

LTM9003 12 Bit Digital Predistortion Receiver Subsystem

DESCRIPTION

Demonstration circuit DC1437 is an evaluation board featuring Linear Technology Corporation's LTM9003 12-Bit Predistortion Receiver Subsystem. DC1437 demonstrates good circuit layout techniques and recommended external circuitry for optimal system performance.

DC1437 comes with Linear Technology's 12-bit LTM9003 receiver subsystem installed. The board includes output LVDS buffers. **The LTM9003 is also capable of generating CMOS outputs – for evaluation of the part with CMOS outputs, obtain DC1438.** DC1437 plugs into the DC890 Data Acquisition demo board and

the output can be easily analyzed with Linear Technology's PScope data processing software, which is available for no charge on our website at <http://www.linear.com>.

Design files for this circuit board are available. Call the LTC factory.

LT, LTC, LTM, LT, Burst Mode, OPTI-LOOP, Over-The-Top and PolyPhase are registered trademarks of Linear Technology Corporation. Adaptive Power, C-Load, DirectSense, Easy Drive, FilterCAD, Hot Swap, LinearView, µModule, Micropower SwitcherCAD, Multimode Dimming, No Latency $\Delta\Sigma$, No Latency Delta-Sigma, No R_{SENSE}, Operational Filter, PanelProtect, PowerPath, PowerSOT, SmartStart, SoftSpan, Stage Shedding, SwitcherCAD, ThinSOT, UltraFast and VLDO are trademarks of Linear Technology Corporation. Other product names may be trademarks of the companies that manufacture the products.

QUICK START PROCEDURE

Validating the performance of the LTM9003 is simple with DC1437, and requires only two input sources, a clock source, a computer, and a lab power supply. Refer to Figure 1 for proper board evaluation equipment setup and follow the procedure below:

1. Connect the power supply as shown in Figure 1. There are on-board low-noise voltage regulators that provide the supply voltage for the DC1437. The entire board and all components share a common ground. The power supply should still be a low-noise lab power supply capable of supplying at least 1 Amp.
2. Provide an encode clock to the ADC via SMA connector J7. Use a low-phase-noise clock source such as a filtered RF signal generator or a high-quality clock oscillator.

NOTE. Similar to having a noisy input, a high-jitter (phase noise) encode clock will degrade the signal-to-noise ratio (SNR) of the system.

Table 1: DC1437 Connectors and Jumpers

REFERENCE	FUNCTION
J2 (MODE)	Output Format and Clock Duty Stabilizer pin. Default is VDD.
J3 (SHDN/OE)	Enables/disables the ADC. Default is ON.
J4 (SENSE)	Reference input to adjust the full-scale range of the DC1437. Default is VDD.
J5 (RF)	Board RF Signal Input. Impedance-matched to 50Ω for use with lab signal generators.
J6 (MIXER/AMP ENABLE)	Enables/disables the RF mixer & amplifier. Default is ON.
J7 (CLK)	Board Clock Input. Impedance-matched to 50Ω. Drive with a low-phase-noise clock oscillator or filtered sine wave signal source.
J9 (LO)	Board LO Signal Input. Impedance-matched to 50Ω for use with lab signal generators.
TP1 (EXT REF)	Reference input to adjust the full-scale range of the LTM9003. Connects to the SENSE pin; by default, tied to VDD for internal reference.
TP2 (GND)	DC ground.
TP3 (+3.3V)	DC Supply input (3.3VDC).
TP4 (GND)	DC ground.
TP5 (+5V)	DC Supply input (5VDC).

3. Apply an RF input signal to the board. For best results, use a low distortion, low noise signal gen-

DC1437

erator with sufficient filtering to avoid degrading the performance of the receiver.

4. Apply an LO input signal to the board. Note that the difference in frequency between this signal and the RF signal will be the IF frequency resulting at the IF filter and ADC input.

5. Observe the ADC output with demo circuit DC890B, a USB cable, a Windows computer, and Linear Technology's PScope data processing software. Note that DC890B will also require an external +6V/1A power supply when receiving LVDS outputs.

NOTE. Even a high-quality signal synthesizer will still have noise and harmonics that should be attenuated with a low-pass or band-pass filter. For good-quality high order filters, see TTE, Lark Engineering, or equivalent.

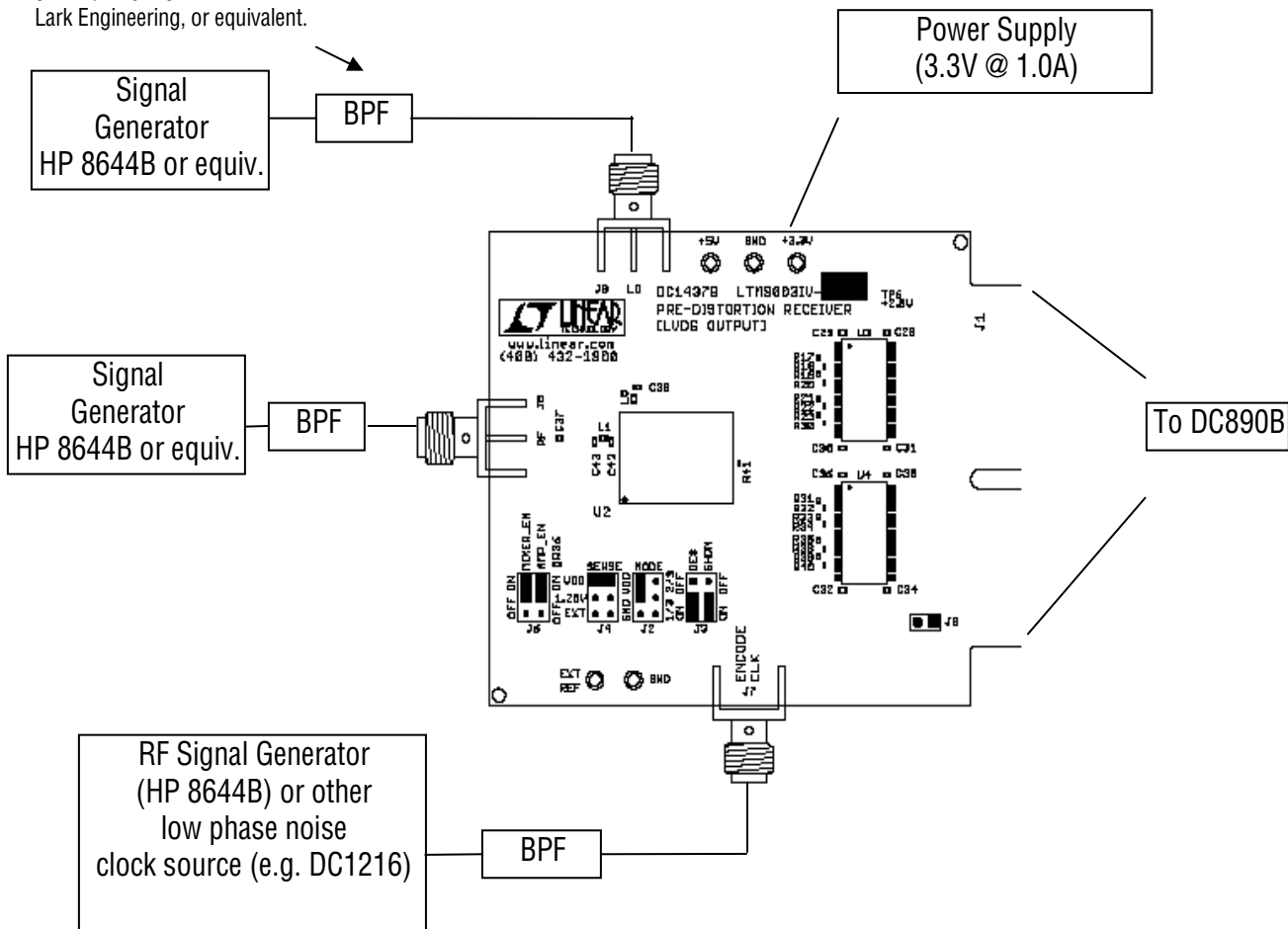


Figure 1. Proper Measurement Equipment Setup

OTHER BOARD CIRCUITRY

Device U1 is an EEPROM device that is used by the PScope software to identify the board and apply the correct settings for the data collection.

USING PSCOPE SOFTWARE

PScope, downloadable from Linear Technology's website <http://www.linear.com/>, processes data from the DC890B FastDAACS board and displays FFT and signal analysis information on the computer screen.

The on-board EEPROM U1 should enable automatic board detection and auto-configuration of the software, but if the user wishes to change the settings, they can easily do so.

From the Configure menu in the toolbar, uncheck "Autodetect Device". The default settings for DC1437 are shown in Figure 2.

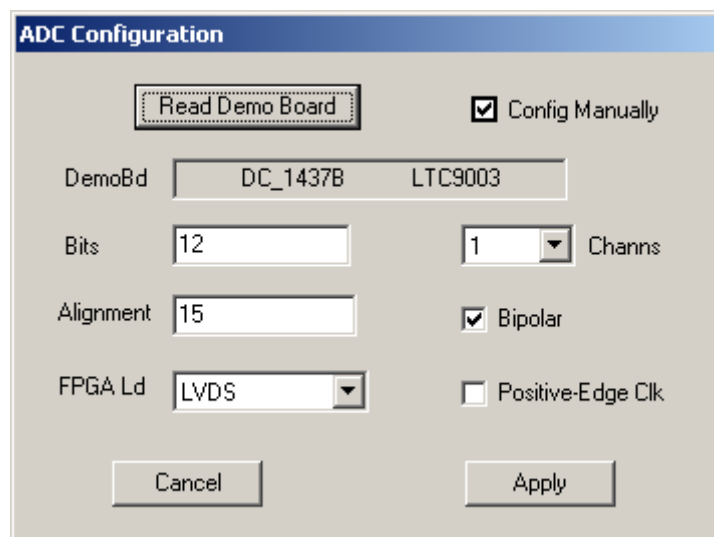


Figure 2. Entering the correct device information for your ADC. Select the correct parameters for the DC1437. Under normal conditions, PScope should automatically recognize the board and adjust the software settings accordingly.

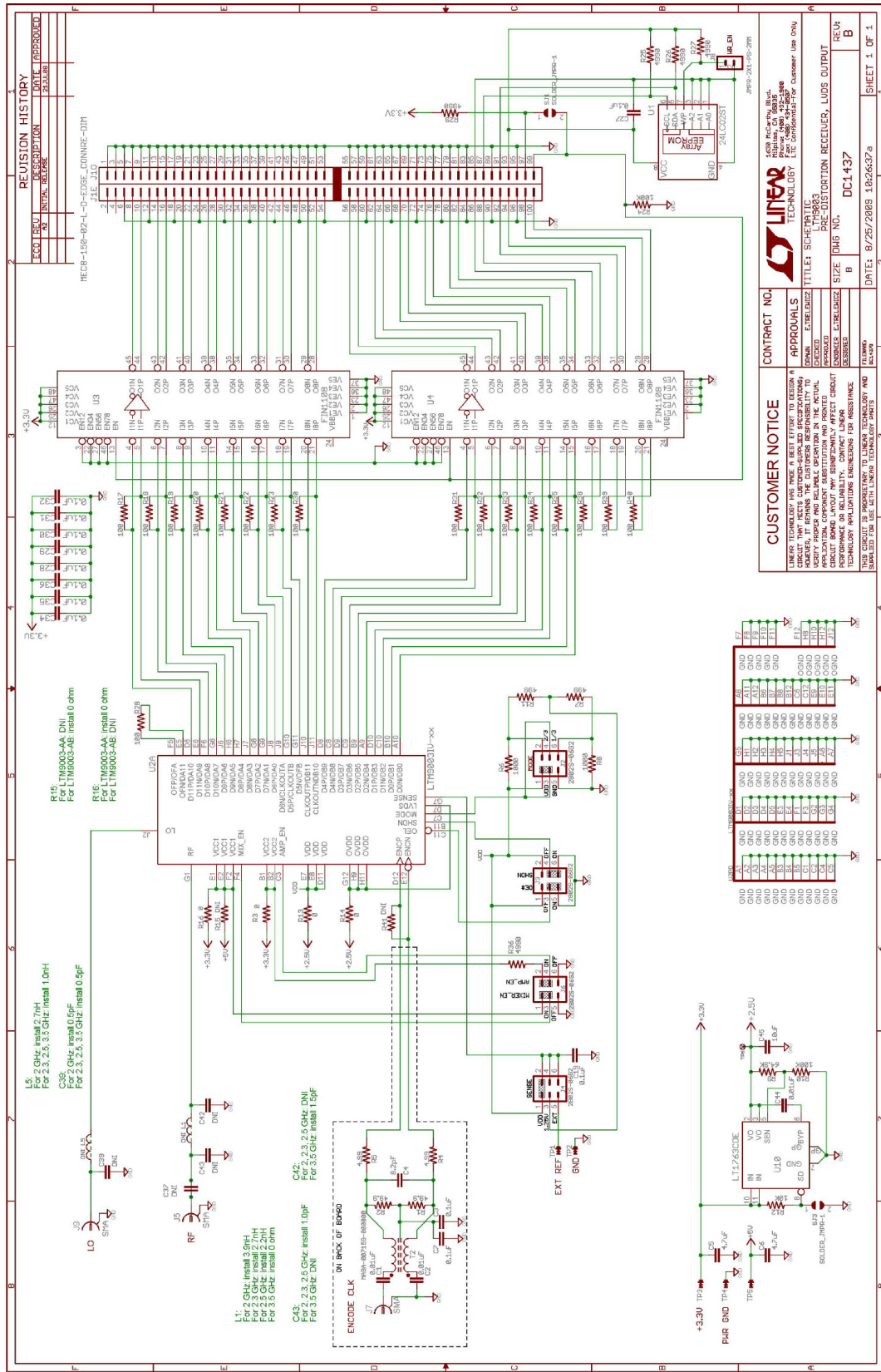


Figure 3. Schematic.