

LTC5594
300MHz to 9GHz High Linearity
I/Q Demodulator with
Wideband IF Amplifier

DESCRIPTION

Demonstration circuit 2645A showcases the **LTC®5594** 300MHz to 9GHz high linearity I/Q demodulator with wideband IF amplifiers. The USB serial controller, DC590B, is required to control and configure LTC5594 for its evaluation.

The DC2645A's single-ended RF input is optimized for 500MHz to 9GHz and can be easily modified for lower frequency evaluations down to 300MHz. Its single-ended LO input is programmable for 300MHz to 9GHz operation via SPI bus. The demo circuit includes discrete L-C interstage lowpass filters between the demodulator outputs

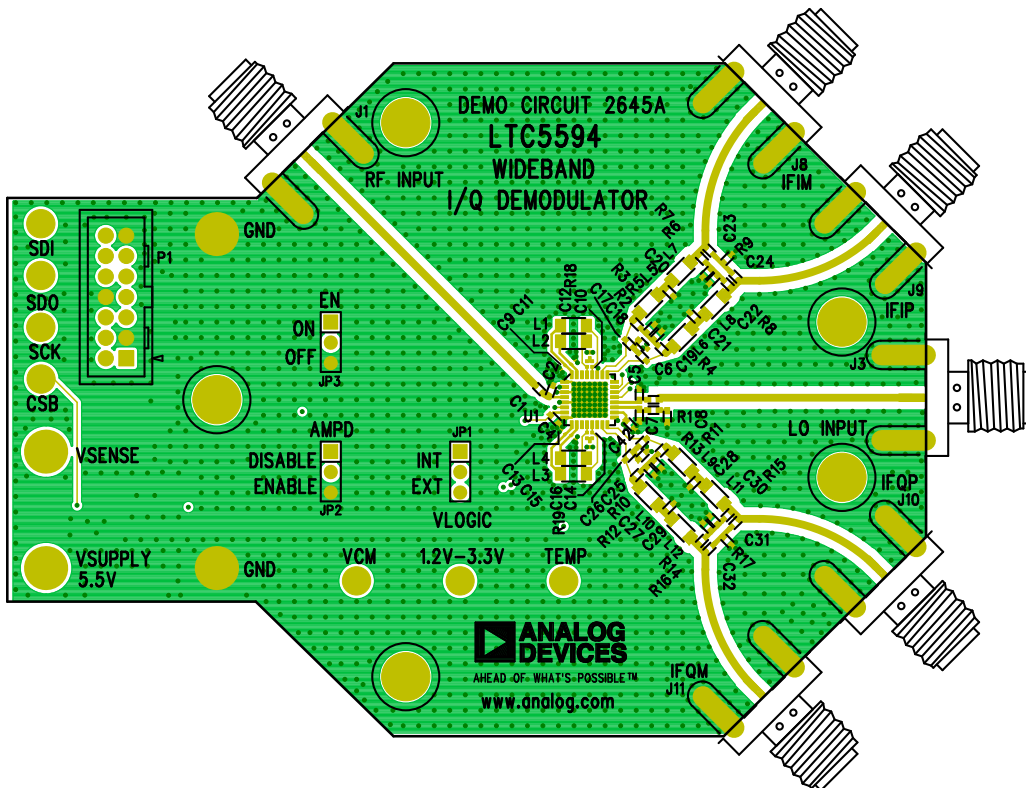
and the IF amplifier inputs, which limits the DC-coupled differential I and Q outputs to about 1GHz. (The LTC5594 data sheet lists filter component values for other cutoff frequencies.)

By writing to specific registers through SPI bus, LTC5594's IF amplifier gain, LO input frequency, output DC offset, image rejection, and linearity can be adjusted or optimized.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2645A>

All registered trademarks and trademarks are the property of their respective owners.

BOARD PHOTO



QUICK START PROCEDURE

NOTE 1: Evaluation of demonstration circuit 2645A requires DC590B USB serial controller and QuikEval™ software. Please refer to DC590B demo manual for their setup and installation.

NOTE 2: An internet connection is required for automatic download and installation of the LTC5594 software GUI. If an internet connection is not available, contact technical support for installation files.

NOTE 3: Refer to Figure 1 for proper equipment setup.

NOTE 4: Make all connections without RF and DC applied.

NOTE 5: Care should be taken to never exceed absolute maximum input ratings.

1. If not already done, install the QuikEval software and connect the DC590B USB serial controller to an internet-connected computer's USB port.
2. Set DC590B's isolated supply voltage to 3.3V by moving its VCCIO jumper (JP6) to 3.3V position.
3. Verify that the DC2645A's jumpers are set to:
 - JP1 (VLOGIC) = INT (onboard 3.3V digital supply)
 - JP2 (AMPD) = ENABLE (enable IF amplifiers)
 - JP3 (EN) = ON (turn on LTC5594 IC)
4. While the RF sources and the DC power supplies are switched off, connect all test equipment as shown in Figure 1.
5. When the DC2645A demo board is connected to the DC590B USB serial controller, the QuikEval software will automatically download and install the proper software GUI.
6. While monitoring the voltage on VSENSE, increase the VSUPPLY DC power supply voltage until VSENSE reaches 5V (VSUPPLY voltage should be approximately 5.5V). Verify the current consumption is close to the figure listed in the data sheet.
7. Increase the IF amplifier common mode output voltage, VCM, to 0.9V.
8. In the LTC5594 QuikEval computer GUI, verify that "Connected" is displayed, then press the "Soft Reset" button. See Figure 2.
9. Set the desired LO frequency and LO power, and turn on the LO signal source.
10. Use the LTC5594 QuikEval GUI to configure the LTC5594 to the same LO frequency.
11. Set the desired RF frequency and RF power, and turn on the RF source.
12. Perform measurements.
13. The LTC5594 QuikEval GUI can be used to control and configure various functions of the LTC5594. Press the button "Show Regs" will make the LTC5594's internal register visible and accessible on screen. See Figure 3.

QUICK START PROCEDURE

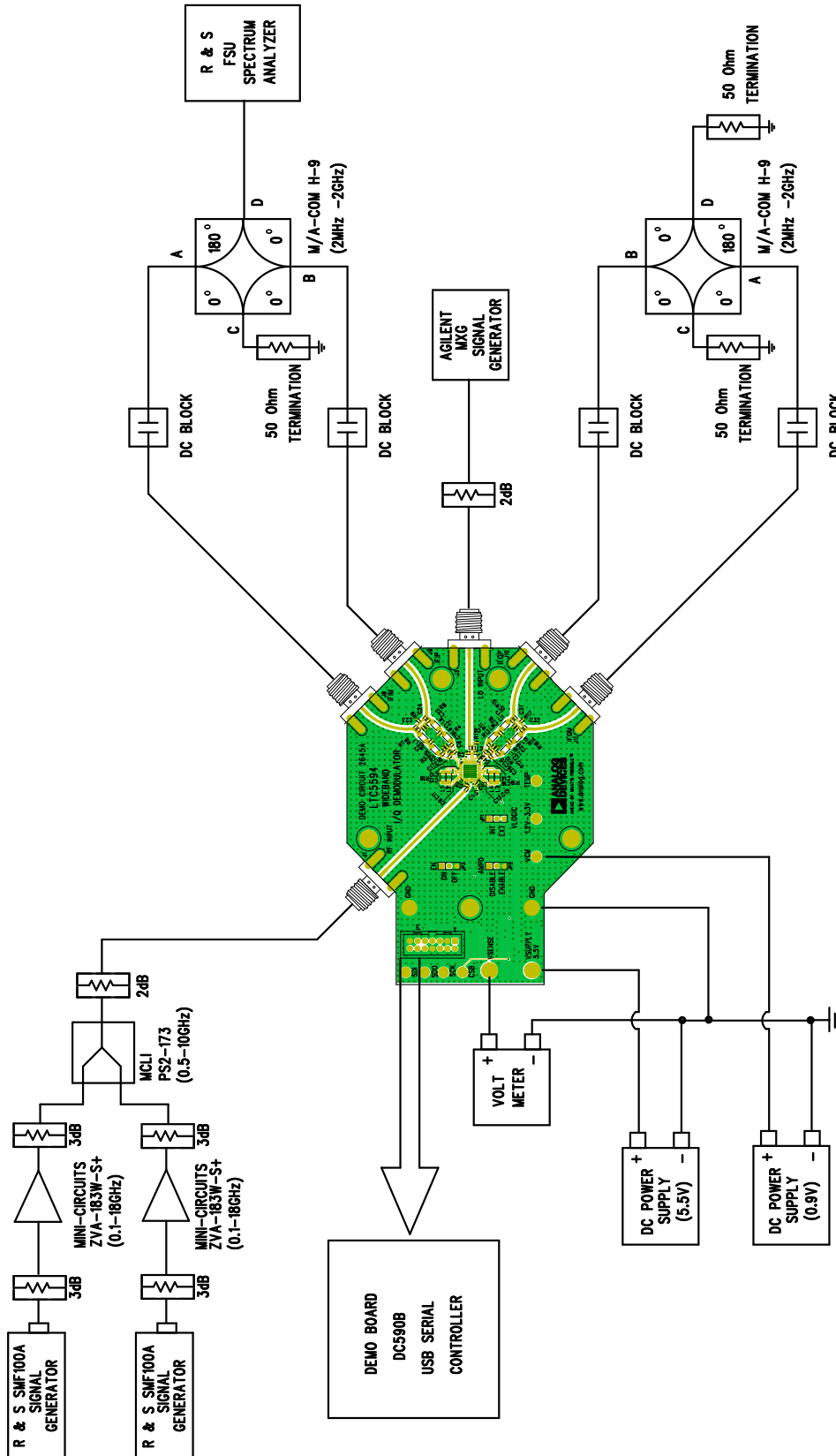


Figure 1. Proper Equipment Setup

QUICK START PROCEDURE

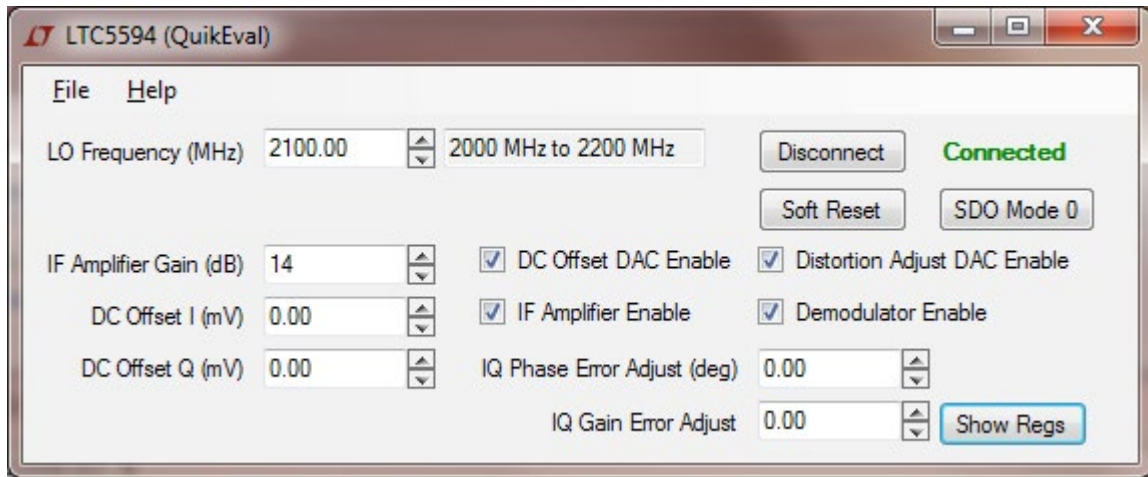


Figure 2. LTC5594 QuikEval GUI

QUICK START PROCEDURE

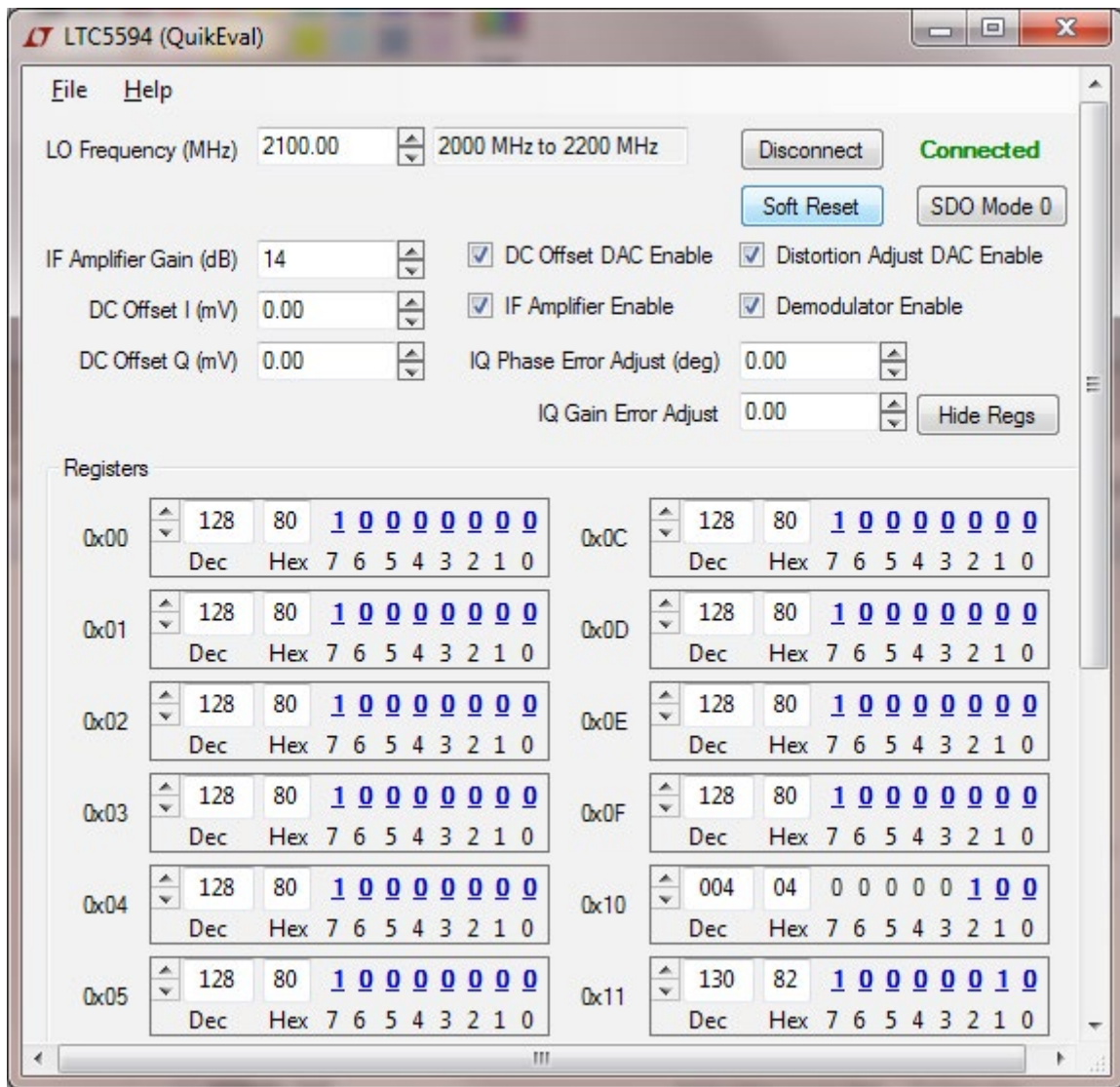


Figure 3. LTC5594 QuikEval GUI Showing Internal Registers



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.