

Advanced solutions for lighting control and driver electronics



NXP & energy-efficient lighting

The lighting industry is undergoing a major transformation, driven largely by concerns over climate change and the desire to use energy resources more efficiently. Governments and consumers alike are setting incandescent lights aside, switching to newer, more energy-efficient technologies like compactfluorescent lamps (CFLs) and solid-state lighting (SSL). These new technologies are, indeed, much more energy-efficient, but they're also much more challenging to design, since they require complex driver and control electronics.

That's where NXP comes in.

Making it easy

As one of the first semiconductor companies to recognize the growing importance of energyefficient lighting, we've been supplying complete lighting solutions to some of the largest and most innovative lighting companies for more than 20 years.

Now, we're opening up our portfolio, offering our proven, highly integrated ICs for lighting control and driver electronics to a much wider audience of OEMs and ODMs. We've even established a dedicated lighting group, so our customers get the optimized solutions and detailed application support they need to be competitive.

Offering integration and support

We've made lighting a strategic focus area and devote a substantial portion of our R&D resources to developing new ways to save energy and simplify design. Our industry-leading GreenChip ICs, for example, are the basis for many of our

lighting solutions, and bring new degrees of power management to lighting applications. We consistently set the bar for integration, finding new ways to reduce form factors, and we offer extensive support tooling, for the fastest, simplest design-in possible.

Equipped for economies of scale

We offer large-scale production capacity and support all the leading formats, including CFL, SSL, HID, and TL. We apply the same best-in-class technical and industry practices across the board, no matter what the technology, so you get a fullservice partner that delivers true innovation - like dimmer compatibility - while simplifying your logistics and reducing your supplier base.

This all means we can offer a complete range of solutions for lighting control, from advanced, highenergy-saving integrated solutions, to cost-efficient discrete solutions based on our broad range of semiconductor components.





The right technology for every application

We offer advanced, cost-effective control and driver ICs for every application, from home and office to retail and street lights.

Saving energy at home

In the past decade, CFLs have become a popular choice for residential lighting. SSL is starting to make its way into the home, too, and shows great promise for the future. NXP offers cost-effective driver solutions for both technologies.

Giving retail revenue a boost

Shop owners use lighting to draw people in and show off the merchandise. They're looking for good, consistent white-color rendering that's as close as possible to natural daylight. Reliability and longevity are also important, since they help reduce maintenance and replacement costs. HID and SSL are excellent choices, and NXP has innovative options for both.

in unoccupied areas, for added energy savings. NXP has the right control functions for HF TL. Keeping streets safe Cities around the world are switching to low-energy lighting for their street and highway networks. Advanced dimming capabilities allow large areas to be dimmed during quieter periods, for reduced light pollution and added energy savings. Lights can be set to brighten automatically when there are cars or people present, so everyone stays safe. HID and SSL are popular choices, and NXP has energy-efficient solutions for both technologies.

Making work spaces more efficient

Offices and industrial sites need general lighting, localized lighting, and local task lighting. HF TL fluorescent is an ideal choice, because its bright white light and good color rendering minimize eyestrain, while its consistent performance over a long life reduces cost. HF TL can also dim light



Control and driver solutions for fluorescent and HID

UBA2021/UBA2025 integrated drivers for high-power CFL

Both devices include a half-bridge power circuit, a feed-forward circuit (constant lamp power over mains voltage variations), a high-voltage level-shift circuit, an oscillator function, a current-control function, a timer function, and protections. The UBA2025 is the same as the UBA2021, but with integrated 3 Ω switches and support for ignition currents up to 1.5 A and lamp powers up to 25 W.

Feature	Benefit
Voltage feed forward	Constant light output, over-power protection
Adjustable pre-heat time and current	Long lifetime
Integrated bootstrap diodes	Reduced BOM cost
Capacitive mode protection	Safety

UBA2025 application diagram



UBA2024/UBA2028 integrated HF TL controllers for external switches with or without dimming

Both devices include a half-bridge power circuit, a dim function, a high-voltage level-shift circuit, an oscillator function, a lamp-voltage monitor, a current-control function, a timer function, and protections. The UBA2028 is the same as the UBA2014, but with integrated 3 Ω switches and support for ignition currents up to 1.5 A and lamp powers up to 25 W.

Feature	B
Fully-integrated solution (including power switches)	R
Pre-heat function	C
Capacitive mode protection	S
Power-down function	S

The UBA2028 in a 230 V application



Benefit

- Reduces form factor, low system cost
- Optimized lifetime, cost of ownership
- Safety, efficiency
- Safety

UBA2024/A selection guide

Туре	Package	Lamp power
UBA2024P	DIP8	Up to 15 W
UBA2024T	SO14	Up to 15 W
UBA2024AP	DIP8	Up to 22 W
UBA2024AT	SO14	Up to 18 W

The UBA2024 in a lighting application



UBA2014 HF TL controller for external switches with or without dimming

Supports ignition currents up to 1.5 A. Includes a half-bridge power circuit, a dim function, a high-voltage level-shift circuit, and oscillator function, a lamp-voltage monitor, a current-control function, a timer function, and protections. The UBA2028 is the same as the UBA2014, but with integrated 3 Ω switches.

Feature	Benefit
Adjustable pre-heat time and current	Low total cost of ownership
Dimming functionality	Energy-saving regulation and low cost
Adaptive non-overlap time	Easy to use
Capacitive mode protection	Safety and system efficiency

UBA2014 application diagram



UBA2037 HID controller

A flexible and robust full-bridge circuit that controls lamp power in commercial and automotive applications

Feature	ľ
Guaranteed 50% duty factor	ł
Automatic start-up cycle	I
High integration level	I
Automatic, adaptive non-overlap time	E

Benefit

- Highly efficient system
- Improves system efficiency and safety
- Low system cost and flexibility in application design
- Easy to use



Control & driver ICs (SSL)

Control and driver ICs for SSL applications

Segment	Subsegment	SSL152x	SSL1623	SSL2101	SSL2102	SSL1750	UBA3070
Rotrofit	Dimmable			•	•		
Ketront	Fixed Output	•	•				
Archite Retail o	Architectural	•	•			•	•
	Retail display		•	•	•	•	•
General	Street light					•	•
Lighting	Residential	•	•	•	•	•	
	Spot - down lights	•	•	•	•	•	•
	Channel / contour					•	
Signal	Traffic Lighting	•				•	•
Signal	Safety / Security	•	•				
Specialty	Entertainment		•			•	•
Lighting	LED screen					•	•

SSL152x SMPS driver ICs with integrated power switch

Operating directly from rectified universal mains, these highly integrated ICs support buck and flyback topologies. They are suitable for LED retrofit lamps and separate LED drivers.

Feature	I
Efficient power conversion	1
Internal HV startup source	F
Reduced component count with integrated 650 V MOSFET	l
Extensive range of built-in protection features	F

SSL210x SMPS driver ICs with integrated power switch

The same as the SSL152x series, but with integrated logic and switches to support mains phase cut dimming. The SSL210x also has improved thermal design, for improved lifetime in the tough operating conditions often found in retrofit lamps.

Feature	E
Efficient power conversion	I
Support for majority of existing dimmers	(
Dimming curve correction	[
Extensive range of built-in protection features	F
Supports non-dimmable, dimmable flyback, buck, high PF design and a power range of 1-25 W	(

SSL2102 application diagram



Benefit

- Maximizes energy efficiency
- Reduces external components, increases efficiency
- Low system cost, smaller application size
- Rugged fail-safe design, reliable operation

Benefit

- Maximizes energy efficiency
- Compatible with existing lighting infrastructure
- Deep dimming comparable to incandescent lamps
- Rugged fail-safe design, reliable operation
- One type fits all

SSL175x SMPS ICs with flyback control and PFC

Combining flyback control with Power Factor Correction (PFC), these highly integrated GreenChip III controllers enable cost-effective designs with very few external components.

Feature	Benefit
Efficient power conversion from mains	Maximizes energy efficiency, reduces heat
Current control through LEDs	Allows dimming to save energy when there is no demand
Extensive range of built-in protection features	Rugged fail safe design, less external components and smaller size
Integrated PFC	Meets regulations for power factor and harmonic distortion above 25 W

Basic SSL1750 application diagram



UBA3070 Buck controller for accurate LED string control

This highly efficient buck converter drives LED strings up to 600 V.

Feature	Benefit
Boundary Conduction Mode (BCM) operation with zero-current switching at turn-on and zero-voltage or valley switching	Very power-efficient operation, maximum utilization of magnetics, and true (switch-mode) current source operation
Direct PWM dimming	Optimal and accurate dimming performance
Cycle-by-cycle current control	Quick, accurate settling of current levels
Extensive range of built-in protection features, including prevention of LED overcurrent and under-voltage lockout	Safety
Reduced component count	Low system cost

Complete solutions for total lighting

Our lighting portfolio goes beyond control and driver ICs, giving you one of the widest selections in the industry. We provide you with everything from discretes to advanced microcontrollers, and specialize in complex LED applications. In particular, we build on the I²C connector technology, with a wide selection of options, including Fast-mode Plus (Fm+), for easy control of even the most advanced LED systems.

To learn more, go to the lighting section of NXP's range of lighting drivers, available samples, web site (www.nxp.com/lighting), where you'll find demoboards, and online calculation tools. product information pages, a list of our complete

	CFL/CCFL	HF TL	HID	SSL
Lighting control ICs for CFL, CCFL, HF TL, and HID				
UBA202x CFL drivers with integrated switches with or without dimming	х	Х		
UBA201x HF TL controllers for external switches with or without dimming	x	Х		
UBA203x Versatile HID controllers for commercial and automotive applications			х	
Mains LED drivers for SSL				
SSL152x SMPS ICs with an integrated power switch, supporting buck and flyback topologies				х
SSL162x SMPS ICs with resonant controller				Х
SSL175x SMPS ICs with flyback control and PFC				х
SSL210x SMPS ICs for dimmable LED lighting, with integrated power switch and circuitry for mains dimmer support				Х
UBA307x Buck converter for accurate control of LED stripps				х
LED colour controllars				
PCA962y				
I ² C-bus Fast-mode Plus controllers for HB quick-changing displays: 40 V, up to 100 mA LED controllers, individual and global 256 step PWMs				Х
PCA963x I ² C-bus Fast-mode Plus controller for quick-changing displays: 5 V, up to 25 mA LED controllers, individual and alobal 256 step PWMs				х
PCA9685 I ² C-bus Fast-mode Plus controller for LED backlighting: 5V up to 25 mA LED controllers with programmable start/store points_individual 4K stop PWM				х
Microcontrollers				
IPC13xx				
Cortex-M3 series with operation up to 70 MHz, low power consumption at 200 µA per MHz, full-speed USB, A/D converter, and multiple interfaces	х	Х	Х	Х
LPC17xx Cortex-M3 series with operation up to 100 MHz, multiple A/D converter and PWM channels, and pin-compatibility with the LPC23xx series	х	х	Х	х
LPC2xxx ARM7 family with extensive range of PWM generators, A/D converters, interfaces, and memory sizes	х	х	х	х
LPC9xx 8 bit family with extensive range of PWM generators, A/D converters, interfaces, and memory sizes	х	х	Х	х
Diodes, transistors, and triacs				
Low V _{cEss} transistors More than 150 types, supporting low-voltage applications and applications up to 500 V • Low V _{cEss} transistors in SOT23, SOT457, SOT89, SOT223, and SOT1061 • High-voltage low V _{cess} , and high-voltage transistors in SOT223. SOT89, and SOT23				×
Medium-power Schottky barrier diodes Low V. Schottky rectifier in SOD123x. SOD128. and SOD323x	x			Х
General-purpose transistors, diodes, and shunt regulators • BCM/PMP (matched pair) in SOT363 and SOT457				x
High-speed switching diodes in SOT23 and SOD323 General-purpose Zener diodes Adiustable precision shunt regulator TL431 in SOT23	х	х		X X X
BUJ10x / PHE1300x Fast switching transistors	Х	Х	Х	
BYVxx, BYCxx Ultrafast diodes for power factor correction, rectification, and more			Х	
BT1xx SCRs for safety shutdown and protection		Х	Х	
BTAxxx Triacs that are insensitive to Hi-Com, for HID lamp ignitors, lamp control adaptors, security lighting (PIR. dusk-to-dawn), and more	х	х	Х	

www.nxp.com

©2009 NXP B.V.

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Date of release: October 2009 Document order number: 9397 750 16830 Printed in the Netherlands

