DESCRIPTION

The LTC2418 is a high resolution, 24-bit ΔΣ ADC with 5ppm INL and 5μV offset. Channel selection is programmed through a simple serial interface. Since there is no latency, each conversion is valid, even after a change in input channel.

DC571A is a member of Linear Technology's QuickEval™ family of demonstration boards.

It is designed to allow easy evaluation of the LTC2418 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.

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.

QUICK START PROCEDURE

Connect DC571 to 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. The correct program will be loaded automatically.

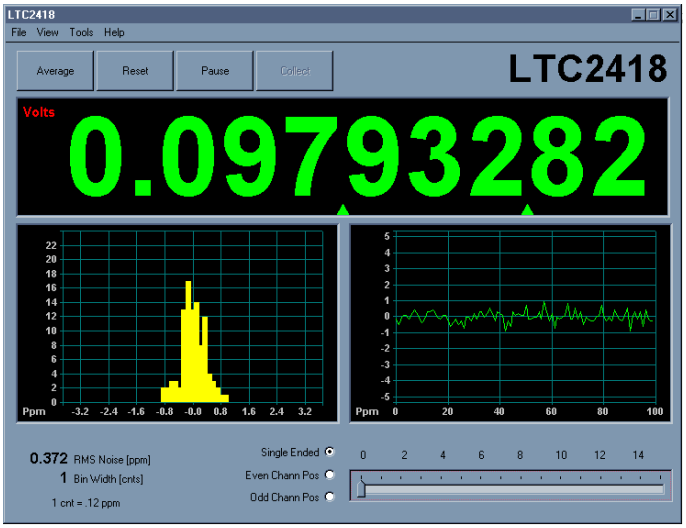


Figure 1. DC590 Program

Click the COLLECT button to start reading the input voltage. Click the slider at the bottom of the strip-chart display to change the input channel being displayed. For differential measurements, Even Channel Pos and Odd Channel Pos correspond to

even channels being positive inputs or odd channels being positive inputs, respectively. See the LTC2418 data sheet for details of channel selection.

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: Select the connection for the common pin, either ground or external connection. Single ended measurements are taken with respect to this pin.

JP2 and JP3: Select the source for differential reference. Selecting 5V and GND will use the onboard 5 Volt reference. Select EXT to use an external reference.

JP5: Select notch frequency, 60Hz or 50Hz. Alternatively, this jumper may be removed and an external conversion clock applied to the center pin of JP5.

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 turret posts along the edge of the board (CH0 to CH15.) Also, if you are connecting the board to an existing circuit, make full use of the four ground connections at the corners of the board.

EXPERIMENTS

Figure 2 shows a number of applications for the LTC2418.

CH0, CH1, CH2

Channels 0 and 1 measure the differential output of an Intersema MS5401 absolute pressure sensor. The 6.8k resistor performs a first order temperature compensation of the bridge output. CH2 measures the bridge voltage, which provides a convenient temperature measurement. This can also be used to perform further temperature compensation in software.

CH3

Channel 3 measures the output of a thermistor in a half bridge circuit. Many thermistors will work, the constraints are that the bridge output must have an impedance of less than 20k and the voltage must not go above $V_{REF}/2$.

CH4

Channel 4 measures the output of a type J thermocouple. The circuit shown for channel 3 can be used for cold junction compensation. The cold junction sensor should be close to the connections of the thermocouple to the board.

CH5

Channel 5 measures the output of an Omega OS36-01 infrared thermocouple. This can be used for remote temperature measurement.

CH6

Channel 6 measures the photocurrent of a Hamamatsu S1336-5BK photodiode.

CH7

Channel 7 measures the output of a resistive attenuator.

CH8, 9

Channels 8 and 9 measure the drop across a Deltec SWE-3000-50 current shunt. Up to 3000 Amps can be measured, with a resolution of 60mA. With careful grounding, both positive and negative currents can be measured. Care must be taken to ensure that both inputs stay more positive than GND–0.3V.

CH10

Channel 10 is buffered with an LT1793 FET input amplifier suitable for very high source impedance measurements.

CH11

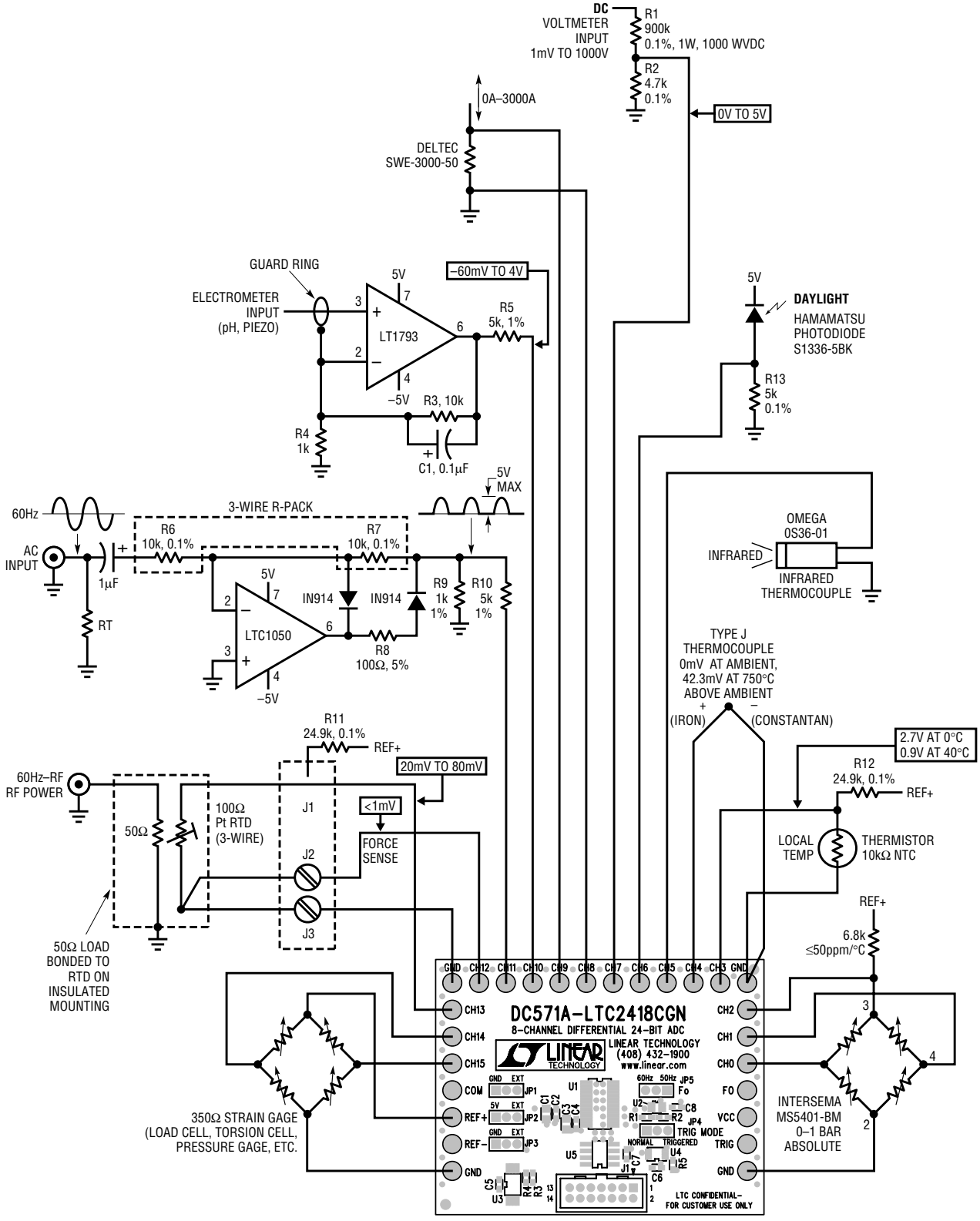
Channel 11 measures the output of a precision rectifier.

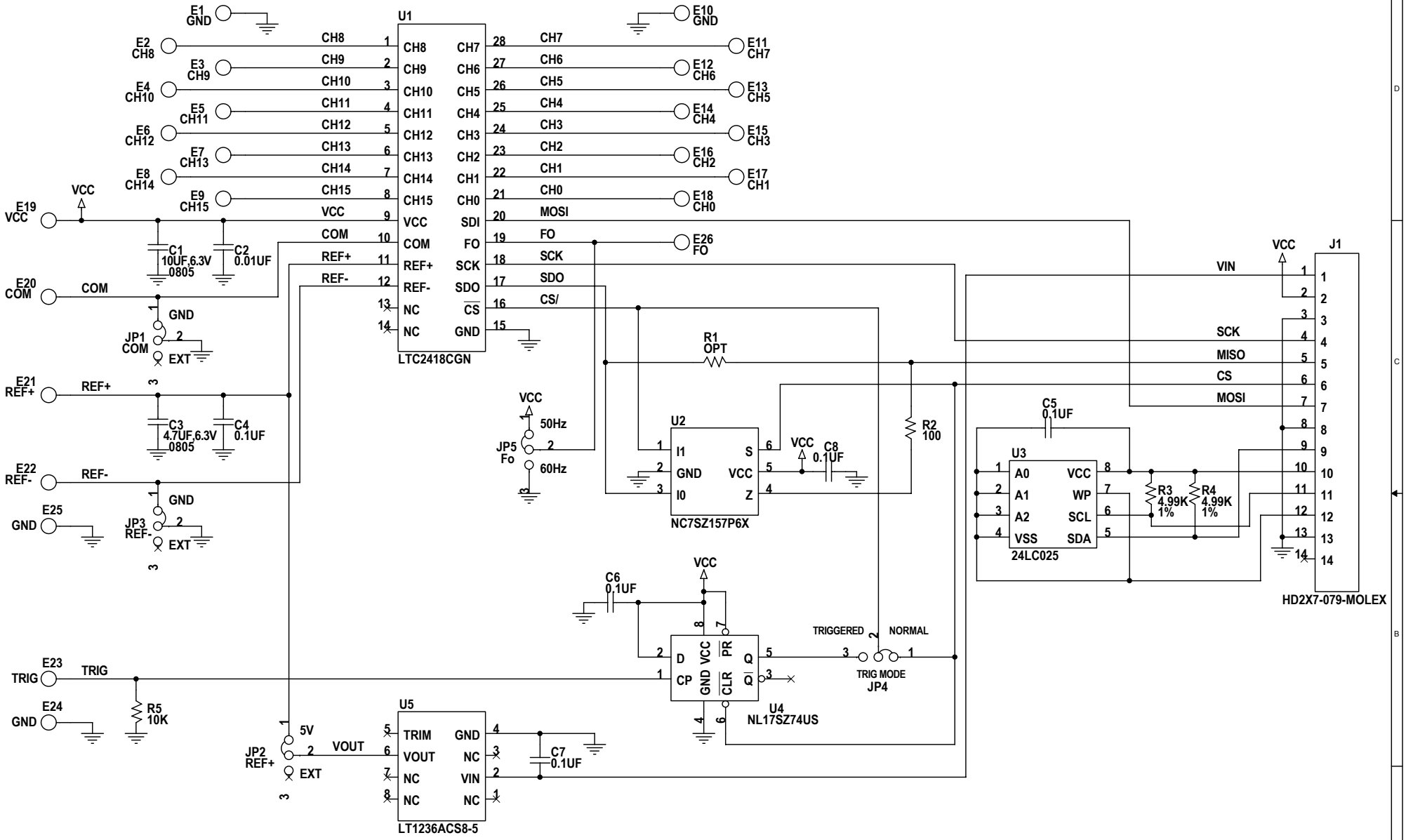
CH12, 13

Channels 12 and 13 measure a 3-wire RTD. The differential voltage is the output, and CH12 single ended reading is the ground lead compensation.

CH14, 15

Channels 14 and 15 measure the output of a 350Ω bridge. This is standard for a wide variety of sensors. Typically the full-scale output voltage is only 10mV. However, the LTC2418 still gives 13 effective bits of resolution with no amplification.


DC
VOLTMETER
INPUT
1mV TO 1000V
R1
900k
0.1%, 1W, 1000 WVDC
R2
4.7k
0.1%
0V TO 5V
0A–3000A
DELTEC
SWE-3000-50
GUARD RING
ELECTROMETER
INPUT
(pH, PIEZO)
5V
–60mV TO 4V
LT1793
R5
5k, 1%
–5V
R3, 10k
R4
1k
C1, 0.1µF
5V
DAYLIGHT
HAMAMATSU
PHOTODIODE
S1336-5BK
R13
5k
0.1%
60Hz
AC
INPUT
1µF
RT
3-WIRE R-PACK
R6
10k, 0.1%
R7
10k, 0.1%
5V
MAX
LTC1050
IN914
IN914
R9
1k
1%
R10
5k
1%
R8
100Ω, 5%
–5V
OMEGA
0S36-01
INFRARED
INFRARED
THERMOCOUPLE
TYPE J
THERMOCOUPLE
0mV AT AMBIENT,
42.3mV AT 750°C
ABOVE AMBIENT
(IRON)
(CONSTANTAN)
2.7V AT 0°C
0.9V AT 40°C
R11
24.9k, 0.1%
REF+
20mV TO 80mV
60Hz–RF
RF POWER
50Ω
100Ω
Pt RTD
(3-WIRE)
J1
J2
J3
<1mV
FORCE
SENSE
R12
24.9k, 0.1%
REF+
LOCAL
TEMP
THERMISTOR
10kΩ NTC
REF+
6.8k
≤50ppm/°C
50Ω LOAD
BONDED TO
RTD ON
INSULATED
MOUNTING
DC571A–LTC2418CGN
8–CHANNEL DIFFERENTIAL 24–BIT ADC
LINEAR TECHNOLOGY
(408) 432–1900
www.linear.com
CH13
CH14
CH15
COM
REF+
REF–
GND
CH2
CH1
CH0
FO
VCC
TRIG
GND
350Ω STRAIN GAGE
(LOAD CELL, TORSION CELL,
PRESSURE GAGE, ETC.
INTERSEMA
MS5401-BM
0–1 BAR
ABSOLUTE
LTC CONFIDENTIAL–
FOR CUSTOMER USE ONLY



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0603.
   ALL CAPACITORS ARE IN MICROFARADS, 0603.
2. INSTALL SHUNT ON JP1-JP5 PIN 1 AND 2.

CONTRACT NO.	LINEAR TECHNOLOGY	1630 McCarthy Blvd. Milpitas, CA 95035 Phone: (408)432-1900 Fax: (408)434-0507 LTC Confidential-For Customer Use Only
APPROVALS		
DRAWN: KIM T.	TITLE: SCHEMATIC	
CHECKED:	8-CHANNEL DIFFERENTIAL 24-BIT ADC	
APPROVED:		
ENGINEER: MARK T.	SIZE: A	DWG NO.: DC571A-1 * LTC2418CGN
DESIGNER:	REV: A	
	DATE: Thursday, January 09, 2003	SHEET 1 OF 1

Linear Technology Corporation

LTC2418CGN
8-CHANNEL DIFFERENTIAL 24-BIT ADC
ENG: MARK T. (25-30)

BILL OF MATERIALS
DC571A-1
QTY-175
11/9/2004
10:31 AM

Item	Qty	Reference	Part Description	Manufacture / Part #
1	1	C1	CAP., X5R, 10UF 6.3V, 20%, 0805	TDK, C2012X5R0J106M
2	1	C2	CAP., X7R 0.01UF 16V 10%,0603	AVX, 0603YC103KAT1A
3	1	C3	CAP., X5R 4.7UF 6.3V, 20%, 0805	TAIYO YUDEN, JMK212BJ475MGT
4	5	C4,C5,C6,C7,C8	CAP., X7R 0.1UF 16V,0603	AVX, 0603YC104MAT1A
5	26	E1-E26	TESTPOINT, TURRET, 0.064"	MILL-MAX, 2308-2
6	5	JP1,JP2,JP3,JP4,JP5	JMP, 3PIN 1 ROW .079CC	COMM-CON, 2802S-03-G1
7	5	SHUNTS FOR JP1-JP5	SHUNT, .079" CENTER	COMM-CON CCIJ2MM-138G
8	1	J1	HEADER, 2X7PIN, 0.079CC	MOLEX, 87331-1420
9	0	R1	RES., 0603	OPT
10	1	R2	RES., CHIP 100 1/16W 5%,0603	AAC, CR16-101JM
11	2	R3,R4	RES., CHIP 4.99K 1/16W 1%,0603	AAC, CR16-4991FM
12	1	R5	RES., CHIP 10K 1/16W 5%,0603	AAC, CR16-103JM
13	1	U1	I.C., LTC2418CGN, SSOP16GN	LINEAR TECH., LTC2418CGN
14	1	U2	I.C., NC7SZ157P6X, SC70-6P	FAIRCHILD SEMI., NC7SZ157P6X
15	1	U3	I.C., 24LC025, TSSOP8	MICROCHIP, 24LC025
16	1	U4	I.C., NL17SZ74US, US8	ON SEMI., NL17SZ74US
17	1	U5	I.C., LT1236ACS8-5, SO8	LINEAR TECH., LT1236ACS8-5
		NOTES: UNLESS OTHERWISE SPECIFIED		
		1. ALL RESISTORS ARE IN OHMS.		
		2. INSTALL SHUNTS ON JP1-JP5 PIN 1 AND 2.		