

# AS3689

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

### 1 General Description

The AS3689 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 AS3689 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 AS3689 is a successor to the austriamicrosystems AS3681 with several additional features (Charge Pump Automatic Up Switching, Extended timer features, autonomous logarithmic and linear PWM dimming, LED pattern generator, DCDC step up overvoltage protection, improved Charge Pump and a fourth high current sink).

### 2 Key Features

- 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
  - Efficiency up to 95%
  - *Very Low effective Resistance (0.5Ω typ. 1Ω max. in 1:1 mode, 1.8Ω typ. in 1:1.5)*
  - Only 4 External Capacitors Required: 2 x 1μF Flying Capacitors, 2 x 2.2μF Input/Output Capacitors
  - Supports LCD White Backlight LEDs,
  - Camera Flash White LEDs, and Keypad Backlight LEDs
- Supports up to 15 Current Sinks
  - *Four Programmable (6-Bit) from: 0.6mA to 37.8mA*
  - *Two Programmable (8-bit) from: 0.15mA to 38.5mA*
  - *Three High Voltage Programmable (8-bit) from: 0.15mA to 38.5mA (Keyboard LEDs)*
  - *Six Programmable (8-bit) from: 0.15mA to 38.5mA (2 RGB LEDs)*

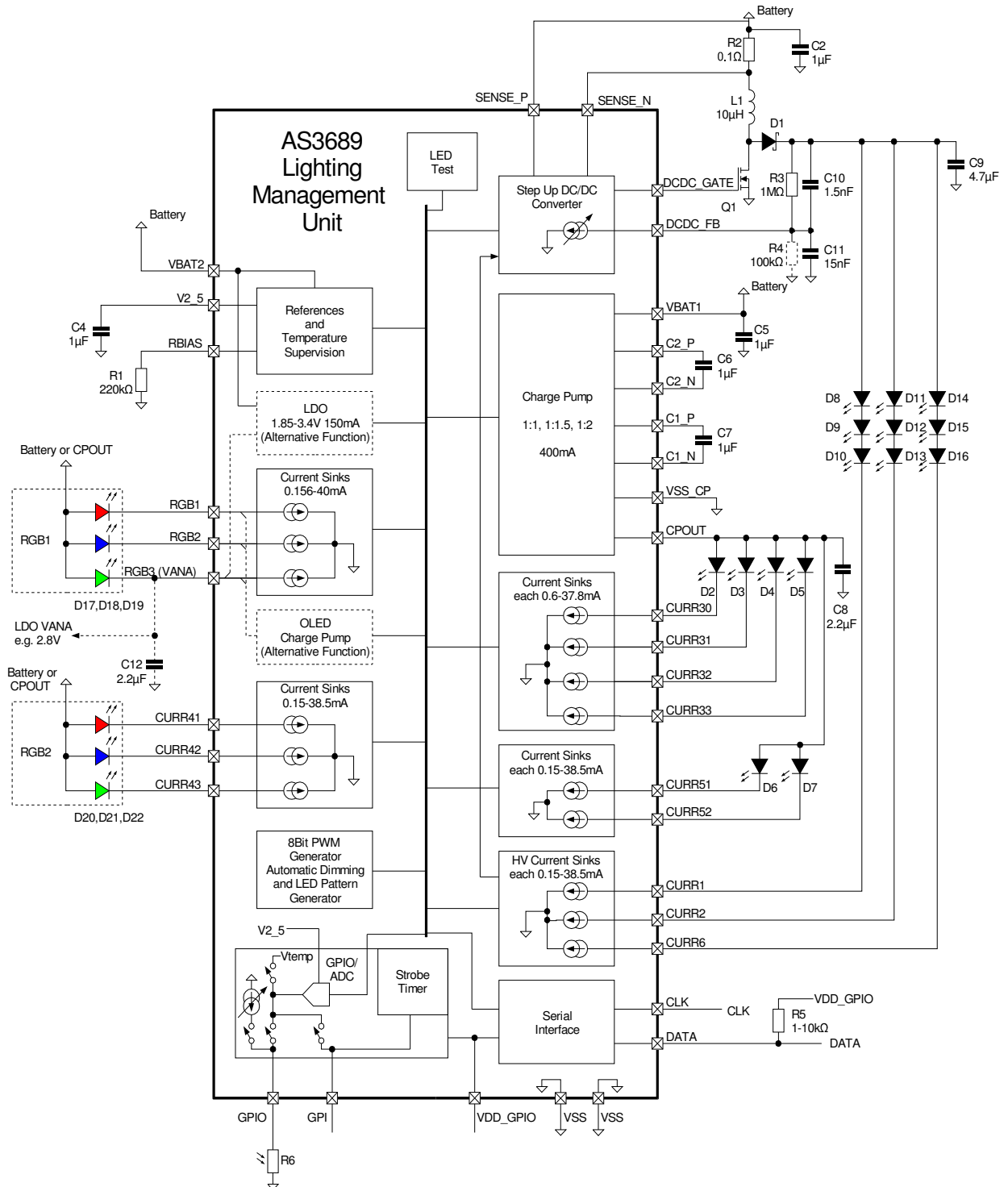
- Programmable Hardware Control (*Strobe, and Preview* or PWM)
- Selectively Enable/Disable Current Sinks
- *Internal PWM Generation*
- 8 Bit resolution
- Logarithmic up/down dimming
- *Led Pattern Generator*
- *Autonomous driving for Fun RGB LEDs*
- 10-bit Successive Approximation ADC
  - 27μs Conversion Time
  - Selectable Inputs: GPIO, GPI, all current sources, VBAT, CP\_OUT, DCDC\_FB
  - *Internal Temp. Measurement*
  - *Light Sensor, including a adjustable current source (0-15uA) to V2\_5*
- *Support for automatic LED 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*
- 2 General Purpose Inputs/Outputs
- GPIO Input/Output, *GPI only Input*
  - Digital Input, Digital Output, and Tristate
  - Programmable Pull-Up, and Pull-Down
  - *GPI can be used as Flash Strobe*
  - *GPIO can be used for Preview Mode*
  - *GPIO can be used as 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
- Programmable LDO (shared with RGB3)
  - 1.85 to 3.4V, 150mA
- Programmable via Serial Interface
- 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: *CSP 3 x 3 mm*

### 3 Application

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

# 4 Block Diagram

Figure 1 – Application Diagram of the AS3689



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