

## Evaluating the **CN-0285** Wideband Tx Modulator Solution

### FEATURES

Self-contained board including

**ADF4351** wideband PLL + VCO

**ADL5375** wideband IQ modulator

Ultralow noise voltage regulators: **ADP150**, **ADP3334**

25 MHz TCXO reference

USB interface

Accompanying **ADF4351** software allows control of synthesizer functions from PC

### ONLINE RESOURCES

Documents Needed

**ADF4351** Data Sheet

**ADL5375** Data Sheet

**ADP150** Data Sheet

**ADP3334** Data Sheet

Required Software

**ADF435x** programming software

Design and Integration Files

**Schematics**, **Layout Files**, **Bill of Materials**

### EQUIPMENT NEEDED

A standard PC running Windows® XP, Windows Vista (32-bit), or Windows 7 with a USB port

**EVAL-CN0285-EB1Z** circuit evaluation board

5.5 V power supplies

An IQ signal source, such as the Rohde & Schwarz AMIQ

A spectrum analyzer, such as the Rohde & Schwarz FSQ8

### GENERAL DESCRIPTION

The **EVAL-CN0285-EB1Z** is the evaluation board described in the Circuits From the Lab™ **Circuit Note CN-0285**, *Broadband Low EVM Direct Conversion Transmitter*. A photo of the board is shown in Figure 1. It contains the **ADF4351** synthesizer, the **ADL5375** wideband transmit modulator, and ultralow noise LDOs. The board can be controlled using the **ADF4351** programming software. A USB cable is included with the board to connect to a PC USB port.

Additional information, including other PLL data sheets, technical notes, articles, and ADIsimPLL™ PLL simulation software from Analog Devices, Inc., is available at [www.analog.com/pll](http://www.analog.com/pll).

### PHOTO OF THE EVALUATION BOARD

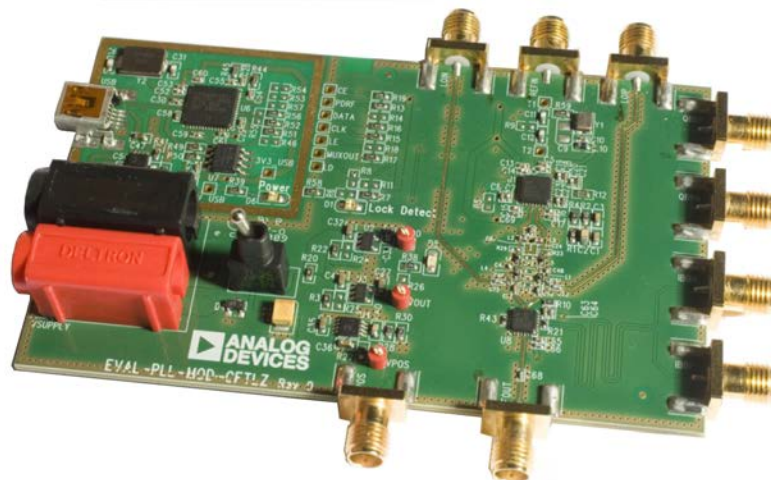


Figure 1. **EVAL-CN0285-EB1Z**

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**REVISION HISTORY**

3/13—Revision 0: Initial Version

## EVALUATION BOARD HARDWARE

### POWER SUPPLIES

The user must apply 5.5 V to the VSUPPLY power connectors (4 mm banana connectors). An LED, D6, indicates when USB power is available, and another LED, D5, indicates when the main board is powered. Switch SW-EXT is used to switch in the 5.5 V supply.

### IQ INPUTS

The ADL5375 has four differential IQ inputs. These are accessible from the SMA connectors and should be connected to an appropriate analog baseband IQ source such as the Rhode & Schwarz AMIQ. Set the dc bias voltage for the IQ inputs at 0.5 V.

### RF/LO OUTPUTS

The ADL5375 RF output is ac-coupled out to the RFOUT SMA. There are also two LO output SMA connectors that can be used to view the filtered ADF4351 RF outputs on a spectrum analyzer. When connecting to an analyzer, terminate the unused LO output with a 50  $\Omega$  termination. When measuring EVM or adjacent channel leakage current (ACLR), disconnect these LO outputs by removing Capacitors C72 and C73 to prevent loading the circuit.

### LOOP FILTER AND CHARGE PUMP CURRENT

The loop filter schematic is included in the evaluation board and can be found at [www.analog.com/CN0285-DesignSupport](http://www.analog.com/CN0285-DesignSupport).

The default loop filter is set to 70 kHz. Using a charge pump setting of 2.5 mA is recommended.

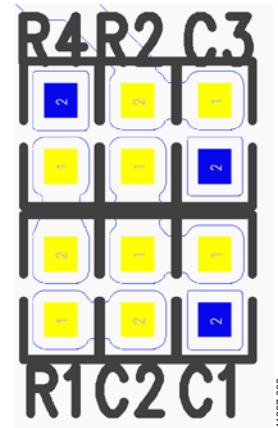


Figure 2. Loop Filter Layout

### REFERENCE SOURCE

The 25 MHz TCXO from Rakon provides the necessary reference signal. An external REFIN can be used if desired. In this case, disable the on-board TCXO by removing R59. R9 can be populated with 50  $\Omega$  to match the impedance of the evaluation board to the external reference source.

## EVALUATION BOARD SOFTWARE QUICK START PROCEDURES

The control software for [EVAL-CN0285-EB1Z](#) uses the standard [ADF4351](#) programming software. For more details on the installation of this software, consult [UG-435, Evaluation Board for the ADF4351 Fractional-N PLL Frequency Synthesizer](#).

After installing the software, run the software by clicking the **ADI ADF435x** file on the desktop or in the **Start** menu. The software front panel opens (see Figure 3).

Confirm that **Analog Devices RFG.L Eval Board connected** is displayed in the bottom left corner of the window. Otherwise, the software has no connection to the evaluation board. In this case, check that the cable connection and USB drivers are correctly installed.

Program the RF output frequency in the **Main Controls** tab of the software front panel.

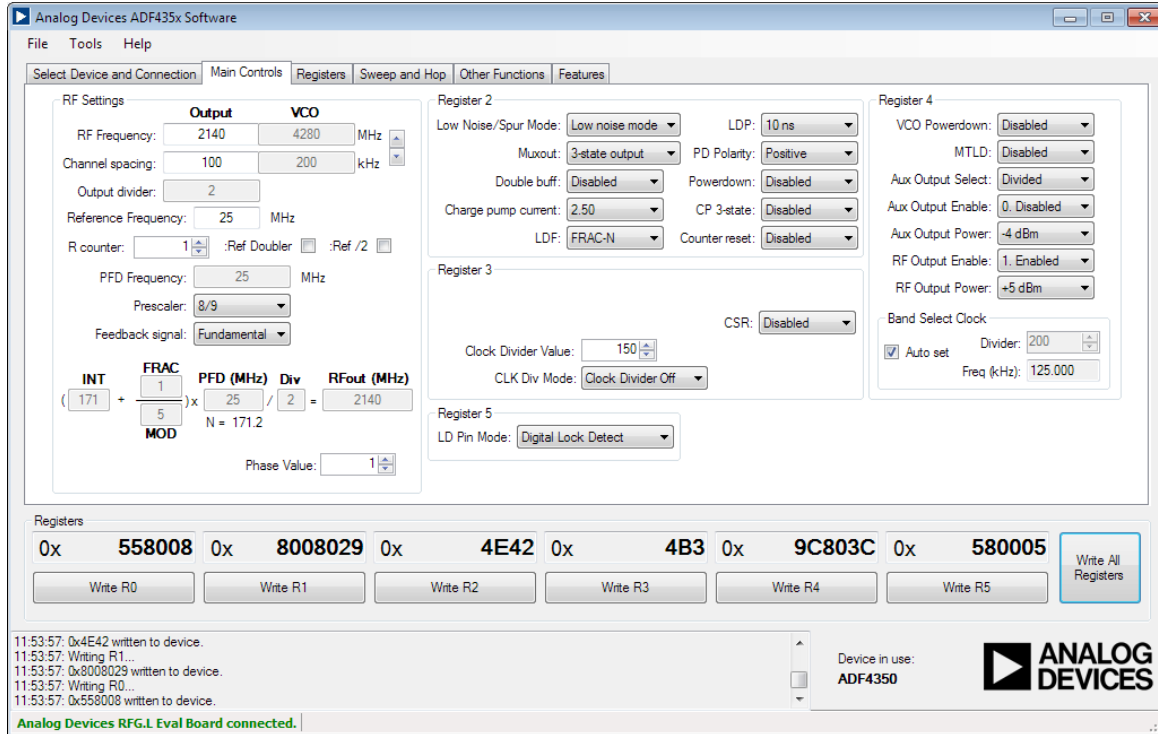


Figure 3. Software Front Panel

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## 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.

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