
LED backlight demonstration based on the STP04CM05, ST1S40 and STM32F030

Data brief



Features

- 24 1-Watt LEDs for ~ 25 W total
- Scalable solution capable of cascading multiple boards for larger systems (pinouts for connection to other boards)
- Preset demo mode for adaptive voltage control, error representation and brightness control
- Adaptive rail voltage correction for minimal device dissipation and higher efficiency

- All channels monitored and worst-case corrected
- Periodic self-tuning possible
- Self-tuning at each startup corrects aging behavior of LEDs
- Double-layered PCB
- RoHS compliant

Description

The STEVAL-ILL071V1 demonstrates how to implement LED backlighting based on the STP04CM05 high current LED driver, the ST1S40 step-down DC-DC converter and the STM32F030 ARM Cortex-M0 microcontroller. This board features 24 LEDs (8 LED strings with 3 LEDs per string) but additional modules can be cascaded for a larger backlight area. Possible application may be extended to any LED lighting system based on integrated LED drivers. The design optimizes the LED driver rail voltage such that dissipation within the driver is minimized. It employs an adaptive process to compensate for aging effects of the LEDs (forward LED voltage increases with time). This is achieved by tracking the drop across the LED string using the ADC of the STM32F030, and acting accordingly on the feedback pin of the ST1S40 (via PWM) to adjust rail voltage until the LED driver comes out of constant current mode. This knee point of operation is detected and the DC-DC converter output is locked to the minimum voltage at which the LED driver is able to maintain constant current operation. This ensures minimum drop across the driver channels and thus minimum loss within them, improving efficiency, reducing power consumption and increasing reliability.

1 Schematic diagrams

Figure 1: STEVAL-ILL071V1 circuit schematic (1 of 6)

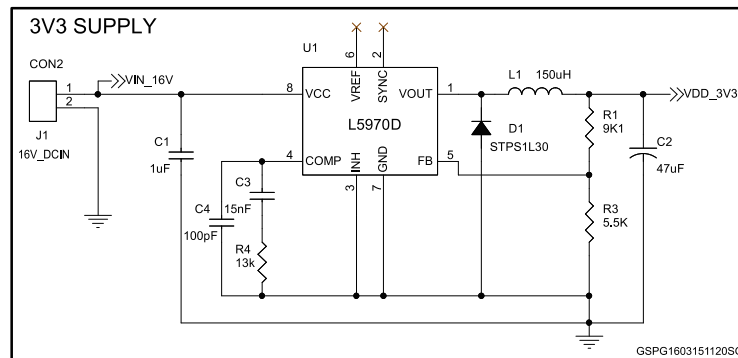


Figure 2: STEVAL-ILL071V1 circuit schematic (2 of 6)

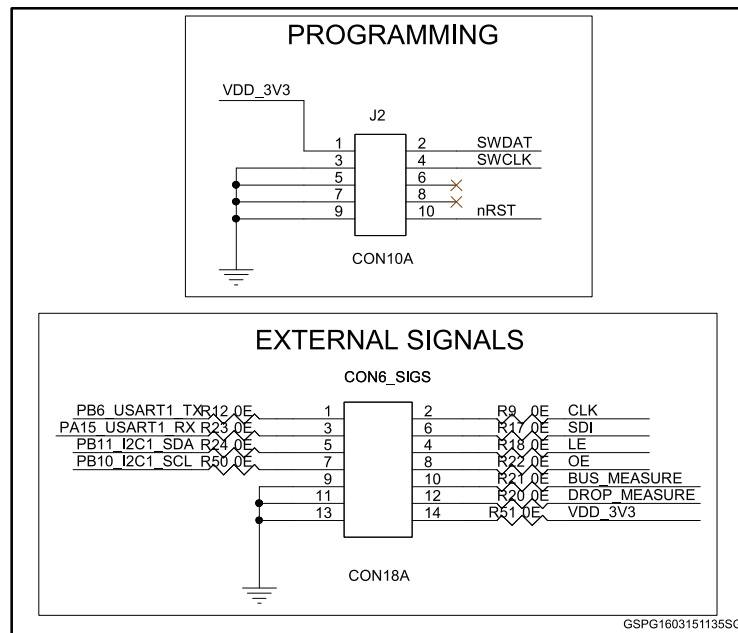


Figure 3: STEVAL-ILL071V1 circuit schematic (3 of 6)

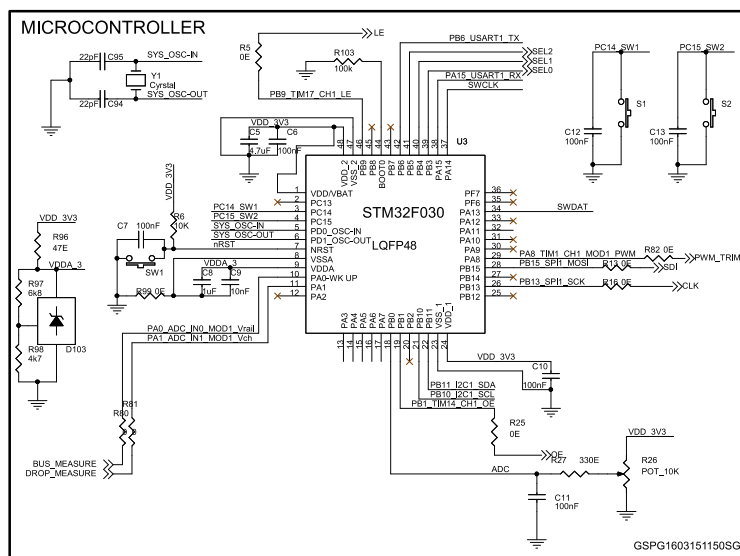


Figure 4: STEVAL-ILL071V1 circuit schematic (4 of 6)

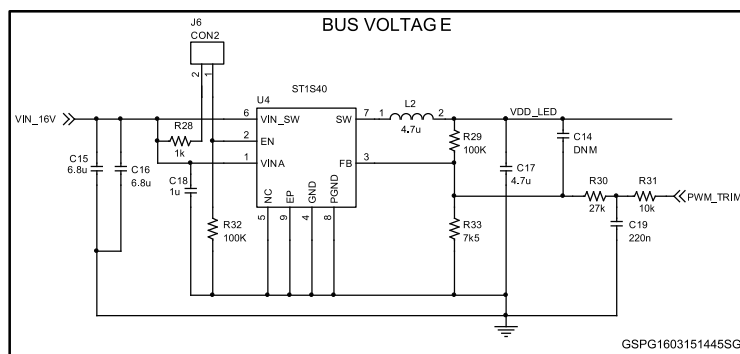


Figure 5: STEVAL-ILL071V1 circuit schematic (5 of 6)

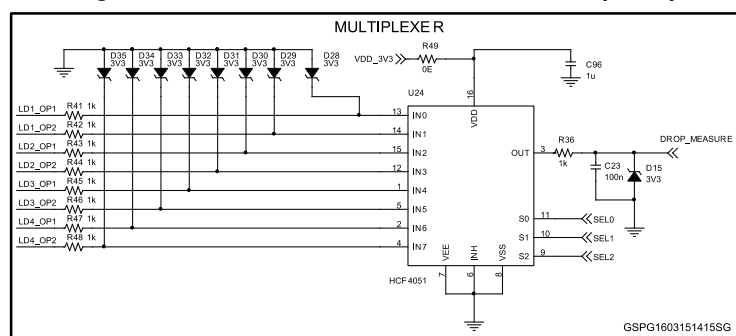
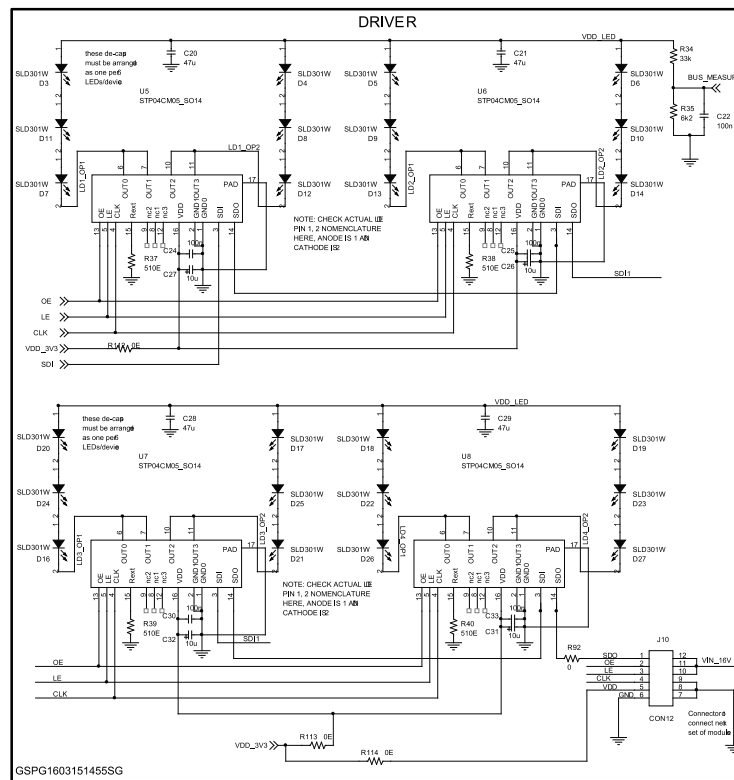


Figure 6: STEVAL-ILL071V1 circuit schematic (6 of 6)



2 Revision history

Table 1: Document revision history

Date	Rev	Changes
25-Mar-2015	1	First release.

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