General Description

The MAX11960 evaluation kit (EV kit) demonstrates the device's, 20-bit, 1.0Msps, dual-channel, fully differential SAR ADC with internal reference buffers. The EV kit includes a graphical user interface (GUI) that provides communication from Avnet's ZedBoard™ development board for the Xilinx Zynq®-7000 SoC. The ZedBoard is not included with the EV kit and must be purchased through Avnet.

The ZedBoard communicates with the PC through an Ethernet cable using Windows® 7, or Windows 8/8.1-compatible software.

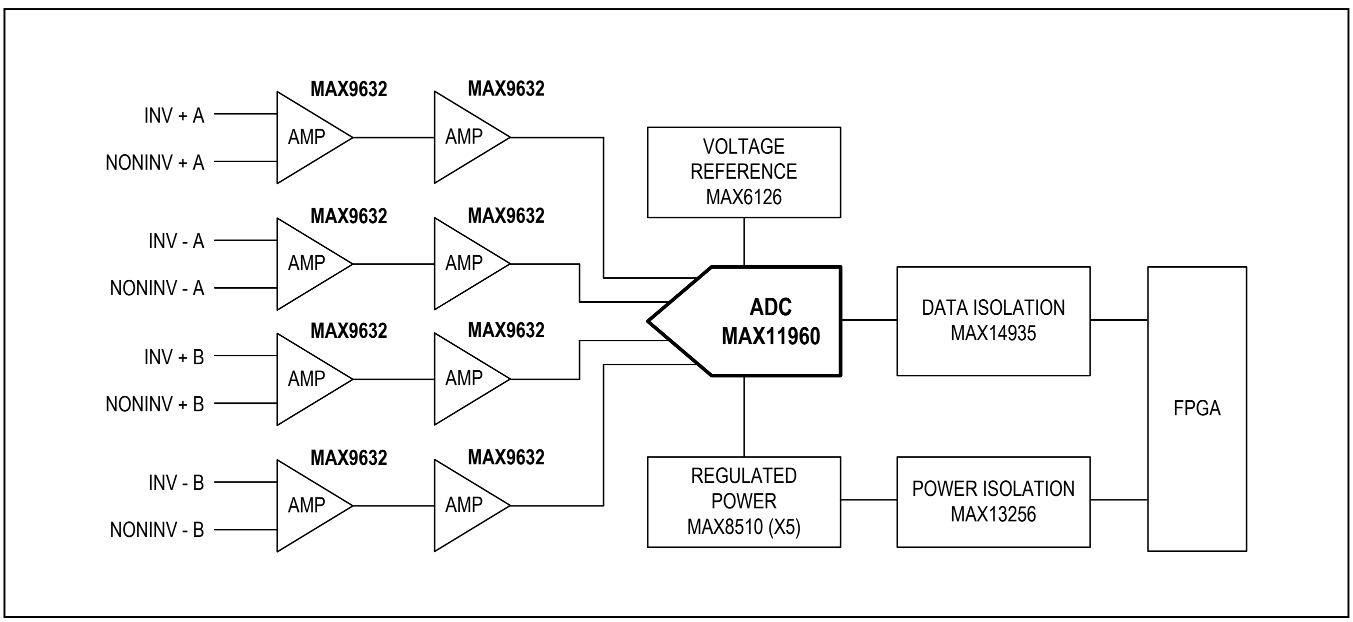
The EV kit comes with the MAX11960ETP+ installed.

Benefits and Features

- FMC Connector for Interface
- 75MHz SPI Clock Capability through FMC Connector
- Sync In and Sync Out for Coherent Sampling
- On-Board Input Buffers (MAX9632)
- On-Board +3.0V Reference Voltage (MAX6126)
- Windows 7, and Windows 8/8.1-Compatible Software

***Ordering Information* appears at end of data sheet.**

System Block Diagram



19-8486; Rev 0; 3/16

Quick Start

Required Equipment

- MAX11960 differential EV kit with SD card
- ZedBoard development board
- Windows PC
- Ethernet cable
- +20V/1A DC power supply or equivalent wall plug
- Signal generator with differential outputs (e.g., Audio Precision 2700 series)
- Soldering iron and 2-pin 2.54mm header

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold and underlined** refers to items from the Windows operating system.

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Visit **http://www.maximintegrated.com/en/design/tools/applications/evkit-software/** to download the latest version of the EV kit software, 11960EVKit.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.
2) Solder the 2-pin header on J18-3V3 of the ZedBoard.
3) Connect the Ethernet cable from the PC to the ZedBoard and configure the **Internet Protocol Version 4 (TCP/IPv4)** properties in the local area connection to IP address **192.168.1.2** and subnet mask to **255.255.255.0**. **Note:** If an ethernet port is not available on the PC, please use the option of ethernet to USB port adapter.
4) Verify that the ZedBoard's jumpers JP7, JP8, and JP11 have shunts installed at the GND position, and JP9 and JP10 at the 3V3 position.
5) Move the shunt of J18 of the ZedBoard to the 3V3 position from 1V8.
6) Insert the SD card with the boot image (BOOT.bin).
7) Verify that all jumpers on the EV kit are in their default positions, as shown in Table 1.
8) Connect the ZedBoard to J2 on the EV kit for FMC connection.
9) Connect the +20V DC power supply between +20V and GNDA4 test points. If the power supply is unavailable, a +20V wall plug can be inserted into the J3 connector of the MAX11960 EV kit.
10) Insert the +12V wall plug into the connect J20 of the ZedBoard. Turn on the power to the ZedBoard.
11) Verify that the OLED screen on the ZedBoard displays "MAX11960".
12) Apply differential signals at test points INV+A and INV-A, and at INV+B and INV-B.
13) Enable the function generators.
14) Open the EV kit GUI, MAX11960EVKit.exe and verify that the status bar at the lower right corner displays **EV Kit Hardware Connected**.
15) Select **MAX11960** from the **Device** Dropdown list within the **System** tab sheet (Figure 1).
16) Click on the **Scope** (Figure 2) or **FFT** (Figure 6) tab sheet and start capturing data by clicking the **Capture** button.

Table 1. Jumper Descriptions

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	Connects INV+A to GND for noninverting configuration on channel A of the MAX11960.
	3-4	Connects to the output of the op amp (U12).
	5-6*	Connects NONINV+A to GND for inverting configuration on channel A of the MAX11960.
JU2	1-2	Connects output of the op amp (U10) to the negative input of the op amp (U8).
	3-4	GND the negative input of the op amp (U8).
	5-6*	Connects output of the op amp (U10) to positive input of the op amp (U8).
	7-8	GND the positive input of the op amp (U8).
	9-10	Connects REFA2 to positive input of the op amp (U8).
JU3	1-2*	Connects output of the op amp (U8) to AIN+A.
	3-4	Connects output of the op amp (U13) to AIN+A.
	5-6*	Connects output of the op amp (U7) to AIN-A.
	7-8	Connects output of the op amp (U14) to AIN-A.
	9-10*	Connects output of the op amp (U13) to AIN+B.
	11-12	Connects output of the op amp (U8) to AIN+B.
	13-14*	Connects output of the op amp (U14) to AIN-B.
	15-16	Connects output of the op amp (U7) to AIN-B.
JU4	1-2	Connects to REF offset.
	3-4*	Connects to REF/2 offset.
	5-6	Connects to GND.
JU5	1-2	Connects NONINV-A to GND for inverting configuration on channel A of the MAX11960.
	3-4	Connects to the output of the op amp (U10).
	5-6*	Connects INV-A to GND for noninverting configuration on channel A of the MAX11960.
JU6	1-2	Connects REFA2 to positive input of the op amp (U7).
	3-4	GND the positive input of the op amp (U7).
	5-6*	Connects output of the op amp (U12) to positive input of the op amp (U7).
	7-8	GND the negative input of the op amp (U7).
	9-10	Connects output of the op amp (U12) to the negative input of the op amp (U7).
JU8	1-2	Connects INV+B to GND for noninverting configuration on channel B of the MAX11960.
	3-4	Connects to the output of the op amp (U16).
	5-6*	Connects NONINV+B to GND for inverting configuration on channel B of the MAX11960.
JU9	1-2	Connects output of the op amp (U15) to the negative input of the op amp (U3).
	3-4	GND the negative input of the op amp (13).
	5-6*	Connects output of the op amp (U15) to positive input of the op amp (U13).
	7-8	GND the positive input of the op amp (U13).
	9-10	Connects REFB2 to positive input of the op amp (U13).

Table 1. Jumper Descriptions (continued)

JUMPER	SHUNT POSITION	DESCRIPTION
JU11	1-2	Connects to REF offset.
	3-4*	Connects to REF/2 offset.
	5-6	Connects to GND.
JU12	1-2	Connects NONINV-B to GND for inverting configuration on channel B of the MAX11960.
	3-4	Connects to the output of the op amp (U15).
	5-6*	Connects INV-B to GND for noninverting configuration on channel B of the MAX11960.
JU13	1-2	Connects REFB2 to positive input of the op amp (U14).
	3-4	GND the positive input of the op amp (U14).
	5-6*	Connects output of the op amp (U16) to positive input of the op amp (U14).
	7-8	GND the negative input of the op amp (U14).
	9-10	Connects output of the op amp (U16) to the negative input of the op amp (U14).
JU16	1-2*	REFINAB connects to on-board +3.0V reference.
	2-3	User-supplied REFINAB. Apply reference voltage at the EXT_ REFINAB test point.
JU17	1-2*	Set isolator's voltage level to OVDDA
	2-3	Set isolator's voltage level to OVDDB
JU18	1-2, 4-5, 7-8, 16-17, 19-20, 22-23, 25-26*	Connects the SPI signals coming from the FMC connectors to the MAX11960.
	Not installed	User-supplied SPI. Connect SPI signals at SCLK, CNVSTA, CNVSTB, DINA, DINB, DOUA, and DOUTB test points.

JUMPER	SHUNT POSITION	DESCRIPTION
JU20	Not installed*	Enables line driver.
	Installed	Disables line driver.
JU22	1-2, 3-4*	DVDDA and DVDDB supplies connects to on-board +1.8V LDO.
	Not installed	User-supplied DVDDA and DVDDB. Apply +1.8V at the DVDDA and DVDDB test points.
JU23	1-3, 2-4*	OVDDA and OVDDB supplies connects to on-board +1.8V LDO.
	3-5, 4-6	OVDDA and OVDDB supplies connects to on-board +3.3V LDO.
	Not installed	User-supplied OVDDA and OVDDB. Apply +1.8V to +3.3V at the OVDDA and OVDDB test points.
JU24	1-2, 3-4*	AVDDA and AVDDB supplies connects to on-board +1.8V LDO.
	Not installed	User-supplied AVDDA and AVDDB. Apply +1.8V at the AVDDA and AVDDB test points.
JU25	1-2, 3-4*	REFVDDA and REFVDDB supplies connects to on-board +3.3V LDO.
	Not installed	User-supplied REFVDDA and REFVDDB. Apply +3.3V at the REFVDDA and REFVDDB test points.
JU30	Install	Do not use.
	Not installed*	User-supplied +20V power-supply header connection.
JU31	1-2*	Enabled MAX13256 (U2)
	2-3	Disable MAX13256 (U2)

Table 1. Jumper Descriptions (continued)

JUMPER	SHUNT POSITION	DESCRIPTION
JU32	1-2	User-supplied +24V power-supply connection.
	3-4*	Isolated +24V from MAX13256
JU33	1-2	User-supplied -24V power-supply connection.
	3-4*	Isolated -24V from MAX13256
JU34	1-2, 7-8	User-supplied +15V supply to analog front-end op amps.
	3-4, 5-6*	Isolated +15V supply to analog front-end op amps and LDO.
JU35	1-2	GND the negative supply of the analog front-end op amps.
	3-4	User-supplied -15V supply to analog front-end op amps.
	5-6*	Isolated -15V supply to analog front-end op amps.
JU36	1-2	User-Supplied +5V to LDOs that powers the supplies on the MAX11960.
	3-4*	+5V supply to LDOs that powers the supplies on the MAX11960.

**Default position.*

General Description of Software

The main window of the MAX11960 EV kit software contains six tabs: **System**, **Scope**, **DMM**, **Histogram**, **FFT**, and **Register Settings**.

System Tab

The System tab is an overview of the evaluation system. The left side displays Sampling Rate, Number of Samples, Clock Source, and Sync-Out CLK for the coherent sampling feature. For the Clock Source selection, the ZedBoard internal clock is always a valid option. If the External Sync-In is selected, then an external clock must be applied at the DCLK_IN SMA on the EV kit. The Sync-Out CLK selection is used to synchronize the signal generator with a 10MHz input. See the *Sync Input and Sync Output* section for more information.

The center of the tab sheet displays a block diagram and the description of the installed ADC: Device, Resolution, Input Range, Reference Voltage, and Max Sampling Rate. The Device dropdown list provides the selection between Maxim's 16-, 18-, and 20-bit parts. Once appropriately selected, the description of the ADC will change accordingly. The Reference Voltage dropdown list is adjustable. Please see the MAX11960 data sheet for detailed specification of the reference voltage range.

The right-side of the tab sheet reads a single conversion in LSB and decimal. An additional feature is the ADC calibration.

Scope Tab

The **Scope** tab sheet is used to capture data and display it in the time domain. Sampling rate and number of samples can also be set in this tab if they were not adjusted appropriately in other tabs. The **Display Unit** drop-down list allows counts and voltages. Below the graph, the user can select to display **Channel A** and/or **Channel B**. Once the desired configuration is set, click on the **Capture** button. The right-side of the tab sheet displays details of the waveform, such as **Average**, **Standard Deviation**, **Maximum**, **Minimum**, and **Fundamental Frequency**.

Figure 2 displays data of both ADCs when differential sinusoidal are applied at the inputs on the EV kit.

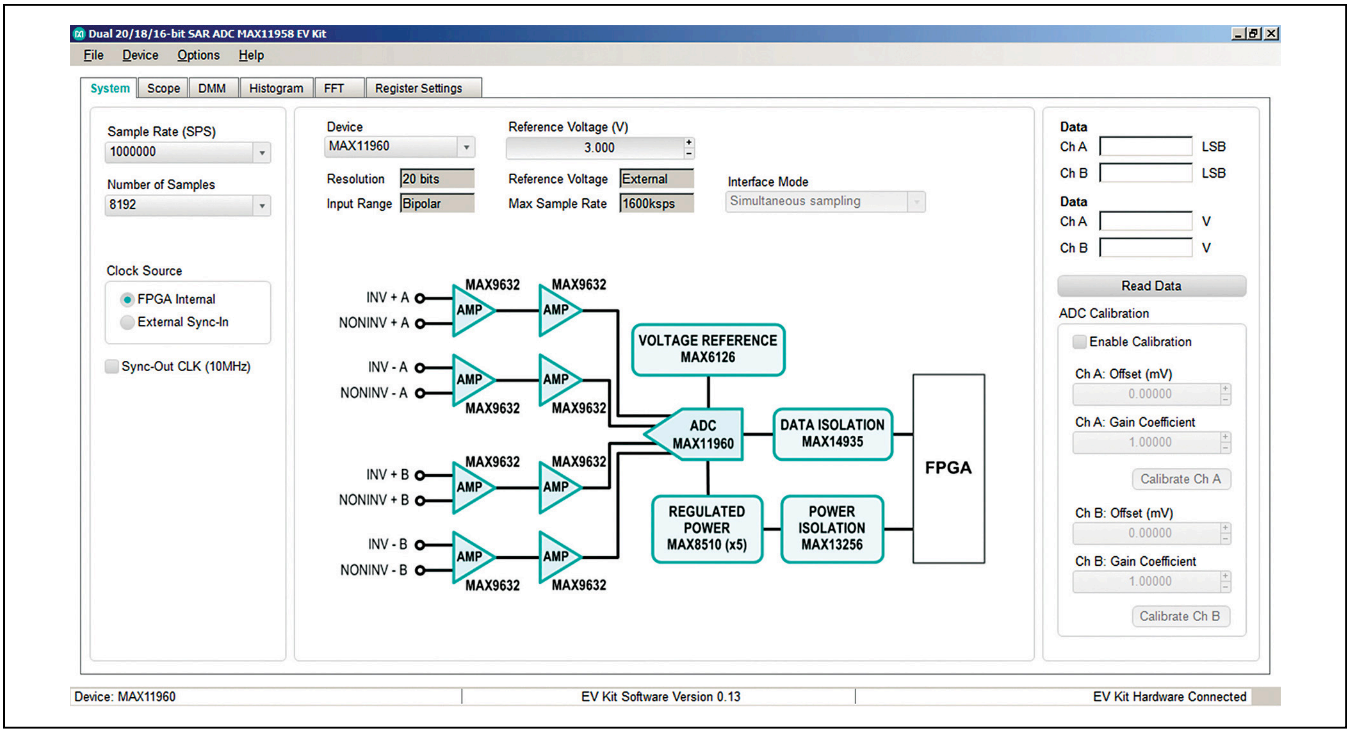


Figure 1. MAX11960 EV Kit Main Window (System Tab)

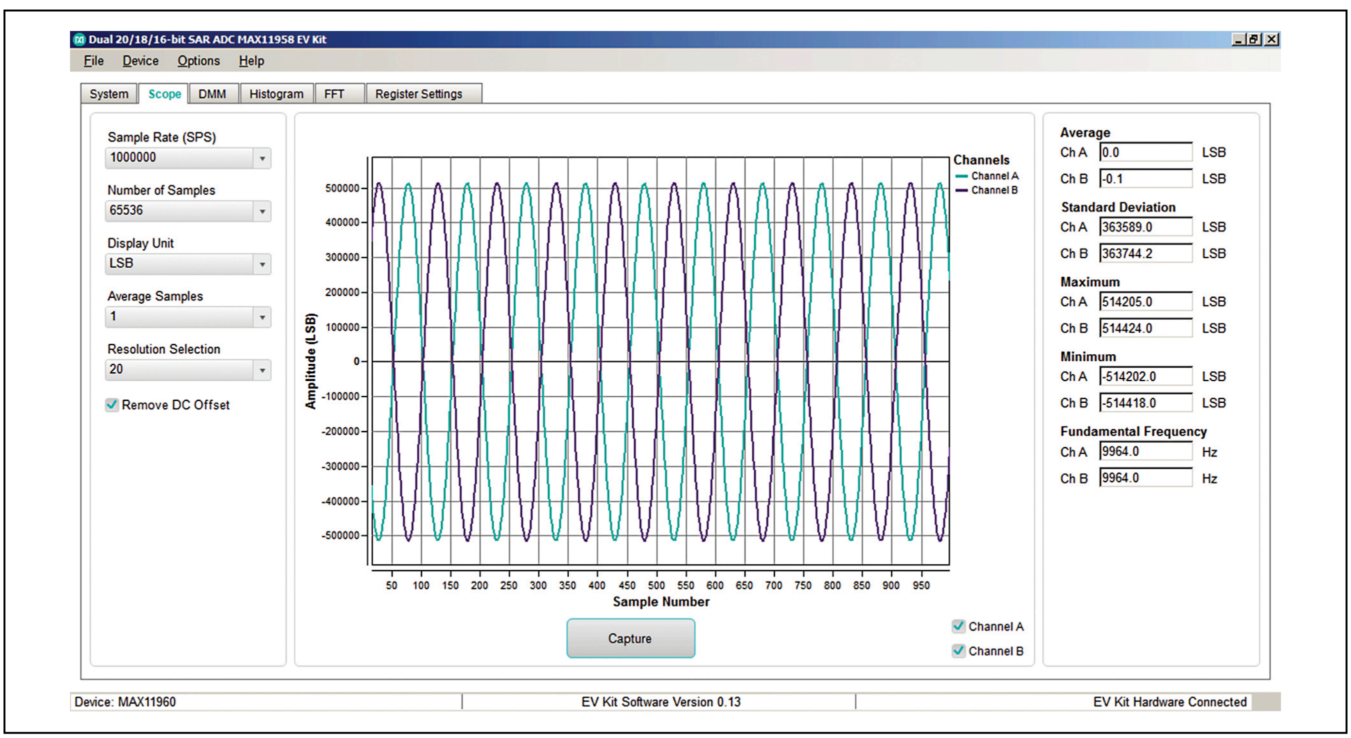


Figure 2. MAX11960 EV Kit Main Window (Scope Tab)

DMM Tab

The DMM tab sheet provides the typical information as a digital multimeter. Once the desired configuration is set, click on the **Capture** button.

Figure 3 displays the numerical value when the inputs on the EV kit are shorted to ground using the jumpers. See Table 1 for shunt settings.

Histogram Tab

The **Histogram** tab sheet is used to capture the histogram of the data. Sampling rate and number of samples can also be set in this tab if they were not adjusted appropriately in other tabs. Make sure that the number of samples do not exceed 524288. Otherwise, data capturing is longer than expected. Below the graph, the user can select to display **Channel A** and/or **Channel B**. Once the desired configuration is set, click on the **Capture** button. The right side of the tab sheet displays details of the histogram such as **Average**, **Standard Deviation**, **Maximum**, **Minimum**, **Peak to Peak Noise**, **Effective Resolution**, and **Noise Free Resolution**.

To use this histogram feature, apply a DC voltage at the input of channel A and/or B. Figure 4 displays the results when the input of the EV kit are shorted to ground. See Table 1 for placement of shunt positions.

FFT Tab

The **FFT** tab is used to display the FFT of the data. Sampling rate and number of samples can also be set in this tab if they were not adjusted appropriately in other tabs. When coherent sampling is needed, this tab sheet allows the user to calculate the input frequency or the master clock coming into the board. Either adjust the input frequency applied to the signal generator or adjust the master clock applied to the DCLK_IN SMA connector. See the *Sync Input and Sync Output* section before using this feature. Once the desired configuration is set, click on the **Capture** button. The right side of the tab sheet displays the performance based on the FFT, such as **Fundamental Frequency**, **THD**, **SNR**, **SINAD**, **SFDR**, **ENOB**, and **Noise Floor**.

Figure 5 is the setup Maxim Integrated uses to capture data for coherent sampling.

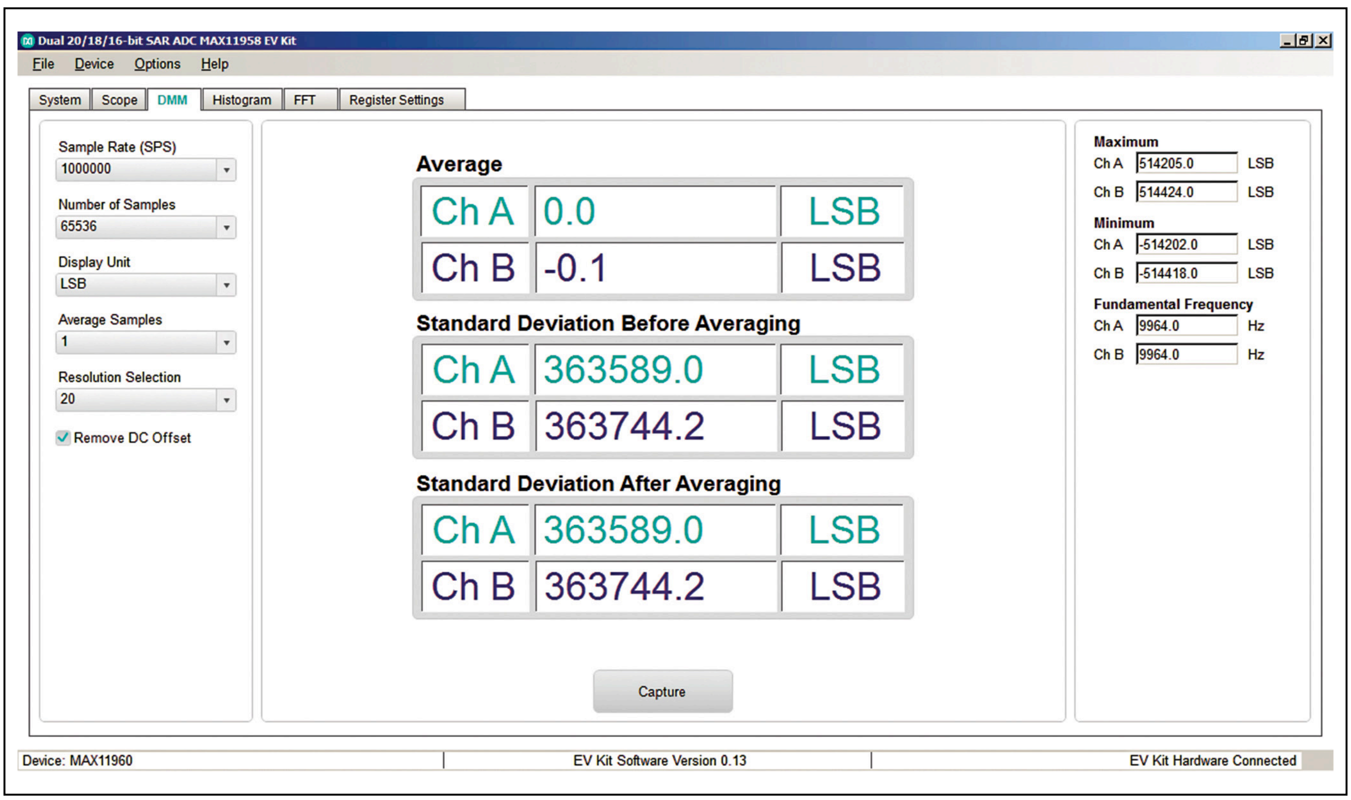


Figure 3. MAX11960 EV Kit Main Window (DMM Tab)

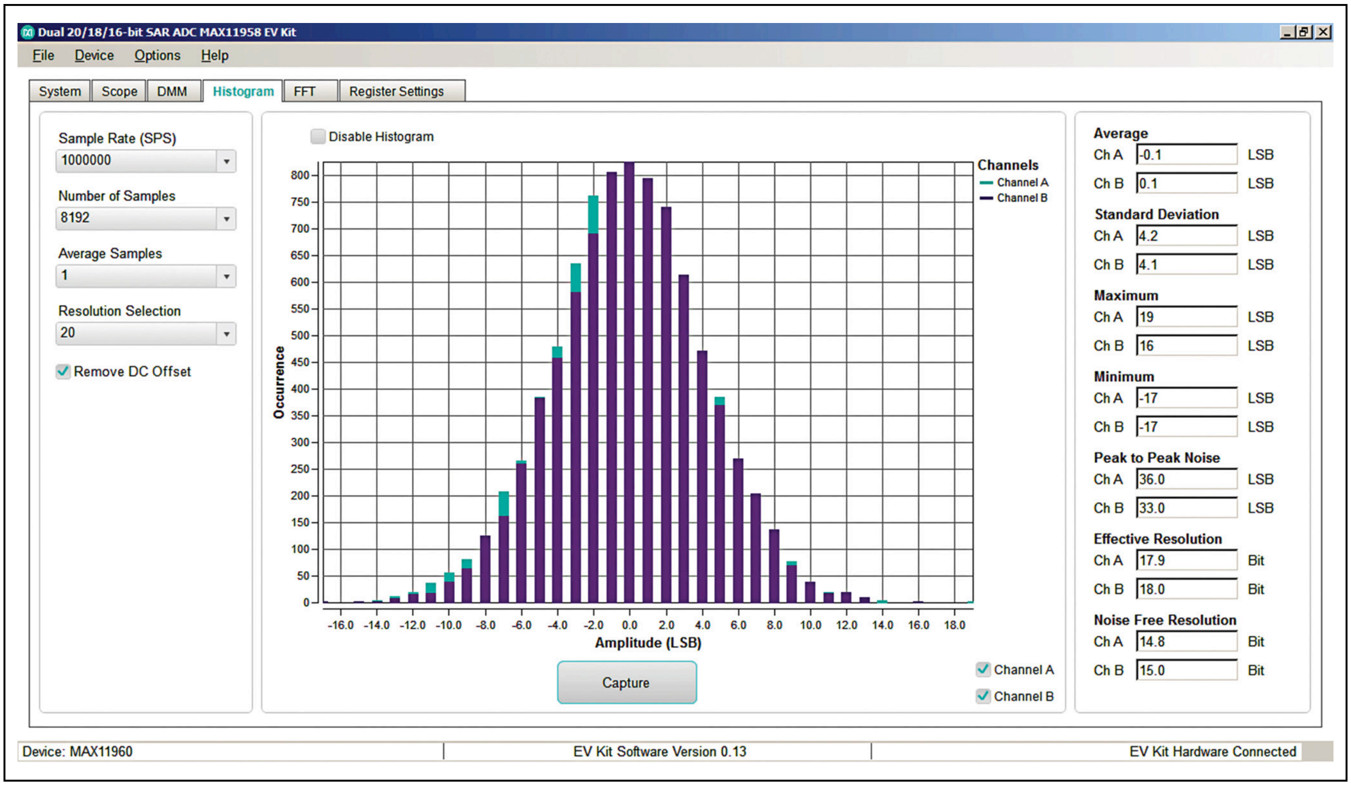


Figure 4. MAX11960 EV Kit Main Window (Histogram Tab)

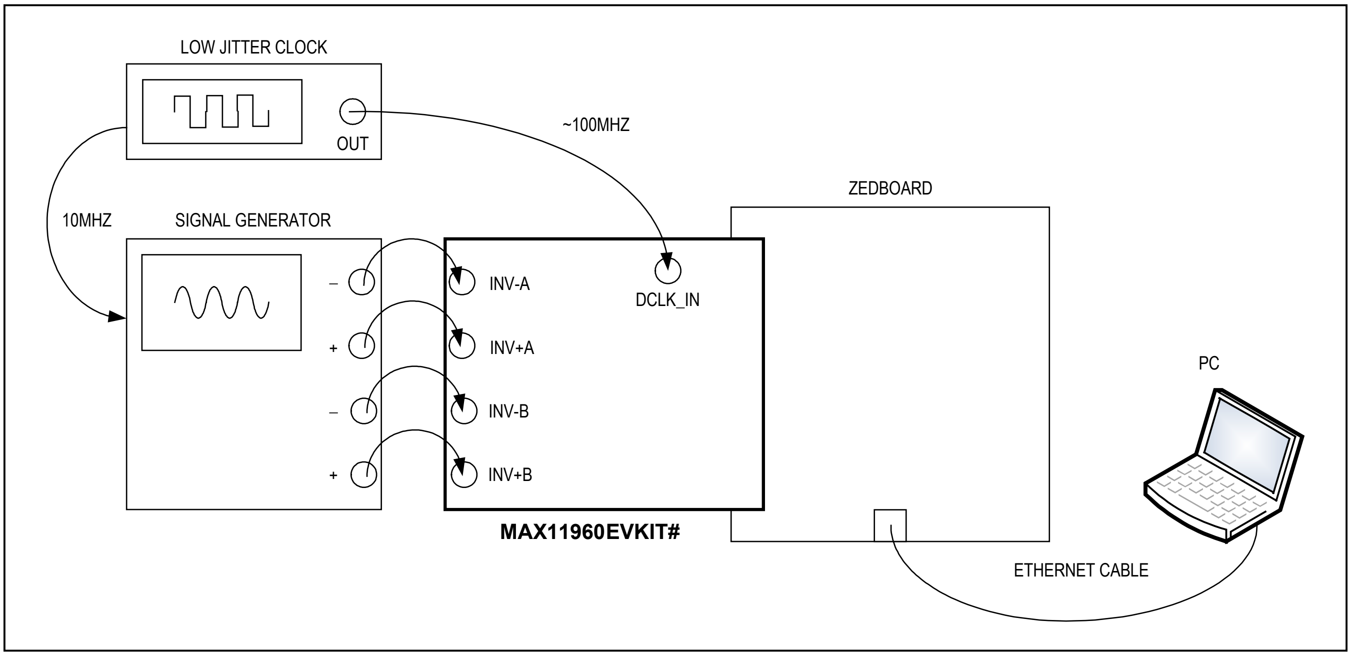


Figure 5. MAX11960 Differential EV Kit Coherent Sampling Setup

The input signal from the signal generator must be exactly **10000.000000Hz**. The low-jitter clock is synchronized with the signal generator. The master clock was initially set to **1000000000 Hz** but to achieve coherent sampling, then user must click on the **Calculate** button and use the **Adjusted(Hz)** frequency. **99523158.694 Hz** was entered into our low-jitter clock. The master clock is fed back to the ZedBoard and multiplied by 3/2, then generates a system clock that drives the Xilinx FPGA. All SPI timing and sampling rate are based off the system clock.

If the results do not look similar to Figure 6 and more similar to Figure 7, then check all connections in Figure 5 to make sure the setup is synchronizing properly.

Register Settings Tab

The **Register Settings** tab allows the user to read and write to the appropriate registers at a bit level. Each bit(s) in each register contains the **Value**, **Setting**, and **Description**.

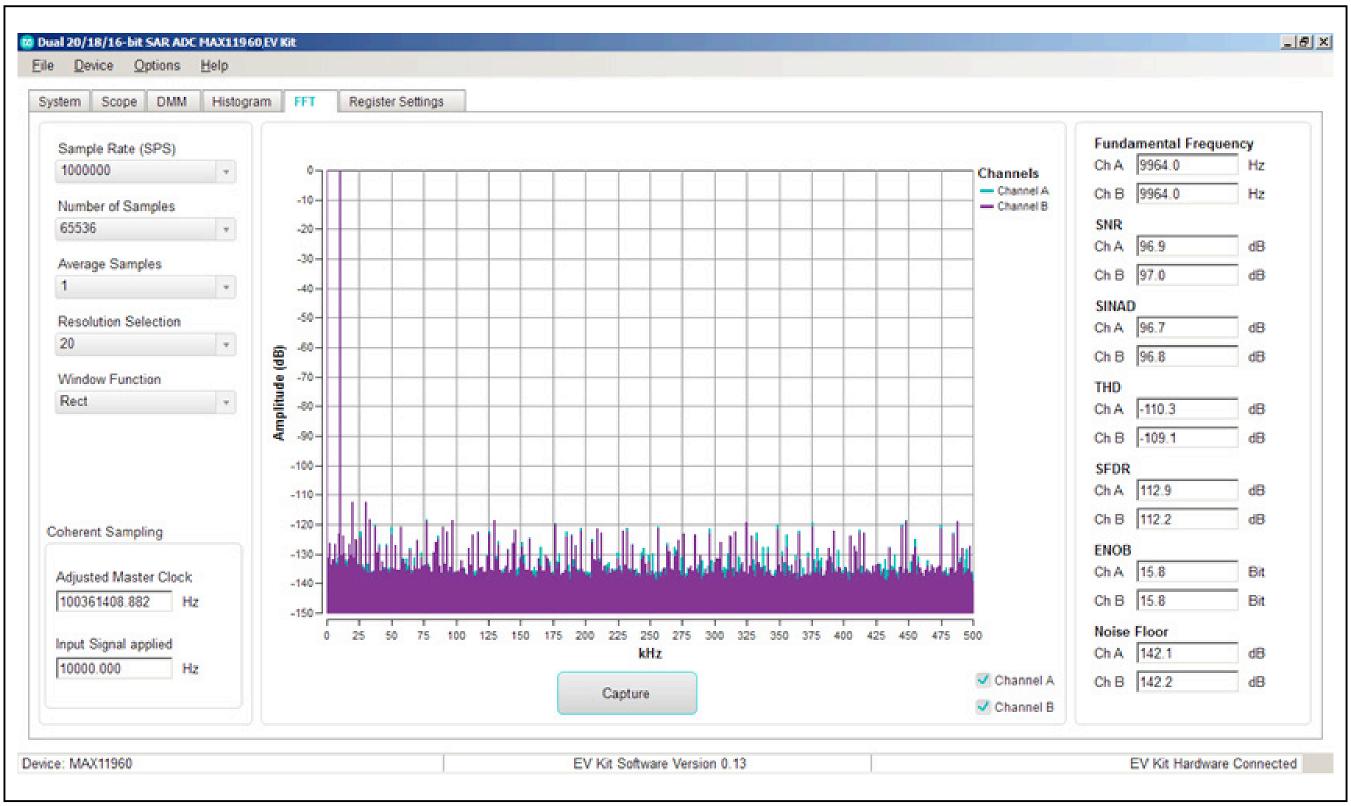


Figure 6. MAX11960 EV Kit Main Window, Coherent Sampling Results (FFT Tab)

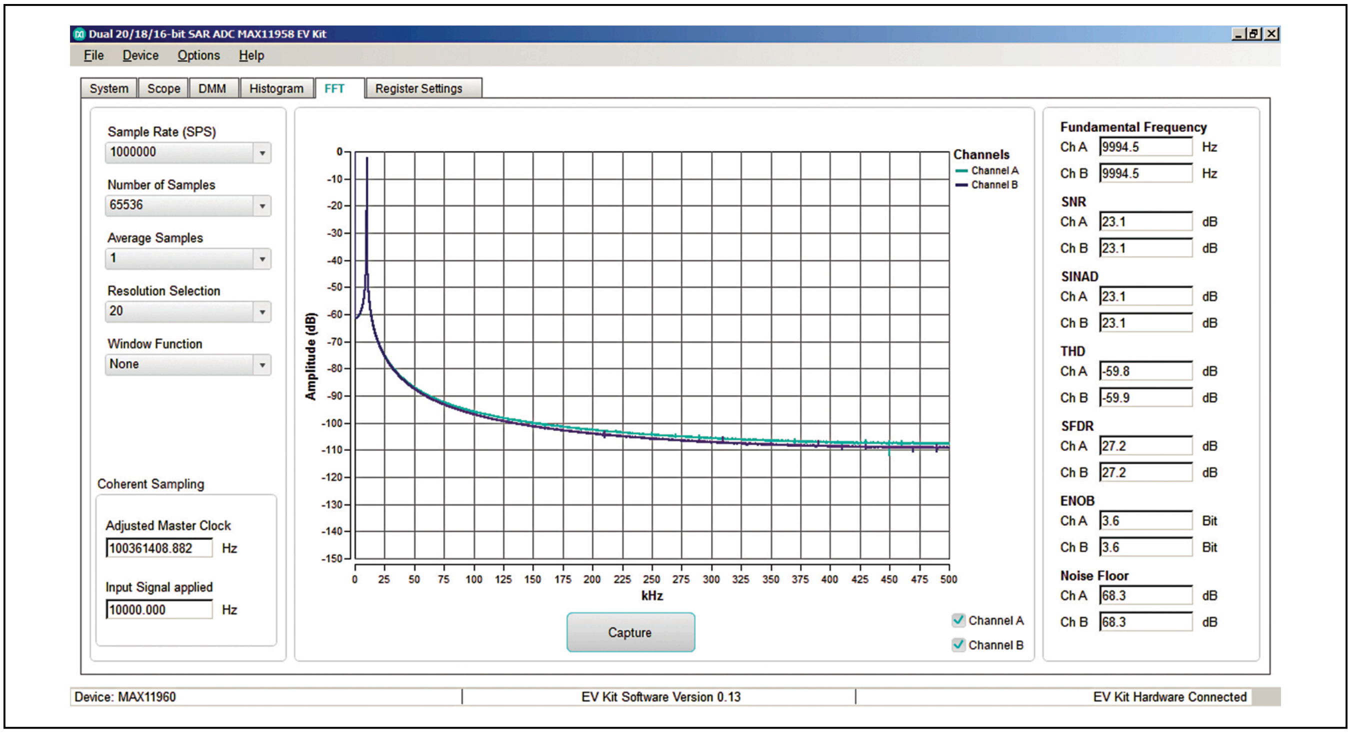


Figure 7. MAX11960 EV Kit Main Window, Non-coherent Sampling Results (FFT Tab)

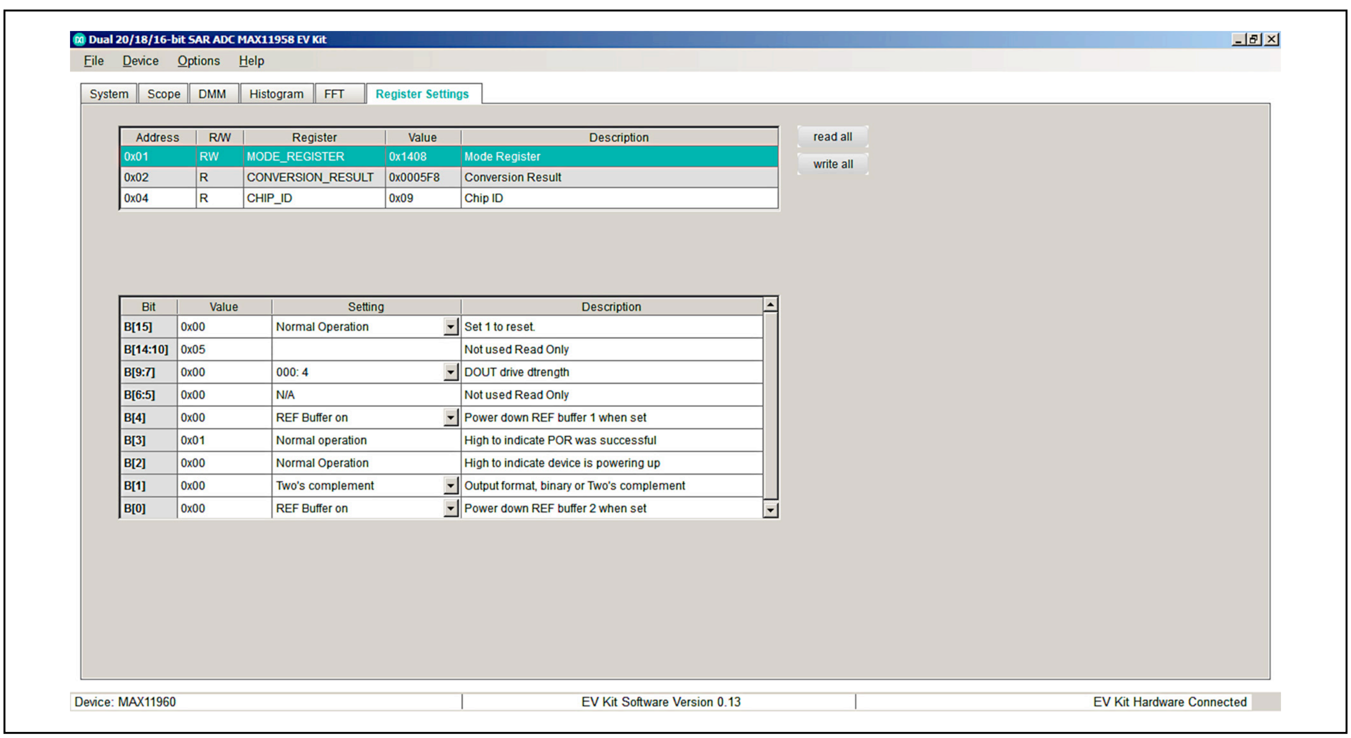


Figure 8. MAX11960 EV Kit Main Window, Register Settings (FFT Tab)

General Description of Hardware

This EV kit provides a proven layout to demonstrate the performance of the MAX11960 18-bit, dual-channel SAR ADC. Included in the EV kit are digital isolators (MAX14935), ultra low-noise LDOs (MAX8510) to all MAX11960 supply pins, on-board reference (MAX6126), precision amplifiers (MAX9632) for the analog inputs, and sync in and sync out signals for coherent sampling.

User-Supplied SPI

To evaluate the EV kit with a user-supplied SPI bus, remove shunts from jumper JU18. Apply the user-supplied SPI signals to the SCLK, CNVSTA, CNVSTB, DINA, DINB, DOUTA, and DOUTB test points. Make sure the return ground is the same as the MAX11960's ground.

User-Supplied REFVDD

The REFVDD supply is powered through a +3.3V LDO by default. For user-supplied REFVDD, remove the shunt of the jumper JU25 and apply +2.7V to +3.6V at the REFVDDA and REFVDDB test points.

User-Supplied AVDD

The AVDD supply is powered through a +1.8V LDO by default. For user-supplied AVDD, remove the shunt of the jumper JU24 and apply +1.7V to +1.9V at the AVDDA and AVDDB test points.

User-Supplied DVDD

The DVDD supply is powered through a +1.8V LDO by default. For user-supplied DVDD, remove the shunt of the jumper JU22 and apply +1.7V to +1.9V at the DVDDA and DVDDB test points.

User-Supplied OVDD

The OVDD supply is powered through a +1.8V LDO by default. Move the shunt to the 2-3 position of jumper JU23 to use the +3.3V LDO. For user-supplied OVDD, remove the shunt of the jumper JU23 and apply +1.5V to +3.6V at the OVDDA and OVDDB test points.

User-Supplied REFINAB

The MAX11960 uses an on-board +3V reference MAX6126 by default. For user-supplied REFINAB, move the shunt of jumper JU16 to the 2-3 position. Make sure that REFINAB is 300mV below REFVDD before applying the reference.

Analog Inputs

For simplicity, channel A will be discussed but will apply to channel B as well. Both analog inputs, AIN+A and AIN-A, range from 0V to V_{REF}. The differential input range is from $-V_{REF}$ to $+V_{REF}$ and the full-scale range is 2 times the V_{REF}. The desired input signals are applied at the INV+ and INV- SMAs for inverting configuration, and NONINV+A and NONINV-A SMAs for noninverting configuration.

Sync Input and Sync Output

The DCLK_IN SMA accepts an approximate 100MHz waveform signal to generate the system clock of the ZedBoard. For maximum performance, use a low-jitter clock that syncs to the user's analog function generator. The SYNC_OUT SMA outputs a 10MHz square waveform that syncs to the user's analog function generator. Both options are used for coherent sampling of the IC. Only one option should be used at a time. The relationship between f_{IN}, f_S, N_{CYCLES}, and $M_{SAMPLES}$ is given as follows:

$$\frac{f_{IN}}{f_S} = \frac{N_{CYCLES}}{M_{SAMPLES}}$$

where,

f_{IN} = Input frequency

f_S = Sampling frequency

N_{CYCLES} = Prime number of cycles in the sampled set

$M_{SAMPLES}$ = Total number of samples

Table 2. Analog Input Configurations

JUMPER	INVERTING	NONINVERTING
JU1	5-6	1-2
JU2	5-6	5-6
JU4	3-4	3-4
JU5	1-2	5-6
JU6	5-6	5-6
JU8	5-6	1-2
JU9	5-6	5-6
JU11	3-4	3-4
JU12	1-2	5-6
JU13	5-6	5-6

Component Information, PCB Layout, and Schematics

See the following links for component information, PCB layout diagrams and schematics.

- MAX11960 EV BOM
- MAX11960 EV PCB Layout
- MAX11960 EV Schematics

Ordering Information

PART	TYPE
MAX11960EVKIT#	EVKIT

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/16	Initial release	—

TITLE: Bill of Materials
DATE: 05/13/2015
DESIGN: max119xx_evkit_a

ITEM	QTY	REF DES	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	6	+20V, +3.3V_A, EXT_+5V, U23_VCC, EXT_+15V, EXT_+24V	5005	KEYSTONE	N/A	TESTPOINT WITH 1.80MM HO NOT FOR COLD TEST
2	7	AVDDA, AVDDB, OVDDA, OVDDB, CNVSTA, CNVSTB, EXT_REFINB	PEC01SAAN	SULLINS ELECTRONICS CORP	PEC01SAAN	CONNECTOR; MALE; THROU STRAIGHT; 1PIN
3	36	C1, C2, C45, C48, C51, C54, C61, C64, C67, C70, C74, C77, C80, C83, C90, C93, C96, C99, C115, C117, C119, C121, C124, C127, C130, C133, C138, C139, C151, C155, C156, C160, C165, C177, C179, C188	C2012X5R1V106K085	TDK	10UF	CAPACITOR; SMT (0805); CE TOL=10%; TG=-55 DEGC TO
4	45	C3, C4, C8, C9, C46, C47, C52, C53, C62, C63, C68, C69, C75, C76, C81, C82, C91, C92, C97, C98, C101-C104, C107, C110-C112, C116, C118, C120, C122, C125, C128, C131, C134, C136, C137, C152, C154, C157, C159, C171, C173, C187	GRM188R72A104KA35	MURATA	0.1UF	CAPACITOR; SMT (0603); CE TOL=10%; TG=-55 DEGC TO
5	6	C5, C7, C105, C106, C108, C109	UMK107BJ105KA-T; C1608X5R1H105K080AB	TAIYO YUDEN/TDK	1UF	CAPACITOR; SMT (0603); CE TOL=10%; MODEL=_MK SER DEGC
6	7	C10, C59, C86, C113, C114, C153, C158	GRM32ER72A225KA35; CGA6N3X7R2A225K230	MURATA/TDK	2.2UF	CAPACITOR; SMT (1210); CE TOL=10%; MODEL=GRM SER +125 DEGC; TC=X7R
7	1	C11	C1608X5R1V225K080AC; GRM188R6YA225KA12	TDK/MURATA	2.2UF	CAPACITOR; SMT (0805); CE TOL=10%; TG=-55 DEGC TO
8	13	C12, C14, C16, C18, C20, C28, C29, C31, C33, C35, C37, C39, C42	CGA2B3X7R1H104K; C1005X7R1H104K050BB; GRM155R71H104KE14	TDK; MURATA	0.1UF	CAPACITOR; SMT (0402); CE TOL=10%; TG=-55 DEGC TO
9	12	C13, C15, C17, C19, C27, C30, C32, C34, C36, C38, C40, C41	C2012X5R1V106K085	TDK	10UF	CAPACITOR; SMT (0805); CE TOL=10%; TG=-55 DEGC TO

10	4	C23, C26	CGA4F3C0G2E102J	TDK	1000PF	CAPACITOR; SMT (0805); CEI 250V; TOL=5%; MODEL=; TG= DEGC; TC=C0G
11	8	C43, C49, C60, C66, C78, C95, C163, C164	C0603C102K1GAC	KEMET	1000PF	CAPACITOR; SMT (0603); CEI 100V; TOL=10%; MODEL=C0C DEGC; TC=
12	10	C44, C50, C56, C65, C71, C73, C79, C85, C94, C100	CGA4F3C0G2E102J	TDK	1000PF	CAPACITOR; SMT (0805); CEI 250V; TOL=5%; MODEL=; TG= DEGC; TC=C0G
13	2	C55, C84	CGA5L4C0G2J332J; CL31C332JHHNFN	TDK/SAMSUNG ELECTRONICS	3300PF	CAPACITOR; SMT (1206); CEI 630V; TOL=5%; MODEL=; TG= DEGC; TC=C0G
14	9	C123, C126, C129, C132, C135, C175, C176, C178, C189	C0603C103K2RAC	KEMET	0.01UF	CAPACITOR; SMT (0603); CEI 200V; TOL=10%; MODEL=; TG DEGC; TC=X7R
15	1	C166	GRM188R71E474KA12	MURATA	0.47UF	CAPACITOR; SMT (0603); CEI TOL=10%; MODEL=GRM SER +125 DEGC; TC=X7R
16	4	C167-C170	C2012X7R1E475K125AB	TDK	4.7UF	CAPACITOR; SMT (0805); CEI TOL=10%; MODEL=; TG=-55 D TC=X7R
17	3	C172, C174, C186	08053C105JAT2A	AVX	1UF	CAPACITOR; SMT (0805); CEI TOL=5%; MODEL=X7R; TG=-5 TC=+/-
18	1	D1	MBR0520L	FAIRCHILD SEMICONDUCT OR	MBR0520L	DIODE, SCHOTTKY, SOD-123 Vf=0.385V@If=0.5A, If(ave)=0.
19	1	D2	LGL29K-G2J1-24-Z	OSRAM	LGL29K-G2J1-24-Z	DIODE; LED; SMARTLED; GR IF=0.02A
20	1	D3	LS L29K-G1J2-1-Z	OSRAM	LS L29K-G1J2-1-Z	DIODE; LED; SMART; RED; SI IF=0.02A; -40 DEGC TO +100
21	2	D4, D5	BAS4002A-RPP	INFINEON	BAS4002A-RPP	DIODE; SCH; LOW VF SCHOT (SOT-143); PIV=40V; IF=0.2A
22	10	INV+A, INV+B, INV-A, INV-B, DCLK_IN, NONINV+A, NONINV+B, NONINV-A, NONINV-B, SYNC_OUT	5-1814832-1	TYCO	5-1814832-1	CONNECTOR; FEMALE; THRO SOCKET SMA STR DIE CAST
23	2	EXT_-15V, EXT_-24V	5008	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN BOARD HOLE=0.063IN; ORAN BRONZE WIRE SILVER PLATI RECOMMENDED FOR BOARD NOT FOR COLD TEST

24	13	TP8, GND1-GND6, TP27, TP28, TP36, GNDD1-GNDD3	5006	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN BOARD HOLE=0.063IN; BLAC WIRE SILVER PLATE FINISH; BOARD THICKNESS=0.062IN;
25	1	GNDD	5123	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN BOARD HOLE=0.063IN; GRAY WIRE SILVER PLATE FINISH; BOARD THICKNESS=0.062IN;
26	1	J1	TSW-106-08-S-D-RA	SAMTEC	TSW-106-08-S-D-RA	CONNECTOR; THROUGH HO ANGLE; 12PINS; THIS PART I PMOD PERIPHERAL BOARD
27	1	J2	ASP-134604-01	SAMTEC	ASP-134604-01	CONNECTOR; MALE; SMT; HI DENSITY OPEN PIN FIELD TE STRAIGHT; 160PINS
28	1	J3	KLDX-0202-B	KYCON	KLDX-0202-B	CONNECTOR; FEMALE; THRO JACK; RIGHT ANGLE; 3PINS
29	8	JU1, JU4, JU5, JU8, JU11, JU12, JU23, JU35	PEC03DAAN	SULLINS ELECTRONICS CORP.	PEC03DAAN	CONNECTOR; MALE; THROU STRAIGHT THROUGH; 6PINS DEGC
30	4	JU2, JU6, JU9, JU13	PEC05DAAN	SULLINS ELECTRONICS CORP.	PEC05DAAN	CONNECTOR; MALE; THROU STRAIGHT; 10PINS; -65 DEGC
31	1	JU3	PEC08DAAN	SULLINS ELECTRONICS CORP.	PEC08DAAN	CONNECTOR; MALE; THROU STRAIGHT; 16PINS; -65 DEGC
32	3	JU16, JU17, JU31	PCC03SAAN	SULLINS	PCC03SAAN	CONNECTOR; MALE; THROU STRAIGHT THROUGH; 3PINS DEGC
33	1	JU18	TSW-110-26-T-T	SAMTEC	TSW-110-26-T-T	CONNECTOR; MALE; THROU STRAIGHT; 30PINS
34	1	JU20	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROU STRAIGHT; 2PINS
35	4	JU22, JU24, JU25, JU36	PEC02DAAN	SULLINS ELECTRONIC CORP.	PEC02DAAN	CONNECTOR; MALE; THROU STRAIGHT; 4PINS
36	1	JU30	282834-2	TE CONNECTIVITY	282834-2	CONNECTOR; FEMALE; THRO PITCH; SIDE WIRE ENTRY ST BLOCK ; STRAIGHT; 2PINS; -4
37	2	JU32, JU33	PBC02DAAN	SULLINS ELECTRONIC CORP.	PBC02DAAN	CONNECTOR; MALE; THROU STRAIGHT; 4PINS

38	1	JU34	PEC04DAAN	SULLINS ELECTRONICS CORP.	PEC04DAAN	CONNECTOR; MALE; THROU STRAIGHT; 8PINS
39	4	L1-L4	LBC3225T330KR	TAIYO YUDEN	33UH	INDUCTOR; SMT (1210); WIR TOL=+/-10%; 0.3A
40	15	R1-R4, R37, R38, R50, R53, R92, R97, R105, R111, R121-R123	CRCW06030000ZS; MCR03EZPJ000; ERJ-3GEY0R00	VISHAY DALE/ROHM/PANASONIC	0	RESISTOR; 0603; 0 OHM; 0%; FILM
41	1	R5	RG1608N-101-W-T1	SUSUMU CO LTD.	100	RESISTOR; 0603; 100 OHM; 0 THICK FILM
42	4	R7-R10	RNCF0603BKC2R21	STACKPOLE ELECTRONICS INC.	2.21	RESISTOR; 0603; 2.21 OHM; THIN FILM
43	15	R11, R12, R36, R39-R41, R48, R49, R51, R52, R54, R61, R62, R84, R85	SEE NOTES	VISHAY DALE	33	RESISTOR; 0603; 33 OHM; 1% FILM
44	16	R13-R16, R20-R22, R25-R27, R31-R33, R71-R73	RN73C1J2K0B; 5-1614352-1	TE CONNECTIVITY	2K	RESISTOR; 0603; 2K OHM; 0. METAL FILM
45	12	R17, R23, R28, R34, R75, R76, R80, R81, R93, R94, R104, R112	288-0603-1.0K-RC	XICON	1K	RESISTOR, 0603, 1K, 0.1%, 1
46	12	R18, R24, R29, R35, R90, R91, R95, R96, R106, R107, R109, R110	PCF0603R-2K0B	TT ELECTRONICS	2K	RESISTOR; 0603; 2K OHM; 0. METAL FILM
47	1	R19	CRCW0603330KFK	VISHAY DALE	330K	RESISTOR, 0603, 330K OHM, THICK FILM
48	1	R30	CRCW06031M50FK	VISHAY DALE	1.5M	RESISTOR, 0603, 1.5M OHM, THICK FILM
49	13	R42-R45, R47, R56-R59, R63-R66	CRCW06031003FK; ERJ-3EKF1003	VISHAY DALE/PANASONIC	100K	RESISTOR; 0603; 100K; 1%; 1 FILM
50	1	R46	CRCW060349R9FK	VISHAY DALE	49.9	RESISTOR; 0603; 49.9 OHM; THICK FILM
51	16	R55, R60, R67-R70, R74, R77-R79, R82, R83, R98, R99, R108, R113	RN73C1J10RBTG; 1614350-2	TE CONNECTIVITY	10	RESISTOR; 0603; 10 OHM; 0. THICK FILM
52	8	R86-R89, R100-R103	CRCW060375R0FK	VISHAY DALE	75	RESISTOR; 0603; 75 OHM; 1% FILM
53	2	R114, R115	MCR03EZPFX2002; ERJ-3EKF2002	ROHM; PANASONIC	20K	RESISTOR; 0603; 20K OHM; THICK FILM
54	1	R116	CRCW06031001FK; ERJ-3EKF1001V	VISHAY DALE; PANASONIC	1K	RESISTOR; 0603; 1K; 1%; 10
55	2	R117, R119	CRCW0603820KFK	VISHAY DALE	820K	RESISTOR, 0603, 820K OHM, THICK FILM
56	2	R118, R120	RC0603FR-0771K5L	YAGEO PHYCOMP	71.5K	RESISTOR; 0603; 71.5K OHM THICK FILM

57	14	SU1, SU2, SU4-SU6, SU8, SU9, SU11-SU13, SU3_1-SU3_4	STC02SYAN	SULLINS ELECTRONICS CORP.	STC02SYAN	TEST POINT; JUMPER; STR; T BLACK; INSULATION=PBT CO BRONZE; COPPER PLATED T
58	15	SU16, SU17, SU32-SU36, SU22_1, SU22_2, SU23_1, SU23_2, SU24_1, SU24_2, SU25_1, SU25_2	2012J-CR	JAMECO VALUEPRO	2012J-CR	CONNECTOR; FEMALE; WIRE SHORTING BLOCK; CLOSED 2PINS
59	8	SU31, SU18_1-SU18_7	GJWCL-B-R	JAMECO VALUEPRO	GJWCL-B-R	CONNECTOR; FEMALE; WIRE SHORTING BLOCK; CLOSED 2PINS
60	1	T1	TGM-H240V8LF	HALO ELECTRONICS, INC	TGM-H240V8LF	TRANSFORMER; SMT; 1:1:1.3
61	12	U10_6, U12_6, U15_6, U16_6, TP_INV+A, TP_INV+B, TP_INV-A, TP_INV-B, TP_NONINV+A, TP_NONINV+B, TP_NONINV-A, TP_NONINV-B	5009	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN BOARD HOLE=0.063IN; YELLO WIRE SILVER PLATE FINISH; BOARD THICKNESS=0.062IN;
62	1	U1	MAX11958ETP+	MAXIM	MAX11958ETP+	EVKIT PART - IC; MAX11958; T3255MK-2
63	1	U2	MAX13256ATB+	MAXIM	MAX13256ATB+	IC; DRV; 36V H-BRIDGE TRAN ISOLATED SUPPLIES; TDFN1
64	3	U3, U18, U22	MAX14935FAWE+	MAXIM	MAX14935FAWE+	IC; DISO; FOUR-CHANNEL; 15 ISOLATOR; WSOIC16 300MIL
65	1	U4	TPS7A4901DGN	TEXAS INSTRUMENTS	TPS7A4901DGN	IC; VREG; ULTRALOW-NOISE REGULATOR; MSOP8-EP 300
66	1	U6	TPS7A3001DGN	TEXAS INSTRUMENTS	TPS7A3001DGN	IC; VREG; ULTRALOW-NOISE REGULATOR; MSOP8-EP 300
67	10	U7, U8, U10-U16, U20	MAX9632AUA+	MAXIM	MAX9632AUA+	IC; OPAMP; PRECISION, LOW AMPLIFIER; UMAX8 ; -40 DEG
68	2	U9, U19	MAX9632AUA+	MAXIM	MAX9632AUA+	IC; OPAMP; PRECISION, LOW AMPLIFIER; UMAX8 ; -40 DEG
69	1	U17	93LC66BT-I/OT	MICROCHIP	93LC66BT-I/OT	IC; EPROM; 4K MICROWIRE S 6
70	1	U21	74LVC1G126GV	NXP	74LVC1G126GV	IC; DRV; SINGLE BUS BUFFE SOT753
71	1	U23	MAX15006BATT+	MAXIM	MAX15006BATT+	IC; VREG; ULTRA-LOW QUIES REGULATOR; TDFN6-EP 3X3
72	3	U26, U27, U29	MAX8510EXK18	MAXIM	MAX8510EXK18	IC; VREG; ULTRA-LOW-NOISE DROPOUT; 0.12A LINEAR RE
73	2	U28, U30	MAX8510EXK33+	MAXIM	MAX8510EXK33+	IC; VREG; ULTRA-LOW-NOISE DROPOUT; 0.12A LINEAR RE

74	1	U36	MAX6126AASA30+	MAXIM	MAX6126AA SA30	SERIES VOLTAGE REFEREN
75	1		MAX119XX	MAXIM	PCB	PCB: MAX119XX
TOTAL	437					

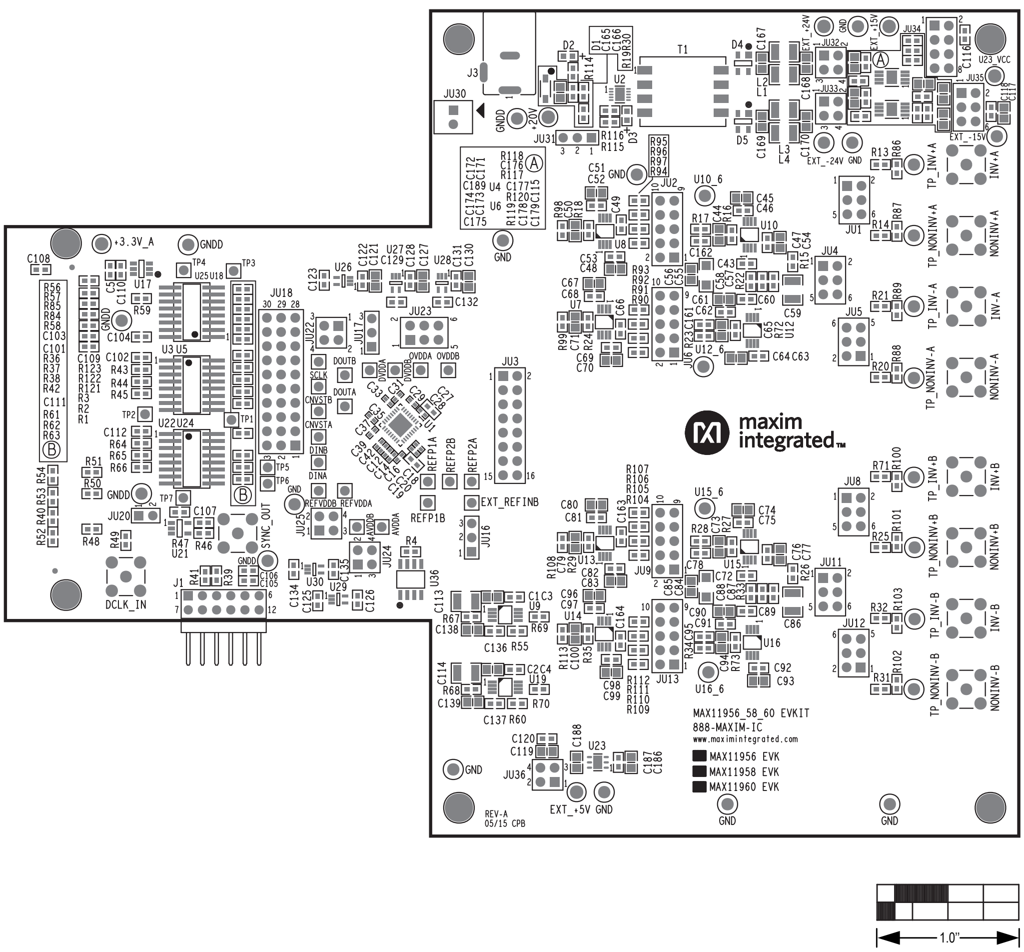
DO NOT PURCHASE(DNP)

ITEM	QTY	REF DES	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	12	C21, C22, C24, C25, C57, C58, C72, C87-C89, C161, C162	N/A	N/A	?	CAPACITOR; 0603 PACKAGE
2	20	TP1-TP7, DINA, DINB, SCLK, DOUTA, DOUTB, DVDDA, DVDDB, REFP1A, REFP1B, REFP2A, REFP2B, REFVDDA, REFVDDB	PEC01SAAN	SULLINS ELECTRONICS CORP	PEC01SAAN	CONNECTOR; MALE; THROU STRAIGHT; 1PIN
3	1	R6	N/A	N/A	?	RESISTOR; 0603 PACKAGE; (
TOTAL	33					

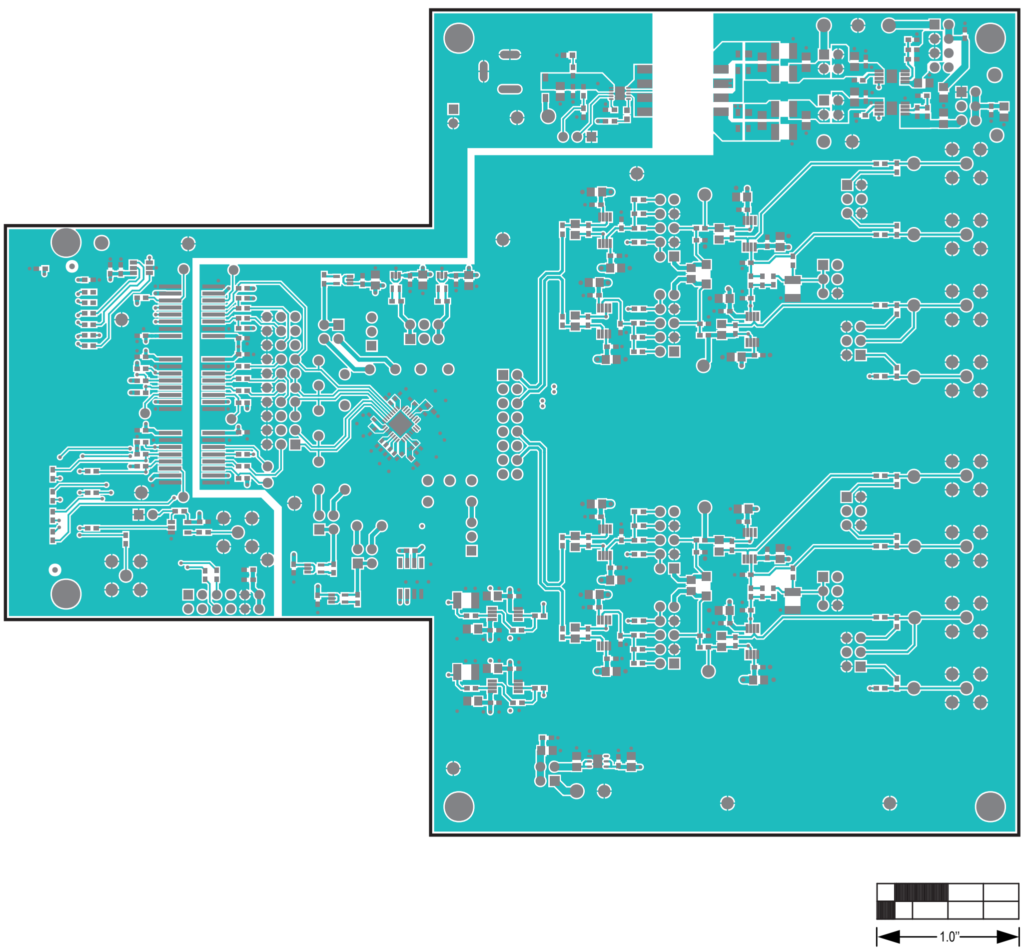
PACKOUT (These are DO NOT INSTALL parts and will be shipped with PCB)

ITEM	QTY	REF DES	MANUFACTURER	VALUE	DESCRIPTION	STATUS
1	1	PACKOUT	N/A	?	BOX;SMALL BROWN 9 3/16"X7"X1 1/4" - PACKOUT	EVKIT-NOT FOR TEST
2	1	PACKOUT	N/A	?	ESD BAG;+;BAG; STATIC SHIELD ZIP 8”X10”; W/ ESD LOGO	EVKIT-NOT FOR TEST
3	1	PACKOUT	N/A	?	PINK FOAM;FOAM;ANTI-STATIC PE 12inX12inX5 MM - PACKOUT	EVKIT-NOT FOR TEST

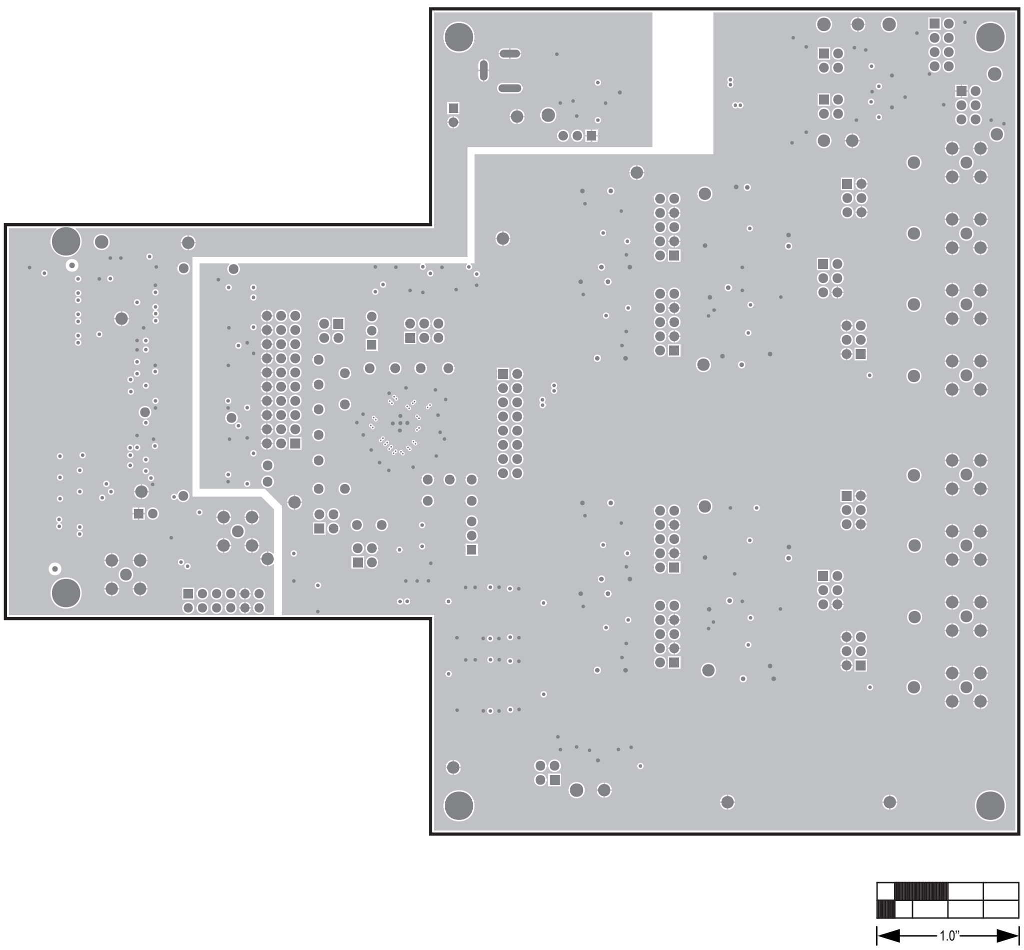
4	1	PACKOUT	N/A	?	WEB INSTRUCTIONS FOR MAXIM DATA SHEET	EVKIT-NOT FOR TEST
5	1	PACKOUT	N/A	?	LABEL(EV KIT BOX) - PACKOUT	EVKIT-NOT FOR TEST
6	1	MEM1	KINGSTON TECHNOLOGY	SDC4/4GB	ACCESSORY; MEMORY CARD; 4GB; MICROSDHC SERIES; CLASS4	EVKIT-NOT FOR TEST
7	1		B00ET4KHJ2	CABLE MATTERS	USB 2.0 TO 10/100 ETHERNET ADAPTER	
TOTAL	7					



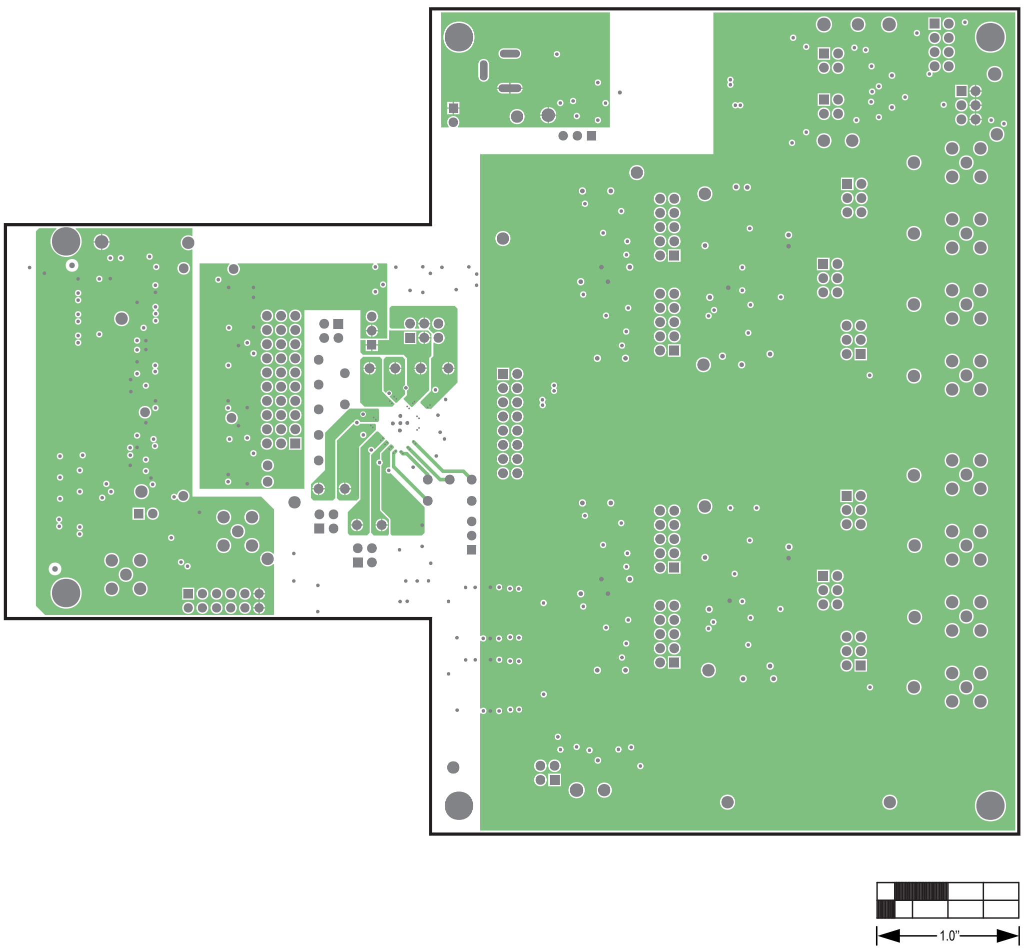
Component Placement Guide—Component Side



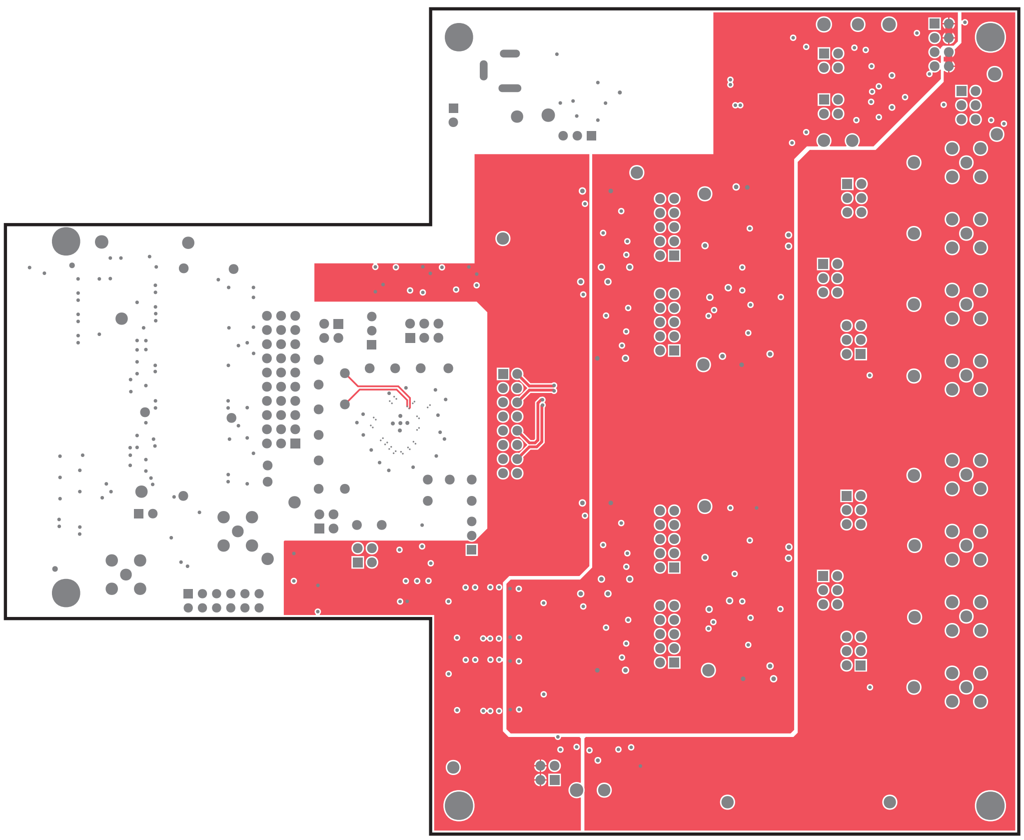
PCB Layout—Component Side

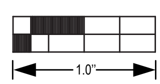


PCB Layout—Layer 2

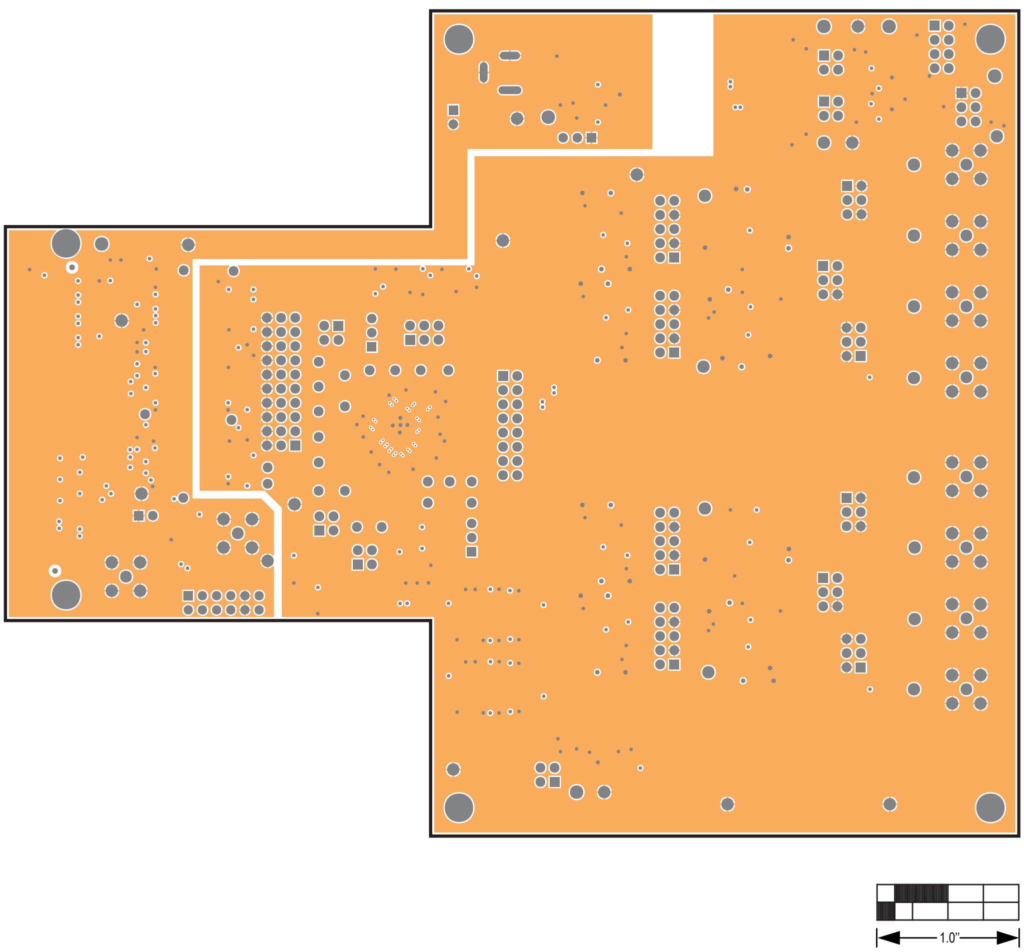


PCB Layout—Layer 3

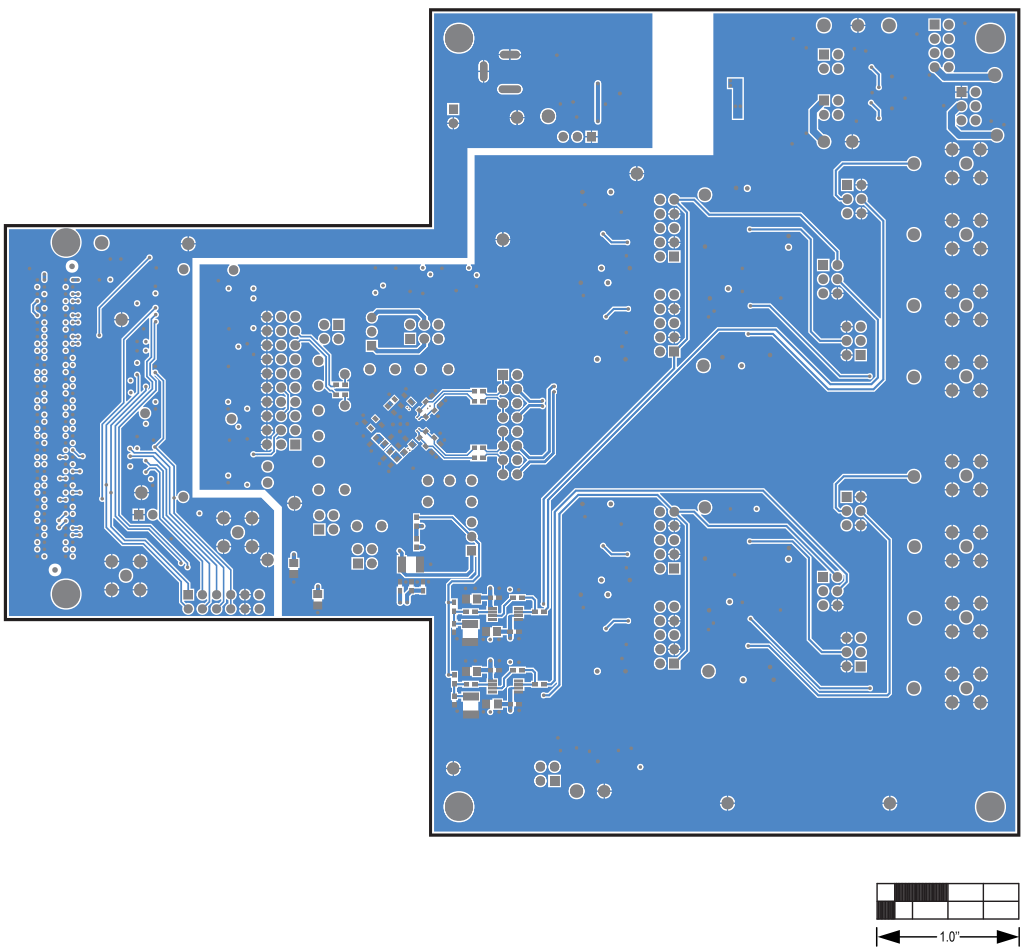




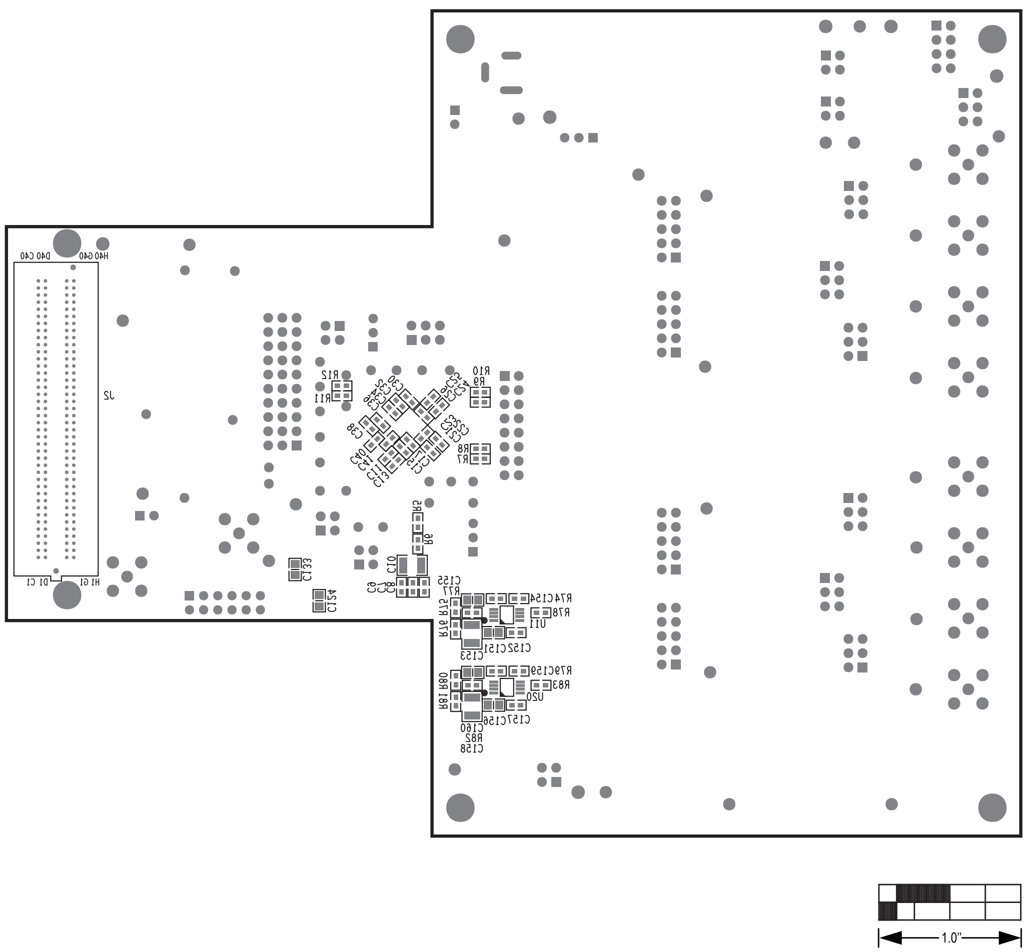
PCB Layout—Layer 4



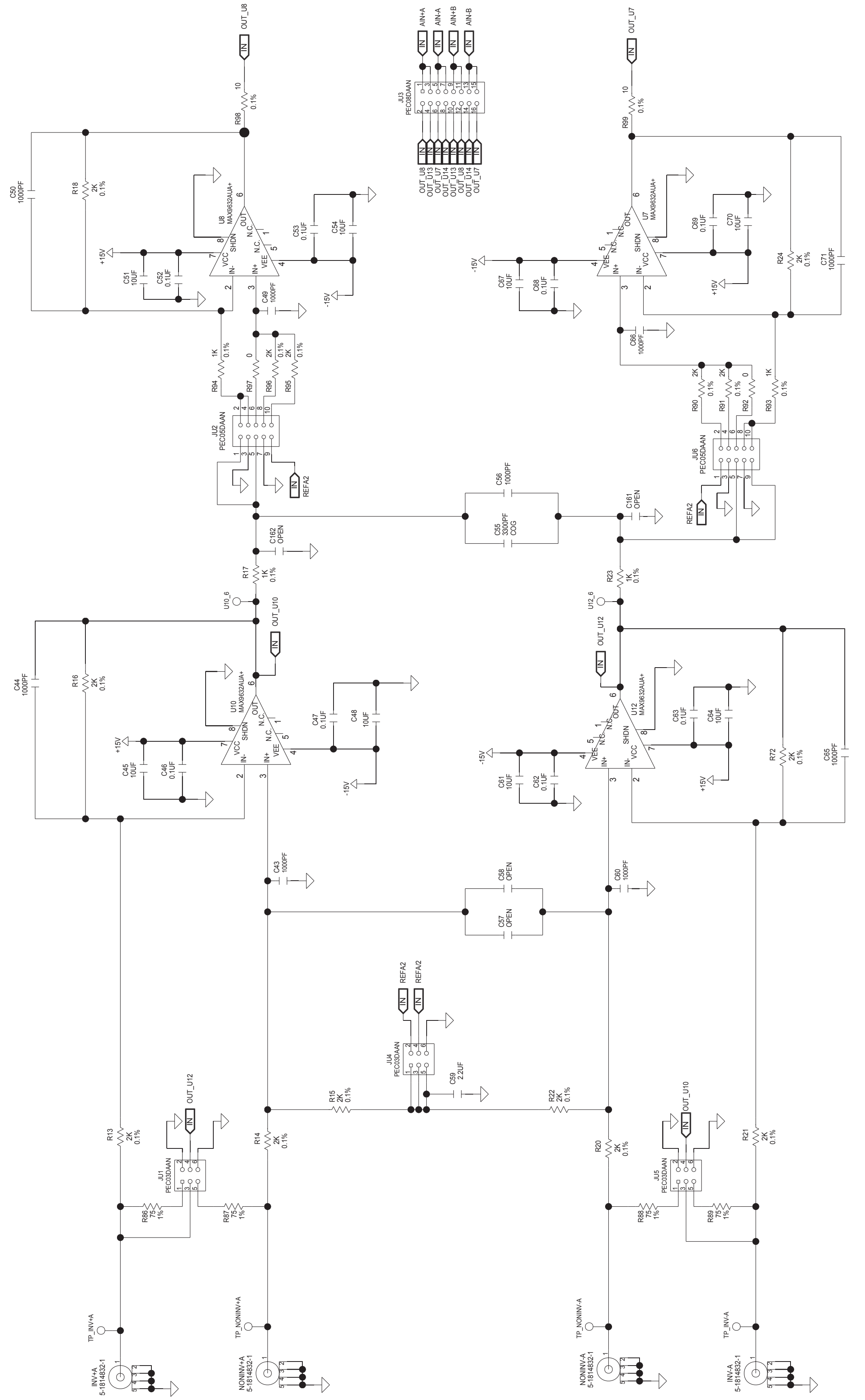
PCB Layout—Layer 5

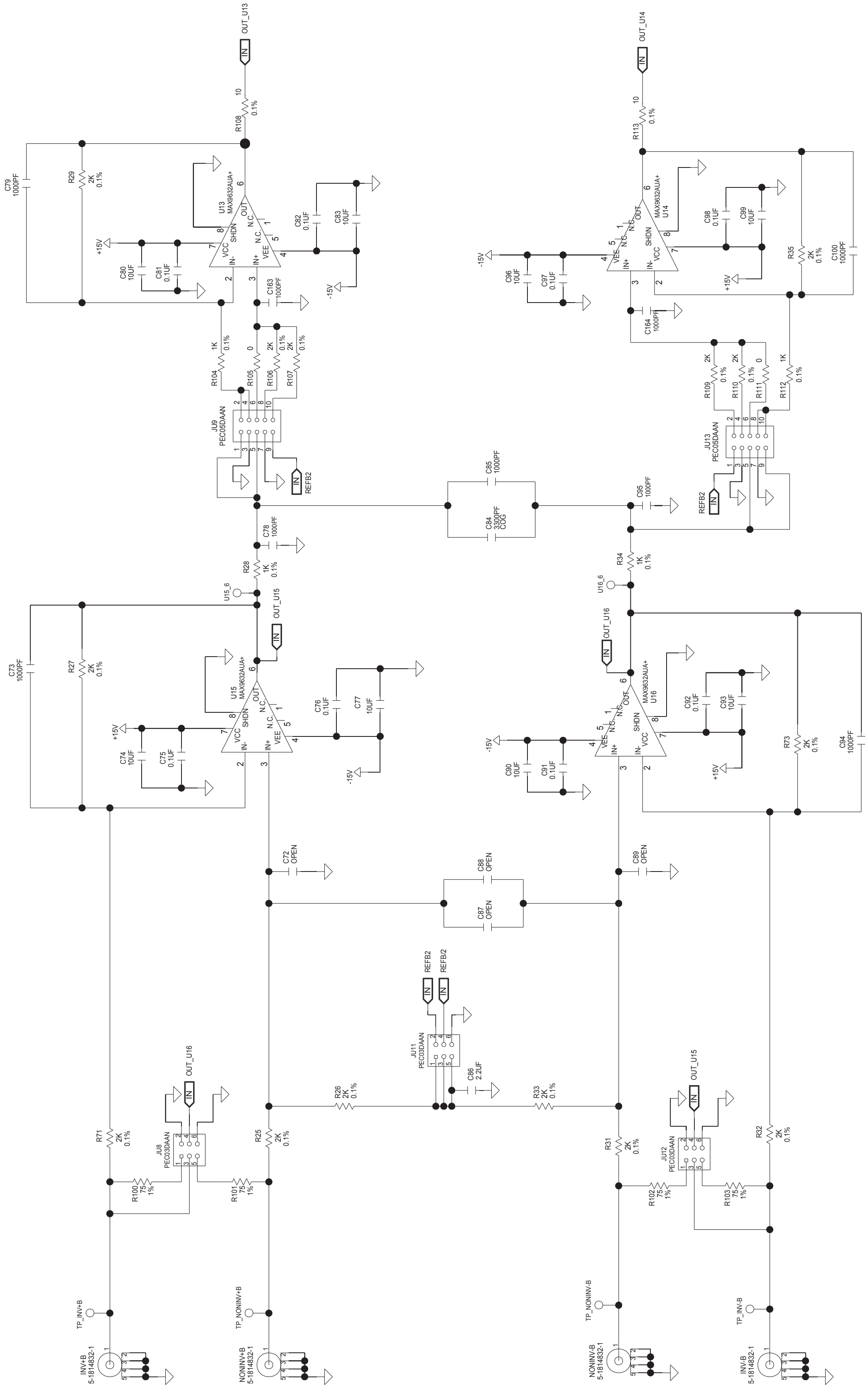


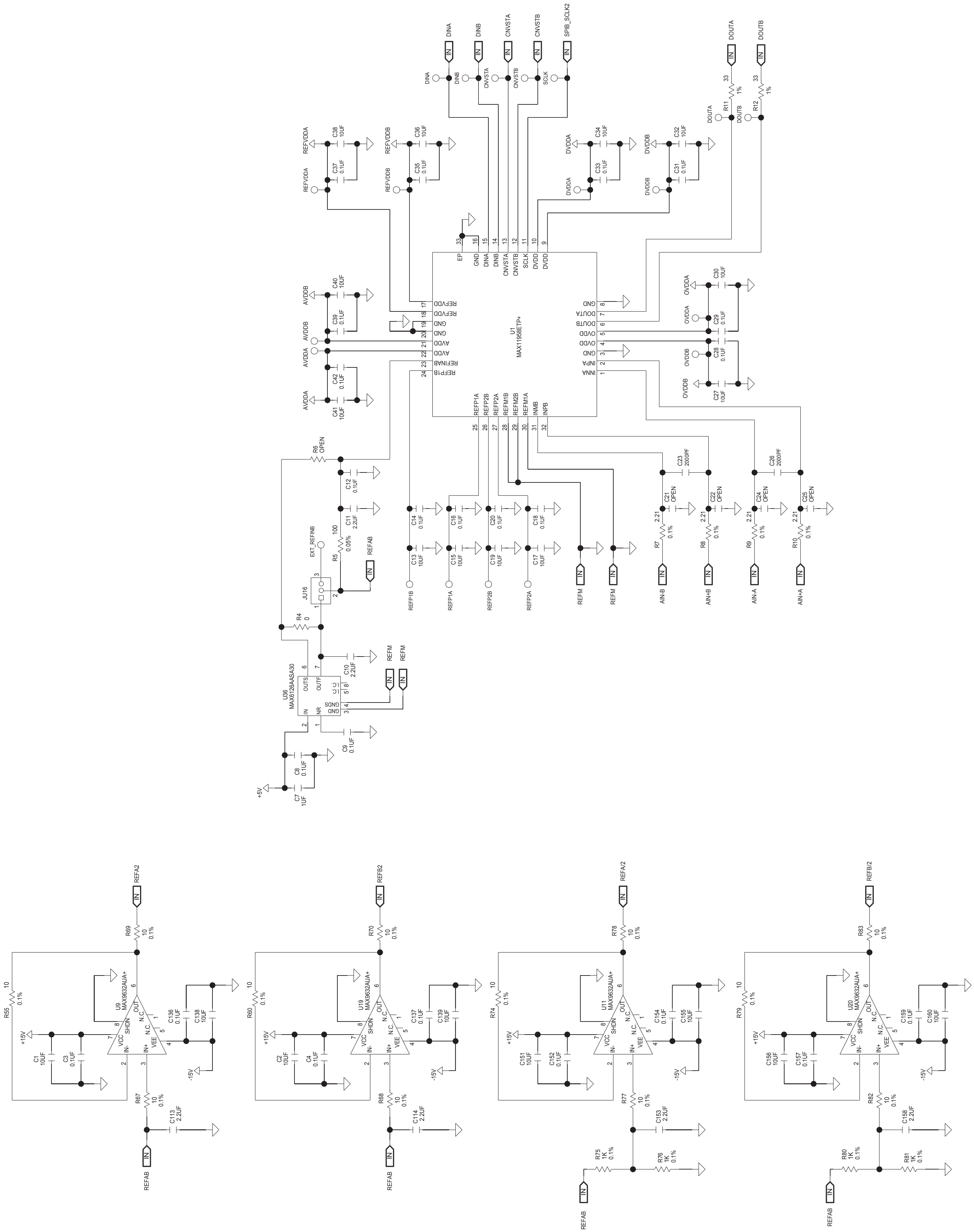
PCB Layout—Solder Side



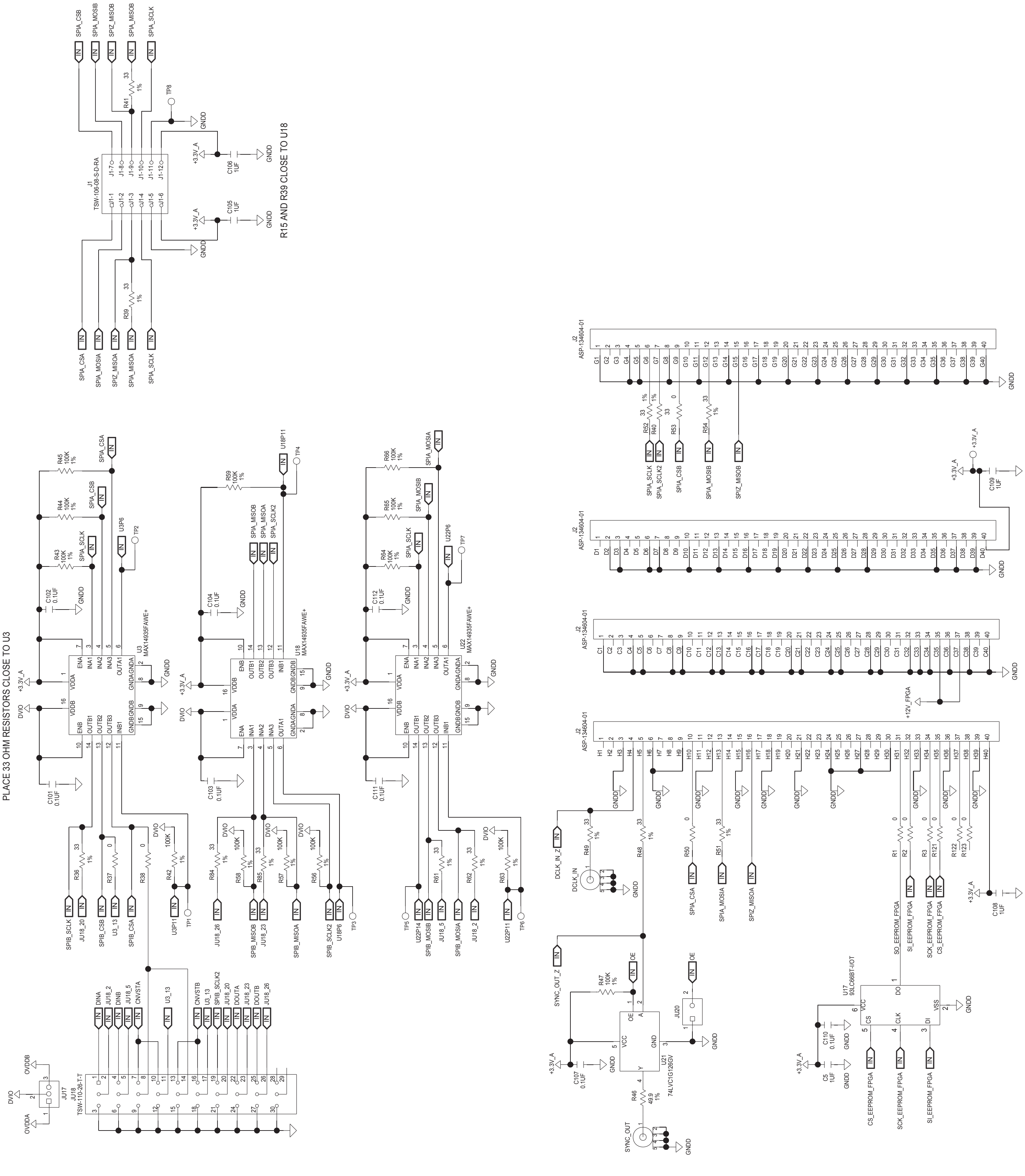
Component Placement Guide—Solder Side

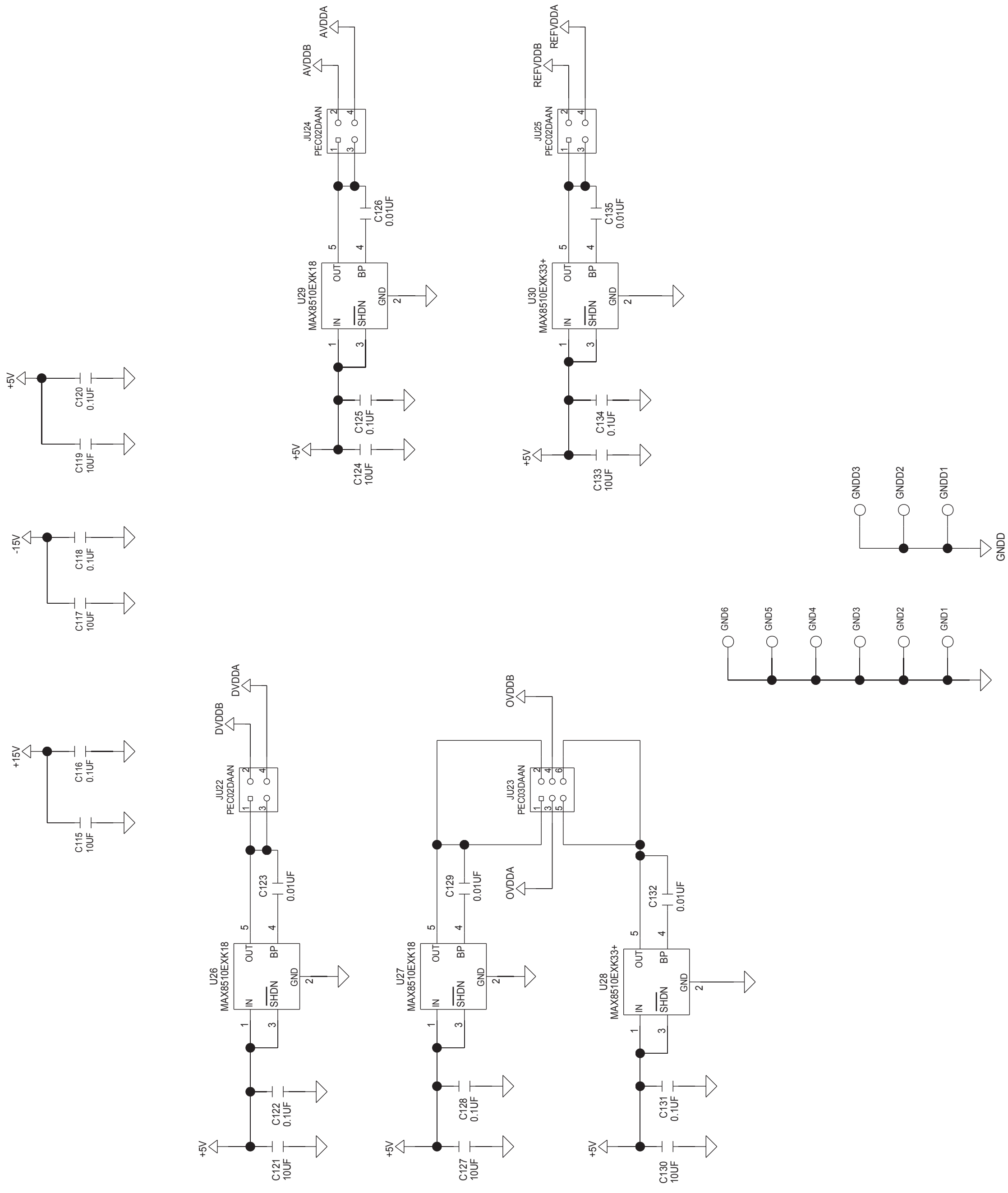

OUT_U8
OUT_U7
AIN+A
AIN-A
AIN+B
AIN-B
JU3
PEC08DAAN
OUT_U8
OUT_U13
OUT_U7
OUT_U14
OUT_U13
OUT_U8
OUT_U14
OUT_U7
R98
R99
10
0.1%
C50
1000PF
R18
2K
0.1%
U8
MAX9632AUA+
U7
MAX9632AUA+
U10
MAX9632AUA+
U12
MAX9632AUA+
SHDN
VCC
VEE
N.C.
OUT
IN-
IN+
+15V
-15V
C51
10UF
C52
0.1UF
C53
0.1UF
C54
10UF
C49
1000PF
C67
10UF
C68
0.1UF
C69
0.1UF
C70
10UF
R24
2K
0.1%
C71
1000PF
C66
1000PF
R94
1K
R97
0
R96
2K
R95
2K
JU2
PEC05DAAN
REFA2
R90
2K
R91
2K
R92
0
R93
1K
JU6
PEC05DAAN
C56
1000PF
C55
3300PF
COG
C161
OPEN
C162
OPEN
R17
1K
0.1%
R23
1K
0.1%
U10_6
U12_6
OUT_U10
OUT_U12
C44
1000PF
R16
2K
0.1%
C45
10UF
C46
0.1UF
C47
0.1UF
C48
10UF
C61
10UF
C62
0.1UF
C63
0.1UF
C64
10UF
R72
2K
0.1%
C65
1000PF
C43
1000PF
C60
1000PF
C58
OPEN
C57
OPEN
REFA2
REFA/2
JU4
PEC03DAAN
C59
2.2UF
R15
2K
0.1%
R22
2K
0.1%
R13
2K
0.1%
R14
2K
0.1%
R20
2K
0.1%
R21
2K
0.1%
JU1
PEC03DAAN
JU5
PEC03DAAN
R86
75
1%
R87
75
1%
R88
75
1%
R89
75
1%
TP_INV+A
TP_NONINV+A
TP_NONINV-A
TP_INV-A
INV+A
5-1814832-1
NONINV+A
5-1814832-1
NONINV-A
5-1814832-1
INV-A
5-1814832-1

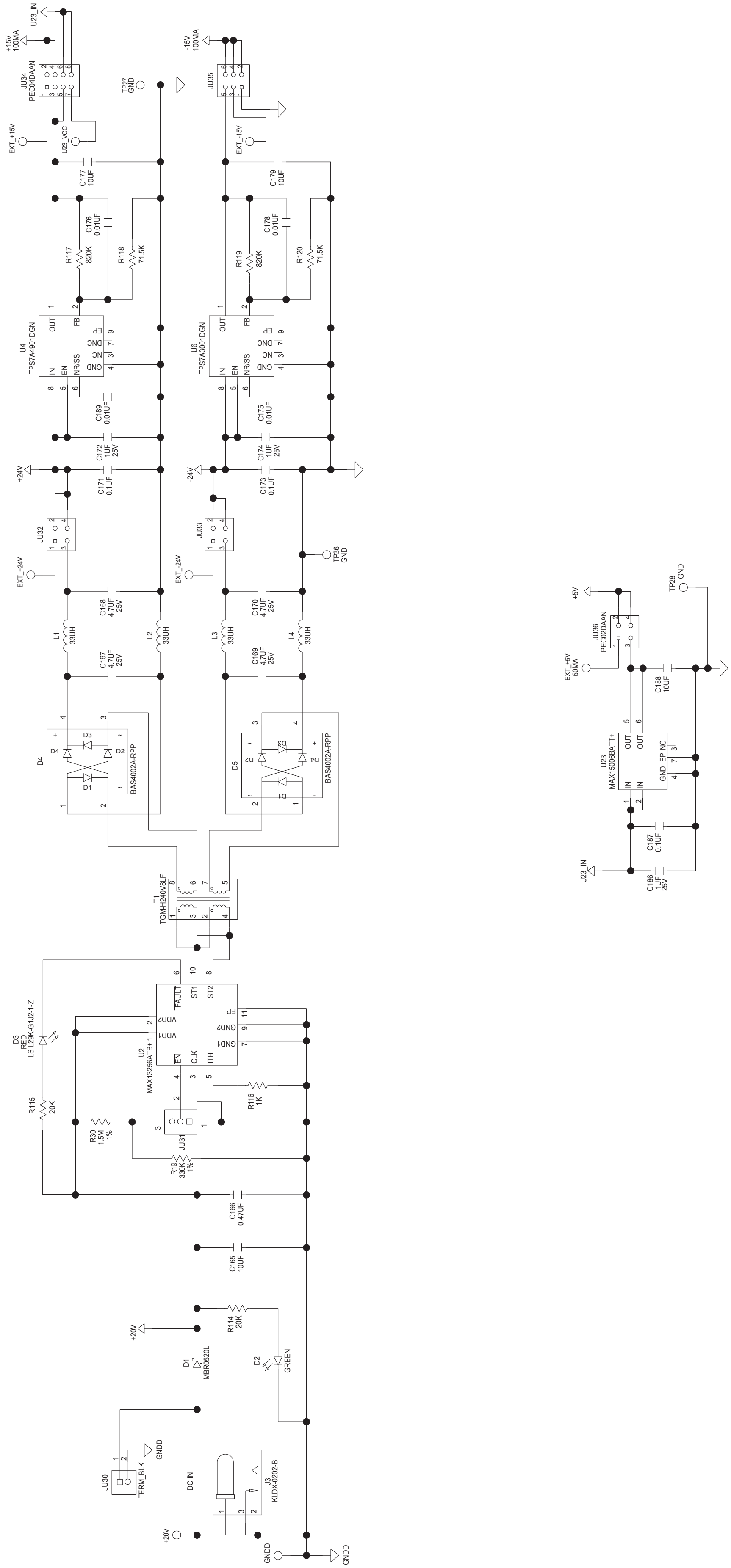




U1
MAX11958ETP+
U35
MAX6126AASA30
JU16
EXT_REFINB
REFAB
DINA
DINB
CNVSTA
CNVSTB
SPIB_SCLK2
DOUTA
DOUTB
REFVDDA
REFVDDB
DVDDA
DVDDB
OVDDA
OVDDB
AVDDA
AVDDB
REFP1B
REFP1A
REFP2B
REFP2A
REFM
AIN-B
AIN+B
AIN-A
AIN+A
+5V
U9
U19
U11
U20
MAX9632AUA+
REFA2
REFB2
REFA/2
REFB/2
+15V
-15V


PLACE 33 OHM RESISTORS CLOSE TO U3
R15 AND R39 CLOSE TO U18


AVDDA
AVDDB
JU24
PEC02DAAN
C126
0.01UF
U29
MAX8510EXK18
OUT
BP
GND
IN
SHDN
C125
0.1UF
C124
10UF
+5V
REFVDDA
REFVDDB
JU25
PEC02DAAN
C135
0.01UF
U30
MAX8510EXK33+
C134
0.1UF
C133
10UF
C120
0.1UF
C119
10UF
-15V
C118
0.1UF
C117
10UF
+15V
C116
0.1UF
C115
10UF
GNDD3
GNDD2
GNDD1
GNDD
GND6
GND5
GND4
GND3
GND2
GND1
DVDDA
DVDDB
JU22
PEC02DAAN
C123
0.01UF
U26
MAX8510EXK18
C122
0.1UF
C121
10UF
OVDDB
OVDDA
JU23
PEC03DAAN
C129
0.01UF
U27
MAX8510EXK18
C128
0.1UF
C127
10UF
C132
0.01UF
U28
MAX8510EXK33+
C131
0.1UF
C130
10UF


U23_IN
+15V 100MA
JU34 PEC04DAAN
EXT_+15V
U23_VCC
TP27 GND
-15V 100MA
JU35
EXT_-15V
C177 10UF
C179 10UF
C176 0.01UF
C178 0.01UF
R117 820K
R118 71.5K
R119 820K
R120 71.5K
U4 TPS7A4901DGN
U6 TPS7A3001DGN
C189 0.01UF
C175 0.01UF
C172 1UF 25V
C174 1UF 25V
+24V
-24V
C171 0.1UF
C173 0.1UF
JU32
JU33
EXT_+24V
EXT_-24V
TP36 GND
C168 4.7UF 25V
C170 4.7UF 25V
L1 33UH
L2 33UH
L3 33UH
L4 33UH
C167 4.7UF 25V
C169 4.7UF 25V
D4 BAS4002A-RPP
D5 BAS4002A-RPP
T1 TGM-H240V8LF
D3 RED LSL29K-G1J2-1-Z
R115 20K
U2 MAX13256ATB+1
R116 1K
R30 1.5M 1%
JU31
R19 330K 1%
C166 0.47UF
C165 10UF
+20V
R114 20K
D1 MBR0520L
D2 GREEN
JU30 TERM_BLK
GNDD
DC IN
J3 KLDX-0202-B
+5V
TP28 GND
JU36 PEC02DAAN
EXT_+5V 50MA
C188 10UF
U23 MAX15006BATT+
C187 0.1UF
C186 1UF 25V