



LED7707 demo board

LED7707 Monolithic DC/DC Converter for LED Driving

The new LED7707 is a monolithic DC/DC converter for LED driving specifically designed for LCD backlighting and general lighting. It consists of a highly-efficient boost converter integrating a power MOSFET and six controlled-current generators (ROWS). The device can manage an output voltage up to 36V (example is 10 white LEDs x row). The boost section is based on a constant switching frequency, peak current-mode architecture. The boost output voltage is controlled so that the lowest voltage of the ROW, referred to as SGND, is equal to an internal reference voltage (700 mV typical). The input voltage range is from 4.5V up to 36V. In addition, the LED7707 has an internal 5V LDO regulator that supplies the internal circuitry of the device and is capable of delivering up to 40 mA. The input of the LDO is the main input voltage (V_{BATT}). The boost section switching frequency can be externally adjusted from 200 kHz to 1 MHz. It also has an internal fixed value of 660 kHz (typical), which eliminates the need for a resistor, an important feature in minimum component-count applications. The frequency pin (FSW) can also be used as the synchronization input, allowing the LED7707 to operate both as the master or the slave. The generators can be externally programmed to sink from 16 mA up to 85 mA and can be dimmed via a PWM signal (1 percent dimming duty-cycle at 1 kHz can be managed). For high-current LEDs, it is possible to parallel the outputs to get the maximum output current value of 510 mA (6 ROWs x 85 mA). The device is able to detect and manage open- and shorted-LED faults. If some ROWs are not used, during the start up, the device is able to self-detect and automatically disconnect the ROWs without any fault detection. Output over-voltage, internal power MOSFET over-current, and thermal shutdown are provided as protection.

Features ▶

- Constant-frequency, peak, current control mode
- Internal power MOSFET
- External sync for multi-device applications
- Pulse-skip power saving mode at light load
- Programmable soft-start and over voltage protection
- Ceramic output capacitor
- Six ROWs with 85 mA maximum current capability (adjustable)
- Parallelable rows up to 510 mA (6 ROWs x 85 mA)
- Up to 36V output voltage (example 10 white LED per row)
- 2% current matching between ROWs
- LED failure (open- and short-circuit) detection
- Housed in VQFPN-24L space-saving package

Benefits ▶

- High efficiency thanks to adaptive-output voltage
- High-performance 36V rated current generators
- 1% dimming duty-cycle at 1 KHz can be managed
- Keeps externals tiny
- Demo board and application notes available

Applications ▶

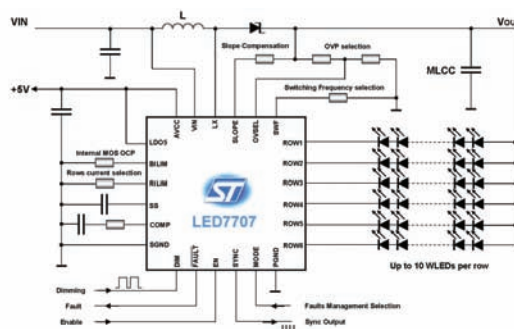
- Backlighting in LCD panels for battery/AC adapter supplied equipment such as:
 - GPS navigator backlighting
 - LCD monitor backlighting
- General lighting

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
LED7707	Boost converter	PWM	36V (example 10 white LEDs)	6	Series/parallel	4.5-36	Adaptive to 36V	6 ROWs x 85	>90	Short/open	—	CL BL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



LED7707 application schematic

24-Bit Constant-Current LED Sink Driver with Output Error Detection



The STP24DP05 is a monolithic, low-voltage, low current-power 24-bit shift register designed for LED panel displays. The 24-bit are grouped into three sets of 8-bit for RGB control to simplify PCB layout in parallel to achieve high resolution video display. In the output stage, 24 regulated current sources were designed to provide 5 mA to 80 mA constant current to drive the LEDs. The 8 x 3 shift registers data flow sequence order can be managed with two dedicated pins. The STP24DP05 has a dedicated pin to activate the outputs with a sequential delay that will prevent in-rush current during outputs turn-on. The device detection circuit checks three different conditions that can occur on the output line: short-to-GND, short-to-VO, or open line. The data detection results are loaded in the shift registers and shifted out via the serial line output. The detection functionality is activated with a dedicated pin, or as an alternative, through a logic sequence that allows the user to enter or exit from detection mode. Through three external resistors, users can adjust the output current for each 8-channel group, controlling the light intensity of LEDs.



STP24DP05 evaluation board

Features ▶

- 20V output driving capability
- 25 MHz clock frequency
- 3.3V and 5V supply voltage range
- Up to 80 mA drive capability per channel
- Thermal shutdown
- Thermal error flag
- Gradual outputs delay
- Short- and open-LED detection
- Controlled in-rush current
- TQFP-48 exposed pad, high thermal efficiency package

Benefits ▶

- Superior display quality
- Finer brightness control through three independent external resistors
- Accurate color balance and white points
- Remote diagnostics

Applications ▶

- Full-motion RGB video wall display
- Monochrome LED signs
- Billboards and scoreboards
- Large-panel LCD backlighting units
- Traffic display
- Gaming machine
- Channel letter signs

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
STP24DP05	Linear	SW/PWM signaling	20V (example 6 green LEDs)	24	Series/parallel	3.3-5	20	80	–	Open/short LED detection	SPI	CL TR BL SI

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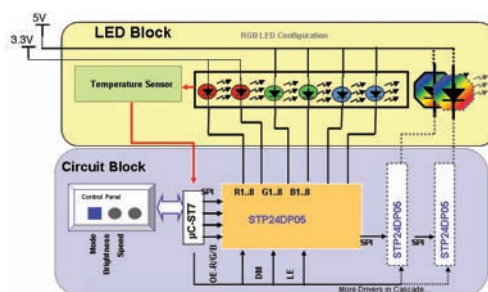
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STP24DP05 typical application circuit



STP04CM05 evaluation board

4-Bit Constant-Current Power-LED Sink Driver

STMicroelectronics has introduced the STP04CM05, a monolithic 4-bit shift register designed to supply high-power RRGB LEDs achieving high precision color control. Each channel provides a controlled current ranging from 80 mA to 400 mA. The device has 1 percent precision among the channels and 6 percent chip-to-chip. The STP04CM05 guarantee 20V output driving capability, allowing users to connect more LEDs in series. The high clock frequency, 30 MHz, makes the device suitable for high data transmission. The 3.3V voltage supply is useful in applications that interface with 3.3V microcontroller.

Features ▶

- 20V output driving capability
- 30 MHz clock frequency
- 3.3V and 5V supply voltage range
- Controlled in-rush current
- Thermal shutdown
- Available in SO, TSSOP, and TSSOP exposed pad
- Adjustable output current through one external resistor

Benefits ▶

- Constant voltage and constant current
- Adjustable current limit
- Simple to implement
- Over-voltage protection
- High efficiency

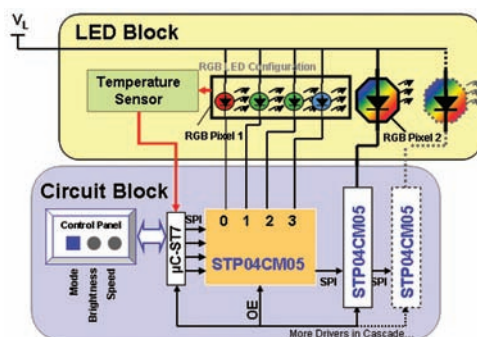
Applications ▶

- Architectural lighting
- Special illumination
- Ambient lights
- Automotive interior lighting
- Light indicator for white goods

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
STP04CM05	Linear	SW/PWM signaling	20V (example 5 green LEDs)	4	Series/parallel	3.3-5.5	20	400	–	TSD	SPI	CL TR
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*Diagnostic capabilities: TSD: Thermal shutdown



STP04CM05 typical application diagram

15W TRIAC Dimmable LED Driver Based on L6562A

The L6562A is the latest proposal for power factor correction. The application note AN2711 presents a 15W driver for LEDs, based on single stage fly-back PFC, that is compatible with TRIAC phase-control dimmers. The design gives luminaire manufacturers a low-cost, commonly available dimming option for home fixtures. An additional benefit is that when not wired to a dimmer, the unit's power factor is over 0.9. This solution is scalable up to 60W.



Features ▶

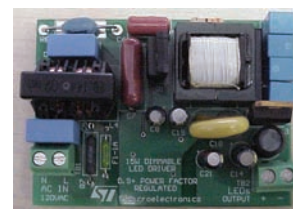
- High efficiency >87%
- No large electrolytic capacitor
- Able to meet FCC class B
- High power factor >0.9

Benefits ▶

- Solution compatible with common TRIAC dimmers
- Small form factor
- Scalable up to 60W

Applications ▶

- Downlight
- Dimmable ballast replacement
- Chandelier



STEVAL-ILL016V1 evaluation board

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
STEVAL-ILL016V1	Evaluation board	TRIAC dimmable	8 (1W)	2	Series/parallel	120 VAC	36V	350	87	-	-	CL

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ST LED Evaluation Boards

ST Board Order Code	LED Board Description
STEVAL-ILL001V1	Dimmable driver for HB power LEDs with Viper22A (DALI connector)
STEVAL-ILL002V3	HB-LED with diagnostic (40 LED) based on STP08DP05
STEVAL-ILL002V4	HB-LED with diagnostic (40 LED) based on STP08DP05
STEVAL-ILL003V1	HB-LED without diagnostic (32 LED) based on STP16CP596
STEVAL-ILL003V2	HB-LED without diagnostic (32 LED) based on STP16CP05
STEVAL-ILL005V1	VIPer12A offline, constant-current driver for high-intensity LEDs
STEVAL-ILL006V1	VIPer22A offline, constant-current driver for high-intensity LEDs
STEVAL-ILL007V1	High intensity LED driver for MR-16 format based on L5973D
STEVAL-ILL008V1	LED flashlight demo
STEVAL-ILL009V3	OSTAR projection module
STEVAL-ILL009V4	OSRAM DRAGON LEDs module
STEVAL-ILL009V5	New RGB color control board based on STP04CM05 and ST1S10
STEVAL-ILL010V1	High-intensity LED dimming driver based on L6902
STEVAL-ILL014V1	Constant-current controller for high brightness LEDs based on STCS1
STEVAL-ILL015V1	HB-LED driver with diagnostic based on STP24DP05 and STM32
STEVAL-ILL016V1	15W offline TRIAC dimmable LED driver based on L6562AD and TSM1052 (USA Market-115V)
STEVAL-ILL018V1	OSRAM Golden DRAGON white LED module (LUW W5AM)
STEVAL-ILL018V2	OSRAM Golden DRAGON warm white LED module (LCW W5AM)
STEVAL-ILL018V3	OSRAM Golden DRAGON amber (red) LED module (LA W55M)
STEVAL-ILL018V4	OSRAM Golden DRAGON blue LED module (LB W55M)
STEVAL-TLL001V1	White LED controller based on STLD40D
STEVAL-TLL002V1	Flash driver based on STCF01
STEVAL-TLL003V1	Power Flash driver based on STCF02
STEVAL-TLL004V1	Power Flash driver based on STCF03
STEVAL-TLL005V1	Power Flash evaluation board based on STCF03 and ST7 MCU (include the STEVAL-TLL004V1)