Data Acquisition Circuit Collection

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INTRODUCTION

This application note features 8-, 10-, and 12-bit data acquisition components in various circuit configurations. The circuits include battery monitoring, temperature sensing, isolated serial interfaces, and microprocessor and microcontroller serial and parallel interfaces. Also included are voltage reference circuits (Application Note 42 contains more voltage reference circuits).

Additional circuit information is located in the information references listed in the Circuit Index. Each information reference refers to either an application note (example: AN42 = Application Note 42), a data sheet (example: LTC®1292 DS = LTC1292 Data Sheet), or a design note (example: DN66 = Design Note 66).

CIRCUIT INDEX

GENERAL ANALOG-TO-DIGITAL APPLICATION CIRCUITS

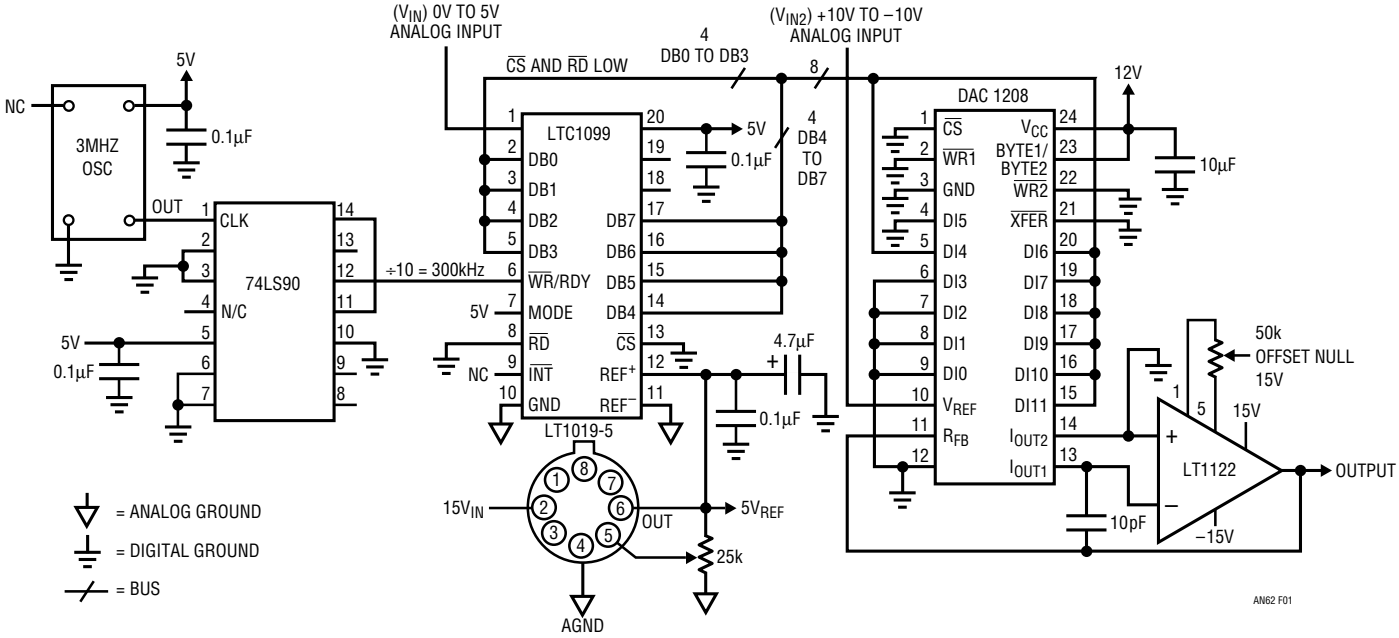


Figure 1. Two-Quadrant 150kHz Bandwidth Analog Multiplier

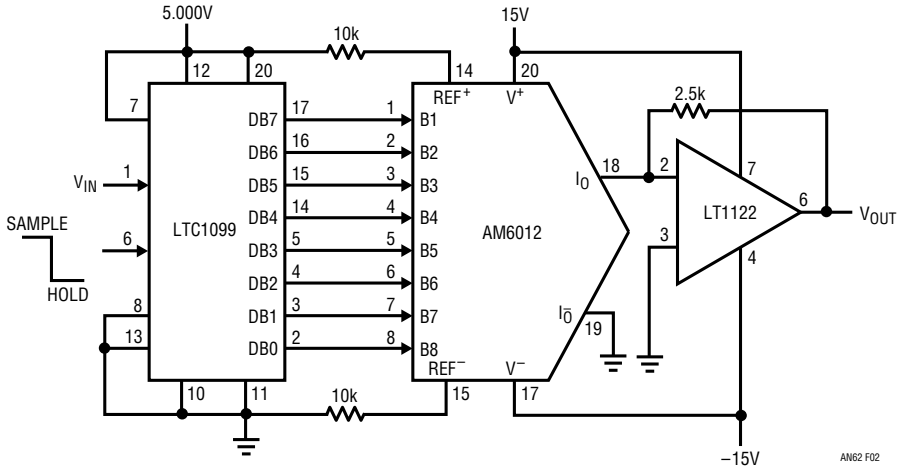


Figure 2. Infinite Hold Time Sample-and-Hold (t_{ACQ} = 240ns)

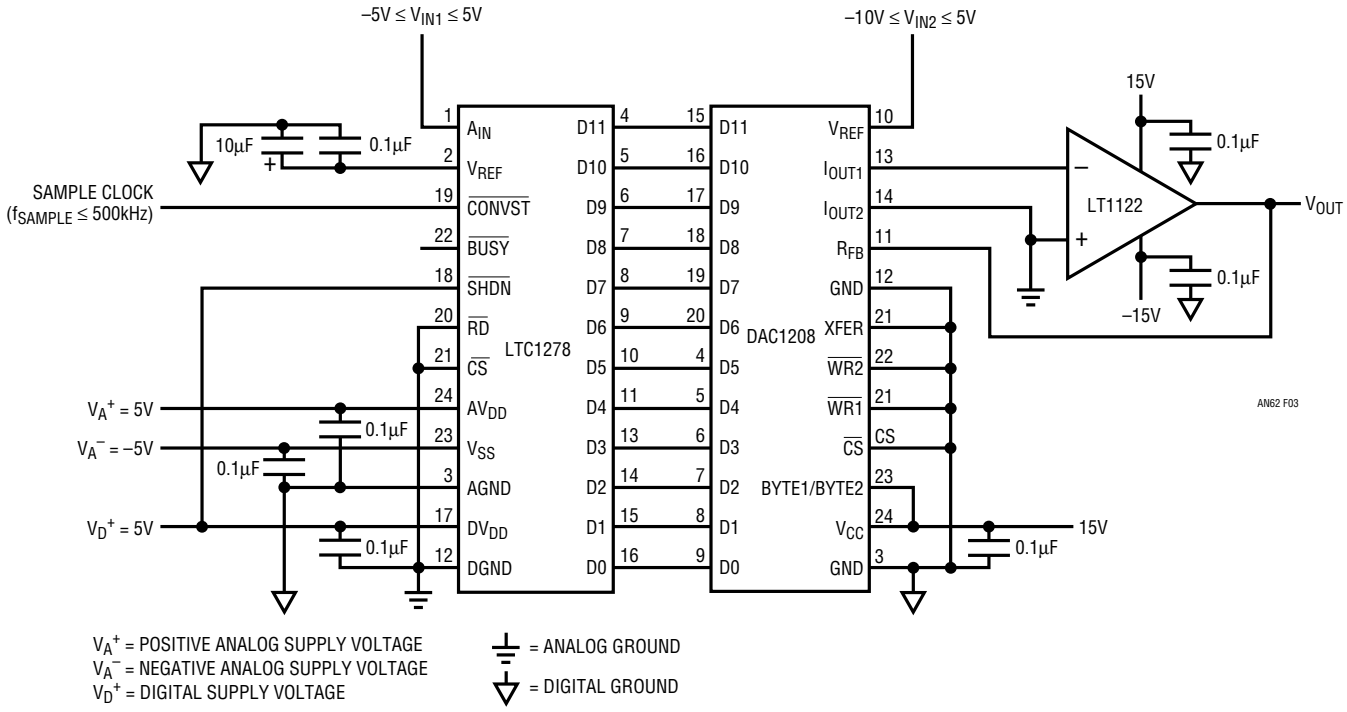


Figure 3. Four-Quadrant 250kHz Bandwidth Analog Multiplier

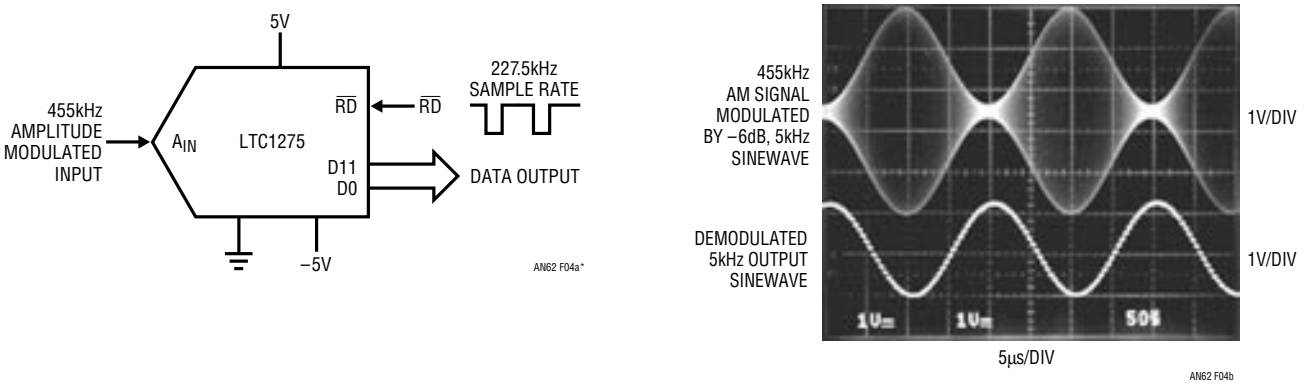
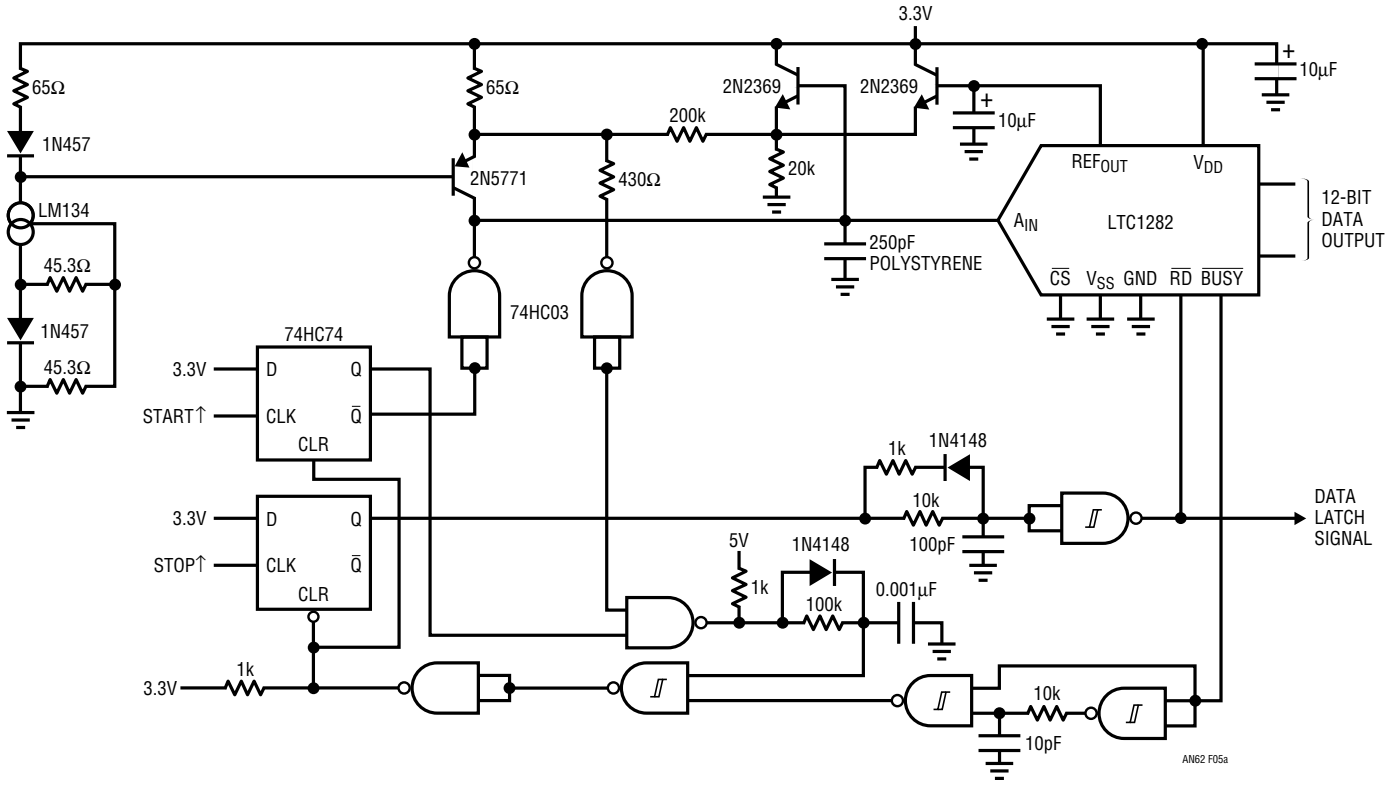
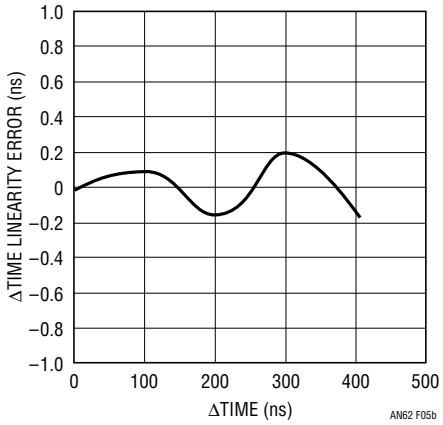
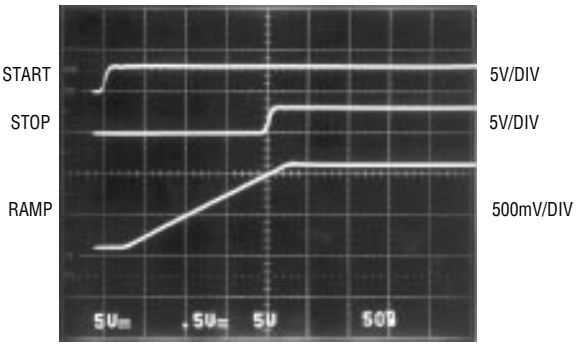


Figure 4. Demodulating a Signal Using Undersampling







THE PHOTO SHOWS THE START, STOP AND RAMP WAVEFORMS FOR A HALF SCALE, 200ns INPUT. THE RAMP REACHES 2.5V IN 400ns FOR A FULL-SCALE ADC INPUT. THE 4096 CODES SPREAD OVER 400ns EQUATE TO 100ps PER LSB.

Figure 5. Complete 100ps Resolution ΔTime Circuit with "Bow" Correction

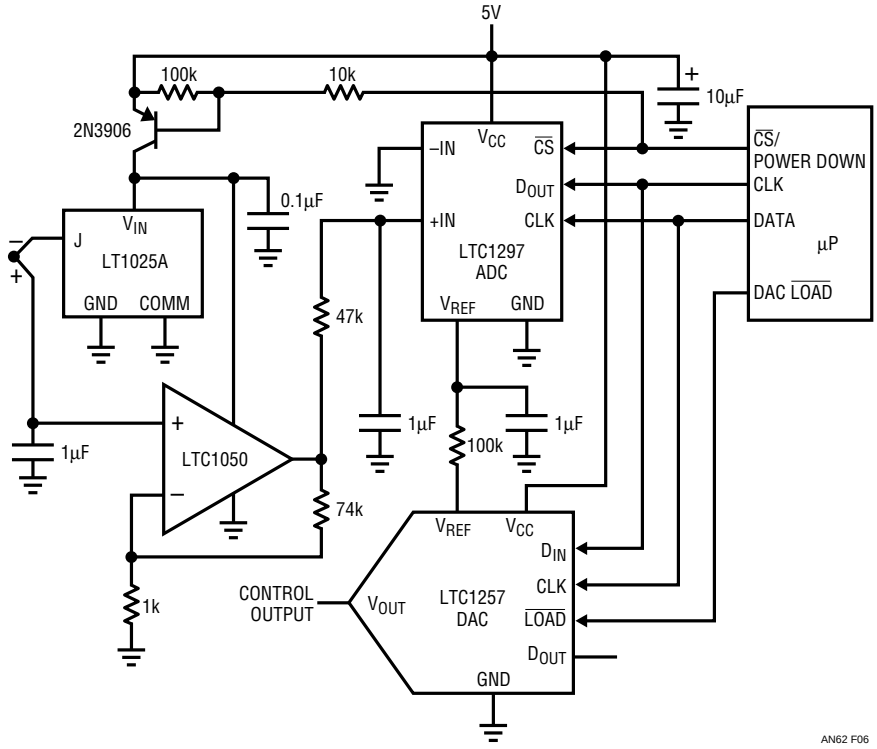


Figure 6. Single 5V 12-Bit Temperature Control System with Shutdown

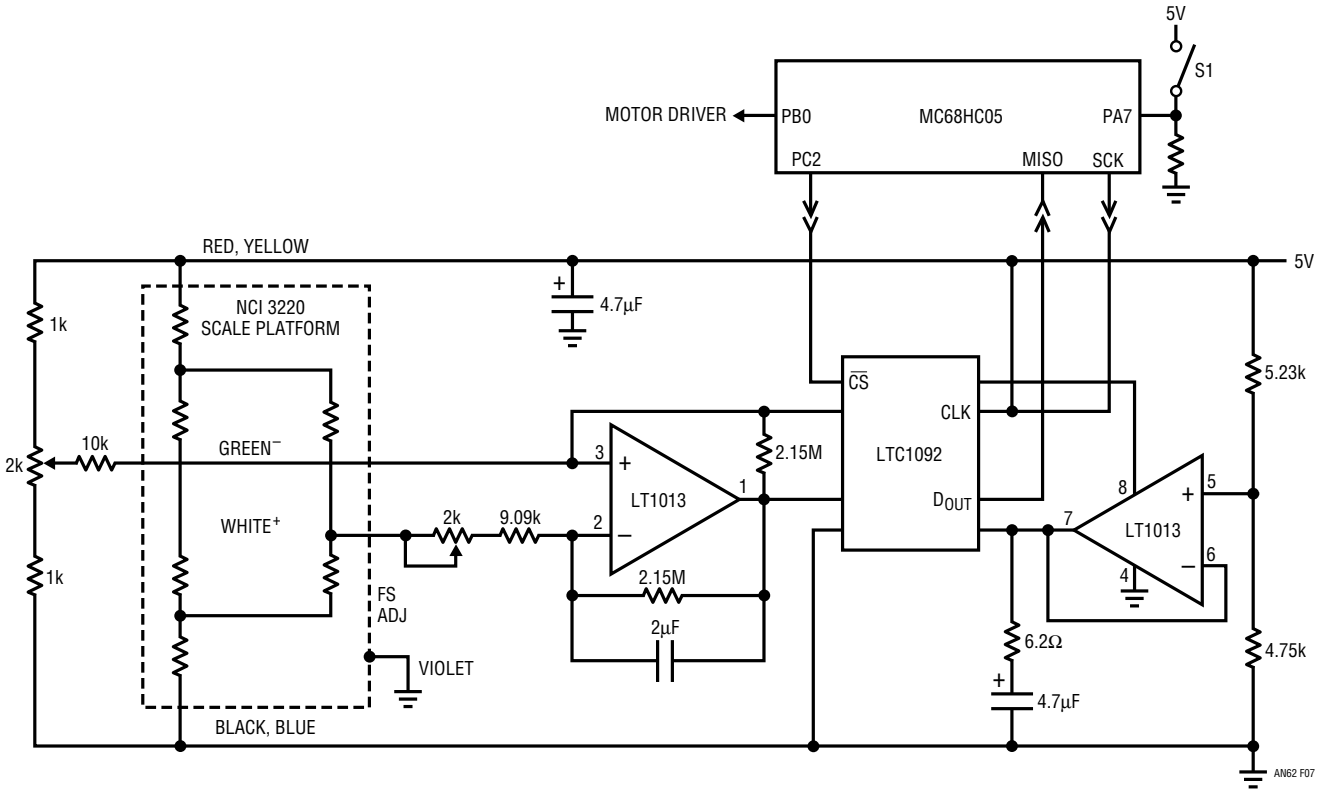
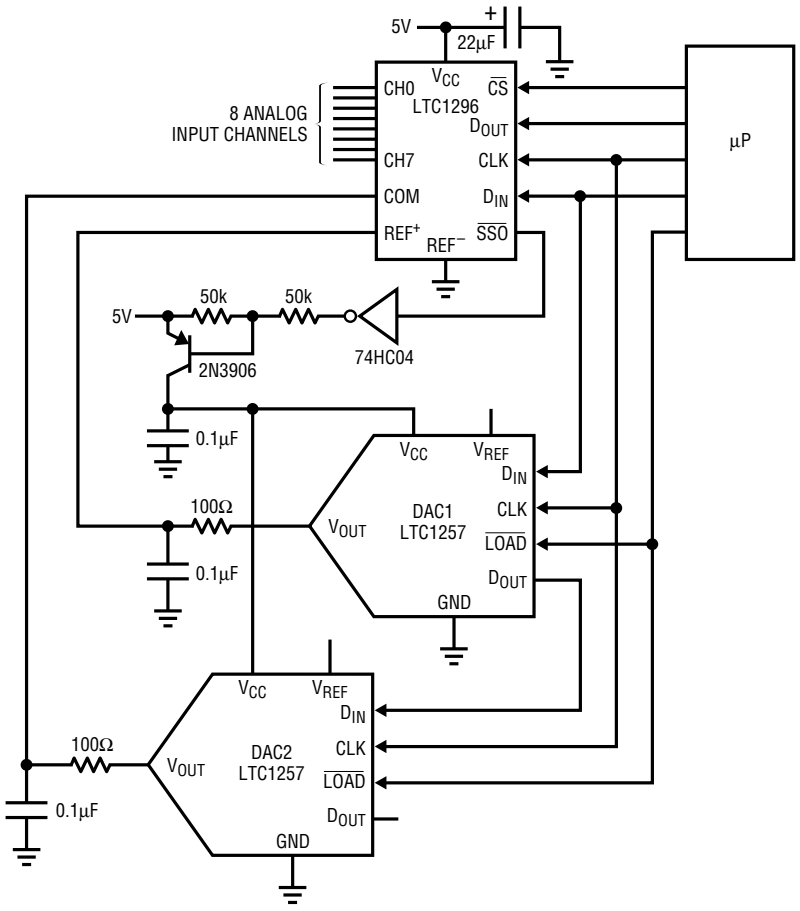


Figure 7. Weight Scale



NOTE: THE µP SETS THE LTC1296's FULL-SCALE AND ZERO-SCALE MAGNITUDES WITH THE CODE APPLIED TO DAC1 AND DAC2, RESPECTIVELY.

AN62 F08

Figure 8. Auto-Ranging 8-Channel 12-Bit Data Acquisition System with Shutdown

ANALOG-TO-DIGITAL BATTERY MONITORING APPLICATION CIRCUITS

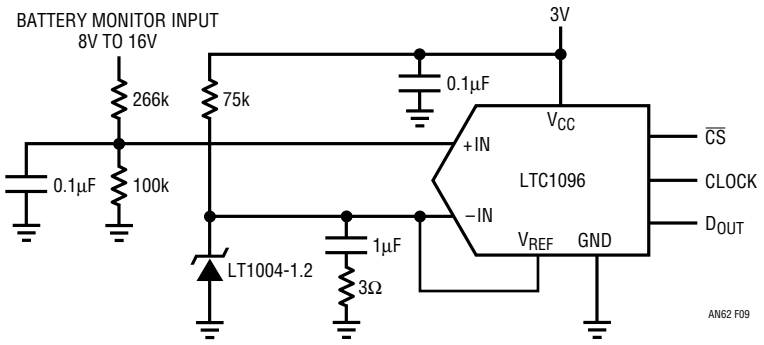


Figure 9. Micropower Battery Voltage Monitor

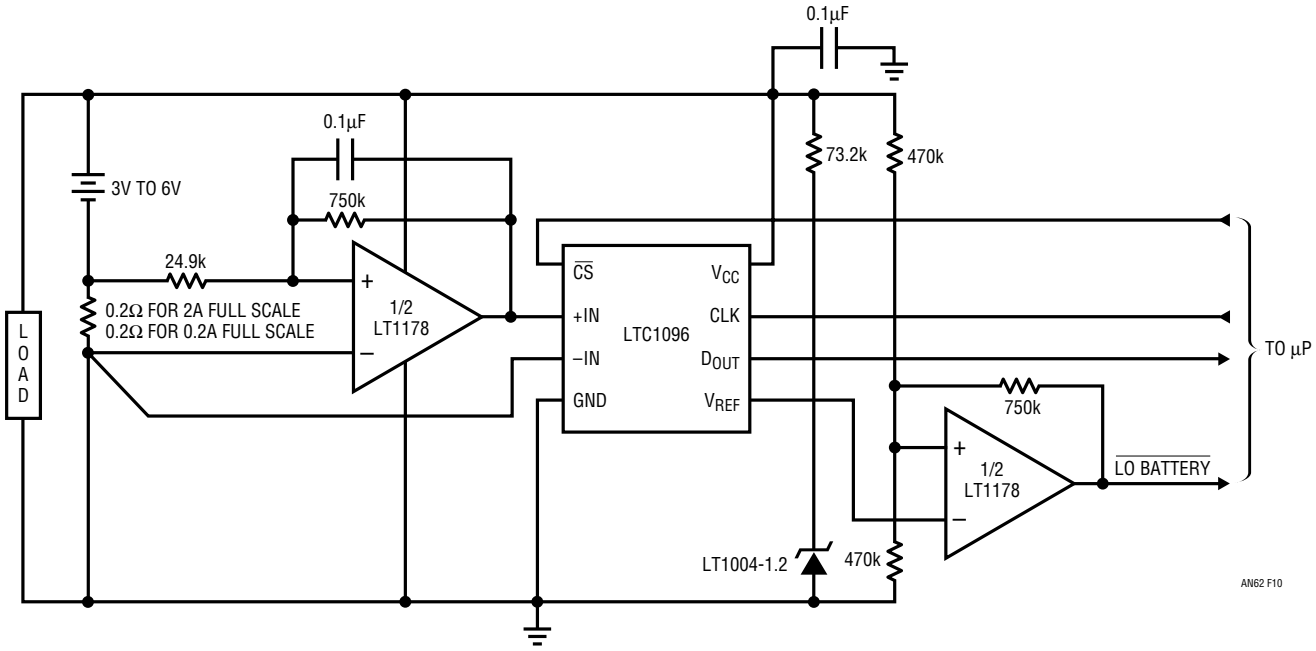


Figure 10. 0A to 2A Battery Current Monitor Draws Only 70µA

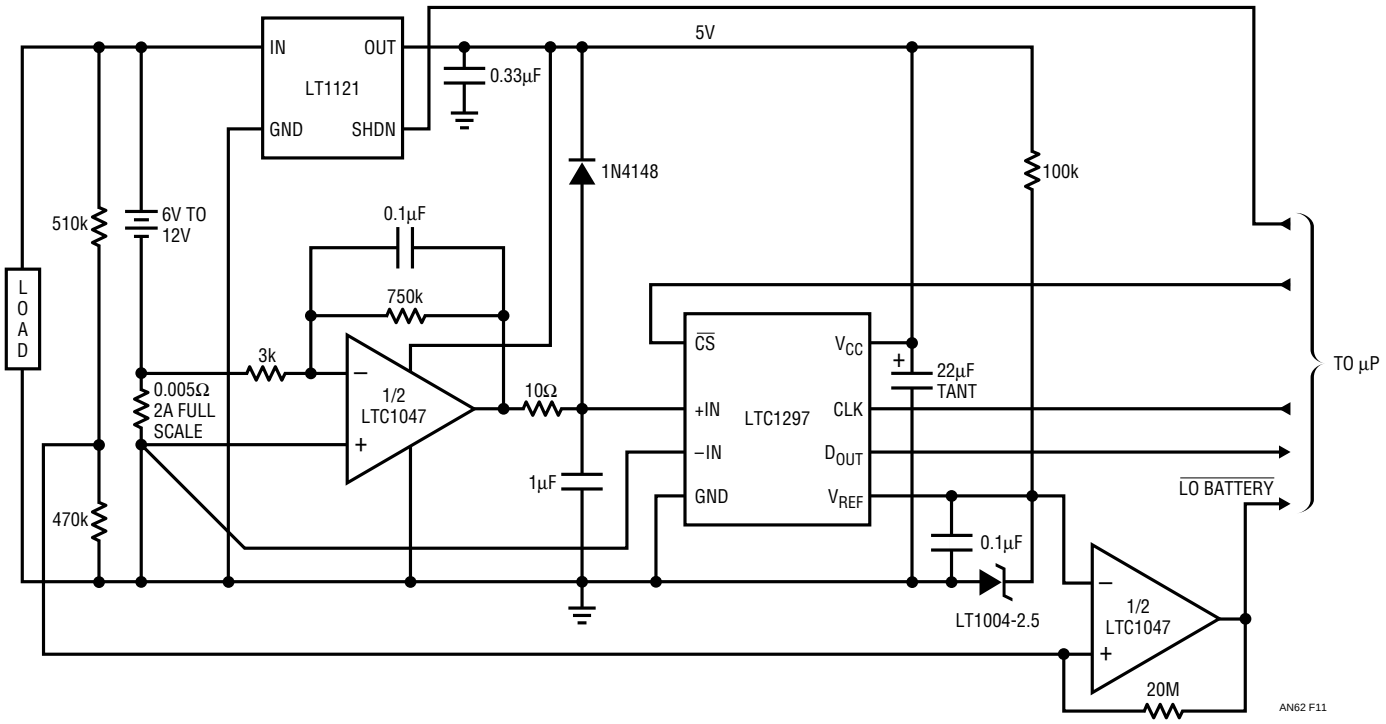


Figure 11. LTC1297 Data Acquisition System Micropower Battery Current Monitor

TEMPERATURE SENSING AND CONVERSION

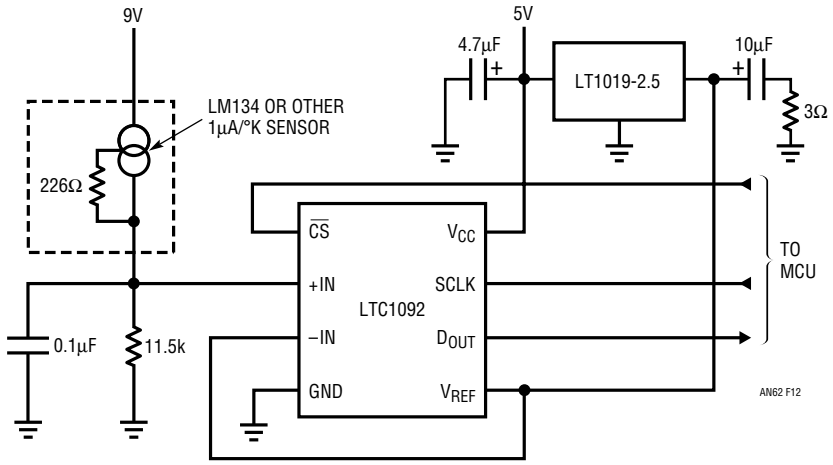


Figure 12. Current Output Silicon Sensor Thermometer Driving 10-Bit Analog-to-Digital Converter Covers –55°C to 125°C with 0.2°C Resolution

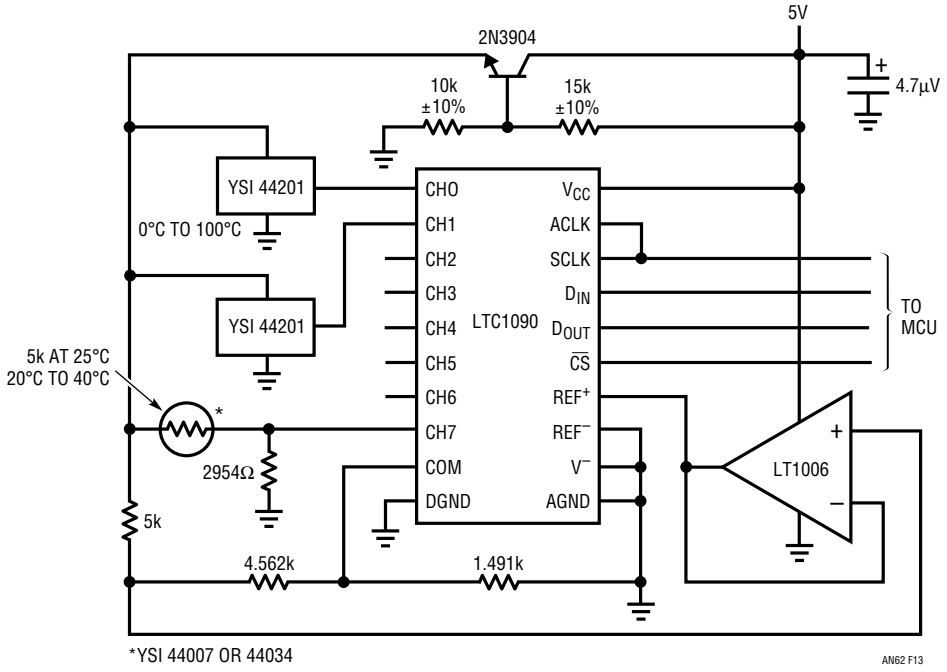


Figure 13. Thermistor-Based Temperature Measurement System Covers 20°C to 40°C and 0°C to 100°C with 0.25°C Accuracy

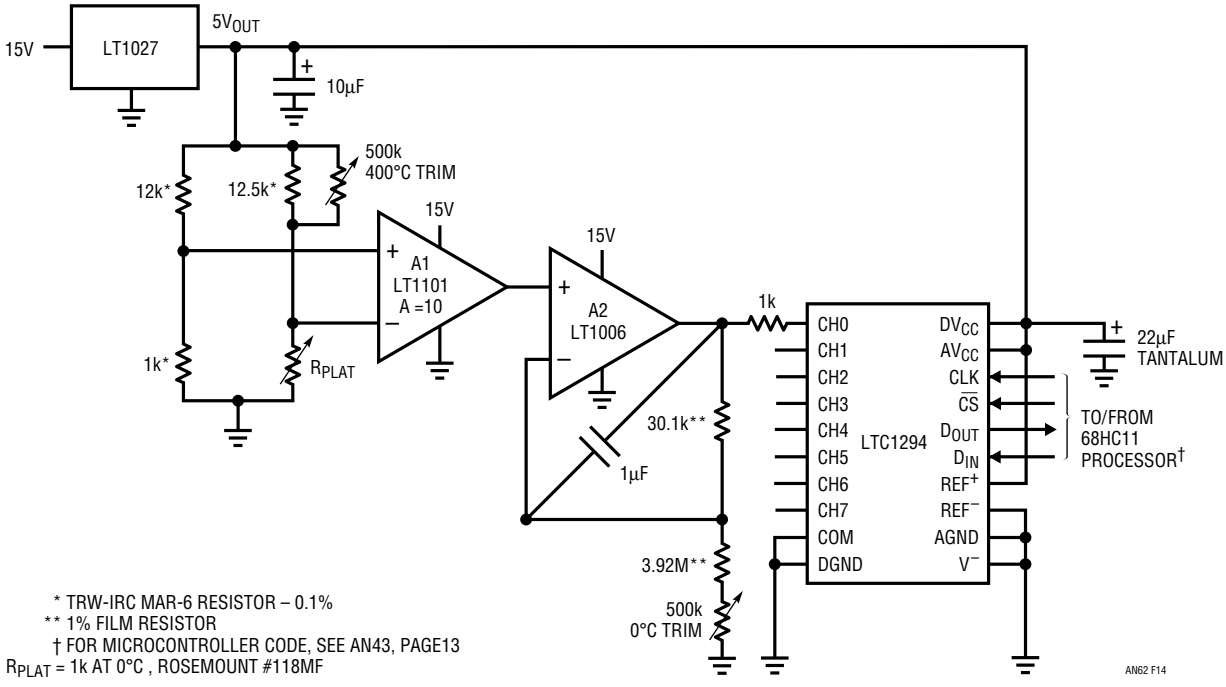


Figure 14. Digitally Linearized Platinum RTD Signal Conditioner

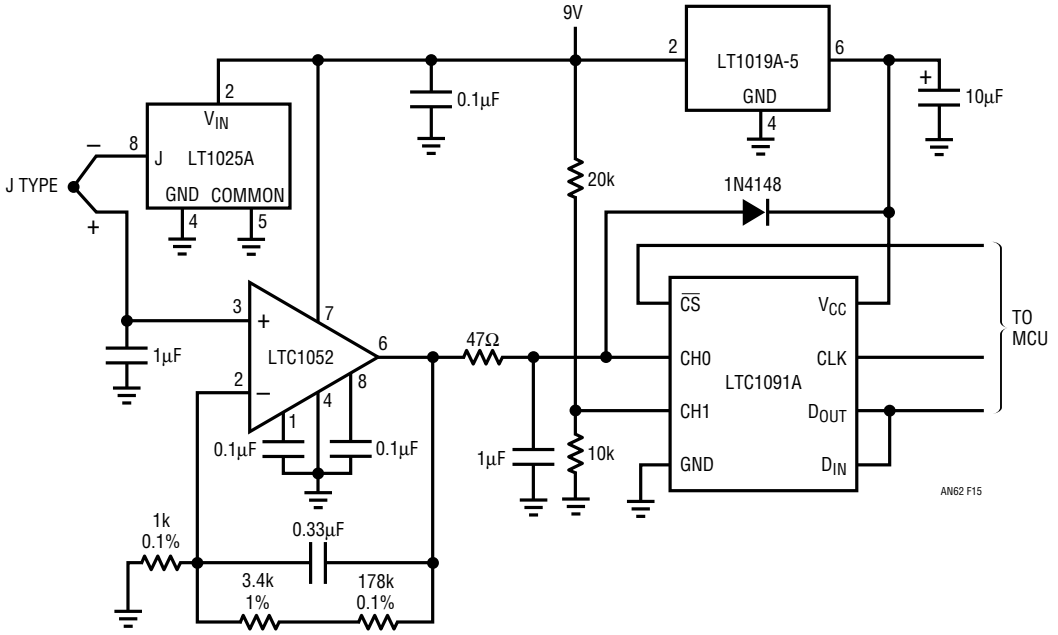


Figure 15. Furnace Exhaust Gas Temperature Monitor Covers 0°C to 500°C and Has Low Supply Detection

ISOLATED INTERFACES

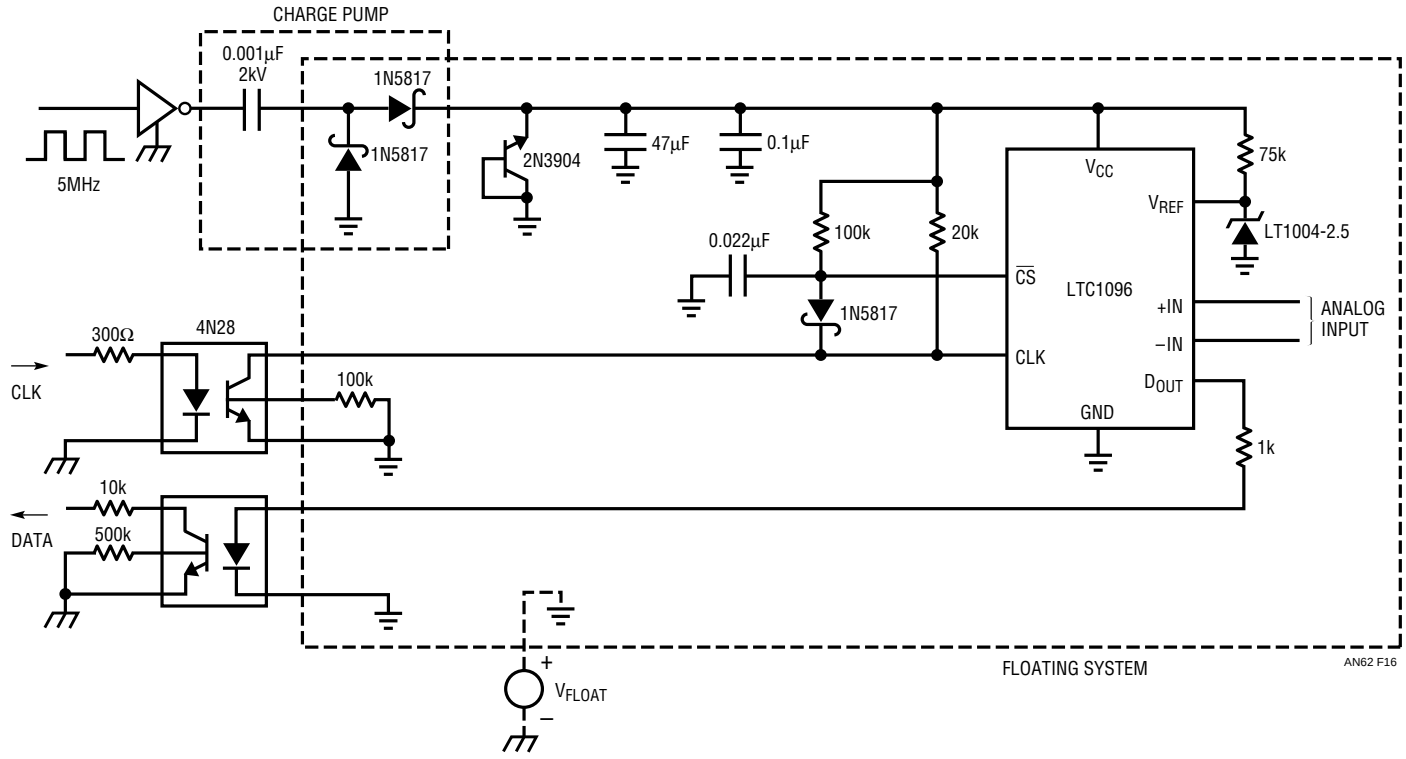


Figure 16. Floating Analog-to-Digital Conversion System Powered by Capacitor Charge Pump

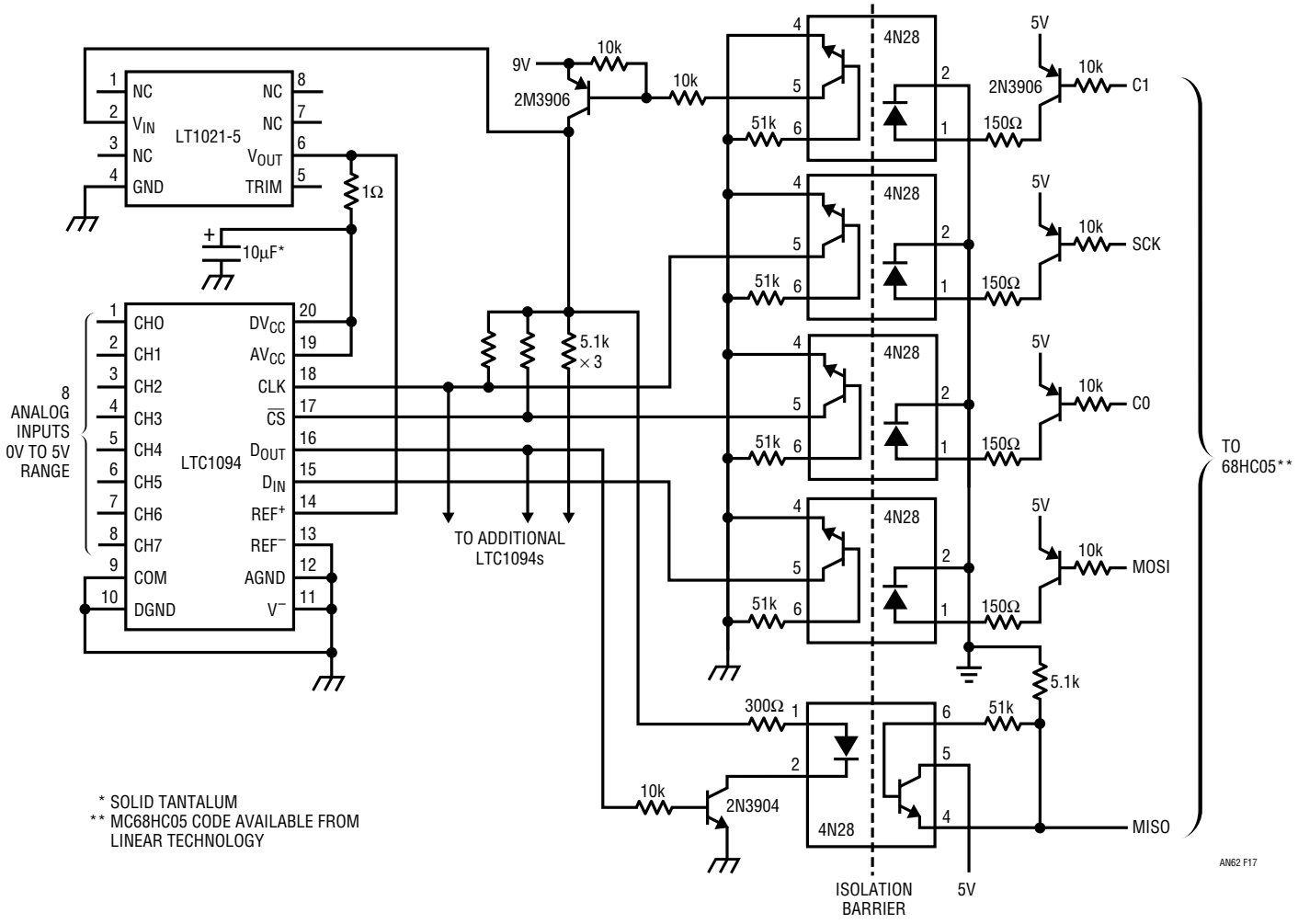


Figure 17. Micropower Serial 10-Bit Data Acquisition System with 500V Opto-Isolated Communication

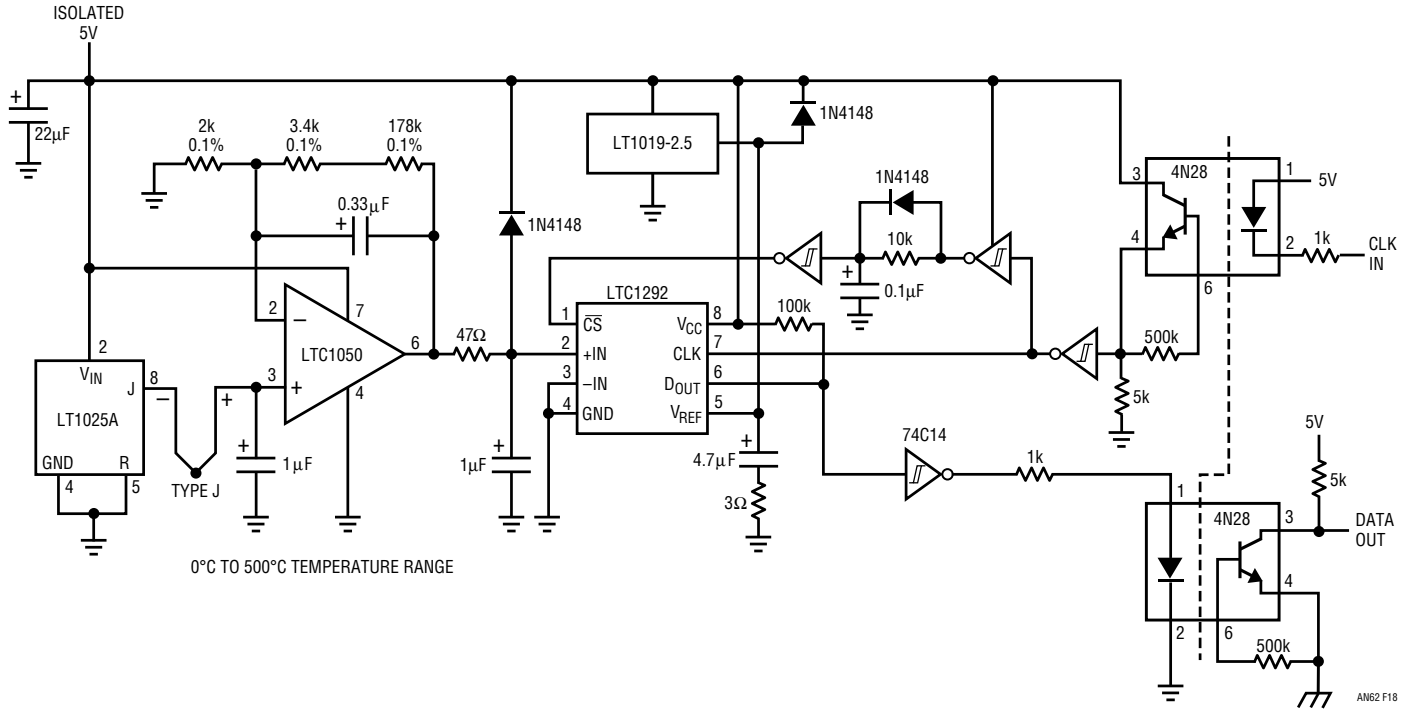


Figure 18. Opto-Isolated Temperature Monitor

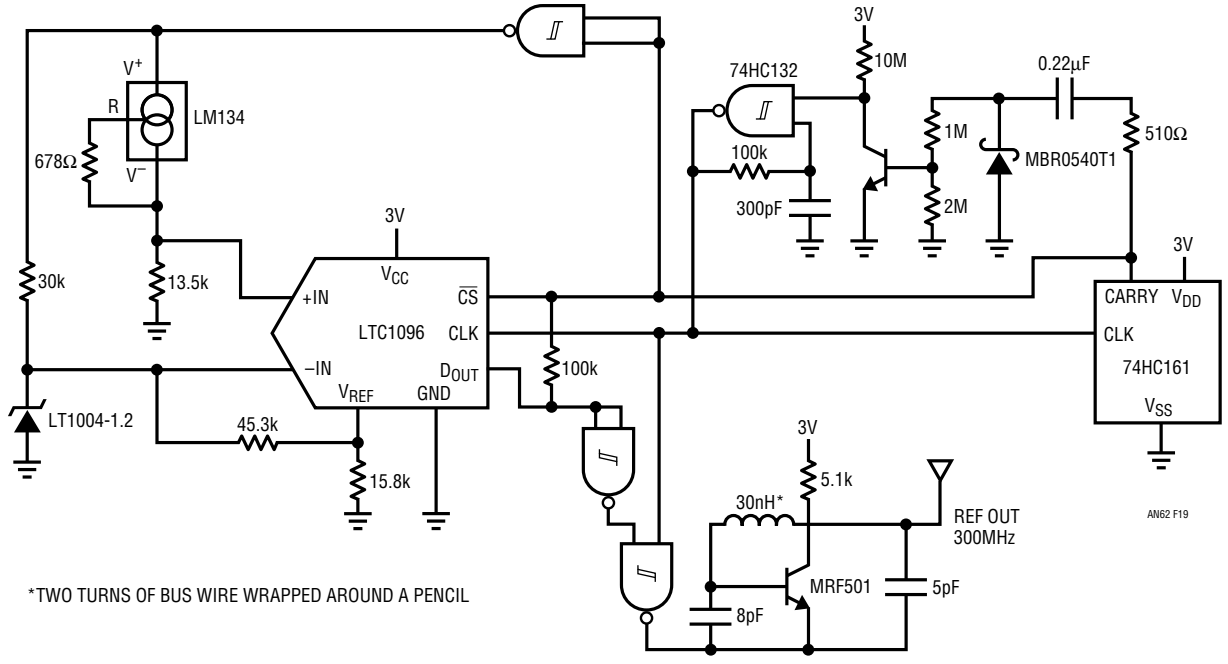
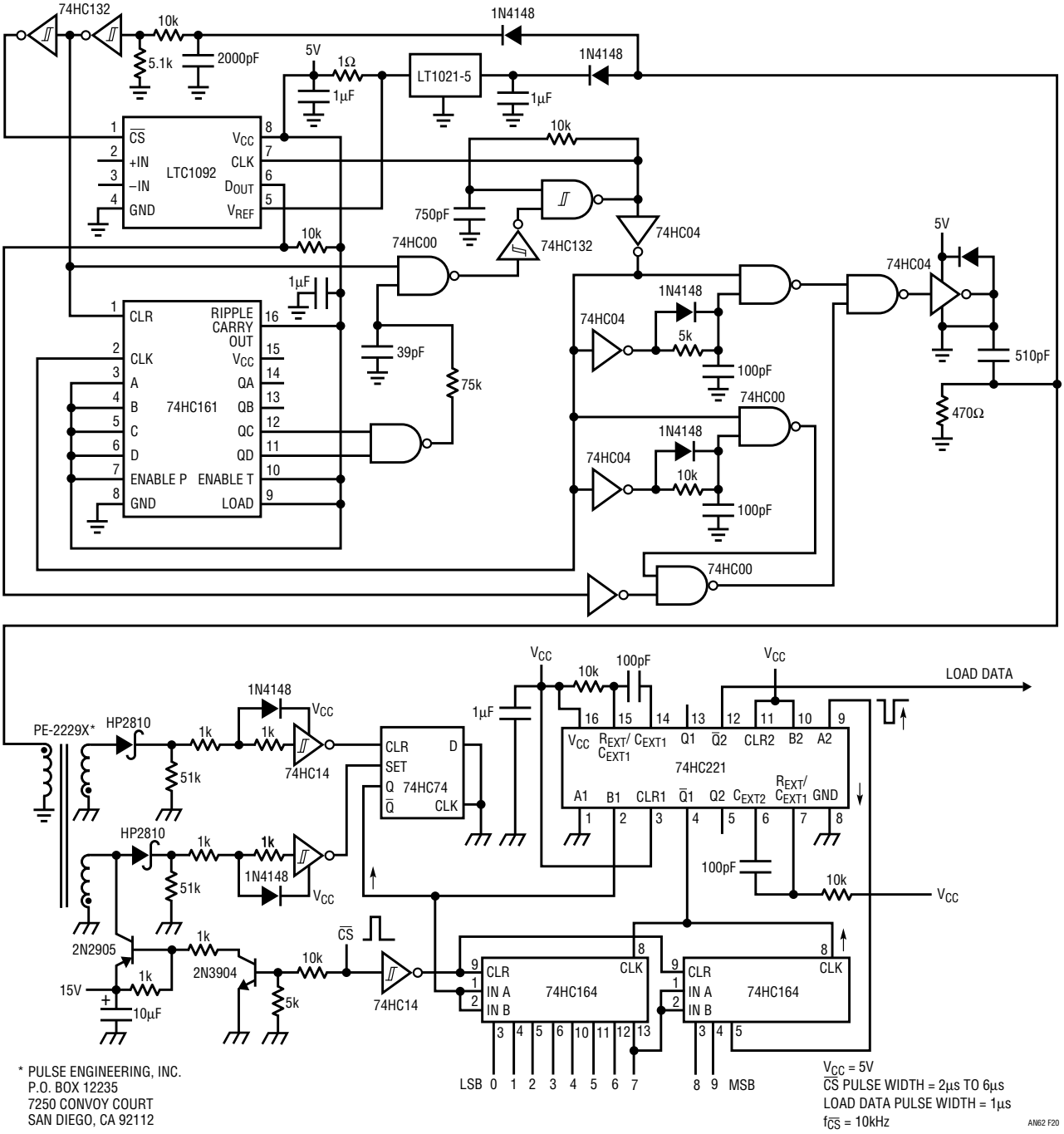


Figure 19. Battery-Powered Digital Thermometer Transmits Over RF-Link



TIMING DIAGRAM SHOWING PULSE-WIDTH CODING TECHNIQUE

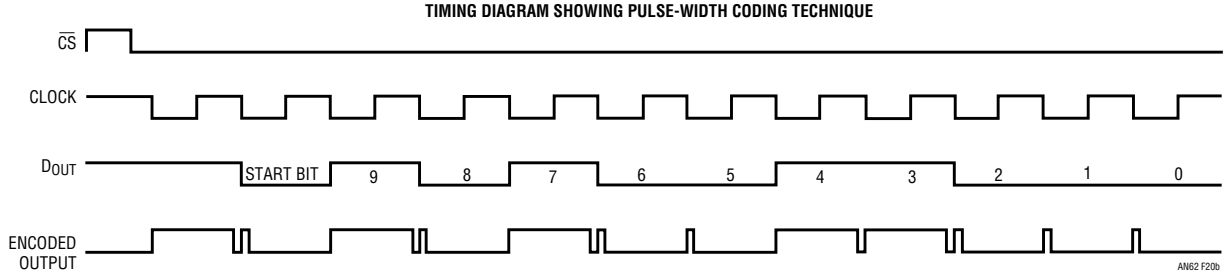


Figure 20. LTC1092 10-Bit Analog-to-Digital Converter Receives Power and Transmits Data Over Two Transformer-Isolated Lines

MISCELLANEOUS CIRCUITS

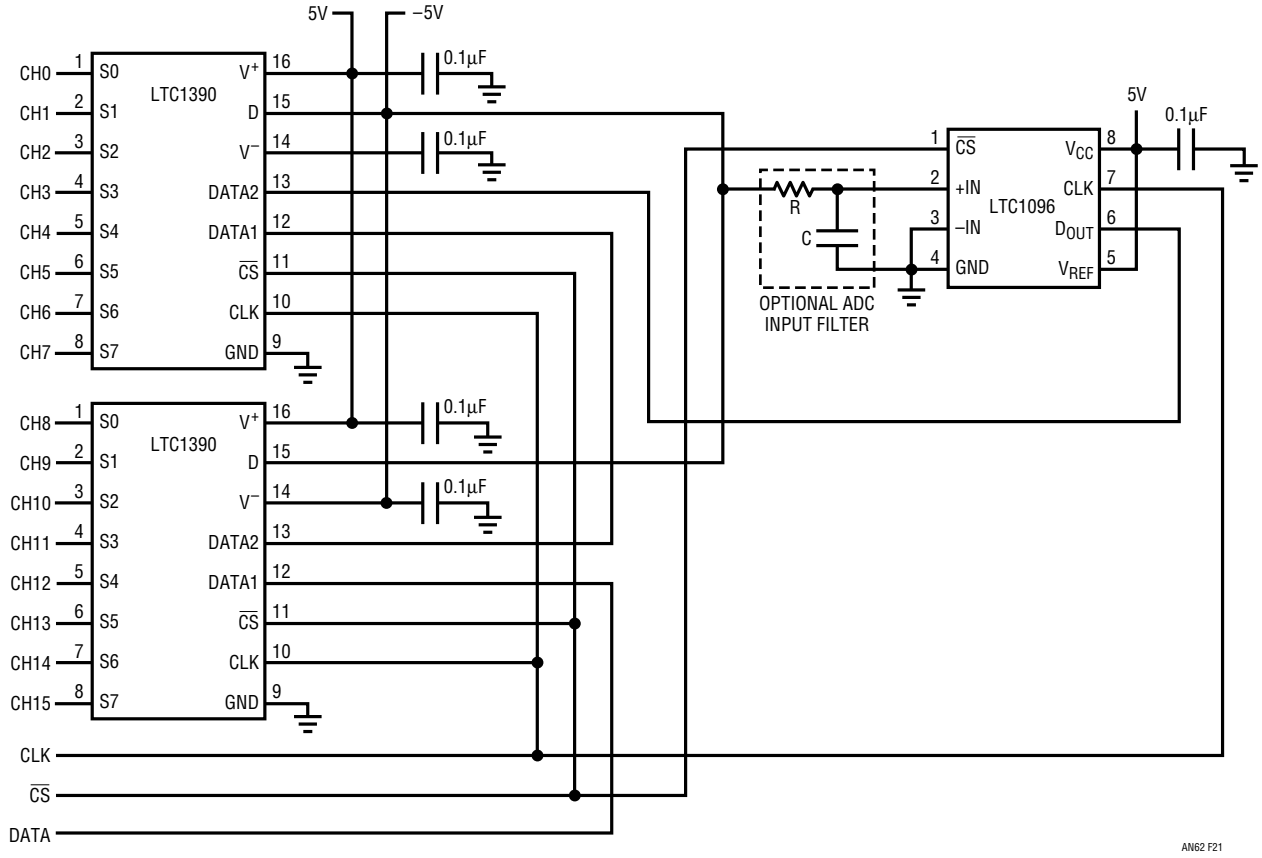


Figure 21. Two LTC1390 Cascadable Serially Programmed 8-Channel Multiplexers Provide the Single Channel LTC1096 with 16 Analog Inputs

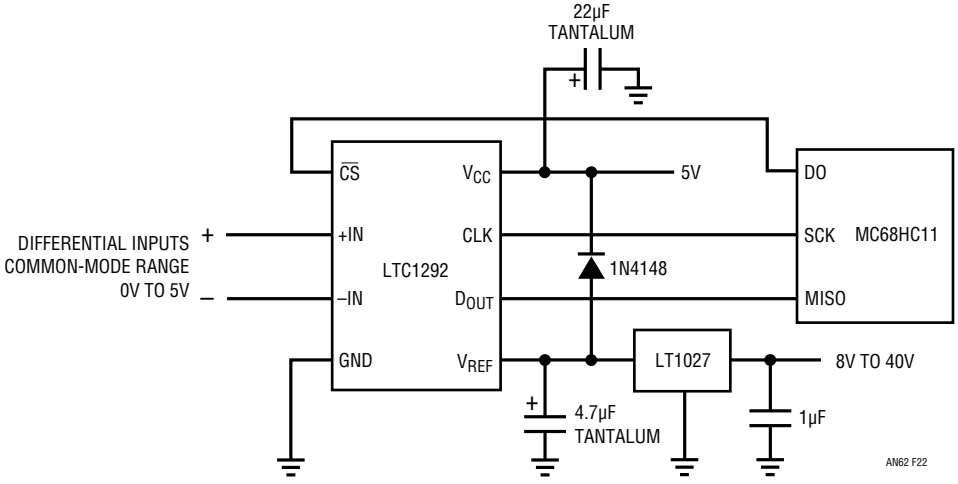


Figure 22. Small 12-Bit Differential-Input LTC1292 Data Acquisition System Occupies Only 0.35IN^2 Including Reference and Power Supply Bypass Components

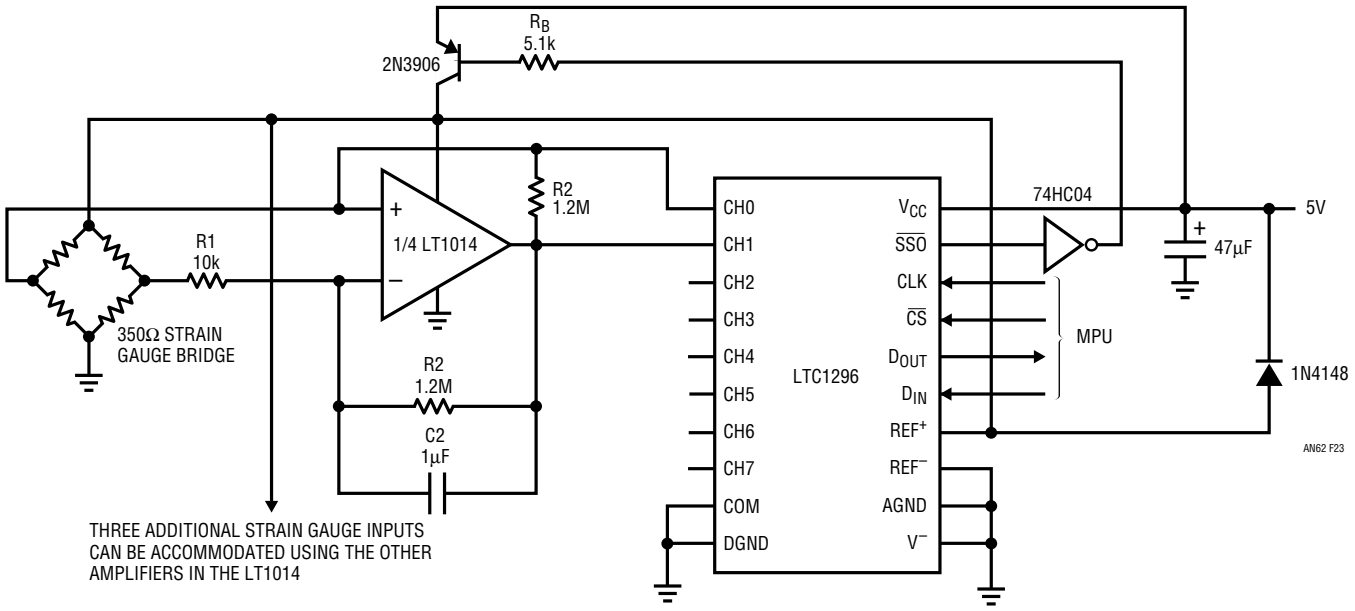


Figure 23. 12-Bit LTC1296 Data Acquisition System Strain Gauge with Bridge-Driver-Power Shutdown

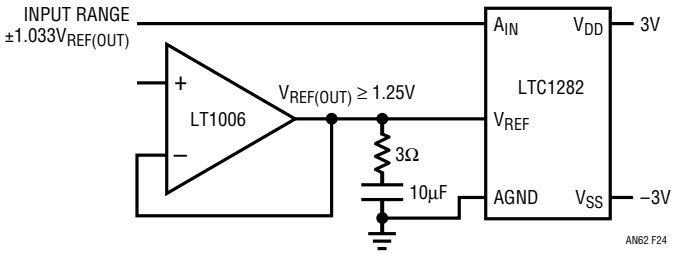


Figure 24. LTC1282 3V Analog-to-Digital Converter with Full-Scale Adjust

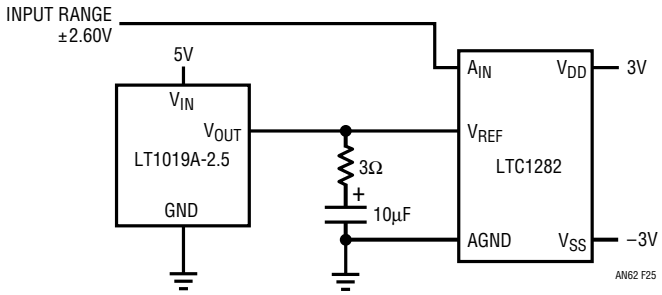


Figure 25. Ultra-Low Full-Scale Drift LTC1282 3V Analog-to-Digital Converter

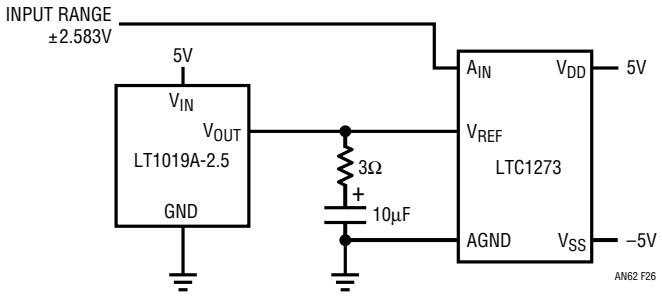


Figure 26. Ultra-Low Full-Scale Drift LTC1273 3V Analog-to-Digital Converter

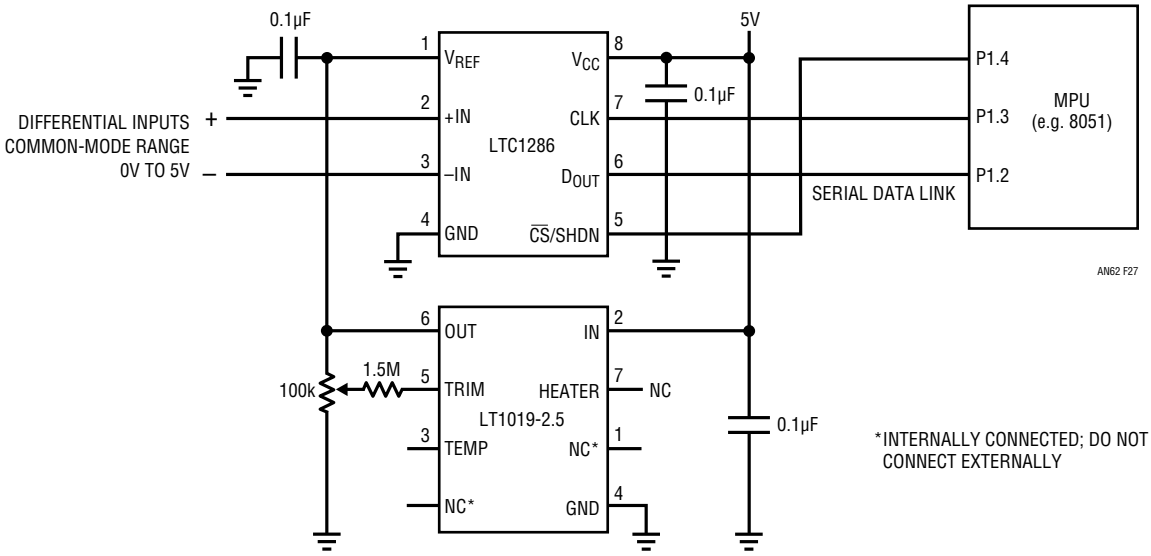


Figure 27. "Tiny" LTC1286 12-Bit Differential-Input Data Acquisition System (In SO Package) and "Tiny" LT1019-2.5 Reference Occupies Only 0.47IN^2 Including Reference and Power Supply Bypass Components

HARDWARE MICROCONTROLLER INTERFACES

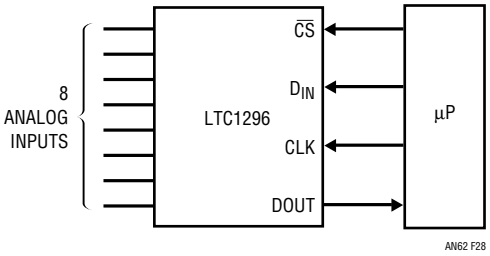


Figure 28. LTC1296 to Microcontroller Hardware Serial Interface

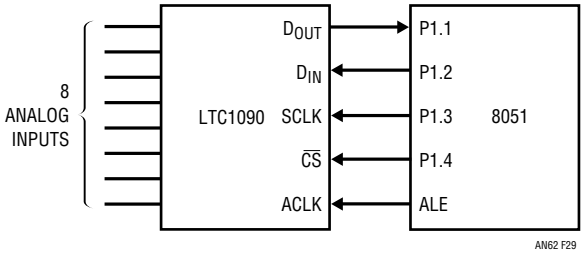


Figure 29. LTC1090* to Intel 8051 Microcontroller Hardware Serial Interface

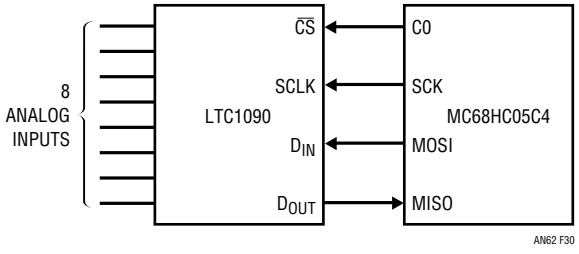


Figure 30. LTC1090* to Motorola MC68HC05C4 Microcontroller Hardware Serial Interface

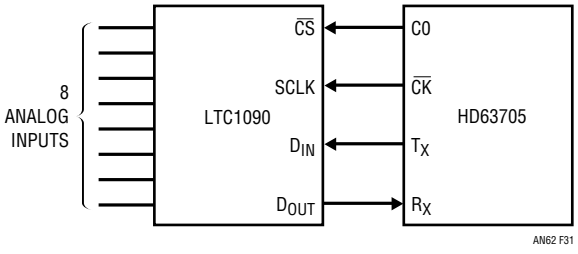


Figure 31. LTC1090* to Hitachi HD63705 Microcontroller Hardware Serial Interface

*Increase resolution from 10 bits to 12 bits with the pin compatible LTC1290.

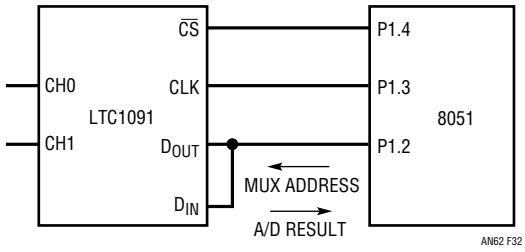


Figure 32. LTC1091* to Intel 8051 Microcontroller Hardware Serial Interface

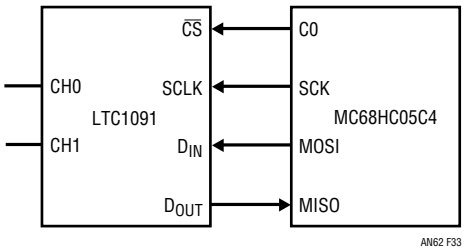


Figure 33. LTC1091* to Motorola MC68HC05C4 Microcontroller Hardware Serial Interface

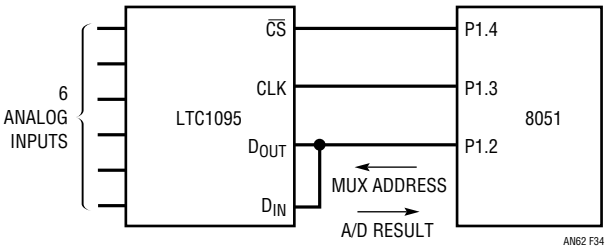


Figure 34. LTC1095 to Intel 8051 Microcontroller Hardware Serial Interface

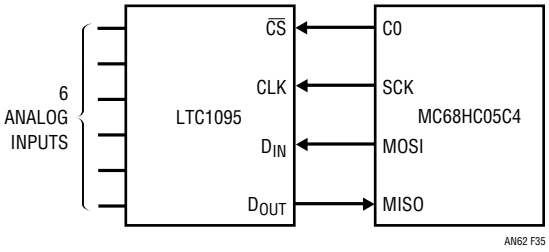


Figure 35. LTC1095 to Motorola MC68HC05C4 Microcontroller Hardware Serial Interface

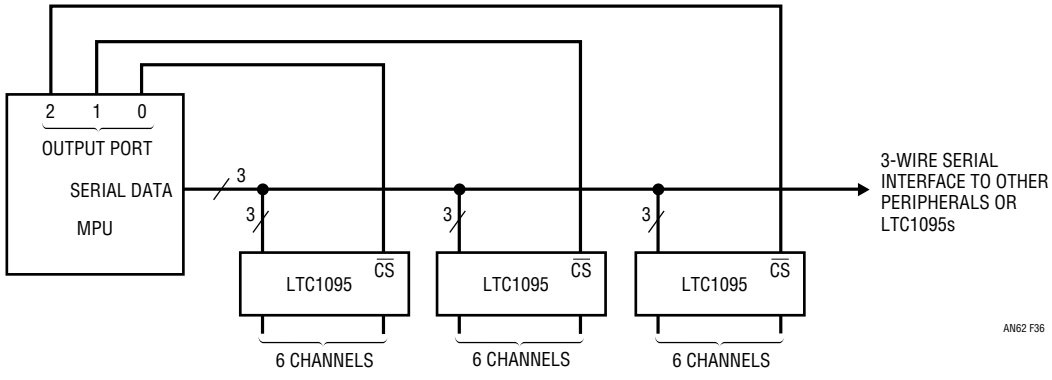


Figure 36. Multiple LTC1095s Sharing One Three-Wire Serial Interface

*Increase resolution from 10 bits to 12 bits with the pin compatible LTC1291.

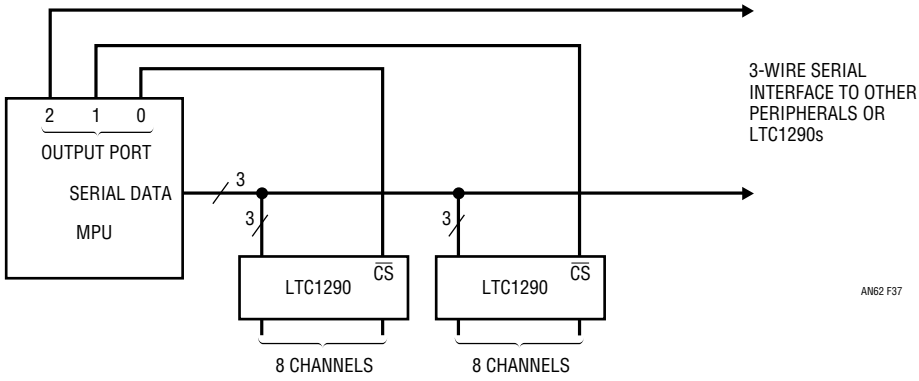


Figure 37. Multiple LTC1290s Sharing One Three-Wire Serial Interface

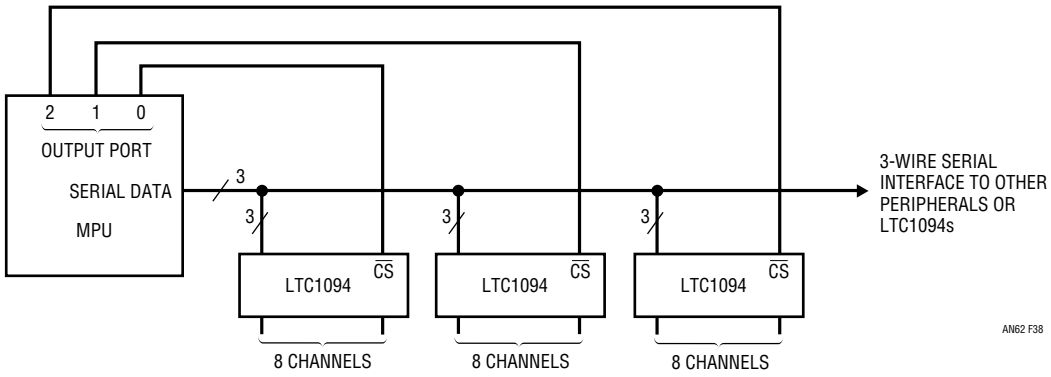


Figure 38. Multiple LTC1094s* Sharing One Three-Wire Serial Interface

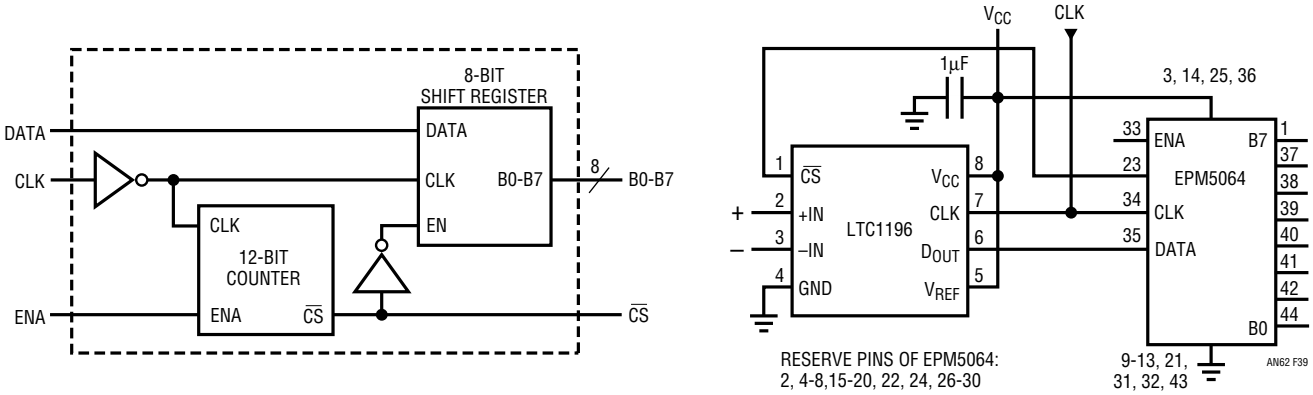


Figure 39. Interfacing the LTC1196 to the Altera EPM5064 PLD

*Increase resolution from 10 bits to 12 bits with the pin compatible LTC1294.

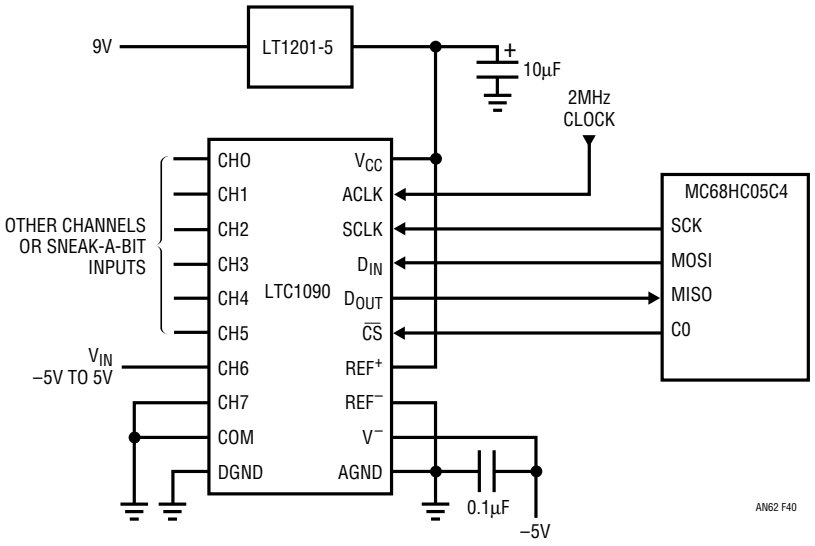


Figure 40. SNEAK-A-BIT Circuit for the LTC1090: 11-Bit Resolution from a 10-Bit ADC

PC SERIAL INTERFACE CIRCUITS

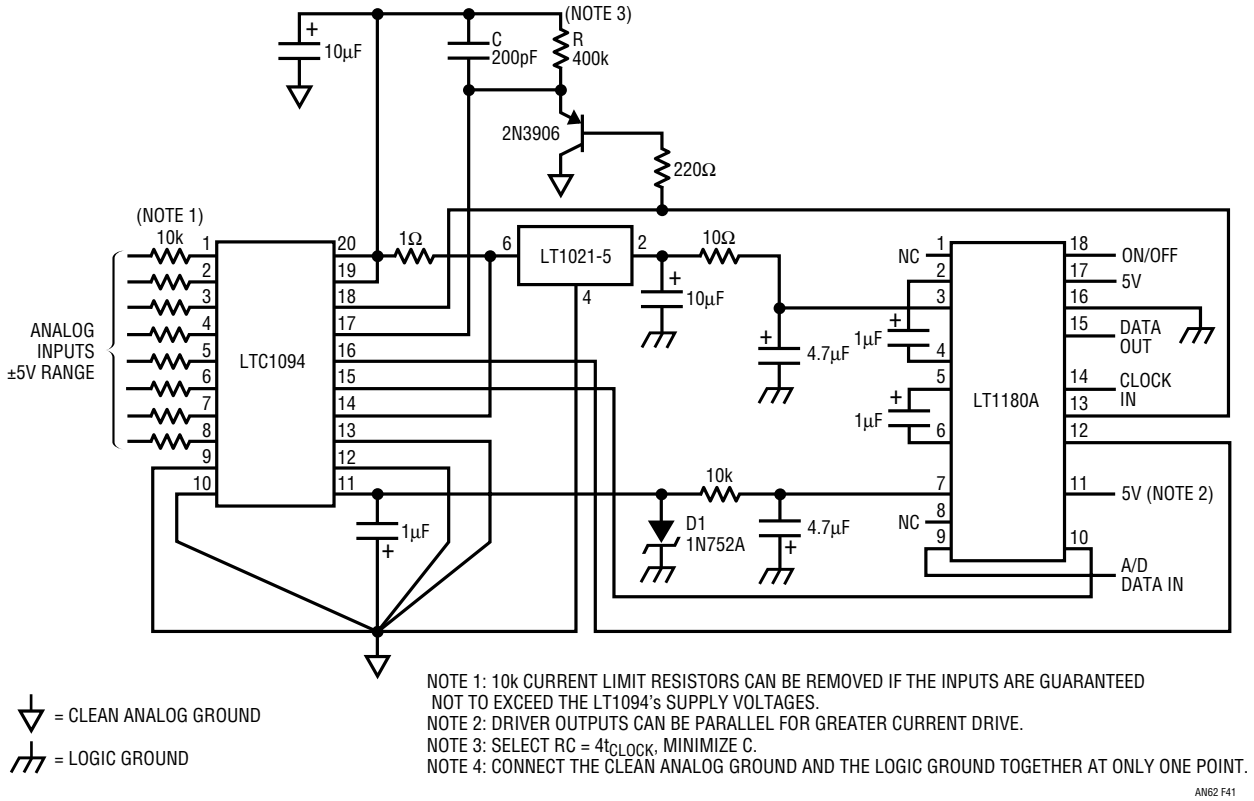


Figure 41. LTC1094 Analog-to-Digital Converter RS232 Serial Interface Using the LT1180A Dual Driver/Receiver

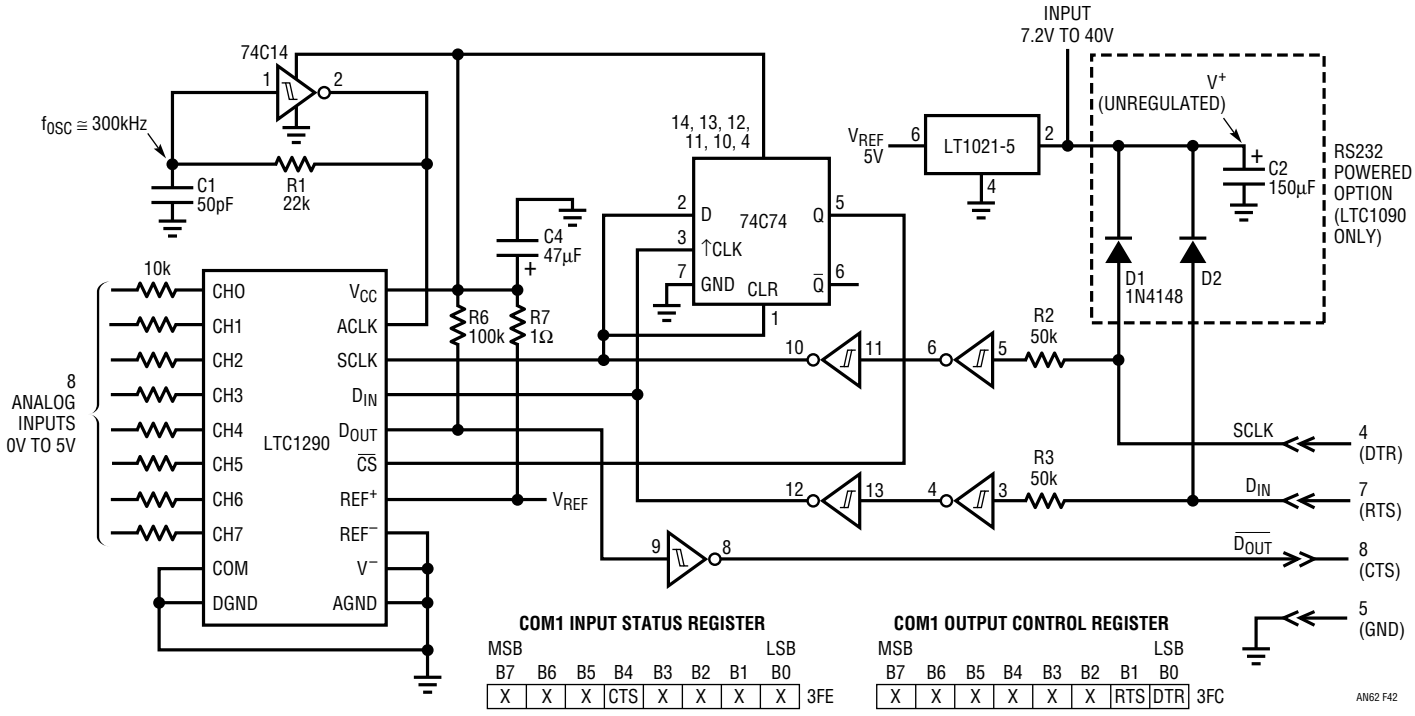


Figure 42. LTC1290 to IBM PC Serial Port

PARALLEL INTERFACE CIRCUITS

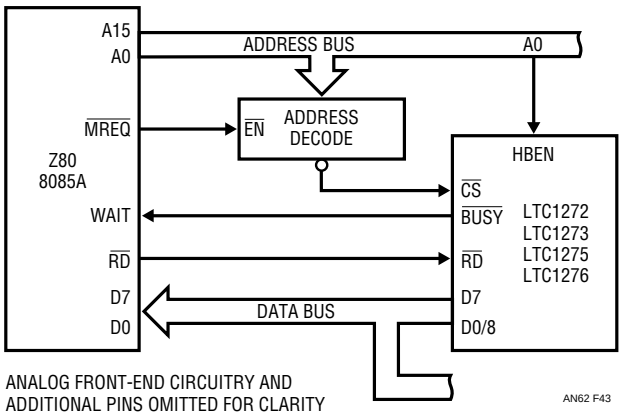


Figure 43. LTC1272/LTC1273/LTC1275/LTC1276 to 8085A/Z80 Microprocessor Hardware Parallel Interface

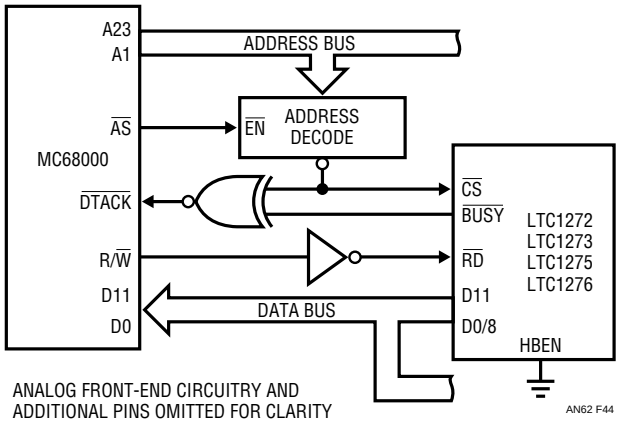


Figure 44. LTC1272/LTC1273/LTC1275/LTC1276 to MC68000 Microproessor Hardware Parallel Interface

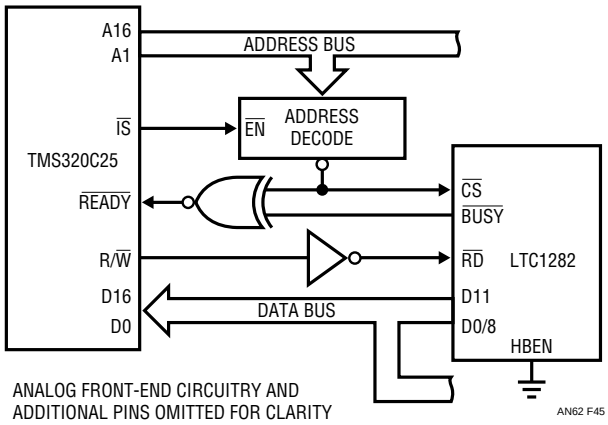


Figure 45. LTC1282 to TMS320C25 DSP Processor Parallel Interface

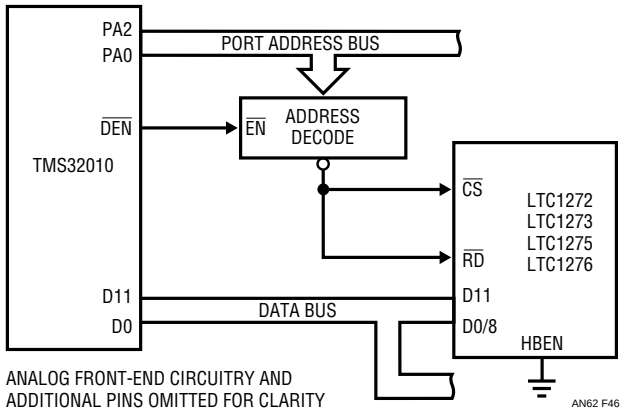


Figure 46. LTC1272/LTC1273/LTC1275/LTC1276 to TMS32010 DSP Processor Parallel Interface

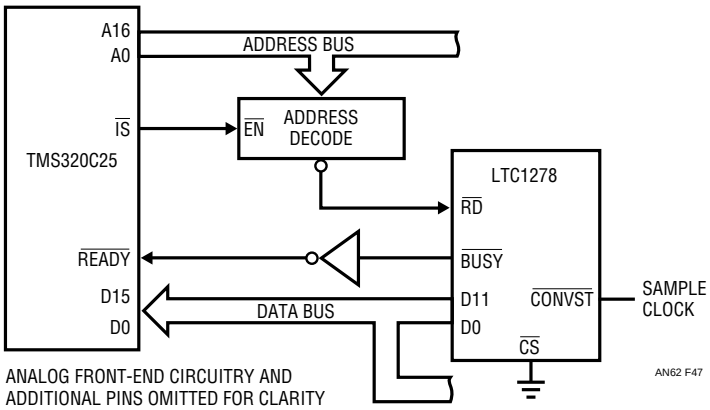


Figure 47. LTC1278 to TMS320C25 DSP Processor Parallel Interface

REFERENCE CIRCUITS

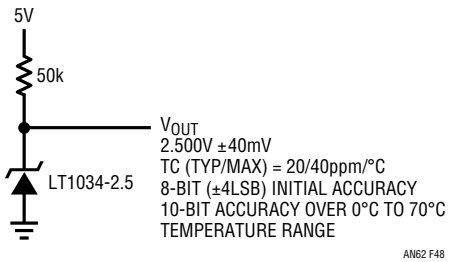


Figure 48. LT1034-2.5 2.5V Voltage Reference

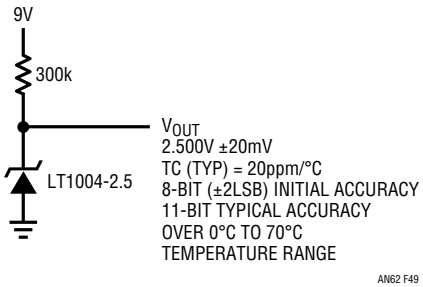


Figure 49. Battery-Powered LT1004-2.5 2.5V Voltage Reference

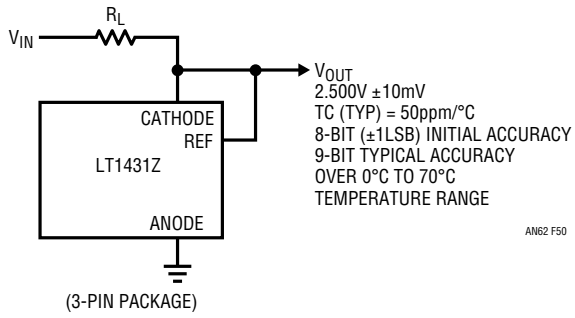


Figure 50. LT1431Z 2.5V Voltage Reference (3-Pin Package)

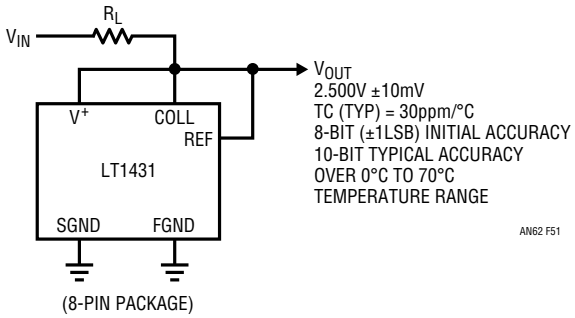


Figure 51. LT1431 2.5V Voltage Reference (8-Pin Package)

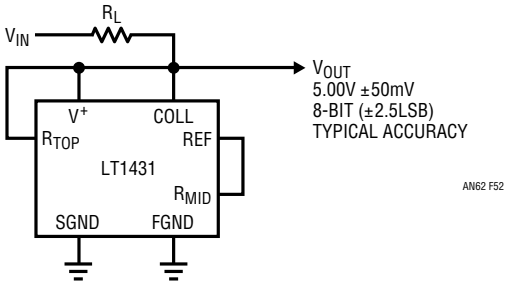


Figure 52. LT1431Z 5V Voltage Reference (8-Pin Package)

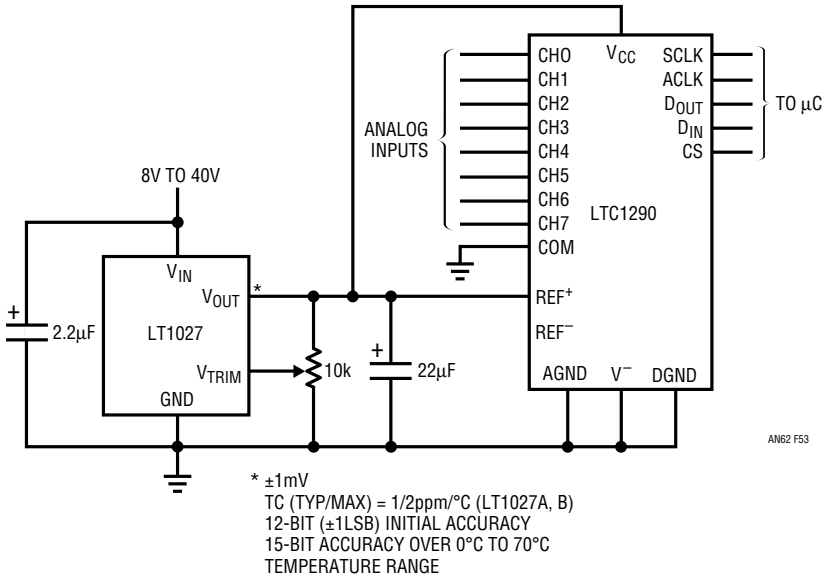


Figure 53. LT1027 12-Bit Accurate 5V Voltage Reference Supplying Input Voltages to the LTC1290's V_{REF} and V_{CC} Pins

ADJUSTABLE REFERENCES

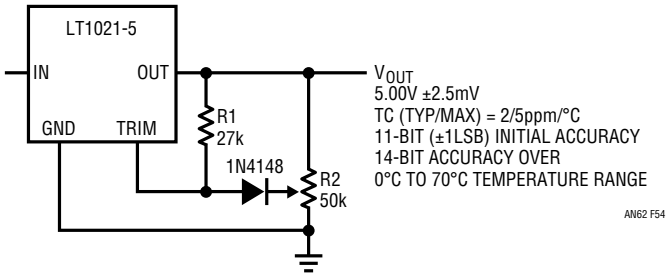


Figure 54. LT1021-5 Adjustable 5V Voltage Reference

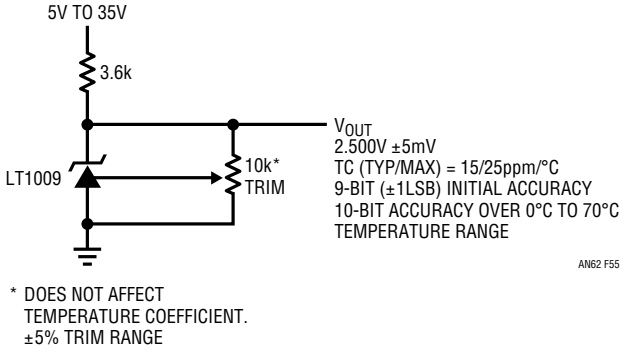
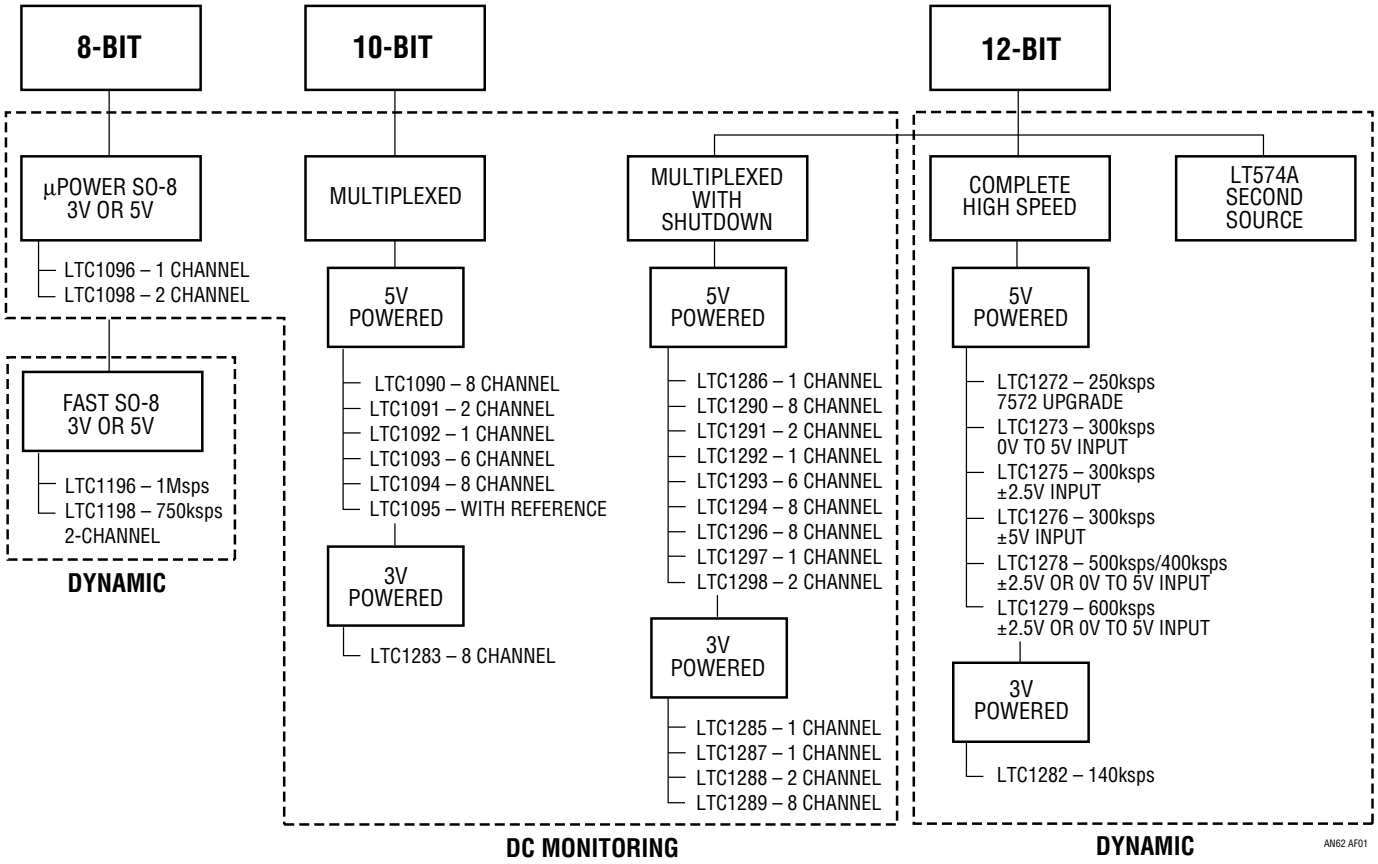


Figure 55. LT1009 2.5V Voltage Reference with ±5% Trim Range

APPENDIX A



Analog-to-Digital Converter Selection Guide

PART NUMBER	DESCRIPTION	RESOLUTION	TOTAL UNADJUSTED ERROR	SAMPLE RATE	VOLTAGE SUPPLY	MAXIMUM SUPPLY CURRENT	PKGS AVAIL	IMPORTANT FEATURES
LTC1090C,M	10-Bit, Serial I/O, A/D Converter with 8-Channel Multiplexer. Full Duplex Serial Interface.	10 Bits	±0.5LSB (LTC1090A) Over Full Temperature Range	35ksps	5V, 10V, or ±5V	2.5mA	J, N, S	10-Bit ADC with Built-In 8-Channel Analog MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configuable Bipolar or Unipolar Operation. Full Duplex Serial I/O.
LTC1091C,M	10-Bit, 8-Pin Serial I/O, A/D Converter with 2-Channel Analog Multiplexer.	10 Bits	±0.5LSB (LTC1091A) Over Full Temperature Range	31ksps	5V or 10V	3.5mA	J8, N8	10-Bit ADC with Built-In 2-Channel Analog MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Unipolar Operation.
LTC1092C,M	10-Bit, 8-Pin, A/D Converter with Serial Output.	10 Bits	±0.5LSB (LTC1092A) Over Full Temperature Range	38ksps	5V or 10V	2.5mA	J8, N8	Separate Reference Pin Allows Reduced Span (Down to 220mV) Operation. Unipolar ADCs Are Performed on a Differential Input Pair. Compatible with All Microprocessors' Serial Ports.
LTC1093C,M	10-Bit, Serial I/O, A/D Converter with 6-Channel Multiplexer.	10 Bits	±0.5LSB (LTC1093A) Over Full Temperature Range	26ksps	5V, 10V, or ±5V	2.5mA	J, N, S	1-Bit ADC with Built-In 6-Channel Analog MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Half Duplex Serial I/O.

PART NUMBER	DESCRIPTION	RESOLUTION	TOTAL UNADJUSTED ERROR	SAMPLE RATE	VOLTAGE SUPPLY	MAXIMUM SUPPLY CURRENT	PKGS. AVAIL.	IMPORTANT FEATURES
LTC1094C,M	10-Bit, Serial I/O. A/D Converter System with 8-Channel Multiplexer.	10 Bits	±0.5LSB (LTC1094A) Over Full Temperature Range	26ksps	5V, 10V, or ±5V	2.5mA	J, N	10-Bit ADC with Built-In 8-Channel Analog MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Half Duplex Serial I/O.
LTC1095C,M	10-Bit, Serial I/O, A/D Converter with 6-Channel Multiplexer and 5V Buried Zener Reference.	10 Bits	±0.15% FSR	26ksps	7.2V to 10V	3.7mA	J	10-Bit ADC with Built-In 6-Channel Analog MUX, Sample-and-Hold, and 5V Buried Zener Reference. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Half Duplex Serial I/O.
LTC1096C	8-Bit, 16µs, Micropower, Sampling A/D Converter with Serial I/O and Differential Input.	8 Bits	±0.5LSB (LTC1096A) Over Full Temperature Range	33ksps	3V to 9V	180µA, 3µA During Shutdown	N8, S8	Single Differential Input, Sample-and-Hold with Single-Ended Inputs. Ultra-Low Power, Automatic Power-Down Mode.
LTC1098C	8-Bit, 16µs, Micropower, Sampling A/D Converter with Serial I/O and 2-Channel MUX.	8 Bits	±0.5LSB (LTC1098A) Over Full Temperature Range	33ksps	3V to 9V	230µA, 3µA During Shutdown	N8, S8	2-Channel Multiplexer, Sampling ADC. Ultra-Low Power, Automatic Power-Down Mode.
LTC1099C,M	8-Bit, 2µs A/D Converter with Built-in Sample-and-Hold. Parallel Output.	8 Bits	±1LSB Over Full Temperature Range	256ksps	5V	15mA	J, N, S	Built-in Sample-and-Hold Allows Direct Conversion of $5V_{P-P}$ Signals up to 156kHz. Pin Compatible with ADC0820 and AD7820.
LTC1196C	8-Bit, 8-Pin, Serial I/O, 600ns, 1MHz, Sampling A/D Converter with Automatic Power-Down.	8 Bits	±0.5LSB Over Full Temperature Range	1Msps	3V to 6V	10mA	N, S	8-Bit ADC with Built-In Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Full Duplex Serial I/O.
LTC1198C	8-Bit, 8-Pin, Serial I/O, 600ns, 750kHz, Sampling A/D Converter with 2-Channel Analog MUX and Automatic Power-Down.	8 Bits	±0.5LSB Over Full Temperature Range	750ksps	3V to 6V	10mA, 3µA During Shutdown	N, S	8-Bit ADC with Built-In Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Full Duplex Serial I/O. 2-Channel Analog MUX and Automatic Power-Down.
LTC1272C,M	12-Bit, 3µs, 250ksps Sampling A/D Converter with Parallel Output. Single 5V Supply. Input Range: $0V \le V_{IN} \le 5V$.	12 Bits	±0.5LSB Linearity, ±1LSB Differential Nonlinearity, and ±4LSB Offset Error Over Full Temperature Range. ±10LSB Full-Scale Error. 72dB SINAD and –82dB THD at f_{IN} = 10kHz.	250ksps (111ksps also available)	5V	30mA	J, N, S	Single Supply 12-Bit ADC with Built-In Sample-and-Hold and 250ksps Conversion Rate. Built-In 2.42V Reference. Plug-In Upgrade for AD7572. Operates with or without –15V Supply Required by AD7572.
LTC1273C,M	12-Bit, 2.7µs, 300ksps Sampling A/D Converter with Parallel Output. Single 5V Supply. Input Range: $0V \le V_{IN} \le 5V$.	12 Bits	±0.5LSB Linearity, ±0.75LSB Differential Nonlinearity, and ±4LSB Offset Error Over Full Temperature Range. ±10LSB Full-Scale Error. 70dB SINAD and –74dB THD at f_{IN} = 150kHz.	300ksps	5V	25mA	J, N, S	Single Supply 12-Bit ADC with Built-In Sample-and-Hold, Internal Clock, and 300ksps Conversion Rate. Built-In 2.42V Reference.
LTC1275C	12-Bit, 2.7µs, 300ksps, Sampling A/D Converter with Parallel Output. Split ±5V Supply. Input Range: $-2.5V \le V_{IN} \le 2.5V$.	12 Bits	±0.5LSB Linearity, ±0.75LSB Differential Nonlinearity, and ±4LSB Offset Error Over Full Temperature Range. 70dB SINAD and –74dB THD at f_{IN} = 150kHz. ±10LSB Full-Scale Error.	300ksps	±5V	25mA	N, S	Split Supply 12-Bit ADC with Built-In Sample-and-Hold, Internal Clock, and 300ksps Conversion Rate. Built-In 2.42V Reference.

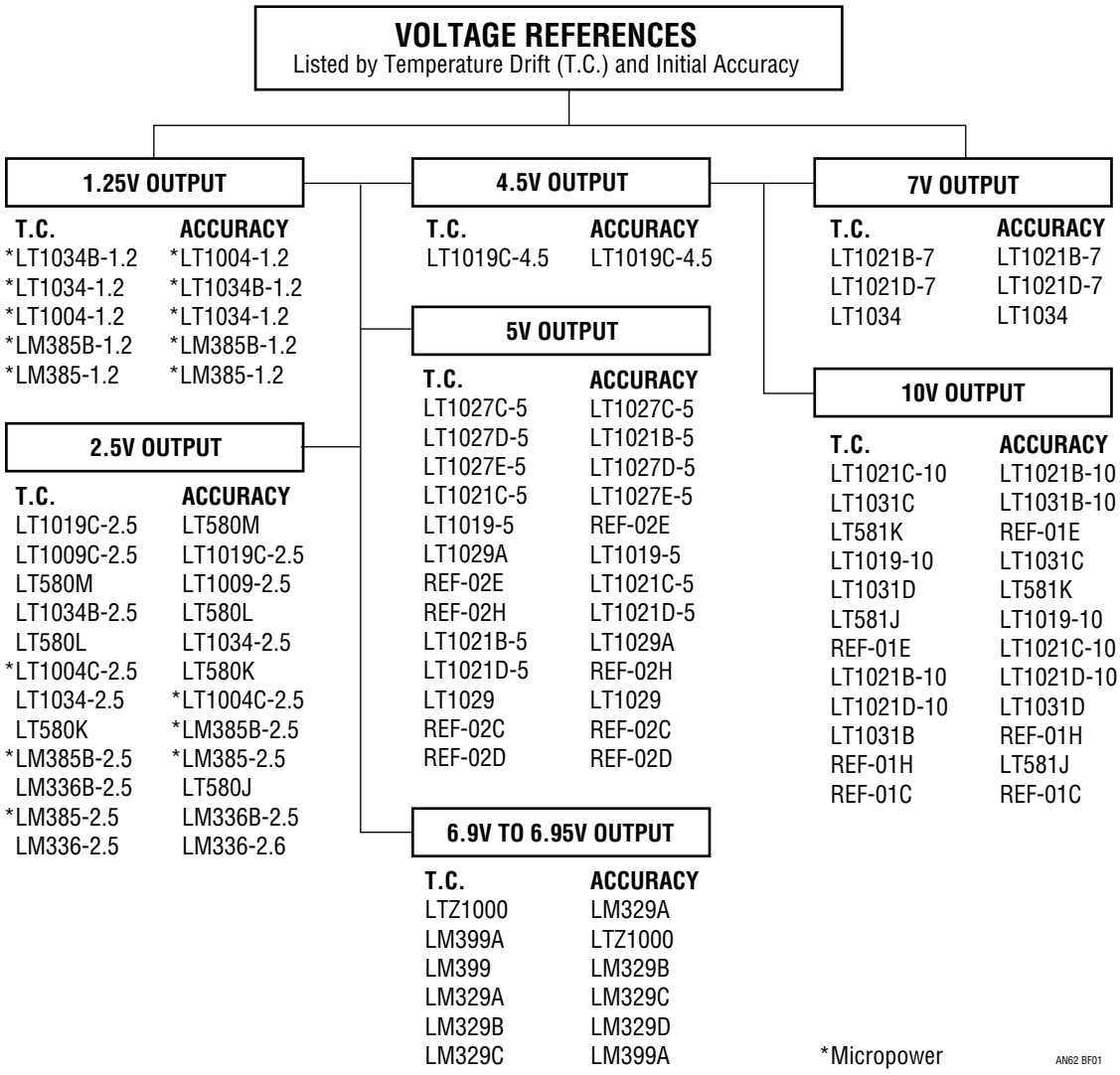
PART NUMBER	DESCRIPTION	RESOLUTION	TOTAL UNADJUSTED ERROR	SAMPLE RATE	VOLTAGE SUPPLY	MAXIMUM SUPPLY CURRENT	PKGS. AVAIL.	IMPORTANT FEATURES
LTC1276C	12-Bit, 2.7µs, 300ksps Sampling A/D Converter with Parallel Output. Split ±5V Supply. Input Range: $-5V \le V_{IN} \le 5V$.	12 Bits	±0.5LSB Linearity, ±0.75LSB Differential Nonlinearity, and ±4LSB Offset Error Over Full Temperature Range. 70dB SINAD and –74dB THD at f_{IN} = 150kHz. ±10LSB Full-Scale Error.	300ksps	±5V	25mA	N, S	Split Supply 12-Bit ADC with Built-In Sample-and-Hold, Internal Clock, and 300ksps Conversion Rate. Built-In 2.42V Reference.
LTC1278C,I	12-Bit, 1.6µs, 500ksps Sampling A/D Converter with Parallel Output. Input Range with Split ±5V Supply: $-2.5V \le V_{IN} \le 2.5V$; with 5V Supply: $0V \le V_{IN} \le 5V$.	12 Bits	±1LSB Linearity, ±1LSB Differential Nonlinearity, and ±6LSB Offset Error Over Full Temperature Range. 70dB SINAD and –74dB THD at f_{IN} = 250kHz. ±15LSB Gain Error.	500ksps (400ksps also available)	5V or ±5V	30mA, 3mA During Shutdown	N, S	Single or Split Supply 12-Bit ADC with Built-In Sample-and-Hold, Internal Clock, and 500ksps Conversion Rate. Built-In 2.42V Reference. Guaranteed 70dB SINAD and –78 THD at 100kHz Input Frequency Over Temperature.
LTC1279C,I	12-Bit, 1.4µs, 600ksps Sampling A/D Converter with Parallel Output. Input Range with 5V Supply: $0V \le V_{IN} \le 5V$; with Split ±5V Supply: $-2.5V \le V_{IN} \le 2.5V$.	12 Bits	±1LSB Linearity, ±1LSB Differential Nonlinearity, and ±6LSB Offset Error Over Full Temperature Range. 70dB SINAD and –74dB THD at f_{IN} = 300kHz. ±15LSB Gain Error.	600ksps	5V or ±5V	20mA, 3mA During Shutdown	N, S	Single or Split Supply 12-Bit ADC with Built-In Sample-and-Hold, Internal Clock, and 600ksps Conversion Rate. Built-In 2.42V Reference. Guaranteed 70dB SINAD and –78dB THD at 100kHz Input Frequency Over Temperature.
LTC1282C	12-Bit, 6µs, 140ksps Sampling A/D Converter with Parallel Output. Input Range with Single 3V Supply: $0V \le V_{IN} \le 2.5V$; with Split ±3V Supply: $-1.25V \le V_{IN} \le 1.25V$.	12 Bits	±0.5LSB Linearity, ±0.75LSB Differential Nonlinearity, and ±4LSB Offset Error Over Full Temperature Range. 69dB SINAD and –77dB THD at f_{IN} = 70kHz. ±10LSB Full-Scale Error.	140ksps	3V or ±3V	8mA	N, S	Single or Split Supply 12-Bit ADC with a 2.7V Guaranteed Minimum Supply Voltage. Complete with Sample-and-Hold, Internal Clock and a 25ppm/°C 1.2V Reference.
LTC1283C	10-Bit, 44µs, 3.3V or ±3.3V Sampling A/D Converter with Serial Output. Input Range with Split ±3.3V Supply: $-2.5V \le V_{IN} \le 2.5V$; with 3.3V Supply: $0V \le V_{IN} \le 2.5V$.	10 Bits	±0.5LSB Linearity and ±0.5LSB Offset Error Over Full Temperature Range.	15ksps	3.3V or ±3.3V	350µA	N, S	3.3V or ±3.3V Supply 10-Bit ADC with Built-In Sample-and-Hold. 10-Bit Unipolar or 9-Bit + Sign Bipolar Serial Output. Compatible with All Microprocessors' Serial Ports. Full Duplex Serial I/O.
LTC1285C	12-Bit, 8-Pin Serial I/O, 160µA (Typ) 3V Sampling A/D Converter with Automatic Power-Down and Differential Analog Input.	12 Bits	±2LSB Linearity, ±0.75LSB Differential Nonlinearity, ±3LSB Offset, and ±8LSB Full-Scale Error Over Full Temperature Range.	7.5ksps	3V	320µA, 3µA During Shutdown	N, S	12-Bit ADC with Built-In Sample-and-Hold. Operates on 3V Supply Voltage. Compatible with All Microprocessors' Serial Ports. Automatic Power-Down.
LTC1286C,I	12-Bit, 8-Pin Serial I/O, 250µA (Typ) Sampling A/D Converter with Automatic Power-Down.	12 Bits	±2LSB Linearity, ±0.75LSB Differential Nonlinearity, ±3LSB Offset, and ±8LSB Full-Scale Error Over Full Temperature Range.	12.5ksps	5V to 9V	500µA, 3µA During Shutdown	N, S	12-Bit ADC with Built-In Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Automatic Power Down.
LTC1287C,I	12-Bit, 33µs, 3.3V Sampling A/D Converter with Serial Output. Input Range with 3.3V Supply: $0V \le V_{IN} \le 3.3V$.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	30ksps	2.7V to 3.3V	5mA	J, N,	12-Bit ADC with Built-In Sample-and-Hold. Guaranteed Operation on a 2.7V Supply. Compatible with All Microprocessors' Serial Ports.

PART NUMBER	DESCRIPTION	RESOLUTION	TOTAL UNADJUSTED ERROR	SAMPLE RATE	VOLTAGE SUPPLY	MAXIMUM SUPPLY CURRENT	PKGS. AVAIL.	IMPORTANT FEATURES
LLTC1288C	12-Bit, 8-Pin, Serial I/O, 210µA (Typ) 3V Sampling A/D Converter with Automatic Power-Down, Differential Analog Input and 2-Channel Multiplexer.	12 Bits	±2LSB Linearity, ±0.75 Differential Nonlinearity, ±3LSB Offset, and ±8LSB Full-Scale Error Over Full Temperature Range.	6.6ksps	3V	390µA, 3µA During Shutdown	N, S	12-Bit ADC with Built-In Sample-and-Hold. Operates on 3V Supply Voltage. Compatible with All Microprocessors' Serial Ports. Automatic Power-Down. 2-Channel Multiplexer.
LTC1289C,I	12-Bit, 40µs, 3.3V or ±3.3V, Sampling A/D Converter with 8-Channel MUX and Serial Output. Input Range with Split ±3.3V Supply: $-3.3V \le V_{IN} \le 3.3V$; with 3.3V Supply: $0V \le V_{IN} \le 3.3V$.	12 Bits	±0.5LSB Linearity, ±1.5LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	25ksps	2.7V to 3.3V or ±2.7V to ±3.3V	5mA, 10µA During Shutdown	J, N, S	12-Bit ADC with Built-In Sample-and-Hold and 8-Channel MUX. Guaranteed Operation on a 2.7V Supply. Compatible with All Microprocessors' Serial Ports. Automatic Power-Down.
LTC1290C,I,M	12-Bit, 8-Pin Serial I/O, A/D Converter with 8-Channel Multiplexer. Full Duplex Serial Interface.	12 Bits	±0.5LSB Linearity, ±1.5LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	50ksps	5V or ±5V	12mA	J, N, S	12-Bit ADC with Built-In 8-Channel Analog MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Full Duplex Serial I/O.
LTC1291C,I,M	12-Bit, 12µs, 5V, Sampling A/D Converter with Serial Output. Input Range: $0V \le V_{IN} \le 5V$.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±1LSB Full-Scale Error Over Full Temperature Range.	54ksps	2.7V to 3.3V or ±3.3V	12mA, 10µA During Shutdown	J, N	12-Bit ADC with Built-In Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Automatic Power-Down.
LTC1292C,I,M	12-Bit, 8-Pin A/D Converter Serial Output.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	60ksps	5V	12mA	J, N	12-Bit ADC, Unipolar Conversion of Single Differential Input. Separate Reference Pin Allows Reduced Span. Compatible with All Microprocessors' Serial Ports.
LTC1293C,I,M	12-Bit, Serial I/O, A/D Converter System with 6-Channel Multiplexer.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	46ksps	5V or ±5V	12mA	J, N	12-Bit ADC with Built-In 6-Channel MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Full Duplex Serial I/O.
LTC1294C,I,M	12-Bit, Serial I/O, A/D Converter System with 8-Channel Multiplexer.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	46ksps	5V or ±5V	12mA	J, N	12-Bit ADC with Built-In 8-Channel MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Half Duplex Serial I/O.
LTC1296C,I,M	12-Bit, Serial I/O, A/D Converter System with 8-Channel Multiplexer.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±0.5LSB Full-Scale Error Over Full Temperature Range.	46ksps	5V or ±5V	12mA, 10µA During Shutdown	J, N	12-Bit ADC with Built-In 8-Channel MUX and Sample-and-Hold. Compatible with All Microprocessors' Serial Ports. Software Configurable Bipolar or Unipolar Operation. Programmable Power-Down Includes a System Shutdown Output.
LTC1297C,I,M	12-Bit, 20µs, 5V, Sampling A/D Converter with Differential Input and Serial Output. Input Range with 5V Supply: $0V \le V_{IN} \le 5V$.	12 Bits	±0.5LSB Linearity, ±3LSB Offset, and ±1LSB Full-Scale Error Over Full Temperature Range.	20ksps	5V	12mA, 10µA During Shutdown	J, N	12-Bit ADC with Built-In Sample-and-Hold. Compatible with All Microprocessors Serial Ports. Automatic Power-Down.
LTC1298C,I	12-Bit, 8-Pin, Serial I/O, 340µA (Typ) Sampling A/D Converter with Automatic Power-Down.	12 Bits	±2LSB Linearity, ±0.75LSB Differential Nonlinearity, ±3LSB Offset, and ±8LSB Full-Scale Error Over Full Temperature Range.	11.1ksps	5V to 9V	640µA, 3µA During Shutdown	N, S	12-Bit ADC with Built-In Sample-and-Hold and 2-Channel MUX. Compatible with All Microprocessors Serial Ports. Automatic Power-Down.

Digital-to-Analog Converter Selection Guide

PART NUMBER	DESCRIPTION	RESOLUTION	TOTAL UNADJUSTED ERROR	SETTLING TIME	VOLTAGE SUPPLY	MAXIMUM SUPPLY CURRENT	PKGS. AVAIL.	IMPORTANT FEATURES
LTC1257C,I	12-Bit, Serial I/O, 8-Pin D/A Converter. Cascadable Serial I/O. Internal 2.048V Reference. Voltage Output.	12 Bits	±0.5LSB DNL, ±3.5LSB INL	6µs (±1/2LSB)	5V to 15.5V	600µA at V_{CC} = 5V	N, S	12-Bit DAC with Cascadable Serial I/O, Built-In Reference, and Voltage Output. Wide Supply Range of 5V to 15.5V. Space Saving SO-8 Package.

APPENDIX B



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