

NXP Semiconductor- Path towards Future Lighting Solutions

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Conventional incandescent bulbs have been the lighting workhorse for over 100 years globally and in India, but they are now being phased out across the globe. It is expected that by 2017, incandescent bulbs will be banned in most major markets.

These regulations have propelled energy-efficient lighting from niche to mainstream, rapidly expanding the market for lighting control and driver solutions.

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In particular, the market for LED lighting is expected to grow significantly in the coming years. SSL is not yet a mass-market general lighting technology. Although some LED “bulbs” are available in stores, the use of SSL is currently limited mainly to architectural, decorative and effect lighting plus specific applications such as traffic signals, street lighting and refrigerator lighting in the retail sector. According to industry estimates, there is potential demand for up to 5 million units per state for street lighting solutions in India.

It is anticipated that LED lighting will go mainstream

Till date, NXP has helped save 500 million kg CO2 per year compared to more traditional lighting solutions as the company has sold 250 million fluorescent lighting driver ICs through its environmentally conscious design process.

over the next few years. In India, being a price-sensitive market, one would expect that future offerings would likely be focused on providing better quality and durability at low prices. Technological advancements would act as a catalyst to drive adoption in India even further.

Environmentally conscious design process

The lighting industry is going through some major changes driven largely by concerns over climate change and the desire to use energy resources more efficiently. There are ongoing efforts being sponsored by governments, civic bodies and utilities to serve the public with better lighting and reduce our carbon footprint with the added benefit of reducing energy costs. Both governments and consumers are looking towards more efficient lighting options such as compact-fluorescent lamps (CFLs) and solid-state-lighting (SSL) to achieve these savings.

The European Union recently announced a ban on conventional light bulbs and has adopted the new compact fluorescent lamps (CFLs) that are slated to slash annual carbon dioxide emissions by around 15 million tonnes. If a similar approach were to be adopted in India, it could result in tremendous energy savings. While CFL solutions have made their way to India, LED solutions are still at a nascent stage and are slated to grow over the coming years.

In HF-TL application the manufacturers are looking for One chip ICs which can drive the power MOSFETs and provide dimming functionalities to the end user either manually or remotely. Further

the same IC should also have the capability to provide the active control for Power factor correction. This helps them to keep their system cost low.

In CFL the manufacturers have changed their old design to meet the new regulation from the government effective from 1st Oct2009 to have a power factor correction PFC greater than 0.85. Due to cost constraints, the manufactures are going for passive PFC in case of CFLs. Dimming CFL products are yet in the conceptual stage and would be the reality in coming years. The manufacturers are also evaluating Onechip CFL ICs which improve the life of CFLs, lumen outputs that are highly efficient along with several other advantages like less rejection rate both from the field and on production, increased production volume etc. which would aid in improving their operational cost significantly.

Solid state lighting is gaining momentum especially in street lighting & solar lighting applications. In both these applications efficiency is the prime feature requirement from most of the manufacturers. Very few companies like NXP offer such highly efficient products

There is a drive in the market to replace conventional sodium vapour lamp based streetlights with LED based since LED streetlight saves about 60-70% of power by reducing the carbon footprints and this saving can help to light millions of homes full fill billions of dreams and further help to save the saving environment.

NXP Technology

NXP has a portfolio of lighting products for applications such as CFLs, high-frequency tube lamps (HF- TL), HID, and SSL solutions such as light emitting diodes (LED) , retro-fit LED lamps, LED ballasts, commercial lighting and others. NXP has a strong portfolio of high voltage solutions covering 1W to >250W with an emphasis on superior control and deep dimming capabilities. LED lighting is widely expected to be the next wave of technology globally and in India, and many industry watchers expect SSL solutions to go mainstream within the next 5-10 years. The switch to low-energy solid state lighting is now a top priority for governments and enterprises around the world.

A case in point is the LED based street lighting solution implemented in Andhra Pradesh. It illustrates the use of innovative semiconductor technologies to significantly help ease the burden

that civic authorities face with regards to energy usage and maintenance of illuminated highways and streets. Using the NXP solution, sufficient lighting can now be maintained while operating at significantly lower levels of electrical consumption, without the authorities having to switch off street lighting (which creates safety hazards) to save energy consumption.

In addition to offering reduced levels of energy consumption, NXP solutions offer innovation, reliability, high levels of integration with a reduced form factor and support for extensive tooling to simplify and speed up design. NXP has been supplying components to leading lighting manufacturers for over 20 years.

Products & Solutions

NXP has various offerings in its portfolio for different lighting products like CFL, TL and LEDs that support reduced energy consumption. Some of these are listed below:

CFLs – Delivering deep dimming down to 10%, the UBA2028 fully integrated (3 Ohm, 600 V MOSFETs) CFL solution for dimmable lamps offers best in class performance. Various package and product options of the UBA2024 CFL driver with integrated switches for non dimmable lamps provides a range of outputs to meet the different regional requirements (US / Europe / Japan / Asia, see table – CFL product fit with target segment).

Type number	Description
UBA2014	Lamp controller and half-bridge driver IC for dimmable CFL / TL
UBA2021	Lamp controller and half-bridge driver IC for high-performance CFL / TL
UBA2024(A)	Fully integrated CFL solution for up to 15 W / 21 W
UBA2025	Fully integrated CFL solution for high-performance CFL
UBA2028	Fully integrated CFL solution for dimmable CFL

SSLs – Light-emitting diodes (LEDs) represent a revolution in the electronics industry. These versatile devices will illuminate a host of new ideas and applications. And they promise lighting solutions like no other – small, adaptable, energy-saving and controllable in both color and intensity. All our solutions integrate easily into products – so designers don't need to have extensive electronics skills. This 'hassle-free' integration cuts time-to-market and will help speed the adoption of SSL in the general lighting market. As the only mains LED controller and driver on the market to match the LED lifetimes, NXP's SSL2101 for dimmable LED lighting is the next step in SSL retrofit LED lighting. This small, highly integrated and highly efficient driver supports the majority of available dimmers (TRIAC and transistor) and is ideal for small form-

[INDUSTRY FOCUS]

Type number	Description
SSL2101	AC mains dimmable LED driver upto 15W
SSL2102	AC mains dimmable LED driver upto 25W
SSL152X	Highly integrated fly-back / buck converter for up to 15 W
SSL1623PH	Highly integrated fly-back / buck converter for up to 25W
SSL1750	Highly integrated SMPS with active power factor correction for application above 25W
TEA1751	Variant of SSL1750
TEA1752	Variant of SSL1750
UBA3070	high-voltage, current-controlled buck / fly-back converter for DC/DC LED solutions

factor applications with closed casings.

One of the latest solutions deployed by NXP is the street lighting solution implemented in the Tirupati and Pulivendula Municipal Corporations in the state of Andhra Pradesh. This lighting solution is based on NXP's SSL1750 SMPS controller IC, a highly integrated IC and part of NXP's GreenChip product portfolio that has helped achieve power savings in the range of 60-70% over the traditional lamps used, resulting in lower operating costs. The SSL1750 IC offers a high level of integration that enables lighting manufacturers to create high-quality LEDs, maximizing energy efficiency and minimizing form factor through reduced heat generation, thereby enabling cost-effective power supply designs and extended lifetimes beyond 50,000 hours. This solution has the potential to reduce carbon emissions by up to 115kg per lamp per year, and save approximately 160 W of power per lamp, which is enough to light up almost four homes using CFLs.

Key benefits and features

In terms of key benefits and features, NXP solutions offer the following:

- Proven innovation - NXP has been supplying supply all the leading lighting innovators with complete solutions
- Proven efficiency - Many NXP solutions are based on their established and highly efficient GreenChip™ power management range
- Proven reliability -
 - a. NXP has been supplying leading lighting manufacturers for over 20 years
 - b. All products are effectively “pre-qualified” by these companies
- Highly integrated solutions reduce form factor
- Extensive support tooling to simplify and speed up design-in
- A complete lighting portfolio (CFL SSL, HID and TL) helps deliver economies of scale - Similar technical and industry practices apply independently of the lighting technology
 - a. Dimmer compatibility
 - b. Innovation cycle
 - c. Customer support needs
 - d. Logistics and supplier reduction programs

Topics for Cover Story / Industry Watch / Product Reviews & Contributory Spotlight for the year 2010



MONTH	COVER STORY	INDUSTRY WATCH	PRODUCT REVIEWS	CONTRIBUTORY SPOTLIGHT
January	Display Technologies at a Glance	Solar Cells	Spectrum Analyzer	Embedded Wireless Design
February	Solid State Lighting	Test & Measurement	Line Interactive UPS	LED Drives
March	Set Top Boxes	Battery Trends	LED Displays	FPGA
April	Handheld Oscilloscopes	Pick n Place Machines	SMF Battery	Data Acquisition
May	Automotive Electronics	UPS	Solder Paste	Video Surveillance
June	SMT Technology	Semiconductors	CCTV	LED Products & Assembly
July	Security & Surveillance	Embedded Training	BGA Rework Stations	Power MOSFET
August	Image Sensors	EMS	Connectors	Automated Test System
September	Low Power Microcontrollers	Electronic Components	Reflow Soldering Machines	SoC
October	RFID	Soldering/Desoldering	Digital Oscilloscopes	SMT Process & Technology
November	Medical Electronics	LED Market	Electronic Weighing Machines	Touch Sensor
December	Design Test Equipments	Robotic Kits	Programmable DMM	Automation Controllers