

SMBus/I2C Controlled WLED Driver for Medium Sized LCD Backlight

General Description

The LP8543 is a white LED driver with integrated boost converter. It has 7 adjustable current sinks which can be controlled by SMBus or I²C-compatible serial interface, PWM input and Ambient Light Sensor (ALS).

The boost converter has adaptive output voltage control based on the LED driver voltages. This feature minimizes the power consumption by adjusting the voltage to lowest sufficient level in all conditions. Phase Shift PWM dimming offers further power saving especially when there is poor matching in the forward voltages of the LED strings. Boost voltage can also be controlled through the SMBus/I²C.

Internal EEPROM stores the data for backlight brightness and ambient light sensor calibration. Brightness can be calibrated during the backlight unit production so that all units produce the same brightness. EEPROM also stores the coefficients for the LED control equations and the default LED current value. LED current has 8-bit adjustment from 0 to 60 mA.

The LP8543 has several safety and diagnostic features. Low-input voltage detection turns the chip off if the system gets stuck and battery fully discharges. Input voltage detection threshold is adjustable for different battery configurations. Thermal regulation reduces backlight brightness above a set temperature. LED fault detection reports open or LED short fault. Boost over-current fault detection protects the chip in case of over-current event.

LP8543 is available in National's LLP-24 package.

NOTICE: This document is not a full datasheet. For more information regarding this product or to order samples, please contact your local National Semiconductor sales office or visit <http://www.national.com/support/dir.html>.

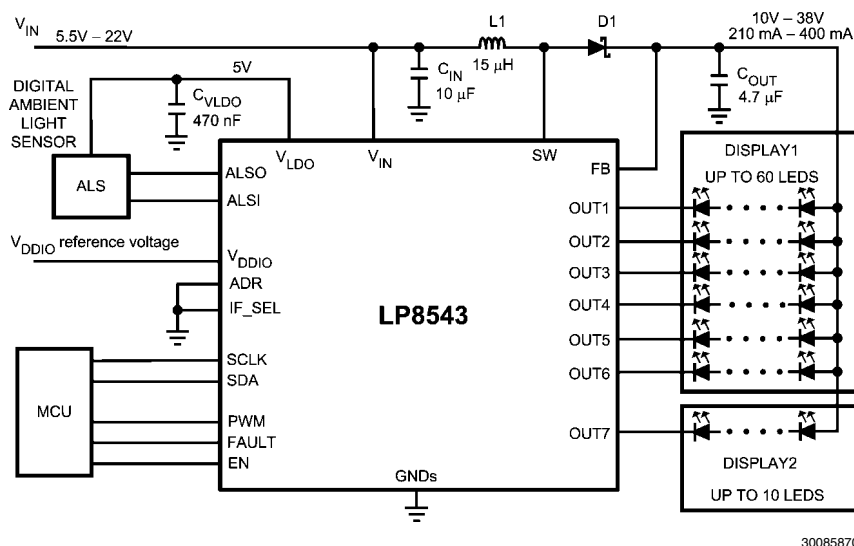
Features

- High-voltage DC/DC boost converter with integrated FET
- 5.5 - 22V input voltage range to support 2x, 3x and 4x Li-Ion batteries.
- PWM phase shift control with adaptive boost output to increase efficiency compared to conventional boost converters topologies
- PWM brightness control for single wire control and stand-alone use
- Digital Ambient light sensor interface with user-programmed ambient light to backlight brightness curve
- Easy-to-use EEPROM calibration for current, intensity and ambient light response setting
- Seven LED drivers with LED fault (short/open) detection
- Eight-bit LED current control
- Internal thermal protection and backlight safety dimming feature
- Two wire, SMBus/ I²C-compatible control interface
- Low-input voltage detection and shutdown
- Minimum number of external components
- LLP-24 package, 4 x 4 x 0.8 mm (0.4 mm pitch)

Applications

- Medium sized (>10 inches) LCD Display Backlight
- LED Lighting

Typical Application



30085870

For more National Semiconductor product information and proven design tools, visit the following Web sites at:

Products		Design Support	
Amplifiers	www.national.com/amplifiers	WEBENCH® Tools	www.national.com/webench
Audio	www.national.com/audio	App Notes	www.national.com/appnotes
Clock and Timing	www.national.com/timing	Reference Designs	www.national.com/refdesigns
Data Converters	www.national.com/adc	Samples	www.national.com/samples
Interface	www.national.com/interface	Eval Boards	www.national.com/evalboards
LVDS	www.national.com/lvds	Packaging	www.national.com/packaging
Power Management	www.national.com/power	Green Compliance	www.national.com/quality/green
Switching Regulators	www.national.com/switchers	Distributors	www.national.com/contacts
LDOs	www.national.com/lido	Quality and Reliability	www.national.com/quality
LED Lighting	www.national.com/led	Feedback/Support	www.national.com/feedback
Voltage Reference	www.national.com/vref	Design Made Easy	www.national.com/easy
PowerWise® Solutions	www.national.com/powerwise	Solutions	www.national.com/solutions
Serial Digital Interface (SDI)	www.national.com/sdi	Mil/Aero	www.national.com/milaero
Temperature Sensors	www.national.com/tempensors	SolarMagic™	www.national.com/solarmagic
Wireless (PLL/VCO)	www.national.com/wireless	PowerWise® Design University	www.national.com/training

THE CONTENTS OF THIS DOCUMENT ARE PROVIDED IN CONNECTION WITH NATIONAL SEMICONDUCTOR CORPORATION ("NATIONAL") PRODUCTS. NATIONAL MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE CONTENTS OF THIS PUBLICATION AND RESERVES THE RIGHT TO MAKE CHANGES TO SPECIFICATIONS AND PRODUCT DESCRIPTIONS AT ANY TIME WITHOUT NOTICE. NO LICENSE, WHETHER EXPRESS, IMPLIED, ARISING BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT.

TESTING AND OTHER QUALITY CONTROLS ARE USED TO THE EXTENT NATIONAL DEEMS NECESSARY TO SUPPORT NATIONAL'S PRODUCT WARRANTY. EXCEPT WHERE MANDATED BY GOVERNMENT REQUIREMENTS, TESTING OF ALL PARAMETERS OF EACH PRODUCT IS NOT NECESSARILY PERFORMED. NATIONAL ASSUMES NO LIABILITY FOR APPLICATIONS ASSISTANCE OR BUYER PRODUCT DESIGN. BUYERS ARE RESPONSIBLE FOR THEIR PRODUCTS AND APPLICATIONS USING NATIONAL COMPONENTS. PRIOR TO USING OR DISTRIBUTING ANY PRODUCTS THAT INCLUDE NATIONAL COMPONENTS, BUYERS SHOULD PROVIDE ADEQUATE DESIGN, TESTING AND OPERATING SAFEGUARDS.

EXCEPT AS PROVIDED IN NATIONAL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, NATIONAL ASSUMES NO LIABILITY WHATSOEVER, AND NATIONAL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY RELATING TO THE SALE AND/OR USE OF NATIONAL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS PRIOR WRITTEN APPROVAL OF THE CHIEF EXECUTIVE OFFICER AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

Life support devices or systems are devices which (a) are intended for surgical implant into the body, or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in a significant injury to the user. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

National Semiconductor and the National Semiconductor logo are registered trademarks of National Semiconductor Corporation. All other brand or product names may be trademarks or registered trademarks of their respective holders.

Copyright© 2009 National Semiconductor Corporation

For the most current product information visit us at www.national.com



National Semiconductor Americas Technical Support Center
 Email: support@nsc.com
 Tel: 1-800-272-9959

National Semiconductor Europe Technical Support Center
 Email: europe.support@nsc.com

National Semiconductor Asia Pacific Technical Support Center
 Email: ap.support@nsc.com

National Semiconductor Japan Technical Support Center
 Email: jpn.feedback@nsc.com