



# AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/ AD8115-EVALZ/ADV3205-EVALZ User Guide

## UG-818

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## Evaluation Board for the **AD8112, AD8113, AD8114/AD8115, and ADV3205** Analog Crosspoint Switches

### FEATURES

Full featured evaluation board for the **AD8112, AD8113, AD8114/AD8115, and ADV3205**

Uses USB Board Z with PIC18F4550 for the digital control  
 $\pm 5$  V operation

$\pm 12$  V operation for audio applications of **AD8112** and **AD8113**

### EVALUATION KIT CONTENTS

**AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/  
AD8115-EVALZ/ADV3205-EVALZ** evaluation board

6-pin serial wire

Instruction guide for software download

### EQUIPMENT NEEDED

Signal source or video pattern generator and signal analyzer

Power supplies (5 V/1 A and  $\pm 5$  V/1 A)

PC running Windows XP only

Type A to Type B USB 2.0 connector (recommended)

BNC to BNC connector for inputs and outputs

### SOFTWARE NEEDED

For the **AD8112**, use the **ADV3224/ADV3225** control  
software for the  $16 \times 8$  switch array

For the **AD8113**, the **AD8114/AD8115**, and the **ADV3205**, use  
the **ADV3226/ADV3227** control software for the  $16 \times 16$   
switch array

### GENERAL DESCRIPTION

The **AD8112** is a low cost,  $16 \times 8$  fully buffered crosspoint switch matrix, and the **AD8113** is a  $16 \times 16$  fully buffered crosspoint switch matrix. Both products operate on voltage supplies of  $\pm 12$  V for audio applications and of  $\pm 5$  V for video applications, offering a  $-3$  dB signal bandwidth greater than 60 MHz and channel switch times of less than 60 ns with 0.1% settling for use in both analog and digital audio. Both the **AD8112** and the **AD8113** have gain of +2.

The **AD8114/AD8115** are high speed  $16 \times 16$  video crosspoint switch matrices. They offer a  $-3$  dB signal bandwidth greater than 200 MHz and channel switch times of less than 50 ns with

1% settling. The **AD8114/AD8115** include 16 independent output buffers that can be placed into a high impedance state for paralleling crosspoint outputs to prevent off channels from loading the output bus. The **AD8114** has a gain of +1 while the **AD8115** has a gain of +2. They both operate on voltage supplies of  $\pm 5$  V while consuming only 70 mA of idle current. Channel switching is performed via a serial digital control that can accommodate the daisy-chaining of several devices or via a parallel control to allow updating of an individual output without reprogramming the entire array.

The **ADV3205** is a  $16 \times 16$  fully buffered crosspoint switch matrix that operates on  $\pm 5$  V, making it ideal for video applications, and has a gain of +2. The **ADV3205** offers a  $-3$  dB signal bandwidth of 60 MHz and channel switch times of less than 60 ns with 0.1% settling.

The **AD8112**, the **AD8113**, and the **ADV3205** are available in a 100-lead LQFP over the commercial temperature range of  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ . Some applications of these analog crosspoint switches are closed circuit television (CCTV) surveillance/DVR, analog/digital audio routers, video routers (NTSC, PAL, S-video, SECAM), multimedia systems, and video conferencing.

The **AD8114/AD8115** are available in a 100-lead LQFP over the extended industrial temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ . Some applications of these analog crosspoint switches are routing of high speed signals including video (NTSC, PAL, S-video, SECAM, YUV, RGB), compressed video, three-level digital video, data communications, and telecommunications.

The **AD8112, AD8113, AD8114/AD8115, and ADV3205** are all pin-compatible with each other and are available in the same 100-lead LQFP, which can be evaluated on a single board.

This user guide provides all of the supporting documents and software for the evaluation of the **AD8112, AD8113, AD8114/AD8115, and ADV3205**. Complete specifications for the **AD8112, AD8113, AD8114/AD8115, and ADV3205** are available in the **AD8112, AD8113, AD8114/AD8115, and ADV3205** data sheets available from Analog Devices, Inc., and should be consulted when working with the evaluation board.

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## REVISION HISTORY

3/15—Revision 0: Initial Version

### EVALUATION BOARD PHOTOGRAPH AND BLOCK DIAGRAM

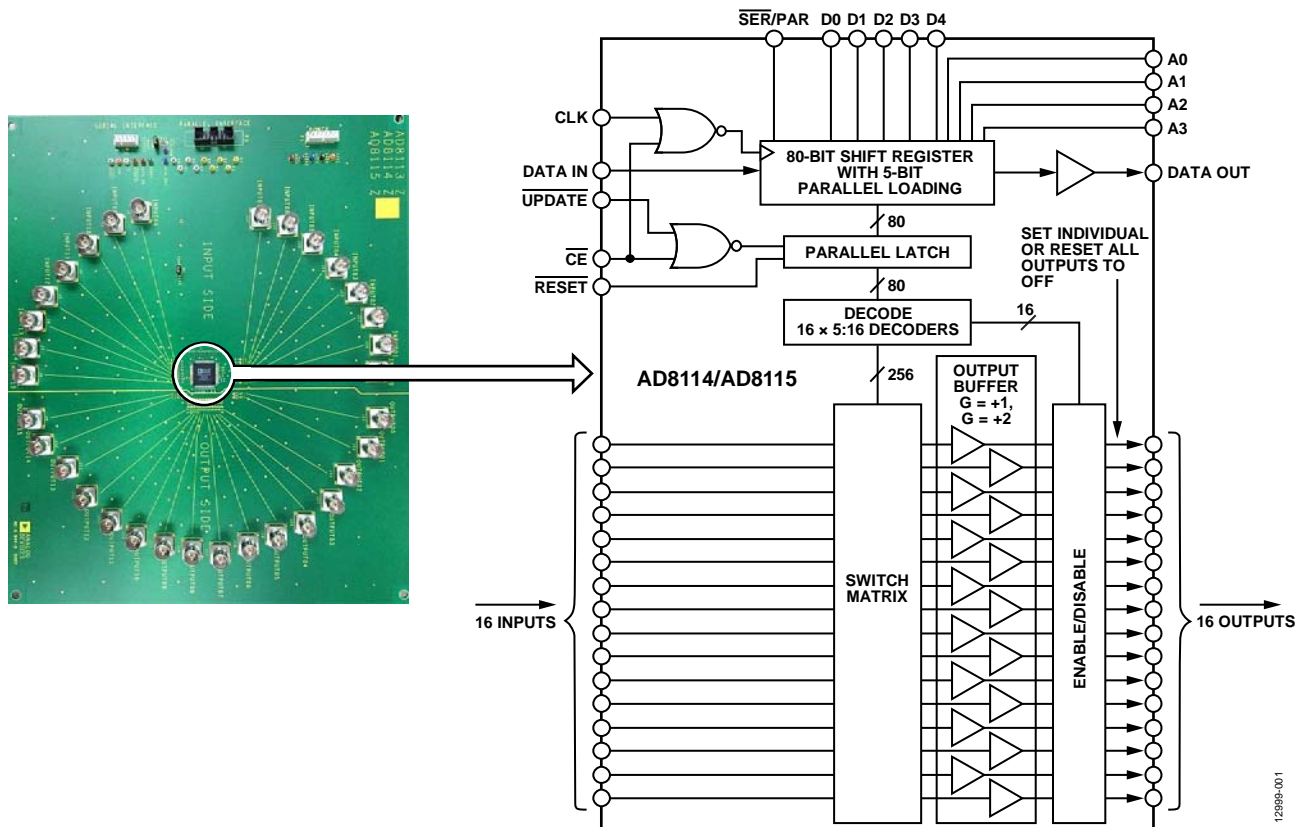


Figure 1.

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# EVALUATION BOARD HARDWARE

## INTRODUCTION

The [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board allow the user to easily evaluate the [AD8112](#), the [AD8113](#), the [AD8114/AD8115](#), and the [ADV3205](#) in their various modes and configurations. Figure 2 shows the typical bench setup used to evaluate the five analog crosspoint switches.

## POWER SUPPLY

The [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board requires a typical  $\pm 5$  V power supply for the analog circuitry and a +5 V single supply for the digital circuitry. When using the [AD8112](#) and the [AD8113](#) in audio applications, use +12 V in AVCC and -12 V in AVEE. Connect the supplies as shown in Figure 2.

## ANALOG INPUTS

Drive any or all of the inputs, INPUT00 to INPUT15, with a waveform generator, video pattern generator, or any signal source that can provide an input voltage of  $\pm 1.5$  V for both the [AD8112](#) and the [AD8113](#) in video application and  $\pm 5$  V for both the [AD8112](#) and the [AD8113](#) in audio application. For the [AD8114/AD8115](#), the input voltage range is between  $\pm 3.5$  V. The [ADV3205](#) has an input voltage range of  $\pm 1.5$  V. All inputs are terminated with  $75 \Omega$  termination resistors.

For audio applications of the [AD8112](#) and the [AD8113](#), input terminations can be removed and changed because audio signals are not as demanding on termination as video signals.

## ANALOG OUTPUTS

The 16 outputs, terminated with  $75 \Omega$  termination resistors of the [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board can be disabled using the **Reset** button. The waveform signal from each or from all of the outputs is checked using a signal analyzer such as an oscilloscope or display/monitor.

For audio applications of the [AD8112](#) and the [AD8113](#), output series terminations can be shorted or changed in value because audio signals are not as demanding on termination as video signals.

## USB BOARD Z

The USB Board Z uses a PIC18F4550 microcontroller to control the inputs and outputs of the crosspoint switch. The USB Board Z has a USB port that easily connects the USB Board Z to the PC to access the evaluation board control software. A 6-pin serial wire connects the USB board Z to the [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board.

## QUICK START GUIDE

Take the following steps to test the functionality and performance of the evaluation board:

1. Remove the [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board from its packaging.
2. Connect the external bench top power supply to P1 of the [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board (or optionally from test points AVCC to DVCC). The power supply voltage for video applications is  $\pm 5$  V, and it is  $\pm 12$  V for audio applications (applicable for the [AD8112-EVALZ/AD8113-EVALZ](#) only).
3. Connect the serial wire between P2 of the [AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board and P1 of the USB Board Z.
4. Connect the Type A to Type B USB connector between the USB Board Z and the PC control. When completed, CR1 and CR2 of the USB Board Z light alternatingly, and CR3 lights steadily.
5. Connect an input signal that is within the input voltage range of the device through the BNC to BNC connector between the signal generator or the video pattern generator and IN00.
6. Connect an oscilloscope or display/monitor to OUTPUT00 through the BNC to BNC connector.
7. Open the evaluation board control software (see the [Installing the Evaluation Software](#) section for details on downloading the software) and then click **0** on the first row, first column to enable INPUT00 and to enable OUTPUT00.

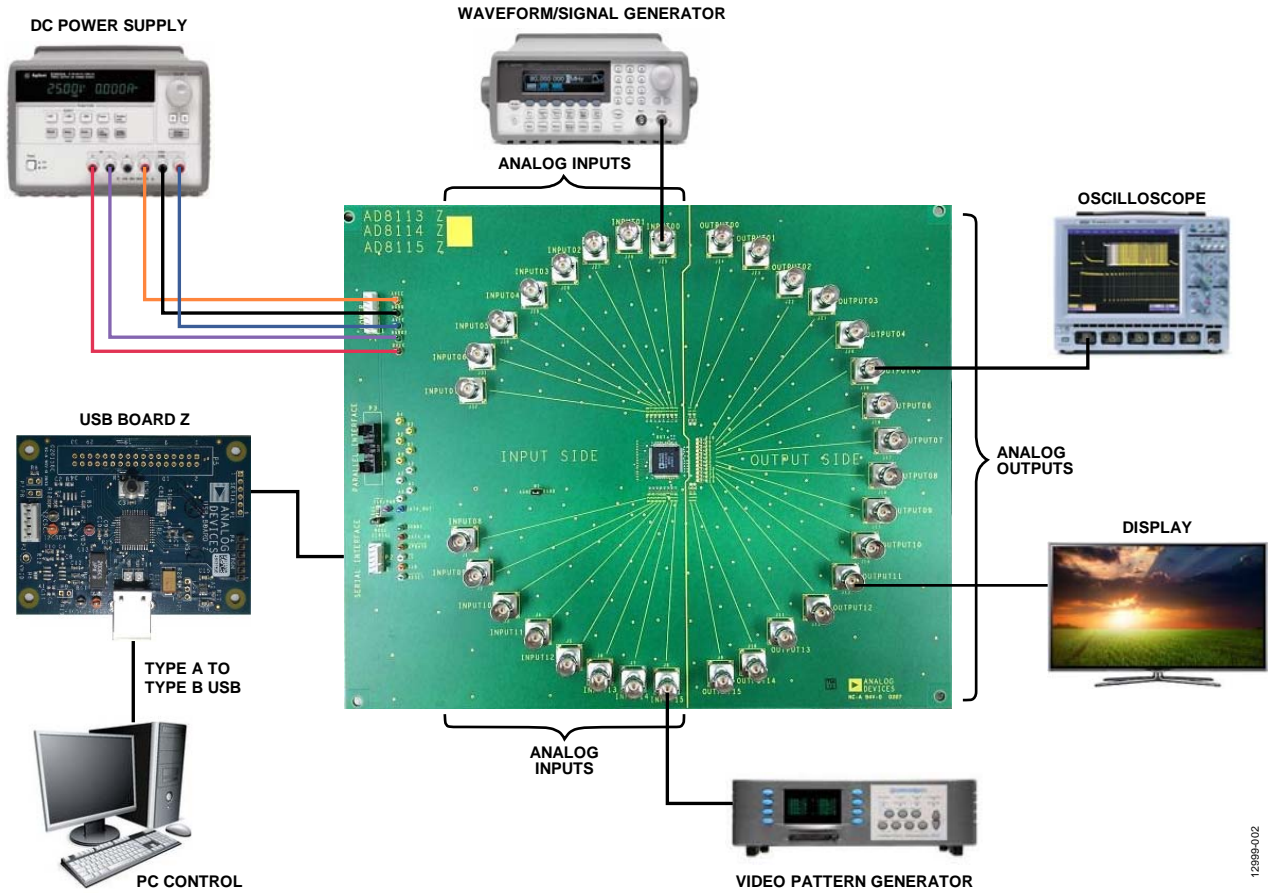


Figure 2. Typical Evaluation Setup

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## EVALUATION BOARD CONTROL SOFTWARE

This evaluation board is configured with a USB friendly interface to allow programmability of the [AD8112](#), the [AD8113](#), the [AD8114/AD8115](#), and the [ADV3205](#) registers.

Parallel and serial programming, using the P1 and P3 connectors on the evaluation board, can also be done; however, these are not focused on in this user guide. For more information on these two programming modes, see the [AD8112](#), the [AD8113](#), the [AD8114/AD8115](#), and the [ADV3205](#) data sheets.

The [AD8112-EVALZ](#) evaluation board uses the same evaluation software as the [ADV3224-EVALZ/ADV3225-EVALZ](#) evaluation board and the [AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ](#) evaluation board are compatible with the evaluation software of the [ADV3226-EVALZ/ADV3227-EVALZ](#) evaluation board.

### INSTALLING THE EVALUATION SOFTWARE

The following instructions describe the procedure to install the control software onto a Windows® PC running an XP operating system.

Note that the software can be installed in other operating systems, such as Windows 7 or Windows 8; however, any commands by the user in the graphic user interface (GUI) are not read, and the **Unhandled exception has occurred in your application** error appears, as shown in Figure 3. The same error message appears when the software is activated; however, the USB connector is not connected to the evaluation board.

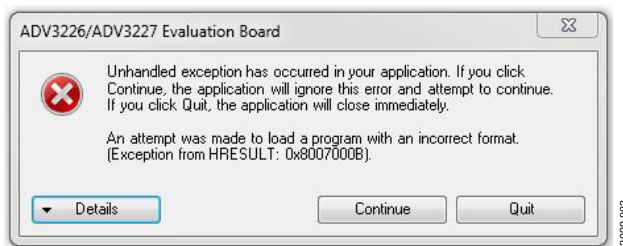


Figure 3. [ADV3226/ADV3227](#) Evaluation Board—Error Message

To install the software, take the following steps:

1. Download the control software at <https://ez.analog.com/docs/DOC-11329> for the [AD8112](#) and at <https://ez.analog.com/docs/DOC-11380> for the [AD8113](#), [AD8114/AD8115](#), and [ADV3205](#).
2. Extract the .zip file and open or run the .exe file. The GUI opens, as shown in Figure 4. By default, all inputs and outputs are disabled even though an input signal is present at the input port of the evaluation board.

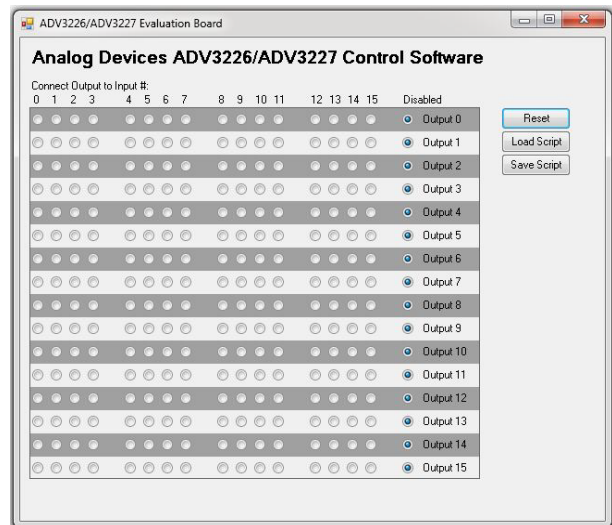


Figure 4. GUI Window for [ADV3226/ADV3227](#) Control Software for the [ADV3226/ADV3227](#) Evaluation Board

# EVALUATION BOARD SCHEMATIC AND ARTWORK

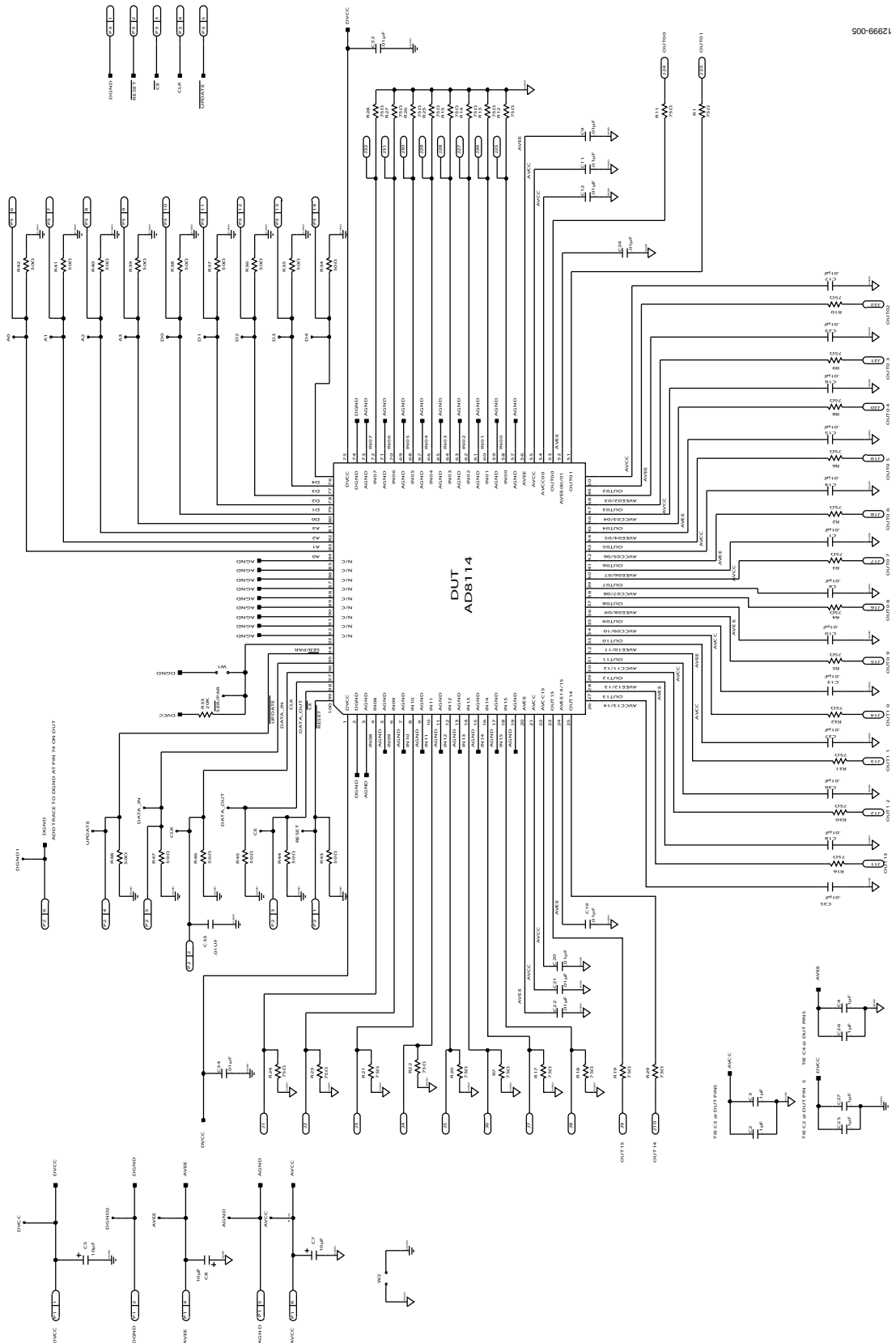


Figure 5. Evaluation Board Schematic

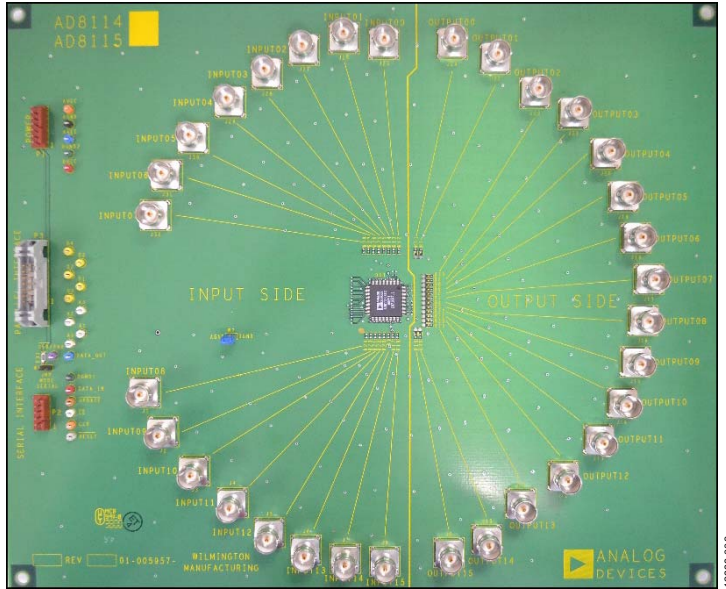


Figure 6. AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ Evaluation Board, Top View

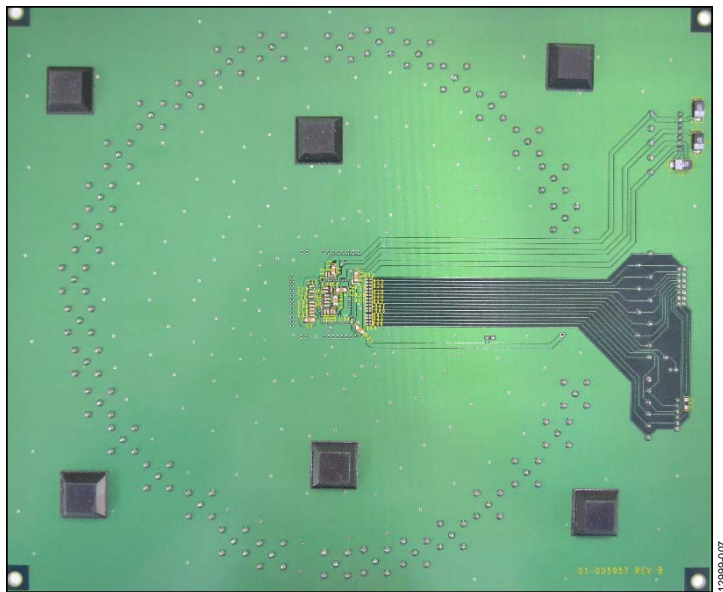


Figure 7. AD8112-EVALZ/AD8113-EVALZ/AD8114-EVALZ/AD8115-EVALZ/ADV3205-EVALZ Evaluation Board, Bottom View



## ORDERING INFORMATION

### BILL OF MATERIALS

Table 1.

| Item | Quantity | Reference Designator          | Description                                                                                                                       | Stock Number   |
|------|----------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------|
| 1    | 1        |                               | Printed circuit board                                                                                                             | 08-005957      |
| 2    | 6        | C2, C3, C4, C25, C26, C27     | 0.1 $\mu$ F ceramic chip capacitors                                                                                               | ADS # 4-5-18   |
| 3    | 4        | C5, C6, C7, C8                | 10 $\mu$ F, tantalum chip capacitors                                                                                              | ADS # 4-7-2    |
| 4    | 24       | C1, C6, C9 to C24, C32 to C37 | 0.01 $\mu$ F chip capacitors                                                                                                      | ADS # 4-5-105  |
| 5    | 32       | R1 to R32                     | 75 $\Omega$ chip resistors, 1/16 W, 1%                                                                                            | ADS # 3-35-1   |
| 6    | 1        | R33                           | 20 k $\Omega$ chip resistor, 1/8 W, 1%                                                                                            | ADS # 3-18-26  |
| 7    | 15       | R34 to R48                    | 50 $\Omega$ chip resistors, do not install these resistors unless another parallel interface is used aside from the USB Board Z   | ADS # 3-35-3   |
| 8    | 32       | J1 to J32                     | 75 $\Omega$ BNC connectors                                                                                                        | Do not install |
| 9    | 1        | P3                            | 14-pin connector, straight                                                                                                        | ADS # 12-3-62  |
| 10   | 1        | P1                            | 7-pin connector, header                                                                                                           | ADS # 12-3-61  |
| 11   | 1        | P2                            | 6-pin connector, header                                                                                                           | ADS # 12-3-60  |
| 12   | 1        | DUT1                          | IC <a href="#">AD8112</a> , <a href="#">AD8113</a> , <a href="#">AD8114</a> , <a href="#">AD8115</a> , or <a href="#">ADV3205</a> | Do not install |
| 13   | 1        | AGND                          | Test point, black                                                                                                                 | ADS # 12-18-44 |
| 14   | 1        | UPDATE                        | Test point, brown                                                                                                                 | ADS # 12-18-59 |
| 15   | 2        | DVCC, DATA_IN                 | Test points, red                                                                                                                  | ADS # 12-18-43 |
| 16   | 2        | CLK, AVCC                     | Test points, orange                                                                                                               | ADS # 12-18-60 |
| 17   | 6        | DATA_OUT, D0, D1, D2, D3, D4  | Test points, yellow                                                                                                               | ADS # 12-18-32 |
| 18   | 2        | DGND1, DGND2                  | Test points, green                                                                                                                | ADS # 12-18-61 |
| 19   | 2        | AVEE, DATA_OUT                | Test points, blue                                                                                                                 | ADS # 12-18-62 |
| 20   | 1        | SER/PAR                       | Test points, violet                                                                                                               | ADS # 12-18-63 |
| 21   | 5        | CE, A0, A1, A2, A3            | Test points, white                                                                                                                | ADS # 12-18-42 |
| 22   | 1        | RESET                         | Test points, grey                                                                                                                 | ADS # 12-18-64 |
| 23   | 6        | Not applicable                | Large, self adhesive bumper pads                                                                                                  | ADS # 31-1-3   |
| 24   | 2        | W1, W2                        | 2-pin headers, male                                                                                                               | ADS # 11-2-37  |
| 25   | 2        | W1, W2                        | 2-pin jumpers, female                                                                                                             | ADS # 11-2-38  |

## NOTES



### 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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