

Smart LED driver using 6LoWPAN Mesh network for outdoor street lighting



Features

- Intelligent power conversion stage based on the HVLED001A high voltage LED driver:
 - wide input voltage range: 90 – 300 V_{AC}
 - constant current output: 60-110 V / 0.7 A, with $\pm 5\%$ current regulation
 - high power factor > 0.97 and low THD < 15% for entire line and load cycle in quasi resonant mode
 - peak overall efficiency (including auxiliary supply) at maximum load > 89%
 - various start-up, operating and low-power modes
 - open circuit, short-circuit, undervoltage and overvoltage circuit protection
- Digital and remote control section based on STM32 microcontroller:
 - wireless connectivity with embedded sub-1 GHz transceiver
 - can accept remote on, off and dimming commands
- Five levels of analog dimming
- Less than 0.5 W standby power consumption ensures compliance with EnergyStar norms
- RoHS compliant
- WEEE compliant

Description

The **STEVAL-LLL006V1** board is designed to help you evaluate high power LED lighting solutions with comprehensive power management and wireless connectivity.

The board integrates an intelligent power conversion stage thanks to the **HVLED001A** LED lighting controller with various operating modes, sensing and protection mechanisms, and highly efficient switching based on the **STP21N90K5** Power MOSFET. The board is able to convert a wide 90 - 300 V_{AC} input voltage range into a 60 - 110 V_{DC} output in constant current mode, with high power factor and low THD.

The on-board **STM32L071KZ** microcontroller is able to receive remote on, off and dimming commands via the embedded **SPSGRFC** sub-1 GHz transceiver module.

A data concentrator unit (DCU) and mobile Android application have been developed to help you explore the functionality of the evaluation board. The DCU consists of a **NUCLEO-F401RE** development platform, plus the **X-NUCLEO-IDS01A4** for sub 1-GHz communication with the LED driver board and a **X-NUCLEO-IDB05A2** board for Bluetooth communication with the mobile device.

The ST 6LoWPAN Smart Streetlight mobile application (available on Google Play store) collects lighting nodes represented by the microcontroller and RF module on the evaluation board in a 6LoWPAN mesh network.

Summary table

| | |
|--|------------------------|
| Smart LED Driver using 6LoWPAN Mesh network for outdoor street lighting | STEVAL-LLL006V1 |
| high voltage controller for LED lighting | HVLED001A |
| N-channel 900 V, 0.25 Ω typ., 18.5 A MDmesh K5 Power MOSFET | STP21N90K5 |
| ultra-low-power ARM Cortex-M0+ MCU | STM32L071KZ |
| sub-1 GHz programmable transceiver module | SPSGRFC |
| VIPerPlus family: Low voltage energy saving fixed frequency high voltage converter | VIPER012LS |

1 Block diagram

Figure 1. Block diagram

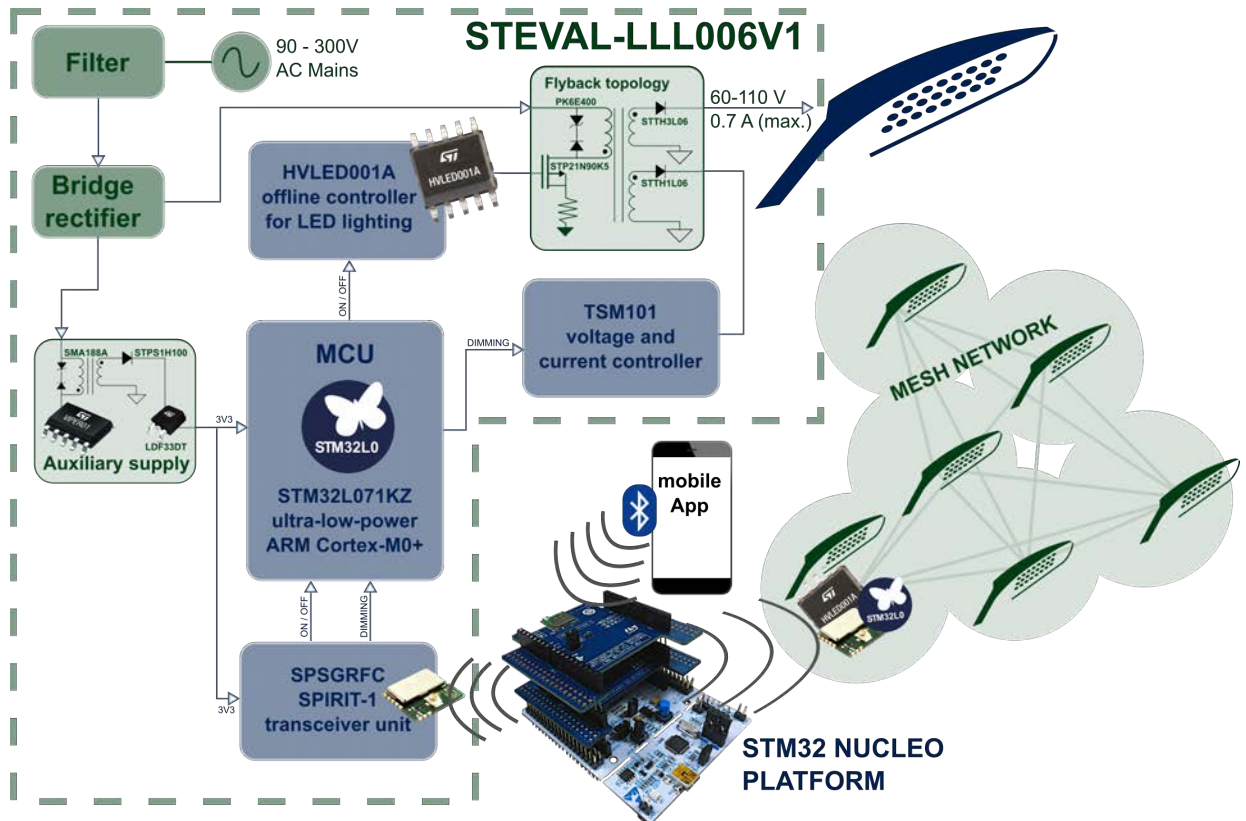
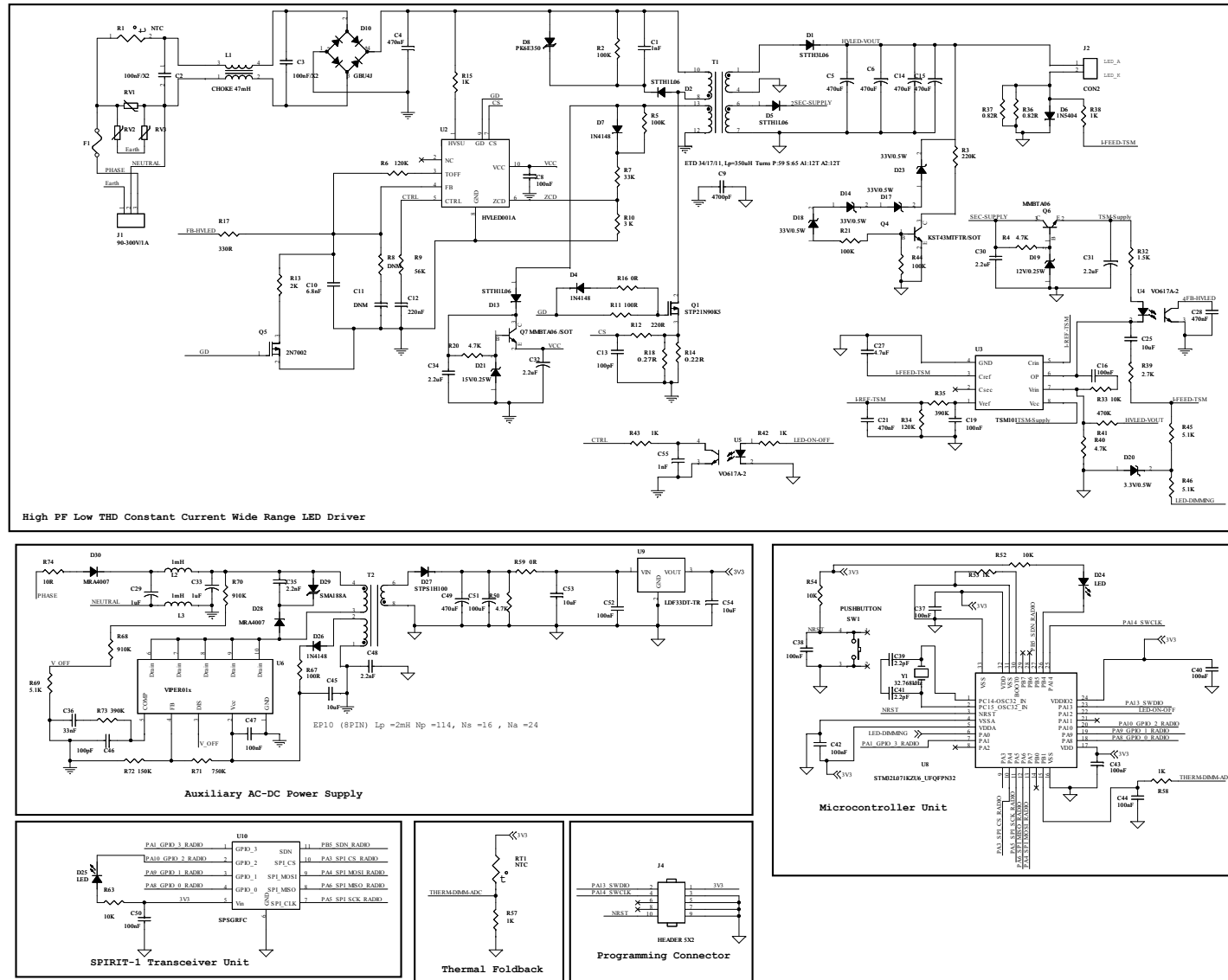


Figure 2. STEVAL-LLL006V1 board schematic



Revision history

Table 1. Document revision history

| Date | Version | Changes |
|-------------|---------|--|
| 28-Jul-2019 | 1 | Initial release. |
| 06-May-2020 | 2 | Substituted X-NUCLEO-IDB05A1 (no longer recommended for new designs) with X-NUCLEO-IDB05A2 |

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