Map Lighting
Infotainment
Side Markers
Headlights
Big Rigs
Agriculture
Tail lighting

Automotive Selection Guide
For Innovative Analog Applications
http://ams.issi.com
ISSI is a leading analog and memory technology supplier for the automotive industry. Our primary products are automotive grade high speed, low power SRAM, medium density DRAM, and NOR flash memory products. Our analog mixed signal division called ‘AMS’, designs and markets high performance LED drivers, sensors, and MCUs with AEC-Q100 certification. We have been a committed long-term semiconductor supplier to the automotive market, even through periods of tight manufacturing capacity. We will continue to provide excellent service, long-term support and latest technology to our valued automotive customers.

Automotive Solutions Provider
The AMS division of ISSI is continuously growing its innovative portfolio of leading-edge automotive LED drivers for both interior and exterior lighting, sensors for both capacitive and magnetic sensing, and audio applications. Our LED drivers cover a mix of linear and switching topologies with advanced noise and EMI reduction, thermal management and color management techniques.

Quality and Long Term Support
All automotive products are qualified according to the Automotive Electronics Council (AEC) Reliability Test requirements (AEC-Q100). This includes both device and package testing. AMS’s automotive product development and manufacturing sites are ISO9001 and ISO/TS-16949 certified.

ISSI’s commitment to long term support for its memory products extends to AMS’s analog product line. Long term product support will ensure a steady flow of product guaranteeing longevity to your designs.

Samples Availability and Support
This selection guide provides an overview of our automotive IC portfolio. All products are freely available for IC sampling and evaluation boards are available for qualified customers. Please contact your sales rep or distributor for your free sample requirements.
**Map/Dome Light Linear Driver**

- Operating voltage 5V to 42V
- Single, dual or triple channel current source
  - Programmable current via external resistors I2C registers
- Gamma corrected Fade In/Out algorithm
  - Programmable current via external resistors I2C registers
- Switch enable selectable via resistor or I2C
  - Momentary contact
  - Latched switch
- Priority of switch over I2C or PWM input
  - Selectable via resistor or I2C
- Fault Protection:
  - OUTx pin shorted to GND
  - ISET pin short to GND
  - Over temperature
- Operating temperature from -40°C ~ +125°C

**Note:** Reference device datasheet for specific features

**Description**

LEDs continue to gain popularity in automotive applications; Our family of map/dome light LED drivers offer unique cost effective solutions with advanced functionality. They integrate functions which normally require a microcontroller and several discrete components. Individual resistors are all that is required to adjust the LED current as well as the theatrical fade up/down ramp speed; there is no software programming required. However if a micro is present, it can be leveraged to fully program the map light driver functionality.

The map/dome light LED drivers can be controlled by either switches, courtesy signal input or I2C bus. The switches can be either momentary contact or latched to better match the vehicle’s ecosystem.

The 3 channel drivers enable a truly low BOM-cost solution since a single 20 pin package can drive both the high brightness LEDs and a smaller LED used for switch backlighting purposes.

**Application**

- **Automotive Interior:**
  - Map/Dome light
  - Vanity mirror
  - Puddle lamp in doors
  - Glove box

**Part Number**

<table>
<thead>
<tr>
<th>Part Number</th>
<th># CH</th>
<th>PWM Input</th>
<th>Enhanced Feature</th>
<th>Current / Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS32LT3120</td>
<td>2</td>
<td>NO</td>
<td>Fault protect, SOP-8 package</td>
<td>200</td>
</tr>
<tr>
<td>IS32LT3128</td>
<td>3</td>
<td>NO</td>
<td>Fault Report, Mode Select, Resistor Config</td>
<td>150 (30 backlight)</td>
</tr>
<tr>
<td>IS32LT3128A</td>
<td>3</td>
<td>NO</td>
<td>Fault Report, Mode Select, Resistor Config</td>
<td>150 (30 backlight)</td>
</tr>
<tr>
<td>IS32LT3129</td>
<td>3</td>
<td>NO</td>
<td>Fault Report, Mode Select, I2C Config</td>
<td>150 (30 backlight)</td>
</tr>
<tr>
<td>IS32LT3129A</td>
<td>3</td>
<td>NO</td>
<td>Fault Report, Mode Select, I2C Config</td>
<td>150 (30 backlight)</td>
</tr>
<tr>
<td>IS32LT3174</td>
<td>1</td>
<td>NO</td>
<td>Fault protect, SOP-8 package</td>
<td>200</td>
</tr>
<tr>
<td>IS32LT3175P</td>
<td>1</td>
<td>YES (Positive)</td>
<td>Fault protect, SOP-8 package</td>
<td>150</td>
</tr>
<tr>
<td>IS32LT3175N</td>
<td>1</td>
<td>YES (Negative)</td>
<td>Fault protect, SOP-8 package</td>
<td>150</td>
</tr>
</tbody>
</table>
**Interior Cabin Linear Driver**

- Operating voltage
  - High Brightness: 5V to 42V
  - RGB: 2.7V to 5.5V
- High Brightness Driver
  - Integrated fault detection and reporting
  - LED Open/Short
  - Over temperature with thermal rollback
  - Flexible LED dimming
  - PSM (Power Supply Modulation)
  - PWM (Pulse Width Modulation)
- RGB LED Driver
  - I2C Bus Configurable
  - High frequency PWM color mixing for 16-bit color
  - Individual LED addressable and programmable
  - Integrated EMI reduction technology
  - Spread spectrum
  - Staggered outputs and noise canceling channels
- All available in automotive temp range -40°C ~ +125°C

*Note:* Reference device datasheet for specific features

**Description**

Automotive interior lighting has been used for “functional” uses such as dome map, door panel, vanity and glove box lighting. With the growth of autonomous vehicles, there is more interest in use of ambient lighting to enhance the occupant’s well being and mood. It helps that strategically placed lighting enhances the perceived value the vehicle.

Our linear LED driver portfolio can address these in-cabin lighting requirements, future and present. The RGB drivers support up to 16-bit PWM resolution for creating spectacular and accurate colors. Their innovative noise cancellation technology drastically reduces any EMI and the integrated spread spectrum technology further reduces the noise floor. Their low shutdown current enhances the automobile’s energy profile.

The high brightness drivers support high LED currents in small packages with excellent thermal management capabilities. Their fault detection and reporting capabilities makes these devices ideal for high reliability and quality operation. Single LED short detection within an LED string enhances the lighting source avoiding the appearance of a single LED failure.

**Application**

- **Automotive Interior:**
  - Vanity mirror
  - Glove box
  - Ambient Lighting
  - Knob/button backlight
- Footwell
- Puddle lamp
- Cluster telltale
- Indicators

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**Part Number**

<table>
<thead>
<tr>
<th>Part Number</th>
<th># CH</th>
<th>Type</th>
<th>Enhanced Feature</th>
<th>Current / Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS32FL3209</td>
<td>18</td>
<td>6 RGB</td>
<td>I2C, WFQFN-28</td>
<td>76</td>
</tr>
<tr>
<td>IS32FL3237</td>
<td>36</td>
<td>12 RGB</td>
<td>I2C, noise cancel, 16-bit PWM, spread spectrum, dot correction</td>
<td>38</td>
</tr>
<tr>
<td>IS32FL3238</td>
<td>18</td>
<td>6 RGB</td>
<td>I2C, noise cancel, 16-bit PWM, spread spectrum, dot correction</td>
<td>76</td>
</tr>
<tr>
<td>IS32FL3738</td>
<td>48</td>
<td>6x8 Matrix</td>
<td>I2C, individual auto-breath, de-ghost, cascadeable</td>
<td>13.2 (Avg)</td>
</tr>
<tr>
<td>IS32FL3740</td>
<td>12</td>
<td>3x4 Matrix</td>
<td>I2C, individual auto-breath, de-ghost, cascadeable</td>
<td>26.3 (Avg)</td>
</tr>
<tr>
<td>IS32LT3125</td>
<td>1</td>
<td>Source</td>
<td>UVLO, short report, 30mA under fault, fault stored</td>
<td>250</td>
</tr>
<tr>
<td>IS32LT3125A</td>
<td>1</td>
<td>Source</td>
<td>UVLO, short report, 2mA under fault, fault stored</td>
<td>250</td>
</tr>
<tr>
<td>IS32LT3126</td>
<td>2</td>
<td>Source</td>
<td>Individual (UVLO, EN, Iset), single LED fail, fault report stored</td>
<td>150</td>
</tr>
<tr>
<td>IS32LT3177</td>
<td>1</td>
<td>Sink</td>
<td>PSM (supply mod), +/-5% accuracy, thermal roll-off</td>
<td>200</td>
</tr>
<tr>
<td>IS32LT3178</td>
<td>1</td>
<td>Sink</td>
<td>1kHz PWM, +/-5% accuracy, thermal roll-off</td>
<td>200</td>
</tr>
</tbody>
</table>

**Cabin Lighting**
Infotainment and Clusters

Audio:
- 5-24V Supply
- Mono BTL Class-D
- 22W/CH into 4Ω Speaker
- Selectable Gain Settings

Matrix LED Driver:
- 2.7-5.5V Supply
- Matrix or Multi-channel architecture
  - Matrix: 6x8 (16RGB), 3x4 (4RGB)
  - Multichannel: 18 (6RGB), 36 (12RGB)
- Individual LED Control
- 1MHz I2C-Compatible Bus

MCU and Sensor
- 8-bit single cycle 8051
- 16 Channel programmable capacitive touch

All Devices:
- Fault Reporting
- -40°C to +125°C Operating Temperature (except MCU and cap sensor)
- AEC-Q100 qualified (pending)

Note: Reference device datasheet for specific features

Description

Infotainment Systems and Instrument Clusters are transforming the driver and passenger experience inside the car, impacting a customer’s buying decision. Infotainment systems are getting more sophisticated and clusters are displaying more information than ever before.

The audible chime is one part of an automotive cluster; it provides audio feedback during turn signal-flasher operation, seat belt warning, etc. Visual feedback to alert when something is wrong is in the form of LED backlight of various cluster warning lights or icons.

Modern infotainment systems and controls benefit from an intuitive driver-car interface. LED backlighting of control switches make them easily identifiable, day or night. Adding a capacitive touch feature not only enhances functionality but also adds to the car’s perceived elegance and value.

Application

- Chime Alerts (Audio and Visual)
- Adjustable Backlight Icons and Buttons

<table>
<thead>
<tr>
<th>Infotainment and Instrument Cluster Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Audio</td>
</tr>
<tr>
<td>FxLED</td>
</tr>
<tr>
<td>FxLED</td>
</tr>
<tr>
<td>FxLED</td>
</tr>
<tr>
<td>FxLED</td>
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<tr>
<td>FxLED</td>
</tr>
<tr>
<td>FxLED</td>
</tr>
<tr>
<td>Sensor</td>
</tr>
<tr>
<td>MCU</td>
</tr>
</tbody>
</table>
Automotive LEDs, are developing rapidly and replacing traditional incandescent light bulbs with LED light sources. Not only do LEDs provide higher reliability and longer life, they also increase fuel efficiency. For example, a typical car using traditional bulbs could consume up to 14.5A during night driving. Replacing those bulbs with LEDs will bring down the required current to about 2.0A. In horsepower terms, LEDs lower the horsepower requirement from 0.25HP (14.5A) to less than 0.03HP (2.0A), which translates to a reduction in fuel consumption.

ISSI’s automotive LED driver portfolio consists of innovative and reliable linear or switching topologies for rear stop, turn, daytime running and backup lighting. Linear LED drivers are used when the LED forward voltage is less than the battery voltage and low-EMI is required. Switching DC/DC drivers are used when the LED forward voltage is greater than the input battery voltage; the DC/DC will boost the input supply to meet the higher LED voltage. Both topologies offer full diagnostic support for LED open/short with thermal monitoring and reporting.

Linear and Switching LED Drivers

**Linear Drivers:**
- Single and Multi-channel
- 5~42V with Load Dump Protection
- Single Resistor Sets the Current, 10~250mA
- PWM Dimming, Logic or Supply Level
- Fault Reporting

**Switching Drivers:**
- Buck (Step Down) or Boost (Step Up)
- Voltage Input up to 75V
- Logic PWM Dimming
- Integrated Switch
- Fault Protection and Reporting

Note: Reference device datasheet for specific features

### Linear Drivers

<table>
<thead>
<tr>
<th>Part Number</th>
<th># Ch</th>
<th>Sink/Source</th>
<th>Dimming</th>
<th>Channel (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS32LT3124</td>
<td>4</td>
<td>Source</td>
<td>PWM &amp; BCM</td>
<td>150</td>
</tr>
<tr>
<td>IS32LT3125</td>
<td>1</td>
<td>Source</td>
<td>PWM &amp; BCM</td>
<td>250</td>
</tr>
<tr>
<td>IS32LT3125A</td>
<td>1</td>
<td>Source</td>
<td>PWM &amp; BCM</td>
<td>250, 30mA in Fault</td>
</tr>
<tr>
<td>IS32LT3126</td>
<td>2</td>
<td>Source</td>
<td>PWM &amp; BCM</td>
<td>150</td>
</tr>
<tr>
<td>IS32LT3177</td>
<td>1</td>
<td>Sink</td>
<td>Power Supply PWM</td>
<td>10~200</td>
</tr>
<tr>
<td>IS32LT3178</td>
<td>1</td>
<td>Sink</td>
<td>Digital PWM</td>
<td>10~200</td>
</tr>
<tr>
<td>IS32LT3180</td>
<td>8</td>
<td>Sink</td>
<td>Internal PWM</td>
<td>75/CH</td>
</tr>
<tr>
<td>IS32LT3181</td>
<td>6</td>
<td>Sink</td>
<td>Internal PWM</td>
<td>75/CH</td>
</tr>
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</table>

### Switching Drivers

<table>
<thead>
<tr>
<th>Part Number</th>
<th># Ch</th>
<th>Type</th>
<th>Dimming</th>
<th>Channel (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS32LT3951</td>
<td>1</td>
<td>Buck</td>
<td>PWM, Bypass Switch</td>
<td>1.5A, Fault Report</td>
</tr>
<tr>
<td>IS32LT3952</td>
<td>1</td>
<td>Buck</td>
<td>PWM</td>
<td>1.5A</td>
</tr>
<tr>
<td>IS32LT3953</td>
<td>1</td>
<td>Buck</td>
<td>PWM</td>
<td>3A</td>
</tr>
<tr>
<td>IS32LT3954</td>
<td>1</td>
<td>Buck</td>
<td>PWM</td>
<td>3A, Fault Report</td>
</tr>
<tr>
<td>IS32LT3956</td>
<td>1</td>
<td>Buck</td>
<td>PWM, Bypass Switch</td>
<td>3A</td>
</tr>
<tr>
<td>IS32LT3957</td>
<td>1</td>
<td>Boost/Buckboost</td>
<td>PWM, Analog</td>
<td>~</td>
</tr>
</tbody>
</table>
**CAPACITANCE TOUCH SENSORS**

**Touch Sense Management**

**Robust & reliable operation**
- Automotive grade touch key controller
- Robust noise immunity to changing environments, without the need for manual tuning
- Liquid tolerance algorithm for wet/moist environments
- Reliable under noise, humidity, temperature
- Supports proximity sensing distance

**Versatile touch-sensing:**
- Enabled through plastic, glass, wood
- Liquid tolerance algorithm
- Gloved hands operation
- Buttons, Sliders, wheels & Proximity sensor

**Easy & Flexible configuration**
- Self tuning capacitor touch
- Flexible number of touch sensors
- Integrated touch sensor & LED driver solutions
- I/O configurability - SPI, I2C, UART, LIN, CAN, etc.
- User-friendly GUI for quick configuration and characterization
- Browser based flash programming tooling
- Low power consumption by ULL process

**Description**

Capacitive touch sensing enables ascetic design and superb in-car experience. Extending from traditional infotainment center-stack to a variety of user interfaces throughout the vehicle such as illumination controls, indoor & outdoor touch sensor switches, liquid level sensors and many others.

The ISSI touch sensor solutions enable product designers to quickly replace mechanical buttons with sleek and reliable capacitive-sensing user interfaces.

Bringing to the market a reliable and flexible solution, working through different user interfaces (button, wheel, slider, proximity, etc.), surface materials (plastic, wood, etc.), wide environmental conditions (humidity, temperature) and user-touch interface (gloves, wet or dirty surface, etc.). This in turn is critical to determine the user satisfaction of the human-machine interaction.

Utilizing the programmable capabilities of the ISSI touch sense solution enables a range of system solutions starting with direction, proximity or gesture recognition, going through providing visual (LED, STN-LCD) and audio feedback, as well as ability for in-line communication with other elements in the vehicle.

### Table: Touch Sensor Applications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Touch Keys</th>
<th>LED/LCD Driver</th>
<th>Package</th>
<th>Enhanced Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS32SE5110</td>
<td>16 (TK1)</td>
<td>No</td>
<td>TSSOP-24</td>
<td>SPI, I2C, 6-ch PWM16, 10-bit DAC, LIN, Buzzer, AEC-Q100</td>
</tr>
<tr>
<td>IS32SE5111</td>
<td>15 (TK1, TK2)</td>
<td>No</td>
<td>TSSOP-24</td>
<td>SPI, I2C, 12-ch PWM8, 12-bit DAC, LIN, Buzzer, Stable AC Transient Response, AEC-Q100 Pending</td>
</tr>
<tr>
<td>IS32SE5114</td>
<td>15 (TK1, TK2)</td>
<td>Common cathode direct drive 8 x 15, Matrix LED 28x8, STN-LCD 32 x 4~28 x 8</td>
<td>LQFP-64</td>
<td>SPI, I2C, RTC, 6-ch PWM16, 2-ch PWM8, 12-bit DAC, LIN, Buzzer, Stable AC Transient Response, AEC-Q100 Pending</td>
</tr>
</tbody>
</table>

P.S.: TK1: Oscillator Type; TK2: Charge Transfer Type

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Analog Part Decoder

**ISSI Locations**

**ISSI Locations**

**Analog Product Family**
- 31 = Commercial/Industrial Analog
- 32 = Automotive Analog and Mixed Signal

**Product Type**
- AP = Audio Power Amplifier
- AS = ASIC
- BL = White LED Driver for LCD Backlight
- CG = Connectivity
- CS = MCU Auto and non-Auto
- FB = Fiber
- FL = FxLED Driver
- IO = Multi-Function I/O Expander, CAN, LIN
- LT = Lighting LED Driver
- NM = Networking
- PM = Power Management
- SE = Sensor

**Temperature Grade**
- S1 = Commercial [0°C to 70°C]
- S2 = Industrial temp. [-40°C to 85°C]
- S3 = Industrial temp. [-40°C to 105°C]
- S4 = Industrial temp. [-40°C to 125°C]
- A1 = Automotive Grade [-40°C to +85°C]
- A2 = Automotive Grade [-40°C to +105°C]
- A3 = Automotive temp. [-40 to 125°C]

**Solder Type**
- Blank = Sn/Pb
- L = Lead-free (RoHS Compliant)

**Package Code**
- GR = SOP
- QF = QFN
- TD = TSOT
- UX = UTQFN
- QW = Wettable flank QFN
- QU = UQFN
- Z = eTSSOP

**Voltage Range / Parameters**
- Sense Voltage Range
  - V1 = 91mV to 101mV
  - V2 = 99mV to 110mV
- Under-Voltage Range
  - V1 = 1.13V to 1.21V
  - V2 = 1.19V to 1.26V

**Package Option**
- Blank = Tray or Tube
- TR = Tape & Reel

**Voltage/Parameter**

**ISSI Locations**

Authorized Worldwide Distributors:

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