

### FEATURES

**4-channel data acquisition board**  
**22-bit resolution**  
**PC printer port compatible**

### INTRODUCTION

The EVAL-AD7716EBZ demonstrates the AD7716, 4-channel, 22-bit ADC. This high resolution ADC is ideally suited for biomedical data acquisition systems, such as ECG and EEG, as well as general data acquisition applications.

Refer to the [AD7716](#) data sheet in conjunction with this evaluation board when using the evaluation board. Included on the evaluation board with the AD7716 are four input buffers, a voltage reference, a crystal oscillator, output interface circuitry, and a 25-way D-type connector. The board comes complete with a cable for connecting directly to the printer port of a PC.

### FUNCTIONAL BLOCK DIAGRAM

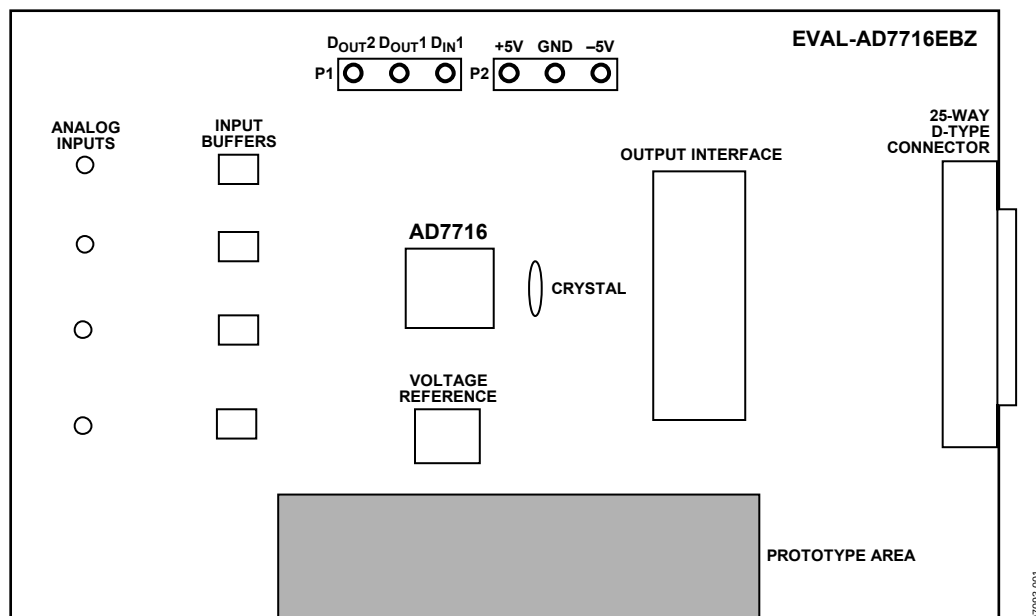


Figure 1.

07099-001

#### Rev. C

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REVISION HISTORY

11/07—Rev. B to Rev. C

Changes to Features Section and Introduction Section ..... 1

Changes to Hardware Description Section and Board

    Capabilities Section..... 3

    Deleted Software Description Section ..... 4

    Changes to Figure 3..... 4

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    Added Ordering Information Section ..... 5

## HARDWARE DESCRIPTION

The EVAL-AD7716EBZ circuit diagram, shown in Figure 3, is powered by  $\pm 5$  V supplies that are connected to VDD and VSS. All analog and digital circuitry on the board is powered from these supplies.

### ANALOG SECTION

The [OP07](#) input buffers are low noise, low bandwidth op amps and are ideal for buffering the low bandwidth signals that the AD7716 digitizes. They have a specified noise spectral density of  $11 \text{ nV}/\sqrt{\text{Hz}}$  at 600 Hz. This corresponds to an rms noise of  $0.25 \text{ }\mu\text{V}$  in the band, which is more than adequate for the AD7716.

The [AD780](#) reference is the recommended reference for these low noise applications. It provides the necessary 2.5 V reference for the device. It is chosen for its very low noise in the programmed pass band. The [AD780](#) has a typical noise spectral density of  $100 \text{ nV}/\sqrt{\text{Hz}}$  at 600 Hz. This corresponds to an rms noise of  $2.5 \text{ }\mu\text{V}$  in this band, which is more than adequate for the AD7716.

### DIGITAL SECTION

The AD7716 accepts one digital input to the  $D_{\text{IN}1}$  pin and allows transmission back to the host processor. The  $D_{\text{IN}1}$  input is clearly identified at P1 on the board.

The device also allows the user to program two digital outputs. These outputs are available on  $D_{\text{OUT}1}$  and  $D_{\text{OUT}2}$  and the state of these outputs are displayed on the two LEDs, D1 and D2. Note that  $D_{\text{OUT}1}$  and  $D_{\text{OUT}2}$  are also available on P1.

The EVAL-AD7716EBZ has an on-board 8 MHz crystal oscillator to run the device. This standard parallel resonance crystal has two 15 pF capacitors connected for stable operation. On the digital side of the AD7716, the circuitry is designed to simplify the printer port interface. The SDATA pin of the device is bidirectional and is separated into two data lines ( $\text{SDATA}_{\text{IN}}$  and  $\text{SDATA}_{\text{OUT}}$ ) by IC8. The  $\overline{\text{DRDY}}$  output pin is used as the handshake signal for the printer port.

CASCIN and CASCOUT are made available on J2. These signals allow multiple AD7716s to be hooked together simply in multi-device applications.

### BOARD CAPABILITIES

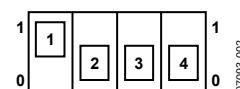
The EVAL-AD7716EBZ allows the digital filter in the AD7716 to be programmed for three cutoff frequencies: 36.5 Hz, 73 Hz, and 146 Hz. The device itself is capable of operating at two other cutoff frequencies: 292 Hz and 584 Hz. However, at these higher cutoff frequencies, it is not possible to transfer all the device data (128 bits) in the time available, given the speed of the printer port interface, which is why this feature is not offered with this package. If operation at the higher cutoff frequencies is desired, it is recommended that the user interface the EVAL-AD7716EBZ to a microcontroller or a DSP microcomputer over a faster serial port.

### LINKS AND SWITCHES

Links and switches on the board and their functions are described in Table 1.

**Table 1. Evaluation Board Links and Switches**

| Link or Switch          | Description                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LK1                     | Normally Not Connected. This link connects the CASCOUT pin to the CASCIN pin of the AD7716. When the device is operated in this fashion, a reset must be applied after every write to the control register.                                                                                                                                                                                                      |
| LK2                     | Normally Connected. This link connects the inverse of $\overline{\text{DRDY}}$ to the CASCIN pin of the AD7716. When used in this fashion, only one reset is needed at the start of the operation. The control register may be written to without further resets.                                                                                                                                                |
| LK3                     | Normally Not Connected. This link allows IC8 to be bypassed in applications where the user wishes to keep a common SDATA line.                                                                                                                                                                                                                                                                                   |
| LK4                     | Normally Not Connected. This link, in association with LK14, allows IC8 to be bypassed.                                                                                                                                                                                                                                                                                                                          |
| SW2-1                   | This switch, when positioned as shown in Figure 2, sets the MODE pin of the AD7716 to high. This sets up the device for the slave mode interface, which is the interface mode employed when connected to the PC. In this mode, the AD7716 is the slave in the system and the processor is the master.                                                                                                            |
| SW2-2, SW2-3, and SW2-4 | These three switches, when positioned as shown in Figure 2, set the device address pins (A0, A1, A2) of the AD7716 to 000. This information is contained in the data stream going back to the processor. In a multidevice system, it is possible to have eight discrete addresses for eight AD7716s, making a 32-channel data acquisition system. See the <a href="#">AD7716</a> data sheet for further details. |



*Figure 2. SW2 Default Settings*

# EVAL-AD7716

## CIRCUIT DIAGRAM

600-6602.0

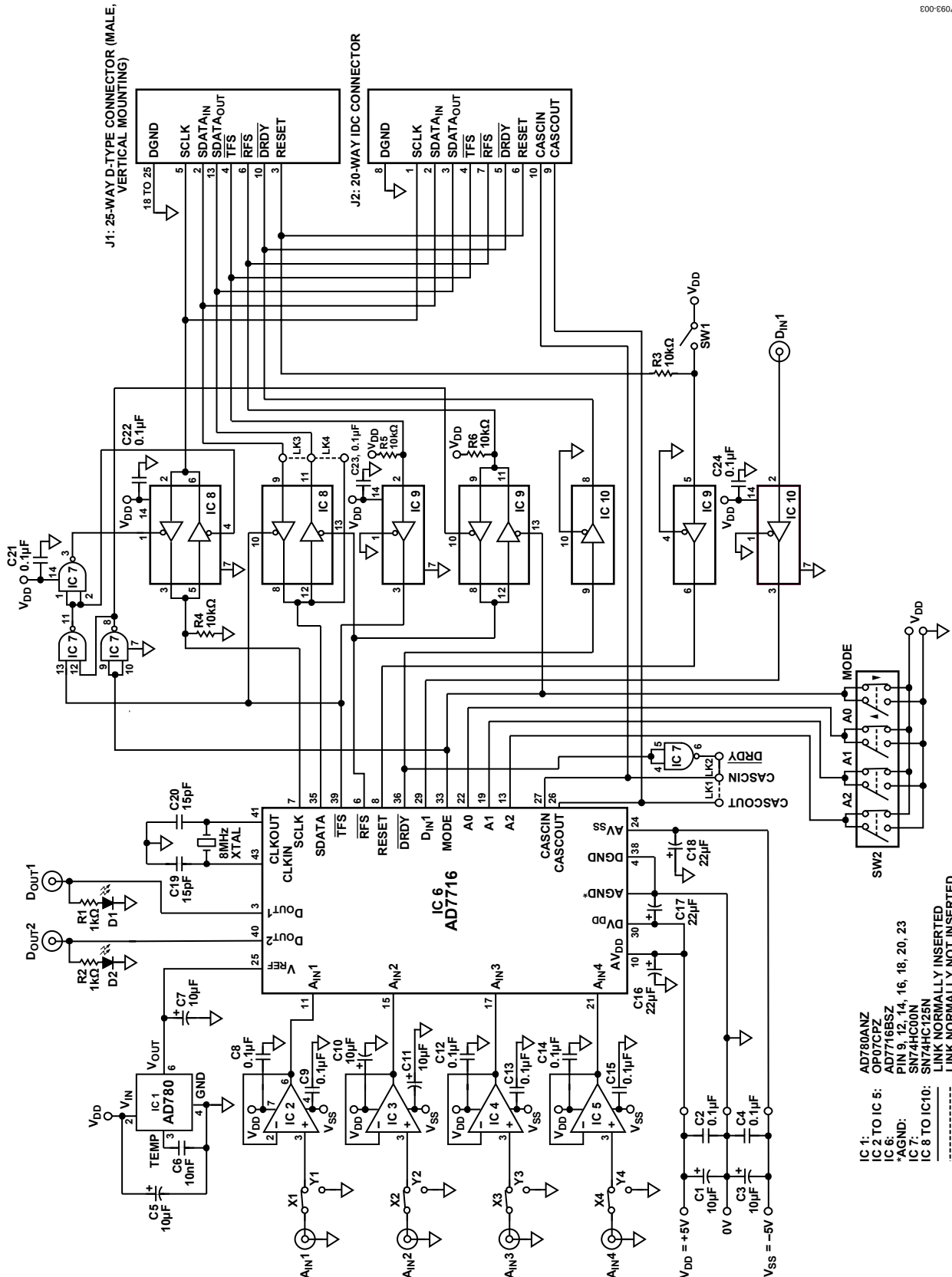


Figure 3. EVAL-AD7716EBZ Circuit Diagram

## ORDERING INFORMATION

### ORDERING GUIDE

| Model                       | Description      |
|-----------------------------|------------------|
| EVAL-AD7716EBZ <sup>1</sup> | Evaluation Board |

<sup>1</sup> Z = RoHS Compliant Part.

### 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.

**EVAL-AD7716**

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