Wednesday 9 November, 2005/POrrell

Evaluation Board For Fractional-N PLL Frequency Synthesizer

Evaluation Board Tech Note

EVAL-ADF4193EB1

FEATURES

Self-Contained Board Including Synthesizer, VCO and Loop Filter

Designed For GSM Application:

13 MHz PFD Frequency, 200 kHz Channel Spacing,

Meets GSM lock time time requiremnts

1805-1880MHz

Accompanying Software Allows Complete Control of Synthesizer Functions from PC

Choice of 3 VCO footprints

ADIsimPLL files assist user to design own loop filter

Requires external 9V supply

Typical Phase Noise Performance of -102 dBc/Hz @ 5 kHz Offset from Carrier

GENERAL DESCRIPTION

This board is designed to allow the user to evaluate the performance of the ADF4193 Frequency Synthesizer for PLL's (Phase Locked Loops). The board is shown below. It contains the ADF4193 synthesizer, a PC connector, and input for the reference input, SMA connectors RF output and 4mm connectors for the 9V supply. There is also a low pass loop filter (60kHz) and a VCO (Sirenza VCO190-1843T) on board. The evaluation board is set up for a 13MHz PFD comparison frequency. A cable is included with the board to connect to a pc printer port. In addition a simPLL file is included which is a simulation of the evaluation board.

The package also contains windows software (2000 and XP compatible) to allow easy programming of the synthesizer.

ADF4193 Evaluation Board

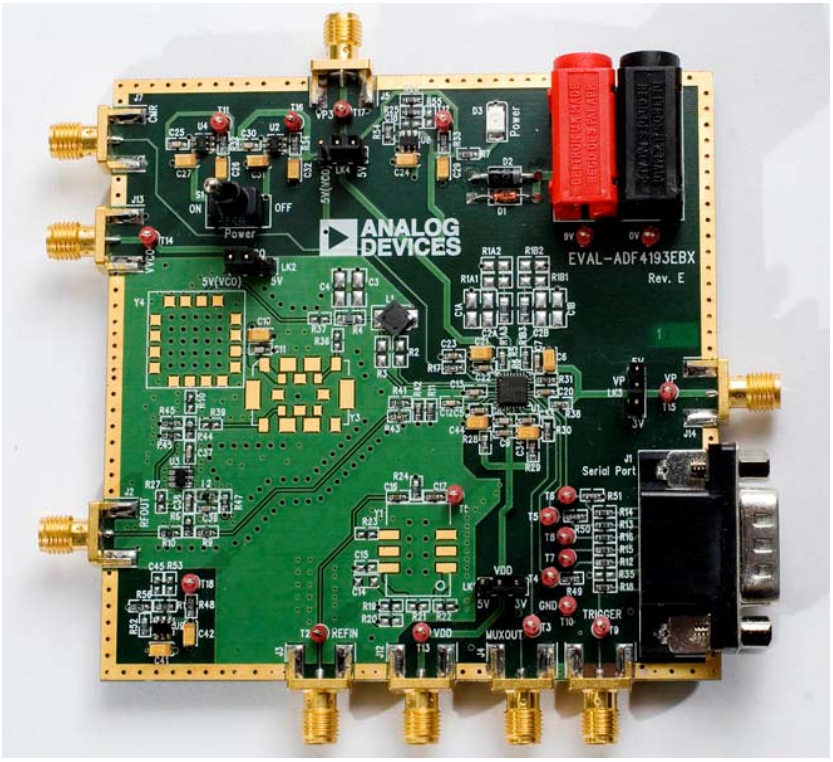

Figure 1.

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Fax: 781.326.8703

TABLE OF CONTENTS

HARDWARE

OVERVIEW

The evaluation board comes with a cable for connecting to the printer port of a PC. An external power supply of 9V is needed and an external reference is needed An RF source of 104MHz with an amplitude of 5dBm would be suitable. Lower frequencies can be used if the reference slew rate is met. Please consult the datasheet. To see the part at its best a low noise reference source should be used. At least -130dBc/Hz @1kHz is recommended.

The evaluation board has the flexibility to accept three alternative VCO footprints if the user wishes.

The cable diagram for the evaluation board is shown below. 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 different voltages for Vdd and the VCO supply

On the board there are 4 jumper settings which are used to configure the various power supply options. The default settings are as follows:-

LK1= 3V	(Vdd supply)
LK2= 5V(VCO)	(VCO supply)
LK3= 5V	(Vp supply)
LK4= 5V	(Differential Amplifier Supply)

The EV board is switched on with the on/off power switch

VCO CHOICES

The evaluation board can except three industry standard VCOs with different footprint. These VCOs are labelled Y4 and Y3(Two choices are within this footprint). If Y4 footprint ("The square one") is used then 0 ohms resistors R40 and R37 must be fitted with R44 and R36 omitted. This is the default setting. If Y3 footprint is used then R44 and R36 must be 0 ohms with R40 and R37 omitted.

LOCAL OSCILLATOR COMPONENTS

All components necessary for Local Oscillator (LO) generation are included on the board. An SMA connector is provided for the Reference Input. The PLL is made up of the ADF4193, an active loop filter (60 kHz bandwidth), and the VCO190-1843T VCO from Sirenza Microdevices. The loop bandwidth has been set to 60kHz to meet typical GSM lock time requirements. The output is available at RFOUT through a standard SMA connector. Note that an external REFIN is required.

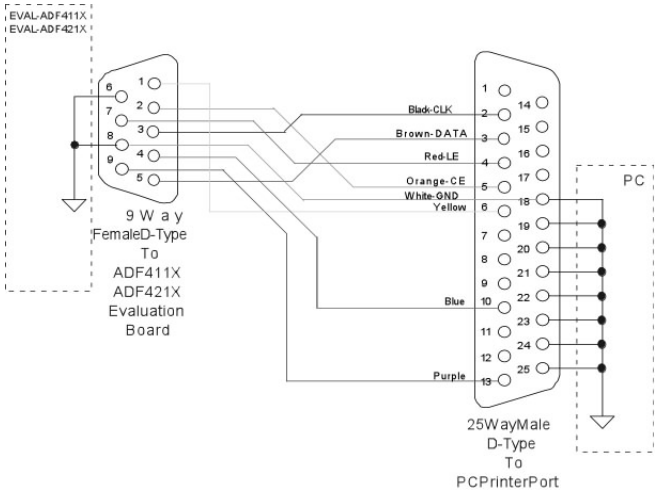

Figure 3. PC Cable Diagram

SCHEMATICS

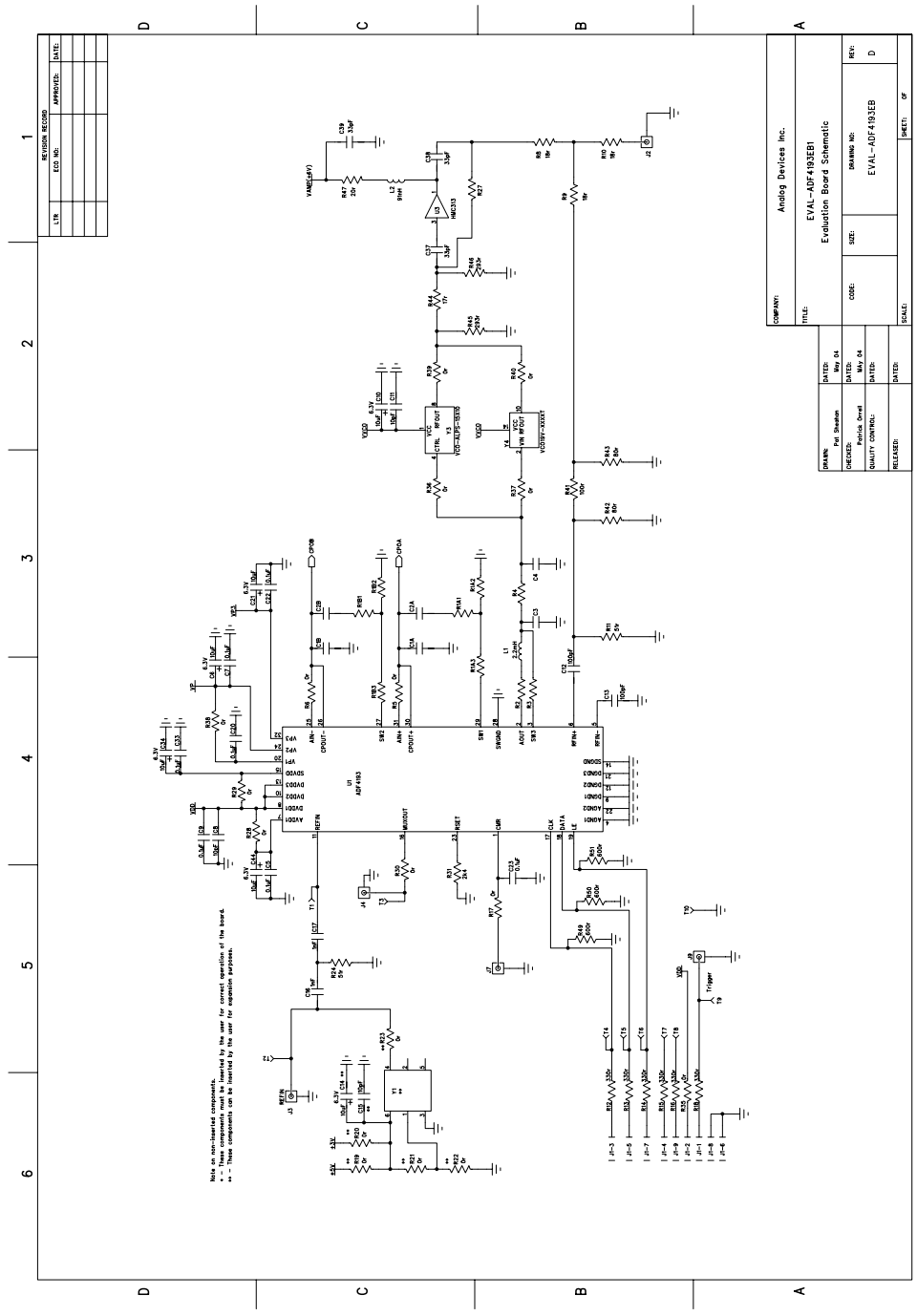

Figure 4. Evaluation Board Schematic (Page 1)

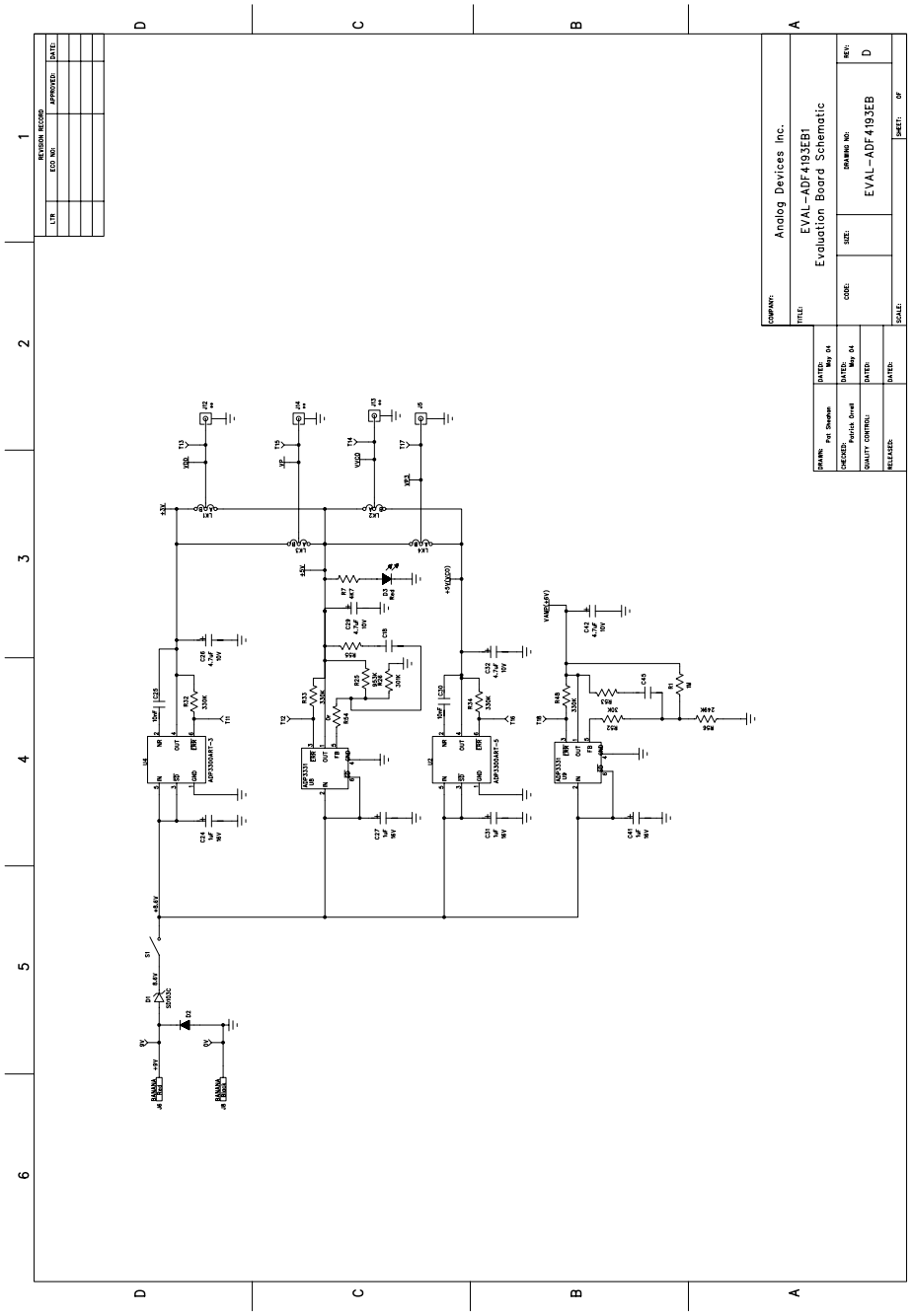

Figure 5. Evaluation Board Schematic (Page 2)

BILL OF MATERIALS

Name	Part Type	Value	Tolerance	PCB Decal	SMD	Part Description	Stock Code	Assemble
0V	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	No
9V	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	No
C1A	CAP	120pF	1%	1206	Yes	COG SMD	Mouser 80-CO805C121F5G	Yes
C1B	CAP	120pF	1%	1206	Yes	COG SMD	Mouser 80-CO805C121F5G	Yes
C2A	CAP	1.2nF	1%	1206	Yes	COG SMD	Mouser 80-CO805C122F5G	Yes
C2B	CAP	1.2nF	1%	1206	Yes	COG SMD	Mouser 80-CO805C122F5G	Yes
C3	CAP	470pF	1%	1206	Yes	COG SMD	Mouser 80-CO805C471F5G	Yes
C4	CAP			1206	Yes			No
C5	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C6	CAP+	10uF		CAP\TAJ_A	Yes	6.3VDC TAJ-A Tantalum Capacitor	FEC 197-014	Yes
C7	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C8	CAP	10pF		0603	Yes	50VDC NPO Ceramic Capacitor	FEC 721-967	Yes
C9	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C10	CAP+	10uF		CAP\TAJ_A	Yes	6.3VDC TAJ-A Tantalum Capacitor	FEC 197-014	Yes
C11	CAP	10pF		0603	Yes	50VDC NPO Ceramic Capacitor	FEC 721-967	Yes
C12	CAP	100pF		0603	Yes	50VDC X7R Ceramic Capacitor	FEC 722-110	Yes
C13	CAP	100pF		0603	Yes	50VDC X7R Ceramic Capacitor	FEC 722-110	Yes
C14	CAP+	10uF		CAP\TAJ_A	Yes	6.3VDC TAJ-A Tantalum Capacitor	FEC 197-014	No
C15	CAP	10pF		0603	Yes	50VDC NPO Ceramic Capacitor	FEC 721-967	No
C16	CAP	1nF		0603	Yes	50VDC X7R Ceramic Capacitor	FEC 722-170	Yes
C17	CAP	1nF		0603	Yes	50VDC X7R Ceramic Capacitor	FEC 722-170	Yes
C18	CAP			0603	Yes			No
C20	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C21	CAP+	10uF		CAP\TAJ_A	Yes	6.3VDC TAJ-A Tantalum Capacitor	FEC 197-014	Yes
C22	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C23	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C24	CAP+	1uF		CAP\TAJ_A	Yes	16VDC TAJ-A Tantalum Capacitor	FEC 498-701	Yes
C25	CAP	10nF		0603	Yes	50VDC X7R Ceramic Capacitor	FEC 722-236	Yes
C26	CAP+	4.7uF		CAP\TAJ_A	Yes	10VDC TAJ-A Tantalum Capacitor	FEC 498-658	Yes
C27	CAP+	1uF		CAP\TAJ_A	Yes	16VDC TAJ-A Tantalum Capacitor	FEC 498-701	Yes
C29	CAP+	4.7uF		CAP\TAJ_A	Yes	10VDC TAJ-A Tantalum Capacitor	FEC 498-658	Yes
C30	CAP	10nF		0603	Yes	50VDC X7R Ceramic Capacitor	FEC 722-236	Yes
C31	CAP+	1uF		CAP\TAJ_A	Yes	16VDC TAJ-A Tantalum Capacitor	FEC 498-701	Yes
C32	CAP+	4.7uF		CAP\TAJ_A	Yes	10VDC TAJ-A Tantalum Capacitor	FEC 498-658	Yes
C33	CAP	0.1uF		0603	Yes	16VDC X7R Ceramic Capacitor	FEC 499-675	Yes
C34	CAP+	10uF		CAP\TAJ_A	Yes	6.3VDC TAJ-A Tantalum Capacitor	FEC 197-014	Yes
C37	CAP	33pF		0603	Yes	Ceramic Capacitor	FEC 722-029	Yes
C38	CAP	33pF		0603	Yes	Ceramic Capacitor	FEC 722-029	Yes
C39	CAP	33pF		0603	Yes	Ceramic Capacitor	FEC 722-029	Yes
C41	CAP+	1uF		CAP\TAJ_A	Yes	16VDC TAJ-A Tantalum Capacitor	FEC 498-701	Yes
C42	CAP+	4.7uF		CAP\TAJ_A	Yes	10VDC TAJ-A Tantalum Capacitor	FEC 498-658	Yes
C44	CAP+	10uF		CAP\TAJ_A	Yes	6.3VDC TAJ-A Tantalum Capacitor	FEC 197-014	Yes
C45	CAP			0603	Yes			No
D1	SD103C	6.2V		DO35	No	Schottky Diode	Digikey - SD103CDICT-ND	Yes
D2	DIODE			DO35	No	1N4001 Rectifier Diode	FEC 365-117	Yes
D3	LED			LED_SMT	Yes	Red LED SMD	FEC 515-607	Yes
J1	CON-DB9HM			DB9-HM	No	9 Pin D-Type Horizantal Plug	FEC 150-750	Yes
J2	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J3	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J4	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J5	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J6	BANANA			BANANA	No	Red 4mm Bananna Connector	FEC 150-039	Yes
J7	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J8	BANANA			BANANA	No	Black 4mm Bananna Connector	FEC 150-040	Yes
J12	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J13	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
J14	SMA			SMA_CARD_EDGE_RF	Yes	SMA Card Edge (0,062" card) Connector	Johnson Components 142-0701-851	Yes
L1	IND	2.2mH		1212	Yes	SMD Inductor	Coilcraft LPS4012-225)	Yes
L2	IND	91nH		0603	Yes	SMD Inductor	Murata LQW18AN91NG00	Yes
LK1	JUMPER2\SIP3			LINK-3P	No	3 Pin SIL Header & shorting option	FEC 512-047 & FEC 150-410	Yes
LK2	JUMPER2\SIP3			LINK-3P	No	3 Pin SIL Header & shorting option	FEC 512-047 & FEC 150-410	Yes
LK3	JUMPER2\SIP3			LINK-3P	No	3 Pin SIL Header & shorting option	FEC 512-047 & FEC 150-410	Yes
LK4	JUMPER2\SIP3			LINK-3P	No	3 Pin SIL Header & shorting option	FEC 512-047 & FEC 150-410	Yes
R1	RES	1M		0603	Yes		FEC 911-598	Yes
R1A1	RES	820	1%	0805	Yes	Precision Resistor	FEC 911-227	Yes
R1A2	RES	6.2k	1%	0805	Yes	Precision Resistor	FEC 357-1490	Yes
R1A3	RES	0	1%	0805	Yes	Precision Resistor	FEC 772-239	Yes
R1B1	RES	820	1%	0805	Yes	Precision Resistor	FEC 911-227	Yes
R1B2	RES	6.2k	1%	0805	Yes	Precision Resistor	FEC 357-1490	Yes
R1B3	RES	0	1%	0805	Yes	Precision Resistor	FEC 772-239	Yes
R2	RES	1.8k	1%	0805	Yes	Precision Resistor	FEC 911-884	Yes
R3	RES	62	1%	0805	Yes	CRG0603 1% Resistor	FEC 357-1257	Yes
R4	RES	0	1%	0805	Yes	Precision Resistor	FEC 772-239	Yes
R5	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R6	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R7	RES	4K7		0603	Yes	0.063W Resistor	FEC 911-318	Yes
R8	RES	18R		0603	Yes	0.063W Resistor	FEC 911-021	Yes

BILL OF MATERIALS (CNTD.)

R9	RES	18R		0603	Yes	0.063W Resistor	FEC 911-021	Yes
R10	RES	18R		0603	Yes	0.063W Resistor	FEC 911-021	Yes
R11	RES	51R		0603	Yes	0.063W Resistor	FEC 357-1245	Yes
R12	RES	330r		0603	Yes	0.063W Resistor	FEC 911-173	Yes
R13	RES	330r		0603	Yes	0.063W Resistor	FEC 911-173	Yes
R14	RES	330r		0603	Yes	0.063W Resistor	FEC 911-173	Yes
R15	RES	330r		0603	Yes	0.063W Resistor	FEC 911-173	Yes
R16	RES	330r		0603	Yes	0.063W Resistor	FEC 911-173	Yes
R17	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R18	RES	330r		0603	Yes	0.063W Resistor	FEC 911-173	Yes
R19	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R20	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R21	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R22	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R23	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R24	RES	51R		0603	Yes	0.063W Resistor	FEC 357-1245	Yes
R25	RES	953K		0603	Yes		FEC 422-5685	
R26	RES	301K		0603	Yes		FEC 422-5211	
R27	RES			0603	Yes			No
R28	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R29	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R30	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R31	RES	2k4		0603	Yes	0.063W Resistor	FEC 357-1440	Yes
R32	RES	330K		0603	Yes	0.063W Resistor	FEC 911-537	Yes
R33	RES	330K		0603	Yes	0.063W Resistor	FEC 911-537	Yes
R34	RES	330K		0603	Yes	0.063W Resistor	FEC 911-537	Yes
R35	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R36	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R37	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R38	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R39	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	No
R40	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R41	RES	100r		0603	Yes	SMD Resistor	FEC 911-112	Yes
R42	RES	80,6		0603	Yes	SMD Resistor	FEC 422-2015	Yes
R43	RES	80,6		0603	Yes	SMD Resistor	FEC 422-2015	Yes
R44	RES	16,9		0603	Yes	SMD Resistor	FEC 422-1382	Yes
R45	RES	294		0603	Yes	SMD Resistor	FEC 422-2507	Yes
R46	RES	294		0603	Yes	SMD Resistor	FEC 422-2507	Yes
R47	RES	20r		0603	Yes	SMD Resistor	FEC 357-1191	Yes
R48	RES	330K		0603	Yes	0.063W Resistor	FEC 911-537	Yes
R49	RES	590R		0603	Yes		FEC 422-2799	Yes
R50	RES	590R		0603	Yes		FEC 422-2799	Yes
R51	RES	590R		0603	Yes		FEC 422-2799	Yes
R52	RES	30K		0603	Yes	SMD Resistor	FEC 357-1579	
R53	RES			0603	Yes			No
R54	RES	0r		0603	Yes	0.063W Resistor	FEC 772-227	Yes
R55	RES			0603	Yes			No
R56	RES	249K		0603	Yes		FEC 422-5132	Yes
S1	SW_POWER			SW_SIP-3P	No	SPDT Toggle Switch	FEC 150-559	Yes
T1	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T2	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T3	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T4	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T5	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T6	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T7	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T8	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T9	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T10	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T11	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T12	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T13	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T14	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T15	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T16	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T17	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
T18	TESTPOINT			TESTPOINT	No	Testpoint	FEC-240-345	Yes
U1	ADF4193			LFCSP-32	Yes		ADI ADF4193BCP	Yes
U2	ADP3300			SOT23-6	Yes		ADI ADP3300ART-5	Yes
U3	HMC313			SOT26	Yes	Broadband Amplifier Gain Block DC-6.0Ghz	Hittite HMC313	Yes
U4	ADP3300			SOT23-6	Yes		ADI ADP3300ART-3	Yes
U8	ADP3331			SOT23-6	Yes		ADI ADP3331ART-REEL	Yes
U9	ADP3331			SOT23-6	Yes		ADI ADP3331ART-REEL	Yes
Y1	VCXO-JTYPE			NOKIA_TCXO	Yes	Do not fit		No
Y3	VCO-Sirenza 1843T			VCO Sirenza 1843T	No		VCO190-1843T	Yes
Y4	VCO19V-XXXXT			VCO19V-XXXXT	Yes	Do not Fit		No

TEST SET UP

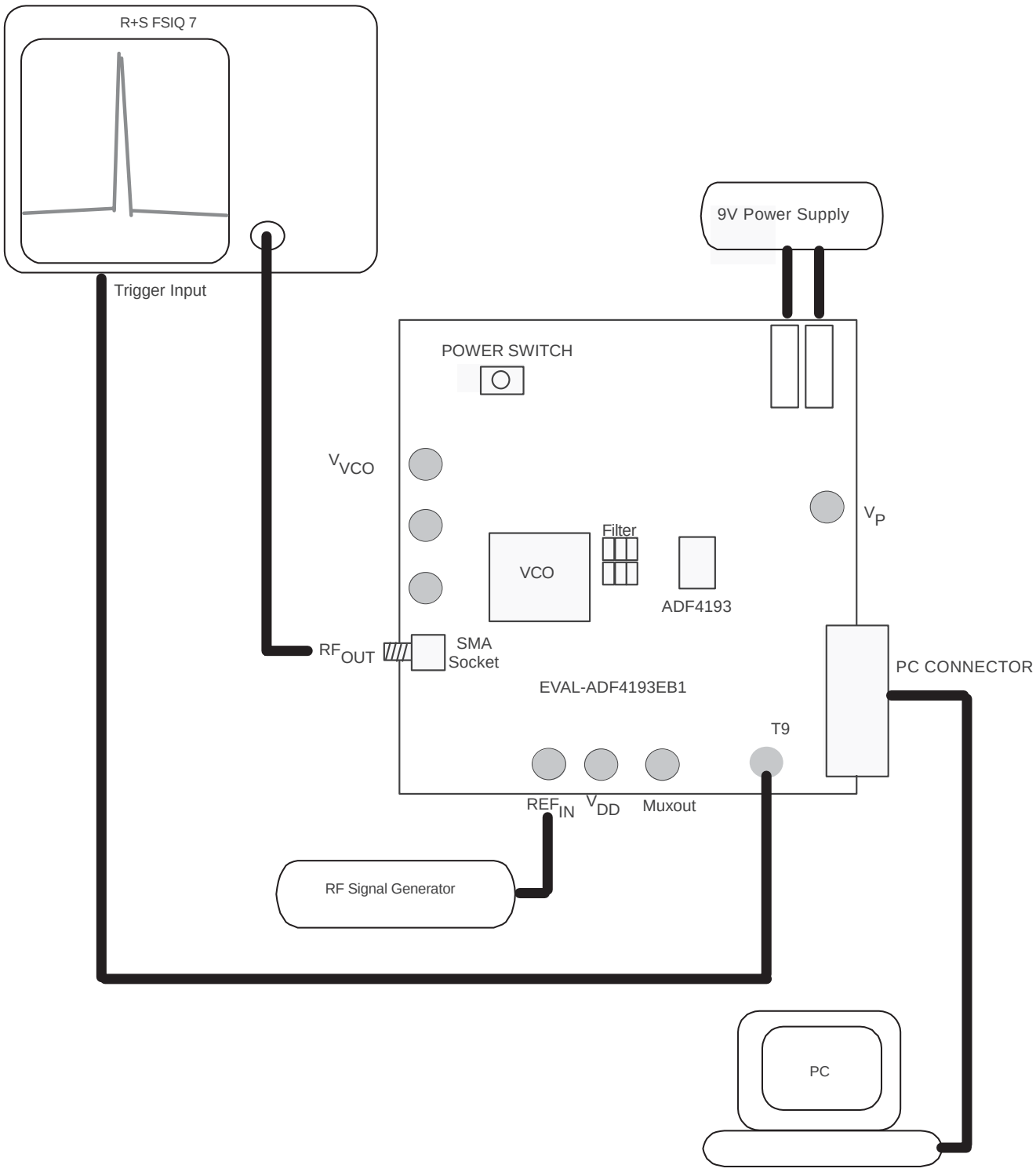

Figure 6. Test Set Up

SOFTWARE

INSTALLATION

The control software for EVAL-ADF4193EB1 is on the CD which accompanies the board.

STEP 1: There are the required phase codes on the CD for optimal lock time and spurious. **These are located in the directory \Phase_Codes. on the CD. They must be manually copied onto the host computer in the directory of choice**

The phase codes included on the CD are as follows

gsm1800tx_phase_codes.txt: -ADF4193EB1 eval board and GSM 1800 TX systems

gsm1800rx_phase_codes.txt: GSM 1800 RX systems

gsm900tx_phase_codes.txt: GSM 900 TX systems

gsm900rx_phase_codes.txt: GSM 900 RX systems

26M_60K_phase_codes.txt: Old GSM 1800 TX table for systems designed with 26MHz PFD

Also, on the CD there are additional tables with other timer settings that can be tried

STEP2: On the CD run the setup.exe to start the install shield. If the install shield asks to modify the installation chose remove and run the setup.exe again.

RUNNING THE PROGRAM

Choose the ADF4193 program from the Start Menu. located under the Analog Devices menu. The program is **called ADF4193 Rev 4.1** Before the main software screen appears, the user is given the choice to load a phase table or use manual settings. If manual setup is chosen then the default values for the ADF4193 EB1 will be loaded with phase values of 5 for each frequency. This will work fine but more optimal settling time and spurious results can be obtained by using the phase tables

The user then accepts his choice. The Main Interface Window will now appear (Figure 7). Note just below the Analog Devices logo the software will remind you of the file that you have loaded., or if no file is loaded at all The user must now enter the Frequency Control Section and enter the frequencies of choice. (Fig 8) and Update R0 and R1 (Normal Mode). Now exit the window and the main interface will now appear again as in Figure 7 but with the large Initialisation Sequence button now visible. Press the Initialisation Button. The light to the left of the dialogue will glow red then green(fig 9) C lick on "Update All Registers" and an RF spectrum should appear at the output.

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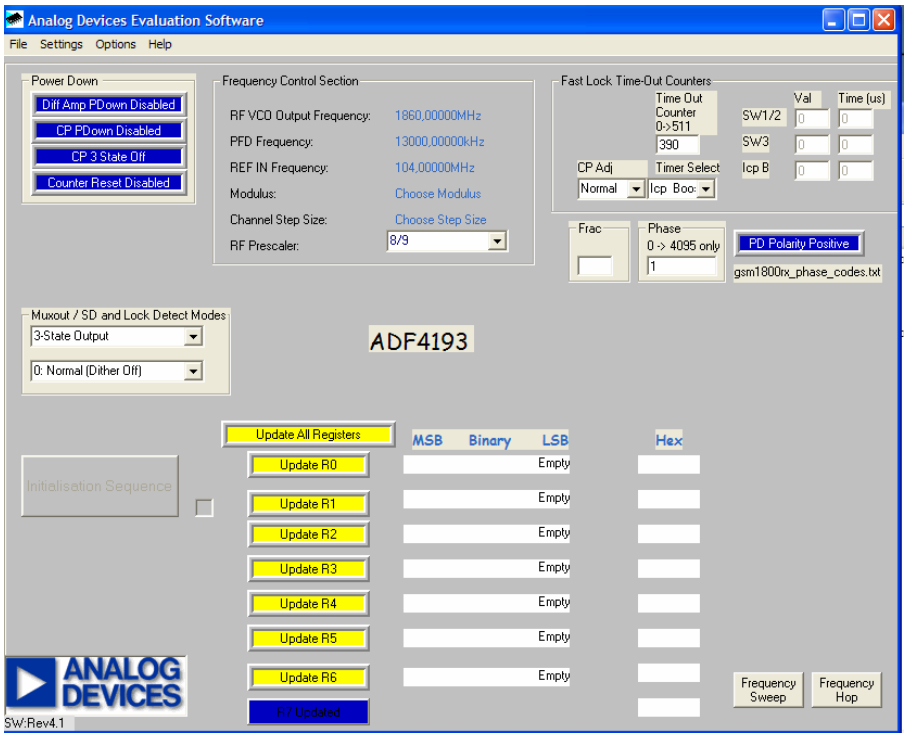


Figure 7 . Software Front Panel

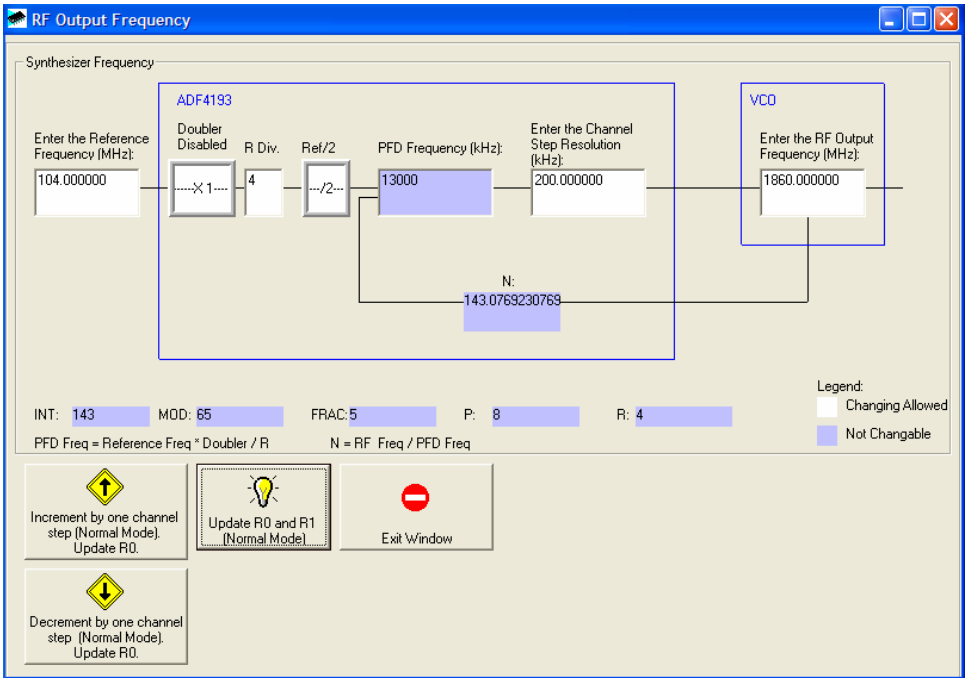


Figure 8 . RF front panel

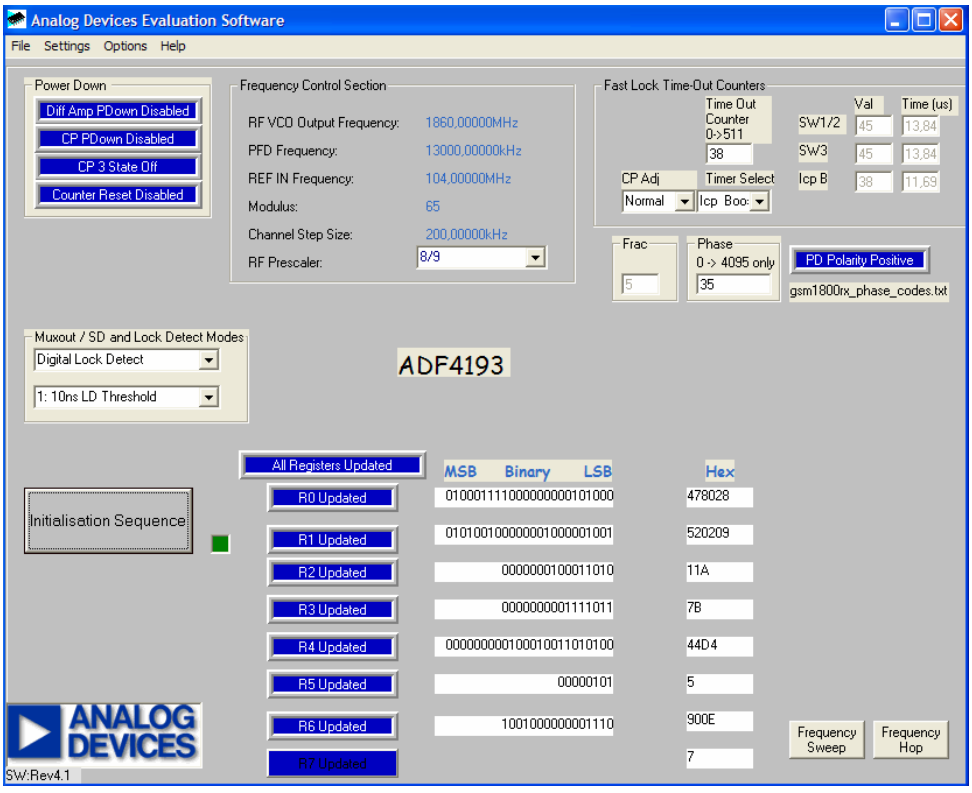
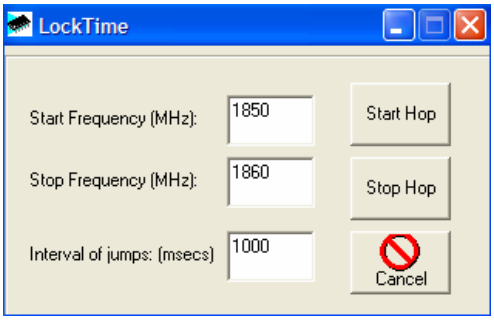


Figure 9 . Software front panel

FREQUENCY HOPPING

To frequency hop between two frequencies, click on the frequency hop button and the

following panel should appear

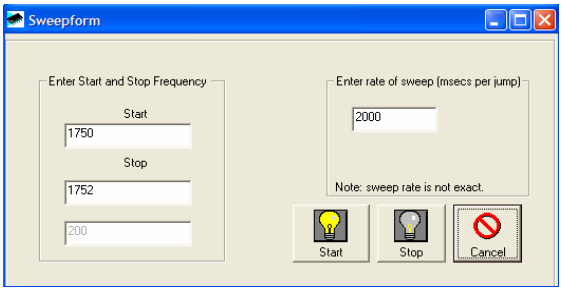


Enter start ,stop frequencies and interval of the jump in milliseconds and then click on the "start hop". To stop the hopping click on the "stop" and then "cancel" to return to the main form. As the ADF4193 is writing to phase registers before it writes the frequency information there will be more than one LE pulse for each frequency write.

A feature of the software is an extra trigger signal from the computer to make the lock time measurements easier. This signal is a copy of the last latch enable and can be monitored on T9 on the evaluation board. The LE enable pulse can still be monitored on T6

FREQUENCY SWEEPING

To frequency sweep the user clicks on the "frequency sweep" button. The following panel should appear

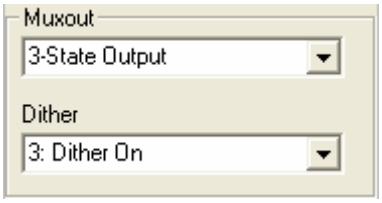


Start and stop frequencies are entered with the rate of sweep in milliseconds. The resolution of the sweep is taken from the channel already set on the main form and shown underneath the "stop" display

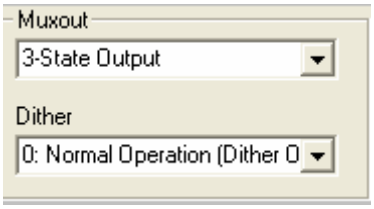
DITHER ON AND OFF

Inside the ADF4193 sigma-delta core, a technique called dithering is used to reduce spurious. When dithering is enabled the spurious power is spread over frequency and appears in the noise in the noise. As a result of the dithering there will be a slight degradation to the phase noise. Dither Off is recommended for normal use

To select dither on set the MuxOut third row to "dither on"



To switch off dither set the MuxOut third row to "Normal Operation(dither off)"

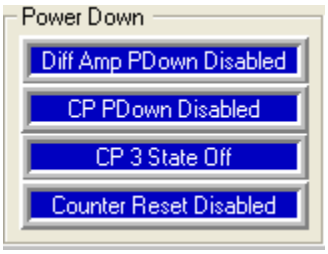


In both cases you will need to update the Register 6 and Register 2 after the dither mode has been selected. Register 2 is updated as a different phase values is used for dither off and on. The software will load Dither Off as default.

POWER DOWN PANEL

Here various parts functions of ADF4193 can be shut down eg diff amp and charge pump. Also the charge pump can be placed in tri state mode with the CP3 State Off button If you want to use an external op-amp instead of the built ADF4193 amplifier you will need to power down the diff amp.

Below are shown the default values



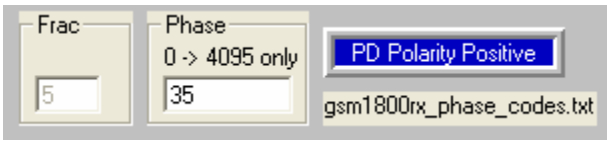
ADJUSTING THE CHARGE PUMP CURRENT (CPADJ)

In some cases the uses may wish to use another PFD other than the recommended 13MHz or 26MHz eg 20.8MHz. In such a case to maintain the same loop bandwidth and settling time the current can be boosted by 25% by using the CPAdj toggle

After updating the toggle please update R1 to activate this setting. Please note that by decreasing the PFD you will extend the timer counter values that will have to be modified to keep the original settling time requirements.

THE PHASE LOOK UP TABLE

Software files have been supplied that contain optimal phase values for both spurious and lock time requirements. For each fraction used there is a phase associated with it that must be programmed. When a file is loaded its name is displayed to the right of the phase as shown below. In the case of Manual mode selected a phase of 5 will be loaded for all fractions and "Manual, no phase table" will be displayed.



To load a new lookup table you will need to close and re-start the software. The phase tables also contain the basic setup information for the PLL eg PFD, Modulus, timer settings, dither mode. An example of such a table is listed below. An excel sheet has been supplied so that these tables can be created. If the tables are modified in manual form it is important that **tabs** are used to seperate the phase and the frac values. An example of a table is shown below:-

* **ADF4193 Phase Table for DCS1800 / PCS1900 TX**
* with a 13MHz PFD and a ~60kHz Loop BW
*
* File Name: gsm1800tx_phase_codes.txt
* Version: 1.0
* Date: 30-Nov-04
*
* Setup Values:
$PFD= 13
$MOD=65
$CHOP= 13
$ICP= 28
$SW12=35
$SW3= 35
$P= 8
$Dither=0
*
*
* FRAC PHASE
0 13
1 60
2 53

PLL SIMULATIONS

The ADF4193 performance can be simulated using ADI simPLL v2.7 On the CD three simulations have been supplied included the evaluation board that shows the performance of the evaluation board. The latest version of ADI simPll can be downloaded at www.analog.com/pll For instructions on how to setup the ADF4193 with ADIsimPLL please refer to the tech note **ADF4193-TN-001** that is also supplied on the CD. Below are shown some plots from the ADF4193 simulation file.

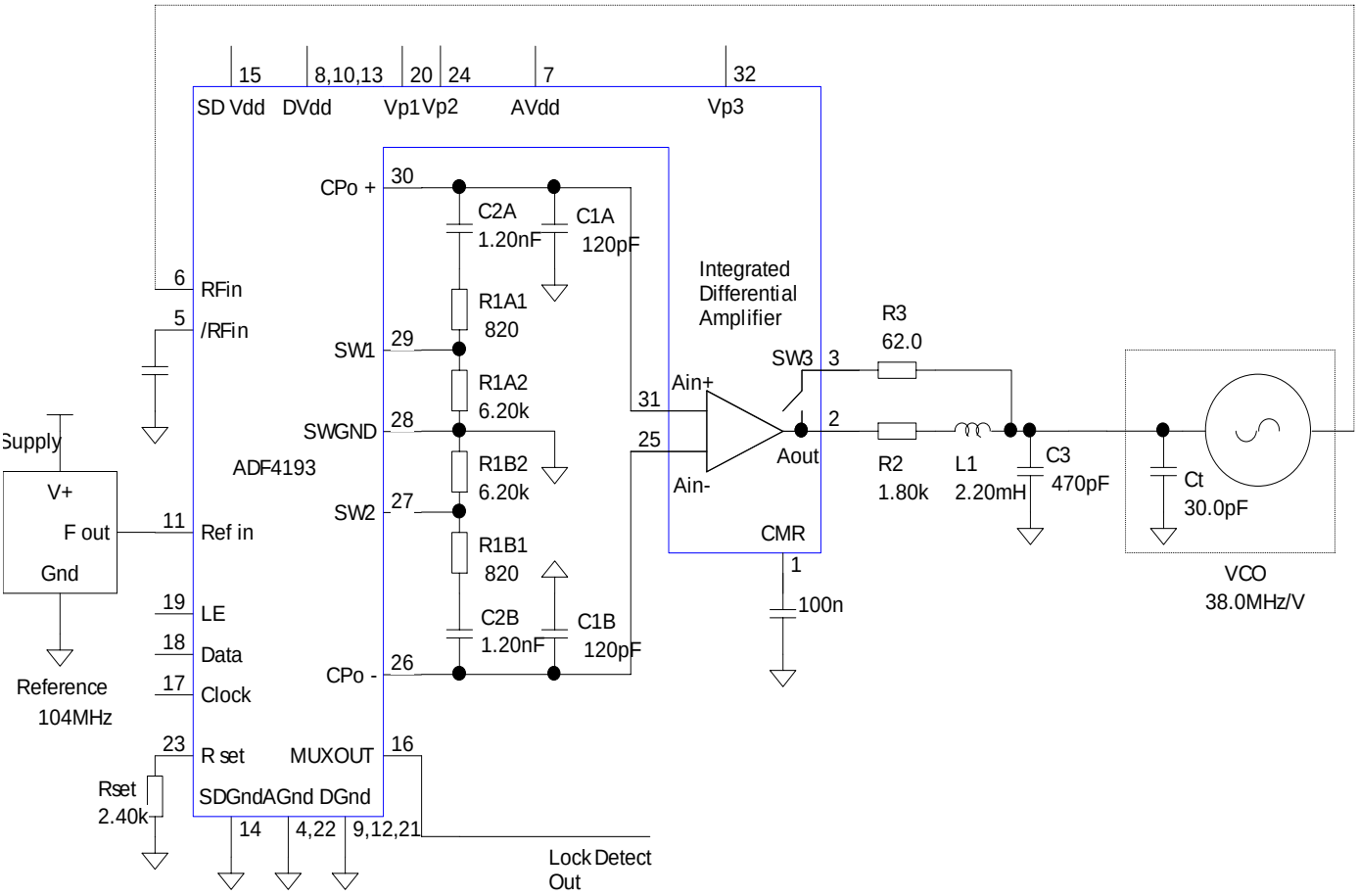


Figure 10. ADIsimPLL Schematic

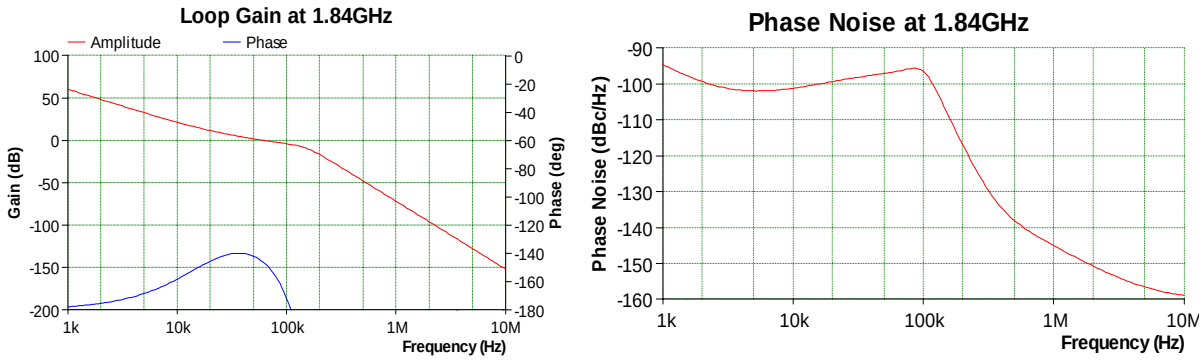


Figure 11 . ADIsimPLL Frequency Domain plots

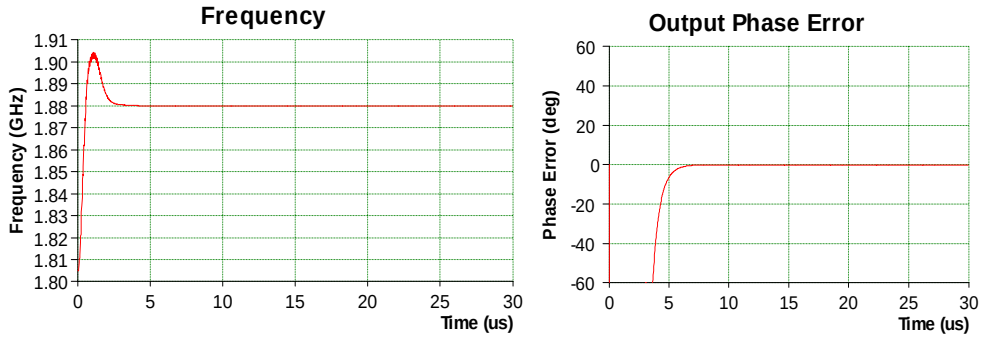


Figure 12 . ADIsimPLL Time Domain plots