

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1012A 24-/16-BIT EASY DRIVE 8-/16-CHANNEL DELTA SIGMA ADC WITH I2C INTERFACE

LTC2499CUHF, LTC2497CUHF, LTC2495CUHF

DESCRIPTION

DC1012A-A features the LTC[®]2499 8/16 channel, 24-bit $\Delta\Sigma$ ADC with EasyDrive inputs. Key DC specifications include 2ppm INL, 1ppm offset, 25ppm full-scale error and 10nV/°C offset drift. In the 6.8Hz/600nV_{RMS} mode, input normal mode rejection of 50Hz and 60Hz noise is better than 87dB. The LTC2499 also includes an internal temperature sensor that is accurate to 2 degrees C over the operating temperature range.

DC1012A-B features the LTC2497 16-bit ADC that is pinout and software compatible with the LTC2499.

DC1012A-C features the LTC2495 16-bit ADC that also includes a PGA with a gain range from 1 to 256 and the same temperature sensor as the LTC2499.

DC1012A is a member of Linear Technology's QuickEval™ family of demonstration boards. It is designed to allow easy evaluation of the LTC2499, LTC2497 or LTC2495. DC1012A may be connected directly to the target application's analog signals while using the DC590A USB Serial Controller board and supplied software to measure performance. The exposed ground planes allow proper grounding to prototype circuitry. After evaluating with LTC's software, the digital signals can be connected to the application's processor / controller for development of the serial interface.

Design files for this circuit board are available. Call the LTC factory.

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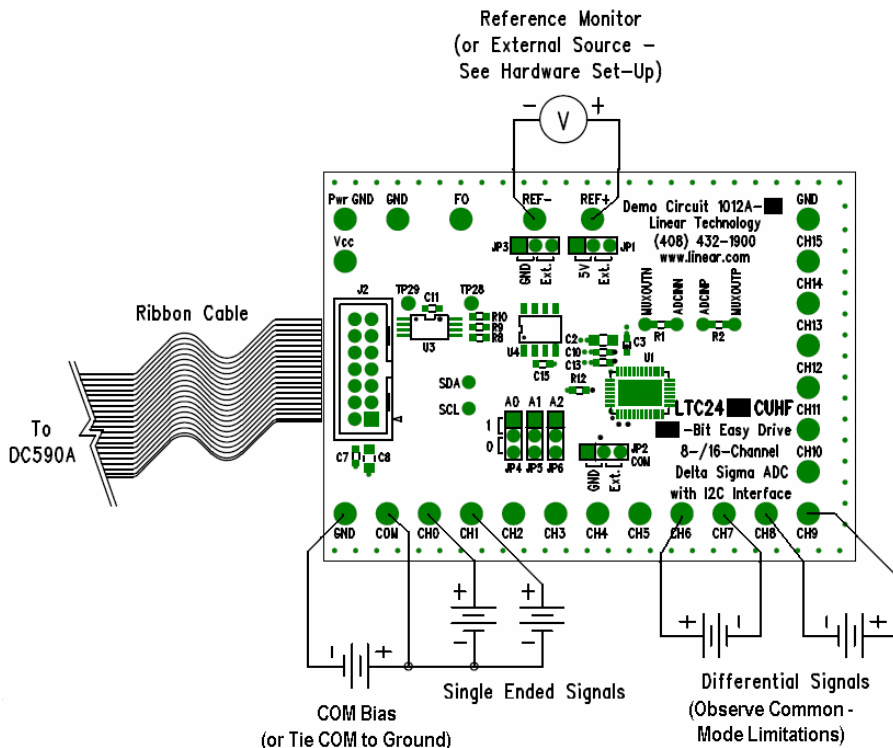


Figure 1. Proper Measurement Equipment Setup

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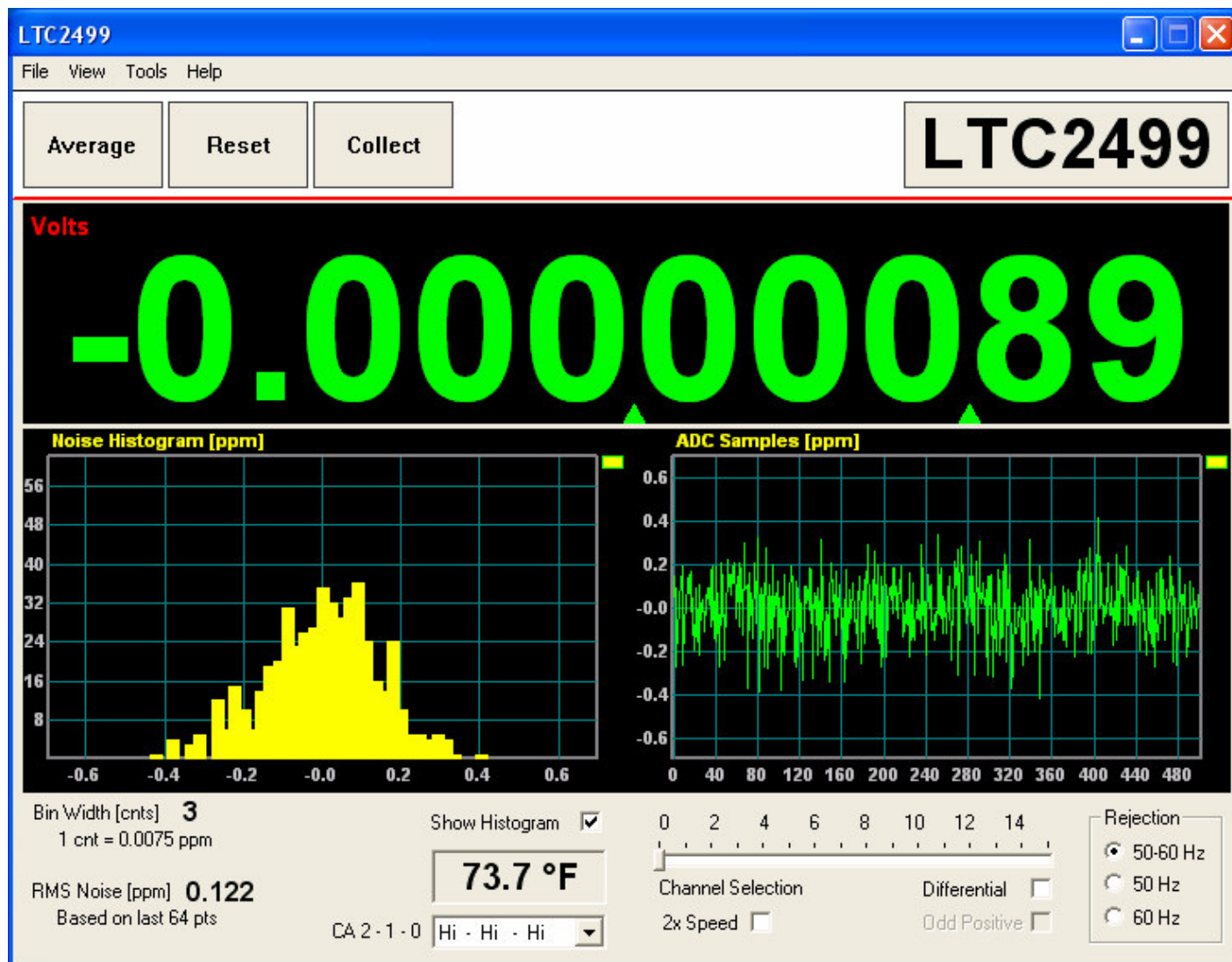
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QUICK START PROCEDURE

Connect the DC1012A to a DC590A USB Serial Controller using the supplied 14 conductor ribbon cable. Connect DC590A to host PC with a standard USB A/B cable. Run the evaluation software supplied with DC590A or downloaded from www.linear.com. The correct program will be loaded automatically. Click the COLLECT button to start reading the input voltage. The software allows for selecting the input channel, single ended or dif-

ferential mode and 50/60Hz rejection settings. Selecting 2x Speed located at the bottom of the strip-chart display will double the data output rate at the expense of offset accuracy (LTC2499 and LTC2495 only).

Tools are available for logging data, changing reference voltage, changing the number of points in the strip chart and histogram, and changing the number of points averaged for the DVM display.



HARDWARE SET-UP

JUMPERS

JP1, JP3 – Select the source for REF+ and REF-, respectively. REF+ can be 5.00 volts from the on-board LT1236 reference (default) or supplied externally. REF- can be Ground (0 volts, default) or supplied externally.

JP2 – Select source for analog COM input, either tied to ground or supplied externally to the COM turret post.

JP4 – JP6 – (CA0-CA2) Address select lines. Lines may be 1, 0 or floating for a total of 27 different addresses. The default setting is all 1s.

CONNECTION TO DC590A SERIAL CONTROLLER

J2 is the power and digital interface connector. Connect to a DC590A serial controller with the supplied 14 conductor ribbon cable. Digital signals are also connected to through-hole test points on the circuit board.

ANALOG CONNECTIONS

Analog signal connections are made via the row of turret posts along the edge of the board. Also, if you are connecting the board to an existing circuit, the exposed ground planes along the edges of the board may be used to form a solid connection between grounds.

GND – Ground turrets are connected directly to the internal analog ground plane.

EXPERIMENTS

INPUT NOISE

Solder a short wire between the CH0 and CH1 turrets. Connect the inputs to ground through a short wire and start taking data. LTC2499 Noise should be approximately 0.12ppm of 5V (600nV RMS.) The

PWR GND – Power ground, connected to the power return trace.

VCC – This is the supply for the ADC. Do not draw any power from this point. External power may be applied to this point after disabling the Vcc supply on DC590A. See the DC590A quick start guide for details.

REF+, REF- - These turrets are connected to the LTC2495/2497/2499 REF+ and REF- pins. If the on-board reference is being used, the reference voltage may be monitored from this point. An external reference may be connected to these terminals if JP1 and JP3 are configured for external reference.

Note: The REF+ and REF- terminals are decoupled to ground with 0.01 μ F and 4.7 μ F capacitors in parallel. Thus any source connected to these terminals must be able to drive a capacitive load and have very low impedance at DC. Examples are series references that require an output capacitor and C-load stable op amps such as the LT1219 and LT1368.

CH0 – CH15 – These are the differential inputs to the LTC2499/2497/2495. They may be configured as single-ended inputs with respect to the COM pin, or as differential inputs (CH0-1, CH2-3, etc.) with the polarity software selected.

electrical noise of the LTC2497 is also 600nV RMS, however this is masked by the 76.3 μ V quantization level. If the input is well between code transitions, the noise level will read zero. If the input is exactly between two codes such that the two adjacent output codes have equal probability, the noise level will

be approximately 7.9ppm. The input noise of the LTC2495 is apparent at very high gain settings (128 or 256.) Note that with a 5V reference and gain set to 256, 1LSB is equal to 298nV – which is lower than the 600nVRMS electrical noise of the input stage.

COMMON MODE REJECTION

Tie the two inputs (still connected together from previous experiment) to ground through a short wire and note the indicated voltage. Tie the inputs to REF+; the difference should be less than 0.5 μ V due to the 140dB+ CMRR of the LTC2499. The LTC2497 will produce less than 1LSB difference.

INPUT NORMAL MODE REJECTION

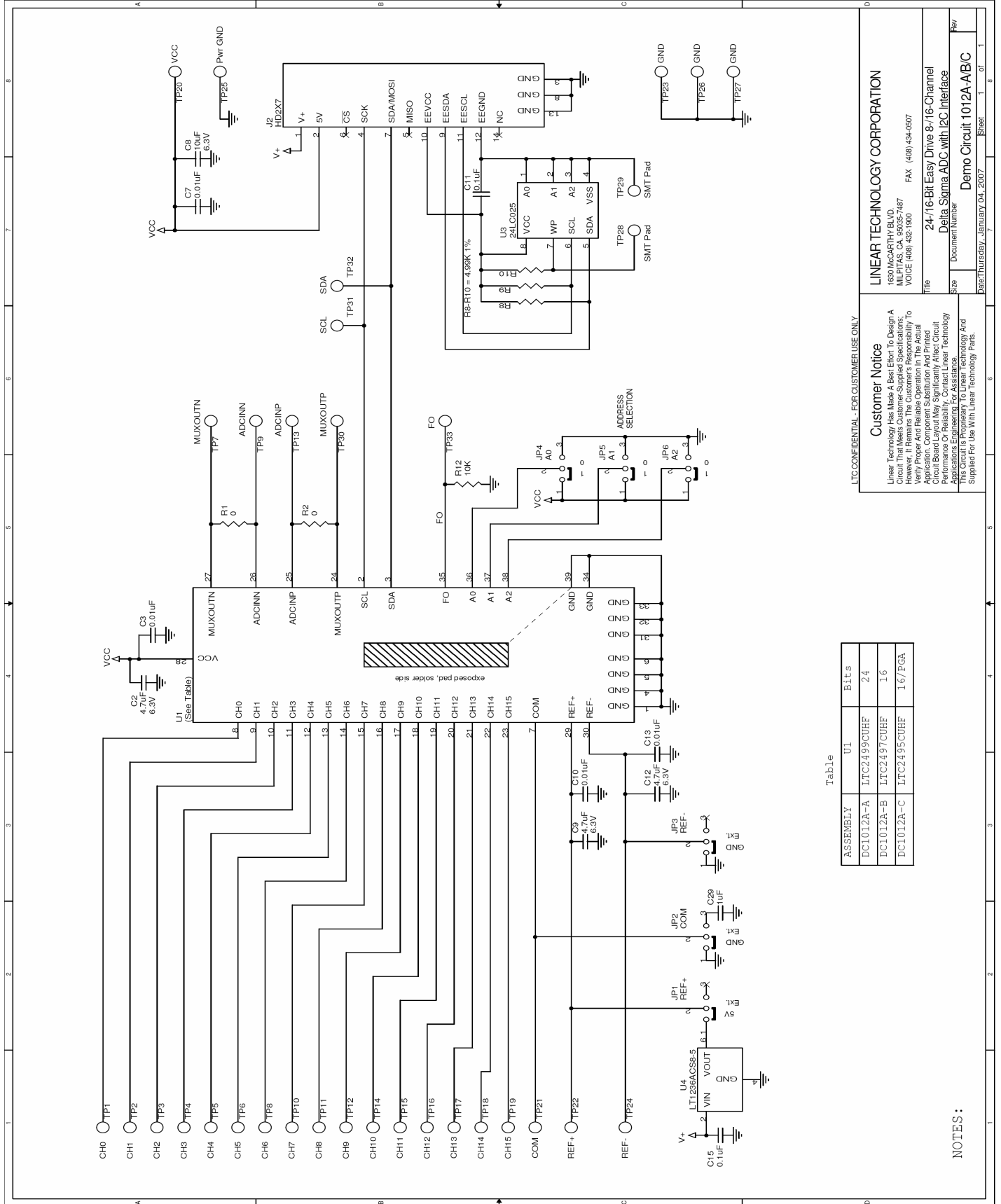
The LTC2499 and LTC2495 SINC4 digital filter can be software selected to reject 50Hz, 60Hz by 110dB, or both 50 and 60Hz by 87dB. The LTC2497's SINC4 filter is fixed at 50/60Hz. To measure input normal mode rejection, connect COM to a 2.5 volt source such as an LT1790-2.5 reference or a power supply. Connect any other input (CH0 – CH15) to the same supply through a 10k Ω resistor. Apply a 10Hz, 2V peak-to-peak sine wave to the input through a 1uF capacitor.

Set the rejection frequency to 55Hz (LTC2499 only) and start taking data. The input noise will be quite large, and the graph of output vs. time should show large variations.

Next, slowly increase the frequency to 55Hz. The noise should be almost undetectable in the graph.

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 This Circuit Is Proprietary To Linear Technology And Supplied For Use With Linear Technology Parts.

LINEAR TECHNOLOGY CORPORATION
 1630 MCCARTHY BLVD.
 MILPITAS, CA. 95035-7487
 VOICE (408) 432-1900
 FAX (408) 434-0507

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 Document Number: Demo Circuit 1012A-ABC
 Rev: 1

Table

ASSEMBLY	U1	Bits
DC1012A-A	LTC2499CUHF	24
DC1012A-B	LTC2497CUHF	16
DC1012A-C	LTC2495CUHF	16/PGA

NOTES: