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AS3688

Flexible Lighting Management (Charge Pump, DCDC Step Up, Current Sink, ADC, LDO)

1 General Description

The AS3688 is a highly-integrated CMOS Power and Lighting Management Unit to supply power to LCD-and cameramodules in mobile telephones, and other 1-cell Li+ or 3-cell NiMH powered devices.
The AS3688 incorporates one low-power, low-dropout regulator (LDO), one Step Up DC/DC Converter for white backlight LEDs, one high-power Charge Pump for camera flash LEDs, one Analog-to-Digital Converter, support for up to 11 current sinks, a two wire serial interface, and control logic all onto a single device. Output voltages and output currents are fully programmable.
The AS3688 is a successor to the austrimicrosystems AS3681 with several additional features (Charge Pump Automatic Up Switching, Extended timer features, autonomous logarithmic PWM dimming, LED pattern generator, DCDC step up overvoltage protection, improved Charge Pump and a fourth high current sink).

2 Key Features

New features of the AS3688 compared to the AS3681 are written in ***boldface italics***.

- Programmable High-Performance Regulator
  - Low-Noise LDO (1.85 to 3.4V, 150mA)
  - ***Default off*** after Power-up
  - 3µA Quiescent Current in Standby
  - Programmable via Serial Interface
- High-Efficiency Step Up DC/DC Converter
  - Up to 25V/50mA for White LEDs
  - Programmable Output Voltage with External Resistors and Serial Interface
  - ***Overvoltage Protection***
  - ***0.1Ohm*** Shunt Resistor
- High-Efficiency High-Power Charge Pump
  - 1:1, 1:1.5, and 1:2 Mode
  - ***Automatic Up Switching (can be disabled and 1:2 mode can be blocked)***
  - Output Current up to 400mA / ***900mA pulsed***
  - Efficiency up to 95%
  - ***Very Low effective Resistance*** (0.5Ω typ. 1Ω max. in 1:1 mode, ***1.4Ω typ. 2Ω max***. in 1:1.5)
  - Only 4 External Capacitors Required: 2 x 1µF Flying Capacitors, 2 x 2.2µF
  - Supports LCD White Backlight LEDs,
  - Camera Flash White LEDs, and Keypad Backlight LEDs
- Supports up to ***12*** Current Sinks
  - ***Four*** Programmable (***8+1Bit***) from: ***0.6mA to 300mA***
  - Two High Voltage Programmable (***8-bit***) from: ***0.15mA to 38.25mA***
  - Three Programmable (***8-bit***) from: ***0.15mA to 38.25mA*** for RGB LEDs
  - Three Programmable (***8-bit***) from: ***0.15mA to 38.25mA*** for General Purpose
  - Programmable Hardware Control (Strobe, ***and Preview*** or PWM)
  - Selectively Enable/Disable Current Sinks
- ***Internal PWM Generation***
  - 8 Bit resolution
  - Logarithmic up/down dimming
- ***Led Pattern Generator***
  - ***Autonomous driving for Fun RGB LED***
- 10-bit Successive Approximation ADC
  - 27µs Conversion Time
  - ***Four*** Selectable Inputs: GPIO0-3
  - ***Internal Temp. Measurement***
  - ***Support for Light Sensor, inluding a adjustable current source (0-15uA)***
- **Support for automatic LED function testing (open and shorted LEDs can be identified)**
- ***Support for external Temperature Sensor for high current LED protection (CURR3x)***
- Strobe Timeout protection
  - ***Up to 1600ms***
  - ***Three different timing modes***
- ***TXMask function (reduce current during Strobe) selectable on pin GPIO1***
- Four General Purpose Inputs/Outputs
  - GPIO0-2 Input/Output, ***GPI only Input***
    - Digital Input, Digital Output, and Tristate
    - Programmable Pull-Up, and Pull-Down
    - ***GPI*** can be used as Flash Strobe
    - ***GPIO2 can be used for Preview Mode***
    - ***GPIO0/2 can used for PWM input***
- Negative or High-Voltage Charge Pump
  - Regulated Output Voltage, Programmable by Dual Resistors e.g. -6V, 10mA for OLED or ±15V, 5mA for TFT
  - ±5% Accuracy
- Standby LDO always on
  - Regulated 2.5V max. output 10mA
  - 3µA Quiescent Current
- Wide Battery Supply Range: 3.0 to 5.5V
- Two Wire Serial Interface Control
- Overcurrent and Thermal Protection
- Package ***QFN32 5x5mm or CSP 3x3mm***

3 Application

Power- and lighting-management for mobile telephones and other 1-cell Li+ or 3-cell NiMH powered devices.

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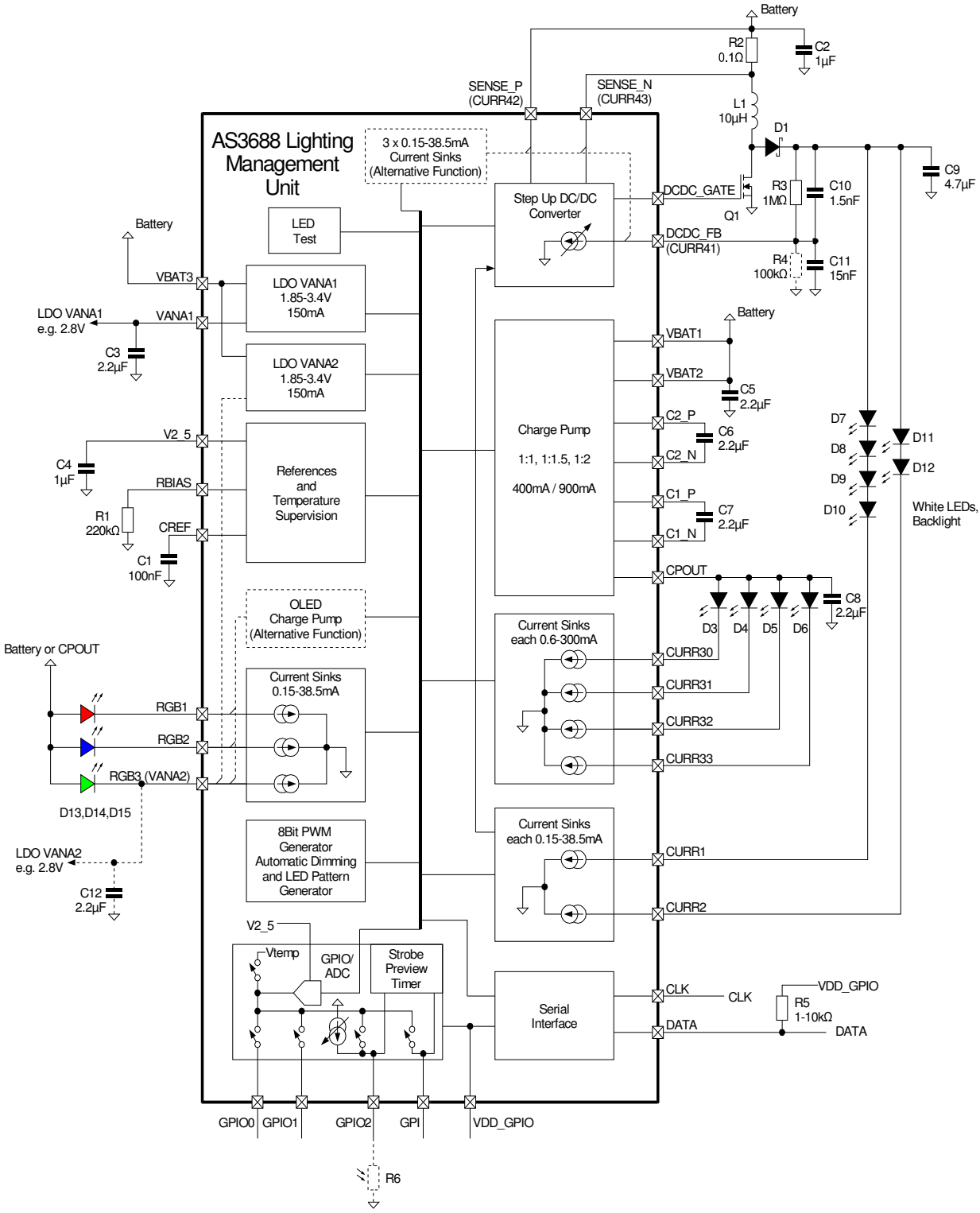
4 Block Diagram

Figure 1 – Application Diagram of the AS3688: Option shown: Step up DCDC converter, RGB Current Sinks



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