

Precision Analog Products

Precision Op Amps, Voltage References, Real Time Clocks,
Digital Potentiometers, Interface, Precision Instrumentation Amplifiers,
Digital Power Monitors, Multi-Cell Battery Management



Product Highlights
April 2017

intersil[™]
A Renesas Company



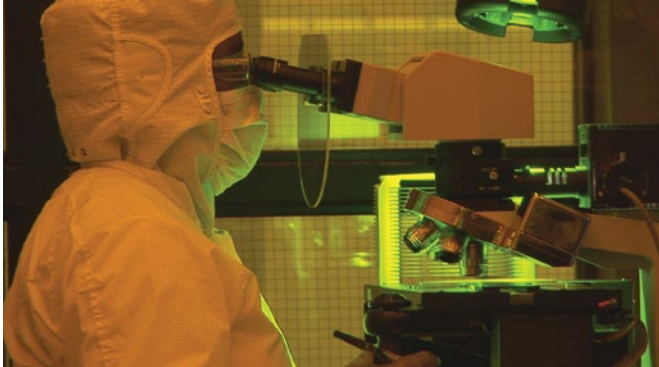
High-Performance Solutions for Precision Signal Chain Design

Our broad precision analog portfolio provides for a wide range of next-gen precision instrumentation, medical, communication and industrial process

control applications where innovation, reliability and dependability is central to the analog designs.



Why Intersil?



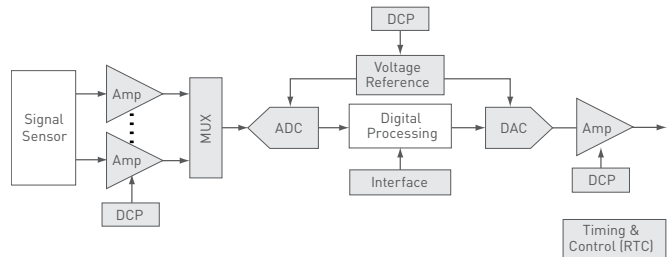
Reliable, Proven Supply Chain

Proven proprietary processes and package technologies, shipping over 1 billion ICs per year.

- **Strong technology development**
 - Proprietary process and package technologies
- **Multi-sourcing strategy**
 - Sourcing from multiple leading-edge semiconductor foundries & assembly/test partners ensures a steady product supply and reduced risk
- **Industry-leading quality & reliability metrics**
 - Billion+ ICs shipped every year
 - Less than 1.0 DPPM (defective parts per million) and improving
 - Decades of experience handling military/space products and delivering world-class quality and reliability metrics
 - ISO/TS16949 and AEC-Q100
 - MIL-PRF-38535 compliant and 100% burned in

Complete Signal Chain Solutions

Intersil 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.



Assured Product Supply

Long life cycles ensure a steady flow of product, which gives your design longevity. Intersil still supports products that have been in production for more than 40 years.



Industrial Precision Products

Intersil's High-Performance Integrated Analog Solutions

MULTI-CELL BATTERY MANAGEMENT (PAGE 6)

- Intersil's Li-ion battery pack monitoring, protection, and balancing IC
- Ideal for packs from 3 to 12 cells, ensures pack safety and long run time
- Built-in fault detection for open-wire, overvoltage, undervoltage, over-temperature, and cell mismatch. Meets stringent safety standards.
 - Example applications: power tools, generators, lawn mowers, vacuum cleaners, solar (charge, distribution), battery backup (UPS), military (handheld radios), e-bike/e-moto



DIGITAL POWER MONITORS (PAGE 14)

- Simple integrated solution with digital output (I²C) with alerts
- Measures voltage, current (high-side & low-side, bi-directional) and calculates power
 - Input common mode up to 60V
 - High accuracy (16-Bit ADC)
 - User defined alerts — OV, UV, OC
 - Additional features (margin DAC, voltage regulator, internal temp sensor, auxiliary channel)



Signal Path Products

Intersil's High-Performance Analog Standard Products

INTERFACE (PAGE 8) www.intersil.com/interface	CURRENT SENSE AMPS (PAGE 10) www.intersil.com/precisionanalog	
<ul style="list-style-type: none"> • RS-232 • RS-485/422 • Isolated RS-485 • I²C buffer • Dual protocol 	<p>Precision Current Sense Amplifiers—Discrete Solutions (page 10)</p> <ul style="list-style-type: none"> • Ultra low noise, low distortion op amps at 5V and 40V • 5V and 40V low drift, precision op amps <p>Precision Current Sense Amplifiers—Integrated Solutions (page 12)</p> <ul style="list-style-type: none"> • Micropower • High or low side uni-direction current sense <p>Digital Power Monitors (page 14)</p>	
VOLTAGE REFERENCES (PAGE 16) www.intersil.com/vref	REAL TIME CLOCKS (PAGE 18) www.intersil.com/timing-and-digital	DCPs (PAGE 20) www.intersil.com/DCPs-DCCs
<ul style="list-style-type: none"> • Excellent balance of power vs. performance • Among the industry's best temperature drift and accuracy performances • Industry's lowest power, low noise voltage reference offering 	<ul style="list-style-type: none"> • High accuracy (low drift) with low parts count • Power supervisory and backup management functions • 3-in-1 module — feature-rich RTC with onboard crystal and temperature compensation 	
SWITCHES / MULTIPLEXERS www.intersil.com/switchmux	DATA CONVERTERS www.intersil.com/converters	HIGH SPEED OP AMPS www.intersil.com//highspeedanalog
<ul style="list-style-type: none"> • Up to $\pm 20V$ supply • Low R_{ON} • Low capacitance • Low charge injection • Overvoltage protected 	<p>Precision Data Converters</p> <ul style="list-style-type: none"> • 24-Bit $\Delta\Sigma$ • 12-Bit SAR <p>High Speed Data Converters</p> <ul style="list-style-type: none"> • Comprehensive portfolio: 8- to 16-bits, 40 to 500MSPS 	
		<ul style="list-style-type: none"> • Rail-to-rail voltage feedback amplifiers • Current feedback amplifiers • Slew rate enhanced voltage feedback amplifiers • High performance voltage feedback amplifiers • Differential line drivers/receivers • Fixed gain op amps

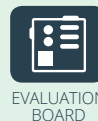
Multi-Cell Battery Management

ISL94202/03

Standalone Battery Protection System Accurately Monitors & Balances Rechargeable Battery Packs

The ISL94202/03 battery pack monitors enable ultra-small 2-terminal designs, and accurately monitors, protects and cell balances rechargeable battery packs to ensure safe operation and charging. These devices support Li-ion and other battery chemistries used in applications such as vacuum cleaners, lawn equipment, handheld power tools, e-bikes, scooters, toys, and energy storage systems.

- 8 cell voltage monitors support Li-ion CoO_2 , Li-ion Mn_2O_4 , and Li-ion FePO_4 battery chemistries
- Highest level of integration: cell voltage level shift, automatic cell balance, 14-bit ADC, current sense monitor, power FET control, and temperature sensor interface
- Multiple cell voltage protection options up to 4.8V
- Integrated charge/discharge FET drive circuitry with built-in charge pump supports high-side N-channel FETs



Multi-Cell Battery Management Comparison



Multi-Cell Battery Management and Balancing

ISL94212



3-8 Cell Li-Ion Battery Pack Manager

ISL94202/03



4-6 Cell Li-Ion Battery Management Analog Front End

ISL94208

# Series Cells	6 to 12 Cells	3 to 8 Cells	4 to 6 Cells
Communication Interface	SPI	I ² C	I ² C
Cell Balancing	External (Built-in FET Drivers)	External (Built-in FET Drivers)	Internal
Pack Voltage	Up to 63V per Device	6V to 36V	8V to 27V
Absolute Cell Voltage Measurement Accuracy	10mV max (0°C to 50°C)	15mV max (0°C to 60°C)	30mV max (-40°C to 85°C)
Int. Charge/Discharge FET Drive	No	Yes	Yes
Int. Current Sense/Detection	No	Yes (High-Side Measurement)	Yes (Low-Side Detection)
Int. Temp Sense	Yes	Yes	Yes
Supply Current	5mA Max	370µA Max	510µA Max
Shutdown Supply Current	1.2µA Typ	1µA Max	1µA Typ
Int. Voltage Regulator Output	3.3V	2.5V	3.3V
Int. Voltage Reference Output	2.5V	2.5V	3V
Temperature Range	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Special Features	*Daisy chain up to 14 devices (168 cells) *Robust hot plug performance *Provides diagnostic information *Fast scan rate of 20µs/cell	*Complete stand alone operation or with external µC *Provides diagnostic information *Robust hot plug performance *Fast scan rate of 10µs/Cell	*Analog voltage output *Robust hot plug performance *Provides diagnostic information
Package	64 Ld TQFP (12x12mm)	48 Ld TQFN (6x6mm)	32 Ld QFN (5x5mm)

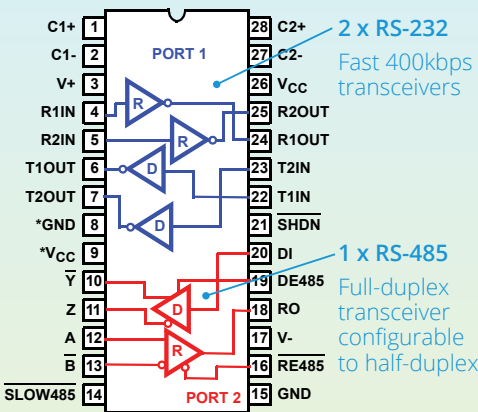
Interface

ISL3333xE/5xE

Two-Port, Dual Protocol Transceivers Allow Designers to Replace Two Chips with a Single Device

- Fixed-port devices
 - Simpler device that is more cost-effective
 - QFN package saves even more board space
- Support dual protocol
 - Two ports, one for RS-232 and one for RS-485
 - Selectable data rate for RS-485

FIXED DUAL PROTOCOL TRANSCEIVERS (ISL33334E)



Dual Protocol RS485/RS-232 (Fixed and Configurable)

Device	# of Ports	Port Assignmt.	V _{cc} (V)	DR (Mbps) RS-485	DR (kbps) RS-232	Package
ISL33334E/37E	2	Fixed	3.3	20, 0.115	400	28 Ld SSOP / 40 Ld QFN
ISL33354E/57E	2	Fixed	5	20, 0.115	460	28 Ld SSOP / 40 Ld QFN
ISL3330E/1E	1	Config.	3.3	20, 0.46, 0.115	400	20 Ld SSOP, 28 Ld SSOP, 40 Ld QFN
ISL3332E/3E	2	Config.	3.3	20, 0.46, 0.115	400	20 Ld SSOP, 28 Ld SSOP, 40 Ld QFN
ISL41334E	2	Config.	5	20, 0.46, 0.115	650	40 Ld QFN
ISL81334E	2	Config.	5	20, 0.46, 0.115	650	28 Ld SSOP, 28 Ld SOIC
ISL41387E	1	Config.	5	20, 0.46, 0.115	650	40 Ld QFN
ISL81387E	1	Config.	5	20, 0.46, 0.115	650	20 Ld SSOP, 20 Ld SOIC

ISL32704E

Industry's Smallest Isolated RS-485 Transceiver

The ISL32704E isolated RS-485 transceiver provides 4Mbps bidirectional data transmission for Industrial Internet of Things networks. The high-speed device delivers industry-leading EMI and common-mode transient immunity in a small 4mm x 5mm QSOP package that's 70% smaller than competing solutions.



16 Ld 4mm x 5mm QSOP Package



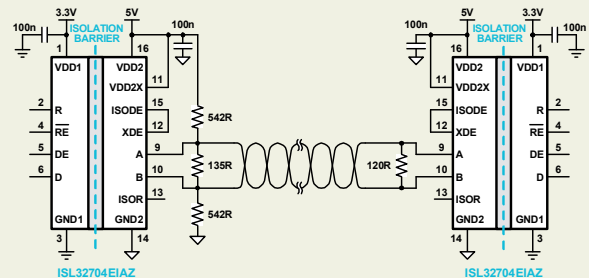
EVALUATION
BOARD



DESIGN
MODEL

- Galvanically isolated using giant magnetoresistance (GMR) technology
- 2.5kVRMS isolation; 600VRMS working voltage (50% higher than the closest competitor)
- Very low EMI, no board level shielding needed
- Supports 3V to 5V power supplies
- 50kV/μs (typ), 30kV/μs (min) CMTI for enhanced data integrity
- Single unit load allows up to 32 devices on the bus

GIANT MAGNETORESISTANCE (GMR) TECHNOLOGY TO PROVIDE GALVANIC ISOLATION



Galvanically Isolated RS-485 Transceiver

Device	Data Rate	Duplex	Isolation Rating	Working Voltage	V _{DD1}	V _{DD2}	I _{DD1}	I _{DD2}	Package
ISL32704E	4Mbps	Half	2.5kV	600Vrms	3V to 5.5V	4.5V to 5.5V	3 to 4mA	5mA	16 Ld QSOP, 16Ld WSOIC

Precision Current Sense Amplifiers—Discrete Solutions

Right Price and Performance

Intersil has a selection of discrete and integrated products that have a good price/performance combination—particularly for applications that need to reduce power loss in the sensing circuit by using an affordable low offset voltage amplifier.

LOW V_{OS} OP AMP IN THE SENSING CIRCUIT ALLOWS FOR A MUCH LOWER SENSE RESISTOR AND LESS WASTED POWER

Example – 20mA resolution, 5A full current

■ Generic solution:

$V_{OS} = 500\mu V \rightarrow 25m\Omega$ $R_{sense} \rightarrow 625mW$ R_{sense} power loss

■ ISL28X30 solution:

$V_{OS} = 40\mu V \rightarrow 2m\Omega$ $R_{sense} \rightarrow 50mW$ R_{sense} power loss

■ ISL28x34 solution:

$V_{OS} = 2.5\mu V \rightarrow 125\mu\Omega$ $R_{sense} \rightarrow 3mW$ R_{sense} power loss

92% reduction in wasted power!

99.5% reduction in wasted power!!

MOST COMMON DISCRETE SOLUTIONS

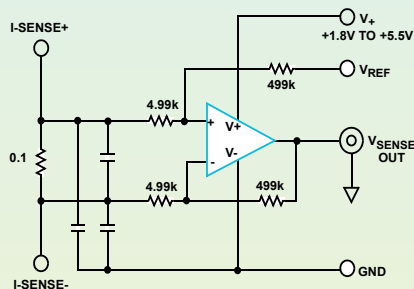
Device	V_{OS} Max @ 25°C (μV)	Notes
ISL28x9x	700	Low cost (low side)
ISL28x30	40	Good – still low cost
ISL28x33	6	Great
ISL28x34	2.5	World Class

ISL28x30

Micropower, Low Drift, RRIO Operational Amplifiers



- Ideal for low power high side or low side current sense applications
- 40 μV max offset voltage
- 1.8V to 5.5V supply voltage
- Low quiescent power consumption 20 μA (typ)



BI-DIRECTIONAL CURRENT SENSE AMPLIFIER

Precision Op Amps (Current Sensing Discrete Solutions)

ULTRA PRECISION

Low Voltage (5V)

Single	Dual	Quad
ISL28130	ISL28230	ISL28430

- Low Offset—40 μ V max
- Micro-Power—25 μ A max
- Low Drift—150nV/°C

ISL28133	ISL28233	ISL28433
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- Low Offset—6 μ V max
- Micro-Power—25 μ A max
- Low Drift—50nV/°C
- Chopper Stabilized

ISL28134		
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- Low Offset—2.5 μ V max
- Low Drift—15nV/°C max
- Low Noise—165nVpp (0.1 to 10Hz)
- Chopper Stabilized

High Voltage (40V)

Single	Dual	Quad
ISL28117B	ISL28217B	ISL28417B

- Low Offset—50 μ V max
- Low Power—0.53 μ A max

ISL28127	ISL28227	
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- Low Offset—70 μ V max
- Low Noise—2.5nV/√Hz

ISL28107	ISL28207	ISL28407
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- Low Offset—75 μ V max
- Low Power—290 μ A max

ISL28118	ISL28218	
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- Low Offset—230 μ V max
- Single Supply—RRO

ISL28110	ISL28210	
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- Low Offset—300 μ V max
- Low Ib—2pA max

ISL28108	ISL28208	ISL28408
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- Low Offset—230 μ V max
- Single Supply—RRO
- Low Power—250 μ A

ISL28177		
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- Low Offset—150 μ V
- Low Cost

LOW NOISE

Low Voltage (5V)

Single	Dual
ISL28190	ISL28290

- Low Noise—1nV/√Hz
- Low THD+N

ISL28191	ISL28291
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- Low Noise—1.7nV/√Hz
- Low THD+N

ISL28134	
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- Low Noise—165nVpp (0.1 to 10Hz)

High Voltage (40V)

Single	Dual
ISL28127	ISL28227

- Low Noise—2.5nV/√Hz
- Low Offset—70 μ V max

ISL28118	ISL28218
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- Low Noise—5.6nV/√Hz
- Low Offset—230 μ V max
- Single Supply—RRO

ISL28110	ISL28210
----------	----------

- Low Noise—6nV/√Hz
- Low Offset—300 μ V max
- Low Ib—2pA max

LOW POWER

Low Voltage (5V)

Single	Dual	Quad
ISL28194		

- Micro-Power—450nA max

ISL28130	ISL28230	ISL28430
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- Low Offset—40 μ V max
- Micro-Power—25 μ A max
- Low Drift—150nV/°C

ISL28133	ISL28233	ISL28433
----------	----------	----------

- Micro-Power—25 μ A max
- Low Offset—6 μ V max
- Low Drift—50nV/°C
- Chopper Stabilized

High Voltage (40V)

Single	Dual	Quad
ISL28108	ISL28208	ISL28408

- Low Offset—230 μ V max
- Low Power—250 μ V max

ISL28107	ISL28207	ISL28407
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- Low Offset—75 μ V max
- Low Power—290 μ A max

ISL28117B	ISL28217B	ISL28417B
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- Low Offset—50 μ V max
- Low Power—0.53 μ A max

LOW INPUT BIAS CURRENT

Low Voltage (5V)

Single	Dual	Quad
ISL28113	ISL28213	ISL28413

- Low Ib—20pA max

ISL28114	ISL28214	ISL28414
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- Low Ib—20pA max

ISL28158	ISL28258	
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- Low Ib—30pA max

High Voltage (40V)

Single	Dual	Quad
ISL28110	ISL28210	

- Low Noise—6nV/√Hz
- Low Offset—300 μ V max
- Low Ib—2pA max

ISL28107	ISL28207	ISL28407
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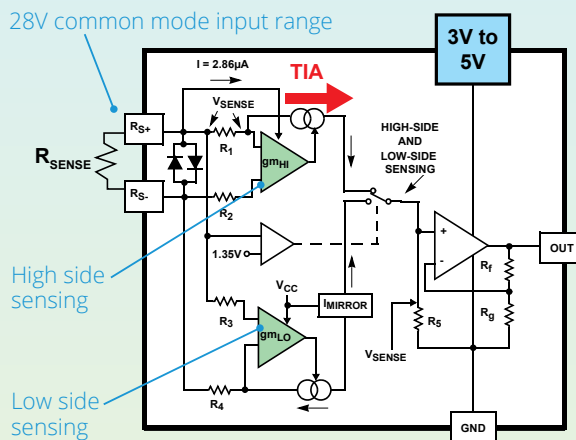
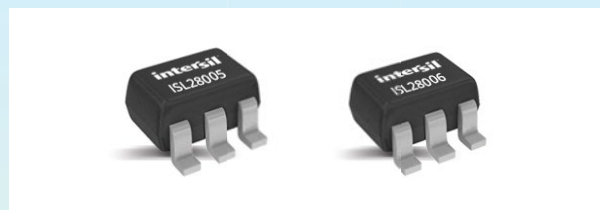
- Low Offset—75 μ V max
- Low Power—290 μ A max
- Low Ib—300pA max

Precision Current Sense Amplifiers—Integrated Solutions

ISL28005/6

Micropower, Current Sense Amplifier with Voltage Output

- High or low side uni-direction current sense
- Low power consumption, 50 μ A (typ)
- TIA Architecture:
 - Input sense voltage converted to current
 - Current fed into 5V TIA for ADC drive
 - Constant 100kHz BW across gain
- Internal fixed gain for high accuracy and low TCVs



Part Number	Supply Voltage Range	Input Common Mode Range	Vos Max @ 25°C	Vos Max Temp	CMRR min Temp	PSRR min Temp	Gain Range	Gain Accuracy @ 25°C	Gain Accuracy Temp	Is Max @ 25°C	Is Max Temp	Package
ISL28005	2.7 to 28	0 to 28	μ V	μ V	dB	dB	V/V	%	%	μ A	μ A	5 Ld SOT-23
ISL28006	2.7 to 28	0 to 28	250	300	105	90	20, 50, 100, Adj (20-100)	0.7	1	62	62	5 Ld SOT-23, 6 Ld SOT-23

Current Sensor Design Guide

ISL28005, ISL28006 Uni-directional Current Sense Amplifiers

INTRODUCTION

The ISL28005 and ISL28006 are ground-sensing current sense amplifiers that amplify milli-volt current signals developed across sub-1W sense resistors. The simplest type of current sense amplifiers use single stage op amp circuits that take their power from the same voltage source that generates the current to be measured. These are realized using an op amp and a handful of external components to condition the amplifier to requirements of the application. As long as the measured current signal remains within the common mode voltage range of the op amp, these circuits are simple.

Applications where the amplifier operates from a different power source than the load adds complexity, particularly when the measured current is at voltage levels much higher than the op amp supply voltage. In many cases an additional amplifier circuit is needed to perform the voltage translation to step-down the current sense signal to match the common mode input range of the current sense amplifier.

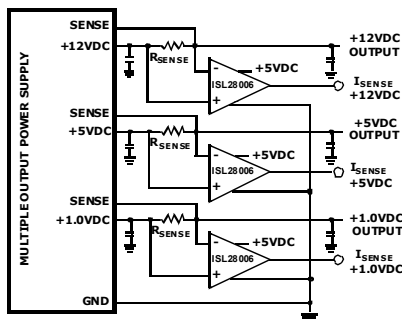


Figure 1. Typical Application Circuit

Current sensing in multi-output power supply systems (see Figure 1) is one application where one or more power supply output voltages must be measured using current sense amplifiers powered from a much lower supply voltage. The ISL2800x family of current sense amplifiers are ideal for these applications because they perform precise current sensing operating from supply voltages as low as 3.3V, while sensing from supply voltages as high as 28V. These current sense amplifiers are very simple, self-contained solutions requiring only an external current sense resistor. The space-saving SOT-23 package and low component count results in very small footprint.

THE ISL2800X PRODUCT FAMILY

Within the ISL2800x family are the ISL28005 sub-family of lower cost amplifiers for general sensing applications featuring measurement accuracies better than 4% and input offset voltages less than 500 μ V over the -40°C to +125°C temperature range. For greater precision, the ISL28006 sub-family offers gain accuracy and input offset voltages as low as 1% and 300 μ V over the full temperature range, depending on the device.

Within each family are pin-compatible fixed gain amplifiers in the 5 Ld SOT-23 package. The ISL2800x-20, ISL2800x-50 and ISL2800x-100 are single supply, uni-directional current sense amplifiers with fixed gains of 20V/V, 50V/V and 100V/V

respectively. In the ISL28006 family is an additional adjustable-gain version in a 6 Ld SOT-23.

GROUND-SENSING DIAGNOSTIC FEATURES

In addition to the ability to sense current from high input common mode “beyond the rail” voltages, these devices also sense currents at input voltages levels down to 0V, or ground. This ground-sensing feature adds a useful diagnostic capability to the current sensing function.

For example, during normal operation the high-side output current sense (see Figure 1) supplies common mode input voltage to the current sense amplifier equal to the supply voltage. However, in the presence of a power supply fault, (such as an output short circuit or loss of the measured output) the ground sensing feature can still measure current flow, even though the supply voltage is at 0V. In the case of an output short, the current sense will measure the abnormally high current, even though the voltage is at ground. The high current measurement capability at ground level gives the indication that a short circuit has occurred. In the case of a loss of output, a measured current near 0A and a measured voltage near 0V gives the indication that the measured supply has gone open circuit or has been disabled.

For more info, see Application Note 1567 on www.intersil.com.

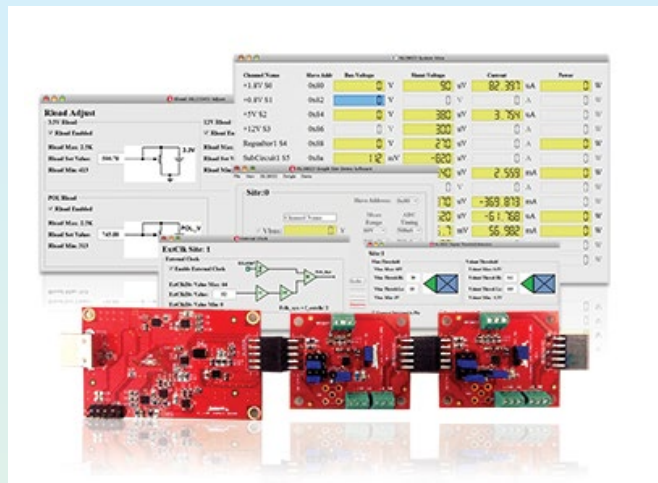
Digital Power Monitors

ISL28022/23/25

Highly Accurate Digital Current Sense and Voltage 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.



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iSIM



EVALUATION
BOARD



DESIGN
MODEL

Precision Digital Power Monitors Comparison



Basic
ISL28022



Full Featured
ISL28023



Tiny Package
ISL28025

Input Range	0 to 60V	Opt 1: 0 to 60V Opt 2: 0 to 16V	Opt 1: 0 to 60V Opt 2: 0 to 16V
Primary Channel	Yes	Yes	Yes
LV Aux Channel	-	Yes	Voltage Only
Internal Temp Sensor	-	Yes	Yes
External Temp Sensor	-	Yes	-
HV Internal Regulator (3.3V out)	-	Yes	Yes
Fast OC/OV/UV Alert Outputs	-	2	2
Margin DAC	-	Yes	-
Slave Addresses Available	16	55	55
User Select Conversion Mode / Sample Rate	Yes	Yes	Yes
User Select Fixed Period Averaging	-	Yes	Yes
Peak Min / Max Current Registers	-	Yes	Yes
I²C / SMBus	Yes	Yes	Yes
PMBus	-	Yes	Yes
1.2V I²C Level Translators	-	Yes	Yes
High Speed (3.4MHz) I²C Mode	Yes	Yes	Yes
External Clock Input	Yes	Yes	Yes
Power Shutdown Mode	Yes	Yes	Yes
Package	10 Ld MSOP, 16 Ld QFN	24 Ld QFN	16 Ld WLCSP

Precision Voltage References

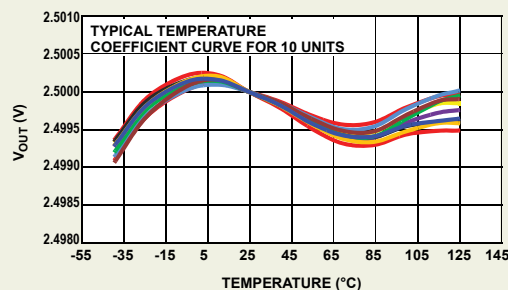
ISL21090

Ultra Low Noise, Precision Voltage Reference

The ISL21090 is an ultra low noise, high DC accuracy precision voltage reference with wide input voltage range from 3.7V to 36V. The ISL21090 is ideal for high-end instrumentation, data acquisition and processing applications requiring high DC precision where low noise performance is critical.

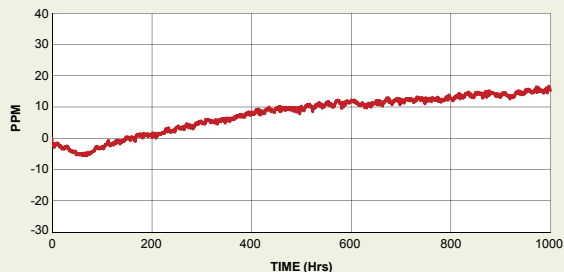
- Reference output voltage options:
 - 1.25V, 2.5V, 5.0V, 7.5V
- Initial accuracy: $\pm 0.003\%$ (1.25V option)
- Output voltage noise: $1\mu\text{V}_{\text{P-P}}$ Typ (0.1Hz to 10Hz) (1.25V option)
- Supply current: $750\mu\text{A}$ Typ (1.25V option)
- Tempco: $7\text{ppm}/^\circ\text{C}$ Max
- Output current capability: 20mA
- Line regulation: $8\text{ppm}/\text{V}$ (1.25V option)
- Load regulation: $2.5\text{ppm}/\text{mA}$ (1.25V option)
- Operating temperature range: -40°C to $+125^\circ\text{C}$

TEMPERATURE DRIFT (COEFFICIENT)



ISL21090 Typical Temperature Coefficient

LONG TERM DRIFT



ISL21090 Long Term Drift Data (1000 Hrs)

Precision Voltage References Products Highlights

Category	Device	Reference Output Voltage Option														TempCo (ppm/°C)			Initial Accuracy (% Vout @ 2.5V)			I _{sy} Max	V _{sy} Min	V _{sy} Max	Package
		0.9V	1.024V	1.2V	1.25V	1.5V	1.8V	2.048V	2.5V	2.6V	3V	3.3V	4.096V	5V	7.5V	B-Grade	C-Grade	D-Grade	B-Grade	C-Grade	D-Grade	μA	V	V	
Low Drift	ISL21007				X			D	X							-	5	10	-	0.08	0.08	150	2.7	5.5	8 Ld SOIC
	ISL21090				X				X					X	X	7	-	-	0.03	-	-	1280	3.7	36	8 Ld SOIC
Lowest Power	X60003												B/C	X		10	20	20	0.02*	0.05*	0.10*	0.9	4.5	9	3 Ld SOT-23
	ISL60002		X	X	X		X	X	X	X	X	X				20	20	20	0.04	0.10	0.49	0.9	2.7	5.5	3 Ld SOT-23
Low Cost	ISL21010		D		D	C		C	C		C	C	C			-	50	50	-	0.20	0.20	80	2.2	5.5	3 Ld SOT-23
	ISL21080	D	D		D	C		C	C		C	C	C	C		-	50	50	-	<0.70	<0.50	1.5	2.7	8	3 Ld SOT-23
With Comparator	ISL21440	1.182V ±0.5% with Comparator														*			0.5			0.7	2	11	8 Ld MSOP, 8 Ld TDFN

*Check Data Sheet Conditions X = All grades B/C/D = Only B or C or D grades

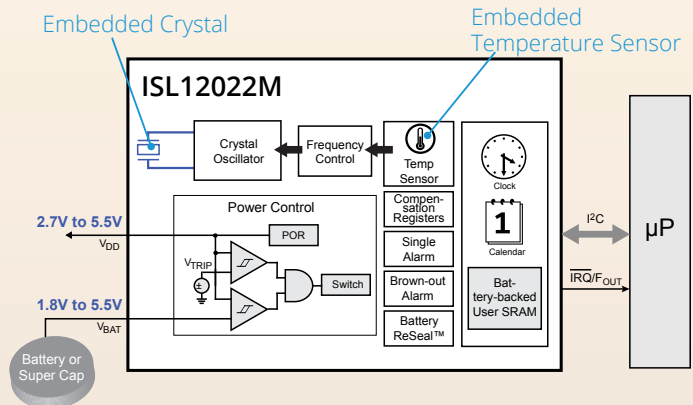
Real Time Clocks

ISL12022M

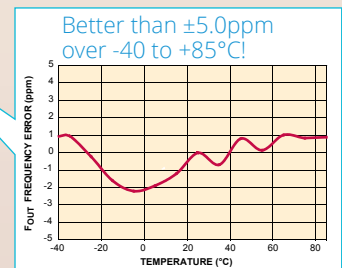
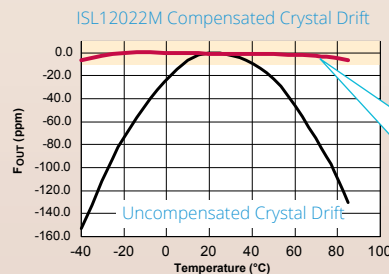
High Accuracy 3-in-1 RTC Module (RTC + Embedded Crystal + Temp Sensor)

- $\pm 5\text{ppm}$ accuracy (-40°C to $+85^{\circ}\text{C}$)
 - Factory programmed RTC for optimal accuracy
 - Onboard temperature sensor
 - Embedded crystal
 - Reliable timekeeping & power management
 - Backup battery management
 - V_{DD} and battery status monitors and switchover timestamp
 - Battery ReSealTM function extends battery shelf life
- User programmability
 - I²C interface
 - 128 bytes battery-backed user SRAM
- Solution for industrial applications
 - Provides low-drift time source for patient event time stamp
 - Reliable clock solution for patient monitoring (ECG)

BLOCK DIAGRAM



HIGH ACCURACY EVEN IN EXTREME TEMPERATURE CONDITIONS



Category/Special Features		Device	Other Functions									Memory	Package	
			Event Detection	Time Stamp	Batt Sw Timestamp	Auto DST Adjust	Temp Comp	Power Monitor	Unique ID	Integrated Crystal	Crystal Capacitor			
High Accuracy RTC Module	With Embedded Crystal & Temp Compensation	ISL12020M			✓	✓	✓	✓		✓		128 Bytes SRAM	20 Ld DFN	
		ISL12022M			✓	✓	✓	✓		✓		128 Bytes SRAM	20 Ld SOIC	
Feature Rich RTC	With On-Chip Temp Sensor	ISL12022			✓	✓	✓	✓				128 Bytes SRAM	20 Ld SOIC	
	With Embedded Unique ID	ISL12024							✓			512x8-Bit EEPROM	8 Ld SOIC, 8 Ld TSSOP	
		ISL12025								✓			512x8-Bit EEPROM	8 Ld SOIC
	With Integrated EEPROM & CPU Supervisory Function	ISL12026A										512x8-Bit EEPROM	8 Ld SOIC, 8 Ld TSSOP	
		ISL12027A											512x8-Bit EEPROM	8 Ld TSSOP
		ISL12028											512x8-Bit EEPROM	14 Ld SOIC, 14 Ld TSSOP
Low Cost	With Battery Backup	ISL12008											8 Ld SOIC	
		ISL12082											8 Ld SOIC	
	With Battery Backed SRAM	ISL1208										2 Bytes SRAM	8 Ld MSOP, 8 Ld SOIC, 8 Ld TDFN	
		ISL1218										8 Bytes SRAM	8 Ld MSOP, 8 Ld SOIC	
		ISL1220										8 Bytes SRAM	10 Ld MSOP	
	With Battery Backed SRAM, Event Detection	ISL1209	✓									2 Bytes SRAM	10 Ld MSOP	
		ISL1219	✓	✓								2 Bytes SRAM	10 Ld MSOP	
		ISL1221	✓	✓								2 Bytes SRAM	10 Ld MSOP	
Basic	With IRQ, Alarm, Timers	ISL12057									✓		8 Ld MSOP, 8 Ld SOIC	
		ISL12058											8 Ld MSOP, 8 Ld SOIC, 8 Ld μTDFN	







Digital Potentiometers

Intersil's DCP Benefits

LOWEST VOLTAGE

Specification	Intersil	Competition	Intersil Benefit
Analog Voltage	1.7V to 5.5V	1.8V to 5.5V 2.7V to 5.5V	Operational when battery starts draining.
Digital Voltage	1.2V to 5.5V	Same as analog voltage, lowest is 1.8V	Eliminate level shifter for I ² C/SPI when μ C has low voltage I/O pins.
Low Current Consumption	2.5μA - 1CH 3μA - 2CH 5μA - 4CH	Up to 2x more power consumption	Drains up to 50% less battery power.

SMALLER PACKAGE

Type	Intersil Device Number	Intersil	Competition	Intersil Benefit
Single	ISL23315, ISL23415, ISL23318, ISL23418	 μTQFN (2.1x1.6mm)	 SC-70 (2x2.1mm)	20% Smaller
Dual	ISL23325, ISL23425, ISL23328, ISL23428	 μTQFN (2.6x1.8mm)	 QFN (4x4mm)	48% Smaller
Quad	ISL23345, ISL23445, ISL23348, ISL23448	 QFN (3x4mm)	 QFN (4x4mm)	25% Smaller

ISL233x5, ISL234x5

Ultra Low Voltage, Small Package DCPs



10 Ld μ TQFN
(2.1x1.6mm)

- Key parameters
 - I²C/SPI voltage = 1.2V to 5.5V
 - V_{CC} = 1.7V to 5.5V
 - S/D/Q, volatile, I²C or SPI
 - 10k Ω , 50k Ω , 100k Ω
- Features
 - Integrated level translator
 - Direct communication with low voltage μ C
 - Use with battery & operate down to 1.7V
 - Daisy chain capability with SPI
- Package flexibility
 - Single: 10 Ld μ TQFN/10 Ld MSOP
 - Dual: 16 Ld μ QFN/14 Ld TSSOP
 - Quad: 20 Ld QFN/20 Ld TSSOP

NON-VOLATILE (EEPROM MEMORY)

<ul style="list-style-type: none">• Single 16-Tap (4-Bits) X9116 - 10kΩ, Up-Down• Single 32-Tap (5-Bits)<ul style="list-style-type: none">Ⓛ X9314 - 10kΩ, Log Taper, Up-DownX9315 - 10kΩ / 50kΩ / 100kΩ, Up-DownⓁ X9511 - 10kΩ, Push Button• Single 100-Tap (~6.65-Bits) X9317 - 10kΩ / 50kΩ / 100kΩ, Up-Down X9318 - 10kΩ, Up-Down X9319 - 10kΩ / 50kΩ, Up-Down<ul style="list-style-type: none">Ⓛ X9C102 - 1kΩ, Up-DownⓁ X9C103 - 10kΩ, Up-DownⓁ X9C104 - 100kΩ, Up-DownⓁ X9C503 - 50kΩ, Up-DownⓁ X9C303 - 32kΩ, Log Taper, Up-Down• Single 128-Tap (7-Bits) ISL22316 - 10kΩ, I²C ISL22317 - 10kΩ, 1% Tolerance, I²C<ul style="list-style-type: none">Ⓛ ISL95311 - 10kΩ, I²CⓁ ISL95310 - 50kΩ, Up-Down• Single 256-Tap (8-Bits) ISL95810 - 10kΩ / 50kΩ, I²C• Single 1024-Tap (10-Bits)<ul style="list-style-type: none">Ⓛ X9110 - 100kΩ, SPIX9111 - 100kΩ, SPIⓁ X9118 - 100kΩ, 2-WireX9119 - 100kΩ, 2-Wire	<ul style="list-style-type: none">• Dual 128-Tap (7-Bits) ISL22326 - 10kΩ, I²C• Dual 256-Tap (8-Bits) X95820 - 10kΩ / 50kΩ, I²C<ul style="list-style-type: none">Ⓛ X9268 - 50kΩ / 100kΩ, 2-WireⓁ ISL22424 - 10kΩ, SPI	<ul style="list-style-type: none">• Quad 64-Tap (6-Bits)<ul style="list-style-type: none">Ⓛ X9408 - 2.5kΩ / 10kΩ, 2-Wire• Quad 128-Tap (7-Bits) ISL22346 - 10kΩ / 50kΩ, I²C• 366Quad 256-Tap (8-Bits) X95840 - 10kΩ / 50kΩ, I²C<ul style="list-style-type: none">Ⓛ X9250 - 50kΩ / 100kΩ, SPIX9251 - 50kΩ, SPIX9252 - 2kΩ / 10kΩ, 2-WireⓁ X9258 - 50kΩ / 100kΩ, 2-WireX9259 - 50kΩ, 2-Wire
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SPECIAL FUNCTION DCPs

- **Dual Audio DCP - Integrated Output Buffer Amps and Audio Detect**
ISL22102 - 32kΩ, Log Taper, Push Button, 0 to -72dB Dynamic Range
- **Low Voltage 1% Tolerant Precision DCP & Low Temperature Coefficient**
ISL22317 - 10kΩ, I²C
- **TFT/LCD Programmable VCOM Calibrator (128 Step)**
ISL45041 - I²C
ISL45042 - Up-Down
- **Military Temperature (-55°C to 125°C) Non-Volatile DCP**
ISL22316WM (Single) - 10kΩ, I²C
ISL22326WM (Dual) - 10kΩ, I²C
ISL22346WM (Quad) - 10kΩ, I²C

VOLATILE (NO EEPROM MEMORY)

<ul style="list-style-type: none">• Single 32-Tap (5-Bits) ISL23511 - 10kΩ, Push Button ISL90461 - 10kΩ / 50kΩ / 100kΩ, Up-Down, 2-Pin, Rheostat ISL90462 - 10kΩ / 50kΩ, Up-Down, 2-Pin, Voltage Divider Only• Single 128-Tap (7-Bits) ISL90726 - 10kΩ / 50kΩ, I²C, Rheostat ISL90727/28 - 10kΩ / 50kΩ, I²C, Voltage Divide Only ISL23318 - 10kΩ / 50kΩ / 100kΩ, I²C, Low Voltage ISL23418 - 100kΩ, SPI, Low Voltage• Single 256-Tap (8-Bits) ISL23315 - 100kΩ, I²C, Low Voltage ISL23415 - 100kΩ, SPI, Low Voltage	<ul style="list-style-type: none">• Dual 32-Tap (5-Bits) ISL22102 - 32kΩ, Log Taper, Audio Detect, Push Button• Dual 128-Tap (7-Bits) ISL23328 - 10kΩ / 100kΩ, I²C, Low Voltage ISL23428 - 10kΩ / 100kΩ, SPI, Low Voltage• Dual 256-Tap (8-Bits) ISL23325 - 10kΩ / 100kΩ, I²C, Low Voltage ISL23425 - 10kΩ / 100kΩ, SPI, Low Voltage	<ul style="list-style-type: none">• Quad 256-Tap (8-Bits) ISL90841 - 50kΩ, I²C ISL90842 - 10kΩ / 50kΩ, I²C <div><ul style="list-style-type: none">Ⓛ Extended positive terminal voltageⓁ Positive and negative terminal voltage</div>
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Design Tools and Support

www.intersil.com/tools

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Intersil's PowerNavigator tool allows simple configuration and monitoring of multiple Digital-DC devices using a PC with a USB interface.

POWERCOMPASS™ TOOL



Quickly identify parts that match your specific requirements, set up multiple rails, perform high-level system analysis, and generate custom reference design files.

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