AUTOMOTIVE PRODUCTS

Infotainment, Displays, Audio Amplifiers, Reference Designs, HEV/EV Battery Management, General Purpose Automotive Analog

SIMPLY SMARTER™
INTERSIL'S AUTOMOTIVE SOLUTIONS

Intersil, with a proven history of providing innovative and highly reliable ICs for the space, consumer, computing, and industrial markets, is uniquely qualified to meet the challenging requirements of the automotive industry.

Over the past few years Intersil has invested in key technologies to address the current mega trends within the automotive market such as environment, safety, information and affordability.

This effort has resulted in leadership positions in high performance power conversions, state-of-the-art precision analog, cell balancing and battery charging ICs, power-efficient class D audio amplifiers, and highly-flexible TFT display controllers.

Intersil has also invested in TS16949 certification of internal fabs and the development of proprietary process technologies (including smart power) for automotive. Intersil, with a strong balance sheet and a dedicated organization of automotive professionals, is committed to delivering world class automotive solutions for you and your customers.

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ADVANCED LCD CONTROLLER WITH ON-CHIP MCU AND 65K COLOR 16-BIT OSD SUPPORT

The TW8823 is a highly integrated advanced LCD controller designed for the automotive infotainment market, targeting center console and rear seat entertainment applications. Features such as an embedded MCU, LED/CCFL backlight controllers, a 4-wire resistive touch screen controller, analog and digital TCON, and a multi-window 16-bit (65K color) bit-map OSD are designed to reduce the system’s overall BOM cost. The TW8823 has multiple analog and digital inputs to support a wide array of video and graphic sources, including navigation modules, back-up cameras, DVD/multimedia modules, PCs, etc. The TW8823 can support a wide variety of both digital & analog LCD panels with resolutions up to WXGA, and also has an integrated single channel LVDS interface to directly drive LVDS based LCD panels.

KEY FEATURES
- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Dual channel digital input support with following combinations:
  - 1 channel 18/16-bit inputs and 1 channel 8-bit inputs
  - 1 channel 24 bit digital RGB/YCbCr inputs
- Integrated 8052 MCU with on-chip cache and SPI DMA support for Read/Write to OSD memory
- 16-bit (65K colors)/8-bit (256 colors) based bit-map OSD support. External 18-bit OSD supported with alpha blending control
- Embedded image enhancement functions:
  - Programmable CTI, hue, brightness, saturation, contrast and sharpness control
  - Black/White stretch
  - Programmable favorite color enhancement - up to three colors (Skin, Grass and Sky)
  - Programmable gamma correction tables
LOW LIGHT OPTIMIZED AMBIENT LIGHT SENSOR (ALS)
Offered in a tiny 4.2mm² package the ISL76671 will measure incident light levels to lower than 0.01 lux. As such, it’s an ideal solution for light detection when hidden behind darkened glass and plastic bezels in a wide range of light based control applications. With temperature compensation and excellent IR rejection, the ISL76671 is an economic and easy to use alternative to other forms of optical sensors such as photo diodes & transistors as it can be directly connected to an ADC sampling system.

KEY FEATURES
- Operates down to < 0.01 lux
- Tiny 2.1 x 2.1mm OFDN package
- Ultra-low operating current < 5µA
- 1.8V to 3.0V supply range
- Full scale determined by low cost bias resistor
- Square root law voltage output
- Close to human eye spectral response
- Fast response time 30ms
- Sampling Q4 2010
- -40 to 105 °C Operation

AUTOMOTIVE SERDES VIDEO LINK
ISL76321 - 16(+3)-BITs, 6 To 45MHz PIXEL CLOCK SERDES ISL76341 - 24(+3)-BITs, 6 To 45MHz PIXEL CLOCK SERDES
A simple, low overhead solution to video data transmission in the car. Intersil’s Serdes enables transmission of video data together with bi-directional control down a single shielded twisted pair (STP) cable. The ISL76321/41 are the only products in their class to use a transceiver at both cable ends allowing on-demand, primary data direction change.

These Serdes links offer user flexibility through their I²C programmability, including 16 levels of cable equalization and pre-emphasis. A unique fast locking circuit at the receiver ensures excellent link performance even when exposed to considerable noise.

KEY FEATURES
- Tx pre-emphasis and Rx-equalization
  - Allows for longer cable runs and/or cable cost optimization
  - EQ provides maximum cable drive capability whilst minimizing EMI
- Unique back-channel solution
  - Allows low cost end-to-end control data communication
  - I²C control interface with four I²C addresses
- Unique transceiver design
  - Reduces inventory management
- Superior line rate locking performance
  - ensures continuous video transmission in the face of noise
- Hot-plugging with automatic re-lock with every Hsync
- DC balanced line coding via 8B/10B allows AC coupling
2A SYNCHRONOUS BUCK REGULATOR WITH BOOST CONVERTER

KEY FEATURES
• Buck with boost pre-regulator for start-stop and cold crank operation
• Flexible device operational topologies
  - Boost-buck converter
  - Synchronous buck converter
  - Standard buck converter
  - Boost controller
• Optional mode operation:
  - Constant frequency PWM
  - Programmable load boundary between PFM and PWM modes
  - Optional PFM under light load
• 3V to 40V input range
• 4A integrated HS FET
• Programmable frequency from 200kHz - 2.2MHz
• 100µA quiescent current, 0.5µA shutdown current
• Programmable cycle by cycle current limit
• Frequency fold back feature
• -40°C to +125°C operating temperature range

APPLICATIONS
• Automotive Cold Crank Power
• Automotive Start-Stop Power
• Industrial Power
• Battery Power
• Point of Load
• Embedded Processor and I/O Supplies

EXCELLENT LINE REGULATION
BAT+(VIN) drops from 15V to 3V

BAT+(VIN) rise from 3V to 40V (simulate load dump situation)

TYPICAL APPLICATION DIAGRAM
HV, Low \( I_q \) LDO

**ISL78300, ISL78301, ISL78306, ISL78307**

**40V, LOW \( I_q \), 50mA AND 150mA LINEAR REGULATORS**

**KEY FEATURES**
- Optimized for “always-on” applications
- 21\( \mu \)A quiescent current (typical)
- Withstands 45V load dump
- Operates down to 3V during cold cranking
- Low 300mV dropout voltage
- 50mA (78300/1) or 150mA (78306/7) output
- +3.3V, +5.0V or 2.5-12V adjustable output
- Stable operation with 10\( \mu \)F output capacitor
- Shutdown input (EN) (ISL78301/7)
- Thermal protection
- Current limit protection
- -40°C to +125°C operating temperature range
- Thermally enhanced 8 Ld SOIC & 14 Ld HTSSOP packages

**APPLICATIONS**
- Alarm Systems
- Remote Keyless Entry Receivers
- “Always-on” Module Power

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**3A/4A LOW \( I_q \), 1MHz HIGH EFFICIENCY SYNCHRONOUS BUCK REGULATOR**

**ISL78213, ISL78214**

**AEC-Q100**

**KEY FEATURES**
- Pin-to-Pin compatible 3A/4A integrated FET regulators
- \( V_{\text{IN}} \) range: 2.7V to 5.5V
- \( V_{\text{OUT}} \) range: 0.8V to \( V_{\text{IN}} \)
- ISL78213: 3A continuous load current
- ISL78214: 4A continuous load current
- Current mode control
- Flexible operation mode: Selectable PFM/PWM mode
- Highest light load efficiency: 35\( \mu \)A quiescent current
- High switching frequency – 1MHz
- External synchronization capability
- Up to 95% efficiency
- \( V_{\text{GOOD}} \) (Power OK) output, internal digital soft-start & regulator enable pin
- Peak current limiting, short circuit protection over-temp

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**Efficiency vs Load (1MHz 5V IN PWM)**
AUTOMOTIVE INFOTAINMENT PRODUCTS

Core & GPU Power
- Automotive PWM DC/DC Voltage Controller
  ISL78210 (page 14)
- Automotive Single-Phase Core Regulator for IMVP-6™ CPUs
  ISL78211 (page 14)
- Improved Industry Standard Single Ended Current Mode PWM Controller
  ISL78215 (page 30)

System Power
- 40V, Low Iq, 50mA and 150mA Linear Regulators
  ISL78300, ISL78301, ISL78306, (page 7)
- 2A Synchronous Buck Regulator with Boost Converter
  ISL78200 (page 6)
- 3A/4A Low Iq 1MHz High Efficiency Synchronous Buck Regulator
  ISL78213, ISL78214 (page 7)

Audio Power Booster
- High power switching supply > 400W to drive high performance car audio
- Flexible Single Ended Current Mode PWM Controller
  ISL6721 (page 12)
- 2A Buck Controller
  ISL8540 (page 12)
- 100V/2A Peak High-Frequency Half Bridge Driver with CMOS Logic Inputs
  ISL8540 (page 12)
- 6-Phase Boost PWM Controller with Phase Dropping Enhancement
  ISL78220 (page 13)

USB Switching
- Automotive Grade USB 2.0 High/Full Speed Multiplexer
  ISL76120 (page 15)
Intersil D2Audio (page 10)

**Class D Amplifier**

*Only Class D amplifier to have received coveted approvals from Mark Levinson & THX*

Intersil and Mark Levinson will partner to jointly develop custom-tuned audio amplifier solutions. Mark Levinson's custom tuning of Intersil D2Audio products will provide customers with the unique opportunity to create a wide range of automotive audio solutions with superior sonic performance.

60mW Capfree Class AB Stereo Amplifier
ISL99202 (page 12)

**Digital Audio Engines and Integrated Power Stages for Head Units and Trunk Amplifiers**

**LVDS**

High performance Serdes video link

SERDES
ISL76321, ISL76341 (page 5)
ISL76322 (page 28)

**USB & Analog Switches**

Diverse portfolio of high ESD low current switches
(page 15)
Intersil’s D2Audio® group makes the world’s only Intelligent Digital Amplifier™. Patented D2Audio technology is integrated into every Digital Audio Engine™ (DAE™) to deliver an immersive audio experience with incredible sound and flexibility.

Today, Intersil combines the compelling value advantages of its D2Audio technology with its in-house expertise in power management and power supply design to bring a range of cost effective, multi-channel audio solutions to market. The D2Audio portfolio ideally suits compact, high efficiency sound in today’s car applications like Infotainment, Head Units and even scalable multi-channel audio solutions for trunk amplifiers.

Intersil’s advanced audio control technology delivers outstanding acoustic quality even with inexpensive speakers in the harsh, space conscious, automotive environment. The powerful D2Audio PWM ICs are customizable allowing acoustic performance to be tailored to a specific model platform. In the future, D2Audio technology will be exploited in Active Sound Design (ASD) contexts where the in-cabin acoustic profile can be modified to suit an acoustic environment matching the needs of a car’s brand.

All Intersil’s D2Audio Automotive solutions share the following base features:

- **All-Digital Amplifier Signal Processing**
- **Only Class D Amplifier to Have Received Coveted Approvals From Mark Levinson & THX**
- **Multi-channel High Performance PWM Outputs**
  - Achieve >110dB dynamic range without additional pro-audio output DACs
- **Integrated, Multi-channel Input, Adaptive Sample Rate Converters (SRCs)**
- **Scalable Architecture**
  - from 20W to > 500W/channel
  - Support for half bridge, full bridge and BTL (bridge tied load) connections
  - Works with lowest cost discrete solutions or fully integrated power stages
- **Graceful Fault Handling and Recovery**
  - Maximizes audio performance under all potential fault conditions
- **Dynatiming™ Adaptive Switching for Highest System Power Efficiency**
  - Reduces EMI profile
    - D2Audio amplifiers are compliant with CISPR25
- **Full Diagnostic Reporting Modules Available**
- **Audio Canvas™ III System Developers Tool**
  - GUI simplifies system design
  - Intuitive, audio-centric user interface
  - User programmable signal flows
  - "Point-and-click" options on a Windows® PC
  - Simplifies audio processing configurations and avoids complex programming
  - Available Q4 2010
- **D2Audio SoundSuite™ Immersive Processing Options Include:**
  - WideSound spatializer
  - DeepBass low-frequency enhancement
  - AudioAlign vertical A/V adjustment
  - HiLo automatic near-field loudspeaker EQ
  - LEO automatic room/cabin EQ
  - Selectable preset content/model EQ
D2 Audio
DIGITAL AUDIO ENGINES

Device # Primary Auto Application # of PWM Outputs # Audio Input Channels # SRC Inputs (32 to 192kHz) Output Power (W) Digital Ports SPDIF Rx/Tx I/f Key Features Package Temperature range (ºc)

D2-81431 (DAE1B) Head unit 4 4 4 Determined by o/p stage choice I/C x 1 SCI x 1 Y Multi-channel class D power amplifier controller with graceful protection and recovery. Drives discrete or Integrated Power Stages from 10W to over 500W. 128 Ld LQFP -40 to 85ºC

D2-914xx (DAE2) Multi-channel Trunk amplifier 4 4 4 Determined by o/p stage choice SPI x 1 I/C x 2 SCI x 1 Y Multi-channel class D power amplifier controller with graceful protection and recovery. Drives discrete or Integrated Power Stages from 10W to over 500W. 128 Ld LQFP -40 to 85ºC

D2AQ-926xx (DAE3) Multi-channel Trunk amplifier 12 12 8 Determined by o/p stage choice SPI x 1 I/C x 2 SCI x 1 Y Multi-channel class D power amplifier controller with graceful protection and recovery. Drives discrete or Integrated Power Stages from 10W to over 500W. 128 Ld LQFP -40 to 105ºC

D2-42x57 (DAE4) Head unit 5 5 2 Determined by o/p stage choice SPI x 1 I/C x 2 Y Fully integrated amplifier solution with integrated power stage. Includes all the features of the DAE4 Built-in audio controls including tone, EQ, mixing and routing. 128 Ld LQFP -40 to 85ºC

D2-42x57 (DAE4P) Head unit 1, plus 4 x ½ bridge amps 5 2 30W x 2 (in 8ohm) SPI x 1 I/C x 2 Y On completion of Auto qualification, parts can be rated to operate from -40 to 105ºC

INTEGRATED POWER STAGE

Device Description Amplifier Type THD+N SNR Pout @ 1% THD (W) ICC (mA) Power Supply Package

D2-24044 Quad channel configurable digital audio power output stage Class D 0.05 110 4 chs @10W in 8Ω (% bridge) 2 chs @30W in 8Ω (bridged) TBD 9 to 26V 38 Ld EPTSSOP

LOW POWER AUDIO AMPLIFIERS

Device Device Description Amplifier Type THD+N (%) SNR (dB) Pout @ 1% THD (W) ICC Current (mA) Shutdown Current (μA) Power Supply Range (V) Package

ISL99201 Filterless High Efficiency 1.5W Class D Mono Amplifier Class D 0.05 102 1.15 3.2 0.2 2.4 to 5.5 8 Ld TDFN

ISL99202 60mW, Capfree, Stereo Headphone Amplifier Class AB 0.01 102 0.063 2.4 0.1 2.4 to 5.5 12 Ld TQFN

Automotive Reference Design

Amplifiers

To simplify the evaluation of D2Audio Automotive sound systems, several reference designs have been developed.

<table>
<thead>
<tr>
<th>Product</th>
<th>DAE Engine</th>
<th>Output Power</th>
<th>No. of External Input Channels</th>
<th>No. of Output Channels</th>
<th>Input Supply Voltage (V)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>XA50-4</td>
<td>DAE1B</td>
<td>4 x 50W in 4Ω</td>
<td>4 analog and 1 S/PDIF</td>
<td>4 (full bridge)</td>
<td>up to 28V</td>
<td>Multiple independent channels,full Diagnostics,versatile audio controls cross-fade,mixing EQ etc.</td>
</tr>
<tr>
<td>KA50-9</td>
<td>DAE3</td>
<td>9 x 50W in 4Ω</td>
<td>5/PDIF &amp; 2 voice grade line inputs</td>
<td>9 (full bridge)</td>
<td>up to 28V</td>
<td>Multiple independent channels,versatile audio controls cross-fade, mixing EQ etc. Includes Blackfin DSP.</td>
</tr>
<tr>
<td>VA100-8N</td>
<td>DAE2 x 2</td>
<td>8 x 100W in 2Ω</td>
<td>4 analog and 1 S/PDIF</td>
<td>8 (half bridge)</td>
<td>12V nominal</td>
<td>Implements full digital,closed loop feedback for highest performance audio including high damping factors &gt; 300, &gt;115dB SNR, &lt;0.001% THD+N. Integrated power booster.</td>
</tr>
</tbody>
</table>

If you’re currently working on a particular in-car acoustic problem, be sure to contact Intersil to learn how we can help move your designs to a new level of acoustic performance whilst helping manage system costs. D2Audio amplifiers are already found inside powerful consumer, commercial & professional sound systems and will emerge in initial automotive production platforms during 2010.
An example of a recently developed reference power supply design shows what can be achieved. The design provides 400W output (nominal) with peak handling in excess of 1kW in support of a highly dynamic audio experience. The key electrical parameters for this design were:

- Input voltage range: 9V – 18V
- Nominal output power of 400W, triple outputs provided:
  - +30V, 12A continuous, 36A peak
  - +12V, 750mA
  - +5V, 500mA
- Efficiency: 95%
- Other features include:
  - Synchronizable to the PWM power amplifier
  - Natural convection cooled
  - EMI & EMC compliant (AEC-Q101, CISPR25)
  - Load Dump & Ignition Event tolerant
  - Peak current limit

This resultant design provides an efficiency > 92% for load currents beyond 2A and the supply gives excellent output regulation across the full load range as shown in the adjacent graphs.

**KEY FEATURES**

- 1A MOSFET gate driver
- 100μA start-up current
- Fast transient response with peak current mode control
- Adjustable switching frequency up to 1MHz
- Bi-directional synchronization
- Low power disable mode
- Delayed restart from OV and OC shutdown faults
- Adjustable:
  - Slope compensation
  - Soft-start
  - Over-current shutdown delay
  - UV and OV monitors
- Leading edge blanking

**HIGH LEVEL POWER SUPPLY BLOCK DIAGRAM**

**ISL6721**

**FLEXIBLE SINGLE ENDED CURRENT MODE PWM CONTROLLER**

**KEY FEATURES**

- Voltage feed-forward mode
- Step down DC/DC supporting up to 2A
- Input voltage range of 9.0V to 40V
- Adjustable output voltage range of 1.21V to 35V
- Adjustable switching frequency 100kHz to 600kHz
- Frequency SYNC pin
- Zero load current operation
- Pulse by pulse mode current limit and Hiccup mode
- Low standby current of 60μA typical
- Load dump to 100V for 400ms
6-PHASE BOOST PWM CONTROLLER WITH PHASE DROPPING ENHANCEMENT

**KEY FEATURES**
- Peak current mode PWM control with adjustable slope compensation
- Precision resistor/DCR current sensing
  - Accurate channel-current balancing
  - Accurate total current monitoring Pin \(I_{OUT}\)
- 2, 3, 4 or 6-phase operation
- Adjustable phase dropping/diode emulation/pulse
- Skipping for high efficiency at light load
- Adjustable (75kHz to 1MHz) switching frequency
- Adjustable maximum duty cycle
- Frequency synchronization
- Input & output over-voltage detection

**APPLICATIONS**
- Electronic Power Steering
- Start/Stop Applications
- Fluid Pumps
- High Power Audio Amplifiers
- Fuel Injection

**HIGH EFFICIENCY**

- Peak Efficiency: 98.18%

24V Sync Boost Efficiency vs Load Current

48V Non-Sync Boost Efficiency vs Load Current

**TYPICAL APPLICATION 4-PHASE SYNC BOOST CONVERTER**
**AUTOMOTIVE PWM DC/DC VOLTAGE CONTROLLER**

**ISL78210**

**KEY FEATURES**
- Input voltage range: 3.3V to 25V
- Output voltage range: 0.5V to 3.3V
- Output load to 30A
- Simple resistor programming for output voltage
- ±0.75% system accuracy: -40°C to +105°C
- Capacitor programming for soft-start delay
- Fixed 300kHz PWM frequency in continuous conduction
- Automatic diode emulation mode for highest efficiency
- Integrated high-current MOSFET drivers and schottky bootstrap diode for optimal efficiency
- Choice of over-current detection schemes
  - Lossless inductor DCR current sensing
  - Precision resistive current sensing
- Power-Good monitor for soft-start and fault detection
- TS16949 compliant
- Fully AEC-Q100 tested

**APPLICATIONS**
- Automotive PC Graphical Processing Unit V_{CC} Rail
- Automotive PC I/O Controller Hub (ICH) V_{CC} Rail
- Automotive PC Memory Controller Hub (GMCH) V_{CC} Rail

**AUTOMOTIVE SINGLE-PHASE CORE REGULATOR FOR IMVP-6™ CPUS**

**ISL78211**

**KEY FEATURES**
- Precision single-phase CORE voltage regulator
  - 0.5% system accuracy over -10°C to 100°C temperature range
  - 0.8% system accuracy over entire temperature range
  - Enhanced load line accuracy
- Internal gate driver with 2A driving capability
- Microprocessor voltage identification input
  - 7-Bit VID input
  - 0.300V to 1.500V in 12.5mV steps
  - Support VID change-on-the-fly
- Multiple current sensing schemes supported
  - Lossless inductor DCR current sensing
  - Precision resistive current sensing
- Power monitor indicating CPU instantaneous power
- User programmable switching frequency
- Differential remote voltage sensing at CPU die
- TS16949 compliant
- AEC-Q100 tested
## Switches
### ANALOG SWITCHES

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Switch or MUX</th>
<th>Switch Format</th>
<th>Type of Switch</th>
<th>TON (ns)</th>
<th>TOFF (ns)</th>
<th>TON RANGE (O)/T (O)</th>
<th>CKG INJ (µA)</th>
<th>Leakage (nA)</th>
<th>SRCCap (µF)</th>
<th>DRN Cap (µF)</th>
<th>VCC Range (V)</th>
<th>IOP (µA)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL54051</td>
<td>Ultra Low ON-Resistance, Low Voltage, Single Supply, Single SPST Analog Switches</td>
<td>Switch</td>
<td>Single NO SPST</td>
<td>SPST</td>
<td>0.86</td>
<td>24</td>
<td>10</td>
<td>26</td>
<td>20</td>
<td>16</td>
<td>48</td>
<td>0.1</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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<tr>
<td>ISL54052</td>
<td>Ultra Low ON-Resistance, Low Voltage, Single Supply, Single SPST Analog Switches</td>
<td>Switch</td>
<td>Single NC SPST</td>
<td>SPST</td>
<td>0.86</td>
<td>24</td>
<td>10</td>
<td>26</td>
<td>20</td>
<td>16</td>
<td>48</td>
<td>0.1</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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<tr>
<td>ISL54053</td>
<td>Ultra Low ON-Resistance, Low Voltage, Single Supply, SPDT Analog Switch</td>
<td>Switch &amp; MUX</td>
<td>Single MIX SPDT</td>
<td>SPDT</td>
<td>0.86</td>
<td>24</td>
<td>10</td>
<td>26</td>
<td>20</td>
<td>16</td>
<td>48</td>
<td>0.1</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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<tr>
<td>ISL54054</td>
<td>Ultra Low ON-Resistance, Low Voltage, Single Supply, Single SPST/12 Distribution Analog Switch</td>
<td>Switch</td>
<td>Single NO SPST</td>
<td>SPST</td>
<td>0.36</td>
<td>12</td>
<td>12</td>
<td>71</td>
<td>20</td>
<td>30</td>
<td>62</td>
<td>0.5</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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<tr>
<td>ISL54059</td>
<td>1.8V to 6.5V, Sub-OHM, Dual SPDT Analog Switch with Negative Signal Capability</td>
<td>Switch &amp; MUX</td>
<td>Single MIX SPDT</td>
<td>SPDT</td>
<td>0.52</td>
<td>43</td>
<td>23</td>
<td>170</td>
<td>8.13</td>
<td>36</td>
<td>100</td>
<td>0.1</td>
<td>1.8 to 6.5</td>
<td>10 Ld TDFN, 10 Ld MSOP</td>
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<tr>
<td>ISL54060</td>
<td>Negative Signal Swing, Sub-ohm, Dual SPST Single Supply Switch</td>
<td>Switch</td>
<td>Single NO SPST</td>
<td>SPST</td>
<td>0.52</td>
<td>43</td>
<td>23</td>
<td>170</td>
<td>8.13</td>
<td>36</td>
<td>100</td>
<td>0.1</td>
<td>1.8 to 6.5</td>
<td>10 Ld TDFN, 10 Ld MSOP</td>
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<td>ISL54061</td>
<td>Negative Signal Swing, Sub-ohm, Dual SPST Single Supply Switch</td>
<td>Switch</td>
<td>Single NC SPST</td>
<td>SPST</td>
<td>0.52</td>
<td>43</td>
<td>23</td>
<td>170</td>
<td>8.13</td>
<td>36</td>
<td>100</td>
<td>0.1</td>
<td>1.8 to 6.5</td>
<td>10 Ld TDFN, 10 Ld MSOP</td>
</tr>
<tr>
<td>ISL54073</td>
<td>1.8V to 5.5V, 2.5Ω, Single SPST Analog Switch</td>
<td>Switch</td>
<td>Single MIX SPDT</td>
<td>SPDT</td>
<td>2.5</td>
<td>25</td>
<td>15</td>
<td>24</td>
<td>20</td>
<td>7</td>
<td>18</td>
<td>0.1</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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<tr>
<td>ISL54074</td>
<td>1.8V to 5.5V, 2.5Ω, Single SPST Analog Switch</td>
<td>Switch</td>
<td>Single NO SPST</td>
<td>SPST</td>
<td>2.5</td>
<td>25</td>
<td>15</td>
<td>24</td>
<td>20</td>
<td>7</td>
<td>18</td>
<td>0.1</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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<td>ISL54075</td>
<td>1.8V to 5.5V, 2.5Ω, Single SPST Analog Switch</td>
<td>Switch</td>
<td>Single NC SPST</td>
<td>SPST</td>
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<td>20</td>
<td>7</td>
<td>18</td>
<td>0.1</td>
<td>1.85 to 5.5</td>
<td>6 Ld SOT23</td>
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## USB SWITCHES

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<th>Switch Control</th>
<th>Audio Input Range (V)</th>
<th>Audio THD 320 (%)</th>
<th>Video Diff Gain/Phase (%)</th>
<th>BW USB (MHz)</th>
<th>BW Video (MHz)</th>
<th>VCC (V)</th>
<th>IOP (µA)</th>
<th>Package</th>
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<td>ISL54415</td>
<td>Low Voltage, Dual SPDT, USB/CVBS/Audio Switches with Negative Signal Capability</td>
<td>USB/Video</td>
<td>VBUS</td>
<td>±1.5</td>
<td>0.007</td>
<td>0.04/0.03</td>
<td>239</td>
<td>264</td>
<td>2.5 to 3.0</td>
<td>5</td>
<td>10 Ld QFN</td>
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<td>ISL54417</td>
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<td>USB/Video</td>
<td>Logic Level</td>
<td>±1.5</td>
<td>0.007</td>
<td>0.04/0.03</td>
<td>239</td>
<td>264</td>
<td>1.8 to 5.5</td>
<td>5</td>
<td>10 Ld QFN</td>
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<table>
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<tr>
<th>Device</th>
<th>Device Description</th>
<th>Configuration</th>
<th>Switch Control</th>
<th>Audio Input Range (V)</th>
<th>Audio THD 320 (%)</th>
<th>Video Diff Gain/Phase (%)</th>
<th>BW USB (MHz)</th>
<th>BW Video (MHz)</th>
<th>VCC (V)</th>
<th>IOP (µA)</th>
<th>Package</th>
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<td>ISL54207</td>
<td>Low Voltage, Dual SPDT, USB/CVBS/Audio Switches, with Negative Signal Capability</td>
<td>USB/Video</td>
<td>VBUS</td>
<td>N</td>
<td>±1.5</td>
<td>0.28/0.04</td>
<td>630</td>
<td>338</td>
<td>2.7 to 5.5</td>
<td>6.0/0.001</td>
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<td>338</td>
<td>2.7 to 5.5</td>
<td>6.0/0.001</td>
<td>10 Ld TDFN, 10 Ld MSOP</td>
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## Digital Potentiometers

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th># of Devices/Channels</th>
<th># of Taps</th>
<th>Memory Type</th>
<th>Bus Interface Type</th>
<th>Resistance Options (kΩ)</th>
<th>VCC Range (V)</th>
<th>DCP Single Supply Range (V)</th>
<th>DCP Resistance (Ω)</th>
<th>Wiper Current (mA)</th>
<th>Wiper Resistance (Ω)</th>
<th>Max Operating Temp (°C)</th>
<th>End-to-End Tempco (ppm/°C)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL22416</td>
<td>Low Noise, Low Power, SPI® Bus, 128 Taps</td>
<td>1</td>
<td>128</td>
<td>Non-Volatile</td>
<td>SPI</td>
<td>10, 50</td>
<td>2.7 to 5.5</td>
<td>0 to 5.5</td>
<td>Linear</td>
<td>±3</td>
<td>70</td>
<td>5</td>
<td>125</td>
<td>±50</td>
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<tr>
<td>ISL90727</td>
<td>Single Volatile Single Tap Digitally Controlled Potentiometer (XDCP™)</td>
<td>1</td>
<td>128</td>
<td>Volatile</td>
<td>I²C</td>
<td>10, 50</td>
<td>2.7 to 5.5</td>
<td>0 to 5.5</td>
<td>Linear</td>
<td>±3</td>
<td>85</td>
<td>0.5</td>
<td>±45</td>
<td>6 Ld SC-70</td>
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<tr>
<td>ISL90728</td>
<td>Single Volatile Single Tap Digitally Controlled Potentiometer (XDCP™)</td>
<td>1</td>
<td>128</td>
<td>Volatile</td>
<td>I²C</td>
<td>10, 50</td>
<td>2.7 to 5.5</td>
<td>0 to 5.5</td>
<td>Linear</td>
<td>±3</td>
<td>85</td>
<td>0.5</td>
<td>±45</td>
<td>6 Ld SC-70</td>
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<tr>
<td>ISL96017</td>
<td>128-Tap DCP, 8-bit EEPROM, and I²C Serial Interface</td>
<td>1</td>
<td>128</td>
<td>Non-Volatile</td>
<td>I²C</td>
<td>10, 50</td>
<td>3.0 to 3.6</td>
<td>0 to 3.6</td>
<td>Linear</td>
<td>±3</td>
<td>100</td>
<td>10</td>
<td>85</td>
<td>±100</td>
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</tbody>
</table>
AUTOMOTIVE DISPLAY PRODUCTS

Video Serdes
- Serializer/deserializer of LVCMOS parallel video data
- Bi-directional I2C communication for remote end control
- Enhanced cable driving capability
- Industry standard 8B/10B coding for enhanced EMI performance
- Tx pre-emphasis and Rx-equalization
- Fast locking link (sub 10ms) guarantees robust link

SERDES
ISL76321, ISL76341 (page 5)
ISL76322 (page 28)

Display Power
- Multi-output devices with high level of integration
- Fault protection for improved reliability

40V, Low Iq, 50mA and 150mA Linear Regulators
ISL78300, ISL78301, ISL78306, (page 7)

2A Synchronous Buck Regulator with Boost Converter
ISL78200 (page 6)

3A/4A Low Iq 1MHz High Efficiency Synchronous Buck Regulator
ISL78213, ISL78214 (page 7)

TFT LCD Power Supply
ISL78010 (page 20)
Advanced LCD Controllers

- Wide range of product dependent features including:
  - Support for analog inputs including CVBS, S-Video & Analog RGB/YPbPr
  - Support for digital inputs including 8/16/24-bit RGB/YCbCr
  - Both interlaced and progressive ITU 656 and 601 format
  - Provides all display timing control
  - Supports both digital & analog panels up to WXGA resolutions
  - Integrates cost saving features including:
    - CCFL/LED backlight controller
    - On-chip 8-bit 8051 based MCU with SPI interface
    - Built-in Font OSD, bit-map OSD & PiP on some devices
    - Touch screen interface on some devices

Techwell Advanced Display Controllers

TW88xx (page 19)

Proximity Sensing

- Improves man machine interface
- Facilitates enhanced menu control in touch screen environments
- Use Active IR reflection to give range up to 15cm.

Ambient Light and Proximity Sensors
ISL29028 (page 21)

Gamma and VCOM Buffers

- Enhance display color accuracy over temperature
- Facilitate common appearance across multiple displays

Gamma Buffers
ISL24833 (page 21)

VCOM Calibrator and Buffer
ISL24211 (page 21)

Ambient Light Sensor

- Low power
- High sensitivity with near-human eye response
- Insensitive to sunlight
- Close tolerance output & improved linearity
- Enhanced low light performance

Ambient Light Sensor
ISL76671 (page 5)
ISL76683 (page 20)

Backlight Drivers

- Available in buck, boost or return to load topologies
- High efficiency devices

Multi-Channel LED Driver
ISL97636 (page 24)
### Intersil Techwell

Intersil Techwell is one of the largest portfolios of video semiconductor solutions for automotive infotainment display applications. As a pioneer in this market, we have leveraged our extensive mixed signal video and display processing expertise to create unique and robust IC products specifically tailored to the requirements of the automotive display market.

Intersil Techwell's TW88xx automotive infotainment display IC product line is defined by feature rich, highly integrated semiconductor solutions that incorporate many key functional blocks for front console, rear seat entertainment, and rear camera display applications, including an analog video decoder, high quality H/V scaler, 2-D de-interlacer, and embedded timing controllers. In addition, certain TW88xx products include advanced technologies such as a 3D adaptive comb filter, 3D noise reduction, an embedded MCU, a touchscreen controller, 16-bit multi-window OSD, graphic overlay with alpha blending, PIP/POP, dual view display support, and a single channel LVDS interface to directly drive LVDS based LCD panels.

The TW88xx product line is designed for OEM Automotive applications and therefore supports the -40˚C to +85˚C temperature range.

### TW88XX COMPARISON TABLE

<table>
<thead>
<tr>
<th>TW8833(S)</th>
<th>TW8832(S)</th>
<th>TW8827</th>
<th>TW8826</th>
<th>TW8817</th>
<th>TW8816</th>
<th>TW8810</th>
<th>TW8811</th>
<th>TW8813</th>
<th>TW8823</th>
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<td><strong>Input</strong></td>
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<td>S-Video</td>
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<td>Yes</td>
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<td>YPbPr</td>
<td>Yes (480)</td>
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<td>Colors</td>
<td>16 Colors / 16-bit Palette</td>
<td>16 Colors / 16-bit Palette</td>
<td>8 x 2 Color / 8-bit Palette</td>
<td>8 x 2 Colors / 8-bit Palette</td>
<td>8 x 2 Color / 8-bit Palette</td>
<td>8 x 2 Color / 8-bit Palette</td>
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<td>256 Colors / 24-bit Palette</td>
<td>65K Colors / 24-bit Palette</td>
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<td>Analog, Digital 18-bit &amp; PIP overlay</td>
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<td>Yes (Y+C Out)</td>
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</tr>
</tbody>
</table>
**HIGHLY INTEGRATED LCD CONTROLLER WITH ON-CHIP MCU & CCFL-LED CONTROLLER**

The TW8816 is a highly integrated multi-purpose LCD display solution with a high quality NTSC/PAL/SECAM 2D video decoder and a 2D video decoder, 2D de-interlacer, and H/V scaler, supporting both digital and analog panels. To reduce BOM cost, TW8816 integrates an 8-bit MCU and a CCFL/LED backlight controller. Through multiple input ports, TW8816 can directly display video and graphic content from a variety of devices including TV Tuners, DVD players, back-up cameras, DTV/DMB receivers and navigation/GPS receivers.

**KEY FEATURES**
- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Supports digital inputs including 8/16/24-bit RGB/YCbCr
  - Both interlaced and progressive ITU 656 and 601 format supported
- Supports both digital & analog panels up to WXGA resolutions
- Integrates cost saving features including a CCFL/LED backlight controller & an on-chip 8-bit 8051 based MCU with SPI interface

**COST-EFFECTIVE, HIGHLY INTEGRATED LCD CONTROLLER FOR DIGITAL LCD PANELS**

The TW8832 is a highly integrated cost-effective LCD controller supporting digital LCD panels. TW8832 integrates a high quality NTSC/PAL/SECAM 2D comb video decoder, 2D de-interlacer, and an improved H/V scaling engine. Additional features include a robust font-based OSD engine, independent mirroring functionality for the scaler and OSD, serial RGB output, and an LED backlight controller. The TW8832S version also supports a proprietary SPI Bitmap OSD.

**KEY FEATURES**
- Supports analog inputs including CVBS, S-Video, and Analog RGB/YPbPr (480p)
- Digital input interface supporting BT.656
- Drives digital panel up to SVGA resolution
  - Digital RGB with TCON or serial digital RGB
- Built-in font-based OSD with 256 programmable fonts and a 384 character display RAM
- Integrated LED backlight controller (single string)
- Supports VCOM-DC, VCOM-AC and spread spectrum clock

**TW8816 FUNCTIONAL BLOCK DIAGRAM**

**TW8832(S) FUNCTIONAL BLOCK DIAGRAM**
**DIGITAL AMBIENT LIGHT SENSOR**

**KEY FEATURES**
- Four sensitivities range selection via I2C:
  - Range 1 = 0 lux to 1000 lux
  - Range 2 = 0 lux to 4000 lux
  - Range 3 = 0 lux to 16,000 lux
  - Range 4 = 0 lux to 64,000 lux
- Human eye response (540nm peak sensitivity)
- Temperature compensated
- 16-bit resolution
  - Adjustable up to 65 counts per lux
- User-programmable upper and lower threshold interrupt
- Simple output code, directly proportional to lux
- Built-in rejection for:
  - IR & UV as well as 50Hz/60Hz flicker
- AEC-Q100 grade 2 product (-40 to 105 °C)

**TFT LCD Power Supply**

**ISL78010**

**BOOST WITH INTEGRATED FET, 2 POSITIVE LINEAR REGULATOR CONTROLLER AND NEGATIVE LINEAR REGULATOR CONTROLLER**


**KEY FEATURES**
- High performance boost regulator with integrated FET
  - 2A Switch current
  - Up to 20V output
  - Current mode control
  - 1% accuracy on boost output
- \( V_{ON} \) and \( V_{LOGIC} \) Linear Regulator Controllers 2% accuracy
- \( V_{OFF} \) Linear Regulator Controllers with 3% accuracy
- \( V_{LOGIC} - V_{OFF} - V_{BOOST} - V_{ON} \) or \( V_{BOOST} / V_{LOGIC} - V_{OFF} - V_{ON} \) sequence control
- Programmable sequence delay
- Configurable fault protections
- User selectable start-up sequences and internal soft-start
- Pb-free, tiny, 4mm x 4mm, 20 Ld QFN package

**TYPICAL APPLICATION BLOCK DIAGRAM**

**MULTIPLE OUTPUT TFT POWER SUPPLIES**

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Input Voltage (V)</th>
<th>( V_{BOOST} ) (V)</th>
<th>FET Size (A)</th>
<th>( V_{ON} ) (V)</th>
<th>( V_{OFF} ) (V)</th>
<th>( V_{LOGIC} ) (V)</th>
<th># of ( V_{COM} )</th>
<th># of Gamma</th>
<th>Package</th>
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<tbody>
<tr>
<td>ISL78010</td>
<td>Automotive Grade TFT-LCD Power Supply</td>
<td>3 to 5.5</td>
<td>5.5 to 20</td>
<td>2</td>
<td>15 to 36</td>
<td>-5 to -20</td>
<td>1.3 to ( V_{DD} )</td>
<td>N/A</td>
<td>N/A</td>
<td>32 Ld TQFP</td>
</tr>
<tr>
<td>ISL78020</td>
<td>Automotive Grade TFT-LCD DC/DC with Integrated Amplifiers</td>
<td>2.6 to 5.5</td>
<td>2.99 to 18</td>
<td>3</td>
<td>15 to 36</td>
<td>-25 to -5</td>
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<td>0</td>
<td>32 Ld TQFP</td>
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<tr>
<td>ISL78022</td>
<td>Automotive Grade TFT-LCD DC/DC with Integrated Amplifiers</td>
<td>2.6 to 5.5</td>
<td>2.99 to 18</td>
<td>3</td>
<td>15 to 36</td>
<td>-25 to -5</td>
<td>N/A</td>
<td>1</td>
<td>4</td>
<td>32 Ld TQFP</td>
</tr>
</tbody>
</table>
### GAMMA BUFFERS

<table>
<thead>
<tr>
<th>Device</th>
<th># of Channels</th>
<th>Resolution</th>
<th>Vcom (V)</th>
<th>Gamma Resolution</th>
<th>Internal Memory</th>
<th>Iout per Channel (mA)</th>
<th>Interface</th>
<th>Temperature Range (ºC)</th>
<th>Features</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL24813</td>
<td>18</td>
<td>7-bits</td>
<td></td>
<td>15mV steps (10-bits)</td>
<td>volatile</td>
<td>60</td>
<td>I²C</td>
<td>-40 to 85</td>
<td>Integrated Vcom calibrator, uncommitted opamp, dual bank.</td>
<td>32 Ld TQFN</td>
</tr>
<tr>
<td>ISL24812</td>
<td>14</td>
<td>7-bits</td>
<td></td>
<td>15mV steps (10-bits)</td>
<td>volatile</td>
<td>60</td>
<td>I²C</td>
<td>-40 to 85</td>
<td>Integrated Vcom calibrator, uncommitted opamp, dual bank.</td>
<td>32 Ld TQFN</td>
</tr>
<tr>
<td>ISL24833</td>
<td>18</td>
<td>8-bits</td>
<td></td>
<td>15mV steps (10-bits)</td>
<td>non-volatile</td>
<td>60</td>
<td>I²C</td>
<td>-40 to 85</td>
<td>Integrated Vcom calibrator, nv memory, uncommitted opamp, dual bank.</td>
<td>32 Ld TQFN</td>
</tr>
<tr>
<td>ISL24837</td>
<td>12</td>
<td>8-bits</td>
<td></td>
<td>15mV steps (10-bits)</td>
<td>non-volatile</td>
<td>60</td>
<td>I²C</td>
<td>-40 to 85</td>
<td>Integrated Vcom calibrator, nv memory, uncommitted opamp, dual bank.</td>
<td>32 Ld TQFN</td>
</tr>
</tbody>
</table>

### VCOM CALIBRATOR AND BUFFER

<table>
<thead>
<tr>
<th>Device</th>
<th>Interface</th>
<th>Analog Supply Range (V)</th>
<th>Vg (min) (V)</th>
<th>Vg (max) (V)</th>
<th>Is (mA)</th>
<th>Iout (mA)</th>
<th>Temperature Range (ºC)</th>
<th>Features</th>
<th>PSRR (dB)</th>
<th>CMRR (dB)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL24211</td>
<td>I²C</td>
<td>10.8 to 19.8</td>
<td>50</td>
<td>2.25</td>
<td>3.5</td>
<td>± 300</td>
<td>-40 to 85</td>
<td>Fixed I²C address, integrated 8-bit EEPROM, output adjustment set pin.</td>
<td>80</td>
<td>70</td>
<td>10 Ld DFN</td>
</tr>
</tbody>
</table>

### VCOM BUFFERS

<table>
<thead>
<tr>
<th>Device</th>
<th>Interface</th>
<th>Analog Supply Range (V)</th>
<th>Vg (min) (V)</th>
<th>Vg (max) (V)</th>
<th>Is (mA)</th>
<th>Iout (mA)</th>
<th>Temperature Range (ºC)</th>
<th>Features</th>
<th>PSRR (dB)</th>
<th>CMRR (dB)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL5111T</td>
<td>I²C</td>
<td>3.75 to 19.8</td>
<td>50</td>
<td>2.25</td>
<td>3.5</td>
<td>± 300</td>
<td>-40 to 85</td>
<td>Y</td>
<td>Y</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>EL5211T</td>
<td>I²C</td>
<td>3.75 to 19.8</td>
<td>50</td>
<td>2.25</td>
<td>3.5</td>
<td>± 300</td>
<td>-40 to 85</td>
<td>Y</td>
<td>Y</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>EL5220T</td>
<td>I²C</td>
<td>3.75 to 19.8</td>
<td>50</td>
<td>2.25</td>
<td>3.5</td>
<td>± 300</td>
<td>-40 to 85</td>
<td>Y</td>
<td>Y</td>
<td>75</td>
<td>73</td>
</tr>
</tbody>
</table>

### LONG REACH VIDEO SERDES

<table>
<thead>
<tr>
<th>Device</th>
<th>Product Topology</th>
<th>Vg (V)</th>
<th>BW (MHz)</th>
<th>SR (V/µs)</th>
<th>Vg (min) (V)</th>
<th>Vg (max) (V)</th>
<th>Is (mA/amp)</th>
<th>Iout (mA)</th>
<th>Temperature Range (ºC)</th>
<th>Features</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL76321</td>
<td>Transceiver</td>
<td>3.3 &amp; 1.8</td>
<td>7 to 45</td>
<td>900</td>
<td>16-bit data and 3-bit video control (H, V &amp; Sync)</td>
<td>I²C</td>
<td>-40 to 105</td>
<td>Pre-emphasis, EQ, 500 kHz ESD on Serial lines, Low EMI, int. 100Ω termination, control back-channel, fast locking.</td>
<td>48 Ld QFN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISL76322</td>
<td>Transceiver</td>
<td>3.3 &amp; 1.8</td>
<td>7 to 45</td>
<td>900</td>
<td>16-bit data and 3-bit video control (H, V &amp; Sync)</td>
<td>I²C</td>
<td>-40 to 105</td>
<td>Pre-emphasis, EQ, 500 kHz ESD on Serial lines, Low EMI, int. 100Ω termination, fast locking.</td>
<td>48 Ld QFN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISL76341</td>
<td>Transceiver</td>
<td>3.3 &amp; 1.8</td>
<td>7 to 45</td>
<td>1200</td>
<td>24-bit data and 3-bit video control (H, V &amp; Sync)</td>
<td>I²C</td>
<td>-40 to 105</td>
<td>Pre-emphasis, EQ, 500 kHz ESD on Serial lines, Low EMI, int. 100Ω termination, control back-channel, fast locking.</td>
<td>64 Ld TQFP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### AMBIENT LIGHT AND PROXIMITY SENSORS

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Type</th>
<th>Vr range (V)</th>
<th>Is (mA)</th>
<th>Peak Wavelength Sensitivity (nm)</th>
<th>Sensing Range (lux)</th>
<th>Output Type</th>
<th>Gain Selection?</th>
<th>Digital Interface</th>
<th>Address Pin</th>
<th>Enable Pin</th>
<th>Features</th>
<th>Temp Range (ºC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL29101</td>
<td>ALS</td>
<td>1.8 to 3.3</td>
<td>25</td>
<td>(E=1000 lux)</td>
<td>550</td>
<td>0.5 to 10k</td>
<td>Analog (linear function)</td>
<td>by resistor</td>
<td>N</td>
<td>N/A</td>
<td>Fast response, IR rejection, temperature compensation, ultra-low supply current, tiny package.</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>ISL29102</td>
<td>ALS</td>
<td>1.8 to 3.3</td>
<td>10</td>
<td>(E=1000 lux)</td>
<td>550</td>
<td>0.3 to 10k</td>
<td>Analog (square root function)</td>
<td>by resistor</td>
<td>N</td>
<td>N/A</td>
<td>Fast response, IR rejection, temperature compensation, ultra-low supply current, tiny package.</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>ISL76871</td>
<td>ALS</td>
<td>1.8 to 3.3</td>
<td>5</td>
<td>(E=1000 lux)</td>
<td>550</td>
<td>0.01 to 200</td>
<td>Analog (square root function)</td>
<td>by resistor</td>
<td>N</td>
<td>N/A</td>
<td>Optimized for Ultra-low light applications, fast response, IR rejection, temperature compensation, ultra-low supply current, tiny package.</td>
<td>-40 to 105°C</td>
</tr>
<tr>
<td>ISL76863</td>
<td>ALS</td>
<td>1.8 to 3.3</td>
<td>330</td>
<td>(1.0 shutdown)</td>
<td>540</td>
<td>0 to 64k</td>
<td>Digital (4 ranges)</td>
<td>Y</td>
<td>Digital (4 ranges)</td>
<td>N</td>
<td>Fast response, IR rejection, temperature compensation, 50Hz/60Hz rejection, user set light thresholds, tiny package, hardware interrupt output.</td>
<td>-40 to 105°C</td>
</tr>
<tr>
<td>ISL29020</td>
<td>ALS</td>
<td>2.25 to 3.3</td>
<td>65</td>
<td>(0.5 shutdown)</td>
<td>540</td>
<td>0.015 to 64k</td>
<td>Digital (4 ranges)</td>
<td>Y</td>
<td>Digital (4 ranges)</td>
<td>s/w</td>
<td>Fast response, enhanced low light sensitivity down to 0.015 lux, IR rejection, temperature compensation, 50Hz/60Hz rejection, user set light thresholds, tiny package.</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>ISL29023</td>
<td>ALS</td>
<td>2.25 to 3.3</td>
<td>65</td>
<td>(0.5 shutdown)</td>
<td>540</td>
<td>0.015 to 64k</td>
<td>Digital (4 ranges)</td>
<td>Y</td>
<td>Digital (4 ranges)</td>
<td>s/w</td>
<td>Fast response, enhanced low light sensitivity down to 0.015 lux, IR rejection, temperature compensation, 50Hz/60Hz rejection, user set light thresholds, tiny package.</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>ISL29033</td>
<td>ALS</td>
<td>2.25 to 3.6</td>
<td>55</td>
<td>(0.3 shutdown)</td>
<td>540</td>
<td>0.0019 to 8k</td>
<td>Digital (4 ranges)</td>
<td>Y</td>
<td>Digital (4 ranges)</td>
<td>N</td>
<td>Fast response, enhanced ultra-low light sensitivity down to 0.0019 lux with a max of 520 counts/lux resolution, IR rejection, temperature compensation, 50Hz/60Hz rejection, user set light thresholds, tiny package, ambient and IR light readings, hardware INT output.</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>ISL29011</td>
<td>ALS + Proximity</td>
<td>2.5 to 3.3</td>
<td>90</td>
<td>(0.5 shutdown)</td>
<td>540</td>
<td>0.015 to 64k</td>
<td>Digital (4 ranges)</td>
<td>P/C</td>
<td>N</td>
<td>N</td>
<td>ALS &amp; proximity sensor, 16-bits resolution, fast response, enhanced low light down to 0.015 lux, IR rejection, temperature compensation, 50Hz/60Hz rejection, integrated IR LED driver up to 100mA, tiny package.</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>ISL29028</td>
<td>ALS + Proximity</td>
<td>2.5 to 3.3</td>
<td>125</td>
<td>(0.8 shutdown)</td>
<td>540</td>
<td>125/2k ranges</td>
<td>Digital (2 ranges)</td>
<td>P/C</td>
<td>Y</td>
<td>N</td>
<td>ALS &amp; proximity sensor, 16-bits resolution, fast response, low light down to 0.04 lux, IR rejection, temperature compensation, 50Hz/60Hz rejection, integrated IR LED driver up to 100mA, tiny package. Multiple user control modes including auto power-down &amp; interrupt persistency control.</td>
<td>-40 to 85°C</td>
</tr>
</tbody>
</table>

Notes:
- 1x Qualifying Auto variants will be AEC grade 2 (operates -40 to 105 °C)
EV/HEV LI-ION BATTERY MANAGEMENT AND MONITORING SOLUTIONS

ISL78600
12 CELL LI-ION BATTERY PACK MANAGER

KEY FEATURES
- 6 to 12 cell voltage management
- Supports full range of Li-Ion cell chemistries
- Cell voltage measurement accuracy ±2mV
- VBAT measurement accuracy ±72mV
- Cell voltage scan rate of 20µs per cell
- Proprietary Daisy chain communications system
  - Robust EMI performance
  - Excellent system transient resistance
- 1Mbps SPI interface
- Integrated system diagnostic functions:
  - Cell over and under-voltage
  - Over temperature
  - Open cell monitoring wires
  - Open temperature monitoring wires
  - VBAT and VSS connection integrity
  - Voltage reference function
  - Oscillator function
- 64 lead TQFP package
- Passive balancing
Li-Ion Battery

**ISL78601**

- **Backup to ISL78600 in redundant monitoring systems**
- **6 to 12 cell voltage monitors**
- **Supports full range of Li-Ion cell chemistries.**
- **Programmable over and under voltage thresholds**
- **Cell over-voltage threshold accuracy ±20mV**
- **Cell under-voltage threshold accuracy ±100mV**
- **Logic fault input provides system expansion possibilities**

**Daisy Chain Serial Communication Lines - up to 14 Packs**
- Differential communication system provides high noise immunity
- Uses low cost twisted pair wiring for pack stacking (up to 1m)
- High immunity to system transient and EMI events

**ISL78601**

**12 CELL LI-ION BATTERY PACK MONITOR**

**KEY FEATURES**
- Proprietary Daisy chain communications system
- Robust Daisy chain communications system
- Excellent system transient resistance
- Faults reported to microcontroller via SPI and a logic level “fault” output
- <5µA shutdown current
- 38 lead TSSOP package
Multi-Channel LED Driver
ISL97636

WIDE DIMMING RANGE & HIGH DRIVING CURRENT MULTI-CHANNEL LED DRIVERS

KEY FEATURES
• Dynamic headroom control
  - Highest VF string detection
  - Saves power and reduces LED stress
• Full protection
  - String open/short circuit detection
  - OVP & OTP
  - Optional output short circuit protection

WIDE RANGE OF PWM DIMMING
• Wide range of PWM dimming allows low duty cycles of operation that extend battery life
• PWM Dimming up to 22kHz
  - Avoids audible noise sensitive applications

TYPICAL APPLICATION CIRCUIT

SMBUS MULTI-CHANNEL LED DRIVERS

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Topologies</th>
<th># of LEDs (max)</th>
<th>Digital Interface</th>
<th>For LCD Size</th>
<th>I\textsubscript{OUT} (max) (mA)</th>
<th>Peak Efficiency (%)</th>
<th>V\textsubscript{IN} (V)</th>
<th>V\textsubscript{OUT} (max) (V)</th>
<th>Dimming Control</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL97635</td>
<td>SMBus 8-Channel LED Driver</td>
<td>Inductor Boost</td>
<td>80</td>
<td>SMBus/I2C*</td>
<td>up to 17&quot;</td>
<td>280</td>
<td>91</td>
<td>6 to 24</td>
<td>34.5</td>
<td>SMBus, PWM or DC</td>
<td>24 Ld 4mm x 4mm QFN</td>
</tr>
<tr>
<td>ISL97635A</td>
<td>SMBus 6-Channel LED Driver</td>
<td>Inductor Boost</td>
<td>60</td>
<td>SMBus/I2C*</td>
<td>up to 17&quot;</td>
<td>210</td>
<td>91</td>
<td>6 to 24</td>
<td>34.5</td>
<td>SMBus, PWM or DC</td>
<td>24 Ld 4mm x 4mm QFN</td>
</tr>
</tbody>
</table>

* The driver employs de-featured SMBus design that the Part can be used with most I2C controllers

MULTI-CHANNEL LED DRIVERS

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Topologies</th>
<th># of LEDs (max)</th>
<th>For LCD Size</th>
<th>I\textsubscript{OUT} (max) (mA)</th>
<th>Peak Efficiency (%)</th>
<th>V\textsubscript{IN} (V)</th>
<th>V\textsubscript{OUT} (max) (V)</th>
<th>Dimming Control</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL97636</td>
<td>8-Channel LED Driver</td>
<td>Inductor Boost</td>
<td>80</td>
<td>up to 17&quot;</td>
<td>280</td>
<td>91</td>
<td>6 to 24</td>
<td>34.5</td>
<td>PWM</td>
<td>24 Ld 4mm x 4mm QFN</td>
</tr>
<tr>
<td>ISL97636A</td>
<td>6-Channel LED Driver</td>
<td>Inductor Boost</td>
<td>60</td>
<td>up to 17&quot;</td>
<td>210</td>
<td>91</td>
<td>6 to 24</td>
<td>34.5</td>
<td>PWM</td>
<td>24 Ld 4mm x 4mm QFN</td>
</tr>
</tbody>
</table>
## High Power LED Drivers

**ISL78100 AEC-Q100 HPLED Driver for automotive applications**

- **BEST-IN-CLASS VERSATILE HPLED DRIVER**
  ISL78100 is a high power LED driver that can be configured in Boost (More LEDs) and Buck (1 Ultra HPLED), or Buck/Boost (Load-Return-to-Input) for a wide range of applications.

- **KEY FEATURES**
  - Drives 3 to 8 high-power LEDs in series, up to 32V
  - 2.7V to 16V input voltage range
  - Boost or Buck configurable switch
  - 3A integrated FET
  - Automotive load dump protection
  - Light output temperature compensation
  - LED over-temperature protection
  - LED disconnect
  - PWM/analog light level control
  - Small, 20 Ld 4mm x 4mm QFN package
  - TS-16949 and AEC-Q100 compliant

- **HIGH EFFICIENCY**
  The circuit operates with LEDs voltage either higher or lower than input voltage without compromising on efficiency.

### BUCK/BOOST (LOAD-RETURN-TO-INPUT) CONFIGURATION

![Buck/Boost (Load-Return-to-Input) Application Circuit](image)

**High Power LED Drivers**

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Topologies</th>
<th># of LEDs (max)</th>
<th>Dimming Protection</th>
<th>Applications</th>
<th>VIN (V)</th>
<th>IOUT (max) (mA)</th>
<th>Peak Efficiency (%)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL78100</td>
<td>AEC-Q100 HPLED Driver for automotive applications</td>
<td>- Boost</td>
<td>9</td>
<td>PWM, DC</td>
<td>Automotive Brake Light, Signal Light, Traffic Lighting</td>
<td>6 – 18</td>
<td>800</td>
<td>93</td>
<td>20 Ld 4mm x 4mm QFN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Buck</td>
<td>2</td>
<td></td>
<td>Automotive Brake Light, Signal Light, Dome Light</td>
<td>5 – 18</td>
<td>1300*</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Load Return-to-Input</td>
<td>6</td>
<td></td>
<td>Automotive Brake Light, Signal Light, Traffic Lighting</td>
<td>6 – 18</td>
<td>500</td>
<td>94</td>
<td></td>
</tr>
</tbody>
</table>

* 1HPLED
Intersil has developed a family of precision amplifiers exploiting the industry's newest precision process technology, offering excellent precision performance over a wide voltage range and the -40 to 125 °C temperature range, ideally suiting automotive sensor interface applications.

**SINGLE LOW NOISE OPERATIONAL AMPLIFIERS**

**KEY FEATURES**
- Very low voltage noise: 2.5nV/Hz
- Low input offset: 150μV, Max OT.
- Superb offset drift: 0.5μV/°C, max.
- Input bias current: 10nA, max.
- Wide supply range: 4.5V to 40V
- 10MHz unity gain stable
- 4kV HDM ESD
- No phase reversal
- 8 Ld MSOP package
- AEC-Q100 grade 1 qualification

**LOW FREQUENCY NOISE PERFORMANCE**
2.5nV/Hz

**MICROPOWER, RAIL-TO-RAIL INPUT CURRENT SENSE AMPLIFIER WITH VOLTAGE OUTPUT**

**KEY FEATURES**
- 50µA supply current
- Supply independent of input
  - 2.7V to 28V supply
  - -50mV to 28V VCM
- Max. 250µV input Vos
- Gain accuracy max:
  - 0.5% @ 25°C
  - 1% @ -40 to 125°C
- Four gain options
  - 20V/V, 50V/V, 100V/V, & ADJ
- -40 to 125°C operation
- 5 Ld SOT-23 package

**HIGH ACCURACY**
Gain Accuracy vs VRs+ = 0V to 28V

Gain accuracy over input range & temperature
**OPERATIONAL AND CURRENT SENSE AMPLIFIERS**

### High Side Current sense amplifiers

<table>
<thead>
<tr>
<th>Device</th>
<th># of Channels</th>
<th>$V_{os}$ (µV)</th>
<th>BW (MHz)</th>
<th>$V_{s}$ (V) Range</th>
<th>I$_{S}$ (per amp) (mA)</th>
<th>Gain Range (V/V)</th>
<th>CMRR</th>
<th>Gain Accuracy</th>
<th>Common mode Input Range (V)</th>
<th>ESD</th>
<th>Operating Temperature Range (ºc)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL28005</td>
<td>1</td>
<td>± 500</td>
<td>110 kHz</td>
<td>2.7 to 28</td>
<td>62</td>
<td>20, 50 &amp; 100</td>
<td>125 dB</td>
<td>± 3%</td>
<td>0 to 28 V</td>
<td>4 kV HBM</td>
<td>-40 to 125</td>
<td>5 Ld SOT23</td>
</tr>
<tr>
<td>ISL28006</td>
<td>1</td>
<td>± 300</td>
<td>110 kHz</td>
<td>2.7 to 28</td>
<td>62</td>
<td>20, 50, 100 &amp; ADJ</td>
<td>125 dB</td>
<td>± 1%</td>
<td>0 to 28 V</td>
<td>4 kV HBM</td>
<td>-40 to 125</td>
<td>5 Ld SOT23, 5 Ld SOT for 'Adj'</td>
</tr>
</tbody>
</table>

### Precision High Voltage Opamps

<table>
<thead>
<tr>
<th>Device</th>
<th># of Channels</th>
<th>$V_{os}$ (µV)</th>
<th>BW (MHz)</th>
<th>V$_s$ (V) Range</th>
<th>I$_{S}$ (per amp) (µA)</th>
<th>Noise $V_{n}$ (nV/√Hz)</th>
<th>I$_{SS}$ (mA)</th>
<th>I$_{OUT}$ (mA)</th>
<th>ESD</th>
<th>Operating Temperature Range (ºc)</th>
<th>PSRR (dB)</th>
<th>CMRR (dB)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL28107</td>
<td>1</td>
<td>180</td>
<td>1</td>
<td>0.32</td>
<td>4.5</td>
<td>40</td>
<td>0.35</td>
<td>13</td>
<td>6.6</td>
<td>4.5 kV HBM</td>
<td>-40 to 125</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>ISL28110</td>
<td>1</td>
<td>300</td>
<td>12.5</td>
<td>23</td>
<td>4.5</td>
<td>40</td>
<td>0.38</td>
<td>6</td>
<td>0.245</td>
<td>4.5 kV HBM</td>
<td>-40 to 125</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>ISL28117</td>
<td>1</td>
<td>190</td>
<td>1.5</td>
<td>0.5</td>
<td>4.5</td>
<td>40</td>
<td>0.68</td>
<td>8</td>
<td>1.5</td>
<td>4.5 kV HBM</td>
<td>-40 to 125</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>ISL28127</td>
<td>1</td>
<td>120</td>
<td>10</td>
<td>3.6</td>
<td>4.5</td>
<td>40</td>
<td>3.7</td>
<td>2.5</td>
<td>12</td>
<td>4 kV HBM</td>
<td>-40 to 125</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

### Precision 5V Opamps

<table>
<thead>
<tr>
<th>Device</th>
<th># of Channels</th>
<th>$V_{os}$ (µV)</th>
<th>BW (MHz)</th>
<th>$V_s$ (V) Range</th>
<th>I$_{S}$ (per amp) (µA)</th>
<th>Noise $V_{n}$ (nV/√Hz)</th>
<th>I$_{SS}$ (mA)</th>
<th>I$_{OUT}$ (mA)</th>
<th>ESD</th>
<th>Operating Temperature Range (ºc)</th>
<th>PSRR (dB)</th>
<th>CMRR (dB)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL28133</td>
<td>1</td>
<td>8</td>
<td>0.4</td>
<td>0.2</td>
<td>1.65</td>
<td>5.5</td>
<td>18</td>
<td>65</td>
<td>0.1</td>
<td>4.99</td>
<td>26</td>
<td>138</td>
<td>125</td>
</tr>
<tr>
<td>ISL28233</td>
<td>2</td>
<td>12</td>
<td>0.4</td>
<td>0.2</td>
<td>1.65</td>
<td>5.5</td>
<td>18</td>
<td>65</td>
<td>0.1</td>
<td>4.99</td>
<td>26</td>
<td>138</td>
<td>125</td>
</tr>
</tbody>
</table>

### High Speed Power Opamps

<table>
<thead>
<tr>
<th>Device</th>
<th># of Channels</th>
<th>BW (MHz)</th>
<th>$V_s$ (V) Range</th>
<th>I$_{S}$ (per amp) (mA)</th>
<th>I$_{OUT}$ (mA)</th>
<th>Temperature Range (ºc)</th>
<th>Rail-to-Rail Input</th>
<th>Rail-to-Rail Output</th>
<th>PSRR (dB)</th>
<th>CMRR (dB)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL5111T</td>
<td>1</td>
<td>60</td>
<td>100</td>
<td>4.5</td>
<td>3</td>
<td>± 70</td>
<td>Y</td>
<td>Y</td>
<td>75</td>
<td>73</td>
<td>5 Ld TSSOT</td>
</tr>
<tr>
<td>EL5211T</td>
<td>2</td>
<td>60</td>
<td>75</td>
<td>4.5</td>
<td>3.75</td>
<td>± 65</td>
<td>Y</td>
<td>Y</td>
<td>75</td>
<td>73</td>
<td>8 Ld HMSOT</td>
</tr>
<tr>
<td>EL5220T</td>
<td>2</td>
<td>12</td>
<td>12</td>
<td>4.5</td>
<td>0.75</td>
<td>± 65</td>
<td>Y</td>
<td>Y</td>
<td>75</td>
<td>75</td>
<td>8 Ld MSOP</td>
</tr>
</tbody>
</table>

### Video Amplifier with Integrated Filter

<table>
<thead>
<tr>
<th>Device</th>
<th># of Channels</th>
<th>BW (MHz)</th>
<th>$V_s$ (V) Range</th>
<th>I$_{S}$ (per amp) (mA)</th>
<th>I$_{OUT}$ (mA)</th>
<th>ESD</th>
<th>Operating Temperature Range (ºc)</th>
<th>PSRR (dB)</th>
<th>CMRR (dB)</th>
<th>Extra features</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL59110</td>
<td>1</td>
<td>8</td>
<td>40</td>
<td>2.5</td>
<td>3.6</td>
<td>2 mA 3 µA shutdown</td>
<td>115</td>
<td>63</td>
<td>86</td>
<td>Reconstruction filter, Sync tip clamp, fast enable pin.</td>
<td>6 Ld SOT70</td>
</tr>
</tbody>
</table>

\*Qualified Auto variants are planned to operate from -40 to 105 ºC
# Interface

## RS-485/RS-422 INTERFACE SOLUTIONS

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th># of RS-485 Tx</th>
<th># of RS-485 Rx</th>
<th>Hot Plug</th>
<th>RS-485 Data Rate (Mbps)</th>
<th>Slew Rate Limited</th>
<th>Tx/Rx Enable</th>
<th>IS EN/DS (μA)</th>
<th>SHDN IONA (μA)</th>
<th>VCC Range (V)</th>
<th>VIL, PIN</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL3280E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23 Package, 20Mbps, Full Fail-safe, Low Power, RS-485/RS-422 Receivers</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>20</td>
<td>N/A</td>
<td>No</td>
<td>400</td>
<td>N/A</td>
<td>3.0 to 5.5</td>
<td>No</td>
<td>5 Ld SOT23</td>
</tr>
<tr>
<td>ISL3281E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23 Package, 20Mbps, Full Fail-safe, Low Power, RS-485/RS-422 Receivers</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>20</td>
<td>N/A</td>
<td>Yes - Active Low</td>
<td>400</td>
<td>&lt;20</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>6 Ld SOT23</td>
</tr>
<tr>
<td>ISL3282E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, TDFN Package, 20Mbps, Full Fail-safe, Low Power, RS-485/RS-422 Receivers</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>20</td>
<td>N/A</td>
<td>Yes - Active Low</td>
<td>400</td>
<td>&lt;20</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>8 Ld TDFN</td>
</tr>
<tr>
<td>ISL3283E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23 Package, 20Mbps, Full Fail-safe, Low Power, RS-485/RS-422 Receivers</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>20</td>
<td>N/A</td>
<td>Yes - Active Low</td>
<td>400</td>
<td>&lt;20</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>6 Ld SOT23</td>
</tr>
<tr>
<td>ISL3284E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, TDFN Package, 20Mbps, Full Fail-safe, Low Power, RS-485/RS-422 Receivers</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>20</td>
<td>N/A</td>
<td>Yes - Active Low</td>
<td>400</td>
<td>&lt;20</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>8 Ld TDFN</td>
</tr>
<tr>
<td>ISL3285E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, 20Mbps, Full Fail-safe, Low Power, RS-485/RS-422 Transmitters</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>20</td>
<td>N/A</td>
<td>Yes - Active Low</td>
<td>400</td>
<td>&lt;20</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>8 Ld TDFN</td>
</tr>
<tr>
<td>ISL3293E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, Low Power, RS-485/RS-422 Transmitters</td>
<td>1</td>
<td>0</td>
<td>Yes</td>
<td>0.25</td>
<td>Yes</td>
<td>Yes</td>
<td>120</td>
<td>0.01</td>
<td>3.0 to 5.5</td>
<td>No</td>
<td>8 Ld SOT23</td>
</tr>
<tr>
<td>ISL3294E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, Low Power, RS-485/RS-422 Transmitters</td>
<td>1</td>
<td>0</td>
<td>Yes</td>
<td>0.5</td>
<td>Yes</td>
<td>Yes</td>
<td>120</td>
<td>0.01</td>
<td>3.0 to 5.5</td>
<td>No</td>
<td>8 Ld SOT23</td>
</tr>
<tr>
<td>ISL3295E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, Low Power, RS-485/RS-422 Transmitters</td>
<td>1</td>
<td>0</td>
<td>Yes</td>
<td>0.5</td>
<td>Yes</td>
<td>Yes</td>
<td>120</td>
<td>0.01</td>
<td>3.0 to 5.5</td>
<td>No</td>
<td>8 Ld SOT23</td>
</tr>
<tr>
<td>ISL3296E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, Low Power, RS-485/RS-422 Transmitters</td>
<td>1</td>
<td>0</td>
<td>Yes</td>
<td>0.5</td>
<td>Yes</td>
<td>Yes</td>
<td>120</td>
<td>0.01</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>8 Ld TDFN</td>
</tr>
<tr>
<td>ISL3297E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, Low Power, RS-485/RS-422 Transmitters</td>
<td>1</td>
<td>0</td>
<td>Yes</td>
<td>0.5</td>
<td>Yes</td>
<td>Yes</td>
<td>120</td>
<td>0.01</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>8 Ld TDFN</td>
</tr>
<tr>
<td>ISL3298E</td>
<td>±16.5kV ESD Protected, +125°C, 3.0V to 5.5V, SOT-23/TDFN Package, Low Power, RS-485/RS-422 Transmitters</td>
<td>1</td>
<td>0</td>
<td>Yes</td>
<td>0.5</td>
<td>Yes</td>
<td>Yes</td>
<td>120</td>
<td>0.01</td>
<td>3.0 to 5.5</td>
<td>Yes</td>
<td>8 Ld TDFN</td>
</tr>
</tbody>
</table>

## LONG REACH VIDEO SERIES

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Product Topology</th>
<th>VIL (V)</th>
<th>Features</th>
<th>fCLK (MHz)</th>
<th>Data Throughput (Mbps)</th>
<th>Data Format</th>
<th>Data Coding</th>
<th>Control Interface</th>
<th>Package</th>
<th>Temperature Range (ºC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL76321</td>
<td>16-bits bidirectional Serdes Video Link with back-channel transport</td>
<td>Transceiver</td>
<td>3.3 &amp; 1.8</td>
<td>Pre-emphasis, EQ, 8b ESD on Serial lines, Low EMI, int. 100ohm termination, control back-channel, fast locking.</td>
<td>7 to 45</td>
<td>900</td>
<td>16-bit data and 3-bit video control (H, V &amp; Sync)</td>
<td>8b/10b provides DC balance</td>
<td>FC</td>
<td>48 Ld QFN</td>
<td>-40 to 105</td>
</tr>
<tr>
<td>ISL76322</td>
<td>16-bits bidirectional Serdes Video Link</td>
<td>Transceiver</td>
<td>3.3 &amp; 1.8</td>
<td>Pre-emphasis, EQ, 8b ESD on Serial lines, Low EMI, int. 100ohm termination, fast locking.</td>
<td>7 to 45</td>
<td>900</td>
<td>16-bit data and 3-bit video control (H, V &amp; Sync)</td>
<td>8b/10b provides DC balance</td>
<td>FC</td>
<td>48 Ld QFN</td>
<td>-40 to 105</td>
</tr>
<tr>
<td>ISL76341</td>
<td>24-bits bidirectional Serdes Video Link with back-channel transport</td>
<td>Transceiver</td>
<td>3.3 &amp; 1.8</td>
<td>Pre-emphasis, EQ, 8b ESD on Serial lines, Low EMI, int. 100ohm termination, control back-channel, fast locking.</td>
<td>7 to 45</td>
<td>1200</td>
<td>24-bit data and 3-bit video control (H, V &amp; Sync)</td>
<td>8b/10b provides DC balance</td>
<td>FC</td>
<td>64 Ld TQFP</td>
<td>-40 to 105</td>
</tr>
</tbody>
</table>

## Data Converters

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Resolution (Bits)</th>
<th>Conv. Rate (MSPS)</th>
<th>Power Supply (V)</th>
<th>INL (max) (±LSB)</th>
<th>DNL (max) (±LSB)</th>
<th>SFDR (typ) to Nyquist (Hz)</th>
<th>Data Rate (Mbps)</th>
<th>Power (mW)</th>
<th>VREF (V)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSP600</td>
<td>8-Bit, 125/60MSPS, High Speed D/A Converter</td>
<td>8</td>
<td>125, 60</td>
<td>+3 to +5</td>
<td>0.5</td>
<td>0.5</td>
<td>61dBc @ 10MHz</td>
<td>27mW at 100MHz (3V)</td>
<td>Int</td>
<td>28 Ld SOIC, 28 Ld TSSOP</td>
<td></td>
</tr>
<tr>
<td>ISL76161</td>
<td>12-Bit, +3.3V, 130MSPS, High Speed D/A Converter</td>
<td>12</td>
<td>130</td>
<td>3.3</td>
<td>0.5</td>
<td>0.5</td>
<td>Int</td>
<td>28 Ld TSSOP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Device has completed AEC-Q100 qualification.

## Special Analog

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th># of Drivers</th>
<th>Max Operating Frequency (MHz)</th>
<th>Peak Output (mA)</th>
<th>Rise Time (ns)</th>
<th>Fall Time (ns)</th>
<th>IOL (mA)</th>
<th>RON (Ω)</th>
<th>Input Signal Range (V)</th>
<th>Input Supply Range (V)</th>
<th>Output Signal Range (V)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL55110</td>
<td>Dual, High Speed MOSFET Driver</td>
<td>2</td>
<td>150</td>
<td>3.5</td>
<td>1.5</td>
<td>1.5</td>
<td>3</td>
<td>0 to VP</td>
<td>+2.7 to +5.5</td>
<td>0 to +13.2</td>
<td>16 Ld QFN, 8 Ld TSSOP</td>
<td></td>
</tr>
</tbody>
</table>

* Device has completed AEC-Q100 qualification.
**DUAL LDO WITH LOW NOISE, VERY HIGH PSRR AND LOW Iq**

**KEY FEATURES**
- Integrates two 300mA high performance LDOs
- Excellent transient response to large current steps
- ±1.8% accuracy over all operating conditions
- Excellent load regulation: < 0.1%
- Low output noise: typically 30μVrms @ 100μA (1.5V)
- Very high PSRR: 90dB @ 1kHz
- Extremely low quiescent current: 42μA (both LDOs active)
- Wide input voltage capability: 2.3V to 6.5V
- Low dropout voltage: typically 200mV @ 300mA
- Stable with 1μF to 10μF ceramic capacitors
- Separate enable and POR pins for each LDO
- Soft-start and staged turn-on to limit input current surge
- Current limit and overheat protection
- Tiny 10 Ld 3mm x 3mm DFN package
- -40°C to +85°C operating temperature range

**APPLICATIONS**
- µP and DSP Core Power
- Audio, Sensor and RF systems

---

**SINGLE OUTPUT 1A LDO**

**KEY FEATURES**
- 0.2% initial V_out accuracy
- Designed for 2.2V to 6V input supply
- 130mA dropout (typ) at 1A
- Fast load transient response
- Adjustable in-rush current limiting
- 58dB PSRR (typ)
- 100μVrms output noise (300Hz to 300kHz)
- Power good feature
- Short-circuit current protection
- Over-temperature shutdown
- ±1.8% guaranteed V_out -40°C <Tj< +125°C
- Available in a 10 Ld DFN package

**APPLICATIONS**
- Automotive DSP, FPGA and µP Core Power Supplies
- Noise-Sensitive Sensor & RF Applications
- Post Regulation of Switched Mode Power Supplies

---

**TYPICAL APPLICATION**

**VERY HIGH PSRR**
90dB @ 1kHz

**STANDARD VOLTAGE OPTIONS**
1.2, 1.5, 1.8, 1.85, 2.5, 2.6, 2.7, 2.8, 2.85, 2.9, 2.95, 3.0, 3.3V.
For other options contact factory.

---

**BLOCK DIAGRAM**

**FAST LOAD TRANSIENT RESPONSE**
Load Transient 0A to 1A, C_out = 100μF Ceramic
## Switching Regulators

### 2-in-1 PWM Switches + Linear

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>VIN (min) (V)</th>
<th>VIN (max) (V)</th>
<th>VOUT1 (min) (V)</th>
<th>VOUT1 (max) (V)</th>
<th>VOUT2 (V)</th>
<th>IOUT1 (A)</th>
<th>IOUT2 (A)</th>
<th>VBIAS (V)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL6549</td>
<td>Single 12V Input Supply Dual Regulator - Synchronous Rectified Buck PWM and Linear Power Controller</td>
<td>1</td>
<td>12</td>
<td>0.8</td>
<td>VIN</td>
<td>0.8 to VIN</td>
<td>20</td>
<td>4</td>
<td>12</td>
<td>14 Ld SOIC, 16 Ld QFN, 16 Ld QSOP</td>
</tr>
</tbody>
</table>

### 3-in-1 PWM Switches + Linear

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>VIN (min) (V)</th>
<th>VIN (max) (V)</th>
<th>VOUT1 (min) (V)</th>
<th>VOUT1 (max) (V)</th>
<th>VOUT2 (V)</th>
<th>VOUT3 (V)</th>
<th>IOUT1 (A)</th>
<th>IOUT2 (A)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL6441</td>
<td>1.4MHz Dual, 180° Out-of-Phase, Step-Down PWM and Single Linear Controller</td>
<td>4.5</td>
<td>24</td>
<td>0.8</td>
<td>24</td>
<td>24</td>
<td>Adj.</td>
<td>6</td>
<td>6</td>
<td>28 Ld QFN</td>
</tr>
</tbody>
</table>

### 4-in-1 PWM Switches + Linear

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>VIN (min) (V)</th>
<th>VIN (max) (V)</th>
<th>VOUT1 (min) (V)</th>
<th>VOUT1 (max) (V)</th>
<th>VOUT2 (V)</th>
<th>VOUT3 (V)</th>
<th>VOUT4 (V)</th>
<th>IOUT1 (A)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL9440</td>
<td>Triple, 180° Out-of-Phase, Step-Down PWM and Single Linear Controller</td>
<td>4.5</td>
<td>24</td>
<td>0.8</td>
<td>24</td>
<td>Adj.</td>
<td>20</td>
<td>20</td>
<td>32 Ld QFN</td>
<td></td>
</tr>
<tr>
<td>ISL9440B</td>
<td>Triple Step-Down PWM and Single Linear Controller with Programmable Soft-Start</td>
<td>4.5</td>
<td>24</td>
<td>0.8</td>
<td>24</td>
<td>Adj.</td>
<td>20</td>
<td>20</td>
<td>32 Ld QFN</td>
<td></td>
</tr>
<tr>
<td>ISL9440C</td>
<td>Triple Step-Down PWM and Single Linear Controller with Programmable Soft-Start</td>
<td>4.5</td>
<td>24</td>
<td>0.8</td>
<td>24</td>
<td>Adj.</td>
<td>20</td>
<td>20</td>
<td>32 Ld QFN</td>
<td></td>
</tr>
</tbody>
</table>

### Boost Controllers

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Control Mode</th>
<th>UVOLO Rising (V)</th>
<th>UVOLO Falling (V)</th>
<th>VR (max) (V)</th>
<th>No-Load Operating Current (mA)</th>
<th># of PWM Outputs</th>
<th>FET Driver I_G (max) (A)</th>
<th>Max Duty Cycle (%)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL8843</td>
<td>High Performance Industry Standard Single Ended Current Mode PWM Controller</td>
<td>Peak Current Mode</td>
<td>8.4</td>
<td>7.6</td>
<td>30</td>
<td>2.9</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>8 Ld MSOP, 8 Ld SOIC</td>
</tr>
</tbody>
</table>

### Industry Improved

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Topologies</th>
<th>Peak Efficiency (%)</th>
<th>V_R (V)</th>
<th>IOUT (max) (mA)</th>
<th>Frequency (MHz)</th>
<th>I_S (max) (mA)</th>
<th>I_q (max) (µA)</th>
<th>I_sw (typ) (µA)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL97701</td>
<td>Boost Regulator with Integrated Schottky and Input Disconnect Switch</td>
<td>Inductor Boost</td>
<td>130</td>
<td>87</td>
<td>2.3 to 5.5</td>
<td>28</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1200</td>
</tr>
<tr>
<td>ISL97702</td>
<td>Boost Regulator with Dual Feedback Paths and Output Disconnect for Passive OLED Power Applications</td>
<td>Inductor Boost</td>
<td>130</td>
<td>87</td>
<td>2.3 to 5.5</td>
<td>28</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1200</td>
</tr>
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### Industry Improved

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Topologies</th>
<th>Gate Drive</th>
<th>DC (min)</th>
<th>DC (max)</th>
<th>Frequency</th>
<th>Temperature Range (°C)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL78215</td>
<td>Improved Industry Standard Single Ended Current Mode PWM Controller</td>
<td>Flyback, forward, boost</td>
<td>1A</td>
<td>0%</td>
<td>48%</td>
<td>Up to 2MHz</td>
<td>-40 to +105</td>
<td>8 Ld MSOP</td>
</tr>
</tbody>
</table>
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