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LTC2400
24-Bit Micropower No Latency Delta Sigma ADC

DESCRIPTION

This demonstration board features the LTC®2400, a 24-bit high performance ΔΣ analog-to-digital converter (ADC). The LTC2400 combines exemplary DC accuracy (INL ±2ppm, 2.5μV offset, 0.3ppm noise) with an easy to use SPI interface in a SO-8 package.

DC573 is a member of Linear Technology's QuikEval™ family of demonstration boards. It is designed to allow easy evaluation of the LTC2400 and may be connected directly to the target application's analog signals while using the DC590 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 end application's processor/controller for development of the serial interface.

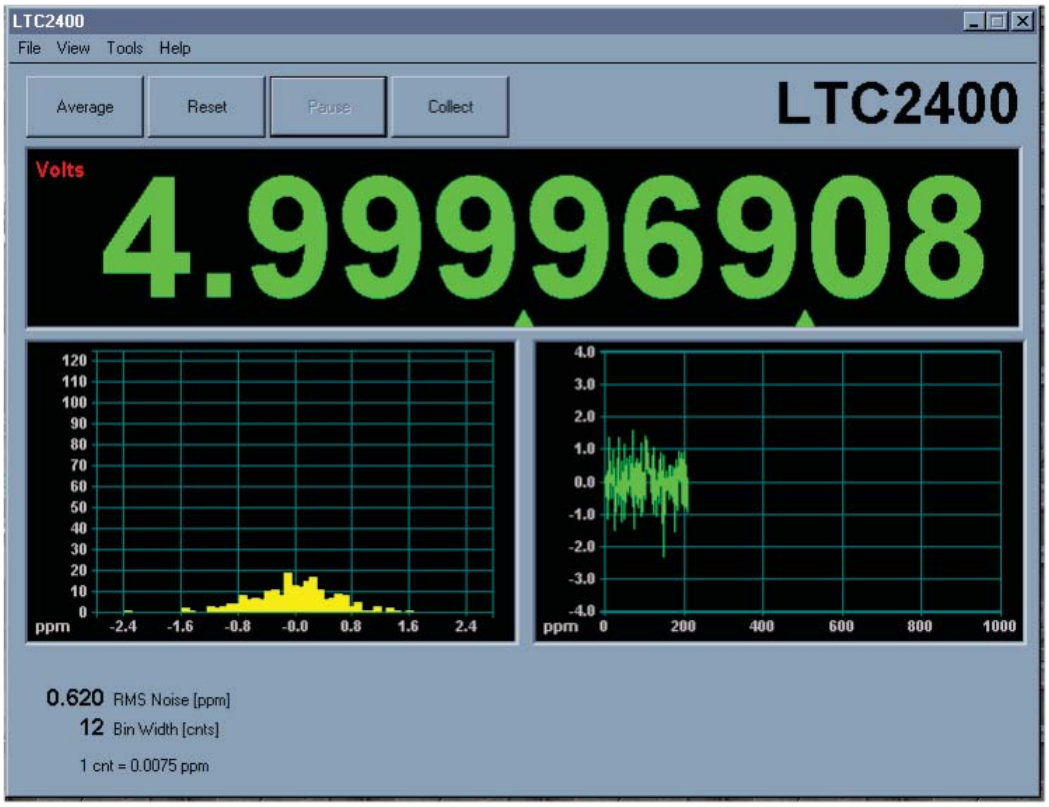
Design files for this circuit board are available at http://www.linear.com/demo

BOARD PHOTO

QUICK START PROCEDURE

Connect DC573 to a DC590 USB serial controller using the supplied 14-conductor ribbon cable. Connect DC590 to host PC with a standard USB A/B cable. Run the evaluation software supplied with DC590 or downloaded from www.linear.com/software. The correct program will be loaded automatically. Click the COLLECT button to start reading the input voltage. Details on software features are documented in the control panel's help menu.

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 SETUP

JUMPERS

JP1: Select the reference source, either external or 5V from the onboard LT1236 reference (default).

JP2: Select the line rejection frequency, either 50Hz or 60Hz (default.) This jumper must be removed if applying an external conversion clock to the F_O turret post.

JP3: Trigger mode, either normal (default) or externally triggered.

JP4: Trigger input signal. Pin 1 is a 5V logic signal, pin 2 is ground. When triggered mode is selected on JP3, a rising edge starts a new conversion.

CONNECTION TO DC590 SERIAL CONTROLLER

J1 is the power and digital interface connector. Connect to DC590 serial controller with supplied 14-conductor ribbon cable.

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 PCB's ground planes.

V_{CC}: 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 switching supply on DC590. If the DC590 serial controller is being used, the voltage must be regulated 5V only, as the isolation circuitry will also be powered from this supply. Refer to the DC590 quick start guide for more details.

V_{REF}: This turret is connected to the LTC2400 reference pin. If the onboard reference is being used, the reference voltage may be monitored from this point. An external ground referred reference may be connected to this terminal if JP1 is configured for external reference.

V_{IN}: Input voltage to the LTC2400. The absolute range of the input voltage is GND – 0.3V to V_{CC} + 0.3V. The range for a valid conversion is GND – 0.125 • V_{REF} to 1.125 V_{REF}. See Figure 1.

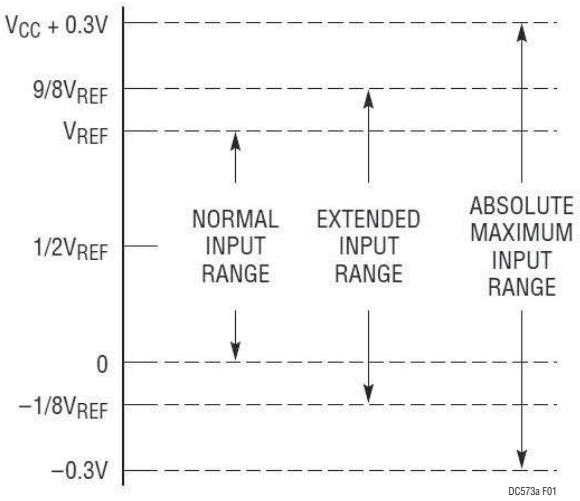


Figure 1. LTC2400 Input Range

EXPERIMENTS

OFFSET

Short V_{IN} to ground. The offset is typically less than 0.5ppm of V_{REF}, with a maximum of 2ppm of V_{REF} (2.5µV typical and 10µV max when using a 5V reference.)

FULL SCALE

Short V_{IN} to V_{REF}. The full-scale error is typically less than 4ppm, with a maximum of 10ppm of V_{REF} (20µV typical and 50µV max when using a 5V reference.)

RMS NOISE

Short V_{IN} to ground. The RMS noise display indicates the RMS noise based on a number of samples that can be set in the software options. With the input shorted to ground, the indicated noise is the noise of the LTC2400 input. When another source is connected, the indicated noise is the total noise of the LTC2400 and the source.

The USB controller powers the LTC2400 from an LT1761 low noise regulator. Although this device has exceptionally low noise for a power regulator, it may still slightly elevate the noise floor of the LTC2400. For lowest noise operation, the LTC2400 may be powered from the onboard LT1236 reference by cutting the indicated trace and connecting V_{REF} to V_{CC} as shown in Figure 3.

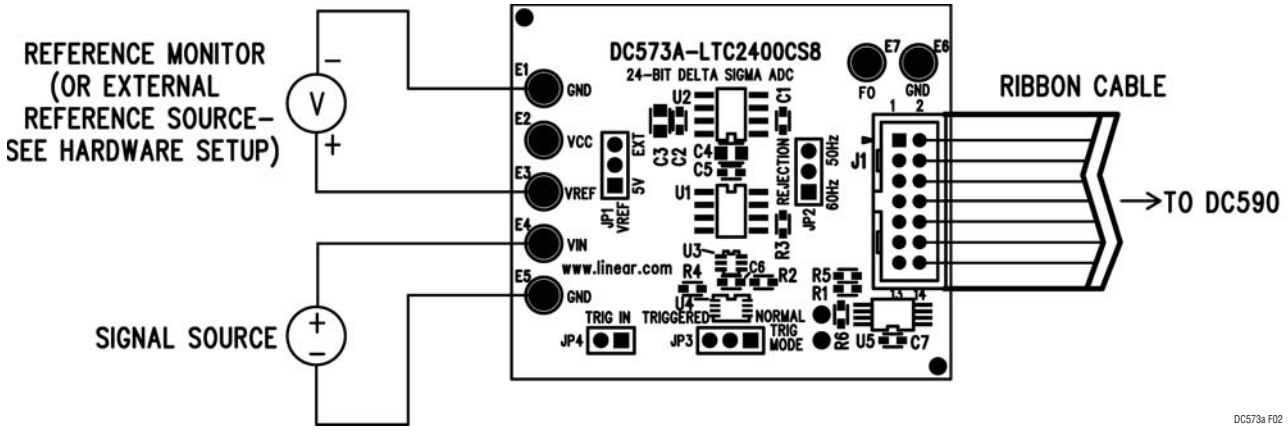


Figure 2. Proper Measurement Equipment Setup

EXPERIMENTS

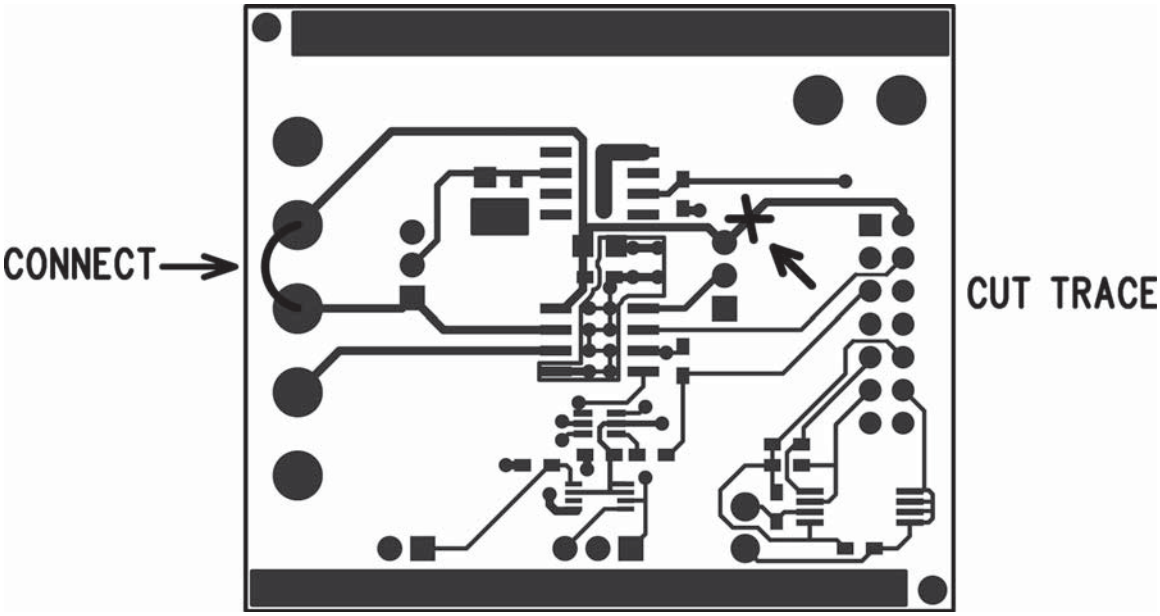
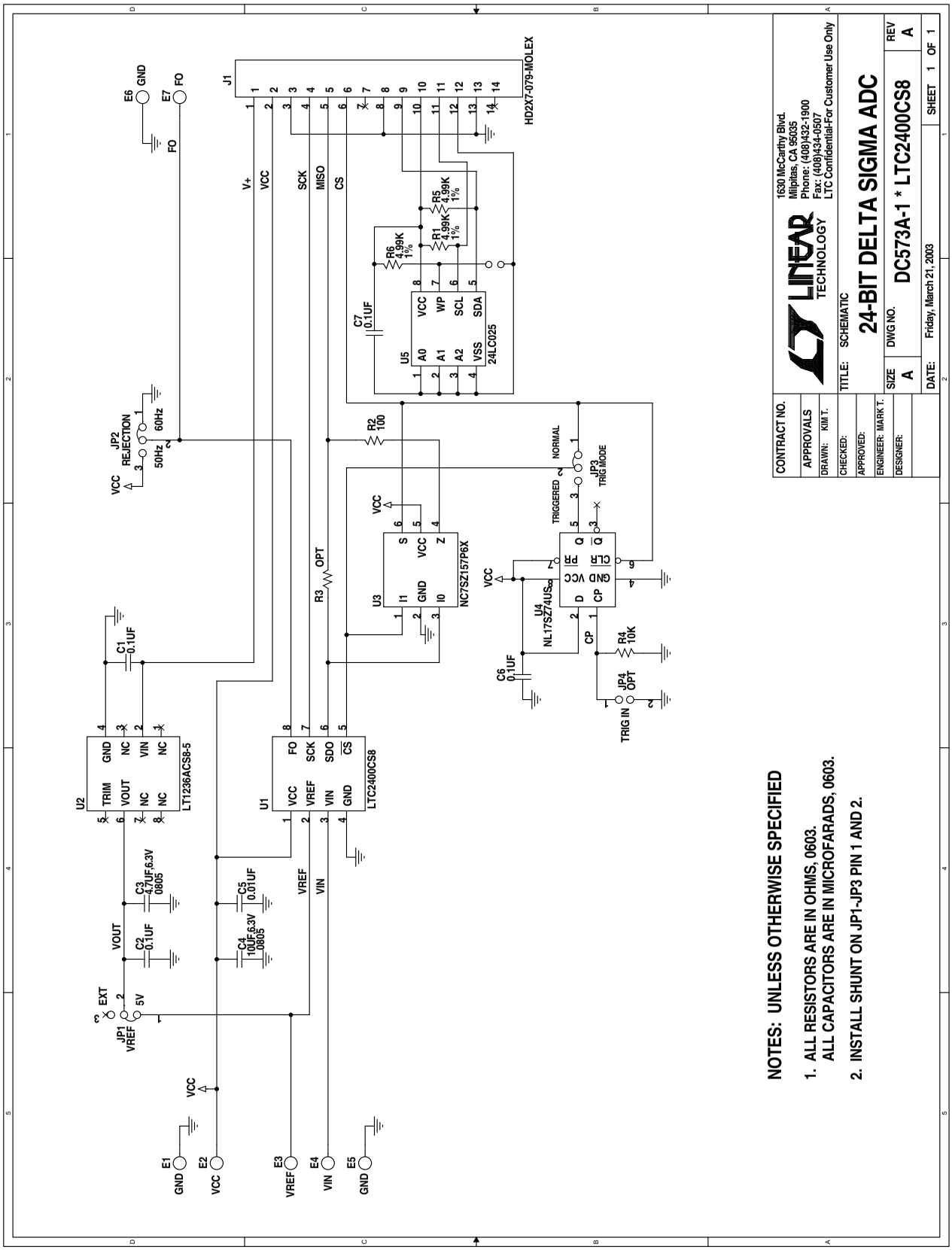


Figure 3. Low Noise Setup

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	4	C1, C2, C6, C7	CAP, X7R 0.1µF 16V, 0603	AVX, 0603YC104MAT1A
2	1	C3	CAP, X5R 4.7µF 6.3V, 20%, 0805	TAIYO YUDEN, JMK212BJ475MGT
3	1	C4	CAP, X5R, 10µF 6.3V, 20%, 0805	TDK, C2012X5R0J106M
4	1	C5	CAP, X7R 0.01µF 16V 10%, 0603	AVX, 0603YC103KAT1A
5	7	E1 TO E7	TESTPOINT, TURRET, 0.064"	MILL-MAX, 2308-2
6	3	JP1, JP2, JP3	JMP, 3PIN 1 ROW 0.079CC	COMM-CON, 2802S-03-G1
7	3	SHUNTS FOR JP1, JP2, JP3	SHUNT, 0.079" CENTER	COMM-CON CCIJ2MM-138G
8	0	JP4	JMP, HD1X2-079	OPT
9	1	J1	HEADER, 2 x 7PIN, 0.079CC	MOLEX, 87331-1420
10	3	R1, R5, R6	RES, CHIP 4.99k 1/16W 1%, 0603	AAC, CR16-4991FM
11	1	R2	RES, CHIP 100 1/16W 5%, 0603	AAC, CR16-101JM
12	0	R3	RES, 0603	OPT
13	1	R4	RES, CHIP 10k 1/16W 5%, 0603	AAC, CR16-103JM
14	1	U1	IC, LTC2400CS8, SO8	LINEAR TECHNOLOGY, LTC2400CS8
15	1	U2	IC, LT1236ACS8-5, SO8	LINEAR TECHNOLOGY, LT1236ACS8-5
16	1	U3	IC, NC7SZ157P6X, SC70-6P	FAIRCHILD SEMI, NC7SZ157P6X
17	1	U4	IC, NL17SZ74US, US8	ON SEMI, NL17SZ74US
18	1	U5	IC, 24LC025, TSSOP-8	MICROCHIP, 24LC025-I /ST

SCHEMATIC DIAGRAM



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This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

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