ANALOG DEVICES

Evaluation Board For PLL Frequency Synthesizer

EVAL-ADF411XEB1

FEATURES

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

Compatible with ADF4110 and ADF4116 synthesizer families.

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 ADF411X Frequency Synthesizer for PLL's (Phase Locked Loops). The block diagram of the board is shown below. It contains the footprint for a ADF411X 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
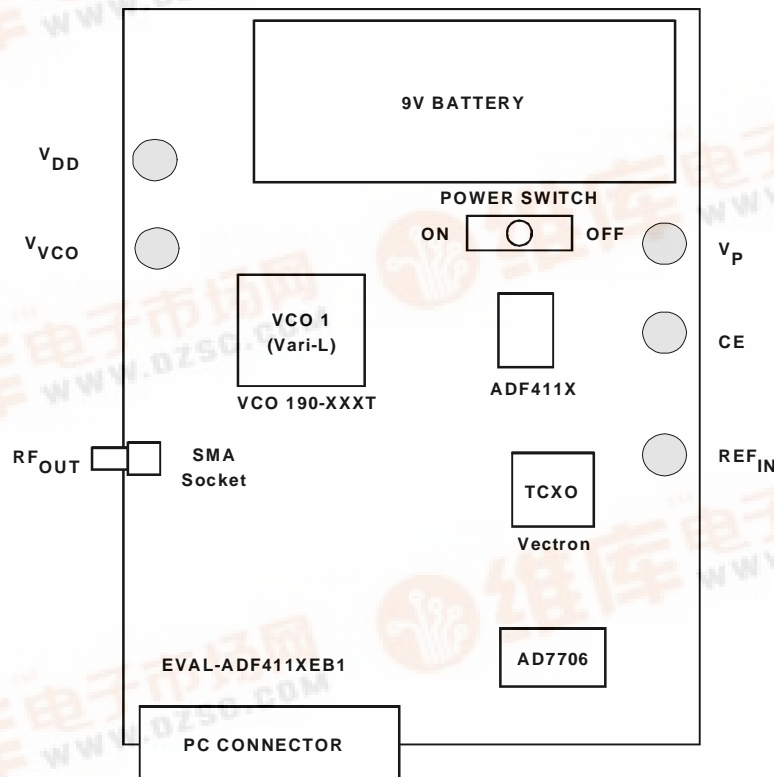
Hardware Description

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.
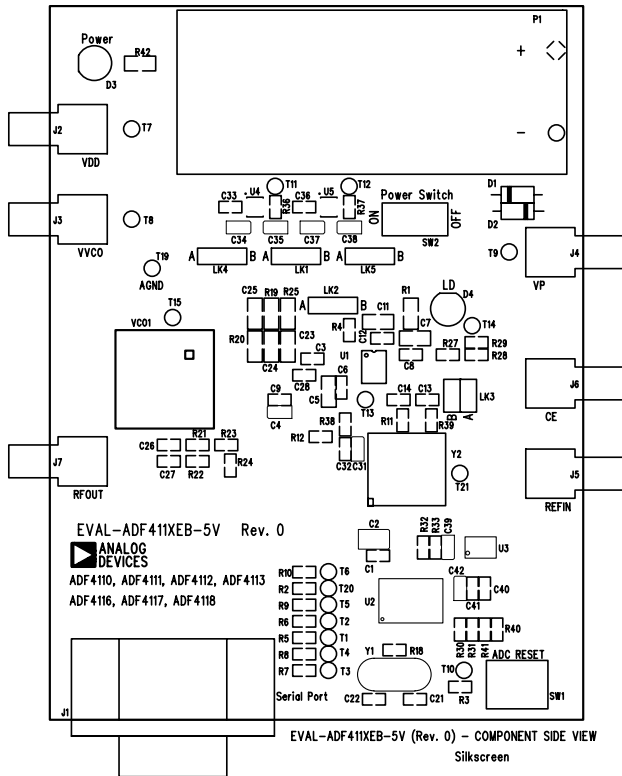

Figure 1. Evaluation Board Silkscreen

Figure 2. PC Cable Diagram

voltage is too low to sustain the required 3V or 5V for the board supply.

Loop component values shown in the circuit diagram are for 900MHz RF output, 5mA CP current, VCO190-902T, 200kHz channel spacing and 20kHz loop bandwidth.

The board is powered from a single 9V battery. The power supply ciruitry allows the user to choose either 3V or 5V for the ADF4113 V_{DD} and V_P, and for the VCO supply. The default settings are 3V for the ADF411X V_{DD} and 5V for the ADF411X V_P and for the VCO supply. **It is very important to note that the ADF4113 V_{DD} should never exceed the ADF411X 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 ADF411X, passive loop filter and the VCO 190-XXXT from Vari-L. The output is available at RFOUT 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.

The AD7706 A/D converter is used to monitor the power supply voltage and current consumption of the ADF411X. This helps the user pick the optimum synthesizer settings for power consumption and also provides an alert if the battery
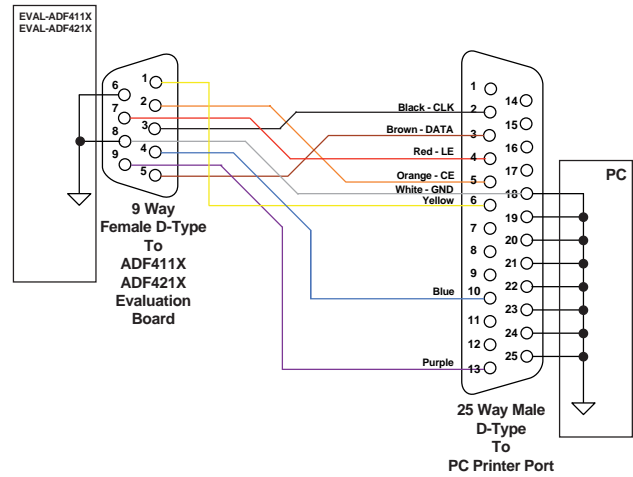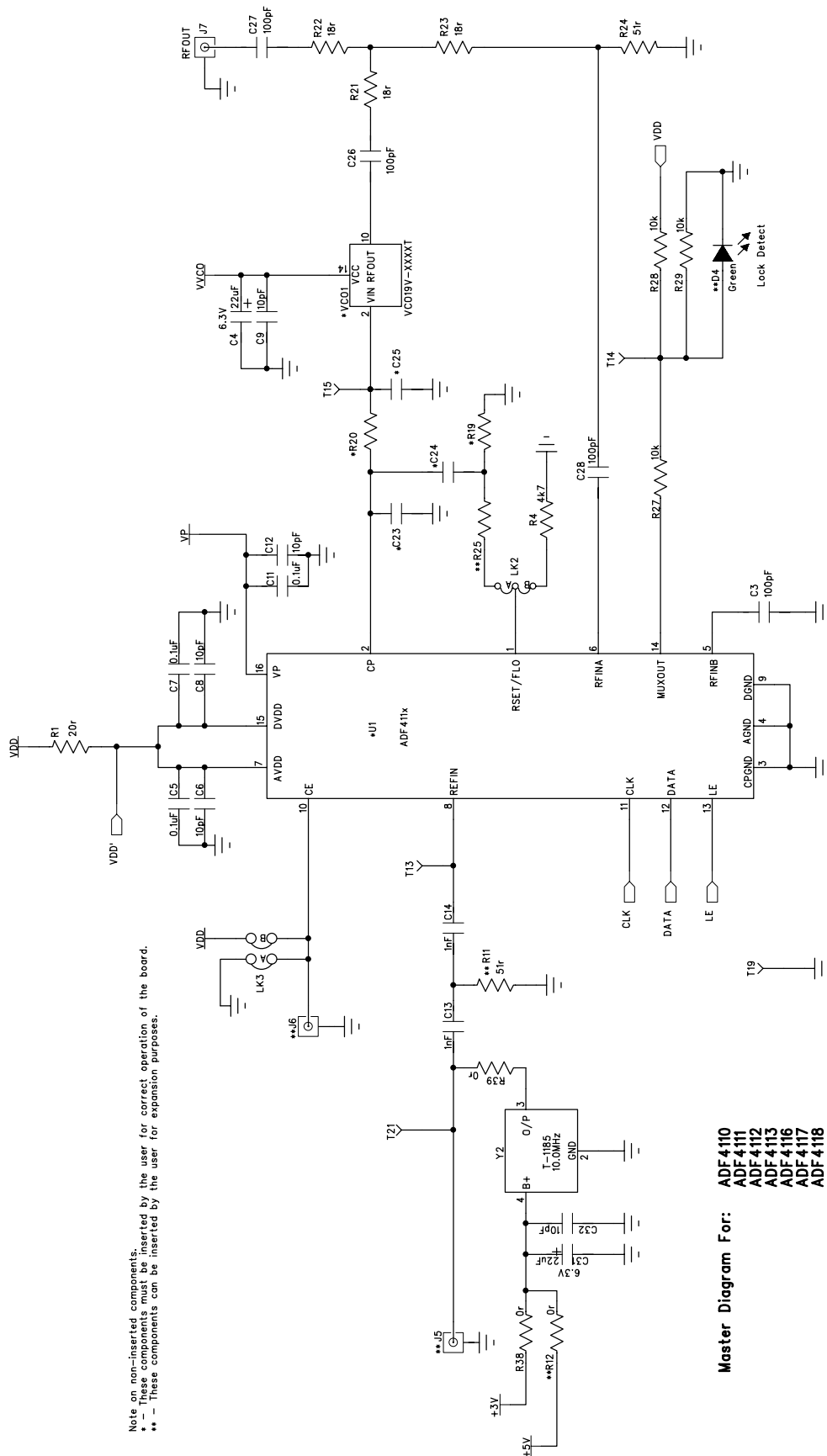
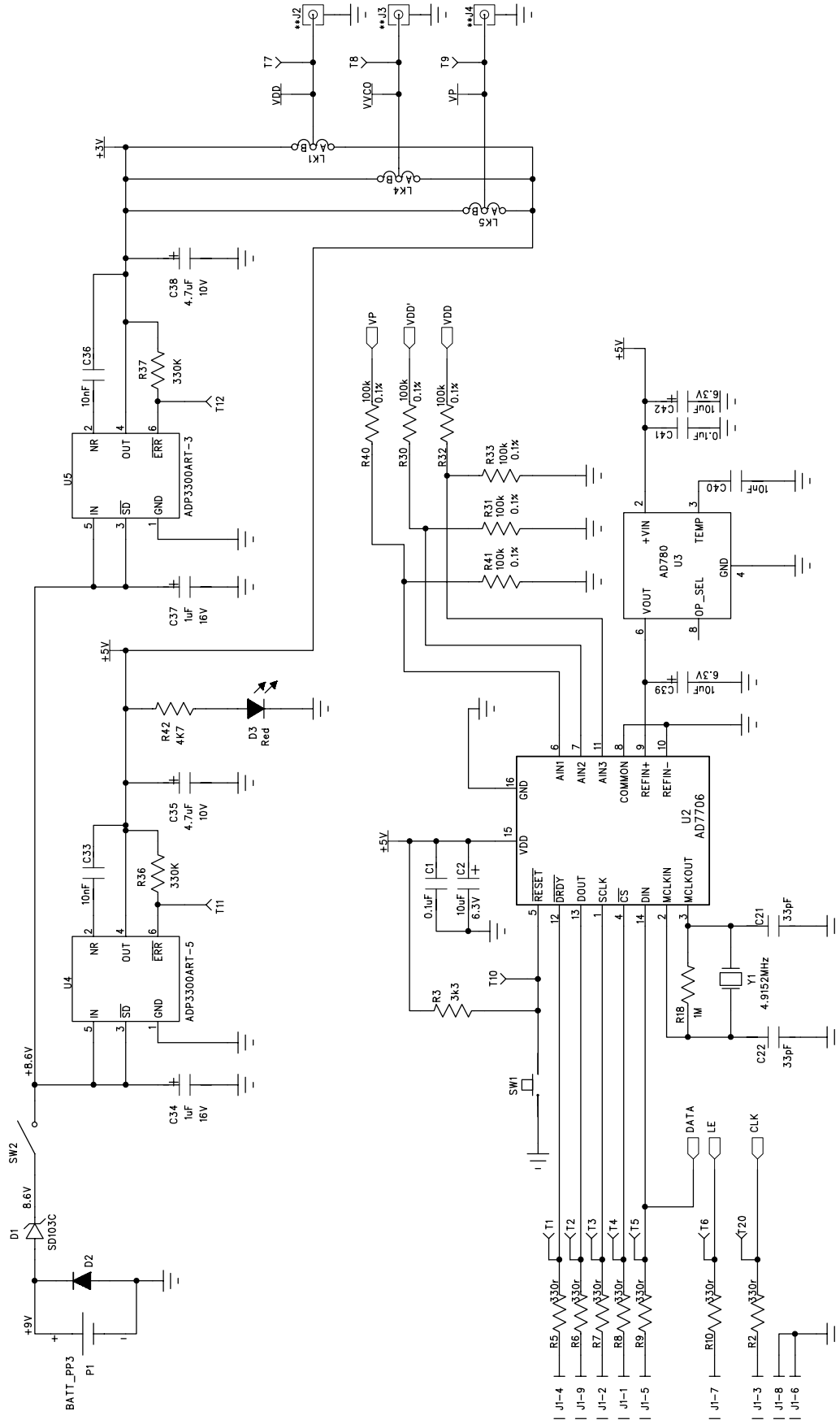*Figure 3. Evaluation Board Circuit Diagram (Page 1)*

Figure 4. Evaluation Board Circuit Diagram (Page 2)

Software Description

The software comes on a CD. If the user double clicks on "setup.exe", 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/ADF4XXX/ADF4XXX_rev0". To run the software, simply double-click on "adf4XXX_rev0.exe".

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

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

Click on Choose Port, and the Port Connector window will appear. Choose the port that the cable is connected to on the PC and click OK. (Normally LPT1)

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 Prescaler, and the Prescaler window will appear. Grab the pointer, and choose the desired prescaler value. 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. 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.
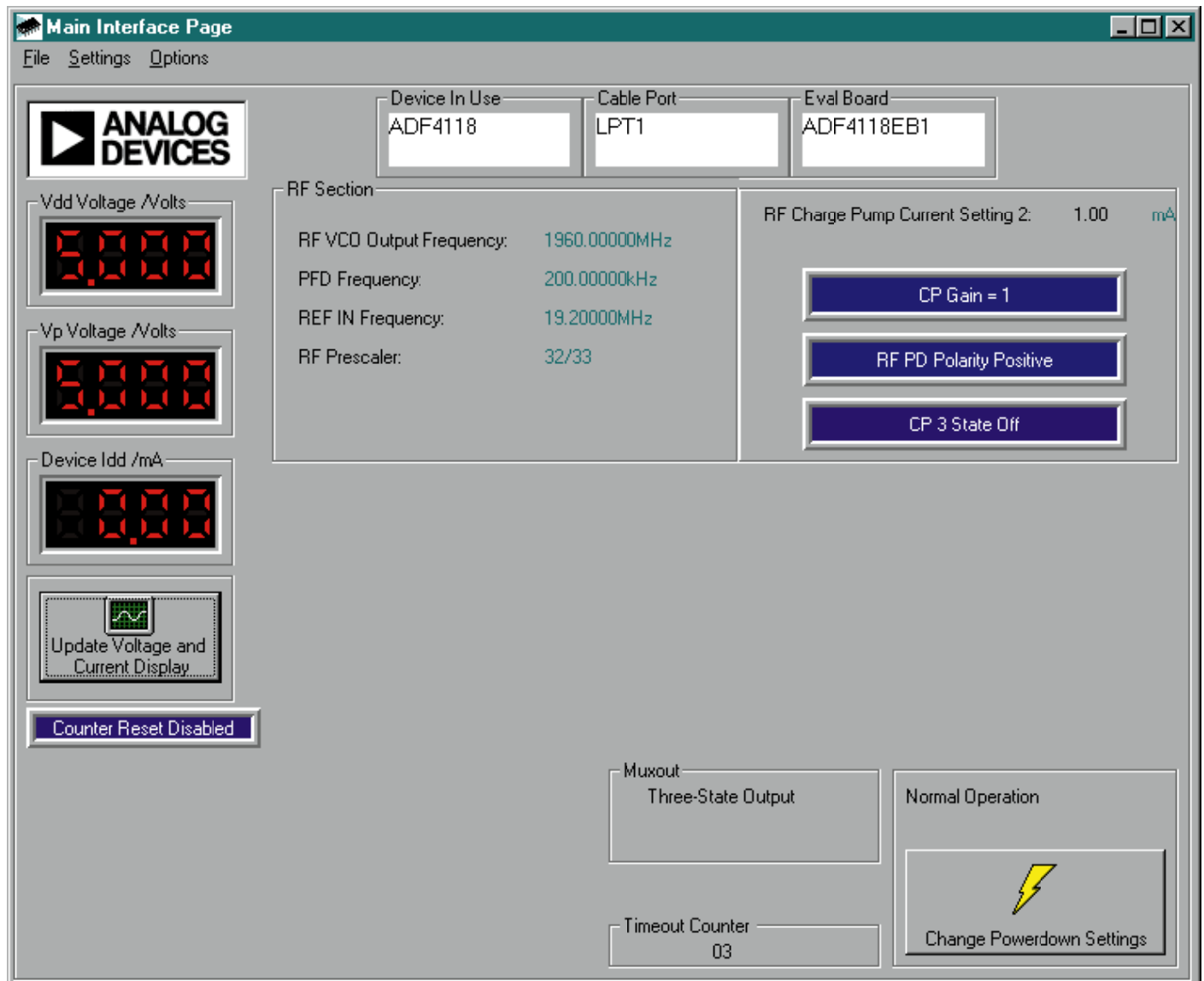

Figure 5. Software Front Panel

Table 1. Bill of Materials for the EVAL-ADF411XEB1

Qty	Reference Designator	Description	Manufacturer	PCB DECAL	VALUE
1	U1	Do Not Inser	ADI	TSSOP-16	
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	Do Not Inser	Vari-L		
1	Y1	4.9152MHz Crystal	Vectron International	HC49 low profile	VXA1-1011
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
2	C1 C41	0.1uF Multi Layer Ceramic Capacitor	Murata	Case 0603	FEC 499-675
1	C2	10uF 6.3V Tantalum Capacitor	AVX	CAP\TAJ_B	FEC 197-014
4	C3 C26 C27 C28	100pF Multi Layer Ceramic Capacitor	Murata	Case 0603	FEC 499-122
2	C4 C31	22uF 6.3V Tantalum Capacitor	AVX	CAP\TAJ_A	FEC 197-038
3	C5 C7 C11	0.1uF Multi Layer Ceramic Capacitor	Murata	Case 0805	FEC 317-627
5	C6 C8 C9 C12 C32	10pF Multi Layer Ceramic Capacito	Murata	Case 0603	FEC 499-110
2	C13 C14	1nF Multi Layer Ceramic Capacitor	Murata	Case 0603	FEC 317-202
2	C21 C22	33pF Multi Layer Ceramic Capacito	Murata	Case 0603	FEC 498-555
1	C23	Do Not Inser		Case 0805	
1	C24	Do Not Inser		Case 0805	
1	C25	Do Not Inser		Case 0805	
3	C33 C36 C40	10nF Multi Layer Ceramic Capacito	Murata	Case 0603	FEC 499-146
2	C34 C37	1uF 16V Tantalum Capacitor	AVX	CAP\TAJ_A	FEC 498-701
2	C35 C38	4.7uF 10V Tantalum Capacitor	AVX	CAP\TAJ_A	FEC 498-658
2	C39 C42	10uF 6.3V Tantalum Capacitor	AVX	CAP\TAJ_A	FEC 197-014
1	R1	20r 5% Resistor (Surface Mount)	Multicomp	Case 0805	FEC 771-132
7	R2 R5 R6 R7 R8 R9 R10	330r 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-143
1	R3	3k3 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-290
1	R4	4k7 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-318
1	R11	Do Not Inser		Case 0603	
1	R18	1M 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-598
1	R19	Do Not Inser		Case 0805	
1	R20	Do Not Inser		Case 0805	
3	R21 R22 R23	18r 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-021
1	R24	51r 1% Resistor (Surface Mount)	Multicomp	Case 0603	
1	R25	Do Not Inser		Case 0805	
3	R27 R28 R29	10k 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-355
6	R30 R31 R32 R33 R40 R41	100k 0.1% Resistor (Surface Mount)	Meggitt	Case 0603	FEC 911-471
2	R36 R37	330K 1% Resistor (Surface Mount)	Multicomp	Case 0603	FEC 911-537
2	R38 R39	0r 1% Resistor (Surface Mount	Multicomp	Case 0603	FEC 772-227
1	R12	0r 1% Resistor - Do Not Insert	Multicomp	Case 0603	FEC 772-227
1	R42	4k7 1% Resistor (Surface Mount)	Multicomp	Case 0805	FEC 911-938
1	SW1	Push Button Switch	Omron	SW\PB-SMALL	FEC 176-986
1	SW2	SPDT Switch - (Washable)	Apem	SW _SIP-3P	FEC 150-559
18	T1-15 T19-21	Red Testpoint	W Hughes	TESTPOINT	FEC-240-345
1	J1	9 PIN D-TYPE MALE (HORIZ)	McMurdo	DCON9M	FEC 150-750
5	J2 J3 J4 J5 J6	Do Not Inser		SMA	
1	J7	GOLD 50Ω SMA SOCKET	Pasternack	SMA	PE4118
4	LK1 LK2 LK4 LK5	3 pin header	Harwin	SIP-3P	FEC 512-047
1	LK3	2 pin header	Harwin	SIP-2P	FEC 512-035
5	LK1-5	Shorting Shunt	Harwin		FEC 150-410
2	P1	Pair PCB snap-on battery connector	Keystone	BATT_PP3	FEC 723-988
1	P1	9V PP3 Battery	Duracell		FEC 908-526
4	Each Corner	Rubber Stick-On Feet	3M		FEC 148-922
1	EVAL-ADF411XEB1	PCB	ADI		
	Parts Free issued by ADI.				