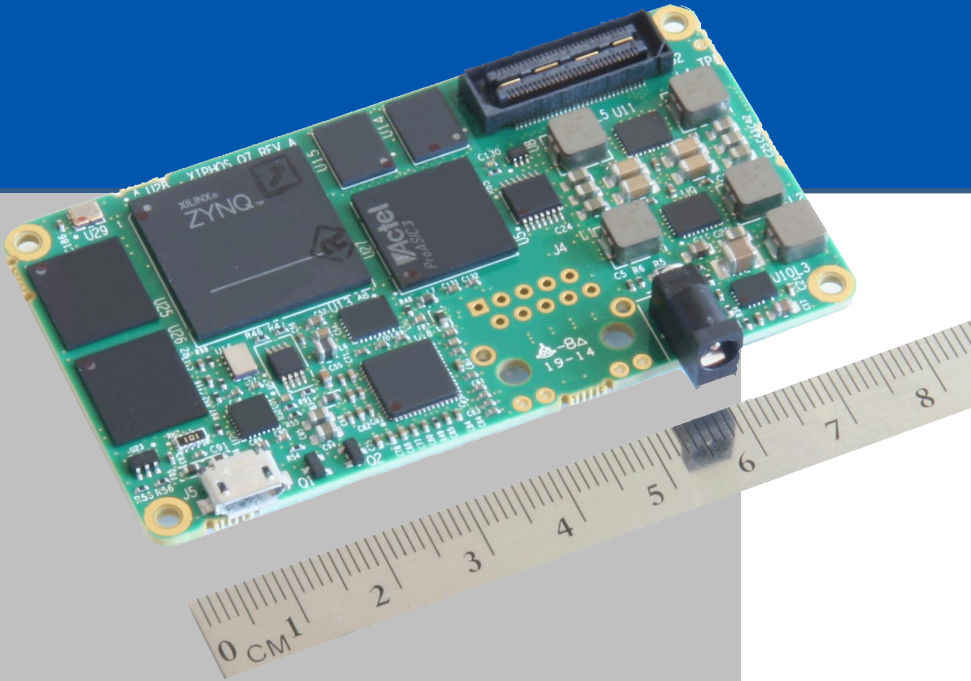


# Q7 SPECIFICATIONS



## 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. As an individual network entity, each node runs its own network stack and command handling functions.

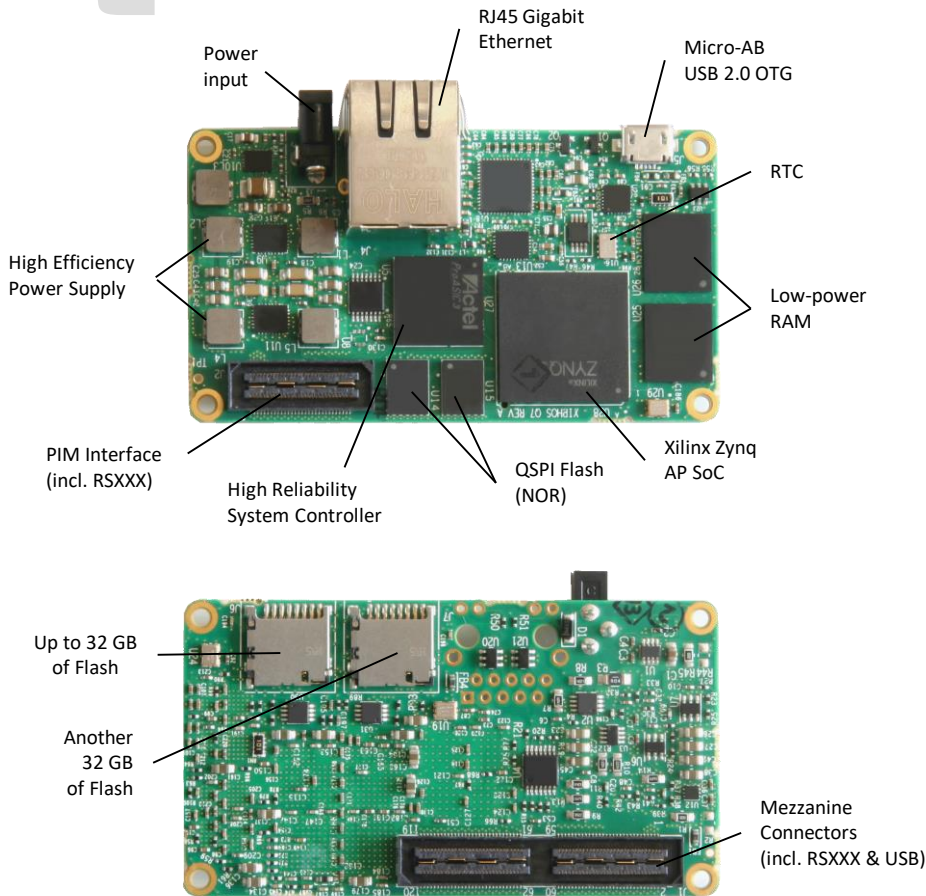
At the core of each Q7 is a hybrid environment of powerful CPUs and reprogrammable logic, providing consistent, reliable performance. The library of logic and software functions is augmented by onboard analog and digital I/O.

## FLIGHT HERITAGE

- The Q7's space version, Q7S, is operating in orbit since June 2016 on board the GHGSat satellite.
- The Q6 was first flown in August 2011, and almost 100 units have been delivered to customers worldwide to date
- The Q5 was first flown in June 2004 and has been operating continuously in orbit since June 2006
- The Q4 is certified for manned space flight and has been used on the International Space Station

# Q7

## Front & Back



### 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 input, 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 Windows and 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.

## 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) and 53,200 look-up tables (LUT)
- DSP Slices 220

### Control FPGA

- Actel ProASIC3

### Operating System

- Linux 4.4+
- Optional alternative configurations, including RTEMS or bare-metal
- 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 28V (options available for < 6V)
- 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 -40C to +85C

### Interfaces

- Gigabit Ethernet (RJ-45)
- USB 2.0 (Micro-AB)
- Software selectable RS232/422/485
- Mezzanine connectors (90 I/O, up to 24 LVDS pairs)
- CANBus

### Space-Qualified Software Available through Q7S Upgrade

- Triple-mode redundancy
- EDAC-protected RAM
- Upset monitoring
- FPGA Bit-stream scrubbing
- Software robustness / watchdog