

TPS92761-Q1 Automotive Constant Voltage Buck with 24-Channel Linear LED Driver

1 Features

- AEC-Q100 qualified for automotive applications
 - Grade 1: -40°C to 125°C ambient operating temperature
- Functional safety targeted
 - Developed for functional safety applications
 - Documentation to aid ISO26262 system design up to ASIL B
- 24 constant current sinks with high precision:
 - 20V maximum voltage capability
 - Up to 90mA channel current set by resistor
 - Low dropout voltage: 400mV (typ) at 90mA
- Flexible dimming control:
 - 6-bit independent current setting
 - 14-bit independent PWM dimming with phase-shift control
 - Programmable slew-rate control
- Integrated synchronous buck regulator
 - Wide input voltage range: 5V to 36V
 - Supports 400kHz and 2.1MHz switching frequency
 - Spread spectrum frequency modulation
 - Dynamic headroom voltage control (DHC)
- UART serial communication
 - Support for up to 2MHz clock frequency
 - Internal oscillator for system clock
 - CAN transceiver compatible
- Internal EEPROM
 - Failsafe default settings
 - Customer calibration data
- Extensive fault diagnostics

2 Applications

- Automotive exterior headlight and rear light
- Tail, stop and sequential (dynamic) turn indicator
- Ambient lighting, grill illumination and dash board lighting functions

3 Description

The TPS92761-Q1 is a 24 channel device with an integrated synchronous Buck regulator and protected linear current sinks. The device is capable of driving current up to 90mA through LEDs with channel-to-channel accuracy of less than $\pm 3.5\%$. Each linear current sink can be individually programmed by a 6-bit current setting value and is independently controlled by pulse width modulation (PWM) using 14-bit registers. Transient behavior is improved by programming uniform phase shifted PWM signals between operating channels.

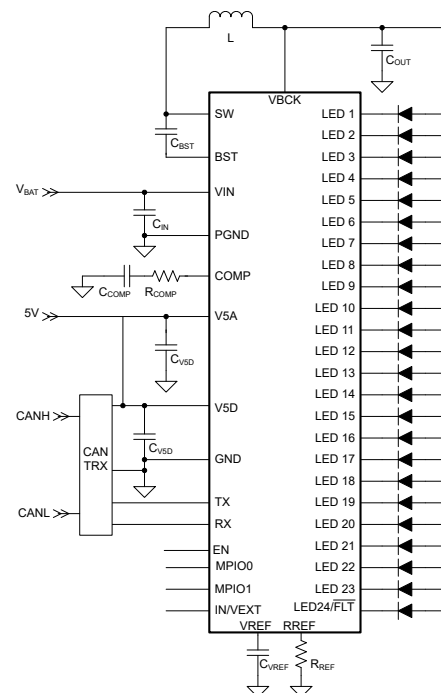
The LEDs can be powered by the voltage rail generated using the wide 5V to 36V input voltage range integrated synchronous Buck regulator. The buck regulator implements an adaptive off-time current mode control enabling low input voltage operation. The device is capable of providing 2.68A current at 2.1MHz switching frequency and 4A current at 400kHz switching frequency with fast transient response. Dynamic headroom control is implemented to optimize system efficiency and reduce thermal dissipation.

The TPS92761-Q1 features an internal oscillator that supports multidrop, universal asynchronous receiver transmitter (UART) serial interface. The internal EEPROM can store system defaults as well as calibration and lighting module data. An on-board ADC with multiplexed inputs samples all LED channels as well as IC die temperature and supply voltages.

Packaging Information

PART NUMBER	PACKAGE ⁽¹⁾	BODY SIZE (NOM)
TPS92761-Q1	48-Pin HTQFP (PHP)	7.00mm x 7.00mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.



Simplified Schematic



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4 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

4.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](https://www.ti.com). Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

4.2 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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4.3 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

4.4 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
June 2026	*	Initial Draft

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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