

16 CH: 1 Output Optical Evaluation for LTC6561 Four-Channel Transimpedance Amplifier with Output Multiplexing

DESCRIPTION

Demonstration circuit 2900A is a 16-channel analog LiDAR receiver chain. The [LTC®6561](#) is featured; which has 74kΩ transimpedance gain and 30μA linear input current range. Utilizing the LTC6561's output MUX, four devices are combined to a single output. The LTC6561's fast overload recovery makes it well suited for LIDAR receivers. The LTC6561 operates from 5V single supply. The LTC6561's single-ended output can swing 2V_{P-P} on a 100Ω load. On the DC2900A, the FirstSensor's

16-channel 400nm to 1100nm wavelength sensitive APD array sensor feeds four LTC6561s for current to voltage conversion and amplification. The APDs are DC coupled to the TIAs inputs to facilitate fast channel switching and output multiplexing. The DC2900A AC-coupled output is intended to demonstrate time domain measurements into 50Ω systems.

[Design files for this circuit board are available.](#)

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BOARD PHOTO

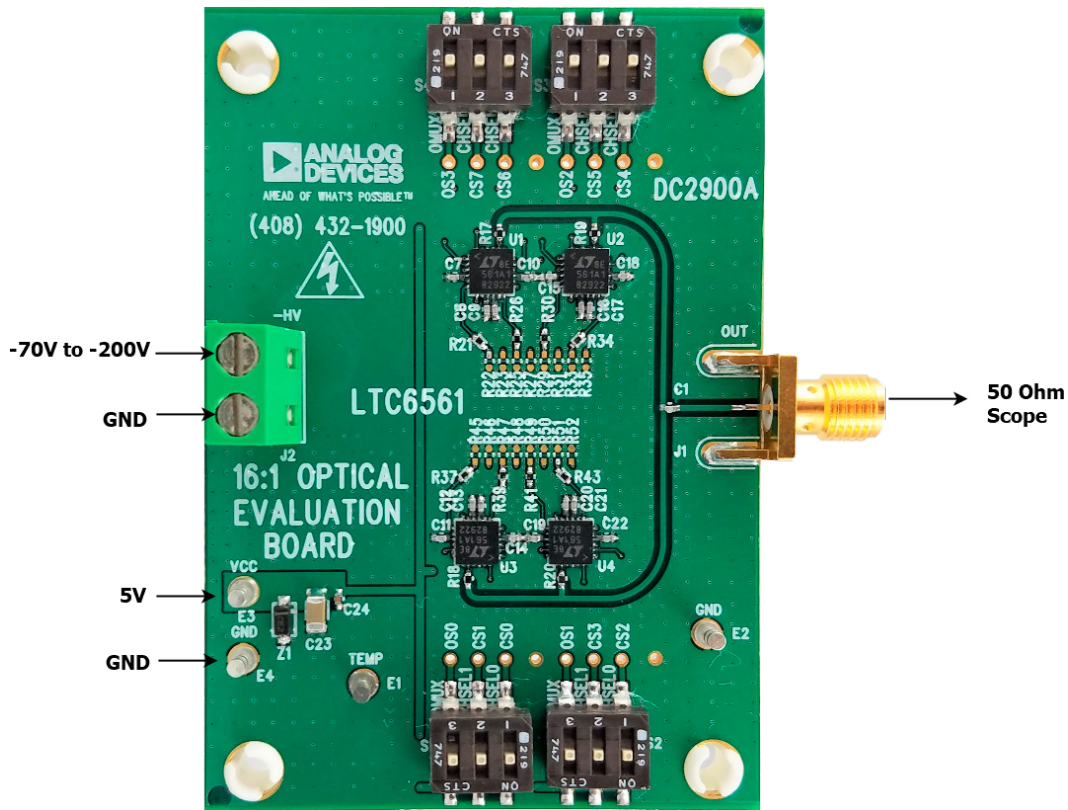


Figure 1. DC2900A Connection Diagram

QUICK START PROCEDURE

1. Connect the SMA out (J1) to an oscilloscope that is 50Ω terminated. The output is AC-coupled with a 1000pF capacitor (C1).
2. Connect a 5V low-noise power supply as shown in Figure 1. The supply should be capable of delivering at least 500mA.
3. Apply -70V to -200V to J2 according to the desired APD gain. The supply should be capable of delivering at least 5mA. The connector and its passives are rated up to 300V.

WARNING! LETHAL VOLTAGES ARE PRESENT ON THE DC2900A CIRCUIT BOARD. AVOID CONTACT WITH THE HIGH VOLTAGE PATH TO PREVENT PERSONAL INJURY.

4. Apply a 400nm to 1100nm wavelength pulsed laser to the APDs which are located on the bottom of the DC2900A, shown in Figure 2. The maximum repetition rate of the pulsed laser should be 100kHz. The DC2900A repetition rate is limited by the output AC coupling capacitor and assumes a pulse width of 5ns.

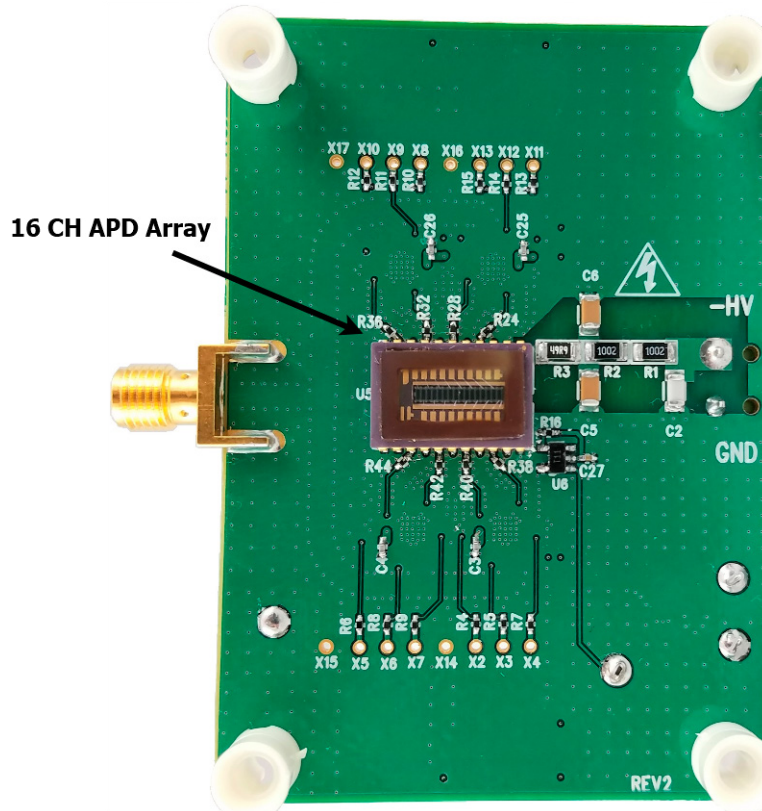


Figure 2. Backside of The DC2900A

QUICK START PROCEDURE

Using OMUX and Channel Select

Each LTC6561 has an OMUX pin and two channel select pins. For convenience, the DC2900A has 3 DIP switches per LTC6561 to select various APD channels. The high position is located towards the edge of the board and the low position is towards the middle of the board. This is shown in Figure 3. Refer to Table 1 for configuration of

the switches to select a channel. Figure 4 shows the APD channel number locations referenced in Table 1. Do not enable (OMUX is low) more than one LTC6561. Doing so will produce a contention on the outputs between the LTC6561s. If all four OMUXs are left high, then all 16 channels of the APDs are decoupled to the output.

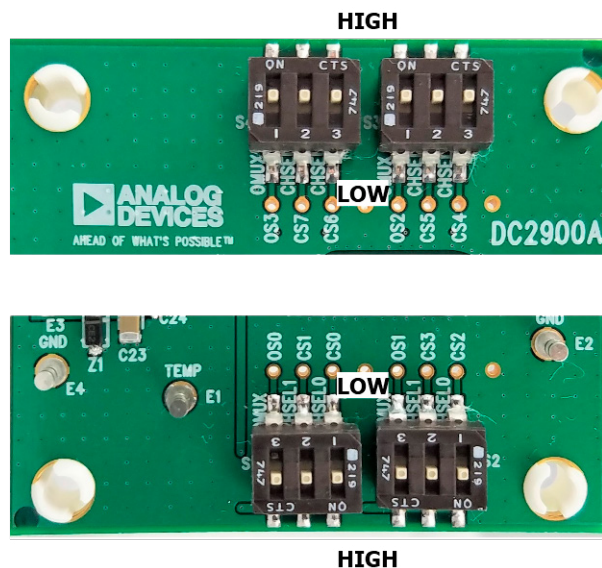


Figure 3. DC2900 Switch Positions for High and Low

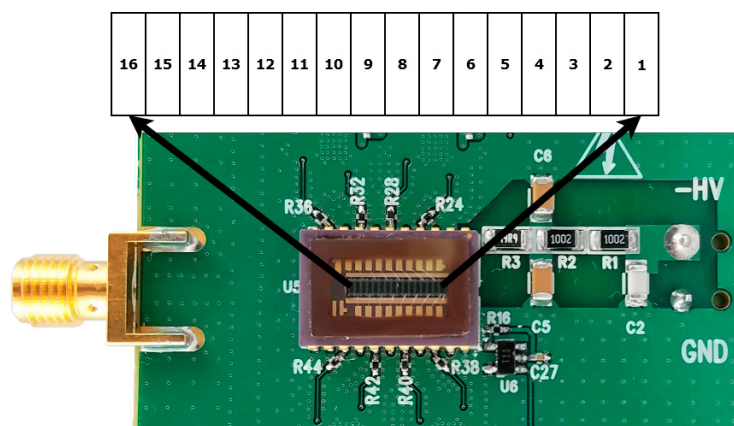


Figure 4. APD Channel Orientation

QUICK START PROCEDURE

Table 1. APD Channel Selection

APD CHANNEL	S1			S2			S3			S4		
	OS0 (OMUX)	CS1 (CHSEL1)	CS0 (CHSELO)	OS1 (OMUX)	CS3 (CHSEL1)	CS2 (CHSELO)	OS2 (OMUX)	CS5 (CHSEL1)	CS4 CHSELO	OS3 (OMUX)	CS7 (CHSEL1)	CS6 (CHSELO)
1	LOW	HIGH	HIGH	HIGH	X	X	HIGH	X	X	HIGH	X	X
2	HIGH	X	X	HIGH	X	X	HIGH	X	X	LOW	LOW	LOW
3	LOW	HIGH	LOW	HIGH	X	X	HIGH	X	X	HIGH	X	X
4	HIGH	X	X	HIGH	X	X	HIGH	X	X	LOW	LOW	HIGH
5	LOW	LOW	HIGH	HIGH	X	X	HIGH	X	X	HIGH	X	X
6	HIGH	X	X	HIGH	X	X	HIGH	X	X	LOW	HIGH	LOW
7	LOW	LOW	LOW	HIGH	X	X	HIGH	X	X	HIGH	X	X
8	HIGH	X	X	HIGH	X	X	HIGH	X	X	LOW	HIGH	HIGH
9	HIGH	X	X	LOW	HIGH	HIGH	HIGH	X	X	HIGH	X	X
10	HIGH	X	X	HIGH	X	X	LOW	LOW	LOW	HIGH	X	X
11	HIGH	X	X	LOW	HIGH	LOW	HIGH	X	X	HIGH	X	X
12	HIGH	X	X	HIGH	X	X	LOW	LOW	HIGH	HIGH	X	X
13	HIGH	X	X	LOW	LOW	HIGH	HIGH	X	X	HIGH	X	X
14	HIGH	X	X	HIGH	X	X	LOW	HIGH	LOW	HIGH	X	X
15	HIGH	X	X	LOW	LOW	LOW	HIGH	X	X	HIGH	X	X
16	HIGH	X	X	HIGH	X	X	LOW	HIGH	HIGH	HIGH	X	X

X = Don't Care

Measuring Temperature

DC2900A includes the option to measure temperature using the TMP36. A turret labeled TEMP is connected to

the TMP36 output. At 25°C, the TMP36 provides 750mV output and has a scale factor of 10 mV/°C. This feature is useful to temperature compensate the APD.

EXTERNAL CONNECTIONS

Connections:

J1: OUT – the analog output of the LTC6561.

J2: 2-pin terminal block. Negative high voltage input for the APDs. A maximum of –300V can be applied.

Turrets:

E1: TEMP – TMP36 analog out.

E3: VCC – LTC6561 VCC and VCCO analog inputs.

E2, E4: GND – the DC2900A ground.



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.

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