Evaluating the **AD7175-8** 24-Bit, 250 kSPS, Sigma-Delta ADC with 20 µs Settling and Integrated Analog Input Buffers

**FEATURES**
- Full featured evaluation board for the **AD7175-8**
- PC control in conjunction with the Analog Devices, Inc., SDP-B board (EVAL-SDP-CB1Z)
- PC software for control and data analysis (time domain)
- Standalone capability

**EVALUATION KIT CONTENTS**
- EVAL-AD7175-8SDZ evaluation board
- AD717x Eval+ software CD
- 7 V to 9 V ac-to-dc adapter

**ADDITIONAL EQUIPMENT NEEDED**
- DC signal source
- PC running Windows® XP to Windows 10

**GENERAL DESCRIPTION**
The EVAL-AD7175-8SDZ evaluation board features the **AD7175-8**, a 24-bit, 250 kSPS analog-to-digital converter (ADC) with integrated 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; this supplies the **AD7175-8** and support components. The evaluation board connects to a USB port via the system demonstration platform (SDP) controller board EVAL-SDP-CB1Z (SDP-B).

The AD717x Eval+ software fully configures the **AD7175-8** device functionality via 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 on the **AD7175-8** are available in the product data sheet, which should be consulted in conjunction with this user guide when working with the evaluation board. Full details for the SDP-B controller board are available on the Analog Devices website.

**FUNCTIONAL BLOCK DIAGRAM**

Figure 1. EVAL-AD7175-8SDZ Block Diagram
Follow these steps to set up the 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 EVAL-AD7175-8SDZ 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 J4 of the evaluation board, as shown in Figure 2. Set LK2 to Position B.
5. Connect the SDP-B board to the PC via the USB cable. For Windows® XP, you may need to search for the SDP drivers. Choose to automatically search for the drivers for the SDP-B board if prompted by the operating system.
6. From the Analog Devices subfolder in the Programs menu, launch the AD717x Eval+ software.

Use the following procedure to quickly test the noise performance:

1. Insert Link LK5 to Link LK20 to initiate the noise performance test mode. In this mode, analog input channels short to the REFOUT pin via SL11.
2. In the evaluation software, 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. 

Figure 2. Hardware Configuration, Setting Up the EVAL-AD7175-8SDZ
EVALUATION BOARD HARDWARE

DEVICE DESCRIPTION

The AD7175-8 is a highly accurate, high resolution, multiplexed, 8-/16-channel (full/pseudo differential) Σ-Δ ADC. The AD7175-8 has a maximum channel-to-channel scan rate of 50 kSPS (20 µs) for fully settled data. The output data rates range from 5 SPS to 250 kSPS. The device includes integrated analog input and reference buffers, an integrated precision 2.5 V reference, and an integrated oscillator.

HARDWARE LINK OPTIONS

See Table 1 for the default link options. By default, the board is configured to operate from the supplied 9 V ac-to-dc adapter connected to Connector J4. The 5 V supply required for the AD7175-8 comes from the on-board low dropout regulator (LDO). The ADP1720, with a 5 V fixed output voltage, receives its input voltage from J2 or J4 (depending on the position of LK2) and generates a 5 V output.

Table 1. Default Link and Solder Link Options

<table>
<thead>
<tr>
<th>Link</th>
<th>Default Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LK1</td>
<td>A</td>
<td>Selects the voltage applied to the power supply sequencer circuit (U3); dependent on AVDD1. Place this link in Position A if using 5 V AVDD1, or Position B if using 2.5 V AVDD1.</td>
</tr>
<tr>
<td>LK2</td>
<td>B</td>
<td>Selects the external power supply from Connector J3 (Position A), or J4 (Position B).</td>
</tr>
<tr>
<td>LK5 to LK20</td>
<td>Inserted</td>
<td>Inserting these links sets up the on-board noise test. In this mode, all inputs short to the common voltage via SL11.</td>
</tr>
<tr>
<td>SL0</td>
<td>A</td>
<td>Routes A0 to one of the following: Position A: AIN0/REF2– pin on the AD7175-8 Position B: Buffer U6 Position C: U7 for use with a single-ended to differential driver circuit Position D: J15-1</td>
</tr>
<tr>
<td>SL1</td>
<td>A</td>
<td>Routes A1 to one of the following: Position A: AIN1/REF2+ pin on the AD7175-8 Position B: Buffer U6 Position C: U7 for use with a single-ended to differential driver circuit Position D: J15-7</td>
</tr>
<tr>
<td>SL2</td>
<td>A</td>
<td>Routes A2 to one of the following: Position A: AIN2 pin on the AD7175-8 Position B: Buffer U10 Position C: U9 for use with a single-ended to differential driver circuit</td>
</tr>
<tr>
<td>SL3</td>
<td>A</td>
<td>Routes A3 to one of the following: Position A: AIN3 pin on the AD7175-8 Position B: Buffer U10 Position C: U9 for use with a single-ended to differential driver circuit</td>
</tr>
<tr>
<td>SL4</td>
<td>A</td>
<td>Sets the voltage applied to the AVDD2 pin. Operates using the AVDD1 supply (default). Position B sets the AVDD2 voltage to the 3.3 V supply from the ADP1720 3.3 V regulator (U11).</td>
</tr>
<tr>
<td>SL5</td>
<td>B</td>
<td>Selects between an external or on-board IOVDD source. Supplies IOVDD from the ADP1720 3.3 V regulator (U11) (default). The evaluation board operates with a 3.3 V logic.</td>
</tr>
<tr>
<td>SL6</td>
<td>Removed</td>
<td>Position A connects Crystal Y1 as an external MCLK clock source. Position B connects the MCLK SMA/SMB connector for use as a clock input or an ADC internal clock output.</td>
</tr>
<tr>
<td>SL7</td>
<td>A</td>
<td>Selects between an external or on-board AVDD1 source. Supplies AVDD1 from the ADP1720 5 V regulator (U8) (default).</td>
</tr>
<tr>
<td>SL8 to SL9</td>
<td>A</td>
<td>Selects between a 5 V and 2.5 V LDO supply for AVDD1. Supplies AVDD1 with 5 V (default).</td>
</tr>
<tr>
<td>SL10</td>
<td>A</td>
<td>Selects the voltage applied to the AVDD1 pin. Operates using the supply set up by Link SL8 to Link SL9 (default). When inserted in Position B, sets the AVDD1 voltage to the 3.3 V supply from the ADP1720 3.3 V regulator.</td>
</tr>
<tr>
<td>SL11</td>
<td>A</td>
<td>Selects the voltage applied to analog input during on-board noise test (LK5 to LK20 inserted). Position A connects to the AD7175-8 REFOUT pin. Position B connects to GND. Position C connects to AVSS.</td>
</tr>
<tr>
<td>SL12 to SL15</td>
<td>Inserted</td>
<td>Connects AVSS and AGND for single-supply operation. To operate in split supply mode, remove these links.</td>
</tr>
</tbody>
</table>
## SOCKETS AND CONNECTORS

### Table 2. Connector Details

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Connector Type</th>
<th>Manufacturer</th>
<th>Manufacturer Number</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>Connector to the SDP-B</td>
<td>120-way connector, 0.6 mm pitch</td>
<td>Hirose</td>
<td>FX8-120S-SV(21)</td>
<td>FEC1324660</td>
</tr>
<tr>
<td>A0 to A3</td>
<td>Analog inputs to the ADC</td>
<td>Straight PCB mount SMB/SMA jack</td>
<td>Tyco</td>
<td>1-1337482-0</td>
<td>Not applicable</td>
</tr>
<tr>
<td>J3</td>
<td>External bench top voltage supply for the EVAL-AD7175-8SDZ</td>
<td>Power socket block, 3-pin, 3.81 mm pitch</td>
<td>Phoenix Contact</td>
<td>MC 1,5/3-G-3.81</td>
<td>FEC3704757</td>
</tr>
<tr>
<td>J4</td>
<td>External ac-to-dc adapter input for the EVAL-AD7175-8SDZ, 7 V to 9 V</td>
<td>DC power connectors, 2 mm SMT power jack</td>
<td>Kycon</td>
<td>KLDX-SMT2-0202-A</td>
<td>MOUSER 806-KLDX-SMT20202A</td>
</tr>
<tr>
<td>J5</td>
<td>External bench top voltage supply option for AVDD1/AVDD2 and IOVDD inputs on the AD7175-8</td>
<td>Screw terminal block, 3.81 mm pitch</td>
<td>Phoenix Contact</td>
<td>MKDS 1/4-3.81</td>
<td>FEC3704592</td>
</tr>
<tr>
<td>J8</td>
<td>GPIO terminal</td>
<td>Power socket block, 4-pin, 3.81 mm pitch</td>
<td>Phoenix Contact</td>
<td>MC 1,5/4-G-3.81</td>
<td>FEC3704749</td>
</tr>
<tr>
<td>J10 and J12</td>
<td>Analog input terminal block; wired connection to external source or sensor</td>
<td>Power socket block, 8-pin, 3.81 mm pitch</td>
<td>Phoenix Contact</td>
<td>MC 1,5/8-G-3.81</td>
<td>FEC3704774</td>
</tr>
<tr>
<td>J14</td>
<td>Analog input terminal block; wired connection to external source or sensor</td>
<td>Power socket block, 6-pin, 3.81 mm pitch</td>
<td>Phoenix Contact</td>
<td>MC 1,5/6-G-3.81</td>
<td>FEC3704762</td>
</tr>
<tr>
<td>J15</td>
<td>Optional header</td>
<td>7-way, 2.54 mm pin header</td>
<td>Samtec</td>
<td>SSW-107-01-T-S</td>
<td>FEC1803478</td>
</tr>
<tr>
<td>J16</td>
<td>Optional header</td>
<td>7-way, 2.54 mm socket</td>
<td>Samtec</td>
<td>TLW-107-05-G-S</td>
<td>FEC1668499</td>
</tr>
</tbody>
</table>

1 Order codes starting with FEC are for Farnell.

### SERIAL INTERFACE

The EVAL-AD7175-8SDZ evaluation board connects to the Blackfin® ADSP-BF527 on the SDP-B controller board via the serial peripheral interface (SPI). There are four primary signals, CS, SCLK, and DIN (all inputs), and one output from the ADC, DOUT/RDY.

To operate the evaluation board in standalone mode, disconnect the AD7175-8 serial interface lines from the 120-pin header by removing the 0 Ω, R9 through R13 links. Use the test points to connect the signals to an alternative digital capture setup.

### POWER SUPPLIES

Power the evaluation board from the ac-to-dc adapter connected to J4, or from an external bench top supply applied to J3 or J5. Linear LDOs generate the required voltages from the applied input voltage (V_{IN}) rail when using J3 or J4. Use J5 to bypass the on-board regulators. The regulators used are the 5 V fixed output voltage and 2.5 V adjustable output voltage ADP1720 devices, which supply the AVDD1 and AVDD2 rails to the ADC; the ADP1720 (3.3 V) supplies the IOVDD rail. Use the ADP7104 (5 V) to supply 5 V for the SDP-B controller board. Each supply is decoupled where it enters the board and again at each device. Table 3 shows the various power supply configurations available, including split supply operation.
### 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 J4. Set LK2 to Position B.
- A bench top power supply connected to J3. Set LK2 to Position A and ensure that AVSS = AGND = 0 V.

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

#### Single Supply (Unregulated)

To set up the board, use the following procedure:

1. Move SL5 to Position A and move SL7 to Position B.
2. Connect the two terminals of J5 labeled AGND and AVSS.
3. Connect 0 V (GND) to J5 at the terminal labeled AGND.
4. Connect 5 V to J5 at the terminal labeled AVDD.
5. Connect 3.3 V to J5 at the terminal labeled IOVDD.
6. Connect the 7 V to 9 V input to either J3 or J4.

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

#### Split Supply (Regulated)

To set up the board, use the following procedure:

1. Remove SL12 to SL15. These links connect AVSS to AGND.
2. Connect a bench top power supply to J3 and set LK2 to Position A. Make sure that AVSS = −2.5 V in this case.
3. Connect 3.3 V to J5 at the terminal labeled IOVDD.
4. Connect the 7 V to 9 V input to either J3 or J4.
5. 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 to the default settings as outlined in Table 1.

#### Split Supply (Unregulated)

To set up the board, use the following procedure:

1. Move SL5 to Position A and move SL7 to Position B.
2. Connect 0 V (GND) to J5 at the terminal labeled AGND.
3. Connect 2.5 V to J5 at the terminal labeled AVDD.
4. Connect −2.5 V to J5 at the terminal labeled AVSS.
5. Connect 3.3 V to J5 at the terminal labeled IOVDD.
6. Connect 7 V to 9 V to either J3 or J4. Connect or disconnect the AVSS terminal of J3 to the AVSS terminal of J5.
7. Connect 7 V to 9 V to either J3 or J4. Connect or disconnect the AVSS terminal of J3 to the AVSS terminal of J5.
8. 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 EVAL-AD7175-8SDZ primary analog inputs can be applied in two separate ways:

- J10, J12, and J14 connectors on the left side of the board
- A0 to A3 SMB/SMA footprints on the evaluation board

The analog inputs route directly to the associated analog input pins on the AD7175-8, provided that the LK5 to LK20 links (on-board noise test) are removed. The AD7175-8 evaluation software is set up to analyze dc inputs to the ADC. The AD7175-8 input buffers work for dc input signals.

### REFERENCE OPTIONS

The EVAL-AD7175-8SDZ includes an external 5 V reference, the ADR445. The AD7175-8 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. Choose the reference in the SETUPCONx registers associated with Setup 0 to Setup 7 to select the reference used for conversions by the AD7175-8.

Change between the internal and external references by accessing the AD7175-8 register map in the evaluation software.

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**Table 3. Power Supply Configurations**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Input Voltage Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Supply</td>
<td>7 V to 9 V</td>
<td>The 7 V to 9 V input is regulated to 5 V for AVDD1/AVDD2 and 3.3 V for IOVDD. This supply also powers the external 5 V reference. See the Single Supply (Regulated) section.</td>
</tr>
<tr>
<td>Single Supply</td>
<td>7 V to 9 V, 5 V, and 3.3 V</td>
<td>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.</td>
</tr>
<tr>
<td>Split Supply</td>
<td>7 V to 9 V and −2.5 V</td>
<td>The 7 V to 9 V input is regulated to 2.5 V for AVDD1/AVDD2 and 3.3 V for IOVDD. The 7 V to 9 V input powers the external 5 V reference, and the −2.5 V input is connected to AVSS directly (unregulated). See the Split Supply (Regulated) section.</td>
</tr>
<tr>
<td>Split Supply</td>
<td>7 V to 9 V, ±2.5 V, and 3.3 V</td>
<td>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.</td>
</tr>
</tbody>
</table>

1 Only one configuration can be used at a time.
EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION

The EVAL-AD7175-8SDZ 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-AD7175-8SDZ 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).
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.
5. A license agreement appears. Read the agreement, select I accept the License Agreement, and click Next.
6. A summary of the installation displays. Click Next to continue.
7. The message in Figure 7 appears when the installation is complete.

![Figure 7. AD717x Eval+ Installation Complete](image)

**Installing the Eval+ Dependencies**

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

1. 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](image)

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

![Figure 9. Eval+ Dependencies Setup, Completing the Driver Setup Wizard](image)

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

![Figure 10. Restarting the PC](image)

**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.

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

![Figure 11. Restarting the PC](image)

2. Follow the steps in the installation wizard to complete the installation.
3. 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.

1. 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.)
2. Check that the board is connecting to the PC correctly using the Device Manager.
3. 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).
4. 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](image)

**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:

1. From the Start menu, click Programs > Analog Devices > AD717x Eval+.
2. 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. AD7175-8 Evaluation Board Selection](image)

3. If the EVAL-AD7175-8SDZ 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](image)

4. The AD717x Eval+ software can also be used without connecting hardware. Click the Simulation button and the options shown in Figure 15 appear. This 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](image)
EVALUATION BOARD SOFTWARE OPERATION

Figure 16. Configuration Tab of the AD7175-8 Eval+ Software in Hardware 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 AD7175-8. 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 AD7175-8. 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 AD7175-8. The AD7175-8 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 sections: 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 AD7175-8, which includes links to the AD7175-8 product page, EVAL-AD7175-8SDZ evaluation board user guide, AD7175-8 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 AD7175-8 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. External MCLK Frequency (15) is only visible on the front panel when an external clock source is selected by the ADC. It 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)

Click the Display Units drop-down menu to select the unit displayed in the graph. This control affects both the waveform graph and the histogram 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 AD7175-8 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 AD7175-8 Eval+ Software
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 allow 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).
**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/fADC and 100% is 2/fADC.

**Step Response (40)**

This section shows timing information about the data rate of the selected output. It shows fADC, Tsettles, and the settling time between conversions, 1/fADC.

**Graph Units (41)**

Use this control to switch the step response between percentages, volts, and codes.
**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.
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).
Figure 24. AD7175-8 Schematic
Figure 26. Power Supply Sequencing Schematic
VID: USE to set I/O voltage max draw 20mA
VIN: Use this pin to power the SDP requires 4-7V 200mA

PMODE: 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

Main I2C bus (Connected blackfin TWI; Pull up resistors not required)

VIN: Use this pin to power the SDP requires 5V 200mA
I2C bus 1 is common across both connectors on SDP – Pull up resistors required
[connected to blackfin GPIO – use I2C_0 first]
Figure 29. Analog Inputs Schematic
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
## BILL OF MATERIALS

<table>
<thead>
<tr>
<th>Name</th>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
<th>Stock Code</th>
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<td>A0 through A3, EXTREF+, EXTREF-, MCLK</td>
<td>Straight PCB mount SMB jack, keep hole clear of solder. Do not insert. Ceramic capacitor, 6.3 V, X5R, 0603, 4.7 μF Capacitor, 0603, 0.1 μF, 16 V</td>
<td>TE Connectivity</td>
<td>1-1337482-0</td>
<td>FEC 173-5527</td>
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<td>C1, C17, C43, C47, C83 through C84</td>
<td>Ceramic capacitor, 10 V, X5R, 0603, 4.7 μF</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<td>C2, C12 through C14, C18, C20 through C21, C34, C38, C44, C50 through C55, C58, C60, C71, C73, C78 through C79, C81, C85, C87, C89, C91, C101 through C102, C15, C45 through C46</td>
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<td>Not applicable</td>
<td>Do not insert</td>
<td></td>
</tr>
<tr>
<td>C16</td>
<td>Ceramic capacitor, not inserted, 0603 Capacitor, 0603, 1 μF, 6.3 V Capacitor, 0805, 50 V, X7R, 1 μF Capacitor, 0603, 1 μF, 6.3V Ceramic capacitor, not inserted, 0402</td>
<td>Multicomp</td>
<td>B0603R104KCT</td>
<td>FEC 940-6140</td>
</tr>
<tr>
<td>C69 through C70, C75 through C76, C93 through C100</td>
<td>Ceramic capacitor, 10 μF, 16 V, X5R, 0805 Ceramic capacitor, 50 V, X5R, 1210 Multilayer ceramic capacitor, 50 V, X7R Red LED, high intensity (&gt;90 mCd), 0603</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
</tr>
<tr>
<td>C10 through C11, C4, C6</td>
<td>Ceramic capacitor, not inserted, 0603 Capacitor, 0603, 1 μF, 6.3 V Capacitor, 0805, 50 V, X7R, 1 μF Capacitor, 0603, 1 μF, 6.3V Ceramic capacitor, not inserted, 0402</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<tr>
<td>C56 through C57, C77, C16</td>
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<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<tr>
<td>C25, C72, C86, C88</td>
<td>Ceramic capacitor, not inserted, 0603 Capacitor, 0603, 1 μF, 6.3 V Capacitor, 0805, 50 V, X7R, 1 μF Capacitor, 0603, 1 μF, 6.3V Ceramic capacitor, not inserted, 0402</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<tr>
<td>C68, C74, C90, C92</td>
<td>Ceramic capacitor, not inserted, 0603 Capacitor, 0603, 1 μF, 6.3 V Capacitor, 0805, 50 V, X7R, 1 μF Capacitor, 0603, 1 μF, 6.3V Ceramic capacitor, not inserted, 0402</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
</tr>
<tr>
<td>D1 through D2, D6</td>
<td>Ceramic capacitor, 10 μF, 16 V, X5R, 0805 Ceramic capacitor, 50 V, X5R, 1210 Multilayer ceramic capacitor, 50 V, X7R Red LED, high intensity (&gt;90 mCd), 0603</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
</tr>
<tr>
<td>D4</td>
<td>Ceramic capacitor, 10 μF, 16 V, X5R, 0805 Ceramic capacitor, 50 V, X5R, 1210 Multilayer ceramic capacitor, 50 V, X7R Red LED, high intensity (&gt;90 mCd), 0603</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<td>D5</td>
<td>Ceramic capacitor, 10 μF, 16 V, X5R, 0805 Ceramic capacitor, 50 V, X5R, 1210 Multilayer ceramic capacitor, 50 V, X7R Red LED, high intensity (&gt;90 mCd), 0603</td>
<td>KEMET Electronics Corp.</td>
<td>C0603C475K8PACTU</td>
<td>FEC 157-2625</td>
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<td>AVSS, GND1 through GND6, REF+, REF−, REFOUT, S1 through S8, S1’ through S8’, TDIN, TDIN1, TDOUT, TDOUT1, TERROR, TERROR1, TP, TSCLK, TSCLK1, TSYNC, TSYNC1, TCS, TCS1</td>
<td>Test point, not inserted, keep hole clear of solder</td>
<td>Not applicable</td>
<td>Do not insert</td>
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<tr>
<td>J1</td>
<td>120-way connector, 0.6 mm pitch PC-SCREWTERM-3WAY</td>
<td>HIROSE</td>
<td>FX8-120S-SV(21)</td>
<td>FEC 1324660</td>
</tr>
<tr>
<td>J2</td>
<td>120-way connector, 0.6 mm pitch PC-SCREWTERM-3WAY</td>
<td>HIROSE</td>
<td>FX8-120S-SV(21)</td>
<td>FEC 1324660</td>
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<tr>
<td>J3</td>
<td>Socket terminal block, 3.81 mm pitch CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4</td>
<td>Phoenix Contact</td>
<td>MC 1.5/3-G-3.81</td>
<td>FEC 370-4737</td>
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<tr>
<td>J4</td>
<td>Socket terminal block, 3.81 mm pitch CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4</td>
<td>Phoenix Contact</td>
<td>MC 1.5/3-G-3.81</td>
<td>FEC 370-4737</td>
</tr>
<tr>
<td>J5</td>
<td>Socket terminal block, 3.81 mm pitch CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4</td>
<td>Phoenix Contact</td>
<td>MC 1.5/3-G-3.81</td>
<td>FEC 370-4737</td>
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<tr>
<td>J6</td>
<td>Socket terminal block, 3.81 mm pitch CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4</td>
<td>Phoenix Contact</td>
<td>MC 1.5/3-G-3.81</td>
<td>FEC 370-4737</td>
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<td>J7</td>
<td>Socket terminal block, 3.81 mm pitch CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4</td>
<td>Phoenix Contact</td>
<td>MC 1.5/3-G-3.81</td>
<td>FEC 370-4737</td>
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<td>J8</td>
<td>Socket terminal block, 3.81 mm pitch CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4</td>
<td>Phoenix Contact</td>
<td>MC 1.5/3-G-3.81</td>
<td>FEC 370-4737</td>
</tr>
</tbody>
</table>

- D1 through D2, D6: Test point, not inserted, keep hole clear of solder
- J1 through J8: 120-way connector, 0.6 mm pitch PC-SCREWTERM-3WAY
- J3 through J8: Socket terminal block, 3.81 mm pitch
- J4 through J8: CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4
- J5 through J8: SCREWTERM-4
- J6 through J8: POWER_SKT_3.81MM_4WAY, keep clear of solder
- J7 through J8: SCREWTERM-4, keep clear of solder
- J8: POWER_SKT_3.81MM_4WAY
- J1 through J8: Test point, not inserted, keep hole clear of solder
- D1 through D6: Test point, not inserted, keep hole clear of solder
- J1 through J8: 120-way connector, 0.6 mm pitch PC-SCREWTERM-3WAY
- J3 through J8: Socket terminal block, 3.81 mm pitch
- J4 through J8: CONN/BBARREL_SMD_2MM_KLDEX-SMT2-0202-A SCREWTERM-4
- J5 through J8: SCREWTERM-4
- J6 through J8: POWER_SKT_3.81MM_4WAY, keep clear of solder
- J7 through J8: SCREWTERM-4, keep clear of solder
- J8: POWER_SKT_3.81MM_4WAY

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<table>
<thead>
<tr>
<th>Name</th>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
<th>Stock Code</th>
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<tbody>
<tr>
<td>J9</td>
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<td>Phoenix Contact</td>
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<td>Phoenix Contact</td>
<td>MC 1,5/ 8-G-3,81</td>
<td>FEC 370-4774 and FEC 370-4956</td>
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<td>Phoenix Contact</td>
<td>MKDS1/6-3.81</td>
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<td>Phoenix Contact</td>
<td>MC 1,5/ 6-G-3,81</td>
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<td>SSW-107-01-T-S</td>
<td>FEB 1803478</td>
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<td>Samtec</td>
<td>TLW-107-05-G-S</td>
<td>FEC 1668499</td>
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<td>TE Connectivity</td>
<td>BMB2A1000LN2</td>
<td>FEC 119-3421</td>
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<td>3-pin (3 x 1) 0.1” header and shorting block in A</td>
<td>Harwin</td>
<td>M20-9990346 and M7566-05</td>
<td>FEC 1022249 and FEC 150-411</td>
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<tr>
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<td>Harwin</td>
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<td>FEC 671915 and FEC 510944</td>
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<td>MMBTC3904LT1G</td>
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<td>Multicomp</td>
<td>MC 0.063W 0603 1% 10 K</td>
<td>FEC 933-0399</td>
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<td>R45</td>
<td>Resistor, thick film, 10 kΩ, 62.5 mW, 5 %</td>
<td>Yageo</td>
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<td>FEC 179-9316</td>
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<td>Vishay</td>
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<td>Vishay</td>
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<td>Vishay</td>
<td>CRCW06030000Z0EA</td>
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<td>Multicomp</td>
<td>MC 0.063W 0603 1% 39K</td>
<td>FEC 9331158</td>
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<td>Name</td>
<td>Part Description</td>
<td>Manufacturer</td>
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<td>Not applicable</td>
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<td>FEC 2141253</td>
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<td>Resistor, thick film, 2.4 kΩ, 0603, 100 mW, 1 %</td>
<td>Yageo</td>
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<td>FEC 1799329</td>
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<td>R66, R75 through R77</td>
<td>Resistor, 0603, thick film, 1 %</td>
<td>Vishay</td>
<td>CRCW06031K00FKEA</td>
<td>FEC 1469740</td>
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<tr>
<td>R74, R103, R106, R131, R134, R141, R144, R151</td>
<td>Resistor, 0603, 1 K</td>
<td>Panasonic</td>
<td>ERA3AB102V</td>
<td>FEC 1577605</td>
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<tr>
<td>R86</td>
<td>Resistor, 0402, 60 K4</td>
<td>Multicomp</td>
<td>MC 0.0625W 0402 1 % 60K4</td>
<td>FEC 1803729</td>
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<tr>
<td>R102, R129, R140, R150</td>
<td>Resistor, 0603, 10R</td>
<td>Bourns Inc.</td>
<td>CR0603-FX-10R0GLF</td>
<td>FEC 2008331</td>
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<tr>
<td>SL0, SL1</td>
<td>4-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;A&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL2, SL3</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;A&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL4</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;A&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL5</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;B&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL6</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Do not insert</td>
</tr>
<tr>
<td>SL7</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;A&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL8</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;A&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL9, SL10</td>
<td>2-way Solder Link (Use 0r 0603 Resistor)</td>
<td>Not applicable</td>
<td>Insert in Link Position &quot;A&quot;</td>
<td>FEC 933-1662</td>
</tr>
<tr>
<td>SL11A</td>
<td>R0603, 0r</td>
<td>Vishay</td>
<td>CRCW06030000Z0EA</td>
<td>FEC 146-9739</td>
</tr>
<tr>
<td>SL11B, S11C</td>
<td>R0603, DNI</td>
<td>Vishay</td>
<td>CRCW06030000Z0EA</td>
<td>Do not insert</td>
</tr>
<tr>
<td>SL12 through SL15</td>
<td>Resistor, 1206, 0R</td>
<td>Multicomp</td>
<td>MC 0.125W 1206 0R</td>
<td>FEC 9336974</td>
</tr>
<tr>
<td>STAR3</td>
<td>Ground link (copper short)</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
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<tr>
<td>U1</td>
<td>32 K i2C Serial EEPROM</td>
<td>Microchip Technology Inc.</td>
<td>24LC32A-I/MS</td>
<td>FEC1331330</td>
</tr>
<tr>
<td>U2</td>
<td>Linear Regulator 5 V, 20 V, 500 mA, Ultralow Noise, CMOS</td>
<td>Analog Devices, Inc.</td>
<td>ADP7104ARDZ-5.0</td>
<td>ADP7104ARDZ-5.0</td>
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<tr>
<td>U3</td>
<td>Quad Voltage Monitor and Sequencer</td>
<td>Analog Devices, Inc.</td>
<td>ADM1185ARMZ-1</td>
<td>ADM1185ARMZ-1</td>
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<tr>
<td>U4</td>
<td>5 V XFET Reference</td>
<td>Analog Devices, Inc.</td>
<td>ADR445BRZ</td>
<td>ADR445BRZ</td>
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<tr>
<td>U5</td>
<td>ADC</td>
<td>Analog Devices, Inc.</td>
<td>AD7175-8B CPZ</td>
<td>AD7175-8B CPZ</td>
</tr>
<tr>
<td>U6</td>
<td>Dual Op-Amp</td>
<td>Analog Devices, Inc.</td>
<td>AD8656ARZ</td>
<td>AD8656ARZ</td>
</tr>
<tr>
<td>U7</td>
<td>Ultra Low Power, Low Distortion ADC Driver, 4nV/rtHz</td>
<td>Analog Devices, Inc.</td>
<td>ADA4940-1ACPZ</td>
<td>ADA4940-1ACPZ</td>
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<tr>
<td>U8</td>
<td>50 mA, High Voltage, Micropower Linear Regulator −5V</td>
<td>Analog Devices, Inc.</td>
<td>ADP1720ARMZ-5-R7</td>
<td>ADP1720ARMZ-5-R7</td>
</tr>
<tr>
<td>U9</td>
<td>Fully Differential Funnel Amplifier</td>
<td>Analog Devices, Inc.</td>
<td>AD8475ARMZ</td>
<td>AD8475ARMZ</td>
</tr>
<tr>
<td>U10</td>
<td>Dual Op-Amp</td>
<td>Analog Devices, Inc.</td>
<td>AD8656ARZ</td>
<td>AD8656ARZ</td>
</tr>
<tr>
<td>U11</td>
<td>Linear Regulator, 50 mA, 3.3 V, MSOP-8</td>
<td>Analog Devices, Inc.</td>
<td>ADP1720ARMZ-3.3-R7</td>
<td>ADP1720ARMZ-3.3-R7</td>
</tr>
<tr>
<td>Name</td>
<td>Part Description</td>
<td>Manufacturer</td>
<td>Part Number</td>
<td>Stock Code</td>
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<tr>
<td>U12</td>
<td>50 mA, High Voltage, Micropower Adjustable Linear Regulator</td>
<td>Analog Devices, Inc.</td>
<td>ADP1720ARMZ-R7</td>
<td>ADP1720ARMZ-R7</td>
</tr>
<tr>
<td>V1 through V4, X1 through X2</td>
<td>Linear Regulator, 50 mA, 3.3 V, MSOP-8</td>
<td>Analog Devices, Inc.</td>
<td>Not applicable</td>
<td>Do not insert</td>
</tr>
<tr>
<td>Y1</td>
<td>Miniature Crystal SMD</td>
<td>Epson</td>
<td>FA-20H, 16 MHz, 10 PPM, 9 PF</td>
<td>FEC 171-2814</td>
</tr>
<tr>
<td>Y2</td>
<td>Ceralock Ceramic Resonator</td>
<td>Murata</td>
<td>CSTCE16M0V53-R0</td>
<td>490-1198-1-ND</td>
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</table>
NOTES

I2C 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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