

DA9053

Flexible high power system PMIC with 1.8 A switching USB power manager

DA9053 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 DA9053 offers an energy-optimised solution suitable for portable handheld, wireless, industrial, and infotainment applications.

The high-efficiency Li-lon/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 1.8 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 and VFBGA 11 mm x 11 mm, 0.8 mm pitch package, consumer and automotive grade options

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Features

- Switched DC/USB charger with power-path management
- Four buck converters (three with DVS) 0.5 V to 2.5 V, up to 2 A
- ► Ten programmable high PSRR LDOs
- Low power backup charger 1.1 V to 3.1 V, up to 6 mA
- ► 32 kHz Real Time Clock (RTC) with alarm wake-up
- 10-channel general purpose ADC with touch screen interface with pen down detect

Typical applications

- Mobile internet devices
- ► Tablet PCs
- Personal navigation devices

- ► High-voltage boost for white LED driver
- 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
- ► Automotive AEC-Q100 Grade 3 option

Single cell Li-lon Buck1 2000 mA LDO1 40 mA Buck2 LDO2 1000 mA 100 mA Buck3 LDO3 1000 mA 200 mA 1000 mA Buck4 LDO4 150 mA DA9053 Backlight boost LDO5 100 mA 76 mA LDO6 1800 mA Charger 150 mA LDO7 200 mA General Power purpose LDO8 200 mA manager 10-bit ADC LDO9 100 mA Multiplexed LDO10 250 mA RTC I/O extender Backup battery charger 6 mA

Block diagram

- Consumer and in-vehicle infotainment devices
- IoT devices



Generated supply domains

Regulator	Supplied voltage	Supplied max. current	External component	Notes
BUCKCORE	0.5 V to 2.075 V ±3 % accuracy	2000 mA	2.2 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	1000 mA	2.2 µH	DVS, 2 MHz, 25 mV steps, DVS ramp with controlled slew rate, pull-down resistor
BUCKPERI	0.95 V to 2.525 V ±3 % accuracy	1000 mA	2.2 µH	2 MHz, 50/100 mV steps
BUCKMEM	0.95 V to 2.525V ±3 % accuracy	1000 mA	2.2 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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