This addendum corrects the part numbers for the following kits listed in Table 4-1:

CARRYING CASE ACCESSORIES	
Kit containing FM-016199-001 Nylon Case (black) (with radio retaining strap) and CC-014527 Leather Belt Loop	14011-0012-01
Kit containing FM-016199-002 Nylon Case (orange) (with radio retaining strap) and CC-014527 Leather Belt Loop	14011-0012-02
Kit containing FM-016199-003 Leather Case (with radio retaining strap) without shoulder strap D-rings, FM-017262-001 swivel mount, and CC-014527 Leather Belt Loop	14011-0012-03
Kit containing FM-016199-004 Leather Case with shoulder strap D-rings (with radio retaining strap), FM-017262-001 swivel mount, and CC-014524-001 Shoulder Strap	14011-0012-04

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Maintenance Manual
14221-1500-5000
Rev. A, Jul/12

XG-25P
VHF Portable Radios

MANUAL REVISION HISTORY

REV.	DATE	REASON FOR CHANGE
-	May/12	Initial release.
A	Jul/12	Updated specifications and alignment procedure.

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ACKNOWLEDGEMENT

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Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitutions of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

This product conforms to the European Union WEEE Directive 2002/96/EC. Do not dispose of this product in a public landfill. Take it to a recycling center at the end of its life.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

TABLE OF CONTENTS

Section *Page*

LIST OF TABLES

Page

TABLE OF CONTENTS

1. SAFETY INFORMATION

1.1 SAFETY SYMBOL CONVENTION

The following conventions are used throughout this manual to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Harris Corporation assumes no liability for the customer's failure to comply with these standards.

The WARNING symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING symbol until the conditions identified are fully understood or met.

The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade the equipment performance.

The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.

The **ESD** symbol calls attention to procedures, practices, or the like, which could expose equipment to the effects of **E**lectro-**S**tatic **D**ischarge. Proper precautions must be taken to prevent ESD when handling circuit modules.

1.2 SERVICE WARNINGS AND OPERATING TIPS

IMPORTANT!

PLEASE READ

1.2.1 Operating Tips

Antenna location and condition are important when operating a portable radio. Operating the radio in low lying areas or terrain, under power lines or bridges, inside of a vehicle, or in a metal framed building can severely reduce the range of the unit. Mountains and buildings can also reduce the range of the unit.

In areas where transmission or reception is poor, some improvement may be obtained by ensuring that the antenna is vertical. Moving a few yards in another direction or moving to a higher elevation may also

improve communications. Vehicular operation can be aided with the use of an externally mounted antenna.

Battery condition is another important factor in the trouble free operation of a portable radio. Always properly charge the batteries.

1.2.2 Efficient Radio Operation

For the most efficient radio operation, hold the portable radio approximately two inches from your mouth and speak into the microphone at a normal voice level.

Keep the antenna in a vertical position when receiving or transmitting a message.

Do not hold the antenna when receiving a message and, especially, do not hold when transmitting a message.

Do NOT hold onto the antenna when the radio is powered on!

1.2.3 Antenna Care and Replacement

Do not use the portable radio with a damaged or missing antenna; doing so can damage the radio. A minor burn may result if a damaged antenna comes into contact with the skin. Replace a damaged antenna immediately.

Use only the supplied or approved antenna. Unauthorized antennas, modifications or attachments could damage the radio unit and may violate FCC regulations. Refer to the options and accessories list for antennas approved for use with this radio.

1.2.4 Electronic Devices

RF energy from the portable radio may affect some electronic equipment. Most modern electronic equipment in cars, hospitals, homes, etc. is shielded from RF energy. However, in areas that instruct two-way radio equipment be powered OFF, always observe the rules. ***If in doubt, turn the radio OFF!***

1.2.5 Other Common Transmitter Hazards

1.2.5.1 Aircraft

Always turn OFF portable radios before boarding any aircraft!

- **Use a portable radio on the ground only with crew permission.**
- **DO NOT use the radio in flight!!**

1.2.5.2 Electric Blasting Caps

To prevent accidental detonation of electric blasting caps, DO NOT use two-way radios within 100 feet of blasting operations. Always obey the "Turn Off Two-Way Radios" signs posted where electric blasting caps are being used. (OSHA Standard 1926.900)

1.2.5.3 Potentially Explosive Atmospheres

Areas with potentially explosive atmosphere are often, but not always, clearly marked. These may be fueling areas, such as gas stations, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust or metal powders.

Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.

Turn the radio OFF when in any area with a potentially explosive atmosphere. It is rare, but not impossible, that the radio or its accessories could generate sparks.

2. RADIO MODELS AND SPECIFICATIONS

2.1 RADIO MODELS

Table 2-1 contains a list of radios supported by this manual.

Table 2-1: XG-25P Portable Radio Models

MODEL #	DESCRIPTION
DPXG-PBV1B	Portable, XG-25, 136-174 MHz, Scan
DPXG-PFV1B	Portable, XG-25, 136-174 MHz, System

2.2 SPECIFICATIONS[1]

2.2.1 General

Input Voltage Range: 7.5 VDC nominal

Frequency Range
- Receive: 136 - 174 MHz
- Transmit: 136 - 174 MHz

Dimensions H x W x D
- Less knobs and antenna, with Battery: 149.6 x 62.0 x 47.0mm (5.89 x 2.44 x 1.85 inches)

Weight (with battery)
- Li Ion: 400.0 g (14.1 oz)
- NiMH: 510.0 g (18.0 oz)

Operable Temperature Range:
- Li Ion: -10°C to +50°C (+14°F to +122°F)
- NiMH: -10°C to +50°C (+14°F to +122°F)

Relative Humidity: 90% @ +122°F (+50°C)

Vibration: 5 G (per U.S. Forest Service 10-60 Hz)

Shock (TIA-603-C): 1.5 meter drop

Altitude
- Operational: 4572 m (15,000 ft.)
- In Transit: 15,240 m (50,000 ft.)

[1] These specifications are primarily intended for the use of the service technician. See the appropriate Specifications Sheet for the additional specifications.

2.2.2 Receive

Channel Spacing[2]:	25 kHz (wideband), 12.5 kHz (narrowband)
Sensitivity (12 dB SINAD):	0.25 µV /119.0 dBm (wideband),
	0.30 µV /-117.5 dBm (narrowband)
Selectivity:	
@ 12.5 kHz (dB):	60
@ 15 kHz (dB):	60
@ 25 kHz (dB):	75
P25 Reference Sensitivity (5% BER):	0.28 µV/118 dBm
Spurious and Image Rejection:	75 dB
P25 Adjacent Channel Rejection:	
	60 dB
Intermodulation:	70 dB
Rated Audio Output:	500 mW rated
Audio Distortion:	3% @ rated power

2.2.3 Transmit

RF Power Output (User-Selectable):	1.0 to 5.0 W
Spurious and Harmonics:	-38 dBm/-75 dBc
Modulation/Deviation[2]:	5.0 kHz (wideband), 2.5 kHz (narrowband)
Audio Distortion (1 kHz tone) [2]:	3% [3 kHz deviation (wideband)]
	3% [1.5 kHz deviation (narrowband)]
Audio Response (dB):	+1/-3
Frequency Stability:	± 1.5 ppm (-30°C to +60°C: + 25°C Ref)
P25 Modulation Fidelity:	5%
P25 Adjacent Channel Power:	78 dBc
FM Hum and Noise[2]:	45 dB (wideband), 40 dB (narrowband)
Frequency Separation (MHz):	Full Bandwidth

2.2.4 Regulatory

FCC Type Acceptance:	OWDTR-0072-E
Applicable FCC Rules:	Part 90
Industry Canada Certification:	3636B-0072
Applicable Industry Canada Rules:	RSS-119

[2] The VHF XG-25P is compliant with applicable FCC narrowbanding mandate below 512 MHz.

3. INTRODUCTION

The XG-25P is available in two models: the Scan model with a limited 6-button front-mounted keypad and the System model with a 15-button DTMF front-mounted keypad. The Harris XG-25P portable radio delivers end-to-end digital voice and IP data communications. It is designed to support multiple operating modes including:

- P25 Trunked Mode
- P25 Digital Conventional Mode
- Conventional Analog Mode

The XG-25P portables can include all of these modes or just one. Additional modes of operation can be added with software updates.

The XG-25P supports a full range of advanced digital trunking features, including talk group calls, priority scanning, emergency calls, late call entry, and dynamic reconfiguration. It performs autonomous roaming for wide area applications. High quality voice coding and robust audio components assure speech clarity.

In the P25 trunked, the user selects a communications "operating" system and group. While communicating in a trunked mode, channel selection is transparent to the user and is controlled via digital communication with the system controller. This provides advanced programmable features and fast access to communication channels. In Conventional Analog mode, the user selects a channel and communicates directly on that channel. A channel is a transmit/receive radio frequency pair.

The exact operation of the radio depends on the operating mode, the radio's programming, and the particular radio system. Most features described in this manual can be enabled through programming. Consult your System Administrator for the particular features programmed into your XG-25P. Then refer to the corresponding section(s) within this manual for feature and operation information.

The XG-25P series portable radios operate reliably even under adverse conditions. These radios meet MIL-STD-810G specifications for wind driven rain, humidity, and salt fog.

4. OPTIONS AND ACCESSORIES

Table 4-1 lists the Options and Accessories tested for use with the XG-25P series portable radios.

Refer to the Harris Products and Services Catalog for a complete list of options and accessories, including those items that do not adversely affect the RF energy exposure.

WARNING

Always use Harris authorized accessories (antennas, batteries, belt clips, speaker/mics, etc). Use of unauthorized accessories may cause the FCC Occupational/Controlled Exposure RF compliance requirements to be exceeded.

CAUTION

Always use the correct options and accessories (battery, antenna, speaker/mic, etc.) for the radio. Factory Mutual options must be used with Factory Mutual certified radios.

Table 4-1: Options and Accessories

DESCRIPTION	PART NUMBER
ANTENNAS	
Helical coil (136-151 MHz)	KRE 101 1219/1
Helical coil (150-162 MHz)	KRE 101 1219/2
Helical coil (162-174 MHz)	KRE 101 1219/3
Helical coil (150-174 MHz)	KRE 101 1219/21
BATTERIES	
NiMH, <IS>	BT-023406-004
Li-Ion	BT-023406-005
NiMH	BT-023406-003
Lithium Polymer	BT-023436-001
CHARGERS	
Single Bay, Tri-Chemistry Charger	DP-CH4G
6-Bay, Tri-Chemistry Charger	DP-CH4H
MISCELLANEOUS ACCESSORIES	
No Ant. (cc)	MC-023933-001
Earphone for speaker/mic	LS103239V1
Ruggedized Speaker Mic-Coil Cord	MC-011617-601
Standard Speaker Mic - Non Ant	MC-011617-701
DROP SHIP AUDIO ACCESSORIES	
Earphone Kit, Black	EA-009580-001
Earphone Kit, Beige	EA-009580-002
2-Wire Kit, Palm Mic, Black	EA-009580-003
2-Wire Kit, Palm Mic, Beige	EA-009580-004
3-Wire Kit, Mini-Lapel Mic, Black	EA-009580-005
3-Wire Kit, Mini-Lapel Mic, Beige	EA-009580-006
Explorer Headset with PTT	EA-009580-007
Lightweight Headset Single Speaker with PTT	EA-009580-008
Breeze Headset with PTT	EA-009580-009
Headset, Heavy Duty, N/C Behind-the-Head, with PTT	EA-009580-010

DESCRIPTION	PART NUMBER
Ranger Headset with PTT	EA-009580-011
Skull Mic with Body PTT and Earcup	EA-009580-012
Headset, Heavy Duty, N/C Over-the-Head, with PTT	EA-009580-013
Throat Mic with Acoustic Tube and Body PTT	EA-009580-014
Throat Mic with Acoustic Tube, Body PTT, and Ring PTT	EA-009580-015
Breeze Headset with PTT and Pigtail Jack	EA-009580-016
Hurricane Headset with PTT	EA-009580-017
Hurricane Headset with PTT and Pigtail Jack	EA-009580-018
CARRYING CASE ACCESSORIES	
Kit containing FM-016199-001 Nylon Case (black) (with radio retaining strap) and CC-014527 Leather Belt Loop	KT-016201-001
Kit containing FM-016199-002 Nylon Case (orange) (with radio retaining strap) and CC-014527 Leather Belt Loop	KT-016201-002
Kit containing FM-016199-003 Leather Case (with radio retaining strap) without shoulder strap D-rings, FM-017262-001 swivel mount, and CC-014527 Leather Belt Loop	KT-016201-003
Kit containing FM-016199-004 Leather Case with shoulder strap D-rings (with radio retaining strap), FM-017262-001 swivel mount, and CC-014524-001 Shoulder Strap	KT-016201-004
Short Leather Retaining Strap (for use with shoulder strap application)	CC-014524-002
Metal Belt Clip	CC23894
Leather belt loop [Merzon] D-swivel	KRY1011609/1 FM-017262-001
Shoulder strap [Merzon]	CC103333V1
UDC weatherproof cover	FM-014712

5. SERVICE AIDS

The following tables list the support software, test equipment, and special tools you may need when programming and servicing the XG-25P series radio. To purchase any of these items, please contact the Harris Customer Care center.

Table 5-1: Recommended Tools and Test Equipment

DESCRIPTION	PART NUMBER	PURPOSE
Radio Personality Manager	TQS3385	Software for programming Harris radios operating in P25 Trunking, P25 Conventional, and Analog Conventional.
Radio Personality Manager	TQS3389	Software for programming Harris radios operating in conventional only.
Programming Cable	CA-023407-001	Use for programming radios.
USB Adapter Cable	MATQ-03421 (CN24741-0001)	Adapts USB to RS-232.
RF Antenna Adapter	19B801496G2	Provides a BNC-Female connection to the antenna connector on top of the radio.
Power Supply Adapter	BT-023406-015	Interface for a variable voltage - current limited power supply that simulates a battery.
Test Box	MATQ-03424	Selectable resistor values to simulate different external devices. Interface point for audio testing
Audio Test Cable	CA-023407-002	Interface cable for TQ0609A with UDC and DB-25 connector.
Service Computer (IBM compatible PC)	x86 based laptop or desktop computer with Windows XP, Windows Server 2003, or Windows Vista (32-bit version only) operating system.	Required to install, configure, and operate the Radio Personality Manager software.
RF Communications Test Set	Agilent HP8920B, with Option 001 High Stability Timebase (or equivalent)	Use to verify radio performance.
DC Power Supply	Agilent E3610A, (or equivalent)	Use as external radio power source.
Switch Removal Tool	T4WK03399	Use for removing the Volume or Channel switch.
Antenna Insertion Tool	337097G1B	Use to reinstall Antenna Insert Connector.
Handheld Torque Driver	12RTD	Use to apply required torque to screws during reassembly.

6. USER INTERFACE

This section describes the primary user interface; the buttons, knob controls, indicators, switch, and display. Refer to operator's manual 14221-1500-2000, available online at www.pspc.harris.com, for complete operating instructions.

6.1 CONTROLS

The XG-25P portable radios feature two rotary control knobs and an emergency button located on the top of the radio (Figure 6-1). The Push-To-Talk (PTT) button and two option buttons are located on the side (Figure 6-2) of the radio. The front mounted keypad of the System model has 15 buttons and the Scan model has six buttons. Refer to Figure 6-3 and Figure 6-4, respectively.

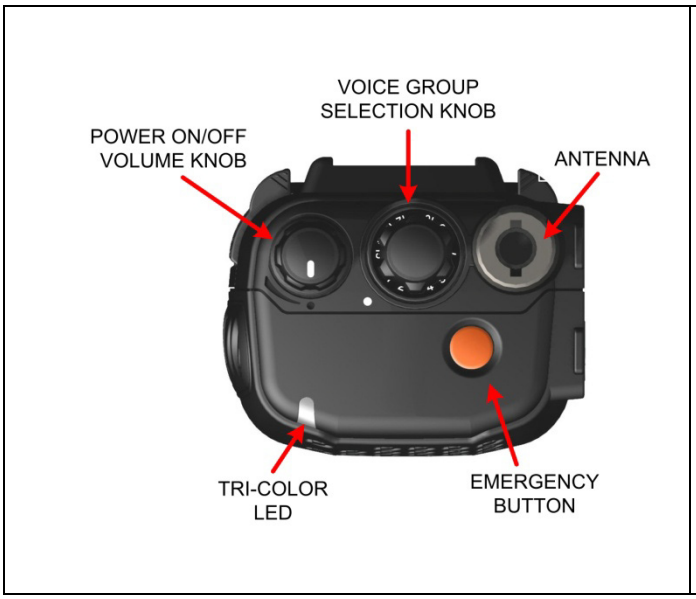


Figure 6-1: Top View

Figure 6-2: Side View

6.1.1 Buttons, Knobs, and Switch

The functions of the buttons and knob controls vary depending on mode of operation. Primary functions of the button, switch, and knob controls are discussed in general terms in the following.

Table 6-1: Buttons, Knobs, and Switch Functions

POWER ON/OFF-VOLUME CONTROL KNOB	Applies power to the radio and adjusts audio volume. Rotating the control clockwise applies power to the radio. If enabled through programming, a single alert tone indicates the radio is operational. Rotating the control clockwise increases the volume level. A minimum volume level can be programmed into the radio to prevent missed calls due to a low volume setting. While adjusting the volume, the display momentarily indicates the volume level (i.e., VOL=31). The volume ranges from a minimum programmable level of zero (displayed as OFF in the display) up to 40, which is the loudest level.
VOICE GROUP SELECTION KNOB	Used to select groups/channels. This is a 16-position rotary knob. ***Note:*** A mechanical stop, used to limit the number of accessible positions, is shipped with the radio but must be installed. To install the mechanical stop, remove the voice group selection control knob, loosen the set screw on the voice group selection control knob metal base (using a 1.27 mm hex wrench), and remove the voice group selection control knob metal base. Replace the 16 channel ring with the channel stop ring located at the desired channel. Re-install the voice group selection control knob metal base, tighten the set screw, and re-install the voice group selection knob.
EMERGENCY/HOME BUTTON	Automatically selects a pre-programmed "Home" Group/System by pressing and holding for a programmed duration OR it can be used to declare an emergency by pressing and holding for a programmed duration. The button can be pre-programmed for either operation, but not both.
PUSH-TO-TALK (PTT) BUTTON	The PTT button is pressed before voice transmission begins.
○	Activates one of a number of programmable software options selected during PC programming.
⊙	Exits the current operation (removing all displays associated with it) and returns the radio to the selected talk group.

6.1.2 Keypad

The front mounted keypad of the Scan model has six buttons and System model has 15 buttons. Refer to Figure 6-3 and Figure 6-4, respectively.

Figure 6-3: Scan Model Front Panel

Figure 6-4: System Model Front Panel

The primary and secondary functions of each key, where applicable, are described in Table 6-2 and the following section.

Table 6-2: XG-25P Front Keypad Functions

KEY	FUNCTION
M	Primary Function: Accesses the menu. Secondary Function: Activates a selected item within the menu, similar to an "Enter" key.
▲ ▼	Primary Function: Scrolls through available systems, groups, or channels, depending on personality programming. Secondary Function: Changes the selection for an item within a list.
A/D	Adds/deletes selected groups or channels from the scan list of the currently selected system.
SCN	Toggles scan operation on and off.
OPT	Activates one of any programmable software options selected during radio programming, i.e., high/low TX power and talkaround.
1 SYS	Primary function: Selects a specific system. If the rotary knob is used to select the system and more than 16 systems are programmed in the radio, the 1 SYS key is used to select additional banks (groupings) of systems.
2 GRP ABC	Primary function: Selects a specific group.
3 SCN DEF	Primary function: Turns the Scan operation on and off.
6 ADD MNO	Primary function: Adds groups or channels from the currently selected system to the scan list.
7 STS PQRS	Primary function: The Status key accesses the status list (0-9) permitting the transmission of a pre-programmed status message to a P25 site.
8 MSG TUV	Primary function: The Message key accesses the message list (0-9). The Message key permits the transmission of a pre-programmed message to a P25 site.
9 DEL WXYZ	Primary function: Deletes selected groups or channels of the currently selected system from the Scan list.

KEY	FUNCTION
1 SYS 2 GRP ABC 3 SCN DEF 4 FVT GHI 5 JKL 6 ADD MNO 7 STS PQRS 8 MSG TUV 9 DEL WXYZ 0 * PHN # IND	Secondary function: The secondary function of these keys acts as a typical DTMF telephone pad, and are used to place telephone interconnect and individual (unit-to-unit) calls.
* PHN	Primary function: In P25 modes, initiates telephone interconnect calls.
# IND	Primary function: In P25 modes, initiates individual, unit-to-unit calls.

6.2 DISPLAY

The XG-25P display is made up of 4 lines containing 12 alpha-numeric character blocks each. If programmed, the display backlighting will illuminate upon power up or when radio controls are operated. Specific display characteristics will be discussed in following sub-sections.

Figure 6-5: XG-25P Radio Display

Table 6-3 describes the icons that may be displayed by the XG-25P during operation.

Table 6-3: Status Icons Descriptions

ICON	DESCRIPTIONS
	Steady – during all radio transmissions.
	Steady – "Busy" transmitting or receiving, call queued.
	Steady – T99 Mode enabled.
	Steady – Channel Guard enabled **If icon is not visible** – Channel Guard is disabled.
	Steady – transmit at low power. **If icon is not visible** – transmit at high power.
	Steady – Indicates the current channel is set up as a Project 25 (P25) channel.
	Steady – Indicates the current channel is set up as an analog channel.
	Animated (*rotates clockwise)* – scan mode enabled. **If icon is not visible** – scan is disabled.
	Steady – priority 1 group or channel.
	Steady – priority 2 group or channel.
	Steady – group or channel in scan list.

ICON	DESCRIPTIONS
	Steady – special call mode (individual or telephone).
	Steady – battery charge indicator. The battery charge indicators illustrate approximate level only, based on battery voltage.
	Flashing – Low battery indicator.

6.3 LED

The LED changes color to indicate radio status and is visible from both the front and top of the radio (see Figure 6-1). In addition, the mode of operation may also help determine what the color of the LED represents.

Green: Receiving

Red: Transmitting

6.4 UNIVERSAL DEVICE CONNECTOR

The Universal Device Connector (UDC) provides connections for external accessories such as a headset, a speaker-microphone, audio test box, audio test cables, and programming cables. The UDC is located on the right side of the radio, opposite the PTT Button. The UDC facilitates programming and testing the radio. The UDC pins perform different functions depending on the accessory attached to the UDC.

Figure 6-6: XG-25P 15-Pin Universal Device Connector

7. PROGRAMMING

This section contains information and procedures for programming the XG-25P radio.

7.1 RADIO PERSONALITY MANAGER

Harris Radio Personality Manager (RPM) is a Microsoft® Windows®-based software application used to program Harris radios. RPM creates and modifies radio personalities. A personality is a computer file generated by the user. The computer file (personality) is downloaded from the computer into the radio and contains data that will direct certain operating characteristics of the radio. The technician can program personalities into the radio or can read personalities from the radio and save them to a hard drive or other computer storage media.

7.2 PLACING RADIO IN PROGRAMMING MODE

RPM cannot communicate with the radio unless the radio is in the programming mode.

Perform the following steps to place the radio into automatic programming mode:

1. Ensure the radio is turned OFF.
2. Connect the radio to the PC as shown in Figure 11-1.
3. Turn the radio ON. The radio will automatically enter `Program` mode when RPM or the Maintenance Tool attempts communication.
4. Turn the radio OFF and disconnect the programming cable after programming is complete.
5. If at any time this method of communication fails, retry this procedure or try one of the following alternate methods.

Alternate Method:

1. Ensure the radio is turned OFF.
2. Connect the radio to the PC as shown in Figure 11-1.
3. Press and hold the **PTT** button.
4. Turn the radio ON and release the **PTT** button.
5. The radio should display `Program`.

7.3 FLASH PROGRAMMING

The "Flash" software is the XG-25P radio operating software. When changes and enhancements are made to the operating code, the new operating code can be "flashed" to the radio, upgrading the operating code without changing the radio hardware. Flash software is a computer file read from a disk and downloaded to the radio using RPM.

7.4 MANAGING TRACKING DATA

The radio software contains certain information bytes known as "Tracking Data" that allow the radio's OMAP processor to control transmitter power, modulation characteristics, RSSI level, squelch opening threshold, and reference oscillator frequency. Normally, no adjustments to the tracking data are necessary to maintain specified limits for all related functions, since the processor makes the necessary adjustments using the *Tracking Data* established at the factory.

However, if the Tracking Data is lost, corrupted, or affected by maintenance actions, it may be necessary to establish new Tracking Data to restore calibrated performance. The following examples of repair situations require reloading (restoring) factory Tracking Data or establishing new Tracking Data.

SITUATION	NEW TRACKING DATA REQUIREMENTS
New PA Module	All RF Power settings
New Reference Oscillator	Reference Oscillator setting
New Main Board	All Tracking Data plus Feature Licensing Data and Operating Software
New Flash Memory	All Tracking Data and Operating Software

Hardware repair for this radio is limited. Technicians servicing this radio should be concerned with isolating the problem to hardware or software. Most radio problems are the result of software errors and are usually corrected by reloading the personality, flash, etc. Radios with hardware issues should be returned to an authorized service center.

7.5 PERSONALITY PROGRAMMING

A personality is a computer file that contains the operating characteristics and frequencies for a radio unit. The radio technician uses the Radio Personality Manager (RPM) software (TQS3385 or TQS3389) to create, edit, or read the personality and then to write the personality into the radio.

RPM software, in one setup, communicates with the radio through the CA-023407-001 programming cable. Figure 7-1 shows a diagram of that Programming Setup to program the radio. Refer to RPM On-Line Help "Programming the Radio" section for detailed programming instructions.

To Load a Personality into the radio:

This section assumes the Service PC has RPM installed. For additional information on installing RPM, refer to the RPM Software Release Notes MS-012550-001 (TQS3385) or MS-012761-001 (TQS3389).

1. Connect the radio to the Service PC using the CA-023407-001 programming cable.
2. Click the **Start** button on the PC.
3. Select **Programs → Harris Radio Personality Manager → Radio Personality Manager**.
4. The programming application initializes with a default Personality window called "Person1."
5. Create a new personality or open an existing personality.

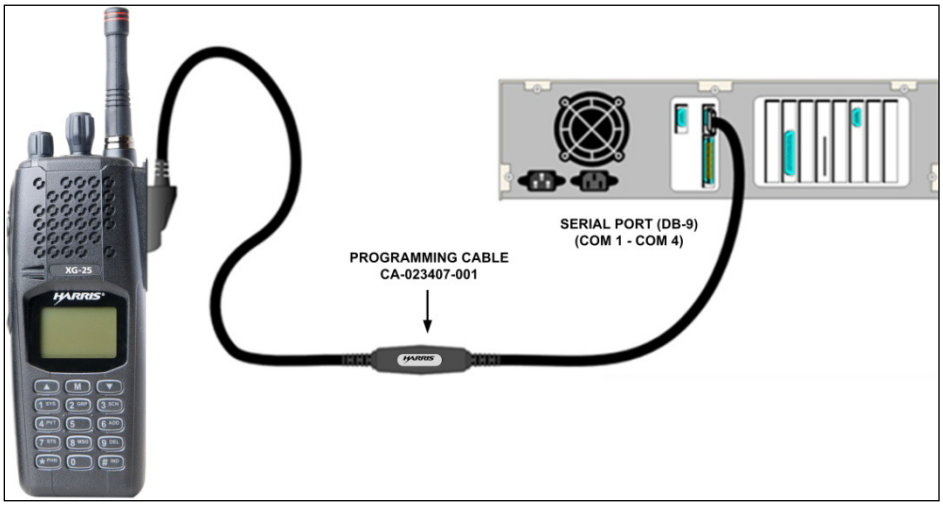


Figure 7-1: XG-25P Programming Setup

6. Select **Radio → Program** and write the personality into the radio.
7. In the "Program Radio Setup" dialog box, click **OK**.
8. The radio will cycle to operational mode after successfully writing the personality to the radio.
9. Exit RPM and disconnect the programming cable.

7.6 LOADING A PERSONALITY INTO A RADIO

To load an existing personality into the radio:

1. Connect the programming cable between the radio and Service PC.

   Use the connection diagram shown in Figure 7-1.


NOTE

If the PC does not have a serial port, use the USB Adapter Cable MATQ-03421 (CN24741-0001), available from Harris as a service part.

2. On the Service PC, click the Start button and select **Programs → Harris Radio Personality Manager → Radio Personality Manager** to start RPM.
3. Select the **File → Open → …*your directory*** and browse to locate a personality (*.PRS) file.
4. Start with the radio powered off.
5. Press and hold the **PTT** button.
6. Turn the radio on and release the **PTT** button.
7. The radio will respond by displaying XG-25P and the software version, before displaying **PROGRAM**.
8. Select **Radio → Program** or click on the **Program** icon. This starts the process of programming or writing the personality to the radio.
9. The *Program Radio Setup* dialog box should appear and the radio should display **PROGRAM** on the top line.
10. While observing the radio display, click **OK**.

    Writing the personality to the radio is successful when the radio resets and RPM returns to the Personality window.
11. Turn off the radio and remove the programming cable.

8. SERVICING

To ensure the XG-25P continues to operate at peak efficiency, we recommend periodically inspecting and cleaning the units. We also recommend periodically testing the units to ensure they are operating within FCC limits.

This section provides the following information:

- Preventive Maintenance (Section 8.1)
- Handling Precautions (Section 8.1.1)
- Annual Physical Inspection (Section 8.1.2).
- Basic Radio Measurements (Section 8.1.3)
- Cleaning (Section 8.1.4)
- Servicing Intrinsically Safe radios (8.2)
- Maintaining Battery Packs (Section 8.4)

8.1 PREVENTIVE MAINTENANCE

To ensure a high operating efficiency and to prevent mechanical and electrical failures, perform periodic maintenance according to the schedule outlined in Sections 8.1.1 and 8.1.3.

8.1.1 Handling Precautions

CAUTION - Do not carry the radio by the antenna

This radio contains components that are susceptible to damage by ElectroStatic Discharge (ESD). Service personnel should be knowledgeable on the proper handling procedures and should only work on the radio in an approved ESD environment.

Use proper grounding techniques (wrist or waist straps with grounding cords, grounded table-top mats, etc.) and other approved methods in order to minimize the chance of damage from ESD.

8.1.2 Physical Inspection

Before placing the radio into service, inspect it for any physical damage and ensure all buttons, knobs, and switches are functional. There are no requirements for internal inspection of the radios. Refer to Section Table 8-1 for part numbers and ordering information.

Table 8-1: Physical Inspection

ITEM DESCRIPTION	INSPECTION COMMENTS
Knobs (volume-on/off and group/channel select)	Cracks, fractures, wear, contaminants.
Switches (volume-on/off and group/channel select)	Loose switches, erratic updates.
Buttons (PTT, emergency, option, clear/monitor)	Wear, actuation force, tactile feel, erratic updates.
Keypad	Wear, tears, erratic updates.
Display and display lens	Cracks, fractures, scratches, contrast, missing segments, obstructions.
Battery pogo pins	Wear, spring force, stuck pins, contaminants.
Battery gasket	Wear, cracks, scratches, obstructions, color.
Microphone hole and gasket	Contaminants, obstruction, gasket tears and scratches.
LED Lens	Cracks, fractures, scratches, obstructions, colors.
UDC	Wear, plating, cracks, scratches, fractures, contaminants, corrosion, erratic accessory operation.
Case, chassis, and battery integrity	Cracks, scratches, fractures, wear, contaminants, corrosion.
Screws	Loose screws, corrosion, o-rings/seals.
Battery connection	Loose battery fit, erratic power cycling.
Accessory connection	Erratic accessory operation.
Antenna	Loose fit, cracks, fractures, cuts, bends, twists, wear.

8.1.3 Basic Radio Measurements

Perform the following tests annually or as required by local directives.

Basic Radio Measurements	Schedule	Comments
Reference Oscillator (TCXO)	Immediately, if unit was in storage for two (2) months or more.	Refer to Section 11.5.3.
	Six (6) months after first deployment.	
	Annually	
TX power	Annually	Refer to Section 11.5.4.
TX deviation	Annually	Refer to Section 11.5.6
RX sensitivity	Annually	Refer to Section11.5.12.2.
RX squelch	Annually	Refer to Section 11.5.11

8.1.4 Cleaning

Keep the exterior of the radio, battery, antenna, and radio accessories clean. Periodically clean using the following procedures:

1. To remove dust and dirt, use a soft clean damp cloth.
2. For more rigorous cleaning, use the following procedure:

Do not use chemical cleaners, spray, or petroleum-based products. They may damage the radio housing. We recommend using an "antibacterial hand soap dishwashing liquid."

Cover the speaker and microphone areas to protect them when cleaning.

a. Prepare the cleaning solution using warm water.

b. Drop the cleaning cloth into the solution, wring it out, and wipe the radio clean.

Do not apply cleaning solution directly on radio. Repeat the process until the radio is clean.

c. Follow up by wiping off the radio with clean damp cloth using warm water only.

d. Wipe dry with clean cloth.

3. Remove the battery and wipe the battery and radio contacts using a soft dry cloth to remove dirt or grease. This will ensure efficient power transfer from the battery to the radio.

4. Remove any accessories and clean the accessories Universal Device Connector (UDC) contacts using a clean dry cloth. When the UDC is not in use, cover the connector with the protective dust cap to prevent the build-up of dust or water particles.
5. If the radio is used in a harsh environment (such as driving rain, salt fog, etc.), it may be necessary to periodically dry and clean the battery and radio contacts with a soft dry cloth or soft-bristle non-metallic brush.

8.2 SERVICING INTRINSICALLY SAFE RADIOS

Certain models of the XG-25P portable radio are rated "Intrinsically Safe" by the Factory Mutual Research Corporation and Canadian Standards Association. These units must be serviced by FM/CSA-certified service centers to retain the Intrinsically Safe certification. All Harris owned service centers are FM/CSA certified. Other service shops may or may not be certified by the rating agencies. Check with your service provider prior to having any Intrinsically Safe product serviced.

CAUTION – Only approved Intrinsically Safe options can be used with an Intrinsically Safe radio. This includes battery packs, speaker microphones, antennas, etc. The specific antenna and speaker microphone options and carrying accessories that may be used with Intrinsically Safe radios appear in Table 4-1 designated by <IS>.

8.3 EXTERNAL CONNECTIONS

8.3.1 RF Connections

- Top Antenna Insert
- Side Antenna Bypass Connector

8.3.2 Universal Device Connector (UDC)

The 15 pin UDC connector mates to numerous external devices.

Partial listing:

- Programming
- External Speaker Microphone
- Enhanced Vehicular Charger
- Data Cable
- Multiple Vendor devices

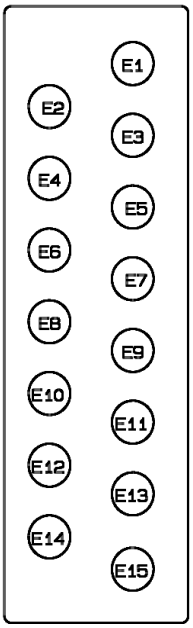


Figure 8-1: UDC Connections

E1* Switched A+
E2 USB D+
E3 USB D-
E4 USB VBUS
E5* UDC Sense
E6* UDC Speaker +
E7* UDC Speaker -
E8* Gnd A-
E9* EXT. MIC. In
E10* EXT. PTT- **
E11* EXT. EMER
E12 TX Data In **
E13* RX Data Out
E14 Mute Out **
E15* T-/R **

* Leads available on MATQ-03424 Test Box

** Leads have other uses.

NOTE

Whenever the UDC is not in use, be sure to install the UDC cover, p/n FM-014712, to protect the UDC from damage or moisture.

8.4 BATTERY PACKS

The XG-25P series portable radios use rechargeable, recyclable Nickel Metal Hydride (NiMH), Lithium-Ion (Li-Ion), or Lithium Polymer (Li-Poly) batteries. Please read carefully, the battery information provided, to maximize the useful life of each type of battery.

WARNING

Do not disassemble or modify Lithium battery packs. Lithium battery packs are equipped with built-in safety and protection features. Should these features be disabled or tampered with in any way, the battery pack can leak electrolyte, overheat, emit smoke, burst, and/or ignite.

WARNING

If the battery is ruptured or is leaking electrolyte that results in skin or eye contact with the electrolyte, immediately flush the affected area with water. If the battery electrolyte gets in the eyes, flush with water for 15 minutes and consult a physician immediately.

8.4.1 Battery Pack Usage

NiMH, Lithium-ion, and Lithium Polymer batteries vary in capacity and life cycle. NiMH, Lithium-Ion, and Lithium Polymer batteries require that basic usage guidelines be followed in order to optimize the battery runtime or shift life.

The following guidelines will help optimize the battery runtime or shift life:

- Ensure Nickel-based battery packs are fully discharged (as indicated by the radio low battery warning) before re-charging. Full discharge is not required for Lithium battery packs.
- Periodically condition Nickel-based battery packs. The frequency should be determined based on usage patterns (refer to ECR-7367). If the battery is fully discharged (to radio Low Battery warning) during routine use, the frequency of conditioning may be reduced. Lithium-ion and Lithium Polymer batteries do not suffer from memory-effect and therefore do not require conditioning.

Do not leave any Harris rechargeable batteries in a charger for more than a few days.

8.4.2 Servicing Battery Packs

To ensure battery packs are readily available for radio operators (that is, the user has a fully charged, long running battery pack at the beginning of the work-shift) we recommend establishing a battery service program (refer to ECR-7367 for details). As part of that program, it is important to actively monitor battery usage and periodically recondition the battery pack (see Table 8-2).

Table 8-2: Battery Pack Usage Patterns

PATTERN	DESCRIPTION	EXAMPLE	NEED TO RECONDITION
A	Battery is taken out of the charger and used for 8-12 hours (low battery warning) then recharged.	A police officer that carries the radio all day.	Annually, to track capacity
B	Battery is charged, used for over 8 hours then recharged and immediately used for the next shift.	A manufacturing plant that has three shifts a day.	Semiannually
C*	Battery is fully charged, used for 4 hours or less, and returned to the charger.	An administrator. May apply to a user that has two batteries.	Monthly
D*	Battery and radio reside in the desktop charger, radio turned ON waiting for a call.	Fireman or EMS	Monthly
E	Battery and radio are used with a vehicular charger.	Vehicle patrol officer.	Monthly
F	Batteries are stored for more than two weeks at room temperature		After one month of storage

PATTERN	DESCRIPTION	EXAMPLE	NEED TO RECONDITION
G	Batteries are stored for more than two weeks at elevated temperatures (around 30°C)		After two weeks storage
* These patterns are the hardest on a battery pack.			

8.4.3 Reconditioning Battery Packs

Always use Harris authorized chargers and conditioners. Use of unauthorized chargers and conditioners may void the warranty.

8.4.3.1 Conditioning NiMH Battery Packs

Failure to properly condition NiMH battery packs before initial use will result in shortened performance by the battery.

Condition a new NiMH battery pack before putting into use. This also applies to rechargeable NiMH battery packs that have been stored for long periods (weeks, months, or longer). Conditioning requires fully charging and fully discharging the battery pack three (3) times using the tri-chemistry charger. The first time the battery pack is put into the charger, this unit will condition Nickel-based battery packs by automatically charging and discharging (cycling) the battery. Refer to the appropriate charger manual for details.

8.4.3.2 Conditioning Lithium-Based Battery Packs

Lithium battery packs do not suffer from memory effect and therefore do not require conditioning.

Always use Harris authorized chargers and conditioners. Use of unauthorized chargers and conditioners may void the warranty.

8.4.3.3 Additional Information

For more information regarding the proper care of portable radio battery packs or establishing a battery maintenance program, refer to ECR-7367.

8.4.4 Charging Battery Packs

There are a number of battery chargers available from Harris. These include single and multi-position rapid chargers and vehicular chargers.

Harris chargers are specifically designed for charging battery packs. The chargers differentiate between NiCd, NiMH, Li-Ion/Poly battery packs and automatically adjust charging rates. Refer to the appropriate charger manual for specific operating instructions.

8.4.5 Charging Guidelines

Observe the following guidelines when charging a battery pack:

- Avoid high temperatures during charging.
- Discontinue use if the charger is overheating.
- Only charge battery packs using a rapid charger approved for use by Harris.
- Do not leave batteries in the charger indefinitely. For best results leave the battery in the charger for two to six hours after the Green Ready LED comes on. Then place the battery pack into service and fully discharge (as indicated by the radio "Low Batt" warning) before re-charging.

If any faults are encountered while charging the battery pack, consult the chargers' manual to determine the cause and possible corrective action.

8.4.6 Changing the Battery Pack

8.4.6.1 Intrinsically Safe Battery Pack Replacement

Only battery packs identified with a green FM/CSA label shall be used with a portable radio that is rated and labeled as FM/CSA Intrinsically Safe. Use of non-specified battery packs voids FM/CSA approval.

The following battery pack is approved for use in Intrinsically Safe XG-25P portable radios:

Option BT-023406-004	Nickel Metal Hydride (NiMH) Battery

8.4.6.2 Removing the Battery Pack

Make sure the power to the radio is turned off.

CAUTION

Although the XG-25P has been designed to tolerate changing the battery pack without turning power off, Harris recommends turning the radio off before changing battery packs to ensure safety and best operation.

Refer to Figure 8-2 and perform the following to remove the battery pack.

1. Press or pull both latches on either side of the battery pack ① toward the bottom of the radio simultaneously.
2. Pull the battery ② away from the radio.
3. Remove the battery pack from the radio.

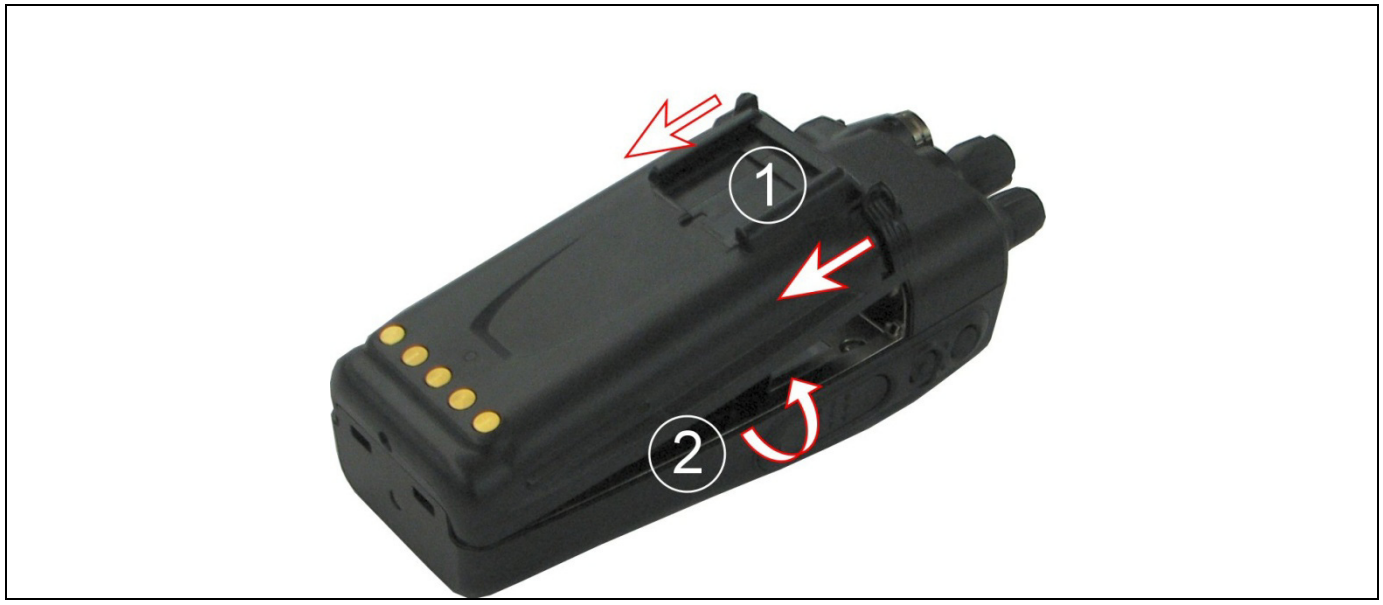


Figure 8-2: Removing the Battery Pack

8.4.6.3 Attaching the Battery Pack

Make sure the power to the radio is turned off.

1. Align the tabs at each side on the bottom of the battery pack with the slots at the bottom of the battery cavity ①.
2. Push the top of the battery pack ② down until the latches click to attach the battery to the radio.
3. Tug gently to verify that the latches are secure and the battery pack is properly attached to the radio.

Figure 8-3: Attaching the Battery Pack

8.4.7 Battery Pack Storage and Disposal

If a battery pack is expected to be idle for a month or more, it should be properly prepared.

Battery packs should not be stored fully charged. Before storing Nickel-based battery packs, discharge them to their end-of-life voltage (about 6 volts). If the battery is not discharged prior to storage, depending on the length of storage, its overall capacity may be reduced.

Lithium batteries should be stored with approximately 40% charge. Although, all battery packs experience some capacity loss during storage, the shelf life varies by chemistry, for example, the shelf life for NiMH battery packs is about three years and for NiCd battery packs about five years. It should be noted that any capacity drop that occurs during storage is permanent and cannot be reversed.

While capacity loss cannot be totally prevented, the following guidelines will reduce the effect during storage:

- Battery packs should be stored in a cool dry storage area (32 to 86°F [0 to 30°C]), preferably a refrigerator, but avoid storing in freezers. Place the battery pack in a plastic bag to protect it against condensation.
- Do not store charged battery packs, ensure the battery has been discharged (to about 6 volts).
- Lithium Ion batteries should be stored approximately 40% charged.
- Never leave a nickel-based battery sitting on a charger for more than a few days.
- Recondition the battery pack before returning it to service.

Never incinerate a battery. Disposing of a battery pack by burning will cause an explosion.

8.4.7.1 Nickel Metal Hydride Battery

There are no special requirements concerning the disposal of NiMH batteries. NiMH batteries can be recycled. Call Toll Free 1-800-8BATTERY for information.

8.4.7.2 Lithium Batteries

There are no special requirements concerning the disposal of Lithium batteries. Lithium batteries can be recycled. Call Toll Free 1-800-8BATTERY for information.

9. CIRCUIT ANALYSIS

9.1 GENERAL INFORMATION

This section contains the circuit analysis for the XG-25P VHF radio. Each radio contains two primary circuit board assemblies:

- Main Board
- Interface (I/F) Board.

These circuits interface with other subassemblies including the Universal Device Connector (UDC), battery, control knobs, and optional keypad assemblies. Block diagrams are provided throughout this section and schematics are provided, beginning with Section 16.

9.2 MAIN BOARD

The Main Board contains the following functional circuits:

- Receiver
- Transmitter
- Synthesizer
- Control Logic

The XG-25P VHF radio employs a single conversion, I/Q receiver. The receiver input frequency range is 136-174 MHz. The IF frequency is 45.1 MHz which is sampled by an analog-to-digital converter (ADC). The signal is I/Q sub-sampled at 96 kHz to translate the filtered signal to baseband. The signal is then processed and demodulated before being applied to an audio power amplifier and the speaker.

The transmit section is a direct baseband-to-RF up-conversion transmitter which takes a complex pair (I/Q) of signals from a baseband dual digital-to-analog converter (DAC) and creates an RF signal in the VHF band. This signal is amplified, filtered, and sent through the high power amplifier (HPA) for further amplification prior to being applied to the antenna. The Control Logic circuitry provides all the necessary program management, memory, and operational control of the radio. A more detailed description is provided in later sections of this manual.

9.2.1 Receiver

The receiver section of the transceiver consists of the following functional circuits:

- RX Front End
- RX IF
- RFLSI Module

9.2.1.1 RX Front End

The RX Front End consists of the TX/RX switch and filters to reject unwanted signals.

The received signal is subjected to a Low Pass Filter (LPF), Antenna Switch (ANT SW), Low Noise Amplifier (LNA), and Band Pass Filter (BPF).

- The LPF is a seventh order filter consisting of L and C components.
- The ANT SW consists of pin diodes (CD2181 and CD2182).
- The LNA is low noise Dual Gate FET (TR2201).
- The BPF is narrow bandwidth and low insertion loss. BPF1 and BPF2 are tunable, consisting of a varactor diode and capacitor switch, and are used to suppress spurious component of 1st image and ½ IF frequency.

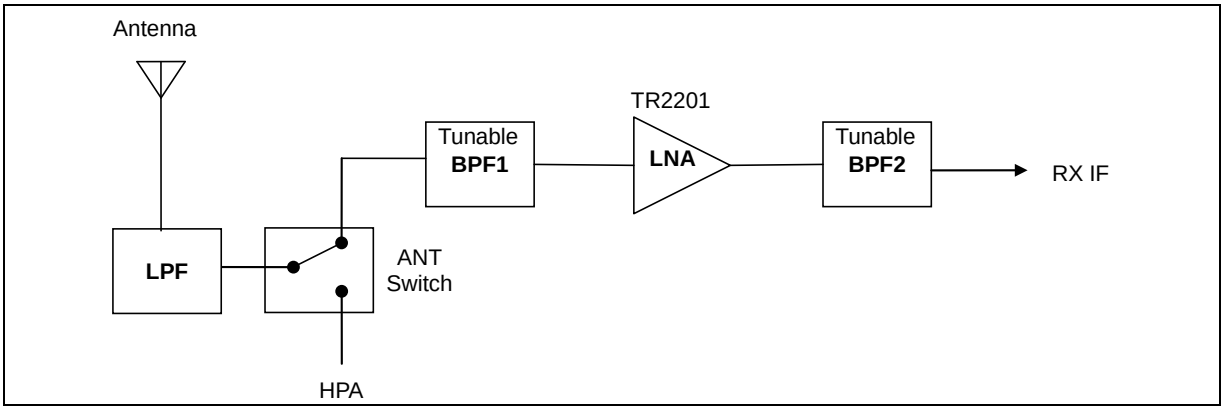


Figure 9-1: Receiver Front End Block Diagram

9.2.1.2 RX IF

RX Mixer IC2206 features low power consumption and high Intercept Point (IP) performance that converts an RF signal in the 136-174 MHz range to the 45.1 MHz IF frequency.

IFBPF (FL2201) is the X'tal filter for adjacent channel suppression for both wide and narrow band.

IFAMP1 (IC2207) is the Broadband MMIC.

IFAMP2 (TR2203) is the AGC AMP consisting of a level detect circuit, OPAMP, and Dual gate FET. It is used to prevent from saturating the ADC by the high level input of desired channel and adjacent channel signal. The RSSI range is limited by AGC AMP saturating.

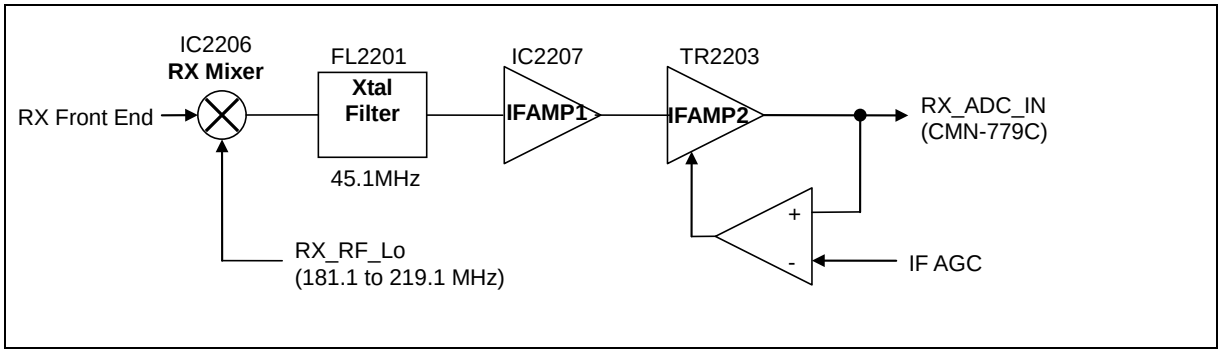


Figure 9-2: RX IF Block Diagram

9.2.1.3 Backend Circuit

The backend circuit primarily consists of the IFAMP3 and ADC that are in the RFLSI module (IC2501).

The signal is converted from unbalanced into balanced by IFAMP3, which consists of ADC driver circuit OPAMPS with resistor set gain for driving differential ADCs input.

The IF signal (45.1 MHz) is sampled at the 12 bit ADC.

The ADC samples the IF signal using the 15.84 MHz clock. The RF LSI performs the digital quadrate demodulate the signal into the quadrate I and Q signal and convert the sampling rate from 15.84 MHz to 96 kHz, then it transfer I and Q signal as 16 bits.

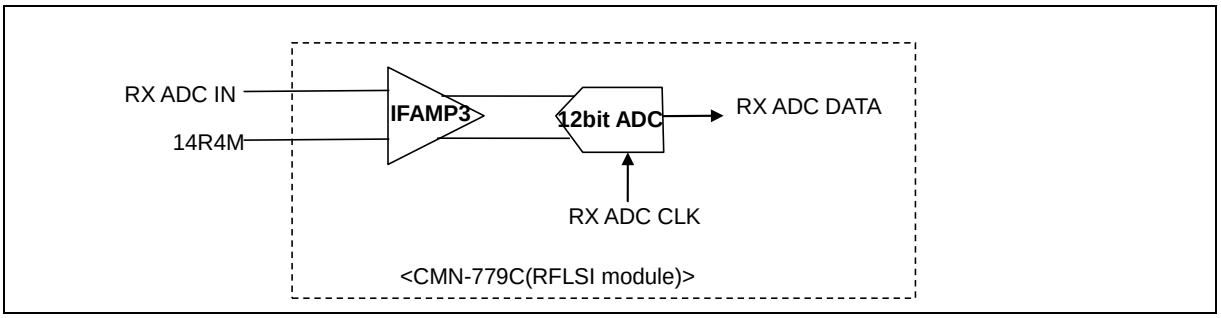


Figure 9-3: RFLSI_module Block Diagram

9.2.2 Transmitter

The XG-25P VHF radio employs a single direct conversion transmitter capable of an operating output frequency of 136-174 MHz. The software in the processor selects the desired frequency.

The XG-25P VHF radio is multi-mode, in that it is capable of operating in the analog or digital mode.

The transmitter section consists of the following functional circuits:

- I/Q Modulator
- TX Automatic Power Control (APC)
- High Power Amplifier (HPA)
- Temperature Sensor

9.2.2.1 I/Q Modulator

The RFLSI module (IC2501) consists of DAC and LPF, image rejection Mixer (IRMixer) that is in the RF_LSI module.

The 12 bit ADC outputs the IQ base band signal at sampling rate 96 kbps and the signal feds to the Low pass filter (LPF).

Good image rejection is obtained by 90 degree offset signal for IF and Local port. To get 90 degree offset signal, TX Local signal (TXRF_LO) is required as four times of frequency. Also the Phase, Amplitude and DC offset adjustment is required for better image rejection.

The 12 bit ADC is the differential current output type and it includes current to voltage converter amplifier. The output voltage is 1.0VDC and 1Vpp maximum.

The modulated signal is fed to the TX_IF_OUT via LPF.

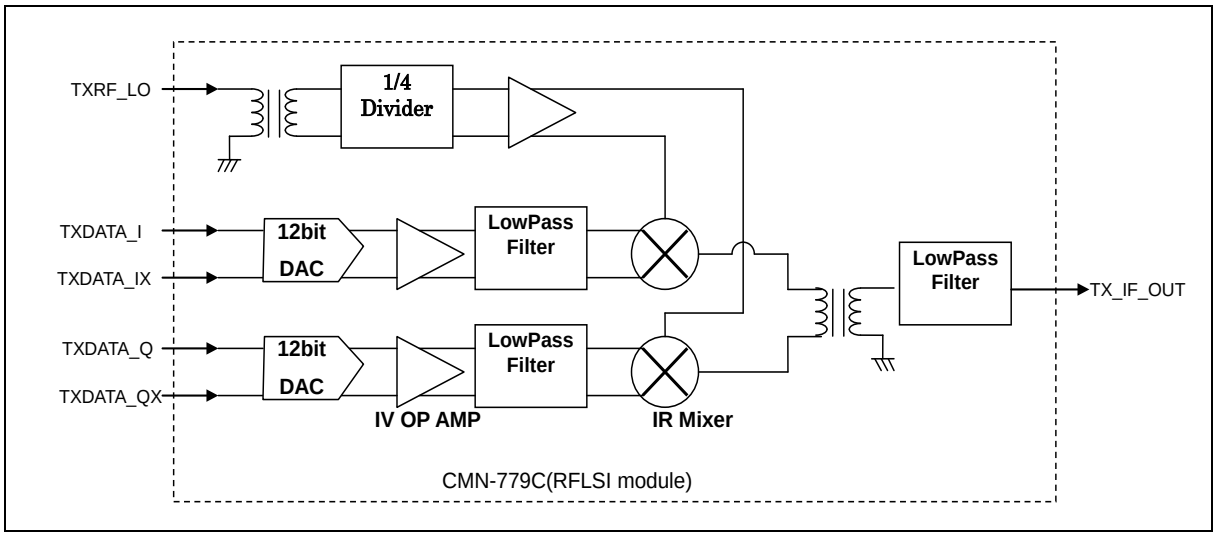


Figure 9-4: IQ Modulator Block Diagram

9.2.2.2 TX APC

The TX AMP1 (IC2101) and TX AMP2 (IC2131) are the broadband MMIC amplifiers.

TX APC (CD2111) consists of a pin diode attenuator. Its variable range is about 50 dB with a resolution of about 0.2 dB.

APC monitors the HPA output power and controls the power using software. It performs the 1 to 5 W output power adjustment and power compensation by temperature or voltage change.

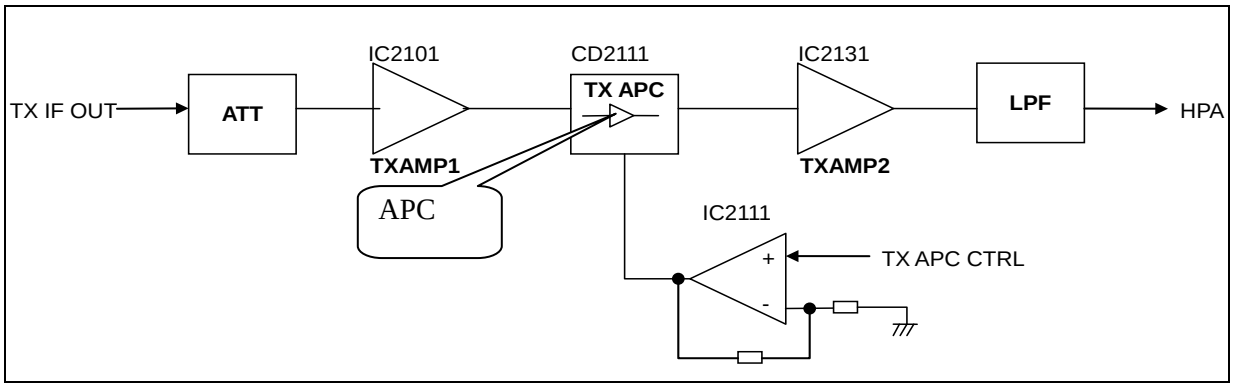


Figure 9-5: TX APC Block Diagram

9.2.2.3 High Power Amplifier (HPA)

The HPA uses MOSFET transistors TR2141 and TR2142, as shown in Figure 9-6, which are capable of producing a maximum of 38.1 dBm output. This has a high linearity for assuming adjacent channel power and spurious performance. FINAL AMP gate is controlled by the signal of TX_FINAL_GATE according to RAMPUP/DOWN command.

The coupler (DC2171) is the RF POWER Detector device is the linear output IC. The Detection level range is about 30 dB, the detection step is about 0.05 dB.

ANTSW consist of pin diodes (CD2181 and CD2182) change TX/RX. LPF is a seventh order filter, and it provides approximately 50 dB attenuation against the 2nd and 3rd harmonics.

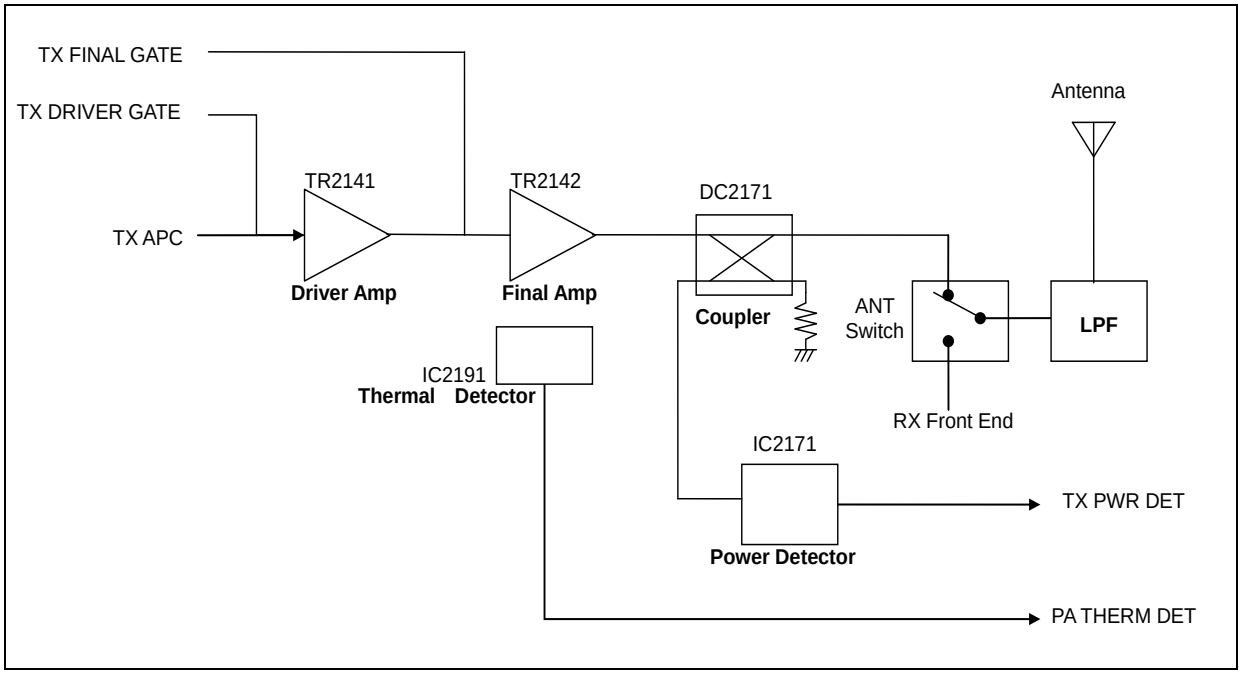


Figure 9-6: HPA Block Diagram

9.2.2.4 Temperature Sensor

The thermal detector (IC2191) monitors the temperature of the final amplifier, and controls the APC temperature compensation and HPA junction temperature.

9.2.3 Synthesizer Section

The RF Synthesizer section consist of two Phase-locked-Loop (PLL) RF synthesizers and a Voltage Controlled X'tal Oscillator (VCXO) XU2301. These PLLs are used for the transmitter and receiver respectively.

The RX PLL circuit consists of PLL IC (in the RF LSI module CMN-779C, Loop filter (IC2311 and IC2321) and VCO (HC2321).

To get fast look time, charge pump current and loop time constant is changed for fast mode and slow mode.

The RX PLL (RFLSI module) is a dual fractional-N.

RX RF_LO frequency is 181.1 to 219.1 MHz.

The TX PLL circuit consists of PLL IC (in the RF LSI module CMN-779C, Loop filter (IC2361) and VCO (HC2322).

The VCO has 2 bit (4-channel) segment for high C/N.

The TXPLL (RFLSI module) is a dual fractional-N.

TX RF Local frequency is four times of the Image rejection filter input frequency 544 to 696 MHz.

The reference frequency of the PLL is generated by VC TCXO (XU2301) and its frequency is 14.4 MHz.

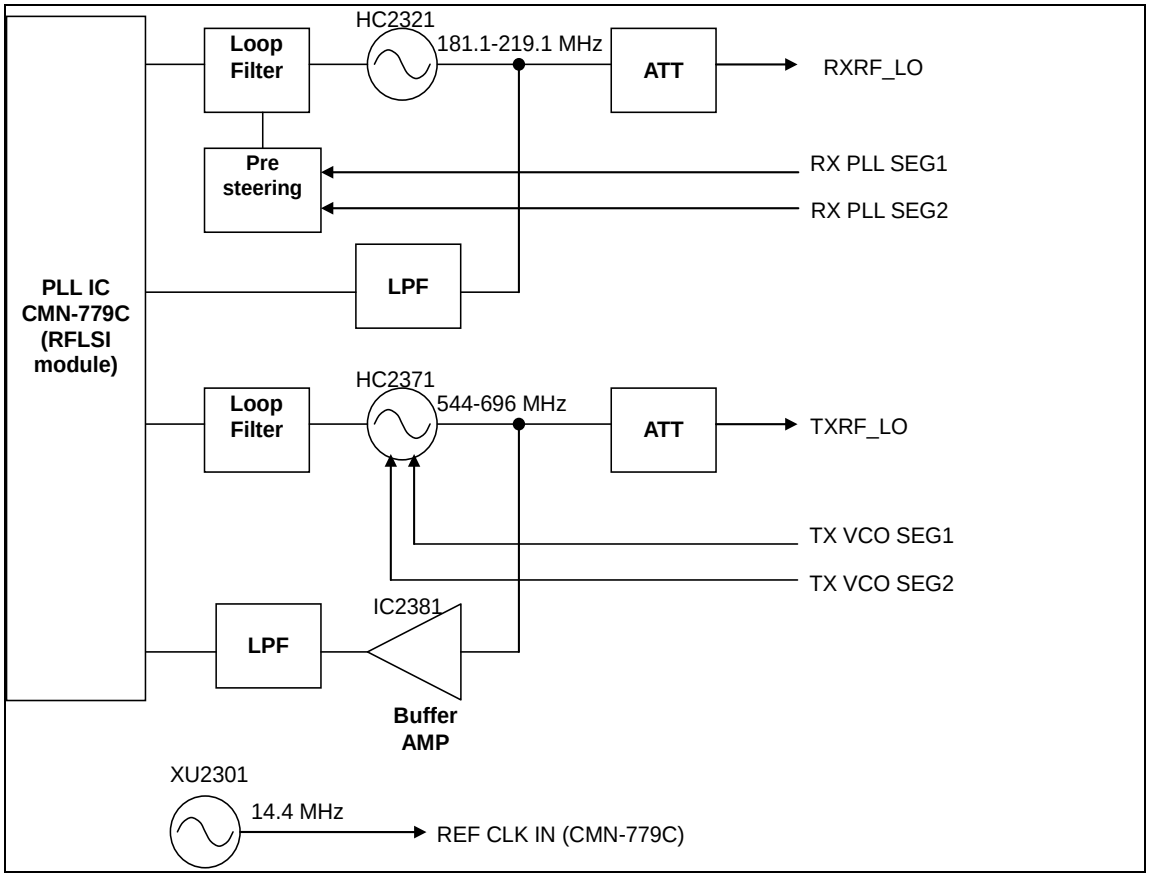


Figure 9-7: Synthesizer Block Diagram

9.2.4 Logic Section

9.2.4.1 Logical circuit

The main logical circuit of XG-25P consists of Dual core processor OMAP (IC0602), 256 Mbits Flash ROM (IC0701), 16Mbits SRAM (IC0702), CPLD (IC0601), Four channel A/D converter (IC0603) and full dots matrix LCD (DD1301).

The main clock of the dual core processor is VCXO 12.0 MHz, and 32 KHz oscillator is used for RTC of OMAP

For audio, the stereo type codec (IC0801) is connected to OMAP though I2C for control and I2S for audio signal.

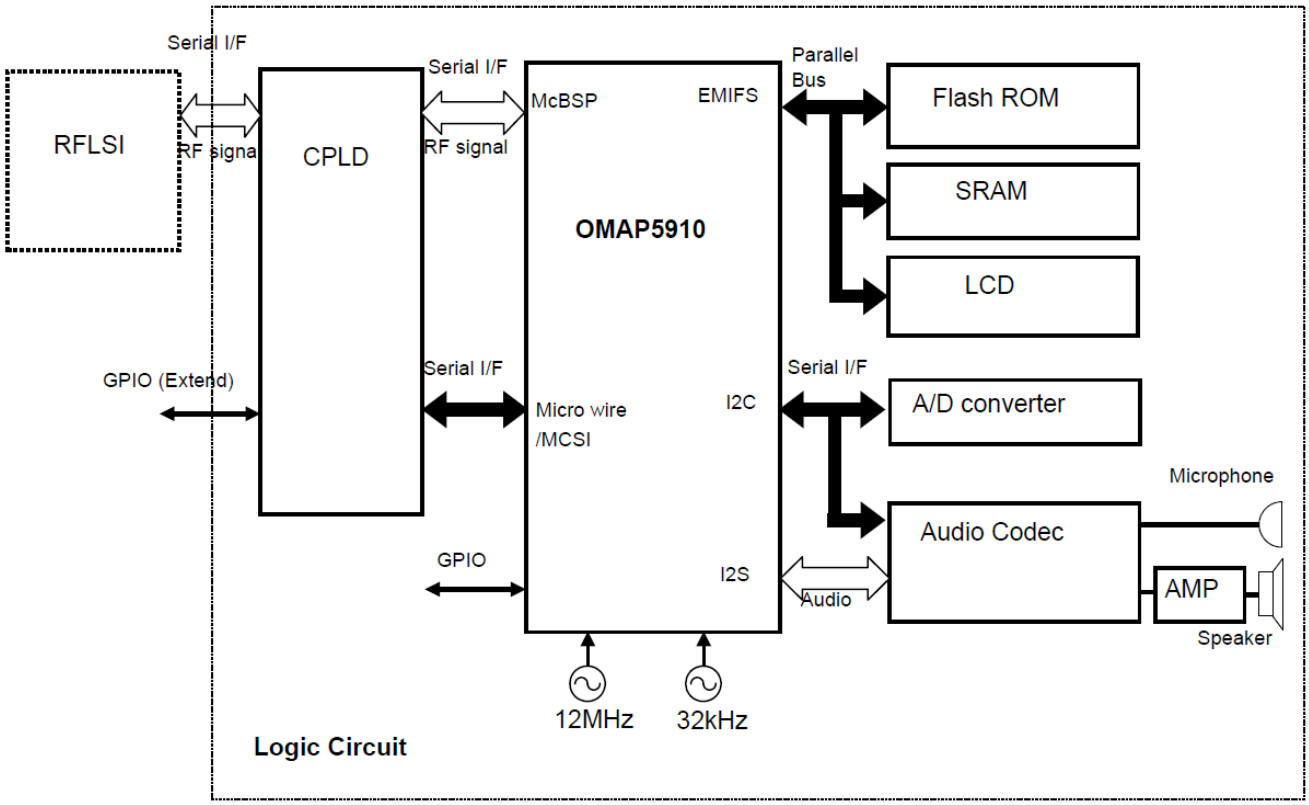


Figure 9-8: Logic Circuit

9.2.4.1.1 OMAP (IC0602)

This dual core processor contains an ARM925-based Microprocessor Unit (MPU) and a C55x Digital Signal Processor (DSP) subsystem with internal memory and control.

The processor has a slow parallel interface as EMIFS, communicates with Flash ROM, SRAM, and LCD. The processor boots from the Flash ROM.

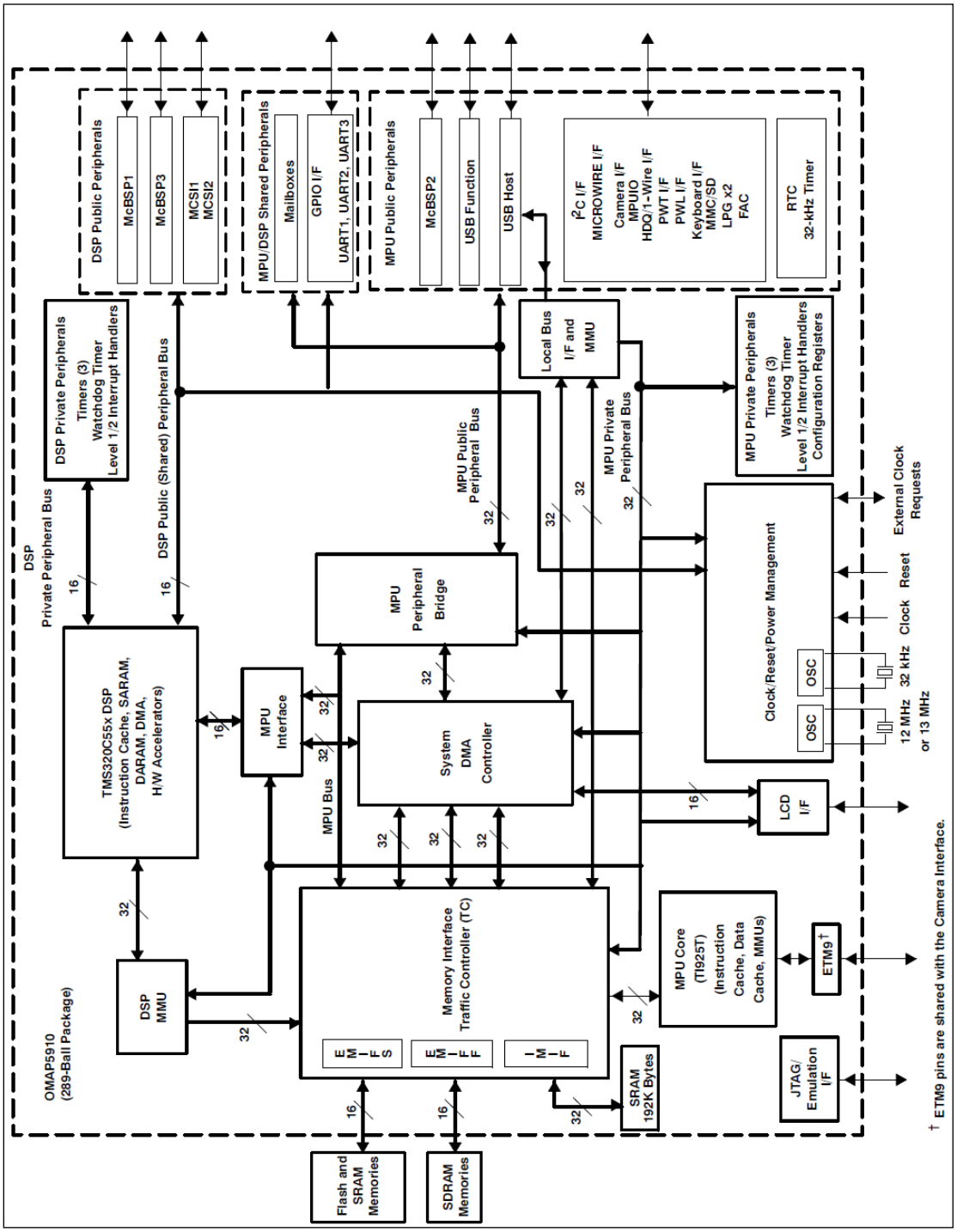


Figure 9-9: OMAP Functional Block Diagram

The MPU manages high layer protocol processing, user interface (display and key) and audio routing control including microphone and speaker selection.

The DSP manages modulation, demodulation and filtering for RF (Radio Frequency), AF (Audio Frequency) signals.

The internal clock of ARM and DSP is 144 MHz; it is created based on 12.0 MHz clock by PLL circuit.

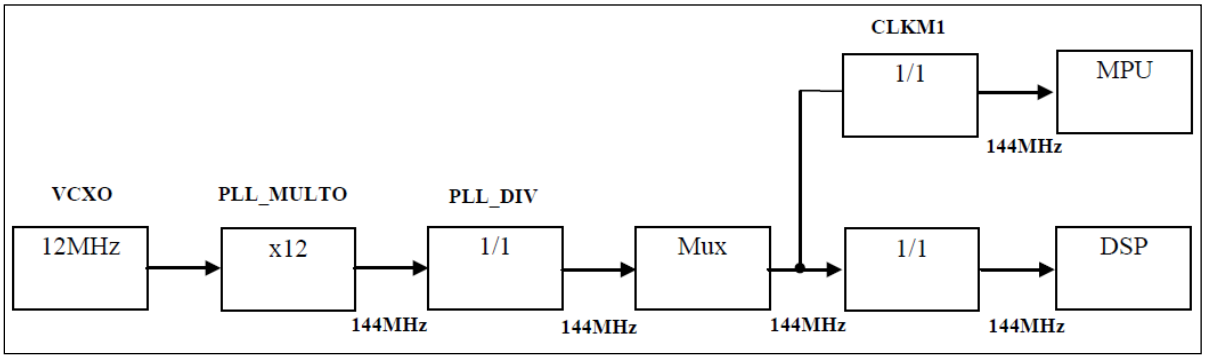


Figure 9-10: Clock and PLL Setting

9.2.4.1.2 FLASH ROM (IC0701)

The main software, boot software, personality data, and calibration (tracking) data are stored in this memory. Flash ROM IC0701 has capability of 8M x 16 bits. The memory space of Flash ROM is allocated to CS0 on EMIFS parallel bus. The access time

9.2.4.1.3 SRAM (IC0702)

The SRAM has a storage capacity of 1M x 16 bits.

The memory space of SRAM is allocated to CS1 on EMIFS parallel bus.

9.2.4.1.4 LCD (DD1304)

The LCD module is full dots matrix monochrome type.

OMAP draw the characters and picture though the EMIFS interface.

The memory space of LCD is allocated to CS2 on EMIFS bus.

9.2.4.1.5 CPLD (IC0601)

CPLD converts the interface difference between OMAP and RFLSI module.

The block diagram of the CPLD is shown in Figure 9-11:

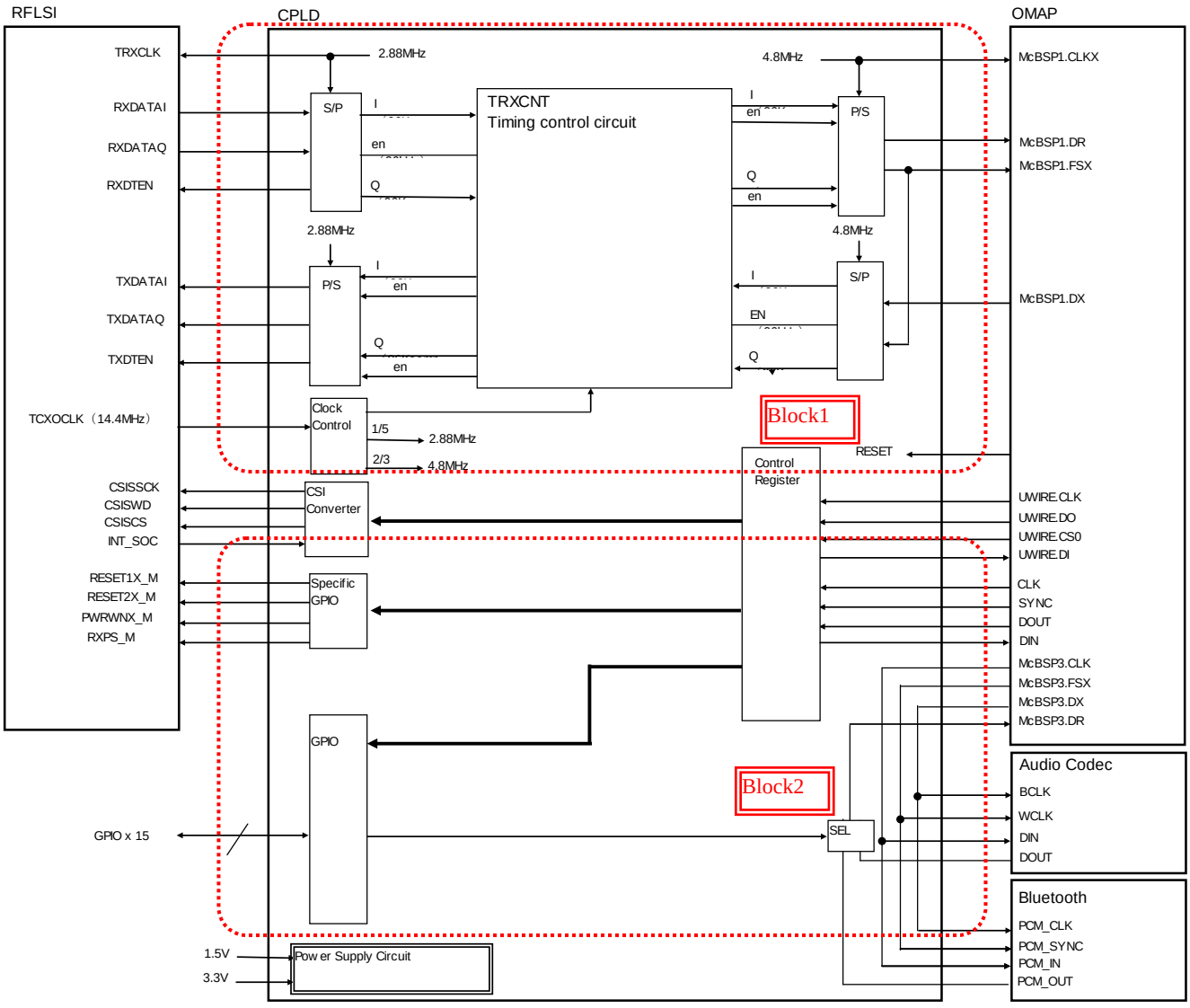


Figure 9-11: CPLD Block Diagram

The CPLD has two main functions:

1. Baseband signal conversion between OMAP and RFLSI module (Block1):
   - There are two symbols, one is I, and another is Q for RF signal.
   - The RFLSI module that manages the RF hardware has I and Q in parallel as the external interface.
   - The DSP of OMAP has I and Q signals in serial.
   - There is gap between OMAP and RFLSI module about the interface.
   - The CPLD converts between two signals (serial and parallel)

- In addition, the CPLD is clock master for OMAP and RFLSI module.
- The clock speed is 4.8 MHz for OMAP; 2.88 MHz for RFLSI module.
- CPLD provides the frame sync timing (96 KHz) to both and synchronize each other.

2. Extension of GPIO (Block2):
   - CPLD has fifteen expansion GPIO.
   - The control of GPIO is controlled from OMAP by Microwire Interface and MCSI interface.
   - Both MPU and DSP can access GPIO.
   - MPU accesses GPIO by the Microwire interface.
   - DSP accesses GPIO by the MCSI interface.
   - GPIO has access right to avoid the simultaneous access of the MPU and DSP.
   - OMAP has to set the access at the initial setup.

9.2.4.1.6 Four Channel A/D Converter (IC1013)

IC1013 has four channel 12bits A/D converters and is connected to the OMAP (IC0602) by IC2 interface.

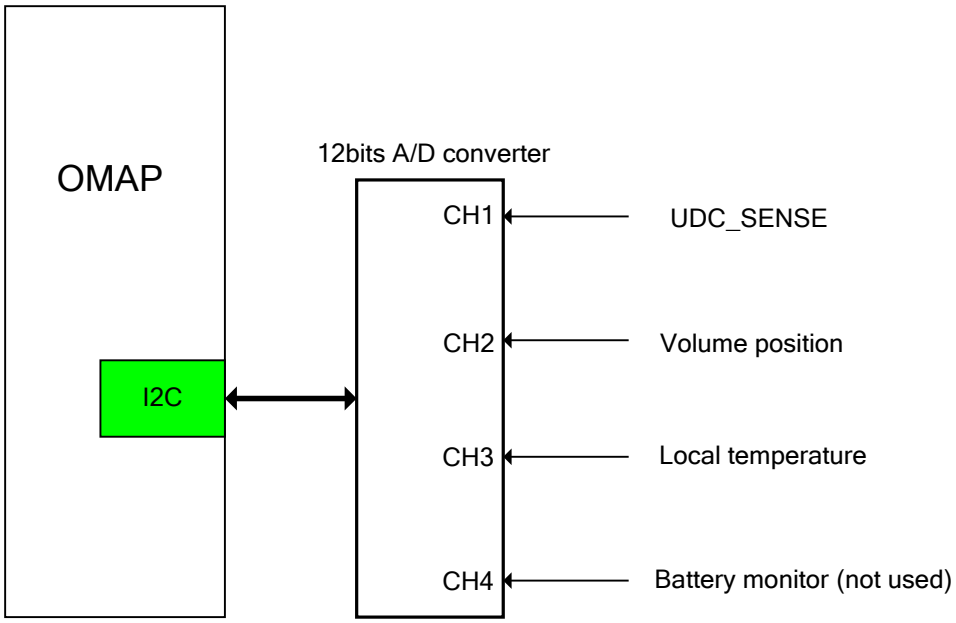


Figure 9-12: Four Channel A/D Converter

The 1st channel monitors UDC_SENSE signal that is changed by the type of external accessory. The OMAP knows what kind of accessory is attached to the radio by monitoring this signal.

The 2nd channel monitors the position of volume knob. The OMAP controls the audio level by monitoring this signal.

The 3rd channel monitors the internal temperature. The OMAP compensates the RF signal that is affected by the temperature change.

The 4th channel monitors the voltage level of battery. The OMAP indicates the timing of battery exchange.

9.2.4.1.7 Bluetooth® Module

The Bluetooth module (IC1301) is connected to the OMAP via UART interface.

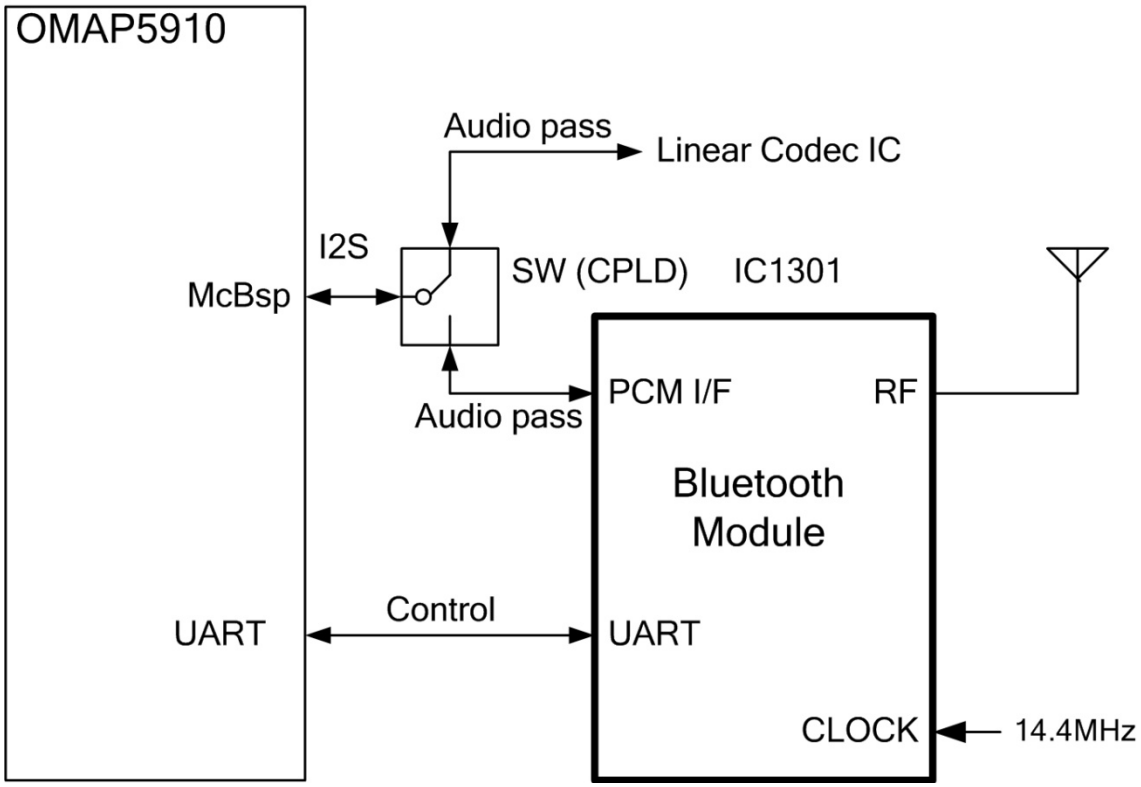


Figure 9-13: Bluetooth Module

The OMAP communicates to the Bluetooth chip of the module via UART. The interface protocol is BCSP. For the audio interface, the OMAP is connected to the Bluetooth module via I2S interface. The I2S interface of OMAP is shared by the audio codec and the Bluetooth. The clock master is OMAP, and the OMAP selects the audio routing for two chips.

9.2.4.1.8 Reset Circuit (IC1013)

This IC's function is resetting radio system. The signal is generated at the timing of ramped up voltage level of 3.3 V. It is possible to adjust delay time from ramped up timing by external capacitor. The generated signal is injected to IC0602 (OMAP).

9.2.4.2 Audio Circuit

The audio circuit block is used for Audio input/output.

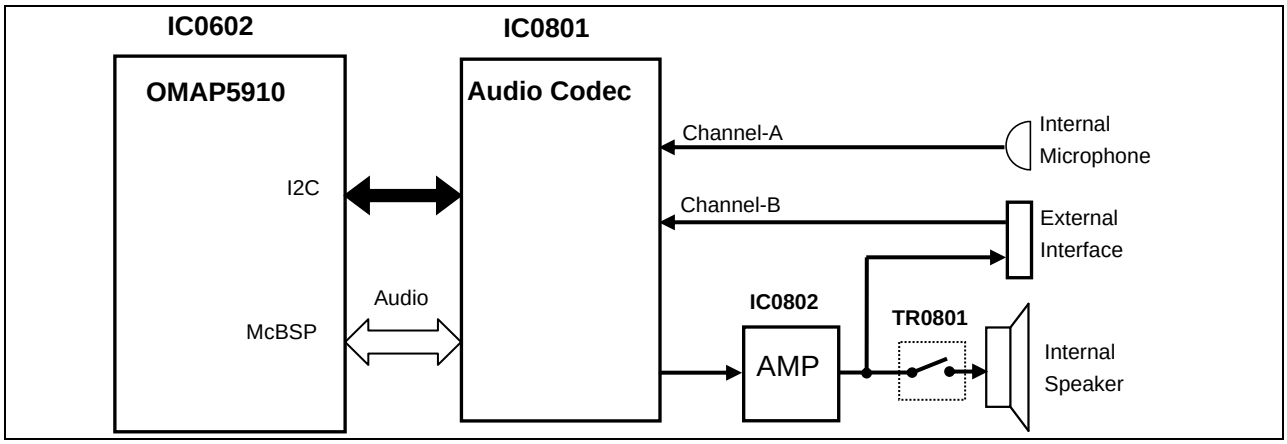


Figure 9-14: Audio Circuit

9.2.4.2.1 Audio CODEC (IC0801)

The audio CODEC converts digital signal to analog audio for receiving voice, and analog audio to digital signal for voice transmission. The CODEC is connected to the OMAP (IC0602) via I2C and I2S interface. The IC2 interface is used for the control line. I2S is used for digital signal of voice.

The CODEC has two channels for transmission audio. One is for internal microphone and the other is for external interface of transmission audio. OMAP (IC0602) selects the input audio from the internal microphone or external interface.

For receiving audio, the output signal of CODEC is one channel and the signal goes to the speaker amplifier outside of the CODEC.

9.2.4.2.2 Speaker Amplifier (IC0802)

The speaker amplifiers are located between the CODEC and internal and external speaker.

The amplifier amplifies the output signal from the IC0801 (CODEC) to the adequate level for driving speaker.

This speaker amplifier is Class D type amplifier.

And the maximum output power is limited by software to avoid breaking the speaker.

The control of output signal is controlled by software though GPIO (AUDIO_MUTE and AUDIO_AMP_EN).

9.2.4.2.3 Speaker Selector (TR0801)

TR0801 controls the audio to the internal speaker. When the diode is in the ON condition, the audio signal is routed to the internal speaker.

9.2.4.3 Power Supply Circuit

This circuit provides the power source to each block. The supplied voltage from external battery is regulated to adequate voltage for each device.

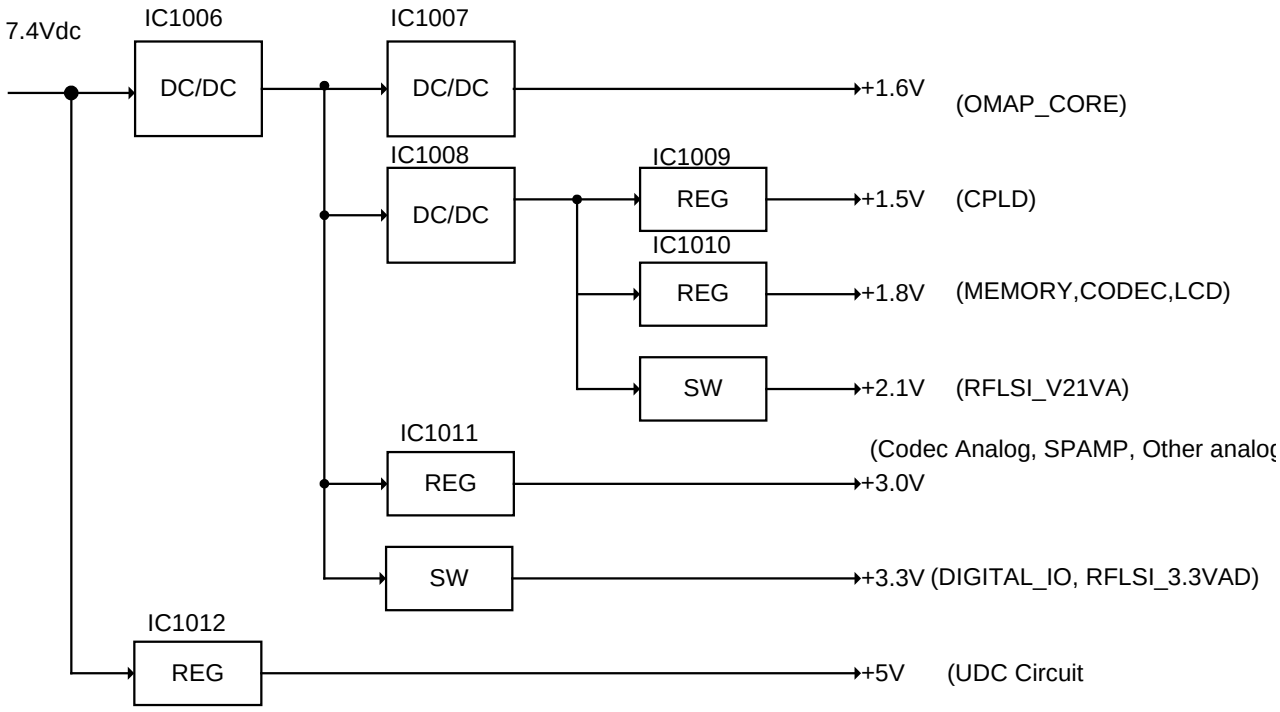


Figure 9-15: Power Supply Circuit

9.2.4.3.1 DC-DC Converter (IC1006, IC1007, and IC1008)

The IC1006 generates 3.3 VDC from the battery voltage (7.4 VDC). 3.3 VDC is provided to several logical blocks and ICs. IC1007 generates 1.6 VDC from 3.3 VDC. 1.6 VDC is used for core of the OMAP (IC0602). IC1008 generates 2.1 VDC from 3.3 VDC. 2.1 VDC is provided to the RFLSI module (IC2501).

9.2.4.3.2 Voltage Regulators (IC1009, IC1010, IC1011, and IC1012)

Voltage regulator IC1009 generates 1.5 VDC for the core of CPLD (IC0601). IC1010 generates 1.8 VDC primarily for the logic ICs. IC1011 is used for the power supply of analog circuit. IC1011 generates 3.0 VDC from 3.3 VDC. IC1012 generates 5.0 VDC from 7.4 VDC which is used for the external interface circuit.

10. DISASSEMBLY AND RE-ASSEMBLY PROCEDURES

This section provides the information and procedures recommended for disassembling and re-assembling the XG-25P series portable radios.

- Disassembly/Re-Assembly Instructions
- Technical Assistance

10.1 SPECIAL TOOLS REQUIRED

The following tools are required to disassemble and re-assemble the XG-25P series portable radio. These tools are specially designed for use with these radios and can be purchased via Harris's Customer Care center. Refer to Section 13.1 for ordering information.

	PART NUMBER	DESCRIPTION
	T8 TORX Bit	
	337097G1B	Antenna insert tool
	B-W1.27 Hex Bit	Knobs Set Screws
	T4WK03399	Volume and channel removal tool
	12RTD	Torque Driver - Range 20 to 120 cN•m
	19B801496G2	RF Antenna Adapter
	T20 TORX Bit	For ground screw installation

10.2 ANTENNA

Install the antenna:

1. Ensure radio is turned off.
2. Install antenna and turn clockwise to tighten.

Remove the antenna:

1. Ensure radio is turned off.
2. Rotate the antenna counter-clockwise to remove.

CAUTION – This radio contains components which can be damaged by the effects of Electrostatic Discharge (ESD). Be sure to use proper precautions when disassembling this equipment.

10.3 BATTERY

Refer to Section 8.4.6 for additional information.

Remove the battery:

Ensure radio is turned off.

1. Press or pull both latches on either side of the battery pack ① toward the bottom of the radio simultaneously.
2. Pull the battery ② away from the radio.
3. Remove the battery pack from the radio.

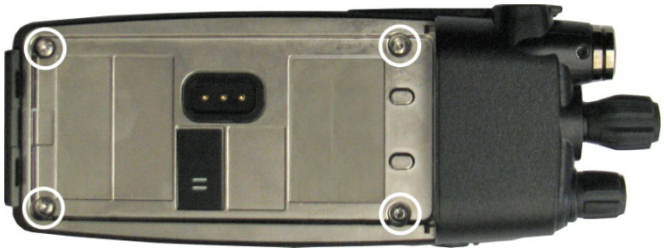
Attach the Battery:

Ensure radio is turned off.

1. Align the tabs at each side on the bottom of the battery pack with the slots at the bottom of the battery cavity ①.
2. Push the top of the battery pack ② down until the latches click to attach the battery to the radio.
3. Tug gently to verify that the latches are secure and the battery pack is properly attached to the radio.

10.4 REAR CASTING DISASSEMBLY

Power the radio OFF and remove the battery as shown in Section 10.3.



1. Remove the four (4) rear casting screws on the rear cover assembly using a #9 TORX driver.

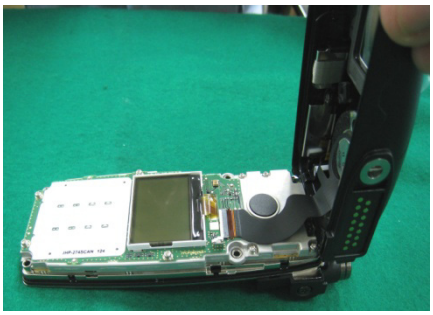
2. Hold the battery latch portion.
3. Lift the rear housing.

4. Separate the front panel by holding the bottom of the rear housing.

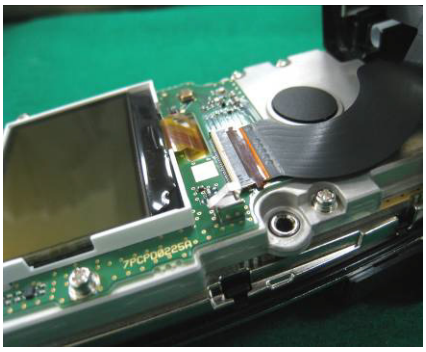
CAUTION

Apply as little force as necessary when lifting and pulling on the rear casting assembly during this step in the procedure. The IF Board flex connector still connects the rear casting assembly to the front cover assembly.

5. Once the tabs have been disengaged, pivot the rear casting assembly up away from the front cover assembly to expose the IF Board and the Flex connector.
6. Tug gently on the Flex connector to completely separate the rear casting assembly and the front cover assembly.

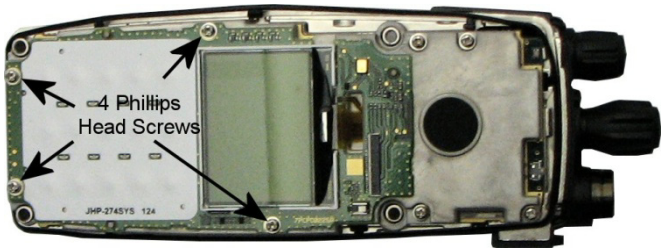


7. Lift up the “lock” of the Speaker and UDC FPC connector (see Section 10.5.2).



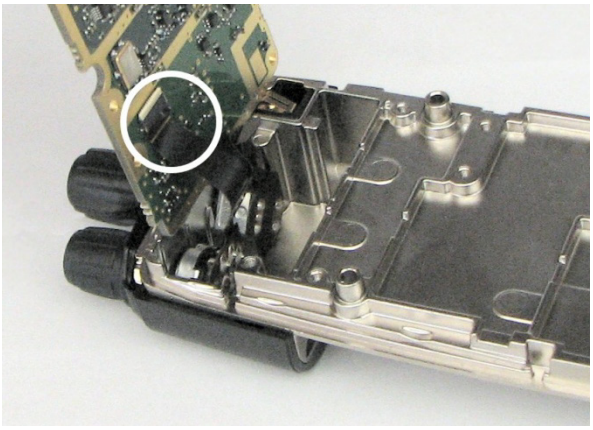
8. Disconnect the Speaker and UDC Flex cable.

9. Remove the four (4) Phillips screws securing the IF Board to the RF Shield.
10. Tug gently on the IF Board to lift it off and away from the RF Shield.



11. Remove the 4 (four) Phillips screws securing the RF Shield to the rear casting assembly.

12. Gently pivot main board up toward top of the radio, using caution to avoid damaging the Switch Module Flex connector still connected beneath.



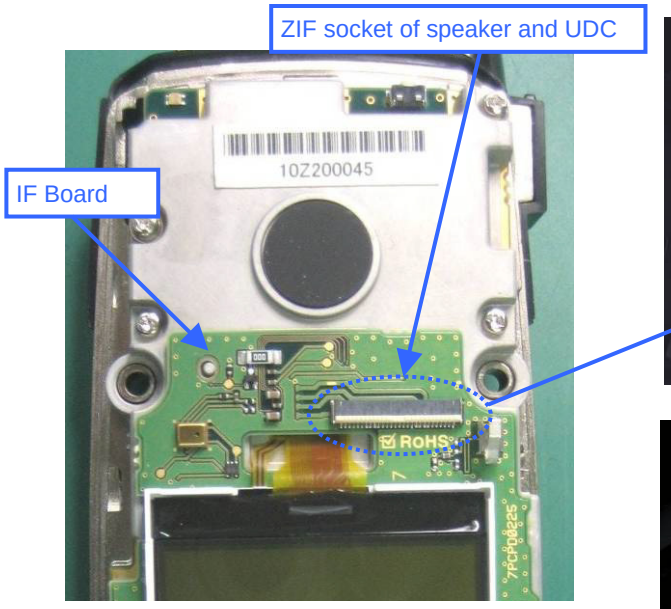
13. Gently disconnect the Switch Assembly Flex from the underside of the Main XCVR/Synthesizer Board and separate the board from the Rear Casting Assembly.

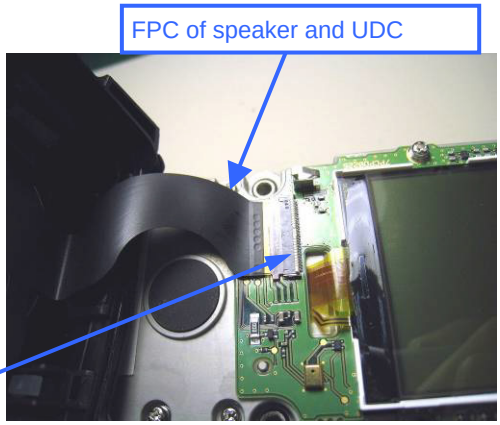
14. Remove Rear Casting Assembly Gasket, noting the position of the tabs.

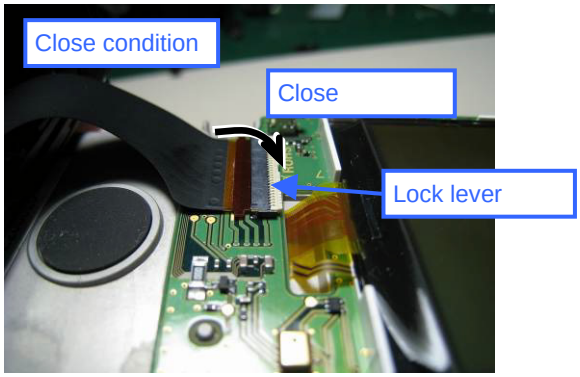
10.5 ZIF SOCKETS AND FPCS

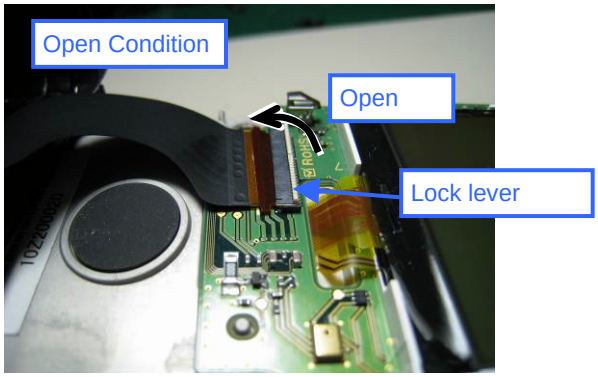
This section outlines the location and connection method of ZIF sockets and FPCs.

10.5.1 Speaker and UDC

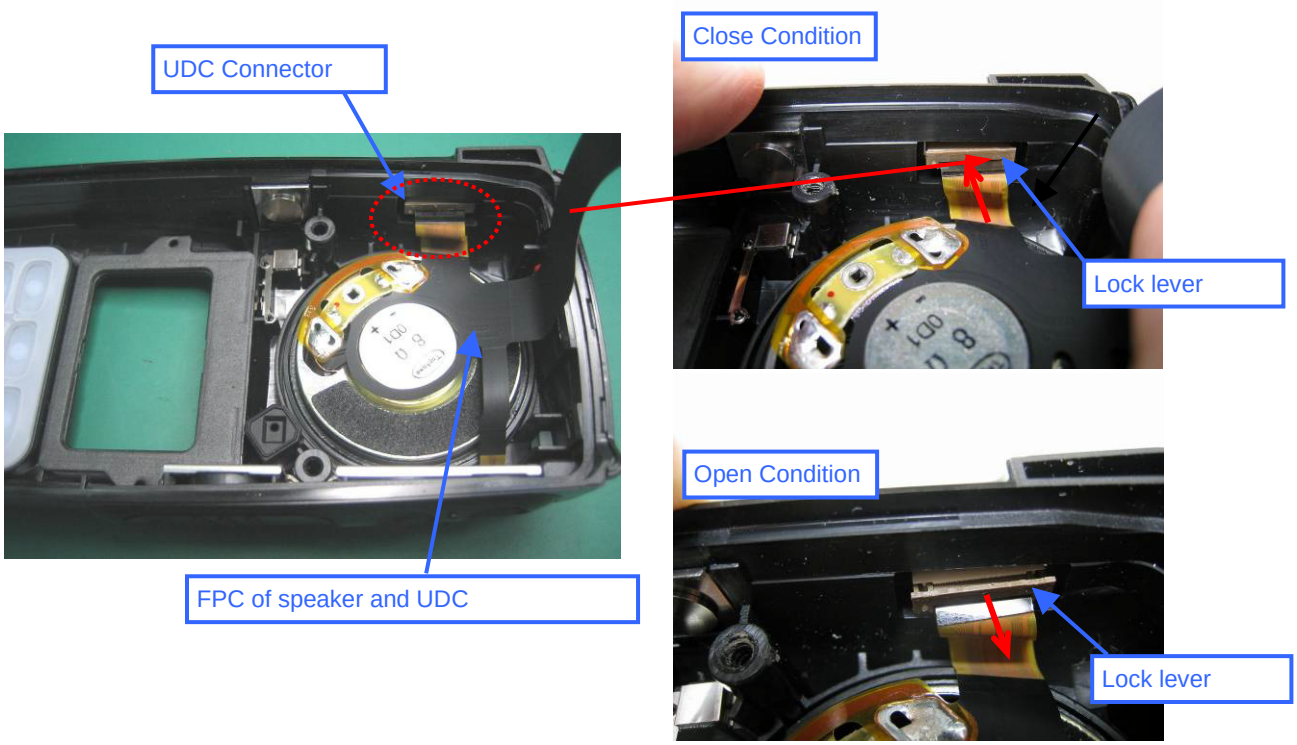




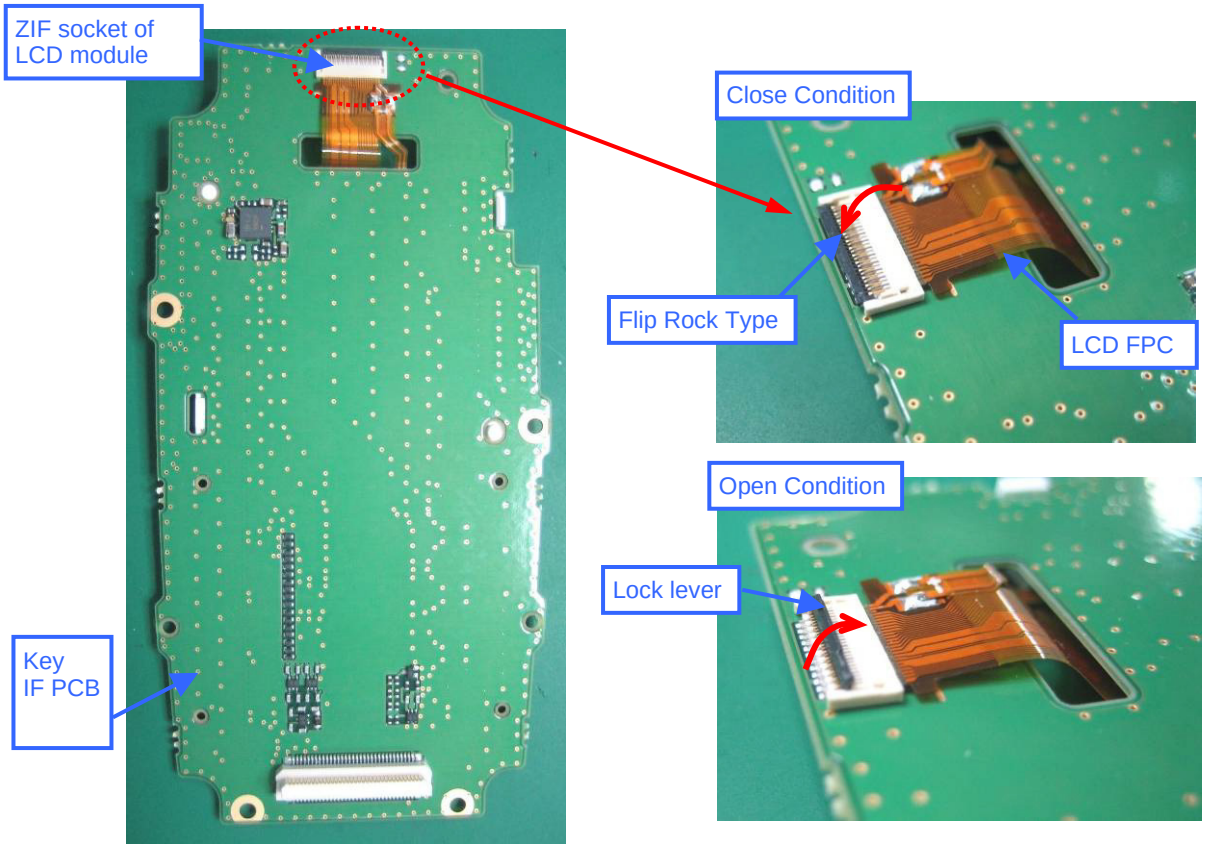




10.5.2 ZIF Socket of UDC



10.5.3 ZIF socket of LCD module



10.6 RADIO REASSEMBLY

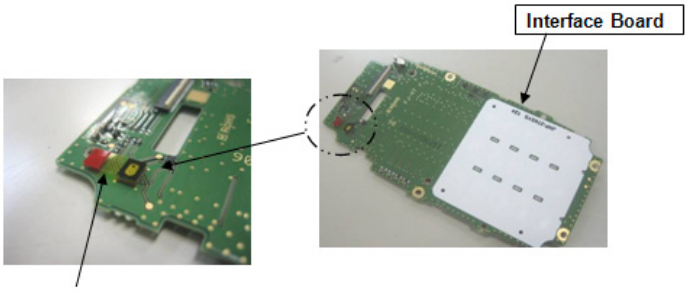
To reassemble the radio, follow all disassembly steps in reverse, paying particular attention to those areas where NOTES and CAUTIONS emphasize specific items of importance. Refer to the assembly diagrams in Section 17 for special requirements such as the amount of torque to apply to screws.

CAUTION

Replacement Interface Boards (part numbers 14011-0014-20 and 14011-0014-21) are shipped with a protective film covering the microphone. This protective film MUST be removed before installation into the radio.

Prior to reassembling the front cover and rear casting assembly, ensure that the tabs of the rear casting assembly gasket are fully inserted into the seven slots as shown.

Replacement Interface Boards (part numbers 14011-0014-20 and 14011-0014-21) are shipped with a protective film covering the microphone. This protective film MUST be removed before installation into the radio.



11. RADIO TEST AND ALIGNMENT

Programming, alignment, and servicing aspects of maintaining a XG-25P portable radio rely on Harris RPM programming software. A software-based Radio Maintenance Utility is included with the RPM software. This tool is installed on the personal computer (PC) when RPM is installed. It is used for various radio alignment and restoration activities, as described in the following subsections.

NOTE

The VHF XG-25P is compliant with applicable FCC narrowbanding mandate below 512 MHz. In certain applications, wideband operation is disabled via Feature Encryption.

11.1 PROGRAMMING SOFTWARE, RADIO CODE, AND TEST EQUIPMENT

Prerequisites required to perform the radio alignment procedures presented in this manual include:

- The minimum version of the RPM programming software, as listed in Table 11-1, must be installed and operating on the technician's PC.
- The minimum version of radio firmware codes, as listed in Table 11-2, must be installed into the radio.
- Test equipment as listed in Table 11-3 is necessary to complete the alignment procedures.

This section also assumes the technician is familiar with the general operation of RPM and that the COM port assigned to the programming cable is properly configured in RPM.

The instructions in this manual are based on the RPM software revisions listed in Table 11-1 which are required when programming, aligning, and servicing the XG-25P portable radios.

Table 11-1: Minimum RPM Programming Software Versions

RPM RADIO SOFTWARE	PART NUMBER	VERSION
RPM (P25 Trunking, P25 Conventional, and Analog Conventional)	TQS3385	R08B or later
RPM (Conventional Only)	TQS3389	R08B or later

The minimum version of radio firmware codes listed in Table 11-2 must be loaded into the radio. Otherwise, the Radio Maintenance Utility will not function properly with the radio. Determining if a radio has the minimum code versions installed is accomplished by using the Radio Maintenance Utility to read the calibration data from the radio. A pop-up message will appear when the radio does not meet the required minimum firmware code versions.

Table 11-2: Minimum Versions of Radio Firmware Codes for XG-25P Radios

OMAP RADIO SOFTWARE	VERSION
BootApp	R12A or later
LoaderApp	R12B or later
BurnApp	R10A or later
Radio Code	R15A or later

The following equipment is required when programming, aligning, and servicing the XG-25P series portable radios:

Table 11-3: Required Test Equipment

EQUIPMENT DESCRIPTION	PART NUMBER
Audio Test Box	MATQ-03424
RF Antenna Adapter	19B801496G2
Programming Cable (UDC-to-DB9M)	CA-023407-001
Audio Test Cable (UDC-to-DB15HD)	CA-023407-002
Battery Eliminator	BT-023406-015
Radio Communications Analyzer Test Set	Aeroflex 3920 or equivalent

11.2 OVERVIEW OF THE RADIO MAINTENANCE UTILITY

The software-based Radio Maintenance Utility is included with the RPM programming software. It is installed on the PC along with the RPM programming software. This utility may be used to align many Harris mobile and mobile products, including the XG-25P portable radio.

The Radio Maintenance Utility is primarily used with the radio operating from a test personality in analog conventional mode. Test systems and frequency sets must be added to the radio's existing personality to complete the tests. Alternately, a "shop" test personality which includes the test system and frequency sets may be developed and used to align the radio.

Within the Radio Maintenance Utility, most transmitter (Tx) and receiver (Rx) alignment fields contain multiple data points within each alignment test. Some tests use up to 40 data points. Each data point sets alignment of a specific function at different frequencies spread across the radio's entire operating frequency range.

Since a radio's RF performance can change over a wide frequency range, this multi-point alignment procedure assures the best possible radio performance at all programmed operating frequencies. Alignment values for frequencies between the specific alignment data points are interpolated from the data points above and below the programmed operating frequency. Therefore, precision alignment at each specific operating frequency is obtained.

11.3 READING AND SAVING FEATURE LICENSE DATA, CALIBRATION DATA, AND PERSONALITY FILES

XG-25P portable radios depend upon feature license data and calibration data for its proper and legal performance. These data sets are specific to an individual radio. Without these data sets, the radio will not function. Should anything happen to the radio resulting in the corruption or loss of this data, a previously saved feature data file can be used to restore corrupted or lost data.

Feature license data and calibration data is very important because **the data sets are specific to each individual radio.** In other words, every radio is different and has different data sets!

Use caution when selecting or loading a calibration data file into a radio. Do not load the wrong data file into a radio.

Radio Maintenance Utility is used to read, write, update, and save feature and calibration data files. This procedure focuses on reading feature and calibration data files from a XG-25P series radio.

Each radio's feature license and calibration data can be backed up locally (i.e., on the PC hard disk or other storage media). Then, if the radio's data becomes corrupt or lost, it may be restored via the Radio Maintenance Utility.

It is highly recommended to read each radio's feature license data and calibration data and save these data sets to local files. This is in preparation of radio repairs which may require data reloads. The following sub-sections provide instruction for preparing the radio for the various data acquisitions and updates required to maintain XG-25P radios.

11.3.1 Entering Programming Mode

Perform the following steps to place the radio into automatic programming mode:

1. Ensure the radio is turned OFF.
2. Connect the radio to the PC as shown in Figure 11-1.
3. Turn the radio ON. The radio will automatically enter `Program` mode when RPM or the Maintenance Tool attempts communication.
4. Turn the radio OFF and disconnect the programming cable after programming is complete.
5. If at any time this method of communication fails, retry this procedure or try one of the following alternate methods.

Alternate Method:

1. Ensure the radio is turned OFF.
2. Connect the radio to the PC as shown in Figure 11-1.
3. Press and hold the **PTT** button.
4. Turn the radio ON and release the **PTT** button.
5. The radio should display `Program`.

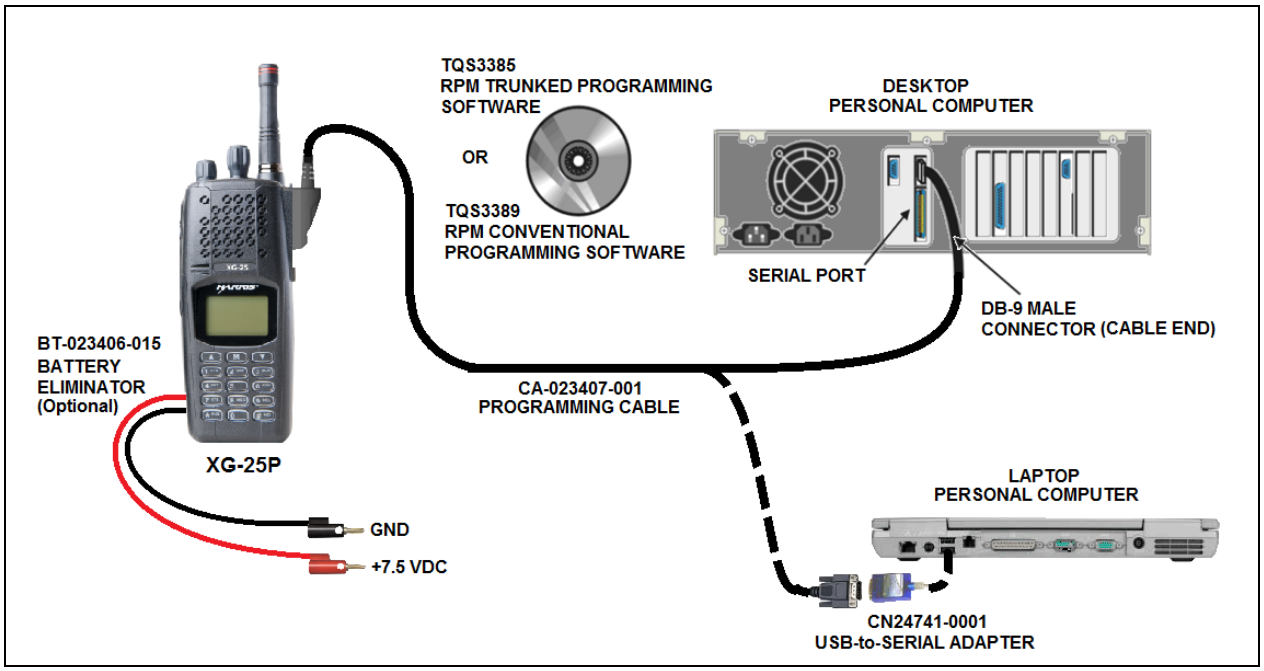
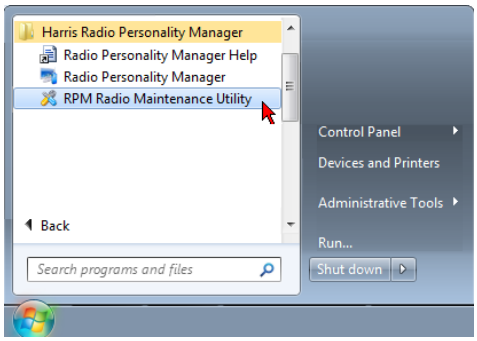


Figure 11-1: Programming Setup

11.3.2 Reading and Saving Feature License Data

Follow this procedure to read and save a radio's feature license data:

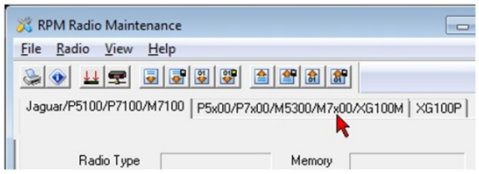
1. Enter programming mode as described in Section 11.3.1.



2. At the PC with the RPM programming software, start the Radio Maintenance Utility:

   Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**

3. Within the utility, click on the tab that includes **P5x00** (for the XG-25P).

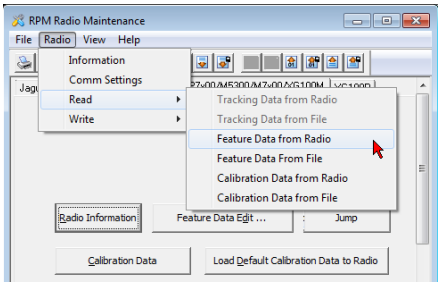


4. From the utility's menu:

   Select: **Radio > Read > Feature Data from Radio**

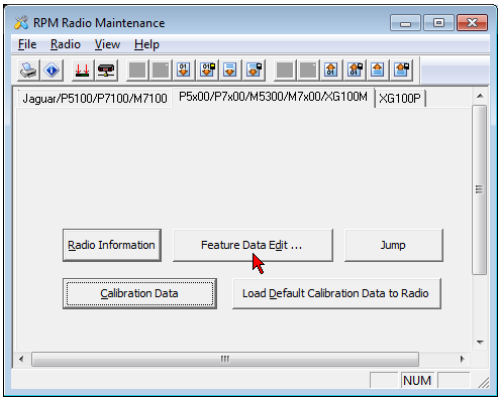
5. When the Read Feature Data Complete message box appears:

   Click: **OK**

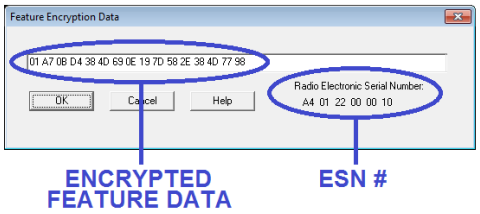


6. In the tab that includes **P5x00**:

   Click: **Feature Data Edit**



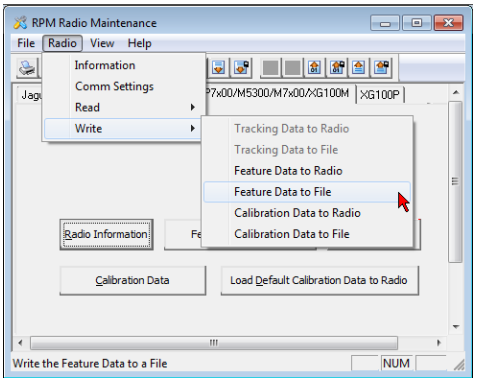
7. The Feature Encryption Data dialog box opens. This dialog box includes the radio's Electronic Serial Number (ESN). Record the ESN for later use. Click **OK** or **Cancel** to exit the box.



8. From the utility's menu:

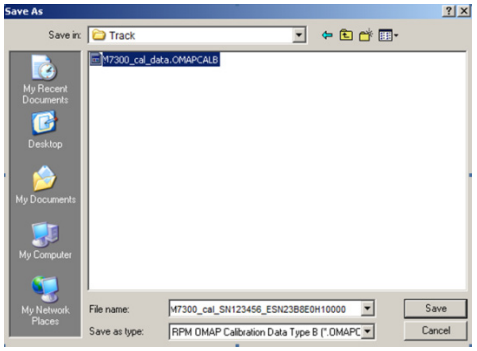
   Select: **Radio > Write > Feature Data to File**

   This action opens up the "Save As" dialog box to the default calibration and feature data folder. If desired, the folder/path may be changed.



9. Enter a unique file name which clearly identifies the radio (such as the serial number of the radio or a property tag number) and the electronic serial number, found on the Feature Encryption Data dialog box.

   Select: **Save**



11.3.3 Reading and Saving Calibration Data

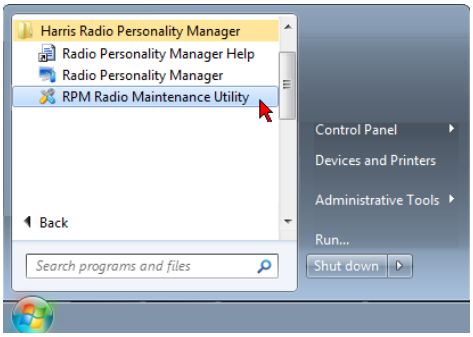
Follow this procedure to read and save a radio's calibration data:

NOTE

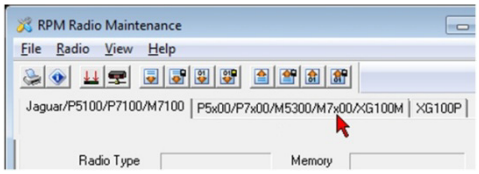
The radio must have R15A or later code before calibration data can be read from or written to it. See Section 11.1 on page 59 for details.

1. Enter programming mode as described in Section 11.3.10.
2. At the PC with the RPM programming software, start the Radio Maintenance Utility:

   Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**



3. Click on the tab that includes **P5x00** (for the XG-25P and other radios).

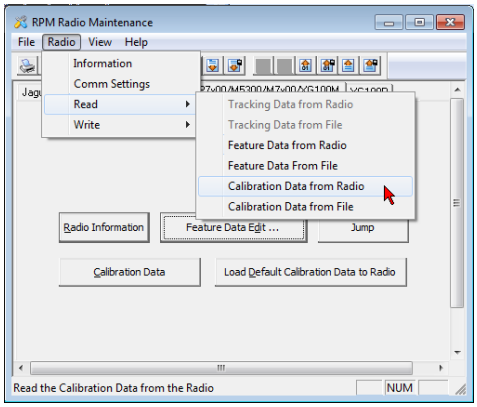


4. From the utility's menu:

   Select: **Radio > Read > Calibration Data from Radio**

5. When the Calibration Data Complete dialog box opens:

   Click: **OK**



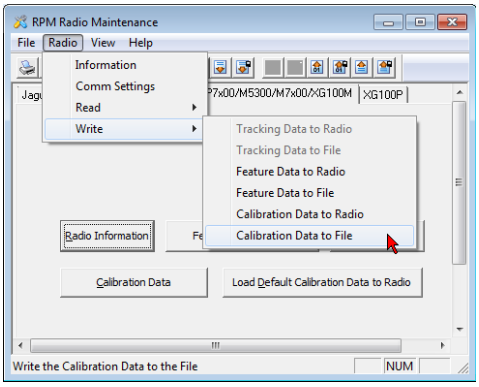
6. From the utility's menu:

   Select: **Radio > Write > Calibration Data to File**

   This action opens up the "Save As" dialog box to the default calibration and feature data folder. If desired, the folder/path may be changed.

7. Enter a unique file name which clearly identifies the radio (such as the serial number of the radio or a property tag number) and the electronic serial number, found on the Feature Encryption Data dialog box.

   Select: **Save**

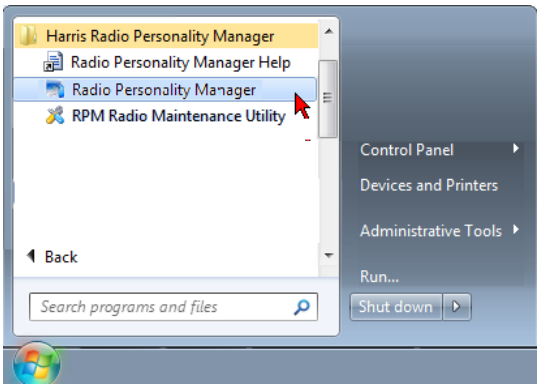


11.3.4 Reading and Saving the Radio Personality

A *personality* file is a computer file created within RPM. It contains the operating characteristics and frequencies for the radio. The personality file is downloaded and stored in the radio. Before beginning any alignment or test procedures, it is highly recommended to save a copy of the personality file to local archive (i.e., on the PC hard disk or other storage media).

1. Enter programming mode as described in Section 11.3.1.
2. At the PC with the RPM programming software, start this software:

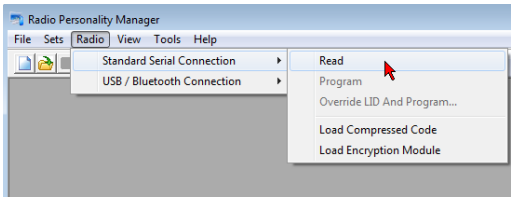
   Click: **Start > Programs > Harris Radio Personality Manager > Radio Personality Manager**



3. From RPM's main menu:

   Select: **Radio > Standard Serial Connection > Read**

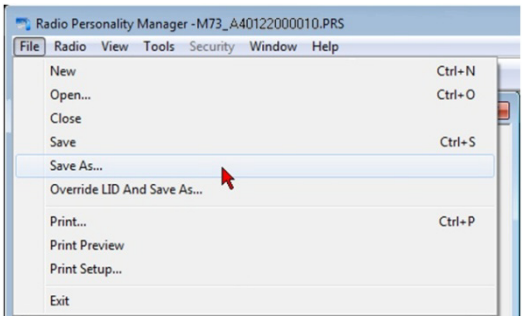
   After the radio personality is read, the Personality window will appear.



4. Within the personality window, information may be entered in the "Description" and "Author" fields.
5. On the RPM's main menu:

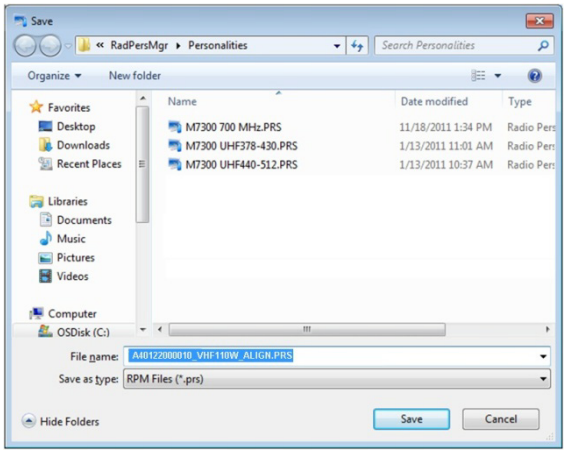
   Click: **File > Save As**

   When reading and saving a radio's personality, always use the Save As feature to prevent overwriting any existing file. RPM can determine the last known personality file name from the radio's personality. Avoid using the Save icon so a previously saved personality is not overwritten.



6. Enter a unique file name which clearly identifies the radio (such as the serial number of the radio, a unit number, a person's name, etc.).

   Select: **Save**



11.4 ADDING AND REMOVING RADIO ALIGNMENT TEST SYSTEMS TO PERSONALITIES

Radio alignment is performed at specific frequencies across the entire RF operating range of the radio. Performing a full radio alignment requires multiple conventional test systems with specific test channels to be added to a personality. The following procedure adds conventional test systems to an existing personality. However, this procedure may be adapted to the creation of a new "shop" test personality specific to each RF band of the XG-25P portable radio series.

11.4.1 Adding Radio Alignment Test Systems to the Personality

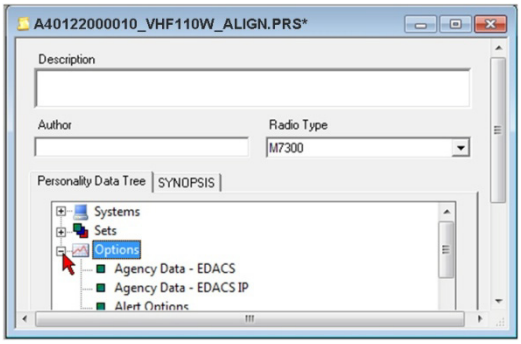
1. Connect the radio to the PC with the RPM programming software and enter programming mode. Refer to Section 11.3.1 as necessary.
2. Verify the feature and calibration data files have been saved to local disk. Refer to Sections 11.3.2 and 11.3.3 as necessary.
3. Read and save the radio's personality. Be sure to save a copy of the original personality to a local file before making changes to the personality. Refer to Section 11.3.4 as necessary.

NOTE

Instead of modifying the customer's personality each time a radio is serviced, it is recommended that a "shop" test personality for the radio be developed and used when radio service is required.

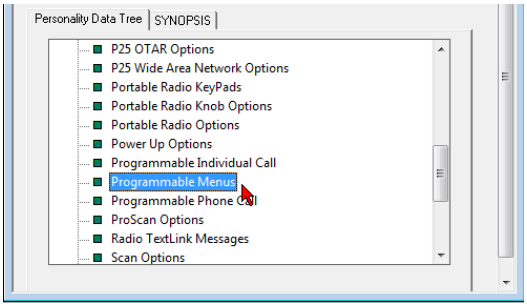
4. In the Personality Data Tree:

   Click: **Options**



5. Scroll down the Options limb:

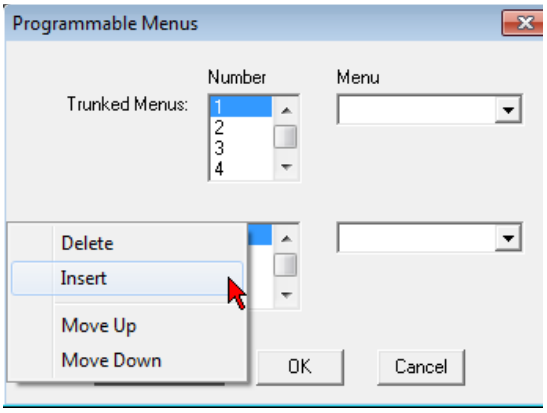
   Double-click: **Programmable Menus**



6. Within the Conventional Menus Number box:

   Double-click: **1**

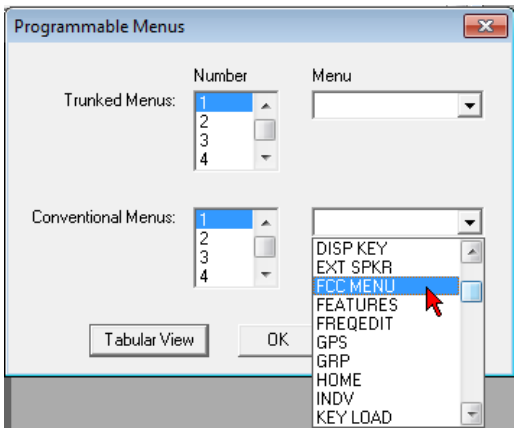
   Click: **Insert**



7. Within the dropdown menu choices:

   Select: **FCC MENU**

   Click: **OK**



NOTE

To support radio alignment and testing, the FCC Menu and several additional conventional frequency sets must be added to the radio's personality. This facilitates proper alignment of the radio.

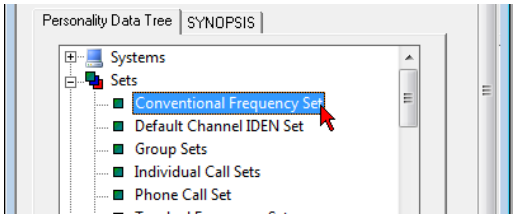
8. In the Personality Data Tree:

   Double-click: **Sets**

   The Sets limb expands.

   Double-click: **Conventional Frequency Set**

   The Conventional Frequency Sets dialog box opens.



NOTE

In the steps that follow, several unique frequency sets will be created and later used to perform alignment test. These sets provide access to various features being tested and the correct test points (frequencies) spread across the radio's RF operating range.

9. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

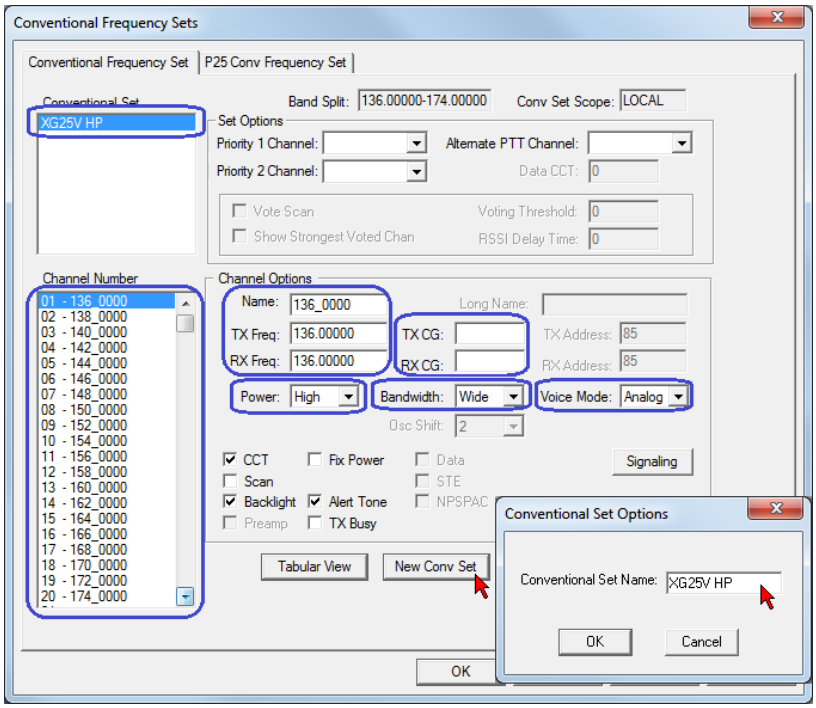
   Click: **New Conv Set**

   Type: **XG25V HP**

   Click: **OK**

   Use the illustration to the right, or reference Table 11-4, and enter for each channel, the channel name, TX and RX frequencies, select High Power, and set any other features as indicated by the outlined boxes. Enter all 20 channels.

   This set is used to align the radio's TX high power.



10. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

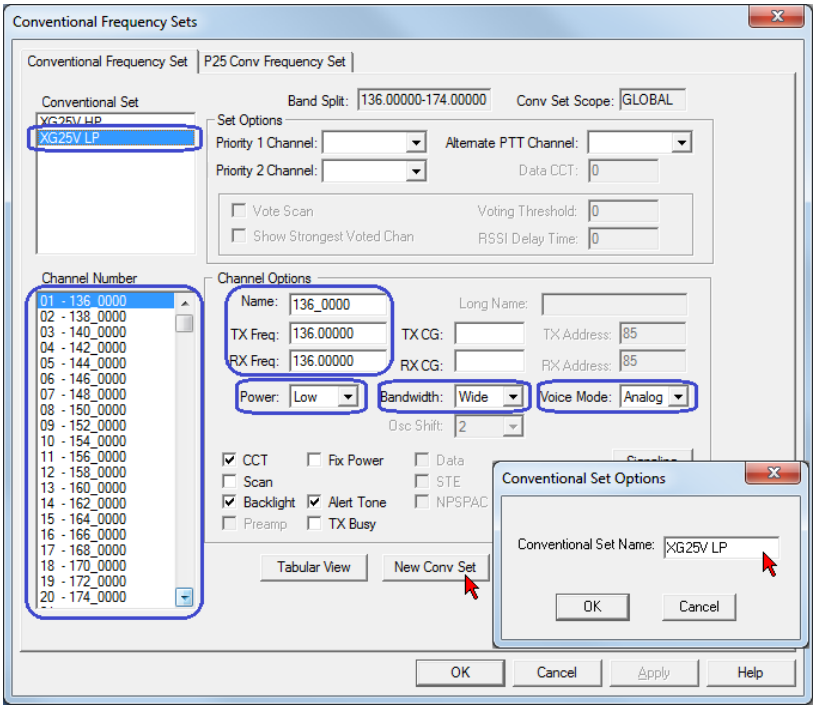
    Click: **New Conv Set**

    Type: **XG25V LP**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-4, and enter the channel name, TX and RX frequencies, select High Power, and set any other features as indicated by the outlined boxes. Enter all 20 channels.

    This set is used to align the TX low power and reference oscillator (TCXO).



11. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

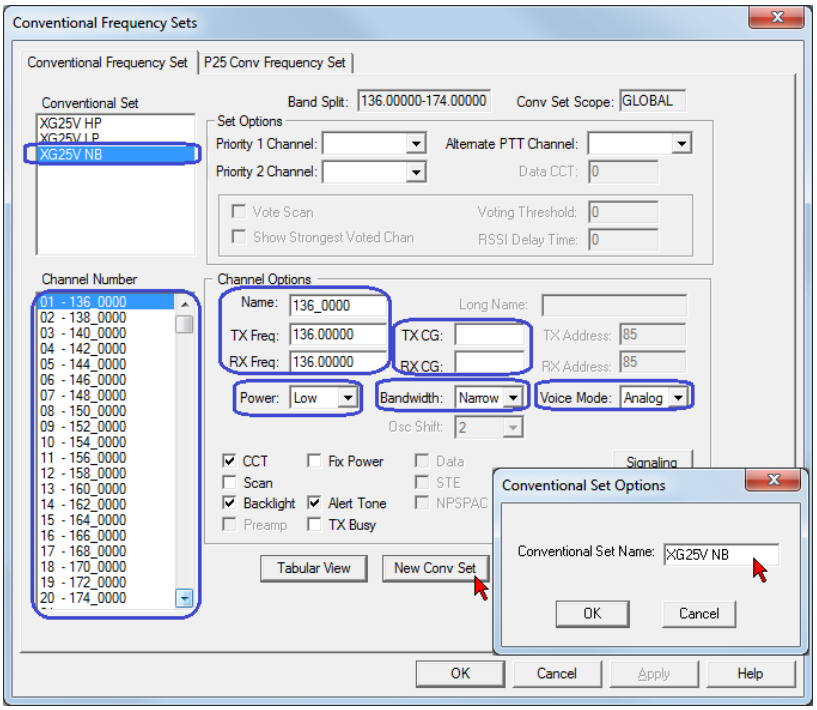
    Click: **New Conv Set**

    Type: **XG25V NB**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-4, and enter the channel name, TX and RX frequencies, select Low Power, Narrowband, and set any other features as indicated by the outlined boxes. Enter all 20 channels.

    This set is used to align Deviation Narrowband.



12. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

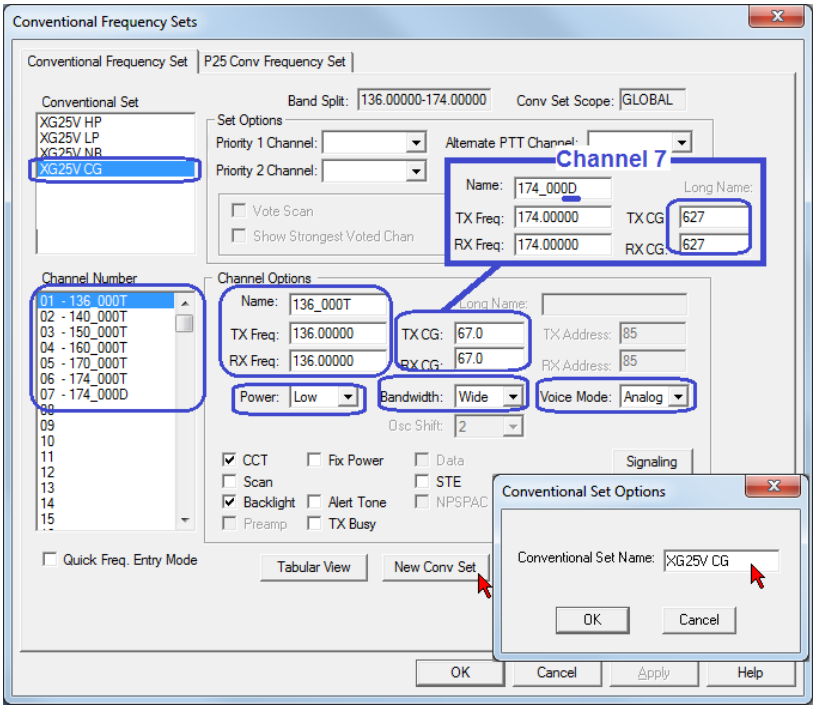
    Click: **New Conv Set**

    Type: **XG25VCGW**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-5, and enter the channel name, frequency, wideband, and set any other features as indicated by the outlined boxes. Enter all seven channels.

    This conventional channel set is used for aligning wideband TX Tone and Digital Channel Guard.



13. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

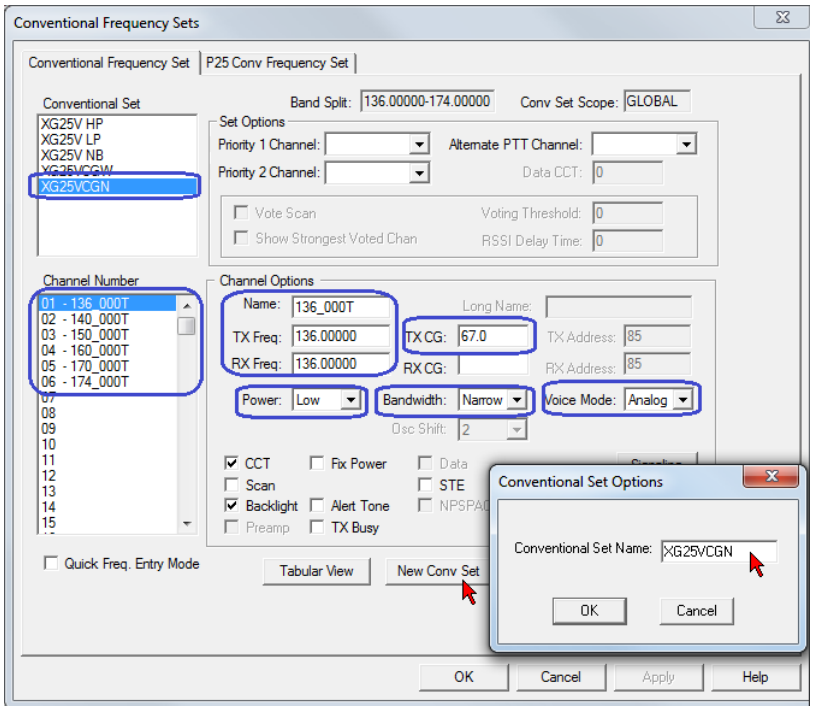
    Click: **New Conv Set**

    Type: **XG25VCGN**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-5, and enter the channel name, frequency, narrowband, and set any other features as indicated by the outlined boxes. Enter all seven channels.

    This conventional channel set is used for aligning narrowband TX Tone and Digital Channel Guard.



14. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

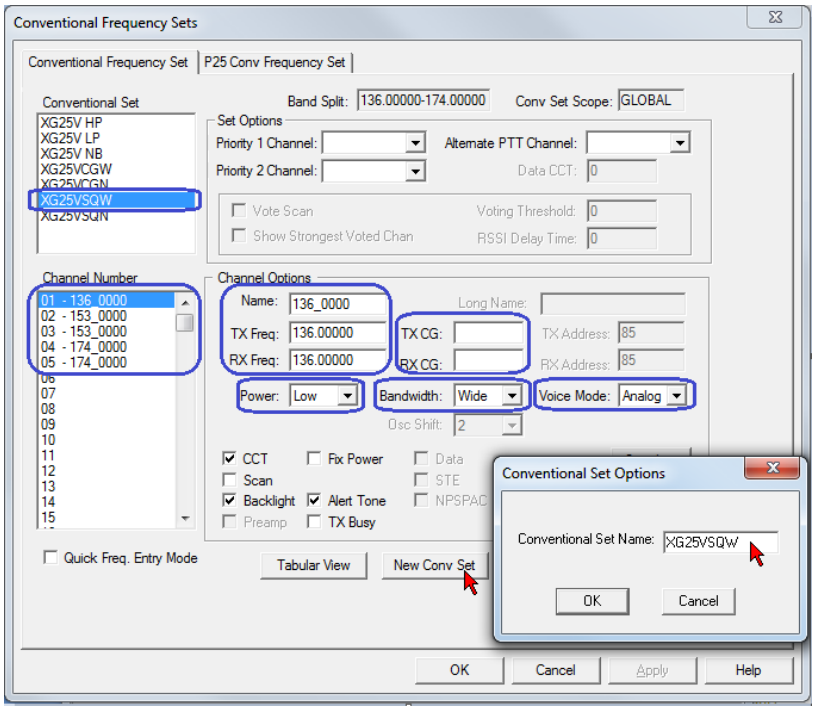
    Click: **New Conv Set**

    Type: **XG25VSQW**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-6, and enter the channel name, frequency, and set any other features as indicated by the outlined boxes. Enter all five channels.

    This conventional channel set is used for aligning wideband squelch.



15. In the Conventional Frequency Sets tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

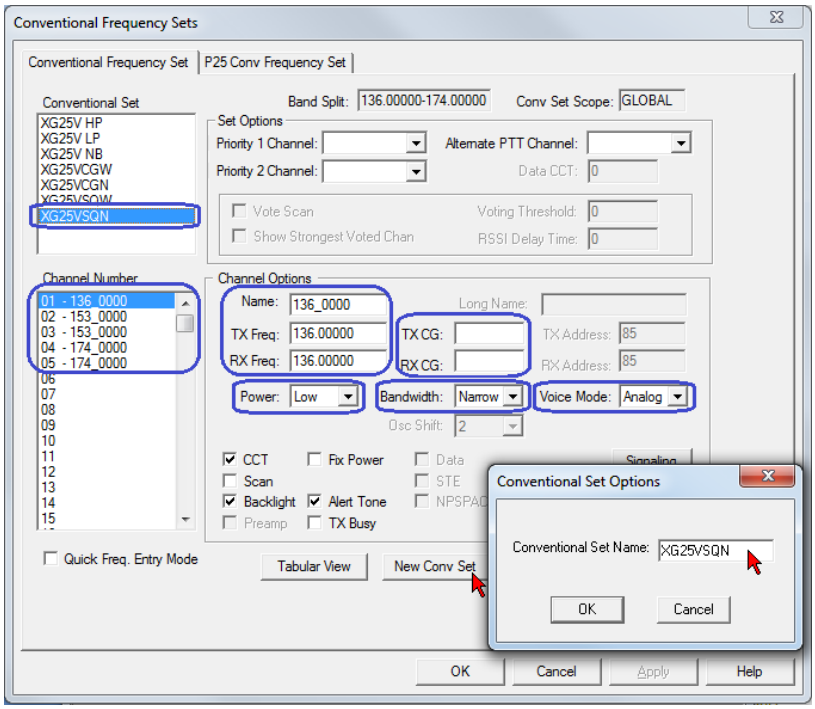
    Click: **New Conv Set**

    Type: **XG25VSQN**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-6, and enter the channel name, frequency, and set any other features as indicated by the outlined boxes. Enter all five channels.

    This conventional channel set is used for aligning narrowband squelch.



16. In the P25 Conv Frequency Set tab of the Conventional Frequency Sets dialog box, add a new set to the existing personality as follows:

    Click: **New P25 Freq Set**

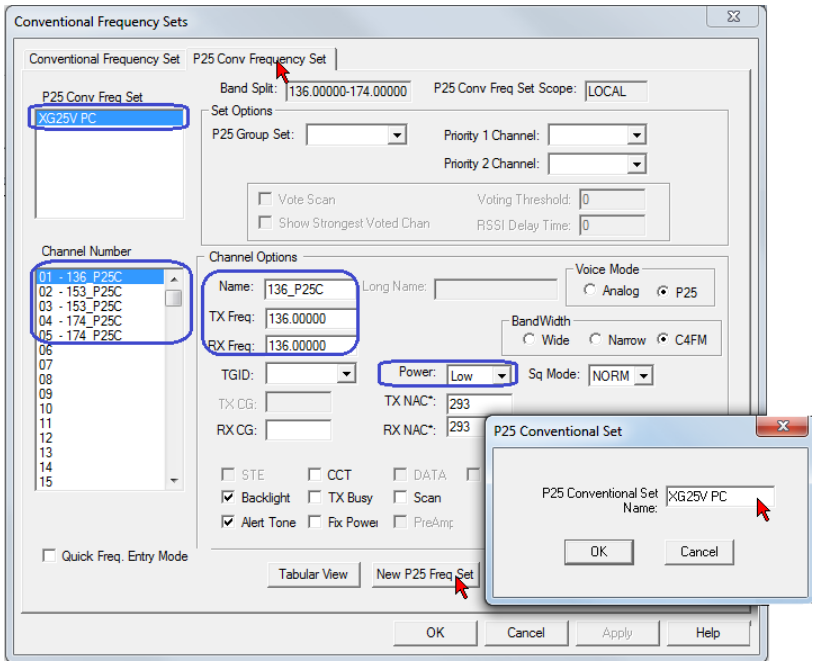
    Type: **XG25V PC**

    Click: **OK**

    Use the illustration to the right, or reference Table 11-6, and enter the channel name, frequency, and set any other features as indicated by the outlined boxes. Enter all five channels.

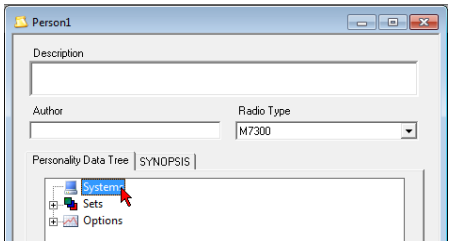
    This conventional channel set is used for aligning narrowband squelch.

    Click: **OK**



17. In the Personality Data Tree, assign these newly-created frequency sets to new systems:

    Double-click: **Systems**



18. In the General tab of the System Setup dialog box:

    Click: **Add New System**

19. In the New System box:

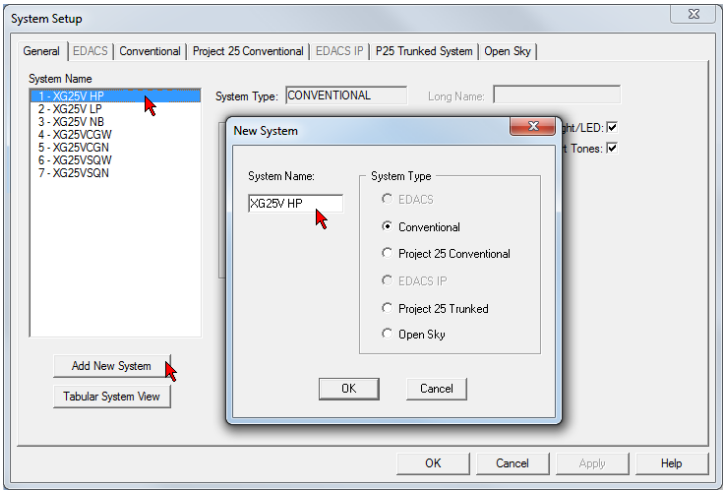
    Type: **XG25V HP**

    Select: **Conventional**

    Click: **OK**

20. Repeat steps 18 and 19, and create a new System Name for each of the following:

    XG25V LP
    XG25V NB
    XG25VCGW
    XG25VCGN
    XG25VSQW
    XG25VSQN



21. In the General tab of the System Setup dialog box:

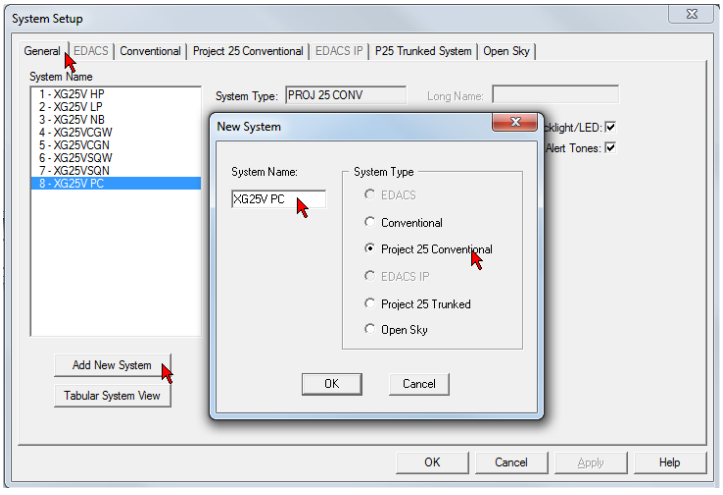
    Click: **Add New System**

22. In the New System box:

    Type: **XG25V PC**

    Select: **Conventional**

    Click: **OK**



23. In the System Setup window, assign a frequency set to each system:

    Click: **Conventional** tab

24. In the System Name field:

    Select: **XG25V HP**

25. In the Conventional Set dropdown:

    Select: **XG25V HP**

26. Repeat steps 24 and 25, and associate each remaining System Name with the matching Conventional Set:

    XG25V LP

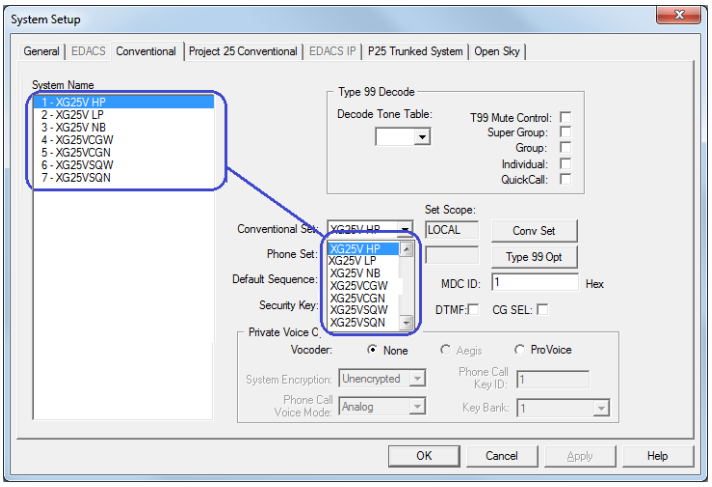
    XG25V NB

    XG25VCGW

    XG25VCGN

    XG25VSQW

    XG25VSQN



27. In the System Setup window, assign a frequency set to each system:

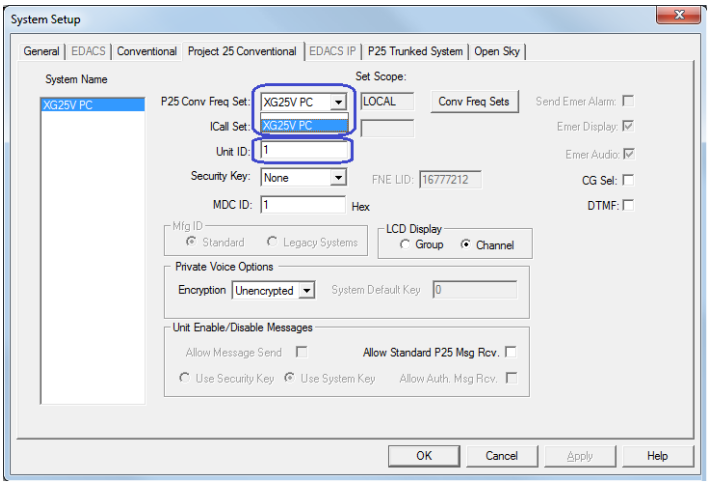
    Click: **Project 25 Conventional** tab

28. In the Conventional Set dropdown:

    Select: **XG25V PC**

    Unit ID: **1**

    Click: **OK**



29. From RPM's main menu:

    Select: **Radio > Standard Serial Connection > Program**

30. After the radio personality is programmed, it is recommended to save the updated personality file to different name for future reference as a test personality for the radio.

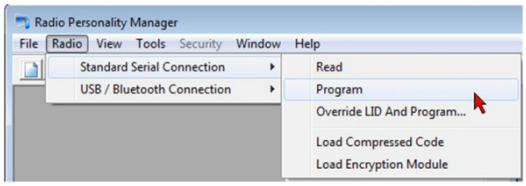


Table 11-4: Frequencies for Conventional Frequency Sets XG25V HP and XG25V LP

CHANNEL NUMBER	FREQUENCY (MHz)	CHANNEL NUMBER	FREQUENCY (MHz)
1	136.0000	11	156.0000
2	138.0000	12	158.0000
3	140.0000	13	160.0000
4	142.0000	14	162.0000
5	144.0000	15	164.0000
6	146.0000	16	166.0000
7	148.0000	17	168.0000
8	150.0000	18	170.0000
9	152.0000	19	172.0000
10	154.0000	20	174.0000

Table 11-5: Frequencies and CG Tones for Conventional Frequency Set XG25VCGW and XG25VCGN

CHANNEL NUMBER	FREQUENCY (MHz)	CG TONE (Hz)	CHANNEL NUMBER	FREQUENCY (MHz)	CG TONE (Hz / DCG)
1	136.0000	67.0	4	160.0000	67.0
2	140.0000	67.0	5	170.0000	67.0
3	150.0000	67.0	6	174.0000	67.0
			7*	174.0000	627

* Channel 7 only used in XG25VCGW wideband channel set.

Table 11-6: Frequencies for Receiver Frequency Sets XG25VSQW, XG25VSQN, and XG25V PC

CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)	CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)
1	136.0000	4	174.0000
2	153.0000	5	174.0000
3	153.0000		

11.4.2 Removing Radio Alignment Test Systems from the Personality

CAUTION

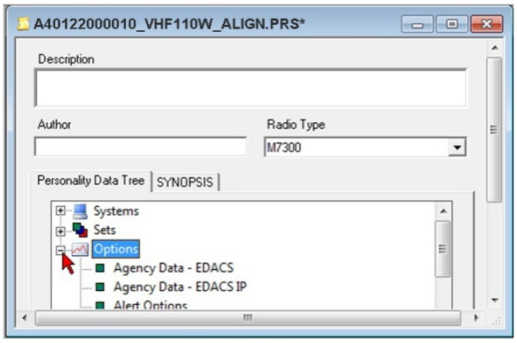
*****IMPORTANT*****

The systems added to the radio for accessing the test conventional frequency sets must **not** be accessible to the end radio user. When testing is completed, reload the radio's original personality, or remove the test systems as described in this section.

In general, deleting the new frequency sets created for radio testing from the radio's personality is not necessary. Simply deleting the test Systems from the System Setup's General tab in RPM and re-programming the radio with this modified personality removes radio user access to the frequency sets used for testing. The respective steps are presented in this procedure:

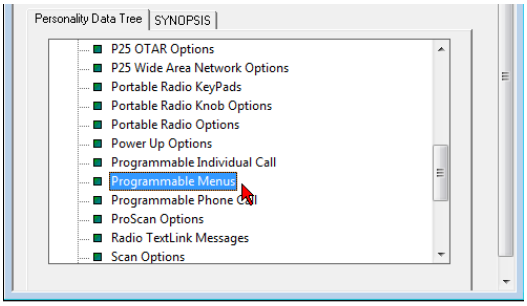
1. Connect the radio to the PC with the RPM programming software and enter programming mode. Refer to Section 11.3.1 as necessary.
2. Verify the feature and calibration data files have been saved to local disk. Refer to Sections 11.3.2 and 11.3.3 as necessary.
3. Read the radio's personality. Refer to Section 11.3.4 as necessary.
4. In the Personality Data Tree tab:

   Click: **Options**



5. Scroll down the Options limb:

   Double-click: **Programmable Menus**

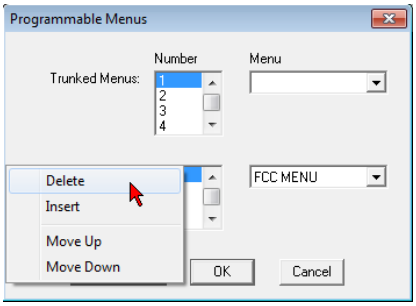


6. Within the Conventional Menus Number box:

   Double-click: **1** ("FCC Menu")

   Click: **Delete**

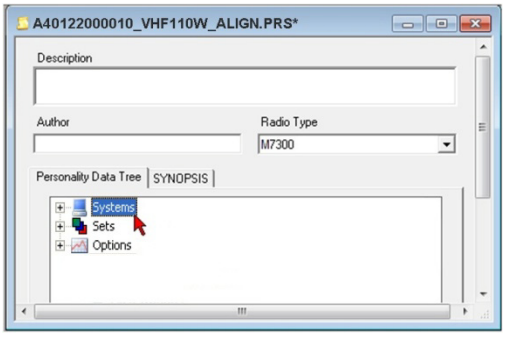
   Click: **OK**



7. In the Personality Data Tree tab:

   Double-click: **Systems**

   The System Setup dialog box opens.



8. In the General tab of the System Setup dialog box:

   Double-click: **XG25V HP**

   Click: **Delete System**

9. Repeat to delete each of the other systems previously added for testing:

   XG25V LP

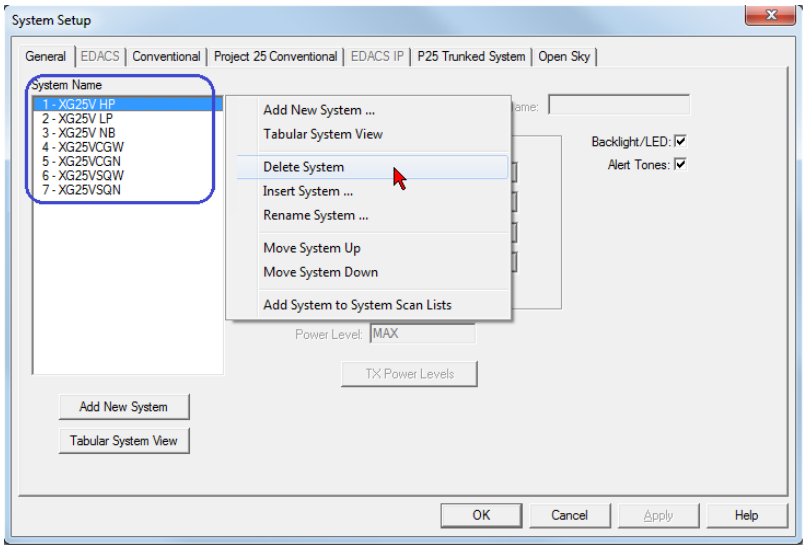
   XG25V NB

   XG25VCGW

   XG25VCGN

   XG25VSQW

   XG25VSQN



NOTE

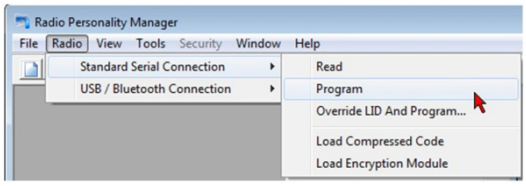
It is generally not necessary to delete the new frequency sets created for testing. Deleting the test System from the General Tab removes customer access to the test frequency sets.

10. When all new conventional systems created for testing are deleted, click **OK**.

11. From RPM's main menu:

    Select: **Radio > Standard Serial Connection > Program**

12. Wait for the re-programming operation to complete.



11.5 RADIO ALIGNMENT PROCEDURES

11.5.1 General Information

Before beginning any radio alignment procedure, a careful review of Sections 11.1 through 11.4 is recommended. The minimum radio firmware code versions and RPM version listed in Section 11.1 (page 59), and the required test equipment must be in place. Unless otherwise stated, each alignment procedure is written as a standalone procedure; in other words, it may be performed without performing the full battery of procedures.

The following flow of events should be performed before beginning radio alignment:

- Read and save the original feature data, calibration data, and personality data files before making any changes. Refer to Section 11.3 (page 61) as necessary.
- Update the existing personality in the radio with conventional test frequency sets. Refer to Section 11.4 (page 66) as necessary.
- Test the radio per the alignment procedures in this manual and align with updated calibration data as necessary.
- Save the final calibration data to a local file. Refer to Section 11.3.3 (page 64) as necessary.
- Reload the radio's original personality and verify operation.

*****IMPORTANT*****

The systems added to the radio for accessing the test conventional frequency sets must **not** be accessible to the end radio user. When testing is completed, reload the radio's original personality, or remove the test systems as described in Section 11.4.2 on page 75.

RF test cables used to connect the radio to the RF Communications Test Set will affect RF power by adding losses. The longer the cable, the greater the loss. For optimum results, connect the radio the RF test equipment using only high-quality RF cables.

11.5.2 Alignment Test Setup

Use this procedure for setting up the radio under test for RF tests (refer to Figure 11-2):

1. Attach the test cable (CA-023407-002) to the Audio Test Box (MATQ-03424) and to the radio.
2. Attach the RF Antenna Adapter (19B801496G2) to the radio's antenna port and connect a RF test cable fro the adapter to the T/R port on the communications analyzer.
3. Attach a BNC-Male to BNC-Male test cable (a 50 ohm RF cable is recommended) from the Mic Hi port on the test box to the FCTN GEN port on the communications analyzer.
4. Attach a BNC-Male to BNC-Male test cable (a 50 ohm RF cable is recommended) from the Speaker Out port on the test box to the Audio In 1 port on the communications analyzer.
5. Optional, attach the Battery Eliminator (BT-023406-015) to the radio. Observing DC polarity, connect a +7.5 VDC power source to the battery eliminator.

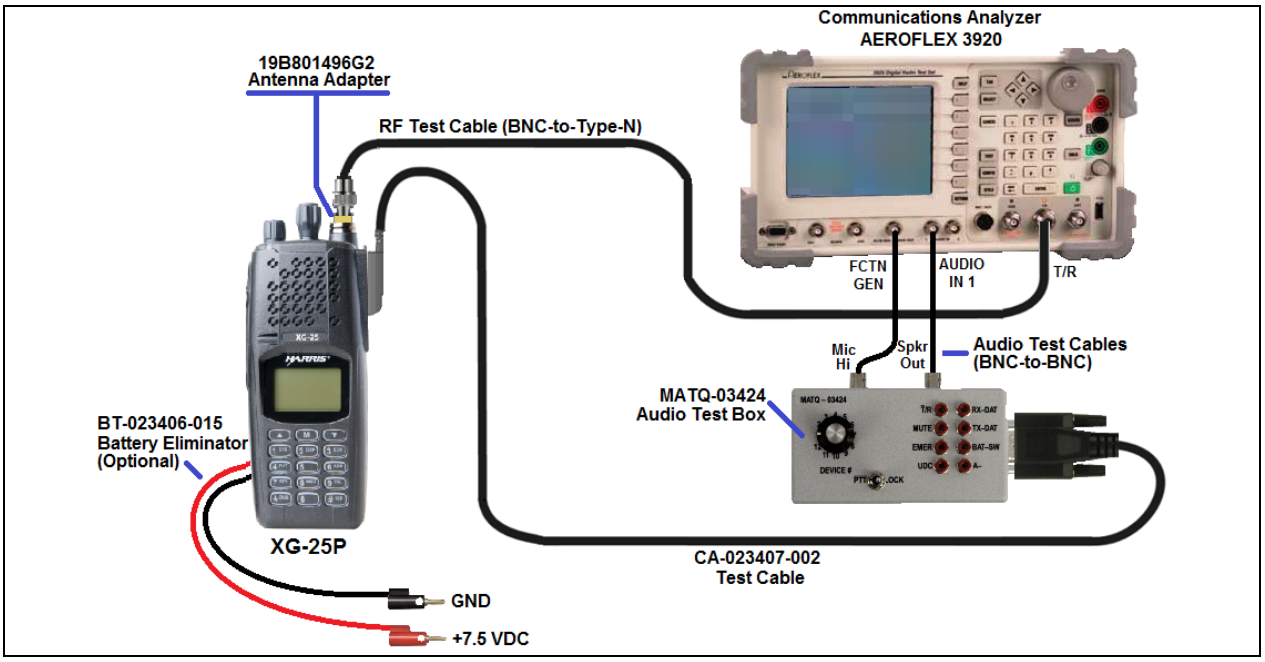


Figure 11-2: Test Equipment Connections for Radio Alignment

11.5.3 Automatic Frequency Control (Reference Oscillator) Test and Alignment

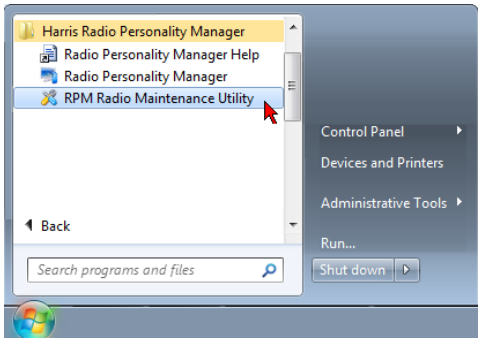
The Automatic Frequency control (AFC) adjusts the radio's reference oscillator frequency. It is critical to use a frequency standard (test instrument) with frequency stability sufficient to assure the radio is within ±0.15 ppm at room temperature.

Perform the following to verify and align the AFC:

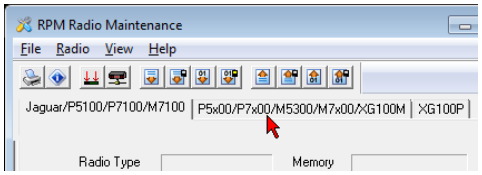
1. Add the conventional test systems to the radio personality (refer to Section 11.4).
2. Prepare the radio for RF testing per instructions in Section 11.5.2.
3. Turn ON the radio and do the following:
   a. Select the conventional test system: **XG25V LP**
   b. Select: **Channel 20** (174.0000 MHz)
4. Using the PTT switch on the MATQ-03424 test box, key the radio and verify the frequency is 174.0000 MHz ±0.15 ppm at room temperature.
5. Unkey the radio. If the TX frequency is within tolerance, proceed to Step 20. Otherwise, proceed to the next step.
6. Turn the radio OFF.
7. Disconnect the test box and connect the programming cable to the radio as described in Section 11.3.1.

8. Turn the radio ON.
9. From the PC, open the Radio Maintenance Utility tool:

   Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



10. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**

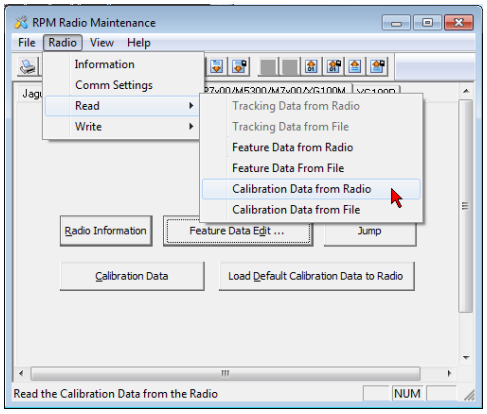


11. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

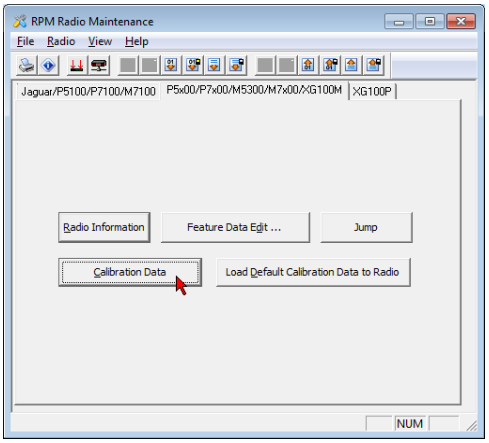
12. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



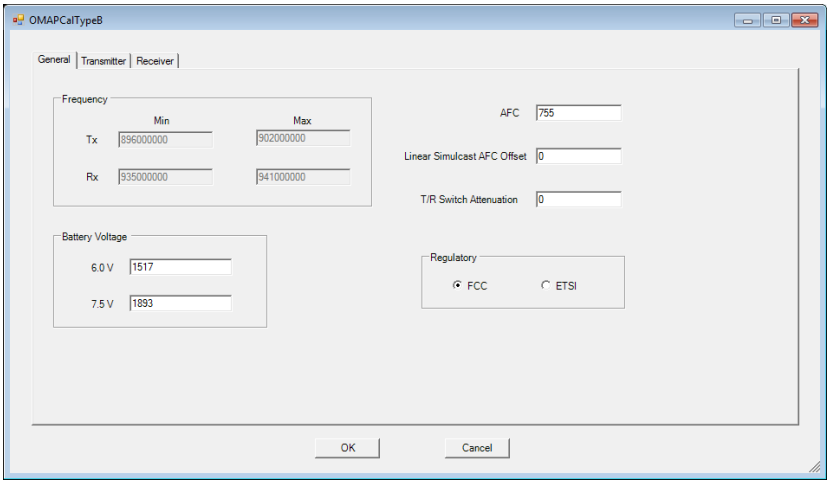
13. Within the center window pane:

    Select: **[Calibration Data]**



14. Within the General tab, adjust the AFC value up or down. The TX frequency should follow the change in AFC value; UP increases the TX frequency while DOWN lowers the TX Frequency.

    Click: **[OK]**



CAUTION

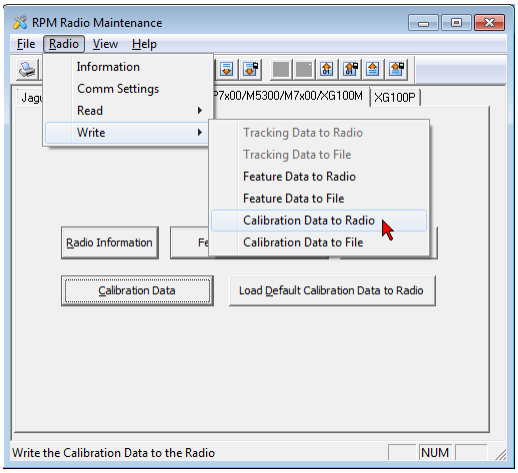
Do not change any of other fields within the General tab.

15. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

16. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



17. Turn the radio OFF.
18. Disconnect the programming cable from the radio and reconnect the radio to the test box (test setup).
19. Repeat the test beginning with Step 3.
20. If no other testing is to be performed, do the following:
    a. Save the final Calibration Data to a local file.
    b. If a “shop” test personality was used to test the radio, reload the original personality into the radio and verify operation.
    c. If conventional test frequency sets were added to the original personality, refer to Section 11.4.2, remove the test sets, and verify radio operation.

11.5.4 TX Power Test and Alignment

The Radio Maintenance Utility tool Calibration Data button accesses tabs (screens) for aligning the following TX power output levels:

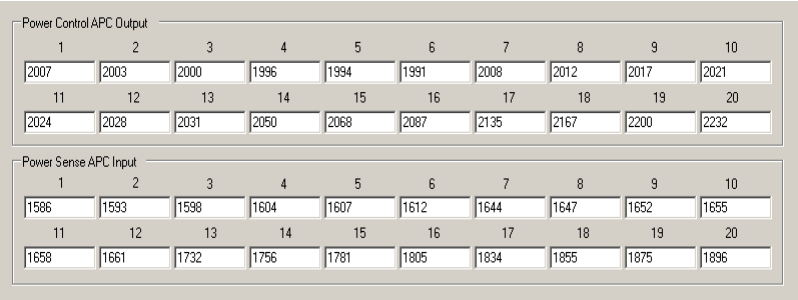
- TX Power Low
- TX Power Mid (field alignment is not supported for XG-25P)
- TX Power High

Each power level tab includes the following three (3) types of compensation factors:

- TX Power reference
- Power Control APC Output
- Power Sense APC Input

Field alignment of the RF power output is performed at the high (maximum) and low (minimum) power levels. Within each Tx Power tab (screen), the value displayed in the "Tx Power" input box represents the RF output level which the radio is aligned, the value being a factor of 10 times the expected power output. In other words, an entry of "10" relates to an RF power output of 1.0 Watts (1.0 x 10 = "10"), an entry of "50" relates to an RF power output of 5.0 Watts (5.0 x 10 = 50), etc.

The TX Power data values for 20 different frequencies across the combined VHF band are used to control the transmitter RF output power level over the entire frequency range of the transmitter. Increasing the data values increases the power output at each reference point.



The Power Control APC Output values prevent the radio from producing excessive RF during initial key-up. The Power Sense APC Input values set the radio's steady state power after being keyed for a period of time (settling time).

CAUTION

The TX power levels are aligned before the radio leaves the factory. Factory alignment establishes the appropriate transmit power levels for the radio. New values should not be entered unless original values are lost, corrupted, or associated hardware is replaced (e.g., TX Power Amplifier).

CAUTION

For optimum performance, sufficient battery life, TX power amplifier protection, and to assure compliance with FCC requirements, DO NOT exceed nominal RF power output settings.

Perform the following to verify and align the RF power output of a XG-25P portable:

1. Add the conventional test systems to the radio personality (refer to Section 11.4).
2. Setup the radio for RF testing per instructions in Section 11.5.2.
3. Power up the radio and do the following:
   a. Select the conventional test system: **XG25V LP**

b. Select **Channel 20** (174.0000 MHz), the next lower test channel, or the channel being aligned.

4. Using the PTT switch on the MATQ-03424 test box, key radio and wait for power to stabilize (typically 1-2 seconds).
5. Capture the steady state trace using the Channel Analyzer as shown in Figure 11-3.
6. Unkey radio and turn the Peak Hold function on.
7. Rekey the radio and measure the initial RF power as shown in Figure 11-3.
8. Unkey the radio:
9. Apply the following:

   a. If the dispersion between the initial peak power and the steady state power is greater than 0.8 dB, or steady power is not within ±0.25 dB of the expected power output, skip to Step 10 and align the power settings for the channel being tested.

   b. If the dispersion between the initial peak power and the steady state power is less than 0.8 dB, and steady power is within ±0.25 dB of the expected power output:

      i. Select the next lower test frequency in the selected system.

      ii. Repeat the test and alignment process, beginning with Step 3.b, until all channels in the selected system have been tested and aligned.

   c. If all data points are aligned in the Low Power system:

      i. Select the High Power test system: **XG25V HP**

      ii. Repeat the test and alignment process, beginning with Step 3.b, until all channels in the selected system have been tested and aligned for High Power.

   d. If High and Low Power alignment has been completed for all test channels, skip to Step 24.

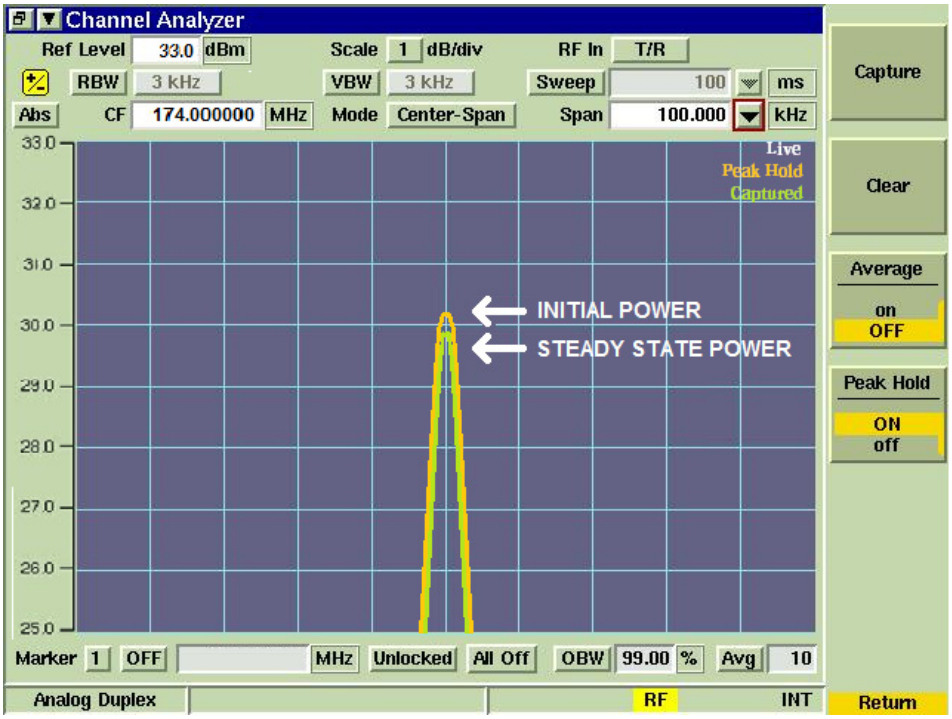
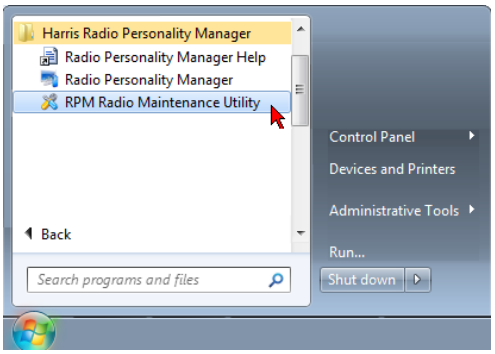


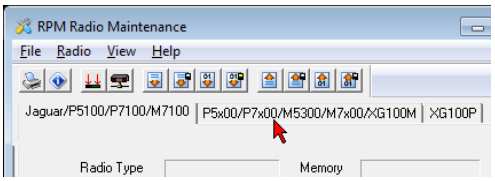
Figure 11-3: Measuring and Aligning APC Input and Output Power with Aeroflex 3920

10. Turn the radio OFF.
11. Disconnect the test box and connect the programming cable to the radio as described in Section 11.5.2.
12. Turn the radio ON.
13. From the PC, open the Radio Maintenance Utility tool:

    Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



14. Within the center window pane, select the tab which includes the correct radio model. For XG-25Ps, select the tab which includes: **P5x00**

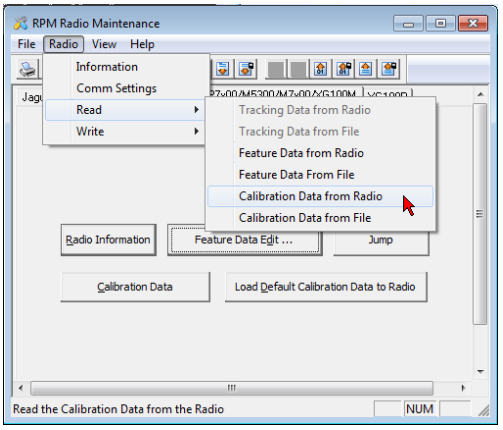


15. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

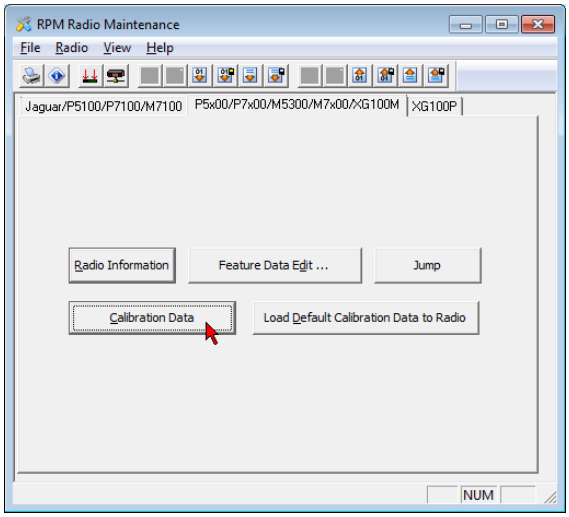
16. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



17. Within the center window pane:

    Select: **[Calibration Data]**



18. From within the Transmitter tab, review the TX Power Low and High tabs and verify the "Tx Power" input box shows the correct values:

    For Low Power: **5** (refer to Figure 11-4)

    For Mid Power: **20** DO NOT make changes to the factory settings within this tab.

    For High Power: **30** (refer to Figure 11-5)

NOTE

The "Tx Power" input box represents the RF output level with which the Tx Power High and Tx Power Low reference points are aligned. A factor of times 10 is applied; for an RF power output of 0.5 Watts, enter "5" (0.5 x 10 = "5"), for 3.0 Watts RF power output, enter "30" (3.0 x 10 = 30), etc.

19. Adjust the Power Control APC Output and Power Sense APC Input values accordingly for the frequency (test channel) being tested.

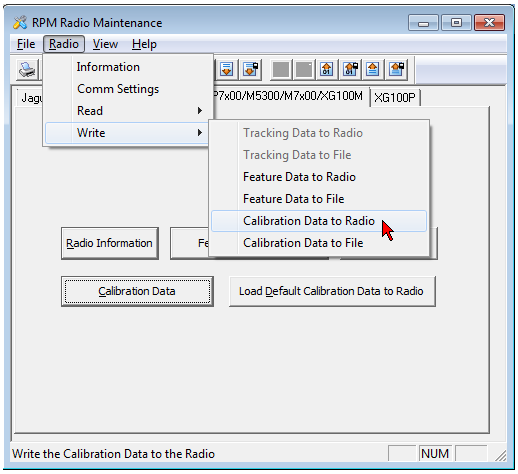
    Click: **[OK]**

20. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

21. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



22. Turn the radio OFF and back ON to apply the changes.
23. Return to Step 3.b and retest the channel.
24. Save the final Calibration Data to a local file.
25. If no other testing is to be performed, do the following:
    a. If a "shop" test personality was used to test the radio, reload the original personality into the radio and verify operation.
    b. If test systems were added to the original personality, refer to Section 11.4.2, remove the systems, and verify radio operation.

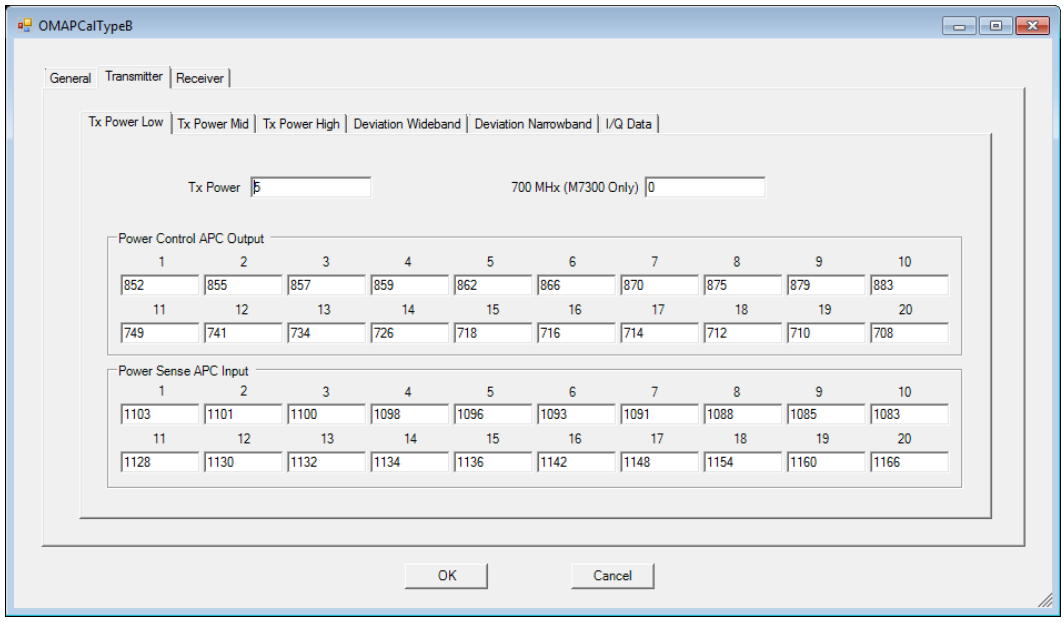


Figure 11-4: Example of TX Power Low APC Input and Output Power Settings

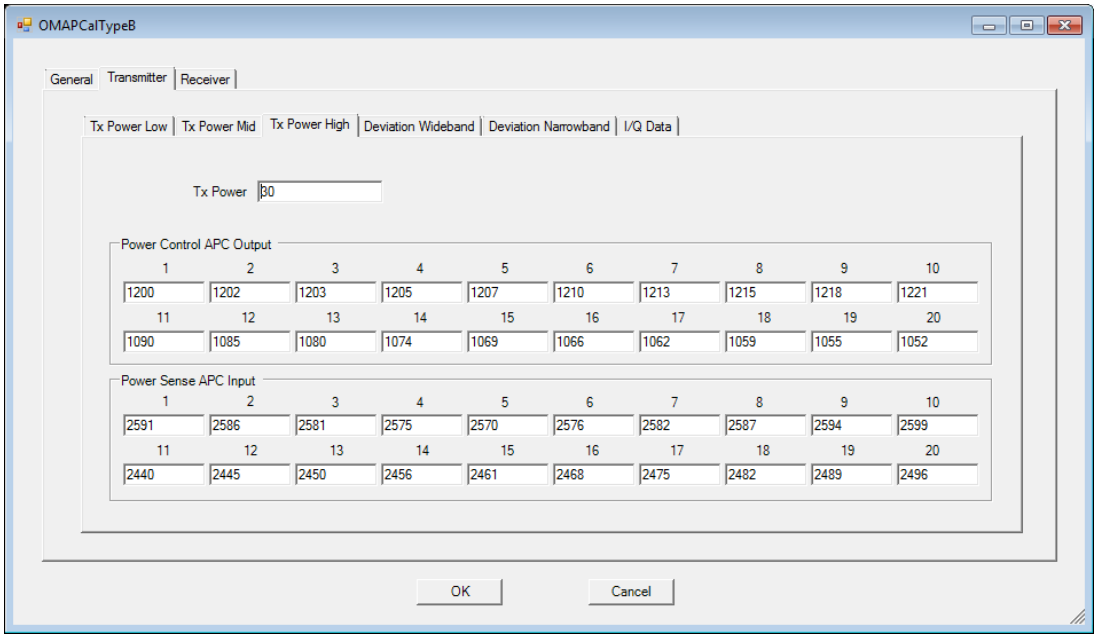


Figure 11-5: Example of TX Power High APC Input and Output Power Settings

11.5.5 I/Q Data Alignment

For XG-25P portables, I and Q alignment is simplified to aligning at only one frequency anywhere across the band. The following procedure will align I and Q at the high end of the band (174.0000 MHz). The Radio Maintenance Utility tool provides alignment tools for setting the DC Offset, Amplitude, and Vector arrays for I and Q modulation.

CAUTION

I/Q Data alignment should only be necessary if hardware components affecting transmitter performance have been replaced or the radio has reset to default factory data. Under any other circumstances where I/Q misalignment is suspected, it is recommended to first verify the test setup, and then determine and correct the cause of radio failure before proceeding with an alignment.

Perform the following to verify and align I and Q modulation:

1. Prepare the radio by adding the test systems to the radio personality (refer to Section 11.4).
2. Connect the communications test set's RF port to the radio antenna port.
3. Setup the communications test set for spectrum analyzer operation at the frequency under test. Refer to Figure 11-6.
4. Power up the radio and do the following:
   a. Select the conventional test channel set: **XG25V LP**
   b. Select Channel 20 (174.0000 MHz, refer to Table 11-4).
   c. Press **Menu** and use the **Up / Down** arrows to select "**FCC MENU**."
   d. Press **Menu** again and use the **Up / Down** arrows to select "**SSB MODE**."

NOTE

While in the *FCC Menu* > *SSB MODE*, use the **Menu** button to key and unkey the radio. This is a latching PTT function; the radio's transmit indicator will illuminate red when transmitting.

5. Press the **Menu** button to key the radio. Observe the difference between the RF SSB carrier being generated (typically USB), any center frequency carrier suppression, or the other sideband (refer to Figure 11-6). Carrier and SSB suppression must be at least -45 dBc.

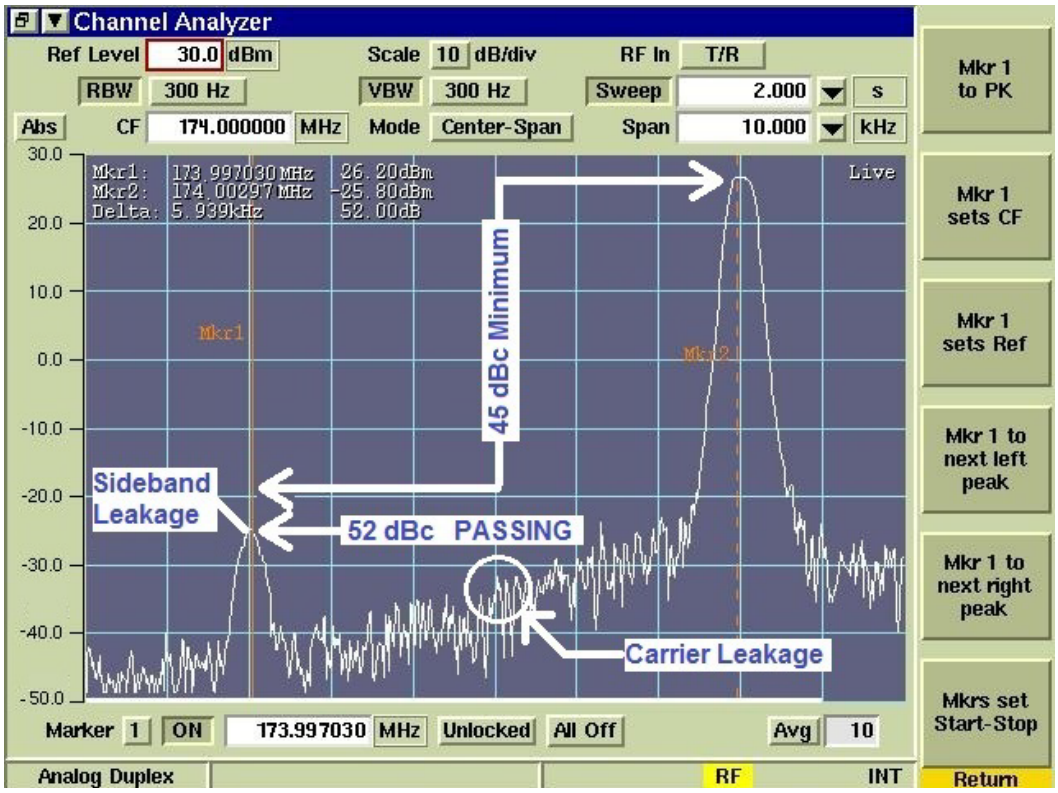
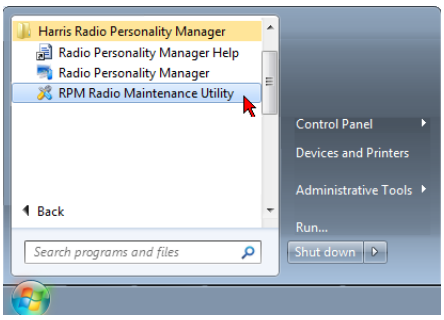


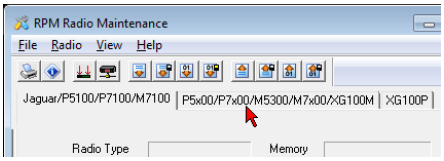
Figure 11-6: I and Q Alignment using FCC Menu SSB MODE

6. Unkey the radio by pressing the **Menu** button.
7. If carrier or sideband leakage did not meet the -45 dBc limit, proceed to Step 8. Otherwise, proceed to Step 19 and save data.
8. Connect the programming cable to the radio as described in Section 11.3.1.
9. From the PC, open the Radio Maintenance Utility tool:

   Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**

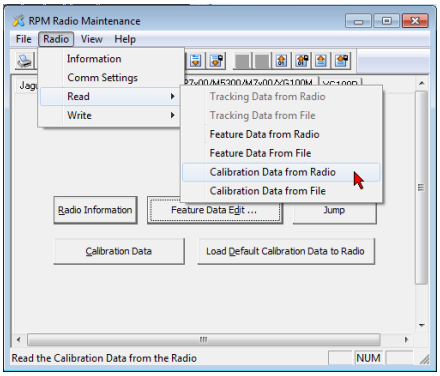


10. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**



11. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

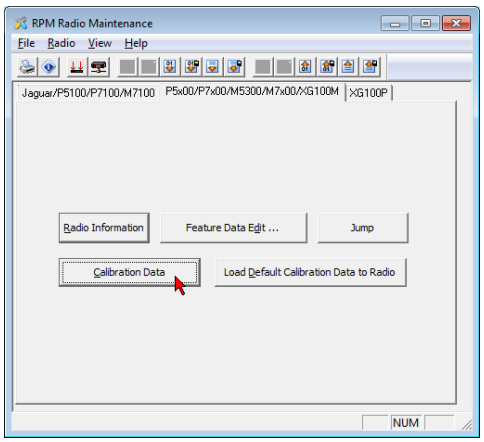


12. When the Calibration Data complete dialog box appears:

    Click: **[OK]**

13. Within the center window pane:

    Select: **[Calibration Data]**



NOTE

Adjusting I and Q values is an iterative (manual) process. The values interact and alignment can be a time consuming process. Start with adjusting the "I" DC Offset up or down and retesting the channel. If an improvement in carrier and sideband suppression is noted, continue updating the value until the improvement ends.

When starting out, it may be helpful to update the values in steps of 10 and note the changes to the RF signal. Once several stepped updates seem to pass by a null, go back and update the values in steps of 1 or 2 units until the best (or a passing) result is achieved.

Continue alignment by systematically adjusting, Q Offset, I Amplitude, Q Amplitude, I Vector, and Q Vector until the best (or a passing) result is achieved. Adjust only one value at a time.

14. Using only the top row of input fields, adjust them one at a time, and retest until the best (or a passing) result is achieved.

    Adjust the fields in the following order, making sure to retest each change before moving onto the next field:

    "I" DC Offset

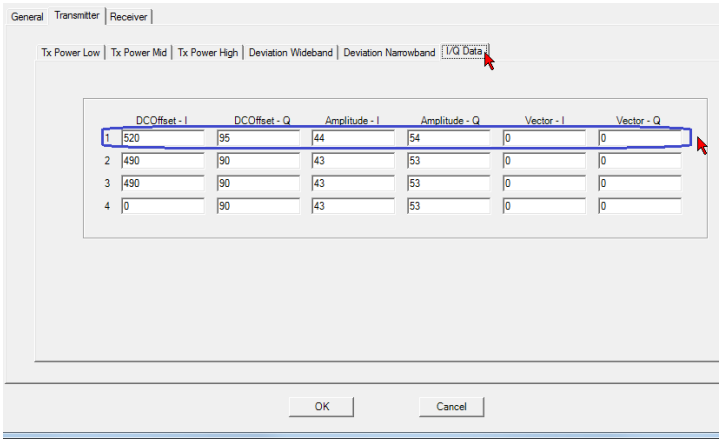
    "Q" DC Offset

    "I" Amplitude

    "Q" Amplitude

    "I" Vector

    "Q" Vector

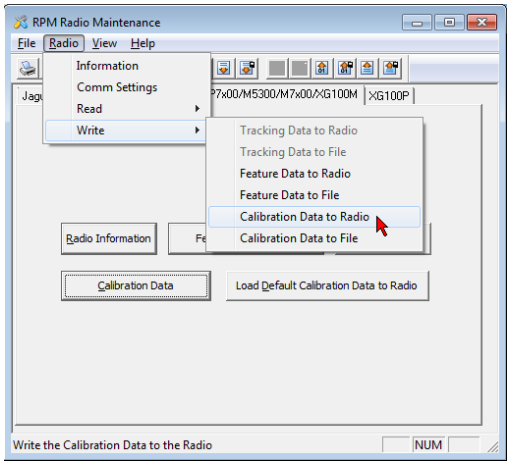


15. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

16. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



17. Cycle power to the radio or Click the **JUMP** button to reset the radio after programming.
18. Return to Step 3; repeat the test and alignment procedure until all channels are correctly aligned.
19. Save the final Calibration Data to a local file.
20. If no other testing is to be performed, do the following:
    a. If a "shop" test personality was used to test the radio, reload the original personality into the radio and verify operation.
    b. If conventional test frequency sets were added to the original personality, refer to Section 11.4.2, remove the test sets, and verify radio operation.

11.5.6 FM Deviation Test and Alignment

Compensation factors are used to maintain consistent modulation characteristics across the radio's bandsplit. These factors are applied at 20 different frequencies across the radio's entire operating range.

Additional input fields for compensating Transmit Channel Guard (TCG) deviation, Data Deviation, and Digital Channel Guard (DCG) modes of operation are aligned in a later section of this manual. The wideband and narrowband analog deviation factors used across the 20 frequencies must first be adjusted.

The six TCG frequencies followed by the Scalar values are aligned in a later section. Any other order may result in a misaligned radio.

NOTE

There are two tabs for entering deviation alignment data, "Deviation Wideband" and "Deviation Narrowband." The 20 alignment frequencies are spread across entire VHF band.

CAUTION

Follow the steps in this verification and alignment procedure in the order which they appear. Certain values rely on others to be done first. Align the deviation and scalar fields in this order:

- 20 Wideband Deviation values (Deviation Wideband tab)
- 20 Narrowband Deviation values (Deviation Narrowband tab)
- Six Wideband TCG Deviation values (Deviation Wideband tab, relies on the 20 wideband values)
- Six TCG Deviation values (Deviation Wideband tab, relies on the 20 narrowband values)
- DCG Scalar (relies on the 20 wideband values)
- Data Deviation Scalar (Deviation Wideband tab, relies on the 20 wideband values)
- C4FM Scalar (Deviation Wideband tab, relies on the 20 wideband values)
- Data Deviation Scalar (4800 Baud) (Deviation Narrowband tab, relies on the 20 narrowband values)
- Data Deviation Scalar (9600 Baud) (Deviation Narrowband tab, relies on the 20 narrowband values)

Perform the following to verify and align XG-25P FM deviation settings:

1. Prepare the radio by adding the conventional test systems to the radio personality (refer to Section 11.4).
2. Setup the radio for RF testing per instructions in Section 11.5.2.
3. Connect the Aeroflex 3920 to the radio as shown in Figure 11-3.
4. Set the Aeroflex 3920 Function Generator to generate a 1 kHz sine wave output at 110 mV.
5. Power up the radio and do the following:
   a. To align wideband analog voice deviation, select test channel set: **XG25V LP**
   b. Refer to frequency list in Table 11-4 and select Channel 20 (174.0000 MHz) or the next lower test frequency.
   c. Set the AeroFlex 3920 to monitor FM deviation on the same frequency.
6. Using the PTT switch on the MATQ-03424 test box, key radio on low power and wait for the signal to stabilize (typically 1-2 seconds).
7. Record the measured analog deviation and unkey the radio.
8. Return to Step 5 and repeat the test until FM deviation is tested on all 20 test channels.

9. The maximum Voice Deviation level (*no CG or DCG*) for the channels being tested should be within the limits specified in Table 11-7. If any channel is out of specification, proceed to Step 11 and realign the channel(s). Otherwise, proceed to Step 29 to save any updated data.
10. If all wideband analog voice deviation levels are within specification, do the following:
    a. To align narrowband analog voice operation, select test channel set: **XG25V NB**
    b. Return to Step 5.b and test the narrowband deviation settings for all 20 channels.

Table 11-7: Maximum Analog Voice Deviation Levels

MODE	VOICE DEVIATION (NO CG OR DCG)
Narrowband Analog Voice	2.25 kHz ±100 Hz
Wideband Analog Voice	4.3 kHz ±200 Hz

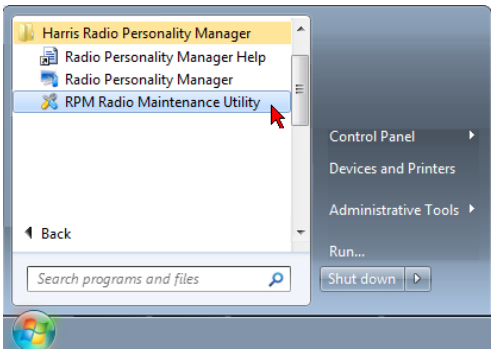
11. If any channel requires realignment, turn the radio OFF.

CAUTION

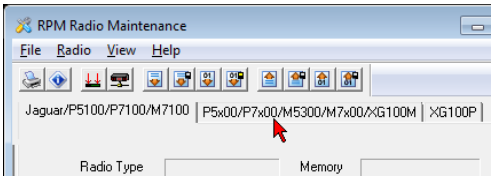
It is the responsibility of anyone entering new tracking data to assure that the radio performs within the legal and operational limits governing the service area. If at any time during the deviation tests the measured deviation is not as expected and resembles the deviation for another mode, check the radio personality settings from RPM first, before attempting realignment.

12. Disconnect the test box and connect the programming cable to the radio as described in Section 11.3.1.
13. Turn the radio ON.
14. From the PC, open the Radio Maintenance Utility tool:

    Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



15. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**

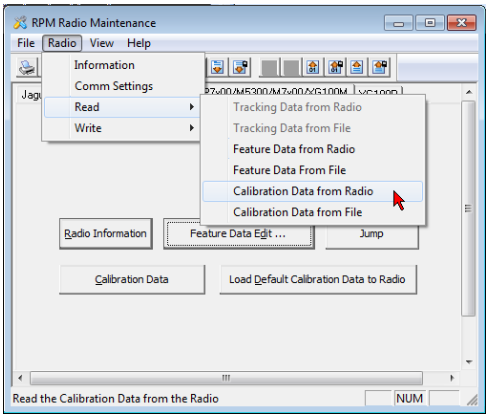


16. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

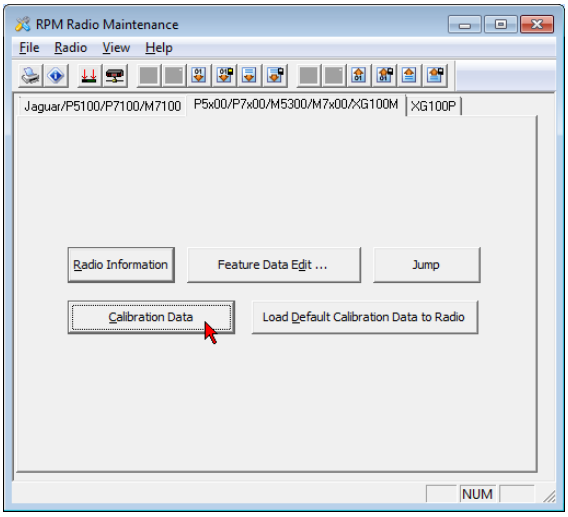
17. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



18. Within the center window pane:

    Select: **[Calibration Data]**



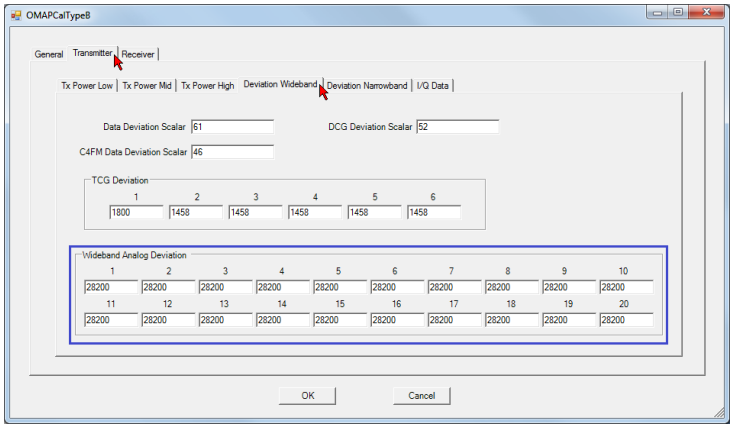
19. If performing narrowband channel alignment, skip to Step 23.

20. For wideband channel alignment:

    Select: **Deviation Wideband**

21. Refer to Step 7 and adjust the Wideband Analog Deviation values for the channels requiring alignment. (Increasing the values increases deviation.)

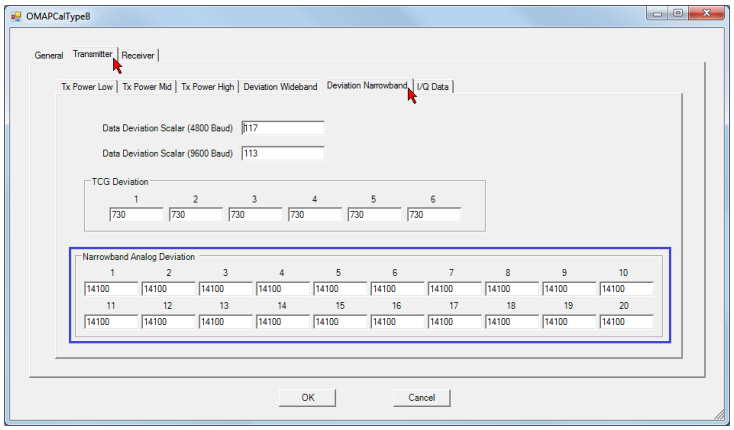
22. Skip to Step 25.



23. For narrowband channel alignment:

    Select: **Deviation Narrowband**

24. Refer to Step 7 and adjust the Narrowband Analog Deviation values for the channels requiring alignment. (Increasing the values increases deviation.)

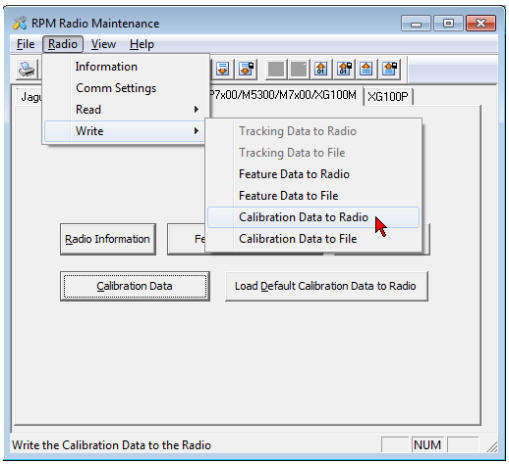


25. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

26. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



27. Turn the radio OFF.

28. Return to Step 5; repeat the test and alignment procedure until the Deviation Wideband and Deviation Narrowband fields are correctly aligned.

29. If no other testing is to be performed, do the following:

    a. Save the final Calibration Data to a local file.

    b. If a "shop" test personality was used to test the radio, reload the original personality into the radio and verify operation.

    c. If test systems were added to the original personality, refer to Section 11.4.2, remove the systems, and verify radio operation.

11.5.7 Channel Guard Deviation and DCG Scalar Test and Alignment

The six TCG Deviation set points and the DCG Scalar on the Deviation Wideband tab, and the 6 (six) TCG Deviation set points Deviation Narrowband tab are used to align Tone and Digital Channel Guard operation.

CAUTION

Follow the steps in this verification and alignment procedure in the order which they appear. Always verify and align the Wideband Analog Deviation values on the Deviation Wideband tab (refer to Section 11.5.6) before aligning any scalar values. Failure to do so may result in a misaligned radio.

Perform the following to verify and align Channel Guard deviation:

1. Prepare the radio by adding the test systems to the radio personality (refer to Section 11.4).
2. Setup the radio for RF testing per instructions in Section 11.5.2. Verify the Function Generator is set to *Off* (alternately, do not connect the Function Generator to the test set for this series of testing).
3. Setup the AeroFlex 3920 to monitor FM deviation starting with the highest frequency programmed for CG operation (refer to frequency list in Table 11-5, channel 6 is 941.0000 MHz and includes a CG tone of 67.0 Hz). As the process is repeated for the remaining test channels, continue down in frequency until all channels with a CG tone have been tested.
4. Power up the radio and do the following:
   a. To align wideband TCG deviation, select test channel set: **XG25VCGW**
   b. Select Channel 6 (174.0000 MHz) or the next lower test channel (refer to Table 11-5).
   c. Setup the AeroFlex 3920 to monitor the same frequency with the analyzer filter set to **20-300 Hz**.
5. Using the PTT switch on the MATQ-03424 test box, key radio on low power and wait for the signal to stabilize (typically 1-2 seconds).
6. Record the measured deviation and unkey the radio.
7. Repeat Steps 4 through 6; measure and record the CG deviation for all six channels programmed with transmit CG tone 67.0 Hz.
8. If CG deviation for any channel is not within the limits shown in Table 11-9, proceed to Step 14 and align the settings.
9. After all wideband TCG deviation levels are aligned, do the following:
   a. Test and align the narrowband TCG deviation levels; select test channel set: **XG25VCGN**
   b. Return to Step 4.b; test and align the narrowband TCG deviation levels.

NOTE

The DCG Deviation Scalar is a compensation value applied to all channel's TCG Deviation settings. DO NOT adjust DCG Deviation Scalar settings until all TCG Deviation settings are properly aligned.

10. After all wideband TCG deviation levels are aligned, do the following:
    a. Test and align DCG deviation level; select test channel set: **XG25VCGW**
    b. Select Channel 7 (174.0000 MHz with DCG tone 627).
    c. Setup the AeroFlex 3920 to monitor the same frequency with the analyzer filter set to **NONE**.
11. Using the PTT switch on the MATQ-03424 test box, key radio on low power and wait for the signal to stabilize (typically 1-2 seconds).

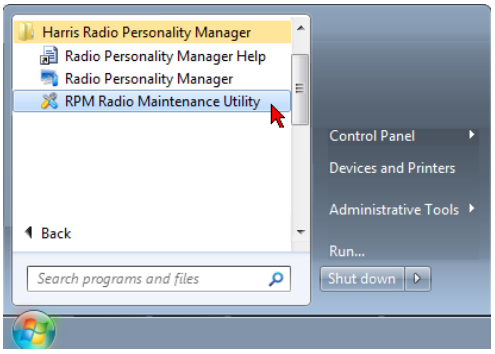
12. If DCG deviation for channel 7 is not within the limits shown in Table 11-9, proceed to Step 14 and align the DCG Scalar.
13. When all CG/DCG deviation measurements are within tolerance, proceed to Step 35 to save any updated data.

Table 11-8: Maximum CG Deviation Levels

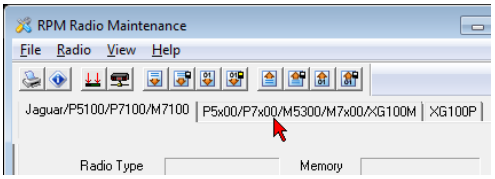
MODE	CG/DCG DEVIATION
Wideband TCG	750 Hz ±50 Hz
Narrowband TCG	400 Hz ±50 Hz
Wideband DCG	600 Hz ±50 Hz

14. Turn the radio OFF.
15. Disconnect the test box and connect the programming cable to the radio as described in Section 11.3.1.
16. Turn the radio ON.
17. From the PC, open the Radio Maintenance Utility tool:

    Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



18. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**

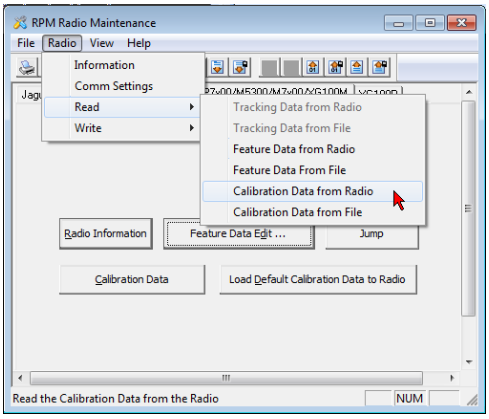


19. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

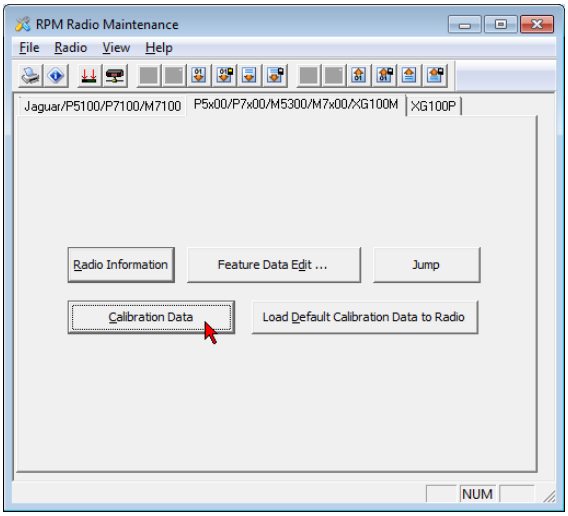
20. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



21. Within the center window pane:

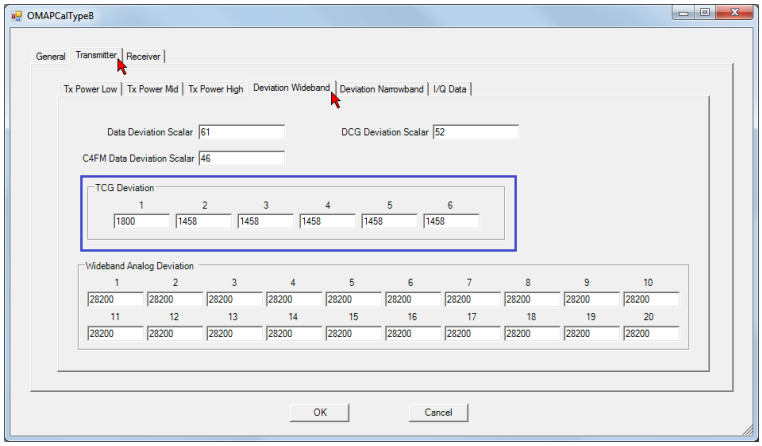
    Select: **[Calibration Data]**



22. If aligning narrowband TCG, skip to Step 26.
23. If aligning DCG Deviation Scalar, skip to Step 28.
24. Otherwise, select the **Deviation Wideband** tab.

    Refer to Step 6 and adjust the wideband TCG Deviation values as necessary. Increasing the values increases TCG deviation.

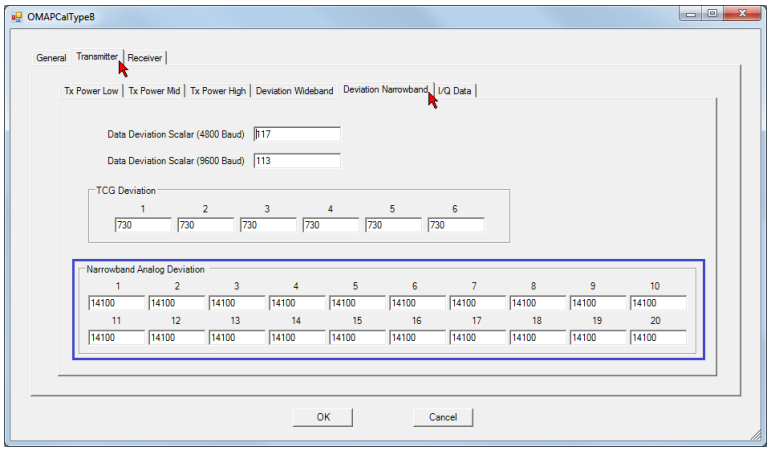
    Click: **[OK]**



25. Skip to Step 31.
26. Select the **Deviation Narrowband** tab.

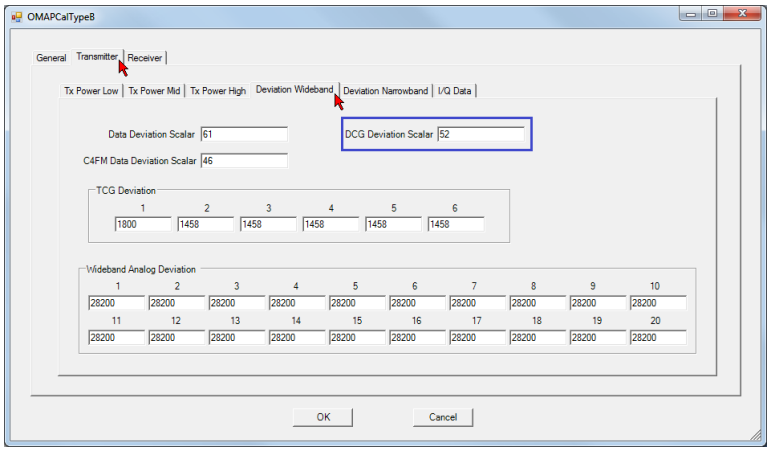
    Refer to Step 6 and adjust the narrowband TCG Deviation values as necessary. Increasing the TCG Deviation values increases deviation.

    Click: **[OK]**



27. Skip to Step 31.

28. Select the **Deviation Narrowband** tab.
29. Refer to Step 6 and adjust the narrowband TCG Deviation values as necessary. Increasing the TCG Deviation values increases deviation.
30. Click: **[OK]**

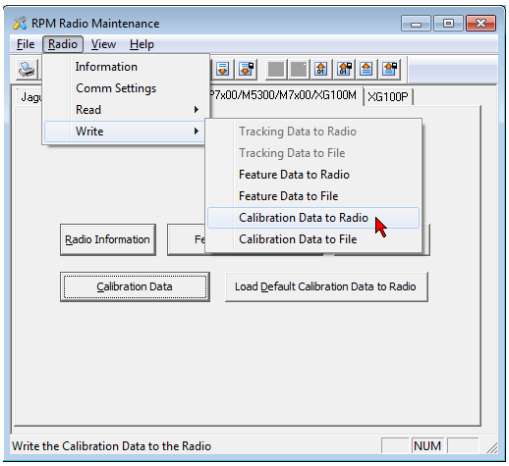


31. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

32. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



33. Turn the radio OFF.
34. Return to Step 4; repeat the test and alignment procedure until all wideband and narrowband CG deviation setting are correctly aligned.
35. Save the final Calibration Data to a local file.
36. If no other testing is to be performed, do the following:
    a. If a “shop” test personality was used to test the radio, reload the original personality into the radio and verify operation.
    b. If test systems were added to the original personality, refer to Section 11.4.2, remove the systems, and verify radio operation.

11.5.8 Data and C4FM Deviation Scalars Test and Alignment

The Deviation Wideband and Deviation Narrowband tabs include scalars for Wideband Data, C4FM, Narrowband 4800 Baud, and Narrowband 9600 Baud data. Alignment of these parameters require the use of the "FCC Menu" function of the radio personality (refer to Section 11.4.1, Step 7). While it is possible to perform scalar alignment on any test frequency, it is normally performed on the highest test frequency.

CAUTION

Follow the steps in this verification and alignment procedure in the order which they appear. Always verify and align the Wideband Analog Deviation values on the Deviation Wideband tab (refer to Section 11.5.6) before aligning any scalar values. Failure to do so may result in a misaligned radio.

NOTE

The FCC Menu selections automatically set the proper bandwidth, regardless of the selected system's bandwidth. The selected system is only used to define the TX or RX frequency of operation. However; observe the caution note above, the Wideband Analog Deviation values must be aligned before aligning any scalar values.

Perform the following to verify and align the data deviation scalars:

1. Prepare the radio by adding the test systems to the radio personality (refer to Section 11.4).
2. Setup the radio for RF testing per instructions in Section 11.5.2.
3. Connect the Aeroflex 3920 to the radio as shown in Figure 11-2. Verify the Function Generator is set to *Off* (alternately, do not connect to generator to the test set for this series of testing).
4. Setup the AeroFlex 3920 to monitor FM deviation.
5. Power up the radio and do the following:
   a. Select the conventional low power test channel set: **XG25V LP**
   b. Select Channel 20 (174.0000 MHz).
   c. Press the **M** and use the **Up / Down** arrows to select "**FCC MENU**."
   d. Press the **M** to enter the FCC Menu.

NOTE

There is no need to exit and re-enter the FCC Menu between tests. From the FCC Menu, the **Up / Down** arrows may be used to select the next test in succession to minimize test time. If at any time the FCC Menu is inadvertently exited, repeat Steps 5.c and 5.d to continue testing.

6. To test and align the Wideband data Deviation Scalar, do the following:
   a. Use the **Up / Down** arrows to select "**TX 9600W**."
   b. Press **M** again to key the radio.
   c. Measure and record the 9600 Baud wideband TX data deviation. This measurement is related to the Wideband tab's Data Deviation Scalar value.
   d. Press **M** again to unkey the radio.
7. To test and align the C4FM Deviation Scalar, do the following:
   a. Select the conventional low power test channel set: **XG25V LP**

b. Use the **Up / Down** arrows to select "**P25 HIGH**."

c. Press **M** again to key the radio.

d. Measure and record the P25 HIGH deviation. This measurement is related to the Wideband tab's C4FM Deviation Scalar value.

e. Press **M** again to unkey the radio.

8. To measure the Narrowband 9600 Baud TX Data deviation, do the following:

a. Select the conventional low power test channel set: **XG25V LP**

b. Use the **Up / Down** arrows to select "**TX 4800N**."

c. Press **M** again to key the radio.

d. Measure and record the 4800 Baud TX Data deviation. This measurement is related to the Narrowband tab's 4800 Baud TX Data Deviation Scalar value.

e. Press **M** again to unkey the radio.

9. To measure the Narrowband 4800 Baud TX Data deviation, do the following:

a. Select the conventional low power test channel set: **XG25V LP**

b. Use the **Up / Down** arrows to select "**TX 9600N**."

c. Press **M** again to key the radio.

d. Measure and record the 4800 Baud TX Data deviation. This measurement is related to the Narrowband tab's 4800 Baud TX Data Deviation Scalar value.

e. Press **M** again to unkey the radio.

10. Compare the measurements made in Steps 6 and 8 to the levels shown in Table 11-9. If either scalar is out of specification, proceed to Step 11 and realign the scalar(s). Otherwise, proceed to Step 35 to save any updated data.

Table 11-9: Scalar Deviation Level Settings

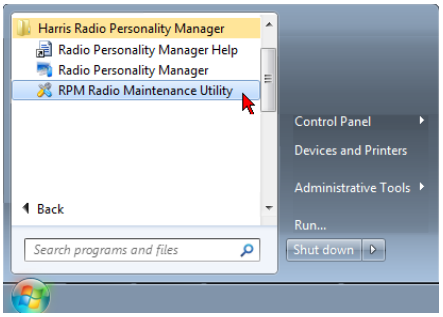
SCALAR	FCC MENU TEST FUNCTION	DEVIATION
Wideband 9600 Baud	TX 9600W	4.5 kHz ±50 Hz
C4FM	P25 HIGH	2.826 kHz ±25 Hz
Narrowband 4800 Baud	TX 4800N	1.65 kHz ±25 Hz
Narrowband 9600 Baud	TX 9600N	2.8 kHz ±25 Hz

11. Turn the radio OFF.

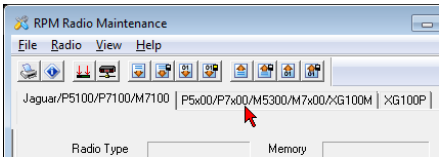
12. Disconnect the test box and connect the programming cable to the radio as described in Section 11.3.1.

13. Turn the radio ON.
14. From the PC, open the Radio Maintenance Utility tool:

    Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



15. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**

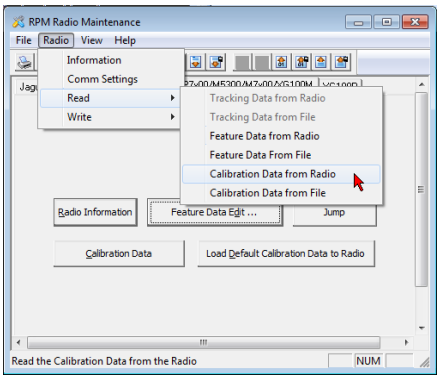


16. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

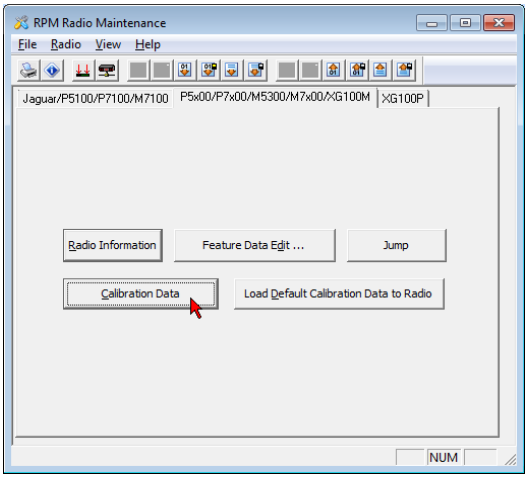
17. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



18. Within the center window pane:

    Select: **[Calibration Data]**



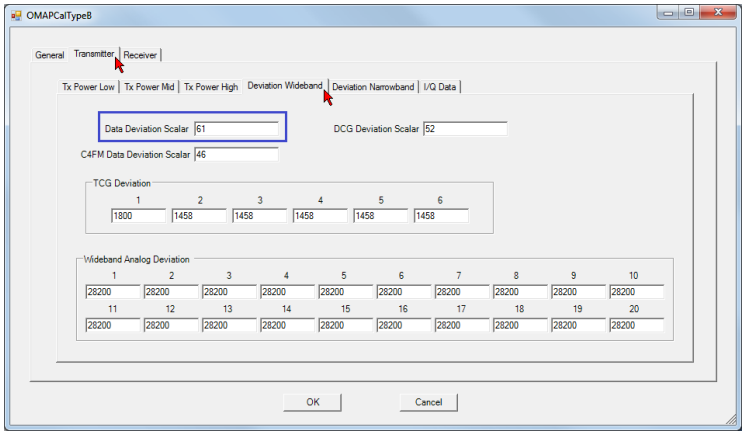
19. To align the Data Deviation Scalar:

    Select: **Transmitter** tab

    Select: **Deviation Wideband** tab

    Align the Data Deviation Scalar as necessary to meet the required deviation shown in Table 11-9. (Increasing the value increases associated deviation.)

    Click: **[OK]**



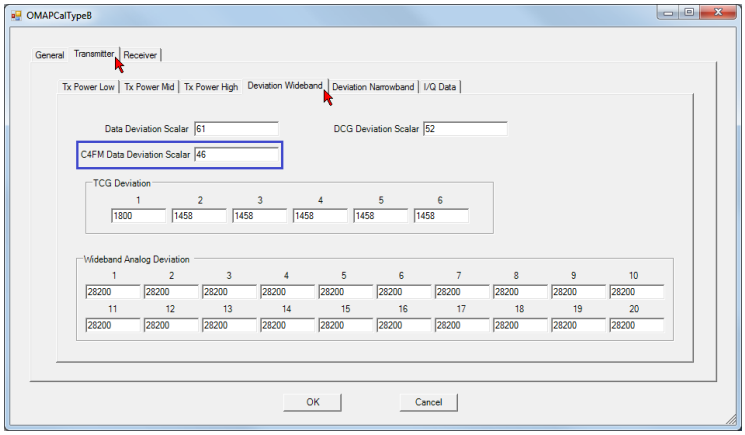
20. To align the C4FM Data Deviation Scalar:

    Select: **Transmitter** tab

    Select: **Deviation Wideband** tab

    Align the C4FM Data Deviation Scalar as necessary to meet the required deviation shown in Table 11-9. (Increasing the value increases associated deviation.)

    Click: **[OK]**



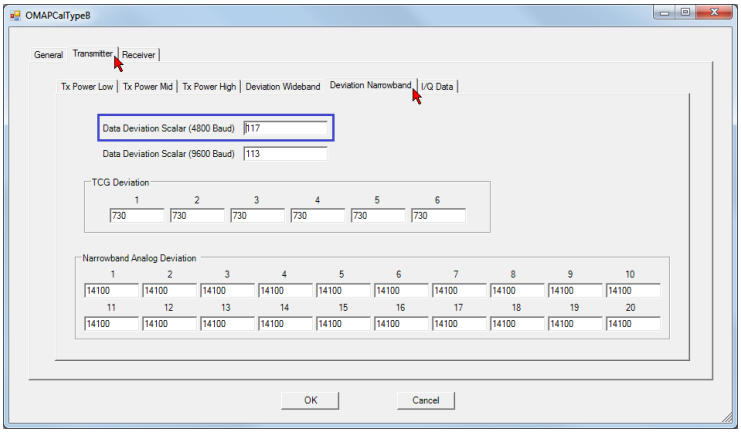
21. To align the Data Deviation Scalar (4800 Baud):

    Select: **Transmitter** tab

    Select: **Deviation Narrowband** tab

    Align the Data Deviation Scalar (4800 Baud) as necessary to meet the required deviation shown in Table 11-9. (Increasing the value increases associated deviation.)

    Click: **[OK]**



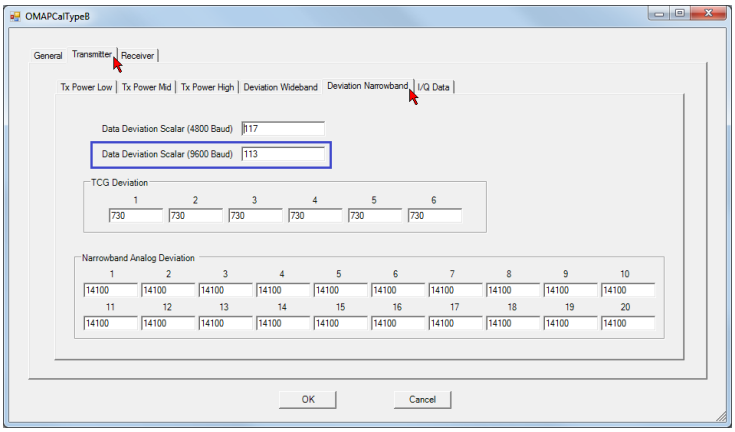
22. To align the Data Deviation Scalar (9600 Baud):

    Select: **Transmitter** tab

    Select: **Deviation Narrowband** tab

    Align the Data Deviation Scalar (9600 Baud) as necessary to meet the required deviation shown in Table 11-9. (Increasing the value increases associated deviation.)

    Click: **[OK]**

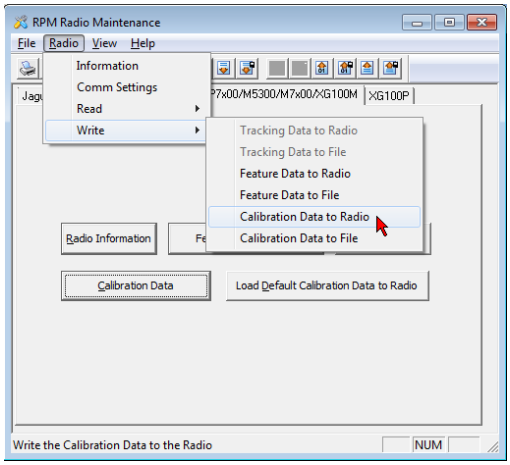


23. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

24. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



25. Turn the radio OFF.
26. Return to Step 5; repeat the test and alignment procedure until all deviation scalars are correctly aligned.
27. Save the final Calibration Data to a local file.
28. If no other testing is to be performed, do the following:
    a. If a "shop" test personality was used to test the radio, reload the original personality into the radio and verify operation.
    b. If test systems were added to the original personality, refer to Section 11.4.2, remove the systems, and verify radio operation.

11.5.9 TX Audio Sensitivity and Distortion

This is a verification-only test and does not require the Utility or any alignment to complete.

1. Prepare the radio by adding the conventional test systems to the radio personality (refer to Section 11.4).
2. Setup the radio for RF testing per instructions in Section 11.5.2.
3. Connect the Aeroflex 3920 to the radio as shown in Figure 11-2.
4. Set the Aeroflex 3920 Function Generator to generate a 1 kHz sine wave output at 10 mV.

5. Power up the radio and do the following:
   a. To test the Audio Sensitivity, select test channel set: **P55V LP**
   b. Refer to frequency list in Table 11-4 and select Channel 20 (174.0000 MHz).
   c. Set the AeroFlex 3920 to monitor FM TX Audio Distortion on the same frequency.
6. Using the PTT switch on the MATQ-03424 test box, key radio on low power and wait for the signal to stabilize (typically 1-2 seconds).
7. Adjust the 1 kHz audio level until the deviation of the transmitter is 60% of systems deviation (refer to Table 11-7) or approximately 3 kHz for a wide band channel. The 1 kHz level should be less than 14 mV.
8. Verify the transmitter audio distortion is less than 3%.

11.5.10 RSSI Test and Alignment

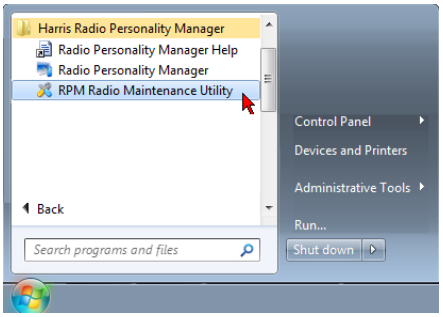
The Receiver tab includes input fields for aligning the RSSI signal strength detection. Alignment is based on weak, medium, and strong input signal levels as measured at five (5) test frequencies spread across the radio's entire operating range.

Perform the following to verify and align the receiver squelch values:

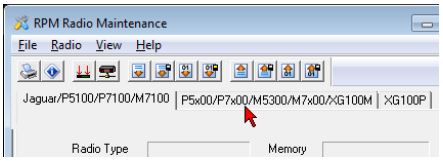
1. Prepare the radio by adding the test systems to the radio personality (refer to Section 11.4).
2. Connect the Aeroflex 3920 RF port to the radio antenna port.
3. Setup the AeroFlex 3920 to generate an FM carrier at -110 dBm output level on the same frequency that the radio is receiving (RF reference level for verifying "Weak" RSSI alignment values).
4. Power up the radio and do the following:
   a. Select the conventional test channel set: **XG25VSQW**
   b. Select Channel 5 (174.0000 MHz) or the next lower test channel. Refer to Table 11-6.
   c. Press **M** and use the **Up / Down** arrows to select "**FCC MENU**."
   d. Press **M** again. The radio display will alternately blink between the RX frequency and the RF input level in dBm.
5. Record the RSSI level displayed on the radio.
6. Change the RF Generator level to -90 dBm RF input (RF reference level for verifying "Medium" RSSI alignment values).
7. Record the RSSI level displayed on the radio.
8. Change the RF Generator level to -70 dBm RF input (RF reference for verifying "Strong" RSSI alignment values).
9. Record the RSSI level displayed on the radio.
10. Change the RF Generator frequency to the next frequency in Table 11-6 and repeat Steps 3 through 9 until all five receive channels have been tested for RSSI values.
11. If any RSSI level measured is more than ±1 dB from the actual RF input level from the generator, proceed to Step 12. Otherwise, proceed to Step 23 and save data.

12. Connect the programming cable to the radio as described in Section 11.3.1.
13. Connect From the PC, open the Radio Maintenance Utility tool:

    Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



14. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**

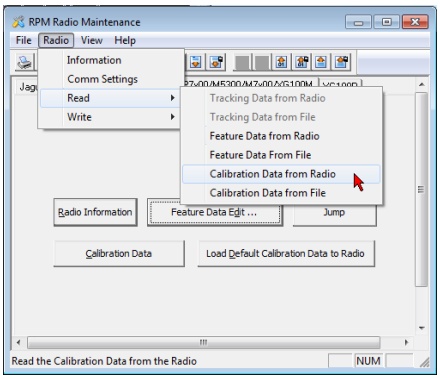


15. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

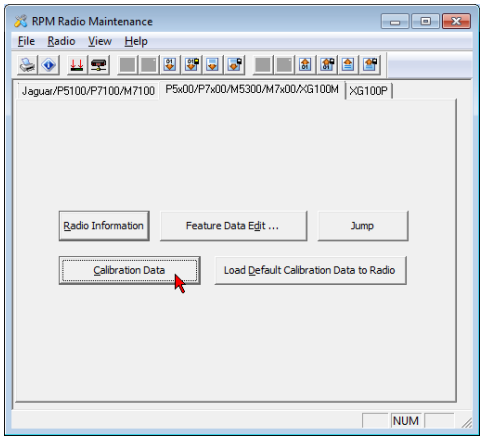
16. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



17. Within the center window pane:

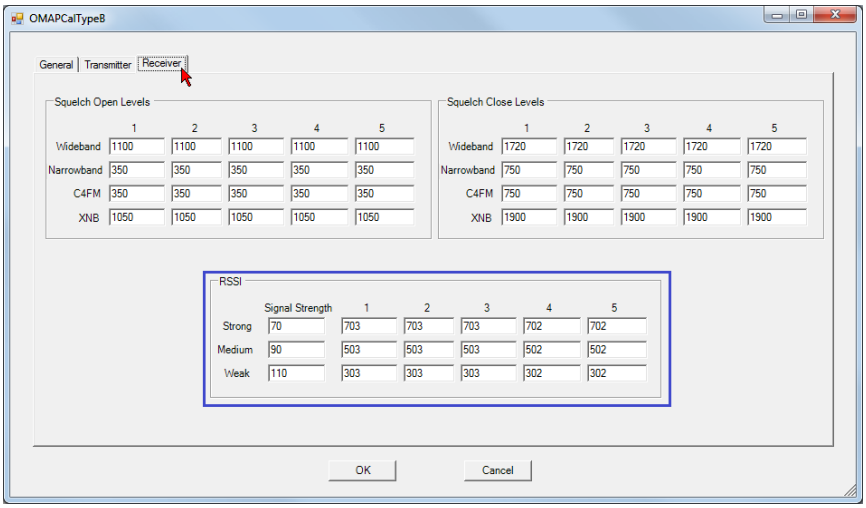
    Select: **[Calibration Data]**



18. Select: **Receiver**

    Refer to Step 11 and adjust the Strong, Medium, and Weak RSSI values as necessary.

    The Signal Strength reference values in the first column should be 70, 90, and 110 (as shown to the right). If not, update the values and retest the radio before continuing alignment.



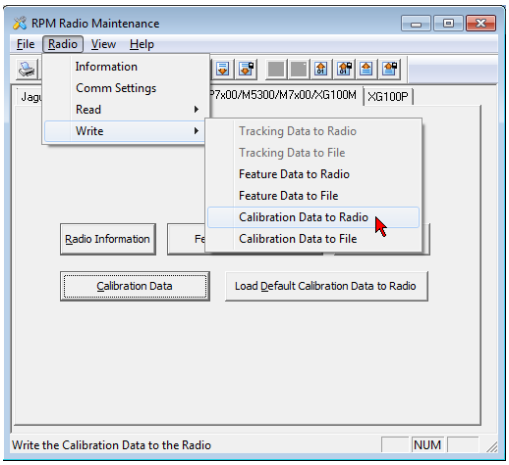
19. Click: **[OK]**

20. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

21. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



22. Return to Step 3; repeat the test and alignment procedure until all RSSI values are correctly aligned.

23. Save the final Calibration Data to a local file.

24. If no other testing is to be performed, do the following:

    a. If a "shop" test personality was used to test the radio, reload the original personality into the radio and verify operation.

    b. If conventional test frequency sets were added to the original personality, refer to Section 11.4.2, remove the test sets, and verify radio operation.

11.5.11 Squelch Open and Close Level Test and Alignment

The Receiver tab within the Calibration Data includes Squelch Open and Squelch Close input fields. The levels entered into these input fields determine the received signal level required to unsquelch the receiver and allow audio to pass to the speaker. The higher the value, the weaker signal the RF signal required to unsquelch the radio.

The Squelch Open and Squelch Close values are set such that a stronger signal is required to open the squelch (Squelch Open Level) and doesn't close until the signal level weakens (Squelch Close Level). This process is called squelch hysteresis. Without hysteresis, the squelch's response to weak signals would result in broken up audio in the speaker.

Squelch alignment is based on the industry standard SIgnal, Noise, And Distortion (SINAD) ratio, a comparison of no signal (all noise) to the desired signal that is that is being received. A hysteresis value of 1.5 to 3.0 dB less in SINAD is considered optimal. Factory alignment sets the Squelch Open level for 8 dB +/- 2 dB SINAD to open the squelch.

NOTE

For the XG-25P, the XNB Squelch Open and XNB Squelch Close input fields are not used. Leave these fields set to factory alignment (or default) values.

Perform the following to verify and align the Squelch Open and Squelch Close input fields:

1. Prepare the radio by adding the test systems to the radio personality (refer to Section 11.4).
2. Connect the Aeroflex 3920 to the radio as described in Section 11.5.2.
3. Set the AeroFlex 3920 to generate an on-channel FM carrier with a 1 kHz test tone set to the deviation level define in Table 11-10. Begin with the RF generator's output level set to minimum output.
4. Also prepare the Aeroflex 3920 to measure receiver SINAD via the radio test set.

NOTE

While it may be desirable to perform SINAD testing simply by listening to the audio heard from the speaker, it is highly recommended to setup the test equipment and let it make accurate and repeatable SINAD measurements.

5. Power up the radio and do the following:
   a. Verify Wideband Squelch alignment, select the conventional test channel set: **XG25VSQW**
   b. Select Channel 5 (174.0000 MHz) or the next lower test channel. Refer to Table 11-6.
6. Increase the RF generator level until the squelch opens. Record the SINAD measurement.
7. Slowly decrease the RF Generator level until the squelch closes. Record the SINAD measurement.
8. Change the RF generator level and record the SINAD level and FCC Menu's "SQ" value just before the squelch closes.
9. Return to Step to 5.b and repeat the process for each remaining test channel in the system.
10. Verify Narrowband Squelch alignment; select the conventional test channel set: **XG25VSQN**
11. Return to Step to 5.b and repeat the process for each test channel in the XG25VSQN system.
12. Verify C4FM analog Squelch alignment; select the conventional test channel set: **XG25V PC**

NOTE

While system XG25V PC operates in P25 Conventional mode, the radio is also operating in analog conventional mode at the same time. The C4FM squelch values are controlling the analog squelch operation, not the C4FM mode.

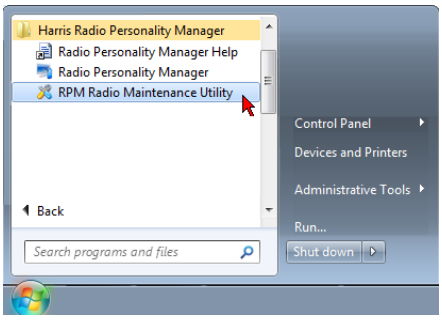
13. Return to Step to 5.b and repeat the process (using an analog RF generator signal) for each test channel in the XG25V PC system.
14. If any channel opened outside of 8 dB ±1 dB SINAD, or closed outside of 6 dB ±1 dB SINAD, then proceed to step 15 and realign the Squelch Open and Squelch Close values. Otherwise, proceed to Step 26 and save data.

Table 11-10: FM Deviation Levels for Aligning Squelch

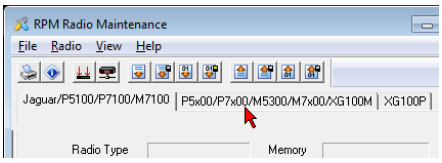
SELECTED TEST SYSTEM	MODE	1 kHz TONE DEVIATION (NO CG OR DCG)
XG25VSQW	Wideband (Analog Conventional)	2.7 kHz ±200 Hz
XG25VSQN	Narrowband (Analog Conventional)	1.35 kHz ±100 Hz
XG25V PC	C4FM (Also uses Analog Conventional)	1.35 kHz ±100 Hz

15. Connect the programming cable to the radio as described in Section 11.3.1.
16. Connect From the PC, open the Radio Maintenance Utility tool:

    Click: **Start > Programs > Harris Radio Personality Manager > Radio Maintenance Utility**



17. Within the center window pane, select the tab which includes the correct radio model. For XG-25P, select the tab which includes: **P5x00**

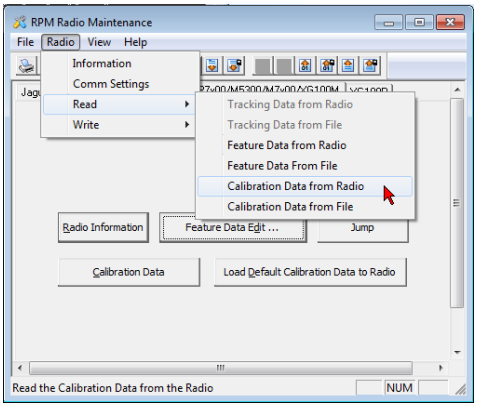


18. From Radio Maintenance Utility tool's top menu bar:

    Select: **Radio > Read > Calibration Data from Radio**

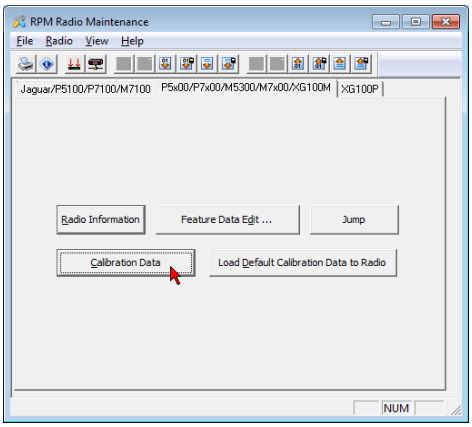
19. When the Calibration Data complete dialog box appears:

    Click: **[OK]**



20. Within the center window pane:

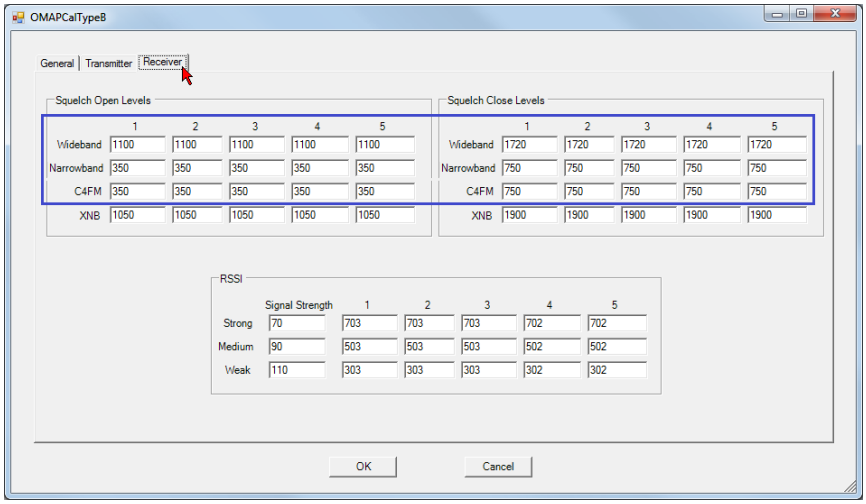
    Select: **[Calibration Data]**



21. Select: **Receiver**

    Adjust the values for any of the channels where the squelch did not open or close as expected. Decreasing the values tightens the squelch operation.

    The Squelch Open value should never be programmed with a value higher than the Squelch Close value. And, neither setting should be programmed with a value greater than the "SQ" value with no carrier present.



22. Click: **[OK]**

NOTE

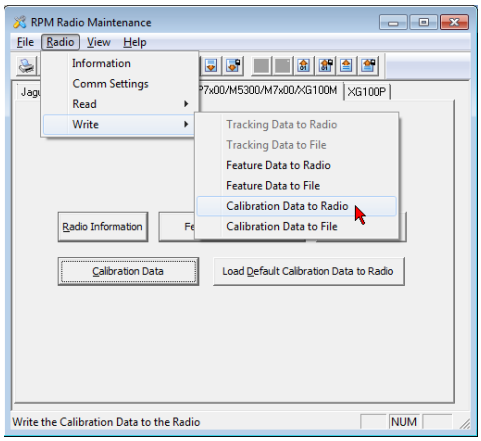
Refer to Section 11.5.11.1 for an alternate squelch alignment procedure. The alternate procedure may be much simpler and less time consuming, depending on the number of squelch values requiring adjustment.

23. From the top menu bar:

    Select: **Radio > Write > Calibration Data to Radio**

24. When the Calibration Data Write Complete dialog box appears:

    Click: **[OK]**



25. Return to Step 5.b; repeat the test and alignment procedure until all Squelch values are correctly aligned.
26. Save the final Calibration Data to a local file.
27. If no other testing is to be performed, do the following:
    a. If a "shop" test personality was used to test the radio, reload the original personality into the radio and verify operation.
    b. If conventional test frequency sets were added to the original personality, refer to Section 11.4.2, remove the test sets, and verify radio operation.

11.5.11.1 Alternate Squelch Alignment Procedure

While the FCC menu functionality is not supported as a field test tool, it is generally available to field service personnel. It may be advantageous to follow this alternate method for setting squelch:

1. Select the conventional test channel set: **XG25VSQW**
2. Begin with the RF generator's RF level set to ***Off***.
3. On the radio, press **M** button and use the **Up** or **Down** arrows to select "**FCC MENU**."
4. Press **M** again.
5. Using the **Up** or **Down** arrows, select: **SQ #####** The numbers will appear to be randomly changing between the 2000 to 4000 range.
6. This is the no-carrier "***SQ***" squelch reference value. The average of the randomly changing number represents the current "no-signal" received noise level being detected by the squelch's DAC circuit.
7. From the Utility, program the Squelch Open values 200 to 300 points lower than the no-carrier "***SQ***" value.
8. Program the Squelch Close values 100 to 200 points lower than the no-carrier "***SQ***" value. This functionally sets the radio's squelch to open with a very weak input signal.
9. Set the generator's RF level to ***On*** and slowly increase the RF level while monitoring the SINAD measurement. Record the average "***SQ***" value seen on the radio's display at 6 dB and 8 dB SINAD.
10. Repeat the above procedure until all channels are tested and "***SQ***" values are recorded for 6 dB and 8 dB SINAD.
11. Repeat the procedure for the other modes (systems): **XG25VSQN** and **XG25V PC**.
12. After recording the measured "***SQ***" values for each channel in all modes, reprogram the Squelch Open values with the corresponding 8 dB "***SQ***" reference values, and reprogram the Squelch Close values with the corresponding 6 dB"***SQ***" reference values.
13. Return to Step 5 of the main test procedure and retest each mode and channel using the new Open and Close values. The squelch should be opening around 8 dB SINAD and closing around 6 dB SINAD.

11.5.12 Additional Receiver Test

Speaker out is available at the UDC as a balanced output. The Test Box provides the 8 ohm load for the radio and a balanced to unbalanced output available as a BNC connection. Do not place an external load or speaker to this connection. It is intended for connections to test equipment of several kilo-ohm impedance or higher.

11.5.12.1 Receiver Audio Level and Distortion

1. Place the Device # switch on the test box to position 7.

Placing the Device # switch in position 12 while testing with the Test Box will double terminate the speaker amplifier circuit causing errors in receive audio measurement. Damage to the radio is unlikely, but one should not operate the receive audio amplifier in this condition longer than necessary to make quick measurements

2. Power on the radio, and select any channel of the analog test system.
3. Connect AC Voltmeter, distortion analyzer, SINAD meter and oscilloscope to the "Speaker Out" of the Test Box.

4. Apply a 1000 µV (-47 dBm) RF signal on channel to the radio antenna connector. The RF signal should be modulated with 1 kHz tone at 60% of system deviation or 3 kHz for wide band channel. This is a full quieting signal and should not have any noise.
5. Observe the oscilloscope and AC voltmeter and adjust the volume control to maximum. Audio will be greater than 2 volts and appear free from distortion.
6. Reduce the volume control to produce 2 Vrms or as close as possible.
7. Measure the distortion of the receiver audio. It should be less than 3%.

11.5.12.2 SINAD Measurement

1. Apply a -60 dBm RF signal on channel to the radio antenna connector. The RF signal should be modulated with 1 kHz tone at 60% of system deviation or 3 kHz for wide band channel. This is a full quieting signal and should not have any noise.
2. Decrease the RF level of the signal generator until reaching 12 dB SINAD. The RF level of the signal generator should be less than -119 dBm.
3. SINAD measurement should be repeated on all receive test frequencies across the receive band. Do not test other frequencies at this time.

11.5.12.3 Receiver IF Bandwidth - Signal Displacement Bandwidth Method

1. Apply a -60 dBm RF signal on channel to the radio antenna connector. The RF signal should be modulated with 1 kHz tone at 60% of system deviation or 3 kHz for wide band channel. This is a full quieting signal and should not have any noise.
2. Decrease the RF level of the signal generator until reaching 12 dB SINAD. The RF level of the signal generator should be less than -119 dBm.
3. Increase the RF level of the signal generator by 6 dB from the level in the SINAD test. This is the same as multiplying the output voltage of the signal generator by two.
4. Notice the SINAD meter is reading a higher number and the noise on the signal is less.
5. Increase the RF input signal frequency until the SINAD meter again displays 12 dB. Record the value of the RF frequency of the signal generator as FHI. _____MHz
6. Decrease the RF input signal frequency below the assigned frequency until the SINAD meter again displays 12 dB. Record the value of the RF frequency as FLo. _____MHz
7. Calculate the frequency differences by the following:
   - FDIFF1 = FHI - assigned frequency
   - FDIFF2 = assigned frequency - FLo
8. The smaller of FDIFF1 or FDIFF2 is the signal displacement bandwidth. This value should be between 2 and 7 kHz for a wide band channel.


NOTE

The upper tolerances (7 kHz) are not specifications, but rather an observation that the radio will pass adjacent channel selectivity.

11.5.13 Channel Guard Decode

1. Turn power off on the radio.
2. Place the Device # switch on the test box to position 7.
3. Power the radio on and select any channel, 1 through 6, on system **P55VCGW**.
4. Set the signal generator for a1 kHz tone at 3 kHz deviation.
5. Set a second to for channel guard 67.0 Hz at 0.75 kHz deviation.
6. Set the generator RF level to –119 dBm. The receiver should unmute.
7. Remove the 67.0 Hz tone. The receiver should mute.
8. To test Digital Channel Guard decode, select channel 7.
9. Set the generator send a non-inverted Digital Channel Guard code of 627. The receiver should unmute.
10. Remove the digital code. The receiver should mute.

12. TROUBLESHOOTING

12.1 GENERAL

The objective of this section is to guide in quickly isolating a problem to either hardware or software. Software errors and problems can usually be corrected in the field. Hardware failures are difficult to isolate and sometimes very tedious to repair without specialized tools. Hardware repair to this radio is very limited at best and not recommended. Service Parts has set up a Repair and Return policy. Service Parts has also made provisions for Circuit Board and Module replacement, as required.

This section includes a General Troubleshooting Table and Test Point Diagram for checking nominal Transmit/Receive Levels (not recommended). Table 12-1 provides a list of possible problems and their possible cause.

Table 12-1: General Troubleshooting

SYMPTOM	POSSIBLE CAUSE/ACTION REQUIRED
Completely inoperative (no display or audio on power up)	Power Supply Problem? 1. Check battery voltage with a voltmeter. 2. Charge battery or replace battery. 3. Check to be sure battery contacts are not broke or bent. 4. Clean battery contacts.
At power-up an error message is displayed	1. See the Error Message Tables on the following pages for type of error and for a probable solution. 2. Attempt to reprogram the personality, Flash and DSP using ProGrammer/RPM.
Receiver inoperative or weak	1. Channel Guard or Type 99 Enabled? 2. Defective antenna or antenna switch assembly - replace antenna or antenna switch assembly. 3. Main Board failure? Return to Harris for repair (recommended).
Transmitter inoperative or low power	1. Programmed incorrectly - check personality. 2. Weak battery - check voltage. 3. Defective antenna or antenna switch assembly - replace antenna or antenna switch assembly. 4. Main Board failure? Return to Harris for repair (recommended).
Transmitter and Receiver inoperative on some channels	1. Programmed incorrectly - check personality. 2. Check the flex circuit inside radio for damage. 3. Defective 16-Position Switch? Return to Harris for repair (recommended).

12.2 ERROR CODES

Table 12-2: Fatal System Error Codes

Number	Message	Error Messages
0	Hardware	less than 100, ROM errors
1	Software	
2	Tracking	RADC tracking data fatal error
3	No Lock	synthesizer became unlocked
4	Freqdata	RADC frequency data fatal error
5	Persdata	Personality errors
6	Network	Network errors, dual CU or radio
STARTUP ERRORS		
	RANGE: 0x00-0x0f	
FATAL_NMI_ERROR	(0x0001)	NMI occurred outside of sleep routine
FATAL_RAM_ERROR	(0x0002)	32k RAM test error
FATAL_ROM_CHKSUM	(0x0003)	not used
FATAL_FLSH_CHKSUM	(0x0004)	Flash checksum test error
FATAL_FLSH_UNKNOWN_TYPE	(0x0005)	Flash part is unknown
FATAL_IV_RANDOM	(0x0006)	FIPS random IV test error
FATAL_BYPASS	(0x0007)	FIPS bypass test error
FATAL_NO_VOICE_KEYS	(0x0008)	FIPS no voice keys error
FATAL_FLSH_WRITE	(0x0009)	Flash write error
	RANGE: 0x10-0x2f	
FATAL_TG_LOAD	(0x0010)	Timing Generator driver failed init
FATAL_DSP_LOAD	(0x0011)	DSP driver failed init
FATAL_ABBIE_LOAD	(0x0012)	Abbie driver failed init
FATAL_EE_LOAD	(0x0013)	EE driver failed init
FATAL_ICP_PORTINIT	(0x0014)	ICP digital Iinit failed
FATAL_INTOUT_LOAD	(0x0015)	INTOUT driver failed init
FATAL_INTIN_LOAD	(0x0016)	INTIN driver failed init
FATAL_RADIO_LOAD	(0x0017)	RADIO driver failed init
FATAL_MODEM_LOAD	(0x0018)	MODEM driver failed init
FATAL_EXTIO_LOAD	(0x0019)	EXTIO driver failed init
FATAL_SCI_LOAD	(0x0020)	SCI driver failed init
FATAL_ICP_CHKSUM	(0x0021)	ICP prom chksum
FATAL_I2C_INIT	(0x0022)	I2C driver initialize had problems
FATAL_I2C_MODE_CHG	(0x0023)	I2C driver mode change had problems
FATAL_I2C_WRITE_ERROR	(0x0024)	I2C driver write error
FATAL_UART_INIT	(0x0025)	UART driver init failed
FATAL_TIMER_CONFIG	(0x0026)	The timer init failed

ADI DRIVER FATAL ERROR CODES		
	RANGE: 0x30-0x37	
FATAL_ADI_NOACK	(0x0030)	ADI did not respond to command
LCD DRIVER FATAL ERROR CODES		
	RANGE: 0x40-0x48	
FATAL_LCD_NOACK	(0x0040)	LCD did not ack message
FATAL_LCD_HARD_FAIL	(0x0041)	LCD hardware is invalid
SCI DRIVER FATAL ERROR CODES		
	RANGE: 0x50-0x59	
FATAL_SCI_NOHEAP	(0x0050)	SCI out of heap space
CAN DRIVER FATAL ERROR CODES		
	RANGE: 0x60-0x69	
FATAL_CAN_SEM_INIT	(0x0060)	CAN server semaphore init failure
IPC DSP DRIVER FATAL ERROR CODES		
	RANGE: 0x70-0x79	
FATAL_IPC_NO_RESPONSE	(0x0070)	The DSP did not read a message within 500ms
FATAL_IPC_RESPONSE_OVERRUN	(0x0071)	The DSP gave a response longer than the buffer
FATAL_IPC_STREAM_BLOCKED	(0x0072)	The DSP did not read the stream data within 500ms
FATAL_IPC_STREAM_OVERRUN	(0x0073)	The ARM tried to write more data than the DSP could store
FATAL_DSP_DOWNLOAD_FAIL	(0x0074)	The ARM tried to write the DSP code and failed
FATAL_IPC_NO_ACK	(0x0075)	The ARM didn't get an ACK to a command to the DSP
RADIO DRIVER FATAL ERROR CODES		
	RANGE: 0x80-0x89	
FATAL_XCVR_PLL_PROG_ERROR	(0x0080)	The XCVR failed to program the PLL after N retrys due to uwire collision
FATAL_XCVR_MCU_PROG_ERROR	(0x0081)	The XCVR failed to program the MCU after N retrys
FATAL_XCVR_CAL_DATA_ERROR	(0x0082)	The XCVR failed to find the proper cal data for the radio
FATAL_XCVR_MCU_RX_ADC_ERROR	(0x0083)	The XCVR MCU failed to program the rx adc after N retries
BOOT LOADER DRIVER FATAL ERROR CODES		
	RANGE: 0x90-0x97	
FATAL_ROM_NOHEAP	(0x0090)	No malloc space for ROM task
FATAL_BL_NOHEAP	(0x0091)	No malloc space for BL task
FATAL_BL_SCI_ATTACH	(0x0092)	boot loader could not attach to SCI

MCBSP FATAL ERROR CODES		
FATAL_MCBSP_ERROR	(0x0093)	McBSP configuration error
RXSIF PRIMATIVE FATAL ERROR CODES		
FATAL_RXSIF	(0x0098)	RXSIF fatal
OPERATING SYSTEM FATAL ERROR CODES		
	RANGE: 0x100-0x199	
FATAL_UNEXPECTED_INT	(0x0100)	There was an interrupt that had no handler
FATAL_PREFETCH_ABORT	(0x0101)	Prefetch abort handler
FATAL_DATA_ABORT	(0x0102)	Data abort handler
FATAL_RESERVED_INT	(0x0103)	Reserved interrupt handler
FATAL_UNEXPECTED_INSTRUCTION	(0x0104)	Unexpected interrupt handler
FATAL_OS_BAD_INT_CONFIG	(0x0105)	The interrupt handler failed to set up the IRQ
FATAL_OS_FORK_FAIL	(0x0106)	The OS fork creation process failed
FATAL_OS_PIPE_FAIL	(0x0107)	The OS pipe creation process failed
FATAL_OS_TASK_FAIL	(0x0108)	The OS task creation process failed
FATAL_STACK_OVERFLOW	(0x0109)	A task stack has overflowed
FATAL_TIMER_TASK_ERROR	(0x0110)	The OS timer task creation failed
FATAL_NUCLEUS_ERROR	(0x0111)	The OS returned a fatal error
FATAL_FORK_STACK	(0x0112)	The OS fork stack overflowed
FATAL_PRIORITY_FORK_STACK	(0x0113)	The OS priority fork stack overflowed
FATAL_GPIO_CONFIG_ERROR	(0x0114)	The GPIO config was wrong - check radio config
FATAL_MPUIO_CONFIG_ERROR	(0x0115)	The MPUIO config was wrong - check radio config
FATAL_RADIO_CONFIG_ERROR	(0x0116)	Could not set radio type right using sector 0
FATAL_DOWNLOAD_ERROR	(0x0117)	Failure in the download system
FATAL_MEMORY_ALLOC_ERROR	(0x0118)	Memory allocation failed
FATAL_SEM_PEND_ERROR	(0x0119)	A semaphore pend operation went badly wrong
FATAL_SEM_POST_ERROR	(0x0120)	A semaphore post operation went badly wrong
FATAL_FORK_ERROR	(0x0121)	The OS fork stack had a Nucleus error
FATAL_PRIORITY_FORK_ERROR	(0x0122)	The OS priority fork stack had a Nucleus error

Table 12-3: Fatal Application Error Codes

RADC FATAL SYS ERROR CODES		
RADC_PITD_ERROR	(0x2200)	PERS tracking data error
RADC_PIHW_ERROR	(0x5201)	PERS hardware data error
RADC_FREQ_ERROR	(0x4202)	PERS frequency data error
RADC_PITD_MALLOC_ERROR	(0x1203)	PERS tracking data malloc error
RADC_PITD_CKSUM_ERROR	(0x1204)	PERS tracking data checksum error
RADC_HWREV_ERROR	(0x1205)	HW revision could not be determined
DACS FATAL SYS ERROR CODES		
DACS_NOLOCK_ERROR	(0x3300)	no lock message
DACS_RADC_FAILURE	(0x1302)	Prosound scan failed
DACS_TU_PUT_CISYSMSG_ERROR	(0x1303)	CISYS message buffer not enabled
DACS_TX_CHAN_RADC_FAILURE	(0x1304)	Failure in the Tx frequency load
DACS_RX_CHAN_RADC_FAILURE	(0x1305)	Failure in the Rx frequency load
DACS_TX_CC_HEADER_FAILURE	(0x1306)	Failure to transmit CC header data
DACS_RX_CC_FAILURE	(0x1307)	Failure to set up CC receiver
DACS_RX_WC_FAILURE	(0x1308)	Failure to set up WC receiver
DACS_RX_WC_LSD_FAILURE	(0x1309)	Failure to set up WC LSD receiver
DACS_RX_WC_HSD_LSD_FAILURE	(0x1310)	Failure to set up WC HSD receiver
DACS_TX_CCMSG_FAILURE	(0x1311)	Failure to transmit body of CC message
DACS_TX_IDLE_FAILURE	(0x1312)	Failure to idle transmitter
DACS_TX_WCMSG_FAILURE	(0x1313)	Failure to transmit body of WC message
DACS_SPEAKER_FAILURE	(0x1314)	Failure in radc_speaker
DACS_TX_WC_HSD_FAILURE	(0x1315)	Failure to transmit WC hsd
DACS_TX_WC_PATH_FAILURE	(0x1316)	Failure to select TX hardware path
DACS_TX_DTMF_FAILURE	(0x1317)	Failure to transmit DTMF digit
DACS_TX_LSD_FAILURE	(0x1318)	Failure to transmit LSD
DACS_HSD_SYNC_FAILURE	(0x1319)	Failure of HSD sync setup
EA FATAL SYS ERROR CODES		
EA_MEMORY_ERROR	(0x1350)	mallocfailure message
CONVENTIONAL FATAL SYSTEM ERROR CODES (400 - 499)		
CONV_RADC_ERROR	(0x1400)	error calling RADC function
CONV_NOLOCK_ERROR	(0x3401)	synthesizer became unlocked
CONV_PUT_UIMSG_ERROR	(0x1402)	UI message buffer not enabled
CONV_MODEM_RXOVR	(0x1403)	Conventional DIGV modem overflow
CONV_MODEM_RXAVR	(0x1404)	Conventional DIGV modem underflow
CONV_MODEM_FATAL_ERROR	(0x1405)	Unable to correctly configure the modem for conventional DIGV operation
CONV_PERS_ERROR	(0x5407)	Conventional personality error
CONV_ECP1_RADC_ERROR	(0x1408)	error calling RADC function in ECP1 scan
CONV_RX_CHAN_RADC_ERROR	(0x1409)	error calling RADC function in CHANUTIL - channelized
CONV_RX_ABS_RADC_ERROR	(0x1410)	error calling RADC function in CHANUTIL - absolute freq
CONV_TX_CHAN_RADC_ERROR	(0x1411)	error calling RADC function in CONVTX - channelized
CONV_TX_ABS_RADC_ERROR	(0x1412)	error calling RADC function in CONVTX - absolute freq

CONV_TX_IDLE_RADC_ERROR	(0x1413)	error calling RADC function in CONVTX - idle mode
CONV_P25_DSP_ATTACH_ERROR	(0x1450)	error calling RADC function in CONVTX - idle mode
PERS INTERFACE FATAL SYSTEM ERROR CODES		
PI_NOPERS_ERROR	(0x5500)	personality data is not present
PI_CRC_ERROR	(0x5501)	flash personality CRC did not match EEPROM
PI_DESC_CRC_ERROR	(0x5502)	personality descriptor table CRC error
PI_MALLOC_ERROR	(0x1503)	descriptor table MALLOC error
PI_CUSTOM_SET_ERROR	(0x5504)	custom freq set table error
USER INTERFACE FATAL SYSTEM ERROR CODES		
UI_FATAL_DEVICE_ERROR	(0x5600)	IO device error
UI_FATAL_SWTO_MALLOC_ERROR	(0x1601)	malloc() returned no more memory
UI_FATAL_SWTO_MAX_ERROR	(0x1602)	maximum number of timers exceeded
UI_FATAL_WINDOW_MAX_ERROR	(0x1603)	too many open windows
UI_FATAL_WINDOW_MALLOC_ERROR	(0x1604)	malloc() returned no more memory
UI_FATAL_MESSAGE_INVPARM	(0x1605)	invalid parameter to ui_put_message()
UI_FATAL_RI_MSGBUF_FULL	(0x1606)	RI BBOS message buffer full error
UI_FATAL_CI_MSGBUF_FULL	(0x1608)	CI BBOS message buffer full error
UI_FATAL_DEVICE_NOTSUPPORTED	(0x5609)	Idevice type (from personality) not supported
UI_FATAL_AUXIO_MALLOC_ERROR	(0x1610)	malloc() returned no more memory
UI_FATAL_NET_DEVICE_ERROR	(0x5611)	Network Idevice error
UI_FATAL_INVALID_CUID	(0x6612)	CU ID is invalid, usually CU=07 in a single CU system
UI_FATAL_NO_TONE_DATA	(0x5613)	No tone data is available in pers
UI_FATAL_UIIO_MSGBUF_FULL	(0x1614)	UI IBBOS message buffer full error
UI_FATAL_PROMOTE_MALLOC_ERROR	(0x1615)	malloc() returned no more memory
UI_FATAL_REMAP_MALLOC_ERROR	(0x1616)	malloc() returned no more memory
UI_FATAL_STDIO_ERROR	(0x1617)	UI stdio trash message received error
TEST UNIT FATAL SYSTEM ERROR CODES		
TU_FATAL_RXBUF_MALLOC_ERROR	(0x1701)	rx msg buffer malloc() failed
TU_FATAL_TXBUF_MALLOC_ERROR	(0x1702)	tx msg buffer malloc() failed
TU_FATAL_PUT_UIMSG_ERROR	(0x1703)	bb message to UI task failed
TU_FATAL_PUT_RISYSMSG_ERROR	(0x1704)	bb message to RISYS task failed
TU_FATAL_FASTPUT_TXMSG_ERROR	(0x1705)	bios call for Voter Monitor failed
AEGIS FATAL SYSTEM ERROR CODES		
AEGIS_ADI_OVERFLOW	(0x1801)	ADI Transmit event not serviced in time and buffer has over flowed
AEGIS_RXBUF_MALLOC_ERROR	(0x1802)	malloc() returned no more memory available
AEGIS_KEYLOAD_MALLOC_ERROR	(0x1803)	malloc() for keyloader table returned no more memory available
AEGIS_KEYLOAD_ERROR	(0x1804)	a general keyload error has occurred
AEGIS_DATAMEM_MALLOC_ERROR	(0x1805)	malloc() for data memory returned error
AEGIS_KEYLOAD_NOTABLE	(0x1806)	no key table was found in EEPROM despite personality saying on existed
AEGIS_KEYLOAD_BAD_TABLESIZE	(0x1807)	key table found in e^2 is wrong size for the pers
AEGIS_KEYLOAD_CORRUPT_TABLE	(0x1808)	key table has been corrupted in e^2

FIPS 140 FATAL SYSTEM ERROR CODES		
FIPS_INVALID_DESMAC_KEY	(0x1902)	Invalid DESMAC key
FIPS_DESMAC_CHECKSUM_FAILED	(0x1903)	DESMAC checksum failed
FIPS_DSP_ATTACH_DESMAC_FAILED	(0x1904)	DESMAC DSP ATTACH Failed
RI FATAL SYSTEM ERROR CODES		
RI_FATAL_MRADIO_FAILURE	(0x6901)	Mult-radio device stopped talking to each other

Table 12-4: Non-Fatal Application Error Codes

ERROR MESSAGES USED BY ALL LIBRARIES		
ERRMSG_FEAT_ENC	(1)	Feature encryption error message
ERRMSG_NOLOCK	(2)	synthesizer became unlocked message
ERRMSG_NOKEYBANK	(3)	no key banks have been allocated in the personality
ERRMSG_BAD_TRACK_DATA	(5)	Tracking data was in error Prism is using default
ERRMSG_PI_DUALPERS	(6)	Dual personality recoverable error message
ERRMSG_GSTAR_ERROR	(7)	GSTAR Error
ERRMSG_TONE_ENC_ERROR	(8)	Tone Encode Error
ERRMSG_KEY_ERROR	(10)	DSP Did not respond to key query
FLAGS TO SET PERSISTENT ERROR MESSAGES, THOSE ERRORS WILL BE DISPLAYED UNTIL ERROR IS DECLARED AGAIN WITH THE CLEAR FLAG SET.		
PERSIST_NONFATAL_ERROR	(0x8000)	set for persist error condition, error will be cleared with another call
CLEAR_NONFATAL_ERROR	(0x1000)	clear persisting error

Table 12-5: Personality Interface Non-Fatal System Error Codes

FEATURE ENCRYPTION ERRORS		
PIFEAT_SNR_ERROR	(0x0550)	Can not read SROM
PIFEAT_READ_ERROR	(0x0551)	PERS sizes don't match
PIFEAT_CRC_ERROR	(0x0552)	decryption failure
PIFEAT_TRACK_ERROR	(0x0553)	Tracking data failure
DUAL PERSONALITY ERRORS - THE OLD PERSONALITY, EEPROM WILL BE RECOVERED		
PIDP_PERS_ERR	(0x0580)	Personality failure
PIDP_TRACK_ERR	(0x0581)	Tracking data failure
PIDP_FEAT_ERR	(0x0582)	Feature data failure
PIDP_IMAGE_ERR	(0x0583)	Image failure

CALIBRATION PARAMETER ERROR CODES		
CAL_DATA_MISSING_ERROR	(0x0560)	ECP Calibration data missing; Cal data updated to current defaults
CAL_DATA_UPDATE_ERROR	(0x0561)	Cal data update failed
CAL_DATA_DATED_REVISION_ERROR	(0x0562)	ECP Calibration data older than current revision; Cal data updated to current defaults
CAL_DATA_NEWER_REVISION_ERROR	(0x0563)	ECP Calibration data newer than current revision
TA_CAL_DATA_MISSING_ERROR	(0x0590)	TestApp Calibration data missing; Cal data updated
TA_CAL_DATA_UPDATE_ERROR	(0x0591)	TestApp Cal data update failed
TA_CAL_DATA_DATED_REVISION_ERROR	(0x0592)	TestApp Calibration data older than current revision; Cal data updated to current defaults
TA_CAL_DATA_NEWER_REVISION_ERROR	(0x0593)	TestApp Calibration data newer than current revision

Table 12-6: Non-Fatal System Error Codes

USER INTERFACE		
AEGIS_PVT_NONE	(0x0870)	
AEGIS_KEYLOAD_NOBANKS	(0x0871)	
AEGIS_DSP_CRC	(0x0872)	
DIGVOICE_ERR_SYS_NOT_DIG	(0x0880)	Group is set to digital but system vocoder is set to analog
DIGVOICE_ERR_NO_VG_SUPPORT	(0x0881)	VG is not supported by the DSP
DIGVOICE_ERR_NO_AEGIS_SUPPORT	(0x0882)	Aegis is not supported by the DSP
DIGVOICE_ERR_NO_IMBE_SUPPORT	(0x0883)	IMBE is not supported by the DSP
DIGVOICE_ERR_NO_DIG_FEAT	(0x0884)	Attempt to use VG or Aegis vocoder with the Digital voice feature turned off
DIGVOICE_ERR_NO_IMBE_FEAT	(0x0885)	Attempt to use IMBE vocoder with the IMBE feature turned off
RADC_NO_HWREV	(0x0890)	HW revision could not be determined
RADC_GSTAR_ERROR	(0x0891)	No GSTAR response from DSP
RADC_TONE_ENC_ERROR	(0x0892)	No Tone Encode response from DSP
RADC_KEY_QUERY_ERROR	(0x0894)	DSP did not respond to key query

13. CUSTOMER SERVICE

13.1 CUSTOMER CARE

If any part of the system equipment is damaged on arrival, contact the shipper to conduct an inspection and prepare a damage report. Save the shipping container and all packing materials until the inspection and the damage report are completed. In addition, contact the Customer Care center to make arrangements for replacement equipment. Do not return any part of the shipment until you receive detailed instructions from a Harris representative.

Contact the Customer Care center at http://www.pspc.harris.com/CustomerService or:

North America:

Phone Number: 1-800-368-3277

Fax Number: 1-321-409-4393

E-mail: PSPC_CustomerFocus@harris.com

International:

Phone Number: 1-434-455-6403

Fax Number: 1-321-409-4394

E-mail: PSPC_InternationalCustomerFocus@harris.com

13.2 TECHNICAL ASSISTANCE

The Technical Assistance Center's (TAC) resources are available to help with overall system operation, maintenance, upgrades and product support. TAC is the point of contact when answers are needed to technical questions.

Product specialists, with detailed knowledge of product operation, maintenance and repair provide technical support via a toll-free (in North America) telephone number. Support is also available through mail, fax and e-mail.

For more information about technical assistance services, contact your sales representative, or call the Technical Assistance Center at:

North America: 1-800-528-7711

International: 1-434-385-2400

Fax: 1-434-455-6712

E-mail: PSPC_tac@harris.com

14. REPLACEABLE PARTS

Replaceable assemblies can be ordered through Harris Corporation's Customer Care Center (see Section 13.1 for contact information). Component Items listed in the following sections, identified with Harris part numbers, are available through the Customer Care Center and are listed in the Harris Service Parts and Accessories Catalog. The parts lists in Section 15 are for reference only or are considered common parts and can be obtained from your local electronic parts distributor.

14.1 PRINTED WIRE BOARDS AND MODULES

Refer to assembly diagrams at the back of this manual.

PART NUMBER	DESCRIPTION
14011-0013-01	Main Board Assembly, VHF
14011-0014-21	Interface Board, Scan
14011-0014-20	Interface Board, System (see following caution)

Replacement Interface Boards (part numbers 14011-0014-20 and 14011-0014-21) are shipped with a protective film covering the microphone. This protective film MUST be removed before installation in the radio.

14.2 MECHANICAL ASSEMBLIES

Refer to assembly diagrams at the back of this manual.

PART NUMBER	DESCRIPTION
14011-0014-01	Front Cover Assembly, XG-25P System
14011-0014-02	Front Cover Assembly, XG-25P Scan
14011-0014-03	Rear Casting Assembly
14011-0014-24	RF Shield Assembly
14011-0014-07	Rear Cover Assembly
14011-0014-16	UDC PWB Kit
14011-0014-15	Top Cover Kit
14011-0014-18	Side Cover Kit

14.3 KITS

Refer to assembly diagrams at the back of this manual.

PART NUMBER	DESCRIPTION
14011-0014-04	XG-25P Outer Knob Kit
14011-0014-06	Channel Knob Kit
14011-0014-05	Volume Knob Kit
14011-0014-28	Antenna Launch Assembly
14011-0014-09	System Keypad
14011-0014-10	Scan Keypad
14011-0014-08	Switch Module Assembly
14011-0014-12	XG-25P LCD Lens Kit
14011-0014-25	External Hardware Kit
14011-0014-26	Internal Hardware Kit
14011-0014-17	Gasket Kit
14011-0014-11	Speaker Assembly Kit
14011-0014-13	Speaker Cloth Kit
14011-0014-14	Nameplate
14011-0014-19	LCD Module Assembly
14011-0014-22	Microphone Gasket Kit
14011-0014-23	Rear Vent Kit
14011-0014-27	Ground Screw Kit

14.4 MISCELLANEOUS TOOLS

Refer to the Service Section of this manual.

PART NUMBER	DESCRIPTION
12RTD	Torque Driver
B-W1.27	Hex Bit, 1.27mm
FM-016782-001	Channel Switch Ring Nut Replacement Driver Bit Tool
FM-016782-002	Volume Switch Ring Nut Replacement Driver Bit Tool
T4WK03399	Special Tool for Volume and Channel Switch
337097G1B	Antenna Insert Tool
19B801496G2	RF Antenna Adapter
CA-023407-004	Universal Test Cable
CA-023407-002	Audio Test Cable
BT-023406-015	Battery Eliminator
MATQ-03424	Audio Test Box
CA-023407-001	Programming/Keyloader Cable
CA-023407-003	Data Cable

15. PARTS LIST

15.1 MAIN BOARD

DE02-CMN-2741, Rev. 2

REF	DESCRIPTION
	CAPACITORS
C0601	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0602	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0608	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0610	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0611	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM188R11C334KA01D
C0612	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0613	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0614	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0615	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0616	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0617	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0618	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0619	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H271JA01D
C0620	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0621	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0623	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C0624	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C0626	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0627	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C0628	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C0629	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C0701	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0702	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0703	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0704	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0705	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0706	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0707	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0708	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0709	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0710	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0711	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0712	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C0713	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0714	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0715	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0716	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0717	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0718	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0719	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0720	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0801	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0802	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0803	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0804	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0805	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0806	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0807	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0811	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0814	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C0815	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0816	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R71E105KA12D
C0817	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R11E104KA01D
C0818	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R11E104KA01D
C0819	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C0820	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C0821	Capacitor ±10% 50V Similar to Murata Manufacturing Co., Ltd. GRM155R11H391KA01D
C0822	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C0823	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C0901	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C0902	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D

REF	DESCRIPTION
C0903	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0904	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0905	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0906	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0907	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0908	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0909	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0910	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0911	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C0912	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C0913	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C0914	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C0915	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0916	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0917	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0918	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0922	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C0923	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0924	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C0925	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0926	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0927	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0928	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0929	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0930	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0931	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0932	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0933	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0934	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0935	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0936	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0937	Capacitor ±5% 25V Similar to GRM0332C1E100JA01D
C0938	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C1007	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C223KA01D
C1008	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM31CR71E106KA12L
C1009	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM31CR71E106KA12L
C1010	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H100JA01D
C1011	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H221JA01D
C1012	Capacitor ±10% 50V Similar to Murata Manufacturing Co., Ltd. GRM155R11H222KA01D

REF	DESCRIPTION
C1013	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R11E104KA01D
C1014	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H100JA01D
C1015	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM31CR71E106KA12L
C1016	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM31CR71E106KA12L
C1017	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1018	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM21BR71A475KA73L
C1019	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H560JA01D
C1020	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM21BR61C106KE15L
C1021	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM21BR71A475KA73L
C1023	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H121JA01D
C1024	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM21BR61C106KE15L
C1025	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1027	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1028	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1029	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1030	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1031	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1032	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R11E104KA01D
C1033	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C1034	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM188R11C334KA01D
C2101	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2102	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2103	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2104	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H680JA01D
C2105	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2112	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2113	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2114	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2115	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2116	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2117	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2118	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2119	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D

REF	DESCRIPTION
C2120	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2131	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2132	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2133	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H680JA01D
C2141	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2142	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H180JA01D
C2143	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H390JA01D
C2144	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2145	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2146	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2148	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2149	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2150	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2151	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C2152	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2153	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2154	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H330JA01D
C2156	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H680JA01D
C2157	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H470JA01D
C2158	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H220JA01D
C2159	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H471JA01D
C2160	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2161	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2162	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM21BR61C106KE15L
C2163	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2171	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H7R0BA01D
C2172	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H471JA01D
C2173	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2174	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2175	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2176	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2179	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2181	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1882C1H471JA01D

REF	DESCRIPTION
C2182	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2183	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2184	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2185	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2187	Capacitor ±1% 100V Similar to Murata Manufacturing Co., Ltd. GRM1882C2A100FA01D
C2188	Capacitor ±1% 100V Similar to Murata Manufacturing Co., Ltd. GRM1882C2A100FA01D
C2189	Capacitor ±1% 100V Similar to Murata Manufacturing Co., Ltd. GRM1882C2A270FA01D
C2190	Capacitor ±0.1pF 100V Similar to Murata Manufacturing Co., Ltd. GRM1882C2A6R0BZ01D
C2191	Capacitor ±1% 100V Similar to Murata Manufacturing Co., Ltd. GRM1882C2A270FA01D
C2193	Capacitor ±1% 100V Similar to Murata Manufacturing Co., Ltd. GRM1882C2A100FA01D
C2194	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2195	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2200	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2201	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2202	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H9R0BA01D
C2204	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2205	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D
C2206	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D
C2207	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2208	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D
C2209	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2210	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2211	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2212	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2213	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2214	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2216	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2217	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2218	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2219	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2221	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C2224	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H5R0BA01D
C2225	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D

REF	DESCRIPTION
C2226	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2227	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2228	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2230	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2231	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D
C2232	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D
C2233	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2234	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H9R0BA01D
C2235	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H9R0BA01D
C2236	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2237	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2241	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2242	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2243	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2245	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2246	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2247	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2248	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2250	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2251	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2252	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2253	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2254	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2255	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2261	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2262	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H100FA01D
C2263	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2265	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2266	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2267	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2270	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H240FA01D
C2271	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2272	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H240FA01D

REF	DESCRIPTION
C2273	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2274	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2275	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2276	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2280	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2281	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H680JA01D
C2282	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H100FA01D
C2283	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2284	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2285	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2286	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2287	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1553C1H3R0BA01D
C2288	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C223KA01D
C2289	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H560JA01D
C2290	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2291	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2294	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C2295	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C2296	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2297	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C2298	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H101JA01D
C2299	Capacitor ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H220FA01D
C2301	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2303	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2304	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2311	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2312	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2313	Capacitor ±5% 10V Similar to Murata Manufacturing Co., Ltd. GRM1881X1A333JA01D
C2314	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GJ421BC81E334KA01L
C2315	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2316	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2317	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GJ421BC81E334KA01L
C2322	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D

REF	DESCRIPTION
C2323	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2324	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2325	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2334	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H120JA01D
C2335	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H6R0BA01D
C2336	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H120JA01D
C2341	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2342	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2345	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM188R71A225KE15D
C2347	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM155B31A105KE15D
C2348	Capacitor ±10% 6.3V Similar to Murata Manufacturing Co., Ltd. GRM155R60J474KE19D
C2349	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM155B31A105KE15D
C2350	Capacitor ±10% 6.3V Similar to Murata Manufacturing Co., Ltd. GRM155R60J684KE19D
C2351	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2352	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2353	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2361	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2362	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2363	Capacitor ±5% 10V Similar to Murata Manufacturing Co., Ltd. GRM1881X1A223JA01D
C2364	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GJ4219C81E224KA01D
C2365	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2366	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2367	Capacitor ±10% 25V Similar to Murata Manufacturing Co., Ltd. GJ4216C81E104KA01D
C2372	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2373	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2375	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2376	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2377	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2378	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2381	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2382	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2383	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H820JA01D
C2384	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D

REF	DESCRIPTION
C2385	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1554C1H2R0BA01D
C2386	Capacitor ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H4R0BA01D
C2388	Capacitor ±0.25pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1554C1H1R0CA01D
C2391	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2392	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2401	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2402	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2403	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM21BR71A475KA73L
C2404	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2405	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2406	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2407	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2408	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2409	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM21BR61C106KE15L
C2410	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2411	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2412	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2413	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2414	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2415	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2416	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C2417	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2430	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2431	Capacitor ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C2432	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2433	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2434	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C2435	Capacitor ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM21BR71A475KA73L
C2436	Capacitor ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
CONNECTORS	
J0901	Connector Similar to Panasonic Electric Works Co., Ltd. AYF531065
J0902	Connector Similar to Panasonic Electric Works Co., Ltd. AXK5S70037YG
J2101	Connector Similar to H-7JAPD0004
J2441	Connector Similar to H-7JTPD0003A

REF	DESCRIPTION
COUPLER	
DC2171	Coupler Similar to MKT TAISEI CO., LTD. DCS3D20-0157-G
DIODES	
CD0601	Diode Similar to ROHM Co., Ltd. DAN217WTL
CD0602	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0901	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0902	Diode Similar to SML-522MUWT86
CD0903	Diode Similar to DF5A6.8JE(TE85L_F)
CD0904	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0905	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0906	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0907	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0908	Diode Similar to DF5A6.8JE(TE85L_F)
CD0909	Diode Similar to DF5A6.8JE(TE85L_F)
CD0910	Diode Similar to Renesas Electronics Corporation HZC18TRF-E
CD0911	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD0912	Diode Similar to DF5A6.8JE(TE85L_F)
CD1002	Diode Similar to HN2S03FE(TE85L F)
CD1003	Diode Similar to HN2S03FE(TE85L F)
CD1004	Diode Similar to HN2S03FE(TE85L F)
CD2111	Diode Similar to Avago Technologies Ltd. HSMP-3816-TR1G
CD2181	Diode Similar to SMP1324-087LF
CD2182	Diode Similar to SMP1321-079LF
CD2201	Diode Similar to JDV2S08FS(TPL3)
CD2202	Diode Similar to JDV2S08FS(TPL3)
CD2203	Diode Similar to JDV2S08FS(TPL3)
CD2204	Diode Similar to JDV2S08FS(TPL3)
CD2205	Diode Similar to HSU277TRF-E
CD2206	Diode Similar to HSU277TRF-E
CD2207	Diode Similar to HSU277TRF-E
CD2208	Diode Similar to HSU277TRF-E
CD2210	Diode Similar to 1SS427(TPL3)
CD2211	Diode Similar to 1SS427(TPL3)
CD2212	Diode Similar to JDH2S01FS(TPL3)
CD2213	Diode Similar to JDH2S01FS(TPL3)
CD2221	Diode Similar to JDV2S08FS(TPL3)
CD2222	Diode Similar to JDV2S08FS(TPL3)
CD2223	Diode Similar to JDV2S08FS(TPL3)
CD2224	Diode Similar to JDV2S08FS(TPL3)
CD2225	Diode Similar to JDV2S08FS(TPL3)
CD2226	Diode Similar to JDV2S08FS(TPL3)
CD2227	Diode Similar to JDV2S08FS(TPL3)
CD2228	Diode Similar to JDV2S08FS(TPL3)
CD2229	Diode Similar to JDV2S08FS(TPL3)
CD2230	Diode Similar to JDV2S08FS(TPL3)
CD2231	Diode Similar to JDV2S08FS(TPL3)
CD2232	Diode Similar to JDV2S08FS(TPL3)
CD2441	Diode Similar to TOSHIBA CORPORATION CMS14_TE12L_Q
CD2442	Diode Similar to Renesas Electronics Corporation HZC18TRF-E
FILTERS	
FL0701	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL0804	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0805	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0901	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D

REF	DESCRIPTION
FL0902	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D
FL1001	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2141	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2142	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2143	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2144	Filter Similar to Murata Manufacturing Co., Ltd. NFE31PT222Z1E9L
FL2171	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2201	Filter Similar to Daishinku Corp. H-7XMPD0028
FL2401	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2430	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2440	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2441	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2443	Filter Similar to Murata Manufacturing Co., Ltd. NFM41PC155B1E3L
FL0701	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL0804	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0805	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0901	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D
FL0902	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D
FL1001	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2141	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2142	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2143	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2144	Filter Similar to Murata Manufacturing Co., Ltd. NFE31PT222Z1E9L
FL2171	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2201	Filter Similar to Daishinku Corp. H-7XMPD0028
FL2401	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2430	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2440	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2441	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2443	Filter Similar to Murata Manufacturing Co., Ltd. NFM41PC155B1E3L
FL0701	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL0804	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0805	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0901	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D

REF	DESCRIPTION
FL0902	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D
FL1001	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2141	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2142	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2143	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2144	Filter Similar to Murata Manufacturing Co., Ltd. NFE31PT222Z1E9L
FL2171	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2201	Filter Similar to Daishinku Corp. H-7XMPD0028
FL2401	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2430	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2440	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2441	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2443	Filter Similar to Murata Manufacturing Co., Ltd. NFM41PC155B1E3L
FL0701	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL0804	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0805	Filter Similar to Murata Manufacturing Co., Ltd. BLM21PG221SN1D
FL0901	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D
FL0902	Filter Similar to Murata Manufacturing Co., Ltd. BLA2AAG102SN4D
FL1001	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2141	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2142	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2143	Filter Similar to Murata Manufacturing Co., Ltd. BLM18BB141SN1D
FL2144	Filter Similar to Murata Manufacturing Co., Ltd. NFE31PT222Z1E9L
FL2171	Filter Similar to Murata Manufacturing Co., Ltd. BLM18PG121SN1D
FL2201	Filter Similar to Daishinku Corp. H-7XMPD0028
FL2401	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2430	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2440	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2441	Filter Similar to Murata Manufacturing Co., Ltd. NFM21PC105B1C3D
FL2443	Filter Similar to Murata Manufacturing Co., Ltd. NFM41PC155B1E3L
FUSE	
F2441	Fuse Similar to MATSUO ELECTRIC CO., LTD. KAB2402252NA29010
INTEGRATED CIRCUITS	
IC0601	IC Similar to H-7DDPD0039A
IC0602	IC Similar to Texas Instruments Incorporated OMAP5910JZZG2

REF	DESCRIPTION
IC0603	IC Similar to Texas Instruments Incorporated ADS7924IRTER
IC0604	IC Similar to Analog Devices, Inc. AD5245BRJZ50-RL7
IC0605	IC Similar to TC7SBD384AFU(T5L_F)
IC0701	IC Similar to H-7DEPD0032C
IC0702	IC Similar to Cypress Semiconductor Corporation CY62167EV18LL-55BVXIT
IC0801	IC Similar to TLV320AIC3105IRHBR
IC0802	IC Similar to Maxim Integrated Products, inc. MAX9768BETG+
IC0901	IC Similar to TC74LCX08FK(EL_K)
IC0902	IC Similar to TC74VHCT08AFK(EL K)
IC1005	IC Similar to Ricoh Company, Ltd. R3119N050A-TR-FE
IC1006	IC Similar to LTC3601EUD#TRPBF
IC1007	IC Similar to XC9235F08DER-G
IC1008	IC Similar to XC9235F08DER-G
IC1009	IC Similar to RP102K151D-TR
IC1010	IC Similar to RP102K181D-TR
IC1011	IC Similar to RP102K301D-TR
IC1012	IC Similar to Ricoh Company, Ltd. R1154L050B-TR
IC1013	IC Similar to Ricoh Company, Ltd. R3116K271A-TR
IC2101	IC Similar to UPC2708TB-E3-A
IC2111	IC Similar to LMV931MGX/NOPB
IC2131	IC Similar to UPC2708TB-E3-A
IC2141	IC Similar to LMV931MGX/NOPB
IC2171	IC Similar to LMV221SD/NOPB
IC2191	IC Similar to S-58LM20A-I4T1G
IC2201	IC Similar to NJG1635AHB6(TE1)-#ZZZB
IC2202	IC Similar to NJG1635AHB6(TE1)-#ZZZB
IC2203	IC Similar to NJG1635AHB6(TE1)-#ZZZB
IC2204	IC Similar to NJG1635AHB6(TE1)-#ZZZB
IC2205	IC Similar to LMV931MGX/NOPB
IC2206	IC Similar to TriQuint Semiconductor CMY210TR
IC2207	IC Similar to UPC2746TB-E3-A
IC2208	IC Similar to LMV931MGX/NOPB
IC2301	IC Similar to LMV931MGX/NOPB
IC2311	IC Similar to LMP7731MFX/NOPB
IC2312	IC Similar to TS5A3167DCKR
IC2313	IC Similar to TS5A3167DCKR
IC2321	IC Similar to LMP7731MFX/NOPB
IC2341	IC Similar to Analog Devices, Inc. ADG704BRMZ-REEL
IC2361	IC Similar to LMP7731MFX/NOPB
IC2362	IC Similar to TS5A3167DCKR
IC2363	IC Similar to TS5A3167DCKR
IC2381	IC Similar to UPC3227TB-E3-A
IC2401	IC Similar to TK11250CUIB-G
IC2402	IC Similar to New Japan Radio Co., Ltd. NJM2830U1-58(TE1)-#ZZZB
IC2403	IC Similar to New Japan Radio Co., Ltd. NJM2863F05(TE1)-#ZZZB
IC2430	IC Similar to RP102K301D-TR
IC2501	IC Similar to Japan Radio Co., Ltd. CMN-779C
INDUCTORS	
L0806	Inductor ±20% - Similar to VLS3012ET-2R2M
L0807	Inductor ±20% - Similar to VLS3012ET-2R2M
L0808	Inductor ±20% - Similar to VLS3012ET-2R2M
L0901	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L1001	Inductor ±20% - Similar to Murata Manufacturing Co., Ltd. LQH44PN2R2MP0L
L1002	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQM2MPN1R5NG0L

REF	DESCRIPTION
L1003	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQM2MPN1R5NG0L
L2101	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQG15HSR18J02D
L2111	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQG15HSR18J02D
L2131	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQG15HSR18J02D
L2141	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN56NG00D
L2142	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN82NG00D
L2143	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR15G00D
L2144	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN68NG00D
L2145	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN18NG00D
L2146	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR10G00D
L2147	Inductor ±10% - Similar to AS030316-N-TO
L2148	Inductor ±5% - Similar to AS030421-NJ-TO
L2149	Inductor ±5% - Similar to AS030621-NJ-TO
L2150	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN15NG00D
L2181	Inductor ±5% - Similar to AS030621-NJ-TO
L2182	Inductor ±5% - Similar to AS030721-NJ-TO
L2183	Inductor ±5% - Similar to AS030721-NJ-TO
L2184	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQW18CNR56J00D
L2185	Inductor ±5% - Similar to TDK Corporation MLF1608DR56JT
L2186	Inductor ±5% - Similar to TDK Corporation MLF1608DR56JT
L2187	Inductor ±5% - Similar to TDK Corporation MLF1608DR56JT
L2201	Inductor ±2% - Similar to TOKO, INC. LLQ2012-F56NG
L2202	Inductor ±2% - Similar to TOKO, INC. LLQ2012-F56NG
L2203	Inductor ±2% - Similar to TOKO, INC. LLQ2012-F56NG
L2204	Inductor ±2% - Similar to TOKO, INC. LLQ2012-F56NG
L2205	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN56NG00D
L2210	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18AN33NG00D
L2211	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQG18HN56NJ00D
L2213	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR27G00D
L2214	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L2215	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L2218	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L2220	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR39G00D
L2221	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR15G00D
L2231	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L2232	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L2233	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D
L2234	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR47G00D

REF	DESCRIPTION
L2322	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR39G00D
L2331	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQG15HS27NJ02D
L2372	Inductor ±2% - Similar to Murata Manufacturing Co., Ltd. LQW18ANR39G00D
L2381	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQG15HS10NJ02D
L2401	Inductor ±5% - Similar to Murata Manufacturing Co., Ltd. LQW18CNR47J00D
	RESISTORS
R0601	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0602	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0604	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0605	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0606	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R0607	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R0608	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0609	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0610	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0611	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R0612	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R0613	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R0614	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0615	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ394X
R0616	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R0626	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ122X
R0627	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R0628	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0629	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0630	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0631	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0632	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0633	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0634	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0635	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ182X
R0636	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R0637	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X

REF	DESCRIPTION
R0638	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ274X
R0639	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ274X
R0640	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0641	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0642	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0643	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0644	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0647	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ100X
R0648	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0701	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0702	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0703	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0704	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0705	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0706	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0707	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0708	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0709	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0710	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0711	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0712	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0713	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0714	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0715	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0716	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0717	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0718	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0719	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0720	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0721	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0722	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0723	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0724	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C

REF	DESCRIPTION
R0725	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0726	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0727	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0728	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0729	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0730	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0731	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0732	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0733	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0734	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0735	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0736	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0737	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0738	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0739	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0740	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0741	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0742	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0743	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0744	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0745	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0747	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0748	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0749	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0750	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0751	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0752	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0758	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0760	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0761	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ100X
R0805	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ222X
R0812	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ123X
R0813	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ203X

REF	DESCRIPTION
R0814	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0815	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0817	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R0818	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0901	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0902	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0903	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0904	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0905	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0906	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0907	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0908	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0909	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0910	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0911	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0912	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R0913	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ181X
R0914	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ181X
R0915	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0916	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0917	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0918	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0919	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0920	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0921	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0922	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0923	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0924	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R0925	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0926	Resistor ±5% 0.25W Panasonic Electronic Devices Co., Ltd. ERJ8GEYJ1R0V
R0927	Resistor ±5% 0.25W Panasonic Electronic Devices Co., Ltd. ERJ8GEYJ1R0V
R0928	Resistor ±5% 0.125W Panasonic Electronic Devices Co., Ltd. ERJ6GEYJ222V
R0929	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ122X

REF	DESCRIPTION
R0930	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0931	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0932	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0933	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0934	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0935	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0936	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0937	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0938	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0939	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0940	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0941	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0942	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0943	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R0944	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R0945	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0946	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R0947	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0948	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R0949	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ560X
R0950	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R0951	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ3GEY0R00V
R0953	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0954	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0955	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0956	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0957	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0958	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0959	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0960	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0961	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0962	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0963	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C

REF	DESCRIPTION
R0964	Resistor ±5% 0.05W Panasonic Electronic Devices Co., Ltd. ERJ1GEJ510C
R0965	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ100X
R1003	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ274X
R1004	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ274X
R1005	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF474X
R1010	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R1012	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R1014	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1016	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1018	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF184X
R1019	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1021	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ133X
R1022	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1023	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF683X
R1024	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF223X
R1025	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF103X
R1026	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF103X
R1027	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R1028	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1029	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF474X
R1030	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF474X
R1031	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ154X
R1032	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1033	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF394X
R1034	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF244X
R1035	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ154X
R1036	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1037	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1038	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1039	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1040	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ564X
R1041	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R1042	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X

REF	DESCRIPTION
R1044	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R1045	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2101	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ221X
R2102	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ220X
R2103	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ221X
R2105	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2111	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R2113	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R2114	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ151X
R2115	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ151X
R2116	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R2117	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ152X
R2119	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2120	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2121	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2125	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R2141	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ120X
R2142	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ224X
R2143	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ124X
R2144	Resistor ±1% 0.125W KOA CORPORATION RN73H2ATTD12R0F50
R2145	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ150X
R2146	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ154X
R2147	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2148	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ821X
R2149	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2150	Resistor ±1% 0.125W KOA CORPORATION RN73H2ATTD12R0F50
R2151	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2171	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ180X
R2172	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ470X
R2173	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ152X
R2174	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ470X
R2176	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R2177	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ181X

REF	DESCRIPTION
R2181	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ222X
R2182	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ222X
R2183	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2184	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ222X
R2185	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2186	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ511X
R2188	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ106X
R2189	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ222X
R2191	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R2192	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF273X
R2193	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF273X
R2202	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2203	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2204	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2205	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2206	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ273X
R2207	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ123X
R2208	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2209	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2210	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ122X
R2211	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ100X
R2215	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2216	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2217	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2218	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2219	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2220	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R2221	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R2222	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ563X
R2223	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ473X
R2225	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ471X
R2226	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ120X
R2227	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ471X

REF	DESCRIPTION
R2230	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R2234	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2238	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2250	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ123X
R2251	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ682X
R2252	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ100X
R2254	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ393X
R2256	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R2257	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ223X
R2261	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2262	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ223X
R2263	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ182X
R2264	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ153X
R2265	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ153X
R2266	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ471X
R2267	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ182X
R2290	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ223X
R2291	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2301	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R2302	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2303	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ222X
R2304	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R2305	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2311	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2312	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ272X
R2313	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ561X
R2316	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ220X
R2317	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ271X
R2322	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB152X
R2323	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB102X
R2331	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ180X
R2332	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ180X
R2333	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ180X

REF	DESCRIPTION
R2335	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2339	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2341	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ125X
R2345	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB8661X
R2347	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2348	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB1871X
R2350	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2351	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB1961X
R2353	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2354	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB202X
R2356	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2357	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB5491X
R2361	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2362	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ332X
R2363	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ681X
R2364	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB102X
R2365	Resistor ±0.1% 0.063W Panasonic Electronic Devices Co., Ltd. ERA2AEB681X
R2366	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ330X
R2367	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ561X
R2384	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R2385	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ4R7X
R2386	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ102X
R2387	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2388	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ103X
R2389	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ101X
R2390	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2391	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ125X
R2392	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2401	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2402	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2403	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ821X
R2404	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2405	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X

REF	DESCRIPTION
R2406	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2407	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2430	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2431	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R2432	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ152X
R2502	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ472X
R2503	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ274X
R2504	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF103X
R2505	Resistor ±1% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2RKF122X
R2506	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ182X
R2507	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R2508	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ472X
R2509	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2510	Resistor Jumper 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R2511	Resistor ±5% 0.1W Panasonic Electronic Devices Co., Ltd. ERJ2GEJ274X
MISCELLANEOUS	
S0901	Switch SKRTLAE010
RT0601	Thermistor Murata Manufacturing Co., Ltd. NCP15XH103J03RC
HC2321	VCO SOSHIN ELECTRIC CO., LTD. H-7DHPD0007
HC2371	VCO SOSHIN ELECTRIC CO., LTD. H-7DHPD0008
XU2301	VCTXO NIHON DEMPA KOGYO CO., LTD. H-7XNPD0013
XU0601	VCXO NIHON DEMPA KOGYO CO., LTD. H-7XNPD0012
X0601	Xtal NIHON DEMPA KOGYO CO., LTD. NX3215SA-32.768K-STD-MUA-8
TRANSISTORS	
TR0601	Transistor US6M11TR
TR0602	Transistor ROHM Co., Ltd. EM6M1T2R
TR0603	Transistor ROHM Co., Ltd. EM6M1T2R
TR0801	Transistor TLP176A(TP_F)
TR0802	Transistor ROHM Co., Ltd. DTC143EMT2L
TR0901	Transistor ROHM Co., Ltd. EMH9T2R
TR0902	Transistor ROHM Co., Ltd. 2SAR513PT100
TR0903	Transistor 2SA1774TLR
TR0904	Transistor ROHM Co., Ltd. DTC144EMT2L
TR0905	Transistor RUE002N02TL
TR0906	Transistor US6M11TR
TR0907	Transistor 2SC4116GR-(TE85L F)
TR1001	Transistor ROHM Co., Ltd. EM6M1T2R
TR1002	Transistor US6M11TR
TR1004	Transistor RW1A030APT2CR
TR1005	Transistor RUE002N02TL
TR2141	Transistor Mitsubishi Electric Corporation RD01MUS2-T113
TR2142	Transistor Mitsubishi Electric Corporation RD07MUS2B-T112
TR2181	Transistor US6M11TR
TR2182	Transistor ROHM Co., Ltd. DTA114TMT2L

REF	DESCRIPTION
TR2201	Transistor NXP Semiconductors NV BF1211R_215
TR2202	Transistor ROHM Co., Ltd. 2SK3019-TL
TR2203	Transistor NXP Semiconductors NV BF1212R_215
TR2204	Transistor 2SC4215-Y(TE85L F)
TR2361	Transistor US6M11TR
TR2362	Transistor US6M11TR
TR2401	Transistor US6M11TR
CONTACTS	
EB2101	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2501	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2502	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2503	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2504	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2505	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2506	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2507	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2508	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2509	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2510	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2511	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2512	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2513	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2514	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2515	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2516	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2517	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2518	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2101	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2501	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2502	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2503	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2504	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2505	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2506	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2507	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2508	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816

REF	DESCRIPTION
EB2509	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2510	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2511	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2512	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2513	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2514	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2515	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2516	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2517	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816
EB2518	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-320816

15.2 INTERFACE BOARD

DE02-CMD-2741, Rev. 2

REF	DESCRIPTION
CAPACITORS	
C1251	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1252	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1253	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1254	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1255	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1256	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1257	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1258	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1259	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1260	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1261	Capacitor 1000P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H102JA01D
C1262	Capacitor 2200P ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM033R11C222KA88D
C1263	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1264	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1266	Capacitor 47P ±5% 25V Similar to Murata Manufacturing Co., Ltd. GRM0332C1E470JA01D
C1267	Capacitor 2200P ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM033R11C222KA88D
C1268	Capacitor 47P ±5% 25V Similar to Murata Manufacturing Co., Ltd. GRM0332C1E470JA01D
C1269	Capacitor 47P ±5% 25V Similar to Murata Manufacturing Co., Ltd. GRM0332C1E470JA01D
C1270	Capacitor 47P ±5% 25V Similar to Murata Manufacturing Co., Ltd. GRM0332C1E470JA01D

REF	DESCRIPTION
C1271	Capacitor 47P ±5% 25V Similar to Murata Manufacturing Co., Ltd. GRM0332C1E470JA01D
C1272	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1273	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1274	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1275	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1276	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1277	Capacitor 47P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H470JA01D
C1278	Capacitor 2200P ±10% 50V Similar to Murata Manufacturing Co., Ltd. GRM155R11H222KA01D
C1279	Capacitor 2200P ±10% 50V Similar to Murata Manufacturing Co., Ltd. GRM155R11H222KA01D
C1280	Capacitor 470P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C1281	Capacitor 470P ±5% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H471JA01D
C1301	Capacitor 0.1U ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C1302	Capacitor 1U ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1303	Capacitor 1U ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R71E105KA12D
C1304	Capacitor 1U ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R61C105KA12D
C1305	Capacitor 1U ±10% 25V Similar to Murata Manufacturing Co., Ltd. GRM188R71E105KA12D
C1306	Capacitor 0.1U ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C104KA88D
C1307	Capacitor 2.2U ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM188R71A225KE15D
C1308	Capacitor 2.2U ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM188R71A225KE15D
C1311	Capacitor 2.2U ±10% 10V Similar to Murata Manufacturing Co., Ltd. GRM188R71A225KE15D
C1313	Capacitor 0.01U ±10% 16V Similar to Murata Manufacturing Co., Ltd. GRM155R11C103KA01D
C1315	Capacitor 2P ±0.1pF 50V Similar to Murata Manufacturing Co., Ltd. GRM1554C1H2R0BA01D
C1316	Capacitor 10P ±1% 50V Similar to Murata Manufacturing Co., Ltd. GRM1552C1H100FA01D
	DIODES
CD1201	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1202	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1203	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1204	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1205	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1206	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1207	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1208	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1209	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1210	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1211	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1212	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1213	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1214	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1215	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1216	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1217	Diode Similar to ROHM Co., Ltd. RB520CS-30T2R
CD1218	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T

REF	DESCRIPTION
CD1219	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1220	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1221	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1222	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1223	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1224	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1225	Diode Similar to ROHM Co., Ltd. SML-E12M8WT86T
CD1251	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
CD1252	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
CD1253	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
CD1254	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
CD1255	Diode Similar to Renesas Electronics Corporation HZC18TRF-E
CD1256	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
CD1257	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
CD1258	Diode Similar to Renesas Electronics Corporation HZC18TRF-E
CD1259	Diode Similar to Renesas Electronics Corporation HZC18TRF-E
CD1262	Diode Similar to TOSHIBA CORPORATION DF5A6.8JE(TE85L_F)
	MISCELLANEOUS
DD1301	LCD Module Similar to Seiko Instruments Inc. H-7WSPD0006
EB1301	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-363050
EB1302	On-Board Contact Similar to KITAGAWA INDUSTRIES CO., LTD. OG-321022
J1201	Connector Similar to Panasonic Electric Works Co., Ltd. AYF532665
J1301	Connector Similar to KYOCERA ELCO Corporation 04 6293 625 005 829+
L1301	Inductor 1.2N ±0.3nH - Similar to Murata Manufacturing Co., Ltd. LQG15HS1N2S02D
MIC1201	Microphone Similar to Knowles Electronics, LLC SPU0410HR5H-PB-7
P1201	Connector Similar to Panasonic Electric Works Co., Ltd. AXK6S70537YG
	INTEGRATED CIRCUITS
IC1301	IC Similar to Murata Manufacturing Co., Ltd. LBMA44TLJZ-345
	RESISTORS
R1201	Resistor 0 Jumper 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1202	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1203	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1204	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1205	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1206	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1207	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X

REF	DESCRIPTION
R1208	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1209	Resistor 330 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ331X
R1210	Resistor 100K ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R1211	Resistor 0 Jumper 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1212	Resistor 0 Jumper 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1214	Resistor 10 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ100C
R1215	Resistor 0 Jumper 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GE0R00C
R1216	Resistor 100 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ101C
R1217	Resistor 100 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ101C
R1218	Resistor 100 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ101C
R1219	Resistor 100 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ101C
R1220	Resistor 100 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ101C
R1221	Resistor 100 ±5% 0.05W Similar to Panasonic Electronic Devices Co., Ltd. ERJ1GEJ101C
R1222	Resistor 0 Jumper 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1301	Resistor 100K ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R1317	Resistor 0 Jumper 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1318	Resistor 2.2 ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ2R2X
R1319	Resistor 100K ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
R1322	Resistor 0 Jumper 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GE0R00X
R1323	Resistor 100K ±5% 0.1W Similar to Panasonic Electronic Devices Co., Ltd. ERJ2GEJ104X
TRANSISTORS	
TR1201	Transistor Similar to ROHM Co., Ltd. RUE002N02TL
TR1301	Transistor Similar to ROHM Co., Ltd. RUE002N02TL

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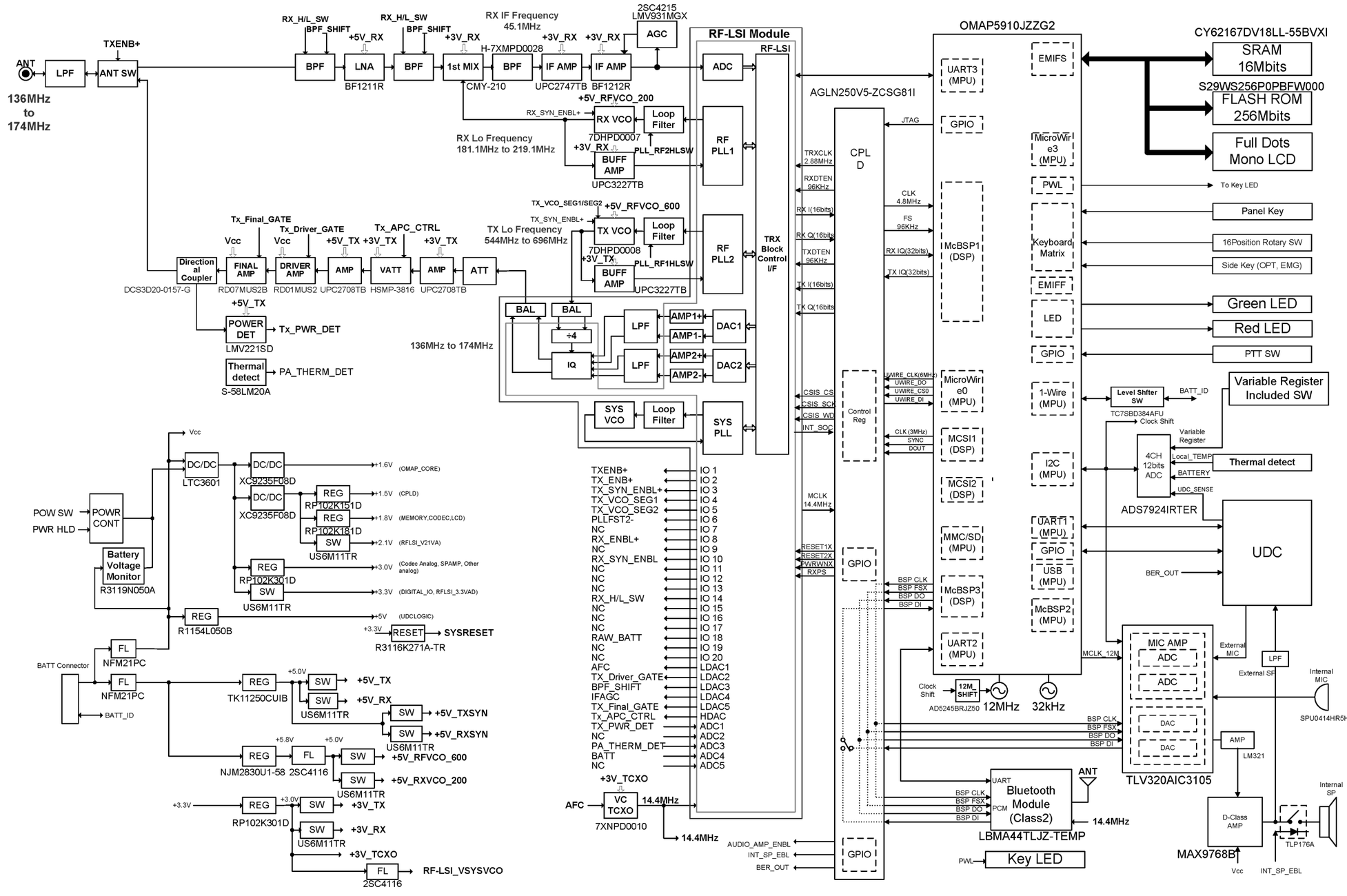
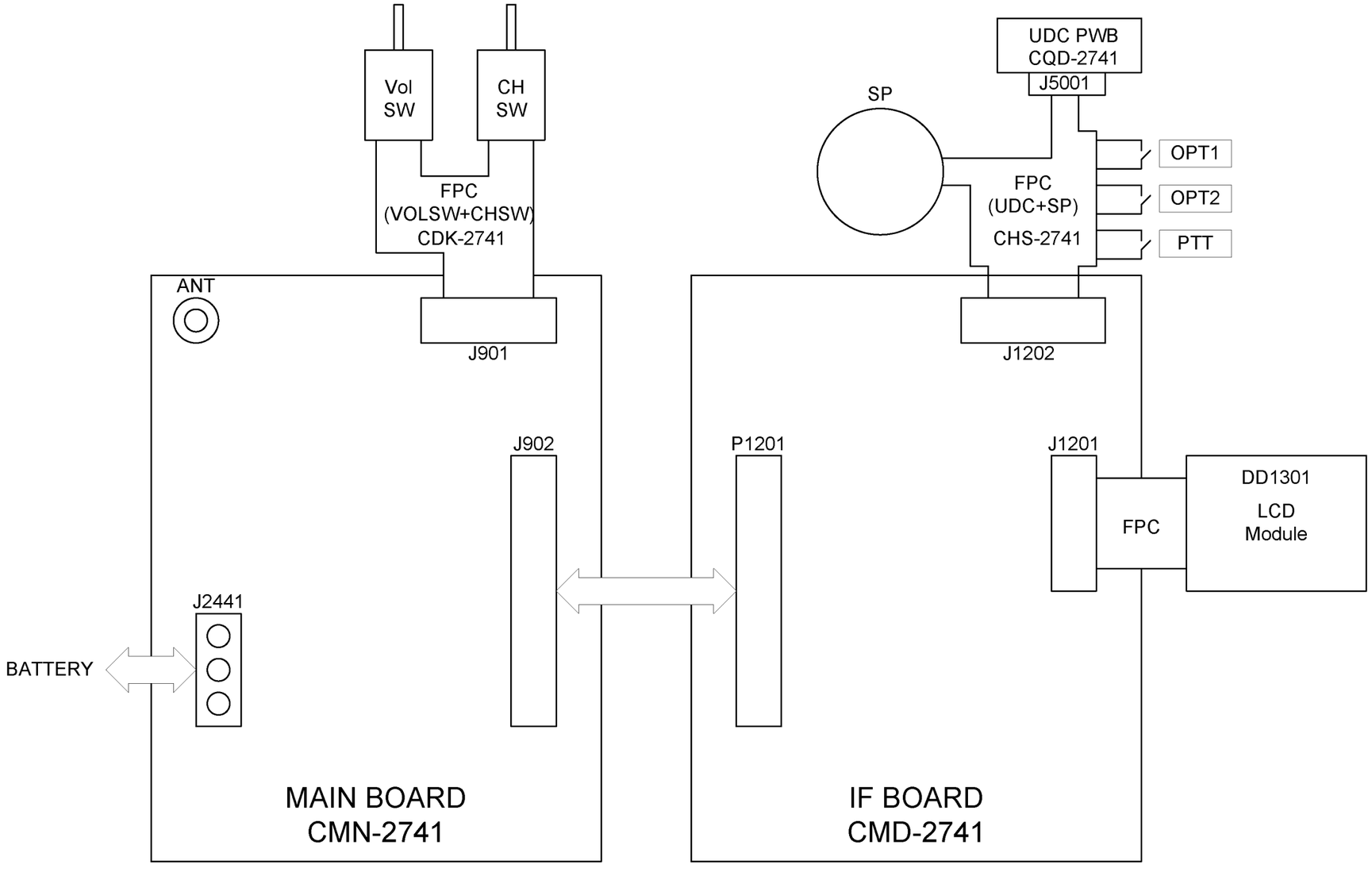
16. BLOCK DIAGRAM



BLOCK DIAGRAM
DA01-JHP-274-1, Rev. 2

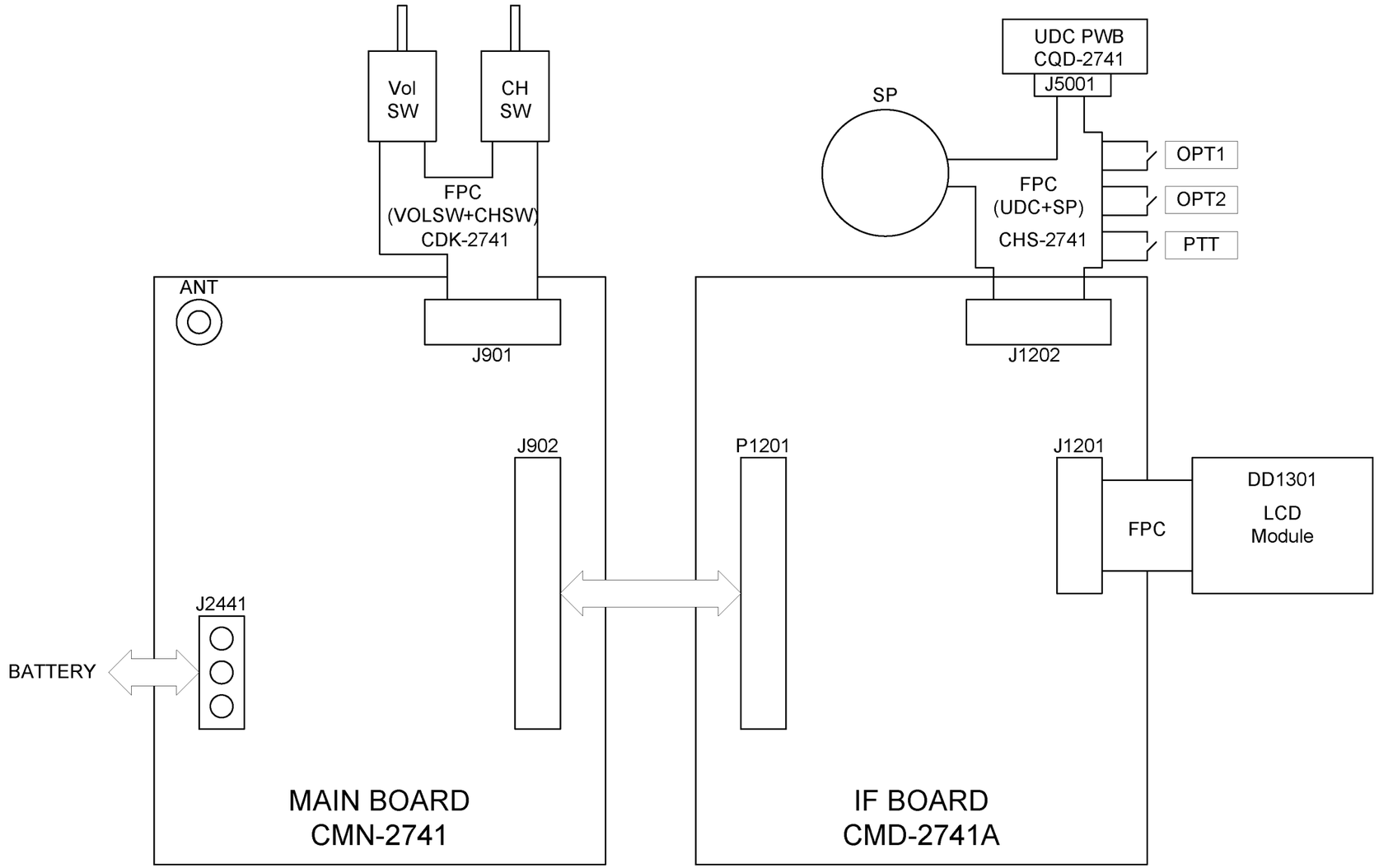
17. INTERCONNECTION DIAGRAMS

17.1 SYSTEM MODEL RADIO



SYSTEM MODEL INTERCONNECTION DIAGRAM
DA01-JHP-274-2, Rev. 2

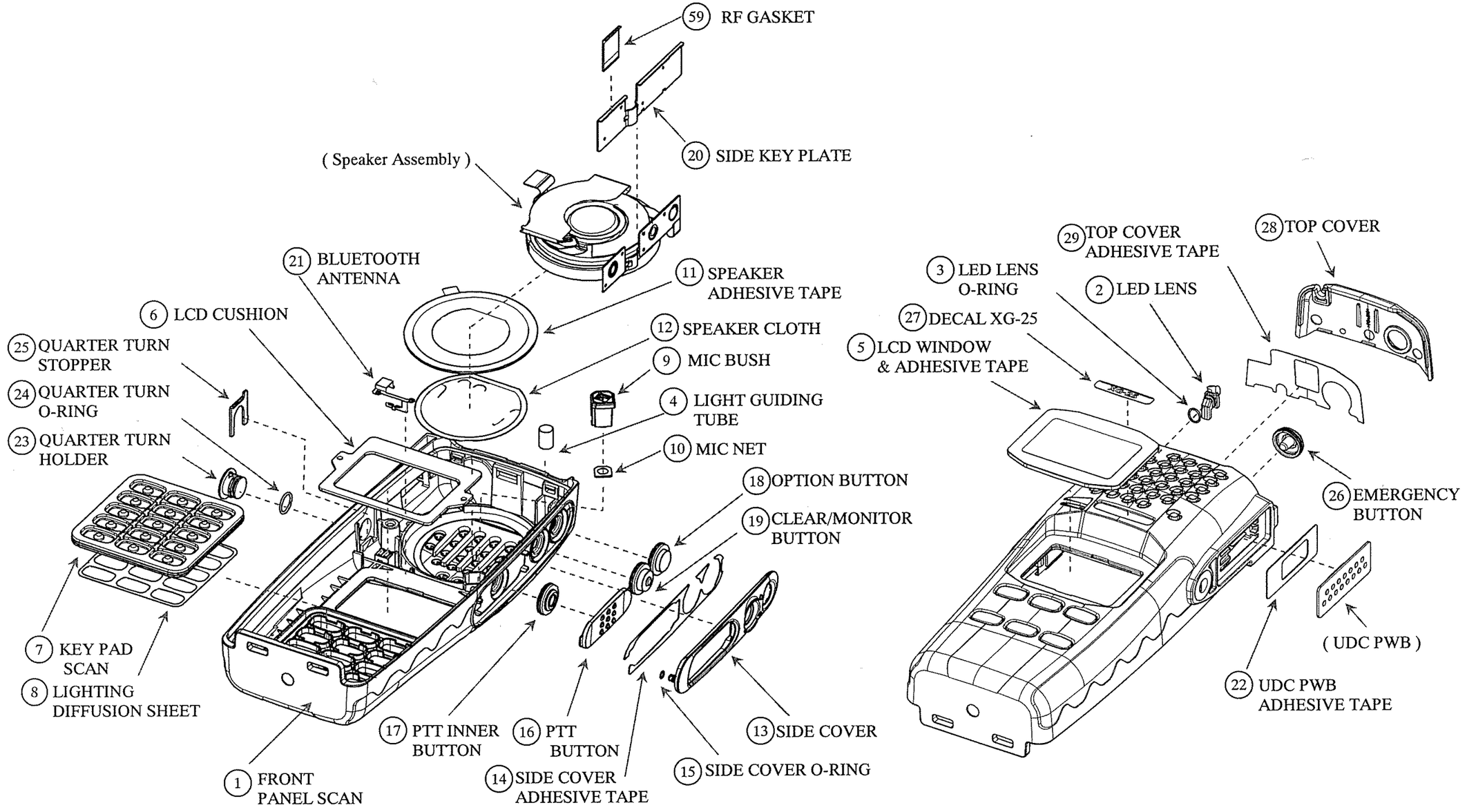
17.2 SCAN MODEL RADIO



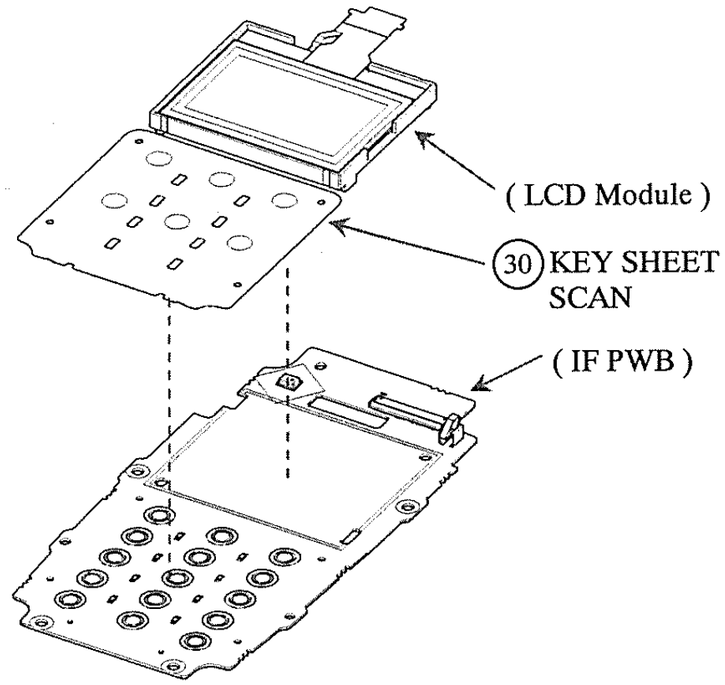
SCAN MODEL INTERCONNECTION DIAGRAM
DA01-JHP-274-3, Rev. 2

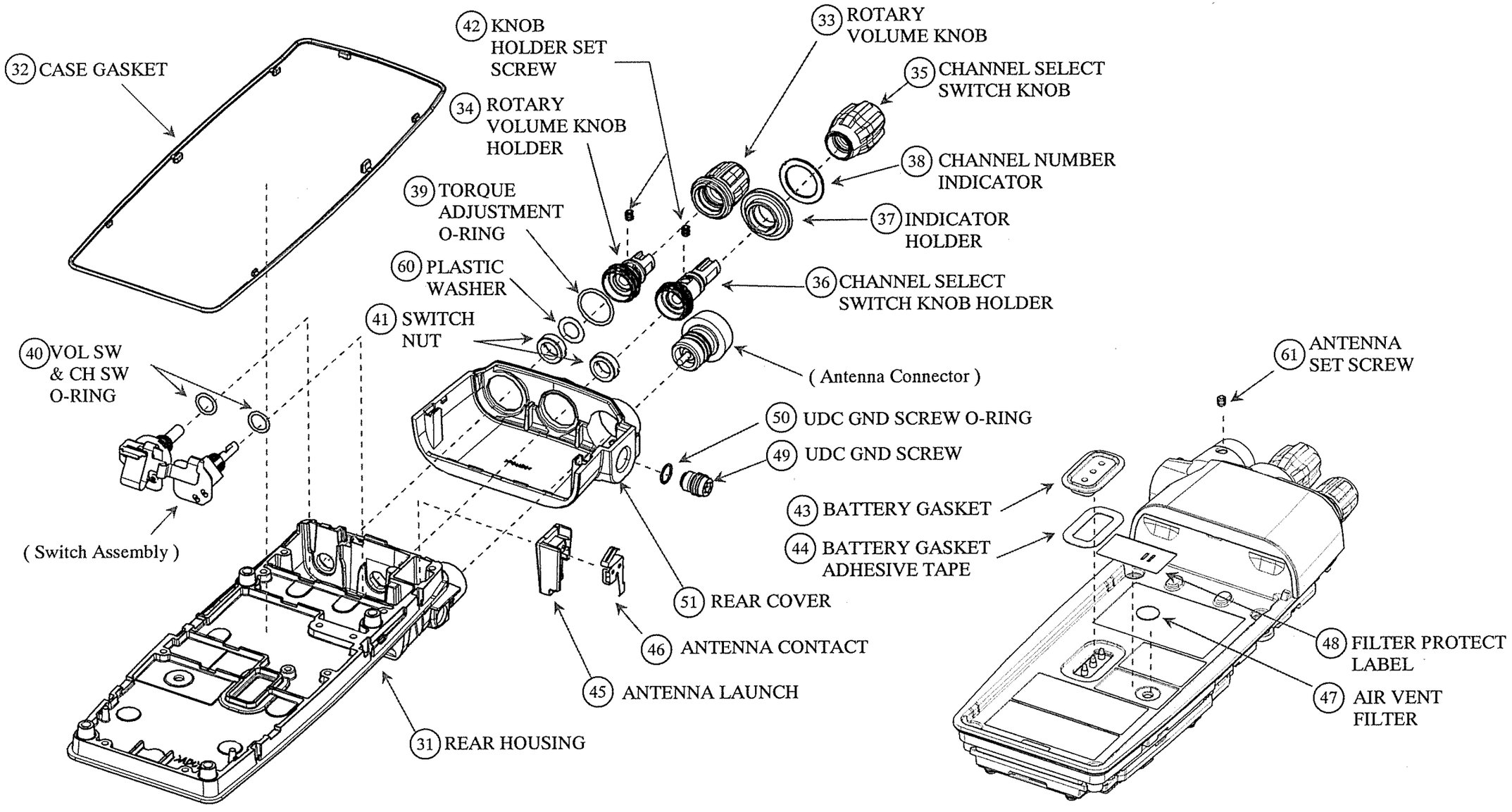
18. ASSEMBLY DIAGRAMS

18.1 SCAN MODEL RADIO

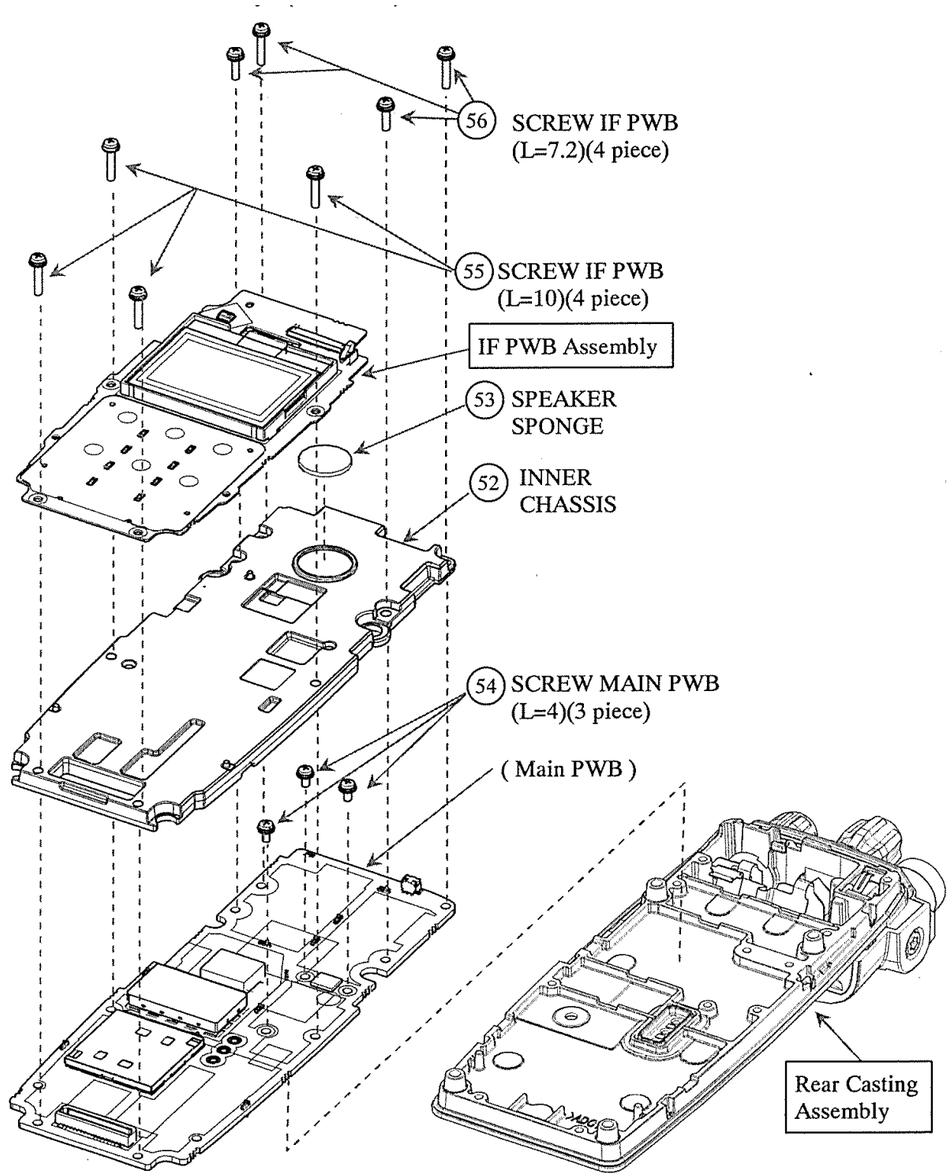


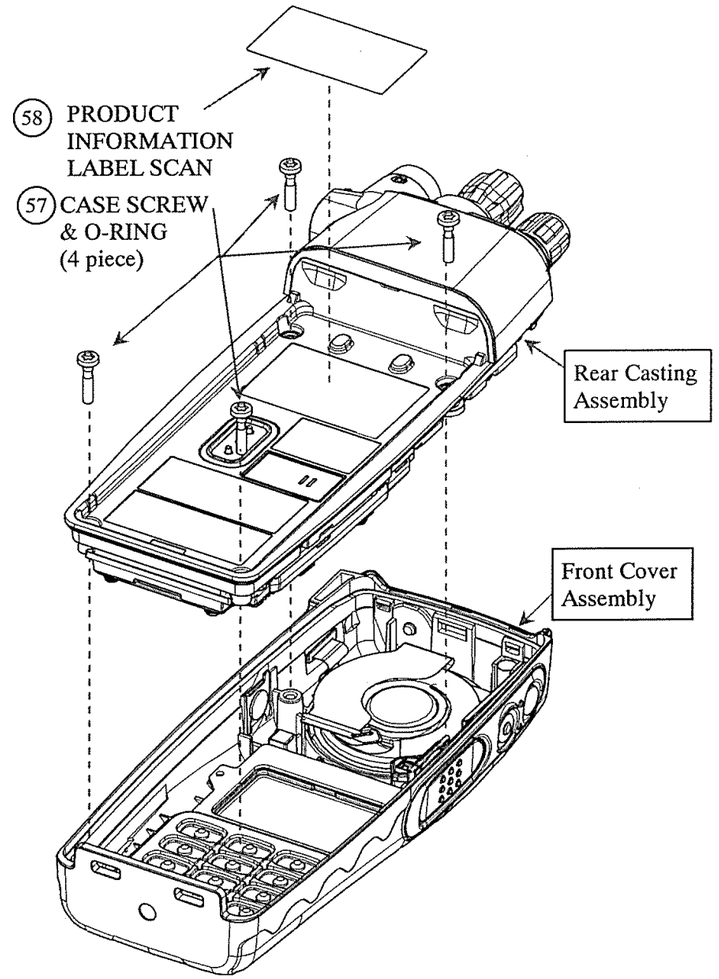
FRONT COVER ASSEMBLY (SCAN)
QR-BK-2756, Rev. 1, Page 1 of 4


(LCD Module)
30 KEY SHEET SCAN
(IF PWB)

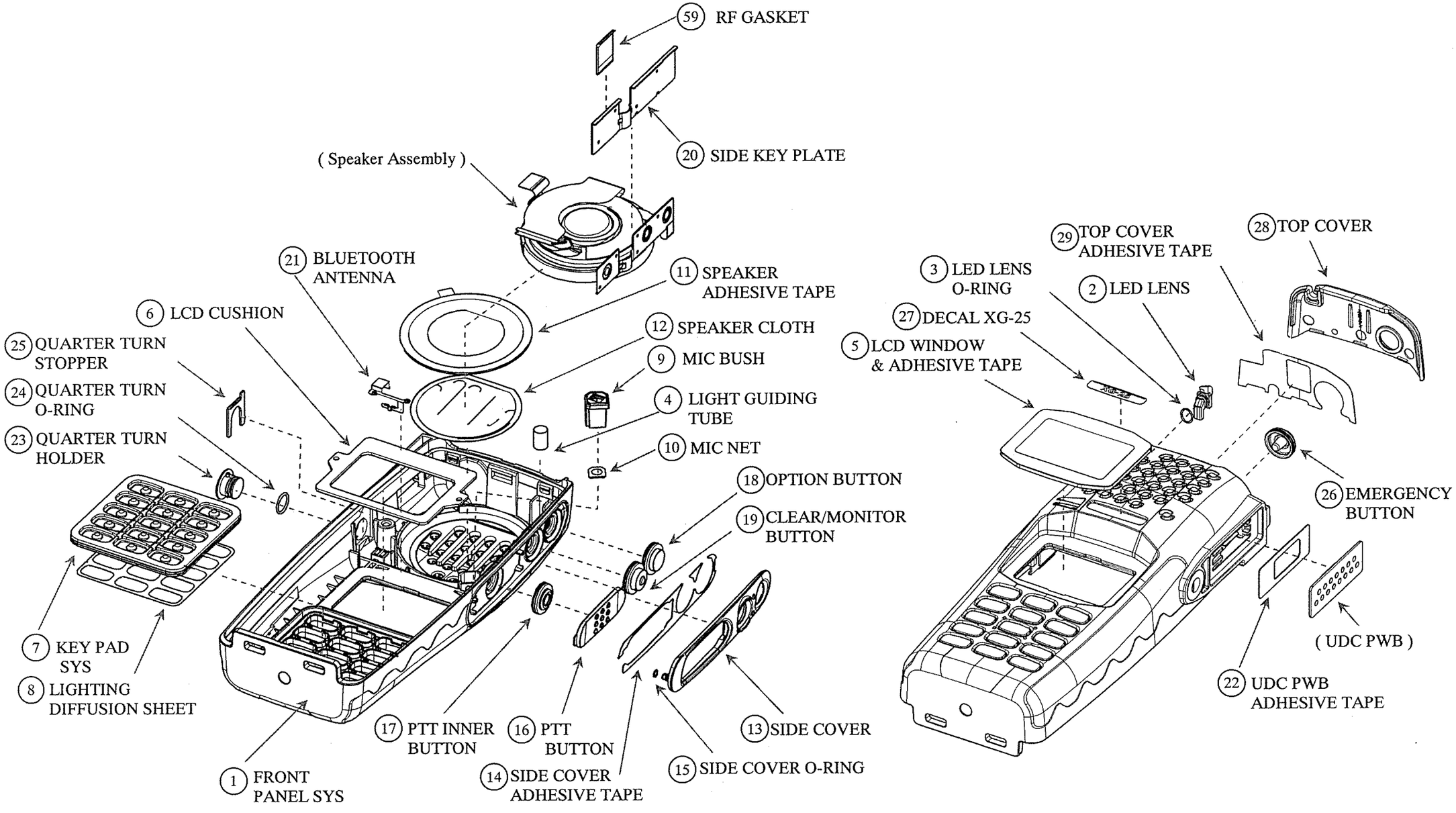


REAR CASTING ASSEMBLY (SCAN)
QR-BK-2756, Rev. 1, Page 3 of 4

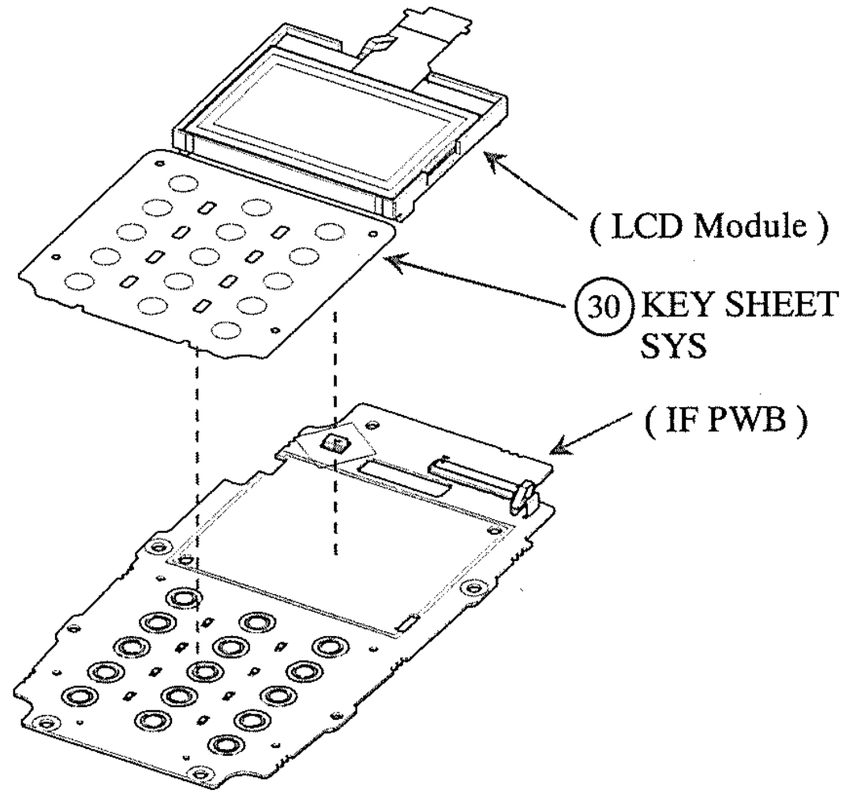

56 SCREW IF PWB
(L=7.2)(4 piece)
55 SCREW IF PWB
(L=10)(4 piece)
IF PWB Assembly
53 SPEAKER
SPONGE
52 INNER
CHASSIS
54 SCREW MAIN PWB
(L=4)(3 piece)
(Main PWB)
Rear Casting
Assembly

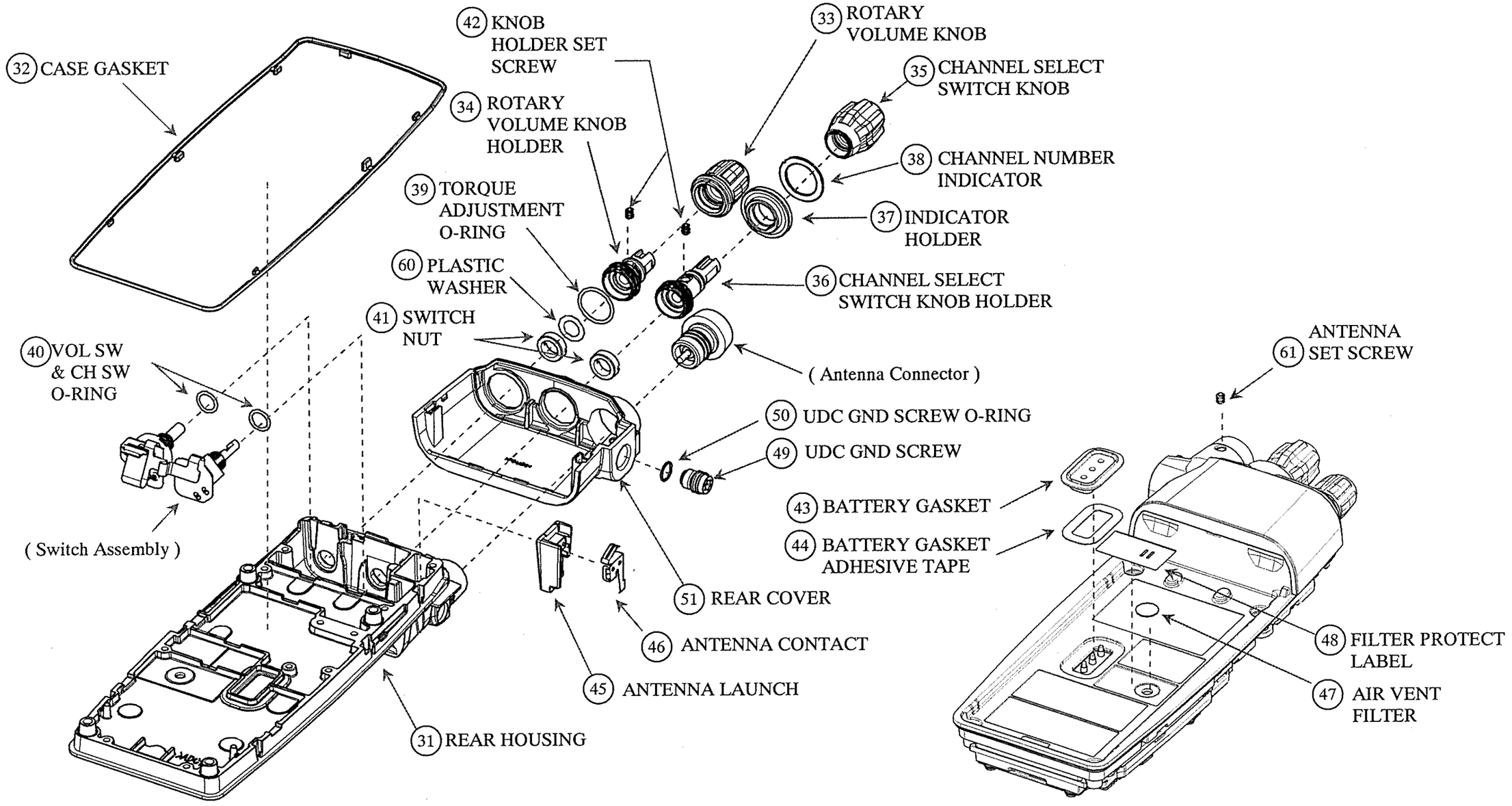

58 PRODUCT
INFORMATION
LABEL SCAN
57 CASE SCREW
& O-RING
(4 piece)
Rear Casting
Assembly
Front Cover
Assembly

18.2 SYSTEM MODEL RADIOS

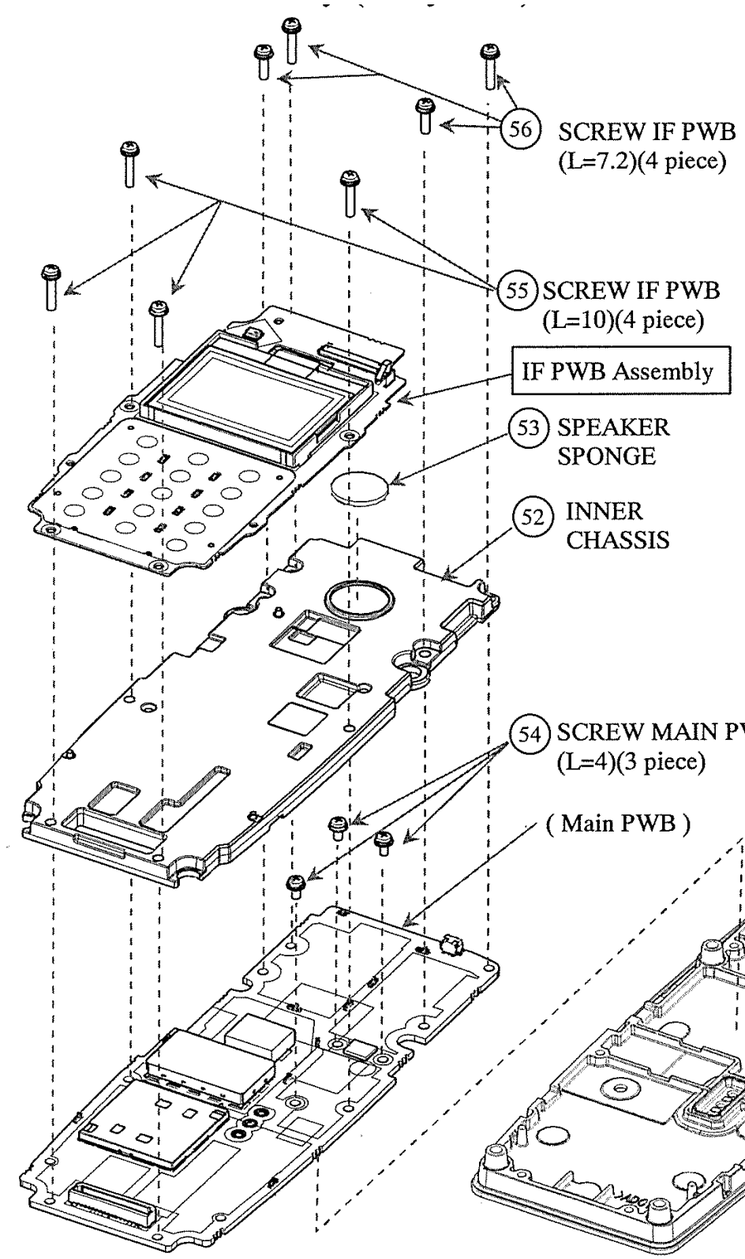


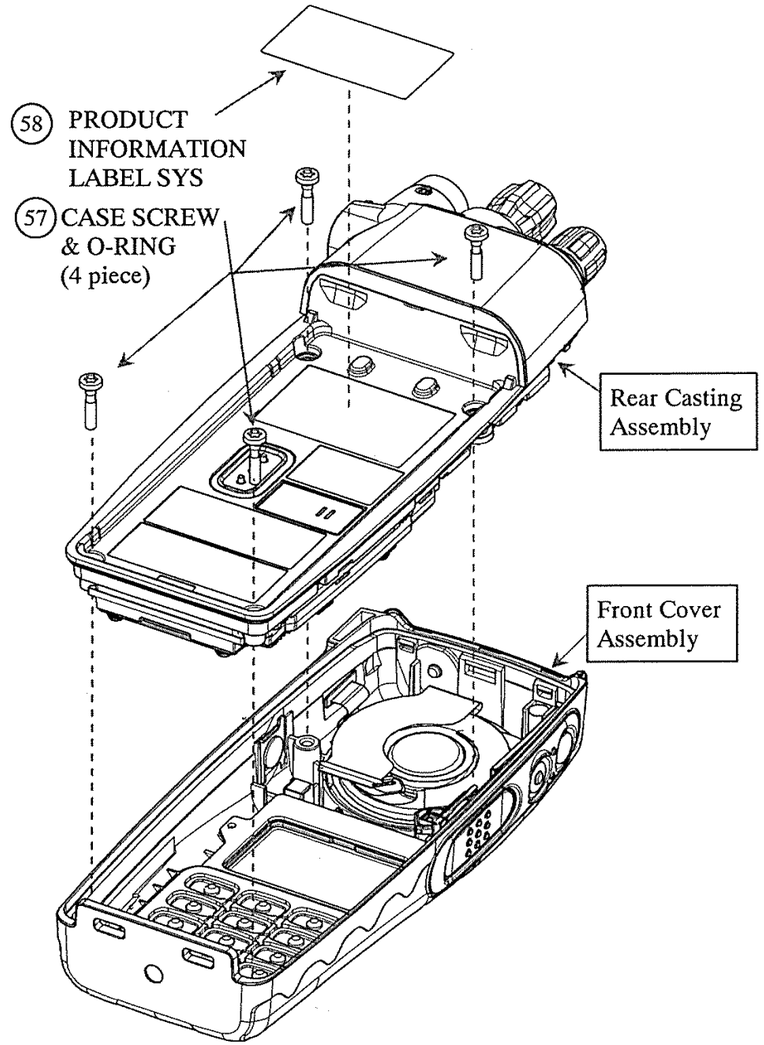
FRONT COVER ASSEMBLY (SYSTEM)
QR-BK-2700, Rev. 2, Page 1 of 4


(LCD Module)
30 KEY SHEET SYS
(IF PWB)



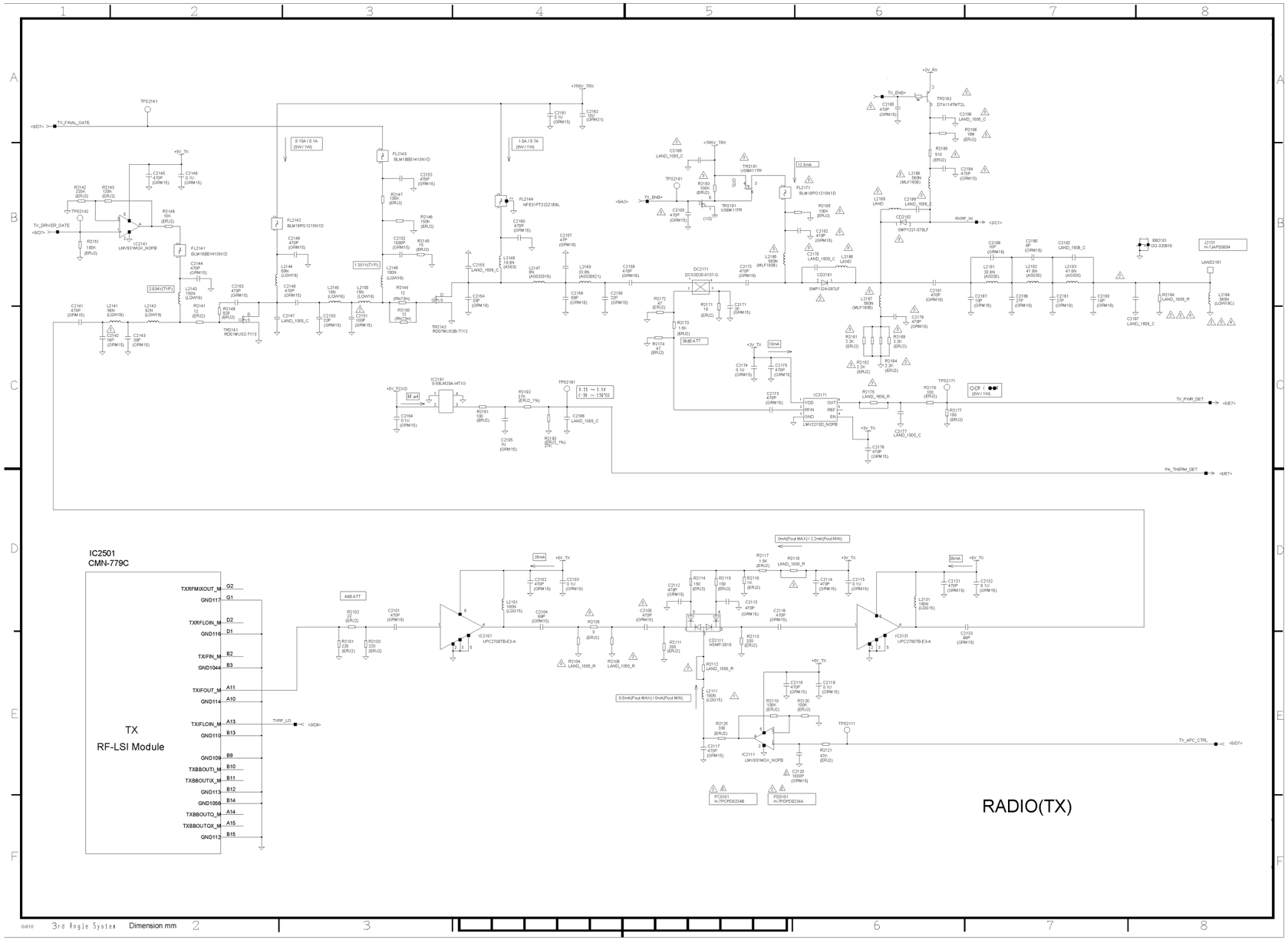
REAR CASTING ASSEMBLY (SYSTEM)
QR-BK-2700, Rev. 2, Page 3 of 4


56 SCREW IF PWB
(L=7.2)(4 piece)
55 SCREW IF PWB
(L=10)(4 piece)
IF PWB Assembly
53 SPEAKER
SPONGE
52 INNER
CHASSIS
54 SCREW MAIN PWB
(L=4)(3 piece)
(Main PWB)
Rear Casting
Assembly

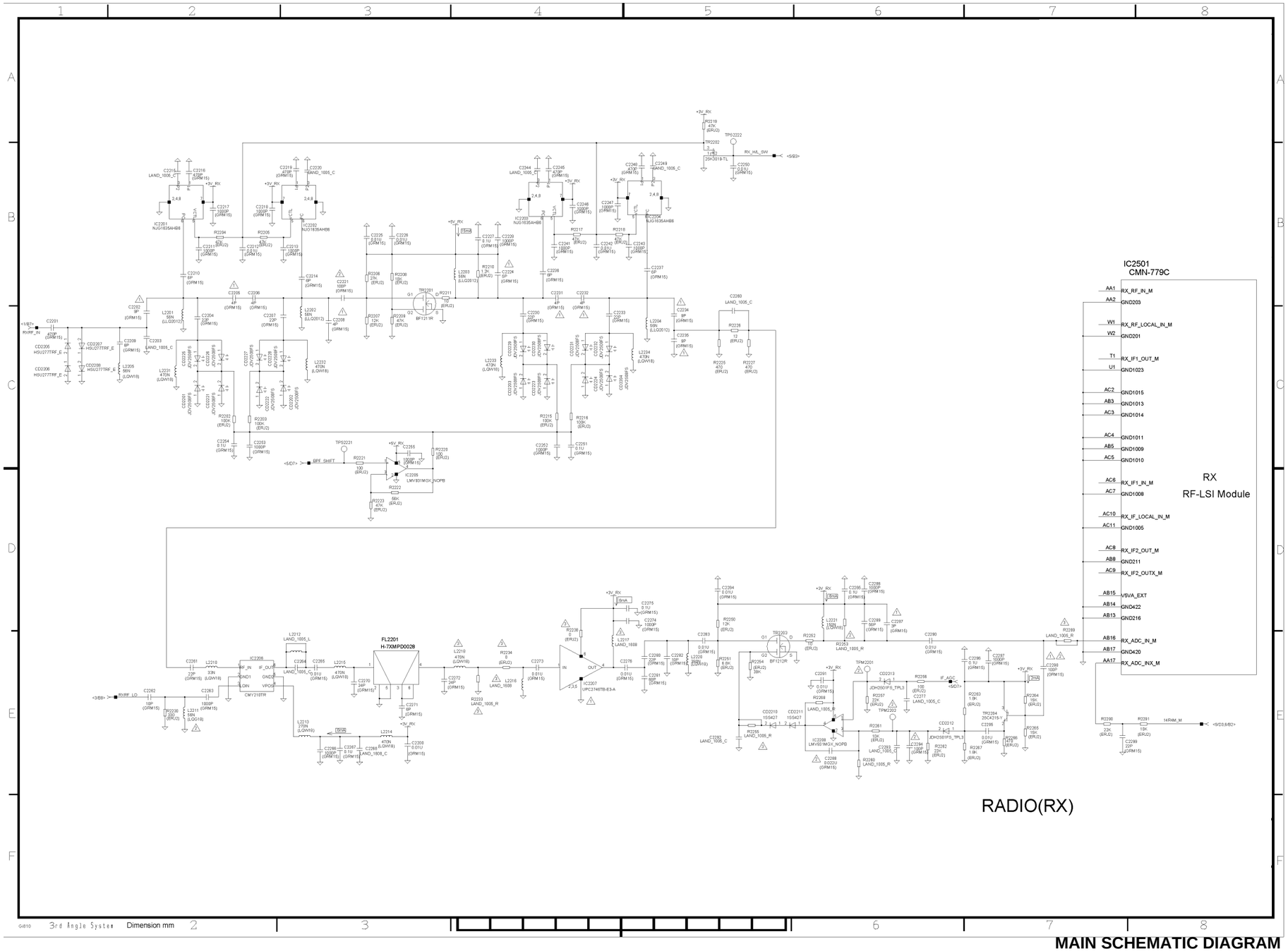

58 PRODUCT
INFORMATION
LABEL SYS
57 CASE SCREW
& O-RING
(4 piece)
Rear Casting
Assembly
Front Cover
Assembly

19. SCHEMATICS

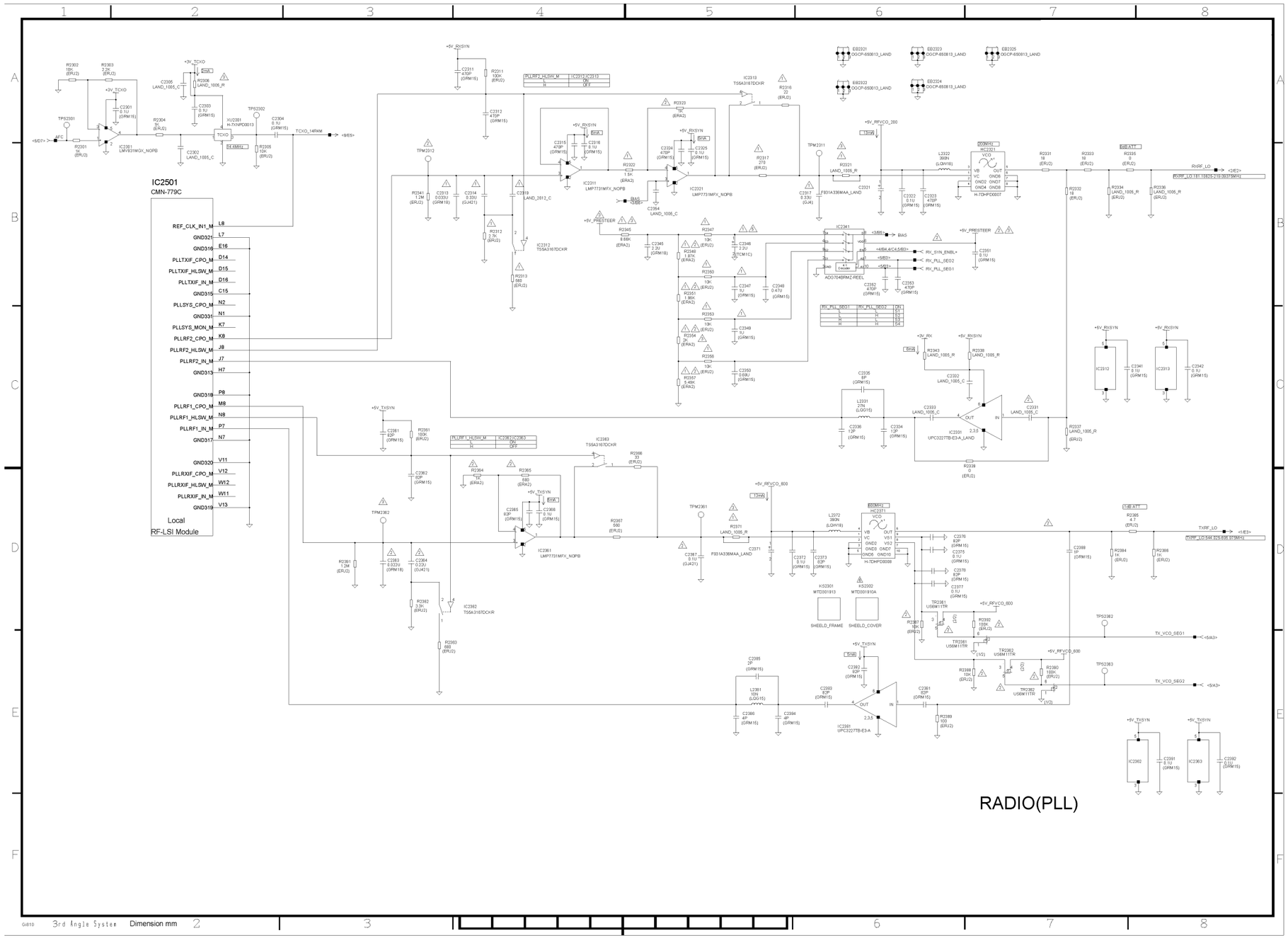
19.1 MAIN SCHEMATIC DIAGRAM



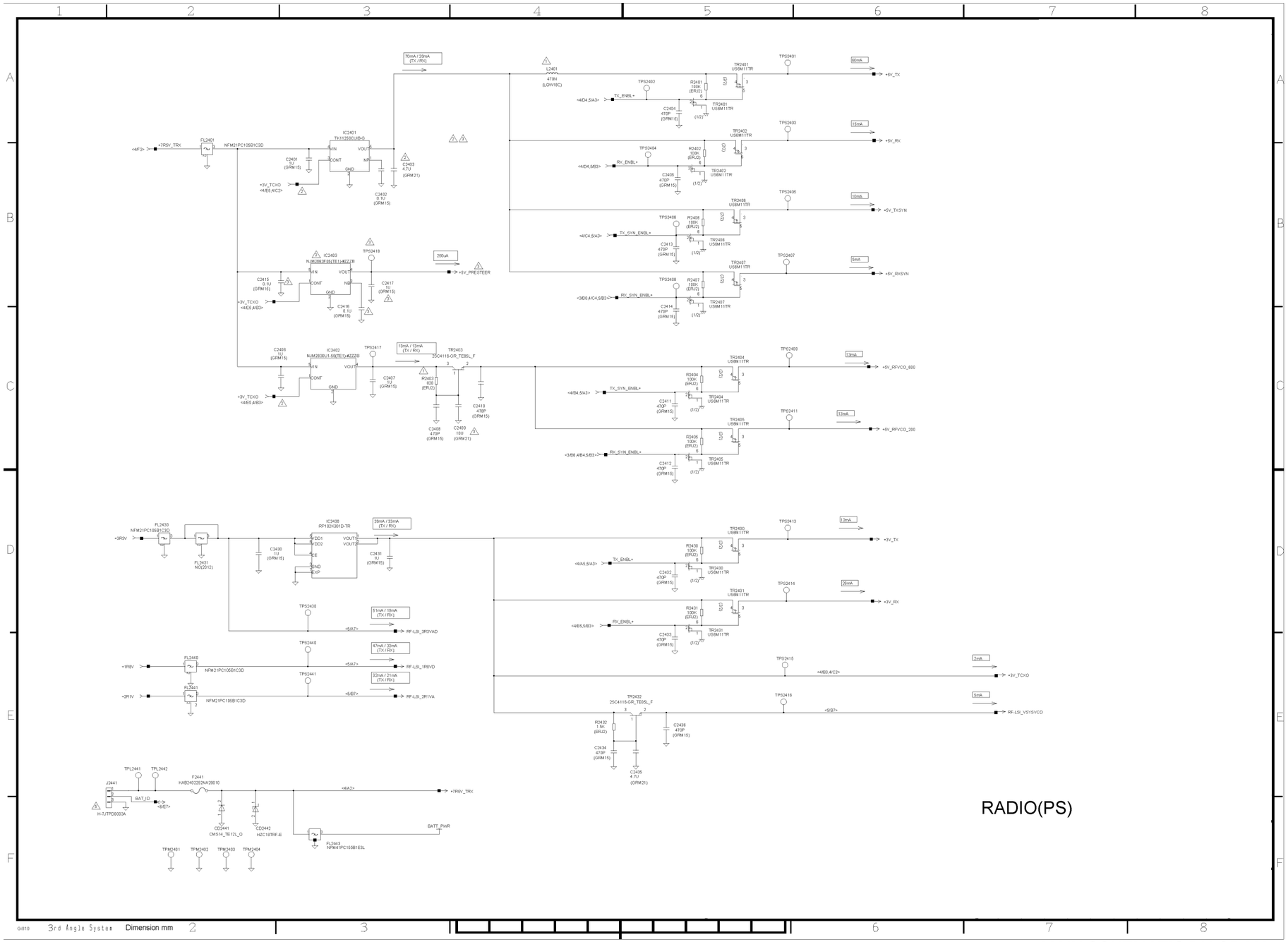
MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 1 of 10



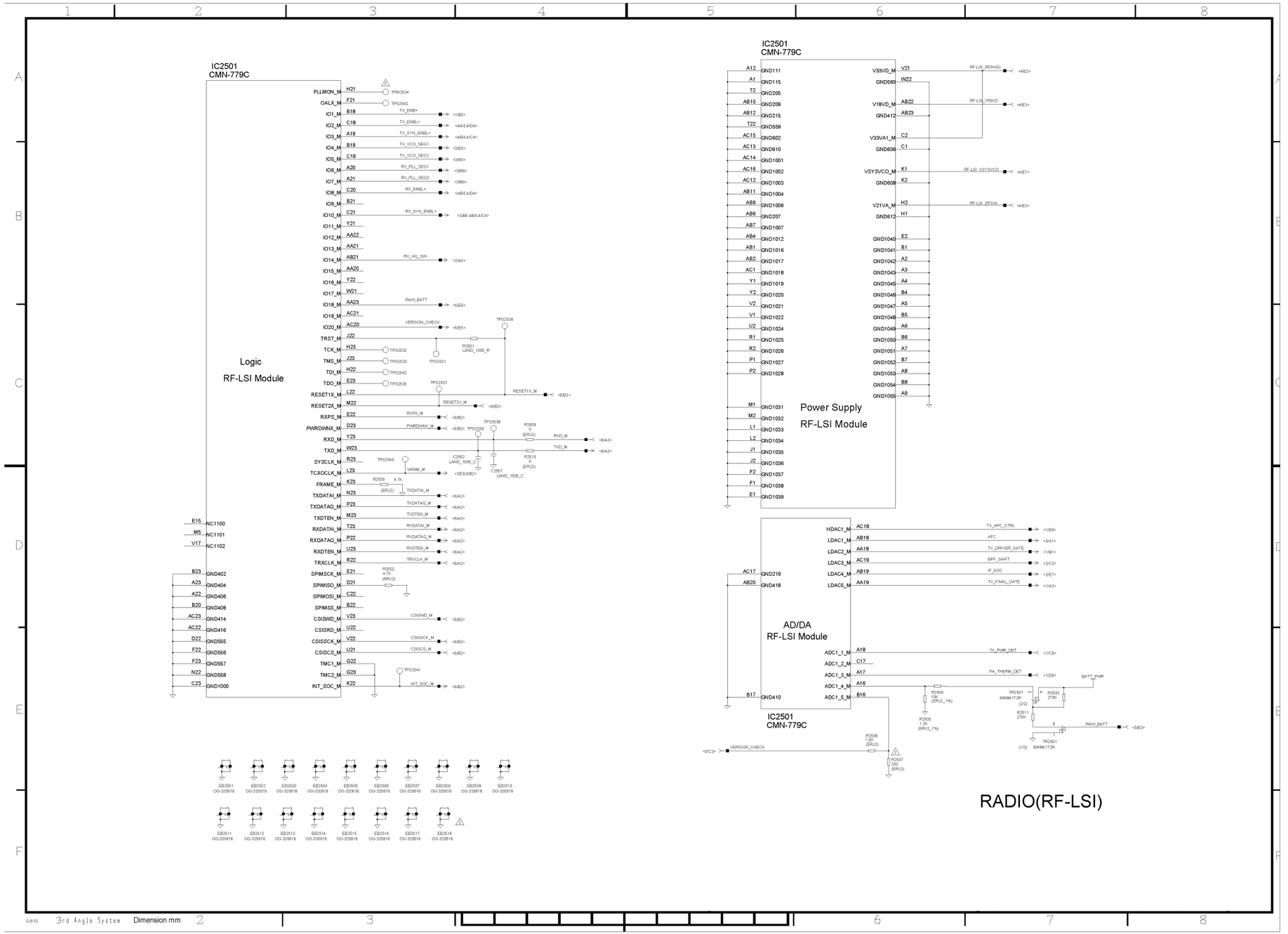
MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 2 of 10



MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 3 of 10



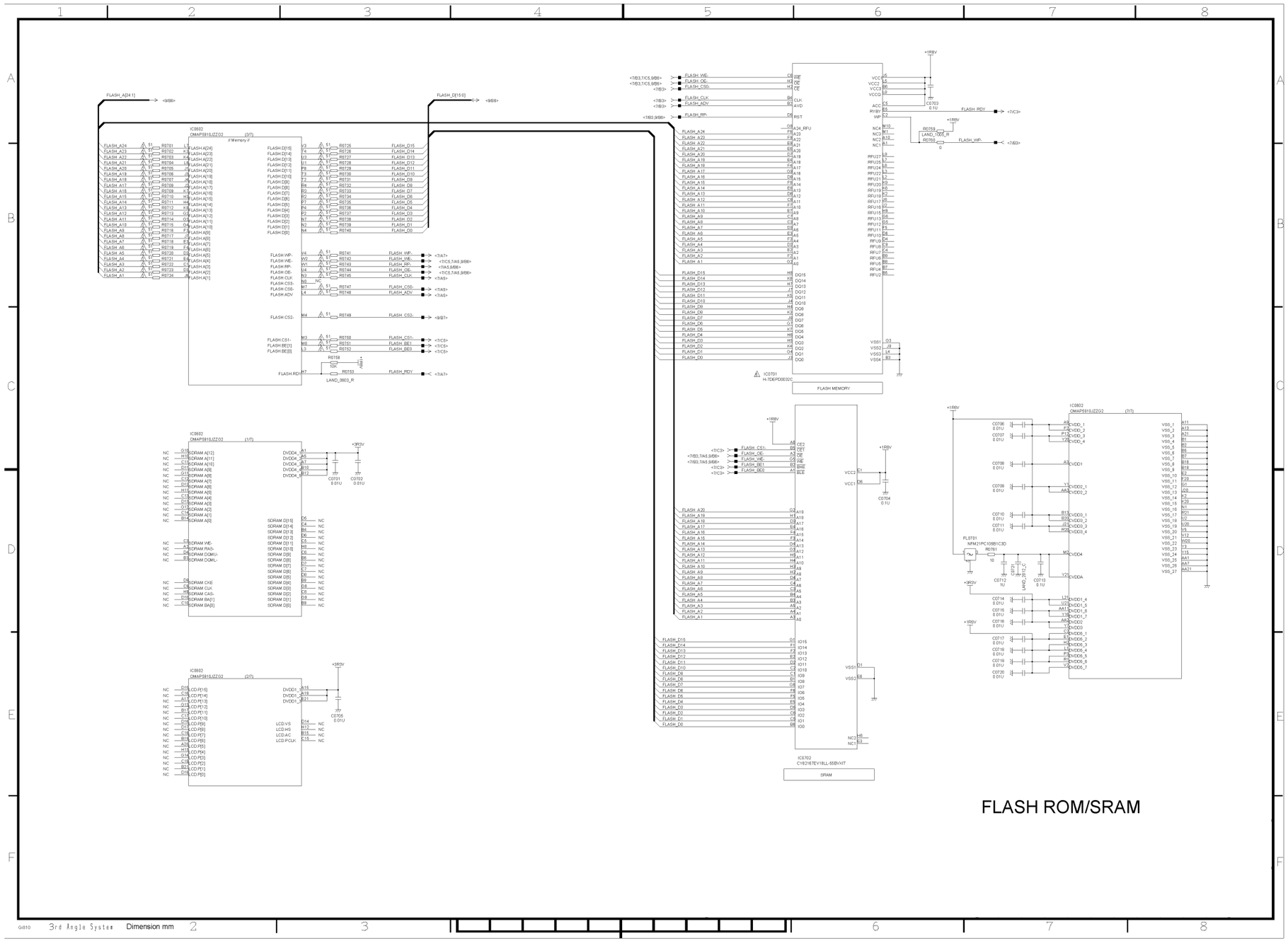
MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 4 of 10



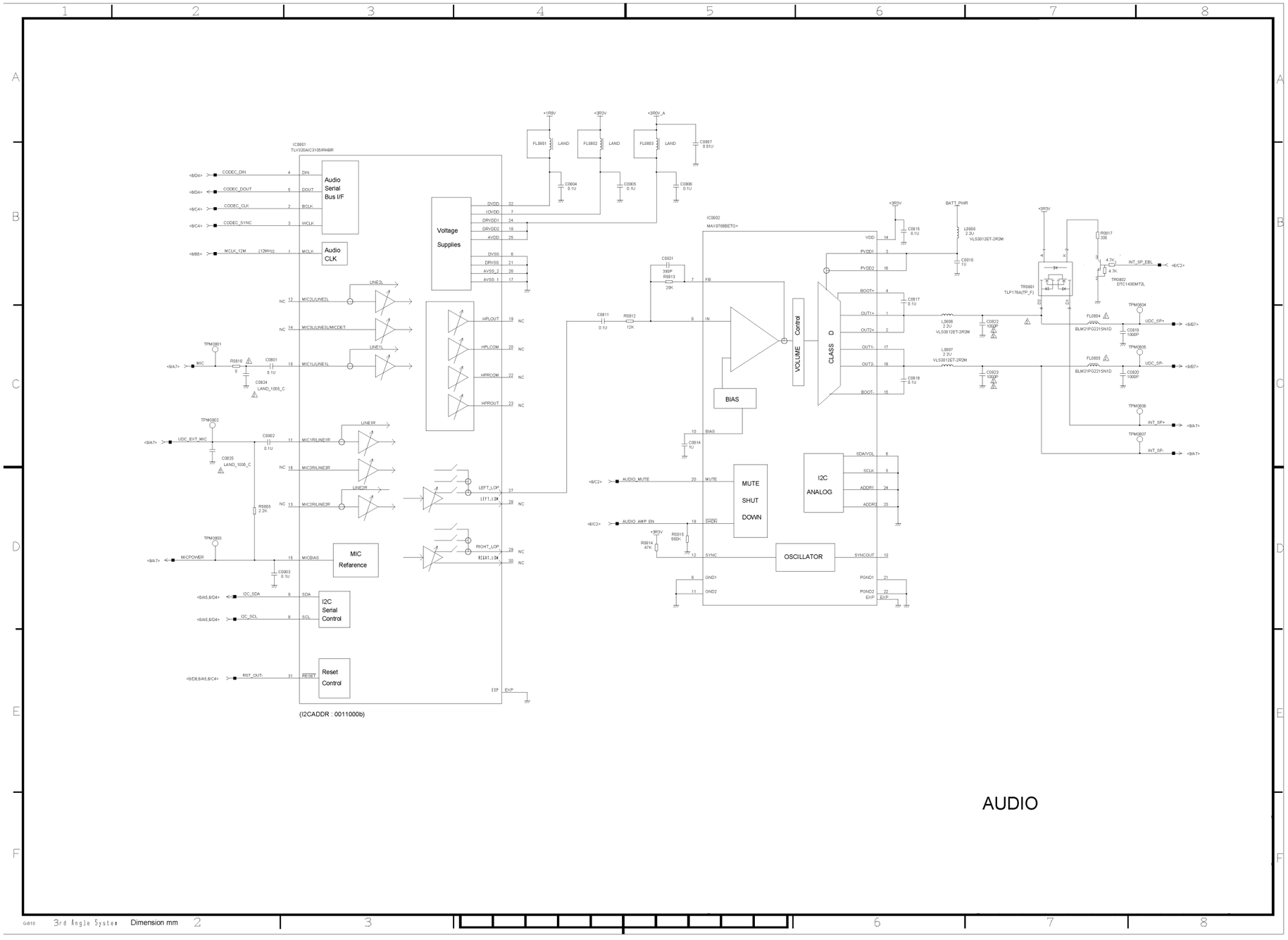
MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 5 of 10

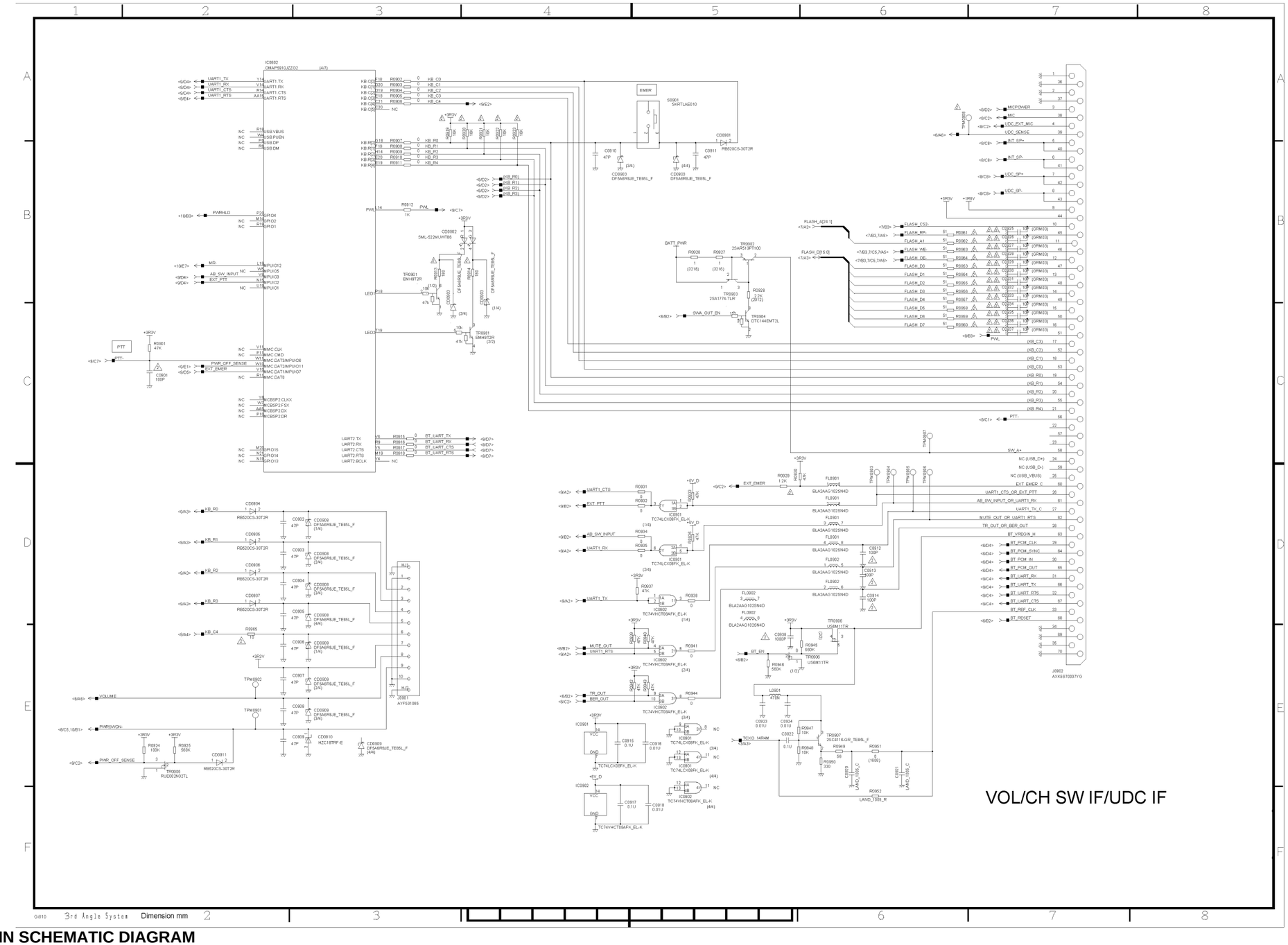
RF IF/AD Conv

MAIN SCHEMATIC DIAGRAM

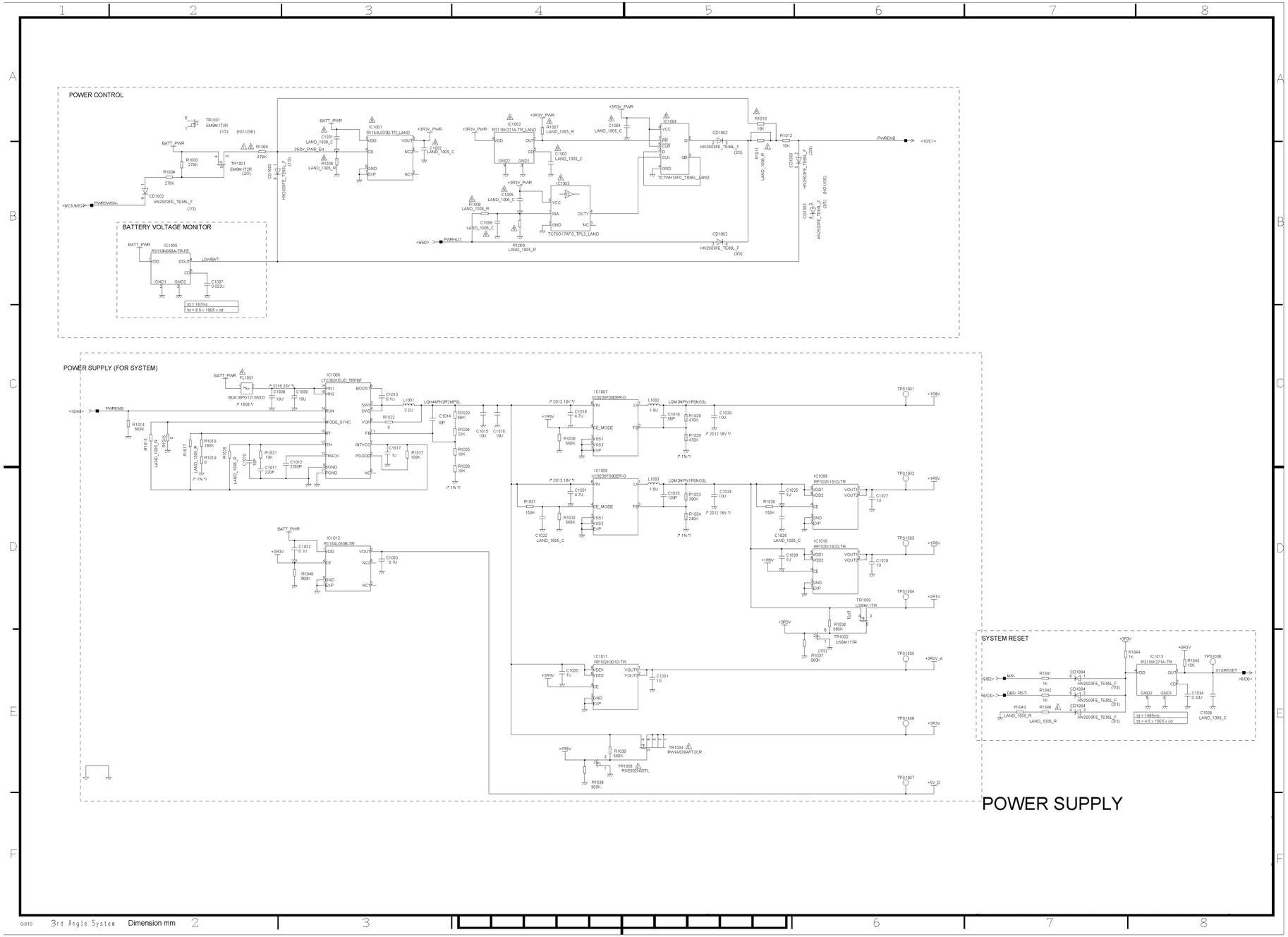


MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 7 of 10


IC0801
TLV320AIC3105IRHBR
Audio Serial Bus I/F
Audio CLK
Voltage Supplies
Audio Reference
I2C Serial Control
Reset Control
MIC Reference
(I2CADDR : 0011000b)
IC0802
MAX9768BETG+
VOLUME Control
CLASS D
BIAS
MUTE SHUT DOWN
I2C ANALOG
OSCILLATOR
AUDIO

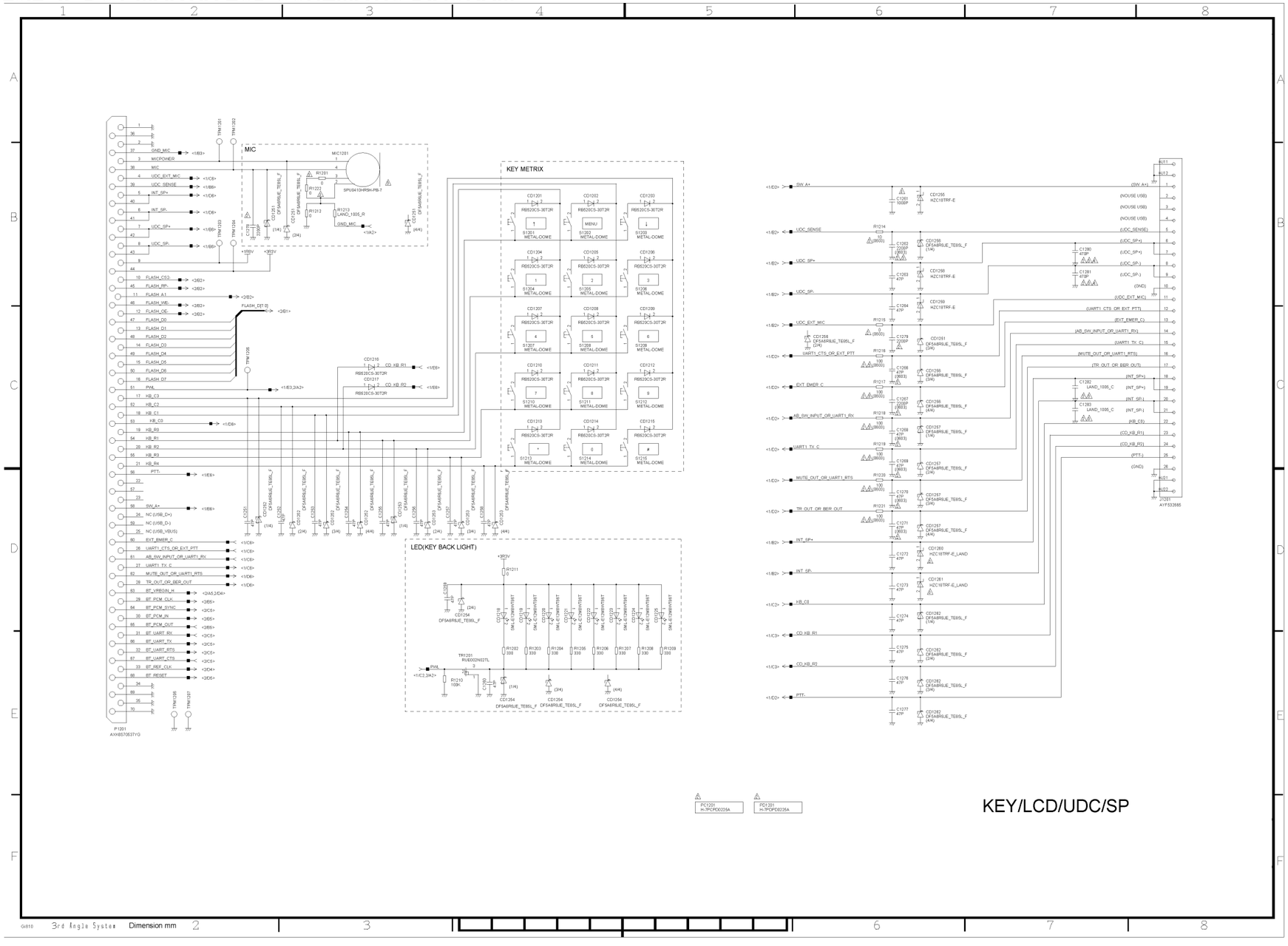


MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 9 of 10

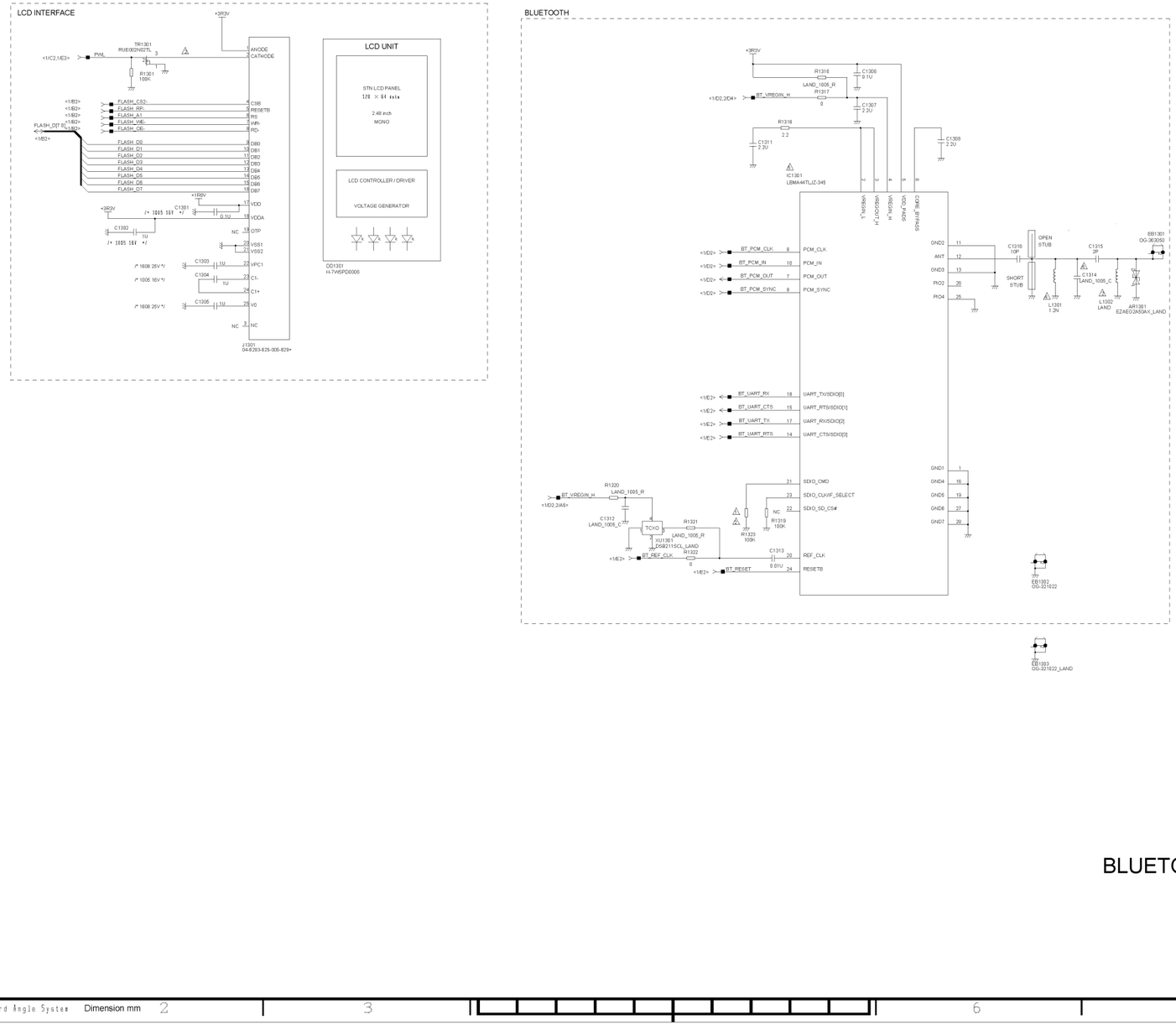


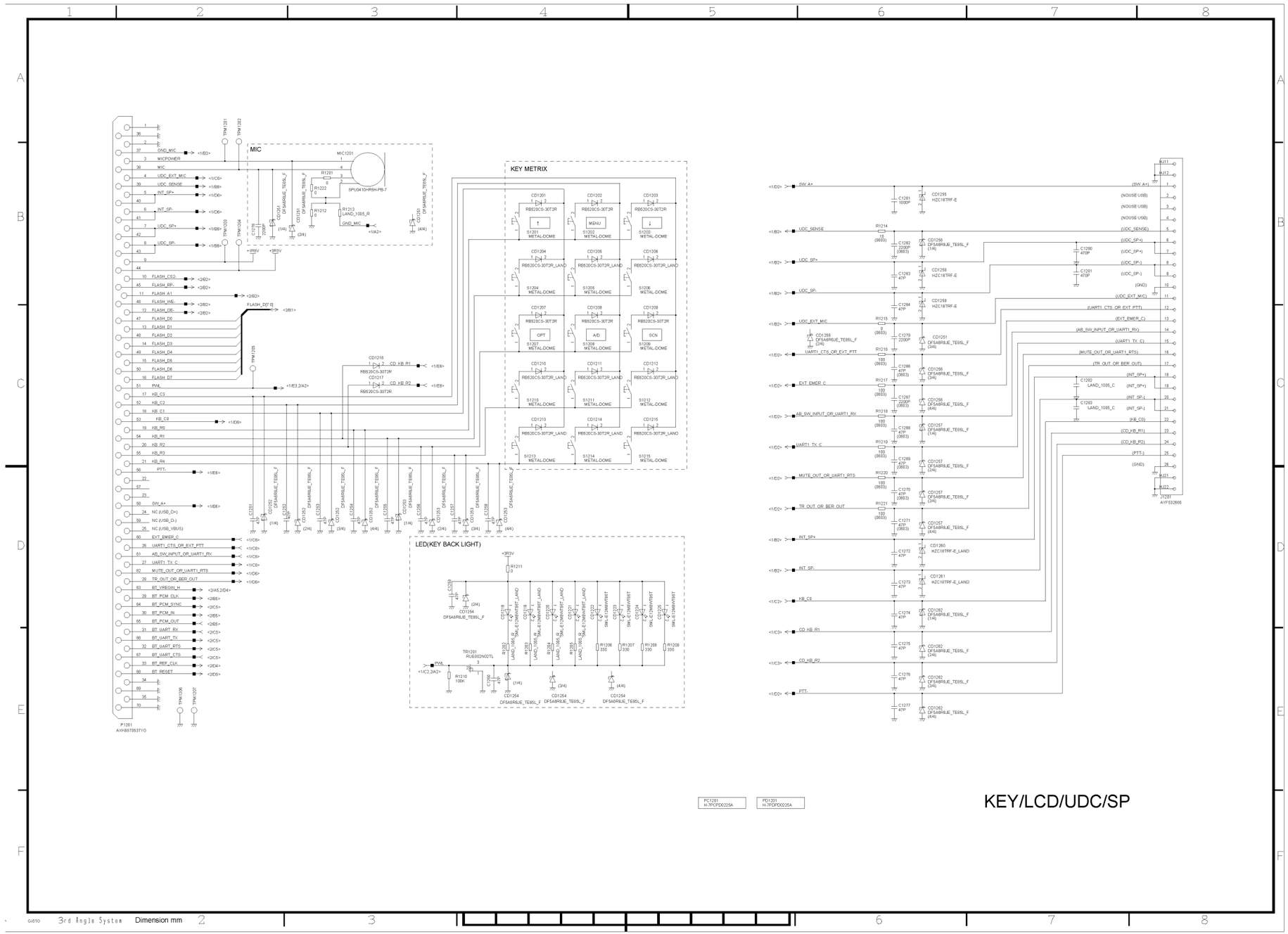
MAIN SCHEMATIC DIAGRAM
DD06-CMN-274, Rev. 2, Page 10 of 10

19.2 IF DOT MARTIX LCD SCHEMATIC DIAGRAM

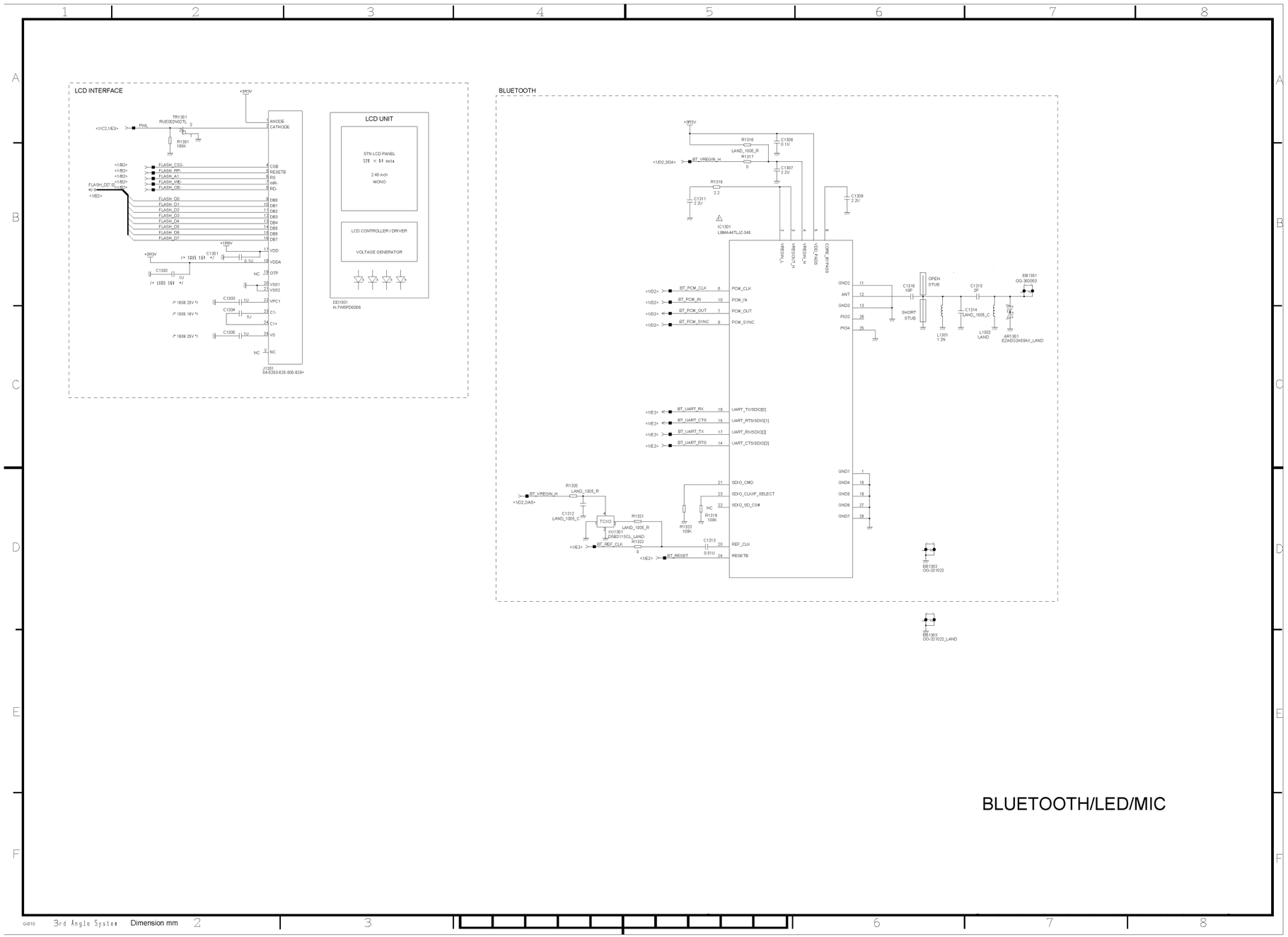


IF DOT MARTIX LCD SCHEMATIC DIAGRAM (SYSTEM)
DD06-CMD-2741, Rev. 2, Page 1 of 2


LCD INTERFACE
LCD UNIT
STN LCD PANEL
128 × 64 dots
2.48 inch
MONO
LCD CONTROLLER / DRIVER
VOLTAGE GENERATOR
BLUETOOTH
BT_PCM_CLK
BT_PCM_IN
BT_PCM_OUT
BT_PCM_SYNC
BT_UART_RX
BT_UART_CTS
BT_UART_TX
BT_UART_RTS
BT_REF_CLK
BT_RESET
BT_VREGIN_H
SDIO_CMD
SDIO_CLK/IF_SELECT
SDIO_SD_CS#
REF_CLK
RESETB
BLUETOOTH/LED/MIC

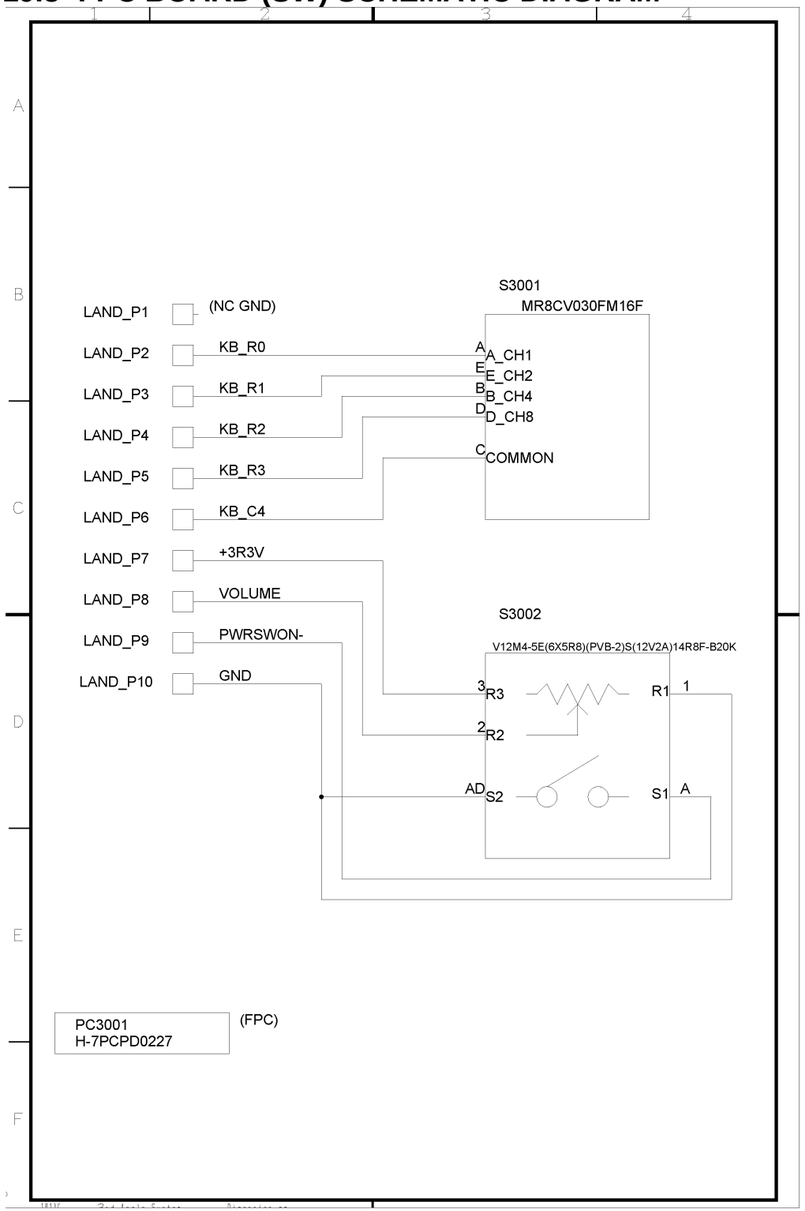


IF DOT MARTIX LCD SCHEMATIC DIAGRAM (SYSTEM)
DD02-CMD-2741A, Rev.1, Page 1 of 2



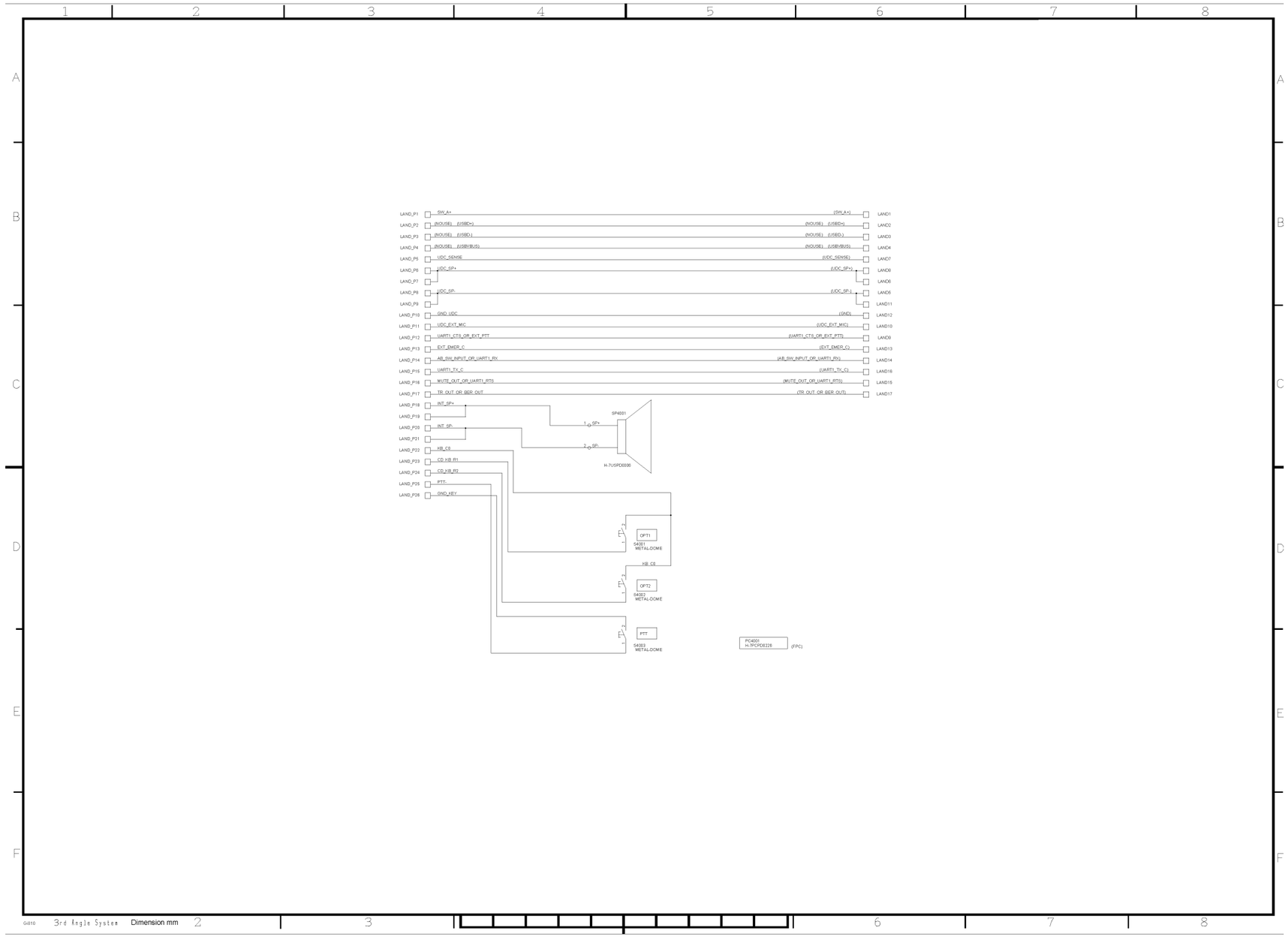
IF DOT MARTIX LCD SCHEMATIC DIAGRAM (SYSTEM)
DD02-CMD-2741A, Rev.1, Page 2 of 2

19.3 FPC BOARD (SW) SCHEMATIC DIAGRAM



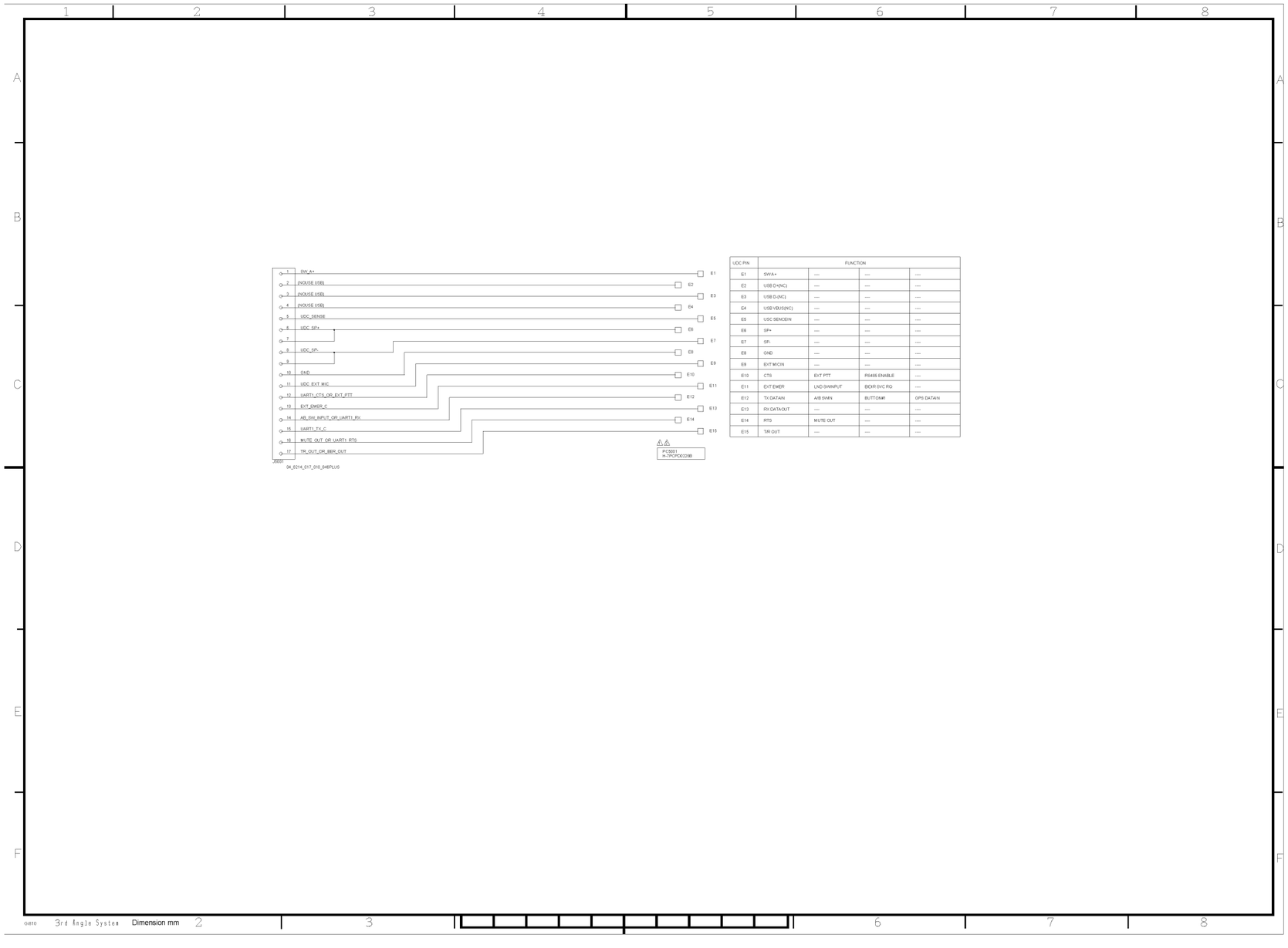
FPC BOARD (SW) SCHEMATIC DIAGRAM
DDO1-CDK-274, Rev. 2

19.4 FPC BOARD (FRONT) SCHEMATIC DIAGRAM



FPC BOARD (FRONT) SCHEMATIC DIAGRAM
DD01-CHS-2741, Rev. 2

19.5 UDC SCHEMATIC DIAGRAM

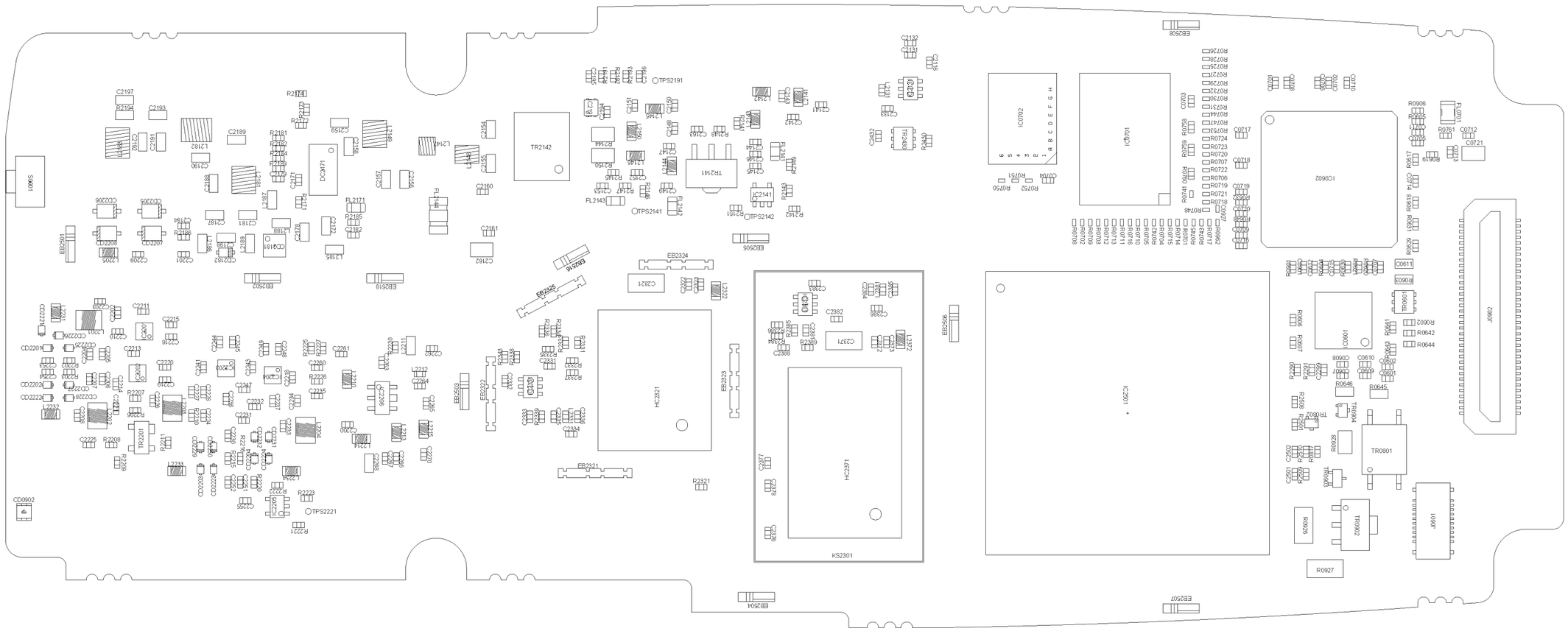


UDC PIN	FUNCTION			
E1	SW A+	----	----	----
E2	USB D+(NC)	----	----	----
E3	USB D-(NC)	----	----	----
E4	USB VBUS(NC)	----	----	----
E5	USC SENCEIN	----	----	----
E6	SP+	----	----	----
E7	SP-	----	----	----
E8	GND	----	----	----
E9	EXT MICIN	----	----	----
E10	CTS	EXT PTT	RS485 ENABLE	----
E11	EXT EMER	LND SWINPUT	BCKR SVC RQ	----
E12	TX DATAIN	A/B SWIN	BUTTONIN1	GPS DATAIN
E13	RX DATAOUT	----	----	----
E14	RTS	MUTE OUT	----	----
E15	TXR OUT	----	----	----

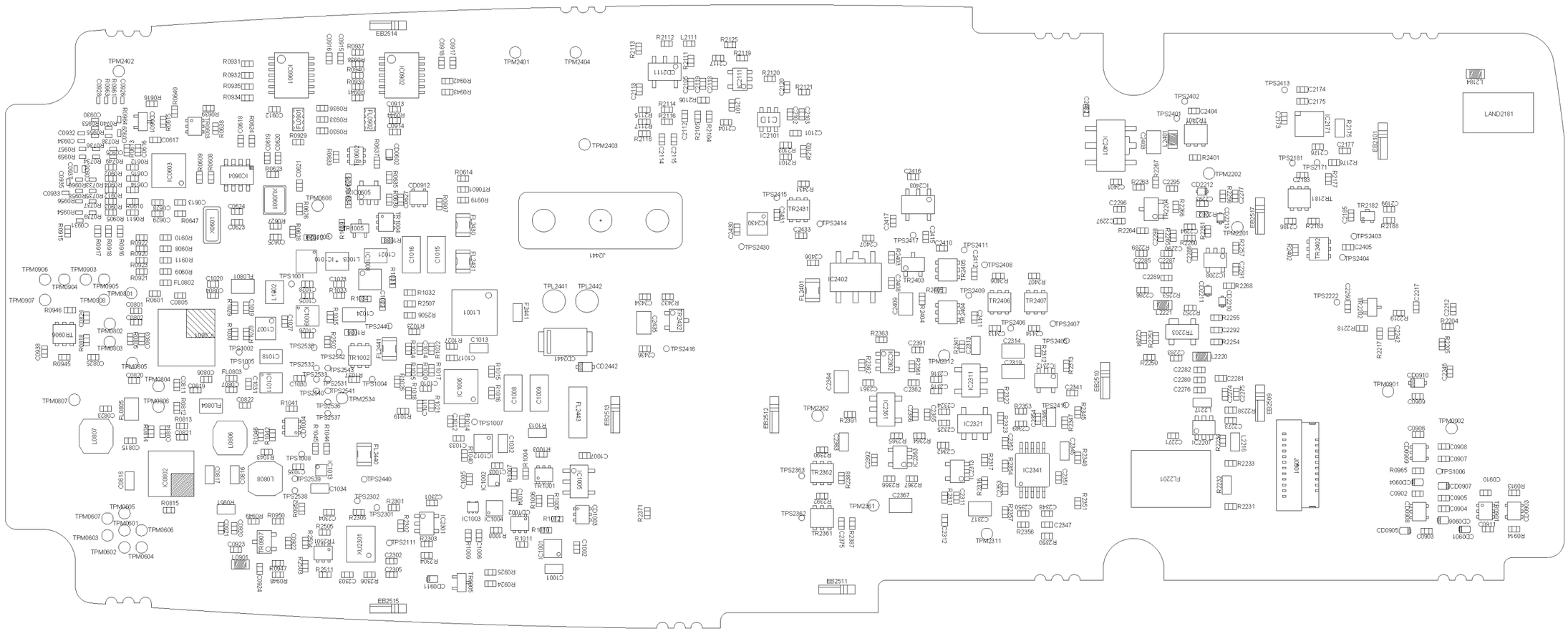
UDC SCHEMATIC DIAGRAM
DD03-CQD-274, Rev. 2

20. BOARD LAYOUTS

20.1 MAIN BOARD LAYOUT

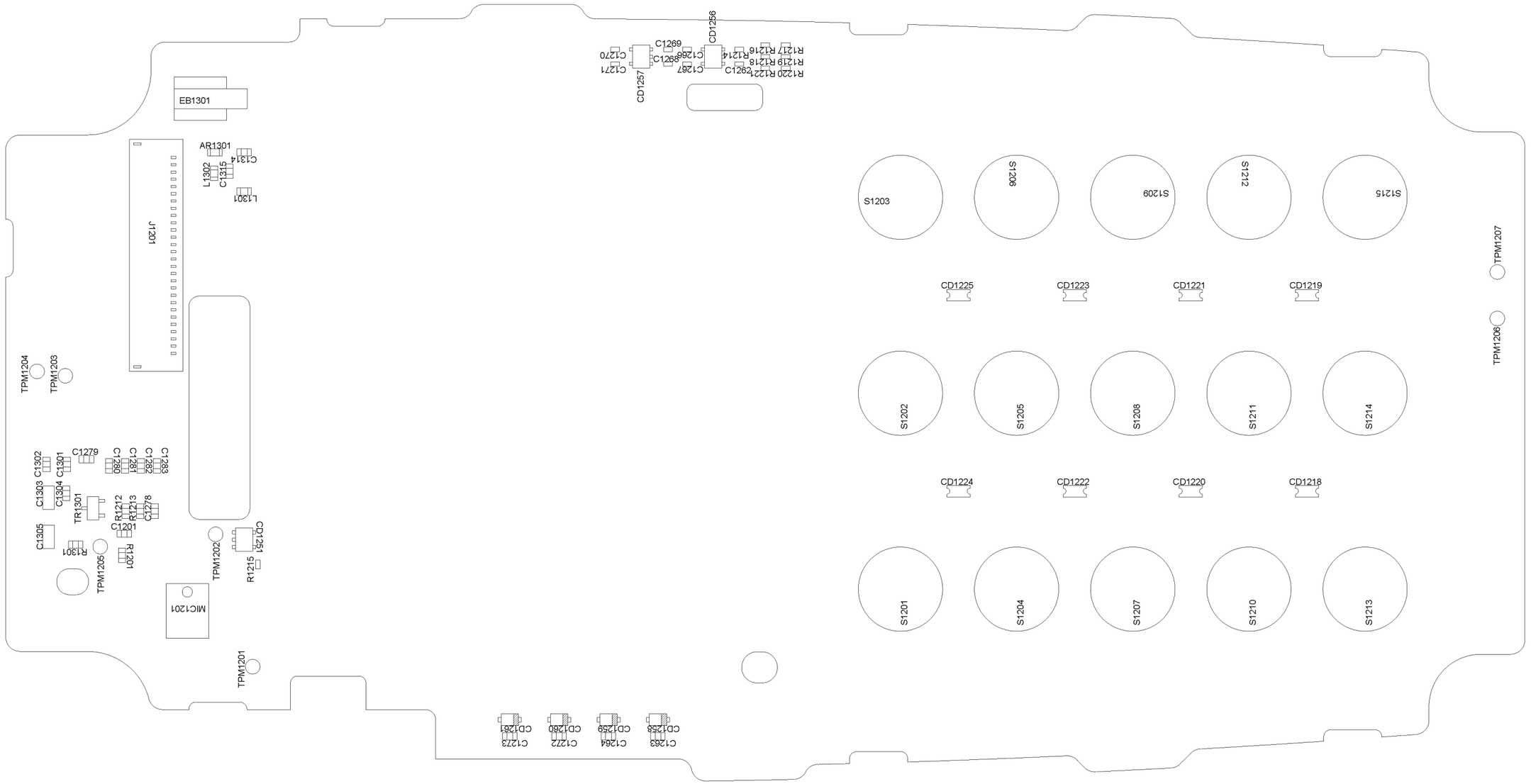


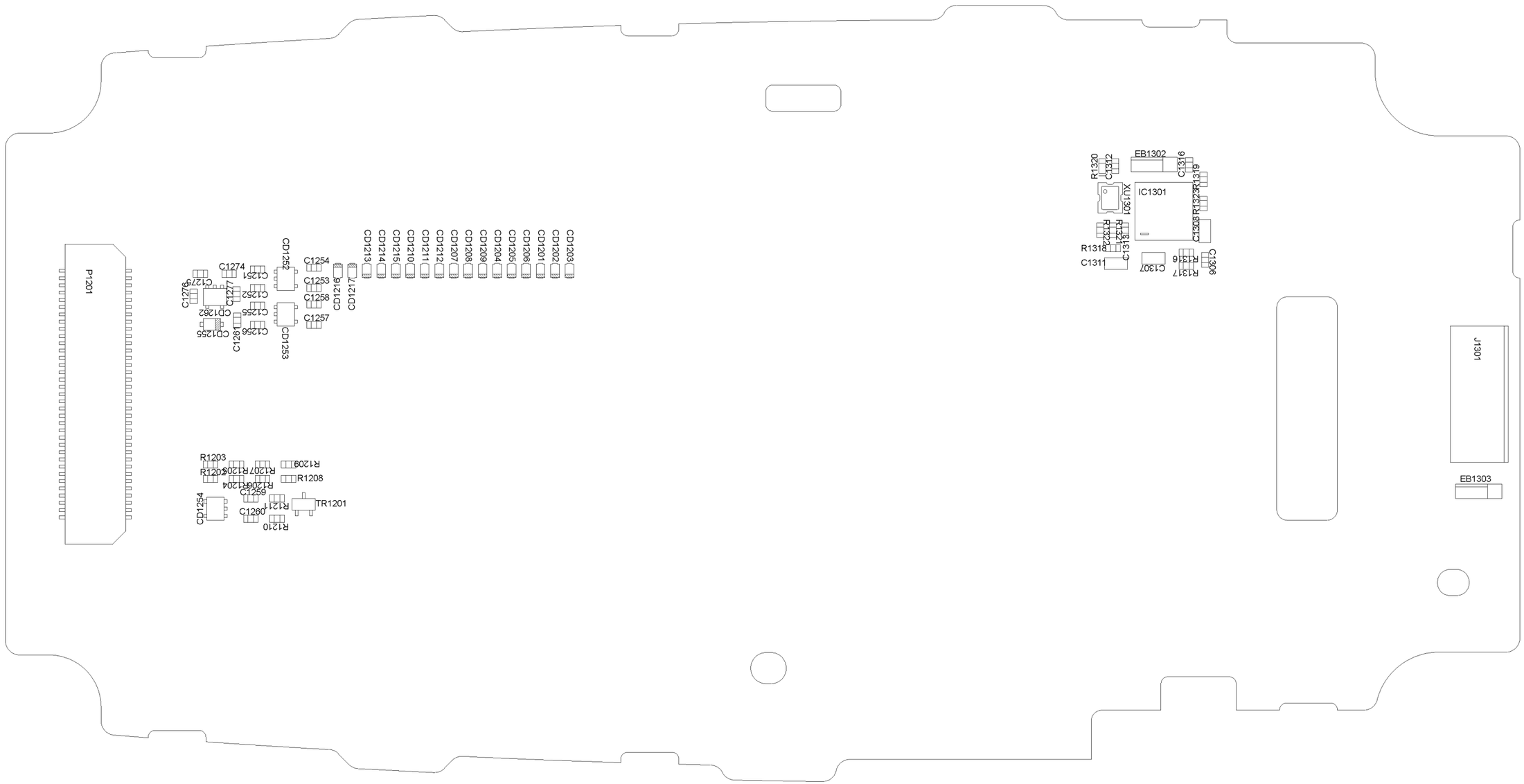
MAIN BOARD LAYOUT
DZ01-CMN-2741, Rev. 2, Page 9 of 10



MAIN BOARD LAYOUT
DZ01-CMN-2741, Rev. 2, Page 10 of 10

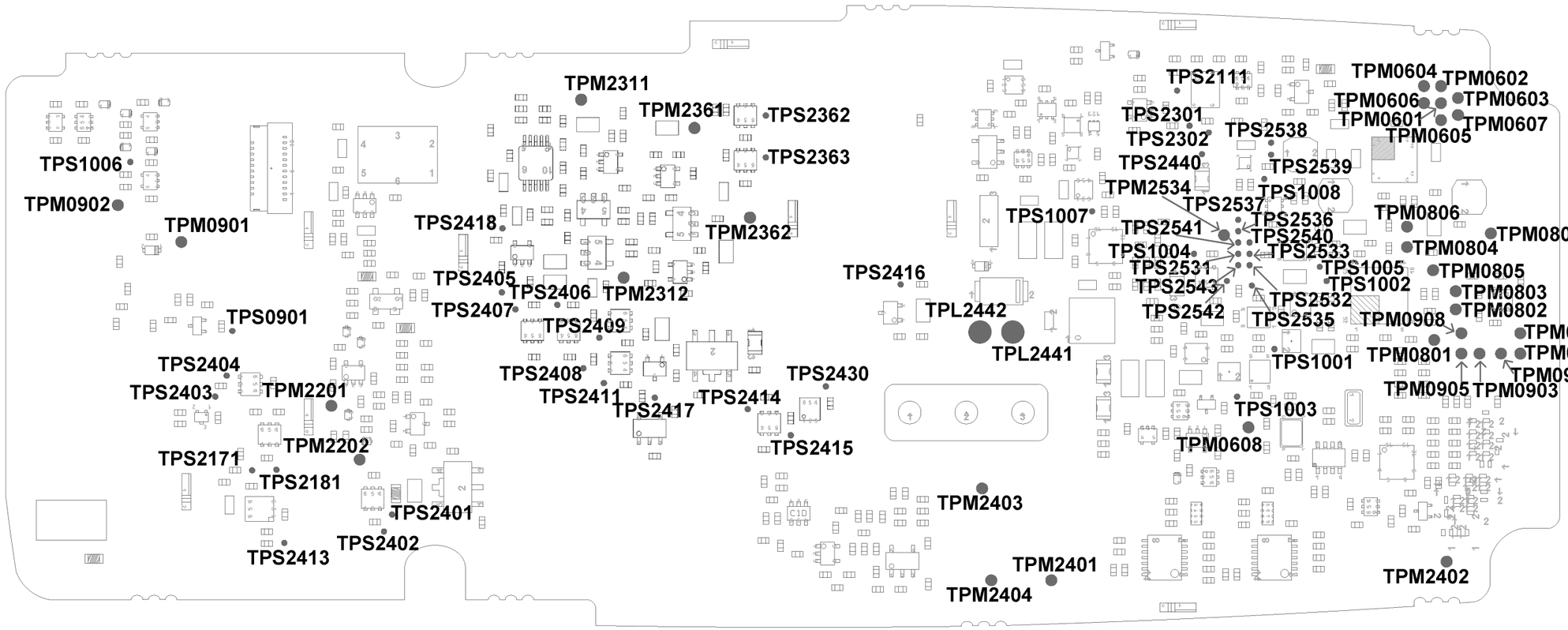
20.2 INTERFACE BOARD LAYOUT





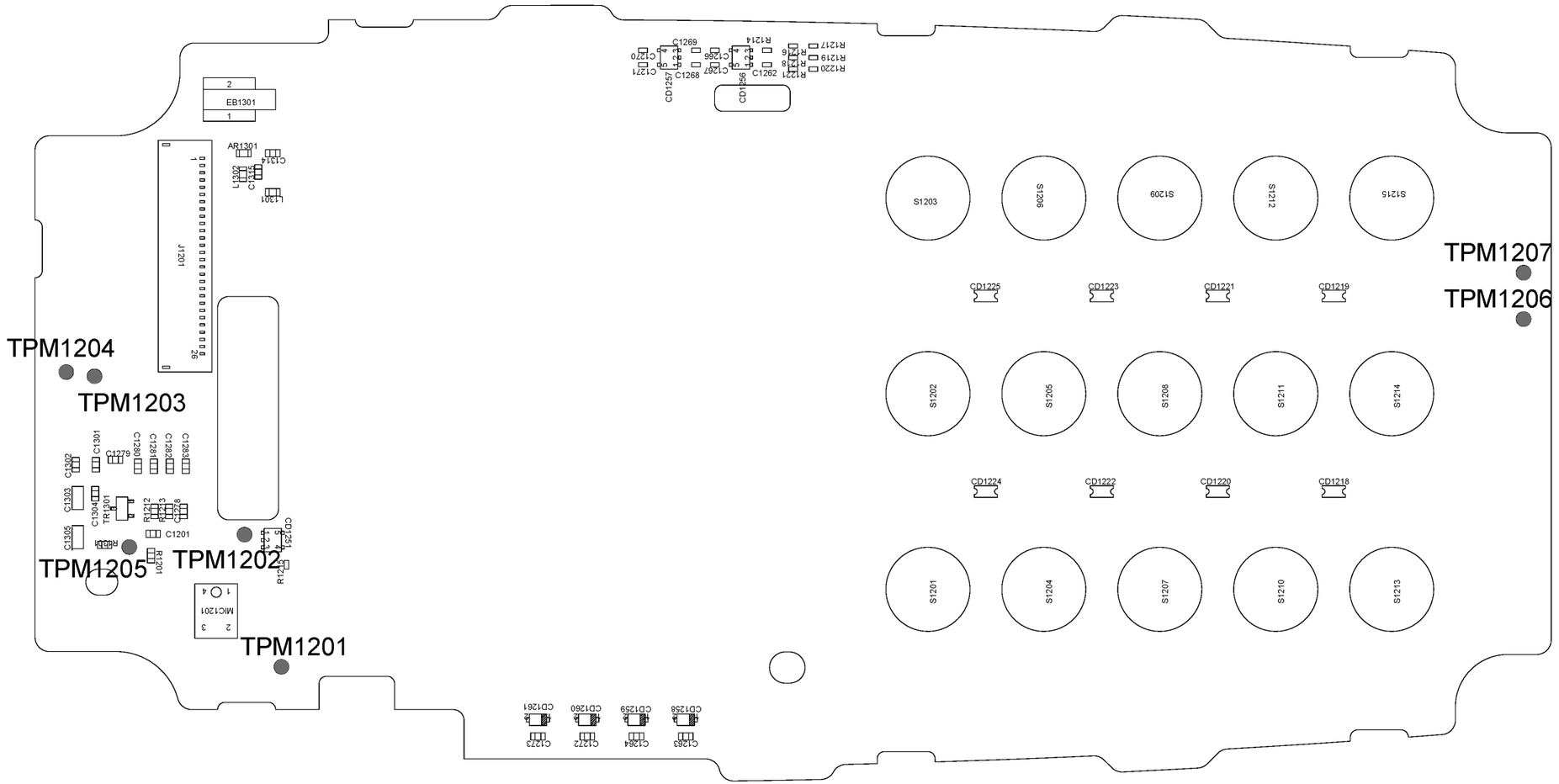
INTERFACE BOARD LAYOUT
DZ01-CMD-2741, Rev.2, Page 6 of 6

21. TEST POINTS



MAIN PWB SS Side

TEST POINT DEFINITION
DZ00-JHP-274, Page 1 of 3



IF PWB PS Side

TEST POINT DEFINITION
DZ00-JHP-274, Page 2 of 3

XG-25P VHF TEST POINT DEFINITION(MAIN BOARD)

TP No.	NAME	DESCRIPTION	VALUE
TPL2441	BATT	Battery Voltage	Typ. +7.5VDC
TPL2442	BATT	Battery Voltage	Typ. +7.5VDC
TPM0601	TCK	JTAG for OMAP	-
TPM0602	TDI	JTAG for OMAP	-
TPM0603	TDO	JTAG for OMAP	-
TPM0604	TMS	JTAG for OMAP	-
TPM0605	TRST	JTAG for OMAP	-
TPM0606	EMU0	JTAG for OMAP	-
TPM0607	EMU1	JTAG for OMAP	-
TPM0608	VCXO_OUT	Clock output	12MHz clock
TPM0801	MIC	INT MIC input signal	11mV RMS 1kHz tone ,3kHz DEV
TPM0802	UDC_EXT_MIC	UDC MIC input signal	11mV RMS 1kHz tone ,3kHz DEV
TPM0803	MICPOWER	MIC Bias output	2VDC
TPM0804	UDC_SP+	UDC SP+ output signal	1.0V RMS at 0.5W
TPM0805	UDC_SP-	UDC SP- output signal	1.0V RMS at 0.5W
TPM0806	INT_SP+	INT SP+ output signal	1.0V RMS at 0.5W
TPM0807	INT_SP-	INT SP- output signal	1.0V RMS at 0.5W
TPM0901	PWRSW ON-	PWR.SW signal	POWER SW ON 0VDC POWER SW OFF 7.5VDC
TPM0902	VOLUME	VOLUME control voltage	MAX Vol : 3.3VDC MIN Vol : 0VDC
TPM0903	EXT_PTT	PTT key signal	0V at active
	UART1_CTS	CTS input signal	CMOS level
TPM0904	AB_SW_INPUT	AB SW input signal	CMOS level
	UART1_RX	RX DATA signal	9.6k or 19.2k band CMOS level data
TPM0905	UART1_TX_C	TX DATA signal	9.6k or 19.2k band CMOS level data
TPM0906	MUTE_OUT	MUTE output signal	CMOS level
	UART1_RTS	RTS output signal	CMOS level
TPM0907	SW_A+	Power supply of external accessory	Typ. +7.5VDC
TPM0908	UDC_SENCE	Sence of external accessary type	0V : Test mode
TPM2201	IF_AGC	RX AGC setting time measuring point	-
TPM2202	IF_AGC_LEF	RX AGC reference voltage	-
TPM2311	RX_VCO_VC	RX VCO control voltage	-
TPM2312	RX_PLL_CPO	RX PLL charge pump output voltage	-
TPM2361	TX_VCO_VC	TX VCO control voltage	-
TPM2362	TX_PLL_CPO	TX PLL charge pump output voltage	-
TPM2401	GND	GND	-
TPM2402	GND	GND	-
TPM2403	GND	GND	-
TPM2404	GND	GND	-
TPM2534	PLLMON	Not used	-
TPS1001	+1.6V	Regulator output	1.6V
TPS1002	+1.5V	Regulator output	1.5V
TPS1003	+1.8V	Regulator output	1.8V
TPS1004	+2.1V	Regulator output	2.1V
TPS1005	+3.0V	Regulator output	3.0V
TPS1006	+3.3V	Regulator output	3.3V
TPS1007	+5.0V	Regulator output	5.0V
TPS1008	SYSRESET	System reset output	3.3V at nomal 0V at system reset
TPS2111	TX_APC_CTRL	APC setting voltage	-
TPS2141	TX_FINAL_GATE	FINAL GATE control voltage	-
TPS2142	TX_DRIVER_GATE	DRIVER GATE control voltage	-
TPS2171	TX_POW_DET	TX power detector output voltage	-
TPS2181	TX_ENB+	ANT SW control signal	3.3V at TX 0V at RX
TPS2191	PA_THERM_DET	Power AMP temperature	-

TP No.	NAME	DESCRIPTION	VALUE
TPS2221	BPF_SHIFT	Voltage for RX BPF frequency control	-
TPS2222	RX_H/L_SW	Signal for RX BPF select	0V at L side freqyency 3.3V at H side freqyency
TPS2301	AFC	Voltage for TCXO frequency control	-
TPS2302	TCXO_14R4M	Clock output	14.4MHz clock
TPS2362	TX_VCO_SEG1	TX VCO segment control signal	SEG1: 3.3V,SEG2 : 3.3V Band 1 SEG1: 3.3V,SEG2 : 0V Band 2
TPS2363	TX_VCO_SEG2	TX VCO segment control signal	SEG1: 0V,SEG2 : 3.3V Band 3 SEG1: 0V,SEG2 : 0V Band 4
TPS2401	+5V_TX	Pow-supply Voltege for RF TX Parts	5.0V
TPS2402	TX_ENBL+	TX control signal	3.3V : TX ON
TPS2403	+5V_RX	Pow-supply Voltege for RF RX Parts	5.0V
TPS2404	RX_ENBL+	RX control signal	3.3V : RX ON
TPS2405	5V_TXSYN	Pow-supply Voltage for TX Synthesizer	5.0V
TPS2406	TX_SYN_ENBL+	TX Synthesizer control signal	3.3V : TX SYN ON
TPS2407	5V_RXSYN	Pow-supply Voltage for RX Synthesizer	5.0V
TPS2408	RX_SYN_ENBL+	RX Synthesizer control signal	3.3V : RX SYN ON
TPS2409	+5V_RFVCO_600	Pow-supply Voltage for TX VCO	5.0V
TPS2411	+5V_RFVCO_200	Pow-supply Voltage for RX VCO	5.0V
TPS2413	+3V_TX	Pow-supply Voltege for RF TX Parts	3.0V
TPS2414	+3V_RX	Pow-supply Voltege for RF RX Parts	3.0V
TPS2415	+3V_TCXO	Pow-supply Voltege for 14.4MHz TCXO	3.0V
TPS2416	RF-LSI_VSYSVCO	Pow-supply Voltege for SYSVCO	3.0V
TPS2417	+5R8V	Regulator output	5.8V
TPS2418	+5V_PRESTEER	Regulator output	5.0V
TPS2430	RF-LSI_3R3VAD	Pow-supply Voltege for RF-LSI	3.3V
TPS2440	RF-LSI_1R8VAD	Pow-supply Voltege for RF-LSI	1.8V
TPS2441	RF-LSI_2R1VAD	Pow-supply Voltege for RF-LSI	2.1V
TPS2531	TRST_M	Not used	-
TPS2532	TCK_M	Not used	-
TPS2533	TMS_M	Not used	-
TPS2535	TDO_M	Not used	-
TPS2536	RESET1X_M	Not used	-
TPS2537	RESET2X_M	Not used	-
TPS2538	RXD_M	Not used	-
TPS2539	TXD_M	Not used	-
TPS2540	TCXOCLK_M	Not used	-
TPS2541	INT_SOC_M	Not used	-
TPS2542	OALX_M	Not used	-
TPS2543	TDI_M	Not used	-

XG-25P VHF TEST POINT DEFINITION(IF BOARD)

TP No.	NAME	DESCRIPTION	VALUE
TPM1201	MICPOWER	MIC Bias output	2VDC
TPM1202	MIC	INT MIC input signal	11mV RMS 1kHz tone ,3kHz DEV
TPM1203	+1.8V	Regulator output	1.8V
TPM1204	+3.3V	Regulator output	3.3V
TPM1205	PWL	Signal for LCD backlight brightness control	-
TPM1206	GND	GND	-
TPM1207	GND	GND	-

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