EFJohnson®

5100 ES Series Portable Radio Service Manual

UHF / 700 / 800 MHz

Project 25 Conventional and Trunked
Analog and Digital Conventional
SMARTNET®/SmartZone®

7.2 VDC
4 Watt (UHF), 2.5 Watt (700 MHz), 3 Watt (800 MHz)

Part Number 001-5100-60001
January 2007

5100 ES Series Portable Radio Service Manual

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General Information

1.1 Scope of Manual

This service manual contains operation, programming, alignment, and service information for the EFJohnson 5100 ES Portable Radio Model I/II/III.

The distinguishing characteristics of the 5100 ES Portable Radio Model I/II/III are shown in Figure 1.1.

Figure 1.1 5100 ES Portable Radio Model I/II/III

Model I Model II Model III

5100 ES Portable Radio Model I

- Three Side Function Buttons
- No LCD Display
- No DTMF Keypad

5100 ES Portable Radio Model II

- Three Side Function Buttons
- LCD Display
- No DTMF Keypad

5100 ES Portable Radio Model III

- Three Side Function Buttons
- LCD Display
- DTMF Keypad

1.2 Radio Description

1.2.1 General

The 5100 ES portable transceivers have multiple system programming capability to allow operation in various types of radio systems described in the following information.

Models are available for operation in the following frequency ranges. Repeater talk-around, which allows transmitting on the receive frequency, is available with all bands.

UHF Low: 380-470 MHz
700/800 MHz: 762-806 and 806-870 MHz
800 MHz: 806-870 MHz

Power output is user switchable for low and high levels as follows:

UHF - 1 and 4 watts
700 MHz - 1 and 2.5 watts
800 MHz - 1 and 3 watts

1.2.2 Analog/Digital Operation

The 5100 ES transceiver uses a Digital Signal Processor (DSP) to provide IF and audio filtering and modulation functions. This allows operation on the various types of channels, backward compatibility with existing equipment, and the ability to operate on various types of radio systems.

Narrow Band Analog - FM modulation is used with a maximum deviation of 2.5 kHz. This mode is usually used in systems with a channel spacing of 12.5 or 15 kHz.

Wideband Analog - FM modulation is used with a maximum deviation of 5 kHz. This mode is usually used in systems where the channel spacing is 25 kHz or 30 kHz.

Digital - C4FM modulation is used. The voice is digitized, filtered, error corrected, optionally encrypted, and then transmitted. Operation in the Project 25 mode is always digital, and operation in the SMARTNET/SmartZone mode can be either analog or digital. This mode uses a channel spacing of 12.5 kHz.

1.2.3 Operating Protocols

Standard 5100 ES transceivers can be programmed for any or all the following operating protocols. The conventional analog protocol is standard and the others are optional and therefore must be enabled by factory programming. Refer to “Operation” on page 3-1 for more operation information.

- APCO Project 25 (digital) conventional
- APCO Project 25 (digital) trunked
- SMARTNET®/SmartZone® analog or digital
- Analog conventional

1.2.4 Systems, Channels, and Zones

A zone and channel are selected to place and receive calls. The following information describes the relationship between systems, channels, and zones.

1.2.4.1 Systems

A system is a collection of channels or talk groups belonging to the same repeater site. It defines all the parameters and protocol information required to access a site. Up to 16 systems of any type can be programmed. The maximum number of channels assignable to a system is limited to approximately 512 with the 512 channel option (or the available memory space as described in the following information). The 512-channel option is typically standard with all radios.

1.2.4.2 Channels

A channel selects an RF channel or talk group as follows:

Conventional Analog Mode - A channel selects a specific radio channel, Call Guard (CTCSS/DCS) squelch coding, and other parameters unique to that channel.

Conventional Project 25 Mode - A channel selects a specific radio channel, NAC squelch coding, talk group ID, and other parameters unique to that channel.

Trunked Project 25 Mode - A channel selects a specific talk group, announcement group, emergency group, and other parameters unique to that talk group.

SMARTNET/SmartZone and Project 25 Trunked Operation - A channel selects a specific talk group, announcement group, emergency group, and other parameters unique to that talk group.

Although it is theoretically possible to program any combination of systems that produces up to 512 total channels, the maximum number is also limited by the available memory. For example, since more memory is required to program a SMARTNET system than a conventional system, the total number of channels decreases as the number of SMARTNET systems increases. The programming software displays a bar graph which shows the amount of available memory space that is used by the current data. Refer to “Transceiver Programming” on page 4-1 for more information.

1.2.4.3 Zones

A zone is a collection of up to 16 channels of any type. For example, a zone could include 12 conventional channels and 4 SMARTNET channels. One use of zones may be to program the channels used for operation in a specific geographical area. Up to 16 zones can be programmed with standard models and up to 32 can be programmed if the 512-channel option is enabled.

1.2.5 Programming

Transceiver programming is performed using a PC-compatible computer, the EFJohnson 5100 Programming Cable, and PC Configure™ programming software (see Table 1.1 “Accessories”).

1.2.6 Alignment

Transceiver alignment is performed using EFJohnson PC Tune™ software and test cable, and the same computer used for PC Configure™ programming. All adjustments are made electronically using the software (no manual adjustments are required). For alignment and performance testing information, refer to the PC Tune manual included on the PC Tune CD.

1.3 Part Number Breakdown

The following is a breakdown of the part number used to identify this transceiver. Some combinations are not available.

242-51FK-ABC-xxD

Model Breakdown

F Frequency Band

2 - 380-470 MHz UHF-Low
7 - 700-800 MHz
8 - 800 MHz

K Keypad/IS

A - No Display, No Keypad (Model I)
B - Non-DTMF Keypad (Model II)
C - DTMF Keypad (Model III)

D - I/S No Display, No Keypad (Model I)
E - I/S Non-DTMF Keypad (Model II)
F - I/S DTMF Keypad (Model III)

A (Antenna)

0 - No Antenna
4 - UHF - 403-520 MHz
8 - 800 MHz, 1/2 Wavelength
9 - 800 MHz, 1/4 Wavelength

B (Battery)

0 - No Battery Pack
1 - Ultra High Capacity - NiMH
2 - Alkaline Battery Clamshell
3 - Ultra High Capacity - NiMH - Submersible
6 - I/S Ultra High Capacity - NiMH
7 - I/S Ultra High Capacity - NiMH - Submersible

C (Front Housing Color)

0 - Black
1 - Yellow
2 - Orange
3 - Black, Ruggedized Submersible
4 - Yellow, Ruggedized Submersible
5 - Orange, Ruggedized Submersible

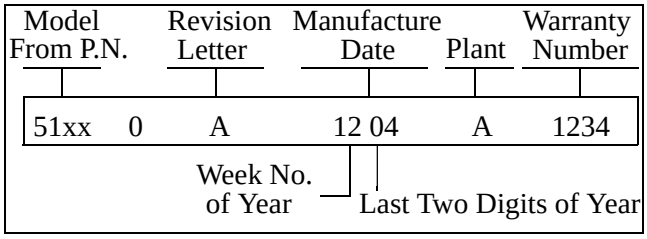
xx - Software enabled features/options

These xx letters indicate other operating protocols and options that are enabled by factory programming. Options may include encryption, OTAR, 512 Talk Groups, Digital SMARTNET/SmartZone, AES encryption, and others. Use the **Transfer > Read Options From Radio** menu function of PC Configure to determine which protocols and options are enabled in your radio.

D - 6 = 5100 ES Model, SEM/No SEM

1.4 Transceiver Identification

The transceiver identification number is printed on a label that is attached to the chassis. The following information is contained in the identification number:



1.5 Accessories

The accessories available for this transceiver are listed in Table 1.1.

Table 1.1 Accessories

Accessory	Part No.
Batteries	
3600 mAH NiMH standard	587-5100-360
3600 mAH NiMH std intrin safe	587-5100-361*
3600 mAH NiMH Immersion Rated	587-5100-362
Battery case for AA alkaline	250-5100-280
Portable Vehicular Adapter (PVA)	585-5100-270
Battery Chargers Kits	
Charger kit, -210 chgr, -230 PS, US cord	250-5100-210
Charger kit, -215 chgr, -230 PS, US cord	250-5100-215
Charger kit, -210 chgr, -230 PS, Eur cord	250-5100-220
Charger kit, -215 chgr, -230 PS, Eur cord	250-5100-225
Charger kit, -235 chgr, Non-Switching Pwr Supply	250-5100-235
4-unit charger kit, -240 station, four -210 chargers, US cord	250-5100-240

Table 1.1 Accessories (Continued)

Accessory	Part No.
4-unit chgr/cond kit, -240 station, four -215 charger/conditioners, US cord	250-5100-245
4-unit charger kit as above, Euro cord	250-5100-250
4-unit chgr/cond kit as above, Euro cord	250-5100-255
Vehicular charger	585-5100-260
Battery Charger Replacement Parts	
Single-unit rapid chgr, w/o power supply	585-5100-210
Single-unit rapid chgr/cond w/o pwr sup	585-5100-215
Docking station, 4-unit for -210 (-250 power supply included)	585-5100-240
Pwr supply, switching 120/230 VAC, 15V 2.0A, -152 cord required	585-5100-230
Power supply, switching 120/230 VAC 5.0A for docking stat., -152 cord req'd	585-5100-250
Wall mount kit for 4-unit docking station	585-5100-245
Power cord, AC 7-1/2 ft US	597-1001-152
Power cord, AC 6-1/2 ft Euro	597-1001-153
Antennas	
136-174 MHz helical wideband (red core)	501-0017-100
136-151 MHz helical (yellow core)	501-0017-101
151-166 MHz helical (black core)	501-0017-103
166-174 MHz helical (blue core)	501-0017-105
403-520 MHz whip dipole	501-0017-107
800 MHz half-wave (red core)	501-0105-013
800 MHz 1/4-wave (white core)	501-0105-012
Carrying Accessories	
Nylon Case, Model I, Military LBE Strap, Black	585-5100-15005
Nylon Case, Model I, B-Clip, Black	585-5100-15003
Nylon Case, Model I, D-Swivel Belt Loop, Black	585-5100-15001
Nylon Case, Model II/III, D-Swivel, Yellow	585-5100-15004
Nylon Case, Model II/III, D-Swivel Belt Loop, Black	585-5100-15002
Leather Case, Model I, D-Swivel Belt Loop	585-5100-14002
Leather Case, Model I, Belt Flap	585-5100-14001
Leather Case, Model II/III, D-Swivel Belt Loop	585-5100-14004
Leather Case, Model II/III, Belt Flap	585-5100-14003
2.5 D-Swivel Belt Loop Only	585-5100-130
3.0 D-Swivel Belt Loop Only	585-5100-132
Radio D-Swivel button for -130/-132 loops	585-5100-127
Belt Clip, 2 1/2 Standard Spring loaded	585-5100-128
Belt Clip, 3 1/4 Long Spring loaded	585-5100-129

Table 1.1 Accessories (Continued)

Accessory	Part No.
Speaker/Microphones and Earphones	
Spkr/mic, coil cord w/2.5mm earphone jk	589-0015-057*
Replacement coil cord for above spkr/mic	597-2002-101
Earphone kit, coil cord w/2.5mm rt angle plug, for -057 spkr/mic	589-5100-057*
Spkr/mic, public safety, 800 MHz only, 501-0105-012 antenna req'd	589-0015-058*
Earphone kit, coil cord w/2.5mm straight plug, for -057 spkr/mic	589-5100-059*
Earphone adapter, w/3.5 mm thrd jack	589-5100-051*
Lightwght headset w/inline PTT for -051	589-0015-059*
1-wire earphone kit, for -051 adapter	589-5100-053*
2-wire palm mic kit, for -051 adapter	589-5100-055*
Programming Accessories	
5100 Programming Kit (-488 software, -920 cable, CD manual)	250-5100-003
5100 Programming Cable	023-5100-920
5100 Cloning Cable	023-5100-930
PC Configure programming software, CD	023-9998-488
Adapter, DB9M-DB25F	515-9000-015
Test Cables and Accessories	
PC Tune radio tuning software	023-9998-499
PC Tune cable w/2.5mm audio out jack	023-5100-940
Patch cord, 2.5 mm phone plug to BNC	023-5100-950
5100 Tuning Kit (-499 software, -940 cable, -950 patch cord)	250-5100-005
SMA F to BNC F adapter	515-3102-050
UI to Logic Board Test Cable	023-5100-955
Encryption Keyloader Accessories	
SMA (PDA) keyloader	250-5000-945
SMA keyloader to 5100 radio cable	023-5000-940
SMA keyloader to 5300 radio cable	023-5000-950
KVL 3000 keyloader to 5100 radio cable	585-5000-932

1.6 Intrinsically Safe Information

1.6.1 Introduction

Intrinsically safe 5100 ES transceivers have been approved by the Factory Mutual Research Corporation for operation in certain flammable atmospheres. The specific atmospheres for approved operation are shown in the Section, “Classification of Hazardous Areas and Atmospheres” on page 1-11 and also on the label on the back cover of the transceiver.

⚠ WARNING *When servicing an intrinsically safe transceiver, these rules must be followed to maintain intrinsic safety:*

- Service can be provided only by the factory or by service centers specifically authorized by the Factory Mutual Research Corporation to service EFJohnson intrinsically safe transceivers. Contact Factory Mutual at the following address for information concerning their auditing procedure. Contact the EFJohnson Customer Service Department as described in Section 8.2 if you have questions.

  Factory Mutual Research Corporation
  1151 Boston-Providence Turnpike
  P.O. Box 9102
  Norwood, Massachusetts 02062
  Phone: (617) 762-4300

- Replace the battery pack only with Intrinsically Safe Battery Pack, Part No. 587-5100-361.

- Do not make any modifications to the circuitry.

- When replacing a part, use only the exact replacement part listed in the service manual parts list.

- Do not install any accessory that is not specifically approved for use with intrinsically safe 5100 ES models. Approved accessories are indicated by an asterisk (*) in the accessories listing in Table 1.1.

1.6.2 Definitions

Intrinsically Safe - This is a fire rating given to these transceivers by the Factory Mutual Research Corporation. When electrical equipment is given this rating, the equipment is considered incapable of releasing sufficient electrical and thermal energy under normal operation or specified fault conditions per the testing standard to cause ignition of a specific flammable or combustible atmosphere in its most easily ignited concentration. In other words, this transceiver should not cause a fire or explosion when used in certain flammable atmospheres.

Fault - A defect or electrical breakdown of any component, spacing, or insulation which alone or in combination with other faults may adversely affect the electrical or thermal characteristics of the intrinsically safe circuit (for example, a shorted transistor).

1.6.3 Possible Ignition Sources

When a transceiver is evaluated by Factory Mutual, possible sources of ignition are checked. These sources may be electrical (spark) or thermal (heat). The following could be sources of spark ignition:

- Discharge of a capacitive circuit by a fault such as a short circuit.
- Interruption of an inductive circuit.
- Intermittent making or breaking of a resistive circuit.
- Hot-wire fusing.
- The following could be sources of thermal ignition:
- Heating of a small-gauge wire or PC board trace.
- High surface temperature of components.

1.6.4 Intrinsically Safe and Nonincendive Ratings

This transceiver is rated intrinsically safe for some types of hazards and nonincendive for other types of hazards. An intrinsically safe rating applies to operation in Division 1 areas, and a nonincendive rating applies to operation in Division 2 areas (see next section). The difference between these ratings is as follows:

The intrinsically safe rating is a higher rating because more severe conditions must be met. To be approved for this rating, the transceiver must not cause ignition of a particular atmosphere if two of the faults specified in the testing procedure occur. In other words, it must be able to withstand two simultaneous unrelated breakdowns without causing ignition. To receive a nonincendive rating, the transceiver needs to withstand only a single fault without causing ignition of a particular atmosphere.

1.6.5 Classification of Hazardous Areas and Atmospheres

This transceiver has been submitted for approval to operate in the following hazardous atmospheres and areas. Contact your sales representative or refer to the label on the back of the transceiver to determine the specific atmospheres and areas for which approval was obtained.

Intrinsically Safe - Class I, II, and III, Division 1, Groups C, D, E, F, and G.

Nonincendive - Class I, Division 2, Groups A, B, C, and D.

Temperature Code - T3C

Definitions of these Class, Division, and Group designations are in the following sections.

1.6.5.1 Classification of Hazardous Areas (Division)

Hazardous areas are classified as Division 1 or 2 as shown in Table 1.2. Since a Division 1 area is considered most hazardous, a transceiver approved for a specific Division 1 atmosphere can also be used in the same Division 2 atmosphere. The intrinsically safe rating applies to Division 1 areas and the nonincendive rating applies to Division 2 areas.

Table 1.2 Area Classification

Division	Area
Class I and II Materials (Gases, Vapors, and Dusts)	
1	An area where there is or could be an explosive atmosphere most of the time in normal operation
2	An area where an explosive atmosphere exists only as a result of a fault (something going wrong)
Class III Materials (Fibers or Flyings)	
1	An area in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.
2	An area in which easily ignitable fibers are stored or handled. An exception is in process of manufacture.

1.6.5.2 Atmosphere Classification (Class/Group)

For the purposes of testing and approval, various atmospheric mixtures have been grouped on the basis of their hazardous characteristics. Equipment is approved for a class of material and also for the specific group of gas, vapor, or dust in that class. Class I materials include gases and vapors, Class II materials include combustible dusts, and Class III materials include ignitable fibers or flyings. The typical hazardous materials in each group and class are shown in Table 1.3.

Table 1.3 Material Classification

Typical Hazard	Group	Class
Acetylene	A	I
Hydrogen	B	I
Ethylene, ethyl ether, cyclopropane	C	I
Gasoline, naphtha, butane, propane, alcohol, acetone, benzol, natural gas	D	I
Metal dust including aluminum, magnesium, and their alloys	E	II
Carbon black, coal, or coke dust	F	II
Flour, starch, or grain dusts	G	II
Ignitable fibers/flyings such as rayon or cotton	-	III

1.7 Secure Communication

SecureNet™ and AES voice encryption can be used to provide secure communication with this transceiver. These protocols digitize the voice and then encrypt it using the DES or AES algorithm and an encryption key. The following types of encryption are available on analog and digital channels:

- Analog Conventional and SMARTNET/SmartZone Analog Channels

  DES

- Digital Project 25 and SMARTNET/SmartZone Channels

  DES-OFB (Output Feedback)

  AES (Advanced Encryption Standard). Refer to the 5100 ES Operating Manual for more information.

- FIPS 140-2 Approved Encryption

  DES-OFB and AES encryption is FIPS 140-2 approved in 5100 ES models equipped with the SEM.

- Over-The-Air-Rekeying (OTAR)

  Encryption keys are loaded into the radio by OTAR (Over-The-Air-Rekeying) using a KMF (Key Management Facility) and/or a handheld keyloader such as the EFJohnson SMA (Subscriber Management Assistant) or Motorola KVL 3000 Plus with the AES option.

  The keyloader is connected directly to the radio using an interconnect cable, and it loads DES, DES-OFB, and AES keys. Currently, OTAR can be used to load DES-OFB keys on Project 25 conventional channels. Future OTAR of AES keys and on Project 25 trunked channels is planned.

Note *Refer to the 5100 ES Operating Manual for more information on OTAR and on secure communication.*

1.8 Typical Performance Specifications

This section contains general specifications intended for use in testing and servicing this portable radio. Table 1.4 “5100 ES Portable Radio General Specifications” contains general specifications. For current advertised specifications, refer to the specification sheet available from your sales representative. Values are typical and are subject to change without notice.

This portable radio supports the following:

- Project 25 CAI (Common Air Interface) — Project 25 Trunked and conventional system protocols and Project 25 OTAR (Over-The-Air-Rekeying) functionality.
- Analog and digital trunking protocols — Licensed to support SMARTNET II® and SmartZone® trunking protocols.
- Encryption Protocols — Industry standard encryption capabilities such as AES, DES-OFB, and DES.

Table 1.4 5100 ES Portable Radio General Specifications

Characteristic	800 Only	700/800	UHF Low
Frequency Range	806-870 MHz	700: 762–806 MHz 800: 806-870 MHz	380-470 MHz
Channel Spacing	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz
Pressure Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit
FCC Type Acceptance Certification	ATH2425171	ATH2425171	ATH2425131
Industry Canada Type Certification	IC: 933B-2425171	IC: 933B-2425171	IC: 933B2425131
FCC Emissions Designators	11K0F3E, 16K0F3E 14K0F3E,8K10F1E,8K1OF1D	11K0F3E, 16K0F3E 14K0F3E,8K10F1E,8K1OF1D	16K0F3E, 11K0F3E 8K10F1E,8K10F1D
Input Voltage	7.2 V		
Dimensions (w/o antenna) (HxWxD)	6.7" x 2.52" x 1.9" (6.4 cm x 17.0 cm x 4.8 cm)		
Weight (with standard battery)	24 oz. (675 g)		
Case	Polycarbonate–black, yellow, orange		
Temperature Range	-22°F to +140°F (–30°C to +60°C)		

Refer to Table 1.5 “5100 ES Portable Radio Transmitter Specifications” for information on transmitter specifications.

Table 1.5 5100 ES Portable Radio Transmitter Specifications

Characteristic	800 Only	700/800	UHF Low
RF Power Output	3.0/1.0 W, 800 MHz	700: 2.5/1 W 800: 3.0/1.0 W	4/1 W
Frequency Stability [–22°F to +140°F (–30°C to +60°C)]	±1.5 ppm	±1.5 ppm	±1.5 ppm
Modulation Limiting			
25 kHz Channels	±5 kHz	±5 kHz	±5 kHz
NPSPAC Channels	±4 kHz	±4 kHz	N/A
12.5 kHz Channels	±2.5 kHz	±2.5 kHz	±2.5 kHz
Emissions (Conducted/Radiated)	–75 dBc	–75 dBc	–75 dBc
Audio Response	+1, -3dB	+1, -3dB	+1, -3dB
FM Hum and Noise			
25 kHz Channels	-40 dB	-40 dB	-40 dB
12.5 kHz Channels	-35 dB	-35 dB	-35 dB
Audio Distortion	3%	3%	3%

Refer to Table 1.6 “5100 ES Portable Radio Receiver Specifications” for information on receiver specifications.

Table 1.6 5100 ES Portable Radio Receiver Specifications

Characteristic	800 Only	700/800	UHF Low
Audio Output Power	500 mW	500 mW	500 mW
Frequency Stability [–22°F to +140°F (–30°C to +60°C)]	±1.5 ppm	±1.5 ppm	±1.5 ppm
Sensitivity			
Analog Mode: 12 dB SINAD	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Digital Mode: 5% BER	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Selectivity			
25 kHz Channels	-75 dB	-75 dB	-75 dB
12.5 kHz Channels	-63 dB	-63 dB	-63 dB
Intermodulation	–75 dB	–75 dB	–75 dB
Spurious & Image Rejection	–75 dB	–75 dB	–75 dB
FM Hum and Noise			
25 kHz Channels	-40 dB	-40 dB	-40 dB
12.5 kHz Channels	-35 dB	-35 dB	-35 dB
Audio Distortion	3%	3%	3%
All specifications are measured per TIA 102.CAAA, TIA 102.CAAB and per TIA 603 standards.			

Table 1.7 “5100 ES Portable Radio Batteries Specifications” contains specifications for batteries. For current advertised specifications, refer to the specification sheet available from your sales representative. Values are typical and are subject to change without notice.

Table 1.7 5100 ES Portable Radio Batteries Specifications

Battery Type	Dimensions (HxWxD)	Weight	Approximate Life (5/5/90)
Extra-High Capacity NiMH	6.0 x 2.3 x 0.85 inches (153 x 59 x 22 mm)	0.81 lbs (0.37 kg)	UHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours
Extra-High Capacity NiMH, IS	6.0 x 2.3 x 0.85 inches (153 x 59 x 22 mm)	0.81 lbs (0.37 kg)	UHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours
Alkaline Battery Clamshell	7.2 x 2.6 x 2.0 inches (183 x 67 x 51 mm)	0.98 lbs (0.45 kg) (w/12 AA batt.)	14-16 hours

SECTION

2

Battery, Accessory and Disassembly Information

2.1 Battery Information

2.1.1 Battery Removal/Installation

To remove the battery from the radio for recharging or replacement, press the release button (see Figure 2.1) and then rotate it upward to the approximate point shown and remove it from the radio.

Figure 2.1 Battery Removal

2.1.2 Battery Charging

Note *Do not charge the battery with radio power on.*

The battery can be charged separately or while attached to the radio. When it is charged while attached to the radio, radio power should be turned off. If it is not, the battery begins slowly discharging when the trickle charge mode is entered. The trickle mode is indicated by a green Ready indication, and it is entered automatically when the battery is nearly fully charged. Gradual discharging occurs in the trickle mode because the charge current of approximately 50 mA is less than the radio standby current of 200 mA.

⚠ CAUTION *Do not transmit in close proximity to the charger base.*

Do not expose the charger base to high level RF signals while a battery is being charged because this may cause a charger fuse to blow (especially in the UHF range). Radios programmed for SMARTNET/SmartZone operation, for example, may affiliate while in the charger which causes them to key automatically. Therefore, do not leave radio power on while charging as described above.

2.1.3 Preventing Loss of Encryption Keys

If Infinite Key Retention is not programmed, the transceiver must be connected to a constant power source to preserve the encryption keys in memory. Storage capacitors maintain the supply voltage (and these keys) for approximately 30 seconds to allow the battery to be changed. Therefore, when changing the battery of a transceiver containing keys, make sure to reattach another battery within 30 seconds.

Models with Flash code 1.11.0 or later can be programmed for Infinite Key Retention. The keys are then stored in memory and are not lost, even if power is disconnected for an extended period.

2.1.4 Battery Care

⚠ WARNING *Do not incinerate a battery pack because of the risk of explosion. Also, do not short circuit the terminals because the battery pack and the object causing the short may become very hot. Do not disassemble or modify a battery pack.*

Proper battery care enhances the useful life of the battery. The battery should be recharged as soon a practical after the low battery indication appears (see Section 3). Follow the charging instructions in the manual included with the charger. When the battery fails to hold a charge or provides only a very short operating time, it must be replaced with a new unit.

A fully charged battery provides approximately 13 hours of service before recharging is required. This time assumes that 5% of the time is spent transmitting, 5% in the receive

unsquelched mode, and 90% in the receive squelched mode. The operating time may be less if more time is spent in the transmit or unsquelched modes, or if the battery is not fully charged or its capacity has deteriorated. Be sure to dispose of the nickel metal-hydride (NiMH) battery pack in accordance with local waste regulations.

Figure 2.2 **Belt Clip Installation**

2.2 Belt Clip Installation

Remove the battery and slide the belt clip into the slot on the battery as shown in Figure 2.2. To remove the clip, simply slide it out. It is held in place by the chassis when the battery is installed on the radio.

2.3 Accessory Installation

To connect an accessory such as a speaker-microphone to the transceiver, refer to Figure 2.3 and proceed as follows:

1 Remove the dust cover over the accessory jack on the side of the transceiver.

2 Insert the hook of the accessory connector into the slot on the side of the transceiver.

3 Hold the latch open, press the connector against the transceiver, and then release the latch to lock the connector in place.

4 Install the included locking screw in the latch tab in the location shown.

Figure 2.3 Accessory Installation

2.3.1 Option Select Lines

Opt Sel 1 (pin 1) and Opt Sel 2 (pin 5) of the UDC (accessory) connector indicate to the control logic when an accessory is connected and what accessory is installed. These lines function as follows:

Opt Sel 1 and 2 High (3.3V) - This is the normal operating condition in which no accessory is connected. Both lines are pulled high (3.3V) by internal pull-up resistors.

Opt Sel 1 Low - A speaker-microphone or some other accessory is connected. Opt Sel 2 then functions as an external PTT line (low = PTT), and the radio PTT switch is also functional. The internal speaker and microphone are disabled.

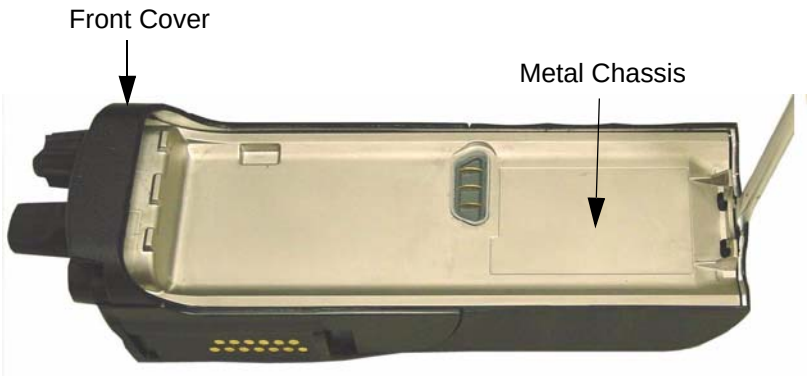
Opt Sel 1 High, Opt Sel 2 Low - The encryption keyloader is connected.

2.4 Transceiver Disassembly

2.4.1 Separating Front Cover and Chassis

1 Remove the antenna.

2 Insert a small flat-blade screwdriver or similar tool between the plastic front cover and metal chassis as shown below. Carefully lift the chassis out of the cover with the screwdriver blade. Raise it to approximately the point shown in the next illustration.



3 Slide the chassis out of the top part of the front cover.

Note *Before reassembling the front cover and chassis, make sure the UDC (accessory) connector flex circuit is flat against the side of the front cover. If it is not, the RF board shield clip may catch and damage it.*

4 When reassembling, make sure the perimeter gasket is in place, and then use the screwdriver blade again as a guide to prevent damage to the bottom part of the gasket as the chassis slides back in place. Firmly press the chassis and the cover together until they snap in place.

2.4.2 Removing RF and Logic Boards From Chassis

5 Separate the front cover and chassis as described in the preceding section. The RF and logic boards are located inside the metal chassis as shown below.

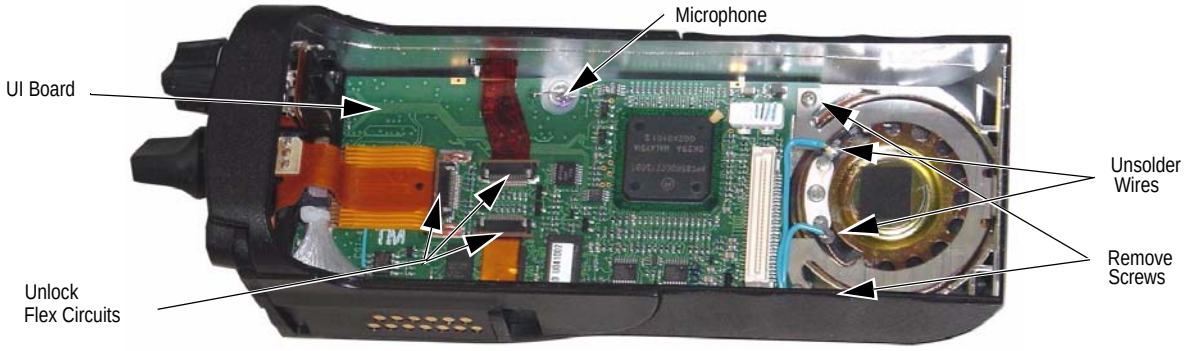
6 Remove the shields over the RF and logic boards. These shields insert in slots on one side of the chassis and then clip to the other side of the chassis. These shields also hold the boards in place.

7 Unplug the antenna cable from the RF board using a plier or similar tool at the location shown below. Unlock the logic board flex circuit by sliding the tab on the connector outward. The RF and logic boards can now be removed.

8 When handling these boards, minimize bending of the flex circuit to prevent it from being damaged. Before replacing the RF board, make sure there is adequate heat sink compound on the pad under the RF module.

2.4.3 Removing UI (User Interface) Board

9 Separate the front cover and chassis as described in Section 2.4.1. The UI board is located inside the front cover as shown below.

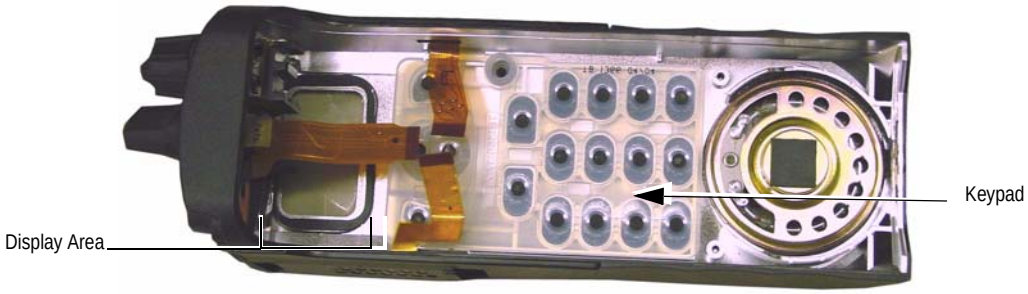


10 Unlock the three flex circuits shown above by sliding the tab on each connector outward. Carefully slide the flex circuits out of the connectors, taking care to minimize bending which could crack the traces.

11 Remove the two screws shown above. If required, also unsolder the two speaker wires.

12 Carefully lift the bottom end of the UI board upward (guide the microphone out of its cavity). Then slide the UI board out of the radio.

13 When reinstalling the UI board, the display assembly on the bottom of the board must slide into the area above the keypad (see following illustration). If the UI board does not lie flat against the keypad after it is installed, the display is probably hanging up on the keypad. Do not force it in place. Reorient the keypad and UI board as required until the display slides into place. Also make sure that the optic fiber bundle slides under the boss on the switch assembly, and the microphone is properly positioned back in its cavity.



2.4.4 Removing Switch Assembly

14 Separate the front cover and chassis as described in Section 2.4.1. Then remove the UI board as described in the preceding section.

15 Pull the rubber knobs and plastic channel number ring off the shafts.

16 To remove the position indicator ring under the channel knob, turn the channel switch so that the flat part of the shaft is toward one of the tangs (see below). Then insert a tweezers or similar tool under both tangs and push it inward to release the tangs from the groove in the shaft.

17 Remove the spanner nut on each shaft and slide the switch assembly out of the cover.

SECTION

3

Operation

3.1 General

The operation of the 5100 ES transceiver is described in the 5100 ES Model I Operating Manual and the 5100 ES Model II/III Operation Manual. These manuals are available from your EFJohnson dealer.

SECTION

4

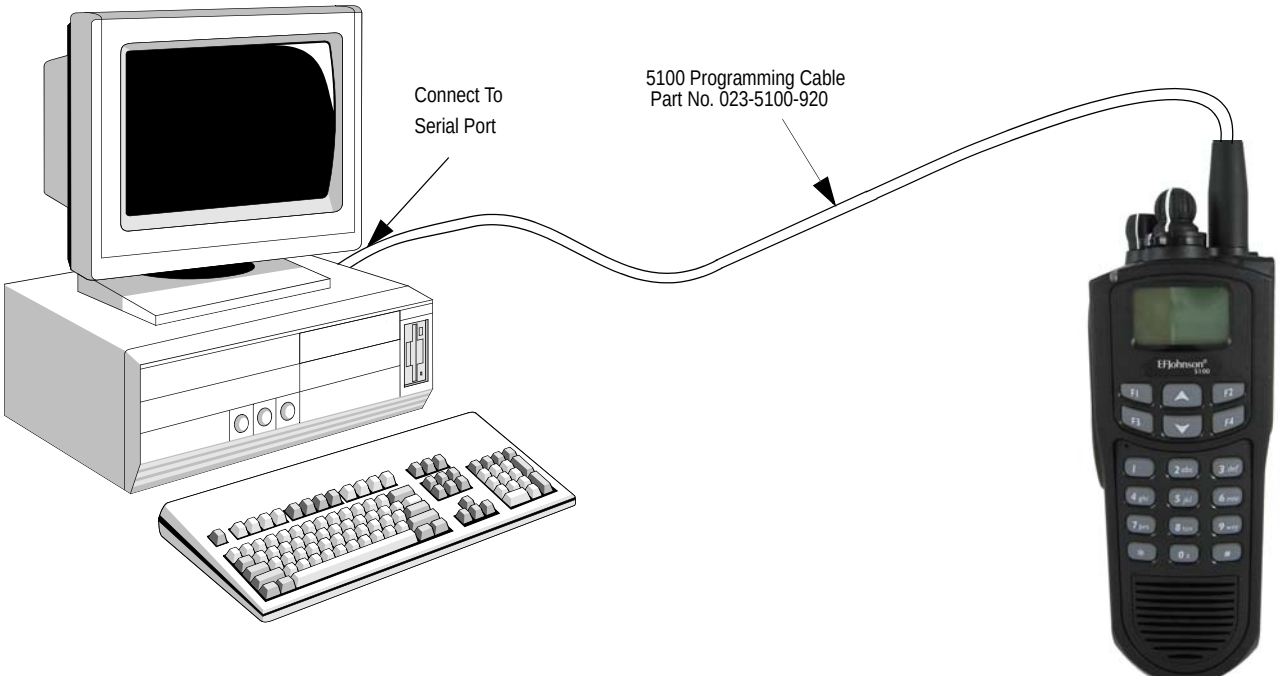
Transceiver Programming

4.1 Programming Setup

The following items are required to program the transceiver. The part numbers of this equipment are shown in the accessories listing in Table 1.1. The programming set-up is shown in Figure 4.1.

- Computer running Windows® software
- 5100 Programming Cable, Part No. 023-5100-920
- PC Configure programming software, Part No. 023-9998-527.

Figure 4.1 Programming Setup



Note *The 023-5100-920 cable, 023-9998-527 software, and a CD manual are included in the 5100 ES Portable Radio Programming Kit, Part No. 250-5100-003.*

4.2 Computer Description

The computer used to run this program should meet the following minimum requirements:

- Windows 2000 or XP
- Pentium® processor or equivalent
- A hard disk drive with at least 4 MB of free space
- A CD-ROM drive
- An available serial port

4.3 Using the PC Configure Software

The PC Configure software is described in a separate manual included on the PC Configure CD.

Tone (CTCSS) and digital (DCS) Call Guard tones and 800 Mhz channel frequencies are located in the back of the above manual.

4.4 Firmware Upgrade Instructions

4.4.1 Upgrade Utility Compatibility

PC Configure 2.4.x supports 5100 ES Portable Radios that have 4.8.x firmware. This firmware has a revised memory configuration for storing the radio operating program. Firmware versions utilizing this new memory configuration are as follows:

Non-SEM - Version 1.14.0 or later

SEM - Version 2.04.0 or later

A new utility is required to upgrade the radio firmware. This utility is included in PC Configure™ Version 1.24.0 or later. This utility is not compatible with earlier versions of firmware. Additional information follows:

- To upgrade radios to the above firmware versions or later, PC Configure Version 1.24.0 or later must be used.
- To upgrade radios to earlier versions than those shown above, PC Configure Version 1.22.0 or earlier must be used.

- If an attempt is made to upgrade firmware with the wrong version of PC Configure software, the procedure halts and an error message is displayed.
- When upgrading early versions of firmware to one of the preceding versions or later, the Boot Loader code must also be updated. This must be done before updating the main PPC code.
- This limitation does not apply to standard programming of radio personality parameters. The PC Configure software is backward compatible and can be used to program radios with earlier versions of firmware. However, some parameters may not be available with earlier versions of firmware.

4.4.2 Firmware Upgrade instructions

Note *If upgrading to the version of firmware described in the preceding section, the Boot Code must also be upgraded, and it must be done before upgrading the PPC code.*

4.4.2.1 Requirements

4.4.2.1.1 Firmware Versions

Note *The firmware (Flash/operating software) version number is briefly displayed when the radio powers up. It is also indicated by the 13th digit of the radio part number (242-51xx-xxx-xxV).*

Three different logic versions of the 5100 ES portable are in service, and each uses a different code base as follows. The same code base must be used to upgrade the firmware. For example, if the radio currently has Ver 3.1.0, the new code must have a 3.x.x version number, not 2.x.x. or 1.x.x.

Code Version Displayed	Radio Version
Version 1.x.x	Standard Version
Version 2.x.x	SEM Version
Version 3.x.x	UCM Version

4.4.2.1.2 Equipment Required

Description	Part No.
PC Configure Software on CD-ROM	023-9998-527
Windows®-Based Computer	-
5100 Programming Cable	023-5100-920

4.4.2.2 PC Configure Upgrade Instructions

⚠ CAUTION *After installing a new version of PC Configure, be sure to transfer the system key and data files as described below. Previous PC Configure versions can then be safely uninstalled if desired (although a previous version does not need to be removed to run a new version).*

1 Install the new version of the PC Configure programming software on your computer's hard drive. The default location of this software is C:\Program Files\EF Johnson\ PC Configure.

2 Using the Windows® File Explorer application, copy the system key and data files from the previous PC Configure "Data" and "Keys" folders to the same folders of the new PC Configure version.

4.4.2.3 Initial Setup

1 Connect the programming cable to the serial port of your computer. Remove the accessory/programming jack cover on the side of the 5100 ES radio and connect the other end of the programming cable to this jack.

2 Start the PC Configure program.

3 From PC Configure, open the **Radio** menu and select **Series** > "**5100 Portable**". Then open the **Transfer** menu and select **Baud Rates** > "**115200**" baud.

Note *If a communication error occurs, try selecting a lower baud rate.*

4 From PC Configure, verify the current code version by opening the **Transfer** menu and selecting **Read Version Info from Radio**. Note the Controller Version number in the window that is displayed. This indicates what code base version to use. For example, if the radio currently has Ver 4.8.x, the new code must have a 4.x.x version number.

5 Using the Windows File Explorer application, copy the code file "Ver_0x_xx_xx.hex" on the included CD-ROM to the PPC\5100 folder under the new version of PC Configure located at C:\Program Files\EF Johnson\PCConfigure.

6 If new Boot code is also included, copy the "CodeDownLoadROM_1_x.hex" file on the included CD-ROM to the PPC\5100\Upgrade folder under the new version of PC Configure located at C:\Program Files\EF Johnson\PCConfigure.

4.4.2.4 Firmware Upgrade Procedure

Note *Radio personality programming previously performed using the PC Configure software is not changed when the firmware is updated as follows. Any encryption keys in the 5100 radio will be lost and must be reloaded.*

4.4.2.4.1 Boot Code Downloading (If Supplied)

Note *The radio must be connected to the computer before performing this step.*

1 Open the **Transfer menu** and select **Write Application Code To Radio**. The Password is then requested. Enter **wildcats** using lowercase letters and click the OK button.

2 Verify “Loader file to Download” has the file “5100PCConifBootUpgradeLoader.hex” selected. If not, click the “Choose” button and select this file in PPC\5100\upgrade folder.

3 Click the “Choose” (Code) button to the right of the “Code file to Download” box and select the upgrade file “CodeDownLoadROM_x_x.hex” that you copied in the initial setup to the PPC\5100\Upgrade folder.

4 With the 5100 radio powered off, select the bootload (code programming) mode by pressing and holding the third side option button immediately above the PTT switch and then turn power on. Release the button and the display will indicate “Bootload Waiting for serial-bus command.”

5 Click the “Start” button and the progress bar should begin advancing to the right. If downloading does not start, wait until the “Communication Problem During Code Download” message appears and then click “Start” again. Typically, if a sync failure occurs on the first attempt, it will not be successful until the third or fourth attempt. Download time varies with the speed of your computer and serial port card.

6 When downloading is complete, the 5100 radio **does not** automatically cycle power. Manually turn power off and then on.

7 Click the OK button.

4.4.2.4.2 PPC Code Downloading

1 Open the **Transfer** menu and select **Write Application Code To Radio**. The Password is then requested. Enter **huskers** using lowercase letters and click the OK button.

2 Click the “Choose” (Code) button at the right end of the “Code file to Download” box and select the upgrade file “Ver_0x_xx_xx.hex” that you copied in the initial setup to the PPC\5100 folder.

3 With the 5100 powered off, select the bootload (code programming) mode by pressing and holding the third side option button immediately above the PTT switch and then turn power on. Release the button and the display will indicate “Bootload Waiting for serial-bus command.”

4 Click the “Start” button and the progress bar should begin advancing to the right. If downloading does not start, wait until the “Communication Problem During Code Download” message appears and then click “Start” again. Typically, if a sync failure occurs on the first attempt, it will not be successful until the third or fourth attempt. Download time varies with the speed of your computer and serial port card.

5 When downloading is complete, radio power automatically cycles. If the error “BAD FL FMT” appears in the 5100 display, the programming file was created with an older version of PC Configure. To correct this error, read the programming file from the radio and then write it back again.

6 Click the OK button to exit the **Write Application Code to Radio** window.

7 Once a 5100 radio has been upgraded, Read and then Write the programming file to correct any differences in PC Configure versions. To do this, open the **Transfer** menu and select **Read Parameters from Radio**. The Progress bar at the bottom of the programmer advances as the parameters are read. Radio power automatically cycles after this occurs.

8 Wait for the power to cycle and the radio to return to the normal mode. Then open the **Transfer** menu and select **Write Parameters to Radio**. The Progress bar at the bottom of the screen advances as the parameters are written. Radio power automatically cycles after the parameters are written.

9 To verify that the new code version has been loaded, open the **Transfer** menu and select **Read Version Info From Radio.** Note the Controller Version number to verify that the new code version has been loaded. Click the OK button.

10 If “**Parms Fail**” is displayed by the radio, a programming parameters error was detected during the self-test part of the power-up cycle. To correct this error, Read and then Write the programming file again.

11 To upgrade another radio, repeat this procedure starting with step 1.

12 If you are upgrading a large number of radios and do not need to distribute them immediately, you can stop at step 5 and return to step 3.

13 If encryption keys were in the 5100 radio prior to this upgrade, these keys should now be reloaded.

4.5 Cloning Procedure

The Clone feature allows one radio to be used to program another with identical information. The PC Configure programming software is not required. Only conventional analog and Project 25 zones can be programmed with this feature. SMARTNET/ SmartZone and Project 25 trunked information is not transferred. The Clone option switch must be programmed on the master radio. With the latest 5100 versions, both wireless and wired cloning are available.

For more information on cloning one radio with another, refer to the PC Configure Programming Manual.

SECTION

5

Circuit Description

5.1 General Overview

5.1.1 Introduction

The EFJohnson 5100 ES Portable Radio uses a PowerPC®-based controller and a Digital Signal Processor (DSP) to provide the following modes of operation:

Narrowband Analog - FM modulation with a maximum deviation of 2.5 kHz. This mode is usually used in systems where the channel spacing is 12.5 kHz. Call Guard (CTCSS or DCS) subaudible squelch signaling can be used in this mode.

Wideband Analog - FM modulation with a maximum deviation of 5 kHz. This mode is usually used in systems where the channel spacing is 25 kHz or 30 kHz. Call Guard (CTCSS or DCS) subaudible squelch signaling can be used in this mode.

Project 25 Digital - The voice is digitized, error corrected, optionally encrypted and transmitted using C4FM modulation according to the Project 25 standard. This mode can be used in channel spacings of 12.5 kHz.

The DSP processes the received signals and generates the appropriate output signals. The microcontroller controls the hardware and provides an interface between hardware and DSP.

5.1.1.1 PC Boards

This radio contains the following PC boards:

- RF Board
- Logic Board

- User Interface (UI) Board
- Five flex circuits that provide interconnection with the RF board, display, top panel controls, side buttons, and UDC (accessory) connector.

The UI Board provides the input/output interface for the user. It contains the PowerPC processor which is the main controller for the transceiver. It also contains the keypad and has inputs for the various buttons and switches. It also controls the display and performs all RS-232 communications between the radio and remote computer stations for the purposes of radio programming, tuning, encryption key loading and software downloading.

The Logic Board contains the digital audio processing circuitry that includes the CODEC and DSP devices.

5.1.2 Analog Mode

5.1.2.1 Receive Mode

The signal is routed from the antenna connector to the RF Board where it is filtered, amplified, and mixed with the first local oscillator frequency generated by the synthesizer. The resulting IF signal is also filtered and amplified and sent to the AD9864 digital IF chip.

The signal is then mixed with the second local oscillator frequency to create a second IF signal. The second IF signal is then sampled and downconverted to baseband. The baseband signal is then decimated to a lower sample rate that is selectable at 20 kHz. This signal is then routed via a serial interface from the IF chip to the DSP on the logic board.

On the logic board the DSP digitally filters the input signal and performs frequency discrimination to obtain the message signal. The DSP first performs a carrier-detection squelch function on the radio. If a signal is determined to be present, the audio portion of the signal is resampled and then filtered appropriately. The filtered signal is then routed back to a D/A in the CODEC to produce an analog signal for output to the audio power amplifier and then the speaker. Any detected signaling information is decoded and the resulting information is sent to the microcontroller.

5.1.2.2 Transmit Mode

The signal from the microphone is amplified and then routed to the CODEC chip where it is first digitized and then sent to the DSP. The DSP performs the required filtering, adds the desired signaling, converts the sample rate and then sends the resulting signal back to a D/A in the CODEC to produce the analog modulation signals for the VCOs. The modulated VCO signal is then sent to the RF power amplifier and transmitted.

5.1.3 Project 25 Digital Mode

In Project 25 Digital Mode, the carrier is modulated with four discrete deviation levels. These levels are ± 600 Hz and ± 1800 Hz. Digitized voice is created using an IMBE™ vocoder.

5.1.3.1 Receive Mode

The signal is processed in the same way as an analog mode transmission until after the squelch function is performed. If a signal is detected to be present, the DSP resamples the signal from 20 kHz to 24 kHz. This is done so that the sample rate is an integer multiple (5x) of the data rate of the digital modulation which is 4800 symbols/sec (9600 bits/sec).

The resampled signal is then processed by a demodulator routine to extract the digital information. The resulting bit stream (9600 bps) is sent to a routine that performs unframing, error-correction, and voice decoding. The result of these operations is a reconstructed voice signal sampled at 8 kHz. The sampled voice signal is sent to a D/A in the CODEC to produce an analog signal for output to the audio power amplifier and speaker.

5.1.3.2 Transmit Mode

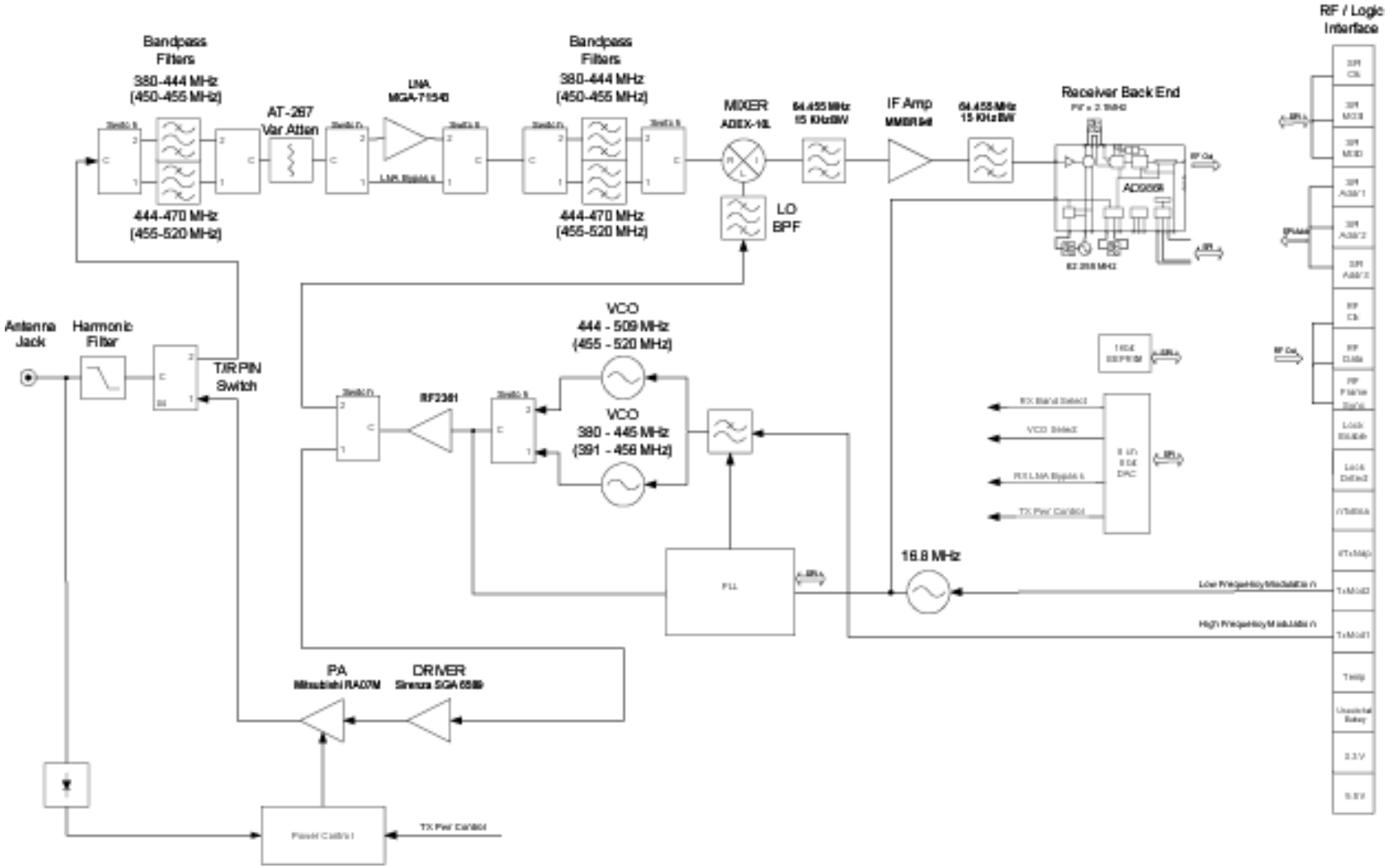
The microphone signal is processed as in the analog mode until it reaches the DSP. At this point the audio signal is processed by a voice encoding routine to digitize the information. The resulting samples are then converted to a bit stream that is placed into the proper framing structure and error protected. The resulting bit stream has a bit rate of 9600 Hz.

This bit stream in then encoded, two bits at a time, into a digital level corresponding to one of the four allowable frequency deviations. This produces 16-bit symbols with a rate of 4800 Hz. The symbols are resampled to a rate of 48 kHz and filtered to comply with channel bandwidth requirements. The filtered signal is then sent to a D/A in the CODEC to produce the analog modulation signal for the VCO. The modulated VCO signal is then mixed up to the final transmit frequency and then sent to the RF PA for transmission.

5.2 UHF Low RF Board

Note *The RF Board is not field serviceable. It must be replaced as a unit with a new board.*

Figure 5.1 UHF RF Board Block Diagram



5.2.1 Receiver

5.2.1.1 Front End Bandpass Filter

A harmonic filter is followed by a PIN diode transmit/receive switch. Following the switch, two fixed tuned bandpass filters are used in the front-end of the receiver. Depending on the desired receive band, the appropriate filter is selected using RF switches (U37/U41). This filter provides first-image rejection with minimal loss in order to provide the desired level of receiver sensitivity. A variable attenuator, which follows the filter, increases the dynamic range of the receiver when receiving high-level signals.

5.2.1.2 Front End LNA and Bypass Switching

The Low Noise Amplifier (LNA) is critical in determining the overall noise figure of the receiver chain. An MGA-71543 amplifier (U39) provides optimum noise figure, gain, intercept point, and power consumption.

5.2.1.3 Post-LNA Bandpass Filters

Additional bandpass filters are positioned after the LNA. These filters are identical to the front-end filters previously described. RF switches U42 and U40 are used to select between the two bands. These filters provide additional image rejection.

5.2.1.4 Mixer and LO Filter

A double-balanced, low-level ADEX-10L mixer (MX1) with a LO drive level of +4 dBm is used for the first conversion. This mixer provides good dynamic range with a 3 dB lower LO drive than the more traditional +7 dBm drive mixers. This reduces power consumption and also the conducted and radiated local oscillator leakage from the receiver.

For the low band UHF version, a high-side mix is used for the 380-444 MHz receive band and a low-side mix is used for the 444-470 MHz receive band. For the high band UHF version, a high-side mix is used for the 450-455 MHz receive band and a low-side mix is used for the 455-520 MHz receive band. This band plan reduces the tuning range requirements for the VCOs.

A LO filter is used prior to LO port of the mixer to reduce the impact of wideband noise from the LO synthesizer on the receiver sensitivity.

5.2.1.5 IF Filter and Amplifier

A two-pole 64.455 MHz crystal filter (U2) is used to provide the desired level of adjacent channel rejection while providing minimal amplitude and phase distortion within a 25

KHz bandwidth. Shields installed around the crystal filter provide sufficient isolation to meet the second image response specifications and minimize noise pickup by the impedance-matching inductors (L1, L2, L3, L4 and L7.)

A transistor IF amplifier (Q1 and supporting circuitry) is required to boost the signal strength, thereby reducing the overall noise figure. The noise figure, signal gain, intercept point, and power consumption are optimized in this design. An additional two-pole 64.455 MHz crystal filter (U25) is used to increase the adjacent channel rejection. An LC circuit provides the required impedance matching between the output of the IF filter and the input of the backend chip (U11.)

5.2.1.6 Back End IC

An Analog Devices AD9864 IF Digitizing Subsystem IC (U11) provides a variety of functions for the receiver as follows:

Second Local Oscillator - A varactor-tuned transistor (Q2) oscillator is phase-locked to a fixed frequency of 62.355 MHz for converting the first IF of 64.455 MHz to a second IF frequency of 2.1 MHz. Phase Locked Loop circuitry inside of the AD9864 operates with a phase-detector frequency of 15 kHz.

Second Conversion Mixer and Filtering - A mixer inside the AD9864 converts from the first IF of 64.455 MHz to the second IF of 2.1 MHz. External filters (L29 and L30) provide IF bandpass filtering. Additional filtering is provided by the inherent operation of the sigma-delta analog/digital converters.

Gain Control - This device provides up to 12 dB of AGC range via a combination of analog and digital controls. Additionally, there is a 16 dB attenuator in the front end. The optimum settings are controlled by the host microprocessor.

Analog / Digital Conversion and Processing - Sigma-delta converters provide I and Q sampling directly from the second IF frequency. The resulting digital words are first filtered by internal programmable FIR filters and then clocked out of the AD9864 via a serial data bus using a programmable data rate.

5.2.2 Synthesizer

5.2.2.1 PLL IC

A CX72301 sigma-delta modulated PLL (U29) forms the basis of the main synthesizer that is used for both receive and transmit modes. This PLL chip provides good phase noise capabilities to reduce adjacent channel interference and quick switching between the receive and transmit modes.

In receive mode the PLL is programmed for a local oscillator frequency that is 64.455 MHz away from the receive frequency. In transmit mode the PLL is programmed directly for the transmit frequency.

5.2.2.2 Reference Oscillator

A 16.8 MHz oscillator (Y1) is used as the frequency reference to the synthesizer and also to the receiver backend IC. The center frequency of this oscillator is corrected using a DC tuning voltage from the digital board during receive and voice and data modulation during transmit.

5.2.2.3 Analog Switches and PLL Loop Filters

An analog switch (U17) provides quicker switching of signals during channel changes by varying the time constant of the PLL loop filter.

5.2.2.4 VCOs

Two different VCOs minimize the tuning range of the VCOs in order to meet phase noise specifications. Both VCO's (U1 and U5) are used for transmit and receive modes. Their combined tuning range covers the entire transmit and receive frequency bands. Transmit modulation is provided to each oscillator's modulation port from the digital board.

A RF2361 buffer amplifier (U6) provides the required level of drive for the receiver mixer's local oscillator signal as discussed above.

5.2.3 Transmitter

5.2.3.1 Modulation

A “dual-port” modulation scheme is used in order to provide DC coupling of the signal required for data modulation applications. Modulation applied to the PLL's frequency reference provides low-frequency modulation, whereas modulation applied to the PLL's transmit VCO's (U1 and U5) provide high-frequency modulation. Signals for both modulation ports are provided from DACs on the digital board.

5.2.3.2 Power Amplifier

The power amplifier (U3) is a Mitsubishi RA07M4047M-01 module for the low band version and a Mitsubishi RA07M4452M-01 module for the high band version. The PA module provides the desired RF power output level and is stable over a wide range of VSWR conditions. The PA is driven by a SGA-6589 driver (U20) that typically provides +21 dBm output power. The PA is turned on and off by switching the power to this driver via transistor D10.

5.2.3.3 ALC

To maintain the specified Transmitter output power level, Automatic Level Control (ALC) is provided to control the drive level to the PA. The detected forward power is compared to a reference level provided by the digital board via op amp U21A. The resulting error voltage is applied to a power level control port of the power amplifier module. Transmitter on/off splatter filtering is provided by an RC network (R76, R109, C267 and C141.)

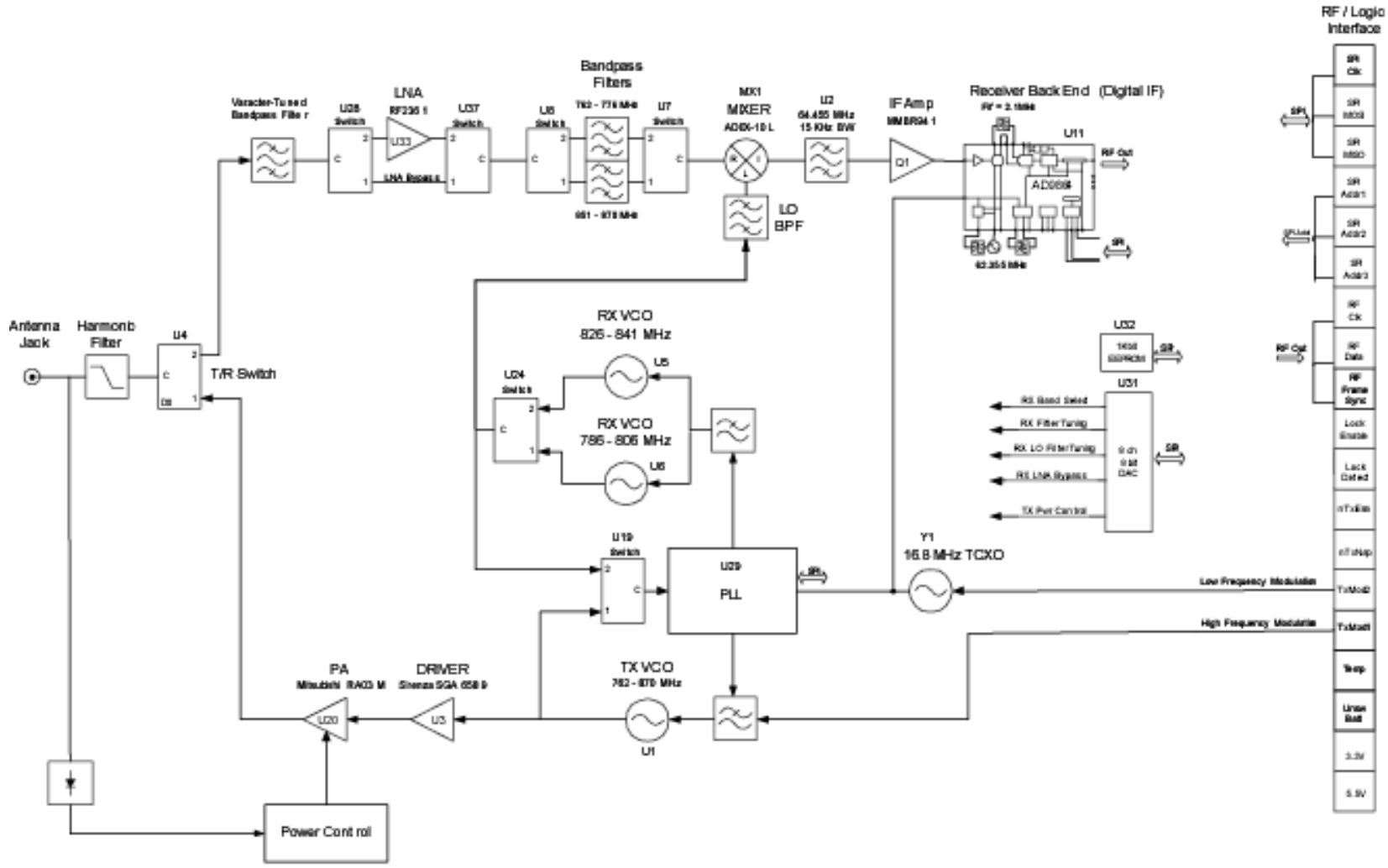
5.2.3.4 T/R Switching and Harmonic Filter

The output of the power amplifier is applied to the transmit/receive RF PIN switch (D12 & D13.) This is a high dynamic-range switch that is capable of passing the desired transmit power with minimal compression. Any harmonics generated by the PA module and the RF T/R switch are filtered by a harmonic filter that is between the RF T/R switch and the antenna jack.

5.3 700/800 MHz RF Board

Note *The RF Board is not field serviceable. It must be replaced as a unit with a new board.*

Figure 5.2 700/800 MHz RF Board Block Diagram



5.3.1 Receiver

5.3.1.1 Front End Bandpass Filter

A varactor-tuned bandpass filter (including W3 and W4) is used in the front-end of the receiver. This filter provides first-image rejection with minimal loss to provide the desired level of receiver sensitivity. The front-end bandpass filter center frequency is tuned via voltages from an 8-channel D/A converter. Ceramic resonators provide a high circuit Q and lower loss than a fixed inductor. A back-to-back varactor diode configuration increases the circuit's third-order intercept point.

5.3.1.2 Front End LNA and Bypass Switching

Low Noise Amplifier (LNA) U33 is critical in determining the overall noise figure of the receiver. The RF2361 amplifier provides a good noise figure, gain, intercept point and power consumption. RF switches U28 and U37 bypass the signal around the LNA when required to increase the effective third-order intercept point and the interference rejection capabilities of the receiver.

5.3.1.3 Post-LNA Bandpass Filters

Additional bandpass filters are used after the LNA. These filters are fixed-tuned since varactor-tuned filters would have an excessive third-order intercept point. One filter bank is tuned to the 700 MHz receive band and the other bank to the 800 MHz receive band. RF switches U8 and U7 select the desired band. These filters have better selectivity and more loss than the front-end filters, but the gain of the LNA minimizes the impact of the filter loss on the receiver sensitivity.

5.3.1.4 Mixer and LO Filter

A double-balanced, low-level ADEX-10L mixer (MX1) with a LO drive of +4 dBm is used for the first conversion. This mixer provides good dynamic range with 3 dB lower LO drive than the more traditional +7 dBm drive mixers. This provides power savings and reduces conducted and radiated LO leakage from the receiver. A high-side mix is used for the 700 MHz receive band and a low-side mix is used for the 800 MHz receive band. This band plan reduces the tuning range requirements for the VCOs.

A LO filter (including W1 and W2) is used prior to LO port of the mixer to reduce the effect of wideband noise from the LO synthesizer on the receiver sensitivity. This filter is varactor-tuned with the center frequency tuned via a voltage from a D/A converter.

5.3.1.5 IF Filter and Amplifier

A four-pole 64.455 MHz crystal filter (U2) is used to provide the desired level of adjacent channel and image rejection while providing minimal amplitude and phase distortion within the 25 kHz bandwidth. Shields are installed around the crystal filter to provide sufficient isolation in order to meet the second image response requirements and minimize noise pickup by the impedance-matching inductors (L1, L2 and L7.)

A transistor IF amplifier (Q1 and supporting circuitry) is used to boost the signal strength which reduces the overall noise figure. The noise figure, signal gain, intercept point and power consumption are optimized by this circuit. An LC circuit provides the required impedance matching between the output of the IF amplifier and the input of backend chip U11.

5.3.1.6 Back End IC

An Analog Devices AD9864 IF Digitizing Subsystem IC (U11) provides the following receiver functions:

Second Local Oscillator - A varactor-tuned transistor (Q2) oscillator is phase-locked to a fixed frequency of 62.355 MHz in order to convert the first IF of 64.455 MHz to a second IF frequency of 2.1 MHz. Phase Locked Loop circuitry inside of the AD9864 operates with a phase-detector frequency of 15 kHz.

Second Conversion Mixer and Filtering - A mixer inside the AD9864 converts from the first IF of 64.455 MHz to the second IF of 2.1 MHz. External filters L29 and L30 provide IF bandpass filtering. Additional filtering is provided by the inherent operation of the sigma-delta analog/digital converters.

Gain Control - This device provides up to 12 dB of AGC range via a combination of analog and digital controls. Additionally, there is a 16 dB attenuator in the front end. The optimum settings are controlled by the host microprocessor.

Analog/Digital Conversion and Processing - Sigma-Delta Converters provide I and Q sampling directly from the second IF frequency. The resulting digital words are first filtered by internal programmable FIR filters and then clocked out of the AD9864 via a serial data bus using a programmable data rate.

5.3.2 Synthesizer

5.3.2.1 PLL IC

A CX72301 sigma-delta modulated PLL (U29) is used as the main receive and transmit synthesizer. This PLL chip provides exceptional phase noise capabilities to reduce adjacent channel interference and quick switching between the receive and transmit modes.

In the receive mode the PLL is programmed to a Local Oscillator frequency that is 64.455 MHz from the receive frequency. For the 700 MHz receive band, the LO frequency is higher than the receive frequency, and for the 800 MHz band, it is lower than the receive frequency. In transmit mode, the PLL is programmed directly to select the desired transmit frequency.

5.3.2.2 Reference Oscillator

A 16.8 MHz oscillator (Y1) provides the frequency reference for the synthesizer and receiver backend IC. The center frequency of this oscillator is corrected using a DC tuning voltage from the digital board during receive and it is modulated with voice or data during transmit.

5.3.2.3 Analog Switches and PLL Loop Filters

Analog switches U16, U17, and U18 provide faster channel switching by changing the time constant of the PLL loop filters.

5.3.2.4 VCOs

Three different VCOs are used. VCO U1 is used strictly in transmit mode. It's tuning range covers the entire transmit and receive frequency bands. Transmit modulation is provided to this oscillator's modulation port from the digital board through R9.

Two receive VCOs (U5 and U6) are required to meet the phase noise requirements. Each VCO functions for only one of the two receive bands. An RF2361 buffer amplifier (U40) provides the required level of drive for the receiver mixer's local oscillator signal as discussed above.

5.3.3 Transmitter

5.3.3.1 Modulation

A “dual-port” modulation scheme is used to provide DC coupling of the signal for data modulation applications. Modulation applied to the PLL frequency reference provides low-frequency modulation, and modulation applied to the PLL transmit VCO (U1) provides high-frequency modulation. Signals for both modulation ports are provided from DACs on the digital board.

5.3.3.2 Power Amplifier

Power Amplifier U3 is a RA03M8087M module. It provides the desired RF power output level and is stable over a wide range of VSWR conditions. The PA is driven by a SGA-6589 driver (U20) that typically provides +21 dBm output power. The PA is turned on and off by switching the power to this driver via transistor D10.

5.3.3.3 ALC

To maintain the specified Transmitter output power level, Automatic Level Control (ALC) is provided to control the drive level to the PA. The detected forward power is compared to a reference level provided by the digital board via op amp U21A. The resulting error voltage is applied to a power-level control port of the power amplifier module. Transmitter on/off splatter filtering is provided by RC network R63, R64, C141 and C211.

5.3.3.4 T/R Switching and Harmonic Filter

The output of the power amplifier is applied to transmit/receive RF switch U4. This is a high dynamic-range switch that is capable of passing the desired transmit power with minimal compression. Any harmonics generated by the PA module and the RF T/R switch are filtered by a harmonic filter that is between the RF T/R switch and the antenna jack.

5.4 User Interface Board

This section provides a functional description of the 5100 ES Portable Radio User Interface board (P/N 023-5500-480/485).

Related Documents

- Schematic, 5100 ES UI Board, P/N 025-5500-480/485
- Schematic, 5100 ES Logic Board, P/N 025-5500-180/185
- MPC885 PowerQUICC Family Reference Manual, Freescale Document MPC885RM.PDF
- Firmware, CPLD, 5100 ES UI, P/N 049-0088-200
- TMS320VC5510 Fixed-Point Digital Signal Processor, TI Document TMS320VC5510.PDf
- HCS08 Microcontrollers, Freescale Document MC9S08GB60.PDF

Functional Description

A functional description of the UI Board is provided in the following paragraphs. A block diagram of the UI Board is shown in Figure 5.3.

5.4.1 Power Supplies

All power used by the UI Board is provided by voltage regulators located on the Logic Board. The six supply voltages are as follows:

- 5Vdc (SW_VD5_0) – power for keypad backlights, LCD backlights, and transmit/ receive LED
- 3.3Vdc (UNSW_VD3_3) – SRAM
- 1.8Vdc (SW_VD1_8) –MPC870, FLASH, and CPLD core voltage
- 3.3Vdc (SW_VD3_3) – Supply for digital I/O, HC08, and discrete logic devices
- 5Vdc (SW_VA5_0) - analog supply
- Battery(SW_BATT) – Accessory Connector (J1), speaker audio PAs

5.4.2 MPC870 Processor

The control processor, MPC870CZT66 is a derivative of the MPC885 PowerQUICC™ family which is a die-shrunk (0.18-micron) version of the MPC860 PowerQUICC family and operates at speeds of up to 120 MHz on the MPC8xx core and up to 80 MHz (1:1 mode) on the external bus. The MPC870 has a 1.8-V core and 3.3-V I/O operation with 5-V TTL compatibility. The MPC870 contains a PowerPC™ processor core. The MPC885 family is a PowerPC-architecture-based quad integrated communications controller (PowerQUICC). The CPU on the MPC885 is the MPC8xx core, a 32-bit microprocessor which implements the PowerPC architecture.

The MPC870(U1) is utilized as a control processor to that directs the operation of the radio. Communication between the MPC870 and other functional blocks in the radio is controlled though internal peripheral devices controllers. The device controllers provide the following functions:

- SPI Bus Controller – Communication link to volume control DAC, HC08 Microcontroller, SPI FLASH, Logic Board SEM, and LCD display
- RS232 Controller – UDC RS232 link
- I2C Bus Controller – I2C bus control link to the Logic Board Codec
- Memory Controller – SRAM, FLASH, and HPI data interface and timing
- General Purpose I/O – I/O control signals to/from the RF Deck, LCD, HC08, Logic Board, and UDC connector

5.4.3 Flash Memory

The UI Board Flash memory (U4) is a 16Mbit x 16, Intel 28F640P30 device. The Flash memory operates off a 1.8 Vdc core and 3.3 Vdc I/O voltages.

5.4.4 SRAM

The SRAM (U6) is a Cypress CY62167DV30 16 Mbit device in a 2Mx16 memory configuration. The device is powered from a linear regulator that is connected directly to the radio battery. This allows for battery backup operation in which data stored in the SRAM is retained when the radio is turned off. A logic gate (U22) disables the SRAM chip select when normal UI Board power is turned off and places the SRAM in a low power consumption state.

5.4.5 HPI Bus Multiplexer

The MPC870 processor communicates with the 5510 DSP on the Logic Board via the DSP 16 bit host peripheral (HPI) bus. This interface is used by the MPC870 to load application code into the DSP internal SRAM and for exchanging control/status with the DSP.

Due to pin limitations on the 60 connector (J2) between the UI and Logic board, the HPI bus is multiplexed across J2 in two 8 bit transfers. The bus transfer is controlled by logic in the CPLD at U5. The signals controlling the transfer (DSP_DS0, DSP_DS1, EB_CS5, and EB_R/nW – J2 pins 39, 50, 12 and 13) are generated by the MPC870. Operation of the multiplexer logic is shown in the table below.

Table 5.1 Multiplexer Logic Operation

EB_CS5	EB_R/nW	DSP_DS0	DSP_DS1	8 bit bus J2
1	x	x	x	Hi Z
0	1	0	1	DSP lsb
0	1	1	0	DSP msb
0	0	0	1	PPC lsb
0	0	1	0	PPC msb

5.4.6 Bus Configuration Logic

At reset (signal nHRESET low), the CPLD at U5 sets the initial operating configuration of the MPC870 by driving selected signals on the MPC870 data bus (signals EB_D0-15) high. Two different configurations can be selected depending on the state of the nTAP (test point TP56) signal line to the CPLD. If nTAP is left floating (normal configuration), the MPC870 JTAG/BDM port is set for BDM operation. If nTAP is pulled low, the MPC870 JTAG/BDM port is set for JTAG operation.

5.4.7 HC08 Microcontroller

A Freescale MC9S08GT60 microcontroller (U39) is used to handle general purpose analog to digital conversion, keypad/switch scanning and decoding, and keyload serial communication. A communication channel to the control processor is maintained through the SPI bus.

5.4.8 SPI Flash

The SPI Flash (U40 or U44) is a 512Kbit Flash memory device used to store radio operating parameters. Only one device is present on the board. The device is accessed by the MPC870 via the UI Board SPI bus.

5.4.9 Audio Out

The receiver audio signal is then fed to the UI board on the Audio_Out_P/M lines. This differential signal is converted to a single-ended signal (U37B) and applied to a summing amplifier (U37A). The second input to the summing amplifier is the PWM tone signal from the HC08 which has been filtered by an op amp filter (U17A and U17B). The output of the summing amplifier is then applied the audio amplifiers (U8 and U21).

Audio amplifier U8 provides amplification for the internal 16-ohm speaker and U21 provides amplification for an external speaker-microphone connected to pins 2 and 6 of the accessory connector (J1). Power to these devices is controlled by the MPC870 through transistors Q10 and Q16 for the internal speaker PA and Q2 and Q17 for the external speaker PA.

The gain of U8 and U21 is controlled by the DC voltage on pin 4 of the device. When the voltage on this pin is < 0.4 Vdc the PA is muted (~80 db attenuation). Gain then increases as this DC voltage increases. The volume control signal is produced as follows:

The top panel volume control produces a varying DC voltage that is buffered by U41B on the UI board. This voltage is then applied to an 8 bit A/D converter in the HC08 microcontroller.

The HC08 forwards the voltage reading to the MPC870 via the SPI bus. This allows the MPC870 to determine the volume level that is currently set by the user.

The MPC870 then programs D/A converter (U7) to produce a DC output voltage that sets the desired volume level. The volume control voltage is then buffered by U18B and applied to the volume control pin of audio amplifiers U8 and U21.

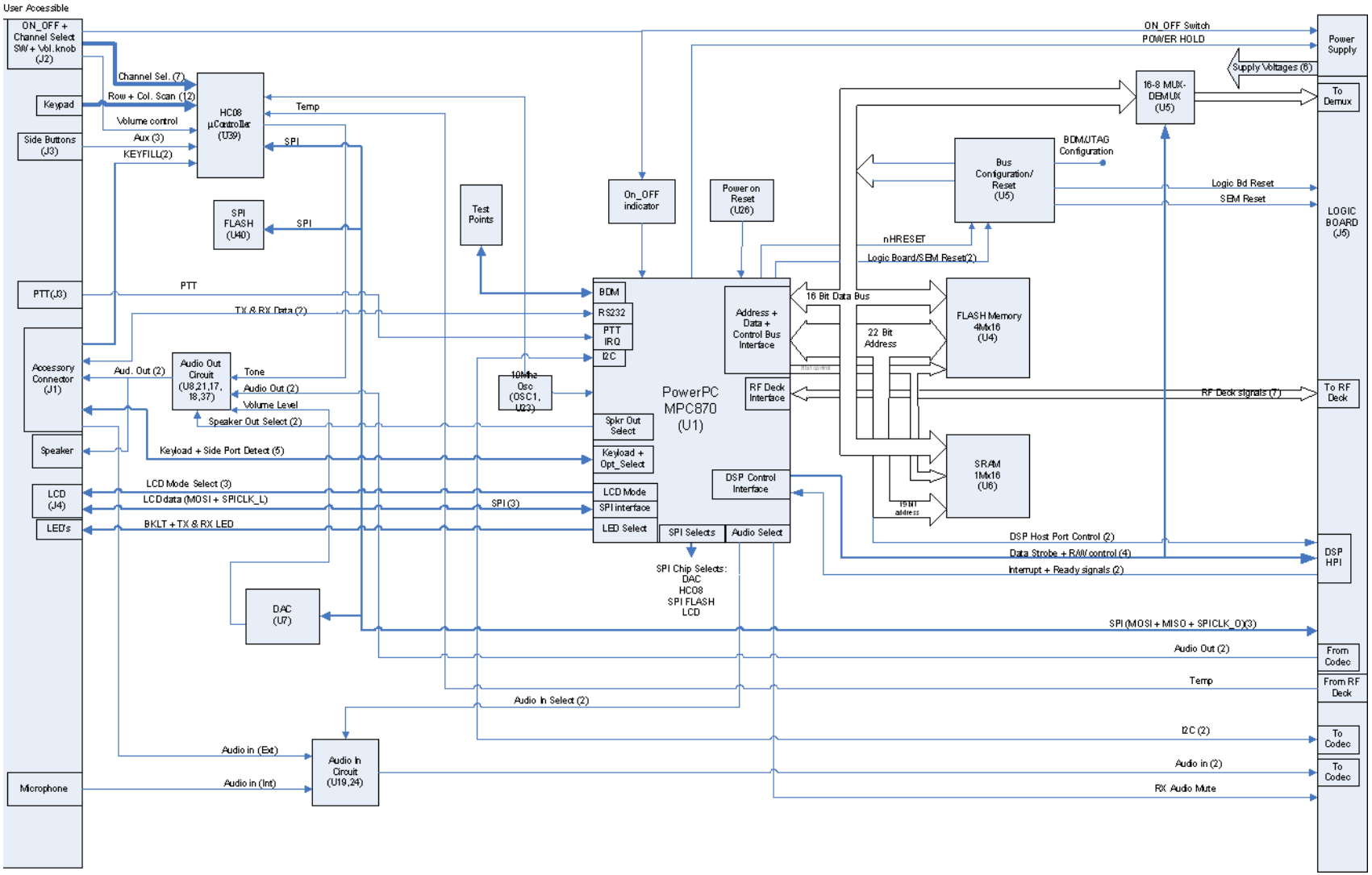
5.4.10 Audio In

In transmit mode, the audio for transmission can be selected from either the internal microphone or an external microphone connected to pin 3 of the accessory (UDC) connector (J1). A 2.5Vdc supply voltage is applied to the internal microphone through R76 with C44 providing DC blocking. U19B provides buffering and low-pass filtering. U19C and related components provide the same function for the external microphone signal.

Analog switch U24 selects either the internal or external microphone signal, depending on the logic level on the SRC_SEL signal from the MPC870. The internal microphone is selected when SRC_SEL is low and the external microphone is selected when SRC_SEL is high.

The single-ended microphone signal is then converted to a differential signal by U19A and U19D to reduce noise. It is then fed to the Logic Board on the AUDIO_IN_P/M lines (J5 - 27 and 25).

Figure 5.3 User Interface Board Block Diagram



5.5 Logic Board

This section provides a functional description of the 5100 ES Portable Radio Logic Board (P/N 023-5500-180/185).

Related Documents

- Schematic, 5100 ES Logic Board, P/N 025-5500-180/185
- Schematic, 5100 ES UI Board, P/N 025-5500-480/485
- MPC885 PowerQUIC Family Reference Manual, Freescale Document MPC885RM.PDF
- Firmware, CPL:D, 5100 ES Logic, P/N 049-0087-200
- TMS320VC5510 Fixed-Point Digital Signal Processor, TI Document TMS320VC5510.PDF
- TLV320AIC21 Data Manual, TI Document TLV320AIC21.PDF

Functional Description

A functional description of the Logic Board is provided in the following paragraphs. A block diagram of the Logic Board is shown in Figure 5.4.

5.5.1 Power Supplies

The power supply section of the Logic board receives power from the battery and converts it through linear and switching regulators into various other voltages that are used to power the digital and analog circuitry on both the Logic Board and on the UI Board.

Transistors Q1 and Q3 control are used to switch on the battery supply to the Logic Board regulators. These transistors are turned on or off by the radio on/off switch or the power hold signal from the MPC870 processor on the UI Board.

5.5.1.1 Digital

Four regulators provide power to the digital electronics on the UI and Logic boards. These voltages are as follows:

- 5Vdc (U11) – power for keypad backlights, LCD backlights, and transmit/receive LED
- 1.6Vdc(U49) – Logic Board DSP and SEM processor core voltage supply
- 1.8Vdc(U46) – Logic Board Codec and CPLD core voltage supply/UI board MPC870 and CPLD core voltage
- 3.3Vdc(U47) – Supply for digital I/O and discrete logic devices

The supplies are powered up in the following sequence, 1.6Vdc, 1.8Vdc, 3.3Vdc, then 5Vdc. This power up sequence is dictated by power application requirements of the DSP and MPC 870 processors. Additionally, the switching regulators (U49, U46, and U47) are synchronized to a 768Khz clock from the CPLD (U20) that is derived from the 12.288 TCXO (Y2).

5.5.1.2 Analog

Two linear regulators (U11, U45) provide power to the analog circuitry (op amps, Codec) on the Logic and UI boards. The 5Vdc analog supply (U11) powers the audio out section (U9, U10) and Codec 3.3Vdc linear regulator (U45) on the Logic Board. Additionally, the 5Vdc supply provides power to the microphone and audio output circuitry on the UI Board.

5.5.1.3 RF Deck

Two linear regulators supply 3.3Vdc and 5.5Vdc voltages to the RF Deck. The 3.3Vdc supply (U43) powers the digital circuitry on the RF Deck. The 5.5Vdc supplies power to the 5Vdc LDOs used on the RF Deck.

5.5.2 DSP

The Digital Signal Processing (DSP) functions are performed by a TI 5510 DSP (U15) and the TI AIC21 Codec (U27) with the support of MPC870 processor on the UI board. Operation of the DSP is described in the paragraphs below.

5.5.2.1 Control Interface

The MPC870 processor on the UI Board communicates with the DSP via a multiplexed 16 bit host peripheral (HPI) bus. This interface is used by the MPC870 to load application code into the DSP's internal SRAM and for exchanging control/status with the DSP. The DSP has three internal registers, accessible by the MPC870, for transferring of data. Access to the internal registers is controlled by the DSP's chip select (signal H_nCS), data strobe (DSP_DS0), read/write (H_R/nW), and register select (HDS1, HDS2) input signals. The DSP uses its HRDY line to signal the MPC870 when a bus transfer has completed.

5.5.2.2 Transmit Operation

In transmit mode the microphone audio signal is converted to a differential signal on the UI board and then routed to the Codec on the Logic Board where it is digitized by an internal A/D converter and forwarded to the DSP via a synchronous serial interface (SSI) bus. The DSP processes the incoming data and sends the digitized modulation signals for the RF Deck VCO and TCXO back to the Codec via the SSI bus. The Codec converts the digitized modulation signals into analog signals which are level shifted by an op amp (U26) to derive the TXMOD1 and TXMOD2 signals for the RF Deck.

5.5.2.3 Receive Operation

In receive mode, the DSP receives I/Q data from the Rx Backend IC on the RF Deck (J1) via an SSI bus. The Rx Backend IC controls the timing on SSI bus with the clock set to 1.4 MHz and a frame time of 40 KHz. The SSI bus signals from the RF Deck are heavily filtered and are buffered through U20 to improve the wave shape. The DSP filters and demodulates the I/Q samples from the Rx Backend IC. The resulting demodulated signal is sent to the Codec via the SSI bus. The Codec converts the processed signal from the DSP to an audio signal which is passed to an op amp (U8) that converts it to a differential form. This differential signal is amplified on the UI Board and applied to either the internal on external speaker. Additionally, the DSP sends data to the Codec via the SSI bus to adjust the TXMOD1 and TXMOD2 signals to set the RF Deck receiver frequency.

5.5.3 HPI Bus Multiplexer

The DSP communicates with the MPC870 processor on the UI Board via its 16 bit host peripheral (HPI) bus. This interface is used by the MPC870 to load application code into the DSP internal SRAM and for exchanging control/status with the DSP.

Due to pin limitations on the 60 connector (J2) between the UI and Logic board, the HPI bus is multiplexed across J2 in two 8 bit transfers. The bus transfer is controlled by logic in the CPLD at U20. The signals controlling the transfer (HDS1, HDS2, H_nCS, and H_R/nW – J2 pins 39, 50, 12 and 13) are generated by the MPC870. Operation of the multiplexer logic is shown in the table below.

H_nCS	H_R/nW	HDS1	HDS2	8 bit bus J2
1	x	x	x	Hi Z
0	1	0	1	DSP lsb
0	1	1	0	DSP msb
0	0	0	1	PPC lsb
0	0	1	0	PPC msb

5.5.4 Codec

The Codec (U27) is a support chip for the DSP. It provides the A/D and D/A conversion between the DSP and the microphone and speaker audio signals and between the DSP and the RF Deck modulation signals.

The operation of the Codec is determined by fourteen internal registers. These registers are configured by the MPC870 on the UI Board via the Codec I^2C bus interface. The Codec internal timing is derived from a 12.288 Mhz TCXO (Y2).

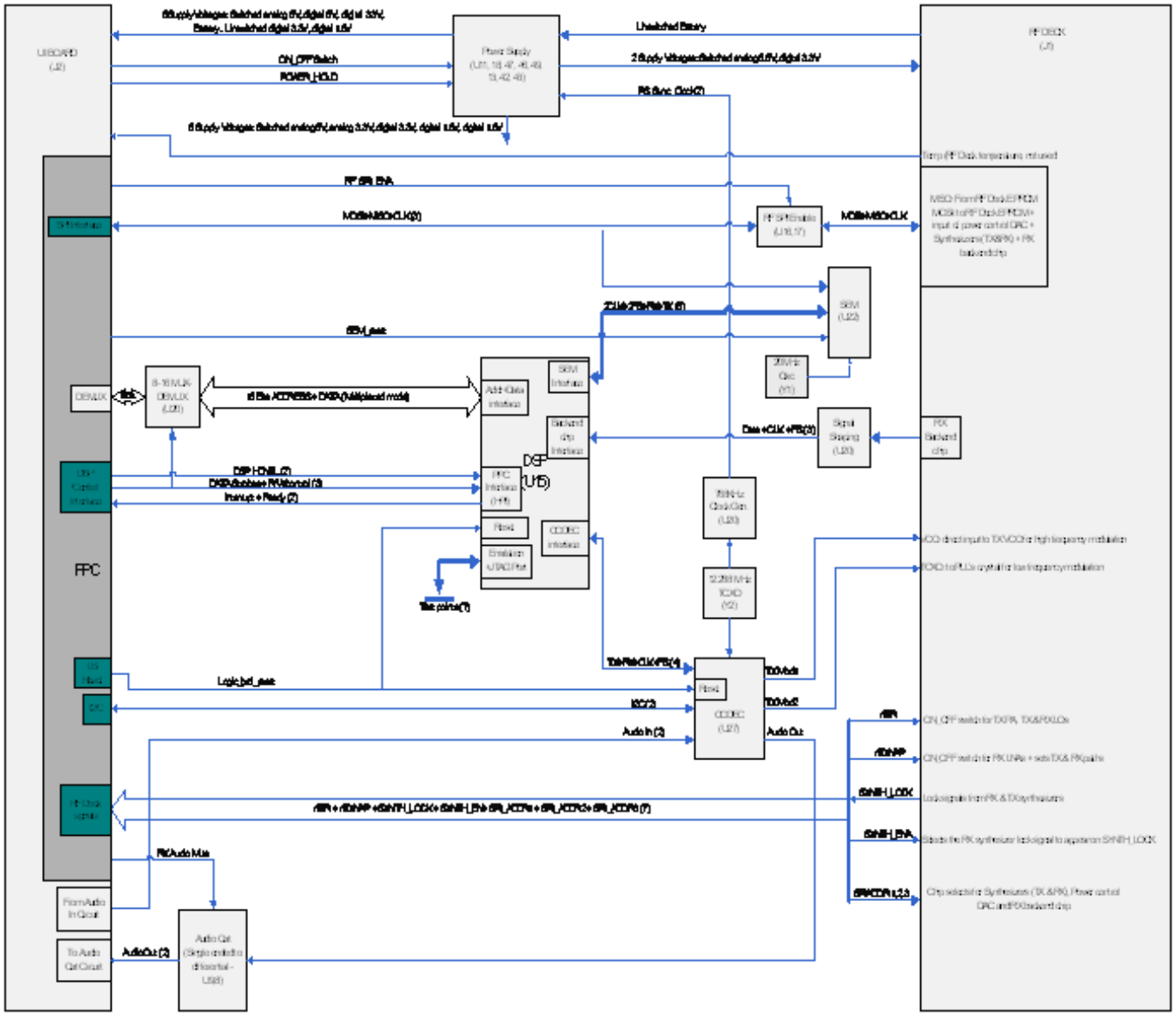
The interface to the DSP (U15) is via an SSI bus. The Codec generates the framing and clock signals for this bus as configured by the MPC870 via the I^2C control bus. The SSI bus clock (signal CODEC_CLK) is set to 768 KHz with a frame time (signal CODEC_FS) of 24 KHz.

5.5.5 SEM Module

The SEM module (U22) consists of a TI 5416 DSP and serial EEPROM device mounted on a 1.0” x 0.6” printed circuit board that in turn is mounted on the Logic Board. The application code resides in the EEPROM and is downloaded into the 5416 DSP after reset.

Operation of the SEM is controlled by the MPC870 on the UI Board through a SPI bus interface on the 5416 DSP. Data to be encrypted or decrypted is passed to the SEM through an SSI bus that is connected to the Logic Board 5510 DSP.

Figure 5.4 Logic Board Block Diagram



SECTION

6

Alignment Procedure

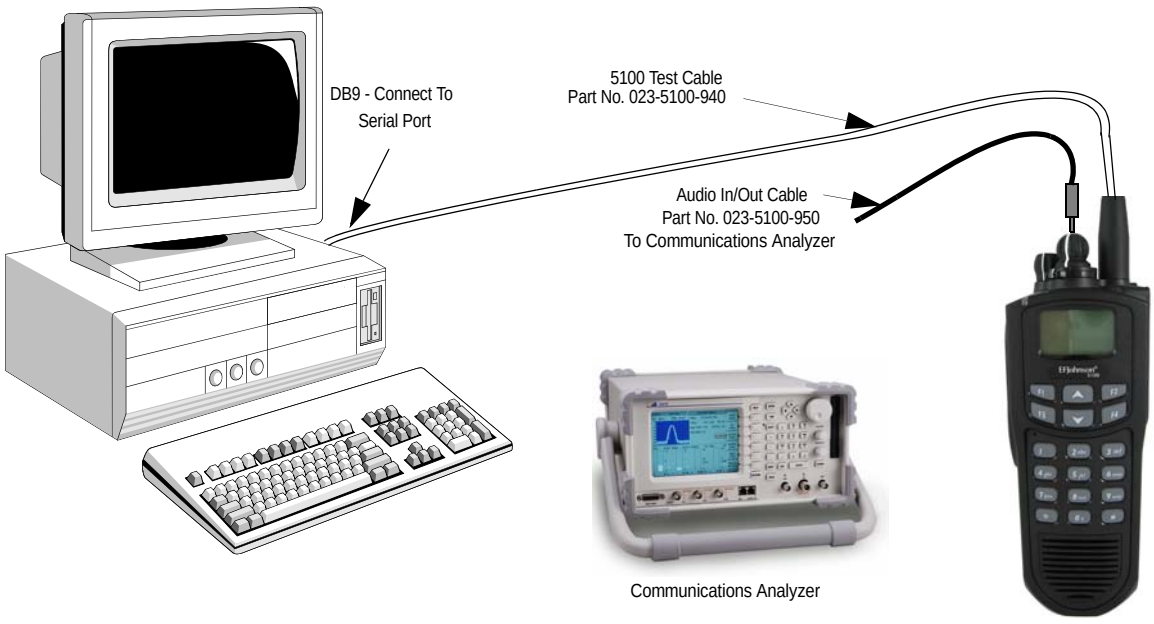
6.1 PC Tune

PC Tune software is used to perform alignment procedures on the EFJohnson 5100 series portable radios.

Perform alignment procedures if repairs or adjustments are made that can affect the factory alignment. All adjustments are set digitally using the computer. It is not necessary to disassemble the transceiver to access adjustment points. In addition, audio test signals are generated internally, so an audio generator is not required.

To verify radio operation, perform the Digital Performance Tests and the Analog Performance Tests in the PC Tune manual included on the PC Tune CD.

Figure 6.1 Alignment Setup



SECTION 7

Troubleshooting

7.1 Start Up Failure LED Indications

Note *There are no user-serviceable components in the transceiver.*

Table 7.1 Start Up Failure LED Indications

Orange LED Blinks	Start Up Failure	Start Up Failure Type
1	Incorrect Software	The software was loaded on the wrong platform. This indication is displayed if the boot loader version does not match the expected boot loader version number.
2	Bad File Format	The parameter file version number does not match the software version in the radio.
3	Parms Fail	The backup copy of the parameters (stored in the SPI flash device) is invalid. To remove this error, use PC Configure to write the parameter file.
4	Bad Band	The radio band in the parameter file does not match the radio band in the tuning parameters. This error message displays if a parameter file for the wrong band is downloaded to the radio.
5	Corrupt Parms	This error message appears if the parameters checksum is OK, but the parameters file has an error in it. This message does not normally appear.
6	EE PROM Fail	The self test timed out and the parameter file has not yet been read and verified.
7	DSP Failed	The PowerPC never received a power up message from the DSP.
8	Cycle Power	This error message appears when there is a communication failure between the DSP and the back end ADC on the RF deck.

7.2 User Troubleshooting

- When approaching the limits of radio range, the other party may not be able to hear your transmissions and there may be an increase in background noise when messages are received.
- You may still be out of range even though you can hear a message.

  The reason for this is that the signal you are receiving is usually transmitted at a higher power level than the one transmitted by your transceiver.
- Communication may be improved by moving to higher ground or away from shielding objects such as tall buildings or hills.
- If some other problem is occurring, turn power off and then on again to reset the control logic. Also make sure that the controls are properly set.
- If the radio still does not operate correctly, return it for service.

7.3 Low Battery Indicators

- A Low Battery Beep sounds once a minute in the standby and transmit modes.
- The LED indicator flashes in the receive mode.

7.3.1 Battery Replacement

The battery should be recharged or replaced as soon as possible after the low battery indications appear.

Note *If the transceiver contains encryption (hardware) keys, be sure to reattach a battery within approximately one minute to prevent the loss of these keys.*

7.4 Additional Information

The following documentation provides additional information about the 5100 ES Portable Radios.

Tone Guide

Each radio comes with a tone reference guide. This guide provides information about the tones used in the 5100 ES Portable Radio.

Quick Reference Guide

Each radio comes with a quick reference guide. This guide includes descriptions and graphics of the 5100 ES Portable Radio hardware features.

Operator's Manual

Please refer to the 5100 ES Model I Operating Manual or the 5100 ES Models II/III Operating Manual for technical information.

7.5 Contact Information

Contact EFJohnson at the numbers and e-mail address shown in Section 8.2.

SECTION

8

Service Information

This section describes how to obtain authorized service for the EFJohnson 5100 ES Portable Radio.

8.1 Product Warranty

The warranty statement for this equipment is available from your product supplier or from

Warranty Department
EFJohnson
1440 Corporate Drive
Irving, TX 75038-2401

This information may also be requested from the Warranty Department by phone at the numbers listed in Section 8.2. The Warranty Department may also be contacted for warranty service reports, claim forms, or any other questions concerning warranties or warranty service.

8.2 Factory Customer Service

The EFJohnson Customer Service Department provides customer assistance on technical problems and the availability of local and factory repair facilities. Regular customer service hours are 8:00 a.m. - 5:00 p.m. Central Time, Monday- Friday. A technical support subscription service is available or support can be purchased on an as-needed basis. The Customer Service Department can be reached using the following telephone numbers:

Toll-Free:(800) 328-3911 (all except Multi-Net)
(800) 295-1773 (Multi-Net only)
Fax: (972) 819-0639
E-Mail: customerservice@efjohnson.com

You can also e-mail a person directly if you know the first initial/last name. For example, if John Smith is an EFJohnson employee, his e-mail address is probably jsmith@EFJohnson.com

Note Emergency 24-hour technical support is also available at the preceding numbers during off hours, holidays, and weekends.

When your call is answered at EFJohnson, you will hear a brief message informing you of numbers that can be entered to reach various departments. This number may be entered during or after the message using a tone-type telephone. If you have a pulse-type telephone, wait until the message is finished and an operator will come on the line to assist you. When you enter some numbers, another number is requested to further categorize the type of information you need.

You may also contact the Customer Service Department by mail. Please include all information that may be helpful in solving your problem. The mailing address is as follows:

Customer Service Department
EFJohnson
1440 Corporate Drive
Irving, TX 75038-2401

8.3 Returns for Repairs

Before returning equipment for repair, contact the EFJohnson Customer Service Department as described in the preceding section. They may be able to suggest a solution to the problem, making return of the equipment unnecessary.

Repair service is normally available through local authorized EFJohnson land mobile radio service centers. If local service is not available, the equipment can be returned to the EFJohnson repair depot for repair. However, before returning equipment, contact the Customer Service Department Repair Depot for the correct “Ship To” address.

Be sure to fill out a Factory Repair Request Form #271 for each unit to be repaired, whether it is in or out of warranty. You can obtain it in any of three ways:

- Download it from the EFJohnson Web site's "Service & Support" section.
- Call the EFJohnson Customer Service Department and request it. See Section 8.2.
- Request it when you send a unit in for repair.

Clearly describe the difficulty experienced in the space provided and also note any prior physical damage to the equipment. Include this form in the shipping container with each unit. Your telephone number and contact name are important as there are times when the technicians may have specific questions that need to be answered to completely identify and repair a problem.

When returning equipment for repair, it is also recommended that you use a PO number or some other reference number on your paperwork in case you need to call the repair lab about your unit. These numbers are referenced on the repair order and make it easier and faster to locate your unit in the lab.

Return Authorization (RA) numbers are not necessary unless you have been given one by the Field Service Department. RA numbers are required for exchange units or if the Field Service Department wants to be aware of a specific problem. If you have been given an RA number, reference this number on the Factory Repair Request Form sent with the unit. The repair lab will then contact the Field Service Department when the unit arrives. For additional information on factory service, the Depot Service Department can be contacted at the following e-mail address:

depotrepair@efjohnson.com

8.4 Replacement Parts

Replacement parts can be ordered directly from the Service Parts Department. To order parts by phone, dial the toll-free number as described in Section 8.2. When ordering, please supply the part number and quantity of each part ordered. The accessories available for this transceiver are shown in the accessories listing in Table 1.1.

EFJohnson dealers also need to give their account number. If there is uncertainty about the part number, include the designator (C512, for example) and the model number of the equipment the part is from.

You may also send your order by mail or fax. The mailing address is as follows and the fax number is shown in Section 8.2.

Service Parts Department
EFJohnson
1440 Corporate Drive
Irving, TX 75038-2401

8.5 Internet Home Page

EFJohnson has a site on the World Wide Web that can be accessed for information on the company about such things as products, systems, and regulations. The address is

http://www.efjohnson.com

SECTION

9

Parts List

9.1 Parts

This section lists the 5100 ES Model I/II/III Portable Radio component descriptions, reference designators (Ref No.), and part numbers (Part No.).

Ref Number	Description	Part Number
	Model I 7/800 MHz, No SEM, Black, No Display	023-5170-161
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB, PLAIN, BLACK (See separate listing on Page 9-2.)	023-5100-341
A 080	COMMON PARTS, FINAL ASSEMBLY (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD, NON-ENCRYPTED (See separate listing on Page 9-4.)	023-5500-185
A 200	RF MODULE 700/800 MHz CALAMP 6A830	585-5500-710
A 400	ASSEMBLY, UI PCB, PLAIN (See separate listing on Page 9-9.)	023-5100-485

Ref Number	Description	Part Number
	Assembly, Front Housing, Without UI PCB, Plain, Black	023-5100-341
A 040	ASSEMBLY CONTROLS, 5100 (See separate listing on Page 9-2.)	023-5100-045
A 060	ASSEMBLY, FRONT HOUSING, BLACK, PLAIN	587-5100-06104
HW 102	SPNR NUT M6-.75-6H MET	013-1313-005
HW 105	SPNR NUT M6-.75-6H MET	013-1313-005
MP 006	LIGHTPIPE / SLEEVE ASSEMBLY	032-0431-194
MP 104	BUTTON, EMERGENCY	320-4312-0801
MP 105	5100 3 POS SELECTOR RING	015-0805-653
MP 106	SPACER, SELECTOR SWITCH 5100	032-0431-166
MP 107	KNOB, SELECTOR, 5100	032-5100-100
MP 108	KNOB, VOLUME, 5100	032-5100-101
MP 110	KEYPAD, PLAIN	320-4312-0103
MP 111	BEZEL, FRONT, NON-DTMF, BLACK	320-4311-4504
NP 101	LABEL, EFJ LOGO, FRONT 5100	559-5000-550

Ref Number	Description	Part Number
	Assembly Controls	023-5100-045
EP 101	TOP SWITCH SEAL	574-3500-071
EP 102	TOP SWITCH SEAL	574-3500-071
MP 040	SWITCH HOLDER NGP 5100	032-0431-171
PC 040	FLEX CKT, CONTROLS (REV 1)	355-1000-4501

Ref Number	Description	Part Number
R 101	HIGH TORQUE WIPING ON / OFF SWITCH	562-0018-067
S 101	HIGH DETENT SELECT SWITCH 5100	583-2009-047

Ref Number	Description	Part Number
	Common Parts, Final Assembly	023-5100-085
A 030	REAR HOUSING ASSEMBLY 5100 GREEN (See separate listing on Page 9-3.)	023-5100-035
A 035	BATTERY CONTACT ASSEMBLY 5100	585-5100-017
A 070	ASSEMBLY, REAR HOUSING SHIELD	587-5100-07101
EP 120	THIN WALL TEFLON TUBE - (3/16 LENGTH)	574-5100-120
HW 031	MOLDED SILICON, NI/C, BLACK, ORING .301 X .070	574-2510-001
HW 103	SCREW, THREAD FORMING, M1.8 X 6	575-7800-10001
MK 101	MIC CARTRIDGE	589-0301-003
ML 000	36 YD x 1/4 ROLL POLYMIDE TAPE	042-0241-241
ML 003	.020 62/36/2RA44CORE58	042-0211-234
MP 113	BRACKET, SPEAKER	172-2295-6201
MP 120	CLIP, SHIELD, REAR HOUSING	172-2295-8101
MP 201	CONDUCTIVE COMPRESSION SPACER	574-5100-005
NP 002	WINDRIVER VXWORKS LICENSE LABEL 5100/5300	559-5000-558
SP 101	SPEAKER, 45mm, 16 OHM, W/GASKET	589-1015-00901

Ref Number	Description	Part Number
	Rear Housing Assembly	023-5100-035
CH 030	HOUSING, REAR	150-8056-5401
J 030	PRESS FIT SMA CONNECTOR 5100 PORTABLE ASSY **AIR**	051-5900-6130
ML 000	LOCTITE 290 THREAD LOCKER WICKING TYPE GREEN	042-0181-591

Ref Number	Description	Part Number
	Logic Board, Non-Encrypted	023-5500-185
C 001	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 002	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 003	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 004	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 014	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 015	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 016	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 017	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 018	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 019	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 020	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 021	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 022	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 023	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 024	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 025	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 026	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 027	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 059	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 063	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 064	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 065	4.7 µF 10V SMD TANT RL	510-2624-479
C 066	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 067	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 070	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 076	4.7 µF 10V SMD TANT RL	510-2624-479
C 077	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 078	4.7 µF 10V SMD TANT RL	510-2624-479
C 079	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 080	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 081	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 082	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 084	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 085	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 087	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 090	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 091	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 092	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 100	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 101	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103

Ref Number	Description	Part Number
C 102	4.7 µF 10V SMD TANT RL	510-2624-479
C 104	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 105	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 109	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 110	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 111	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 114	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 115	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 117	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 118	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 119	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 120	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 121	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 122	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 123	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 124	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 125	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 126	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 127	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 128	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 129	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 130	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 132	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 133	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 134	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 135	10 µF, 16V, 10% TANTALUM CAPACITOR LOW-ESR,T494	510-2642-100
C 137	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 138	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 139	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 140	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 141	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 142	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 143	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 144	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 145	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 146	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 147	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 148	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 149	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 150	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 151	CAP, 470 µF, 10%, 402, 25V	510-3681-471
C 152	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 153	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103

Ref Number	Description	Part Number
C 154	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 155	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 157	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 158	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 159	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
CR 001	DUAL DIODES-COM ANODES	523-1504-024
CR 008	DUAL DIODES-COM ANODES	523-1504-024
J 001	CONN, 26-P, ZIF 0.5MM PITCH SMD	515-7111-526
J 002	FINE PITCH SMD BD TO BD RECEP 60 PIN(TR)	515-7111-650
J 003	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 004	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
L 003	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
L 004	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
L 005	270 nH 0603 SMD INDUCTOR	542-9017-274
L 007	270 nH 0603 SMD INDUCTOR	542-9017-274
L 010	270 nH 0603 SMD INDUCTOR	542-9017-274
L 011	INDUCTOR, 27 µH, 1.2A, SMD	542-5010-019
L 013	270 nH 0603 SMD INDUCTOR	542-9017-274
L 014	270 nH 0603 SMD INDUCTOR	542-9017-274
L 015	270 nH 0603 SMD INDUCTOR	542-9017-274
L 016	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
PC 001	PCB, 5100G LOGIC BOARD	035-5500-180
Q 001	POWER MOSFET N+P PAIR 20 V SC-70	576-0006-244
Q 002	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 003	POWER MOSFET N+P PAIR 20 V SC-70	576-0006-244
R 002	RES, 10K, 5%, 402	569-0165-103
R 003	RES, 10K, 5%, 402	569-0165-103
R 004	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 005	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 009	RES, 0 ohm, 5%, 402	569-0165-001
R 019	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 020	RESISTOR, 15K OHM, 0402, SMT	569-0165-153
R 022	SURFACE MOUNT 20K, 0402, RESISTOR	569-0165-203
R 023	RESISTOR, 15K OHM, 0402, SMT	569-0165-153
R 024	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 028	RES, 4.7K, 5%, 402	569-0165-472
R 029	RES, 4.7K, 5%, 402	569-0165-472

Ref Number	Description	Part Number
R 030	RES, 10K, 5%, 402	569-0165-103
R 031	RES, 30.1K, 1%, 0402	569-0161-447
R 032	RES, 30.1K, 1%, 0402	569-0161-447
R 033	SURFACE MOUNT 20K, 0402, RESISTOR	569-0165-203
R 059	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 060	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 061	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 062	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 063	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 064	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 065	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 068	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 069	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 078	RESISTOR 1%, 221K, 0402	569-0161-534
R 081	RESISTOR 1%, 0603, 100K OHM	569-0151-501
R 088	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 090	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 091	RES, 10K, 5%, 402	569-0165-103
R 092	RES, 10K, 5%, 402	569-0165-103
R 097	RES, 10K, 5%, 402	569-0165-103
R 098	RES, 10K, 5%, 402	569-0165-103
R 100	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 101	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 102	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 103	RESISTOR 1%, 0603, 13K OHM	569-0151-412
R 105	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 106	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 107	RESISTOR 1%, 0603, 20K OHM	569-0151-430
R 110	RESISTOR 1%, 0603, 38.3K OHM	569-0151-457
R 111	RESISTOR 1%, 0603, 12.1K OHM	569-0151-409
R 182	RES, 10K, 5%, 402	569-0165-103
R 186	RES, 10K, 5%, 402	569-0165-103
R 188	RES, 10K, 5%, 402	569-0165-103
R 190	RES, 10K, 5%, 402	569-0165-103
R 191	RES, 10K, 5%, 402	569-0165-103
R 193	RES, 10K, 5%, 402	569-0165-103
R 194	RES, 10K, 5%, 402	569-0165-103
R 195	RES, 10K, 5%, 402	569-0165-103
R 236	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 237	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 238	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 239	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 240	RESISTOR, 1K OHM, 0402, SMT	569-0165-102

Ref Number	Description	Part Number
R 241	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 242	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 243	RES, 10K, 5%, 402	569-0165-103
R 244	RES, 10K, 5%, 402	569-0165-103
R 245	RES, 10K, 5%, 402	569-0165-103
R 249	RES, 10K, 5%, 402	569-0165-103
R 253	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 254	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 255	CHIP RESISTOR, 0402	569-0165-100
R 259	CHIP RESISTOR, 0402	569-0165-100
R 260	CHIP RESISTOR, 0402	569-0165-100
R 261	CHIP RESISTOR, 0402	569-0165-100
R 262	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 263	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 264	RES, 0 ohm, 5%, 402	569-0165-001
R 265	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 266	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 267	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 268	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 269	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 270	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 271	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 272	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 273	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 274	CHIP RESISTOR, 0402	569-0165-100
R 275	CHIP RESISTOR, 0402	569-0165-100
R 276	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 277	RES, 0 ohm, 5%, 402	569-0165-001
R 278	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 279	RES, 0 ohm, 5%, 402	569-0165-001
R 281	RES, 0 ohm, 5%, 402	569-0165-001
R 282	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 283	RES, 0 ohm, 5%, 402	569-0165-001
R 284	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 286	RES, 0 ohm, 5%, 402	569-0165-001
R 288	RES, 0 ohm, 5%, 402	569-0165-001
R 289	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 290	RES, 0 ohm, 5%, 402	569-0165-001
R 291	RES, 10K, 5%, 402	569-0165-103
R 292	RES, 10K, 5%, 402	569-0165-103
R 294	RES, 10K, 5%, 402	569-0165-103
R 295	RES, 0 ohm, 5%, 402	569-0165-001
R 296	RES, 47K OHM 5%, 402	569-0165-473

Ref Number	Description	Part Number
R 297	RES, 47K OHM 5%, 402	569-0165-473
R 299	RES, 0 ohm, 5%, 402	569-0165-001
R 301	CHIP RESISTOR, 0402	569-0165-100
R 302	CHIP RESISTOR, 0402	569-0165-100
R 303	CHIP RESISTOR, 0402	569-0165-100
R 306	CHIP RESISTOR, 0402	569-0165-100
U 008	OPAMP, QUAD SINGLE SPLY SSOP	544-2020-013
U 009	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 011	LDO, DMOS400MA 5V 8P MSOP	544-2603-055
U 015	DSP,TMS3205510AGGWA1, 160MHz BGA trays	544-5003-133
U 016	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 017	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 018	LDO, DMOS400MA 5V 8P MSOP	544-2603-055
U 020	IC, CPLD, 64 CELL, 45 IO, MIXED IO VOLTAGE	544-5001-421
U 026	OpAmp, Dual, single sply 8p	544-2018-015
U 027	AIC21 16-BIT DUAL CODEC, LOW POWER	544-3016-057
U 042	REGULATOR LDO, ADJ TO 5.5V 500mA, MSOP-8	544-2603-057
U 043	REGULATOR LDO, ADJ TO 5.5V 500mA, MSOP-8	544-2603-057
U 045	IC, LDO, 3.3V, 150MA, SOT23, TPS73133	544-2603-068
U 046	CONV, SYNC STEP DOWN, 2.7-10V IN. 1.8V OUT	544-4006-012
U 047	CONV, SYNC STEP DOWN V.REG, 2.7-10V IN, 3.3V OUT	544-4006-014
U 049	CONV, SYNC STEP DOWN, 2.7-10V IN. VAR OUT	544-4006-010
Y 002	TCXO, 12.288 MHz, 2PPM, HCMOS	518-7012-210

Ref Number	Description	Part Number
	Assembly, UI PC Board, Plain	023-5100-485
A 001	5100G UI BD, W/O DISPLAY (MODEL 1) Eff end 01-10-07	023-5500-485
A 001	5100G UI BD, W/O DISPLAY, NON-FM Eff begin 01-11-07	023-5500-487
EP 010	FOAM FRAME DISPLAY BACKLIGHT 5100	574-3500-065
MP 005	SPACER, LCD, 5180x	325-1001-2501

Ref Number	Description	Part Number
	UI Board without Display	023-5500-485
C 013	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 014	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 029	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 030	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 035	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104

Ref Number	Description	Part Number
C 036	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 044	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 047	CAP, 680 µF, 10%, 50V, X7R, 0402	510-3685-681
C 053	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 054	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 071	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 072	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 076	4.7 µF 10V SMD TANT RL	510-2604-479
C 077	4.7 µF 10V SMD TANT RL	510-2604-479
C 078	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 079	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 080	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 083	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 084	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 086	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 087	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 088	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 089	CAP, 220 µF, 10%, 50V, X7R, 0402	510-3685-221
C 092	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 093	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 094	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 095	CAP, 1 µF, 25V, 0603, X5S, +/-20%	510-3693-105
C 097	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 098	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 099	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 100	CAP, 2200 µF, 0402,SMD, 10V, 10%	510-3681-222
C 101	CAP, 270 µF, 10%, 50V, X7R, 0402	510-3685-271
C 112	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 133	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 134	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 135	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 136	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 137	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 139	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 140	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 141	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 142	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 143	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 144	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 158	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 164	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 165	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 166	CAP, 100 µF, 402, 25V, 10%	510-3681-101

Ref Number	Description	Part Number
C 167	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 168	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 169	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 172	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 173	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 174	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 175	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 176	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 177	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 202	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 215	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 216	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 217	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 220	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 221	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 222	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 223	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 224	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 226	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 227	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 228	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 229	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 230	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 231	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 232	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 233	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 234	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 235	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 236	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 237	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 238	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 239	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 240	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 241	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 242	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 243	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 244	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 245	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 246	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 247	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 248	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 249	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 250	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103

Ref Number	Description	Part Number
C 251	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 252	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 253	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 254	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 255	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 256	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 257	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 258	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 259	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 260	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 261	1000 µF, 50V, 0402 CERAMIC CAP, X7R, +/-10%	510-3685-102
C 263	CAP, 1.0 µF, 6.3V, 10%, X5R, 0402	510-3604-105
C 265	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 266	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 267	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 268	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 269	CAP, 680 µF, 10%, 50V, X7R, 0402	510-3685-681
C 270	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 271	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 272	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 273	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 274	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 275	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 276	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 277	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 278	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 279	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 280	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 281	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 282	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 283	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 284	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 285	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 286	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 287	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 288	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 289	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 290	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 291	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 292	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 293	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 294	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 297	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103

Ref Number	Description	Part Number
C 298	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 299	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 300	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 301	CAP, 390 µF, 10%, 50V, X7R, 0402	510-3685-391
C 302	CAP, 3300 µF, 10%, 50V, X7R, 0402	510-3685-332
C 303	CAP, 8200 µF, 16V, 10%, X7R, 0402	510-3687-822
C 304	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 305	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 306	CAP, 100 µF, 402, 25V, 10%	510-3681-101
C 309	CAP, 470 µF, 10%, 50V,X7R, 0402	510-3685-471
C 310	CAP, 1.0 µF, 6.3V, 10%, X5R, 0402	510-3604-105
C 311	CAP, 1.0 µF, 6.3V, 10%, X5R, 0402	510-3604-105
C 315	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 316	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 317	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 318	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 321	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
CR 001	TVS, 5V, 5 LINE ARRAY, SMD	523-2909-005
CR 002	TVS, 5V, 5 LINE ARRAY, SMD	523-2909-005
CR 003	ZENER REG 5.6V SOT23 T&R	523-2016-569
CR 005	ZDIO, MMBZ5V6ALT1, SOT23	523-2602-001
CR 008	DUAL COLOR, RED/GRN LED, SMD	549-4001-215
CR 009	ZDIO, MMBZ5V6ALT1, SOT23	523-2602-001
CR 033	DUAL DIODES-COM ANODES	523-1504-024
CR 044	DIODE, DUAL, COMMON ANODE, 7.5V, SC89	523-1508-105
CR 045	DIODE, DUAL, COMMON ANODE, 7.5V, SC89	523-1508-105
F 001	FUSE, 0.5A, 24V, FAST ACTING, SMD, 0402	534-0402-005
FL 001	FILTER, EMI/ESD, 8 LINE	532-3003-005
J 001	CONN 16 PIN ZIF .5 MM PITCH SMD	515-7111-516
J 002	CONN 16 PIN ZIF .5 MM PITCH SMD	515-7111-516
J 003	CONN 16 PIN ZIF .5 MM PITCH SMD	515-7111-516
J 005	FINE PITCH SMD BD TO BD PLUG 60 POS(T&R)	515-7111-651
J 006	GROUNDING CLIP	537-5001-005
J 007	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 008	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 009	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 010	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 011	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014

Ref Number	Description	Part Number
L 001	8.2 µH J CHIP L 1008	542-9000-829
L 004	0.1 µH 0603 SMD INDUCTOR	542-9017-108
MP 001	SHIELD, PCB, VENTED	57851-0012-301
OSC001	OSC 20.000 MHz SMD 3.3V -40 / +85C	561-9004-200
PC 001	PCB, 5100G U BOARD	035-5500-480
Q 002	MOSFET 20V 238mA N-CH ESD SC75/SOT416, NTA4001N	576-0010-001
Q 003	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 004	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 006	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 010	MOSFET 20V 238mA N-CH ESD SC75/SOT416, NTA4001N	576-0010-001
Q 012	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 013	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 014	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 015	MOSFET 20V 238mA N-CH ESD SC75/SOT416, NTA4001N	576-0010-001
Q 016	XSTR, P CHNL MOSFET, 30V, SOT23	576-0006-330
Q 017	XSTR, P CHNL MOSFET, 30V, SOT23	576-0006-330
R 005	CHIP RESISTOR, 0402	569-0165-100
R 055	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 057	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 058	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 060	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 067	RES, 47K OHM 5%, 402	569-0165-473
R 075	RES, 10K, 5%, 402	569-0165-103
R 076	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 080	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 081	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 083	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 084	RESISTOR 1%, 0402, 4.99K	569-0161-368
R 085	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 086	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 087	RESISTOR 1%, 0402, 49.9K OHM	569-0161-468
R 088	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 089	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 090	RESISTOR 1%, 0402, 10K T/R	569-0161-401
R 091	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 095	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 096	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 097	75 OHMS J 063W 0603 CHIP	569-0155-750

Ref Number	Description	Part Number
R 098	RES, 10K, 5%, 402	569-0165-103
R 099	RES, 10K, 5%, 402	569-0165-103
R 101	RES, 47K OHM 5%, 402	569-0165-473
R 103	RES, 47K OHM 5%, 402	569-0165-473
R 104	RES, 47K OHM 5%, 402	569-0165-473
R 105	RES, 47K OHM 5%, 402	569-0165-473
R 107	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 111	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 112	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 113	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 114	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 115	RESISTOR 1%, 0402, 49.9K OHM	569-0161-468
R 116	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 117	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 118	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 119	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 120	RESISTOR 1%, 0402, 49.9K OHM	569-0161-468
R 122	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 123	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 128	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 129	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 130	RES, 47K OHM 5%, 402	569-0165-473
R 131	RES, 47K OHM 5%, 402	569-0165-473
R 132	RES, 47K OHM 5%, 402	569-0165-473
R 135	RES, 47K OHM 5%, 402	569-0165-473
R 136	RES, 47K OHM 5%, 402	569-0165-473
R 137	RES, 47K OHM 5%, 402	569-0165-473
R 138	RES, 47K OHM 5%, 402	569-0165-473
R 172	RES, 10K, 5%, 402	569-0165-103
R 173	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 176	75 OHMS J 063W 0603 CHIP	569-0155-750
R 180	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 244	RESISTOR 1%, 0402, 10K	569-0161-401
R 252	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 254	RES, 47K OHM 5%, 402	569-0165-473
R 255	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 256	RES, 4.7K, 5%, 402	569-0165-472
R 263	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 269	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 278	75 OHMS J 063W 0603 CHIP	569-0155-750
R 279	CHIP RESISTOR, 0402	569-0165-100
R 280	RES, 4.7K, 5%, 402	569-0165-472
R 281	RES, 4.7K, 5%, 402	569-0165-472

Ref Number	Description	Part Number
R 282	RES, 10K, 5%, 402	569-0165-103
R 283	RES, 10K, 5%, 402	569-0165-103
R 284	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 285	RES, 10K, 5%, 402	569-0165-103
R 286	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 287	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 288	RES, 10K, 5%, 402	569-0165-103
R 289	RES, 10K, 5%, 402	569-0165-103
R 290	RES, 10K, 5%, 402	569-0165-103
R 291	RES, 10K, 5%, 402	569-0165-103
R 292	RES, 10K, 5%, 402	569-0165-103
R 293	RES, 10K, 5%, 402	569-0165-103
R 294	RES, 10K, 5%, 402	569-0165-103
R 295	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 296	RES, 10K, 5%, 402	569-0165-103
R 297	RES, 10K, 5%, 402	569-0165-103
R 300	RES, 10K, 5%, 402	569-0165-103
R 303	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 304	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 305	RES, 10K, 5%, 402	569-0165-103
R 306	RES, 10K, 5%, 402	569-0165-103
R 307	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 308	RES, 10K, 5%, 402	569-0165-103
R 309	RES, 10K, 5%, 402	569-0165-103
R 311	RES, 10K, 5%, 402	569-0165-103
R 312	RES, 10K, 5%, 402	569-0165-103
R 313	RES, 10K, 5%, 402	569-0165-103
R 314	RES, 10K, 5%, 402	569-0165-103
R 315	RES, 10K, 5%, 402	569-0165-103
R 316	RES, 10K, 5%, 402	569-0165-103
R 317	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 318	RES, 10K, 5%, 402	569-0165-103
R 319	RES, 10K, 5%, 402	569-0165-103
R 320	CHIP RESISTOR, 0402	569-0165-100
R 321	RES, 10K, 5%, 402	569-0165-103
R 322	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 323	RESISTOR 1%, 0402, 20K OHM	569-0161-432
R 324	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 325	RESISTOR 1%, 0402, 825K OHM	569-0161-589
R 326	RESISTOR 1%, 0402, 10K	569-0161-401
R 327	RESISTOR 1%, 0402, 6.81K OHM	569-0161-381
R 328	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 329	RESISTOR 1%, 0402, 4.99K	569-0161-368

Ref Number	Description	Part Number
R 330	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 331	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 332	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 333	RES, 34K, 1%, 402	569-0161-452
R 334	RES, 0 OHM	569-0155-001
R 335	RESISTOR 56.2K, 1%, 0402	569-0161-473
R 336	RES, 31.6K, 1%, 402	569-0161-449
R 337	RES, 63.4K, 1%, 402	569-0161-478
R 338	RESISTOR 1%, 0402, 4.99K	569-0161-368
R 339	RESISTOR 1%, 0402, 49.9K OHM	569-0161-468
R 340	RESISTOR 1%, 0402, 49.9K OHM	569-0161-468
R 341	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 343	RES, 4.7K, 5%, 402	569-0165-472
R 344	RES, 4.7K, 5%, 402	569-0165-472
R 345	RES, 4.7K, 5%, 402	569-0165-472
R 346	RES, 10K, 5%, 402	569-0165-103
R 347	RES, 10K, 5%, 402	569-0165-103
R 348	RES, 10K, 5%, 402	569-0165-103
R 349	RES, 10K, 5%, 402	569-0165-103
R 350	RES, 10K, 5%, 402	569-0165-103
R 360	RES, 10K, 5%, 402	569-0165-103
R 361	RES, 10K, 5%, 402	569-0165-103
R 362	RES, 10K, 5%, 402	569-0165-103
R 363	RES, 10K, 5%, 402	569-0165-103
R 364	RES, 10K, 5%, 402	569-0165-103
R 365	RES, 10K, 5%, 402	569-0165-103
R 367	RES, 10K, 5%, 402	569-0165-103
R 376	RESISTOR, 255K, 1%, 0402	569-0161-540
R 377	RES, 10K, 5%, 402	569-0165-103
R 378	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 379	RES, 10K, 5%, 402	569-0165-103
R 380	CHIP RESISTOR, 0402	569-0165-100
R 381	CHIP RESISTOR, 0402	569-0165-100
R 382	RES, 31.6K, 1%, 402	569-0161-449
R 383	RES, 10K, 5%, 402	569-0165-103
R 384	RES, 10K, 5%, 402	569-0165-103
R 385	RES, 10K, 5%, 402	569-0165-103
R 386	RES, 34K, 1%, 402	569-0161-452
R 387	RESISTOR 1%, 0402, 49.9K OHM	569-0161-468
R 388	RES, 10K, 5%, 402	569-0165-103
R 389	RES, 10K, 5%, 402	569-0165-103
R 390	RES, 10K, 5%, 402	569-0165-103
R 391	RESISTOR, 1K OHM, 0402, SMT	569-0165-102

Ref Number	Description	Part Number
R 392	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 393	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 394	RES, 0 ohm, 5%, 402	569-0165-001
R 396	RESISTOR 1%, 0402, 7.5K	569-0161-385
R 397	RESISTOR 1%, 0402, 7.5K	569-0161-385
R 402	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 403	RES, 10K, 5%, 402	569-0165-103
R 404	RES, 10K, 5%, 402	569-0165-103
R 406	RESISTOR, 100 OHM, 402 SIZE, 5%	569-0165-101
R 407	CHIP RESISTOR, 0402	569-0165-100
R 410	RES, 470K, 402, SMD, 5%	569-0165-474
R 411	RES, 10K, 5%, 402	569-0165-103
U 001	IC, PPC, 66 MHz, EXT TEMP, MPC870	544-5003-145
U 004	IC, FLASH MEM, 16 x 4M, 85NS, 64 BGA, RC28F640P30T85	544-5001-260
U 005	IC, CPLD, 64 CELL, 45 IO, MIXED IO VOLTAGE	544-5001-421
U 006	SRAM, 1Mx16, 70ns, 3.3v	544-1028-198
U 007	IC, DAC, 8 BIT, LOW PWR, SC-70, 2.7 TO 5.5V	544-2031-020
U 008	AMP, AUDIO POWER, 150-mW, SOIC, TPA122	544-2006-030
U 017	OpAmp, Dual, single sply 8p	544-2018-015
U 018	OpAmp, Dual, single sply 8p	544-2018-015
U 019	OPAMP, QUAD SINGLE SPLY SSOP	544-2020-013
U 021	AMP, AUDIO POWER, 150-mW, SOIC, TPA122	544-2006-030
U 022	TRI ST BUFR 3.3V SINGLE GATE 5-P T&R	544-3914-125
U 023	SINGLE D F/F WITH PR/CLR, LOW POWER, 8 PIN SOP	544-1010-045
U 024	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 026	IC, VOLT SUPV W RESET, MSOP8, TPS3307-18	544-2003-107
U 034	IC, VOLT COMPARATOR, SC70, LMV331	544-2025-022
U 036	TRANSCEIVER RS232	544-2023-036
U 037	OpAmp, Dual, single sply 8p	544-2018-015
U 039	IC, UCNTRL, 60KB FLASH, 4KB SRAM, 48QFN, MC9S08GT60	544-1030-015
U 040	**NLA** IC, SPI FLASH, 512 KBIT, TSSOP8, M25P05	544-3772-512
U 041	OpAmp, Dual, single sply 8p	544-2018-015
U 042	IC, DUAL BUFFER, OPEN DRAIN, NC7WV07	544-3914-130
U 043	IC, NC7SP14, INVERTER, SCHMITT, SC70	544-3532-016

Ref Number	Description	Part Number
	5100G UI Bd, w/o Display, Non-FM (Eff Begin 01-11-07)	023-5500-487
C 013	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 014	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 029	CERAMIC CAPACITOR, 10 µF, 1206,10V	510-3755-106
C 030	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 035	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 036	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 044	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 047	CAP, 680 pF, 10%, 50V, X7R, 0402 (t&r)	510-3685-681
C 053	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 054	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 071	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 072	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 076	CAP, 22 µF, 16V, 20%, X5R, 1206	510-3804-226
C 077	CAP, 10 µF, 16V, 10%, X5R, 0805	510-3803-106
C 078	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 079	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 080	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 083	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 084	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 086	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 087	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 088	CAP, 22 µF, 16V, 20%, X5R, 1206	510-3804-226
C 089	CAP, 220 pF, 10%, 50V, X7R, 0402 (t&r)	510-3685-221
C 092	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 093	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 094	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 095	CAP, 1 µF, 25V, 0603, X5S, +/-20%	510-3693-105
C 097	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 098	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 099	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 100	CAP, 2200 pF, 0402, SMD, 10V, 10%	510-3681-222
C 101	CAP, 270 pF, 10%, 50V, X7R, 0402 (t&r)	510-3685-271
C 112	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 133	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 134	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 135	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 136	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 137	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 139	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 140	CAP, 100 pF, 402, 25V, 10%	510-3681-101

Ref Number	Description	Part Number
C 142	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 143	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 144	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 158	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 164	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 165	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 166	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 167	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 168	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 169	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 172	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 173	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 174	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 175	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 176	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 177	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 202	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 215	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 216	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 217	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 220	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 221	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 222	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 223	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 224	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 226	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 227	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 228	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 229	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 230	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 231	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 232	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 233	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 234	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 235	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 236	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 237	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 238	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 239	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 240	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 241	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 242	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 243	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104

Ref Number	Description	Part Number
C 244	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 245	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 246	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 247	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 248	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 249	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 250	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 251	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 252	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 253	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 254	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 255	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 256	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 257	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 258	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 259	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 260	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 261	1000 pF, 50V, 0402 CERAMIC CAP, X7R, +/-10%	510-3685-102
C 263	CAP, 1.0 µF, 6.3V, 10%, X5R, 0402	510-3604-105
C 265	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 266	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 267	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 268	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 269	CAP, 680 pF, 10%, 50V, X7R, 0402 (t&r)	510-3685-681
C 270	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 271	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 272	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 273	CAP, 470 pF, 10%, 50V,X7R,0402	510-3685-471
C 274	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 275	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 276	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 277	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 278	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 279	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 280	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 281	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 282	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 283	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 284	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 285	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 286	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 287	CAP, 100 pF, 402, 25V, 10%	510-3681-101
C 288	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103

Ref Number	Description	Part Number
C 289	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 290	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 291	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 292	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 293	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 294	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 297	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 298	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 299	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 300	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 301	CAP, 390 pF, 10%, 50V, X7R, 0402	510-3685-391
C 302	CAP, 3300 pF, 10%, 50V, X7R, 0402	510-3685-332
C 303	CAP, 8200 pF, 16V, 10%, X7R, 0402 (t&r)	510-3687-822
C 304	CAP, 470 pF, 10%, 50V, X7R, 0402	510-3685-471
C 305	CAP, 470 pF, 10%, 50V, X7R, 0402	510-3685-471
C 306	CAP,100 pF, 402, 25V, 10%	510-3681-101
C 309	CAP, 470 pF, 10%, 50V, X7R, 0402	510-3685-471
C 310	CAP, 1.0 µF, 6.3V, 10%, X5R, 0402	510-3604-105
C 311	CAP, 1.0 µF, 6.3V, 10%, X5R, 0402	510-3604-105
C 315	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 316	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 317	CAP, 33 pF, 10%, 402, 25V	510-3681-330
C 318	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 321	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
CR 001	TVS, 5V, 5 LINE ARRAY, SMD	523-2909-005
CR 002	TVS, 5V, 5 LINE ARRAY, SMD	523-2909-005
CR 003	ZENER REG 5.6V SOT23 T&R*	523-2016-569
CR 005	ZDIO, MMBZ5V6ALT1, SOT23	523-2602-001
CR 008	DUAL COLOR, RED/GRN LED, SMD	549-4001-215
CR 009	ZDIO, MMBZ5V6ALT1, SOT23	523-2602-001
CR 033	DUAL DIODES-COM ANODES	523-1504-024
CR 044	DIODE, DUAL, COMMON ANODE, 7.5V, SC89, T&R	523-1508-105
CR 045	DIODE, DUAL, COMMON ANODE, 7.5V, SC89, T&R	523-1508-105
FL 001	FILTER, EMI/ESD, 8 LINE, T&R	532-3003-005
J 001	CONN 16 PIN ZIF .5 MM PITCH SMD	515-7111-516
J 002	CONN 16 PIN ZIF .5 MM PITCH SMD	515-7111-516
J 003	CONN 16 PIN ZIF .5 MM PITCH SMD	515-7111-516
J 005	FINE PITCH SMD BD TO BD PLUG 60 POS(T&R)	515-7111-651
J 006	GROUNDING CLIP	537-5001-005
J 007	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014

Ref Number	Description	Part Number
J 008	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 009	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 010	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 011	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
L 001	8.2 µH J CHIP L 1008	542-9000-829
L 004	0.1 µH 0603 SMD INDUCTOR (T&R)	542-9017-108
MP 001	SHIELD, PCB, VENTED	578-5100-12301
OSC001	OSC 20.000 MHz SMD 3.3V -40 / +85C	561-9004-200
PC 001	PCB, 5100G UI BOARD (REV 1)	355-5004-8001
Q 002	MOSFET 20V 238mA N-CH ESD SC75/SOT416, NTA4001N	576-0010-001
Q 003	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 004	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 006	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 010	MOSFET 20V 238mA N-CH ESD SC75/SOT416, NTA4001N	576-0010-001
Q 012	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 013	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 014	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 015	MOSFET 20V 238mA N-CH ESD SC75/SOT416, NTA4001N	576-0010-001
Q 016	XSTR, P CHNL MOSFET, 30V, SOT23	576-0006-330
Q 017	XSTR, P CHNL MOSFET, 30V, SOT23	576-0006-330
R 005	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 055	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 057	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 058	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 060	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 067	RES,47K OHM 5%, 402	569-0165-473
R 075	RES, 10K, 5%, 402	569-0165-103
R 076	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 080	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 081	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 083	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 084	RESISTOR 1%, 0402, 4.99K, T&R	569-0161-368
R 085	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 086	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 087	RESISTOR 1%, 0402, 49.9K OHM, T&R	569-0161-468
R 088	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 089	RESISTOR 1%, 0402, 100K OHM	569-0161-501

Ref Number	Description	Part Number
R 090	RESISTOR 1%, 0402, 10K T/R	569-0161-401
R 091	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 095	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 096	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 097	75 OHMS J 063W 0603 CHIP	569-0155-750
R 098	RES, 10K, 5%, 402	569-0165-103
R 099	RES, 10K, 5%, 402	569-0165-103
R 101	RES, 47K OHM 5%, 402	569-0165-473
R 103	RES, 47K OHM 5%, 402	569-0165-473
R 104	RES, 47K OHM 5%, 402	569-0165-473
R 105	RES, 47K OHM 5%, 402	569-0165-473
R 107	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 111	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 112	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 113	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 114	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 115	RESISTOR 1%, 0402, 49.9K OHM, T&R	569-0161-468
R 116	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 117	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 118	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 119	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 120	RESISTOR 1%, 0402, 49.9K OHM, T&R	569-0161-468
R 122	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 123	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 128	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 129	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 130	RES, 47K OHM 5%, 402	569-0165-473
R 131	RES, 47K OHM 5%, 402	569-0165-473
R 132	RES, 47K OHM 5%, 402	569-0165-473
R 135	RES, 47K OHM 5%, 402	569-0165-473
R 136	RES, 47K OHM 5%, 402	569-0165-473
R 137	RES, 47K OHM 5%, 402	569-0165-473
R 138	RES, 47K OHM 5%, 402	569-0165-473
R 172	RES, 10K, 5%, 402	569-0165-103
R 173	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 176	75 OHMS J 063W 0603 CHIP	569-0155-750
R 180	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 244	RESISTOR 1%, 0402, 10K T/R	569-0161-401
R 252	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 254	RES,47K OHM 5%, 402	569-0165-473
R 255	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 256	RES, 4.7K, 5%, 402	569-0165-472
R 257	RES, 0ohm, 5%, 402	569-0165-001

Ref Number	Description	Part Number
R 263	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 269	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 278	75 OHMS J 063W 0603 CHIP	569-0155-750
R 279	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 280	RES, 4.7K, 5%, 402	569-0165-472
R 281	RES, 4.7K, 5%, 402	569-0165-472
R 282	RES, 10K, 5%, 402	569-0165-103
R 283	RES, 10K, 5%, 402	569-0165-103
R 284	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 285	RES, 10K, 5%, 402	569-0165-103
R 286	RESISTOR, 1%, 0402, 2.21K OHM	569-0161-334
R 287	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 288	RES, 10K, 5%, 402	569-0165-103
R 289	RES, 10K, 5%, 402	569-0165-103
R 290	RES, 10K, 5%, 402	569-0165-103
R 291	RES, 10K, 5%, 402	569-0165-103
R 292	RES, 10K, 5%, 402	569-0165-103
R 293	RES, 10K, 5%, 402	569-0165-103
R 294	RES, 10K, 5%, 402	569-0165-103
R 295	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 296	RES, 10K, 5%, 402	569-0165-103
R 297	RES, 10K, 5%, 402	569-0165-103
R 300	RES, 10K, 5%, 402	569-0165-103
R 303	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 304	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 305	RES, 10K, 5%, 402	569-0165-103
R 306	RES, 10K, 5%, 402	569-0165-103
R 307	RES, 1K OHM, 1%, 0402 SIZE, SMT	569-0161-301
R 308	RES, 10K, 5%, 402	569-0165-103
R 309	RES, 10K, 5%, 402	569-0165-103
R 311	RES, 10K, 5%, 402	569-0165-103
R 312	RES, 10K, 5%, 402	569-0165-103
R 313	RES, 10K, 5%, 402	569-0165-103
R 314	RES, 10K, 5%, 402	569-0165-103
R 315	RES, 10K, 5%, 402	569-0165-103
R 316	RES, 10K, 5%, 402	569-0165-103
R 317	RESISTOR, 470 OHM, 0402, SMT	569-0165-471
R 318	RES, 10K, 5%, 402	569-0165-103
R 319	RES, 10K, 5%, 402	569-0165-103
R 320	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 321	RES, 10K, 5%, 402	569-0165-103
R 322	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 323	RESISTOR 1%, 0402, 20K OHM, T&R	569-0161-432

Ref Number	Description	Part Number
R 324	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 325	RESISTOR 1%, 0402, 825K OHM	569-0161-589
R 326	RESISTOR 1%, 0402, 10K T/R	569-0161-401
R 327	RESISTOR 1%, 0402, 6.81K OHM, T&R	569-0161-381
R 328	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 329	RESISTOR 1%, 0402, 4.99K, T&R	569-0161-368
R 330	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 331	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 332	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 333	RES, 34K, 1%, 402	569-0161-452
R 334	RES, 0 OHM	569-0155-001
R 335	RESISTOR 56.2K, 1%, 0402	569-0161-473
R 336	RES, 31.6K, 1%, 402	569-0161-449
R 337	RES, 63.4K, 1%, 402	569-0161-478
R 338	RESISTOR 1%, 0402, 4.99K, T&R	569-0161-368
R 339	RESISTOR 1%, 0402, 49.9K OHM, T&R	569-0161-468
R 340	RESISTOR 1%, 0402, 49.9K OHM, T&R	569-0161-468
R 341	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 343	RES, 4.7K, 5%, 402	569-0165-472
R 344	RES, 4.7K, 5%, 402	569-0165-472
R 345	RES, 4.7K, 5%, 402	569-0165-472
R 346	RES, 10K, 5%, 402	569-0165-103
R 347	RES, 10K, 5%, 402	569-0165-103
R 348	RES, 10K, 5%, 402	569-0165-103
R 349	RES, 10K, 5%, 402	569-0165-103
R 350	RES, 10K, 5%, 402	569-0165-103
R 360	RES, 10K, 5%, 402	569-0165-103
R 361	RES, 10K, 5%, 402	569-0165-103
R 362	RES, 10K, 5%, 402	569-0165-103
R 363	RES, 10K, 5%, 402	569-0165-103
R 364	RES, 10K, 5%, 402	569-0165-103
R 365	RES, 10K, 5%, 402	569-0165-103
R 367	RES, 10K, 5%, 402	569-0165-103
R 376	RESISTOR, 255K, 1%, 0402	569-0161-540
R 377	RES, 10K, 5%, 402	569-0165-103
R 378	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 379	RES, 10K, 5%, 402	569-0165-103
R 380	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 381	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 382	RES, 31.6K, 1%, 402	569-0161-449
R 383	RES, 10K, 5%, 402	569-0165-103
R 384	RES, 10K, 5%, 402	569-0165-103
R 385	RES, 10K, 5%, 402	569-0165-103

Ref Number	Description	Part Number
R 386	RES, 34K, 1%, 402	569-0161-452
R 387	RESISTOR 1%, 0402, 49.9K OHM, T&R	569-0161-468
R 388	RES, 10K, 5%, 402	569-0165-103
R 389	RES, 10K, 5%, 402	569-0165-103
R 390	RES, 10K, 5%, 402	569-0165-103
R 391	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 392	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 393	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 394	RES, 0ohm, 5%, 402	569-0165-001
R 396	RESISTOR 1%, 0402, 7.5K, T&R	569-0161-385
R 397	RESISTOR 1%, 0402, 7.5K, T&R	569-0161-385
R 402	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 403	RES, 10K, 5%, 402	569-0165-103
R 404	RES, 10K, 5%, 402	569-0165-103
R 406	RESISTOR, 100 OHM, 402 SIZE, 5%	569-0165-101
R 407	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 410	RES, 470K, 402, SMD, 5%	569-0165-474
R 411	RES, 10K, 5%, 402	569-0165-103
U 001	IC, PPC, 66 MHz, EXT TEMP, MPC870	544-5003-145
U 004	IC, FLASH MEM, 16 x 4M, 85NS, 64 BGA, RC28F640P30T85	544-5001-260
U 005	IC, CPLD, 64 CELL, 45 IO, MIXED IO VOLTAGE	544-5001-421
U 006	SRAM, 1Mx16, 70ns, 3.3v, (T&R)	544-1028-198
U 007	IC, DAC, 8 BIT, LOW PWR, SC-70, 2.7 TO 5.5V	544-2031-020
U 008	AMP, AUDIO PWR, BTL, VOL CTRL, 8 PIN SOIC	544-2006-035
U 017	OpAmp, Dual, single sply 8p(regA T&R)	544-2018-015
U 018	OpAmp, Dual, single sply 8p(regA T&R)	544-2018-015
U 019	OPAMP, QUAD SINGLE SPLY SSOP(regAT&R)	544-2020-013
U 021	AMP, AUDIO PWR, BTL, VOL CTRL, 8 PIN SOIC	544-2006-035
U 022	TRI ST BUFR 3.3V SINGLE GATE 5-P T&R	544-3914-125
U 023	SINGLE D F/F WITH PR/CLR, LOW POWER, 8 PIN SOP	544-1010-045
U 024	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 026	IC, VOLT SUPV W RESET, MSOP8, TPS3307-18	544-2003-107
U 034	IC, VOLT COMPARATOR, SC70, LMV331	544-2025-022
U 036	TRANSCEIVER RS232 (t&r)	544-2023-036
U 037	OpAmp, Dual, single sply 8p(regA T&R)	544-2018-015
U 039	IC, UCNTRL, 60KB FLASH, 4KB SRAM, 48QFN, MC9S08GT60	544-1030-015
U 040	**NLA** IC, SPI FLASH, 512 KBIT, TSSOP8, M25P05	544-3772-512
U 041	OpAmp, Dual, single sply 8p(regA T&R)	544-2018-015
U 042	IC, DUAL BUFFER, OPEN DRAIN, NC7WV07	544-3914-130
U 043	IC, NC7SP14, INVERTER, SCHMITT, SC70	544-3532-016

Ref Number	Description	Part Number
	Model I 7/800 MHz, SEM, Black, No Display	023-5170-061
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB, PLAIN, BLACK (See separate listing on Page 9-2.)	023-5100-341
A 080	COMMON PARTS, FINAL ASSEMBLY (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD ENCRYPTED (See separate listing on Page 9-28.)	023-5500-180
A 200	RF MODULE 700/800 MHz CALAMP 6A830	585-5500-710
A 400	ASSEMBLY, UI PCB, PLAIN (See separate listing on Page 9-9.)	023-5100-485

Ref Number	Description	Part Number
	Logic Board, Encrypted	023-5500-180
C 001	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 002	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 003	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 004	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 014	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 015	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 016	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 017	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 018	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 019	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 020	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 021	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 022	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 023	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 024	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 025	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 026	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 027	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 059	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 063	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 064	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 065	4.7 µF 10V SMD TANT RL	510-2624-479
C 066	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 067	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 069	CERAMIC CAPACITOR,2.2 µF, 1206, 16V	510-3925-225
C 070	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 071	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 072	TANTALUM CAPACITOR 150 µF CASED 6V	510-2001-151
C 073	TANTALUM CAPACITOR 150 µF CASED 6V	510-2001-151
C 076	4.7 µF 10V SMD TANT RL	510-2624-479

Ref Number	Description	Part Number
C 077	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 078	4.7 µF 10V SMD TANT RL	510-2624-479
C 079	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 080	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 081	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 082	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 084	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 085	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 087	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 090	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 091	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 092	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 100	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 101	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 102	4.7 µF 10V SMD TANT RL	510-2624-479
C 104	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 105	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 109	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 110	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 111	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 114	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 115	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 117	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 118	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 119	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 120	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 121	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 122	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 123	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 124	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 125	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 126	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 127	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 128	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 129	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 130	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 132	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 133	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 134	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 137	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 138	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 139	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 140	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105

Ref Number	Description	Part Number
C 141	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 142	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 143	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 144	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 145	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 146	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 147	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 148	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 149	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 150	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 151	CAP, 470 µF, 10%, 402, 25V	510-3681-471
C 152	CAP, 0.1 µF, 16V, 10%, X7R, 0402	510-3687-104
C 153	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 154	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 155	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 157	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 158	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 159	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
CR 001	DUAL DIODES-COM ANODES	523-1504-024
CR 004	SILICON SWITCHING DIODE SC-75	523-1004-021
CR 008	DUAL DIODES-COM ANODES	523-1504-024
J 001	CONN, 26-P, ZIF 0.5MM PITCH SMD	515-7111-526
J 002	FINE PITCH SMD BD TO BD RECEP 60 PIN(TR)	515-7111-650
J 003	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 004	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
L 003	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
L 004	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
L 005	270 nH 0603 SMD INDUCTOR	542-9017-274
L 007	270 nH 0603 SMD INDUCTOR	542-9017-274
L 010	270 nH 0603 SMD INDUCTOR	542-9017-274
L 011	INDUCTOR, 27 UH, 1.2A, SMD	542-5010-019
L 013	270 nH 0603 SMD INDUCTOR	542-9017-274
L 014	270 nH 0603 SMD INDUCTOR	542-9017-274
L 015	270 nH 0603 SMD INDUCTOR	542-9017-274
L 016	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
Q 001	POWER MOSFET N+P PAIR 20 V SC-70	576-0006-244
Q 002	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 003	POWER MOSFET N+P PAIR 20 V SC-70	576-0006-244

Ref Number	Description	Part Number
R 002	RES, 10K, 5%, 402	569-0165-103
R 003	RES, 10K, 5%, 402	569-0165-103
R 004	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 005	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 009	RES, 0 ohm, 5%, 402	569-0165-001
R 019	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 020	RESISTOR, 15K OHM, 0402, SMT	569-0165-153
R 022	SURFACE MOUNT 20K, 0402, RESISTOR	569-0165-203
R 023	RESISTOR, 15K OHM, 0402, SMT	569-0165-153
R 024	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 028	RES, 4.7K, 5%, 402	569-0165-472
R 029	RES, 4.7K, 5%, 402	569-0165-472
R 030	RES, 10K, 5%, 402	569-0165-103
R 031	RES, 30.1K, 1%, 0402	569-0161-447
R 032	RES, 30.1K, 1%, 0402	569-0161-447
R 033	SURFACE MOUNT 20K, 0402, RESISTOR	569-0165-203
R 059	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 060	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 061	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 062	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 063	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 064	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 065	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 068	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 069	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 074	CHIP RESISTOR, 0402	569-0165-100
R 075	RESISTOR, 100 OHM, 402 SIZE, 5%	569-0165-101
R 078	RESISTOR 1%, 221K, 0402	569-0161-534
R 081	RESISTOR 1%, 0603, 100K OHM	569-0151-501
R 088	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 090	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 091	RES, 10K, 5%, 402	569-0165-103
R 092	RES, 10K, 5%, 402	569-0165-103
R 097	RES, 10K, 5%, 402	569-0165-103
R 098	RES, 10K, 5%, 402	569-0165-103
R 100	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 101	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 102	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 103	RESISTOR 1%, 0603, 13K OHM	569-0151-412
R 105	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 106	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 107	RESISTOR 1%, 0603, 20K OHM	569-0151-430
R 110	RESISTOR 1%, 0603, 38.3K OHM	569-0151-457

Ref Number	Description	Part Number
R 111	RESISTOR 1%, 0603, 12.1K OHM	569-0151-409
R 182	RES, 10K, 5%, 402	569-0165-103
R 186	RES, 10K, 5%, 402	569-0165-103
R 188	RES, 10K, 5%, 402	569-0165-103
R 190	RES, 10K, 5%, 402	569-0165-103
R 191	RES, 10K, 5%, 402	569-0165-103
R 193	RES, 10K, 5%, 402	569-0165-103
R 194	RES, 10K, 5%, 402	569-0165-103
R 195	RES, 10K, 5%, 402	569-0165-103
R 236	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 237	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 238	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 239	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 240	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 241	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 242	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 243	RES, 10K, 5%, 402	569-0165-103
R 244	RES, 10K, 5%, 402	569-0165-103
R 245	RES, 10K, 5%, 402	569-0165-103
R 249	RES, 10K, 5%, 402	569-0165-103
R 253	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 254	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 255	CHIP RESISTOR, 0402	569-0165-100
R 259	CHIP RESISTOR, 0402	569-0165-100
R 260	CHIP RESISTOR, 0402	569-0165-100
R 261	CHIP RESISTOR, 0402	569-0165-100
R 262	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 263	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 264	RES, 0 ohm, 5%, 402	569-0165-001
R 265	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 266	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 267	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 268	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 269	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 270	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 271	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 272	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 273	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 274	CHIP RESISTOR, 0402	569-0165-100
R 275	CHIP RESISTOR, 0402	569-0165-100
R 276	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 277	RES, 0 ohm, 5%, 402	569-0165-001
R 278	RESISTOR, 1K OHM, 0402, SMT	569-0165-102

Ref Number	Description	Part Number
R 279	RES, 0 ohm, 5%, 402	569-0165-001
R 281	RES, 0 ohm, 5%, 402	569-0165-001
R 282	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 283	RES, 0 ohm, 5%, 402	569-0165-001
R 284	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 286	RES, 0 ohm, 5%, 402	569-0165-001
R 288	RES, 0 ohm, 5%, 402	569-0165-001
R 289	RES, 100K, 0.06W, 5%, 402	569-0165-104
R 290	RES, 0 ohm, 5%, 402	569-0165-001
R 291	RES, 10K, 5%, 402	569-0165-103
R 292	RES, 10K, 5%, 402	569-0165-103
R 294	RES, 10K, 5%, 402	569-0165-103
R 295	RES, 0 ohm, 5%, 402	569-0165-001
R 296	RES, 47K OHM 5%, 402	569-0165-473
R 297	RES, 47K OHM 5%, 402	569-0165-473
R 299	RES, 0 ohm, 5%, 402	569-0165-001
R 301	CHIP RESISTOR, 0402	569-0165-100
R 302	CHIP RESISTOR, 0402	569-0165-100
R 303	CHIP RESISTOR, 0402	569-0165-100
R 306	CHIP RESISTOR, 0402	569-0165-100
U 008	OPAMP,QUAD SINGLE SPLY SSOP	544-2020-013
U 009	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 011	LDO,DMOS400MA 5V 8P MSOP	544-2603-055
U 013	Reg'L, LDO 3.8V, 50MA SOT23, 5pin,T&R	544-5001-335
U 015	DSP,TMS3205510AGGWA1, 160MHz BGA trays	544-5003-133
U 016	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 017	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 018	LDO,DMOS400MA 5V 8P MSOP	544-2603-055
U 020	IC, CPLD, 64 CELL, 45 IO, MIXED IO VOLTAGE	544-5001-421
U 022	SEM ENCRYPTION MODULE 5509 DSP	023-5000-980
U 026	OpAmp, Dual, single sply 8p	544-2018-015
U 027	AIC21 16-BIT DUAL CODEC, LOW POWER	544-3016-057
U 042	REGULATOR LDO, ADJ TO 5.5V 500mA, MSOP-8	544-2603-057
U 043	REGULATOR LDO, ADJ TO 5.5V 500mA, MSOP-8	544-2603-057
U 045	IC, LDO, 3.3V, 150MA, SOT23, TPS73133	544-2603-068
U 046	CONV, SYNC STEP DOWN, 2.7-10V IN. 1.8V OUT	544-4006-012
U 047	CONV,SYNC STEP DOWN V.REG, 2.7-10V IN, 3.3V OUT	544-4006-014
U 049	CONV, SYNC STEP DOWN, 2.7-10V IN. VAR OUT	544-4006-010
Y 001	OSC 20.000 MHz SMD 3.3V -40 / +85C	561-9004-200
Y 002	TCXO, 12.288 MHz, 2PPM, HCMOS	518-7012-210

Ref Number	Description	Part Number
	Model II 7/800 MHz, No SEM, Black, Simple Keypad	023-5170-162
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB, NON-DTMF, BLACK (See separate listing on Page 9-34.)	023-5100-351
A 080	COMMON PARTS, FINAL ASSEMBLY (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD, NON-ENCRYPTED (See separate listing on Page 9-4.)	023-5500-185
A 200	RF MODULE 700/800 MHz ONLY CALAMP 6A830	585-5500-710
A 400	ASSEMBLY, UI PCB, NON-DTMF (See separate listing on Page 9-34.)	023-5100-482

Ref Number	Description	Part Number
	Assembly, Front Housing, Without UI PCB, Non-DTMF, Black	023-5100-351
A 040	ASSEMBLY CONTROLS, 5100 (See separate listing on Page 9-2.)	023-5100-045
A 060	ASSEMBLY, FR HOUSING, BLACK	587-5100-06101
HW 102	SPNR NUT M6-.75-6H MET	013-1313-005
HW 105	SPNR NUT M6-.75-6H MET	013-1313-005
MP 006	LIGHTPIPE / SLEEVE ASSEMBLY	032-0431-194
MP 104	BUTTON, EMERGENCY	320-4312-0801
MP 105	5100 3 POS SELECTOR RING	015-0805-653
MP 106	SPACER, SELECTOR SWITCH 5100	032-0431-166
MP 107	KNOB, SELECTOR, 5100	032-5100-100
MP 108	KNOB,VOLUME, 5100	032-5100-101
MP 110	KEYPAD, NON-DTMF	320-4312-0102
MP 111	BEZEL,FRONT, NON-DTMF, BLACK	320-4311-4504
NP 101	LABEL, EFJ LOGO, FRONT 5100	559-5000-550

Ref Number	Description	Part Number
	Assembly, UI PC Board, Non-DTMF	023-5100-482
A 400	5100G UI BD	023-5500-480
DS 010	LCD 49 X 96 FSN EXTENDED TEMP COG	549-5000-005
EP 010	FOAM FRAME DISPLAY BACKLIGHT 5100	574-3500-065
EP 015	LIGHT PIPE, LCD	585-5100-02101
MP 010	SPACER, LIGHT PIPE	574-3500-11701

Ref Number	Description	Part Number
MP 132	COMPRESSION PAD, UI PCB	574-5100-13201
S 010	DOME ARRAY, TOP	583-9511-02101

Ref Number	Description	Part Number
	Model II 7/800 MHz, SEM, Black, Simple Keypad	023-5170-062
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB, NON-DTMF, BLACK (See separate listing on Page 9-34.)	023-5100-351
A 080	COMMON PARTS, FINAL ASSEMBLY (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD ENCRYPTED (See separate listing on Page 9-28.)	023-5500-180
A 200	RF MODULE 700/800 MHz ONLY CALAMP 6A830	585-5500-710
A 400	ASSEMBLY, UI PCB, NON-DTMF (See separate listing on Page 9-34.)	023-5100-482

Ref Number	Description	Part Number
	Model III 7/800 MHz, No SEM, Black, DTMF	023-5170-163
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB, DTMF BLACK (See separate listing on Page 9-35.)	023-5100-361
A 080	COMMON PARTS, FINAL ASSEMBLY (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD, NON-ENCRYPTED (See separate listing on Page 9-4.)	023-5500-185
A 200	RF MODULE 700/800 MHz ONLY CALAMP 6A830	585-5500-710
A 400	ASSEMBLY, UI PCB, DTMF (See separate listing on Page 9-36.)	023-5100-480

Ref Number	Description	Part Number
	Assembly, Front Housing, Without UI PCB, DTMF, Black	023-5100-361
A 040	ASSEMBLY CONTROLS, 5100 (See separate listing on Page 9-2.)	023-5100-045
A 060	ASSEMBLY, FR HOUSING, BLACK	587-5100-06101
HW 102	SPNR NUT M6-.75-6H MET	013-1313-005
HW 103	**R/B 013-1313-008** SPANNER NUT	013-1313-007
HW 110	NYLON WASHER - 5100 VOLUME KNOB	596-9405-015
MP 006	LIGHTPIPE / SLEEVE ASSEMBLY	032-0431-194
MP 104	BUTTON, EMERGENCY	320-4312-0801
MP 105	5100 3 POS SELECTOR RING	015-0805-653

Ref Number	Description	Part Number
MP 106	SPACER, SELECTOR SWITCH 5100	032-0431-166
MP 110	KEYPAD, DTMF	320-4312-0101
MP 111	BEZEL,FRONT, DTMF, BLACK	320-4311-4502
NP 101	LABEL,EFJ LOGO, FRONT 5100	559-5000-550

Ref Number	Description	Part Number
	Assembly, UI PC Board, DTMF	023-5100-480
A 400	5100G UI BD	023-5500-480
DS 010	LCD 49 X 96 FSN EXTENDED TEMP COG	549-5000-005
EP 010	FOAM FRAME DISPLAY BACKLIGHT 5100	574-3500-065
EP 015	LIGHT PIPE, LCD	585-5100-02101
MP 100	SPACER, LIGHT PIPE	574-3500-11701
MP 132	COMPRESSION PAD, UI PCB	574-5100-13201
S 010	DOME ARRAY, TOP	583-9511-02101
S 012	DOME ARRAY, BOTTOM	583-9511-02201

Ref Number	Description	Part Number
	Model III 7/800 MHz, SEM, Black, DTMF	023-5170-063
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB, DTMF BLACK (See separate listing on Page 9-35.)	023-5100-361
A 080	COMMON PARTS, FINAL ASSEMBLY (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD ENCRYPTED (See separate listing on Page 9-28.)	023-5500-180
A 200	RF MODULE 700/800 MHz ONLY CALAMP 6A830	585-5500-710
A 400	ASSEMBLY, UI PCB, DTMF (See separate listing on Page 9-36.)	023-5100-480

Ref Number	Description	Part Number
	UHF 380-470 MHz, SEM, Black, DTMF	023-5120-061
A 050	ASSEMBLY, FR HOUSING, W/O UI PCB,PLAIN,BLACK (See separate listing on Page 9-2.)	023-5100-341
A 080	COMMON PARTS, FINAL ASSEMBLY, (GREEN) (See separate listing on Page 9-3.)	023-5100-085
A 100	5100G LOGIC BD, ENCRYPTED, NON-FM	023-5500-182
A 200	RF MODULE UHF LO(380-470) CALAMP D8 PORT GREEN	585-5500-300PGD8
A 400	ASSEMBLY, UI PCB, PLAIN (See separate listing on Page 9-9.)	023-5100-485

Ref Number	Description	Part Number
	5100G Logic Board, Encrypted, Non-FM	023-5500-182
C 001	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 002	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 003	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 004	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 014	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 015	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 016	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 017	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 018	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 019	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 020	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 021	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 022	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 023	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 024	CAP, 0.01 µF, 0402,10%TOL	510-3681-103
C 025	CAP, 0.01 µF, 0402,10%TOL	510-3681-103
C 026	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 027	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 059	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 063	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 064	CAP, 0.01 µF, 0402,10%TOL	510-3681-103
C 065	4.7UFD 10V SMD TANT RL	510-2624-479
C 066	CERAMIC CAPACITOR, 10 µF, 1206,10V	510-3755-106
C 067	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 069	CERAMIC CAPACITOR, 2.2 µF, 1206, 16V	510-3925-225
C 070	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 071	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 072	TANTALUM CAPACITOR 150 UF CASED 6V	510-2001-151

Ref Number	Description	Part Number
C 073	TANTALUM CAPACITOR 150 UF CASED 6V	510-2001-151
C 076	4.7UFD 10V SMD TANT RL	510-2624-479
C 077	CERAMIC CAPACITOR, 10 µF, 1206, 10V	510-3755-106
C 078	4.7UFD 10V SMD TANT RL	510-2624-479
C 079	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 080	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 081	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 082	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 084	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 085	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 087	CAP, 33 µF, 10%, 402, 25V	510-3681-330
C 090	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 091	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 092	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 100	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 101	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 102	4.7UFD 10V SMD TANT RL	510-2624-479
C 104	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 105	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 109	CAP, 22 µF, 10%, 16V, X5R, 1210	510-3607-226
C 110	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 111	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 114	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 115	CAP, 10 µF, 10%, 402, 25V	510-3681-100
C 117	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 118	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 119	CAP,0.01 µF, 0402,10%TOL	510-3681-103
C 120	CAP,0.01 µF, 0402,10%TOL	510-3681-103
C 121	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 122	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 123	CERAMIC CAPACITOR, 10 µF, 1206,10V	510-3755-106
C 124	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 125	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 126	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 127	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 128	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 129	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 130	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 132	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 133	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 134	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 135	CAP, 220 µF, 16V, 10%, TANT, EIA7343	510-2652-221
C 137	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104

Ref Number	Description	Part Number
C 138	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 139	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 140	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 141	CERAMIC CAPACITOR, 1.0 µF, 0805, 16V	510-3923-105
C 142	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 143	CAP, 0.01 µF, 0402, 10% TOL	510-3681-103
C 144	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 145	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 146	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 147	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 148	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 149	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 150	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 151	CAP, 470 µF, 10%, 402, 25V	510-3681-471
C 152	CAP, 0.1 µF, 16V, 10%, X7R, 0402 (t&r)	510-3687-104
C 153	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 154	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 155	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 157	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 158	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 159	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
C 160	CAP, 0.01 µF, 0402, 10%TOL	510-3681-103
CR 001	DUAL DIODES-COM ANODES	523-1504-024
CR 004	SILICON SWITCHING DIODE SC-75	523-1004-021
CR 008	DUAL DIODES-COM ANODES	523-1504-024
J 001	CONN, 26-P, ZIF 0.5MM PITCH SMD see notes	515-7111-526
J 002	FINE PITCH SMD BD TO BD RECEP 60 PIN (TR)	515-7111-650
J 003	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
J 004	SINGLE SPRING CLIP BRIGHT TINNED 75RC-.05-08	537-5001-014
L 003	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
L 004	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100
L 005	270 nH 0603 SMD INDUCTOR (T&R)	542-9017-274
L 007	270 nH 0603 SMD INDUCTOR (T&R)	542-9017-274
L 010	270 nH 0603 SMD INDUCTOR (T&R)	542-9017-274
L 011	INDUCTOR, 27 UH, 1.2A, SMD, T&R	542-5010-019
L 013	270 nH 0603 SMD INDUCTOR (T&R)	542-9017-274
L 014	270 nH 0603 SMD INDUCTOR (T&R)	542-9017-274
L 015	270 nH 0603 SMD INDUCTOR (T&R)	542-9017-274
L 016	10 µH SMT POWER INDUCTOR (SD12-100)	542-9009-100

Ref Number	Description	Part Number
PC 001	PCB, 5100G LOGIC BOARD REV 2	355-5001-8002
Q 001	POWER MOSFET N+P PAIR 20 V SC-70 T&R	576-0006-244
Q 002	GEN PURPOSE 3904 BST SC-75	576-0001-029
Q 003	POWER MOSFET N+P PAIR 20 V SC-70 T&R	576-0006-244
R 002	RES, 10K, 5%, 402	569-0165-103
R 003	RES, 10K, 5%, 402	569-0165-103
R 004	RES, 100K, .06W, 5%, 402	569-0165-104
R 005	RES, 100K, .06W, 5%, 402	569-0165-104
R 009	RES, 0ohm, 5%, 402	569-0165-001
R 019	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 020	RESISTOR, 15K OHM, 0402, SMT	569-0165-153
R 022	SURFACE MOUNT 20K,0402, RESISTOR	569-0165-203
R 023	RESISTOR, 15K OHM, 0402, SMT	569-0165-153
R 024	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 028	RES, 4.7K, 5%, 402	569-0165-472
R 029	RES, 4.7K, 5%, 402	569-0165-472
R 030	RES, 10K, 5%, 402	569-0165-103
R 031	RES, 30.1K, 1%, 0402	569-0161-447
R 032	RES, 30.1K, 1%, 0402	569-0161-447
R 033	SURFACE MOUNT 20K,0402, RESISTOR	569-0165-203
R 059	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 060	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 061	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 062	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 063	RESISTOR 1%, 0402, 100K OHM	569-0161-501
R 064	RES, 100K, .06W, 5%, 402	569-0165-104
R 065	RES, 100K, .06W, 5%, 402	569-0165-104
R 068	RES, 100K, .06W, 5%, 402	569-0165-104
R 069	RES, 100K, .06W, 5%, 402	569-0165-104
R 074	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 075	RESISTOR, 100 OHM, 402 SIZE, 5%	569-0165-101
R 078	RESISTOR 1%, 221K, 0402	569-0161-534
R 081	RESISTOR 1%, 0603, 100K OHM	569-0151-501
R 088	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 090	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 091	RES, 10K, 5%, 402	569-0165-103
R 092	RES, 10K, 5%, 402	569-0165-103
R 097	RES, 10K, 5%, 402	569-0165-103
R 098	RES, 10K, 5%, 402	569-0165-103
R 100	RESISTOR, 1K OHM, 0402,SMT	569-0165-102
R 101	RESISTOR, 1K OHM, 0402, SMT	569-0165-102

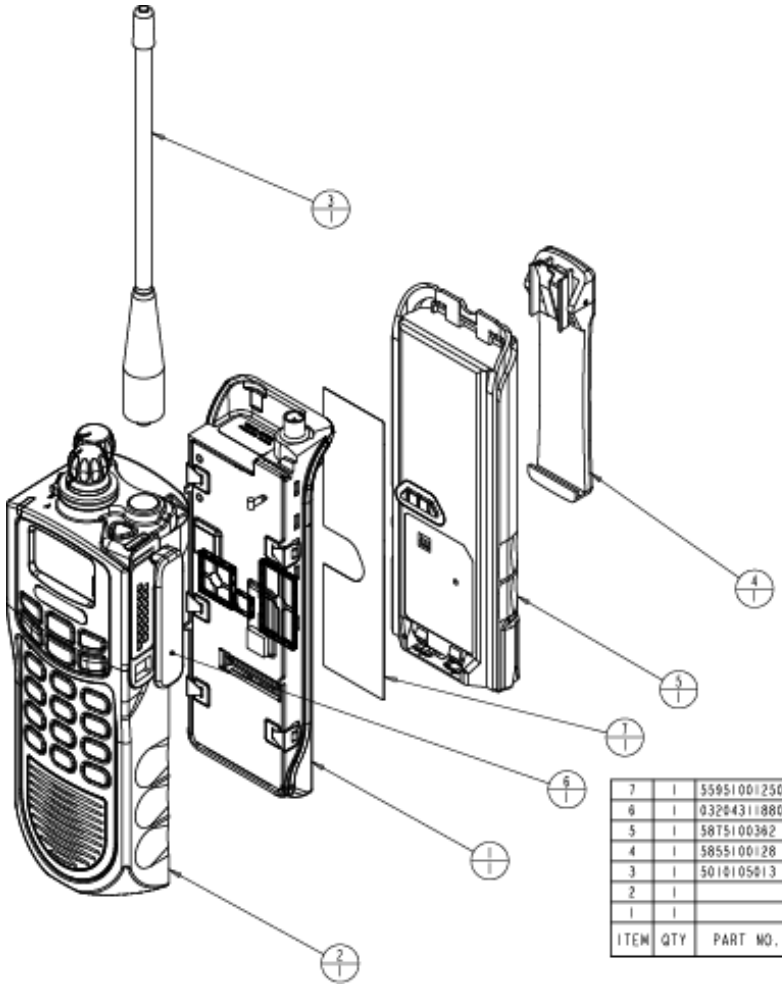
Ref Number	Description	Part Number
R 102	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 103	RESISTOR 1%, 0603, 13K OHM	569-0151-412
R 105	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 106	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 107	RESISTOR 1%, 0603, 20K OHM	569-0151-430
R 110	RESISTOR 1%, 0603, 38.3K OHM	569-0151-457
R 111	RESISTOR 1%, 0603, 12.1K OHM	569-0151-409
R 182	RES, 10K, 5%, 402	569-0165-103
R 186	RES, 10K, 5%, 402	569-0165-103
R 188	RES, 10K, 5%, 402	569-0165-103
R 190	RES, 10K, 5%, 402	569-0165-103
R 191	RES, 10K, 5%, 402	569-0165-103
R 193	RES, 10K, 5%, 402	569-0165-103
R 194	RES, 10K, 5%, 402	569-0165-103
R 195	RES, 10K, 5%, 402	569-0165-103
R 236	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 237	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 238	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 239	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 240	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 241	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 242	RESISTOR, 1K OHM,0402, SMT	569-0165-102
R 243	RES, 10K, 5%, 402	569-0165-103
R 244	RES, 10K, 5%, 402	569-0165-103
R 245	RES, 10K, 5%, 402	569-0165-103
R 249	RES, 10K, 5%, 402	569-0165-103
R 253	RES,100K, .06W, 5%, 402	569-0165-104
R 254	RES,100K, .06W, 5%, 402	569-0165-104
R 255	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 259	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 260	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 261	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 262	RES, 100K, .06W, 5%, 402	569-0165-104
R 263	RES, 100K, .06W, 5%, 402	569-0165-104
R 264	RES, 0ohm, 5%, 402	569-0165-001
R 265	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 266	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 267	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 268	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 269	RES, 100K, .06W, 5%, 402	569-0165-104
R 270	RES, 100K, .06W,5%, 402	569-0165-104
R 271	RES, 100K, .06W, 5%, 402	569-0165-104
R 272	RES, 100K, .06W, 5%, 402	569-0165-104

Ref Number	Description	Part Number
R 273	RES, 100K, .06W, 5%, 402	569-0165-104
R 274	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 275	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 276	RES, 100K, .06W, 5%, 402	569-0165-104
R 277	RES, 0ohm, 5%, 402	569-0165-001
R 278	RESISTOR, 1K OHM, 0402, SMT	569-0165-102
R 279	RES, 0ohm, 5%, 402	569-0165-001
R 281	RES, 0ohm, 5%, 402	569-0165-001
R 282	RESISTOR, 1K OHM, 0402,SMT	569-0165-102
R 283	RES, 0ohm, 5%, 402	569-0165-001
R 284	RES,100K, .06W, 5%, 402	569-0165-104
R 286	RES, 0ohm, 5%, 402	569-0165-001
R 288	RES, 0ohm, 5%, 402	569-0165-001
R 289	RES, 100K, .06W, 5%, 402	569-0165-104
R 290	RES, 0ohm, 5%, 402	569-0165-001
R 291	RES, 10K, 5%, 402	569-0165-103
R 292	RES, 10K, 5%, 402	569-0165-103
R 294	RES, 10K, 5%, 402	569-0165-103
R 295	RES, 0ohm, 5%, 402	569-0165-001
R 296	RES, 47K OHM 5%, 402	569-0165-473
R 297	RES, 47K OHM 5%, 402	569-0165-473
R 299	RES, 0ohm, 5%, 402	569-0165-001
R 301	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 302	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 303	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 306	CHIP RESISTOR, TAPE & REEL, 0402	569-0165-100
R 307	RES, 100K, .06W, 5%, 402	569-0165-104
U 008	OPAMP, QUAD SINGLE SPLY SSOP (regAT&R)	544-2020-013
U 009	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 011	LDO, DMOS400MA 5V 8P MSOP (regAT&R)	544-2603-055
U 013	Reg'L , LDO 3.8V, 50MA SOT23, 5pin,T&R	544-5001-335
U 015	DSP, TMS3205510AGGWA1, 160MHz BGA trays	544-5003-133
U 016	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 017	SINGLE SUPPLY SPDT ANALOG SWITCH SC-70	544-4002-007
U 018	LDO, DMOS400MA 5V 8P MSOP (regAT&R)	544-2603-055
U 020	IC, CPLD, 64 CELL, 45 IO, MIXED IO VOLTAGE	544-5001-421
U 022	SEM ENCRYPTION MODULE 5509 DSP (AUTO)	023-5000-980
U 026	OpAmp, Dual, single sply 8p (regA T&R)	544-2018-015
U 027	AIC21 16-BIT DUAL CODEC, LOW POWER	544-3016-057
U 042	REGULATOR LDO, ADJ TO 5.5V 500mA, MSOP-8	544-2603-057
U 043	REGULATOR LDO, ADJ TO 5.5V 500mA, MSOP-8	544-2603-057
U 045	IC, LDO, 3.3V, 150MA, SOT23, TPS73133	544-2603-068

Ref Number	Description	Part Number
U 046	CONV, SYNC STEP DOWN, 2.7-10V IN. 1.8V OUT	544-4006-012
U 047	CONV, SYNC STEP DOWN V.REG, 2.7-10V IN, 3.3V OUT	544-4006-014
U 049	CONV, SYNC STEP DOWN, 2.7-10V IN. VAR OUT	544-4006-010
Y 001	OSC 20.000 MHz SMD 3.3V -40 / +85C	561-9004-200
Y 002	TCXO, 12.288 MHz, 2PPM, HCMOS	518-7012-210

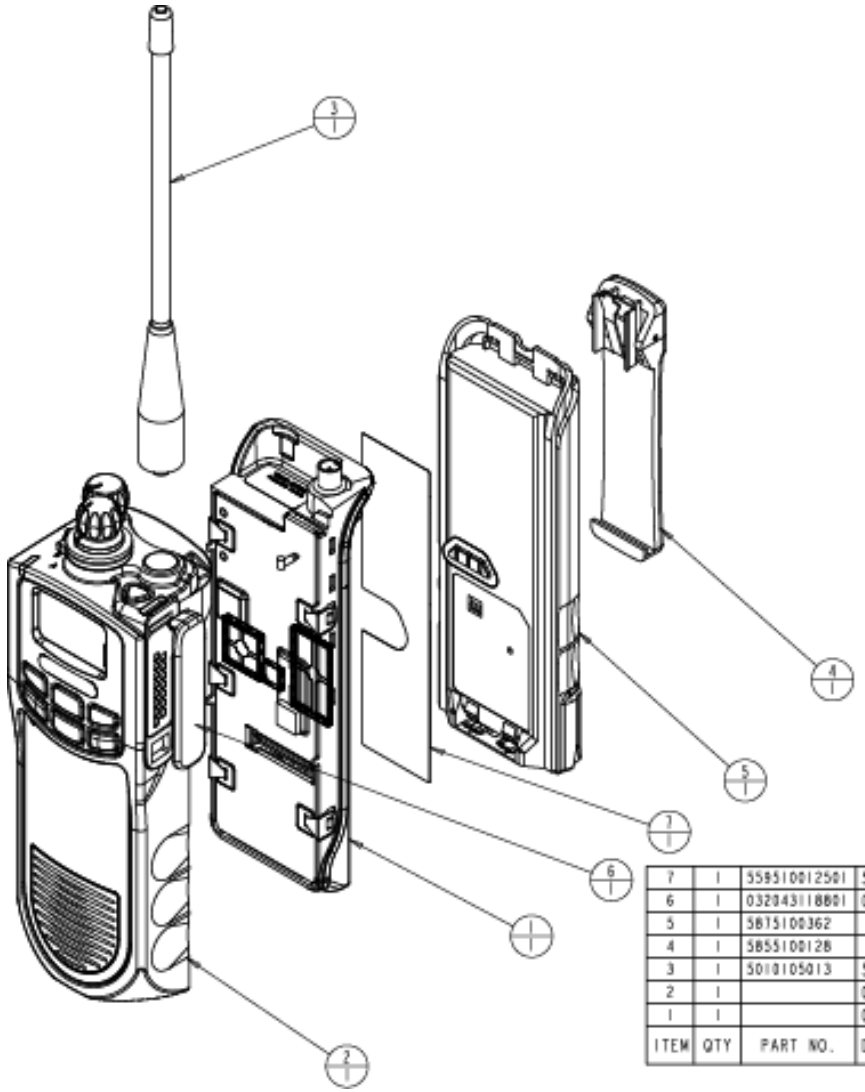
9.2 Exploded Views

Figure 9.1 5100 ES Portable Radio Model III Assembly



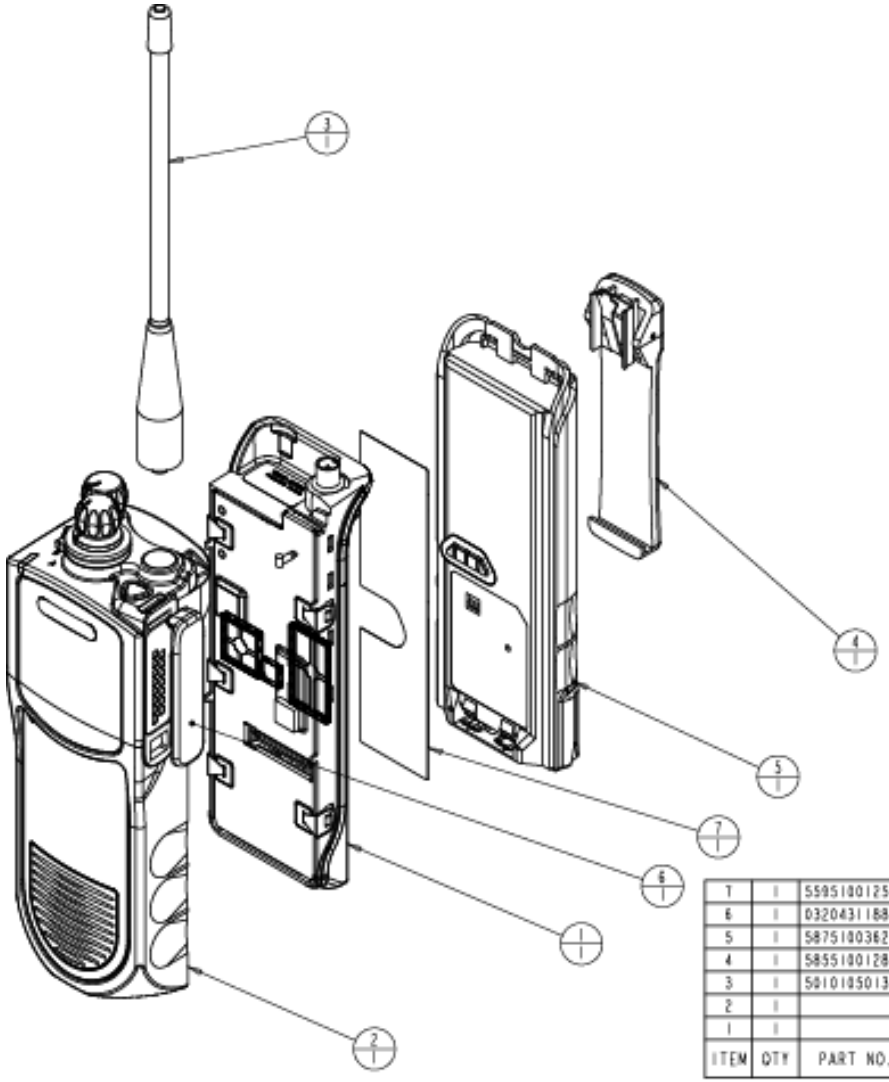
ITEM	QTY	PART NO.	DRAWING NO.	DESCRIPTION
7	1	5595100125U	5595100125	LABEL, SERIAL NUMBER
6	1	0320431188U	0320431188	DUST COVER, UOC
5	1	5875100362		BATTERY, 5100, SUBMERSIBLE, NI-MH
4	1	5855100128		BELT CLIP
3	1	5010105013	5010105013	ANTENNA, 1/2 WAVE, 806-866 MHZ
2	1		0275180310	ASSEMBLY, FR HOUSING, DTMF
1	1		0275180320	ASSEMBLY, REAR HOUSING

Figure 9.2 5100 ES Portable Radio Model II Assembly



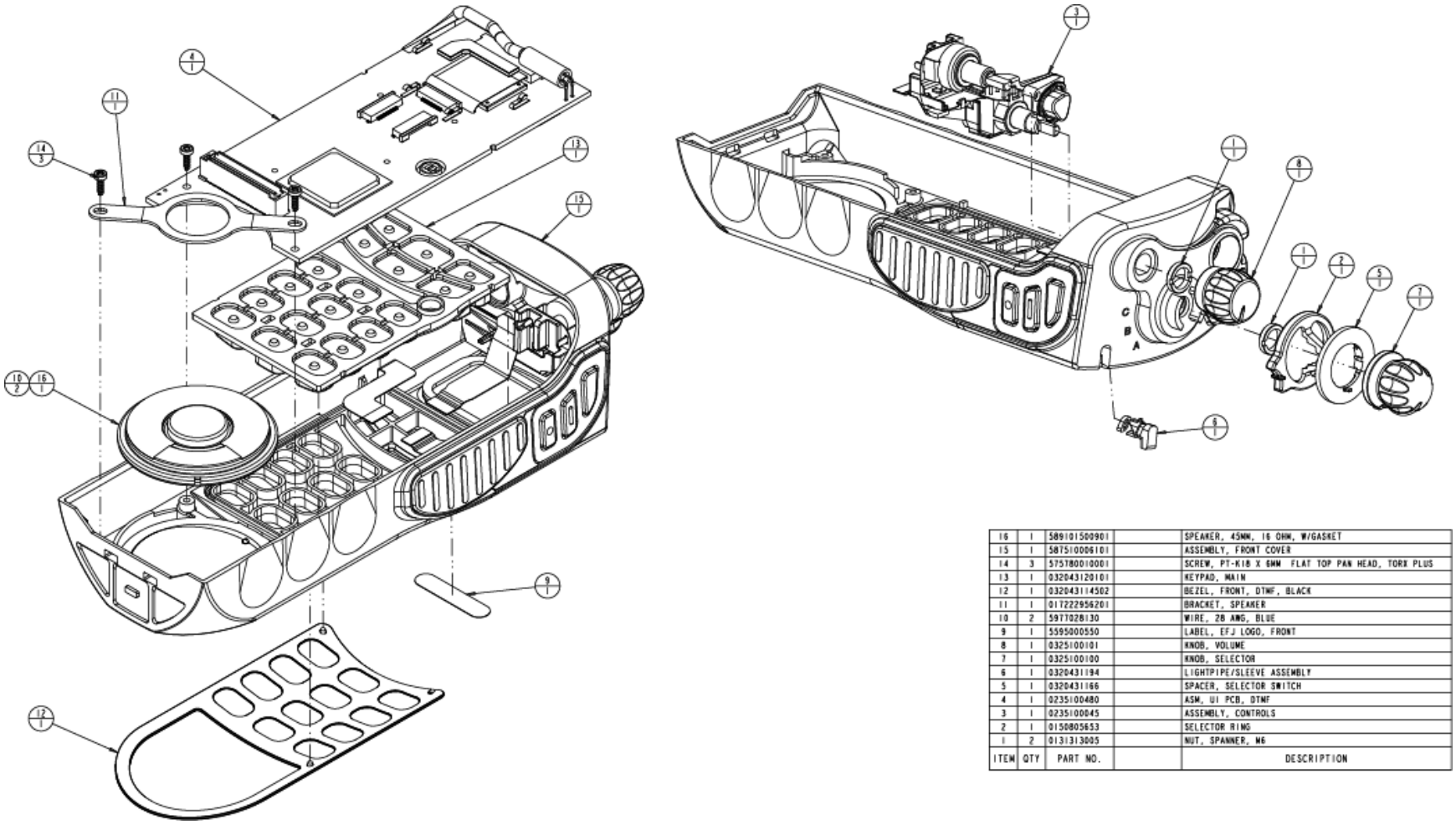
ITEM	QTY	PART NO.	DRAWING NO.	DESCRIPTION
7	1	5585100125	5595100125	LABEL, SERIAL NUMBER
6	1	0320431188	0320431188	DUST COVER, UDC
5	1	5815100362		BATTERY, 5100, SUBMERSIBLE, NI-MH
4	1	5855100128		BELT CLIP
3	1	5010105013	5010105013	ANTENNA, 1/2 WAVE, 806-866 MHZ
2	1		0275180310	ASSEMBLY, FR HOUSING, MON-DTMF
1	1		0275180320	ASSEMBLY, REAR HOUSING

Figure 9.3 5100 ES Portable Radio Model I Assembly



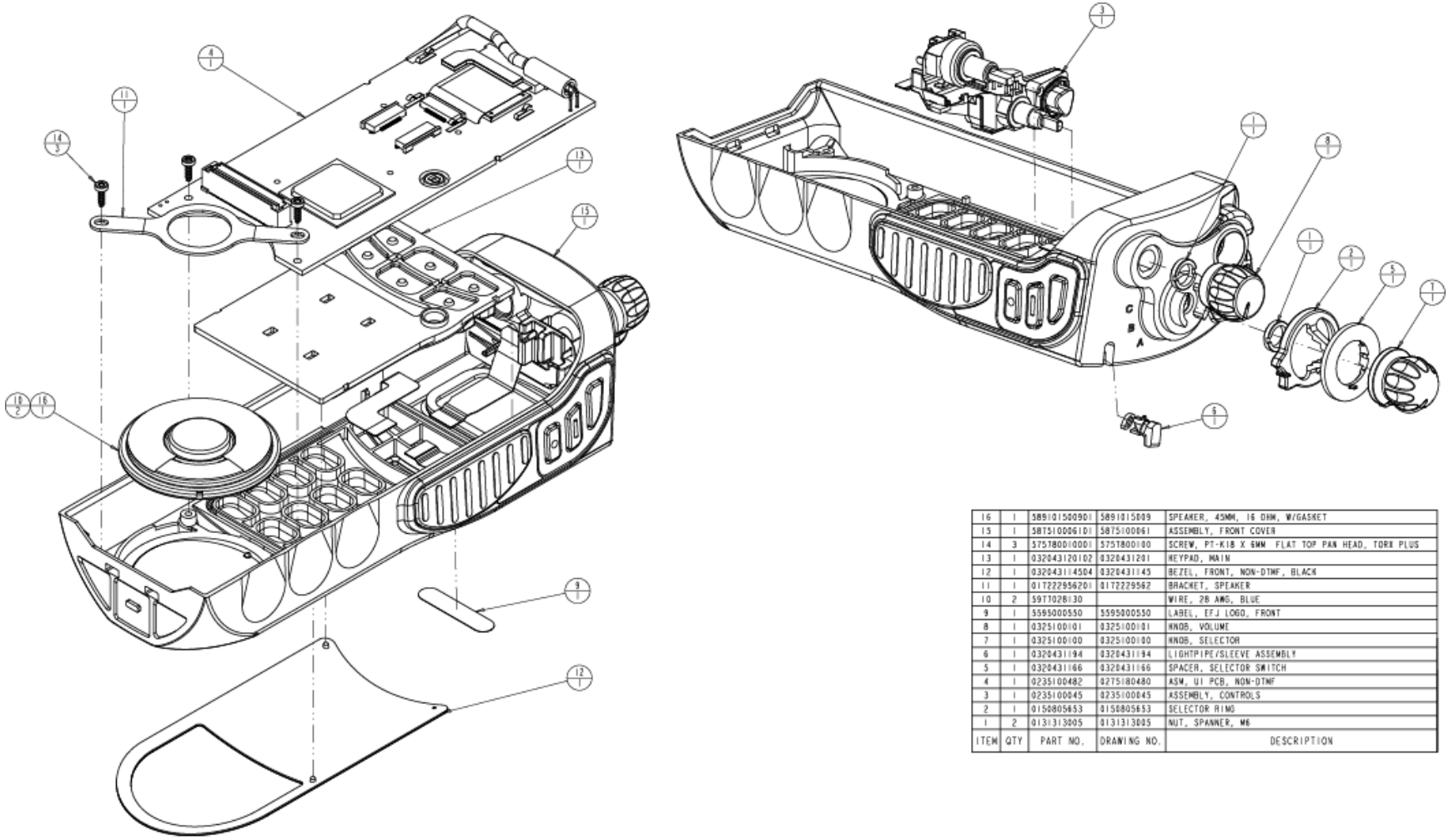
ITEM	QTY	PART NO.	DRAWING NO.	DESCRIPTION
7	1	5595140125 01	5595100125	LABEL, SERIAL NUMBER
6	1	0320431188 01	0320431188	DUST COVER, UDC
5	1	5875100362		BATTERY, 5100, SUBMERSIBLE, NI-MH
4	1	5855100128		BELT CLIP
3	1	5010105013	5010105013	ANTENNA, 1/2 WAVE, 806-866 MHZ
2	1		0275180310	ASSEMBLY, FR HOUSING, PLAIN
1	1		0275180320	ASSEMBLY, REAR HOUSING

Figure 9.4 Front Housing Assembly Model III



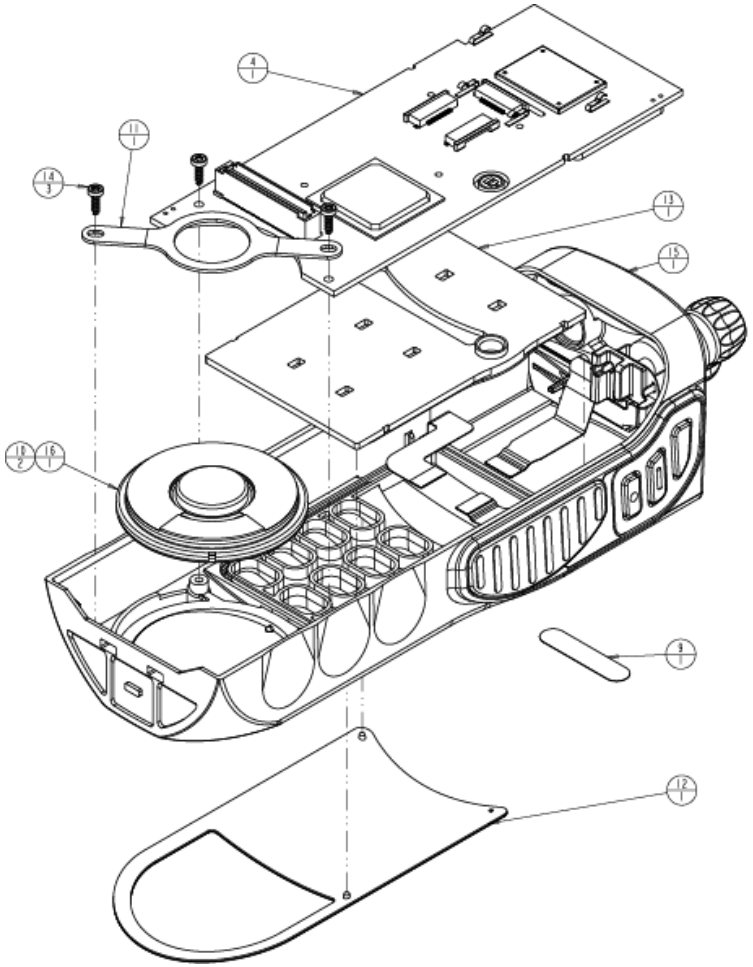
ITEM	QTY	PART NO.		DESCRIPTION
16	1	5891015009O1		SPEAKER, 45MM, 16 OHM, W/GASKET
15	1	5875100061O1		ASSEMBLY, FRONT COVER
14	3	3757800100O1		SCREW, PT-K18 X 6MM FLAT TOP PAN HEAD, TORX PLUS
13	1	0320431201O1		KEYPAD, MAIN
12	1	0320431145O2		BEZEL, FRONT, DTMF, BLACK
11	1	0172229562O1		BRACKET, SPEAKER
10	2	5977028130		WIRE, 28 AWG, BLUE
9	1	5595000550		LABEL, EFJ LOGO, FRONT
8	1	0325100101		KNOB, VOLUME
7	1	0325100100		KNOB, SELECTOR
6	1	0320431194		LIGHTPIPE/SLEEVE ASSEMBLY
5	1	0320431166		SPACER, SELECTOR SWITCH
4	1	0235100480		ASM, UI PCB, DTMF
3	1	0235100045		ASSEMBLY, CONTROLS
2	1	0150805653		SELECTOR RING
1	2	0131313005		NUT, SPANNER, M6

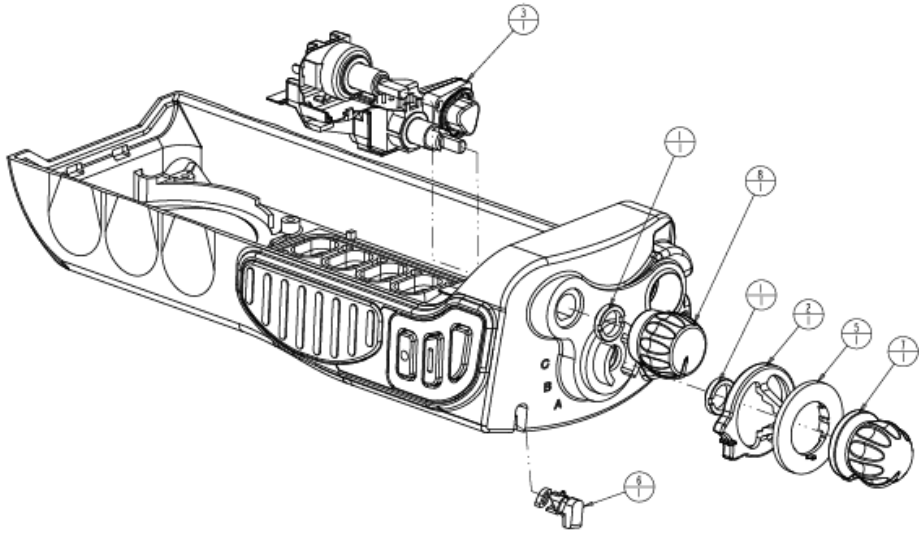
Figure 9.5 Front Housing Assembly Model II



ITEM	QTY	PART NO.	DRAWING NO.	DESCRIPTION
16	1	5891015009001	5891015009	SPEAKER, 45MM, 16 OHM, W/GASKET
15	1	5875100061001	5875100061	ASSEMBLY, FRONT COVER
14	3	3757800100001	3757800100	SCREW, PT-K18 X 6MM FLAT TOP PAN HEAD, TORX PLUS
13	1	0320431201002	0320431201	KEYPAD, MAIN
12	1	0320431145004	0320431145	BEZEL, FRONT, NON-DTMF, BLACK
11	1	0172229562001	0172229562	BRACKET, SPEAKER
10	2	5977028130		WIRE, 28 AWG, BLUE
9	1	5595000550	5595000550	LABEL, EFJ LOGO, FRONT
8	1	0325100101	0325100101	KNOB, VOLUME
7	1	0325100100	0325100100	KNOB, SELECTOR
6	1	0320431194	0320431194	LIGHTPIPE/SLEEVE ASSEMBLY
5	1	0320431166	0320431166	SPACER, SELECTOR SWITCH
4	1	0235100482	0275180480	ASM, UI PCB, NON-DTMF
3	1	0235100045	0235100045	ASSEMBLY, CONTROLS
2	1	0150805653	0150805653	SELECTOR RING
1	2	0131313005	0131313005	NUT, SPANNER, M6

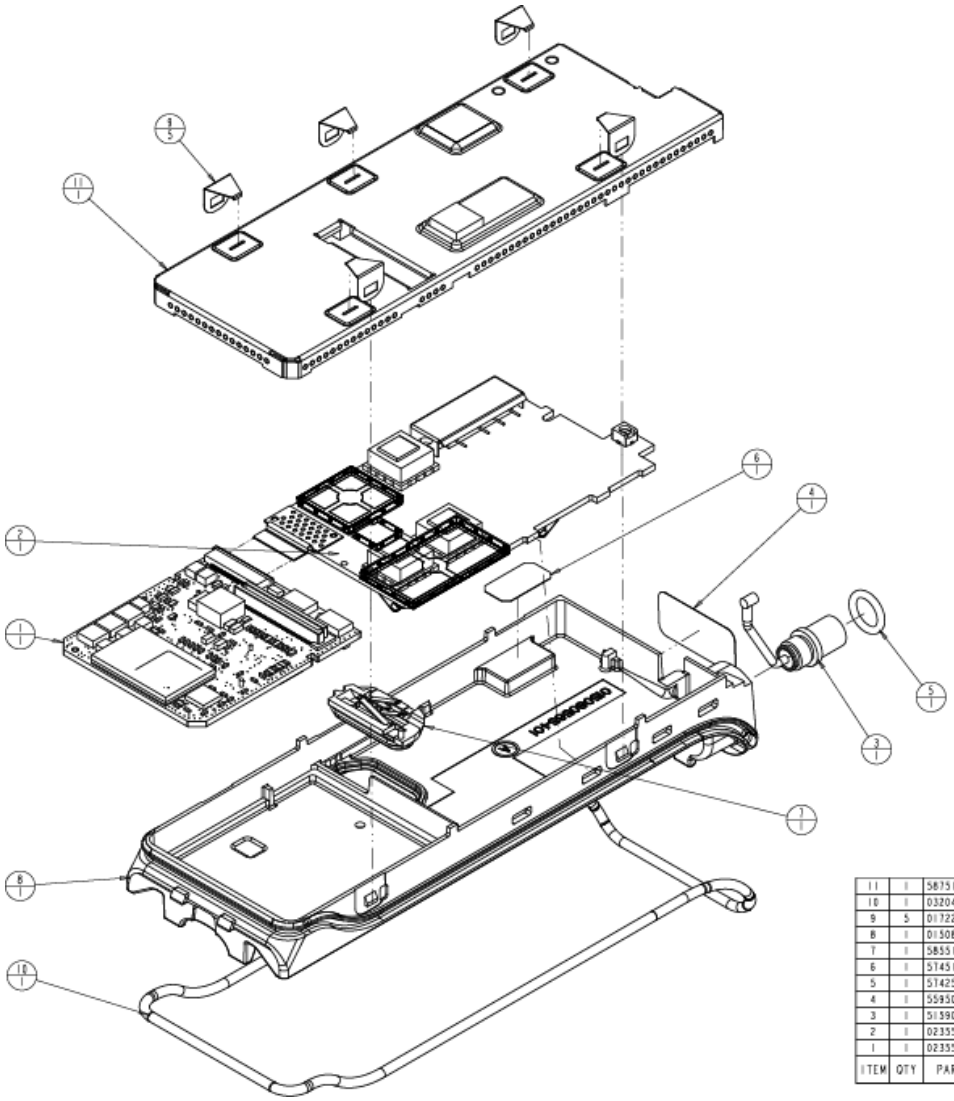
Figure 9.6 Front Housing Assembly Model I

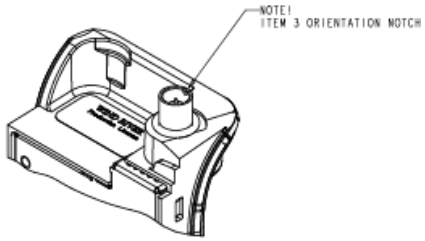




ITEM	QTY	PART NO.	DRAWING NO.	DESCRIPTION
16	1	5891015809B1	5891015809	SPEAKER, 45MM, 16 OHM, W/GASKET
15	1	58T5100061B4	58T5100061	ASSEMBLY, FRONT COVER, PLAIN
14	3	3757800100B1	3757800100	SCREW, PT-K18 X 6MM FLAT TOP PAN HEAD, TORX PLUS
13	1	0320431201B3	0320431201	KEYPAD, MAIN
12	1	0320431145B4	0320431145	BEZEL, FRONT, NON-DTMF, BLACK
11	1	0172229562B1	0172229562	BRACKET, SPEAKER
10	2	5977028130		WIRE, 28 AWG, BLUE
9	1	5595000550	5595000550	LABEL, EFJ LOGO, FRONT
8	1	0325100101	0325100101	KNOB, VOLUME
7	1	0325100100	0325100100	KNOB, SELECTOR
6	1	0320431194	0320431194	LIGHTPIPE/SLEEVE ASSEMBLY
5	1	0320431166	0320431166	SPACER, SELECTOR SWITCH
4	1	0235100485	0275180480	ASM, UI PCB, PLAIN
3	1	0235100845	0235100845	ASSEMBLY, CONTROLS
2	1	0150805653	0150805653	SELECTOR RING
1	2	0131313805	0131313805	NUT, SPANNER, M6

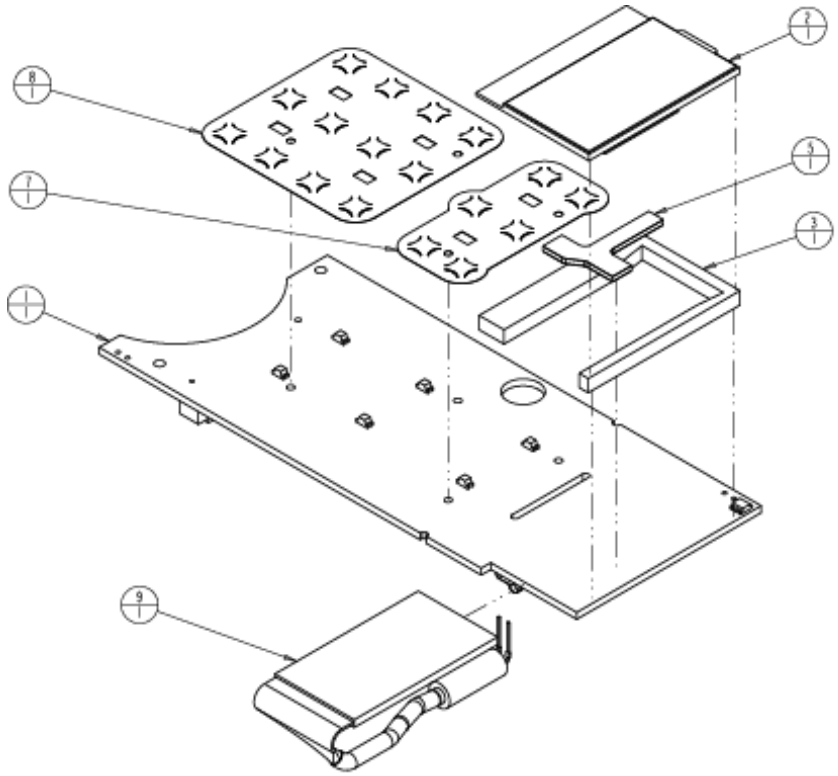
Figure 9.7 Rear Housing Assembly Model I/II/III

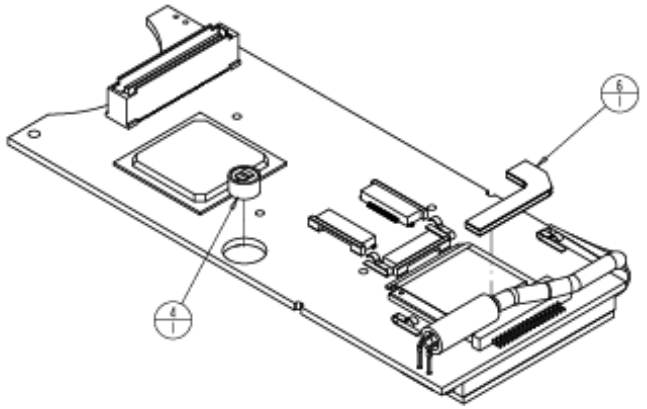




ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL
11	1	5875100071Q1	ASSY, REAR HOUSING SHIELD	SEE BOM
10	1	0320431T802	GASKET, MAIN SEAL, NON-CONDUCTIVE	PARKER .103 X .040 SILICONE 70
9	5	0172295801Q1	CLIP, SHIELD, REAR HOUSING	1075 CRS HRC40-50, .008 THK
8	1	0150B05654Q1	HOUSING, REAR	MAGNESIUM, AZ91D
7	1	5855100011	BATTERY CONTACT ASSEMBLY	
6	1	5745100005	CONDUCTIVE COMPRESSION SPACER	
5	1	5742510001	ANTENNA ORING	
4	1	5595000558	LABEL, WIND RIVER	
3	1	5139006130	SMA CABLE ASSEMBLY	
2	1	0235580001	ASSEMBLY, RF PCB, 800 MHZ	
1	1	0235001B0	LOGIC BOARD ASSEMBLY	

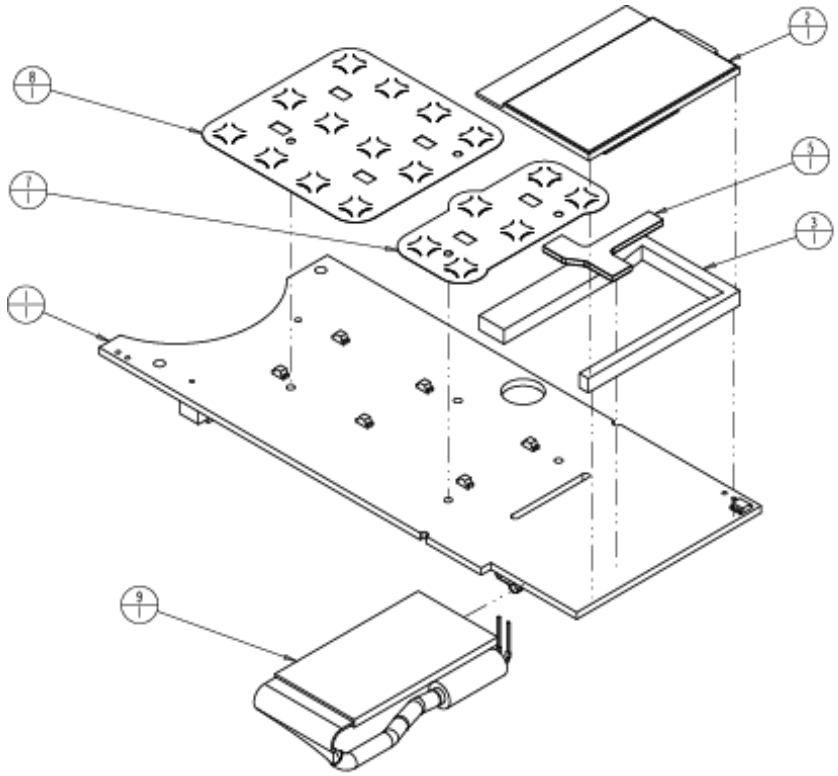
Figure 9.8 User Interface PCB Assembly Model III

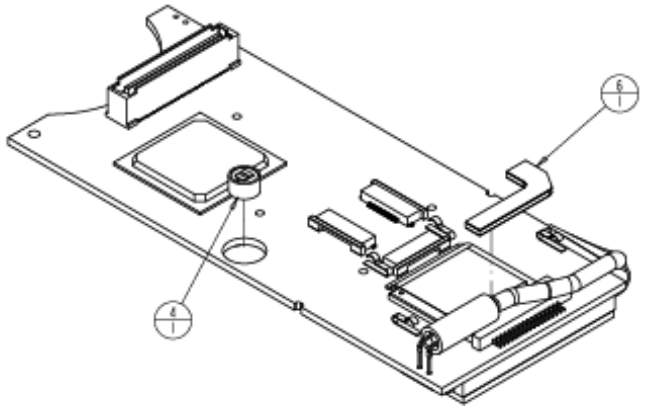




ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL
9	1	5855100021O1	BACKLIGHT, LCD	
8	1	5839511022O1	DOME ARRAY, BOTTOM	DOME: EFJ #5839511008B1
7	1	5839511021O1	DOME ARRAY, TOP	DOME: EFJ # 5839511008B1
6	1	5745100132O1	COMPRESSION PAD, UI PCB	PORON 4701-50-20040-04
5	1	5743500117O1	SPACER, LIGHTPIPE	PORON 4701-50-20040-04
4	1	5890301083	MICROPHONE	
3	1	5743500065	LCD MODULE FOAM MOUNTING PAD	
2	1	5495000085	LCD	
1	1	0235500480	ASSEMBLY, UI PCB	

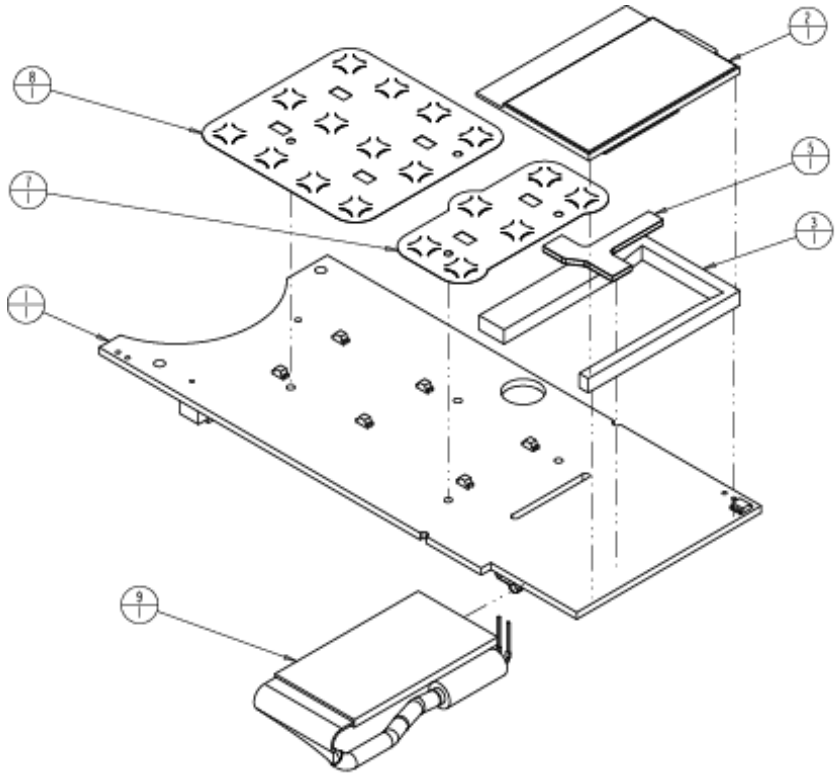
Figure 9.9 User Interface PCB Assembly Model II

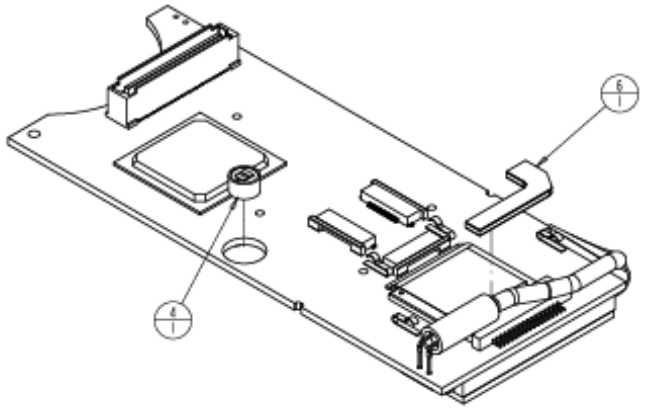




ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL
9	1	5855100021O1	BACKLIGHT, LCD	
8	1	5839511022O1	DOME ARRAY, BOTTOM	DOME: EFJ #5839511008B1
7	1	5839511021O1	DOME ARRAY, TOP	DOME: EFJ # 5839511008B1
6	1	5745100132O1	COMPRESSION PAD, UI PCB	PORON 4701-50-20040-04
5	1	5743500117O1	SPACER, LIGHTPIPE	PORON 4701-50-20040-04
4	1	5890301083	MICROPHONE	
3	1	5743500065	LCD MODULE FOAM MOUNTING PAD	
2	1	5495000085	LCD	
1	1	0235500480	ASSEMBLY, UI PCB	

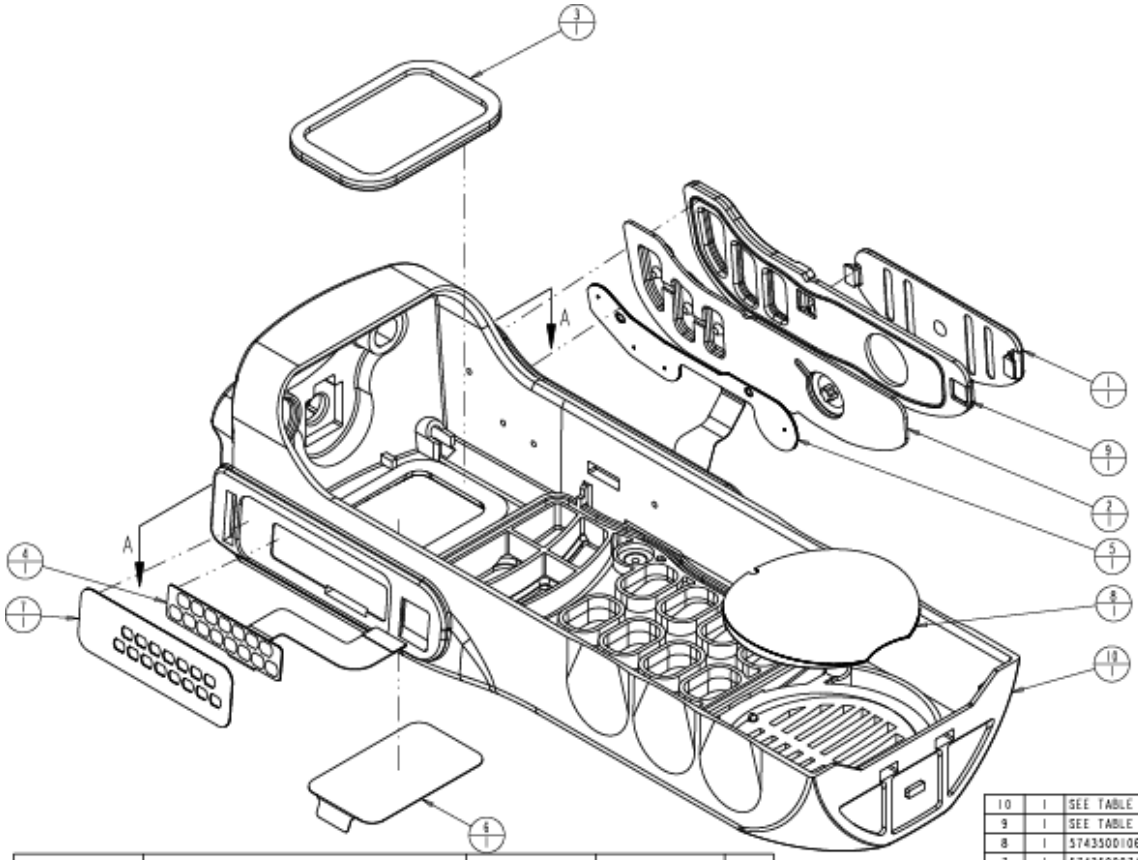
Figure 9.10 User Interface PCB Assembly Model I

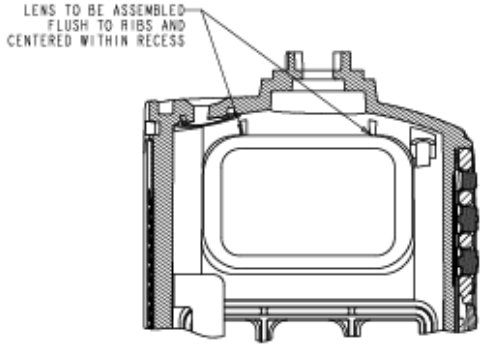




ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL
9	1	5855100021O1	BACKLIGHT, LCD	
8	1	5839511022O1	DOME ARRAY, BOTTOM	DOME: EFJ #5839511008B1
7	1	5839511021O1	DOME ARRAY, TOP	DOME: EFJ # 5839511008B1
6	1	5745100132O1	COMPRESSION PAD, UI PCB	PORON 4701-50-20040-04
5	1	5743500117O1	SPACER, LIGHTPIPE	PORON 4701-50-20040-04
4	1	5890301083	MICROPHONE	
3	1	5743500065	LCD MODULE FOAM MOUNTING PAD	
2	1	5495000085	LCD	
1	1	0235500480	ASSEMBLY, UI PCB	

Figure 9.11 Front Cover Assembly Model II/III



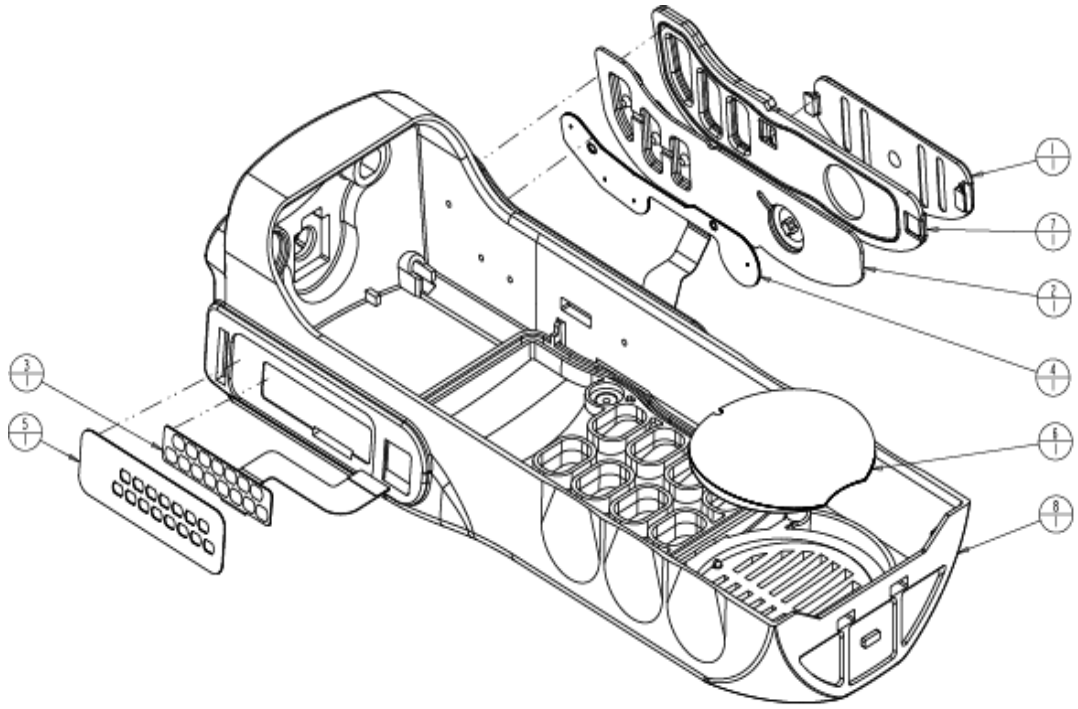


SECTION A-A

5875100006106	ASSEMBLY, FR HOUSING, ORANGE, PLAIN	3204311 4006	3204311 3403	2
5875100006105	ASSEMBLY, FR HOUSING, YELLOW, PLAIN	3204311 4005	3204311 3402	2
5875100006104	ASSEMBLY, FR HOUSING, BLACK, PLAIN	3204311 4004	3204311 3401	2
5875100006103	ASSEMBLY, FR HOUSING, ORANGE	3204311 4003	3204311 3403	1
5875100006102	ASSEMBLY, FR HOUSING, YELLOW	3204311 4002	3204311 3402	1
5875100006101	ASSEMBLY, FR HOUSING, BLACK	3204311 4001	3204311 3401	1
ASM PART NUMBER	**DESCRIPTION**	**HOUSING P/N**	**BEZEL P/N**	**SHEET**

10	1	SEE TABLE	HOUSING, FRONT	ZENOY 2230
9	1	SEE TABLE	BEZEL, PTT	SEE TABLE
8	1	5743500106001	GRILLE CLOTH, SPEAKER	HYPHOBE ACOUSTEX B025
7	1	5743500074001	WATER BARRIER, UDC	MATTE POLYCARBONATE .005 THK
6	1	5595100121001	COVER, PROTECTIVE, LENS	CLEAR FLEXCON STATIC CLING
5	1	0355100025001	FLEX CIRCUIT, PTT	KAPTON (POLYAMIDE)
4	1	0355100015001	FLEX CIRCUIT, UDC	KAPTON
3	1	3204312050	ASSEMBLY, LENS	
2	1	3204311620	KEYPAD, PTT	SILICONE RUBBER
1	1	3204311310	LEVER, PTT	CYCOLOY CU6800
ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL

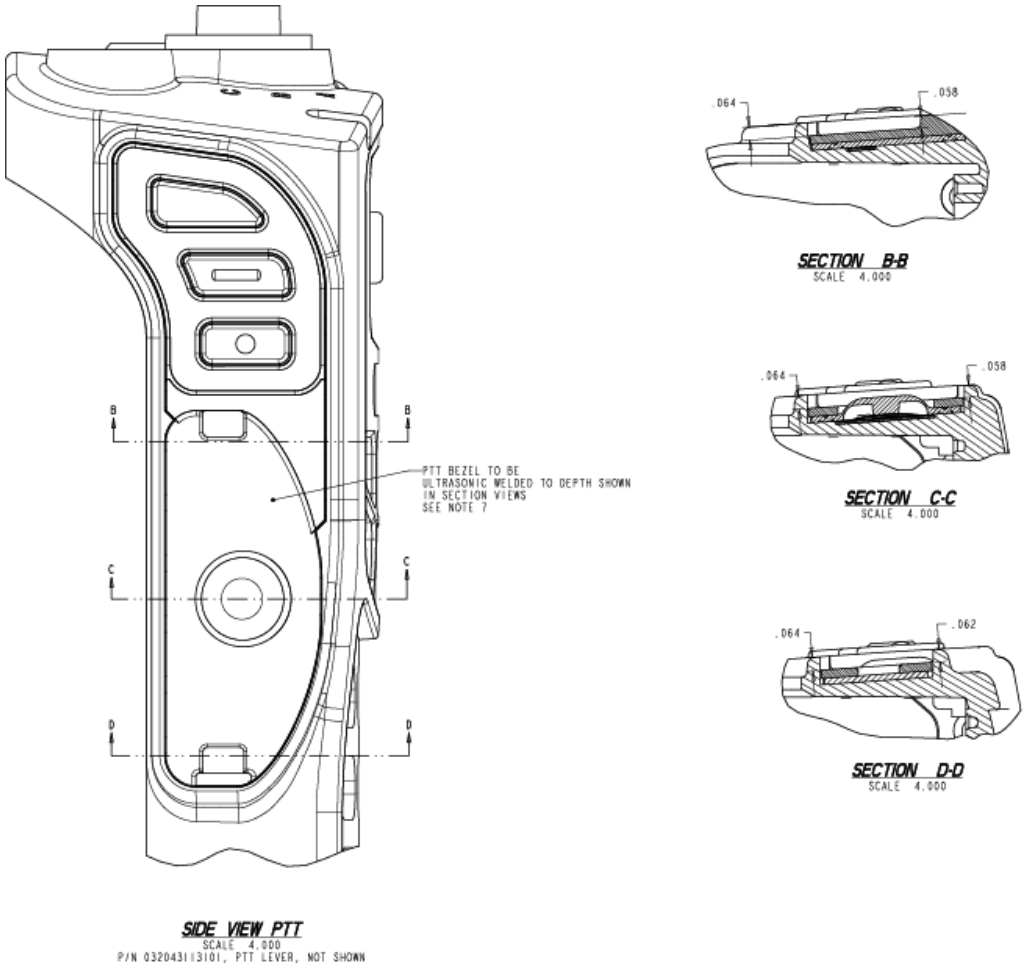
Figure 9.12 Front Cover Assembly Model I



PLAIN FRONT COVER ASM
SEE P/N TABLE SHT. 1

ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL
8	1	SEE TABLE	HOUSING, FRONT	ZENOY 2230
7	1	SEE TABLE	BEZEL, PTT	SEE TABLE
6	1	5743500 1060	GRILLE CLOTH, SPEAKER	HYPHOBE ACOUSTEX 8025
5	1	57435008740	WATER BARRIER, UDC	MATTE POLYCARBONATE .005 THK
4	1	0355 1008250	FLEX CIRCUIT, PTT	KAPTON (POLYAMIDE)
3	1	0355 1008150	FLEX CIRCUIT, UDC	KAPTON
2	1	0320431 1820	KEYPAD, PTT	SILICONE RUBBER
1	1	0320431 1310	LEVER, PTT	CYCOLOY C08800

Figure 9.13 Front Cover Assembly Detail



SECTION

10

Schematic Diagrams and Component Layouts

This section contains schematic diagrams and layout illustrations of most components for the 5100 ES Portable Radio.

Figure 10.1 Interconnect Schematic

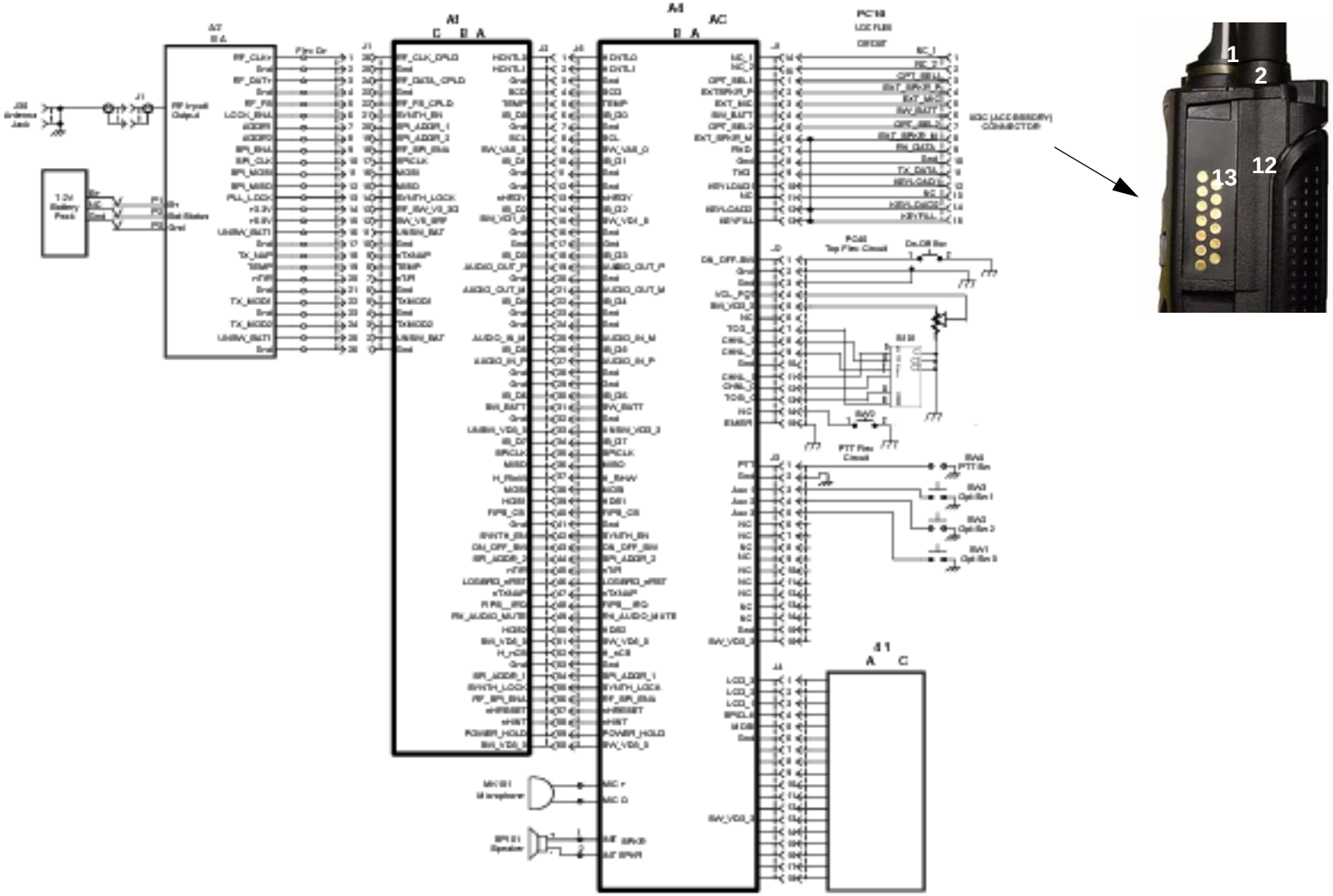


Figure 10.2 UHF RF Board Schematic (Page 1 of 5)

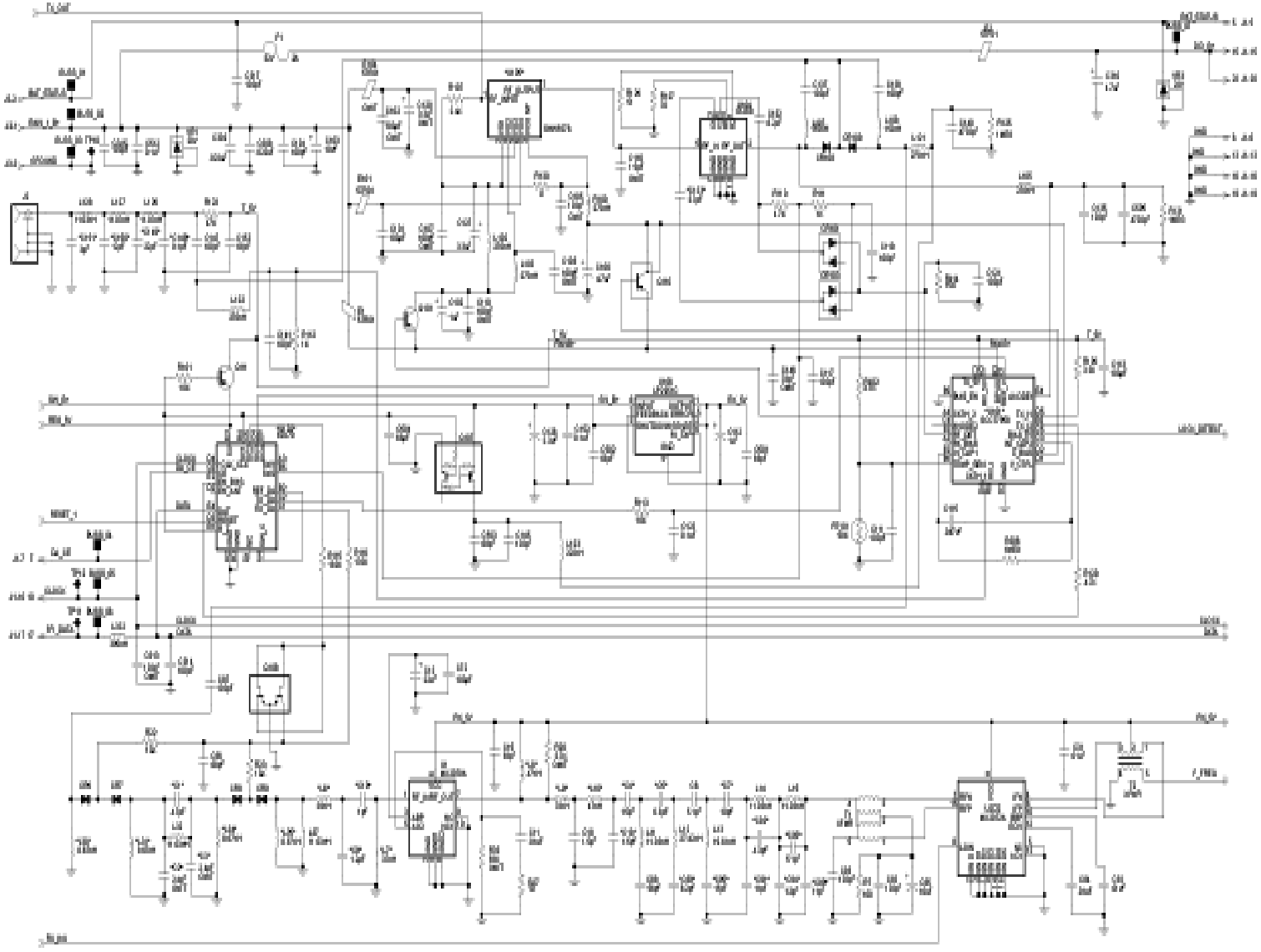


Figure 10.3 UHF RF Board Schematic (Page 2 of 5)

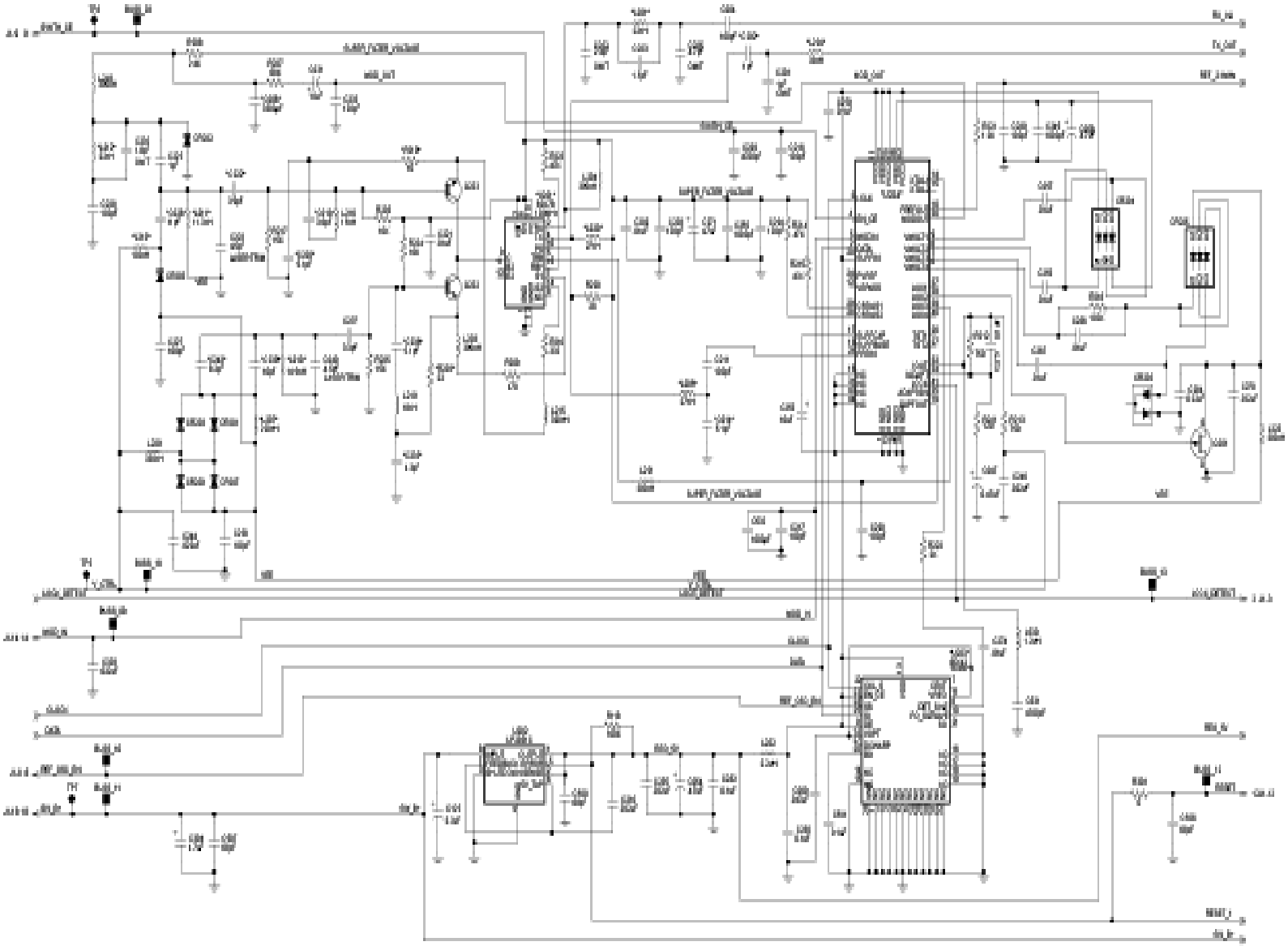


Figure 10.4 UHF RF Board Schematic (Page 3 of 5)

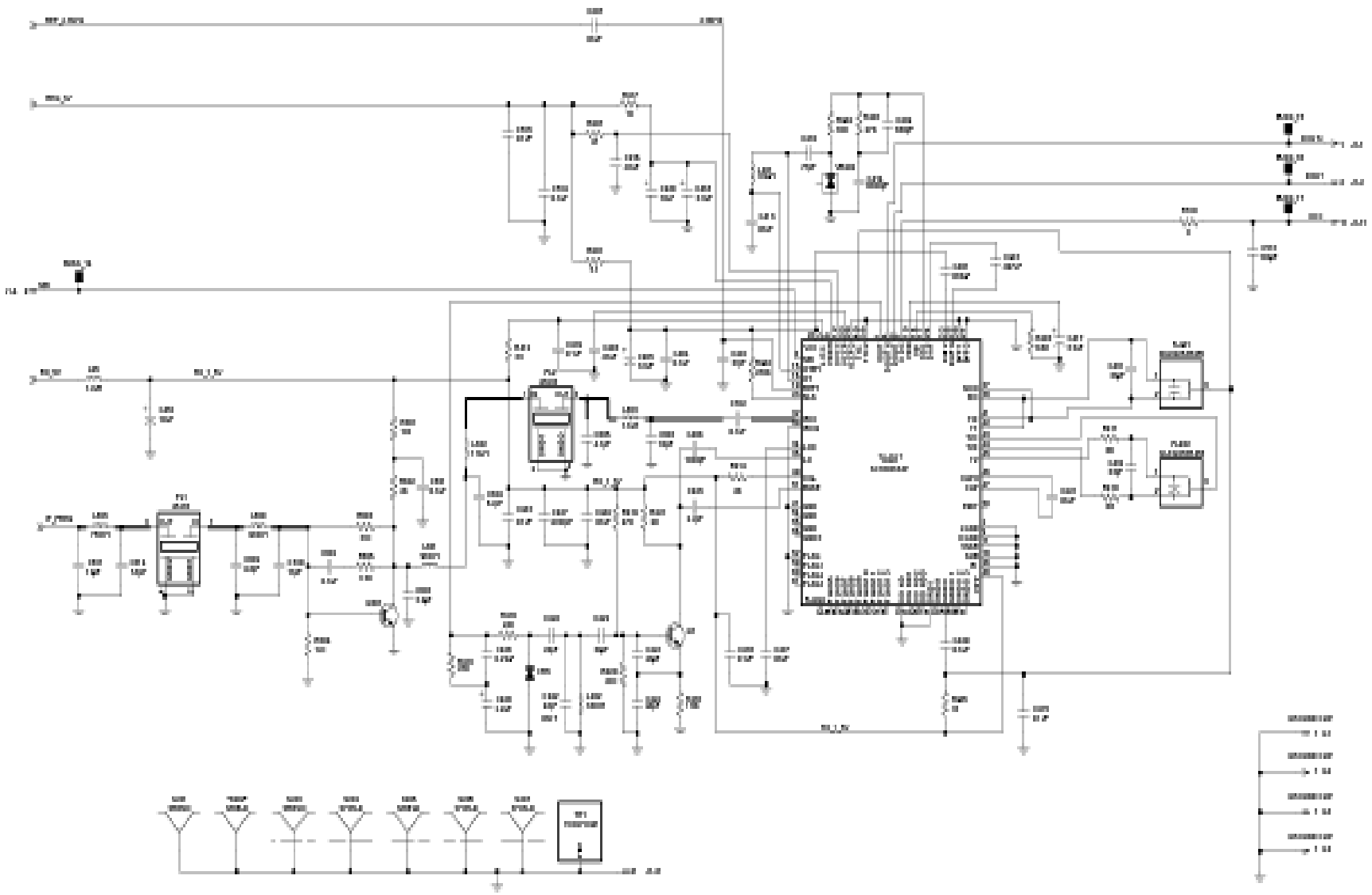


Figure 10.5 UHF RF Board Schematic (Page 4 of 5)

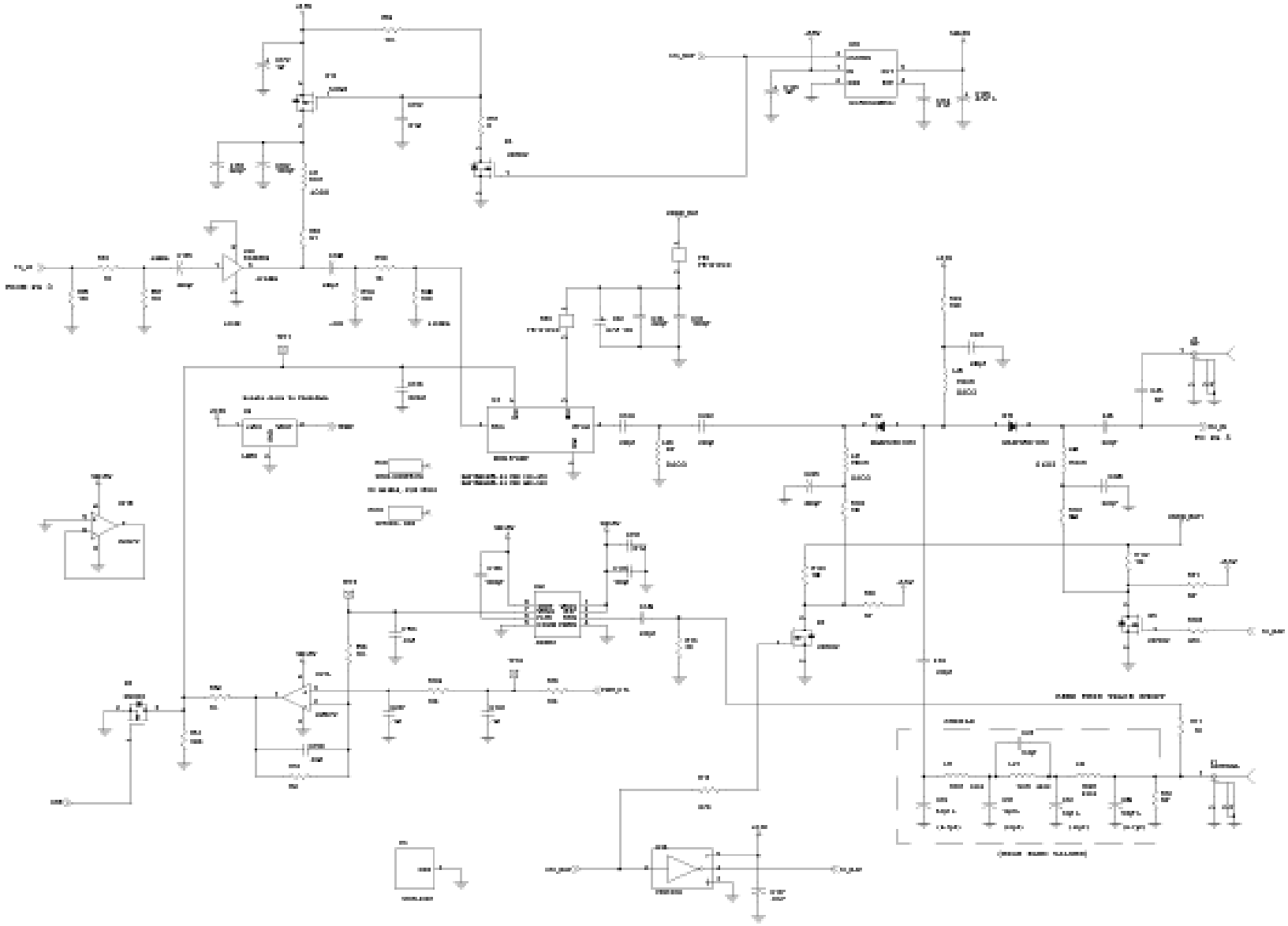


Figure 10.6 UHF RF Board Schematic (Page 5 of 5)

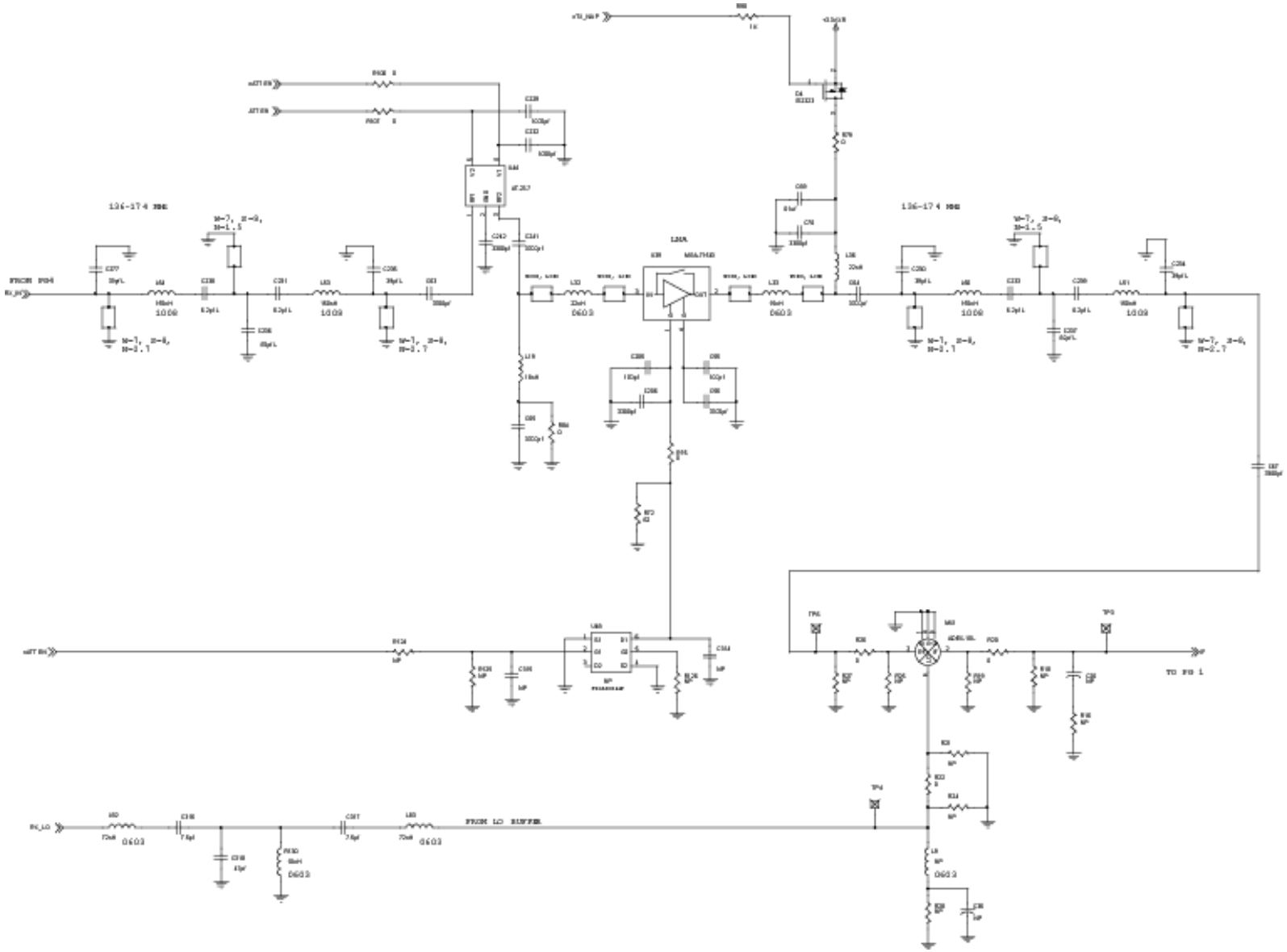
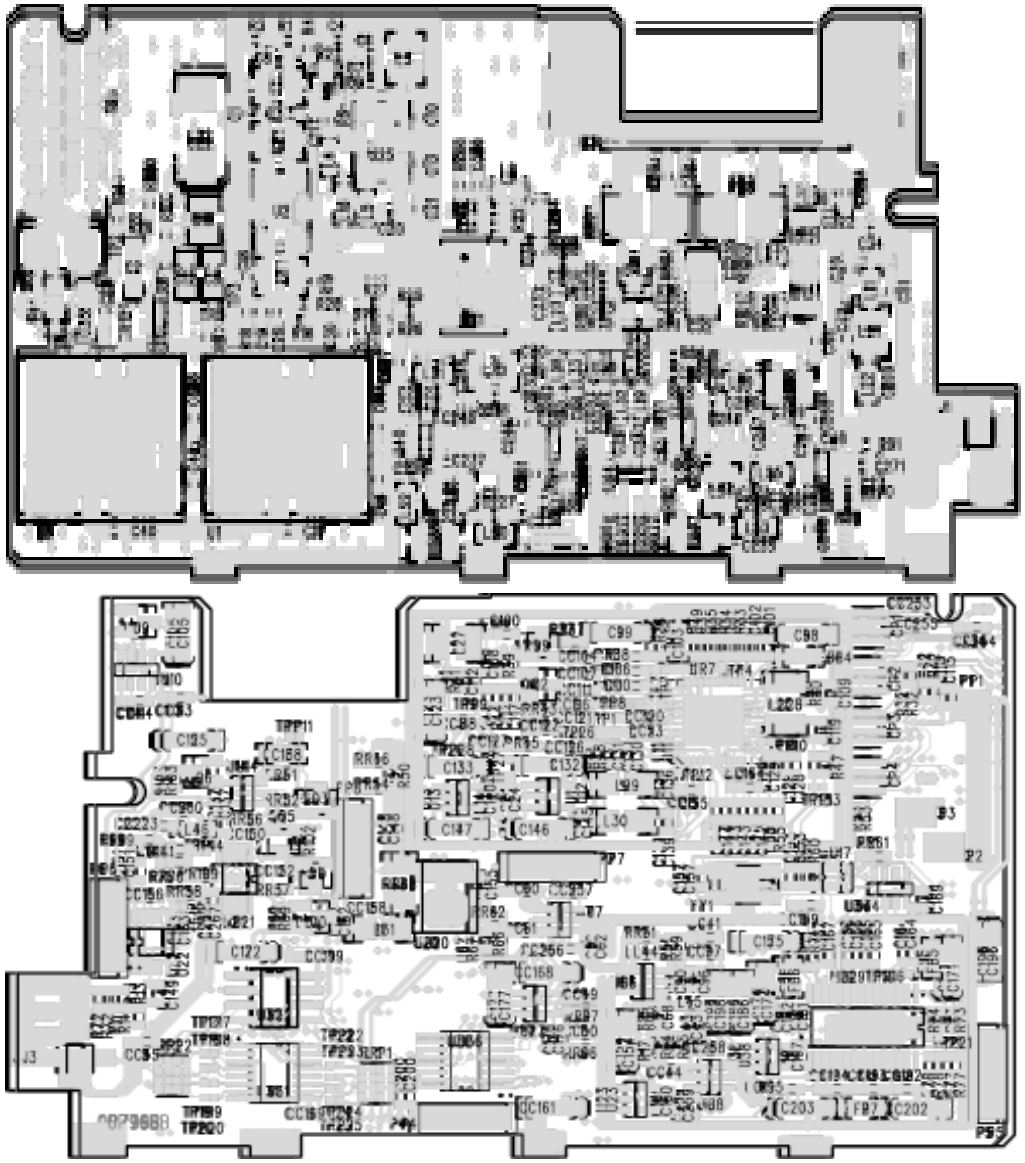


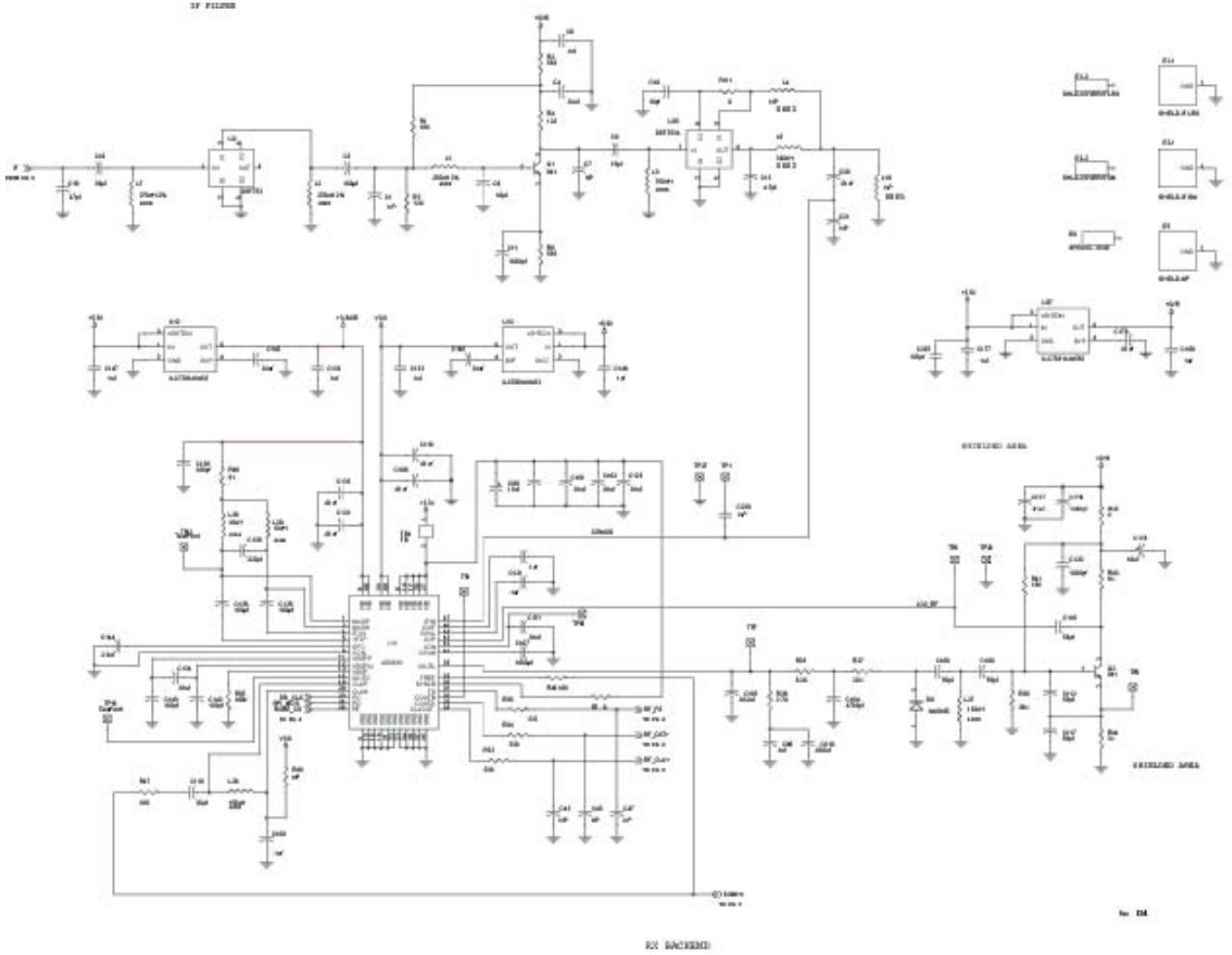
Figure 10.7 UHF RF Board Layout



TOP VIEW

BOTTOM VIEW

Figure 10.8 700/800 MHz RF Board Schematic (Page 1 of 5)



Note *Individual replacement parts are not available for the RF board, so the entire board must be replaced if it is defective.*

Figure 10.9 700/800 MHz RF Board Schematic (Page 2 of 5)

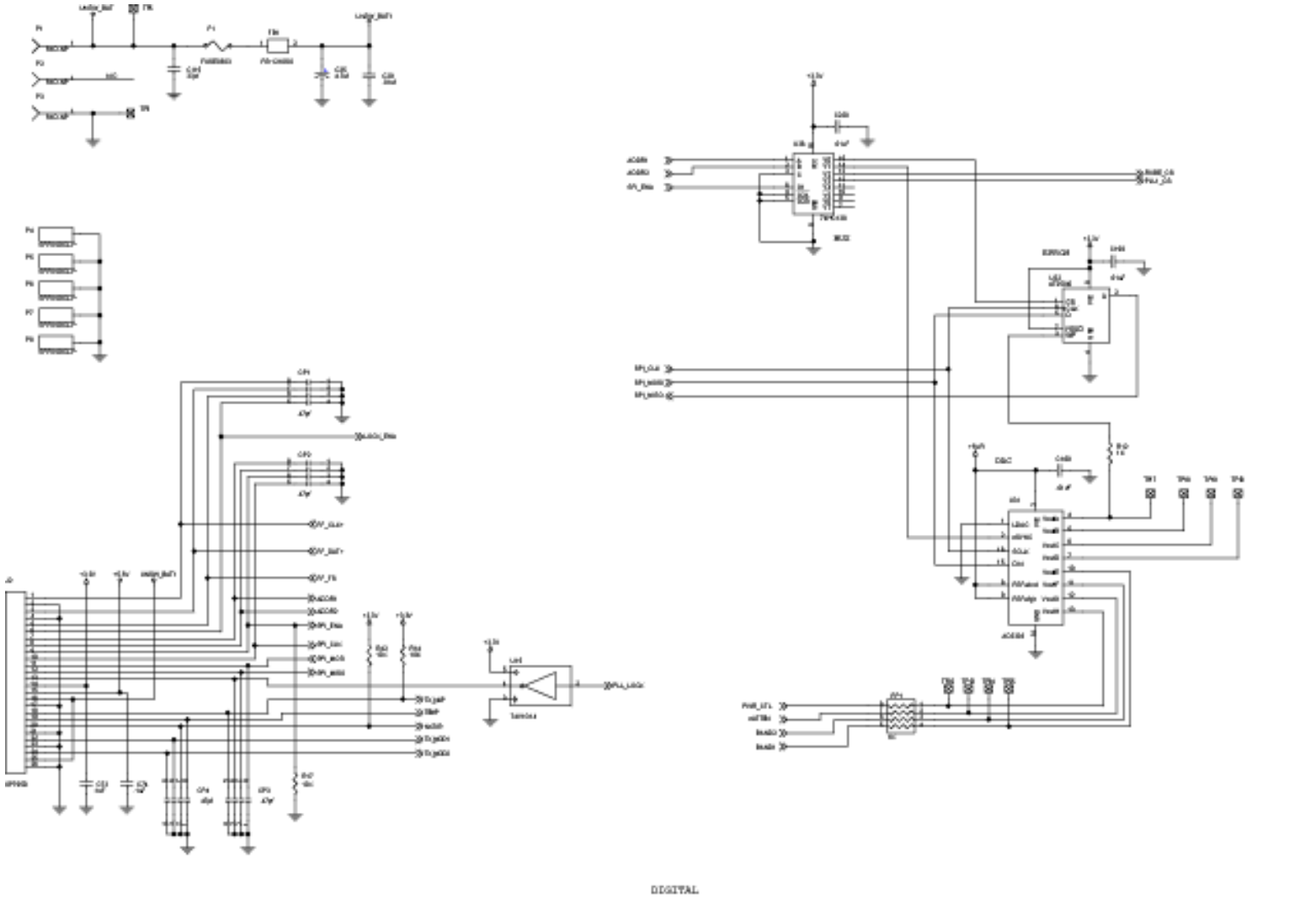


Figure 10.10 700/800 MHz RF Board Schematic (Page 3 of 5)

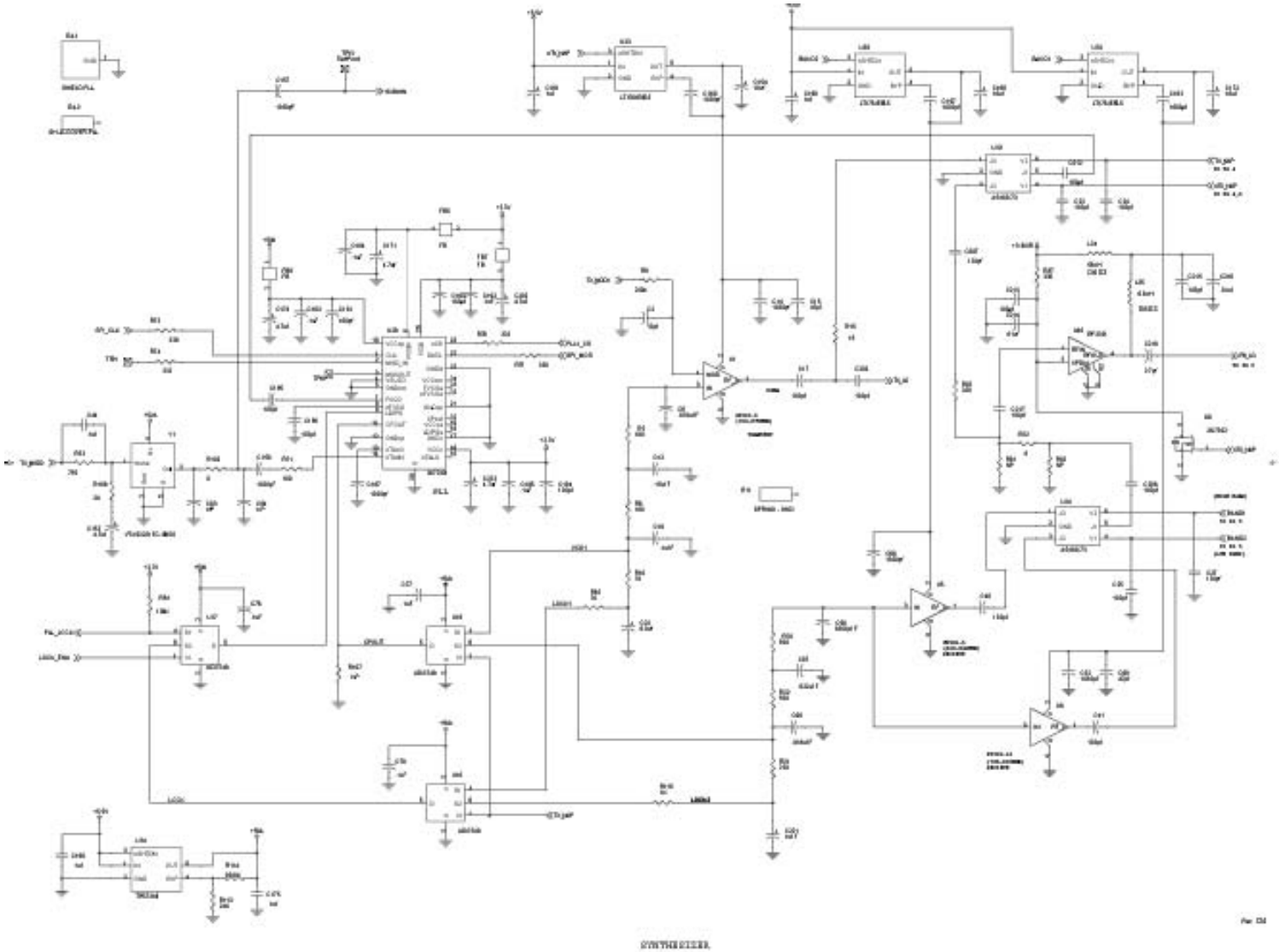


Figure 10.11 700/800 MHz RF Board Schematic (Page 4 of 5)

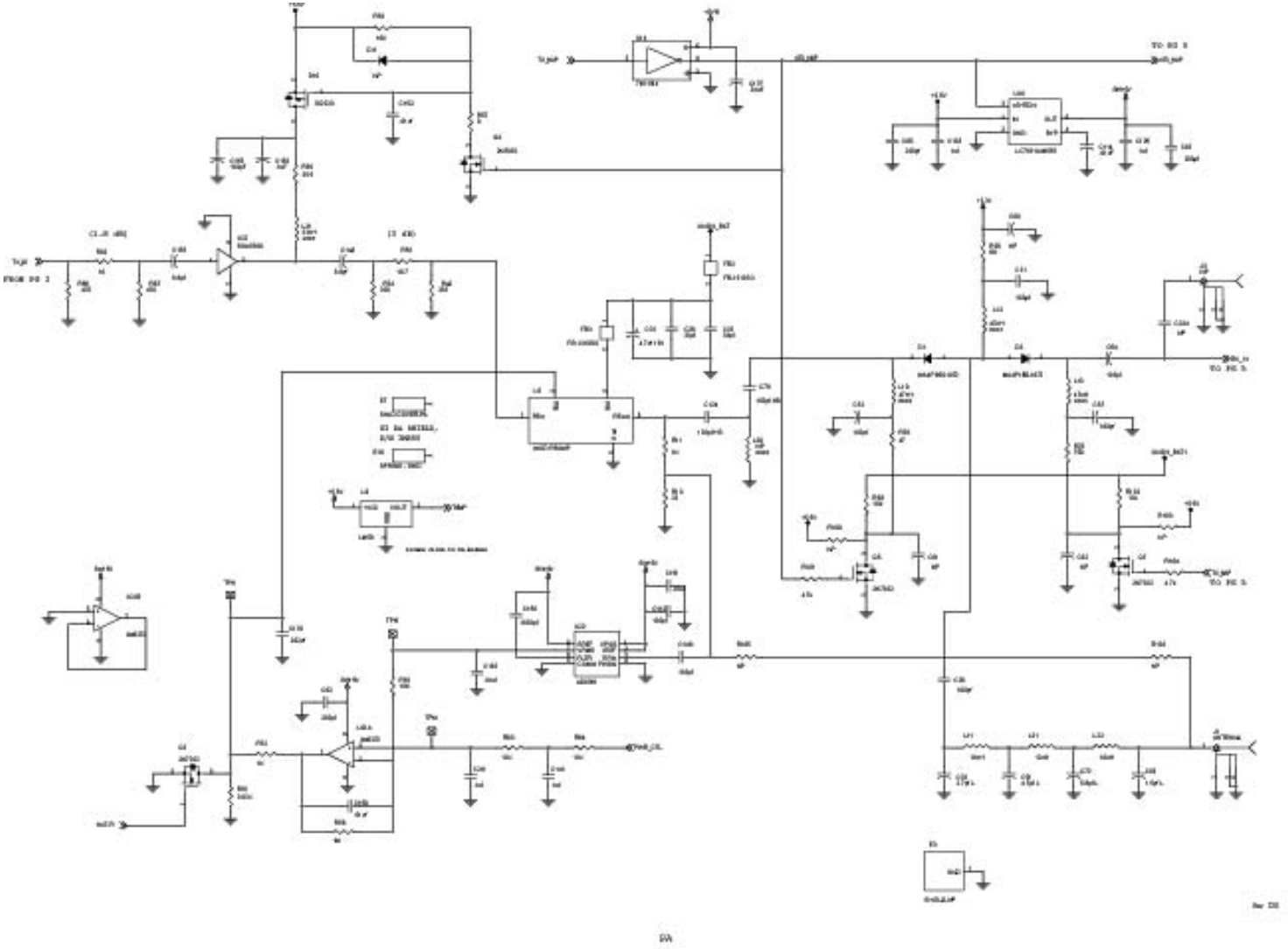


Figure 10.12 700/800 MHz RF Board Schematic (Page 5 of 5)

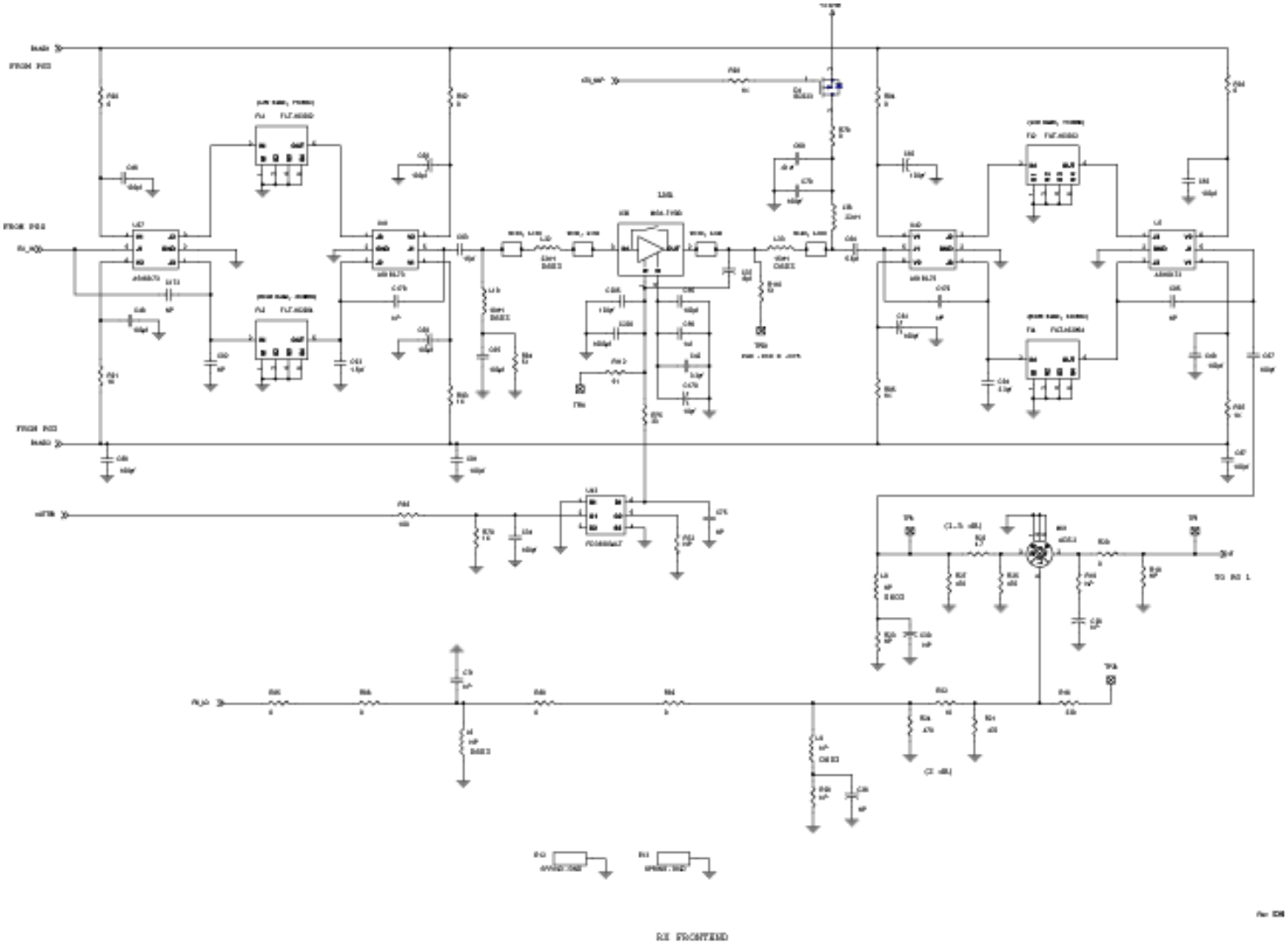
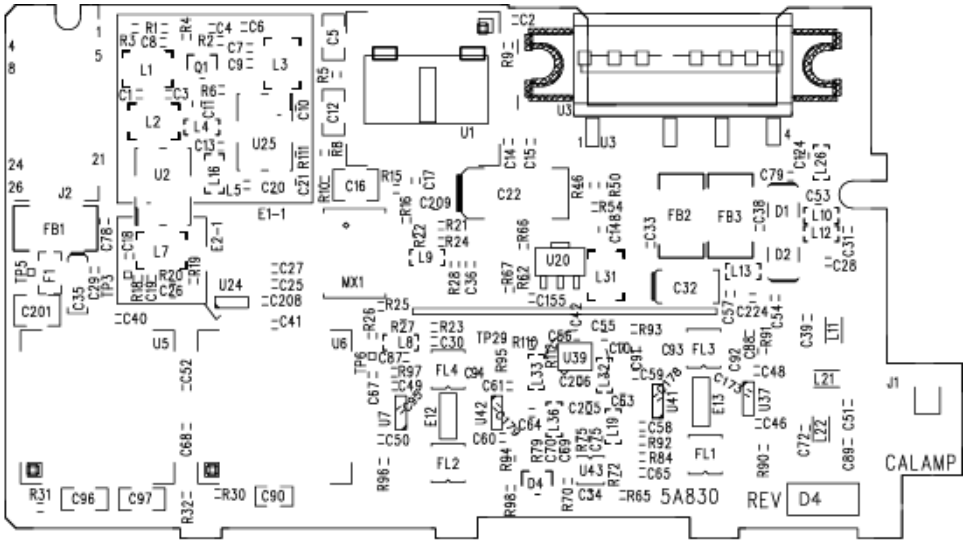
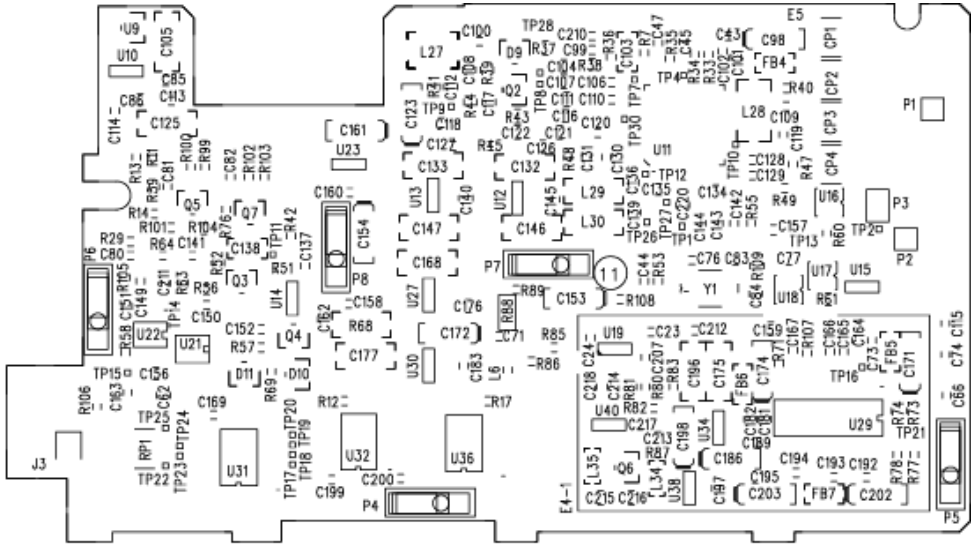


Figure 10.13 700/800 MHz RF Board Layout

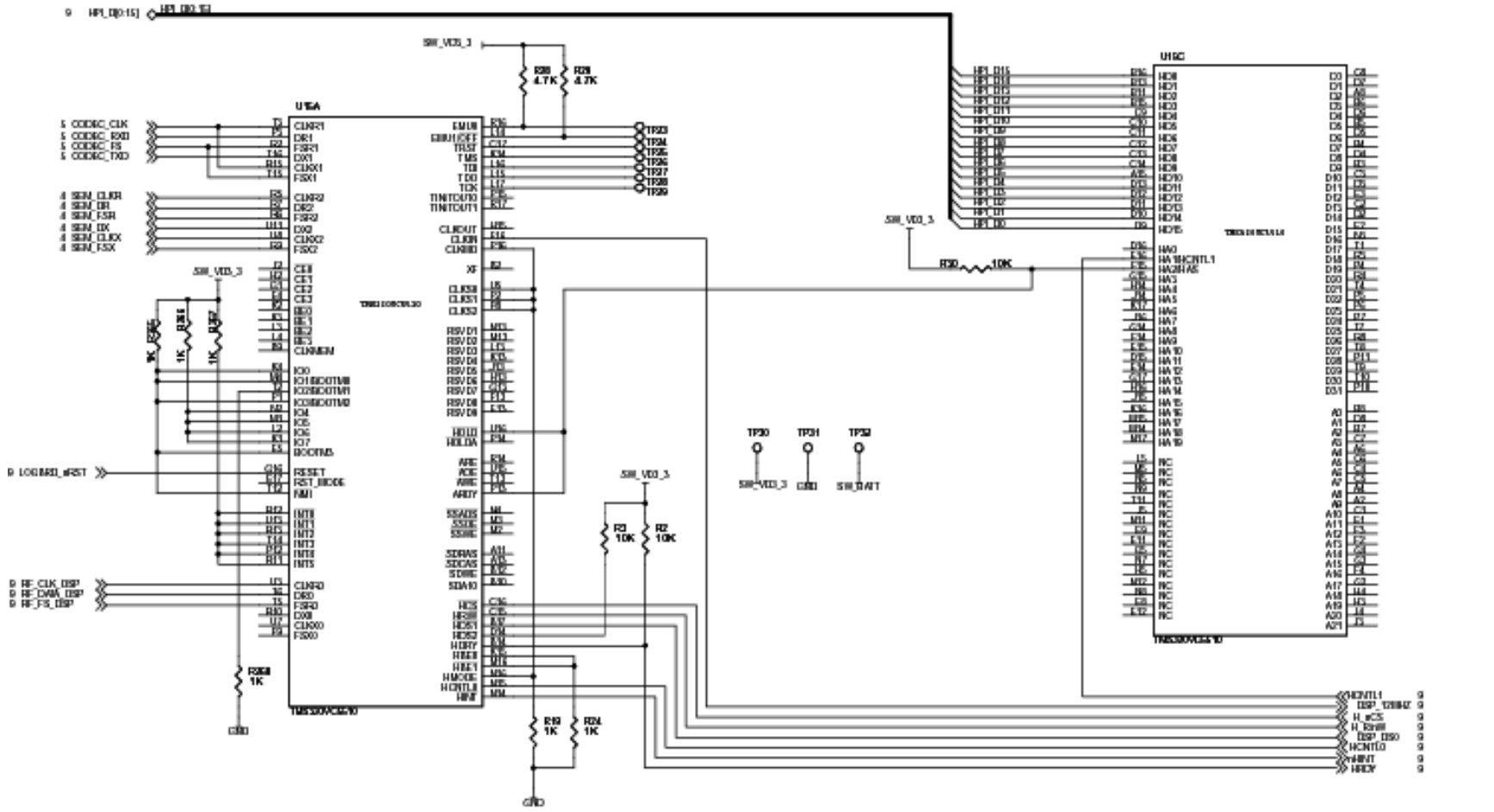


Top View



Bottom View

Figure 10.14 023-5500-180/182/185 Logic Board Schematic (Page 1 of 7)



Note *The number from 3-11 next to a node label indicates the page number of the circuit to which it connects.*

Note *Pages 1 and 2 are not used.*

Figure 10.15 023-5500-180/182/185 Logic Board Schematic (Page 2 of 7)

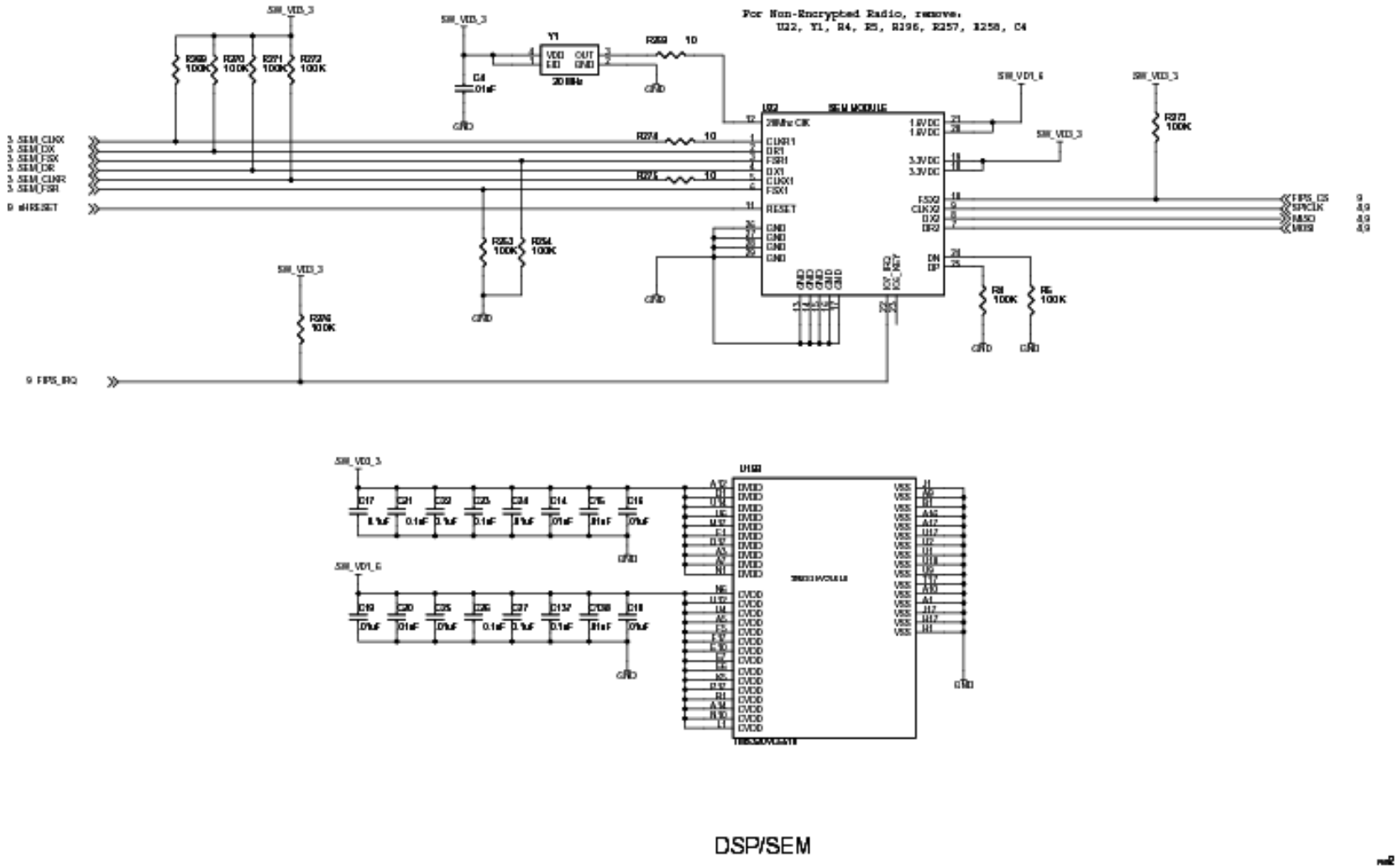


Figure 10.16 023-5500-180/182/185 Logic Board Schematic (Page 3 of 7)

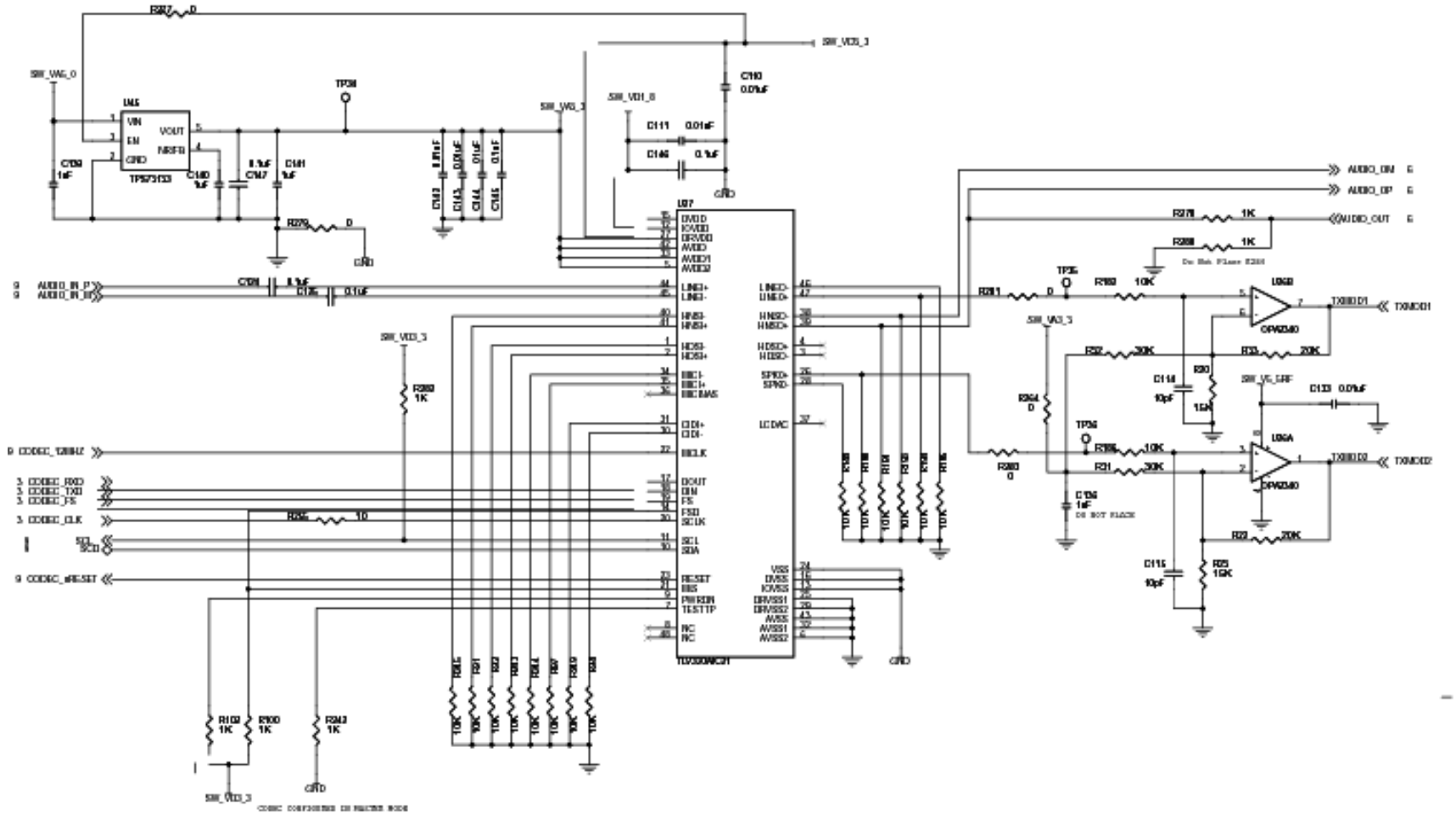


Figure 10.17 023-5500-180/182/185 Logic Board Schematic (Page 4 of 7)

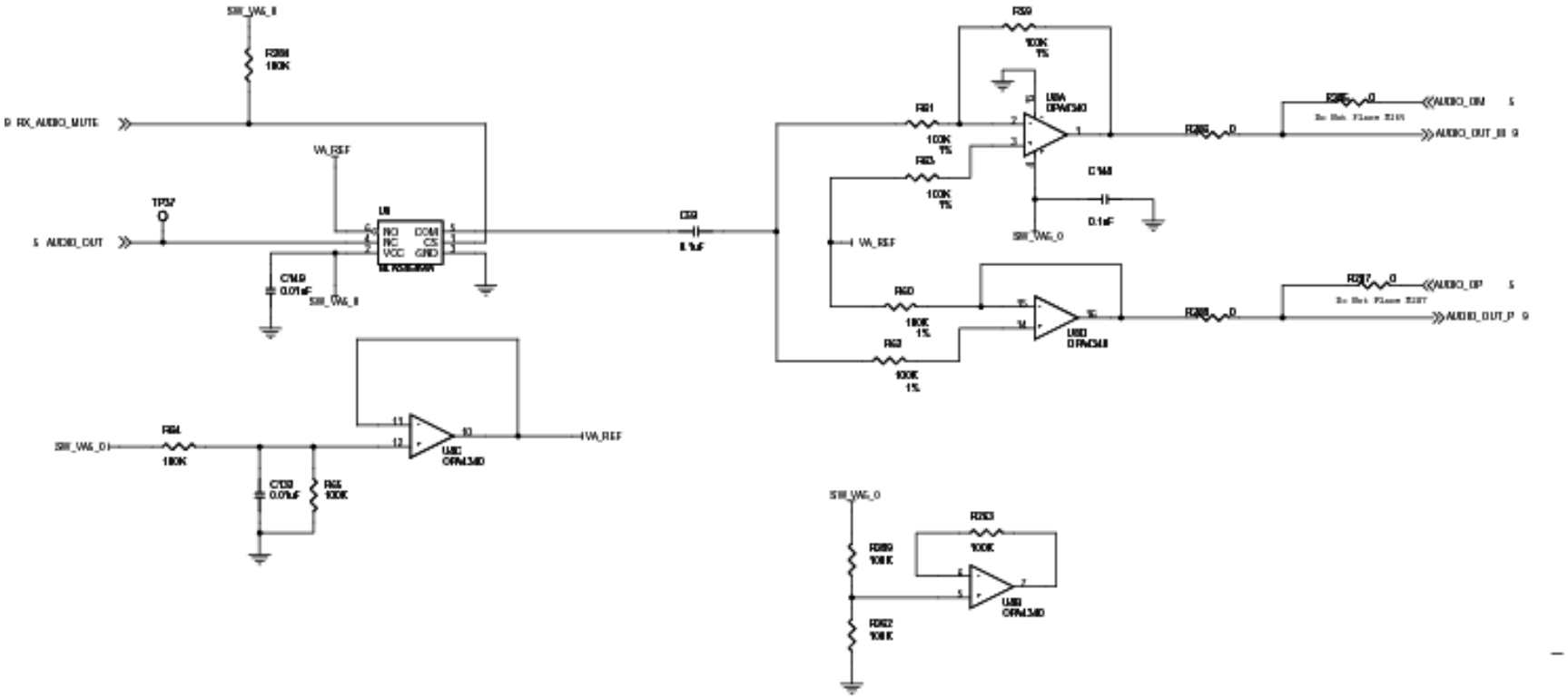


Figure 10.18 023-5500-180/182/185 Logic Board Schematic (Page 5 of 7)

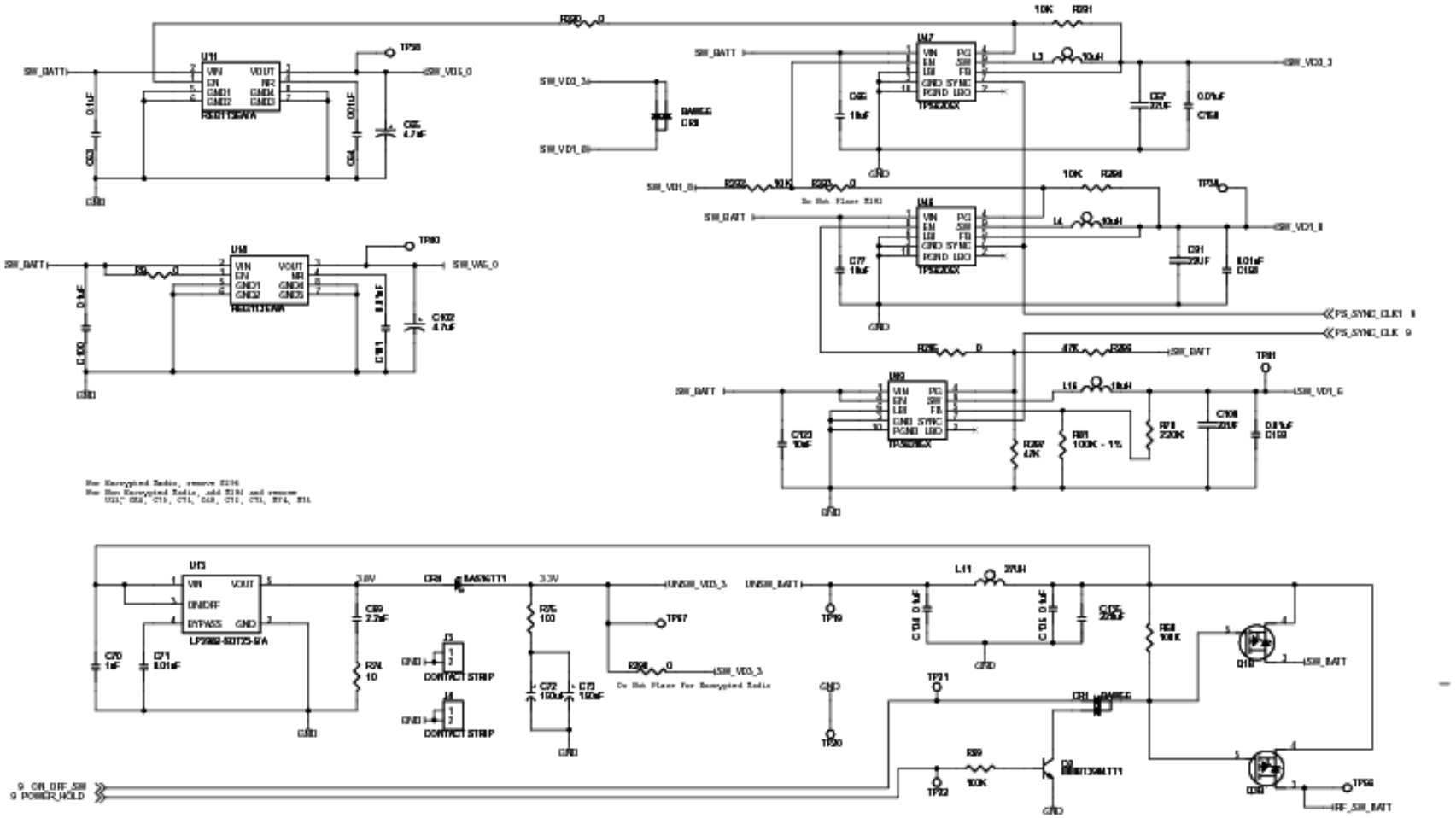


Figure 10.19 023-5500-180/182/185 Logic Board Schematic (Page 6 of 7)

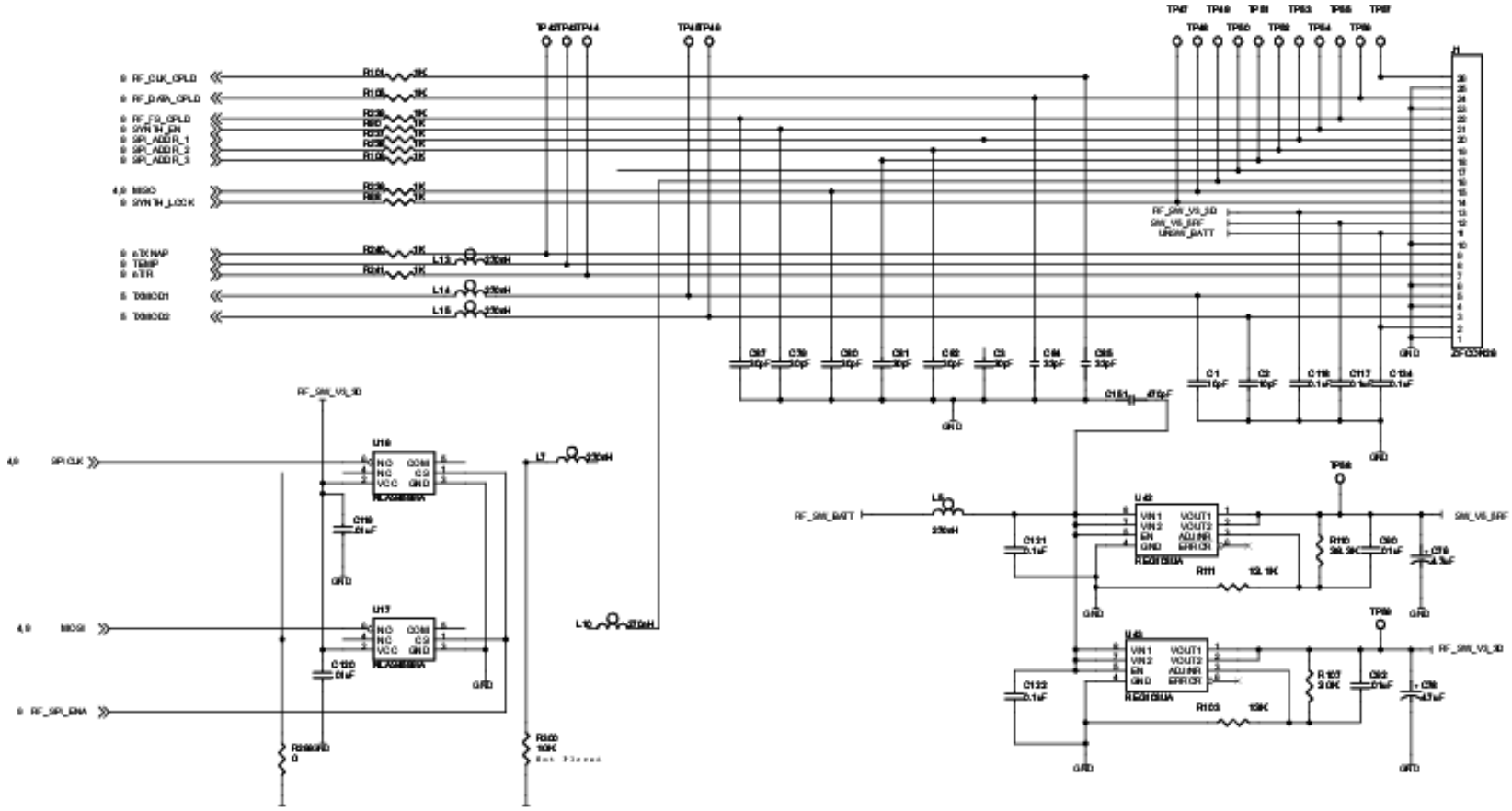


Figure 10.20 023-5500-180/182/185 Logic Board Schematic (Page 7 of 7)

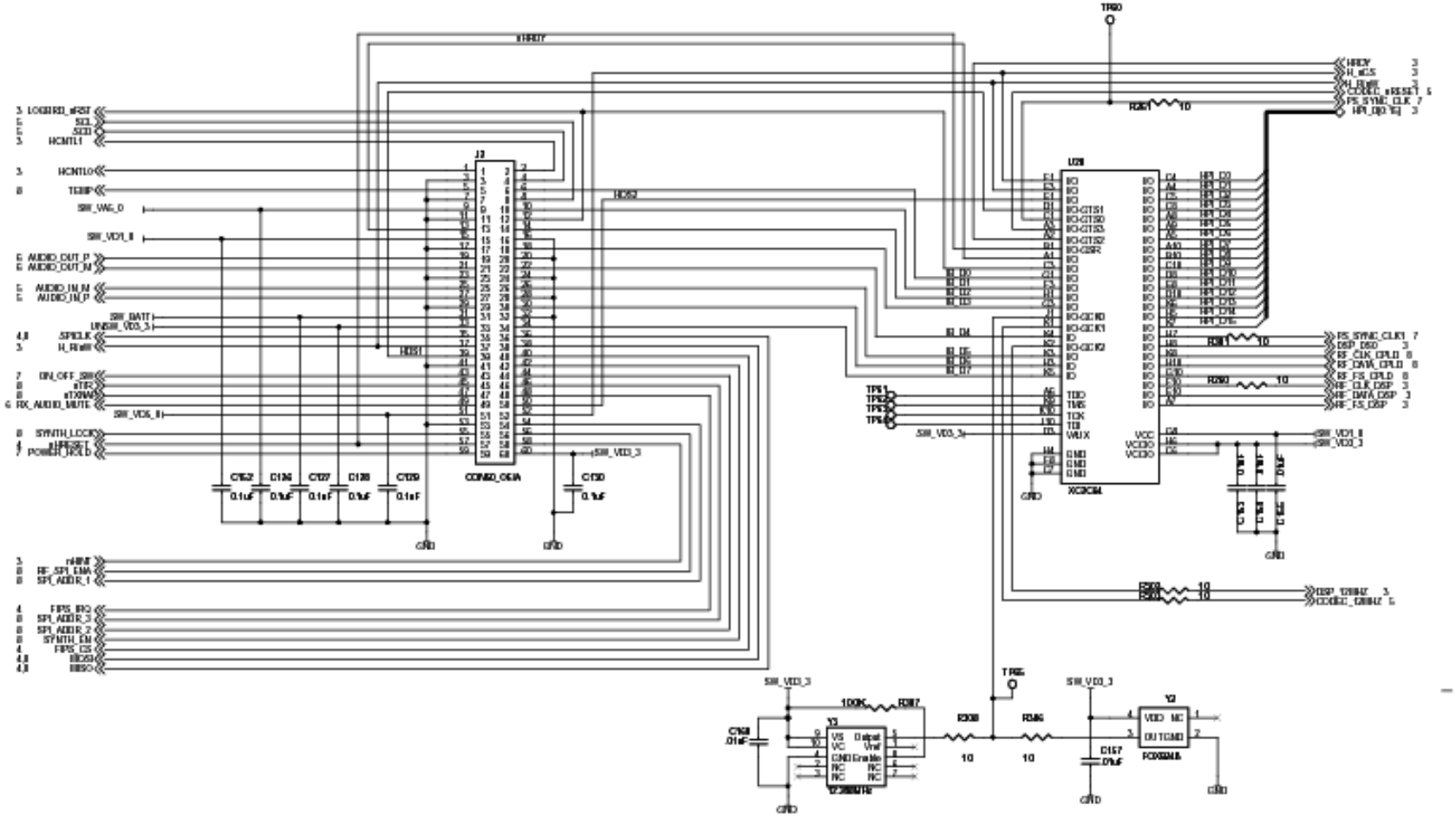
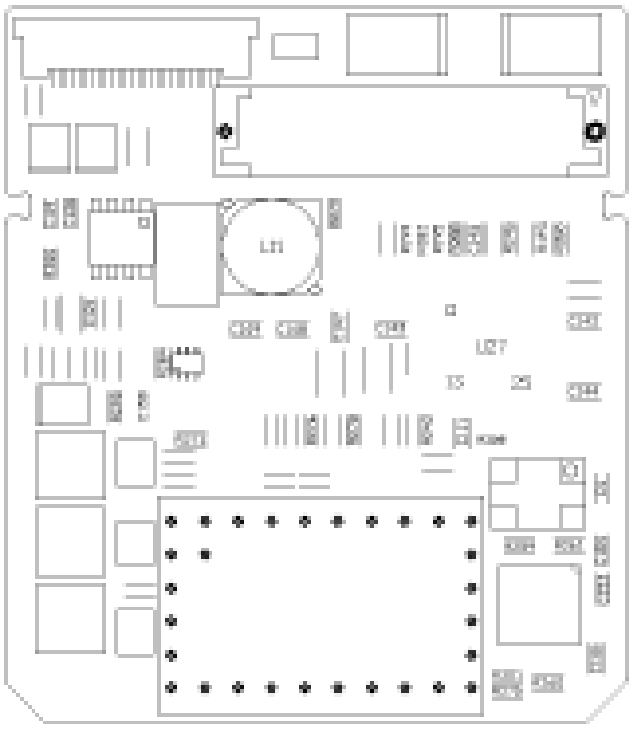
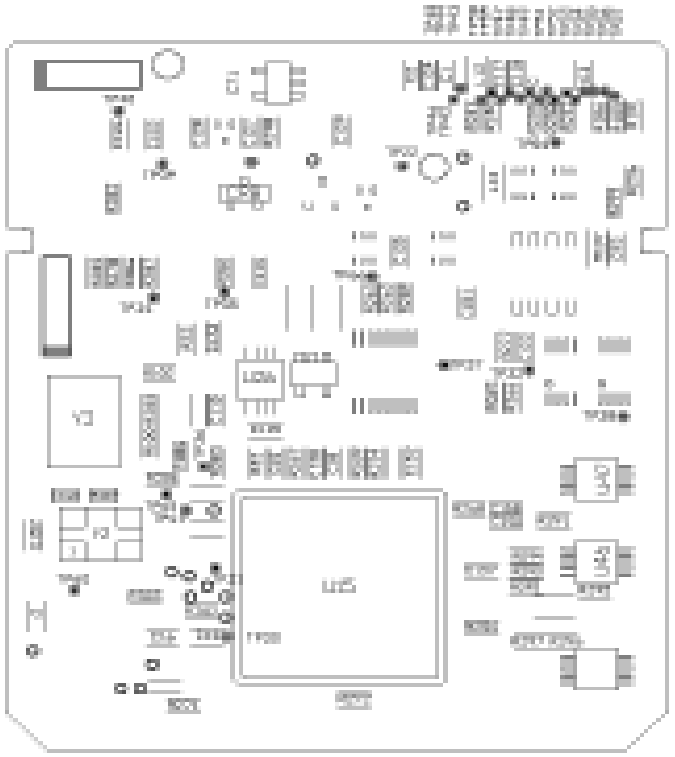


Figure 10.21 023-5500-180/182/185 Logic Board Assembly

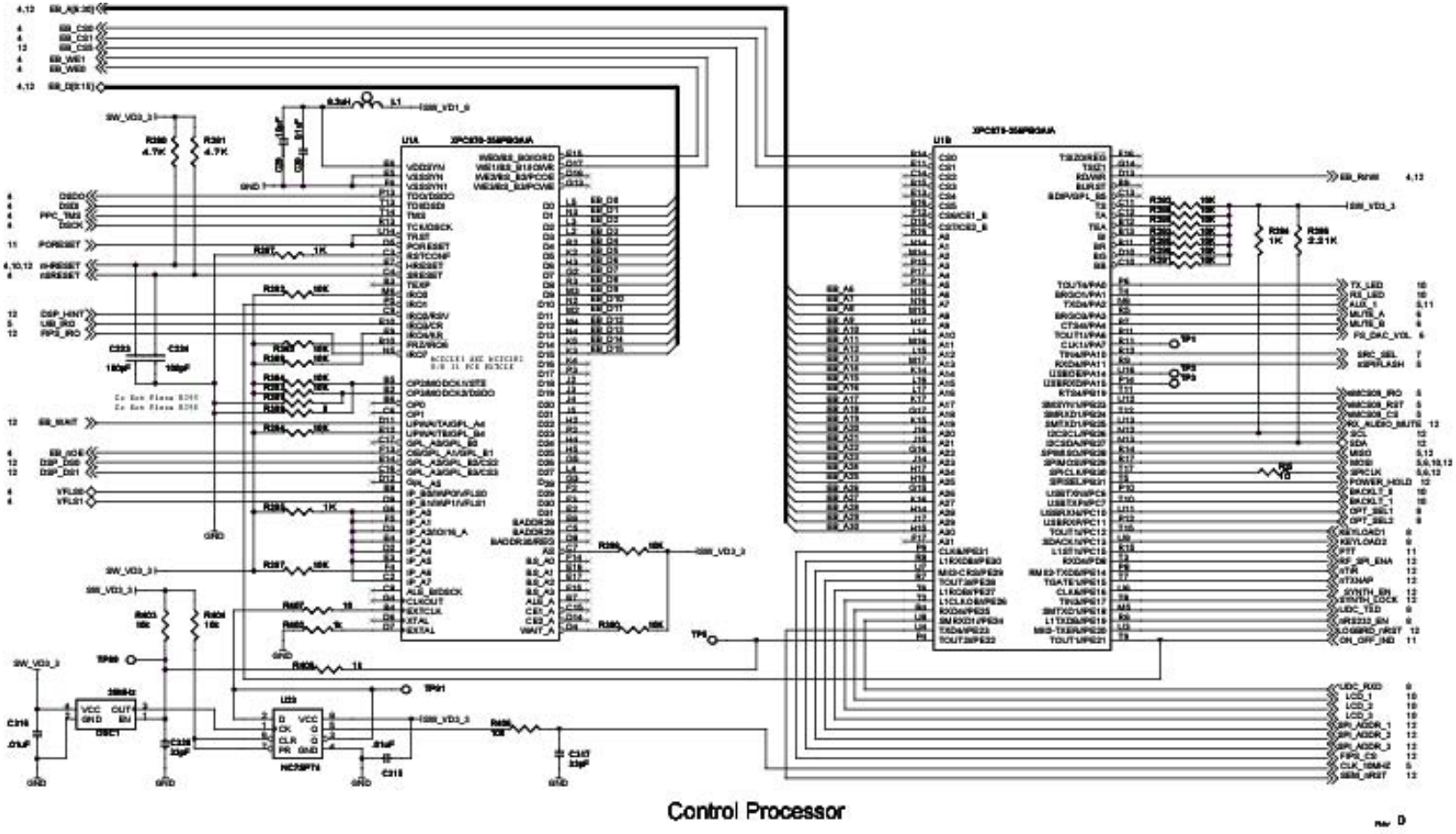


Top View



Bottom View

Figure 10.22 023-5500-480/485 User Interface Board Schematic (Page 1 of 10)



Note *The number from 3-12 next to a node label indicates the page number of the circuit to which it connects.*

Note *Pages 1 and 2 are not used.*

Figure 10.23 023-5500-480/485 User Interface Board Schematic (Page 2 of 10)

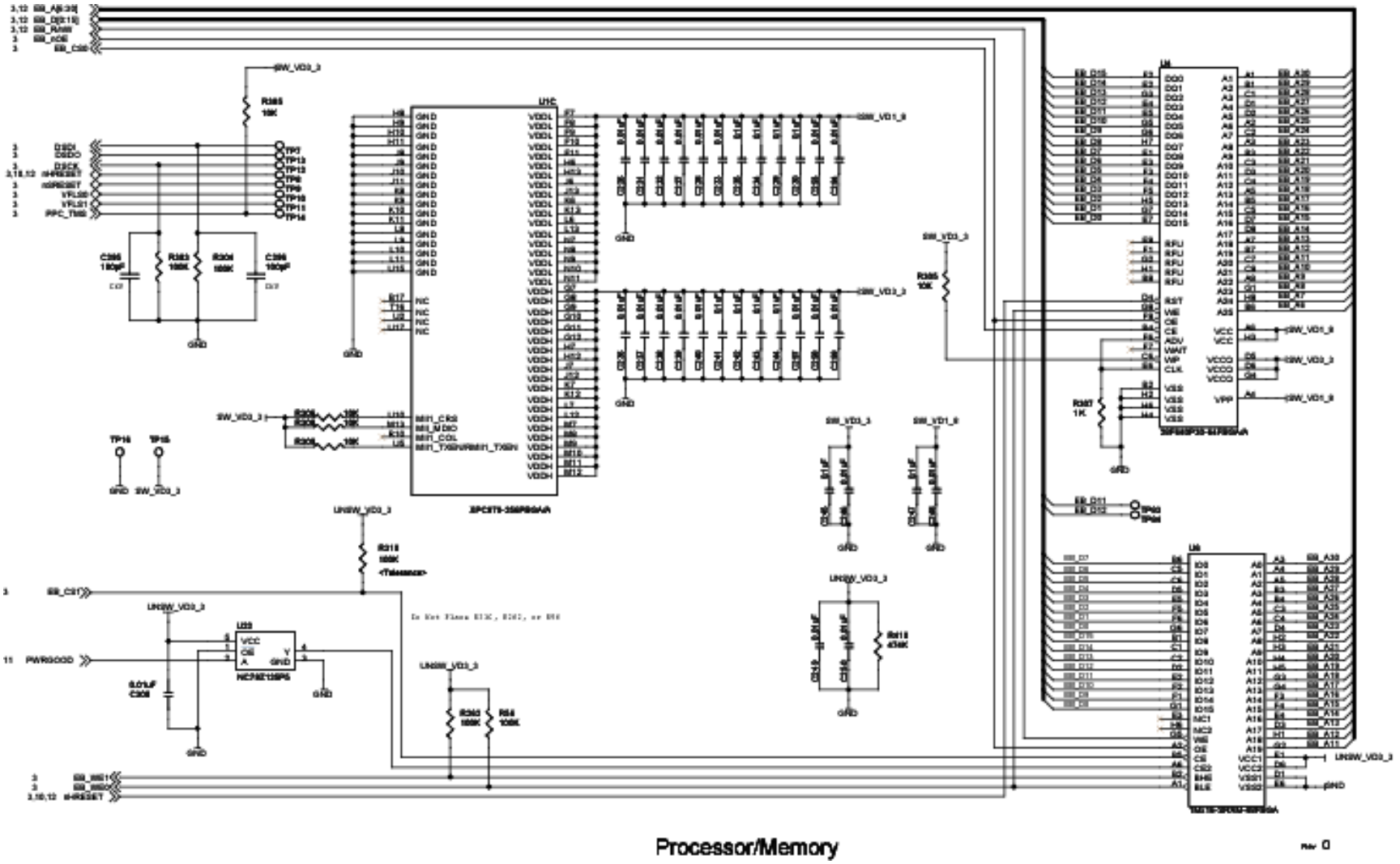


Figure 10.24 023-5500-480/485 User Interface Board Schematic (Page 3 of 10)

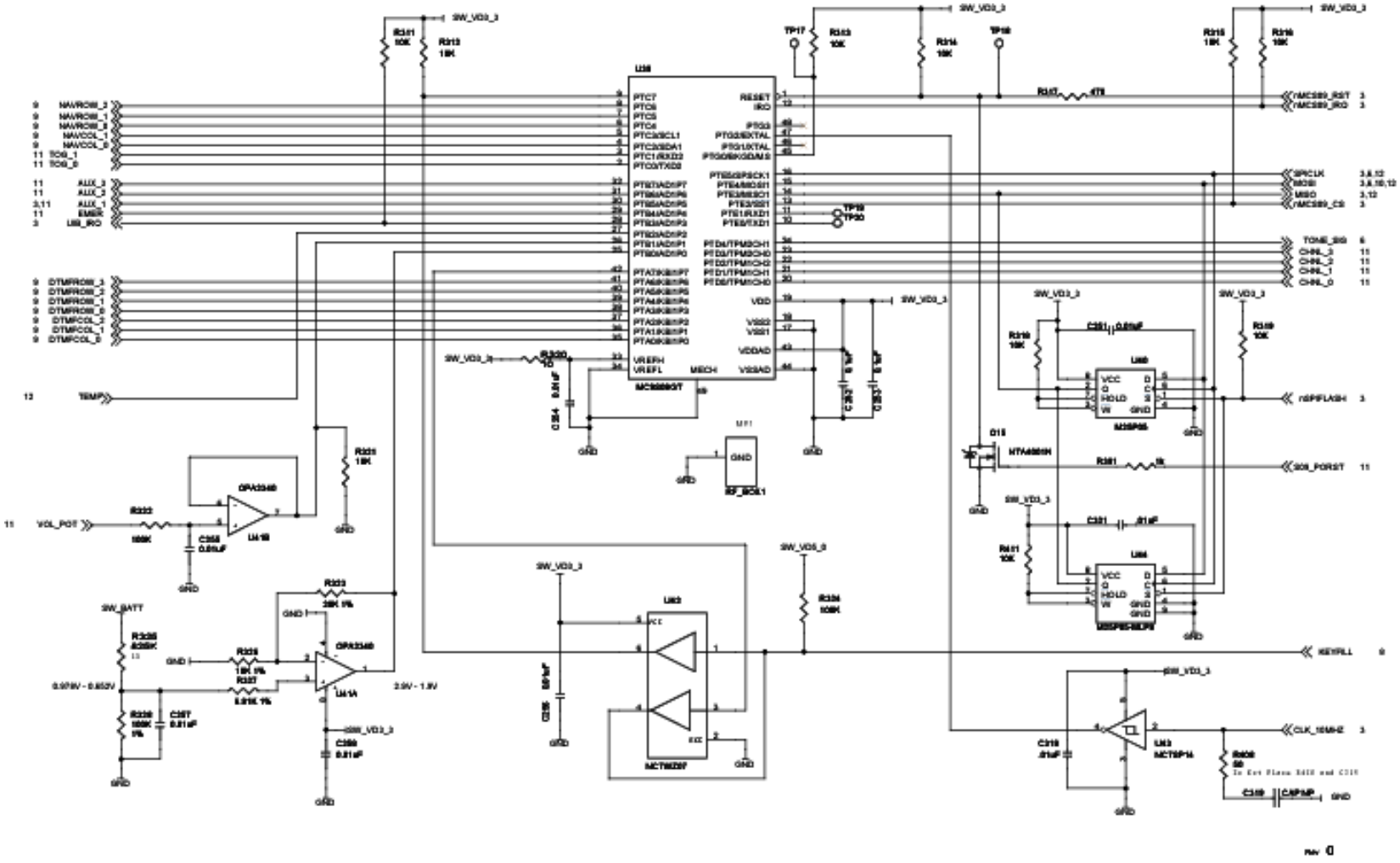


Figure 10.25 023-5500-480/485 User Interface Board Schematic (Page 4 of 10)

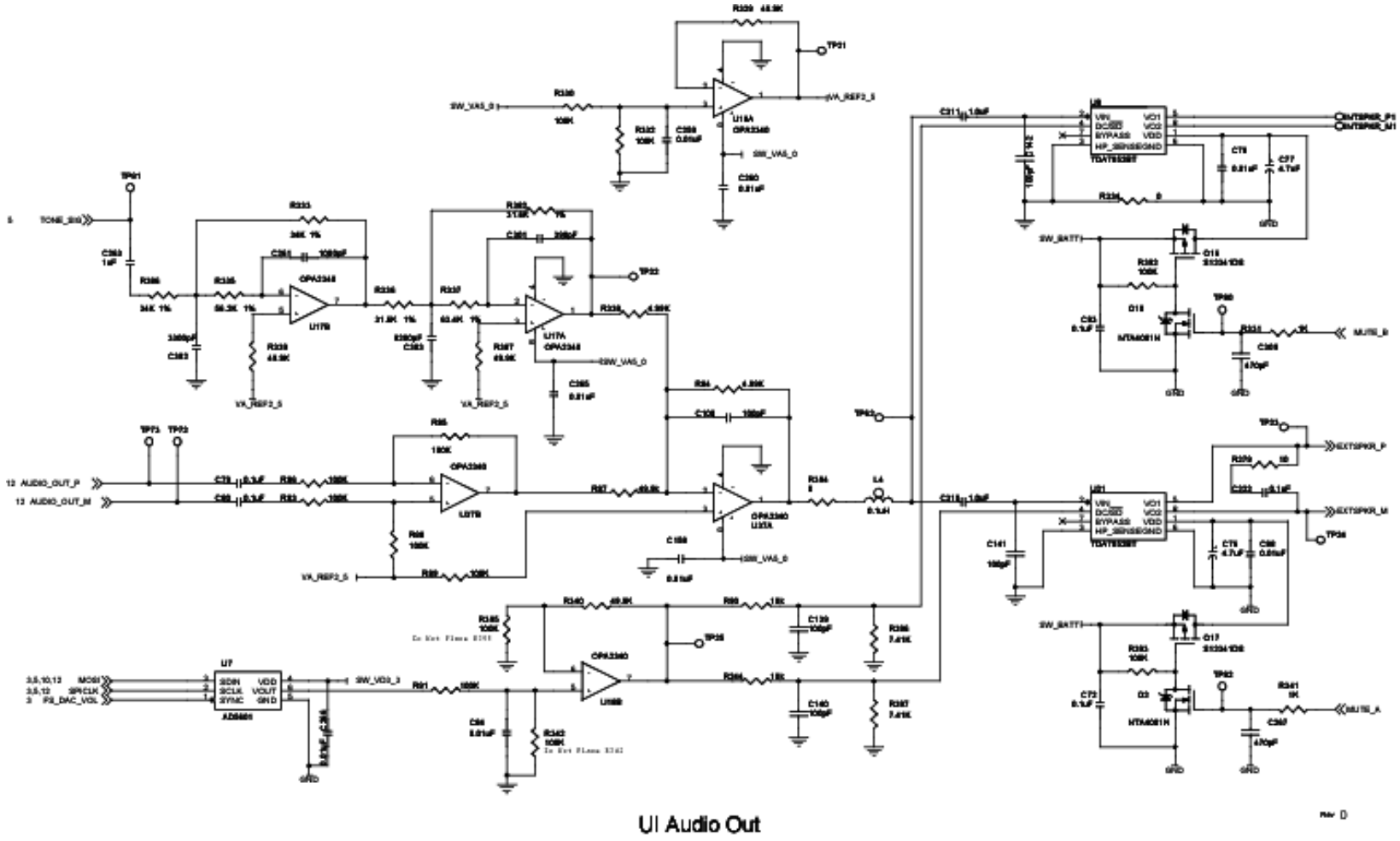


Figure 10.26 023-5500-480/485 User Interface Board Schematic (Page 5 of 10)

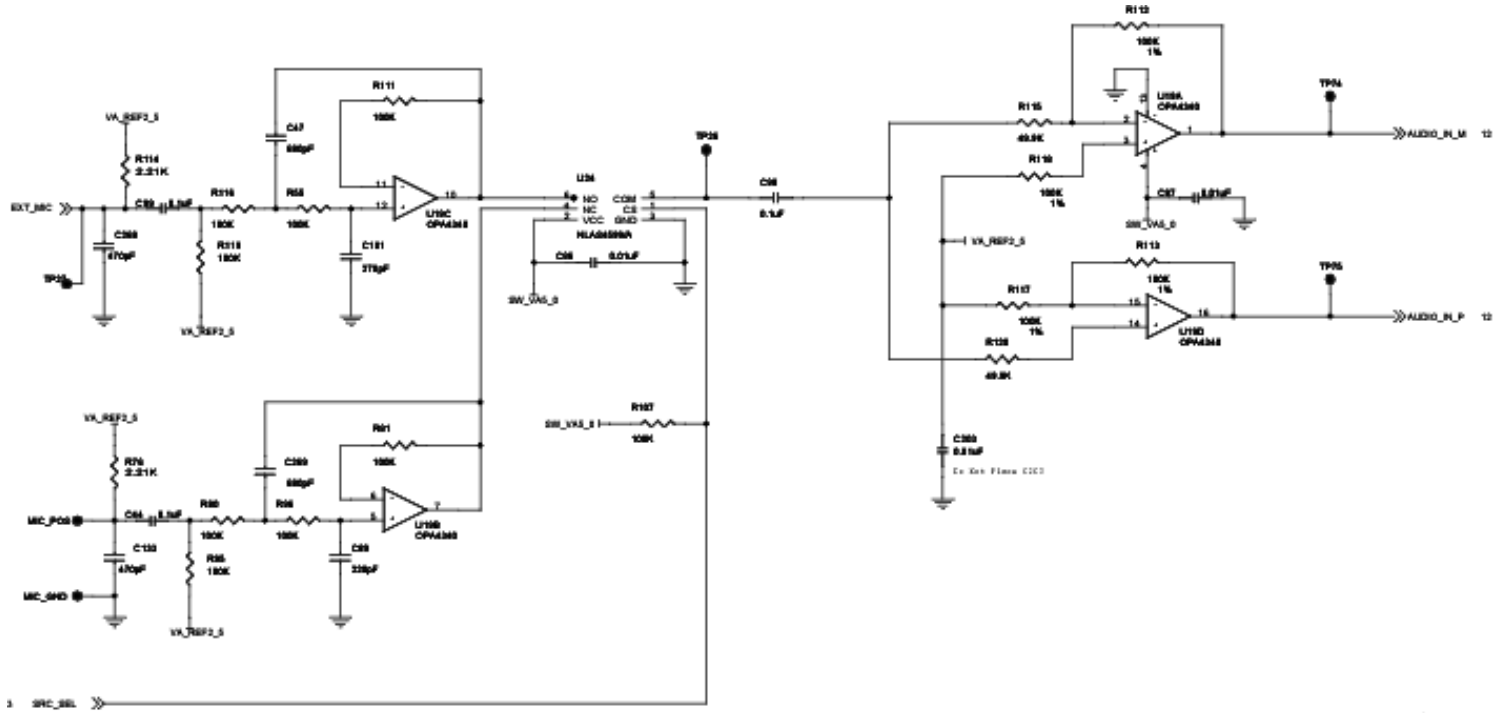


Figure 10.27 023-5500-480/485 User Interface Board Schematic (Page 6 of 10)

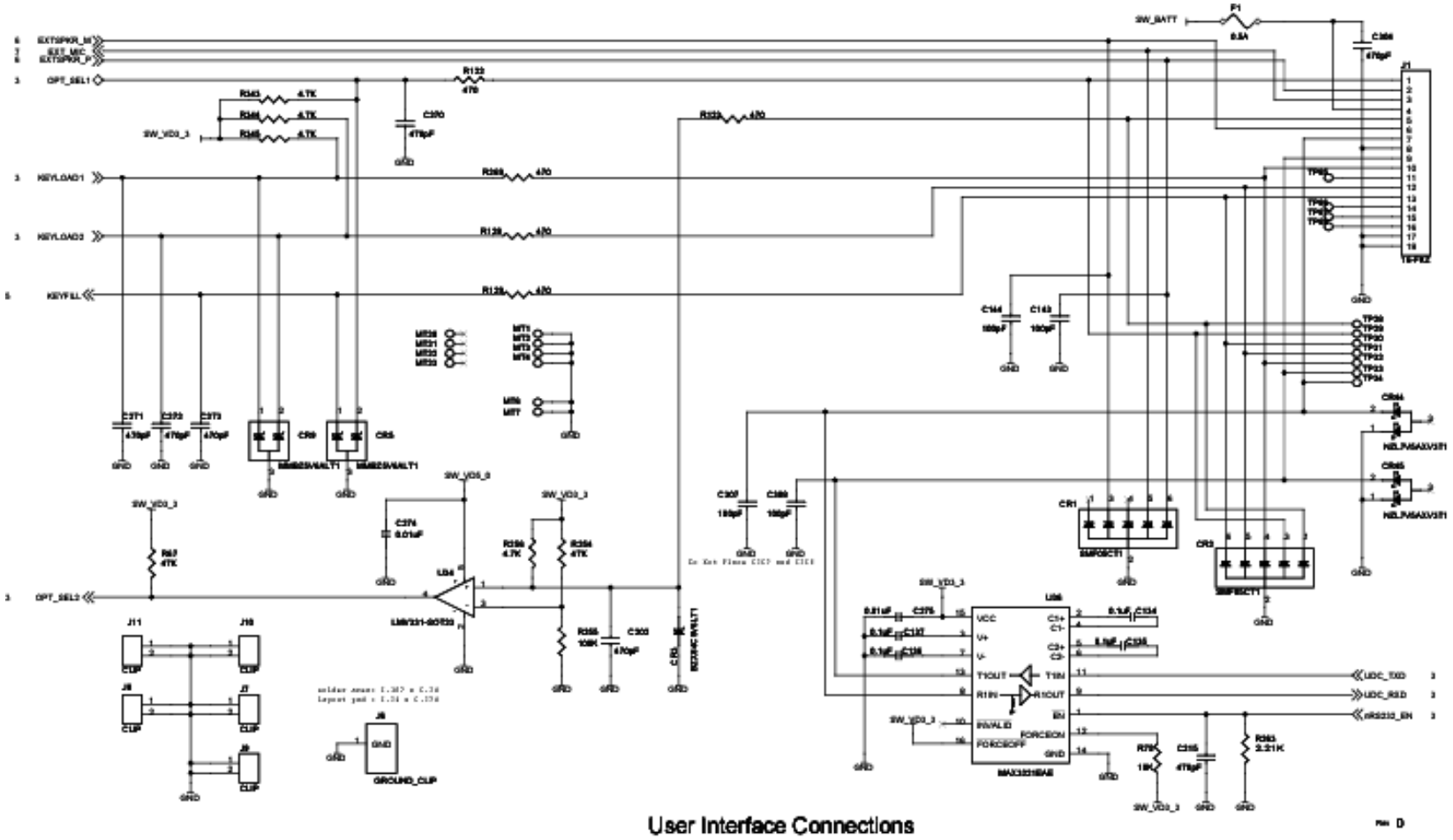


Figure 10.28 023-5500-480/485 User Interface Board Schematic (Page 7 of 10)

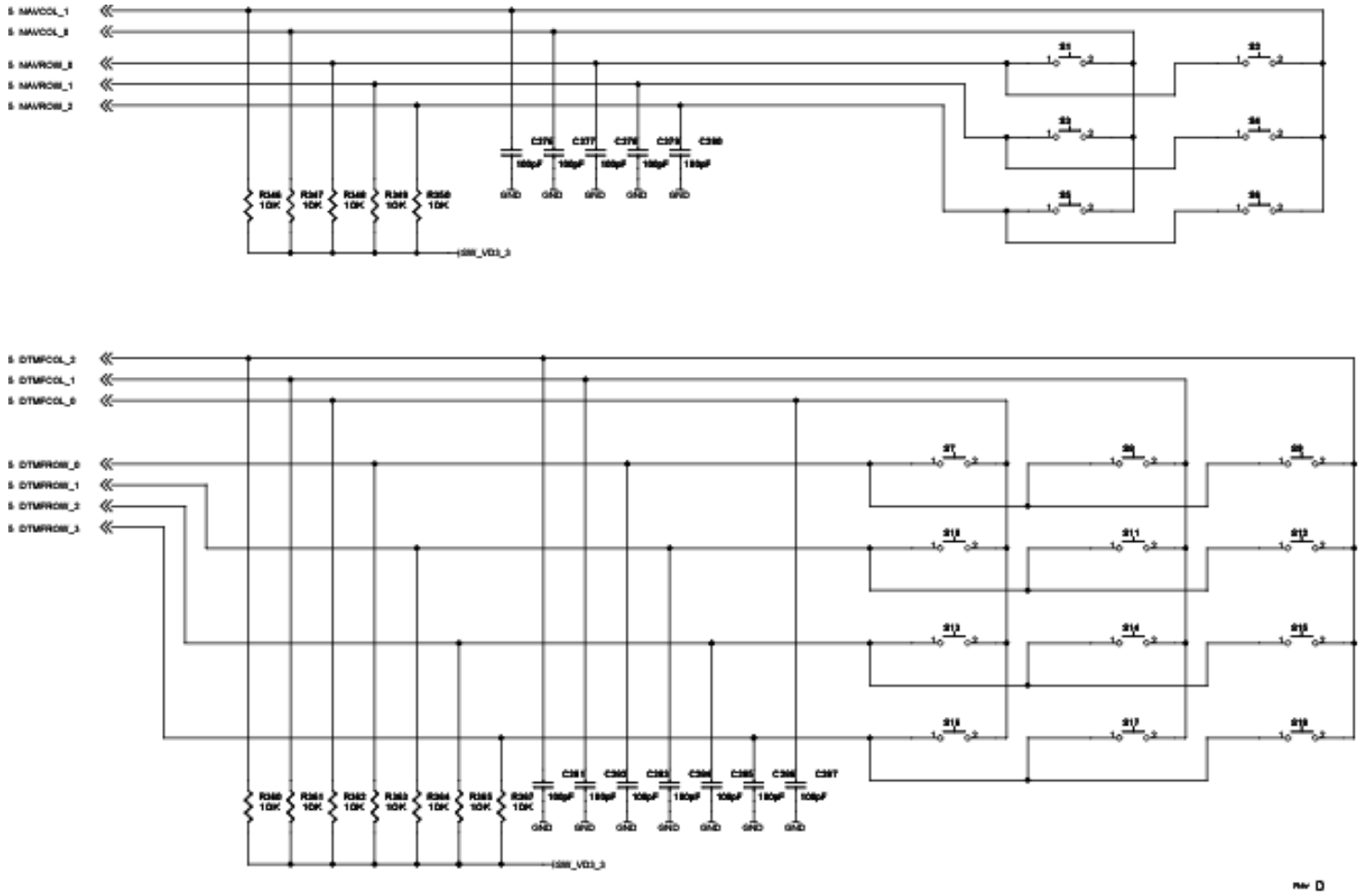


Figure 10.29 023-5500-480/485 User Interface Board Schematic (Page 8 of 10)

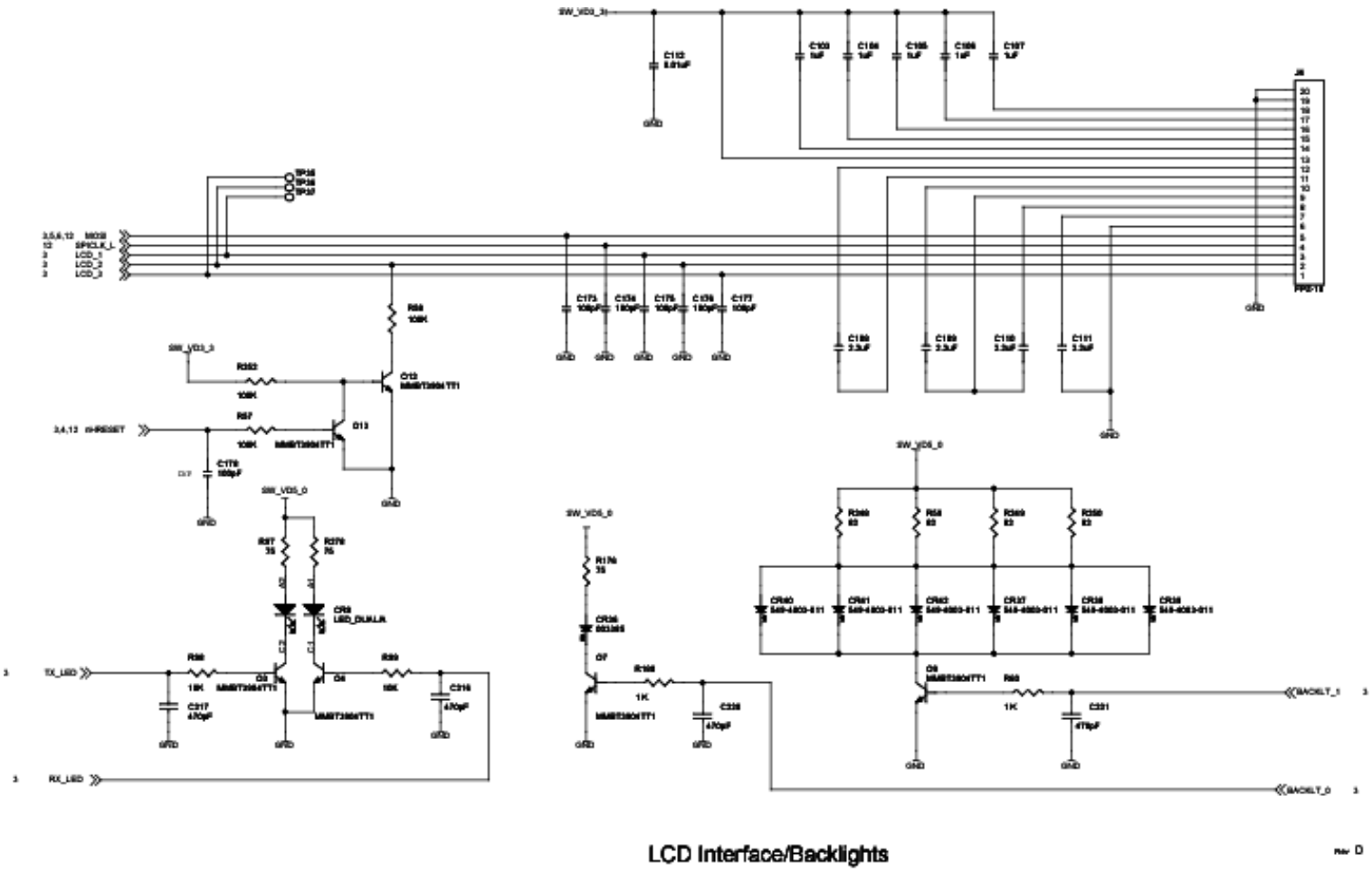


Figure 10.30 023-5500-480/485 User Interface Board Schematic (Page 9 of 10)

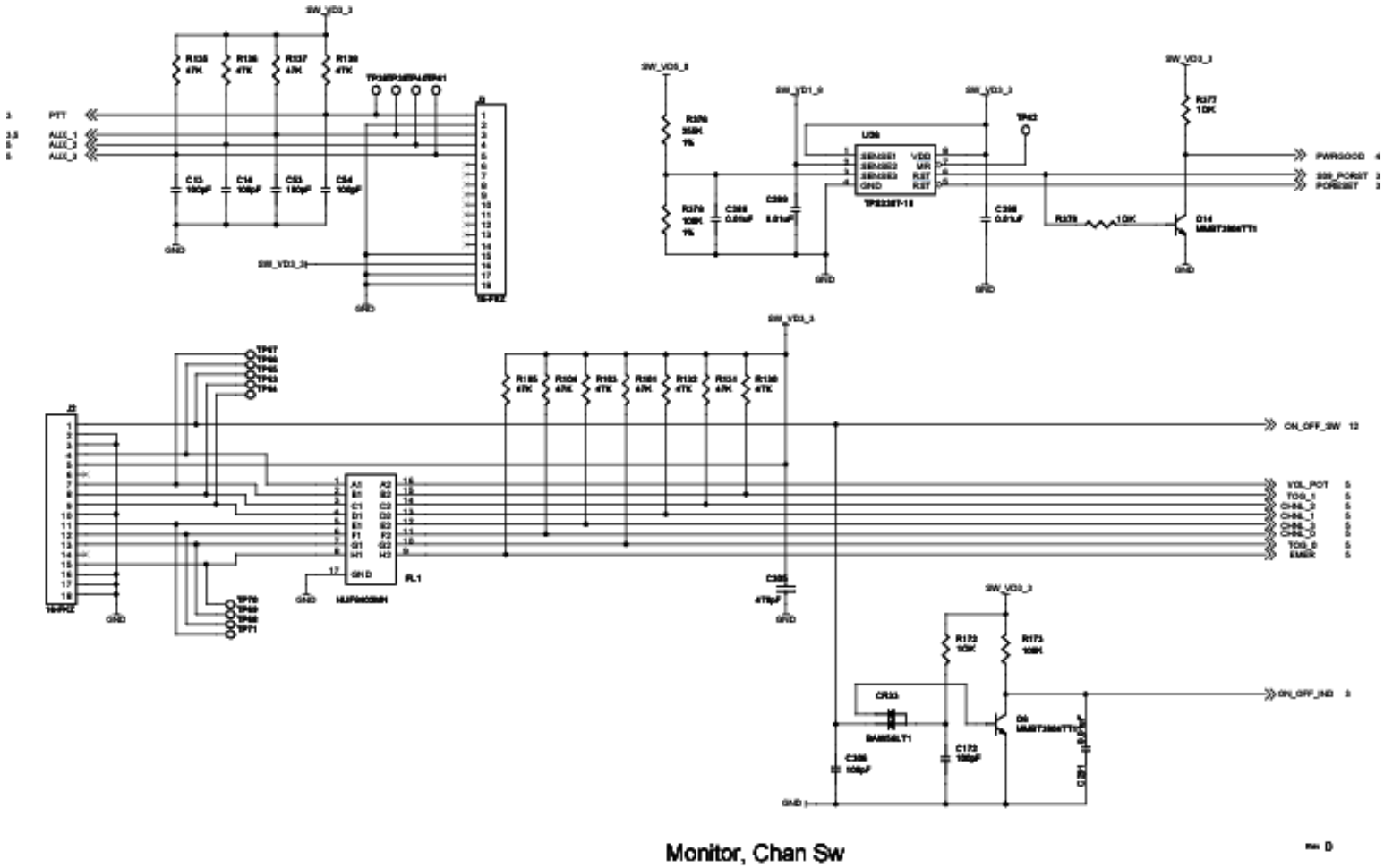


Figure 10.31 023-5500-480/485 User Interface Board Schematic (Page 10 of 10)

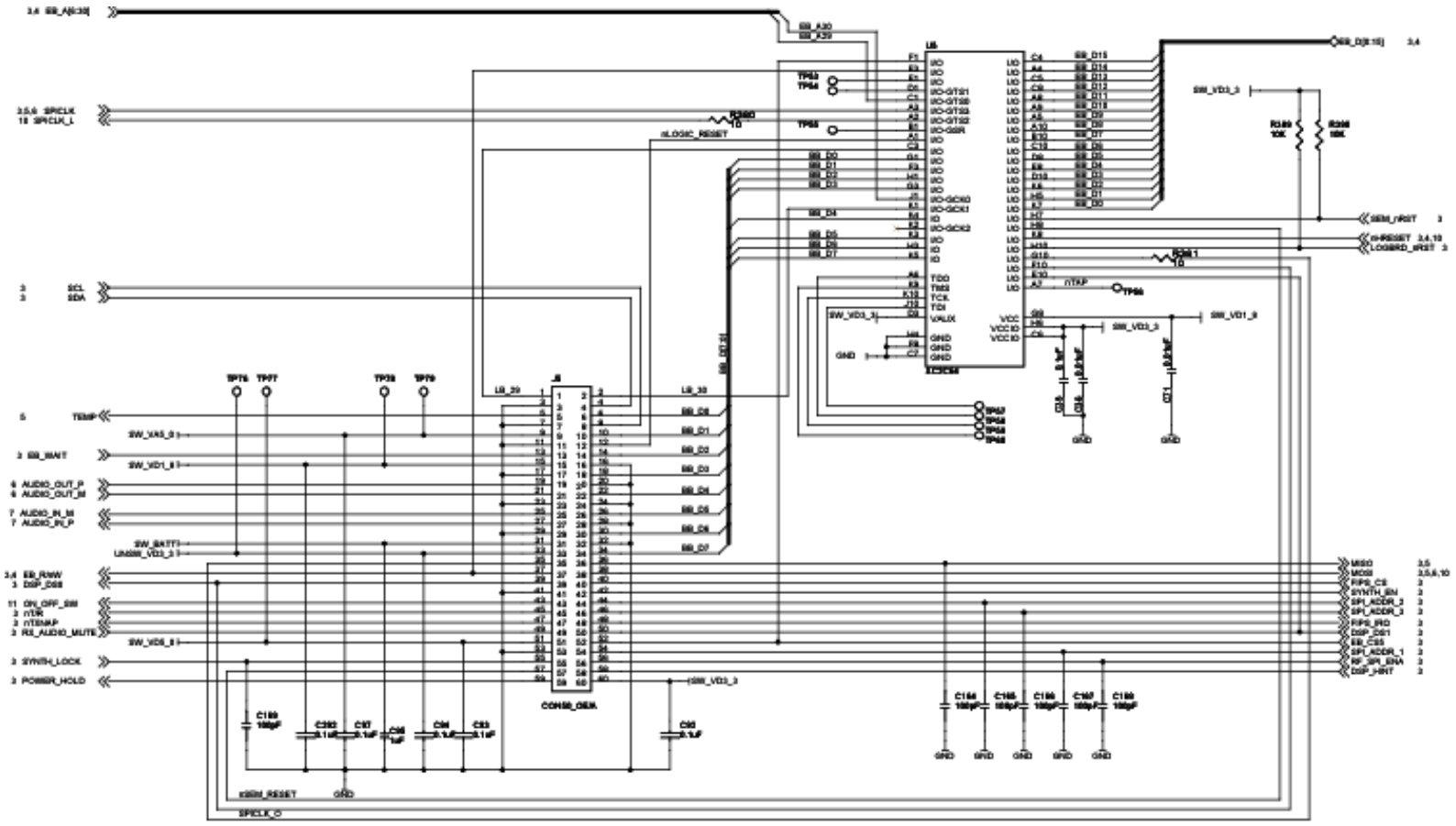
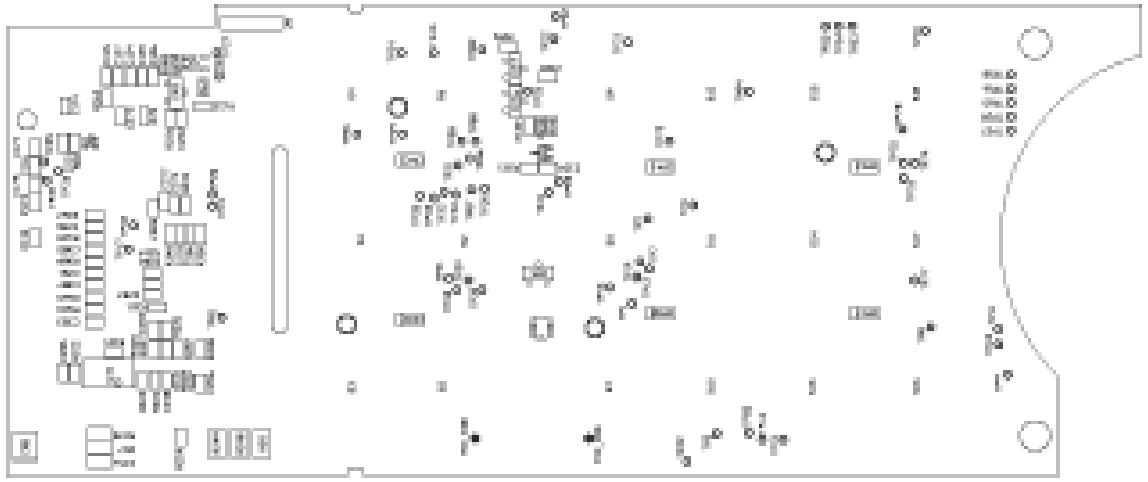
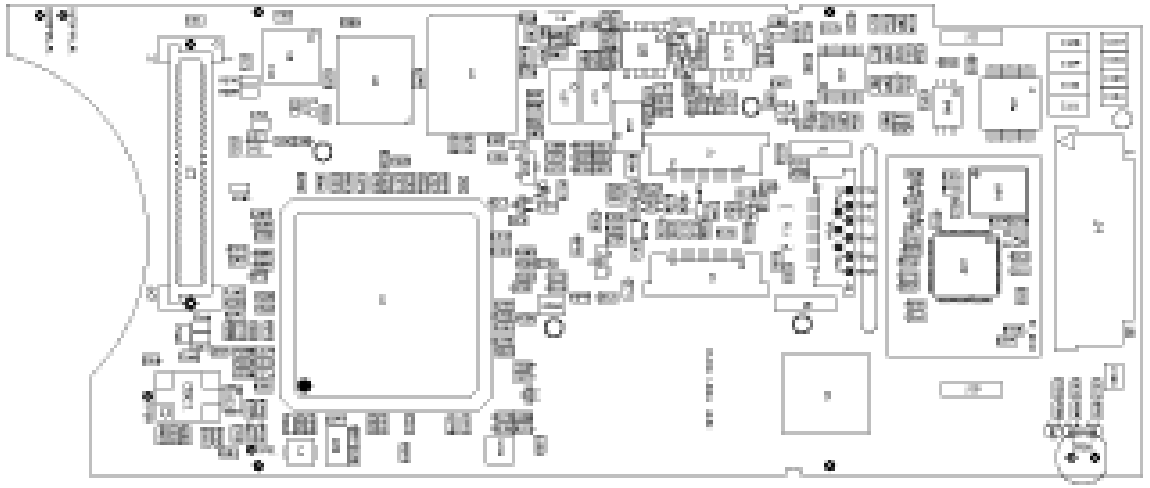


Figure 10.32 023-5500-480/485 User Interface Board Assembly

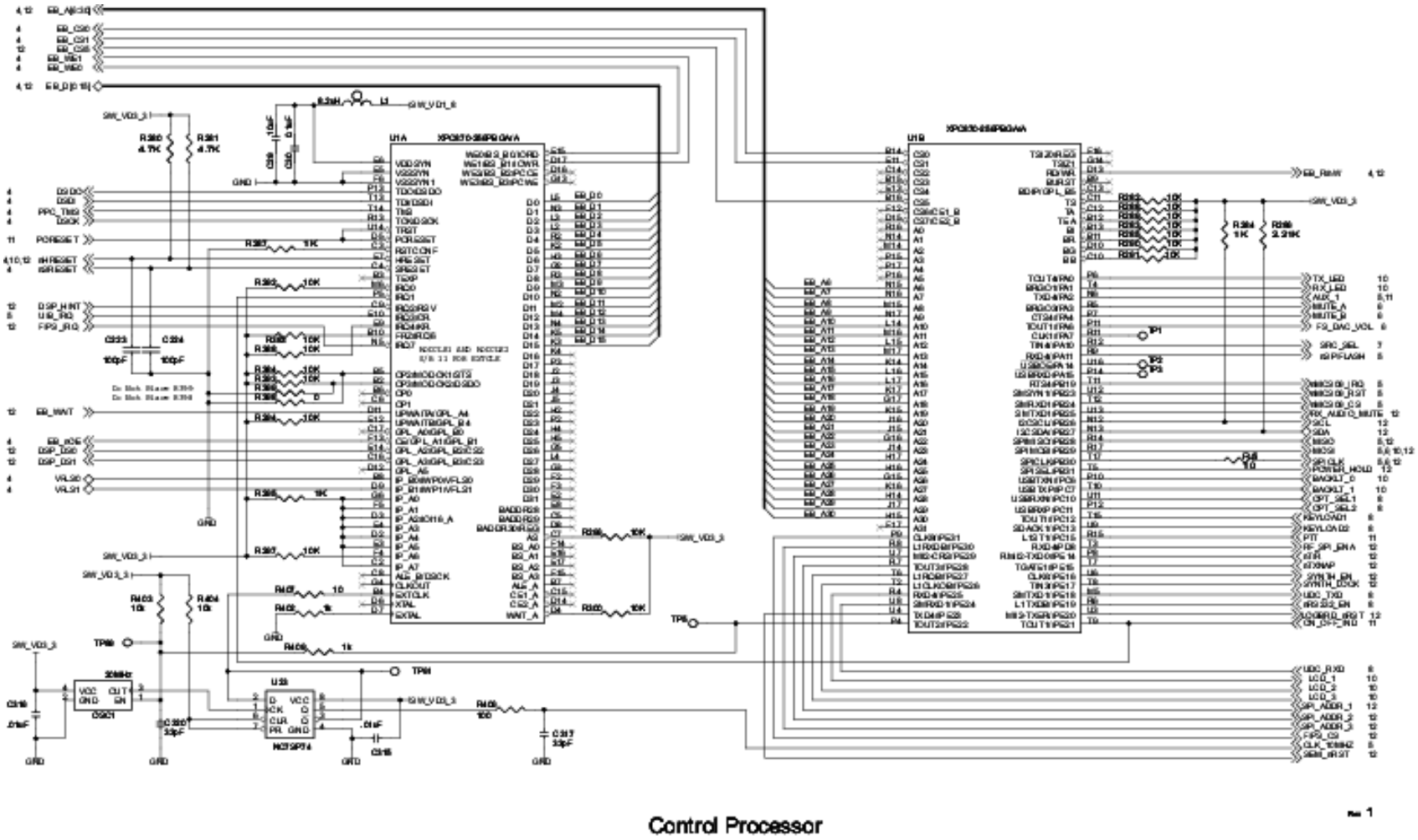


Top View



Bottom View

Figure 10.33 023-5500-480-01/487 User Interface Board Schematic (Page 1 of 10)



Note *The number from 3-12 next to a node label indicates the page number of the circuit to which it connects.*

Note *Pages 1 and 2 are not used.*

Figure 10.34 023-5500-480-01/487 User Interface Board Schematic (Page 2 of 10)

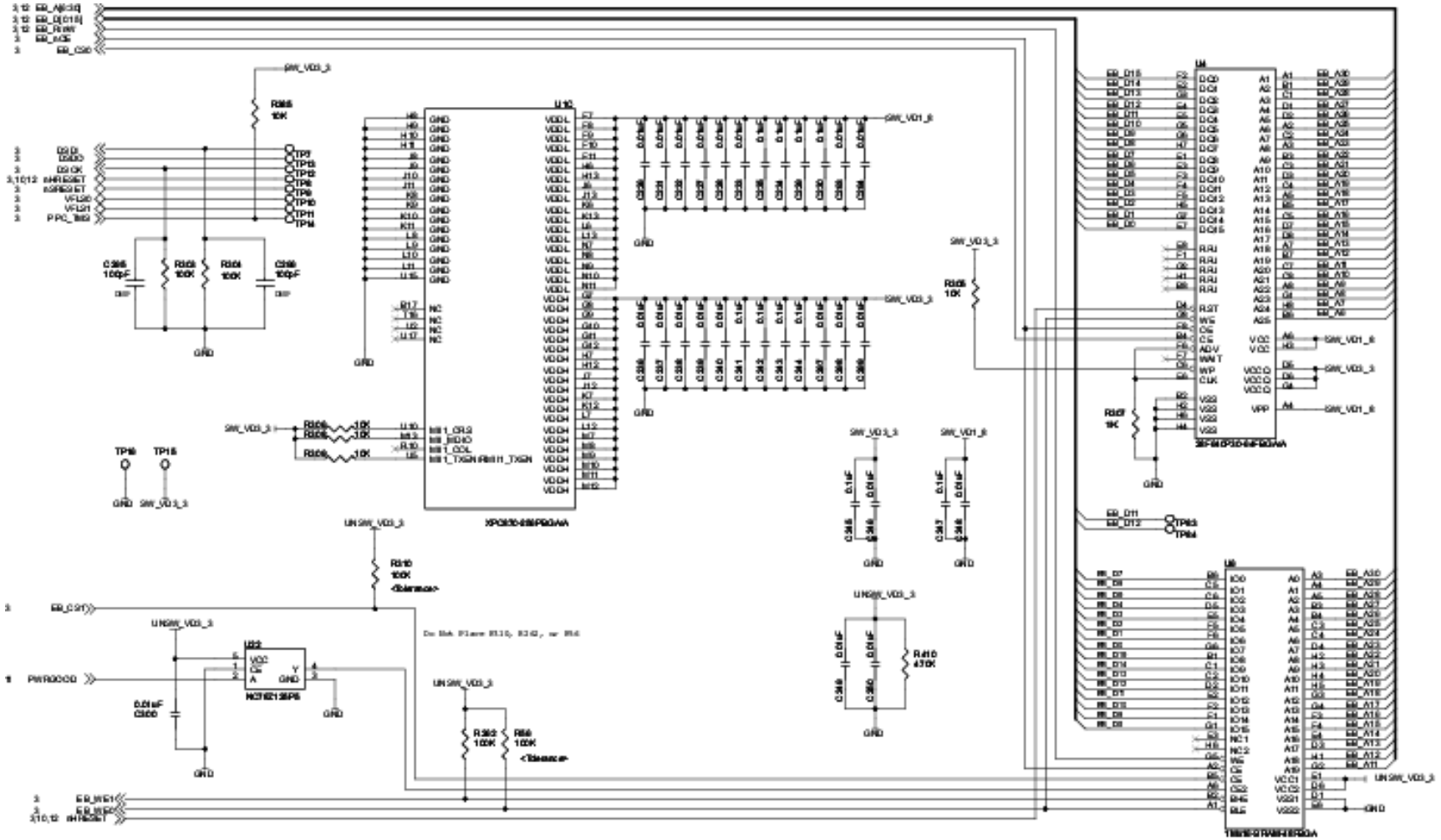


Figure 10.35 023-5500-480-01/487 User Interface Board Schematic (Page 3 of 10)

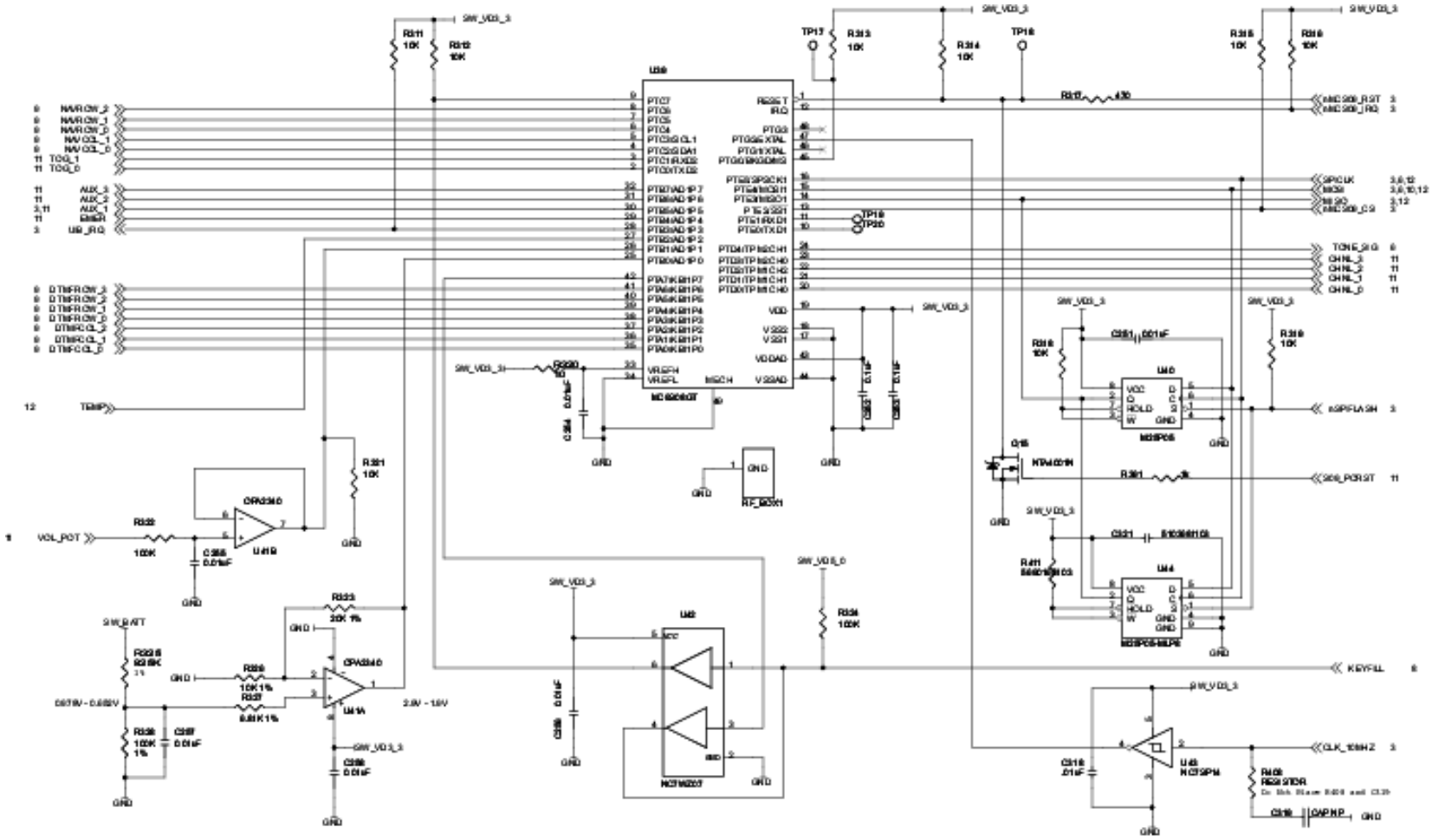


Figure 10.36 023-5500-480-01/487 User Interface Board Schematic (Page 4 of 10)

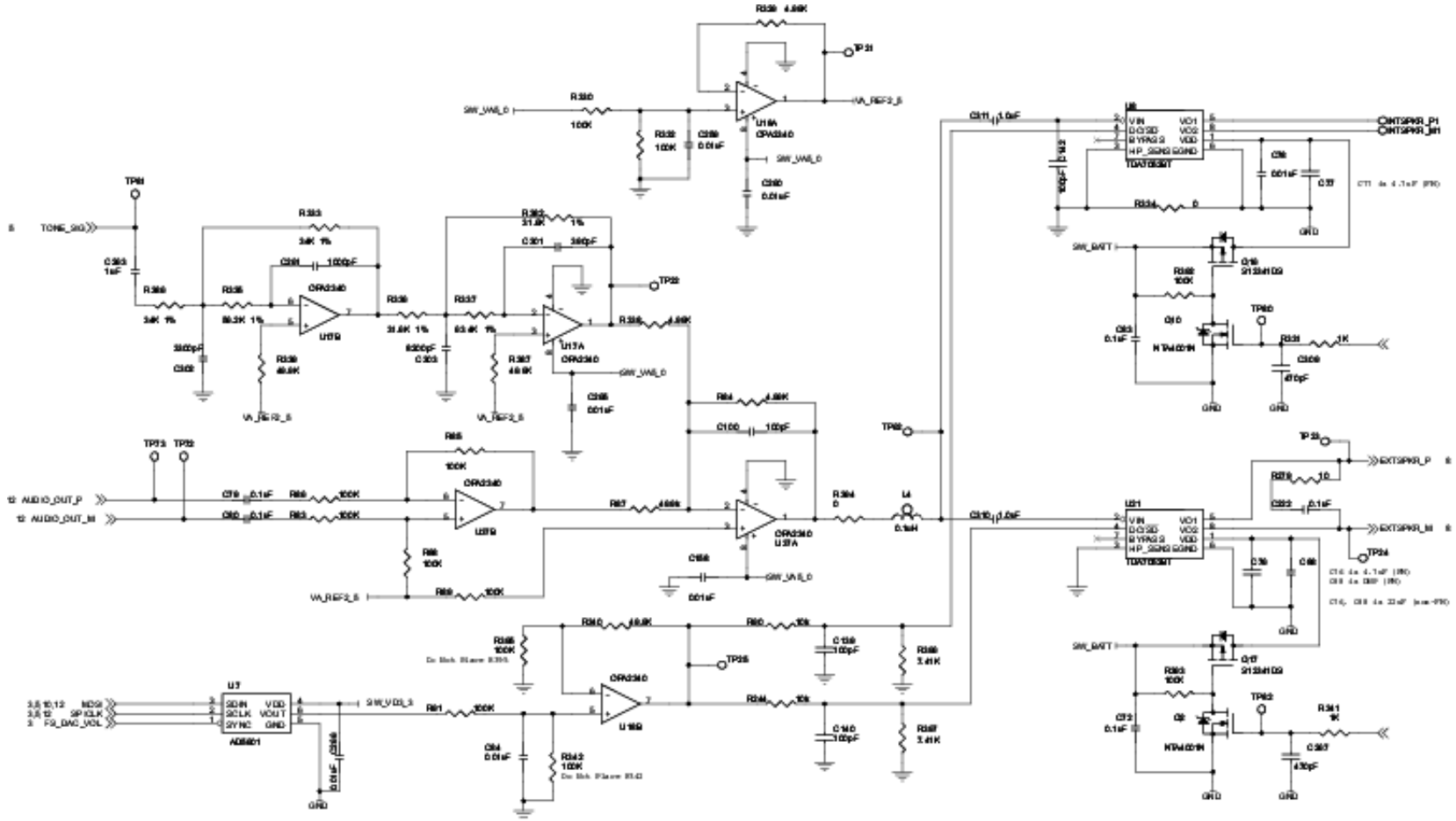


Figure 10.37 023-5500-480-01/487 User Interface Board Schematic (Page 5 of 10)

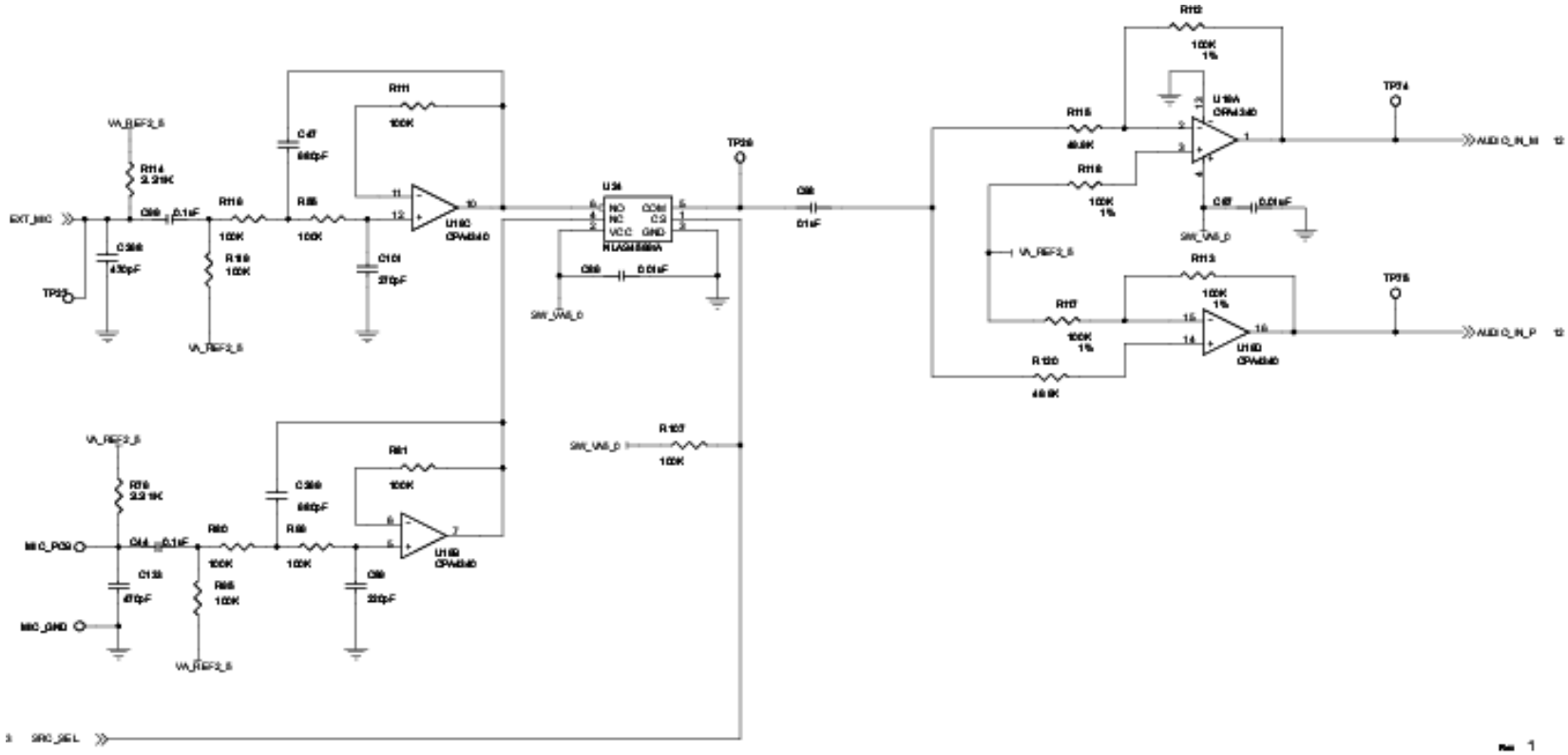


Figure 10.38 023-5500-480-01/487 User Interface Board Schematic (Page 6 of 10)

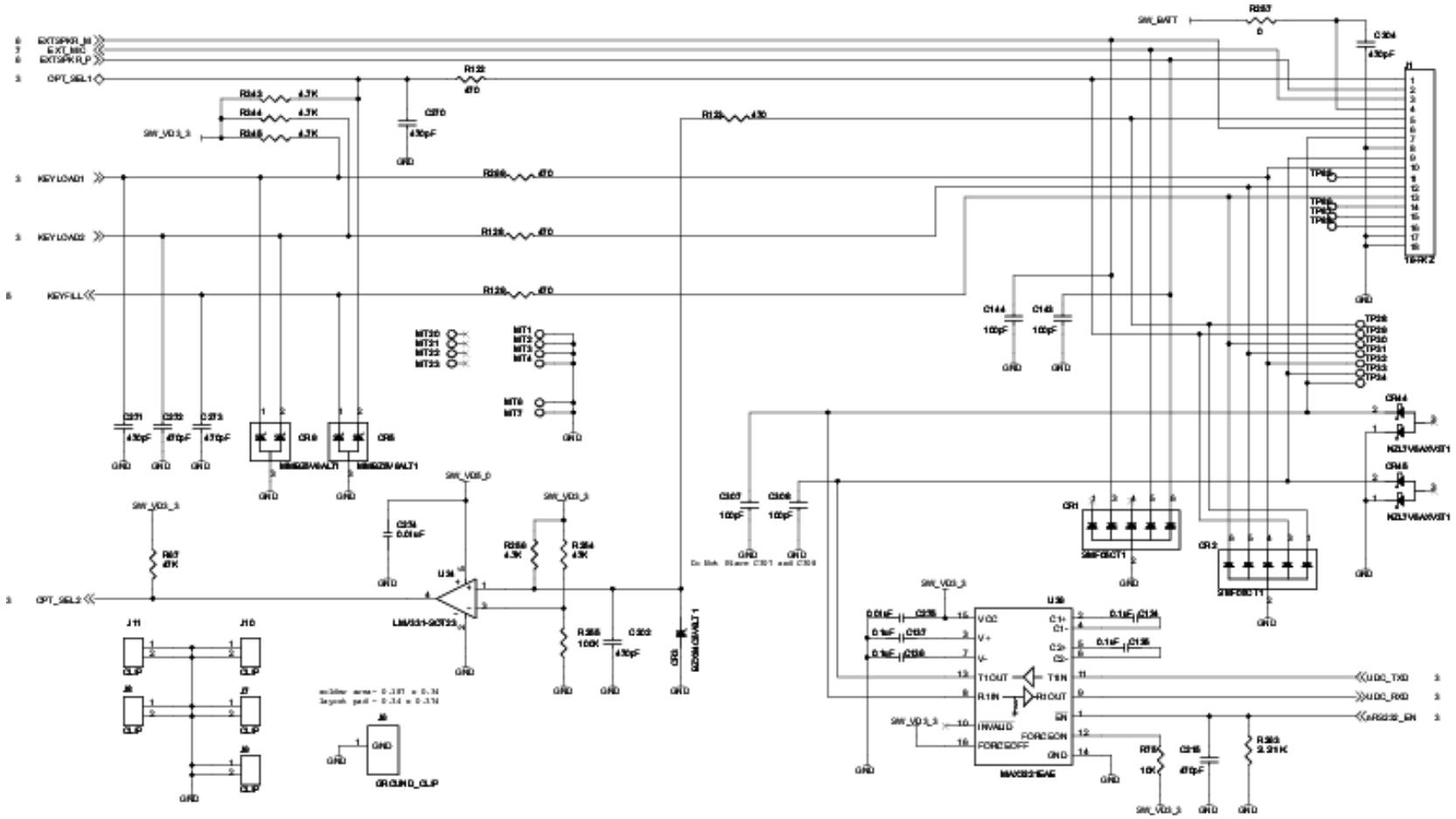


Figure 10.39 023-5500-480-01/487 User Interface Board Schematic (Page 7 of 10)

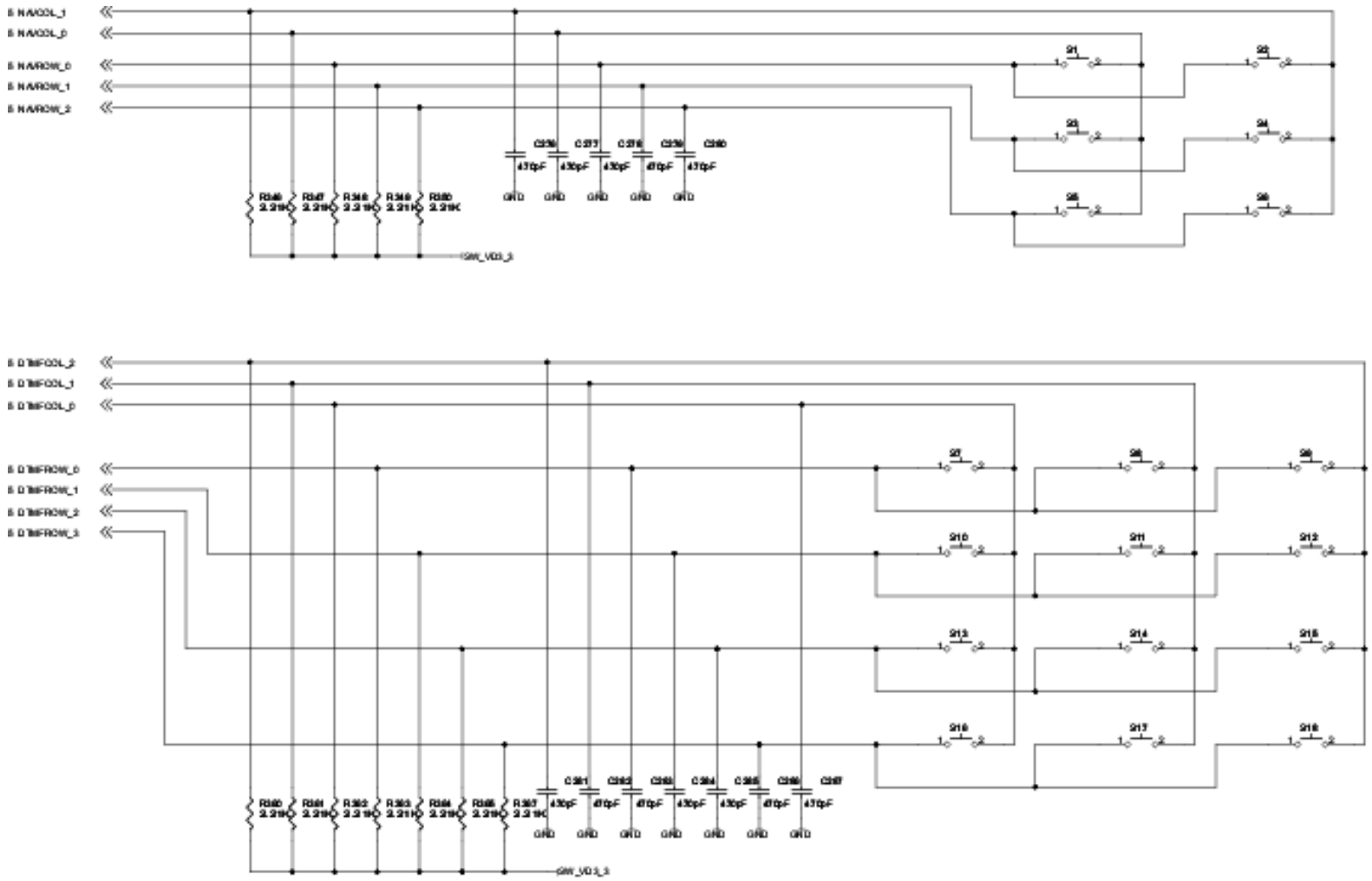


Figure 10.40 023-5500-480-01/487 User Interface Board Schematic (Page 8 of 10)

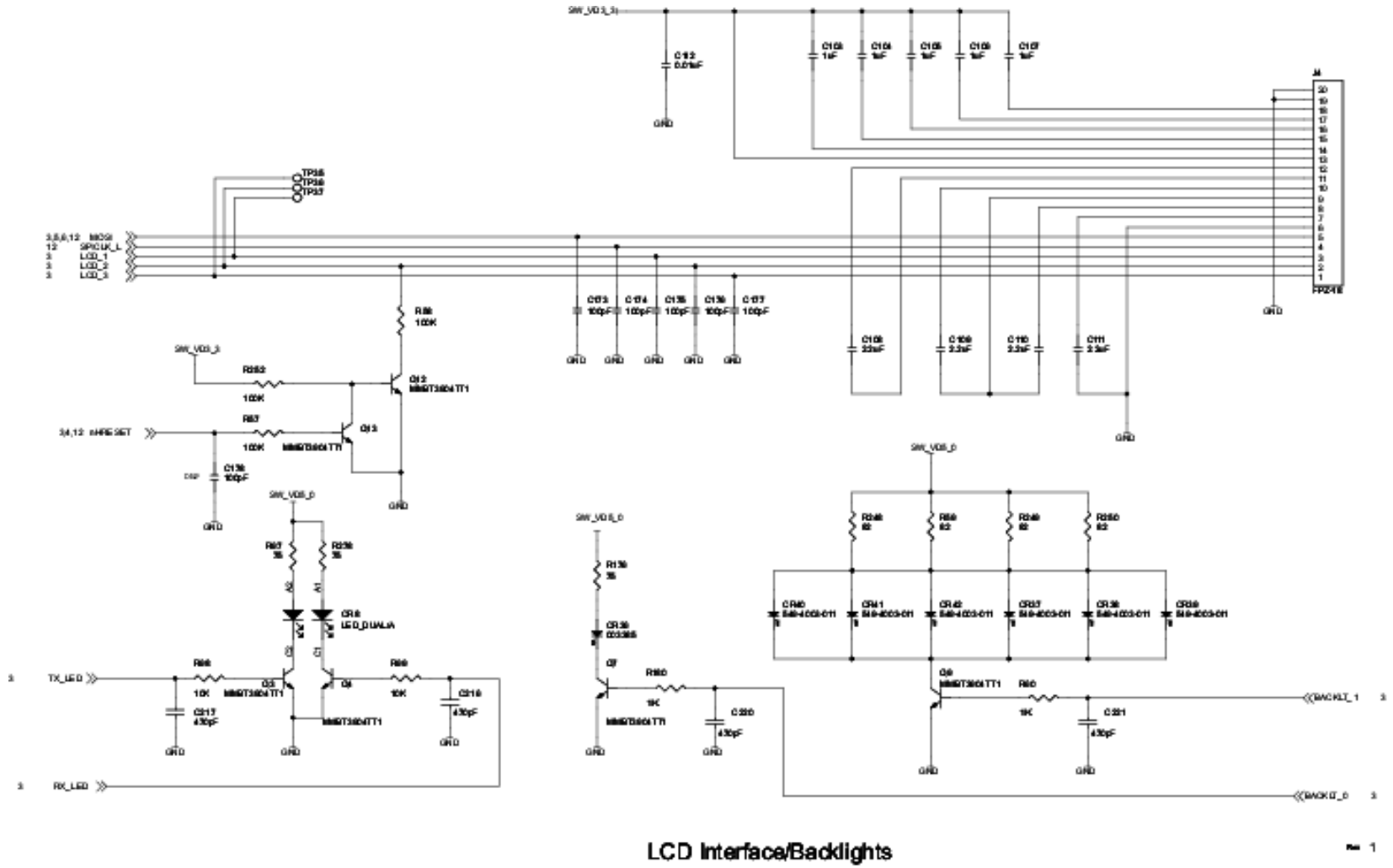


Figure 10.41 023-5500-480-01/487 User Interface Board Schematic (Page 9 of 10)

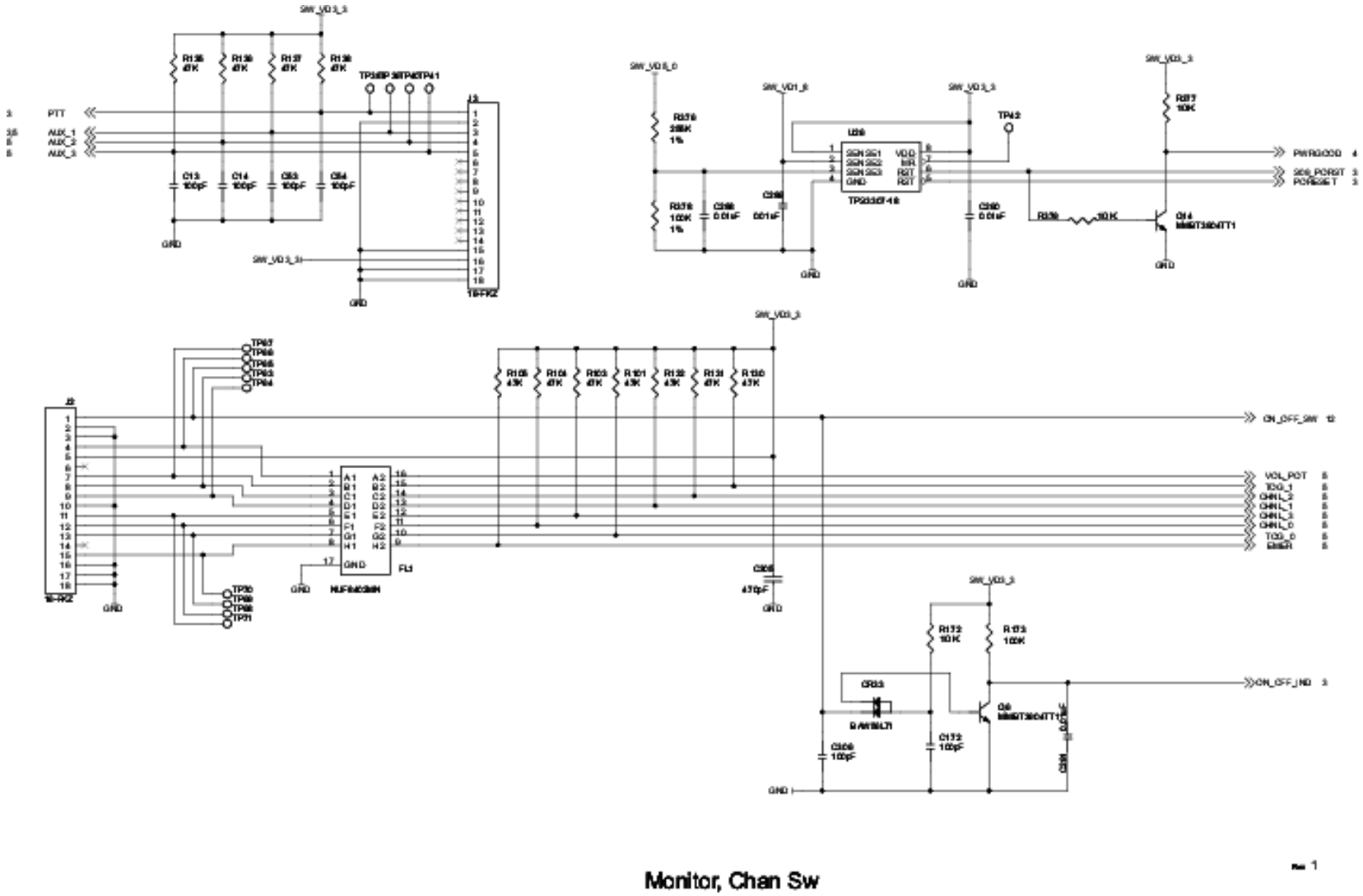


Figure 10.42 023-5500-480-01/487 User Interface Board Schematic (Page 10 of 10)

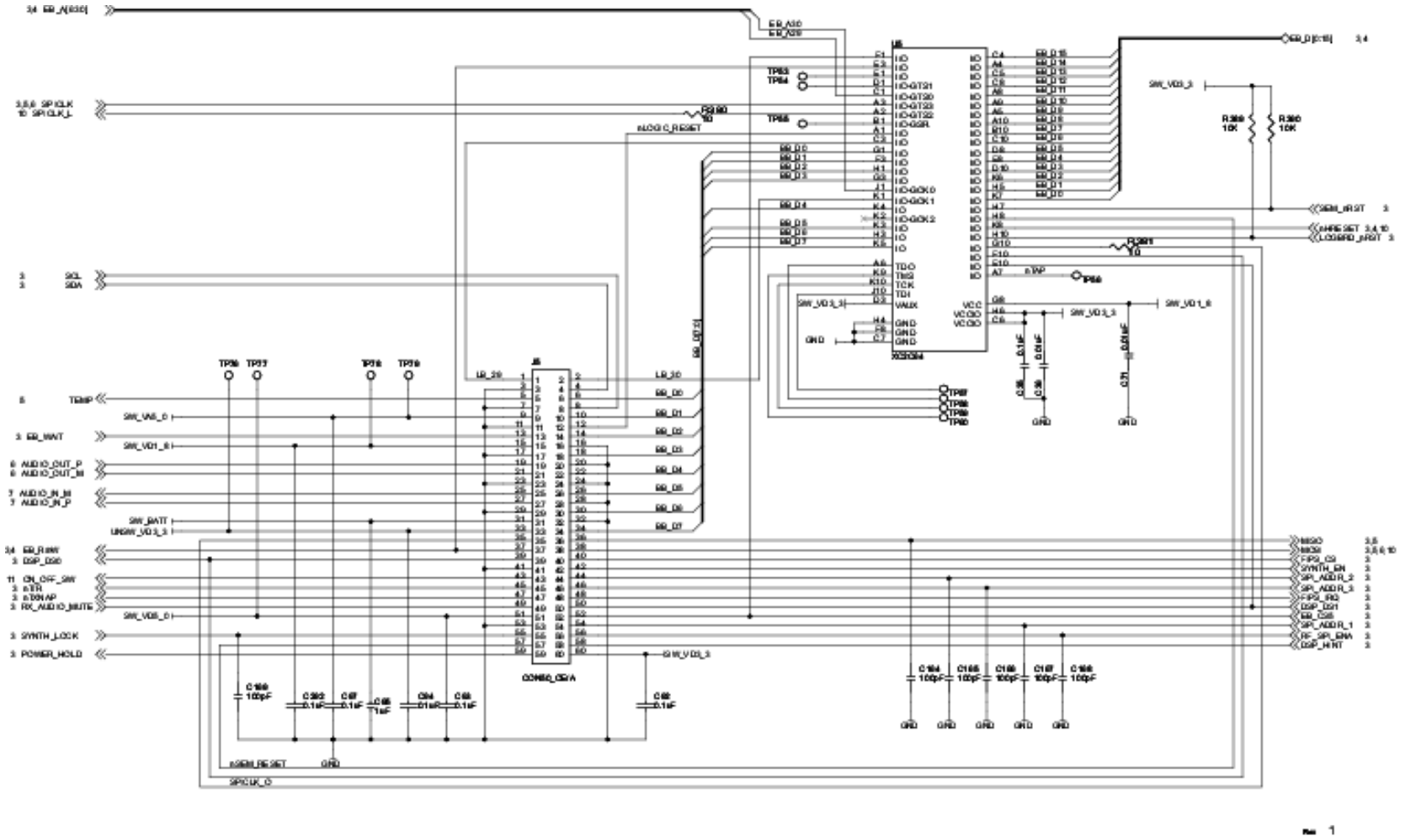
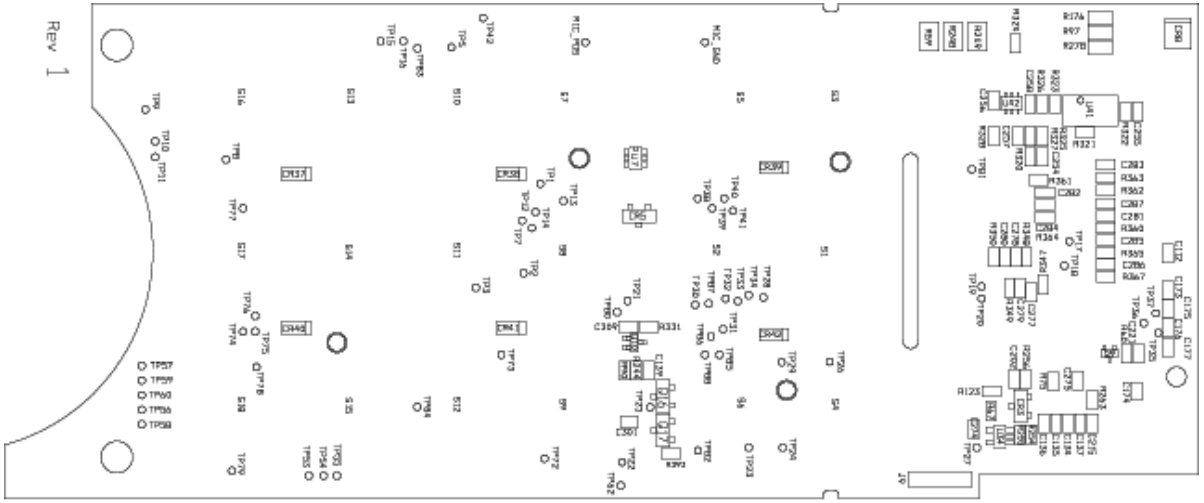
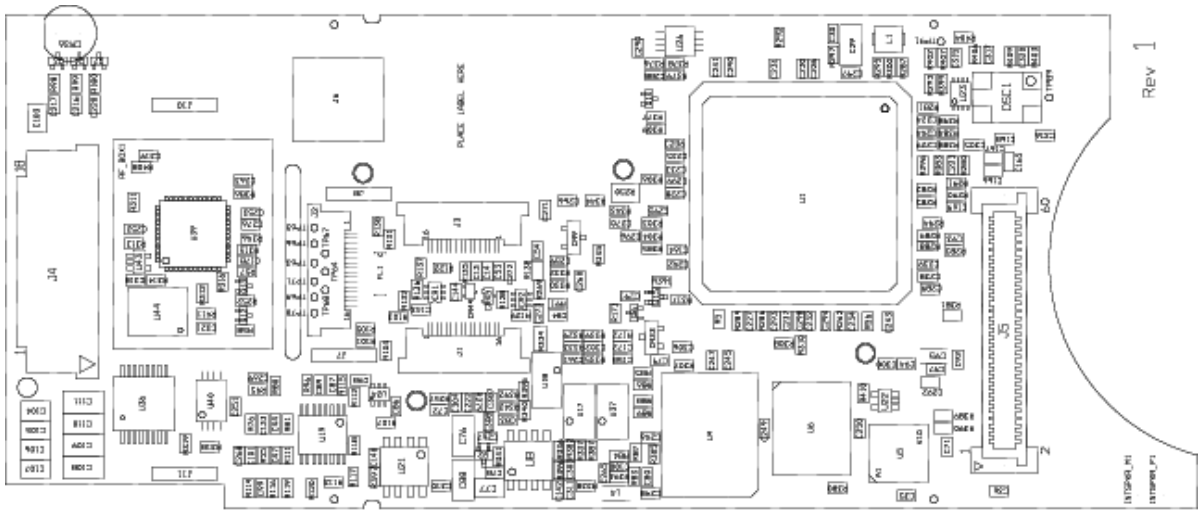


Figure 10.43 023-5500-480-01/487 User Interface Board Assembly

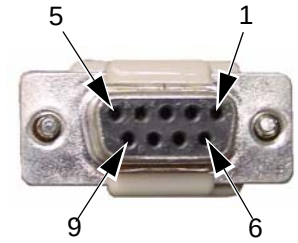


Top View

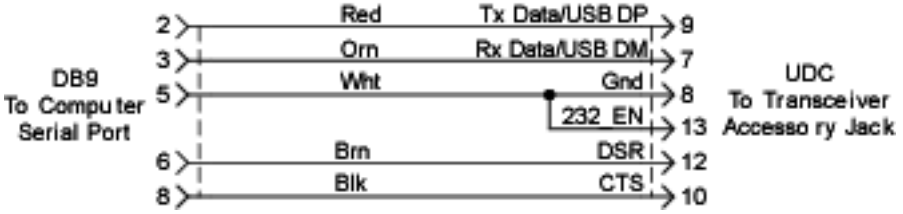


Bottom View

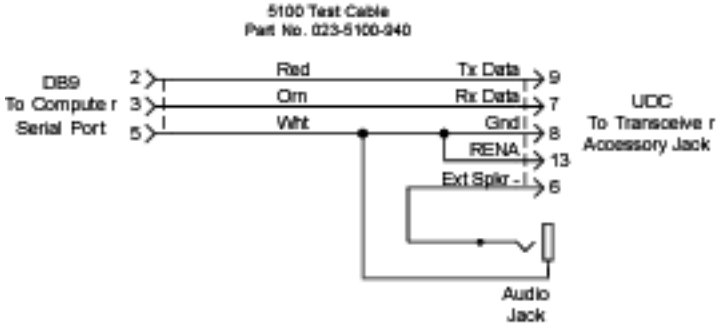
Figure 10.44 Cable Schematics



DB9 F Pin Numbering



Programming Cable Schematic
Part No. 023-5100-920



Test Cable Schematic
Part No. 023-5100-940

UDC Pin Numbering