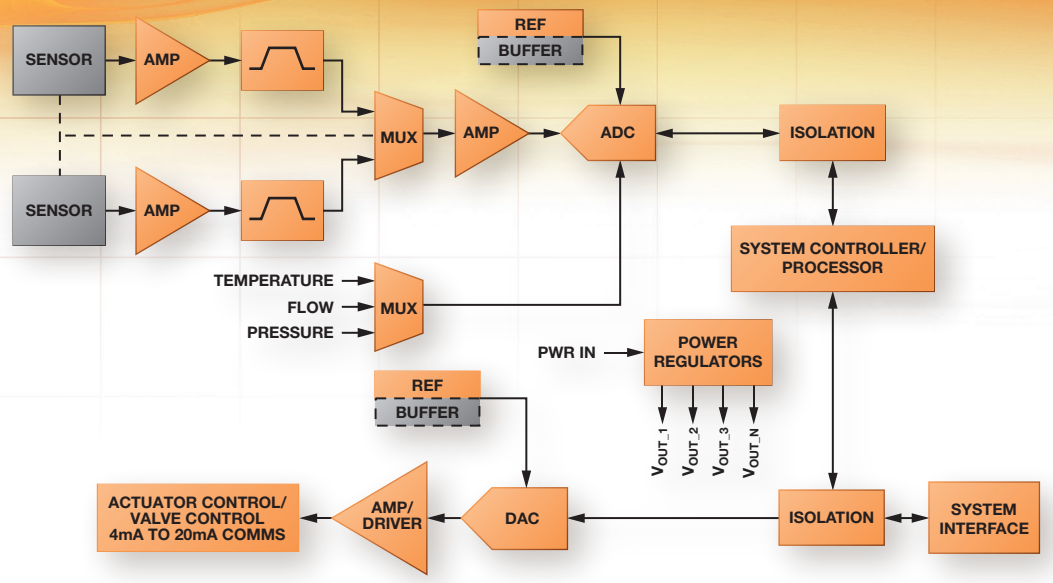
Industrial Automation Solutions

Data Converters, Amplifiers, Power Management, Isolators, Interface, and Microcontrollers



Analog Devices has a 40 year heritage of working in concert with its industrial customers to define, develop, and deploy complete signal chain solutions that are optimized for their applications. ADI's legacy of supporting the industrial sector's long product life cycles with multiyear manufacturing commitments is augmented by the company's educated sales force, knowledgeable field applications engineers, and advanced design support tools that include evaluation boards and SPICE models. In addition, Analog Devices provides world-class quality and supply chain support coupled with superior on-time delivery.

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ANALOG DEVICES

Introduction

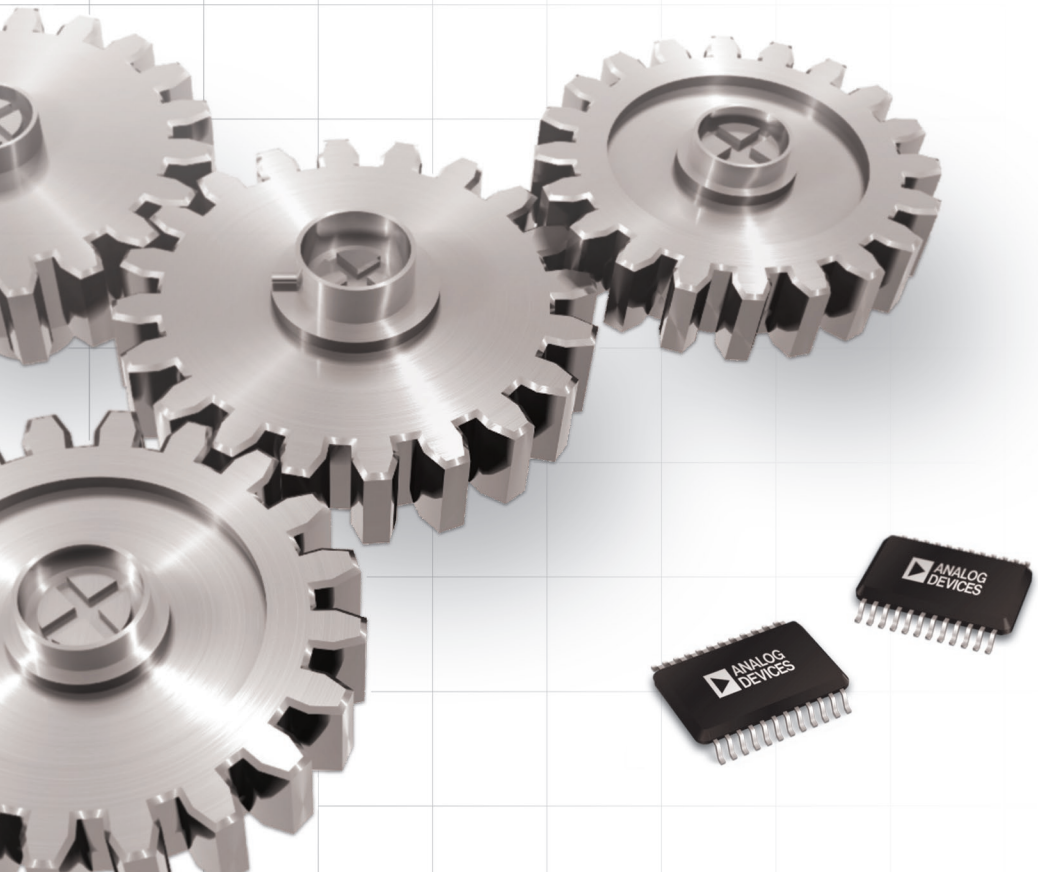
In a host of industries—from automotive assembly to food processing to oil refining—industrial process control applications require solutions to the growing demand for feature-rich, high performance, highly reliable semiconductor components. The increase in sensor and actuator usage has resulted in tighter control of open- and closed-loop processes, leading to improved systems for asset management, building control, measurement, and programmable automation. This brochure features recently announced signal path ICs that are ideally suited for demanding industrial environments within current and future industrial control systems.

Measurement and control implementations exist in several industrial applications, including programmable logic controllers (PLC), distributed control systems (DCS), smart transmitters, and general-purpose data acquisition. Their purpose is to leverage various types of sensors and feedback mechanisms to monitor and control machine or system interactions by collecting, storing, and analyzing data. Acquiring data from sensors involves precision measurement and processing of analog variables, such as voltages and currents, where there is a need to often sense very small changes. Typical devices used in the input signal chain are amplifiers, multiplexers, isolators, and ADCs. Accuracy, drift, noise rejection, and processing speed are all very important characteristics in these systems. System requirements for accuracy, bandwidth, and input range dictate the selection of not only the choice of signal chain components but also power supply components.

A DSP or microcontroller is commonly used to process the digital signals for display or analysis. Once process data has been appropriately conditioned and digitized, an appropriate action normally takes place. This action occurs in the output signal chain. A response is fed into a DAC, which can control or manipulate the appropriate actuator, pump, or valve, or simply transmit data over the 4 mA to 20 mA control loop, depending on the desired result.

If the system resides in a harsh industrial environment, safety measures require not only an isolation barrier that prevents ground loops but operation that is intrinsically safe as well. Isolation devices are used to protect against high voltages or currents caused by line surges, which can introduce noise, degrade measurements, and even destroy system components.

Analog Devices—with a broad selection of analog, power, and interface ICs—is positioned to deliver world-class processing solutions to our customers and continues to invest heavily in the industrial market with innovative new product families. With our new data converters, operational amplifiers, isolators, interface ICs, and power products, you'll find solutions inside that will achieve the performance requirements of your current and future industrial control systems.



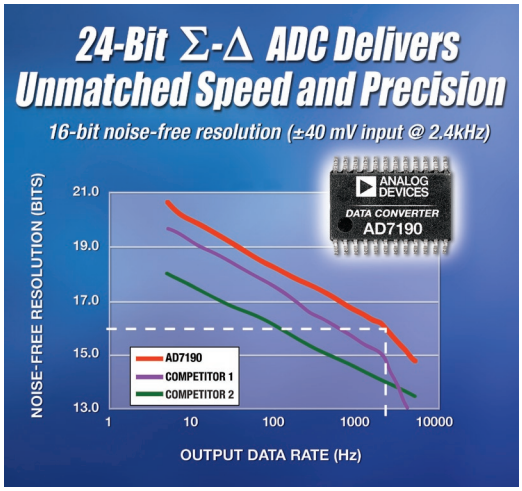
Data Converters

AD7190: 4.8 kHz, Ultralow Noise, 24-Bit Σ-Δ ADC with PGA Enables Faster Precision Measurement

The AD7190 is the first device of a new family of industry-leading Σ-Δ ADCs aimed at enabling industrial equipment manufacturers to expand the operating speed and precision of their high performance measurement products. The AD7190 ADC achieves greater than 16-bit noise-free resolution up to 2.4 kHz for an input voltage range from 40 mV to 5 V. This level of performance allows designers to measure smaller signals faster and with greater accuracy, which can significantly improve the performance of precision industrial measurement and control systems, such as weigh scales, PLC/DCS analog input modules, and process controllers. Additionally, designers can achieve an industry-leading 21-bit noise-free resolution for their high precision dc systems given the device's noise performance of only 7 nV rms for an input signal of 40 mV at a 4.7 Hz data rate. At this same data rate, the AD7190 delivers 23-bit noise-free resolution for a 5 V input signal. Delivering superior noise-free resolution across the widest data rate and input signal range of any Σ-Δ ADC, the AD7190 offers manufacturers the flexibility to use the same data converter solution in multiple lines of end equipment.

Features

- Ultralow noise (7 nV rms)
- Up to 23 bits noise-free resolution
- Programmable data rates from 4.7 Hz to 4.8 kHz
- Integrated PGA and clock
- Zero latency mode available
- Simultaneous 50 Hz/60 Hz rejection
- Temperature specified up to +105°C
- 24-lead TSSOP



Applications

- Weigh scales
- Distributed control systems
- Programmable logic controllers

AD7794: Process Measurement Solution in a Single Chip Reduces Cost

The AD7794 24-bit Σ-Δ ADC offers a unique balance of very low noise (40 nV rms) and very low power (450 μA) performance, making it an ideal solution for loop-powered smart transmitters and field instruments. It is a highly integrated multichannel analog input solution, delivering features such as an on-chip PGA, reference, current sources, and clock in a small TSSOP package. Simultaneous 50 Hz and 60 Hz rejection comes standard, as does the flexibility of a choice of programmable output data update rates. These on-chip features eliminate the need for many peripheral components, thus saving cost, board space, and design time, making the AD7794 also particularly suitable for industrial analog input module requirements. See also the AD7785, AD7792, AD7793, and AD7795 extended family of products to find the right device for your industrial design.

Features

- Very low noise (40 nV rms)
- Very low power (450 μA)
- Up to 20.5 bits noise-free resolution
- Programmable data rates from 4 Hz to 470 Hz
- Integrated PGA and clock
- Integrated excitation currents/voltage reference
- Simultaneous 50 Hz/60 Hz rejection
- Temperature specified up to +125°C
- 24-lead TSSOP

Applications

- Distributed control systems
- Programmable logic controllers
- 4 mA to 20 mA smart transmitters measuring temperature, pressure, and flow

Data Converters

AD7264: Simultaneous Sampling, 1 MSPS, 14-Bit, 2-Channel SAR ADC with PGA

Analog Devices' AD7264 simplifies industrial motor control designs by integrating two simultaneous sampling successive-approximation (SAR) analog-to-digital converters (ADCs), two programmable gain amplifiers (PGA), and four comparators on a single chip. By providing a direct interface for multiple types of sensors, this new ADC solution allows a single, standardized data acquisition board to be used in industrial motor drives, replacing as many as three separate boards previously required to perform the same system control function. This integration allows designers to develop simpler, more cost-effective motor control units.

Designed for industrial applications, the AD7264 features two high speed, low power SAR ADCs, each providing throughput rates up to 1 MSPS. The on-chip PGAs accept a true differential analog input, and supports 13 programmable gain settings from 1 to 128. In addition, the AD7264 includes four on-chip comparators: two optimized for low power and two optimized for short propagation delays. The AD7262 is a 12-bit pin-compatible solution. ADI's AD8132 and ADA4941-1 are recommended drivers for single-ended and differential conversion.

Features

- Dual, 14-bit ADCs
- True differential analog inputs
- Programmable gain stage: ×1, ×2, ×3, ×4, ×6, ×8, ×12, ×16, ×24, ×32, ×48, ×64, ×96, ×128
- Throughput rate per ADC: 1 MSPS
- 4 on-chip comparators
- Low power consumption: 24 mA
- 48-lead LQFP, 48-lead LFCSP

Applications

- Motor control
- Power measurement
- Instrumentation

AD7634: 18-Bit, Bipolar Input ADC for Industrial Applications

In present solutions, data acquisition customers use level shifting and gain stages to accommodate various bipolar and unipolar input ranges required by their OEM customers. The AD763x, AD761x and AD795x families of *i*CMOS® PulSAR® ADCs allow customers to remove most of this signal conditioning and select various input ranges using software instead of hardware.

Present ADCs with multiple input ranges force customers to pin strap multiple analog inputs to vary input ranges. These 14-bit, 16-bit, and 18-bit families improve present software-selectable input range ADCs by a factor 16× and 64×, respectively.

Features

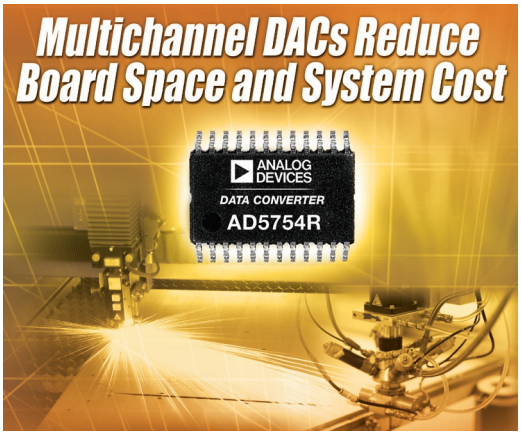
- Software-programmable input ranges: 0 V to 5 V, 0 V to 10 V, ±5 V, ±10 V
- Throughput rates up to 1 MSPS
- 14-, 16-, and 18-bit resolution with no missing codes
- 48-lead LFCSP, 48-lead LQFP
- On-board reference and buffer

Applications

- Process control
- Data acquisition
- Motion control
- Instrumentation

Data Converters

AD5754R: Small and Flexible Multichannel Voltage Output DACs



The AD5754R is a 16-bit quad DAC with user programmable voltage output ranges. The family includes dual and quad channel configurations in resolutions of 12, 14, and 16 bits and operates from single-supply voltages of 4.5 V to 16.5 V, or dual-supply voltages of ±4.5 V to ±16.5 V. The output range is software-selectable from options of 5 V, 10 V, ±5 V, and ±10 V, plus an overrange setting. The AD5754R achieves an accuracy level of 0.1% TUE and includes a precision 5 ppm/°C internal reference. These devices incorporate a 30 MHz serial peripheral interface, power-on reset, and a per-channel power-down mode. Additionally, the device offers hardware LDAC and CLR functionality, and the on-chip programmable precision output amplifier allows rail-to-rail output swing to be achieved, maximizing dynamic range and enabling the device to deliver the performance needed in a wide variety of end applications. All devices are fully specified over the –40°C to +85°C industrial temperature range.

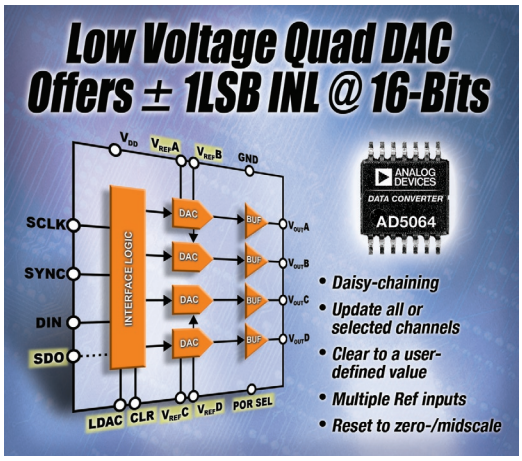
Features

- 12-, 14-, and 16-bit resolution options
- User-programmable voltage outputs
- Accuracy: 0.1% TUE
- On-chip precision force and sense amplifier
- 24-lead TSSOP

Applications

- Analog I/O systems
- Closed-loop servo control
- Process control

AD5064: Low Voltage Quad DAC with ±1 LSB INL @ 16 Bits



Ideal for precision multichannel I/O systems, the AD5064 is a quad 16-bit DAC with 16-bit accuracy over a 0 V to 5 V output span—delivering a total unadjusted error of less than ±2 mV in a 14-lead TSSOP. It is also available in 16-lead TSSOP with individual reference pins, allowing each DAC the flexibility to be driven with a different reference voltage. In addition, the devices are extremely flexible and provide many convenient control features such as pin-selectable reset/power-on to mid- or zero-scale, hardware LDAC and CLR pins, and a programmable CLR function to allow the user to select clear options. Other features include LDAC override to allow only selected channels to be synchronously updated, an SDO pin to allow daisy-chaining of multiple devices, and a per-channel power-down feature. Pin-compatible 12-bit and 14-bit versions are also available.

The AD5765 is a quad, 16-bit, bipolar, voltage output digital-to-analog converter that operates from ±5 V supplies. Featuring 1 LSB maximum integral and differential nonlinearity (INL and DNL), the AD5765 provides integrated output amplifiers, reference buffers, and proprietary power-up/power-down control circuitry. The part also features a digital I/O port and digital offset and gain adjust registers per channel. The part is housed in a 32-lead TQFP package.

Features

- 16-bit resolution
- 1 LSB INL and DNL
- Pin-compatible 12-bit/14-bit devices
- On-chip precision force and sense amplifier
- 14-lead TSSOP, 16-lead TSSOP

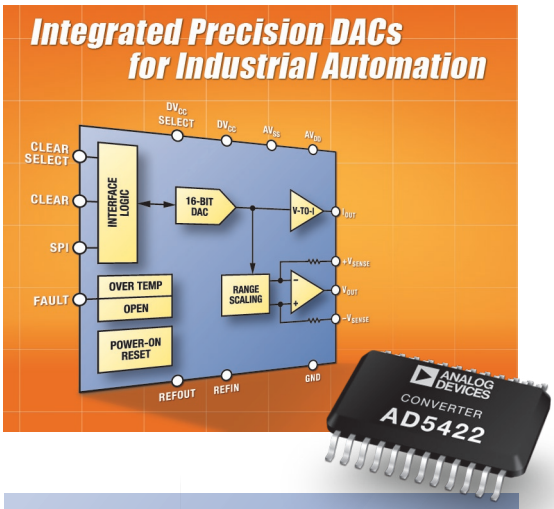
Applications

- Multichannel PLC/DCS systems
- Programmable attenuators
- Data acquisition systems

Data Converters

AD5422: Actuation and Communications in a Single Step

Ideal for per-channel isolated systems, the AD5422 is a serial input, precision, fully integrated 16-bit converter offering a programmable current source and programmable voltage output. The output configuration is software-selectable from options of 5 V, 10 V, ±5 V, and ±10 V in voltage mode; and 4 mA to 20 mA, 0 mA to 20 mA, and 0 mA to 24 mA in current mode. All output spans include an additional overrange setting. Analog outputs feature output control functionality and can drive capacitive loads of 1 μF and inductive loads of 1 H. The device is specified to operate from a single 12 V to 48 V supply or dual ±12 V to ±24 V supplies. Internal fault detection circuitry provides hardware and software indication of line faults, such as opens or shorts in cable wiring or remotely located loads. The device integrates a precision 10 ppm/°C reference.



Features

- 16-bit resolution
- Voltage and current output
- Accuracy: 0.1% TUE
- On-chip precision force and sense amplifier
- Integrated diagnostics
- Pin-compatible 12-bit device
- 24-lead TSSOP, 40-lead LFCSP

Applications

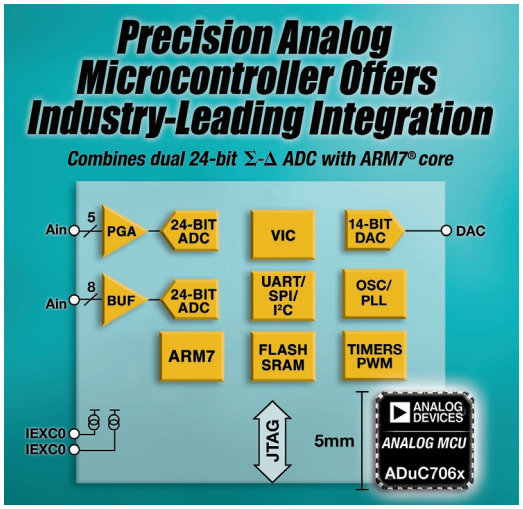
- Distributed control systems
- Programmable logic controllers
- 4 mA to 20 mA smart transmitters

Precision Analog Microcontrollers

ADuC706x: Precision Analog Microcontroller with Unequaled Data Acquisition and Processing Performance

The ADuC706x family of ARM7™ microcontrollers, with best-in-class data conversion performance, is ideal for industrial systems engineers designing smart sensing, factory automation, and instrumentation equipment. The ADuC7060 and ADuC7061 incorporate two 24-bit Σ-Δ ADCs, and a host of analog peripherals with ARM7 core to create a solution for precision sensing applications. The integration of a 32-bit RISC MCU, flash memory, and high resolution data converters in a small footprint, combined with low power operation eliminates the complexity, cost, and performance degradation issues associated with discrete mixed-signal solutions.

Designed to support 4 mA to 20 mA loop-powered applications and precision instrumentation, the 24-bit Σ-Δ ADCs provide the resolution required by high performance industrial and instrumentation equipment, while keeping the noise low at just 60 nV. This performance combined with an ARM7 provides a single-chip solution that can handle all data acquisition, processing, and communications functions at the sensor node. In addition to the 5-channel, 24-bit Σ-Δ ADC with PGA, the ARM7 core with eight interrupt priority levels, the ADuC706x products integrate 32 kB flash memory and 4 kB SRAM, a 14-bit DAC, multiplexers, buffers, an auxiliary 8-channel, 24-bit ADC for cold junction compensation and interfacing to thermocouple applications, and SPI, UART, and I²C ports. Operating current is just 2.6 mA with all peripherals activated.



Features

- ARM7TDMI MCU core with vectored interrupt controller (VIC)
- Low operating current: 2.6 mA
- 4 kB SRAM, 32 kB Flash/EE
- 2 × 24-bit Σ-Δ ADC, 1 × 14-bit DAC
- Programmable gain amplifier (PGA)
- 5 mm × 5 mm, 32-lead LFCSP

Applications

- Industrial automation
- Process control
- 4 mA to 20 mA loop-powered smart sensors

Amplifiers

OP2177: Precision, Low Noise, Low Input Bias Current Operational Amplifiers

The OP1177/OP2177/OP4177 family of op amps features low offset voltage and drift, low input bias current, low noise, and low power consumption. Outputs are stable with capacitive loads of over 1000 pF with no external compensation. Supply current is less than 500 μA per amplifier at 30 V. Internal 500 Ω series resistors protect the inputs, allowing input signal levels several volts beyond either supply without phase reversal. The OPx177 family offers the widest specified temperature range, –40°C to +125°C, of any high precision amplifier in surface-mount packaging. The OP1177 (single) and OP2177 (dual) amplifiers are available in 8-lead surface-mount MSOP and 8-lead, narrow-body SOIC packages; the OP4177 (quad) is available in 14-lead TSSOP and 14-lead, narrow-body SOIC packages.

Features

- Bandwidth: –3 dB @ 1.3 MHz
- Slew rate: 700 mV/μs
- Offset voltage: 60 μV max
- Offset voltage drift: 0.7 μV/°C max
- Input bias current: 2 nA max
- Noise: 8 nV/√Hz
- CMRR, PSRR, and A_{VO} > 120 dB min
- Supply current: 400 μA/amp
- Dual supply operation: ±2.5 V to ±15 V
- Unity gain stable
- No phase reversal
- Inputs internally protected beyond supply voltage

Applications

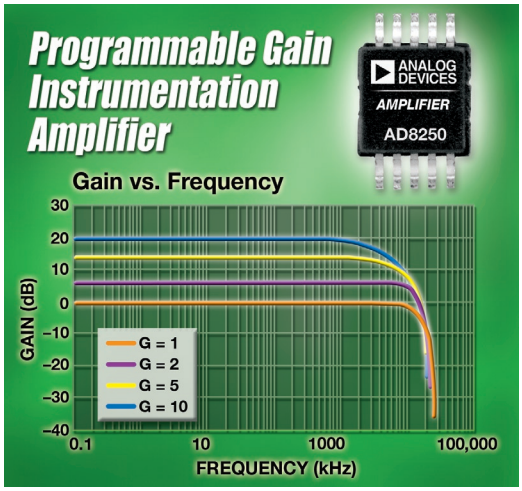
- Voltage and current level setting
- Precision diode power measurement
- Sensor signal conditioning
- Precision filters
- Line-powered and portable instrumentation

AD8253: Digitally Programmable Gain Instrumentation Amplifier (PGIA) Improves Performance and Simplifies Design

The AD8250/AD8251/AD8253 PGIA family offers a monolithic solution, combining precision dc performance and high speed capabilities for data acquisition systems requiring fast, accurate measurement with robust signal conditioning over large voltage ranges. Design and manufacturing are simplified and performance of the instrumentation is boosted by maintaining a tight match of internal resistors and amplifiers.

The AD8253 programmable gain settings allows users to adjust gain even after the devices are designed into the system. Operating from ±5 V to ±15 V, it achieves 10 MHz bandwidth and 700 ns settling time to 0.01%. The AD8253 offers dc precision and ac bandwidth unmatched by other in-amps or discrete solutions on the market. Manufactured using Analog Devices' *i*CMOS (industrial CMOS) process technology, the AD8253 draws just 4 mA of quiescent current.

The AD8250 and AD8251 are instrumentation amplifiers with digitally programmable gains that have GΩ input impedance, low output noise, and low distortion making them suitable for interfacing with sensors and driving high sample rate analog-to-digital converters (ADCs). They have a high bandwidth of 10 MHz, a low THD of –110 dB, and a fast settling time of 615 ns (maximum, G = 1) to 0.001%. Offset drift and gain drift are guaranteed to 1.7 μV/°C and 10 ppm/°C, respectively, for G = 10. In addition to their wide input common voltage range, they boast a high common-mode rejection of 80 dB at G = 1 from dc to 50 kHz.



Features

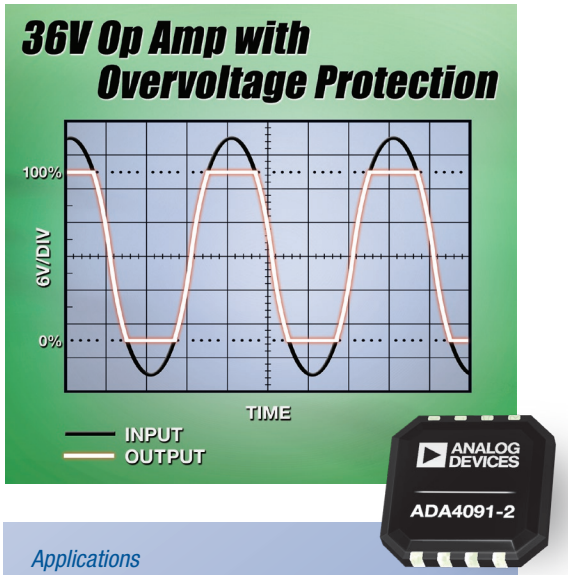
- AD8250: programmable gains of 1, 2, 5, and 10
- AD8251: programmable gains of 1, 2, 4, and 8
- AD8253: programmable gains of 1, 10, 100, and 1000
- Temperature range: –40°C to +85°C
- 10-lead MSOP
- Supply: ±5 V to ±15 V

Applications

- Data acquisition
- Programmable logic controllers

Amplifiers

ADA4091-2: 36 V Micropower R-R I/O Op Amp with Overvoltage Protection (OVP)



Sensor input amplifiers in systems such as PLCs are often subjected to transient or fault voltages that may exceed the supply voltage of the amplifier and can damage the amplifier and/or other circuitry or may cause spurious output conditions that could cause system lockup or damage. The ADA4091-2 integrates circuitry that protects the amplifier from damage and prevents phase inversion errors. Amplifier performance is fully specified, including the protection circuits, eliminating the need to account for the effect of errors from external components on system performance.

External protection devices are reduced, saving system cost and reducing PCB space requirements. The low power and small form factor make the ADA4091-2 ideal for both multichannel systems and space-constrained applications. Low offset, low offset drift, and wide GBW allow accurate signal conditioning of a wide variety of sensor inputs. It is available in 8-lead LFCSP and 8-lead SOIC.

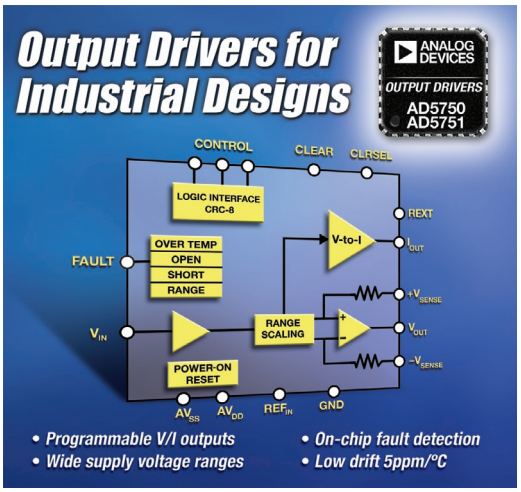
Features

- Overvoltage protection
  - 12 V above/below the supply rails @ ±15 V
  - 25 V above/below the supply rails @ ±5 V
- Power supply: 3 V to 36 V (single); ±1.5 V to ±18 V (dual)
- Supply current: 350 µA/amp max
- Bandwidth: 1.5 MHz
- Slew rate: 0.5 V/µs
- Offset voltage: 500 µV or better max
- No phase reversal

Applications

- Industrial process control inputs (PLC, DCS)
- Battery-powered instrumentation
- Power supply control and protection
- Remote sensor output conditioning
- High-side current monitors

AD5750: Industry's Most Accurate Voltage/Current Output Driver for Industrial Control Systems



The AD5750 and AD5751 are single-channel, high performance, voltage/current output drivers with hardware- or software-programmable output ranges. The AD5750 operates from industry-standard ±12 V to ±24 V supplies and delivers 5 ppm/°C output drift, 0.01% linearity, and 0.1% TUE (total unadjusted error). The output configuration is software-selectable from options of 5 V, 10 V, ±5 V, and ±10 V in voltage mode; and 4 mA to 20 mA, 0 mA to 20 mA, 0 mA to 24 mA, ±20 mA, and ±24 mA in current mode. All output spans include an additional overrange setting.

Analog outputs are short- and open-circuit protected and can drive capacitive loads of 1 µF and inductive loads of 0.1 H. The flexible serial interface is SPI compatible and features an optional PEC error checking feature using CRC-8 error checking. The device also includes an asynchronous CLEAR pin that sets the outputs to zero-scale/midscale in voltage mode or the low end of the selected current range in current mode. The AD5751 operates with single supplies of 12 V to 60 V, and features unipolar voltage and current mode output configurations. Both devices are specified over the –40°C to +105°C extended industrial temperature range and are housed in a 5 mm × 5 mm LFCSP package. Chip fabrication is on ADI's *i*CMOS process technology.

Features

- Software-programmable universal V/I outputs
- On-chip diagnostics
- 0.1% TUE
- 5 ppm/°C output drift
- Asynchronous output control
- 5 mm × 5 mm LFCSP

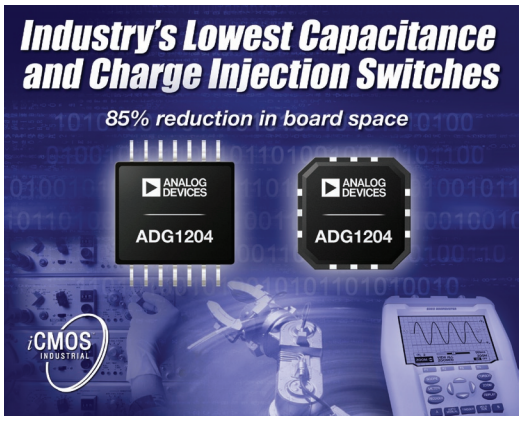
Applications

- PLC/DCS systems
- Actuator control
- Data acquisition systems

Switches and Multiplexers

ADG1204: Low Capacitance, Low Leakage 4:1 Mux

Analog Devices offers a broad portfolio of robust ±15 V switches and multiplexers for industrial applications where system reliability is critical. Leveraging the patented *i*CMOS manufacturing process technology, ADI's array of switches and multiplexers offers industry-leading performance in very small form factors to enable board area space savings. The ADG1204 is a 4:1 multiplexer offering groundbreaking low capacitance and charge injection. As well as having low charge injection, the ADG1204 also has very stable charge injection over the full signal range and offers a quantum leap improvement for makers of measurement and data acquisition equipment for which minimum glitch and fast settling times are critical. The ADG1204 also offers excellent leakage performance and is available in tiny space-saving 3 mm × 3 mm LFCSP packages, in addition to standard TSSOP packages, enabling superior performance with up to 85% board area savings. The ADG1408 is a ±15 V, 12 V, ±5 V 8:1 multiplexer offering industry-best low on resistance (max 5 Ω) and excellent on-resistance flatness, making it an ideal solution in applications where low distortion is essential, such as gain switching networks, relay replacement, and data acquisition. The ADG1408 is available in TSSOP and 4 mm × 4 mm LFCSP packages, enabling up to a 75% board area saving compared to industry-standard solutions.



Features

- 1.5 pF off source capacitance
- <1 pC charge injection
- <20 pA on leakage at 25°C
- Fully specified at ±15 V, 12 V, and ±5 V
- Rail-to-rail operation
- 14-lead TSSOP; 3 mm × 3 mm, 12-lead LFCSP

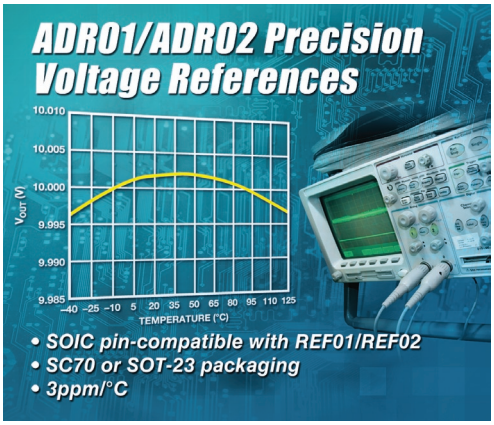
Applications

- Sample-and-hold systems
- Automatic test equipment
- Data acquisition systems

References

ADR0x: Precision Voltage References in Small Packages

ADI has a large portfolio of precision references capable of providing the accurate output voltage required by data converters in industrial control. Whether your application requires ultralow noise, micropower with low drift, or high precision in tiny packages, ADI has a voltage reference to meet your needs. For example, the ADR0x family delivers 0.1% initial accuracy with tempco as low as 9 ppm/°C maximum for devices in SC70 or TSOT packages.



Features

- High ±0.1% accuracy
- Superb tempco performance
  - SOIC version: 3 ppm/°C
  - TSOT and SC70: 9 ppm/°C
- ADR01/ADR02/ADR03 SOIC version is pin-for-pin compatible to the industry standard REF01/REF02/REF03
- Input voltage up to 40 V
- Available in 10 V, 5.0 V, 3.0 V, and 2.5 V options
- –40°C to +125°C operation
- 8-lead SOIC, 5-lead TSOT, and 5-lead SC70

Applications

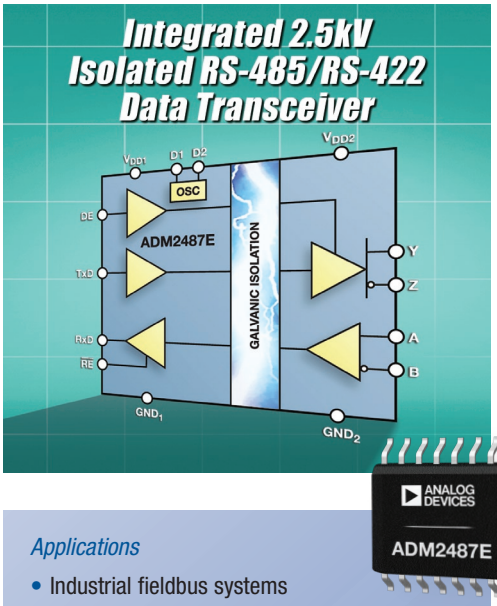
- Distributed control systems
- Programmable logic controllers
- 4 mA to 20 mA smart transmitters

Isolated Interface

ADM2487E/ADM2482E: 500 kbps/16 Mbps Signal Isolated RS-485 Transceivers with Integrated Transformer Driver

The ADM2487E/ADM2482E are ideal to meet the isolation requirements of RS-485 based physical layer industrial fieldbus networks, such as Modbus and BACnet. These products offer designers a higher level of integration than competitors' discrete solutions, resulting in saving on-board space and a significant improvement in required design time.

The ADM2487E/ADM2482E devices employ Analog Devices' *i*Coupler® technology to combine a 3-channel isolator, a three-state differential line driver, and a differential input receiver into a single package. An on-chip oscillator outputs a pair of square waveforms that drive an external transformer to provide isolated power with an external transformer.



Features

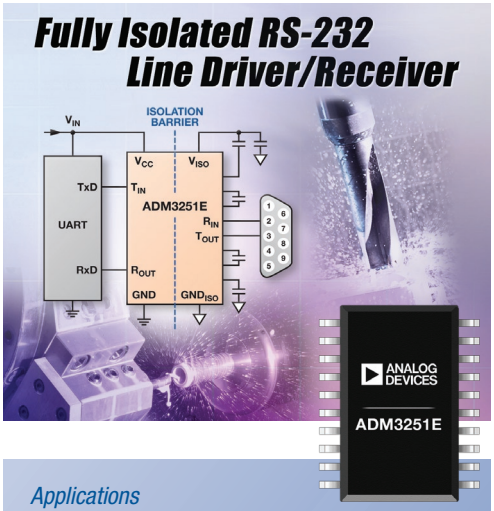
- 2.5 kV isolated RS-485/RS-422 transceiver, configurable as half or full duplex
- Integrated oscillator driver for external transformer
- ±15 kV ESD protection on RS-485 input/output pins
- 5 V or 3.3 V operation (VDD1)
- High common-mode transient immunity: >25 kV/μs

Applications

- Industrial fieldbus systems
- Suitable for Modbus/BACnet field networks
- Isolated RS-485/RS-422
- Distributed control systems
- Programmable logic controllers

ADM3251E: Fully Isolated (Power and Data) Single-Channel RS-232 Line Driver/Receiver

The ADM3251E is the industry's first fully isolated single-package surface-mount RS-232 transceiver with integrated power isolation. Featuring a very small form factor SMT (surface-mount technology) package, the ADM3251E transceiver integrates five discrete components, a rectifier, and a transformer into a single-chip solution that isolates both the data and power lines on chip. This highly integrated interface device provides a robust serial interconnect for managing data and power between the transmitter and receiver in harsh HVAC, industrial, and medical applications, while the SMT package reduces committed board space by 45% compared with traditional ICs and helps to accelerate the manufacturing process and lower system development costs.



Features

- 2.5 kV fully isolated (power and data) RS-232 transceiver
- Integrated *iso*Power® isolated dc-to-dc converter
- 460 kbps data rate
- 1 Tx and 1 Rx
- 0.1 μF charge pump capacitors
- ±15 kV ESD protection on R_{IN} and T_{OUT} pins
- High common-mode transient immunity: >25 kV/μs
- Operating temperature range: –40°C to +85°C
- Wide-body, 20-lead SOIC

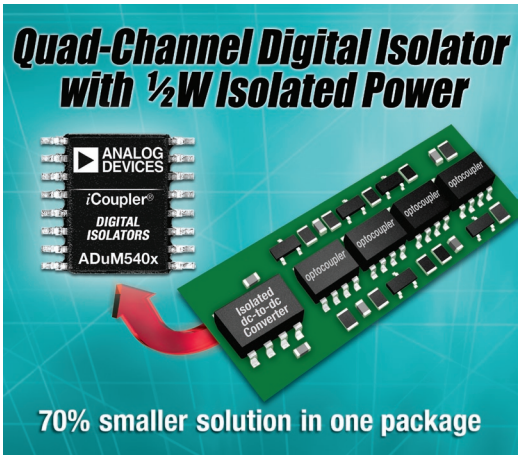
Applications

- High noise data communications
- Industrial communications
- Industrial/telecom diagnostic ports
- HVAC building control systems

Digital Isolation

ADuM540x: *i*Coupler Digital Isolation Products Deliver 500 mW Isolated Power

The *i*Coupler family of digital isolators are ideally suited for industrial controls and fit seamlessly into the signal chain with other Analog Devices products. Whether used in I/O modules or communication interfaces, *i*Coupler products can replace optocouplers and improve performance in less area and at lower cost. *i*Coupler isolators support data rates greater than 90 Mbps with propagation delays as low as 18 ns and are suitable for industrial field buses such as CAN and ProfiBus. With up to five channels in a single package, the small size of *i*Coupler isolators enables compact I/O module design. The ADuM540x is the second generation of products utilizing *iso*Power integrated, isolated dc-to-dc converters further reducing system size and cost by providing both isolated data and isolated power in a single package. *i*Coupler products come with UL, CSA, and VDE approvals. Available with isolation ratings up to 5 kV rms, the ADI portfolio of up to 100 digital isolation solutions meets industrial control needs.



Features

- 2 or 4 channels of digital isolation
- Multidirectional channel configurations
- Integrated, isolated power (ADuM540x)
- High data rate: dc to over 90 Mbps
- Low propagation delay: <18 ns
- Low power operation down to 0.7 mA/channel
- High temperature operation up to 125°C
- 3.3 V/5 V level translation
- 8-lead and 16-lead surface-mount SOIC
- UL, CSA, and VDE approvals

Applications

- Industrial field bus isolation
- Isolated RS-232/RS-422/RS-485 transceivers
- Isolated sensor interface
- Programmable logic controllers
- Optocoupler replacement

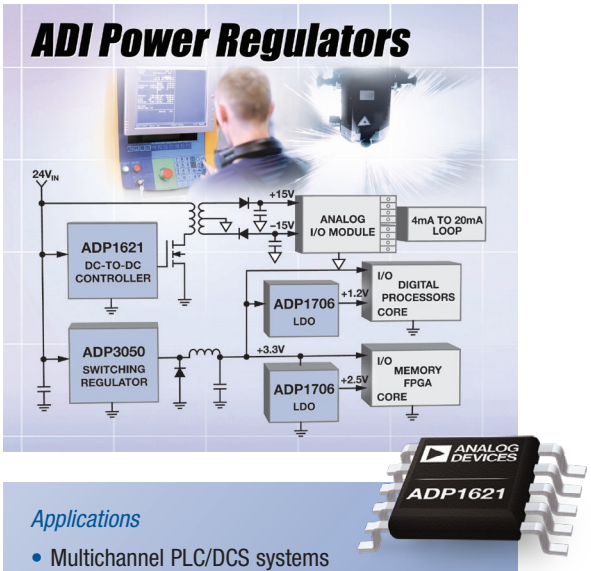
Power Management

ADP1621: Solving Power Distribution Problems in Industrial Equipment with ADI Power Regulators

Typical industrial control systems include a set of analog input/output modules that operate from ±15 V supplies and interface with industry-standard 4 mA to 20 mA control loops. Such power supplies are easily generated from the versatile synchronizable ADP1621 switching controller enabling ADC clock aperture synchronization to the quiet period of the switching frequency.

The control of the system is normally made up of a set of processors, memory, and FPGAs often powered from 3 V supplies with additional lower voltage inputs for core processor power. Generation of the 3.3 V rail is accomplished very efficiently with a switching regulator such as the ADP3050—minimizing external parts count. The local core voltage is easily generated from the low dropout ADP1706 linear regulator that provides stable operation with compact multilayer ceramic capacitors.

Analog Devices now makes it easier then ever to support system level design with magnetic components using ADIsimPower™ design tools that produce ready-to-go designs for linear regulators, switching controllers, and regulators. For more information, visit *www.analog.com/ADIsimPower*.



Features

- 92% efficiency (no sense resistor required)
- ±1.0% initial accuracy
- Wide IC supply voltage range
- Space saving MSOP

Applications

- Multichannel PLC/DCS systems
- Data acquisition systems
- Step-up/step-down dc-to-dc converters

Selection Tables

Converters

Part Number	Resolution (Bits)	Description
Analog-to-Digital Converters		
AD7328	13	Multichannel with bipolar input, 8-channel, 12-bit plus sign ADC
AD7366/AD7367	12, 14	True bipolar input, dual, 1 μs, 14-bit, 2-channel SAR ADC
AD7476A	12	12-bit, 1 MSPS, low power ADC in SC70 and MSOP packages
AD7262/AD7264	12, 14	1 MSPS, simultaneous sampling SAR ADC with PGA and 4 comparators
AD763x/AD761x	16, 18	Differential programmable input *i*CMOS PulSAR ADC
AD7190	24	4.8 kHz, ultralow noise, 24-bit Σ-Δ ADC with PGA
AD7792/AD7793/AD7794/AD7795	16, 24	3-/6-channel, 40 nV, 450 μA Σ-Δ ADC with on-chip in-amp and reference
AD7798/AD7799	16, 24	3-channel, 27 nV, 450 μA Σ-Δ ADC with on-chip in-amp
Digital-to-Analog Converters		
AD5420/AD5410	16, 12	Single channel, serial input, 4 mA to 20 mA current source DAC
AD5764R/AD5744R	16, 14	Quad, high accuracy, serial, bipolar V_{OUT} DAC
AD5754R/AD5734R/AD5724R	16, 14, 12	Quad, unipolar/bipolar, V_{OUT} DAC with software-programmable output
AD536x	16, 14	16-/8-channel, serial, bipolar, V_{OUT} DAC
AD5666/AD5664R	16	Quad, serial, unipolar DACs with on-chip reference (LDAC and CLR pins on AD5666)
AD506x	16	Single/multichannel, unipolar, high accuracy, serial input DAC

Switches and Multiplexers

Part Number	Configuration	Description
ADG1204/ADG1208/ADG1206/ADG1211	4:1/8:1/16:1, 4 × SPST	2 pF off capacitance and <1 pC Q_{INJ}, TSSOP and LFCSP packages
ADG1408/ADG1409/ADG1433	8:1/diff 4:1, 3 × SPST	5 Ω max R_{ON}, TSSOP and 4 mm × 4 mm LFCSP packages

Amplifiers

Part Number	Signal Chain Focus	Description
OP2177/AD8676/OP284/OP295	Highest accuracy front ends	Highest precision, low noise, 36 V amplifiers
AD8512/AD822/ADTL082/OP291/ADA4000-2	High impedance and higher BW front ends	Precision, low power JFET and bipolar 36 V amplifiers
AD8606/AD8656/AD8616/AD8652	ADC drivers	Precision, 2.7 V to 6 V, 10 MHz to 50 MHz op amps
AD8692/AD8646/AD8647/AD8666	Filter and utility amplifiers	Fast, low noise amplifiers with very high input impedance. 2.7 V to 6 V and 4 V to 16 V
AD8607/AD8667/OP296/OP2177	4 mA to 20 mA loop drivers	Low power precision amplifiers
AD8628/AD8638	Reference buffering	Low noise, zero drift amplifiers
AD8250/AD8251/AD8253	Front end	10 MHz, 20 V/μs programmable gain instrumentation amplifier
AD5750/AD5751	Output driver IC	Current/voltage output driver, programmable ranges

References

Part Number	Output Voltage Range (V)	Description
ADR360/ADR361/ADR363/ADR364/ADR365/ADR366	2.048 to 5	Micropower, low noise reference family with sink/source
ADR01/ADR02/ADR03/ADR06	3 to 10	Ultracompact precision reference family
ADR380/ADR381	2.048 to 2.5	2.048 V/2.5 V band gap voltage reference family

Isolation Products

Part Number	Configuration	Description
ADuM1100/ADuM1120x/ADuM1130x/ADuM1140x	Single, dual, triple, quad channel	Digital isolators, data rates to 100 Mbps, 2.5 kV rms isolation
ADuM540x	Quad channel, 500 mW	Quad channel isolators with integrated dc-to-dc converter

Isolated Interface

Part Number	Data Rate	Description
ADM2487E/ADM2482E	500 kbps/16 Mbps	500 kbps/16 Mbps signal isolated RS-485 transceivers with integrated transformer driver
ADM3251E	460 kbps	Integrated signal and power, isolated single channel RS-232 line driver/receiver

Microcontrollers

Part Number	MCU Core	Description
ADuC845/ADuC847/ADuC848	8051 core and flash	Dual, 24-/16-bit analog front end with PGA, PWM, and DAC
ADuC702x	ARM7 core and flash	Fast, 1 MSPS, multichannel, 12-bit SAR ADC; 12-bit DACs, up to 126 kB flash
ADuC706x	ARM7 core and flash	Combines dual 24-bit Σ-Δ ADCs, a 14-bit DAC, and ARM7 core

Switching Controller Devices

Part Number	Parameters	Description
ADP1621	Sync/CLK input	Buck/boost/inverter controller
ADP1864	2 A to 14 A	Compact nonsynchronous buck controller

Switching Regulator Devices

Part Number	Input Voltage Range (V)	Description
ADP3050	3 to 30	Internal switch, adjustable and fixed V_{OUT} options
ADP2107	2.7 to 5.5	Internal 2 A switch, 95% efficiency

Low Dropout Linear Regulators

Part Number	Input Voltage Range (V)	Description
ADP1706	2.5 to 5.5	1 A, multiple V_{OUT} options from 0.75 V to 3.3 V
ADP1720	4 to 28	50 mA, for standby power applications

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Printed in the U.S.A. BR07209-3-9/08

ANALOG DEVICES