DA9057 Flexible Energy Management with Ultra low Power CODEC

General Description

The DA9057 is a highly integrated power management, audio and user interface controller dedicated for multimedia players, portable navigation systems and other handheld devices.

PMIC

Four DC-DC converters and ten low dropout regulators are provided, each fully configurable on startup to support a wide range of application processors, associated peripherals and user interface functions.

Featuring a dual-input switched-mode charger, three-way USB powerpath management and multiple sleep modes the device offers an energy-optimised solution for a wide variety of portable applications.

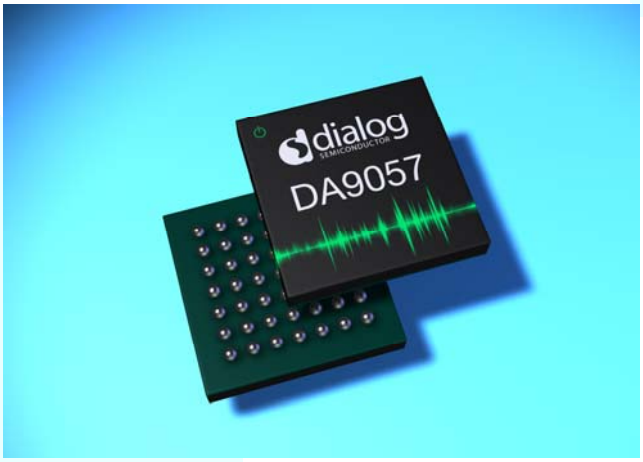
Interfacing directly to a single Li-Ion/Polymer battery pack the high efficiency switching charger supports precise current/voltage charging as well as pre charge and USB modes without processor interaction. During charging the die temperature is thermally regulated enabling higher capacity batteries to be rapidly charged at currents up to 1.3A with minimum thermal impact to space-constrained PCB's.

USB suspend mode operation is supported; for robustness the 500mA current-limited USB power inputs are internally protected against over-voltage conditions.

The autonomous power path controller seamlessly detects and manages energy flow between an AC adaptor, USB cable and battery whilst 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.

The power efficiency and flexibility of the switching input stage is maintained to the generated supplies. Controlled by a programmable digital power manager the 14 user- programmable switched/linear regulators may be configured for a variety of start up sequences, levels and timings.



Available in VFBGA 7x7mm package

Applications

- Personal Media Players
- Smart phone
- Personal Navigation devices
- Consumer Infotainment devices

For optimal processor energy-per-task performance dynamic voltage scaling is permissible on up to five supply domains. Dialog's patented Smart Mirror™ dynamic biasing is implemented on all linear regulators.

Audio

A high definition audio codec with integrated true-ground capless headphone driver suitable for a variety of low power, digital portable audio products.

Featuring a high efficiency class G headphone amplifier and a common supply voltage of 1.8V to simplify interfacing to digital processors, the ultra-low 2.5mW power consumption extends music playback time for battery operated equipment.

The integrated PLL uses a FRACT-N PLL architecture to support a wide range of input frequencies and sample rates. Both master and slave data interface modes are supported.

Product Brief DA9057

Eight analogue input pins allow multiple audio sources to be internally mixed, eliminating the need for external switches. Both single-ended and fully-differential line and microphone inputs are supported with built-in variable gain amplifiers to optimize dynamic range prior to digitisation. This allows a diverse variety of analogue audio sources such as baseband voice, mobile TV, WiFi and FM radio to be managed.

Input and output mixers with stereo-to- mono conversion also support mono configurations such headset/baseband line outputs. In addition to the fully differential mono RX channel, two volume-controlled differential/single-ended stereo line out drivers and ground centered stereo amplifiers will directly drive standard 3-wire 16ohm headphones.

For example the dc-coupled, dedicated pop-free drivers may be connected to stereo headphones, stereo speaker and mono line out, all simultaneously and without external switches.

All filtering and sidetone functions are performed digitally including 5-band EQ and a digital input AGC with programmable attack and decay parameters.

A configurable signal processing filter engine allows various audio application enhancements and effects i.e. acoustic filtering, wind noise suppression and 3D sound.

Alternatively the filter engine may be programmed to improve the frequency response of an external speaker or headphone by providing an 8-pole per channel equalisation function. This is available in addition to the 5-band EQ.

PMIC Features

- Switched DC/USB Charger with power path management
- 4 Buck Converters (3 with DVS) 0.5V-3.6V up to 1Amp
- 10 Programmable LDO's High PSRR, 1% accuracy.
- Low power Backup Charger 1.1-3.1V up to 6mA
- 32kHz RTC Oscillator
- 10 channel general Purpose ADC with touch screen interface
- High voltage White LED driver 24V/ 50mA Boost, 3 strings
- 16 bit GPIO bus for enhanced wakeup and peripheral control
- Dual serial control interfaces
- Unique USB supply detection and charge current selection
- Unique ID code capability with OTP memory

Audio Features

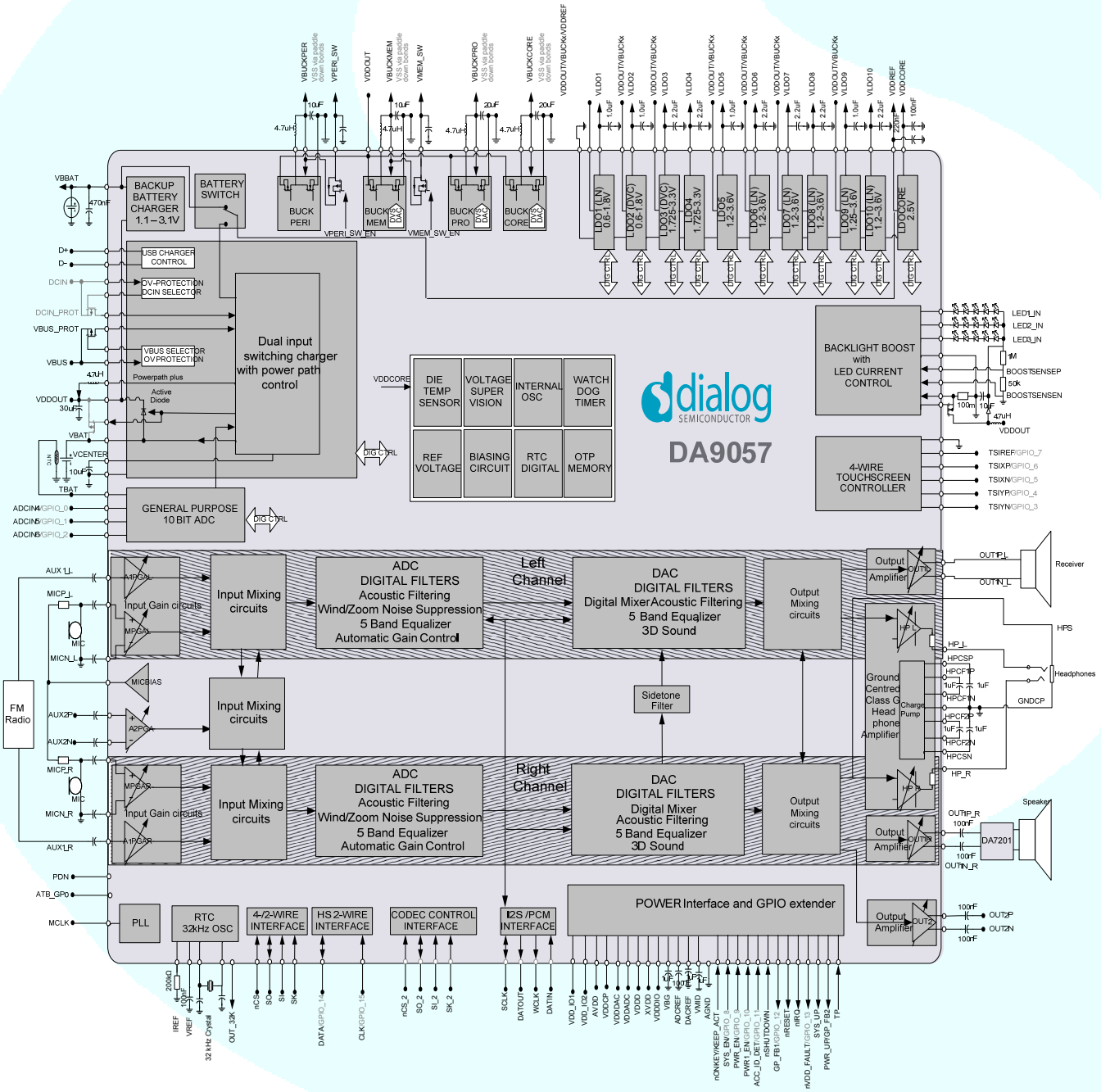
- High performance audio codec with integrated PLL
- True-GND capless Class G 40mW headphone driver with integrated charge pump
- Direct Battery connection with 5mW playback power consumption into stereo headphones.
- Flexible clocking capability to minimise master clock circuit board routing
- Fully differential mono voice channel
- Pop & Click suppression circuitry
- Multi mode audio routers and mixers & volume control
- Linux and WinCE software drivers available

Peripherals and Connectivity

- Power Manager with programmable Start-up and configurable low power modes
- System Monitor including watchdog timer
- Up to 16 free configurable GPIO Pins enable system control during application standby modes
- General purpose monitoring ADC
- 10-bit 4 wire Touch-Screen Interface
- Real-time clock and alarm with crystal frequency adjustment and oscillator circuitry
- Unique ID Code via 10 free programmable registers (OTP)
- Optimized size 7x7mm BGA169 package – 0.5mm pitch

Audio Key Parameters

- Stereo Playback/Record: 2.5mW & 3.5mW @ 1.8V
- Audio performance@ 2.5V
- - DAC: 102dB/-85db THD
- - ADC: 96db SNR/-89dB THD
- Sample rates up to 96kHz supported via multi-slot I2S/PCM interface
- Stereo fully-differential microphone amplifiers with 5uV input noise and bias
- DSP 5 Band EQ, Input ALC, programmable noise and acoustic enhancement filters



DA9057 Block Diagram

Dialog Semiconductor worldwide offices

Germany (Headquarters)	Japan	Korea	Taiwan	USA	United Kingdom
Tel: (+49) 7021 805-0	Tel: (+81) 3 3769 8123	Tel: (+82) 2 6007 2303	Tel: (+886) 37 598 166	Tel: (+1) 888 809 3816	Tel: (+44) 1793 757700
Fax: (+49) 7021 805-100	Fax: (+81) 3 3769 8124	Fax: (+82) 2 6007 2703	Fax: (+886) 37 595 026	Fax: (+1) 408 328 9275	Fax: (+44) 1793 758000

Email: enquiry@diasemi.com

Web: wwwdialog-semiconductor.com

DA9057