

WCDMA Evaluation Board for PLL Frequency Synthesizer

FEATURES

Self-contained board including synthesizer, VCO, and loop filter for generating WCDMA frequencies (1.93 GHz to 1.99 GHz)

Designed for 20 kHz loop bandwidth

Accompanying software allows complete control of synthesizer functions from a PC

Battery operated: choice of 3 V or 5 V supplies

Typical phase noise performance of -85 dBc/Hz at 1 kHz offset

GENERAL DESCRIPTION

This board is designed to allow the user to evaluate the performance of the [ADF4118](#) frequency synthesizer for phase-locked loops (PLLs). The block diagram of the board is shown in Figure 1. It contains the [ADF4118](#) synthesizer, a PC connector, TCXO for the reference input, SMA connectors for the power supplies, and an RF output. There is also a low-pass loop filter (20 kHz) and a VCO (Vari-L VCO190-1960T) on board. A cable is included with the board to connect to a PC printer port.

The package also contains Windows® software to allow easy programming of the synthesizer.

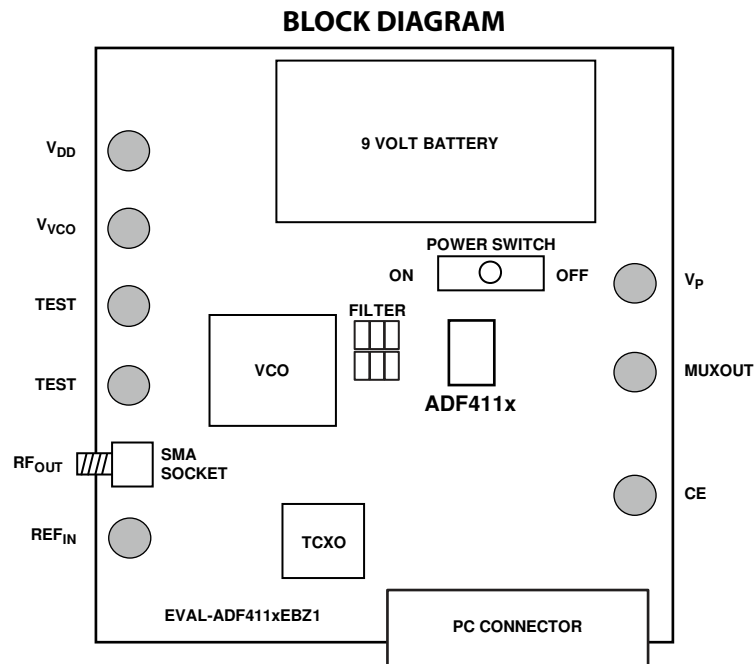


Figure 1.

091566-001

TABLE OF CONTENTS

Features	1	Evaluation Board Hardware.....	3
General Description	1	Loop Components.....	3
Block Diagram	1	Evaluation Board Software.....	4
Revision History	2	Evaluation Board Schematics.....	5

REVISION HISTORY

6/11—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

The evaluation board is supplied with a cable for connecting to the printer port of a PC. The silkscreen and cable diagram for the evaluation board are shown in Figure 2 and Figure 3, respectively. The board schematics are shown in Figure 5 and Figure 6.

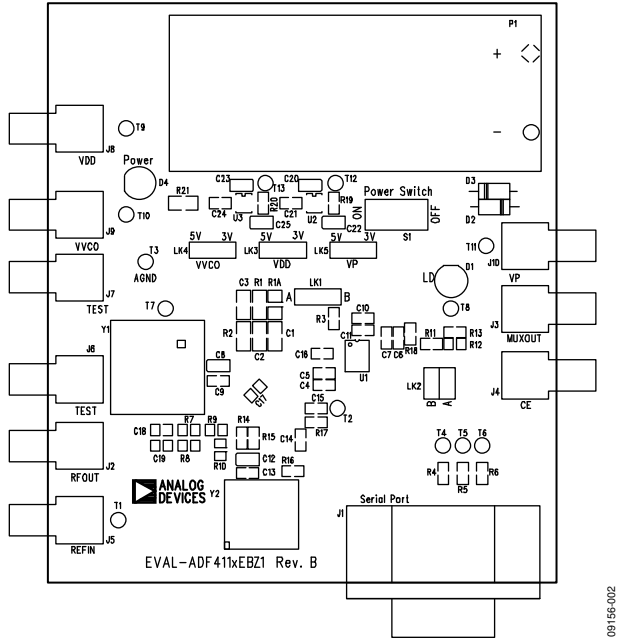


Figure 2. Evaluation Board Silkscreen

The board is powered from a single 9 V battery. The power supply circuitry allows the user to choose either 3 V or 5 V for the ADF4118 V_{DD} and V_P and for the VCO supply. The default settings are 3 V for the ADF4118 V_{DD} and 5 V for the ADF4118 V_P and for the VCO supply. It is very important to note that the ADF4118 V_{DD} should never exceed the ADF4118 V_P . This can damage the device.

All components necessary for LO generation are included on board. The 10 MHz TCXO from Vectron provides the necessary reference input. The PLL is made up of the ADF4118, a passive

loop filter (20 kHz), and the VCO 190-1960T from Vari-L. The output is available at RF_{OUT} through a standard SMA connector. Alternatively, users can use their own power supplies and reference input. In this case, insert SMA connectors as shown on the silkscreen in Figure 2 and the block diagram in Figure 1.

LOOP COMPONENTS

$C1 = 150 \text{ pF}$, $C2 = 1.5 \text{ nF}$, $C3 = 82 \text{ pF}$.

$R1 = 22 \text{ k}\Omega$, $R1a = 22 \text{ k}\Omega$, $R2 = 20 \text{ k}\Omega$.

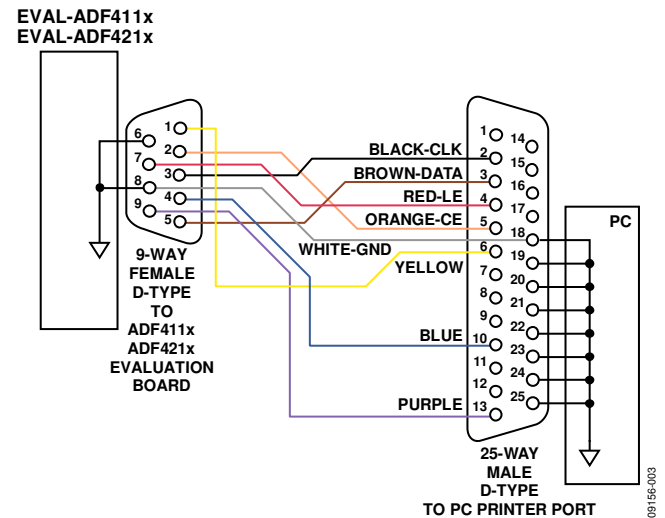


Figure 3. PC Cable Diagram

Loop component values shown in the circuit diagrams (see Figure 5 and Figure 6) are for a 1.96 GHz RF output, 1 mA charge pump (CP) current, 200 kHz channel spacing, and 20 kHz loop bandwidth, with a VCO190-1960T.

EVALUATION BOARD SOFTWARE

The software is supplied on a CD. Double-click **setup.exe** to open the install wizard, which installs the software. Follow the on-screen instructions. The software is then installed in a default directory: **C:/ProgramFiles/ADF4XXX/ADF4XXX_revx**. To run the software, simply double-click **adf4XXX_revx.exe**.

Before the main **Main Interface Page** appears, the device window opens, which prompts you to choose the device to be evaluated.

1. Select the **ADF4118** and click **OK**.
2. The **Main Interface Page** window opens (see Figure 4).
3. Click the **Eval Board** box near the top right corner of the **Main Interface Page** window.
4. When the evaluation board window opens, select the **Eval-ADF4118EBZ1** and click **OK**.

The data is now set up, and you can explore the other features of the **Main Interface Page** window.

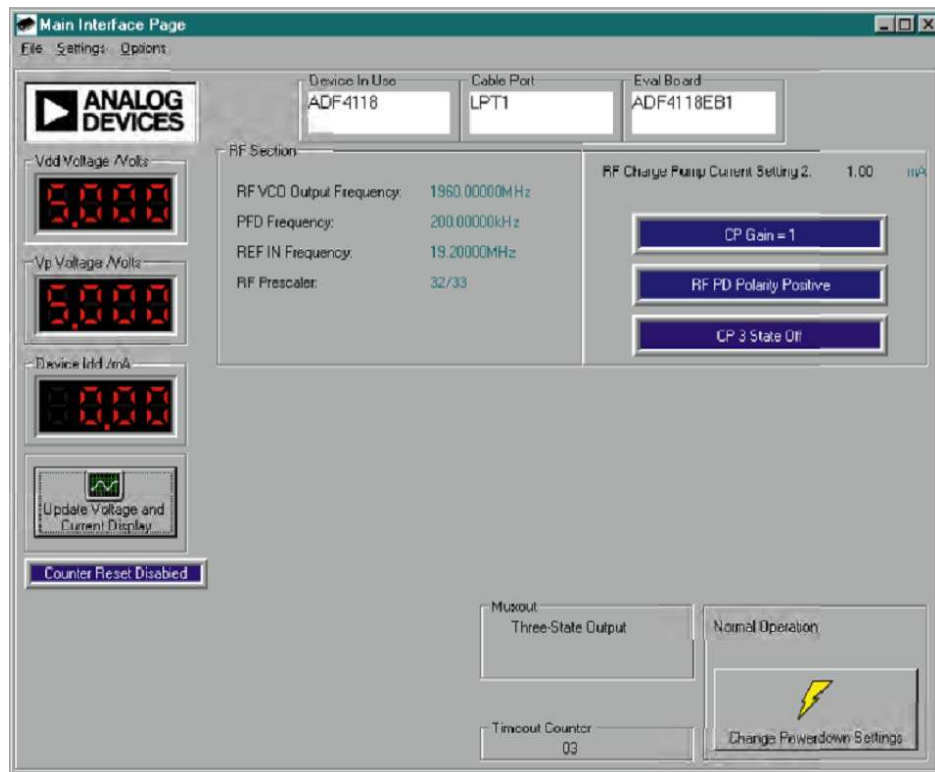


Figure 4. Main Interface Page

EVALUATION BOARD SCHEMATICS

900-95160

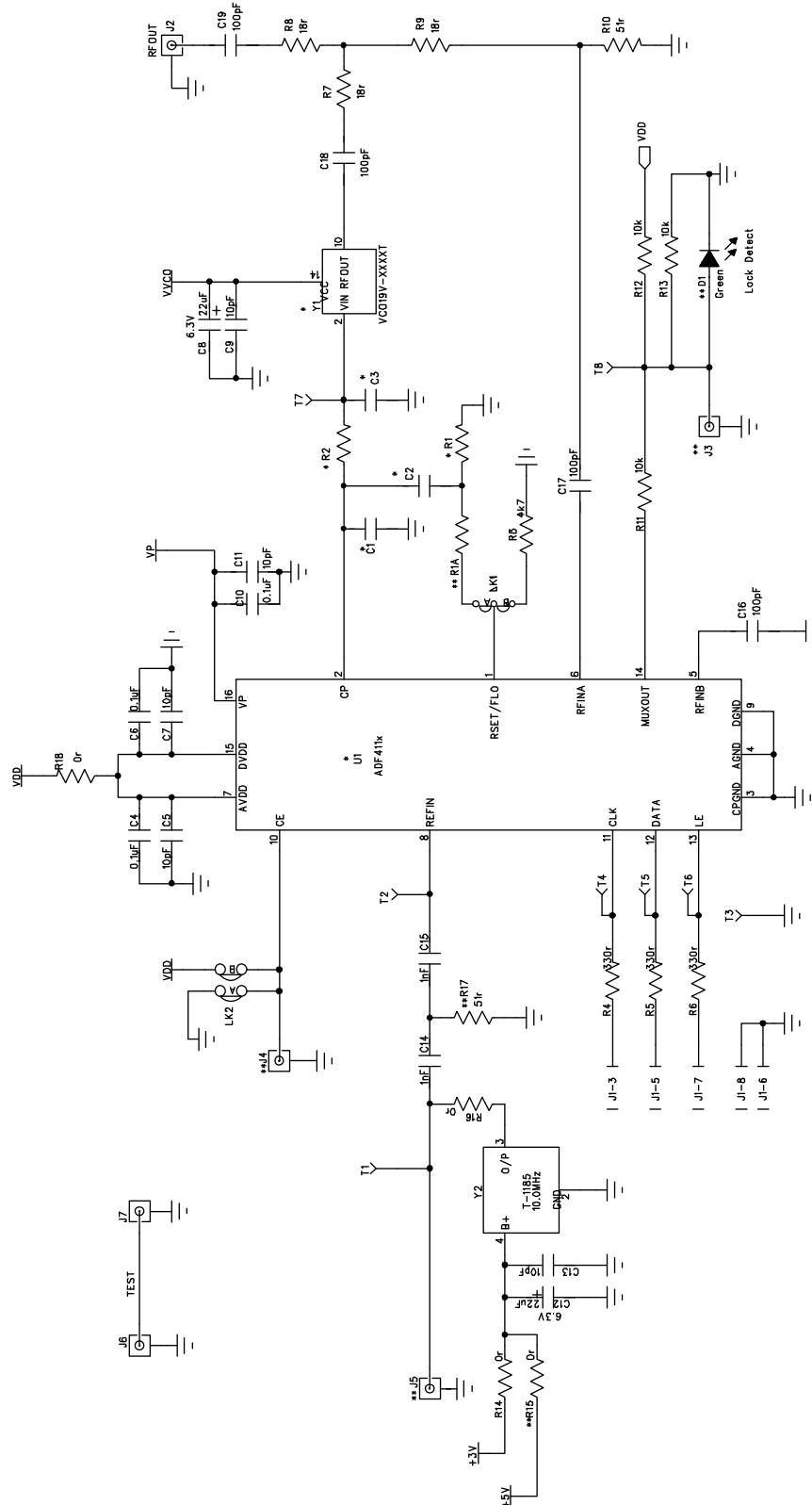


Figure 5. Evaluation Board Circuit Diagram (Page 1)

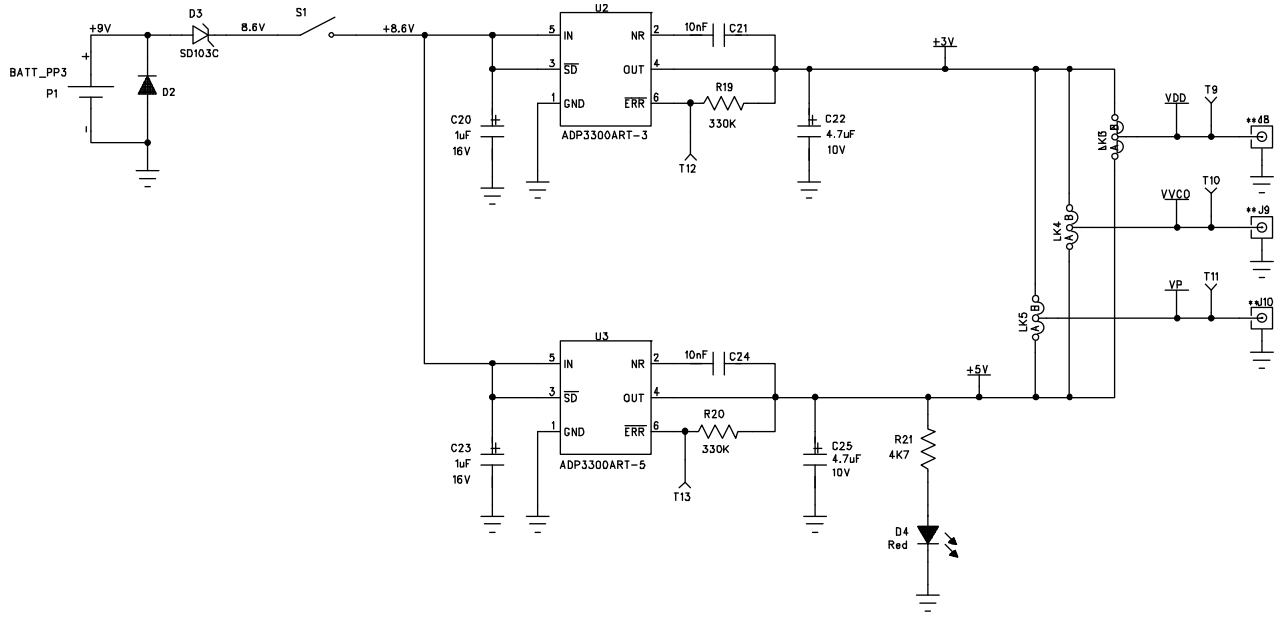


Figure 6. Evaluation Board Circuit Diagram (Page 2)

09156-006

NOTES

NOTES

**ESD Caution**

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.