

Apollo4 Family Voice-on-SPOT Kit

Product Brief

The Apollo4 Family Voice-on-SPOT® (VoS®) Kit provides a platform for professional AI endpoints with automatic speech recognition. It is based on Ambiq's Apollo4 Plus and Blue Plus SoCs which deliver power efficient MCU functionality and ample memory to enable quality voice and audio on battery operated embedded systems with a tiny power budget. The Apollo4 Plus boasts a high performing audio subsystem that provides multiple audio interfaces including two full duplex I²S channels with ASRC, four stereo PDM interfaces, and an ultra-low power stereo audio ADC that supports an analog microphone to enable truly always on listening.

AI application developers can use the AmbiqVoS SDK and Ambiq's proprietary voice activity detection (VAD) algorithm to detect human speech and use their preferred audio preprocessing solutions for noise reduction and beamforming. Users can harness the potential of VoS's high-compute, low power capability with highly optimized keyword spotting models for accurate voice command and control for local and cloud-based applications.

The Apollo4 Audio Kit is a flexible hardware platform designed for fast evaluation and application development. It includes three microphones on MikroElektronika click boards and an audio shield that is compatible with Apollo4 Blue Plus or Apollo4 Plus with microphone evaluation boards.

- Apollo4 audio shield
- Invensense analog microphone
- Memsensing digital microphone
(Note: Apollo4 SoC evaluation boards are not included)

The hardware kit is tested with close-talk, near-field, and far-field use cases under Amazon's standard testing conditions for False Rejection Rate (FRR), Response Accuracy Rate (RAR), False Alarm Rate (FAR). It successfully demonstrates low latency and accurate responses using wake word/command detection, audio compression codecs, and Bluetooth® Low Energy communication. Some always listening applications can operate for up to one year on standard alkaline or lithium batteries.

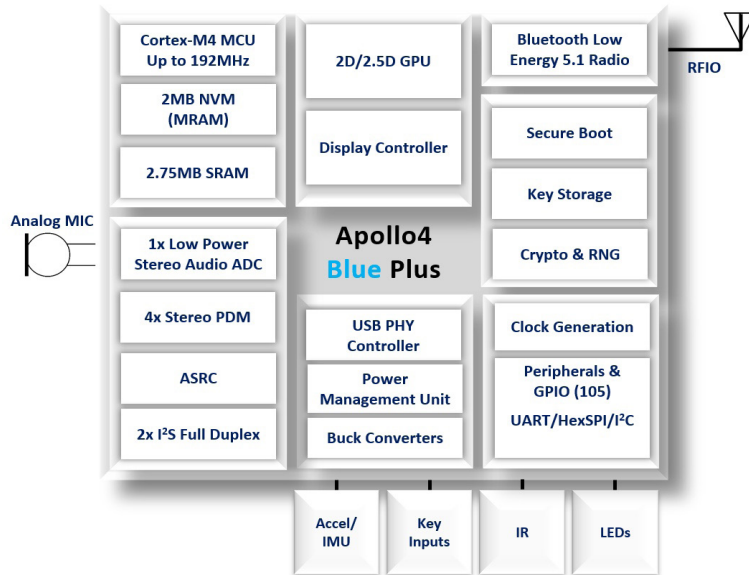


Apollo Audio Kit

Feature Highlights:

- Ambiq's industry-leading, patented Subthreshold Power Optimized Technology (SPOT®)
- Provides a stereo analog microphone and four stereo digital microphones for truly always on listening
- Includes Ambiq's propriety VAD algorithm and supports Sensory's TrulyHandsfree wake word engine and DSP Concepts' beamforming algorithm
- Supports Alexa Mobile Accessory (AMA) protocol and Android TV Voice Services
- Passes Alexa Voice Services (AVS) Far-Field and Near-Field testing for FAR, FRR, RAR

Features and Specifications



Apollo4 Blue Plus Diagram

Ultra-Low Supply Current

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

Ultra-low Power Memory

- Up to 2MB of non-volatile MRAM for code/data
- Up to 2.75MB of low power RAM for code/data

Integrated Bluetooth Low Energy 5.1 Radio

- RF Sensitivity: -95 dBm
- TX Power: +6 dBm max

Audio Interfaces

- Two full duplex I²S channels with ASRC
- Four stereo PDM microphones
- An ultra-low power audio ADC

Flexible Peripherals

- 2x 2/4/8-bit SPI master interfaces
- 2/4/8/16-bit SPI master interface
- 7x I²C/SPI masters for peripheral communication
- 1x SPI slave for host communications
- 4x UART modules with flow control
- 1x USB 2.0 HS/FS device controller
- 1x SDIO (SD3.0)/1x eMMC (v4.51)

Software

- AmbiqVoS SDK
- Audio Compression
 - Opus
 - mSBC
 - ADPCM
- Third Party Audio Processing
 - DSP Concepts 2-MIC beamforming SCNR audio preprocessing
 - Sensory TrulyHandsfree® (THF) MCU wake word engine
- Audio Communication
 - Alexa Mobile Accessory (AMA)
 - Android TV Voice Service (ATTV) over Bluetooth Low Energy
 - Audio stream over RTT, AMU2S (SPI to USB)

Applications

- Voice controlled home automation devices
- Smart watches/bands
- Activity and fitness monitor
- Smart sensors

Ordering Information

- AMA4AUD (Apollo4 Audio Kit)
- AMAP4PEVB (Apollo4 Plus EVB)
- AMAP4BPXEVB (Apollo4 Blue Plus KXR EVB)

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A-SOCAP4-PBGA02EN v1.1 March 2023

