EVAL-AD5327DBZ User Guide
UG-929

One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 • www.analog.com

Evaluation Board for the AD5327 12-Bit, Quad Channel, Voltage Output Digital-to-Analog Converter (DAC)

FEATURES

- Full featured evaluation board in conjunction with *nano*DAC motherboard (EVAL-MBnanoDAC-SDZ)
- On-board references
- Various link options
- PC control in conjunction with Analog Devices, Inc., system demonstration platform (SDP)

PACKAGE CONTENTS

- EVAL-AD5327DBZ evaluation board
- EVAL-MBnanoDAC-SDZ motherboard

SOFTWARE REQUIRED

- EVAL-AD5327DBZ evaluation software

HARDWARE REQUIRED

- EVAL-SDP-CB1Z board (SDP-B controller board), must be purchased separately

GENERAL DESCRIPTION

This user guide details the operation of the evaluation board for the AD5327 quad channel, voltage output DAC.

The evaluation board is designed to help users quickly prototype new AD5327 circuits and reduce design time. The AD5327 operates from a single 2.5 V to 5.5 V supply.

For full details, see the AD5327 data sheet, which must be consulted in conjunction with this user guide when using the EVAL-AD5327DBZ evaluation board.

The evaluation board interfaces to the USB port of a PC via the SDP-B board. Software is supplied with the evaluation board to allow the user to program the AD5327.

This evaluation board requires the SDP-B controller board (EVAL-SDP-CB1Z), which is available for order on the Analog Devices website www.analog.com.

EVAL-AD5327DBZ, EVAL-MBnanoDAC-SDZ, AND SDP-B BOARDS

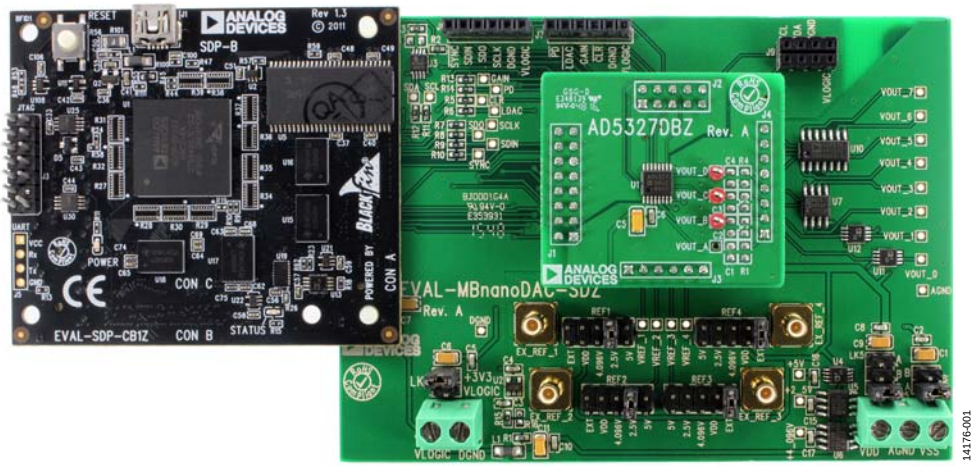

Figure 1.

TABLE OF CONTENTS

REVISION HISTORY

3/2017—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The *nano*DAC® EVAL-MBnanoDAC-SDZ motherboard supports single and dual power supplies.

The EVAL-AD5327DBZ evaluation board can be powered either from the SDP-B port or externally by the J5 and J6 connectors, as described in Table 1.

Both AGND and DGND inputs are provided on the board. The AGND and DGND planes are connected at one location on the EVAL-MBnanoDAC-SDZ. It is recommended that AGND and DGND not be connected elsewhere in the system to avoid ground loop problems.

All supplies are decoupled to ground with 10 µF tantalum and 0.1 µF ceramic capacitors.

Table 1. Power Supply Connectors

Connector No.	Label	Voltage
J5, Pin 1 (J5-1)	VDD	Analog positive power supply, V_{DD} Single and dual supply, 5.5 V
J5, Pin 2 (J5-2)	AGND	Analog ground
J5, Pin 3 (J5-3)	VSS	Analog negative power supply, V_{SS} Dual supply, −5.5 V
J6, Pin 1 (J6-1)	VLOGIC	Digital supply from 1.8 V to V_{DD}
J6, Pin 2 (J6-2)	DGND	Digital ground

LINK OPTIONS

Various link options are incorporated in the EVAL-MBnanoDAC-SDZ and must be set for the required operating conditions before using the evaluation board. Table 2 describes the positions of the links to control the evaluation board via the SDP-B board using a PC and external power supplies. The functions of these link options are described in detail in Table 3.

The positions listed in Table 2 and Table 3 match the evaluation board imprints (see Figure 11).

Table 2. Link Options Setup for SDP-B Control (Default)

Link No.	Position
REF1	2.5V
REF2	2.5V
REF3	EXT
REF4	EXT
LK5	C
LK6	+3V3
LK7	B

Table 3. Link Functions

Link No.	Function
REF1, REF2, REF3, REF4	These links select the reference source. Position EXT selects an off-board voltage reference via the appropriate EXT_REF_x connector. Position VDD selects V_{DD} as the reference source. Position 4.096V selects the on-board 4.096 V reference as the reference source. Position 2.5V selects the on-board 2.5 V reference as the reference source. Position 5V selects the on-board 5 V reference as the reference source.
LK5	This link selects the positive DAC analog voltage source. Position A selects the internal voltage source from the SDP-B board. Position B selects the internal voltage source 3.3 V from the ADP121on the motherboard. Position C selects an external supply voltage, V_{DD}.
LK6	This link selects the VLOGIC voltage source. Position +3V3 selects the digital voltage source from the SDP-B board (3.3 V). Position VLOGIC selects an external digital supply voltage V_{LOGIC}.
LK7	This link selects the negative DAC analog voltage source. Position A selects V_{SS}. Position B selects AGND.

EVALUATION BOARD SOFTWARE QUICK START PROCEDURES

INSTALLING THE SOFTWARE

The AD5327 evaluation software is compatible with Windows® Vista (64-bit/32-bit) and Windows 7 (64-bit/32-bit).

Install the software before connecting the SDP-B board to the USB port of the PC to ensure that the SDP-B board is recognized when it connects to the PC.

To install the AD5327 evaluation software, take the following steps:

1. Start the Windows operating system.
2. Download the installation software from the EVAL-AD5327DBZ evaluation board page.
3. Run the **setup.exe** file from the installer folder if it does not open automatically.
4. After the installation is complete, power up the evaluation board as described in the Power Supplies section.
5. Connect the EVAL-AD5327DBZ evaluation board to the SDP-B controller board and connect the SDP-B board to the PC using the USB cable included in the evaluation kit.
6. When the software detects the EVAL-AD5327DBZ, proceed through any dialog boxes that appear to finalize the installation.

RUNNING THE SOFTWARE

To run the program, do the following:

1. Connect the evaluation board to the SDP-B board and connect the USB cable between the SDP-B board and the PC.
2. Power up the evaluation board as described in the Power Supplies section.
3. From the **Start** menu, click **All Programs**, **Analog Devices**, **AD5328 Evaluation Software**.

If the SDP-B board is not connected to the USB port when the software is launched, a connectivity error displays (see Figure 2). Connect the evaluation board to the USB port of the PC and wait a few seconds. When the SDP-B board is detected, the display is updated (see Figure 3).

Alternatively, the software can be used without an evaluation board. The software runs in simulation mode displaying expected outputs based on the input data. The main window of the AD5327 evaluation software then opens, as shown in Figure 4.

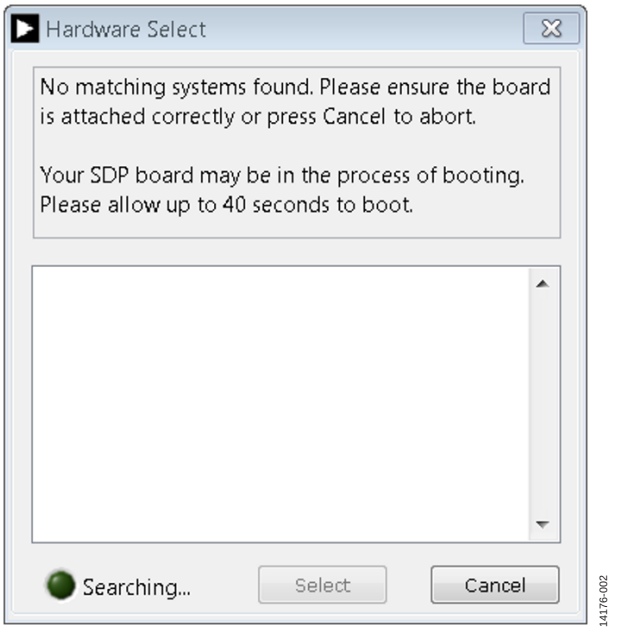

Figure 2. Connectivity Error

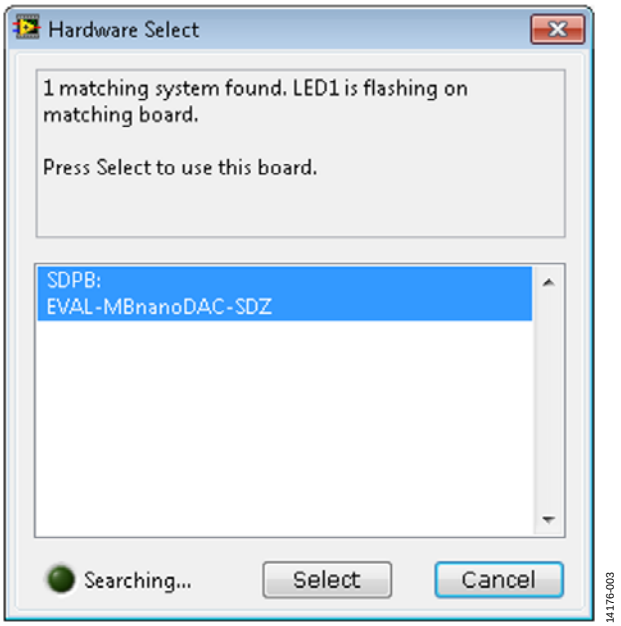

Figure 3. Hardware Select

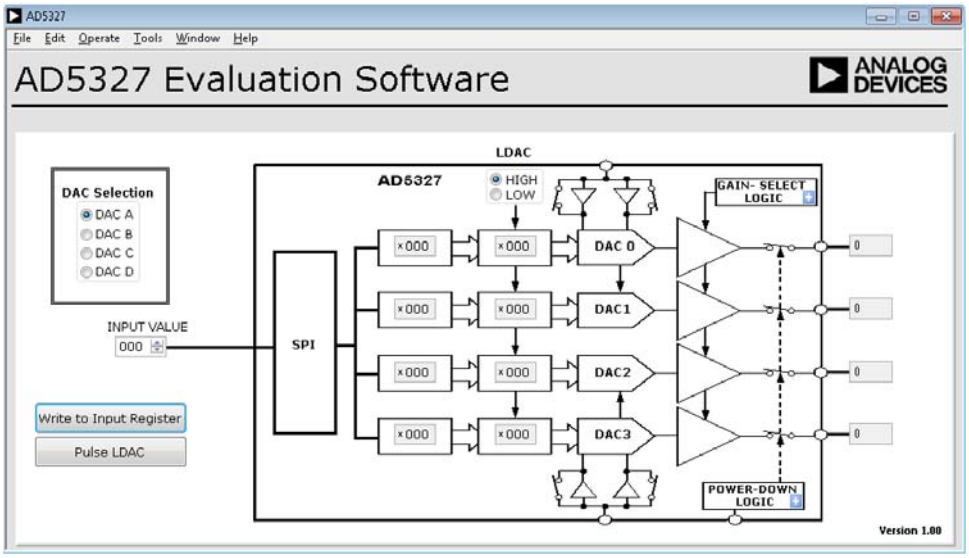

Figure 4. AD5327 Evaluation Board Software Main Window

SOFTWARE OPERATION

The software for the AD5327 allows the user to program values to the input and DAC registers of each DAC individually.

Write to Input Register

Click **Write to Input Register** to load the code of the input data control to the input register of the selected DAC in the **DAC Selection** box.

LDAC Control

Click **Pulse LDAC** to bring the $\overline{\text{LDAC}}$ pin low and then back to high. Doing this copies the data from the input registers to the DAC registers, and the outputs update accordingly.

Alternatively, set the $\overline{\text{LDAC}}$ pin high or low by clicking **HIGH** or **LOW** in the **LDAC** box.

Power-Down Control

The selected DAC on the **DAC Selection** box can be powered down individually. Click the blue progressive disclosure button on the **POWER-DOWN LOGIC block** to access the **Powerdown Config** window, as shown in Figure 5. When the power-down setting for the DAC is selected, click **OK** to write the appropriate values to the AD5327.

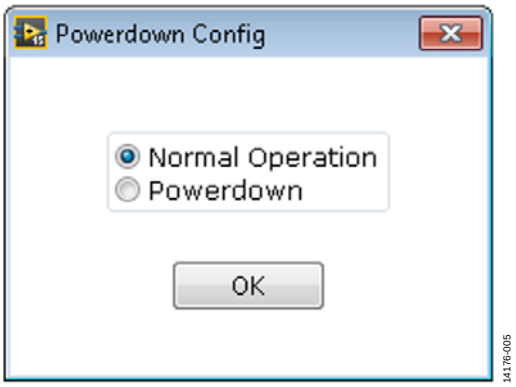

*Figure 5. **Powerdown Config** Window*

Gain Control

The gain of all the DACs is set simultaneously. Click the blue progressive disclosure button on the **GAIN- SELECT LOGIC** block to access the **Gain Control** window. Select **X1** in the **GAIN** box for a full-scale output of 2.5 V, or select **X2** for a full-scale output of 5 V.

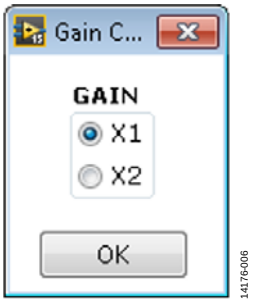

*Figure 6. **Gain Control** Window*

EVALUATION BOARD SCHEMATICS AND ARTWORK

EVAL-MBnanoDAC-SDZ MOTHERBOARD

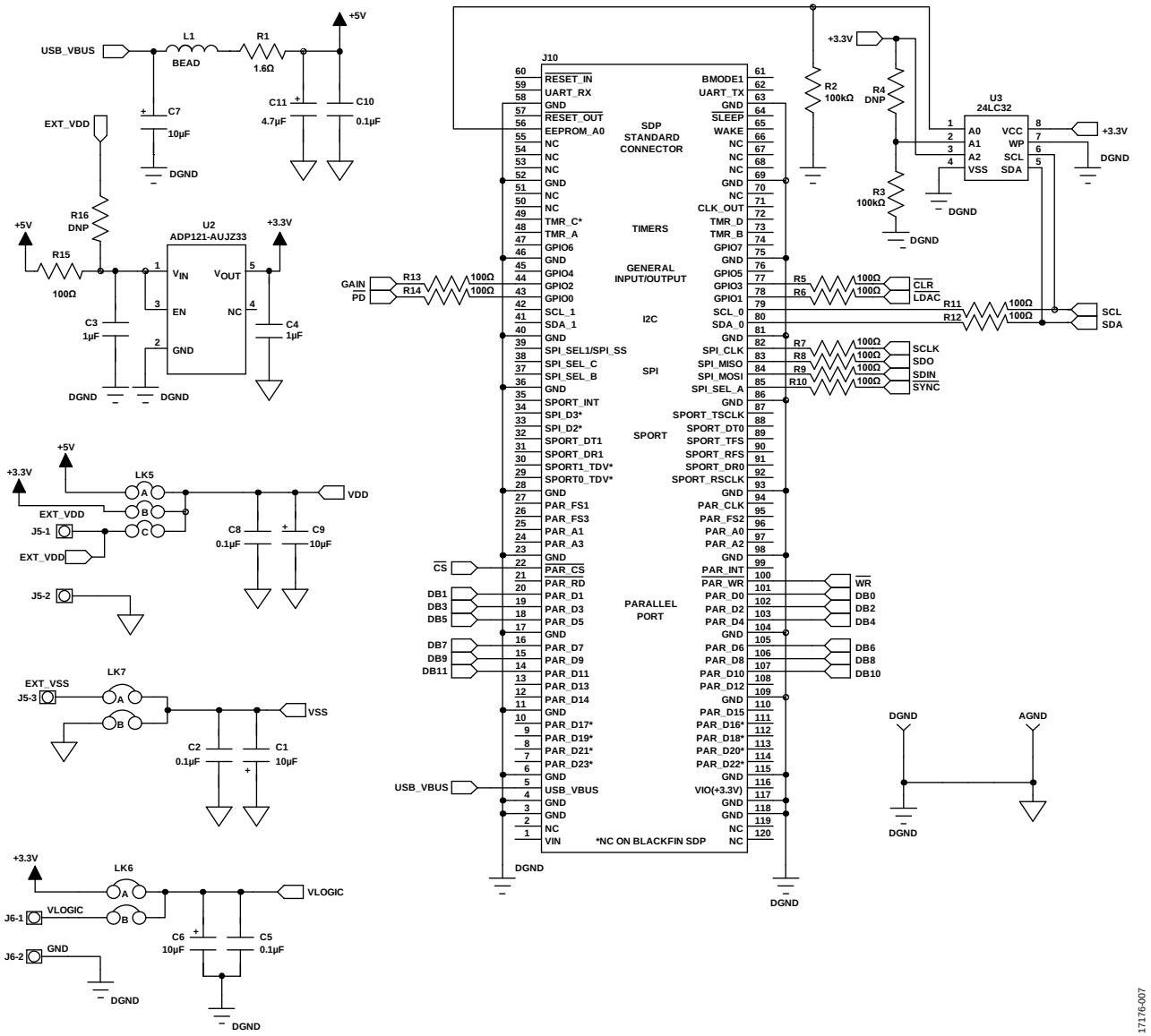

Figure 7. EVAL-MBnanoDAC-SDZ SDP Connector and Power Supply

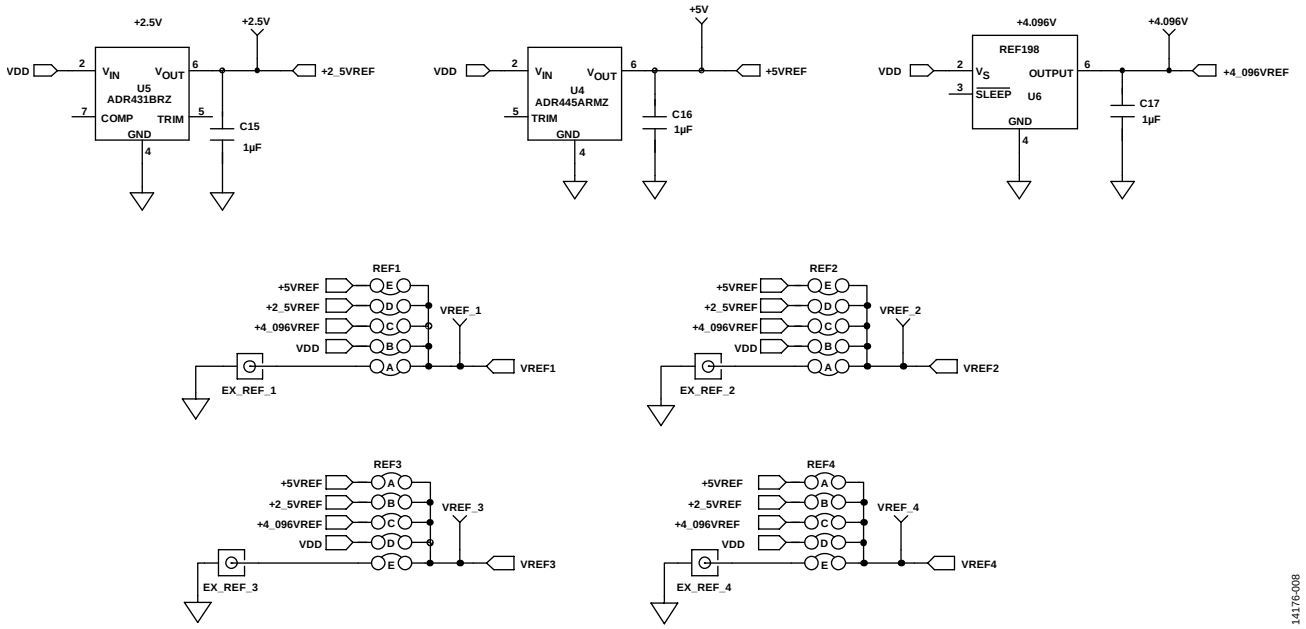

Figure 8. EVAL-MBnanoDAC-SDZ Reference Voltage Selector Circuit

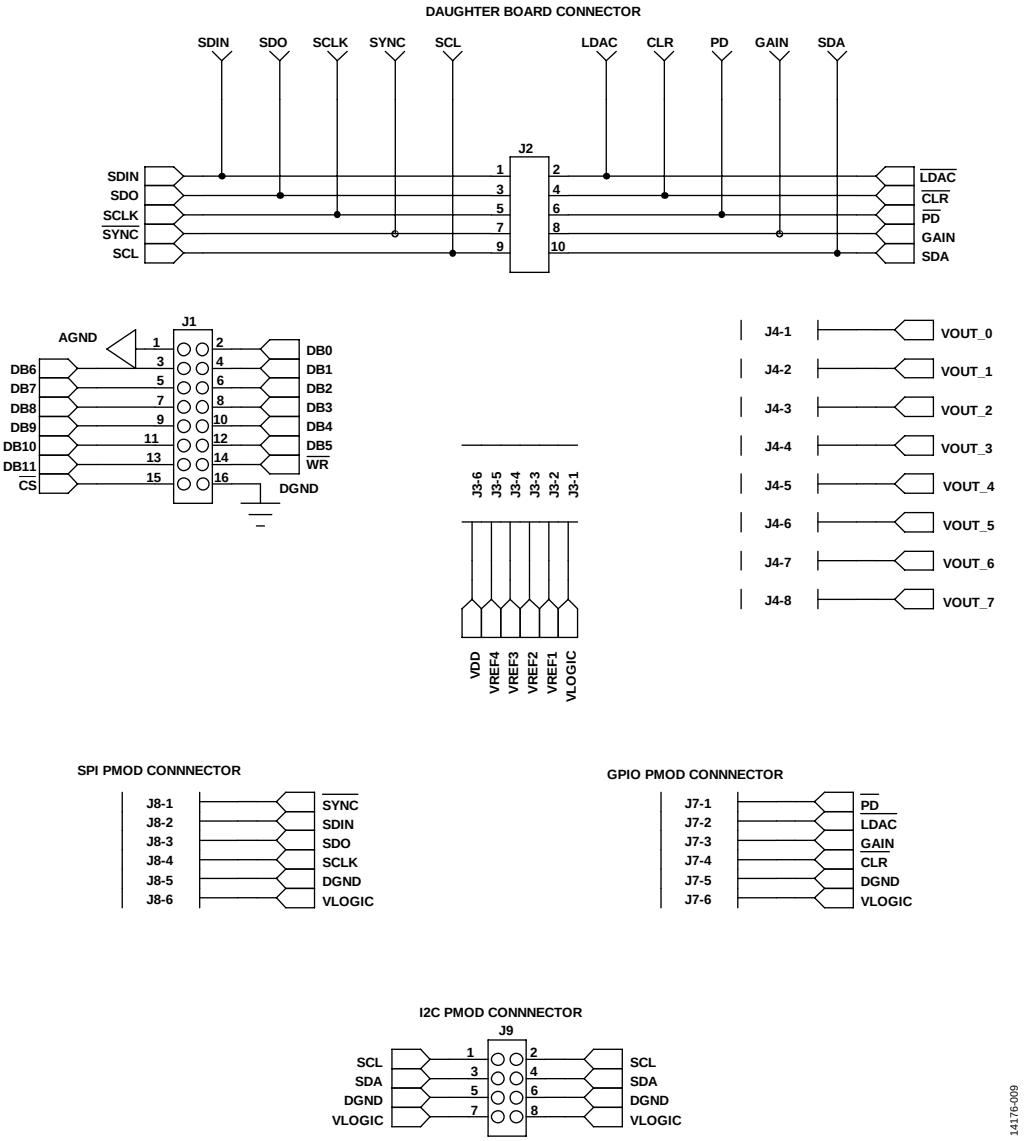

Figure 9. EVAL-MBnanoDAC-SDZ Connectors to EVAL-AD5327DBZ Serial Interface

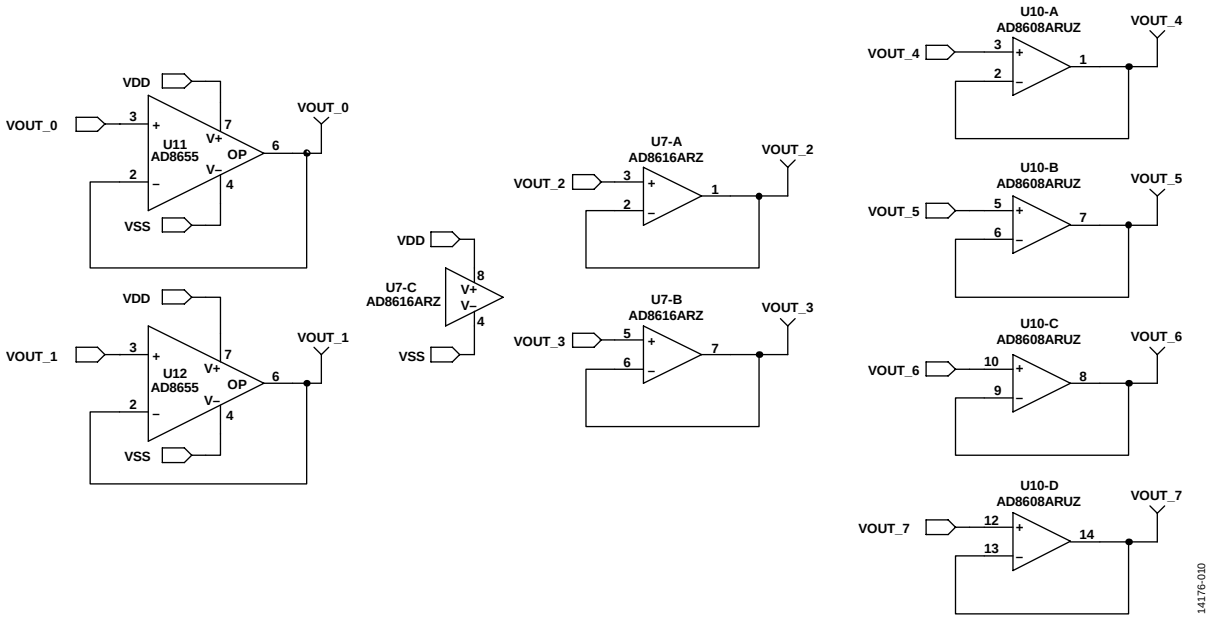

Figure 10. EVAL-MBnanoDAC-SDZ Output Amplifier Circuit

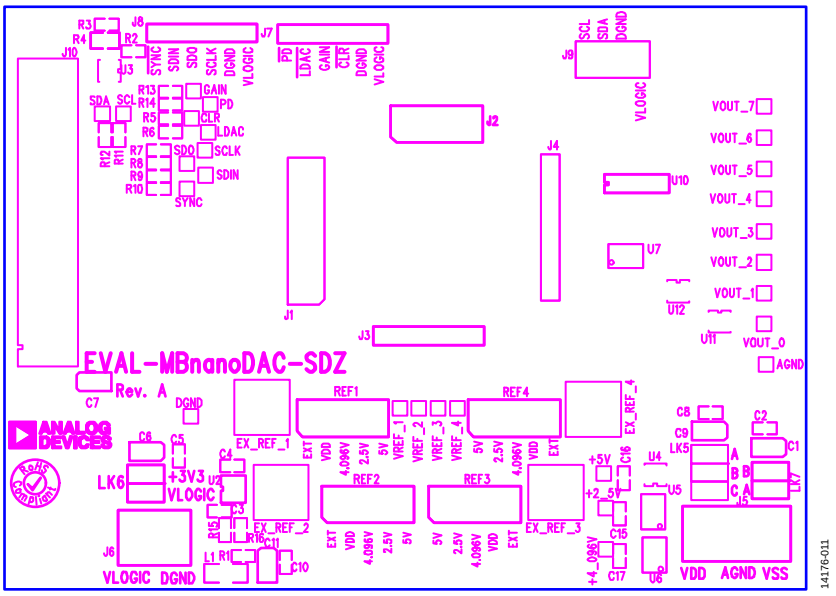

Figure 11. EVAL-MBnanoDAC-SDZ Component Placement

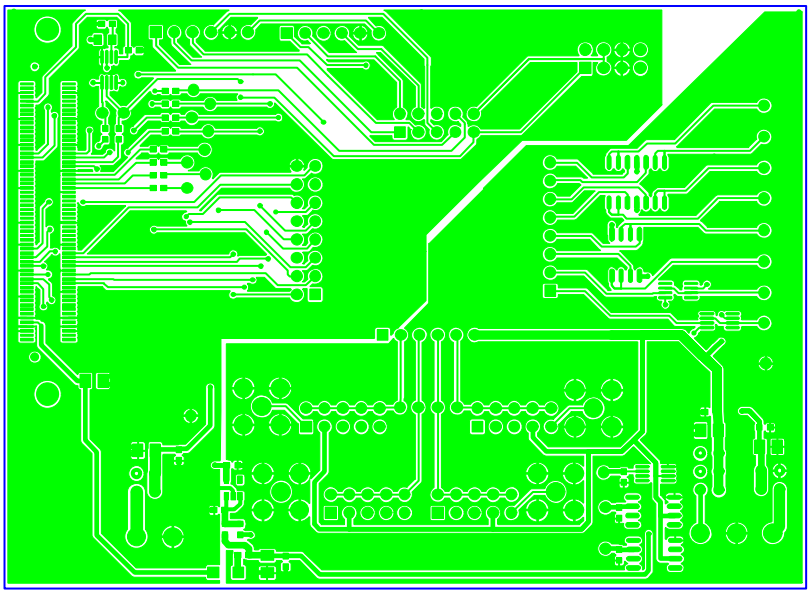

Figure 12. EVAL-MBnanoDAC-SDZ Top Side Routing

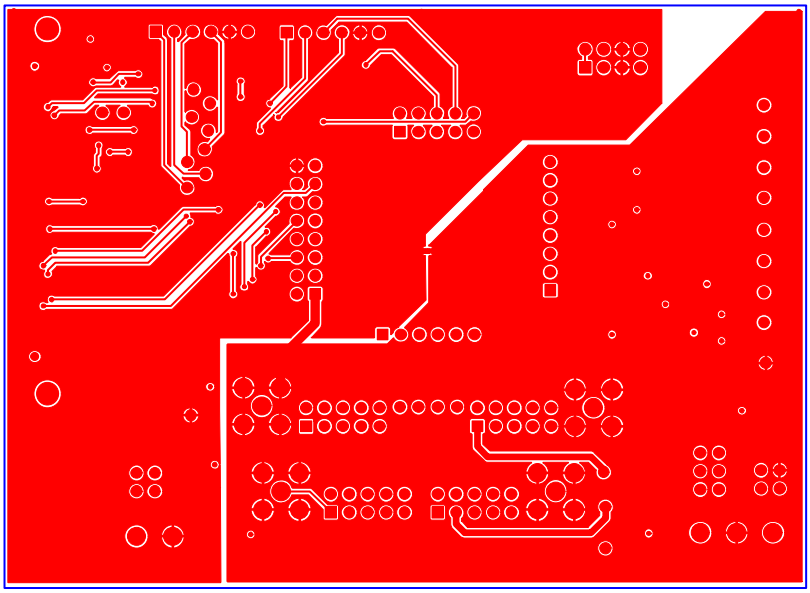

Figure 13. EVAL-MBnanoDAC-SDZ Bottom Side Routing

EVAL-AD5327RDBZ DAUGHTER BOARD

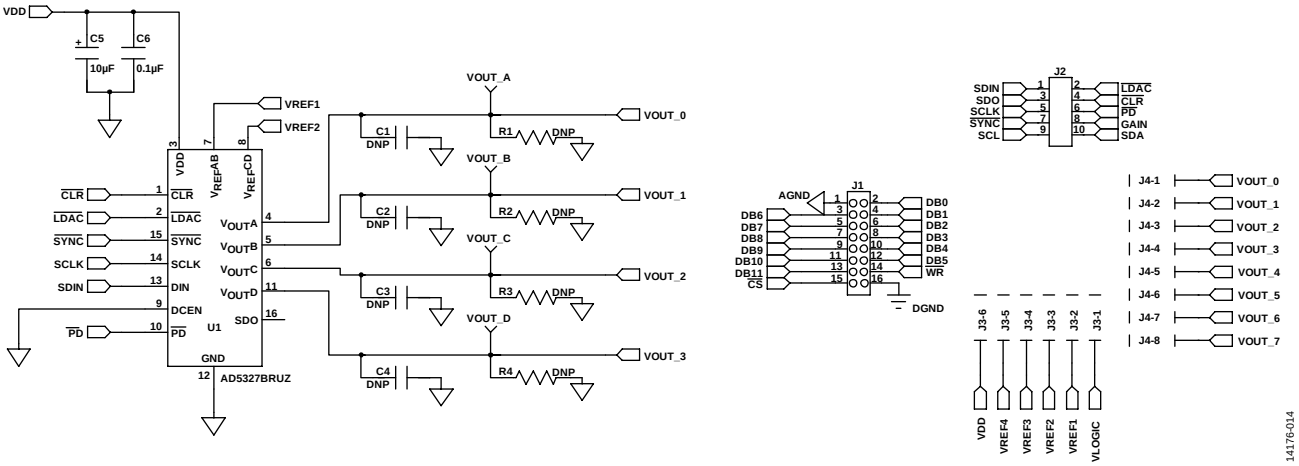

Figure 14. EVAL-AD5327RDBZ Daughter Board Schematic

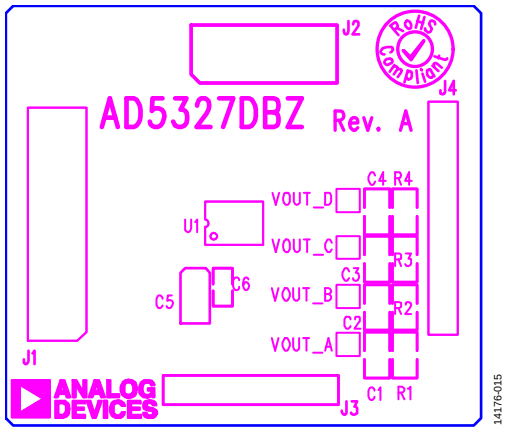

Figure 15. EVAL-AD5327RDBZ Component Placement

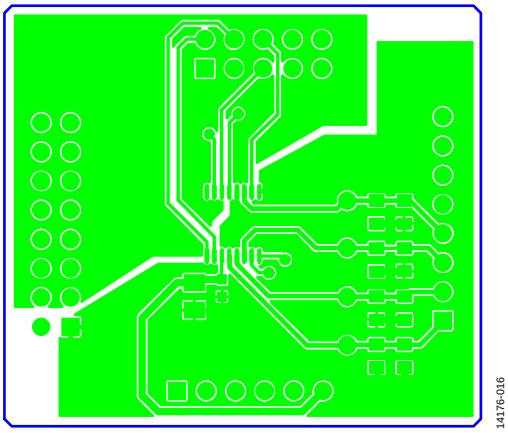

Figure 16. EVAL-AD5327DBZ Top Side Routing

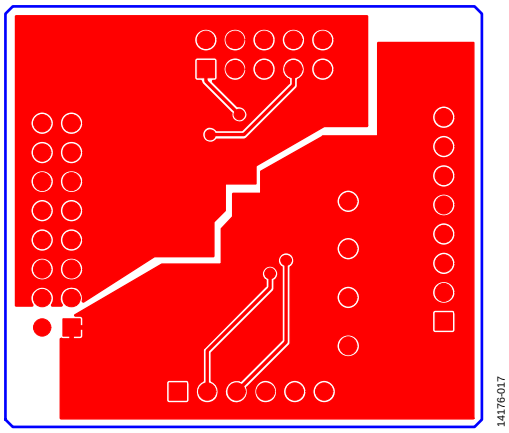

Figure 17. EVAL-AD5327DBZ Bottom Side Routing

ORDERING INFORMATION

BILL OF MATERIALS

Table 4. Motherboard

Qty	Reference Designator	Description	Stock Code/Part Number[1, 2]
4	C1, C6, C7, C9	6.3 V, tantalum capacitor (Case A), 10 µF, ±20%	FEC 1190107
7	C2, C5, C8, C10, C15, C16, C17	50 V, X7R, ceramic capacitor, 0.1 µF, ±10%	FEC 1759122
2	C3, C4	10 V, X5R, ceramic capacitor, 1 µF, ±10%	GRM188R61A105KA61D
1	C11	6.3 V, tantalum capacitor (Case A), 4.7 µF, ±20%	FEC 1432350
4	EXT_REF_1 to EXT_REF_4	Straight PCB mount SMB jack, 50 Ω	FEC 1206013
1	J1	Header, 2.54 mm, 2 × 8-way	FEC 2308428
1	J2	Header, 2.54 mm, 2 × 5-way	FEC 9689583
3	J3, J7, J8	Header, 2.54 mm, 1 × 6-way	FEC 9689508
1	J4	Header, 2.54 mm, 1 × 8-way	FEC 1766172
1	J5	3-pin terminal block	FEC 1667472
1	J6	2-pin terminal block	FEC 151789
1	J9	Header, 2.54 mm, 2 × 4-way	FEC 1667509
1	J10	120-way connector	FEC 1324660
1	L1	Inductor, SMD, 600 Ω	FEC 9526862
1	LK5	6-pin (3 × 2), 0.1 inch header and shorting block	FEC 148-535 and 150-411 (36-pin strip)
2	LK6, LK7	4-pin (2 × 2), 0.1 inch header and shorting block	FEC 148-535 and 150-411 (36-pin strip)
4	REF1, REF2, REF3, REF4	10-pin (5 × 2), 0.1 inch header and shorting block	FEC 1022227 and 150-411
1	R1	Resistor, surge, 1.6 Ω, 1%, 0603	FEC 1627674
2	R2, R3	SMD resistor, 100 kΩ, 1%, 0603	FEC 9330402
11	R5 to R15	SMD resistor, 100 Ω, 1%, 0603	FEC 9330364
1	U2	3.3 V linear regulator	Analog Devices ADP121-AUJZ33R7
1	U3	32 kb I^2C serial EEPROM	FEC 1331330
1	U4	5 V reference, 8-lead MSOP	Analog Devices ADR445ARMZ
1	U5	Ultralow noise XFET® voltage reference	Analog Devices ADR431BRZ
1	U6	4.096 V reference	Analog Devices REF198ESZ
1	U7	Dual op amp	Analog Devices AD8616ARZ
1	U10	Quad op amp	Analog Devices AD8608ARMZ
2	U11, U12	Op amp	Analog Devices AD8655ARMZ

[1] FEC refers to Farnell electronic component distributors.
[2] GRM refers to Murata manufacturing company.

Table 5. Daughter Board

Qty	Reference Designator	Description	Stock Code/Part Number[1]
1	C1	Not applicable	Not inserted
1	C2	Not applicable	Not inserted
1	C3	Not applicable	Not inserted
1	C4	Not applicable	Not inserted
1	C5	6.3 V, tantalum capacitor (Case A), 10 µF, ±20%	FEC 1190107
1	C6	50 V, X7R, ceramic capacitor, 0.1 µF, ±10%	FEC 1759122
1	J1	16-pin (2 × 8) header	FEC 2308428 inserted from solder side
1	J2	10-pin (2 × 5) straight header, 2.54 mm pitch	FEC 9689583 inserted from solder side
1	J3	6-pin (1 × 6) straight header, 2.54 mm pitch	FEC 9689508 inserted from solder side
1	J4	Header, 2.54 mm, PCB, 1 × 8-way	FEC 1766172 inserted from solder side
1	R1	Not applicable	Not inserted
1	R2	Not applicable	Not inserted
1	R3	Not applicable	Not inserted
1	R4	Not applicable	Not inserted
1	U1	12-bit DAC	Analog Devices AD5327BRUZ
1	VOUT_A	Red test point	Do not insert
1	VOUT_B	Red test point	FEC 8731144 (pack)
1	VOUT_C	Red test point	FEC 8731144 (pack)
1	VOUT_D	Red test point	FEC 8731144 (pack)

[1] FEC refers to Farnell electronic component distributors.

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.

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 NONINFRINGEMENT 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.

©2017 Analog Devices, Inc. All rights reserved. Trademarks and registered trademarks are the property of their respective owners.
UG14176-0-3/17(0)

ANALOG DEVICES

www.analog.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Data Conversion IC Development Tools ***category:***

Click to view products by Analog Devices ***manufacturer:***

Other Similar products are found below :

EVAL-AD5063EBZ EVAL-AD5422LFEBZ EVAL-AD7265EDZ EVAL-AD7641EDZ EVAL-AD7674EDZ EVAL-AD7719EBZ EVAL-AD7767-1EDZ EVAL-AD7995EBZ AD9114-DPG2-EBZ AD9211-200EBZ AD9251-20EBZ AD9251-65EBZ AD9255-125EBZ AD9284-250EBZ AD9613-170EBZ AD9627-125EBZ AD9629-20EBZ AD9709-EBZ AD9716-DPG2-EBZ AD9737A-EBZ AD9787-DPG2-EBZ AD9993-EBZ DAC8555EVM ADS5482EVM ADS8372EVM EVAL-AD5061EBZ EVAL-AD5062EBZ EVAL-AD5443-DBRDZ EVAL-AD5570SDZ EVAL-AD7450ASDZ EVAL-AD7677EDZ EVAL-AD7992EBZ EVAL-AD7994EBZ AD9119-MIX-EBZ AD9148-M5375-EBZ AD9204-80EBZ AD9233-125EBZ AD9265-105EBZ AD9265-80EBZ AD9608-125EBZ AD9629-80EBZ AD9648-125EBZ AD9649-20EBZ AD9650-80EBZ AD9765-EBZ AD9767-EBZ AD9778A-DPG2-EBZ ADS8322EVM LM96080EB/NOPB EVAL-AD5445SDZ