INTERSIL SELECTION GUIDE

MEDICAL SOLUTIONS

Precision Operational Amplifiers,
Precision Voltage References,
Switching Regulators, Switching Controllers,
Battery Charger, LDOs, PWM Controllers,
Power Sequencers, Voltage Monitors

intersil™

SIMPLY SMARTER™

INTERSIL SELECTION GUIDE

MEDICAL SOLUTIONS

INTERSIL'S SOLUTIONS FOR MEDICAL EQUIPMENT (PATIENT MONITORING AND DIAGNOSTIC EQUIPMENT)

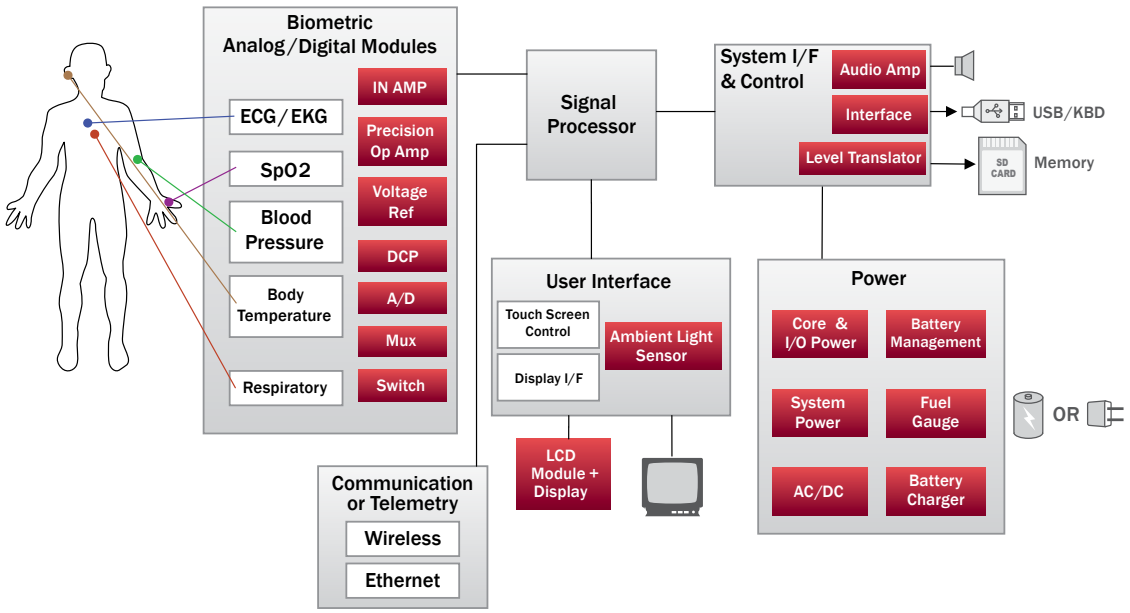
Intersil Corporation is a global technology leader specializing in the design and manufacture of high performance analog semiconductors. Built on a solid foundation, with many years of analog experience, Intersil is committed to developing leadership solutions for the medical market segment. Over the past several years Intersil has heavily invested and will continue to invest in robust technology capable of supporting the demanding requirements of the medical market segment. Intersil's proprietary 40V precision silicon-on-insulator (SOI) bipolar process technology developed for the medical market segment and the growing portfolios of leadership precision amplifiers are excellent examples of this commitment.

Medical solutions range from home/consumer medical devices to high end hospital imaging equipment. These applications utilize various types of sensors and feedback mechanisms to monitor, collect, store, and analyze data. Acquiring data from sensors involves precision measurement and processing of analog variables, such as voltages and currents, where there is a need for sensing very small changes. High performance, small size regulators and LDOs are needed in these applications to provide high efficiency and/or low noise power solutions. Intersil's broad portfolio of analog, power and interface products makes it well positioned to deliver world class solutions to medical customers. In this brochure, you will find outstanding solutions from Intersil for your current and future medical systems.

Contents

PATIENT MONITORS

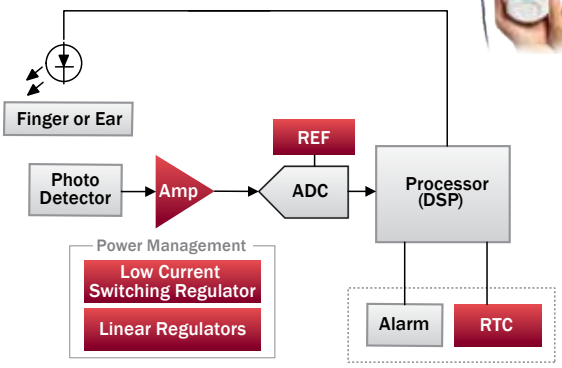




MEDICAL SOLUTIONS

PATIENT MONITORS MODULES

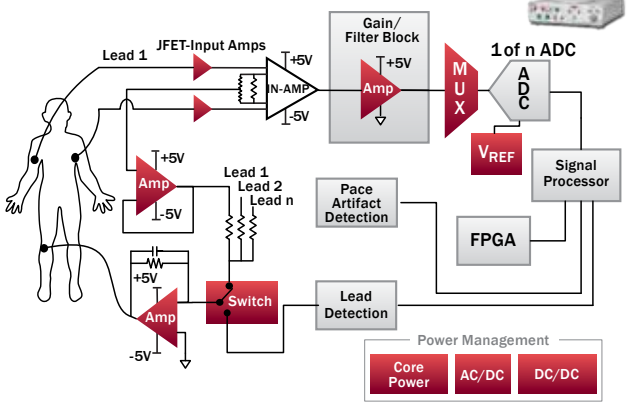
SpO2 (Pulse Oximetry) Module



Key Products

Product Type	Part Number	Device Description
Power Management	ISL9104 (page 8)	500mA low Iq Switching Regulator
	ISL9012 (page 11)	Dual LDO with Low Noise, Low Iq and High PSRR
Amplifier	ISL28110 (page 4)	Low Noise, JFET Op Amp
	ISL28133 (page 7)	Micro-power, Zero Drift Op Amp
	ISl28130 (page 6)	Micro-power, Low Cost Op Amp
Voltage Reference	ISL21070 (page 6)	Micro-power Voltage Reference
	ISL21080 (page 6)	Nano-Power Voltage Reference
	ISL21009D (page 6)	High Voltage Precision, Voltage Reference

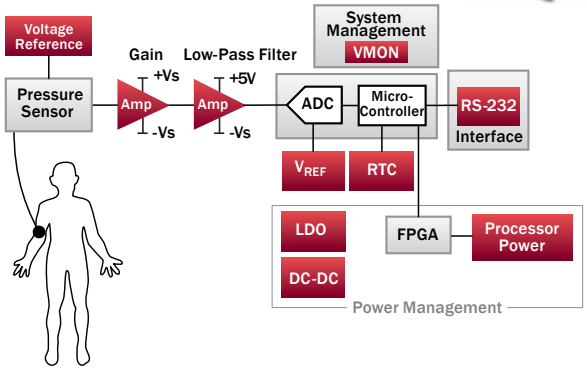
ECG/EKG Module



Key Products

Product Type	Part Number	Device Description
Power Management	ISL9440A (page 9)	Triple Output, Interleaved Switching Controller and Single Linear Controller
	ISL88012 (page 11)	5 Ld Voltage Supervisors with Adjustable Power-On Reset, Dual Voltage Monitoring or Watchdog Timer Capability
Amplifier	ISL28110 (page 4)	Low Noise, JFET Op Amp
	ISL28217 (page 5)	Low Noise, Precision, Bipolar Op Amp
Voltage Reference	ISL21060 (page 6)	Precision, Low Power Voltage Reference
	ISL21009D (page 6)	High Voltage Precision, Voltage Reference
Switch	ISL54500	+1.8V to +5.5V, 5Ω, Single SPDT Analog Switch
	ISL54503	+1.8V to +5.5V, 2.5Ω, Single SPDT Analog Switch
MUX	ISL43640	Low-Voltage, Single Supply, 4 to 1 Multiplexer
	ISL43681	Low-Voltage, Single and Dual Supply, 8 to 1 Multiplexer

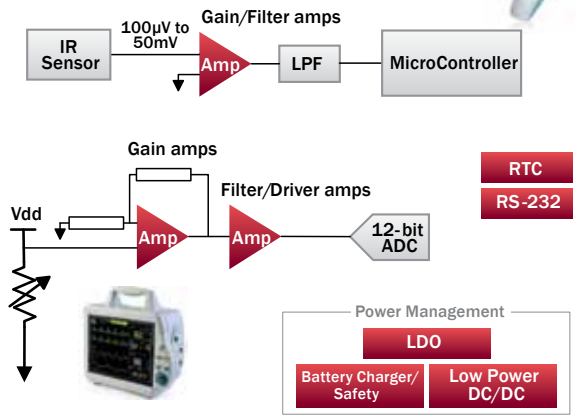
Blood Pressure Module



Key Products

Product Type	Part Number	Device Description
Power Management	ISL80101 (page 11)	High PSRR 1A LDO
	ISL9440A (page 9)	Triple Output, Interleaved Switching Controller and Single Linear Controller.
Amplifiers	ISL28217 (page 5)	Precision, Low Noise, Bipolar Op Amp
	ISL28233 (page 7)	Micro-power, Zero Drift Op Amp
Voltage Reference	ISL21070 (page 6)	Micro-power Voltage Reference
	ISL21080 (page 6)	Nano-Power Voltage Reference
	ISL21009D (page 6)	High Voltage Precision, Voltage Reference

Body Temperature Module



Key Products

Product Type	Part Number	Device Description
Power Management	ISL9220 (page 10)	Single and Dual Cell Li-ion Battery Charger
	ISL8088 (page 8)	Dual 800mA Low Quiescent Current 2.25MHz Switching Regulator
Amplifier	ISL28130 (page 6)	Micro-power, Low Cost Op Amp
	ISL28217 (page 5)	Low Noise, Precision, Bipolar Op Amp
	ISL28207 (page 7)	Precision, Low Power, Bipolar Op Amp

MEDICAL SOLUTIONS

PRECISION LOW NOISE JFET OP AMPS

40V Op Amp

ISL28110, ISL28210

The ISL28110, ISL28210, single and dual JFET amplifiers feature very low noise, high slew rate and bandwidth, low I_{BIAS} current, low offset voltage, and low temperature drift. These features make them the ideal choice for low power applications needing low noise, low input bias currents and high DC accuracy. The combination of precision, low noise, and low power along with a small footprint provides outstanding value and flexibility.

KEY FEATURES

- Wide Supply Range.....9V to 40V
- Low Voltage Noise.....6nV/√Hz
- Low Input Bias Current.....2pA
- High Slew Rate.....20V/µs
- High Bandwidth.....12.5MHz
- Low Input Offset.....300µV, Max
- Low Current Consumption....2.55mA
- Wide Temp Range.....-40°C to +125°C

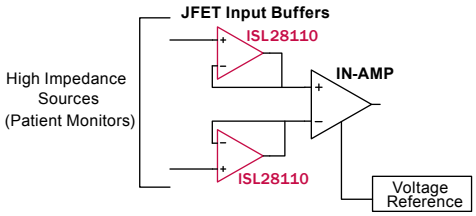
APPLICATIONS

- High Impedance Buffers
- Medical Instrumentation
- Biochemical Analyzers
- Medical Diagnostic
- Patient Monitors
- Gas Analyzers
- Bio-sensor

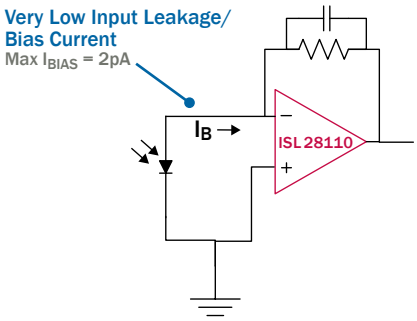
Photodiodes are widely used in industrial applications. Key requirements for photodiode amplifiers are low input bias current, low noise, wide bandwidth and high slew rate. The ISL28210 is an excellent choice for many industrial optical applications.

HIGH IMPEDANCE INPUT INSTRUMENTATION AMPLIFIER

For Patient Monitoring



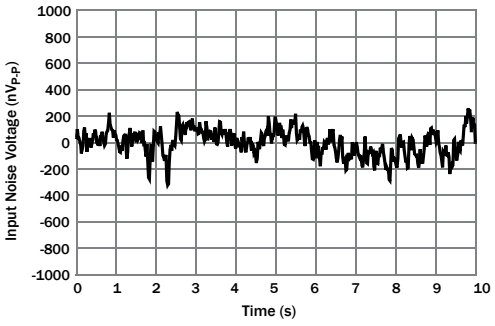
TRANSIMPEDANCE AMPLIFIER



Competitive Summary

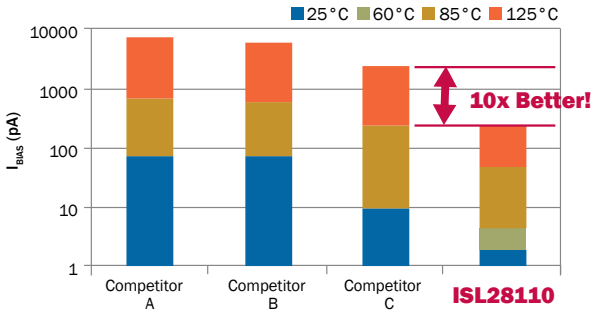
ISL28110 HAS SUPERIOR I_{BIAS} AND NOISE PERFORMANCE

LOW NOISE



0.1Hz to 10Hz V_{P-P} Noise Voltage, V_S = ±5V

LOW INPUT BIAS CURRENT



Input Bias Current Comparison

SUPERIOR PERFORMANCE

Mfg	Max V_{OS} (µV)	Max I_{BIAS} (pA)	Differential Input Capacitance (pF)	Noise @ 1kHz (nV/√Hz)	Noise @ 0.1 to 10Hz (nV_{P-P})	Max I_S (mA)
ISL28110	300	2	8.3	6	580	2.9
Comp A	900	75	12.5	8	2400	2.3
Comp B	600	50	4	13	2100	2.5
Comp C	100	10	8	6	1800	3
Comp D	500	50	1	8	-	4.8

MEDICAL SOLUTIONS

PRECISION 40V LOW NOISE, LOW POWER, BIPOLAR OP AMPS

40V Op Amp

ISL28117B, ISL28217B

The ISL28117B and ISL28217B are a family of very high precision amplifiers featuring low noise vs power consumption, low offset voltage, low I_{BIAS} current and low temperature drift making them the ideal choice for applications requiring both high DC accuracy and AC performance. The combination of precision, low noise, and small footprint provides the user with outstanding value and flexibility relative to similar competitive parts.

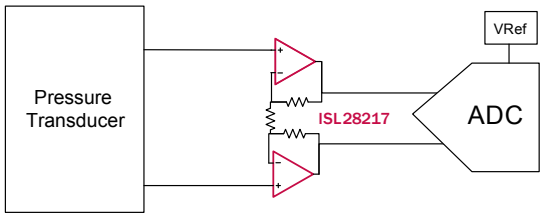
KEY FEATURES

- Low Input Offset.....±50µV, Max.
- Superb Offset TC..... 0.6µV/°C, Max.
- Input Bias Current.....±1nA, Max.
- Input Bias Current TC..... ±5pA/°C, Max.
- Low Current Consumption.....440µA
- Voltage Noise.....8nV/√Hz
- Wide Supply Range.....4.5V to 40V
- Operating Temperature Range.....-40°C to +125°C
- Small Package Offerings in Single, Dual and Quad

APPLICATIONS

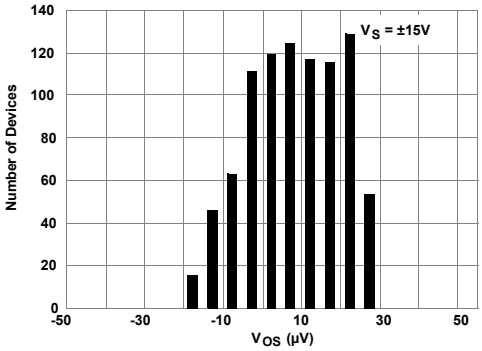
- Medical Instrumentation
- Biosensor Gain/Filter Amp
- Medical Diagnostic
- Patient Monitors
- Blood Pressure

(BLOOD) PRESSURE SENSOR SIGNAL CONDITIONING AMPLIFIER

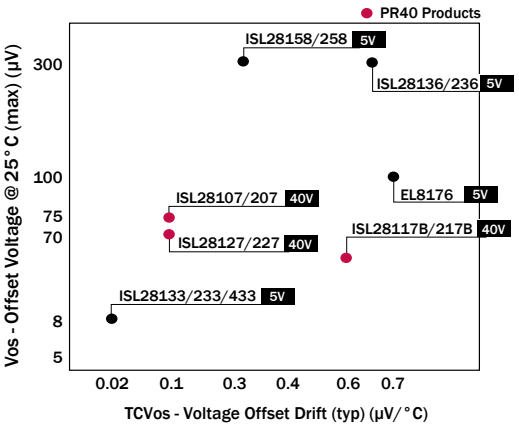


LOW VOLTAGE OFFSET

±50µV Max



PRECISION AMPS BY DC OFFSET AND DRIFT OVER TEMPERATURE



HIGH VOLTAGE (4.5V TO 40V) PRECISION AMPLIFIERS

Part	# Amp	In/ Out	V_S Min (V)	V_S Max (V)	I_{SS}/Amp Max	V_{OS} Max	V_{OS} Drift (µV/°C max)	CMRR Min (dB)	PSRR Min (dB)	I_B Max	I_B Drift Max	V_N @1kHz (nV/√Hz)	GBW	Slew Rate (V/µs)	Package	$ @ 1K
ISL28117B	1	N	4.5	40	530µA	50µV	0.6	120	120	1nA	5pA/°C	8	1.5MHz	1	DFN, SOIC	$0.95
ISL28217B	2	N	4.5	40	530µA	50µV	0.6	120	120	1nA	5pA/°C	8	1.5MHz	1	DFN, SOIC, MSOP	$1.89
ISL28127	1	N	4.5	40	2.8mA	70µV	0.5	115	115	10nA	NS	2.5	10MHz	3.6	SOIC, TDFN, MSOP	$1.05
ISL28107	1	N	4.5	40	290µA	75µV	0.65	115	115	300pA	0.9pA/°C	13	1MHz	0.3	DFN, SOIC	$1.15
ISL28207	2	N	4.5	40	290µA	75µV	0.65	115	115	300pA	0.9pA/°C	13	1MHz	0.3	DFN, SOIC, MSOP	$1.58

MEDICAL SOLUTIONS

MICRO-POWER, RAIL-TO-RAIL INPUT AND OUTPUT OP AMPS / PRECISION VOLTAGE REFERENCES

5V Op Amp

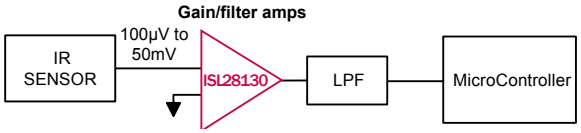
ISL28130, ISL28230, ISL28430

The ISL28130, ISL28230 and ISL28430 are single, dual and quad micro-power, low drift operational amplifiers that are optimized for single and dual supply operation from 1.65V to 5.5V and ±0.825V to ±2.75V. Their low supply current of 20µA and wide input range enable the ISL28130, ISL28230, ISL28430 to be an excellent general purpose op amp for a range of applications. The ISL28130, ISL28230 and ISL28430 are ideal for handheld devices that operate off 2 AA or single Li-ion batteries.

KEY FEATURES

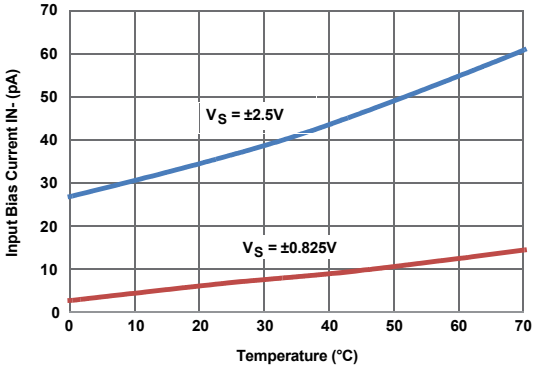
- Low Input Offset Voltage.....40µV, Max.
- Low Offset Drift.....150nV/°C, Max.
- Input Bias Current.....250pA, Max.
- Quiescent Current (Per Amplifier).....20µA, Typ.
- Single Supply Range.....+1.65V to +5.5V
- Dual Supply Range.....±0.825V to ±2.75V
- Low Noise (0.01Hz to 10Hz).....1.1µV_{P-P}, Typ.
- Rail-to-Rail Input and Output
- Operating Temperature Range.....0°C to +70°C

TEMPERATURE (IR) SIGNAL CONDITIONING AMPLIFIER



LOW INPUT BIAS CURRENT

250pA Max



Competitive Summary

MFG	Vs Min	Vs Max	Vos Max	GBW	Slew Rate	Is max	Noise @ 1k	Ib max
ISL28230C	1.65V	6V	40µV	400kHz	200V/ms	25µA	65nV/√ (Hz)	250pA
Comp A	1.8V	5.5V	50µV	350kHz	160V/ms	25µA	55nV/√ (Hz)	500pA
Comp B	1.8V	6V	50µV	400kHz	100V/ms	50 uA	25nV/√ (Hz)	1pA

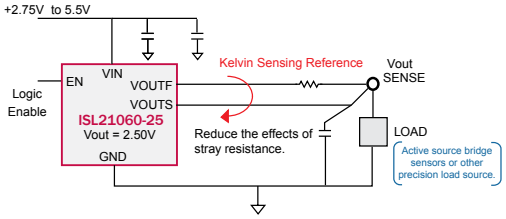
Voltage References

ISL21060

VOLTAGE REFERENCE FOR ACCURATE, ACTIVE LOADS FOR SENSOR FRONT-ENDS

Force and sense connections or Kelvin connections, offer a method of eliminating the effects of voltage drops in circuit wires. The Kelvin connection overcomes the problem by including the wire resistance within the forcing loop of the voltage reference and sensing the load voltage.

A copper trace with a stray resistance of 1Ω develops an error of 1mV/mA and introduces a TC of 4V/mA/°C. For a 2.5V reference, this corresponds to an accuracy degradation of 0.04% and a TC of 1.6 ppm/°C.



PRECISION VOLTAGE REFERENCES

Device Number	Category	Broad Range of Output Voltages															Temp Co	Initial Accuracy	Temp Range	Isy Max	Vsy Range	Noise Low Freq	Noise High Freq	Line Reg	Load Reg	Iout Source/ Sink	Hyst	LTD	Pkg
		0.6V	0.9V	1.024V	1.2V	1.25V	1.5V	1.8V	2.048V	2.5V	2.6V	3V	3.3V	4.096V	5V	7V	10V	ppm/°C	% Vout	°C	mA	Volts	mVp-p	mVrms	mV/V	mV/mA	mA	ppm	ppm/1khr	
ISL21009D	Ultra Precision					○				○				○	○			10	0.160	-40 to 125	180	3.5 to 16.5	4.5	2.2	40	80	7/7	50	50	SOIC-8
X60003B	Ultra Precision, Ultra Low Power													○	○			10	0.020	-40 to 85	0.9	4.5 to 9	30	NA	37	12	10/10	150	10	SOT23-3
ISL60002D	Low Cost, Ultra Low Power			○	○	○		○	○	○	○	○	○					20	0.490	-40 to 85	0.9	2.7 to 5.5	30	NA	244	98	7/7	100	316	SOT23-3
ISL21060C	Ultra Low Power								○	○		○		○				25	0.120	-40 to 125	40	2.5 to 5.5	10	2.5	150	50	10/5	100	100	SOT23-6
ISL21070C	Low Cost, Ultra Low Power	○		○					○	○			○					30	0.500	-40 to 85	25	2.7 to 5.5	30	10	250	100	10/10	100	50	SOT23-3
ISL21080	Low Cost, Ultra Low Power		○	○		○	○		○	○		○	○	○	○			50	0.500	-40 to 85	1.5	2.7 to 5.5	30	52	350	100	7/7	100	50	SOT23-3

Check Data Sheet Conditions ○ = available now ● = Sampling, call for more information

PRECISION AMPLIFIER SELECTION GUIDE

High Precision

Part Number			Supply Voltage (V)		Rail-To-Rail		Vos Max @ 25°C	TCVos Typ	Ib Max @ 25°C	CMRR min @ 25°C	PSRR min @ 25°C	Is Max @ 25°C	GBW	Slew Rate	Noise 0.1 to 10Hz	Voltage Noise @ 1kHz	Price @ 1kpcs		
Single	Dual	Quad	Min	Max	In	Out	mV	µV/°C	nA	dB	dB	mA	MHz	V/µs	µVpp	nV/√Hz	Single	Dual	Quad
ISL28133	ISL28233	ISL28433	1.65	5.5	Yes	Yes	0.006	0.05	0.18	118	110	0.025	0.4	0.2	1	65	$0.99	$1.45	$2.60
ISL28130	ISL28230	ISL28430	1.65	5.5	Yes	Yes	0.04	0.02	0.25	110	105	0.025	0.4	0.2	1.1	65	$0.60	$0.90	$1.60
ISL28117B	ISL28217B		4.5	40	No	No	0.05	0.14	1	120	120	0.53	1.5	0.5	0.25	8	$0.94	$1.75	
ISL28127	ISL28227		4.5	40	No	No	0.07	0.1	10	115	115	2.8	10	3.6	0.085	2.5	$0.90	$1.45	
ISL28107	ISL28207		4.5	40	No	No	0.075	0.1	0.3	115	115	0.29	1	0.32	0.34	13	$1.16	$1.58	
EL8176			2.4	5.5	Yes	Yes	0.1	2.4	2	90	90	0.075	0.4	0.13	1.5	28	$0.76		
ISL28176	ISL28276	ISL28476	2.4	5.5	Yes	Yes	0.1	0.5	2	90	90	0.075	0.4	0.13	1.5	28	$0.86	$1.27	$1.69
ISL28117C	ISL28217C		4.5	40	No	No	0.1	0.14	1	120	120	0.53	1.5	0.5	0.25	8	$0.74	$1.48	

Low Noise

Part Number		Supply Voltage (V)		Rail-To-Rail		Vos Max @ 25°C	TCVos Typ	Ib Max @ 25°C	Is Max @ 25°C	GBW	Slew Rate	Noise 0.1 to 10Hz	Voltage Noise @ 1kHz	Current Noise @ 1kHz	Price @ 1kpcs	
Single	Dual	Min	Max	In	Out	mV	µV/°C	nA	mA	MHz	V/µs	µVpp	nV/√Hz	fA/√Hz	Single	Dual
ISL28190	ISL28290	3	5.5	Single Supply	Yes	0.7	1.9	16,000	11	170	50		1	2,100	$1.58	$2.61
ISL28191	ISL28291	3	5.5	Single Supply	Yes	0.63	3.1	6,000	3.5	61	17		1.7	1,800	$1.32	$2.38
ISL28127	ISL28227	4.5	40	No	No	0.07	0.1	10	2.8	10	3.6	0.085	2.5	400	$0.90	$1.45
ISL28118 (coming soon)	ISL28218	3	40	Single Supply	Yes	0.23	0.3	575	1.1	4	1.2	0.3	5.6	355	TBD	$1.79
ISL28110 (coming soon)	ISL28210	9	40	No	No	0.3	1	0.002	2.9	12.5	23	0.6	6	9	TBD	$1.69
ISL28117B	ISL28217B	4.5	40	No	No	0.05	0.14	1	0.53	1.5	0.5	0.25	8	100	$0.94	$1.75
ISL28117C	ISL28217C	4.5	40	No	No	0.1	0.14	1	0.53	1.5	0.5	0.25	8	100	$0.74	$1.48
ISL28146	ISI28246	2.4	5.5	Yes	Yes	0.65	0.3	35	1.25	5	1.9	0.4	12	350	$0.76	$0.92
ISL28107	ISL28207	4.5	40	No	No	0.075	0.1	0.3	0.29	1	0.32	0.34	13	53	$1.16	$1.58
ISL28136	ISL28236	2.4	5.5	Yes	Yes	0.15	0.4	35	1.1	5	1.9	0.4	15	350	$1.00	$1.14
ISL28138		2.4	5.5	Yes	Yes	0.3	0.6	0.03	1.1	4.5	4.8	2	26	120	$0.70	

Low Power

Part Number			Supply Voltage (V)		Rail-To-Rail		Vos Max @ 25°C	TCVos Typ	Ib Max @ 25°C	Is Max @ 25°C	GBW	Slew Rate	Noise 0.1 to 10Hz	Voltage Noise @ 1kHz	Price @ 1kpcs		
Single	Dual	Quad	Min	Max	In	Out	mV	µV/°C	nA	mA	MHz	V/µs	µVpp	nV/√Hz	Single	Dual	Quad
ISL28194			1.8	5.5	Yes	Yes	2	1.5	0.08	0.00045	0.0035	0.0012	10	265	$0.55		
ISL28195			1.8	5.5	Yes	Yes	2	1.5	0.08	0.0013	0.01	0.0042	4	150	$0.55		
ISL28133	ISL28233	ISL28433	1.65	5.5	Yes	Yes	0.006	0.05	0.18	0.025	0.4	0.2	1	65	$0.99	$1.45	$2.60
ISL28130	ISL28230	ISL28430	1.65	5.5	Yes	Yes	0.04	0.02	0.25	0.025	0.4	0.2	1.1	65	$0.60	$0.90	$1.60
ISL28158	ISL28258		2.4	5.5	Yes	Yes	0.3	0.3	0.03	0.043	0.2	0.1	1.4	64	$0.70	$.1.14	
ISL28168	ISL28268		2.5	5.5	Yes	Yes	1.6	0.3	0.03	0.043	0.2	0.1	1.4	64	$0.58	$1.00	
ISL28156			2.4	5	Yes	Yes	0.12	1.5	1.2	0.047	0.25	0.05		46	$0.76		
ISL28166	ISL28266		2.4	5	Yes	Yes	0.7	1.5	5	0.047	0.25	0.05		46	$0.66	$1.14	
EL8176			2.4	5.5	Yes	Yes	0.1	2.4	2	0.075	0.4	0.13	1.5	28	$0.76		
ISL28176	ISL28276	ISL28476	2.4	5.5	Yes	Yes	0.1	0.5	2	0.075	0.4	0.13	1.5	28	$0.86	$1.27	$1.69
ISL28113	ISL28213	ISL28413	1.8	5.5	Yes	Yes	5	2	0.02	0.13	2	1	14	55	$0.44	$0.53	$0.72

Low Input Bias Current (High Input Impedance)

Part Number			Supply Voltage (V)		Rail-To-Rail		Vos Max @ 25°C	TCVos Typ	Ib Max @ 25°C	Is Max @ 25°C	GBW	Slew Rate	Noise 0.1 to 10Hz	Voltage Noise @ 1kHz	Current Noise @ 1kHz	Price @ 1kpcs		
Single	Dual	Quad	Min	Max	In	Out	mV	µV/°C	nA	mA	MHz	V/µs	µVpp	nV/√Hz	fA/√Hz	Single	Dual	Quad
ISL28110	ISL28210		9	40	No	No	0.3	1	0.002	2.9	12.5	23	0.6	6	9	$0.99	$1.69	
ISL28113	ISL28213	ISL28413	1.8	5.5	Yes	Yes	5	2	0.02	0.13	2	1	14	55	5	$0.44	$0.53	$0.72
ISL28114	ISL28214	ISL28414	1.8	5.5	Yes	Yes	5	2	0.02	0.36	5	2.5	12	40	8	$0.44	$0.53	$0.72

Note: Above specs, pricing, and availability are as of December 2010. Information subject to change. For the latest information, check our web site: www.intersil.com

Single Output Buck Regulators

ISL9104

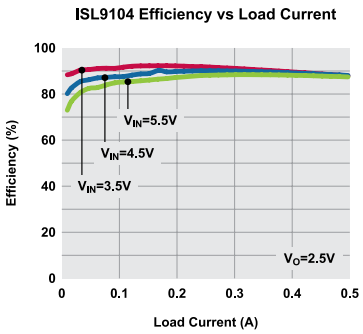
SPACE SAVING AND EFFICIENT SINGLE CHANNEL BUCK REGULATOR

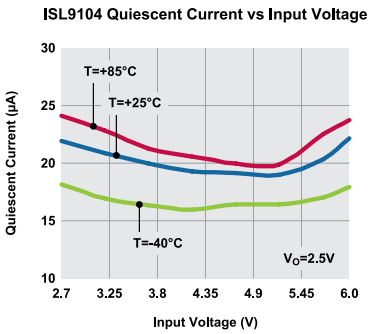
Space and efficiency are key specs in many medical monitoring devices. Ensuring that the voltage rail can be generated with very few external components is key to ensuring the total space needed is small, however no-one wants to give up on efficiency. The ISL9104/5/6 family of parts only need three external components (fixed voltage option) and allows a very efficient rail to be generated in full load or low load conditions.

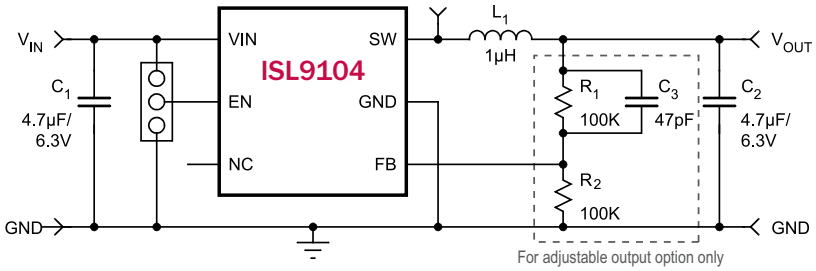
The ISL9104 is a 4.3MHz Low I_Q High Efficiency Synchronous Buck Converter. The device is capable of delivering up to 500mA output current with an input voltage range from 2.7V to 6.0V. For devices with an adjustable output option, the output voltage is set by two voltage divider resistors of R1 and R2 on the board (default output voltage is set at 1.6V).

KEY FEATURES

- 500mA Continuous Output Current Buck Regulators with High Switching Frequency and Ultrasonic Mode of Operation
- 20µA Quiescent Supply Current in Low I_Q Mode
- 2.4 / 4.3MHz Synchronous Buck Regulator with up to 95% Efficiency







Low Current Integrated FET Switching Regulators

Device	Device Description	V_{IN} (min) (V)	V_{IN} (max) (V)	V_{OUT} (min) (V)	V_{OUT} (max) (V)	I_{OUT} (max) (A)	I_Q (µA)	Switching Frequency (MHz)	Peak Efficiency (%)	POR/ PGOOD	Package	1K Units MSRP ($)
Single Output												
ISL9104	500mA 4.3MHz Low I_Q High Efficiency Synchronous Buck Converter	2.7	6	0.8	V_{IN}	0.5	20	4.3	93	N	6 Ld µTDFN	1.60
ISL9105	600mA Low Quiescent Current 1.6MHz High Efficiency Synchronous Buck Regulator	2.7	5.5	0.8	V_{IN}	0.6	25	1.6	96	Y	8 Ld DFN	0.89
ISL9106	1.2A 1.6MHz Low Quiescent Current High Efficiency Synchronous Buck Regulator	2.7	5.5	0.8	V_{IN}	1.2	17	1.6	95	Y	10 Ld DFN	1.91
ISL8009A	1.5A Low Quiescent Current 1.6MHz High Efficiency Synchronous Buck Regulator	2.7	5.5	0.8	V_{IN}	1.5	17	1.6	95	Y	8 Ld DFN	1.52
Multiple Output												
ISL8088	Dual 800mA Low Quiescent Current 2.25MHz High Efficiency Synchronous Buck Regulator	2.75	5.5	0.6	V_{IN}	0.8/0.8	30	2.25	96	Y	10 Ld DFN	2.63

Other recommended devices for Medical Monitoring.

LDOs

Device	Device Description	V_{IN} Range (V)	V_{OUT} Range (V)	O/P Volt Accuracy (%)	I_{OUT1} (max) (mA)	I_{OUT2} (max) (mA)	PSRR @ 1kHz (dB)	I_Q (µA)	Typical Drop-Out Voltage (mV)	Enable/ Shutdown	Package	1K Units MSRP ($)
ISL9003A	Low Noise LDO with Low I_Q, High PSRR	2.3 to 6.5	1.5 to 3.3	±1.8	150	N/A	90	29	200 @150mA	Y	5 Ld SC-70, 6 Ld µTDFN	0.56
ISL9021	250mA Single LDO with Low I_Q, Low Noise and High PSRR LDO	1.5 to 5.5	0.9 to 3.3	±1.8	250	N/A	60	35	150 @ 250mA	Y	4 Ld WLCSP, 6 Ld µTDFN	0.69
ISL9007	High Current LDO with Low I_Q and High PSRR	2.3 to 6.5	1.5 to 3.3	±1.8	400	N/A	75	50	250 @ 400mA	Y	8 Ld MSOP	0.67
ISL9000	Dual LDO with Low Noise, Very High PSRR, and Low I_Q	2.3 to 6.5	1.5 to 3.3	±1.8	300	300	90	40	250 @ 300mA	Y	10 Ld DFN	1.27
ISL9012	Dual LDO with Low Noise, Low I_Q, and High PSRR	2.3 to 6.5	1.5 to 3.3	±1.8	150	300	70	50	250 @ 300mA	Y	10 Ld DFN	1.11

MEDICAL SOLUTIONS

COMPLETE CORE POWER DELIVERY SOLUTIONS FROM INTERSIL

Switching Controller

ISL9440A

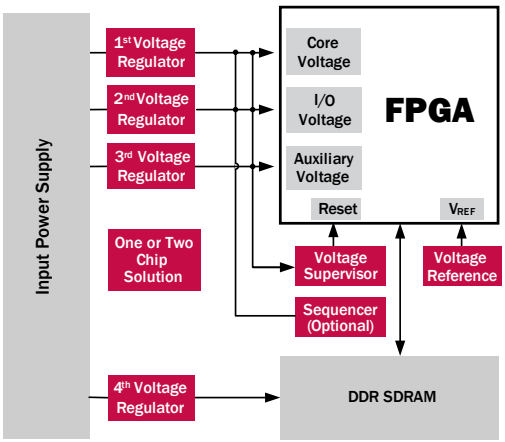
IDEAL SOLUTION FOR POWERING ANY FPGA

At the heart of any Patient monitoring and Diagnostics equipment is a Processor or FPGA. Intersil offers a complete portfolio of high performance regulators for Intel and AMD embedded processors as well as solutions for all FPGA's. These products offer a range of highly flexible PWM controllers & drivers that are tailored to meet the stringent power requirements for these processors.

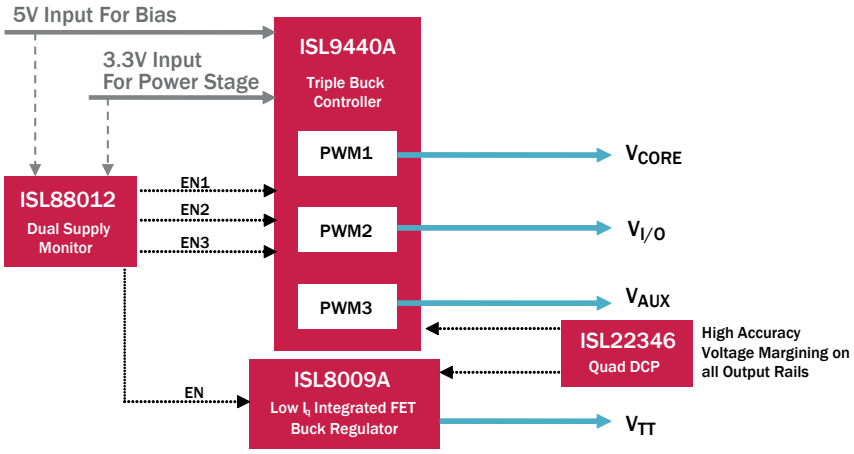
The ISL9440A is an ideal solution for powering any FPGA. The ISL944x family of triple PWM/single linear controllers adds to the flexibility and versatility of the popular ISL644x family of dual PWM/single linear controllers. It can create a highly efficient quad-output solution by using out-of-phase synchronous buck switchers to drive external FETs for current loads up to 20A and has an internal 5V linear regulator that can source up to 6A using an external transistor.

The three PWMs are synchronized at 0°/180°/0° to reduce the RMS input current and ripple voltage. Switching frequency of 300kHz (ISL9440, ISL9441) or 600kHz (ISL9440A) allow the designer to make trade-offs between efficiency and external component size and cost.

The ISL944x family incorporates several protection features such as OCP, OVP, OTP and UVLO, and offers cycle by cycle current limiting. It utilizes current mode control with internal compensation, keeping total BOM costs low. Independent digital enables for each PWM not only allow sequencing without additional circuitry, but are also "green" functions, allowing supplies to shut down when not needed, conserving energy. The output voltages are independently programmable using a simple resistor divider.



Power Module Block Diagram



ISL9440A: TRIPLE, 180° OUT-OF-PHASE, STEP-DOWN PWM AND SINGLE LINEAR CONTROLLER

- Three Independent Integrated Synchronous Buck PWM Controllers
- Internal Bootstrap Diodes
- Internal Compensation & Soft-Start
- Adaptive Shoot Through Protection
- Out-of-Phase Switching to Reduce Input Capacitance (0°/180°/0°)
- No External Current Sense Resistor - Uses Lower MOSFET's $r_{DS(ON)}$
- Current Mode Controller with Voltage Feed Forward
- Overcurrent, Overvoltage, Undervoltage, Over-Temperature Protection
- Wide Input Voltage Range

ISL8009A/B: 1.5A LOW QUIESCENT CURRENT 1.6MHZ HIGH EFFICIENCY SYNCHRONOUS BUCK REGULATOR

- Synchronous Buck Regulator with up to 95% Efficiency
- 2.7V to 5.5V Supply Voltage
- 3% Output Accuracy Over-Temperature/Load/Line
- 1.5A Guaranteed Output Current
- Selectable Forced PWM Mode and PFM Mode
- Less Than 1µA Logic Controlled Shutdown Current
- Internal Soft-Start and Current Mode Compensation
- Internal Digital Soft-Start
- Peak Current Limiting, Short Circuit and Over-Temperature Protection

MEDICAL SOLUTIONS

SWITCHING CHARGER FOR 1-CELL AND 2-CELL LI-ION BATTERIES

Battery Charger
ISL9220/A

INDUSTRY'S MOST EFFICIENT AND VERSATILE BATTERY CHARGER FOR 1-CELL AND 2-CELL LI-ION/LI-POLYMER BATTERIES

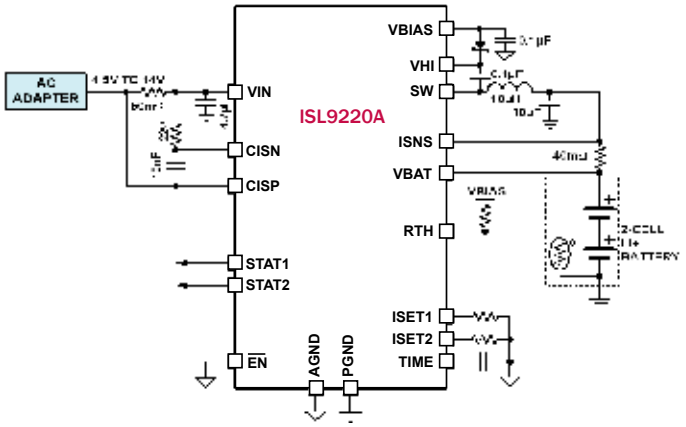
Most battery powered medical applications will require a battery charger to recharge portable medical device batteries. Our ISL9220 & ISL9220A integrated FET's switch mode battery charger provides best in class efficiency performance among all 1-cell and 2-cell switching charger products because it uses a true switch mode topology. This allows our device to achieve up to 90+% efficiency performance from a single and dual cell application. Better efficiency translates to faster charging cycles times for our customers.

- Higher efficiencies
- Faster Charging Due to Higher Efficiency
- Low Power Dissipation
- Capable of Charging from Higher Input Voltages
- Increased Charging Current from Current Restricted Sources

The 1.2MHz switching frequency allows use of small external inductors and capacitors. A programmable charge timer provides the ability to detect defective batteries, and provides a secondary method of detecting charge termination. A thermistor interface is provided for battery presence detection, and for temperature qualified charging conditions. Additional features include preconditioning of an over-discharged battery, automatic recharge, and thermally enhanced QFN package.

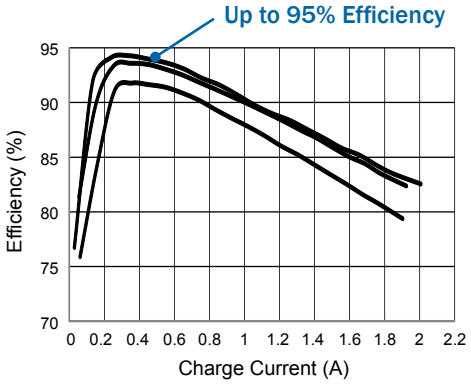
KEY FEATURES

- Highly Integrated Battery Charger IC
- ISL9220: Charges 1-Cell Li-ion or Li-Polymer Battery
- ISL9220A: Charges 2-Cell Li-ion or Li-Polymer Batteries
- Up to 2A Charge Current
- Synchronous Buck Topology with Integrated Power FETs
- 1.2MHz Switching Frequency
- 0.5% Charge Voltage Accuracy
- Programmable Input Current Limit with One External Resistor
- Thermistor Interface for Battery Detection and Temperature Qualified Charging
- Two Status Outputs
- Programmable Charge Safety Timer



Typical Applications Diagram for 2-Cell Application

HIGH EFFICIENCY



Battery Charge Efficiency

Device	Device Description	V_{OUT} (typ) (V)	Voltage Accuracy (%)	V_{IN1} (max) (V)	V_{IN2} (max) (V)	I_{OUT1} (max) (A)	I_{OUT2} (max) (A)	Safety Timer	Self Termination	Accepts CC Adapter	V_{IN1} Trickle Charge (min) (% CC)	V_{IN2} Trickle Charge (min) (% CC)	Thermal Regulation	Functions (Pin)	Package	1K Units MSRP ($)
ISL9220/A	Switching Charger for 1-Cell and 2-Cell Li-ion Batteries	4.2	0.5	18	N/A	2	N/A	Y	Y	N	10	N/A	Y	Enable, Charge Status, Fault	20 Ld TQFN	2.3

Device	Device Description	Programmable Overcurrent (A)	Input Overvoltage Protection (V)	Battery Overvoltage Protection (V)	Battery Leakage	R_{ON} @ 500mA (mΩ)	Package	1K Units MSRP ($)
ISL9209B	Charging System Safety Circuit	0 to 1.5	5.58 typ, 5.65 min, 6.0 max	4.34 typ, 4.28 min, 4.4 max	20nA max @ 4.34VVB	250 typ, 450 max	12 Ld TDFN	0.53
ISL9211A	Charging System Safety Circuit	0 to 2.0	5.8 typ, 4.6 min, 7.0 max	4.34 typ, 4.25 min, 4.4 max	20nA max @ 4.34VVB	170 typ, 280 max	8 Ld µTDFN	0.73
ISL9212B	Charging System Safety Circuit	0 to 2	6.8 typ, 6.65 min, 7.0 max	4.4 typ, 4.325 min, 4.475 max	20nA max @ 4.4VVB	170 typ, 280 max	12 Ld TDFN	0.61

POWER MANAGEMENT SELECTION GUIDE

LDOs

High Current

Device	Device Description	V_{IN} Range (V)	V_{BIAS} Range (V)	V_{OUT} Range (V)	Adj. & Fixed V_{OUT} Options*	V_{OUT} Accuracy (%)	I_{OUT} Max (A)	I_Q of V_{IN} (mA)	I_Q of V_{BIAS} (mA)	Typ. V_{IN} Drop-Out Voltage (mV)	Package	1K Units MSRP ($)
ISL80101	High Performance 1A LDO	2.2 to 6	N/A	0.8 to 5	Y	±1.8	1	5	N/A	130 @ 1A	10 Ld DFN, 5 Ld TO263/220	1.10
ISL80102	High Performance 2A LDO	2.2 to 6	N/A	0.8 to 5	Y	±1.8	2	8	N/A	81 @ 2A	10 Ld DFN, 5 Ld TO263/220	1.42
ISL80103	High Performance 3A LDO	2.2 to 6	N/A	0.8 to 5	Y	±1.8	3	8.5	N/A	120 @ 3A	10 Ld DFN, 5 Ld TO263/220	2.26

* See respective datasheets for available fixed output voltage options.

High Voltage

Device	Device Description	V_{IN} (min) (V)	V_{IN} (max) (V)	V_{OUT} (min) (V)	V_{OUT} (max) (V)	I_{OUT} (max) (mA)	I_{BIAS} (min) (mA)	Package	1K Units MSRP ($)
ISL6719	100V Linear Bias Supply	17	100	1.5	20	100	1.1	9 Ld DFN	1.25

PWM Controllers

Single Output

Device	Device Description	V_{IN} (min) (V)	V_{IN} (max) (V)	V_{OUT} (min) (V)	V_{OUT} (max) (V)	I_{OUT} (max) (A)	V_{BIAS} (V)	Switching Frequency (MHz)	I_S (typ) (mA)	Package	1K Units MSRP ($)
ISL6341B	5V or 12V Synchronous Buck PWM Controller	1.5	12	0.8	V_{IN}	30	4.5 to 14.4	0.6	7	10 Ld TDFN	1.31
ISL6420B	Advanced Synchronous Buck PWM Controller	4.5	28	0.6	V_{IN}-0.5V	10	5	1.4	2	20 Ld QFN, 20 Ld QSOP	1.41
ISL8105B	+5V or +12V Single-Phase Synchronous Buck Converter PWM Controller with Integrated MOSFET Gate Drivers, Extended Soft-Start Time	1	20	0.6	0.87 V_{IN}	15	5, 12	0.3	3.2	8 Ld SOIC, 10 Ld DFN	0.89

Multiple Output

Device	Device Description	V_{IN} (min) (V)	V_{IN} (max) (V)	V_{OUT} (min) (V)	V_{OUT} (max) (V)	I_{OUT} (max) (A)	Switching Freq. (kHz)	Package	1K Units MSRP ($)
ISL6440	300kHz Dual, 180° Out-of-Phase, Step-Down PWM Controller	4.5	24	0.8	22	10	300	24 Ld QSOP	2.44
ISL8112	High Light-Load Efficiency, Dual-Output, Main Power Supply Controllers	4.5	25	0.7	5.5	30	400/500, 300/400, 200/300	32 Ld QFN	2.31
ISL8120	Dual/n-Phase Buck PWM Controller with Integrated Drivers	3.3	22	0.6	90% of V_{IN}	>60	150 to 1500	32 Ld QFN	4.31

Integrated FET Switching Regulators

Device	Device Description	V_{IN} (min) (V)	V_{IN} (max) (V)	V_{OUT} (min) (V)	V_{OUT} (max) (V)	I_{OUT} (max) (A)	I_Q (µA)	Switching Frequency (MHz)	Peak Efficiency (%)	POR/ PGOOD	Package	1K Units MSRP ($)
Single Output												
ISL9104A	500mA 4.3MHz Low IQ High Efficiency Synchronous Buck Converter	2.7	6	0.8	V_{IN}	0.5	32	4.3	93	N	6 Ld µTDFN	1.60
ISL8012	2A Low Quiescent Current 1MHz High Efficiency Synchronous Buck Regulator	2.7	5.5	0.8	V_{IN}	2	40	1	95	Y	10 Ld DFN	1.85
ISL8013A	3A Low Quiescent Current 1MHz High Efficiency Synchronous Buck Regulator	2.8	5.5	0.8	V_{IN}	3	35	1	97	Y	16 Ld QFN	2.71
ISL8014A	4A Low Quiescent Current 1MHz High Efficiency Synchronous Buck Regulator	2.8	5.5	0.8	V_{IN}	4	35	1	97	Y	16 Ld QFN	3.71
Multiple Output												
ISL8022	Dual 2A/1.7A Low Quiescent Current 2.25MHz High Efficiency Synchronous Buck Regulator	2.8	5.5	0.6	V_{IN}	2.0/1.7	40	2.25	97	Y	12 Ld DFN	3.05
ISL8033A	Dual 3A/3A Low Quiescent Current 2.25MHz High Efficiency Synchronous Buck Regulator	2.8	5.5	0.6	V_{IN}	3/3	40	2.25	97	Y	12 Ld DFN	4.17
ISL85033	Wide VIN Dual Standard Buck Regulator With 3A/3A Continuous Output Current	4.5	28	0.8	V_{IN}	3/3	1.2	0.3 to 2	92	Y	28 Ld TQFN	3.3

Power Sequencers

Low Voltage Sequencers

Device	Device Description	V_{BIAS} Range (V)	Sequenced Voltages or Range (V)	Enable	Logic Level	Sequenced Output Control	Initial Startup Require-ments	Monitored Inputs	Channel That Turn-off When 1 UVLO Faults	Preset or Adjustable Sequence	Features	Package	1K Units MSRP ($)
ISL6124	Power Sequencing Controllers	+1.5 to +5.5	+0.7 to +5.5	Active Low	CMOS	Charge Pumped 1µA FET Drive	4 UVLO 1EN	4	4 Gates	Adjustable ON & OFF Delay	Auto Restart	24 Ld QFN	2.39
ISL8724	Power Sequencing Controllers	+2.5 to +5.5	+0.7 to +5.5	Active Low	CMOS	Charge Pumped 10µA FET Drive	4 UVLO 1 EN	4	4 Gates	Adjustable ON & OFF Delay	Auto Restart	24 Ld QFN	2.48

High Voltage Sequencers

Device	Device Description	V_{BIAS} (V)	Enable	Logic Level	Sequenced Output Control	Initial Startup Requirements	Monitored Inputs	Channels That Turn-On When V_{IN} is Non-Compliant	Preset or Adjustable Sequence	Features	Package	1K Units MSRP ($)
ISL8702A	Adjustable Quad Sequencer	3.3 to 24	Active High	TTL	Active High, Open Drain	UV/OV & EN	1	4 Simultaneous	Preset Order, Adjustable Delay	Fault Reporting	14 Ld SOIC	1.11
ISL8705A	Adjustable Quad Sequencer	3.3 to 24	Active Low	TTL	Active Low, Open Drain	UV/OV & EN	1	4 Simultaneous	Preset Order, Adjustable Delay	Fault Reporting	14 Ld SOIC	1.11

Voltage Monitors

Device	Device Description	# of Voltage Monitors	Fixed V_{TRIP}	Adj. V_{TRIP} (Resistors)	Reset Output Type	Manual Reset	TwinPin™ MR/RST	WDT	Adj. POR Timeout	Bus Interface	Package	1K Units MSRP ($)
ISL88012	5 Ld Voltage Supervisors with Adjustable Power-On Reset, Dual Voltage Monitoring or Watchdog Timer Capability	2	Y	Y	Active High and Low	Y	Y	N	N	N/A	5 Ld SOT23	0.99

Note: Above specs, pricing, and availability are as of December 2010. Information subject to change. For the latest information, check our web site: www.intersil.com

DESIGN SOFTWARE

isim™

Intersil Interactive web design simulation tool

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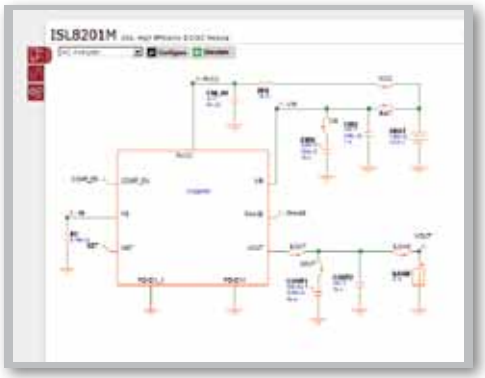

Easily Generate Schematics with Intersil's Devices

NEW!

iSim Active Filter Designer

The iSim Active Filter tool gives designers the ability to view the interstage and final output, AC response, noise, and step response, making it easy to see what is going on inside a multi-stage filter design and/or assess the impact of choosing alternate devices.

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