

M7300 Mobile Radio

UHF Front and Remote-Mount

378 to 430 MHz and 440 to 512 MHz

Mobile Radios

RU-144750-021 and RU-144750-031



MANUAL REVISION HISTORY

REV.	DATE	REASON FOR CHANGE
—	Apr/11	Original release.
A	Aug/11	Revised specifications, service parts, programming and configuration information, maintenance procedures, part lists, and production changes. Added information on HHC-731 maintenance manual.
B	May/12	Updated service parts, basic operating procedures, test procedures, disassembly and reassembly procedures, parts list, production changes, and schematic diagrams. Added alignment procedures.

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1 SAFETY SYMBOL CONVENTIONS

The following conventions are used in this manual to alert the user to general safety precautions that must be observed during all phases of operation, installation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere 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.



WARNING

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.



CAUTION

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



NOTE

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 boards or modules.

2 OPERATIONAL SAFETY RECOMMENDATIONS

2.1 TRANSMITTER HAZARDS



The operator of any mobile radio should be aware of certain hazards common to the operation of vehicular radio transmissions. Possible hazards include but are not limited to:

- **Explosive Atmospheres** — Just as it is dangerous to fuel a vehicle while its engine is running, be sure to turn the radio **OFF** while fueling the vehicle. If the radio is mounted in the trunk of the vehicle, **DO NOT** carry containers of fuel in the trunk.

Areas with potentially explosive atmosphere are often, but not always, clearly marked. 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.
- **Interference To Vehicular Electronic Systems** — Electronic fuel injection systems, electronic anti-skid braking systems, electronic cruise control systems, etc., are typical of the types of electronic devices that can malfunction due to the lack of protection from radio frequency (RF) energy present when transmitting. If the vehicle contains such equipment, consult the dealer for the make of vehicle and enlist his aid in determining if such electronic circuits perform normally when the radio is transmitting.
- **Electric Blasting Caps** — To prevent accidental detonation of electric blasting caps, **DO NOT** use two-way radios within 1000 feet (305 meters) of blasting operations. Always obey the “**Turn Off Two-Way Radios**” (or equivalent) signs posted where electric blasting caps are being used. (OSHA Standard: 1926.900).
- **Radio Frequency Energy** — To prevent burns or related physical injury from radio frequency energy, do not operate the transmitter when anyone outside of the vehicle is within the minimum safe distance from the antenna as specified in the respective *Installation and Product Safety Manual*.
- **Vehicles Powered By Liquefied Petroleum (LP) Gas** — Radio installation in vehicles powered by liquefied petroleum gas, where the LP gas container is located in the trunk or other sealed-off space within the interior of the vehicle, must conform to the **National Fire Protection Association** standard **NFPA 58**. This requires:
 - The space containing the radio equipment must be isolated by a seal from the space containing the LP gas container and its fittings.
 - Outside filling connections must be used for the LP gas container.
 - The LP gas container space shall be vented to the outside of the vehicle.

2.2 SAFE DRIVING RECOMMENDATIONS

The American Automobile Association (AAA) advocates the following key safe driving recommendations:

- Read the literature on the safe operation of the radio.
- Keep both hands on the steering wheel and the microphone in its hanger whenever the vehicle is in motion.
- Place calls only when the vehicle is stopped.
- When talking from a moving vehicle is unavoidable, drive in the slower lane. Keep conversations brief.

- If a conversation requires taking notes or complex thought, stop the vehicle in a safe place and continue the call.
- Whenever using a mobile radio, exercise caution.

2.3 OPERATING RULES AND REGULATIONS

Two-way radio systems must be operated in accordance with the rules and regulations of the local, regional, or national government.

In the United States, the M7300 mobile radio must be operated in accordance with the rules and regulations of the Federal Communications Commission (FCC). Operators of two-way radio equipment must be thoroughly familiar with the rules that apply to the particular type of radio operation. Following these rules helps eliminate confusion, assures the most efficient use of the existing radio channels, and results in a smoothly functioning radio network.

When using a two-way radio, remember these rules:

- It is a violation of FCC rules to interrupt any distress or emergency message. The radio operates in much the same way as a telephone “party line.” Therefore, always listen to make sure the channel is clear before transmitting. Emergency calls have priority over all other messages. If someone is sending an emergency message – such as reporting a fire or asking for help in an accident, do not transmit unless assistance can be offered.
- The use of profane or obscene language is prohibited by Federal law.
- It is against the law to send false call letters or false distress or emergency messages. The FCC requires keeping conversations brief and confined to business. Use coded messages whenever possible to save time.
- Using the radio to send personal messages (except in an emergency) is a violation of FCC rules. Send only essential messages.
- It is against Federal law to repeat or otherwise make known anything overheard on the radio. Conversations between others sharing the channel must be regarded as confidential.
- The FCC requires self-identification at certain specific times by means of call letters. Refer to the rules that apply to the particular type of operation for the proper procedure.
- No changes or adjustments shall be made to the equipment except by an authorized or certified electronics technician.



Under U.S. law, operation of an unlicensed radio transmitter within the jurisdiction of the United States may be punishable by a fine of up to \$10,000, imprisonment for up to two (2) years, or both.

2.4 OPERATING TIPS

The following conditions tend to reduce the effective range of two-way radios and should be avoided whenever possible:

- Operating the radio in areas of low terrain, or while under power lines or bridges.
- Obstructions such as mountains and buildings.



In areas where transmission or reception is poor, communication improvement may sometimes be obtained by moving a few yards in another direction, or moving to a higher elevation.

3 SPECIFICATIONS¹

3.1 GENERAL

Dimensions, Front-Mount Mobile Radio: (Height x Width x Depth)	2.4 x 6.9 x 11.3 inches (6.1 x 17.5 x 28.7 centimeters) (Includes knobs but <u>not</u> space required for mounting bracket and cables at rear of radio)
Dimensions, Remote-Mount Mobile Radio: (Height x Width x Depth)	2.0 x 6.9 x 9.2 inches (5.1 x 17.5 x 23.4 centimeters) (Does <u>not</u> include space required for mounting bracket and cables at rear of radio)
Dimensions, CH-721 Control Head: (Height x Width x Depth)	2.4 x 6.9 x 3.9 inches (6 x 17.5 x 10 centimeters) (Does <u>not</u> include bracket and mounting screws)
Dimensions, HHC-731 Hand-Held Controller: (Height x Width x Depth)	4.7 x 2.5 x 1.2 inches (11.9 x 6.4 x 3.1 centimeters) (Does <u>not</u> include coiled cable and mic hanger)
Weight, Front-Mount Mobile Radio:	5.9 pounds (2.68 kilograms), does not include bracket
Weight, Remote-Mount Mobile Radio:	5.25 pounds (2.38 kilograms), does not include bracket
Weight, CH-721 Control Head:	1.25 pounds (0.57 kilograms), does not include bracket
Weight, HHC-731 Hand-Held Controller:	0.65 pounds (0.29 kilograms), includes coiled cable
Operating Ambient Temperature Range:	-22 to +140° Fahrenheit (-30 to +60° Celsius)
Storage Temperature Range:	-40 to +185° Fahrenheit (-40 to +85° Celsius)
Altitude:	15,000 feet (4572 meters) maximum
DC Supply Voltage Operating Ranges	
For Full Performance:	+13.6 Vdc \pm 10% (Normal range per TIA-603)
Overall Operating Range:	+10.8 to +16.6 Vdc
Continuous without Damage:	0 to +17 Vdc
DC Supply Current Requirements	
Receive (includes CH-721 control head):	
With Speaker Muted:	1.1 amps maximum
With 0.5-Watt Speaker Output Power:	1.5 amps maximum
With 10-Watt Speaker Output Power:	3.5 amps maximum
With 15-Watt Speaker Output Power:	4.0 amps maximum
Transmit (includes CH-721 control head):	
At 50 Watts RF:	15 amps maximum, 13 amps typical
HHC-731 Hand-Held Controller:	0.5 amps maximum
Quiescent/Off Currents	
Mobile Radio:	2 milliamps maximum
CH-721 Control Head:	100 microamps maximum
HHC-731 Hand-Held Controller:	500 microamps maximum

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

3.2 TRANSCEIVER

Frequency Ranges

Low-Split Radio (RU-144750-021):

378 to 430 MHz

High-Split Radio (RU-144750-031):

440 to 512 MHz [See footnote ²]

Transmit RF Output:

8 to 50 watts (programmable range)

Channel Spacing:

12.5 kHz or 25 kHz (mode dependent)

Channel Tuning Increment:

6.25 kHz

Voice and Data Communications Modes:

Half-Duplex

Frequency Stability:

±1.5 ppm

Receiver Sensitivity:

P25 Mode (TIA-102 Method):

-116 dBm minimum at 5% Static BER

EDACS[®]/ProVoice[™] & Conv. Modes:

-119 dBm minimum at 12 dB SINAD (25 kHz channels)

Receiver Intermodulation Rejection:

80 dB typical

Audio Frequency Response:

300 to 3000 Hz (transmit and receive)

Microphone Input Sensitivity:

82 ±28 mV rms (typical)

Microphone Maximum Input Level:

2500 mV peak-to-peak

Microphone Input Impedance:

600 ohms

Microphone Audio Frequency Response:

±0.5 dB from 100 Hz to 3000 Hz

Microphone Connector:

17-pin Conxall-style flush-mount thumbscrew-locking connector located on front panel of CH-721 control head

Microphone Types Available:

Standard, DTMF, and Noise-Canceling

Speaker Audio Output Power:

15 watts RMS minimum into 4-ohm external speaker

Speaker Audio Output Distortion:

< 5% at 15 watts RMS into 4-ohm external speaker

Headset Audio Output Power

At CH-721 Microphone Connector:

1 watt minimum into 4-ohm headset/speaker

At CH-721 DB-25 Rear Panel Connector:

35 milliwatts maximum into 24-ohm headset

At HHC-731 DB-25 Connector:

1 watt minimum into 8-ohm headset/speaker

External Speaker Connection

Local Control (Front-Mount Radio):

2-pin audio connector on radio's option cable

Remote Control (Trunk-Mount Radio):

2-pin audio connector on rear of control head

Remote Control with HHC-731:

DB-44 connector on rear of radio

Mic A-D and Speaker D-A Audio Conversion

CODEC Audio Sampling Rate:

8 kHz

CODEC Algorithm (Vocoding Method):

Sigma-Delta ($\Sigma\Delta$)

² The low-split UHF M7300 mobile radio covers the 378 to 430 MHz RF band. However, per FCC regulations, the lowest allowed transmit frequency for LMR operations is 406.1 MHz.

Modulation and Data Rates

EDACS and ProVoice Modes:	FM and 2-Level GFSK at 9600 bits-per-second
Analog Conventional Mode:	FM
P25 Phase 1 Mode:	C4FM at 4800 symbols-per-second

Voice-Coding Method

EDACS, ProVoice and P25 Modes:	Improved Multi-Band Excitation (IMBE [®])
Analog Conventional Mode:	(none)

3.3 REGULATORY

3.3.1 General

FCC Type Acceptance

Low-Split Radio (378 to 430 MHz):	OWDTR-0061-E
High-Split Radio (440 to 512 MHz):	OWDTR-0062-E

Applicable FCC Rules:	Part 15 and Part 90
------------------------------	---------------------

Industry Canada Certification

Low-Split Radio (378 to 430 MHz):	3636B-0061
High-Split Radio (440 to 512 MHz):	3636B-0062

Applicable Industry Canada Rules:	RSS-119
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3.3.2 FCC Part 15 Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

3.3.3 Industry Canada RSS Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

4 INTRODUCTION

The UHF M7300 radios are multi-mode digital mobile radios designed to meet the critical demands of radio users. Two different UHF-band radios are available. The low-split UHF radio covers the 378 to 430 MHz frequency band, and the high-split UHF radio covers the 440 to 512 MHz frequency band. Each radio can provide 50-watts of transmit output power when transmitting in full-power mode.

Both radios support multiple operating modes, including Enhanced Digital Access Communications System (EDACS®) or ProVoice™ trunked modes, P25 digital trunked mode, P25 digital conventional mode, and analog conventional mode. Advanced Encryption Standard (AES) is optionally available for maximum communications security.

The radio can also be equipped with an optional Global Positioning System (GPS) receiver module. This module provides standard GPS-formatted data over-the-air for vehicle tracking systems.

Front-mount and remote-mount radio configurations are available, as illustrated in Figure 4-1 below. In the front-mount configuration, the control head is an integral part of the mobile radio. In the remote-mount configuration, the control head is located near the radio operator's position and the radio is mounted remotely from the control head, typically in the vehicle's trunk. In addition, a hand-held controller can be connected to a remote-mount radio in place of the control head.



Figure 4-1: Front-Mount and Remote-Mount UHF M7300 Mobile Radios

The M7300 is designed to operate in a mobile environment, typically within a motor vehicle. It must be connected to an external transmit/receive antenna such as one mounted to the vehicle's rooftop or trunk lid. Several different types of external-mount antennas are approved and available for use with the radio, as listed in the radio's installation manual. The respective publication numbers are listed in Section 5 on page 18.

Control heads used with the M7300 radio include the CH-721 Scan and the CH-721 System model control heads. See Figure 4-3 and Figure 4-4. Both heads feature a large 3-line graphical vacuum-fluorescent display, front panel controls and buttons/keys for user control of the mobile radio, an internal high-power audio amplifier to drive an externally-connected speaker, and a front panel microphone connector. The CH-721 System control head also has a 12-button numeric keypad that provides Dual-Tone Multi-Frequency (DTMF) functionality and easier operator system/group selection control at the control head's front panel.

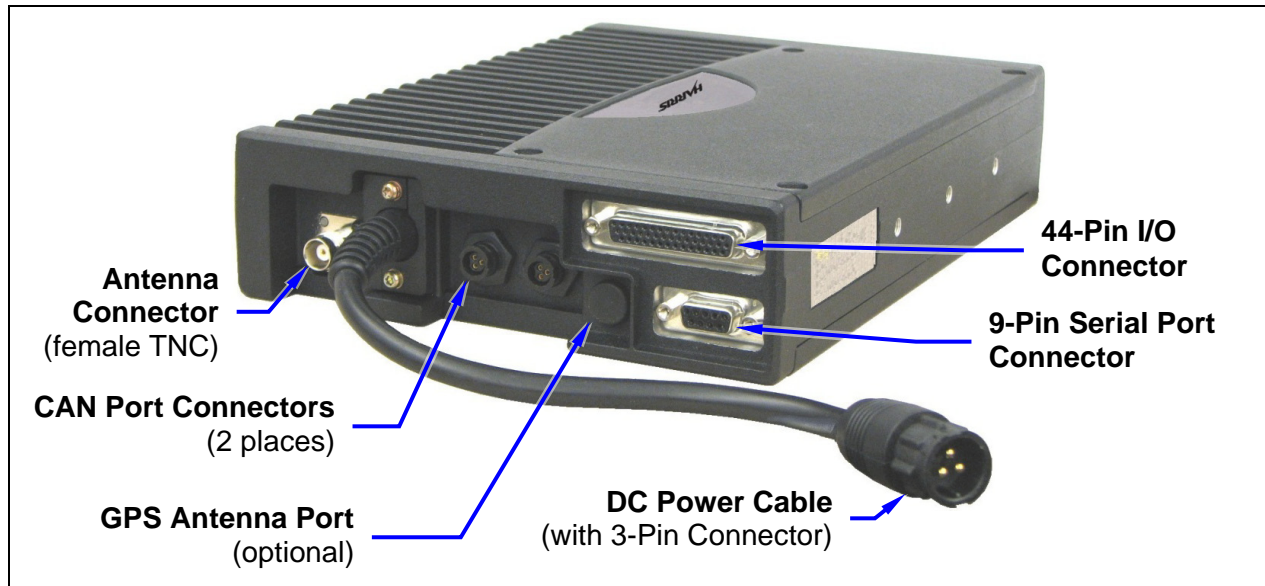


Figure 4-2: UHF M7300 Mobile Radio (Rear View)

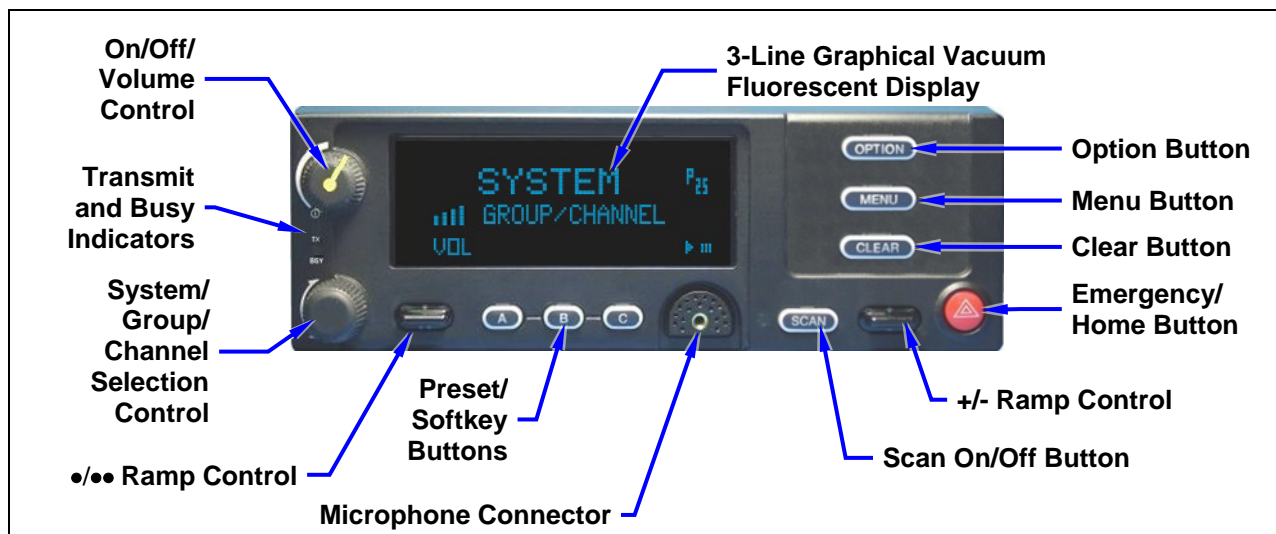


Figure 4-3: CH-721 Scan Model Control Head Front Panel

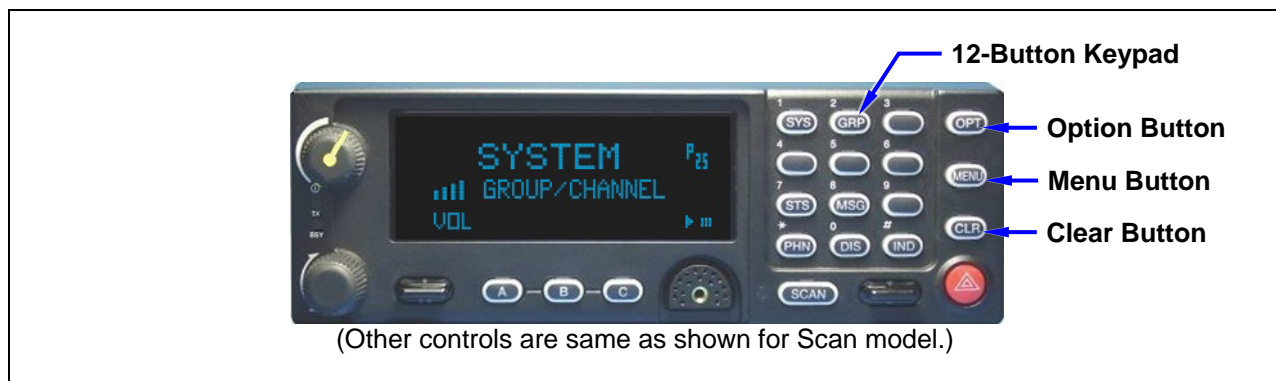


Figure 4-4: CH-721 System Model Control Head Front Panel

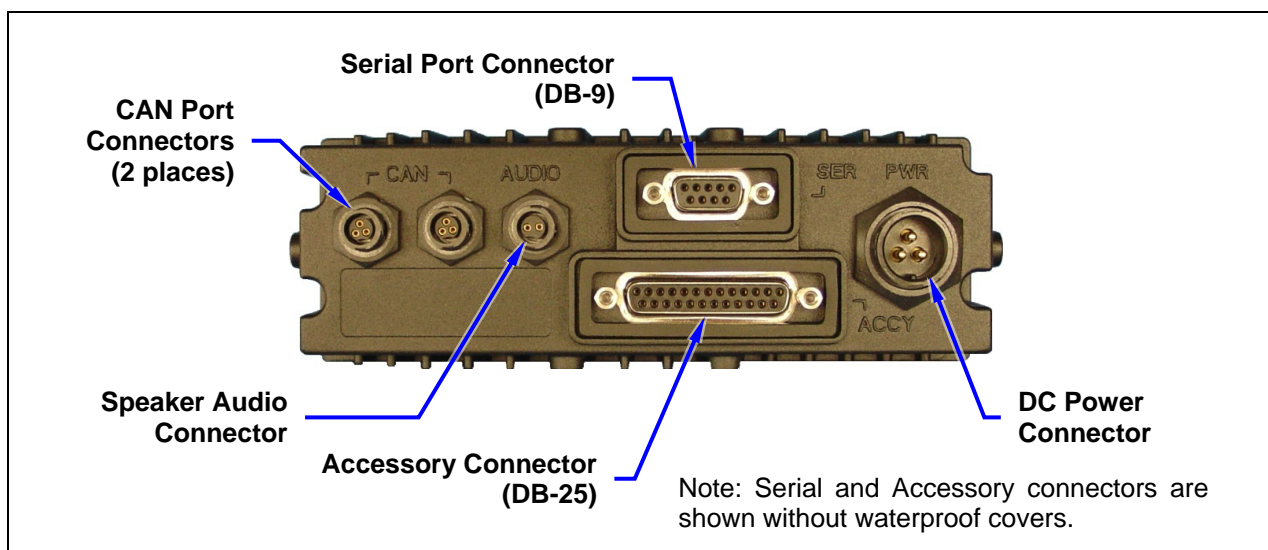


Figure 4-5: CH-721 Rear Panel (both control head models)

In a remote-mount M7300 mobile radio installation, the HHC-731 hand-held controller can be employed in place of the CH-721 control head. This easy-to-use hand-held mobile radio controller is primarily designed for use in harsh environments such as maritime (i.e., boating) applications and All-Terrain Vehicle (ATV) applications. The HHC-731 hand-held controller has easy-to-use buttons, a tough liquid-crystal display (LCD), and a built-in microphone. As of the publication of this manual, only one (1) HHC-731 hand-held controller can be connected to a radio, and without any connected CH-721 control heads. The front of the HHC-731 hand-held controller is shown in Figure 4-6.



Figure 4-6: HHC-731 Hand-Held Controller Front View

The remote-mount M7300 radio is designed for remote mounting in a motor vehicle's trunk, or some other preferably unoccupied section in a vehicle, such as a fire truck's equipment shelf. EDACS Conventional P25 (ECP) mode supports dual control heads. For a front-mount radio, this includes the head in the radio. The radio is remotely controlled by a control head(s) connected to it via 3-wire Controller Area Network (CAN) cables. Between the radio and control head(s), the CAN link carries digitized microphone and speaker audio, controlling data such as button presses and radio messages, and user data such as that for a mobile data terminal connected to the serial port of the radio or control head. For proper operation, the CAN link must be terminated appropriately on each end. In multiple control head installations, heads are interconnected to the mobile radio in a series ("daisy-chain") fashion via CAN link cables. CAN port connectors are located on the rear of the radio and control heads, as illustrated in Figure 4-2 and Figure 4-5.

The 44-pin D-subminiature connector on the rear panel of the radio provides a connection point for various types of optional equipment. For example, with a front-mount radio, this connector can provide connections for an optional siren/light control system via an optional interconnect cable.

As shown in Figure 4-5, the CH-721 Scan and System model control heads used in remote-mount radio installations have several connectors located on the head's rear panel. These connectors include a DC power connector, two (2) CAN port connectors used for CAN link interconnections, an external speaker connector, a 9-pin serial port connector for connecting optional equipment such as a mobile data terminal, and a 25-pin accessory connector. Both CH-721 models can interface to an optional siren/light control system for broadcasting via a public address (PA) speaker.

The radio and control head/hand-held controller must be powered by an external +13.6-volt (nominal) DC power source. In mobile applications, the motor vehicle's electrical system is utilized as the source of DC power. In a remote-mount radio installation, the CH-721 control head(s) or the HHC-731 hand-held controller connected to the radio is also powered by the same DC power source, but separately fused. When the control head/hand-held controller is powered-up by the operator, it "wakes up" the radio by transmitting data to the radio via the CAN link.

The radio provides half-duplex voice and data communications. Voice communications are accomplished via a "push-to-talk" (PTT) type microphone and an external speaker connected to the control head. The HHC-731 hand-held controller has an integrated microphone and PTT button/key. When a control head is employed in a mobile radio installation, an audio amplifier in the head drives the speaker. When the hand-held controller is employed, an audio amplifier in the remote-mounted mobile radio drives the speaker.

For data communications, the radio has an industry-standard 9-pin serial interface port for connecting optional data-type equipment, such as a Mobile Data Terminal (MDT), a laptop PC, an external display, or a key-entry device. This port works seamlessly with equipment from popular manufacturers and off-the-shelf applications.

The radio has an optional built-in Global Positioning System (GPS) tracking receiver. The GPS receiver determines the unit's location and the radio transmits it to the network, either when polled by the network or automatically on a predetermined periodic basis. The GPS antenna can be integrated into the mobile transmit/receive antenna (i.e., a "combination" antenna). Alternately, the GPS antenna can be located/mounted completely separate from the mobile transmit/receive antenna.

The M7300 mobile radio, the CH-721 control head and the HHC-731 hand-held controller exceed tough environmental specifications included within military standard MIL-STD-810F, the radio industry standard TIA/EIA-603, and the radio standard established by the U.S. Forest Service.

The M7300 mobile radio supports operation on APCO Project 25 phase I compliant Common Air Interface (P25 CAI) trunked radio networks, and operation in a talk-around mode in accordance with the APCO Project 25 phase I standard. P25 radio systems utilize Improved Multi-Band Excitation (IMBE) speech and data compression technology, developed by Digital Voice Systems, Inc.

EDACS and ProVoice trunked radio networks employ analog FM and 2-level Gaussian Frequency-Shift Keying (GFSK) modulation techniques on the RF channels. Data is transmitted on an RF channel at a 9600 bits-per-second rate. ProVoice also employs IMBE technology.

For over-the-air secure radio communications, the M7300 mobile radio may be equipped for 64-bit DES (Data Encryption Standard) encryption or 128/256-bit AES (Advanced Encryption Standard) encryption. With encryption, voice and/or user data signals transmitted and received by the radio on an RF channel are digitally encrypted ("scrambled") to virtually eliminate unauthorized monitoring via the RF channel.



Harris recommends the buyer use only an authorized representative to install and service this product. The warranties provided to the buyer under the terms of sale shall be null and void if this product is installed or serviced improperly, and Harris shall have no further obligation to the buyer for any damage caused to the product or to any person or personal property.

5 RELATED PUBLICATIONS

The following publications contain additional information about the UHF M7300 mobile radio:

- Installation Manual for Front and Remote-Mount Radio Installations: MM-014763-001
- Quick Guide for EDACS, Conventional and P25 (ECP) modes: MM-014369-001
- Operator's Manual for All Modes: MM-014716-001
- Operator's Manual for HHC-731 Hand-Held Controller: MM-018321-001
- Maintenance Manual for CH-721 Scan and System Control Heads: MM-008918-001
(included with this manual)
- Maintenance Manual for HHC-731 Hand-Held Controller: MM-018323-001
(included with this manual)
- Maintenance Manual for HHC-731 Hand-Held Controller: MM-018323-001
(included with this manual)

A Quick Guide and the Installation and Product Safety Manual are included with each mobile radio equipment package when it ships from the factory. Quick Guides and the Operator's Manuals are available at www.pspc.harris.com without a login. Obtaining the Installation and Product Safety Manual or a Maintenance Manual from that web site requires an Information Center log-in, then browsing to Tech Link's Technical Manual Library.

6 REPLACEMENT PARTS

Parts listed in Section 8 of this manual can be ordered via our Customer Care center. To order replacement parts, contact the Customer Care center at <http://www.pspc.harris.com/CustomerService> or:

United States:

- Phone Number: 1-800-368-3277
- Fax Number: 1-321-409-4393 (U.S. Only)
- E-mail: PSPC_CustomerFocus@harris.com

International:

- Phone Number: 434-455-6403
- Fax Number: 321-409-4394
- E-mail: PSPC_InternationalCustomerFocus@harris.com

7 TECHNICAL ASSISTANCE

If any of the radio equipment requires repair, or if there are questions or concerns about the installation of this equipment, contact the Harris Technical Assistance Center (TAC) using the following telephone numbers or e-mail address:

- United States and Canada: 1-800-528-7711 (toll free)
- International: 1-434-385-2400
- Fax: 1-434-455-6712
- E-mail: PSPC_tac@harris.com

8 CATALOG AND PART NUMBERS

8.1 RADIOS AND CONTROL HEADS

Table 8-1: UHF M7300 Mobile Radio Catalog and Part Numbers

CATALOG NUMBER	RADIO PART NUMBER	DESCRIPTION
MAMW-SNMXX*	RU-144750-021	Low-Split UHF (378 to 430 MHz) 50-Watt M7300 Mobile Radio for Front and Remote-Mount Configurations
MAMW-SUMXX*	RU-144750-031	High-Split UHF (440 to 512 MHz) 50-Watt M7300 Mobile Radio for Front and Remote-Mount Configurations

* Catalog package also includes installation manual and quick-reference operating guide.

Table 8-2: CH-721 Control Head Catalog and Part Numbers

CONTROL HEAD CATALOG NUMBER	CONTROL HEAD PART NUMBER	DESCRIPTION
MAMW-NCP9G	CU23218-0001	CH-721 Scan Control Head, Local-Control for Use on a Front-Mount Mobile Radio
MAMW-NCP9E	CU23218-0002	CH-721 Scan Control Head, Remote-Control for Use with a Remote-Mount Mobile Radio
MAMW-NCP9H	CU23218-0003	CH-721 System Control Head, Local-Control for Use on a Front-Mount Mobile Radio
MAMW-NCP9F	CU23218-0004	CH-721 System Control Head, Remote-Control for Use with a Remote-Mount Mobile Radio

Table 8-3: AES and DES Encryption Catalog Numbers for M7300 Mobile Radios

CATALOG NUMBER	DESCRIPTION
MAMW-NPL7M	256-Bit Advanced Encryption Standard (AES) for EDACS, Conventional and P25 (ECP) Modes
MAMW-NPL3V	64-Bit Data Encryption Standard (DES) for ECP Modes
MAMW-PKG8C	256-Bit AES for ECP and OpenSky Modes, and 64-Bit DES for ECP Modes
MAMW-PKG8F	256-Bit AES and 64-Bit DES for ECP Modes

8.2 INSTALLATION-RELATED COMPONENTS

For detailed information on installation-related components, refer to the *Installation and Product Safety Manual*, publication MM-014763-001.

8.3 SERVICE PARTS

This section lists service parts available for the UHF M7300 mobile radios. See Section 6 on page 18 for parts ordering information.

Table 8-4: Service Parts for the UHF M7300 Mobile Radio


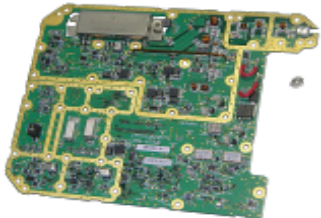
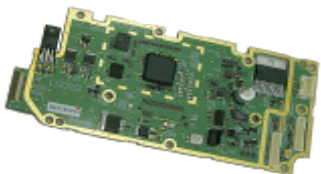


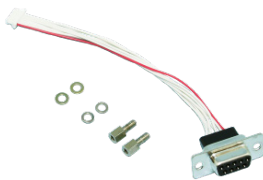

SERVICE PARTS PART NUMBER	DESCRIPTION	ILLUSTRATION
14002-0125-01	Board Assembly, 378 to 430 MHz RF Processor (CMN-4750L/- MDHW10758)	
14002-0126-01	Board Assembly, 440 to 512 MHz RF Processor (CMN-4750H/- MDHW10757)	
CB-015585	Board Assembly, PK (CMC-1294E/- MDCW11220)	
CA-013869	Kit, Pigtail DC Power (W1 of radio chassis)	
CA-015586	Kit, DB-44 Cable Assembly (W2 of radio chassis)	
CA-013870	Kit, DB-9 Cable Assembly (W3 of radio chassis)	
CA-013891	Kit, CAN Connectors (W4 of radio chassis)	

Table 8-4: Service Parts for the UHF M7300 Mobile Radio



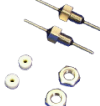






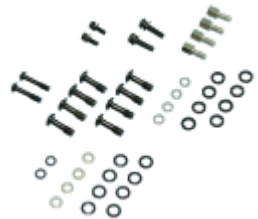





SERVICE PARTS PART NUMBER	DESCRIPTION	ILLUSTRATION
14002-0177-01	Kit, Rear Connector Jackscrews (includes 4 jackscrews, 4 lockwashers, and 4 flat washers)	
CN-013898	Kit, TNC Antenna Connector (J2 of radio chassis)	
XD-016595	Kit, Feed-Through Capacitors, Ceramic (includes spacers and nuts); similar to FSA35250F102P-NM-N (C1 and C2 of radio chassis)	
14002-0123-01	PA Module, RA60H3847M1-138 (IC101 of 378 to 430 MHz RF Processor Board)	
14002-0124-01	PA Module, RA60H4452M1-138 (IC101 of 440 to 512 MHz RF Processor Board)	
AM-015589	Integrated Circuit, TDA7391 Audio Amp (IC905 of PK Board)	
IC-015593	Integrated Circuit, NJM7805FA Fixed 5-Volt Regulator (IC908 of PK Board)	
14018-0178-06	Kit, Fuses for PK Board. Includes: <ul style="list-style-type: none"> Mastuo KAB3202 102NA 29 010 1.0-Amp / 1.6 x 0.8 mm (8 pcs) Mastuo KAB2402 322 NA31010 3.15-Amp / 2.0 x 1.25 mm (1 pcs) Littelfuse® 0453005.MR 5.0-Amp / 6.10 x 2.69 mm (1 pcs) 	
SC-014865	Kit, Internal Screws	

Table 8-4: Service Parts for the UHF M7300 Mobile Radio

SERVICE PARTS PART NUMBER	DESCRIPTION	ILLUSTRATION
SC-013867	Kit, External Screws	
14002-0127-01	Cover, Bottom (includes metal cover and shield gasket)	
MA-013861	Cover, Top	
NP-013868	Label, Harris (for Top Cover)	
FM-013890	Cap, GPS	
MA-013357	Kit, Front Panel (for Remote-Mount Radios)	



For CH-721 control head parts, refer to the CH-721 maintenance manual included with this manual set, publication number MM-008918-001.

For HHC-731 hand-held controller parts, refer to the HHC-731 maintenance manual included with this manual set, publication number MM-018323-001.

9 BASIC OPERATING INFORMATION




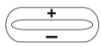

This section provides basic operating information for the radio connected to a CH-721 control head. For detailed CH-721-based operating instructions, refer to operator's manual publication number MM-014716-001. For detailed HHC-721 hand-held controller operating instructions, refer to operator's manual MM-018321-001. These and other publications are available at www.pspc.harris.com via an Information Center login and Tech Link.

9.1 CONTROLS OF THE CH-721 CONTROL HEAD

The front panel of the CH-721 control head includes a dot matrix display, controls for menu navigation, an emergency button, three pre-set buttons, a power button/rotary volume dial, and a microphone connector. In addition, the system model control head features a DTMF keypad. Table 9-1 lists the controls and their default functions. Also refer to Figure 4-4 and Figure 4-3 as necessary.

The buttons on the front panel are backlit for operation in a low ambient light level such as nighttime operation. Some buttons also flash to provide feedback of various operating conditions.

Table 9-1: Controls of the CH-721 Scan and System Control Heads

CONTROL	FUNCTION
 On/Off/Volume Control Knob	To turn the radio and control head on, rotate this knob clockwise out of the detent position. Clockwise rotation also increases volume. Turn this knob counter-clockwise to decrease volume, and to turn off the radio and control head.
 System/Group/Channel Knob	Use the System/Group/Channel knob to select systems or groups/channels, depending upon radio programming.
 Emergency/Home Button	Use this button to declare an emergency, if the emergency feature is enabled. Alternately, this button can also be programmed to, when pressed, switch the radio to a home group/channel.
 Ramp Control	This rocker-type ramp control has multiple functions. It is used to display the current scan status for a group/channel, and to then add or delete the group/channel from the system scan list. Pressing the add/delete button twice while the radio is actively receiving or three times when the radio is not receiving selects the last scanned channel (last scanned channel recall). It is also used for various other selection-type functions.
 Ramp Control	This rocker-type ramp control also has multiple functions. Its primary function is to scroll through the System list or the Group/Channel list, depending upon programming. Its secondary function is to increment or decrement a selection of items within a list (e.g., a phone list).
OPT (Option Button)	The OPT (option) button is used to toggle a programmable feature on and off.


(Table Continued on Next Page)

Table 9-1: Controls of the CH-721 Scan and System Control Heads (Continued)

CONTROL	FUNCTION
MENU (Menu Button)	The primary function of the MENU button is to access the menu list. This is a list of additional features that are not available directly from the keypad. As a secondary function, the MENU button activates a selected item within a list, similar to an enter button/key.
CLR (Clear Button)	<u>EDACS and P25 Modes:</u> In these modes, the CLR (clear) button cancels the current operation and removes all displays associated with it. The radio and display return to the group/channel receive state. <u>Conventional Mode:</u> Unmutes the radio's receiver so activity on the selected channel can be monitored. When pressed and held for approximately 3 seconds, this button toggles conventional channel decoding (Channel Guard, Digital Channel Guard, T99) on and off, if programmed for the selected channel.
SCAN (Scan Button)	Press the SCAN button to toggle group/channel scan operation on and off.
A, B and C Pre-Set Buttons	A preset button may be pre-programmed to perform a particular pre-determined task. For example, a preset button can be used to store and recall user-selectable parameters.
SYS (System Key)	Press this key to enter the system select mode.
GRP (Group Key)	Press this key to enter the group select mode.
DIS (Display Key)	Press to display the encryption key's ID number, and whether or not the key is valid or available.
IND (Individual Call Key)	Use this key to make an individual call or make an all-call via the individual call function.
PHN (Phone Key)	Use this key to place telephone calls through the radio system via the telephone interconnect special call function.
STS (Status Key)	Use this key to send pre-programmed status conditions to a trunked radio network.
MSG (Message Key)	Use this key to send pre-programmed message text to a trunked radio network.

9.2 LOCKING AND UNLOCKING THE KEYPAD

The control head's keypad can be locked to prevent accidental button press operations. Lock and unlock it as follows:

1. Press the control head's **MENU** button.
2. Use the  ramp control to scroll through the menu until **KEY LOCK** appears in the middle line of the display.
3. Press the **MENU** button again to lock the head's keypad.

To unlock the keypad, simply press the **MENU** and **CLR** (Clear) buttons simultaneously.












9.3 RADIO STATUS ICONS

Status icons are indications on the control head's display that indicate various operating characteristics of the radio.



Figure 9-1: Typical Display during P25 Trunked Operation

Table 9-2: Radio Status Icons

ICON	DESCRIPTION
	Indicates the EDACS system is in Failsoft™ mode (if enabled through programming).
	Indicates selected group or channel is in scan list.
	Indicates selected group or channel is programmed as Priority 1 in scan list.
	Indicates selected group or channel is programmed as Priority 2 in scan list.
	Scan mode enabled.
	Volume bars – indicates relative volume level.
	Indicates the current channel is set up as an analog channel.
	Indicates the current channel is set up as a ProVoice channel.
	Transmitting or receiving in encrypted mode.
	Indicates the current channel is set up as a Project 25 (P25) channel.
	Indicates a conventional channel enabled with Channel Guard Function.

9.4 ALERT TONES

The radio provides audible alert tones or “beeps” to indicate the various operating conditions. These alert tones can be enabled or disabled through programming.

Table 9-3: Alert Tones for P25 Trunked Operation

NAME	tone	DESCRIPTION
Call Originate	1 short mid-pitched tone	Sounds after keying the radio via its Push-To-Talk (PTT) button. Indicates the radio has been assigned a working channel. After it sounds, begin speaking into the microphone, while holding the PTT button depressed.
Autokey	1 mid-pitched tone	After being placed in a queue or releasing the PTT button prior to a working channel assignment, the site calls the radio when a channel becomes available. At this point, the radio automatically keys the transmitter (autokey) for a short period to hold the channel. The radio sounds a mid-pitched tone when it is clear to talk. Immediately press the PTT button to keep the assigned channel.
Call Queued	1 high-pitched tone	Sounds after pressing the PTT button indicating the system has placed the call request in the queue. The receiving unit(s) also sound(s) the tone to indicate they will receive a call shortly.
System Busy	3 low-pitched tones	Sounds if the radio is keyed when the system is busy, if no channels are available for sending the message, if the call queue is full, or if an individual call is being attempted to a radio that is transmitting.
Call Denied	1 low-pitched tone	Indicates the radio is not authorized on the system that has been selected.
Carrier Control Timer	5 short high-pitched warning tones followed by 1 long low-pitched tone	Sounds if the programmed time for continuous transmission is exceeded. The transmitter will shut down shortly after the alert, interrupting communications. Release and re-key the PTT button to maintain communications. This will reset the carrier control timer and turn the transmitter back on.
Key Press Alert	1 short tone	Indicates a key has been pressed. A short low-pitched tone indicates no action was taken because the key is not active in the current mode.
Page (P25 Trunked Only)	3 high-pitched tones	In P25 trunked mode, if the receiving radio accepts a page, both the receiving and transmitting radios emit three high-pitched tones.
Out of Range	1 low pitched tone	Indicates the radio is in Wide Area Scan. Radio will periodically beep when in Wide Area Scan.

9.5 HAND-HELD CONTROLLER OPERATION

Operating information for the HHC-731 Hand-Held Controller is contained in *Operator's Manual* publication MM-018321-001. See Section 5 on page 18 for additional information.

10 PROGRAMMING AND CONFIGURATION

10.1 RADIO PERSONALITY MANAGER (RPM) TQS3385 AND TQS3389

Radio Personality Manager (RPM) software application TQS3385 (part number SK-104768-001) is used to program the M7300 mobile radio for operations in EDACS, ProVoice, and P25 trunked radio systems. TQS3385 can also be used to program the radio for analog conventional and P25 conventional operations. For additional information, refer to RPM's built-in help and/or RPM Software Release Notes, publication number MS-012550-001.

Conventional RPM software application TQS3389 (part number SK-012177-001) is used to program the M7300 mobile radio for analog conventional and P25 conventional operations. Trunking mode programming is disabled in TQS3389. For additional information, refer to RPM's built-in help and/or Conventional RPM Software Release Notes, publication number MS-012761-001.

Both RPM applications also support other radios such as the M7100, M7200, and Unity XG-100M mobile radios, and the P7200, P7300, and Unity XG-100P portable radios.



NOTE

Use the information and procedures in this section and RPM's built-in help as a guideline for programming and configuring an M7300 mobile radio. **Additional configurations not covered in this manual must be applied to meet specific customer requirements.**

10.2 LOADING NEW ECP CODE ("FLASHING" THE RADIO)

EDACS Conventional P25 (ECP) application firmware code is loaded into the radio before it ships from the factory. Therefore, typically this procedure can be bypassed. However in some cases, before the mobile radio is deployed for use, the ECP code must be updated by loading new ECP code.



CAUTION

Before loading new ECP code into the radio, consult with the Harris Technical Assistance Center (TAC) and/or respective Software Release Notes as necessary. TAC contact information is included on page 18 of this manual. Software Release Notes are available at www.pspc.harris.com via a PSPC Info Center login and Tech-Link account.

Follow this procedure to load ECP code into the M7300 mobile radio:

1. As illustrated in Figure 10-1, connect the radio to a personal computer with the Radio Personality Manager (RPM) programming software installed on it. Use Serial Programming Cable CA-104861 (5 feet long), CA-013671-020 (20 feet long), or equivalent, to connect the computer's serial port to the 9-pin (DB-9) connector on the rear of the radio.



NOTE

If the utilized PC is not equipped with a DB-9 type serial port connector, the use of a suitable adapter is required, such as USB-to-RS-232 Adapter Cable CN24741-0001. As of the publication of this manual, CN24741-0001 is available via the Harris Customer Care center; refer to Section 6 on page 18 for the respective contact information.

2. Power-up the PC that has the RPM programming software installed on it, and start Windows.
3. Start the RPM programming software.

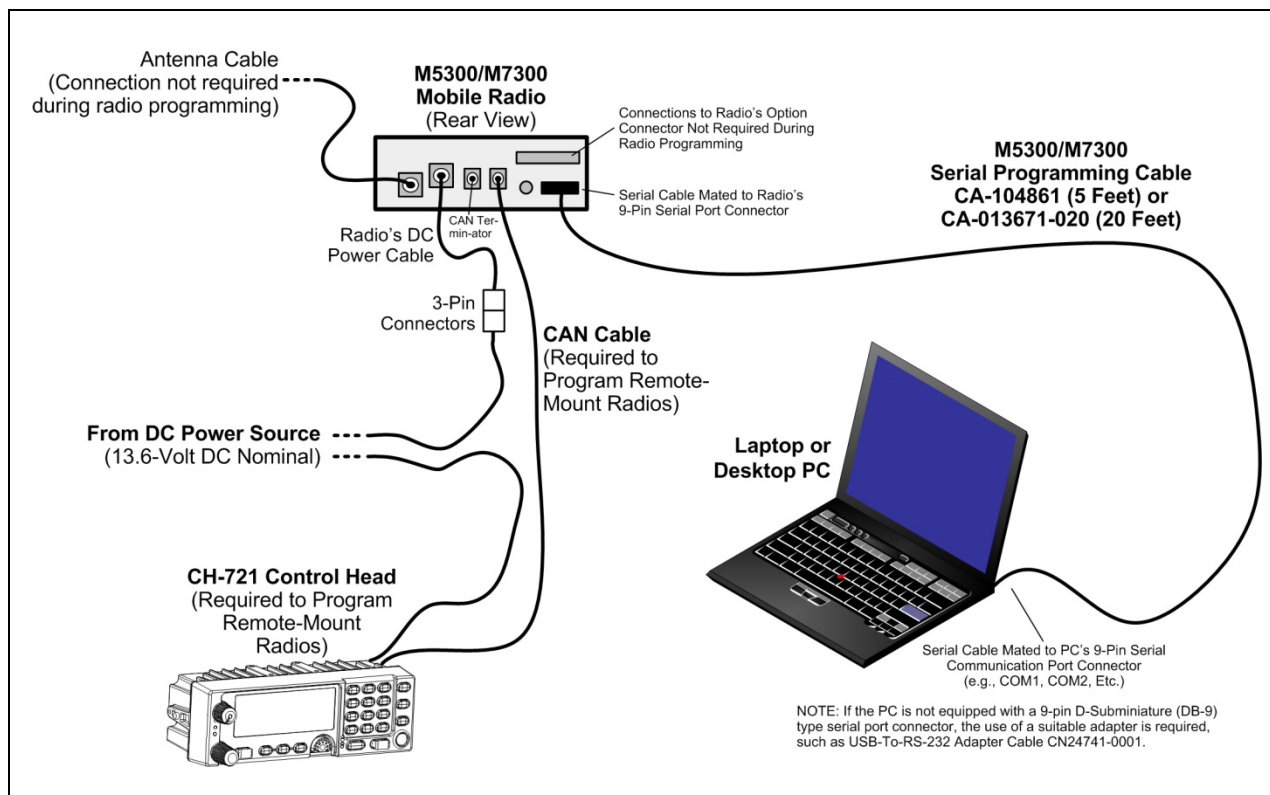


Figure 10-1: Cable Connections for Radio Programming

4. Optional: Turn the radio and control head off via the on/off/volume control on the control head.
5. Optional: While depressing both the A and C preset buttons on the control head, turn the radio and the control head on. "PROGRAM" should appear in the control head's display.



NOTE

Cycling power (with the A and C preset buttons depressed at power-up) is not necessary. RPM will automatically place the radio into program mode before loading ECP code to it.

6. In RPM, click the Radio menu, and then click Standard Serial Connection > Load Compressed Code.
7. In the Load Compressed Code dialog box, click the ECP Code's button and then select the location of the compressed M7300 mobile radio ECP code, named **m7200_ecp_RxxXxx.cmp** (where **RxxXxx** is the required software version). After selecting the correct code file, click the Open button in the Open dialog box, and then click the OK button in the Load Compressed Code dialog box.



NOTE

The UHF M7300 mobile radio requires release R14A (or later) code. The compressed code (file named **m7200_ecp_RxxXxx.cmp**) is included with Media Kit SK-011983-001. That Media Kit is included with Software Distribution Kit ST-011986-001. For additional information, refer to Software Release Notes MS-010366-001.

8. RPM will begin loading the selected code to the mobile radio, with load status displayed in the Serial I/O Status box. The code is loaded successfully when the Serial I/O Status box disappears.

9. When the Serial I/O Status box disappears, continue with radio personality programming, as presented in the following section.

10.3 RADIO PERSONALITY PROGRAMMING

1. Connect the radio to a personal computer with the Radio Personality Manager (RPM) programming software installed on it. Use Serial Programming Cable CA-104861 (5 feet long) or CA-013671-020 (20 feet long), or equivalent, to connect the computer's serial port to the 9-pin (DB-9) connector on the rear of the radio. Connections are illustrated in Figure 10-1.
2. Power-up the PC that has the RPM programming software installed on it, and start Windows.
3. Start the RPM programming software.
4. Open an existing UHF band split personality, or start a new M7300 personality in the required UHF band split, or read the existing personality from the radio. Consult RPM's built-in help as necessary.
5. As illustrated in Figure 10-2, verify the Radio Type is set to M7300 in RPM's main dialog box. If it is not, make this change.

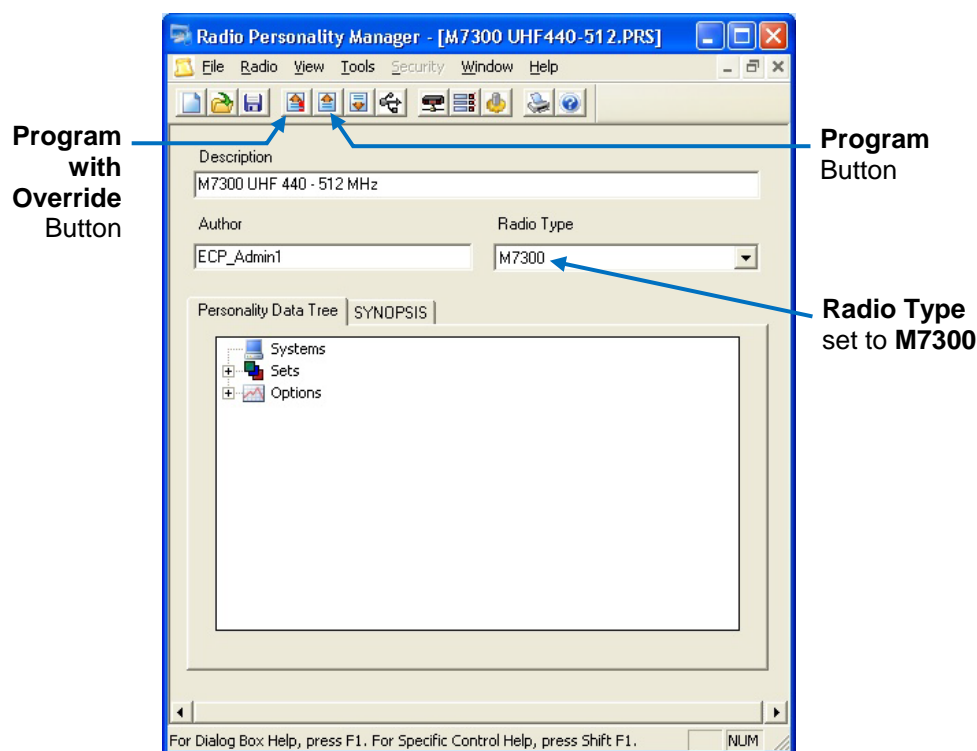


Figure 10-2: RPM's Program and Program with Override Buttons (Example Main Dialog Box)

6. Complete the personality programming as required for the radio. Consult with the radio system(s) network administration personnel and/or RPM's built-in help as necessary.
7. Save the personality, using a unique filename if necessary.
8. If logical ID (LID) values and the radio's IP address (if required) currently in the personality are correct for this radio, click on the Program button in the RPM toolbar.

Otherwise, in RPM's toolbar, click the Program with Override button and in the Override Options dialog box, enter the radio's LID number(s) and other relative information as required for the respective radio. Consult with radio network administration personnel as necessary. The following figure shows example LID numbers only:

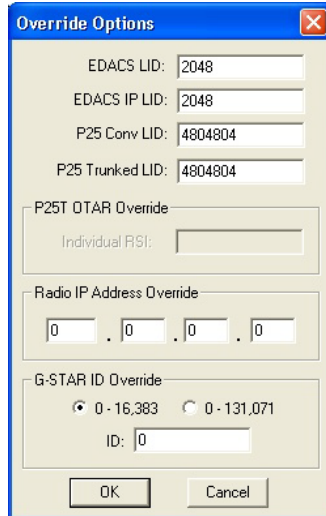


Figure 10-3: RPM's Override Options Dialog Box (with Example LID Numbers)

9. Click the OK button to start the personality write operation. After it is completely written, the M7300 radio automatically reboots.
10. Disconnect cables and check for proper radio operation.

10.4 ADDING SOFTWARE FEATURE PACKAGES TO THE RADIO

10.4.1 Displaying the Currently Enabled Software Feature Packages

To display the radio's software feature packages which are currently enabled:

1. If not already, use RPM to add the FEATURES programmable menu function to the radio's menu(s). Do this by modifying the personality. In RPM, access the respective dialog box by double-clicking on Programmable Menus the Options limb of RPM's Personality Data Tree. There is one menu used during trunked operations and one menu used during conventional operations.
2. Program/Write the modified personality to the radio.
3. At the CH-721 control head, press the MENU button, then use the ●/●● ramp control to scroll through the menu until FEATURES appears in the middle line of the display.
4. Press the MENU button again.
5. Use the ●/●● ramp control through the features list, as necessary.
6. Press the MENU or CLR (Clear) button to exit the features list.

10.4.2 Enabling Software Feature Packages

To enable software feature packages:

1. Contact the Harris Technical Assistance Center (TAC) to obtain a new software feature data string for new (and existing) features. TAC contact information is listed on page 18. Be prepared to report the radio's serial number, new feature(s) needed, and the respective customer information.
2. If it is running, exit the RPM programming software.
3. Connect the radio to a personal computer with the RPM programming software installed on it. Use Serial Programming Cable CA-104861 (5 feet long) or CA-013671-020 (20 feet long), or equivalent,

to connect the computer's serial port to the 9-pin (DB-9) connector on the rear of the radio. Connections are illustrated in Figure 10-1.

4. Start RPM's Radio Maintenance Utility application by clicking **Start > (All) Programs > Harris Radio Personality Manager > Radio Maintenance Utility**.
5. On the utility's **Radio** menu, select **Read > Feature Data from Radio** to read the existing feature data string from the radio.
6. Select the **P5x00/P7x00/M5300/M7x00/XG100M** tab.
7. Click the **Feature Data Edit** button and replace the existing feature data string with the new feature data string supplied by TAC. If necessary, refer to the application's built-in help for additional information.
8. Click the **OK** button.
9. On the utility's **Radio** menu, select **Write > Feature Data to Radio** function to send the new feature data string to the radio. The radio briefly displays an "install" prompt and the utility displays a **Command Response** dialog box.
10. Verify the dialog box reports the feature data transfer is complete.
11. Click the dialog box's **OK** button, and exit the utility.

11 MAINTENANCE

11.1 GENERAL INFORMATION

Technicians servicing this radio should generally be concerned with isolating a problem to either caused by a hardware failure or a software problem. Hardware repair of this radio is limited. Radio problems resulting from software errors can usually be corrected by re-configuration of the utilized personality, reloading the radio's personality, and/or (re)flashing the radio's application code.



An in-warranty M7300 mobile radio, **must** be serviced by a Harris Corporation-authorized service center. Service performed by any non-authorized service center will void the radio's warranty.



Improper radio service may void the radio's RF integrity and cause it to violate FCC rules and regulations. Do not return the radio to field use until it is fully tested to ensure proper operation.

The PK Board and the RF Processor Board are serialized during final testing and tuning procedures at the factory. If a board is replaced, always successfully complete all applicable test and alignment procedures presented in this manual before returning the radio to the customer. The radio should also be fully tested and (where necessary) aligned if any component in an RF signal path is replaced, retuned, or disturbed in any way.

For technical assistance, contact the Technical Assistance Center using the contact information listed in Section 7.

11.2 PREVENTIVE MAINTENANCE

Preventive maintenance on the radio installation should be performed periodically. Harris recommends performing preventive maintenance on an annual basis or more often in harsh environments such as an installation in a fire truck. Preventive maintenance should include:

- Inspecting all mobile radio related hardware to verify it is in place and securely tight. Any missing or loose hardware should be replaced and/or tightened as necessary.
- Inspecting all control head related hardware to verify it is in place and securely tight. Any missing or loose hardware should be replaced and/or tightened as necessary.
- Inspecting all cabling to verify it is not damaged, it is securely tied-and-stowed, and all related cable connectors are tight. Repair as necessary.
- Performing radio and antenna system performance tests as described in the radio's installation manual, publication number MM-014763-001. Repair as necessary.

Verifying overall radio operation by performing an operations check.

11.3 STATUS AND ERROR CODES DISPLAYED AT CONTROL HEAD

The following table lists and defines error codes for EDACS, conventional and P25 modes. Fatal errors typically cause the radio to automatically reset after a short delay. For non-fatal errors, the radio will typically resume operation after a short delay.

Table 11-1: Error Codes for EDACS, Conventional and P25 (ECP) Modes

DISPLAYED CODE	MEANING
FATAL SYSTEM ERROR CODES:	
Startup Errors	
(0x0001)	Non-maskable interrupt occurred outside of sleep routine
(0x0002)	32k RAM test error
(0x0003)	Not used
(0x0004)	Flash memory checksum test error
(0x0005)	Flash memory part is unknown
(0x0006)	FIPS random IV test error
(0x0007)	FIPS bypass test error
(0x0008)	FIPS no voice keys error
(0x0009)	Flash memory write error
(0x0010)	Timing generator driver failed initialization
(0x0011)	DSP driver failed initialization
(0x0012)	Abbie driver failed initialization
(0x0013)	EEPROM memory driver failed initialization
(0x0014)	ICP digital failed initialization
(0x0015)	INTOUT driver failed initialization
(0x0016)	INTIN driver failed initialization
(0x0017)	RADIO driver failed initialization
(0x0018)	MODEM driver failed initialization
(0x0019)	EXTIO driver failed initialization
(0x0020)	SCI driver failed initialization
(0x0021)	ICP PROM checksum error
(0x0022)	I2C driver initialization error
(0x0023)	I2C driver mode change error
(0x0024)	I2C driver write error
(0x0025)	UART driver failed initialization
(0x0026)	Timer failed initialization
ADI Driver Fatal Error Codes	
(0x0030)	ADI did not respond to command
(0x0039)	FIPS DES self test had incorrect result
LCD Driver Fatal Error Codes	
(0x0040)	LCD did not acknowledge message
(0x0041)	LCD hardware is invalid
SCI Driver Fatal Error Codes	
(0x0050)	SCI out of heap space
CAN Driver Fatal Error Codes	
(0x0060)	CAN server semaphore initialization failure
IPC DSP Driver Fatal Error Codes	
(0x0070)	DSP did not read a message within 500 milliseconds

Table 11-1: Error Codes for EDACS, Conventional and P25 (ECP) Modes (Continued)

DISPLAYED CODE	MEANING
(0x0071)	DSP gave a response longer than buffer
(0x0072)	DSP did not read stream data within 500 milliseconds
(0x0073)	ARM tried to write more data than DSP could store
(0x0074)	ARM tried to write DSP code and failed
(0x0075)	ARM did not get an acknowledgement of a command to the DSP
Radio Driver Fatal Error Codes	
(0x0080)	Transceiver failed to program synthesizer due to data collision(s)
(0x0081)	Transceiver failed to program MCU
(0x0082)	Transceiver failed to find proper calibration data
(0x0083)	Transceiver MCU failed to program receiver ADC
Boot Loader Fatal Error Codes	
(0x0090)	No memory space for ROM task
(0x0091)	No memory space for BL task
(0x0092)	Boot loader could not attach to SCI
MCBSP Fatal Error Codes	
(0x0093)	McBSP configuration error
RXSIF Primitive Fatal Error Codes	
(0x0098)	RXSIF fatal error
Operating System Fatal Error Codes	
(0x0100)	Interrupt had no handler
(0x0101)	Pre-fetch abort handler
(0x0102)	Data abort handler
(0x0103)	Reserved interrupt handler
(0x0104)	Unexpected interrupt handler
(0x0105)	Interrupt handler failed to set-up the IRQ
(0x0106)	OS fork creation process failed
(0x0107)	OS pipe creation process failed
(0x0108)	OS task creation process failed
(0x0109)	Task stack overflowed
(0x0110)	OS timer task creation failed
(0x0111)	OS returned fatal error
(0x0112)	OS fork stack overflowed
(0x0113)	OS priority fork stack overflowed
(0x0114)	GPIO config was wrong - check radio config
(0x0115)	MPUIO config was wrong - check radio config
(0x0116)	Could not set radio type right using sector 0
(0x0117)	Failure in download system
(0x0118)	Memory allocation failed
(0x0119)	Semaphore pending error
(0x0120)	Semaphore post operation error
(0x0121)	OS fork stack had nucleus error

Table 11-1: Error Codes for EDACS, Conventional and P25 (ECP) Modes (Continued)

DISPLAYED CODE	MEANING
(0x0122)	OS priority fork stack had nucleus error
FATAL APPLICATION ERROR CODES:	
RADC Fatal System Error Codes	
(0x2200)	PERS tracking data error
(0x5201)	PERS hardware data error
(0x4202)	PERS frequency data error
(0x1203)	PERS tracking data memory error
(0x1204)	PERS tracking data checksum error
(0x1205)	Hardware revision could not be determined
DACS Fatal System Error Codes	
(0x3300)	No lock message
(0x1301)	Unable to correctly configure modem for EDACS operation
(0x1302)	ProSound scan failed
(0x1303)	CISYS message buffer not enabled
(0x1304)	Failure in Tx frequency load
(0x1305)	Failure in Rx frequency load
(0x1306)	Failure to transmit CC header data
(0x1307)	Failure to set up CC receiver
(0x1308)	Failure to set up WC receiver
(0x1309)	Failure to set up WC LSD receiver
(0x1310)	Failure to set up WC HSD receiver
(0x1311)	Failure to transmit body of CC message
(0x1312)	Failure to idle transmitter
(0x1313)	Failure to transmit body of WC message
(0x1314)	Failure in RADC speaker function
(0x1315)	Failure to transmit WC HSD
(0x1316)	Failure to select TX hardware path
(0x1317)	Failure to transmit DTMF digit
(0x1318)	Failure to transmit LSD
(0x1319)	Failure of HSD sync setup
EA Fatal System Error Codes	
(0x1350)	Memory failure message
Conventional Fatal System Error Codes	
(0x1400)	Error calling RADC function
(0x3401)	Synthesizer became unlocked
(0x1402)	UI message buffer not enabled
(0x1403)	Conventional digital voice modem overflow
(0x1404)	Conventional digital voice modem underflow
(0x1405)	Unable to correctly configure the modem for conventional digital voice operation
(0x5407)	Conventional personality error

Table 11-1: Error Codes for EDACS, Conventional and P25 (ECP) Modes (Continued)

DISPLAYED CODE	MEANING
(0x1408)	Error calling RADC function in ECP1 scan
(0x1409)	Error calling RADC function in CHANUTIL - channelized
(0x1410)	Error calling RADC function in CHANUTIL - absolute frequency
(0x1411)	Error calling RADC function in CONVTX – channelized
(0x1412)	Error calling RADC function in CONVTX - absolute frequency
(0x1413)	Error calling RADC function in CONVTX - idle mode
(0x1450)	Error calling RADC function in CONVTX - idle mode
(0x1451)	Error calling RADC function in trunked P25
(0x1452)	Error reading serial number
(0x1453)	Bad message type requested
Personality Interface Fatal System Error Codes	
(0x5500)	Personality data is not present
(0x5501)	Flash personality Cyclic Redundancy Check (CRC) did not match EEPROM's CRC
(0x5502)	Personality descriptor table CRC error
(0x1503)	Descriptor table memory error
(0x5504)	Custom frequency set table error
User Interface Fatal System Error Codes	
(0x5600)	Input/Output device error
(0x1601)	Out of memory
(0x1602)	Maximum number of timers exceeded
(0x1603)	Too many open windows
(0x1604)	Out of memory
(0x1605)	Invalid parameter
(0x1606)	RI BBOS message buffer full error
(0x1607)	RI System (EDACSBOS message buffer full error)
(0x1608)	CI BBOS message buffer full error
(0x5609)	I/O device type from personality not supported
(0x1610)	No more memory
(0x5611)	Network I/O device error
(0x6612)	Control head ID is invalid
(0x5613)	No tone data is available in personality
(0x1614)	UI IBBOS message buffer full error
(0x1615)	No more memory
(0x1616)	No more memory
(0x1617)	UI message received error
Test Unit Fatal System Error Codes	
(0x1701)	Rx message buffer memory failed
(0x1702)	Tx message buffer memory failed
(0x1703)	BB message to UI task failed
(0x1704)	BB message to RISYS task failed
(0x1705)	BIOS call for voter monitor failed

Table 11-1: Error Codes for EDACS, Conventional and P25 (ECP) Modes (Continued)

DISPLAYED CODE	MEANING
FIPS 140 Fatal System Error Codes	
(0x1902)	Invalid DESMAC key
(0x1903)	DESMAC checksum failed
(0x1904)	DESMAC DSP attach failed
RI Fatal System Error Codes	
(0x6901)	Multi-radio devices stopped communicating
NON-FATAL APPLICATION ERROR CODES:	
Common Error Messages	
(1)	Feature encryption error message
(2)	Synthesizer unlocked
(3)	No key banks allocated in personality
(5)	Tracking data was in error; using default
(6)	Dual personality recoverable error message
(7)	G-STAR error
(8)	Tone encode error
(9)	Traffic encryption keys Cyclic Redundancy Check (CRC) error
(10)	DSP did not respond to key query
(11)	AES configuration error
(12)	DES configuration error
Flags to Set Persistent Error Messages	
(0x8000)	Set persisting error condition, error will be cleared with another call
(0x1000)	Clear persisting error condition
Personality Interface Non-Fatal System Error Codes (Feature Encryption Errors)	
(0x0550)	Cannot read SROM
(0x0551)	Personalities sizes don't match
(0x0552)	Decryption failure
(0x0553)	Tracking data failure
Dual Personality Errors	
(0x0580)	Personality failure
(0x0581)	Tracking data failure
(0x0582)	Feature data failure
(0x0583)	Image failure
Calibration Parameter Error Codes	
(0x0560)	ECP calibration data missing; data updated to current defaults
(0x0561)	Calibration data update failed
(0x0562)	ECP calibration data older than current revision; data updated to current defaults
(0x0563)	ECP calibration data newer than current revision
(0x0590)	TestApp calibration data missing; data updated
(0x0591)	TestApp calibration data update failed
(0x0592)	TestApp calibration data older than current revision; data updated to current defaults

Table 11-1: Error Codes for EDACS, Conventional and P25 (ECP) Modes (Continued)

DISPLAYED CODE	MEANING
(0x0593)	TestApp calibration data newer than current revision
USER INTERFACE NON-FATAL SYSTEM ERROR CODES:	
(0x0880)	Group is set to digital but system vocoder is set to analog
(0x0883)	IMBE is not supported by DSP
(0x0885)	Attempt to use IMBE vocoder with IMBE feature turned off
(0x0886)	Attempt to use encryption but DSP doesn't support encryption
(0x0887)	Attempt to use encryption but encryption is turned off
(0x0890)	Hardware revision could not be determined
(0x0891)	No G-STAR response from DSP
(0x0892)	No tone encode response from DSP
(0x0894)	DSP did not respond to key query

11.4 RF PERFORMANCE TESTS AND ALIGNMENT

11.4.1 General Information

This section includes RF performance test procedures for the UHF M7300 mobile radio. Basic receiver and transmitter RF performance test procedures are included, along with details on the configuration of a recommended conventional test personality, and a list of recommended test equipment. Unless otherwise stated, all test procedures in this section are performed in analog conventional mode.

Performance test procedures for a complete UHF M7300 mobile radio installation are included in the installation manual, publication number MM-014763-001, revision G (or later). These test procedures test basic aspects of the radio and control head installation, including the installation's antenna system.



Improper radio service may void the radio's RF integrity and cause it to violate FCC rules and regulations. Do not return the radio to field use until it is fully tested to ensure proper operation.

The PK Board and the RF Processor Board are serialized during final testing and tuning procedures at the factory. If a board is replaced, always successfully complete all applicable test and alignment procedures presented in this manual before returning the radio to the customer. The radio should also be fully tested and (where necessary) aligned if any component in an RF signal path is replaced, retuned, or disturbed in any way.



Observe precautions for damage due to **Electro-Static Discharge (ESD)**. Always 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.

For technical assistance, contact the Technical Assistance Center using the contact information listed in Section 7.

11.4.2 Test Equipment

Table 11-2 lists test equipment required for mobile radio RF performance tests included in this manual.

Table 11-2: Test Equipment for RF Performance Tests and Alignments

EQUIPMENT	RECOMMENDED TYPES / MODEL NUMBERS
RF Communications Test Set	Any RF Communications Test Set capable of generating a standard P25 1011 Test Pattern, such as an Aeroflex IFR 2975 or Aeroflex 3920
RF Cable, 50-Ohm: TNC Male to Type-N Male	Pasternack Enterprises PE3661-36 or equivalent
RF Cable, 50-Ohm: Type-N Male to Type-N Male*	Pasternack Enterprises PE3441-36 or equivalent
RF Attenuator, 50-Ohm: 30 dB, Type-N Female*	Bird Tenuline® 100-SA-FFN-30 or 100-A-FFN-30 or equivalent
Modified Microphone**	Harris Part Number MC-101616-041 modified similar to Tech Tips modification instructions in the Technical Training Toolbox on the Tech Link web site. (https://premier.pspc.harris.com/infocenter/TechLink)
Modified Speaker**	Harris Part Number LS102824V10 modified similar to Tech Tips modifications instructions in the Technical Training Toolbox on the Tech Link web site. (https://premier.pspc.harris.com/infocenter/TechLink)
Personal Computer (PC) with Radio Personality Manager (RPM) Programming Software	Laptop PC recommended with RPM Release R8B or later (See Section 10.1 on page 27 and/or Table 12-6 on page 52 for additional information).
Serial Programming Cable***	CA-104861 (5 feet long) <u>or</u> CA-013671-020 (20 feet long) <u>or</u> equivalent
DC Power Cable with Fuses (for Powering Radio)	Harris Part Number CA-012365-001
DC Power Cable with Fuses (for Powering Control Head)****	Harris Part Number CA-012616-001
CAN Cable****	Harris Part Number CA-009562-030
CAN Terminators (2)	Harris Part Number CD-014027-001
Speaker Cable	Harris Part Number MAMROS0034-NN006
Option Cable	Harris Part Number 14002-0174-01 <u>or</u> CA-012349-001)
Power Supply	Adjustable Regulated DC-Output Power Supply capable of adjustment from 12 to 15 Vdc (minimum) and 20-ampere output current (minimum)

* An RF attenuator is required if the utilized RF Communications Test Set does not have a high-power input port capable of at least 50 watts of continuous RF input power.

** Not Required for Transmitter/TCXO Error Test and Transmitter Power Test.

*** If the utilized PC is not equipped with a DB-9 type serial port connector, the use of a suitable adapter is required, such as USB-to-RS-232 Adapter Cable CN24741-0001. As of the publication of this manual, CN24741-0001 is available via the Harris Customer Care center; refer to Section 6 on page 18 for the respective contact information.

**** DC Power Cable CA-012616-001 (with fuses) and CAN Cable CA-009562-030 are not required for testing a front-mount radio.



NOTE

The RF Communications Test Set should have a frequency accuracy equal to or better than 0.15 ppm. If not, an appropriate external timebase reference which meets or exceeds this specification must be applied to the test set's external timebase reference input, and the test set must be configured to use this external reference.


NOTE

Test procedures included in this section can be performed on customer frequencies/channels, if possible. This will prevent unnecessary radio personality reprogramming operations.

However, if customer frequencies/channels are not available and/or the utilized test equipment does not allow testing on these frequencies/channels or radio operating mode, a conventional test personality should be created and used as described in Section 11.4.3 that follows.

11.4.3 Recommended Conventional Test Personality

To create a conventional test personality for M7300 radio testing, use RPM to create and program one into the radio as follows. Also refer to Section 10.3 and/or RPM's built-in help as necessary.

1. If the personality currently in the radio is not available on computer storage media, use RPM's read function to read it from the radio and store it for later restoration.

Create the Analog Conventional Test System

2. Create a new conventional system using RPM's Add New System button. This button is located on the System Setup dialog box's General tab.
3. Configure this new conventional system with at least the analog conventional test channels listed in Table 11-3 (for low-split UHF radios) or Table 11-4 (for high-split UHF radios). Achieve this by creating a new conventional (channel) set with the listed channels and assigning the set to the new system.
4. Verify each channel's Voice Mode is set to Analog. If not, make this change.
5. In the System Setup dialog box, click the General tab and select the test system.
6. Verify "MAX" is present in the Power Level text box. If not, enter that so the radio will transmit at full-power when in high-power transmit level. Exit this dialog box and save changes by clicking the OK button.

Table 11-3: Analog Conventional and P25 Conventional Test Channels for 378 to 430 MHz Radios

TX FREQ. (MHz)	RX FREQ. (MHz)	RECOMMENDED NAME FOR ANALOG CONV. SYSTEM	RECOMMENDED NAME FOR P25 CONV. SYSTEM	BANDWIDTH	RX CG (Hz)	TX CG (Hz)	OTHER SETTINGS
378.025	378.025	378.025A	378.025P	"Wide" (25 kHz) for Analog Conv.; "C4FM" (12.5 kHz) for P25 Conv.	156.7	156.7	Leave at RPM Defaults
404.025	404.025	404.025A	404.025P				
429.975	429.975	429.975A	429.975P				


NOTE

Within RPM, a period (.) can be entered into the Name field of the Conventional Frequency Sets dialog box using a right-click and paste action. This assumes a period or the complete frequency in MHz has been previously copied to the Windows clipboard.

Table 11-4: Analog Conventional and P25 Conventional Test Channels for 440 to 512 MHz Radios

TX FREQ. (MHz)	RX FREQ. (MHz)	RECOMMENDED NAME FOR ANALOG CONV. SYSTEM	RECOMMENDED NAME FOR P25 CONV. SYSTEM	BANDWIDTH	RX CG (Hz)	TX CG (Hz)	OTHER SETTINGS
440.025	440.025	440.025A	440.025P	“Wide” (25 kHz) for Analog Conv.; “C4FM” (12.5 kHz) for P25 Conv.	156.7	156.7	Leave at RPM Defaults
476.025	476.025	476.025A	476.025P				
511.975	511.975	511.975A	511.975P				

7. In the Personality Data Tree, double-click on Programmable Menus and use that dialog box to set the TX POWER function as a selection on the conventional menu. This menu is necessary for the transceiver performance test procedures in Section 11.4.4.
8. Add the SQUELCH function as a selection on the conventional menu. This menu is necessary for the receiver performance test procedures in Section 11.4.5.
9. Add the FCC MENU function as a selection on the conventional menu. This menu is necessary for P25-related test procedures in Sections 11.4.4 and 11.4.5.
10. Continue by creating a new P25 test system.

Create the P25 Conventional Test System

11. Create a new P25 conventional system using RPM’s Add New System button.
12. Configure this new P25 conventional system with at least the P25 conventional test channels listed in Table 11-3 (for low-split UHF radios) or Table 11-4 (for high-split UHF radios). Achieve this by creating a new P25 conventional (channel) set with the listed channels and assigning the set to the new system.
13. Set each P25 test channel’s Voice Mode to P25 and Bandwidth to C4FM.
14. Set each channel’s Tx NAC and Rx NAC as desired, or leave them at the default values of 293.
15. In the System Setup dialog box’s Project 25 Conventional tab, set the radio’s Unit ID number as required (range = 1 to 9,999,999 decimal).
16. Save this personality and program it to the radio. Refer to Section 10.3 and/or RPM’s built-in help as necessary.

11.4.4 Transmitter Performance Tests

11.4.4.1 Tx Frequency Test

Use the procedure in this section to check the accuracy of the radio’s Temperature-Compensated Crystal Oscillator (TCXO) frequency and transmitter frequency. TCXO performance affects both transmitter and receiver performance.



The radio’s TCXO is a highly accurate and stable crystal reference oscillator. The use of a recently-calibrated RF Communications Test Set and/or Frequency Counter is recommended. **The utilized test equipment should have a specified frequency accuracy equal to or better than 0.15 ppm.**


NOTE

This test should be performed with the radio and test equipment at room temperature between 68 and 77° Fahrenheit (20 to 25°C).

1. With the DC power supply output **off**, connect the radio and control head to the supply. To make these connections, use standard DC power installation cables with fuses.

To connect the radio to the power supply, use cable CA-012365-001 with a 15-amp fuse in its red wire (main power) to the power supply's positive (+) output terminal. Connect the cable's black wire to the power supply's negative (-) output terminal. For a remote-mount radio, leave the cable's white wire unconnected and insulated. For a front-mount radio, connect the white wire via a 3-amp fuse to the power supply's positive (+) output terminal or to a switched power source.


To connect the control head to the power supply, use cable CA-012616-001 with a 5-amp fuse in the red wire (main power) to the power supply's positive (+) output terminal. Connect the cable's black wire to the power supply's negative (-) output terminal. Connect the cable's white wire to the power supply's positive output terminal with a 3-amp fuse in the white wire (switched power).


CAUTION

Always observe polarity when making connections to the power supply!

2. For a remote-mount radio, connect the control head to the radio via the CAN cable.
3. Terminate both ends of the CAN link by installing a CAN terminator onto each unterminated CAN port connector.
4. For a remote-mount radio, connect the modified speaker to the control head via speaker cable MAMROS0034-NN006. One end of this 6-inch speaker cable mates to the 2-pin circular connector on the rear of the control head, and the other end mates to the 2-pin rectangular connector of the modified speaker's cable.

For a front-mount radio, connect the modified speaker to the radio via option cable 14002-0174-01 or CA-012349-001. The option cable mates to the 44-pin connector on the rear of the radio. The 2-pin rectangular connector of the modified speaker's cable mates to the 2-pin rectangular connector of the option cable.

5. Connect the radio's TNC antenna port connector to the RF Communications Test Set's high-power RF input port. To make this connection, use only high-quality RF coax cable(s). If the utilized test set does not have a high-power input port capable of at least 50 watts of continuous RF power, use an external RF attenuator between the radio and test set. The attenuator should have a minimum power rating of 60 watts.
6. Set the DC power supply's output voltage to 13.6 Vdc with a current limit between 15 and 20 amps.
7. **Power-up the radio and the control head and allow at least a 15-minute warm-up period.**
8. At the control head, select the analog conventional test system and then select one of the test channels within that system.
9. Configure the test set's frequency counter for an in-band frequency count.
10. Temporarily disable receive and transmit CTCSS operation (i.e., Channel Guard) by depressing the control head's CLR button for approximately two (2) seconds. The display's  icon remains off when CTCSS operation is disabled.

11. Key the radio by depressing the microphone's PTT button and verify the radio is transmitting per an illuminated red Tx (transmit) indicator at the control head.
12. Use the test set's frequency counter function to accurately measure the transmit frequency.
13. Unkey the radio.
14. Change channels at the control head and repeat the transmit frequency measurements for the other two (2) applicable test channels listed in Table 11-5. After changing channels, be sure to disable CTCSS operation. Always unkey the radio before making a channel change.
15. Verify each measured transmit frequency is within the respective error limits listed in Table 11-5. Any error outside of the listed limits indicates TCXO reference oscillator alignment is needed or there is a TCXO reference oscillator or transceiver synthesizer circuit problem in the radio. Record the overall pass/fail result in the table.



NOTE

TCXO reference oscillator alignment procedures are included in Section 11.5.5.2 which begins on page 69. This alignment is sometimes referred to as "Automatic Frequency Control" (AFC) alignment.

16. Unkey the radio.
17. If no other tests are required at this time, disconnect all test equipment and remove the conventional test personality from the radio. The test personality **must** be removed from the radio and the original personality restored before the radio is returned to normal service.

Table 11-5: Maximum Transmit Frequency Errors for Recommended Test Channels

RF BAND/RADIO (See Table 8-1 for radio part numbers)	TEST TX FREQUENCY (MHz)	MAXIMUM TRANSMIT FREQUENCY ERROR (± 1.5 ppm)	MINIMUM TX FREQUENCY (MHz)	MAXIMUM TX FREQUENCY (MHz)	MEASURED FREQUENCY (MHz)	PASS/FAIL
378 to 430 MHz	378.025	± 567 Hz	378.024433	378.025567		
	404.025	± 606 Hz	404.024394	404.025606		
	429.975	± 645 Hz	429.974355	429.975645		
440 to 512 MHz	440.025	± 660 Hz	440.024340	440.025660		
	476.025	± 714 Hz	476.024286	476.025714		
	511.975	± 768 Hz	511.974232	511.975768		

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz <input type="checkbox"/> 440 to 512 MHz	RU-144750-021 RU-144750-031				



CAUTION

Do **not** return the radio to service if frequency error exceeds TIA-603 limits.

11.4.4.2 Tx Power Levels Test

Follow this procedure to check the M7300 radio's transmitter output power levels. Transmit power levels are factory-adjusted and cannot be adjusted in the field:

1. If the transmitter frequency test procedure has not been performed per Section 11.4.4.1, do that now. Leave the radio and test equipment connected and configured as described in that procedure.
2. Zero out (i.e., account for) all RF loss in utilized test cable(s), attenuator, adapter(s), etc. Refer to the RF Communications Test Set's documentation and the equipment's RF loss data as necessary.
3. While in high-power transmit level, select each test frequency listed in Table 11-6, key the radio by depressing the microphone's PTT button, and verify the transmit power level is within the respective range listed in the table. If not, check cable connections, etc., and re-test if necessary.
4. At the control head, switch the radio to low-power transmit level.



NOTE

To switch between high-power and low-power transmit level, press the control head's MENU button, then use the ●/●● ramp control to scroll through the menu until TX POWER appears in the middle line of the display. Finally, toggle to the other power level by pressing the MENU button again.

5. While in low-power transmit level, select each test frequency listed in Table 11-5, key the radio by depressing the microphone's PTT button, and verify the transmit power level is within the respective range listed in the Table 11-6. If not, check cable connections, etc., and re-test if necessary. Unkey the radio before making a channel change.

Table 11-6: Transmitter Power Test—Maximum Errors

TX POWER LEVEL SETTING	TOLERANCE (dB)	LIMITS		MEASURED TX POWER (Watts)	PASS/ FAIL
		MINIMUM TX POWER (Watts)	MAXIMUM TX POWER (Watts)		
Low (8 watts)	±0.5 dB	7.1	9		
High (50 watts)	±0.25 dB	47.2	53		

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/ FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz	RU-144750-021				
<input type="checkbox"/> 440 to 512 MHz	RU-144750-031				



NOTE

Transmit power level alignment information is included in Section 11.5.5.3 (page 71).

6. Unkey the radio.
7. If no additional tests are to be performed, disconnect all test equipment and remove the conventional test personality from the radio. The test personality must be removed from the radio and the original personality restored before the radio is returned to normal service.




CAUTION

Do not return the radio to service if any measured transmit power level is outside of the respective limits listed in Table 11-6.

11.4.4.3 Conventional Tx Modulation Limiting Tests

Follow this test procedure to check the radio's analog conventional modulation limiting and symmetry:

1. If the transmitter frequency test procedure has not been performed per Section 11.4.4.1, do that now. Leave the radio and test equipment connected and configured as described in that procedure.
2. Adjust the RF Communication Test Set's audio signal generator output for a 1 kHz audio signal at a level of 200 mV rms.
3. Connect this 1 kHz signal to the control head's microphone input. To make this connection, use a modified microphone (see Table 11-2 for additional information) along with a BNC cable and an adapter(s) appropriate for the test set. Apply the signal to the modified microphone's mic audio BNC input connector.
4. Select the analog conventional test system and select any test channel within that system.
5. Switch the radio to high-power transmit level via the control head.
6. Configure the test set for an on-frequency transmitter FM deviation measurement.
7. Temporarily disable receive and transmit CTCSS operation (i.e., Channel Guard) by depressing the control head's CLR button for approximately two (2) seconds. The display's  icon remains off when CTCSS operation is disabled.
8. Key the radio via the modified microphone and verify it is transmitting per an illuminated red Tx (transmit) indicator at the control head.
9. Measure FM deviation and verify it is between 4.3 and 5.0 kHz. Record the pass/fail result in the following table:

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz	RU-144750-021				
<input type="checkbox"/> 440 to 512 MHz	RU-144750-031				



FM deviation in excess of 5.0 kHz on a wideband (25 kHz) channel may violate FCC rules on wideband RF channels.



FM deviation alignment information is included in Section 11.5.5.5 which begins on page 79.

10. Unkey the radio.
11. If no additional tests are to be performed, disconnect all test equipment and remove the conventional test personality from the radio. The test personality **must** be removed from the radio and the original personality restored before the radio is returned to normal service.



Do **not** return the radio to service if any measured parameter exceeds the respective limits.

11.4.4.4 P25 (C4FM) Tx Modulation Test

Follow this procedure to test radio transmitter's P25 modulation performance:

1. If the transmitter frequency test procedure has not been performed per Section 11.4.4.1, do that now. Leave the radio and test equipment connected and configured as described in that procedure.
2. Select the P25 conventional test system and select any test channel within that system.
3. Configure the test set for an on-frequency transmitter peak-positive FM deviation measurement.
4. Configure the test set deviation meter's audio bandwidth response with a high-pass frequency at ≤ 15 Hz and a low-pass frequency at ≥ 3 kHz.
5. Disable the deviation meter's de-emphasis function.
6. Press the control head's MENU button, then use the $\bullet/\bullet\bullet$ ramp control to scroll through the menu until FCC Menu appears in the middle line of the display, and then press the MENU button again.
7. Use the $\bullet/\bullet\bullet$ ramp control to scroll through the FCC menu until P25 HIGH appears, and select that function by pressing the MENU button again. The radio will begin transmitting a standard C4FM symbol rate pattern.
8. Measure the deviation at the test set. It should be between 2544 and 3111 Hz. Record the pass/fail result in the following table:

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz	RU-144750-021				
<input type="checkbox"/> 440 to 512 MHz	RU-144750-031				



For related alignment information, refer to the I/Q Data Modulation Alignment procedure in Section 11.5.5.4 (page 76). This alignment is performed in a single side-band mode.

9. Press the MENU button again to unkey the radio.
10. If no additional tests are to be performed, disconnect all test equipment and remove the conventional test personality from the radio. The test personality **must** be removed from the radio and the original personality restored before the radio is returned to normal service.

11.4.5 Receiver Performance Tests

Unless otherwise stated, all receiver performance test procedures presented in this section should be performed in the order presented.

11.4.5.1 Audio Output and Distortion Levels Tests

Receiver audio output and distortion levels should always be verified as being good **before** performing a receiver sensitivity test, or other receiver-related tests. This ensures the respective audio circuits in the control head have sufficient output capability and minimal distortion, and that other related circuits are operating properly. Follow this procedure to check the audio output and distortion levels:

1. With the DC power supply output off, connect the radio and control head to the supply. To make these connections, use standard DC power installation cables with fuses. **Always observe polarity when making connections to the power supply!**
2. For a remote-mount radio, connect the control head to the radio via the CAN cable.

3. Terminate both ends of the CAN link by installing a CAN terminator onto each unterminated CAN port connector.
4. For a remote-mount radio, connect the modified speaker to the control head via speaker cable MAMROS0034-NN006. One end of this 6-inch speaker cable mates to the 2-pin circular connector on the rear of the control head, and the other end mates to the 2-pin rectangular connector of the modified speaker's cable.

For a front-mount radio, connect the modified speaker to the radio via option cable 14002-0174-01 or CA-012349-001. The option cable mates to the 44-pin connector on the rear of the radio. The 2-pin rectangular connector of the modified speaker's cable mates to the 2-pin rectangular connector of the option cable.

5. Connect the speaker output of the control head/radio to the RF Communication Test Set's audio input measurement port. Make this connection at the 4-ohm load resistor in the modified speaker (see Table 11-2 for additional information).



The modified speaker contains a 1:1 audio coupling transformer to couple the radio's/control head's differential-type speaker output to the modified speaker's unbalanced test port output (BNC connector or banana plug). This output **must** only be connected to a high-impedance load (of any test equipment). Loading this output with a speaker could damage the transformer.

6. Switch the modified speaker's double-pole switch to the load position (i.e., speaker off).
7. Set the DC power supply's output voltage at 13.6 Vdc at a current limit between 6 and 8 amps.
8. Turn the power supply's output on, if it is not already.
9. **Power-up the radio and the control head and allow at least a 5-minute warm-up period.**



Do **not** key the radio during this test. Doing so could damage to the RF Communication Test Set.

Using an external 20 or 30 dB attenuator between the radio's antenna port and the test set's generator/low-power RF output port can help to prevent damage to the test set if the radio is accidentally keyed. If an external attenuator is used, all RF signal level measurements must be adjusted accordingly when making RF signal level measurements.

10. Set the control head's volume control to a mid-range position.
11. Select the analog conventional test system.
12. Select any analog conventional test channel listed in Table 11-3 (for low-split UHF radios) or Table 11-4 (for high-split UHF radios). Make a system and channel change as necessary.
Alternately, select any customer channel that can be used for radio testing.
13. Temporarily disable receive and transmit CTCSS operation (i.e., Channel Guard) by depressing the control head's CLR button for approximately two (2) seconds. The display's C_G icon remains off when CTCSS operation is disabled.
14. Connect the radio's TNC antenna port connector to the RF Communications Test Set's signal generator/low-power RF output port. To make this connection, use only high-quality RF coax cable(s).

15. Set the RF Communication Test Set on-frequency with an RF output level of -47 dBm (1000 μ V). Modulate the RF output with a 1 kHz tone with a 3 kHz deviation (60% rated system deviation for wideband channel). This is considered a full-quieting RF signal for a wideband channel.
16. Verify the radio is receiving the full-quieting RF signal. If not, recheck connections and/or radio and test equipment configurations.
17. While monitoring the test set's audio analyzer or AC voltmeter, adjust the control head's volume control for a speaker output audio level of 7.745 Vrms. This is 15 watts into the 4-ohm speaker load.
18. Using the test set's audio analyzer, measure the distortion level of the 1 kHz tone from the radio/control head. It should be less than 5%.
19. Reduce the volume control to a relatively low setting.
20. Switch the modified speaker's double-pole switch to the speaker position.
21. Adjust the volume control to at least a mid-range setting to verify the 1 kHz tone from the speaker is loud and clear.

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz	RU-144750-021				
<input type="checkbox"/> 440 to 512 MHz	RU-144750-031				

22. If no additional tests are to be performed, disconnect all test equipment and remove the test personality from the radio. The test personality **must** be removed from the radio and the original personality restored before the radio is returned to normal service.

11.4.5.2 12 dB SINAD Rx Sensitivity Test

Use this test procedure to determine the radio's 12 dB SINAD receiver sensitivity level:

1. Complete the Audio Output and Distortion Levels Tests presented in Section 11.4.5.1. Leave the radio and all test equipment interconnected and configured per that procedure.



NOTE

Receiver audio output and distortion levels should always be verified as being good **before** performing a receiver sensitivity test, or other receiver-related tests. This ensures the respective audio circuits in the control head have sufficient output capability and minimal distortion, and that other related circuits are operating properly.

2. If using the recommended test channels, select the first test channel listed in Table 11-3 (for low-split UHF radios) or Table 11-4 (for high-split UHF radios). Make a system and channel change as necessary.

If using the customer's channels, select the channel with the lowest frequency.

3. Disable squelch by adjusting it to a minimum setting. Refer to the following NOTE as necessary.



NOTE

Before squelch can be disabled/adjusted, the SQUELCH programmable menu function must be programmed to the conventional menu as described in Section 11.4.3. In this case, disable squelch as follows:

- Press the control head's MENU button.
- Press the ●/● ramp control to scroll through the conventional menu until SQUELCH appears in the middle line of the display.
- Press the MENU button again.
- Press the ●/● ramp control **down** until SQUELCH=1 appears in the top line of the display. At this point, squelch is at a minimum setting and essentially disabled.

4. Set the RF Communication Test Set on frequency with an initial RF output level of approximately -100 dBm (2.25 μ V), and verify the radio is receiving the RF signal from the test set. If not, recheck connections and/or radio and test equipment configurations.
5. Configure the RF Communication Test Set for a 12 dB SINAD level measurement. Modulate its RF output with a 1 kHz tone at 3 kHz deviation (60% rated system deviation for wideband channel). Reduce/Adjust the test set's RF output level as necessary to obtain a 12 dB SINAD level reading. Control head volume control adjustments may also be necessary.
6. Verify the 12 dB SINAD level measurement against specifications listed in Section 3.2. If the 12 dB SINAD level measurement is worse than (i.e., RF signal level greater than) the respective specification, first recheck connections and test set configuration. If the problem cannot be resolved, verify RF channel programming before contacting the Harris Technical Assistance Center (TAC) for assistance. The channel must be programmed for wideband operation.
7. If using the recommended test channels, select the next test channel listed in the table, change the test set to the corresponding frequency, and measure the 12 dB SINAD level on the channel. Verify the measured value against the respective specification.

If using the customer's channels, select the channel with the highest frequency.

8. Repeat until all test channels have been measured. Record the overall pass/fail result in the following table:

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz	RU-144750-021				
<input type="checkbox"/> 440 to 512 MHz	RU-144750-031				

9. Using the SQUELCH menu, re-enable squelch by returning its level to the original setting.
10. If no additional tests are to be performed, disconnect all test equipment and remove the conventional test personality from the radio. The test personality **must** be removed from the radio and the original personality restored before the radio is returned to normal service.

11.4.5.3 P25 (C4FM) Rx Sensitivity Test

Follow this test procedure to check P25 (C4FM) receiver sensitivity:

1. Complete the Audio Output and Distortion Levels Tests presented in Section 11.4.5.1. Leave the radio and all test equipment interconnected and configured per that procedure.
2. Select the P25 conventional test system and a test channel within that system.
3. Set the RF Communication Test Set on frequency at an RF output level of -113 dBm (0.5 μ V).

4. Modulate the test set with a standard 1011 P25 (C5FM) test pattern.
5. Press the control head's MENU button, then use the ●/●● ramp control to scroll through the menu until FCC Menu appears in the middle line of the display, and then press the MENU button again.
6. Use the ●/●● ramp control to scroll through the FCC menu until IBERC4FM appears, and select that function by pressing the MENU button again. The radio displays the internally calculated Bit Error Rate (BER) of the received test pattern.
7. Press the MENU button again to toggle the display from fast BER to slow (averaging) BER.
8. Verify the displayed BER is not 0%, but less than 5%. If a 0% is displayed, the radio is not receiving an on-channel RF signal from the test set.
9. Repeat BER measurements on the other test channels. Record the overall pass/fail result in the following table:

Radio RF Band:	Radio Part Number:	Radio Serial Number:	PASS/ FAIL	Test Date:	Technician's Initials:
<input type="checkbox"/> 378 to 430 MHz	RU-144750-021				
<input type="checkbox"/> 440 to 512 MHz	RU-144750-031				

10. If no additional tests are to be performed, disconnect all test equipment and remove the conventional test personality from the radio. The test personality **must** be removed from the radio and the original personality restored before the radio is returned to normal service.

11.5 RADIO ALIGNMENT

Programming, alignment, and servicing aspects of maintaining a M7300 mobile 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.

11.5.1 Required RPM 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 11-7, must be installed and operating on the technician's PC.
- The minimum version of ECP radio firmware codes, as listed in Table 11-8, must be installed into the radio.
- Test equipment as listed in Table 11-2 (page 40) 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 11-7 which are required when programming, aligning, and servicing the M7300 mobile radios.

Table 11-7: Minimum RPM Programming Software Versions

RPM RADIO SOFTWARE	PART NUMBER	VERSION
RPM for EDACS, ProVoice and P25 Trunked Systems	TQS3385	R08B or later
RPM for Conventional and P25 Conventional Systems	TQS3389	R08B or later

The minimum version of radio ECP firmware codes listed in Table 11-8 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 ECP firmware code versions.

Table 11-8: Minimum Versions of ECP Radio Firmware Codes for M7300 Radios

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

11.5.2 Overview of the Radio Maintenance Utility

As previously stated, 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 M7300 mobile 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 forty (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.

11.5.3 Reading and Saving Feature License Data, Calibration Data, and Personality Files

M7300 mobile radios depend upon feature license data and calibration data for their 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 and loading a calibration data file into a radio. Loading an incorrect calibration data file into a radio may prevent the radio from functioning properly.

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 M7300 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 for 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 M7300 radios.

11.5.3.1 Entering Programming Mode

Automatically Entering Programming Mode:

Perform these steps to automatically place the radio into programming mode:

1. As illustrated in Figure 10-1 on page 28, connect the control head to the radio and connect the control head and radio to a DC power source.
2. Turn off the radio and control head via the control head's on/off/volume knob.
3. Power-up the PC that has the RPM programming software installed on it, and start Windows.
4. Start the RPM programming software.

5. Using a serial programming cable, connect the radio to the PC with the RPM programming software. See Figure 10-1.
6. Turn on the radio and control head. After RPM communicates with the radio, “PROGRAM” appears in the control head’s display, indicating the radio has automatically entered program mode.
7. Continue with personality programming or calibration procedures as described elsewhere in this manual.
8. Turn the radio off and disconnect the programming cable after programming is complete.

If at any time this automatic method fails, retry the procedure or try one of the manual methods that follow.

Manually Enter Programming Mode via A and C Preset Buttons:

1. Connect the equipment as illustrated in Figure 10-1 on page 28.
2. Turn off the radio and control head via the control head’s on/off/volume knob.
3. While simultaneously depressing the control head’s A and C preset buttons, turn the radio and control head on via the head’s on/off/volume knob, then release both buttons. After the “Booting” message clears, a “PROGRAM Please Wait...” message should appear in the control head’s display. This indicates the radio is in programming mode.
4. Continue with personality programming or calibration procedures as described elsewhere in this manual.
5. Turn the radio off and disconnect the programming cable after programming is complete.

Manually Enter Programming Mode via Program Menu:

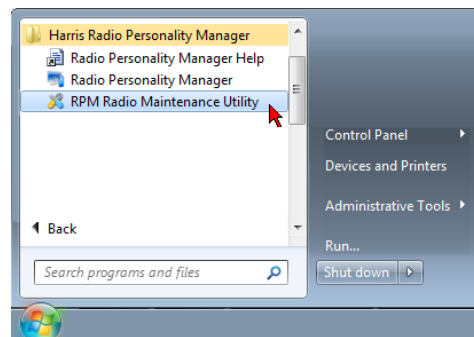
If the existing personality in the radio has the Program menu enabled, the programming mode can be manually entered by selecting this menu.

11.5.3.2 Reading and Saving Feature License Data

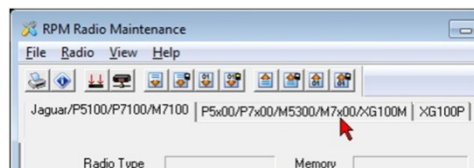
Follow this procedure to read and save a radio’s feature license data:

1. Enter programming mode as described in Section 11.5.3.1.
2. At the PC with the RPM programming software, start the Radio Maintenance Utility:

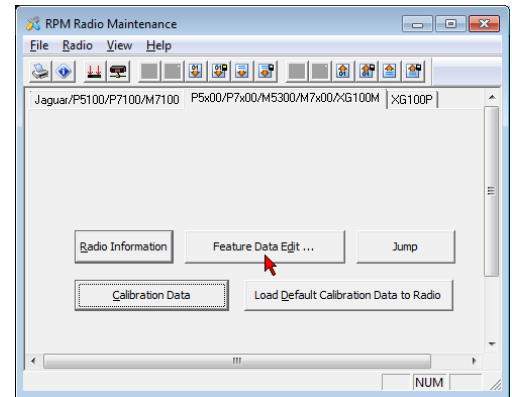
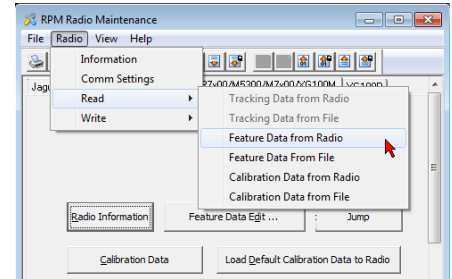
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**



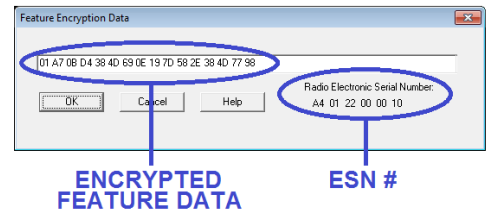
3. Within the utility, click on the tab that includes **M7x00** (for the M7300 and other radios).



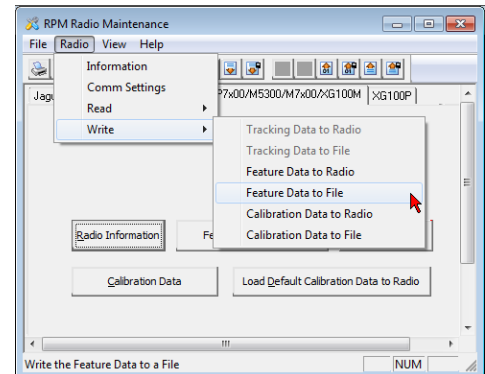
4. From the utility's menu:
Select: **Radio > Read > Feature Data from Radio**
5. When the Read Feature Data Complete message box appears:
Click: **OK**
6. In the tab that includes **M7x00**:
Click: **Feature Data Edit**



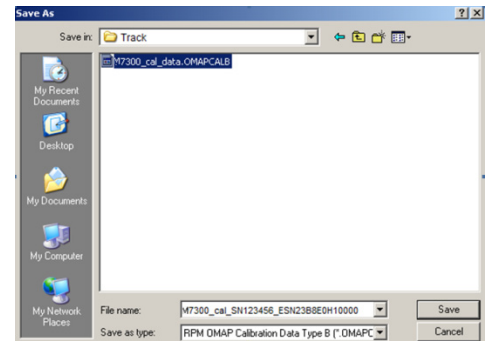
7. The Feature Encryption Data dialog box opens. This dialog box includes the radio's Electronic Serial Number (ESN). Record the ESN for later use. Click **OK** or **Cancel** to exit the box.



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**



11.5.3.3 Reading and Saving Calibration Data

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

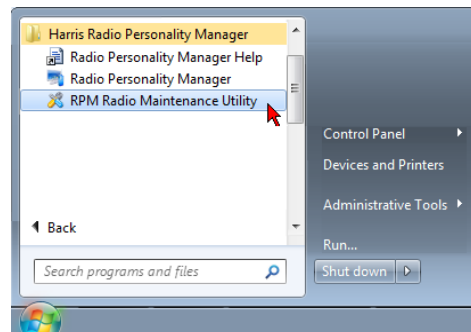


NOTE

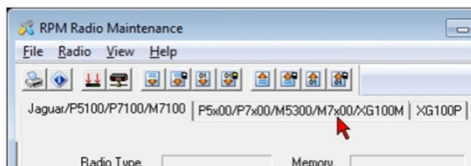
The radio must have R15A or later code before calibration data can be read from or written to it. See Section 11.5.1 on page 52 for details.

1. Enter programming mode as described in Section 11.5.3.1.
2. At the PC with the RPM programming software, start the Radio Maintenance Utility:

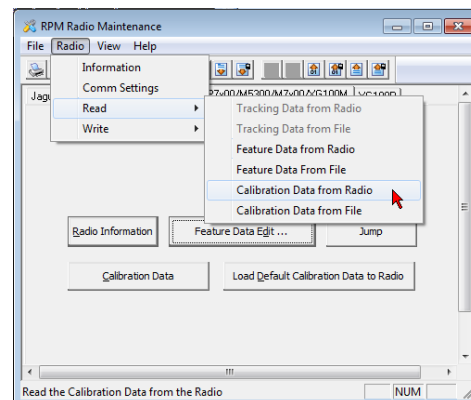
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**



3. Click on the tab that includes **M7x00** (for the M7300 and other radios).



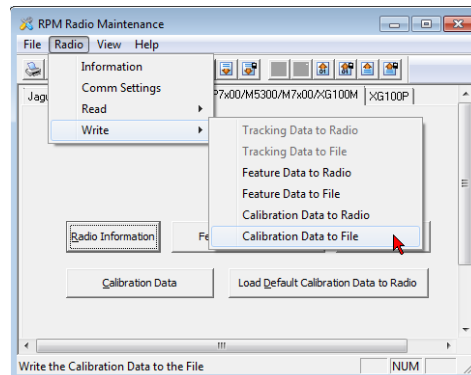
4. From the utility's menu:
Select: **Radio > Read > Calibration Data from Radio**
5. When the Calibration Data Complete dialog box opens:
Click: **OK**



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**



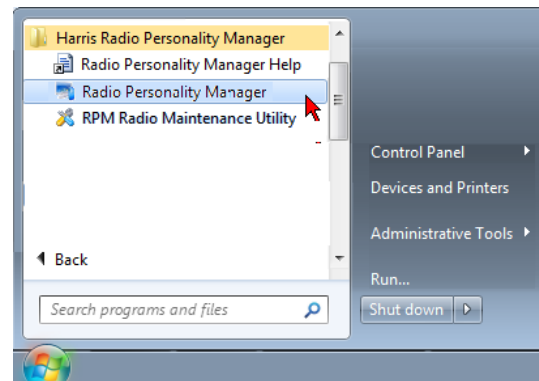
11.5.3.4 Reading and Saving the Radio Personality

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 11.5.3.1.

2. At the PC with the RPM programming software, start this software:

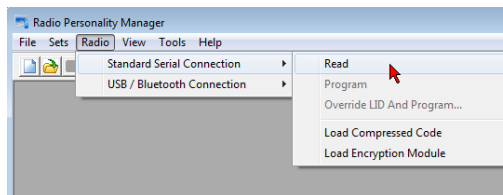
Click: **Start > Programs > Harris Radio Personality Manager > Radio Personality Manager**



3. From RPM's main menu:

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

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

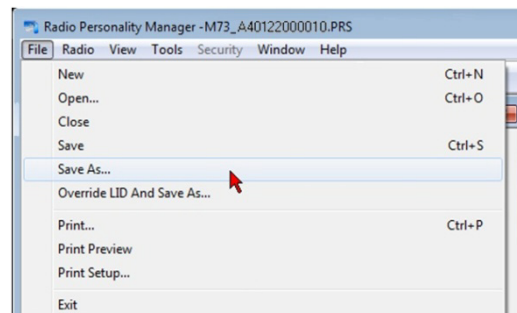


4. Within the personality window, information may be entered in the "Description" and "Author" fields.

5. On the RPM's main menu:

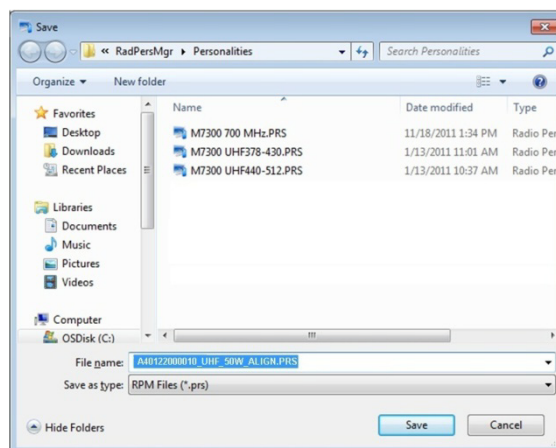
Click: **File > Save As**

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**



11.5.4 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 M7300 mobile radio series.

11.5.4.1 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 11.5.3.1 as necessary.
2. Verify the feature and calibration data files have been saved to local disk. Refer to Sections 11.5.3.2 and 11.5.3.3 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 11.5.3.4 as necessary.

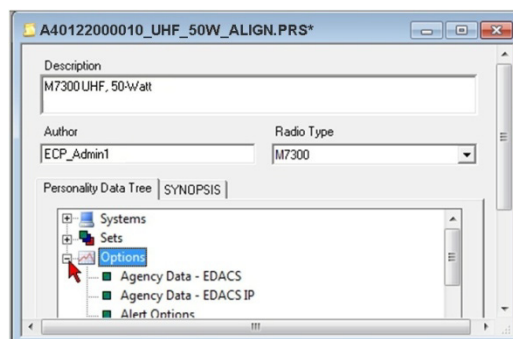


NOTE

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. Always be sure to save the radio’s original personality before loading any test personality. After tests/alignments are complete, be sure to re-load the original personality back into the radio.

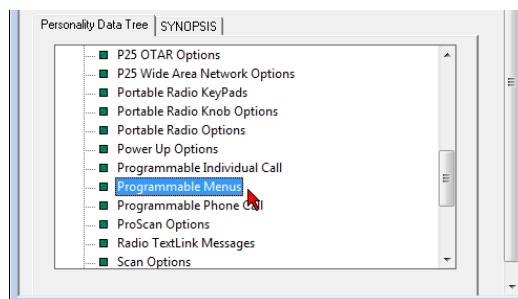
4. In the Personality Data Tree:

Click: **Options**



5. Scroll down the Options limb:

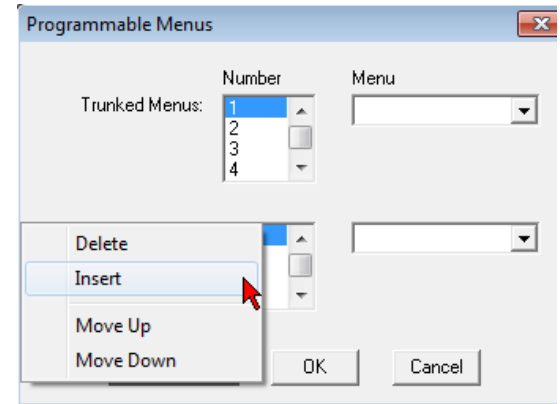
Double-click: **Programmable Menus**



6. Within the Conventional Menus Number box:

Double-click: **1**

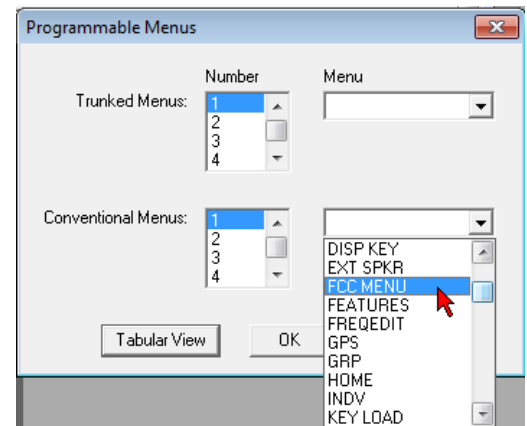
Click: **Insert**



7. Within the dropdown menu choices:

Select: **FCC MENU**

Click: **OK**



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.

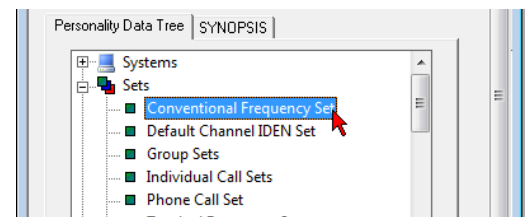
8. In the Personality Data Tree:

Double-click: **Sets**

The Sets limb expands.

Double-click: **Conventional Frequency Set**

The Conventional Frequency Sets dialog box opens.



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**

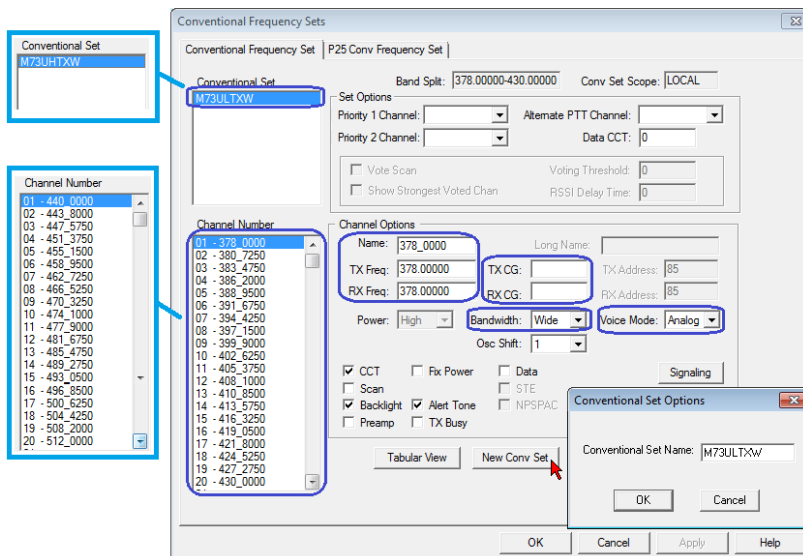
For a UHF-L radio,
type: **M73ULTXW**

or

For a UHF-H radio,
type: **M73UHTXW**

Click: **OK**

Use the illustration to the right, or reference Table 11-9, 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 reference oscillator (TCXO), and its high, mid, and low TX 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**

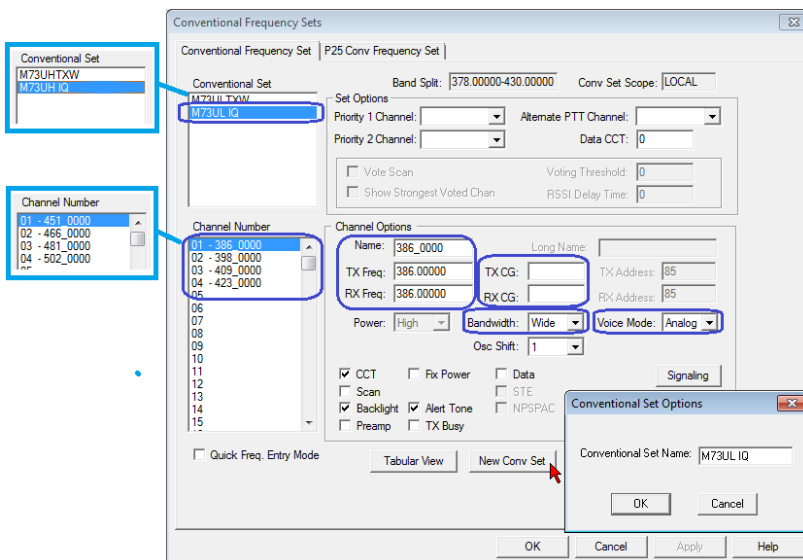
For a UHF-L radio,
type: **M73ULIQ**

or

For a UHF-H radio,
type: **M73UHIQ**

Click: **OK**

Use the illustration to the right, or reference Table 11-10, 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 4 channels.



This set is used to align the radio's IQ modulation.

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**

For a UHF-L radio,
type: **M73ULSQW**

or

For a UHF-H radio,
type: **M73UHSQW**

Click: **OK**

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

This set is used to align wide-band analog squelch. Settings also effect C4FM squelch operation.

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**

For a UHF-L radio,
type: **M73ULSQN**

or

For a UHF-H radio,
type: **M73UHSQN**

Click: **OK**

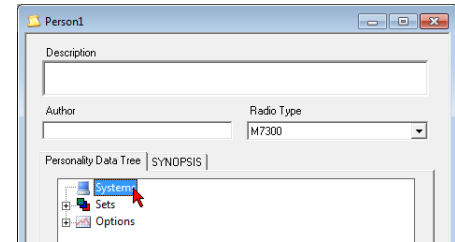
Use the illustration to the right, or reference Table 11-11, and enter the channel name, frequency, and set any other features as indicated by the outlined boxes. Enter all 5 channels.

This set is used to align narrow-band squelch.

13. To exit the Conventional Frequency Sets dialog box, click: **OK**

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

Double-click: **Systems**



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

Click: **Add New System**

16. In the New System box:

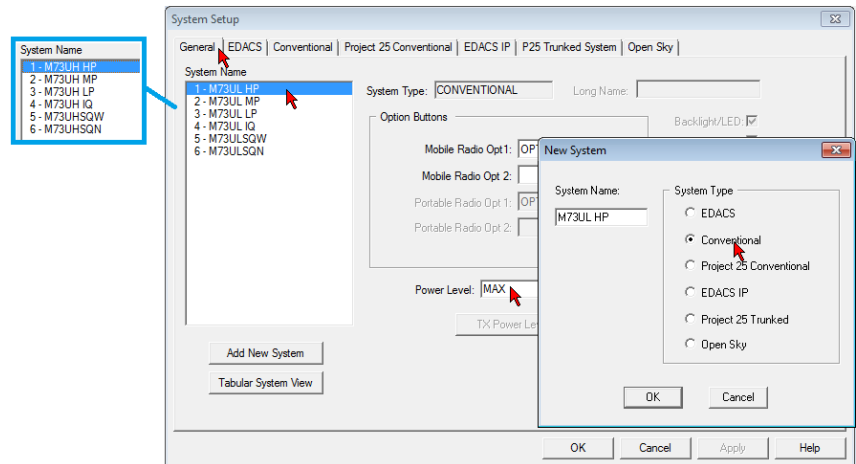
For a UHF-L radio,
type: **M73UL HP**

or

For a UHF-H radio,
type: **M73UH HP**

Select: **Conventional**

Click: **OK**



17. Repeat steps 15 and 16, except create a new system for each of the following previously-created frequency sets:

For a UHF-L radio:

M73UL MP
M73UL LP
M73UL IQ
M73ULSQW
M73ULSQN

For a UHF-H radio:

M73UH MP
M73UH LP
M73UH IQ
M73UHSQW
M73UHSQN

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

Click: **Conventional** tab

19. In the System Name field:

For a UHF-L radio,
select: **M73UL HP**

or

For a UHF-H radio,
select: **M73UH HP**

20. In the Conventional Set dropdown:

For a UHF-L radio,
select: **M73ULTXW**

or

For a UHF-H radio,
select: **M73UHTXW**

21. Click the **General** tab and set the **Power Level** to **MAX** (50 watts).

(Using “MAX” forces the radio to use the high power alignment values for each channel in this system.)

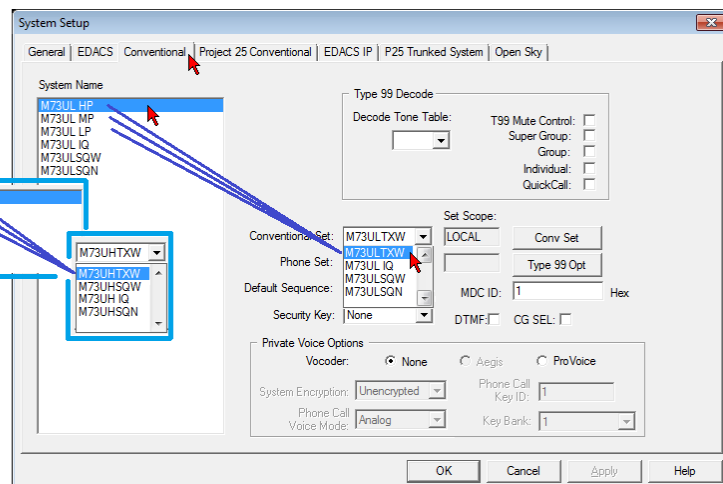
22. Repeat steps 19 and 20 to associate each additional new conventional frequency set with its corresponding system name, as shown below. Also set the system’s Power Level via the General tab:

For a UHF-L radio:

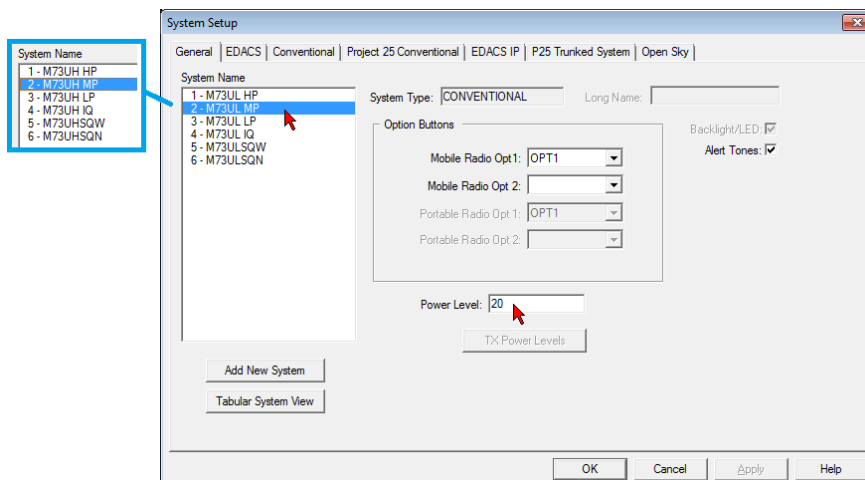
<u>System Name</u>	<u>Conv. Freq. Set</u>	<u>Power Level (Watts)</u>
M73UL MP	M73ULTXW	20
M73UL LP	M73ULTXW	8
M73UL IQ	M73UL IQ	8
M73ULSQW	M73ULSQW	8
M73ULSQN	M73ULSQN	8

For a UHF-H radio:

<u>System Name</u>	<u>Conv. Freq. Set</u>	<u>Power Level (Watts)</u>
M73HL MP	M73HLTXW	20
M73HL LP	M73HLTXW	8
M73HL IQ	M73HL IQ	8
M73HLSQW	M73HLSQW	8
M73HLSQN	M73HLSQN	8



The numeric value entered in the **Power Level** box is used to set the TX power in Watts. Only whole numbers may be entered. Entering a value that is outside the High or Low Power reference levels range entered during alignment results in the radio defaulting to the high or low alignment value. See Section 11.5.5.3 on page 71 for additional information).



The value used for aligning the mid power level is not critical, as long as the measured transmitter power output matches the reference value shown in the mid power “Tx Power” field.

23. From RPM’s main menu:

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

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

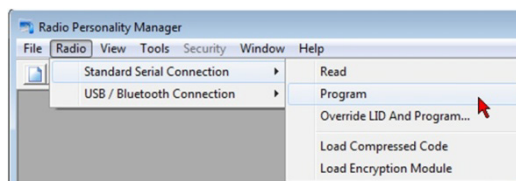


Table 11-9: Frequencies for Conventional Frequency Set M73ULTXW or M73UHTXW

CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)	
	UHF-L	UHF-H
1	378.000	440.000
2	380.725	443.800
3	383.475	447.575
4	386.200	451.375
5	388.950	455.150
6	391.675	458.950
7	394.425	462.725
8	397.150	466.525
9	399.900	470.325
10	402.625	474.100

CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)	
	UHF-L	UHF-H
11	405.375	477.900
12	408.100	481.675
13	410.850	485.475
14	413.575	489.275
15	416.325	493.050
16	419.050	496.850
17	421.800	500.625
18	424.525	504.425
19	427.275	508.200
20	430.000	512.000

Table 11-10: Frequencies for I/Q Modulation Frequency Set M73UL IQ or M73UH IQ

CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)	
	UHF-L	UHF-H
1	386.0000	451.0000
2	398.0000	466.0000
3	409.0000	481.0000
4	423.0000	502.0000

**Table 11-11: Frequencies for Receiver Frequency Set
M73ULSQW and M73ULSQN or M73UHSQW and M73UHSQN**

CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)	
	UHF-L	UHF-H
1	378.0000	440.0000
2	391.0000	458.0000
3	404.0000	476.0000

CHANNEL NUMBER	FREQUENCY IN MHz (TX and RX)	
	UHF-L	UHF-H
4	417.0000	494.0000
5	430.0000	512.0000

11.5.4.2 Removing Radio Alignment Test Systems from the Personality



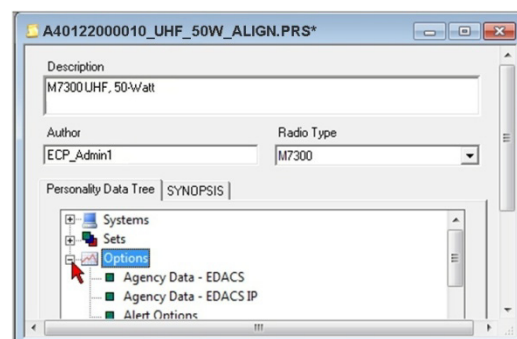
IMPORTANT

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:

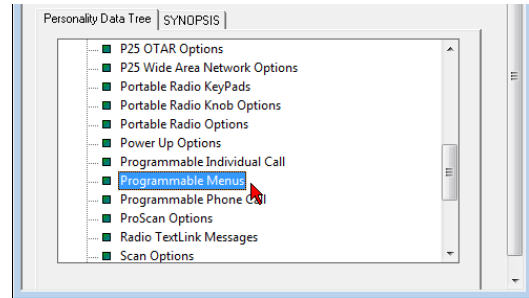
1. Connect the radio to the PC with the RPM programming software and enter programming mode. Refer to Section 11.5.3.1 as necessary.
2. Verify the feature and calibration data files have been saved to local disk. Refer to Sections 11.5.3.2 and 11.5.3.3 as necessary.
3. Read the radio's personality. Refer to Section 11.5.3.4 as necessary.
4. In the Personality Data Tree tab:

Click: **Options**



5. Scroll down the Options limb:

Double-click: **Programmable Menus**

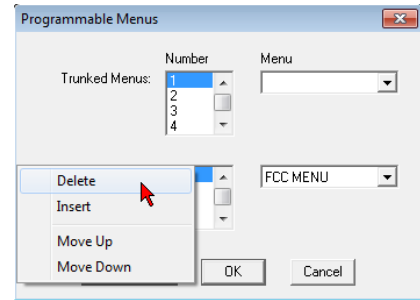


6. Within the Conventional Menus Number box:

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

Click: **Delete**

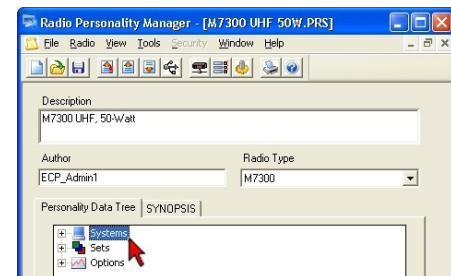
Click: **OK**



7. In the Personality Data Tree tab:

Double-click: **Systems**

The System Setup dialog box opens.



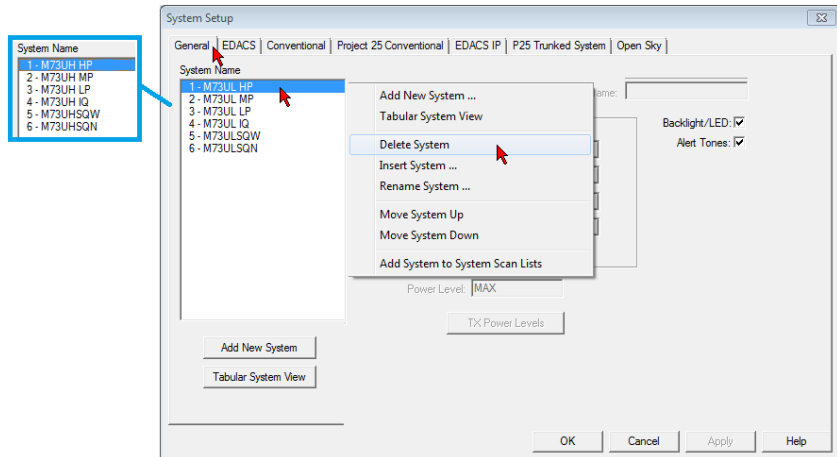
8. In the General tab of the System Setup dialog box:

For a UHF-L radio,
double-click: **M73UL HP**

or

For a UHF-H radio,
double-click: **M73UH HP**

Click: **Delete System**



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

For a UHF-L radio:

M73UL MP

M73UL LP

M73UL IQ

M73ULSQW

M73ULSQN

For a UHF-H radio:

M73UH MP

M73UH LP

M73UH IQ

M73UHSQW

M73UHSQN



NOTE

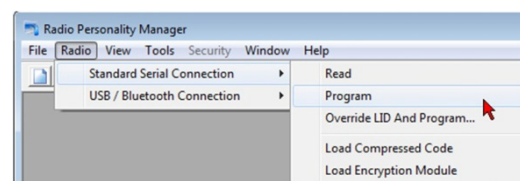
In general, deleting the new frequency sets created for radio testing from the radio's personality is not necessary. Simply deleting the test Systems from the System Setup's General tab in RPM and re-programming the radio with this modified personality removes radio user access to the frequency sets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

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.



11.5.5 Radio Alignment Procedures

11.5.5.1 General Information

Before beginning any radio alignment procedure, a careful review of Sections 11.5.3.1 through 11.5.3.4 is recommended. The minimum radio firmware code versions and RPM version listed in Section 11.5.1 (page 52), 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 11.5.3 (page 53) as necessary.
- Update the existing personality in the radio with conventional test frequency sets. Refer to Section 11.5.4 (page 58) 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 11.5.3.3 (page 56) as necessary.
- Reload the radio's original personality and verify operation.



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 Section 11.5.4.2 (page 65).



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 to the RF test equipment using only high-quality cables as listed in Table 11-2 (page 40).



The use of an RF attenuator between the radio and the test equipment is recommended, and it may be required for some test equipment. Consult the test equipment's specifications as necessary. An attenuator is not shown in the following figure. When an attenuator is used, be sure to compensate all measurements accordingly.

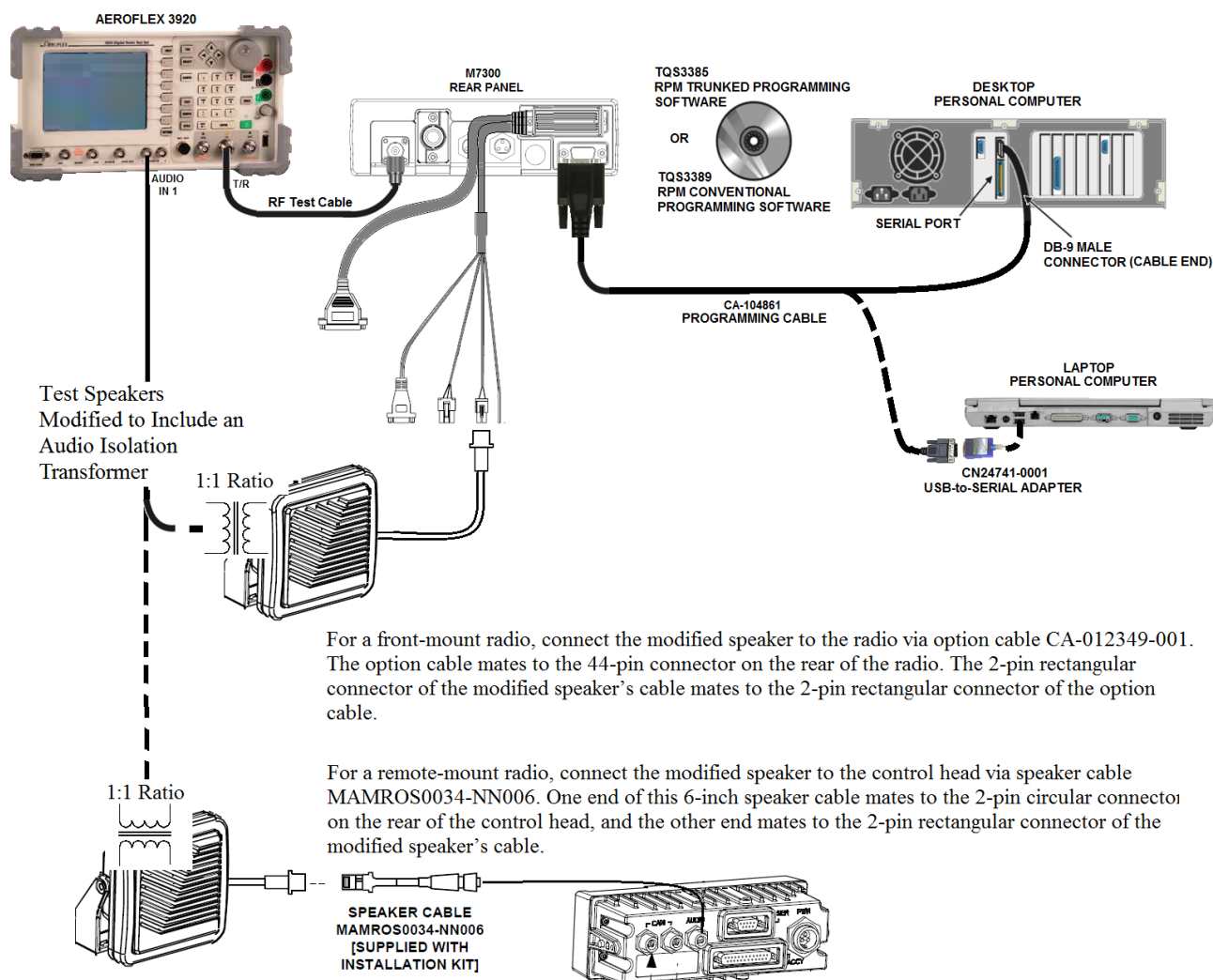


Figure 11-1: Test Equipment Connections for Radio Alignment

11.5.5.2 Automatic Frequency Control (TCXO Reference Oscillator) Alignment



NOTE

The radio's TCXO reference oscillator is a highly accurate and stable crystal reference oscillator which should **not** normally require re-alignment. The use of a recently-calibrated RF Communications Test Set or Frequency Counter is recommended. **The utilized test equipment should have a specified frequency accuracy/stability equal to or better than 0.15 ppm.** If not, an appropriate external timebase reference which meets or exceeds this specification must be applied to the external timebase reference input of the test set/frequency counter, and the test set/frequency counter must be configured to use this external reference.



NOTE

This alignment should be performed with the radio and test equipment at a room temperature between 68 and 77° Fahrenheit (20 to 25° Celsius). After radio power-up, always wait at least 15 minutes before taking a measurement. This warm-up time will allow the temperature of the radio's circuits to properly stabilize.



NOTE

If frequency alignment is necessary, maximum errors less than or equal to ± 370 Hz for a UHF-L radio and ± 440 Hz for a UHF-H radio should be obtained.

DO NOT attempt AFC alignment while in trunked mode!



CAUTION

Only align the AFC value in analog conventional mode. During trunked mode, an additional AFC compensation value is applied to the radio's reference oscillator frequency control.

The additional compensation value is temporary and refreshed each time the radio locks onto a Control Channel. While locked on a Control Channel, the radio's reference oscillator is precision-aligned to match the Control Channel base station's true frequency.

The Automatic Frequency Control (AFC) adjusts the frequency of the radio's TCXO reference oscillator. Follow this procedure to align this oscillator:

1. Setup and power-up the radio, control head, and test equipment as described in the Tx Frequency Test procedure, Section 11.4.4.1 (do steps 1 through 7 of that procedure). Also see Figure 11-1.
2. Add the conventional test systems to the radio personality. Refer to Section 11.5.4 as necessary.
3. Select the low-power test system **M73UL LP** for a UHF-L radio or **M73UH LP** for a UHF-H radio.
4. Select **Channel 20** (430.000 MHz for a UHF-L radio; 512.000 MHz for a UHF-H radio). See Table 11-9 on page 64 for all channels/frequencies used in this procedure.
5. Configure the RF Communications Test Set's frequency counter for an in-band frequency count.
6. **If at least 15 minutes has passed since the radio was powered-up, continue to the next step. Otherwise, wait until this period has passed, to allow the frequency of the radio's TCXO reference oscillator to stabilize.**
7. Key the radio by depressing the microphone's PTT button, and measure the radio's transmit frequency.
8. If the measured frequency is within ± 370 Hz for a UHF-L radio or ± 440 Hz for a UHF-H radio, unkey the radio and advance to step 22.

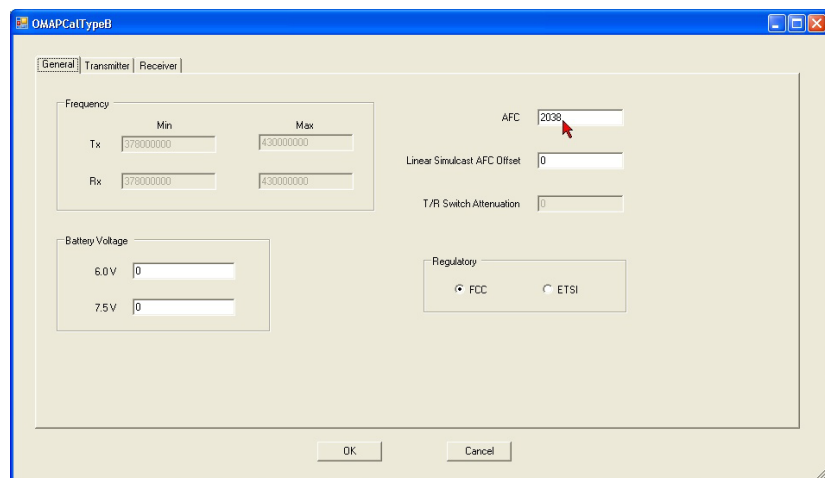
If the measured frequency is not within this range, unkey the radio and go to step 9.

9. Turn off the radio and the control head.

10. Using a serial programming cable, connect the radio to the PC with the RPM programming software. See Figure 10-1 on page 28.
11. Turn on the radio and control head.
12. At the PC with the RPM programming software, start the Radio Maintenance Utility:
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**
13. In the utility, click on the tab that includes **M7x00** (for the M7300 and other radios).
14. From utility's main menu:
Select: **Radio > Read > Calibration Data from Radio**
15. When the Calibration Data Complete dialog box opens:
Click: **OK**
16. In the tab that includes **M7x00**:
Click: **Calibration Data**

17. In the General tab, adjust the AFC value up or down. The TX frequency is proportional to the change in AFC value: Increasing the value increases the TX frequency while decreasing the value decreases the TX Frequency.

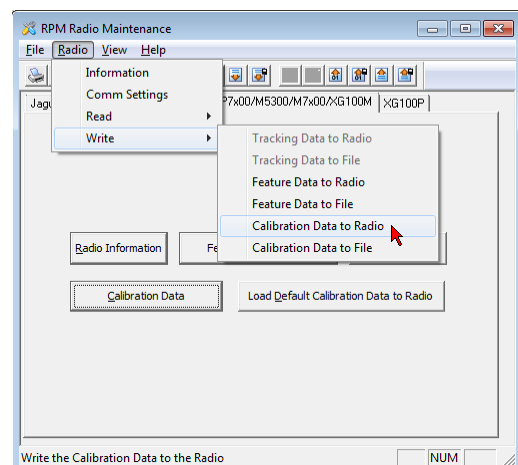
Click: **OK**



CAUTION

Do **not** change any of the other fields in the General tab.

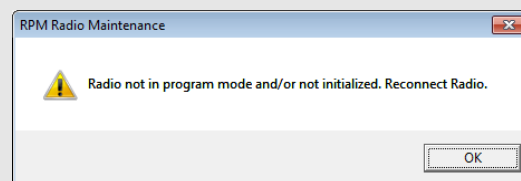
18. From the utility's main menu:
Select: **Radio > Write > Calibration Data to Radio**
19. When the Calibration Data Write Complete dialog box appears:
Click: **OK**
20. Cycle power to the radio or click the **JUMP** button to reset the radio after programming. Power cycling the control head is not necessary.





NOTE

If an error message box appears similar to the one shown at the right, try re-writing the calibration data. If a second write does not resolve the issue, first verify serial programming cable connections. Next, within the utility, verify serial port settings by clicking **Radio > Comm Settings** on the utility's main menu.



21. Repeat from step 3 until the measured transmit frequency is within ± 370 Hz for a UHF-L radio or ± 440 Hz for a UHF-H radio. Step resolution of the AFC increment/decrement value may not allow setting to the exact frequency. In that case, use a value which results in a transmit frequency as close as possible, and within the respective range. When performing alignment, do **not** use the maximum frequency errors listed in Table 11-5, as they are based on ± 1.5 ppm across the entire operating temperature range of the radio.
22. If no other alignment or testing will 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 and verify radio operation.
 - c. If conventional test systems were added to the original personality, remove the test systems, and verify radio operation. Refer to Section 11.5.4.2 on page 65 as necessary.

11.5.5.3 TX Power Alignment

The Radio Maintenance Utility's Calibration Data button accesses several tabs that can be used for aligning radio transmit power output levels. These levels include:

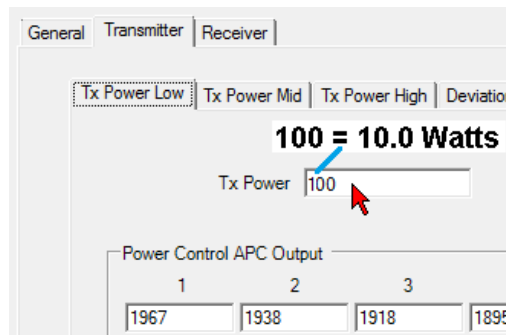
- TX Power Low
- TX Power Mid
- TX Power High

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. In each Tx Power tab, the value entered in the Tx Power box represents the RF output level which the radio is aligned to in deciwatts (i.e., divide by 10 for watts). For example, an entry of “500” equals an RF power output of 50 watts, and an entry of “100” equals 10 watts.

For the Power Control APC Output and Power Sense APC Input alignment data points, increasing a data point value increases the power output at the corresponding test frequency. Values for frequencies between the 20 specific alignment data points/frequencies are interpolated from the 20 data point values.



Example Data Values for a UHF-L Radio

Power Control APC Output									
1	2	3	4	5	6	7	8	9	10
For 378.000 MHz → 1265	1260	1254	1249	1244	1238	1233	1228	1223	1217 → For 402.625 MHz
11	12	13	14	15	16	17	18	19	20
For 405.375 MHz → 1212	1208	1204	1200	1196	1192	1188	1184	1180	1176 → For 430.000 MHz
Power Sense APC Input									
1	2	3	4	5	6	7	8	9	10
For 378.000 MHz → 247	246	245	243	242	241	240	239	237	236 → For 402.625 MHz
11	12	13	14	15	16	17	18	19	20
For 405.375 MHz → 235	234	233	232	231	230	229	228	227	226 → For 430.000 MHz

See Table 11-9 for a Complete List of Frequencies Vs. Channels/Alignment Data Points

Example Data Values for a UHF-H Radio

Power Control APC Output									
1	2	3	4	5	6	7	8	9	10
For 440.000 MHz → 1294	1282	1270	1257	1245	1233	1221	1209	1196	1184 → For 474.100 MHz
11	12	13	14	15	16	17	18	19	20
For 477.900 MHz → 1172	1162	1151	1141	1131	1120	1110	1100	1089	1079 → For 512.000 MHz
Power Sense APC Input									
1	2	3	4	5	6	7	8	9	10
For 440.000 MHz → 304	300	297	293	290	286	282	279	275	272 → For 474.100 MHz
11	12	13	14	15	16	17	18	19	20
For 477.900 MHz → 268	265	262	259	256	253	250	247	244	241 → For 512.000 MHz

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



TX power levels are factory aligned. 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 module).



For optimum performance, minimum DC current drain, TX power amplifier protection, and to assure compliance with FCC requirements, DO NOT exceed nominal RF power output settings.

Perform the following to align the transmit RF power output of the radio:

1. Setup and power-up the radio, control head, and test equipment as described in the Tx Frequency Test procedure, Section 11.4.4.1 (do steps 1 through 7 of that procedure). Also see Figure 11-1.
2. Add the conventional test systems to the radio's personality. Refer to Section 11.5.4 as necessary.
3. Select the low-power test system **M73UL LP** for a UHF-L radio or **M73UH LP** for a UHF-H radio.
4. Select **Channel 20** (430.000 MHz for a UHF-L radio; 512.000 MHz for a UHF-H radio), the next test channel, or the channel being aligned. See Table 11-9 on page 64 for all channels/frequencies used in this procedure.
5. Key the radio by depressing the microphone's PTT button, and wait for the transmit power to stabilize (typically one to two seconds).
6. Measure the steady-state transmit power. Figure 11-2 shows the Channel Analyzer function of the Aeroflex 3920.

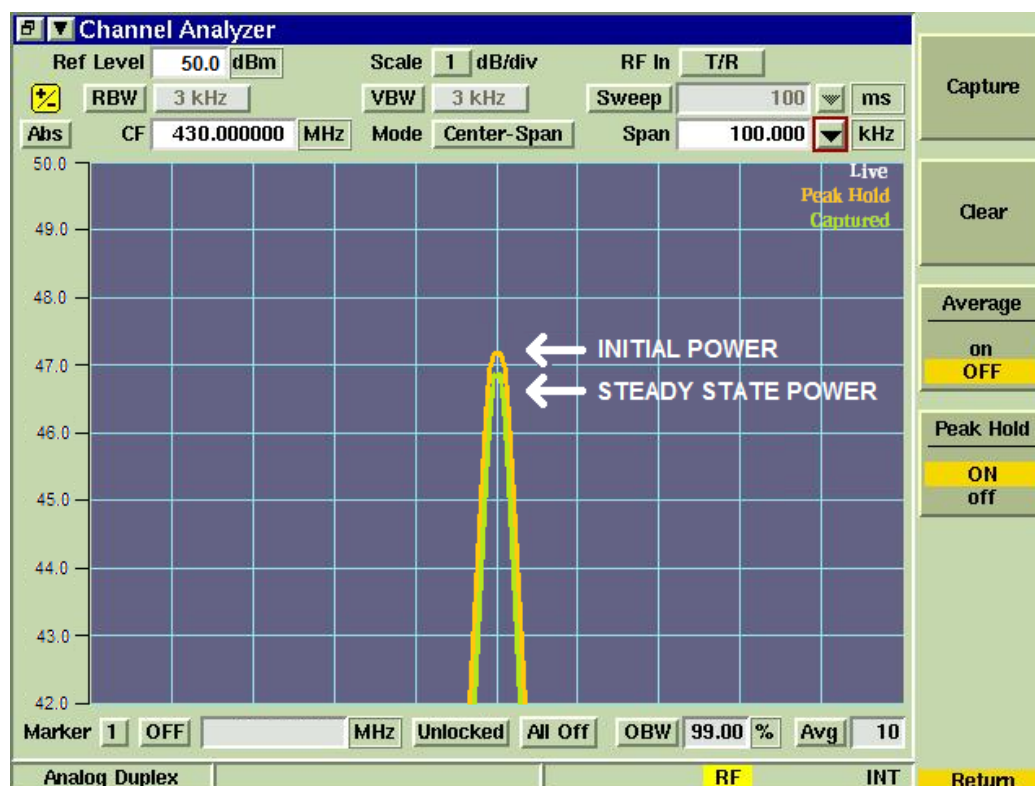


Figure 11-2: Measuring and Aligning APC Input and Output Power with Aeroflex 3920
(Example of a UHF-L Radio)

7. Unkey radio.
8. Turn on the test set's Peak Hold function.
9. Rekey the radio and measure the initial transmit power. Typically, this measurement is higher than this channel's steady-state transmit power. See Figure 11-2 for an example display.
10. Unkey the radio.
11. Use the applicable case below to continue:
 - a. If the difference between the initial transmit power and the steady-state transmit power is greater than 0.8 dB, or the steady-state power measurement is not within ± 0.25 dB of the set power level, then advance to step 12 and align the power settings for the channel being tested.
 - b. If the difference between the initial transmit power and the steady-state transmit power is less than 0.8 dB, and the steady-state transmit power is within ± 0.25 dB of the set power level:
 - i. Select the next lower test frequency in the selected system.
 - ii. Repeat the test and alignment process, beginning with step 4, 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 system, **M73UL HP** for a UHF-L radio or **M73UH HP** for a UHF-H radio.
 - ii. Repeat the test and alignment process beginning with step 4, until all channels in the selected system have been tested and aligned for high power.

- d. If all data points are aligned in the high power system:
 - i. Select the mid-power system, **M73UL MP** for a UHF-L radio or **M73UH MP** for a UHF-H radio.
 - ii. Repeat the test and alignment process beginning with step 4, until all channels in the selected system have been tested and aligned for mid power.
 - e. If high, mid, and low power testing has been completed for all test channels, advance to step 27.
12. Turn off the radio and control head.
 13. Using a serial programming cable, connect the radio to the PC with the RPM programming software. See Figure 10-1 on page 28.
 14. Turn on the radio and control head.
 15. At the PC with the RPM programming software, start the Radio Maintenance Utility:
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**
 16. In the utility, click on the tab that includes **M7x00** (for the M7300 and other radios).
 17. From the utility's main menu:
Select: **Radio > Read > Calibration Data from Radio**
 18. When the Calibration Data Complete dialog box opens:
Click: **OK**
 19. In the tab that includes **M7x00**:
Click: **Calibration Data**
 20. In the Transmitter tab, review the TX Power Low, Mid, and High tabs and verify the Tx Power input boxes show correct values (ignore the 700 MHz input box):
For Low Power: **80** (see Figure 11-3)
For Mid Power: **200**
For High Power: **500**

**NOTE**

The Tx Power input box values represent the transmit power output level associated to each Tx Power Tab (High, Mid, and Low) in deciwatts. Divide by 10 for watts. For example, "500" equals an RF power output of 50 watts, and "80" equals 8 watts.

The screenshot shows the OMAPCalTypeB software window with the Receiver tab selected. The Tx Power Low sub-tab is active, showing a Tx Power of 80 and a 700 MHz frequency. Below these are two tables of Power Control APC Output and Power Sense APC Input values for 20 channels each.

Power Control APC Output																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1265	1260	1254	1249	1244	1238	1233	1228	1223	1217	1212	1208	1204	1200	1196	1192	1188	1184	1180	1176

Power Sense APC Input																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
247	246	245	243	242	241	240	239	237	236	235	234	233	232	231	230	229	228	227	226

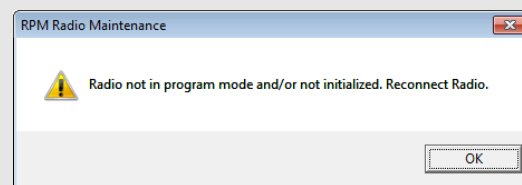
Figure 11-3: Example of TX Power Low APC Input and Output Power Settings

21. Adjust the Power Control APC Output and Power Sense APC Input values accordingly for the frequency (test channel) being tested. Increasing the values increases transmit power output.
22. Click **OK**.
23. From the utility's main menu:
Select: **Radio > Write > Calibration Data to Radio**



NOTE

If an error message box appears similar to the one shown at the right, try re-writing the calibration data. If a second write does not resolve the issue, first verify serial programming cable connections. Next, within the utility, verify serial port settings by clicking **Radio > Comm Settings** on the utility's main menu.



24. When the Calibration Data Write Complete dialog box appears, click **OK**.
25. Cycle power to the radio or click the **JUMP** button to reset the radio after programming. Power cycling the control head is not necessary.
26. Return to step 4 and retest the channel.
27. Save the final calibration data to a local file.
28. If no other alignment or testing will be performed, do the following:
 - a. If a "shop" test personality was used to test the radio, reload the original personality and verify operation.

- b. If test systems were added to the original personality, refer to Section 11.5.4.2 (page 65), remove the systems, and verify radio operation.

11.5.5.4 I/Q Data Modulation Alignment

The Radio Maintenance Utility can be used to align the following I and Q data modulation parameters: DC offset, amplitude, and vector arrays. This alignment affects radio transmissions when operating on a channel programmed for C4FM mode.



I/Q data modulation 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.

Follow this procedure to verify and align I and Q data modulation:

1. Setup and power-up the radio, control head, and test equipment as described in the Tx Frequency Test procedure, Section 11.4.4.1 (do steps 1 through 7 of that procedure). Also see Figure 11-1.
2. Add the conventional test systems to the radio's personality. Refer to Section 11.5.4 as necessary.
3. At the control head, select conventional test system **M73UL IQ** for a UHF-L radio or **M73UH IQ** for a UHF-H radio.
4. At the control head, select **Channel 4** (423.000 MHz for a UHF-L radio; 502.000 MHz for a UHF-H radio). See Table 11-10 on page 65 for all channels/frequencies used in this procedure.
5. Setup the RF Communications Test Set's RF spectrum analyzer for on-frequency measurements. Refer to Figure 11-4.
6. Press the control head's **MENU** button, then use the **•/••** ramp control to scroll through the menu until **FCC Menu** appears in the middle line of the display, and then press the **MENU** button again. The second line of the display now alternates between the selected RX frequency and the present RF input level (in dBm) applied to the radio.
7. Press the **•/••** ramp control down to select **SSB MODE** (single side-band mode).



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

8. Press the **MENU** button to key the radio.
9. Using the spectrum analyzer display, measure the difference between the RF carrier and any carrier leakage or sidebands. See Figure 11-4 for an example analyzer display. Record the suppressed carrier leakage and sidebands on this channel/frequency. Each must be at least -45 dBc (i.e., at least 45 dB below the carrier).
10. Press the **MENU** button to unkey the radio.

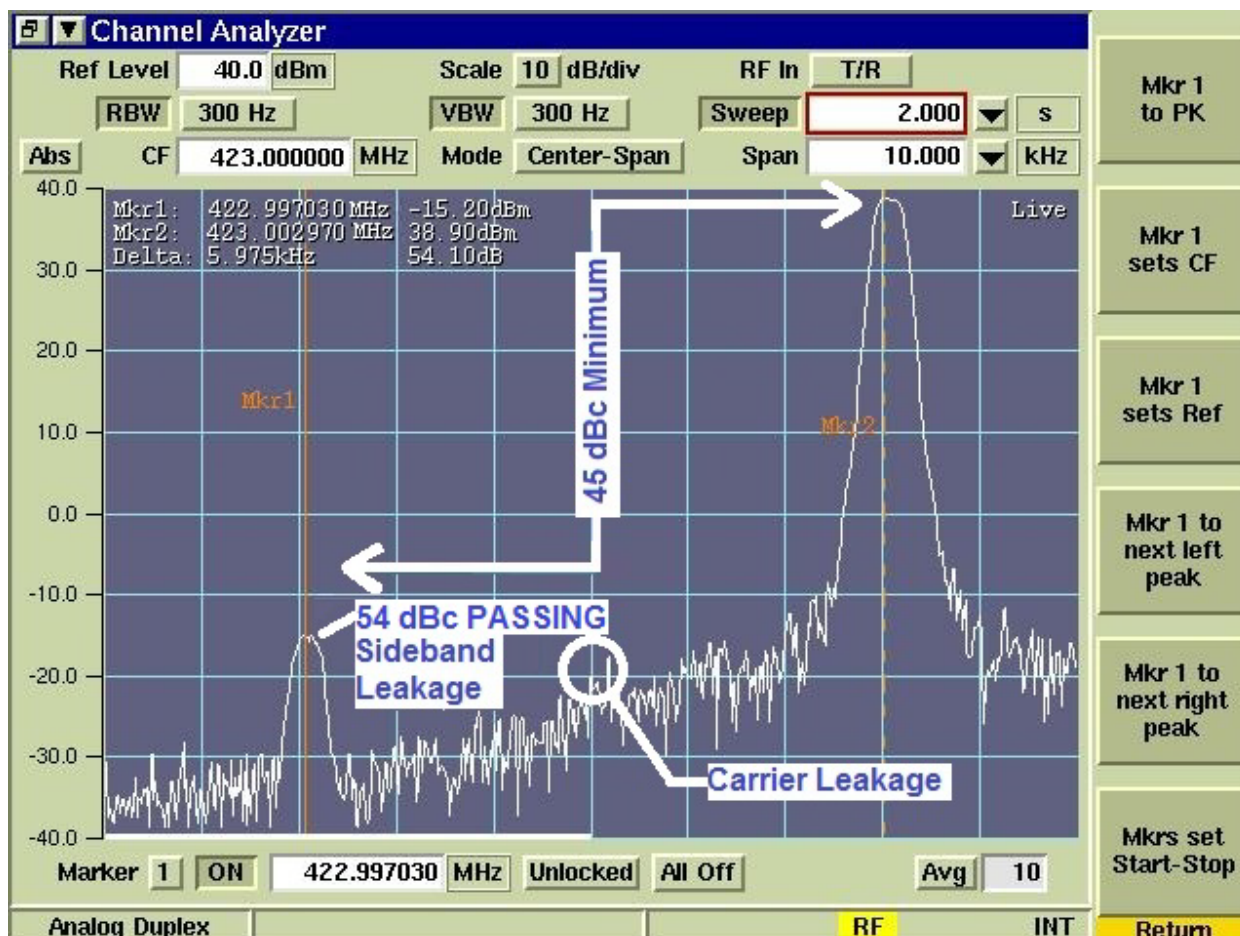
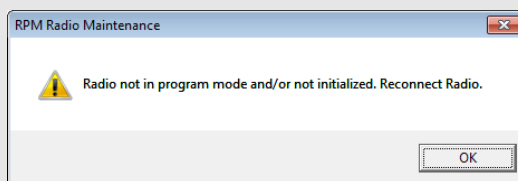


Figure 11-4: I and Q Alignment using FCC Menu SSB MODE
(Example of a UHF-L Radio)

11. Select the next lowest channel/frequency and repeat steps 5 through 10 until carrier leakage and sideband measurements have been recorded for all four (4) test channels/frequencies.
12. If carrier leakage or sideband leakage on any test frequency exceeded the -45 dBc limit, go to step 13. Otherwise, advance to step 27 and save data.
13. Turn off the radio and control head.
14. Using a serial programming cable, connect the radio to the PC with the RPM programming software. See Figure 10-1 on page 28.
15. Turn on the radio and control head.
16. At the PC with the RPM programming software, start the Radio Maintenance Utility:
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**
17. In the utility, click on the tab that includes **M7x00** (for the M7300 and other radios).
18. From the utility's main menu:
Select: **Radio > Read > Calibration Data from Radio**

**NOTE**

If an error message box appears similar to the one shown at the right, try re-reading the calibration data. If a second read does not resolve the issue, first verify serial programming cable connections. Next, within the utility, verify serial port settings by clicking **Radio > Comm Settings** on the utility's main menu.



19. When the Calibration Data Complete dialog box opens:

Click: **OK**

20. In the tab that includes **M7x00**:

Click: **Calibration Data**

**NOTE**

Adjusting I and Q values is an iterative (manual) and time-consuming process. The values interact with each other. Start by 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 50 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 5 or 10 until the best (or a passing) result is achieved.

Continue alignment by systematically adjusting, Q DC 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. However, all failing channels may be adjusted at the same time (or just one at a time), whichever is least confusing and the most efficient.

21. Within the Transmitter tab, select a test channel requiring alignment.

22. Adjust the fields, 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

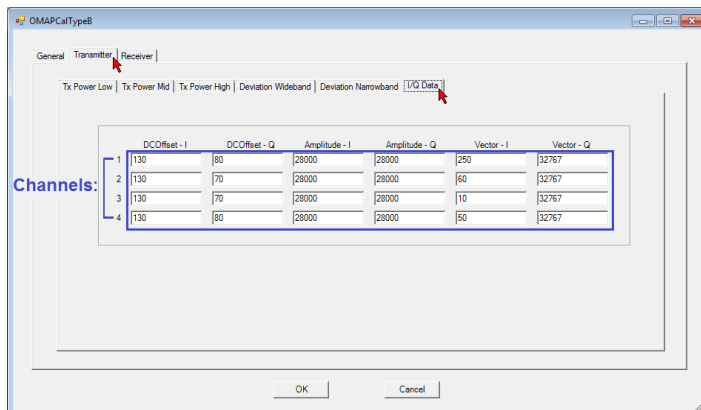
"Q" Amplitude

"I" Vector

"Q" Vector

23. From the utility's main menu:

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



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

Click: **OK**

25. Cycle power to the radio or click the **JUMP** button to reset the radio after programming. Power cycling the control head is not necessary.

26. Return to step 3 and repeat the procedure until all channels 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 conventional test frequency sets were added to the original personality, refer to Section 11.5.4.2, remove the test sets, and verify radio operation.

11.5.5.5 FM Deviation Alignment (Not Required)

While the Radio Maintenance Utility’s user interface is generically written for most OMAP radios, it provides alignment tabs for the wide-band and narrowband deviation alignment. However, these tabs only apply to portable radios and to the 900 MHz M5300 mobile radio.



Changing values within the Deviation Wideband tab or Deviation Narrowband tab will not affect radio alignment for VHF, UHF, 700 or 800 MHz M7300 mobile radios.

11.5.5.6 RSSI Alignment

The Radio Maintenance Utility’s Receiver tab includes input fields for aligning the Receive Signal Strength Indication (RSSI) detection. This alignment is based on weak, medium, and strong input RF signal levels as measured on five (5) test frequencies spread across the entire RF operating range of the radio. Correct alignment ensures the proper values are displayed in the FCC menu, and that received signal strength reports sent over-the-air from the radio are accurate.

Follow this procedure to test and align RSSI values:

1. Connect and power-up the radio, control head, and test equipment as described in the Audio Output and Distortion Levels Tests presented in Section 11.4.5.1 (do steps 1 through 9 of that procedure). Also see Figure 11-1. Distortion levels do not need to be tested (i.e., do not need to be verified as good) before performing this procedure.
2. Add the conventional test systems to the radio’s personality. Refer to Section 11.5.4 as necessary.
3. Connect the radio’s TNC antenna port connector to the RF Communications Test Set’s signal generator/low-power RF output port. To make this connection, use only high-quality RF coax cable(s).
4. At the control head, select the narrowband test system **M73ULSQN** for a UHF-L radio or **M73UHSQN** for a UHF-H radio.
5. At the control head, select **Channel 1** (378.000 MHz for a UHF-L radio; 440.000 MHz for a UHF-H radio). See Table 11-11 on page 65 for all channels/frequencies used in this procedure.
6. Press the control head’s **MENU** button, then use the **•/••** ramp control to scroll through the menu until **FCC Menu** appears in the middle line of the display, and then press the **MENU** button again.

The second line of the display now alternates between the selected RX frequency and the present RF input level (in dBm) applied to the radio.

7. Configure the test set to generate an on-frequency FM carrier at a -110 dBm RF output level. This RF level is a reference level for verifying “weak” RSSI alignment values.
8. Record the displayed RSSI level.
9. Change the test set’s RF output level to -90 dBm. This RF level is a reference level for verifying “medium” RSSI alignment values.
10. Record the displayed RSSI level.
11. Change the test set’s RF output level to -70 dBm. This RF level is a reference level for verifying “strong” RSSI alignment values.
12. Record the displayed RSSI level.
13. At the control head, change the channel to the next higher channel/frequency and repeat steps 6 through 12 until weak, medium and strong RSSI measurements are done on all five (5) receive frequencies. The five channels/frequencies are listed in Table 11-11 on page 65.
14. If any of the measured RSSI level measurement is more than ± 1.0 dB from the test set’s RF output level, continue with step 15 to align the radio. Otherwise, advance to step 29 and save data.
15. Turn off the radio and control head.
16. Using a serial programming cable, connect the radio to the PC with the RPM programming software. See Figure 10-1 on page 28.
17. Turn on the radio and control head.
18. At the PC with the RPM programming software, start the Radio Maintenance Utility:
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**
19. In the utility, click on the tab that includes **M7x00** (for the M7300 and other radios).
20. From the utility’s main menu:
Select: **Radio > Read > Calibration Data from Radio**
21. When the Calibration Data Complete dialog box opens:
Click: **OK**
22. In the tab that includes **M7x00**:
Click: **Calibration Data**

23. Select: **Receiver** tab.

Refer to step 14 and adjust the Strong, Medium, and Weak RSSI values as necessary.

Do **not** change the Signal Strength values in the first column.

24. Click: **OK**

Squelch Open Levels					
	1	2	3	4	5
Wideband	900	900	900	900	900
Narrowband	270	270	270	270	270
C4FM	270	270	270	270	270
XNB	1050	1050	1050	1050	1050

Squelch Close Levels					
	1	2	3	4	5
Wideband	1200	1200	1200	1200	1200
Narrowband	400	400	400	400	400
C4FM	420	420	420	420	420
XNB	1900	1900	1900	1900	1900

RSSI					
Signal Strength	1	2	3	4	5
Strong	70	712	708	704	698
Medium	90	511	508	504	497
Weak	110	314	308	302	297

RSSI ADJUSTMENTS

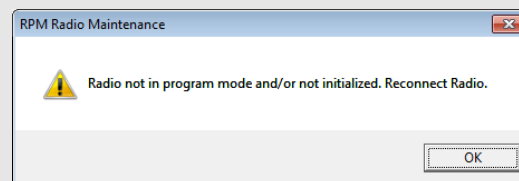
25. From the utility's main menu:

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



NOTE

If an error message box appears similar to the one shown at the right, try re-writing the calibration data. If a second write does not resolve the issue, first verify serial programming cable connections. Next, within the utility, verify serial port settings by clicking **Radio > Comm Settings** on the utility's main menu.



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

Click: **OK**

27. Cycle power to the radio or click the **JUMP** button to reset the radio after programming. Power cycling the control head is not necessary.
28. Return to step 4 and repeat the test and alignment procedure until all RSSI values are correctly aligned.
29. Save the final calibration data to a local file.
30. If no other testing is to be performed, do the following:
- If a "shop" test personality was used to test the radio, reload the original personality and verify operation.
 - If conventional test systems were added to the original personality, refer to Section 11.5.4.2, remove the test systems, and verify radio operation.

11.5.5.7 Squelch Open and Close Alignment

The Radio Maintenance Utility's Receiver tab includes input fields for Squelch Open Levels and Squelch Close Levels. Values entered into these fields determine the received signal level required to unsquelch the receiver. A higher value equates to a weaker RF signal required to unsquelch the radio on the respective channel/frequency.

Radios like the M7300 that support multiple modes of operation and wide and narrow bandwidths require different squelch levels for each mode. Squelch Open Levels and Squelch Close Levels input fields are provided for wide-band, narrowband, C4FM, and XNB operations. Values for wideband and narrowband

operation are aligned for squelch open and squelch close at five (5) frequencies spread across the entire RF operating range of the radio.



The C4FM Squelch Open Levels and C4FM Squelch Closed Levels values are not used with a UHF M7300 radio. These values are only used with a 110-Watt VHF radio. Do not change these values in a UHF radio.

Likewise, the XNB Squelch Open Levels and XNB Squelch Close Levels values are not used with a UHF M7300 radio. These values only apply to a 900 MHz radio. Do not change these values in a UHF radio.

Each compliment of Squelch Open Level and Squelch Close Level values are set such that a stronger signal is required to open the squelch (Squelch Open Levels) and it doesn't close until the signal level weakens (Squelch Close Levels). This is squelch hysteresis. Without hysteresis, squelch response to weak signals would result in broken-up receive audio in the speaker.

Squelch alignment is based on the industry-standard Signal, Noise, And Distortion (SINAD) ratio. This is a comparison of no signal (all noise) to the desired signal being received. A hysteresis value of between 1.5 and 3.0 dB in SINAD is considered optimal. Factory alignment sets the Squelch Open Level for 8 dB \pm 2 dB SINAD.

Follow this procedure to test and align squelch open and close levels:

1. Connect and power-up the radio, control head, and test equipment as described in the Audio Output and Distortion Levels Tests presented in Section 11.4.5.1 (do steps 1 through 9 of that procedure). Also see Figure 11-1. Distortion levels do not need to be tested (i.e., do not need to be verified as good) before performing this procedure.
2. Add the conventional test systems to the radio's personality. Refer to Section 11.5.4 as necessary.
3. Connect the radio's TNC antenna port connector to the RF Communications Test Set's signal generator/low-power RF output port.
4. At the control head, select a conventional test system as listed in Table 11-12 for the respective radio type (i.e., UHF-L or UHF-H).
5. At the control head, select **Channel 1** (378.000 MHz for a UHF-L radio; 440.000 MHz for a UHF-H radio).
6. Configure the test set to generate an on-frequency FM carrier at a minimum RF output level (-125 dBm or lower) and modulated with a 1 kHz tone at a deviation level per the respective operating mode in Table 11-12.

Table 11-12: FM Deviation Levels for Aligning Squelch

SELECTED TEST SYSTEM		MODE	1 kHz TONE DEVIATION (NO CG OR DCG)
UHF-L	UHF-H		
M73ULSQN	M73UHSQN	Narrowband (Analog)	1.35 kHz +/- 100 Hz
M73ULSQW	M73UHSQW	Wideband (Analog)	2.7 kHz +/- 200 Hz

7. Also prepare the test set for a SINAD measurement.



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

8. Press the control head's **MENU** button, then use the **•/••** ramp control to scroll through the menu until **FCC Menu** appears in the middle line of the display, and then press the **MENU** button again. The second line of the display now alternates between the selected channel's RX frequency and the RF input level (in dBm) currently applied to the radio. Typically, the displayed RF input level will be -125 dBm or less. It is important to verify the frequency is clear (no undesired receive signals).
9. Press the **•/••** ramp control down to select: **SQ #####**, where ##### represents a randomly changing number, typically between 1000 and 4000. This is the Squelch Reference value. It represents the received noise level currently being detected by the receiver's squelch circuit.
10. Record the Squelch Reference value displayed for this channel/frequency.
11. While monitoring the SINAD level, slowly increase the test set's RF output level until the squelch just opens. Record the measured SINAD level at this RF level for this channel/frequency.
12. While monitoring the SINAD level, slowly decrease the test set's RF output level until the squelch closes. Record the measured SINAD level just before squelch closing for this channel/frequency.
13. At the control head, select the next higher channel/frequency, then return to step 6 and repeat measurements on this frequency. Repeat this until the SINAD levels are measured and recorded on all five (5) wide-band channels/frequencies. Table 11-11 on page 65 lists the channels/frequencies.


NOTE

C4FM squelch operation works as a conventional analog squelch and thus C4FM squelch is aligned as analog squelch. When a P25 signal's RF signal strength satisfies the C4FM Squelch Open Level value (RF signal quality), the radio then verifies P25 synchronization. If synchronization is present, the audio path opens in P25 mode. Otherwise, if a valid CG is detected (or if the channel is programmed for carrier squelch), the audio path is opened in analog voice mode.

14. If any channel opens at a level of 9 dB SINAD or greater, or closes at a value 5 dB SINAD or less, then continue with step 15 to realign the Squelch Open Level and Squelch Close Level values. Otherwise, advance to step 29 and save data.
15. Turn off the radio and control head.
16. Using a serial programming cable, connect the radio to the PC with the RPM programming software. See Figure 10-1 on page 28.
17. Turn on the radio and control head.
18. At the PC with the RPM programming software, start the Radio Maintenance Utility:
Click: **Start > Programs > Harris Radio Personality Manager > RPM Radio Maintenance Utility**
19. In the utility, click on the tab that includes **M7x00** (for the M7300 and other radios).
20. From the utility's main menu:
Select: **Radio > Read > Calibration Data from Radio**
21. When the Calibration Data Complete dialog box opens:
Click: **OK**
22. In the tab that includes **M7x00**:
Click: **Calibration Data**

23. Select: **Receiver** tab

Refer to steps 11 and 12 to adjust the values for any of the channels where the squelch did not open or close as expected. Decreasing the input value tightens the squelch function.

24. Click: **OK**



A Squelch Open Level value must always be lower than the respective Squelch Close Level value.



It may be advantageous to initially set each Squelch Open Level value 200 to 300 points lower than the displayed no-carrier **SQ #####** value, and then set the respective Squelch Close Level value 100 to 200 points lower than the displayed no-carrier **SQ #####** value.

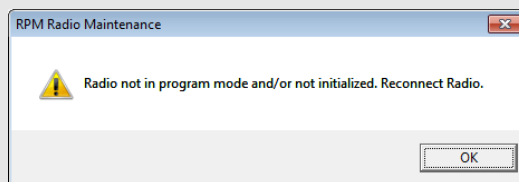
This allows the radio's audio path to open with a very weak RF input signal and prevent the squelch from closing too soon. This allows the **SQ #####** value to be monitored while varying the RF generator's signal strength to near 0 dB SINAD. Afterward, the **SQ #####** values seen when 8 dB SINAD (Squelch Open) and 6 dB SINAD (Squelch Close) signal levels are achieved may be used to program the Squelch Open Levels and Squelch Close Levels values for each test channel/frequency, thus achieving alignment in a simplified test.

25. From the menu:

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



If an error message box appears similar to the one shown at the right, try re-writing the calibration data. If a second write does not resolve the issue, first verify serial programming cable connections. Next, within the utility, verify serial port settings by clicking **Radio > Comm Settings** on the utility's main menu.



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

Click: **OK**

27. Cycle power to the radio or click the **JUMP** button to reset the radio after programming. Power cycling the control head is not necessary.

28. Return to step 6 and repeat the test and alignment procedure until all squelch level values are correctly aligned.

29. Save the final calibration data to a local file.

30. 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 and verify operation.
 - b. If conventional test systems were added to the original personality, refer to Section 11.5.4.2, remove the test systems, and verify radio operation.

12 DISASSEMBLY AND REASSEMBLY PROCEDURES

This section includes disassembly and reassembly procedures for the M7300 mobile radio. A list of tools required to perform the procedures is also included.



Observe precautions for damage due to **Electro-Static Discharge (ESD)**. 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.

12.1 TOOLS REQUIRED

- T7 Torx® Screwdriver
- T8 Torx Screwdriver
- T10 Torx Screwdriver
- T15 Torx Screwdriver
- Torque Screwdriver with Torx T7, T8, T10, and T15 bits
- 5.5-Millimeter Wrench or Nutdriver (required only if the radio has the optional GPS receiver)

The following items are only needed for M7300 Transceiver Board and RF High-Power Amplifier (HPA) Module removal and installation:

- Thermal Heat-Transfer Compound: Dow Chemical 340 or equivalent
- ESD-Safe Temperature Controlled Soldering Iron/Station
- Solder and 1/4-Inch Solder Wick

12.2 REMOVING THE PK BOARD

Follow this procedure to remove the PK Board:

1. Lay the radio on a flat ESD-safe surface, in a top-up position. See Figure 12-1.
2. Using a T15 Torx screwdriver, loosen the four (4) screws securing the top cover to the radio. These are captive-type screws, so complete removal from the cover is not required.
3. Lift and remove the cover (with screws and gasket) off of the radio chassis.
4. Unplug the cables mated to connectors J802, J804, J805, and J806 of the PK Board. See Figure 12-2.
5. If the radio is equipped with the optional GPS receiver module, loosen and remove the screw that secures the module, then lift it up to unplug it from connector J901 of the PK Board. The module is not shown in Figure 12-2.
6. Using a T10 Torx screwdriver, loosen and remove the two (2) screws securing the audio amplifier IC (IC905) and the 5-volt regulator IC (IC908) to the radio chassis.
7. Using a T10 Torx screwdriver, loosen and remove the ten (10) screws securing the PK Board to the radio chassis. If the radio is equipped with the optional GPS receiver module, there are nine (9) screws and one (1) hex standoff which must be removed; in this case, also loosen and remove this stand-off.
8. Carefully lift and remove the PK Board from the chassis. The 40-pin board-to-board connector on the bottom of the board must be carefully disengaged from the connector of the RF Processor Board.

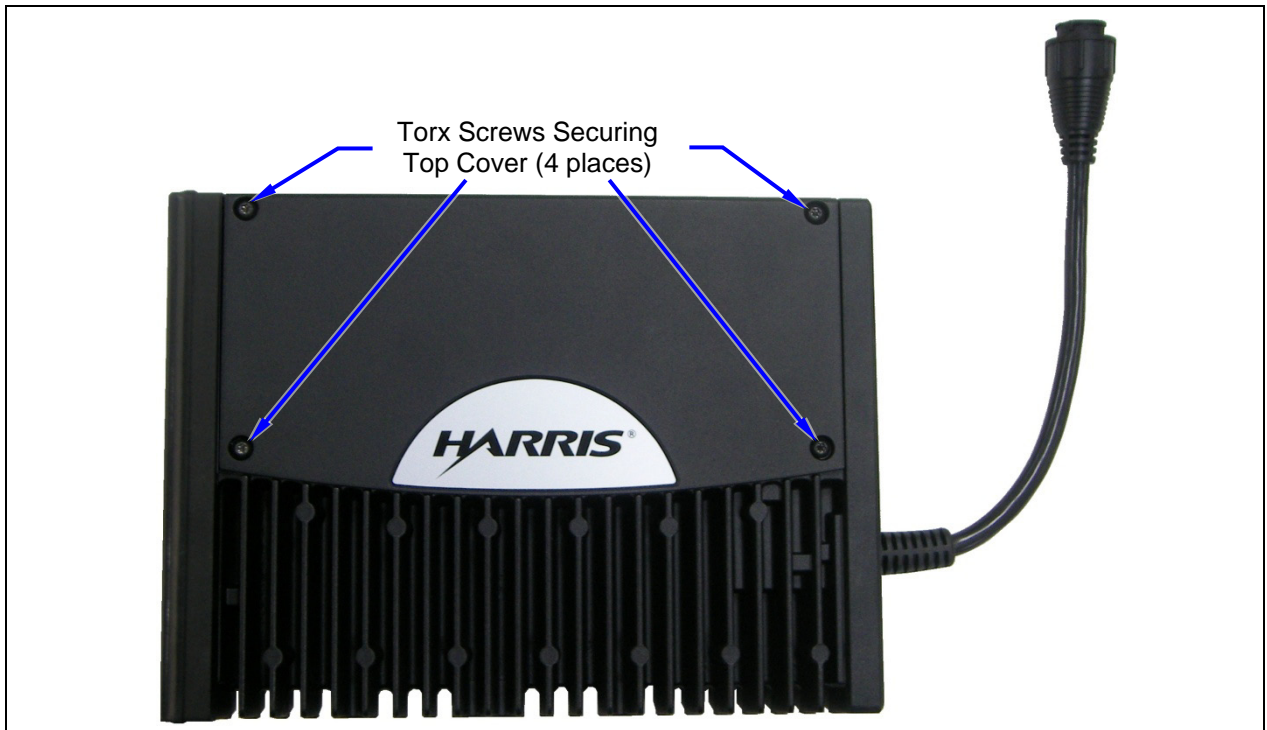


Figure 12-1: Removing the Top Cover

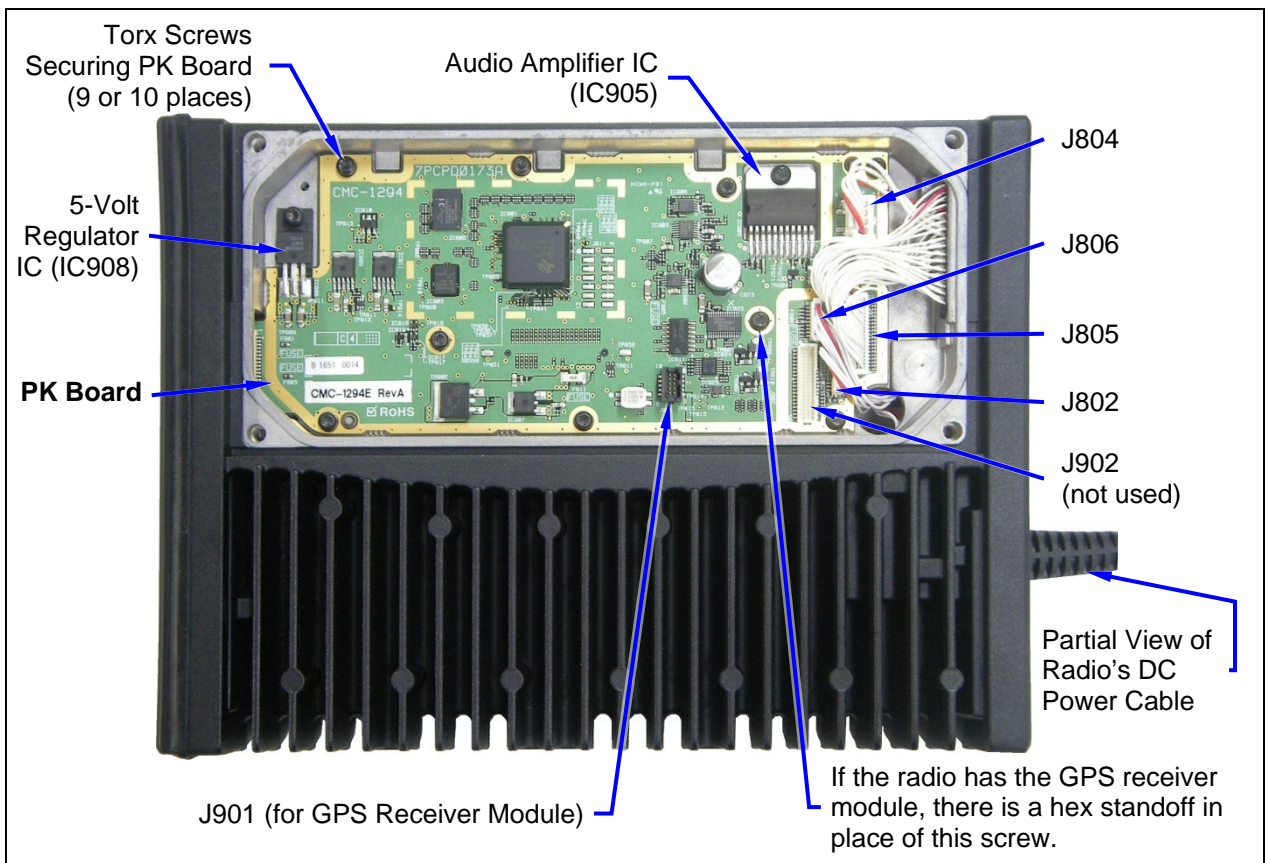


Figure 12-2: PK Board Removal

12.3 INSTALLING THE PK BOARD

Follow this procedure to install a PK Board into the radio chassis:

1. Obtain a replacement PK Board. Refer to Table 8-4 which begins on page 20 as necessary.
2. Lay the radio on a flat ESD-safe surface, in a top-up position.
3. Verify the upper cavity of the chassis is completely clear of any foreign material such as loose screws, dirt, dust, etc. Clean and/or vacuum it as necessary.
4. Carefully lay the PK Board into the chassis so the 40-pin board-to-board connector on the bottom of the board smoothly mates to the connector of the RF Processor Board. Connector mating should be sensed and the board should lay completely flat on the floor of the casting. Thermal compound/grease on the two ICs that mount to the chassis (IC905 and IC908) is not required.
5. Start but do not tighten all ten T10 Torx-head screws into the threaded holes of the chassis. Be sure to use the correct screws, as screws that are too long will damage the RF Processor Board in the opposite cavity of the chassis. **The correct screws are between 9 and 10 millimeters long.**
6. Start but do not tighten a T10 Torx-head screw in each of the two ICs that mount to the chassis (IC905 and IC908). **The correct screws are between 9 and 10 millimeters long.**
7. Using a T10 Torx bit and a torque driver, torque the two (2) screws nearest to the center of the board first, and then torque the remaining eight (8) screws around the perimeter of the board. Torque all ten (10) screws to 7.4 inch-pounds (8.5 kg/cm).
8. Torque the two (2) screws securing the ICs to the chassis to 7.4 inch-pounds (8.5 kg/cm).
9. At the rear of the radio, mate the four cables to the corresponding header connectors on the PK Board. Refer to Figure 12-2 as necessary.
10. Verify the top cover's perimeter gasket is in good condition and embedded into the groove in the interior side of the cover.
11. Place the top cover (with screws and gasket) on to the top of the radio.
12. Using a T15 bit and torque driver, tighten the cover's four (4) screws to 10.4 inch-pounds (12 kg/cm). Use an "X" pattern torque pattern sequence.

12.4 REMOVING THE RF PROCESSOR BOARD AND PA MODULE

Follow this procedure to remove the radio's RF Processor Board:

1. Lay the radio on a flat ESD-safe surface, in a bottom-up position. See Figure 12-3.
2. Using a T15 Torx screwdriver, loosen the four (4) captive screws securing the bottom cover to the radio. These are captive-type screws, so complete removal from the cover is not required.
3. Lift and remove the cover (with screws and gasket) off of the radio chassis.
4. Near the rear of the chassis, carefully unsolder the two (2) red wires from the two feed-through capacitors. See Figure 12-5. These two wires are soldered to pads P701 (the "IGNITION" switched power DC input) and P702 (the "A+" main power DC input) of the PK Board.
5. Using a T10 Torx screwdriver, loosen and remove the thirty (30) screws securing the two (2) die-cast shields.
6. Carefully lift and remove the two die-cast shields from the chassis.
7. Unsolder the center terminal of the antenna connector. Avoid damaging the pad or components of the board.

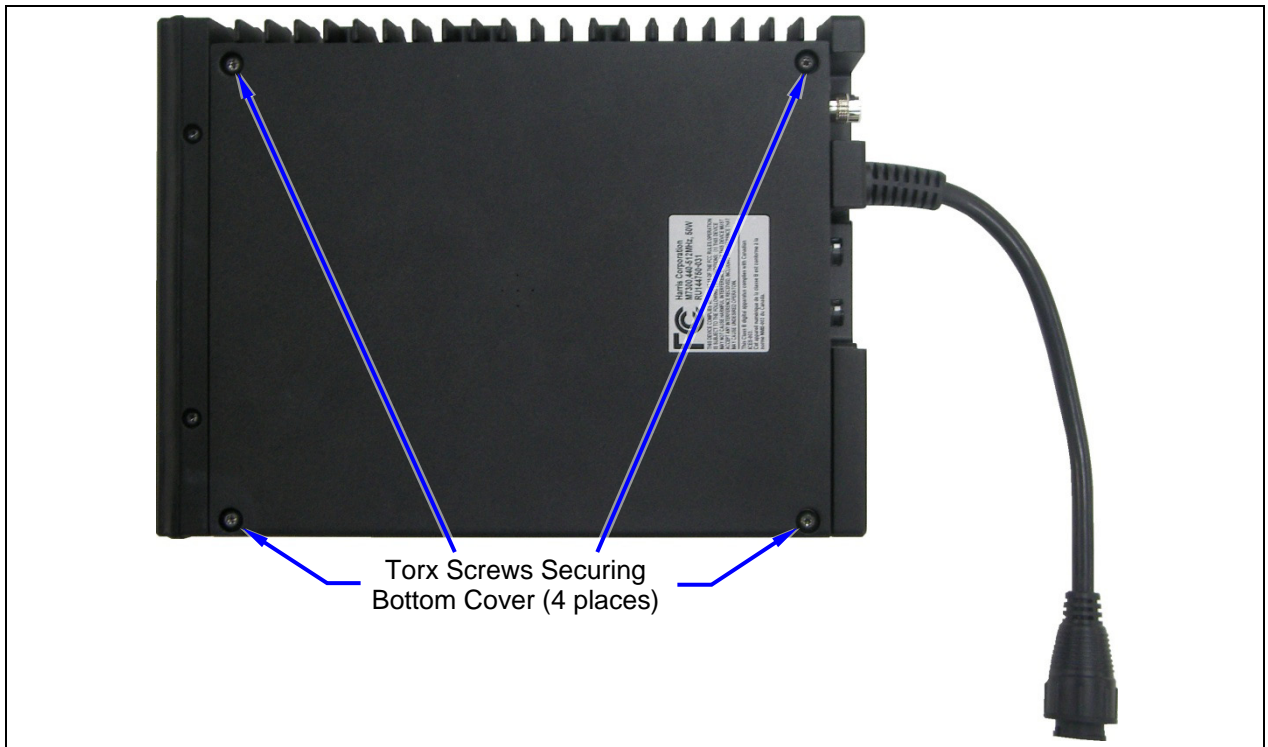


Figure 12-3: Removing the Bottom Cover

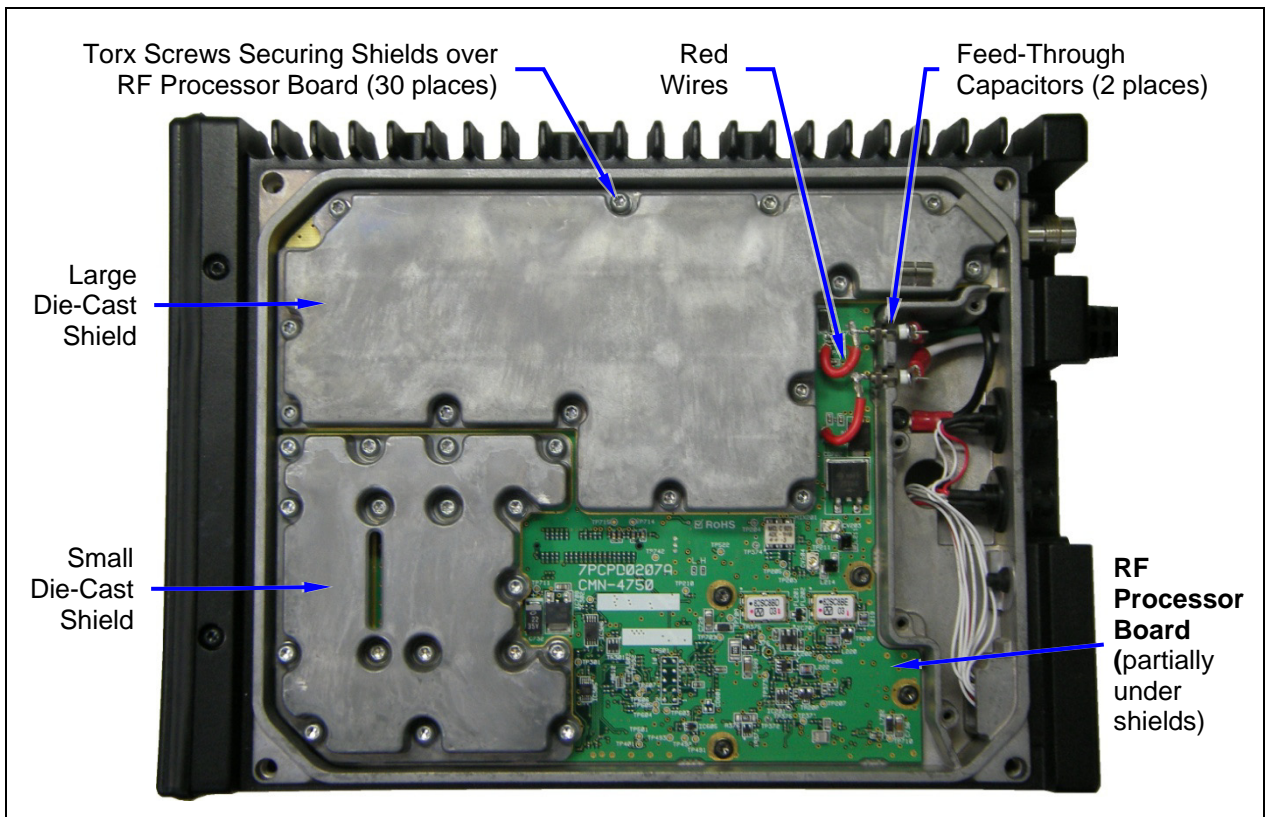


Figure 12-4: Removing the RF Processor Board

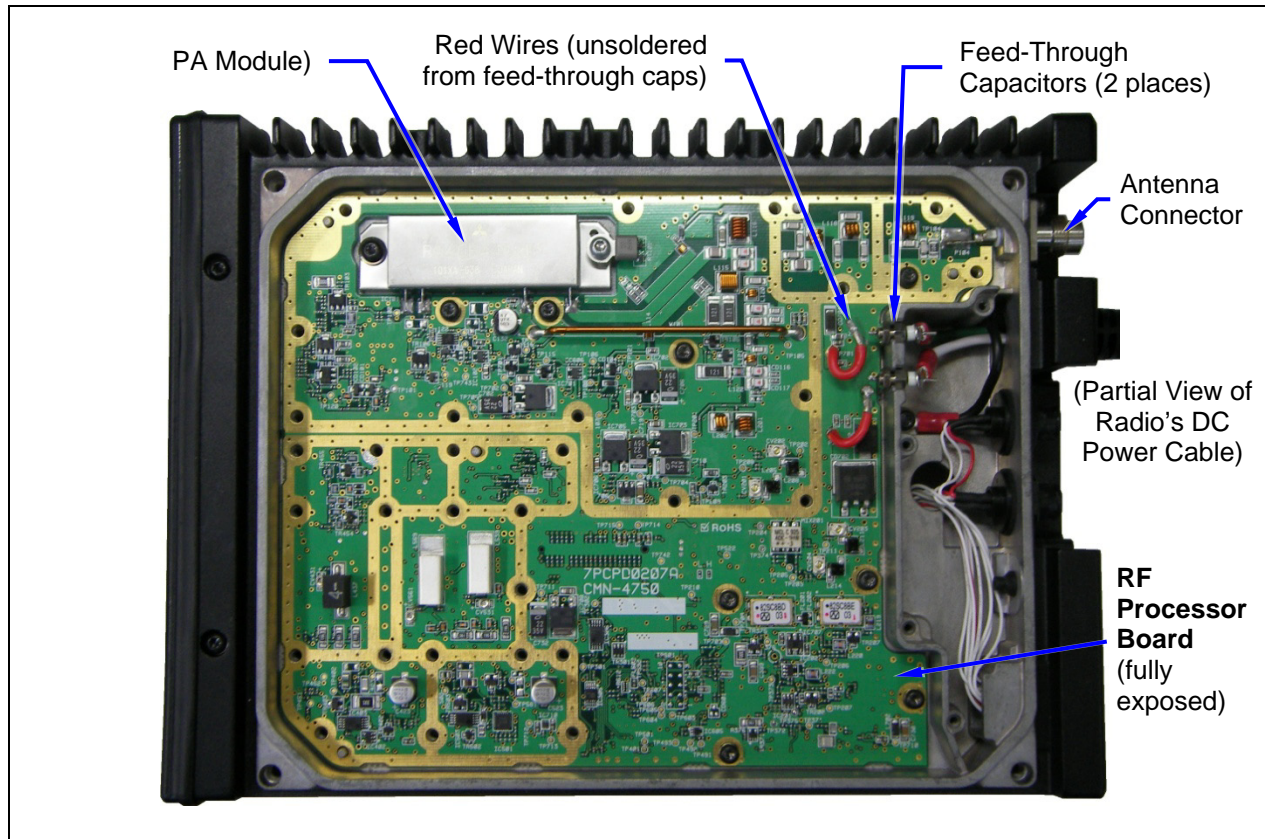


Figure 12-5: Removing the RF Processor Board

8. Remove the two (2) screws securing the antenna connector to the chassis, and then carefully slide the connector out of the chassis.
9. Carefully unsolder the four (4) leads of the PA module. Use caution as to not damage the board's pads or components.
10. Loosen and remove the two (2) screws that secure the PA module to the chassis, then lift and remove the module from the chassis.
11. Loosen and remove the remaining eight (8) screws securing the board to the chassis.
12. Carefully lift and remove the RF Processor Board from the chassis. The 40-pin board-to-board connector on the bottom of the board must be carefully disengaged from the connector of the PK Board.

12.5 INSTALLING THE RF PROCESSOR BOARD AND PA MODULE

Follow this procedure to install a RF Processor Board into the radio chassis. The PA module is a part of this board:

1. Obtain a replacement RF Processor Board. Refer to Table 8-4 which begins on page 20 as necessary.
2. Lay the radio on a flat ESD-safe surface, in a bottom-up position.
3. Verify the lower cavity of the chassis is completely clear of any foreign material such as loose screws, dirt, dust, etc. Clean and/or vacuum it as necessary.

4. Carefully apply a thin layer of thermal compound/grease to the bottom surface of the PA module. Avoid bending the leads of the module, as to not stress the leads or the respective pads of the printed circuit board.



NOTE

The board may be supplied separately from the module. In this case, install the board into the radio chassis first, and then install the module. Before installing the large RF shield, be sure to solder the leads of the module to the respective pads on the board.

5. Carefully lay the RF Processor Board into the chassis so the 40-pin board-to-board connector on the bottom of the board smoothly mates to the connector of the PK Board. Connector mating should be sensed and the board should lay completely flat on the floor of the casting.
6. Start but do not tighten eight (8) **10-millimeter-long** T10 Torx-head screws into the threaded holes of the chassis. For the locations of these holes, refer to Figure 12-5 (i.e., screws are shown installed in the figure). Be sure to use the correct screws, as screws that are too long will damage the PK Board in the opposite cavity of the chassis.
7. Install a **9-millimeter-long** T10 Torx-head screw into the hole in the metal tab of the RF PA module closest to the front corner of the board/radio.
8. Install a **13-millimeter-long** screw and spacer at the hole in the metal tab of the RF PA module closest to the rear of the board/radio. This screw also secures the temperature-sensing thermistor (RT101). The spacer must be located between the metal tabs of the module and thermistor.
9. Torque these ten (10) screws to 7.4 inch-pounds (8.5 kg/cm).
10. Carefully install the antenna connector into its hole in the rear panel and secure it to the rear panel using two (2) screws. Torque these two screws to 4.3 inch-pounds (5.0 kg/cm).
11. Solder the center terminal of the antenna connector to the respective pad of the RF Processor Board. **Use great care to avoid damaging board pads, traces, and all board components!**
12. Carefully lay the two (2) die-cast shields into the casting.
13. To secure the shields, first start but do not tighten all thirty (30) **13 millimeter-long** T10 Torx-head screws. Be sure to use the correct screws, as screws that are too long will damage the PK Board in the opposite cavity of the chassis.
14. Torque these thirty (30) screws to 7.4 inch-pounds (8.5 kg/cm).
15. Carefully solder the two red wires to the feed-through capacitors. As illustrated in Figure 12-4, these two wires should not be crossed. The wire soldered pad P701 is the “IGNITION” switched power DC input. The wire soldered to pad P702 is the “A+” main power DC input.
16. Verify the bottom cover’s perimeter gasket is in good condition and embedded into the groove in the interior side of the cover.
17. Place the bottom cover (with screws and gasket) on to the bottom of the radio.
18. Using a T15 bit and torque driver, tighten the cover’s four (4) screws to 10.4 inch-pounds (12 kg/cm). Use an “X” pattern torque pattern sequence.

13 GPS RECEIVER FIELD UPGRADE KIT

M5300/M7300 GPS Receiver Field Upgrade Kit KT-015605-001 is available which includes a GPS receiver module, software, and an installation manual. This optional kit allows an M5300 or M7300 mobile radio that was not originally equipped with the GPS receiver option to be upgraded in the field with an internal GPS receiver. Refer to the kit's installation manual, publication number MM-015617-001 for installation instructions.

The kit can also be ordered via part number KT-012350-001. This kit does not include the installation manual. Otherwise, it is the same as kit KT-015605-001.

To order a kit, contact the Customer Care center using the contact information included in Section 6 of this manual.

14 RADIO CONNECTOR PIN-OUTS

14.1 9-PIN I/O CONNECTOR (SERIAL PORT CONNECTOR)

The 9-pin D-subminiature (DB-9) connector on the rear panel of the radio is a multi-purpose TIA/EIA/RS-232C serial port. Its pin-out is included in Table 14-1 below. It is also shown in the radio's internal interconnection diagram on page 146.

This serial port is used during radio programming operations. In this manual, see Sections 10.2 and 10.3 for details. Radio programming information, including cable hook-up diagrams, is also included in RPM's built-in help.

This serial port can also be used for connection to optional serially-interfaced equipment such as a computer/laptop running Mobile Data Terminal (MDT) software. For connections details, refer to the radio's *Installation and Product Safety Manual*, publication MM-014763-001.

In addition, this port is used for diagnostic testing performed at the factory.

Table 14-1: 9-Pin I/O Connector Pin-Out

PIN	SIGNAL NAME	DESCRIPTION
1	DCD_A	RS-232 Data-Carrier-Detect output
2	TD_A	RS-232 Transmit-Data output
3	RD_A	RS-232 Receive-Data input
4	DSR_A	RS-232 Data-Set-Ready input
5	GND	RS-232 signal ground/reference
6	DTR_A	RS-232 Data-Terminal Ready output
7	CTS_A	RS-232 Clear-To-Send input
8	RTS_A	RS-232 Ready-To-Send output
9	RI_A	RS-232 Ring Indicator output

14.2 44-PIN I/O CONNECTOR (OPTION/ACCESSORY CONNECTOR)

The 44-pin D-subminiature (DB-44) connector of the rear panel of the radio is a connection point for optional inputs and outputs. The pin-out for this connector and the respective connectors of Option Cable 14002-0174-01 (formerly CA-012349-001) are included in the following table. It is also shown in the radio's internal interconnection diagram on page 146.

Table 14-2: 44-Pin I/O Connector Pin-Out

PIN	SIGNAL NAME	OPTION CABLE 14002-0174-01 (or CA-012349-001)	DESCRIPTION
19	SPKR1	P2 pin 1	Speaker Audio Outputs 1 and 2. This differential speaker output is not used in a remote-mount radio installation with a CH-721 control head. However, in a front-mount radio installation, and in a remote-mount radio installation with an HHC-731 hand-held controller, this output drives the radio installation's external speaker.
20	SPKR1		
21	SPKR2	P2 pin 2	
22	SPKR2		
10	OUT2	P3 pin 1	Digital Output 2 (open-collector, 100 mA / 17 V maximum). External pull-up resistor needed if required by the external device's input during the high/off state. Use P3 pin 2 or 4 for ground. For ECP, configure via the "External Output Control Line 2" in Radio Personality Manager's (RPM's) External I/O dialog box. For example, an external logging recorder's record enable/disable input can be controlled by setting "External Output Control Line 2" to "Extern. Tx Indicator."
7	GND	P3 pins 2 & 4	Chassis Ground. Over-current-protected by a fuse on radio's PK Board.
26	HKSW	P3 pin 3	Digital Input for Hookswitch (default) or for radio PTT. Active = Ground. Inactive = Open.
25	INP2	P3 pin 5	Digital Input 2. Active = Ground. Inactive = Open. Use P3 pin 2 or 4 for ground. For ECP, configure via the "Auxiliary Input 2" in Radio Personality Manager's (RPM's) External I/O dialog Box.
28	SWA+	P3 pin 6	Switched A+ (DC Power) Output.
8	GND	P4 pin 1	Chassis Ground. Over-current-protected by a fuse on radio's PK Board.
30	DGPS_DATA	P4 pin 4	GPS Receiver Module DGPS Correction Data Serial Data Input (NMEA-Formatted).
4	EXTRX	P4 pin 5	External Rx Audio Input (from external/2 nd receiver; summed).
9	EXTMOD	P4 pin 7	External Tx Audio Input (typically not used).

Table 14-2: 44-Pin I/O Connector Pin-Out

PIN	SIGNAL NAME	OPTION CABLE 14002-0174-01 (or CA-012349-001)	DESCRIPTION
3	SDATA	P4 pin 8	In a front-mount M5300/M7300 radio installation, this pin for the siren/PA interface is the siren serial data output (open-collector/open-drain) from the radio's mounted (local) CH-721. It serially transfers siren and light control data from the CH-721 to a connected third-party siren and light system (e.g., Federal Signal SS2000 SmartSiren). Data rate = 1200 bps. Connects to SS2000's DB-9 pin 3. For a remote-mount radio installation, see footnote ³ .
5	FDISC	P4 pin 9	Buffered Filtered Discriminator Audio Output (typically not used). A fixed-level audio output with DC bias. Approximately 200 mV rms into a 600-ohm load at rated deviation. Does <u>not</u> contain signaling (e.g., CTCSS). Mutes when speaker mutes. Use a 33 μ F / 50 V (or greater) AC-coupling capacitor to couple to a 600-ohm load. Use P4 pin 12 for ground.
13	ALO	P4 pin 10	In a front-mount M5300/M7300 radio installation, this 600-ohm AC-coupled differential audio output from the mounted (local) CH-721 is typically not used. In a remote-mount M5300/M7300 radio installation, these two pins of the radio's DB-44 connector are not functional.
12	MICHI	P4 pin 11	
1	EXTALO	P4 pin 12	In a front-mount M5300/M7300 radio installation, VOLHI (a single-ended AC-coupled audio signal) and EXTALO (signal ground) provide public address (PA) mic audio from the mounted (local) CH-721 to a siren and light system, such as the Federal Signal SS2000 SmartSiren. Pin 13 connects to SS2000's DB-9 pin 5. Pin 12 connects to SS2000's DB-9 pin 6. For a remote-mount radio installation, these two pins can provide an unmuted volume-level-controlled single-ended audio signal to external devices. P1 pin 1 is over-current protected by a fuse on radio's PK Board.
14	VOLHI	P4 pin 13	
15	CTLON	P4 pin 14	Control-On Digital Input for data-only radio on/off power control.
16	XTONEENC	P4 pin 15	External Tone Encode Audio Input (default) or Auxiliary Mic Audio Input.
17	XTONEDEC	P4 pin 16	External Tone Decode Audio Output.
6	EXTALO	P4 pin 17	Reference/Ground for external audio. Over-current protected by a fuse on radio's PK Board.
24	HORNRING	P4 pin 18	In a front-mount M5300/M7300 radio installation, this pin for the siren/PA interface is the horn/ring logic input to the radio's mounted (local) CH-721. When a connected third-party siren and light system (e.g., Federal Signal SmartSiren SS2000) has its horn/ring function active, this input is used to signal the head/radio as such. Connects to SS2000's DB-9 pin 8. For a remote-mount radio installation, see footnote ³ .

³ In a remote-mount M5300/M7300 mobile radio installation, this pin on the radio's DB-44 connector is typically not used. For the CH-721 control head, use the respective pin on the CH-721 Option Cable's female DB-25 pin connector. For the HHC-731 hand-held controller, use the respective pin on the HHC-731 Interface Cable's female DB-25 connector.

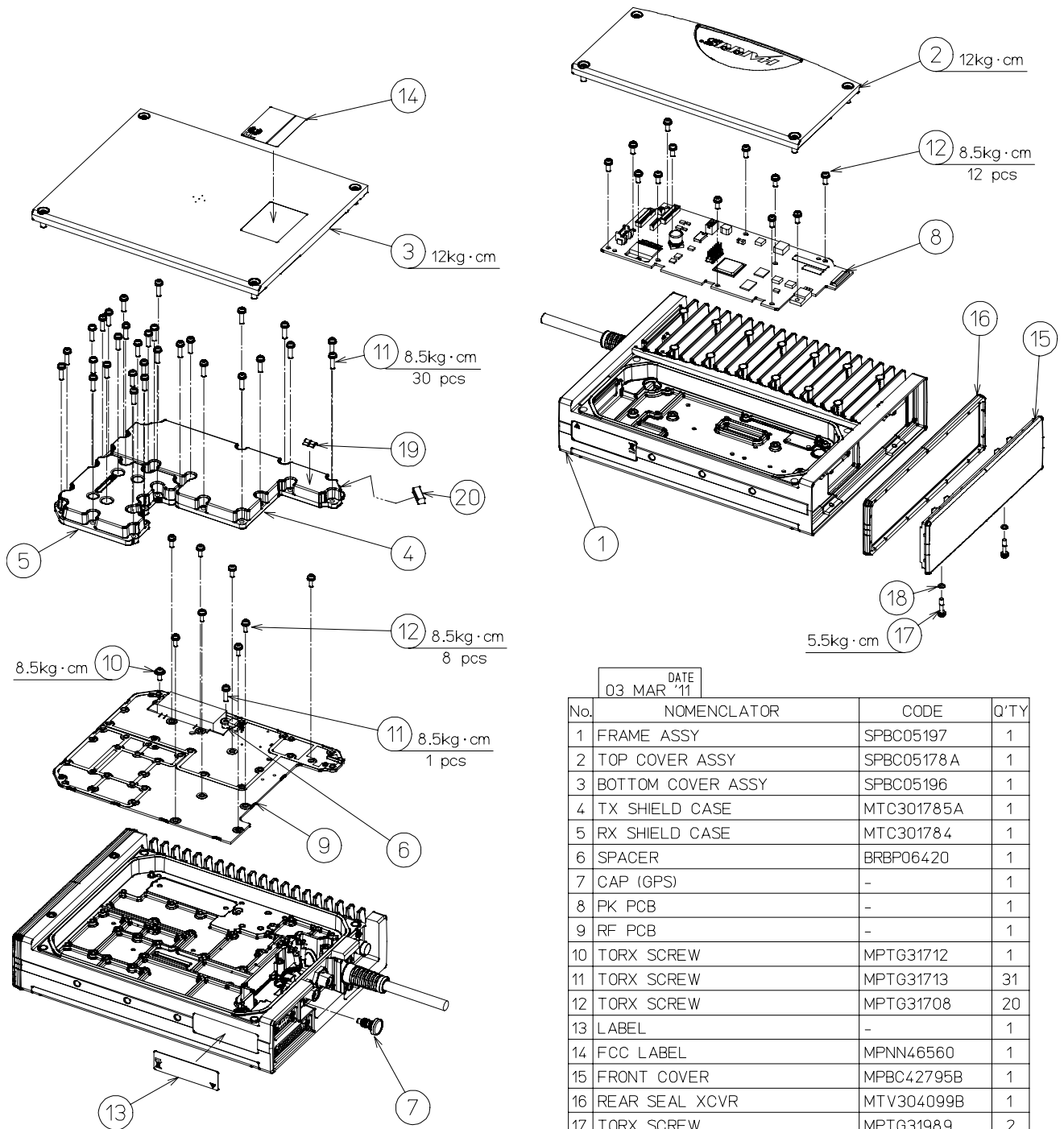
Table 14-2: 44-Pin I/O Connector Pin-Out

PIN	SIGNAL NAME	OPTION CABLE 14002-0174-01 (or CA-012349-001)	DESCRIPTION
23	SONOFF	P4 pin 19	In a front-mount M5300/M7300 radio installation, this pin for the siren/PA interface is the siren on/off logic output (open-collector) from the radio's mounted (local) CH-721. It is the signal that powers the connected third-party siren and light system (e.g., Federal Signal SmartSiren SS2000) on and off. Connects to SS2000's DB-9 pin 4. For a remote-mount radio installation, see footnote ³ .
18	INP1	P4 pin 21	Digital Input 1. Active = Ground. Inactive = Open. Use P4 pin 1 for ground. For ECP, configure via the "Auxiliary Input 1" in Radio Personality Manager's (RPM's) External I/O dialog Box.
2	OUT1	P4 pin 22	Digital Output 1 (open-collector, 100 mA / 17 V maximum). External pull-up resistor needed if required by the external device's input during the high/off state. Use P4 pin 1 for ground. For ECP, configure via the "External Output Control Line 1" in Radio Personality Manager's (RPM's) External I/O dialog Box.
29	TXENB+	P4 pin 23	Transmit Enable B+ Output (open-collector, 100 mA / 17 V maximum). Radio transmitting = low/on. Radio not transmitting = high/off. External pull-up resistor needed if required by the external device's input during the high/off state. Use P4 pin 1 for ground. Typically, this output is not used.
27	EXTMIC	P4 pin 24	External/Auxiliary Mic Audio Input. Fixed-level audio input (i.e., input gain is not adjustable). Approximately 120 mV rms gives full-rated deviation. Use P4 pin 17 for ground.
28	SWA+	P4 pin 25	Switched A+ DC Power Output. Typically, this output is not used.
32	GPS_NMEA_RX	P5 pin 2	NMEA-Formatted GPS Receiver Position Data Serial Data Output.
31	GPS_NMEA_TX	P5 pin 3	NMEA-Formatted GPS Receiver Module Initialization Data Serial Data Input.
7	GND	P5 pin 5	Ground for GPS Serial Data Signals. Over-current-protected by a fuse on radio's PK Board.
11	IGNITION	Yellow Wire	Unused/Spare ignition sense input.
33 — 44	—	(no connections)	These twelve pins of the 44-pin connector on the rear of the radio are not used/not connected when the Option Cable is connected to it.

15 ASSEMBLY DIAGRAMS

15.1 EXPLODED VIEWS

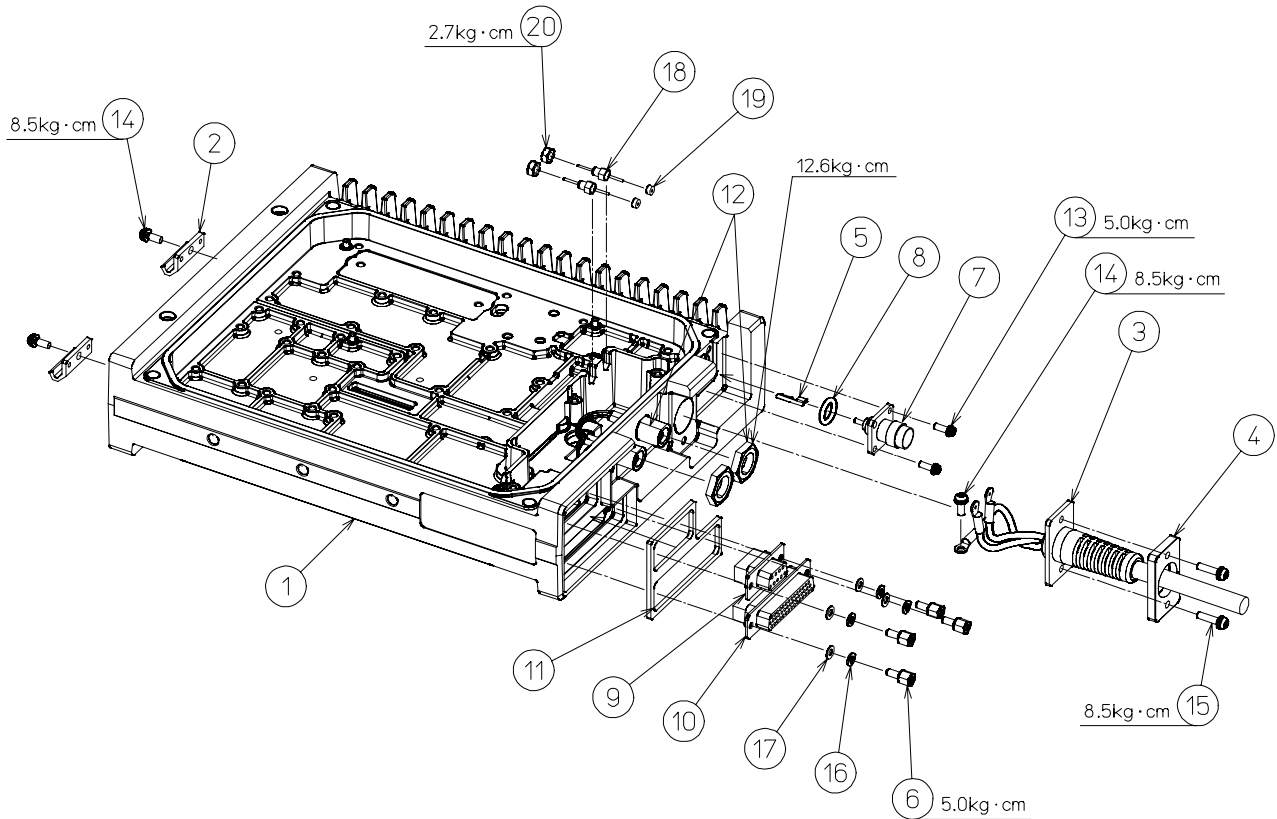
15.1.1 Final Assembly Exploded Views



DATE		NOMENCLATOR	CODE	Q'TY
No.				
1	03 MAR '11	FRAME ASSY	SPBC05197	1
2		TOP COVER ASSY	SPBC05178 A	1
3		BOTTOM COVER ASSY	SPBC05196	1
4		TX SHIELD CASE	MTC301785A	1
5		RX SHIELD CASE	MTC301784	1
6		SPACER	BRBP06420	1
7		CAP (GPS)	-	1
8		PK PCB	-	1
9		RF PCB	-	1
10		TORX SCREW	MPTG31712	1
11		TORX SCREW	MPTG31713	31
12		TORX SCREW	MPTG31708	20
13		LABEL	-	1
14		FCC LABEL	MPNN46560	1
15		FRONT COVER	MPBC42795B	1
16		REAR SEAL XCVR	MTV304099B	1
17		TORX SCREW	MPTG31989	2
18		PLAIN WASHER	BRTG00339	2
19		SHIELD FINGER	MPSR30651	1
20		SHIELD GASKET	MPPK31589	1

(SDJHM5046-0101, Rev. 20110303)

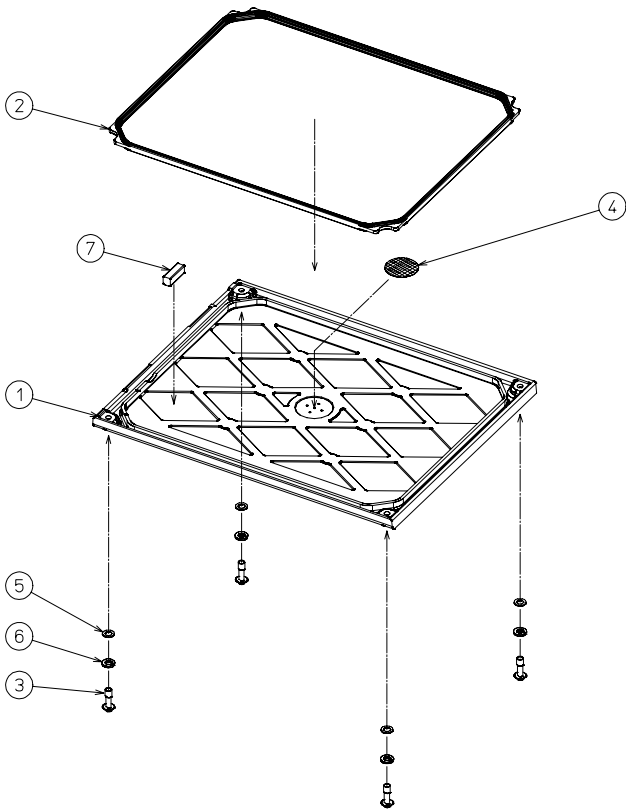
15.1.2 Frame Sub-Assembly Exploded View



No.	NOMENCLATOR	CODE	Q'TY
1	CHASSIS	MTC301782	1
2	BRACKET	MTV300093	2
3	PIGTAIL CABLE	-	1
4	CLAMP	-	1
5	ANTENNA BRACKET	-	1
6	SCREW LOCK	MTL322391	4
7	ANTENNA CONNECTOR	-	1
8	O-RING	MPPK01858	1
9	DB9 CONNECTOR	-	1
10	DB44 CONNECTOR	-	1
11	GASKET	MTZ303709	1
12	CAN CONNECTOR	-	2
13	TORX SCREW	MPTG31709	2
14	TORX SCREW	MPTG31708	3
15	TORX SCREW	MPTG31984	2
16	SPRING LOCK WASHER	BSSW03000S	4
17	PRAIN WASHER	BSLW03000R	4
18	FEEDTHROUGH TYPE CERAMIC CAPACITOR	-	2
19	SPACER	BRBP07139	2
20	HEX NUT	-	2

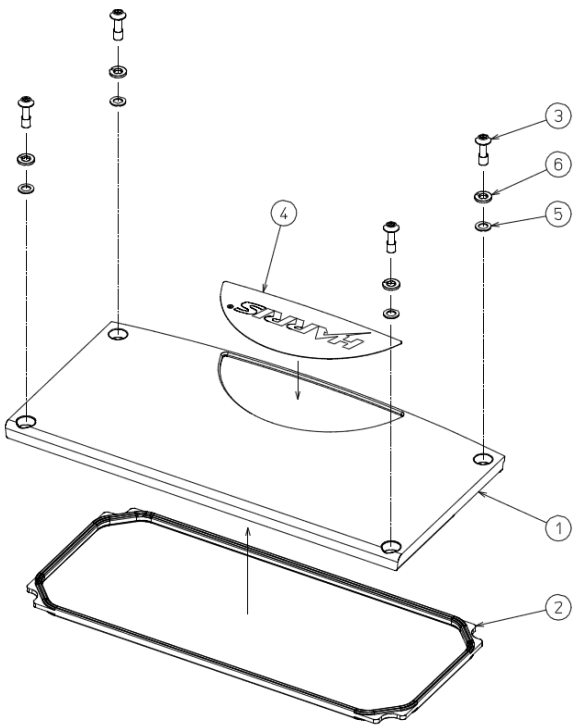
DATE
03 MAR '11

15.1.3 Bottom and Top Cover Assemblies Exploded Views



No.	NOMENCLATOR	CODE	Q'TY
1	BOTTOM COVER	MTC301589B	1
2	GASKET	-	1
3	TORX SCREW	MPTG31710	4
4	VENT FILTER	BRPK05034	1
5	PLAIN WASHER	MPTG31711	4
6	SPRING LOCK WASHER	BRTG09206	4
7	SHIELD GASKET	MPPK31589	1

DATE
03 MAR '11



No.	NOMENCLATOR	CODE	Q'TY
1	TOP COVER	MTC301588	1
2	GASKET	-	1
3	TORX SCREW	MPTG31710	4
4	LOGO LABEL	MPNM35816	1
5	PLAIN WASHER	MPTG31711	4
6	SPRING LOCK WASHER	BRTG09206	4

DATE
30 SEP '09

16 PARTS LISTS

16.1 PK BOARD

PK BOARD

(CMC-1294E Rev. B/MDCW11220)

SYMBOL	DESCRIPTION
	----- CAPACITORS -----
C801	0.01 uF; similar to Murata GRM155B11E103KA01D.
C802	0.01 uF; similar to Murata GRM155B11E103KA01D.
C803	0.01 uF; similar to Murata GRM155B11E103KA01D.
C804	0.01 uF; similar to Murata GRM155B11E103KA01D.
C805	0.01 uF; similar to Murata GRM155B11E103KA01D.
C806	0.01 uF; similar to Murata GRM155B11E103KA01D.
C809	0.01 uF; similar to Murata GRM155B11E103KA01D.
C810	0.01 uF; similar to Murata GRM155B11E103KA01D.
C811	0.01 uF; similar to Murata GRM155B11E103KA01D.
C812	0.01 uF; similar to Murata GRM155B11E103KA01D.
C813	0.01 uF; similar to Murata GRM155B11E103KA01D.
C814	0.01 uF; similar to Murata GRM155B11E103KA01D.
C815	0.01 uF; similar to Murata GRM155B11E103KA01D.
C816	0.01 uF; similar to Murata GRM155B11E103KA01D.
C817	0.01 uF; similar to Murata GRM155B11E103KA01D.
C818	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C819	9 pF; similar to Taiyo Yuden UMK105CH090DV-F.
C820	0.01 uF; similar to Murata GRM155B11E103KA01D.
C821	10 uF; similar to Murata GRM31CR61C106KA88L.
C822	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C823	0.01 uF; similar to Murata GRM155B11E103KA01D.
C824	0.01 uF; similar to Murata GRM155B11E103KA01D.
C825	0.01 uF; similar to Murata GRM155B11E103KA01D.
C826	0.01 uF; similar to Murata GRM155B11E103KA01D.
C830	0.1 uF; similar to Murata GRM155B11A104KA01D.
C831	0.22 uF; similar to Murata GRM188B11A224KA01D.
C832	0.01 uF; similar to Murata GRM155B11E103KA01D.
C833	22 pF; similar to Taiyo Yuden UMK105CH220JV-F.
C834	18 pF; similar to Taiyo Yuden UMK105CH180JV-F.
C835	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C836	18 pF; similar to Taiyo Yuden UMK105CH180JV-F.
C837	0.01 uF; similar to Murata GRM155B11E103KA01D.
C838	0.01 uF; similar to Murata GRM155B11E103KA01D.
C839	0.01 uF; similar to Murata GRM155B11E103KA01D.
C840	0.01 uF; similar to Murata GRM155B11E103KA01D.

SYMBOL	DESCRIPTION
C841	0.01 uF; similar to Murata GRM155B11E103KA01D.
C842	0.01 uF; similar to Murata GRM155B11E103KA01D.
C843	0.01 uF; similar to Murata GRM155B11E103KA01D.
C844	0.01 uF; similar to Murata GRM155B11E103KA01D.
C845	10 uF; similar to Murata GRM31CR61C106KA88L.
C846	0.1 uF; similar to Murata GRM155B11A104KA01D.
C847	10 uF; similar to Murata GRM31CR61C106KA88L.
C848	0.1 uF; similar to Murata GRM155B11A104KA01D.
C849	0.01 uF; similar to Murata GRM155B11E103KA01D.
C851	10 uF; similar to Murata GRM31CR61C106KA88L.
C852	0.1 uF; similar to Murata GRM155B11A104KA01D.
C853	470 pF; similar to Taiyo Yuden UMK105BJ471KV-F.
C854	0.1 uF; similar to Murata GRM155B11A104KA01D.
C855	4.7 uF; similar to Murata GRM21BB31E475KA75L.
C856	0.1 uF; similar to Murata GRM155B11A104KA01D.
C857	4.7 uF; similar to Murata GRM21BB31E475KA75L.
C858	1 uF; similar to Taiyo Yuden LMK105BJ105KV-F.
C859	10 pF; similar to Murata GRM1552C1H100JZ01D.
C860	1 uF; similar to Taiyo Yuden LMK105BJ105KV-F.
C861	0.1 uF; similar to Murata GRM155B11A104KA01D.
C862	0.01 uF; similar to Murata GRM155B11E103KA01D.
C863	0.1 uF; similar to Murata GRM155B11A104KA01D.
C864	4.7 uF; similar to Murata GRM21BB31E475KA75L.
C865	0.1 uF; similar to Murata GRM155B11A104KA01D.
C866	0.1 uF; similar to Murata GRM155B11A104KA01D.
C867	47 pF; similar to Murata GRM1552C1H470JZ01D.
C868	0.01 uF; similar to Murata GRM155B11E103KA01D.
C869	0.47 uF; similar to Murata GRM155B30J474KE18D.
C870	0.22 uF; similar to Murata GRM188B11A224KA01D.
C871	0.22 uF; similar to Murata GRM188B11A224KA01D.
C872	0.1 uF; similar to Murata GRM188B11E104KA01D.
C873	220 uF; similar to NIPON CHEMI-CON EMVH350ADA221MJA0G.
C874	22 uF; similar to Murata GRM32EB31E226KE15L.
C875	0.01 uF; similar to Murata GRM155B11E103KA01D.
C876	0.1 uF; similar to Murata GRM155B11A104KA01D.
C878	2.2 uF; similar to Murata GRM21BB31E225KA75L.
C879	0.01 uF; similar to Murata GRM155B11E103KA01D.
C882	1800 pF; similar to Murata GRM188B11H182KA01D.
C883	0.01 uF; similar to Murata GRM155B11E103KA01D.
C884	0.01 uF; similar to Murata GRM155B11E103KA01D.
C885	2200 pF; similar to Murata GRM155B11H222KA01D.

SYMBOL	DESCRIPTION
C886	0.01 uF; similar to Murata GRM155B11E103KA01D.
C887	0.1 uF; similar to Murata GRM188B11E104KA01D.
C888	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C889	4.7 uF; similar to Murata GRM21BB31E475KA75L.
C890	22 uF; similar to Taiyo Yuden EMK325BJ226MM-T.
C892	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C893	0.1 uF; similar to Murata GRM155B11A104KA01D.
C894	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C895	0.01 uF; similar to Murata GRM155B11E103KA01D.
C896	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C897	0.33 uF; similar to Murata GRM319B11E334KA01D.
C898	0.1 uF; similar to Murata GRM155B11A104KA01D.
C899	10 uF; similar to Murata GRM31CR61C106KA88L.
C900	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C901	0.01 uF; similar to Murata GRM155B11E103KA01D.
C902	0.33 uF; similar to Murata GRM319B11E334KA01D.
C903	4.7 uF; similar to Murata GRM21BB31E475KA75L.
C905	0.1 uF; similar to Murata GRM155B11A104KA01D.
C906	0.1 uF; similar to Murata GRM155B11A104KA01D.
C907	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C908	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C909	0.33 uF; similar to Murata GRM319B11E334KA01D.
C910	4.7 uF; similar to Murata GRM21BB31E475KA75L.
C911	0.1 uF; similar to Murata GRM188B11E104KA01D.
C912	0.1 uF; similar to Murata GRM188B11E104KA01D.
C913	1 uF; similar to Taiyo Yuden LMK105BJ105KV-F.
C914	0.01 uF; similar to Murata GRM155B11E103KA01D.
C920	0.1 uF; similar to Murata GRM188B11E104KA01D.
C921	0.1 uF; similar to Murata GRM188B11E104KA01D.
C922	10 uF; similar to Murata GRM31CR61C106KA88L.
C923	0.1 uF; similar to Murata GRM188B11E104KA01D.
C924	0.1 uF; similar to Murata GRM188B11E104KA01D.
C925	0.1 uF; similar to Murata GRM188B11E104KA01D.
C926	0.01 uF; similar to Murata GRM155B11E103KA01D.
C927	0.01 uF; similar to Murata GRM155B11E103KA01D.
C928	0.01 uF; similar to Murata GRM155B11E103KA01D.
C929	0.01 uF; similar to Murata GRM155B11E103KA01D.
C930	0.01 uF; similar to Murata GRM155B11E103KA01D.
C931	0.01 uF; similar to Murata GRM155B11E103KA01D.
C932	0.01 uF; similar to Murata GRM155B11E103KA01D.
C933	0.01 uF; similar to Murata GRM155B11E103KA01D.

SYMBOL	DESCRIPTION
C934	0.01 uF; similar to Murata GRM155B11E103KA01D.
C935	0.01 uF; similar to Murata GRM155B11E103KA01D.
C936	0.01 uF; similar to Murata GRM155B11E103KA01D.
C937	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C938	0.01 uF; similar to Murata GRM155B11E103KA01D.
C939	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C941	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C943	0.1 uF; similar to Murata GRM155B11A104KA01D.
C944	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C945	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C946	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C947	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C948	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C951	0.01 uF; similar to Murata GRM155B11E103KA01D.
C952	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C953	0.01 uF; similar to Murata GRM155B11E103KA01D.
C954	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C955	0.01 uF; similar to Murata GRM155B11E103KA01D.
C956	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C957	0.1 uF; similar to Murata GRM155B11A104KA01D.
C959	0.01 uF; similar to Murata GRM155B11E103KA01D.
C960	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C961	0.01 uF; similar to Murata GRM155B11E103KA01D.
C962	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C966	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C967	0.01 uF; similar to Murata GRM155B11E103KA01D.
C968	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C969	0.01 uF; similar to Murata GRM155B11E103KA01D.
C970	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C971	0.01 uF; similar to Murata GRM155B11E103KA01D.
C972	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C973	0.01 uF; similar to Murata GRM155B11E103KA01D.
C974	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C975	0.01 uF; similar to Murata GRM155B11E103KA01D.
C976	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C977	0.01 uF; similar to Murata GRM155B11E103KA01D.
C978	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C979	0.01 uF; similar to Murata GRM155B11E103KA01D.
C980	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C981	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C982	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.

SYMBOL	DESCRIPTION
C983	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C984	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C985	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C986	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C987	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C988	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C989	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C990	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C991	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C992	0.01 uF; similar to Murata GRM155B11E103KA01D.
C993	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C994	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C995	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C998	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1121	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1122	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1123	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1124	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1125	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1126	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1127	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1128	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1129	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1130	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1131	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1132	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1133	0.1 uF; similar to Murata GRM188B11E104KA01D.
C1134	0.1 uF; similar to Murata GRM188B11E104KA01D.
C1135	0.1 uF; similar to Murata GRM188B11E104KA01D.
C1136	0.1 uF; similar to Murata GRM188B11E104KA01D.
C1137	0.1 uF; similar to Murata GRM188B11E104KA01D.
C1138	10 uF; similar to Murata GRM31CR61C106KA88L.
C1148	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1149	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1150	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1151	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1152	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1153	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1154	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1155	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1156	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.

SYMBOL	DESCRIPTION
C1158	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1159	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1160	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1161	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1162	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1163	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1164	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1165	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1166	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C1170	0.01 uF; similar to Murata GRM155B11E103KA01D.
C1171	0.01 uF; similar to Murata GRM155B11E103KA01D.
C1172	0.01 uF; similar to Murata GRM155B11E103KA01D.
C1173	0.1 uF; similar to Murata GRM188B11E104KA01D.
----- DIODES -----	
CD805	Similar to Toshiba DF2S24FS(TPL3).
CD806	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD807	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD808	Similar to Toshiba DF2S24FS(TPL3).
CD809	Similar to Toshiba DF2S24FS(TPL3).
CD810	Similar to Toshiba DF2S24FS(TPL3).
CD811	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD812	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD813	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD814	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD815	Similar to Toshiba DF7A6.8CFU(TE85L_F).
CD816	Similar to Toshiba DF2S24FS(TPL3).
CD817	Similar to Toshiba DF2S24FS(TPL3).
----- FUSES -----	
F801	1.0 Amp; similar to MASTUO KAB3202 102NA 29 010.
F803	1.0 Amp; similar to MASTUO KAB3202 102NA 29 010.
F804	1.0 Amp; similar to MASTUO KAB3202 102NA 29 010.
F805	1.0 Amp; similar to MASTUO KAB3202 102NA 29 010.
F806	1.0 Amp; similar to MASTUO KAB3202 102NA 29 010.
F808	1.0 Amp; similar to MASTUO KAB3202 102NA 29 010.
F810	3.15 Amp; similar to MASTUO KAB2402 322 NA31010.
F811	5 Amp; similar to Littelfuse 0453005.MR.
----- INTEGRATED CIRCUITS -----	
IC801	Similar to Texas Instruments OMAP5910JZDY2.
IC802	Similar to SPANSION S29WS128J0PBFW000A.
IC803	Similar to CYPRESS CY62167EV18LL-55BVXIT.

SYMBOL	DESCRIPTION
IC804	Similar to Texas Instruments SN74LVCH16652ADGGR.
IC805	Similar to Toshiba TC74VCX164245(EL_F).
IC806	Similar to Renesas HD74LV1G126ACME-E.
IC807	Similar to Renesas HD74LV2G32AUSE-E.
IC808	Similar to MICROCHIP MCP2515T-I/ST.
IC809	Similar to Texas Instruments SN65HVD251DR.
IC810	Similar to Toshiba TC74HCT32AF(EL_F).
IC811	Similar to Renesas RD74LVC32BFPEL-E.
IC812	Similar to Renesas HD74LV2G125AUSE-E.
IC813	Similar to Renesas HD74LV1G125ACME-E.
IC814	Similar to FAIRCHILD NC7SZ373P6X.
IC815	Similar to Renesas HD74LV1G125ACME-E.
IC817	Similar to Renesas HD74LV1G02ACME-E.
IC818	Similar to Renesas HD74LV1G08ACME-E.
IC819	Similar to RICOH R3112Q441C-TR-F.
IC820	Similar to Toshiba TC74HC244AF(EL_F).
IC821	Similar to SIPEX SP3238EEY-L/TR.
IC822	Similar to ETRON EM636165TS-7IG.
IC823	Similar to SIPEX SP3243EBEY-L.
IC824	Similar to Toshiba TC74VHC04FT-EL.
IC825	Similar to Renesas HD74LV2GT04AUSE-E.
IC901	Similar to Texas Instruments TLV320AIC26IRHBG4.
IC902	Similar to NJRC NJM3404AV(TE1)-#ZZZB.
IC903	Similar to NJRC NJM3403AV(TE1)-#ZZZB.
IC904	Similar to Toshiba TC7S66FU(TE85L_F).
IC905	Similar to STMICROELECTRONICS TDA7391. See Table 8-4 which begins on page 20 for Harris part number.
IC906	Similar to NJRC NJM3404AV(TE1)-#ZZZB.
IC907	Similar to Toshiba TA58M05F(TE16L1,NQ).
IC908	Similar to NJRC NJM7805FA-#ZZZB. See Table 8-4 which begins on page 20 for Harris part number.
IC909	Similar to NJRC NJM2887DL3(TE1)-#ZZZB.
IC910	Similar to RICOH R1130H181B-T1-F.
IC911	Similar to NJRC NJM2887DL3(TE1)-#ZZZB.
-----CONNECTOR-----	
J801	16-pin; similar to HIROSE FH12-16S-1SH(55).
J802	3-pin; similar to JST BM03B-SRSS-TB(LF)(SN).
J804	4-pin; similar to JST BM04B-XASS-TF(LF)(SN).
J805	40-pin; similar to JST BM40B-SRDS-G-TFC(LF)(SN).
J806	9-pin; similar to JST BM09B-SRSS-TB(LF)(SN).
J807	40-pin; similar to SUYIN 127150FA040G209ZR.

SYMBOL	DESCRIPTION
J901	14-pin; similar to SUYIN 127174MA010G200ZR.
J902	40-pin; similar to JST BM40B-SRDS-G-TFC(LF)(SN).
----- INDUCTORS -----	
L801	2.2 mH; similar to EPCOS B82790C0225N265.
L901	60 ohm at 100 MHz; similar to Murata BLM18PG600SN1D.
L902	60 ohm at 100 MHz; similar to Murata BLM18PG600SN1D.
----- RESISTORS -----	
R801	100 ohm; similar to Panasonic EXB28V101JX.
R802	100 ohm; similar to Panasonic EXB28V101JX.
R803	100 ohm; similar to Panasonic EXB28V101JX.
R804	100 ohm; similar to Panasonic EXB28V101JX.
R805	100 ohm; similar to Panasonic EXB28V101JX.
R806	100 ohm; similar to Panasonic EXB28V101JX.
R807	100 ohm; similar to Panasonic EXB28V101JX.
R808	51 ohm; similar to Panasonic EXB28V510JX.
R809	100 ohm; similar to Panasonic EXB28V101JX.
R810	33 ohm; similar to Panasonic EXB28V330JX.
R811	33 ohm; similar to Panasonic EXB28V330JX.
R812	33 ohm; similar to Panasonic EXB28V330JX.
R813	33 ohm; similar to Panasonic EXB28V330JX.
R814	33 ohm; similar to Panasonic EXB28V330JX.
R815	33 ohm; similar to Panasonic EXB28V330JX.
R816	33 ohm; similar to Panasonic EXB28V330JX.
R817	33 ohm; similar to Panasonic EXB28V330JX.
R818	33 ohm; similar to Panasonic EXB28V330JX.
R819	33 ohm; similar to Panasonic EXB28V330JX.
R820	33 ohm; similar to Panasonic EXB28V330JX.
R821	33 ohm; similar to Panasonic EXB28V330JX.
R822	33 ohm; similar to Panasonic EXB28V330JX.
R823	82 ohm; similar to Panasonic EXB28V820JX.
R824	82 ohm; similar to Panasonic EXB28V820JX.
R825	82 ohm; similar to Panasonic EXB28V820JX.
R826	82 ohm; similar to Panasonic EXB28V820JX.
R827	82 ohm; similar to Panasonic EXB28V820JX.
R828	82 ohm; similar to Panasonic EXB28V820JX.
R829	82 ohm; similar to Panasonic EXB28V820JX.
R830	82 ohm; similar to Panasonic EXB28V820JX.
R831	10k ohm; similar to Panasonic ERJ2GEJ103X.
R832	470 ohm; similar to Panasonic ERJ6GEYJ471V.
R833	10k ohm; similar to Panasonic ERJ2GEJ103X.

SYMBOL	DESCRIPTION
R834	470 ohm; similar to Panasonic ERJ6GEYJ471V.
R835	100 ohm; similar to Panasonic ERJ2GEJ101X.
R840	0 ohm; similar to Panasonic ERJ2GE0R00X.
R841	0 ohm; similar to Panasonic ERJ2GE0R00X.
R842	0 ohm; similar to Panasonic ERJ2GE0R00X.
R843	0 ohm; similar to Panasonic ERJ2GE0R00X.
R844	0 ohm; similar to Panasonic ERJ2GE0R00X.
R845	0 ohm; similar to Panasonic ERJ2GE0R00X.
R846	0 ohm; similar to Panasonic ERJ2GE0R00X.
R847	0 ohm; similar to Panasonic ERJ2GE0R00X.
R848	0 ohm; similar to Panasonic ERJ2GE0R00X.
R849	0 ohm; similar to Panasonic ERJ2GE0R00X.
R850	0 ohm; similar to Panasonic ERJ2GE0R00X.
R851	0 ohm; similar to Panasonic ERJ2GE0R00X.
R852	0 ohm; similar to Panasonic ERJ2GE0R00X.
R853	0 ohm; similar to Panasonic ERJ2GE0R00X.
R854	0 ohm; similar to Panasonic ERJ2GE0R00X.
R855	0 ohm; similar to Panasonic ERJ2GE0R00X.
R857	22k ohm; similar to Panasonic ERJ2GEJ223X.
R860	22k ohm; similar to Panasonic ERJ2GEJ223X.
R861	22k ohm; similar to Panasonic ERJ2GEJ223X.
R862	22k ohm; similar to Panasonic ERJ2GEJ223X.
R868	22k ohm; similar to Panasonic ERJ2GEJ223X.
R869	22k ohm; similar to Panasonic ERJ2GEJ223X.
R870	22k ohm; similar to Panasonic ERJ2GEJ223X.
R887	10k ohm; similar to Panasonic ERJ2GEJ103X.
R888	10k ohm; similar to Panasonic ERJ2GEJ103X.
R890	22k ohm; similar to Panasonic ERJ2GEJ223X.
R891	22k ohm; similar to Panasonic ERJ2GEJ223X.
R892	22k ohm; similar to Panasonic ERJ2GEJ223X.
R893	22k ohm; similar to Panasonic ERJ2GEJ223X.
R894	22k ohm; similar to Panasonic ERJ2GEJ223X.
R895	22k ohm; similar to Panasonic ERJ2GEJ223X.
R896	22k ohm; similar to Panasonic ERJ2GEJ223X.
R897	22k ohm; similar to Panasonic ERJ2GEJ223X.
R898	150 ohm; similar to Panasonic ERJ2GEJ151X.
R899	150 ohm; similar to Panasonic ERJ2GEJ151X.
R900	150 ohm; similar to Panasonic ERJ2GEJ151X.
R901	22k ohm; similar to Panasonic ERJ2GEJ223X.
R902	22k ohm; similar to Panasonic ERJ2GEJ223X.
R903	22k ohm; similar to Panasonic ERJ2GEJ223X.

SYMBOL	DESCRIPTION
R904	10k ohm; similar to Panasonic ERJ2GEJ103X.
R905	51 ohm; similar to Panasonic ERJ2GEJ510X.
R906	51 ohm; similar to Panasonic ERJ2GEJ510X.
R907	51 ohm; similar to Panasonic ERJ2GEJ510X.
R908	82 ohm; similar to Panasonic ERJ2GEJ820X.
R909	82 ohm; similar to Panasonic ERJ2GEJ820X.
R910	33 ohm; similar to Panasonic ERJ2GEJ330X.
R911	22k ohm; similar to Panasonic ERJ2GEJ223X.
R912	22k ohm; similar to Panasonic ERJ2GEJ223X.
R913	22k ohm; similar to Panasonic ERJ2GEJ223X.
R915	22k ohm; similar to Panasonic ERJ2GEJ223X.
R916	22k ohm; similar to Panasonic ERJ2GEJ223X.
R917	22k ohm; similar to Panasonic ERJ2GEJ223X.
R918	22k ohm; similar to Panasonic ERJ2GEJ223X.
R919	22k ohm; similar to Panasonic ERJ2GEJ223X.
R920	22k ohm; similar to Panasonic ERJ2GEJ223X.
R921	75 ohm; similar to HOKURIKUDENNKI CR10-750FV.
R922	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R923	22k ohm; similar to Panasonic ERJ2GEJ223X.
R924	22k ohm; similar to Panasonic ERJ2GEJ223X.
R925	22k ohm; similar to Panasonic ERJ2GEJ223X.
R926	22k ohm; similar to Panasonic ERJ2GEJ223X.
R927	22k ohm; similar to Panasonic ERJ2GEJ223X.
R928	22k ohm; similar to Panasonic ERJ2GEJ223X.
R929	10k ohm; similar to Panasonic ERJ2GEJ103X.
R932	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R933	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R934	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R935	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R936	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R939	22k ohm; similar to Panasonic ERJ2GEJ223X.
R940	22k ohm; similar to Panasonic ERJ2GEJ223X.
R942	22k ohm; similar to Panasonic ERJ2GEJ223X.
R944	47k ohm; similar to Panasonic ERJ2GEJ473X.
R945	1.5k ohm; similar to Panasonic ERJ2GEJ152X.
R946	10 ohm; similar to Panasonic ERJ2GEJ100X.
R947	10 ohm; similar to Panasonic ERJ2GEJ100X.
R949	22k ohm; similar to Panasonic ERJ2GEJ223X.
R951	82k ohm; similar to Panasonic ERJ2GEJ823X.
R952	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R953	22k ohm; similar to Panasonic ERJ2GEJ223X.

SYMBOL	DESCRIPTION
R954	47k ohm; similar to Panasonic ERJ2GEJ473X.
R955	100k ohm; similar to Panasonic ERJ2GEJ104X.
R957	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R958	470k ohm; similar to Panasonic ERJ2GEJ474X.
R959	22k ohm; similar to Panasonic EXB28V223JX.
R960	120 ohm; similar to Panasonic EXB28V121JX.
R961	120 ohm; similar to Panasonic EXB28V121JX.
R962	100k ohm; similar to Panasonic ERJ2GEJ104X.
R963	150k ohm; similar to Panasonic ERJ2GEJ154X.
R964	22k ohm; similar to Panasonic ERJ2GEJ223X.
R965	22k ohm; similar to Panasonic ERJ2GEJ223X.
R966	22k ohm; similar to Panasonic ERJ2GEJ223X.
R967	22k ohm; similar to Panasonic ERJ2GEJ223X.
R968	22k ohm; similar to Panasonic ERJ2GEJ223X.
R970	22k ohm; similar to Panasonic ERJ2GEJ223X.
R971	120 ohm; similar to Panasonic ERJ2GEJ121X.
R972	120 ohm; similar to Panasonic ERJ2GEJ121X.
R973	22k ohm; similar to Panasonic ERJ2GEJ223X.
R974	22k ohm; similar to Panasonic ERJ2GEJ223X.
R975	10k ohm; similar to Panasonic ERJ2GEJ103X.
R976	56k ohm; similar to Panasonic ERJ2GEJ563X.
R977	270k ohm; similar to Panasonic ERJ2GEJ274X.
R978	150k ohm; similar to Panasonic ERJ2GEJ154X.
R979	56k ohm; similar to Panasonic ERJ2GEJ563X.
R980	0 ohm; similar to Panasonic ERJ2GE0R00X.
R982	56k ohm; similar to Panasonic ERJ2GEJ563X.
R983	56k ohm; similar to Panasonic ERJ2GEJ563X.
R984	33k ohm; similar to Panasonic ERJ2GEJ333X.
R985	68k ohm; similar to Panasonic ERJ2GEJ683X.
R986	680 ohm; similar to Panasonic ERJ2GEJ681X.
R987	0 ohm; similar to Panasonic ERJ2GE0R00X.
R988	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R990	100 ohm; similar to Panasonic ERJ2GEJ101X.
R991	3.3K ohm; similar to Panasonic ERJ2GEJ332X.
R994	100 ohm; similar to Panasonic ERJ2GEJ101X.
R995	10k ohm; similar to Panasonic ERJ2GEJ103X.
R996	10 ohm; similar to Panasonic ERJ2GEJ100X.
R997	56k ohm; similar to Panasonic ERJ2GEJ563X.
R998	470k ohm; similar to Panasonic ERJ2GEJ474X.
R1100	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1101	22k ohm; similar to Panasonic ERJ2GEJ223X.

SYMBOL	DESCRIPTION
R1102	100k ohm; similar to Panasonic ERJ2GEJ104X.
R1103	24k ohm; similar to HOKURIKUDENNKI CR10-243FV.
R1104	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1105	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1106	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1107	33 ohm; similar to Panasonic EXB28V330JX.
R1108	33 ohm; similar to Panasonic EXB28V330JX.
R1109	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1110	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1112	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1113	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R1114	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R1115	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1116	22k ohm; similar to Panasonic EXB28V223JX.
R1120	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1121	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1124	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1130	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1131	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1132	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1133	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1136	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1137	22k ohm; similar to Panasonic EXB28V223JX.
R1138	22k ohm; similar to Panasonic EXB28V223JX.
R1139	10k ohm; similar to Panasonic ERJ2GEJ103X.
R1140	10k ohm; similar to Panasonic ERJ2GEJ103X.
R1142	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1143	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1144	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1145	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1146	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1147	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1148	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1149	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1150	0 ohm; similar to Panasonic ERJ2GE0R00X.
R1151	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1152	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1153	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1154	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1155	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1156	22k ohm; similar to Panasonic ERJ2GEJ223X.

SYMBOL	DESCRIPTION
R1157	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1158	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1159	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1160	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1161	22k ohm; similar to Panasonic ERJ2GEJ223X.
R1163	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1164	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1165	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1166	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1168	22k ohm; similar to Panasonic ERJ2GEJ223X.
----- TEST POINTS -----	
TP851 and TP852	HK-2; similar to MAC8 HK-2-S.
----- TRANSISTORS -----	
TR801	Similar to Toshiba 2SK1829(TE85L_F.
TR802	Similar to ROHM UMD2NTR.
TR803	Similar to ROHM QS6M3TR.
TR804	Similar to ROHM UMD2NTR.
TR805	Similar to Toshiba RN1304(TE85L_F.
TR806	Similar to ROHM UMG2NTR.
TR807	Similar to Toshiba 2SC2859-Y(TE85L_F.
TR808	Similar to NEC 2SC3736T1-AZ OK.
TR809	Similar to Toshiba 2SC2859-Y(TE85L_F.
TR810	Similar to NEC 2SC3736T1-AZ OK.
TR811 thru TR815	Similar to ROHM UMG2NTR.
TR816	Similar to Toshiba RN1304(TE85L_F.
TR901	Similar to ROHM UMG2NTR.
TR902	Similar to Renesas 2SJ553STR-E.
TR904	Similar to Toshiba 2SC2859-Y(TE85L_F.
TR905 thru TR911	Similar to ROHM UMD2NTR.
----- OSCILLATOR MODULES AND CYRSTAL -----	
X801	12.0 MHz; similar to CITIZEN CS20_12.000.000MABJT, or NDK NX1255GB-12MHZ-30PPM..
X802	32.768 kHz; similar to Epson Toyocom MC-306-32.768KHZ-12.5/2.
X803	40.0 MHz; similar to CITIZEN CS10_40.000.000MABJT or Epson Toyocom FA-365-40MHZ-18PF/50PPM-F.

16.2 RF PROCESSOR BOARD, 378 – 430 MHz

378 TO 430 MHz RF PROCESSOR BOARD

(CMN-4750L, Rev. 20110916)

SYMBOL	DESCRIPTION
-----CAPACITORS -----	
C101	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C102	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C103	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C104	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C105	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C106	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C107	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C108	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C109	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C110	5 pF; similar to Taiyo Yuden UMK105CH050CW-F.
C111	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C112	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C113	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C114	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C115	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C116	5 pF; similar to Taiyo Yuden UMK105CH050CW-F.
C117	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C118	180 pF; similar to Taiyo Yuden UMK105CH181JV-F.
C119	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C120	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C121	220 pF; similar to Taiyo Yuden UMK105CH221JV-F.
C122	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C123	(Not mounted.)
C124	(Not mounted.)
C125	6 pF; similar to Taiyo Yuden UMK105CH060DW-F.
C126	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C127	0.1 uF; similar to Murata GRM188R11E104KA01D.
C128	4 pF; similar to Taiyo Yuden UMK105CH040CW-F.
C129	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C130	(Not mounted.)
C131	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C132	47 uF; similar to Panasonic EEFEK1V470P.
C133	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C134	0.047 uF; similar to Murata GRM188R11H473KA61D.
C135	7 pF; similar to Murata GRM1882C1H7R0DZ01D.
C136	7 pF; similar to Murata GRM1882C1H7R0DZ01D.

SYMBOL	DESCRIPTION
C137	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C138	(Not mounted.)
C139	(Not mounted.)
C140	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C143	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C144	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C145	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C146	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C147	2.2 uF; similar to Taiyo Yuden EMK107BJ225KA-T.
C148	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C149	10 uF; similar to Taiyo Yuden EMK212BJ106KG-T.
C150	(Not mounted.)
C151	(Not mounted.)
C152	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C153	0.047 uF; similar to Murata GRM188R11H473KA61D.
C154	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C155	(Not mounted.)
C156	200 pF; similar to Murata GRM32N2C2H201JV01L.
C157	1000 pF; similar to Murata GRM31A7U2J102JW31D.
C158	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C159	200 pF; similar to Murata GRM32N2C2H201JV01L.
C160	(Not mounted.)
C161	(Not mounted.)
C162	(Not mounted.)
C163	1 pF; similar to Murata GRM31M4C2H1R0CY21L.
C164	1 pF; similar to Murata GRM31M4C2H1R0CY21L.
C165	2 pF; similar to Murata GRM31M4C2H2R0CY21L.
C166	4 pF; similar to Murata GRM31M2C2H4R0CY21L.
C167	4 pF; similar to Murata GRM31M2C2H4R0CY21L.
C168	4 pF; similar to Murata GRM31M2C2H4R0CY21L.
C169	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C170	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C171	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C172	6 pF; similar to Murata GRM31M2C2H6R0DV01L.
C173	6 pF; similar to Murata GRM2162C1H6R0DD01D.
C175	3 pF; similar to Murata GRM2193C2D3R0CY21D.
C176	1000 pF; similar to Murata GRM2192C2A102JA01D.
C177	1000 pF; similar to Murata GRM2192C2A102JA01D.
C178	1000 pF; similar to Murata GRM1882C1H102JA01D.
C179	1000 pF; similar to Murata GRM1882C1H102JA01D.
C180	4 pF; similar to Murata GRM1882C1H4R0CZ01D.

SYMBOL	DESCRIPTION
C181	(Not mounted.)
C183	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C184	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C185	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C186	0.01 uF; similar to Murata GRM188R11H103KA01D.
C187	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C188	(Not mounted.)
C189	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C190	(Not mounted.)
C191	(Not mounted.)
C192	(Not mounted.)
C193	(Not mounted.)
C194	(Not mounted.)
C195	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C196	0.1 uF; similar to Murata GRM188R11E104KA01D.
C197	1000 pF; similar to Murata GRM1882C1H102JA01D.
C198	(Not mounted.)
C199	0.01 uF; similar to Murata GRM188R11H103KA01D.
C201	27 pF; similar to Murata GRM1552C1H270FZ01D.
C202	15 pF; similar to Murata GRM1552C1H150FZ01D.
C203	7 pF; similar to Murata GRM1552C1H7R0FZ01D.
C204	47 pF; similar to Murata GRM1552C1H470FZ01D.
C205	27 pF; similar to Murata GRM1552C1H270FZ01D.
C206	18 pF; similar to Taiyo Yuden UMK105CH180JV-F.
C207	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C208	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C209	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C210	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C211	(Not mounted.)
C212	2.1 pF; similar to Murata GRM1553C1H2R1WA01D.
C213	1.3 pF; similar to Murata GRM1554C1H1R3WA01D.
C214	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C215	2.2 pF; similar to Murata GRM1553C1H2R2WA01D.
C216	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C217	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C218	2.2 pF; similar to Murata GRM1553C1H2R2WA01D.
C219	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C220	4.7 pF; similar to Murata GRM1552C1H4R7WA01D.
C221	1.3 pF; similar to Murata GRM1554C1H1R3WA01D.
C222	2.3 pF; similar to Murata GRM1553C1H2R3WA01D.
C223	0.01 uF; similar to Murata GRM155R11E103KA01D.

SYMBOL	DESCRIPTION
C224	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C225	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C226	0.01 uF; similar to Murata GRM155R11E103KA01D.
C227	0.01 uF; similar to Murata GRM155R11E103KA01D.
C228	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C229	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C230	18 pF; similar to Taiyo Yuden UMK105CH180JV-F.
C231	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C232	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C233	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C234	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C235	(Not mounted.)
C236	2.5 pF; similar to Murata GRM1553C1H2R5WA01D.
C237	2.7 pF; similar to Murata GRM1553C1H2R7WA01D.
C238	5.4 pF; similar to Murata GRM1552C1H5R4WA01D.
C239	2.5 pF; similar to Murata GRM1553C1H2R5WA01D.
C240	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C241	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C242	2.3 pF; similar to Murata GRM1553C1H2R3WA01D.
C243	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C244	4.6 pF; similar to Murata GRM1552C1H4R6WA01D.
C245	1.3 pF; similar to Murata GRM1554C1H1R3WA01D.
C246	2.2 pF; similar to Murata GRM1553C1H2R2WA01D.
C247	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C248	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C249	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C250	0.01 uF; similar to Murata GRM155R11E103KA01D.
C251	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C252	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C253	0.01 uF; similar to Murata GRM155R11E103KA01D.
C254	0.01 uF; similar to Murata GRM155R11E103KA01D.
C255	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C256	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C257	0.01 uF; similar to Murata GRM155R11E103KA01D.
C258	0.01 uF; similar to Murata GRM155R11E103KA01D.
C259	0.01 uF; similar to Murata GRM155R11E103KA01D.
C260	12 pF; similar to Murata GRM1552C1H120JZ01D.
C261	(Not mounted.)
C262	7 pF; similar to Murata GRM1552C1H7R0FZ01D.
C263	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C264	3 pF; similar to Murata GRM1553C1H3R0WA01D.

SYMBOL	DESCRIPTION
C265	0.01 uF; similar to Murata GRM155R11E103KA01D.
C266	0.01 uF; similar to Murata GRM155R11E103KA01D.
C267	0.01 uF; similar to Murata GRM155R11E103KA01D.
C268	(Not mounted.)
C269	0.01 uF; similar to Murata GRM155R11E103KA01D.
C270	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C271	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C272	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C273	0.01 uF; similar to Murata GRM155R11E103KA01D.
C274	0.01 uF; similar to Murata GRM155R11E103KA01D.
C275	0.01 uF; similar to Murata GRM155R11E103KA01D.
C276	(Not mounted.)
C277	15 pF; similar to Murata GRM1552C1H150JZ01D.
C278	(Not mounted.)
C279	0.01 uF; similar to Murata GRM155R11E103KA01D.
C280	0.01 uF; similar to Murata GRM155R11E103KA01D.
C281	0.01 uF; similar to Murata GRM155R11E103KA01D.
C282	0.01 uF; similar to Murata GRM155R11E103KA01D.
C283	0.01 uF; similar to Murata GRM155R11E103KA01D.
C284	15 pF; similar to Murata GRM1552C1H150JZ01D.
C285	0.01 uF; similar to Murata GRM155R11E103KA01D.
C286	10 pF; similar to Murata GRM1552C1H100JZ01D.
C287	0.01 uF; similar to Murata GRM155R11E103KA01D.
C288	0.01 uF; similar to Murata GRM155R11E103KA01D.
C289	0.01 uF; similar to Murata GRM155R11E103KA01D.
C290	(Not mounted.)
C291	18 pF; similar to Murata GRM1552C1H180JZ01D.
C292	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C293	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C294	0.01 uF; similar to Murata GRM155R11E103KA01D.
C295	0.01 uF; similar to Murata GRM155R11E103KA01D.
C297	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C298	0.047 uF; similar to Murata GRM155R11C473KA01D.
C299	0.01 uF; similar to Murata GRM155R11E103KA01D.
C301	10 uF; similar to Murata GRM31CR61C106KA88L.
C302	0.01 uF; similar to Murata GRM155R11E103KA01D.
C303	0.01 uF; similar to Murata GRM155R11E103KA01D.
C304	0.01 uF; similar to Murata GRM155R11E103KA01D.
C305	0.01 uF; similar to Murata GRM155R11E103KA01D.
C306	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C307	0.01 uF; similar to Murata GRM155R11E103KA01D.

SYMBOL	DESCRIPTION
C308	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C321	1 uF; similar to Taiyo Yuden LMK212BJ105KG-T.
C322	2200 pF; similar to Panasonic ECHU1C222JX5.
C323	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C324	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C325	2200 pF; similar to Panasonic ECHU1C222JX5.
C326	2200 pF; similar to Panasonic ECHU1C222JX5.
C328	2200 pF; similar to Panasonic ECHU1C222JX5.
C329	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C330	(Not mounted.)
C331	560 pF; similar to Murata GRM1552C1H561GA01D.
C332	220 pF; similar to Murata GRM1552C1H221GA01D.
C333	560 pF; similar to Murata GRM1552C1H561GA01D.
C334	220 pF; similar to Murata GRM1552C1H221GA01D.
C335	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C336	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C337	(Not mounted.)
C338	560 pF; similar to Murata GRM1552C1H561GA01D.
C339	220 pF; similar to Murata GRM1552C1H221GA01D.
C340	560 pF; similar to Murata GRM1552C1H561GA01D.
C341	220 pF; similar to Murata GRM1552C1H221GA01D.
C342	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C343	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C344	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C345	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C346	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C347	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C348	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C349	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C350	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C351	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C352	10 pF; similar to Murata GRM1552C1H100FZ01D.
C353	5 pF; similar to Murata GRM1552C1H5R0WA01D.
C354	4 pF; similar to Murata GRM1552C1H4R0BZ01D.
C355	9 pF; similar to Murata GRM1552C1H9R0FA01D.
C356	12 pF; similar to Murata GRM1552C1H120FZ01D.
C357	9 pF; similar to Murata GRM1552C1H9R0FA01D.
C358	10 pF; similar to Murata GRM1552C1H100FZ01D.
C359	1 pF; similar to Murata GRM1554C1H1R0BA01D.
C360	8 pF; similar to Murata GRM1552C1H8R0WA01D.
C361	2 pF; similar to Murata GRM1552C1H2R0BZ01D.

SYMBOL	DESCRIPTION
C362	7 pF; similar to Murata GRM1552C1H7R0BZ01D.
C363	6 pF; similar to Taiyo Yuden UMK105CH060DW-F.
C364	6 pF; similar to Taiyo Yuden UMK105CH060DW-F.
C365	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C371	4700 pF; similar to Panasonic ECHU1C472JX5.
C372	0.082 uF; similar to Panasonic ECHU1C823JX5.
C373	1000 pF; similar to Murata GRM1552C1H102JA01D.
C374	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C375	22 pF; similar to Murata GRM1552C1H220FZ01D.
C376	4 pF; similar to Murata GRM1552C1H4R0BZ01D.
C377	1.5 pF; similar to Murata GRM1554C1H1R5WA01D.
C378	0.01 uF; similar to Murata GRM155R11E103KA01D.
C379	0.01 uF; similar to Murata GRM155R11E103KA01D.
C380	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C381	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C382	22 pF; similar to Murata GRM1552C1H220FZ01D.
C383	39 pF; similar to Murata GRM1552C1H390FZ01D.
C384	47 pF; similar to Murata GRM1552C1H470FZ01D.
C385	2 pF; similar to Murata GRM1552C1H2R0BZ01D.
C386	0.01 uF; similar to Murata GRM155R11E103KA01D.
C387	18 pF; similar to Taiyo Yuden UMK105CH180JV-F.
C388	0.01 uF; similar to Murata GRM155R11E103KA01D.
C389	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C390	9 pF; similar to Taiyo Yuden UMK105CH090DV-F.
C391	27 pF; similar to Taiyo Yuden UMK105CH270JV-F.
C392	27 pF; similar to Taiyo Yuden UMK105CH270JV-F.
C397	0.01 uF; similar to Murata GRM155R11E103KA01D.
C398	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C399	10 uF; similar to Murata GRM31CR61C106KA88L.
C401	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C402	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C403	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C404	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C405	0.22 uF; similar to Murata GRM188R11C224KA01D.
C406	0.22 uF; similar to Murata GRM188R11C224KA01D.
C407	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C408	0.01 uF; similar to Panasonic ECHU1C103JX5.
C409	4.7 uF; similar to Nichicon F931C475MAA.
C410	10 uF; similar to Murata GRM31CR61C106KA88L.
C411	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C412	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C413	10 uF; similar to Murata GRM31CR61C106KA88L.
C414	0.68 uF; similar to Panasonic ECPU1C684MA5.
C415	0.022 uF; similar to Panasonic ECHU1C223JX5.
C416	0.1 uF; similar to Panasonic ECPU1C104MA5.
C417	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C418	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C419	0.047 uF; similar to Murata GRM188R11E473KA01D.
C421	0.01 uF; similar to Murata GRM155R11E103KA01D.
C422	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C423	220 uF; similar to Nippon Chemi-Con EMVY160ADA221MF80G.
C424	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C425	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C431	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C432	12 pF; similar to Murata GRM1552C1H120FZ01D.
C433	22 pF; similar to Murata GRM1552C1H220FZ01D.
C434	33 pF; similar to Murata GRM1552C1H330FZ01D.
C435	3.3 pF; similar to Murata GRM1553C1H3R3WA01D.
C436	7.2 pF; similar to Murata GRM1552C1H7R2WA01D.
C437	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C438	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C439	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C440	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C441	15 pF; similar to Murata GRM1552C1H150FZ01D.
C442	7 pF; similar to Murata GRM1552C1H7R0FZ01D.
C443	33 pF; similar to Murata GRM1552C1H220FZ01D.
C444	39 pF; similar to Murata GRM1552C1H390FZ01D.
C445	1 pF; similar to Murata GRM1554C1H1R0BA01D.
C446	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C447	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C448	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C451	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C452	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C453	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C454	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C455	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C456	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C457	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C458	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C459	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C460	12 pF; similar to Taiyo Yuden UMK105CH120JV-F.
C461	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C462	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C463	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C464	2.4 pF; similar to Murata GRM1553C1H2R4WA01D.
C465	5 pF; similar to Murata GRM1552C1H5R0WA01D.
C466	1 pF; similar to Murata GRM1554C1H1R0WA01D.
C467	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C468	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C469	2.5 pF; similar to Murata GRM1553C1H2R5WA01D.
C470	1 pF; similar to Murata GRM1554C1H1R0WA01D.
C471	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C472	2.1 pF; similar to Murata GRM1553C1H2R1WA01D.
C473	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C474	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C480	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C481	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C482	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C483	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C484	5 pF; similar to Murata GRM1552C1H5R0WA01D.
C485	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C486	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C487	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C491	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C492	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C493	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C494	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C495	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C496	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C497	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C501	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C502	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C503	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C504	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C505	0.22 uF; similar to Murata GRM188R11C224KA01D.
C506	0.22 uF; similar to Murata GRM188R11C224KA01D.
C507	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C508	4700 pF; similar to Panasonic ECHU1C472JX5.
C509	4.7 uF; similar to Nichicon F931C475MAA.
C510	10 uF; similar to Murata GRM31CR61C106KA88L.
C511	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C512	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C513	10 uF; similar to Murata GRM31CR61C106KA88L.

SYMBOL	DESCRIPTION
C514	0.68 uF; similar to Panasonic ECPU1C684MA5.
C515	0.022 uF; similar to Panasonic ECHU1C223JX5.
C516	0.1 uF; similar to Panasonic ECPU1C104MA5.
C517	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C518	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C519	0.047 uF; similar to Murata GRM188R11E473KA01D.
C521	0.01 uF; similar to Murata GRM155R11E103KA01D.
C522	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C523	220 uF; similar to Nippon Chemi-Con EMVY160ADA221MF80G.
C524	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C525	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C526	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C527	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C528	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C531	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C532	8 pF; similar to Murata GRM1552C1H8R0WA01D.
C533	18 pF; similar to Murata GRM1552C1H180FA01D.
C534	22 pF; similar to Murata GRM1552C1H220FZ01D.
C535	1.5 pF; similar to Murata GRM1554C1H1R5WA01D.
C536	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C537	6.5 pF; similar to Murata GRM1552C1H6R5WA01D.
C538	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C539	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C540	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C541	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C542	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C543	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C544	3.5 pF; similar to Murata GRM1553C1H3R5GA01D.
C545	12 pF; similar to Murata GRM1552C1H120FZ01D.
C546	12 pF; similar to Murata GRM1552C1H120FZ01D.
C547	1 pF; similar to Murata GRM1554C1H1R0CZ01D.
C548	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C549	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C550	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C551	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C552	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C561	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C562	10 pF; similar to Murata GRM1552C1H100FA01D.
C563	33 pF; similar to Murata GRM1552C1H330FZ01D.
C564	22 pF; similar to Murata GRM1552C1H220FZ01D.
C565	2 pF; similar to Murata GRM1554C1H2R0WA01D.

SYMBOL	DESCRIPTION
C566	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C567	8 pF; similar to Murata GRM1552C1H8R0WA01D.
C568	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C569	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C570	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C571	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C572	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C573	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C574	5 pF; similar to Murata GRM1552C1H5R0WA01D.
C575	18 pF; similar to Murata GRM1552C1H180FA01D.
C576	18 pF; similar to Murata GRM1552C1H180FA01D.
C577	1 pF; similar to Murata GRM1554C1H1R0CZ01D.
C578	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C579	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C581	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C582	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C583	5 pF; similar to Taiyo Yuden UMK105CH050CW-F.
C584	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C585	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C586	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C587	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C588	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C589	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C590	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C591	9 pF; similar to Taiyo Yuden UMK105CH090DV-F.
C592	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C593	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C594	12 pF; similar to Taiyo Yuden UMK105CH120JV-F.
C595	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C596	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C597	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C598	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C601	(Not mounted.)
C602	(Not mounted.)
C603	(Not mounted.)
C604	(Not mounted.)
C605	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C606	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C607	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C608	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C609	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.

SYMBOL	DESCRIPTION
C610	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C611	0.01 uF; similar to Murata GRM155R11E103KA01D.
C612	10 uF; similar to Murata GRM31CR61C106KA88L.
C613	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C614	(Not mounted.)
C615	(Not mounted.)
C616	(Not mounted.)
C620	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C621	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C622	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C623	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C624	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C625	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C626	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C627	0.1 uF; similar to Murata GRM188R11E104KA01D.
C628	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C629	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C630	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C631	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C632	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C633	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C634	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C635	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C636	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C637	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C638	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C639	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C640	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C641	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C642	(Not mounted.)
C643	(Not mounted.)
C644	(Not mounted.)
C645	(Not mounted.)
C646	(Not mounted.)
C647	(Not mounted.)
C648	(Not mounted.)
C649	(Not mounted.)
C650	0.01 uF; similar to Murata GRM155R11E103KA01D.
C651	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C652	0.01 uF; similar to Murata GRM155R11E103KA01D.
C653	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C654	(Not mounted.)
C701	0.33 uF; similar to Murata GRM219R71H334KA88D.
C702	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C703	0.01 uF; similar to Murata GRM155R11E103KA01D.
C704	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C705	0.33 uF; similar to Murata GRM219R71H334KA88D.
C706	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C707	0.01 uF; similar to Murata GRM155R11E103KA01D.
C708	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C709	0.33 uF; similar to Murata GRM219R71H334KA88D.
C710	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C711	0.01 uF; similar to Murata GRM155R11E103KA01D.
C712	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C713	0.33 uF; similar to Murata GRM219R71H334KA88D.
C714	10 uF; similar to Murata GRM31CR61C106KA88L.
C715	0.01 uF; similar to Murata GRM155R11E103KA01D.
C716	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C717	(Not mounted.)
C718	0.33 uF; similar to Murata GRM219R71H334KA88D.
C719	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C720	0.01 uF; similar to Murata GRM155R11E103KA01D.
C721	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C722	0.01 uF; similar to Murata GRM155R11E103KA01D.
C723	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C724	10 uF; similar to Murata GRM31CR61C106KA88L.
C725	0.01 uF; similar to Murata GRM155R11E103KA01D.
C726	0.22 uF; similar to Murata GRM188R11C224KA01D.
C727	0.01 uF; similar to Murata GRM155R11E103KA01D.
C728	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C729	10 uF; similar to Murata GRM31CR61C106KA88L.
C730	10 uF; similar to Murata GRM31CR61C106KA88L.
C731	0.33 uF; similar to Murata GRM219R71H334KA88D.
C732	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C733	0.01 uF; similar to Murata GRM155R11E103KA01D.
C734	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C735	10 uF; similar to Murata GRM31CR61C106KA88L.
C736	0.01 uF; similar to Murata GRM155R11E103KA01D.
C737	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.

SYMBOL	DESCRIPTION
C738	0.01 uF; similar to Murata GRM155R11E103KA01D.
C739	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C740	0.01 uF; similar to Murata GRM188R11H103KA01D.
C741	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C742	0.01 uF; similar to Murata GRM188R11H103KA01D.
C743	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C744	0.01 uF; similar to Murata GRM188R11H103KA01D.
C745	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C746	0.01 uF; similar to Murata GRM188R11H103KA01D.
C747	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C748	0.1 uF; similar to Murata GRM188R11H104KA93D.
C749	(Not mounted.)
C750	(Not mounted.)
C751	0.1 uF; similar to Murata GRM188R11H104KA93D.
C752	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C753	(Not mounted.)
C754	(Not mounted.)
C755	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C756	(Not mounted.)
C757	(Not mounted.)
C758	(Not mounted.)
C759	(Not mounted.)
C760	(Not mounted.)
C761	(Not mounted.)
C762	(Not mounted.)
C763	(Not mounted.)
C764	(Not mounted.)
C765	(Not mounted.)
C766	(Not mounted.)
C767	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C768	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C769	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C770	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C771	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C772	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C773	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C774	(Not mounted.)
C775	(Not mounted.)
C776	(Not mounted.)
C777	(Not mounted.)
C778	(Not mounted.)

SYMBOL	DESCRIPTION
C779	(Not mounted.)
C780	(Not mounted.)
C781	0.01 uF; similar to Murata GRM188R11H103KA01D.
C782	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C801	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C802	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C803	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C804	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C805	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C806	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C807	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C808	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C809	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C810	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C811	0.22 uF; similar to Murata GRM188R11C224KA01D.
C812	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C813	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C814	0.01 uF; similar to Murata GRM155R11E103KA01D.
C815	0.01 uF; similar to Murata GRM155R11E103KA01D.
C816	0.22 uF; similar to Murata GRM188B11C224KA01D.
C817	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C818	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C819	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C820	0.01 uF; similar to Murata GRM155R11E103KA01D.
C821	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C822	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C823	0.01 uF; similar to Murata GRM155R11E103KA01D.
C824	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C825	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C826	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C827	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C828	2200 pF; similar to Taiyo Yuden UMK105BJ222KV-F.
C829	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C830	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C831	180 pF; similar to Taiyo Yuden UMK105CH181JV-F.
C832	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C833	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C834	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C1101	1000 pF; similar to Murata GRM2192C2A102JA01D.
C1102	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1103	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C1110	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1111	(Not mounted.)
C1170	1000 pF; similar to Murata GRM2192C2A102JA01D.
C1171	1000 pF; similar to Murata GRM1882C1H102JA01D.
C1190	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1191	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1192	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1193	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1194	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1201	(Not mounted.)
C1240	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1241	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1301	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1302	(Not mounted.)
C1303	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C1350	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C1351	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C1352	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C1371	0.01 uF; similar to Murata GRM155R11E103KA01D.
C1372	(Not mounted.)
C1373	(Not mounted.)
C1375	(Not mounted.)
C1376	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1377	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1401	(Not mounted.)
C1402	(Not mounted.)
C1403	(Not mounted.)
C1404	(Not mounted.)
C1410	(Not mounted.)
C1411	(Not mounted.)
C1412	(Not mounted.)
C1421	(Not mounted.)
C1422	(Not mounted.)
C1431	2.2 pF; similar to Murata GRM1553C1H2R2WA01D.
C1433	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1434	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1437	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1452	(Not mounted.)
C1456	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1457	(Not mounted.)
C1458	4 pF; similar to Taiyo Yuden UMK105CH040CW-F.

SYMBOL	DESCRIPTION
C1459	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1460	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1491	(Not mounted.)
C1492	(Not mounted.)
C1493	(Not mounted.)
C1501	(Not mounted.)
C1502	(Not mounted.)
C1503	(Not mounted.)
C1504	(Not mounted.)
C1510	(Not mounted.)
C1511	(Not mounted.)
C1512	(Not mounted.)
C1521	(Not mounted.)
C1522	(Not mounted.)
C1523	(Not mounted.)
C1524	(Not mounted.)
C1525	(Not mounted.)
C1527	(Not mounted.)
C1534	18 pF; similar to Murata GRM1552C1H180FA01D.
C1535	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1564	18 pF; similar to Murata GRM1552C1H180FA01D.
C1565	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1566	(Not mounted.)
C1568	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C1569	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1570	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1740	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1741	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1780	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1801	(Not mounted.)
----- DIODES -----	
CD101	Similar to Avago HSMP-3864-TR1G.
CD102	Similar to Avago HSMP-3864-TR1G.
CD103	Similar to Renesas HSU88TRF-E.
CD104	Similar to Renesas HSM88ASTL-E.
CD105	Similar to Renesas HSM88ASTL-E.
CD106	Similar to Renesas HSM88ASTL-E.
CD110	(Not mounted.)
CD111	Similar to LITEC L709CER.
CD112	Similar to LITEC L709CER.
CD113	Similar to Toshiba 1SS302(TE85L_F).

SYMBOL	DESCRIPTION
CD114	Similar to LITEC L709CER.
CD115	Similar to LITEC L709CER.
CD116	Similar to LITEC L709CER.
CD117	Similar to LITEC L709CER.
CD118	(Not mounted.)
CD119	Similar to Renesas HSU88TRF-E.
CD201	Similar to Renesas HVC383BTRF-E.
CD202	Similar to Renesas RKS151KJ-P1.
CD203	Similar to Renesas RKS151KJ-P1.
CD204	Similar to Renesas HVC383BTRF-E.
CD205	Similar to Renesas HVC383BTRF-E.
CD206	Similar to Renesas RKS151KJ-P1.
CD207	Similar to Renesas RKS151KJ-P1.
CD208	Similar to Renesas HVC383BTRF-E.
CD209	Similar to Renesas HSM88ASTL-E.
CD210	Similar to Avago HSMP-3864-TR1G.
CD211	Similar to Avago HSMP-3864-TR1G.
CD371	Similar to Toshiba 1SV276(TPH3_F).
CD372	Similar to Toshiba 1SS381(TPH3_F).
CD401	Similar to NEC RD2.4S-T1-AT.
CD402	Similar to Renesas HSU88TRF-E.
CD431	Similar to Renesas HVC383BTRF-E.
CD432	Similar to Renesas HVC383BTRF-E.
CD433	Similar to Renesas HVC383BTRF-E.
CD434	Similar to Renesas HVC383BTRF-E.
CD435	Similar to Toshiba 1SS381(TPH3_F).
CD436	Similar to Toshiba 1SS381(TPH3_F).
CD437	Similar to Toshiba 1SS381(TPH3_F).
CD438	Similar to Toshiba 1SS381(TPH3_F).
CD461	Similar to Renesas HVC383BTRF-E.
CD462	Similar to Renesas HVC383BTRF-E.
CD463	Similar to Renesas HVC383BTRF-E.
CD464	Similar to Renesas HVC383BTRF-E.
CD501	Similar to NEC RD2.4S-T1-AT.
CD502	Similar to Renesas HSU88TRF-E.
CD531	Similar to Renesas HVC383BTRF-E.
CD532	Similar to Renesas HVC383BTRF-E.
CD533	Similar to Renesas HVC383BTRF-E.
CD534	Similar to Renesas HVC383BTRF-E.
CD535	Similar to Toshiba 1SS381(TPH3_F).
CD536	Similar to Toshiba 1SS381(TPH3_F).

SYMBOL	DESCRIPTION
CD537	Similar to Toshiba 1SS381(TPH3_F).
CD538	Similar to Toshiba 1SS381(TPH3_F).
CD539	Similar to Toshiba 1SS381(TPH3_F).
CD540	Similar to Toshiba 1SS381(TPH3_F).
CD561	Similar to Renesas HVC383BTRF-E.
CD562	Similar to Renesas HVC383BTRF-E.
CD563	Similar to Renesas HVC383BTRF-E.
CD564	Similar to Renesas HVC383BTRF-E.
CD565	Similar to Toshiba 1SS381(TPH3_F).
CD566	Similar to Toshiba 1SS381(TPH3_F).
CD567	Similar to Toshiba 1SS381(TPH3_F).
CD568	Similar to Toshiba 1SS381(TPH3_F).
CD569	Similar to Toshiba 1SS381(TPH3_F).
CD570	Similar to Toshiba 1SS381(TPH3_F).
CD601	(Not mounted.)
CD701	Similar to SHINDENGEN D1F60-5053.
CD702	Similar to SHINDENGEN DF25V60-5072.
CD801	Similar to TOKO KV1870STL-G.
CD1371	(Not mounted.)
CD1431	Similar to Toshiba 1SS381(TPH3_F).
CD1432	Similar to Toshiba 1SS381(TPH3_F).
----- VARIABLE CAPACITORS -----	
CV201	Similar to SANSIN TC03C030A-TP02.
CV202	Similar to SANSIN TC03C030A-TP02.
CV203	Similar to SANSIN TC03C030A-TP02.
CV204	Similar to SANSIN TC03C030A-TP02.
CV431	Similar to Murata TZY2Z100A001R00.
CV531	Similar to Murata TZY2Z100A001R00.
CV561	Similar to Murata TZY2Z100A001R00.
----- FILTERS -----	
FL201	Similar to NDK H-7XMPD0026.
FL202	Similar to NDK H-7XMPD0027.
FL601	Similar to Murata BLA2ABD601SN4D.
FL602	Similar to Murata BLM18BD601SN1D.
FL603	Similar to Murata BLM18BD601SN1D.
FL604	Similar to Murata BLM18BD601SN1D.
FL605	Similar to Murata BLM18BD601SN1D.
FL606	Similar to Murata BLM18BD601SN1D.
FL607	Similar to Murata BLA2ABD601SN4D.
FL608	Similar to Murata BLA2ABD601SN4D.
FL609	Similar to Murata BLM18BD601SN1D.

SYMBOL	DESCRIPTION
FL610	Similar to Murata BLM18BD601SN1D.
	-----INTEGRATED CIRCUITS-----
IC101	Similar to Mitsubishi RA60H3847M1-138. See Table 8-4 which begins on page 20 for Harris part number.
IC102	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC103	Similar to Toshiba TC4W53FU(TE12L_F).
IC201	Similar to Linear Technology LTC5507ES6#TRPBF.
IC202	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC301	Similar to AKM AK4386VT-E2.
IC302	Similar to CYPRESS H-7DLPD0023B.
IC303	Similar to Toshiba TC74VHC4040FK(EL,K).
IC304	Similar to Toshiba TC74VHC74FK(EL,K).
IC305	Similar to Analog Devices AD5304ARMZ-REEL7.
IC306	Similar to New JRC NJM3404AV(TE1)-#ZZZB.
IC321	Similar to New JRC NJM2746RB1(TE1)-#ZZZB.
IC322	Similar to New JRC NJM2746RB1(TE1)-#ZZZB.
IC323	Similar to New JRC NJM2746RB1(TE1)-#ZZZB.
IC324	Similar to Analog Devices ADL5385ACPZ-R7.
IC401	Similar to AKM AK1541-L.
IC402	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC403	Similar to New JRC NJM3404AV(TE1)-#ZZZB.
IC501	Similar to AKM AK1541-L.
IC502	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC503	Similar to New JRC NJM3404AV(TE1)-#ZZZB.
IC601	Similar to CYGNAL INTEGRATED H-7DLPD0029.
IC602	Similar to Toshiba TC7S04FU(TE85L_F).
IC603	Similar to Toshiba TC74VHC125FT(EL).
IC605	Similar to New JRC NJM2741F3(TE1)-#ZZZB.
IC606	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC701	Similar to Rohm BA09FP-E2.
IC702	Similar to Rohm BA09FP-E2.
IC703	Similar to Rohm BA09FP-E2.
IC704	Similar to New JRC NJM7805DL1A(TE1)-#ZZZB.
IC705	Similar to Rohm BA09FP-E2.
IC706	Similar to New JRC NJM78L05UA(TE1)-#ZZZB.
IC707	Similar to TOKO TK11233CUCB-G.
IC708	Similar to Rohm BA09FP-E2.
IC709	Similar to New JRC NJM78L05UA(TE1)-#ZZZB.
IC710	Similar to RICOH R1114D301B-TR-F.
IC801	Similar to Analog Devices AD9864BCPZRL.

SYMBOL	DESCRIPTION
	-----CONNECTOR-----
J701	Similar to SUYIN CONNECTOR 127180MA040G200ZR.
	-----INDUCTORS-----
L101	270 nH; similar to TOKO LLQ1608-FR27G.
L102	270 nH; similar to TOKO LLQ1608-FR27G.
L103	270 nH; similar to TOKO LLQ1608-FR27G.
L104	18 nH; similar to TOKO LL1005-FHL18NJ.
L105	18 nH; similar to TOKO LL1005-FHL18NJ.
L106	39 nH; similar to TOKO LL1005-FHL39NJ.
L107	18 nH; similar to TOKO LL1005-FHL18NJ.
L108	18 nH; similar to TOKO LL1005-FHL18NJ.
L109	39 nH; similar to TOKO LL1005-FHL39NJ.
L110	12 nH; similar to TOKO LL1005-FHL12NJ.
L111	27 nH; similar to TOKO LLQ2012-F27NJ.
L112	18 nH; similar to TOKO LL1608-FSL18NJ.
L113	18.9 nH; similar to KORIN AS030421-18R9NJ-T.
L114	18.9 nH; similar to KORIN AS030421-18R9NJ-T.
L115	160 nH; similar to KORIN AS050847-160NJ-T.
L116	58.7 nH; similar to KORIN AS080647-58R7NJ-T.
L117	10.4 nH; similar to KORIN AS100340-10R4NJ-T.
L118	10.4 nH; similar to KORIN AS100340-10R4NJ-T.
L119	10.4 nH; similar to KORIN AS100340-10R4NJ-T.
L120	11.4 nH; similar to KORIN AS050327-11R4NJ-T.
L121	11.4 nH; similar to KORIN AS050327-11R4NJ-T.
L122	220 nH; similar to TOKO LLQ2012-FR22J.
L123	(Not mounted.)
L201	22.4 nH; similar to KORIN AS080440-22R4NJ-T.
L202	15.5 nH; similar to KORIN AS080340-15R5NJ-T.
L203	12 nH; similar to TOKO LL1005-FHL12NJ.
L204	15 nH; similar to TOKO LL1005-FHL15NJ.
L205	8 nH; similar to COILCRAFT A03TGLC.
L206	330 nH; similar to TOKO LLQ2012-FR33J.
L207	330 nH; similar to TOKO LLQ2012-FR33J.
L208	8 nH; similar to COILCRAFT A03TGLC.
L209	12 nH; similar to TOKO LL1005-FHL12NJ.
L210	18 nH; similar to TOKO LL1005-FHL18NJ.
L211	8 nH; similar to COILCRAFT A03TGLC.
L212	330 nH; similar to TOKO LLQ2012-FR33J.
L213	330 nH; similar to TOKO LLQ2012-FR33J.
L214	8 nH; similar to COILCRAFT A03TGLC.

SYMBOL	DESCRIPTION
L215	820 nH; similar to TOKO LLQ2012-FR82J.
L216	330 nH; similar to TOKO LLQ2012-FR33J.
L217	180 nH; similar to Murata LQW2BASR18J00L.
L218	470 nH; similar to TOKO LLQ2012-FR47J.
L219	220 nH; similar to TOKO LLQ2012-FR22J.
L220	220 nH; similar to TOKO LLQ2012-FR22J.
L221	820 nH; similar to TOKO LLQ2012-FR82J.
L222	820 nH; similar to TOKO LLQ2012-FR82J.
L223	820 nH; similar to TOKO LLQ2012-FR82J.
L224	270 nH; similar to TOKO LL1608-FSLR27J.
L225	270 nH; similar to TOKO LL1608-FSLR27J.
L226	(Not mounted.)
L227	220 nH; similar to TOKO LL1608-FSLR22J.
L301	1 uH; similar to Murata LQH31MN1R0K03L.
L321	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L322	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L323	10 nH; similar to TOKO LLQ1608-F10NG.
L324	8.2 nH; similar to TOKO LLQ1608-F8N2G.
L325	22 nH; similar to TOKO LL1005-FHL22NJ.
L371	4.7 uH; similar to Murata LQH31MN4R7J03L.
L372	4.7 uH; similar to Murata LQH31MN4R7J03L.
L373	150 nH; similar to TOKO LLQ2012-FR15G.
L374	820 nH; similar to TOKO LLQ2012-FR82J.
L375	820 nH; similar to TOKO LLQ2012-FR82J.
L377	220 nH; similar to TOKO LL1608-FSLR22J.
L378	100 nH; similar to TOKO LL1608-FSLR10J.
L431	220 nH; similar to TOKO LLQ1608-FR22J.
L432	220 nH; similar to TOKO LLQ1608-FR22J.
L433	470 nH; similar to TOKO LLQ1608-FR47J.
L434	470 nH; similar to TOKO LLQ1608-FR47J.
L435	470 nH; similar to TOKO LLQ1608-FR47J.
L436	470 nH; similar to TOKO LLQ1608-FR47J.
L437	11 nH; similar to MIDORIMUSEN H-7LAPD0054.
L438	10 nH; similar to TOKO LL1005-FHL10NJ.
L439	10 nH; similar to TOKO LL1005-FHL10NJ.
L451	39 nH; similar to TOKO LL1005-FHL39NJ.
L452	33 nH; similar to TOKO LL1005-FHL33NJ.
L454	33 nH; similar to TOKO LL1608-FSL33NJ.
L455	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L456	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L457	10 nH; similar to TOKO LLQ1608-F10NG.

SYMBOL	DESCRIPTION
L458	10 nH; similar to TOKO LLQ1608-F10NG.
L459	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L460	100 nH; similar to TOKO LLQ1608-FR10J.
L461	100 nH; similar to TOKO LLQ1608-FR10J.
L462	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L463	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L531	220 nH; similar to TOKO LLQ1608-FR22J.
L532	220 nH; similar to TOKO LLQ1608-FR22J.
L533	220 nH; similar to TOKO LLQ1608-FR22J.
L534	220 nH; similar to TOKO LLQ1608-FR22J.
L535	220 nH; similar to TOKO LLQ1608-FR22J.
L536	220 nH; similar to TOKO LLQ1608-FR22J.
L537	220 nH; similar to TOKO LLQ1608-FR22J.
L538	220 nH; similar to TOKO LLQ1608-FR22J.
L539	Resonator; similar to MARUWA H-7LZPD0014.
L540	220 nH; similar to TOKO LLQ1608-FR22J.
L541	220 nH; similar to TOKO LLQ1608-FR22J.
L561	220 nH; similar to TOKO LLQ1608-FR22J.
L562	220 nH; similar to TOKO LLQ1608-FR22J.
L563	470 nH; similar to TOKO LLQ1608-FR47J.
L564	220 nH; similar to TOKO LLQ1608-FR22J.
L565	220 nH; similar to TOKO LLQ1608-FR22J.
L566	220 nH; similar to TOKO LLQ1608-FR22J.
L567	220 nH; similar to TOKO LLQ1608-FR22J.
L568	220 nH; similar to TOKO LLQ1608-FR22J.
L569	Resonator; similar to MARUWA H-7LZPD0015.
L570	220 nH; similar to TOKO LLQ1608-FR22J.
L571	220 nH; similar to TOKO LLQ1608-FR22J.
L581	33 nH; similar to TOKO LL1005-FHL33NJ.
L582	27 nH; similar to TOKO LL1005-FHL27NJ.
L584	27 nH; similar to TOKO LL1608-FSL27NJ.
L585	22 nH; similar to TOKO LLQ2012-F22NJ.
L586	15 nH; similar to TOKO LLQ2012-F15NJ.
L701	1 uH; similar to Murata LQH31MN1R0K03L.
L702	1 uH; similar to Murata LQH31MN1R0K03L.
L801	1.2 uH; similar to Murata LQH31MN1R2K03L.
L802	390 nH; similar to Taiyo Yuden LK1005_R39K-T.
L803	10 uH; similar to Murata LQH32CN100K23L.
L804	10 uH; similar to Murata LQH32CN100K23L.
L1350	4.7 nH; similar to TOKO LL1005-FHL4N7S.
L1371	(Not mounted.)

SYMBOL	DESCRIPTION
L1421	(Not mounted.)
L1431	470 nH; similar to TOKO LLQ1608-FR47J.
L1432	470 nH; similar to TOKO LLQ1608-FR47J.
L1435	15 nH; similar to TOKO LL1005-FHL15NJ.
L1521	(Not mounted.)
L1563	15 nH; similar to TOKO LL1005-FHL15NJ.
	-----INTEGRATED CIRCUIT-----
MIX201	Mixer; similar to MINI-CIRCUITS ADE-1HW-3+-TR.
	-----RESISTORS-----
R101	18 ohm; similar to Panasonic ERJ2GEJ180X.
R102	270 ohm; similar to Panasonic ERJ2GEJ271X.
R103	270 ohm; similar to Panasonic ERJ2GEJ271X.
R104	560 ohm; similar to Panasonic ERJ2GEJ561X.
R105	150 ohm; similar to Panasonic ERJ2GEJ151X.
R106	560 ohm; similar to Panasonic ERJ2GEJ561X.
R107	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R108	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R109	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R110	560 ohm; similar to Panasonic ERJ2GEJ561X.
R111	18 ohm; similar to Panasonic ERJ2GEJ180X.
R112	270 ohm; similar to Panasonic ERJ2GEJ271X.
R113	270 ohm; similar to Panasonic ERJ2GEJ271X.
R114	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R115	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R116	1k ohm; similar to Panasonic ERJ2GEJ102X.
R117	10 ohm; similar to Panasonic ERJ2GEJ100X.
R118	33 ohm; similar to Panasonic ERJ6GEYJ330V.
R119	18 ohm; similar to Panasonic ERJ2GEJ180X.
R120	270 ohm; similar to Panasonic ERJ2GEJ271X.
R121	270 ohm; similar to Panasonic ERJ2GEJ271X.
R122	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R123	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R124	1k ohm; similar to Panasonic ERJ2GEJ102X.
R125	10 ohm; similar to Panasonic ERJ2GEJ100X.
R126	33 ohm; similar to Panasonic ERJ6GEYJ330V.
R127	18 ohm; similar to Panasonic ERJ2GEJ180X.
R128	270 ohm; similar to Panasonic ERJ2GEJ271X.
R129	270 ohm; similar to Panasonic ERJ2GEJ271X.
R130	0 ohm; similar to Panasonic ERJ2GE0R00X.
R131	5.6 ohm; similar to Panasonic ERJ2GEJ5R6X.
R132	2.7k ohm; similar to Panasonic ERJ2GEJ272X.

SYMBOL	DESCRIPTION
R133	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R134	390 ohm; similar to Panasonic ERJ2GEJ391X.
R135	68 ohm; similar to Panasonic ERJ2GEJ680X.
R136	0 ohm; similar to Panasonic ERJ14Y0R00U.
R137	18 ohm; similar to Panasonic ERJ2GEJ180X.
R138	270 ohm; similar to Panasonic ERJ2GEJ271X.
R139	270 ohm; similar to Panasonic ERJ2GEJ271X.
R140	390 ohm; similar to Panasonic ERJ2GEJ391X.
R141	1k ohm; similar to Panasonic ERJ2GEJ102X.
R142	82 ohm; similar to Panasonic ERJ6GEYJ820V.
R143	82 ohm; similar to Panasonic ERJ6GEYJ820V.
R144	68 ohm; similar to Panasonic ERJ6GEYJ680V.
R145	82 ohm; similar to Panasonic ERJ6GEYJ820V.
R146	100k ohm; similar to Panasonic ERJ2GEJ104X.
R147	100k ohm; similar to Panasonic ERJ2GEJ104X.
R148	100k ohm; similar to Panasonic ERJ2GEJ104X.
R149	27k ohm; similar to Panasonic ERJ2GEJ273X.
R150	0 ohm; similar to Panasonic ERJ2GE0R00X.
R151	1k ohm; similar to Panasonic ERJ2GEJ102X.
R152	680 ohm; similar to Panasonic ERJ2GEJ681X.
R153	27k ohm; similar to Panasonic ERJ2GEJ273X.
R154	1k ohm; similar to Panasonic ERJ2GEJ102X.
R155	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R156	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R157	820 ohm; similar to Panasonic ERJ2GEJ821X.
R158	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R159	56k ohm; similar to Panasonic ERJ2GEJ563X.
R160	0 ohm; similar to Panasonic ERJ2GE0R00X.
R161	(Not mounted.)
R162	0 ohm; similar to Panasonic ERJ2GE0R00X.
R163	10k ohm; similar to Panasonic ERJ2GEJ103X.
R164	47k ohm; similar to Panasonic ERJ2GEJ473X.
R165	120 ohm; similar to Panasonic ERJ1TYJ121U.
R166	120 ohm; similar to Panasonic ERJ1TYJ121U.
R167	(Not mounted.)
R168	1k ohm; similar to Panasonic ERJ2GEJ102X.
R169	100k ohm; similar to Panasonic ERJ2GEJ104X.
R171	33k ohm; similar to Panasonic ERJ2GEJ333X.
R172	(Not mounted.)
R173	100k ohm; similar to Panasonic ERJ14YJ104U.
R174	8.2k ohm; similar to Panasonic ERJ2GEJ822X.

SYMBOL	DESCRIPTION
R175	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R176	8.2k ohm; similar to Panasonic ERJ2GEJ822X.
R177	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R178	(Not mounted.)
R179	100 ohm; similar to Panasonic ERJ2GEJ101X.
R180	33k ohm; similar to Panasonic ERJ2GEJ333X.
R181	120 ohm; similar to Panasonic ERJ1TYJ121U.
R201	10 ohm; similar to Panasonic ERJ2GEJ100X.
R202	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R203	1k ohm; similar to Panasonic ERJ2GEJ102X.
R204	18 ohm; similar to Panasonic ERJ6GEYJ470V.
R205	47 ohm; similar to Panasonic ERJ2GEJ470X.
R206	120 ohm; similar to Panasonic ERJ2GEJ121X.
R207	120 ohm; similar to Panasonic ERJ2GEJ121X.
R208	56k ohm; similar to Panasonic ERJ2GEJ563X.
R209	1k ohm; similar to Panasonic ERJ2GEJ102X.
R210	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R211	56k ohm; similar to Panasonic ERJ2GEJ563X.
R212	10 ohm; similar to Panasonic ERJ8GEYJ100V.
R213	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R214	1k ohm; similar to Panasonic ERJ2GEJ102X.
R215	10 ohm; similar to Panasonic ERJ8GEYJ100V.
R216	56k ohm; similar to Panasonic ERJ2GEJ563X.
R217	1k ohm; similar to Panasonic ERJ2GEJ102X.
R218	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R219	56k ohm; similar to Panasonic ERJ2GEJ563X.
R220	1.5k ohm; similar to Panasonic ERJ6GEYJ152V.
R221	18 ohm; similar to Panasonic ERJ2GEJ180X.
R222	270 ohm; similar to Panasonic ERJ2GEJ271X.
R223	270 ohm; similar to Panasonic ERJ2GEJ271X.
R224	12 ohm; similar to Panasonic ERJ2GEJ120X.
R225	470 ohm; similar to Panasonic ERJ2GEJ471X.
R226	470 ohm; similar to Panasonic ERJ2GEJ471X.
R227	(Not mounted.)
R228	(Not mounted.)
R229	(Not mounted.)
R230	56 ohm; similar to Panasonic ERJ2GEJ560X.
R231	10 ohm; similar to Panasonic ERJ2GEJ100X.
R232	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R233	0 ohm; similar to Panasonic ERJ2GE0R00X.
R234	(Not mounted.)

SYMBOL	DESCRIPTION
R235	(Not mounted.)
R236	820 ohm; similar to Panasonic ERJ2GEJ821X.
R237	330 ohm; similar to Panasonic ERJ2GEJ331X.
R238	220k ohm; similar to Panasonic ERJ2GEJ224X.
R239	(Not mounted.)
R240	270 ohm; similar to Panasonic ERJ2GEJ271X.
R241	5.6 ohm; similar to Panasonic ERJ2GEJ5R6X.
R242	(Not mounted.)
R243	0 ohm; similar to Panasonic ERJ2GE0R00X.
R244	(Not mounted.)
R245	(Not mounted.)
R246	560 ohm; similar to Panasonic ERJ2GEJ561X.
R247	330 ohm; similar to Panasonic ERJ2GEJ331X.
R248	330k ohm; similar to Panasonic ERJ2GEJ334X.
R249	(Not mounted.)
R250	390 ohm; similar to Panasonic ERJ2GEJ391X.
R251	10 ohm; similar to Panasonic ERJ2GEJ100X.
R252	(Not mounted.)
R253	0 ohm; similar to Panasonic ERJ2GE0R00X.
R254	(Not mounted.)
R255	(Not mounted.)
R257	560 ohm; similar to Panasonic ERJ2GEJ561X.
R258	390 ohm; similar to Panasonic ERJ2GEJ391X.
R259	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R260	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R261	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R262	680 ohm; similar to Panasonic ERJ2GEJ681X.
R263	560 ohm; similar to Panasonic ERJ2GEJ561X.
R264	18 ohm; similar to Panasonic ERJ2GEJ180X.
R265	18 ohm; similar to Panasonic ERJ2GEJ180X.
R266	18 ohm; similar to Panasonic ERJ2GEJ180X.
R267	(Not mounted.)
R268	47 ohm; similar to Panasonic ERJ2GEJ470X.
R269	100k ohm; similar to Panasonic ERJ2GEJ104X.
R270	(Not mounted.)
R271	22k ohm; similar to Panasonic ERJ2GEJ223X.
R272	68 ohm; similar to Panasonic ERJ2GEJ680X.
R273	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R274	1k ohm; similar to Panasonic ERJ2GEJ102X.
R275	15k ohm; similar to Panasonic ERJ2GEJ153X.
R276	1k ohm; similar to Panasonic ERJ2GEJ102X.

SYMBOL	DESCRIPTION
R277	82k ohm; similar to Panasonic ERJ2GEJ823X.
R278	(Not mounted.)
R301	10k ohm; similar to Panasonic EXB28V103JX.
R302	10k ohm; similar to Panasonic ERJ2GEJ103X.
R303	10k ohm; similar to Panasonic ERJ2GEJ103X.
R304	10k ohm; similar to Panasonic ERJ2GEJ103X.
R306	10k ohm; similar to Panasonic ERJ2GEJ103X.
R307	15k ohm; similar to Panasonic ERJ2GEJ153X.
R308	1k ohm; similar to Panasonic ERJ2GEJ102X.
R309	10k ohm; similar to Panasonic ERJ2GEJ103X.
R310	15k ohm; similar to Panasonic ERJ2GEJ153X.
R311	1k ohm; similar to Panasonic ERJ2GEJ102X.
R321	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R322	10k ohm; similar to Panasonic ERJ2RKF1002X.
R323	10k ohm; similar to Panasonic ERJ2GEJ103X.
R324	10k ohm; similar to Panasonic ERJ2RKF1002X.
R325	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R326	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R327	10k ohm; similar to Panasonic ERJ2RKF1002X.
R328	10k ohm; similar to Panasonic ERJ2GEJ103X.
R329	10k ohm; similar to Panasonic ERJ2RKF1002X.
R330	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R331	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R332	10k ohm; similar to Panasonic ERJ2RKF1002X.
R333	18k ohm; similar to Panasonic ERJ2RKF1802X.
R334	10k ohm; similar to Panasonic ERJ2RKF1002X.
R335	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R336	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R337	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R338	10k ohm; similar to Panasonic ERJ2RKF1002X.
R339	18k ohm; similar to Panasonic ERJ2RKF1802X.
R340	10k ohm; similar to Panasonic ERJ2RKF1002X.
R341	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R342	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R343	56k ohm; similar to Panasonic ERJ2RKF5602X.
R344	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R345	10k ohm; similar to Panasonic ERJ2RKF1002X.
R346	18k ohm; similar to Panasonic ERJ2RKF1802X.
R347	10k ohm; similar to Panasonic ERJ2RKF1002X.
R348	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R349	1.2k ohm; similar to Panasonic ERJ2RKF1201X.

SYMBOL	DESCRIPTION
R350	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R351	10k ohm; similar to Panasonic ERJ2RKF1002X.
R352	18k ohm; similar to Panasonic ERJ2RKF1802X.
R353	10k ohm; similar to Panasonic ERJ2RKF1002X.
R354	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R355	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R356	56k ohm; similar to Panasonic ERJ2RKF5602X.
R357	27 ohm; similar to Panasonic ERJ2GEJ270X.
R358	330 ohm; similar to Panasonic ERJ2GEJ331X.
R359	330 ohm; similar to Panasonic ERJ2GEJ331X.
R360	18k ohm; similar to Panasonic ERJ2GEJ183X.
R361	18k ohm; similar to Panasonic ERJ2GEJ183X.
R362	18k ohm; similar to Panasonic ERJ2GEJ183X.
R371	4.3k ohm; similar to Panasonic ERJ2GEJ432X.
R372	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R373	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R374	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R375	10k ohm; similar to Panasonic ERJ2GEJ103X.
R376	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R377	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R378	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R379	560 ohm; similar to Panasonic ERJ2GEJ561X.
R380	33 ohm; similar to Panasonic ERJ2GEJ330X.
R381	220 ohm; similar to Panasonic ERJ2GEJ221X.
R382	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R389	330 ohm; similar to Panasonic ERJ14YJ331U.
R401	27k ohm; similar to Panasonic ERJ2GEJ273X.
R402	(Not mounted.)
R403	3.9k ohm; similar to Panasonic ERJ2GEJ392X.
R404	22 ohm; similar to Panasonic ERJ2GEJ220X.
R405	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R406	47 ohm; similar to Panasonic ERJ2GEJ470X.
R407	1k ohm; similar to Panasonic ERJ2GEJ102X.
R408	820 ohm; similar to Panasonic ERJ2GEJ821X.
R409	330 ohm; similar to Panasonic ERJ12YJ331U.
R410	150k ohm; similar to Panasonic ERJ2GEJ154X.
R411	8.2k ohm; similar to Panasonic ERJ2GEJ822X.
R412	1k ohm; similar to Panasonic ERJ2GEJ102X.
R413	180 ohm; similar to Panasonic ERJ2GEJ181X.
R414	180 ohm; similar to Panasonic ERJ2GEJ181X.
R415	470 ohm; similar to Panasonic ERJ2GEJ471X.

SYMBOL	DESCRIPTION
R416	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R417	1000k ohm; similar to Panasonic ERJ2GEJ105X.
R421	330 ohm; similar to Panasonic ERJ14YJ331U.
R431	1.8k ohm; similar to KOA RN731ETTP1801F50.
R432	2.2k ohm; similar to KOA RN731ETTP2201F50.
R433	270 ohm; similar to KOA RN732ATTD2700F50.
R451	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R452	1.5k ohm; similar to Panasonic ERJ2GEJ152X.
R453	100 ohm; similar to Panasonic ERJ2GEJ101X.
R454	10 ohm; similar to Panasonic ERJ2GEJ100X.
R455	68 ohm; similar to Panasonic ERJ2GEJ680X.
R456	150 ohm; similar to Panasonic ERJ2GEJ151X.
R458	1k ohm; similar to Panasonic ERJ2GEJ102X.
R459	100k ohm; similar to Panasonic ERJ2GEJ104X.
R460	47 ohm; similar to Panasonic ERJ2GEJ470X.
R462	470 ohm; similar to Panasonic ERJ2GEJ471X.
R463	82k ohm; similar to Panasonic ERJ2GEJ823X.
R464	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R465	820 ohm; similar to Panasonic ERJ2GEJ821X.
R467	68 ohm; similar to Panasonic ERJ2GEJ680X.
R468	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R469	820 ohm; similar to Panasonic ERJ2GEJ821X.
R470	68 ohm; similar to Panasonic ERJ2GEJ680X.
R471	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R472	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R473	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R474	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R475	56k ohm; similar to Panasonic ERJ2GEJ563X.
R476	56k ohm; similar to Panasonic ERJ2GEJ563X.
R491	470 ohm; similar to Panasonic ERJ2GEJ471X.
R492	150k ohm; similar to Panasonic ERJ2GEJ154X.
R501	27k ohm; similar to Panasonic ERJ2GEJ273X.
R502	(Not mounted.)
R503	15k ohm; similar to Panasonic ERJ2GEJ153X.
R504	22 ohm; similar to Panasonic ERJ2GEJ220X.
R505	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R506	47 ohm; similar to Panasonic ERJ2GEJ470X.
R507	1k ohm; similar to Panasonic ERJ2GEJ102X.
R508	820 ohm; similar to Panasonic ERJ2GEJ821X.
R509	330 ohm; similar to Panasonic ERJ12YJ331U.
R510	150k ohm; similar to Panasonic ERJ2GEJ154X.

SYMBOL	DESCRIPTION
R511	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R512	1k ohm; similar to Panasonic ERJ2GEJ102X.
R513	180 ohm; similar to Panasonic ERJ2GEJ181X.
R514	180 ohm; similar to Panasonic ERJ2GEJ181X.
R515	470 ohm; similar to Panasonic ERJ2GEJ471X.
R516	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R517	1M ohm; similar to Panasonic ERJ2GEJ105X.
R521	330 ohm; similar to Panasonic ERJ14YJ331U.
R522	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R523	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R524	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R525	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R526	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R527	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R531	6.8k ohm; similar to KOA RN731ETTP6801F50.
R532	2.2k ohm; similar to KOA RN731ETTP2201F50.
R533	82 ohm; similar to KOA RN732ATTD82R0F50.
R561	6.8k ohm; similar to KOA RN731ETTP6801F50.
R562	2.2k ohm; similar to KOA RN731ETTP2201F50.
R563	82 ohm; similar to KOA RN732ATTD82R0F50.
R564	3.9k ohm; similar to Panasonic ERJ2GEJ392X.
R581	18 ohm; similar to Panasonic ERJ2GEJ180X.
R582	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R583	1.5k ohm; similar to Panasonic ERJ2GEJ152X.
R584	120 ohm; similar to Panasonic ERJ2GEJ121X.
R585	10 ohm; similar to Panasonic ERJ2GEJ100X.
R586	68 ohm; similar to Panasonic ERJ2GEJ680X.
R587	150 ohm; similar to Panasonic ERJ2GEJ151X.
R589	1k ohm; similar to Panasonic ERJ2GEJ102X.
R590	100k ohm; similar to Panasonic ERJ2GEJ104X.
R591	47 ohm; similar to Panasonic ERJ2GEJ470X.
R593	390 ohm; similar to Panasonic ERJ2GEJ391X.
R594	47k ohm; similar to Panasonic ERJ2GEJ473X.
R595	18 ohm; similar to Panasonic ERJ2GEJ180X.
R596	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R597	1.8k ohm; similar to Panasonic ERJ2GEJ182X.
R598	33 ohm; similar to Panasonic ERJ6GEYJ330V.
R601	(Not mounted.)
R602	22k ohm; similar to Panasonic ERJ2GEJ223X.
R603	22k ohm; similar to Panasonic ERJ2GEJ223X.
R604	33k ohm; similar to Panasonic ERJ2GEJ333X.

SYMBOL	DESCRIPTION
R605	33k ohm; similar to Panasonic ERJ2GEJ333X.
R606	10k ohm; similar to Panasonic ERJ2GEJ103X.
R607	(Not mounted.)
R608	(Not mounted.)
R609	(Not mounted.)
R610	(Not mounted.)
R611	22k ohm; similar to Panasonic ERJ2GEJ223X.
R612	22k ohm; similar to Panasonic EXB28V223JX.
R613	33 ohm; similar to Panasonic ERJ2GEJ330X.
R614	(Not mounted.)
R615	33 ohm; similar to Panasonic ERJ2GEJ330X.
R616	10k ohm; similar to Panasonic ERJ2GEJ103X.
R617	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R618	2.2 ohm; similar to Panasonic ERJ2GEJ2R2X.
R619	51k ohm; similar to Panasonic ERJ2RKF5102X.
R620	47k ohm; similar to Panasonic ERJ2RKF4702X.
R621	51k ohm; similar to Panasonic ERJ2RKF5102X.
R622	27k ohm; similar to Panasonic ERJ2RKF2702X.
R623	51k ohm; similar to Panasonic ERJ2RKF5102X.
R624	10k ohm; similar to Panasonic ERJ2RKF1002X.
R625	51k ohm; similar to Panasonic ERJ2RKF5102X.
R626	10k ohm; similar to Panasonic ERJ2RKF1002X.
R627	200k ohm; similar to Panasonic ERJ2RKF2003X.
R628	27k ohm; similar to Panasonic ERJ2RKF2702X.
R629	22k ohm; similar to Panasonic EXB28V223JX.
R630	22k ohm; similar to Panasonic ERJ2GEJ223X.
R631	22k ohm; similar to Panasonic ERJ2GEJ223X.
R632	22k ohm; similar to Panasonic ERJ2GEJ223X.
R633	(Not mounted.)
R634	(Not mounted.)
R635	(Not mounted.)
R636	(Not mounted.)
R637	(Not mounted.)
R638	10k ohm; similar to Panasonic EXB28V103JX.
R639	10k ohm; similar to Panasonic ERJ2GEJ103X.
R640	10k ohm; similar to Panasonic ERJ2GEJ103X.
R641	10k ohm; similar to Panasonic ERJ2GEJ103X.
R642	(Not mounted.)
R643	47k ohm; similar to Panasonic ERJ2GEJ473X.
R644	12k ohm; similar to Panasonic ERJ2GEJ123X.
R645	(Not mounted.)

SYMBOL	DESCRIPTION
R646	27k ohm; similar to Panasonic ERJ2GEJ273X.
R647	47k ohm; similar to Panasonic ERJ2GEJ473X.
R650	(Not mounted.)
R701	27 ohm; similar to Panasonic ERJ1TYJ270U.
R702	27 ohm; similar to Panasonic ERJ1TYJ270U.
R801	47 ohm; similar to Panasonic ERJ2GEJ470X.
R802	22k ohm; similar to Panasonic ERJ2GEJ223X.
R803	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R804	820 ohm; similar to Panasonic ERJ2GEJ821X.
R805	1k ohm; similar to Panasonic ERJ2GEJ102X.
R806	100k ohm; similar to Panasonic ERJ2GEJ104X.
R807	33 ohm; similar to Panasonic EXB28V330JX.
R808	82 ohm; similar to Panasonic ERJ2GEJ820X.
R809	47 ohm; similar to Panasonic ERJ2GEJ470X.
R810	47 ohm; similar to Panasonic ERJ2GEJ470X.
R1371	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R1372	220 ohm; similar to Panasonic ERJ2GEJ221X.
R1373	(Not mounted.)
R1374	(Not mounted.)
R1375	(Not mounted.)
R1378	(Not mounted.)
R1379	(Not mounted.)
R1380	(Not mounted.)
R1401	(Not mounted.)
R1410	(Not mounted.)
R1453	15 ohm; similar to Panasonic ERJ2GEJ150X.
R1454	220 ohm; similar to Panasonic ERJ2GEJ221X.
R1455	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1456	(Not mounted.)
R1459	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R1460	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R1491	(Not mounted.)
R1492	100 ohm; similar to Panasonic ERJ2GEJ101X.
R1501	(Not mounted.)
R1510	(Not mounted.)
R1583	33 ohm; similar to Panasonic ERJ2GEJ330X.
-----THERMISTOR -----	
RT101	Thermistor: 2.2k ohm with Positive Temperature Coefficient; similar to Murata PTFM04BD222Q2N34B0.
----- TRANSISTORS -----	
TR101	Similar to NEC 2SC3357-T1-A_RF.

SYMBOL	DESCRIPTION
TR102	Similar to NEC 2SC3357-T1-A_RF.
TR103	Similar to Mitsubishi RD01MUS1-T113.
TR104	Similar to Rohm 2SD1781KT146R.
TR105	Similar to NEC 2SD596-T1B-A_DV5.
TR106	Similar to NEC 2SB798-T2-AZ_DK.
TR107	Similar to Toshiba RN1301(TE85L_F).
TR108	(Not mounted.)
TR109	Similar to NEC 2SB798-T2-AZ_DK.
TR110	Similar to Toshiba RN1301(TE85L_F).
TR111	Similar to Toshiba RN1301(TE85L_F).
TR112	Similar to NEC 2SD596-T1B-A_DV5.
TR201	Similar to NEC 2SC5337-T1-AZ_QS.
TR202	Similar to NEC 2SC5337-T1-AZ_QS.
TR203	Similar to Toshiba RN1301(TE85L_F).
TR204	Similar to ON Semiconductor MMBFJ310LT1G.
TR205	Similar to ON Semiconductor MMBFJ310LT1G.
TR206	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR207	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR208	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR301	Similar to Rohm QS6M3TR.
TR371	Similar to Rohm UMG3NTR.
TR372	Similar to NEC 2SC3356-T1B-A_R.
TR373	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR375	Similar to Rohm 2SD1781KT146R.
TR401	Similar to Sanyo 2SK536-TB-E.
TR402	Similar to Toshiba RN1301(TE85L_F).
TR403	Similar to Rohm 2SA1037AKT146R.
TR404	Similar to Sanyo 2SK536-TB-E.
TR405	Similar to Sanyo 2SK536-TB-E.
TR406	Similar to Toshiba RN1301(TE85L_F).
TR421	Similar to Rohm 2SD1781KT146R.
TR431	Similar to Renesas 2SC5890FS-TL-E.
TR432	Similar to Toshiba RN1305(TE85L_F).
TR451	Similar to NEC 2SC3356-T1B-A_R.
TR452	Similar to NEC 2SC3356-T1B-A_R.
TR453	Similar to NEC 2SC3356-T1B-A_R.
TR454	Similar to NEC 2SC3356-T1B-A_R.
TR455	Similar to NEC 2SC3356-T1B-A_R.
TR456	Similar to Rohm UMG3NTR.
TR457	Similar to Rohm UMG3NTR.
TR491	Similar to Toshiba 2SC2712-BL(TE85L_F).

SYMBOL	DESCRIPTION
TR501	Similar to Sanyo 2SK536-TB-E.
TR502	Similar to Toshiba RN1301(TE85L_F).
TR503	Similar to Rohm 2SA1037AKT146R.
TR504	Similar to Sanyo 2SK536-TB-E.
TR505	Similar to Sanyo 2SK536-TB-E.
TR506	Similar to Toshiba RN1301(TE85L_F).
TR521	Similar to Rohm 2SD1781KT146R.
TR522	Similar to Rohm UMG3NTR.
TR523	Similar to Rohm UMG3NTR.
TR524	Similar to Rohm UMG3NTR.
TR531	Similar to Renesas 2SC5772FR-TL-E.
TR532	Similar to Toshiba RN1305(TE85L_F).
TR533	Similar to Toshiba RN1305(TE85L_F).
TR561	Similar to Renesas 2SC5772FR-TL-E.
TR562	Similar to Toshiba RN1301(TE85L_F).
TR563	Similar to Toshiba RN1305(TE85L_F).
TR581	Similar to NEC 2SC3356-T1B-A_R.
TR582	Similar to NEC 2SC3356-T1B-A_R.
TR583	Similar to NEC 2SC3356-T1B-A_R.
TR584	Similar to NEC 2SC3357-T1-A_RF.
TR1371	(Not mounted.)
TR1451	Similar to ROHM UMG3NTR.
----- JUMPER -----	
W101	Jumper; similar to MIDORIMUSEN N H-7ZCPD0269.
----- OSCILLATOR -----	
XU491	Similar to NDK H-7XNPD0004.
----- SURGE ABSORBERS -----	
Z701	Similar to KOA NV73A2ATTE22_PBF.
Z702	Surge Absorber; similar to Panasonic ERZCF2MK220.

16.3 RF PROCESSOR BOARD, 450 – 512 MHz

450 TO 512 MHz RF PROCESSOR BOARD

(CMN-4750H, Rev. 20100723)

SYMBOL	DESCRIPTION
----- CAPACITORS -----	
C101	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C102	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C103	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C104	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C105	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C106	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C107	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C108	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C109	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C110	5 pF; similar to Taiyo Yuden UMK105CH050CW-F.
C111	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C112	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C113	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C114	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C115	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C116	5 pF; similar to Taiyo Yuden UMK105CH050CW-F.
C117	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C118	180 pF; similar to Taiyo Yuden UMK105CH181JV-F.
C119	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C120	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C121	220 pF; similar to Taiyo Yuden UMK105CH221JV-F.
C122	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C123	(Not mounted.)
C124	(Not mounted.)
C125	4 pF; similar to Taiyo Yuden UMK105CH040CW-F.
C126	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C127	0.1 uF; similar to Murata GRM188R11E104KA01D.
C128	5 pF; similar to Taiyo Yuden UMK105CH050CW-F.
C129	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C130	(Not mounted.)
C131	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C132	47 uF; similar to Panasonic EEEFK1V470P.
C133	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C134	0.047 uF; similar to Murata GRM188R11H473KA61D.
C135	7 pF; similar to Murata GRM1882C1H7R0DZ01D.
C136	7 pF; similar to Murata GRM1882C1H7R0DZ01D.
C137	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C138	(Not mounted.)
C139	(Not mounted.)
C140	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C143	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C144	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C145	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C146	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C147	2.2 uF; similar to Taiyo Yuden EMK107BJ225KA-T.
C148	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C149	10 uF; similar to Taiyo Yuden EMK212BJ106KG-T.
C150	(Not mounted.)
C151	(Not mounted.)
C152	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C153	0.047 uF; similar to Murata GRM188R11H473KA61D.
C154	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C155	(Not mounted.)
C156	200 pF; similar to Murata GRM32N2C2H201JV01L.
C157	1000 pF; similar to Murata GRM31A7U2J102JW31D.
C158	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C159	200 pF; similar to Murata GRM32N2C2H201JV01L.
C160	(Not mounted.)
C161	(Not mounted.)
C162	(Not mounted.)
C163	1 pF; similar to Murata GRM31M4C2H1R0CY21L.
C164	1 pF; similar to Murata GRM31M4C2H1R0CY21L.
C165	1 pF; similar to Murata GRM31M4C2H1R0CY21L.
C166	4 pF; similar to Murata GRM31M2C2H4R0CY21L.
C167	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C168	4 pF; similar to Murata GRM31M2C2H4R0CY21L.
C169	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C170	2 pF; similar to Murata GRM31M4C2H2R0CY21L.
C171	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C172	3 pF; similar to Murata GRM31M3C2H3R0CY21L.
C173	2 pF; similar to Murata GRM2194C2D2R0CY21D.
C175	4 pF; similar to Murata GRM2162C1H4R0CD01D.
C176	1000 pF; similar to Murata GRM2192C2A102JA01D.
C177	1000 pF; similar to Murata GRM2192C2A102JA01D.
C178	1000 pF; similar to Murata GRM1882C1H102JA01D.
C179	1000 pF; similar to Murata GRM1882C1H102JA01D.
C180	3 pF; similar to Murata GRM1883C1H3R0CZ01D.
C181	(Not mounted.)
C183	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C184	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C185	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C186	0.01 uF; similar to Murata GRM188R11H103KA01D.
C187	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C188	(Not mounted.)
C189	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C190	(Not mounted.)
C191	(Not mounted.)
C192	(Not mounted.)
C193	(Not mounted.)
C194	(Not mounted.)
C195	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C196	0.1 uF; similar to Murata GRM188R11H104KA93D.
C197	1000 pF; similar to Murata GRM1882C1H102JA01D.
C198	(Not mounted.)
C199	0.01 uF; similar to Murata GRM188R11H103KA01D.
C201	12 pF; similar to Murata GRM1552C1H120FZ01D.
C202	9 pF; similar to Murata GRM1552C1H9R0FZ01D.
C203	5 pF; similar to Murata GRM1552C1H5R0FZ01D.
C204	33 pF; similar to Murata GRM1552C1H330FZ01D.
C205	8 pF; similar to Murata GRM1552C1H8R0FZ01D.
C206	15 pF; similar to Murata GRM1552C1H150JZ01D.
C207	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C208	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C209	10 pF; similar to Murata GRM1552C1H100JZ01D.
C210	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C211	(Not mounted.)
C212	1.9 pF; similar to Murata GRM1554C1H1R9WA01D.
C213	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C214	4.3 pF; similar to Murata GRM1552C1H4R3WA01D.
C215	2.4 pF; similar to Murata GRM1553C1H2R4WA01D.
C216	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C217	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C218	2.4 pF; similar to Murata GRM1553C1H2R4WA01D.
C219	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C220	4.8 pF; similar to Murata GRM1552C1H4R8WA01D.
C221	1 pF; similar to Murata GRM1554C1H1R0WA01D.
C222	1.9 pF; similar to Murata GRM1554C1H1R9WA01D.
C223	0.01 uF; similar to Murata GRM155R11E103KA01D.
C224	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C225	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C226	0.01 uF; similar to Murata GRM155R11E103KA01D.
C227	0.01 uF; similar to Murata GRM155R11E103KA01D.
C228	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C229	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C230	15 pF; similar to Murata GRM1552C1H150JZ01D.
C231	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C232	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C233	22 pF; similar to Murata GRM1552C1H220JZ01D.
C234	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C235	(Not mounted.)
C236	1.9 pF; similar to Murata GRM1554C1H1R9WA01D.
C237	2.5 pF; similar to Murata GRM1553C1H2R5WA01D.
C238	5.8 pF; similar to Murata GRM1552C1H5R8WA01D.
C239	2.9 pF; similar to Murata GRM1553C1H2R9WA01D.
C240	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C241	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C242	2.5 pF; similar to Murata GRM1553C1H2R5WA01D.
C243	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C244	4.8 pF; similar to Murata GRM1552C1H4R8WA01D.
C245	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C246	1.9 pF; similar to Murata GRM1554C1H1R9WA01D.
C247	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C248	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C249	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C250	0.01 uF; similar to Murata GRM155R11E103KA01D.
C251	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C252	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C253	0.01 uF; similar to Murata GRM155R11E103KA01D.
C254	0.01 uF; similar to Murata GRM155R11E103KA01D.
C255	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C256	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C257	0.01 uF; similar to Murata GRM155R11E103KA01D.
C258	0.01 uF; similar to Murata GRM155R11E103KA01D.
C259	0.01 uF; similar to Murata GRM155R11E103KA01D.
C260	12 pF; similar to Murata GRM1552C1H120JZ01D.
C261	(Not mounted.)
C262	7 pF; similar to Murata GRM1552C1H7R0FZ01D.
C263	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C264	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C265	0.01 uF; similar to Murata GRM155R11E103KA01D.
C266	0.01 uF; similar to Murata GRM155R11E103KA01D.
C267	0.01 uF; similar to Murata GRM155R11E103KA01D.
C268	(Not mounted.)
C269	0.01 uF; similar to Murata GRM155R11E103KA01D.
C270	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C271	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C272	2 pF; similar to Murata GRM1554C1H2R0WA01D.

SYMBOL	DESCRIPTION
C273	0.01 uF; similar to Murata GRM155R11E103KA01D.
C274	0.01 uF; similar to Murata GRM155R11E103KA01D.
C275	0.01 uF; similar to Murata GRM155R11E103KA01D.
C276	(Not mounted.)
C277	15 pF; similar to Murata GRM1552C1H150JZ01D.
C278	(Not mounted.)
C279	0.01 uF; similar to Murata GRM155R11E103KA01D.
C280	0.01 uF; similar to Murata GRM155R11E103KA01D.
C281	0.01 uF; similar to Murata GRM155R11E103KA01D.
C282	0.01 uF; similar to Murata GRM155R11E103KA01D.
C283	0.01 uF; similar to Murata GRM155R11E103KA01D.
C284	15 pF; similar to Murata GRM1552C1H150JZ01D.
C285	0.01 uF; similar to Murata GRM155R11E103KA01D.
C286	10 pF; similar to Murata GRM1552C1H100JZ01D.
C287	0.01 uF; similar to Murata GRM155R11E103KA01D.
C288	0.01 uF; similar to Murata GRM155R11E103KA01D.
C289	0.01 uF; similar to Murata GRM155R11E103KA01D.
C290	(Not mounted.)
C291	18 pF; similar to Murata GRM1552C1H180JZ01D.
C292	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C293	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C294	0.01 uF; similar to Murata GRM155R11E103KA01D.
C295	0.01 uF; similar to Murata GRM155R11E103KA01D.
C297	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C298	0.047 uF; similar to Murata GRM155R11C473KA01D.
C299	0.01 uF; similar to Murata GRM155R11E103KA01D.
C301	10 uF; similar to Murata GRM31CR61C106KA88L.
C302	0.01 uF; similar to Murata GRM155R11E103KA01D.
C303	0.01 uF; similar to Murata GRM155R11E103KA01D.
C304	0.01 uF; similar to Murata GRM155R11E103KA01D.
C305	0.01 uF; similar to Murata GRM155R11E103KA01D.
C306	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C307	0.01 uF; similar to Murata GRM155R11E103KA01D.
C308	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C321	1 uF; similar to Taiyo Yuden LMK212BJ105KG-T.
C322	2200 pF; similar to Panasonic ECHU1C222GX5.
C323	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C324	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C325	2200 pF; similar to Panasonic ECHU1C222GX5.
C326	2200 pF; similar to Panasonic ECHU1C222GX5.
C328	2200 pF; similar to Panasonic ECHU1C222GX5.

SYMBOL	DESCRIPTION
C329	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C330	(Not mounted.)
C331	560 pF; similar to Murata GRM1552C1H561GA01D.
C332	220 pF; similar to Murata GRM1552C1H221GA01D.
C333	560 pF; similar to Murata GRM1552C1H561GA01D.
C334	220 pF; similar to Murata GRM1552C1H221GA01D.
C335	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C336	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C337	(Not mounted.)
C338	560 pF; similar to Murata GRM1552C1H561GA01D.
C339	220 pF; similar to Murata GRM1552C1H221GA01D.
C340	560 pF; similar to Murata GRM1552C1H561GA01D.
C341	220 pF; similar to Murata GRM1552C1H221GA01D.
C342	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C343	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C344	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C345	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C346	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C347	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C348	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C349	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C350	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C351	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C352	6 pF; similar to Murata GRM1552C1H6R0BZ01D.
C353	3.5 pF; similar to Murata GRM1553C1H3R5WA01D.
C354	5 pF; similar to Murata GRM1552C1H5R0BZ01D.
C355	8 pF; similar to Murata GRM1552C1H8R0WA01D.
C356	8 pF; similar to Murata GRM1552C1H8R0WA01D.
C357	6.5 pF; similar to Murata GRM1552C1H6R5FZ01D.
C358	6.5 pF; similar to Murata GRM1552C1H6R5FZ01D.
C359	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C360	8 pF; similar to Murata GRM1552C1H8R0WA01D.
C361	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C362	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C363	4 pF; similar to Taiyo Yuden UMK105CH040CW-F.
C364	4 pF; similar to Taiyo Yuden UMK105CH040CW-F.
C365	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C371	4700 pF; similar to Panasonic ECHU1C472JX5.
C372	0.082 uF; similar to Panasonic ECHU1C823JX5.
C373	1000 pF; similar to Murata GRM1552C1H102JA01D.
C374	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.

SYMBOL	DESCRIPTION
C375	22 pF; similar to Murata GRM1552C1H220FZ01D.
C376	4 pF; similar to Murata GRM1552C1H4R0BZ01D.
C377	1 pF; similar to Murata GRM1554C1H1R0BA01D.
C378	0.01 uF; similar to Murata GRM155R11E103KA01D.
C379	0.01 uF; similar to Murata GRM155R11E103KA01D.
C380	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C381	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C382	22 pF; similar to Murata GRM1552C1H220FZ01D.
C383	39 pF; similar to Murata GRM1552C1H390FZ01D.
C384	47 pF; similar to Murata GRM1552C1H470FZ01D.
C385	2 pF; similar to Murata GRM1552C1H2R0BZ01D.
C386	0.01 uF; similar to Murata GRM155R11E103KA01D.
C387	18 pF; similar to Taiyo Yuden UMK105CH180JV-F.
C388	0.01 uF; similar to Murata GRM155R11E103KA01D.
C389	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C390	9 pF; similar to Taiyo Yuden UMK105CH090DV-F.
C391	27 pF; similar to Taiyo Yuden UMK105CH270JV-F.
C392	27 pF; similar to Taiyo Yuden UMK105CH270JV-F.
C397	0.01 uF; similar to Murata GRM155R11E103KA01D.
C398	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C399	10 uF; similar to Murata GRM31CR61C106KA88L.
C401	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C402	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C403	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C404	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C405	0.22 uF; similar to Murata GRM188R11C224KA01D.
C406	0.22 uF; similar to Murata GRM188R11C224KA01D.
C407	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C408	0.01 uF; similar to Panasonic ECHU1C103JX5.
C409	4.7 uF; similar to Nichicon F931C475MAA.
C410	10 uF; similar to Murata GRM31CR61C106KA88L.
C411	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C412	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C413	10 uF; similar to Murata GRM31CR61C106KA88L.
C414	0.68 uF; similar to Panasonic ECPU1C684MA5.
C415	0.022 uF; similar to Panasonic ECHU1C223JX5.
C416	0.1 uF; similar to Panasonic ECPU1C104MA5.
C417	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C418	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C419	0.047 uF; similar to Murata GRM188R11E473KA01D.
C421	0.01 uF; similar to Murata GRM155R11E103KA01D.

SYMBOL	DESCRIPTION
C422	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C423	220 uF; similar to Nippon Chemi-Con EMVY160ADA221MF80G.
C424	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C425	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C431	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C432	12 pF; similar to Murata GRM1552C1H120FZ01D.
C433	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C434	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C435	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C436	5.5 pF; similar to Murata GRM1552C1H5R5BA01D.
C437	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C438	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C439	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C440	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C441	10 pF; similar to Murata GRM1552C1H100FZ01D.
C442	7 pF; similar to Murata GRM1552C1H7R0WA01D.
C443	18 pF; similar to Murata GRM1552C1H180FA01D.
C444	27 pF; similar to Murata GRM1552C1H270FZ01D.
C445	1 pF; similar to Murata GRM1554C1H1R0BA01D.
C446	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C447	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C448	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C451	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C452	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C453	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C454	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C455	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C456	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C457	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C458	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C459	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C460	12 pF; similar to Taiyo Yuden UMK105CH120JV-F.
C461	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C462	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C463	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C464	1.5 pF; similar to Murata GRM1554C1H1R5WA01D.
C465	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C466	1 pF; similar to Murata GRM1554C1H1R0WA01D.
C467	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C468	0.5 pF; similar to Murata GRM1554C1HR50WA01D.
C469	2.5 pF; similar to Murata GRM1553C1H2R5WA01D.

SYMBOL	DESCRIPTION
C470	1 pF; similar to Murata GRM1554C1H1R0WA01D.
C471	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C472	1.3 pF; similar to Murata GRM1554C1H1R3WA01D.
C473	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C474	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C480	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C481	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C482	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C483	1.8 pF; similar to Murata GRM1554C1H1R8WA01D.
C484	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C485	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C486	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C487	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C491	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C492	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C493	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C494	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C495	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C496	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C497	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C501	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C502	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C503	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C504	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C505	0.22 uF; similar to Murata GRM188R11C224KA01D.
C506	0.22 uF; similar to Murata GRM188R11C224KA01D.
C507	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C508	4700 pF; similar to Panasonic ECHU1C472JX5.
C509	4.7 uF; similar to Nichicon F931C475MAA.
C510	10 uF; similar to Murata GRM31CR61C106KA88L.
C511	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C512	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C513	10 uF; similar to Murata GRM31CR61C106KA88L.
C514	0.68 uF; similar to Panasonic ECPU1C684MA5.
C515	0.022 uF; similar to Panasonic ECHU1C223JX5.
C516	0.1 uF; similar to Panasonic ECPU1C104MA5.
C517	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C518	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C519	0.047 uF; similar to Murata GRM188R11E473KA01D.
C521	0.01 uF; similar to Murata GRM155R11E103KA01D.
C522	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C523	220 uF; similar to Nippon Chemi-Con EMVY160ADA221MF80G.
C524	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C525	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C526	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C527	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C528	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C531	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C532	6 pF; similar to Murata GRM1552C1H6R0BZ01D.
C533	22 pF; similar to Murata GRM1552C1H220JZ01D.
C534	15 pF; similar to Murata GRM1552C1H150FZ01D.
C535	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C536	3 pF; similar to Murata GRM1553C1H3R0WA01D.
C537	7 pF; similar to Murata GRM1552C1H7R0BZ01D.
C538	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C539	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C540	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C541	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C542	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C543	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C544	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C545	9 pF; similar to Murata GRM1552C1H9R0FZ01D.
C546	7 pF; similar to Murata GRM1552C1H7R0FZ01D.
C547	1 pF; similar to Murata GRM1554C1H1R0CZ01D.
C548	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C549	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C550	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C551	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C552	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C561	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C562	8 pF; similar to Murata GRM1552C1H8R0BZ01D.
C563	22 pF; similar to Murata GRM1552C1H220JZ01D.
C564	22 pF; similar to Murata GRM1552C1H220FZ01D.
C565	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C566	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C567	8 pF; similar to Murata GRM1552C1H8R0BZ01D.
C568	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C569	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C570	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C571	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C572	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C573	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C574	4 pF; similar to Murata GRM1552C1H4R0WA01D.
C575	10 pF; similar to Murata GRM1552C1H100FZ01D.
C576	10 pF; similar to Murata GRM1552C1H100FZ01D.
C577	1 pF; similar to Murata GRM1554C1H1R0CZ01D.
C578	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C579	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C581	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C582	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C583	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C584	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C585	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C586	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C587	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C588	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C589	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C590	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C591	9 pF; similar to Taiyo Yuden UMK105CH090DV-F.
C592	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C593	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C594	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C595	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C596	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C597	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C598	8 pF; similar to Taiyo Yuden UMK105CH080DV-F.
C601	(Not mounted.)
C602	(Not mounted.)
C603	(Not mounted.)
C604	(Not mounted.)
C605	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C606	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C607	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C608	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C609	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C610	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C611	0.01 uF; similar to Murata GRM155R11E103KA01D.
C612	10 uF; similar to Murata GRM31CR61C106KA88L.
C613	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C614	(Not mounted.)
C615	(Not mounted.)
C616	(Not mounted.)
C620	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.

SYMBOL	DESCRIPTION
C621	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C622	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C623	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C624	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C625	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C626	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C627	0.1 uF; similar to Murata GRM188R11E104KA01D.
C628	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C629	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C630	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C631	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C632	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C633	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C634	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C635	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C636	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C637	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C638	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C639	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C640	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C641	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C642	(Not mounted.)
C643	(Not mounted.)
C644	(Not mounted.)
C645	(Not mounted.)
C646	(Not mounted.)
C647	(Not mounted.)
C648	(Not mounted.)
C649	(Not mounted.)
C650	0.01 uF; similar to Murata GRM155R11E103KA01D.
C651	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C652	0.01 uF; similar to Murata GRM155R11E103KA01D.
C653	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C654	(Not mounted.)
C701	0.33 uF; similar to Murata GRM219R71H334KA88D.
C702	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C703	0.01 uF; similar to Murata GRM155R11E103KA01D.
C704	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C705	0.33 uF; similar to Murata GRM219R71H334KA88D.
C706	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.

SYMBOL	DESCRIPTION
C707	0.01 uF; similar to Murata GRM155R11E103KA01D.
C708	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C709	0.33 uF; similar to Murata GRM219R71H334KA88D.
C710	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C711	0.01 uF; similar to Murata GRM155R11E103KA01D.
C712	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C713	0.33 uF; similar to Murata GRM219R71H334KA88D.
C714	10 uF; similar to Murata GRM31CR61C106KA88L.
C715	0.01 uF; similar to Murata GRM155R11E103KA01D.
C716	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C717	(Not mounted.)
C718	0.33 uF; similar to Murata GRM219R71H334KA88D.
C719	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C720	0.01 uF; similar to Murata GRM155R11E103KA01D.
C721	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C722	0.01 uF; similar to Murata GRM155R11E103KA01D.
C723	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C724	10 uF; similar to Murata GRM31CR61C106KA88L.
C725	0.01 uF; similar to Murata GRM155R11E103KA01D.
C726	0.22 uF; similar to Murata GRM188R11C224KA01D.
C727	0.01 uF; similar to Murata GRM155R11E103KA01D.
C728	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C729	10 uF; similar to Murata GRM31CR61C106KA88L.
C730	10 uF; similar to Murata GRM31CR61C106KA88L.
C731	0.33 uF; similar to Murata GRM219R71H334KA88D.
C732	Tantalum, Solid: 22 uF, 35V; similar to Nichicon F931V226MNC.
C733	0.01 uF; similar to Murata GRM155R11E103KA01D.
C734	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C735	10 uF; similar to Murata GRM31CR61C106KA88L.
C736	0.01 uF; similar to Murata GRM155R11E103KA01D.
C737	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C738	0.01 uF; similar to Murata GRM155R11E103KA01D.
C739	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C740	0.01 uF; similar to Murata GRM188R11H103KA01D.
C741	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C742	0.01 uF; similar to Murata GRM188R11H103KA01D.
C743	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C744	0.01 uF; similar to Murata GRM188R11H103KA01D.
C745	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C746	0.01 uF; similar to Murata GRM188R11H103KA01D.

SYMBOL	DESCRIPTION
C747	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C748	0.1 uF; similar to Murata GRM188R11H104KA93D.
C749	(Not mounted.)
C750	(Not mounted.)
C751	0.1 uF; similar to Murata GRM188R11H104KA93D.
C752	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C753	(Not mounted.)
C754	(Not mounted.)
C755	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C756	(Not mounted.)
C757	(Not mounted.)
C758	(Not mounted.)
C759	(Not mounted.)
C760	(Not mounted.)
C761	(Not mounted.)
C762	(Not mounted.)
C763	(Not mounted.)
C764	(Not mounted.)
C765	(Not mounted.)
C766	(Not mounted.)
C767	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C768	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C769	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C770	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C771	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C772	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C773	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C774	(Not mounted.)
C775	(Not mounted.)
C776	(Not mounted.)
C777	(Not mounted.)
C778	(Not mounted.)
C779	(Not mounted.)
C780	(Not mounted.)
C781	0.01 uF; similar to Murata GRM188R11H103KA01D.
C782	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C801	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C802	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C803	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C804	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C805	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.

SYMBOL	DESCRIPTION
C806	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C807	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C808	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C809	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C810	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C811	0.22 uF; similar to Murata GRM188R11C224KA01D.
C812	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C813	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C814	0.01 uF; similar to Murata GRM155R11E103KA01D.
C815	0.01 uF; similar to Murata GRM155R11E103KA01D.
C816	0.22 uF; similar to Murata GRM188B11C224KA01D.
C817	1 uF; similar to Taiyo Yuden EMK107BJ105KA-T.
C818	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C819	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C820	0.01 uF; similar to Murata GRM155R11E103KA01D.
C821	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C822	15 pF; similar to Taiyo Yuden UMK105CH150JV-F.
C823	0.01 uF; similar to Murata GRM155R11E103KA01D.
C824	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C825	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C826	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C827	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C828	2200 pF; similar to Taiyo Yuden UMK105BJ222KV-F.
C829	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C830	100 pF; similar to Taiyo Yuden UMK105CH101JV-F.
C831	180 pF; similar to Taiyo Yuden UMK105CH181JV-F.
C832	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C833	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C834	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C1101	1000 pF; similar to Murata GRM2192C2A102JA01D.
C1102	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1103	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1110	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1111	(Not mounted.)
C1170	1000 pF; similar to Murata GRM2192C2A102JA01D.
C1171	1000 pF; similar to Murata GRM1882C1H102JA01D.
C1190	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1191	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1192	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1193	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1194	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.

SYMBOL	DESCRIPTION
C1201	(Not mounted.)
C1240	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1241	(Not mounted.)
C1301	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1302	(Not mounted.)
C1303	0.1 uF; similar to Taiyo Yuden TMK105BJ104KV-F.
C1350	2 pF; similar to Murata GRM1554C1H2R0WA01D.
C1351	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C1352	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C1371	0.01 uF; similar to Murata GRM155R11E103KA01D.
C1372	(Not mounted.)
C1373	(Not mounted.)
C1375	(Not mounted.)
C1376	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1377	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1401	(Not mounted.)
C1402	(Not mounted.)
C1403	(Not mounted.)
C1404	(Not mounted.)
C1410	(Not mounted.)
C1411	(Not mounted.)
C1412	(Not mounted.)
C1421	(Not mounted.)
C1422	(Not mounted.)
C1431	(Not mounted.)
C1433	(Not mounted.)
C1434	(Not mounted.)
C1437	(Not mounted.)
C1452	(Not mounted.)
C1456	(Not mounted.)
C1457	(Not mounted.)
C1458	4 pF; similar to Taiyo Yuden UMK105CH040CW-F.
C1459	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1460	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1491	(Not mounted.)
C1492	(Not mounted.)
C1493	(Not mounted.)
C1501	(Not mounted.)
C1502	(Not mounted.)
C1503	(Not mounted.)
C1504	(Not mounted.)

SYMBOL	DESCRIPTION
C1510	(Not mounted.)
C1511	(Not mounted.)
C1512	(Not mounted.)
C1521	(Not mounted.)
C1522	(Not mounted.)
C1523	(Not mounted.)
C1524	(Not mounted.)
C1525	(Not mounted.)
C1527	(Not mounted.)
C1534	10 pF; similar to Murata GRM1552C1H100FZ01D.
C1535	1000 pF; similar to Taiyo Yuden UMK105BJ102KV-F.
C1564	18 pF; similar to Murata GRM1552C1H180FA01D.
C1565	(Not mounted.)
C1566	(Not mounted.)
C1568	2 pF; similar to Taiyo Yuden UMK105CK020CW-F.
C1569	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1570	10 pF; similar to Taiyo Yuden UMK105CH100DV-F.
C1740	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1741	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1780	0.1 uF; similar to Murata GRM188R11H104KA93D.
C1801	(Not mounted.)
----- DIODES -----	
CD101	Similar to Avago HSMP-3864-TR1G.
CD102	Similar to Avago HSMP-3864-TR1G.
CD103	Similar to Renesas HSU88TRF-E.
CD104	Similar to Renesas HSM88ASTL-E.
CD105	Similar to Renesas HSM88ASTL-E.
CD106	Similar to Renesas HSM88ASTL-E.
CD110	(Not mounted.)
CD111	Similar to LITEC L709CER.
CD112	Similar to LITEC L709CER.
CD113	Similar to Toshiba 1SS302(TE85L_F).
CD114	Similar to LITEC L709CER.
CD115	Similar to LITEC L709CER.
CD116	Similar to LITEC L709CER.
CD117	Similar to LITEC L709CER.
CD118	(Not mounted.)
CD119	Similar to Renesas HSU88TRF-E.
CD201	Similar to Renesas HVC383BTRF-E.
CD202	Similar to Renesas RKS151KJ-P1.
CD203	Similar to Renesas RKS151KJ-P1.

SYMBOL	DESCRIPTION
CD204	Similar to Renesas HVC383BTRF-E.
CD205	Similar to Renesas HVC383BTRF-E.
CD206	Similar to Renesas RKS151KJ-P1.
CD207	Similar to Renesas RKS151KJ-P1.
CD208	Similar to Renesas HVC383BTRF-E.
CD209	Similar to Renesas HSM88ASTL-E.
CD210	Similar to Avago HSMP-3864-TR1G.
CD211	Similar to Avago HSMP-3864-TR1G.
CD371	Similar to Toshiba 1SV276(TPH3_F).
CD372	Similar to Toshiba 1SS381(TPL3_F).
CD401	Similar to NEC RD2.4S-T2-A.
CD402	Similar to Renesas HSU88TRF-E.
CD431	(Not mounted.)
CD432	Similar to Renesas HVC383BTRF-E.
CD433	(Not mounted.)
CD434	Similar to Renesas HVC383BTRF-E.
CD435	Similar to Toshiba 1SS381(TPL3_F).
CD436	Similar to Toshiba 1SS381(TPL3_F).
CD437	Similar to Toshiba 1SS381(TPL3_F).
CD438	Similar to Toshiba 1SS381(TPL3_F).
CD461	Similar to Renesas HVC383BTRF-E.
CD462	Similar to Renesas HVC383BTRF-E.
CD463	Similar to Renesas HVC383BTRF-E.
CD464	Similar to Renesas HVC383BTRF-E.
CD501	Similar to NEC RD2.4S-T2-A.
CD502	Similar to Renesas HSU88TRF-E.
CD531	Similar to Renesas HVC383BTRF-E.
CD532	(Not mounted.)
CD533	Similar to Renesas HVC383BTRF-E.
CD534	(Not mounted.)
CD535	Similar to Toshiba 1SS381(TPL3_F).
CD536	Similar to Toshiba 1SS381(TPL3_F).
CD537	Similar to Toshiba 1SS381(TPL3_F).
CD538	Similar to Toshiba 1SS381(TPL3_F).
CD539	Similar to Toshiba 1SS381(TPL3_F).
CD540	Similar to Toshiba 1SS381(TPL3_F).
CD561	Similar to Renesas HVC383BTRF-E.
CD562	(Not mounted.)
CD563	Similar to Renesas HVC383BTRF-E.
CD564	(Not mounted.)
CD565	Similar to Toshiba 1SS381(TPL3_F).

SYMBOL	DESCRIPTION
CD566	Similar to Toshiba 1SS381(TPL3_F).
CD567	Similar to Toshiba 1SS381(TPL3_F).
CD568	Similar to Toshiba 1SS381(TPL3_F).
CD569	Similar to Toshiba 1SS381(TPL3_F).
CD570	Similar to Toshiba 1SS381(TPL3_F).
CD601	(Not mounted.)
CD701	Similar to SHINDENGEN D1F60-5053.
CD702	Similar to SHINDENGEN DF25V60-5072.
CD801	Similar to TOKO KV1870STL-G.
CD1371	(Not mounted.)
CD1431	(Not mounted.)
CD1432	(Not mounted.)
-----VARIABLE CAPACITORS-----	
CV201	Similar to SANSIN TC03C030A-TP02.
CV202	Similar to SANSIN TC03C030A-TP02.
CV203	Similar to SANSIN TC03C030A-TP02.
CV204	Similar to SANSIN TC03C030A-TP02.
CV431	Similar to Murata TZY2Z100A001R00.
CV531	Similar to Murata TZY2Z100A001R00.
CV561	Similar to Murata TZY2Z100A001R00.
----- FILTERS-----	
FL201	Similar to NDK H-7XMPD0026.
FL202	Similar to NDK H-7XMPD0027.
FL601	Similar to Murata BLA2ABD601SN4D.
FL602	Similar to Murata BLM18BD601SN1D.
FL603	Similar to Murata BLM18BD601SN1D.
FL604	Similar to Murata BLM18BD601SN1D.
FL605	Similar to Murata BLM18BD601SN1D.
FL606	Similar to Murata BLM18BD601SN1D.
FL607	Similar to Murata BLA2ABD601SN4D.
FL608	Similar to Murata BLA2ABD601SN4D.
FL609	Similar to Murata BLM18BD601SN1D.
FL610	Similar to Murata BLM18BD601SN1D.
----- INTEGRATED CIRCUITS -----	
IC101	PA Module; similar to Mitsubishi RA60H4452M1-138. <i>See Table 8-4 which begins on page 20 for Harris part number.</i>
IC102	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC103	Similar to Toshiba TC4W53FU(TE12L_F).
IC201	Similar to Linear Technology LTC5507ES6#TRPBF.
IC202	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC301	Similar to AKM AK4386VT-E2.

SYMBOL	DESCRIPTION
IC302	Similar to CYPRESS H-7DLPD0023B.
IC303	Similar to Toshiba TC74VHC4040FK(EL,K).
IC304	Similar to Toshiba TC74VHC74FK(EL,K).
IC305	Similar to Analog Devices AD5304ARMZ-REEL7.
IC306	Similar to New JRC NJM3404AV(TE1)-#ZZZB.
IC321	Similar to New JRC NJM2746RB1(TE1)-#ZZZB.
IC322	Similar to New JRC NJM2746RB1(TE1)-#ZZZB.
IC323	Similar to New JRC NJM2746RB1(TE1)-#ZZZB.
IC324	Similar to Analog Devices ADL5385ACPZ-R7.
IC401	Similar to AKM AK1541-L.
IC402	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC403	Similar to New JRC NJM3404AV(TE1)-#ZZZB.
IC501	Similar to AKM AK1541-L.
IC502	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC503	Similar to New JRC NJM3404AV(TE1)-#ZZZB.
IC601	Similar to CYGNAL INTEGRATED H-7DLPD0029.
IC602	Similar to Toshiba TC7S04FU(TE85L_F).
IC603	Similar to Toshiba TC74VHC125FT(EL).
IC605	Similar to New JRC NJM2741F3(TE1)-#ZZZB.
IC606	Similar to New JRC NJM2125F(TE1)-#ZZZB.
IC701	Similar to Rohm BA09FP-E2.
IC702	Similar to Rohm BA09FP-E2.
IC703	Similar to Rohm BA09FP-E2.
IC704	Similar to New JRC NJM7805DL1A(TE1)-#ZZZB.
IC705	Similar to Rohm BA09FP-E2.
IC706	Similar to New JRC NJM78L05UA(TE1)-#ZZZB.
IC707	Similar to TOKO TK11233CUCB-G.
IC708	Similar to Rohm BA09FP-E2.
IC709	Similar to New JRC NJM78L05UA(TE1)-#ZZZB.
IC710	Similar to RICOH R1114D301B-TR-F.
IC801	Similar to Analog Devices AD9864BCPZRL.
----- CONNECTORS -----	
J701	Similar to SUYIN CONNECTOR 127180MA040G200ZR.
----- INDUCTORS -----	
L101	270 nH; similar to TOKO LLQ1608-FR27G.
L102	270 nH; similar to TOKO LLQ1608-FR27G.
L103	270 nH; similar to TOKO LLQ1608-FR27G.
L104	18 nH; similar to TOKO LL1005-FHL18NJ.
L105	18 nH; similar to TOKO LL1005-FHL18NJ.
L106	39 nH; similar to TOKO LL1005-FHL39NJ.

SYMBOL	DESCRIPTION
L107	18 nH; similar to TOKO LL1005-FHL18NJ.
L108	18 nH; similar to TOKO LL1005-FHL18NJ.
L109	39 nH; similar to TOKO LL1005-FHL39NJ.
L110	10 nH; similar to TOKO LL1005-FHL10NJ.
L111	27 nH; similar to TOKO LLQ2012-F27NJ.
L112	18 nH; similar to TOKO LL1608-FSL18NJ.
L113	18.9 nH; similar to KORIN AS030421-18R9NJ-T.
L114	18.9 nH; similar to KORIN AS030421-18R9NJ-T.
L115	160 nH; similar to KORIN AS050847-160NJ-T.
L116	56 nH; similar to KORIN AS080647-56NJ.
L117	10.4 nH; similar to KORIN AS100340-10R4NJ-T.
L118	10.4 nH; similar to KORIN AS100340-10R4NJ-T.
L119	10.4 nH; similar to KORIN AS100340-10R4NJ-T.
L120	11.4 nH; similar to KORIN AS050327-11R4NJ-T.
L121	11.4 nH; similar to KORIN AS050327-11R4NJ-T.
L122	220 nH; similar to TOKO LLQ2012-FR22J.
L123	0 ohm; similar to Panasonic ERJ6GEY0R00V.
L201	22.4 nH; similar to KORIN AS080440-22R4NJ-T.
L202	15.5 nH; similar to KORIN AS080340-15R5NJ-T.
L203	10 nH; similar to TOKO LL1005-FHL10NJ.
L204	12 nH; similar to TOKO LL1005-FHL12NJ.
L205	5 nH; similar to COILCRAFT A02TGLC.
L206	330 nH; similar to TOKO LLQ2012-FR33J.
L207	330 nH; similar to TOKO LLQ2012-FR33J.
L208	5 nH; similar to COILCRAFT A02TGLC.
L209	12 nH; similar to TOKO LL1005-FHL12NJ.
L210	15 nH; similar to TOKO LL1005-FHL15NJ.
L211	5 nH; similar to COILCRAFT A02TGLC.
L212	330 nH; similar to TOKO LLQ2012-FR33J.
L213	330 nH; similar to TOKO LLQ2012-FR33J.
L214	5 nH; similar to COILCRAFT A02TGLC.
L215	820 nH; similar to TOKO LLQ2012-FR82J.
L216	330 nH; similar to TOKO LLQ2012-FR33J.
L217	220 nH; similar to TOKO LLQ2012-FR22J.
L218	680 nH; similar to TOKO LLQ2012-FR68J.
L219	220 nH; similar to TOKO LLQ2012-FR22J.
L220	220 nH; similar to TOKO LLQ2012-FR22J.
L221	820 nH; similar to TOKO LLQ2012-FR82J.
L222	820 nH; similar to TOKO LLQ2012-FR82J.
L223	820 nH; similar to TOKO LLQ2012-FR82J.
L224	270 nH; similar to TOKO LL1608-FSLR27J.

SYMBOL	DESCRIPTION
L225	270 nH; similar to TOKO LL1608-FSLR27J.
L226	(Not mounted.)
L227	220 nH; similar to TOKO LL1608-FSLR22J.
L301	1 uH; similar to Murata LQH31MN1R0K03L.
L321	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L322	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L323	8.2 nH; similar to TOKO LLQ1608-F8N2G.
L324	8.2 nH; similar to TOKO LLQ1608-F8N2G.
L325	22 nH; similar to TOKO LL1005-FHL22NJ.
L371	4.7 uH; similar to Murata LQH31MN4R7J03L.
L372	4.7 uH; similar to Murata LQH31MN4R7J03L.
L373	150 nH; similar to TOKO LLQ2012-FR15G.
L374	820 nH; similar to TOKO LLQ2012-FR82J.
L375	820 nH; similar to TOKO LLQ2012-FR82J.
L377	220 nH; similar to TOKO LL1608-FSLR22J.
L378	100 nH; similar to TOKO LL1608-FSLR10J.
L431	220 nH; similar to TOKO LLQ1608-FR22J.
L432	220 nH; similar to TOKO LLQ1608-FR22J.
L433	470 nH; similar to TOKO LLQ1608-FR47J.
L434	470 nH; similar to TOKO LLQ1608-FR47J.
L435	470 nH; similar to TOKO LLQ1608-FR47J.
L436	470 nH; similar to TOKO LLQ1608-FR47J.
L437	11 nH; similar to MIDORIMUSEN H-7LAPD0054.
L438	10 nH; similar to TOKO LL1005-FHL10NJ.
L439	10 nH; similar to TOKO LL1005-FHL10NJ.
L451	39 nH; similar to TOKO LL1005-FHL39NJ.
L452	33 nH; similar to TOKO LL1005-FHL33NJ.
L454	33 nH; similar to TOKO LL1608-FSL33NJ.
L455	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L456	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L457	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L458	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L459	6.8 nH; similar to TOKO LLQ1608-F6N8G.
L460	100 nH; similar to TOKO LLQ1608-FR10J.
L461	100 nH; similar to TOKO LLQ1608-FR10J.
L462	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L463	3.9 nH; similar to TOKO LLQ1608-F3N9J.
L531	220 nH; similar to TOKO LLQ1608-FR22J.
L532	220 nH; similar to TOKO LLQ1608-FR22J.
L533	220 nH; similar to TOKO LLQ1608-FR22J.
L534	220 nH; similar to TOKO LLQ1608-FR22J.

SYMBOL	DESCRIPTION
L535	220 nH; similar to TOKO LLQ1608-FR22J.
L536	220 nH; similar to TOKO LLQ1608-FR22J.
L537	220 nH; similar to TOKO LLQ1608-FR22J.
L538	220 nH; similar to TOKO LLQ1608-FR22J.
L539	Resonator; similar to MARUWA H-7LZPD0013.
L540	220 nH; similar to TOKO LLQ1608-FR22J.
L541	220 nH; similar to TOKO LLQ1608-FR22J.
L561	220 nH; similar to TOKO LLQ1608-FR22J.
L562	220 nH; similar to TOKO LLQ1608-FR22J.
L563	220 nH; similar to TOKO LLQ1608-FR22J.
L564	220 nH; similar to TOKO LLQ1608-FR22J.
L565	220 nH; similar to TOKO LLQ1608-FR22J.
L566	220 nH; similar to TOKO LLQ1608-FR22J.
L567	220 nH; similar to TOKO LLQ1608-FR22J.
L568	220 nH; similar to TOKO LLQ1608-FR22J.
L569	Resonator; similar to MARUWA H-7LZPD0013.
L570	220 nH; similar to TOKO LLQ1608-FR22J.
L571	220 nH; similar to TOKO LLQ1608-FR22J.
L581	39 nH; similar to TOKO LL1005-FHL39NJ.
L582	27 nH; similar to TOKO LL1005-FHL27NJ.
L584	27 nH; similar to TOKO LL1608-FSL27NJ.
L585	18 nH; similar to TOKO LLQ2012-F18NJ.
L586	15 nH; similar to TOKO LLQ2012-F15NJ.
L701	1 uH; similar to Murata LQH31MN1R0K03L.
L702	1 uH; similar to Murata LQH31MN1R0K03L.
L801	1.2 uH; similar to Murata LQH31MN1R2K03L.
L802	390 nH; similar to Taiyo Yuden LK1005_R39K-T.
L803	10 uH; similar to Murata LQH32CN100K23L.
L804	10 uH; similar to Murata LQH32CN100K23L.
L1350	3.3 nH; similar to TOKO LL1005-FHL3N3S.
L1371	(Not mounted.)
L1421	(Not mounted.)
L1431	(Not mounted.)
L1432	(Not mounted.)
L1435	15 nH; similar to TOKO LL1005-FHL15NJ.
L1521	(Not mounted.)
L1563	15 nH; similar to TOKO LL1005-FHL15NJ.
	-----INTEGRATED CIRCUIT -----
MIX201	Mixer; similar to MINI-CIRCUITS ADE-1HW-3+-TR.
	-----RESISTORS -----
R101	18 ohm; similar to Panasonic ERJ2GEJ180X.

SYMBOL	DESCRIPTION
R102	270 ohm; similar to Panasonic ERJ2GEJ271X.
R103	270 ohm; similar to Panasonic ERJ2GEJ271X.
R104	560 ohm; similar to Panasonic ERJ2GEJ561X.
R105	150 ohm; similar to Panasonic ERJ2GEJ151X.
R106	560 ohm; similar to Panasonic ERJ2GEJ561X.
R107	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R108	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R109	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R110	560 ohm; similar to Panasonic ERJ2GEJ561X.
R111	18 ohm; similar to Panasonic ERJ2GEJ180X.
R112	270 ohm; similar to Panasonic ERJ2GEJ271X.
R113	270 ohm; similar to Panasonic ERJ2GEJ271X.
R114	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R115	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R116	1k ohm; similar to Panasonic ERJ2GEJ102X.
R117	10 ohm; similar to Panasonic ERJ2GEJ100X.
R118	33 ohm; similar to Panasonic ERJ6GEYJ330V.
R119	18 ohm; similar to Panasonic ERJ2GEJ180X.
R120	270 ohm; similar to Panasonic ERJ2GEJ271X.
R121	270 ohm; similar to Panasonic ERJ2GEJ271X.
R122	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R123	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R124	1k ohm; similar to Panasonic ERJ2GEJ102X.
R125	10 ohm; similar to Panasonic ERJ2GEJ100X.
R126	33 ohm; similar to Panasonic ERJ6GEYJ330V.
R127	18 ohm; similar to Panasonic ERJ2GEJ180X.
R128	270 ohm; similar to Panasonic ERJ2GEJ271X.
R129	270 ohm; similar to Panasonic ERJ2GEJ271X.
R130	0 ohm; similar to Panasonic ERJ2GE0R00X.
R131	5.6 ohm; similar to Panasonic ERJ2GEJ5R6X.
R132	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R133	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R134	390 ohm; similar to Panasonic ERJ2GEJ391X.
R135	68 ohm; similar to Panasonic ERJ2GEJ680X.
R136	0 ohm; similar to Panasonic ERJ14Y0R00U.
R137	18 ohm; similar to Panasonic ERJ2GEJ180X.
R138	270 ohm; similar to Panasonic ERJ2GEJ271X.
R139	270 ohm; similar to Panasonic ERJ2GEJ271X.
R140	560 ohm; similar to Panasonic ERJ2GEJ561X.
R141	680 ohm; similar to Panasonic ERJ2GEJ681X.
R142	82 ohm; similar to Panasonic ERJ6GEYJ820V.

SYMBOL	DESCRIPTION
R143	82 ohm; similar to Panasonic ERJ6GEYJ820V.
R144	68 ohm; similar to Panasonic ERJ6GEYJ680V.
R145	82 ohm; similar to Panasonic ERJ6GEYJ820V.
R146	100k ohm; similar to Panasonic ERJ2GEJ104X.
R147	100k ohm; similar to Panasonic ERJ2GEJ104X.
R148	100k ohm; similar to Panasonic ERJ2GEJ104X.
R149	39k ohm; similar to Panasonic ERJ2GEJ393X.
R150	0 ohm; similar to Panasonic ERJ2GE0R00X.
R151	1k ohm; similar to Panasonic ERJ2GEJ102X.
R152	820 ohm; similar to Panasonic ERJ2GEJ821X.
R153	27k ohm; similar to Panasonic ERJ2GEJ273X.
R154	1k ohm; similar to Panasonic ERJ2GEJ102X.
R155	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R156	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R157	820 ohm; similar to Panasonic ERJ2GEJ821X.
R158	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R159	56k ohm; similar to Panasonic ERJ2GEJ563X.
R160	0 ohm; similar to Panasonic ERJ2GE0R00X.
R161	(Not mounted.)
R162	0 ohm; similar to Panasonic ERJ2GE0R00X.
R163	10k ohm; similar to Panasonic ERJ2GEJ103X.
R164	47k ohm; similar to Panasonic ERJ2GEJ473X.
R165	120 ohm; similar to Panasonic ERJ1TYJ121U.
R166	120 ohm; similar to Panasonic ERJ1TYJ121U.
R167	(Not mounted.)
R168	1k ohm; similar to Panasonic ERJ2GEJ102X.
R169	100k ohm; similar to Panasonic ERJ2GEJ104X.
R171	33k ohm; similar to Panasonic ERJ2GEJ333X.
R172	(Not mounted.)
R173	100k ohm; similar to Panasonic ERJ14YJ104U.
R174	8.2k ohm; similar to Panasonic ERJ2GEJ822X.
R175	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R176	8.2k ohm; similar to Panasonic ERJ2GEJ822X.
R177	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R178	(Not mounted.)
R179	100 ohm; similar to Panasonic ERJ2GEJ101X.
R180	33k ohm; similar to Panasonic ERJ2GEJ333X.
R181	120 ohm; similar to Panasonic ERJ1TYJ121U.
R201	10 ohm; similar to Panasonic ERJ2GEJ100X.
R202	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R203	1k ohm; similar to Panasonic ERJ2GEJ102X.

SYMBOL	DESCRIPTION
R204	47 ohm; similar to Panasonic ERJ6GEYJ470V.
R205	18 ohm; similar to Panasonic ERJ2GEJ180X.
R206	270 ohm; similar to Panasonic ERJ2GEJ271X.
R207	270 ohm; similar to Panasonic ERJ2GEJ271X.
R208	56k ohm; similar to Panasonic ERJ2GEJ563X.
R209	1k ohm; similar to Panasonic ERJ2GEJ102X.
R210	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R211	56k ohm; similar to Panasonic ERJ2GEJ563X.
R212	10 ohm; similar to Panasonic ERJ8GEYJ100V.
R213	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R214	1k ohm; similar to Panasonic ERJ2GEJ102X.
R215	10 ohm; similar to Panasonic ERJ8GEYJ100V.
R216	56k ohm; similar to Panasonic ERJ2GEJ563X.
R217	1k ohm; similar to Panasonic ERJ2GEJ102X.
R218	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R219	56k ohm; similar to Panasonic ERJ2GEJ563X.
R220	1.5k ohm; similar to Panasonic ERJ6GEYJ152V.
R221	18 ohm; similar to Panasonic ERJ2GEJ180X.
R222	270 ohm; similar to Panasonic ERJ2GEJ271X.
R223	270 ohm; similar to Panasonic ERJ2GEJ271X.
R224	12 ohm; similar to Panasonic ERJ2GEJ120X.
R225	470 ohm; similar to Panasonic ERJ2GEJ471X.
R226	470 ohm; similar to Panasonic ERJ2GEJ471X.
R227	(Not mounted.)
R228	(Not mounted.)
R229	(Not mounted.)
R230	56 ohm; similar to Panasonic ERJ2GEJ560X.
R231	10 ohm; similar to Panasonic ERJ2GEJ100X.
R232	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R233	0 ohm; similar to Panasonic ERJ2GE0R00X.
R234	(Not mounted.)
R235	(Not mounted.)
R236	470 ohm; similar to Panasonic ERJ2GEJ471X.
R237	330 ohm; similar to Panasonic ERJ2GEJ331X.
R238	330k ohm; similar to Panasonic ERJ2GEJ334X.
R239	(Not mounted.)
R240	270 ohm; similar to Panasonic ERJ2GEJ271X.
R241	10 ohm; similar to Panasonic ERJ2GEJ100X.
R242	(Not mounted.)
R243	0 ohm; similar to Panasonic ERJ2GE0R00X.
R244	(Not mounted.)

SYMBOL	DESCRIPTION
R245	(Not mounted.)
R246	560 ohm; similar to Panasonic ERJ2GEJ561X.
R247	330 ohm; similar to Panasonic ERJ2GEJ331X.
R248	330k ohm; similar to Panasonic ERJ2GEJ334X.
R249	(Not mounted.)
R250	390 ohm; similar to Panasonic ERJ2GEJ391X.
R251	10 ohm; similar to Panasonic ERJ2GEJ100X.
R252	(Not mounted.)
R253	0 ohm; similar to Panasonic ERJ2GE0R00X.
R254	(Not mounted.)
R255	(Not mounted.)
R257	560 ohm; similar to Panasonic ERJ2GEJ561X.
R258	390 ohm; similar to Panasonic ERJ2GEJ391X.
R259	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R260	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R261	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R262	680 ohm; similar to Panasonic ERJ2GEJ681X.
R263	560 ohm; similar to Panasonic ERJ2GEJ561X.
R264	18 ohm; similar to Panasonic ERJ2GEJ180X.
R265	18 ohm; similar to Panasonic ERJ2GEJ180X.
R266	18 ohm; similar to Panasonic ERJ2GEJ180X.
R267	(Not mounted.)
R268	47 ohm; similar to Panasonic ERJ2GEJ470X.
R269	100k ohm; similar to Panasonic ERJ2GEJ104X.
R270	(Not mounted.)
R271	22k ohm; similar to Panasonic ERJ2GEJ223X.
R272	68 ohm; similar to Panasonic ERJ2GEJ680X.
R273	1.2k ohm; similar to Panasonic ERJ2GEJ122X.
R274	1k ohm; similar to Panasonic ERJ2GEJ102X.
R275	15k ohm; similar to Panasonic ERJ2GEJ153X.
R276	1k ohm; similar to Panasonic ERJ2GEJ102X.
R277	82k ohm; similar to Panasonic ERJ2GEJ823X.
R278	(Not mounted.)
R301	10k ohm; similar to Panasonic EXB28V103JX.
R302	10k ohm; similar to Panasonic ERJ2GEJ103X.
R303	10k ohm; similar to Panasonic ERJ2GEJ103X.
R304	10k ohm; similar to Panasonic ERJ2GEJ103X.
R306	10k ohm; similar to Panasonic ERJ2GEJ103X.
R307	15k ohm; similar to Panasonic ERJ2GEJ153X.
R308	1k ohm; similar to Panasonic ERJ2GEJ102X.
R309	10k ohm; similar to Panasonic ERJ2GEJ103X.

SYMBOL	DESCRIPTION
R310	15k ohm; similar to Panasonic ERJ2GEJ153X.
R311	1k ohm; similar to Panasonic ERJ2GEJ102X.
R321	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R322	10k ohm; similar to Panasonic ERJ2RKF1002X.
R323	10k ohm; similar to Panasonic ERJ2GEJ103X.
R324	10k ohm; similar to Panasonic ERJ2RKF1002X.
R325	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R326	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R327	10k ohm; similar to Panasonic ERJ2RKF1002X.
R328	10k ohm; similar to Panasonic ERJ2GEJ103X.
R329	10k ohm; similar to Panasonic ERJ2RKF1002X.
R330	2.2k ohm; similar to Panasonic ERJ2RKF2201X.
R331	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R332	10k ohm; similar to Panasonic ERJ2RKF1002X.
R333	18k ohm; similar to Panasonic ERJ2RKF1802X.
R334	10k ohm; similar to Panasonic ERJ2RKF1002X.
R335	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R336	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R337	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R338	10k ohm; similar to Panasonic ERJ2RKF1002X.
R339	18k ohm; similar to Panasonic ERJ2RKF1802X.
R340	10k ohm; similar to Panasonic ERJ2RKF1002X.
R341	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R342	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R343	56k ohm; similar to Panasonic ERJ2RKF5602X.
R344	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R345	10k ohm; similar to Panasonic ERJ2RKF1002X.
R346	18k ohm; similar to Panasonic ERJ2RKF1802X.
R347	10k ohm; similar to Panasonic ERJ2RKF1002X.
R348	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R349	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R350	2.7k ohm; similar to Panasonic ERJ2RKF2701X.
R351	10k ohm; similar to Panasonic ERJ2RKF1002X.
R352	18k ohm; similar to Panasonic ERJ2RKF1802X.
R353	10k ohm; similar to Panasonic ERJ2RKF1002X.
R354	3.3k ohm; similar to Panasonic ERJ2RKF3301X.
R355	1.2k ohm; similar to Panasonic ERJ2RKF1201X.
R356	56k ohm; similar to Panasonic ERJ2RKF5602X.
R357	24 ohm; similar to Panasonic ERJ2GEJ240X.
R358	330 ohm; similar to Panasonic ERJ2GEJ331X.
R359	330 ohm; similar to Panasonic ERJ2GEJ331X.

SYMBOL	DESCRIPTION
R360	18k ohm; similar to Panasonic ERJ2GEJ183X.
R361	18k ohm; similar to Panasonic ERJ2GEJ183X.
R362	18k ohm; similar to Panasonic ERJ2GEJ183X.
R371	4.3k ohm; similar to Panasonic ERJ2GEJ432X.
R372	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R373	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R374	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R375	10k ohm; similar to Panasonic ERJ2GEJ103X.
R376	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R377	2.7k ohm; similar to Panasonic ERJ2GEJ272X.
R378	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R379	560 ohm; similar to Panasonic ERJ2GEJ561X.
R380	33 ohm; similar to Panasonic ERJ2GEJ330X.
R381	220 ohm; similar to Panasonic ERJ2GEJ221X.
R382	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R389	330 ohm; similar to Panasonic ERJ14YJ331U.
R401	27k ohm; similar to Panasonic ERJ2GEJ273X.
R402	(Not mounted.)
R403	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R404	22 ohm; similar to Panasonic ERJ2GEJ220X.
R405	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R406	47 ohm; similar to Panasonic ERJ2GEJ470X.
R407	1k ohm; similar to Panasonic ERJ2GEJ102X.
R408	820 ohm; similar to Panasonic ERJ2GEJ821X.
R409	330 ohm; similar to Panasonic ERJ12YJ331U.
R410	150k ohm; similar to Panasonic ERJ2GEJ154X.
R411	8.2k ohm; similar to Panasonic ERJ2GEJ822X.
R412	1k ohm; similar to Panasonic ERJ2GEJ102X.
R413	180 ohm; similar to Panasonic ERJ2GEJ181X.
R414	180 ohm; similar to Panasonic ERJ2GEJ181X.
R415	470 ohm; similar to Panasonic ERJ2GEJ471X.
R416	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R417	1000k ohm; similar to Panasonic ERJ2GEJ105X.
R421	330 ohm; similar to Panasonic ERJ14YJ331U.
R431	1.8k ohm; similar to KOA RN731ETTP1801F50.
R432	2.2k ohm; similar to KOA RN731ETTP2201F50.
R433	270 ohm; similar to KOA RN732ATTD2700F50.
R451	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R452	1.5k ohm; similar to Panasonic ERJ2GEJ152X.
R453	100 ohm; similar to Panasonic ERJ2GEJ101X.
R454	10 ohm; similar to Panasonic ERJ2GEJ100X.

SYMBOL	DESCRIPTION
R455	68 ohm; similar to Panasonic ERJ2GEJ680X.
R456	150 ohm; similar to Panasonic ERJ2GEJ151X.
R458	1k ohm; similar to Panasonic ERJ2GEJ102X.
R459	100k ohm; similar to Panasonic ERJ2GEJ104X.
R460	47 ohm; similar to Panasonic ERJ2GEJ470X.
R462	470 ohm; similar to Panasonic ERJ2GEJ471X.
R463	82k ohm; similar to Panasonic ERJ2GEJ823X.
R464	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R465	820 ohm; similar to Panasonic ERJ2GEJ821X.
R467	68 ohm; similar to Panasonic ERJ2GEJ680X.
R468	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R469	820 ohm; similar to Panasonic ERJ2GEJ821X.
R470	68 ohm; similar to Panasonic ERJ2GEJ680X.
R471	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R472	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R473	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R474	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R475	56k ohm; similar to Panasonic ERJ2GEJ563X.
R476	56k ohm; similar to Panasonic ERJ2GEJ563X.
R491	470 ohm; similar to Panasonic ERJ2GEJ471X.
R492	150k ohm; similar to Panasonic ERJ2GEJ154X.
R501	27k ohm; similar to Panasonic ERJ2GEJ273X.
R502	(Not mounted.)
R503	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R504	22 ohm; similar to Panasonic ERJ2GEJ220X.
R505	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R506	47 ohm; similar to Panasonic ERJ2GEJ470X.
R507	1k ohm; similar to Panasonic ERJ2GEJ102X.
R508	820 ohm; similar to Panasonic ERJ2GEJ821X.
R509	330 ohm; similar to Panasonic ERJ12YJ331U.
R510	150k ohm; similar to Panasonic ERJ2GEJ154X.
R511	8.2k ohm; similar to Panasonic ERJ2GEJ822X.
R512	1k ohm; similar to Panasonic ERJ2GEJ102X.
R513	180 ohm; similar to Panasonic ERJ2GEJ181X.
R514	180 ohm; similar to Panasonic ERJ2GEJ181X.
R515	470 ohm; similar to Panasonic ERJ2GEJ471X.
R516	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R517	1M ohm; similar to Panasonic ERJ2GEJ105X.
R521	330 ohm; similar to Panasonic ERJ14YJ331U.
R522	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R523	560 ohm; similar to Panasonic ERJ8GEYJ561V.

SYMBOL	DESCRIPTION
R524	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R525	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R526	4.7k ohm; similar to Panasonic ERJ2GEJ472X.
R527	560 ohm; similar to Panasonic ERJ8GEYJ561V.
R531	6.8k ohm; similar to KOA RN731ETTP6801F50.
R532	2.2k ohm; similar to KOA RN731ETTP2201F50.
R533	82 ohm; similar to KOA RN732ATTD82R0F50.
R561	6.8k ohm; similar to KOA RN731ETTP6801F50.
R562	2.2k ohm; similar to KOA RN731ETTP2201F50.
R563	82 ohm; similar to KOA RN732ATTD82R0F50.
R564	3.9k ohm; similar to Panasonic ERJ2GEJ392X.
R581	18 ohm; similar to Panasonic ERJ2GEJ180X.
R582	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R583	1.5k ohm; similar to Panasonic ERJ2GEJ152X.
R584	120 ohm; similar to Panasonic ERJ2GEJ121X.
R585	10 ohm; similar to Panasonic ERJ2GEJ100X.
R586	68 ohm; similar to Panasonic ERJ2GEJ680X.
R587	150 ohm; similar to Panasonic ERJ2GEJ151X.
R589	1k ohm; similar to Panasonic ERJ2GEJ102X.
R590	100k ohm; similar to Panasonic ERJ2GEJ104X.
R591	47 ohm; similar to Panasonic ERJ2GEJ470X.
R593	390 ohm; similar to Panasonic ERJ2GEJ391X.
R594	47k ohm; similar to Panasonic ERJ2GEJ473X.
R595	18 ohm; similar to Panasonic ERJ2GEJ180X.
R596	6.8k ohm; similar to Panasonic ERJ2GEJ682X.
R597	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R598	33 ohm; similar to Panasonic ERJ6GEYJ330V.
R601	(Not mounted.)
R602	22k ohm; similar to Panasonic ERJ2GEJ223X.
R603	22k ohm; similar to Panasonic ERJ2GEJ223X.
R604	33k ohm; similar to Panasonic ERJ2GEJ333X.
R605	33k ohm; similar to Panasonic ERJ2GEJ333X.
R606	10k ohm; similar to Panasonic ERJ2GEJ103X.
R607	(Not mounted.)
R608	(Not mounted.)
R609	(Not mounted.)
R610	(Not mounted.)
R611	22k ohm; similar to Panasonic ERJ2GEJ223X.
R612	22k ohm; similar to Panasonic EXB28V223JX.
R613	33 ohm; similar to Panasonic ERJ2GEJ330X.
R614	(Not mounted.)

SYMBOL	DESCRIPTION
R615	33 ohm; similar to Panasonic ERJ2GEJ330X.
R616	10k ohm; similar to Panasonic ERJ2GEJ103X.
R617	3.3k ohm; similar to Panasonic ERJ2GEJ332X.
R618	2.2 ohm; similar to Panasonic ERJ2GEJ2R2X.
R619	51k ohm; similar to Panasonic ERJ2RKF5102X.
R620	47k ohm; similar to Panasonic ERJ2RKF4702X.
R621	51k ohm; similar to Panasonic ERJ2RKF5102X.
R622	27k ohm; similar to Panasonic ERJ2RKF2702X.
R623	51k ohm; similar to Panasonic ERJ2RKF5102X.
R624	10k ohm; similar to Panasonic ERJ2RKF1002X.
R625	51k ohm; similar to Panasonic ERJ2RKF5102X.
R626	10k ohm; similar to Panasonic ERJ2RKF1002X.
R627	200k ohm; similar to Panasonic ERJ2RKF2003X.
R628	27k ohm; similar to Panasonic ERJ2RKF2702X.
R629	22k ohm; similar to Panasonic EXB28V223JX.
R630	22k ohm; similar to Panasonic ERJ2GEJ223X.
R631	22k ohm; similar to Panasonic ERJ2GEJ223X.
R632	22k ohm; similar to Panasonic ERJ2GEJ223X.
R633	(Not mounted.)
R634	(Not mounted.)
R635	(Not mounted.)
R636	(Not mounted.)
R637	(Not mounted.)
R638	10k ohm; similar to Panasonic EXB28V103JX.
R639	10k ohm; similar to Panasonic ERJ2GEJ103X.
R640	10k ohm; similar to Panasonic ERJ2GEJ103X.
R641	10k ohm; similar to Panasonic ERJ2GEJ103X.
R642	(Not mounted.)
R643	47k ohm; similar to Panasonic ERJ2GEJ473X.
R644	12k ohm; similar to Panasonic ERJ2GEJ123X.
R645	(Not mounted.)
R646	27k ohm; similar to Panasonic ERJ2GEJ273X.
R647	47k ohm; similar to Panasonic ERJ2GEJ473X.
R650	(Not mounted.)
R701	27 ohm; similar to Panasonic ERJ1TYJ270U.
R702	27 ohm; similar to Panasonic ERJ1TYJ270U.
R801	47 ohm; similar to Panasonic ERJ2GEJ470X.
R802	22k ohm; similar to Panasonic ERJ2GEJ223X.
R803	2.2k ohm; similar to Panasonic ERJ2GEJ222X.
R804	820 ohm; similar to Panasonic ERJ2GEJ821X.
R805	1k ohm; similar to Panasonic ERJ2GEJ102X.

SYMBOL	DESCRIPTION
R806	100k ohm; similar to Panasonic ERJ2GEJ104X.
R807	33 ohm; similar to Panasonic EXB28V330JX.
R808	82 ohm; similar to Panasonic ERJ2GEJ820X.
R809	47 ohm; similar to Panasonic ERJ2GEJ470X.
R810	47 ohm; similar to Panasonic ERJ2GEJ470X.
R1371	5.6k ohm; similar to Panasonic ERJ2GEJ562X.
R1372	220 ohm; similar to Panasonic ERJ2GEJ221X.
R1373	(Not mounted.)
R1374	(Not mounted.)
R1375	(Not mounted.)
R1378	(Not mounted.)
R1379	(Not mounted.)
R1380	(Not mounted.)
R1401	(Not mounted.)
R1410	(Not mounted.)
R1453	15 ohm; similar to Panasonic ERJ2GEJ150X.
R1454	220 ohm; similar to Panasonic ERJ2GEJ221X.
R1455	33 ohm; similar to Panasonic ERJ2GEJ330X.
R1456	(Not mounted.)
R1459	(Not mounted.)
R1460	(Not mounted.)
R1491	(Not mounted.)
R1492	100 ohm; similar to Panasonic ERJ2GEJ101X.
R1501	(Not mounted.)
R1510	(Not mounted.)
R1583	33 ohm; similar to Panasonic ERJ2GEJ330X.
----- THERMISTOR -----	
RT101	2.2k ohm with Positive Temperature Coefficient; similar to Murata PTFM04BD222Q2N34B0.
----- TRANSISTORS -----	
TR101	Similar to NEC 2SC3357-T1-A_RF.
TR102	Similar to NEC 2SC3357-T1-A_RF.
TR103	Mitsubishi RD01MUS1-T113.
TR104	Similar to Rohm 2SD1781KT146R.
TR105	Similar to NEC 2SD596-T1B-A_DV5.
TR106	Similar to NEC 2SB798-T2-AZ_DK.
TR107	Similar to Toshiba RN1301(TE85L_F).
TR108	(Not mounted.)
TR109	Similar to NEC 2SB798-T2-AZ_DK.
TR110	Similar to Toshiba RN1301(TE85L_F).
TR111	Similar to Toshiba RN1301(TE85L_F).

SYMBOL	DESCRIPTION
TR112	Similar to NEC 2SD596-T1B-A_DV5.
TR201	Similar to NEC 2SC5337-T1-AZ_QS.
TR202	Similar to NEC 2SC5337-T1-AZ_QS.
TR203	Similar to Toshiba RN1301(TE85L_F).
TR204	Similar to ON Semiconductor MMBFJ310LT1G.
TR205	Similar to ON Semiconductor MMBFJ310LT1G.
TR206	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR207	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR208	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR301	Similar to Rohm QS6M3TR.
TR371	Similar to Rohm UMG3NTR.
TR372	Similar to NEC 2SC3356-T1B-A_R.
TR373	Similar to Toshiba 2SC2714-Y(TE85L_F).
TR375	Similar to Rohm 2SD1781KT146R.
TR401	Similar to Sanyo 2SK536-TB-E.
TR402	Similar to Toshiba RN1301(TE85L_F).
TR403	Similar to Rohm 2SA1037AKT146R.
TR404	Similar to Sanyo 2SK536-TB-E.
TR405	Similar to Sanyo 2SK536-TB-E.
TR406	Similar to Toshiba RN1301(TE85L_F).
TR421	Similar to Rohm 2SD1781KT146R.
TR431	Similar to Renesas 2SC5890FS-TL-E.
TR432	Similar to Toshiba RN1305(TE85L_F).
TR451	Similar to NEC 2SC3356-T1B-A_R.
TR452	Similar to NEC 2SC3356-T1B-A_R.
TR453	Similar to NEC 2SC3356-T1B-A_R.
TR454	Similar to NEC 2SC3356-T1B-A_R.
TR455	Similar to NEC 2SC3356-T1B-A_R.
TR456	Similar to Rohm UMG3NTR.
TR457	Similar to Rohm UMG3NTR.
TR491	Similar to Toshiba 2SC2712-BL(TE85L_F).
TR501	Similar to Sanyo 2SK536-TB-E.
TR502	Similar to Toshiba RN1301(TE85L_F).
TR503	Similar to Rohm 2SA1037AKT146R.
TR504	Similar to Sanyo 2SK536-TB-E.
TR505	Similar to Sanyo 2SK536-TB-E.
TR506	Similar to Toshiba RN1301(TE85L_F).
TR521	Similar to Rohm 2SD1781KT146R.
TR522	Similar to Rohm UMG3NTR.
TR523	Similar to Rohm UMG3NTR.
TR524	Similar to Rohm UMG3NTR.

SYMBOL	DESCRIPTION
TR531	Similar to Renesas 2SC5772FR-TL-E.
TR532	Similar to Toshiba RN1305(TE85L_F).
TR533	Similar to Toshiba RN1305(TE85L_F).
TR561	Similar to Renesas 2SC5772FR-TL-E.
TR562	Similar to Toshiba RN1301(TE85L_F).
TR563	Similar to Toshiba RN1305(TE85L_F).
TR581	Similar to NEC 2SC3356-T1B-A_R.
TR582	Similar to NEC 2SC3356-T1B-A_R.
TR583	Similar to NEC 2SC3356-T1B-A_R.
TR584	Similar to NEC 2SC3357-T1-A_RF.
TR1371	(Not mounted.)
TR1451	(Not mounted.)
----- JUMPER -----	
W101	Similar to MIDORIMUSEN H-7ZCPD0269.
----- OSCILLATOR -----	
XU491	Oscillator; similar to NDK H-7XNPD0004.
----- SURGE ABSORBERS -----	
Z701	Similar to KOA NV73A2ATTE22_PBF.
Z702	Similar to Panasonic ERZCF2MK220.

16.4 RADIO CHASSIS

M7300 UHF-L/UHF-H

(CWB-4750)

SYMBOL	DESCRIPTION
C1 and C2	Capacitor, Feed-Thru: 1000 pF. (For ordering information, see Section 8.3 on page 20.)
J2	Connector, RF TNC Female. (For ordering information, see Section 8.3 on page 20.)
W1	Cable Assembly, DC Power. (For ordering information, see Section 8.3 on page 20.)
W2	Cable Assembly, 44-Pin Accessory. (For ordering information, see Section 8.3 on page 20.)
W3	Cable Assembly, 9-Pin Serial. (For ordering information, see Section 8.3 on page 20.)
W4	Cable Assembly, 3-Pin CAN. (For ordering information, see Section 8.3 on page 20.)
W5 and W6	Wire, Red.

17 PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter," which is followed by a number in some cases. The revision includes all previous revisions. Refer to the Parts List for the descriptions of parts affected by these revisions.

Rev. – M7300 Mobile Radio, 378 – 430 MHz (RU-144750-021)
Initial release.

Rev. – M7300 Mobile Radio, 450 – 512 MHz (RU-144750-031)
Initial release.

Rev. – RF Processor Board, 378 – 430 MHz (CMN-4750L)
Initial release.

Rev. – RF Processor Board, 450 – 512 MHz (CMN-4750H)
Initial release.

Rev. C PK Board (CMC-1294E/MDCW11220)
Board revision at initial release of UHF-L and UHF-H radios.

Rev. A M7300 Mobile Radio, 378 – 430 MHz (RU-144750-021)
No hardware changes.

Rev. B M7300 Mobile Radio, 378 – 430 MHz (RU-144750-021)

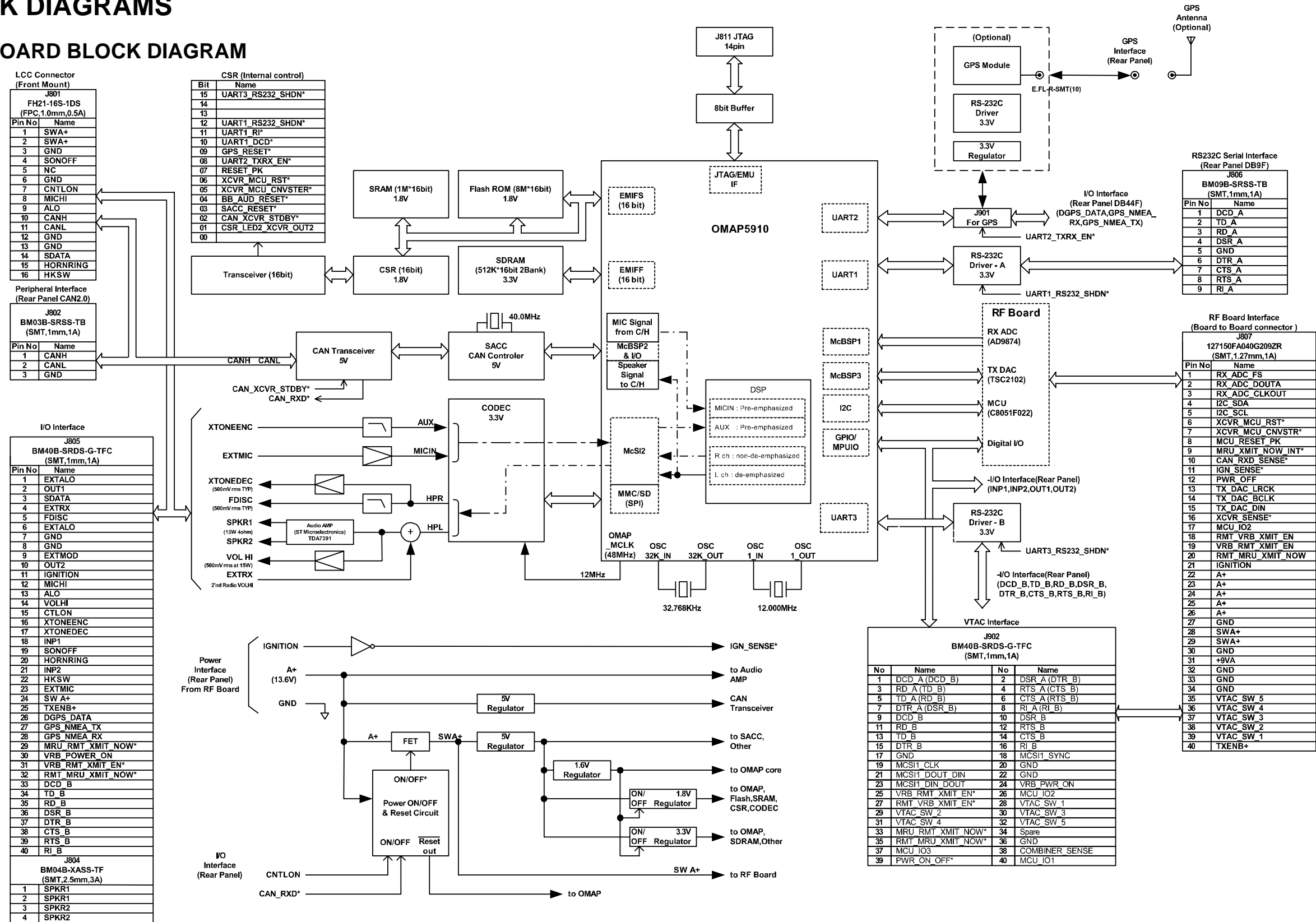
Rev. A RF Processor Board, 378 – 430 MHz (CMN-4750L)

To improve receiver sensitivity, changed the following components in the 1st IF amplifier stage of the RF Processor Board: L217 from 220 nH to 180 nH, L218 from 680 nH to 470 nH, R236 from 470 ohms to 820 ohms, R238 from 330k ohms to 220k ohms, and R241 from 10 ohms to 5.6 ohms. See sheet 2 of the 378–430 MHz RF Processor Board's schematic. The 378–430 MHz RF Processor Board schematic changed to DD02-CMN-4750L and the respective printed circuit board assembly changed to CMN-4750L Rev A.

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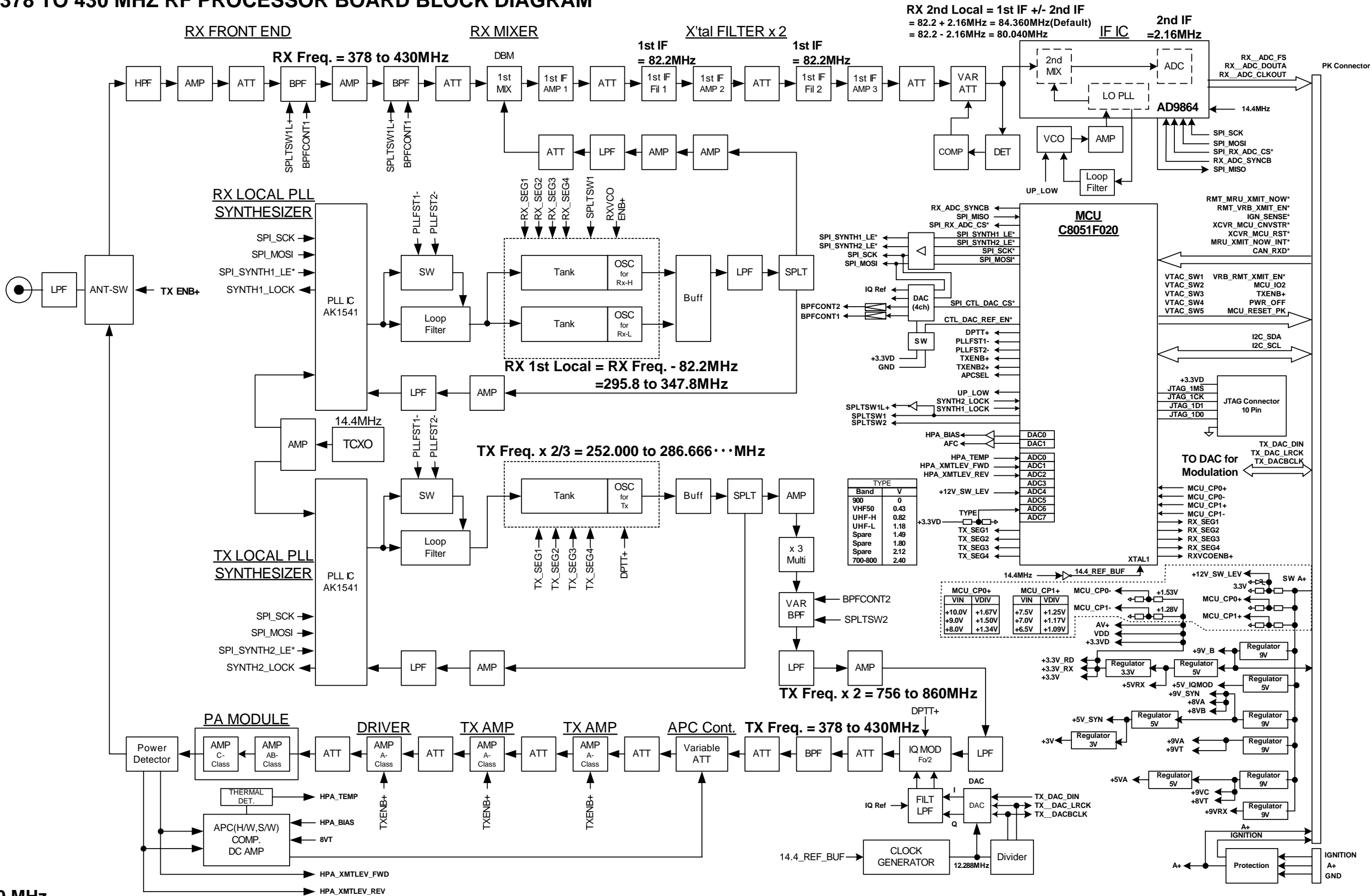
18 BLOCK DIAGRAMS

18.1 PK BOARD BLOCK DIAGRAM



M7300 UHF 50W H/L-Band PK Board Block Diagram
DA00-CMC-1294E
Jul 22 2010 Ver. 1.00

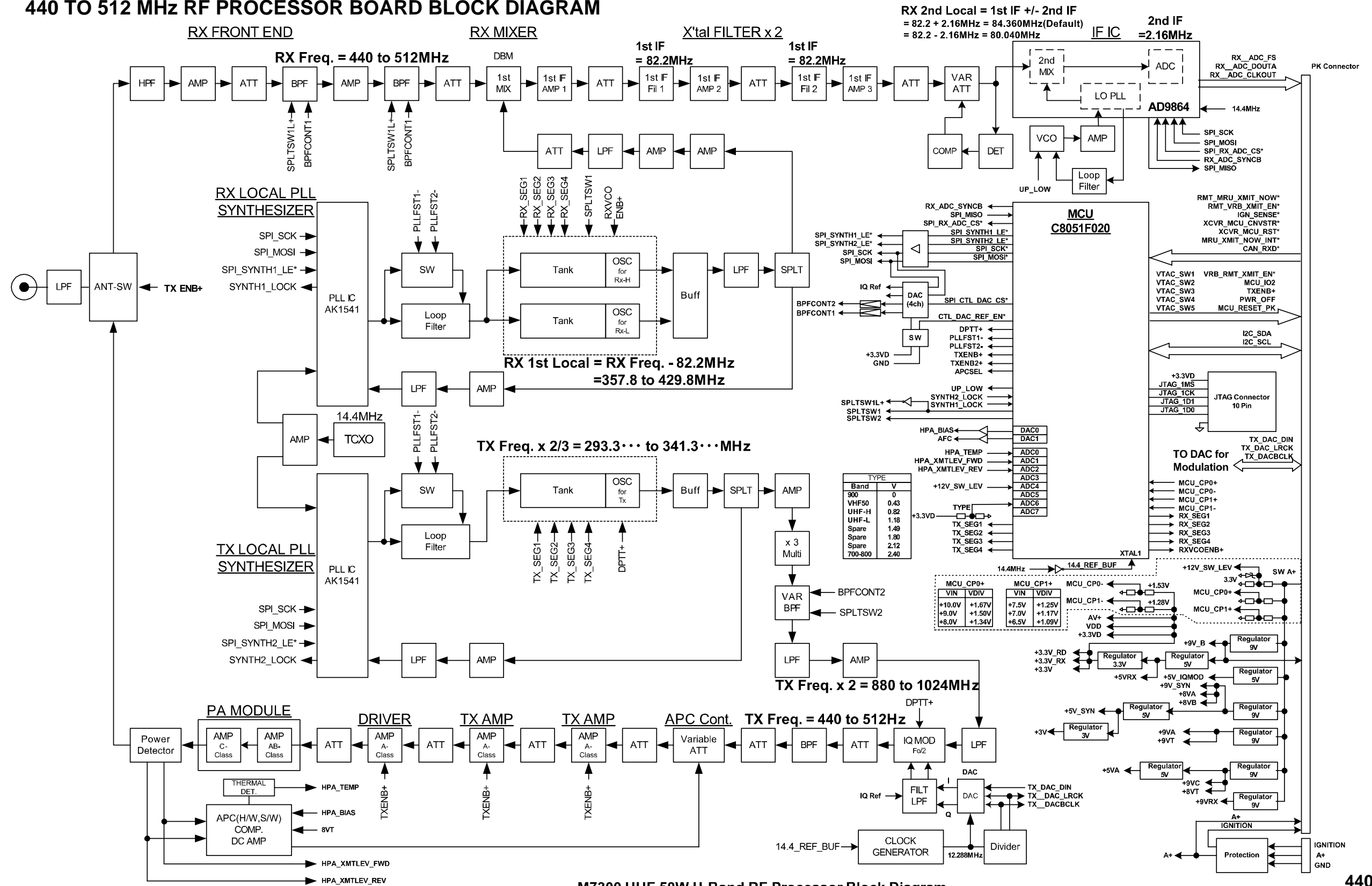
18.2 378 TO 430 MHZ RF PROCESSOR BOARD BLOCK DIAGRAM



378 to 430 MHz
RF PROCESSOR BOARD
Block Diagram
(DA00-CMN-4750L, 20101008 Version 1.00)

M7300 UHF 50W L-Band RF Processor Block Diagram
DA00-CMN-4750L
Oct. 8 2010 Ver. 1.00

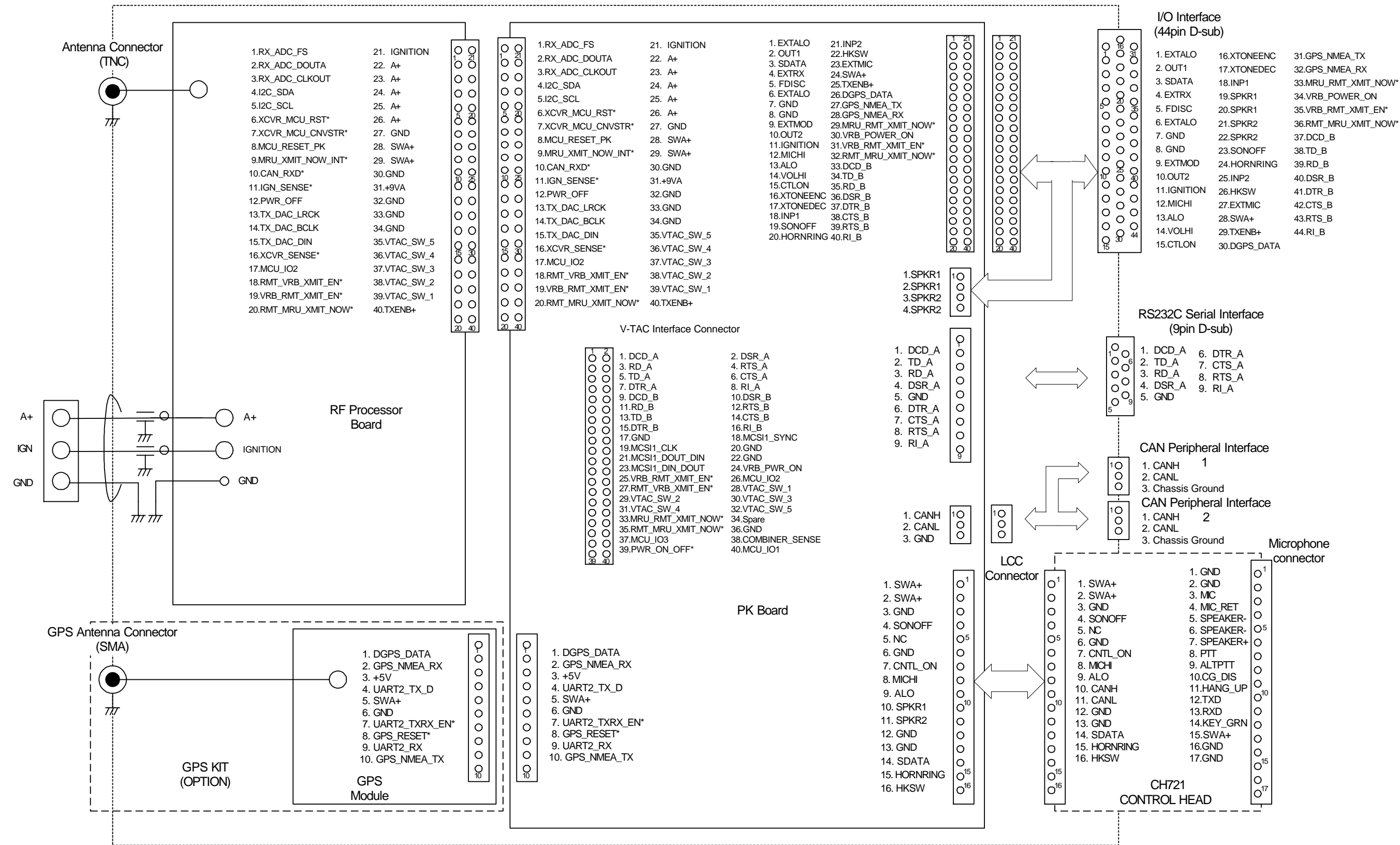
18.3 440 TO 512 MHz RF PROCESSOR BOARD BLOCK DIAGRAM



M7300 UHF 50W H-Band RF Processor Block Diagram
DA00-CMN-4750
Aug 7 2010 Ver. 1.01

440 to 512 MHz
RF PROCESSOR BOARD
Block Diagram
(DA00-CMN-4750, 20100807 Version 1.01)

19 INTERCONNECTION DIAGRAM



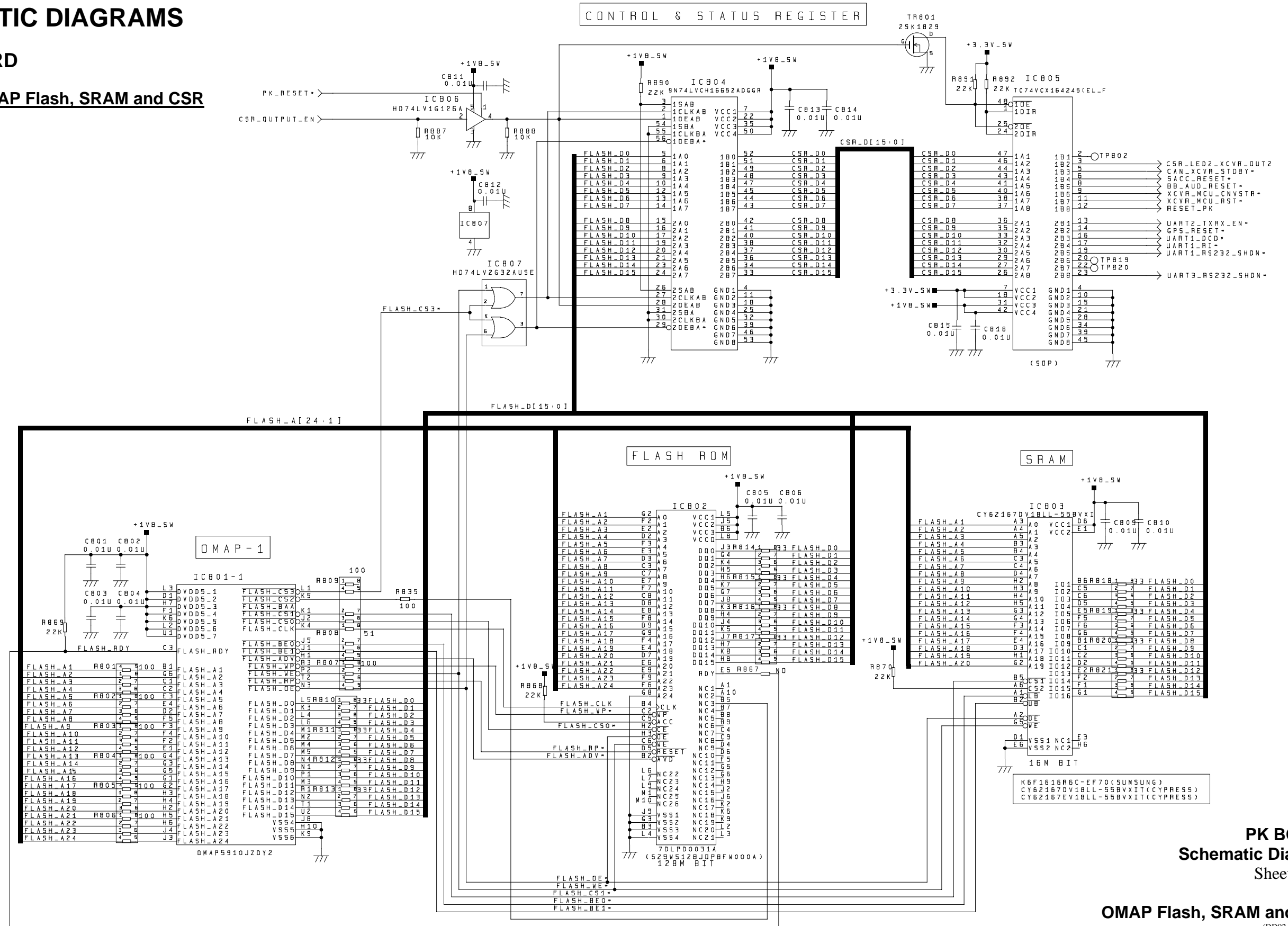
INTERCONNECTION DIAGRAM

(DA00-JHM-475S50, Rev. 7/ 22/2010, Ver. 1.00)

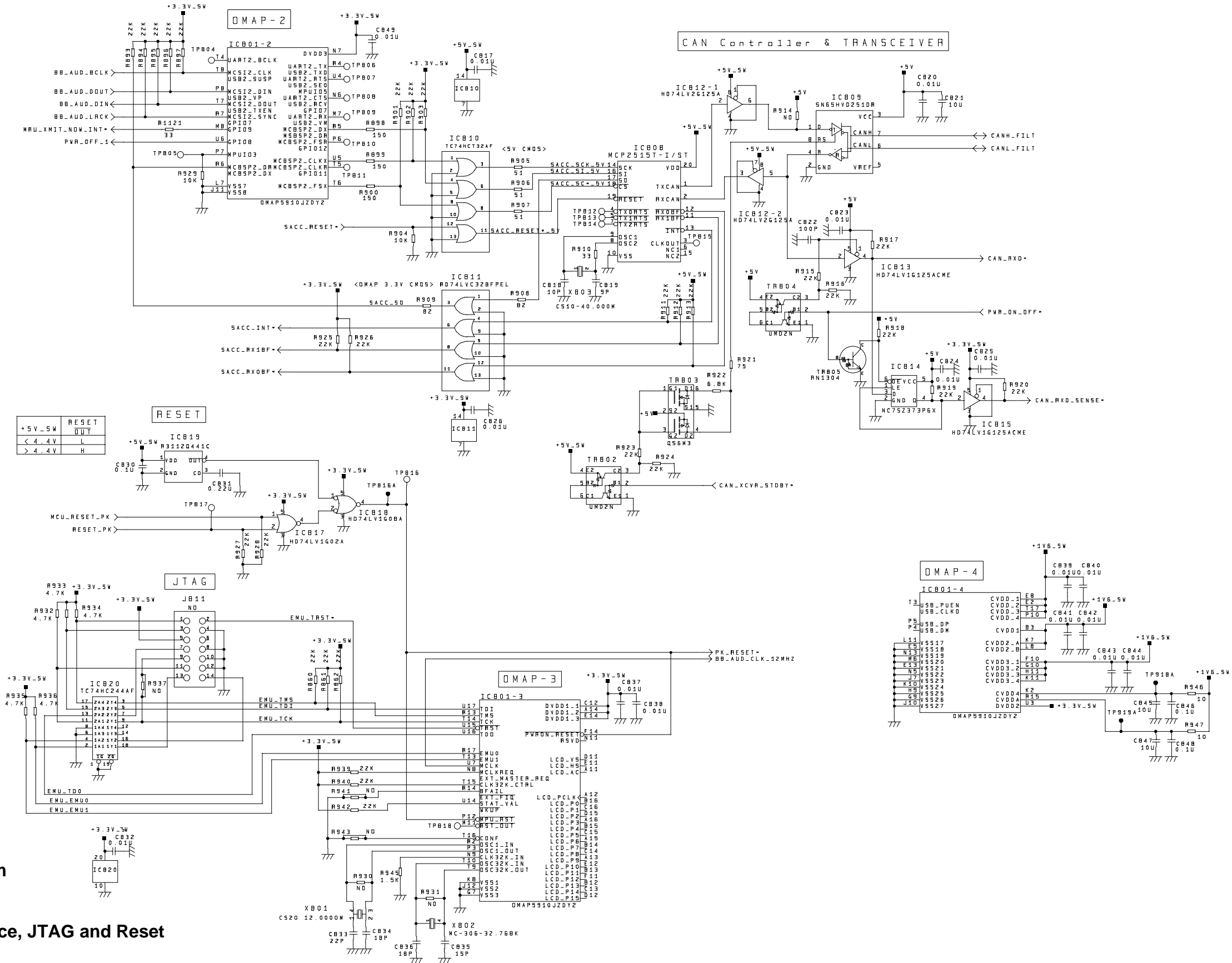
20 SCHEMATIC DIAGRAMS

20.1 PK BOARD

20.1.1 OMAP Flash, SRAM and CSR

PK BOARD
Schematic Diagram
Sheet 1 of 6OMAP Flash, SRAM and CSR
(DD02-CMC-1294E)

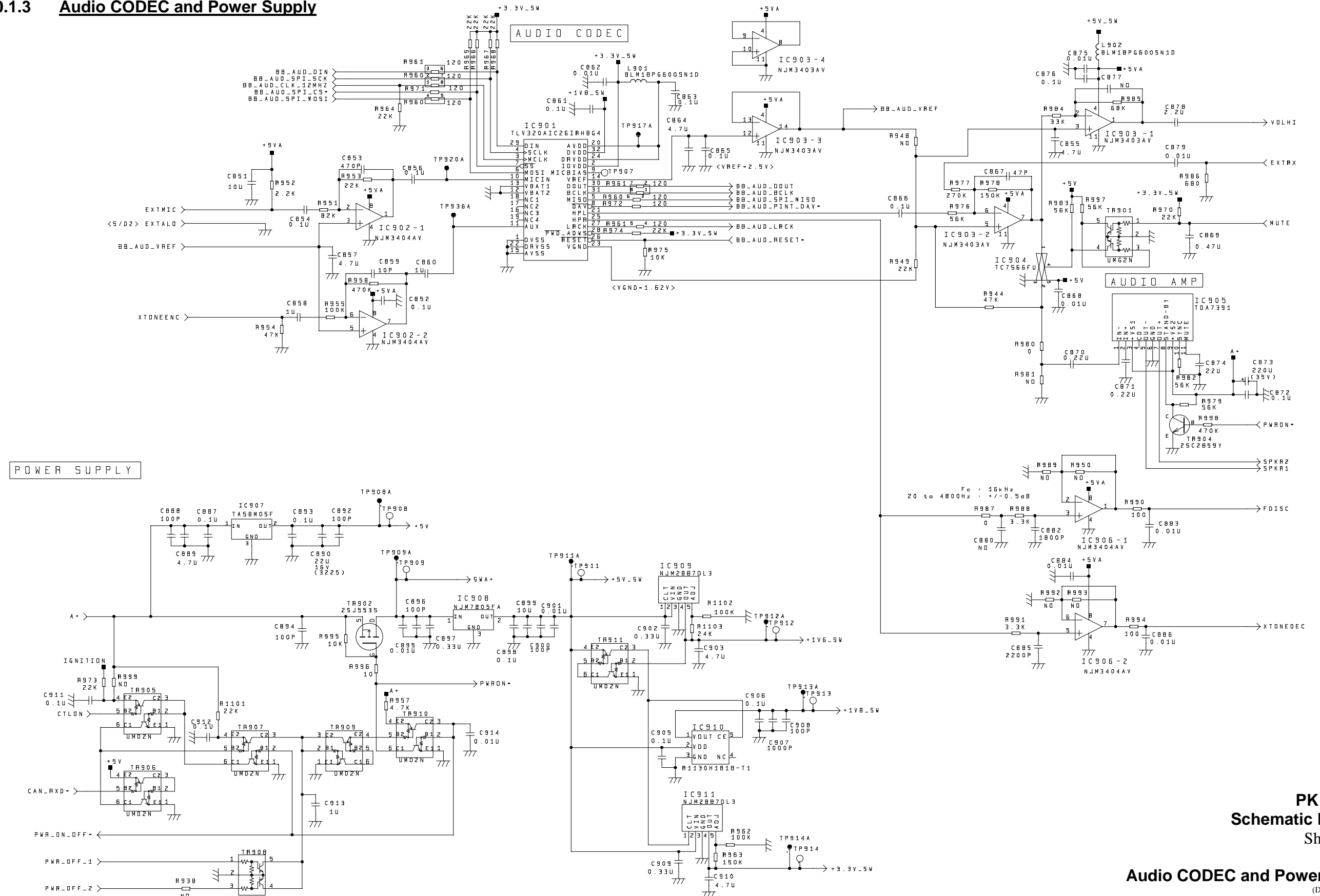
20.1.2 OMAP CAN Interface, JTAG and Reset



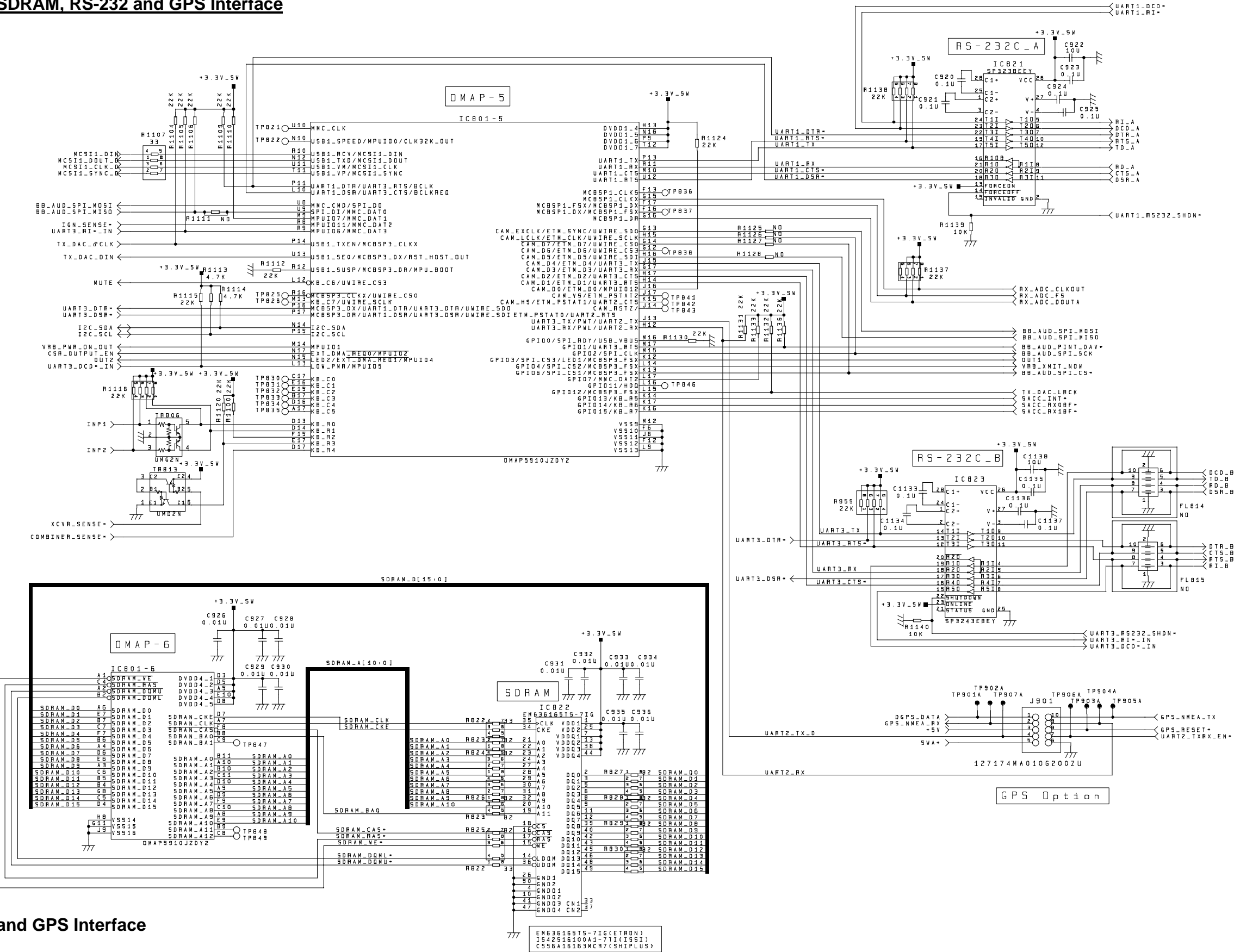
PK BOARD
Schematic Diagram
Sheet 2 of 6

OMAP CAN Interface, JTAG and Reset
(DD02-CMC-1294E)

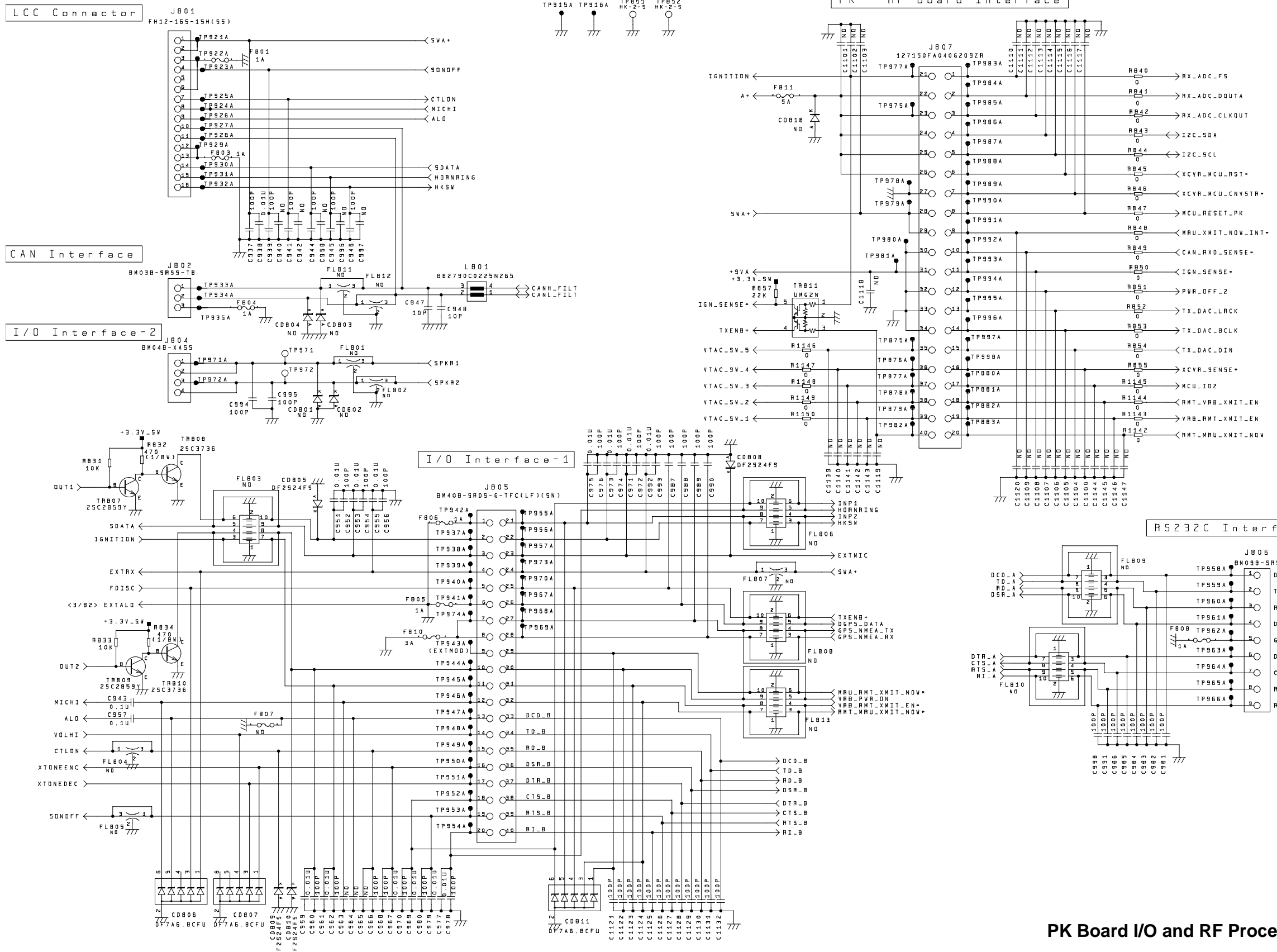
20.1.3 Audio CODEC and Power Supply



20.1.4 **OMAP, SDRAM, RS-232 and GPS Interface**

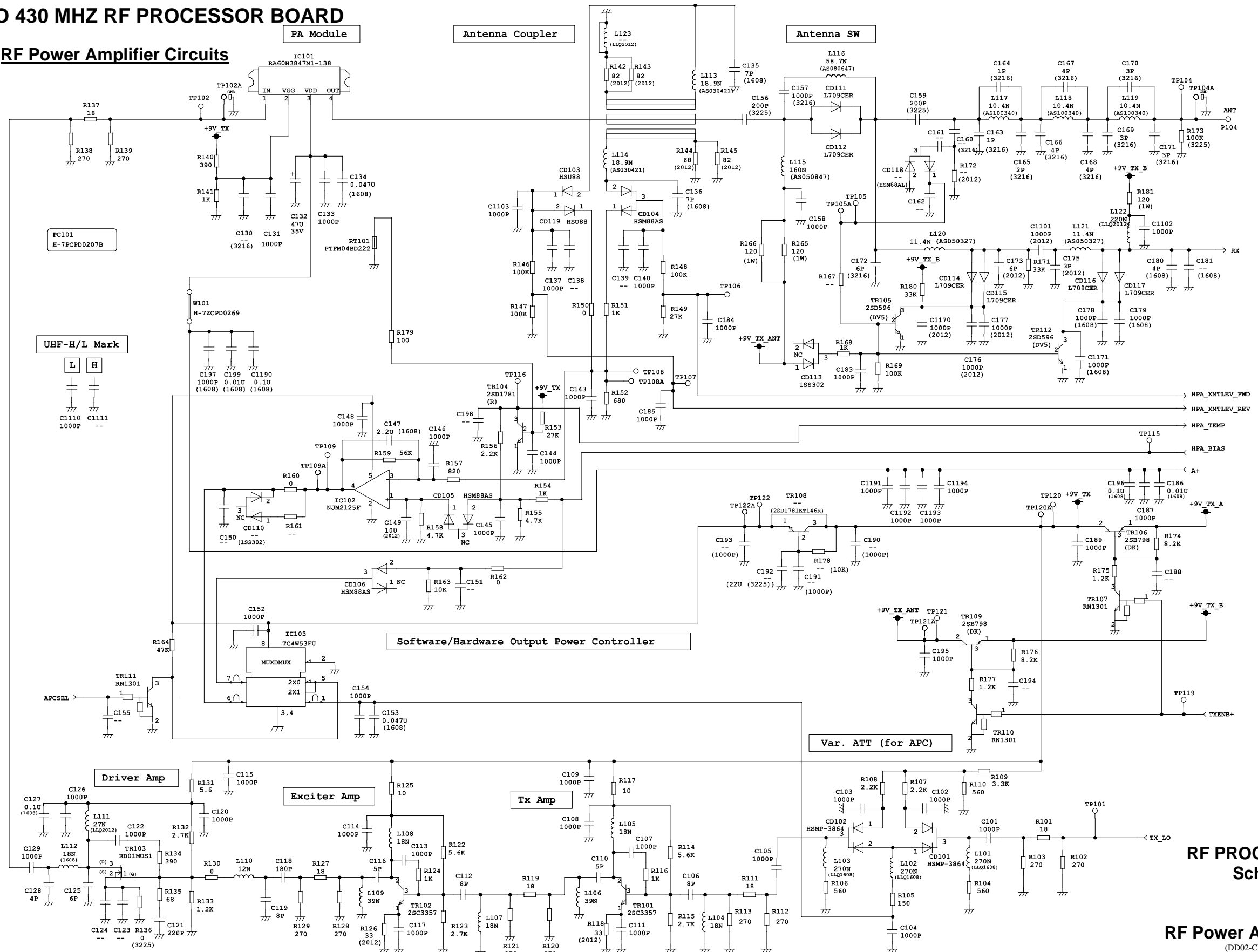


LCC Connector



PK BOARD
Schematic Diagram
Sheet 5 of 6

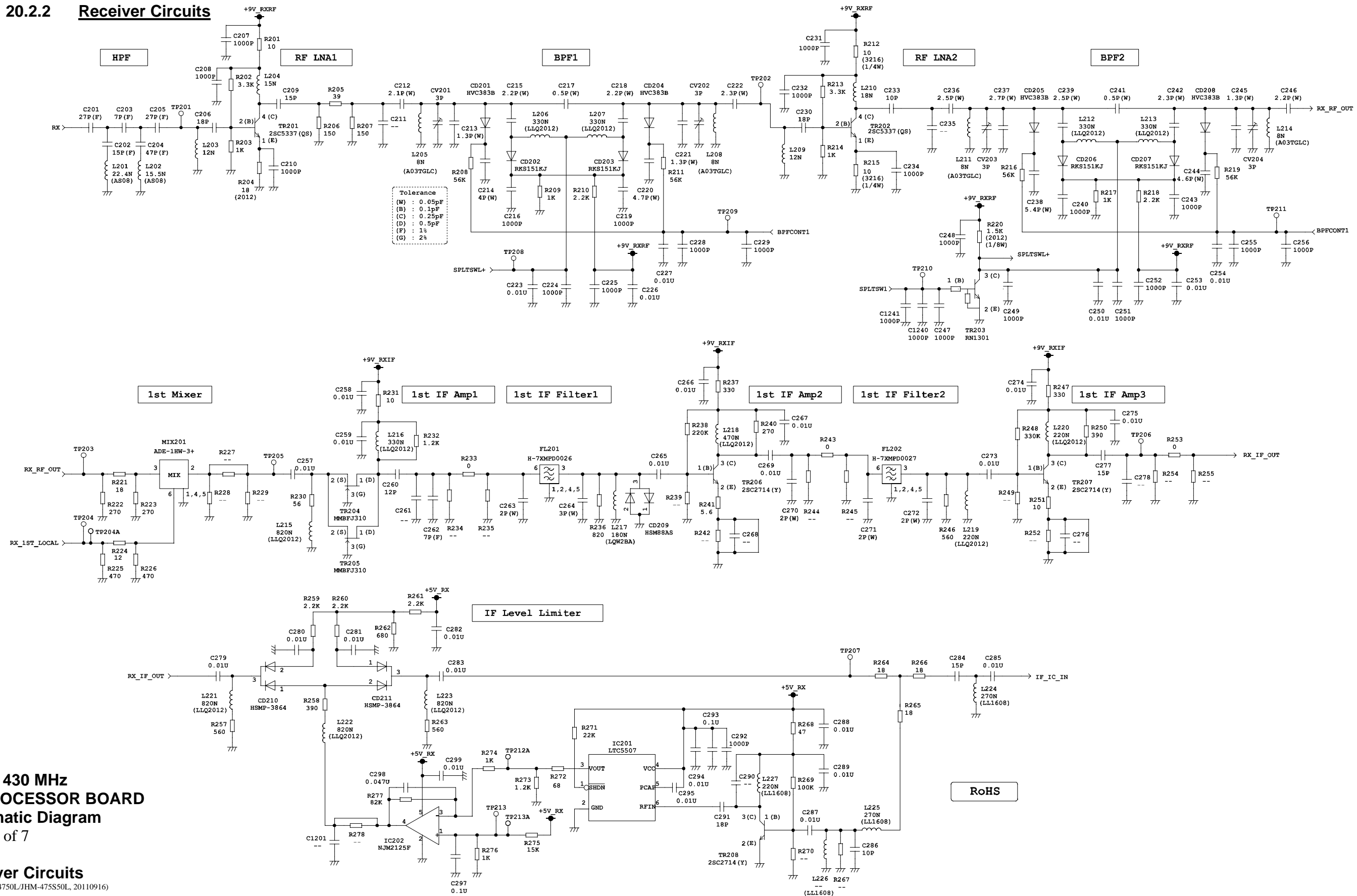
20.2.1 RF Power Amplifier Circuits



378 to 430 MHz
RF PROCESSOR BOARD
Schematic Diagram
Sheet 1 of 7

RF Power Amplifier Circuits

20.2.2 Receiver Circuits

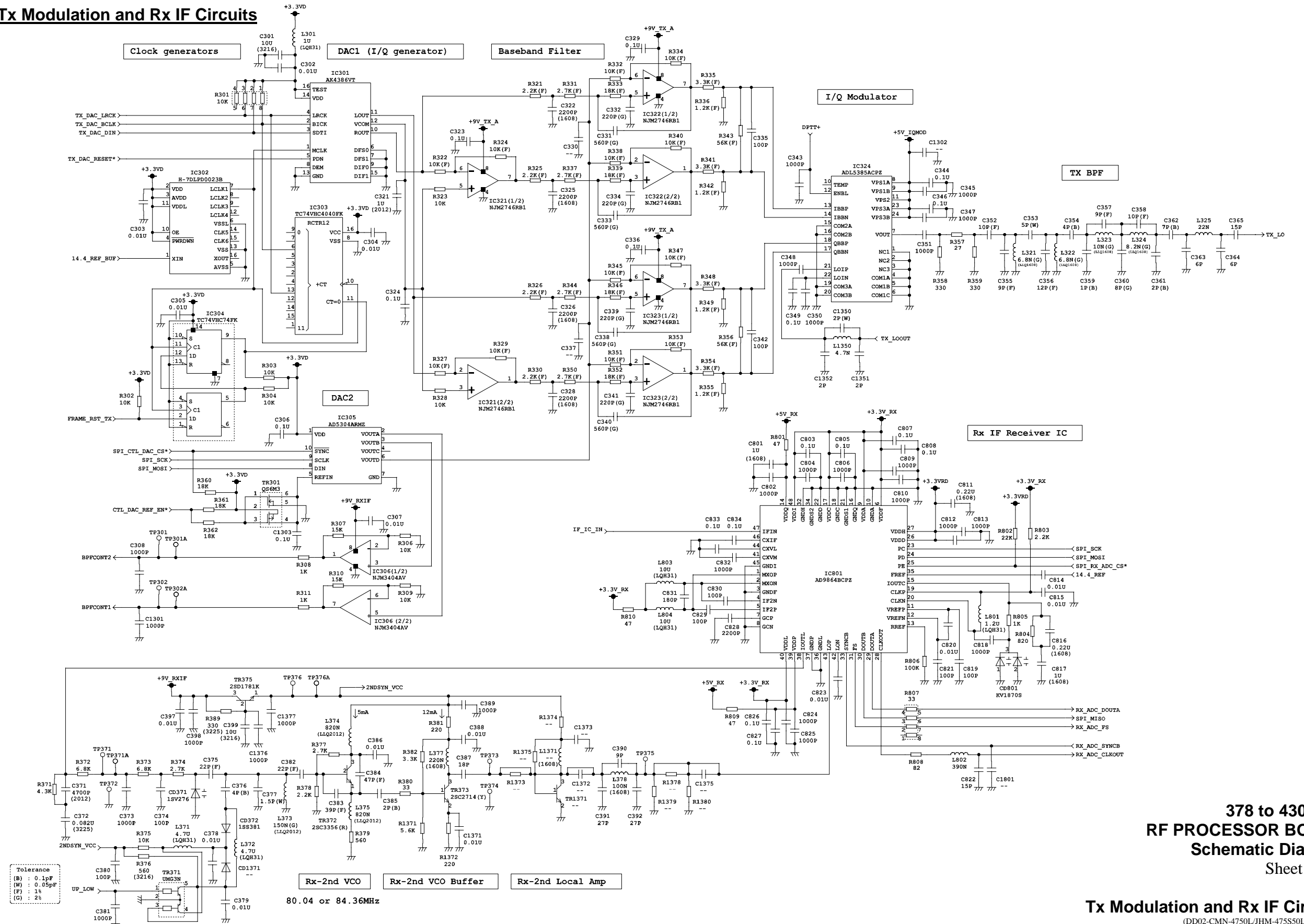


378 to 430 MHz
RF PROCESSOR BOARD
Schematic Diagram
Sheet 2 of 7

Receiver Circuits

(DD02-CMN-4750L/JHM-475S50L, 20110916)

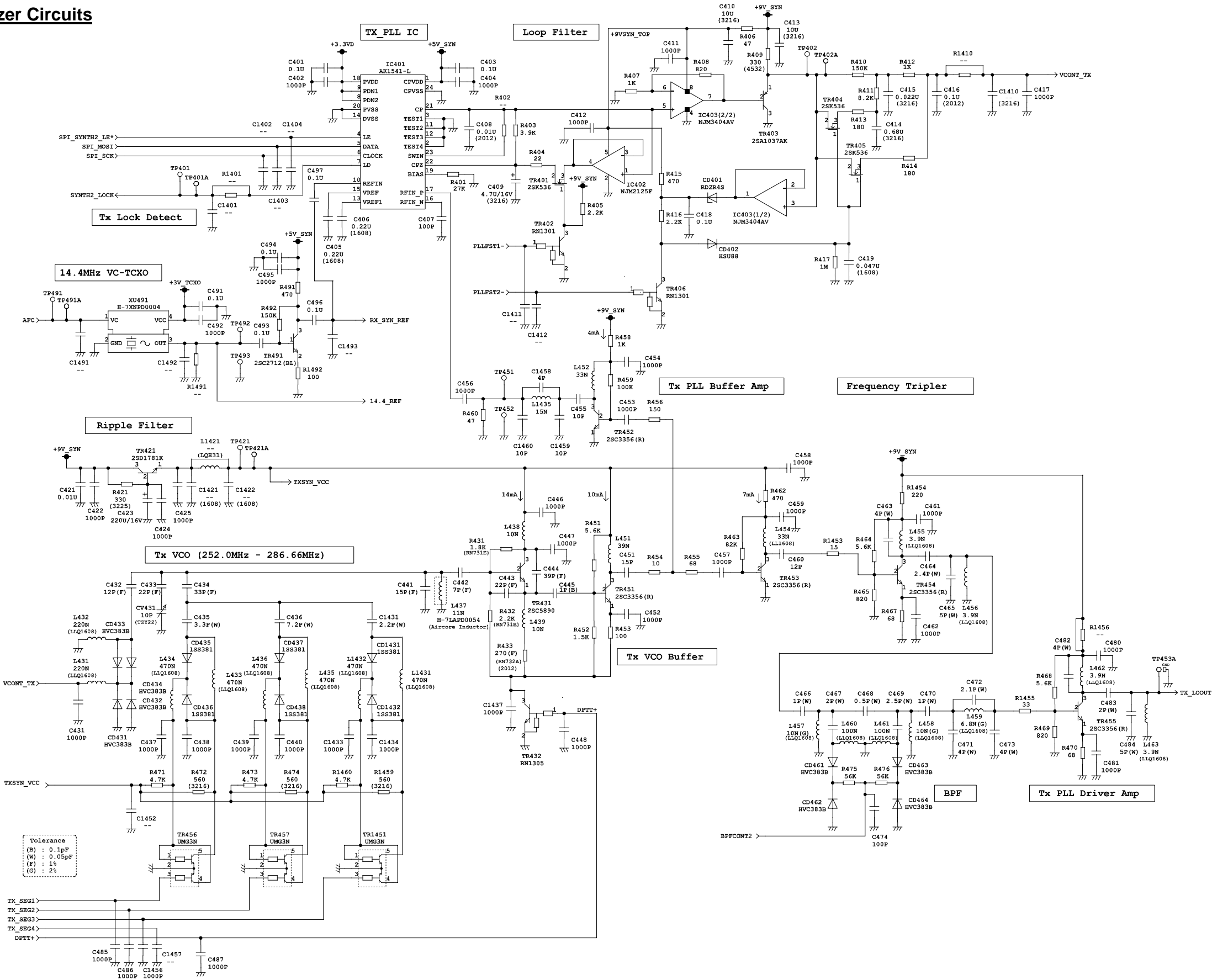
20.2.3 Tx Modulation and Rx IF Circuits



Tx Modulation and Rx IF Circuits

(DD02-CMN-4750L/JHM-475S50L, 20110916)

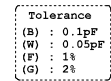
20.2.4 Tx Synthesizer Circuits



378 to 430 MHz
RF PROCESSOR BOARD
Schematic Diagram
Sheet 4 of 7

Tx Synthesizer Circuits
(DD02-CMN-4750L/JHM-475S50L, 20110916)

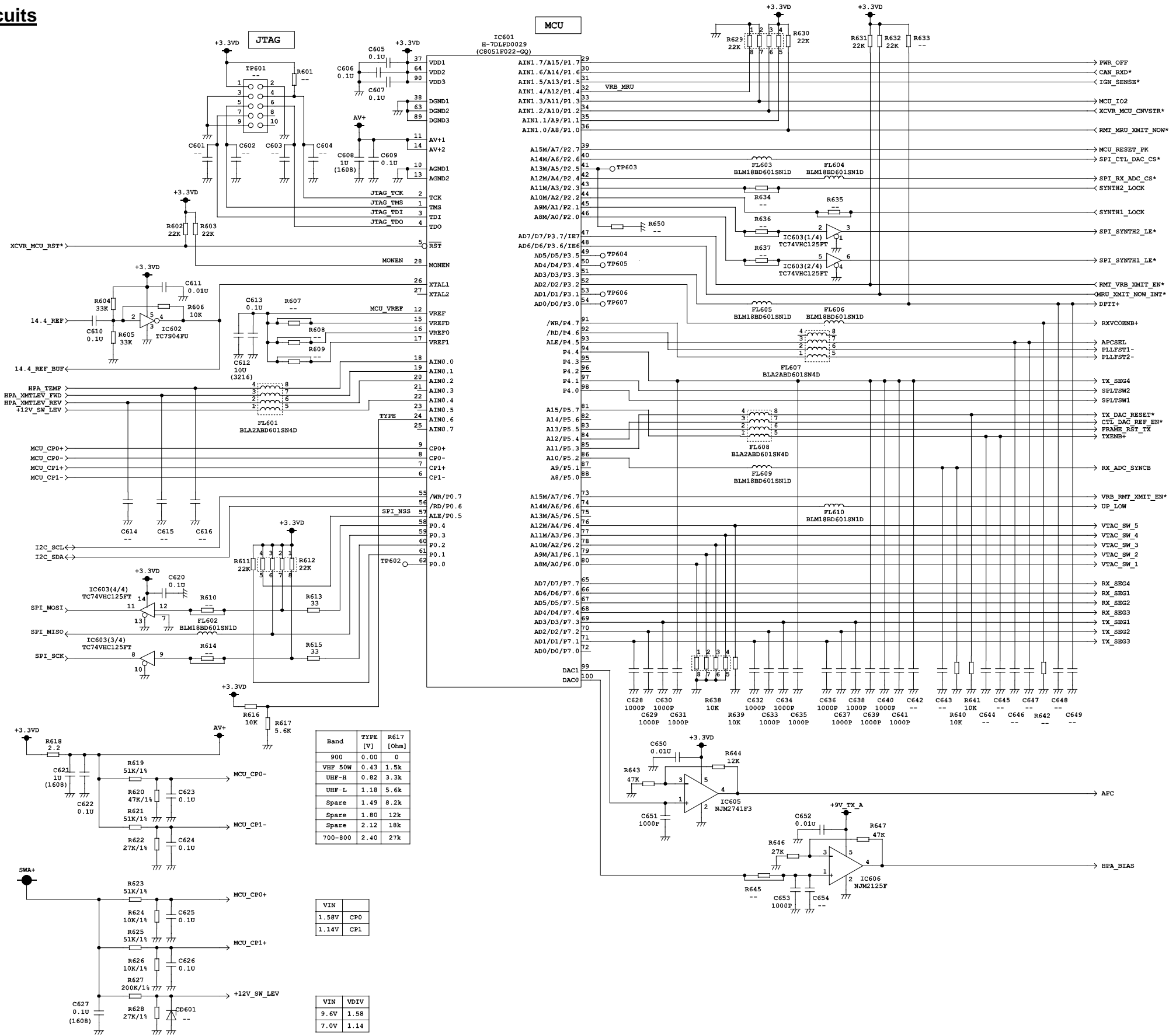
20.2.5 Rx 1st Synthesizer Circuits



378 to 430 MHz
RF PROCESSOR BOARD
Schematic Diagram
Sheet 5 of 7

Rx 1st Synthesizer Circuits

20.2.6 MCU Circuits



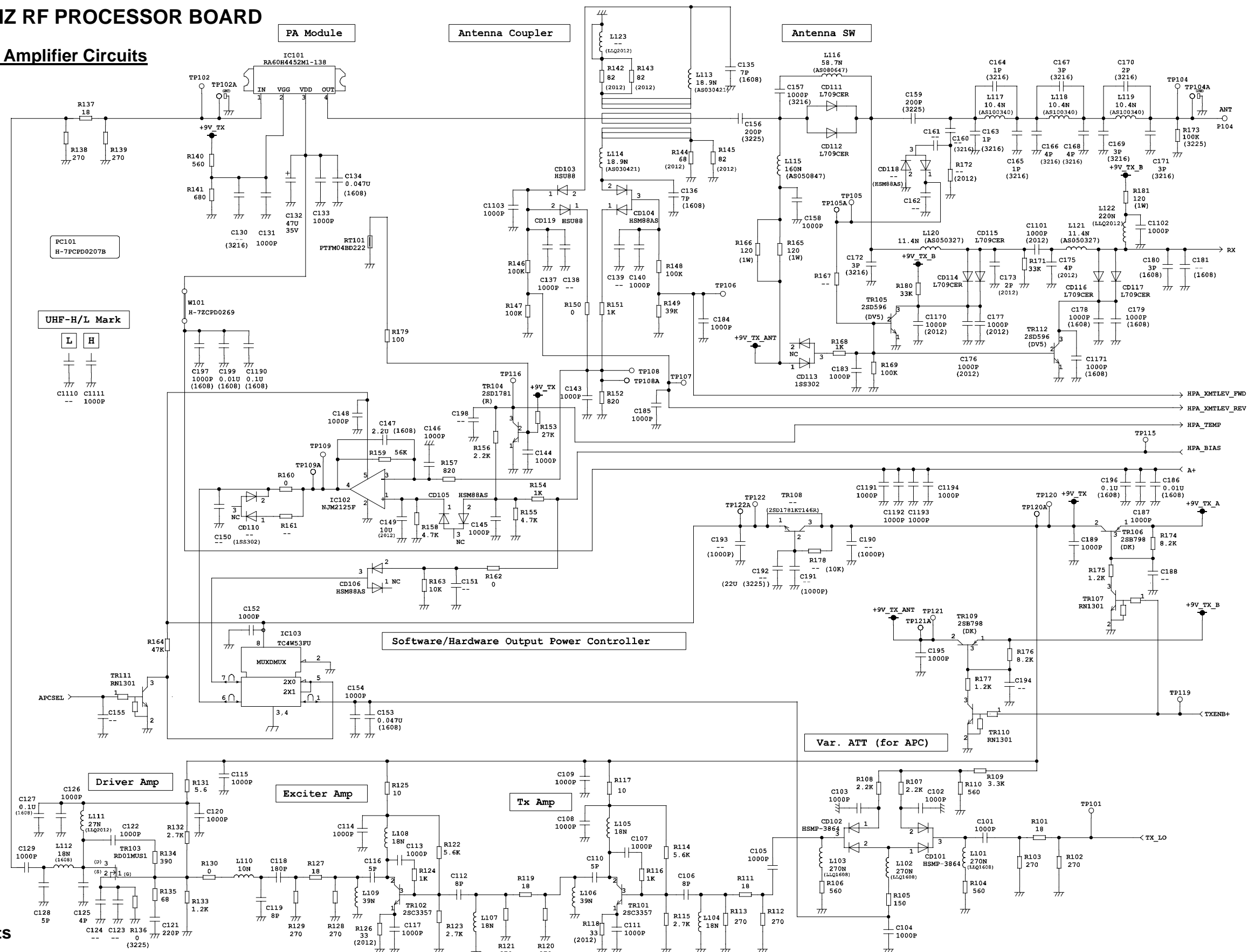
378 to 430 MHz
RF PROCESSOR BOARD
Schematic Diagram
Sheet 6 of 7

MCU Circuits
(DD02-CMN-4750L/JHM-475SS0L, 20110916)

378 to 430 MHz
RF PROCESSOR BOARD
Schematic Diagram
Sheet 7 of 7



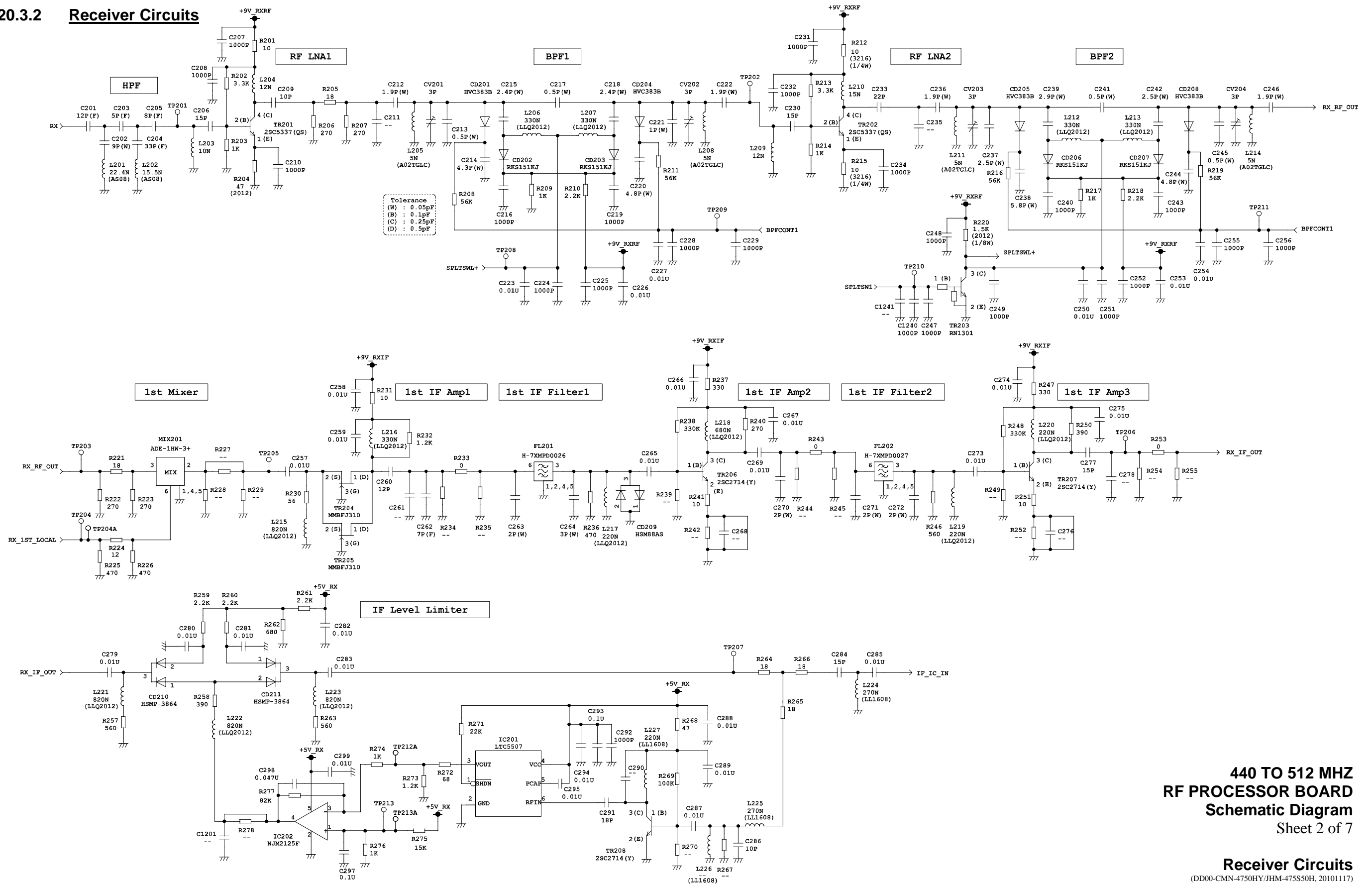
20.3.1 RF Power Amplifier Circuits



RF Power Amplifier Circuits

(DD00-CMN-4750HY/JHM-475S50H, 20101117)

20.3.2 Receiver Circuits

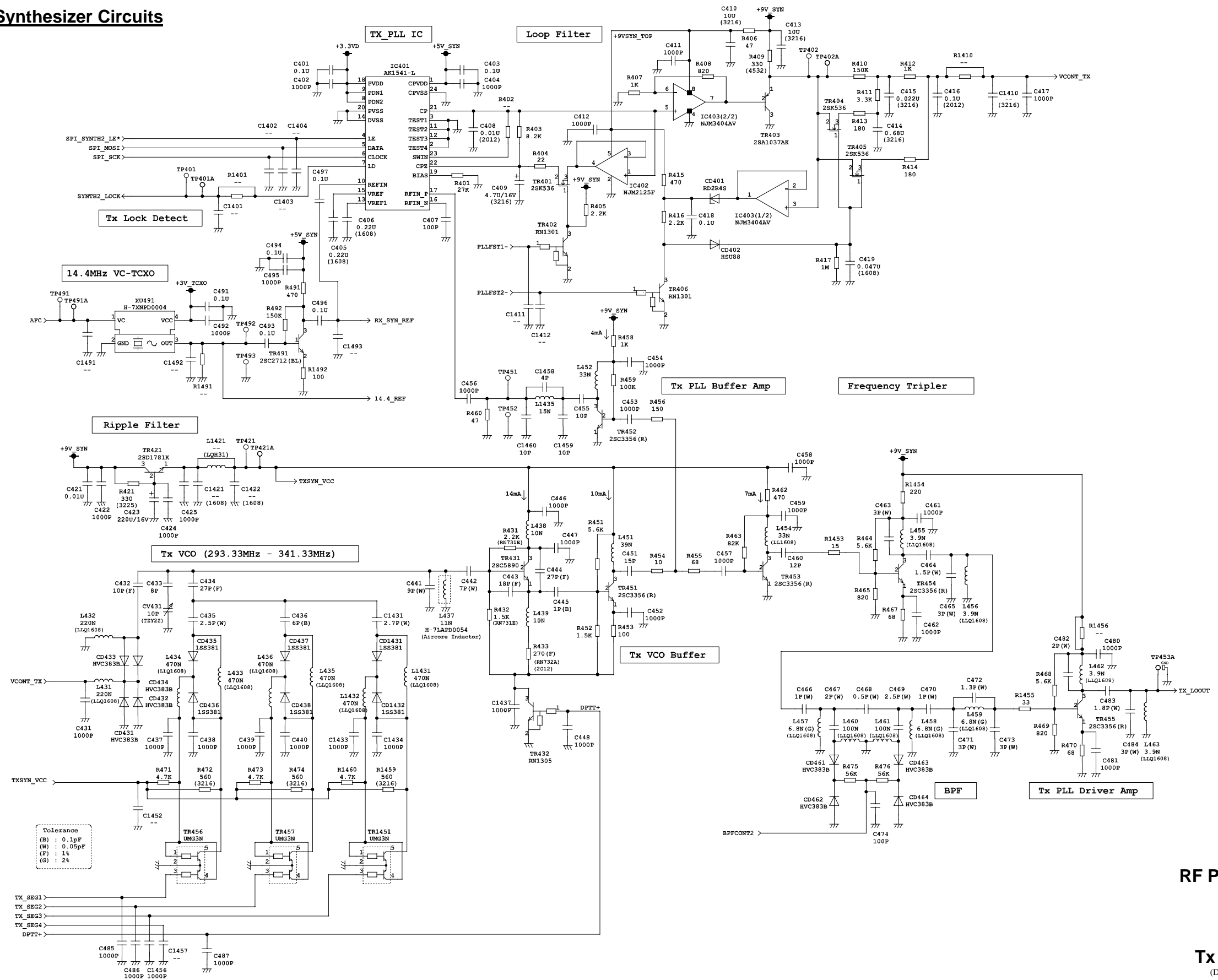


440 TO 512 MHZ
RF PROCESSOR BOARD
Schematic Diagram
Sheet 3 of 7

(DD00-CMN-4750HY/JHM-475S50H, 20101117)

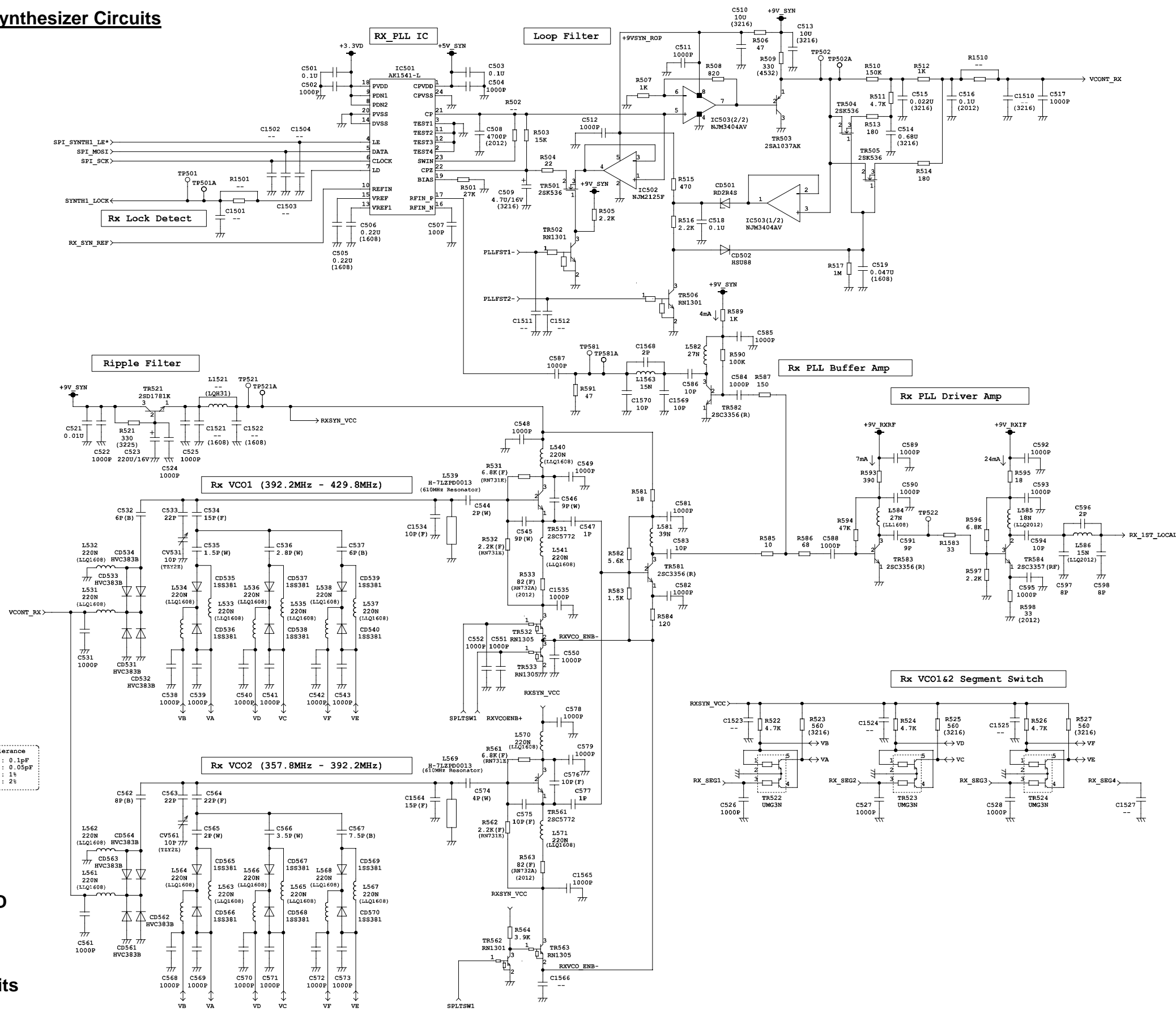


20.3.4 Tx Synthesizer Circuits



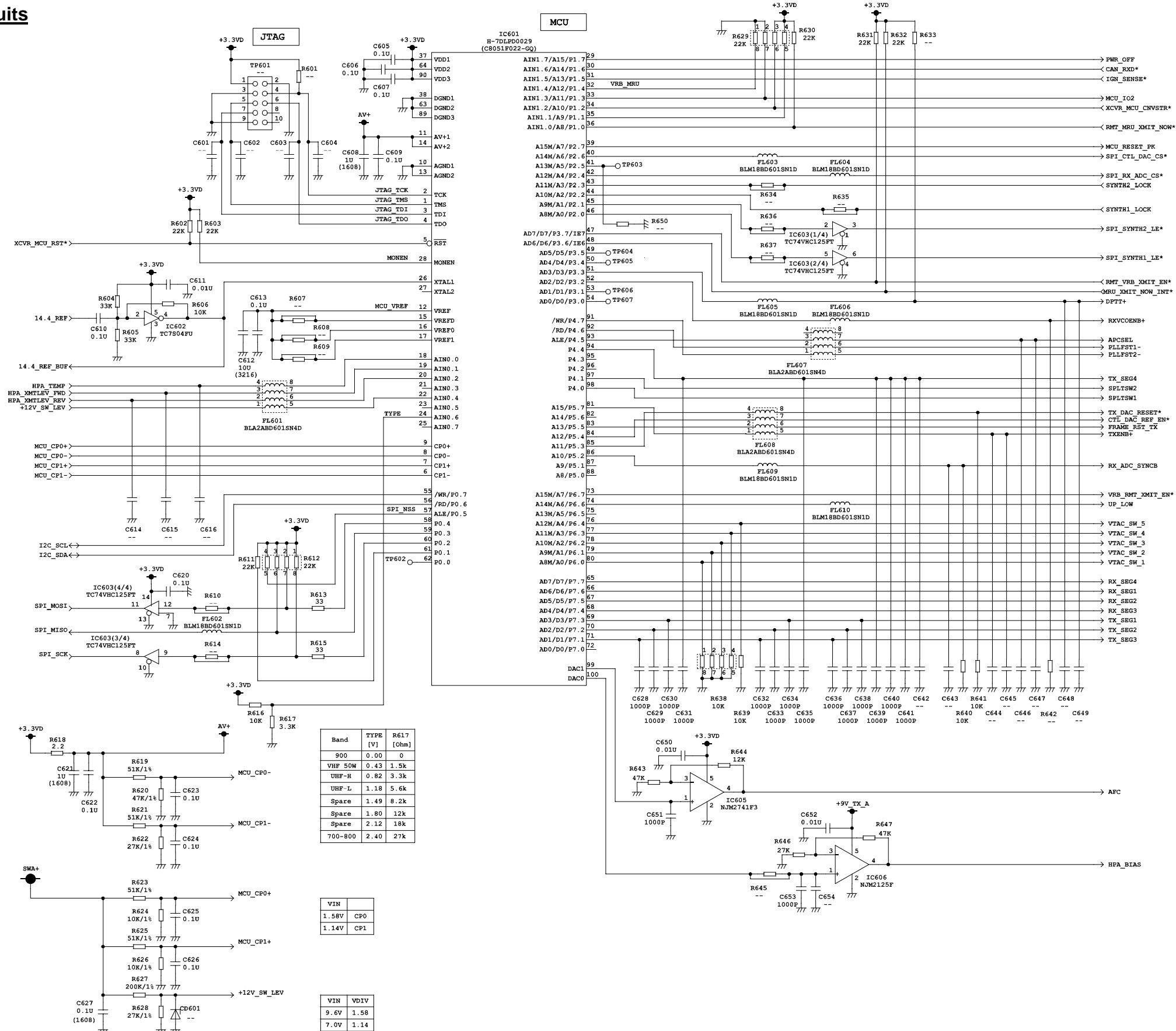
440 TO 512 MHZ
RF PROCESSOR BOARD
Schematic Diagram
Sheet 4 of 7

20.3.5 Rx 1st Synthesizer Circuits

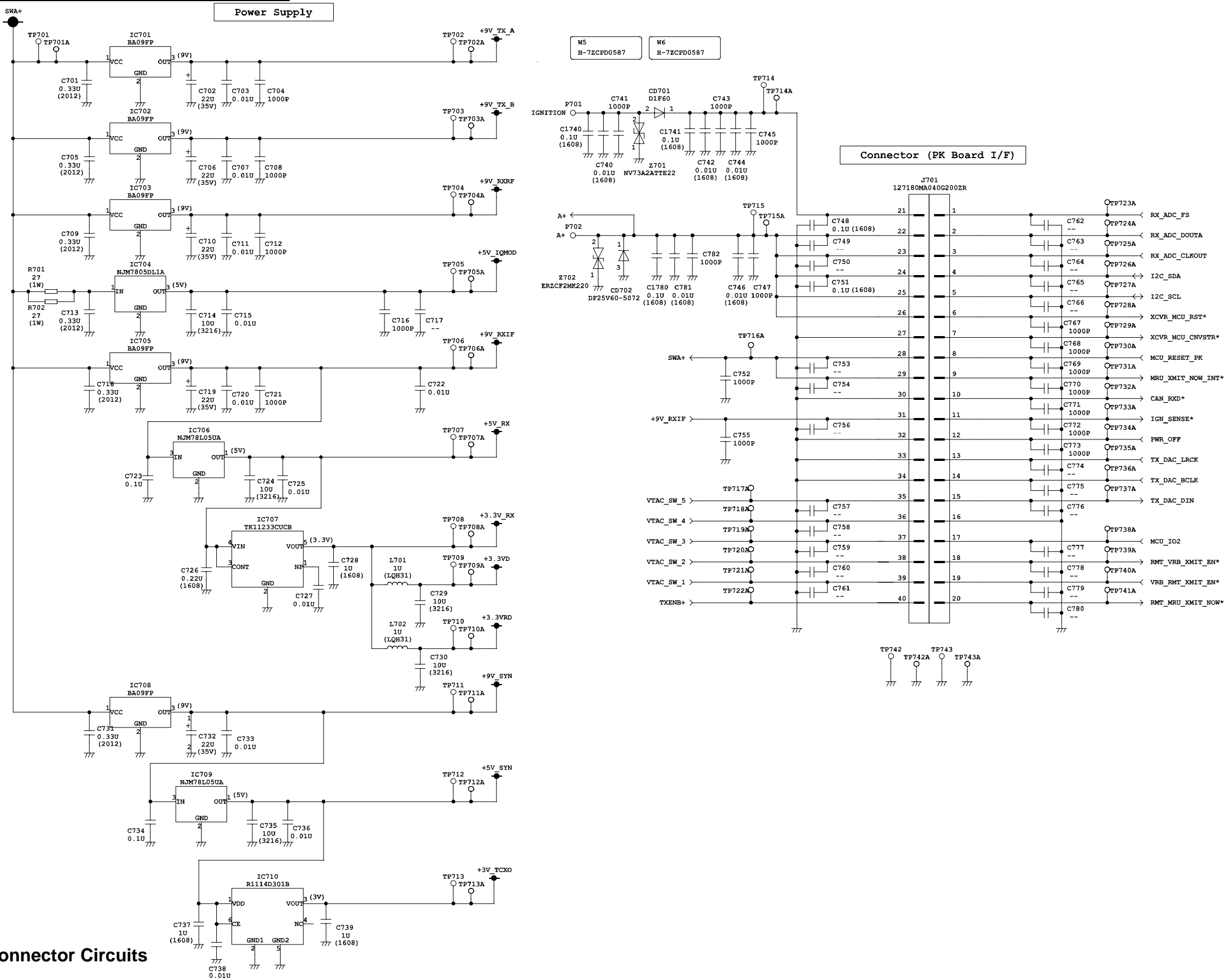


440 TO 512 MHZ
RF PROCESSOR BOARD
Schematic Diagram
Sheet 5 of 7

Rx 1st Synthesizer Circuits



20.3.7 Power Supplies and PK Board Connector Circuits

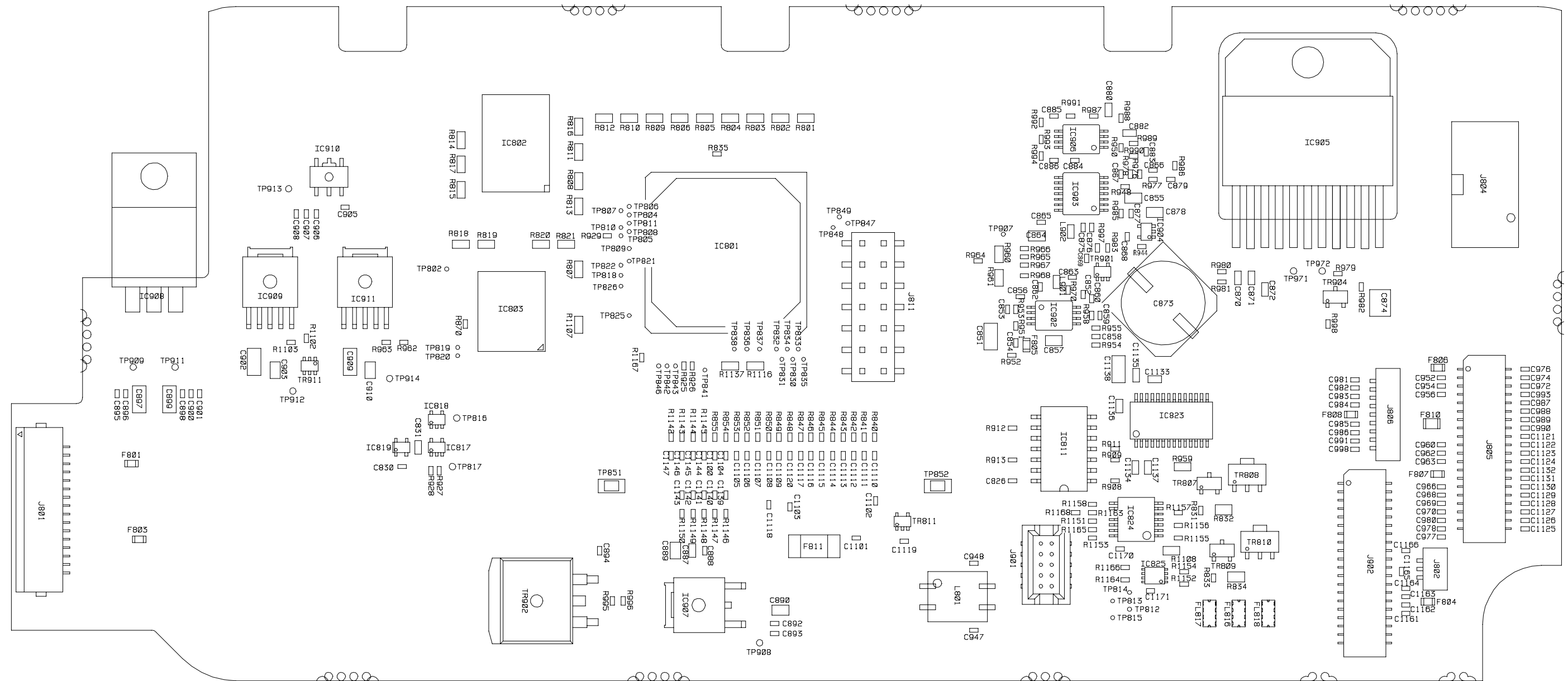


440 TO 512 MHZ
RF PROCESSOR BOARD
Schematic Diagram
Sheet 7 of 7

Power Supplies and PK Board Connector Circuits
(DD00-CMN-4750HY/JHM-475S50H, 20101117)

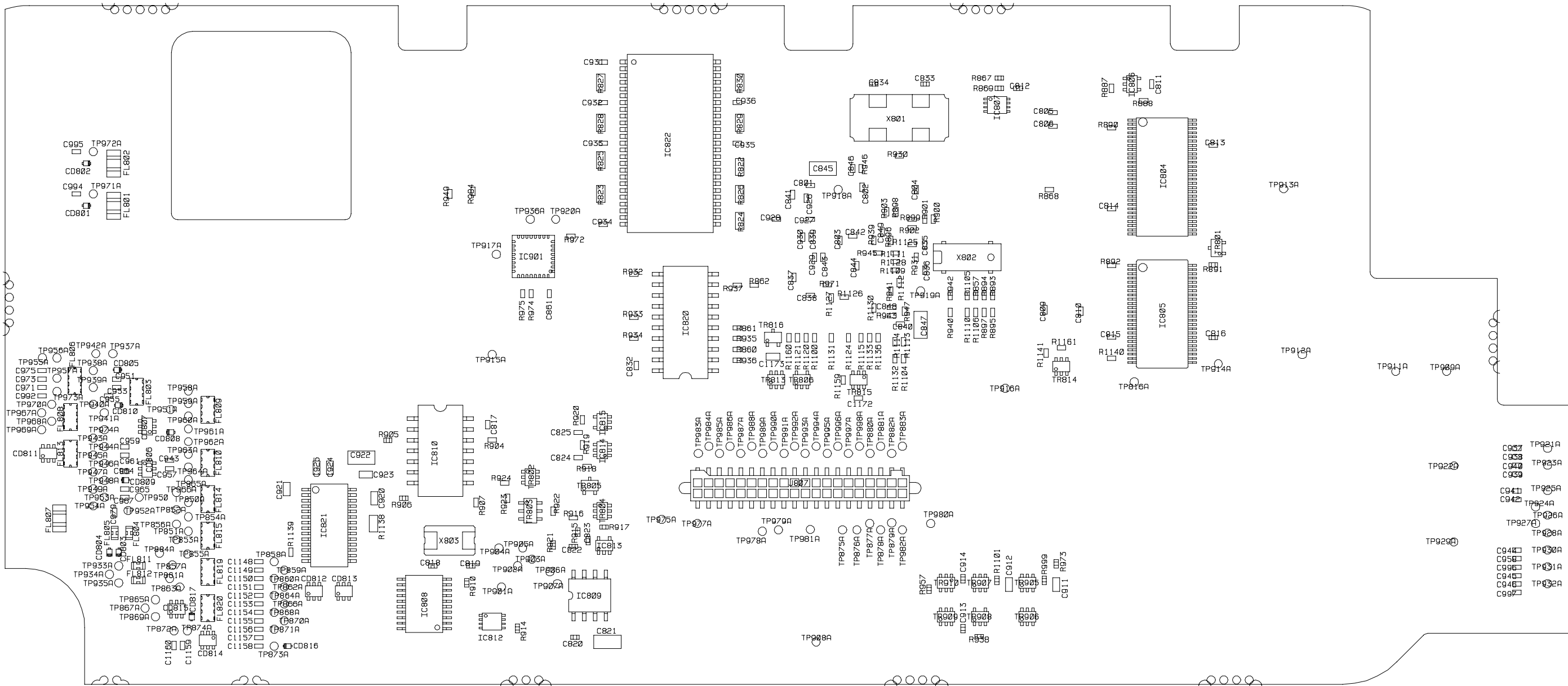
21 BOARD OUTLINE DIAGRAMS

21.1 PK BOARD — PRIMARY SIDE



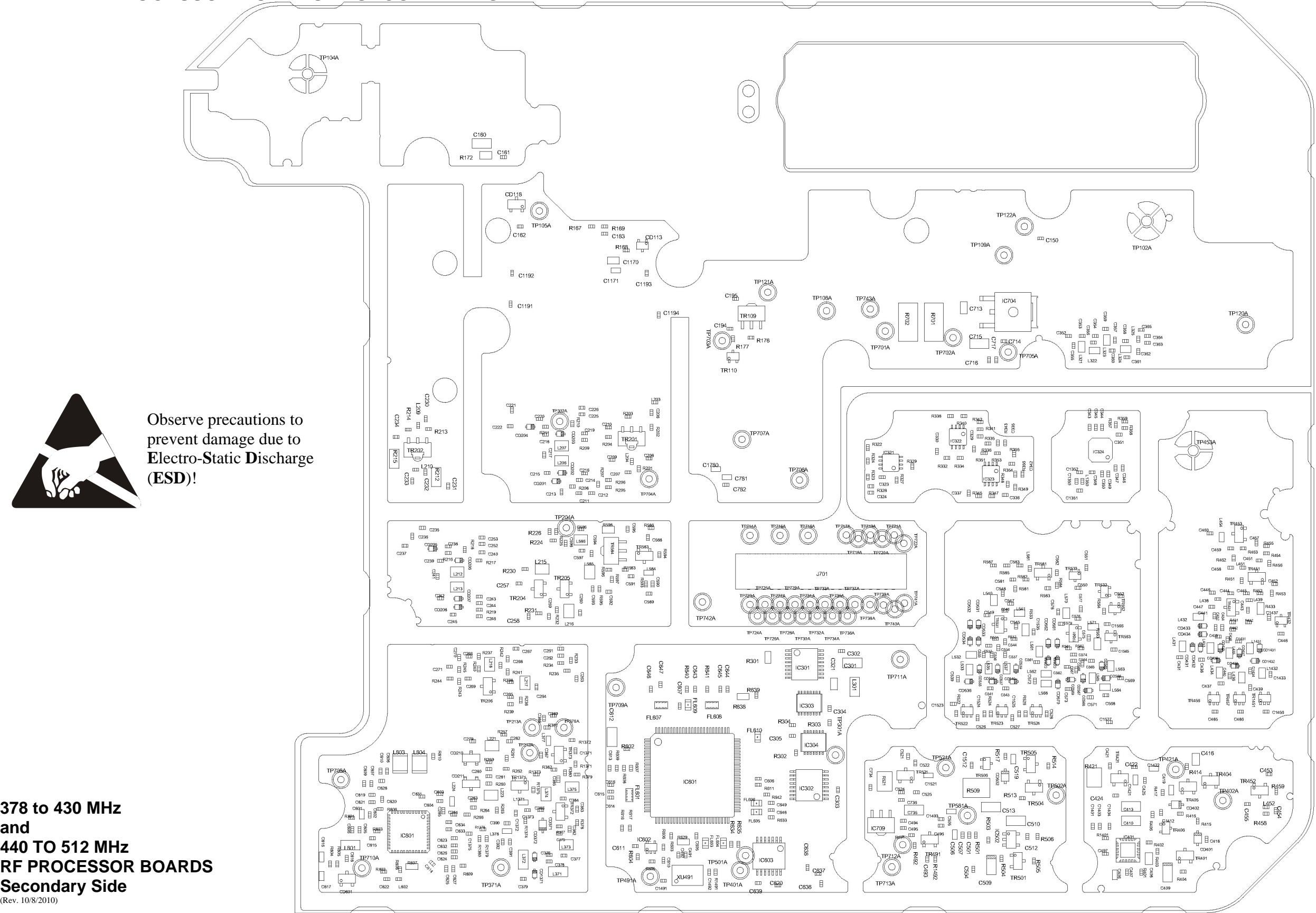
Observe precautions to prevent damage due to **Electro-Static Discharge (ESD)!**

21.2 PK BOARD — SECONDARY SIDE



Observe precautions to prevent damage due to Electro-Static Discharge (ESD)!

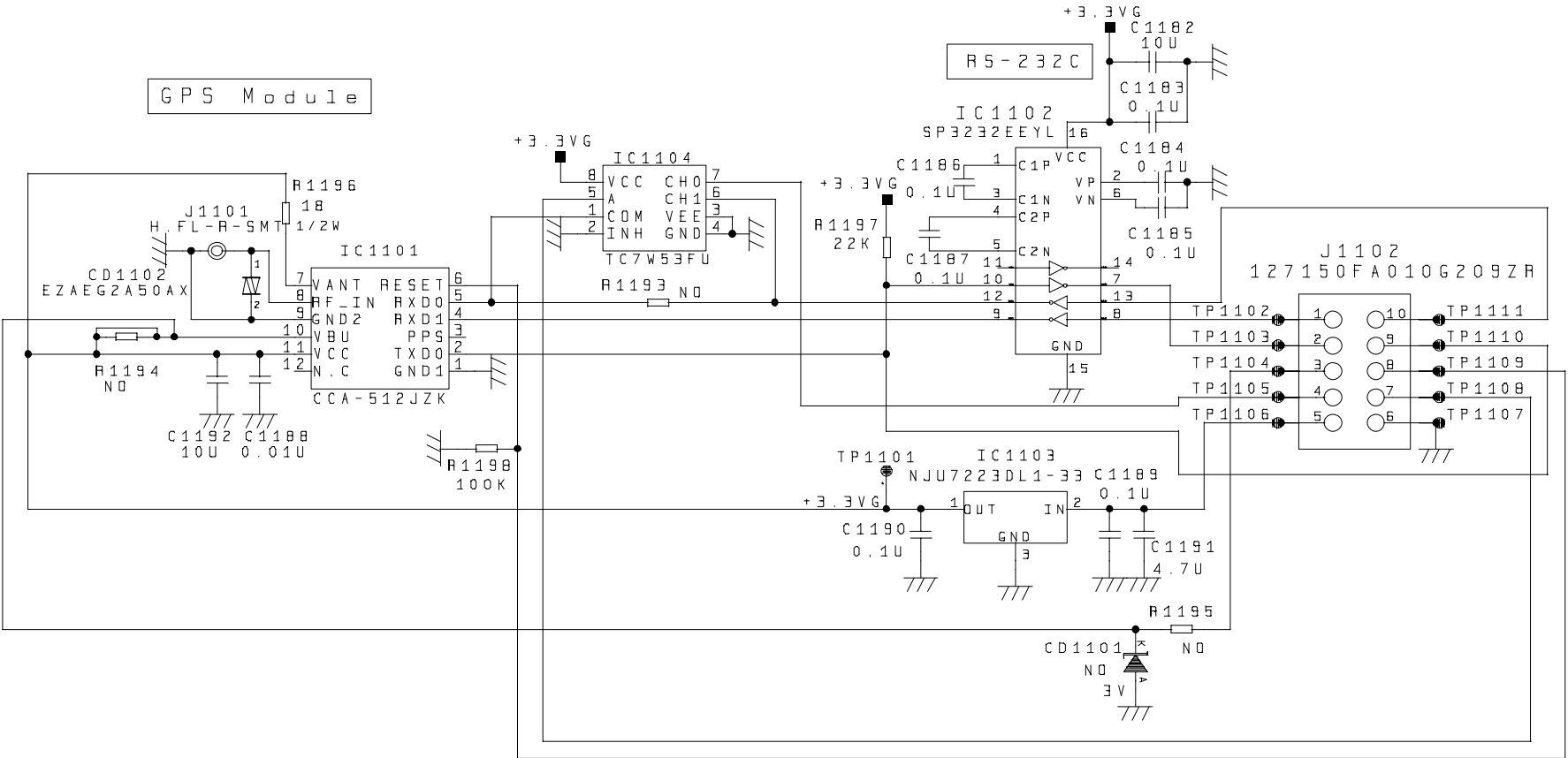
21.4 RF PROCESSOR BOARDS — SECONDARY SIDE



22.1 GPS RECEIVER MODULE (OPTIONAL)

J1102 Pin-Out

PIN	PK BOARD SIGNAL NAME	SOURCE	DESCRIPTION
1	DGPS_DATA	External	DGPS Correction Data Input (RXD1); RS-232C
2	GPS_NMEA_RX	GPS	Position Data Output (TXD0); RS-232C
3	+5V	Radio	Backup Power (Not used.)
4	UART2_TX_D	Radio	Initial Setting Data Input (RXD0); +3.3V
5	SWA+	Radio	Switched A+ (+13.6V)
6	GND	Radio	GND
7	UART2_TXRX_EN*	Radio	Select signal of RXD0 H: External GPS_NMEA_TX L: Radio UART2_TX_D
8	GPS_RESET*	Radio	Reset for GPS
9	UART2_RX	GPS	Position Data Output (TXD0); +3.3V
10	GPS_NMEA_TX	External	Initial Setting Data Input (RXD0) RS-232C



**BLOCK, SCHEMATIC AND BOARD OUTLINE
DIAGRAMS INSIDE
for
PK Board and RF Processing Boards

and

SERVICE SHEET INSIDE
for
GPS Receiver Module (Optional)**