

Automotive Solutions

Solutions Guide

national.com/automotive

2008 Vol. 2

SerDes Solutions

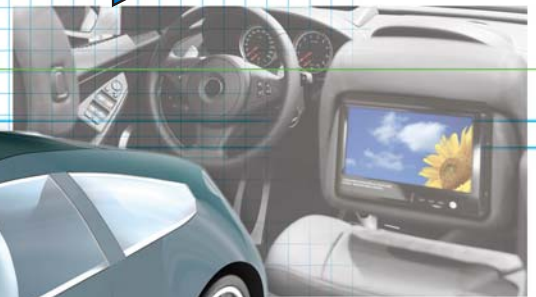
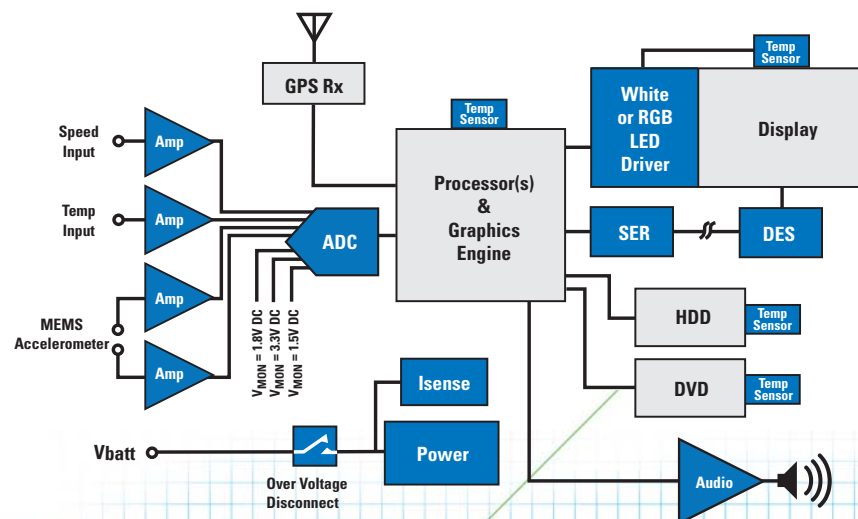
Clock and Timing Solutions

Analog Video Solutions

Power Solutions

Audio Solutions

Design Resources



 **National**
Semiconductor

Create Robust Automotive Designs with National's High-Quality Automotive Solutions

National Semiconductor, a leader in integrated circuits and a leading-edge silicon supplier in the automotive industry, offers a diverse product portfolio to address the many challenges and needs of the automotive market.

Today's automotive applications require reliability and precision under high temperature environments and wide operating voltage ranges. At the same time, high efficiency solutions are critical to helping automotive electronic systems capitalize on space, lower operating temperatures, and conserve on overall power consumption. National offers a diverse portfolio of data converter, temperature sensor, amplifier, power management, audio, and interface products to address everyday design challenges of the automotive industry.

Power Management Solutions

Efficiency in automotive solutions can not only save electrical power, but can also lower operating junction temperature and reduce solution size. National offers best-in-class, low Iq products that preserve battery life for always-on electronics along with a wide selection of LDOs, LED drivers, and PowerWise® regulators for systems with high-efficiency needs. Additional features such as wide input voltage ranges, adjustable frequencies, and other special features make National's power management solutions ideal for automotive systems.

SerDes Solutions

Electronic complexities in today's cutting-edge vehicles introduce more variables for failure. National's FPD-link II solutions simplify systems or improve robustness using true embedded clock architecture for lower system cost, several industry-leading EMI mitigation techniques, and a Built-In Self Test (BIST) feature for performing diagnostic functions to ensure signal integrity.

Data Conversion Solutions

A wide portfolio of general purpose and high-speed analog-to-digital converters (ADCs) are ideal for applications like GPS and adaptive cruise control. National's ADCs maintain high dynamic performance over varying automotive temperature ranges while keeping system power dissipation low.

Audio Solutions

National's audio products enable high-performance listening experiences in vehicles with high-fidelity products, and minimize EMI with spread spectrum and edge rate control Class D products. These innovative solutions allow for multiple features in a single device, while reducing cable and heat sink requirements, for smaller, lighter automotive systems.

Temperature Sensor Solutions

Increased electronic content in critical automotive applications is driving the need for specialized high temperature thermal management solutions. As a pioneer in this area, National's extensive line of thermal products include innovative technology building blocks that offer the highest accuracy, lowest power, and smallest packages with built-in safety mechanisms. This promotes the highest levels of reliability and best-in-class energy efficient solutions over a wide range of temperatures.

Current Sensor Solutions

National's current sensors are optimized for automotive use and are 100 % tested at high and low temperatures to ensure consistent accuracy.

Amplifier Solutions

In many automotive analog applications and subsystems, EMI is a concern for the system designer. EMI may interrupt, alter, or limit the effective signal performance of a critical electronic control unit or a car radio application. National offers EMI-hardened amplifiers which suppress the interference and enhanced connectivity caused by EMI sources. As a result, these amplifiers minimize the need for adding filtering or costly shielding components.

PowerWise® Solutions for Energy-Efficient Designs

 National's energy efficient PowerWise solutions for automotive products allow automotive designers to reduce heat wear on electronics for longer service life while minimizing the overall power consumption.

See all of National's automotive applications, products, and PowerWise solutions at: www.national.com/automotive

Automotive-Grade Products

National has developed Automotive-Grade products to help address and streamline design challenges with products that have passed rigorous testing and provide enhanced reliability specific to automotive requirements.

Automotive-Grade Products

National's Automotive-Grade products are:

- AEC-Q100 with capabilities for each temperature grade
- TS-16949 certified
- Meeting customer-specific requirements
- Visible and traceable throughout the manufacturing, ordering, and supply chain processes

Product Qualification

Along with the AEC-Q100 reliability specification, a complete Production Part Approval Process (PPAP) package, compliant with the AIAG manual, is generated based on customer specifications.

Product Development

A comprehensive, phase review based development process ensures quality from product inception through completion. This process includes complete design process documentation and AEC-Q003-compliant device characterization.

Manufacturing Quality

Beyond AEC-Q100 certification, National's manufacturing process distinguishes its Automotive-Grade products from others with:

- Special manufacturing flow with increased inspection and screening
- Enhanced defect detection through methods including PAT, delta current stress tests, statistical bin yield analysis, and reliability monitors
- Statistical process control
- Defect analysis using a closed loop, 8D-based corrective action and 5 Why root cause analysis

Change Management

To provide better visibility into product changes, National provides notifications with complete AEC-QXXX compliant documentation, including:

- Six months notification for change management
- Twelve month end-of-life notification with three-month shipping window

Identifying Automotive-Grade Products in this Guide

All products featured in this guide are ideal for designing automotive applications.

To find products that are fully Automotive Grade compliant, look for the  symbol. Products with a  symbol are completing the requirements for Automotive Grade status and will be fully qualified within the next 6 months.

Unique Device Identification

Each part is identified by a special order code 'Q' in the device part number. This identification enables complete product visibility and traceability throughout the ordering, manufacturing and supply chain.

AECQ temp grades are as follows:

Temperature Grade	Min (°C)	Max (°C)
Grade 0	-40	+150
Grade 1	-40	+125
Grade 2	-40	+105
Grade 3	-40	+85
Grade 4	-0	+70

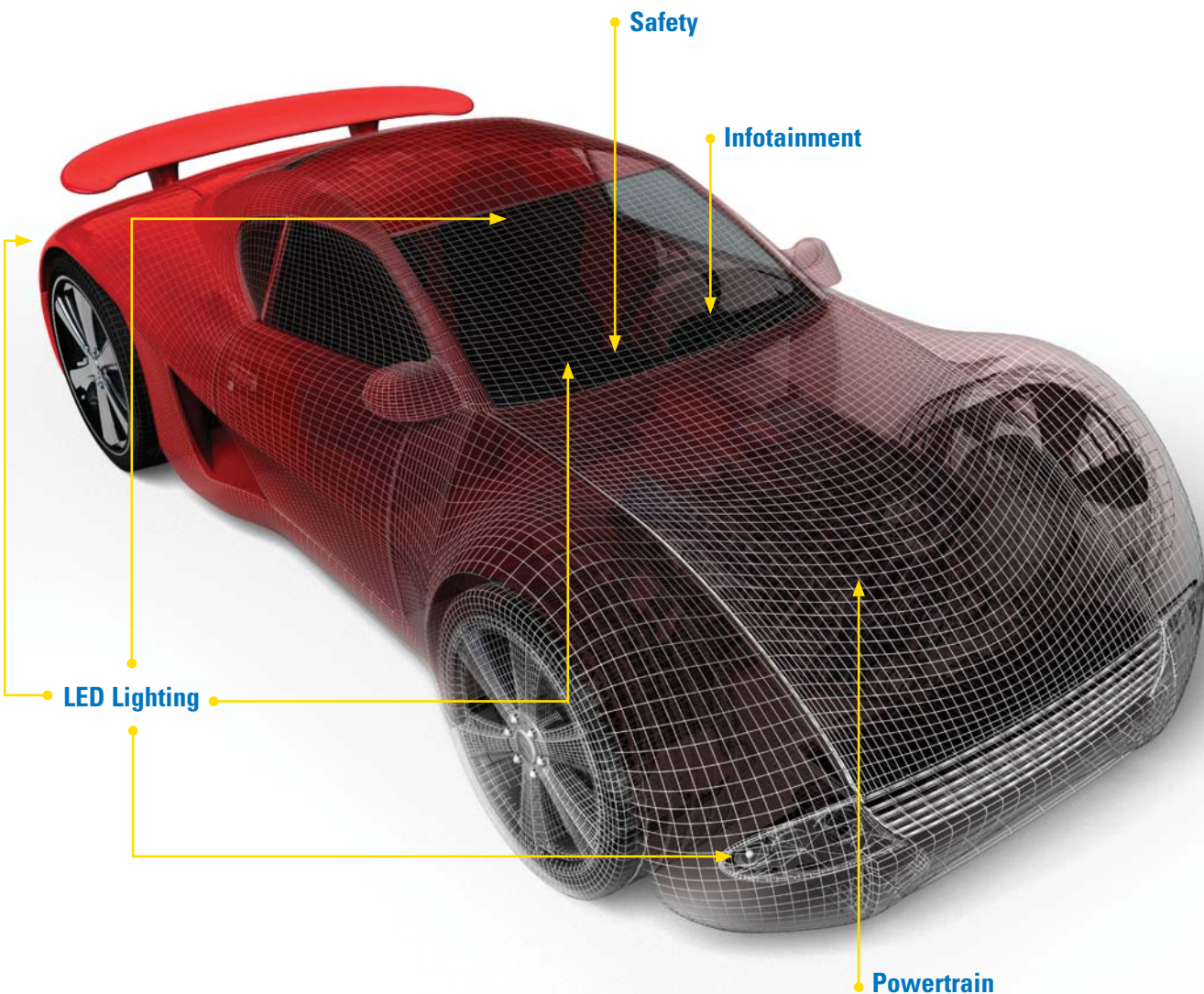
Visit www.national.com/automotive for the most current list of AEC-Q100-qualified products.

Automotive Applications

National's commitment to the automotive industry means providing more than just a collection of parts; it means delivering innovative, comprehensive automotive solutions that address system-level design requirements and enable applications.

Following are a sampling of system-level solutions that address key automotive trends in infotainment, LED lighting, imaging, and powertrain.

When it comes to analog in automotive, National provides highly reliable solutions through a broad and growing array of products, regardless of the system. Look for growing innovation and updates at www.national.com/automotive.



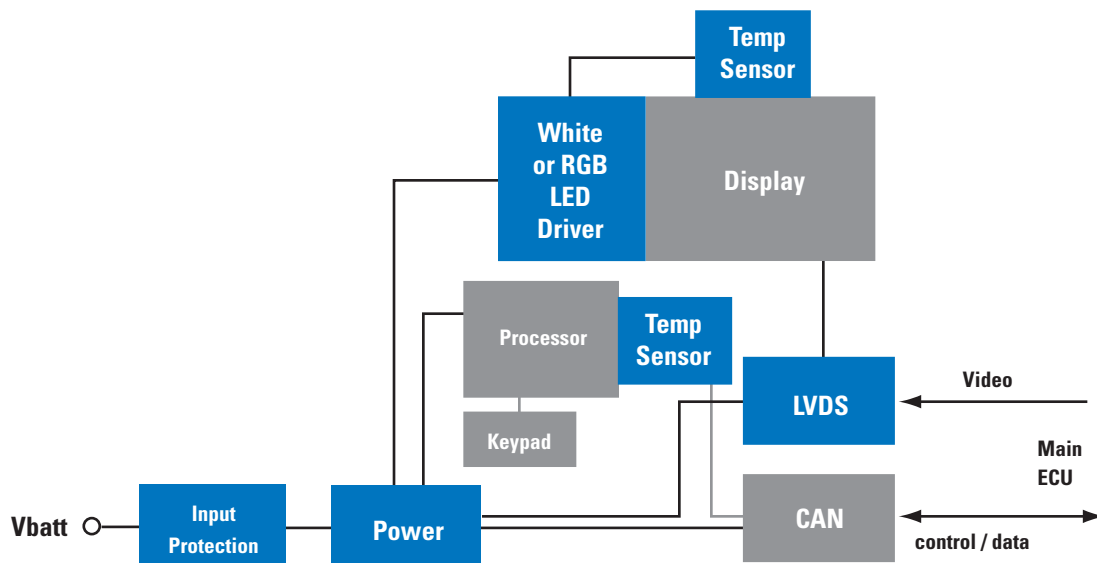
Automotive Applications Infotainment and GPS

Infotainment, the fusion of driver information systems with in-car entertainment, continues to evolve as the automotive customer experience demands more advanced multimedia, integrated navigation, and robust sound systems. To meet

this demand, National features a diverse portfolio of products specifically targeted toward automotive infotainment systems that are small in size, feature EMI mitigating techniques, and incorporate power-saving technology.

Product	Features	Benefits
LVDS SerDes	Serial link randomization and scrambling	EMI mitigation
	Spread-spectrum clock and leading EMI-mitigation techniques	
	Integrated signal conditioning features and termination resistors	Enhanced signal integrity
	Auto power up/down	Preserve battery life
	Small size	Reduce total board area
Power	High frequency	EMI mitigation, smaller inductor
	External oscillator sync for spread-spectrum and/or avoiding specific radio tuner frequencies	
	Highly integrated Power Management Units (PMUs)	Small, cost-effective total footprint
Amplifiers	Extremely low noise	High-fidelity audio
	Excellent Total Harmonic Distortion (THD)	
	Analog NTSC amplifiers available	Compatible with NTSC video signal standard
Temp Sensors	Best in class: high accuracy and resolution, fast conversion time, low quiescent current, and integrated reliability features	Protects electronics, maintains visual aesthetics, promote energy-efficient continuous operations

Automotive Infotainment System Central Information & Instrument Cluster Displays

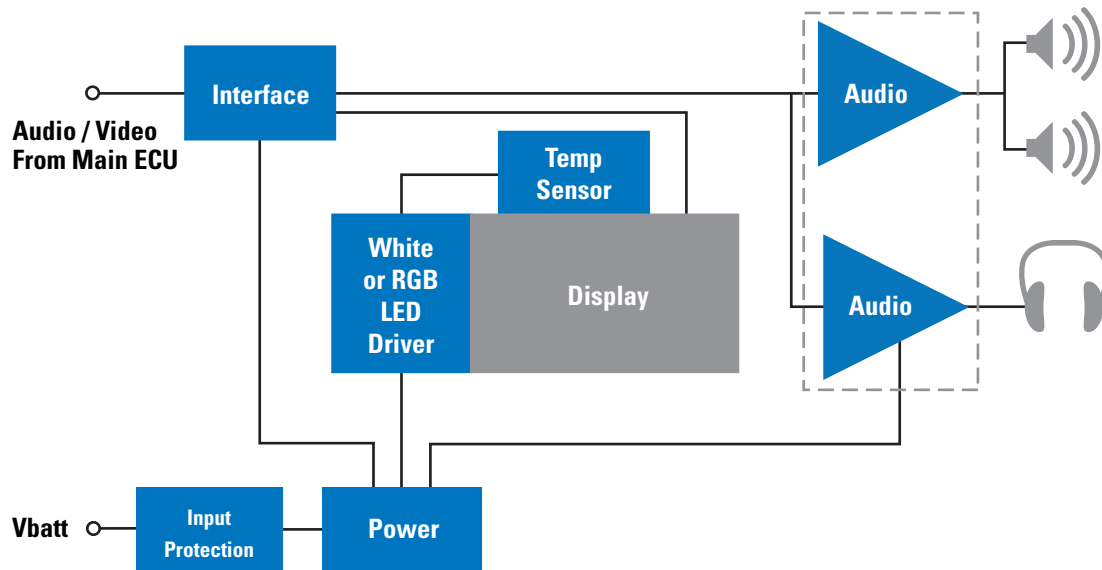


Automotive Applications

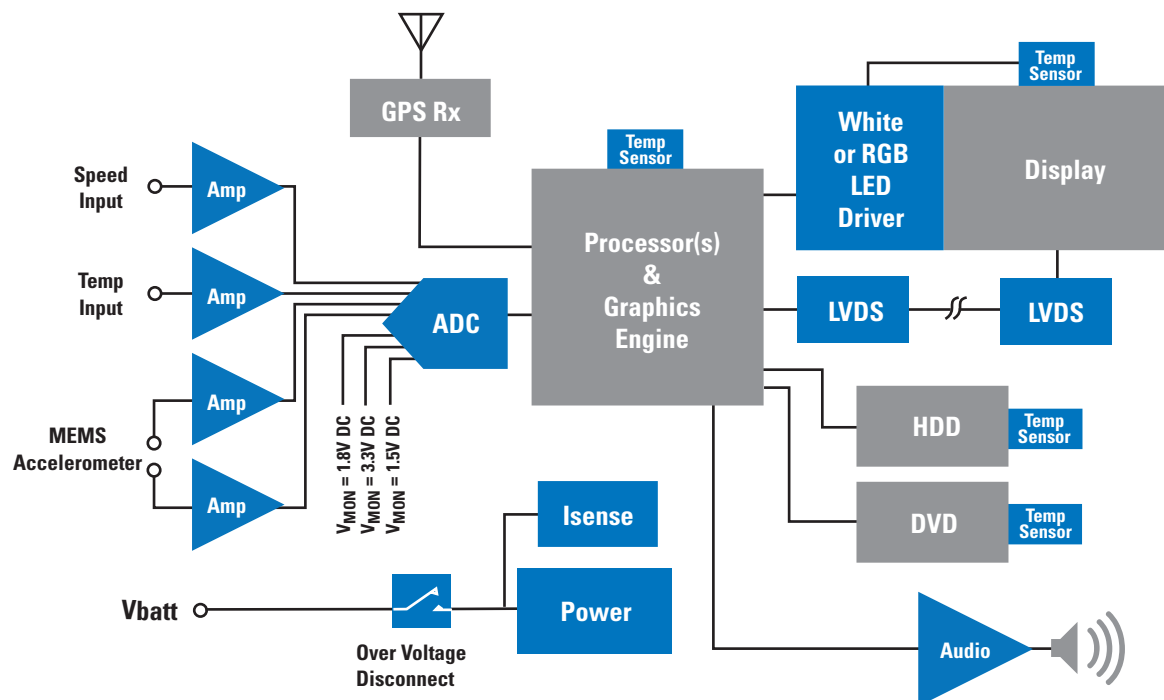
Infotainment and GPS

Automotive Infotainment System

Rear Seat Entertainment Unit



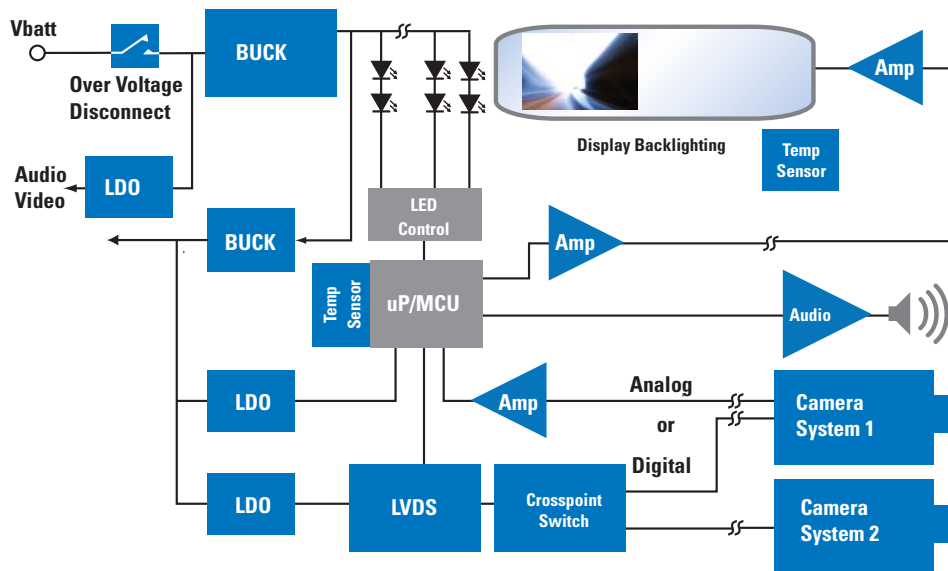
Automotive GPS Navigation System



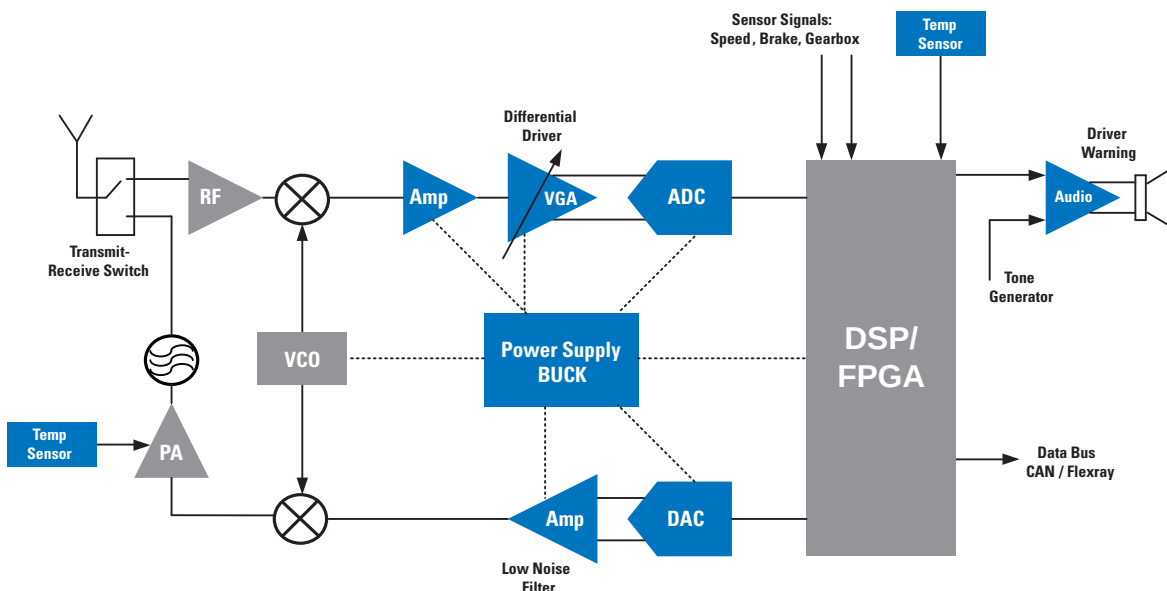
Safety combined with convenience is emerging as a top feature among automotive customers. Imaging addresses this by extending visibility in end applications such as parallel parking and backup vision. National

creates innovative products for imaging applications that are qualified for automotive. These solutions utilize industry-leading EMI mitigating techniques, high efficiency at small solution sizes, and extensive power savings.

Automotive Park Assist Imaging System



Car Radar for Active Cruise Control



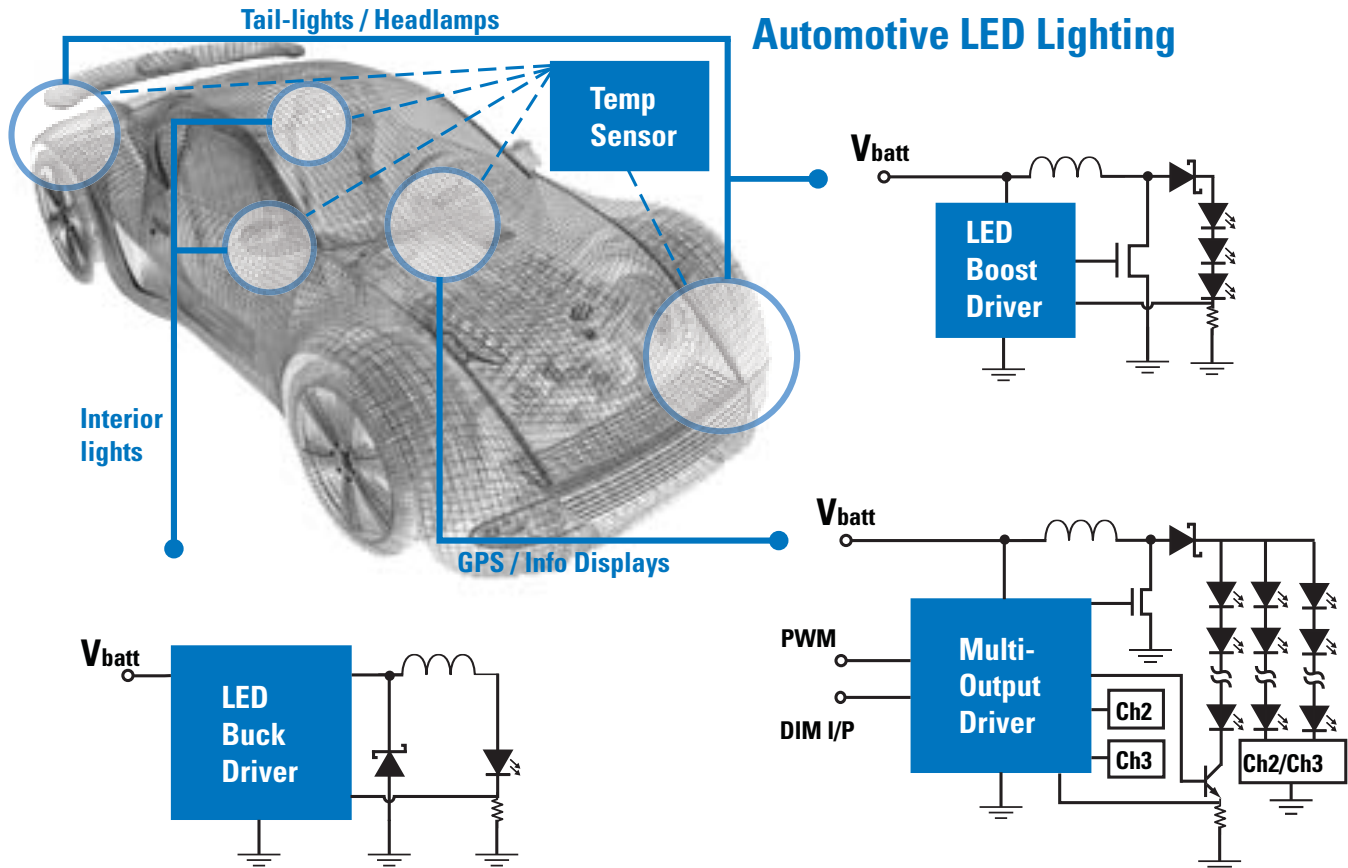
Automotive Applications

LED Lighting

From headlights to LCD backlighting in infotainment systems, LEDs are an integral part of the driving experience. National's portfolio of LED drivers offer key features like Pulse Width Modification (PWM) dimming, accurate Under Voltage Lockout (UVLO), and high-side current sensing.

Plus, low LED ripple current and external oscillator sync capabilities allow designers to reduce issues with EMI. These LED drivers provide maximum efficiency and effectiveness in any automotive lighting system.

Features	Benefits
High efficiency	Alleviates major heat problems
High-side current sensing	LEDs grounded to chassis
Accurate current control	Protect LEDs from over current
PWM and analog dimming	Easily reduces current when battery is low to avoid excessive battery drain
Wide-voltage range	Stable under instant on, low and high battery, high voltage transients
Accurate UVLO	Disable when battery is low
Low LED ripple current	Minimize EMI
External oscillator sync capability	External spread spectrum for low EMI

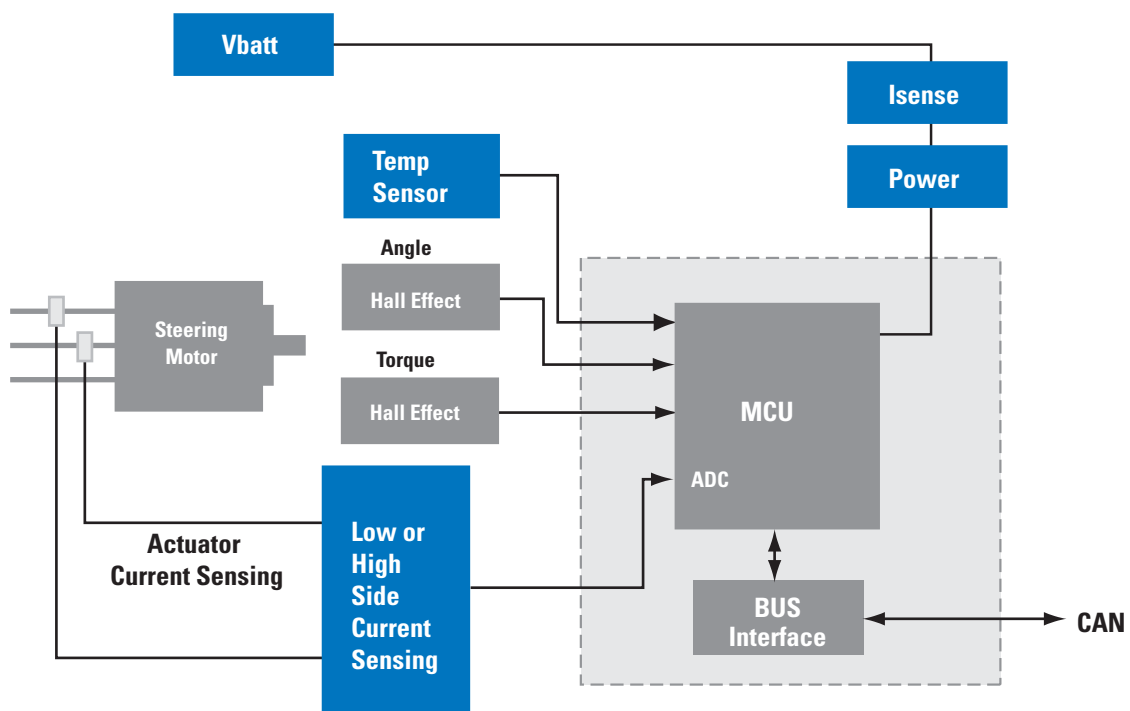


Powertrain and under-the-hood systems, like electric power steering, gearbox or injection systems demand the highest thermal performance from electronics at temperatures up to 150°C. Temperature sensors monitor these high-temperature applications and provide a more efficient system operation.

National offers a variety of high-temperature, high-reliability products that exceed the highest AEC-Q100 requirements, and the widest selection of products in die form that perform up to 175°C.

See why National is first in market position and has 85% brand recognition for its best-in-class temperature sensor solutions.

Automotive Electric Power Steering



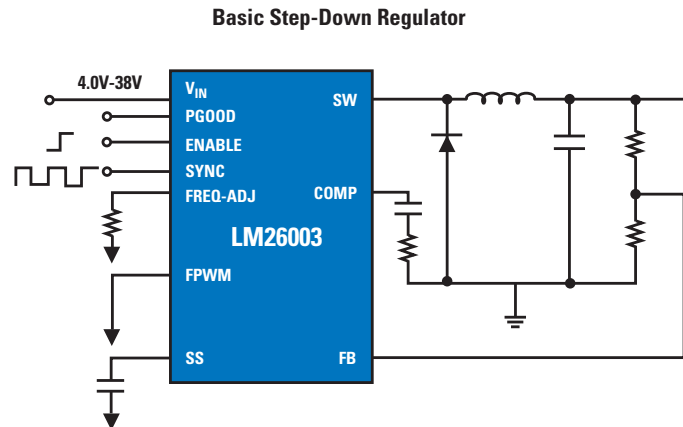
Power Management Solutions

Buck and Boost Regulators

LM26001/3 – PowerWise® 1.5A Buck Regulator Delivers Industry-Leading Low I_q and Feedback Voltage Accuracy

Features

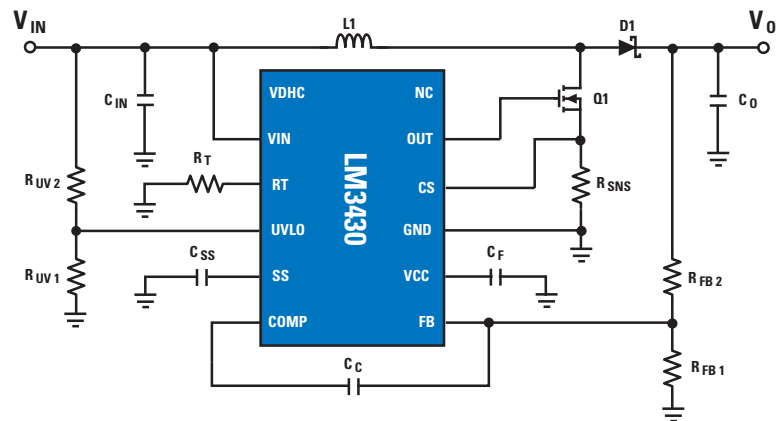
- High-efficiency sleep mode (40 μ A I_q typ.)
- 10 μ A in shutdown mode
- 3V cold-crank compatibility
- 4V to 38V continuous input range
- 1.5% reference accuracy
- Frequency synchronization
- Low input version LM26001B (4.8V to 18V)
- Available in eTSSOP-16 exposed-pad packaging



LM3430 – PowerWise Boost Controller with External Oscillator Sync up to 2MHz

LM3430 Features:

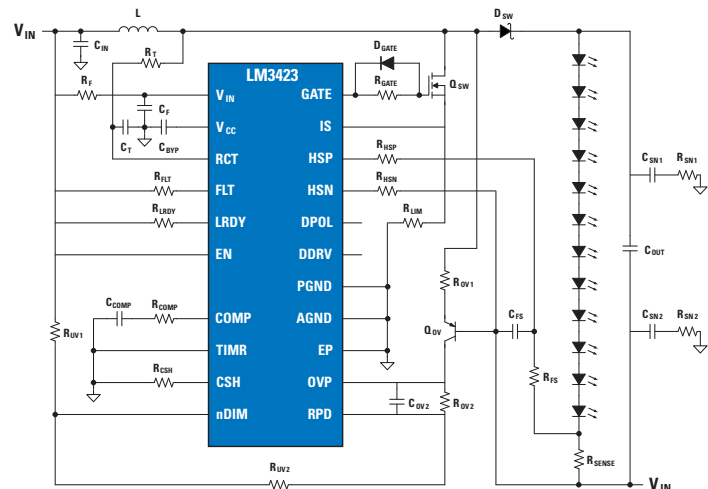
- Internal 40V startup regulator
- 1A peak MOSFET gate driver
- V_{IN} Range 6V to 40V
- Duty cycle limit in excess of 90%
- Programmable UVLO with hysteresis
- Cycle-by-cycle current limit
- External synchronizable (AC-coupled)
- Single resistor oscillator frequency set
- Slope compensation
- Adjustable soft-start
- Available in LLP-12 packaging (3mm x 3mm)



LM3421/3 – PowerWise N-Channel Controllers for Constant Current LED Drivers

LM3421/3 Features:

- Buck, Buck/Boost, SEPIC Topologies
- V_{in} Range 4.5 to 75V
- High side current sensing
- Fast (50kHz) PWM dimming input
- Programmable running frequency
- Zero current shutdown
- Input UVLO
- LED ready flag
- Fault timer pin
- Available in TSSOP-16/20 packaging



Power Management Solutions

Buck and Boost Regulators

Buck Switching Regulators

Product ID	SIMPLE SWITCHER® Buck Regulators	Synchronous Rectification	Load	V _m (V)	V _{ref} (V)	Max Freq	Sync	I _q /Shutdown (µA)	Packaging	Auto Grade
LM25574	✓		500 mA	6 to 42	1.225	1 MHz	✓	3.7 mA/48 µA	TSSOP-16	■
LM5574	✓		500 mA	6 to 75	1.225	500 kHz	✓	3.7 mA/5 µA	TSSOP-16	■
LM25007			500 mA	9 to 42	2.5	800 kHz		0.6 mA/70 µA	MSOP, LLP-8	—
LM5007			500 mA	9 to 75	2.5	800 kHz		0.5 mA/100 µA	MSOP, LLP-8	—
LM34919			600 mA	8 to 40	2.5	1.6 MHz		0.6 mA/80 µA	micro SMD-10	—
LM3103	✓	✓	750 mA	4.5 to 42	0.6	1 MHz	✓	0.7 mA/20 µA	eTSSOP-16	—
LM25010			1A	8 to 42	2.5	1 MHz		0.6 mA/90 µA	LLP-10, eTSSOP-14	■
LM5010A			1A	8 to 75	2.5	1 MHz		0.6 mA/95 µA	LLP-10, eTSSOP-14	■
LM34917A			1.2A	8 to 33	2.5	2 MHz		0.68 mA/95 µA	micro SMD-12	—
LM34914			1.25	8 to 40	2.5	1 MHz		0.6 mA/80 µA	LLP-10	—
LM34910C			1.25	8 to 50	2.5	1 MHz		0.6 mA/80 µA	LLP-10	—
LM25575	✓		1.5A	6 to 42	1.225	1 MHz	✓	3.7 mA/48 µA	eTSSOP-16	■
LM5575	✓		1.5A	6 to 75	1.225	500 kHz	✓	3.7 mA/57 µA	eTSSOP-16	■
LM3100	✓	✓	1.5A	4.5 to 42	0.8	1 MHz	✓	0.7 mA/20 µA	eTSSOP-20	—
LM26001/3			1.5/3.0A	3 to 38	1.25/1.24	500 kHz	✓	40 µA/10 µA	eTSSOP-16/20	■
LM3102	✓	✓	2.5A	4.5 to 42	0.8	1 MHz	✓	0.7 mA/25 µA	eTSSOP-20	—
LM25005			2.5A	7 to 42	1.225	500 kHz		3 mA/50 µA	eTSSOP-20	—
LM5005			2.5A	7 to 75	1.225	500 kHz		3 mA/60 µA	eTSSOP-20	—
LM25576	✓		3A	6 to 42	1.225	1 MHz	✓	3.7 mA/48 µA	eTSSOP-20	■
LM5576	✓		3A	6 to 75	1.225	500 kHz	✓	3.7 mA/57 µA	eTSSOP-20	■

High-Power Density Buck Switching Regulators

Product ID	Input Max Voltage (V)	Input Min Voltage (V)	Output Min (V)	Output Max (V)	Output Current (mA)	Frequency Range (kHz) & Sync	Synchronous Rectification	Packaging	Auto Grade
LM2734X/Y	20	3	0.8	18	1000	500, 1600		SOT23-6	■
LM2734Z	20	3	0.8	18	1000	3000		SOT23-6, LLP-6	■
LM2830X/Z	5.5	3	0.6	4.5	1000	1600		SOT23-5/SOT23-5, LLP-6	(X) ■ (Z) ■
LM2831/2	5.5	3	0.6	4.5	1500/2000	550, 1600, 3000		SOT23-5/LLP-6, eMSOP-8	—
LM20123	5.5	2.95	0.8	5	3000	1500	✓	eTSSOP-16	—
LM20124	5.5	2.95	0.8	5	4000	1000	✓	eTSSOP-16	—
LM20125	5.5	2.95	0.8	5	5000	500	✓	eTSSOP-16	—
LM20133	5.5	2.95	0.8	5	3000	460 to 1.5 MHz, Sync	✓	eTSSOP-16	—
LM20134	5.5	2.95	0.8	5	4000	460 to 1.5 MHz, Sync	✓	eTSSOP-16	—
LM20143	5.5	2.95	0.8	5	3000	500 to 1500	✓	eTSSOP-16	—
LM20144	5.5	2.95	0.8	5	4000	500 to 1000	✓	eTSSOP-16	—
LM20145	5.5	2.95	0.8	5	5000	250 to 750	✓	eTSSOP-16	—
LM20154	5.5	2.95	0.8	5	4000	1000	✓	eTSSOP-16	—
LM20242	36	4.5	0.8	32	2000	1000	✓	eTSSOP-16	—
LM203(2,3,4)3	36	4.5	0.8	32	3000	500 fixed /250 to 1.5MHz/1MHz, Sync	✓	eTSSOP-20	—

Boost Switching Regulators

Product ID	Input Max (V)	Input Min (V)	Output Min (V)	Output Max (V)	Switch Current (A)	Frequency Range (kHz) & Sync	Synchronous Rectification	Packaging	Auto Grade
LM2731	14	2.7	1.23	22	1.5	600, 1600		SOT23-5	—
LM2733	14	2.7	3	40	1	600, 1600		SOT23-5	—
LM2735X	5.5	2.7	3	24	2.25	1600		SOT23-5	■
LM2735Y	5.5	2.7	3	24	2.25	520		SOT23-5	■
LM5000	40	3.1	1.259	Set by external feedback network	2	300, 600		LLP-16, TSSOP-16	—
LM5001	75	3.1	1.26	Set by external feedback network	1	50 to 1500, Sync		SO-8, LLP-8	—
LM5002	75	3.1	1.26	Set by external feedback network	0.5	50 to 1500, Sync		SO-8, LLP-8	—
LM27313	14	2.7	4	28	1	600, 1600		SOT23-5	—

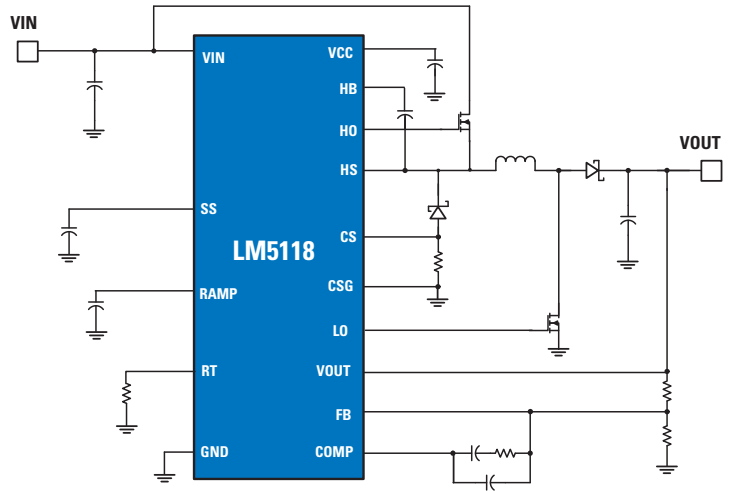
PowerWise® product, ■ = AEC-Q100 qualified, ■ = AEC-Q100 qualification coming soon

Power Management Solutions Controllers

LM5118 – Wide Voltage Range Buck-Boost Controller

Features

- Ultra-wide input voltage range from 3V to 75V
- Emulated peak current mode control
- Smooth transition between step-down and step-up modes
- Switching frequency programmable to 500KHz
- Oscillator synchronization capability
- Internal high voltage bias regulator
- Integrated high and low-side gate drivers
- Programmable soft-start time
- Ultra low shutdown current
- Enable input wide bandwidth error amplifier
- 1.5% feedback reference accuracy
- Thermal shutdown
- Available in TSSOP-20 packaging



Boost, Buck-Boost Controllers

Product ID	Input Max (V)	Input Min (V)	Output Min (V)	Output Max (V)	Feedback Tolerance %	Frequency Range (kHz) & Sync	On/Off Pin	Topology, PWM Mode	Channels	Packaging	Auto Grade
LM5118	75	3	1.23	70	1.46	50 to 500, Sync	✓	Buck-Boost	1	eTSSOP-20	—
LM3478	40	2.95	1.26	40	1.26	100 to 1000, Sync	✓	Boost, Sepic, Flyback	1	MSOP-8	🚗
LM3481	48	2.97	1.275	40.8	1.275	100 to 1000, Sync	✓	Boost, SEPIC, Flyback	1	MSOP-10	■
LM3488	40	2.95	1.26	40	1.26	100 to 1000, Sync	✓	Boost, Sepic, Flyback	1	MSOP-8	🚗
LM5022	60	6	1.25	54	1.25	50 to 2000, Sync	✓	Boost, Sepic, Flyback	1	MSOP-10	—

Buck Controllers

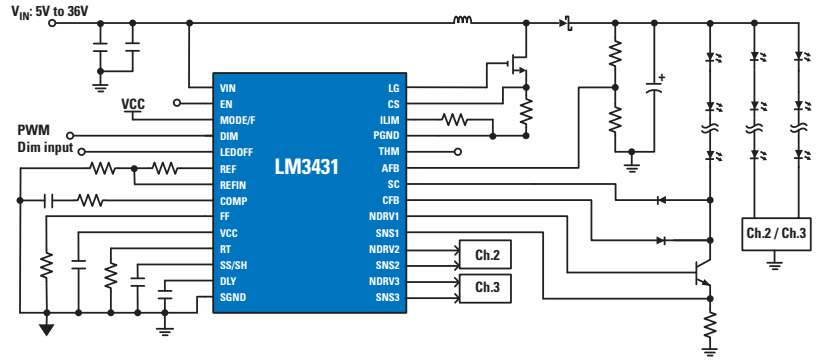
Product ID	Input Max (V)	Input Min (V)	Output Min (V)	Output Max (V)	Feedback Tolerance %	Frequency Range (kHz) & Sync	On/Off Pin	Topology, PWM Mode	Channels	Packaging	Auto Grade
LM25115/A	42	4.5	13.5	0.75	1.7	100 to 1000, Sync	✓	Secondary Side Post Regulator Controller, Voltage/current-injection	1	TSSOP-16	—
LM25116	42	6	36	1.215	1.5	50 to 1000, Sync	✓	Current mode step down	1	eTSSOP-20	—
LM3485	35	4.5	1.242	V _{IN}	2	0 to 1400	—	Hysteretic step down	1	MSOP-8	🚗
LM3489	35	4.5	1.239	V _{IN}	2	0 to 1400	✓	Hysteretic step down	1	MSOP-8	🚗
LM5115/A	75	4.5	13.5	0.75	1.7	50 to 1000, Sync	✓	Voltage/current-injection Valley current mode	1	TSSOP-16	—
LM5116	100	6	80	1.215	1.5	50 to 1000, Sync	✓	Current mode step down	1	eTSSOP-20	—
LM5642X	36	4.5	1.3	34.5	1.5	200 to 500, Sync	✓	Current mode step down	2	eTSSOP-28, TSSOP-28	—

PowerWise® product, 🚗 = AEC-Q100 qualified, ■ = AEC-Q100 qualification coming soon

LM3431 – PowerWise® 3-Channel Constant-Current LED Driver with Integrated Boost Controller

Features

- 3-channel programmable LED current
- High accuracy linear current regulation
- Analog and digital PWM dimming control
- Up to 25 kHz dimming frequency
- >100:1 contrast ratio
- Integrated boost controller
- 5V to 36V input voltage range
- Adjustable switching frequency up to 1 MHz
- Available in eTSSOP-28 packaging



Lighting Management Units

Product ID	Description	V _{IN} Range	Drive Current for All	Current for Flash Mode	Current Matching	Temp Range (°C)	Packaging	Auto Grade
LP5526	Lighting management unit with high-voltage boost converter with up to 150 mA serial flash LED driver	3. to 5.5	150 mA total	150 mA	2% (RGB)	-30 to 85	micro SMD-25	—
LP5521	Fully programmable 3-channel color LED driver with advanced power save features	2.7 to 5.5	75 mA	—	1%	-30 to 85	micro SMD-20	—
LP5522	Autonomous single LED controller with one wire interface	2.7 to 5.5	20 mA	—	—	-30 to 85	micro SMD-6	—

LED Drivers

Product ID	Description	Input Range (V)	Max Output (V)	Max LED Current (mA)	Max # of LEDs in Series	Switching Freq (MHz)	Topology	Key Features	Packaging	Auto Grade
LM3401	Hysteretic PFET LED Driver	4.5 to 30	35	3000	9	1.5	Buck	Adjustable hysteresis, 100% duty cycle, PWM dimming	MSOP-8	—
LM3402HV 04HV/06HV	0.5A Constant Current LED Driver	6 to 42 / 6 to 75	37 / 67	500/1000/1500	9/15	Adjustable up to 1 MHz	Buck	Fast PWM dimming, no control loop compensation, supports ceramic capacitor and capacitor-less outputs	MSOP-8, PSOP-8	—
LM3402/04/06	1A Constant Current LED Driver	6 to 42	37 / 67	1000	9/15	Adjustable up to 1 MHz	Buck	Same as features of LM3402/HV above	SOIC-8, PSOP-9	—
LM3405A	1A Constant Current LED Driver	3 to 15 / 3 to 22	14 / 20	1000	4	1.6	Buck	205 mV feedback voltage, PWM dimming	TSOT-6	—
LM3407	0.35A Constant Current LED Driver	4.5 to 30	27	350	7	Adjustable up to 1 MHz	Buck	Fast PWM dimming, low external component count, constant frequency	eMSOP-8	—
LM3410	Constant Current Boost and SEPIC LED Driver with Internal Compensation	2.7 to 5.5	24	1000	6	525 kHz / 1.6 MHz	Boost, SEPIC	PWM dimming, small footprint, low external component count	SOT23-5, LLP-6	■
LM3430/32	6-Channel Constant Current Boost Controller and Current Regulator for Driving LEDs	6 to 40	80+	40 per string	100	Adjustable up to 2 MHz	Boost	Dynamic Headroom Control for balanced current through up to 6 strings of LEDs	TSSOP-28, LLP-28	—
LM3431	3-Channel Constant Current LED Driver with Integrated Boost Controller	5 to 36	40+	200 per string	30	Adjustable up to 1 MHz	Boost	Balances current through 3 strings of LEDs for even brightness	LLP-12, LLP-24, eTSSOP-28	■
LM5022	Low Side Boost Controller	6 to 60	80+	1000+	20+	Adjustable up to 2 MHz	Boost, Flyback	PWM dimming, current mode control, precision enable	MSOP-10, LLP-10	—
LM3421/3	N-Channel Controllers for Constant Current LED Drivers	4.5 to 75	75V	>2000	20	Adjustable up to 2MHz	Buck, Boost, Flyback, SEPIC	Fast PWM dimming, LED ready, broken open check, over voltage protection, FLT, cycle by cycle current limit	eTSSOP-16/20	■

PowerWise® product, ■ AEC-Q100 qualification coming soon

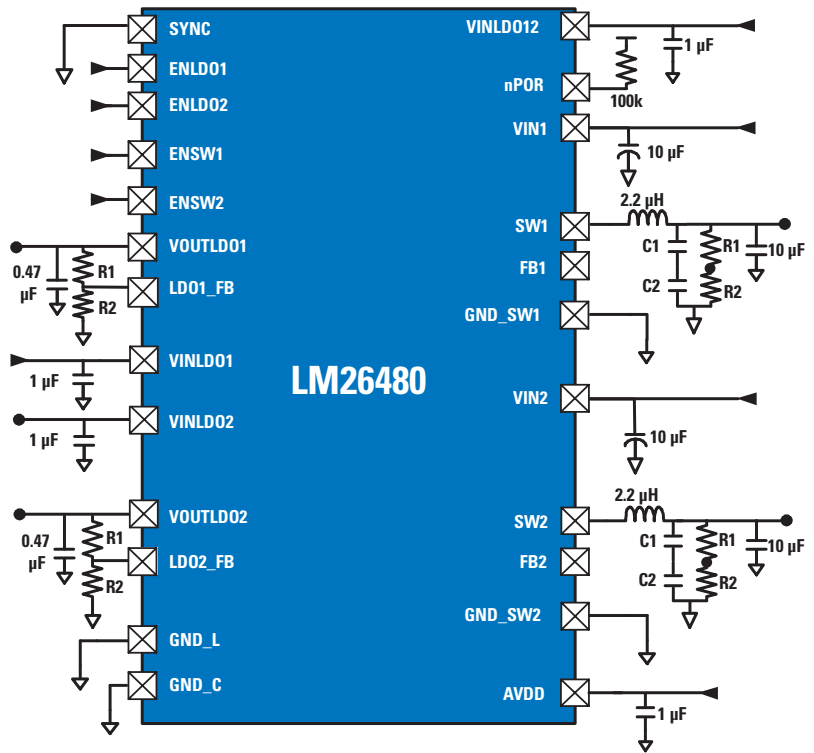
Power Management Solutions

Multi-Output Regulators and Sequencers

LM26480 – Dual High-Current Buck Regulator and Dual Linear Regulator with Externally Controlled Voltage Outputs

Features

- V_{OUT} from:
 - Buck1: 0.8V–2.0V at 1.5A
 - Buck2: 1.0V–3.3V at 1.5A
- Up to 96% efficiency
- $\pm 3\%$ FB voltage accuracy
- 2 MHz PWM switching frequency
- LDO V_{OUT} of 1.0V to 3.5V at 300 mA
- Compatible with advanced applications processors and FPGAs
- Available in LLP-24 packaging (4 x 4 x 0.8 mm)



Multi-Output Regulators

Multi-output Regulators	Description	I_{OUT}	Output Range (V)	Peak Efficiency	Input Range (V)	Features	Auto Grade
LP3906	Dual 1.5A buck, dual 300 mA LDO, I ² C	up to 1.5A	0.8 to 3.3	96%	2.7 to 5.5	I ² C to voltage and on/off control One pin sequence control Sync pin	—
LM26480	Dual 1.5A buck, dual 300 mA LDO, external control	up to 1.5A	0.8 to 3.3	96%	2.7 to 5.5	External enables	—
LP3907SQ	Dual 1000 mA/600 mA buck, dual 300 mA LDO	up to 1000 mA	0.8 to 3.3	96%	2.7 to 5.5	I ² C to voltage and on/off control External enables one pin sequence control Power on reset	—

Sequencers

Product ID	Input Max (V)	Input Min (V)	Number of Regulators Able to Sequence	Power Down	Power Up	Ability to Cascade	On/Off Pin	Packaging	Auto Grade
LM3880	5.5	2.7	3	Yes	Yes	Yes	Yes	SOT-23 - 6	
LM3881	5.5	2.7	3	Yes	Yes	Yes	Yes	Mini-SOIC - 8	—

PowerWise® product, = AEC-Q100 qualified

Power Management Solutions

LDO Linear Regulators and Voltage References

Low Dropout CMOS Linear Regulator Family

Product ID	Input Max (V)	Input Min (V)	V _{OUT}	Maximum Dropout (mV)	Load (mA)	Enable Pin	Packaging	Auto Grade
LP38690	10	2.7	ADJ (1.25 - 9) or 1.8, 2.5, 3.3, 5	1600	1000	—	T0252-3, SOT223-5 or LLP-6	—
LP38692	10	2.7	ADJ (1.25 - 9) or 1.8, 2.5, 3.3, 5	1600	1000	✓	SOT223-5 or LLP-6	—
LP38691	10	2.7	ADJ (1.25 - 9) or 1.8, 2.5, 3.3, 5	725	500	—	T0252-3 or LLP-6	—
LP38693	10	2.7	ADJ (1.25 - 9) or 1.8, 2.5, 3.3, 5	725	500	✓	SOT223-5 or LLP-6	—
LP2960	30	—	ADJ (1.24 - 29) or 3.3, 5	600	500	✓	SOIC-16	—
LM9070	26	5.3	5	800	250	—	TSOP-20, T0220-7	—
LM9071	26	5.3	5	800	250	✓	T0220-5, T0263-5	—
LP2952	30	—	ADJ (1.24 - 29) or 3.3, 5	600	250	✓	TSOP-16, MDIP-14, D, W	—
LP2953	30	—	ADJ (1.24 - 29) or 3.3, 5	600	250	✓	TSOP-16, MDIP-16, D, W	—
LP2954	30	—	ADJ (1.24 - 29) or 5	600	250	✓	MSOP-8, T0220-3, T0263-3	—
LP2956	30	—	ADJ (1.24 - 29) or 5	600	250	✓	TSOP-16, MDIP-16	—
LP2957	30	—	5	600	250	✓	T0220-5	—
LM9076	40	3.65, 5.4	3.3, 5	450	150	✓	T0263-5	—
LM2936	40	3.3	3, 3.3, 3.5	400	50	✓	MSOP-8, SOT223-4, T0252-3, SOIC-8, T092-3, D, W	—
LM9036	40	3.7	3.3, 5	400	50	—	MSOP-8, T0252-3, SOIC-8	—

Voltage References

Product ID	Type	Input Max (V)	Input Min (V)	Reference (V)	Initial Accuracy (+/-) Max	Tempco, Max (ppm/C)	Output Current (mA)	Quiescent Current (mA)	Long Term Stability (ppm/1000hr)	Voltage Noise (μVp-p)	Packaging	Auto Grade
LM4120	Series	14	3.3	3, 3.3, 4.096, 2.048, 5, 1.8, 2.5	0.2, 0.5	50	5	0.16	100	20	SOT23-5	—
LM4128	Series	5.5	2.2	3, 3.3, 4.096, 2.048, 1.8, 2.5	0.1, 0.2, 0.5, 1	75, 100	20	0.06	50	170	SOT23-5	■
LM4132	Series	5.5	2.2	4.096, 2.048, 2.5	0.05, 0.1, 0.2, 0.4, 0.5	10-30	20	0.06	50	170	SOT23-5	🚗
LM4140	Series	5.5	1.8	1.25, 4.096, 2.048, 1.024, 2.5	0.1	3	8	0.23	60	2.2	SO-8	—
LM4030	Shunt	NA	NA	2.5, 4.096, 5.0	0.05, 0.10, 0.15	10, 20, 30	30	0.12	50	100	SOT23-5	—

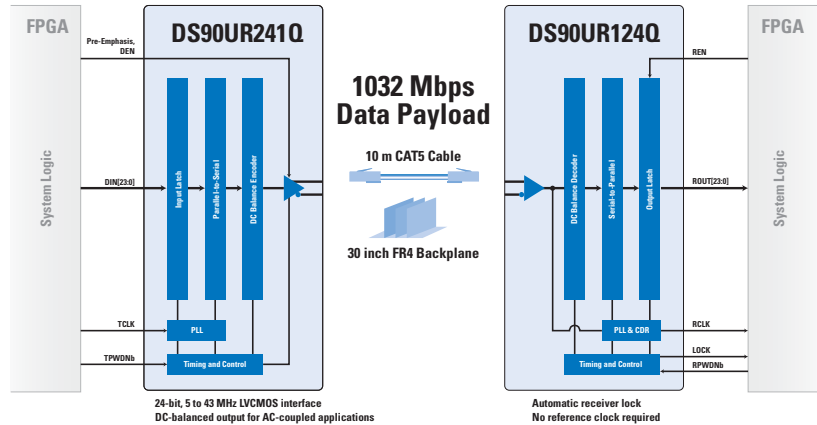
🚗 = AEC-Q100 qualified, ■ = AEC-Q100 qualification coming soon

Interface Solutions

DS90UR241Q/124Q – 24-bit FPD-Link II LVDS Ser/Des with DC-Balance and Pre-Emphasis

Features

- Serializes 24 bits at 5 to 43 MHz (125 to 1032 Mbps)
- Receiver automatically locks to any data pattern without external clock
- DC-balance encoding for AC-coupled and optical interconnects
- Drives 10m twisted pair cable
- At-speed BIST pattern generation/verification
- 10 kV ESD (ISO-10605) and hot plug protection
- Extreme -40 to +105°C temperature range

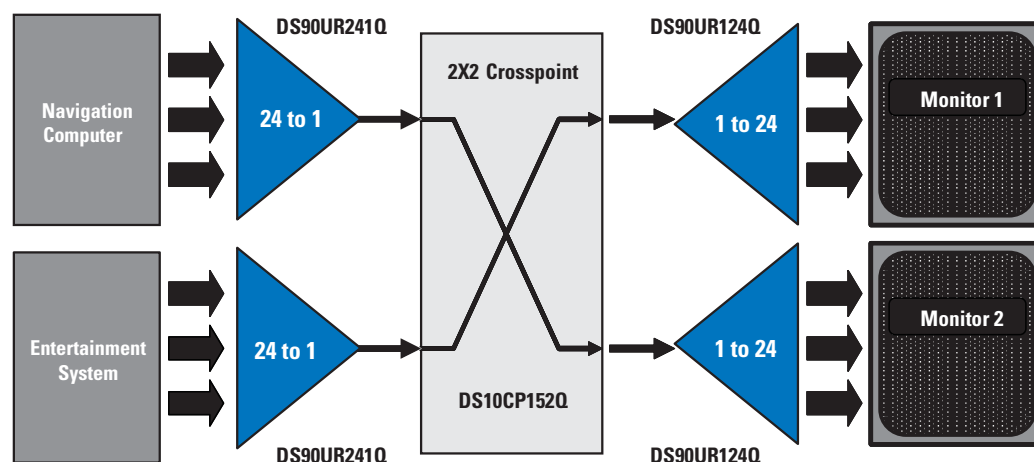


Serializer/Deserializer

Product ID	Description	Mux Rate	Throughput (Mbps)	Pixel Clock Rate (MHz)	Graphics Bits	Function	ESD	Temperature Range (°C)	Packaging	Auto Grade
Serializers										
DS90UR241Q	5 to 43 MHz, 24 bit FPD Link II LVDS	24 : 1	1032	43	6	AC-Coupled, DC Balance, Built-In Self Test (BIST), Enhanced Serial Link Randomization and Scrambling to lower EMI	8 kV HBM, ISO 10605	- 40 to 105	TQFP-64	
DS99R421Q	5 to 43 MHz, 24 bit FPD Link to FPD Link II LVDS Converter	24 : 1	1032	43	6	AC-Coupled, DC Balance, Built-In Self Test (BIST), Enhanced Serial Link Randomization and Scrambling to lower EMI	8 kV HBM, ISO 10605	- 40 to 105	LLP-36	
DS90C241Q	5 to 35 MHz, 24 bit FPD Link II LVDS	24 : 1	840	35	6	AC-Coupled, DC Balance	8 kV HBM, ISO 10605	- 40 to 105	TQFP-48	
SCAN921025H	20 to 80 MHz, 10 bit BLVDS Serializer	10 : 1	800	80	10	IEEE1149.1, Built-In Self Test (BIST)	2 kV HBM	- 40 to 125	FBGA-49	—
Deserializers										
DS90UR124Q	5 to 43 MHz, 24 bit FPD Link II LVDS	1 : 24	1032	43	6	AC-Coupled, DC Balance, Built-In Self Test (BIST), Frequency spread PTO and Slew rate control to lower EMI	8 kV HBM, ISO 10605	- 40 to 105	TQFP-64	
DS90C124Q	5 to 35 MHz, 24 bit FPD Link II LVDS	1 : 24	840	35	6	AC-Coupled, DC Balance, Adjustable PTO to lower EMI	8 kV HBM	- 40 to 105	TQFP-48	
SCAN921226H	20 to 80 MHz, 10 bit BLVDS Deserializer	1:10	800	80	10	IEEE1149.1, Built-In Self Test (BIST)	2 kV HBM	- 40 to 125	FBGA-49	—

= AEC-Q100 certified

Crosspoint Switch with Ser/Des in Automotive Infotainment



Product ID	Description	Inputs	Outputs	Input Levels	Output Levels	Max Datarate (Mbps)	Temp Range (°C)	Packaging	Auto Grade
Crosspoint Switches									
DS25CP102	3.125 Gbps LVDS 2X2 Crosspoint with pre-emphasis and equalization	2	2	LVDS	LVDS	3125	-40 to 85	LLP-16	
DS10CP152Q	1.5 Gbps LVDS 2X2 Crosspoint	2	2	LVDS	LVDS	1500	-40 to 85	SOIC-16	
DS25CP152Q	3.125 Gbps LVDS 2X2 Crosspoint	2	2	LVDS	LVDS	3125	-40 to 85	LLP-16	
Drivers/Receivers									
DS90LV011AQ	LVDS Driver	1	1	LVTTTL	LVDS	400	-40 to 85	SOT-23-5	
DS90LV027AQ	Dual LVDS Driver	2	2	LVTTTL	LVDS	400	-40 to 85	SOIC-8	
DS90LT012AQ	LVDS Receiver	1	1	LVDS	LVTTTL	400	-40 to 85	SOT-23-5	
DS90LV028AQ	Dual LVDS Receiver	2	2	LVDS	LVTTTL	400	-40 to 85	SOIC-8	
DS90LV049Q	Dual full duplex LVDS Transceiver	4	4	LVTTTL/LVDS	LVDS/LVTTTL	400	-40 to 85	SOIC-16	
M-LVDS									
DS91D176	M-LVDS Transceiver	1	1	LVTTTL/LVDS	LVDS/LVTTTL	200	-40 to 85	SOIC-8	—
DS91C176	M-LVDS Transceiver	1	1	LVTTTL/LVDS	LVDS/LVTTTL	200	-40 to 85	SOIC-8	—
DS91D180	M-LVDS Full Duplex	2	2	LVTTTL/LVDS	LVDS/LVTTTL	200	-40 to 85	SOIC-8	—
DS91C180	M-LVDS Full Duplex	2	2	LVTTTL/LVDS	LVDS/LVTTTL	200	-40 to 85	SOIC-8	—
DS91M040	Quad Full Duplex M-LVDS Transceiver	4	4	LVDS/LVTTTL	LVDS/LVTTTL	250	-40 to 85	LLP-32	—
DS91M047	Quad M-LVDS Driver	4	4	LVTTTL	LVDS	250	-40 to 85	SOIC-16	—
DS91M124	1 to 4 M-LVDS Driver	1	4	LVTTTL	LVDS	250	-40 to 85	SOIC-16	—
DS91M125	1 to 4 M-LVDS Driver	1	4	LVDS	LVDS	250	-40 to 85	SOIC-16	—

PowerWise® product, = AEC-Q100 certified

Data Conversion Solutions

A/D and D/A Converters

Ultra-High Speed A/D Converters

Product ID	Sampling Rate (MSPS)	Power	ENOB (Bits)	SNR (dB)	SFDR (dB)	THD (dBc)	Packaging	Auto Grade
ADC083000 	3000	1.9	7.2	45.3	57	-57	LQFP-128	—
ADC08B3000 	3000	1.6	7.2	45.3	55.4	-57	LQFP-128	—
ADC08D1000 	1000	1.6	7.4	47.1	55	-55	LQFP-128	—
ADC08D1500 	1500	1.8	7.4	47	56	-54.5	LQFP-128	—
ADC08B200Q	200	0.306	7.2	46.3	56	-53	TQFP-48	
ADC08D500 	500	1.4	7.5	48	55	-55	LQFP-128	—

High-Speed A/D Converters

Product ID	Channels	Speed (MSPS)	Power (mW)	SNR (dB)	SFDR (dB)	Outputs	Packaging	Auto Grade
10-Bit								
ADC10040Q 	1	40	56	59.6	80	CMOS	TSSOP-28	
ADC10065 	1	65	68.4	59.6	80	CMOS	TSSOP-28	—
ADC10080 	1	80	78.6	59.5	79	CMOS	TSSOP-28	—
ADC10D020	2	20	150	59	75	CMOS	TQFP-48	—
ADC10D040 	2	40	267	60	72	CMOS	TQFP-48	—
ADC10DL065	2	65	370	61	85	CMOS	TQFP-64	—
12-Bit								
ADC12C080 	1	80	300	71.2	90	CMOS	LLP-32	—
ADC12C105 	1	105	400	71	90	CMOS	LLP-32	—
ADC12DL040 	2	40	210	69	85	CMOS	TQFP-64	—
ADC12DL065 	2	65	360	69	86	CMOS	TQFP-64	—
ADC12DL080 	2	80	447	69	82	CMOS	TQFP-64	—
ADC12DS080 	2	80	800	71.2	90	Serial LVDS	LLP-60	—
ADC12DS105 	2	105	1000	71	88	Serial LVDS	LLP-60	—
14-Bit								
ADC14C080 	1	80	300	74.2	90	CMOS	LLP-32	—
ADC14C105 	1	105	400	74	90	CMOS	LLP-32	—
ADC14DS080 	2	80	800	74.2	90	Serial LVDS	LLP-60	—
ADC14DS105 	2	105	1000	73	90	Serial LVDS	LLP-60	—

 PowerWise® product,  = AEC-Q100 qualified

Data Conversion Solutions

A/D and D/A Converters

Low-Power A/D Converters

Product ID	Res (bits)	Inputs	Pin and Function Compatible	Speed Range (kSPS)	Supply Voltage Range (V)	Typ Power (mW)		Static Performance (Typ)		ENOB (bits) typ	Temp Range (°C)	Packaging	Auto Grade
						3V	5V	INL (LSB)	DNL (LSB)				
Single-Ended Input SPI A/D Converters													
ADC121S021 	12	1		50 to 200	2.7 to 5.25	1.5	7.9	+0.45, -0.4	+0.45, -0.25	11.7	-40 to 85	SOT-23, LLP-6	—
ADC121S051 	12	1		200 to 500	2.7 to 5.25	1.7	8.7	+0.45, -0.4	+0.5, -0.25	11.6	-40 to 85	SOT-23, LLP-6	—
ADC121S101 	12	1		500 to 1000	2.7 to 5.25	2	10	±0.4	+0.5, -0.3	11.7	-40 to 125	SOT-23, LLP-6	—
ADC122S021 	12	2		50 to 200	2.7 to 5.25	2.2	7.9	±0.35	+0.4, -0.2	11.7	-40 to 85	MSOP-8	—
ADC122S051 	12	2		200 to 500	2.7 to 5.25	3	10	±0.5	+0.7, -0.4	11.7	-40 to 85	MSOP-8	—
ADC122S101 	12	2		500 to 1000	2.7 to 5.25	4.3	13.1	±0.64	+0.9, -0.6	11.7	-40 to 85	MSOP-8	—
ADC124S021 	12	4		50 to 200	2.7 to 5.25	2.2	7.9	±0.35	+0.4, -0.2	11.7	-40 to 85	MSOP-10	—
ADC124S051 	12	4		200 to 500	2.7 to 5.25	3	10	±0.5	+0.7, -0.4	11.7	-40 to 85	MSOP-10	—
ADC124S101 	12	4		500 to 1000	2.7 to 5.25	4.3	13.1	±0.64	+0.9, -0.6	11.7	-40 to 85	MSOP-10	—
ADC128S022 	12	8		50 to 200	2.7 to 5.25	1.2	7.5	±0.4	-0.3, +0.5	11.8	-40 to 105	TSSOP-16	—
ADC128S052 	12	8		200 to 500	2.7 to 5.25	1.6	8.7	±0.4	-0.4, +0.6	11.8	-40 to 105	TSSOP-16	—
ADC128S102 	12	8		500 to 1000	2.7 to 5.25	2.3	10.7	±0.5	-0.4, +0.7	11.8	-40 to 105	TSSOP-16	—
Differential-Input SPI A/D Converters													
ADC121S625 	12	1		50 - 200	4.5 to 5.5	—	2.25	+0.5/-0.3	±0.4	11.8	-40 to 85	MSOP-8	—
ADC121S655 	12	1		200 - 500	4.5 to 5.5	—	9	±0.6	±0.4	11.7	-40 to 105	MSOP-8	—
ADC121S705 	12	1		500 - 1000	4.5 to 5.5	—	11.5	±0.6	±0.4	11.7	-40 to 105	MSOP-8	—
ADC141S626 	14	1		50 - 250	2.7 to 5.5	2	4.8	±0.5	±0.5	13.7	-40 to 85	MSOP-10	—
ADC122S625 	12	2		50 - 200	4.5 to 5.5		8.6	±1.0	±0.95	11.25	-40 to 105	MSOP-10	—
ADC122S655 	12	2		200 - 500	4.5 to 5.5		11	±1.0	±0.95	11.25	-40 to 105	MSOP-10	—
ADC122S706 	12	2		500-1050	2.7 to 5.5	20	25	±1.0	±0.95	11.25	-40 to 105	TSSOP-14	—

Low-Power D/A Converters

Product ID	Res (bits)	# Mux Inputs	Pin and Function Comp. Family	Typ Settling Time (µsec)	Supply Voltage (V)	Typ Current Consumption (µA)		Static Performance (Typ)		Reference	I/O Type¹	Packaging	Auto Grade
						3V	5V	INL (LSB)	DNL (LSB)				
Digital-to-Analog Converters													
DAC081S101 	8	1		3	2.7 to 5.5	175	260	±0.2	±0.04	Supply	Serial (SPI)	TSOP-6, MSOP-8	—
DAC101S101 	10	1		8	2.7 to 5.5	175	260	±0.6	±0.15	Supply	Serial (SPI)	TSOP-6, MSOP-8	—
DAC121S101 	12	1		8	2.7 to 5.5	175	260	±2.6	+0.2, -0.1	Supply	Serial (SPI)	TSOP-6, MSOP-8	—
DAC082S085 	8	2		3	2.7 to 5.5	210	320	±0.14	+0.04, -0.02	External	Serial (SPI)	MSOP-10, LLP-10	—
DAC102S085 	10	2		4.5	2.7 to 5.5	210	320	±0.7	+0.08, -0.03	External	Serial (SPI)	MSOP-10, LLP-10	—
DAC122S085 	12	2		6	2.7 to 5.5	210	320	±2.4	+0.2, -0.1	External	Serial (SPI)	MSOP-10, LLP-10	—
DAC084S085 	8	4		3	2.7 to 5.5	350	500	±0.14	+0.04, -0.02	External	Serial (SPI)	MSOP-10, LLP-10	—
DAC104S085 	10	4		4.5	2.7 to 5.5	350	500	±0.7	+0.08, -0.03	External	Serial (SPI)	MSOP-10, LLP-10	—
DAC124S085 	12	4		6	2.7 to 5.5	360	480	±2.4	+0.2, -0.1	External	Serial (SPI)	MSOP-10, LLP-10	—
DAC088S085 	8	8		3	2.7 to 5.5	650	970	±0.125	±0.03	Dual External	Serial (SPI)	TSSOP-16, LLP-16	—
DAC108S085 	10	8		4.5	2.7 to 5.5	650	970	±0.5	+0.08, -0.04	Dual External	Serial (SPI)	TSSOP-16, LLP-16	—
DAC128S085 	12	8		6	2.7 to 5.5	650	970	±2.0	+0.15, -0.09	Dual External	Serial (SPI)	TSSOP-16, LLP-16	—

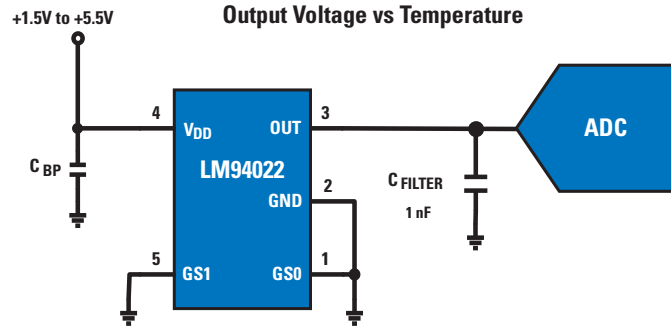
PowerWise® product ¹SPI/QSPI/DSP compatible

Temperature Sensor Solutions

LM94022Q - 1.5V, SC70, Multi Gain Analog Temperature Sensor with Class-AB Output

Features

- 1.5V to 5.5V Supply
- 5.4 μ A typ quiescent current
- $\pm 1.5^{\circ}\text{C}$ accuracy
- -50°C to 150°C operating temperature
- Four selectable gains to optimize maximum gain for a given supply voltage
- Optimized to drive ADC inputs
 - ± 50 μ A output drive
 - Drives up to 1100 pF load capacitance without external resistor
- SC70 packaging



Temperature Sensors: Analog

Product ID	Description	Temperature Range ($^{\circ}\text{C}$)	Accuracy ($^{\circ}\text{C}$)	Scale Factor / Resolution	Power Supply (V)	Supply Current	Packaging	Auto Grade
Analog								
LM94022Q	1.5V analog temperature sensor with 4 selectable gains and class-AB output	-50 to 150	± 1.5	-5.5 to -13.6 mV/ $^{\circ}\text{C}$	1.5 to 5.5	5.4 μ A	SC70	(0)
LM19	Very low supply current, CMOS, leaded package	-55 to 130	± 2.5	-11.7 mV/ $^{\circ}\text{C}$	2.4 to 5.5	4.5 μ A	TO-92	—
LM20	Very low supply current, CMOS, tiny packages	-55 to 130	± 1.5	-11.7 mV/ $^{\circ}\text{C}$	2.4 to 5.5	4.5 μ A	SC70 & micro SMD	—
LM35	Bipolar, high accuracy	-55 to 150	± 0.5	10 mV/ $^{\circ}\text{C}$	4 to 30	56 μ A	SOIC-8, TO-92, TO-220, TO-46	—

Temperature Sensors: Temperature Switch

Product ID	Description	Temperature Range ($^{\circ}\text{C}$)	Accuracy ($^{\circ}\text{C}$)	Set Point Range ($^{\circ}\text{C}$)	Power Supply (V)	Supply Current	Packaging	Auto Grade
Temperature Switch								
LM26	Analog temperature switch + temp sensor: small, low power temperature switch plus analog temperature sensor	-55 to 120, 1°C increments	± 3	-55 to 120, 1°C increments	2.7 to 5.5	16 μ A	SOT-23	—
LM27	Analog temperature switch + temp sensor: small, low power, high temp temperature switch plus analog temperature sensor	120 to 150, 1°C increments	± 3	120 to 150, 1°C increments	2.7 to 5.5	15 μ A	Die, SOT-23	—
LM26LV	Analog temperature switch + temp sensor: small, low voltage, low power, extended temperature, switch plus analog temperature sensor	0 to 150, 1°C increments	± 2.2	0 to 150, 1°C increments	1.6 to 5.5	8 μ A	LLP-6	—
LM56	Analog TS + temp sensor: user programmable temperature dual setpoint/output switches plus analog temperature sensor	-40 to 125, Ext Resistor set	± 2.0	-40 to 125, Ext Resistor set	2.7 to 10	110 μ A	SOIC-8, MSOP-8	—

PowerWise® product, (0) = AEC-Q100 qualified, (0) AECQ Temperature Grade 0

Temperature Sensor Solutions

Temperature Sensors: Digital

Product ID	Description	Accuracy (°C)	Voltage Range (V)	Supply I (mA)	Temperature Range (°C)	Interface Type	Resolution (bits)	Packaging	Auto Grade
Digital									
LM73	11- to 14-bit, 2-wire local digital temperature sensor	± 1	2.7 to 5.5	0.320	-40 to 150	2-wire	11-14	SOT23-6	—
LM75	9-bit digital temperature sensor and thermal watchdog with two-wire interface	± 2.0	3 to 5.5	0.250	-55 to 125	2-wire	9	MSOP-8, SOIC-8	—
LM92	Highly accurate temperature sensor and thermal window comparator	± 0.33 and ± 0.5	2.7 to 5.5	0.350	-55 to 150	2-wire	13	SOIC-8	—
LM71	High accuracy and resolution SPI/Microwire™ temperature sensor	± 1.5	2.65 to 5.5	0.300	-40 to 150	3-wire	14	Die, SOT23-5, LLP-6	—
LM95071	High accuracy and resolution SPI/Microwire temperature sensor	± 1.0	2.4 to 5.5	0.28	-40 to 150	3-wire	14	SOT23-5	—
LM9517202	175°C, High temperature, accuracy and resolution SPI/Microwire Temp Sensor	±1.0	3 to 5.5V	0.400	-40 to 175	3-wire	16	Die	 (0)

Temperature Sensors: Remote Diode

Product ID	Description	Temperature Range (°C)	Accuracy (°C)	Scale Factor/ Resolution	Power Supply (V)	Supply Current	Packaging	Auto Grade
Remote Diode								
LM95235Q	11-bit remote diode temperature sensor with SMBus interface and TruTherm® technology	-40 to 85°C, 140°C remote range	±0.75	0.03125°C/LSB	3.0 to 3.6	350 µA	MSOP-8	
LM95213	11-bit dual remote diode temperature sensor with SMBus interface, 3 Tcrit	-40 to 140°C, 140°C remote range	±1.1	0.03125°C/LSB	3.0 to 3.6	570 µA	LLP-14	—
LM95214	11-bit quad remote diode temperature sensor with SMBus interface, 3 Tcrit	-40 to 140°C, 140°C remote range	±1.1	0.03125°C/LSB	3.0 to 3.6	570 µA	LLP-14	—

Temperature Sensors: Hardware Monitors

Product ID	Description	Temperature Range (°C)	Accuracy (°C)	Scale Factor / Resolution	Vmon Accuracy	Power Supply (V)	Supply Current	Packaging	Auto Grade
Hardware Monitor									
LM80	Hardware monitor with voltage monitoring, DAC output, TACH inputs	-25 to 125	± 3.0	0.0625°C/LSB	1%	2.8 to 5.75	0.2 mA	TSSOP-24	—
LM87	Hardware monitor with dual remote diodes, DAC output, TACH Inputs	-40 to 125	± 3.0	1°C/LSB	2%	2.8 to 3.8	0.7 mA	TSSOP-24	—
LM63	Remote diode digital temperature sensor with PWM output LUT fan control	0 to 85 (Local) 25 to 125 (Remote)	± 1.0	0.125°C/LSB	NA	3.0 to 3.6	1.3mA	SOIC-8	—
LM64	Remote diode digital temperature sensor with PWM output LUT fan control, GPIOs	0 to 85 (Local) 25 to 140 (Remote)	± 1.0	0.125°C/LSB	NA	3.0 to 3.6	1.1 mA	LLP-24	—
LM96194	Hardware monitor, 4 TruTherm® remote diodes, 4 fan monitor, 2 PWM fan controls, 8 voltage monitors, PI and LUT closed loop fan control for 4-pin fans	-40 to 85 (Local) -40 to 100 (Remote)	± 3.0	0.5°C/LSB	2%	3.0 to 3.6	1.6 mA	LLP-48	—
LM96163	Hardware monitor, with TruTherm support and LUT fan control	-40 to 125	± 0.75	0.03125°C/LSB	NA	3.0 to 3.6	456 µA	LLP-10	—

 PowerWise® product,  = AEC-Q100 qualified, (0) AECQ Temperature Grade 0

Audio Solutions

Class AB Mono

Product ID	Description	THD (%)	Output Power at 1% THD+N $V_{DD} = 5V$		Packaging	Auto Grade
			4Ω (W)	8Ω (W)		
LM48100	Mono, 1.25W Audio Power Amplifier with Output Fault Detection and Volume Control	0.02	—	1.25	Exposed Pad TSSOP-14	
 LM4941 	1.25W Boomer®, RF suppression, high PSRR and CMRR	0.04	—	1.25	micro SMD-9, LLP-8	—
LM4990	2W (into 4Ω) Boomer with selectable shutdown	0.02	2.03	1.25	LLP-10, micro SMD-9, MSOP-8, TSSOP-10	—
 LM4995 	1.3W Boomer amplifier	0.08	—	1.3	micro SMD-9, LLP-8	—

Class D Mono

Product ID	Description	THD (%)	Output Power THD ≤ 1% $V_{DD} = 5V$		Packaging	Auto Grade
			4Ω (W)	8Ω (W)		
 LM4673 	Mono filterless	0.02	2.15	1.24	micro SMD-9, LLP-8	—
LM4675 	Mono, ultra-low EMI	0.02	2.2	1.3	micro SMD-9, LLP-8	—
LM48310	Mono filterless, Enhanced Emission Suppression (E ² S)	0.03	2.1	1.3	LLP-10	—

Class AB Stereo

Product ID	Description	THD (%)	Output Power at THD ≤ 1%		Packaging	Auto Grade
			4Ω (W)	8Ω (W)		
LM48510 	1.2W Boosted Class D Boomer	0.07	1.7 at 3.3V	1.2 at 3.3V	LLP-16	—
LM48511	3W Boosted Class D Boomer with ultra low EMI and spread spectrum	0.03	5.4 at 5V	3 at 5V	LLP-24	—
LM4928	Audio power amplifier with RF Suppression	0.04	1.8W	1.2W	LLP-14, micro SMD-16	—

Class D Stereo

Product ID	Description	THD (%)	Output Power THD ≤ 1% $V_{DD} = 5V$		Packaging	Auto Grade
			4Ω (W)	8Ω (W)		
LM4674 	Stereo filterless	0.05	1.9	1.25	micro SMD-16, LLP-16	—
LM48411	Enhanced Emission Suppression (E ² S)	0.05	2W	1.25	micro SMD-16	—

Audio Subsystems

Product ID	Description	Mono Input Ch.	Stereo Input Ch.	Class D Speaker Driver	Packaging	Auto Grade
LM49450	2.5W low EMI stereo class D subsystem with 24-bit DAC, ground referenced headphones, volume control, and 3D enhancement	—	I ² S	✓	LLP-32	—
LM4934	3D audio sub-system with stereo speaker, OCL/SE stereo headphone, earpiece and monoline level outputs	1	2, I ² S	—	micro SMD-42	—
LM4935	Audio sub-system with dual-mode stereo headphone & Mono high efficiency loudspeaker amplifiers and multi-purpose ADC	1 analog + I ² S	1 analog + I ² S	✓	micro SMD-49	—
LM49250	Enhanced Emissions Suppression stereo class D audio sub-system with ground referenced headphone amplifier	differential	2	✓	micro SMD-36	—
LM49370 	Boomer audio power amplifier series audio sub-system with dedicated interface for Bluetooth transceivers	PCM	1 ² s	✓	micro SMD-49	—

 PowerWise® product,  = AEC-Q100 qualified

High-Performance Audio Op Amplifiers

Product ID	Description	Input Voltage Noise Density (nV/√Hz)	THD (%)	Slew Rate (V/μs)	GBWP (MHz)	PSRR (dB)	Supply Voltage (V)	Packaging	Auto Grade
LME49710	High-performance, high-fidelity audio op amp	2.7	0.00003	20	56	125	±2.5 to ±17	DIP-8, MSOP-8, T099-8	—
LME49870	44V High-performance, high-fidelity audio op amp	2.7	0.00003	20	55	125	±2.5 to ±22	SOIC-8	—
LM4562*	Dual high-performance, high-fidelity audio op amp	2.7	0.00003	20	56	110	±2.5 to ±17	DIP-8, MSOP-8, T099-8	—
LME49720	Dual high-performance, high-fidelity op amp	2.7	0.00003	20	56	110	±2.5 to ±17	DIP-8, MSOP-8, T099-8	—
LME49860	44V dual high-performance, high-fidelity audio op amp	2.7	0.00003	20	55	120	±2.5 to ±22	SOIC-8	—
LME49740	Quad high-performance, high-fidelity audio op amp	2.7	0.00003	20	56	125	±2.5 to ±17	DIP-8, MSOP-8	—
LME49713	High-performance, high-fidelity current feedback audio op amp	1.9	0.00008	1900	30	102	±5 to ±18	SOIC-8	—
LME49721	High-performance, high-fidelity, rail-to-rail input/output audio op amp	4	0.0002	8.5	20	103	2.2 to 5.5	MSOP-8	—
LME49723	Dual, high-fidelity audio op amp	3.6	0.0002	8	17	100	±2.5 to ±17	MSOP-8	—
LM49743	Quad high-performance, high-fidelity audio op-amp	3.5	0.0001	12	30	98	±4 to ±17	TSSOP-14	—

*EETimes China ACE Awards 2007 Product of the Year; Electronic Products 2006 Product of the Year; EDN's 100 of Product of 2006

Headphone Buffer

Product ID	Description	THD (%)	Output Current (mA)	Slew Rate (V/μs)	GBWP (MHz)	Supply Voltage (V)	Packaging	Auto Grade
LME49600	High-performance, high-fidelity, high-current audio buffer	0.00015	250	2000	20/180	±2.25 to ±18	T0263-5	—

High-Performance Audio Power Amplifier Driver

Product ID	Description	Supply Voltage Max (V)	Typical THD Ratings (%)	THD Measurement Conditions	PSRR (dB)	Supply Voltage Range (V)	Mute/Shutdown	Packaging	Auto Grade
LM4702B	Stereo high-fidelity audio power amplifier driver	±100	0.003	$A_V = 30$ dB, $V_{OUT} = 20 V_{RMS}$ at 1 kHz	110	±20 to ±100	Mute	T0220-15	—
LM4702C	Stereo high-fidelity audio power amplifier driver	±75	0.005	$A_V = 30$ dB, $V_{OUT} = 14 V_{RMS}$ at 1 kHz	110	±20 to ±75	Mute	T0220-15	—
LME49810	Mono high-fidelity audio power amplifier driver with Baker Clamp	±100	0.0007	No Load, BW = 30 kHz, $V_{OUT} = 20 V_{RMS}$ at 1 kHz	110	±20 to ±100	Mute	T0247-15	—
LME49811	Mono high-fidelity audio power amplifier driver with mute	±100	0.005	No load, $A_V = 30$ dB, $V_{OUT} = 10 V_{RMS}$ at 1 kHz	110	±20 to ±100	Mute	T0247-15	—

Stereo Headphone Amplifier

Product ID	Description	THD (%)	PSRR (dB)	Output Power THD ≤ 1%, $V_{CC} = 3V$		Auto Grade
				16Ω (mW)	32Ω (mW)	
LM4980	42 mW high-fidelity stereo headphone amplifier with click/pop suppression	0.02	90	42	28	—
LM4985	135 mW headphone Boomer with OCL or cap-coupled output, 32-step I ² C volume control	0.08	77	45	23	—

 PowerWise® product

Amplifier Solutions

High-Speed Amplifiers

Product ID	Description	Channels	-3 dB Bandwidth at min gain (MHz)	Min Gain	Slew Rate (V/ μ s)
Video					
LM6171	Wide supply video amp	1	160	+1	3600
LM6172	Wide supply video amp	2	160	+1	3000
LM7121	Wide supply video amp	1	235	+1	1300
LM7171	Wide supply video amp	1	220	+2,-1	4100
LM7372	Wide supply video amp	2	220	+2,-1	3000
LMH6714/20/22	Wideband single and quad amps	1, 4	420	+1	1800
LMH6715	Dual wideband video amp	2	480	+1	1300
LMH6723/24/25 	PowerWise® 1mA 370 MHz amplifier	1, 2, 4	370	+1	600
LMH6733	Single supply GHz triple amp	3	1000	+1	3750
LMH6734	Programmable gain -1,+1,+2 gain buffer	3	925	n/a	3750
Single Supply Optimized for Video					
LMH6601	CMOS high input impedance rail to rail output	1	125	+1	250
LMH6611/12 	PowerWise high speed rail-to-rail output	1,2	345	+1	460
LMH6618/19 	PowerWise rail to rail input and output	1, 2	140	+1	57
LMH6639	Rail to rail output	1	228	+1	172
LMH6642/43/44	Rail to rail output	1, 2, 4	130	+1	135
LMH6645/46/47	PowerWise rail to rail input and output	1, 2,1	55	+1	22
High-Speed Low Noise					
LMH6609	Ultra wideband voltage feedback amplifier	1	900	+1	1400
LMH6624/26 	Ultra low noise wideband	1, 2	190/170	10	400/360
LMH6628 	Wideband low noise and distortion	2	300	+1	550
LMH6702 	Ultra low distortion wideband	1	1700	+1	3100
LMH6703 	Wideband low distortion with shutdown	1	1800	+1	4200
High-Speed Differential Amplifiers					
LMH6550	Fully differential high speed	1	400	+1	3000
LMH6551	Low-power fully differential	1	370	+1	2400
LMH6552	Fully differential wideband 8- to 14-bit ADC driver	1	1500	+1	3800
Variable Gain Amplifiers		Input	-3 dB Bandwidth, unity gain (MHz)	Voltage Noise (nV/$\sqrt$Hz)	Gain adjust range (dB)
LMH6502	Wideband linear in DB VGA	Differential	130	7.7	70
LMH6503	Wideband linear in V/V VGA	Differential	135	6.6	70
LMH6505	Wideband, Low-power, linear in dB VGA	Single Ended	150	4.4	80
Clock Buffers		Channels	Frequency (MHz)	Phase Noise (dBc/Hz)	Slew Rate V/μs)
LMH2180	75 MHz dual clock buffer	2	78	-123	106
LMV112	49 MHz dual clock buffer	2	40	—	110
RF Detectors		RF frequency (MHz)	Dynamic Range (dB)	Power Range (dBm)	Accuracy (dB)
LMH2100	Log power detector for CDMA and WCDMA	50-4000	40	-45 to -5	0.5
LMV221	Log power detector for CDMA and WCDMA	50-3500	40	-45 to -5	0.5
LMV225	RF power detector for CDMA and WCDMA	450-2000	30	-30 to 0	1
LMV228	RF power detector for CDMA and WCDMA	450-2000	30	-15 to 15	1
High-Speed Comparators		Vcc (V)	Icc (mA/ ch)	t_{pd} (ns)	Toggle Rate (Mbps)
LMH7322	Dual high-speed comparator with LVDS/ RSPECL outputs	2.7 to 12	22.6	0.7	4000
LMH7324 	Quad high-speed comparator with LVDS/ RSPECL outputs	5 to 12	22.6	0.7	4000
LMH7220	High-speed comparator with LVDS outputs	2.7 to 12	6.8	2.9	1080
LMV7219 	High-speed comparator with TTL outputs	2.7 to 5	1.1	7	
LMP7300	Precision comparator and reference	2.7 to 12	10 μ A	10 μ s	
Special Video Functions		Vcc (V)	Supported Standards	Outputs	Packaging
LMH1980	Auto detecting SD/HD/PC video sync separator	4.75 to 5.25	NTSC, PAL, 480I/P, 576I/P, 720P, 1080I/P/PsF, PC RGB	Hsync, Vsync, Csync, Burst/Back Porch, Odd/Even, HD Detect	MSOP-10
LMH1251	YPBPR to RGBHV converter and 2:1 video switch	Vcc (V)	Switch Inputs	Output	Packaging
		4.75 to 5.25	1 : YPBPR 480I/P, 576I/P, 720P, 1080I/P 2: PC RGBHV up to UXGA	RGBHV up to UXGA	TSSOP-24

 PowerWise® product,  = AEC-Q100 qualified

	Supply Voltage (V)	Supply Current Per Channel Type (mA)	Input Offset Voltage Max 25C (mV)	Voltage Noise (nV/√Hz)	Shut down	Packaging	Temp Range (°C)	Auto Grade
	5.5 to 34	2.5	3	12	—	MDIP-8,SOIC-8	IND -40 to 85	—
	5.5 to 36	2.2	3	12	—	MDIP-8,CDIP8,CSOIC-16,SOIC-8	IND -40 to 85, MIL -55 to 125	—
	4.5 to 33 (SOIC-8) 4.5 to 11 (SOT23-5)	5.3	8	17	—	SOIC-8,SOT23-5	IND -40 to 85	—
	5.5 to 36	6.5	1	14	—	MDIP-8,SOIC -8,CDIP-8,CPACK-10,	IND -40 to 85, MIL -55 to 125	—
	9-to 36	6.5	8	14	—	SOIC,PSOP,LLP-8	IND -40 to 85	—
	10 to 12	5.6	5	3.4	✓ (6720)	SOT23-5,SOT23-6,SOIC-8, SOIC-14, TSSOP-14	IND -40 to 85, MIL -55 to 125	🚗 (6722)
	10 to 12	5.8	6	3.4	—	SOIC-8,CDIP-8	IND -40 to 85, MIL -55 to 125	—
	4.5-12	1	3	4.3	—	SOT23-5, SOIC-8, SOIC-14, TSSOP-14	IND -40 to 85,	—
	3 to 12	6.5	2.2	2.1	✓	SSOP-16	IND -40 to 85	—
	3 to 12	6.5	2.4	2.1	✓	SSOP-16	IND -40 to 85	—
	2.4 to 5.5	9.6	2.4	10	✓	SC70-6,	IND -40 to 85	🚗
	2.7 to 11	3.25	0.75	10	✓ (6611)	SOT23-6	Ext IND -40 to 125	—
	2.7 to 11	1.35	0.6	10	✓ (6618)	TSOT-6	Ext IND -40 to 125	—
	3 to 12	4.18	5	16	✓	SOT23-6, SOIC-8	IND -40 to 85	—
	2.7 to 12.8	2.7	5	17	—	SOT23-5, SOIC-8, SOIC-14, TSSOP-14	IND -40 to 85	—
	2.5 to 12	0.725	3	17	✓ (6647)	SOT23-5, SOT23-6, SOIC-8, MSOP-8	IND -40 to 85	—
	6 to 12	7	2.5	3.1	—	SOT23, SOIC-8	IND -40 to 85	—
	5 to 12	12	0.5	0.92/1.0	—	SOT23-5, SOIC8,CDIP-8,CPACK-10	IND -40 to 85, MIL -55 to 125	—
	5 to 12	9	2	2	—	SOIC-8	IND -40 to 85	—
	10 to 12	12.5	4.5	1.83	—	SOT23-5, SOIC-8, CDIP-8, CPACK-10	IND -40 to 85	—
	8 to 12	11	7	2.3	✓	SOT23-6,SOIC-8	IND -40 to 85	—
	5 to 12	20	5	6	✓	SOIC-8, MSOP-8	IND -40 to 85	—
	3 to 12	12.5	4	6	—	SOIC-8, MSOP-8	IND -40 to 85	—
	4.5 to 12	19	16.5	1.1	✓	SOIC-8, LLP-8	IND -40 to 85	—
	Icc (mA)	Slew rate (V/μs)	Linear in	Packaging				
	27	1800	dB	SOIC-14, TSSOP-14				—
	37	1800	V/V	SOIC-14, TSSOP-14				—
	11	1500	dB	SOIC-8, MSOP-8				—
	Supply Voltage Range (V)	Supply Current (mA)	Independent Shutdown	Packaging				
	2.4 to 5	2.3	✓	LLP-8				—
	2.4 to 5	1.6	✓	LLP-8				—
	Supply Voltage (V)	Supply Current (mA)	Shutdown	Packaging				
	2.7 to 3.3	7.1	✓	0.4 mm micro SMD-6				—
	2.7 to 3.3	7.2	✓	LLP-6				—
	2.7 to 5.5	4.8	✓	micro SMD-4 thin/ultra-thin/LLP-6				—
	2.7 to 5.5	4.9	✓	micro SMD-4 thin/ultra-thin/LLP-6				—
	Packaging							
	LLP-24							—
	LLP-32							—
	TSOT-23							—
	SOT-23							—
	SOIC, MSOP							—
								—
								—

Amplifier Solutions

Precision Amplifiers

High-Voltage Operational Amplifiers

Product ID	Channels	Supply Voltage Range (V)	Supply Current Per Channel (mA)	Gain Bandwidth (MHz)	Slew Rate (V/ μ s)	Offset Voltage max, 25C (mV)	Voltage Noise (nV/ $\sqrt{\text{Hz}}$)	Output Current (mA)	Temp Range ($^{\circ}\text{C}$)	Packaging	CMOS Inputs	Rail to Rail inputs	Auto Grade
LM6132/34	2/4	2.7 to 24	0.36	10	14	6	27	4.3	-40 to 85	SOIC-8, MDIP-8, SOIC-14	Bipolar	✓	—
LM6142/44	2/4	1.8 to 24	0.65	17	25	2.5	16	8	-40 to 85	SOIC-8, MDIP-8, SOIC-14	Bipolar	✓	—
LM6211	1	5 to 24	0.96	17	5.5	2.5	6	16	-40 to 125	SOT23-5	✓		—
LM8272	2	2.5 to 24	0.9	13	12	5	15	100	-40 to 85	MSOP-8	Bipolar	✓	—
LM7301	1	2.2 to 30	0.6	4	1.25	6	36	9.5	-40 to 85	SOIC-8, SOT23-5	Bipolar	✓	—
LM8261/62	1/2	2.5 to 30	1.05	21	12	7	15	60	-40 to 85	MSOP-8, SOT23-5	Bipolar	✓	—
LM7341	1	2.5 to 32	0.6	4.5	1.2	4	36	8	-40 to 125	SOT23-5	Bipolar	✓	■
LM7321/22	1/2	2.5 to 32	0.48	16	8.5	5	11.9	48	-40 to 125	SOT23-5, SOIC-8, MSOP-8		✓	—
LM7332	2	2.5 to 32	1.5	19.3	12	4	14.8	55	-40 to 125	SOIC-8, MSOP-8		✓	—
LME49710/20/40	1/2/4	5 to 34	4.8	55	20	0.7	2.5	26	-40 to 85	TO99-8, SOIC-8, MDIP-8	Bipolar		—
LM833	2	10 to 36	2.5	15	7	5	4.5	40	-40 to 85	SOIC-8, MDIP-8, MSOP-8	Bipolar		—
LM10	1	1.1 to 40	.27		.2	2			-40 to 85	TO-5, MDIP, SOIC			

Precision Operational Amplifiers

Product ID	Offset Voltage max, 25C (mV)	Supply Voltage Max	TcVos ($\mu\text{V}/^{\circ}\text{C}$)	CMRR (dB)	PSRR (dB)	Avol (dB)	Voltage Noise (nV/ $\sqrt{\text{Hz}}$)	Channels	Supply Current Per Channel (mA)	Supply Voltage Range (V)	Packaging	CMOS Inputs	Rail to Rail inputs	Auto Grade
LMP2015/16	0.005	5	0.015	130	120	130	35	1/2	0.93	2.7 to 5	SOT23-5, SOIC-8, MSOP-8	✓		—
LMP2014MT	0.025	5	0.01	130	120	130	35	2	0.93	2.7 to 5	TSSOP-14	✓		—
LMP7731/32	0.04	5.5	1	120	129	130	2.9	1/2	2.2	1.8 to 5.5	SOT-23, SOIC-8	Bipolar	✓	—
LMP2021/22	0.005	5.5	0.02	139	130	160	11	1/2	1.1	2.2 to 5.5	SOT-23, SOIC-8, MSOP-8	✓		—
LMP2231/32/34	0.15	5	1	97	120	120	60	1/2/4	0.009	1.8 to 5	SOT23-5, MSOP-8, SOIC-8, TSSOP-14	✓		—
LMP7711/12	0.15	5.5	1	100	100	110	5.8	1/2	1.15	1.8 to 5.5	TSOT-6, MSOP-10	✓		—
LMP7715/16	0.15	5	1	100	98	110	5.8	1/2	1.15	1.8 to 5	SOT23-5	✓		☞ (7716)
LMP7717/18	0.15	5	1	100	98	110	5.8	1/2	1.15	1.8 to 5	SOIC-8, SOT23-8, MSOP-8	✓		—
LMP7701/02/04	0.2	12	1	130	100	119	9	1/2/4	0.715	2.7 to 12	SOT23-5, SOIC-8, MSOP-8, TSSOP-14	✓	✓	—
LMP7707/08/09	0.2	12	1	138	98	119	9	1/2/4	0.715	2.7 to 12	SOT23-5, MSOP-8, TSSOP-14	✓	✓	—
LMP7701/02/04	0.2	12	1	130	100	119	9	1/2/4	0.715	2.7 to 12	SOT23-5, SOIC-8, MSOP-8, TSSOP-14	✓	✓	—
LMP7707/08/09	0.2	12	1	138	98	119	9	1/2/4	0.715	2.7 to 12	SOT23-5, MSOP-8, TSSOP-14	✓	✓	—

☞ PowerWise® product, ☞ = AEC-Q100 qualified, ■ AEC-Q100 qualification coming soon

Low-Noise Operational Amplifiers

Product ID	Channels	Voltage Noise (nV/√Hz)	Max Input Bias Current (nA)	Offset Voltage max, 25C (mV)	Supply Current Per Channel (mA)	Gain Bandwidth (MHz)	Supply Voltage Range (V)	Temperature Range (°C)	Packaging	CMOS Inputs	Rail to Rail inputs	Auto Grade
LMH6624	1	0.92	25000	0.5	12	1500	5 to 12	-40 to 125	SOIC-8, SOT23-5, CERPAC-10	Bipolar	✓	—
LMH6626	2	1	25000	0.5	12	1300	5 to 12	-40 to 125	SOIC-8, MSOP-8	Bipolar	✓	—
LMH6622	2	1.6	15000	1.2	4.3	160	5 to 12	-40 to 85	SOIC-8, MSOP-8	Bipolar		—
LMH6702	1	1.83	34000	4.5	12.5	1700	10 to 12	-40 to 85	SOIC-8, SOT23-5, CERPAC-10	Bipolar		—
LMV771/72/74	1/2/4	12	0.1	0.85	0.6	3.5	2.7 to 5	-40 to 125	SC70-5, SOIC-8, MSOP-8, TSSOP	✓		—
LMH6628	2	2	20000	2	9	300	5 to 12	-55 to 125	CERDIP-8, MSOP-8	Bipolar		—
LMP7731/32	1/2	2.9	85	0.04	2.2	22	1.8 to 5.5	-40 to 125	SOT23-5, SOIC-8	Bipolar	✓	—
LMP2021/22	1/2	11	0.1	0.005	1.1	5	2.2 to 5.5	-40 to 125	SOIC-8, SOT23-5, MSOP-8	✓		—
LM833	2	4.5	1050	5	2.5	15	10 to 36	-40 to 85	SOIC-8, MDIP-8, MSOP-8	Bipolar		—
LMP7711/12	1/2	5.8	0.1	0.15	1.15	17	1.8 to 5.5	-40 to 125	TSOT-6, MSOP-10	✓		—
LMP7715/16	1/2	5.8	0.1	0.15	1.15	17	1.8 to 5	-40 to 125	SOT23-5, SOIC-8, MSOP-8	✓		—
LMP7717/18	1/2	5.8	0.1	0.15	1.15	88	1.8 to 5	-40 to 125	SOIC-8, SOT23-5, MSOP-8	✓		—
LMV791/792	1/2	5.8	0.025	1.35	1.15	17	1.8 to 5	-40 to 125	TSOT-6, MSOP-10	✓		—
LMV793/794	1/2	5.8	0.1	1.35	1.15	88	1.8 to 5	-40 to 125	SOIC-8, SOT23-5, MSOP-8	✓		—
LMV796/797	1/2	5.8	0.1	1.35	1.15	17	1.8 to 5	-40 to 125	SOIC-8, SOT23-5, MSOP-8	✓		—
LM6211	1	6	0.01	2.5	0.96	17	5 to 24	-40 to 125	SOT23-5	✓		—
LMV751	1	6.5	0.1	1	0.6	5	2.7 to 5.5	-40 to 85	SOT23-5	✓		—
LMP7701/02/04	1/2/4	9	0.05	0.2	0.715	2.5	2.7 to 12	-40 to 125	SOIC-8, SOT23-5, MSOP-8, TSSOP-14	✓		—

Current Sense Amplifiers

Product ID	Description	Vcm Range (V)	Vos (mV) (max)	Max TC-VOS (μV/°C)	Gain Output (V/V)	Supply Voltage Range (V)	Supply Current (mA)	PSRR (dB)	Packaging	Auto Grade
LMP8270	High common-mode, AV = 20, unidirectional	-2V to 16V	1	15	20	4.7 to 5.5	1	80	SOIC-8	—
LMP8271	High common-mode, AV = 20, bidirectional	-2V to 16V	1	15	20	4.7 to 5.5	1	80	SOIC-8	—
LMP8272	High common-mode, AV = 14, unidirectional	-2V to 16V	1	15	14	4.7 to 5.5	1	80	SOIC-8	—
LMP8275	Same as LMP8270	-2V to 16V	2	30	20	4.7 to 5.5	1	80	SOIC-8	—
LMP8276	Same as LMP8271	-2V to 16V	2	30	20	4.7 to 5.5	1	80	SOIC-8	—
LMP8277	Same as LMP8272	-2V to 16V	2	30	14	4.7 to 5.5	1	80	SOIC-8	—
LMP8601/Q	High common-mode, 60V, Current Sensing Precision Difference Amplifier	-20V to 60V	1	20	20	3.0 to 5.5	1.1	90	SOIC-8	🚗

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Amplifier Solutions

Precision Amplifiers

Low-Power Operational Amplifiers

Product ID	Channels	Supply Current Per Channel (mA)	Gain Bandwidth (MHz)	Offset Voltage max, 25°C (mV)	Max Input Bias Current (nA)	Voltage Noise (nV/√Hz)	Supply Voltage Range (V)	Temperature Range (°C)	Packaging	CMOS Inputs	Rail to Rail inputs	Auto Grade
LMV641	1	0.158	10	0.5	105	14	2.7 to 12	-40 to 125	SOIC-8, SC70-5	Bipolar		■
LM6132/34 	2/4	0.36	10	6	350	27	2.7 to 24	-40 to 85	SOIC-8, MDIP-8, SOIC-14	Bipolar	✓	—
LMV422	2	0.4	8	4	0.1	25	2.7 to 5.5	-40 to 85	MSOP-10	✓		—
LMV851/52/54	1/2/4	0.41	8	1	0.5	11	2.7 to 5	-40 to 125	SC70-5, MSOP, TSSOP-14	✓		—
LMV951 	1	0.57	2.8	2.8	85	25	0.9 to 3	-40 to 125	TSOT-6	Bipolar	✓	—
LM7301	1	0.6	4	6	250	36	2.2 to 30	-40 to 85	SOIC-8, SOT23-5	Bipolar	✓	—
LM6142/42	2/4	0.65	17	1	526	16	1.8 to 24	-55 to 125	SOIC-8, MDIP-8, SOIC-14	Bipolar	✓	—
LM7341	1	.65	4	4	-95	33	2.7 to 32	-40 to 125	SOT23-5	bipolar	✓	■
LMP7701/02/04 	1/2/4	0.725	2.5	0.22	0.4	9	2.7 to 12	-40 to 125	SOIC-8, SOT23-5, MSOP, TSSOP-14	✓	✓	 (7701)
LM6211 	1	0.96	17	2.5	0.01	6	5 to 24	-40 to 125	SOT23-5	✓		—
LM8261/62	1/2	0.97	21	5	2700	15	2.5 to 30	-40 to 85	SOT23-5, MSOP-8	Bipolar	✓	—
LMV841/42/44	1/2/4	1	4.5	5		20	2.7 to 12	-40 to 125	SC70-5, SOIC, MSOP, TSSOP-14	✓	✓	—

Micropower Operational Amplifiers

Product ID	Channels	Supply Current Per Channel (mA)	Gain Bandwidth (MHz)	Offset Voltage max, 25°C (mV)	Voltage Noise (nV/√Hz)	Output Current (mA)	Supply Range (Volt)	Supply Max (Volt)	Temperature Range (°C)	Packaging	CMOS Inputs	Rail to Rail inputs	Auto Grade
LMC6442	2	0.001	0.01	3	170	0.9	1.8 to 11	11	-40 to 85	SOIC-8, MDIP-8	✓		—
LPV511 	1	0.001	0.027	3	320	0.5	2.7 to 12	12	-40 to 85	SC-70	Bipolar	✓	—
LMP2231/32/34 	1/2/4	0.009	0.13	0.15	60	22	1.8	5	-40 to 125	SOT23-5, MSOP, SOIC, TSSOP-14	✓		—
LMC7111	1	0.025	0.05	7	110	7	2.7	11	-40 to 85	SOT23-5	Bipolar		—
LMV551/52/54 	1/2/4	0.037	3	3	70	10	2.7	5.5	-40 to 125	SC70-5, MSOP-8, TSSOP-14	Bipolar		—
LMV651/52/54 	1/2/4	0.11	12	1.5	17	15	2.7	5.5	-40 to 125	SC70-5, MSOP-8, TSSOP-14	Bipolar		—
LPV531 	1	Adjustable	4.6	4.5	25	15	2.7	5	-40 to 85	TSOT-6	✓		—

 PowerWise® product,  = AEC-Q100 qualified, ■ AEC-Q100 qualification coming soon

Low-Voltage Operational Amplifiers

Product ID	Channels	Supply Voltage Range (V)	Offset Voltage max, 25C (mV)	Supply Current Per Channel (mA)	Gain Bandwidth (MHz)	Voltage Noise (nV/√Hz)	Shut down	Temperature Range (°C)	Packaging	CMOS Inputs	Rail to Rail inputs	Auto Grade
LMV951	1	0.9 to 3	2.8	0.57	2.8	25	Yes	-40 to 125	TSOT-6	Bipolar	✓	—
LM10	1	1.1 to 40	2	.27				-40 to 85	TO-5, MDIP, SOIC			—
LM6142/44	2/4	1.8 to 24	1	0.65	17	16	No	-40 to 85	SOIC-8, MDIP-8	Bipolar	✓	—
LMC6442	2	1.8 to 11	3	0.001	0.01	170	No	-40 to 85	SOIC-8, MDIP-8	✓		—
LMP7711/12	1/2	1.8 to 5.5	0.15	1.15	17	5.8	Yes	-40 to 125	TSOT-6, MSOP-10	✓		—
LMP7716/17	1/2	1.8 to 5	0.15	1.3	17	5.8	No	-40 to 125	MSOP-8	✓		—
LMP7731/32	1/2	1.8 to 5.5	0.04	2.2	22	2.9	No	-40 to 125	SOT23-5, SOIC-8	Bipolar	✓	■
LMV791/92	1/2	1.8 to 5	1.35	1.15	17	5.8	Yes	-40 to 125	TSOT-6, MSOP-10	✓		—
LMV793/94	1/2	1.8 to 5	1.35	1.15	88	5.8	No	-40 to 125	SOIC-8, SOT23-5, MSOP-8	✓		—
LM7301	1	2.2 to 30	6	0.6	4	36	No	-40 to 85	SOIC-8, SOT23-5	Bipolar	✓	—
LM7341	1	2.5 to 32	4	0.6	4	36	No	-40 to 125	SOT23-5	Bipolar	✓	■
LM8261/62	1/2	2.5 to 22	5	0.97	21	15	No	-40 to 85	SOT23-5, MSOP-8	Bipolar	✓	—
LMV841/2/4	1/2/4	2.7 to 12	.5	1.5	4.5	20	No	-40 to 125	SC70, SOIC, TSSOP		✓	—

Comparators

Product ID	Channels	Response Time (μs)	Offset Voltage max, 25C (mV)	Supply Voltage Max	Supply Voltage Range (V)	Supply Current Per Channel (mA)	Output	Temperature Range (°C)	Packaging	Auto Grade
LMV7219	1	0.009	6	5	2.7 to 5	1.1	Push Pull	-40 to 85	SC70, SOT23	—
LMV761/762	1/2	0.12	0.3	5	2.7 to 5	0.275	Push Pull	-40 to 125	SOIC-8, SOT23-5, MSOP-8	—
LM6511	1	0.18	5	36	2.7 to 36	2.7	Open Drain	-40 to 85	SOIC-8	—
LMV331/393/339	1/2/4	0.2	7	5.5	2.7 to 5.5	0.06	Open Drain	-40 to 85	SC70-5, SOT23-5, MSOP, TSSOP	—
LMV7271	1	0.88	4	5	1.8 to 5	0.009	Push Pull	-40 to 85	SC70-5, SOT23-5	—
LMV7291	1	0.88	4	5	1.8 to 5	0.009	Push Pull	-40 to 85	SC70-5	—
LMC6762	2	4	15	15	2.7 to 15	0.006	Push Pull	-40 to 85	SOIC-8	—
LMC6772	2	4	5	15	2.7 to 15	0.006	Open Drain	-40 to 85	SOIC-8	🚗
LMC7211	1	4	5	15	2.7 to 15	0.007	Push Pull	-40 to 85	SOIC-8, SOT23-5	—
LMC7221	1	4	5	15	2.7 to 15	0.007	Open Drain	-40 to 85	SOIC-8, SOT23-5	—
LMP7300	1	4	0.3	12	2.7 to 12	0.012	Open Drain	-40 to 125	SOIC-8	—
LPV7215	1	4.5	3	5	1.8 to 5	0.001	Push Pull	-40 to 85	SC70-5, SOT23-5	—
LMC7215	1	24	6	8	2 to 8	0.001	Push Pull	-40 to 85	SOIC-8, SOT23-5	—

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LM71	Temperature Sensor
LM74	Temperature Sensor
LMP7716	Amplifier
LP2951	Voltage Regulator

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