SOLUTION BRIEF

AIRBORNE MISSION COMPUTING AND VISUALIZATION WITH 2ND GENERATION VERSAL ADAPTIVE SOCS

- High-performance application processing system supporting mixed-criticality applications
- Next-generation AI Engines and DSP slices for processing at the edge
- First adaptive SoC with safety-critical capable 4k GPU and image processing hardware

AMD
together we advance_

CHALLENGE

Airborne mission computing requirements are constantly evolving, pushing for increased computing, interfacing, and networking capabilities. Computing must meet today's mission needs while supporting upgradability to tackle future needs and evolving threats. It is critical to meet the latest high bandwidth interface standards while also allowing backward compatibility with legacy interfaces. These technical requirements must all be balanced with support for safety and security, while maximizing the capability within size, weight, and power (SWAP) budgets. Second-generation Versal™ adaptive SoCs are ideally suited to address these challenges, with a broad range of heterogeneous computing subsystems with support for state-of-security and safety certification capability.

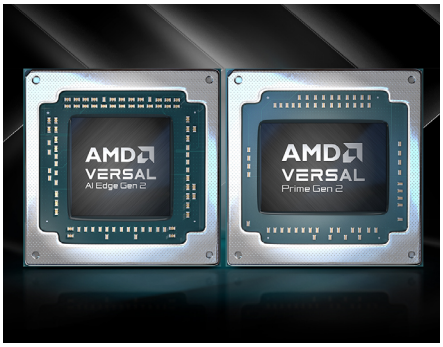
SOLUTION

AIRBORNE MISSION COMPUTING AND VISUALIZATION WITH VERSAL AI EDGE SERIES GEN 2 AND VERSAL PRIME SERIES GEN 2

AMD Versal™ AI Edge Series Gen 2 and Prime Series Gen 2 extend the possibilities for airborne systems and advanced levels of partitioning for high levels of safety and security with AI Engines for inferencing applications, a robust high-performance Arm®-based processor, a GPU, LP/DDR5 memory, and I/O subsystems. These devices are suitable for a multitude of A&D applications from autonomous systems to those that will use AI inferencing in mission computing, imaging systems, onboard networking, flight control systems, position timing and navigation, to the most advanced detection and tracking, and sensor fusion systems as well as software defined radio (SDR) and Satcom applications.

HIGH-PERFORMANCE PARTITIONABLE APPLICATION PROCESSING SYSTEM

Up to 3X TOPS/Watt
with next-generation AI Engines[1]



The combination of an aggregate 8-core Arm Cortex®-A78AE processor, delivering a throughput of 200K DMIPs, with the flexibility of split mode or lock-step configurations for application processors ensures the required performance for diverse needs. Processor partitioning capabilities address and support stringent security requirements, enabling seamless integration for mixed-criticality.

NEXT-GENERATION AI ENGINES AND DSPS

With up to 2k DSP58 blocks in the programmable logic available in the Versal AI Edge Series Gen 2 and Versal Prime Series Gen 2 devices, and up to 185 INT8 dense TOPs available in the AIE-ML v2 of Versal AI Edge Series Gen 2, these devices allow high compute per power efficiency for mission computing and autonomous systems, all with 37.5 mm or smaller packages. Maximize the SWAP of flexible multi-mission platforms with these devices.

FIRST ADAPTIVE SOCS WITH AN EMBEDDED 4K GPU

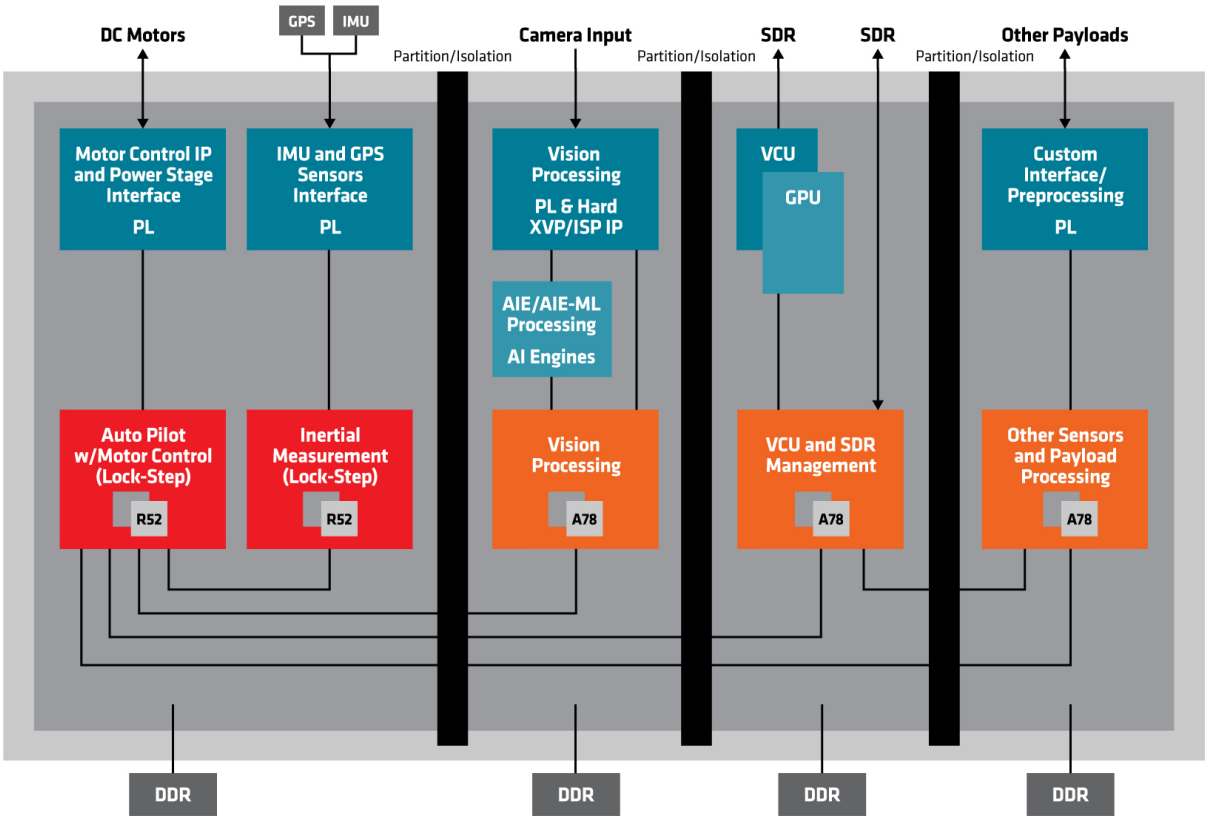
Versal AI Edge Series Gen 2 and Versal Prime Series Gen 2 adaptive SoCs offer GPUs suitable for displays, surpassing the limited lifecycle of current discrete GPUs. These systems also provide partitioning support for separate hardware partitions or lock-step configurations, while achieving resolutions of up to 4K60 and four cores with support for dual partitions.

SECOND-GENERATION VERSAL ADAPTIVE SOCS IMPLEMENTATION

VISUALIZATION AND DISPLAY

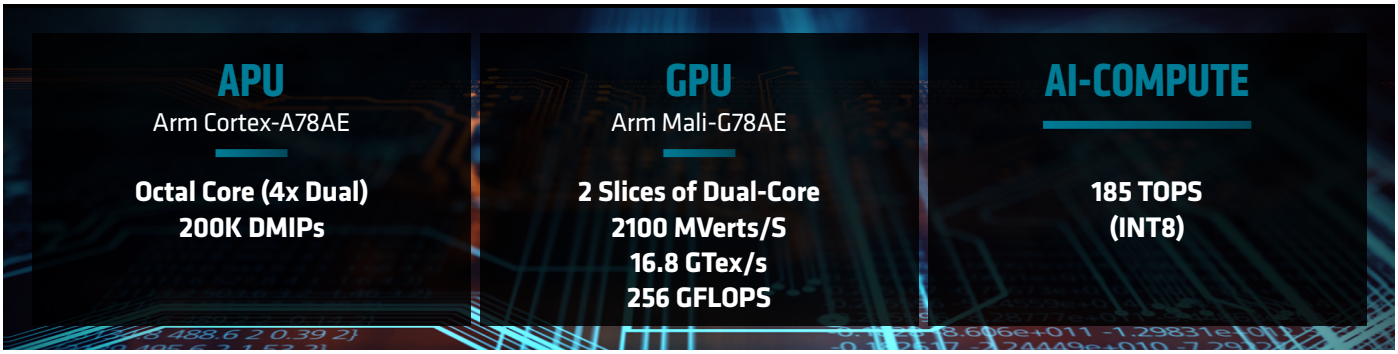
Whether it's providing overlays on a camera feed or driving a flight display, the integrated GPU provides the right capability. The dual slice partition can support lock-step for increased reliability of graphics output or be combined for higher performance needs. The application processors can service general compute needs as well as support monitoring or BIT functions often needed in flight display applications. The GPU data moves to DDR where an ARINC 818 interface in the adaptive SoC can retrieve the data and drive displays.

AUTONOMOUS SYSTEM APPLICATION



PLATFORM HIGHLIGHTS	
Flexible Processing Subsystem	• Octal core Arm Cortex-A78AE processors with partitioning capability to satisfy safety and security requirements • Deca core Arm Cortex-R52 processors for moderate compute and real-time processing, and system management functionality
Multi-Media Capability	• Quad core Arm Mali™-G78AE GPU with two slices to enable multi-display use, safety-critical redundancy, and/or graphics overlay demands • ISP to support real-time streaming or multicasting memory-mapped configuration with 1.4 Gpix/s • Performance of 4k60
Memory Partitioning and Network on Chip	• Up to five DDR5/LPDDR5/LPDDR5X memory controllers supporting inline encryption and ECC for up to 170 GB/s bandwidth of memory vs. previous generation,[2] with inline encryption to help secure data • Partitionable memory controllers and network on chip to ensure separation
AI Compute	• Up to 185 INT8 TOPS • Up to 3X TOPS/watt vs. previous generation[1]
Signal Processing Compute	• Hardened ISP for accelerating standard image processing, supporting five camera streams with >1 Gpix/s throughput • VCU supporting 4K60 12-bit encode & decode[3]
Mission Critical Capability	• Robust safety and security features, with functional safety support and radiation reliance • High reliability with a 20-year lifetime and long-term availability of 15+ years

BENCHMARK



TAKE THE NEXT STEP

- To learn more about Versal AI Edge Series Gen 2, visit **www.amd.com/versal-ai-edge-gen2**
- To learn more about Versal Prime Series Gen 2, visit **www.amd.com/versal-prime-gen2**
- Visit the AMD Aerospace and Defense page at **www.amd.com/aerospace-defense**

ENDNOTES

1. Based on AMD internal performance and power projections for the AIE-ML v2 compute tile architecture in the Versal AI Edge Series Gen 2 using the MX6 data type, compared to performance specifications and AMD Power Design Manager power results for the AIE-ML compute tile architecture featured in the first-generation Versal AI Edge Series using INT8 data type. Assumptions: 2 row, 8 column sub-arrays. Operating conditions: 1 GHz F_{MAX}, 0.7V AIE operating voltage, 100°C junction temperature, typical process, 60% vector load, % activations = 0 < 10%. Actual performance will vary when final products are released in market. Performance projections as of March 2024. (VER-023)

2. Based on AMD engineering pre-silicon performance estimates for the Versal AI Edge Series Gen 2 2VE3858 device with 5x 32B memory controllers and expected maximum LPDDR5X memory data rate of 8.533 GB/s, compared to an in-production first-generation Versal AI Edge Series VE2802 device with 3x 64b memory controllers operating at the published maximum LPDDR4X memory bandwidth of 102.4 GB/s. Actual memory bandwidth calculations for the Versal AI Edge Series Gen 2 devices are subject to change when final products are released in market. Performance projections as of March 2024. (VER-031)

3. Video codec acceleration (including at least the HEVC (H.265), H.264, VP9, and AV1 codecs) is subject to and not operable without inclusion/installation of compatible media players. (GD-176)

DISCLAIMERS

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