Apollo4 **Lite** Low Power System-on-Chip

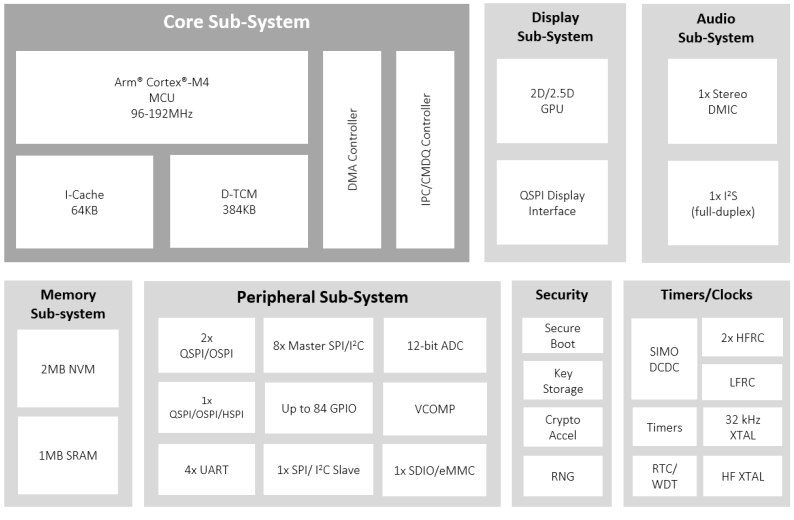
Product Brief

Ambiq®, the leader in low power System-on-Chip (SoC) design, introduces the Apollo4 Lite SoC, extending the Apollo4 product family. Apollo4 Lite maintains feature-rich capability and optimizes memory and peripherals to balance the Apollo4 product family with a lightweight solution. It is conveniently pin-compatible to its superset variant, Apollo4 Plus, providing developers the optimum flexibility to innovate with smooth, vibrant graphics in their next generation wearables and smart IoT devices.

The Apollo4 Lite SoC is built upon Ambiq's proprietary Subthreshold Power-Optimized Technology (SPOT®) platform. The Apollo4 Lite complete hardware and software solution enables the battery-powered endpoint devices of tomorrow to achieve a higher level of intelligence without sacrificing battery life. The Apollo4 Lite includes a 32-bit Arm® Cortex®-M4 core with Floating Point Unit embedded in a BGA package.

With 2MB of MRAM and 1.4MB of SRAM, the Apollo4 Lite has optimal compute and storage to process complex algorithms and neural networks while displaying vibrant, crystal-clear, and smooth graphics. If additional memory is required, external memory is supported through Ambiq's high bandwidth multi-bit SPI and eMMC interfaces.

The Apollo4 Lite is purpose-built to serve as both an application processor and a coprocessor for battery-powered endpoint devices, including smartwatches, fitness bands, animal trackers, voice activated remotes, digital health products, industrial maintenance, and smart home IoT devices.



Block Diagram for Ambiq Apollo4 Lite SoC

AMAP4LEVB (EVB)

Feature Highlights:

- Unmatched power efficiency with low power sleep modes and active current drawing as little as 4 µA/MHz
- Up to 192 MHz clock frequency with turboSPOT®
- 2D/2.5D graphics accelerator supporting hardware anti-aliasing and dithering
- Serves as an applications processor with a fully integrated audio subsystem and interface to cellular/Wi-Fi® radios
- Includes an extensive set of digital and analog peripheral interfaces with integrated ADCs and digital sensor processing using the integrated serial master ports
- Stereo PDM channel, 1 stereo I²S channel
- PSA-L1 certified

Features and Specifications

Ultra-Low Supply Current

- 4 µA/MHz executing from MRAM (with cache)
- Low power and deep sleep mode selectable levels of RAM/cache retention

High-Performance Arm Cortex-M4 Processor with FPU

- Up to 192 MHz clock frequency
- Memory protection unit (MPU)
- Secure Boot
- PSA-L1 certified

Ultra-Low Power Memory

- Up to 2MB of non-volatile MRAM for code/data
- Up to 1.4MB of low power SRAM for code/data

Ultra-Low Power Interface for On- and Off-Chip Sensors

- 12-bit ADC, 11 selectable input channels
- Up to 2.8 MS/s sampling rate
- Temperature sensor with ±3°C accuracy

Ultra-low Power Flexible Serial Peripherals

- 2x 2/4/8-bit SPI master interface
- 1x 2/4/8/16-bit SPI master interface
- 8x I^2C/SPI Masters for peripheral communication
- 1x SPI Slave for host communications
- 4x UART modules with flow control
- 1x SDIO (SD3.0)/1x eMMC (v4.51)

Display

- Up to 500 x 500 resolution
- Frame buffer decompression

Graphics

- 2D/2.5D graphics accelerator
- Texture and frame buffer compression
- Dithering and hardware anti-aliasing

Audio Processing

- 1x stereo digital microphone
- 1x full-duplex I^2S ports

Rich Set of Clock Sources

- 16-52 MHz and 32.768 kHz Crystal XTAL oscillators
- 1 kHz Low Frequency RC (LFRC) oscillator
- 2x High Frequency RC (HFRC) oscillator – 192/384 MHz

Power Management

- Operating range: 1.71-2.2 V, –20°C to 60°C
- SIMO Buck
- Multiple I/O voltages

Applications

- Smart watches/bands
- Wireless sensors and IoT
- Activity and fitness monitors
- Children's watches
- Digital health devices
- Animal trackers
- Motion and tracking devices
- Alarms and security system
- Far-field voice remotes
- Predictive maintenance
- Smart home

Package Options

- 5mm x 5mm, 146-pin BGA with 84 GPIO

Ordering Information

- AMAP42KL-KBR
- AMAP4LEVB (EVB)

AMAP42KL-KBR

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