Apollo4 Display Kit

Product Brief

The Apollo4 Display Kit facilitates demos, evaluation, and the development of ultra-low power display capabilities on the Ambiq system on chip (SoC). The Kit delivers the complete ultra-low power solution at the MCU and system levels with a 454x454 display with touch. There is support for high-resolution with accelerated 2/2.5D graphics, 32-bit color, and a choice of MIPI DSI or SPI high-speed interfaces for displays in smartwatches, smart home and industrial applications.

The GPU on the Apollo4 SoC brings high quality graphics for user interfaces in a very small power budget. The GPU provides a fluid graphics experience for a wide range of applications. Developers are able to create compelling Graphical User Interfaces (GUIs) and software applications with ultra-low power and bounded memory resources.

The Kit contains the Apollo4 EVB, display shield with AMOLED display, USB cables, and jumpers. It is supported by the AmbiqSuite SDK including display examples.

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Feature Highlights:

- Fully programmable engine with a very long instructions word (VLIW) instruction set
- Command list based direct memory accesses (DMAs) to minimize CPU overhead
- 4:1, 4:1 with alpha and 6:1 Compression
- 2D drawing:
  - Pixel/line drawing
  - Filled rectangles
  - Triangles (Gouraud shaded)
- Blit support for rotation, mirroring, stretch, source and/or destination color keying, and format conversions
- Color formats: 32/16/8-bit with/out alpha, Grayscale, RGB
- Full alpha blending with programmable blending modes
- Image transformation
  - 3D perspective correct projections
  - Texture mapping
- OS support
  - FreeRTOS support
  - No OS (BareMetal)
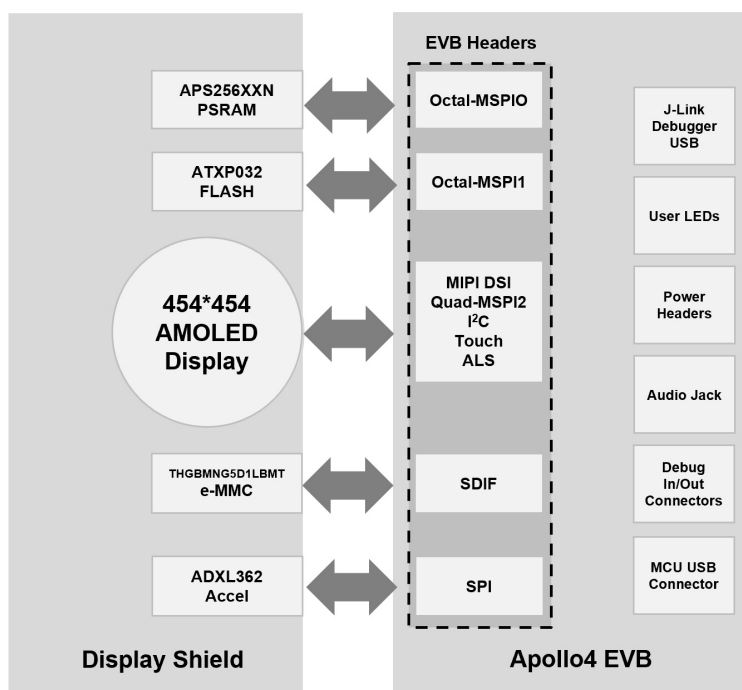
Apollo4 Display Kit System Diagram

Features and Specifications

High-Performance Arm Cortex-M4 with FPU Processor

- 96 MHz ultra-low power clock frequency with 192 MHz turboSPOT Mode

Ultra-low Power Memory

- 2MB of embedded non-volatile memory
- 1.8MB of low power RAM
- 64KB 2-way Associative/Direct-Mapped Cache

Display

- MIPI DSI 1.2 with 2 data lanes up to 500 Mbps
- 4 layers with alpha blending
- Frame buffer decompression
- 390x390 screen size with two options:
  - Single RGB888 frame buffer in SRAM, assets in PSRAM, QSPI or DSI interface targeting 30fps
  - Dual RGB565 frame buffers in SRAM, assets in PSRAM, DSI interface targeting 60fps
- 454x454 screen size:
  - Dual TSC6 frame buffers in SSRAM, assets TSC-compressed in PSRAM, DSI interface targeting 30fps

Graphics

- 2D/2.5D graphics accelerator
- Rasterizer
- Full alpha blending
- Texture mapping
- Texture and frame buffer compression

Hardware Display Shield

- 1.4" 454x454 Pixel MIPI/SPI/QSPI AMOLED display
- Display laminated ambient light sensor – TSL2540
- Display laminated capacitive touch sensor – TMA525C
- 256Mb Octal-SPI double-data-rate (DDR) enabled PSRAM – APS256XXN
- 32Mb Octal-SPI DDR enabled flash memory – ATXP032
- 4GB x1/x4/x8 e-MMC module – THGBMNG5D1LBAIT
- 3-Axis MEMS accelerometer – ADXL362

Apollo4 AMAP4EVB Evaluation Board

- USB Type C connector for power/download/debug
- USB Type C connector for power/data to Apollo4
- Segger J-Link debugger
- Debugger-in port (SWD or ETM)
- Debugger-out port with connection-indication LED
- Three user-controlled LEDs
- Two push buttons for application use, plus a reset push button
- Power slide switch with LED power indicator
- 3.5mm audio jack (SJ-435107) for evaluating low power analog audio interface

Software

- Ambiq
  - AmbiqSuite SDK
  - Multiple display examples
- NemaGFX API

Applications

- Smart watches/bands
- Kiosks
- Smart home appliances
- Automation/industrial applications

Ordering Information

- AMAP4DISP

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