




ANALOG DEVICES ADL6317-EVALZ Evaluating TxVGAs for Use with RF DACs and Transceivers User Guide

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ANALOG DEVICES ADL6317-EVALZ Evaluating TxVGAs for Use with RF DACs and Transceivers



FEATURES

- Full featured evaluation board for the ADL6317
- SPI control via SDP-S board
- 5.0 V single-supply operation

EVALUATION KIT CONTENTS

ADL6317-EVALZ evaluation board

ADDITIONAL HARDWARE REQUIRED

- Analog signal generator
- Analog signal analyzer
- Power supplies (6 V, 5 A)
- PC with Windows® XP, Windows 7, or Windows 10 operating system
- USB 2.0 port, recommended (USB 1.1-compatible)
- EVAL-SDP-CS1Z (SDP-S) controller board

ADDITIONAL SOFTWARE REQUIRED

Analysis | Control | Evaluation (ACE) software

GENERAL DESCRIPTION

The ADL6317 is a transmit variable gain amplifier (VGA) that provides an interface from radio frequency (RF) digital-to-analog converters (DACs), transceivers, and systems on a chip (SoC) to power amplifiers (PAs). Integrated balun and hybrid couplers allow high performance RF capability in the 1.5 GHz to 3.0 GHz frequency range

To optimize performance vs. power level, the ADL6317 includes a voltage variable attenuator (VVA), high linearity amplifiers, and a digital step attenuator (DSA). The devices integrated into the ADL6317 are programmable via a

4-wire serial port interface (SPI).

This user guide describes the evaluation board and software for the ADL6317. See the ADL6317 data sheet for full details, which must be consulted in conjunction with this user guide when using the evaluation board. The ADL6317 evaluation board was fabri-cated using FR-370HR, Rogers 4350B in four layers.

EVALUATION BOARD PHOTOGRAPH

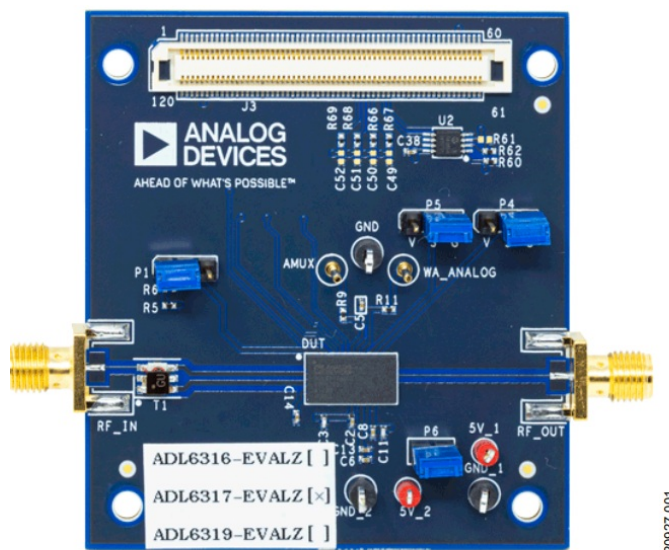


Figure 1. ADL6317 Evaluation Board

EVALUATION BOARD HARDWARE

The ADL6317-EVALZ evaluation board provides the support circuitry required to operate the ADL6317 in various modes and configurations. Figure 2 shows the typical bench setup to evaluate the performance of the ADL6317.

POWER SUPPLY

The ADL6317-EVALZ evaluation board requires a single, 5.0 V power supply.

RF INPUT

The on-board balun enables single-ended driving. The ADL6317 operates over a frequency range of 1.5 GHz to 3.0 GHz.

RF OUTPUTS

The RF outputs are available on the evaluation board at the RF_OUT SMA connectors, which can drive a load of 50 Ω .

SIGNAL PATH MODES SELECTION

The ADL6317 has two signal path modes. This feature allows two predefined modes of operation to be controlled by the logic level on TXEN, a real-time external pin (Pin 37) with no SPI latency. Table 1 shows the hardware configuration to select the desired mode.

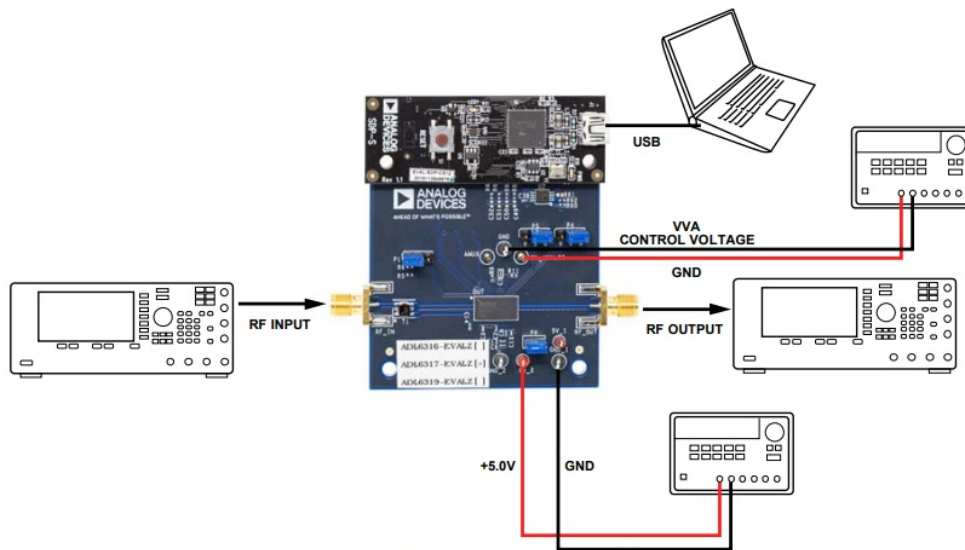


Figure 2. ADL6317 Typical Measurement Setup

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Table 1. Mode Selection and Setup Registers

TXEN(Pin 37)	Register	Functional Blocks	Description
0	0x0102	DSA attenuation	0 dB to ~15.5 dB range, 0.5dB step
	0x0107	AMP1	Amplifier 1 optimization
	0x0108	AMP1	Amplifier 1 enable
	0x0109	AMP2	Amplifier 2 optimization
	0x010A	AMP2	Amplifier 2 enable
1	0x0112	DSA attenuation	0 dB to ~15.5 dB range, 0.5dB step
	0x0117	AMP1	Amplifier 1 optimization
	0x0118	AMP1	Amplifier 1 enable
	0x0119	AMP2	Amplifier 2 optimization
	0x011A	AMP2	Amplifier 2 enable

EVALUATION BOARD SOFTWARE

The ADL6317 on the ADL6317-EVALZ evaluation board and the SDP-S controller board are configured with a USB friendly interface to allow programmability of the ADL6317 registers.

SOFTWARE REQUIREMENTS AND INSTALLATION

The Analysis | Control | Evaluation (ACE) software is required to program and control the ADL6317 and the ADL6317-EVALZ evaluation board.

The ACE software suite allows bit control of the ADL6317 register map via the SPI, and communicates to the SDP-S controller board via the USB connection. The SDP-S controller board configures the SPI lines (CS, SDI, SDO, and SCLK) accordingly to communicate to the ADL6317.

Installing the ACE Software Suite

To install the ACE software suite, take the following steps:

1. Download the software from the ACE product page.
2. Open the downloaded file to begin the installation process. The default installation path is C:\Program Files (x86)\Analog Devices\ACE.
3. If desired, the user can create a desktop icon for the ACE software. Otherwise, the ACE executable can be found by clicking Start > Analog Devices > ACE.

INSTALLING ADL6317 ACE PLUGINS

When the ACE software installations are complete, the user must install the evaluation board plugins to the hard drive of the PC.

1. Download ADL6317 ACE plugins (Board.ADL631x.1.2019.34200.acezip) from the ADL6317-EVALZ product page.
2. Double-click the Board.ADL631x.1.2019.34200.acezip file to install the evaluation board plugins.
3. Ensure that the Board.ADL631x.1.2019.34200 and Chip.ADL631x.1.2019.34200 folders are located inside the C:\ProgramData\Analog Devices\ACE\Plugins folder.

ACE SOFTWARE SUITE

Power up the ADL6317-EVALZ evaluation board and connect the USB cable to the PC and to the SDP-S board mounted on the ADL6317-EVALZ evaluation board.

1. Double-click the ACE shortcut on the PC desktop of the computer (if created). The software automatically detects the ADL6317-EVALZ evaluation board. The software opens the ACE plugin view, as shown in Figure 3.

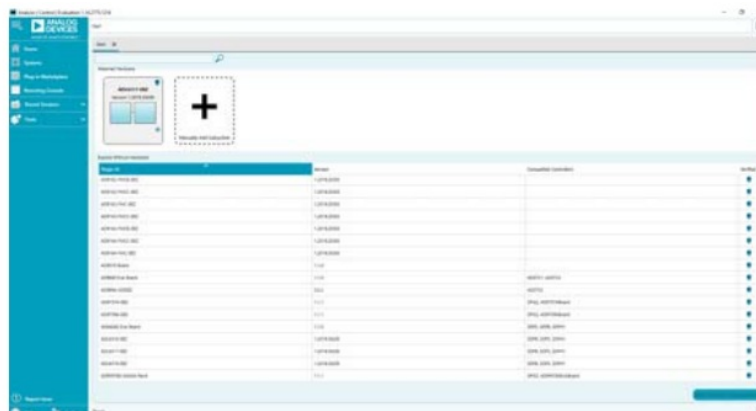


Figure 3. ACE Plugin View

2. Double-click the ADL6317-EBZ board icon, as shown in Figure 4.

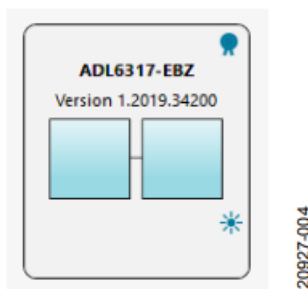


Figure 4. ADL6317-EBZ Board Icon

3. The software opens the ACE chip view as shown in Figure 5.

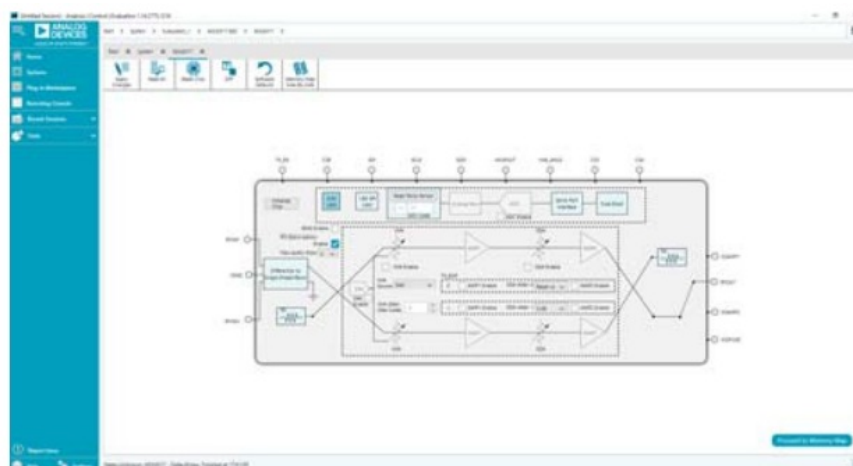


Figure 5. ACE Chip View

CONFIGURATION AND PROGRAMMING SEQUENCE

To configure and program the evaluation board, take the following steps:

1. Run the ACE software as explained in the ACE Software Suite.
2. Click Initialize Chip (Label A, see Figure 6).
3. Click and adjust the blocks in Label B to Label H, as shown in Figure 6, if necessary.
4. After changing the block as directed in Step 3, in the ACE software, click Apply Changes (Label K, see Figure 7) to update to ADL6317.
5. To adjust an individual register and bit, click Proceed to Memory Map. This button opens the ADL6317 memory map for bit control (see Figure 8). The ADL6317 can be configured by either putting data into Data(Hex) column or by clicking a specific bit in the Data(Binary) column of the register map (see Figure 8). Click Apply Changes to save changes and program the ADL6317.

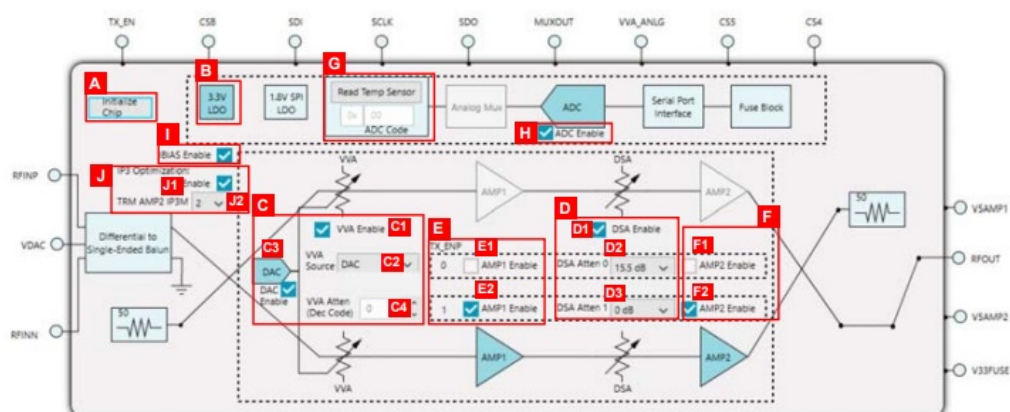


Figure 6. ADL6317 Chip Block Diagram

Table 2. Main Screen Functionality (see Figure 6)

Label	Function
A	Initialize chip button.
B	3.3 V low dropout regulator (LDO) enable.
C	VVA control block.
C1	VVA Enable checkbox.
C2	Selects VVA voltage source:
	DAC: VVA attenuation set by internal 12-bit DAC, set DAC code (0 to ~4095 range) in VVA Atten (Dec Code) field.
	VVA_ANALOG: VVA attenuation set by analog voltage applied on ANLG pin.
C3	DAC Enable checkbox for VVA attenuation when the VVA Source field is set to DAC .
C4	VVA Atten (Dec Code) menu. Selects VVA DAC code in decimal (0 to ~4095 range). Higher numbers equal less attenuation.
D	DSA control block, DSA Atten 0 and DSA Atten 1 are selected by the logic level on TXEN (see Table 1).
D1	DSA Enable checkbox.
D2	Set DSA Atten 0 attenuation.
D3	Set DSA Atten 1 attenuation.
E	AMP1 Enable checkbox. AMP1 can be set individually by the logic level on TXEN (see Table 1).
F	AMP2 Enable checkbox. AMP2 can be set individually by the logic level on TXEN (see Table 1).
G	Read Temp Sensor button and ADC Code text fields. These functions are for proportional to absolute temperature (PTAT) ADC
	code readback.
H	ADC Enable checkbox.
I	IBIAS Enable checkbox. This function enables the bias generator.
J	IP3 Optimization control block.
J1	Enable checkbox for IP3 optimization.
J2	TRM AMP2 IP3M dropdown menu. Set the TRM_AMP2_IP3 bits value for IP3 optimization.

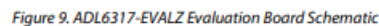


Figure 7. ADL6317-EVALZ ACE Chip View After Chip Initialization



Figure 8. ADL6317-EVALZ ACE Memory Map View

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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.

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Documents / Resources

	<p>ANALOG DEVICES ADL6317-EVALZ Evaluating TxVGAs for Use with RF DACs and Transceivers [pdf] User Guide</p> <p>ADL6317-EVALZ Evaluating TxVGAs for Use with RF DACs and Transceivers, ADL6317-EVAL Z, Evaluating TxVGAs for Use with RF DACs and Transceivers, RF DACs and Transceivers, Tra nsceivers</p>
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References

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