

## Evaluating the **AD7175-2** 24-Bit, 250 kSPS, Sigma-Delta ADC with 20 $\mu$ s Settling and Integrated Analog Input Buffers

### FEATURES

Full featured evaluation board for the **AD7175-2**  
PC control in conjunction with the Analog Devices, Inc.,  
**EVAL-SDP-CB1Z** system demonstration platform (SDP)  
PC software for control and data analysis (time domain)  
Standalone capability

### EVALUATION KIT CONTENTS

**EVAL-AD7175-2SDZ** evaluation board  
AD717x Eval+ software CD  
7 V to 9 V ac-to-dc adapter  
Plastic screw washer set

### EQUIPMENT NEEDED

DC signal source  
PC running Windows® XP to Windows 10

### GENERAL DESCRIPTION

The **EVAL-AD7175-2SDZ** evaluation kit features the **AD7175-2**, a 24-bit, 250 kSPS analog-to-digital converter (ADC) with integrated rail-to rail-analog input buffers, on-board power supply regulation, and an external amplifier section for amplifier evaluation. A 7 V to 9 V ac-to-dc adapter is regulated to 5 V and 3.3 V, which supply the **AD7175-2** and support components. The **EVAL-AD7175-2SDZ** evaluation board connects to the USB port of a PC via the **EVAL-SDP-CB1Z** (SDP-B) controller board.

The AD717x Eval+ software fully configures the **AD7175-2** device functionality via an interactive block diagram and a user accessible register interface and provides dc time domain analysis in the form of waveform graphs, histograms, and associated noise analysis for ADC performance evaluation.

Full specifications for the **AD7175-2** are available in the product data sheet, which should be consulted in conjunction with this user guide when using the evaluation board.

### FUNCTIONAL BLOCK DIAGRAM

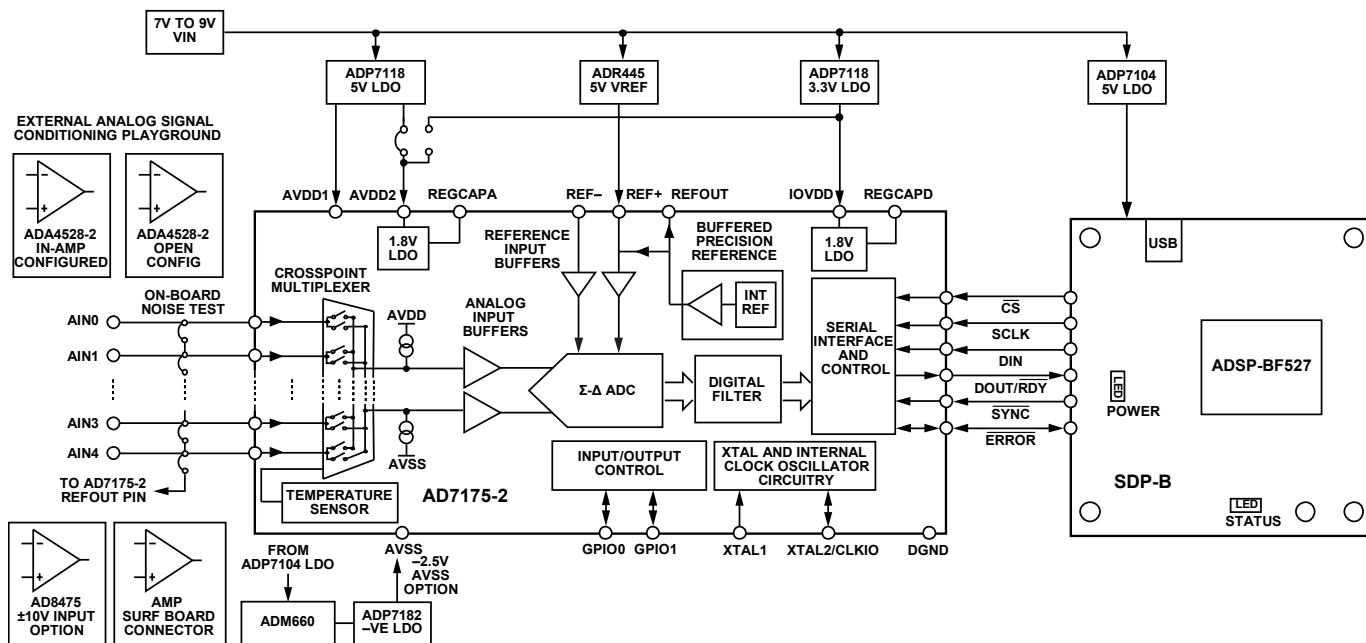


Figure 1.

## TABLE OF CONTENTS

|                                          |   |
|------------------------------------------|---|
| Features .....                           | 1 |
| Evaluation Kit Contents.....             | 1 |
| Equipment Needed.....                    | 1 |
| General Description .....                | 1 |
| Functional Block Diagram .....           | 1 |
| Revision History .....                   | 2 |
| EVAL-AD7175-2SDZ Quick Start Guide ..... | 3 |
| Recommended Quick Start Guide .....      | 3 |
| Quick Start Noise Test .....             | 3 |
| Evaluation Board Hardware.....           | 4 |
| Device Description.....                  | 4 |
| Hardware Link Options.....               | 4 |
| Sockets and Connectors .....             | 5 |
| Serial Interface .....                   | 6 |
| Power Supplies .....                     | 6 |
| Power Supply Configurations .....        | 7 |
| Analog Inputs.....                       | 7 |

## REVISION HISTORY

### 1/2018—Rev. A to Rev. B

|                                                                                                                   |            |
|-------------------------------------------------------------------------------------------------------------------|------------|
| Changed EVAL-SDP-CB1Z to SDP-B.....                                                                               | Throughout |
| Changed AD7175-2 Eval+ to AD717x Eval+ .....                                                                      | Throughout |
| Changes to Evaluation Kit Contents Section, Equipment<br>Needed Section, and General Description Section .....    | 1          |
| Changes to Table 1 .....                                                                                          | 4          |
| Changes to Table 2.....                                                                                           | 5          |
| Changes to Power Supply Configuration Section .....                                                               | 7          |
| Changes to Software Installation Section, Figure 3, Figure 3<br>Caption, Figure 4, and Figure 4 Caption .....     | 8          |
| Added Figure 5 and Figure 6; Renumbered Sequentially .....                                                        | 8          |
| Added Figure 7 through Figure 11 .....                                                                            | 9          |
| Added Setting Up the System for Data Capture Section.....                                                         | 10         |
| Added Figure 13 and Figure 14.....                                                                                | 10         |
| Changes to Launching the Software Section, Figure 12, Figure 12<br>Caption, Figure 15, and Figure 15 Caption..... | 10         |
| Changed to Software Operation Section to Evaluation Board<br>Software Operation Section .....                     | 11         |
| Changes to Figure 16.....                                                                                         | 11         |
| Changes to Figure 17 .....                                                                                        | 12         |
| Changes to Overview of the Main Window Section and<br>Configuration Tab (1) Section .....                         | 12         |
| Changes to Waveform Tab (18) Section .....                                                                        | 14         |
| Changes to Figure 18 and Figure 18 Caption .....                                                                  | 15         |
| Changes to Histogram Tab (26) Section, Figure 19, and Figure<br>19 Caption .....                                  | 16         |
| Changed Calculated Performance Tab (29) Section to Modelled<br>Performance Tab (31) Section.....                  | 17         |
| Changes to Modelled Performance Tab (31) Section, Figure 20,<br>and Figure 20 Caption.....                        | 17         |
| Added Figure 21.....                                                                                              | 18         |
| Added Figure 22.....                                                                                              | 19         |

|                                              |    |
|----------------------------------------------|----|
| Reference Options .....                      | 7  |
| Evaluation Board Software.....               | 8  |
| Software Installation .....                  | 8  |
| Setting up the System for Data Capture ..... | 10 |
| Launching the Software .....                 | 10 |
| Evaluation Board Software Operation.....     | 11 |
| Overview of the Main Window.....             | 12 |
| Configuration Tab (1).....                   | 12 |
| Waveform Tab (18).....                       | 14 |
| Histogram Tab (28).....                      | 16 |
| Modelled Performance Tab (31).....           | 17 |
| Registers Tab (45).....                      | 20 |
| Exiting the Software .....                   | 20 |
| Evaluation Board Schematics and Artwork..... | 21 |
| Ordering Information.....                    | 29 |
| Bill of Materials.....                       | 29 |

|                                                                             |    |
|-----------------------------------------------------------------------------|----|
| Changed Register Map Tab (34) Section to Registers Tab (45)<br>Section..... | 20 |
| Changes to Registers Tab (45) Section and Figure 23 .....                   | 20 |
| Added Evaluation Board Schematics and Artwork Section .....                 | 21 |
| Added Ordering Information Section and Table 4.....                         | 29 |

### 6/2015—Rev. 0 to Rev. A

|                                                                                                                                                                                                                                                    |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Changed Evaluation Software to Eval+ Software.....                                                                                                                                                                                                 | Throughout |
| Changes to Evaluation Kit Contents Section, General Description<br>Section, and Figure 1.....                                                                                                                                                      | 1          |
| Changes to Quick Start Noise Test Section and Figure 2.....                                                                                                                                                                                        | 3          |
| Changes to Table 1 .....                                                                                                                                                                                                                           | 4          |
| Changes to Table 3.....                                                                                                                                                                                                                            | 6          |
| Changes to Single Supply (Unregulated) Section, Split Supply<br>(Regulated) Section, and Split Supply (Unregulated) Section.....                                                                                                                   | 7          |
| Changes to Evaluation Board Software Section .....                                                                                                                                                                                                 | 8          |
| Changes to Overview of the Main Window Section .....                                                                                                                                                                                               | 9          |
| Added Evaluation Mode (2) Section, Analog Supply Voltage<br>(9 and 13) Section, Digital Supply Voltage (10) Section, Analog<br>Input Voltage (11) Section, External SCLK Frequency (12)<br>Section, and External MCLK Frequency (14) Section ..... | 9          |
| Changes to Figure 7.....                                                                                                                                                                                                                           | 10         |
| Added Figure 8; Renumbered Sequentially .....                                                                                                                                                                                                      | 11         |
| Changes to Figure 9.....                                                                                                                                                                                                                           | 13         |
| Changes to Figure 10.....                                                                                                                                                                                                                          | 14         |
| Added Calculated Performance Tab (29) Section, Filter Profile<br>and Response (30 and 31) Section, Performance Summary (32)<br>Section, Timing Diagram (33) Section, and Figure 11.....                                                            | 15         |
| Changes to Figure 12.....                                                                                                                                                                                                                          | 16         |

### 11/2014—Revision 0: Initial Version

## EVAL-AD7175-2SDZ QUICK START GUIDE

### RECOMMENDED QUICK START GUIDE

Follow these steps to set up the evaluation board:

1. Disconnect the **SDP-B** board from the USB port of the PC. Install the AD717x Eval+ software from the enclosed CD. Restart the PC after installation.
2. Connect the **SDP-B** board to the evaluation board, as shown in Figure 2.
3. Fasten the two boards together with the enclosed plastic screw washer set.
4. Connect the external 9 V power supply to Connector J5 of the evaluation board as shown in Figure 2. Set Link LK2 to Position B.
5. Connect the **SDP-B** board to the PC via the USB cable. For Windows XP, search for the **SDP-B** drivers. Choose to automatically search for the drivers for the **SDP-B** board if prompted by the operating system.
6. Launch the AD717x Eval+ software from the **Analog Devices** subfolder in the **Programs** menu.

### QUICK START NOISE TEST

Use the following procedure to quickly test the noise performance:

1. Insert Link LK8 to Link LK12 to initiate the noise performance test mode. In this mode, analog input channels short to the REFOUT pin.
2. Click **Start Sampling** to acquire samples from the ADC (see Figure 16).

The **Samples** numeric control in the top right corner of the main window sets the number of samples collected in each batch (see Figure 16).

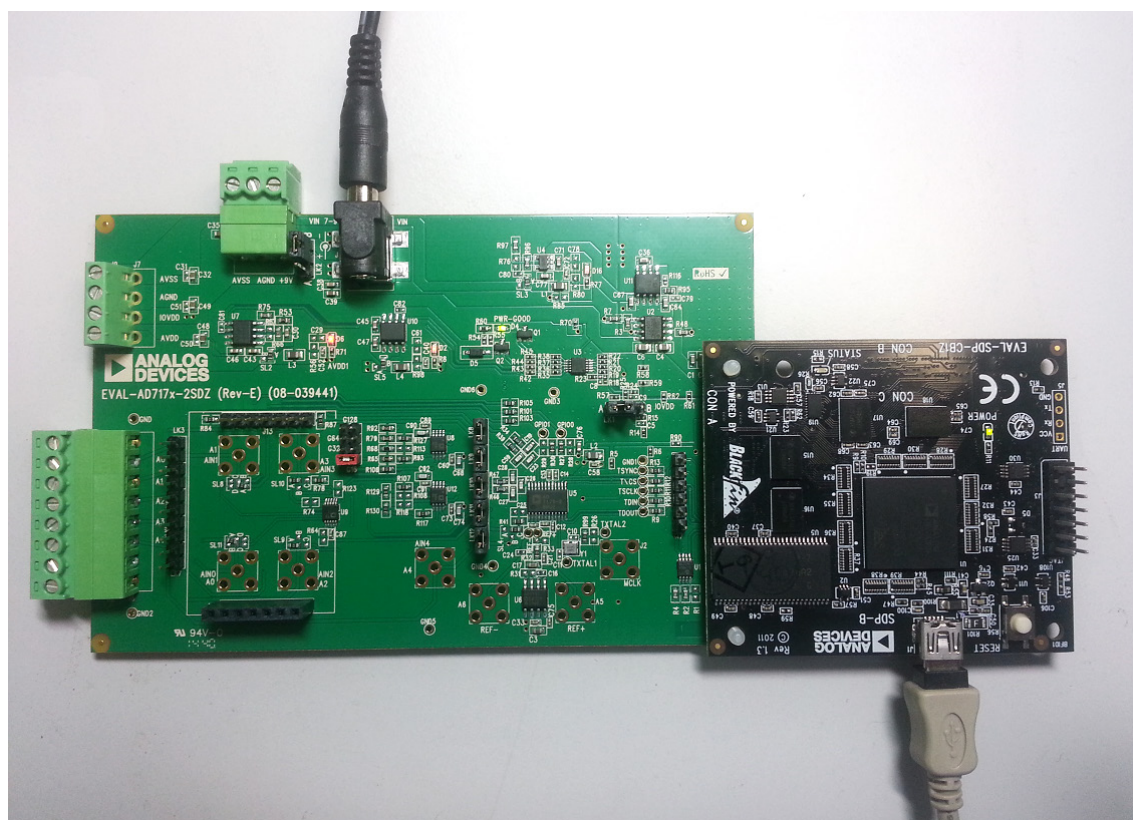


Figure 2. Hardware Configuration, Setting Up the EVAL-AD7175-2SDZ Evaluation Board

12528-002

## EVALUATION BOARD HARDWARE

### DEVICE DESCRIPTION

The [AD7175-2](#) is a highly accurate, high resolution, multiplexed, 2-/4-channel (fully differential/single-ended)  $\Sigma$ - $\Delta$  ADC. The [AD7175-2](#) has a maximum channel-to-channel scan rate of 50 kSPS (20  $\mu$ s) for fully settled data. The output data rates range from 5 SPS to 250 kSPS. The device includes integrated rail-to-rail analog input and reference input buffers, an integrated precision 2.5 V reference, and an integrated oscillator.

See the [AD7175-2](#) data sheet for complete specifications. Consult the data sheet in conjunction with this user guide when using the evaluation board. Full details for the [SDP-B](#) are available at the [SDP-B](#) product page on the Analog Devices website.

### HARDWARE LINK OPTIONS

See Table 1 for default link options. By default, the evaluation board is configured to operate from the supplied 9 V ac-to-dc adapter connected to connector J5. The 5 V supply required for the [AD7175-2](#) comes from the [ADP7118](#) on-board low dropout regulator (LDO). The [ADP7118](#), with a 5 V output voltage, receives its input voltage from J3 or J5 (depending on the position of LK2) and generates a 5 V output.

**Table 1. Default Link and Solder Link Options**

| Link        | Default Option | Description                                                                                                                                                                                            |
|-------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LK1         | A              | Selects the voltage applied to the power supply sequencer circuit (U3); dependent on AVDD1. Place in Position A if using 5 V AVDD1, or Position B if using 2.5 V AVDD1.                                |
| LK2         | B              | Selects the external power supply from Connector J3 (Position A) or Connector J5 (Position B).                                                                                                         |
| LK3 to LK7  | Not inserted   | Prior to inserting SL8 to SL11, insert these links sets up the on-board noise test to short the inputs to the on-board amplifiers, U8 and U9. In this mode, all inputs short to REFOUT.                |
| LK8 to LK12 | Inserted       | Inserting these links sets up the on-board noise test close to the ADC analog inputs. In this mode, all inputs short to REFOUT.                                                                        |
| SL1         | A              | Sets the voltage applied to the AVDD2 pin. Operates using the AVDD1 supply (default). Position B sets the AVDD2 voltage to 3.3 V supply from the <a href="#">ADP7118</a> (3.3 V) (U10) regulator.      |
| SL2         | A              | Selects between an external (Position B) or on-board AVDD1 source (Position A). Supplies AVDD1 from the <a href="#">ADP7118</a> (5 V) (U7) (default).                                                  |
| SL3         | A              | Selects between an external (Position B) or on-board AVSS (Position A) source. Supplies AVSS from the <a href="#">ADP7182</a> (–2.5 V) (U4) (default).                                                 |
| SL4         | C              | Connects AIN4 to: A4/J6 (Position A), REFOUT pin on the <a href="#">AD7175-2</a> (Position B), or AVSS (Position C). Position B and Position C are used to simplify using a single-ended input source. |
| SL5         | B              | Selects between an external or on-board IOVDD source. Supplies IOVDD from the <a href="#">ADP7118</a> (3.3 V) (U10) (default). The evaluation board operates with a 3.3 V logic.                       |
| SL8         | A              | Routes A0 to: AIN0 pin on the <a href="#">AD7175-2</a> (Position A), Buffer/In-amp U8 (Position B), Funnel Amp U9 with gain of 0.8 $\times$ (Position C), or J10-1 (Position D).                       |
| SL9         | A              | Routes A2 to: AIN2 pin on the <a href="#">AD7175-2</a> (Position A), Buffer U12 (Position B), or Funnel Amp U9 gain of 0.4 $\times$ (Position C).                                                      |
| SL10        | A              | Routes A3 to: AIN3 pin on the <a href="#">AD7175-2</a> (Position A), Buffer U12 (Position B), or Funnel Amp U9 gain of 0.4 $\times$ (Position C).                                                      |
| SL11        | A              | Routes A1 to: AIN1 pin on the <a href="#">AD7175-2</a> (Position A), Buffer/In-amp U8 (Position B), Funnel Amp U9 with gain of 0.8 $\times$ (Position C), or J10-7 (Position D).                       |
| G16         | Inserted       | Sets the on board in-amp (U8) to a gain of 16. Insert only one of G16, G32, G64, and G128 at a time.                                                                                                   |
| G32         | Not inserted   | Sets the on-board in-amp (U8) to a gain of 32. Insert only one of G16, G32, G64, and G128 at a time.                                                                                                   |
| G64         | Not inserted   | Sets the on-board in-amp (U8) to a gain of 64. Insert only one of G16, G32, G64, and G128 at a time.                                                                                                   |
| G128        | Not inserted   | Sets the on-board in-amp (U8) to a gain of 128. Insert only one of G16, G32, G64, and G128 at a time.                                                                                                  |
| R49 to R51  | Inserted       | Connects AVSS and AGND for single-supply operation. To operate in split supply mode, remove these links.                                                                                               |

## SOCKETS AND CONNECTORS

Table 2. Connector Details

| Connector | Function                                                                                                         | Connector Type                           | Manufacturer    | Manufacturer Number | Order Code <sup>1</sup>   |
|-----------|------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------|---------------------|---------------------------|
| J1        | Connector to the <a href="#">SDP-B</a>                                                                           | 120-way connector, 0.6 mm pitch          | Hirose          | FX8-120S-SV(21)     | FEC1324660                |
| J2        | External MCLK input                                                                                              | Straight PCB mount SMB/SMA jack          | TE Connectivity | 1-1337482-0         | Not applicable            |
| J3        | External bench top voltage supply for the <a href="#">EVAL-AD7175-2SDZ</a>                                       | Power socket block, 3-pin, 3.81 mm pitch | Phoenix Contact | MC 1,5/ 3-G-3,81    | FEC3704737                |
| J5        | External ac-to-dc adapter input for the <a href="#">EVAL-AD7175-2SDZ</a> , 7 V to 9 V                            | DC power connectors, 2 mm SMT power jack | Kycon           | KLDX-SMT2-0202-A    | MOUSER 806-KLDX-SMT20202A |
| J6        | Analog input terminal block; wired connection to external source or sensor                                       | Power socket block, 8-pin, 3.81 mm pitch | Phoenix Contact | MC 1,5/ 8-G-3,81    | FEC3704774                |
| J9        | External bench top voltage supply option for AVDD1/AVDD2, IOVDD, and AVSS inputs on the <a href="#">AD7175-2</a> | Screw terminal block, 3.81 mm pitch      | Phoenix Contact | MKDS 1/4-3.81       | FEC3704592                |
| J10       | Optional header                                                                                                  | 7-way, 2.54 mm pin header                | Samtec          | SSW-107-01-T-S      | FEC1803478                |
| J13       | Optional header                                                                                                  | 7-way, 2.54 mm socket                    | Samtec          | TLW-107-05-G-S      | FEC1668499                |
| A0 to A4  | Analog inputs to ADC                                                                                             | Straight PCB mount SMB/SMA jack          | TE Connectivity | 1-1337482-0         | Not applicable            |
| A7        | PMOD-compatible header                                                                                           | 6-Pin SIL header (0.1" pitch)            | Harwin          | 20-9990646          | FEC 1022255               |

<sup>1</sup> Order codes starting with FEC are for Farnell.

## SERIAL INTERFACE

The [EVAL-AD7175-2SDZ](#) evaluation board connects via the serial peripheral interface (SPI) to the Blackfin® [ADSP-BF527](#) on the [SDP-B](#). There are four primary signals:  $\overline{CS}$ , SCLK, and DIN (all inputs), and one output from the ADC, DOUT/RDY.

To operate the evaluation board in standalone mode, disconnect the evaluation board from the [SDP-B](#) controller board. Use the test points to connect the signals to an alternative digital capture setup or the PMOD-compatible header (A7).

## POWER SUPPLIES

Power the evaluation board from the ac-to-dc adapter connected to J5, or from an external bench top supply applied to J3 or J9. Linear LDOs generate the required voltages from the applied input voltage ( $V_{IN}$ ) rail when using J3 or J5. Use J9 to bypass the on-board regulators. An [ADP7118](#) regulator generates the 5 V (single supply) and 2.5 V (split supply) supplies for the AVDD1 and AVDD2 rails to the ADC; a second [ADP7118](#) generates 3.3 V for the IOVDD rail. The [ADP7104](#) supplies 5 V for the [SDP-B](#) controller board as well as 5 V for the [ADM660](#) voltage converter to generate –5 V to supply the [ADP7182](#). The [ADP7182](#) generates the –2.5 V supply for AVSS when operating in split supply mode. Each supply is decoupled where it enters the board and again at each device in accordance with the schematic. Table 3 shows the various power supply configurations available, including split supply operation.

**Table 3. Power Supply Configurations<sup>1</sup>**

| Configuration               | Input Voltage Range                | Description                                                                                                                                                                                                                                    |
|-----------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Single Supply (Regulated)   | 7 V to 9 V                         | The 7 V to 9 V input is regulated to 5 V for AVDD1/AVDD2 and 3.3 V for IOVDD. This also powers the external 5 V reference. See the Single Supply (Regulated) section in the Power Supply Configurations section.                               |
| Single Supply (Unregulated) | 7 V to 9 V, 5 V, and 3.3 V         | The input is unregulated and connects directly to AVDD1/AVDD2 and IOVDD from J5. The 7 V to 9 V input powers the external 5 V reference. See the Single Supply (Unregulated) section in the Power Supply Configurations section.               |
| Split Supply (Regulated)    | 7 V to 9 V                         | The 7 V to 9 V input is regulated to 2.5 V for AVDD1/AVDD2, –2.5 V for AVSS, and 3.3 V for IOVDD. The 7 V to 9 V input powers the external 5 V reference. See the Split Supply (Regulated) section in the Power Supply Configurations section. |
| Split Supply (Unregulated)  | 7 V to 9 V, $\pm 2.5$ V, and 3.3 V | The input is unregulated and connects directly to AVDD1/AVDD2 and IOVDD from J5. The 7 V to 9 V input powers the external 5 V reference. See the Split Supply (Unregulated) section in the Power Supply Configurations section.                |

<sup>1</sup> Only one configuration can be used at a time.



## POWER SUPPLY CONFIGURATIONS

### Single Supply (Regulated)

There are two available power supply options for the single supply (regulated) configuration.

- An ac-to-dc adapter (included) connected to J5. Set LK2 to Position B.
- A bench top power supply connected to J3. Set LK2 to Position A, and ensure that  $AVSS = AGND = 0\text{ V}$ .

Set all other links and solder links to the default settings as outlined in Table 1.

### Single Supply (Unregulated)

To set up the evaluation board, use the following procedure:

1. Move SL2 to Position B and SL5 to Position A.
3. Connect the two terminals of J9 labeled AGND and AVSS.
4. Connect 0 V (GND) to J9 at the terminal labeled AGND.
5. Connect 5 V to J9 at the terminal labeled AVDD.
6. Connect 3.3 V to J9 at the terminal labeled IOVDD.
7. Connect the 7 V to 9 V input to J5.

Set all other links and solder links to the default settings as outlined in Table 1.

### Split Supply (Regulated)

To set up the evaluation board, use the following procedure:

1. Remove R49 to R52. These links connect AVSS to AGND.
2. Insert a 0  $\Omega$  resistor for R67 and R85.
3. Set LK1 to Position B, which sets the input to the power monitor circuitry to work with the lower AVDD1 supply of 2.5 V.
4. Connect a bench top power supply to J5 and set LK2 to Position B.

Set all other links and solder links to the default settings as outlined in Table 1.

### Split Supply (Unregulated)

To set up the evaluation board, use the following procedure:

1. Move SL2, SL3 to Position B and SL5 to Position A.
2. Remove R49 to R52.
3. Insert a 0  $\Omega$  resistor at R67 and R 85.
4. Connect 0 V (GND) to J9 at the terminal labeled AGND.
5. Connect 2.5 V to J9 at the terminal labeled AVDD.
6. Connect -2.5 V to J9 at the terminal labeled AVSS.
7. Connect 3.3 V to J9 at the terminal labeled IOVDD.
8. Connect 7 V to 9 V to J5.
9. Set LK1 to Position B. This sets the input to the power monitor circuitry to work with the lower AVDD1 supply of 2.5 V.

Set all other links and solder links set to the default settings as outlined in Table 1.

## ANALOG INPUTS

The primary analog inputs of the [EVAL-AD7175-2SDZ](#) evaluation board can be applied in two separate ways.

- J6 connector on the left side of the board
- A0 to A4 SMB/SMA footprints on the evaluation board

The analog inputs route directly to the associated analog input pins on the [AD7175-2](#), provided that the LK5 to LK9 links (on-board noise test) are removed. The AD717x Eval+ software is set up to analyze dc inputs to the ADC. The [AD7175-2](#) input buffers work for dc input signals.

## REFERENCE OPTIONS

The [EVAL-AD7175-2SDZ](#) evaluation board includes an external 5 V reference, the [ADR445](#). The [AD7175-2](#) includes an internal 2.5 V reference. The default operation is to use the external reference input, which is set to accept the 5 V [ADR445](#) on the evaluation board.

## EVALUATION BOARD SOFTWARE

### SOFTWARE INSTALLATION

The [EVAL-AD7175-2SDZ](#) evaluation kit includes software on a CD. Double-click the **setup.exe** file from the CD to run the installer. The default installation location for the software is **C:\Program Files\Analog Devices\AD717x Eval+**.

Install the AD717x Eval+ software before connecting the evaluation board and [SDP-B](#) board to the USB port of the PC to ensure that the evaluation system is correctly recognized when connected to the PC.

There are two parts to the installation.

1. AD717x Eval+ software installation.
2. AD717x Eval+ Dependencies
  - a. [SDP-B](#) board drivers
  - b. Ssrc SVG plug-in installation
  - c. Microsoft .Net Framework v3.5

#### Warning

To ensure the PC correctly recognizes the evaluation system, the evaluation software drivers must be installed before connecting the [EVAL-AD7175-2SDZ](#) evaluation board and [SDP-B](#) boards to the USB port of the PC.

#### Installing the AD717x Eval+ Software

To install the AD717x Eval+ software take the following steps:

1. With the [SDP-B](#) disconnected from the USB port of the PC, insert the AD717x Eval+ software installation CD into the CD-ROM drive. Double-click the **setup.exe** file to begin the evaluation board software installation.
2. The default installation location for the software is **C:\Program Files\Analog Devices\AD717x Eval+**.
3. A dialog box appears asking for permission to allow the program to make changes to the PC. Click **Yes** to proceed (see Figure 3).

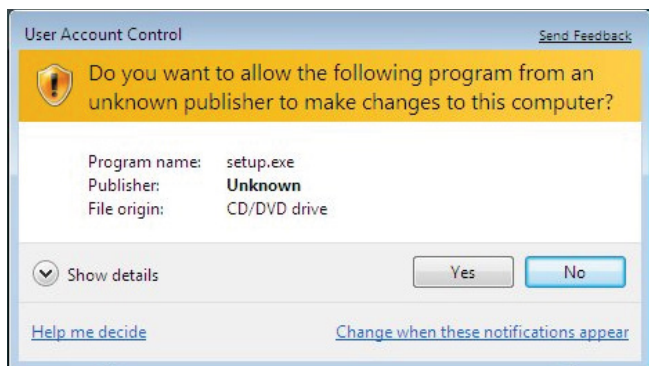


Figure 3. **User Account Control** Permission Dialog Box

4. Select a location to install the software and click **Next**. Figure 4 shows the default locations displayed when the dialog box opens. To select another location click **Browse**.

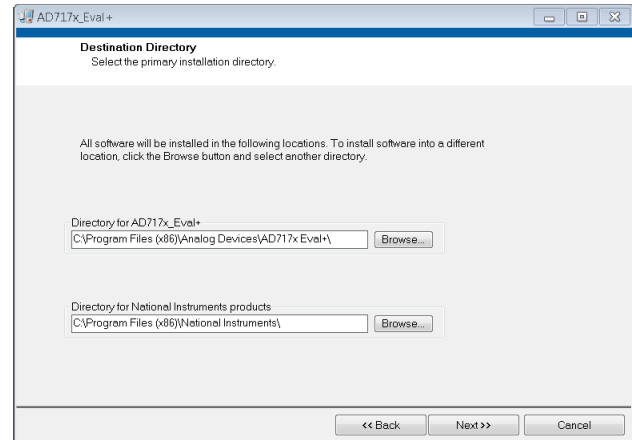


Figure 4. **AD717x Eval+** Installation, Selecting the Location for Software Installation

5. A license agreement appears. Read the agreement, select **I accept the License Agreement**, and click **Next**.

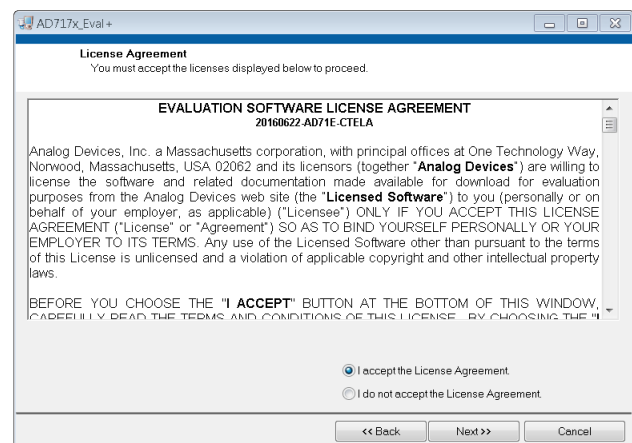


Figure 5. **AD717x Eval+** Installation, Accepting the License Agreement

6. A summary of the installation displays. Click **Next** to continue.

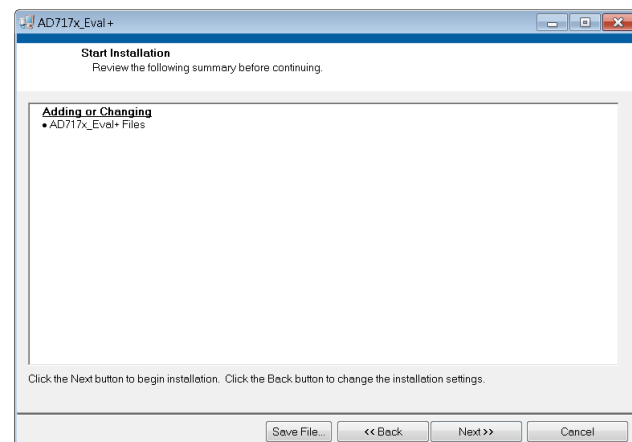


Figure 6. **AD717x Eval+** Installation, Reviewing a Summary of the Installation



- The message in Figure 7 appears when the installation is complete.

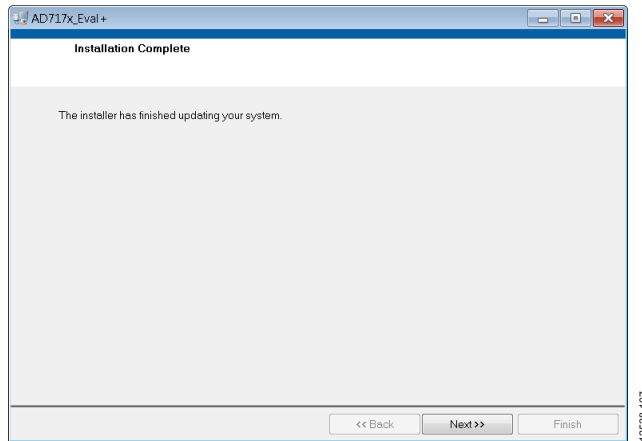


Figure 7. **AD717x Eval+** Installation Complete

### Installing the Eval+ Dependencies

After installation of the evaluation software is complete, a welcome window displays to install the **Eval+ Dependencies**.

- With the **SDP-B** board still disconnected from the USB port of the PC, make sure all other applications are closed, then click **Install**.

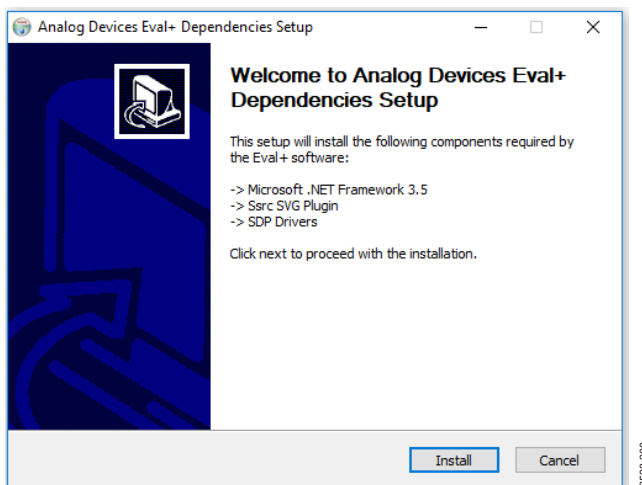


Figure 8. **Eval+ Dependencies Setup**, Beginning the Drivers Installation

- The Ssrc SVG plug-in will install first, then the **SDP-B** drivers, and finally the .Net Framework.
- If using Windows 8 or Windows 10 see the Installing the .Net Framework v3.5 on Windows 8 and Windows 10 section.
- To complete the drivers installation click **Close**. This closes the installation setup wizard.

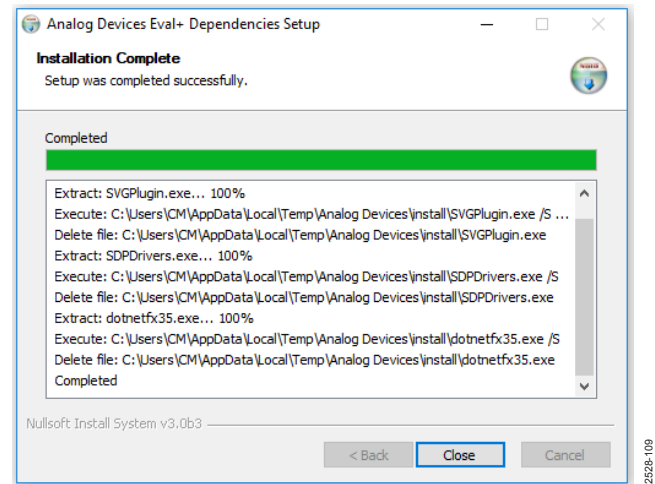


Figure 9. **Eval+ Dependencies Setup**, Completing the Driver Setup Wizard

- Before using the evaluation board, the user must restart the PC.

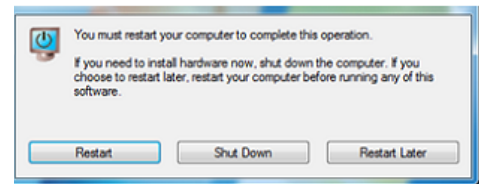


Figure 10. Restarting the PC

### Installing the .Net Framework v3.5 on Windows 8 and Windows 10

Windows 8 and Windows 10 have a built in installer for the .Net Framework v3.5. In order to run this software the user will need an internet connection and may need administrator privileges. Complete the following steps to install the software. If unable to install the .Net Framework contact your system administrator.

- When the Eval+ Dependencies installer reaches the .Net Framework, the window shown in Figure 11 will appear.

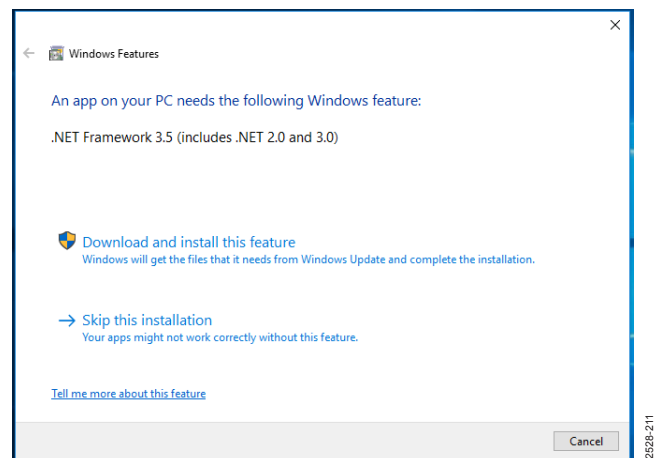


Figure 11. Restarting the PC

- Follow the steps in the installation wizard to complete the installation.

- If the window in Figure 11 does not appear; v3.5 may already be installed. To check if the software is already installed open **Control Panel > Programs > Programs and Features** and select **Turn Windows features on or off**. Check that the .Net Framework v3.5 is enabled.

## SETTING UP THE SYSTEM FOR DATA CAPTURE

After completing the steps in the Software Installation section and the Evaluation Board Hardware section, set up the system for data capture using the following steps.

- Allow the **Found New Hardware Wizard** to run after the **SDP-B** board is connected to the PC. (If using Windows XP, search for the **SDP-B** drivers. Choose to automatically search for the drivers if prompted by the operating system.)
- Check that the board is connecting to the PC correctly using the **Device Manager**.
- Access the **Device Manager** by right clicking **My Computer**, then **Manage**. A dialog box appears asking for permission to allow the program to make changes to the PC. Click **Yes**. The **Computer Management** box appears. Click **Device Manager** from the list of **System Tools** (see Figure 12).
- The **SDP-B** board appears under **ADI Development Tools**. This indicates that the driver software has installed and the board is connected to the PC correctly.

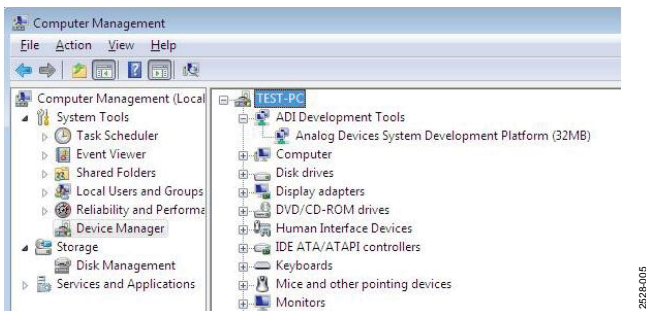


Figure 12. Device Manager, Checking the Board Connected to the PC Correctly

## LAUNCHING THE SOFTWARE

After completing the steps in the Setting up the System for Data Capture section, launch the AD717x Eval+ software using the following steps:

- From the **Start** menu, click **Programs > Analog Devices > AD717x Eval+**.
- The dialog box in Figure 13 appears, select **AD7175 Evaluation Board**. The main window of the software box displays as shown in Figure 16.

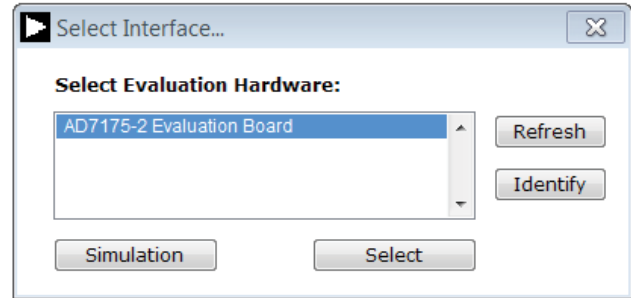


Figure 13. AD7175-2 Evaluation Board Selection

- If the **EVAL-AD7175-2SDZ** evaluation system is not connected to the USB port via the **SDP-B**, when the software is launched the **Select Interface** dialog box appears (see Figure 14). Connect the evaluation board to the USB port of the PC, wait a few seconds, click **Refresh** and the option shown in Figure 13 appears.

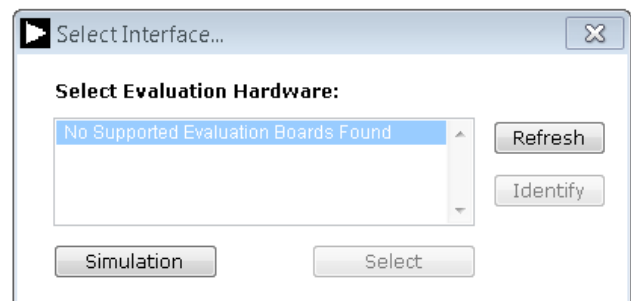


Figure 14. Evaluation Board Selection, No Board Connected

- The AD717x Eval+ software can also be used without connecting hardware. Click the **Simulation** button and the options shown in Figure 15 appear. The simulation mode uses a model and allows the **AD7172-2**, **AD7172-4**, **AD7173-8**, **AD7175-2**, **AD7175-8**, **AD7176-2**, or **AD7177-2** to be evaluated.

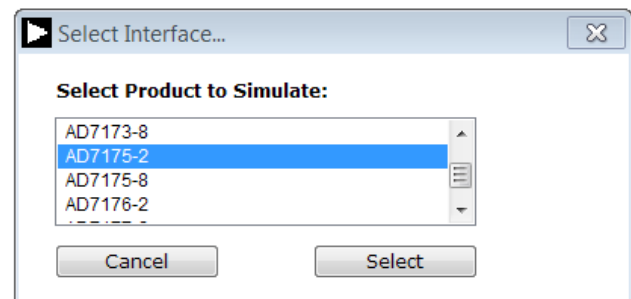


Figure 15. Evaluation Board Selection Simulation

## EVALUATION BOARD SOFTWARE OPERATION

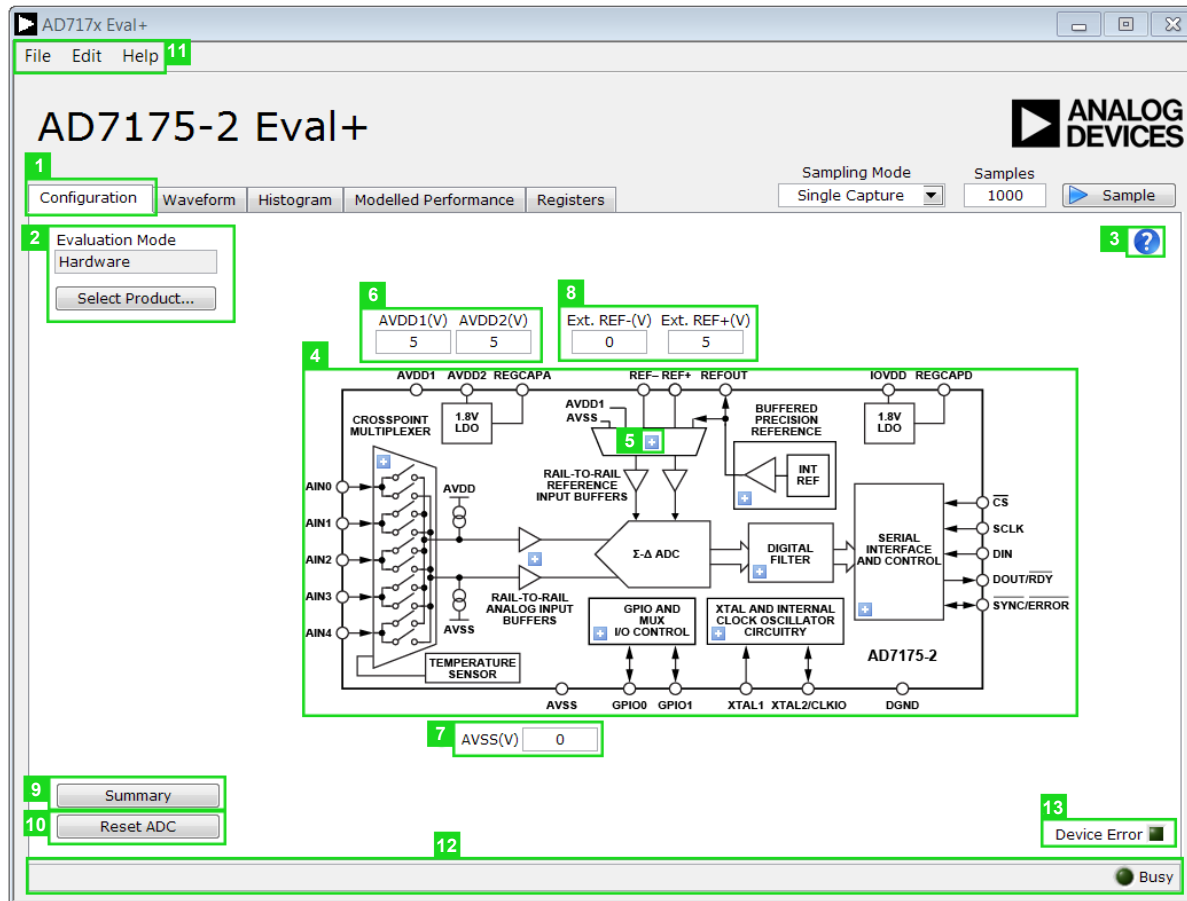


Figure 16. Configuration Tab of the AD7175-2 Eval+ Software in Hardware Mode

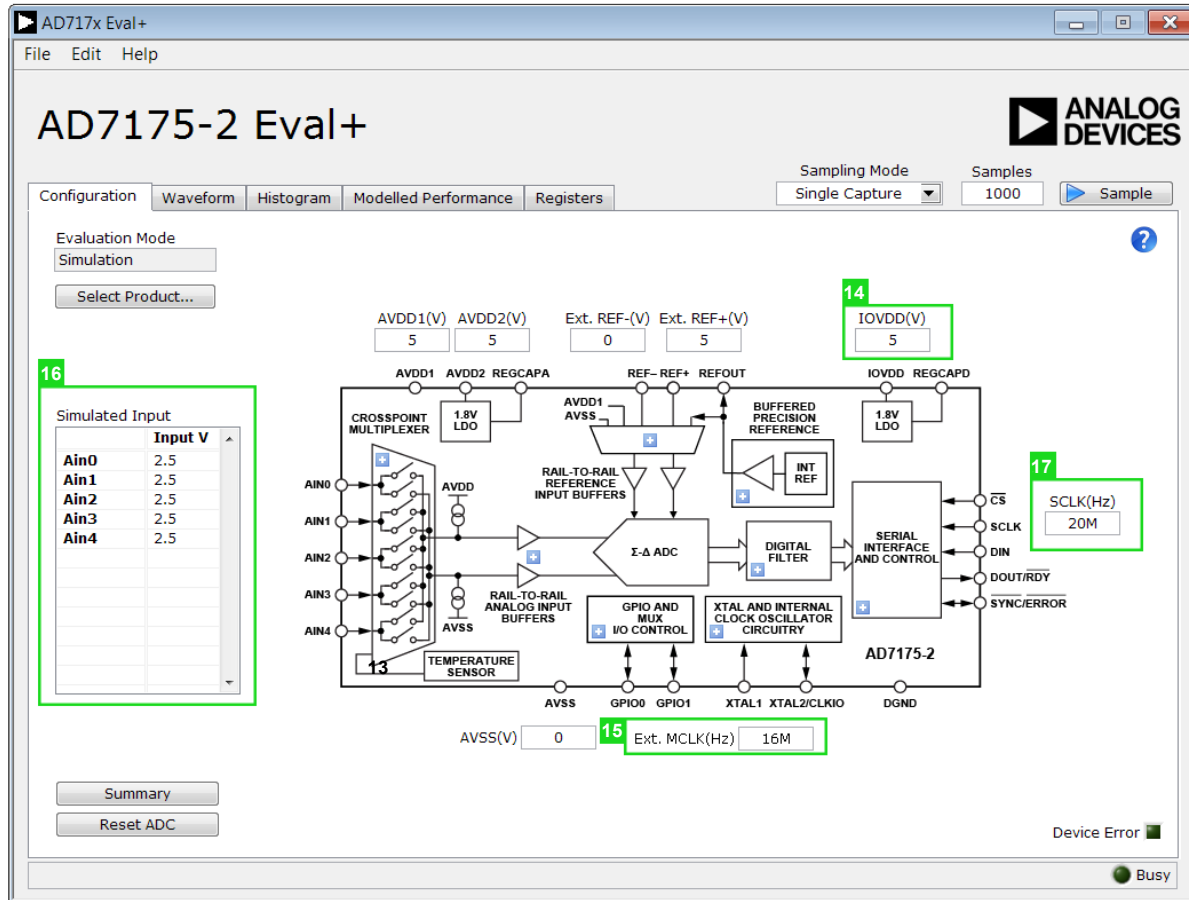


Figure 17. Configuration Tab of the AD7175-2 Eval+ Software in Simulation Mode

## OVERVIEW OF THE MAIN WINDOW

The main window of the AD717x Eval+ software displays the significant control buttons and analysis indicators of the AD717x Eval+ software. The main window is divided into five tabs.

- Configuration
- Waveform
- Histogram
- Modelled Performance
- Registers

### CONFIGURATION TAB (1)

Figure 16 shows the Configuration tab when **Hardware Mode** is selected and Figure 17 shows the Configuration tab when **Simulation** mode is selected. The controls highlighted in Figure 17 are only available in **Simulation** mode.

#### Evaluation Mode (2)

The Evaluation Mode indicator displays the current evaluation mode. To switch between modes, click the **Select Product** button and the dialog box shown in Figure 13 appears.

#### Tutorial Button (3)

Click the tutorial button to open a tutorial and access additional information on using the AD717x Eval+ software.

### Functional Block Diagram (4)

The functional block diagram of the ADC shows each of the separate functional blocks within the ADC. Clicking a configuration pop-up button on any of the functional blocks opens the configuration pop-up window for the block selected. Not all blocks have a configuration button.

#### Configuration Pop-up Button (5)

Each configuration pop-up button opens a different window that allows the configuration of the relevant functional block.

#### Analog and Digital Supply Voltage (6, 7, and 14)

These input fields are used to take the supply voltage levels selected for the AD7175-2. Checks are performed to ensure the power supply voltage levels entered are within the specified limits. These power supply voltage levels are also used for the modelled performance to calculate the power dissipation.

**External Reference (Ext. REF) (8)**

The **Ext. REF** input fields set the positive and negative external reference voltage values. The difference is used for calculating the results for both the **Waveform** and **Histogram** tabs. The evaluation board has an external 5 V [ADR445](#) reference, which can be bypassed by removing R32. Change the external reference values in **Ext. REF** to ensure correct calculation of results in the **Waveform** and **Histogram** tabs.

**Register Configuration Summary(9)**

Click the **Summary** button to display the selected configuration of the [AD7175-2](#), this includes the channel configuration, information on each of the individual steps, and information on any error present.

**Reset ADC (10)**

Click the **Reset ADC** button to perform a software reset of the [AD7175-2](#). The [AD7175-2](#) does not have a hardware reset pin, to perform a hard reset the power must be removed from the board. The software reset has the same effect as a hard reset.

**Menu Bar (11)**

The menu bar has three section: **File**, **Edit**, and **Help**.

**File**

There are three options available in the **File** drop-down menu: Save, Load, and Generate.

**Save**

Save allows the user to save register configurations or waveform data. Register configurations can be saved as a JSON file or a header file. If the configuration is only used in the AD717x Eval+ software environment then it is recommended to use the JSON setting. Waveforms are saved as .csv files and the user is prompted to save the register configuration as well.

**Load**

Load allows the user to load saved register configurations or waveform data. In order to load a header into AD717x Eval+ it must be in the same format as one that is saved from AD717x Eval+. The header file can be used when developing firmware. When loading the waveform data the user is prompted to load the register configuration. This allows the software to correctly analyze the data.

**Edit**

There are two options in the **Edit** drop-down menu; Change Product Selection and Reset ADC. Change Product Selection performs the same action as the **Select Product** button and Reset ADC performs the same action as the **Reset ADC** button.

**Help**

The **Help** drop-down menu provides links to extra information about the [AD7175-2](#), which includes links to the [AD7175-2](#) product page, [EVAL-AD7175-2SDZ](#) evaluation board user guide, [AD7175-2](#) datasheet, and No-OS Drivers. Selecting the AD717x Eval+ Tutorial opens the tutorial outlined in the Tutorial Button (3) section. For details on the current version of the software the **About** option opens a dialog box displaying the current version of the software and relevant licenses.

**Status Bar (12)**

The status bar displays the busy indicator and status updates, such as **Analysis Completed** and **Reset Completed** during software use.

**Device Error (13)**

The Device Error LED icon illuminates when an ADC error is detected or when a cyclic redundancy check (CRC) error occurs. The CRC functionality on the [AD7175-2](#) is disabled by default and must be enabled for the Device Error indicator to work. Specific information on the error can be found in the Register Configuration Summary(9) section.

**External MCLK Frequency (15)**

This field sets the external MCLK frequency. The External MCLK Frequency (15) is only visible on the front panel when an external clock source is selected by the ADC. The External MCLK Frequency (15) is used by the functional model for modelled performance.

**Analog Input Voltage (16)**

These fields are only available when simulation mode is selected. These inputs allow the analog input voltages to be set and can be changed at any time while in simulation mode.

**External SCLK Frequency (17)**

This input field sets the external SCLK frequency for the SPI interface. This field is only available in simulation mode to determine if the SCLK frequency is within the permitted range.

**WAVEFORM TAB (18)**

Figure 18 shows the **Waveform** tab of the AD717x Eval+ software.

**Sampling Mode (19)**

This control is unrelated to ADC mode. The user can capture a defined sample set, single capture; or continuously gather batches of samples, repeated capture. The user can also select data logging that runs similar to repeated capture, but posts the results to a .csv file. When saving, the .csv file prompts the user to save the register configuration. This is necessary to load the data back into the software for analysis.

**Samples (20)**

The Samples field control sets the number of samples gathered per batch. Single capture returns the number entered into the Samples control. Repeated capture keeps returning batches of the number entered into the Samples control until stopped by the user.

**Sample (21)**

Click the **Sample** button to start gathering ADC results. Results appear in the waveform graph (22). See Figure 18.

**Waveform Graph and Controls (22 and 23)**

The data waveform graph shows each successive sample of the ADC output. Zoom in on the data using the control toolbar (labeled 23 in Figure 18). Click the x-axis and y-axis to change the scales on the graph.

**Channel Selection (24)**

The channel selection control allows the user to choose which channels display on the data waveform graph (23). These controls only affect the display of the channels and have no effect on the channel settings in the ADC register map.

**Noise Analysis (25)**

The **Noise Analysis** section displays the results of the noise analysis for the selected analysis channel, which includes both noise and resolution measurements.

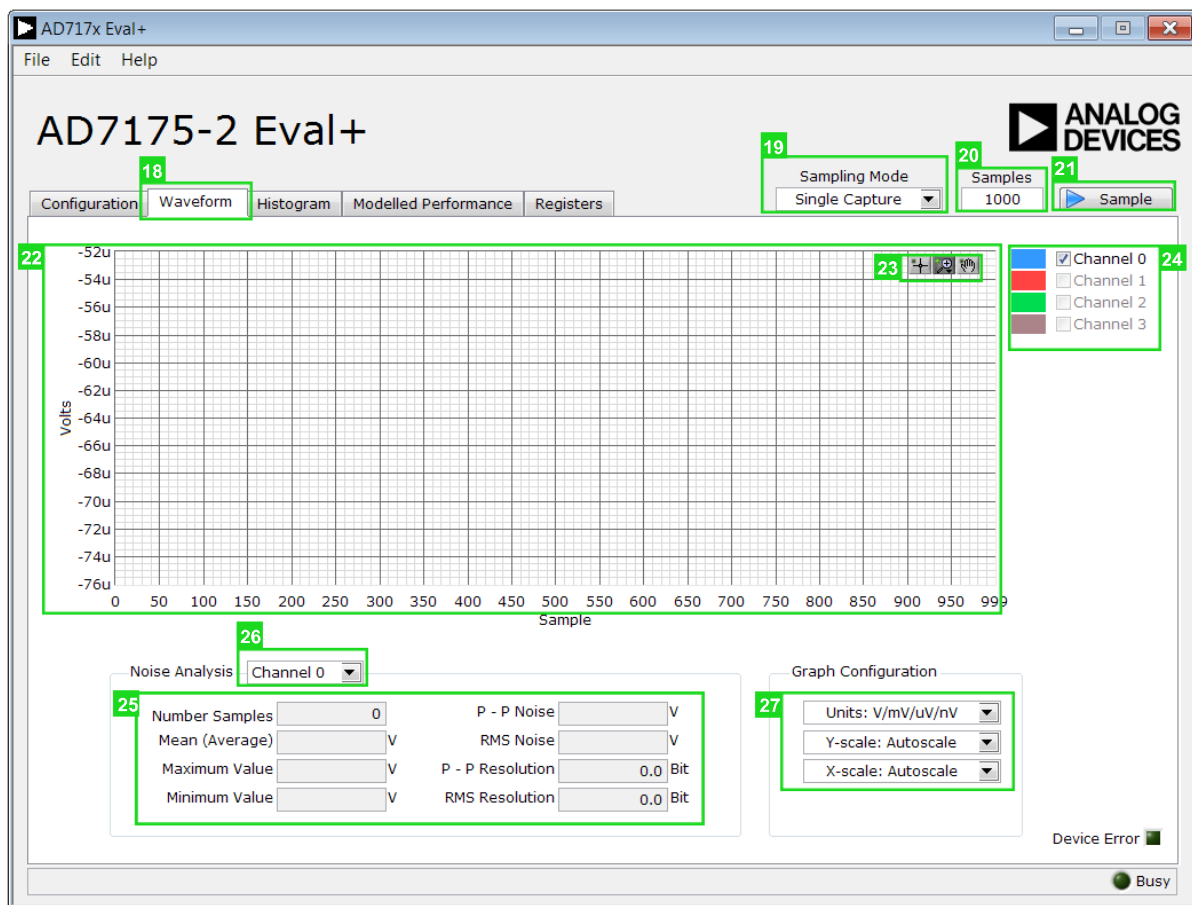
**Analysis Channel (26)**

The **Noise Analysis** section and histogram graph show the analysis of the channel selected via the **Analysis Control** drop-down menu.

**Display Units and Axis Controls (27)**

The **Display Units** control affects both the waveform graph and the histogram graph. Click the **Display Units** drop-down menu to select the unit displayed in the graph. The axis controls can be switched between dynamic and fixed. When dynamic is selected, the axis automatically adjusts to show the entire range of the ADC results after each batch of samples. When fixed is selected, the user can program the axis ranges; the axis ranges do not automatically adjust after each batch of samples.



Figure 18. **Waveform** Tab of the **AD7175-2** Evaluation Software

## HISTOGRAM TAB (28)

Figure 19 shows the **Histogram** tab of the AD717x Eval+ Software.

## Histogram Graph and Controls (29 and 30)

The data histogram graph (29) shows the number of times each sample of the ADC output occurs. The control toolbar (30) in the histogram graph allows the user to zoom in on the data (see Figure 19). Click the x-axis and y-axis to change the scales on the graph (see Figure 19).

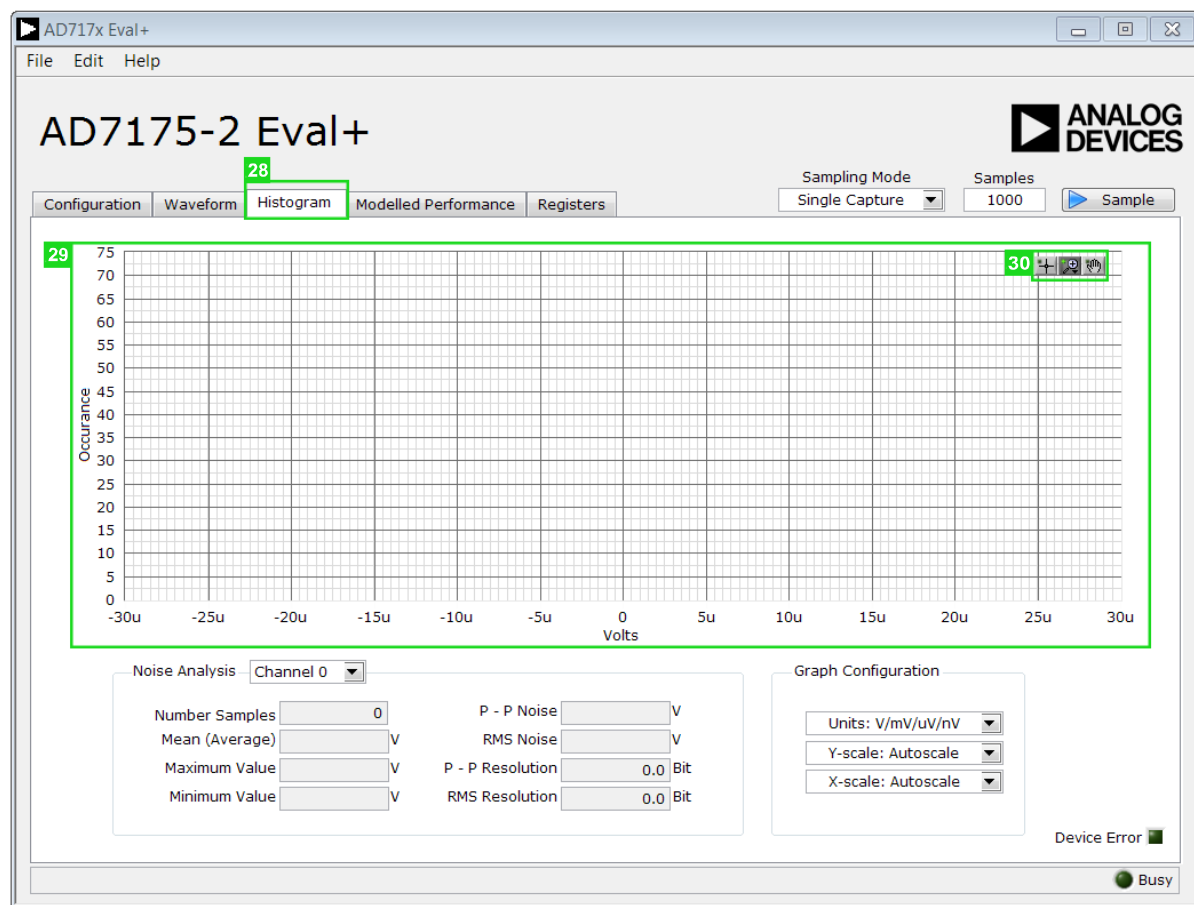


Figure 19. **Histogram** Tab of the AD7175-2 Eval+ Software

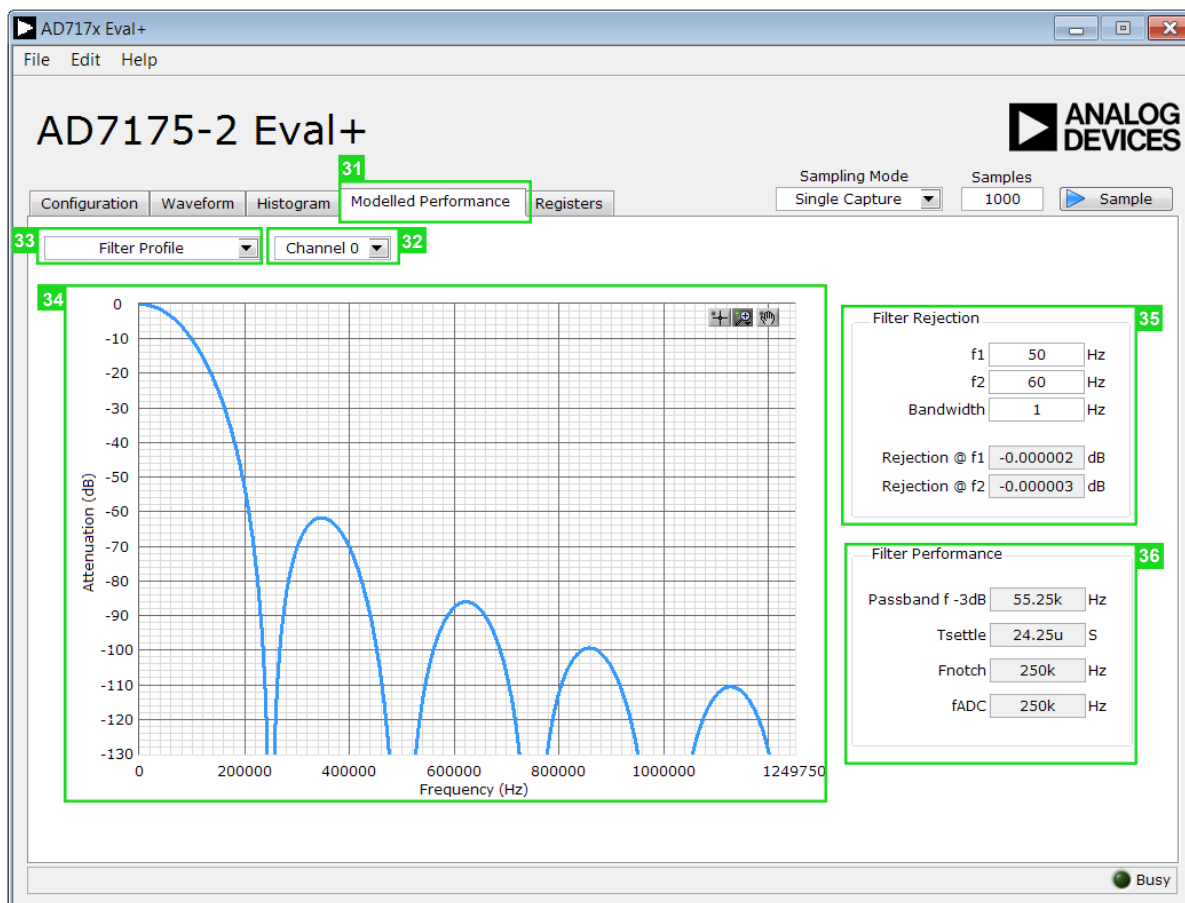


Figure 20. Filter Profiles of the AD7175-2 Evaluation Software

## MODELLED PERFORMANCE TAB (31)

The **Modelled Performance** tab shows a number of ADC performance parameters, which are calculated using the ADC functional model. There are three main sections to the **Modelled Performance** tab; Filter Profile, Filter Step Response, and Timing Diagram/Power. These can be selected using the drop-down menu (33).

### Analysis Channel (32)

The **Analysis Channel** drop-down menu selects the channel to be evaluated by the functional model.

### Filter Profile (33)

The **Filter Profile** drop-down menu allows the user to switch between the three sections of the **Modelled Performance** tab. Figure 20 shows the **Modelled Performance** tab when filter profile is selected.

### Filter Profile Graph (34)

This graph shows the frequency response for the selected digital filter. The graph controls allows the user to zoom in on the data. Click the x-axis and y-axis to change the scales on the graph.

### Filter Rejection (35)

This section shows the rejection/attenuation of the digital filter over the rejection bandwidth (Rej.BW) for f1 and f2 in decibels; f1, f2, and Bandwidth can be changed.

### Filter Performance (36)

This section shows the timing information about the data rate of the selected output. It shows the ADC initial settling time (**Tsettle**), the first frequency notch (**Fnotch**), and the actual sampling frequency (**fADC**).

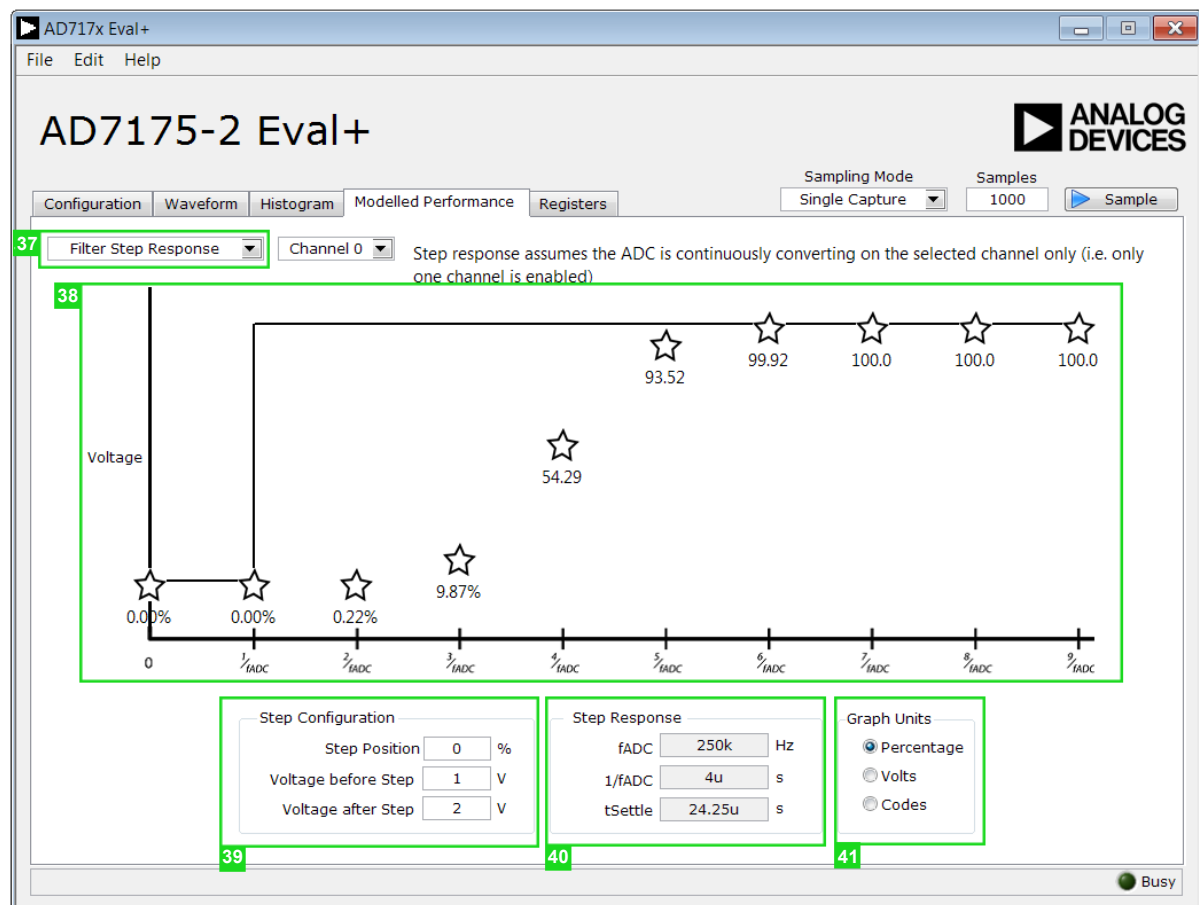


Figure 21. Filter Step Response of the AD7175-2 Evaluation Software

**Filter Step Response (37)**

This drop down menu allows the user to switch between the three sections of the **Modelled Performance** tab. Figure 21 shows the tab when Filter Step Response is selected.

**Step Response Graph (38)**

This graph shows how long the filter takes to settle when the voltage is stepped from one voltage to the next. For this analysis, it is assumed the ADC is continuously converting on only one channel.

**Step Configuration (39)**

Step Configuration allows the user to set the voltage before and after the step and the step position. Step position is set as a percentage where 0% is  $1/f_{ADC}$  and 100% is  $2/f_{ADC}$ .

**Step Response (40)**

This section shows timing information about the data rate of the selected output. It shows fADC, Tsettle, and the settling time between conversions,  $1/f_{ADC}$ .

**Graph Units (41)**

Use this control to switch the step response between percentages, volts, and codes.

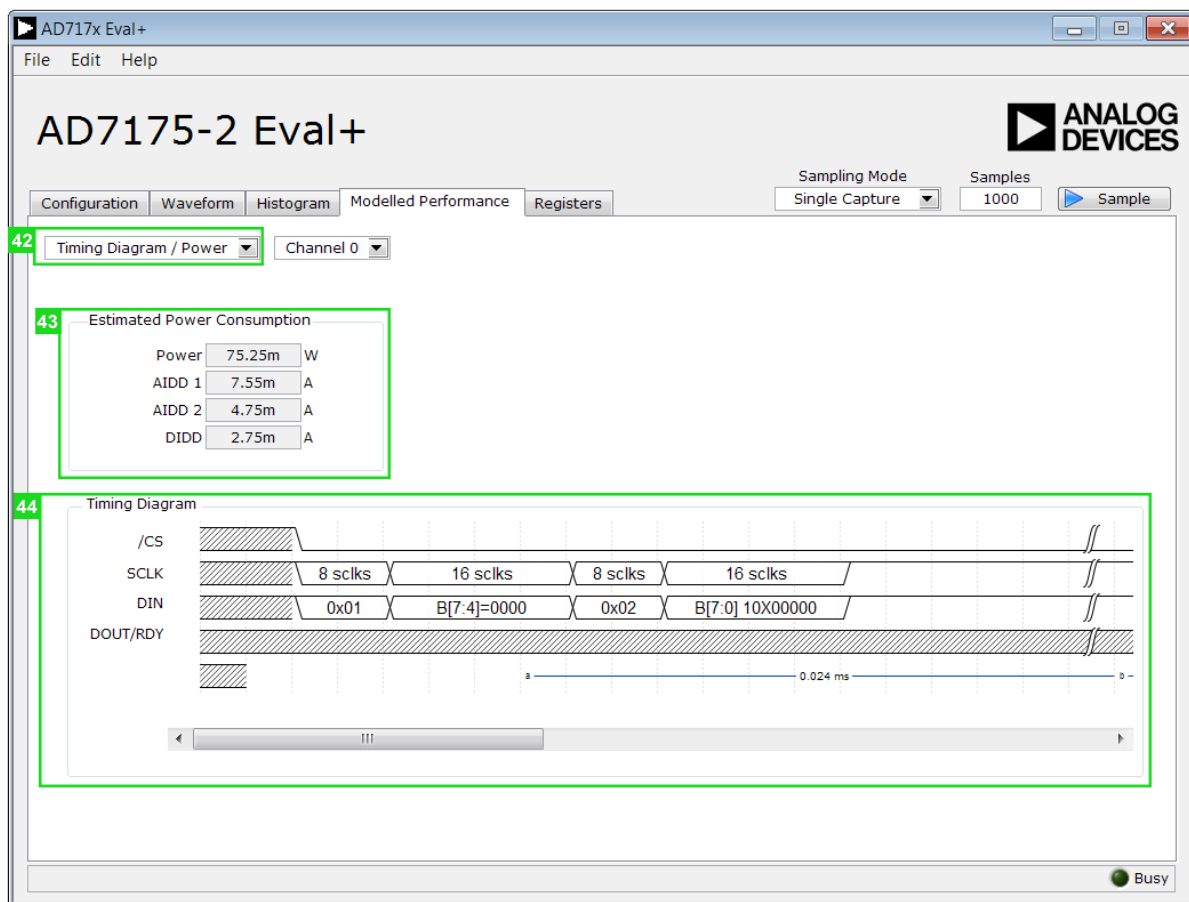


Figure 22. Timing Diagram/Power of the AD7175-2 Evaluation Software

**Timing Diagram/ Power (42)**

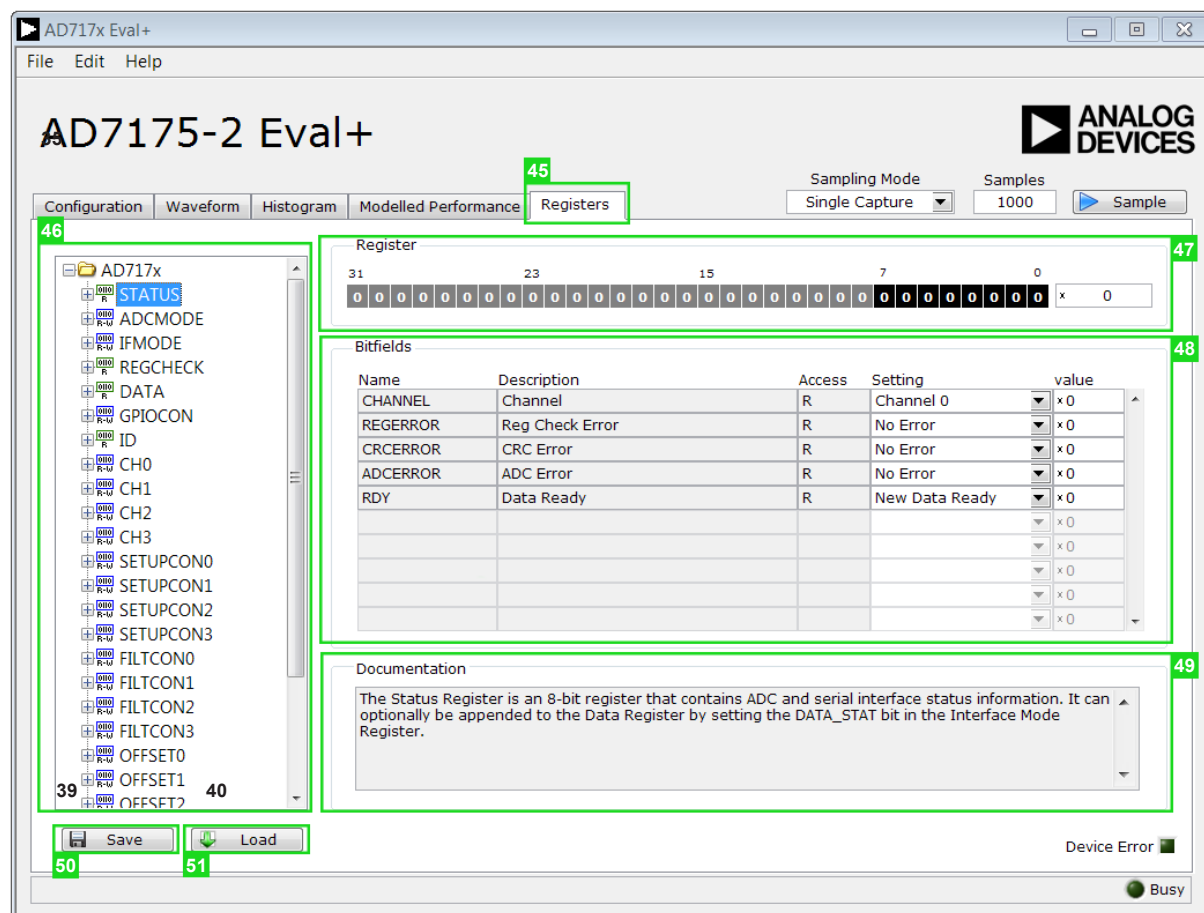
This drop down menu allows the user to switch between the three sections of the **Modelled Performance** tab. Figure 22 shows the **Modelled Performance** tab when Filter Step Response is selected.

**Estimated Power Consumption (43)**

This section shows the total power consumption of the device in the current configuration, as well as, the current consumption on each of the power supply rails. Note that the estimated power consumption is for the continuous conversion mode only and no other mode of operation is supported.

**Timing Diagram (44)**

This graph shows the digital interface timing diagram for the current configuration. The graph shows the timing for both the configuration of the ADC, and the subsequent data reads from the ADC.

Figure 23. **Registers** Tab of the **AD7175-2** Evaluation Software

## REGISTERS TAB (45)

Figure 23 shows the **Registers** tab.

### Register Tree (46)

This control shows the full register map in a tree control. Each register is shown; click the expand button next to each register to show all the bit fields contained within that register.

### Register (47)

The **Register** control allows the user to change the individual bit of the register selected in the register tree (46) by clicking the bits or by programming the register value directly into the number control field on the right.

### Bitfields (48)

This list shows all the bit fields of the register selected in the register tree (46). Change the values by using the drop-down box or by directly entering a value into the number control field on the right.

### Documentation (49)

The **Documentation** field contains the documentation for the register or bitfield selected in the register tree (46).

### Save(50) and Load (51)

The **Save** (50) and **Load** (51) buttons allow the user to save the current configuration of the **AD7175-2** by saving off of the register map setting to a file and load the setting from that same file. When using these buttons the register configurations are saved and loaded as JSON files.

## EXITING THE SOFTWARE

To exit the software, click the close button at the top right corner of the main window (see Figure 16).

## EVALUATION BOARD SCHEMATICS AND ARTWORK

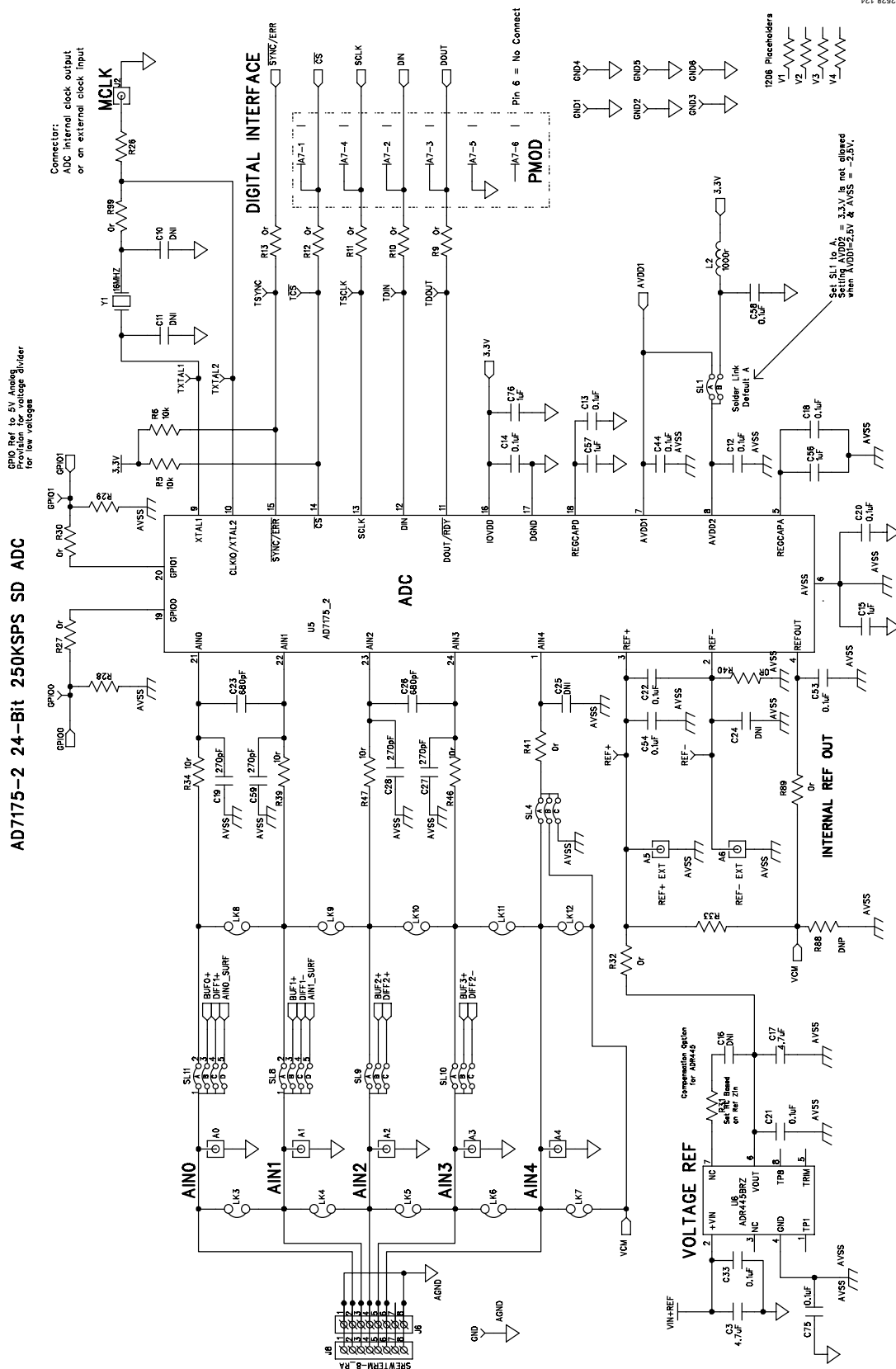


Figure 24. AD7175-2 Schematic



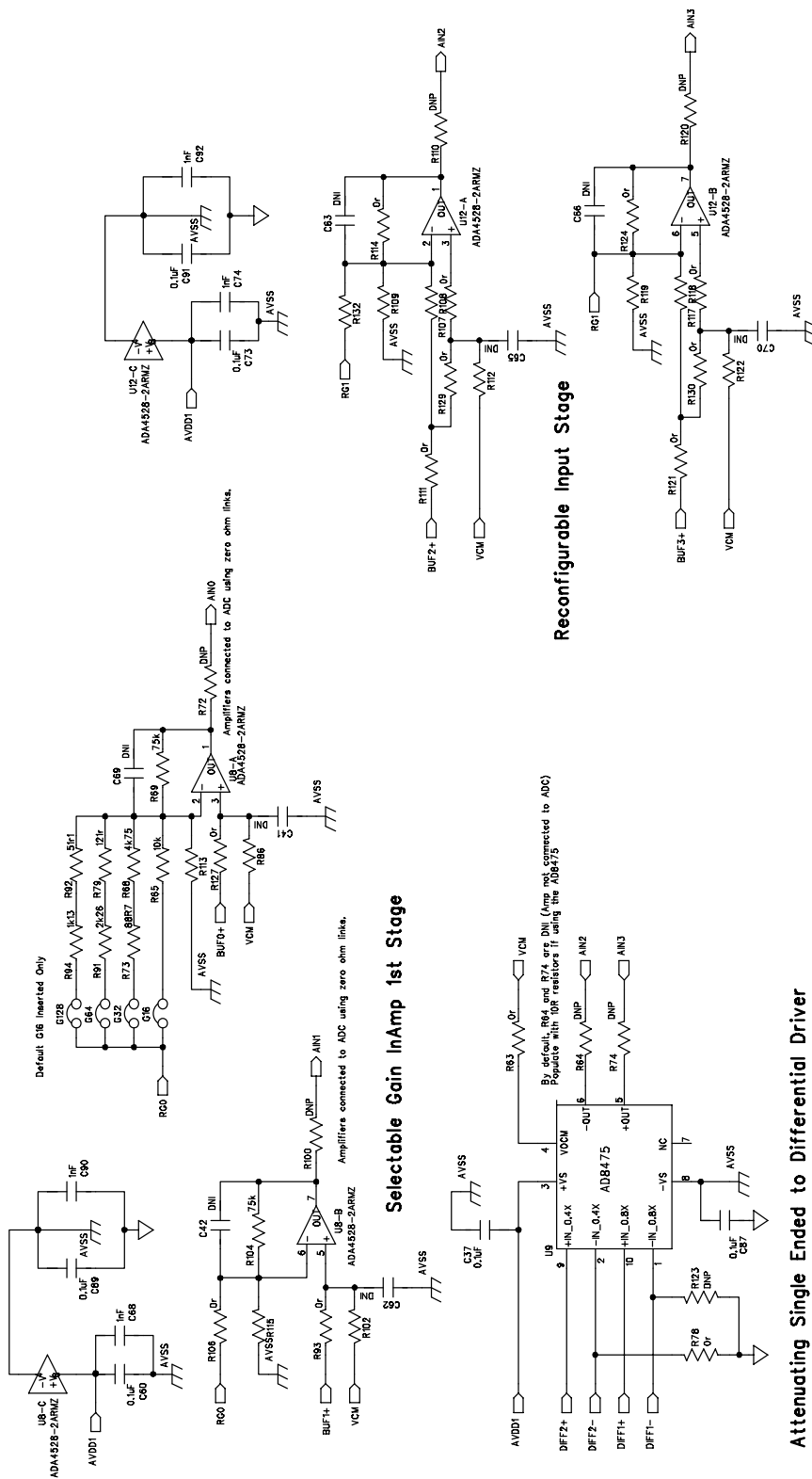


Figure 25. Amplifier Schematic



Rev. B | Page 23 of 33

## 5V, 3.3V & +/- 2.5V Regulators

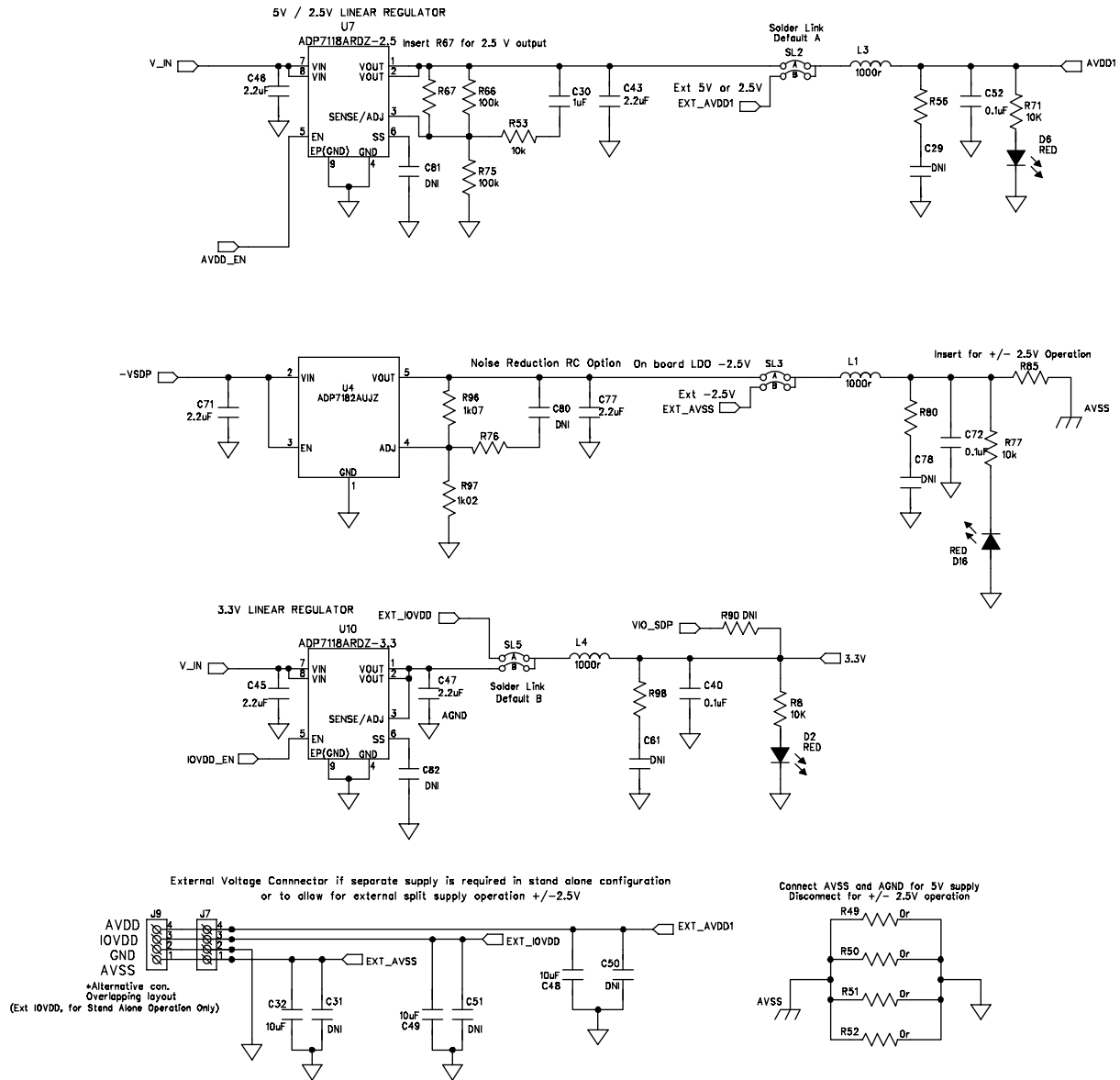


Figure 27. Regulator Schematic

12528-127

## SDP CONNECTOR EEPROM-SW/USB ID

VIO: USE to set IO voltage max draw 20mA

VIN: Use this pin to power the SDP requires 4-7V 200mA

BMODE: Pull up with a 10K resistor to set SDP to boot from a SPI FLASH on the daughter board

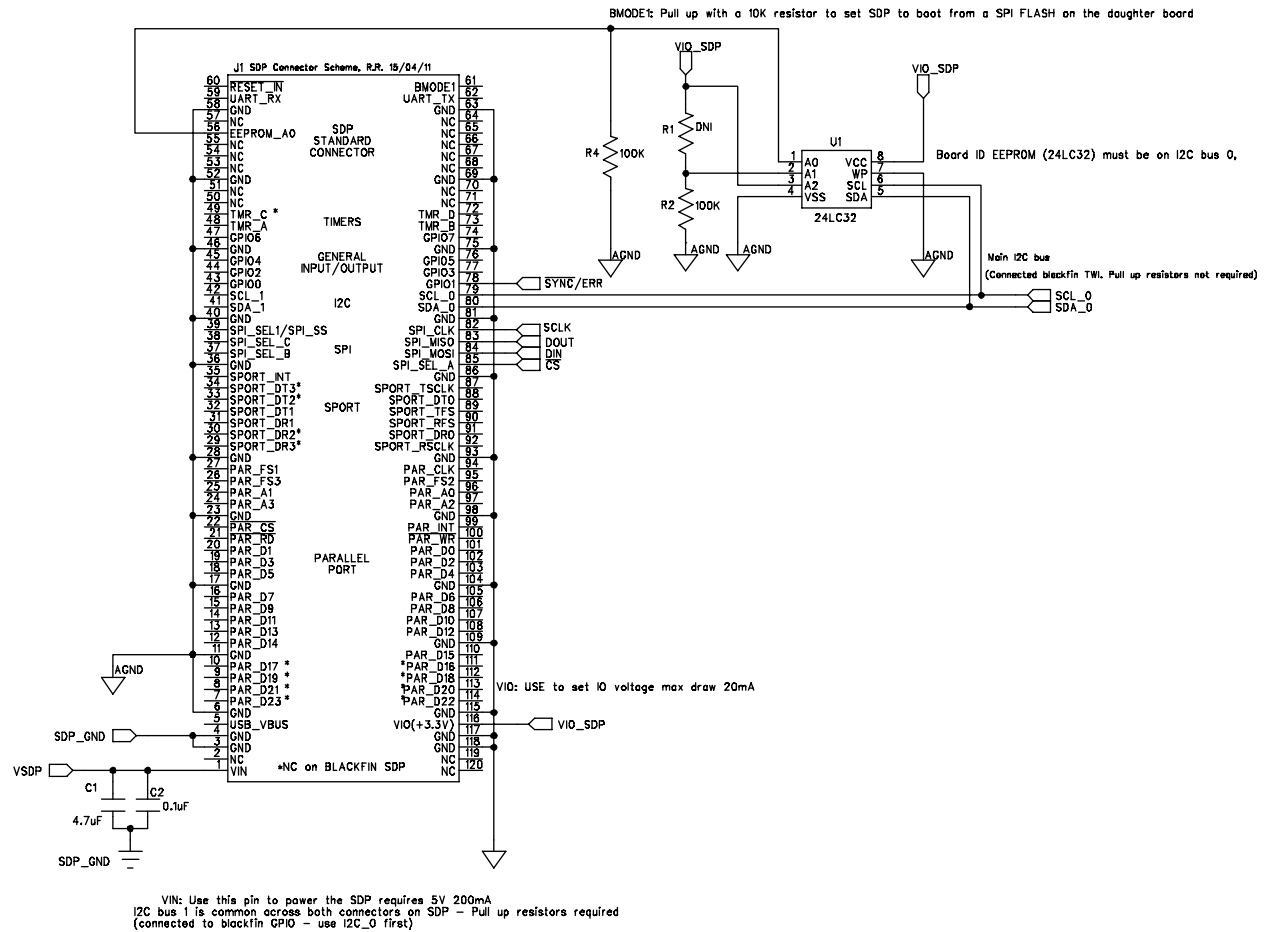


Figure 28. SDP-B Connector Schematic

12528-128

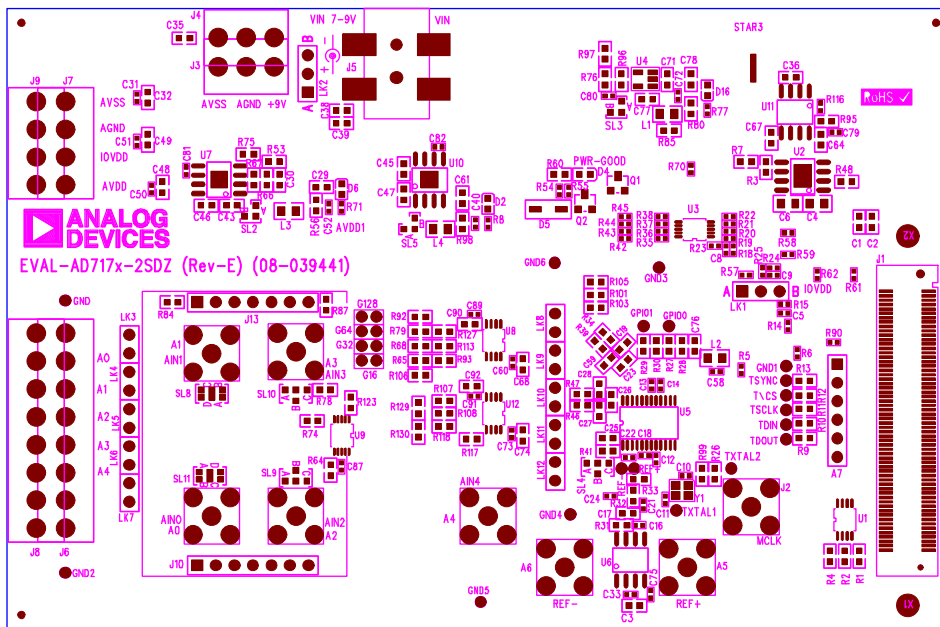


Figure 29. Top Printed Circuit Board (PCB) Silkscreen

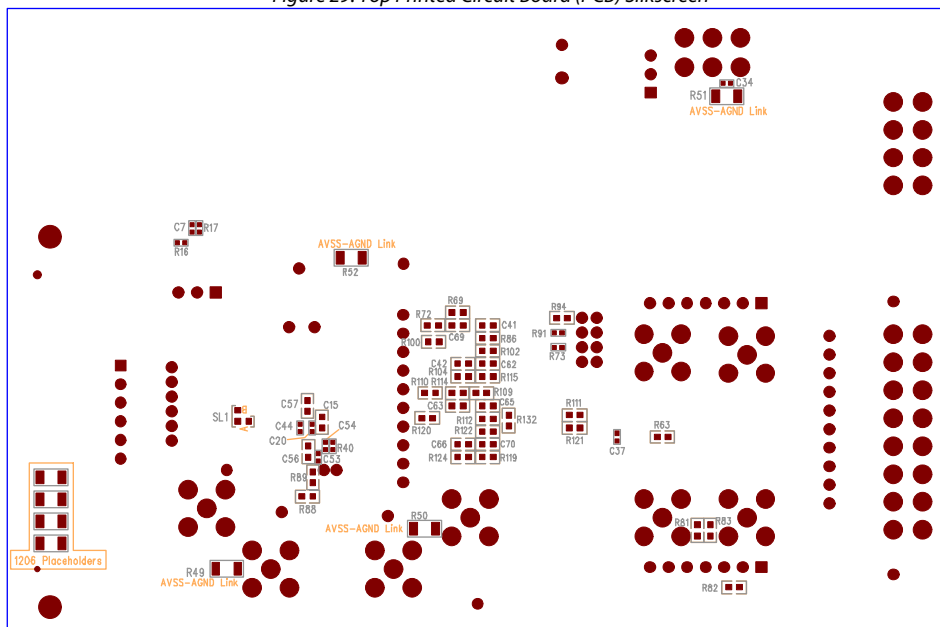


Figure 30. Bottom PCB Silkscreen

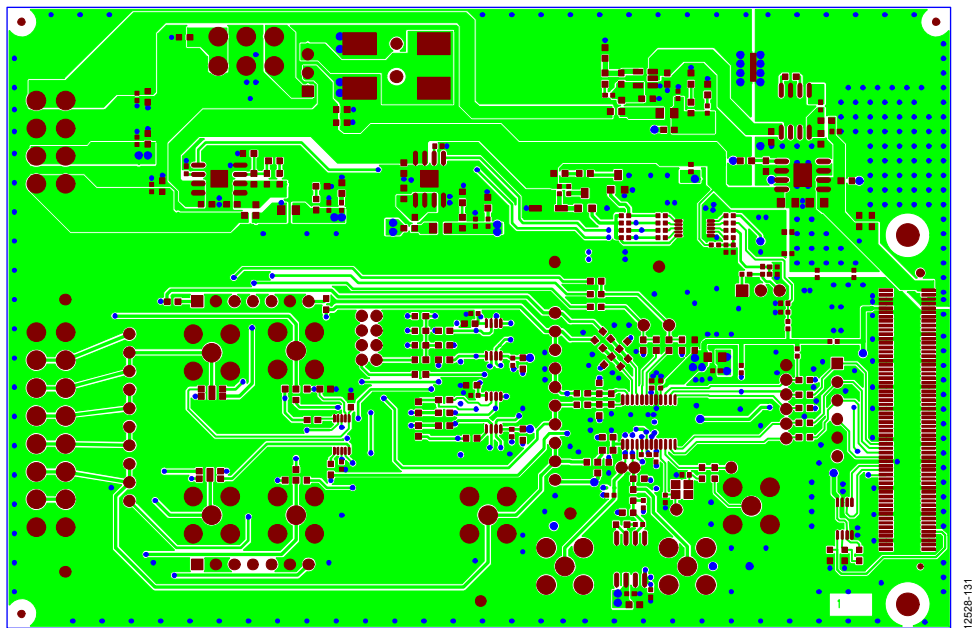


Figure 31. Layer 1 Component Side

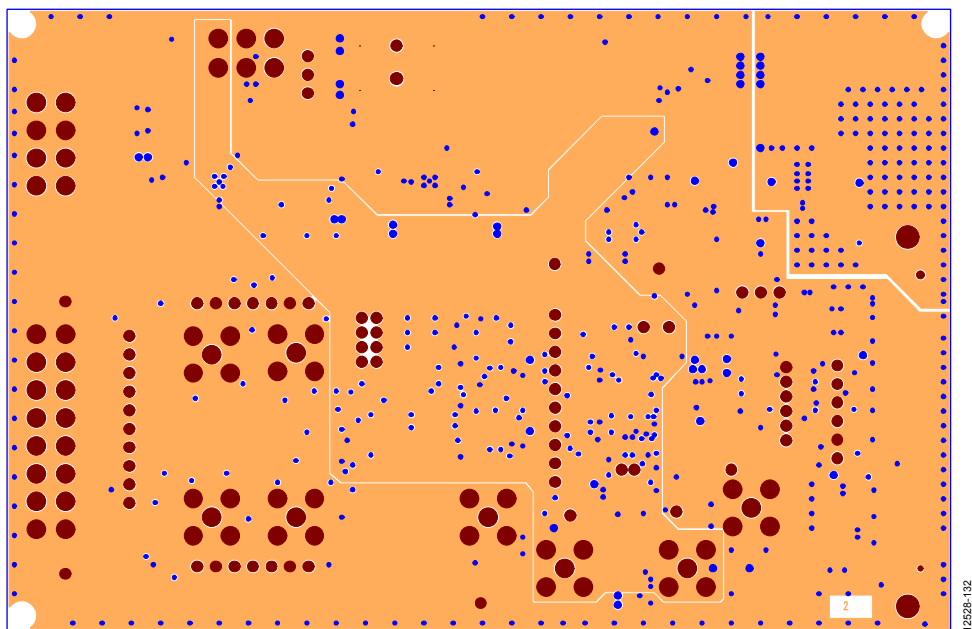


Figure 32. Layer 2 Ground Plane

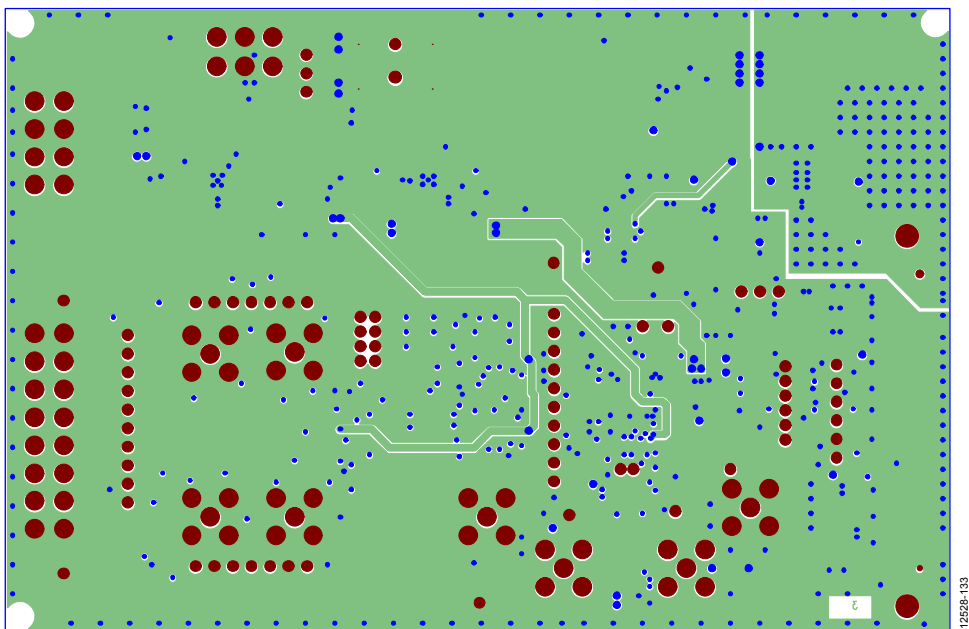


Figure 33. Layer 3 Power/Ground Plane

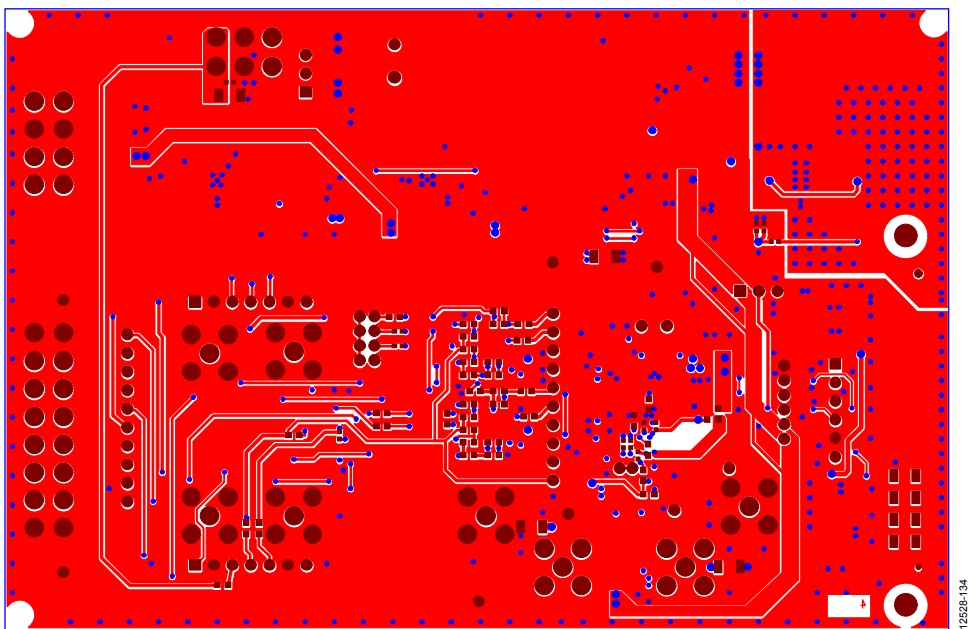


Figure 34. Layer 4 Solder Side



## ORDERING INFORMATION

## BILL OF MATERIALS

Table 4.

| Name                                                                                                                                  | Part Description                                                           | Manufacturer            | Part Number               | Stock Code            |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------|---------------------------|-----------------------|
| A0 through A6                                                                                                                         | Straight PCB mount SMB jack, keep hole clear of solder. Do not insert.     | TE Connectivity         | 1-1337482-0               | Do not insert         |
| A7                                                                                                                                    | 6-pin SIL header (0.1" pitch)                                              | Harwin                  | 20-9990646                | FEC 1022255           |
| C1, C17                                                                                                                               | Ceramic capacitor, 6.3 V, X5R, 0603, 4.7 $\mu$ F                           | Murata                  | GRM188R60J475K            | FEC 173-5527          |
| C2, C38                                                                                                                               | Ceramic capacitor, 50 V, X7R, 0603, 0.1 $\mu$ F                            | Murata                  | GRM188R71H104K            | FEC 882-0023          |
| C3                                                                                                                                    | Ceramic capacitor, 10 V, X5R, 0603, 4.7 $\mu$ F                            | KEMET Electronics Corp. | C0603C475K8PACTU          | FEC 157-2625          |
| C4, C6                                                                                                                                | Capacitor, 0805, 50 V, X7R, 1 $\mu$ F                                      | Murata                  | GRM21BR71H105KA12L        | FEC 1735541           |
| C5, C7 through C9, C16, C24 through C25, C29, C41 through C42, C61 through C63, C65 through C66, C69 through C70, C78 through C82     | Ceramic capacitor, not inserted, 0402                                      | Not applicable          | Not applicable            | Do not insert         |
| C10, C11                                                                                                                              | Ceramic capacitor XTAL, not inserted, 0402                                 | Not applicable          | Not applicable            | Do not insert         |
| C12 through C14, C18, C20 through C22, C33 through C34, C37, C40, C44, C52 through C54, C58, C60, C72 through C73, C75, C87, C89, C91 | Capacitor ceramic, 16 V, X7R, 0402                                         | Murata                  | GRM155R71C104K            | FEC 881-9742          |
| C15, C30, C56 through C57, C76                                                                                                        | Capacitor, 0603, 1 $\mu$ F, 6.3 V                                          | Murata                  | GRM188R70J105KA01D        | FEC 184-5765          |
| C19, C27 through C28, C55, C59, C83, C85 through C86                                                                                  | Ceramic capacitor, 50 V, C0G/NPO, 0603                                     | AVX Corporation         | 06035A271JAT2A            | FEC 1734627           |
| C23, C26, C84, C88                                                                                                                    | Ceramic capacitor, 50 V, NPO, 0603                                         | KEMET Electronics Corp. | C0603C681J5GACTU          | FEC 1414648           |
| C31, C50 through C51                                                                                                                  | Ceramic capacitor, 16 V, X7R, 0402, do not insert.                         | Not applicable          | Not applicable            | Do not insert         |
| C32, C35 through C36, C39, C48 through C49, C64, C67                                                                                  | Capacitor, multilayer ceramic capacitor (MLCC) X5R, 10 $\mu$ F, 10 V, 0603 | TDK                     | C1608X5R1A106K080AC       | FEC 221-1164          |
| C43, C45 through C47, C71, C77                                                                                                        | Capacitor, MLCC, X5R, 2.2 $\mu$ F, 10 V, 0603                              | MCM Electronics         | MC0603X225K100CT          | FEC 232-0817          |
| C68, C74, C90, C92                                                                                                                    | 50 V X7R MLCC                                                              | Yageo                   | 2238 586 15623            | FEC 722170            |
| D2, D6, D16                                                                                                                           | Red LED, high intensity (>90 mCd), 0603                                    | Broadcom Ltd.           | HSMC-C191                 | FEC 855-4528          |
| D4                                                                                                                                    | LED, SMD green                                                             | Osram                   | LGQ971                    | FEC 1226372           |
| D5                                                                                                                                    | Zener Diode, 0.5 W, 5.1 V                                                  | Vishay                  | BZT52B5V1-V-GS08          | FEC 1617767           |
| G16                                                                                                                                   | 2-pin (2 mm pitch) header and shorting shunt                               | Harwin                  | M22-2010205 & M22-1920005 | FEC 671915 and 510944 |
| G32, G64, G128                                                                                                                        | 2-pin (2 mm pitch) header                                                  | Harwin                  | M22-2010205               | FEC 671915            |

| Name                                                                                                   | Part Description                                                                      | Manufacturer     | Part Number                   | Stock Code                    |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------|-------------------------------|-------------------------------|
| GND, GND1 through GND6, GPIO0, GPIO1, REF+, REF-, TDIN, TDOUT, TERR, TCLK, TSYNC, TXTAL1, TXTAL2, TVCS | Test point, not inserted, keep hole clear of solder                                   | Not applicable   | Not applicable                | Do not insert                 |
| J1                                                                                                     | 120-way connector, 0.6 mm pitch                                                       | HIROSE           | FX8-120S-SV(21)               | FEC 1324660                   |
| J2                                                                                                     | Straight PCB mount SMB jack, keep hole clear of solder, do not insert                 | TE Connectivity  | 1-1337482-0                   | Do not insert                 |
| J3                                                                                                     | Socket terminal block, 3.81 mm pitch                                                  | Phoenix Contact  | MC 1.5/3-G-3.81               | FEC 370-4737                  |
| J4                                                                                                     | Screw terminal block, 3.81 mm pitch, do not insert                                    | Phoenix Contact  | 1727023                       | Do not insert                 |
| J5                                                                                                     | DC power connectors 2 mm SMT power jack                                               | Lumberg          | 161314                        | FEC 1243245                   |
| J6                                                                                                     | 8-pin terminal header, 3.81 mm pitch, vertical                                        | Phoenix Contact  | MC 1,5/ 8-G-3,81              | FEC 3704774                   |
| J7                                                                                                     | Connector, pitch 3.81 mm, right angle                                                 | Phoenix Contact  | MC 1,5/ 4-G-3,81 and 180-3594 | Do not insert                 |
| J8                                                                                                     | 8-pin screw terminal, 3.81 mm pitch, vertical                                         | Phoenix Contact  | 1727078                       | Do not insert                 |
| J9                                                                                                     | Screw terminal block, 3.81 mm pitch                                                   | Phoenix Contact  | 1727036                       | FEC 370-4592                  |
| J10                                                                                                    | 7-way SSW 2.54 mm vertical socket (make sure to line up with connector on surf board) | Samtec           | SSW-107-01-T-S                | FEC 1803478                   |
| J11, J14                                                                                               | Screw terminal block, 3.81 mm pitch                                                   | Phoenix Contact  | MKDS1/4-3.81                  | Do not insert.                |
| J12                                                                                                    | 4-way power socket block, 3.81 mm pitch                                               | Phoenix Contact  | MC1.5/4-G-3.81                | FEC 370-4749 and FEC 370-4920 |
| J13                                                                                                    | 7-way SIP 2.54 mm TH Header (make sure to line up with connector on surf board)       | Samtec           | TLW-107-05-G-S                | FEC 1668499                   |
| J15                                                                                                    | 4- way power socket block, 3.81 mm pitch                                              | Phoenix Contact  | MC1.5/4-G-3.81                | FEC 370-4749 and FEC 370-4920 |
| L1 through L4                                                                                          | Ferrite bead, 0.3 $\Omega$ at dc, 1000 $\Omega$ at 100 MHz, 350 mA, 0805              | TE Connectivity  | BMB2A1000LN2                  | FEC 119-3421                  |
| LK1 through LK2                                                                                        | 3 pin (3 $\times$ 1) 0.1" header and shorting block in A                              | Harwin           | M20-9990346 & M7566-05        | FEC 1022249 and 150-411       |
| LK3 through LK7                                                                                        | 2-pin (0.1" pitch) header                                                             | Harwin           | M20-9990246                   | FEC 1022247                   |
| LK8 through LK12                                                                                       | 2-pin (0.1" pitch) header and shorting shunt                                          | Harwin           | M20-9990246                   | FEC 1022247 and 150-411       |
| Q1                                                                                                     | SI2304DDS-T1-GE3 MOSFET, N CH, 30 V, 3.6 A, diode, SOT-23                             | Vishay           | SI2304DDS-T1-GE3              | FEC 1858939                   |
| Q2                                                                                                     | Transistor, NPN, SOT-23                                                               | ON Semiconductor | MMBT3904LT1G                  | FEC 1459100                   |
| R1                                                                                                     | Resistor, not inserted, 0603                                                          | Not applicable   | Not applicable                | Do not insert.                |
| R2 through R4, R7, R48, R66, R75                                                                       | Resistor, 100 K, 0.063 W, 1%, 0603                                                    | MCM Electronics  | MC0063W06031100K              | FEC 9330402                   |
| R5, R6, R77                                                                                            | Resistor, 10 K, 0.063 W, 1 %, 0402                                                    | MCM Electronics  | MC00625W0402110K              | FEC 1358069                   |
| R8, R71                                                                                                | Resistor, 1 %, 0402                                                                   | Yageo            | CRCW040210K0FKEAHP            | FEC 173-8864                  |

| Name                                                                                                                                                                                                 | Part Description                                | Manufacturer                   | Part Number             | Stock Code    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------|-------------------------|---------------|
| R9 through R13, R27, R30, R32, R41, R63, R78, R81 through R84, R87, R95, R99, R101, R103, R105, R107, R111, R114, R117, R121, R124, R128 through R131                                                | Resistor, 0603 1 % 0R                           | MCM Electronics                | MC0063W06030R           | FEC 9331662   |
| R14                                                                                                                                                                                                  | Resistor, 0402, 1 %, 39 K                       | MCM Electronics                | MC 0.0625W 0402 1% 39K  | FEC 1358085   |
| R15, R17, R18, R24                                                                                                                                                                                   | SMD Resistor                                    | MCM Electronics                | MC 0.0625W 0402 1% 10K2 | FEC 1803137   |
| R16                                                                                                                                                                                                  | Resistor, 0402, 1 %, 69K8                       | MCM Electronics                | MC 0.0625W 0402 1% 69K8 | FEC 1803735   |
| R19 through R22, R35 through R38, R40, R58, R59, R61, R62, R70, R116                                                                                                                                 | Resistor, 0402                                  | Vishay                         | CRCW04020000Z0ED        | FEC 146-9661  |
| R23                                                                                                                                                                                                  | Resistor, 0402, 1 %, 86K6                       | MCM Electronics                | MC 0.0625W 0402 1% 86K6 | FEC 1803744   |
| R25, R57                                                                                                                                                                                             | Resistor, 0402, 1 %, 30k1                       | MCM Electronics                | MC 0.0625W 0402 1% 30k1 | FEC 1803699   |
| R26, R28, R29, R31, R33, R56, R64, R67, R72, R74, R76, R80, R85, R86, R88, R98, R100, R102, R108 through R110, R112, R113, R115, R118 through R120, R122, R123, R125, R126, R132, R34, R39, R46, R47 | SMD Resistor 0603                               | Not applicable                 | Not applicable          | Do Not Insert |
| R42 through R45                                                                                                                                                                                      | Resistor, 10 R, 0.063 W, 1 %, 0603              | MCM Electronics                | MC0063W0603110R         | FEC 9330429   |
| R49 through R52                                                                                                                                                                                      | Resistor, Thick Film, 10 kΩ, 62.5 mW, 5 %       | Yageo                          | RC0402JR-1310KL         | FEC 179-9316  |
| R53, R65                                                                                                                                                                                             | Resistor, 1206                                  | MCM Electronics                | MC 0.125W 1206 0R       | FEC 9336974   |
| R54                                                                                                                                                                                                  | Resistor, 10 K, 0.063 W, 1 %, 0603              | MCM Electronics                | MC0063W0603110K         | FEC 9330399   |
| R55                                                                                                                                                                                                  | Resistor, Thick Film, 4.53 kΩ, 63 mW, 1 %       | Vishay                         | CRCW04024K53FKED        | FEC 1151244   |
| R56                                                                                                                                                                                                  | Resistor, 0402, 1 %, 61R9                       | MCM Electronics                | MC 0.0625W 0402 1% 61R9 | FEC 1802915   |
| R60                                                                                                                                                                                                  | Resistor, Thick Film, 2.4 kΩ, 0603, 100 mW, 1 % | Yageo                          | RC0603FR-072K4L         | FEC 1799329   |
| R68                                                                                                                                                                                                  | Resistor, 0603, 4K75, 0.1 %, 0.1 W              | Panasonic                      | ERA3ARB4751V            | FEC 209-4611  |
| R69, R104                                                                                                                                                                                            | Resistor, 0603, 0.1 %, 0.1 W, 75K               | Panasonic                      | ERA3ARB753P             | FEC 171-7620  |
| R73                                                                                                                                                                                                  | Resistor, 88R7, 0.063 W, 0.1 %, 0402            | TE Connectivity                | RN73C1E88R7B            | FEC 173-7900  |
| R79                                                                                                                                                                                                  | Resistor, 121R, 0.063 W, 0.1 %, 0603            | TE Connectivity/<br>Holsworthy | RN73C1J121RBTG          | FEC 114-0465  |
| R90                                                                                                                                                                                                  | Resistor, not inserted, 0402                    | Not applicable                 | Not applicable          | Do Not Insert |
| R91                                                                                                                                                                                                  | Resistor, 2K26, 0.063 W, 0.1 %, 0402            | TE Connectivity                | RN73C1E2K26B            | FEC 173-8050  |
| R92                                                                                                                                                                                                  | Resistor, 51R1, 0.063 W, 0.1 %, 0603            | TE Connectivity/<br>Holsworthy | RN73C1J51R1BTG          | FEC 114-0446  |
| R93, R106                                                                                                                                                                                            | Resistor, 0603                                  | Vishay                         | CRCW06030000Z0EA        | FEC 146-9739  |
| R94                                                                                                                                                                                                  | Resistor, 0603, 1K13, 0.1 %, 0.1 W              | Panasonic                      | ERA3ARB1131V            | FEC 209-4485  |

| Name          | Part Description                                         | Manufacturer              | Part Number                     | Stock Code                         |
|---------------|----------------------------------------------------------|---------------------------|---------------------------------|------------------------------------|
| R96           | Resistor, 1K07, 0.063 W, 1 %, 0603                       | MCM Electronics           | MC0063W060311K07                | FEC 1170792                        |
| R97           | Resistor, 1K02, 0.063 W, 1 %, 0603                       | MCM Electronics           | MC0063W060311K02                | FEC 1170789                        |
| R127          | Resistor, 0603                                           | Vishay                    | CRCW06030000Z0EA                | FEC 146-9739                       |
| SL1           | 2-way Resistor Link Option                               | MCM Electronics           | MC 0.063W 0603 0R               | FEC 9331662                        |
| SL2, SL3      | 2-way Solder Link (Use Or 0603 Resistor)                 | Not applicable            | Insert in Link Position "A"     | FEC 933-1662                       |
| SL4           | 3-way Solder Link (Use Or 0603 Resistor)                 | Not applicable            | Insert in Link Position "C"     | FEC 933-1662                       |
| SL5           | 2-way Solder Link (Use Or 0603 Resistor)                 | Not applicable            | Insert in Link Position "B"     | FEC 933-1662                       |
| SL8           | 4-way Solder Link (Use Or 0603 Resistor)                 | Not applicable            | Insert in Link Position "A"     | FEC 933-1662                       |
| SL9, SL10     | 3-way Solder Link (Use Or 0603 Resistor)                 | Not applicable            | Insert in Link Position "A"     | FEC 933-1662                       |
| SL11          | 4-way Solder Link (Use Or 0603 Resistor)                 | Not applicable            | Insert in Link Position "A"     | FEC 933-1662                       |
| STAR3         | Ground Link (Copper Short)                               | Not applicable            | Not applicable                  | Not applicable                     |
| U1            | 32 K I <sup>2</sup> C Serial EEPROM                      | Microchip Technology Inc. | 24LC32A-I/MS                    | FEC1331330                         |
| U2            | Linear Regulator 5 V, 20 V, 500 mA, Ultralow Noise, CMOS | Analog Devices, Inc.      | <a href="#">ADP7104ARDZ-5.0</a> | <a href="#">ADP7104ARDZ-5.0</a>    |
| U3            | Quad Voltage Monitor and Sequencer                       | Analog Devices, Inc.      | <a href="#">ADM1185ARMZ-1</a>   | <a href="#">ADM1185ARMZ-1</a>      |
| U4            | 8 V, –200 mA, Low Noise, Linear Regulator                | Analog Devices, Inc.      | <a href="#">ADP7182AUJZ</a>     | <a href="#">ADP7182AUJZ-R7</a>     |
| U5            | ADC                                                      | Analog Devices, Inc.      | <a href="#">AD7175-2BRUZ</a>    | <a href="#">AD7175-2BRUZ</a>       |
| U6            | 5 V XFET Reference                                       | Analog Devices, Inc.      | <a href="#">ADR445BRZ</a>       | <a href="#">ADR445BRZ</a>          |
| U7            | Linear Regulator 2.5 V, Ultralow Noise, CMOS             | Analog Devices, Inc.      | <a href="#">ADP7118ARDZ-2.5</a> | <a href="#">ADP7118ARDZ-2.5-R7</a> |
| U8            | 5.0 V Ultralow Noise, Zero-Drift, RRIO, Dual Op-Amp      | Analog Devices, Inc.      | <a href="#">ADA4528-2ARMZ</a>   | <a href="#">ADA4528-2ARMZ</a>      |
| U9            | Fully Differential Funnel Amplifier                      | Analog Devices, Inc.      | <a href="#">AD8475ARMZ</a>      | <a href="#">AD8475ARMZ</a>         |
| U10           | Linear Regulator 3.3 V, Ultralow Noise, CMOS             | Analog Devices, Inc.      | <a href="#">ADP7118ARDZ-3.3</a> | <a href="#">ADP7118ARDZ-3.3-R7</a> |
| U11           | CMOS Switched-Capacitor Voltage Converter                | Analog Devices, Inc.      | <a href="#">ADM660ARZ</a>       | <a href="#">ADM660ARZ</a>          |
| U12           | 5.0 V Ultralow Noise, Zero-Drift, RRIO, Dual Op-Amp      | Analog Devices, Inc.      | <a href="#">ADA4528-2ARMZ</a>   | <a href="#">ADA4528-2ARMZ</a>      |
| V1 through V4 | 1206 Place Holder                                        | Not applicable            | Not applicable                  | Do Not Insert                      |
| Y1            | Miniature Crystal SMD                                    | Epson                     | FA-20H, 16 MHz, 10 PPM, 9 PF    | FEC 171-2814                       |

## NOTES

I<sup>2</sup>C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).



### ESD Caution

**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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Тел: +7 (812) 336 43 04 (многоканальный)

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