

FEATURES

Self-Contained Board Including Synthesizer, VCO, TCXO for reference frequency, and Loop Filter (5.8GHz)

Designed For 10 MHz PFD Frequency, minimum charge pump current and 20 kHz Loop Bandwidth

Accompanying Software Allows Complete Control of Synthesizer Functions from PC

Battery Operated: Choice of 3V or 5V Supplies

GENERAL DESCRIPTION

This board is designed to allow the user to evaluate the performance of the ADF4157 Frequency Synthesizer for PLL's (Phase Locked Loops). The block diagram of the board is shown below. It contains the ADF4157 synthesizer, a pc connector, SMA connectors for the power supplies and RF output. There is also a low pass loop filter (8kHz) and a VCO (Sirenza VCO940ME03 5.8GHz) on board. The evaluation board is set up for a 10MHz PFD comparison frequency. An on-board TCXO provides the 10MHz reference frequency. A cable is included with the board to connect to a pc printer port.

The package also contains windows software (XP compatible) to allow easy programming of the synthesizer.

BLOCK DIAGRAM

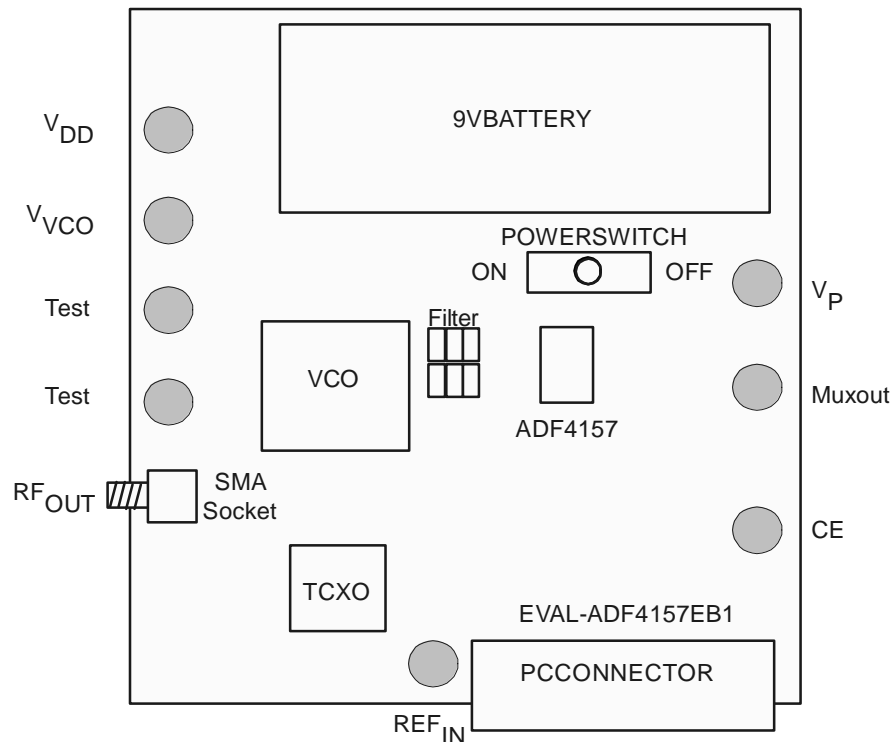


Figure 1.

Rev.PrA

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HARDWARE DESCRIPTION

OVERVIEW

The evaluation board comes with a cable for connecting to the printer port of a PC. The board schematic is shown on pages 4 and 5.

POWER SUPPLIES

The board is powered from a single 9V battery. The power supply circuitry allows the user to choose 3V for the ADF4157 V_{DD} and either 3V or 5V for the ADF4157 V_P and for the VCO supply. The default settings are 3V for the ADF4157 V_{DD} and 5V for the ADF4157 V_P and for the VCO supply.

It is very important to note that the ADF4157 V_{DD} should never exceed the ADF4157 V_P . This can cause damage to the device.

If the user wishes, external power supplies may be used. In this case, you need to insert SMA connectors as shown on the silk screen and block diagram.

LOCAL OSCILLATOR COMPONENTS

The 10MHz TCXO provides the reference frequency. The on-chip R divider should be set to 1, so that the PFD frequency is also 10MHz. The PLL is made up of the 10MHz TCXO, the ADF4157, a passive loop filter (8kHz bandwidth), and the VCO940ME03 VCO from ZComm. The output is available at RFOUT through a standard SMA connector.

The on-board loop filter has been designed for a charge pump current of 0.3125mA. ADIsimPLL (www.analog.com/pll) can be used to design other loop filters.

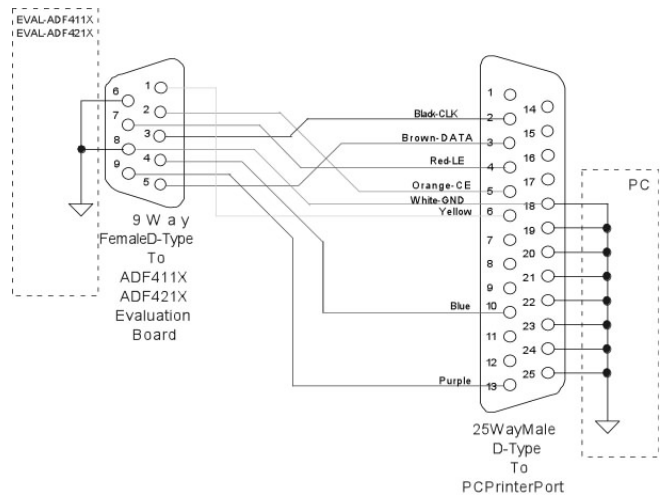


Figure 2. PC Cable Diagram

SCHEMATICS

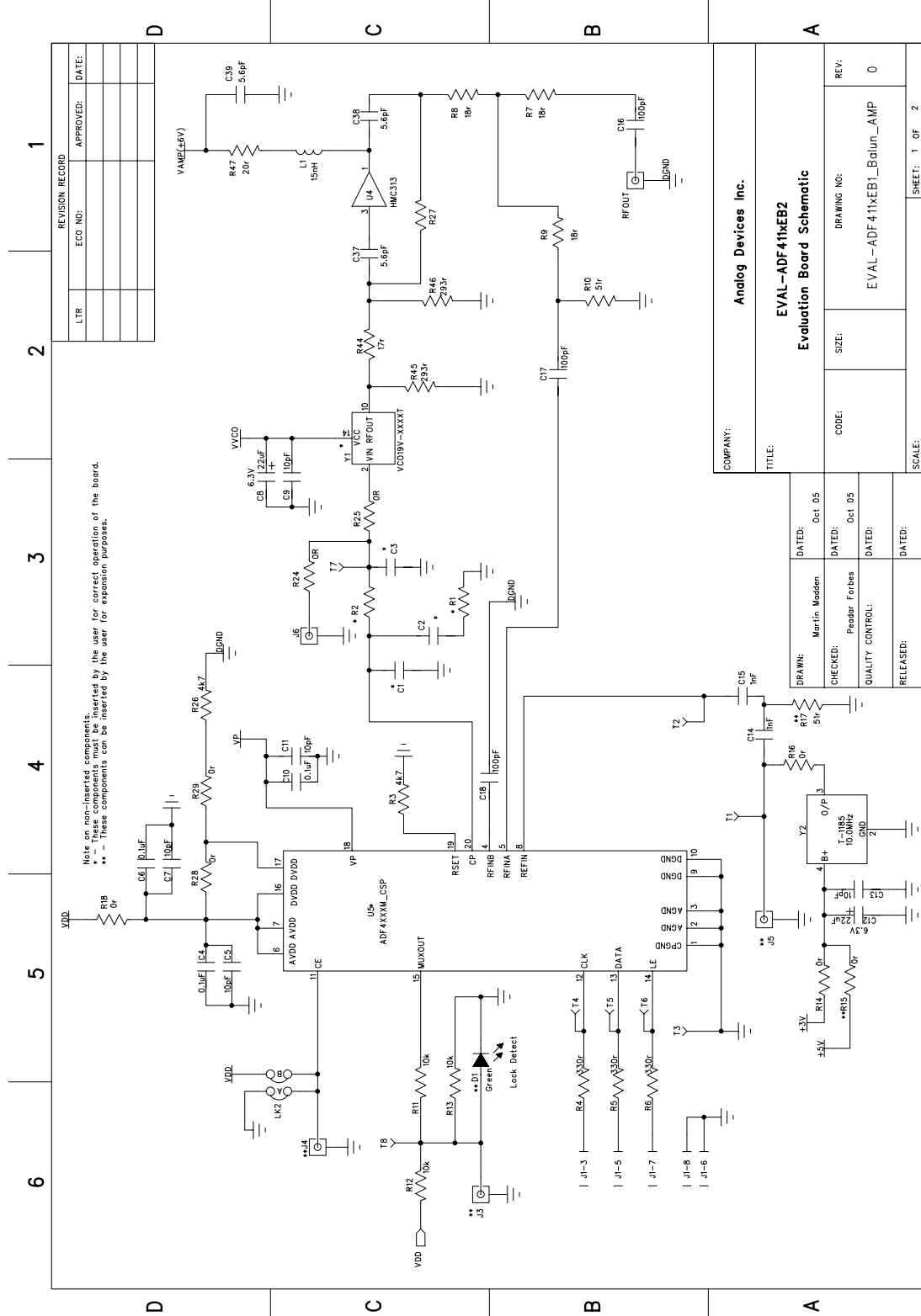


Figure 3. Evaluation Board Schematic (Page 1)

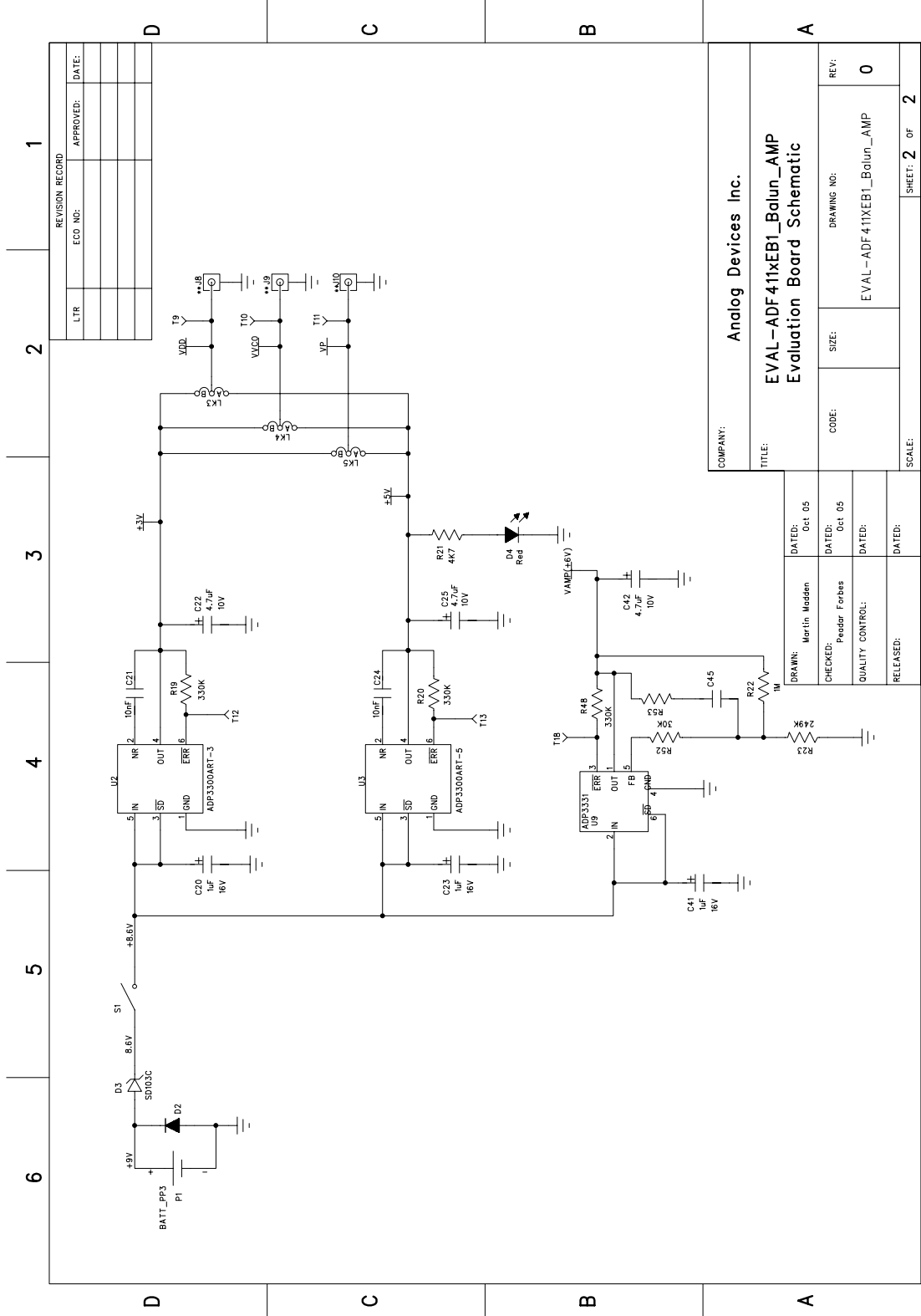


Figure 4. Evaluation Board Schematic (Page 2)

TEST SET UP

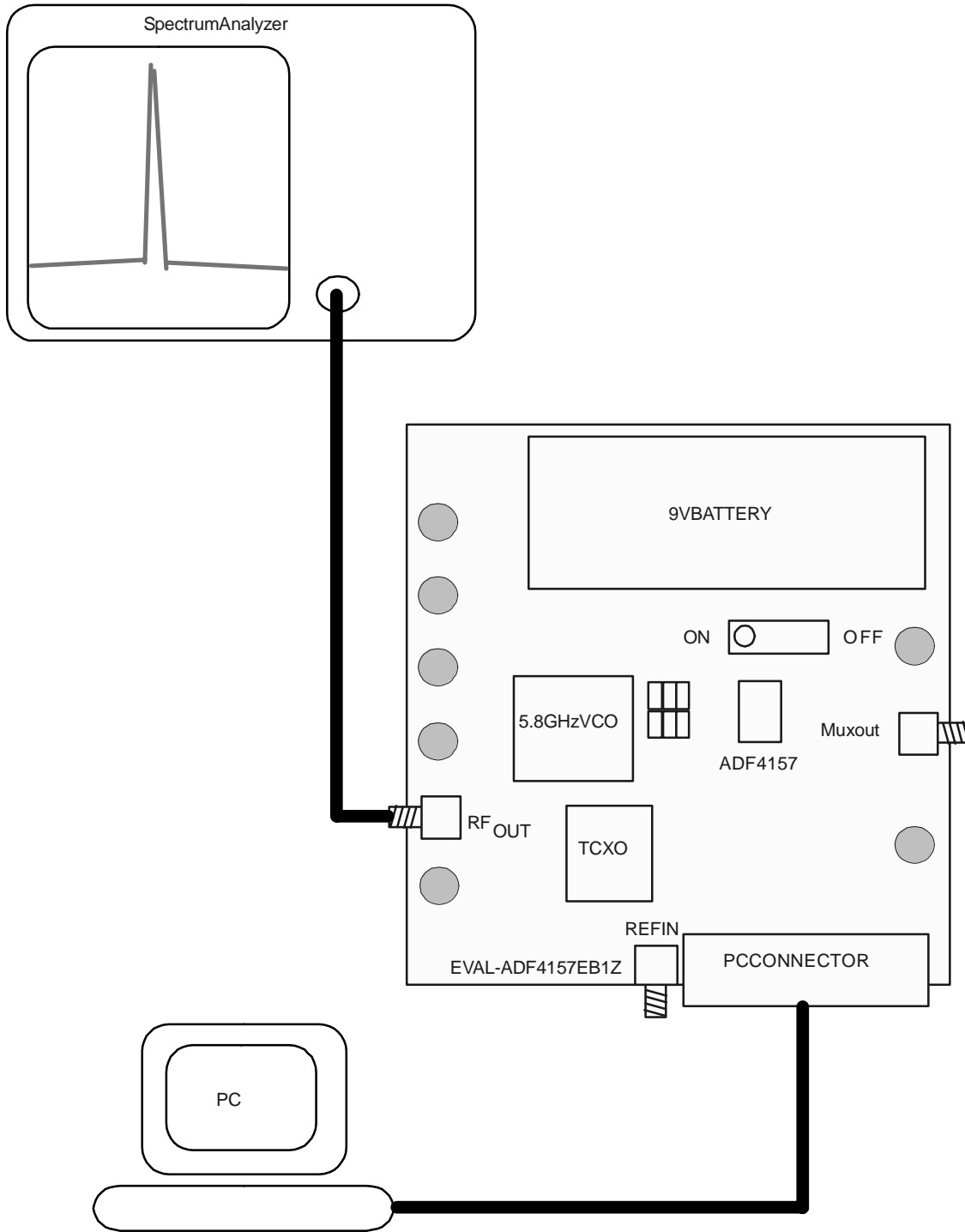


Figure 5. Test Set Up

SOFTWARE

SOFTWARE DESCRIPTION

The control software for EVAL-ADF4157EB1Z is on the CD which accompanies the board. If the user clicks on “setup.exe”, then the install wizard guides the user through the install process. Simply follow the on-screen instructions. The software will be installed in a default directory call “C:/Program Files/Analog Devices/ADF4x5x”. To run the software, click on ADF_Frac_Rev3.exe.

Before the main software screen appears, the Device Window is shown. This will ask the user to choose which device is being evaluated. Choose ADF4157 and click OK.

The Main Interface Window will now appear. This is shown below in Figure 6. Change the Reference frequency to 10MHz by clicking on the REFIn frequency. Click “Update R0 and R1 (Normal Mode)” and then “Exit Window”. Click on “Update All Registers”. The data is now set up and other features can be examined by the user. To change the VCO output frequency and/or channel spacing, click on the text of the “RF VCO Output Frequency”. The output frequency window will appear and you can change this value. The on-board loop filter has been designed for a charge pump current of 0.3125mA.

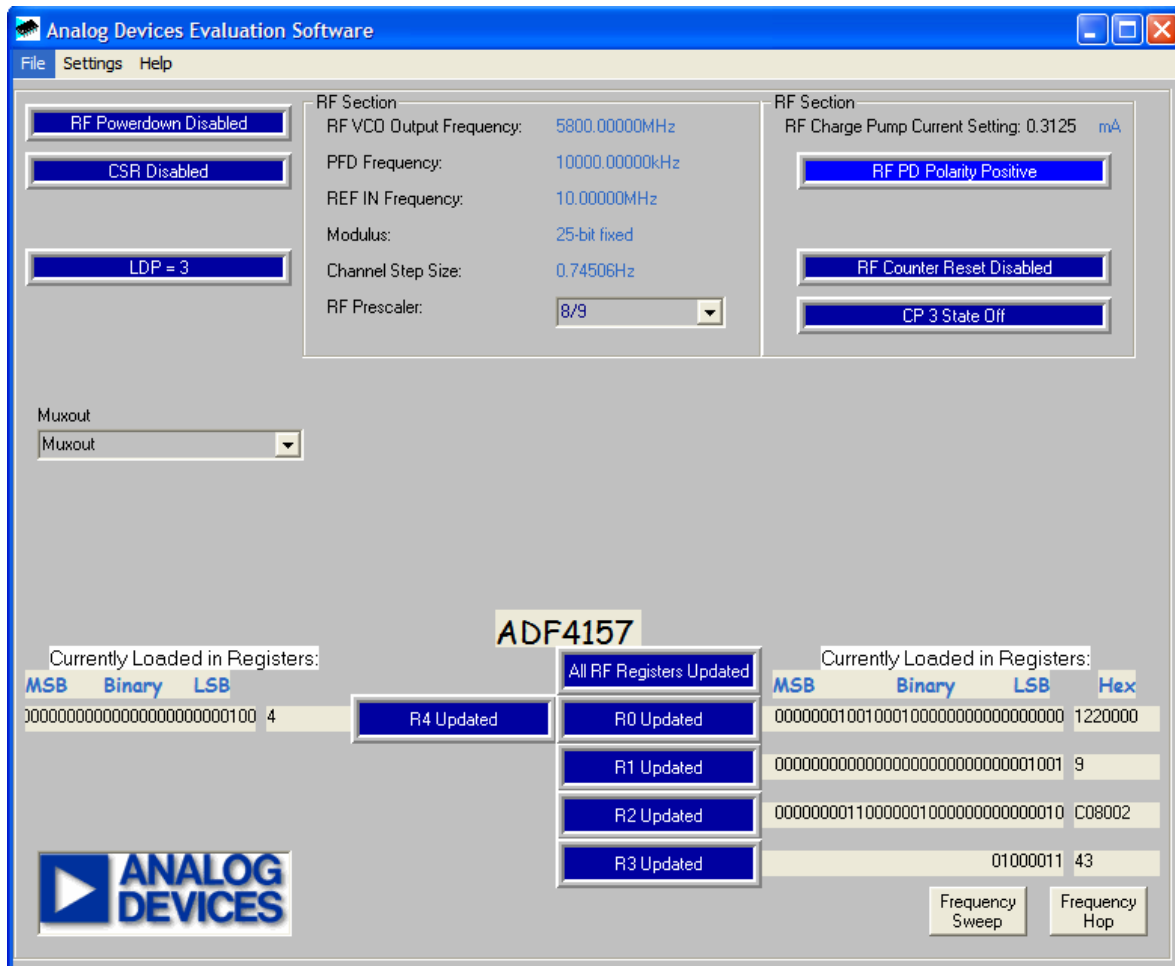


Figure 6. Software Front Panel

BILL OF MATERIALS

Name	Part Type	Value	PCB Decal	Stock Code	Assemble
C1	CAP	3.3nF	0805	317251	Yes
C2	CAP	47nF	0805	1118180	Yes
C3	CAP	1.2nF	0805	3019664	Yes
C4	CAP	0.1uF	0603	FEC 499-675	Yes
C5	CAP	10pF	0603	FEC 499-110	Yes
C6	CAP	0.1uF	0603	FEC 499-675	Yes
C7	CAP	10pF	0603	FEC 499-110	Yes
C8	CAP+	22uF 6.3V	CAP\TAJ_A	FEC 197-038	Yes
C9	CAP	10pF	0603	FEC 499-110	Yes
C10	CAP	0.1uF	0603	FEC 499-675	Yes
C11	CAP	10pF	0603	FEC 499-110	Yes
C12	CAP+	22uF 6.3V	CAP\TAJ_A	FEC 197-038	Yes
C13	CAP	10pF	0603	FEC 499-110	Yes
C14	CAP	1nF	0603	FEC 317-202	Yes
C15	CAP	1nF	0603	FEC 317-202	Yes
C16	CAP	100pF	0603	FEC 499-122	Yes
C17	CAP	100pF	0603	FEC 499-122	Yes
C18	CAP	100pF	0603	FEC 499-122	Yes
C20	CAP+	1uF	CAP\TAJ_A	FEC 498-701	Yes
C21	CAP	10nF	0603	FEC 499-146	Yes
C22	CAP+	4.7uF 10V	CAP\TAJ_A	FEC 498-658	Yes
C23	CAP+	1uF	CAP\TAJ_A	FEC 498-701	Yes
C24	CAP	10nF	0603	FEC 499-146	Yes
C25	CAP+	4.7uF 10V	CAP\TAJ_A	FEC 498-658	Yes
C37	CAP	5.6pF	0603	FEC 499-122	No
C38	CAP	5.6pF	0603	FEC 499-122	No
C39	CAP	5.6pF	0603	FEC 499-122	No
C41	CAP+	1uF	CAP\TAJ_A	FEC 498-701	Yes
C42	CAP+	4.7uF 10V	CAP\TAJ_A	FEC 498-658	Yes
C45	CAP		0805		No
D1	LED	Green	LED	FEC 657-141	No
D2	DIODE		DO35	FEC 365-117	Yes
D3	SD103C	6.2V	DO35	SD103C	Yes
D4	LED	Red	LED	FEC 657-130	Yes
J1	CON-DB9HM		DB9-HM	FEC 150-750	Yes
RFOUT	SMA		SMA_90DEG	Johnson Components 142-0701-851	Yes
J3	SMA		SMA_90DEG	Johnson Components 142-0701-851	No
J4	SMA		SMA_90DEG	Johnson Components 142-0701-851	No
J5	SMA		SMA_EDGE	Johnson Components 142-0701-851	Yes
J6	SMA		SMA_EDGE	Johnson	No

				Components 142-0701-851	
J8	SMA		SMA_90DEG	Johnson Components 142-0701-851	No
J9	SMA		SMA_90DEG	Johnson Components 142-0701-851	No
J10	SMA		SMA_90DEG	Johnson Components 142-0701-851	No
L1	IND	15nH	603	FEC 387-7036	No
LK1	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	Yes
LK2	JUMPER-2		JUMPER_2	FEC 512-035 & FEC 150-410	Yes
LK3	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	Yes
LK4	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	Yes
LK5	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	Yes
P1	BATT_PP3		BATT_PP3	FEC 723-988	Yes
P1	9V PP3 Battery			FEC 908-526	Yes
R1	RES	1.1k	0805	9332448	Yes
R2	RES	2.7k	0805	9234063	Yes
R3	RES	4k7	0805	FEC 911-938	Yes
R4	RES	330R	0603	FEC 911-143	Yes
R5	RES	330R	0603	FEC 911-143	Yes
R6	RES	330R	0603	FEC 911-143	Yes
R7	RES	18R	0603	FEC 911-021	Yes
R8	RES	18R	0603	FEC 911-021	Yes
R9	RES	18R	0603	FEC 911-021	Yes
R10	RES	51r	0603	Digikey 311- 51GCT-ND	Yes
R11	RES	0r	0603	FEC 772-227	Yes
R12	RES	10K	0603	FEC 911-355	No
R13	RES	10K	0603	FEC 911-355	No
R14	RES	0r	0603	FEC 772-227	Yes
R15	RES	0r	0603	FEC 772-227	No
R16	RES	0r	0603	FEC 772-227	sr26
R17	RES	51r	0603	Digikey 311- 51GCT-ND	No
R18	RES	0r	0603	FEC 772-227	Yes
R19	RES	330K	0603	FEC 911-537	Yes
R20	RES	330K	0603	FEC 911-537	Yes
R21	RES	4K7	0805	FEC 911-318	Yes
R22	RES	1M	0603	FEC 933-0410	Yes
R23	RES	249K	0603	FEC 422-5132	Yes
R24	RES	0R	0805	FEC 933-3681	No
R25	RES	0R	0805	FEC 933-3681	Yes
R26	RES	4k7	0805	FEC 911-318	No

R27	RES	Or	0603	FEC 772-227	Yes
R28	RES	Or	0603	FEC 772-227	Yes
R29	RES	Or	0603	FEC 772-227	No
R44	RES	Or	0603	FEC 772-227	Yes
R45	RES	293r	0603		No
R46	RES	293r	0603		No
R47	RES	20r	0603		No
R48	RES	330K	0603	FEC 911-537	Yes
R52	RES	30K	0603	FEC 933-0984	Yes
R53	RES		0603		No
S1	SW_POWER		SW_SIP-3P	FEC 150-559	Yes
T1	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T2	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T3	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T4	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T5	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T6	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T7	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T8	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T9	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T10	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T11	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T12	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T13	TESTPOINT		TESTPOINT	FEC-240-345	Yes
T18	TESTPOINT		TESTPOINT	FEC-240-345	Yes
U9	ADP3331			No	No
U2	ADP3300		SOT23-6	ADP3300ART-3	Yes
U3	ADP3300		SOT23-6	ADP3300ART-5	Yes
U4	HMC313				No
U5	ADF4157BCP		LFCSP-20	ADF4157BCPZ	Yes
Y1	VCO V940ME03		T-type	V940ME03	Yes
Y2	OSC_TCXO	10.0MHz	OSC_TCXO	Fox 801-BE	Yes