Evaluation Board for the AD3532R 16-Bit, 16-Channel, Voltage Output DAC

FEATURES

- Full featured evaluation board for the AD3532R
- Various link options
- PC control when used in conjunction with the Analog Devices, Inc., SDP board

EVALUATION KIT CONTENTS

- EVAL-AD3532RARDZ

HARDWARE REQUIRED

- EVAL-SDP-CK1Z (SDP-K1) board; purchased separately

SOFTWARE REQUIRED

- ACE software with the EVAL-AD3532RARDZ plugin
- SDP-K1 firmware for EVAL-AD3532RARDZ (included in the plugin)

GENERAL DESCRIPTION

This user guide details the operation of the EVAL-AD3532RARDZ for the AD3532R 16-bit, 16-channel, voltage output, digital-to-analog converter (DAC).

The EVAL-AD3532RARDZ allows users to quickly prototype the AD3532R circuits and reduce design time. The AD3532R operates from single 2.7V to 5.5V supply ranges. The AD3532R incorporates internal 2.5V references to give output voltages of 2.5V or 5V. The EVAL-AD3532RARDZ also incorporates an additional on-board voltage reference, the ADR4525.

The EVAL-AD3532RARDZ interfaces to the USB port of a PC via a system demonstration platform (SDP-K1) board. The Analysis | Control | Evaluation (ACE) software is available for download from the EVAL-AD3532RARDZ product page to use with the evaluation board to allow the user to program the AD3532R device. A peripheral module interface (PMOD) connection is also available to allow the connection of microcontrollers to the evaluation board without the SDP-K1 board. When a microcontroller is used through the PMOD connection, the SDP-K1 board must be disconnected, and the user is unable to operate the ACE software.

The EVAL-AD3532RARDZ is compatible with Analog Devices, Inc., SDP-K1 board, which must be purchased separately.

For full details, see the AD3532R data sheet, which must be used in conjunction with this user guide when using the EVAL-AD3532RARDZ.

TABLE OF CONTENTS

Features..... 1
Evaluation Kit Contents..... 1
Hardware Required..... 1
Software Required.....1
General Description.....1
Evaluation Board Software Quick Start Procedures..... 3
Installing ACE.....3
Initial Setup.....3
Evaluation Board Hardware.....4
Power Supplies..... 4
Link Options..... 4
Other On-Board Connectors..... 5
Evaluation Board Schematics and Artwork..... 6
Ordering Information.....12
Evaluation Boards..... 12
Bill of Materials.....12

REVISION HISTORY

4/2026—Revision 0: Initial Version

EVALUATION BOARD SOFTWARE QUICK START PROCEDURES

INSTALLING ACE

The EVAL-AD3532RARDZ uses the ACE evaluation software that allows the evaluation and control of multiple evaluation systems.

The ACE installer installs the necessary SDP-K1 drivers and the Microsoft® .NET Framework 4 by default. The ACE software is available for download from the ACE Software page and must be installed before connecting the SDP-K1 board to the USB port of the PC to ensure that the SDP-K1 board is recognized as connected to the PC. For full instructions on how to install and use this software, see the ACE Software page on the Analog Devices website.

INITIAL SETUP

To set up the evaluation board, take the following steps:

1. Connect the evaluation board to the SDP-K1 board, and then connect the USB cable between the SDP-K1 board and the PC.
2. Run the ACE application. The EVAL-AD3532RARDZ plugins appear in the attached hardware section of the **Start** tab.
3. Double-click the board plugin to open the board view seen in Figure 1. When the correct firmware in the SDP-K1 controller is missing or does not match, a dialog (as shown in Figure 2) appears and gives the option to flash the correct firmware. Press **OK** for initial setup. Press **Cancel** if the firmware has been loaded previously.
4. Double-click the AD3532R chip to access the chip block diagram. This view provides a basic representation of the functionality of the board. The main functions of the board are labeled in Figure 3.

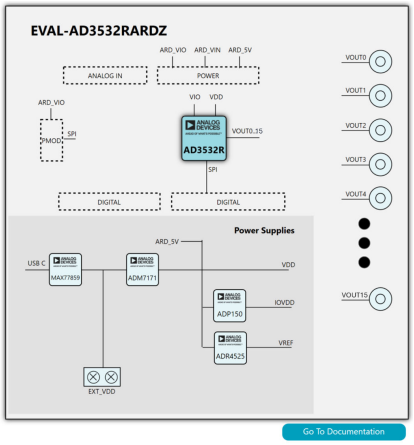

Figure 1. Board View of the EVAL-AD3532RARDZ

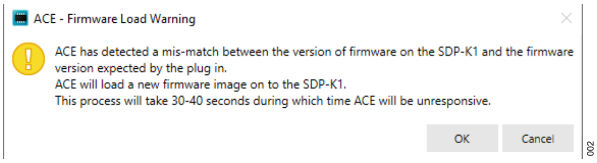

Figure 2. Firmware Loading Dialogue Box

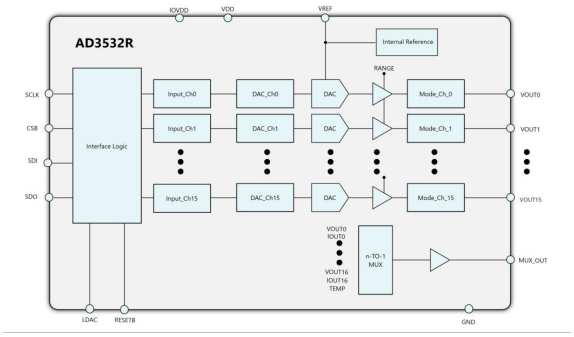

Figure 3. Chip Block Diagram of the AD3532R

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The EVAL-AD3532RARDZ provides on-board 1.8V, 3.3V, and 5V regulators powered through the SDP-K1 or from an external source (USB-C connector or terminal block). If a different supply is required or the evaluation board is controlled through the PMOD connector, an external supply must be provided by the USB-C connector or through the terminal block. See Table 1 for more details.

LINK OPTIONS

A number of link options are incorporated on the EVAL-AD3532RARDZ and must be set for the required operating conditions before using the board. The functions of these link options are described in Table 2.

Table 1. Power Supply Connectors

Connector Label	Voltage Supplies Description
M1 (USB-C Connector)	5V supply. Requires a USB charger adapter that complies with the USB charging specification 1.2. Use this if the total load of the part is more than 100mA.
P6 (TERM_BLOCK)	5.2V to 6.5V input. Use this if the total load is more than 100mA when the USB charger adapter is not preferred. JP1 should be set to Position B.
P2, Pin 5 (ARD_5V)	If the overall load required is less than 100mA, ARD_5V can be used as a source and, with SDP-K1, powered through the USB. JP3 should be set to Position B.

Table 2. Link Functions

Link	Default Position	Description
JP1	A	This link selects the external supply for the on board ADM7171 LDO regulator. Position A: External supply used will be through the USB-C connector. A USB-C based charger adapter must be connected. The ADM7171 is powered by a 6V rail coming from the MAX77859. Position B: External supply used will be through the 2-pin terminal block, P6. An acceptable voltage range for this input is 5.2V to 6.5V.
JP2	Short	This link selects the voltage setpoint for the LDO stage (ADM7171). Short: Voltage setpoint is 5V. Open: Voltage setpoint is 3.3V.
JP3	B	This link selects the VDD source. There are two options, as follows: Position A: Takes either 5V or 3.3V generated by LDO stage. Please refer to JP2 orientation. Position B: Takes 5V generated by the SDP-K1 or any controller connected to the Arduino connector. Loads sourced by AD3532R should not exceed 100mA.
JP4	Open	This link selects the availability of on-board reference voltage (the ADR4525) to the VREF pin of the device. The options are as follows: Short: VREF supplies reference voltage to the AD3532R. The reference control register must be set such that the on-chip reference is disabled. Open: Required if on-chip reference is enabled or reference voltage is supplied through J2.
JP5	Short	This link enables/disables the MAX13030 level shifter. Shorted: Enables the MAX13030. Digital communication can come from either the SDP-K1 controller board or the PMOD connector, P5. Opened: Disables the MAX13030.

EVALUATION BOARD HARDWARE

OTHER ON-BOARD CONNECTORS

Table 3 shows the connectors on the EVAL-AD3532RARDZ.

Table 3. Other On-Board Connectors

Connector	Function
J2 (unmounted)	Male Subminiature Version B (SMB) port for external reference. Prior to use, P11 must be opened, and the on-chip reference of the AD3532R must be disabled through the reference control register.
P5 (unmounted)	12-pin SPI PMOD connector. Use this if a separate digital interface, aside from Arduino form factor controller (the SDP-K1, for example), will be used.
J1 (unmounted)	Male SMB port to measure the DAC output voltage.
P8 (unmounted)	Short a pair of rows to temporarily select the channel to be measured on J1. Mounting one 0Ω on either of the resistors from R78 to R85 can also be used. Only one method and one channel can be selected at a time.
P7	Male headers to monitor or connect external loads to each DAC output channel.

EVALUATION BOARD SCHEMATICS AND ARTWORK

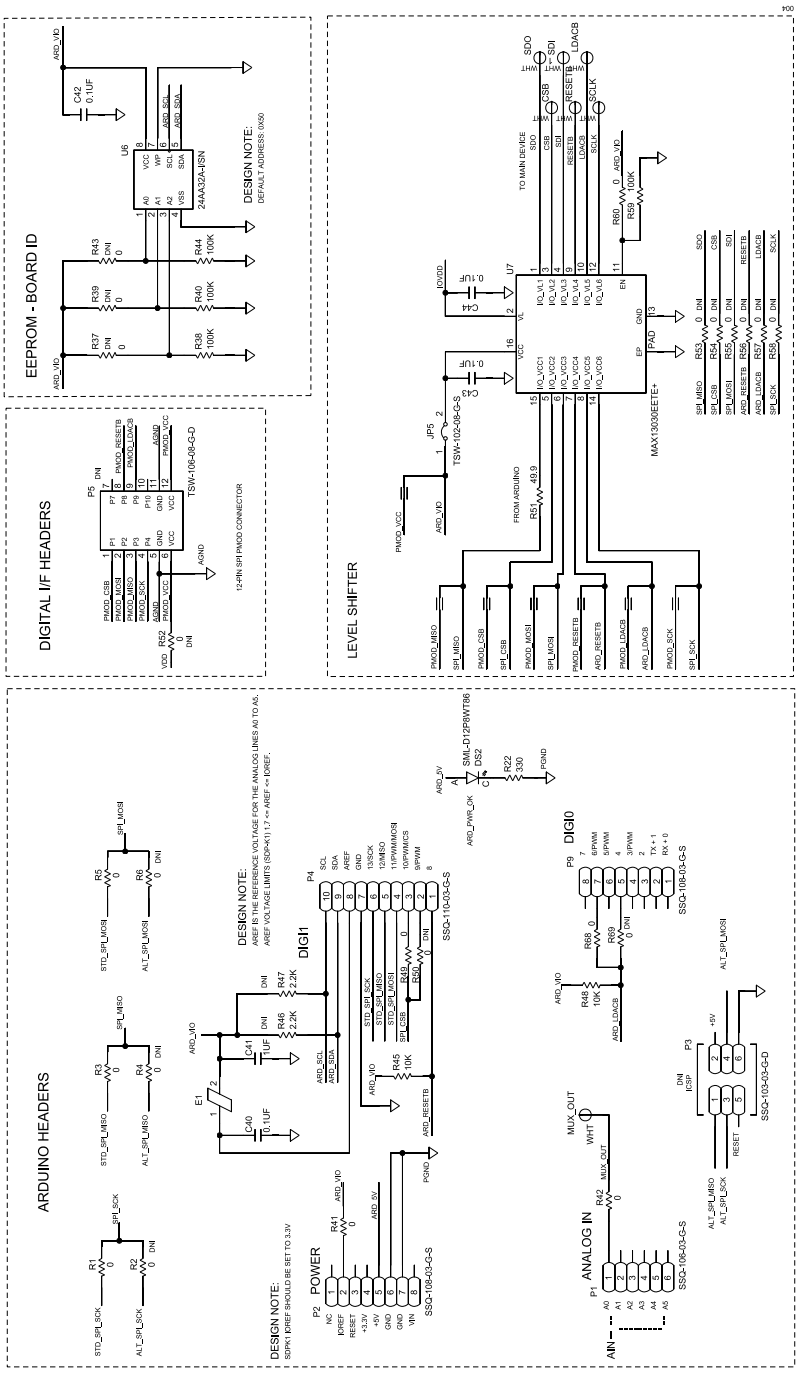

Figure 4. EVAL-AD3532RARDZ Schematic, SDP, Arduino-Compatible, and PMOD Connectors

EVALUATION BOARD SCHEMATICS AND ARTWORK

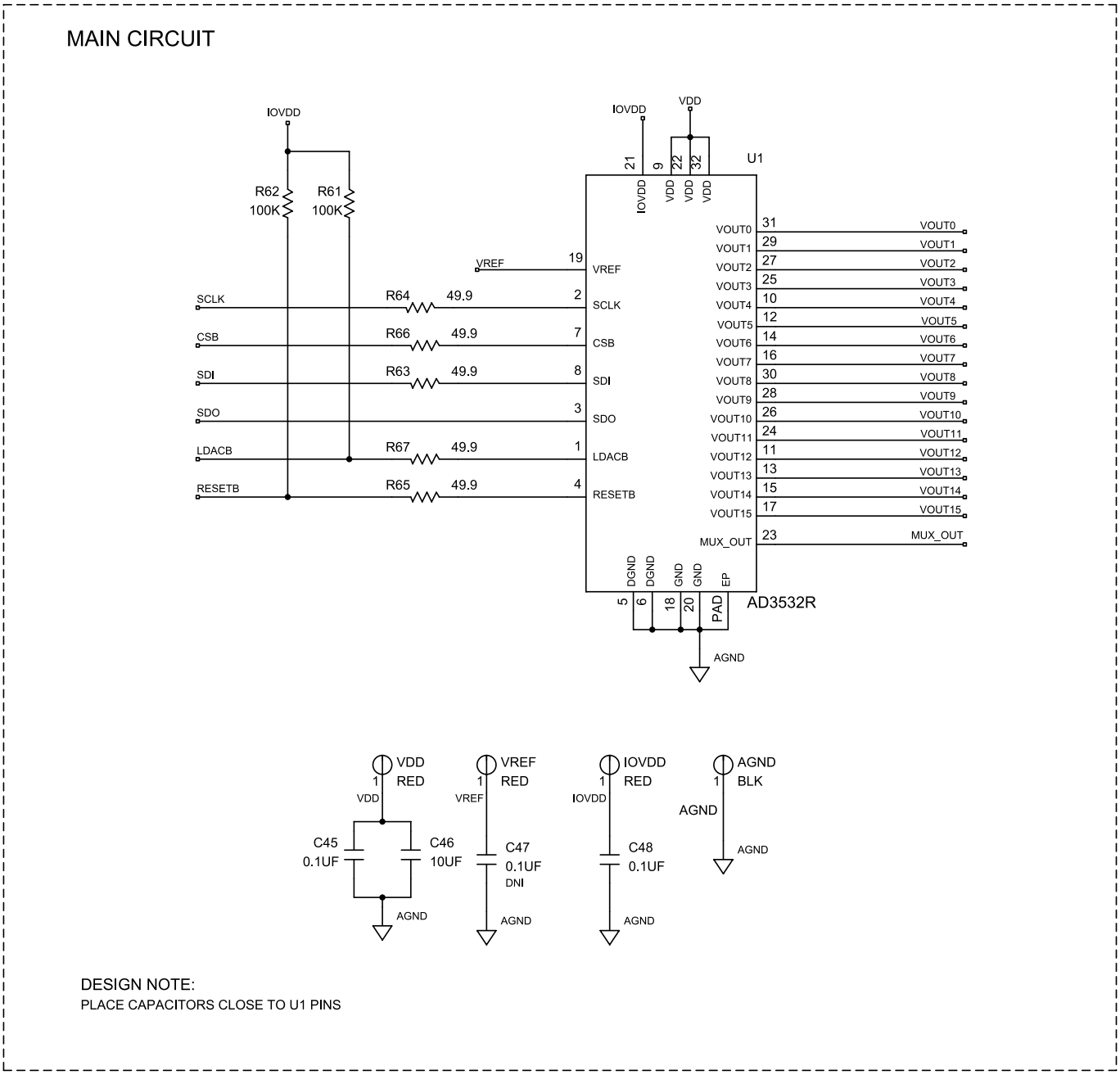

Figure 5. EVAL-AD3532RARDZ Schematic, Main Circuit, and Output Connectors

EVALUATION BOARD SCHEMATICS AND ARTWORK

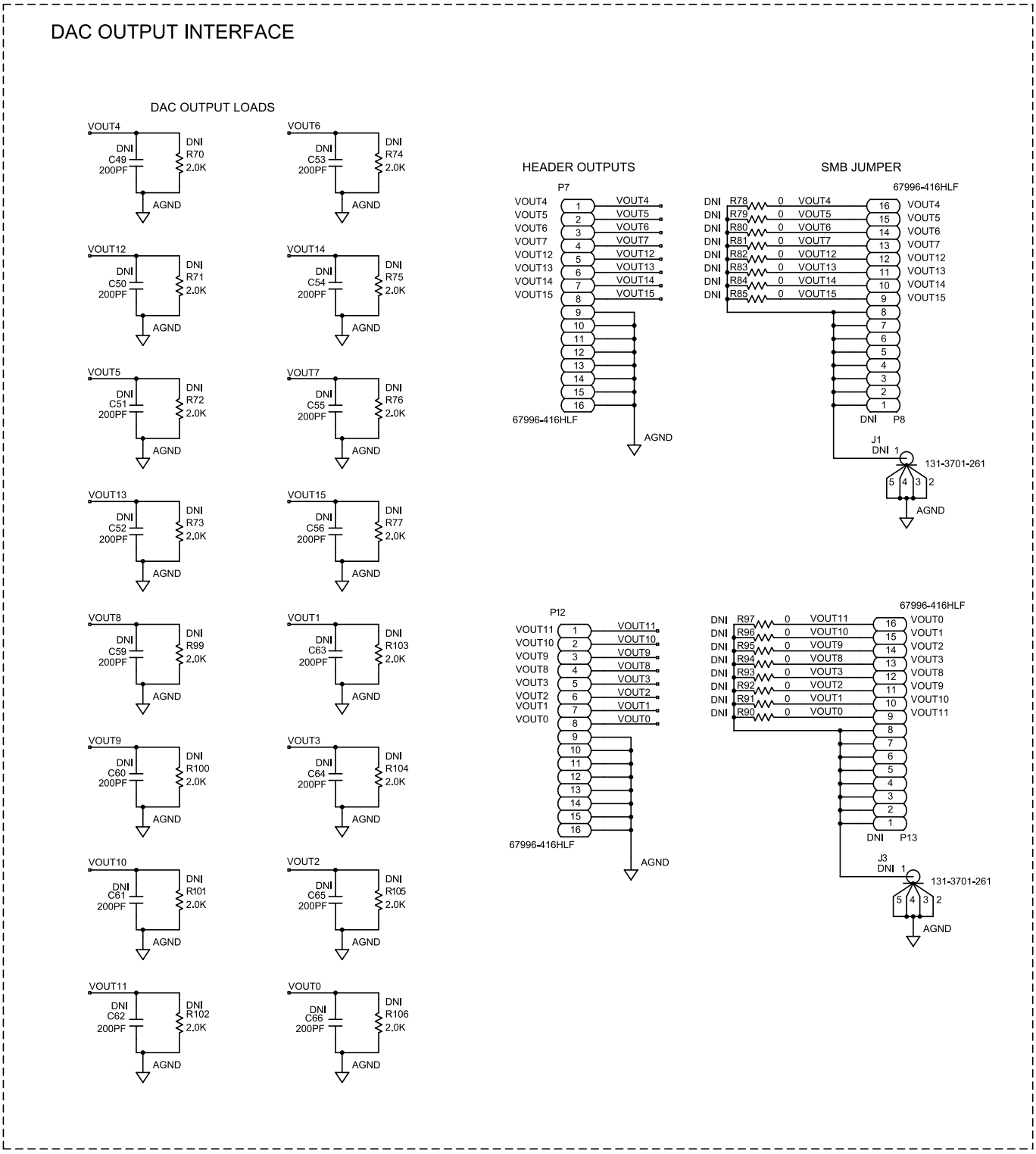

Figure 6. DAC Output Interface Schematic

EVALUATION BOARD SCHEMATICS AND ARTWORK

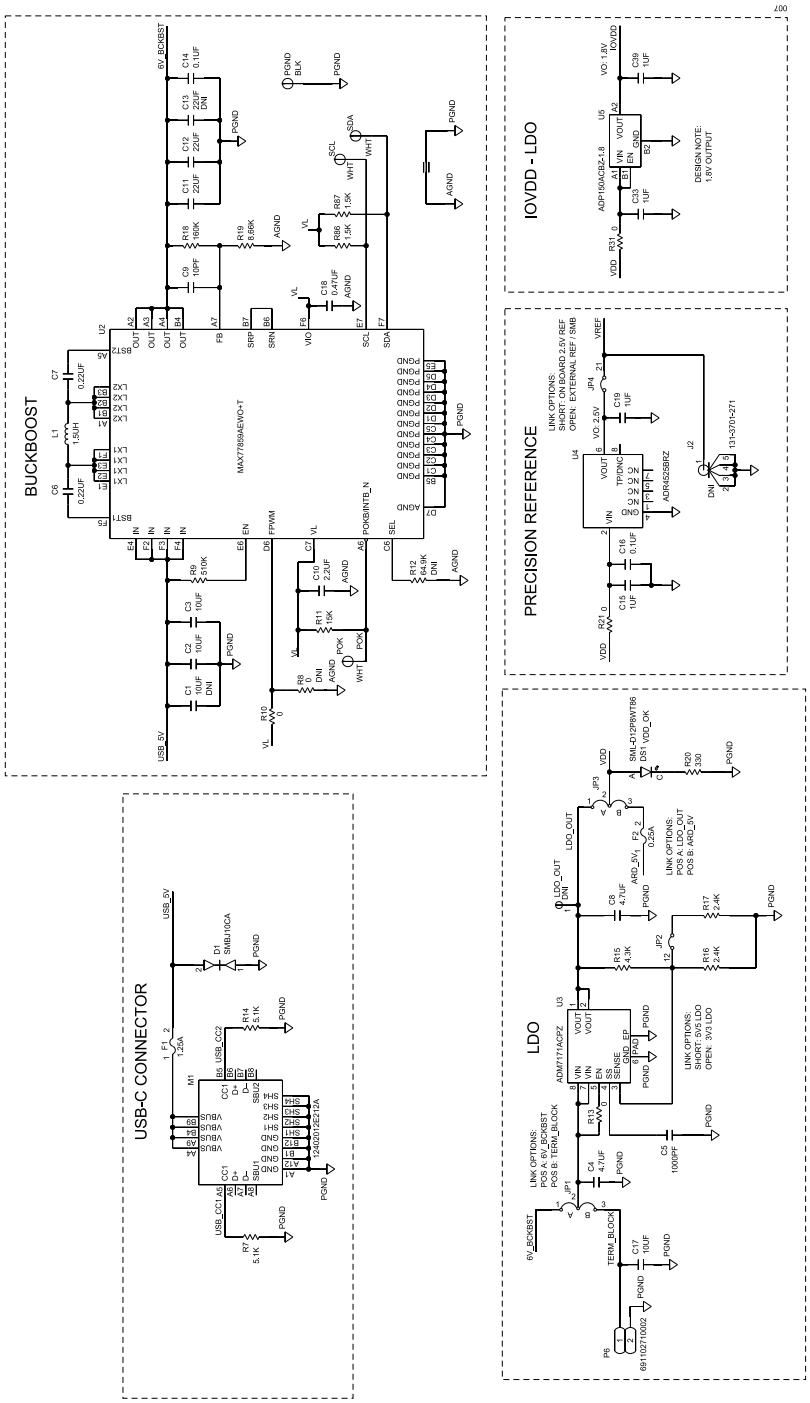

Figure 7. EVAL-AD3532RARDZ Schematic, Power Tree, and On-Board Reference

EVALUATION BOARD SCHEMATICS AND ARTWORK

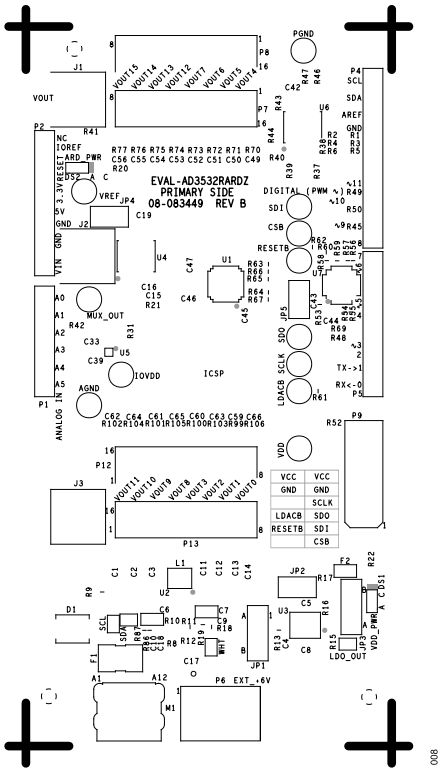

Figure 8. EVAL-AD3532RARDZ Top Side Component Placement

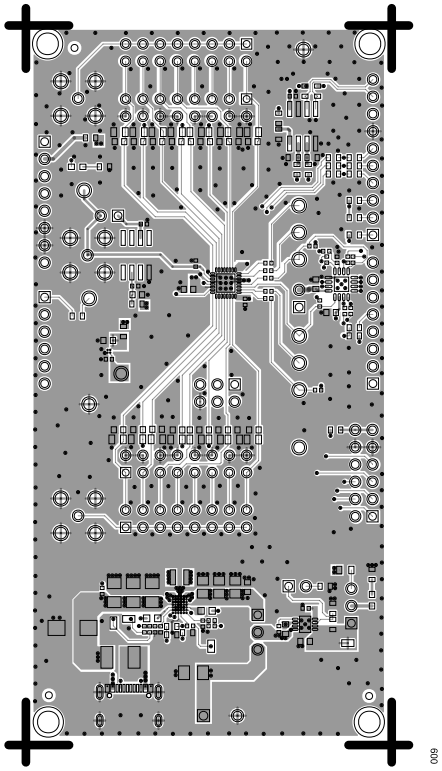

Figure 9. EVAL-AD3532RARDZ Top Side Routing

EVALUATION BOARD SCHEMATICS AND ARTWORK

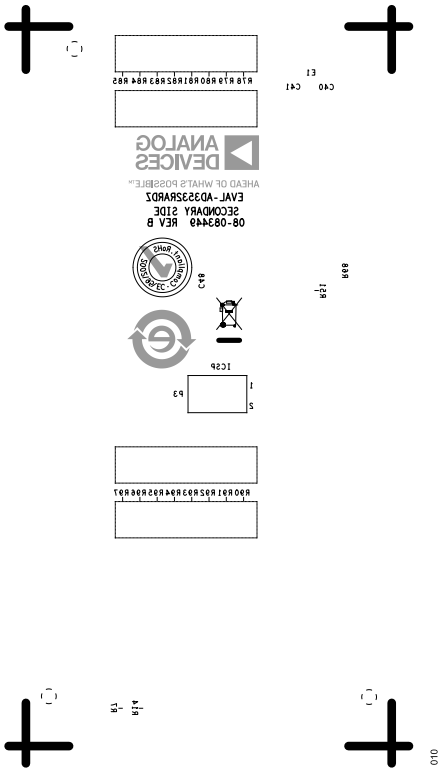

Figure 10. EVAL-AD3532RARDZ Bottom Side Component Placement

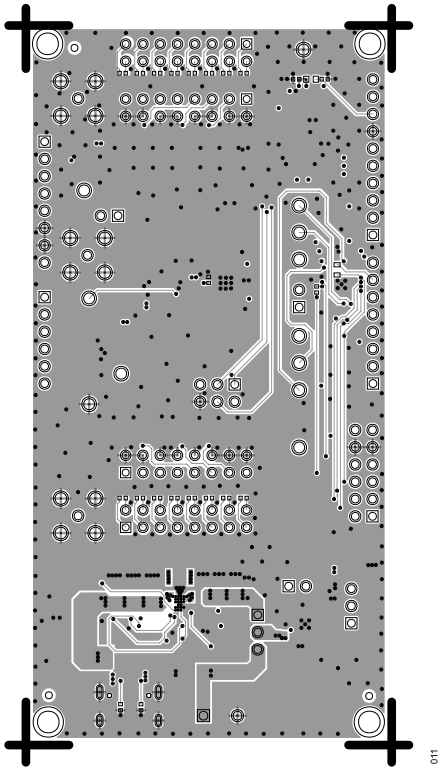

Figure 11. EVAL-AD3532RARDZ Bottom Side Routing

ORDERING INFORMATION

EVALUATION BOARDS

Table 4. Evaluation Board

Model	Description
EVAL-AD3532R-ARDZ	Evaluation Board

BILL OF MATERIALS

Table 5. Bill of Materials

Quantity	Description	Reference Designator	Supplier, Part Number[1]
3	Connectors, printed circuit board (PCB), test point, black	AGND, MUX_OUT, PGND	Generic
1	Capacitor, ceramic, 2.2µF, 25V, 20%, X5R, 0402	C10	Generic
2	Capacitors, ceramic, 22µF, 25V, 20%, X5R, 0805	C11, C12	Generic
3	Capacitors, ceramic, 0.1µF, 50V, 10%, X7R, 0603	C14, C43, C44	Generic
2	Capacitors, ceramic, 1µF, 50V, 10%, X5R, 0603 AEC-Q200	C15, C33	Generic
5	Capacitors, ceramic, 0.1µF, 50V, 10%, X7R, 0402	C16, C40, C42, C45, C48	Generic
3	Capacitors, ceramic, 10µF, 50V, 10%, X7R, 1206	C2, C3, C17	Generic
1	Capacitor, ceramic, 0.47µF, 10V, 10%, X7S, 0402 AEC-Q200	C18	Generic
3	Capacitors, ceramic, 1µF, 50V, 10%, X5R, 0402	C19, C39, C41	Generic
2	Capacitors, ceramic, 4.7µF, 25V, 10%, X5R, 0603	C4, C8	Generic
1	Capacitor, ceramic, 10µF, 35V, 20%, X5R, 0603	C46	Generic
1	Capacitor, ceramic, 1000pF, 50V, 5%, C0G, 0402	C5	Generic
2	Capacitors, ceramic, 0.22µF, 50V, 10%, X7R, 0603, AEC-Q200	C6,C7	Generic
1	Capacitor, ceramic, 10pF, 50V, 5%, C0G, 0402, AEC-Q200	C9	Generic
6	Connectors, PCB, test point, white	CSB, LDACB, RESETB, SCLK, SDI, SDO	Generic
1	Diode, TVS, bidirectional, 10V, 600W, 35.3A, 17V, (clamping) Subminiature Version B (SMB)	D1	Generic
2	Light-emitting diode (LED), Excelo lamp, trade chip, 560NM, 0.020A, green	DS1, DS2	Generic
1	Inductor, ferrite bead, 0.150Ω, maximum DC resistance, 1A	E1	Generic
1	Fuse, polymer, positive temperature coefficient, resettable, fast acting, 250mA, 32V, 0603	F1	Generic
1	Fuse, fast acting, 250mA, 32V, 0603	F2	Generic
3	Connectors, PCB test point, red	IOVDD, VDD, VREF	Generic
2	Connectors, PCB, header male, unshrouded, single row, 3 positions, 2.54mm pitch, 3mm solder tail	JP1, JP3	Generic
3	Connectors, PCB, header, 2 positions	JP2, JP4, JP5	Generic
1	Inductor, power, wirewound, 1.5µH, 20%, 1MHz, 3.2A, 0.054Ω, DC resistant, 1008	L1	Generic
1	Module USB 2.0 Type-C connector, right angle	M1	Generic
1	Connector, PCB, receptacle, 25mil square post, 2.54mm pitch	P1	Generic
2	Connectors, PCB, header, male, 16 position, 0.100in pitch, tin plated	P7, P12	Generic
2	Connectors, PCB, receptacle, 25mil square post, 2.5mm pitch	P2, P5	Generic
1	Connector, PCB, receptacle, 25mil, square post, 2.54mm pitch	P4	Generic
1	Connector, PCB, 2 positions, terminal block, side entry, 5mm pitch	P6	Generic

ORDERING INFORMATION

Table 5. Bill of Materials (Continued)

Quantity	Description	Reference Designator	Supplier, Part Number[1]
7	Resistors, surface mount device (SMD), 0Ω jumper, 1/10W, 0603, AEC-Q200	R1, R3, R5, R41, R42, R49, R68	Generic
3	Resistors, SMD, 0Ω jumper, 1/10W, 0603, AEC-Q200, precision power	R10, R21, R31	Generic
1	Resistor, SMD, 15kΩ, 1%, 1/16W, 0402, AEC-Q200	R11	Generic
2	Resistors, SMD, 0Ω jumper, 1/10W, 0402, AEC-Q200	R13, R60	Generic
2	Resistors, SMD, 5.1kΩ, 5%, 1/10W, 0402, AEC-Q200	R7, R14	Generic
1	Resistor, SMD, 4.3kΩ, 0.1%, 1/10W, 0603, AEC-Q200, high reliabitlity	R15	Generic
2	Resistors, SMD, 2.4kΩ, 1%, 1/10W, 0603, AEC-Q200	R16, R17	Generic
1	Resistor, SMD, 160kΩ, 1%, 1/10W, 0402, AEC-Q200	R18	Generic
1	Resistor, SMD, 8.66kΩ, 1%, 1/10W, 0402, AEC-Q200	R19	Generic
2	Resistors, SMD, 330Ω, 1%, 1/10W, 0603, AEC-Q200	R20, R22	Generic
3	Resistors, SMD, 100kΩ, 1%, 1/10W, 0603	R38, R40, R44	Generic
2	Resistors, SMD, 1kΩ, 1/10W, 1%, 0603, AEC-Q200	R45, R48	Generic
6	Resistors, SMD, 49.9Ω, 1%, 1/10W, 0402, AEC-Q200	R51, R63, R64, R65, R66, R67	Generic
3	Resistors, SMD, 100kΩ, 1%, 1/10W, 0402, AEC-Q200	R59, R61, R62	Generic
2	Resistors, SMD, 1.5kΩ, 1%, 1/10W, 0402, AEC-Q200	R86, R87	Generic
1	Resistor, SMD, 510kΩ, 1%, 1/10W, 0402, AEC-2200	R9	Generic
3	Connectors, PCB, SMD, test point, tin plated	SCL, SDA, WHT	Generic
1	16-channel, 16-bit, voltage output DAC, on-chip reference, SPI	U1	Analog Devices, Inc.
1	2.5V to 22V input, 7.8A switching current, high-efficiency buck-boost converter	U2	Analog Devices
1	Fast transient response, CMOS, LDO regulator	U3	Analog Devices
1	Ultra-low noise, high accuracy voltage reference	U4	Analog Devices
1	6.5V, 2A, ultra-low noise, high power supply rejection ration (PSRR), fast transient response, CMOS, LDO regulator	U5	Analog Devices
1	32k-bit, serial, electrically erasable programmable read-only memory (EEPROM)	U6	Generic
1	6-channel, bidirectional, high-speed, logic-level translator	U7	Analog Devices
1	Capacitor, ceramic, 10µF, 50V, 10%, X7R, 1206	C1	Do Not Install
1	Capacitor, ceramic, 22µF, 25V, 20%, X5R, 0805	C13	Do Not Install
1	Capacitor, ceramic, 0.1µF, 16V, 10%, X7R, 0402, AEC-Q200	C47	Do Not Install
16	Capacitors, ceramic, 200pF, 50V, 1%, C0G, 0603	C49, C50, C51, C52, C53, C54, C55, C56, C59, C60, C61, C62, C63, C64, C65, C66	Do Not Install
3	Connectors, PCB, coaxial SMB jack, RF, vertical, gold plated	J1, J2, J3	Do Not Install
1	Connector, PCB, SMD, test point, tin plated	LDO_OUT	Do Not Install
2	Connectors, header, 16 position, 0.100in, straight, tin plated	P8, P13	Do Not Install
1	Connector, PCB, receptacle, 25mil, square post, dual row, 2.54mm pitch	P3	Do Not Install
1	Connector, PCB, header, straight, male, PMOD	P9	Do Not Install
16	Resistors, SMD, 2.0kΩ, 0.1%, 1/8W, 0805, AEC-Q200, high reliability	R70, R71, R72, R73, R74, R75, R76, R77, R99, R100, R101, R102, R103, R104, R105, R106	Do Not Install
1	Resistor, SMD, 64.9kΩ, 1%, 1/10W, 0603, AEC-Q200	R12	Do Not Install
6	Resistors, SMD, 0Ω jumper, 1/10W, 0603, AEC-Q200	R2, R4, R6, R50, R52, R69	Do Not Install
4	Resistors, SMD, 0Ω jumper, 1/10W, 0603, AEC-Q200, precision power	R8, R37, R39, R43	Do Not Install

ORDERING INFORMATION

Table 5. Bill of Materials (Continued)

Quantity	Description	Reference Designator	Supplier, Part Number[1]
2	Resistors, SMD, 2.2kΩ 1%, 1/10W, 0603, AEC-Q200	R46, R47	Do Not Install
22	Resistors, SMD, 0Ω jumper, 1/10W, 0402, AEC-Q200	R53, R54, R55, R56, R57, R58, R78, R79, R80, R81, R82, R83, R84, R85, R90, R91, R92, R93, R94, R95, R96, R97	Do Not Install

[1] Generic indicates that any part with the specified value, size, and rating can be used.

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.