a

Evaluation Board for
16-Channel Serial DAC

Preliminary Technical Data

EVAL-AD5516EB

FEATURES
Full-Featured Evaluation Board for the AD5516
On-Board 3 V Reference
Various Link and Switch Options
PC Software for Control af AD5516

INTRODUCTION
This Technical Note describes the evaluation board for the AD5516. This device contains 16 voltage-output DACs. Each DAC is written to via an 18-bit write to the 3-wire serial interface. Channel selection is accomplished by address bits A3-A0. The AD5516 is operated with $AVcc = 5$ V $\pm$ 5%, $DVcc = 2.7$ V to 5.25 V, $Vss = -4.75$ V to -12 V and $V_{DD} = 4.75$ V to 12 V. It requires a stable 3 V reference on the REF_IN pin.

The AD5516 is available in a 74-lead LFBGA package. There are three models of this device (-1, -2 and -3). Each model offers a different output voltage range. Ensure you order the correct evaluation board for your requirements.

The AD5516-1 has an output voltage range of $\pm$ 2.5 V.

The AD5516-2 has an output voltage range of $\pm$ 5 V.

The AD5516-3 has an output voltage range of $\pm$ 10 V.

Full details are available in the AD5516 datasheet from Analog Devices (see www.analog.com). This datasheet should be consulted in conjunction with this Technical Note when using the Evaluation Board.

This evaluation board contains an AD780 which is a pin programmable 3 V high precision bandgap reference. There are various link and switch options which are explained in detail on page 2.

Interfacing to this board from a PC is through a 36-way Centronics connector. This 36-way connector is compatible with most printer cables and is usually connected to the parallel printer port on a standard PC via a standard printer cable.

OPERATING THE AD5516 EVALUATION BOARD
Power Supplies
The following external supplies must be provided: +5 V between the DVCC and DGND inputs which supplies the DVcc pins on the AD5516. +5 V between the AVCC and the AGND inputs to supply the AD780 and the AVcc pins on the AD5516. -5 V to the VSS input to supply the AD5516 Vss pins. +5 V to the VDD input to supply the AD5516 V_{DD} pins.

Each supply is decoupled to the relevant ground plane with a 47 uF and a 0.1 uF capacitor pair as it enters the board. Each device supply pin is again decoupled with a 10 uF and a 0.1 uF capacitor pair to the relevant ground plane.

There are 2 ground planes on the board, AGND and DGND. These are connected together at one location close to the AD5516. It is recommended not to connect these anywhere else to avoid ground loop problems.

FUNCTIONAL BLOCK DIAGRAM
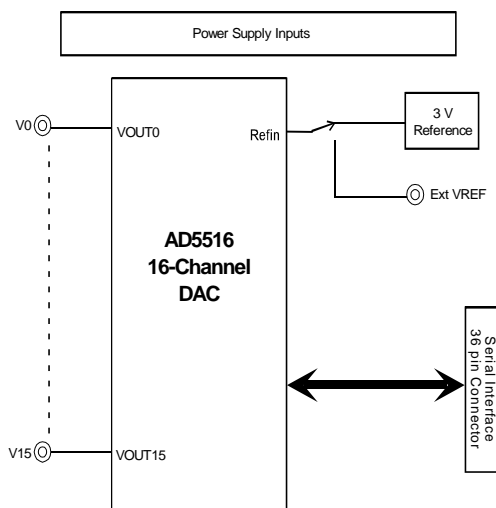
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LINK AND SWITCH OPTIONS

There are 20 link options and 1 switch which must be set for the required operating setup before using the evaluation board. The functions of these links and switch options are outlined below.

Table I. Link and Switch Functions.

Link No.	Function
LK0..LK15	These link options allow the user to have access to the feedback resistors on the output amplifiers. When these links are in place each feedback resistor is connected to it's corresponding V_{OUT}.
LK16	This link option is used to select whether the *RESET* line is tied to DVCC (inactive) or disconnected so that it can be driven from the parallel port.
LK17	This link option is used to select whether the PD line is tied to DGND (inactive) or disconnected so that it can be driven from the parallel port.
LK18	This link option is used to select Stand-Alone Mode (DCEN = 0) or Daisy-Chain Mode (DCEN = 1) for the AD5516 serial interface.
LK19	This link option is used to select the reference value output from the AD780. When the link is in place the AD780 outputs 3 V, when it is disconnected it outputs 2.5 V.

Switch No.	Function
S1	This switch selects the source of the reference voltage for the AD5516 REFIN pin. It has 2 settings. When the slider is moved to the AD780 position, the AD780 reference provides the reference. In the other position an external reference must be provided at the SMB connector, SK6.

SET-UP CONDITIONS

Care should be taken before applying power and signals to the evaluation board to ensure that all link/switch positions are set as per the required operating mode. Table II shows the position in which all the links are set when the evaluation board is shipped.

Table II. Initial Link and Switch Positions

Link No.	Position	Function
LK0..15	ON	Each output amplifier has it's feedback resistor connected to the corresponding V_{OUT} pin.
LK16	OFF	The *RESET* line is disconnected so that it can be driven from the parallel port.
LK17	OFF	The PD line is disconnected so that it can be driven from the parallel port.
LK18	LEFT	DCEN is tied to DGND for Stand-Alone Mode.
LK19	ON	The AD780 outputs a 3 V reference.
S1	AD780	The AD780 provides the reference for the AD5516.

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EVAL-AD5516EB

EVALUATION BOARD INTERFACING

Serial interfacing
The 36-pin centronics connector interfaces to the serial interface on the AD5516. The evaluation software provided with the evaluation kit will only work when the user is using the serial interface. The pin-out description and function of the 36-pin serial interface connector, J1, is given in Table III.

Table III. 36-pin Serial Interface connector

Pin No.	Name	Description.
2	DIN	Connects to the AD5516 DIN pin. Serial data is loaded to the device via this pin.
3	SCLK	Connects to the serial clock pin on the AD5516.
4	$\overline{SYNC}$	Connects to the $\overline{SYNC}$ pin on the AD5516.
5	PD	Connects to the PD pin on the AD5516.
6	RESET	Connects to the $\overline{RESET}$ pin on the AD5516.
10	DOUT	Connects to the DOUT pin on the AD5516. DOUT can be probed at T2.
13	BUSY	Connects to the $\overline{BUSY}$ pin on the AD5516. $\overline{BUSY}$ can be probed at T1.
19-30	GND	Connects to the DGND plane on the board.

For further information on the functions and timing of these signals refer to the AD5516 Data Sheet.

EVAL-AD5516EB

EVALUATION BOARD SOFTWARE

Software installation
Install the AD5516 software from the CD onto your PC by executing setup.exe. Power-up the eval board then connect the eval board to the PC via a Centronics cable. Run ad5516.exe.
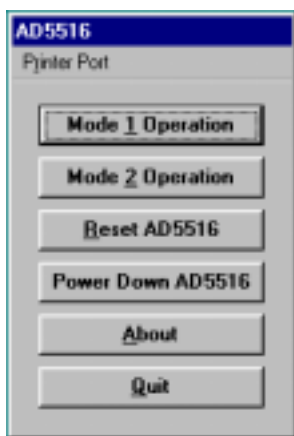
The main menu looks as follows:

Figure 1: Main Menu

Mode1
This mode allows the user to program a 12-bit word to a selected DAC channel.
• Select any channel.
• Enter a DAC Word between 000 and FFF Hex.
• Click on **Update Channel**.

Figure 2: Mode1 DAC write

Mode 2 Operation
Mode2 enables the user to perform a fine-adjustment on the DAC code. It allows the user to increment or decrement the DAC code of a selected DAC channel in 1 LSB steps, where 1 LSB corresponds to a 14-bit LSB. The maximum increment/decrement step-size is 127 14-bit LSBs.
• Select any channel.
• Select **Increment Code** or **Decrement Code**.
• Enter a decimal increment/decrement value between 000 and 127 LSBs.
• Click on **Update Selected Channel**.

Figure 3: Mode2 DAC write

Reset Function
To reset the AD5516 click on **Reset AD5516**. This transmits a single negative pulse on the RESET line which resets the AD5516.

Note that this will work only if the link at LK16 is disconnected.

Power Down Function
To power-down the AD5516 click on **Power Down AD5516**. This transmits a high level on the PD line which places the AD5516 in a low-power mode.

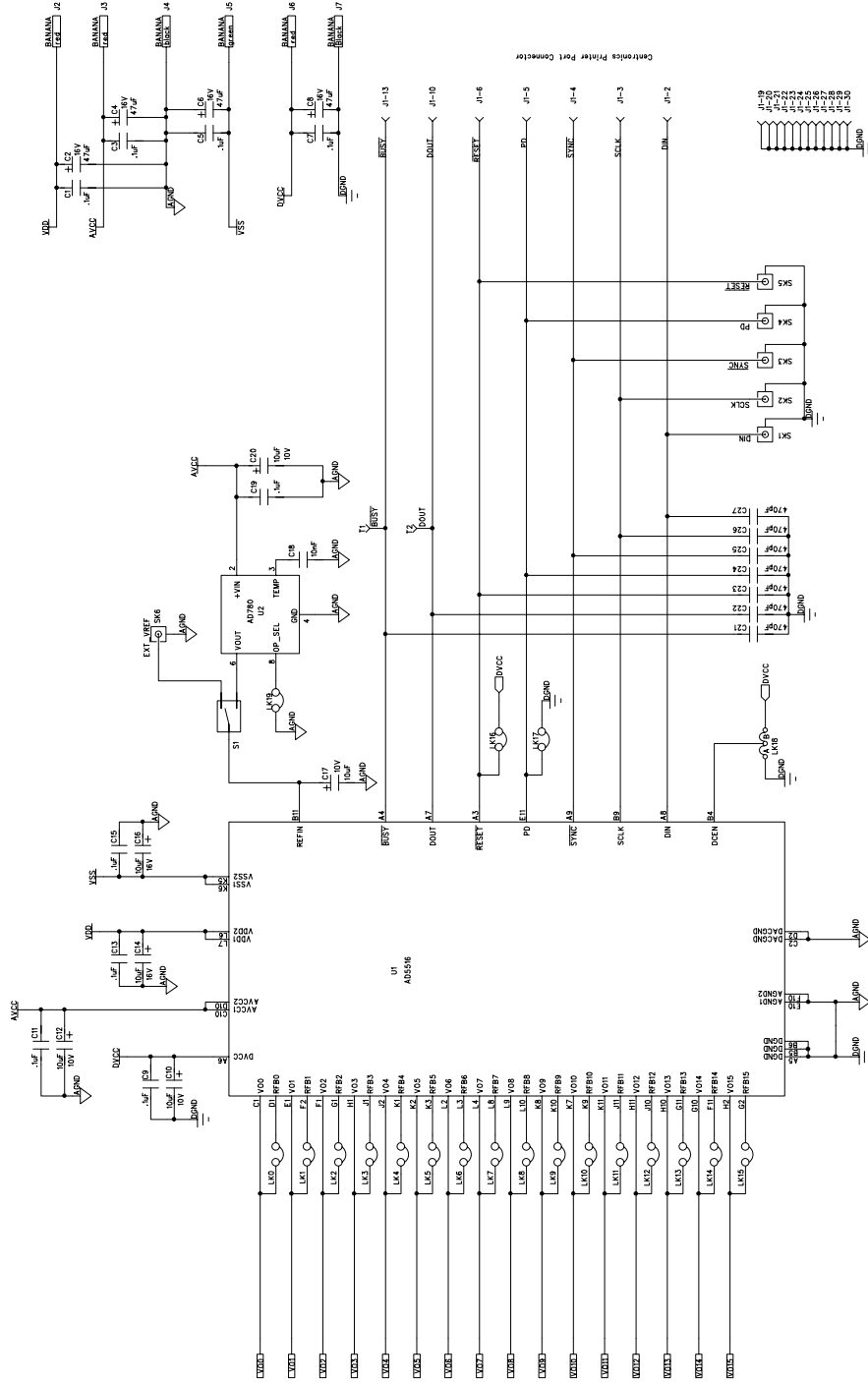Note that this will work only if the link at LK17 is disconnected.

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Figure 4: Evaluation Board Circuit Diagram

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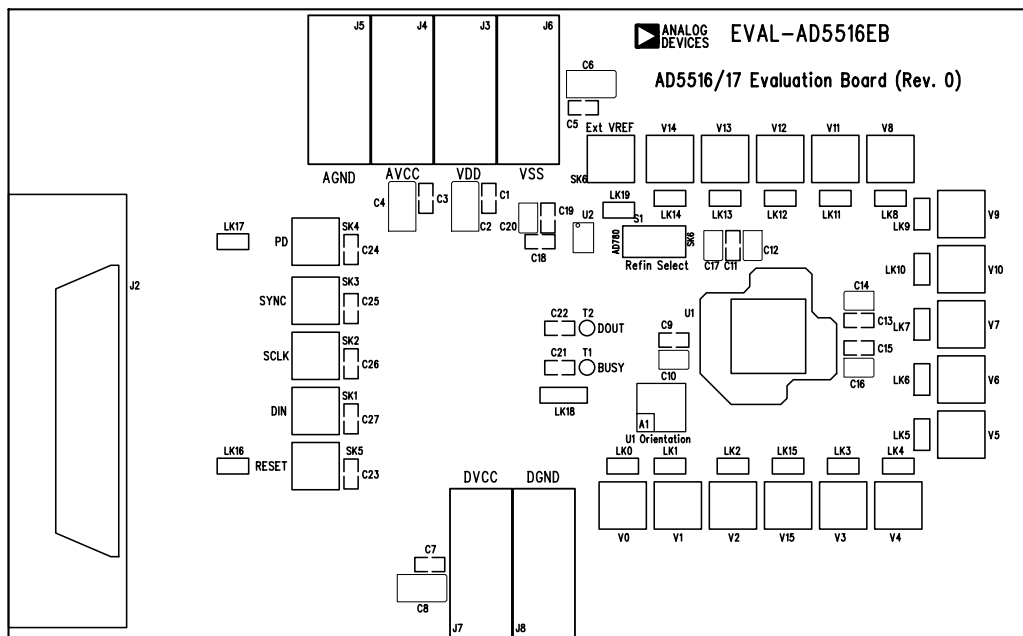

Figure 5: EVAL-AD5516EB Evaluation Board.

Table IV. Bill Of Materials

Item	Qty	PartType	Reference/Description	Supplier/Number
1	1	AD5516ABC-1	U1	ADI Free Issue
2	1	AD780AR	U2	ADI Free Issue
3	9	0.1uF Multilayer Ceramic Cap. (0805 Package)	C1 C3 C5 C7 C9 C11 C13 C15 C19	FEC 499-687
4	4	47uF 16V Tantalum Capacitor (TAJ-D Size)	C2 C4 C6 C8	FEC 498-762
5	6	10uF 10V Tantalum Capacitor (TAJ-B Size)	C10 C12 C14 C16 C17 C20	FEC 498-660
6	1	10nF Multilayer Ceramic Cap. (0805 Package)	C18	FEC 499-225
7	7	???pF Multilayer Ceramic Cap. (0805 Package)	C21 C22 C23 C24 C25 C26 C27	——————-
8	1	36 Pin Centronics Connector (IEEE 488 Style)	J2	FEC 147-753
9	3	Red Banana Socket	J3 J4 J7	FEC 150-039
10	2	Black Banana Socket	J5 J8	FEC 150-040
11	1	Green Banana Socket	J6	FEC 150-041
12	19	2 Pin (SIL) Link Option (0.1" pitch)	LK0-17 LK19	FEC 511-705
13	1	3 Pin (SIL) Link Option (0.1" pitch)	LK18	FEC 511-705
14	20	Shorting Bar	LK0-19	FEC 150-410
15	1	Single Pole, Double Throw Slide Switch	S1	FEC 733-647
16	22	Gold 50 Ohm SMB Jack	SK1 - SK6, V0 - V15	FEC 310-682
17	5	Rubber Stick-On Feet	Each Corner and 1 under BGA Socket	FEC 148-922
18	1	PCB	AD5516 PCB	

FEC - Farnell Electronic Components, Units 4 & 5 Gofton Court, Jamestown Road, Finglas, Dublin 11. Tel. Int +353 (0)1 8309277

ADI - Analog Devices, Raheen Business Park, Limerick. Tel. Int +353 (0)61 229011

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