

# AS3515

## Stereo Audio Codec with System Power Management

### 1 General Description

The AS3515 is a low power stereo audio codec and is designed for Portable Digital Audio Applications. It allows playback in CD quality and recording in FM-stereo quality. It has a variety of audio inputs and outputs to directly connect electret microphones, 16 $\Omega$  headset, 4 $\Omega$  speaker and auxiliary signal sources via a 10-channel mixer. It only consumes 22mW in playback mode.

Further the device offers advanced power management functions. All necessary ICs and peripherals in a flash based Digital Audio Player are supplied by the AS3515. The power management block generates 9 different supply voltages out of the battery supply. CPU, NAND flash, SRAM, memory cards, LCD back-light, USB RX/TX can be powered. The different supply voltages are programmable via the serial control interface. It also contains a charger and is designed for battery supplies from 1V to 5V.

The AS3515 has an on-chip, phase locked loop (PLL) controlled, clock generator. It generates 44.1kHz, 48kHz and other sample rates defined in MP3, AAC, WMA, OGG VORBIS etc. No additional external crystal or PLL is needed. Further the AS3515 has an independent 32kHz real time clock (RTC) on chip which allows a complete power down of the system CPU.

### 2 Key Features

#### Multi-bit Sigma Delta Converters

- DAC: 18bit with 94dB SNR ('A' weighted) , 48kHz
- ADC: 14bit with 82dB SNR ('A' weighted), 16kHz

#### 2 Microphone Inputs

- 3 gain pre-setting (28dB/34dB/40dB) and AGC
- 32 gain steps @1.5dB and MUTE
- supply for electret microphone
- microphone detection
- remote control by switch

#### 2 Line Inputs

- volume control via serial interface
- 32 steps @1.5dB and MUTE
- stereo or 2x mono or mono differential

#### Line Outputs

- volume control via serial interface
- 32 steps @1.5dB and MUTE
- 1Vp @10k $\Omega$

#### Audio Mixer

- 10 channel input/output mixer with AGC
- mixes line inputs and microphones with DAC
- left and right channels independent

#### High Efficiency Headphone Amplifier

- volume control via serial interface
- 32 steps @1.5dB and MUTE
- 2x40mW @16 $\Omega$  driver capability
- headphone and over-current detection
- phantom ground eliminates large capacitors

#### High Power Speaker Amplifier

- volume control via serial interface
- 32 steps @1.5dB and MUTE
- 2x500mW @8 $\Omega$  driver capability
- over-current detection

#### Power Management

- step up for system supply (3.0V – 3.6V)
- charge pump for CPU core (0.85V – 1.8V, 200mA)
- step up for backlight (15V, 38.5mA)
- LDO for digital supply (2.9V, 200mA)
- LDO for analogue supply (2.9V, 200mA)
- LDO for peripherals (1.7V-3.3V, 200mA)
- LDO for peripherals (3.1V-3.3V, 200mA)
- LDO for RTC (1.0V-2.5V, 2mA)
- LDO for USB 1.1 transceiver (3.26V, 10mA)
- battery supervision
- 10sec emergency shut-down

#### Battery Charger

- automatic trickle charge (50mA)
- prog. constant current charging (100-400mA)
- prog. constant voltage charging (3.9V-4.25V)

#### Real Time Clock

- ultra low power 32kHz oscillator
- 32bit RTC sec counter
- selectable alarm (seconds or minutes)

#### General Purpose ADC

- 10bit resolution
- 16 inputs analogue multiplexer

#### Interfaces

- I<sup>2</sup>S digital audio interface
- 2 wire serial control interface
- watchdog via serial interface
- power good pin
- 128bit unique ID (OTP)
- 17 different interrupts

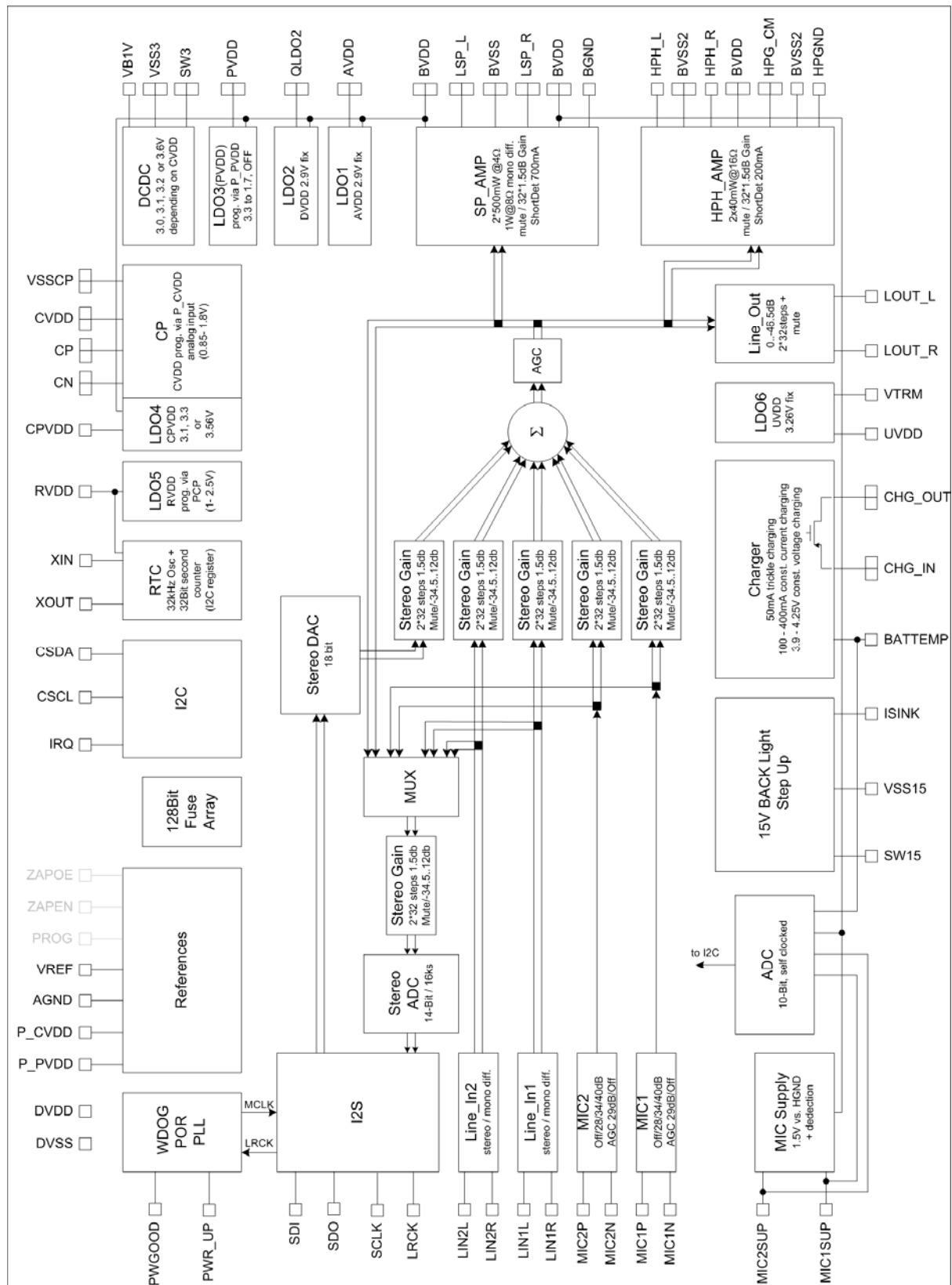
Package CTBGA64 [7.0x7.0x1.1mm] 0.8mm pitch

### 3 Application

Portable Digital Audio Player and Recorder  
PDA, Smartphone

## 4 Block Diagram

Figure 1 AS3515 Block Diagram



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