

## MAX20078

## Synchronous Buck, High-Brightness LED Controller

### General Description

The MAX20078 is a high-voltage, synchronous n-channel MOSFET controller for high-current buck LED drivers. The device uses a proprietary average current-mode-control scheme to regulate the inductor current. This control method does not need any control-loop compensation while maintaining nearly constant switching frequency. Inductor current sense is achieved by sensing the current in the bottom synchronous n-channel MOSFET. It does not require any current sense at high voltages. The device operates over a wide 4.5V to 65V input range. The device is designed for high-frequency operation and can operate at switching frequencies as high as 1MHz. The high- and low-side gate drivers have peak source and sink current capability of 2A. The driver block also includes a logic circuit that provides an adaptive nonoverlap time to prevent shoot-through currents during transition. The device includes both analog and PWM dimming. The device includes a 5V  $V_{CC}$  regulator capable of delivering 10mA to external circuitry. The device also includes a current monitor that provides an analog voltage proportional to the inductor current. The device has a fault flag that indicates open and shorts across the output. Protection features include inductor current-limit protection, overvoltage protection, and thermal shutdown. The MAX20078 is available in a space-saving (3mm x 3mm), 16-pin TQFN or a 16-pin TSSOP package and is specified to operate over the  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  automotive temperature range.

### Benefits and Features

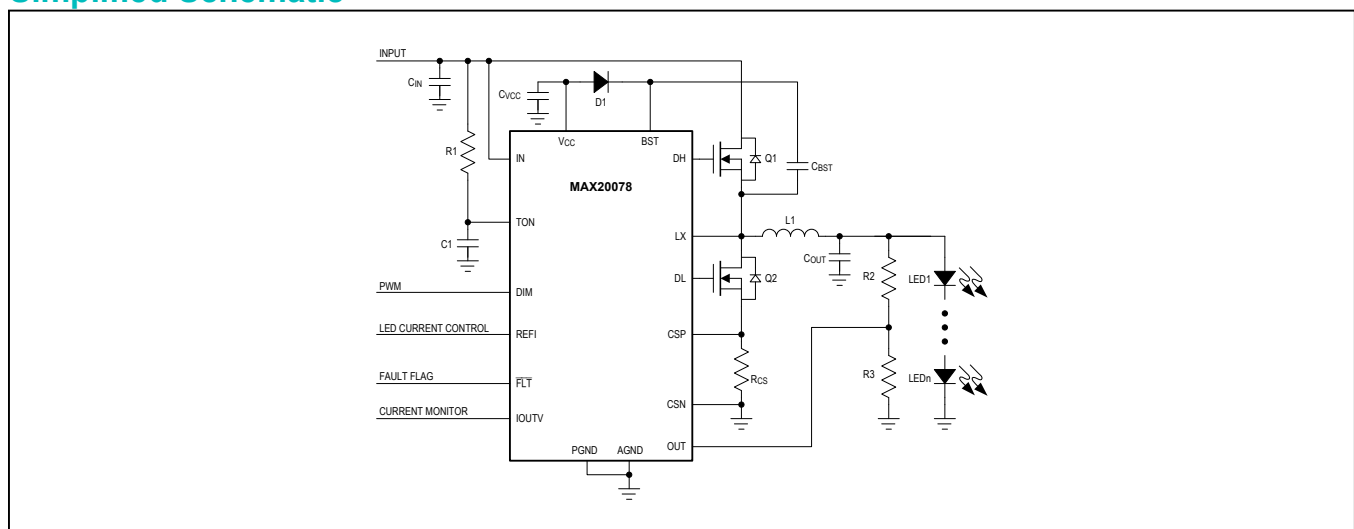
- Automotive Ready: AEC-Q100 Qualified
- Wide Input Voltage Range: 4.5V to 65V
- Easy to Design
  - No Compensation Components
  - Programmable Switching Frequency
- Wide Dimming Ratio Allows High Contrast Ratio
  - Analog Dimming
  - PWM Dimming
- Suitable for Matrix Lighting
  - Maintains Current Regulation While Shorting/Opening Individual LEDs in the String
  - Ultrafast-Response Control Loop Prevents Overshoots and Undershoots
- Fault Detection and Protection
  - Overvoltage Protection
  - Open and Short Detection
  - Low-Power Shutdown Mode
  - Thermal Shutdown
  - Inductor Current Monitor

### Applications

- Automotive Front Lights
- Automotive Matrix Lights
- Head-Up Displays
- Constant-Current Regulators

*Ordering Information appears at end of data sheet.*

### Simplified Schematic



# ABRIDGED DATA SHEET

MAX20078

Synchronous Buck,  
High-Brightness LED Controller

## Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX20078ATE+	-40°C to +125°C	16 TQFN-EP*
MAX20078ATE/V+	-40°C to +125°C	16 TQFN-EP*
MAX20078ATE/VY+	-40°C to +125°C	16 TQFN-EP* (SW)
MAX20078AUE/V+	-40°C to +125°C	16 TSSOP-EP*

+Denotes a lead(Pb)-free/RoHS-compliant package.  
/V denotes an automotive qualified part.  
(SW) = Side wettable.  
\*EP = Exposed pad.

## Chip Information

PROCESS: CMOS

## Package Information

For the latest package outline information and land patterns (footprints), go to [www.maximintegrated.com/packages](http://www.maximintegrated.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
TQFN-EP	T1633+4C	<a href="#">21-0136</a>	<a href="#">90-0031</a>
TQFN-EP (SW)	T1633Y+4C	<a href="#">21-100108</a>	<a href="#">90-100046</a>
TSSOP-EP	U16E+4C	<a href="#">21-0108</a>	<a href="#">90-0446</a>