

General Description

The MAX20090 is a single-channel high-brightness LED (HB LED) driver for automotive front-light applications such as high beam, low beam, daytime running lights (DRLs), turn indicators, fog lights, and other LED lights. It can take an input voltage from 5V to 65V and drive a string of LEDs with a maximum output voltage of 65V.

The device senses output current at the high side of the LED string. High-side current sensing is required to protect for shorts from the output to the ground or battery input. It is also the most flexible scheme for driving LEDs, allowing boost, high-side buck, SEPIC mode, or buck-boost-mode configurations. The PWM input provides LED dimming ratios of up to 1000:1, and the ICTRL input provides additional analog dimming capability in the controller. The device also includes a fault flag (\overline{FLT}) that indicates open string, shorted string, and thermal shutdown. The device has built-in spread-spectrum modulation for improved electromagnetic-compatibility performance. The device can also be used in zeta and Cuk converter configurations, if necessary in some applications. The MAX20090 is available in a space-saving (4mm x 4mm), 20-pin TQFN, 20-pin side-wettable TQFN, or a 20-pin TSSOP package and is specified to operate over the -40°C to +125°C automotive temperature range

Applications

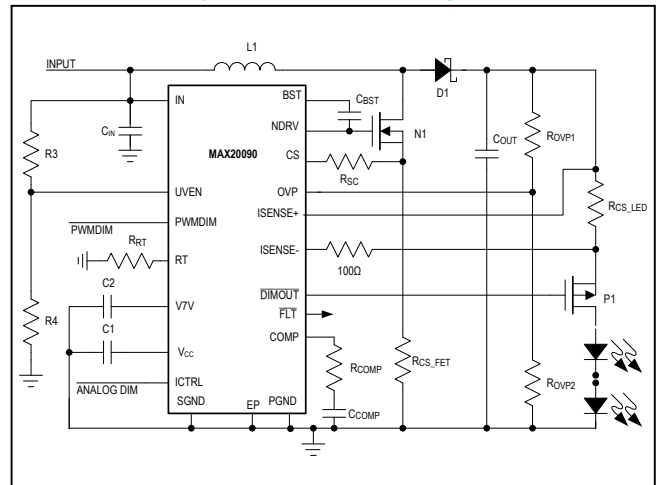
- Automotive Exterior Lighting
- High-Beam/Low-Beam/Signal/Position Lights
- Daytime Running Lights (DRLs)
- Fog Lights and Adaptive Front-Light Assemblies
- Head-Up Displays
- Commercial, Industrial, and Architectural Lighting

Ordering Information appears at end of data sheet.

Benefits and Features

- High-Brightness LED Driver with a Wide Input Range Saves Space and Cost Through Integration
 - +5V to +65V Wide Input Voltage Range
 - +65V Maximum Boost Output Voltage
 - ICTRL Pin for Analog Dimming
 - Integrated High-Side Current-Sense Amplifier
 - 200Hz On-Board Ramp Simplifies PWM Dimming
- Flexible Architecture Enables Easy Design Optimization
 - Configurable as Boost, High-Side Buck, SEPIC, Buck-Boost, Zeta, and Cuk
 - Programmable Switching Frequency (200kHz to 2.2MHz)
 - Spread-Spectrum Modulation to Reduce EMI Noise
- Automotive Features and Robustness Improve System Reliability
 - Fault Diagnosis Through Fault Flag
 - Short Circuit, Overvoltage, and Thermal Protection
 - -40°C to +125°C Operating Temperature Range

Simplified Typical Operating Circuit



Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX20090ATP/V+	-40°C to +125°C	20 TQFN-EP*
MAX20090ATP/V+T	-40°C to +125°C	20 TQFN-EP*
MAX20090AUP/V+**	-40°C to +125°C	20 TSSOP-EP*
MAX20090AUP/V+T**	-40°C to +125°C	20 TSSOP-EP*

V denotes an automotive-qualified part.

+Denotes a lead(Pb)-free/RoHS-compliant package.

*EP = Exposed pad.

**Future product—contact factory for availability.

T = Tape and reel.

Chip Information

PROCESS: BiCMOS

Package Information

For the latest package outline information and land patterns (footprints), go to 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.
20 TQFN-EP*	T2044+4C	21-0139	90-0409
20 TSSOP-EP*	U20E+3C	21-0108	90-0114