a

PLL Frequency Synthesizer Evaluation Board

EVAL-ADF411XEB1

FEATURES

General Purpose PLL Evaluation Board excluding Synthesizer, VCO, Loop Filter for generating generic PLL standards.

Compatible with :

ADF4001
ADF4110, ADF4111, ADF4112, ADF4113
ADF4116, ADF4117, ADF4118
ADF4106, ADF4107
ADF4153.

Accompanying Software allows complete control of synthesizer functions from PC

Battery Operated: Choice of 3V or 5V supplies

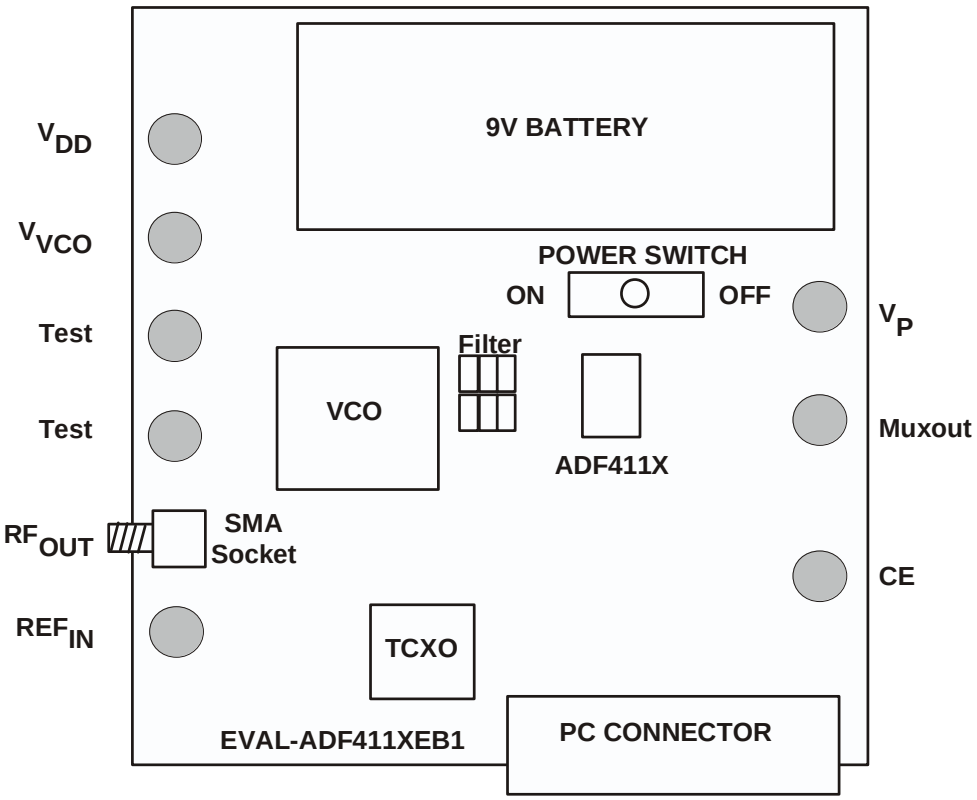
Rogers Material Substrate for improved RF performance

GENERAL DESCRIPTION

This board is designed to allow the user to evaluate the performance of the ADF4XXX Frequency Synthesizer for PLL's (Phase Locked Loops). The block diagram of the board is shown below. It contains the footprint for an ADF4XXX synthesizer, a pc connector, SMA connector for the reference input, power supplies and RF output. There is also a footprint for a loop filter and a VCO on board. 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.

BLOCK DIAGRAM



REV.PrC 12/02

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Tel: 781-329-4700 **Fax: 781-326-8703**

Hardware Description

The evaluation board comes with a cable for connecting to the printer port of a PC. The silk screen and cable diagram for the evaluation board are shown below. The board schematic is shown on pages 3 and 4.

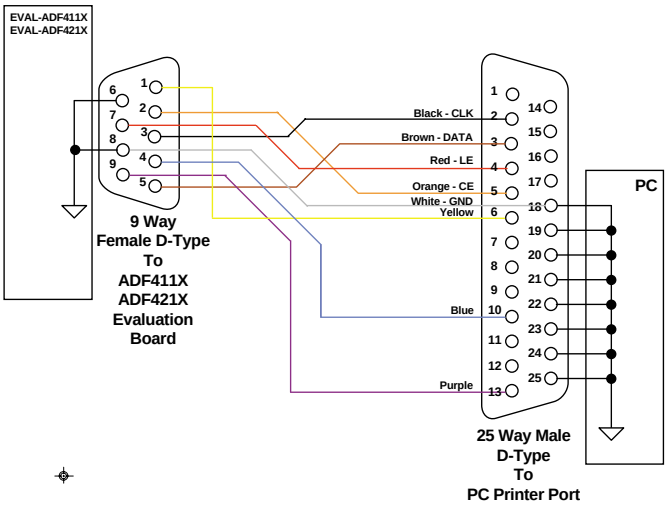


Figure 2. PC Cable Diagram

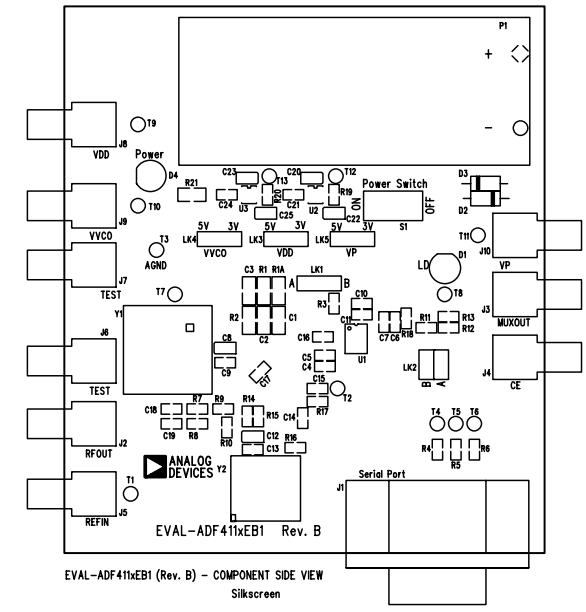


Figure 1. Evaluation Board Silkscreen

The board is powered from a single 9V battery. The power supply ciruitry allows the user to choose either 3V or 5V for the V_{DD} and V_P, and for the VCO supply. The default settings are 3V for the ADF4XXX V_{DD} and 5V for the ADF4XXX V_P and for the VCO supply. **It is very important to note that V_{DD} should never exceed V_P. This can damage the device.**

All components necessary for LO generation are catered for on-board. The TCXO connector provides the necessary Reference Input. The PLL is made up of the ADF4XXX synthesizer, passive loop filter and the VCO. The output is available at RF_{OUT} through a standard SMA connector. If the user wishes they may use their own power supplies and reference input. In this case, they need to insert SMA connectors to as shown on the silkscreen and block diagram.

Loop Design

The evaluation board does not have a VCO, loop filter or synthesizer chip. The synth and VCO are chosen by the user, depending on the frequency and applications requirements. The filter is deisgned around these requirements. On the Evaluation Kit CD, there is a copy of the ADIsimPLL software. This allows the user to enter the loop parameters. The software will design the filter, and show frequency and time domain analysis of the filter response. It also has useful schematic and report options.

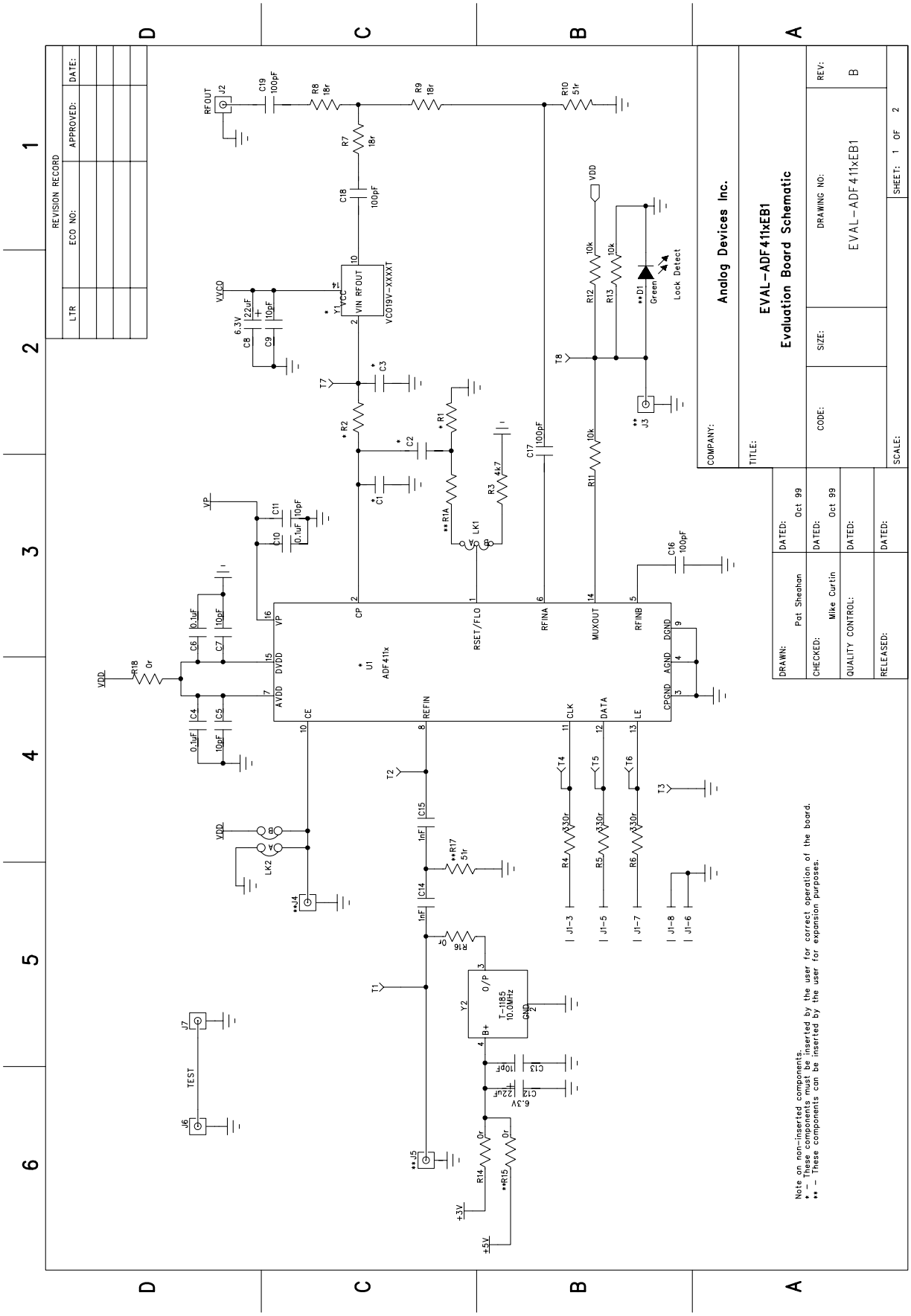


Figure 3. Evaluation Board Circuit Diagram (Page 1)

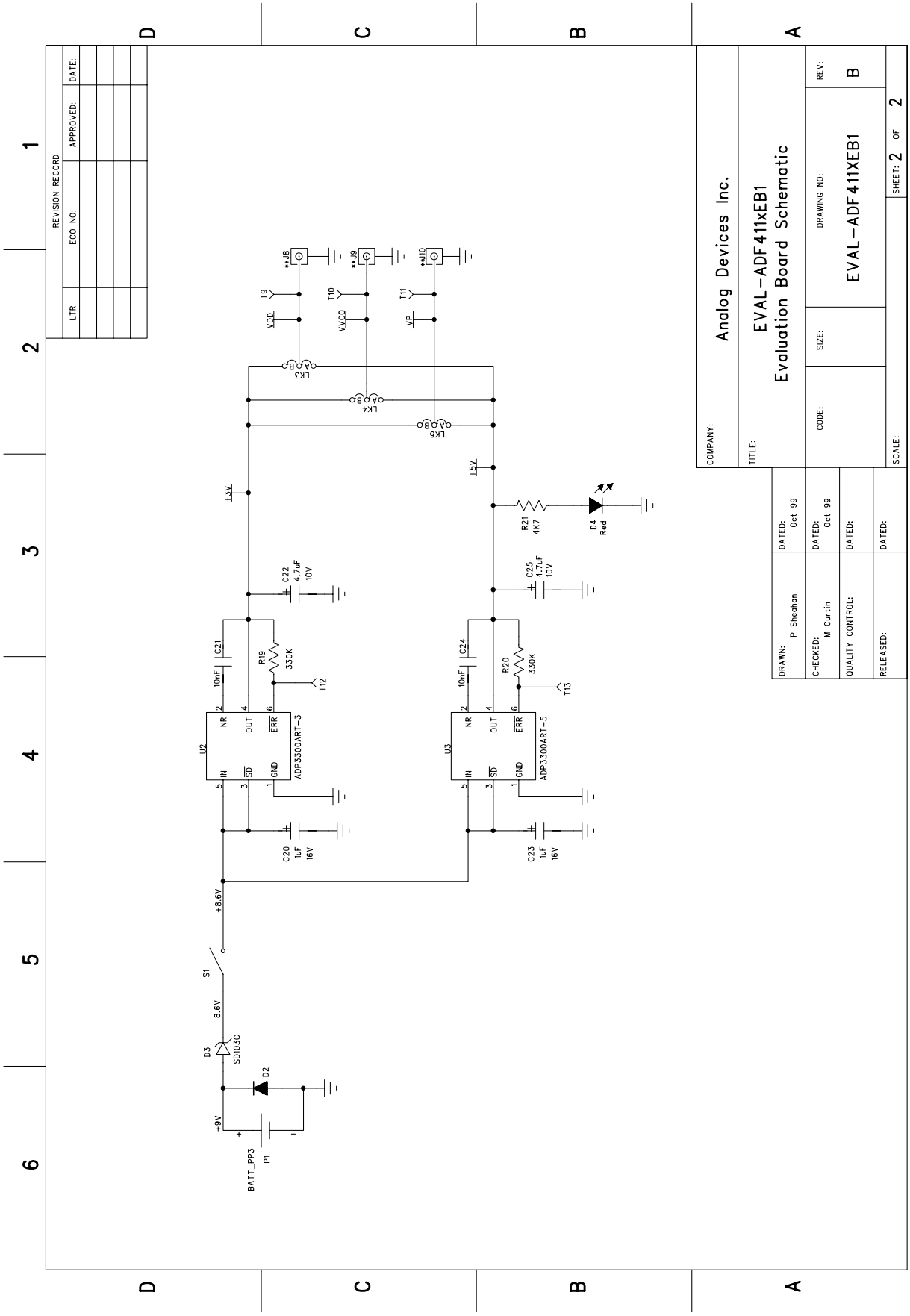
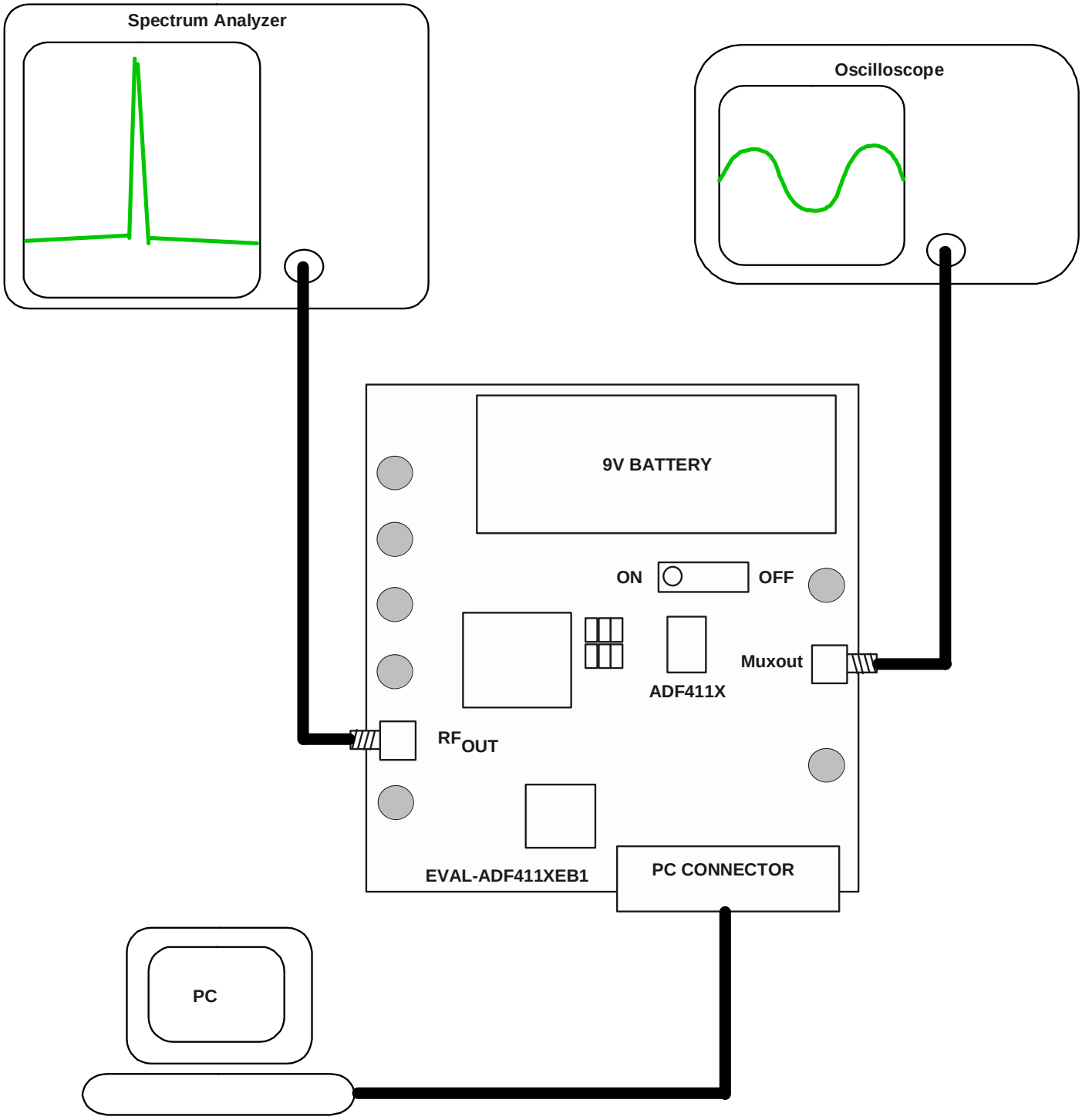


Figure 4. Evaluation Board Circuit Diagram (Page 2)



Evaluation Setup

Integer-N Software Description

The software comes on a CD. Open the Integer-N Software folder. If the user double clicks on “Setup.exe”, the install wizard installs the software. Follow the on-screen directions. The software will be installed in a default directory called "C:\Program Files\Analog Devices\ADF_Rev3.1\". To run the software, simply double-click on “ADF_Rev3_1.exe”. Ensure that the eval board is turned on, and the interface cable is connected.

Before the main software screen appears, the Device window appears, which will ask the user to choose which device is being evaluated. Choose the appropriate device, and Click OK.

The Main Interface Window will now appear. (See Figure 5)

Click on Reference Frequency, and the Reference Frequency window will appear. Enter the reference frequency being used and click OK.

Click on RF VCO Output Frequency, and the Output Frequency window will appear. Enter the output frequency and PFD reference frequency, and click OK.

Click on Charge Pump Current Setting 2 or Charge Pump Current Setting 1 and the Current Setting window will appear. Grab the pointer to set the Charge Pump Current Setting to the value used for the loop filter. Click OK.

Click on the RF PD Polarity button to set the RF PD Polarity bit.

The data is now set up, and other features can now be examined by the user.

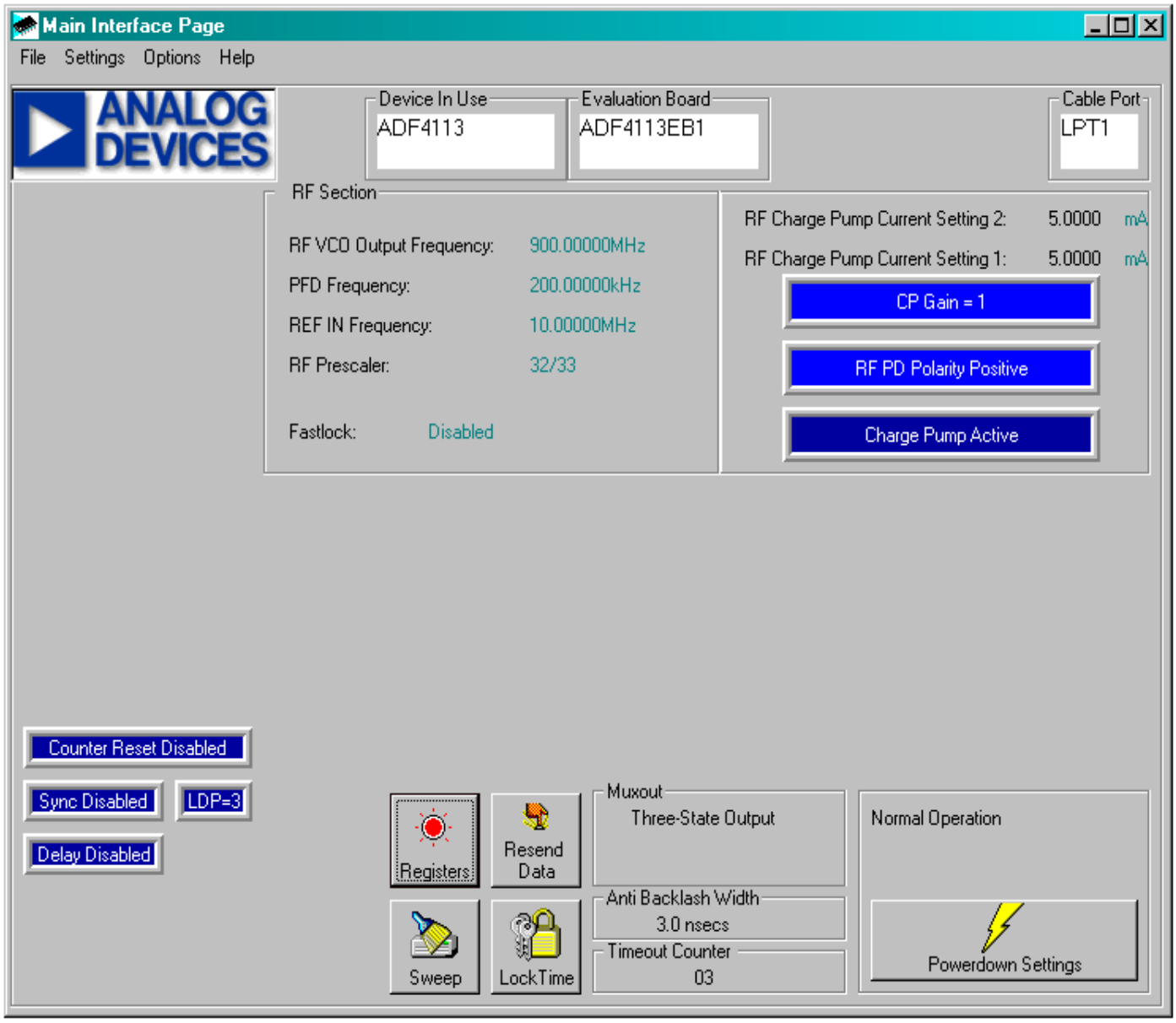


Figure 5. Integer-N Software Front Panel

Fractional-N Software Description

The software comes on a CD. Open the Fractional-N Software folder. If the user double clicks on “Setup.exe”, the install wizard installs the software. Follow the on-screen directions. The software will be installed in a default directory called "C:\Program Files\Analog Devices\ADF_Frac\". To run the software, simply double-click on “ADF_Frac_Rev2.exe”. Ensure that the eval board is turned on, and the interface cable is connected.

Before the main software screen appears, the Device window appears, which will ask the user to choose which device is being evaluated. Choose the appropriate device, and Click OK.
The Main Interface window will now appear. (See Figure 6)

Click on RF VCO Output Frequency, and the Output Frequency window will appear. Enter the RF Output frequency, PFD frequency, reference frequency and channel spacing and click "Update RO and R1" button. Now Click on the "Exit Window" Button.
Click on Charge Pump Current Setting, and the Current Setting window will appear. Grab the pointer to set the Charge Pump Current Setting to the value used for the loop filter. Click OK.
Click on the RF PD Polarity button to set the PD Polarity bit. Click on the "Update all RF Registers" button.
The data is now set up, and other features can now be examined by the user.

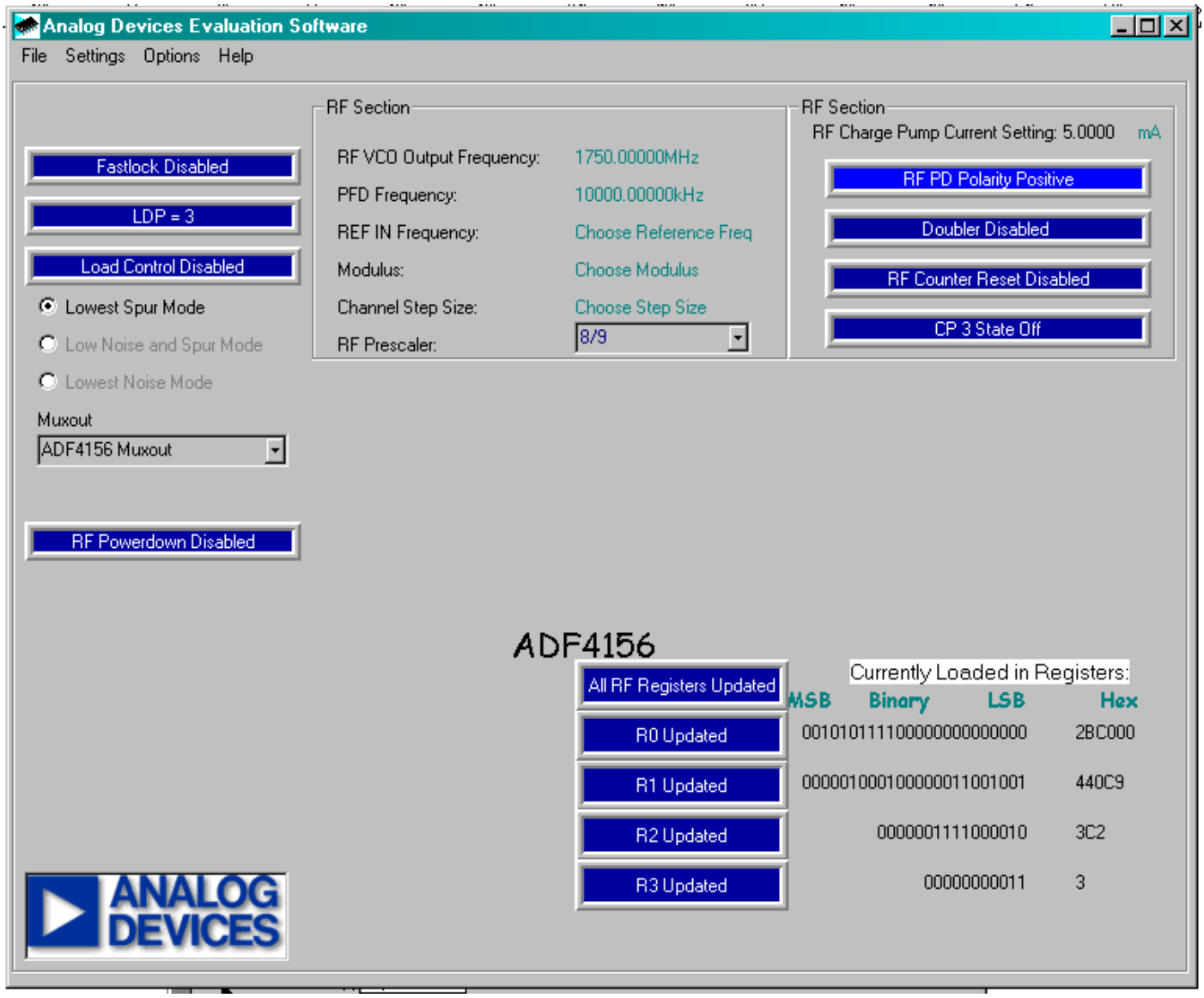


Figure 6. Fractional-N Software Front Panel

Table 1. Bill of Materials for the EVAL-ADF411XEB1

Name	Part Type	Value	PCB Decal	Stock Code	SMD	Assemble
C1	CAP		0805		Yes	No
C2	CAP		0805		Yes	No
C3	CAP		0805		Yes	No
C4	CAP	0.1uF	0603	FEC 499-675	Yes	Yes
C5	CAP	10pF	0603	FEC 499-110	Yes	Yes
C6	CAP	0.1uF	0603	FEC 499-675	Yes	Yes
C7	CAP	10pF	0603	FEC 499-110	Yes	Yes
C8	CAP+	22uF 6.3V	CAP\TAJ_A	FEC 197-038	Yes	Yes
C9	CAP	10pF	0603	FEC 499-110	Yes	Yes
C10	CAP	0.1uF	0603	FEC 499-675	Yes	Yes
C11	CAP	10pF	0603	FEC 499-110	Yes	Yes
C12	CAP+	22uF 6.3V	CAP\TAJ_A	FEC 197-038	Yes	Yes
C13	CAP	10pF	0603	FEC 499-110	Yes	Yes
C14	CAP	1nF	0603	FEC 317-202	Yes	Yes
C15	CAP	1nF	0603	FEC 317-202	Yes	Yes
C16	CAP	100pF	0603	FEC 499-122	Yes	Yes
C17	CAP	100pF	0603	FEC 499-122	Yes	Yes
C18	CAP	100pF	0603	FEC 499-122	Yes	Yes
C19	CAP	100pF	0603	FEC 499-122	Yes	Yes
C20	CAP+	1uF	CAP\TAJ_A	FEC 498-701	Yes	Yes
C21	CAP	10nF	0603	FEC 499-146	Yes	Yes
C22	CAP+	4.7uF 10V	CAP\TAJ_A	FEC 498-658	Yes	Yes
C23	CAP+	1uF	CAP\TAJ_A	FEC 498-701	Yes	Yes
C24	CAP	10nF	0603	FEC 499-146	Yes	Yes
C25	CAP+	4.7uF 10V	CAP\TAJ_A	FEC 498-658	Yes	Yes
D1	LED	Green	LED	FEC 657-141	No	No
D2	DIODE		DO35	FEC 365-117	No	Yes
D3	SD103C	6.2V	DO35	SD103C	No	Yes
D4	LED	Red	LED	FEC 657-130	No	Yes
J1	CON-DB9HM		DB9-HM	FEC 150-750	No	Yes
J2	SMA		SMA_90DEG	Pasternack PE4118	No	Yes
J3	SMA		SMA_90DEG	Pasternack PE4118	No	No
J4	SMA		SMA_90DEG	Pasternack PE4118	No	No
J5	SMA		SMA_90DEG	Pasternack PE4118	No	No
J6	SMA		SMA_90DEG	Pasternack PE4118	No	No
J7	SMA		SMA_90DEG	Pasternack PE4118	No	No
J8	SMA		SMA_90DEG	Pasternack PE4118	No	No
J9	SMA		SMA_90DEG	Pasternack PE4118	No	No
J10	SMA		SMA_90DEG	Pasternack PE4118	No	No
LK1	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	No	Yes
LK2	JUMPER-2		JUMPER_2	FEC 512-035 & FEC 150-410	No	Yes
LK3	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	No	Yes
LK4	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	No	Yes
LK5	JUMPER2\SIP3		LINK-3P	FEC 512-047 & FEC 150-410	No	Yes
P1	BATT_PP3		BATT_PP3	FEC 723-988	No	Yes
P1	9V PP3 Battery			FEC 908-526	No	Yes
R1A	RES		0805		Yes	No
R1	RES		0805		Yes	No
R2	RES		0805		Yes	No
R3	RES	4k7	0603	FEC 911-318	Yes	Yes
R4	RES	330R	0603	FEC 911-143	Yes	Yes
R5	RES	330R	0603	FEC 911-143	Yes	Yes
R6	RES	330R	0603	FEC 911-143	Yes	Yes
R7	RES	18R	0603	FEC 911-021	Yes	Yes
R8	RES	18R	0603	FEC 911-021	Yes	Yes
R9	RES	18R	0603	FEC 911-021	Yes	Yes
R10	RES	51r	0603	Digikey 311-51GCT-ND	Yes	Yes
R11	RES	10K	0603	FEC 911-355	Yes	Yes
R12	RES	10K	0603	FEC 911-355	Yes	Yes
R13	RES	10K	0603	FEC 911-355	Yes	Yes
R14	RES	0r	0603	FEC 772-227	Yes	Yes
R15	RES	0r	0603	FEC 772-227	Yes	No
R16	RES	0r	0603	FEC 772-227	Yes	Yes
R17	RES	51r	0603	Digikey 311-51GCT-ND	Yes	No
R18	RES	0r	0603	FEC 772-227	Yes	Yes
R19	RES	330K	0603	FEC 911-537	Yes	Yes
R20	RES	330K	0603	FEC 911-537	Yes	Yes
R21	RES	4K7	0805	FEC 911-318	Yes	Yes
S1	SW_POWER		SW_SIP-3P	FEC 150-559	No	Yes
T1	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T2	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T3	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T4	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T5	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T6	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T7	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T8	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T9	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T10	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T11	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T12	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
T13	TESTPOINT		TESTPOINT	FEC-240-345	No	Yes
U1	ADF411X		TSSOP-16		Yes	No
U2	ADP3300		SOT23-6	ADP3300ART-5	Yes	Yes
U3	ADP3300		SOT23-6	ADP3300ART-3	Yes	Yes
Y1	VCO19V-XXXXT		VCO19V-XXXXT		Yes	No
Y2	OSC_TCXO	10.0MHz	OSC_TCXO	T-1185	Yes	Yes