

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

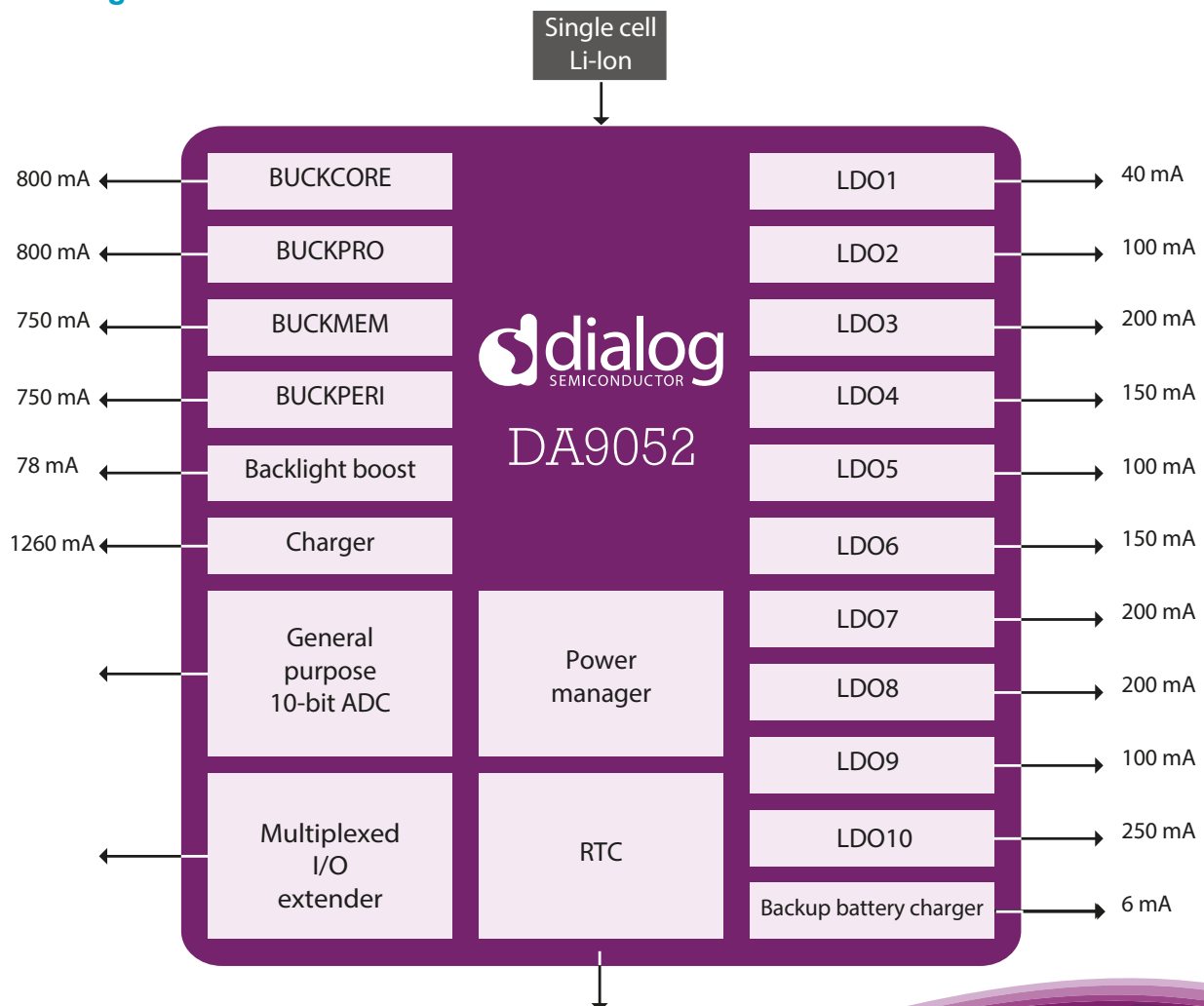
Features

- ▶ 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 ±3 % accuracy | 800 mA | 2.2 µH to 4.7 µH | DVS, 2 MHz, 25 mV steps, DVS ramp with controlled slew rate, pull-down resistor |
| BUCKPRO | 0.5 V to 2.075 V ±3 % accuracy | 800 mA | 2.2 µH to 4.7 µH | DVS, 2 MHz, 25 mV steps, DVS ramp with controlled slew rate, pull-down resistor |
| BUCKPERI | 1.8 V to 3.6 V ±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 ±3 % accuracy | 750 mA | 2.2 µH to 4.7 µH | DVS, 2 MHz, 25 mV steps, DVS ramp with controlled slew rate, pull-down resistor |
| LDO1 | 0.6 V to 1.8 V ±3 % accuracy | 40 mA | 1.0 µF | High PSRR, low noise LDO, 50 mV steps |
| LDO2 | 0.6 V to 1.8 V ±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 ±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 ±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 ±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 ±3 % accuracy | 150 mA | 2.2 µF | High PSRR, low noise, 50 mV steps |
| LDO7 | 1.2 V to 3.6 V ±3 % accuracy | 200 mA | 2.2 µF | High PSRR, low noise, 50 mV steps |
| LDO8 | 1.2 V to 3.6 V ±3 % accuracy | 200 mA | 2.2 µF | High PSRR, low noise, 50 mV steps |
| LDO9 | 1.25 V to 3.6 V ±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 ±3 % accuracy | 250 mA | 2.2 µF | High PSRR, low noise, 50 mV steps |

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