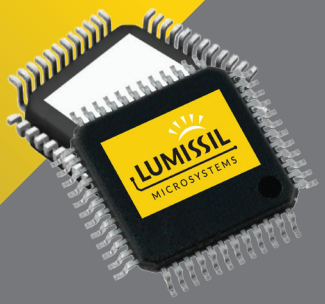
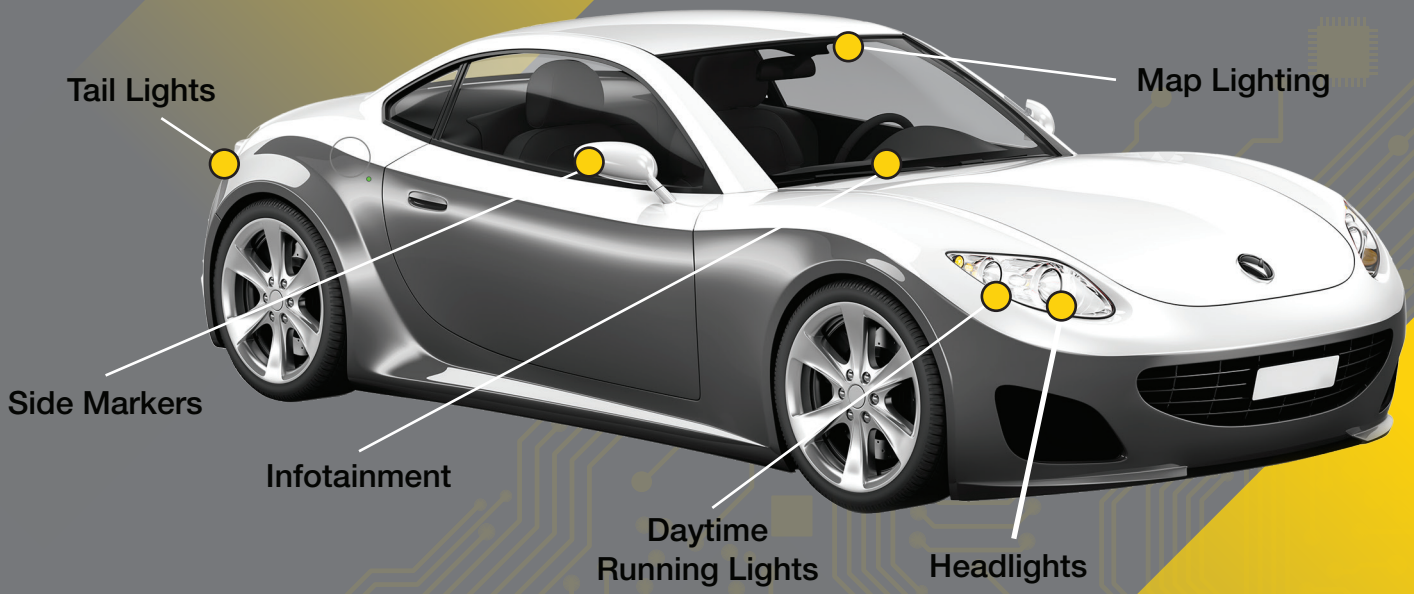
LUMISSIL MICROSYSTEMS



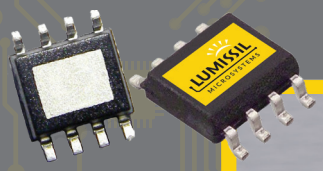
2024

Automotive Products

For Innovative Analog Applications



We also provide IC solutions for:

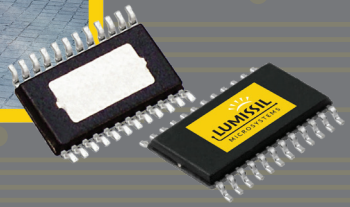


Motorcycles & Scooters

Semi Trucks

Autos & EV

Construction & Farming Equipment



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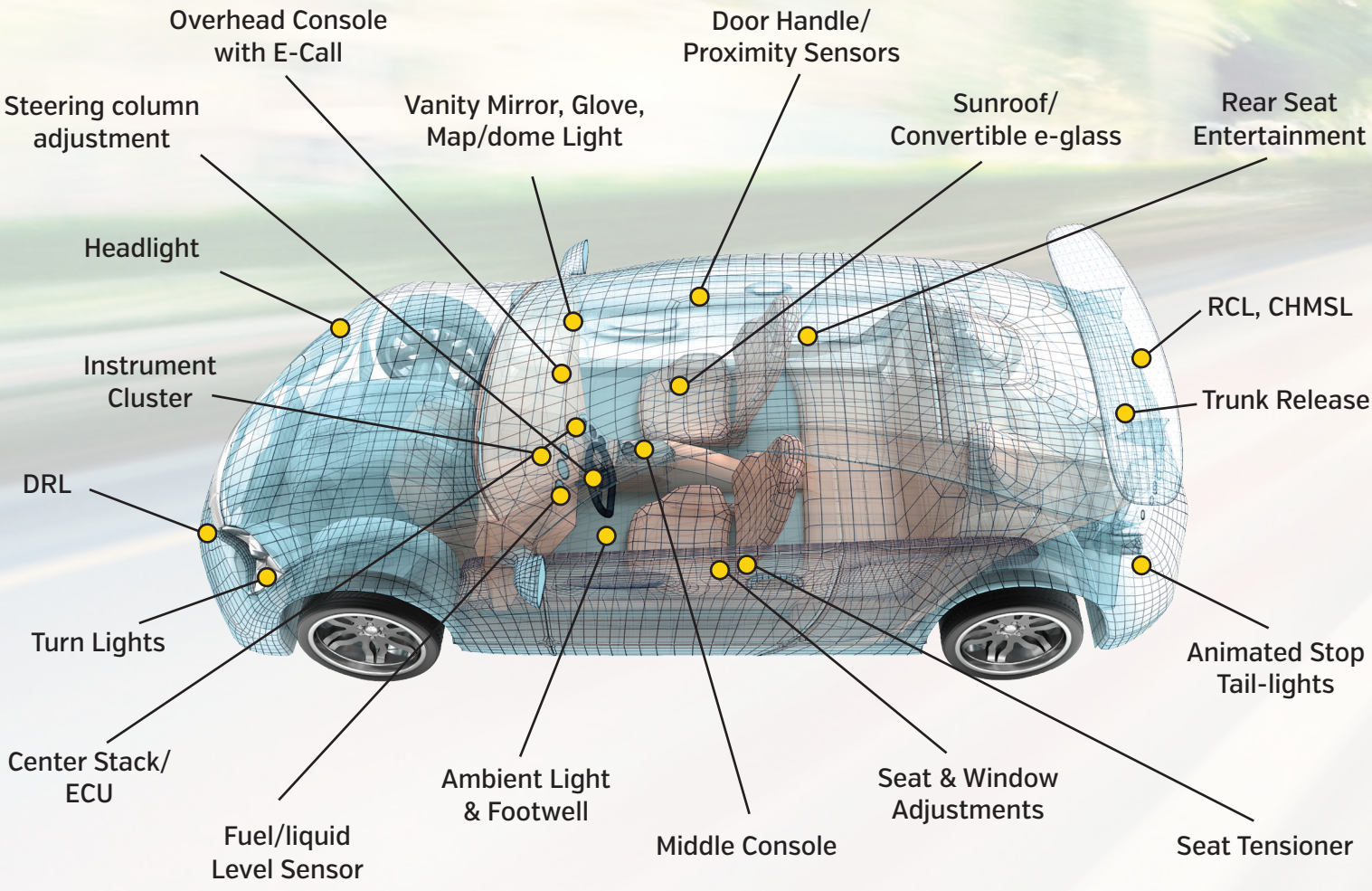
Automotive Application



About Lumissil

Lumissil Microsystems is a fabless semiconductor company that specializes in the analog and mixed-signal domain. Our products cater to consumer, industrial, automotive, and medical markets. We are market leaders in LED driver solutions, addressing low to mid-power RGB color mixing and high-brightness lighting applications. Lumissil is also a leading provider of Home Plug Green Phy for the EV market. Our expertise extends to crafting application-specific microcontrollers (MCUs) and multimedia microprocessors (MPUs) based on our proprietary Xburst CPU for a diverse customer base. We are known for our low power, capacitive sensing touch key technology and coupled with our advanced audio amplifiers and optical networking components, Lumissil is dedicated to delivering unparalleled semiconductor innovations.

Primary Markets: Automotive, industrial, appliance, and communication.

Product Range: Includes LED drivers, vehicle networking transceivers, microcontrollers, microprocessors, Home Plug Green Phy and power line communications.

Quality: Adheres to AEC-Q100 reliability standards and ISO 26262 functional safety standards in automotive.

Resiliency: Diverse supply chain footprint to mitigate sudden supply challenges or requirements of certain geographical locations

Long-Term Support: Committed to providing ongoing support and product availability.

Innovative Solutions: Aims to facilitate customer design efforts in automotive technology.

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. The latest generation automotive devices are designed to be compliant with ISO 26262 functional safety standards. Lumissil's automotive product development and manufacturing sites are ISO9001 and ISO/TS-16949 certified.

We are committed to long term product support and reliable product availability to ensure longevity of your designs.

Samples Availability and Support

This selection guide provides an overview of Lumissil automotive products portfolio. Samples and evaluation boards for all products are available to qualified customers. Please contact your sales representative or distributor for your free sample needs.

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Interior Automotive

A car's interior "comfort rating" is an important differentiating factor since increasingly car buyers value comfort over engine power. It is up to car OEMs to develop intelligent controls complemented with lighting to make for a pleasant cabin experience. Today's cars and evolving autonomous vehicles rely on microcontrollers and LED lighting to enhance the driver/passenger experience and safety. For example, the instrument cluster located behind the steering wheel houses a variety of gauges and indicators to display the vehicle's status. At a glance, it provides vehicle driving information such as gasoline or charge level, speed, travel distance, and hazard alerts. In combination with visual alerts, haptic technology such as steering wheel and seat vibrations serve to augment a driver's awareness. In combination, color lighting and vibration serve as "gentle" attention grabbing notifications.

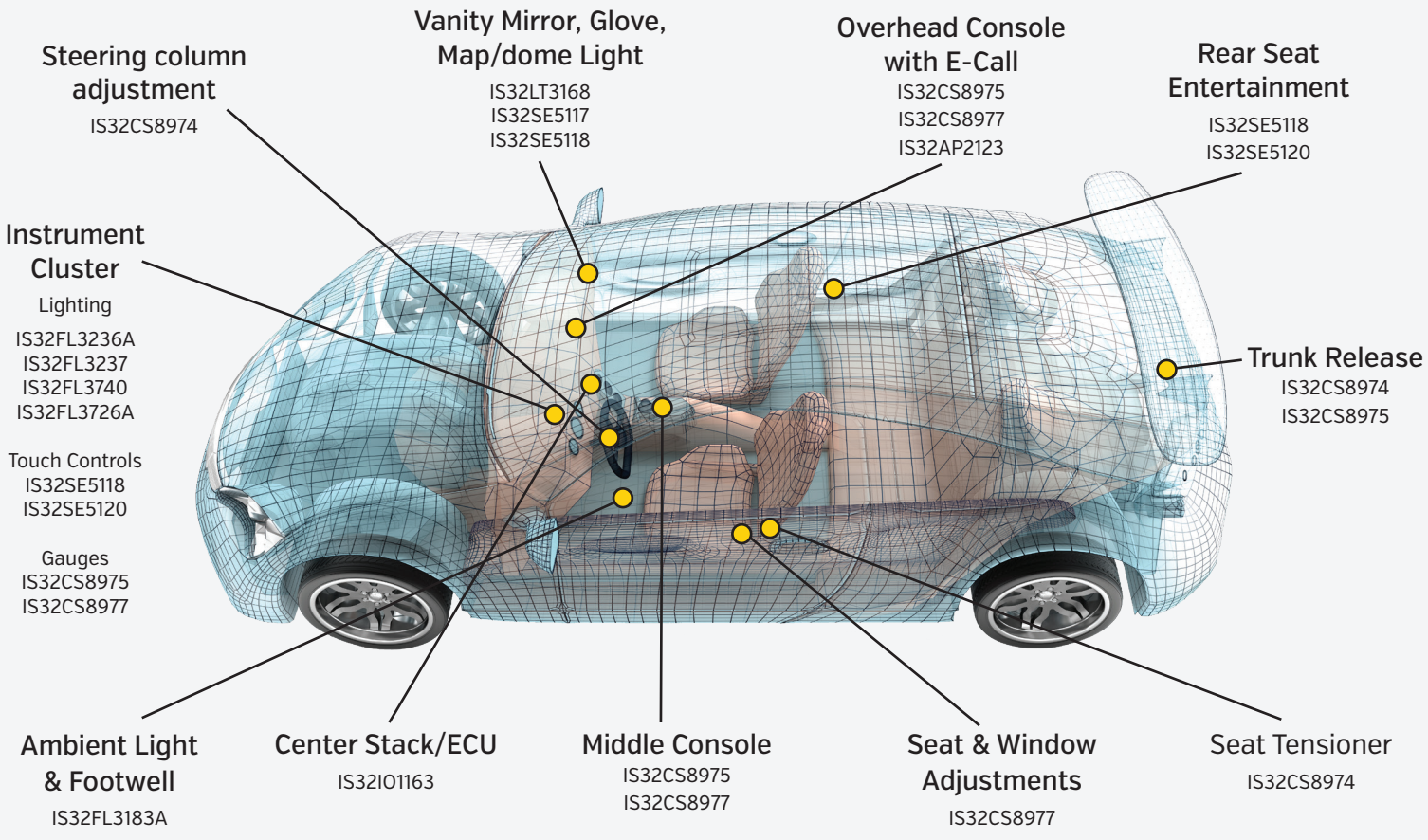
Lumissil offers a broad portfolio of silicon solutions to increase a vehicle's cabin comfort level. Our LED drivers for interior accent lighting and instrument cluster applications provide an appealing interior experience. Our microcontrollers for touch sensing and mechanical control enhance the HMI (Human Machine Interface) experience. Lumissil's automotive IC solutions are AEC-Q100 qualified, meaning they have passed the specified stress tests to guarantee automotive quality and reliability.

Interior lighting applications:

- Instrument cluster
- Infotainment and multimedia display
- Glove box and vanity mirror lighting
- Overhead cabin lighting
- Color accent lighting in doors, seating, dashboard/console

Microcontroller applications:

- Microcontroller applications
- Instrument cluster gauges
- Overhead/middle console
- Steering wheel and seat adjustment
- Touch sensors



Interior Lighting

Color FxLED Light

Smart LED

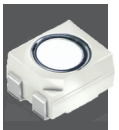
4	LIN	19KHz	MCU	60mA	IS32LT3183A
3	CAN (5V)	1 MHz or 2MHz	State Machine	63mA	IS32FL3202

Multi-Channel LED

18	I2C	400KHz	5V I/O	78mA	IS32FL3209
		1MHz	5V I/O	38mA	IS32FL3207
				78mA	IS32FL3238
		1MHz	>10V I/O	60mA	IS32FL3265A
	SPI	12MHz	>10V I/O	60mA	IS32FL3265B
30	I2C	1MHz	5V I/O	38mA	IS32FL3240
36	I2C	400KHz	5V I/O	38mA	IS32FL3236A
		1MHz	5V I/O	38mA	IS32FL3237

Matrix LED

3x4	I2C	1MHz	5V I/O	84mA	IS32FL3740
6x8	I2C	1MHz	5V I/O	84mA	IS32FL3738
18x4	SPI	12MHz	5V I/O	34mA	IS32FL3746B
24x4	SPI	33MHz	>10V I/O	60mA	IS32FL3749
	Serial Shift	33MHz	>10V I/O	60mA	IS32FL3749



White HB LED Light

High Brightness Linear LED

1	PSM	Sink	5V ~ 40V	200mA	IS32LT3177
1	PWM	Sink	2.9V ~ 40V	200mA	IS32LT3178
2	PWM/ PSM	Source	5V ~ 42V	150mA	IS32LT3126

Map/Dome/Vanity LED

1	Hall Switch	Fade Up/Dn	6.5V ~ 28V	200mA		IS32LT3168
1	BCM or Momentary Switch	Fade Up/Dn	5V ~ 42V	150mA	Positive BCM	IS32LT3175P
					Negative BCM	IS32LT3175N
3	Momentary or Latch Switch	Fade Up/Dn	5V ~ 42V	2x150mA 1x30mA	Switch Priority	IS32LT3128
					BCM Priority	IS32LT3128A
3 I2C	Momentary or Latch Switch	Fade Up/Dn	5V ~ 42V	2x150mA 1x30mA	Switch Priority	IS32LT3129
					I2C Priority	IS32LT3129A

Interior Lighting

Dome/Map/Vanity/
Glove/Truck/Door-Puddle

Automotive Interior LED Linear Drivers

- Single or triple channel configurable current source
- PWM or automatic Gamma-corrected luminosity fading
- Momentary/latched/Magnetic switch control
- Fault Protection
- Small package, -40°C to +125°C, AEC-Q100

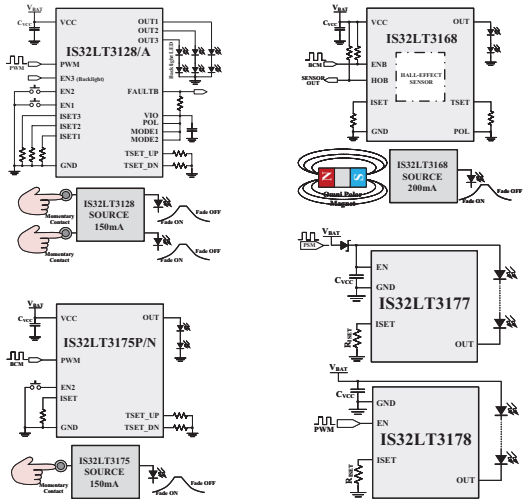
Description

LED drivers with integrated gamma-corrected fade ON/OFF provide smooth lighting transitions for Interior automotive lighting applications. Lumissil's single or triple channel LED drivers come with a momentary (internally debounced), latched or a magnetic switch option. For example a central map/dome light application benefits from a triple channel driver (two for bright LEDs and one for button switch backlighting) while a glove compartment application can use a single channel driver.

Applications

- Dome
- Map
- Glove box
- Vanity mirror
- Trunk light
- Door-Puddle

Application Circuits



Dome/Map Light

Glove Compartment

Trunk Light

Vanity Light

Product Offerings

Part Number	# of Channels	Current	Switch	Supply	Pkg
IS32LT3128/A	3	2-CH: 20mA to 150mA, 1-CH: 30mA	Momentary or latched	5V to 42V	eTSSOP-20
IS32LT3129/A	3	2-CH: 20mA to 150mA, 1-CH: 30mA	Momentary or latched	5V to 42V	eTSSOP-20
IS32LT3168	1	20mA to 200mA	Hall-Effect Sensor	6.5V to 28V; maximum 36V	SOP-8-EP
IS32LT3175P/N	1	YES (Positive)	Fault protect, SOP-8 package	150	SOP-8-EP
IS32LT3177/8	1	10mA to 200mA	Power Supply Modulation Logic Level PWM	5V to 40V (IS32LT3177) 2.9V to 40V (IS32LT3178)	SOP-8-EP

Interior Lighting

Interior Cabin Linear Driver

- Operating voltage
  - High Brightness: 5V to 42V
  - RGB : 2.7V to 5.5V
  - High Voltage I/O: upto 16V
- 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 Driver
  - I2C Bus Configurable
    - High frequency 16-bit PWM color mixing
    - Individual LED addressable and programmable
    - Integrated EMI reduction technology
    - Spread spectrum
    - Staggered outputs and noise canceling channels
- -40°C ~ +125°C; AEC-Q100

Description

Automotive ambient lighting provides attractive and functional interior illumination to enhance the occupant's comfort and well being. Lumissil's ambient LED driver portfolio support up to 16-bit PWM resolution for creating spectacular and accurate colors. Innovative noise cancellation technologies such as spread spectrum, phase delay drastically reduces electromagnetic emissions. Low shutdown current minimizes energy consumption while fault reporting capabilities make these devices ideal for reliable operation.

Applications

- **Ambient Lighting**
- **Footwell**
- **Puddle lamp**
- **Cluster telltale**
- **Indicators**
- **Knob/button backlight**

Cabin Lighting

Product Offerings

Part Number	# CH	Current (mA)	Inter-face	Type	Pkg
IS32FL3207	18	38	I2C	Multi-Channel	WFQFN-28
IS32FL3209	18	78	I2C	Multi-Channel	WFQFN-28
IS32FL3236A	36	38	I2C	Multi-Channel	eTQFP48
IS32FL3237	36	38	I2C	Multi-Channel	eTQFP48
IS32FL3238	18	78	I2C	Multi-Channel	eTSSOP-28
IS32FL3240	30	38	I2C	Multi-Channel	WFQFN-40
IS32FL3265A/B	18	60	I2C/SPI	Multi-Channel	eTSSOP-28
IS32FL3738	6x8	84	I2C	Matrix	eTSSOP-28
IS32FL3740	3x4	84	I2C	Matrix	eTSSOP-20
IS32FL3746B	18xn (n=1~4)	34	SPI	Matrix	WFQFN-32
IS32LT3126	2	150	-	White	eTSSOP-16
IS32LT3177/8	1	200	-	White	SOT23-6, SOP-8-EP
IS32LT3183A	4	60	LIN	RGB/W	SOP-8-EP
IS32FL3202	3	63	CAN Lite	RGB	WFQFN-10

IS32LT3183A: LIN Compliant RGB+W LED Driver

- Operating voltage: 5.5V to 18V (40V tolerate)
- 4 channels of current sinks of up to 60mA
  - Reconfigurable to GPIO, SPI/I2C
  - High Color resolution of up to 16-Bit LED color range with LED temperature compensation
- Dimming and color transition function with programmable transition time
- Integrated MCU for LIN protocol handling and LIN message decoding compliant to LIN 2.2A
- Support LIN SNPD (Slave Node Position Detection) using BSM (Bus Shunt Method).
- Protection:
  -Open/Short LED detection
  -High temperature warning and shutdown
- SOP-8EP package with temp range -40°C ~ +150°C

IS32FL3202: CANLite RGB Controller

- Operating voltage: 3.5V to 6.5V
- 3 channels of current sinks of up to 63mA
  - High Color resolution of up to 12-Bit LED color range with LED temperature compensation
  - Constant luminance over wide temperature range by temperature compensation algorithm
- Two field PWM modes allow easier dimming and cross fading light effects
- All registers accessible via a 5V CAN interface
- CANLite bus with LAA (Location Address Assignment)
  - 1MHz upto 254 linked devices
  - 2MHz upto 128 linked devices
  - 12-bit PWM and 6-bit current adjust per channel
- State machine with acceleration algorithms
  - LED temperature compensation
  - OTP for binning data
- Spread spectrum to reduce EMI
- WFDFN-10 package with temp range -40°C ~ +125°C

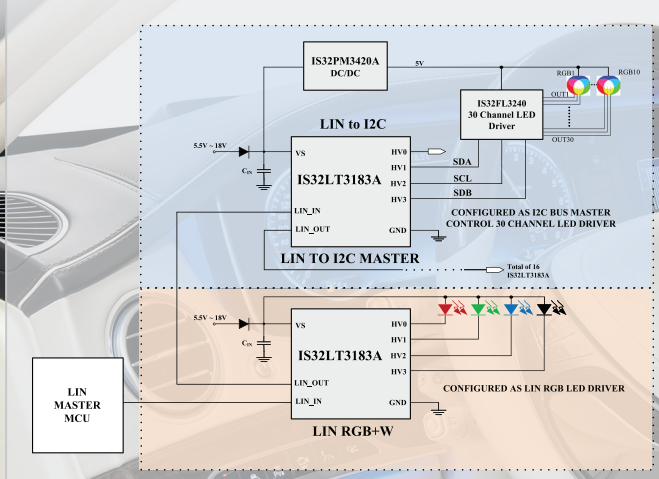
Applications

- Vehicle cabin ambient Lighting
- LIN Interface
  - LIN to SPI or LIN to I2C bridging
  - General Purpose MCU for LIN slave node operation
- CANLite Interface
  - >254 devices per chain for zonal RGB ambient light

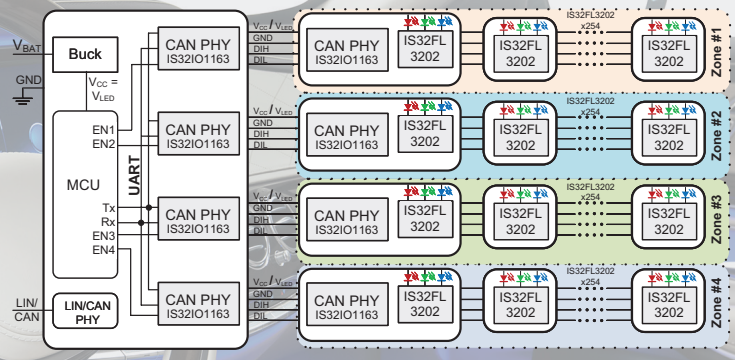
Product Offerings

Part Number	Interface	# CH	Current	Package
IS32FL3202	CAN Lite	3	63mA	WFDFN-10
IS32LT3183A	LIN 2.2A	4	60mA	SOP-8EP

Application Circuits



IS32LT3183A



IS32FL3202

Infotainment, Clusters, Audio & Backlight

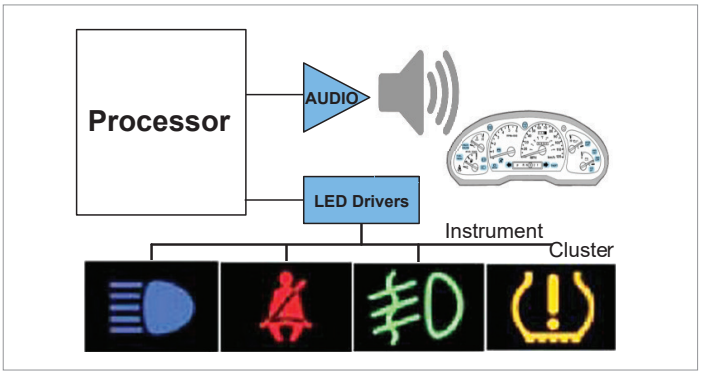
Infotainment & Clusters

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
- Individual LED Control
- 1MHz I2C Host Control

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

All Devices:
- Fault Reporting
- -40°C to +125°C, AEC-Q100



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.

Applications

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

Infotainment and Instrument Cluster Devices

Family	Device	Features	Package
Audio	IS32AP2123	22W Mono Class-D	eTSSOP-16
FxLED	IS32FL3209	18-Channel @ 76mA	WFQFN-28 eTSSOP-28
FxLED	IS32FL3738	6x8 Matrix LEDs	eTSSOP-28
FxLED	IS32FL3238	18-Channel @ 76mA, Noise reduction	WFQFN-28 eTSSOP-28
FxLED	IS32FL3738	6x8 Matrix LEDs	eTSSOP-28
FxLED	IS32FL3240	30-Channel	WFQFN-40
Sensor	IS32SE5110	16-CH Programmable Capacitive Touch	TSSOP-24
Sensor	IS32SE5117A/ SE5118A/ SE5120A	Programmable Capacitive Touch and proximity sensors	QFN-16, QFN-24, QFN-32
MCU	IS32CS8975 /8975/8977	8-bit single cycle 8051 with 32kB flash, 1kB RAM, 16-Channel 12-bit ADC	TSSOP-24, TSSOP-20, TSSOP-16, SOP-8

Family of 48, 24 and16 channel constant current and matrix LED drivers with a serial shift control interface.

IS32FL3268 & IS32FL3248 Features

- IS32FL3268 - 24 current sink channels @ 50mA
- IS32FL3248 - 48 current sink channels @ 33mA
- IC Vcc 3.0 ~ 5V with LEDs VLED 4.5 ~ 16v (18V tolerant)
  -Enables multiple LEDs in series
- 33MHz serial-shift or SPI interface
- Individual 16-bit, 8+8-bit dithering, 8+4-bit dithering, 8-bit PWM mode
- Noise Reduction
  - PWM Clock Spread Spectrum
  - 180-degree phase delay
- Protection
  - LED open/short detection
  - Over temperature

IS32FL3726A Features

- 16 current sink channels @ 60mA
- 5V operation, LEDs not stackable
- 30MHz serial-shift interface
- Current accuracy
  - Device-to-Device: < ±2%
  - Channel-to-Channel: < ±4%

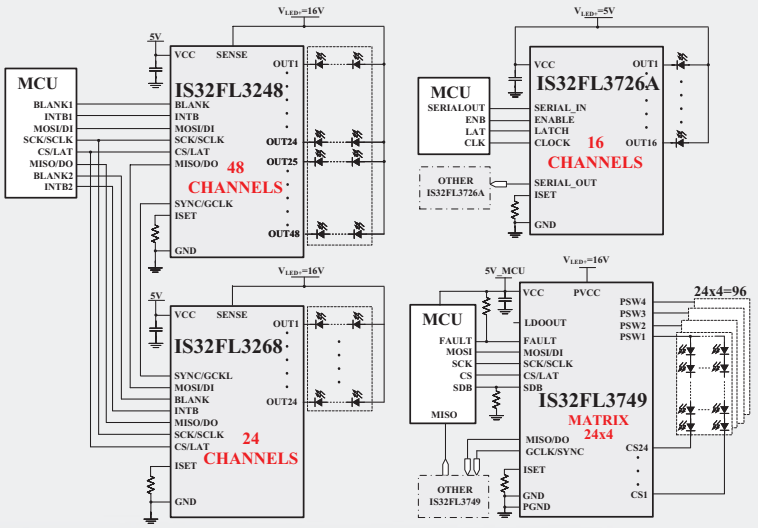
IS32FL3749 Features

- 4x24 Matrix driver supports 96 LED array size
- IC and VLED 4.3 ~ 16V (20V tolerant)
  - Enables multiple LEDs in series
- 33MHz serial-shift or SPI interface
- Individual 16-bit, 8+8-bit dithering, 8+4-bit dithering, 8-bit PWM mode
- Noise Reduction
  - PWM Clock Spread Spectrum\
  - 4 group phase delay
  - LED de-ghosting circuit
- Protection
  - LED open/short detection
  - PSW short
  - Over temperature

Applications

- Automotive LED Back Light
- Automotive Center Information Display
- Automotive Signage

Application Circuits



Product Offerings

Part Number	Channel current	Individual LEDs (No Stack)	High Voltage (Stack LEDs)	Serial Bus	Package
IS32FL3248	33mA	48 Channel	Yes (16V)	Serial-shift or SPI @33MHz	eTQFP-64 QFN-64
IS32FL3268	50mA	24 Channel	Yes (16V)	Serial-shift or SPI @33MHz	WFQFN-40
IS32FL3726A	60mA	16 channel	No (5V)	Serial-shift @30MHz	QFN-24 SSOP-24 eTSSOP-24
IS32FL3749	60mA	4x24=96 Matrix	Yes (16V)	Serial-shift or SPI @33MHz	eTQFP-48

Exterior Automotive

Automotive exterior refers to all the lights and controls around the outer perimeter of a vehicle, whether it is a car, motorcycle, bus, or truck. Exterior lighting provides a competitive differentiation to enhance a vehicle's perceived value and brand recognition. Well-positioned and contoured lighting helps the vehicle stand out while providing informative signaling and illumination functions. While microcontrollers are unseen, they are necessary for door handle sensing, moon roof control, and even performing taillight animations.

Lumissil provides AEC-Q100 LED drivers and microcontrollers for advanced automotive applications. These intelligent LED controllers take car safety to the next level by enabling dynamic signaling on rear combination lights, dual intensity for daytime running lights, synchronized welcome lights and glare free headlights.

Informative signaling:

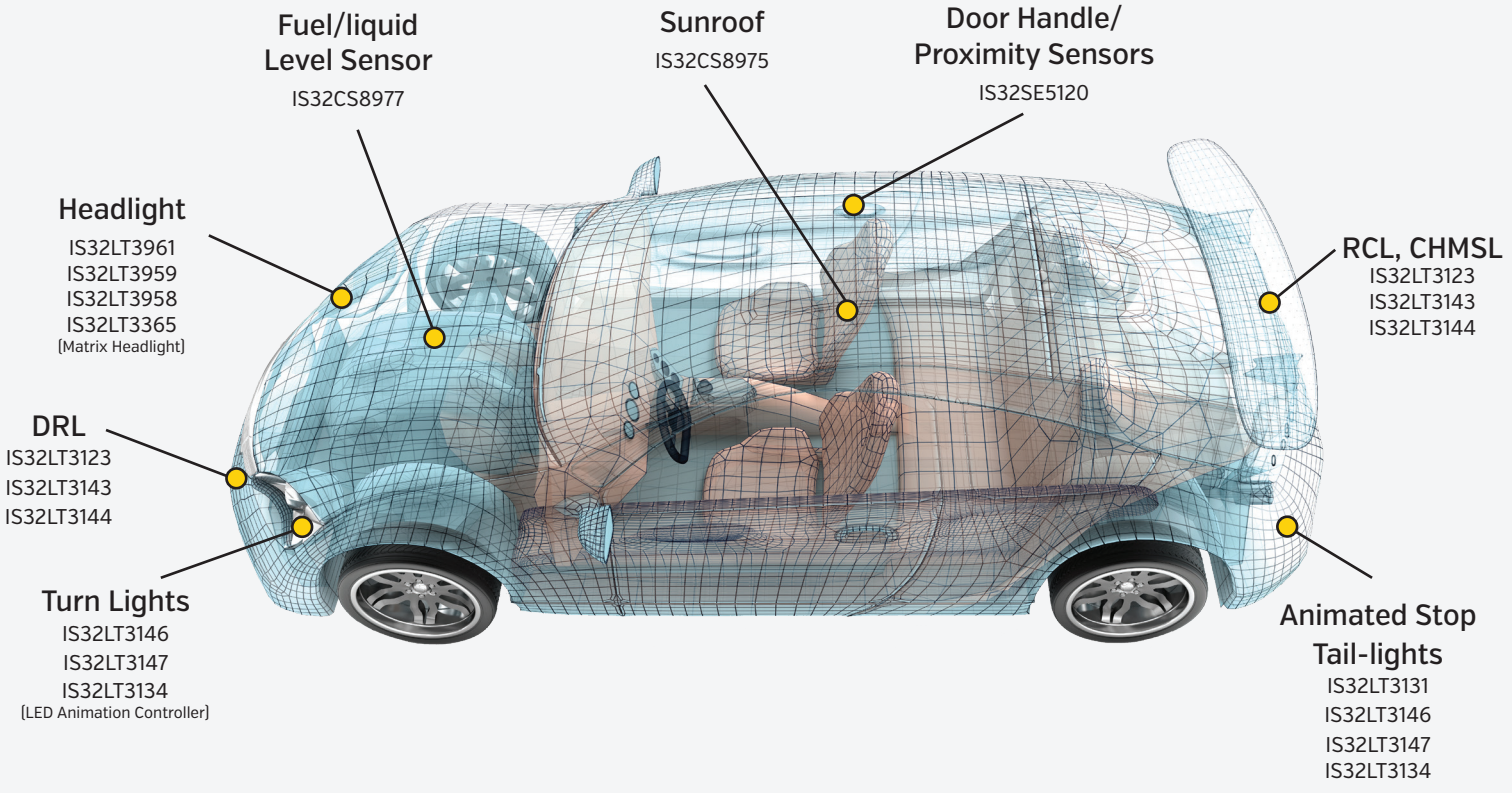
- Rear Combination Light (RCL)
- Center High-Mounted Stop Light (CHMSL)
- Daytime Running Light (DRL)
- Turn/Emergency Lights
- Welcome Light

Illumination:

- Head Light
- Fog Lamp
- Reverse Light
- License Plate

Microcontroller:

- Touch and proximity sensing
- Sunroof & trunk control



Linear - Exterior Lighting

Front

DRL LED

- Source → 1ch → 450mA → 4.5V~40V
  - Thermal Shunt → PWM
    - Single LED Short → IS32LT3140A
    - Single LED Short → IS32LT3140B
  - 1 - Wire → Daisy Chain
    - Single LED Short → IS32LT3141A
    - Single LED Short → IS32LT3141B
- 3ch → 150mA → 5V~40V → PWM → Single LED Short
  - Resistor Thermal Rolloff → IS32LT3143
  - NTC Temp Sensor → IS32LT3144

Matrix Headlight LED

12 Bypass Switches → 20V @1.5A/Switch → CRC → UART, CANLite, SPI → Eeprom → 2x Analog Dim → IS32LT3365A/B/C

Rear

Tail/Stop LED

- Ext Channel x4 FETs → 4ch → Internal PWM → SINK → 5V~40V → Traditional 2 Wire Control → IS32LT3123
- Ext Thermal Mgmt FET → 4ch → PWM → Source → 5V~28V → 150mA → IS32LT3124
- Thermal Shunt → 6ch
  - State Machine → Animation → Source → 5V~40V → 75mA → IS32LT3146
  - PWM X6 → Source → 5V~40V → 75mA → IS32LT3147

Switching - Exterior Lighting

Buck

Hysteretic CCM

6V~40V → 1.3A → Shared Fault → Analog or PWM DIM → Integrated FET → IS32LT3361

Fixed Frequency

- 4.5V~38V → PWM DIM → Integrated FET
  - 1.5A → Fault
    - IS32LT3951
    - IS32LT3952
  - 3.0A
    - IS32LT3953
    - VDD OUT → IS32LT3953B
    - Fault → IS32LT3954
    - Shared Fault → IS32LT3954A
- 5V~60V → Analog & PWM DIM → Integrated FET → Single LED Short → Analog Current Monitor → Fault → Cathode to Ground → IS32LT3961
- 3.8V~38V → Integrated FET & Diode → Shared Fault → Cathode to Ground → IS32LT3965

Buck, Buck Boost, Boost, SEPIC

Buck, Buck Boost, Boost, SEPIC

- 5V~75V → 1x Analog & PWM DIM → No Internal PWM → No Single LED Short → No LED Cathode GND → IS32LT3957A
- 5V~70V → 2x Analog & PWM DIM → Internal PWM → No Single LED Short → No LED Cathode GND
  - IS32LT3958
  - Optimized Soft Start → IS32LT3958A
- 4.5V~55V → 1x Analog & PWM DIM → Internal PWM → Single LED Short → LED Cathode GND
  - IS32LT3959
  - Optimized LED Bypass → IS32LT3959A

Exterior Lighting

Description

New vehicles utilize LED headlights due to their efficiency, durability, reliability and refined luminosity control. Basic headlights provide two levels of luminosity control. Advanced headlights systems such as matrix headlight enables refined dimming control of an array of LEDs; such that other in-front vehicles can be glare-free and also made more visible to the driver. Switching LED drivers provides high current at high efficiency.

Applications

- Headlights
- Matrix Headlights
- Daytime Running Lights (DRL)
- Fog Lights

Switching Buck LED Drivers

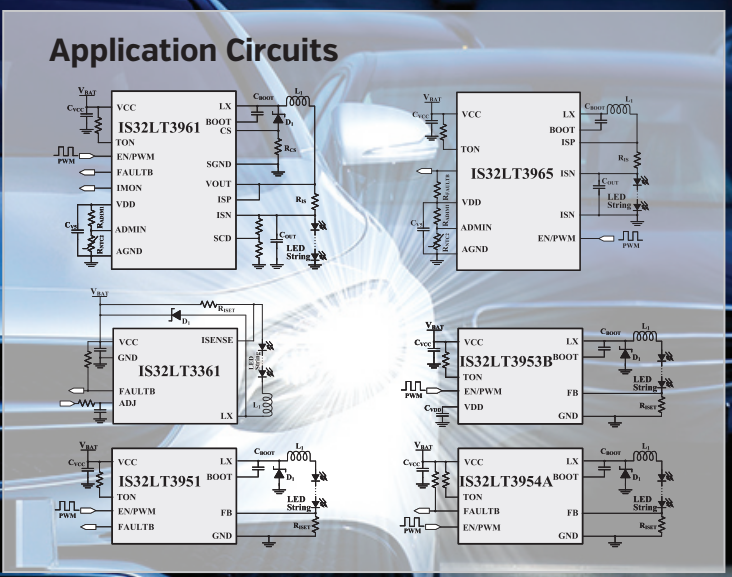
Linear Drivers:

- 2 to 3 channel
- External PWM, Internal PWM or Analog dimming
- ADC for LED binning or temperature sensing of LEDs
- Fault Protection and Reporting
- -40°C to +150°C, AEC-Q100

Switching Drivers:

- Buck or Boost or Buck-boost or SEPIC switching drivers
- Analog or PWM Dimming
- ADC for LED binning or temperature sensing of LEDs
- Fault Protection and Reporting
- -40°C to +125°C or +150°C, AEC-Q100

Application Circuits



Product Offerings

Part Number	#CH	Type	Current	LED Dimming	Fault	Package
IS32LT3951	1	Buck	1.5A	PWM	Faults protection and Report	SOP-8-EP
IS32LT3952	1	Buck	1.5A	PWM	Faults protection only	SOP-8-EP
IS32LT3953	1	Buck	3A	PWM	Faults protection only	SOP-8-EP
IS32LT3954	1	Buck	3A	PWM	Faults protection and Report	SOP-8-EP
IS32LT3123	4	Linear	External FET	External PWM, Internal PWM,	Faults protection and Report	eTSSOP-24
IS32LT3957A	1	Buck,boost, Buck-boost, SEPIC	External FET	PWM, Analog	Faults protection and Report	eTSSOP-16
IS32LT3958	1	Buck, Boost, Buck-boost, SEPIC	External FET	External PWM, internal PWM, Analog	Faults protection and Report	eTSSOP-20
IS32LT3959	1	Buck, Boost, Buck-boost	External FET	External PWM, internal PWM, Analog	Faults protection and Report	eTSSOP-28
IS32LT3961	1	Buck	2A	PWM, Analog, Bypass MOS-FET shunt	Faults protection and Report	eTSSOP-16
IS32LT3365	12	Large array dimmer	1.5A	PWM	Faults protection and Report, ISO26262	eLQFP-48

Exterior Lighting

Switching Boost, Buck-Boost LED Drivers

Description

Step-up (or boost) LED drivers are used for regulating the current in an LED string from a supply voltage that is lower than the total LED string voltage. A 12v automotive battery can vary from 6 ~ 18V requiring the LED driver to boost the 6V to a higher voltage buck the 18V to match the total LED string voltage. A buck-boost

Applications

- Headlight
- Daytime Running Lamp (DRL)
- Fog Lamp
- Turn signal light

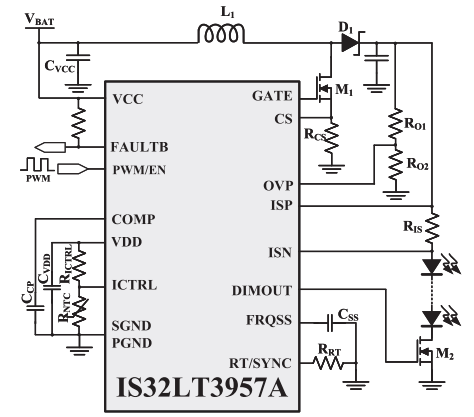
Key Features

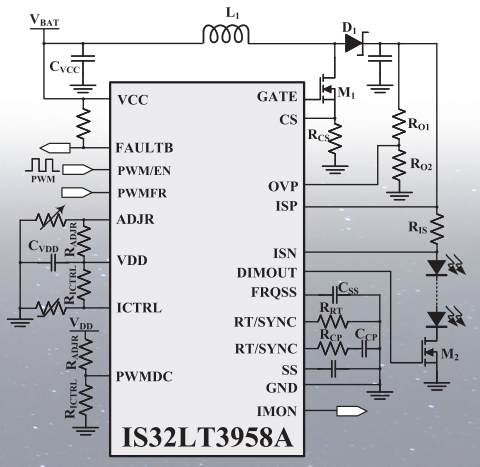
- Wide operating range
  - IS32LT3957A – 5V to 75V
  - IS32LT3958/A – 5V to 70V
  - IS32LT3959/A – 4.5V to 55V
- Analog and digital LED current adjust
- High current accuracy over the operating temperature

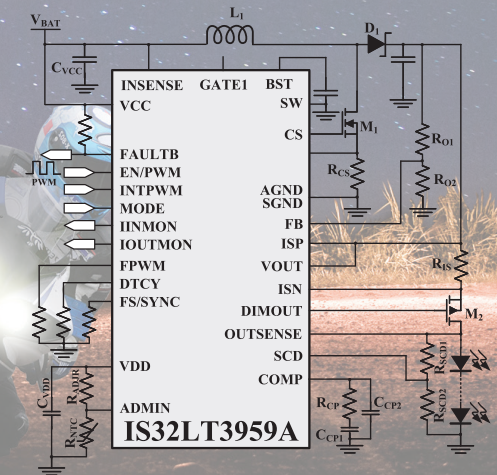
Product Offerings

Part Number	Type	Voltage	Current	LED Dimming
IS32LT3957A	Constant freq. Buck, Boost, Buck-Boost, SEPIC	5.0 to 75V	External FET	PWM, Analog
IS32LT3958/A	Constant freq. Buck, Boost, Buck-Boost, SEPIC	5.0 to 75V	External FET	Analog, External PWM, Internal PWM
IS32LT3959/A	Constant ON-Time Buck, Constant OFF-Time Boost, Buck-Boost	4.5 to 55V	External FET	Analog, External PWM, Internal PWM

Application Circuits







IS32LT3365 & IS32LT3961 Features

IS32LT3365 (LED array dimmer):

- 3 PNs with CANLITE, UART, or SPI Host Interfaces
- Wide input supply: 4.5V to 58V
- Integrated 12 Series LED Bypass Switches in 4 groups
- 10-bits PWM dimming resolution
- Adjustable PWM frequency with multiple device synch
- I2C EEPROM interface for LED binning and calibration
- Two 10-bits ADC for temperature sensing (via thermistor) of PCB and LEDs
- EMI optimization: Phase shift, Spread Spectrum, Slew rate control
- ASIL compliant Fault protection and report: LED open/ short, Single LED short, Thermal Alarm
- eLQFP-48, -40°C to +150°C, AEC-Q100

IS32LT3961 (current source):

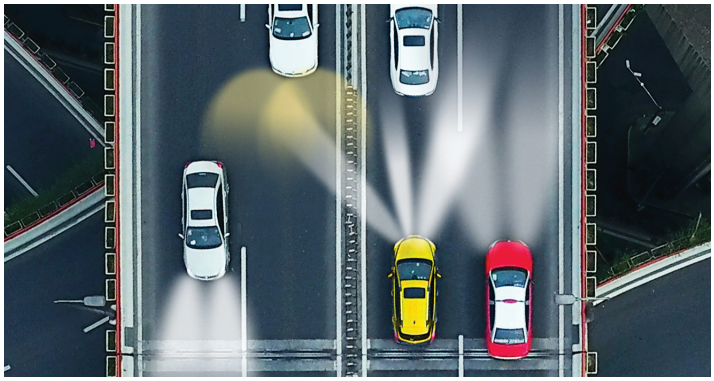
- Wide input supply: 5V to 60V
- Low power shutdown (typical 1uA)
- 2A max output current over operating temperature
- Output current monitor
- PWM dimming capability
- Analog dimming for LED binning or thermal roll-off protection
- Spread spectrum to optimize EMI
- Robust fault protection and reporting
- eTSSOP-16, -40°C to +150°C, AEC-Q100

Application

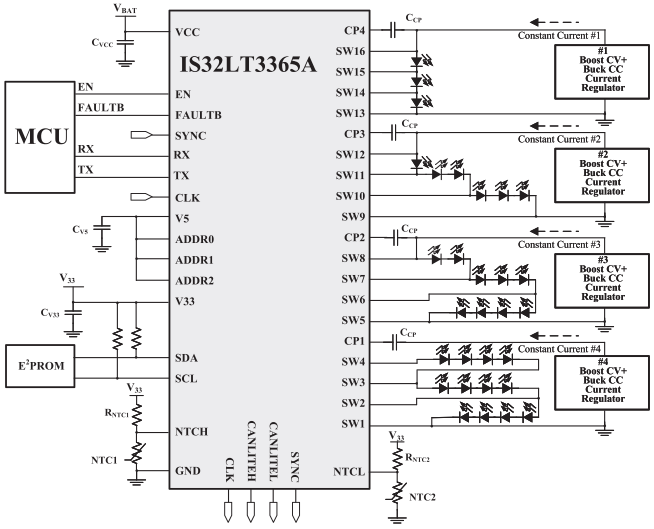
- LED Matrix Headlight

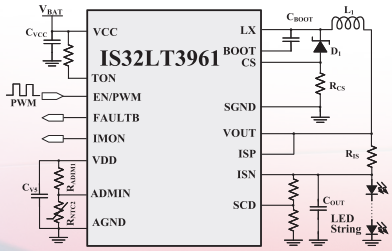
Key Advantages

- High integration for compact size
- Fault detection and protection for high reliability
- High resolution dimming
- Multiple EMI optimization mechanisms built-in
- ASIL compliance



Application Circuits





Product Offerings

Part Number	Host Interface	Special Feature
IS32LT3365A	CANLITE	12 Bypass Switches, ASIL-B
IS32LT3365B	UART	12 Bypass Switches, ASIL-B
IS32LT3365C	SPI	12 Bypass Switches, ASIL-B
IS32LT3961	None	Buck Regulator, Single LED Short Detect, Analog Dimming

Description

Rear vehicle lights are important for a vehicle's safety. Stop and turn signal lights are required to notify the rear vehicle of the driver's intentions. Reverse and fog lights are high luminous output to provide visibility during night or fog driving conditions.

Applications

- Stop Tail-lights & CHMSL
- Rear Combination Lights (RCL)
- Reverse & Fog Lights
- Sequential Turn Signals

Features

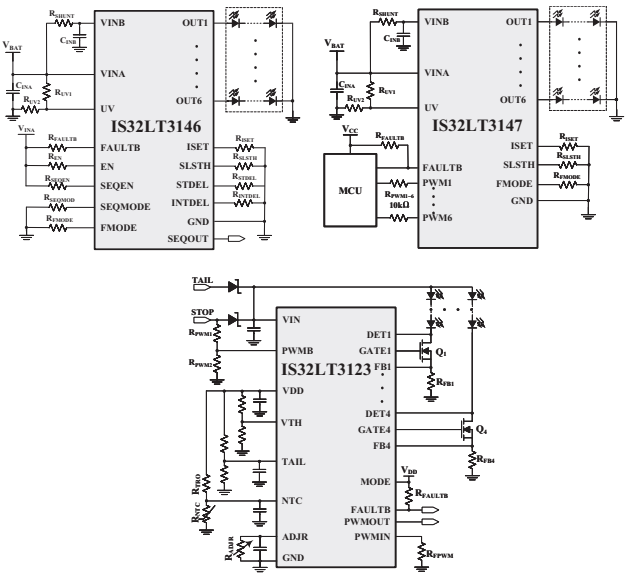
Linear Drivers:

- 1, 2, 3, 6 or 12 channels
- External PWM, Internal PWM or Analog dimming
- ADC for LED binning or temperature sensing of LEDs
- Fault Protection and Reporting
- -40°C to +150°C, AEC-Q100

LED Animation Controller:

- Up to 12 channels
- 0.1s to 15s animation duration
- Four pattern banks with 12KB Flash each
- Animation across cascade connected controllers
- Support programmable duty cycle for dimming
- -40°C to +125°C, AEC-Q100

Application Circuits



Product Offerings

Part Number	#CH	Current/CH (mA)	Special Feature
IS32LT3123	4	External FET	External PWM, Internal PWM for Dual Brightness
IS32LT3124	4	150	Dynamic Headroom Control, Current Source
IS32LT3126	2	150	Single LED Short Detect, Fault State Storage
IS32LT3134	12	Logic	Micro Programmable, with GUI
IS32LT3140A	1	450	Single LED Short Detect, Thermal Shunt Resistor
IS32LT3140B	1	450	Thermal Shunt Resistor
IS32LT3141A	1	450	Single LED Short Detect, 1-wire Serial

Part Number	#CH	Current/CH (mA)	Special Feature
IS32LT3141B	1	450	1-wire Serial
IS32LT3143	3	150	Single LED Short Detect,Res Temp Set, 3 Individual PWM
IS32LT3144	3	150	Single LED Short Detect, NTC Analog Dim, Individual PWM
IS32LT3146	6	75	State Machine
IS32LT3147	6	75	Single LED Short Detect, Thermal Shunt Resistor
IS32LT3177	1	200	Power Supply PWM
IS32LT3178	1	200	Digital PWM

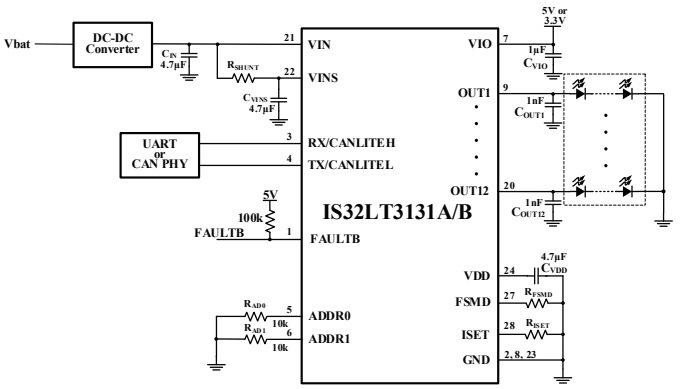
IS32LT3131 Description

The IS32LT3131A/B/C is a 12-channel current source linear driver capable of delivering up to 75mA per channel. It integrates a 10bit ADC with 15 multiplexed inputs with register accessible ADC value storage. It supports bus error correction (CRC) and integrates a watchdog timer to automatically set failsafe modes when the bus interface connection is lost. The interface bus type is identified by part number suffix; 'A' - UART, 'B' - CANLITE, and 'C' - SPI

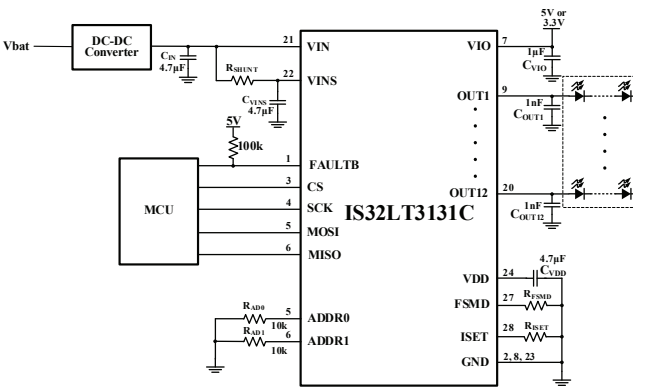
IS32LT3138 Description

The IS32LT3138 is an 18-channel current sink linear driver capable of delivering up to 100mA per channel. It has a UART interface which is compatible with CANFD PHY for master MCU communication over a CAN Bus. It supports bus error correction (CRC) and integrates a watchdog timer to automatically set failsafe modes when the bus interface connection is lost. An external NTC thermistor can be connected to support LED temperature roll-off.

Application Circuits for IS32LT3131

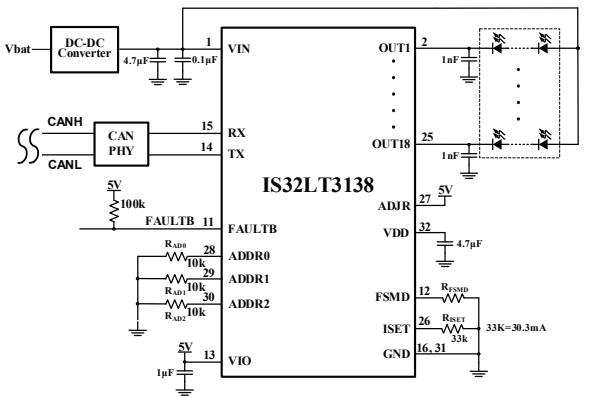


UART OR CANLITE CIRCUIT APPLICATION



SPI BUS CIRCUIT APPLICATION

Application Circuit for IS32LT3138



Product Offerings

Device	Bus Interface	#CH	Source or Sink	Current/CH (mA)
IS32LT3131A	UART	12	Source	75
IS32LT3131B	CANLITE	12	Source	75
IS32LT3131C	SPI	12	Source	75
IS32LT3137	UART	18	Sink	100
IS32LT3138	UART	12	Sink	100

Description

DC/DC voltage converters are required when converting one DC voltage level to another. They are essential components in automotive electronic systems providing a means to step down (buck) or step up (boost) a DC voltage as needed to match the requirements of the electronic components.

A fully synchronous DC/DC converter employs synchronous rectification that replaces traditional diode rectification with actively controlled MOSFETs to improve efficiency and voltage accuracy. They require fewer external components making for highly reliable designs. In additions, since they come in small IC package sizes, the resulting designs will require less PCB area making for small compact designs.

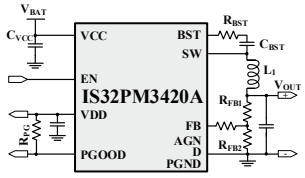
These DC/DC converters are designed with spread spectrum to minimize EMI profile and facilitate passage of CISPR 25 EMI standards. They provide highly accurate output voltages with high accuracy of ±1.5% over the operating temperature range . They are designed to consume minimal power with 25μA (typ) quiescent current and a 1μA (typ)shutdown current.

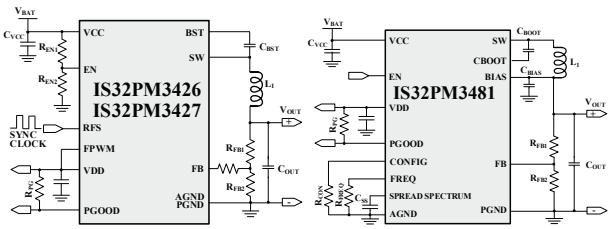
Applications

Automotive general purpose power supply

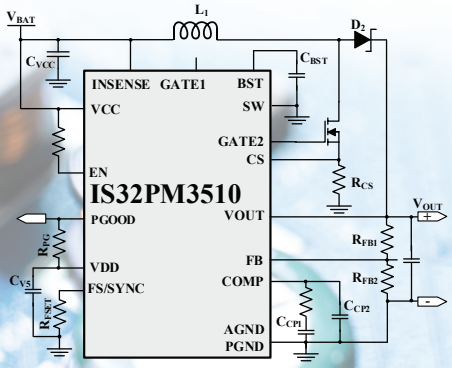
- Lighting system
- Infotainment system
- ADAS system
- Head-up display
- Body Control Module

Application Circuits





Synchronous Buck Converter



Multi-Topology Converter

Product Offerings

Part Number	Volt In	Volt Out	Current Out	Type	Frequency
IS32PM3420A	3.8V ~ 36V	1V ~ 24V	3A	Synchronous	400kHz (Fixed)
IS32PM3426	3.8V ~ 36V	1V ~ 24V	2A	Synchronous	100kHz ~ 2.1MHz
IS32PM3427	3.8V ~ 36V	1V ~ 24V	4A	Synchronous	100kHz ~ 2.1MHz
IS32PM3481	3.8V ~ 60V	1V ~ 28V	1A	Synchronous	200kHz ~ 2.2MHz
IS32PM3510	4.5V ~ 55V	Multi-Topology	3A	Asynchronous	150kHz ~ 650kHz

Capacitance Touch Sensors

Buttons, Sliders, Wheels & Proximity

Description

Capacitive touch sensing enables aesthetic 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 Lumissil 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 Lumissil 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.

Touch Sense Management

Robust & reliable operation

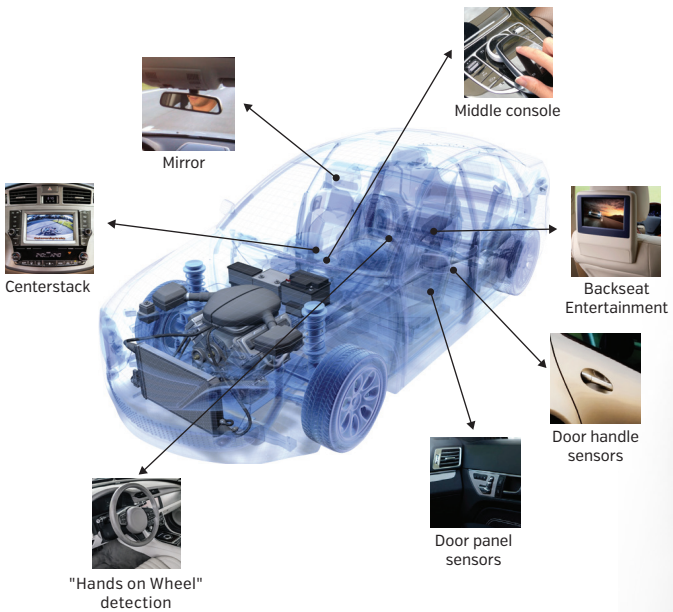
- Automotive grade touch key controller
- Robust noise immunity to changing environments, without the need for manual tuning
- Liquid tolerance algorithm for wet/moist environments
- Reliable under noise, humidity, temperature
- Supports proximity sensing distance
- Versatile touch-sensing
- Self-calibrating to long term changes in baseline capacitance

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



Automotive Touch Sensor Applications

Product Offerings

Part Number	#CH	Package	Key features	Enhanced Features
IS32SE5117A	16	WQFN-24 (4x4)	E-Flash and SRAM with built-in ECC, water resistant, proximity sensor, and melody generator	SPI, I2C, 6-ch PWM16, 10-bit DAC, LIN, Buzzer, AEC-Q100
IS32SE5118A	8	TSSOP-16 (6.4x5)	E-Flash and SRAM with built-in ECC, water resistant, proximity sensor, and melody generator	SPI, I2C, 12-ch PWM8, 12-bit DAC, LIN, Buzzer, Stable AC Transient Response, AEC-Q100 Pending
IS32SE5120A	24	QFN-32 (5x5)	E-Flash and SRAM with built-in ECC, water resistant, and melody generator	Proximity sensing, SPI, 12-bit DAC, buzzer, AEC-Q100

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

Capacitance Touch Sensors

Touch-Sense & Proximity Sensing

IS32SE5120 Features

- 24-channel capacitive touch controller with readable key value
- Flexible GPIO setting
- Touch threshold setting for individual key
- Optional multiple-key function
- Press and hold function
- Automatic calibration
- Individual key calibration
- Interrupt output with auto-clear and repeating
- Auto sleep mode for extremely low power
- Keys wake up from sleep mode
- Shield output shared with touch key channels
- Buzzer/Melody Generator shared with touch key channels
- 400kHz fast-mode I^2C interface
- Operating temperature between -40°C ~ +105°C
- Compact QFN-32 pin package

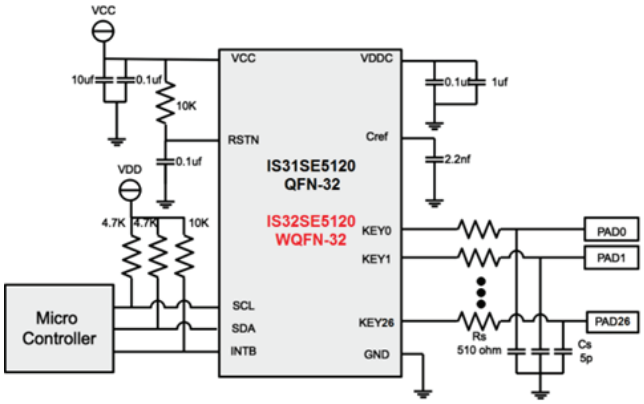
Key Advantages

- Touch and proximity application using a single device
- Offers MCU and sensor application in a single chip
- Application specific features reduce design cycle time and speed up time to market
- User friendly design tools – Evaluation boards and GUI
- Comes from family of successful and proven automotive MCUs/Sensors
- Packaged in auto AEC qualified compact QFN 32-pin package, high reliability & small PCB

Applications

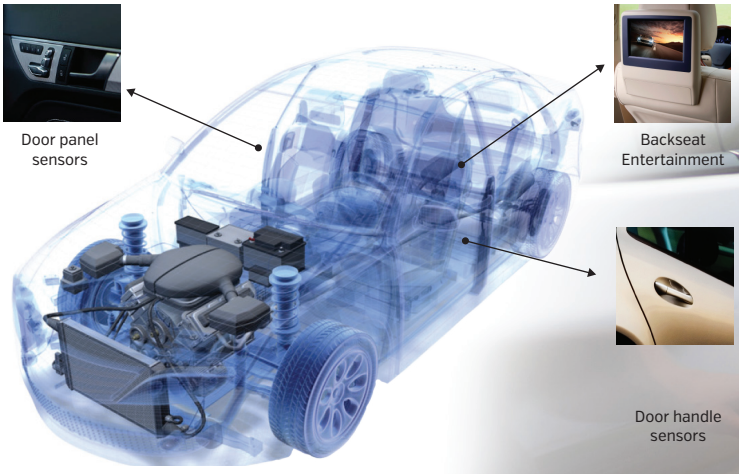
- Auto door handle proximity sensor
- Touch sensitive sunroof
- Rear seat entertainment system
- Instrument cluster
- Door window control module
- "Hands on Wheel" detection

Application Circuit



Product Offering

Part Number	Package
IS32SE5120A-QFLS3-TR	24 Ch. Cap Touch input through shared GPI, QFN-32 (5mm x 5mm in T&R)



IS32SE5120 Automotive Touch Sensor Applications

MCUs

Description

Lumissil automotive MCUs have 16KB to 64KB of embedded-flash memory and 1-2KB of embedded SRAM for data manipulations. Both SRAM and e-Flash implement built-in ECC that correct 1-bit error and detect two-bit errors. CPU can access the e-Flash through program address read and through Flash Controller which can perform software read/write operations of e-Flash for EEPROM emulations. CPU is 1-T 8051 with enhanced multiplication and division accelerator. There are T0/T1/T2/T3/T4/T5 timers coupled with CPU and two WDT where WDT0 is clocked by SYSCLK, and WDT2/WDT3 are clocked by a non-stop SIOSC. An 8-bit/16-bit checksum and 16-bit CRC accelerator is included. There are EUART/LIN controller and I2C master/Slave controller as well as SPI master/slave controller. The interfaces of these controllers are with GPIO pins. Other useful peripherals include a buzzer/melody control. Analog peripherals include touch key controllers up to 20-bit resolution employing dual-slope charge sharing capacitance conversion. The touch key controller has shield output capability for moisture immunity.

Touch Sense Management

Robust & reliable operation

- Automotive MCUs based on industry standard 8-bit 8051
- LIN, CAN, UART, ADC, DAC, PWM, Analog Comparator, I2C, SPI Interface
- Embedded Flash microcontrollers based on the high-performance 8-bit 8051
- A comprehensive set of power-saving modes allows low-power designs
- Frequency range from 8MHz up to 125MHz (if implemented PLL) to enhance end-product performance
- Integrate Analog, MCU and Memory for SOC solutions
- Touch key Control with LED/STN-LCD Driver for Auto applications
- Watchdog timers with multiple choices of clock source

Applications

- Automotive Comfort systems - Networked (CAN/LIN) ambient/head light controlled by auto grade MCU
- Automotive Safety Systems - Networked (CAN/LIN) animated stop/tail light, ADB Matrix headlights, Ignition, alternator regulator, etc.
- BDC/BLDC motor drivers, e.g., door and trunk lock gear motors and grill shutters, seat motors, radiator/condenser/seat cooling fans, power windows, sunroof, actuator, etc.
- System Diagnostics Functions – Monitor and report systems status – Voltage, power, Temp, air quality sensor, etc.

Product Offerings

Part Number	Flash/ RAM (ECC)	Package	Key features	Enhanced Features
IS32CS8974	32KB/2KB	TSSOP-24, WQFN-24	16 MHz clock, 20 GPIOs, Master/Slave I2C, UART/ EUART/LIN controller, SPI, WDT, 19 Sigma-Delta Cap.Touch sensors	SPI, I2C, 6-ch PWM16, 10-bit DAC, LIN, Buzzer, AEC-Q100
IS32CS8975	16KB/1KB	TSSOP-16, SOP-8	32 MHz clock, 12 GPIOs, Master/Slave I2C, UART/ EUART/LIN controller, SPI, WDT, 11 Sigma-Delta Cap.Touch sensors	SPI, I2C, 12-ch PWM8, 12-bit DAC, LIN, Buzzer, Stable AC Transient Response, AEC-Q100 Pending
IS32CS8977	64KB/2KB	TSSOP-16/24/28, WQFN-32, LQFP-32	132 MHz clock, 28 GPIOs, Master/Slave I2C, UART/ EUART/LIN controller, SPI, WDT, 27 Sigma-Delta Cap.Touch sensors	SPI, I2C, RTC, 6-ch PWM16, 2-ch PWM8, 12-bit DAC, LIN, Buzzer, Stable AC Transient Response, AEC-Q100 Pending

IS32CS8977 Features

- Automotive MCUs based on industry standard 32MHz 8-bit 8051
- 2KB RAM and 64KB ECC embedded Flash
- LIN, UART, ADC, DAC, PWM, Analog Comparator, I2C, SPI Interface
- Comprehensive set of power-saving modes allows low-power designs
- Integrate Analog, MCU and Memory for SOC solutions
- Touch key Control with LED/STN-LCD Driver for Auto applications
- Watchdog timers with multiple choices of clock source
- Shield output shared with touch key channels
- Buzzer/Melody Generator shared with touch key channels
- Temperature sensor for alerts
- Operating temperature between -40°C ~ +105°C
- Compact 20-pin TSSOP package (other package options are also available)

Key Advantages

- Offers MCU and touch/proximity sensor application in a single chip
- Application specific features reduce design cycle time and speed up time to market
- User friendly design tools – Evaluation boards and GUI
- Comes from family of successful and proven automotive MCUs
- Packaged in AEC qualified compact 20-pin TSSOP package – high reliability and smaller PCB

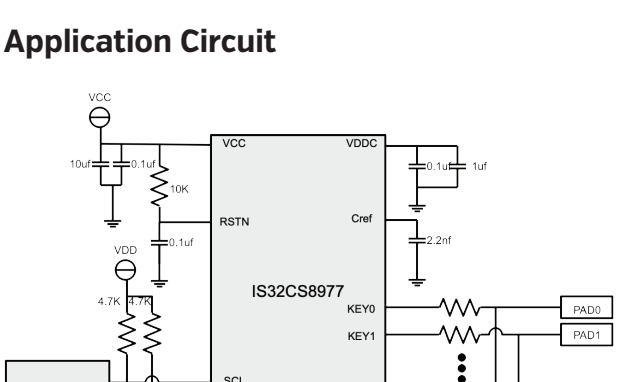
Applications

- Instrument cluster module
- Touch sensitive electric roof
- Door window combo control module
- Trunk release
- Seat tensioner

Product Offering

Part Number	Package
IS32CS8977-QFLS2-TR	MCU with 2KB SRAM and 64Kx16 ECC E-Flash, 5mmx5mm, QFN-32

Application Circuit



IS32CS8977 Automotive Touch Sensor Applications

IS32CS8978 Features

• Automotive MCU based on industry standard 32 MHz 8-bit 8051
• 64KB ECC Flash and 2KB ECC RAM connects directly to LIN bus (CS8978=CS8977+IO1028)
• LIN 2.X/SAE J2602 compliant, up to 20kBaud
• Build-in LDO output on VCC pin for external components
• 3.3V/5.0V options with +/- 5% accuracy and Up to 100mA load
• Sleep mode and Wakeup
• Over temperature shut-down and recovery
• 16-bit Timers T0/T1/T2/T3/T4 and 24-bit Timer T5
• WDT1 by SYSCLK, WDT2/WDT3 by SOSC32KHz
• Up to 6 external interrupts shared with GPIO pins
• Power-saving modes – Normal, STOP, and SLEEP modes
• One 16-bit Timer/Capture and One 16-bit quadrature decoder
• Buzzer/Melody generator
• Capacitance sense controller with up to 20 touch keys
• Active proximity sensing (APS)
• 12-Bit SAR ADC with GPIO analog input
• 8-Bit DAC and four analog comparators
• Low voltage detection (2.2V-4.5V)

Key Advantages

• System on a chip – MCU, Touch key, LIN together significantly reduce board space
• Full Application specific features reduce design-cycle time and speed up time to market
• Multiple system functionality reduces BOM cost
• Fully proven sub-systems in a single chip
• User friendly development tools environment – Eval boards, MS VS code IDE
• Packaged in an automotive AEC qualified compact packages

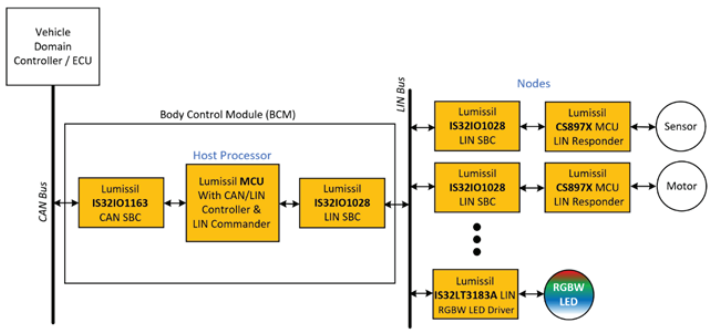
Applications

- Touch key applications that require high robustness and reliability
- Automotive LIN communication and networking applications
- Infotainment applications using active proximity
- Instrument cluster modules
- Touch sensitive electric roof
- Trunk release module
- Door/window combo control module

Product Offerings

Part Number	Package
IS32CS8978A-QWLA3-TR	MCU with 2KB SRAM/ 46KB Flash in WQFN-40, VCC=5V
IS32CS8978B-QWLA3-TR	MCU with 2KB SRAM/ 46KB Flash in WQFN-40, VCC=3.3V

Application Diagram



System Basis Chips (SBC)

IS32IO1163 Features

- High-speed CAN FD data frames up to 5Mbit/s
- Compliant to ISO 11898-2/5/6
- Built-in LDO (5V/100mA) output pin V1 to supply external microcontroller
- 5V nominal output; +/- 2% accuracy on pin V1
- 100mA output current capability at V1 and with short-circuit protection to GND
- Optimized for low electromagnetic emission (EME)
- Wide common mode range (CMR), +12V~-12V, to optimize for a high immunity against electromagnetic interference (EMI)
- Very low quiescent current (Typ. 75uA) in Standby mode with full remote wake-up capability
- Under voltage detection at V1 and BAT
- VIO input allows for direct interfacing with microcontrollers.
- Over temperature shut-down
- Standard pin out and TSSOP-14 with exposed pad package
- Automotive AEC-Q100 qualification in progress

Applications

- Automotive subsystems such as head light control module
- Tail and turn light signal module
- Roof control with interior lighting module
- HVAC control module
- Body control module and many other subsystems

IS32IO1028 Features

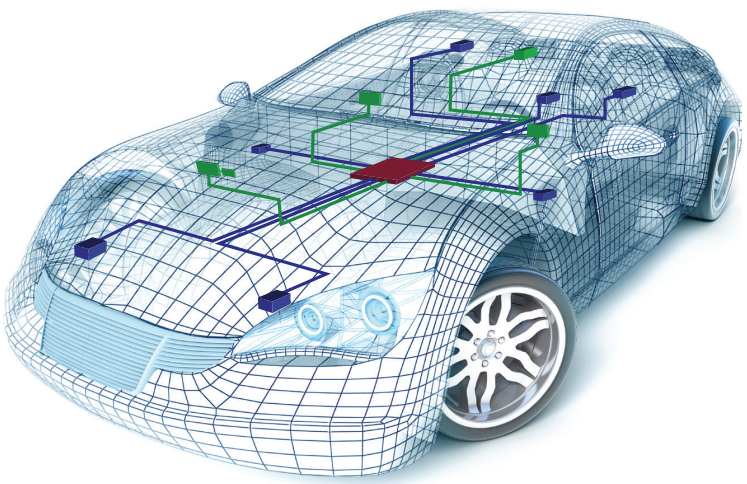
- LIN 2.X/SAE J2602 compliant
- BUS pin support up to 20kBaud
- Operating Voltage VBAT= 5.5V to 32V
- Withstand +40V/-24V
- 3.3V/5.0V options
- +/- 5% accuracy
- Up to 70mA load
- Build-in LDO output on VCC pin for supplying external components
- Short circuit protection with current limiting
- Sleep mode and Wakeup
- Low current consumption in Sleep mode.
- LIN bus wake-up function
- Local wake-up from EN pin
- Over temperature shut-down
- Auto AEC-Q100 qualification in progress

Applications

- **Steering wheel:** Cruise control, wiper, climate control, radio
- **Comfort:** Sensors for temperature, sun-roof, light, humidity
- **Powertrain:** Sensors for position, speed, pressure
- **Engine:** Small motors, cooling fan motors
- **Air condition:** Motors, control panel
- **Door:** Side mirrors, windows, seat control, locks
- **Seats:** Position motors, pressure sensors

Key Advantages for IS32IO1163 & IS32IO1028

- Open source hardware & software – hardware schematic diagram, PCB design, BOM, OS & driver software packages
- Core module – design stamp-holes for mass production capability
- Processor – a compute engine as well as a control MCU
- Connectivity – Ethernet, USB, SSI, UART, PWM, ADC, I2C



Product Offerings

Part Number	Package
IS32IO1163A-ZLA3-TR	CAN FD controller in T&R, TSSOP-14 (VIO internal connects to VI)
IS32IO1163B-ZLA3-TR	CAN FD controller in T&R, TSSOP-14 (Independent VIO pin)
IS32IO1028A-GRLA3-TR	LIN Transceiver with LDO, SOP-8, Vcc=5.0V
IS32IO1028B-GRLA3-TR	LIN Transceiver with LDO, SOP-8, Vcc=3.3V

Description

Backbone to transport all automotive protocols (Ethernet, CAN, LIN, FlexRay etc) transparently. Enables zonal architecture IVN that reduces wiring, simplifies manufacturing, and maintenance/repairs without changes to existing ECUs (HW & SW) and associated communication protocols.

Application

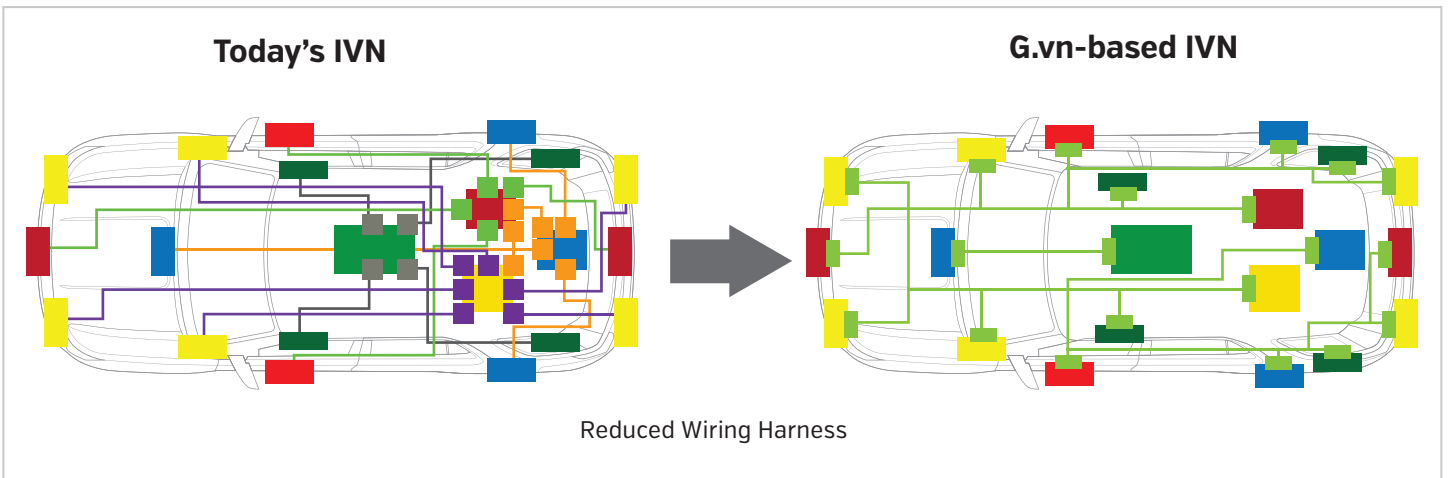
- Automotive In-Vehicle Networking (IVN)

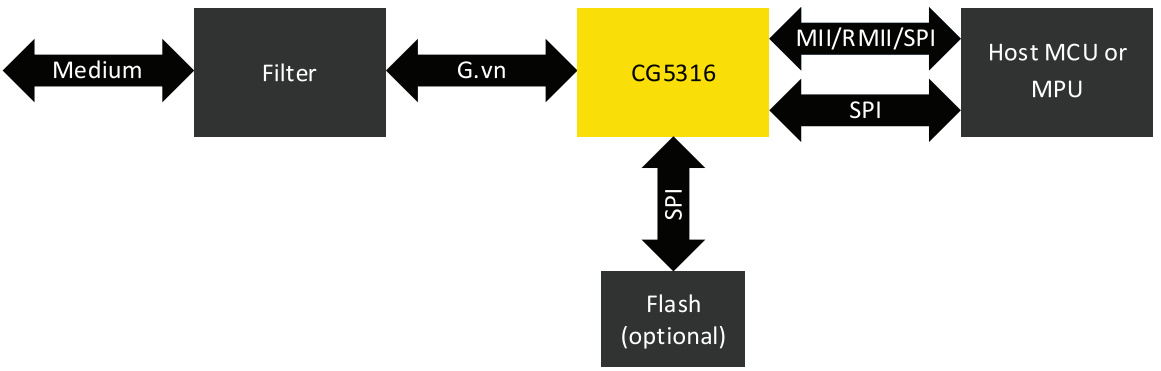
Features List

- Automotive OFDM layer 2 communication technology based on ITU-T's G.9960 standards
- Transports all automotive communication protocols transparency with low/bounded latency
- Practical migration path from current function-based network to future IP-based network.
- "Harness immunity" – generates metric to assess health of the wire harness
- Integrated Analog Front End
- Dual host interface: SPI1 or SPI2 and RGMII
- IEEE1588 support
- 8x8mm aQFN, -40°C to +105°C, AEC-Q100 grade 2

Product Offering

Part Number	Description
CG5316B0-A2NE3	CG5316, G.vn Transceiver for in vehicle networking, aQFN80 (8x8), automotive grade, Green





Description

Required by global dominant charging standard, CCS (Combined Charging Standard) for communications between vehicle and charger. CCS adopts ISO/IEC 15118 specifications. World's first automotive grade HPGP transceiver for use in both Vehicle (EV) and Charger (EVSE)

Applications

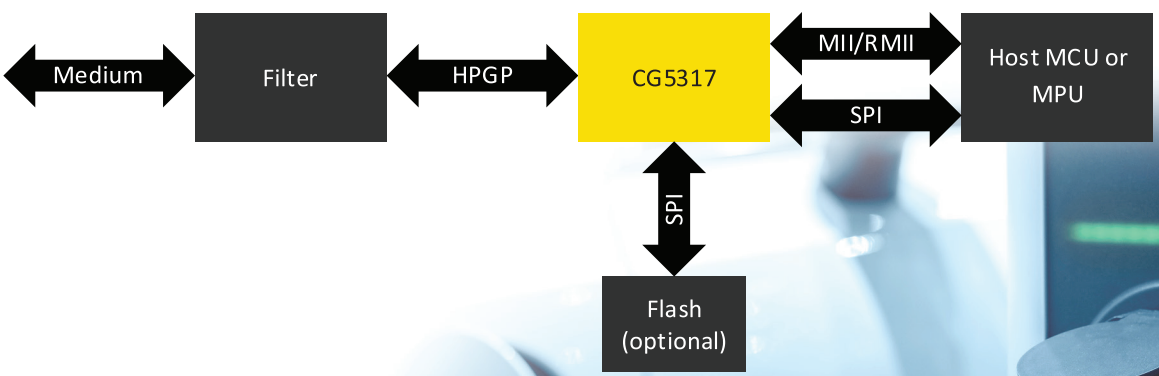
- EV Vehicle Charging Port
- EVSE Charger Station

Product Offerings

Part Number	Description
IS32CG5317-LQLA2-TR	Automotive grade, Tape & Reel packaging. CG5317, HomePlug Green PHY Transceiver, EP-LQFP80.
IS32CG5317-LQLA2	Automotive grade, Tray packaging. CG5317, HomePlug Green PHY Transceiver. EP-LQFP80.
IS31CG5317-LQLS3-TR	Industrial grade, Tape & Reel packaging. CG5317, HomePlug Green PHY Transceiver, EP-LQFP80.(-40 °C +105°C)
IS31CG5317-LQLS3	Industrial grade, Tray packaging. CG5317, HomePlug Green PHY Transceiver. EP-LQFP80. (-40°C +105°C)

HPGP IS32CG5317 Features

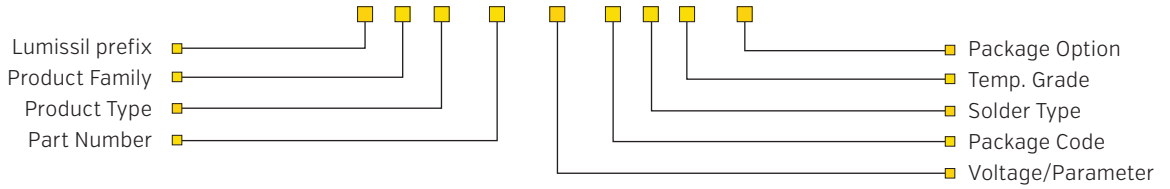
- HomePlug Green PHY standard compliant transceiver for basic EV charging application
- HomePlugAV standard compliant for high-rate applications data exchange during charging
- TX Signal:
  - dBm – complies with ISO15118-3 and DIN 70121 PSD calibration requirements
  - Support optional external line driver for further boosting of the signal (not required in typical applications)
  - Configurable PSD (per tone configuration)
  - Simple PSD calibration process
- Dual host Interface: R/MII, or SPI (configurable clock speed up to 50MHz)
- Boot:
  - FW loading from Host (MCU)
  - Optional FW loading from Flash
- Highly flexible diagnostics capabilities
  - SNR, Noise, Channel, gain, various statistics
  - Ability to stream out logs (depending on support from the Host side)
- Embedded PVT (Process, Voltage, Temperature) sensor
- Embedded eFUSE memory
- RoHS-compliant EP-LQFP 80pin 12x12mm package, -40°C to 105°C, AEC-Q100 qualified



More Information

Analog Part Decoder

IS 31 LT 3135 V1 - GR L S2 - TR



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)
A4 = Automotive temp. (-40 to 150°C)

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

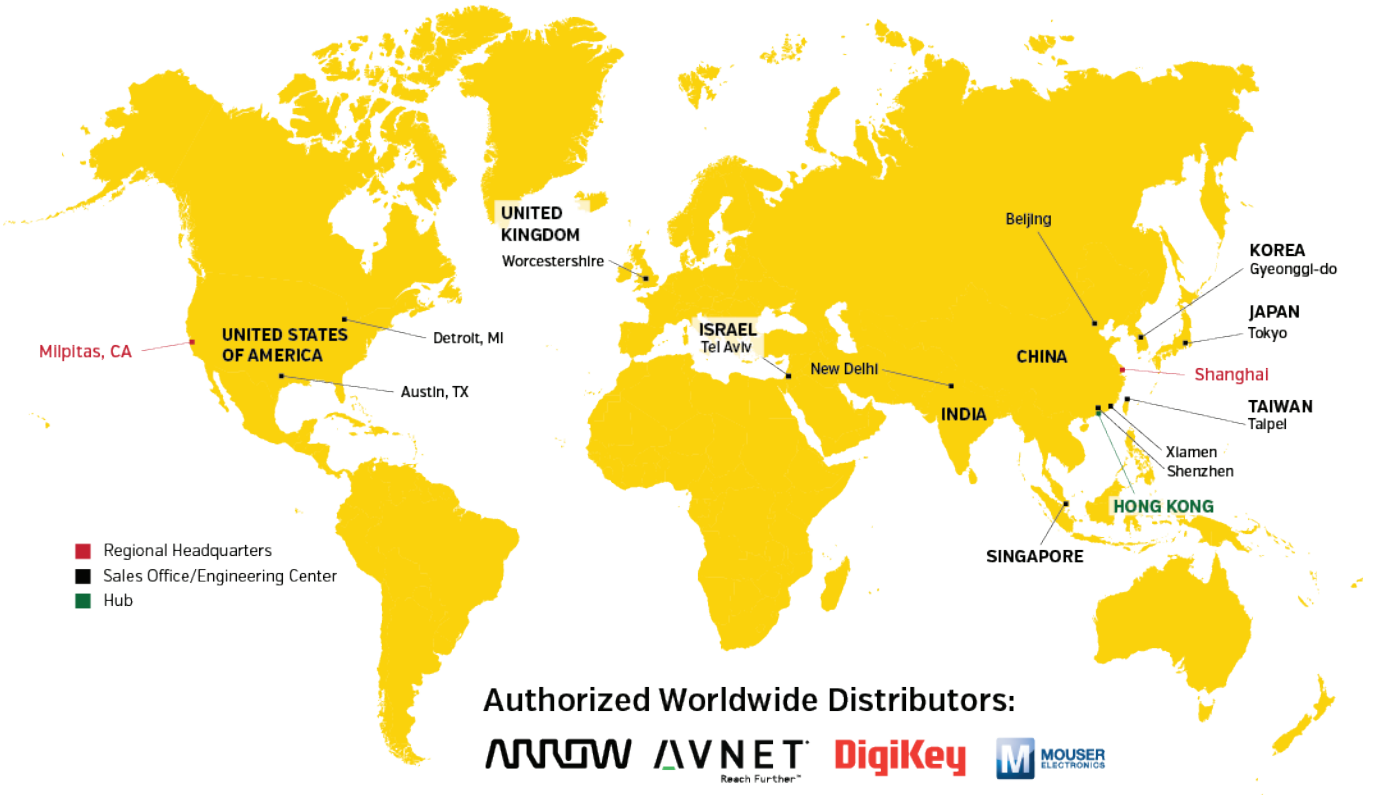
Package Type
C = WCSP, FCQFN
D = DFN
GR = SOP
QF = QFN
LQ = eLQFP
S = MSOP
SA = SSOP
SD = SOT89
ST = SOT23
TQ = TQFP
TT = TSOT
UT = UTQFN
QW = Wettable flank QFN
QU = UQFN
Z = eTSSOP

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

Lumissil Locations



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