

# 48 V, 130 W high-efficiency SMPS for LED street lighting

A two-stage topology provides very high efficiency, extended European input mains range operation and long-term reliability



The high efficiency and long lifetime of LEDs are making them a key player to replace current lamp types for internal or external lighting, so giving an extra contribution to reducing energy consumption.

In street lighting applications, where higher efficiency, longer lifetime and reduced maintenance are vital for reducing costs, the adoption of LEDs is increasing. ST's new generation of offline converters features a two-stage topology to meet these needs.

Based on a front-end PFC and an LCC resonant converter, this innovative architecture eliminates the need for electrolytic capacitors.

## Key features

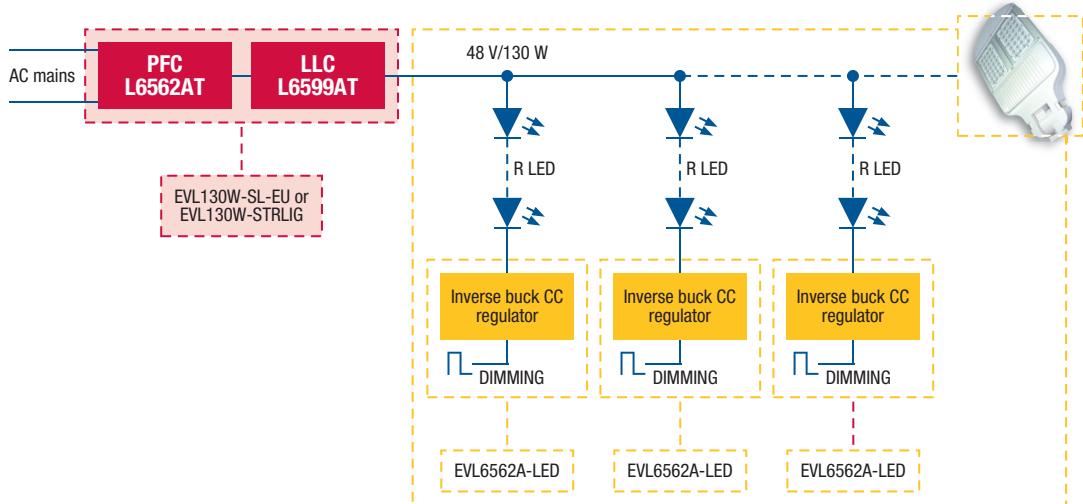
- Extended European Input mains range: 177 to 277 V<sub>AC</sub>
- Output voltage: 48 V at 2.7 A
- Long lifetime – electrolytic capacitors are not used
- Overall efficiency at full load: better than 93%
- No heatsinks needed
- Safety: double insulation, according to EN60950, SELV
- Mains harmonics: according to EN61000-3-2 Class-C
- EMI: according to EN55022-Class-B
- Dimensions: 75 x 135 mm, 30 mm components maximum height
- PCB: single side, 35 µm, FR-4, mixed PTH/SMT
- RoHS and halogen-free compliant

## Key components

- L6562AT: transition mode PFC controller with extended temperature specification
- L6599AT: high-voltage resonant controller with extended temperature specification
- STB21NM60N, STB8NM60N: MDmesh™ power MOSFETs
- STTH3L06U: Turbo2 ultrafast high-voltage rectifier
- STPS10150CG: high-voltage power Schottky rectifier
- SEA05: advanced constant-voltage constant-current controller

## Target application

- SMPS for LED street lighting



The PFC stage, working in transition mode, acts as pre-regulator and powers the resonant stage with an output voltage of 450 V. The PFC power topology is a conventional boost converter, connected to the output of the rectifier bridge.

This design presents a very high efficiency, extended European input mains range operation (177 to 277 V<sub>ac</sub>) and long term reliability. The electrolytic capacitors are replaced by film capacitors. Component derating has also been carefully applied during the design phase, decreasing component stress.

Moreover, the use of L6562AT and L6599AT minimizes the number of external components, reducing the overall system cost and increasing the MTBF (mean time between failures).

The high efficiency achieved means that the PFC stage only requires a small heatsink, while the other power components are surface mounted, like most of the passive components, thus decreasing the assembly cost.

The board also has protection features that are activated in case of overload or short circuit, open loop for each stage or input overvoltage. All the protection features have an auto-restart function – they do not need to be deactivated manually after intervention.

## Evaluation boards

| Order codes   | Description  | Application note |
|---------------|--|------------------|
| EVL130W-SL-EU | 130 W SMPS for LED street lighting applications, extended European input mains range: 177 to 277 V <sub>AC</sub> | AN3105           |
| EVL130W-STRIG | 130 W SMPS for LED street lighting applications universal Input mains range: 85 to 305 V <sub>AC</sub>           | AN3106           |
| EVL6562A-LED  | Constant-current inverse buck LED driver using L6562A, transition mode PFC                                       | AN2983           |



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