a

Evaluation Board For PLL Frequency Synthesizer

EVAL-ADF4212EB1

FEATURES

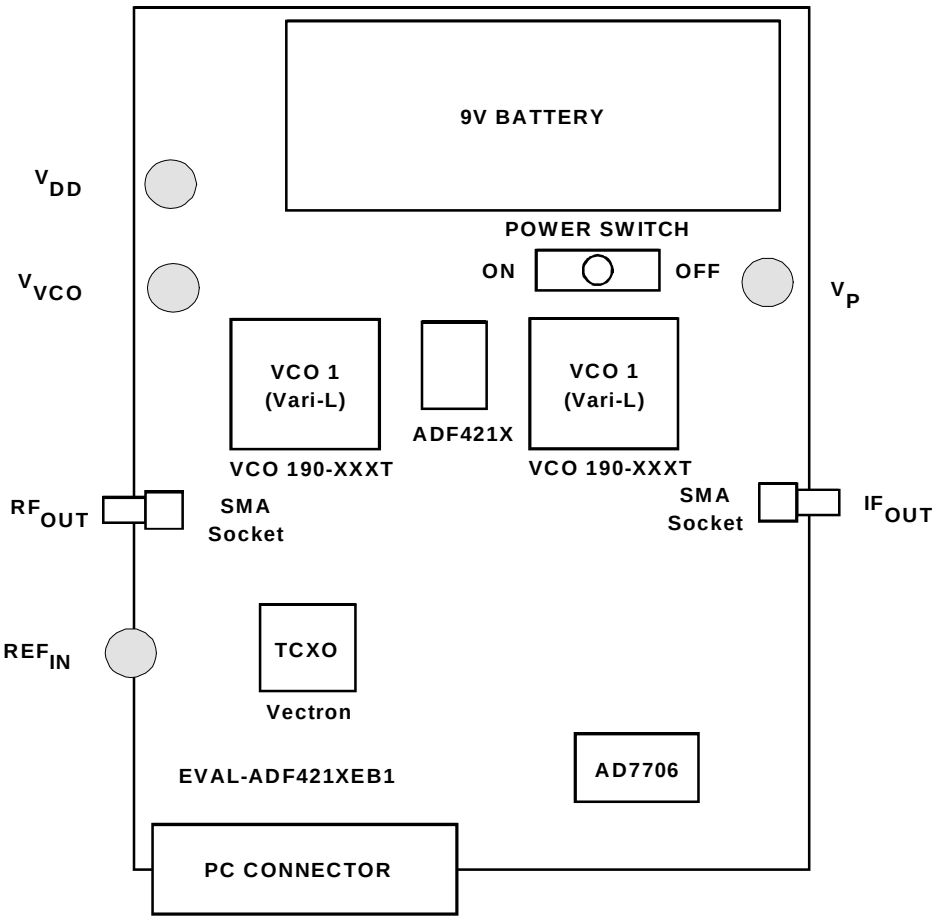
Self Contained Evaluation Board including Synthesizer, VCOs, Loop Filters for generating GSM 1800 standards (1700MHz to 1800MHz RF, 520MHz to 560MHz IF).
RF and IF filters designed for 20kHz Loop Bandwidth, and 200kHz Channel Spacing.
Accompanying Software allows complete control of synthesizer functions from PC using Windows 95/98/NT.
Battery Operated: Choice of 3V or 5V supplies
On-Board Monitoring of Voltage and Current
Typical RF Phase Noise Performance of -84dBc/Hz @1kHz offset.
Typical IF Phase Noise Performance of -90dBc/Hz @1kHz offset.
Typical Spurious Performance of batter than -80dBc @200kHz offset.

GENERAL DESCRIPTION

This board is designed to allow the user to evaluate the performance of the ADF4212 Frequency Synthesizer for PLL's (Phase Locked Loops). The block diagram of the board is shown below. It contains the footprint for a ADF4212 synthesizer, a pc connector, SMA connector for the reference input, power supplies and RF output. There is also a loop filter and a VCO for both the RF and IF section on board. A cable is included with the board to connect to a pc printer port.

The package also contains Windows 95/98/NT software to allow easy programming of the synthesizer.

BLOCK DIAGRAM



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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.

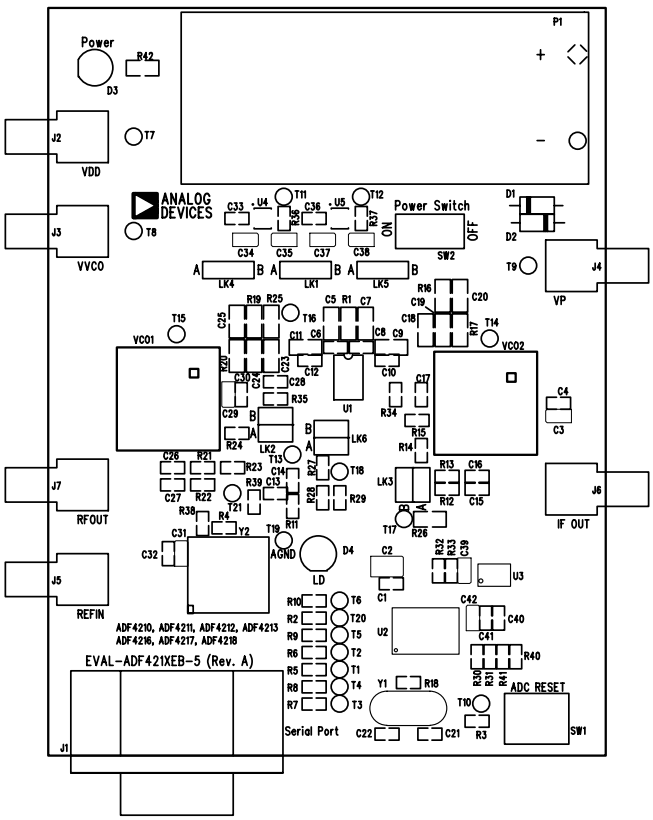

Figure 1. Evaluation Board Silkscreen

The board is powered from a single 9V battery. The power supply ciruitry allows the user to choose either 3V or 5V for the ADF4212 V_{DD} and V_P, and for the VCO supply. The default settings are 3V for the ADF4212 V_{DD} and 5V for the ADF4212 V_P and for the VCO supply. **It is very important to note that the ADF4212 V_{DD} should never exceed the ADF4212 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 RF PLL is made up of the ADF4212, passive loop filter and the VCO 190-1750T from Vari-L. The output is available at RFOUT through a standard SMA connector. The IF PLL is made up of the ADF4212, passive loop filter and the VCO 190-540T from Vari-L. The output is available at IFOUT 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.

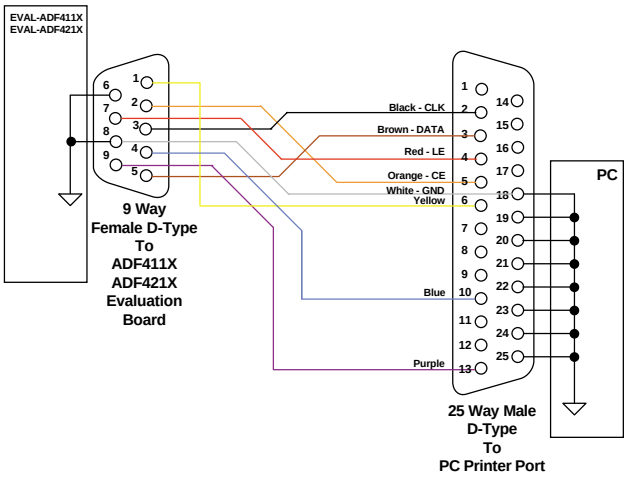

Figure 2. PC Cable Diagram

The AD7706 A/D converter is used to monitor the power supply voltage and current consumption of the ADF4212. This helps the user pick the optimum synthesizer settings for power consumption and also provides an alert if the battery voltage is too low to sustain the required 3V or 5V for the board supply.

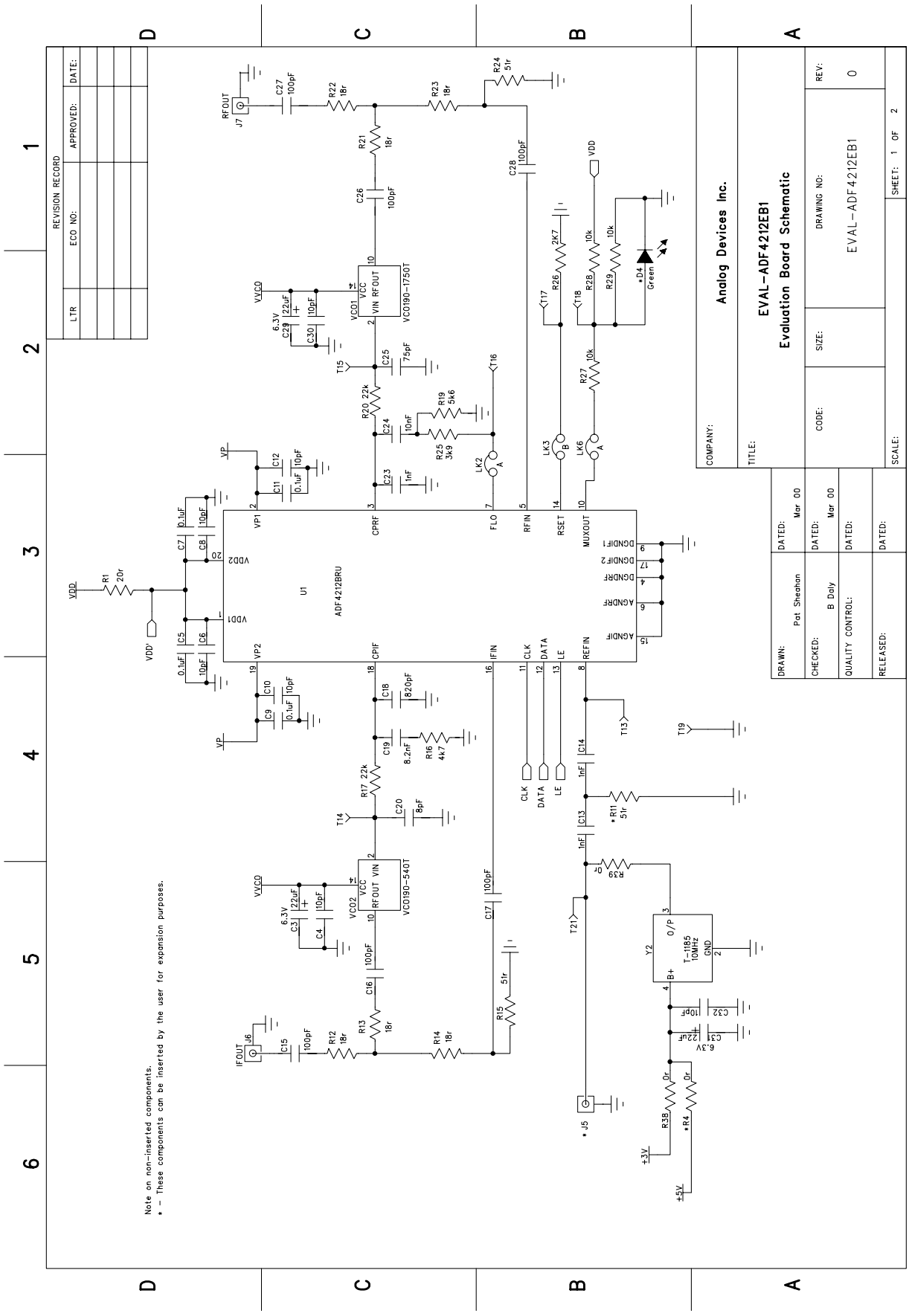

Figure 3. Evaluation Board Circuit Diagram (Page 1)

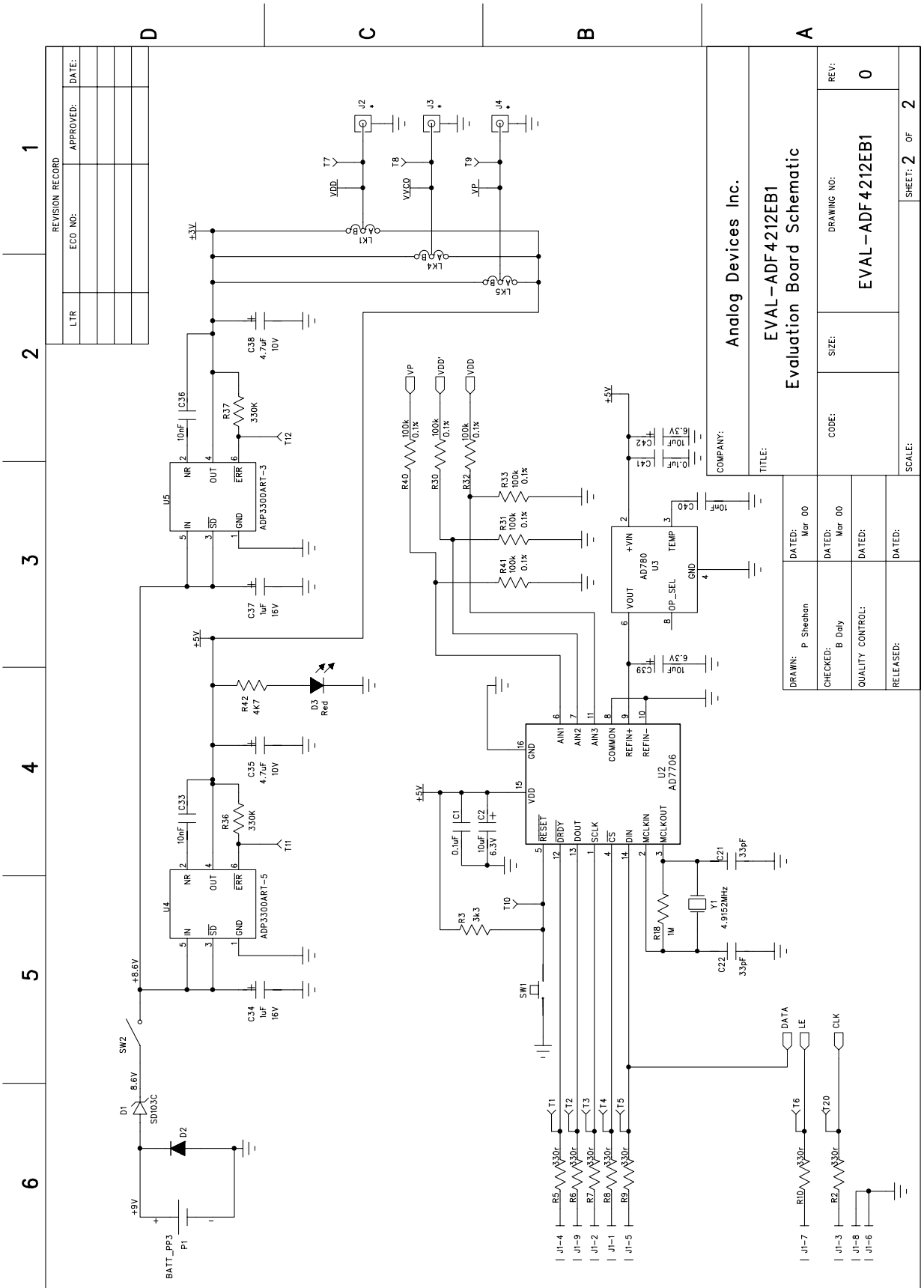

Figure 4. Evaluation Board Circuit Diagram (Page 2)

Software Description

The software comes on a CD. If the user double clicks on "ADF4XXXEvaluationSoftware.exe" on the CD, then 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\ADF4xxx Evaluation Software". To run the software, simply double-click on "ADF4XXX Eval Software.exe".

The front panel of the evaluation board software is shown below.

When the device window appears, choose ADF4212 and click OK. The main software panel now appears. Click on Eval Board in the top right hand side of the main software screen. The Eval Board Window now appears. Click on Eval-ADF4212EB1 and Click OK. This will set the correct data for the board configuartion. The device has now been programmed and other features can now be examined by the user.

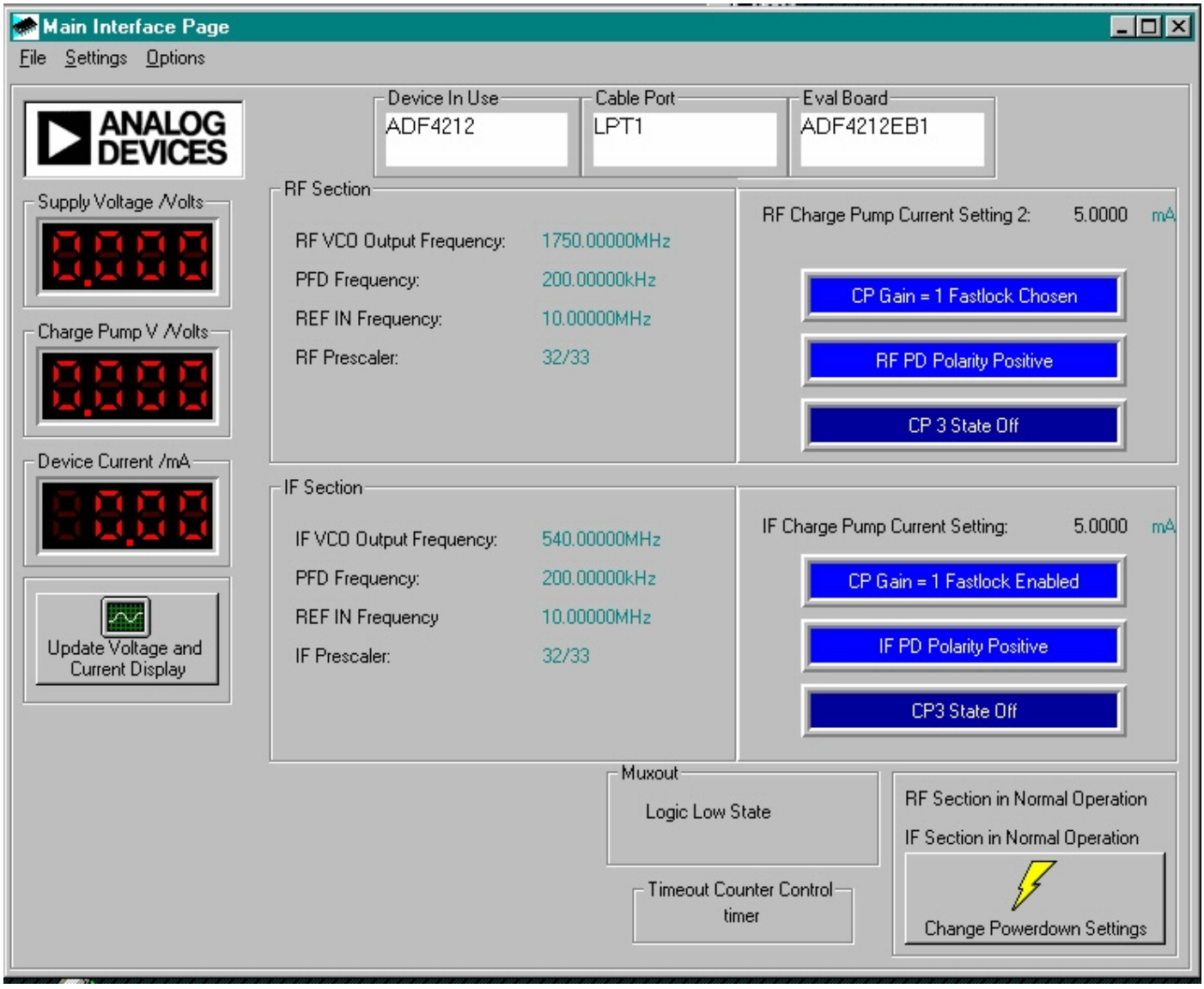

Figure 5. Software Front Panel

Table 1. Bill of Materials for the EVAL-ADF4212EB1

Qty	Reference	Description	Manufacturer	PCB DECAL	VALUE
1	U1	ADF4212BRU	ADI	TSSOP-20	ADF4212BRU
1	U2	AD7706BR	ADI	SO16WB	AD7706BR
1	U3	AD780AR	ADI	SO8NB	AD780AR
1	U4	ADP3300ART-5	ADI	SOT23-6	ADP3300ART-5
1	U5	ADP3300ART-3	ADI	SOT23-6	ADP3300ART-3
1	VCO1	1750MHz VCO	Vari-L		VCO190-1750T
1	VCO2	540MHz VCO	Vari-L		VCO190-540T
1	Y1	4.9152MHz Crystal	Vectron International	HC49 low profile	VXA4-1011
1	Y2	10 MHz TCXO	Vectron International		T-1185
1	D1	SD103C Schottky Diode	General Semiconductor	DO35	SD103C
1	D2	IN4001		D035	FEC 365-117
1	D3	Red Low Power LED	Vishay	LED	FEC 657-130
1	D4	Green Low Power LED (Do Not Insert)	Vishay	LED	FEC 657-141
6	C1 C5 C7 C9 C11 C41	Multi Layer Ceramic Capacitor	Murata	Case 0603	0.1uF
1	C2	Tantalum Capacitor	AVX	CAP\TAJ_B	10uF 6.3V
3	C3 C29 C31	Tantalum Capacitor	AVX	CAP\TAJ_A	22uF 6.3V
7	C4 C6 C8 C10 C12 C30 C32	Multi Layer Ceramic Capacitor	Murata	Case 0603	10pF
2	C13-14	Multi Layer Ceramic Capacitor	Murata	Case 0603	1nF
6	C15-17 C26-28	Multi Layer Ceramic Capacitor	Murata	Case 0603	100pF
1	C18	Multi Layer Ceramic Capacitor	Murata	Case 0805	820pF
1	C19	Multi Layer Ceramic Capacitor	Murata	Case 0805	8.2nF
1	C20	Multi Layer Ceramic Capacitor	Murata	Case 0805	8pF
2	C21-22	Multi Layer Ceramic Capacitor	Murata	Case 0603	33pF
1	C23	Multi Layer Ceramic Capacitor	Murata	Case 0805	1nF
1	C24	Multi Layer Ceramic Capacitor	Murata	Case 0805	10nF
1	C25	Multi Layer Ceramic Capacitor	Murata	Case 0805	75pF
3	C33 C36 C40	Multi Layer Ceramic Capacitor	Murata	Case 0603	10nF
2	C34 C37	Tantalum Capacitor	AVX	CAP\TAJ_A	1uF 16V
2	C35 C38	Tantalum Capacitor	AVX	CAP\TAJ_A	4.7uF 10V
2	C39 C42	Tantalum Capacitor	AVX	CAP\TAJ_A	10uF 6.3V
1	R1	Resistor (Surface Mount)	Bourns	Case 0805	20r 1.0%
7	R2 R5-10	Resistor (Surface Mount)	Bourns	Case 0603	330r 1.0%
1	R3	Resistor (Surface Mount)	Bourns	Case 0603	3k3 1.0%
1	R4	Do Not Insert	Bourns	Case 0603	
1	R11	Do Not Insert	Bourns	Case 0603	
6	R12-14 R21-23	Resistor (Surface Mount)	Bourns	Case 0603	18r 1.0%
2	R15 R24	Resistor (Surface Mount)	Bourns	Case 0603	51r 1.0%
1	R16	Resistor (Surface Mount)	Bourns	Case 0805	4k7 1.0%
1	R17	Resistor (Surface Mount)	Bourns	Case 0805	22k 1.0%
1	R18	Resistor (Surface Mount)	Bourns	Case 0603	1M 1.0%
1	R19	Resistor (Surface Mount)	Bourns	Case 0805	3k9 1.0%
1	R20	Resistor (Surface Mount)	Bourns	Case 0805	22k 1.0%
1	R25	Resistor (Surface Mount)	Bourns	Case 0805	3k9 1.0%
1	R26	Resistor (Surface Mount)	Bourns	Case 0603	2k7 1.0%
3	R27-29	Resistor (Surface Mount)	Bourns	Case 0603	10k 1.0%
6	R30-33 R40-41	Resistor (Surface Mount)	Meggitt	Case 0603	100k 0.1%
2	R34-35	Resistor (Surface Mount)	Bourns	Case 0603	0r 1.0%
2	R36 R37	Resistor (Surface Mount)	Bourns	Case 0603	330k 1.0%
2	R38 R39	Resistor (Surface Mount)	Bourns	Case 0603	0r 1.0%
1	R42	Resistor (Surface Mount)	Bourns	Case 0603	4k7 1.0%
1	SW1	Push Button Switch	Omron	SW\PB-SMALL	FEC 176-986
1	SW2	SPDT Switch - (Washable)	Apem	SW_SIP-3P	FEC 150-559
21	T1-21	Red Testpoint	W Hughes	TESTPOINT	FEC-240-345
1	J1	9 PIN D-TYPE MALE (HORIZ)	McMurdo	DCON9M	FEC 150-750
4	J2 J3 J4 J5 J6	Do Not Insert		SMA	
2	J6 J7	GOLD 50Ω SMA SOCKET	Pasternack	SMA	PE4118
3	LK1 LK4 LK5	3 pin header	Harwin	SIP-3P	FEC 512-047
3	LK2-A LK3-B LK6-A	Wire link			
3	LK1 LK4 LK5	Shorting Shunt	Harwin		FEC 150-410
4	Each Corner	Rubber Stick-On Feet	3M		FEC 148-922
2	P1	Pair PCB snap-on battery connector	Keystone	BATT_PP3	FEC 723-988
1	P1	9V PP3 Battery	Duracell		FEC 908-526
1	PCB	EVAL-ADF421XEB-5 (Rev. A)			
	Parts Free issued by ADI.				