Q9 Versal Computer-on-Module

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AN EPIQ SOLUTIONS COMPANY
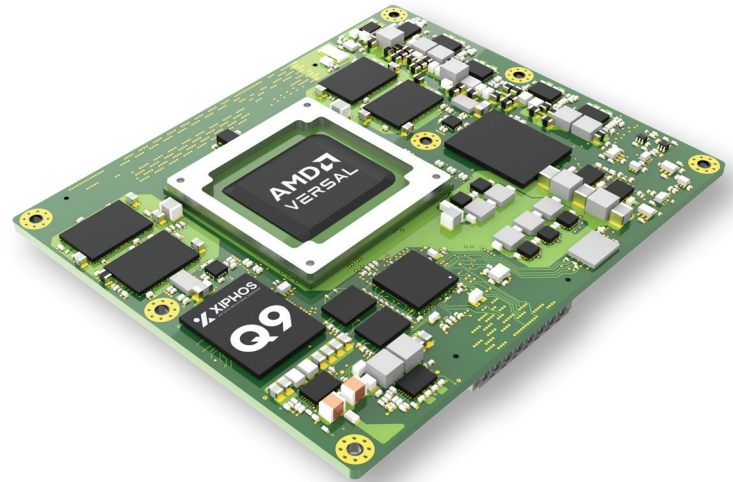
A High Performance AI/ Edge-Processing System-on-Module in a Tiny COTS Package

Designing a processor-intensive payload but short on schedule, and room to fit it? Keen to try out the new AMD Versal but worried about the risk?

The new Xiphos Q9 takes the Versal Adaptive SoC and adds the radiation robust architecture we've been building on for more than 20 years, which has already enabled hundreds of processors to be flying with zero on-orbit failures. The Q9 is as small as a drinks coaster and has all of the benefits of Xiphos' COTS model to enable a smooth development and fast time-to-launch.

OVERVIEW

The Q9 is ideal for advanced payload applications, requiring onboard AI/ML processing, I/O-intensive applications, and high-speed C&DH systems. At the core of each Q9 is a hybrid environment of powerful multi-core CPUs and re-programmable logic, providing flexible and scalable performance. The Q9 extends the capability of the Xiphos Q-Card processor family, adding support for high-speed JESD204B interfaces and PCIe, as well as access to 2TB of high speed data storage.

WHAT'S THE BIG DEAL?

The Q9 is the first time a Versal-based platform has been available in such a small form-factor that can fit almost anywhere. It is also a true commercial grade product with all of the benefits of COTS along with the tools and systems in place to make development, demonstration and launch fast and reliable. It is ideal for development of the next generation of intensive AI and real-time sensor processing applications.

FEATURE HIGHLIGHTS

INDUSTRY–LEADING PERFORMANCE
The new Q9 features an AI/ML capable Adaptive System-on-Chip (SoC), to provide unparalleled performance in a small form factor space hardened architecture supporting our customer's toughest missions and reduce their time to orbit.

SMALL FORM FACTOR, HIGH AI PERFORMANCE
The Q9 measures only 90 mm x 110 mm x 20 mm while providing 101 TOPS and 8 TFLOPs of AI/ML performance. Its small size, low mass and high performance makes the Q9 ideal for aerospace applications that demand extremely high performance.

INTEGRATED HYBRID ENVIRONMENT
The application space in a Q9 is a tight integration of a dual core ARM Cortex A72 Application Processing Unit, a dual core ARM Cortex R5F Real Time Processing Unit, 152 AI Engine–ML tiles, featuring 820,000 system logic cells, 750,000 flip flops, 375,000 lookup tables and 984 DSP slices reserved for application specific use.

SOFTWARE DEVELOPMENT
Xiphos provides an Application Development Kit with standard Linux libraries for C/C++ to support software development on Linux workstations. Code previously developed for Linux desktop and server applications can be easily ported to the Q9. Q9 hardware and logic interfaces are all accessible through either standard Linux and Xilinx kernel drivers or custom drivers provided by Xiphos.

LOGIC DEVELOPMENT
Logic development uses standard Xilinx development tools such as Vivado and Vitis AI. Xiphos, Xilinx and many third–party vendors also provide a wide range of compatible reusable logic cores for Xilinx FPGAs.
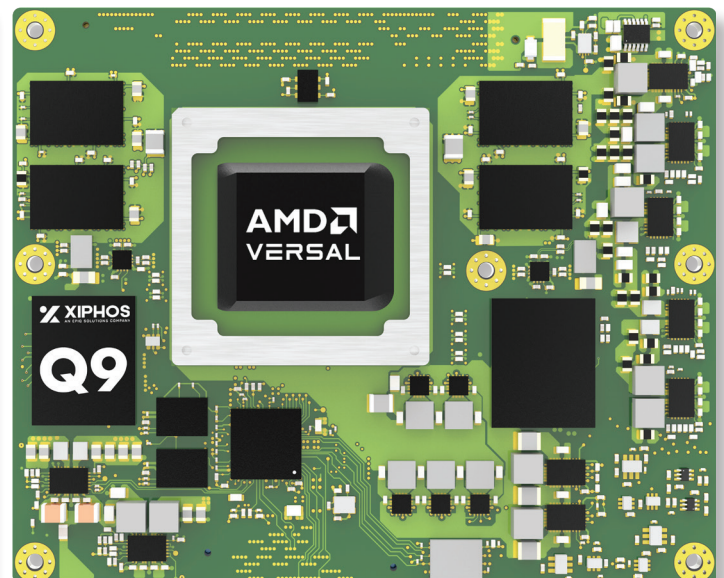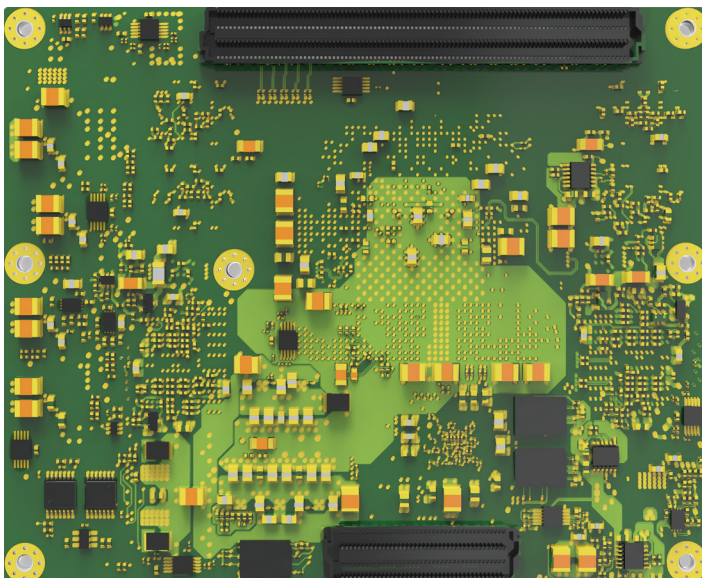
FLEXIBLE INTERFACING

The Q9 provides 16 GTYP transceivers, 64 LVDS/Single Ended GPIO, 20 GPIO 1.8 V, 40 GPIO 3.3 V, 49 MIO, 4 analog inputs. MIO can be configured to provide Gigabit interfaces, USB 2.0, CAN and/or GPIO. GTYP transceivers high–speed interface can be used for various high speed application such as 10 GbE or PCIe.

APPLICATIONS

The extremely high performance, data storage and extensive FPGA fabric make the Q9 ideally suited for onboard:

- AI/ML Edge Processing
- Onboard image processing
- Mass memory applications & Cloud storage
- 5G Direct–to–Device (D2D) network applications
- Synthetic Aperture Radar (SAR) processing
- High Speed Data Movement
- Hyper/multi–spectral compression
- Image registration and alignment
- High resolution camera interfacing and control
- Convolutional neural networks
- Advanced wideband Software Defined Radios (SDR)

CHARACTERISTICS

Model:	Q9
Environmental Characteristics	
Temperature (operating)	–40 to +60 °C
Size	90 mm x 110 mm x 20 mm
Weight	154 g without connectors
Power	• 30–50 W, typical • 8 to 14 VDC • Over–current detection & protection (global and local) and brownout protection
Memory	
Memory	• 16 GB LPDDR4 DRAM, PS and PL–accessible (2x8 GB) • 1GB QSPI Flash (NOR) • 2x SSD, 1,000 GB each, on independent buses • Fire code power power control • 1MB MRAM for critical telemetry/state data
MPSoC	
Model	AMD Versal AI Core Adaptive System-on-Chip
Application Processing Unit	Dual core ARM Cortex A72 Application Processing Unit at up to 1.7 GHz
Real-Time Processing Unit	Dual core ARM Cortex R5F Real-Time Processing Unit at up to 750 MHz
AI Engines	• 152 AI Engine-ML Tiles • 101 TOPS and 8 TFLOPs
System Logic Cells	820,000
Flip Flops	750,000 FF
Look-up Tables	375,000 LUT
DSP Slices	984

Model:	Q9
Control FPGA	
	Microchip PolarFire
Operating System	
	Yocto Linux BSP (LTS distribution)
Real Time Clock	
	• RTC with sleep & wake up on alarm/interrupt • Dedicated power pin for external battery
Interfaces	
	• 2 mezzanine connectors providing: • 1.8 V/ 3.3 V GPIO, 1.8 V MIO, LVDS • 32.75 Gbps GTY transceivers supporting PCIe Gen 4/5, Ethernet, JESD204b, SSD, SERDES, etc. • 2 Multi-rate MACs (each – 1 x 100G or 2 x 50G/40G, or 4 x 10G)

Q9S FLIGHT MODELS INCLUDE

• Triple mode redundancy in Control FPGA
• EDAC-protected RAM
• Upset and multi-current monitoring
• Over-current protection (multiple)
• FPGA bit-stream scrubbing
• Software robustness / watchdog

WHY CHOOSE XIPHOS?

Faster Time to Launch Using COTS Processing With Heritage

FLIGHT-PROVEN PROCESSORS:
Space-hardened, COTS-based computing solutions deployed across hundreds of commercial, civil and defense missions.
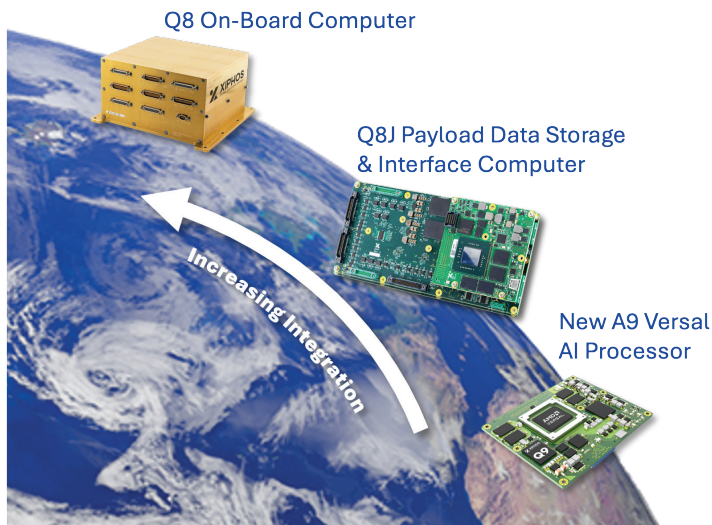
HIGH PERFORMANCE:
Products offer impressive processing, networking, RF and storage performance by leveraging state-of-the-art commercial devices.

COST-EFFECTIVE PERFORMANCE:
Delivers high performance and reliability at a fraction of the cost of traditional space processors.

SCALABLE SOLUTIONS
Flexibility across the design stack ensures the right level of integration for your use case.

Q8 On-Board Computer

Q8J Payload Data Storage & Interface Computer

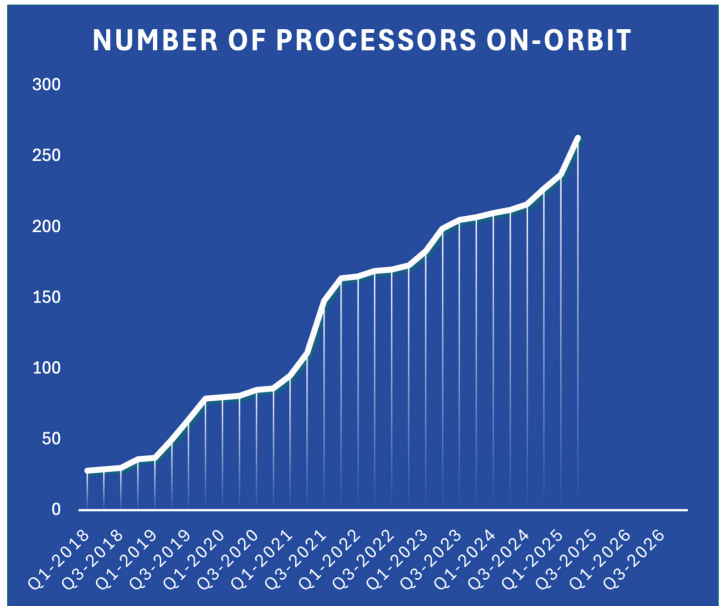Increasing Integration

New A9 Versal AI Processor

ABOUT XIPHOS

Xiphos, based in Montreal and part of Epiq Solutions since 2023, has over 20 years of experience delivering thousands of low-SWaP-C COTS-based processor cards for space applications including satellites, landers, rovers, and space stations. Known for high reliability, radiation tolerance, and strong customer support, Xiphos specializes in compact processing solutions using cutting-edge processors for commercial, scientific, and military missions.

IMPRESSIVE HERITAGE:
We've been a new space company for more than 20 years and have delivered many thousands of cards. In that time, we've accumulated a LOT of experience that you get to benefit from when you partner with us.

As of July 2025, our cumulative time on orbit stands at more than 568 years. In that time, we have had no on-orbit product failures and have more than 260 boards in space.

NUMBER OF PROCESSORS ON-ORBIT

(Line chart showing number of processors on-orbit from Q1-2018 to Q3-2026, y-axis 0 to 300. Values rise from around 25 in early 2018 to over 260 by Q3-2025.)

COMPACT, EFFICIENT, FLEXIBLE:
Ideal for spacecraft, unmanned systems, and robotics requiring small size, low power, and adaptability.

CERTIFIED QUALITY:
AS9100 and ISO 9001:2015 certified; explore our FPGA-based multiprocessors, SoCs, and advanced subsystems.

ENHANCED COTS SOLUTIONS
Optimizes the cost & performance trade while still providing radiation robustness

OPEN ARCHITECTURE DESIGNS
Enables development across a variety of toolkits

SHORTER LEAD TIMES
Shipping 500+ processors annually

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