

# TPS92662A-Q1 High Brightness LED Matrix Manager with EMI Mitigation Techniques

## 1 Features

- AEC-Q100 qualified for automotive applications
  - Grade 1: –40°C to 125°C ambient operating temperature
  - Device HBM classification level H1C
  - Device CDM classification level C5
- Input voltage range: 4.5 V to 60 V
- 12 Integrated bypass switches
- Multi-drop UART communication interface
  - Compatible with TPS92662-Q1 and TPS92663-Q1 devices
  - Compatible with CAN physical layer
- Eight-bit ADC with two MUXed inputs
- Programmable crystal oscillator driver and clock buffer strength
  - Improved radiated and conducted EMI performance
- External EEPROM I<sup>2</sup>C interface
- Programmable 10-bit PWM dimming
- LED open and short detection and protection
- Supports multi-LMM synchronization for more than 12-LED string via time division multiplexing

## 2 Applications

- [Automotive headlight systems](#)
- [ADB or glare-free high beam](#)
- [Sequential turn/animated daytime running lights](#)

## 3 Description

The TPS92662A-Q1 LED matrix manager device enables fully dynamic adaptive lighting solutions by providing individual pixel-level LED control. The device includes four sub-strings of three series-connected integrated switches for bypassing individual LEDs. The individual sub-strings allow the device to accept either single or multiple current sources.

The TPS92662A-Q1 features a programmable Pierce crystal oscillator driver. Optimal performance is achieved by selecting the driver strength based on the quartz crystal or ceramic resonator manufacturers recommendations. The device also incorporates a selectable drive strength clock buffer. The rise and fall times and the EMI generated by clock signal is controlled by varying the drive strength of the clock buffer. When necessary, the clock buffer can be disabled to eliminate the noise generated by the clock signal and provide the lowest EMI performance.

The TPS92662A-Q1 supports the multi-drop universal asynchronous receiver transmitter (UART) serial interface and is compatible with TPS92662-Q1 and TPS92663-Q1 devices. The I<sup>2</sup>C communication interface can be used to read from and write to an external EEPROM that can store system calibration data.

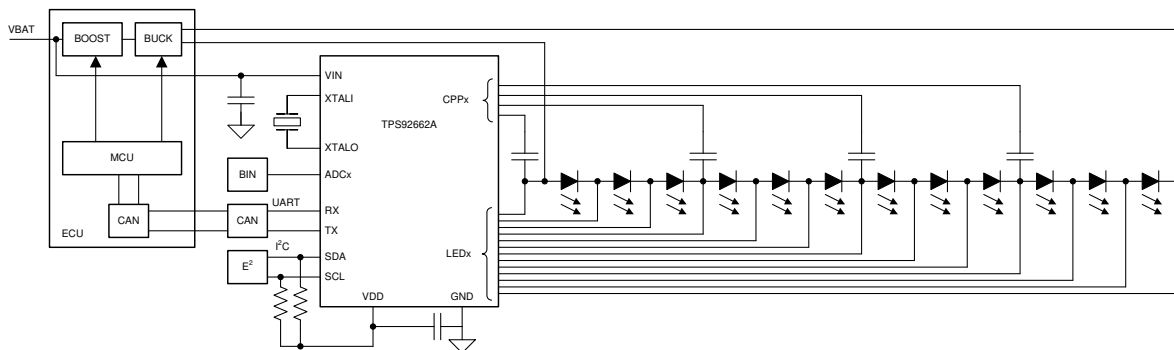
An on-board 8-bit ADC with two multiplexed inputs can be used for system temperature compensation and used to measure a binning value which allows for LED binning and coding.

### Device Information<sup>(1)</sup>

| PART NUMBER  | PACKAGE  | BODY SIZE (NOM)   |
|--------------|----------|-------------------|
| TPS92662A-Q1 | PHP (48) | 7.00 mm x 7.00 mm |

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

### Simplified Application



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## 4 Revision History

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

| <b>Changes from Original (October 2019) to Revision A</b>                 | <b>Page</b> |
|---|-------------|
| • Changed device status from Advance Information to Production Data ..... | <b>1</b>    |

## 5 Description (continued)

The internal charge pump rail supplies the gate drive voltage for the LED bypass switches. The low on-resistance ( $R_{DS(on)}$ ) of the bypass switch minimizes conduction loss and power dissipation.

The TPS92662A-Q1 and TPS92662-Q1 both incorporate identical register settings for programming phase shift and pulse width of each individual LED in the string and for reporting LED open and short circuit faults.

## 6 Device and Documentation Support

### 6.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* 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.

### 6.2 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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### 6.3 Trademarks

E2E is a trademark of Texas Instruments.

All other trademarks are the property of their respective owners.

### 6.4 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.

### 6.5 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

## 7 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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