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Evaluation Board for Dual, 16-Bit, Serial Input, Voltage-Output DAC

EVAL-AD5663REB

FEATURES

Full-featured evaluation board for the AD5663R
Allows evaluation of the AD5663 part
On-board reference
On-board ADC for voltage readback
Various link options
Direct hookup to USB port of PC
PC software for control of DACs

GENERAL DESCRIPTION

This data sheet describes the evaluation board for the AD5663R dual 16-bit DAC. The AD5663R operates from a single 2.7 V to 5.5 V supply. The part incorporates an internal 1.25 V or 2.5 V on-chip reference to give an output voltage span of 2.5 V or 5 V, respectively. The on-chip reference is off at power-up allowing

for the use of an external reference (the REF195 on this evaluation board). The part must be written to after power-up to turn on the internal reference.

Complete specifications for the AD5663R can be found in the data sheet available from Analog Devices, Inc., and should be consulted in conjunction with this data sheet when using the evaluation board.

This board can also be used to evaluate the AD5663 part. Full data on the AD5663 can be found in the data sheet available from Analog Devices.

The evaluation board interfaces to the USB port of an IBM®-compatible PC. Software is available with the evaluation board allowing the user to easily program the AD5663R.
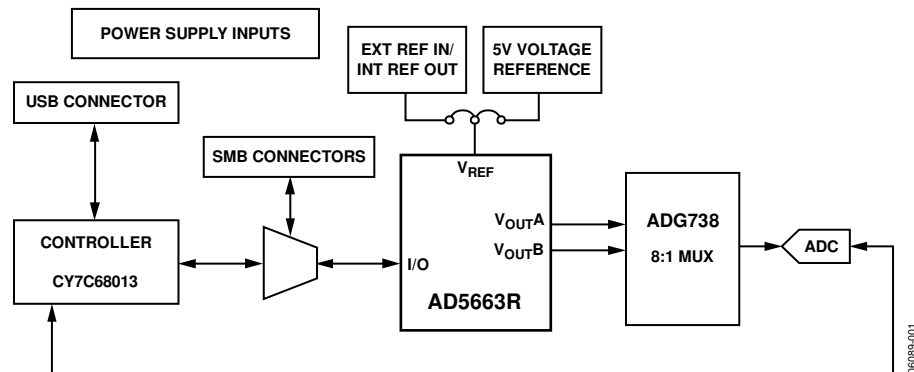
FUNCTIONAL BLOCK DIAGRAM

Figure 1.

EVAL-AD5663REB

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REVISION HISTORY

7/06—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

To power the EVAL-AD5663REB, supply 5.5 V between the AV_{DD} and AGND inputs for the analog supply of the AD5663R (J6). Alternatively, placing Link 6 in Position B powers the analog circuitry from the USB port (default setting).

Both AGND and DGND inputs are provided on the board. The AGND and DGND planes are connected at one location close to the AD5663R. To avoid ground loop problems, it is recommended not to connect AGND and DGND elsewhere in the system.

Each supply is decoupled to the relevant ground plane with 10 μF and 0.1 μF capacitors. Each device supply pin is also decoupled with a 10 μF and 0.1 μF capacitor pair to the relevant ground plane.

LINK OPTIONS

A number of link and switch options on the evaluation board should be set for the required operating setup before using the board. The functions of these link options are described in detail in Table 2. The default setup is for control by the PC via the USB port. The default link options are listed in Table 1.

Table 1. Link Options Setup for PC Control (Default)

Link No.	Option
LK1 to LK2	Inserted
LK5	B
LK6	B
LK7	A
LK8	A
LK9	B
LK10	Removed
LK11	B
LK12	Not applicable
LK13	A

Table 2. Link Functions

Link No.	Function
LK1, LK2	These links connect the $V_{OUT}A$ and $V_{OUT}B$ pins of the AD5663R to the input pins of ADG738 demultiplexer to monitor the DAC output value using the on-board AD7476 ADC.
LK5	This link selects the AVDD power supply source for the analog circuitry. • Position A selects J6 as the AVDD analog circuitry power supply source. • Position B selects the 5 V power supply source as the AVDD analog circuitry power supply source (see LK6).
LK6	This link selects the 5 V power supply source for the digital circuitry. • Position B selects the USB port as the 5 V digital circuitry power supply source. • Position A selects J7 as the 5 V digital circuitry power supply source.
LK7	This link selects whether the AD5663R evaluation board is controlled by the PC via the USB port or by an external source via the SMB connectors J1 to J5. • Position A selects control by the PC via the USB port. • Position B selects control by an external source via the SMB connectors J1 to J3.
LK8	This link sets the RESET pin on the ADG738. • Position A allows normal operation of the switch. • Position B resets the switch.
LK9	This link selects the AVDD power supply source for the REF195. • Position A selects J6 as the REF195 power supply source. • Position B selects the AVDD as the REF195 power supply source (see LK5).
LK10	This link connects a 0.1 μF capacitor to AGND on the V_{REFOUT} pin. It is recommended to connect this when using the internal reference.
LK11	This link selects the reference source. • Position A selects the internal reference as the reference source. The part must be written to via software to turn on the internal reference. • Position B selects the on-board REF195 5 V reference as the reference source.
LK12	Not applicable.
LK13	This link selects the DAC voltage source. • Position A selects the AVDD analog circuitry power supply source. • Position B selects the on-board REF195 5 V reference as the power supply source.

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The AD5663R evaluation kit includes self-installing software on CD-ROM. The software is compatible with Microsoft® Windows® 2000 and Windows® XP.

The software should be installed before connecting the evaluation board to the PC's USB port. This ensures that the board is correctly recognized when connected to the PC.

1. Start the Windows operating system and insert the CD-ROM.

2. The installation software should launch automatically. If it does not, run the **setup.exe** file directly from the CD.

3. After installation from the CD-ROM is complete, power up the AD5663R evaluation board as described in the Power Supplies section. Connect the board to the PC's USB port using the cable supplied.

4. Once the software detects the evaluation board, proceed through any dialog boxes that appear to finalize the installation.

SOFTWARE OPERATION

1. From the **Analog Devices** menu, click **Start > All Programs > Analog Devices >AD5663R >AD5663R Evaluation Software**.

   For older PCs, click **Start > Programs > Analog Devices >AD5663R >AD5663R Evaluation Software**.

2. The main window of AD5663R evaluation software opens, as shown in Figure 2. The data programmed into the 32-bit input shift register is displayed. You can select the command bits, the address bits and the data bits by clicking the appropriate option button under each section.

Command Bits

1. To select a command to program the part, click the appropriate option button under the **Command Bits** section. For example, to program all DAC outputs with full scale, click **Write to and Update DAC channel n**.

2. Next, click **All DACs** in the **Address Bits** section.

3. Then, in the **Data Bits** section, enter the data in **Hex Value** or **Voltage**.

4. To execute, click **Write to Part**. You must click **Write to Part** to execute all writes to the part.

Other commands that the AD5663R evaluation software lets you program include the power down DAC bits, the clear code register bits and the LDAC register bits. This is done by clicking on the corresponding option button under the **Command Bits** section and then clicking **Write to Part**. You can also set the register bits for the required mode of operation. Consult the AD5663R data sheet for details.

Hardware Pins

To set $\overline{\text{LDAC}}$ and $\overline{\text{CLR}}$ to high or low, click the corresponding checkbox in the **Hardware Pins** section. This command is executed immediately. There is no need to click **Write to Part.**

ADC

The voltage output on each DAC channel is monitored using the on-board ADC. To read the output voltage, click the **Sample** button in the **ADC** section (upper right side of the window).

Figure 2. AD5663R Evaluation Software Main Window

Reference Setup

The AD5663R internal reference is turned off at power-up by default, allowing the use of an external reference. To turn on (or turn off) the internal reference, click **REF Setup Register** in the **Command Bits** section. This allows you to program the bit in the reference setup register for the required mode of operation, as shown in Figure 3. Then click **Write to Part**.

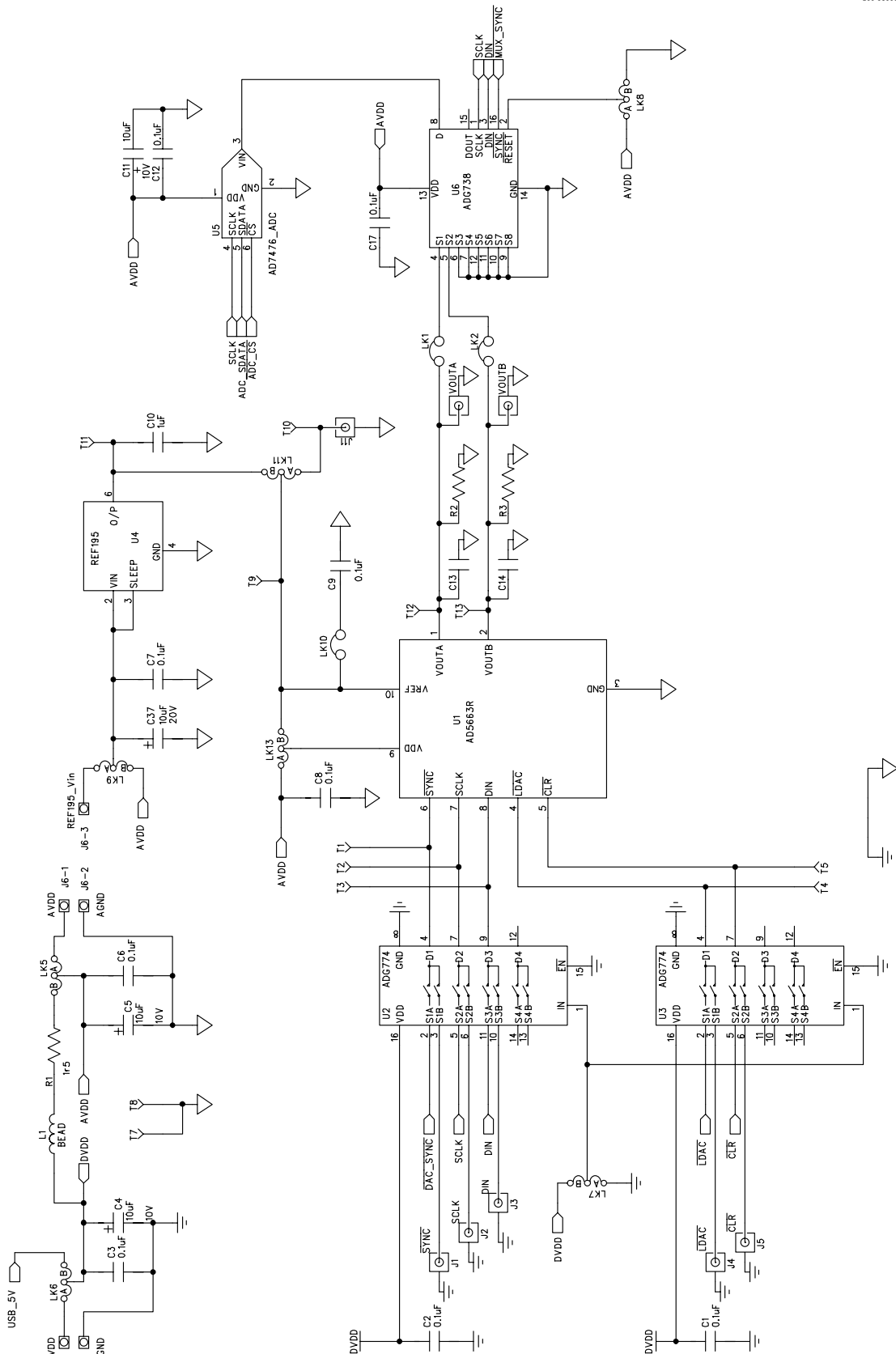Figure 3. AD5663R Evaluation Software Main Window, Reference Setup

EVALUATION BOARD SCHEMATICS AND ARTWORK

Figure 4. Schematic of Controller Circuitry
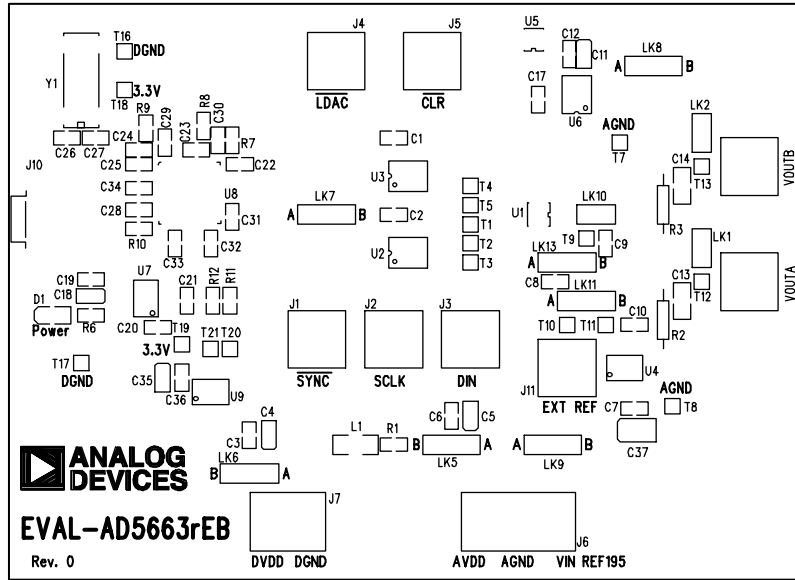
S00-68090

Figure 5. Schematic of AD5663R Circuitry

Figure 6. Component Placement Drawing

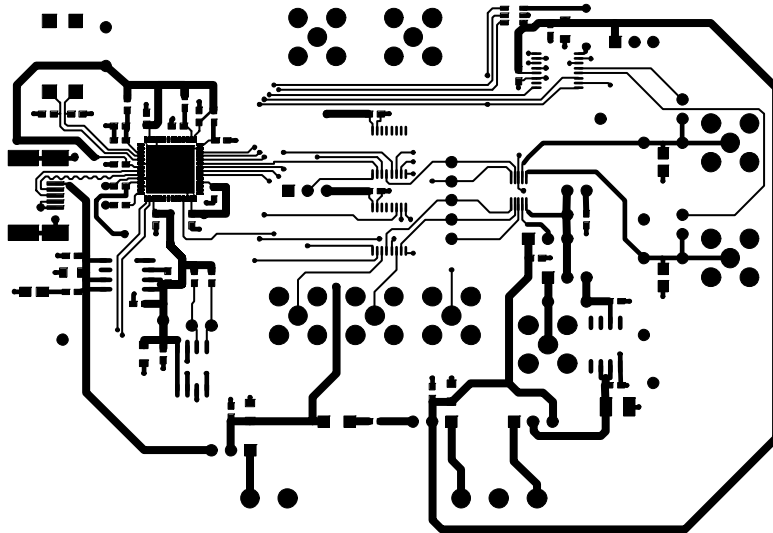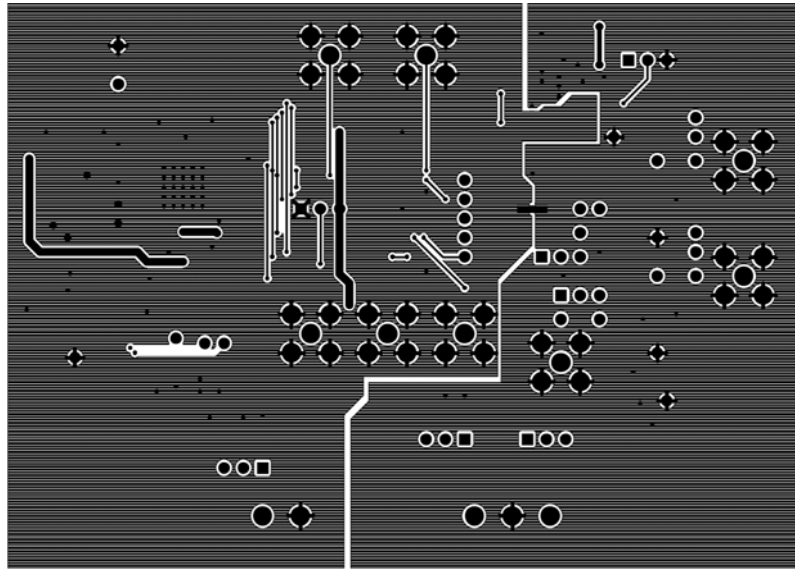*Figure 7. Component Side PCB Drawing*

Figure 8. Solder Side PCB Drawing

ORDERING INFORMATION

COMPONENT LISTING

Table 3.

Qty	Reference Designator	Description	Supplier/Number
1	U1	AD5663RBRMZ-5	Analog Devices
2	U2, U3	ADG774BRQ	Analog Devices
1	U4	REF195ES	Analog Devices
1	U5	AD7476ART	Analog Devices
1	U6	ADG738BRU	Analog Devices
1	U7	ADP3303AR-3.3	Analog Devices
1	U8	CY7C68013-CSP	Embassy CY7C68013-56LFC
1	U9	24LC01	FEC 975-8070
1	Y1	24 MHz crystal	FEC 569-872
8	VOUTA, VOUTB; J1 to J5, J11	Gold 50 Ω SMB jack	FEC 365 1228
1	J10	USB Mini B	FEC 476-8309
1	J6	Power connectors	FEC 151-786
1	J7	Power connectors	FEC 151-785
1	D1	LED	FEC 359-9681
5	C4, C5, C11, C18, C35	10 µF 10 V tantalum cap (TAJ-B package)	FEC 197-130
1	C37	10 µF 20 V tantalum cap (TAJ-B package)	FEC 197-427
2	C26, C27	22 pF (0603 package)	FEC 722-005
25	C1 to C3, C6 to C9, C12, C15 to C17, C19 to C23, C25, C28 to C34, C36	0.1 µF (0603 package)	FEC 882-0023
1	C24	2.2 µF (0603 package)	Digikey 490-1552-1-ND
1	C10	1 µF (0603 package)	FEC 318-8840
2	C13, C14	0805 package (not inserted)	
1	R1	1.5 Ω	FEC 758-267
2	R2, R3	Wire-wrap pin (not inserted)	
1	R6	1 kΩ (0603 package)	FEC 911-239
2	R7, R8	100 kΩ (0603 package)	FEC 911 471
2	R11, R12	2.2 kΩ (0603 package)	FEC 911-276
1	R10	10 kΩ (0603 package)	FEC 911-355
1	R9	0 (0603 package)	FEC 772-227
3	LK1, LK2, LK10	Header (2 × 1 pin)	FEC 511-705
7	LK5 to LK9, LK11, LK13	Header (3 × 1 pin)	FEC 511-717
16	T1 to T13, T16 to T18	Testpoint	FEC 873-1144

ORDERING GUIDE

Model	Package Description
EVAL-AD5663REB	Evaluation Board

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

WARNING!
ESD SENSITIVE DEVICE

NOTES

NOTES

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