

## Evaluating the **ADXL356/ADXL357** Low Noise, Low Drift, Low Power, 3-Axis MEMS Accelerometers

### FEATURES

- 2 sets of spaced vias for populating 6-pin headers
- Easily attaches to prototyping board or PCB
- Small size and board stiffness minimizes impact on the user system and acceleration measurements

### EQUIPMENT NEEDED

External host processor

### DOCUMENTS NEEDED

[ADXL356/ADXL357 data sheet](#)

### GENERAL DESCRIPTION

The [EVAL-ADXL356BZ](#), the [EVAL-ADXL356CZ](#), and the [EVAL-ADXL357Z](#) are evaluation boards that allow quick evaluation of the performance of the [ADXL356](#) and the [ADXL357](#) low noise, low power, 3-axis, MEMS accelerometers. The [EVAL-ADXL356BZ](#) is an analog output supporting a  $\pm 10$  g or  $\pm 20$  g accelerometer, the [EVAL-ADXL356CZ](#) is an analog output supporting a  $\pm 10$  g or  $\pm 40$  g, and the [EVAL-ADXL357Z](#) is a digital output supporting a  $\pm 10.24$  g,  $\pm 20.48$  g, or  $\pm 40.96$  g accelerometer.

These evaluation boards are ideal for evaluating the [ADXL356](#) and [ADXL357](#) in an existing system because the stiffness and the small size of the evaluation board minimize the effect of the board on both the system and acceleration measurements.

Full details about the [ADXL356/ADXL357](#) are available in the [ADXL356/ADXL357 data sheet](#), which is available from Analog Devices, Inc., and must be consulted in conjunction with this user guide when using this evaluation board.

Note that the layout for the [EVAL-ADXL354BZ/EVAL-ADXL354CZ](#) applies to both the [EVAL-ADXL354BZ/EVAL-ADXL354CZ](#) and the [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#), and that the layout for the [EVAL-ADXL355Z](#) applies to both the [EVAL-ADXL355Z](#) and the [EVAL-ADXL357Z](#).

### EVALUATION BOARD PHOTOGRAPHS



Figure 1. [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#)



Figure 2. [EVAL-ADXL357Z](#)

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**REVISION HISTORY**

**9/2018—Rev. 0 to Rev. A**

Changed Printed Circuit Board Layouts Section to Evaluation Board Photographs Section.....	1
Replaced Figure 1 and Figure 2 .....	1
Changes to General Description Section .....	1
Changes to Evaluation Board Hardware Section, Figure 3, Figure 4, Figure 5, Figure 6, and Circuit Description Section....	3
Changes to Figure 7 and Figure 8.....	4
Changes to Table 1 and Table 2.....	5

**2/2017—Revision 0: Initial Version**

## EVALUATION BOARD HARDWARE

The [EVAL-ADXL356BZ](#), the [EVAL-ADXL356CZ](#), and the [EVAL-ADXL357Z](#) allow users to access the individual connections of the [ADXL356](#) and the [ADXL357](#). Each of the evaluation boards includes decoupling capacitors for the supplies, a few discrete resistors that provide isolation on the  $V_{1P8ANA}$  and  $V_{1P8DIG}$  pins, and two 6-pin headers. Refer to the [ADXL356/ADXL357](#) data sheet for more details on the specific pin definitions. The power supplies for the [ADXL356](#) and the [ADXL357](#) are decoupled using multiple 0.1  $\mu\text{F}$  ceramic (0603) capacitors.

The [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#) has capacitors on each axis output to set the output low-pass filter and two 3-position jumpers to configure RANGE and MODE (tied to the [ADXL356](#) STBY pin). The two 6-pin headers provide access to all other pins.

Header P1 provides access to  $V_{DDIO}$  (used to set the RANGE pin and the STBY levels on the [ADXL356](#)),  $V_{DD}$  (which supplies the [ADXL356](#)  $V_{SUPPLY}$  pin),  $V_{SS}/V_{SSIO}$  (supply common connection), and  $X_{OUT}$ ,  $Y_{OUT}$ , and  $Z_{OUT}$ , as shown in Figure 3.

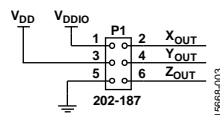


Figure 3. [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#) Functional Block Diagram for Header P1

Header P2 provides access to  $V_{1P8ANA}$ ,  $V_{1P8DIG}$ , TEMP, ST1, ST2, and  $V_{SS}$  (supply common connection), as shown in Figure 4.

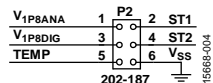


Figure 4. [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#) Functional Block Diagram for Header P2

The [EVAL-ADXL357Z](#) uses two 6-pin headers to provide access to all pins. Header P1 provides access to  $V_{DDIO}$ ,  $V_{DD}$  (which connects to the [ADXL357](#)  $V_{SUPPLY}$  pin),  $V_{SS}/V_{SSIO}$  (supply common connection), INT1, INT2, and DRDY, as shown in Figure 5.

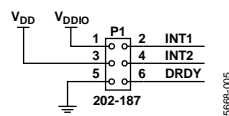


Figure 5. [EVAL-ADXL357Z](#) Functional Block Diagram for Header P1

Header P2 provides access to  $V_{1P8ANA}$ ,  $V_{1P8DIG}$ , MISO/ASEL,  $\overline{\text{CS}}$ /SCL, SCLK/ $V_{SSIO}$ , and MOSI/SDA, as shown in Figure 6.

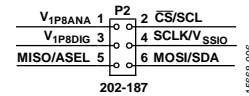


Figure 6. [EVAL-ADXL357Z](#) Functional Block Diagram for Header P2

The vias or headers allow the evaluation boards to attach to either a prototyping breadboard or a printed circuit board (PCB) in an existing user system. Four holes are provided in the corners of the evaluation boards for mechanical attachment of the evaluation boards in many applications. An external host processor is required for communication to the [ADXL357](#). The analog output of the [ADXL356](#) must be connected to a band limited analog-to-digital converter (ADC).

The dimensions of the evaluation boards are 0.8 in.  $\times$  0.8 in.

## CIRCUIT DESCRIPTION

The evaluation board photograph of the [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#) is shown in Figure 1, and the evaluation board photograph of the [EVAL-ADXL357Z](#) is shown in Figure 2. The [ADXL356/ADXL357](#) each have two power modes. They can be powered either by integrated, low dropout (LDO) regulators or by external user supplied 1.8 V regulated supplies. Refer to the [ADXL356/ADXL357](#) data sheet for more information.

## HANDLING CONSIDERATIONS

The [EVAL-ADXL356BZ](#), the [EVAL-ADXL356CZ](#), and the [EVAL-ADXL357Z](#) are not reverse polarity protected. Reversing any of the supply connections, including the  $V_{SS}$  and the  $V_{SSIO}$  pins, can cause damage to the [ADXL356/ADXL357](#).

Dropping the evaluation boards on a hard surface can generate several thousand g of acceleration, which can exceed the [ADXL356/ADXL357](#) data sheet absolute maximum limits.

### EVALUATION BOARD SCHEMATICS

Note that the layout for the [EVAL-ADXL354BZ/EVAL-ADXL354CZ](#) applies to both the [EVAL-ADXL354BZ/EVAL-ADXL354CZ](#) and the [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#)

(see Figure 1), and that the layout for the [EVAL-ADXL355Z](#) applies to both the [EVAL-ADXL355Z](#) and the [EVAL-ADXL357Z](#) (see Figure 2).

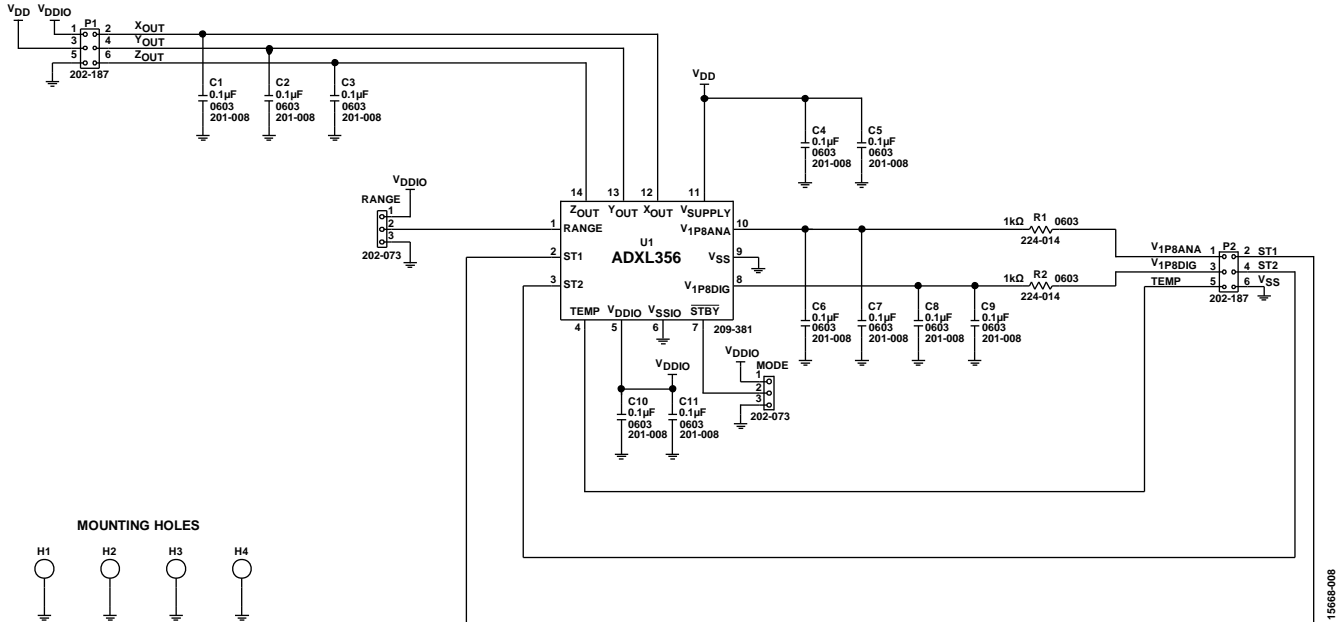


Figure 7. EVAL-ADXL356BZ/EVAL-ADXL356CZ Schematic

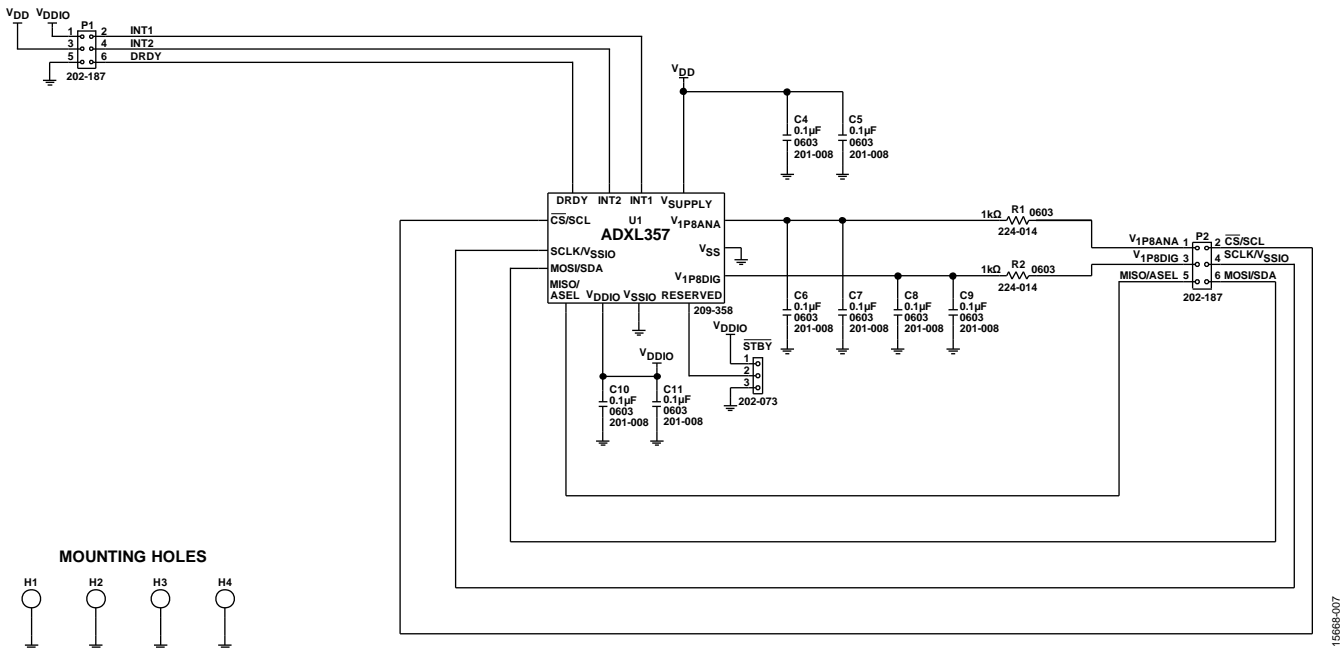


Figure 8. EVAL-ADXL357Z Schematic

## ORDERING INFORMATION

### BILL OF MATERIALS

Table 1. Bill of Materials for the [EVAL-ADXL356BZ/EVAL-ADXL356CZ](#)

Qty	Reference Designator	Description	Manufacturer	Part Number
1	U1	High performance, 3-axis MEMS accelerometer, 14-terminal LCC	Analog Devices, Inc.	<a href="#">ADXL356</a>
11	C1 to C11	Capacitors, ceramic, 0.1 $\mu$ F, 50 V, 10%, X7R, 0603	Cal-Chip	GMC10X7R104K50NTLF
2	R1, R2	Resistors, 1 k $\Omega$ , 0.1 W, 1%, 0603	Cal-Chip	CR0603F1001T1LF
2	MODE, RANGE	Jumpers, 3-position, through hole	Prolex	2556P03UA00
2	P1, P2	Headers, male, nonshrouded, 2 $\times$ 3, 0.1 in. spacing, through hole, do not insert	FCI	67996-206HLF
1	PCB	<a href="#">EVAL-ADXL356BZ/EVAL-ADXL356CZ</a>	Analog Devices, Inc.	

Table 2. Bill of Materials for the [EVAL-ADXL357Z](#)

Qty	Reference Designator	Description	Manufacturer	Part Number
1	U1	High performance, 3-axis MEMS accelerometer, 14-terminal LCC	Analog Devices, Inc.	<a href="#">ADXL357</a>
8	C4 to C11	Capacitors, ceramic, 0.1 $\mu$ F, 50 V, 10%, X7R, 0603	Cal-Chip	GMC10X7R104K50NTLF
2	R1, R2	Resistors, 1 k $\Omega$ , 0.1 W, 1%, 0603	Cal-Chip	CR0603F1001T1LF
1	STBY	Jumper, 3-position, through hole	Prolex	2556P03UA00
2	P1, P2	Headers, male, nonshrouded, 2 $\times$ 3, 0.1 in. spacing, through hole, do not insert	FCI	67996-206HLF
1	PCB	<a href="#">EVAL-ADXL357Z</a>	Analog Devices, Inc.	



#### 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.

#### Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.