



3: TROUBLESHOOTING MANUAL

VX150 to VX2 FM BROADCAST TRANSMITTER

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The comparisons and other information provided in this document have been prepared in good faith based on publicly available information. For verification of materials, the reader is encouraged to consult the respective manufacturer's most recent publication on the official website or through contact with Customer Service.

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RELEASE CONTROL RECORD

| ISSUE | DATE | REASON |
|-------|------------|---|
| 0.1 | 2020-12-01 | <p>Preliminary release for VX150 to VX2. Supports hardware versions:</p> <p>VX150, VX300, VX600 (NARF81) VX1 (NARF79) VX1.5. VX2 (NARF80)</p> <p>Supports software version VX SW 1.0 and later.</p> |

SECTION 3.1: RESPONDING TO ALARMS

This section provides instructions you need when performing troubleshooting on the VX150 to VX2 transmitter. This section includes the following topics:

- [Corrective Maintenance](#)
- [Electrostatic Protection - see page 3.1.3](#)
- [Identifying and Troubleshooting an Alarm - see page 3.1.4](#)
- [Replacement Procedures - see page 3.1.17](#)

If none of the procedures and alarms described in this section address your problem, contact Nautel for assistance. See “Technical Support” in the Installation Manual.

Corrective Maintenance

Corrective maintenance procedures consist of identifying and correcting defects or deficiencies that arise during transmitter operation. Local and/or remote alarm signals are generated when a malfunction occurs. If an alarm condition is caused by a malfunction in the RF power stage, the transmitter may maintain operation at a reduced RF output level. The nature of the fault – and station policy – will dictate whether an immediate maintenance response is necessary. Fault analysis and rectification may be conducted from three different levels, with a different technical competence level required for each: on-air troubleshooting, remote or local, and off-air troubleshooting.

CAUTION! The transmitter contains many solid state devices that may be damaged if subjected to excessive heat or high voltage transients. Take every effort to ensure that circuits are not overdriven or disconnected from their loads while turned on.

On-Air Troubleshooting

On-air troubleshooting can be performed from a remote location, or locally at the transmitter site.

Remote Troubleshooting

Remote on-air troubleshooting consists of monitoring the transmitter's radiated signal using an on-air monitor or via a LAN connection, and observing the status of each remote fault alarm indicator. Information obtained from these sources should enable an operator to decide whether an alarm response may be deferred to a more convenient time, an immediate corrective action must be taken, or

if a standby transmitter must be enabled (if one is available). It is recommended that the significance of remote indications, and the appropriate responses, be incorporated into a station's standard operating procedures. Refer to ["Identifying and Troubleshooting an Alarm" on page 3.1.4](#) to determine the remedial action required for a given fault.

Local Troubleshooting

Local on-air troubleshooting consists of monitoring the transmitter's integral meters and fault alarm indicators. Analysis of this data will normally identify the type of fault, and in most cases will determine what corrective action must be taken. Refer to ["Identifying and Troubleshooting an Alarm" on page 3.1.4](#) to determine the remedial action required for a given fault.

Off-Air Troubleshooting

Off-air troubleshooting must be performed when routine on-air calibration adjustments will not restore operation.

It is recommended that the transmitter's output be connected to a precision 50 Ω resistive dummy load (rated for at least the maximum transmitter power rating) before starting off-air troubleshooting procedures. If an appropriate dummy load is not available, troubleshooting for a majority of faults can be performed with RF power turned off. The transmitter may remain connected to its antenna system for these procedures.

NOTE: *Reduce the RF output level to a minimal value when troubleshooting faults in the power amplifier stage while the transmitter's RF output is connected to the antenna system.*

Electrostatic Protection

The transmitter's assemblies contain semiconductor devices that are susceptible to damage from electrostatic discharge. The following precautions must be observed when handling an assembly which contains these devices.

CAUTION! Electrostatic energy is produced when two insulating materials are rubbed together. A person wearing rubber-soled shoes, walking across a nylon carpet or a waxed floor, can generate an extremely large electrostatic charge. This effect is magnified during periods of low humidity. Semiconductor devices such as integrated circuits, field-effect transistors, thyristors and Schottky diodes may be damaged by this high voltage unless adequate precautions are taken.

Electrical Discharging of Personnel

Personnel should be electrically discharged by a suitable grounding system (e.g., anti-static mats, grounding straps) when removing an assembly from the transmitter, and while handling the assembly for maintenance procedures.

Handling/Storage

An assembly should be placed in an anti-static bag when it is not installed in a host transmitter, or when it is not undergoing maintenance. Electronic components should be stored in anti-static materials.

Tools/Test Equipment

Testing and maintenance equipment – including soldering and unsoldering tools – should be suitable (i.e., grounded tip) for contact with static sensitive semiconductor devices.

Stress Current Protection

Every precaution should be taken to ensure the static sensitive semiconductor devices are protected from unnecessary stress current. This is achieved by ensuring that current is not flowing when an electrical connection is broken, and that voltages are not present on external control/monitoring circuits when they are connected.

Identifying and Troubleshooting an Alarm

You can identify an alarm locally by viewing the front panel user interface (UI) (see [“Front Panel Alarm Checks”](#)) or remotely by viewing the remote AUI’s Alarms page (see [“Remote AUI Alarms Page Checks”](#) on page 3.1.7).

Front Panel Alarm Checks

There two ways to check for alarms on the front panel:

- [Fault LED](#)
- [Alarms Screen](#)

Fault LED

See [Figure 3.1.1](#). The FAULT LED on the right-hand side of the display indicates that a fault is present. The FAULT LED will be either off or red. When illuminated, the transmitter has encountered a summary fault. Use the remote AUI or local UI to view the status of the transmitter.

Figure 3.1.1: Transmitter Front Panel (VX1 shown for reference)

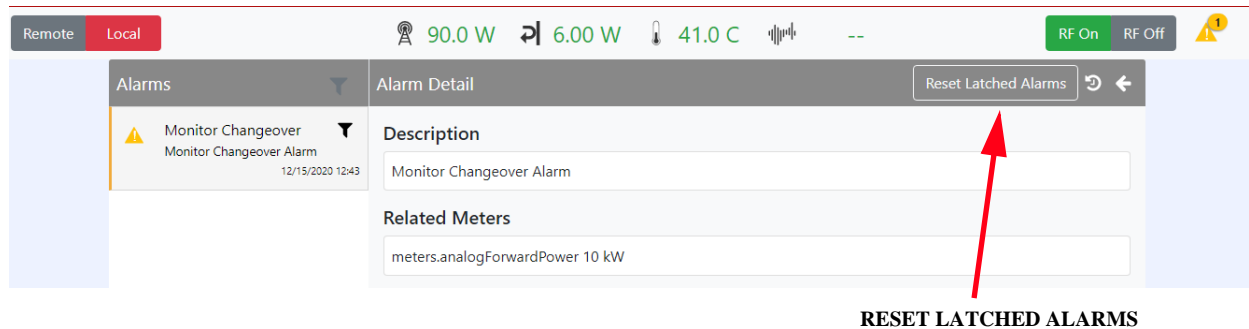


When a fault is present, the transmitter may still produce an RF output. In this case, or if the transmitter has shut down, you should schedule and commence more in-depth fault diagnosis. See [“Alarms Screen”](#) on page 3.1.5.

Alarms Screen

If an alarm exists and is currently being recognized by the transmitter system, it is displayed in the Alarms screen (Dashboard -> Alarms) of the front panel display (see [Figure 3.1.2](#)).

Figure 3.1.2: Alarms Screen



[Table 3.1.1 on page 3.1.9](#) contains a column for most alarms that can occur, sorted alpha-numerically. The Description and Troubleshooting Action column provides a brief description of the alarm, troubleshooting tips and a cross-reference to more troubleshooting, if applicable.

1. Scroll through the Alarms screen to view the active faults.
2. Attempt to clear any latching alarms by pressing the Reset Latched Alarms button in the Main Dashboard -> Alarms screen. If the alarm persists, it will not clear from the display.
3. Locate the alarm name in [Table 3.1.1 on page 3.1.9](#) to determine the cause of the alarm and perform any recommended procedures in the Description and Troubleshooting Action column. This may also lead to replacing a suspect PWB, power supply or fan, as detailed in "[Replacement Procedures](#)" on page 3.1.17.

NOTE: Before undertaking any troubleshooting, record all meter readings and note if any other alarms are displayed on the Alarms screen. record all alarms.

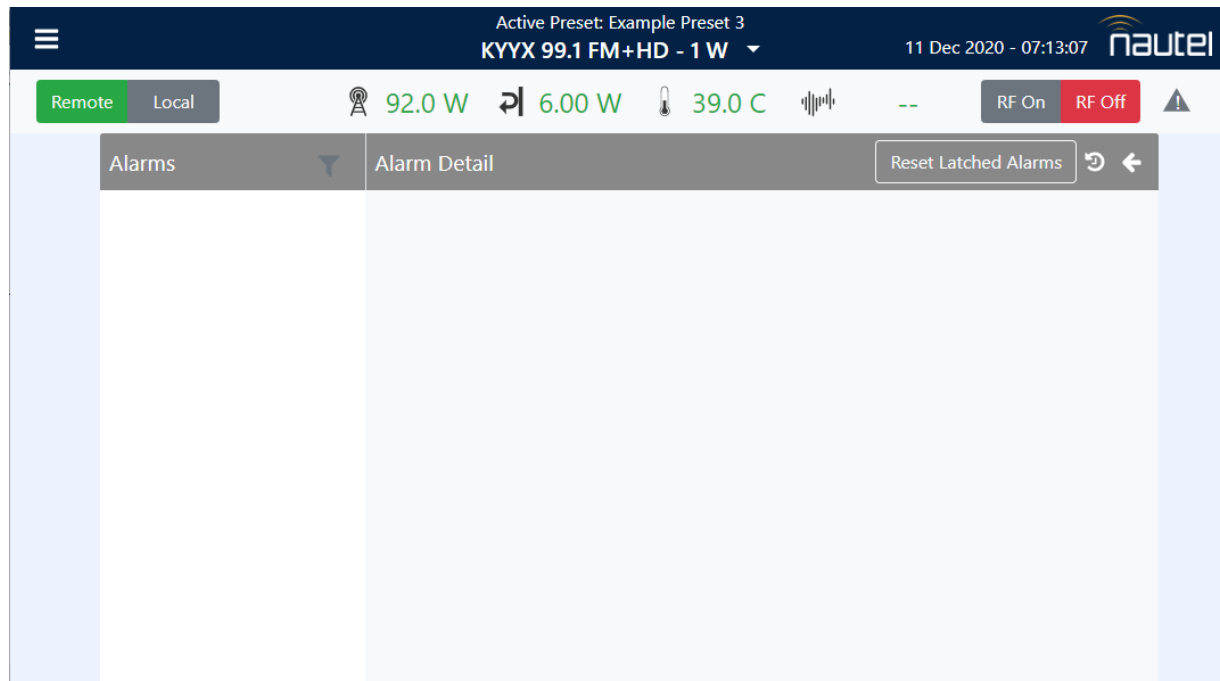
NOTE: [Table 3.1.1 on page 3.1.9](#) contains a column for most alarms that can occur, sorted alpha-numerically, including both the names displayed on the front panel and, if different, the remote AUI. The Description and Troubleshooting Action column provides a description of the alarm, troubleshooting tips, and a link to detailed troubleshooting, as applicable.

4. If troubleshooting and subsequent replacement of a suspect PWB or module causes the alarm to disappear from the Alarms screen, the alarm has been successfully cleared. If the fault condition does not clear, contact Nautel.

Remote AUI Alarms Page Checks

If an alarm exists and is being recognized by the transmitter, it is displayed on the Alarms page (see [Figure 3.1.3](#)). The warning symbol in the upper, right section of the remote AUI dashboard (any page) will be amber or red when an alarm is present.

Figure 3.1.3: AUI Alarms Page



1. Click the warning symbol (or select Menu -> Alarms) to go to the Alarms page (see [Figure 3.1.3](#)). View the list of active faults. Alarms are listed by their name (Alarm column), and then by severity (Alarm Detail column) [single orange ! indicates low severity (RF output not affected); single red ! indicates medium severity (RF output is reduced); two red ! indicates high severity (RF output is inhibited)].
2. Attempt to clear any latching alarms by pressing the Reset Latched Alarms button on the bottom banner of the page. If the alarm persists, it will not be cleared from the display.
3. Locate the alarm name in [Table 3.1.1 on page 3.1.9](#) to determine the cause of the alarm and perform any recommended procedures in the Description and Troubleshooting Action column. This may also lead to replacing a suspect PWB, power supply or fan, as detailed in ["Replacement Procedures" on page 3.1.17](#).

NOTE: [Table 3.1.1 on page 3.1.9](#) contains a column for most alarms that can occur, sorted alphanumerically for each sub-system, including both the names displayed on the remote AUI and, if different, the front panel display. The **Description and Troubleshooting Action** column provides a brief description of the alarm, troubleshooting tips and a cross-reference to more detailed troubleshooting, as applicable.

4. If troubleshooting and subsequent replacement of a suspect PWB or module causes the alarm to disappear from the Alarms page, the alarm has been successfully cleared. If the fault condition does not clear, contact Nautel.

NOTE: Before undertaking any troubleshooting, record all remote AUI meter readings and note if any other alarms are displayed on the Alarms page. Record all alarms. The most convenient way to do this is by using the remote AUI's Menu -> Reports page to download a report of the Alarm History (see "Alarm History" in the Operations & Maintenance Manual). Another method is to use a web browser over a LAN connection to save screen shots of critical status, meter and alarm pages. Go to the Dashboard -> Meters page to view (and save) detailed information (see "Viewing Meters" in the Operations & Maintenance Manual).

Table 3.1.1: Troubleshooting Alarms

| Alarm Name | Description and Troubleshooting Action |
|----------------------------------|--|
| Analog Audio PWB +12V Fail | This alarm occurs if the +12 V supply in the analog audio PWB is 10% lower or 10% higher than the desired value. Check the output voltage of the 12 V power supply module (U2). If necessary, replace the 12 V power supply module (see ???). There may also be a problem with the controller's power supply PWB. |
| Analog Audio PWB DC Voltage Fail | |
| Analog Audio PWB Fail/Missing | |
| Analog Left Audio Low | This alarm indicates the analog left audio input level is too low or is not applied. The transmitter takes no action on this alarm. |
| Analog Right Audio Low | This alarm indicates the analog right audio input level is too low or is not applied. The transmitter takes no action on this alarm. |
| Audio Changeover | This alarm occurs if the main audio source has been lost, and the exciter has switched to the backup source as configured by the user. |
| Audio Player Digital Low | This alarm occurs if the audio player is in use on the SBC , but no digital audio is detected by the controller . |
| Audio Processor Offline | This alarm occurs if the transmitter is configured to include an Orban Inside audio processor, but it is not communicating with the processor on the internal serial bus. Check all connections to the Orban Inside audio processor card |
| Audio Processor Output Fail | This alarm occurs if the transmitter is configured to include an Orban Inside audio processor, but it is not detecting audio from the processor. Check all connections to the Orban Inside audio processor card. |
| Composite 1 Low | This alarm indicates the composite 1 audio input level is too low. The transmitter takes no action on this alarm. |
| Composite 2 Low | This alarm indicates the composite 2 audio input level is too low. The transmitter takes no action on this alarm. |
| Configuration File Not Found | This alarm occurs when the controller does not find a valid configuration file to load at power-up. This alarm is unlikely and may clear when the correct settings are entered. |
| Delaying Turn On | This alarm occurs, if the turn-on delay function is enabled, and transmitter is not permitted turn-on until the delay period elapses. The turn-on delay function is enabled upon an ac power failure and is typically used to add delay for use with an external generator. |
| Digital AES 1 Audio Low | This alarm indicates the digital AES 1 audio input level is too low. Suspect a problem with the external audio processor or studio feed. The transmitter takes no action on this alarm. |
| Digital AES 2 Audio Low | This alarm indicates the digital AES 1 audio input level is too low. Suspect a problem with the external audio processor or studio feed. The transmitter takes no action on this alarm. |

| Alarm Name | Description and Troubleshooting Action |
|------------------------------------|---|
| Entered Firmware Upgrade | This alarm occurs when the exciter is in "firmware upgrade" mode. It should only be displayed during a transmitter software upgrade. |
| Exciter +12V Fail | This alarm occurs if the +12 V supply in the exciter PWB is 10% lower or 10% higher than the desired value. Check the output voltage of the 12 V power supply module (U2). If necessary, replace the 12 V power supply module (see ???). There may also be a problem with the controller's power supply PWB. |
| Exciter Audio Reset | |
| Exciter DC Voltage Fail | |
| Exciter Failure | |
| External Interlock | This alarm occurs when the external interlock input wired to the EXT INTLK terminal is open. The transmitter will not be able to enable its RF output. Check the interlock connection on the rear of the transmitter. If the interlock connection is intact, check that all external interlock switches are closed. If no problem is found with the connection at the transmitter or any of the external interlock switches, suspect a problem with the interlock circuitry on the exciter/control PWB (A1). |
| Fan1/2 Fail | This alarm occurs if the speed of cooling fan 1 is below 3000 RPM (half of its nominal value of 6000 RPM). If either fan 1 or 2 fail, the transmitter takes no action (no effect on the RF output). If the alarm occurs for fans 1 or 2, check the connection between the indicated fan and the PS Distribution PWB (A2). If these connections look OK, replace the indicated fan (see "Cooling fan replacement" on page 1-42). If the alarm still occurs after the fan has been replaced, suspect the PS distribution PWB. |
| FPGA Version Mismatch | |
| Forward Power Shutdown | This alarm occurs if the transmitter tries to reduce the forward power below minimum (?? W) due to repeated Forward Power Limiting alarms. The transmitter latches off. See Forward Power Limiting for troubleshooting tips |
| Front Panel User Interface Failure | This alarm occurs if there is a fault with the front panel user interface (UI), preventing it from being used to control the transmitter. The transmitter will automatically switch to remote control mode to allow use of the AUI or digital I/O. |
| High Ambient Temperature | This alarm is indication only and occurs if the transmitter's ambient temperature exceeds 60°C (140°F). Check the intake air filter or cooling fans. |
| High PA Temperature | This alarm occurs if the power amplifier's heatsink temperature exceeds 85°C (185°F). This alarm is most likely caused by excessive ambient temperature, a fan failure or blockage, or excessive power amplifier dissipation. This alarm will clear when the power amplifier's heatsink temperature decreases to 75°C (167°F). |

| Alarm Name | Description and Troubleshooting Action |
|---------------------|--|
| High SWR | This alarm occurs if the transmitter's average reflected power exceeds the high SWR threshold (?? W). The transmitter takes no action on this alarm. Inspect the antenna and transmission line system for damage or de-tuning. If there are no major issues with the antenna network that would cause an impedance change (icing for example), suspect the Combiner Interface PWB (see "Combiner Interface PWB Replacement" on page 1-50) output power probe PWB (A7) (see "Output power probe PWB replacement" on page 1-45). |
| High SWR Shutdown | This alarm occurs if the transmitter tries to reduce the forward power below a level that is equivalent to a 3:1 VSWR (forward power of ?? W) at the SWR Foldback threshold (reflected power of ?? W) due to a gradually degrading load match. This alarm causes the transmitter to latch off. Inspect the antenna and transmission line system for damage or de-tuning. If there are no major issues with the antenna network that would cause an impedance change (icing for example), suspect the Combiner Interface PWB (A12) (see "Combiner Interface PWB Replacement" on page 1-50). |
| Host Not Booted | This alarm indicates that the controller's host has not finished booting. The remote AUI will not yet be available. Occurrence of this alarm is normal for approximately one to five minutes while the host is booting, immediately after ac power has been applied/restored or after a software upgrade. If this alarm continues to occur more than 30 minutes after ac power has been applied to the transmitter, cycle (turn off, then on) the ac power. If the alarm persists after 30 minutes, replace the Exciter/Control PWB (A1) (see "Exciter/Control PWB Replacement" on page 1-46). |
| Host Not Responding | This alarm indicates that the microcontroller (host) that runs the remote interfacing applications is not communicating with the transmitter's primary microcontroller (DSP). If the watchdog function is enabled, the DSP will automatically reset the host. If this alarm persists for more than 10 minutes, try cycling power (off, then on) to the transmitter. If the alarm persists, replace the Exciter/Control PWB (A1) if necessary (see "Exciter/Control PWB Replacement" on page 1-46). |
| IPA Failure | This alarm occurs if the IPA Output Low alarm is present and the measured IPA current is below 225 mA. The transmitter takes no action on this alarm. See IPA Output Low for troubleshooting tips. |
| IPA Output High | This alarm occurs if the pre-amp/IPA PWB's forward power is greater than the IPA Output High threshold (130%/36 W). If this condition persists, replace the pre-amp/IPA PWB (A5) (see "Pre-amp/IPA PWB replacement" on page 1-42). The transmitter takes no action on this alarm. If this alarm persists after replacing the pre-amp/IPA PWB, suspect the Combiner Interface PWB (A12) (see "Combiner Interface PWB Replacement" on page 1-50) or the Exciter/Control PWB (A1) (see "Exciter/Control PWB Replacement" on page 1-46). |

| Alarm Name | Description and Troubleshooting Action |
|--------------------------|---|
| IPA Output Low | This alarm occurs if the pre-amp/IPA PWB's forward power is less than the IPA Output Low threshold (70%/14.4 W). This alarm causes the controller to limit the PA voltage to 30 V. Check for a +48V Supply Fail alarm and follow the associated troubleshooting procedure if present. IPA Fail and Pre-amp Fail alarms may also be present. If no associated alarms are present, turn RF off and run the bias routine in the front panel's Main Menu -> System Settings -> Calibration menu. If the alarm persists, enable RF and use a digital multimeter to measure the voltage between pad B on Pre-amp/IPA PWB (pre-amp bias) and chassis (ground) and also between pad C on Pre-amp/IPA PWB (IPA bias) and chassis (ground). If the voltage is less than 1 V at either of these points, suspect the Exciter/Control PWB (A1). If the voltage is greater than 1 V at both of these points, use a digital multimeter to measure between pad E (IPA volts) on the Pre-amp IPA PWB and chassis (ground). If the measured voltage is not within an acceptable range (between +43 V and +48 V), with ac power off, perform a continuity check across F1 of the PS Distribution PWB (A2). If the measurement is greater than 1 W, replace the fuse (Nautel Part # FA57 in the ancillary kit). If the measurement is less than 1 W, or replacing the fuse does not clear the alarm, replace the Pre-amp/IPA PWB (A5) (see "Pre-amp/IPA PWB replacement" on page 1-42). If the voltage on pad E is acceptable, use a digital multimeter to measure between pad D (pre-amp volts) on the Pre-amp IPA PWB and chassis (ground). If the measured voltage is not within an acceptable range (between +43 V and +48 V), replace the Pre-amp/IPA PWB (A5) (see "Pre-amp/IPA PWB replacement" on page 1-42). If the voltage is acceptable, or replacing the pre-amp/IPA PWB does not clear the alarm condition, suspect the Combiner Interface PWB (A12) (see "Combiner Interface PWB Replacement" on page 1-50) or the Exciter/Control PWB (A1) (see "Exciter/Control PWB Replacement" on page 1-46). |
| Low Forward Power | This alarm occurs if the transmitter's average forward power falls below the low forward power threshold (defaulted to 50% of the preset power level and is user adjustable) due to PA failures, fan failures, SWR foldback or a pre-amp/IPA failure. The transmitter takes no action on this alarm. Check for associated alarms, and follow the associated troubleshooting procedure if present. If no other alarms are being indicated, with RF turned on, use a digital multimeter to measure the voltage between pad V and pad W on any PA. If the voltage does not fall within an acceptable range (between 2.3 V and 3 V), suspect the Exciter/Control PWB (A1). If the voltage is within this range, perform the "PA resistance checks" on page 1-37, else suspect the Output Power Probe PWB (A7) (see "Output power probe PWB replacement" on page 1-45). |
| Missing Preset | This alarm indicates that there are no presets programmed into the transmitter. The user will not be able to enable RF without first programming a preset. |
| Modulation Loss | This alarm, enabled by the user, indicates that the exciter's audio modulation level is below the level specified in the audio loss settings of the active preset (see "Mod Loss" on page 3.2.110 of the Operations & Maintenance Manual to enable/disable this alarm and to configure the resulting action). Depending on the setting, this alarm could trigger a preset change, inhibit the RF or have no effect (alarm only). Check the appropriate program input(s) and the mod loss setting for the preset. |
| Muted Transmitter Output | For internal control only; no troubleshooting action required |

| Alarm Name | Description and Troubleshooting Action |
|-------------------------|--|
| No External 10 MHz | This alarm occurs if frequency locking to an external 10 MHz source is enabled and no external 10 MHz is detected. The exciter will automatically switch over to the internal 10 MHz reference, and will continue to run. Check the 10 MHz input. If there are no problems with the 10 MHz signal and connection, suspect the Exciter/Control PWB (A1) . |
| No LAN Connection | This alarm occurs if the transmitter is not detecting communication over the LAN connection. This alarm is typically only visible in the Events Log, since it will not be transmitted when communication is interrupted. |
| No One Pulse per Second | This alarm occurs if the pilot phase locking to 1 PPS is enabled and the 1 PPS signal is not present. Check the 1 PPS input. If there are no problems with the 1 PPS signal and connection, suspect the Exciter/Control PWB (A1) . The transmitter takes no action on this alarm |
| Overall Summary | Not displayed in AUI or UI status. Configurable as a remote output. This alarm occurs if there are any alarms present. Check for associated alarms, and follow the associated troubleshooting procedure, if present. |
| PA Fail Foldback | This alarm occurs if the control system determines that the calculated dissipation in any FET on a PA is above the high dissipation threshold (?? W), or the forward power being asked for out of an individual PA [calculated as (output power - combiner losses) / number of active PAs in the system] is above the PA output high threshold (400 W)(850 W for VS2.5 or 900 W for VS3). The forward power of the transmitter will be limited to a level such that neither of these thresholds are exceeded. Check for associated alarms. Typically, the assertion of this alarm is the result of a PA failure or removal, or a high SWR condition. If no other alarms are being indicated, contact Nautek for further support |
| PA Fail/PA1 Fail | This alarm occurs if the dc input current for the PA (A7), also PA1 for VX1.5/VX2 transmitters) has fallen below a predetermined threshold (typically less than 50% of the average PA current of the operational PAs, or below 500 mA, whichever is lower). This may be caused by a cabling fault on the PA, loss of PA voltage or bias, or a defective FET. The transmitter's output power will be reduced (see Table 1.3 on page 1-31) and this condition could cause Per PA Foldback and Reject Foldback alarms. Perform the "PA resistance checks" on page 1-37. If there is no problem found with the PA, or the alarm still persists after replacing the PA, suspect the PS Distribution PWB (A2) . |
| PA2 Fail | For VX1.5/VX2 transmitters only. This alarm occurs if the dc input current for PA2 (A8) has fallen below a predetermined threshold (typically less than 50% of the average PA current of the operational PAs, or below 500 mA, whichever is lower). This may be caused by a cabling fault on the PA, loss of PA voltage or bias, or a defective FET. The transmitter's output power will be reduced (see Table 1.3 on page 1-31) and this condition could cause Per PA Foldback and Reject Foldback alarms. Perform the "PA resistance checks" on page 1-37. If there is no problem found with the PA, or the alarm still persists after replacing the PA, suspect the PS Distribution PWB (A2) . |

| Alarm Name | Description and Troubleshooting Action |
|--|--|
| PA Power Supply AC Fail | This alarm occurs if the power supply module (U3) is reporting an ac failure, indicating its ac input voltage is less than 175 V ac . The transmitter will inhibit its RF output until the alarm is cleared. Check the ac voltage applied to the power supply module. If the ac voltage is acceptable, try replacing the indicated power supply module with a new module (see "Power Supply Module Replacement" on page 3.1.23). If replacing the power supply module does not clear the fault, suspect the PS Distribution PWB (A2) . |
| PA Power Supply Current Limit Foldback | |
| PA Power Supply Fail | This alarm occurs if the power supply module (U3) is reporting a PS failure, indicating its output voltage is outside of its acceptable range. The transmitter will inhibit its RF output until the alarm is cleared. Try replacing the indicated power supply module with a new module (see "Power Supply Module Replacement" on page 3.1.23). If replacing the power supply module does not clear the fault, suspect the PS Distribution PWB (A2) or the Exciter/Control PWB (A1) . |
| PA Power Supply Not Compatible | |
| PA Power Supply Not Detected | This alarm occurs if the power supply module (U3) is not being detected or has been removed. The transmitter will inhibit its RF output until the alarm is cleared. If there is a power supply module in the transmitter, try re-seating it or replacing it with a new module (see "Power Supply Module Replacement" on page 3.1.23). If replacing the power supply module does not clear the fault, suspect the PS Distribution PWB (A2) . |
| PA Power Supply Over Temperature | This alarm occurs if the power supply module (U3) is reporting a high temperature alarm, indicating its operating temperature has exceeded its internal threshold. The transmitter will inhibit its RF output until the alarm is cleared. This alarm is most likely caused by a module fan failure or blockage. Allow the module to cool and attempt to reset the alarm. Verify the module turns on and its fan is operational. If the fan is not operational, inspect it for possible blockage. If a problem is found, replace the power supply module (see "Power Supply Module Replacement" on page 3.1.23). If there is no problem found, inspect the transmitter's front air filter and clean or replace as required (see Section 3, "Routine maintenance of the Operations and Maintenance Manual"). If the alarm persists, replace the power supply module (see "Power Supply Module Replacement" on page 3.1.23). If replacing the power supply module does not clear the fault, suspect the PS Distribution PWB (A2) . |
| PA PS Current Limit Foldback | This alarm occurs if the transmitter is limiting its output power to avoid drawing excessive current (?? A) from the power supply module. This may occur when there are PA failures and the transmitter is attempting to compensate to attain the setpoint level. Check for associated alarms, and follow the associated troubleshooting procedure if present. |
| PA Volts Failure | This alarm indicates the PA voltage from the power supply module does not match the requested setpoint. This is likely caused by a power supply module failure. Check the power supply module (U3) and replace if necessary (see "Power Supply Module Replacement" on page 3.1.23). |

| Alarm Name | Description and Troubleshooting Action |
|----------------------|--|
| Pilot Unsync | This alarm occurs if there is no synchronization between the 10 MHz and 1PPS signals. It may indicate that the GPS receiver is not detecting a signal. Check the GPS receiver and antenna. The transmitter takes no action on this alarm. |
| PLL Unlocked | This alarm indicates that the exciter's master clock is not locked. Possible causes are an out-of-range 10 MHz input or a hardware failure on the Exciter/Control PWB (A1) . The transmitter's RF output is inhibited. |
| Rebooted Exciter | This is an informational alarm only that is displayed when the watchdog timer reboots the transmitter's main microcontroller (DSP). Typically, this alarm will show up after an ac power interruption. |
| Reboot Required | This alarm indicates that exciter setup changes have been made, typically via the Hardware Configuration page of the AUI . Typically, the DSP will reboot itself automatically; however, if this alarm persists for more than five minutes, cycle the transmitter's ac power (off, then on) to store the changes. |
| Running Bias Routine | This is an informational alarm only that is displayed when the bias routine has been initiated. |
| SWR Cutback | This alarm occurs whenever the transmitter experiences a cutback. A cutback (reduction in power) occurs when repeated shutback alarms occur within a prescribed time period. Shutbacks occur when the transmitter's peak reflected power exceeds 2:1 due to a transient SWR condition (arc or lightning) within the output transmission line or antenna system. The transmitter shuts back and recovers to a series of cutback levels (depending on the severity of the alarm), with each level being a 1/8th reduction in power from the previous cutback level, starting from the preset setpoint. Inspect the output transmission line for punctures or damage. After repairing damage, or if no damage is found, attempt to reset the latched condition by clicking the remote AUI's Reset Latched Alarms button in the Alarms page or using the local front panel display (see "Resetting Alarms" on page 2-96 of the Operations and Maintenance Manual). If no damage can be found, suspect a fault with the Combiner Interface PWB (A12) (see "Combiner Interface PWB Replacement" on page 1-50) or the Output Power Probe PWB (A7) (see "Output power probe PWB replacement" on page 1-45). |
| SWR Foldback | <p>This alarm occurs if the transmitter's average reflected power exceeds the SWR foldback threshold (?? W) due to a gradually degrading load match. The forward power of the transmitter will be limited to a level such that this threshold is not exceeded. If the load match improves while the transmitter is producing RF output, the forward power will increase. If the transmitter folds back to a forward power that is equivalent to a 3:1 VSWR at the SWR Foldback threshold (forward power of ?? W), an SWR Shutback alarm occurs.</p> <p>Inspect the antenna and transmission line system for damage or de-tuning. If there are no major issues with the antenna network that would cause an impedance change (icing for example), suspect the Combiner Interface PWB (A12) (see "Combiner Interface PWB Replacement" on page 1-50) or the Output Power Probe PWB (A7) (see "Output power probe PWB replacement" on page 1-45).</p> |

| Alarm Name | Description and Troubleshooting Action |
|------------------------|--|
| SWR Shutback | This alarm occurs if the transmitter's reflected power suddenly exceeds the SWR shutback threshold, which is the reflected power that is equivalent to a 2:1 VSWR at max power (?? W) due to a transient SWR condition (arc or lightning) within the output transmission line or antenna system. Attempt to reset the latched condition by clicking the remote AUI's Reset Latched Alarms button in the Alarms page or using the local front panel display (see "Resetting Alarms" on page 2-96 of the Operations and Maintenance Manual)]. Inspect the output transmission line for punctures or damage. If no damage can be found, suspect the Combiner Interface PWB (A12) (see "Combiner Interface PWB Replacement" on page 1-50) or the Output Power Probe PWB (A7) (see "Output power probe PWB replacement" on page 1-45). See also SWR Cutback alarm |
| Thermal Shutdown | |
| Unsigned DSP Image | This alarm indicates that the exciter is operating with 'unsigned code', but is otherwise operational. This alarm may only be displayed if the transmitter is operating with a 'beta' version of factory software. |
| Unsigned FPGA Image | This alarm indicates that the exciter is operating with 'unsigned code', but is otherwise operational. This alarm may only be displayed if the transmitter is operating with a 'beta' version of factory software. |
| Unsupported Audio Mode | This alarm indicates that the user has selected a preset configuration for the audio processing in the exciter that cannot be implemented. This may be due to attempting to use the same physical input for multiple purposes, or because two incompatible modes have been selected. |
| Very Low Forward Power | This alarm occurs if the transmitter's average forward power falls below the very low forward power threshold (defaulted to 12.5% of the preset power level and is user adjustable) due to PA failures, fan failures, or SWR foldback. The transmitter takes no action on this alarm. See Low Forward Power for troubleshooting tips. |

Replacement Procedures

Table 3.1.2 lists the procedures available in this manual for replacing PWBs and modules that have been designated as line replaceable units (LRUs).

Table 3.1.2: Replacement Procedures

| Module | Replacement Procedure |
|-----------------------|---------------------------------|
| Pre-Amplifier/IPA PWB | See page 3.1.18 |
| Power Amplifier PWB | See page 3.1.20 |
| Power Supply Modules | See page 3.1.23 |

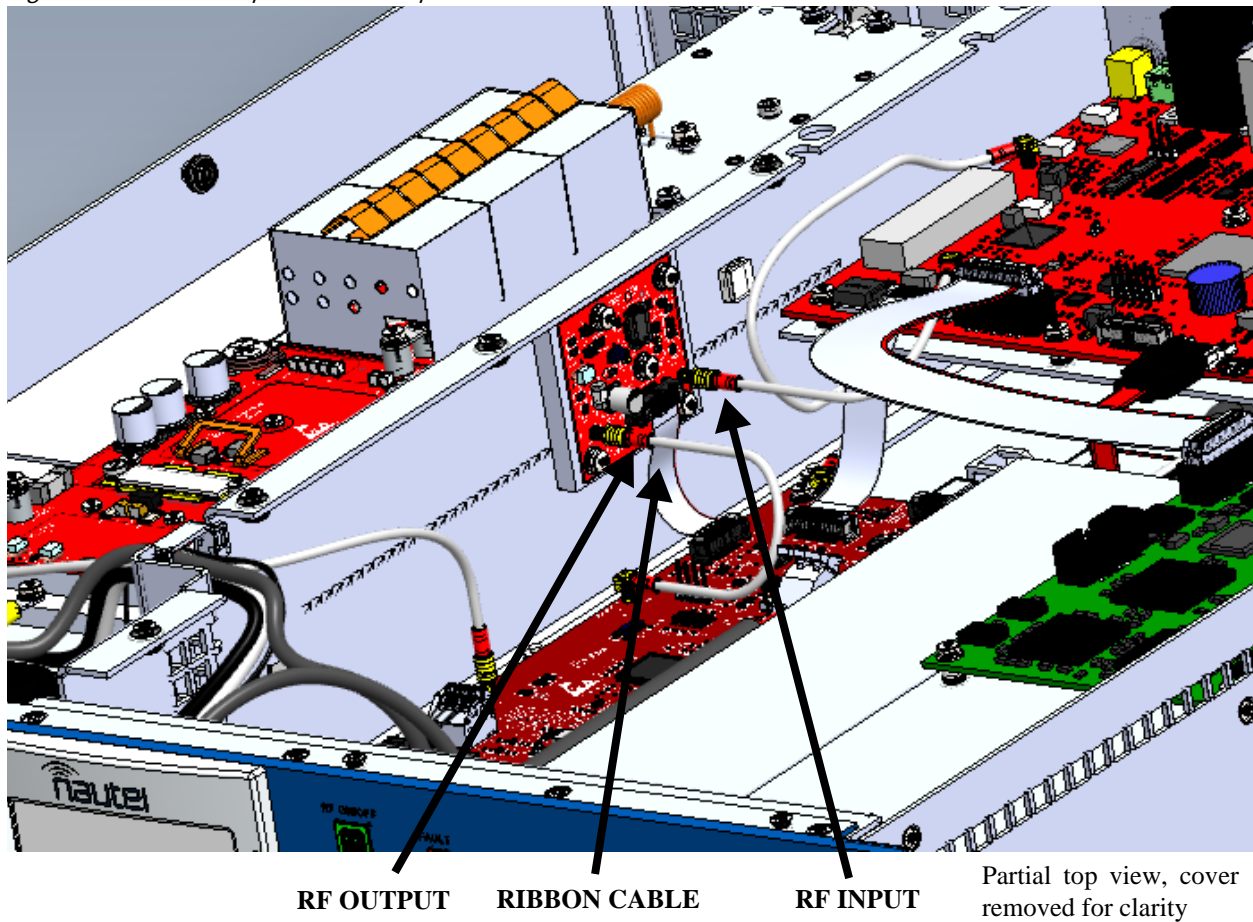
Pre-Amplifier/IPA PWB Replacement

See [Figure 3.1.4 on page 3.1.19](#) of this section, and MD-1 and MD-8 in the Mechanical Drawings section of this manual.

1. Turn RF off and disconnect ac power from the transmitter.
2. Disconnect the RF Input cable from J1 on the IPA PWB.
3. Disconnect the RF Output cable from J2 on the IPA PWB.
4. Disconnect the ribbon cable from J3 that connects between the IPA PWB and the System Interface PWB.
5. Remove and retain the four M3 screws securing the IPA PWB and remove.
6. Obtain the replacement NAPA41 IPA PWB and thermal compound (Nautel part # HAG80) from Nautel.
7. Spread a small amount of thermal compound thinly and evenly, on the underside of the IPA PWB.

CAUTION! The thermal compound is electrically conductive, so care must be taken to ensure it is only on the IPA PWB.

8. Install the Power Amplifier PWB by reversing [Step 2](#) to [Step 5](#).
9. Return the transmitter to operation.

Figure 3.1.4: Pre-Amp/IPA PWB Replacement

Power Amplifier PWB Replacement

See [Figure 3.1.5 on page 3.1.21](#) of this section, and MD-1 and MD-9 in the Mechanical Drawings section of this manual.

1. Turn RF off and disconnect the ac power from the transmitter.
2. Before replacing a suspect Power Amplifier PWB, verify the fault is with the suspect Power Amplifier PWB by performing the continuity and resistance checks detailed in [“PA Resistance Checks” on page 3.1.22](#). If you are prompted to replace a Power Amplifier PWB, return to [Step 3](#) of this procedure.
3. Remove the MCX RF drive connector from J1 on the Power Amplifier PWB.
4. Remove and retain the M3 screw securing the PA volts at E1.
5. Remove and retain the M3 screw securing the jumper connecting the Power Amplifier PWB to the Low Pass Filter at E2.
6. Remove and retain the two M3 screws securing the FET on Power Amplifier PWB.
7. Remove and retain the four M3 screws securing the Low Pass Filter cover. Remove the cover to access the jumper described in [Step 5](#). Loosen the M3 screw and move the jumper off to the side to allow the Power Amplifier to be removed.
8. Remove and retain the eleven M2.5 screws securing the Power Amplifier PWB to the heat sink.
9. Remove the Power Amplifier PWB.
10. Obtain the replacement PA Replacement kit (Nautel part # 235-5046) from the Station Spare kit (Nautel part # 235-5043).
11. Obtain the new NAPA40 PA, thermal pad (Nautel part # HAK77C) and thermal compound (Nautel part # HAG80) that is supplied with the PA Replacement kit. Spread a small amount of thermal compound thinly and evenly on the pad.

CAUTION! The thermal compound is electrically conductive, so care must be taken to ensure it is only on the thermal pad.

NOTE: FETs are static sensitive and must be handled in a static protected manner.

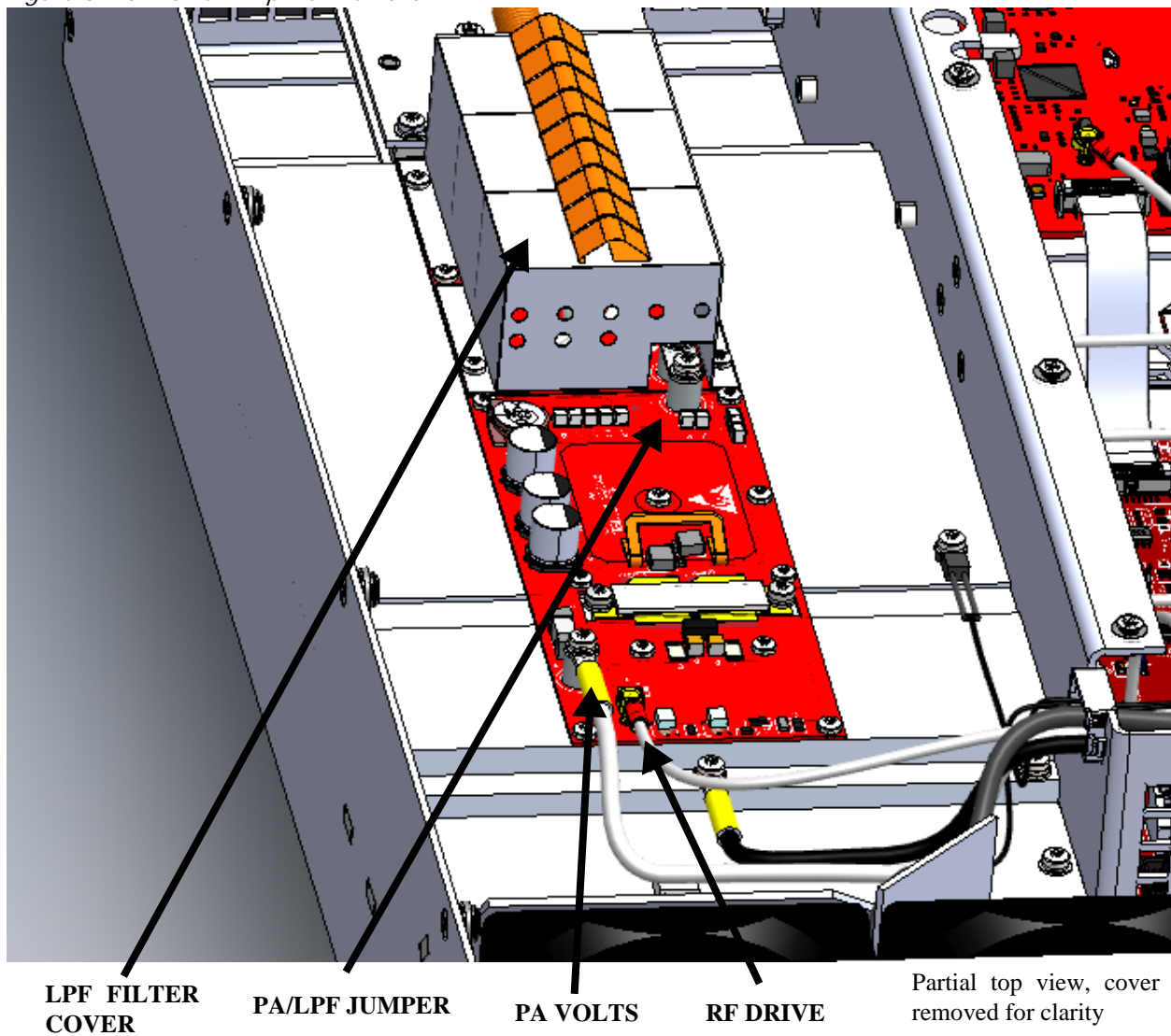
CAUTION! When installing FET securing hardware, you can damage the FET case if you fully tighten one screw while the other is loose. Avoid this by alternately tightening the two screws.

NOTE: Using a torque screwdriver, alternate tightening the left and right screws on each FET, a quarter turn at a time, until 6 inch-pounds (0.67 Newton-meters) of torque has been applied.

12. Install the Power Amplifier PWB by reversing [Step 3](#) to [Step 8](#).

13. Return the transmitter to operation.

Figure 3.1.5: Power Amplifier Removal



PA Resistance Checks

1. Using a digital multimeter, check the continuity across fuse F1 on the suspect PA PWB.
 - ❖ If the measurement is an open circuit, replace the PA PWB (see ["Power Amplifier PWB Replacement" on page 3.1.20](#)).
 - ❖ If the measurement is short circuit (near 0 Ω), proceed to [Step 2](#).
2. Using a digital multimeter, measure the resistance between each gate lead of the FET and the metal flange of the FET.
 - ❖ If the measurement is less than 8 k Ω , replace the PA PWB (see ["Power Amplifier PWB Replacement" on page 3.1.20](#)).
 - ❖ If the measurement is between 8 k Ω and 17.5 k Ω , check the other PA PWBs for a failure. If none of the other PA PWBs have failed, replace the original suspect PA PWB.
 - ❖ If the measurement is greater than 17.5 k Ω , proceed to [Step 3](#).
3. Using a digital multimeter, check the continuity between each drain lead of the FET (positive meter probe) and the metal flange of the FET (negative meter probe).
 - ❖ If the measurement is open circuit, the PA PWB is OK and does not require replacement. Continue troubleshooting and suspect a problem with an associated PWB.
 - ❖ If the measurement is not open circuit, replace the PA PWB (see ["Power Amplifier PWB Replacement" on page 3.1.20](#)).

Power Supply Module Replacement

WARNING! Lethal voltages exist inside the transmitter when the power is turned on. Follow replacement instructions carefully to ensure safety for maintenance personnel during power supply replacement.

Figure 3.1.6: Location of Power Supply Module



NOTE: The power supply module is hot-swappable, meaning there is no need to turn RF off or disconnect ac power from the transmitter.

1. From the front of the transmitter, locate the power supply module. See [Figure 3.1.6 on page 3.1.23](#).
2. Using [Figure 3.1.7 on page 3.1.24](#) as a guide, remove the power supply module from the front of the transmitter.
3. Locate or obtain a replacement power supply module (Nautel Part # UG132 for VX150/VX300/VX600 or UG136 for VX1/VX1.5/VX2).
4. Using [Figure 3.1.7 on page 3.1.24](#) as a guide, reinstall the new power supply module.
5. Verify that the AC OK and DC OK LEDs, on the front of the LVPS / Power Supply module, are solid green.

NOTE: The FAULT LED (red) may blink temporarily until communication is established between the power supply and the transmitter.

6. The transmitter should resume normal operation and the alarm should clear.
7. Close the transmitter's front door.

Figure 3.1.7: Removal of Power Supply Module

NOTE:
Power Supply is mounted horizontally in the adapter

REMOVAL

- Push Panel Latch in and lift handle outwards (swing to the left)
- Remove Power Supply

INSTALLATION

- Push Panel Latch in and lift handle outwards (swing the left)
- Insert Power Supply until it seats in the adapter
- Push handle inwards until it latches (swing the right)

AC & DC OK LEDs should be green (on) after successful power supply installation.

If the associated RF power module is disabled, the DC OK LED will not turn on until the module is enabled.

SECTION 3.2: PARTS INFORMATION

This section contains reference designation lists that provide descriptive and provisioning information for all electrical and mechanical parts that have an assigned reference designation and form a part of the subject equipment.

Topics in this section include:

- [Family Tree](#)
- [How to Locate Information About a Specific Part](#)
- [Column Content on page 3.2.2](#)

Family Tree

A family tree is included in this section for each of the three low power VX model classes:

- VX150/VX300/VX600 - see [Figure 3.2.1 on page 3.2.4](#)
- VX1 - see [Figure 3.2.2 on page 3.2.5](#)
- VX1.5/VX2 - see [Figure 3.2.3 on page 3.2.6](#)

The family tree is based on the descending order of the reference designation hierarchy and identifies all assemblies that have an assigned Nautel configuration control number.

How to Locate Information About a Specific Part

To locate the information for a specific part, the assigned reference designation for the part must be known. In addition, the Nautel nomenclature (e.g., NAPA40) assigned to the assembly containing the part or the full reference designation, including the reference designation of all higher assemblies, must be known.

When the Nautel Nomenclature is Known:

- Refer to the appropriate family tree ([Figure 3.2.1 on page 3.2.4](#), [Figure 3.2.2 on page 3.2.5](#), or [Figure 3.2.3 on page 3.2.6](#)) and identify the block(s) associated with the Nautel nomenclature. Locate the part's reference designation in the identified reference designation list in this section, noting they are sorted alphanumerically.

When the Reference Designation is Known:

- Refer to the appropriate family tree depicted in [Figure 3.2.1 on page 3.2.4](#), [Figure 3.2.2 on page 3.2.5](#), or [Figure 3.2.3 on page 3.2.6](#) with the full reference designation.
- Follow the family tree branches to the block that represents the lowest level assembly assigned a Nautel configuration control number, then locate the reference designation information for that Nautel configuration control number.
- Locate the part's reference designation and associated Nautel Part # in the list provided at the end of this section. In a PDF manual, use Ctrl-F (find) to quickly locate the reference designation.

Reference Designation Lists

Reference designation lists are provided for assemblies that are assigned an alpha-prefixed Nautel nomenclature (e.g., NAPA40) or a numbered Nautel part (e.g., 235-8050).

To obtain the full reference designation for a specific part the Nautel configuration control number must be located in the appropriate family tree ([Figure 3.2.1 on page 3.2.4](#), [Figure 3.2.2 on page 3.2.5](#), or [Figure 3.2.3 on page 3.2.6](#)) to include the reference designation of all higher level assemblies. The reference designation lists are presented in alphanumeric order - for each component level of the transmitter - are divided into columns to aid in locating specific information.

Column Content

The following paragraphs provide an explanation of the purpose and contents of each column in the part number indexes.

Component Level, Stock Code Column

This column contains the *Component Level*/number (01 through 10, as required) and the Nautel *Stock Code* (part number) assigned to each part.

Component Level

This number represents the level of a component in relation to the highest level parts list. In this case the highest level parts list is the VX transmitter's overall parts list, or the top block in the family tree shown in [Figure 3.2.1 on page 3.2.4](#), [Figure 3.2.2 on page 3.2.5](#), or [Figure 3.2.3 on page 3.2.6](#).

Components that are directly descended from the highest level parts list are component level 01. The associated stock code and description for level 01 items appear in bold text in the reference designation list, followed by their sub-assembly components, as applicable. Level 01 items are sorted alphanumerically.

Components that are directly descended from component level 01 items are component level 02. The associated stock code and description for level 02 items appear below their associated level 01 component, slightly indented, followed by their sub-assembly components, as applicable. Level 02 items are sorted alphanumerically

Component level 03 through 10 items, as applicable, descend similarly to component level 02 items, with continuing indentations to identify each new level.

Stock Code

This number is Nautel's drawing number for Nautel manufactured parts, Nautel's configuration control number for assemblies that are under configuration control management, or Nautel's inventory management number for purchased parts. When a Nautel configuration control number (e.g., NAPA*) is shown in this column, its sub-assembly reference designation items are listed below it.

NOTE: *This section includes Nautel part numbers only. It does not include original equipment manufacturer (OEM) information (i.e., vendor part numbers). Some vendor information is provided in the Responding to Alarms section of this manual, otherwise contact Nautel to order a replacement part or to request assistance to find a suitable replacement.*

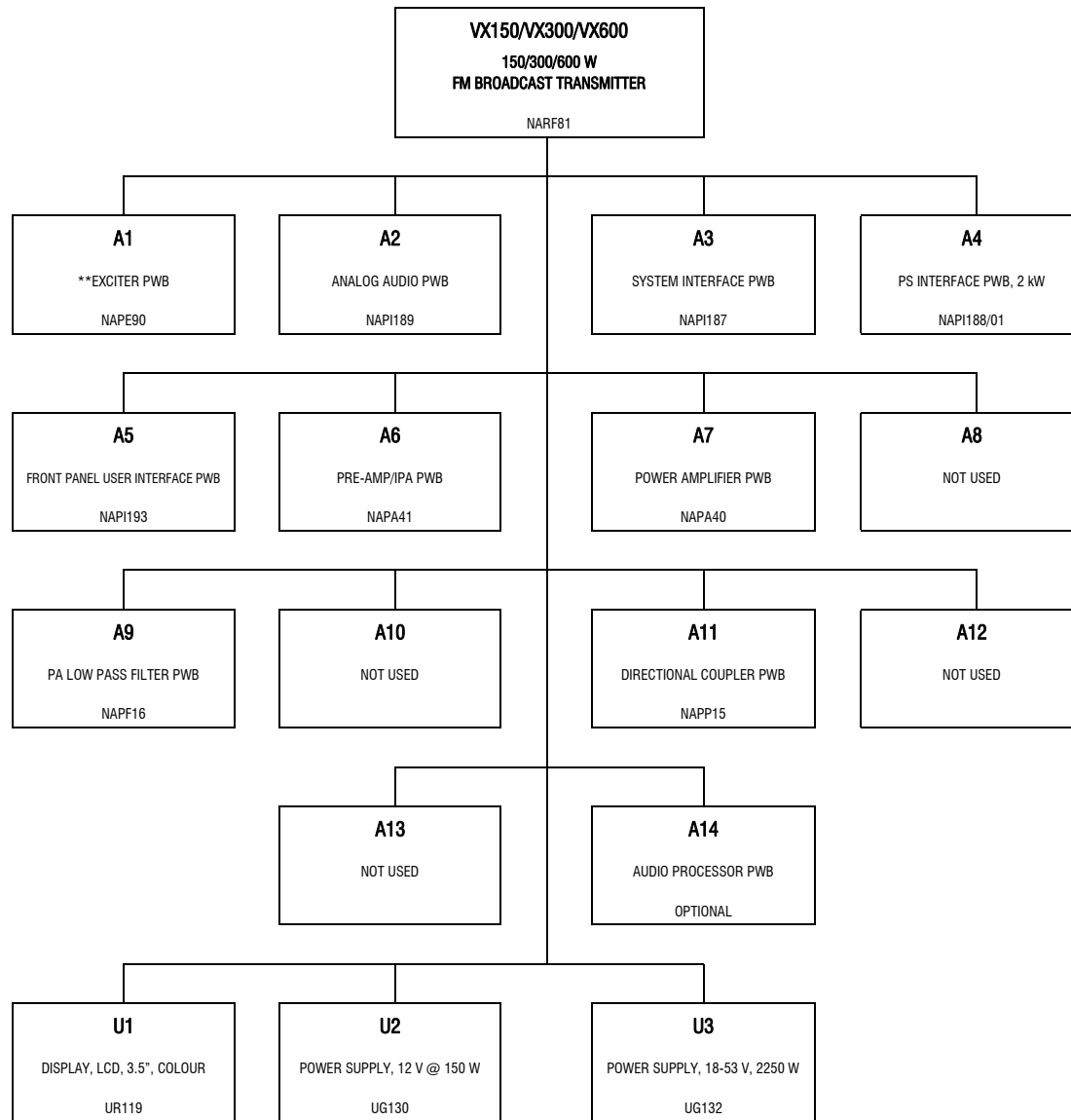
Description Column

The *Description* column contains the name and descriptive information for each part. The key word is presented first, followed by the adjective identifiers.

Reference Designation Column

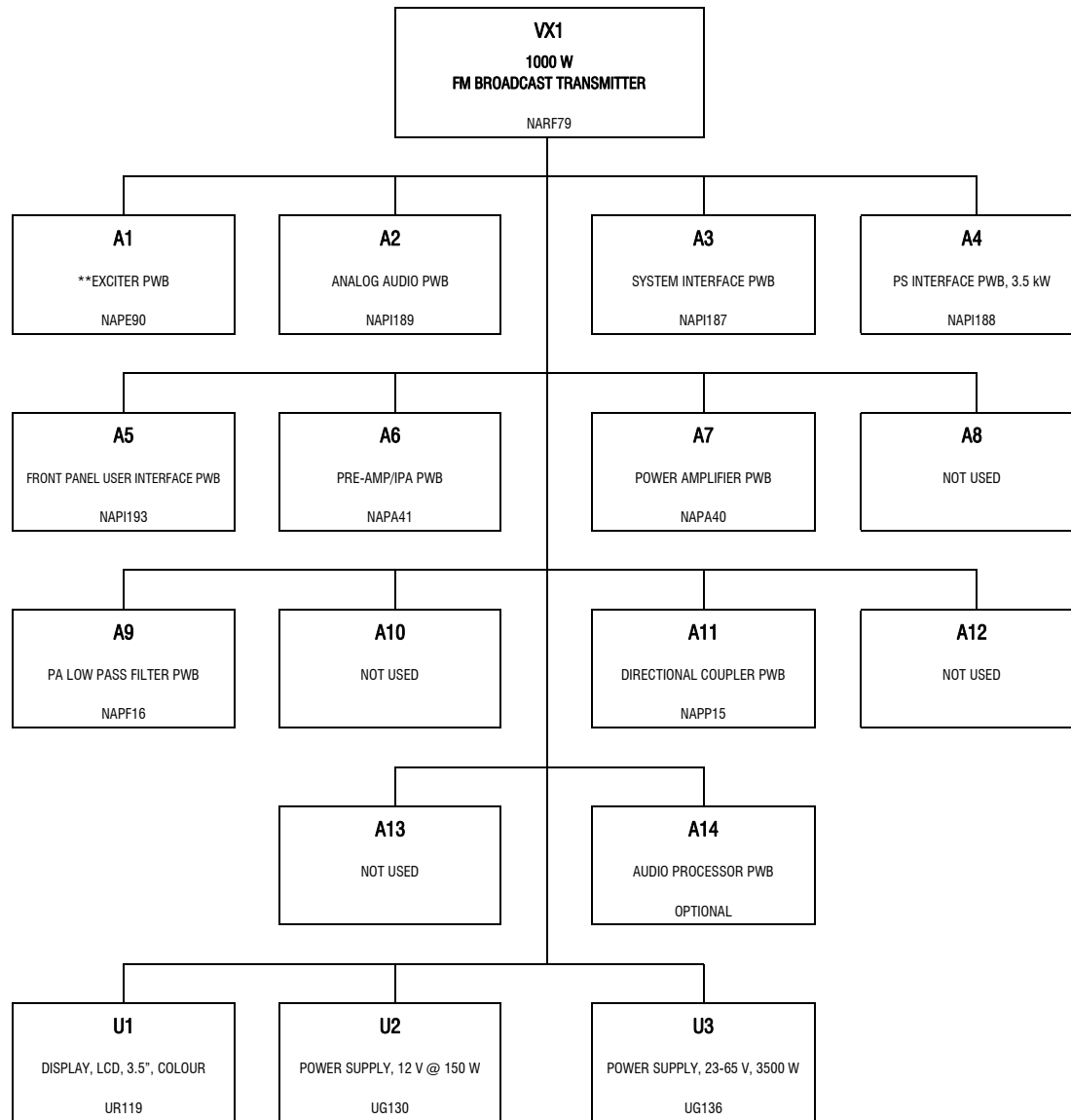
The *Reference Designation* column contains the reference designation(s) for a specific part. When multiple reference designations apply to a part, they are sorted alphanumerically. These designations are assigned in accordance with the requirements of American Society of Mechanical Engineers ASME Y14.44-2008.

Figure 3.2.1: VX150/VX300/VX600 Family Tree (NARF81)



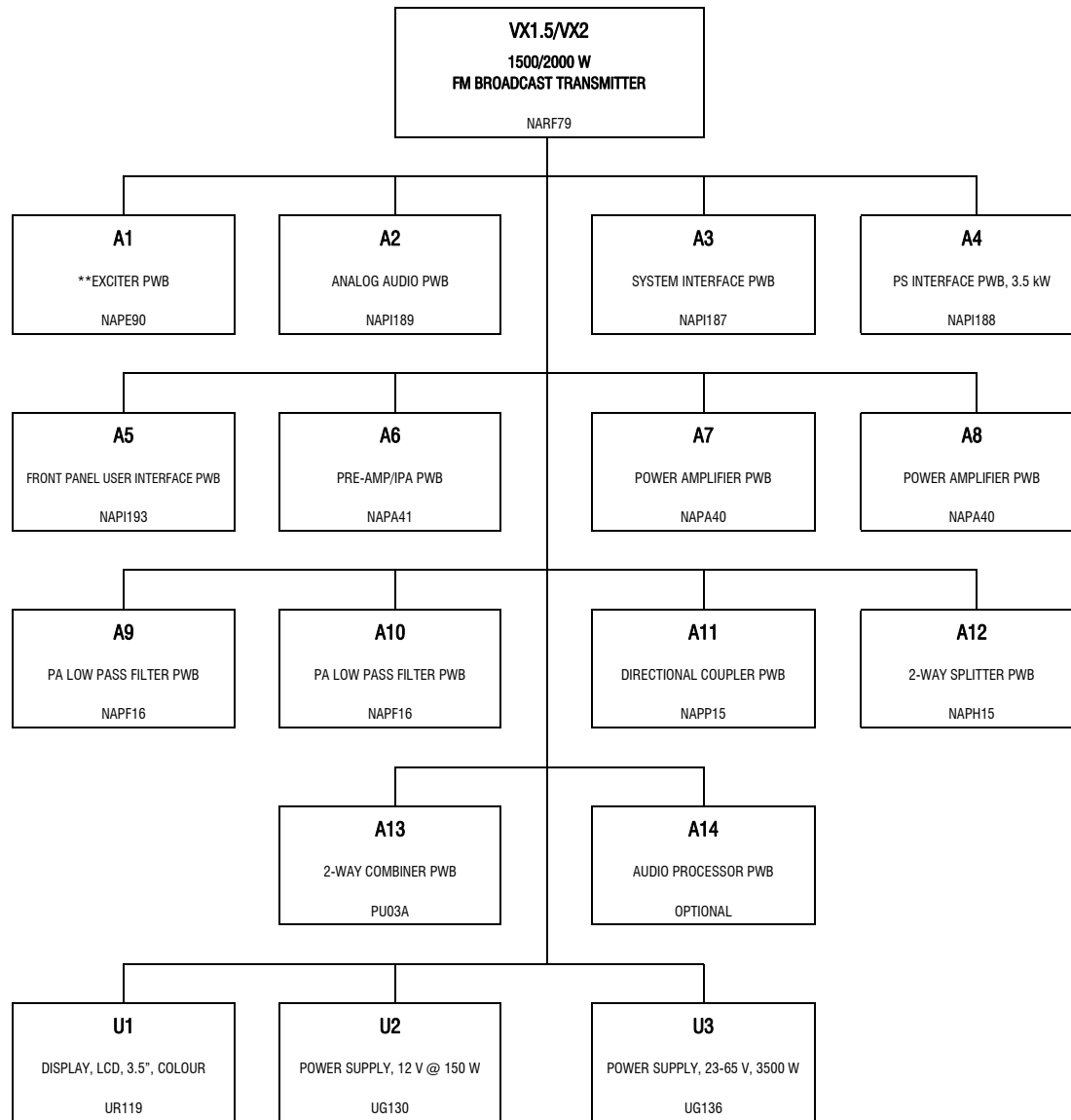
** - Denotes the NAPE90 Exciter PWB is considered proprietary by Nautek. Component details are not provided in this manual.

Figure 3.2.2: VX1 Family Tree (NARF79)



** - Denotes the NAPE90 Exciter PWB is considered proprietary by Nautel. Component details are not provided in this manual.

Figure 3.2.3: VX1.5/VX2 Family Tree (NARF80)



** - Denotes the NAPE90 Exciter PWB is considered proprietary by Nautel. Component details are not provided in this manual.

StockCode: NARF81

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|------------------------------|
| 01 | 235-5910 | SD card mod, Programmed (UB114) | A01U63 |
| 01 | 235-8010 | Ancillary kit for VX (150W-2kW) | |
| 01 | 235-8900 | 2RU Front Panel Detail Assembly | |
| 01 | JDP21 | Conn, Coax, N, Recept, Panel, 50ohm | J01 |
| 01 | LA82C | Inductor, Air Core, 16 AWG magnet, 17 Turn, 0.27" | L01 |
| 01 | NAPA40 | PA PWB Assy | A07 |
| 02 | CB48 | Capacitor, SMT, Clad Mica, 100pF, 300V, +/-5% | C07 |
| 02 | CT102 | Capacitor,SMT, Porcelain, 12pF 1500V,+/-2% | C15, C22 |
| 02 | CT104 | Capacitor,SMT, Porcelain, 1000pF ,300V,+/-5% | C16, C17, C18 |
| 02 | CT105 | Capacitor,SMT, Porcelain, 470pF, 300V,+/-5% | C14, C19, C20, C21 |
| 02 | CT110 | Cap, SMT, Elect, Alum Polymer, 56uF, +/-20%, 63V | C06, C10, C11 |
| 02 | CT113 | Capacitor, SMT, Porcelain, 680pF, 300V, +/-5% | C09, C23 |
| 02 | CT115 | Capacitor,SMT,12pF,+/-1%,250V, NP0,0805 | C03 |
| 02 | CT124 | Capacitor,SMT,22pF,+/-1%,250V, NP0,0805 | C02 |
| 02 | CT66 | Capacitor, SMT, Ceramic, 0.1uF 10%, 100V | C01, C12 |
| 02 | FA79 | Fuse, SMT, 40A, 72VDC, Very Fast | F1 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E1, E2 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J1 |
| 02 | LA80C | Inductor, 1 turn, rectangular + angled, 0.032" cop | L1 |
| 02 | LS33 | Inductor, SMT, 17.5nH, 5%, 4A 3.15mm H x 6.86mm L | L2 |
| 02 | LS59 | Inductor, SMT, 22nH, 20%, 40A | L3 |
| 02 | LS69 | Inductor, SMT, 150nH, 2%, 1.2A, 4.2mm H x 4.95mm L | L4, L5 |
| 02 | QAP73 | Transistor, FET, LDMOS, 65V, Dual, Ruggedized | Q1 |
| 02 | RAD01 | Resistor, SMT, MF, 10 Ohms, 1% 1/4W | R1 |
| 02 | RAD45 | Resistor, SMT, MF, 47.5K Ohms, 1% 1/4W | R5 |
| 02 | RFFS94 | Resistor, SMT, 10 ohms, 1%, 1W, 2512 | R4, R6 |
| 01 | NAPA41 | Pre-Amp/IPA Pwb Assy | A06 |
| 02 | CCFS07 | Cap,SMT,Ceramic,0.1uF,10%,50V,X7R,0805 | C08 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C06 |
| 02 | CT116 | Capacitor,SMT,6.8pF,+/-0.25pF, 250V,NP0,0805 | C12 |
| 02 | CT117 | Capacitor, SMT,33pF,+/-1%,250V, NP0,0805 | C03 |
| 02 | CT118 | Capacitor,SMT,51pF,+/-1%,250V,NP0,0805 NP0,0805 | C16 |
| 02 | CT119 | Capacitor,SMT,82pF,+/-2%,250V, NP0,0805 | C17 |

StockCode: NARF81

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|------------------------------|
| 02 | CT120 | Capacitor, SMT,150pF,+/-1%,250V, NP0,0805 | C02, C04, C07 |
| 02 | CT121 | Capacitor,SMT,180pF,+/-1%,250V, NP0,0805 | C05, C09, C15 |
| 02 | CT122 | Capacitor,SMT, 1000pF, +/-5%, 50V,NP0 | C11, C13 |
| 02 | CT123 | Capacitor, SMT, 0.01uF, +/-10%, 50V,BX | C10, C14 |
| 02 | FA76 | Fuse, 125 VAC, VDC, 5A, Very fast acting | F1 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J1, J2 |
| 02 | JU84 | Conn, Header, Shrouded, 0.050" 16pos, Dual Row, Go | J3 |
| 02 | LS68 | Inductor, SMT, 56nH, 2%, 3A, 4.2mm H x 4.95mm L | L1 |
| 02 | LS70 | Inductor,SMT,51nH,+/-2%,1A, Ceramic,0805 | L7 |
| 02 | LS71 | Inductor,SMT,33nH,+/-2%,0.5A, Ceramic,0805 | L6 |
| 02 | LS72 | Inductor,SMT,68nH,+/-2%,0.5A, Ceramic,0805 | L5 |
| 02 | LS73 | Inductor,SMT,5nH,+/-2%, 4A,Air | L4 |
| 02 | LS74 | Inductor,SMT,33nH,+/-2%, 4.8A,Air | L2, L3 |
| 02 | QAP74 | Transistor,SMT,MOSFET,LDMOS, Single,40V,TO-270-2 | Q1 |
| 02 | RAD33 | Resistor, SMT, MF, 4750 Ohms, 1%, 1/4W | R2 |
| 02 | RAD95 | Resistor,SMT,1 Ohm,1%, 1/4W,1206 | R1 |
| 02 | RAD96 | Resistor,SMT,39.2 Ohms,1%,1/4W,1206 1/4W,1206 | R4 |
| 02 | RFFS58 | Resistor, SMT, MF, 47.5Kohms, 1%, 1/10W, 0603 | R3 |

| | | | |
|----|----------------|--|----------|
| 01 | NAPF16 | PA LPF PWB Assy | A09 |
| 02 | CT106 | Capacitor,SMT,Porcelain,1.5pF, 1500V,+/-0.1pF | C06 |
| 02 | CT107 | Capacitor,SMT,Porcelain,1.8pF, 1500V,+/-0.1pF | C10 |
| 02 | CT108 | Capacitor,SMT,Porcelain,3.3pF, 1500V,+/-0.1pF | C08 |
| 02 | CT109 | Capacitor,SMT,Porcelain,5.6pF, 1500V,+/-0.1pF | C07, C09 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E01 |
| 02 | LA77F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.5 | L01 |
| 02 | LA78F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.5 | L02 |
| 02 | LA79F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.4 | L03 |
| 01 | NAPI187 | System Interface PWB Assy | A03 |

StockCode: NARF81

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|---|
| 02 | CCJ01 | Cap,SMT,Ceramic,1000pF,10%, 50V,X7R,0402 | C02, C04, C11, C12, C14, C15, C53, C81, C82, C86 |
| 02 | CCJ02 | Cap,SMT,Ceramic,0.01uF,10%, 50V,X7R,0402 | C19, C22, C47, C65, C83, C84 |
| 02 | CCJ03 | Cap,SMT,Ceramic,0.1uF,10%, 50V,X7R,0402 | C01, C03, C05, C13, C16, C17, C18, C20, C21, C24, C25, C26, C27, C28, C29, C30,, C31, C32, C37, C38, C40, C41, C42, C43 C44, C45, C46, C48, C50, C51, C54, C55, C56, C57, C58, C59, C61, C63, C64, C66, C68, C69, C71, C72, C74, C77, C78, C79, C80 |
| 02 | CCJ04 | Cap,SMT,Ceramic,1uF,10%, 25V,X5R,0402 | C08, C09, C23, C39, C73, C85 |
| 02 | CCJ06 | Cap,SMT,Ceramic,4.7uF,10%, 25V,X7R,0805 | C52, C60, C62, C75 |
| 02 | CCJ10 | Cap,SMT,Ceramic,18pF,1%, 50V,C0G,0402 | C67 |
| 02 | CCJ18 | Cap,SMT,Ceramic,22uF,20%, 25V,X5R,0805 | C70, C76 |
| 02 | CCJ20 | Cap,SMT,Ceramic,15pF,1%, 50V,C0G,0402 | C33, C35 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C06, C07, C10 |
| 02 | CT65 | Cap, SMT, Ceramic, 6.8pF, 50V, +/-0.25pF, 1206 | C49 |
| 02 | H AJ66 | Terminal, SMT, Test Point, PWB | TP03, TP14 |
| 02 | JF47 | Conn, Header,Square Post,Gold, Dual,40-pin | J12 |
| 02 | JQ16 | Conn, Header, SIP, 12 Pin Breakaway, 10 Ctr | J11 |
| 02 | JR77 | Terminal Block, 2 Pos, 300V, 13A, 28-14AWG, Spring | TB02 |
| 02 | JR89 | Terminal Block, 4 Pos, 300V, 26 - 20AWG, Spring C | TB01 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J05, J06, J09 |
| 02 | JU84 | Conn, Header, Shrouded, 0.050" 16pos, Dual Row, Go | J07 |
| 02 | JU91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J04, J10 |
| 02 | JU95 | Conn, Header, Shrouded, 3mm, 4 pos, Vertical, Gold | J01, J02 |
| 02 | JU96 | Conn, Header, Shrouded, 0.050" 20pos, Dual Row, Go | J03, J08 |
| 02 | LCFS01 | Inductor, SMT, Choke, 600ohms, 2A, 0805 | L05, L06, L10, L11 |
| 02 | LCFS02 | Inductor, SMT, Choke, 2000 ohm s, 80mA, 0805 | L08, L15, L16 |
| 02 | LS18 | Inductor,SMT.2.2uH,600ma,1210 | L12 |
| 02 | LS34 | Inductor, SMT, 28nH, 2%, 4A 3.15mm H x 6.86mm L | L09 |
| 02 | LS45 | Inductor, SMT, Shielded, 33uH, 3.3A RMS | L03, L04 |
| 02 | LS60 | Inductor, SMT, 22uH, 4A RMS, Shielded, Pwr | L13 |
| 02 | LS61 | Inductor, SMT, 9.5nH, 5%, 480mA RMS, 0402 | L17 |
| 02 | QDLS02 | Diode, SMT, LED, Yellow/Green, (570nm), 0603 | DS01 |
| 02 | QDSS01 | Diode, SMT, Schottky, 30V, 0.2A, SOD-323 | CR01, CR04, CR05 |
| 02 | QN53 | Transistor,SMT,MOSFET,N-Channe l,60V,115mA,SOT-23 | Q01, Q02, Q03, Q04, Q05 |
| 02 | QR82 | Diode, SMT, TVS, Vw 5V, Vb 6V Vc 10.8V, SOT-143 | CR02, CR03 |
| 02 | RAD15 | Resistor, SMT, MF, 150 Ohms, 1% 1/4W | R39, R40 |

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl. StockCode</u> | | <u>Description</u> | <u>Reference Designation</u> |
|---------------------------------|-------------------|--|--|
| 02 | RAD38 | Resistor, SMT, MF, 12.1K Ohms, 1% 1/4W | R34 |
| 02 | RAD93 | Resistor, SMT, 0.01 ohms, 1%, 1/4W, 1206 | R80 |
| 02 | RAF24 | Resistor SMT MF 68.1 Ohm 1% 1/16W 0402 | R98 |
| 02 | RAF27 | Resistor SMT MF 121 Ohm 1% 1/16W 0402 | R01, R03, R09, R12, R17, R20, R23, R26, R35, R38, R41, R53, R54, R61, R62, R63, R71, R72, R74,, R75, R76, R78, R84, R85 R86, R87, R91, R92, R93, R94 |
| 02 | RAF34 | Resistor SMT MF 475 Ohm 1% 1/16W 0402 | R83, R88, R90, R95 |
| 02 | RAF38 | Resistor SMT MF 1000 Ohm 1% 1/16W 0402 | R33 |
| 02 | RAF42 | Resistor SMT MF 2210 Ohm 1% 1/16W 0402 | R02, R04, R43, R44, R46, R56, R57, R64, R68 |
| 02 | RAF44 | Resistor SMT MF 3320 Ohm 1% 1/16W 0402 | R06, R08, R10, R11, R36, R52 |
| 02 | RAF50 | Resistor SMT MF 10.0K Ohm 1% 1/16W 0402 | R05, R07, R13, R14, R15, R16, R29, R30, R31, R32, R37, R42, R47, R50, R51, R55, R65, R69, R79,, R81, R82, R89, R96 |
| 02 | RAF54 | Resistor SMT MF 22.1K Ohm 1% 1/16W 0402 | R21, R22, R27, R28, R45, R48, R49, R58, R59, R60, R67, R70, R73 |
| 02 | RAF56 | Resistor SMT MF 33.2K Ohm 1% 1/16W 0402 | R18, R24 |
| 02 | RAF62 | Resistor SMT MF 100K Ohm 1% 1/16W 0402 | R19, R25, R66, R77 |
| 02 | RAF83 | Resistor SMT MF 499 Ohm 1% 1/16W 0402 | R97 |
| 02 | RFFS04 | Resistor, SMT, MF, 1.50ohms, 1%, 1/10W, 0603 | R99 |
| 02 | RT50 | Resistor,SMT,MF,0.0 ohms, Jumper,0805 | L01, L02, L07, L14 |
| 02 | UDTS04 | IC,SMT,RS-485 Transceiver,3.3V ,SO-8 | U07, U08 |
| 02 | UDTS05 | IC, SMT, RS-232 Transceiver, 3.3V, SO-16 | U04 |
| 02 | ULAS01 | IC,SMT,Opamp,Quad,Single Suppl y,SOIC-14 | U01 |
| 02 | UT157 | IC, SMT, DC-DC Conv, Buck, Adj, 2A, 4.5-28Vin, SOT | U06 |
| 02 | UT158 | IC, SMT, Amp, Current Sense, Precision, 50V/V, SOT | U05 |
| 02 | UW207 | Attenuator, SMT, 20dB, 50 ohm, 0.5W, DC to 8 GHz | U09 |
| 02 | UX161 | IC, SMT, Micro, 128K, 8K SRAM, 3.3V, TQFP-100 | U02 |
| 02 | UX191 | IC, SMT, RMS RF Power detector , 3.3V, 40MHz-10GHz | U10 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U03 |
| 02 | XFPS14 | Crystal,SMT,Fund,32.768kHz, 10ppm,12.5pF,50kOhm,-4 | Y01 |
| 01 | NAPI188/01 | Power Supply Interface PWB Assy - 2kW | A04 |
| 02 | CCFS09 | Cap,SMT,Ceramic,0.47uF,10%,25V,X7R,0805 | C02 |
| 02 | CCFS52 | Cap, SMT, Ceramic, 0.1uF, 10%, 25V X7R, 0603 | C01, C03, C07, C09, C10, C11, C13, C15, C16, C17, C18, C20, C21, C23, C24 |
| 02 | CCFS73 | Cap, SMT, Ceramic, 1uF, 10%, 16V, X5R, 0603 | C05, C14 |
| 02 | CX33 | Cap,SMT,Ceramic,4.7uF,20%,10V, X5R,1206 | C06 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E01, E03 |

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl. StockCode</u> | | <u>Description</u> | <u>Reference Designation</u> |
|---------------------------------|----------------|--|--|
| 02 | HAI66 | Terminal, SMT, Test Point, PWB | TP2 |
| 02 | JA121 | Conn, PwrBlade, 3ACP+4P+24S, R/A,Solder Recp, 4mm | J01 |
| 02 | JR78 | Terminal Block, 3 Pos, 300V, 13A, 28-14AWG, Spring | TB1 |
| 02 | JT202 | Conn, Recept, AC, 250VAC, 20A, PWB Mount | J03 |
| 02 | JU91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J02 |
| 02 | LS23 | Choke, SMT, Common Mode, 7000 ohm, 700mA | L01 |
| 02 | RFC504 | Resistor, SMT, 0.002 ohms, 1%, 5W | R28 |
| 02 | RFFS01 | Resistor,SMT,MF,0.0ohms,Jumper ,0603 | R21, R31, R33, R35, R38 |
| 02 | RFFS26 | Resistor, SMT, MF, 100ohms, 1%, 1/10W, 0603 | R09, R14 |
| 02 | RFFS27 | Resistor, SMT, MF, 121ohms, 1%, 1/10W, 0603 | R04, R05, R06, R07 |
| 02 | RFFS34 | Resistor,SMT,MF,475ohms,1%, 1/10W,0603 | R03, R10 |
| 02 | RFFS38 | Resistor,SMT,MF,1000ohms,1%, 1/10W,0603 | R30 |
| 02 | RFFS40 | Resistor,SMT,MF,1500ohms,1%, 1/10W,0603 | R25, R26 |
| 02 | RFFS42 | Resistor,SMT,MF,2210ohms,1%, 1/10W,0603 | R08, R16, R17, R19 |
| 02 | RFFS43 | Resistor, SMT, MF, 2740ohms, 1%, 1/10W, 0603 | R11 |
| 02 | RFFS50 | Resistor,SMT,MF,10.0Kohms,1%, 1/10W,0603 | R01, R02, R12, R13, R23, R24, R27 |
| 02 | RFFS59 | Resistor,SMT,MF,56.2Kohms,1%, 1/10W,0603 | R18 |
| 02 | ULAS02 | IC,SMT,Opamp,Quad,Rail-To-Rail ,SOIC-14 | U05 |
| 02 | UP156 | IC, SMT, Linear Voltage Regula tor, 3.3V, SOT-223 | U01 |
| 02 | US49 | IC, SMT, ADC, 12 bit, 8 Ch, 3.3V, I2C | U02 |
| 02 | UT74 | IC, Amplifier, Instrumentation | U06 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U03 |
| 01 | NAPI189 | Analog Audio PWB Assy | A02 |
| 02 | CCFS54 | Cap,SMT,Ceramic,1500pF,10%,50V ,X7R,0603 | C058, C074, C117, C118 |
| 02 | CCJ01 | Cap,SMT,Ceramic,1000pF,10%, 50V,X7R,0402 | C001, C005, C006, C022, C023, C028, C029, C045 |
| 02 | CCJ02 | Cap,SMT,Ceramic,0.01uF,10%, 50V,X7R,0402 | C036, C044, C061 |
| 02 | CCJ03 | Cap,SMT,Ceramic,0.1uF,10%, 50V,X7R,0402 | C003, C007, C008, C010, C015, C016, C017, C018, C019, C020, C026, C031, C032, C034, C038, C039,, C051, C053, C056, C062, C065, C067, C082, C083, C085, C087, C088, C091, C095, C098, C100,, C104, C108, C111, C113, C115, C121, C124, C127, C131 |
| 02 | CCJ04 | Cap,SMT,Ceramic,1uF,10%, 25V,X5R,0402 | C004, C009, C012, C014, C021, C024, C025, C027, C037, C041, C046, C050, C055, C063, C068, C069,, C073, C078, C081, C086, C092, C094, C101, C102, C103, C107, C112, C116, C119, C120 |
| 02 | CCJ05 | Cap,SMT,Ceramic,10uF,10%, 25V,X5R,0805 | C033, C040, C054, C059, C070, C071, C072, C079, C090, C132 |

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|--|
| 02 | CCJ07 | Cap,SMT,Ceramic,100pF,1%, 50V,C0G,0402 | C048, C049, C057, C080, C089, C110, C128 |
| 02 | CCJ08 | Cap,SMT,Ceramic,2.2uF,10%, 25V,X5R,0402 | C011, C035, C043, C060, C097 |
| 02 | CCJ10 | Cap,SMT,Ceramic,18pF,1%, 50V,C0G,0402 | C093, C105, C114, C125 |
| 02 | CCJ13 | Cap,SMT,Ceramic,3300pF,10%, 50V,X7R,0402 | C077 |
| 02 | CCJ19 | Cap,SMT,Ceramic,470pF,1%, 50V,C0G,0402 | C042, C076, C122 |
| 02 | CCJ20 | Cap,SMT,Ceramic,15pF,1%, 50V,C0G,0402 | C099 |
| 02 | CCJ26 | Cap,SMT,Ceramic,220pF,1%,50V, COG/NPO,0402 | C052, C109 |
| 02 | CCJ28 | Cap,SMT,Ceramic,39pF,1%,50V, NPO/COG,0402 | C075, C123 |
| 02 | HAI66 | Terminal, SMT, Test Point, PWB | TP01, TP14 |
| 02 | JT204 | Conn, BNC, Dual Stacked, Isolated | J01 |
| 02 | JT61 | Conn, BNC, Recept, 50ohm,Insul , Rt Angle | J02 |
| 02 | JT87 | Conn,3-pin,PWB Mount, Fem, XLR | J03, J04 |
| 02 | JU85 | Conn, Header, Shrouded, 0.050" 30pos, Dual Row, Go | J05 |
| 02 | LA72 | Bead, Ferrite, SMT, 120 Ohm at 100MHz, 1.3A, 0402 | L02 |
| 02 | LS56 | Inductor, SMT, 3.3uH, 5.6A,RMS | L01, L03 |
| 02 | QDDS02 | Diode, SMT, Schottky, 40V, 1A, SMA | CR04 |
| 02 | QDSS01 | Diode, SMT, Schottky, 30V, 0.2A, SOD-323 | CR03 |
| 02 | QDZS11 | Diode, SMT, Zener, 5.6V, 1.5W, SMA, 403D | CR01, CR02, CR05, CR06 |
| 02 | RAD23 | Resistor, SMT, MF, 681 Ohms, 1% 1/4W | R011, R052 |
| 02 | RAF01 | Resistor SMT MF 0.0 Ohm Jumper 0402 | R034, R095, R099, R100, R123, R154 |
| 02 | RAF18 | Resistor SMT MF 22.1 Ohm 1% 1/16W 0402 | R090, R103, R144, R145 |
| 02 | RAF26 | Resistor SMT MF 100 Ohm 1% 1/16W 0402 | R003, R018, R037, R038, R048, R069, R082, R097, R113, R131, R153 |
| 02 | RAF38 | Resistor SMT MF 1000 Ohm 1% 1/16W 0402 | R007, R008, R009, R014, R015, R016, R031, R032, R044, R045, R046, R060, R061, R062, R109, R110,, R117, R125, R127, R128, R129, R136, R137, R149, R150 |
| 02 | RAF50 | Resistor SMT MF 10.0K Ohm 1% 1/16W 0402 | R004, R005, R012, R019, R023, R025, R026, R027, R033, R035, R039, R041, R042, R050, R051, R053,, R056, R057, R058, R066, R070, R073, R074, R075, R080, R085, R086, R089, R093, R096, R098, R101,, R102, R104, R105, R106, R107, R108, R114, R119, R126, R134, R135, R146, R147, R148 |
| 02 | RAF52 | Resistor SMT MF 15.0K Ohm 1% 1/16W 0402 | R021, R029, R079, R118 |
| 02 | RAF56 | Resistor SMT MF 33.2K Ohm 1% 1/16W 0402 | R055 |
| 02 | RAF57 | Resistor SMT MF 39.2K Ohm 1% 1/16W 0402 | R006, R013, R020, R043, R059, R072, R088, R111, R116, R141, R151 |
| 02 | RAF59 | Resistor SMT MF 56.2K Ohm 1% 1/16W 0402 | R024, R028, R049, R054, R094 |

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|---|
| 02 | RAF63 | Resistor SMT MF 121K Ohm 1% 1/16W 0402 | R071 |
| 02 | RAF66 | Resistor SMT MF 221K Ohm 1% 1/16W 0402 | R087, R120 |
| 02 | RAF74 | Resistor SMT MF 1.00M Ohm 1% 1/16W 0402 | R001, R030 |
| 02 | RAF87 | Resistor SMT MF 3740 Ohm 1% 1/16W 0402 | R010, R017, R047, R063 |
| 02 | RAF93 | Resistor SMT MF 7.15K Ohm 1% 1/16W 0402 | R077, R083, R132, R139 |
| 02 | RAF94 | Resistor SMT MF 3.57K Ohm 1% 1/16W 0402 | R078, R133 |
| 02 | RAF95 | Resistor SMT MF 4.12K Ohm 1% 1/16W 0402 | R084, R091, R140, R142 |
| 02 | RAF96 | Resistor SMT MF 2.10K Ohm 1% 1/16W 0402 | R092, R143 |
| 02 | US12 | IC, SMT, Rectifier, Bridge, 400V, 0.5A, SOIC-4 | U02, U08, U21, U26 |
| 02 | US58 | IC, SMT, 24Bit Audio Codec, SPI, I2C, TSSOP28 | U06 |
| 02 | US59 | IC, SMT, 10-Bit A/D Converter, 4Ch, 200KSPS, 10-VS | U03 |
| 02 | US60 | IC, SMT, ADC 16 Bit, 2Ch, 750KSPS, 16-WQFN | U17 |
| 02 | UT170 | IC, SMT, Adj. DC to DC Inverting Reg, 2.4A, 16-LFC | U20 |
| 02 | UT171 | IC, SMT, Op AMP, Dual, Low Noise, Bipol Supply, 8- | U01, U04, U09, U13, U15, U18, U19, U23 |
| 02 | UT172 | IC, SMT, Precision Diff Amp, 8-MSOP | U05, U10, U16, U25 |
| 02 | UT178 | IC, SMT, Rail to Rail Dual Op-amp, Wide BW, SOIC8 | U14, U24 |
| 02 | UX66 | IC,SMT,Linear Regulator,150mA Adj.,MSOP-8 | U07, U11, U12 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U22 |
| 01 | NAPI193 | Front Panel User Interface Pwb Assy | A05 |
| 02 | CCFS04 | Cap,SMT,Ceramic,0.01uF,10%,50V,X7R,0603 | C02, C03 |
| 02 | CCFS07 | Cap,SMT,Ceramic,0.1uF,10%,50V,X7R,0805 | C04 |
| 02 | CCJ18 | Cap,SMT,Ceramic,22uF,20%, 25V,X5R,0805 | C06 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C05 |
| 02 | JA140 | Conn, USB, Vertical Mount, Type A, PWB | J04 |
| 02 | JQ55 | Conn, Header, Ribbon Cbl, 20 Pin | J03 |
| 02 | JQ97 | Conn, Header, SATA, Vert, PWB | J01 |
| 02 | JU96 | Conn, Header, Shrouded, 0.050" 20pos, Dual Row, Go | J02 |
| 02 | LS18 | Inductor,SMT,2.2uH,600ma,1210 | L01 |
| 02 | QM77 | Diode, LED, RED, Rectangular, TH, 5mm x 2mm | DS1 |
| 02 | QN53 | Transistor,SMT,MOSFET,N-Channe l,60V,115mA,SOT-23 | Q01, Q02, Q03, Q04, Q05 |
| 02 | RFFS18 | Resistor, SMT, MF, 22.1ohms, 1%, 1/10W, 0603 | R20, R21 |
| 02 | RFFS26 | Resistor, SMT, MF, 100ohms, 1%, 1/10W, 0603 | R12, R16 |
| 02 | RFFS28 | Resistor, SMT, MF, 150ohms, 1%, 1/10W, 0603 | R03, R05, R06, R14, R18 |
| 02 | RFFS50 | Resistor,SMT,MF,10.0Kohms,1%, 1/10W,0603 | R02, R04, R07, R08, R09, R10, R11, R13, R15, R17, R19, R22, R23 |

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Description: Final Assy, VX150/300/600,

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|---|------------------------------|
| 02 | SD94 | Switch, Push-Button, Green/Red, MOM, SPST-NO, PWB | S01, S02 |
| 02 | SD95 | Switch, Push-Button, Tactile, SPST-NO, PWB | S03 |
| 02 | UC107 | Rotary Encoder, 20PPR, Quadrature, w / MOM Push Bu | U01 |
| 01 | NAPP15 | Directional Coupler Bottom PWB Assy | A11 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J01, J02, J03 |
| 02 | RT73 | Resistor, Termination, 50 Ohm, +/- 5%, 60W, Tuned | R01 |
| 01 | RX49 | Thermistor,-30/105°C,10Kohms@ 25°C,Neg,Bvalue 3435 | RT01, RT02 |
| 01 | UA296 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 16 con | W02 |
| 01 | UA297 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 20 con | W03 |
| 01 | UA298 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 20 con | W04 |
| 01 | UA300 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 10 con | W05 |
| 01 | UA301 | Cable Assembly, Flat IDC, 0.100" pitch, 20 cond, 2 | W06 |
| 01 | UA307 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) Straight | W07, W08 |
| 01 | UA309 | Cable, Coax, SRC 316, MCX(M) RA to BNC(F) Bulkhead | W10 |
| 01 | UA310 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) RA, 12.0 | W11 |
| 01 | UA311 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) RA, 16.0 | W12 |
| 01 | UA313 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) Straight | W13 |
| 01 | UA316 | Cable, SATA, 0.5m, Straight F to Straight F, Shiel | W15 |
| 01 | UA318 | Cable Assembly, Flat IDC, 0.050" Tiger Eye,30 cond | W16 |
| 01 | UG130 | Power Supply, LED, 12V@150W, 90-305Vac, PFC, IP67 | U02 |
| 01 | UG132 | Power Supply, 18-53Vdc, 47A, 2250W/1200W, 90-265Va | U03 |
| 01 | UR119 | Display, TFT LCD, 320x240 Graphic, 3.5", Color, SP | U01 |
| 01 | ZAP68 | Fan, 80mm, 12Vdc, PWM Ctrl, Tach, w/Conn+HS Tube+M | B01, B02 |

StockCode: NARF79
Description: Final Assy, VX1,

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| Component Lvl. | StockCode | Description | Reference Designation |
|----------------|-----------|--|-----------------------|
| 01 | 235-5910 | SD card mod, Programmed (UB114) | A01U63 |
| 01 | 235-8010 | Ancillary kit for VX (150W-2kW) | |
| 01 | 235-8900 | 2RU Front Panel Detail Assembly | |
| 01 | JA44 | Conn, Coax, Recept, 7/16 DIN, Panel,50ohm | J01 |
| 01 | LA82C | Inductor, Air Core, 16 AWG magnet, 17 Turn, 0.27" | L01 |
| 01 | NAPA40 | PA PWB Assy | A07 |
| 02 | CB48 | Capacitor, SMT, Clad Mica, 100pF, 300V, +/-5% | C07 |
| 02 | CT102 | Capacitor,SMT, Porcelain, 12pF 1500V,+/-2% | C15, C22 |
| 02 | CT104 | Capacitor,SMT,Porcelain,1000pF ,300V,+/-5% | C16, C17, C18 |
| 02 | CT105 | Capacitor,SMT,Porcelain,470pF, 300V,+/-5% | C14, C19, C20, C21 |
| 02 | CT110 | Cap, SMT, Elect, Alum Polymer, 56uF, +/-20%, 63V | C06, C10, C11 |
| 02 | CT113 | Capacitor, SMT, Porcelain, 680pF, 300V, +/-5% | C09, C23 |
| 02 | CT115 | Capacitor,SMT,12pF,+/-1%,250V, NP0,0805 | C03 |
| 02 | CT124 | Capacitor,SMT,22pF,+/-1%,250V, NP0,0805 | C02 |
| 02 | CT66 | Capacitor, SMT, Ceramic, 0.1uF 10%, 100V | C01, C12 |
| 02 | FA79 | Fuse, SMT, 40A, 72VDC, Very Fast | F1 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E1, E2 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J1 |
| 02 | LA80C | Inductor, 1 turn, rectangular + angled, 0.032" cop | L1 |
| 02 | LS33 | Inductor, SMT, 17.5nH, 5%, 4A 3.15mm H x 6.86mm L | L2 |
| 02 | LS59 | Inductor, SMT, 22nH, 20%, 40A | L3 |
| 02 | LS69 | Inductor, SMT, 150nH, 2%, 1.2A, 4.2mm H x 4.95mm L | L4, L5 |
| 02 | QAP73 | Transistor, FET, LDMOS, 65V, Dual, Ruggedized | Q1 |
| 02 | RAD01 | Resistor, SMT, MF, 10 Ohms, 1% 1/4W | R1 |
| 02 | RAD45 | Resistor, SMT, MF, 47.5K Ohms, 1% 1/4W | R5 |
| 02 | RFFS94 | Resistor, SMT, 10 ohms, 1%, 1W, 2512 | R4, R6 |
| 01 | NAPA41 | Pre-Amp/IPA Pwb Assy | A06 |
| 02 | CCFS07 | Cap,SMT,Ceramic,0.1uF,10%,50V,X7R,0805 | C08 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C06 |
| 02 | CT116 | Capacitor,SMT,6.8pF,+/-0.25pF, 250V,NP0,0805 | C12 |
| 02 | CT117 | Capacitor, SMT,33pF,+/-1%,250V, NP0,0805 | C03 |
| 02 | CT118 | Capacitor,SMT,51pF,+/-1%,250V,NP0,0805 NP0,0805 | C16 |
| 02 | CT119 | Capacitor,SMT,82pF,+/-2%,250V, NP0,0805 | C17 |

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|---------------------------------|----------------|--|------------------------------|
| 02 | CT120 | Capacitor, SMT,150pF,+/-1%,250V, NP0,0805 | C02, C04, C07 |
| 02 | CT121 | Capacitor,SMT,180pF,+/-1%,250V, NP0,0805 | C05, C09, C15 |
| 02 | CT122 | Capacitor,SMT, 1000pF, +/-5%, 50V,NP0 | C11, C13 |
| 02 | CT123 | Capacitor, SMT, 0.01uF, +/-10%, 50V,BX | C10, C14 |
| 02 | FA76 | Fuse, 125 VAC, VDC, 5A, Very fast acting | F1 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J1, J2 |
| 02 | JU84 | Conn, Header, Shrouded, 0.050" 16pos, Dual Row, Go | J3 |
| 02 | LS68 | Inductor, SMT, 56nH, 2%, 3A, 4.2mm H x 4.95mm L | L1 |
| 02 | LS70 | Inductor,SMT,51nH,+/-2%,1A, Ceramic,0805 | L7 |
| 02 | LS71 | Inductor,SMT,33nH,+/-2%,0.5A, Ceramic,0805 | L6 |
| 02 | LS72 | Inductor,SMT,68nH,+/-2%,0.5A, Ceramic,0805 | L5 |
| 02 | LS73 | Inductor,SMT,5nH,+/-2%, 4A,Air | L4 |
| 02 | LS74 | Inductor,SMT,33nH,+/-2%, 4.8A,Air | L2, L3 |
| 02 | QAP74 | Transistor,SMT,MOSFET,LDMOS, Single,40V,TO-270-2 | Q1 |
| 02 | RAD33 | Resistor, SMT, MF, 4750 Ohms, 1%, 1/4W | R2 |
| 02 | RAD95 | Resistor,SMT,1 Ohm,1%, 1/4W,1206 | R1 |
| 02 | RAD96 | Resistor,SMT,39.2 Ohms,1%,1/4W,1206 1/4W,1206 | R4 |
| 02 | RFFS58 | Resistor, SMT, MF, 47.5Kohms, 1%, 1/10W, 0603 | R3 |
| | | | |
| 01 | NAPF16 | PA LPF PWB Assy | A09 |
| 02 | CT106 | Capacitor,SMT,Porcelain,1.5pF, 1500V,+/-0.1pF | C06 |
| 02 | CT107 | Capacitor,SMT,Porcelain,1.8pF, 1500V,+/-0.1pF | C10 |
| 02 | CT108 | Capacitor,SMT,Porcelain,3.3pF, 1500V,+/-0.1pF | C08 |
| 02 | CT109 | Capacitor,SMT,Porcelain,5.6pF, 1500V,+/-0.1pF | C07, C09 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E01 |
| 02 | LA77F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.5 | L01 |
| 02 | LA78F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.5 | L02 |
| 02 | LA79F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.4 | L03 |
| | | | |
| 01 | NAPI187 | System Interface PWB Assy | A03 |

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| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|---|
| 02 | CCJ01 | Cap,SMT,Ceramic,1000pF,10%, 50V,X7R,0402 | C02, C04, C11, C12, C14, C15, C53, C81, C82, C86 |
| 02 | CCJ02 | Cap,SMT,Ceramic,0.01uF,10%, 50V,X7R,0402 | C19, C22, C47, C65, C83, C84 |
| 02 | CCJ03 | Cap,SMT,Ceramic,0.1uF,10%, 50V,X7R,0402 | C01, C03, C05, C13, C16, C17, C18, C20, C21, C24, C25, C26, C27, C28, C29, C30,, C31, C32, C37, C38, C40, C41, C42, C43 C44, C45, C46, C48, C50, C51, C54, C55, C56, C57, C58, C59, C61, C63, C64, C66, C68, C69, C71, C72, C74, C77, C78, C79, C80 |
| 02 | CCJ04 | Cap,SMT,Ceramic,1uF,10%, 25V,X5R,0402 | C08, C09, C23, C39, C73, C85 |
| 02 | CCJ06 | Cap,SMT,Ceramic,4.7uF,10%, 25V,X7R,0805 | C52, C60, C62, C75 |
| 02 | CCJ10 | Cap,SMT,Ceramic,18pF,1%, 50V,C0G,0402 | C67 |
| 02 | CCJ18 | Cap,SMT,Ceramic,22uF,20%, 25V,X5R,0805 | C70, C76 |
| 02 | CCJ20 | Cap,SMT,Ceramic,15pF,1%, 50V,C0G,0402 | C33, C35 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C06, C07, C10 |
| 02 | CT65 | Cap, SMT, Ceramic, 6.8pF, 50V, +/-0.25pF, 1206 | C49 |
| 02 | H AJ66 | Terminal, SMT, Test Point, PWB | TP03, TP14 |
| 02 | JF47 | Conn, Header,Square Post,Gold, Dual,40-pin | J12 |
| 02 | JQ16 | Conn, Header, SIP, 12 Pin Breakaway, 10 Ctr | J11 |
| 02 | JR77 | Terminal Block, 2 Pos, 300V, 13A, 28-14AWG, Spring | TB02 |
| 02 | JR89 | Terminal Block, 4 Pos, 300V, 26 - 20AWG, Spring C | TB01 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J05, J06, J09 |
| 02 | JU84 | Conn, Header, Shrouded, 0.050" 16pos, Dual Row, Go | J07 |
| 02 | JU91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J04, J10 |
| 02 | JU95 | Conn, Header, Shrouded, 3mm, 4 pos, Vertical, Gold | J01, J02 |
| 02 | JU96 | Conn, Header, Shrouded, 0.050" 20pos, Dual Row, Go | J03, J08 |
| 02 | LCFS01 | Inductor, SMT, Choke, 600ohms, 2A, 0805 | L05, L06, L10, L11 |
| 02 | LCFS02 | Inductor, SMT, Choke, 2000 ohm s, 80mA, 0805 | L08, L15, L16 |
| 02 | LS18 | Inductor,SMT.2.2uH,600ma,1210 | L12 |
| 02 | LS34 | Inductor, SMT, 28nH, 2%, 4A 3.15mm H x 6.86mm L | L09 |
| 02 | LS45 | Inductor, SMT, Shielded, 33uH, 3.3A RMS | L03, L04 |
| 02 | LS60 | Inductor, SMT, 22uH, 4A RMS, Shielded, Pwr | L13 |
| 02 | LS61 | Inductor, SMT, 9.5nH, 5%, 480mA RMS, 0402 | L17 |
| 02 | QDLS02 | Diode, SMT, LED, Yellow/Green, (570nm), 0603 | DS01 |
| 02 | QDSS01 | Diode, SMT, Schottky, 30V, 0.2A, SOD-323 | CR01, CR04, CR05 |
| 02 | QN53 | Transistor,SMT,MOSFET,N-Channe l,60V,115mA,SOT-23 | Q01, Q02, Q03, Q04, Q05 |
| 02 | QR82 | Diode, SMT, TVS, Vw 5V, Vb 6V Vc 10.8V, SOT-143 | CR02, CR03 |
| 02 | RAD15 | Resistor, SMT, MF, 150 Ohms, 1% 1/4W | R39, R40 |

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|---------------------------------|----------------|---|--|
| 02 | RAD38 | Resistor, SMT, MF, 12.1K Ohms, 1% 1/4W | R34 |
| 02 | RAD93 | Resistor, SMT, 0.01 ohms, 1%, 1/4W, 1206 | R80 |
| 02 | RAF24 | Resistor SMT MF 68.1 Ohm 1% 1/16W 0402 | R98 |
| 02 | RAF27 | Resistor SMT MF 121 Ohm 1% 1/16W 0402 | R01, R03, R09, R12, R17, R20, R23, R26, R35, R38, R41, R53, R54, R61, R62, R63, R71, R72, R74,, R75, R76, R78, R84, R85 R86, R87, R91, R92, R93, R94 |
| 02 | RAF34 | Resistor SMT MF 475 Ohm 1% 1/16W 0402 | R83, R88, R90, R95 |
| 02 | RAF38 | Resistor SMT MF 1000 Ohm 1% 1/16W 0402 | R33 |
| 02 | RAF42 | Resistor SMT MF 2210 Ohm 1% 1/16W 0402 | R02, R04, R43, R44, R46, R56, R57, R64, R68 |
| 02 | RAF44 | Resistor SMT MF 3320 Ohm 1% 1/16W 0402 | R06, R08, R10, R11, R36, R52 |
| 02 | RAF50 | Resistor SMT MF 10.0K Ohm 1% 1/16W 0402 | R05, R07, R13, R14, R15, R16, R29, R30, R31, R32, R37, R42, R47, R50, R51, R55, R65, R69, R79,, R81, R82, R89, R96 |
| 02 | RAF54 | Resistor SMT MF 22.1K Ohm 1% 1/16W 0402 | R21, R22, R27, R28, R45, R48, R49, R58, R59, R60, R67, R70, R73 |
| 02 | RAF56 | Resistor SMT MF 33.2K Ohm 1% 1/16W 0402 | R18, R24 |
| 02 | RAF62 | Resistor SMT MF 100K Ohm 1% 1/16W 0402 | R19, R25, R66, R77 |
| 02 | RAF83 | Resistor SMT MF 499 Ohm 1% 1/16W 0402 | R97 |
| 02 | RFFS04 | Resistor, SMT, MF, 1.50ohms, 1%, 1/10W, 0603 | R99 |
| 02 | RT50 | Resistor,SMT,MF,0.0 ohms, Jumper,0805 | L01, L02, L07, L14 |
| 02 | UDTS04 | IC,SMT,RS-485 Transceiver,3.3V ,SO-8 | U07, U08 |
| 02 | UDTS05 | IC, SMT, RS-232 Transceiver, 3.3V, SO-16 | U04 |
| 02 | ULAS01 | IC,SMT,Opamp,Quad,Single Suppl y,SOIC-14 | U01 |
| 02 | UT157 | IC, SMT, DC-DC Conv, Buck, Adj, 2A, 4.5-28V _{in} , SOT | U06 |
| 02 | UT158 | IC, SMT, Amp, Current Sense, Precision, 50V/V, SOT | U05 |
| 02 | UW207 | Attenuator, SMT, 20dB, 50 ohm, 0.5W, DC to 8 GHz | U09 |
| 02 | UX161 | IC, SMT, Micro, 128K, 8K SRAM, 3.3V, TQFP-100 | U02 |
| 02 | UX191 | IC, SMT, RMS RF Power detector , 3.3V, 40MHz-10GHz | U10 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U03 |
| 02 | XFPS14 | Crystal,SMT,Fund,32.768kHz, 10ppm,12.5pF,50kOhm,-4 | Y01 |
| 01 | NAPI188 | Power Supply Interface PWB Assy - 3.5kW | A04 |
| 02 | CCFS09 | Cap,SMT,Ceramic,0.47uF,10%,25V,X7R,0805 | C02 |
| 02 | CCFS52 | Cap, SMT, Ceramic, 0.1uF, 10%, 25V X7R, 0603 | C01, C03, C07, C09, C10, C11, C12, C13, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24 |
| 02 | CCFS73 | Cap, SMT, Ceramic, 1uF, 10%, 16V, X5R, 0603 | C05, C14 |
| 02 | CX33 | Cap,SMT,Ceramic,4.7uF,20%,10V, X5R,1206 | C06 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E01, E02, E03, E04 |

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|---------------------------------|----------|--|--|
| 02 | H AJ66 | Terminal, SMT, Test Point, PWB | TP2 |
| 02 | J A137 | Conn, PwrBlade, 3ACP+4P+24S, RA PCB, CP3500 Mate | J01 |
| 02 | J R78 | Terminal Block, 3 Pos, 300V, 13A, 28-14AWG, Spring | TB1 |
| 02 | J T202 | Conn, Recept, AC, 250VAC, 20A, PWB Mount | J03 |
| 02 | J U91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J02 |
| 02 | L S23 | Choke, SMT, Common Mode, 7000 ohm, 700mA | L01 |
| 02 | R FCS04 | Resistor, SMT, 0.002 ohms, 1%, 5W | R22, R28 |
| 02 | R FFS01 | Resistor,SMT,MF,0.0ohms,Jumper ,0603 | R32, R34, R36, R37 |
| 02 | R FFS26 | Resistor, SMT, MF, 100ohms, 1%, 1/10W, 0603 | R09, R14 |
| 02 | R FFS27 | Resistor, SMT, MF, 121ohms, 1%, 1/10W, 0603 | R04, R05, R06, R07 |
| 02 | R FFS34 | Resistor,SMT,MF,475ohms,1%, 1/10W,0603 | R03, R10 |
| 02 | R FFS38 | Resistor,SMT,MF,1000ohms,1%, 1/10W,0603 | R29, R30 |
| 02 | R FFS40 | Resistor,SMT,MF,1500ohms,1%, 1/10W,0603 | R25, R26 |
| 02 | R FFS42 | Resistor,SMT,MF,2210ohms,1%, 1/10W,0603 | R08, R16, R17, R19 |
| 02 | R FFS43 | Resistor, SMT, MF, 2740ohms, 1%, 1/10W, 0603 | R11 |
| 02 | R FFS46 | Resistor, SMT, MF, 4750ohms, 1%, 1/10W, 0603 | R13 |
| 02 | R FFS50 | Resistor,SMT,MF,10.0Kohms,1%, 1/10W,0603 | R01, R02, R12, R20, R23, R24, R27 |
| 02 | R FFS59 | Resistor,SMT,MF,56.2Kohms,1%, 1/10W,0603 | R15, R18 |
| 02 | U LAS02 | IC,SMT,Opamp,Quad,Rail-To-Rail ,SOIC-14 | U05 |
| 02 | U P156 | IC, SMT, Linear Voltage Regula tor, 3.3V, SOT-223 | U01 |
| 02 | U S49 | IC, SMT, ADC, 12 bit, 8 Ch, 3.3V, I2C | U02 |
| 02 | U T74 | IC, Amplifier, Instrumentation | U04, U06 |
| 02 | U X83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U03 |
| 01 | N A P189 | Analog Audio PWB Assy | A02 |
| 02 | C CFS54 | Cap,SMT,Ceramic,1500pF,10%,50V ,X7R,0603 | C058, C074, C117, C118 |
| 02 | C C J01 | Cap,SMT,Ceramic,1000pF,10%, 50V,X7R,0402 | C001, C005, C006, C022, C023, C028, C029, C045 |
| 02 | C C J02 | Cap,SMT,Ceramic,0.01uF,10%, 50V,X7R,0402 | C036, C044, C061 |
| 02 | C C J03 | Cap,SMT,Ceramic,0.1uF,10%, 50V,X7R,0402 | C003, C007, C008, C010, C015, C016, C017, C018, C019, C020, C026, C031, C032, C034, C038, C039,, C051, C053, C056, C062, C065, C067, C082, C083, C085, C087, C088, C091, C095, C098, C100,, C104, C108, C111, C113, C115, C121, C124, C127, C131 |
| 02 | C C J04 | Cap,SMT,Ceramic,1uF,10%, 25V,X5R,0402 | C004, C009, C012, C014, C021, C024, C025, C027, C037, C041, C046, C050, C055, C063, C068, C069,, C073, C078, C081, C086, C092, C094, C101, C102, C103, C107, C112, C116, C119, C120 |

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| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|--|
| 02 | CCJ05 | Cap,SMT,Ceramic,10uF,10%, 25V,X5R,0805 | C033, C040, C054, C059, C070, C071, C072, C079, C090, C132 |
| 02 | CCJ07 | Cap,SMT,Ceramic,100pF,1%, 50V,C0G,0402 | C048, C049, C057, C080, C089, C110, C128 |
| 02 | CCJ08 | Cap,SMT,Ceramic,2.2uF,10%, 25V,X5R,0402 | C011, C035, C043, C060, C097 |
| 02 | CCJ10 | Cap,SMT,Ceramic,18pF,1%, 50V,C0G,0402 | C093, C105, C114, C125 |
| 02 | CCJ13 | Cap,SMT,Ceramic,3300pF,10%, 50V,X7R,0402 | C077 |
| 02 | CCJ19 | Cap,SMT,Ceramic,470pF,1%, 50V,C0G,0402 | C042, C076, C122 |
| 02 | CCJ20 | Cap,SMT,Ceramic,15pF,1%, 50V,C0G,0402 | C099 |
| 02 | CCJ26 | Cap,SMT,Ceramic,220pF,1%,50V, COG/NPO,0402 | C052, C109 |
| 02 | CCJ28 | Cap,SMT,Ceramic,39pF,1%,50V, NPO/COG,0402 | C075, C123 |
| 02 | H AJ66 | Terminal, SMT, Test Point, PWB | TP01, TP14 |
| 02 | JT204 | Conn, BNC, Dual Stacked, Isolated | J01 |
| 02 | JT61 | Conn, BNC, Recept, 50ohm,Insul , Rt Angle | J02 |
| 02 | JT87 | Conn,3-pin,PWB Mount, Fem, XLR | J03, J04 |
| 02 | JU85 | Conn, Header, Shrouded, 0.050" 30pos, Dual Row, Go | J05 |
| 02 | LA72 | Bead, Ferrite, SMT, 120 Ohm at 100MHz, 1.3A, 0402 | L02 |
| 02 | LS56 | Inductor, SMT, 3.3uH, 5.6A,RMS | L01, L03 |
| 02 | QDDS02 | Diode, SMT, Schottky, 40V, 1A, SMA | CR04 |
| 02 | QDSS01 | Diode, SMT, Schottky, 30V, 0.2A, SOD-323 | CR03 |
| 02 | QDZS11 | Diode, SMT, Zener, 5.6V, 1.5W, SMA, 403D | CR01, CR02, CR05, CR06 |
| 02 | RAD23 | Resistor, SMT, MF, 681 Ohms, 1% 1/4W | R011, R052 |
| 02 | RAF01 | Resistor SMT MF 0.0 Ohm Jumper 0402 | R034, R095, R099, R100, R123, R154 |
| 02 | RAF18 | Resistor SMT MF 22.1 Ohm 1% 1/16W 0402 | R090, R103, R144, R145 |
| 02 | RAF26 | Resistor SMT MF 100 Ohm 1% 1/16W 0402 | R003, R018, R037, R038, R048, R069, R082, R097, R113, R131, R153 |
| 02 | RAF38 | Resistor SMT MF 1000 Ohm 1% 1/16W 0402 | R007, R008, R009, R014, R015, R016, R031, R032, R044, R045, R046, R060, R061, R062, R109, R110,, R117, R125, R127, R128, R129, R136, R137, R149, R150 |
| 02 | RAF50 | Resistor SMT MF 10.0K Ohm 1% 1/16W 0402 | R004, R005, R012, R019, R023, R025, R026, R027, R033, R035, R039, R041, R042, R050, R051, R053,, R056, R057, R058, R066, R070, R073, R074, R075, R080, R085, R086, R089, R093, R096, R098, R101,, R102, R104, R105, R106, R107, R108, R114, R119, R126, R134, R135, R146, R147, R148 |
| 02 | RAF52 | Resistor SMT MF 15.0K Ohm 1% 1/16W 0402 | R021, R029, R079, R118 |
| 02 | RAF56 | Resistor SMT MF 33.2K Ohm 1% 1/16W 0402 | R055 |
| 02 | RAF57 | Resistor SMT MF 39.2K Ohm 1% 1/16W 0402 | R006, R013, R020, R043, R059, R072, R088, R111, R116, R141, R151 |

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|---------------------------------|----------------|--|--|
| 02 | RAF59 | Resistor SMT MF 56.2K Ohm 1% 1/16W 0402 | R024, R028, R049, R054, R094 |
| 02 | RAF63 | Resistor SMT MF 121K Ohm 1% 1/16W 0402 | R071 |
| 02 | RAF66 | Resistor SMT MF 221K Ohm 1% 1/16W 0402 | R087, R120 |
| 02 | RAF74 | Resistor SMT MF 1.00M Ohm 1% 1/16W 0402 | R001, R030 |
| 02 | RAF87 | Resistor SMT MF 3740 Ohm 1% 1/16W 0402 | R010, R017, R047, R063 |
| 02 | RAF93 | Resistor SMT MF 7.15K Ohm 1% 1/16W 0402 | R077, R083, R132, R139 |
| 02 | RAF94 | Resistor SMT MF 3.57K Ohm 1% 1/16W 0402 | R078, R133 |
| 02 | RAF95 | Resistor SMT MF 4.12K Ohm 1% 1/16W 0402 | R084, R091, R140, R142 |
| 02 | RAF96 | Resistor SMT MF 2.10K Ohm 1% 1/16W 0402 | R092, R143 |
| 02 | US12 | IC, SMT, Rectifier, Bridge, 400V, 0.5A, SOIC-4 | U02, U08, U21, U26 |
| 02 | US58 | IC, SMT, 24Bit Audio Codec, SPI, I2C, TSSOP28 | U06 |
| 02 | US59 | IC, SMT, 10-Bit A/D Converter, 4Ch, 200KSPS, 10-VS | U03 |
| 02 | US60 | IC, SMT, ADC 16 Bit, 2Ch, 750KSPS, 16-WQFN | U17 |
| 02 | UT170 | IC, SMT, Adj. DC to DC Inverting Reg, 2.4A, 16-LFC | U20 |
| 02 | UT171 | IC, SMT, Op AMP, Dual, Low Noise, Bipol Supply, 8- | U01, U04, U09, U13, U15, U18, U19, U23 |
| 02 | UT172 | IC, SMT, Precision Diff Amp, 8-MSOP | U05, U10, U16, U25 |
| 02 | UT178 | IC, SMT, Rail to Rail Dual Op-amp, Wide BW, SOIC8 | U14, U24 |
| 02 | UX66 | IC,SMT,Linear Regulator,150mA Adj.,MSOP-8 | U07, U11, U12 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U22 |
| 01 | NAPI193 | Front Panel User Interface Pwb Assy | A05 |
| 02 | CCFS04 | Cap,SMT,Ceramic,0.01uF,10%,50V,X7R,0603 | C02, C03 |
| 02 | CCFS07 | Cap,SMT,Ceramic,0.1uF,10%,50V,X7R,0805 | C04 |
| 02 | CCJ18 | Cap,SMT,Ceramic,22uF,20%, 25V,X5R,0805 | C06 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C05 |
| 02 | JA140 | Conn, USB, Vertical Mount, Type A, PWB | J04 |
| 02 | JQ55 | Conn, Header, Ribbon Cbl, 20 Pin | J03 |
| 02 | JQ97 | Conn, Header, SATA, Vert, PWB | J01 |
| 02 | JU96 | Conn, Header, Shrouded, 0.050" 20pos, Dual Row, Go | J02 |
| 02 | LS18 | Inductor,SMT,2.2uH,600ma,1210 | L01 |
| 02 | QM77 | Diode, LED, RED, Rectangular, TH, 5mm x 2mm | DS1 |
| 02 | QN53 | Transistor,SMT,MOSFET,N-Channe l,60V,115mA,SOT-23 | Q01, Q02, Q03, Q04, Q05 |
| 02 | RFFS18 | Resistor, SMT, MF, 22.1ohms, 1%, 1/10W, 0603 | R20, R21 |
| 02 | RFFS26 | Resistor, SMT, MF, 100ohms, 1%, 1/10W, 0603 | R12, R16 |
| 02 | RFFS28 | Resistor, SMT, MF, 150ohms, 1%, 1/10W, 0603 | R03, R05, R06, R14, R18 |

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|-----------------------|------------------|---|---|
| 02 | RFFS50 | Resistor,SMT,MF,10.0Kohms,1%, 1/10W,0603 | R02, R04, R07, R08, R09, R10, R11, R13, R15, R17, R19, R22, R23 |
| 02 | SD94 | Switch, Push-Button, Green/Red, MOM, SPST-NO, PWB | S01, S02 |
| 02 | SD95 | Switch, Push-Button, Tactile, SPST-NO, PWB | S03 |
| 02 | UC107 | Rotary Encoder, 20PPR, Quadrature, w / MOM Push Bu | U01 |
| 01 | NAPP15 | Directional Coupler Bottom PWB Assy | A11 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J01, J02, J03 |
| 02 | RT73 | Resistor, Termination, 50 Ohm, +/- 5%, 60W, Tuned | R01 |
| 01 | RX49 | Thermistor,-30/105°C,10Kohms@ 25°C,Neg,Bvalue 3435 | RT01, RT02 |
| 01 | UA296 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 16 con | W02 |
| 01 | UA297 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 20 con | W03 |
| 01 | UA298 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 20 con | W04 |
| 01 | UA300 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 10 con | W05 |
| 01 | UA301 | Cable Assembly, Flat IDC, 0.100" pitch, 20 cond, 2 | W06 |
| 01 | UA307 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) Straight | W07, W08 |
| 01 | UA309 | Cable, Coax, SRC 316, MCX(M) RA to BNC(F) Bulkhead | W10 |
| 01 | UA310 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) RA, 12.0 | W11 |
| 01 | UA311 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) RA, 16.0 | W12 |
| 01 | UA313 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) Straight | W13 |
| 01 | UA316 | Cable, SATA, 0.5m, Straight F to Straight F, Shiel | W15 |
| 01 | UA318 | Cable Assembly, Flat IDC, 0.050" Tiger Eye,30 cond | W16 |
| 01 | UG130 | Power Supply, LED, 12V@150W, 90-305Vac, PFC, IP67 | U02 |
| 01 | UG136 | Power Supply, 23-65Vdc, 3500W/1500W, 90-265Vac, Co | U03 |
| 01 | UR119 | Display, TFT LCD, 320x240 Graphic, 3.5", Color, SP | U01 |
| 01 | ZAP68 | Fan, 80mm, 12Vdc, PWM Ctrl, Tach, w/Conn+HS Tube+M | B01, B02 |

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|-----------------------|------------------|--|------------------------------|
| 01 | 235-5910 | SD card mod, Programmed (UB114) | A01U63 |
| 01 | 235-8010 | Ancillary kit for VX (150W-2kW) | |
| 01 | 235-8900 | 2RU Front Panel Detail Assembly | |
| 01 | JA44 | Conn, Coax, Recept, 7/16 DIN, Panel,50ohm | J01 |
| 01 | LA82C | Inductor, Air Core, 16 AWG magnet, 17 Turn, 0.27" | L01, L02 |
| 01 | NAPA40 | PA PWB Assy | A07, A08 |
| 02 | CB48 | Capacitor, SMT, Clad Mica, 100pF, 300V, +/-5% | C07 |
| 02 | CT102 | Capacitor,SMT, Porcelain, 12pF 1500V,+/-2% | C15, C22 |
| 02 | CT104 | Capacitor,SMT,Porcelain,1000pF ,300V,+/-5% | C16, C17, C18 |
| 02 | CT105 | Capacitor,SMT,Porcelain,470pF, 300V,+/-5% | C14, C19, C20, C21 |
| 02 | CT110 | Cap, SMT, Elect, Alum Polymer, 56uF, +/-20%, 63V | C06, C10, C11 |
| 02 | CT113 | Capacitor, SMT, Porcelain, 680pF, 300V, +/-5% | C09, C23 |
| 02 | CT115 | Capacitor,SMT,12pF,+/-1%,250V, NP0,0805 | C03 |
| 02 | CT124 | Capacitor,SMT,22pF,+/-1%,250V, NP0,0805 | C02 |
| 02 | CT66 | Capacitor, SMT, Ceramic, 0.1uF 10%, 100V | C01, C12 |
| 02 | FA79 | Fuse, SMT, 40A, 72VDC, Very Fast | F1 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E1, E2 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J1 |
| 02 | LA80C | Inductor, 1 turn, rectangular + angled, 0.032" cop | L1 |
| 02 | LS33 | Inductor, SMT, 17.5nH, 5%, 4A 3.15mm H x 6.86mm L | L2 |
| 02 | LS59 | Inductor, SMT, 22nH, 20%, 40A | L3 |
| 02 | LS69 | Inductor, SMT, 150nH, 2%, 1.2A, 4.2mm H x 4.95mm L | L4, L5 |
| 02 | QAP73 | Transistor, FET, LDMOS, 65V, Dual, Ruggedized | Q1 |
| 02 | RAD01 | Resistor, SMT, MF, 10 Ohms, 1% 1/4W | R1 |
| 02 | RAD45 | Resistor, SMT, MF, 47.5K Ohms, 1% 1/4W | R5 |
| 02 | RFFS94 | Resistor, SMT, 10 ohms, 1%, 1W, 2512 | R4, R6 |
| 01 | NAPA41 | Pre-Amp/IPA Pwb Assy | A06 |
| 02 | CCFS07 | Cap,SMT,Ceramic,0.1uF,10%,50V,X7R,0805 | C08 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C06 |
| 02 | CT116 | Capacitor,SMT,6.8pF,+/-0.25pF, 250V,NP0,0805 | C12 |
| 02 | CT117 | Capacitor, SMT,33pF,+/-1%,250V, NP0,0805 | C03 |
| 02 | CT118 | Capacitor,SMT,51pF,+/-1%,250V,NP0,0805 NP0,0805 | C16 |
| 02 | CT119 | Capacitor,SMT,82pF,+/-2%,250V, NP0,0805 | C17 |

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|-----------------------|------------------|--|------------------------------|
| 02 | CT120 | Capacitor, SMT,150pF,+/-1%,250V, NP0,0805 | C02, C04, C07 |
| 02 | CT121 | Capacitor,SMT,180pF,+/-1%,250V, NP0,0805 | C05, C09, C15 |
| 02 | CT122 | Capacitor,SMT, 1000pF, +/-5%, 50V,NP0 | C11, C13 |
| 02 | CT123 | Capacitor, SMT, 0.01uF, +/-10%, 50V,BX | C10, C14 |
| 02 | FA76 | Fuse, 125 VAC, VDC, 5A, Very fast acting | F1 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J1, J2 |
| 02 | JU84 | Conn, Header, Shrouded, 0.050" 16pos, Dual Row, Go | J3 |
| 02 | LS68 | Inductor, SMT, 56nH, 2%, 3A, 4.2mm H x 4.95mm L | L1 |
| 02 | LS70 | Inductor,SMT,51nH,+/-2%,1A, Ceramic,0805 | L7 |
| 02 | LS71 | Inductor,SMT,33nH,+/-2%,0.5A, Ceramic,0805 | L6 |
| 02 | LS72 | Inductor,SMT,68nH,+/-2%,0.5A, Ceramic,0805 | L5 |
| 02 | LS73 | Inductor,SMT,5nH,+/-2%, 4A,Air | L4 |
| 02 | LS74 | Inductor,SMT,33nH,+/-2%, 4.8A,Air | L2, L3 |
| 02 | QAP74 | Transistor,SMT,MOSFET,LDMOS, Single,40V,TO-270-2 | Q1 |
| 02 | RAD33 | Resistor, SMT, MF, 4750 Ohms, 1%, 1/4W | R2 |
| 02 | RAD95 | Resistor,SMT,1 Ohm,1%, 1/4W,1206 | R1 |
| 02 | RAD96 | Resistor,SMT,39.2 Ohms,1%,1/4W,1206 1/4W,1206 | R4 |
| 02 | RFFS58 | Resistor, SMT, MF, 47.5Kohms, 1%, 1/10W, 0603 | R3 |

| | | | |
|----|---------------|--|----------|
| 01 | NAPF16 | PA LPF PWB Assy | A09, A10 |
| 02 | CT106 | Capacitor,SMT,Porcelain,1.5pF, 1500V,+/-0.1pF | C06 |
| 02 | CT107 | Capacitor,SMT,Porcelain,1.8pF, 1500V,+/-0.1pF | C10 |
| 02 | CT108 | Capacitor,SMT,Porcelain,3.3pF, 1500V,+/-0.1pF | C08 |
| 02 | CT109 | Capacitor,SMT,Porcelain,5.6pF, 1500V,+/-0.1pF | C07, C09 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E01 |
| 02 | LA77F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.5 | L01 |
| 02 | LA78F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.5 | L02 |
| 02 | LA79F | Inductor, SMT, Air Core, 2.5 turn, 10 AWG TCW, 0.4 | L03 |
| 01 | NAPH15 | 2-Way Splitter Pwb Assy | A12 |

| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|---|
| 02 | CCFS04 | Cap,SMT,Ceramic,0.01uF,10%,50V,X7R,0603 | C01, C02 |
| 02 | CS81 | Capacitor, SMT, Porcelain,24pF 500V, 2% | C05 |
| 02 | CS89 | Capacitor, SMT, Porcelain,27pF 500V, 2% | C07 |
| 02 | CT53 | Capacitor,SMT,Ceramic,0.001uF, 50V,10% | C03, C04 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J01, J02, J03 |
| 02 | JU91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J04 |
| 02 | LS68 | Inductor, SMT, 56nH, 2%, 3A, 4.2mm H x 4.95mm L | L01 |
| 02 | RAD38 | Resistor, SMT, MF, 12.1K Ohms, 1% 1/4W | R01, R02 |
| 02 | RFFS38 | Resistor,SMT,MF,1000ohms,1%, 1/10W,0603 | R03, R04 |
| 02 | RT57 | Resistor, SMT, AIN, 100 ohms, 2%, 30W, 3725 | R05 |
| 01 | NAPI187 | System Interface PWB Assy | A03 |
| 02 | CCJ01 | Cap,SMT,Ceramic,1000pF,10%, 50V,X7R,0402 | C02, C04, C11, C12, C14, C15, C53, C81, C82, C86 |
| 02 | CCJ02 | Cap,SMT,Ceramic,0.01uF,10%, 50V,X7R,0402 | C19, C22, C47, C65, C83, C84 |
| 02 | CCJ03 | Cap,SMT,Ceramic,0.1uF,10%, 50V,X7R,0402 | C01, C03, C05, C13, C16, C17, C18, C20, C21, C24, C25, C26, C27, C28, C29, C30,, C31, C32, C37, C38, C40, C41, C42, C43 C44, C45, C46, C48, C50, C51, C54, C55, C56, C57, C58, C59, C61, C63, C64, C66, C68, C69, C71, C72, C74, C77, C78, C79, C80 |
| 02 | CCJ04 | Cap,SMT,Ceramic,1uF,10%, 25V,X5R,0402 | C08, C09, C23, C39, C73, C85 |
| 02 | CCJ06 | Cap,SMT,Ceramic,4.7uF,10%, 25V,X7R,0805 | C52, C60, C62, C75 |
| 02 | CCJ10 | Cap,SMT,Ceramic,18pF,1%, 50V,C0G,0402 | C67 |
| 02 | CCJ18 | Cap,SMT,Ceramic,22uF,20%, 25V,X5R,0805 | C70, C76 |
| 02 | CCJ20 | Cap,SMT,Ceramic,15pF,1%, 50V,C0G,0402 | C33, C35 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C06, C07, C10 |
| 02 | CT65 | Cap, SMT, Ceramic, 6.8pF, 50V, +/-0.25pF, 1206 | C49 |
| 02 | HAI66 | Terminal, SMT, Test Point, PWB | TP03, TP14 |
| 02 | JF47 | Conn, Header,Square Post,Gold, Dual,40-pin | J12 |
| 02 | JQ16 | Conn, Header, SIP, 12 Pin Breakaway, 10 Ctr | J11 |
| 02 | JR77 | Terminal Block, 2 Pos, 300V, 13A, 28-14AWG, Spring | TB02 |
| 02 | JR89 | Terminal Block, 4 Pos, 300V, 26 - 20AWG, Spring C | TB01 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J05, J06, J09 |
| 02 | JU84 | Conn, Header, Shrouded, 0.050" 16pos, Dual Row, Go | J07 |
| 02 | JU91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J04, J10 |
| 02 | JU95 | Conn, Header, Shrouded, 3mm, 4 pos, Vertical, Gold | J01, J02 |
| 02 | JU96 | Conn, Header, Shrouded, 0.050" 20pos, Dual Row, Go | J03, J08 |
| 02 | LCFS01 | Inductor, SMT, Choke, 600ohms, 2A, 0805 | L05, L06, L10, L11 |

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|-----------------------|------------------|---|--|
| 02 | LCFS02 | Inductor, SMT, Choke, 2000 ohm s, 80mA, 0805 | L08, L15, L16 |
| 02 | LS18 | Inductor,SMT,2.2uH,600ma,1210 | L12 |
| 02 | LS34 | Inductor, SMT, 28nH, 2%, 4A 3.15mm H x 6.86mm L | L09 |
| 02 | LS45 | Inductor, SMT, Shielded, 33uH, 3.3A RMS | L03, L04 |
| 02 | LS60 | Inductor, SMT, 22uH, 4A RMS, Shielded, Pwr | L13 |
| 02 | LS61 | Inductor, SMT, 9.5nH, 5%, 480mA RMS, 0402 | L17 |
| 02 | QDLS02 | Diode, SMT, LED, Yellow/Green, (570nm), 0603 | DS01 |
| 02 | QDSS01 | Diode, SMT, Schottky, 30V, 0.2A, SOD-323 | CR01, CR04, CR05 |
| 02 | QN53 | Transistor,SMT,MOSFET,N-Channe l,60V,115mA,SOT-23 | Q01, Q02, Q03, Q04, Q05 |
| 02 | QR82 | Diode, SMT, TVS, Vw 5V, Vb 6V Vc 10.8V, SOT-143 | CR02, CR03 |
| 02 | RAD15 | Resistor, SMT, MF, 150 Ohms, 1% 1/4W | R39, R40 |
| 02 | RAD38 | Resistor, SMT, MF, 12.1K Ohms, 1% 1/4W | R34 |
| 02 | RAD93 | Resistor, SMT, 0.01 ohms, 1%, 1/4W, 1206 | R80 |
| 02 | RAF24 | Resistor SMT MF 68.1 Ohm 1% 1/16W 0402 | R98 |
| 02 | RAF27 | Resistor SMT MF 121 Ohm 1% 1/16W 0402 | R01, R03, R09, R12, R17, R20, R23, R26, R35, R38, R41, R53, R54, R61, R62, R63, R71, R72, R74., R75, R76, R78, R84, R85 R86, R87, R91, R92, R93, R94 |
| 02 | RAF34 | Resistor SMT MF 475 Ohm 1% 1/16W 0402 | R83, R88, R90, R95 |
| 02 | RAF38 | Resistor SMT MF 1000 Ohm 1% 1/16W 0402 | R33 |
| 02 | RAF42 | Resistor SMT MF 2210 Ohm 1% 1/16W 0402 | R02, R04, R43, R44, R46, R56, R57, R64, R68 |
| 02 | RAF44 | Resistor SMT MF 3320 Ohm 1% 1/16W 0402 | R06, R08, R10, R11, R36, R52 |
| 02 | RAF50 | Resistor SMT MF 10.0K Ohm 1% 1/16W 0402 | R05, R07, R13, R14, R15, R16, R29, R30, R31, R32, R37, R42, R47, R50, R51, R55, R65, R69, R79., R81, R82, R89, R96 |
| 02 | RAF54 | Resistor SMT MF 22.1K Ohm 1% 1/16W 0402 | R21, R22, R27, R28, R45, R48, R49, R58, R59, R60, R67, R70, R73 |
| 02 | RAF56 | Resistor SMT MF 33.2K Ohm 1% 1/16W 0402 | R18, R24 |
| 02 | RAF62 | Resistor SMT MF 100K Ohm 1% 1/16W 0402 | R19, R25, R66, R77 |
| 02 | RAF83 | Resistor SMT MF 499 Ohm 1% 1/16W 0402 | R97 |
| 02 | RFFS04 | Resistor, SMT, MF, 1.50ohms, 1%, 1/10W, 0603 | R99 |
| 02 | RT50 | Resistor,SMT,MF,0.0 ohms, Jumper,0805 | L01, L02, L07, L14 |
| 02 | UDTS04 | IC,SMT,RS-485 Transceiver,3.3V ,SO-8 | U07, U08 |
| 02 | UDTS05 | IC, SMT, RS-232 Transceiver, 3.3V, SO-16 | U04 |
| 02 | ULAS01 | IC,SMT,Opamp,Quad,Single Suppl y,SOIC-14 | U01 |
| 02 | UT157 | IC, SMT, DC-DC Conv, Buck, Adj, 2A, 4.5-28V _{in} , SOT | U06 |
| 02 | UT158 | IC, SMT, Amp, Current Sense, Precision, 50V/V, SOT | U05 |
| 02 | UW207 | Attenuator, SMT, 20dB, 50 ohm, 0.5W, DC to 8 GHz | U09 |

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|-----------------------|------------------|--|--|
| 02 | UX161 | IC, SMT, Micro, 128K, 8K SRAM, 3.3V, TQFP-100 | U02 |
| 02 | UX191 | IC, SMT, RMS RF Power detector , 3.3V, 40MHz-10GHz | U10 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U03 |
| 02 | XFPS14 | Crystal,SMT,Fund,32.768kHz, 10ppm,12.5pF,50kOhm,-4 | Y01 |
| 01 | NAPI188 | Power Supply Interface PWB Assy - 3.5kW | A04 |
| 02 | CCFS09 | Cap,SMT,Ceramic,0.47uF,10%,25V,X7R,0805 | C02 |
| 02 | CCFS52 | Cap, SMT, Ceramic, 0.1uF, 10%, 25V X7R, 0603 | C01, C03, C07, C09, C10, C11, C12, C13, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24 |
| 02 | CCFS73 | Cap, SMT, Ceramic, 1uF, 10%, 16V, X5R, 0603 | C05, C14 |
| 02 | CX33 | Cap,SMT,Ceramic,4.7uF,20%,10V, X5R,1206 | C06 |
| 02 | HAC122 | 1 Pin Screw Terminal, Power Tap M3 Surface Mount | E01, E02, E03, E04 |
| 02 | HAI66 | Terminal, SMT, Test Point, PWB | TP2 |
| 02 | JA137 | Conn, PwrBlade, 3ACP+4P+24S, RA PCB, CP3500 Mate | J01 |
| 02 | JR78 | Terminal Block, 3 Pos, 300V, 13A, 28-14AWG, Spring | TB1 |
| 02 | JT202 | Conn, Recept, AC, 250VAC, 20A, PWB Mount | J03 |
| 02 | JU91 | Conn, Header, Shrouded, 0.050" 10pos, Dual Row, Go | J02 |
| 02 | LS23 | Choke, SMT, Common Mode, 7000 ohm, 700mA | L01 |
| 02 | RFC04 | Resistor, SMT, 0.002 ohms, 1%, 5W | R22, R28 |
| 02 | RFFS01 | Resistor,SMT,MF,0.0ohms,Jumper ,0603 | R32, R34, R36, R37 |
| 02 | RFFS26 | Resistor, SMT, MF, 100ohms, 1%, 1/10W, 0603 | R09, R14 |
| 02 | RFFS27 | Resistor, SMT, MF, 121ohms, 1%, 1/10W, 0603 | R04, R05, R06, R07 |
| 02 | RFFS34 | Resistor,SMT,MF,475ohms,1%, 1/10W,0603 | R03, R10 |
| 02 | RFFS38 | Resistor,SMT,MF,1000ohms,1%, 1/10W,0603 | R29, R30 |
| 02 | RFFS40 | Resistor,SMT,MF,1500ohms,1%, 1/10W,0603 | R25, R26 |
| 02 | RFFS42 | Resistor,SMT,MF,2210ohms,1%, 1/10W,0603 | R08, R16, R17, R19 |
| 02 | RFFS43 | Resistor, SMT, MF, 2740ohms, 1%, 1/10W, 0603 | R11 |
| 02 | RFFS46 | Resistor, SMT, MF, 4750ohms, 1%, 1/10W, 0603 | R13 |
| 02 | RFFS50 | Resistor,SMT,MF,10.0Kohms,1%, 1/10W,0603 | R01, R02, R12, R20, R23, R24, R27 |
| 02 | RFFS59 | Resistor,SMT,MF,56.2Kohms,1%, 1/10W,0603 | R15, R18 |
| 02 | ULAS02 | IC,SMT,Opamp,Quad,Rail-To-Rail ,SOIC-14 | U05 |
| 02 | UP156 | IC, SMT, Linear Voltage Regula tor, 3.3V, SOT-223 | U01 |
| 02 | US49 | IC, SMT, ADC, 12 bit, 8 Ch, 3.3V, I2C | U02 |
| 02 | UT74 | IC, Amplifier, Instrumentation | U04, U06 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U03 |
| 01 | NAPI189 | Analog Audio PWB Assy | A02 |

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|---------------------------------|--------|--|--|
| 02 | CCFS54 | Cap,SMT,Ceramic,1500pF,10%,50V ,X7R,0603 | C058, C074, C117, C118 |
| 02 | CCJ01 | Cap,SMT,Ceramic,1000pF,10%, 50V,X7R,0402 | C001, C005, C006, C022, C023, C028, C029, C045 |
| 02 | CCJ02 | Cap,SMT,Ceramic,0.01uF,10%, 50V,X7R,0402 | C036, C044, C061 |
| 02 | CCJ03 | Cap,SMT,Ceramic,0.1uF,10%, 50V,X7R,0402 | C003, C007, C008, C010, C015, C016, C017, C018, C019, C020, C026, C031, C032, C034, C038, C039,, C051, C053, C056, C062, C065, C067, C082, C083, C085, C087, C088, C091, C095, C098, C100,, C104, C108, C111, C113, C115, C121, C124, C127, C131 |
| 02 | CCJ04 | Cap,SMT,Ceramic,1uF,10%, 25V,X5R,0402 | C004, C009, C012, C014, C021, C024, C025, C027, C037, C041, C046, C050, C055, C063, C068, C069,, C073, C078, C081, C086, C092, C094, C101, C102, C103, C107, C112, C116, C119, C120 |
| 02 | CCJ05 | Cap,SMT,Ceramic,10uF,10%, 25V,X5R,0805 | C033, C040, C054, C059, C070, C071, C072, C079, C090, C132 |
| 02 | CCJ07 | Cap,SMT,Ceramic,100pF,1%, 50V,C0G,0402 | C048, C049, C057, C080, C089, C110, C128 |
| 02 | CCJ08 | Cap,SMT,Ceramic,2.2uF,10%, 25V,X5R,0402 | C011, C035, C043, C060, C097 |
| 02 | CCJ10 | Cap,SMT,Ceramic,18pF,1%, 50V,C0G,0402 | C093, C105, C114, C125 |
| 02 | CCJ13 | Cap,SMT,Ceramic,3300pF,10%, 50V,X7R,0402 | C077 |
| 02 | CCJ19 | Cap,SMT,Ceramic,470pF,1%, 50V,C0G,0402 | C042, C076, C122 |
| 02 | CCJ20 | Cap,SMT,Ceramic,15pF,1%, 50V,C0G,0402 | C099 |
| 02 | CCJ26 | Cap,SMT,Ceramic,220pF,1%,50V, COG/NPO,0402 | C052, C109 |
| 02 | CCJ28 | Cap,SMT,Ceramic,39pF,1%,50V, NPO/COG,0402 | C075, C123 |
| 02 | H AJ66 | Terminal, SMT, Test Point, PWB | TP01, TP14 |
| 02 | JT204 | Conn, BNC, Dual Stacked, Isolated | J01 |
| 02 | JT61 | Conn, BNC, Recept, 50ohm,Insul , Rt Angle | J02 |
| 02 | JT87 | Conn,3-pin,PWB Mount, Fem, XLR | J03, J04 |
| 02 | JU85 | Conn, Header, Shrouded, 0.050" 30pos, Dual Row, Go | J05 |
| 02 | LA72 | Bead, Ferrite, SMT, 120 Ohm at 100MHz, 1.3A, 0402 | L02 |
| 02 | LS56 | Inductor, SMT, 3.3uH, 5.6A,RMS | L01, L03 |
| 02 | QDDS02 | Diode, SMT, Schottky, 40V, 1A, SMA | CR04 |
| 02 | QDSS01 | Diode, SMT, Schottky, 30V, 0.2A, SOD-323 | CR03 |
| 02 | QDZS11 | Diode, SMT, Zener, 5.6V, 1.5W, SMA, 403D | CR01, CR02, CR05, CR06 |
| 02 | RAD23 | Resistor, SMT, MF, 681 Ohms, 1% 1/4W | R011, R052 |
| 02 | RAF01 | Resistor SMT MF 0.0 Ohm Jumper 0402 | R034, R095, R099, R100, R123, R154 |
| 02 | RAF18 | Resistor SMT MF 22.1 Ohm 1% 1/16W 0402 | R090, R103, R144, R145 |
| 02 | RAF26 | Resistor SMT MF 100 Ohm 1% 1/16W 0402 | R003, R018, R037, R038, R048, R069, R082, R097, R113, R131, R153 |

StockCode: NARF80
Description: Final Assy, VX1.5/2,

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| <u>Component Lvl. StockCode</u> | | <u>Description</u> | <u>Reference Designation</u> |
|---------------------------------|---------|--|--|
| 02 | RAF38 | Resistor SMT MF 1000 Ohm 1% 1/16W 0402 | R007, R008, R009, R014, R015, R016, R031, R032, R044, R045, R046, R060, R061, R062, R109, R110,, R117, R125, R127, R128, R129, R136, R137, R149, R150 |
| 02 | RAF50 | Resistor SMT MF 10.0K Ohm 1% 1/16W 0402 | R004, R005, R012, R019, R023, R025, R026, R027, R033, R035, R039, R041, R042, R050, R051, R053,, R056, R057, R058, R066, R070, R073, R074, R075, R080, R085, R086, R089, R093, R096, R098, R101,, R102, R104, R105, R106, R107, R108, R114, R119, R126, R134, R135, R146, R147, R148 |
| 02 | RAF52 | Resistor SMT MF 15.0K Ohm 1% 1/16W 0402 | R021, R029, R079, R118 |
| 02 | RAF56 | Resistor SMT MF 33.2K Ohm 1% 1/16W 0402 | R055 |
| 02 | RAF57 | Resistor SMT MF 39.2K Ohm 1% 1/16W 0402 | R006, R013, R020, R043, R059, R072, R088, R111, R116, R141, R151 |
| 02 | RAF59 | Resistor SMT MF 56.2K Ohm 1% 1/16W 0402 | R024, R028, R049, R054, R094 |
| 02 | RAF63 | Resistor SMT MF 121K Ohm 1% 1/16W 0402 | R071 |
| 02 | RAF66 | Resistor SMT MF 221K Ohm 1% 1/16W 0402 | R087, R120 |
| 02 | RAF74 | Resistor SMT MF 1.00M Ohm 1% 1/16W 0402 | R001, R030 |
| 02 | RAF87 | Resistor SMT MF 3740 Ohm 1% 1/16W 0402 | R010, R017, R047, R063 |
| 02 | RAF93 | Resistor SMT MF 7.15K Ohm 1% 1/16W 0402 | R077, R083, R132, R139 |
| 02 | RAF94 | Resistor SMT MF 3.57K Ohm 1% 1/16W 0402 | R078, R133 |
| 02 | RAF95 | Resistor SMT MF 4.12K Ohm 1% 1/16W 0402 | R084, R091, R140, R142 |
| 02 | RAF96 | Resistor SMT MF 2.10K Ohm 1% 1/16W 0402 | R092, R143 |
| 02 | US12 | IC, SMT, Rectifier, Bridge, 400V, 0.5A, SOIC-4 | U02, U08, U21, U26 |
| 02 | US58 | IC, SMT, 24Bit Audio Codec, SPI, I2C, TSSOP28 | U06 |
| 02 | US59 | IC, SMT, 10-Bit A/D Converter, 4Ch, 200KSPS, 10-VS | U03 |
| 02 | US60 | IC, SMT, ADC 16 Bit, 2Ch, 750KSPS, 16-WQFN | U17 |
| 02 | UT170 | IC, SMT, Adj. DC to DC Inverting Reg, 2.4A, 16-LFC | U20 |
| 02 | UT171 | IC, SMT, Op AMP, Dual, Low Noise, Bipol Supply, 8- | U01, U04, U09, U13, U15, U18, U19, U23 |
| 02 | UT172 | IC, SMT, Precision Diff Amp, 8-MSOP | U05, U10, U16, U25 |
| 02 | UT178 | IC, SMT, Rail to Rail Dual Op-amp, Wide BW, SOIC8 | U14, U24 |
| 02 | UX66 | IC,SMT,Linear Regulator,150mA Adj.,MSOP-8 | U07, U11, U12 |
| 02 | UX83 | IC,SMT,2.5V Reference,0.1%,SOT -23-6 | U22 |
| 01 | NAPI193 | Front Panel User Interface Pwb Assy | A05 |
| 02 | CCFS04 | Cap,SMT,Ceramic,0.01uF,10%,50V,X7R,0603 | C02, C03 |
| 02 | CCFS07 | Cap,SMT,Ceramic,0.1uF,10%,50V,X7R,0805 | C04 |
| 02 | CCJ18 | Cap,SMT,Ceramic,22uF,20%, 25V,X5R,0805 | C06 |
| 02 | CT112 | Cap, SMT, Elect, Alum Polymer, 100uF, +/- 20%, 25V | C05 |

StockCode: NARF80
Description: Final Assy, VX1.5/2,

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| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|---|---|
| 02 | JA140 | Conn, USB, Vertical Mount, Type A, PWB | J04 |
| 02 | JQ55 | Conn, Header, Ribbon Cbl, 20 Pin | J03 |
| 02 | JQ97 | Conn, Header, SATA, Vert, PWB | J01 |
| 02 | JU96 | Conn, Header, Shrouded, 0.050" 20pos, Dual Row, Go | J02 |
| 02 | LS18 | Inductor,SMT,2.2uH,600ma,1210 | L01 |
| 02 | QM77 | Diode, LED, RED, Rectangular, TH, 5mm x 2mm | DS1 |
| 02 | QN53 | Transistor,SMT,MOSFET,N-Channe l,60V,115mA,SOT-23 | Q01, Q02, Q03, Q04, Q05 |
| 02 | RFFS18 | Resistor, SMT, MF, 22.1ohms, 1%, 1/10W, 0603 | R20, R21 |
| 02 | RFFS26 | Resistor, SMT, MF, 100ohms, 1%, 1/10W, 0603 | R12, R16 |
| 02 | RFFS28 | Resistor, SMT, MF, 150ohms, 1%, 1/10W, 0603 | R03, R05, R06, R14, R18 |
| 02 | RFFS50 | Resistor,SMT,MF,10.0Kohms,1%, 1/10W,0603 | R02, R04, R07, R08, R09, R10, R11, R13, R15, R17, R19, R22, R23 |
| 02 | SD94 | Switch, Push-Button, Green/Red, MOM, SPST-NO, PWB | S01, S02 |
| 02 | SD95 | Switch, Push-Button, Tactile, SPST-NO, PWB | S03 |
| 02 | UC107 | Rotary Encoder, 20PPR, Quadrature, w / MOM Push Bu | U01 |
| 01 | NAPP15 | Directional Coupler Bottom PWB Assy | A11 |
| 02 | JT188 | Conn, Jack, MCX, 50Ohm, Gold, Vert, SMT | J01, J02, J03 |
| 02 | RT73 | Resistor, Termination, 50 Ohm, +/- 5%, 60W, Tuned | R01 |
| 01 | PU03A | PWB DETAIL, 2-WAY COMBINER, RF-35TC-0600- C1/C1,2L | A13 |
| 01 | RT69 | Res, (BeO), 50 ohms, 5%, 250W, Flng Mt w/stress re | A13R1, A13R2 |
| 01 | RX49 | Thermistor,-30/105°C,10Kohms@ 25°C,Neg,Bvalue 3435 | RT01, RT02 |
| 01 | UA295 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 10 con | W01 |
| 01 | UA296 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 16 con | W02 |
| 01 | UA297 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 20 con | W03 |
| 01 | UA298 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 20 con | W04 |
| 01 | UA300 | Cable Assembly, Flat IDC, 0.050" Tiger Eye, 10 con | W05 |
| 01 | UA301 | Cable Assembly, Flat IDC, 0.100" pitch, 20 cond, 2 | W06 |
| 01 | UA307 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) Straight | W07, W08, W09 |
| 01 | UA309 | Cable, Coax, SRC 316, MCX(M) RA to BNC(F) Bulkhead | W10 |
| 01 | UA310 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) RA, 12.0 | W11 |
| 01 | UA311 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) RA, 16.0 | W12 |

StockCode: NARF80
Description: Final Assy, VX1.5/2,

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



| <u>Component Lvl.</u> | <u>StockCode</u> | <u>Description</u> | <u>Reference Designation</u> |
|-----------------------|------------------|--|------------------------------|
| 01 | UA313 | Cable, Coax, SRC 316, MCX(M) RA to MCX(M) Straight | W13, W14 |
| 01 | UA316 | Cable, SATA, 0.5m, Straight F to Straight F, Shiel | W15 |
| 01 | UA318 | Cable Assembly, Flat IDC, 0.050" Tiger Eye,30 cond | W16 |
| 01 | UG130 | Power Supply, LED, 12V@150W, 90-305Vac, PFC, IP67 | U02 |
| 01 | UG136 | Power Supply, 23-65Vdc, 3500W/1500W, 90-265Vac, Co | U03 |
| 01 | UR119 | Display, TFT LCD, 320x240 Graphic, 3.5", Color, SP | U01 |
| 01 | ZAP68 | Fan, 80mm, 12Vdc, PWM Ctrl, Tach, w/Conn+HS Tube+M | B01, B02 |

SECTION 3.3: READING ELECTRICAL SCHEMATICS

This section contains electrical schematics and logic diagrams for the transmitter. Block diagrams, simplified electrical schematics, and logic diagrams may be included. Refer to [Table 3.3.1 on page 3.3.5](#) for an itemized listing.

Component Values

Unless otherwise specified on the logic or schematic diagram, the following defaults apply:

-  5 Capacitor values are shown in microfarads (uF) (e.g. 5 uF)
-  10 Resistor values are shown in ohms (e.g. 10 ohms; K = 1,000 and M = 1,000,000)
Resistor power ratings are not shown when less than 0.5 W
-  Unidentified diodes are part number BAS21HT1 (Nautel Part # QDRS01)
-  24V Unidentified transient suppressors are part number 0603E SDA-TR1 (Nautel Part # QR70)

Graphic and Logic Symbols

The graphic symbols used on electrical schematics are in accordance with American National Standard ANSI Y32.2-1975 - Graphic Symbols for Electrical and Electronic Diagrams.

The logic symbols used on electrical schematics and logic diagrams are in accordance with American National Standard ANSI Y32.14-1975 - Graphic Symbols for Logic Diagrams.

Reference Designations

Referenced designations were assigned in accordance with American Society of Mechanical Engineers ASME Y14.44-2008 - Reference Designations for Electrical and Electronic Parts and Equipment.

Each electrical symbol is identified with its basic reference designation. To obtain the full reference designation for a specific part, prefix this basic identifier with the reference designation assigned to all higher assemblies. For example, the complete designation for a resistor (R1) on a printed wiring board (A1), that is part of a larger board (A2), would be A2A1R1.

Unique Symbols

Nautel uses unique symbols on electrical schematics to describe logic (two-state) signals. These signals differ from single-state signals or analog signals that may have multiple values.

Type of Inputs and Outputs

On electrical schematics, names used to describe logic (two-state) input and output signals are prefixed with a # symbol.

Logic Level Convention

The # prefix identifies an input or output signal that has two distinct states: high and low.

The suffix on an input or output signal name identifies the active (true) state of the signal. The high suffix (+) indicates the more positive of the two levels used to represent the logic states. The low suffix (-) indicates the less positive of the two levels.

Two types of logic, positive and negative, may be represented on a particular schematic. In positive logic, high represents the active (true) state, and low represents the inactive (false) state. In negative logic, low represents the active (true) state, and high represents the inactive (false) state.

Identifying Schematic Diagrams

Each electrical schematic in this section is identified by a number that is both the figure number and the page number. The numbers are assigned sequentially and are prefixed by the letters SD. The electrical schematics and logic diagrams included in this section are listed in [Table 3.3.1 on page 3.3.5](#).

Structure of Schematics

The electrical schematics are structured in a hierarchical format that is based on function and signal flow. Wherever practical, the signal flow is from left to right. Normally, inputs originate on the left-hand side and outputs extend to the right-hand side. Exceptions are shown by an arrow indicating the direction of signal flow.

NOTE: The physical location of a part or assembly was not necessarily a factor during creation of the schematic. The full reference designation assigned to a part or assembly, in conjunction with the family tree (see [Section 3.2, “Parts Information” on page 3.2.1](#)) and the assembly detail drawings (see [Section 3.4, “Mechanical Drawings” on page 3.4.1](#)), will identify its location.

Figures SD-1 through SD-4 identify each major stage and its detailed interconnection. Each stage contains cross-references that identify which blocks are the signal sources for inputs, or the destinations for outputs.

When a sub-function is treated as a block in figures SD-1 through SD-4, its detailed circuit information is included in its own schematic drawing(s), which is also included in this section.

Locating Schematic Diagram(s) for a Functional Block

The text inside a functional block provides the key to locating its schematic diagram(s).

1. When a functional block is assigned a reference designation (e.g., A2), refer to the family trees in [Section 3.2, “Parts Information” on page 3.2.1](#). Follow the family tree branches to the block that contains the desired reference designation, and associated Nautel nomenclature (e.g., NAPI187 System Interface PWB).
2. Refer to [Table 3.3.1 on page 3.3.5](#) and use the reference designation and Nautel nomenclature to identify the appropriate schematic diagram(s).
Example: NAPI187 System Interface PWB is shown on schematics SD-7 and SD-8.
3. If necessary, refer to the referenced figure in the schematics at the end of this section and locate the next, lower-level assembly. Then, repeat this procedure until the desired schematic diagram is found.

Locating a Part or Assembly on a Schematic

The full reference designation assigned to a part or assembly is the key to physically locating that part or assembly.

NOTE: Full reference designations contain the assembly hierarchical coding. When the end item is divided into units (cabinets), the first coding is a unit number (1, 2, 3, etc.). When the end item is divided into assemblies, the first coding is an assembly number (A1, A2, A3, etc.). If a unit or an assembly is divided into sub-assemblies, assembly coding that identifies assembly relationship (1A1, A2A1, A2A1A1, etc.) is added.

1. Refer to the family trees in [Section 3.2, "Parts Information" on page 3.2.1](#).
2. Follow the family tree branches to the block that contains the desired reference designation, while noting the Nautel nomenclatures and names of all higher assemblies in the path. Example: A2 NAPI187 System Interface PWB.

NOTE: The drawings in the Mechanical Drawings section depict the assembly detail of the transmitter and its modules and assemblies

3. Refer to [Table 3.4.1 in Section 3.4, "Mechanical Drawings" on page 3.4.1](#). Use the Nautel nomenclature and name of each family tree block in the path, starting at the highest assembly – this is normally Figure MD-1 – to determine the figure number(s) for that assembly. Example: NAPI187 System Interface PWB is shown on MD-4.
4. Refer to the referenced figure (e.g., MD-4) in [Section 3.4, "Mechanical Drawings" on page 3.4.1](#) to locate the desired part or assembly.

Table 3.3.1: List of Electrical Schematics

| Figure # | Title |
|----------|---|
| SD-1 | VX150/VX300/VX600 and VX1 Transmitter - Control/Monitor Stage |
| SD-2 | VX150/VX300/VX600 and VX1 Transmitter - Ac and RF Power Stages |
| SD-3 | VX1.5/VX2 Transmitter - Control/Monitor Stage |
| SD-4 | VX1.5/VX2 Transmitter - Ac and RF Power Stages |
| SD-5 | NAPI189 Analog Audio PWB (Sheet 1 of 2) |
| SD-6 | NAPI189 Analog Audio PWB (Sheet 2 of 2) |
| SD-7 | NAPI187 System Interface PWB (Sheet 1 of 2) |
| SD-8 | NAPI187 System Interface PWB (Sheet 2 of 2) |
| SD-9 | NAPI188/01 Power Supply Interface PWB, 2 kW (VX150/VX300/VX600) |
| SD-10 | NAPI188 Power Supply Interface PWB, 3.5 kW (VX1/VX1.5/VX2) |
| SD-11 | NAPI193 Front Panel User Interface PWB |
| SD-12 | NAPA41 Pre-Amp/IPA PWB |
| SD-13 | NAPA40 Power Amplifier PWB |
| SD-14 | NAPF16 Low Pass Filter PWB |
| SD-15 | NAPP15 Directional Coupler Bottom PWB |
| SD-16 | NAPH15 2-Way Splitter PWB (VX1.5/VX2) |

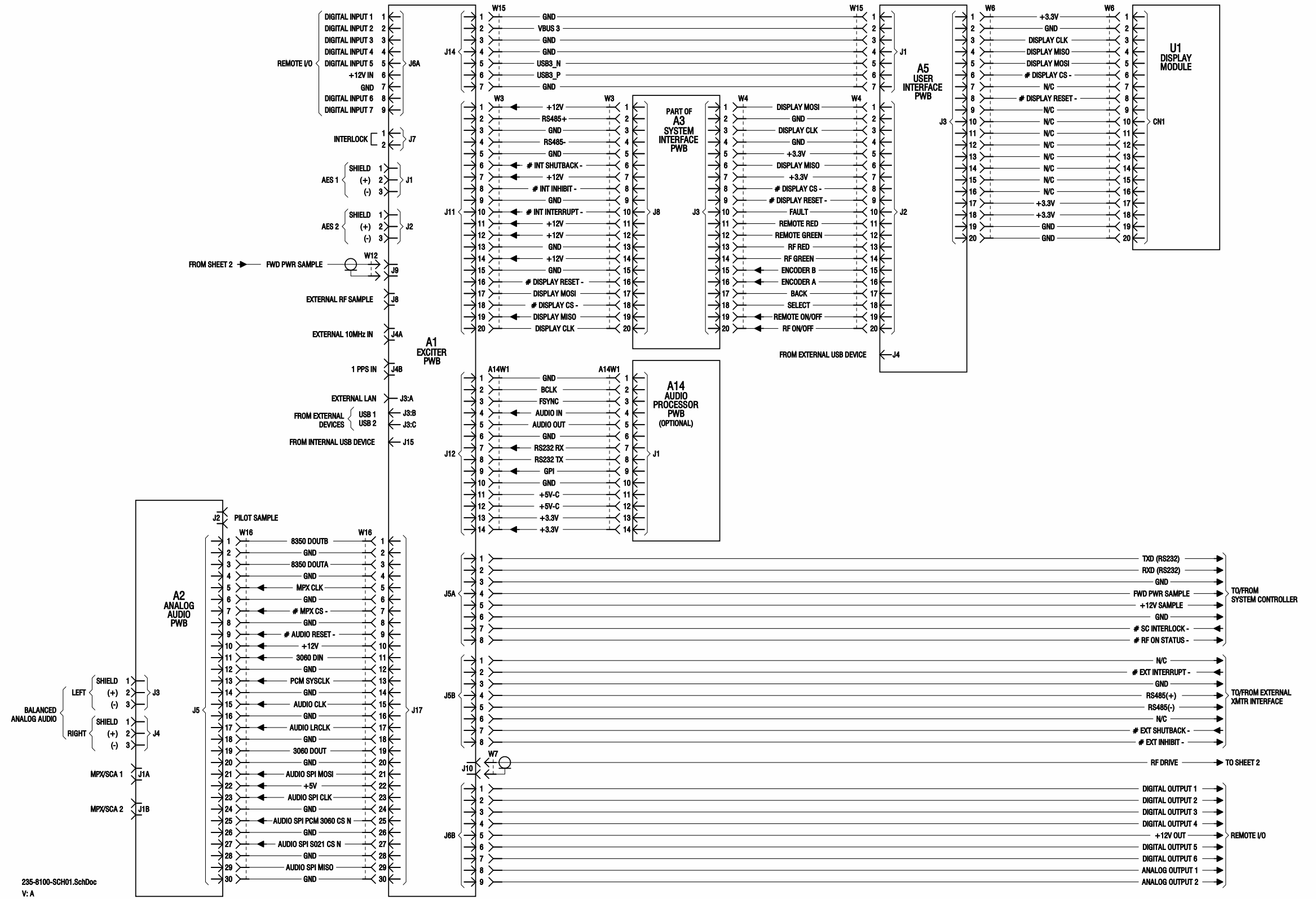


Figure SD-1: VX150/VX300/VX600 and VX1 Transmitter - Control/Monitor Stage

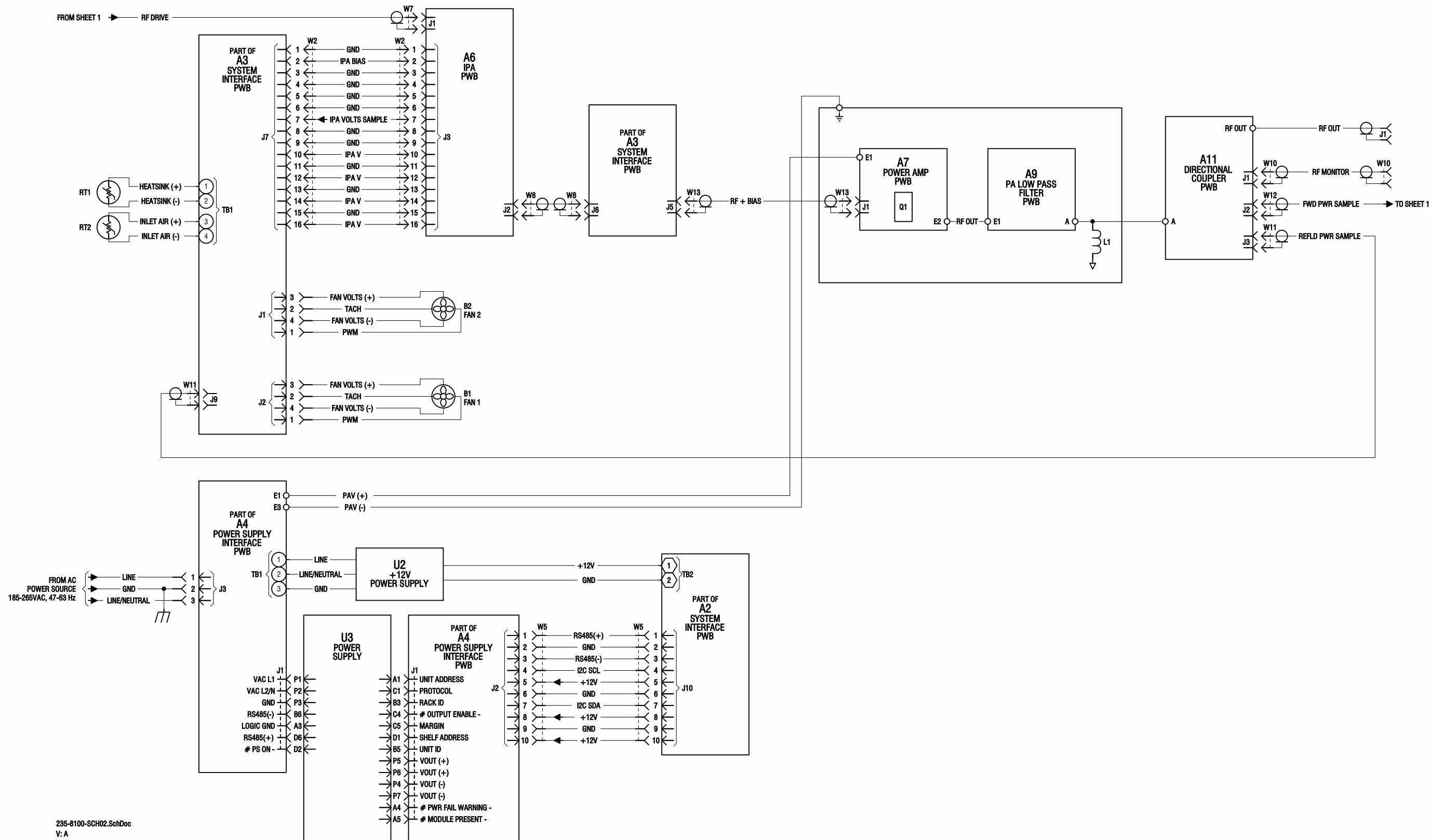


Figure SD-2: VX150/VX300/VX600 and VX1 Transmitter - Ac and RF Power Stages

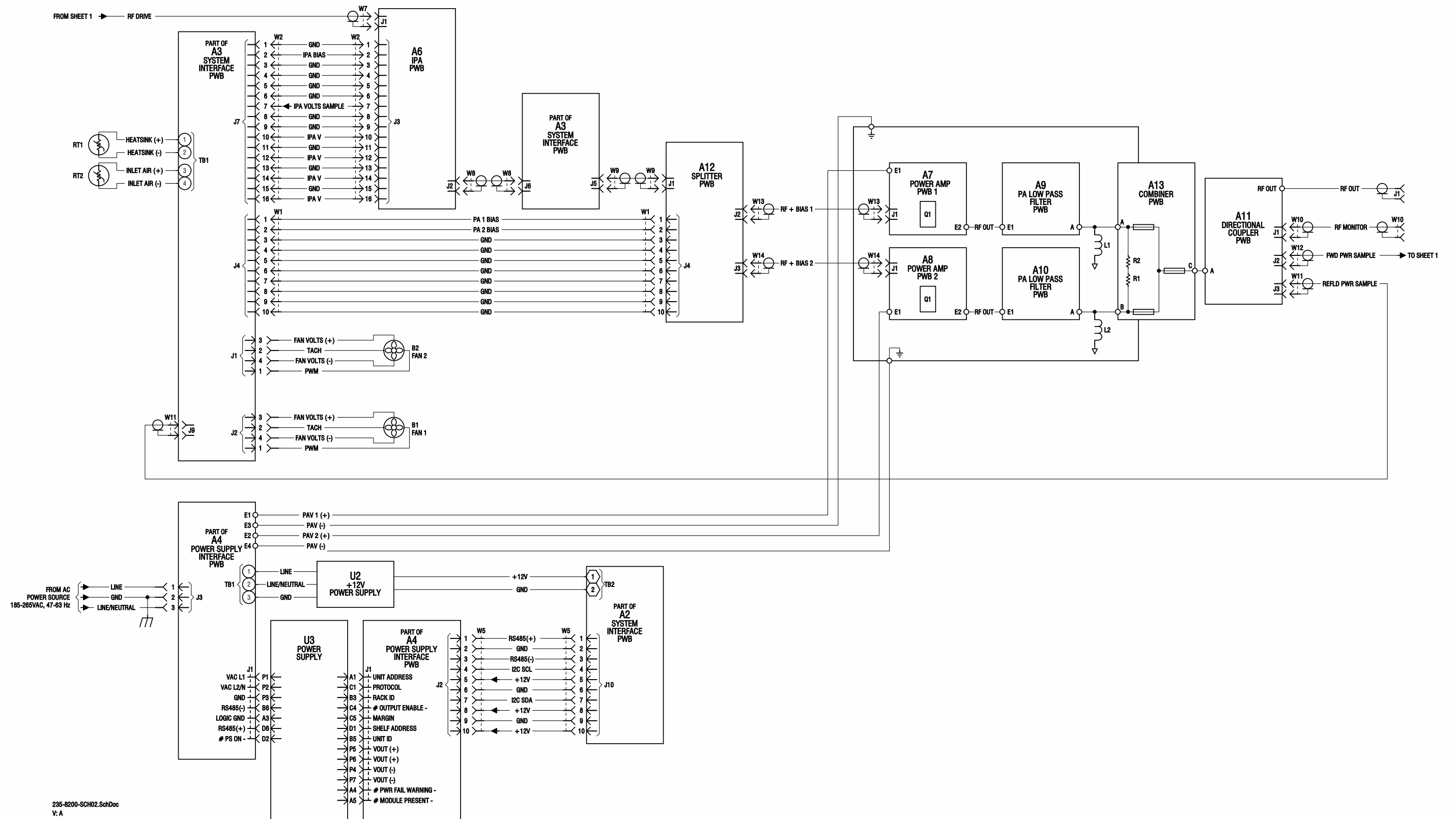


Figure SD-4: VX1.5 Transmitter - Ac and RF Power Stages

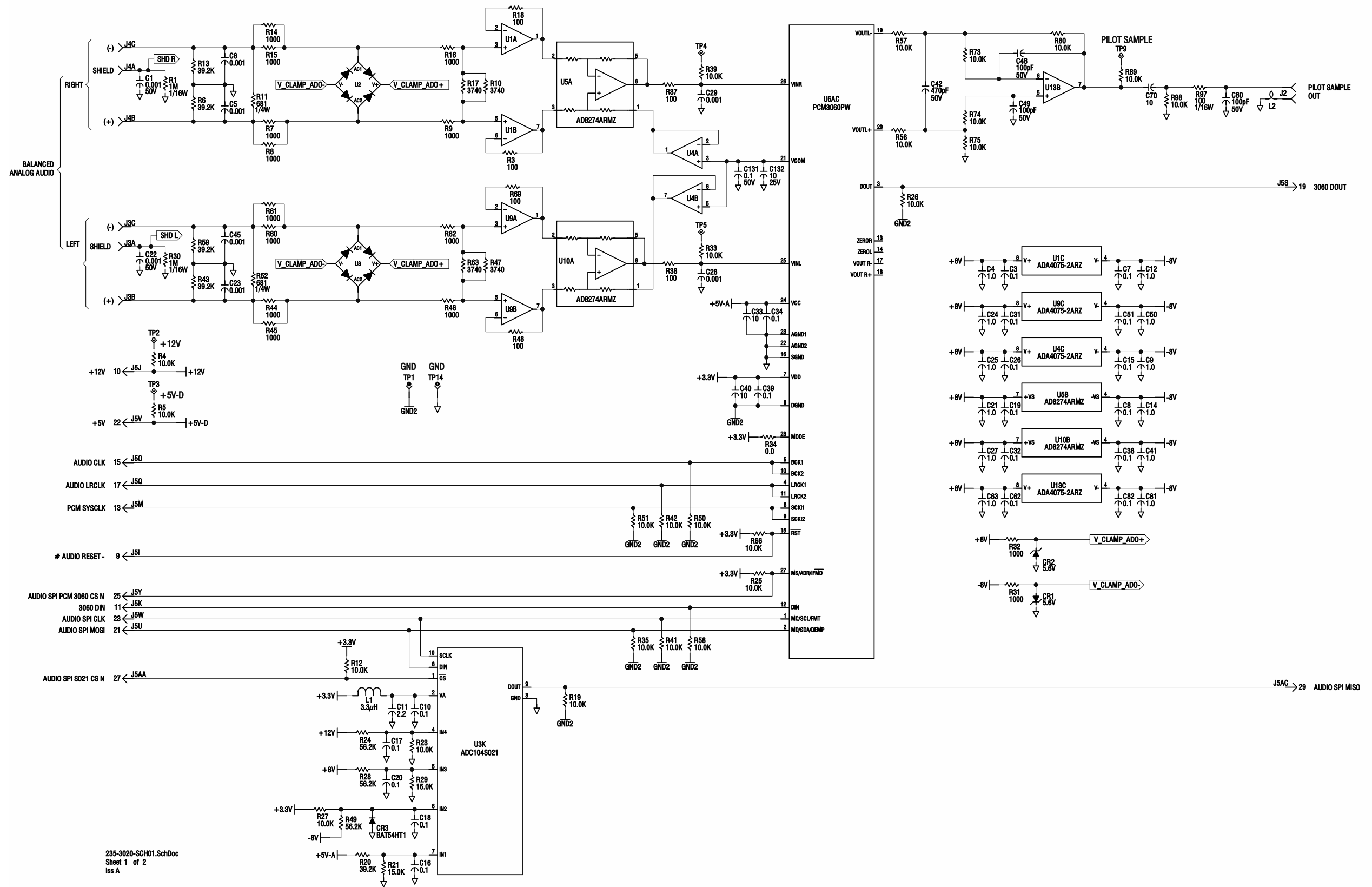
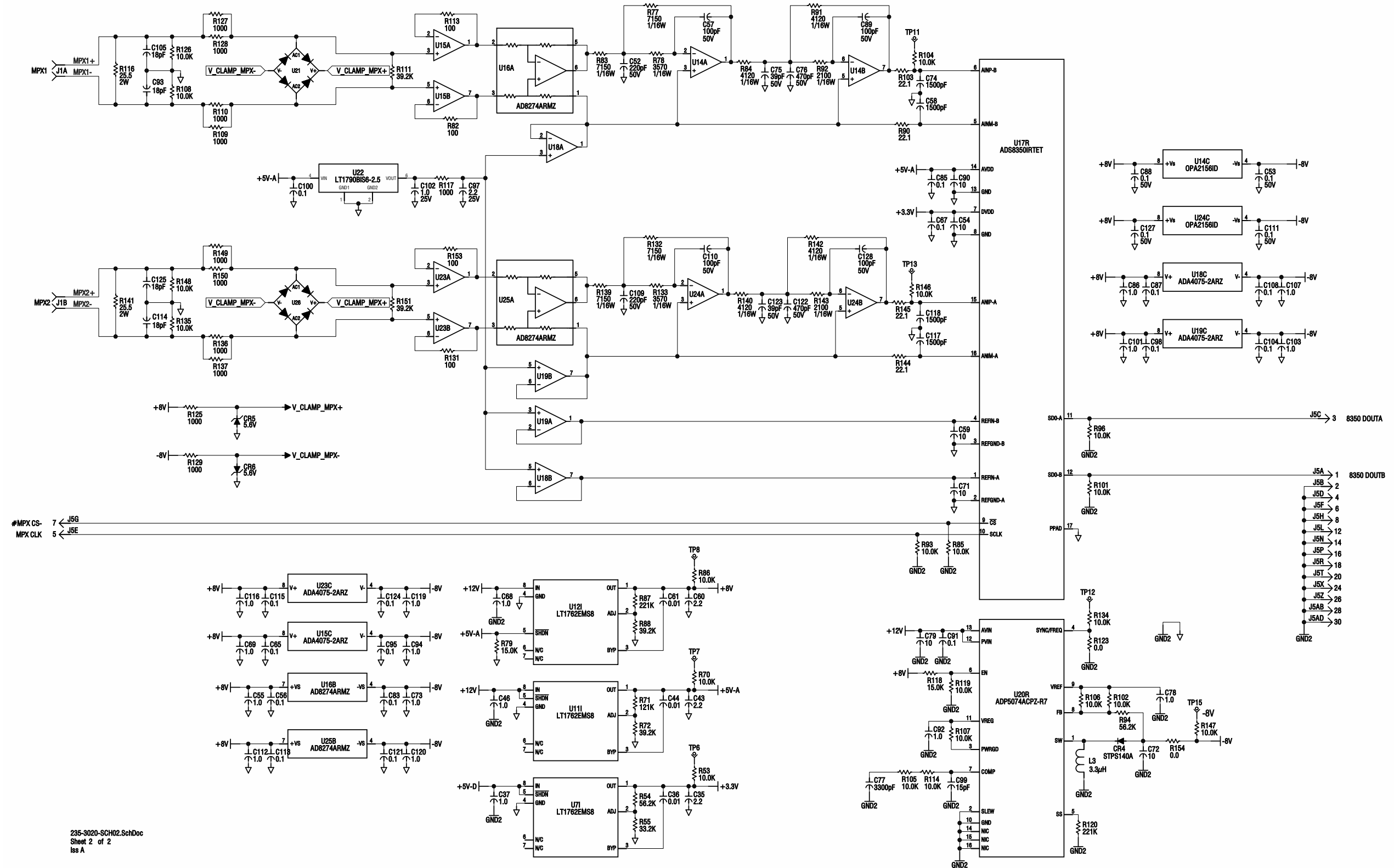


Figure SD-5: NAPI189 Analog Audio PWB (Sheet 1 of 2)



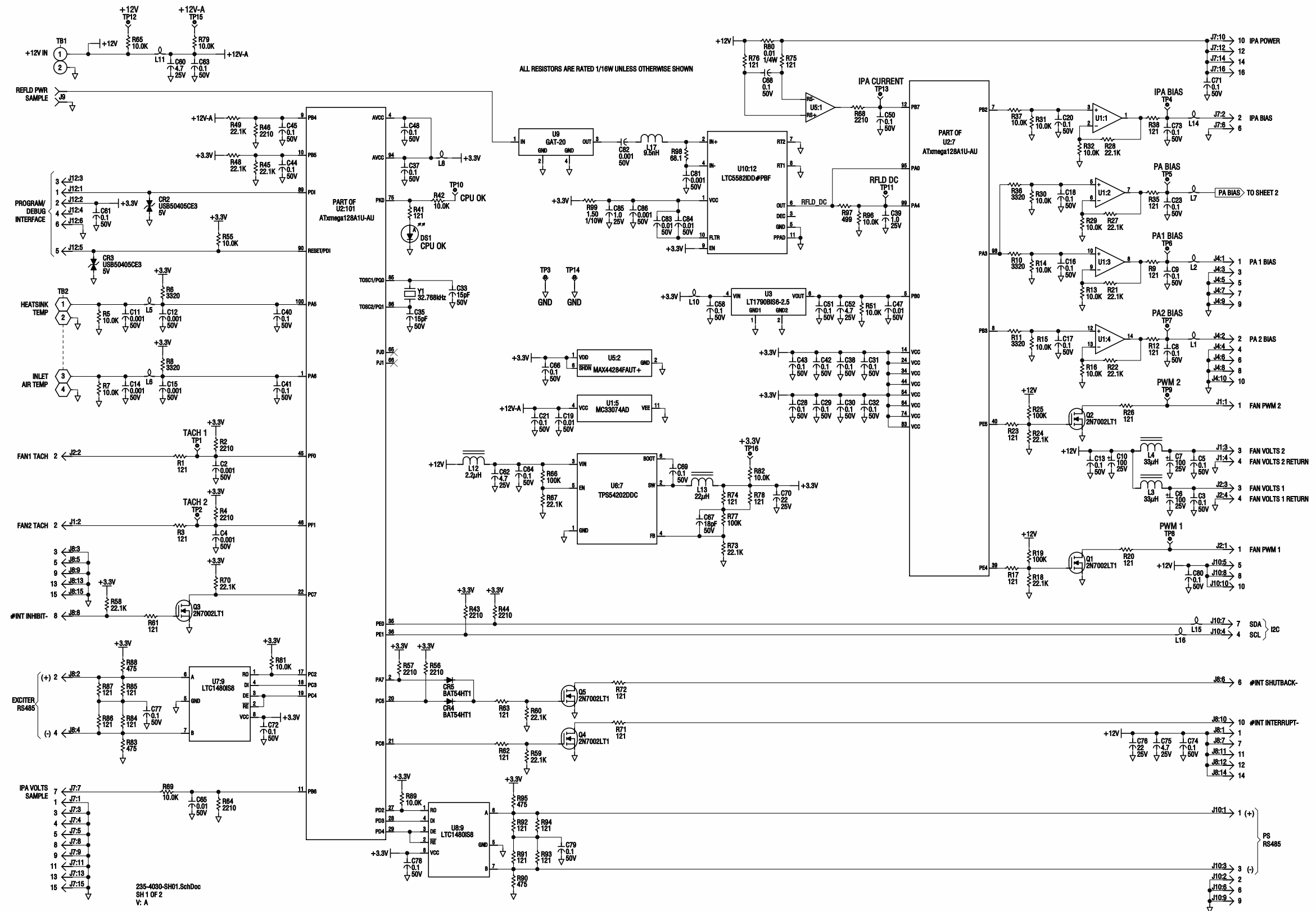


Figure SD-7: NAPI187 System Interface PWB (Sheet 1 of 2)

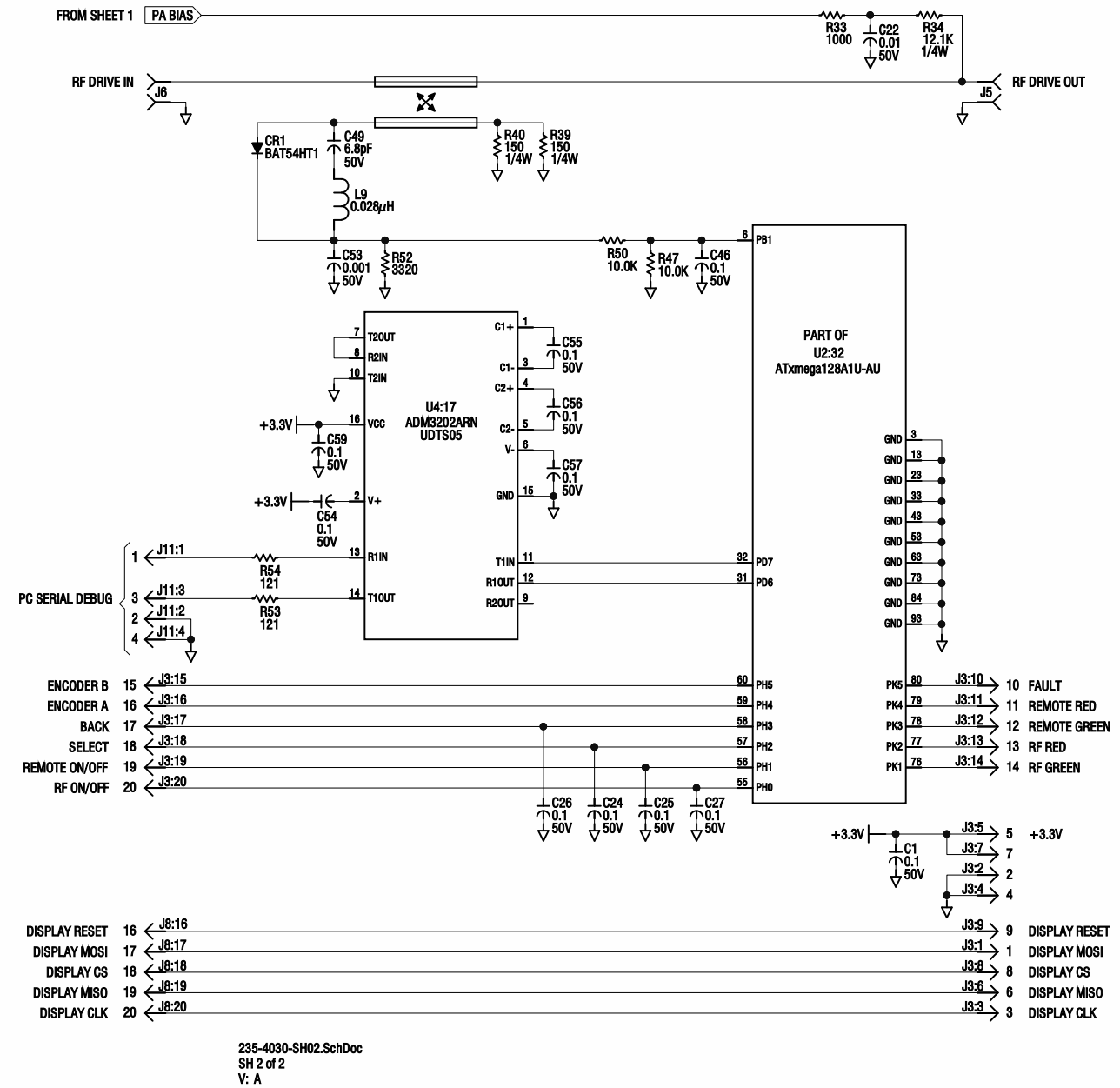
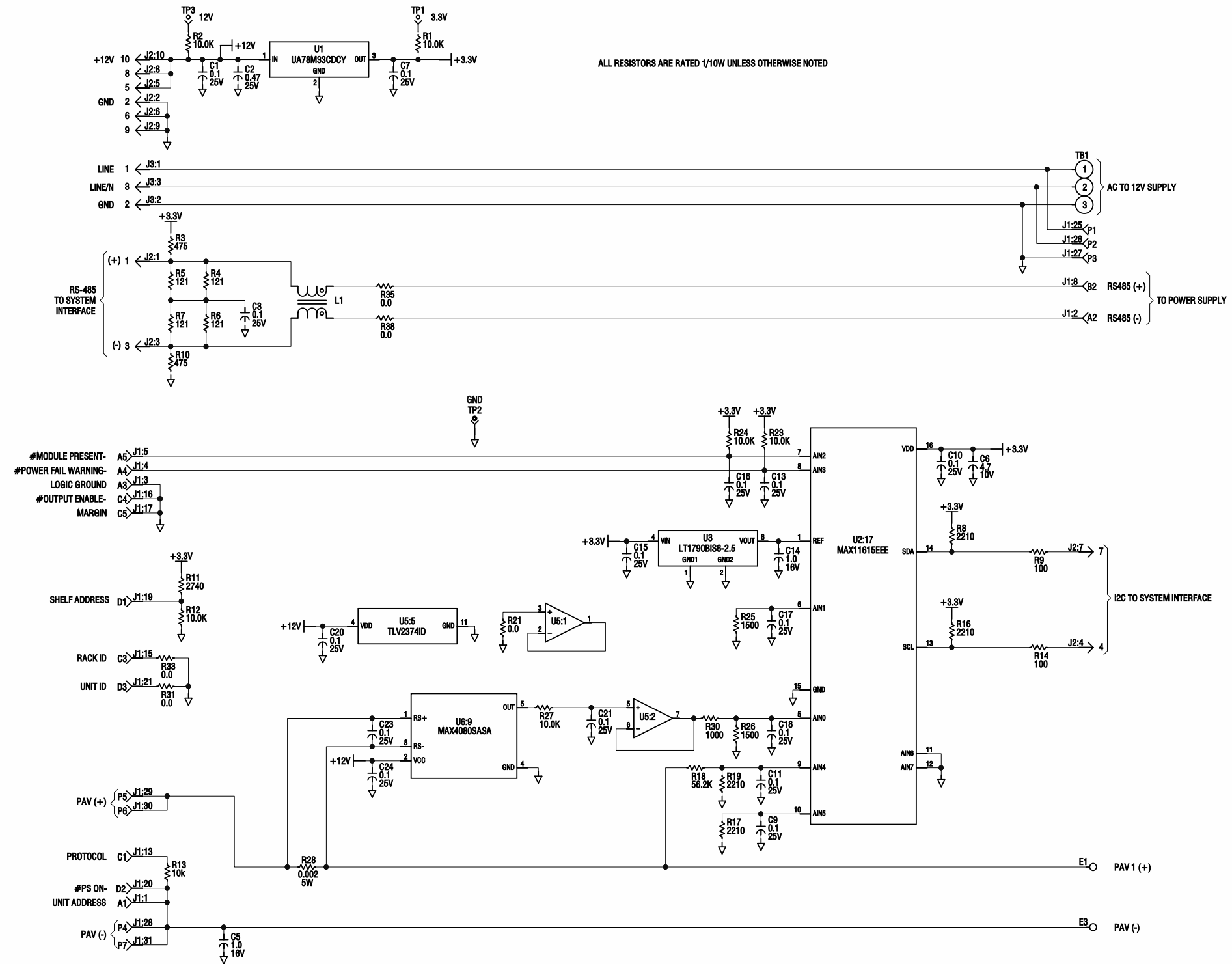
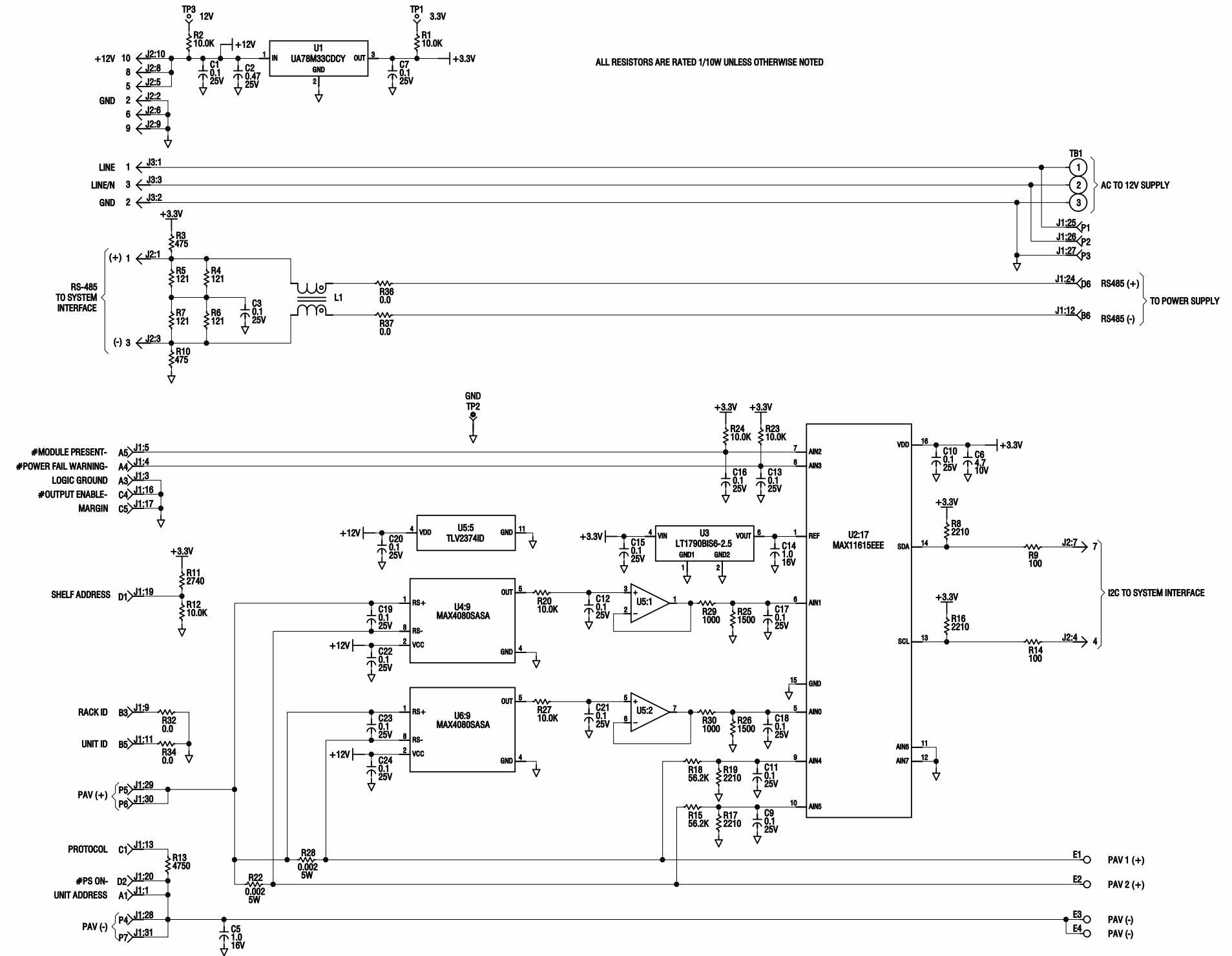


Figure SD-8: NAPI187 System Interface PWB (Sheet 2 of 2)



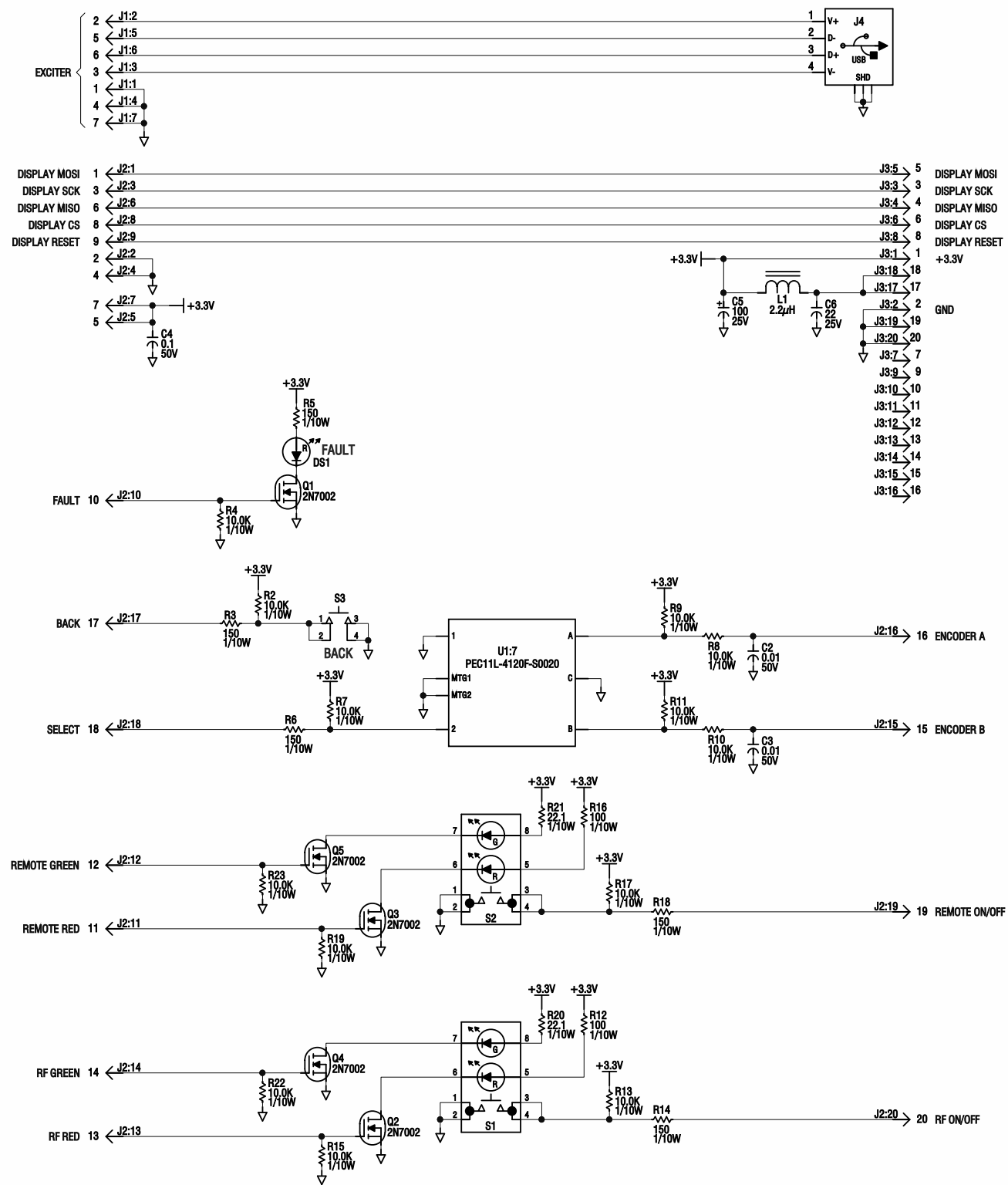
235-4050-01-SCH01.SchDoc
V: B

Figure SD-9: NAPI188/01 Power Supply Interface PWB, 2 kW (VX150/VX300/VX600)



235-4050-SCH01.SchDoc
V: B

Figure SD-10: NAPI188 Power Supply Interface PWB, 3.5 kW (VX1/VX1.5/VX2)



235-4032-SCH01.schdoc
V: A

Figure SD-11: NAPI193 Front Panel User Interface PWB

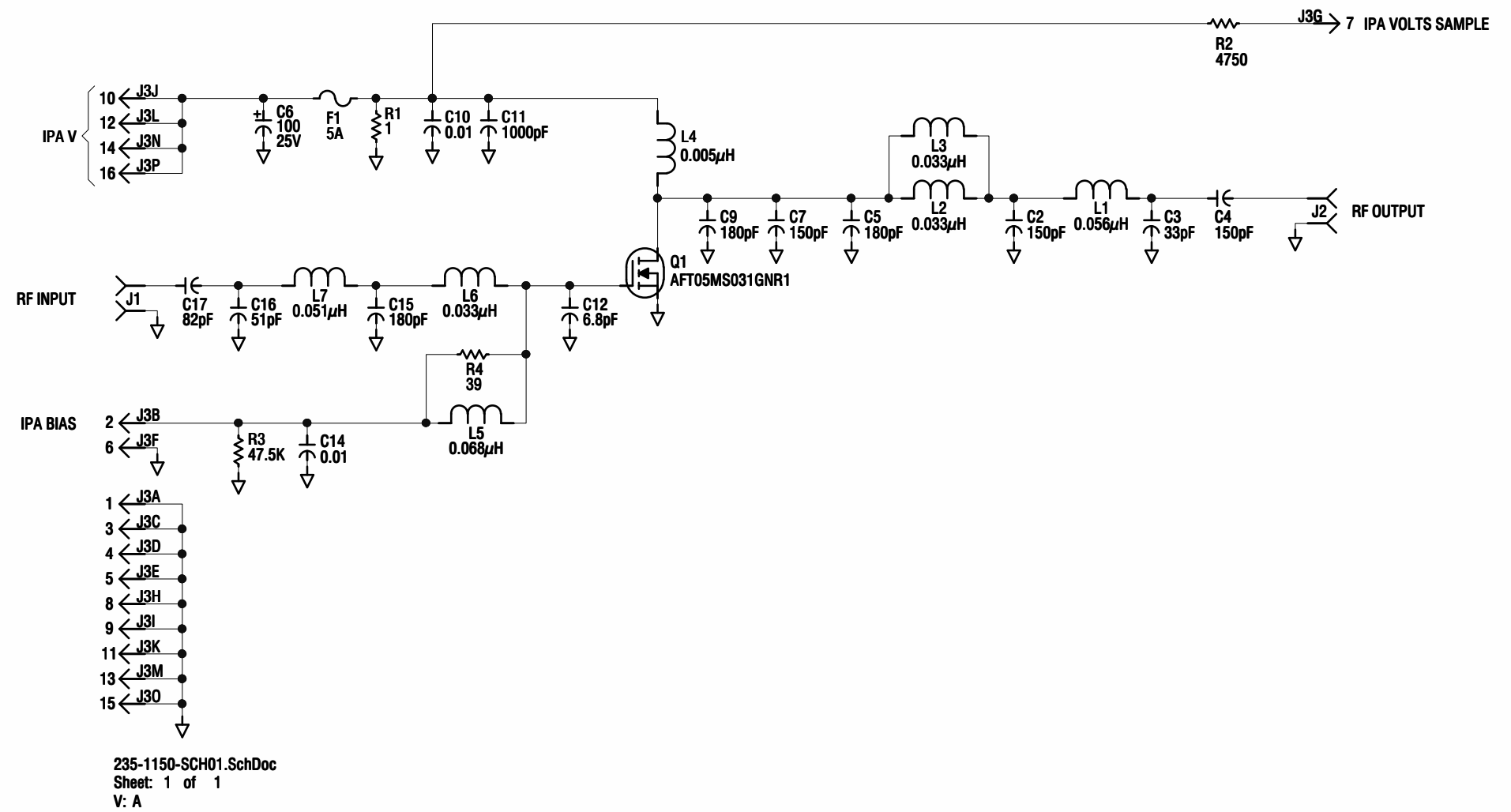


Figure SD-12: NAPA41 Pre-Amp/IPA PWB

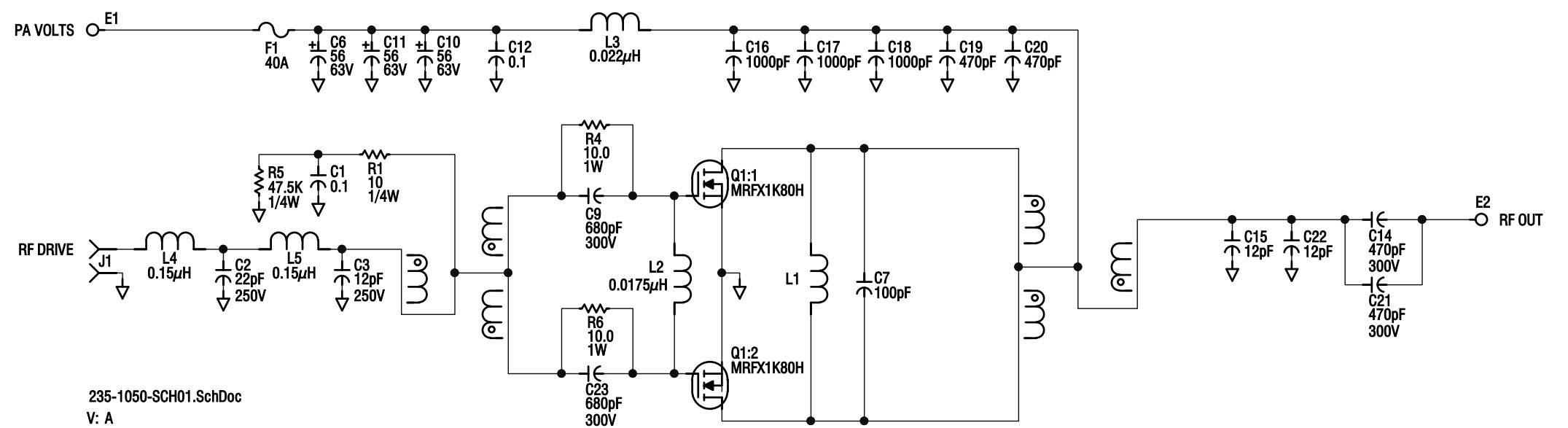


Figure SD-13: NAPA40 Power Amplifier PWB

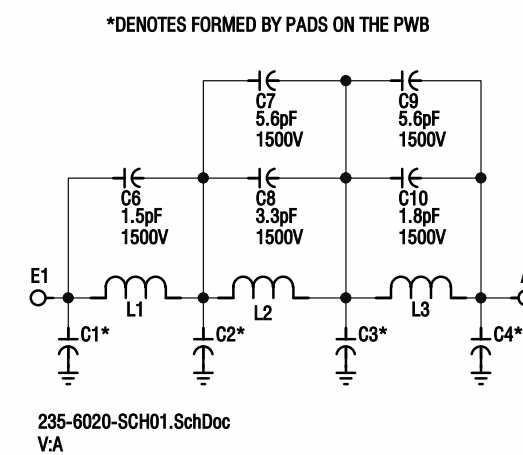


Figure SD-14: NAPF16 Low Pass Filter PWB

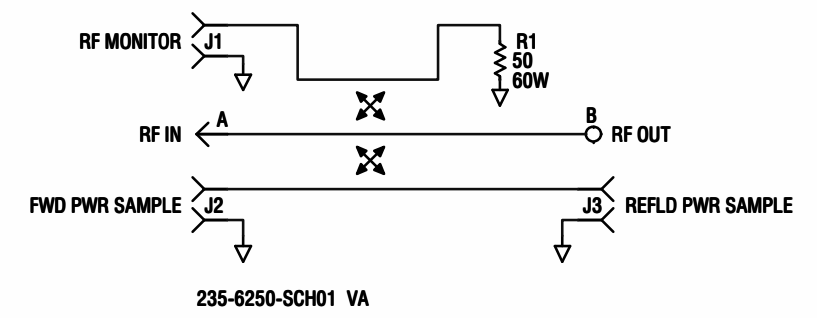


Figure SD-15: NAPP15 Directional Coupler Bottom PWB

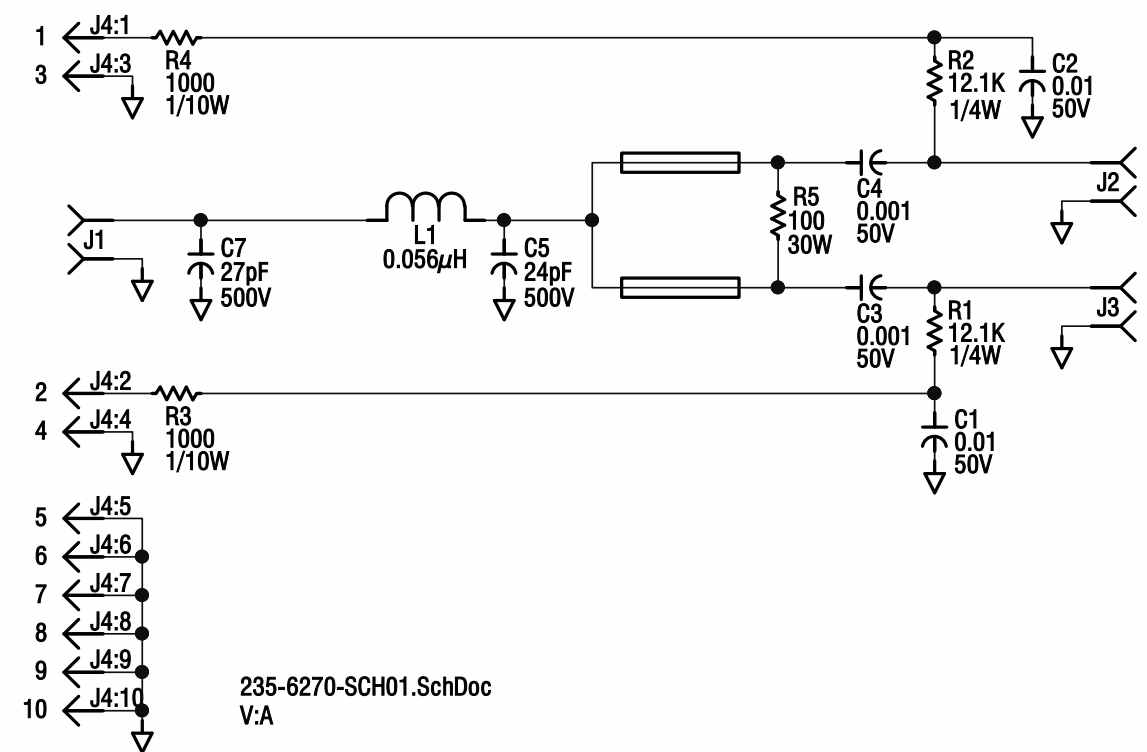


Figure SD-16: NAPH15 2-Way Splitter PWB (VX1.5/VX2)

SECTION 3.4: MECHANICAL DRAWINGS

This section contains mechanical drawings for assemblies of the transmitter. Dimensional drawings may be included. Refer to [Table 3.4.1 on page 3.4.2](#) for an itemized list.

Assembly detail drawings for assemblies and modules that have separate manuals are not included. Refer to the appropriate maintenance manual for the assembly detail of these assemblies.

Identifying Mechanical Drawings

Each mechanical drawing in this section is identified by a number that is both the figure number and the page number. The numbers are assigned sequentially and are prefixed by the letters MD. Drawings in this section are listed in [Table 3.4.1 on page 3.4.2](#).

Content of Mechanical Drawings

Mechanical drawings are illustrations that depict the location of electrical components and show assembly outline detail. Dimensional information is included, where appropriate.

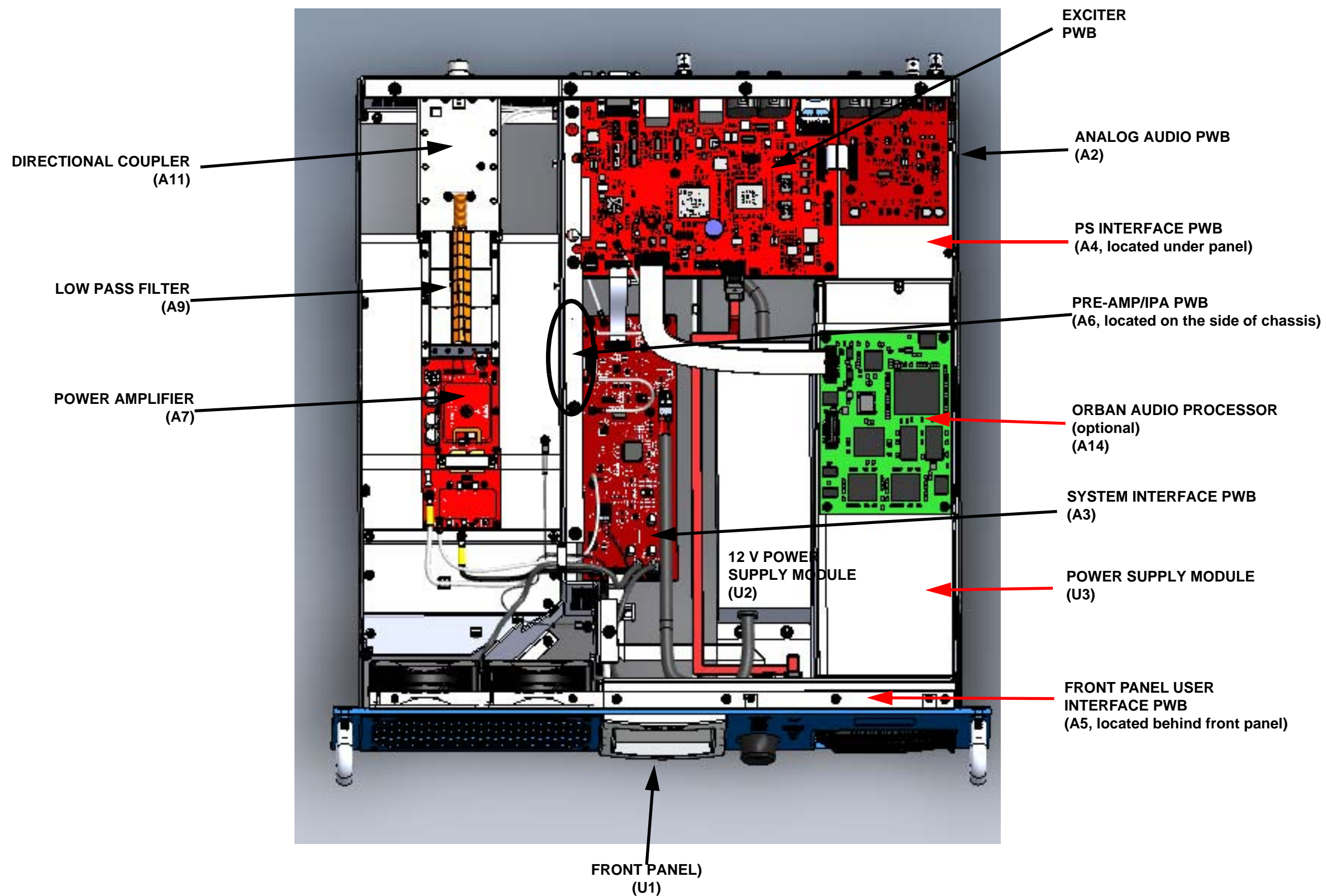
When a module or assembly is the subject of its own assembly detail drawing, and it is also shown in a higher level assembly, the detail depicted in the higher level assembly may have minor differences from the module or assembly actually installed. In this case, always refer to the assembly detail drawing of the module or assembly for detailed information.

Locating a Part or Assembly on a Mechanical Drawing

1. When a part or assembly is assigned a reference designation (e.g., A1 or A1R1), refer to the family trees in [Section 3.2, "Parts Information" on page 3.2.1](#). Follow the family tree branches to the block that contains the desired reference designation and Nautel nomenclature (e.g., NAPA4o Power Amplifier PWB). Note the reference designations and Nautel nomenclatures of all higher assemblies in the path.
Example: A7 NAPA4o Power Amplifier PWB.
2. Refer to [Table 3.4.1 on page 3.4.2](#). Use the reference designation and Nautel nomenclature to identify the appropriate mechanical drawing.
Example: NAPA4o Power Amplifier PWB is shown on schematics MD-9.
3. If necessary, refer to the referenced figure (e.g., MD-9) in the mechanical drawings at the end of this section and locate the next, lower-level assembly. Then, repeat this procedure until the desired part or assembly is found.

Table 3.4.1: List of Mechanical Drawings

| Figure # | Title |
|----------|---|
| MD-1 | VX150/VX300/VX600/VX1 Transmitter |
| MD-2 | VX1.5/VX2 Transmitter |
| MD-3 | NAPI189 Analog Audio PWB |
| MD-4 | NAPI187 System Interface PWB |
| MD-5 | NAPI188/01 Power Supply Interface PWB (VX150/VX300/VX600) |
| MD-6 | NAPI188 Power Supply Interface PWB (VX1/VX1.5/VX2) |
| MD-7 | NAPI193 Front Panel User Interface PWB |
| MD-8 | NAPA41 Pre-Amp/IPA PWB |
| MD-9 | NAPA40 Power Amplifier PWB |
| MD-10 | NAPF16 Low Pass Filter PWB |
| MD-11 | NAPP15 Directional Coupler PWB |
| MD-12 | NAPH15 2-Way Splitter PWB (VX1.5/VX2) |
| MD-13 | 2-Way Combiner PWB (Nautel Part # PU03A) (VX1.5/VX2) |

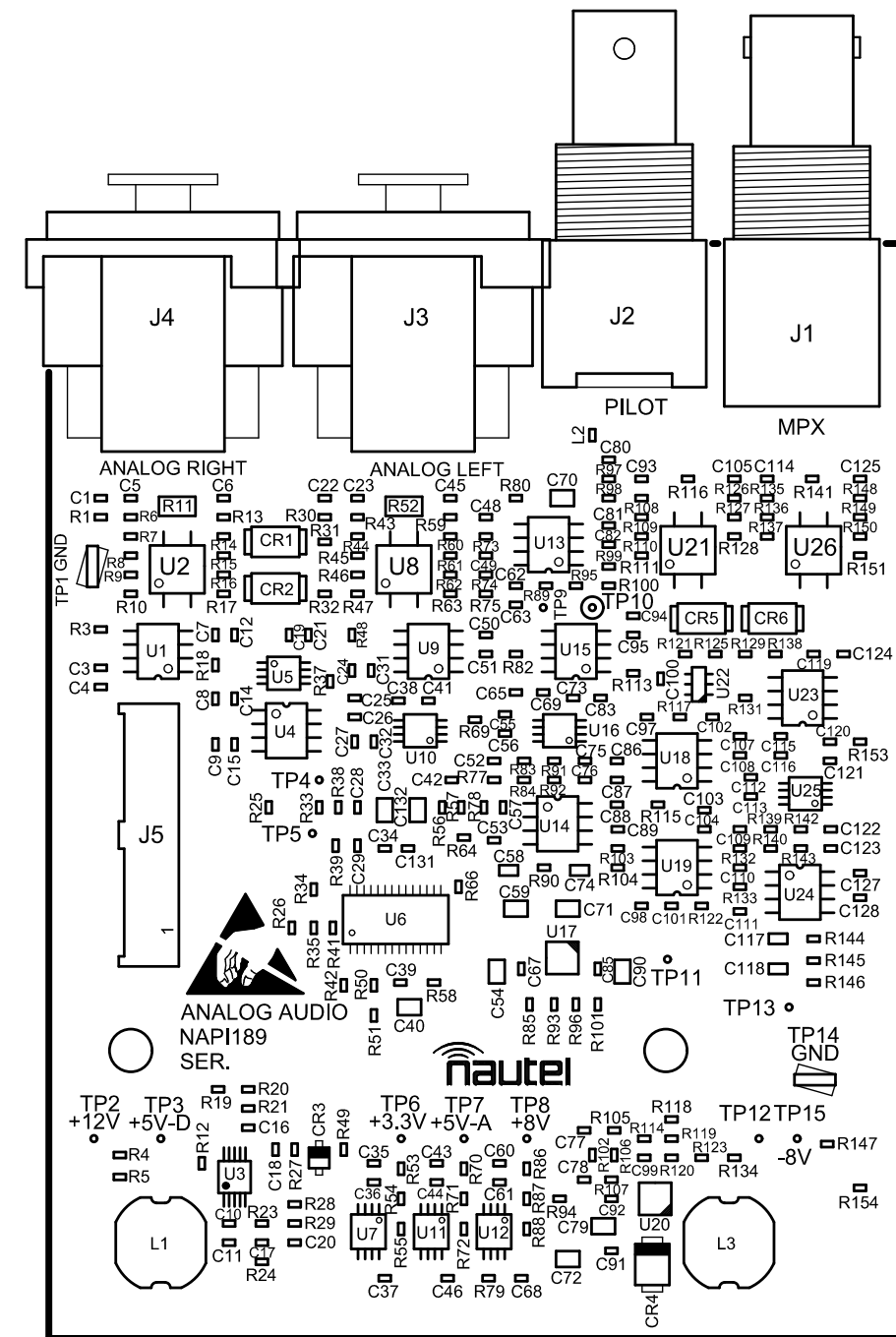


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Figure MD-1: VX150/VX300/VX600/VX1 Transmitters

NOT AVAILABLE AT TIME OF PRINT

Figure MD-2: VX1.5/VX2 Transmitter



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Figure MD-3: NAPI189 Analog Audio PWB

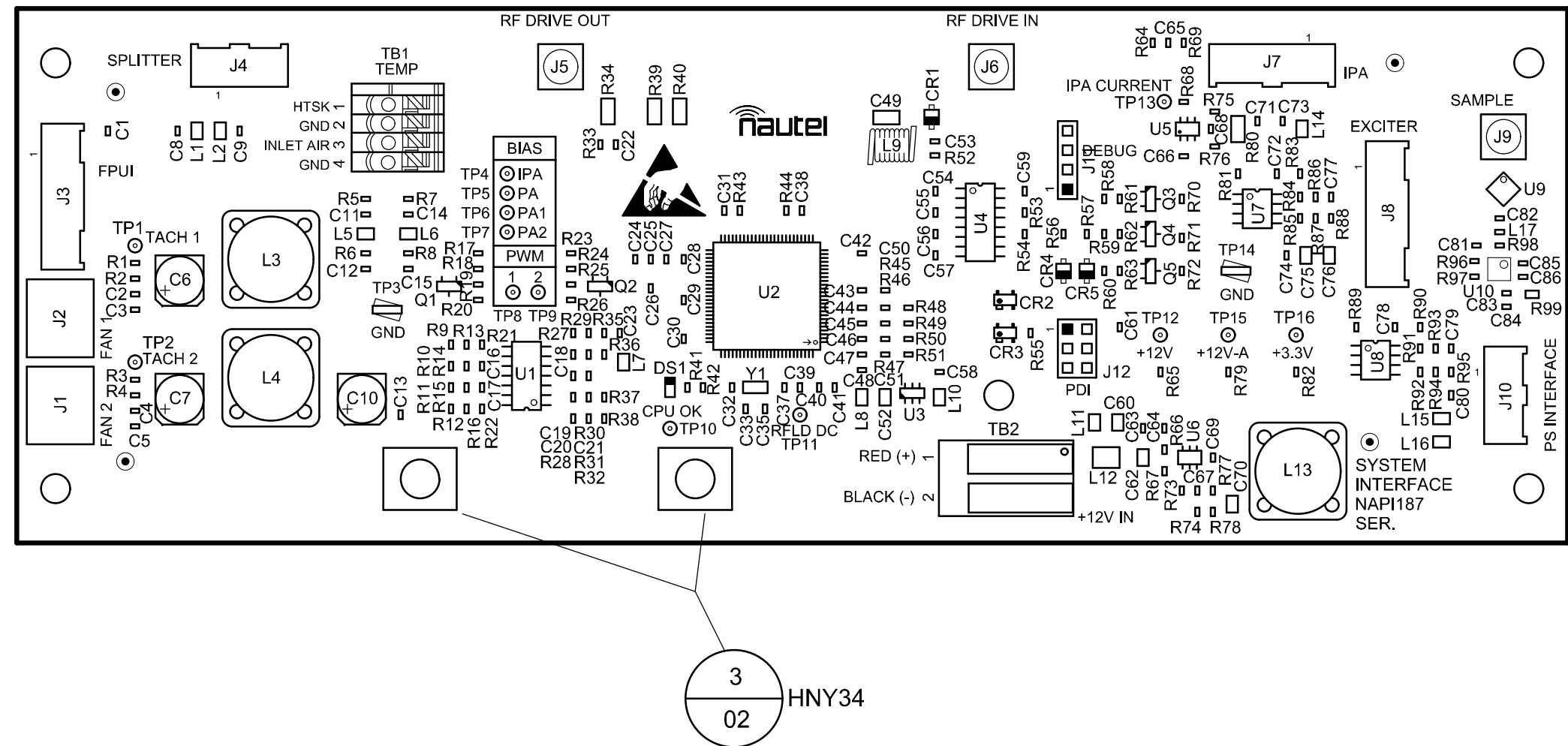


Figure MD-4: NAPI187 System Interface PWB

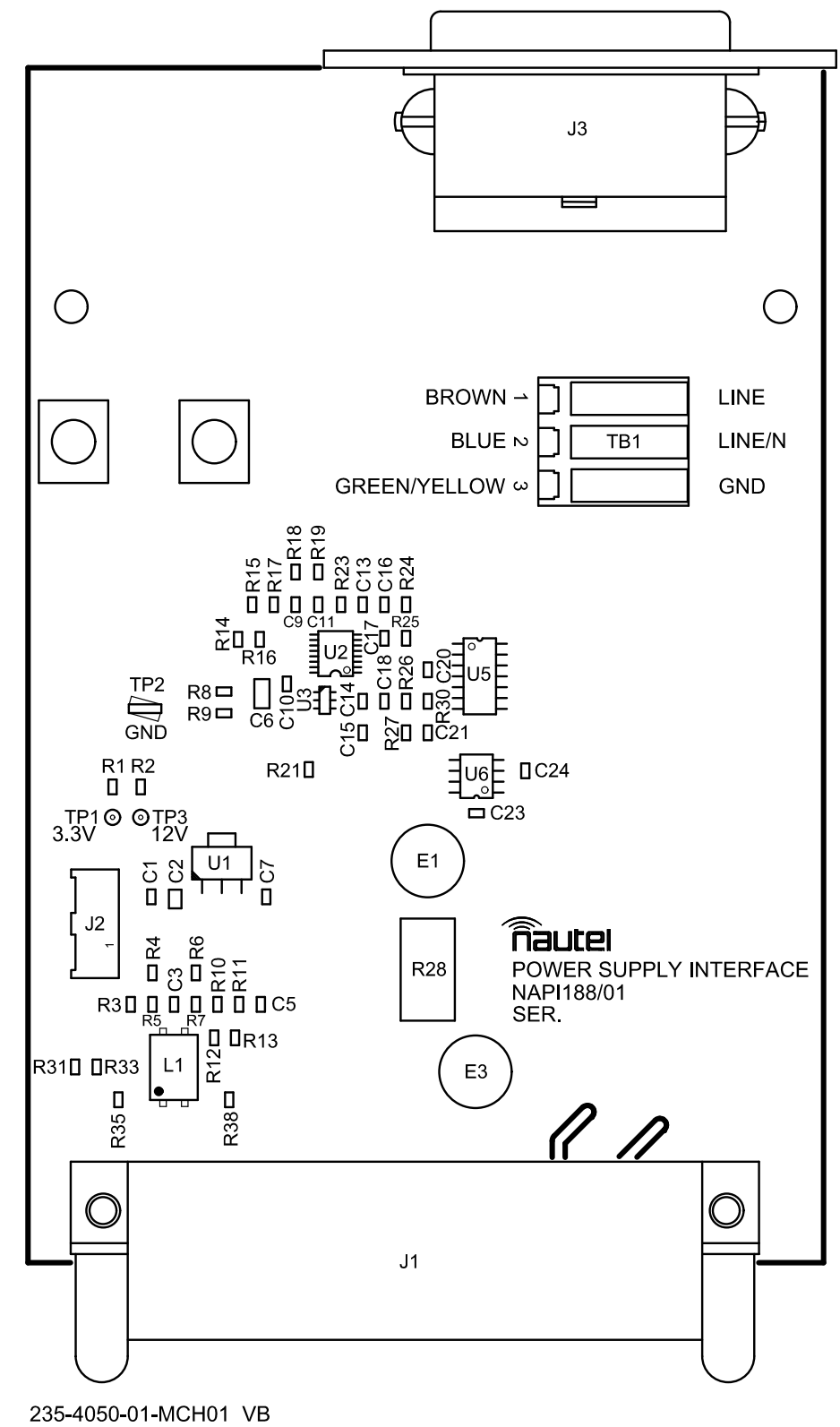


Figure MD-5: NAPI188/01 Power Supply Interface PWB (VX150/VX300/VX600)

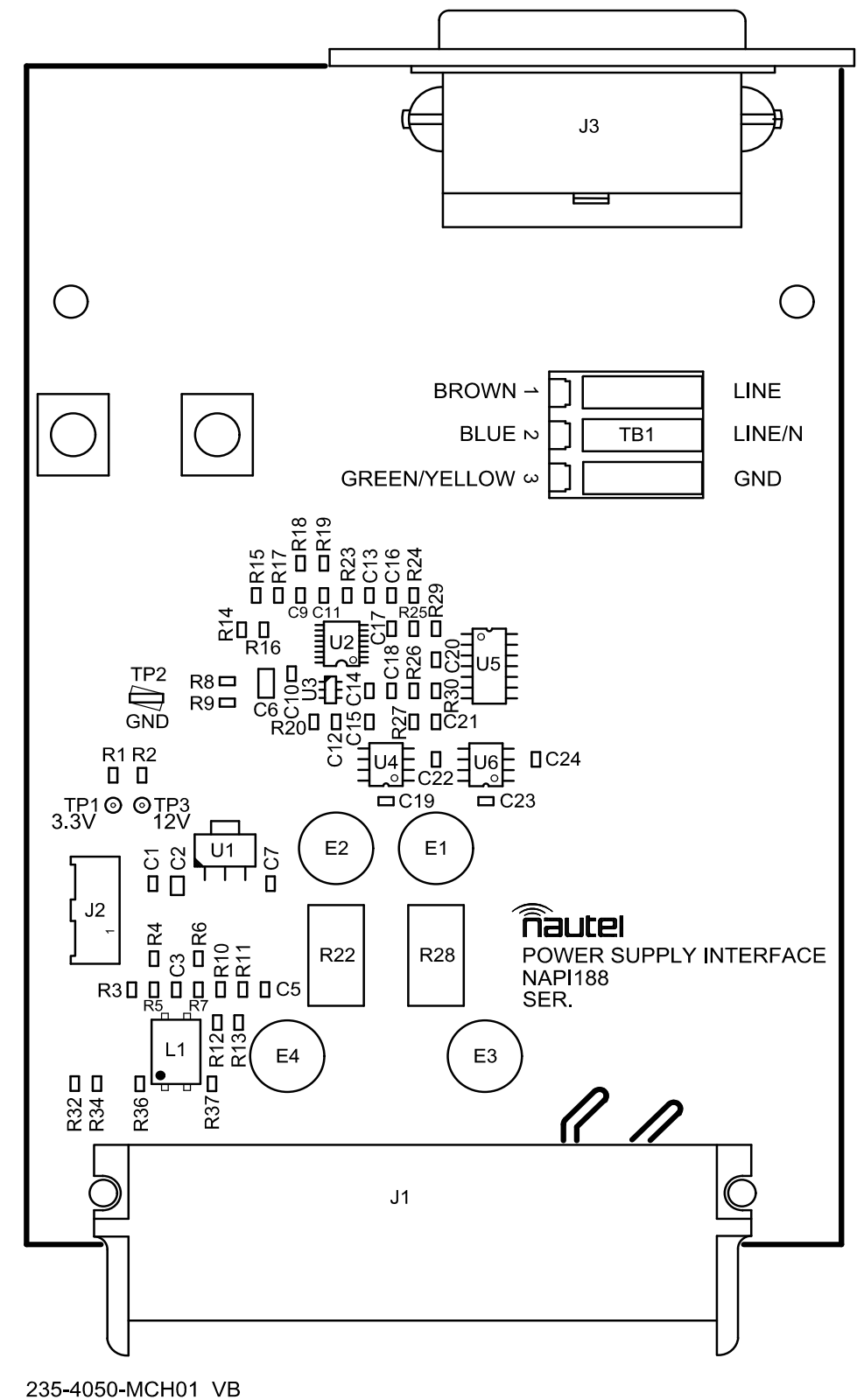
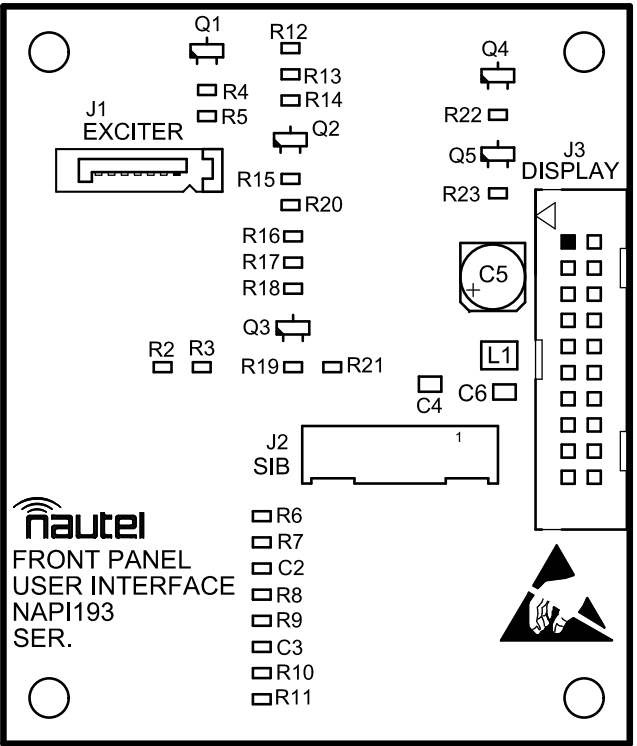
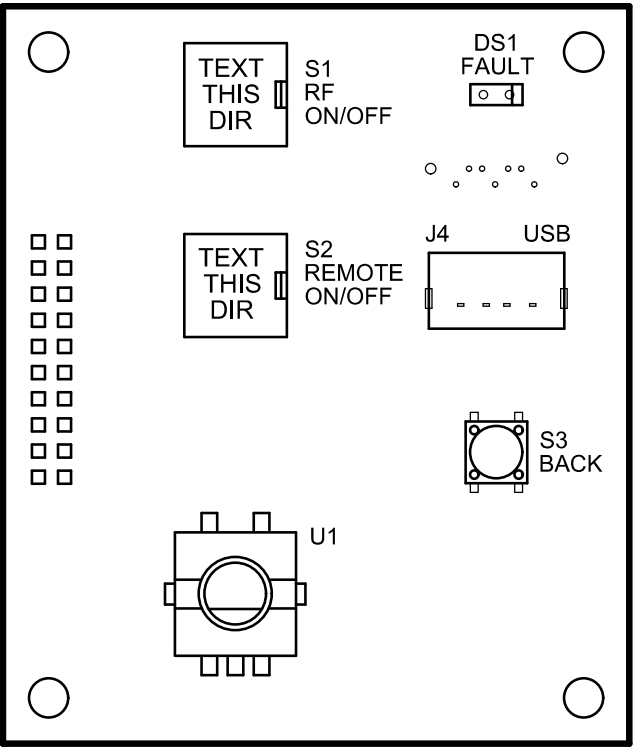


Figure MD-6: NAPI188 Power Supply Interface PWB (VX1/VX1.5/VX2)



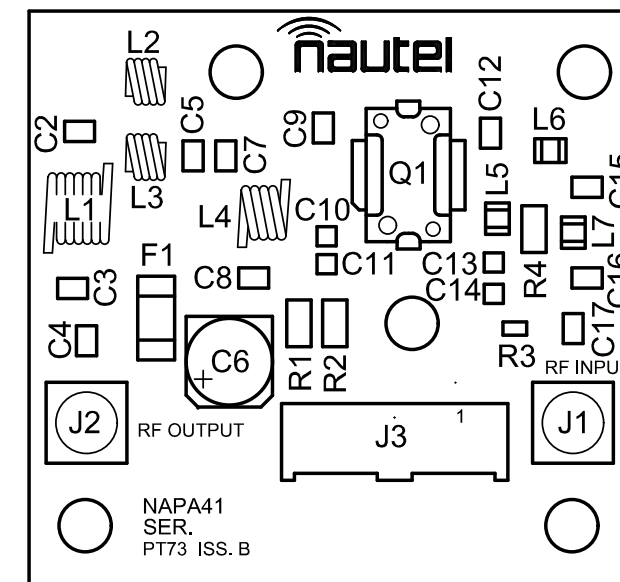
TOP SIDE



UNDERSIDE

235-4032-MCH01 VA

Figure MD-7: NAPI193 Front Panel User Interface PWB



235-1150-MCH01 VA

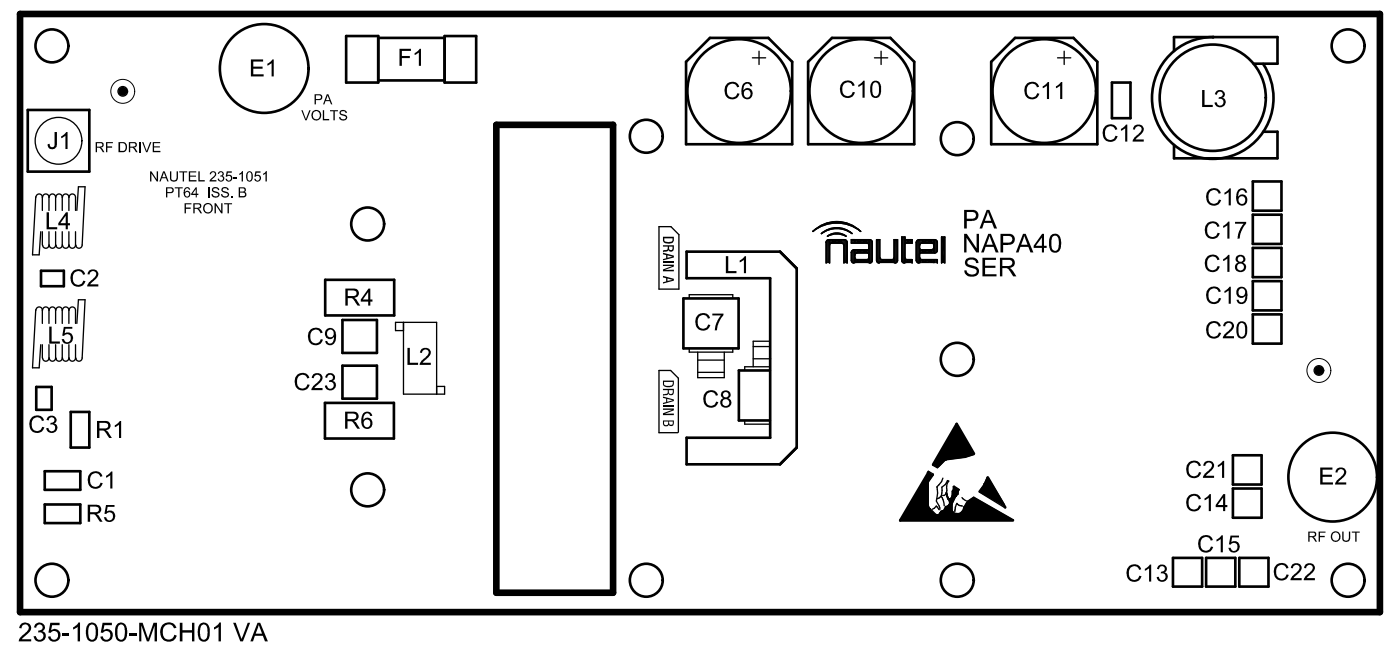
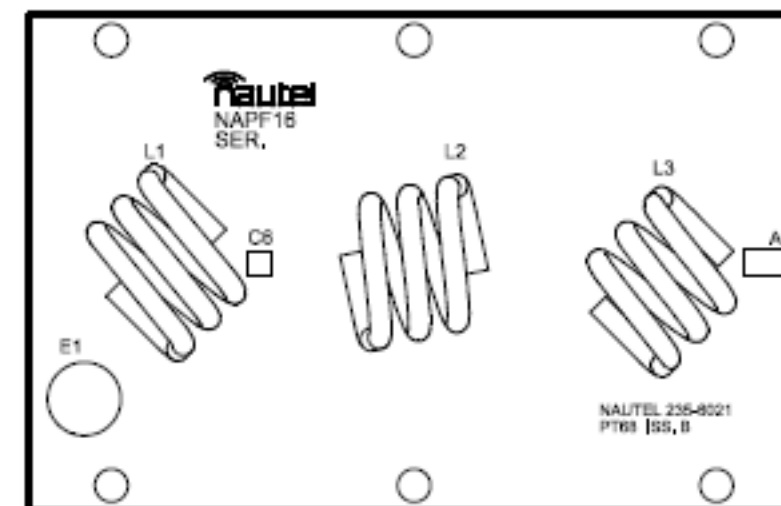


Figure MD-9: NAPA40 Power Amplifier PWB

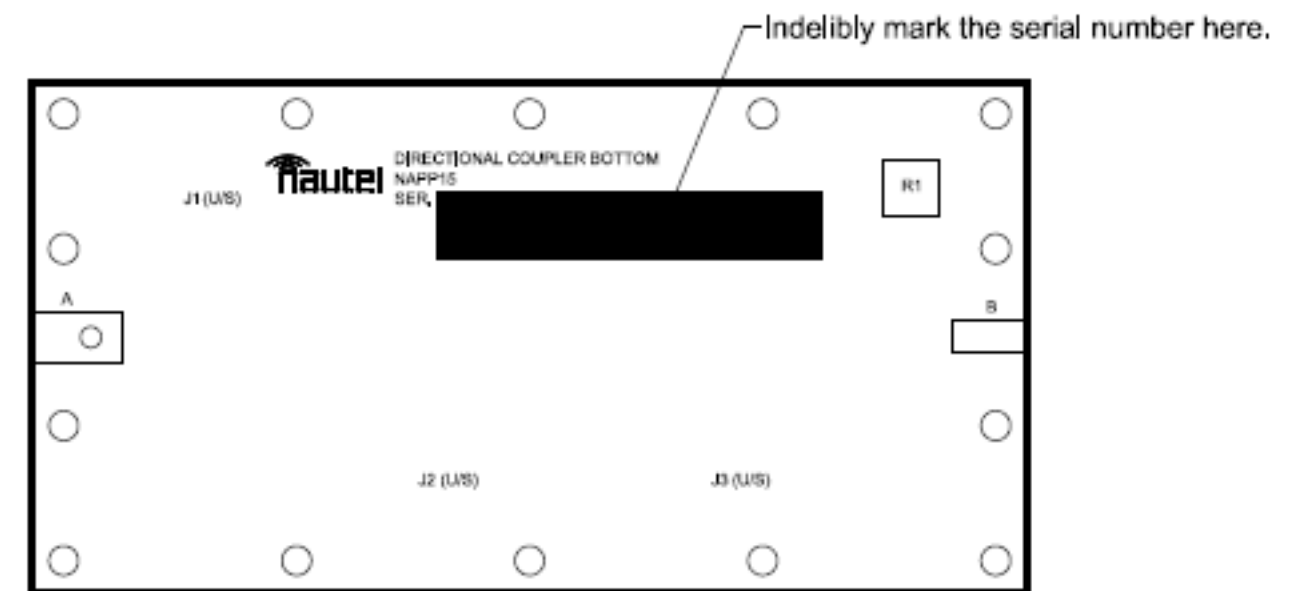


Notes:

Capacitors C7 & C8 are located under L2.

Capacitors C9 & C10 are located under L3.

Figure MD-10: NAPF16 Low Pass Filter PWB



Notes:

- 1) Do not place any labels on this board.
- 2) J1, J2 & J3 are located on the u/side of the PWB.

Figure MD-11: NAPP15 Directional Coupler PWB

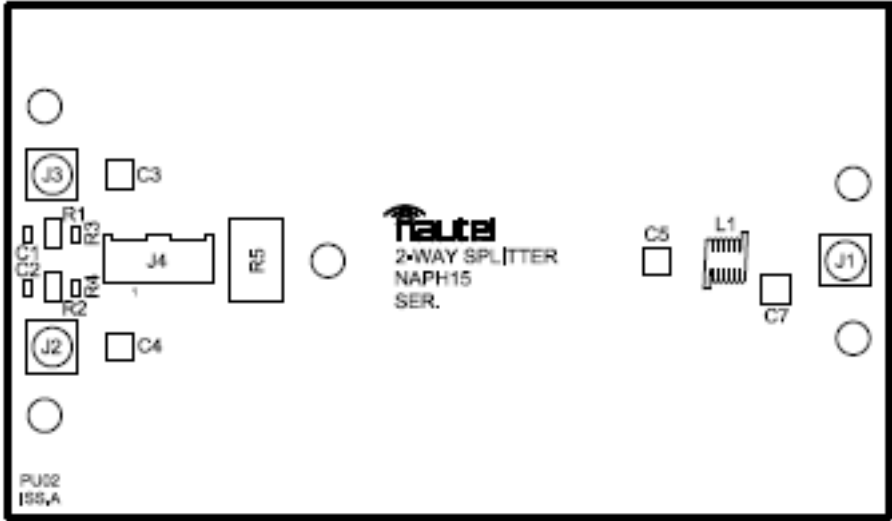


Figure MD-12: NAPH15 2-Way Splitter PWB (VX1.5/VX2)

SECTION 3.5: LIST OF TERMS

This section defines some of the terms that are used in Nautel documentation.

AES/EBU. Audio Engineering Society/European Broadcasting Union (AES/EBU) is the name of a digital audio transfer standard. The AES/EBU digital interface is usually implemented using 3-pin XLR connectors (the same type connector used in professional micros). One cable carries both left-channel and right-channel audio data to the receiving device.

AUI. The Advanced User Interface is the local touch screen on the front door and the advanced remote control/monitoring feature that allows for extensive remote control and monitoring of the transmitter.

CUTBACK. A reduction in RF output power, caused by the occurrence of multiple shutbacks within a pre-defined period.

DHCP. Dynamic Host Carrier Protocol.

DSP. Digital Signal Processing.

EEPROM. Electrically Erasable Programmable Read-Only Memory.

FOLDBACK. A reduction in RF output power, caused by adverse load conditions (high VSWR). No shutbacks or cutbacks have occurred.

LED. Light Emitting Diode (also referred to as lamp).

LVPS. Low Voltage Power Supply. A module or modules used in the ac-dc power stage that generates the low level dc supply voltage for the transmitter.

PRESET. A setting that controls power level, frequency and audio parameters. The VX150 to VX2 allows you to pre-program multiple presets.

PWB. Printed Wiring Board.

SHUTBACK. A complete, but temporary loss of RF output power, caused by any one of a variety of faults, including high VSWR, high reject load power, RF drive failure, or an open external interlock.

SHUTDOWN. A complete and permanent loss of RF output power. Typically follows repeated cutback, foldback or shutback events.

SURGE PROTECTION PANEL. An electrical panel that protects equipment from electrical surges in the ac power supply, antenna or site ground caused by lightning strikes.

UI. The User Interface is the controller module's front panel LCD screen that allows for extensive local control and monitoring of the transmitter.

VSWR. Voltage standing wave ratio. This is an expression of the ratio of reverse voltage to forward voltage on the feedline and antenna system. An ideal VSWR of 1:1 provides maximum transmitter-antenna efficiency.

VX150 TO VX2 TROUBLESHOOTING MANUAL

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