User's Guide
SLOU332B–January 2012–Revised March 2015

AFE5803EVM (Revision E) Evaluation Module

This document assists users in evaluating the AFE5803 highly integrated analog front-end devices through the use of the AFE5803EVM Evaluation Module. Included are setup instructions, printed-circuit board art, bill of materials, and schematics.

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1 Overview

This document is intended to guide users step-by-step through the AFE5803EVM Evaluation Module (EVM) setup and test . The EVM is shipped with a default configuration from the manufacturer. With this configuration, the onboard CMOS clock is used for a analog-to-digital converter sampling clock. No external clock generator is required. Users need to provide the input signal for measurement from a signal generator.

Detail explanation regarding the jumpers, connectors, and test points appear in Section 11. The graphical user interface (GUI) can be downloaded from the TI Web site.

2 Default Configuration

Figure 1 shows the default configuration of the EVM from the factory. The accompanying list identifies the basic components on the EVM board.

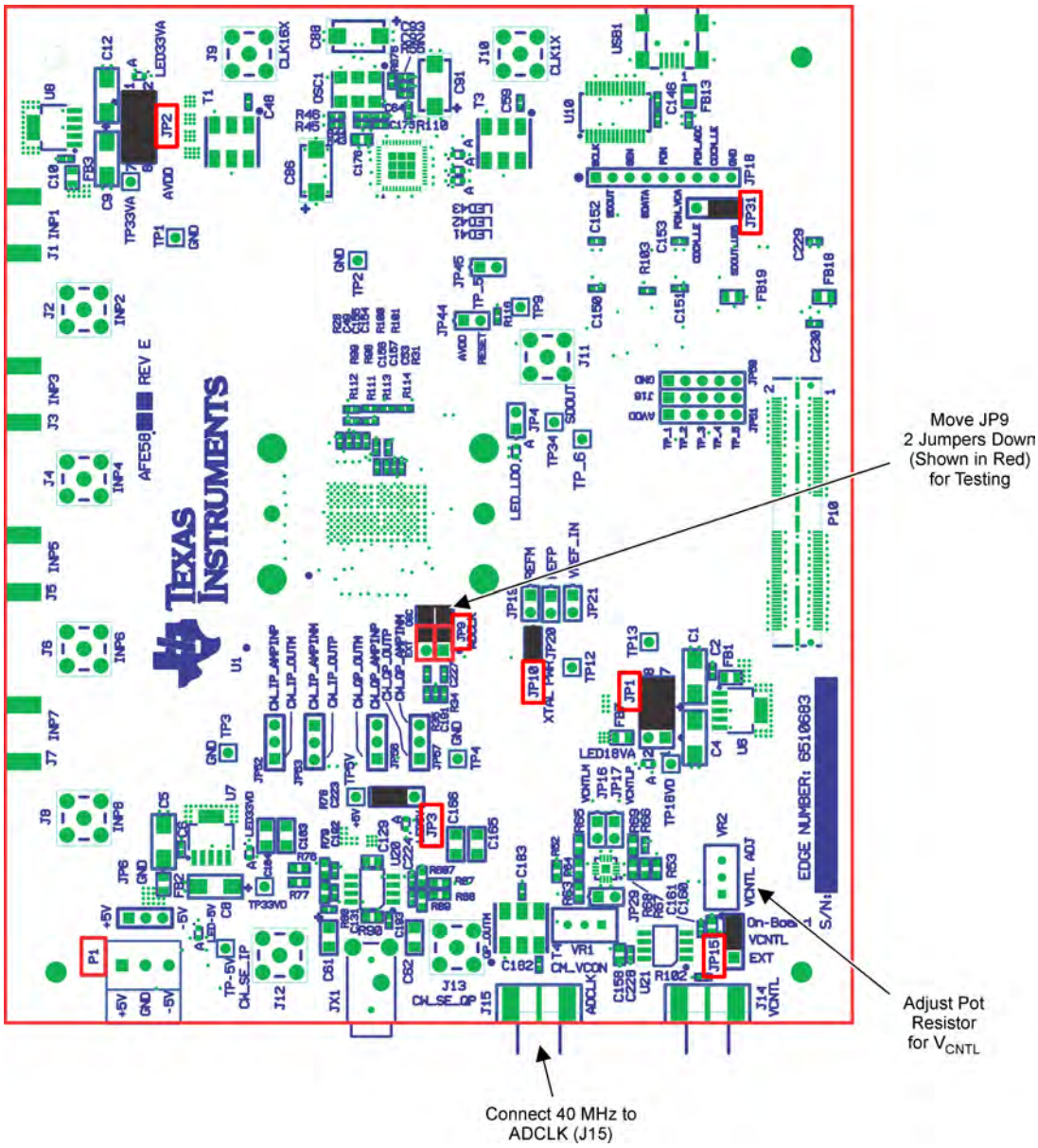


Figure 1. AFE5803EVM Basic Configuration

1. P1 – Power supplies connector.
2. JP1, JP2, and JP3 are set to enable 3.3-V, 1.8-V, and 5-V power supplies to device.
3. JP9: enables onboard CMOS clock.
4. JP10: Power supply for onboard CMOS clock oscillator.
5. JP15: Enables onboard VCNT.
6. JP31 always set as Figure 1.

3 Software Installation and Operation

The AFE5803EVM GUI (SLOC260) can be downloaded from the TI Web site. Follow the directions in ReadMeFirst.pdf file to install GUI and device driver

4 Test Setup

Two EVMs are required to evaluate the AFE5803 device. The following illustration shows the exact setup of these two boards and external connectors. For the default configuration as shown in Figure 1, it is unnecessary to have an external sampling clock and external Vcntl supply. The onboard CMOS clock and onboard Vcntl are used.

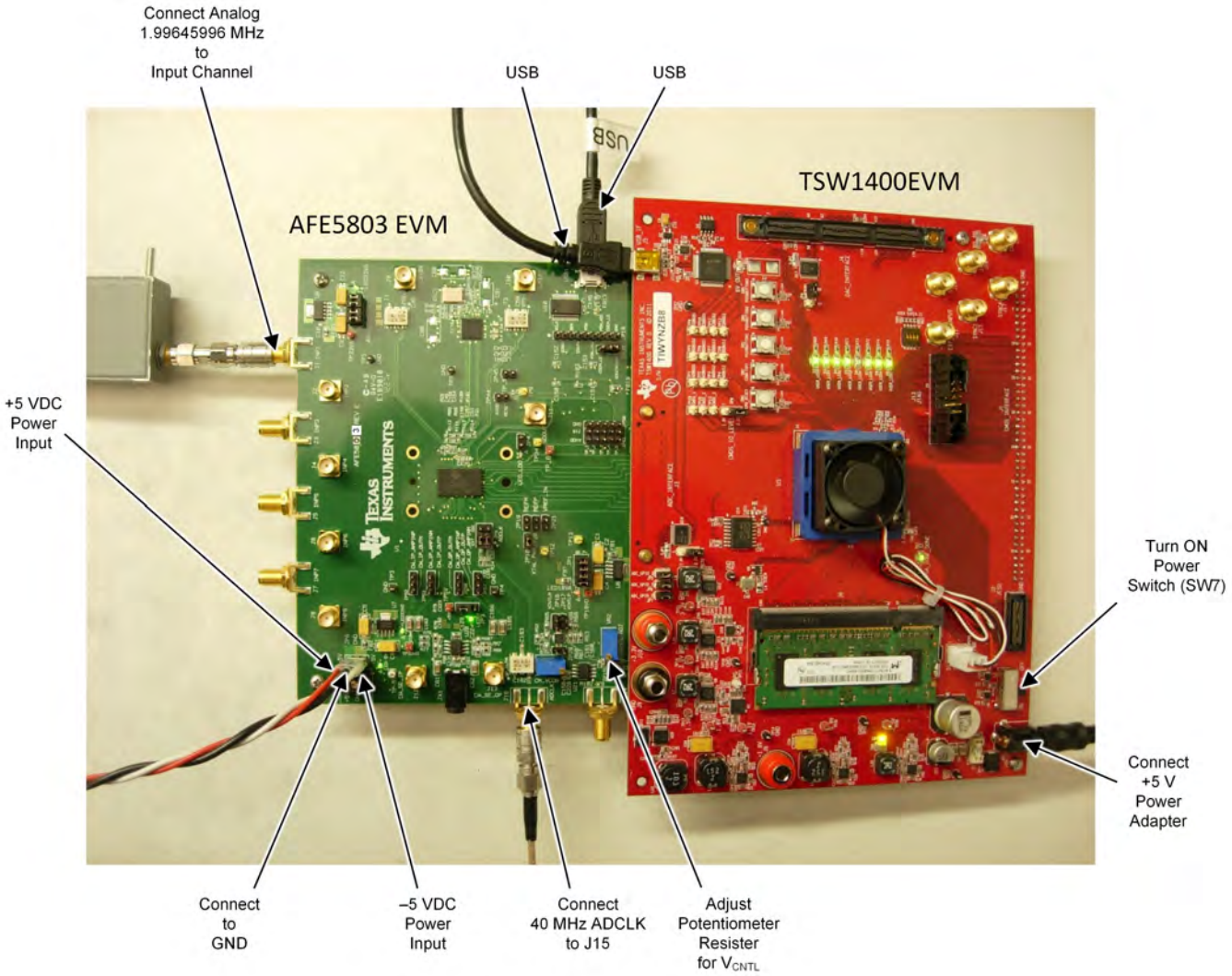
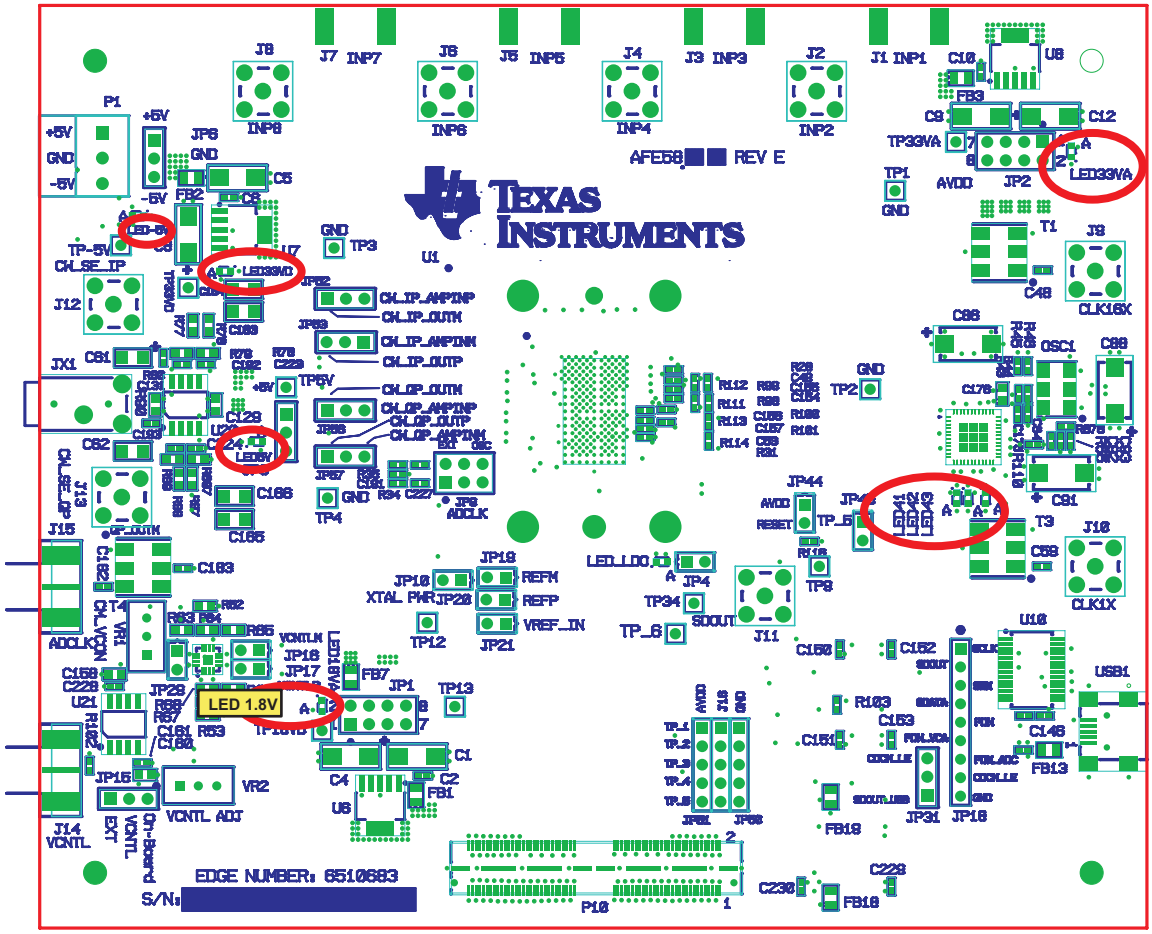


Figure 2. HW Setup With Connection Between TSW1400EVM and AFE5803

5 Power Up AFE5803

Power up the AFE5803EVM by applying +5 V and –5 V to the P1 connector. After power up is complete, four green LEDS and two red LEDS are turned on as shown in the following illustration.



6 Launch AFE5803 GUI

Launch the AFE5803 graphic user interface (GUI), select the ADC page to observe the default condition. Figure 3 shows the default conditions on the ADC page.

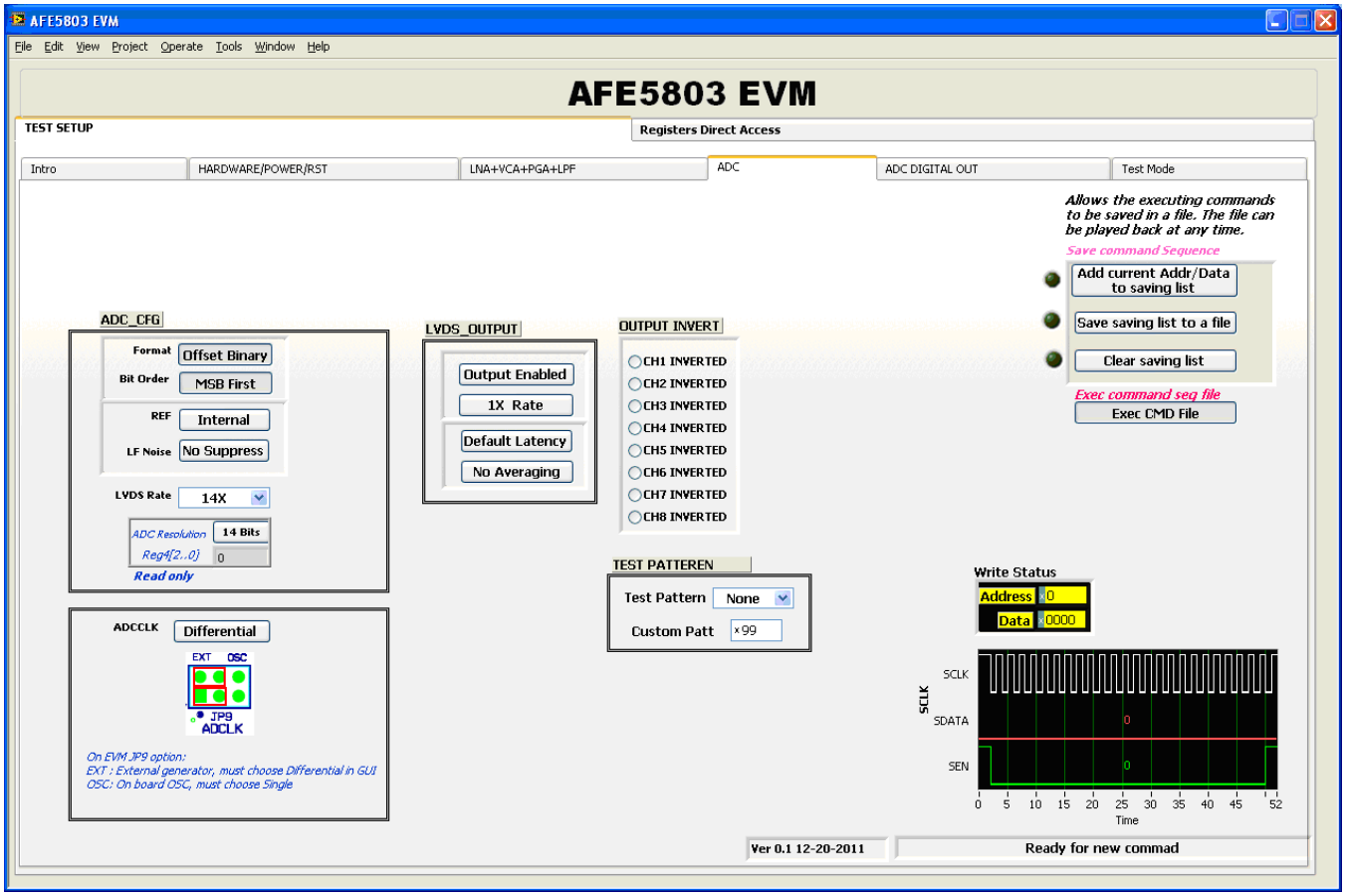


Figure 3. Default Conditions Screen

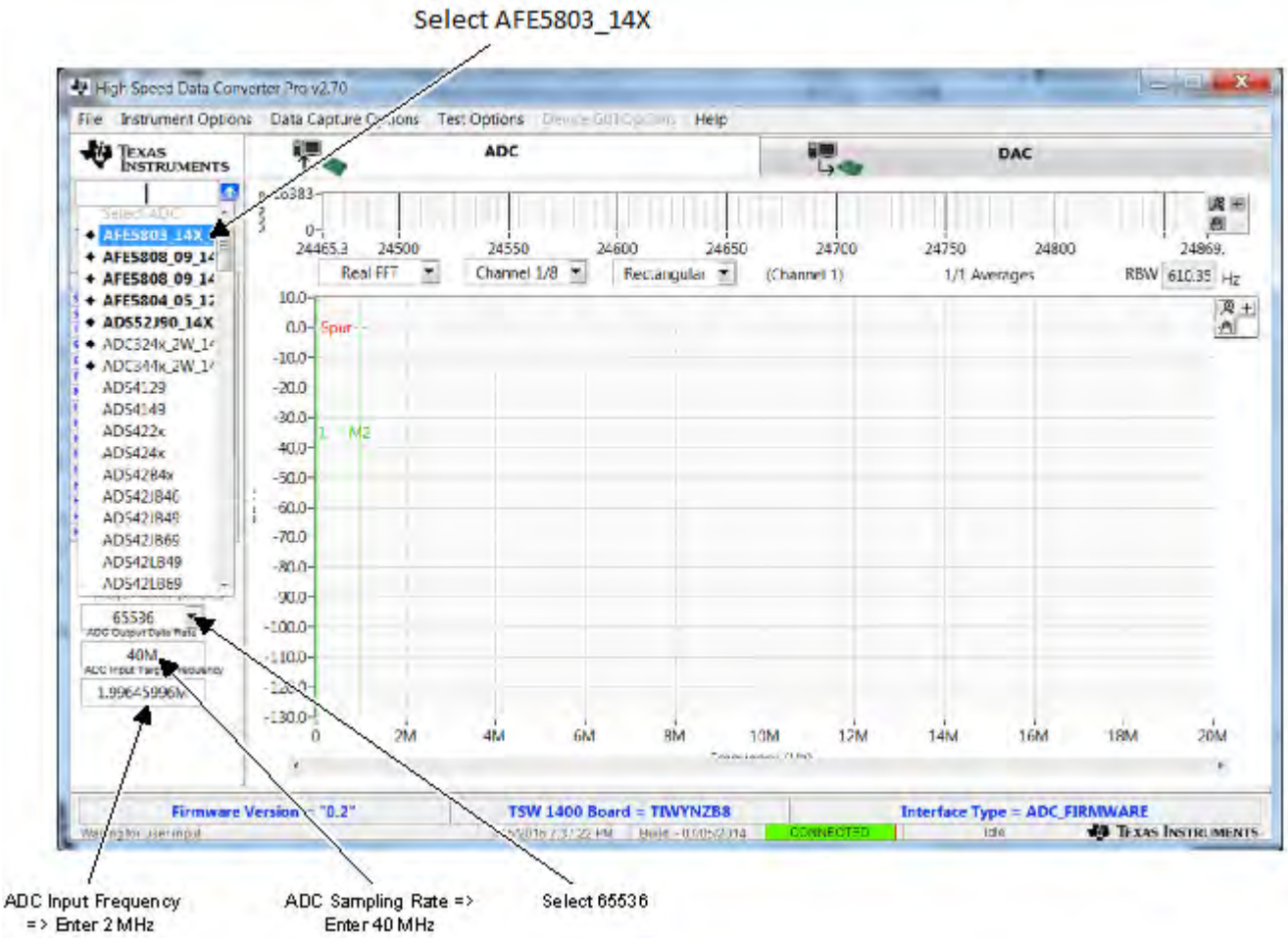
7 Launch TSW1400 GUI

Launch the TSW1400 GUI. For information on how to download this GUI see . The Message window displays the following message to indicate that the setup of the TSW1400EVM and AFE5803EVM is working properly. If a different message or an error message appears, contact TI FAE.

Select **AFE5803**, **14 bits**, **MSB first** from the GUI.

ADC Sampling Rate is fixed at 40 MHz; this is the onboard CMOS clock frequency.

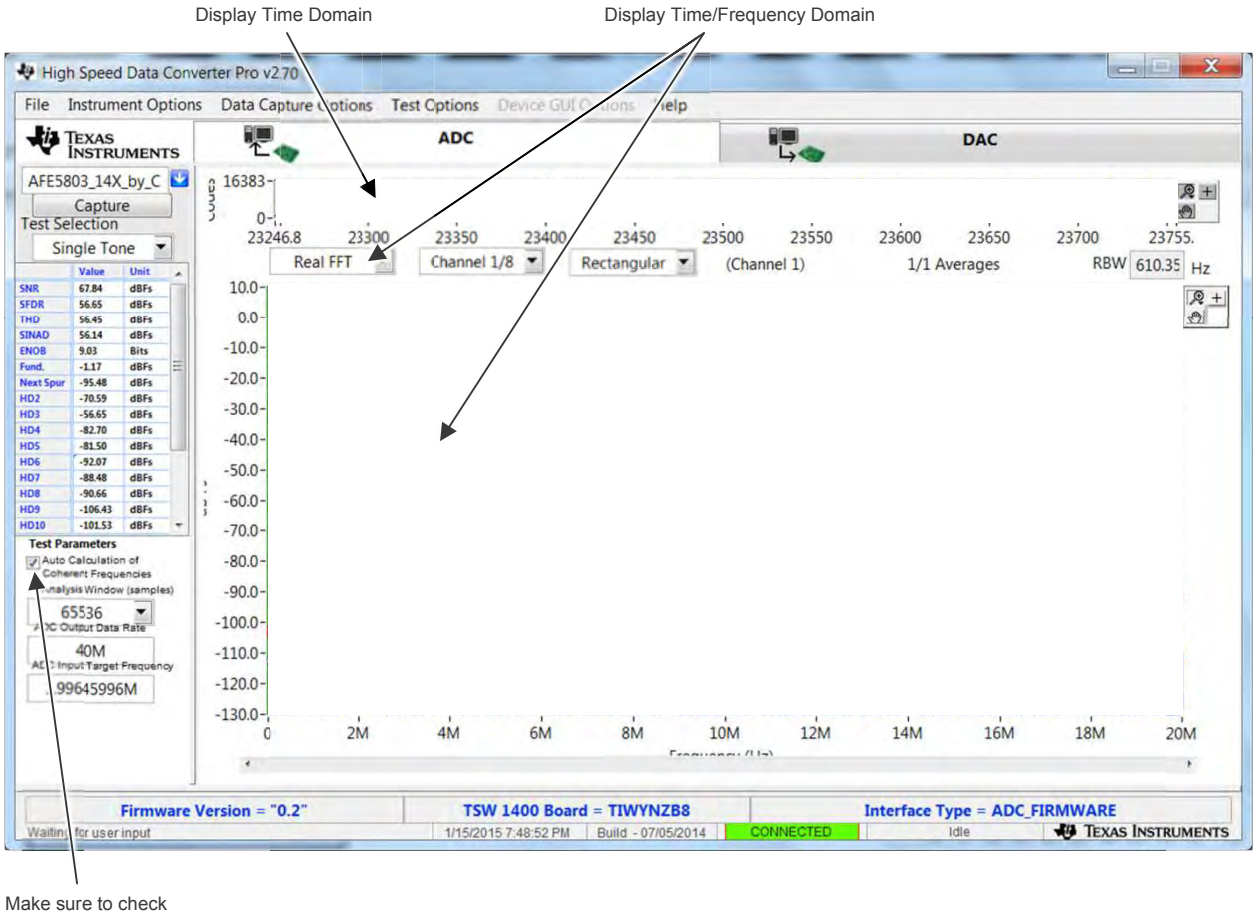
ADC Input Frequency – enter 2M, and the GUI calculates the real coherent frequency to 2.00439453M.



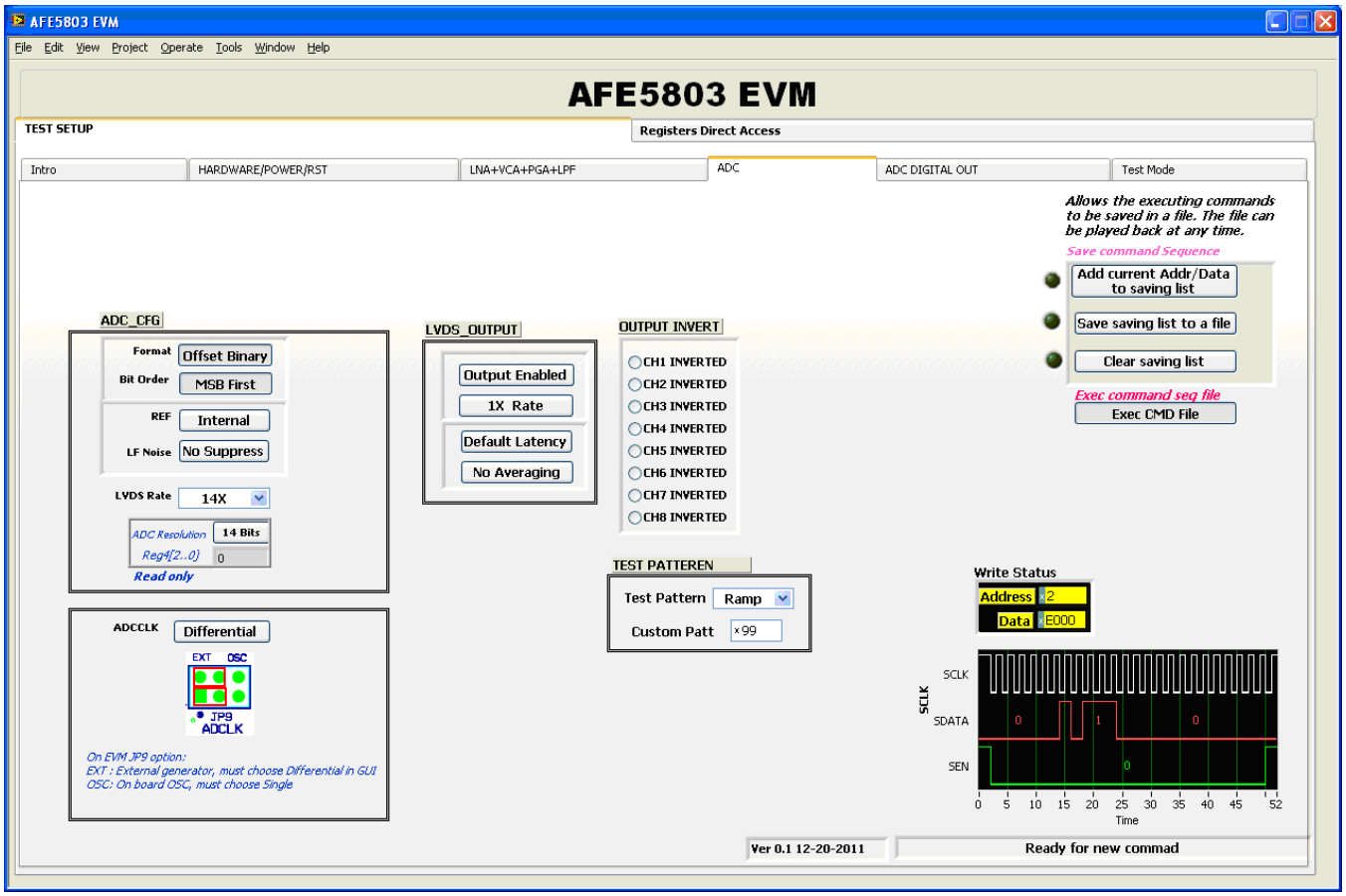
8 Test AFE5803

8.1 Step 1: Time Domain

- Select the Time Domain page from the TSW1400 GUI.



- From the AFE5803 GUI, go to the **ADC** page, and then select **Ramp**.



- Press the Capture button on the TSW1400 GUI. This displays a ramping waveform on the TSW1400 GUI display area as shown in the following illustration.

- Repeat for Channel 2 and Channel 8.
- **If each channel has the output as shown in the following illustration, proceed with the next step; otherwise, contact the TI FAE to troubleshoot the problem.**
- On the AFE5803 GUI, change Test Pattern from **Ramp** to **None** for the next step.

8.2 Step 2: Single Tone FFT

- Select the **Single Tone FFT** page at the TSW1400 GUI.
- Connect Channel 1 of the AFE5803EVM to a signal generator through an **LP filter**. If an LP filter is not present, the result will not be good.
- Set the amplitude of the signal generator to **-25dBm**.
- Set the frequency of the signal generator to **2.00439453M** to match the GUI.
- Change the window option to **Hanning**. This is because the input signal and the onboard CMOS clock are noncoherent.
- Press the Capture button to get the test result.
- Repeat for Channel 2 through Channel 8.

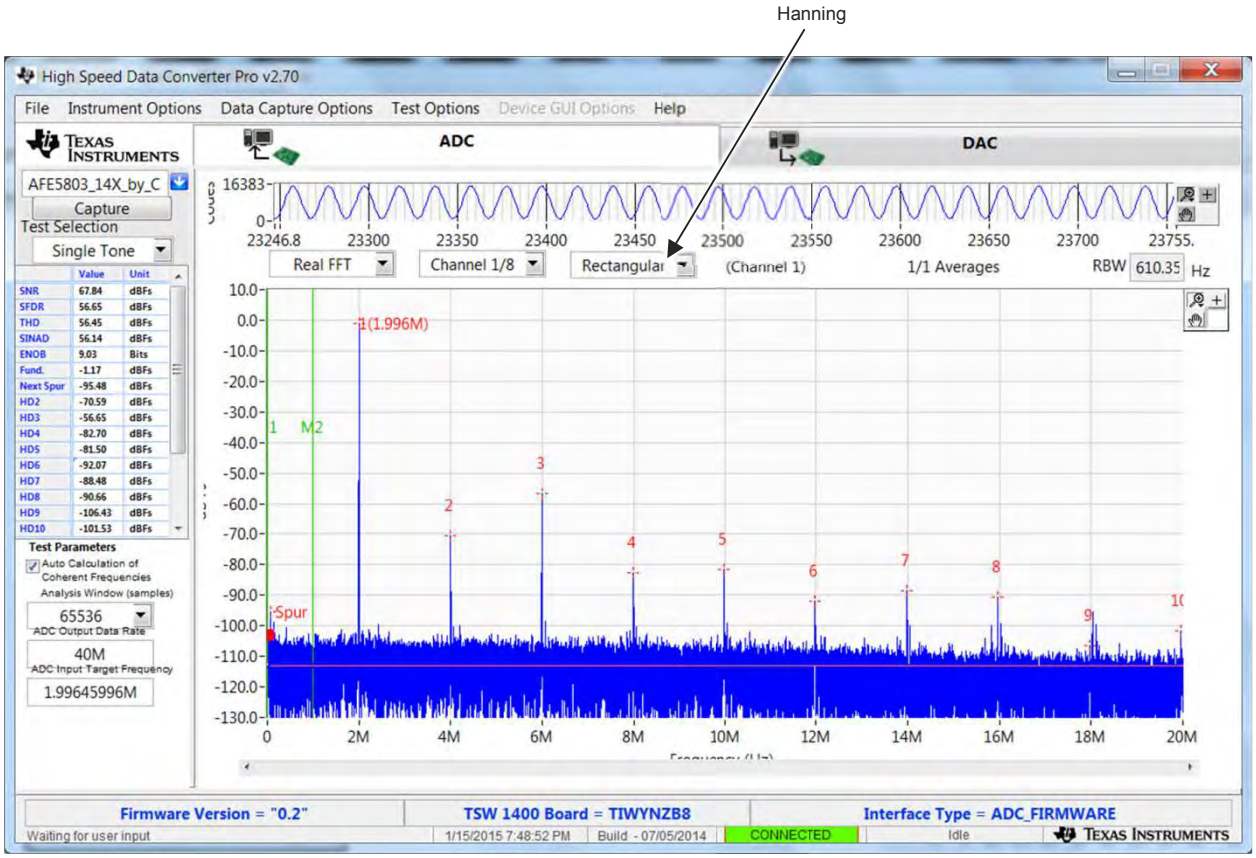


Figure 4. User Interface: Single FFT Format

9 External ADC Sampling Clock

To use the external clock generator to test the AFE5803, perform the following steps.

1. Reconfigure JP9 as shown in the following illustration. The rest of the jumpers remain the same.
2. Connect the external generator as shown in Figure 5.
3. Set the generator output to 40 MHz, 13 dBm.

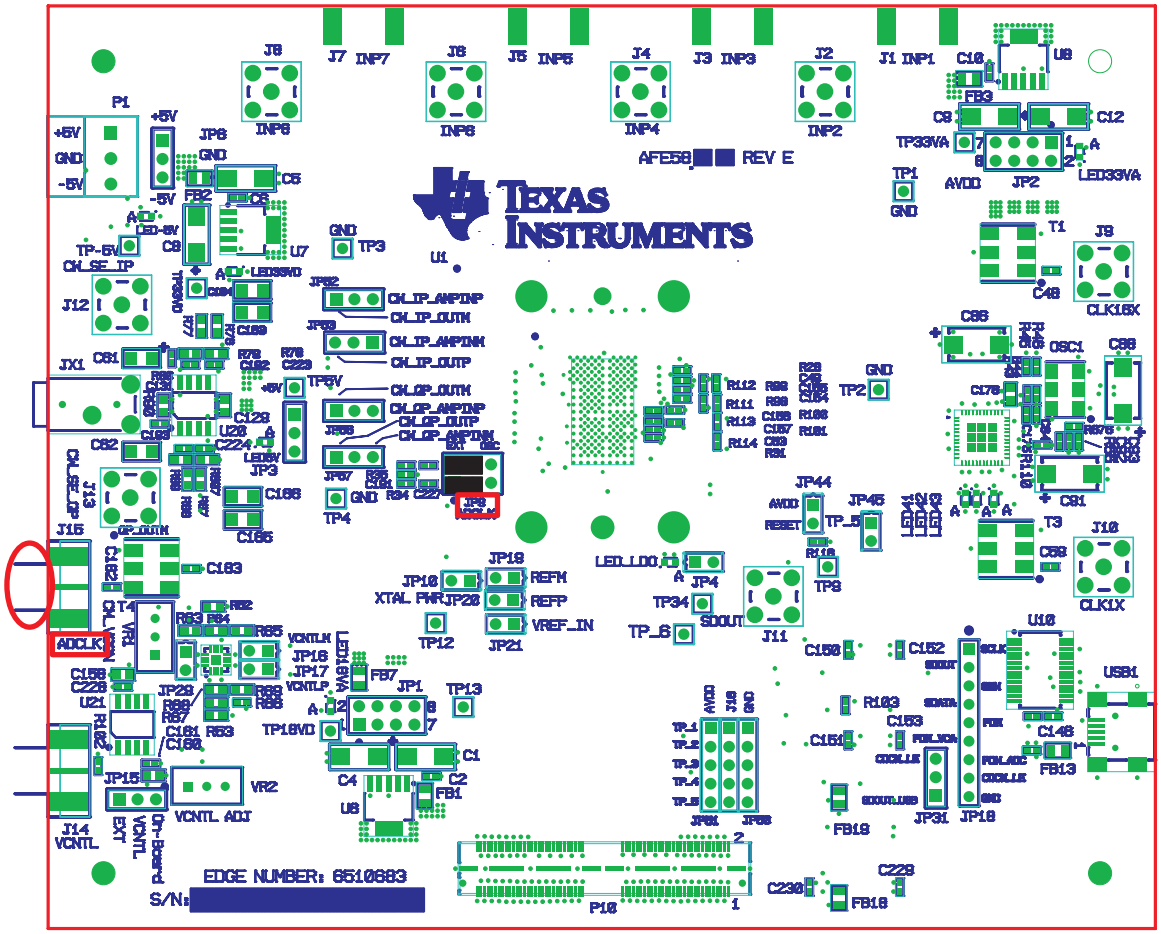
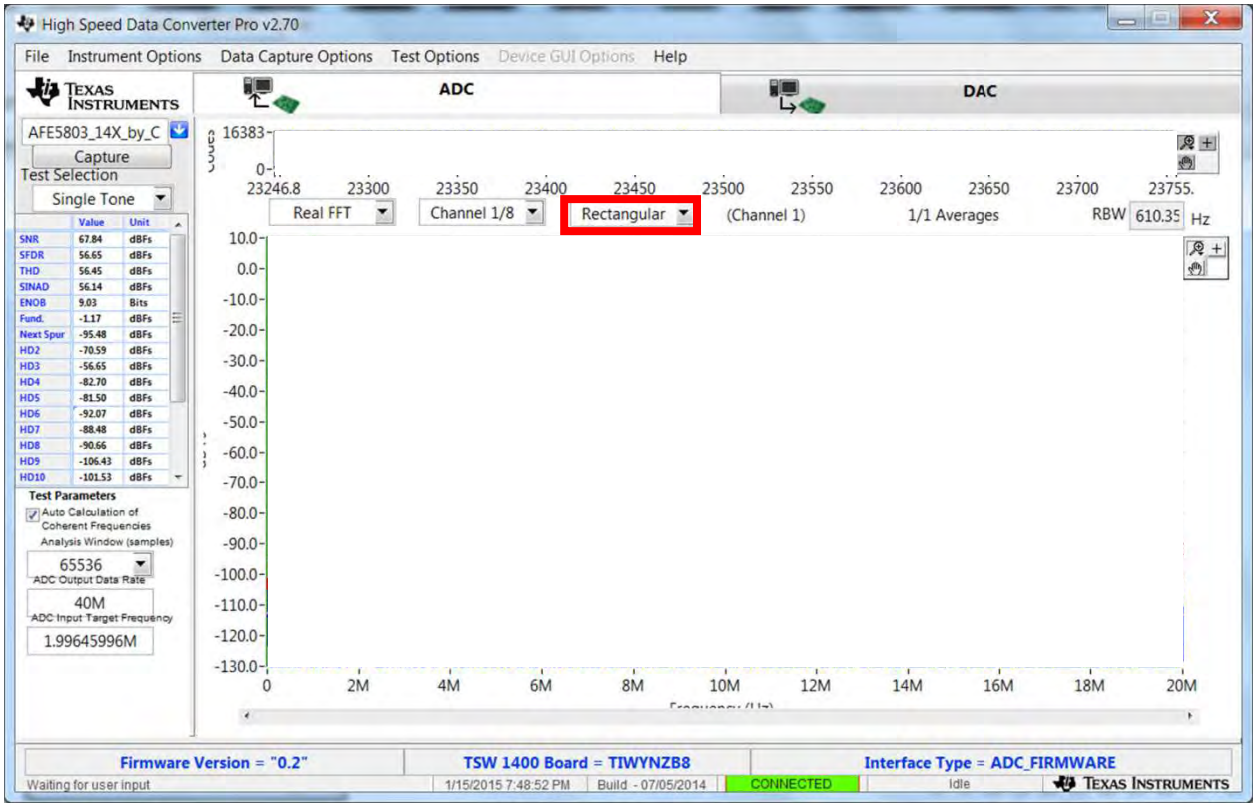


Figure 5. External ADC Sampling Clock Configuration

4. If the generators for the ADC clock and input signal are synchronous, then choose *Rectangular* as the Windowing option; otherwise, use *Hanning* or *Hamming*.



5. The test procedure is the same for the CMOS ADC clock.

10 External Vcntl

- JP15 needs to be reconfigured to short the leftmost two pins.
- A power supply is required to be connected as shown in Figure 6.

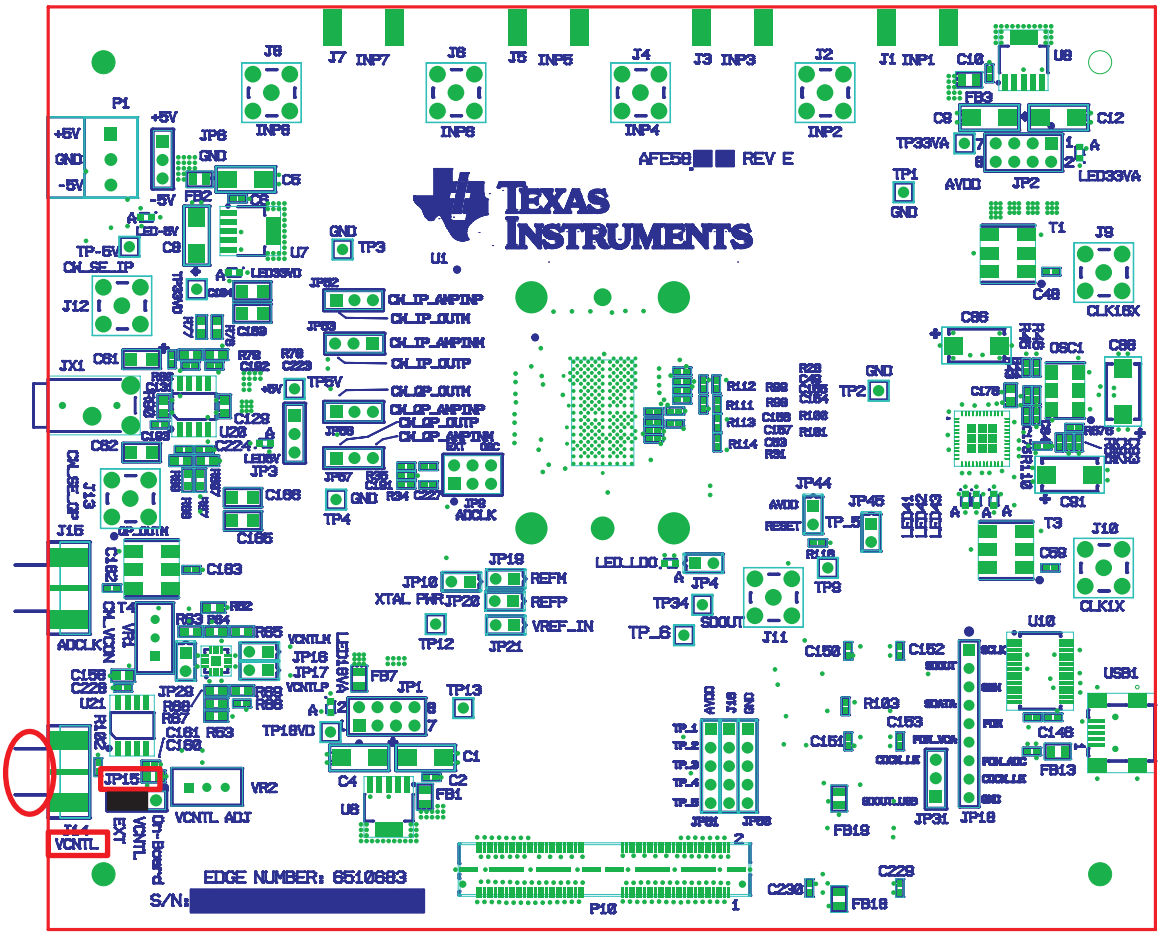


Figure 6. External Vcntl Configuration

11 Board Configuration

11.1 Input/Output, Power Supply, and USB

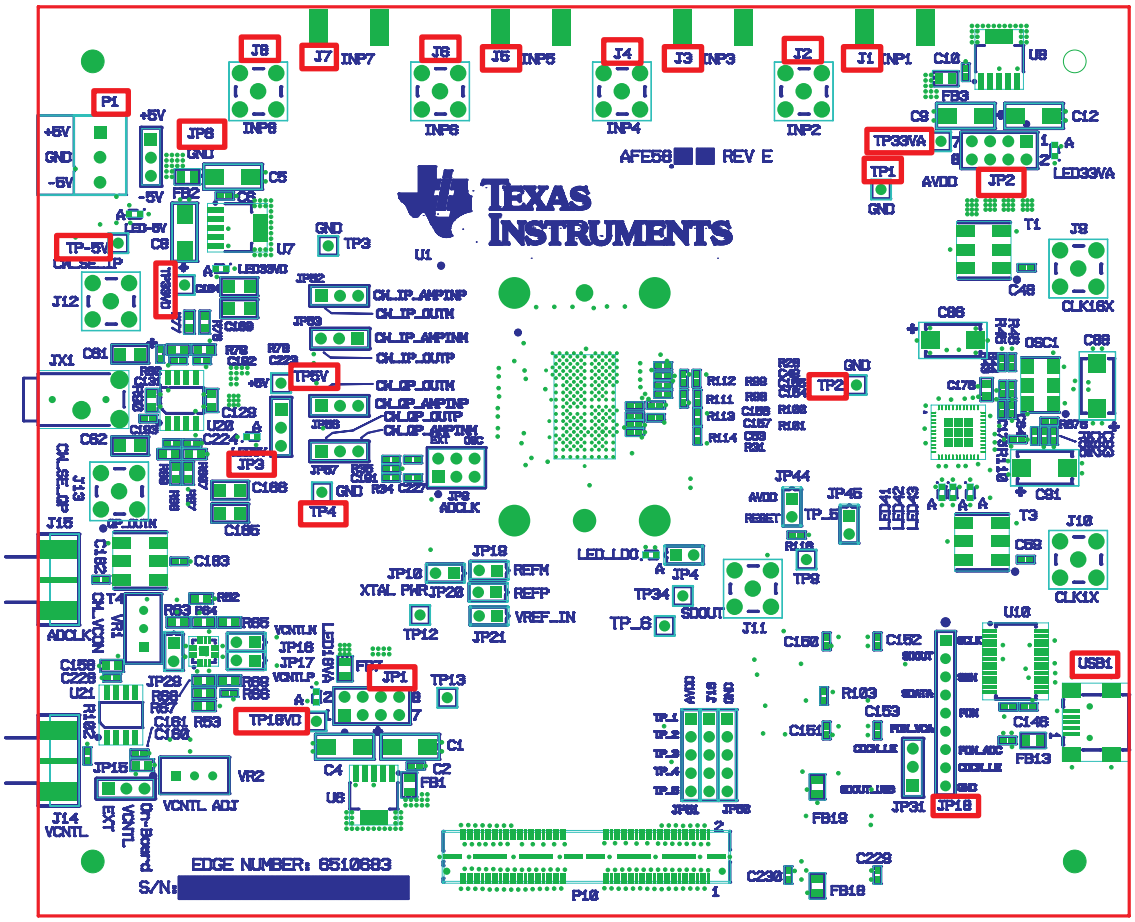


Figure 7. I/O, PWR, and USB Connector

Table 1. Input/Output, Power, and USB

Connector	Description
J1 through J8	Analog Input signals for Ch1 through Ch8. Connect to a signal generator. A bandpass filter must be applied between the generator and the SMA to get a better result. (See Figure 1 .)
P1/JP6	P1 is the +5-V and –5-V power supply connector. JP6 is the test point for +5-V/-5-V power supply.
JP3	Onboard 5-V enable. Set up as Figure 2 is a must to use onboard 5-V supply.
XP-5V	-5-V supply test point.
TP5V	+5-V supply test point.
JP1	Onboard +1.8-V enable. Set up as shown in Figure 2; required to use the onboard +1.8 V.
JP2	Onboard 3.3-VA enable. Set up as shown in Figure 2; required to use the onboard 3.3 V.
TP18VD	+1.8-VD supply test point.
TP33VD	+3.3-VD supply test point.
TP33VA	+3.3-VA supply test point.
TP1 through TP4	Ground test points.
USB1	USB interface connector
JP18	Test points for USB data bus: From pin 1 to pin 9 the signals are: D0, D4, D2, D1, D7, D5, D6, and D3

11.2 ADC Clock

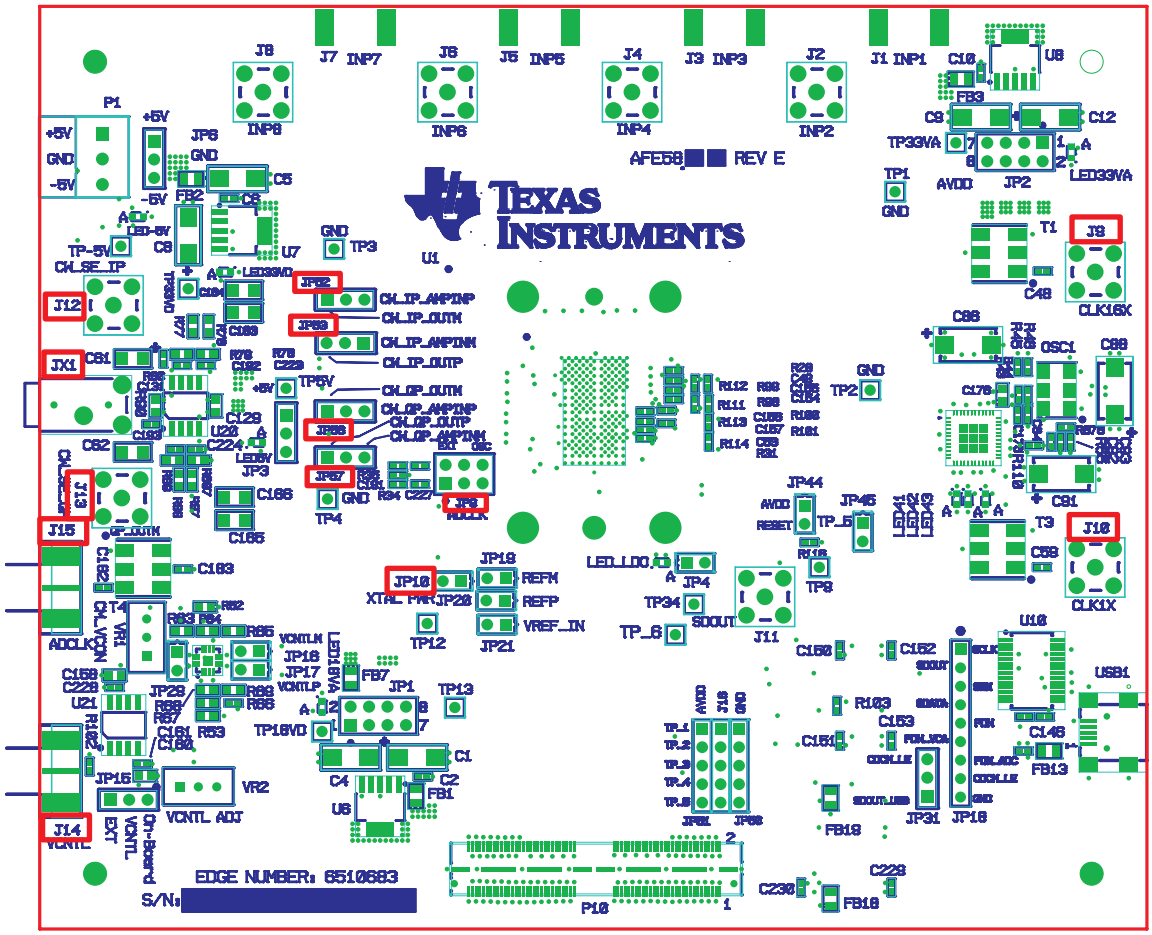


Figure 8. AFE5803EVM Jumper Locations

Table 2. PGATestMode, ADC Clock

Clock Type	Reference Designator	Description	
PGA Test	J9/J10/J12/J13	N/A	
	JP52/JP53/JP56/JP57	Test points for PGA test mode.	
ADC	JP9/JP10	JP9 selects on_board_ADC CMOS clock or external clock from J14. Default setup uses onboard CMOS clock. Set it to the other side to use the external clock source.	
		JP10 Short to power up onboard CMOS clock.	
	J14	External ADC clock Input.	

11.3 Vcntl Control Input

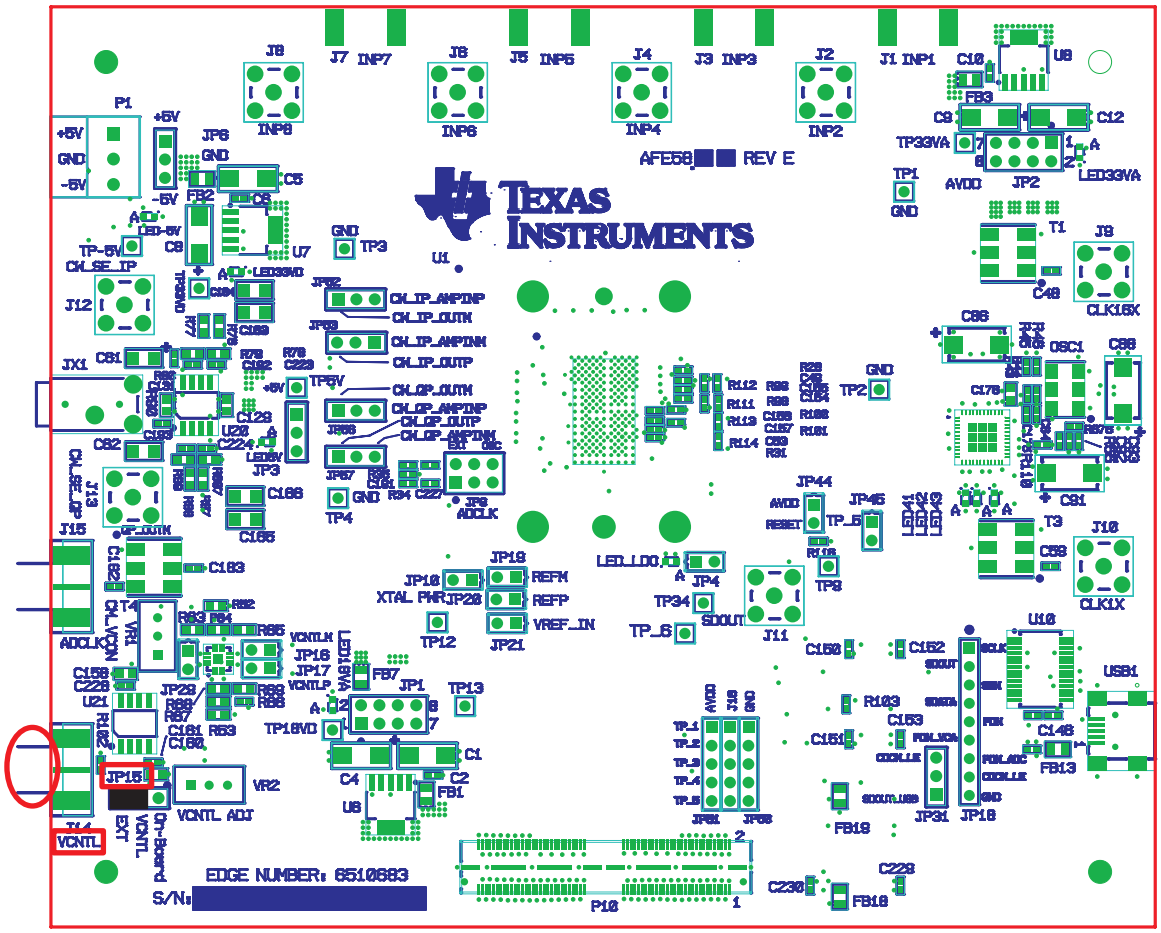


Figure 9. Vcntl

Table 3. Vcntl

Connector	Description
JP15	Choose onboard Vcntl or external Vcntl. The default setup uses onboard Vcntl.
J14	External Vcntl input. The range is from 0 V to 1.5 V.
VR2	Onboard Vcntl adjustment. Use JP15 pin 3 which has the text *On-Board* to monitor the Vcntl voltage level.

11.4 LEDs

The AFE5803EVM has seven LEDs. Their locations are shown in Figure 10. Their ON/OFF states demonstrate the normal operation of the power supplies and the PLL status of the clock buffer.

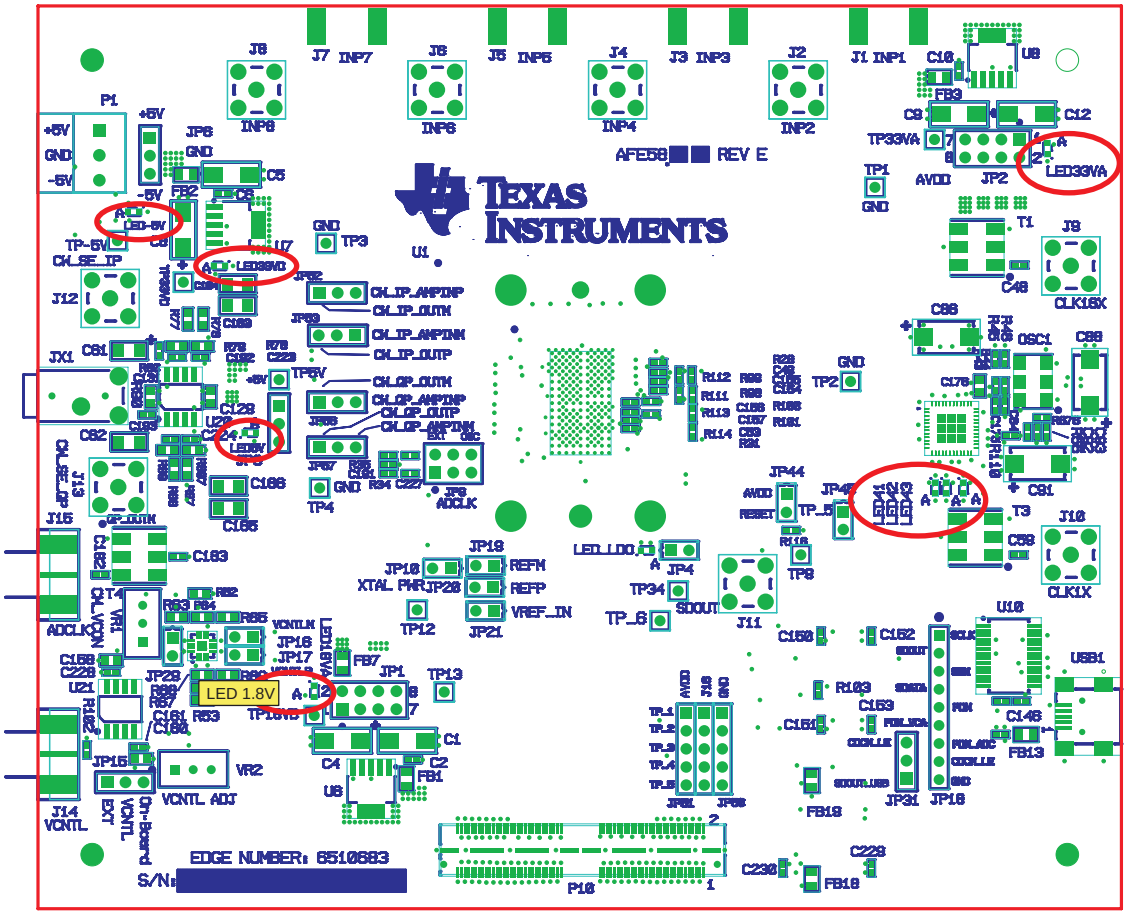


Figure 10. AFE5803EVM LED Location

Table 4. LED Indicators

Reference Designator	Power Supply	Color
LED-5V	–5 V	Green
LED5V	+5 V	Green
LED3.3VD	+3.3 VD	Orange
LED3.3VA	+3.3 VA	Green
LED1.8V	+1.8 VV	Green
LED41	Clock Buffer Status Indicator	Red
LED42		Red

11.5 Miscellaneous Test Points

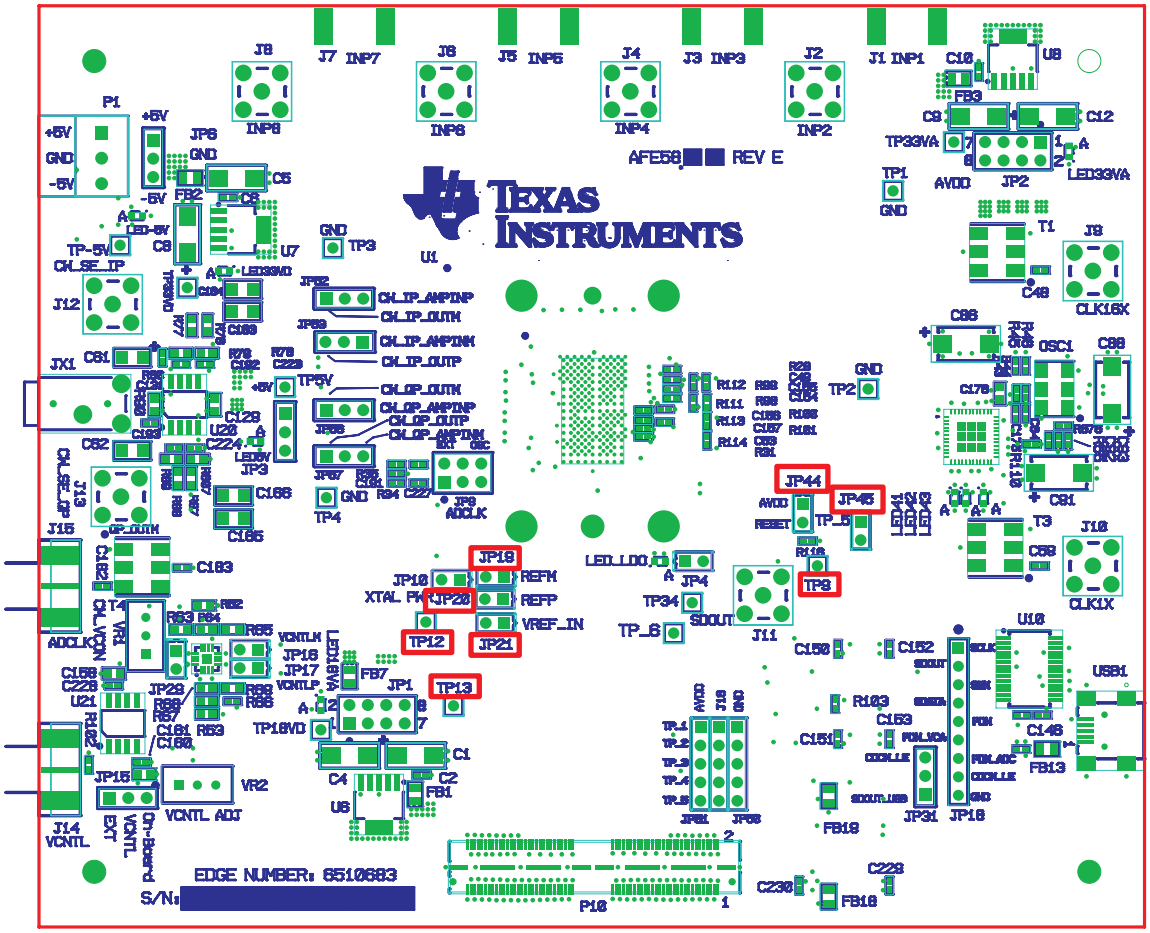


Figure 11. AFE5803EVM Test Point Locations

Table 5. Test Points

Reference Designator	Description
TP9, TP12, TP13,TP34	AFE5803 device test pin M8, L5, M5, and M9
JP19	REFM voltage input
JP31	SDOUT read enable
JP44	RESET input. Short to reset AFE5803.
JP45	TP_5 control enable
JP20	REFP voltage input
JP21	REF_IN voltage input

12 EVM Printed-Circuit Board Layouts and Schematics

The following illustrations show the six layers of the AFE5803EVM board.

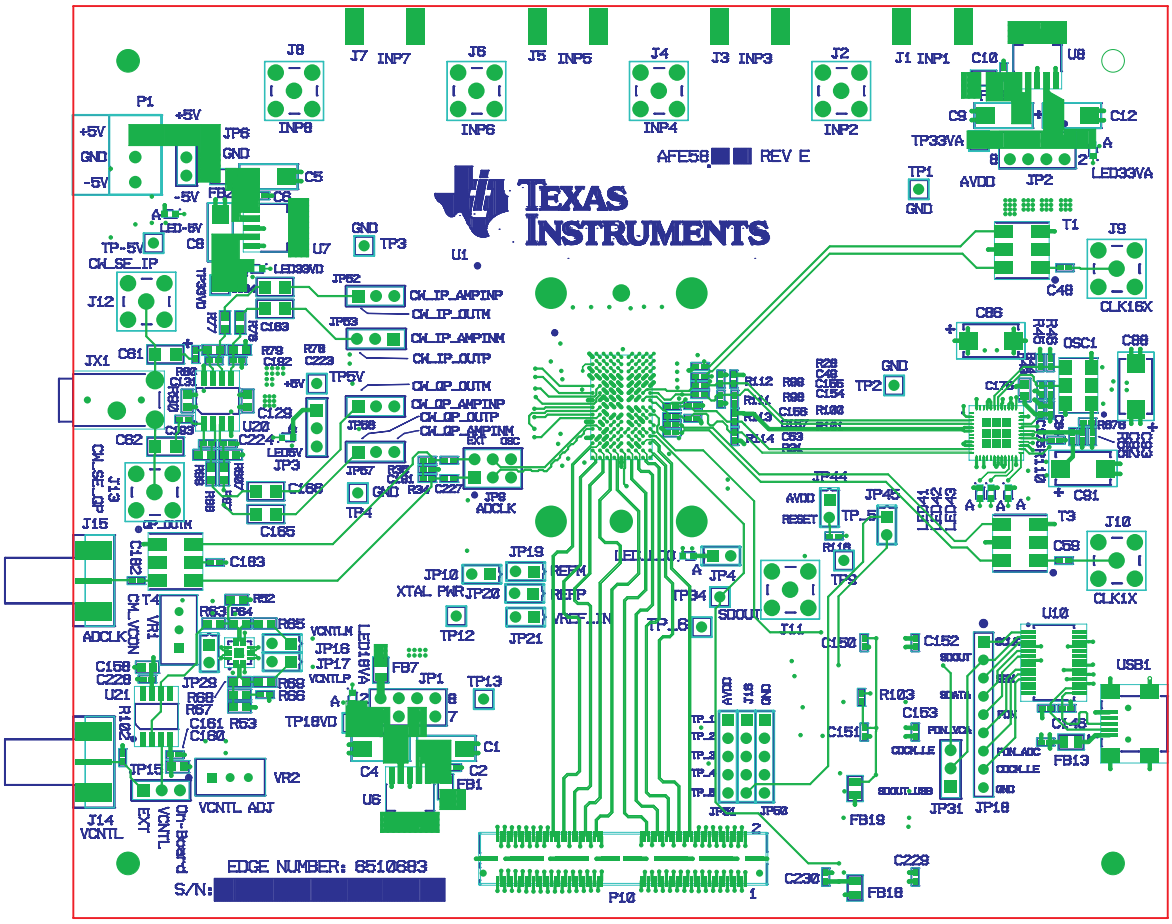


Figure 12. Top Layer - Signal

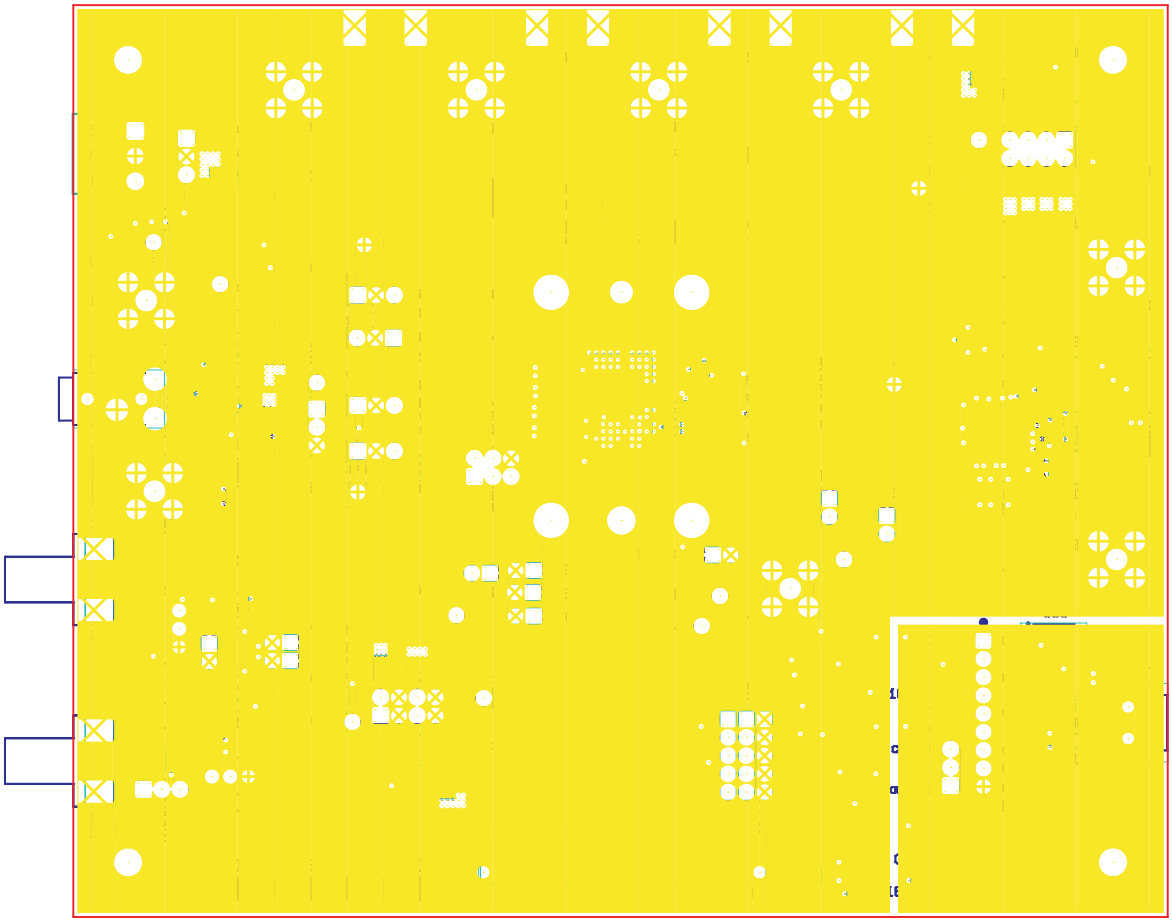


Figure 13. Second Layer - Ground

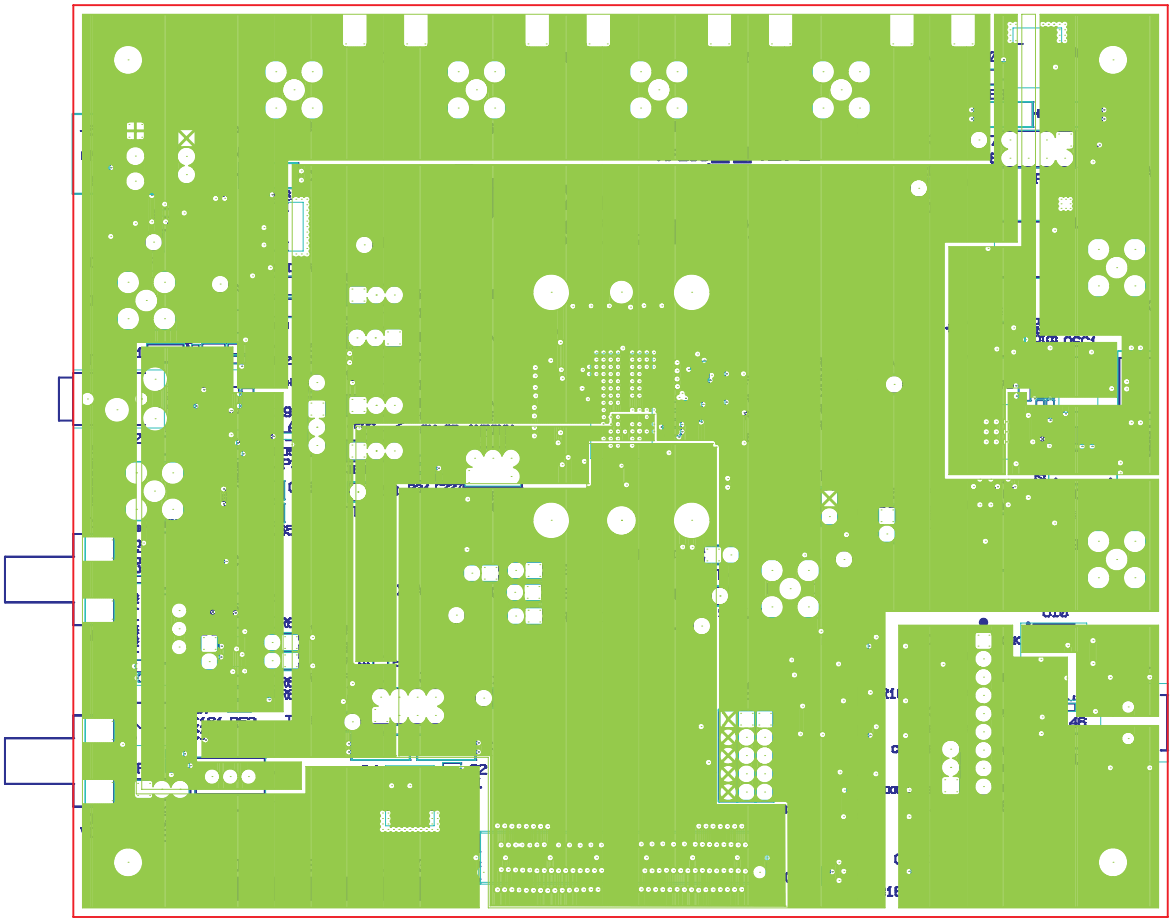


Figure 14. Third Layer - Power

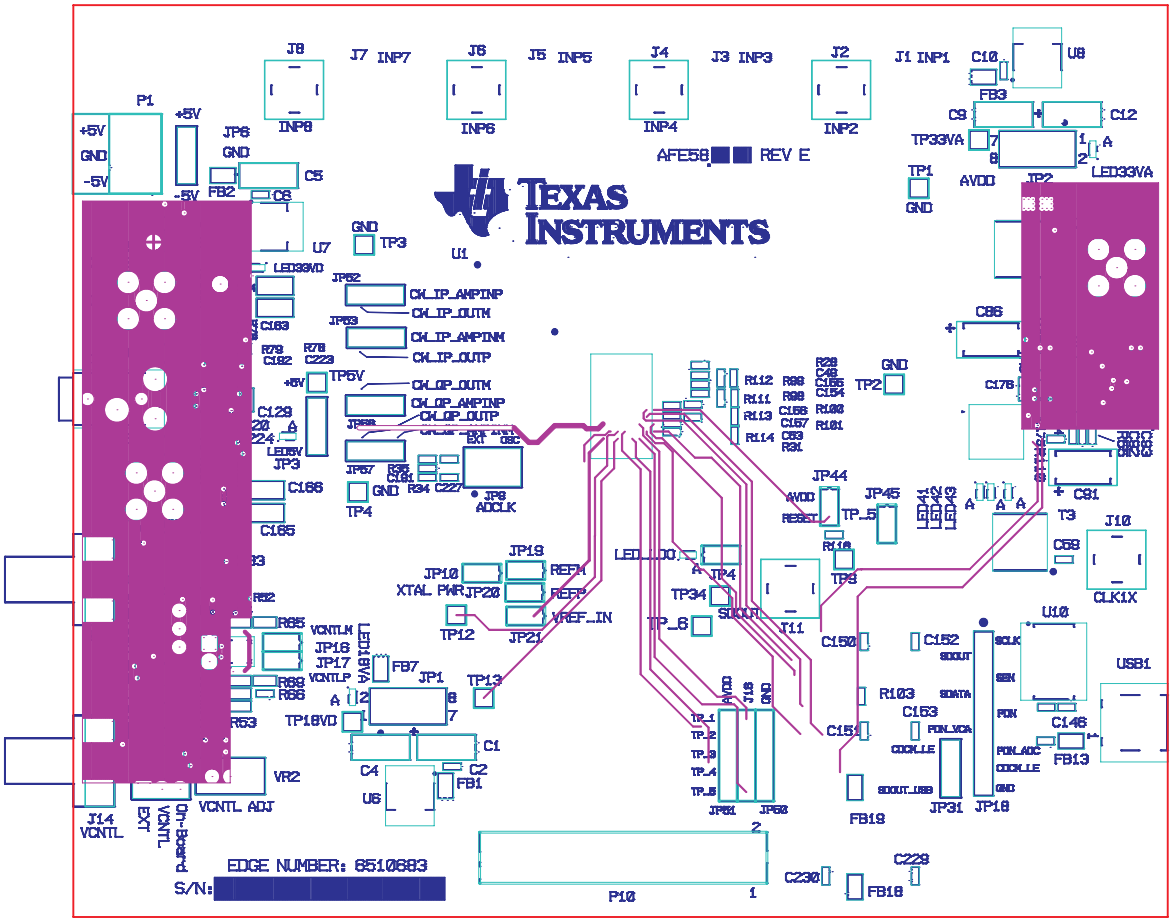


Figure 15. Fourth Layer - Signal

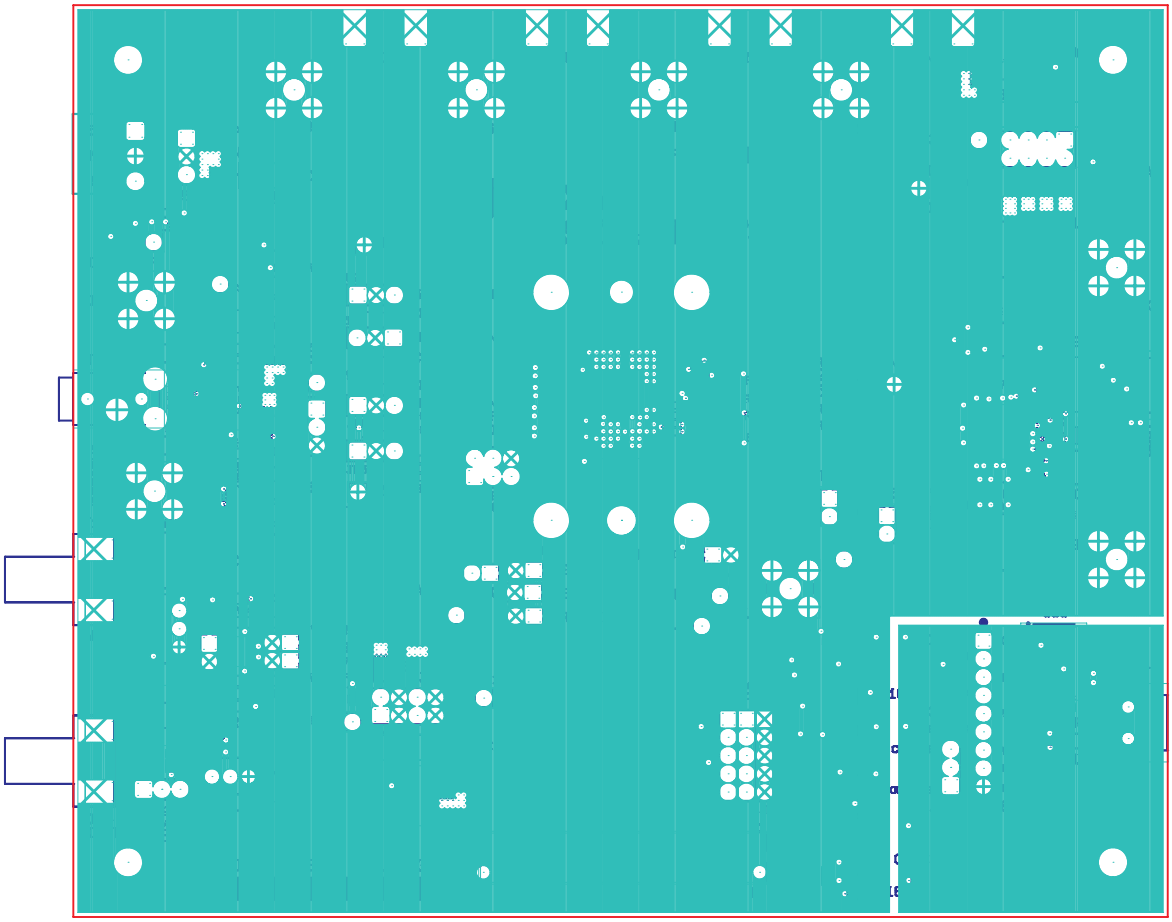


Figure 16. Fifth Layer - Ground

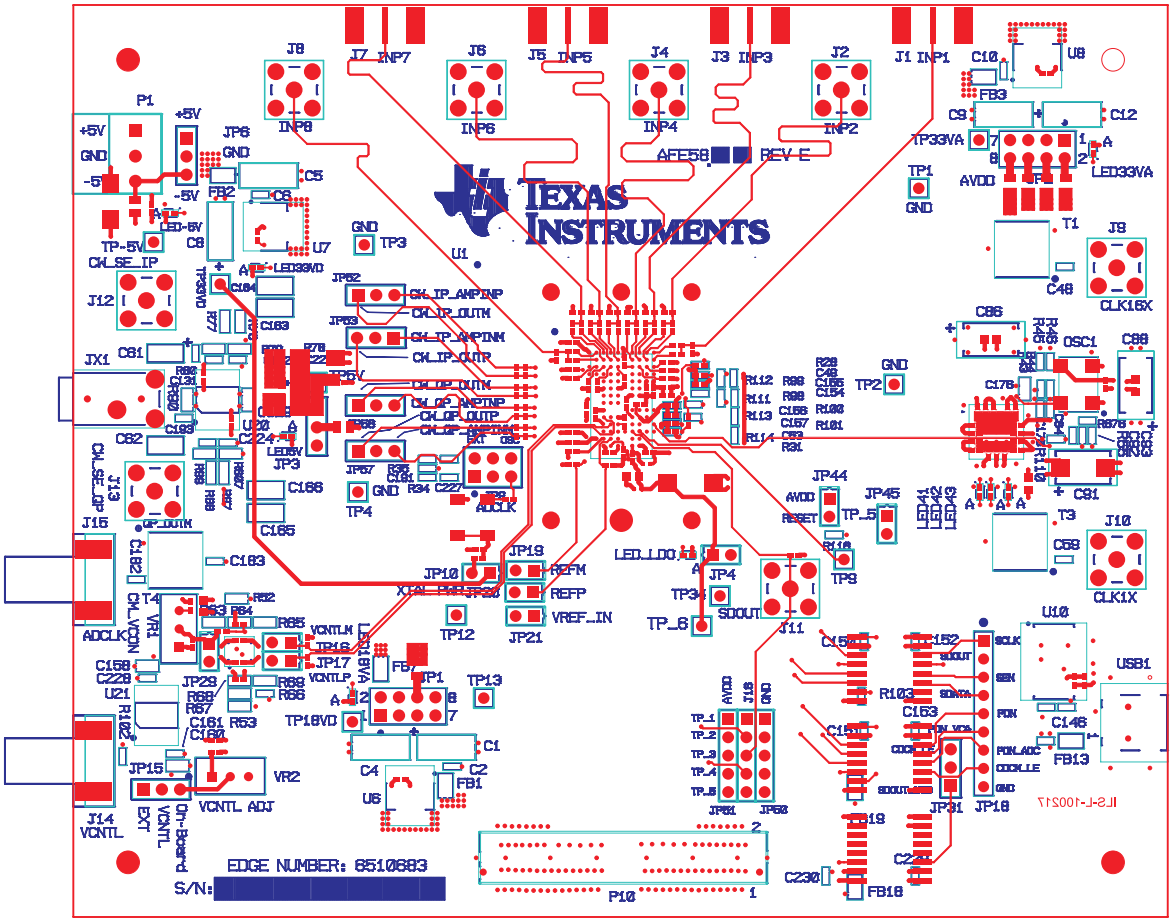


Figure 17. Bottom Layer - Signal

12.1 Schematics

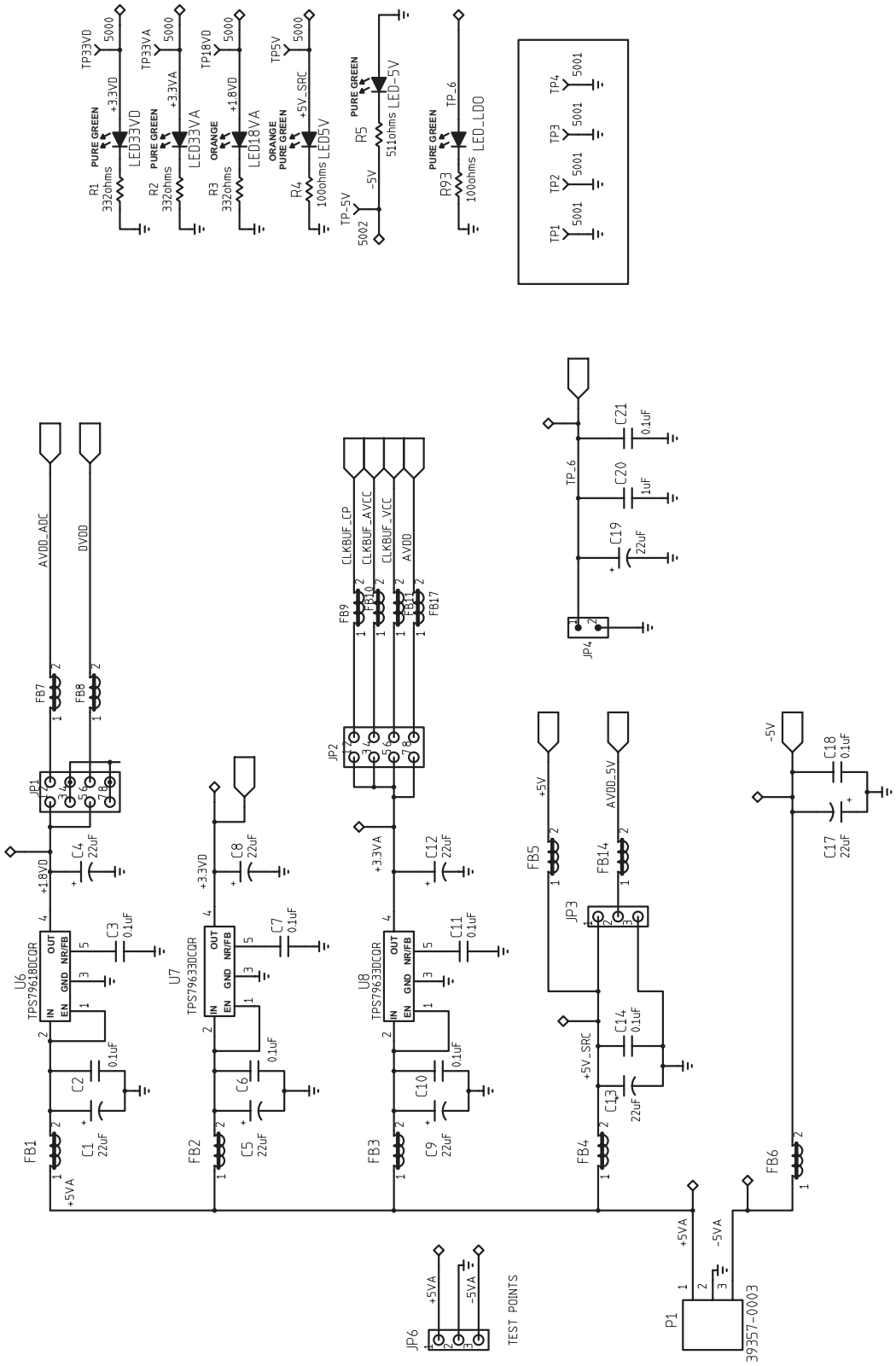


Figure 18. Schematic 1 of 9

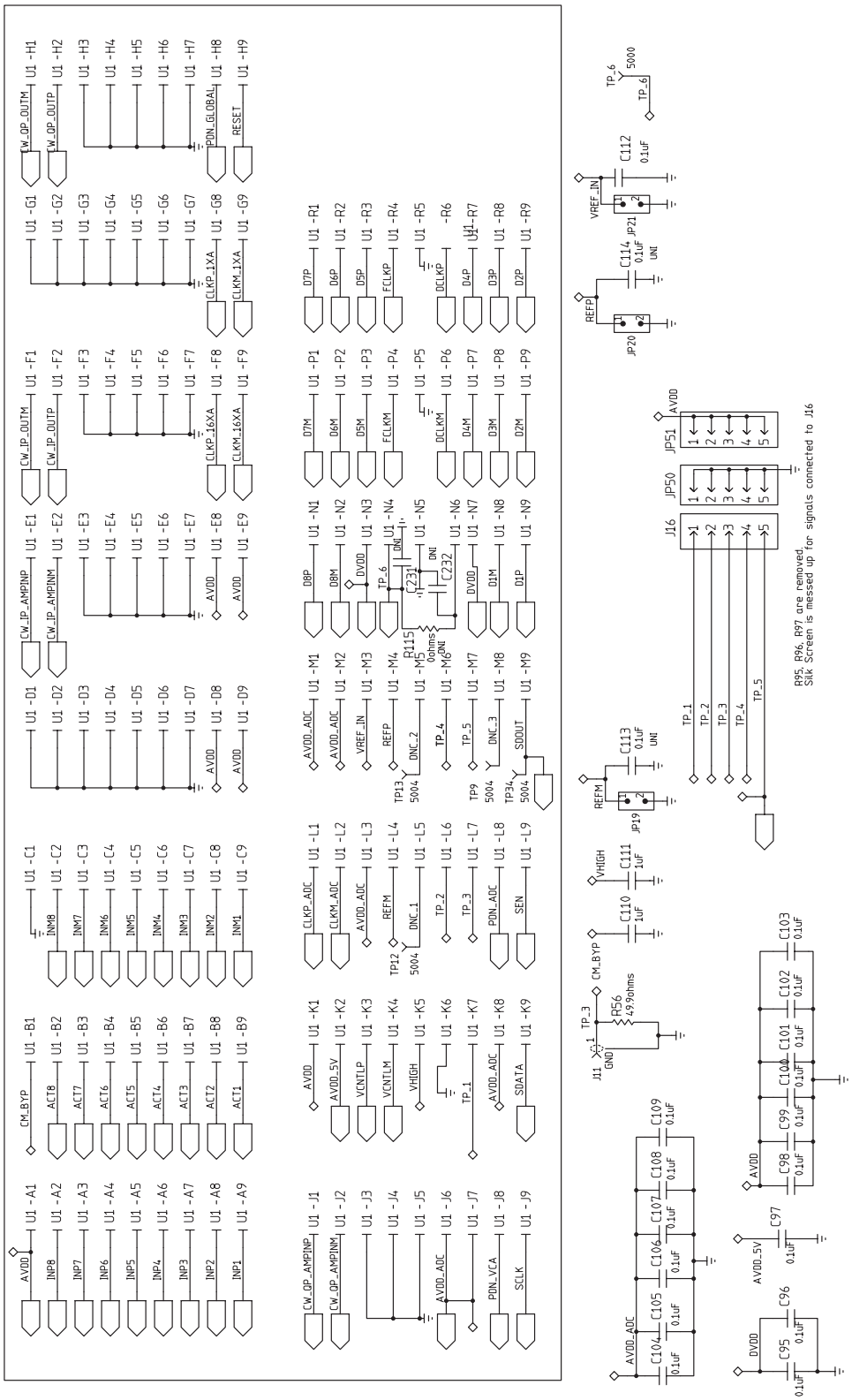


Figure 19. Schematic 2 of 9

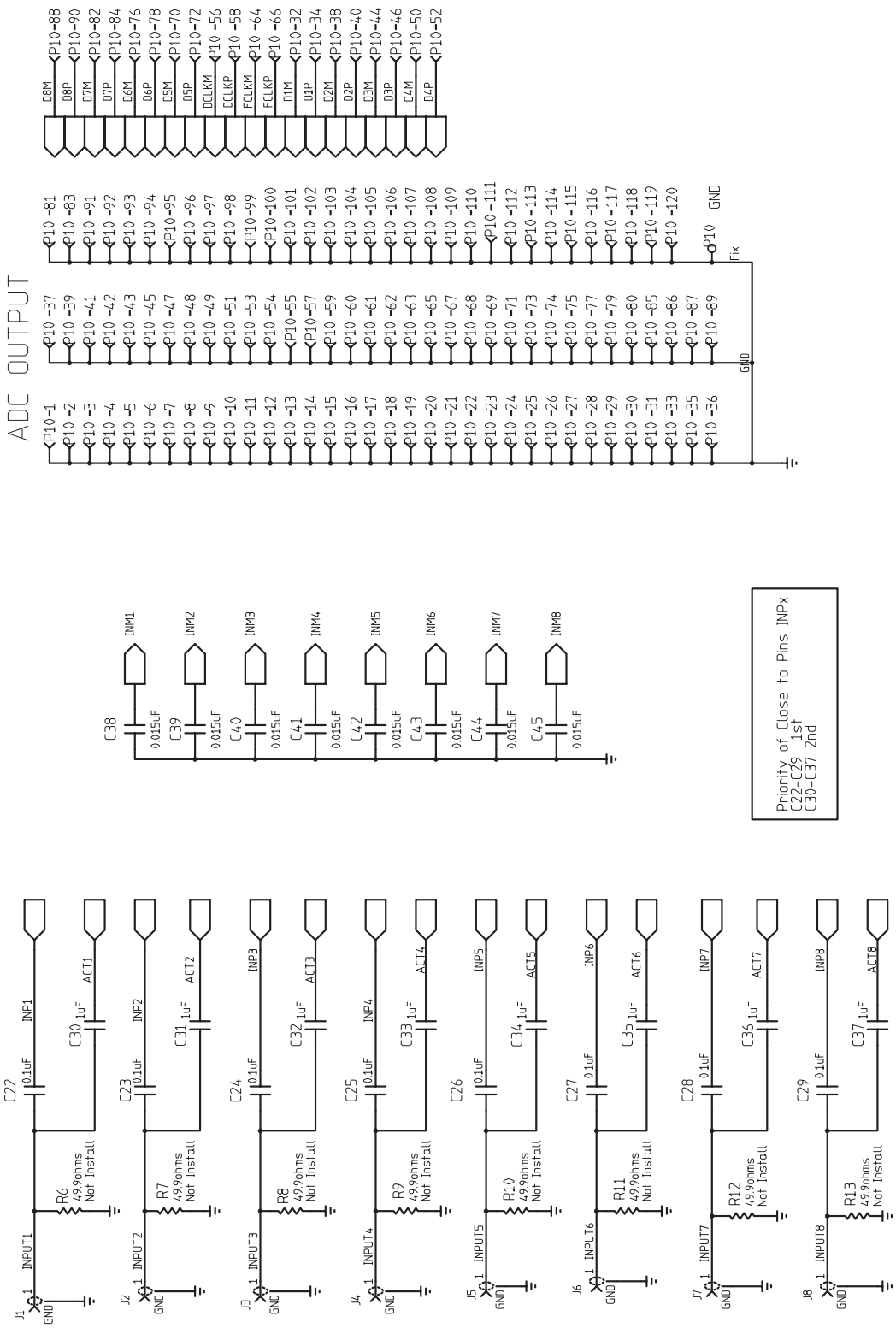


Figure 20. Schematic 3 of 9

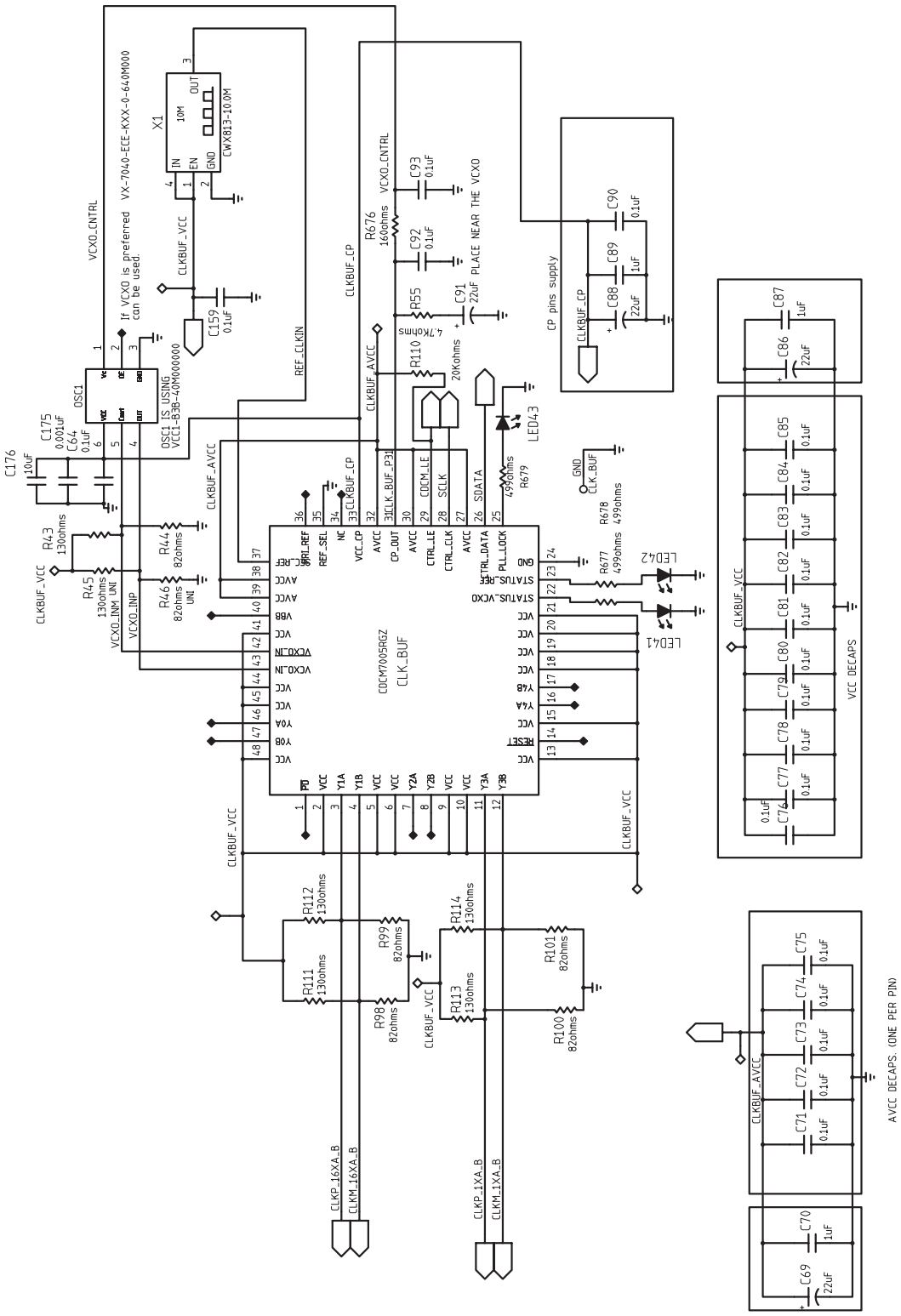


Figure 21. Schematic 4 of 9 (Not applicable to AFE5803)

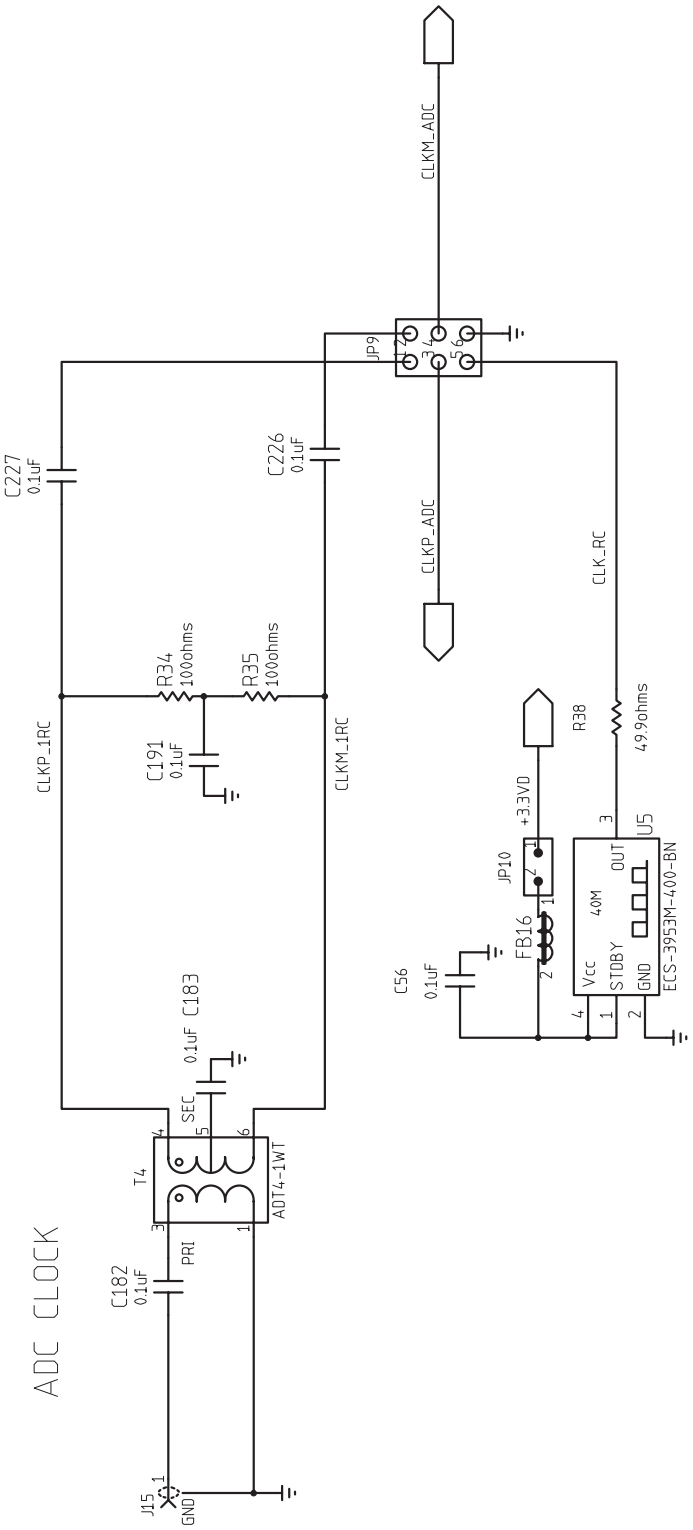


Figure 22. Schematic 5 of 9

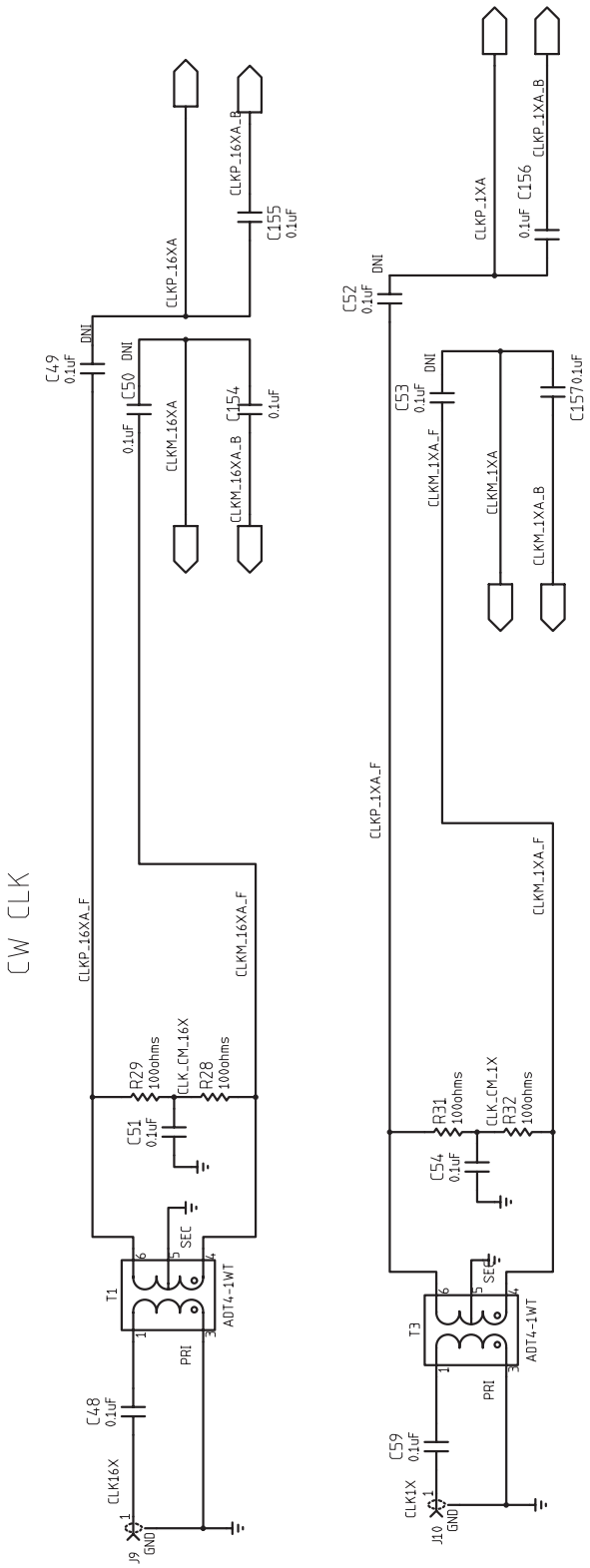


Figure 23. Schematic 6 of 9(Not applicable to AFE5803)

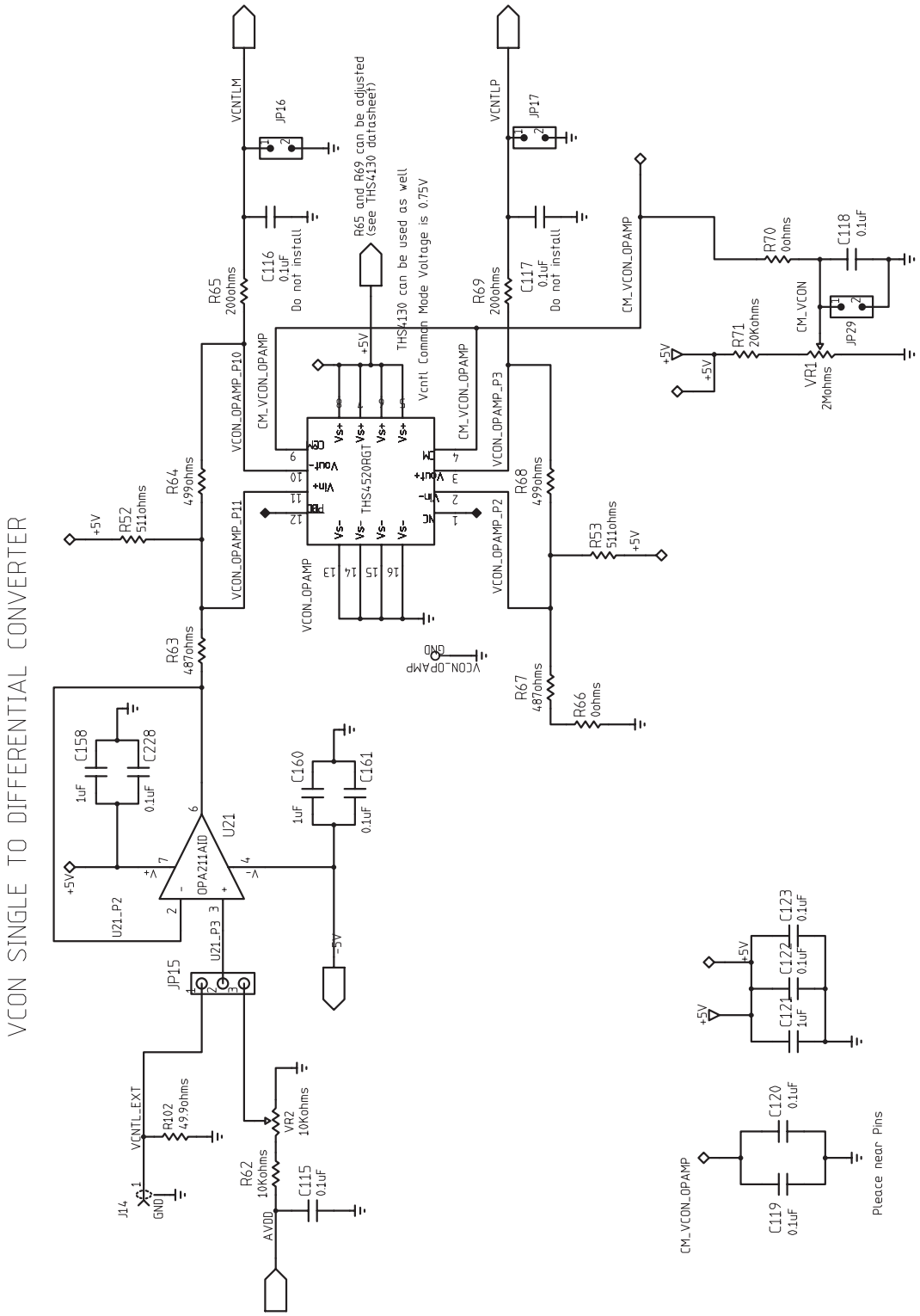


Figure 24. Schematic 7 of 9

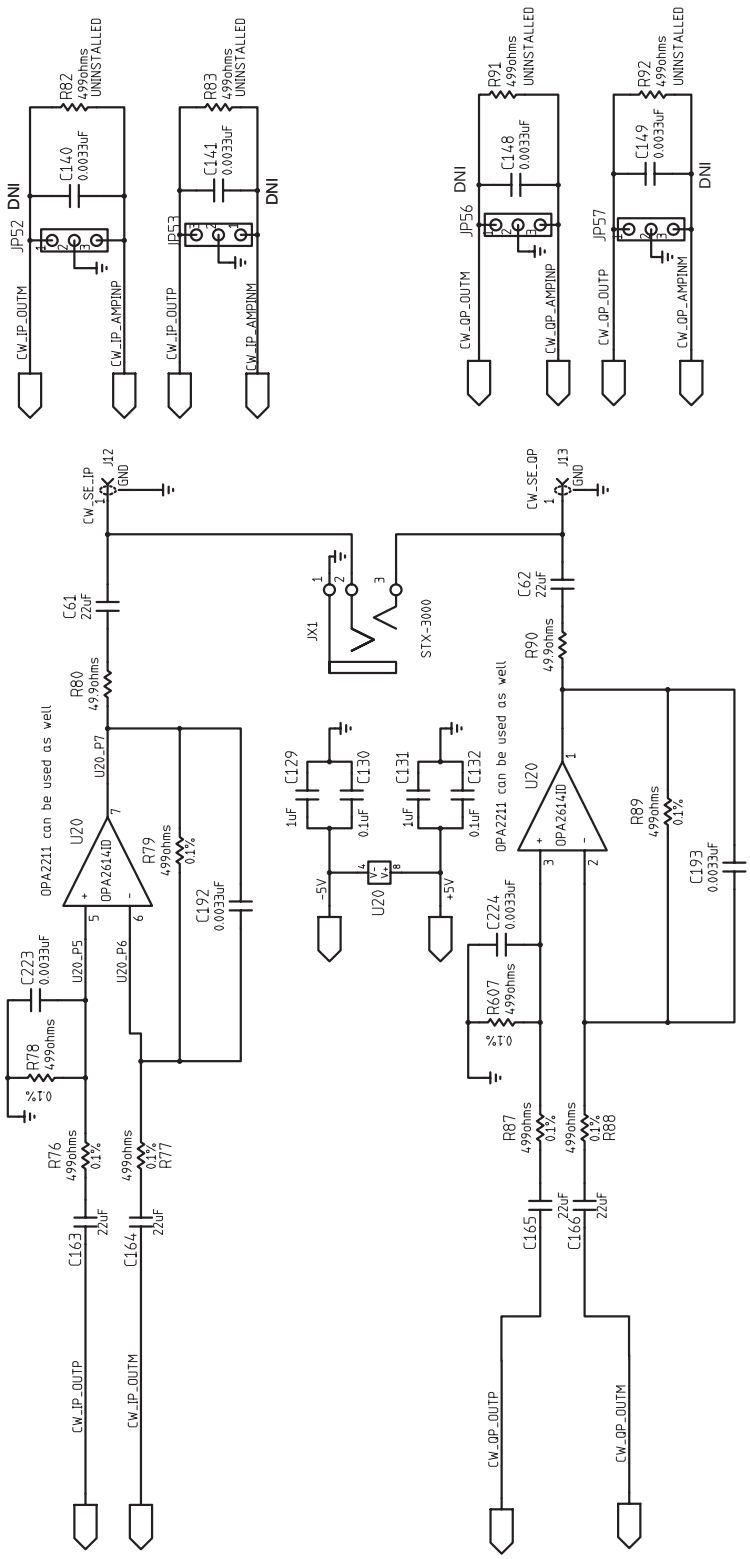


Figure 25. Schematic 8 of 9(Not applicable to AFE5803)

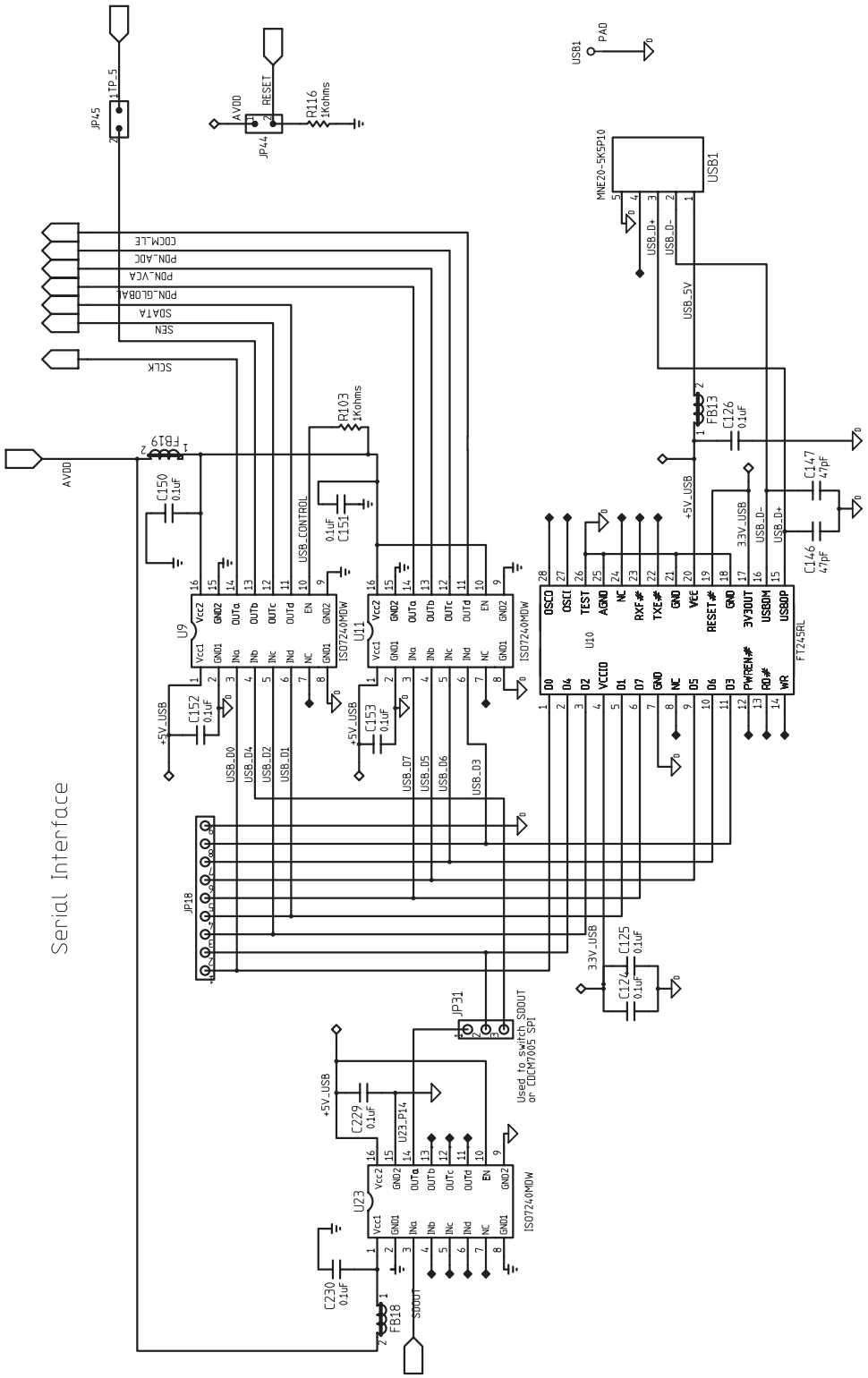


Figure 26. Schematic 9 of 9

13 Bill of Materials

Table 6. Bill of Materials

QTY	MFG	MFG Part#	REF DES	Description	Value or Function	Distributor	Distributor Part #
81	AVX	0402YC104KAT2A	C21, C22, C23, C24, C25, C26, C27, C28, C29, C48, C51, C54, C59, C64, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C90, C95, C96, C97, C98, C99, C100, C101, C102, C103, C104, C105, C106, C107, C108, C109, C112, C115, C118, C119, C120, C122, C123, C124, C125, C126, C130, C132, C150, C151, C152, C153, C154, C155, C156, C157, C159, C161, C182, C183, C191, C226, C227, C228, C229, C230	CAP,SMT,0402	CAPACITOR,SMT,0402,CER,16V,10%,0.1uF	Digikey	445-4952-1-ND
4	AVX	0402YC332KAT2A	C192, C193, C223, C224	CAP,SMT,0402	CAPACITOR,SMT,0402,CER,16V,10%,3300pF	Digikey	0402YC332KAT2A-ND
9	KEMET	C0402C104K8PAC	C2, C3, C6, C7, C10, C11, C14, C18, C56	CAP,SMT,0402	CAPACITOR,SMT,0402,CER,0.1uF,10V,10%,X5R	Digikey	445-4952-1-ND
4	ANY	C0402_PAD020X020_040LS(UN)	C113, C114, C231, C232	CAP,SMT,0402	CAPACITOR,0402,ALTERNAT FOOTPRINT,PAD 020x020,040LS (Uninstalled Part)		
8	PANASONIC	ECJ-0EB1C153K	C38, C39, C40, C41, C42, C43, C44, C45	CAP,SMT,0402	CAPACITOR,SMT,0402,CERAMIC,0.015uF,16V,10%,X7R	Digi-Key	PCC1701CT-ND
1	PANASONIC	ECJ-0EB1H102K	C175	CAP,SMT,0402	CAPACITOR,SMT,0402,CER,1000pF,50V,10%,X7R	Digi-Key	445-1256-2-ND
4	PANASONIC	ECJ-0EB1H332K	C140, C141, C148, C149	CAP,SMT,0402	CAPACITOR,SMT,0402,CER,3300pF,50V,10%,X7R DO NOT INSTALL	Digi-Key	PCC1727CT-ND
2	PANASONIC	ECJ-0EC1H470J	C146, C147	CAP,SMT,0402	CAPACITOR,SMT,0402,CER,47pF,50V,5%,NPO	Digi-Key	490-1287-2-ND
2	TAIYO YUDEN	LMK105F104ZV	C92, C93	CAP,SMT,0402	CAPACITOR,SMT,0402,CERAMIC,10V,Y5V,0.1uF,20% DO NOT INSTALL		
2	PANASONIC	ECJ-0EB1A105M	C110, C111	CAP,SMT,0402	CAPACITOR,SMT,0402,CERAMIC,1.0uF,10V,20%,X5R	Digi-Key	587-1454-2-ND
5	AVX	0603YD105KAT2A	C121, C129, C131, C158, C160	CAP,SMT,0603	CAPACITOR,SMT,0603,CERAMIC,1.0uF,16V,10%,X5R	Digi-Key	587-1241-2-ND
4	PANASONIC	ECJ-1VB1C105K	C20, C70, C87, C89	CAP,SMT,0603	CAPACITOR,SMT,0603,CERAMIC,1.0uF,16V,10%,X5R	Digi-Key	587-1241-2-ND
1	TAIYO YUDEN	JMK107BJ106MA-T	C176	CAP,SMT,0603	CAPACITOR,SMT,0603,CERAMIC,10uF,6.3V,20%,X5R	Digi-Key	445-4112-2-ND
6	KEMET	C1206C226K8PAC	C61, C62, C163, C164, C165, C166	CAP,SMT,1206	CAPACITOR,SMT,1206,CERAMIC,22uF,10V,10%,X5R	Digi-Key	399-4940-1-ND
5	VISHAY SPRAGE	293D226X9016D2T	C19, C69, C86, C88, C91	CAP,SMT,7343	CAP,TAN,SMT, 22uF,16V,+/-10%,-55~85C DO NOT INSTALL C91	Digi-Key	T495D226K035ATE300
8	AVX	TPSC226K016R0375	C1, C4, C5, C8, C9, C12, C13, C17	CAPACITOR,SMT,TANT	10%, 16V, 22uF	Digi-Key	718-1327-1-ND
1	ADVANCED CONNECTEK	MNE20-5K5P10	USB1	CONN,SMT,5P	MINI-AB USB OTG RECEPTACLE R/A SMT TYPE	Samtec	MUSB-05-S-AB-SM-A
6	EFJOHNSON	142-0721-891	J1, J3, J5, J7, J14, J15	CONN,THU,SMA JACK	SMA JACK END LAUNCH, 0.080 PCB THICK	Heilind Electronics	142-0701-801
9	AMPHENOL	901-144-8	J2, J4, J6, J8, J9, J10, J11, J12, J13	CONNECTOR,SMA	SMA COAX STRAIGHT PCB CURRENT P/N IS 901-144-8RFX	Digi-key	ARFX1231-ND
1	TEXAS INSTRUMENTS	AFE5803	U1	CUSTOMER PROVIDE	AFE5803	Texas Instruments	AFE5803

Table 6. Bill of Materials (continued)

QTY	MFG	MFG Part#	REF DES	Description	Value or Function	Distributor	Distributor Part #
1	MURATA	BLM15BD102SN1D	FB16	FERRITE BEAD,SMT,0402	FERRITE BEAD,SMT,0402,1K OHM,200mA	Digi-Key	490-1010-1-ND
16	STEWARD	HI0805R800R-00	FB1, FB2, FB3, FB4, FB5, FB6, FB7, FB8, FB9, FB10, FB11, FB13, FB14, FB17, FB18, FB19	FERRITE BEAD,SMT,2P	FERRITE,SMT,0805,80 OHM@100MHz,5A	Digi-Key	240-2395-2-ND
1	MOLEX	39357-0003	P1	HEADER, THRU, 3P	HEADER, THRU, POWER, 3P,3.5MM, EUROSTYLE	Digi-Key	WM7878-ND
1	SAMTEC	QTH-060-01-L-D-A	P10	HEADER,SMT,120P	HEADER,SMT,120P,0.5mm,FEM,2BANK,RECEPTACLE,168/198H	Digi-Key	SAM8189-ND
1	SAMTEC	TSW-103-07-G-D	JP9	HEADER,THU	HEADER,THU,6P,2X3,MALE,DUAL ROW,100LS,100TL	Digi-Key	HTSW-103-07-G-D-ND
2	SAMTEC	TSW-104-07-G-D	JP1, JP2	HEADER,THU	HEADER,THU,8P,2X4,MALE,DUAL ROW,100LS,100TL	Digi-Key	HTSW-104-07-G-D-ND
3	TYCO ELECTRONICS	4-103239-0X5	J16, JP50, JP51	HEADER,THU,5P	HEADER, 1X5 .1CTRS	Digi-Key	A26512-05-ND
1	SPC TECH	8431-1x9	JP18	HEADER,THU,9P	HEADER,THU,MALE,0.1LS,9P,1X9,335H,120TL	Samtec	HTSW-150-07-G-S
10	TYCO ELECTRONICS	4-103239-0x2	JP4, JP10, JP16, JP17, JP19, JP20, JP21, JP29, JP44, JP45	HEADER,THU,JUMPER	MALE,2PIN,.100CC MAKE FROM 4-103239-0x2	Digi-Key	A26512-02-ND
8	TYCO ELECTRONICS	4-103239-0x3	JP3, JP6, JP15, JP31, JP52, JP53, JP56, JP57	HEADER,THU,JUMPER	MAKE FROM 4-103239-0	Digi-Key	A26512-03-ND
1	TI	THS4520RGT	VCON_OPAMP	IC,SMT,QFN-16EP	WIDEBAND,LOW NOISE/DISTORTION FULLY DIFFERENTIAL AMPLIFIER	Digi-Key	296-20774-1-ND
1	TEXAS INSTRUMENTS	CDCM7005RGZ	CLK_BUF	IC,SMT,QFN-48	3.3-V HIGH PERFORMANCE CLOCK SYNTHESIZER AND JITTER CLEANER	Digi-Key	296-18208-1-ND
3	TI	ISO7240MDW	U9, U11, U23	IC,SMT,SOIC-16W	QUAD DIGITAL ISOLATORS	Digi-Key	296-22629-5-ND
1	TI / BURR-BROWN	OPA211AID	U21	IC,SMT,SOIC-8	1.1nV/Hz NOISE LOW POWER PRECISION OPERATIONAL AMPLIFIER	Digi-Key	296-22634-1-ND
1	TI	OPA2614ID	U20	IC,SMT,SOIC-8	DUAL HI GAIN BWIDTH HI OUTPUT CURRENT OPAMP WITH CURRENT LIMIT	Digi-Key	296-17127-5-ND
1	TI	TPS79618DCQR	U6	IC,SMT,SOT223-6	ULTRALOW-NOISE HI PSRR FAST RF 1-A LDO LINEAR REGULATOR,1.8V	Digi-Key	296-13762-1-ND
2	TI	TPS79633DCQR	U7, U8	IC,SMT,SOT223-6	ULTRALOW-NOISE HI PSRR FAST RF 1-A LDO LINEAR REGULATOR,3.3V	Digikey	296-13766-1-ND
1	FUTURE TECHNOLOGY DEVICE INT.	FT245RL	U10	IC,SMT,SSOP-28	USB FIFO IC INCORPORATE FTDICHIP-ID SECURITY DONGLE	Digikey	768-1011-1-ND
3	PANASONIC	LNJ208R82RA	LED41, LED42, LED43	LED,SMT,0603	LED,SMT,0603,ULTRA BRIGHT RED,1.92V	Digi-Key	P11486CT-ND
5	PANASONIC	LNJ308G8PRA	LED-5V, LED33VA, LED33VD, LED5V, LED_LDO	LED,SMT,0603	LED,SMT,0603,PURE GREEN,2.03V	Digi-Key	160-1443-2-ND
1	PANASONIC	LNJ808R8ERA	LED18VA	LED,SMT,0603	LED,SMT,0603,ORANGE,1.8V	Digi-Key	P523CT-ND
1	CONNOR WINFIELD	CWX813-10.0M	X1	OSC,SMT,4P	OSCILLATOR,SMT,4P,3.3V,+/-25ppm,-20~70C,10.000 MHz	Digi-Key	CW516CT-ND
1	OSC,SMT,4P	VCC1-B3B-40M000000	OSC1	OSC,SMT,4P	OSCILLATOR,SMT,4P,7.5 X 5MM CRYSTAL TRISTATE		
1	ECS	ECS-3953M-400-BN	U5	OSCILLATOR,SMT,4P	OSC,SMT,3.3V,50ppm,-40~85C,5nS,40.000 MHz	Digi-Key	XC341CT-ND
1	VENKEL	CR0402-16W-000T	R70	RES,SMT,0402	RESISTOR,SMT,0402,0 OHM,1/16W,ZERO JUMPER	Digi-Key	311-0.0JRTR-ND
1	VISHAY	CRCW0402000Z(UN)	R115	RES,SMT,0402	(UNINSTALLED PART)		
2	VISHAY	CRCW04021001F100	R103, R116	RES,SMT,0402	RESISTOR,SMT,0402,1K,1/16W,1%,100ppm	Digi-Key	541-1.00KLTR-ND
1	VISHAY	CRCW04021002F100	R62	RES,SMT,0402	RESISTOR,SMT,0402,10K,1/16W,1%,100ppm	Digi-Key	RHM10.0KLTR-ND
2	VISHAY	CRCW04022002F100	R71, R110	RES,SMT,0402	RESISTOR,SMT,0402,20K,1/16W,1%,100ppm	Digi-Key	ERJ-2RKF2002X

Table 6. Bill of Materials (continued)

QTY	MFG	MFG Part#	REF DES	Description	Value or Function	Distributor	Distributor Part #
1	VISHAY	CRCW04024701F100	R55	RES,SMT,0402	RESISTOR,SMT,0402,4.7K,1/16W,1%,100ppm DO NOT INSTALL		
3	VISHAY	CRCW04024990F100	R677, R678, R679	RES,SMT,0402	RESISTOR,SMT,0402,499 OHM,1/16W,1%,100ppm	Digi-Key	541-499LTR-ND
1	VISHAY	CRCW04025110F100	R5	RES,SMT,0402	RESISTOR,SMT,0402,511 OHM,1/16W,1%,100ppm	Digi-Key	P511LTR-ND
1	PANASONIC	ERJ-2GE0R00X	R66	RES,SMT,0402	RESISTOR/JUMPER,SMT,0402,0 OHM,5%,1/16W	Digi-Key	311-0.0JRTR-ND
1	PANASONIC	ERJ-2GEJ131	R45	RES,SMT,0402	RESISTOR,SMT,0402,THICK FILM,5%,1/16W,130 DO NOT INSTALL ,R45		
5	PANASONIC	ERJ-2GEJ131	R43, R111, R112, R113, R114	RES,SMT,0402	RESISTOR,SMT,0402,THICK FILM,5%,1/16W,130 ,R45	Digi-Key	541-130LTR-ND
1	PANASONIC	ERJ-2GEJ161	R676	RES,SMT,0402	RESISTOR,SMT,0402,THICK FILM,5%,1/16W,160 DO NOT INSTALL		
4	PANASONIC	ERJ-2GEJ499	R82, R83, R91, R92	RES,SMT,0402	RESISTOR,SMT,0402,THICK FILM,5%,1/16W,499 DO NOT INSTALL		
8	PANASONIC	ERJ-2GEJ49R9(UN)	R6, R7, R8, R9, R10, R11, R12, R13	RES,SMT,0402	(UNINSTALLED PART)		
1	PANASONIC	ERJ-2GEJ820	R46	RES,SMT,0402	RESISTOR,SMT,0402,THICK FILM,5%,1/16W,82 DO NOT INSTALL R46		
5	PANASONIC	ERJ-2GEJ820	R44, R98, R99, R100, R101	RES,SMT,0402	RESISTOR,SMT,0402,THICK FILM,5%,1/16W,82 R46	Digi-Key	P82.0LTR-ND
8	PANASONIC	ERJ-2RKF1000X	R4, R28, R29, R31, R32, R34, R35, R93	RES,SMT,0402	RESISTOR,SMT,0402,100 OHM,1%,1/10W	Digi-Key	311-100LRTR-ND
3	PANASONIC	ERJ-2RKF3320X	R1, R2, R3	RES,SMT,0402	RESISTOR,SMT,0402,332 OHM,1%,1/16W	Digi-Key	541-332LTR-ND
5	PANASONIC	ERJ-2RKF49R9X	R38, R56, R80, R90, R102	RES,SMT,0402	RESISTOR,SMT,0402,49.9 OHM,1%,1/16W	Digi-Key	311-49.9LRTR-ND
2	VISHAY	CRCW0603200F	R65, R69	RES,SMT,0603	RESISTOR,SMT,0603,1%,1/10W,200 OHM	Digi-Key	P200HTR-ND
2	VISHAY	CRCW0603487F	R63, R67	RES,SMT,0603	RESISTOR,SMT,0603,1%,1/10W,487 OHM	Digi-Key	P487HTR-ND
2	VISHAY	CRCW0603511F	R52, R53	RES,SMT,0603	RESISTOR,SMT,0603,1%,1/10W,511 OHM	Digi-Key	311-511HRTR-ND
2	PANASONIC	ERJ-3GSYJ499	R64, R68	RES,SMT,0603	RESISTOR,SMT,0603,1%,1/10W,499	Digi-Key	P499HTR-ND
8	VISHAY	TNPW06034990BT9	R76, R77, R78, R79, R87, R88, R89, R607	RES,SMT,0603	RESISTOR,SMT,0603,THIN FILM,499 OHM 0.1%,1/10W,25ppm	Digi-Key	RG16P499BCT-ND
1	KYCON	STX-3000	JX1	STEREO PHONE JACK,THU,3 PIN	STEREO PHONE JACK,THU,3 PIN,3.5mm	Mouser	806-STX-3000
5	KEYSTONE ELECTRONICS	5000	TP_6, TP18VD, TP33VA, TP33VD, TP5V	TESTPOINT,THU,1P	TESTPOINT,THU,MINIATURE,0.1LS,120TL, RED	Digi-Key	5000K-ND
4	KEYSTONE ELECTRONICS	5001	TP1, TP2, TP3, TP4	TESTPOINT,THU,1P	TESTPOINT,THU,MINIATURE,0.1LS,120TL, BLACK	Digi-Key	5001K-ND
1	KEYSTONE ELECTRONICS	5002	TP-5V	TESTPOINT,THU,1P	TESTPOINT,THU,MINIATURE,0.1LS,120TL, WHITE	Digi-Key	5002K-ND
4	KEYSTONE ELECTRONICS	5004	TP9, TP12, TP13, TP34	TESTPOINT,THU,1P	TESTPOINT,THU,MINIATURE,0.1LS,120TL, YELLOW	Digi-Key	5002K-ND
3	MINI-CIRCUITS	ADT4-1WT	T1, T3, T4	TRANSF,SMT,6P	RF TRANSFORMER WIDEBAND, 2-775 MHz, 50 OHM	Mini Circuits	ADT4-1WT+
1	BOURNS	3296W-1-103	VR2	TRIMPOT,THU,3P	TRIMPOT,THU,10K,10%,0.5W,100ppm,25T	Digi-Key	3296W-103LF-ND
1	BOURNS	3296W-1-103	VR1	TRIMPOT,THU,3P	TRIMPOT,THU,10K,10%,0.5W,100ppm,25T	Digi-Key	3296W-103LF-ND
4	KEYSTONE ELECTRONICS	2029		STANDOFF RND 4-40THR .750"L ALUM	"Round, Threaded, Female/Female	Digi-Key	2029K-ND
4	KEYSTONE ELECTRONICS	H703-ND		Machine Screw, 4-40	SCREW MACHINE PHIL 4-40X1/4 SS	Digi-Key	H703-ND

Table 6. Bill of Materials (continued)

QTY	MFG	MFG Part#	REF DES	Description	Value or Function	Distributor	Distributor Part #
8	TDK Corporation	C1005X5R0J105M	C30, C31, C32, C33, C34, C35, C36, C37	CAP,SMT,0402	CAP CER 1.0UF 6.3V X5R 20% 0402	Digi-Key	445-1415-1-ND
			C49,C50,C116,C117, C52,C53		DO NOT INSTALL C49,C50,C116,C117C52,C53		

NOTE: ASTERISK(*) NEXT TO PART MANUFACTURER'S NAME DENOTES POSSIBLE LONG LEAD TIME ITEM.
RoHs note : all parts should comply with RoHs and Lead free, as well as the PCBs.

High Speed Data Converter Pro (HSDCPro) Installation

Download the HSDCPro GUI Installer using this link: HSDCPro GUI

- Unzip the saved folder and run the installer executable to obtain the pop-up shown in Figure 27.
- Click the *Install* button.

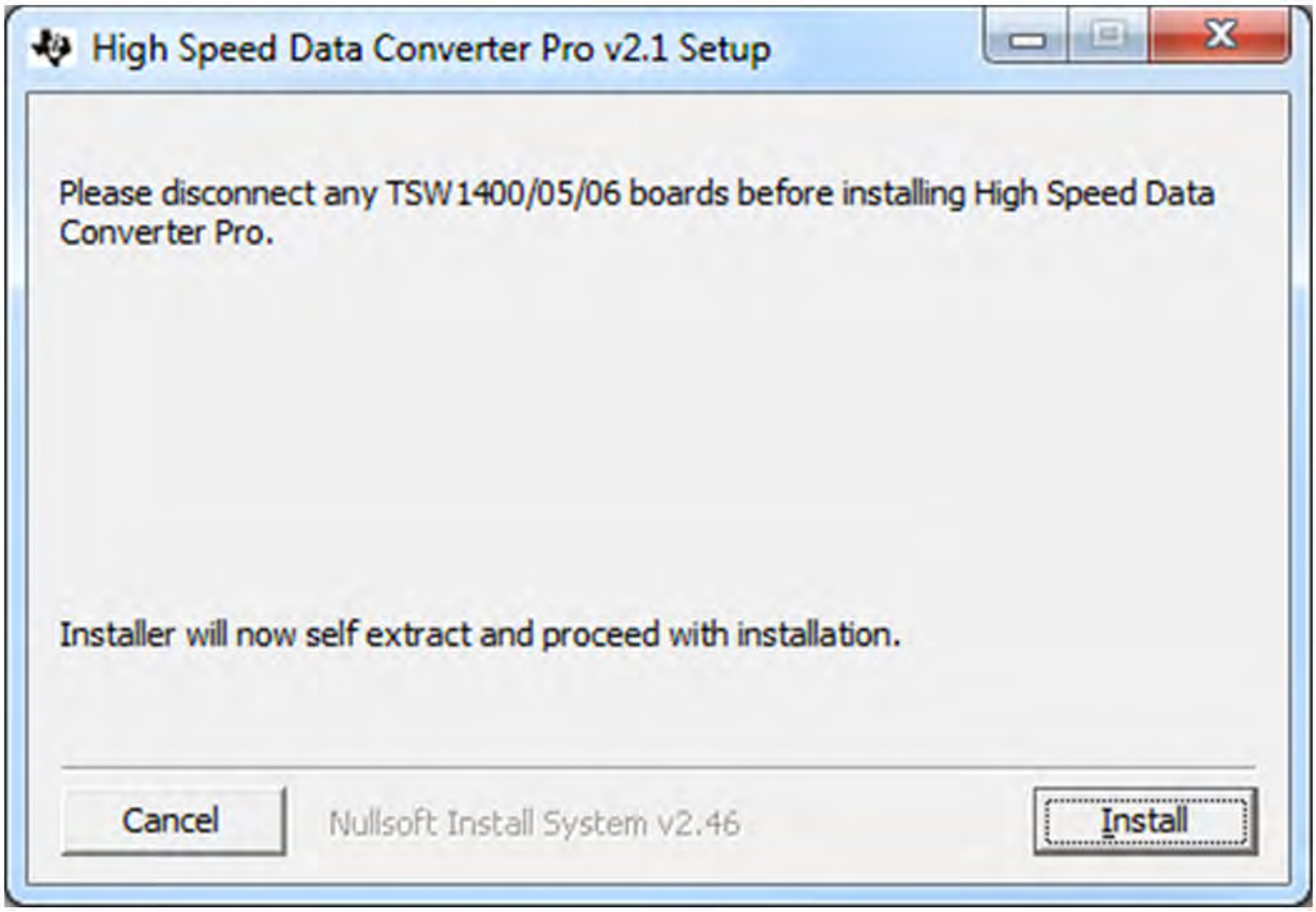


Figure 27. HSDCPro Install (Begin)

- Leave the destination directories as the default location, for the TSW1400GUI installation and press the NEXT button as shown in Figure 28.

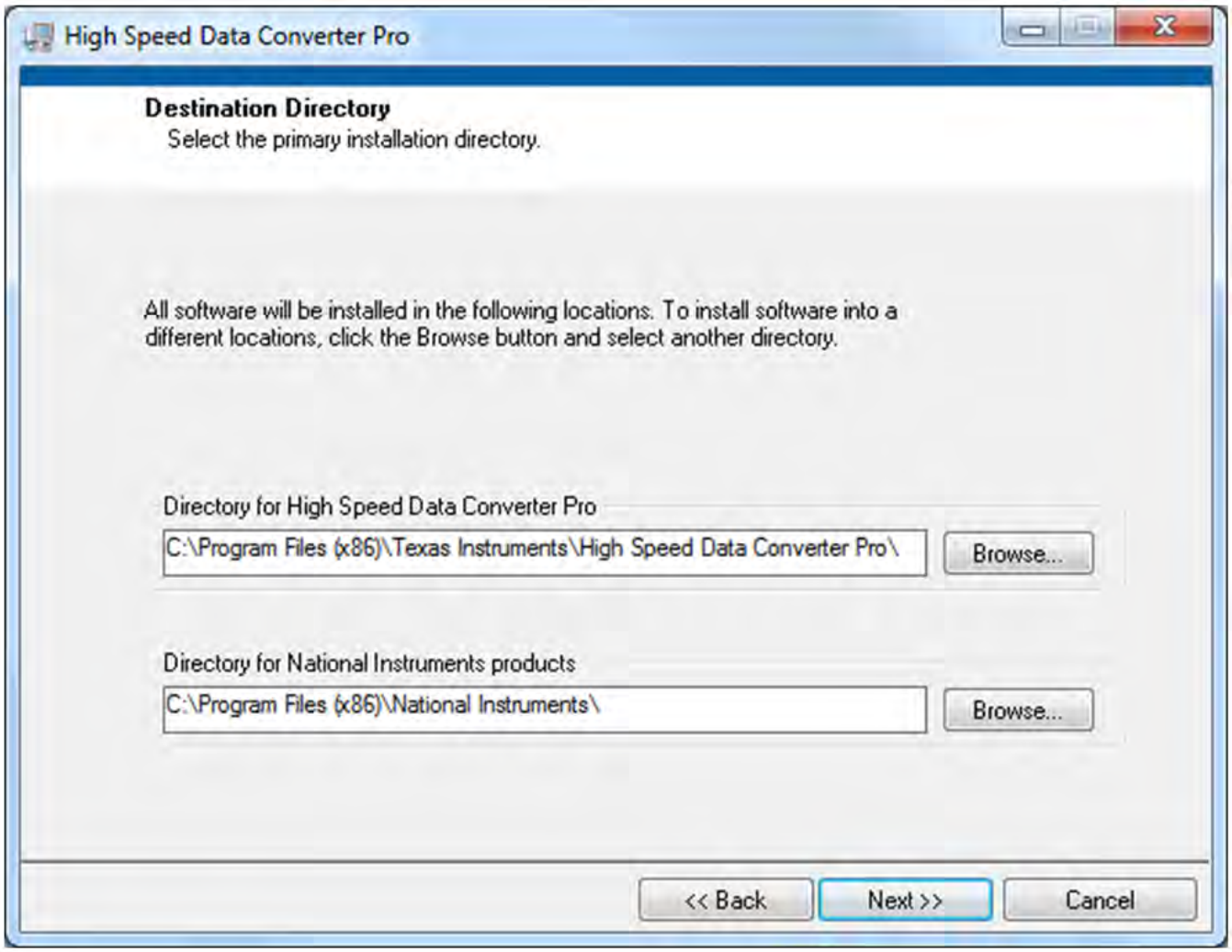


Figure 28. HSDCPro Install (Install Directory)

- Read the License Agreement from Texas Instruments and select *I accept the License Agreement* and press the *Next* button as shown in Figure 29.

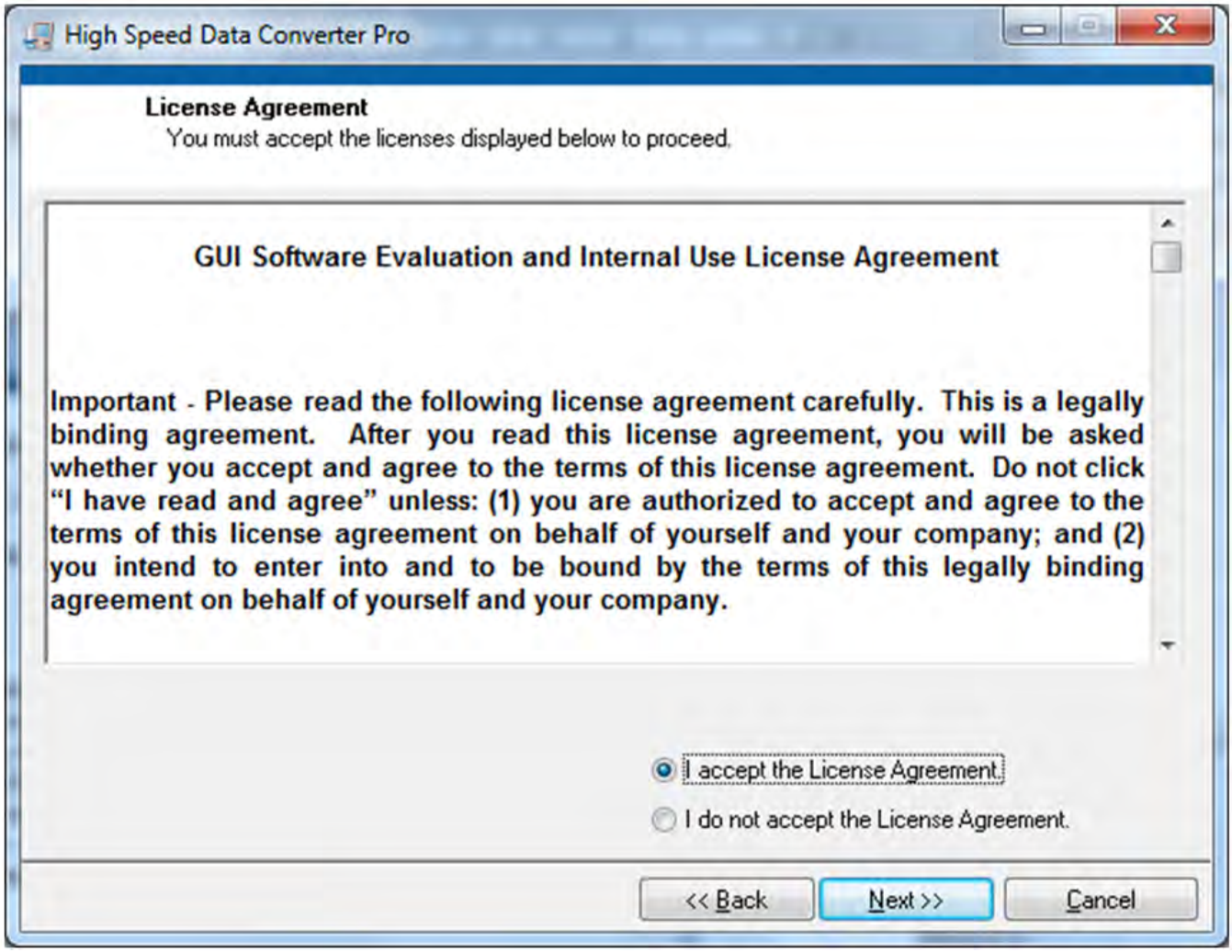


Figure 29. HSDCPro Install (TI License Agreement)

- Read the License Agreement from National Instruments and select *I accept the License Agreement* and press the *Next* button as shown in Figure 30.

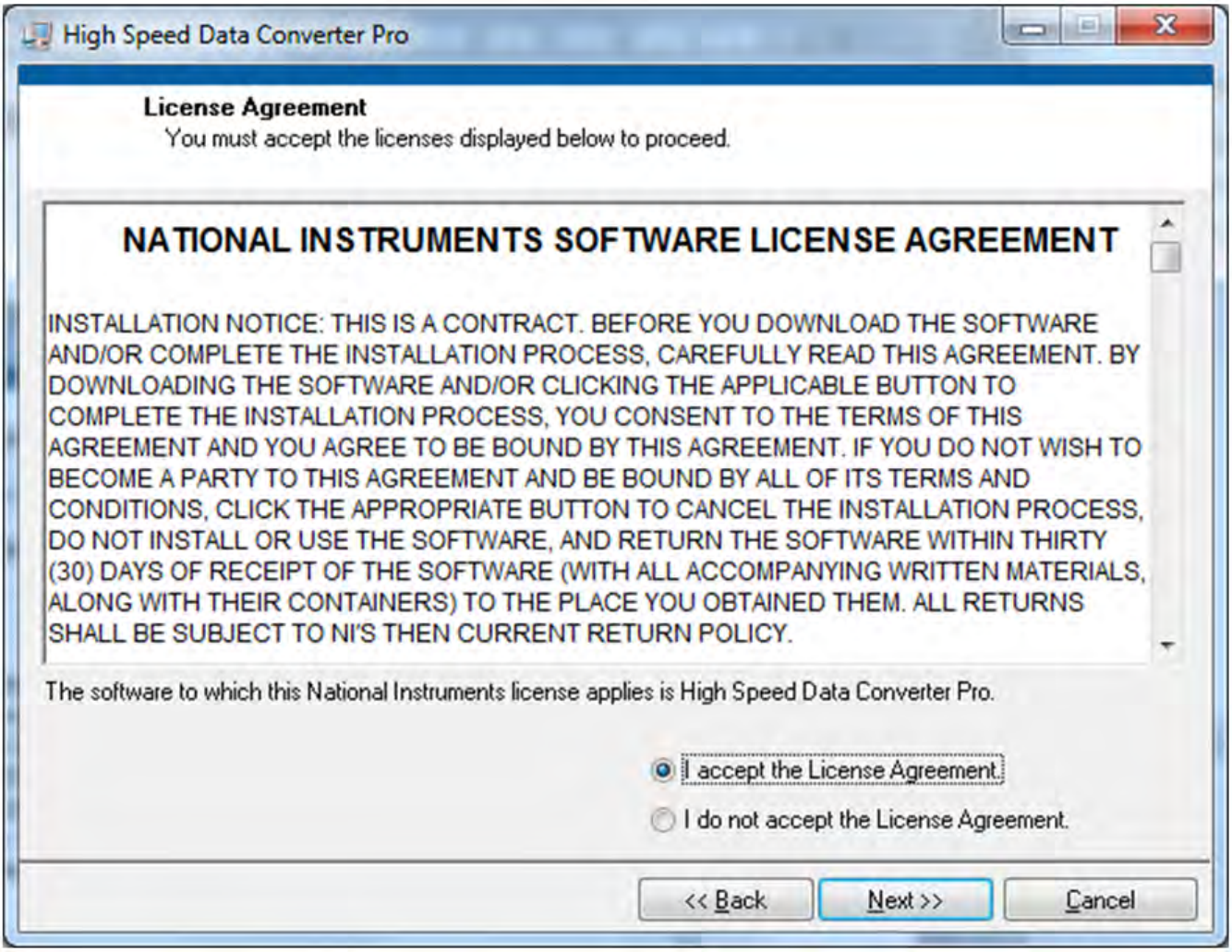


Figure 30. HSDCPro Install (NI License Agreement)

- Press the *Next* button as shown in Figure 31.

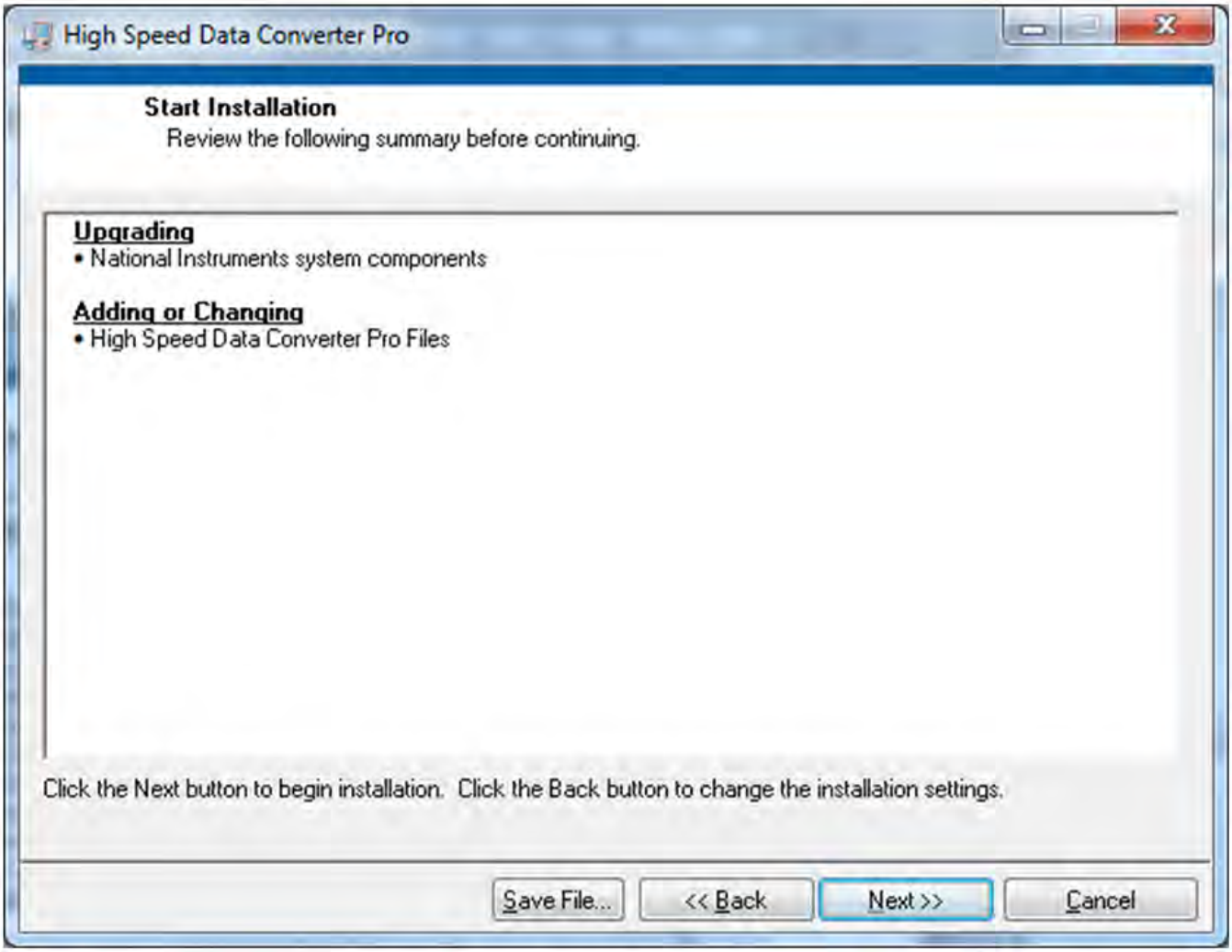


Figure 31. HSDCPro Install (Start Installation)

- The window shown in Figure 32 should appear indicating that the installation is in progress.

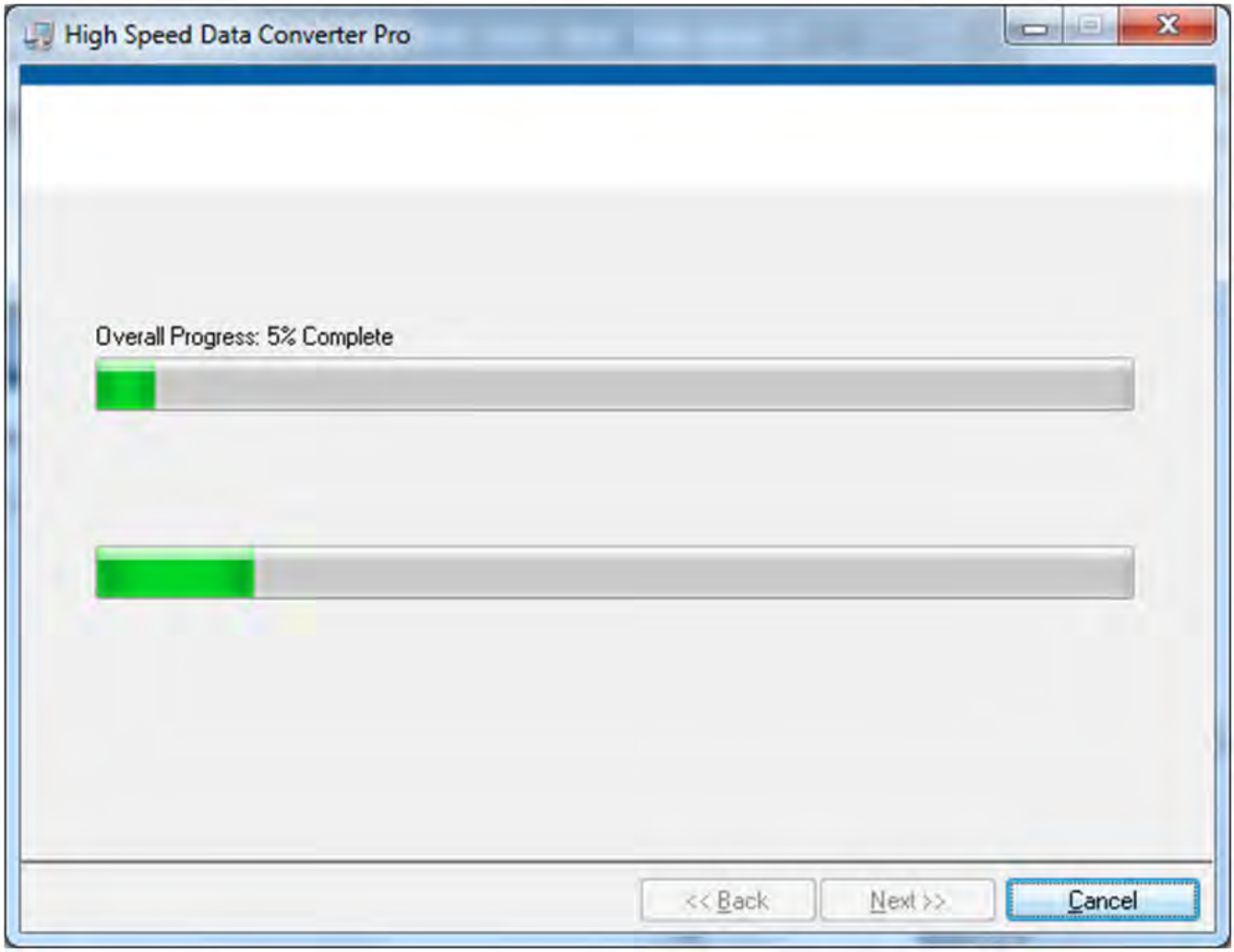


Figure 32. HSDCPro Install (Installation Progress)

- The window shown in Figure 33 appears indicating *Installation Complete*. Press the *Next* button.

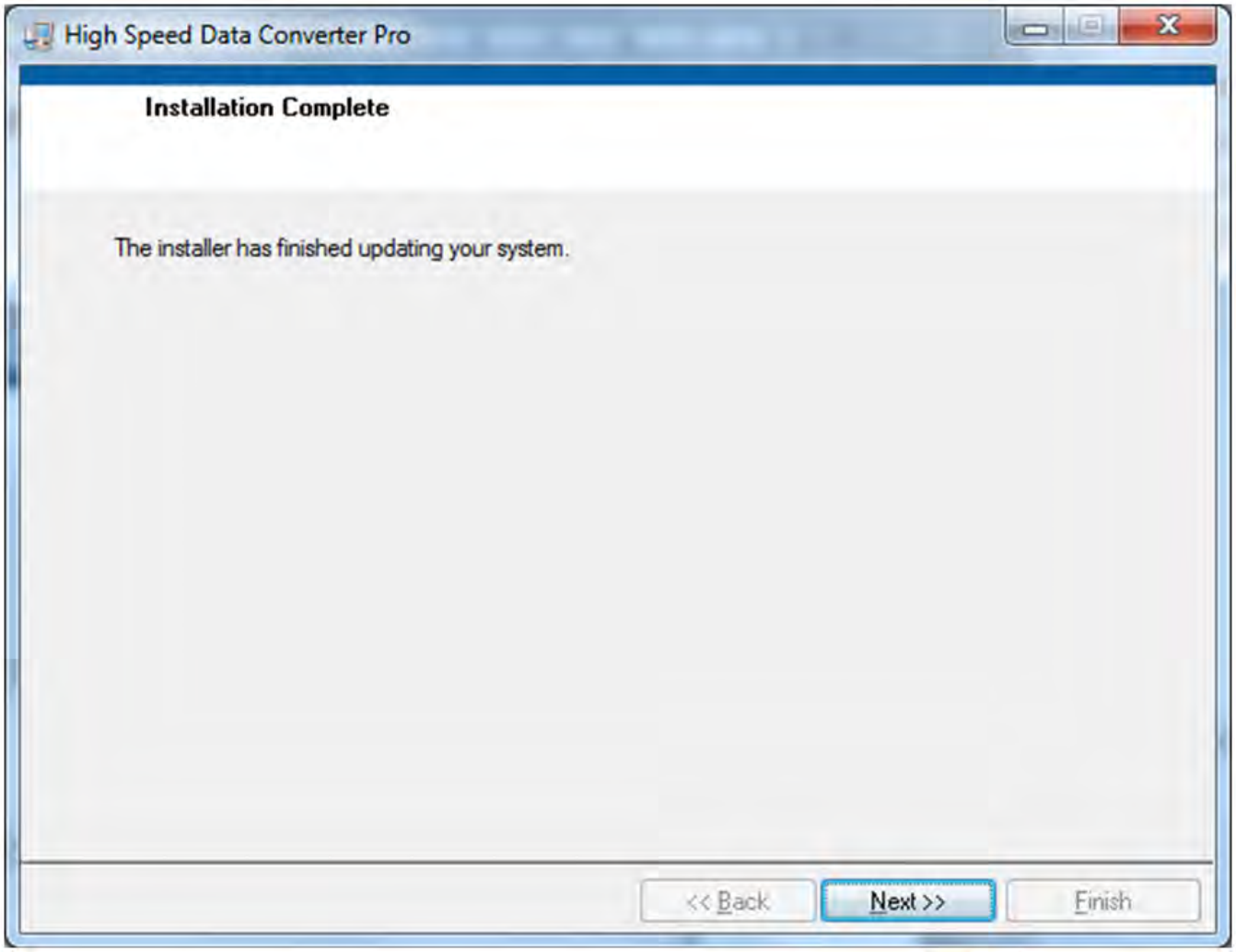


Figure 33. HSDCPro Install (Installation Complete)

- The window shown in Figure 34 appears briefly to complete the process.

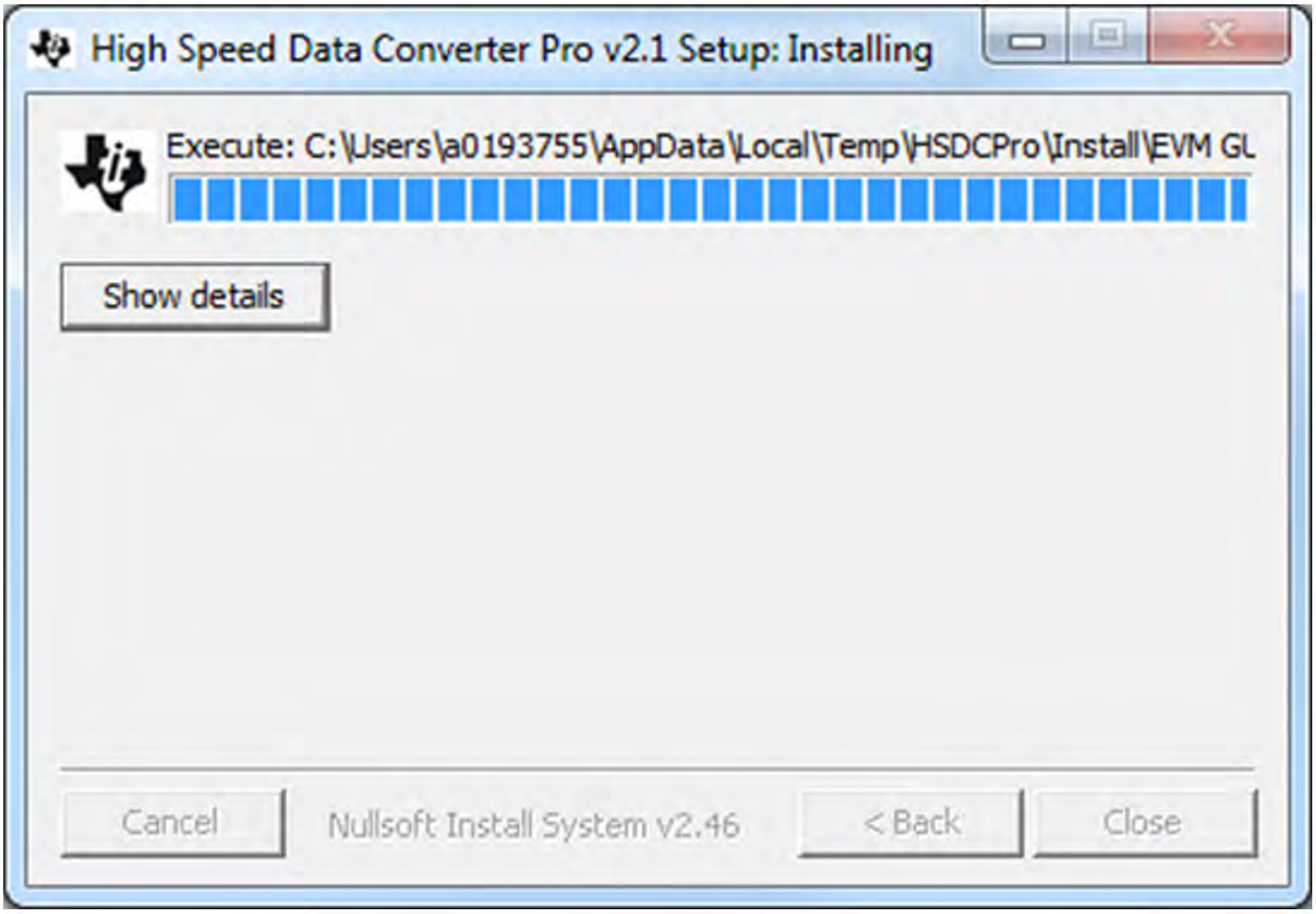


Figure 34. HSDCPro Install (h)

- As shown in Figure 35 a restart might be requested depending on whether or not the PC already had the National Instruments MCR Installer. If requested, hit the *Restart* button to complete the installation.

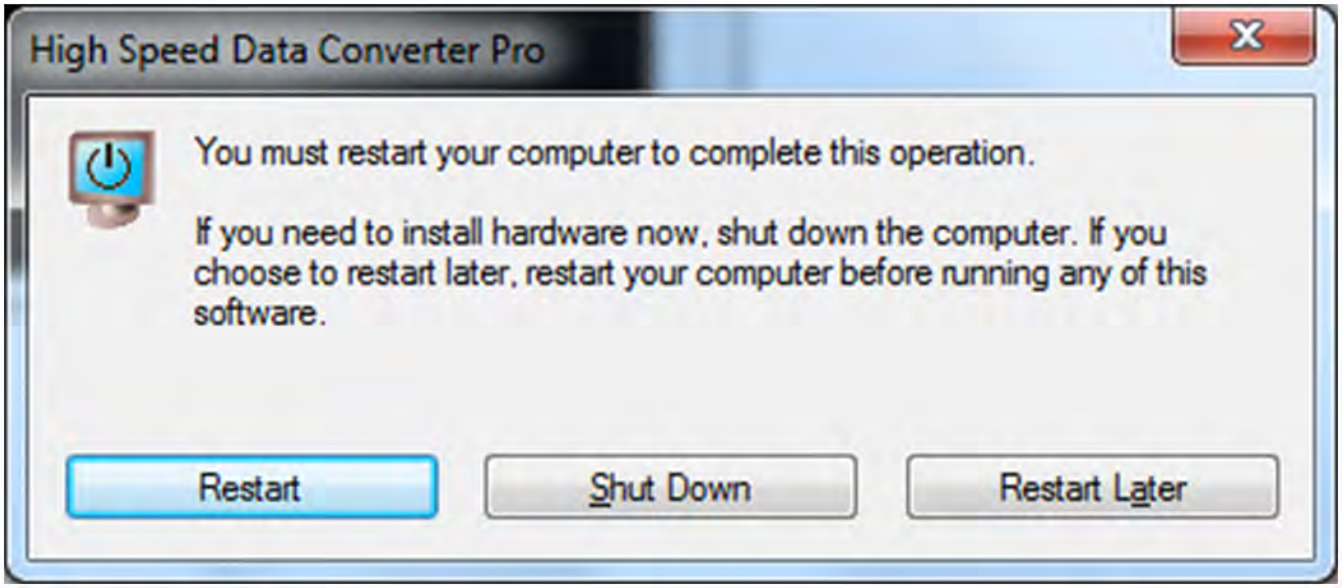


Figure 35. HSDCPro Install

Revision History

Changes from A Revision (January 2012) to B Revision	Page
• Changed labels and markings on *AFE5803EVM Basic Configuration* image, board unchanged.	3
• Changed labels and markings and board photo on *HW Setup With Connection Between TSW1400EVM and AFE5803* image.	4
• Changed software GUI image in the *Launch TSW1400 GUI* section.	7
• Changed software GUI image in the *Test AFE5803* section.	8
• Changed software GUI image.	10
• Changed software GUI image illustrating *Hanning* selection.	11
• Changed software GUI image on step 4 in the *External ADC Sampling Clock* section.	13

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

STANDARD TERMS AND CONDITIONS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, or documentation (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms and conditions set forth herein. Acceptance of the EVM is expressly subject to the following terms and conditions.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms and conditions that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms and conditions do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI. Moreover, TI shall not be liable for any defects that result from User's design, specifications or instructions for such EVMs. Testing and other quality control techniques are used to the extent TI deems necessary or as mandated by government requirements. TI does not test all parameters of each EVM.

   2.3 If any EVM fails to conform to the warranty set forth above, TI's sole liability shall be at its option to repair or replace such EVM, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan are NOT certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

【無線電波を送信する製品の開発キットをお使いになる際の注意事項】

本開発キットは技術基準適合証明を受けておりません。

本製品のご使用に際しては、電波法遵守のため、以下のいずれかの措置を取っていただく必要がありますのでご注意ください。

1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。

日本テキサス・インスツルメンツ株式会社

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西新宿三井ビル

3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

   6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY WRITTEN DESIGN MATERIALS PROVIDED WITH THE EVM (AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

   6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS AND CONDITIONS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT MADE, CONCEIVED OR ACQUIRED PRIOR TO OR AFTER DELIVERY OF THE EVM.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL DEFEND, INDEMNIFY AND HOLD TI, ITS LICENSORS AND THEIR REPRESENTATIVES HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, DAMAGES, LOSSES, EXPENSES, COSTS AND LIABILITIES (COLLECTIVELY, "CLAIMS") ARISING OUT OF OR IN CONNECTION WITH ANY HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS AND CONDITIONS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

   8.1 *General Limitations*. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS ANDCONDITIONS OR THE USE OF THE EVMS PROVIDED HEREUNDER, REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN ONE YEAR AFTER THE RELATED CAUSE OF ACTION HAS OCCURRED.

   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY WARRANTY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS AND CONDITIONS, OR ANY USE OF ANY TI EVM PROVIDED HEREUNDER, EXCEED THE TOTAL AMOUNT PAID TO TI FOR THE PARTICULAR UNITS SOLD UNDER THESE TERMS AND CONDITIONS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM AGAINST THE PARTICULAR UNITS SOLD TO USER UNDER THESE TERMS AND CONDITIONS SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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