

High Efficiency 4-Channel HB LED Driver with I²C Interface and Phase-Shifted PWM Dimming

POWER MANAGEMENT

Features

- Input Voltage — 4.5V to 27V
- Output Voltage — Up to 50V
- Step-up (Boost) Controller
 - Ultra-Fast Transient Response (<100μs)
 - Programmable Switching Frequency
- Linear Current Sinks
 - 4 Strings, up to 120mA/String
 - Current Matching ±1%
 - Current Accuracy ±2%
- PWM Dimming
 - String-by-String Phase Shifting
 - Input Dimming Frequency 100Hz-30kHz
 - User Selectable 9 or 10-Bits Dimming Resolution
- 5-Bits Analog Dimming
- I²C Interface
 - Fault Status — Open/Short LED, UVLO, OTP
 - Device Control: PLL Setting
- Protection Features
 - Open/Shorted LED(s) and adjustable OVP
 - Over-Temperature and UVLO Shutdown Protection
- 4mm X 4mm 20-pin QFN Package

Applications

- Ultrabooks™, All-in-One PCs, Monitors, Automotive-Display Backlighting
- Backlighting for Mid-Size Displays

Description

The SC5014 is a 4-channel, highly integrated, high-efficiency step-up (boost) HB LED driver designed to reduce the thickness of mid-size LCD displays. It features a wide input voltage range (4.5V to 27V), phase-shifted PWM dimming, analog dimming, a flexible output configuration, an I²C interface, and numerous protection features.

The SC5014 exhibits 2% to 4% higher efficiency when using the same size inductors as existing LED drivers. But, unlike existing devices, it can also operate with inductors that are up to 10x smaller without sacrificing efficiency. This part can also use very low-profile inductors (as small as 2.2μH, 1mm height), which allows LED drivers to be built directly into the LCD panel to enable ultra-thin displays.

The boost controller, with programmable switching frequency from 200kHz to 2.2MHz, maximizes efficiency by dynamically minimizing the output voltage while maintaining LED string current accuracy. It provides excellent line and load response with no external compensation components. An external resistor adjusts the current from 20-120mA per string. It also features PWM dimming resolution of 9 or 10-bits (user selectable) over a dimming frequency from 100Hz to 20kHz, synchronized to the boost oscillator. String-by-string phase shifting reduces the demand on the input/output capacitance, decreases EMI, and improves dimming linearity.

Typical Application Circuit

