

GSM900 Evaluation Board for PLL Frequency Synthesizer

FEATURES

Self-contained board including synthesizer, VCO, and loop filter, for generating GSM frequencies (819 MHz to 915 MHz)

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 -91 dBc/Hz at 1 kHz offset

Typical spurious performance of better than -90 dBc at 200 kHz offset from carrier

GENERAL DESCRIPTION

The EVAL-ADF411xEBZ1 is designed to allow users to evaluate the performance of the [ADF4113](#) frequency synthesizer for phase lock loops (PLLs). The block diagram of the board is shown in Figure 1. It contains the ADF4113 synthesizer, a pc connector, an SMA connector for the reference input, power supplies, and an RF output. There is also a loop filter (20 kHz bandwidth) and an on-board VCO. 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.

EVALUATION BOARD CONNECTION DIAGRAM

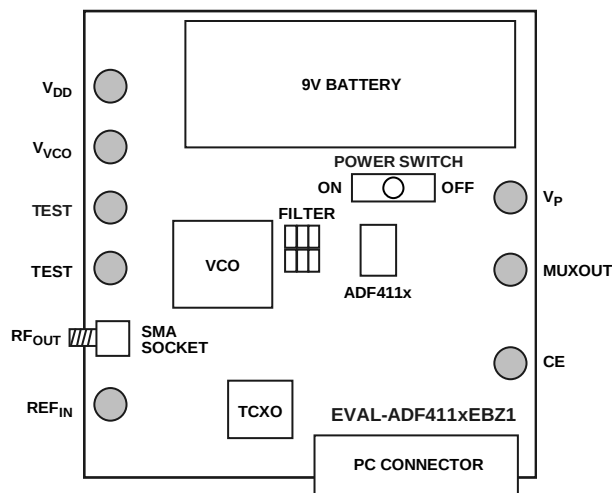


Figure 1.

TABLE OF CONTENTS

Features	1	Hardware Description	3
General Description	1	Evaluation Board Software.....	4
Evaluation Board Connection Diagram	1	Software Description	4
Revision History	2	Programmable Software Settings	4
Evaluation Board Hardware.....	3	Evaluation Board Schematics.....	5

REVISION HISTORY

5/11—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

HARDWARE DESCRIPTION

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

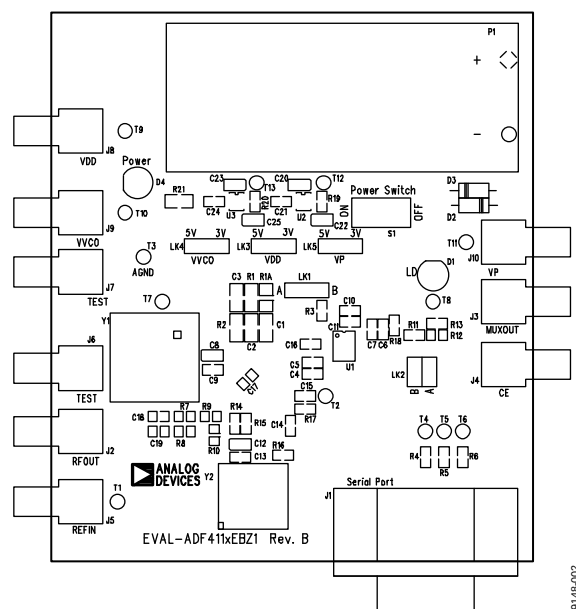


Figure 2. Evaluation Board Silkscreen

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 ADF4113 V_{DD} and V_P , and for the VCO supply. The default settings are 3 V for the ADF4113 V_{DD} , and 5 V for the ADF4113 V_P and VCO supply. Note that the ADF4113 V_{DD} should never exceed the ADF4113 V_P because it can damage the device. All components necessary for LO generation are on board. The 13 MHz TCXO from Vectron provides the necessary reference input. The PLL is made up of the ADF4113, a passive loop filter (20 kHz bandwidth), and the VCO190-902T from Vari-L. The output is available at

RFOUT through a standard SMA connector. Users can use their own power supplies and reference input. In this case, they need to insert SMA connectors as shown on the silkscreen and block diagram.

Loop filter components include the following:

- $C1 = 470 \text{ pF}$
- $C2 = 4.7 \text{ nF}$
- $C3 = 20 \text{ pF}$
- $R1 = 7.5 \text{ k}\Omega$
- $R2 = 20 \text{ k}\Omega$

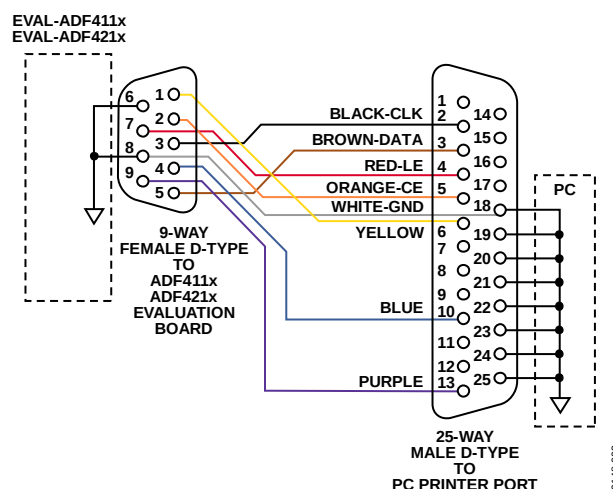


Figure 3. PC Cable Diagram

Loop component values shown in the circuit diagram are for a 900 MHz RF output, 5 mA CP current, VCO190-902T, 200 kHz channel spacing, and 20 kHz loop bandwidth.

EVALUATION BOARD SOFTWARE

SOFTWARE DESCRIPTION

The evaluation board comes with the software on a CD. The software is suitable for all the ADF411x devices. To install, use the following steps:

1. Click **Setup.exe**. The install wizard installs the software. Note that administrator access is required on the PC to install the software.
2. Follow the on-screen directions. The software is installed in a default directory: **C:/Program Files/Analog Devices**. To run the software, click **ADF4XXX_revx**.

Prior to the **Main Interface Page**, a window appears to select the device being evaluated. Choose the ADF4113EBZ1 and click **OK**. The **Main Interface Page** now appears (see Figure 4). The synthesizer is now programmed with the correct settings for a GSM system working at 900 MHz. A 200 kHz PFD frequency is set up, a 32/33 prescaler is chosen, and a charge pump current of 5 mA is programmed.

PROGRAMMABLE SOFTWARE SETTINGS

To program the software, complete the following:

1. Click **REF IN Frequency**, insert the desired frequency in MHz, and click **OK**.
2. Click **RF VCO Output Frequency** for the **Output Frequency** window to appear. Enter the **Output Frequency** and click **OK**.
3. Click **PFD Frequency**, insert the desired frequency in kHz, and click **OK**.
4. Click **RF Charge Pump Current Setting 2** or **RF Charge Pump Current Setting 1** and the current setting window will appear. Enter the value used for the loop filter and click **OK**.
5. Click **RF PD Polarity Positive** to set the PD polarity bit to positive, which ensures that all registers are loaded.

At this point, the data is now set up, and the user can modify other features.

The software also allows monitoring of the device supply voltage, supply current, and the charge pump voltage. Click **Update Voltage and Current Display** to get an up-to-date reading.

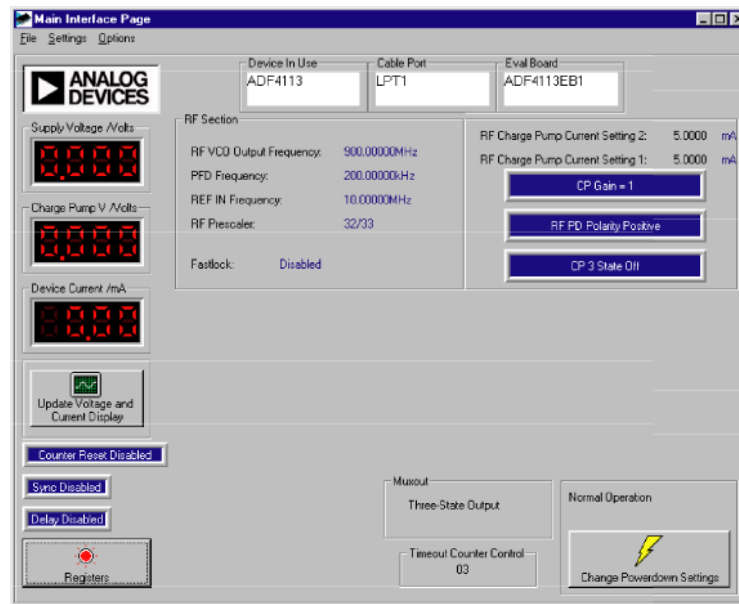
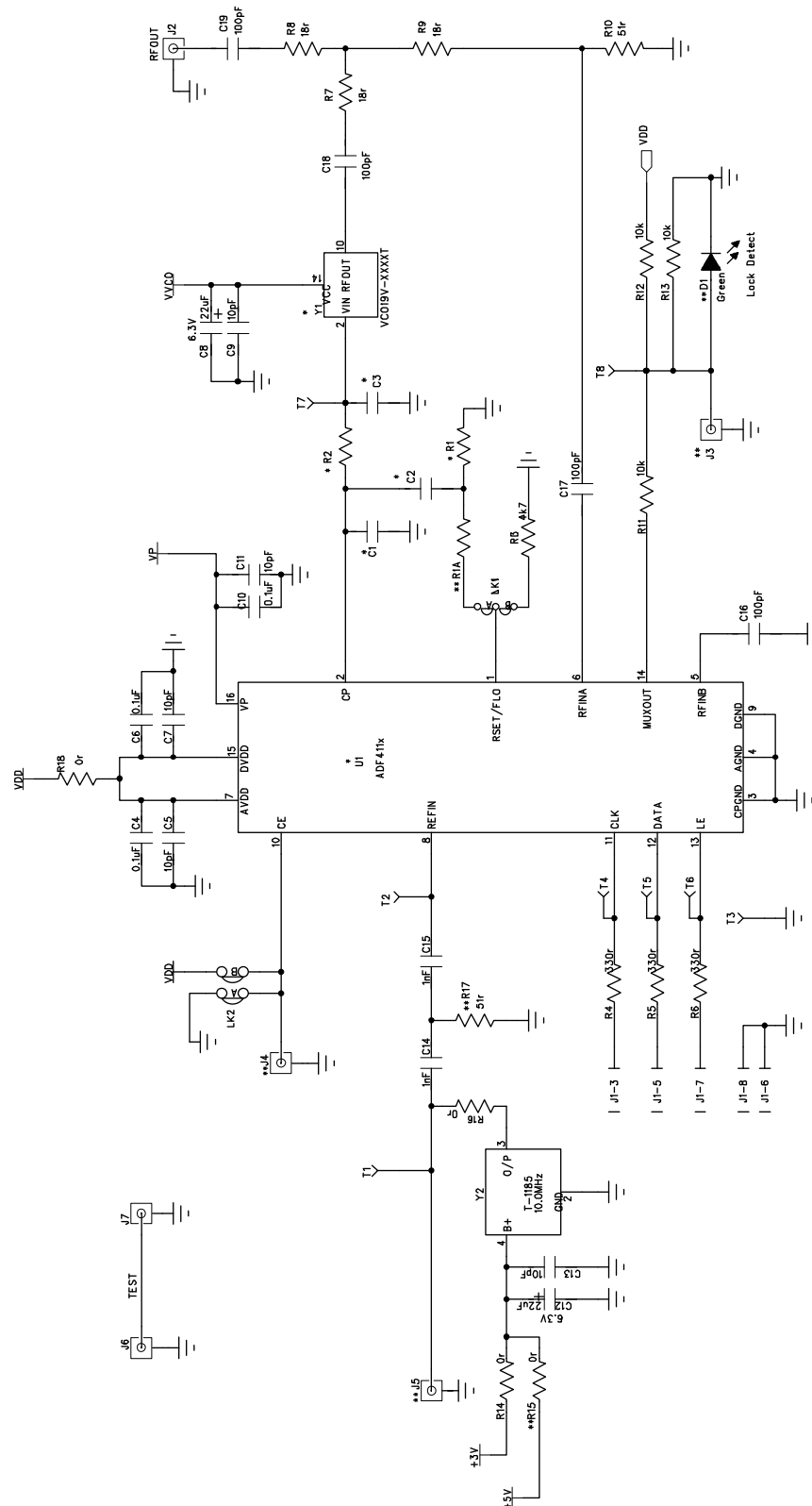


Figure 4. Software Front Panel

EVALUATION BOARD SCHEMATICS



90048-004

Note on non-inserted components:
 ** - These components can be inserted by the user for correct operation of the board.
 ** - These components can be inserted by the user for expansion purposes.

Figure 5. Evaluation Board Circuit Diagram (Page 1)

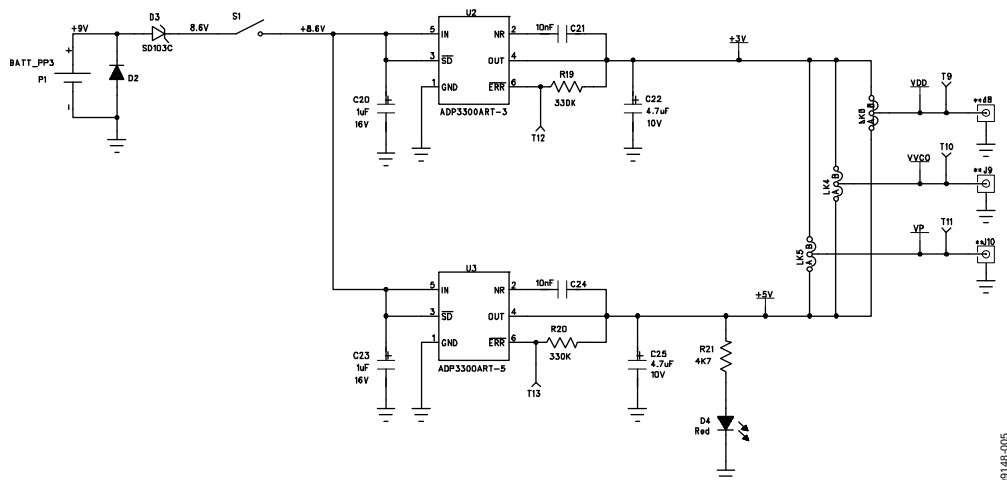


Figure 6. Evaluation Board Circuit Diagram (Page 2)

09148-005

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 NONINFRINGEMENT 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.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.