



NXP 600 V HF-TL lamp drivers UBA2015, UBA2015A and UBA2016A

Fluorescent lamp drivers for HF-TL with PFC control, dimming and boost function

Specially designed for use with electronic ballasts, and based on NXP's GreenChip technology, these highly integrated controller ICs support all common lamp types and configurations.

Product Features

- ▶ Non-dimmable fluorescent lamp driver with PFC (UBA2015)
- ▶ Dimmable fluorescent lamp driver with PFC (UBA2015A)
- ▶ Dimmable fluorescent lamp driver with boost functionality with PFC (UBA2016A)
- ▶ Adjustable, current-controlled preheat
- ▶ Accurate lamp control ($\pm 1\%$)
- ▶ Protection mechanisms for safe operation of the fluorescent lamp in case of abnormal operating conditions or lamp failure
- ▶ Cost-effective system solutions

Applications

- ▶ Linear T4, T5, T8, and T12
- ▶ Compact fluorescent
- ▶ Dimmable fluorescent
- ▶ Boost fluorescent
- ▶ Multi-lamp
- ▶ Multi-power
- ▶ Lamp end-of-life (EOL) detection

This new family of fluorescent driver ICs consists of non-dimmable mainstream (UBA2015), dimmable (UBA2015A), and dimmable-boosted (UBA2016A) for cost-effective HF-TL system solutions. Each drives a half-bridge circuit made of

two MOSFETs with a supply voltage of up to 600 V and a PFC stage using one MOSFET. They feature very low standby power levels (< 100 mW), which further enhances energy efficiency. The many built-in protections support all requirements with respect to standards, reliability (including end-of-life protections), and performance. The ICs are available in 20-pin SO and DIP packages, for easy and fast design-in. All feature the adjustable current controlled preheat and accurate lamp current control ($\pm 1\%$).

Boost (UBA2016A)

Lamps that replace liquid mercury with amalgam, which is a mercury alloy, have long run-up times because the mercury has to be released from the amalgam before the lamp can reach maximum light output. The UBA2016A reduces run-up time by increasing lamp power above nominal at power-on, and then regulating the lamp power gradually to the nominal power level. The result is a run-up time almost similar to mercury-based tube lamps. Boost time can be set in the application.

Dimming (UBA2015A, UBA2016A)

On the UBA2015A and UBA2016A, a dimming feature supports energy harvesting, which is used in office buildings and factories to reduce energy consumption. The dimming level can be set by applying a DC voltage to the DIM input pin. The controller



integrates all the active circuitry, including an operational transconductance amplifier (OTA), for accurate lamp current control.

EOL protections

As required by IEC-60926, the controllers have end-of-life (EOL) protections. The EOL pin uses a window comparator to sense drift in the DC blocking capacitor due to lamp aging. When the drift becomes high enough, and the EOL pin voltage moves outside the window comparator's range, the controller enters standby state. A "lamp rectification" feature prevents overheating at the connectors used by the tube light. This is an especially important feature for small-diameter tube lights, such as T4 and T5, which, unlike larger T8 tubes, have less surface area to release heat.

Lamp current control

Used to operate the lamp to within 1% accuracy. The tolerance of the LC tank components, as well as the bus voltage ripple, are regulated out by the lamp controller.

Selection guide

Function / Feature	UBA2015	UBA2015A	UBA2016A	Advantage
Lamp boost			Yes	Reduced run-up time
Dimming		Yes	Yes	Energy harvesting and dimming
Lamp-on detect		Yes	Yes	No flash at power-on while dimmed
Current-controlled preheat	Yes	Yes	Yes	Accurate lamp operation
Fixed-frequency preheat	Yes	Yes		Accurate lamp operation
Lamp current control	Yes	Yes	Yes	Accurate lamp operation without bus voltage ripple
Output to indicate burn state	Yes	Yes		Supports switchable heater transformer circuit
Open/short protection on selected pins	Yes	Yes	Yes	Safety
Over-temperature protection	Yes	Yes	Yes	Safety
SO and DIP package	Yes	Yes	Yes	More freedom in layout

Safety features

The ballast is shut off when an over-temperature condition occurs, and, to prevent hazardous situations, the controller has open/short protection on selected pins.

Burn state indicator

In some high-end ballasts, a control signal is used to switch a transistor on or off when the lamp has ignited. On the UBA2015 and UBA2015A, this control signal is available at a pin to indicate the burn state.

Lamp-on detect

Lamp-on detection limits startup flash if the ballast is set to dimming. To support this feature, the UBA2015A and UBA2016A versions monitor the lamp current and LC tank voltage. In multi-lamp applications, one or more LC tank voltages can be sensed to ensure all lamps are on.

Demo boards

For reduced time-to-market, reference designs for dimmable and non-dimmable applications are available.

UBA2016A block diagram

