

Connected Lighting

Industry	<ul style="list-style-type: none"> Industrial / Smart Buildings
Applications	<ul style="list-style-type: none"> Connected lighting systems provide the capability to control and personalize different elements of the lighting, including brightness, color, and scheduling, through smartphones, computers, or other connected devices. Illuminate small or large buildings using existing electrical outlets or existing Ethernet network infrastructure (when an outlet is unreachable). Features high-efficiency power conversion and wireless on/off and dimming control. In smart building application, connected lighting is integral part of building's security system where the lights changes colors when an intruder is detected and building security is compromised.

System Purpose

- Connected lighting is seamlessly integrated system with digital technologies and can be conveniently controlled, monitored, and adjusted from a remote location through network connectivity, typically over the internet. These advanced systems frequently utilize LED lighting fixtures and sensors, and they can seamlessly integrate into the wider Internet of Things (IoT) ecosystem.
- It is a system where all the luminaires or the lighting fixtures are connected through a wired or wireless network. The power to the lighting fixtures are delivered through AC outlets or Power over Ethernet (PoE++), which can supply up to 90W using **onsemi** components.
- The network connection facilitates sending and receiving data from a fixture, enabling remote control of ON/OFF and dimming for the lights. Connected lighting is an indispensable aspect of smart buildings, smart cities, and Real-Time Location Systems (RTLS) in commercial and industrial buildings. Lighting is rapidly growing across multiple sectors, including residential homes, commercial buildings, retail spaces, industrial sites, and urban areas. The energy savings from connected LED lighting deliver a clear Return on Investment (RoI).
- Legislation is driving the transformation of connected lighting into a platform that supports multiple novel use cases. Low-power connectivity is fueling innovation in connected lighting and even enabling battery-less designs.



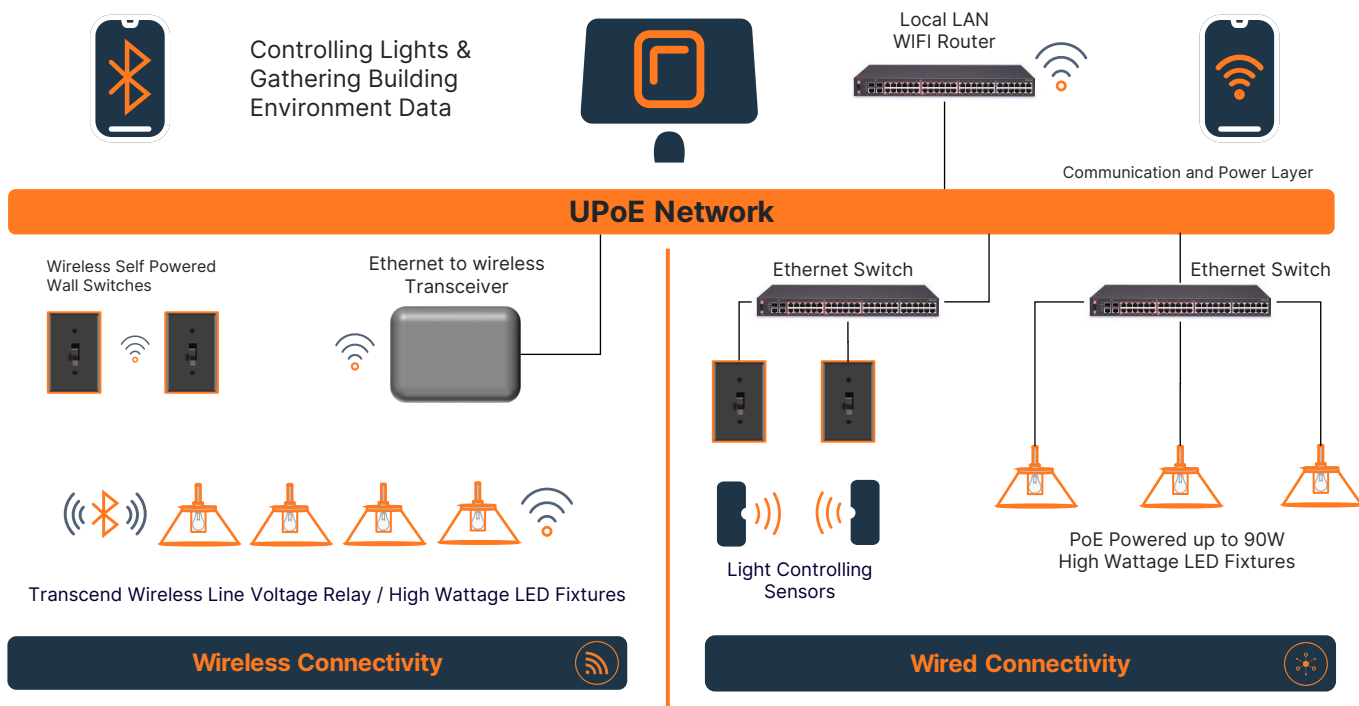
Market Information & Trend

- According to Grand View Research the global smart lighting market size was valued at USD 15.05 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 22.1% from 2023 to 2030. The smart homes, commercial and retail buildings, and smart cities sectors are driving this growth. Industrial connected lighting segment is growing at a faster pace than residential lighting, with the markets having an approximate ratio of 4:1.
- The demand for street lighting systems is also on the rise. Technological advancements have revolutionized outdoor lighting systems from traditional on/off systems to smart luminescence in many countries. The adoption of IoT and AI technology in the lighting industry has increased demand for smart lighting solutions for city streets, leading to a rise in the need for automated luminescence systems. These systems have gained prominence in various fields due to their high sensitivity, selectivity, and non-destructive nature.
- The current market demands energy-efficient lighting systems, with a preference for technologies that operate on less power. Most of these systems are electronic or electrical and rely on power and energy sources. The depletion of energy sources has led to the development of more energy-efficient systems. Smart lighting uses significantly less power than traditional lighting, creating a lucrative market opportunity.
- Based on the IC Market Report Insights, the Global Bluetooth Low Energy IC market is projected to experience significant growth from 2023 to 2030. The market has been steadily growing in 2022 and is expected to continue its upward trajectory in the future, thanks to the implementation of effective strategies by key industry players.
- The emergence of IoT and AI technology for smart lighting is expected to increase demand globally due to advancements in wireless technology and the surge in IoT technology for hyper-connectivity between devices in smart infrastructure. Integration of AI and IoT into lighting systems offers operational efficiencies like automatic dimming and intelligent illumination based on various requirements in applications such as vertical farming, automotive interiors, and smart homes.



Source: [Industry Analysis global-smart-lighting-market](#)

System Implementation



The following block diagram shows the system level implementation of the connected lighting application. The diagram represents two sections that can interpret various connection topologies:

- The first option displays wireless device connections that could be linked through Zigbee wireless network, Wi-Fi, Z-Wave or the more commonly recommended Bluetooth Low Energy Mesh Network.
- The second demonstrates devices which are powered using PoE-based connected lighting technology. With this technology, both power and data are supplied through an Ethernet cable, which extracts and supplies power to the luminaire or lighting fixture.

The connected lighting system can be implemented using wired or wireless network. The wired technologies include KNX and Power over Ethernet (PoE) and the wireless technologies include Bluetooth and Zigbee. The system implementation block diagram shows the PoE based connected lighting technology where power and data both are supplied through an Ethernet cable. The power is extracted and supplied to the luminaire or the lighting fixture. The PoE system architecture includes several devices such as PoE gateways, LED light fixtures, LED lights, LED smart drivers, LED cable harnesses, sensors, wireless switches, and dimmers.

System Description

Functional Blocks

PoE Power Device (PD) Interface Controller:

- The PD function block draws power from the power sourcing equipment (PSE), a device which provides power to the PD (or to the connected light fixture).
- Since the DC voltage applied by the PSE does not have a fixed polarity, it is necessary to have a rectifier stage integrated in the PD to avoid any failure or destruction.
- According to the IEEE 802.3bt standard, power drawn by the PD are divided into eight classes depending upon maximum average power into PD, minimum DC voltage on the PSE output Minimum DC voltage on the PD input and Maximum Current Drawn by the PD. During classification step (a beginning step when PSE is ready to connect to PD and determines the amount of power required by PD), the PD and the PSE negotiate the amount of power that the PSE will allocate to the PD. During this phase the PD indicates to the PSE the maximum power that it may draw, according to its class.
- The PD indicates its class by generating a particular current signature. This current profile is sensed and decoded by the PSE. Once this negotiation is completed the PSE sends very high voltage to PD which can result in Inrush current on PD side. The PD needs to be able to control the inrush current. Once inrush phase is completed, the system is ready to startup.

Wireless Connectivity

- The wireless connectivity is desirable for the connected lighting application to control the light fixture i.e. switching ON/OFF and dimming the lamp remotely.
- There can be several options in wireless communication such as Zigbee wireless network, Wi-Fi, Z-Wave or the more commonly recommended Bluetooth Low Energy Mesh Network.
- For control, wirelessly controlled switches can be used. Additionally various types of sensors can be added for switching. Wireless communication controls LED devices, whether via the Zigbee communication protocol or Bluetooth. Wireless communication mainly consists of low-energy Bluetooth (BLE), which can operate under very low voltages. Controllers working under the Zigbee communication protocol with Controlling Devices.

Feature	Zigbee	Wi-Fi	Bluetooth Low Energy	Z-Wave
Range	10-30 meters (33-98 feet)	Up to 300 meters (984 feet)	10-200 meters (33-656 feet)	Up to 30 meters (98 feet)
Data rate	Up to 250 kbps	Up to 54 Mbps	Up to 1 Mbps	Up to 100 kbps
Power consumption	Low	Medium	Low	Medium
Security	Strong	Strong	Weak	Strong
Applications	Home automation, wearables, industrial automation	Internet access, file sharing, video streaming	IoT devices, fitness trackers, personal health devices	Home automation, security systems, smart locks
Cost	Low	High	Low	High

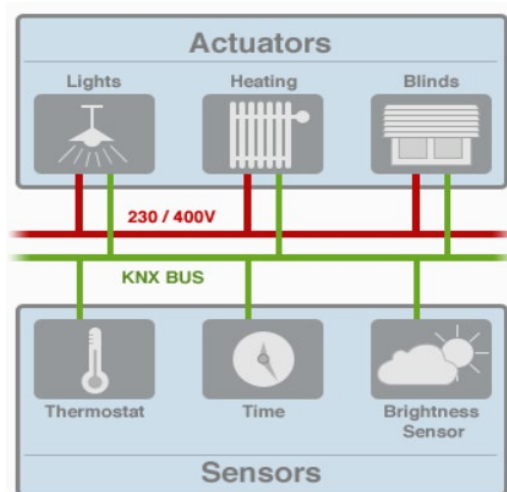
Multi-Sensor Shield

- **onsemi** Multi - Sensor Shield can be hooked to the Bluetooth Low Energy connectivity block. This includes ambient light sensor, temperature, moisture, barometric pressure and many more (ex. accelerometric, tilt and magneto-metric). As some of these parametric are influenced by the local light source like temperature. The implementation will be specifically tuned to measure the local ambient temperature. If the temperature over heating fixture is enclosed or improperly installed, LED failure (no heating) - normal operations or predictive maintenance by temperature degradation or thermal disjunction.

System Description

KNX System

- KNX is an open standard for home and building automation which manages lighting, HVAC, multimedia, blinds and shutters, security, remote control etc... devices in a building. The standard is very popular in European and Asian homes and lighting commercial market.
- As shown in the diagram, a separate green KNX bus line in a building is run connecting all the devices such as, lighting fixtures, sensors, HVAC and blinds.
- The KNX bus uses a twisted pair cable which can supply power for the small sensors and switches and allows communication among all the devices at a data rate of 9,6kbps, and also the network allows for up to 256 devices along one 1000m segment.



Protection ESD:

- The PoE input voltage can be 24V or 48V which is very high for the other devices. Overvoltage events like ESD or Surges can occur in electrical circuits, therefore it's critical to have ESD protections implemented. In addition, a Zener diode can also be used to improve the level of protection.

LED Drivers

- LED drivers are essential for efficiently powering and controlling light-emitting diodes (LEDs). They regulate the electrical current and voltage supplied to the LEDs, ensuring optimal performance and longevity. **onsemi** offers a wide range of components specifically designed for LED driver applications. These include high-performance analog ICs like voltage regulators, MOSFETs, and power factor correction (PFC) controllers. For instance, the NCL300x series combines PFC and PWM controllers into a single device, simplifying design and enhancing energy efficiency. Moreover, **onsemi** provides low-dropout voltage regulators (LDVR) and voltage references that contribute to stable and precise voltage regulation in LED driver circuits. By utilizing these components, designers can create reliable and energy-efficient LED lighting solutions for various applications.

Connectivity Options for Smart Lighting

- Ubiquity
- Widespread Ecosystem
- Ultra-Low-Power
- Energy Harvesting
- Mesh Networking
- Security

Bluetooth Low Energy

- Ultra-Low-Power
- Energy Harvesting
- Mesh Networking
- Security

Zigbee Green Power

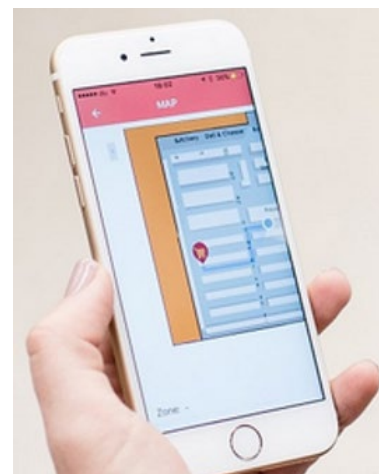
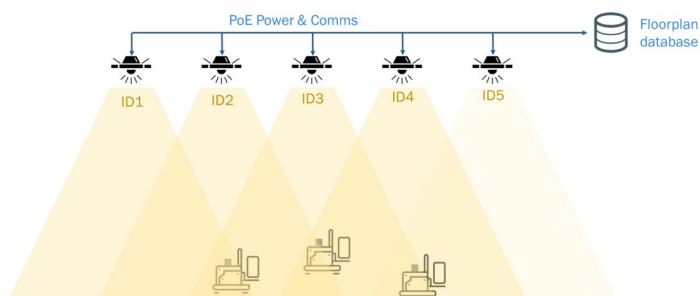
- 20-100 Watts of Power
- B2B/Industrial
- Reliable, wired connection

Power Over Ethernet (POE)

Solution Overview

Visible Light Communication – (VLC)

Visible Light Communication (VLC) is a new technology that uses visible light as a carrier for data transmission. LEDs in a building can transmit data to a camera on a phone or tablet, or to a photodiode, with an accuracy of within 30cm. This is much more accurate than Bluetooth Low Energy, which has an accuracy of 3 meters.



Known as YellowDot, this indoor positioning technology requires certification through a series of tests, granting the use of the YellowDot trademark to a luminaire. However, the NCL31xx family from **onsemi** opens broader possibilities for VLC applications, extending beyond YellowDot. The potential applications include large warehouses, and the capabilities rely heavily on modulation techniques, amplitude, demodulation, and localization algorithms. VLC, as a data communication technology, utilizes visible light as a carrier, ensuring low data rates (kb/s). The imperceptible dimming function facilitates data transmission, readable by an image sensor but invisible to the human eye. Light communication is opening the door to many new applications, overcoming some of the limitations of RF implementations today. With highly integrated and efficient LED drivers from **onsemi**, VLC is emerging as valuable additional technology for expanding information and location services.

VLC – Advantages vs RF:

- Localized to the light source, does not disturb nearby or other applications (no interference)
- No influence of RF sources nearby
- Unlicensed transmission band
- More secure, inherently limited to line of sight
- No extra power amplifier and signal chain needed vs RF (saves power & design complexity)

onsemi strengths

- High output power PoE PD controller which can supply up to 90W of power with over 90% efficiency outperforms most competitors.
- The NCL31000 and NCL31001 LED drivers have intelligent telemetry support.
- The BOM cost can be reduced as **onsemi** offers most devices needed for connected lighting applications.
- **onsemi**'s connected lighting solution is unique as it can supply power through either an AC/DC converter board or PoE board. The board provides Bluetooth Low Energy connectivity.
- **onsemi**'s product portfolio includes an FL7760 LED driver with a wide input voltage range (8V - 70V) and a broad dimming range (analog: 5 - 100%).
- **onsemi RSL 15** with Leading Ultra-Low Power Microcontroller with Easy-to-Use SDK and Industry's Lowest Power Flash-based Secure Bluetooth Low Energy MCU

Solution Overview

Benefits of Connected Lighting

Increased & Improved safety:

- The connected lighting can be networked with smoke detectors and other hazardous substance alarms to create an integrated safety network. The system can be configured to illuminate the fastest and safest evacuation route for personnel based on areas where airborne contaminants are detected to ensure that personnel move away from the area rather than inadvertently entering a hazardous area. LEDs already provide better visibility and clarity than traditional lighting in closed HD safety systems. Integrating an HD Wi-Fi security camera into the luminaire itself can be a two-for-one security solution, increasing coverage and visibility without the need to install and maintain infrastructure.

Productivity tools:

- Smart lighting networks are already equipped with motion detectors and daylight sensors that automatically turn lights on and off and dim them as needed to reduce energy consumption and costs.

Asset tracking:

- Lighting fixtures can be equipped with optical and RFID sensors to track devices, materials, people and products. This can help analyze and improve traffic and workflows in factories and link raw material inventory to ordering systems to automatically replenish supplies when needed.

Building diagnostics:

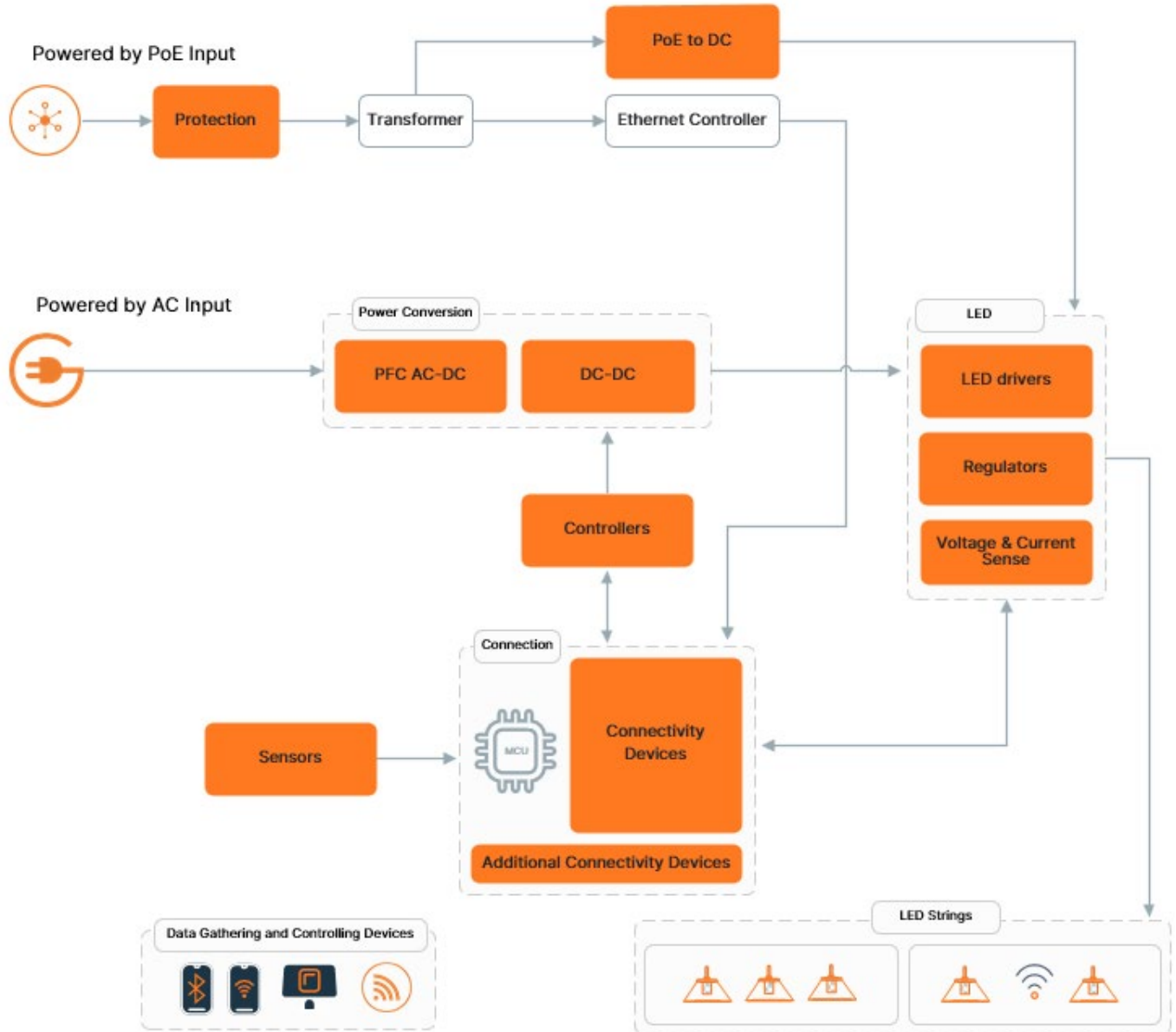
- Sensors built into each luminaire can provide plant-wide diagnostics and data on operational, environmental and energy conditions. For example, the sensors can monitor atmospheric conditions such as temperature and humidity, which can be critical for certain types of production or material storage. The sensors can also provide real-time alerts of abnormal power conditions such as over or under voltage to protect equipment, monitor and report overall power consumption and energy savings.

Automated Demand Response (ADR):

- More and more utilities are implementing demand response programs. Smart LED lights can be integrated into an ADR program to reduce load with minimal impact on productivity. By programming unneeded lighting to automatically turn off or dim when the ADR alarm is triggered, businesses can reduce consumption without having to shut down production facilities and without manual effort. When the alarm is canceled, the lighting automatically switches back to normal operation.

Solution Overview

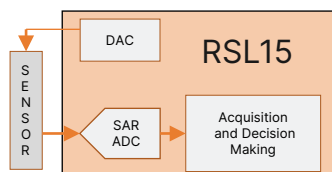
Connected Lighting Block Diagram 2 types of inputs: PoE / AC



Solution Overview – Product Benefits

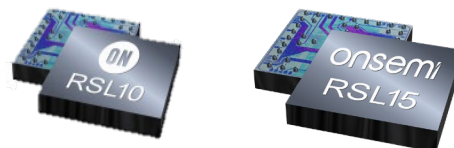
RSL15 and RSL10

- The [RSL15](#) is a wireless microcontroller unit (MCU) that employs Bluetooth Low Energy 5.2 technology and a secure Arm® Cortex®-M33 processor.
- Devices provide maximum design flexibility for high performance and ultra-low-power applications with its built-in power management, flexible GPIO and clocking scheme, and wide supply voltage range.
- Industry Leading Ultra-Low Power Microcontroller with Easy-to-Use SDK
- Industry's Lowest Power Flash-based Secure Bluetooth Low Energy MCU
- Latest in Bluetooth Low Energy with Long Range and Localization



Key Features:

- Higher temperature range (-40 to + 85°C)
- Industry Leading Ultra-Low Power Microcontroller with Easy-to-Use SDK
- [RSL15](#) is the best in ULP Mark - CoreMark - The most efficient MCU in active processing
- Ultra-low Power Operation: Sleep Mode Wakeup 3 V VBAT: 36 nA
- Sleep Mode Deep Sleep, IO Wake-up: 25-57 nA
- Rx Sensitivity (Bluetooth Low Energy Mode, 1 Mbps): -96 dBm
- Data Rate: 62.5 to 2000 kbps, Transmitting Power: -17 to +6 dBm



NCL31000 Family

The **onsemi** [NCL31000](#), [NCL31001](#) and [NCL31010](#) LED Drivers are advanced LED drivers that provide several benefits compared to conventional LED drivers. These benefits include high-bandwidth, analog and PWM dimming capabilities that allow for zero current, integrated DC-DC converters, a diagnostic block, fast safety features, and a versatile status reporting and interrupt mechanism. These advantages make them well-suited for various applications, such as smart LED Lighting, Indoor Positioning, therapeutic lighting and multiple light blending applications.

Key Features:

- Input voltage 21.5 ~ 57V
- Output Voltage up to 4 - 38V
- LED Current: Up to 3A
- I2C or SPI serial interface
- Standby power levels below 500mW
- NCL31000 and NCL31010 contain Integrated Buck Converter: 3.3V fixed - 150mA max, & Adjustable Buck Converter: 2.5 ~ 24V
- NCL31010 - Compatible with multiple PoE standards, 802.3af, 802.3at, and 802.3bt



Solution Overview – Product Benefits

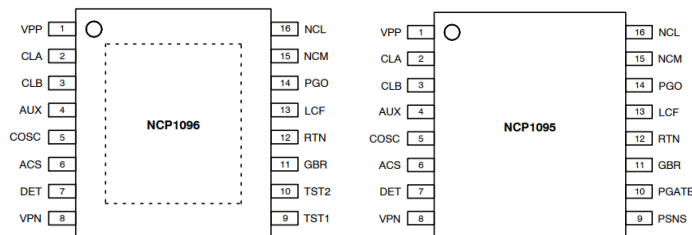
PoE-PD NCP1095/6

- The NCP1095/6 are the members of **onsemi** Power over Ethernet Powered Device (PoE-PD) collection, allowing devices containing it to serve as compliant powered equipment per IEEE 802.3af/at and -3bt. It comes with necessary attributes for seamless operation in PoE systems, such as detection, classification, and current limiting in the inrush phase.
- Supporting high-power applications up to **90 watts PoE**, the [NCP1096](#) includes an internal pass transistor, and its power pin ensures proper enabling or disabling of the adjacent main DC/DC converter.



Key Features/advantages:

- Fully Supports IEEE 802.3af/at and -3bt Specifications
- Industry lowest Rdson < 100 mohm @ Tj = 125°C
- 110 mA Typical Inrush Current Limiting
- Internal 70 m Pass-switch
- Open Drain Power Good Indicator
- Support for Short MPS
- Over Current Protection
- Over Temperature Protection
- Junction Temperature Range of -40°C to +125°C



Standard 16 pins TSSOP with exposed pad

Standard	Power	
	PSE output ¹⁾	PD input ²⁾
802.3af (PoE)	15.4 W	13 W
802.3at (PoE+)	30 W	25.5 W
802.3bt (PoE++)	90 W	71.3 W

1) Maximum power delivered
2) Maximum cable loss included

Solution Overview

Modular Kit For Industrial LED Applications

LED Driver Module
LIGHTING-LEDDRIVE-7760-GEVB

LED Driver Module

- Provides electrical efficiency up to 96%

AC/DC Module

- High-efficiency power conversion (~90%)

LED Module
LIGHTING-LED-GEVK

LED Module

- Supports up to 2 strings of 16 Warm/Cool White LED Bulbs

Bluetooth® Bluetooth Low Energy Connectivity Module

- Based on the RSL10 SIP
- Supports Firmware Over the Air (FOTA) Updates

Bluetooth Low Energy
Connectivity Module
LIGHTING-CONNECTIVITY-GEVB

Power Over Ethernet (PoE) Module

- Based on the NCP1096
- Provides reliable, wired connectivity & power up to 90 watts

PoE Module
LIGHTING-POWER-POE-GEVB

Mobile Apps



Energy Harvesting Bluetooth® Low Energy Switch



- Battery-less lighting control

Connected Lighting Platform
LIGHTING-1-GEVK

- Four Modules
- 12-bits PWM Dimming
- 1000 to 7000 Lumen Range
- 10-90 Watt Output Power Range
- Downlink Connectivity: Localization
- Supports Bluetooth® Low Energy, Zigbee, PoE
- Support multi-sensor shields (PMOD) ALS, PIR, Temp, Moist.
- Supports Modular LED Topology: Multiple Strings, Multiple LED
- Uplink Connected Lighting Functions: On / Off / Dimming / Programming
- Supports Worldwide AC inputs or PoE: 230 Vac, 270 Vac /100 V and 50 / 60 Hz combinations

Connected Lighting Platform for LED Control

Recommended Products

Suggested Block	Part Number	Description
Common Parts for AC-DC / PoE Powered Connected Lighting		
LED Driver Module	NCL31000	Intelligent LED Driver, Visible Light Communication capable, with Precision Dimming, Diagnostics and Power Metrology
	NCL31001	Intelligent LED Driver, Multi-Channel Enabled with Precision Dimming, Diagnostics and Power Metrology
	NCL31010	PoE Interface LED Driver, Visible Light Communication capable
	NCL30161	Buck Regulator, Constant Current, for Driving High Power LEDs
	NCL30170	Direct AC Drive LED Driver for Power Factor Correction and Precise Constant Current Regulation
	NCL30185	LED Driver, AC-DC Power Factor Corrected 3 Step Dimmable Quasi-Resonant Primary Side Current Mode Controller for LED Lighting
	FL7701	LED Driver, Non-Isolated PFC Buck
	Application Recommended LED Drivers	
Regulators Converters	MM3Z18VT1G	200mW 5% Zener, SOD323
	NCP10671	High-Voltage Switcher for low Power offline SMPS
	NCP161	LDO Regulator, 450 mA, Ultra-High PSRR, Ultra-Low Noise
	NCV8152	LDO Regulator, 150 mA, Ultra- Low Dropout, Low-Iq, High PSRR
	NCP718	LDO Regulator, 300 mA, Wide Vin, Ultra-Low Iq
	ES1JFL	Surface Mount Superfast Rectifier
	MMSZ4V3T1G	500 mW; 5% Zener Diode Voltage Regulator
	NSBC114EPDXV6T1G	Complementary Bipolar Digital Transistor (BRT)
	BC846BDW1T1G	Dual NPN Bipolar Transistor
	2N7002LT1G	SOT23, N-Channel MOSFET - 60V 115mA 7.5Ohm
	EMI1051	5.5 V Bidirectional micro-packaged EMI Filter with ESD/Surge Protection
Controllers	NCP1091/2/3/4/5/6	Integrated PoE-PD Interface Controller, IEEE 802.3bt, from 15W up to 90W
	NCP1081/3	Integrated PoE-PD and DC-DC converter controller, 13 W
	FL7760	Analog/PWM Dimmable 70 V input Buck Controller for LED Lighting
	FL7740	PWM Controller, Constant Voltage, Primary Side Regulation for Power Factor Correction
	NCP1566	Highly Integrated Dual-Mode Active Clamp PWM Controller
	NCP1654	Continuous Conduction Mode (CCM) Power Factor Correction Controller
	FXL6408	Fully Configurable 8-Bit I2C-Controlled GPIO Expander


Recommended Products

Suggested Block	Part Number	Description
Voltage & Current Sense	NCS210R	Current Sense Amplifier, 26V, Low-/High-Side Voltage Out, Bidirectional Current Shunt Monitor
	NCS199A3R	Current-Shunt Monitors, 26V, Voltage Output, Bidirectional, Zero-Drift, Low- or High- Side Current Sensing
	NCS7031	80 V Common-mode, Current Sense Amplifiers
Sensors	N34TS108	Low-Voltage Digital Temperature Sensor
	KDT00030	Phototransistor Photo Detector
Wireless Connectivity	RSL10	Radio SoC, Bluetooth® 5.2 Certified
	RSL15	Bluetooth® 5.2 Secure Wireless MCU
	ESD7571	Micro-Packaged Diodes for RF Signal ESD Protection
	ESD8472	Ultra-Low Capacitance RF ESD Protection
	Application Recommended Bluetooth Communication Devices	
Additional Components	NCN5110	KNX Bit Transceiver for Twisted Pair Networks
	NCN5121	KNX Transceiver for Twisted Pair Networks
	NCN5130	Full Featured KNX Transceiver for Twisted Pair Networks
PoE Solution		
Protection ESD	LC03-6	ESD / Surge Protector
	NSP4201	Low Clamping Voltage Surge Protection Diode Array
	MMBZ A-SERIES	Dual Common Anode Zener Diode Protection
	NSR30CM3	200 mA, 30 V, Dual Schottky Diode, Common Cathode
	Application Recommended ESD Protection Devices	
PoE to DC	NCP1091/2/3/4/5/6	Integrated PoE-PD Interface Controller, IEEE 802.3bt, from 15W up to 90W
	NCP1081/3	Integrated PoE-PD and DC-DC converter controller, 13 W
	FL7740	PWM Controller, Constant Voltage, Primary Side Regulation for Power Factor Correction
	NCP1566	Highly Integrated Dual-Mode Active Clamp PWM Controller
	FXL6408	Fully Configurable 8-Bit I2C-Controlled GPIO Expander
	BC846BPDW1T1G	NPN PNP Bipolar Transistor
	FDMQ8205A	GreenBridge™ 2 Series of High-Efficiency Bridge Rectifiers
	NSR30CM3T5G	200 mA, 30 V, Dual Schottky Diode, Common Cathode
	BC846BPDW1	NPN PNP Bipolar Transistor

Recommended Products

Suggested Block	Part Number	Description
AC-DC Solution		
PFC AC-DC	FL5160	IGBT and MOSFET AC Phase Cut Dimmer Controller
	FL5150	IGBT and MOSFET AC Phase Cut Dimmer Controller
	FQP11N40C	Power MOSFET, N-Channel, QFET®, 400 V, 10.5 A, 530 mΩ, TO-220
	FCPF380N60	Power MOSFET, N-Channel, SUPERFET® II, FAST, 600 V, 10.2 A, 380 mΩ, TO-220F
	NCID9211	High Speed Dual-Channel, Bi-Directional Ceramic Digital Isolator
	NCID9311	High Speed 3-Channel Digital Isolator
	NCID9411	High Speed Quad-Channel Digital Isolator
	DF06S1	Bridge Rectifier
	RS1M	1.0A Fast Recovery Rectifier
	ES3D	3.0A Ultra Fast Recovery Rectifier
	NCP13992	Current Mode Resonant Controller with Integrated High Voltage Drivers, Enhanced Light Load
	NCL2801	Critical Conduction Mode (CrM) Power Factor Correction Controller, THD Enhancer
DC-DC	NCP10671	High-Voltage Switcher for low Power offline SMPS
	NCP10672	High-Voltage Switcher for low Power offline SMPS
	NCP115	LDO Regulator, 300 mA, Low Iq, High PSRR, High Accuracy
	NCP163	LDO Regulator, 250 mA, Ultra-High PSRR, Ultra-Low Noise
	NCP161	LDO Regulator, 450 mA, Ultra-High PSRR, Ultra-Low Noise
	NCP1597B	Synchronous Buck Converter, 1 MHz, 2.0 A
	NCP1593	Synchronous Buck Regulator, 1 MHz, 3.0 A
	NCL30076	Wide Analog Dimming Quasi-Resonant Buck Controller
	NCL35076	Wide Analog Dimming CCM Buck Controller

Development Tools and Resources



Product Recommendation Tools+

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Perform simulations for our EliteSIC product line using appropriate engineering tools and software.

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Self-Service PLECS Model generator

Increase Accuracy with Customization and Improve Circuit Performance

[Generate PLECS Model](#)

Technical Documents & Evaluation Boards

Type	Description and Link
onsemi Solution Platform	Connected Lighting Platform
Ref Design (Evaluation Board)	Strata Enabled Zigbee® Green Power Kit
Ref Design (Evaluation Board)	Connected Lighting Platform for LED Control
Ref Design (Evaluation Board)	PoE Interface Intelligent LED Driver Evaluation Kit, IEEE 802.3bt, with Active Bridges
Ref Design (Evaluation Board)	Intelligent PoE LED Driver reference design
Ref Design (Evaluation Board)	NCN5130 KNX Arduino Shield
Ref Design (Evaluation Board)	RSL15 Evaluation and Development Board
Ref Design (Evaluation Board)	Energy Harvesting Bluetooth® Low Energy Switch
Video	NCL31000 Smart LED Driver and Visible Light Communication
User Manual	Connected Lighting Platform User Manual (LIGHTING-1-GEVK)
Other Documents	Creating a State-of-the Art, Cost Effective Energy Harvesting Bluetooth Low Energy Switch
Other Documents	Visible Light Communication
Other Documents	Creating an Energy Harvesting Zigbee Green Power Switch for Smart Homes and Buildings



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