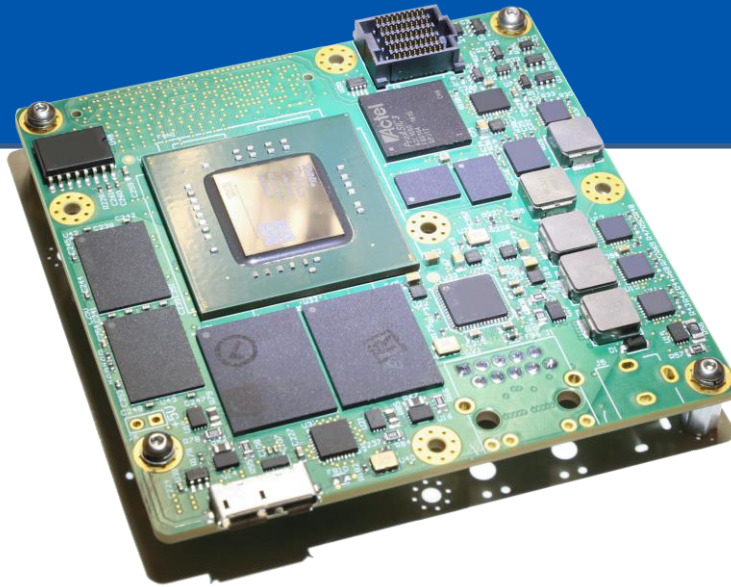


# Q8 SPECIFICATIONS



# Q8

## FEATURE HIGHLIGHTS

### Industry-Leading Performance

The Q8 features a Multi-Processor System-on-Chip (MPSoC), including multi-core CPUs providing 64-bit processor scalability supported by massive programmable logic resources and a wide array of hardware interfaces.

### Low Mass, Volume, Power

The Q8 measures 80 mm x 80 mm x 11.2 mm and consumes as low as 4 W. Its small size, low mass and power consumption make the Q8 ideal for aerospace applications that demand extremely high performance.

### Integrated Hybrid Environment

The application space in a Q8 is a tight integration of a quad-core ARM Cortex-A53 Application Processing Unit, a dual-core ARM Cortex-R5 Real-Time Processing Unit, an ARM Mali-400 GPU and programmable logic, featuring 504,000 system logic cells, 461,000 flip-flops, 274,000 lookup tables and 1,728 DSP slices reserved for application-specific use.

### Flexible Interfacing

The Q8 provides Gigabit Ethernet networking through its RJ45 connector along with USB 2.0 & USB 3.1 Gen 1 host ports. The Q8 also provides multiple digital I/O lines, including up to 52 GPIO, 12 MIO, 64 LVDS pairs, 3 Gigabit transceivers, USB 2.0 and factory-selectable RS-232/422/485 through its mezzanine connector.

### Applications

The extremely high performance and extensive FPGA fabric make the Q8 ideally suited for onboard:

- Synthetic Aperture Radar (SAR) processing
- Hyper/multispectral compression
- Stereo and monocular visual odometry
- Image registration and alignment
- Convolutional neural networks
- Advanced Software Defined Radios (SDR)

## OVERVIEW

The Q8 is the highest performance member of the Xiphos Q-Card family of low-cost, embedded nodes for control, processing and interface applications, primarily for aerospace markets. Q-Cards combine a small form factor with broad networking, processing and I/O capabilities.

At the core of each Q8 is a hybrid environment of powerful multi-core CPUs and reprogrammable logic, providing consistent and reliable performance. The library of logic and software functions is augmented by onboard digital I/O.

## FLIGHT HERITAGE

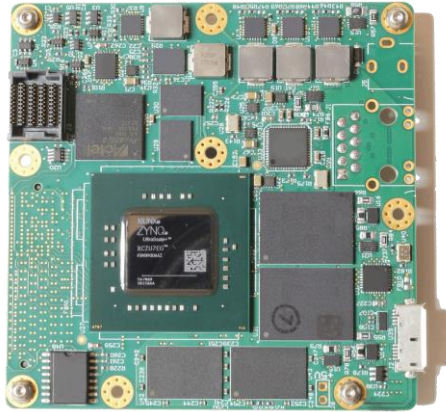
The Q8 is the latest in the line of space qualified Q-Cards. The first flight of the Q8 is planned for Q3 2019. The Q8's predecessors include the Q7, Q6, Q5 and Q4:

- The Q7's space version, Q7S, has been operating in orbit since June 2016. The Q7S is certified for manned space flight and is used on the International Space Station (ISS).
- The Q6 was first flown in August 2011, with almost 100 units delivered to customers worldwide. It was also certified for manned space flight and used on the ISS.
- The Q5 was first flown in June 2004.
- The Q4 was first flown in December 2002 and was also certified for manned space flight and used on the ISS.



# Q8

## Front & Back



### Product Integration Module (PIM)

Each Q8 is delivered with a detachable PIM to facilitate development. The PIM provides standard commercial interfaces (e.g. CAN, 1-wire, 4 RSXXX, JTAG, 13 digital I/O, 8 analog input, 4 analog output), debug LEDs and other lab development features.

### 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 Q8.** Q8 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. Xiphos, Xilinx and many third-party vendors also provide a wide range of compatible reusable logic cores for Xilinx FPGAs.

## Characteristics (Rev B Board)

### Memory

- 4 GB LPDDR4 DRAM
- 2x 128 MB QSPI Flash (NOR)
- 2x eMMC, 128 GB each, on independent buses / power control

### Multi-Processor System-on-Chip

- Xilinx Zynq UltraScale+ XCZU7EG
- Quad-core ARM Cortex-A53 Application Processing Unit at up to 1.2 GHz
- Dual-core ARM Cortex-R5 Real-Time Processing Unit at up to 500 MHz
- ARM Mali-400 GPU at up to 600 MHz
- 504,000 system logic cells
- 461,000 flip-flops (FF)
- 274,000 lookup tables (LUT)
- 1,728 DSP slices

### Control FPGA

- Microsemi ProASIC3

### Operating System

- Linux 4.14 LTS
- Robot Operating System (ROS)

### Real Time Clock

- RTC with sleep & wake-up on alarm/interrupt
- Dedicated power pin for external battery

### Power

- 4 W - 25 W, scalable
- 6 to 16 VDC
- Various power modes (including deep sleep)
- Overcurrent detection & protection (global and local) and brownout protection

### Form Factor

- 85.8 mm x 80 mm x 22.6 mm (with RJ45 and power connectors)
- 80 mm x 80 mm x 11.2 mm (without connectors)

### Environmental

- Operating Temperature -40 to +60°C

### Interfaces

- Power
- Gigabit Ethernet (RJ45)
- USB 2.0 & USB 3.1 Gen 1 hosts (USB Type C)
- CAN Bus controller
- Up to 38 single-ended GPIO 3.3 V, 14 single-ended GPIO 1.8 V, 12 MIO 1.8 V, 64 LVDS pairs/128 single-ended GPIO 1.8 V, 3 Gigabit transceivers (SATA, PCI express), USB 2.0 and factory-selectable RS-232/422/485 (Mezzanine connector)

### Space-Qualified Features (Q8S)

- Triple-mode redundancy (ProASIC3)
- EDAC-protected RAM
- Upset and multi-current monitoring
- FPGA bit-stream scrubbing
- Software robustness / watchdog, etc.

[www.xiphos.com](http://www.xiphos.com)