

# AS3681

## Power & Lighting Management Unit

Product Brief

### 1 General Description

The AS3681 is a highly-integrated, ultra-flexible CMOS Power- and Lighting Management Unit to supply power to LCD- and camera-modules in mobile telephones, and other 1-cell Li+ or 3-cell NIMH powered devices.

The AS3681 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 serial interface, and control logic all onto a single die.

The linear analog regulator features extremely high analog performance regarding:

- Noise (< 30 $\mu$ Vrms from 100Hz to 100kHz)
- Line/load Regulation (<1mV Static and <20mV Transient)
- Power Supply Rejection (>70dB@1kHz)
- Ultra-Low Power Consumption (1 $\mu$ A Shutdown, 6 $\mu$ A Standby)

LDO output voltages and output currents are programmable via a serial interface.

### 2 Key Features

- Programmable High-Performance Regulator
  - Low-Noise LDO (1.8 to 3.4V, 100mA)
  - 2.8V Default Output Voltage after Power-up
  - 3 $\mu$ A Quiescent Current in Standby ( $I_{out}$  <5mA)
  - Turns On/Off with Rising/Falling Edge of GPIO Supply Voltage
  - 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
- High-Efficiency High-Power Charge Pump
  - 1:1, 1.5:1 and 2:1 Mode
  - Output Current up to 400mA
  - Efficiency up to 95%
  - Only 4 External Capacitors Required: 2 x 1 $\mu$ F Flying Capacitors, 2 x 2.2 $\mu$ F Input/Output Capacitors
  - Supports LCD White Backlight LEDs, Camera Flash White LEDs, and Keypad Backlight LEDs

- Supports up to 11 Current Sinks
  - Three Programmable (4-bit) from: 10 to 150mA resp. 300mA
  - Two Programmable (4-bit) from: 2.5 to 37.5 mA
  - Three Programmable (4-bit) from: 2.5 to 37.5 mA for RGB LEDs
  - Three Programmable (4-bit) from: 2.5 to 37.5mA for General Purpose Applications
  - Programmable Hardware Control (Strobe, PWM)
  - Selectively Enable/Disable Current Sinks
- 10-bit Successive Approximation ADC
  - 11 $\mu$ s Conversion Time
  - Two Selectable Inputs: GPIO0 and GPIO1
- Four General Purpose Inputs/Outputs
  - Digital Input, Digital Output, and Tristate
  - Programmable Pull-Up, and Pull-Down
  - GPIO2 can be used as Camera Flash Strobe
- Negative or High-Voltage Charge Pump
  - Regulated Output Voltage, Programmable by Dual Resistors e.g. -6V, 10mA for OLED or  $\pm$ 15V, 5mA for TFT
  - $\pm$  5% Accuracy
  - Requires Few External Components
- Standby LDO
  - Regulated 2.5V
  - Maximum Output Current 10mA
  - Always On (Supplies Internal Digital Blocks)
  - 3 $\mu$ A Quiescent Current
- Wide Battery Supply Range: 3.0 to 5.5V
- Serial Interface Control
- On-Chip Bandgap Tuning for High Accuracy ( $\pm$ 1%)
- Overcurrent and Thermal Protection
- 32-Pin, Small Form-Factor QFN Package (5 x 5 x 1mm, 0.5mm pitch), Enhanced Thermal Characteristics
- 1 Watt Power Dissipation @ T<sub>Ambient</sub> = 70°C

### 3 Application

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

### 4 Block Diagrams

Figure 1. Option (by software): Step Up DC/DC Converter (Pins 23, 24, 28, 29) and External Charge Pump (Pins 25, 26, 27).

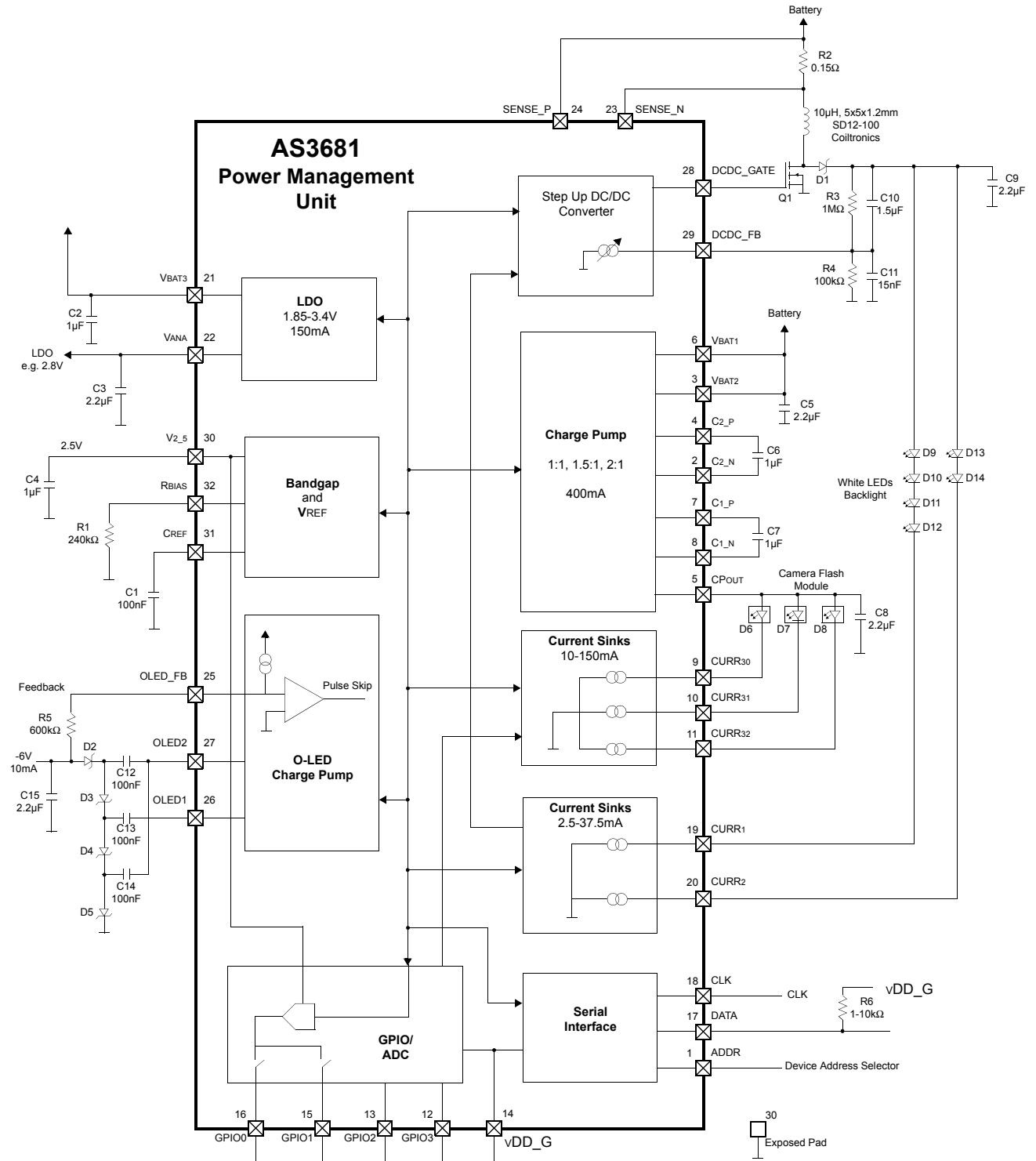
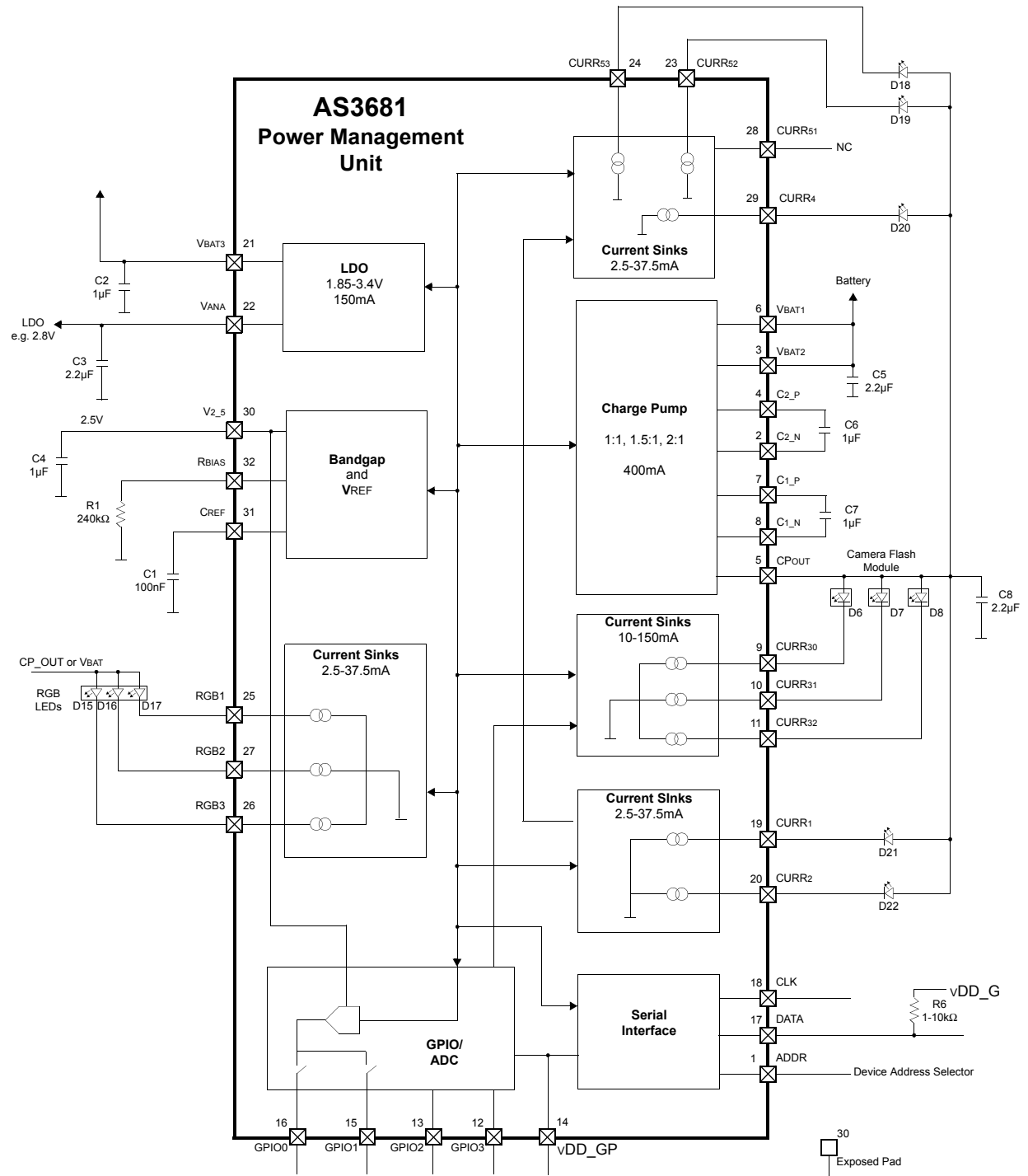


Figure 2. Option (by software): General Purpose Current Sinks (Pins 23, 24, 28, 29) and External Charge Pump (Pins 25, 26, 27).



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