



HSI TECHNICAL NOTE

ADN4600 EVALUATION BOARD APPLICATION NOTE

Introduction:

This application note describes the ADN4600 Evaluation board. It includes a quick start guide, board configuration and software installation instructions.

The ADN4600 evaluation board uses Rogers 4003 with 15.5 mil traces with 30+ mil spacing. The middle layers are Rohs compliant FR-4 material. The both input/output differential transmission line pairs use 100 Ω differential characteristic impedance. The 8 differential input pairs and 8 differential output line pairs connected to standard edge launch SMA connectors. Each input and output pair is ac coupled using a 0.1 μ f capacitor. The board can easily be converted to dc coupled traces by replacing the capacitor with a zero Ohm smt capacitor. The underside of the evaluation board has a differential test trace equal in length to the sum of an input and an output trace.

Equipment required for evaluation:

- 3.3V power supply (two if the user wants to run the part at voltages other than 3.3V and use USB software)
- An oscilloscope
- A differential signal generator
- A PC with Microsoft Windows 2000/XP with the ADN4600 evaluation software installed,
- ADN4600 datasheet
- FR4 test traces of cables for testing EQ and PE

ADN4600 Evaluation Board Initial setup conditions:

Power Supply

The ADN4600 evaluation board requires a 3.3V, +/- 10% nominal power supply (but can work with lower supplies see datasheet). Please bring this supply to the board through the banana jacks, VCC referenced to VEE. See section on power configurations for other options

In (+)/(-) Inputs

The ADN4600 gets a differential or single-ended signal through the SMA connectors IP[0:7] and IN[0:7]. When applied a single-ended signal, please terminate one of the differential input SMA connectors with a 50 Ω terminator. A differential signal level of 800 mVpp differential (+ / - 400mVd) is suggested for initial investigation.

With ac signal coupling, ADN4600 device inputs support both CML and PECL. Ceramic capacitors provide the AC coupling path to the signal input. To match with the 50 Ω transmission line, ADN4600 has on-chip, 50 Ω termination resistors for its input pads.

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Data Outputs

The CML outputs are ac-coupled to the SMA connectors labeled OUTP and OUTN through 0.1uF ceramic capacitors. Output levels are programmable.

PC interface

The evaluation board uses a Microchip controller with voltage isolator and level translator to talk to the device using the software given. DVCC must always be be 3.3V to interface with the pc.

ADN4600 Evaluation Board:

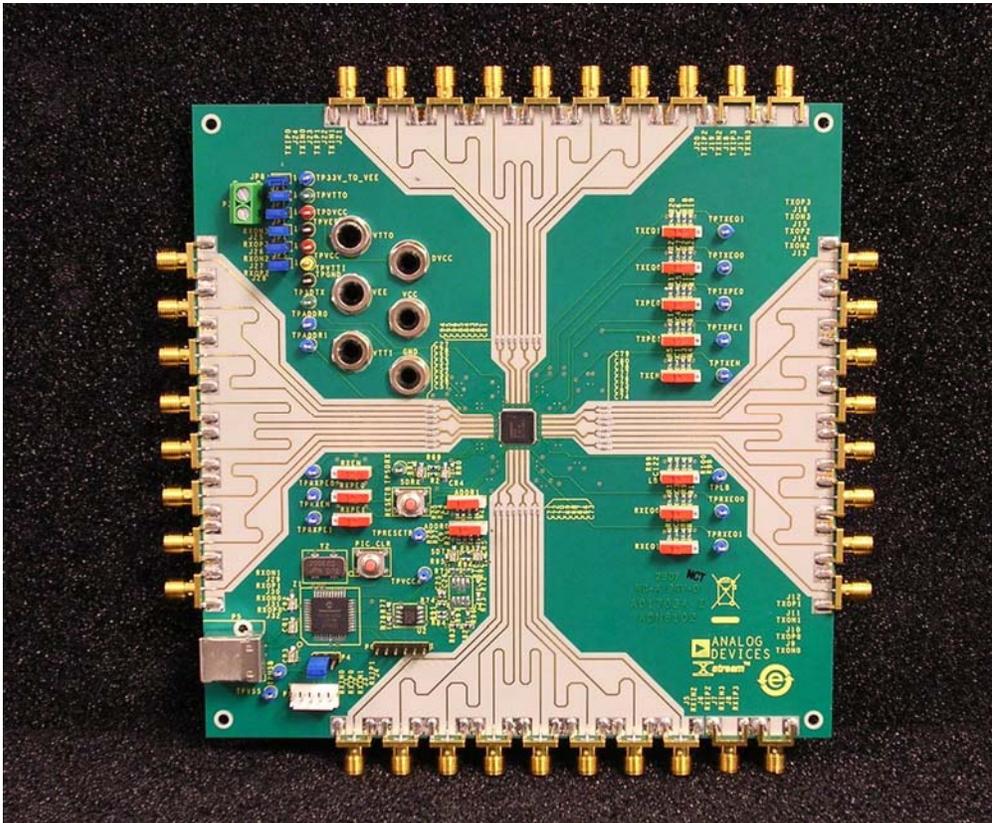


Fig.1 Factory default settings of ADN4600 evaluation board switches.

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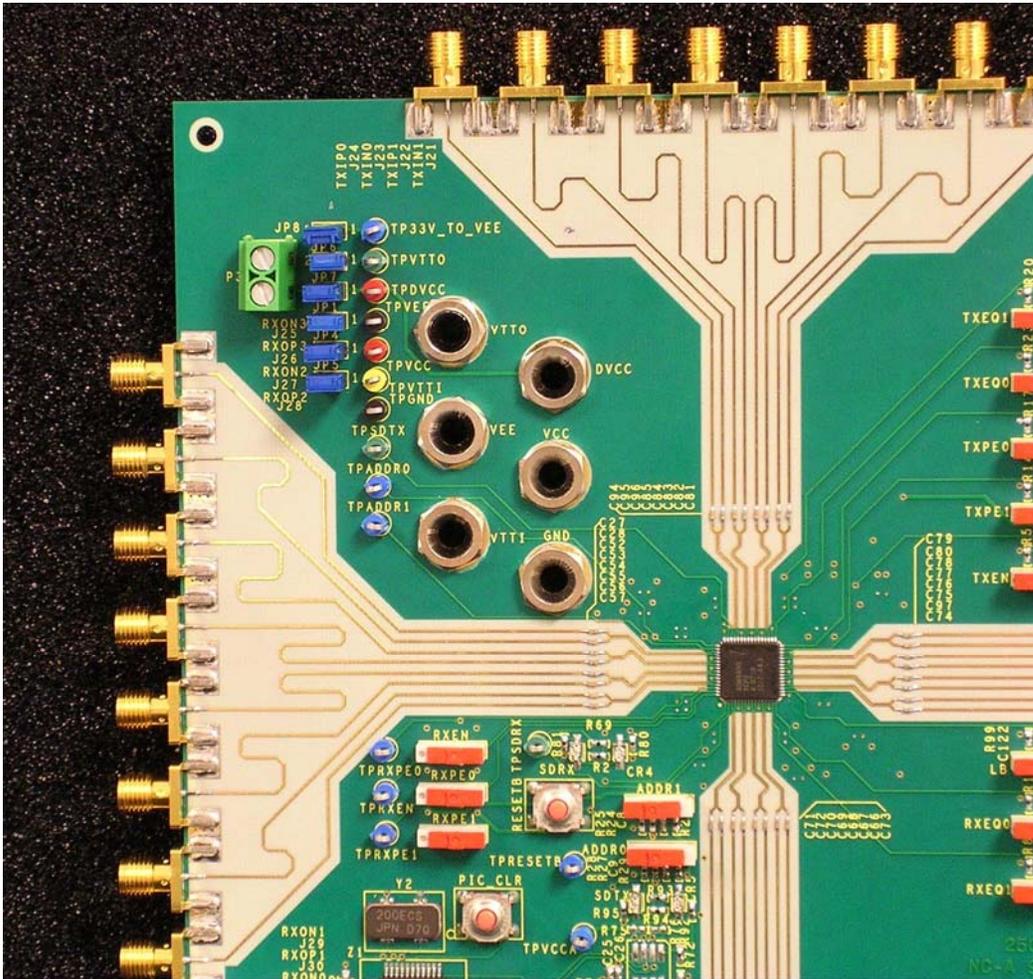


Fig.2 Power supply connections, blue jumpers are used to short all supplies together and short VEE to GND.

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| Switches | Functions |
|-----------------|---------------------------------|
| ADDR0 | I2C Address LSB |
| ADDR1 | I2C Address 2nd LSB |
| RESETb | Chip Reset (Enable Low) |
| PIC_CLR | Resets the microchip controller |

Table 1: Functions of Switches on board

| Jumper/Connector | Functions | Pin 1 | Pin 2 |
|-------------------------|---|----------------------|--------------|
| JP1 | Connects VEE to GND (P3) | VEE | GND |
| JP8 | Connects TP3.3V_to_Vee to DVCC | TP3.3V_to_Vee | SUPPLY |
| JP4 | VCC to Supply (P3) | VCC | SUPPLY |
| JP5 | VTTI to Supply (P3) | VTTI | SUPPLY |
| JP6 | VTTO to Supply (P3) | VTTO | SUPPLY |
| JP7 | DVCC to Supply (P3) | DVCC | SUPPLY |
| P3 | SUPPLY and GND CONNECTOR | SUPPLY | GND |
| P5 | USB CONNECTOR | - | - |
| TP3.3V_to_Vee | 3.3V connection for I2C isolation circuit | 3.3V | - |
| P4 | Connects Microcontroller to VCC | Do not remove | |
| P1 | I2C connector | no connection needed | |
| P6 | ADI internal use only | no connection needed | |

Table 2: Functions of Jumpers/headers on board:

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| Pin Number | Board Label | SMA Label | ADN4600 Pin |
|------------|-------------|-----------|-------------|
| 3 | RXIN0 | J1 | IN0 |
| 4 | RXIP0 | J2 | IP0 |
| 6 | RXIN1 | J3 | IN1 |
| 7 | RXIP1 | J4 | IP1 |
| 9 | RXIN2 | J5 | IN2 |
| 10 | RXIP2 | J6 | IP2 |
| 12 | RXIN3 | J7 | IN3 |
| 13 | RXIP3 | J8 | IP3 |
| 19 | TXON0 | J9 | ON7 |
| 20 | TXOP0 | J10 | OP7 |
| 22 | TXON1 | J11 | ON6 |
| 23 | TXOP1 | J12 | OP6 |
| 25 | TXON2 | J13 | ON5 |
| 26 | TXOP2 | J14 | OP5 |
| 28 | TXON3 | J15 | ON4 |
| 29 | TXOP3 | J16 | OP4 |
| 35 | TXIN3 | J17 | IN4 |
| 36 | TXIP3 | J18 | IP4 |
| 38 | TXIN2 | J19 | IN5 |
| 39 | TXIP2 | J20 | IP5 |
| 41 | TXIN1 | J21 | IN6 |
| 42 | TXIP1 | J22 | IP6 |
| 44 | TXIN0 | J23 | IN7 |
| 45 | TXIP0 | J24 | IP7 |
| 51 | RXON3 | J25 | ON3 |
| 52 | RXOP3 | J26 | OP3 |
| 54 | RXON2 | J27 | ON2 |
| 55 | RXOP2 | J28 | OP2 |
| 57 | RXON1 | J29 | ON1 |
| 58 | RXOP1 | J30 | OP1 |
| 60 | RXON0 | J31 | ON0 |
| 61 | RXOP0 | J32 | OP0 |

Table 3: SMA Connectors labels vs. pin name

Power Configurations

The reference plane (GND) is not electrically connected to VEE to allow the board to be configured with either positive or negative or split supplies. The reference plane (GND) is connected to the shield potential of the input and output SMA connectors. JP1 shorts VEE to GND and can be removed to run in the negative configuration. The negative supply configuration is useful when connecting the ADN4600 board to test equipment that has a 50 Ohm termination to GND, after converting the board to be DC-coupled. JP1 shorts VEE to GND and must be removed to run in the negative configuration. Diagrams of positive and negative supply configurations are illustrated in Figure 4.

Installing JP4 thru JP7 shorts VCC to VTTI and VTTO and DVCC. Remove a jumper when you want to run a particular supply at a different level. To work properly, TP3.3V_to_Vee must always be connected to DVCC, a 3.3V supply referenced to VEE for the isolation circuit to work properly. The isolation circuit isolates the pc's VDD and VSS from the device supplies. Leave the JP8 jumper installed to connect this point to DVCC which should always be at 3.3V or communication will fail.

For example the user can run device at 1.8V. To do this leave all jumpers installed shorting VCC, VTTI, and VTTO JP4 thru JP6. Connect the VCC banana jack to 1.8V referenced to VEE. Remove JP7 and JP8, and connect DVCC banana jack to 3.3V referenced to VEE to allow communication to the pc. For further details on other supply setups see the datasheet.

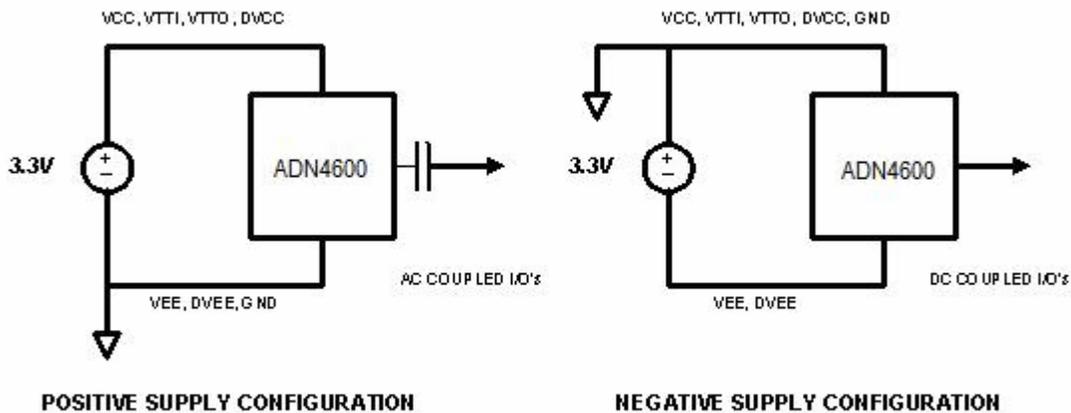


Fig.4: Power Configurations

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Quick Start Guide:

1. After installing the software (see section below). Apply a 3.3V power to banana jack "VCC" relative to "VEE". JP4 thru JP8 should be installed. The test points and banana jacks are at the top of the board shown in the Fig.2. All the supply jumpers should be installed as Fig.2
2. Connect IN0 (J1) and IP0 (J2) (two SMA connectors at bottom of the board shown in Fig.1) to a pattern generator and apply a PRBS signal. It is important to use a pair of matched length, 50Ω cables;
3. Connect ON0 (J31) and OP0 (J32) (two SMA connectors at bottom left side of the board shown in Fig.1) to an oscilloscope using a pair of matched length, 50Ω cables;
4. Apply a data pattern signal (any data rate up to 4.25Gb/s) to the ADN4600. A signal with amplitude >800mVpp differential is a good signal for an initial test. The ADN4600 will present its output at the OUTP and OUTN SMA connectors.
5. Connect the provided USB cable directly to the evaluation board and the pc (it is not recommended to use a hub since the 5V from the pc is needed on the evaluation board to supply the isolator). Use the software provided to control the ADN4600 using I2C commands. Using the software panel, select connection IN/IP0 to connect to ON/OP0.

PROGRAMMING THE ADN4600 Using Supplied Software

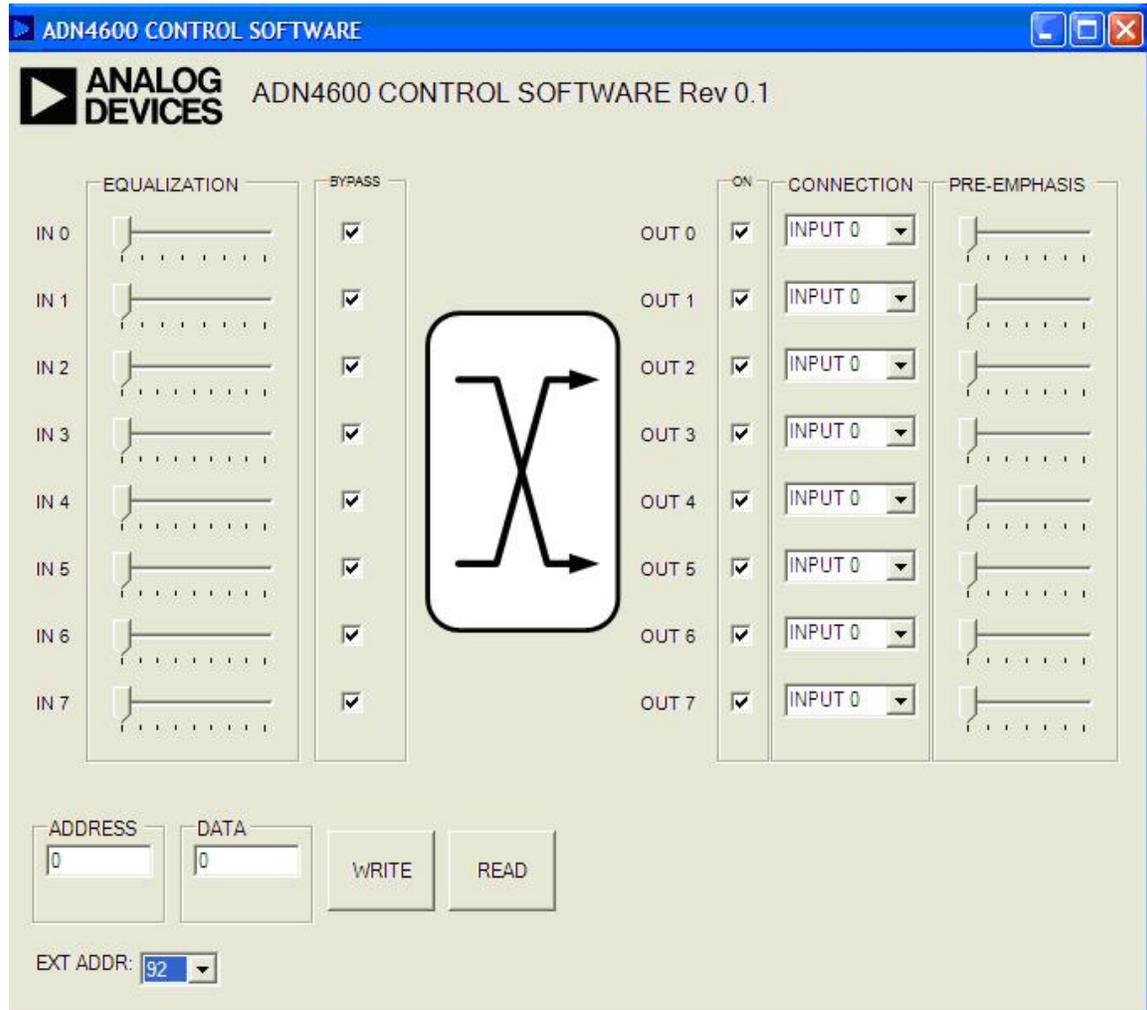


Fig.5: ADN4600 Software Graphical user interface

The ADN4600 can be programmed using the graphical user interface shown in the figure above by clicking on the sliders and check boxes or by typing in register values in the address and data fields. Register map information can be found in the ADN4600 datasheet. The programming is done with the on board using a Microchip pic controller that interfaces to a pc. The user will find the two leds, CR1 and CR2 will flash alternately signifying a good connection to the pc. If at any time they stop flashing unplug the USB cable and plug it back in to reset the controller.

It should be noted that the pre-emphasis delay (TX DATA RATE bit of TX CONFIG register) is optimized for two different datarate ranges, and the control for this delay is currently only accessible through direct register read and write on this version of the software (as opposed to a check box).

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I2C DEVICE ADDRESS

This pull down allows the user to change the device portion of the I2C address. Be sure to change the two on board switches to match the pull down address value. Caution: If the field in the software does not match the switches on the evaluation board the read/write will fail.

WRITE

This button executes a single write-cycle using the values entered in the address and data fields. If either address or data are left blank, zero is assumed. All values must be entered as a hexadecimal number. No need for additional characters, for 0x11 hexadecimal the format to enter is "11".

READ

This button executes a single read-cycle using the value entered in the address field. The response from the device will be displayed in the data field after a short delay. If the address field is left blank, zero is assumed. . All values must be entered as a hexadecimal number. No need for additional characters, for 0x11 hexadecimal the format to enter is "11".

SOFTWARE INSTALLATION

Software for writing to the I2C bus is provided with the CD included with the evaluation board. This utilizes the on board Microchip controller that connects to your pc using the provided USB cable. The software requires Microsoft .Net 1.1 Framework on the host pc. This can be downloaded from Microsoft website if needed.

STEP 1: Insert installation CD.

STEP 2: Install Application Software

Browse to the root directory of the installation CD and double-click on the Setup.exe file. You will see the screen in the figure below.

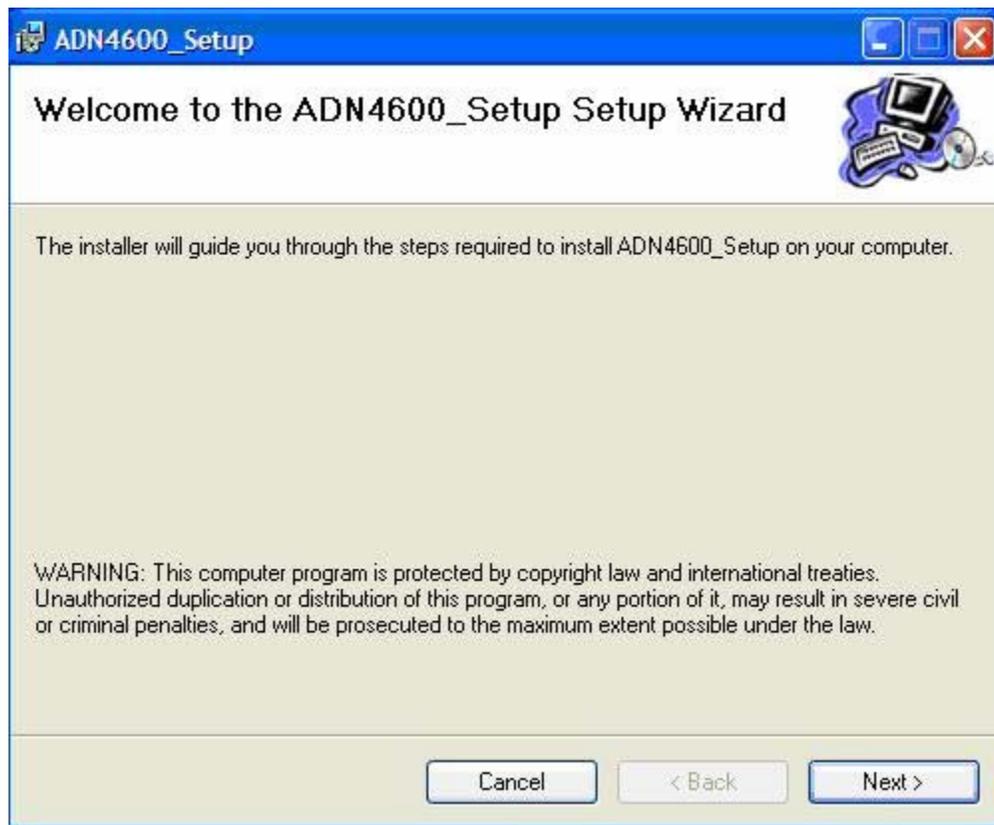


Fig.6: ADN4600 Software installation program

STEP 2: Follow on screen instructions to finish the installation.

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