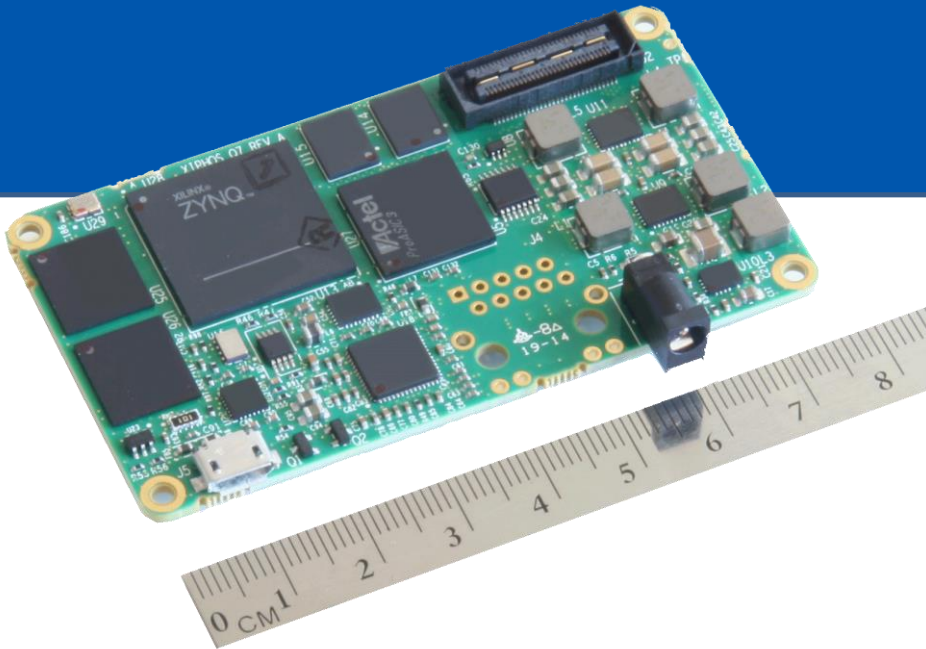# Q7 SPECIFICATIONS



## FEATURE HIGHLIGHTS

**Industry-Leading Performance**

The Q7 features an All-Programmable System-on-Chip (AP SoC), including multi-core CPUs supported by massive programmable logic resources and a wide array of hardware interfaces.

**Low Mass, Volume, Power**

The Q7 measures 78 mm x 43 mm x 9 mm, has a mass of 24 g (excluding connectors) and consumes 1 W for typical applications. Its small size, low mass and power consumption make the Q7 ideal for aerospace applications.

**Integrated Hybrid Environment**

The application space in a Q7 is a tight integration of dual ARM Cortex™-A9 MPCore processors and programmable logic, featuring 106,400 flip-flops and 53,200 look-up tables reserved for application-specific use.

**Flexible Interfacing**

The Q7 provides Gigabit Ethernet networking through its RJ45 connector and USB 2.0 OTG. The Q7 also provides multiple digital I/O lines, including up to 24 LVDS pairs, and selectable RS-232/422/485 through its mezzanine connectors.

**Fault – Tolerant**

Fault tolerance features include:
- Q7 can detect and correct faults within itself
- Combination of software and logic processing creates an excellent fail-safe environment; logic can also be made triple mode redundant
- RAM designed to support EDAC techniques
- Independent RAM and independent MicroSD provide redundancy
- Independent QSPI for logic / OS

## OVERVIEW

The Q7 is the latest in 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 Q7 is a hybrid environment of powerful CPUs and reprogrammable logic, providing consistent, reliable performance. The library of logic and software functions is augmented by onboard analog and digital I/O.
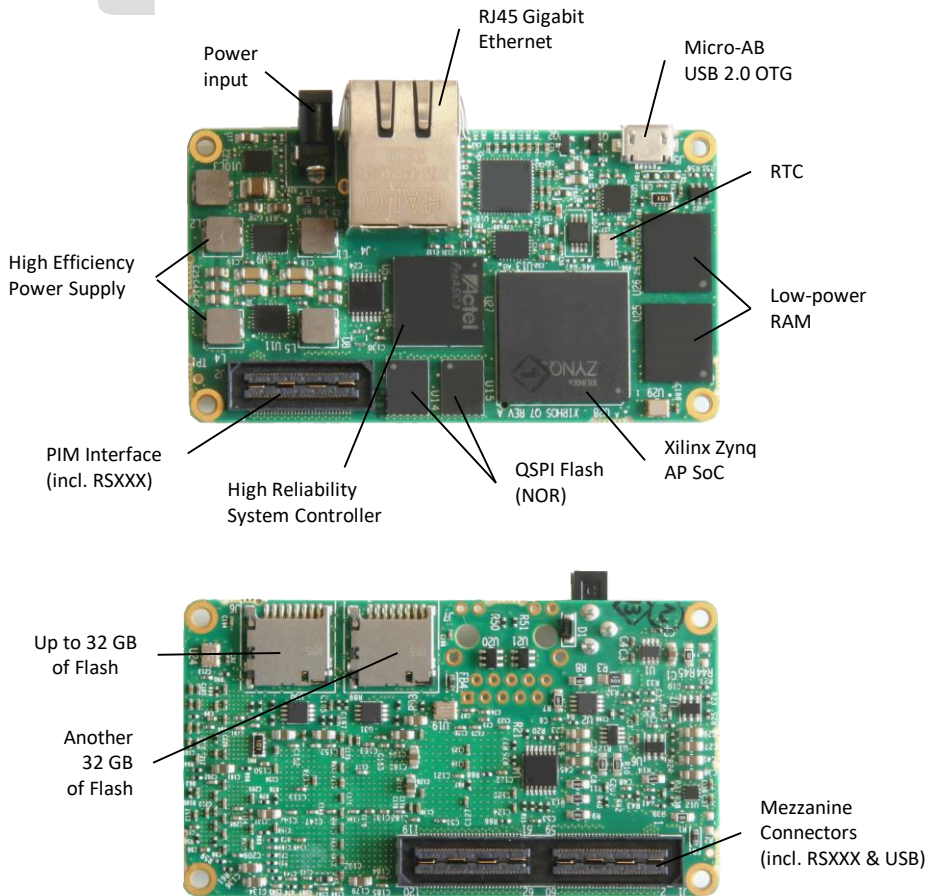
## FLIGHT HERITAGE

- 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. The Q6 was also certified for manned space flight and used on 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.

**Xiphos Technologies**

# Q7 Front & Back



Power input

RJ45 Gigabit Ethernet

Micro-AB USB 2.0 OTG

RTC

Low-power RAM

High Efficiency Power Supply

PIM Interface (incl. RSXXX)

High Reliability System Controller

QSPI Flash (NOR)

Xilinx Zynq AP SoC



Up to 32 GB of Flash

Another 32 GB of Flash

Mezzanine Connectors (incl. RSXXX & USB)

## Product Integration Module (PIM)

Each Q7 is delivered with a detachable PIM, to facilitate development. The PIM provides standard commercial interfaces (e.g. CAN, JTAG, 4 analog inputs, 1-wire) , 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 Q7.* Q7 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.


Xiphos Technologies

# Characteristics

## Memory
- Independent 1x512 MB and 1x256 MB LPDDR2 RAM chips
- 2 MicroSD slots (max. 32 GB each) on independent buses / power control
- 2x128 MB QSPI Flash (NOR)
- External mass memory interface

## All-Programmable System-on-Chip
- Xilinx Zynq-7020
- ARM dual-core Cortex-A9 MPCore processors each up to 766 MHz
- 106,400 flip-flops (FF), 53,200 look-up tables (LUT), and 220 DSP slices

## Control FPGA
- Microsemi ProASIC3

## Operating System
- Linux 4.4+
- Robot Operating System (ROS)

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

## Power
- Scalable, typ. 1 W
- 6 V to 15 V (5 V to 28 V option)
- Power modes (including deep sleep)
- Overcurrent detection and protection

## Mass
- 32 g with RJ45 connector
- 24 g without RJ45 connector

## Form Factor
- 78 mm x 43 mm x 19 mm (with RJ45 connector)
- 78 mm x 43 mm x 9 mm (without connectors)

## Environmental
- Operating Temperature -40 to +60ºC

## Interfaces
- Gigabit Ethernet (RJ45)
- USB 2.0 (Micro-AB)
- Factory-selectable RS232/422/485
- CAN Bus controller
- 90 I/O, with up to 24 LVDS pairs (mezzanine connector)

## Space-Qualified Software and Logic Available through Q7S Upgrade
- Triple-mode redundancy
- EDAC-protected RAM
- Upset and multi-current monitoring
- FPGA bit-stream scrubbing
- Software robustness / watchdog

# www.xiphos.com