

### FEATURES

Board designed for hook-up to external VCO Board  
Contains ADF4108 8GHz frequency synthesizer IC  
Accompanying Software Allows Complete Control of  
Synthesizer Functions from PC  
Battery Operated

### GENERAL DESCRIPTION

This board is designed to allow the user to evaluate the performance of the ADF4108 Frequency Synthesizer for PLL's (Phase Locked Loops). The block diagram of the board is shown below. It contains the ADF4108 synthesizer, a pc connector, SMA connectors for the power supplies and RF output. There is also a passive low pass loop filter. The board is designed to be hooked up to an external VCO A cable is included with the board to connect to a pc printer port.

The package also contains windows software (2000 and XP compatible) to allow easy programming of the synthesizer.

### BLOCK DIAGRAM

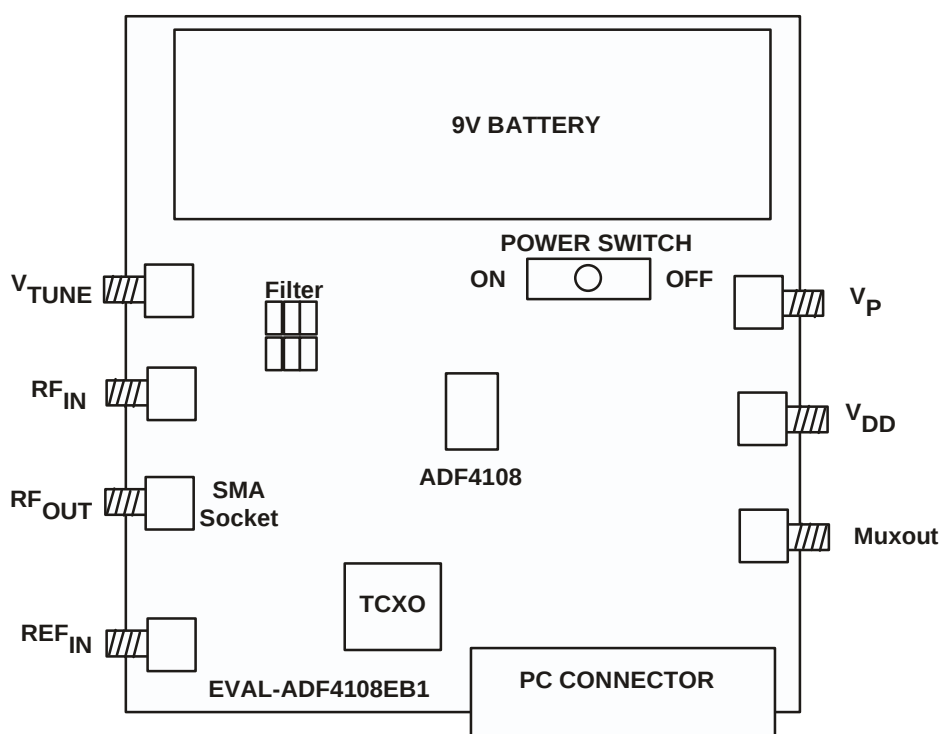


Figure 1.

### Rev. A

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## HARDWARE DESCRIPTION

### OVERVIEW

The evaluation board comes with a cable for connecting to the printer port of a PC. The board schematic is shown on pages 4 and 5.

### POWER SUPPLIES

The board is powered from a single 9V battery. The power supply circuit gives 3.3V to the ADF4108  $V_{DD}$ , and allows the user to choose either 3.3V or 5V for the ADF4108  $V_P$ . The default settings are 3.3V for the ADF4108  $V_{DD}$  and 5V for the ADF4108  $V_P$ .

**It is very important to note that the ADF4108  $V_{DD}$  should never exceed the ADF4108  $V_P$ . This can cause damage to the device.**

If the user wishes, external power supplies may be used. In this case, you need to insert SMA connectors as shown on the silk screen and block diagram.

$V_{TUNE}$  is available at an output SMA connector. This should be connected to an external VCO board. For example, the HMC506LP4 8GHz VCO from Hittite can be used. The output of this board should then be connected back into the EVAL-ADF4108EB1 at  $RF_{IN}$ . This is split into 2 equal power levels, one going to  $RF_{OUT}$  and the other going to the  $RF_{IN}$  of the ADF4007 to close the loop in the PLL. The  $RF_{OUT}$  can be fed to a spectrum analyzer to test the output signal.

**Note that the ADF4108  $RF_{IN}$  input sensitivity spec of 0dBm MAX should not be exceeded. If the VCO output power is greater than 6dB, the power splitting network consisting of R8, R9 and R10 should be redesigned to give <0dBm input power to  $RF_{IN}$ .** For example, if using the HMC506LP4 VCO from Hittite the output power is +14dBm typically. The power splitting network should be changed in this instance.

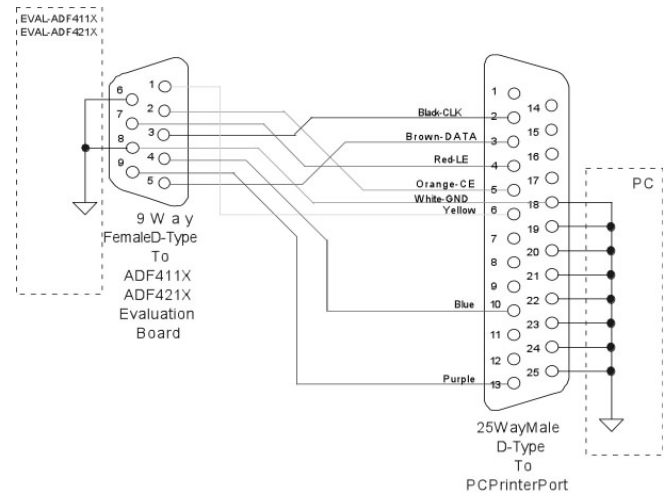


Figure 2. PC Cable Diagram

SCHEMATICS

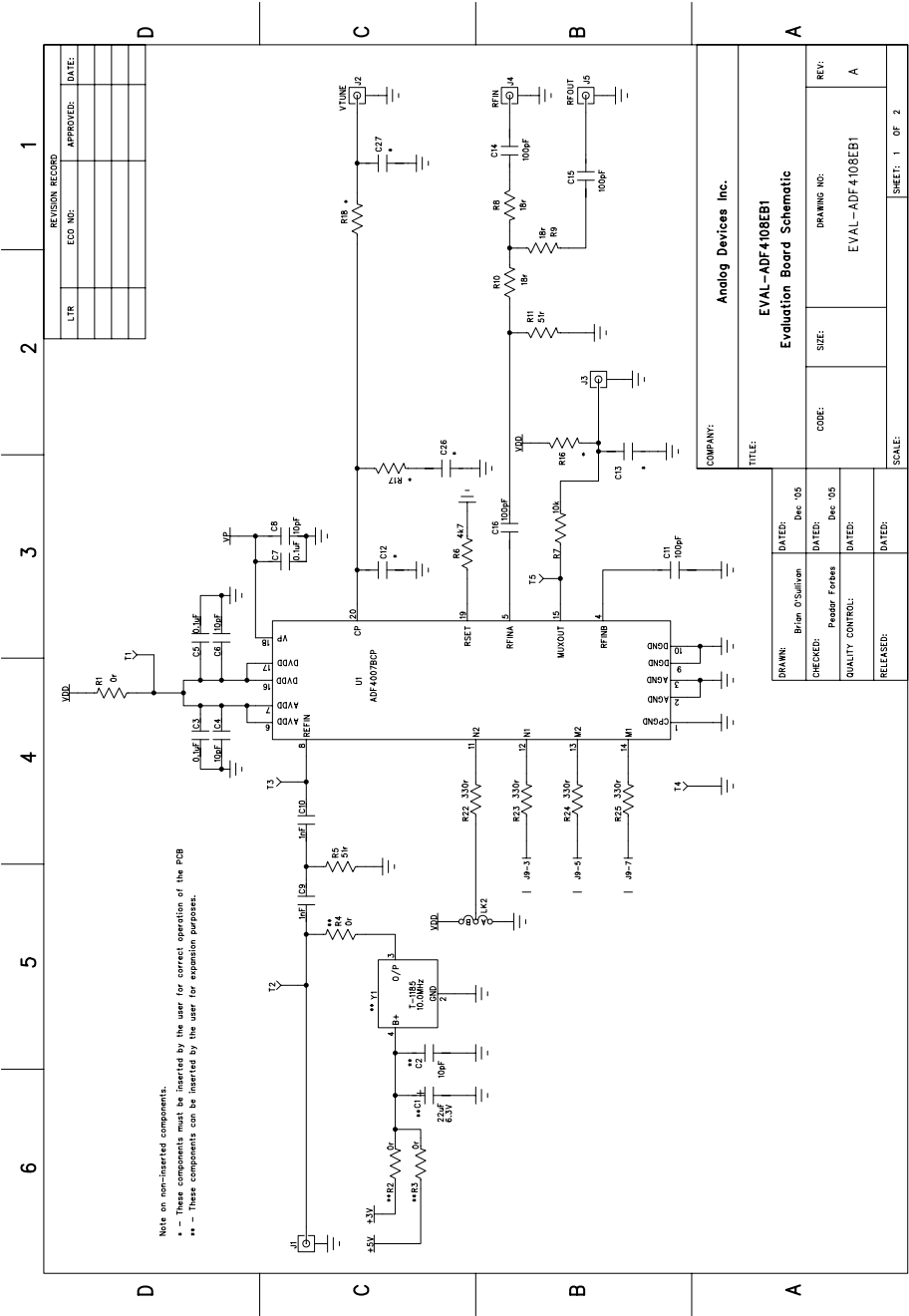


Figure 3. Evaluation Board Schematic (Page 1)

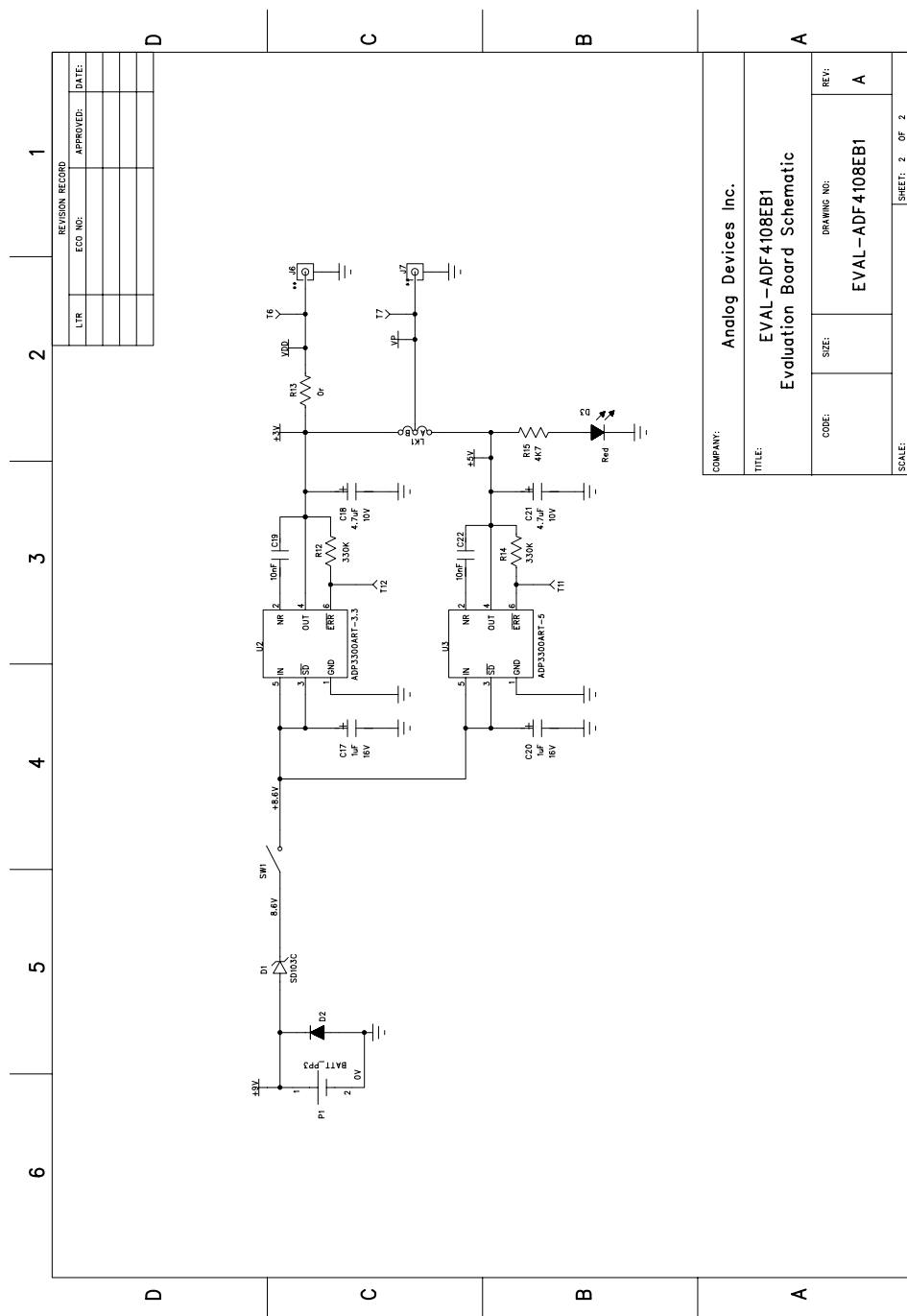


Figure 4. Evaluation Board Schematic (Page 2)



# Evaluation Board For Integer-N PLL Frequency Synthesizer

Evaluation Board Tech Note

**EVAL-ADF4108EB1**

## SOFTWARE

### SOFTWARE DESCRIPTION

The control software for EVAL-ADF4108EB1 is on the CD which accompanies the board. If the user clicks on "setup.exe", then the install wizard guides the user through the install process. Simply follow the on-screen instructions. To run the software, click on Start->All Programs->Analog Devices->ADF\_Rev\_3\_1.exe.

Before the main software screen appears, the Device Window is shown. This will ask the user to choose which device is being

evaluated. Choose ADF4106 and click OK. The software used for the ADF4106 and ADF4108 is the same.

The Main Interface Window will now appear. This is shown below in Figure 6. Click on "Update All Registers". The data is now set up and other features can be examined by the user. To change the VCO output frequency and/or channel spacing, click on the text of the "RF VCO Output Frequency". The output frequency window will appear and you can change this value.

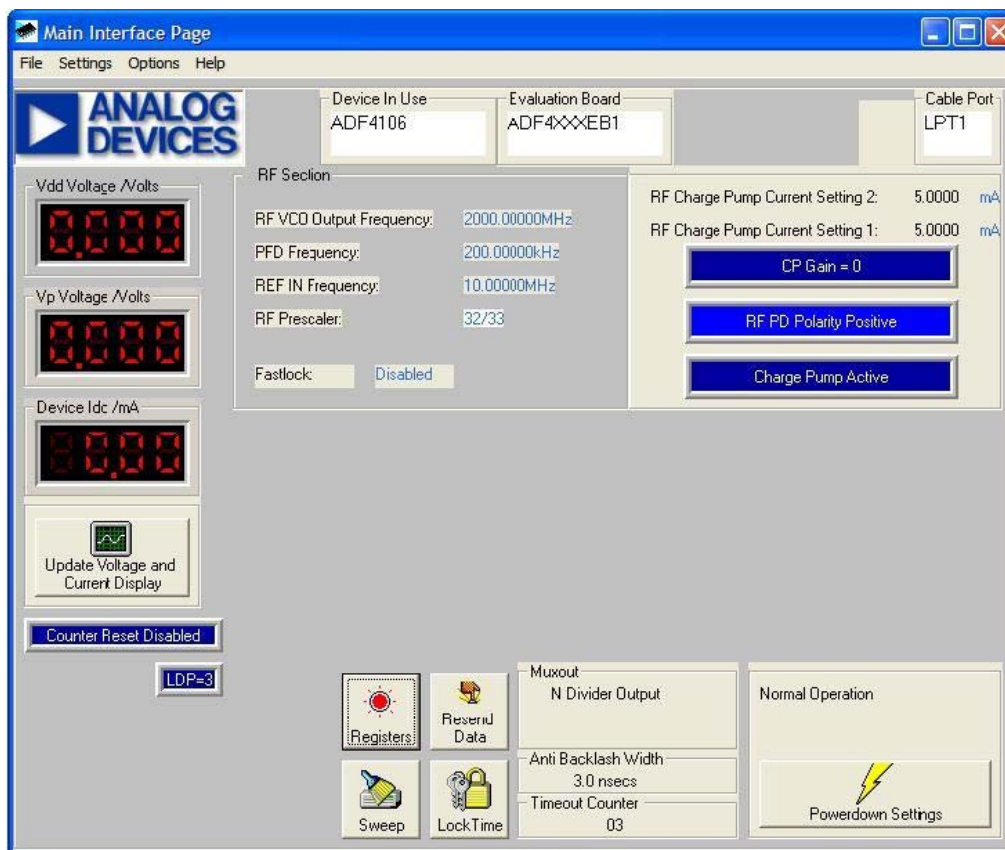


Figure 6. Software Front Panel

### Rev. A

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## BILL OF MATERIALS

| Name | Part Type    | Value | PCB Decal        | Layer Name | Part Description                        |
|------|--------------|-------|------------------|------------|-----------------------------------------|
| C1   | CAP+         | 22uF  | RTAJ_A           | Top        | CAPACITOR, CASE A 22UF 6.3V             |
| C2   | CAP          | 10PF  | C0603            | Top        | CAPACITOR, 0603 10PF 50V                |
| C3   | CAP          | 0.1uF | C0603            | Top        | CAPACITOR, 0603 0.1UF 16V               |
| C4   | CAP          | 10pF  | C0603            | Top        | CAPACITOR, 0603 10PF 50V                |
| C5   | CAP          | 0.1uF | C0603            | Top        | CAPACITOR, 0603 0.1UF 16V               |
| C6   | CAP          | 10PF  | C0603            | Top        | CAPACITOR, 0603 10PF 50V                |
| C7   | CAP          | 0.1uF | C0603            | Top        | CAPACITOR, 0603 0.1UF 16V               |
| C8   | CAP          | 10pF  | C0603            | Top        | CAPACITOR, 0603 10PF 50V                |
| C9   | CAP          | 1NF   | C0603            | Top        | CAPACITOR, 0603 1NF 50V                 |
| C10  | CAP          | 1NF   | C0603            | Top        | CAPACITOR, 0603 1NF 50V                 |
| C11  | CAP          | 100PF | C0603            | Top        | CAPACITOR, 0603 100PF 50V               |
| C12  | CAP          | 220pF | C0603            | Top        |                                         |
| C13  | CAP          | *     | C0603            | Top        |                                         |
| C14  | CAP          | 100PF | C0603            | Top        | CAPACITOR, 0603 100PF 50V               |
| C15  | CAP          | 100PF | C0603            | Top        | CAPACITOR, 0603 100PF 50V               |
| C16  | CAP          | 100PF | C0603            | Top        | CAPACITOR, 0603 100PF 50V               |
| C17  | CAP+         | 1uF   | RTAJ_A           | Top        | CAPACITOR, CASE A 1UF 25V               |
| C18  | CAP+         | 4.7uF | RTAJ_A           | Top        | CAPACITOR, CASE A 4.7UF 10V             |
| C19  | CAP          | 10nF  | C0603            | Top        | CAPACITOR, 0603 10NF 25V                |
| C20  | CAP+         | 1uF   | RTAJ_A           | Top        | CAPACITOR, CASE A 1UF 25V               |
| C21  | CAP+         | 4.7uF | RTAJ_A           | Top        | CAPACITOR, CASE A 4.7UF 10V             |
| C22  | CAP          | 10nF  | C0603            | Top        | CAPACITOR, 0603 10NF 25V                |
| C26  | CAP          | 100pF | C0603            | Top        |                                         |
| C27  | CAP          | 2.7nF | C0603            | Top        |                                         |
| D1   | SD103C       | 6.2V  | DO35             | Top        | DIODE SCHOTTKY 20V 400MW DO35           |
| D2   | DIODE        |       | DO35             | Top        | DIODE, 1A 50V                           |
| D3   | LED          |       | LED_SMT          | Top        | LIGHT EMITTING DIODE                    |
| J1   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J2   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J3   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J4   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J5   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J6   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J7   | SMA          |       | SMA_CARD_EDGE_RF | Top        | CONN JACK END LAUNCH PC GOLD SMA        |
| J9   | CON-DB9HM    |       | DB9-HM           | Top        | PLUG, D PCB R/A T&D 25 WAY              |
| LK1  | JUMPER2\SIP3 |       | LINK-3P_TEXT_INV | Top        | HEADER, 1 ROW VERT 3WAY & JUMPER SOCKET |
| LK2  | JUMPER2\SIP3 |       | LINK-3P_TEXT_INV | Top        | HEADER, 1 ROW VERT 3WAY & JUMPER SOCKET |
| P1   | BATT_PP3     |       | BATT_PP3         | Top        | BATTERY CLIP, PCB MOUNTING              |
| R1   | RES          | 0r    | R0603            | Top        | RESISTOR, 0603 0R0                      |
| R2   | RES          | 0r    | R0603            | Top        | RESISTOR, 0603 0R0                      |
| R3   | RES          | 0r    | R0603            | Top        | RESISTOR, 0603 0R0                      |

|     |           |         |           |     |                                        |
|-----|-----------|---------|-----------|-----|----------------------------------------|
| R4  | RES       | 0r      | R0603     | Top | RESISTOR, 0603 0R0                     |
| R5  | RES       | 51R     | R0603     | Top | RESISTOR, 0603 51R                     |
| R6  | RES       | 4K7     | R0603     | Top | RESISTOR, 0603 4K7                     |
| R7  | RES       | 0r      | R0603     | Top | RESISTOR, 0603 10K                     |
| R8  | RES       | 18r     | R0603     | Top | RESISTOR, 0603 18R                     |
| R9  | RES       | 18r     | R0603     | Top | RESISTOR, 0603 18R                     |
| R10 | RES       | 18r     | R0603     | Top | RESISTOR, 0603 18R                     |
| R11 | RES       | 51R     | R0603     | Top | RESISTOR, 0603 51R                     |
| R12 | RES       | 330K    | R0603     | Top | RESISTOR, 0603 330K                    |
| R13 | RES       | 0r      | R0603     | Top | RESISTOR, 0603 0R0                     |
| R14 | RES       | 330K    | R0603     | Top | RESISTOR, 0603 330K                    |
| R15 | RES       | 4K7     | R0805     | Top | RESISTOR, 0805 4K7                     |
| R16 | RES       | *       | R0603     | Top |                                        |
| R17 | RES       | 3k      | R0603     | Top |                                        |
| R18 | RES       | 6.2k    | R0603     | Top |                                        |
| R22 | RES       | 0r      | R0603     | Top | RESISTOR, 0603 330R                    |
| R23 | RES       | 330r    | R0603     | Top | RESISTOR, 0603 330R                    |
| R24 | RES       | 330r    | R0603     | Top | RESISTOR, 0603 330R                    |
| R25 | RES       | 330r    | R0603     | Top | RESISTOR, 0603 330R                    |
| SW1 | SW_POWER  |         | SW_SIP-3P | Top | SWITCH, PCB SPDT                       |
| T1  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T2  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T3  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T4  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB BLACK                    |
| T5  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T6  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T7  | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T11 | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| T12 | TESTPOINT |         | TESTPOINT | Top | TERMINAL, PCB RED                      |
| U1  | ADF4108   |         | LFCSP-20  | Top | ADF4108 - PLL Frequency Synthesizer    |
| U2  | ADP3300   |         | SOT23-6   | Top | ADP3300 - Low Dropout Linear Regulator |
| U3  | ADP3300   |         | SOT23-6   | Top | ADP3300 - Low Dropout Linear Regulator |
| Y1  | OSC_TCXO  | 10.0MHZ | OSC_TCXO  | Top |                                        |

Red = Do Not Insert