

NXP Driver ICs for CFL/HF-TL applications

Optimize the cost, size, and efficiency of fluorescent lighting

NXP's driver ICs save space, increase efficiency, and lower the overall cost of standard, long-life, and dimmable fluorescent lighting. Designed for applications in the range of 5 to 25 W, these advanced ICs are supported by a variety of design tools, including applications notes, demo boards, and calculation software, so they're especially easy to design in.

Features and benefits

UBA2024, UBA2024A

- ▶ Standard CFL for power levels up to 25 W
- ▶ Rapid- or instant- start.
- ▶ Maximum light output in shortest time
- ▶ Maximum voltage: 550 V
- ▶ Integrated 9 Ω (UBA2024) or 6/6.4 Ω (UBA2024A) switches
- ▶ Integrated bootstrap diode and self-supplying circuitry
- ▶ Only 17 external components required
- ▶ Glow phase (NXP patent)
- ▶ Adjustable operating frequency
- ▶ Compact DIP8 and SO14 packages

UBA2021, UBA2025

- ▶ High-power and long-life CFL/HF-TL applications
- ▶ Constant light output, overpower protection
- ▶ Maximum voltage: 600 V
- ▶ Integrated 3 Ω , 600 V MOSFETs (UBA2025)
- ▶ Adjustable pre-heat time and current
- ▶ High FET drive capacity
- ▶ Integrated bootstrap diodes
- ▶ Capacitive mode protection

- ▶ Reduced board space
 - UBA2021: SO14 and DIP14 packages
 - UBA2024: SO16L package

UBA2014, UBA2028

- ▶ Dimmable CFL/HF-TL applications
- ▶ Extended lifetime and lower total cost
- ▶ Maximum voltage: 600 V
- ▶ Integrated 3 Ω , 600 V MOSFETs (UBA2028)
- ▶ Adjustable pre-heat time and current
- ▶ Advanced dimming (Phase-cut and 1-10 V)
- ▶ Adaptive non-overlap time, integrated bootstrap diodes
- ▶ Automatic re-start after re-lamping (HF-TL applications)
- ▶ Capacitive mode protection, lamp failure detection, power-down in case of lamp failure
- ▶ Lamp removal detection (HF-TL applications)
- ▶ Reduced board space
 - UBA2014: SO16 and DIP16 packages
 - UBA2028: SO20L package



Solutions for standard CFL applications

UBA2024

The UBA2024 is a 550 V lamp controller and half-bridge IC, equipped with 9 Ω switches, that supports standard CFL applications up to 15 W.

The high level of integration reduces the number of external components to only 17 (compared to the 27 typically required by a discrete driver solution), and the IC supports NXP's patented glow phase. The IC includes a soft-start function, an adjustable internal oscillator and an internal drive function with a high-voltage level shifter for driving the half bridge. To guarantee an accurate 50% duty cycle, the oscillator signal is passed through a divider before being fed to the output drivers.

It is available in a demo board for 120 and 230 VAC and is supplied with a calculation tool that lets the engineer fine-tune the board to a given burner specification.

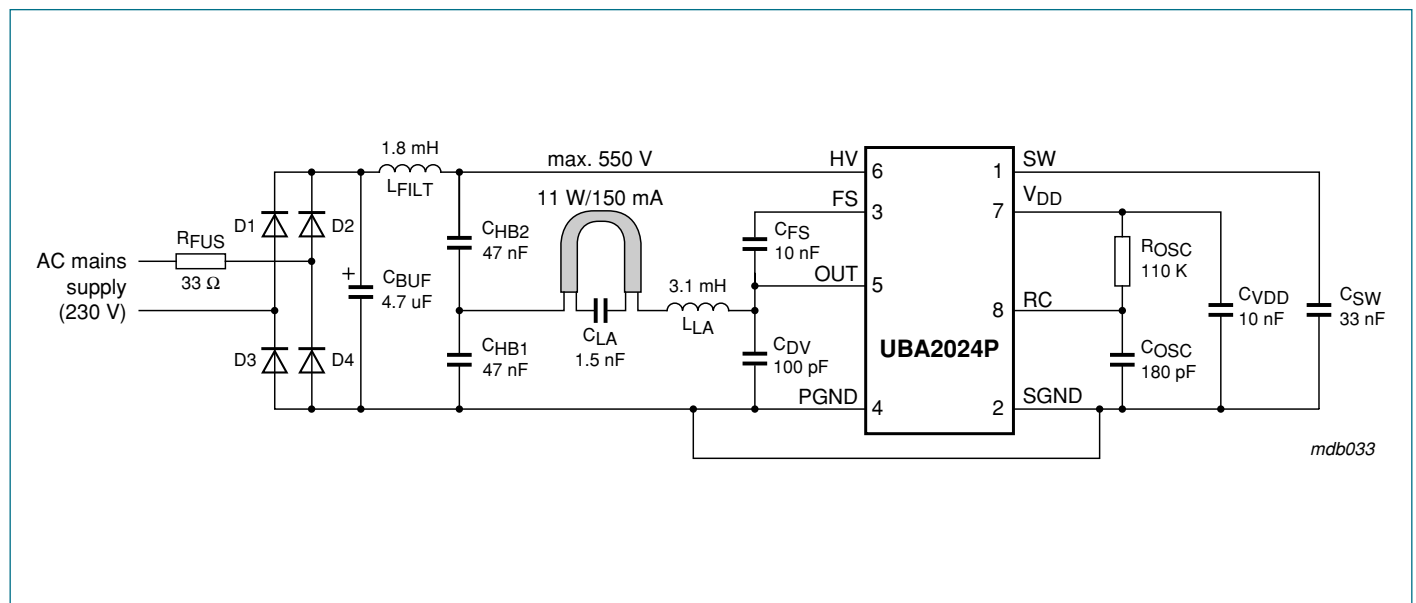
Highlights

- ▶ Integrated half-bridge power transistors
- ▶ Integrated bootstrap diode
- ▶ Integrated low-voltage supply
- ▶ Adjustable oscillator frequency
- ▶ Maximum voltage of 550 V
- ▶ Minimum glow time control
- ▶ Soft start
- ▶ Easy-to-configure burner specification
- ▶ Compact DIP8 and SO14 packages

UBA2024A

The UBA2024A is a pin-compatible variant of the UBA2024. It extends the application range to include systems up to 21 W.

UBA2024 application diagram



In the DIP8 package, it integrates 6 Ω switches, and in the SO14 package, it has 6.4 Ω switches. It enables a single PCB layout with multiple power levels, and reduces switching losses with a 5-6% improvement in efficiency. When compared to a discrete driver, the UBA2024A delivers a lower P_{tot} with the same P_{lamp} , higher efficiency, and lower loss.

Highlights

- ▶ Pin-compatible with UBA2024
- ▶ DIP8 package: integrated 6- Ω switches
- ▶ SO14 package: integrated 6.4 Ω switches

Solutions for high-power, long-life CFL/TL applications

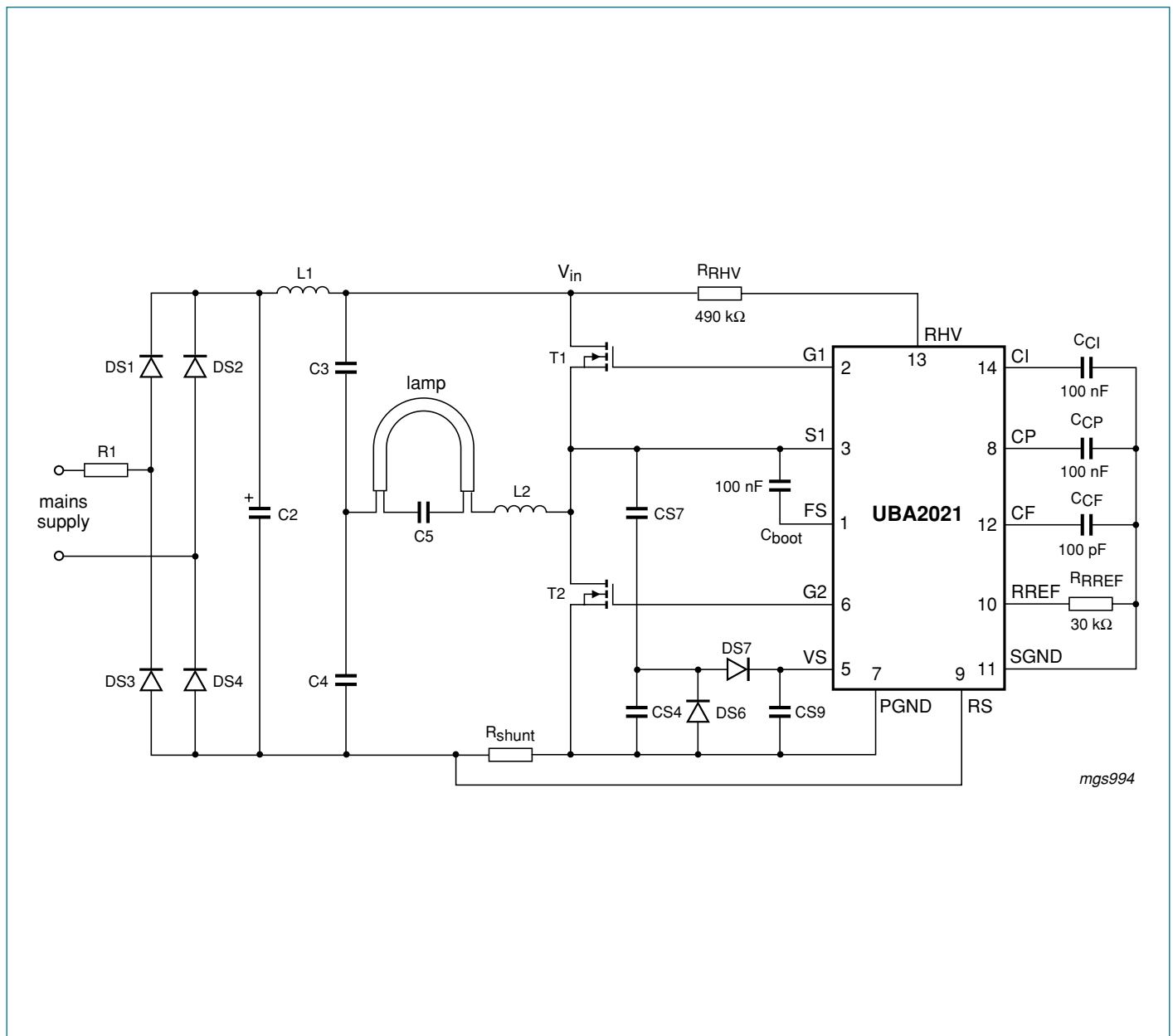
UBA2021

The UBA2021 is a 600 V lamp controller and half-bridge driver IC for high-power, long-life CFL/TL applications. It delivers constant light output and improves safety with over-power protection. It contains a driver circuit for an external half-bridge, an oscillator, and a control circuit for starting, preheating, ignition, lamp burning, and protection. It is available in a demo board for 230 VAC and is supported by a calculation tool.

Highlights

- ▶ Adjustable preheat ignition time
- ▶ Adjustable preheat current
- ▶ Adjustable lamp power
- ▶ Lamp power independent from mains voltage variations
- ▶ Overpower protection
- ▶ Lamp temperature stress protection at higher mains voltages
- ▶ Capacitive mode protection
- ▶ Protection against a drive voltage that is too low for the power MOSFETs
- ▶ SO14 and DIP14 packages

UBA2021 application diagram



mg994

UBA2025

The UBA2025 is the same as the UBA2021, but with integrated $3\ \Omega$ switches. It supports ignition currents up to 1.5 A and lamp powers up to 25 W. The IC includes a half-bridge power circuit, an oscillator, and a control circuit for starting, preheating, ignition, lamp burning, and protection. It provides all the necessary functions for proper preheat, ignition, and on-state operation of the lamp. Besides the control function, the IC provides the level shift and drive for the two internal power MOSFETs.

Highlights

- ▶ Same functionality as UBA2021
- ▶ Two internal 600 V, $3\text{-}\Omega$ (max) NMOST half-bridge power circuits
- ▶ Adjustable preheat and ignition time
- ▶ Adjustable preheat current
- ▶ Adjustable lamp power
- ▶ Lamp temperature stress protection at higher mains voltages
- ▶ Capacitive mode protection
- ▶ Protection against a too-low drive voltage for the power MOSFETs
- ▶ SO16L package: typical $R_{th(j-a)}$ of 80 K/W

Solutions for dimmable CFL/HFL-TL applications

UBA2014

The UBA2014 is a 600 V lamp controller and half-bridge driver IC for dimmable CFL/HFL-TL applications. It makes dimmable lights last longer and support energy-saving regulation while lowering the total cost of ownership. The circuit is made in a 650 V bipolar CMOS DMOS (BCD) power-logic process. It provides the drive function for the two discrete power MOSFETs. Besides the drive function, the IC also includes the level-shift circuit, the oscillator function, a lamp voltage monitor, a current-control function, a timer function, and protections.

In dimmable CFL applications, it offers adjustable pre-heat time and pre-heat current, along with advanced dimming functionality, including phase-cut and support for between 1 and 10 V. It also offers adaptive non-overlap time, integrated bootstrap diodes, capacitive mode protection, lamp failure detection, and power-down in case of lamp failure. In dimmable HFL-TL applications, the device adds automatic re-start after re-lamping, as well as lamp removal detection.

It is available in an evaluation kit that includes a 13 W TRIAC in a dimmable CFL application. The kit supports 58 W TL designs, and accepts inputs of 120/230 VAC or 500 VDC. Support from a calculation tool is also available.

Highlights

- ▶ Adjustable preheat time
- ▶ Adjustable preheat current

- ▶ Current controlled operation
- ▶ Single ignition attempt
- ▶ Adaptive non-overlap time control
- ▶ Integrated high-voltage level-shift function
- ▶ Power-down function
- ▶ Protection against lamp failures or lamp removal
- ▶ Capacitive mode protection
- ▶ SO16 and DIP16 packages

UBA2028

The UBA2028 is the same as the UBA2014, but with 3 Ω integrated switches. It supports ignition currents up to 1.5 A and lamp powers up to 25 W. The IC includes 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.

Highlights

- ▶ Two internal 600 V, 3 Ω (max) NMOST half-bridge powers
- ▶ Adjustable preheat time and current
- ▶ Current-controlled operation
- ▶ Single ignition attempt
- ▶ Adaptive non-overlap time control
- ▶ Integrated high-voltage level-shift function
- ▶ Power-down function
- ▶ Protection against lamp failures or lamp removal
- ▶ Capacitive mode protection
- ▶ SO20L package: typical $R_{th(j-a)}$ of 75 K/W

Package overview: UBA2024, UBA2024A, UBA2025 and UBA2028

Type number	Package	R_{DSON}	Max ignition current
UBA2024P	DIP8	9 Ω	900 mA
UBA2024T	SO14	9 Ω	900 mA
UBA2024AP	DIP8	6 Ω	1350 mA
UBA2024AT	SO14	6.4 Ω	1200 mA
UBA2025T	SO16L	3 Ω	1500 mA
UBA2028T	SO20L	3 Ω	1500 mA

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