

## DA9052

### Flexible system PMIC with high-efficiency USB power manager

**DA9052 is a quad buck PMIC with supply domain flexibility to support a wide range of application processors, associated peripherals, and user interface functions. Combining a dual input switched-mode USB compatible charger, full power-path management, four bucks, ten linear regulators, and support for multiple sleep modes: the DA9052 offers an energy-optimised solution suitable for portable handheld, wireless, industrial, and infotainment applications.**

The high-efficiency Li-Ion/Polymer switching charger supports precise current/voltage charging as well as pre-charge and USB modes without processor interaction. During charging, the die temperature is thermally regulated enabling high-capacity batteries to be rapidly charged at currents up to 1.26 A with minimum thermal impact. USB suspend mode operation is supported and, for robustness, the power inputs are protected against over-voltage conditions.

The autonomous power-path controller seamlessly detects and manages energy flow between an AC adaptor, USB cable, and battery while maintaining USB power specification compliance. The internally-generated system power rail supports power scenarios such as instant-on with a fully discharged battery. A reverse-protected backup battery charger is also integrated into the power-path function.

Controlled by a programmable digital power manager, the 14 user-programmable switched/linear regulators can be configured to meet the start-up sequence, voltage, and timing requirements for most applications. The power manager includes supply-rail qualification and system reset management. For optimal processor energy-per-task performance, Dynamic Voltage Scaling (DVS), is available on up to five supply domains. Dialog's patented SmartMirror™ dynamic biasing is implemented on all linear regulators.

An integrated 10-channel general purpose ADC includes support for a touch screen controller with pen down detect, programmable high/low thresholds, an integrated current source for resistive measurements, and system voltage monitoring with a programmable low voltage warning. The ADC has 8-bit resolution in auto mode and 10-bit resolution in manual conversion mode.



VFBGA 7 mm x 7 mm, 0.5 mm pitch package

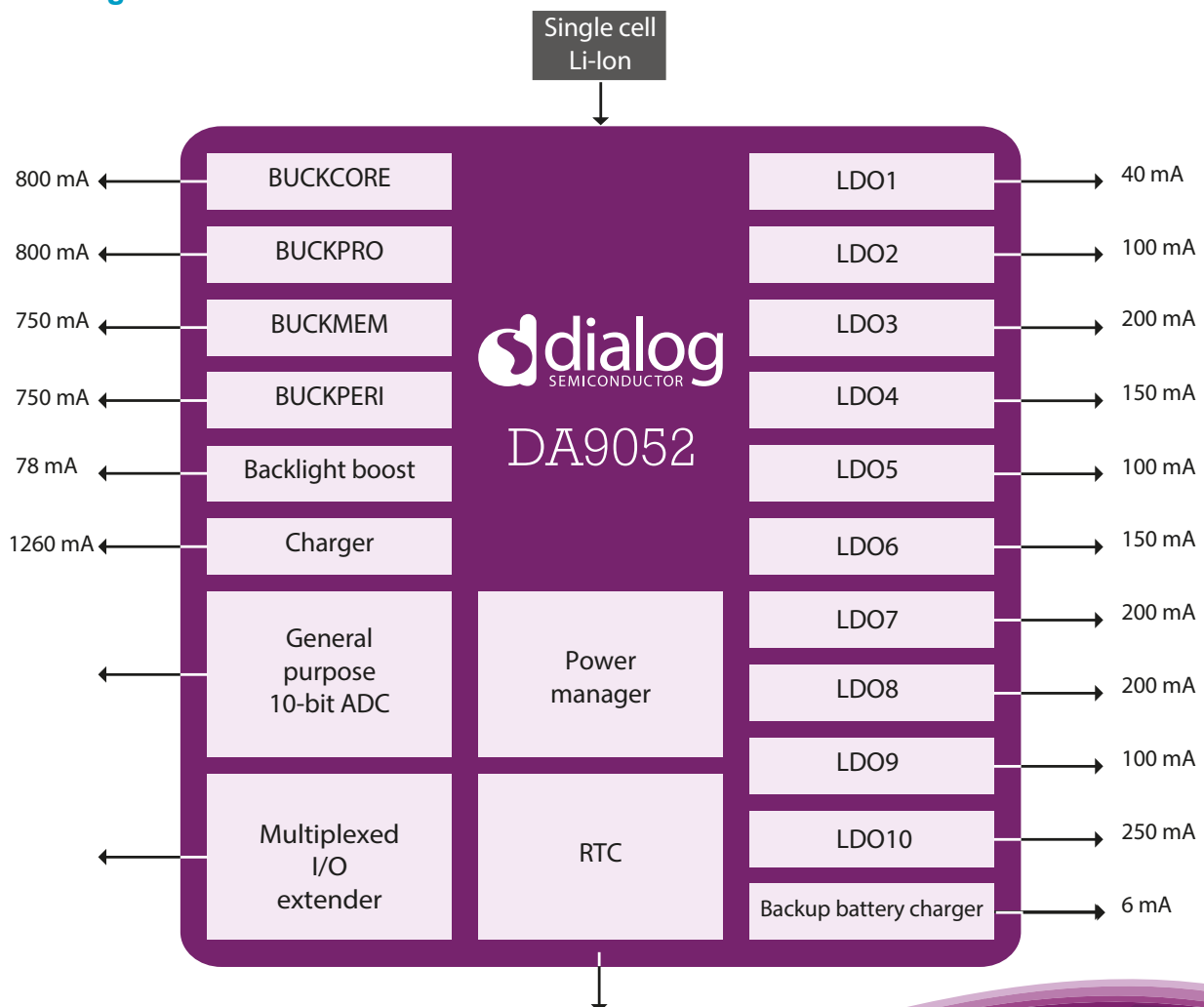
## Features

- ▶ Switched DC/USB charger with power-path management
- ▶ Four buck converters, 0.5 V to 3.6 V up to 800 mA
- ▶ DVS support
- ▶ Ten programmable LDOs, LDO9 is accurate to 1 %, all other LDOs to 3 %
- ▶ Low-power backup battery charger 1.1 V to 3.1 V, up to 6 mA
- ▶ 32 kHz Real Time Clock (RTC) oscillator
- ▶ 10-channel general purpose ADC with touch screen interface with pen down detect
- ▶ High-voltage white LED driver >24 V / 78 mA boost, three strings
- ▶ Sixteen flexible GPIO pins for enhanced wakeup and peripheral control
- ▶ 2-wire and 4-wire control interfaces
- ▶ System watchdog function
- ▶ -40 °C to +125 °C junction temperature operation

## Typical applications

- ▶ Personal media players
- ▶ Smartphones
- ▶ Personal navigation devices
- ▶ Consumer and in-vehicle infotainment devices
- ▶ IoT devices

## Block diagram



## Generated supply domains

| Regulator | Supplied voltage                  | Supplied max. current | External component | Notes  |
|-----------|-----------------------------------|-----------------------|--------------------|--|
| BUCKCORE  | 0.5 V to 2.075 V<br>±3 % accuracy | 800 mA                | 2.2 µH to 4.7 µH   | DVS, 2 MHz, 25 mV steps,<br>DVS ramp with controlled slew rate, pull-down resistor |
| BUCKPRO   | 0.5 V to 2.075 V<br>±3 % accuracy | 800 mA                | 2.2 µH to 4.7 µH   | DVS, 2 MHz, 25 mV steps,<br>DVS ramp with controlled slew rate, pull-down resistor |
| BUCKPERI  | 1.8 V to 3.6 V<br>±3 % accuracy   | 750 mA                | 2.2 µH to 4.7 µH   | 2 MHz, 50/100 mV steps   |
| BUCKMEM   | 0.925 V to 2.5 V<br>±3 % accuracy | 750 mA                | 2.2 µH to 4.7 µH   | DVS, 2 MHz, 25 mV steps,<br>DVS ramp with controlled slew rate, pull-down resistor |
| LDO1      | 0.6 V to 1.8 V<br>±3 % accuracy   | 40 mA                 | 1.0 µF             | High PSRR, low noise LDO, 50 mV steps  |
| LDO2      | 0.6 V to 1.8 V<br>±3 % accuracy   | 100 mA                | 1.0 µF             | DVS, digital LDO, 25 mV steps, DVS with controlled slew rate                       |
| LDO3      | 1.725 V to 3.3 V<br>±3 % accuracy | 200 mA                | 2.2 µF             | DVS, digital LDO, 25 mV steps, DVS with controlled slew rate                       |
| LDO4      | 1.725 V to 3.3 V<br>±3 % accuracy | 150 mA                | 2.2 µF             | Digital LDO, 25 mV steps, optional hardware control via GPI                        |
| LDO5      | 1.2 V to 3.6 V<br>±3 % accuracy   | 100 mA                | 1.0 µF             | Digital LDO, 50 mV steps, optional hardware control via GPI                        |
| LDO6      | 1.2 V to 3.6 V<br>±3 % accuracy   | 150 mA                | 2.2 µF             | High PSRR, low noise, 50 mV steps  |
| LDO7      | 1.2 V to 3.6 V<br>±3 % accuracy   | 200 mA                | 2.2 µF             | High PSRR, low noise, 50 mV steps  |
| LDO8      | 1.2 V to 3.6 V<br>±3 % accuracy   | 200 mA                | 2.2 µF             | High PSRR, low noise, 50 mV steps  |
| LDO9      | 1.25 V to 3.6 V<br>±1 % accuracy  | 100 mA                | 1.0 µF             | High PSRR, low noise, 50 mV steps, optional hardware control via GPI               |
| LDO10     | 1.2 V to 3.6 V<br>±3 % accuracy   | 250 mA                | 2.2 µF             | High PSRR, low noise, 50 mV steps  |

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