1.5 A LED Flash Driver with I²C-Compatible Interface

ADP1650

FEATURES

- **Ultracompact solution**
  - **Small, 2 mm × 1.5 mm, 12-ball WLCSP package**
  - **Smallest footprint, 1 mm height, 1 µH power inductor**
  - **LED current source for local LED grounding**
    - **Simplified routing to/from LED**
    - **Improved LED thermals**
  - **Synchronous 3 MHz PWM boost converter, no external diode**
- **High efficiency: 90% peak**
  - **Reduces high levels of input battery current during flash**
  - **Limits battery current drain in torch mode**
- **I²C programmable**
  - **Currents up to 1500 mA in flash mode for one LED with 7% accuracy over all conditions**
  - **Currents up to 200 mA in torch mode**
  - **Programmable dc battery current limit (4 settings)**
  - **Programmable flash timer up to 1600 ms**
  - **Low VBAT mode to reduce LED current automatically**
  - **4-bit ADC for LED V_F, die/LED temperature readback**
- **Control**
  - **I²C-compatible control registers**
  - **External STROBE and torch input pins**
  - **2 transmitter mask (TxMASK) inputs**
- **Safety**
  - **Thermal overload protection**
  - **Inductor fault detection**
  - **LED short-/open-circuit protection**

APPLICATIONS

Camera-enabled cellular phones and smart phones
Digital still cameras, camcorders, and PDAs

FUNCTIONAL BLOCK DIAGRAM

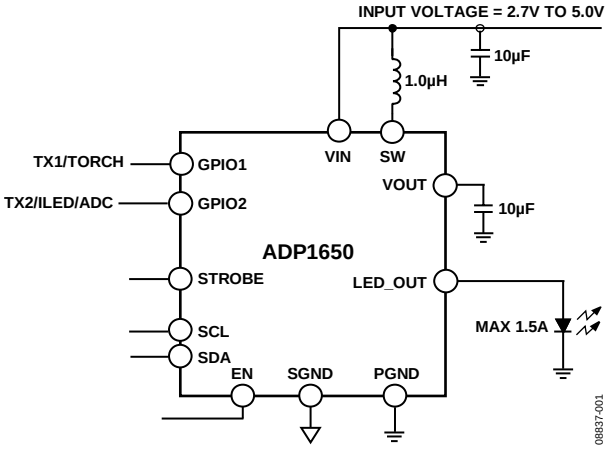


Figure 1.

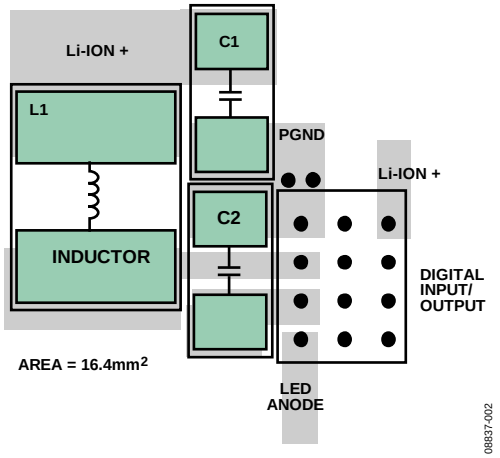


Figure 2. PCB Layout

GENERAL DESCRIPTION

The ADP1650 is a very compact, highly efficient, single white LED flash driver for high resolution camera phones that improves picture and video quality in low light environments. The device integrates a programmable 1.5 MHz or 3.0 MHz synchronous inductive boost converter, an I²C-compatible interface, and a 1500 mA current source. The high switching frequency enables the use of a tiny, 1 mm high, low cost, 1 µH power inductor, and the current source permits LED cathode grounding for thermally enhanced, low EMI, and compact layouts.

The LED driver maximizes efficiency over the entire battery voltage range to maximize the input-power-to-LED-power conversion and minimize battery current draw during flash events. A programmable dc battery current limit safely maximizes LED current for all LED V_F and battery voltage conditions.

Two independent TxMASK inputs permit the flash LED current and battery current to reduce quickly during a power amplifier current burst. The I²C-compatible interface enables the programmability of timers, currents, and status bit readback for operation monitoring and safety control.

The ADP1650 comes in a compact 12-ball, 0.5 mm pitch package and operates within specification over the full −40°C to +125°C junction temperature range.

For more information about the ADP1650, contact Analog Devices, Inc., Sales Office, at http://www.analog.com/sales.

Rev. A

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OUTLINE DIMENSIONS

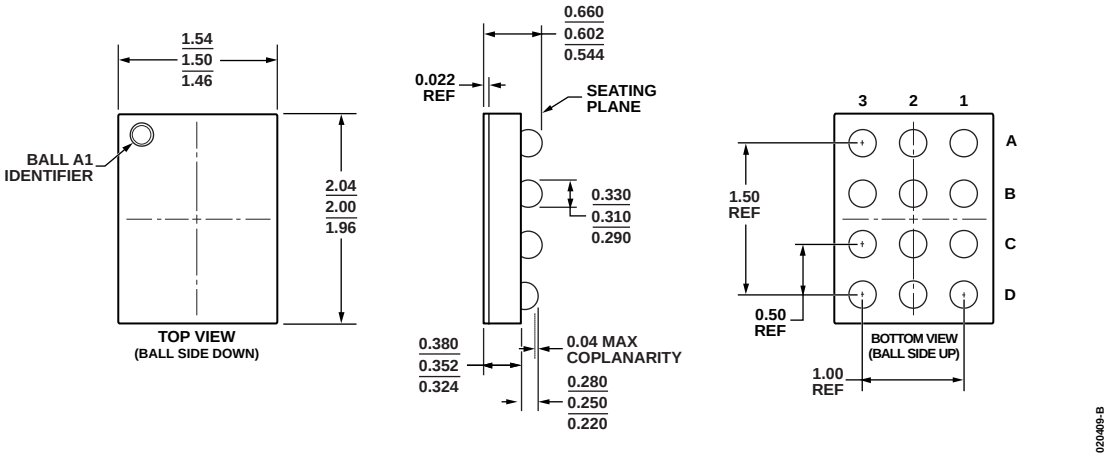


Figure 36. 12-Ball Wafer Level Chip Scale Package [WLCSP]
(CB-12-4)
Dimensions shown in millimeters

REVISION HISTORY

6/10—Rev. 0 to Rev. A

Changes to Contact Information..... 1

5/10—Revision 0: Initial Version

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

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