Integrated Connections:
The Signal Chain Guide
The Signal Chain Guide

Your Avnet team is ready to support your signal chain design requirements. As you review the innovative products featured in this guide, you can rely on Avnet to support every step of your product development process. Connect on your next design – we have assembled a library of product information, development kits and reference designs to jump start your next signal chain design project.

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**ANALOG SIGNAL CHAIN**

What's Involved and What We Support:
The analog signal can be the input and/or the output interface to any design.

The analog input signal chain receives its analog signals from keyboards, pressure sensors, accelerometers, temperature sensors, microphones, voltages (i.e., batteries) and/or currents (i.e., a motor), etc... This input signal is then conditioned or filtered via an amplifier to remove any unwanted noise or to amplify the input signal from the sensor. The signal is then converted to the digital realm through an analog-to-digital (A/D) converter. FPGAs, DSPs, and microprocessors are now able understand the digital information supplied by the A/D converter.
The opposite function is performed in the analog output signal chain. The digital signal from an FPGA, DSP or microprocessor is converted to an analog signal by either a digital-to-analog (D/A) converter or from an on-chip D/A on the microprocessor/DSP. This input signal is then conditioned or filtered via an amplifier to remove any unwanted noise or to amplify the signal. The analog signal is then outputted to the analog world via a speaker, motor/fan, LED or a relay.
Sensors are used to convert light, audio, sound, acceleration, touch, CCD, magnetism, pressure, dust, humidity, current, fingerprints, GPS, IR (heat), proximity, rotation, smoke, tilt and ultrasonic frequencies to an analog signal.

OP Amps (amplifiers) or filters are used to clean up and amplify a signal from the sensor output. This is typically called signal conditioning.

Analog switches/multiplexers function as an electronic switch where there are multiple inputs and one output. A processor can be used to control the multiplexer, which selects the appropriate input signal that needs to be passed through to the output of the multiplexer.

A/D converters produce a digital output, which corresponds to the value of the analog signal applied to its input and compared with a reference voltage. A/D and D/A converters perform the opposite functions.

μP (microprocessor), μC (microcontroller), DSP, or FPGA devices process and analyze the digital data outputted from the A/D converter. They can also output digital data to the D/A converter.

Voltage references provide an extremely accurate output voltage that does not change as temperature changes. Most A/D and D/A converters use them to compare a voltage to their inputs because of their accuracy.

D/A converters produce a discrete analog output value (either AC or DC) corresponding to a digital input word relative to its reference voltage. A/D and D/A converters perform the opposite functions.

FETs, IGBTs and transistors are typically used as the final output stage in power applications (i.e., motor drive and high power audio).

Output devices commonly found in the analog signal chain are speakers for sound, motors, fans, LEDs and relays.

Interface devices enable efficient and reliable communication for industrial control, networking and computing applications.

Logic and Timing Devices: clock generators, buffers, dividers, multiplexers, crystal oscillators and jitter attenuators with frequency translation.

Wireless Connectivity: RF, Wi-Fi or other wireless connection to the CPU.
MARKETS SERVED

AUTOMOTIVE
Motion control, radio control, driver information systems, infotainment, airbag controller, aftermarket access & diagnostics.

COMMERCIAL
Security systems, energy management, portable instruments, advertising signs, temperature sensing & PCs.

CONSUMER
Domestic broadband gateway, web cam, home theater in a box, set-top boxes, DSL modems, mobile phones, PDAs, digital cameras, HDTV & precision audio.

INDUSTRIAL
Measurement & control, robots, process control, instrumentation, automation, data acquisition, distributed power systems, servers, remote control & security cameras.

HEALTHCARE
Blood analyzers, portable instrumentation, ultrasound, X-ray MRI, CAT scanners, glucose meters, temperature meters & patient monitoring.
IDT is the world’s leading provider of silicon timing devices (clock ICs) and offers the industry’s broadest product portfolio of clock timing solutions. IDT’s industry-leading portfolio of timing devices consists of clock generators, buffers, dividers, multiplexers, crystal oscillators and jitter attenuators with frequency translation – many with programmable capabilities for maximum flexibility. Below customers will find highlights from the buffer, PCIe clock generator, and crystal oscillator families IDT offers. For help finding or selecting other IDT timing devices contact your local Avnet salesperson.

Intersil’s precision analog products are built on the latest technology; we offer a wide portfolio of general purpose analog building blocks targeted at precision signal chain design. With proven proprietary processes and package technologies, Intersil ships over one billion ICs per year with less than 1.2 DPPM. Our strong technology development and multi-sourcing strategy from multiple leading-edge semiconductor foundries and assembly/test partners ensures a steady product supply with reduced risk.

Microchip Technology’s broad portfolio of stand-alone analog and interface devices are engineered to meet today’s demanding design requirements addressing linear, mixed signal, power management, thermal and interface products. When combined with Microchip analog microcontrollers, this extensive portfolio can be used in many high performance design applications in the automotive, communications, consumer, computing and industrial control markets.
ULTRA-LOW-JITTER SINGLE-ENDED BUFFER FAMILY

IDT’s versatile family of single-ended clock buffers delivers best-in-class jitter performance in a compact package. With the support of multiple input formats including clipped sine wave, crystal and LVCMOS, this high performance single-ended clock buffer family expands IDT’s offerings in the industrial and automotive markets. Together with small form factor and low power consumption, these devices help customers meet today’s stringent requirements. The operating temperature range from -40º C to 105º C is ideal for extended temperature applications.

LVCMOS HIGH PERFORMANCE CLOCK BUFFERS – 1.8 V TO 3.3 V

Features:
- Very low pin-to-pin skew <50 ps
- <50 fs additive phase jitter
- fmax = 200 MHz
- Integrated serial termination for 50ohm channel
- Output/Input Freq Range 0-200 MHz
- Output Banks (all products) – 1
- Core/Output Voltage (all products): 1.8, 2.5, 3.3
- Output Skew (all products): 65

Products:
- 5PB1102: 1:2 LVCMOS clock buffer. Available in 8-pin DFN and TSSOP packages.
- 5PB1104: 1:4 LVCMOS clock buffer. Available in 8-pin DFN and TSSOP packages.
- 5PB1108: 1:8 LVCMOS clock buffer. Available in 16-pin QFN and TSSOP packages.
- 5PB1110: 1:10 LVCMOS clock buffer. Available in 12-pin QFN and TSSOP packages.
PCIEXPRESS® (PCIE) CLOCK GENERATORS

PCI Express® (PCIe®) is globally recognized as the general purpose I/O that unifies the component interconnect across many applications including desktop computing, servers, workstations, storage, networking, enterprise router, industrial test and control equipment, defense, aerospace, high-end consumer, and many more. IDT provides an extensive product portfolio that tackles design requirements needed to build an entire PCI Express network, including timing solutions, switches, signal integrity and bridges.

Features:
- PCIe Gen1, Gen2, Gen3, and Gen4
- LP–HCSL Differential Output Signaling
- Reference Output
- Spread Spectrum

Products:
- 9FGL02: 2-output 3.3V PCIe Clock Generator, SRIS-compliant, supports PCIe SRnS clocking. Available in 24-pin VFQFPN package.
- 9FGL04: 4-output 3.3V PCIe Clock Generator, SRIS-compliant, supports SRnS clocking. Available in 32-pin VFQFPN package.
- 9FGU0241: 2-output 1.5V PCIe Gen 1–2–3 Clock Generator with Zo=100Ω. The device has 2 output enables for clock management, 2 different spread spectrum levels in addition to spread off. Available in 24-pin VFQFPN package.
- 9FGU0441: 4-output 1.5V PCIe Gen 1–2–3 Clock Generator with Zo=100Ω. The device has 4 output enables for clock management, 2 different spread spectrum levels in addition to spread off. Available in 32-pin VFQFPN package.
- 9FGV0241: 2-output 1.8V PCIe Gen 1–2–3 Clock Generator with Zo=100Ω. The device has 2 output enables for clock management and supports 2 different spread spectrum levels in addition to spread off. Available in 24-pin VFQFPN package.
- 9FGV0441: 4-output 1.8V PCIe Gen 1–2–3 Clock Generator with Zo=100Ω. The device has 4 output enables for clock management and supports 2 different spread spectrum levels in addition to spread off. Available in 32-pin VFQFPN package.

XU – XL CRYSTAL OSCILLATORS

IDT’s crystal oscillators offer designers a flexible, reliable and economical timing solution. They are available in any frequency from 16 kHz to 1.5 GHz. IDT’s XU line features a typical jitter value of 300 fs RMS with a maximum value of 400 fs. The XL line offers an economical solution for less stringent applications with 3.2 mm x 2.5 mm, 5.0mm x 3.2 mm, and 7.0 mm x 5.0 mm packages. Check with your Avnet sales team for detailed specifications at all common frequencies.

Products:
- XLH: <1ps RMS Phase Jitter, HCMOS, 5.0 x 3.2mm Crystal Oscillators
- XUL: <400fs RMS Phase Jitter, LVDS Output Crystal Oscillators
- XUN: <400 fs RMS Phase Jitter, HCSL Output Crystal Oscillators
- XUP: <400 fs RMS Phase Jitter, LVPECL Output Crystal Oscillators
Intersil offers industry-leading devices to enable efficient and reliable communication for industrial control, networking and computing applications. Dual protocol transceivers, I2C Buffers, wide operating voltage range RS-232 transceivers and RS-485/422 devices with high noise immunity and ESD protection in small packages are available to support high-speed data transfer and a variety of configurations to fit your application.

±60V OVP, ±20V CMR, 3.3V–5V TRANSCEIVER FAMILY

<table>
<thead>
<tr>
<th>Device</th>
<th>Speed (Mbps)</th>
<th>Duplex</th>
<th>Slew Rate Limited</th>
<th>Enable Pins</th>
<th>Cable Invert</th>
<th>Low Power SHDN</th>
<th>Packages</th>
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<tbody>
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<td>SOIC-8</td>
</tr>
</tbody>
</table>

Features:
- Fault protected RS-485 bus pins: up to ±60V
- Extended common-mode range: ±20V, larger than required for RS-485
- ±15kV HBM ESD protection on RS-485 bus pins
- Wide supply range: 3V to 5.5V
- Cable invert pin (ISL32457E and ISL32459E only) corrects for reversed cable connections while maintaining Rx full fail-safe functionality
- 1/4 unit load for up to 128 devices on the bus
- High transient overvoltage tolerance: ±80V
- Full fail-safe (open, short, terminated) RS-485 receivers
RS-485/RS-422 FASTEST, MOST RELIABLE & SMALLEST TRANSCEIVERS

DIGITAL POWER MONITORS

Intersil's ISL2802x digital power monitor (DPM) family delivers high accuracy measurements in a wide input common mode voltage range (0V to 60V), providing designers with the high level of safety margin that is often necessary in wired, wireless and data infrastructure applications.

- The ISL28022 is a bidirectional high-side and low-side digital current sense and voltage monitor with serial interface.
- The ISL28023 is a precision DPM that integrates the analog comparators, a voltage regulator, a DAC and a low voltage auxiliary channel in a single chip.
- The ISL28025 is a high precision DPM with integrated analog comparators and an integrated voltage regulator.

PRECISION INSTRUMENTATION AMPLIFIERS (PROGRAMMABLE)

The ISL2853x and ISL2863x family of ultra-high precision instrumentation amplifiers (in-amps) feature zero-drift circuitry that provides auto offset voltage correction and noise reduction, delivering very low offset voltage drift of nV/°C and a low 1/F noise frequency corner down in the tens of mHz range. These in-amps integrate precision matched resistors for the front gain stage and the differential second stage, providing very high gain accuracy and excellent CMRR.

- Zero-drift instrumentation amplifier
- 9 pin selectable gain options: Av = 1 to 1,000
- Rail-to-rail input/output
- Single-ended output (ISL28533, ISL28534, ISL28535)
- Differential output (ISL28633, ISL28634, ISL28635)
- RFI filtered inputs improve EMI rejection
Microchip Technology’s broad portfolio of stand-alone analog and interface devices are engineered to meet today’s demanding design requirements addressing linear, mixed signal, power management, thermal and interface products. When combined with Microchip analog microcontrollers, this extensive portfolio can be used in many high performance design applications in the automotive, communications, consumer, computing and industrial control markets.

**DIGITAL TO ANALOG CONVERTERS (DACs)**

Microchip offers low power Digital to Analog converter (DAC) products in 8- to 12-bit resolution, 1 to 4 channels, I2C or SPI interface and onboard EEPROM. The unique integrated non-volatile memory option allows DAC’s configuration to be saved at power down and can help reducing micro-controller overhead as well as simplify design. Small form factor options as SOT-23 and DFN (2X2) packages are available.

**Products:**
- **MCP47FEB22:** Dual Channel, 12-Bit voltage output DAC w/EEPROM with I2C
- **MCP4728:** Quad Channel, 12-Bit voltage output DAC with I2C

**ANALOG TO DIGITAL CONVERTERS (ADCS)**

Microchip’s A/D converters are available in a wide range of speeds and resolutions, delivering high accuracy and low power per given sampling speed.

**Products:**

**PIPELINED A/D CONVERTERS**

Pipelined Analog-to-Digital Converters offer 12–16-bit resolution and up to 8 Channels with sampling speeds up to 200 Msps. They exhibit very low power operation of less than 500 mW when operating at full speed. These products feature high integration of digital signal processing such as decimation filters and digital down-conversion that simplify system designs.

**DELTA–SIGMA A/D CONVERTERS**

Delta-Sigma ADC families offer 16 to 22-bits of resolution with sampling rates from 4sps to 240sps. Product features include low power operation, low output noise and choices of I2C and SPI interfaces. High integration, including on-board voltage references and PGAs, and small packaging, such as SOT–23 and DFN, allow for high density solution.

**SAR A/D CONVERTERS**

SAR (Successive Approximation Register) ADC offering provides a broad selection for low power applications. These devices operate with an active conversion current as low as 175 µA. The MCP30XX, MCP32XX, and MCP33XX families offer resolutions of 10–13 bits, sampling speeds of 22 ksp to 200 ksp, multiple channel inputs, and I2C or SPI interfaces.
AMPLIFIERS
Microchip offers a broad portfolio of linear solutions featuring Operational Amplifiers (Op Amp), Instrumentation Amplifiers (INA), Comparators, Programmable Gain Amplifiers (PGAs), and DC Power/Current Sensing.

Maximize the performance of your design by using the industry’s lowest power with best in class offset voltages! Combine these performance benefits with small packaging optimizes system performance in a wide variety of applications for the Consumer, Industrial, Medical and Automotive applications.

Products:
- **MCP6S2x**: programmable Gain Amplifier offer 1, 2, 6 or 8 input channels respectively and eight steps of gain. These devices are programmable over an SPI bus and thus add gain control and input channel selection to the embedded control system.
- **MCP6N16**: zero-drift instrumentation amplifier designed for single-supply operation with rail-to-rail input (no common mode crossover distortion) and output performance.
- **MCP6N11**: single instrumentation amplifier is optimized for single-supply operation with rail-to-rail input and output performance w/calibration.
- **MCP6V27**: operational amplifiers has input offset voltage correction for very low offset and offset drift. These devices have a wide bandwidth product and strongly reject switching noise.

TEMPERATURE SENSORS
Microchip thermal sensors are tailored to a variety of desired tasks. Analog temperature sensors output voltage and interface well with ADCs. Digital temperature sensors, both local and remote, are I2C or SPI compatible. Temperature switches result in on/off logic control.

Products:
- **MCP9600**: fully integrated thermocouple Electromotive Force (EMF) to degree Celsius converter, with integrated Cold-Junction compensation. The MCP9600 supports 8 thermocouple types (K, J, T, N, S, E, B and R).

CURRENT SENSORS
Microchip’s power monitoring ICs measure power, voltage and current, while providing the calculated power over an I2C interface. These I2C power monitors are based on the traditional high-side current sensor. The current monitors can measure voltage rails from 0V to 40V. Several of the devices also come with temperature sensors for where we see high power we need thermal management.

Products:
- **PAC1921**: power-monitoring device with a configurable analog output that can present power, current or voltage. Integration periods of 500 µs to 2.9 seconds, analog output range of 3V, 2V, 1.5V, or 1.0V.
VOLTAGE REFERENCE
Microchip voltage reference devices produce a fixed (constant) voltage irrespective of the loading on the device, power supply variations, temperature changes and the passage of time. Voltage references are used in/with power supplies, analog-to-digital converters, digital-to-analog converters and other measurement and control systems. Voltage references vary widely in performance; a regulator for a computer power supply may only hold its value to within a few percent of the nominal value, whereas laboratory voltage standards have precisions and stability measured in parts per million.

Products:
- **MCP1501**: high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. This low-drift bandgap-based reference uses chopper-based amplifiers which significantly reduces the drift and provides high current output.
- **MCP1541**: low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system. This voltage reference is normally used in the 3V to 5V systems, where there may be wide variations in supply voltage and a need to minimize power dissipation.

DIGITAL POTENTIOMETERS
Microchip offers a wide variety of digital potentiometer (digipot) devices that service a broad range of applications, including but not limited to system calibration, gain and offset trimming, set-points, etc. These low-power, compact devices feature 6 to 8 bits of resolution, 1 to 4 channel counts and are available in both volatile and non-volatile memory types. Tiny packages such as SC-70 and DFN (2x3) are offered for space constraint systems. High voltage digipot devices that can support +/-18V dual voltage operation or 10V to 36V single voltage operation are also available.

Products:
- **MCP41HV51**: single-channel, high voltage digital potentiometer (Digipot) family that supports 10V ~36V or +/-5V to +/-18V power rails.
- **MCP4261**: non-volatile, 8-bit (257 wiper steps) digital potentiometers with EEPROM and an SPI compatible interface. The MCP41/42XX family is available with end-to-end resistor values of 5KΩ, 10KΩ, 50kΩ and 100KΩ.
- **MCP4561**: single channel, non-volatile, 8-bit (257 wiper steps) digital potentiometers with EEPROM and an I2C compatible interface.
To complement its market-leading timing products portfolio, IDT offers development tools and reference designs used for next-generation development in areas such as 4G infrastructure, network communications, industrial automation, test and measurement, cloud datacenters and power management.

CLOCK TREE DESIGN SERVICE – COMPLIMENTARY DESIGN AND REVIEW SERVICES

Clock tree design can be a complex task with many considerations that are often overwhelming to designers unfamiliar with clock trees and the associated “language” of timing. While clock tree tools and wizards sometimes exist to assist with simple clock tree designs, these often fall short in real-world applications; automated tools simply can’t address many of the complexities of advanced requirements like phase jitter and spread spectrum.

As the market leader in silicon timing, IDT is the only “one-stop-shop” for timing solutions, offering expertise and products from full-featured system solutions to simple clock building-block devices. Their in-house experts can assist in building a new clock tree from the ground up or evaluating and improving an existing clock tree design.

REFERENCE DESIGNS

Many IDT products are designed to uniquely complement semiconductor partners in their target markets and all IDT products are designed to help customers and partners achieve design success. Here’s a representative sample of IDT reference design solutions with various partners along with IDT industry-leading complementary silicon for customer designs in the application areas shown below.

- FPGAs: IDT products reference clocks for Altera and Xilinx FPGAs
- Handheld / Mobile: Timing products for NXP i.MX and IDT Atomic* Clocks
- Server and Client-side Computing: Clock selector guides for AMD and Intel
- Switches and PHYs: IDT Broadcom reference designs
- System-on-Chip (SoC) and Embedded: Timing solutions for Cavium processor designs and IDT Atomic* Clocks and timing solutions for NXP Processors
- Guides: Wireless infrastructure for RapidIO® and IDT Scheme-it online schematic and block diagramming tool

DOCUMENTATION & DOWNLOADS

IDT has an extensive database of product documentation and downloadable tools including: application notes, package/pinout documents, schematics, simulation models, software, white papers and the IDT Knowledge Base Q&A library.
Intersil’s Reference Design Library contains reference designs, eval boards and demo boards for multiple applications. Reference designs provide supporting technical documentation that includes a user guide, circuit schematic, printed circuit board (PCB) layout, bill-of-materials (BOM) and Gerber files.

**ISL2802XEVKIT1Z DIGITAL POWER MONITOR EVALUATION KITS**

Intersil’s ISL2802x digital power monitor family delivers high accuracy measurements in a wide input common mode voltage range (0V to 60V), providing designers with a high level of safety margin that is often necessary in wired, wireless and data infrastructure applications.

**ISL28022EV1Z DIGITAL POWER MONITOR 8 SITE EVALUATION KIT**

The Digital Power Monitor (DPM) 8 site evaluation board demonstrates the functionality and performance of the ISL28022. By design, the ISL28022 is considered a digital helper for a variety of applications ranging from energy optimization to diagnostics of complex systems. The design of the DPM evaluation board is generic such that the customer can embed the monitor into their specific application.

The DPM Evaluation kit is accompanied by a graphical user interface (GUI) that allows the user to configure the ISL28022 for monitoring bus voltage and current in a specific application. The GUI has a data save feature allowing the transfer of measurement data to another software application for analysis.

The ISL28022EV12Z evaluation board has 8 sites/channels with one microcontroller that is responsible for the data transaction and configuration for each DPM. The ISL28022 is a slave to the microcontroller via a single I2C/SMBus interface. The ISL28022 has two address pins that allow for 16 individual DPMs to be connected on a single I2C bus. The evaluation board utilizes 8 of the available 16 addresses of the ISL28022.

**ISL2853XEV2Z, ISL2863XEV2Z – 5V, RAIL–RAIL I/O, ZERO-DRIFT, PROGRAMMABLE GAIN INSTRUMENTATION AMPLIFIERS EVALUATION BOARDS**

The ISL2853xEV2Z and ISL2863xEV2Z boards allow simple evaluation of the ISL2853x and ISL2863x 5V zero drift programmable gain instrumentation amplifiers. The boards are designed with all necessary components to easily connect the high performance amplifier to an external signal and can operate from a single supply of +2.5V to +5.5V or dual supply of ±1.25V to ±2.75V.
Microchip provides award-winning development tool solutions to fit multiple Analog applications. Support for your Signal Chain based designs begin with free tutorials and webinars, a full range of documentation, free software downloads and evaluations and 24/7 support center.

**MCP3421EV: SINGLE CHANNEL LOW-NOISE, HIGH ACCURACY 18BIT DEL-SIG A/D CONVERTER EVALUATION BOARD**

The MCP3421 SOT23–6 Evaluation Board (P/N MCP3421EV) contains a MCP3421 18-bit Delta-Sigma Analog-to-Digital Converter (ADC). The MCP3421 is an 18-bit single channel ADC device with various options including analog input connection pads and VDD, SDA and SCL test pads. Users can connect any sensor input signal to this evaluation board and test the ADC conversion results.

**MCP4728EV: QUAD–CHANNEL, 12–BIT, NON–VOLATILE DAC WITH EEPROM EVALUATION BOARD**

The MCP4728 Evaluation Board is a tool for quick and easy evaluation of the MCP4728 4-channel 12-bit DAC device with connection pins for the popular PICkit™ Serial Analyzer. Connect the Evaluation Board to the PICkit™ Serial Analyzer and type in the DAC input data into Graphical User Interface program. The PICkit™ Serial Analyzer will then send the user’s data to the DAC device automatically. The new DAC’s analog outputs will be available immediately at the DAC output pins.

**MCP42XXEV: DUAL–CHANNEL, 8–BIT, NON–VOLATILE DIGITAL POTENTIOMETER WITH EEPROM EVALUATION BOARD**

The MCP42XX Evaluation Board allows quick evaluation of MCP4261 Digital Potentiometer device. The board uses the TSSOP20EV Generic PCB and has been populated for the MCP4261. The 6-pin header (PICkit Serial) has been jumpered to allow the PICkit Serial to communicate with the device. Devices Supported: MCP4231, MCP4241, MCP4251, and MCP4261

**ADM00665: INTEGRATED THERMOCOUPLE ELECTROMOTIVE FORCE (EMF) TO CELSIUS EVALUATION BOARD**

This Evaluation Board is used to digitize the Thermocouple EMF voltage to degree Celsius with +/-1C accuracy. Users can easily evaluate all the device features using a Type K thermocouple. The device also supports Types J, T, N, E, B, S and R. Each of these types are evaluated by replacing the Type K Thermocouple connector with the corresponding connectors (not included). In addition, evaluation board connects to PC via USB interface. Temperature can be data-logged using Microchip Thermal Management Software Graphical User Interface (GUI).
ADM00640: SINGLE, 500 KHZ ZERO-DRIFT INSTRUMENTATION AMPLIFIER EVALUATION BOARD

This evaluation board is designed to provide an easy and flexible platform when evaluating the performance of the MCP6N16, a Zero-Drift instrumentation amplifier. The evaluation board is populated with the MCP6N16-100, which is optimized for gains of 100V/V or higher. If one of the other gain option models is desired, exchanging the DUT and adjusting the gain setting resistors can easily be accomplished with standard soldering tools.

ADM00615: TWO-CHANNEL TEMP SENSOR WITH RESISTANCE ERROR CORRECTION EVALUATION BOARD

This Temp Sensor Evaluation Board demonstrates all of the MCP9902 features, and allows a user to view and modify registers. A user may plot the temperature of the two temperature channels and set alert temperatures associated with those channels. LEDs indicating status information and test points are included to enable system voltages monitoring.

ADM00592: HIGH-SIDE CURRENT SENSOR WITH CONFIGURABLE ANALOG OUTPUT EVALUATION BOARD

The PAC1921 is a dedicated power monitoring device with a configurable analog output. This device is unique in that all power related information is available on the 2-wire/I2C© compatible interface and power, current or voltage is available on the analog output.

TMPSNSRD–RTD2: 22-BIT, DELTA-SIGMA A/D WITH 55 HZ REJECTION RTD TEMP SENSOR EVALUATION BOARD

The RTD Reference Design demonstrates the Resistive Temperature Detector (RTD) and accurately measures temperature. This solution uses the MCP3551 22-Bit Analog to Digital Converter (ADC) to measure voltage across the RTD. The ADC and the RTD are referenced using an onboard reference voltage and the ADC inputs are directly connected to the RTD terminals.

TMPSNS–RTD1:
SIX CHANNEL, PRECISION PGA RTD TEMP SENSOR EVALUATION BOARD

The PT100 RTD Evaluation Board demonstrates how to bias a Resistive Temperature Detector (RTD) and accurately measure temperature. Up to two RTDs can be connected. The RTDs are biased using constant current source and the output voltage is scaled using a difference amplifier. In addition to the difference amplifier, a multiple input channel Programmable Gain Amplifier (PGA) MCP6S26 is used to digitally switch between RTDs and increase the scale up to 32 times.

ARD00354: 500 KHZ SINGLE INA, AND 2 MHZ, SINGLE, ZERO DRIFT AMP WHEATSTONE BRIDGE EVALUATION BOARD

This board demonstrates the performance of Microchip’s MCP6N11 instrumentation amplifier (INA) and a traditional three op amp INA using Microchip’s MCP6V26 and MCP6V27 auto-zeroed op amps. The input signal comes from an RTD temperature sensor in a Wheatstone bridge. Real world interference is added to the bridge’s output, to provide realistic performance comparisons.
<table>
<thead>
<tr>
<th>SUPPLIER</th>
<th>AMPLIFIERS</th>
<th>ANALOG SWITCH MULTIPLIERS</th>
<th>DATA CONVERSION</th>
<th>DISCRETES</th>
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Signal Chain Products

AMPLIFIERS
- Analog Divider & Multiplier
- Audio Amplifier
- Comparator
- OP Amp
- SP Amplifier
- Sample and Hold
- Video Amplifier

ANALOG SWITCH MULTIPLEXERS

DATA CONVERSION SUB
- ADC
- DAC
- Data Acquisition System
- Digital Potentiometer
- V2F and F2V

DISCRETES
- Bipolar Transistor
- Diode
- IGBT Chip
- IGBT Module
- Thyristor
- Transistor

INTERFACE SUB
- IR Remote Receiver
- IrDA Transceiver
- LVDS
- Termination ICs

LOGIC AND TIMING SUB
- Bus Exchange Switch
- Bus Switch
- Controlled Oscillators
- Crystals
- Delay Line
- Digital Synthesizers
- Logic ICs
- Oscillators
- Real Time Clock
- SMD Crystal Oscillators
- TH Crystal Oscillators
- Universal Bus Exchange

POWER MANAGEMENT
- Battery Management
- Charge Pump
- Current Limit Switch
- DC to DC Controller
- DC to DC Converter
- Feedback Signal Generator
- Hot Swap Controller
- LED Driver ICs
- Linear Regulator
- Low Dropout Controller
- MOSFET and Power Drivers
- Motion Motor Control
- PWM Controllers
- Power Muxes
- Power Switch
- Supervisory Circuits
- USB Power Switch
- Voltage Reference
Signal Chain Services & Support

DESIGN CHAIN SERVICES®
Avnet offers engineers a host of services from any point in the design cycle from concept to architectural design to new product introduction and on through next generation modification or end-of-life. Avnet has the technical products, services and tools to accelerate design cycles — including ASIC and programmable logic engineering services, IP cores and more. With offerings that run the gamut from Web seminars to connector assembly, Avnet offers it all.

Assembly and Programming
- Commercial and military interconnect assembly
- Custom cable assembly
- Device programming
- Motor modification
- ElectroAir™ avionic components
- Power supply modification
- Thermal management

Design Tools
- Design Resource Center
- Development and evaluation kits
- Embedded OS solutions
- IP cores

Engineering Services
- ASIC design/FPGA design
- Systems design
- Design service partners

Technical Education
- SpeedWay Design Workshops™
- On-Ramp Technical Sessions™
- Seminars/Webinars

SUPPLY CHAIN SERVICES®
Avnet optimizes supply chains by providing end-to-end supply chain services to electronic original equipment manufacturers (EOEMs), Electronic Manufacturing Services (EMS) providers and electronic component manufacturers. By combining internal competencies of global warehousing and logistics, finance, information technology and asset management with objective, external industry-wide data, Avnet’s supply chain services allow customers to increase their overall business knowledge — enabling more informed decisions.

Component Intelligence
- Bill of material (BOM) analysis
- Inventory optimization services
- Green initiative programs

Supply Chain Assessment
- Discovery and logistical analysis
- Financial analysis
- Project implementation

Inventory Management Solutions
- Bonded inventory programs
- EDI Point-of-Use Replenishment Systems (POURS)
- Vendor-managed inventory
- In-plant stores
- New product introduction (NPI) program support
- Pipeline inventory from forecasts
- Inventory ownership programs