ANALOG DEVICES

30-Switch Matrix Manager for Automotive Lighting

MAX25621

General Description

The MAX25621 30-switch matrix manager device enables fully dynamic adaptive lighting solutions by providing individual pixel-level LED control. The device includes 3 strings of 10 series connected integrated switches for bypassing individual LEDs. A microcontroller is used to control and manage the MAX25621 devices through a multidrop universal asynchronous receiver transmitter (UART) serial interface. The serial interface supports the use of CAN transceivers for a more robust physical layer.

The internal charge pump rail supplies the gate drive voltage for the LED bypass switches. The low on-resistance (RDS_{ON}) of the bypass switch minimizes conduction loss and power dissipation. Individual switches are rated for an absolute maximum voltage of 16V. The LEDs across each switch can be fully turned on, turned off, and PWM dimmed with or without a built in logarithmic fade. The phase shift and pulse width for each individual LED in the string are programmable. The device uses an internal register to adjust the PWM frequency. Multiple devices can be synchronized. The switch transitions during PWM dimming operation have a programmable slew rate to mitigate EMI concerns.
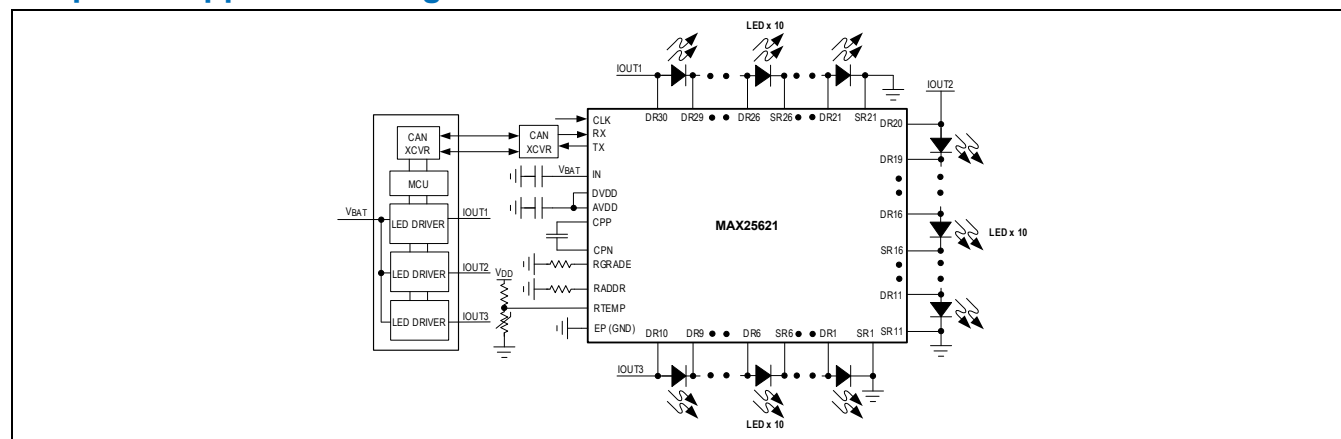
Benefits and Features

- Automotive Ready: AEC-Q100 Qualified
- 30 Individually Controlled Switches
  - Up to 750mA RMS Switch Current
  - Up to 3 LEDs per Switch (16V/Switch)
  - Single/Multistring Configuration
- Optimal PWM Dimming Arrangement Provides Excellent Dimming Performance
  - Programmable 12-Bit PWM Dimming
  - Fade Transition Between PWM Dimming States
  - Dynamic Phase Update without Flicker
  - Internal or External Clock for PWM Dimming
  - Programmable Slew Rate for EMI Control
- Programmable Fail-Safe Mode
- Individual LED Open and Short Detection
- Multidrop UART Communication Interface
  - Up to 16 Addressable Devices
  - Compatible with CAN Physical Layer
  - Real-Time Fault Detection with Error ACK on UART Interface
- 48-Pin TQFP Package and 48-Pin TQFN Package with EP Pad

Ordering Information appears at end of data sheet.

Applications

- Adaptive Driving Beam (ADB)
- Animated Lighting (Turn Indicator/DRL/Position)
- Full Combination Headlamp

Simplified Application Diagram

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/24	Initial release	—
1	7/24	Added Applications; updated Benefits and Features and Electrical Characteristics; added Switch Current Rating section	1, 3, 9–10
2	3/25	Updated Ordering Information table	215