

Q-STACK SPECIFICATIONS



Q6

FEATURE HIGHLIGHTS

High Performance

The heart of the Q-Stack is the Q6 processor card, which is comparable in performance to CPUs operating at GHz speeds and can provide more than 10x performance improvement in terms of instructions per Watt for optimized applications.

Low Mass, Volume, Power

Each card in the Q-Stack measures 78 mm x 38 mm, with height ranging from 12 mm to 25mm depending on connectors. Each card has a mass of <30 g (excluding connectors). Finally, the Q-Stack consumes 2 W for typical applications.

Integrated Hybrid Environment

The application space in a Q6 processor at the heart of the Q-Stack is a tight integration of one or more MicroBlaze soft processors and programmable logic, featuring 138,000 flip-flops and 69,000 look-up tables reserved for application-specific use.

Modular

The basic elements of the Q-Stack are the Q6 processor and a power card; other cards can be added in a modular fashion, depending on applications needs. Standard expansion cards include a USB/FW/Serial interface module, an Analog-Digital Interface Module, and a Motor Drive Module. Custom cards can be developed according to customer specifications.

Flexible Interfacing

The Q-Stack provides a full range of interfaces including Gigabit Ethernet, CAN, SpaceWire, USB, FireWire, Serial (RS-232/422/485), and multiple analog and digital I/O lines. The Q-Stack can be assembled with only those interfaces required for each application.

OVERVIEW

The Q-Stack is part 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. As an individual network entity, each node runs its own network stack and command handling functions.

At the core of each Q-Stack is a Q6 processor, which is a hybrid environment of reprogrammable logic and a soft processor core, providing consistent, reliable performance. The library of logic and software functions is augmented by onboard analog and digital I/O.

FLIGHT HERITAGE

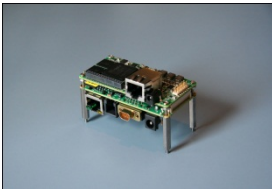
The Q6 is the latest in a line of spaceflight-ready boards. The first flight of the Q6 is planned for 2011. The Q6's predecessors include the Q5 and Q4:

- 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



Q-Stack

Basic Q-Stack



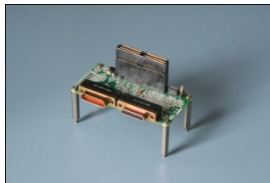
Q6 Processor
(incl. 2x128MB LPDDR RAM,
2x2GB MicroSD, 10/100 Eth,
RS-232, A+D I/O)

Power Card
(incl. GbE, SpW/GPIO, CAN,
8-36V DC input, ESD &
inversion protection)

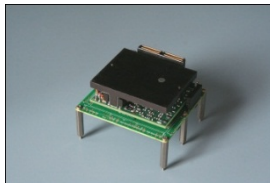
Extra I/O, Mechatronic Control



USB/FW/Serial Interface Module



Analog/Digital Interface Module



Motor Drive Module

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 Q6.**

Q6 hardware and logic interfaces are all accessible through either standard Linux and Xilinx kernel drivers or custom drivers provided by Xiphos.

For MathWorks users, Xiphos offers an Embedded Real-time Target for Real-Time Workshop, allowing applications to be developed in Simulink and Stateflow.

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.

Module Characteristics

Q6 Processor

- 2 independent 128 MB LPDDR RAM chips on independent buses
- 2 MicroSD slots (max. 2 GB each) on independent buses
- Xilinx Spartan-6
- One or more 32-bit MicroBlaze soft processors with optional FPU; optional alternate soft CPUs (eg LEON3)
- 10/100 Ethernet
- Multi-purpose connector (RS-232, Analog and digital I/O)

Power Card

- 18 g (without connectors)
- 8-36 V DC unregulated input
- Overload protection and limits (peak 40V, ESD 8 kV, reverse polarity)
- Optional power daisy-chain
- GbE
- CAN (2.0B physical; CANopen application)
- SpaceWire, 4 GPIO or 8 discrete GPIO

USB/FW/Serial Interface Module

- 27 g (without connectors)
- 2 USB2.0 hosts (s/w configurable to USB1.1), can provide up to 2.5 W to each USB device
- 1 FireWire1394a host, can provide up to 15W to FW device
- 2 Serial (RS-232, RS-422/485 Full Duplex, or RS-485 Half-Duplex – s/w configurable)

Analog/Digital Interface Module

- 4 single-ended analog inputs and 2 pairs of differential analog inputs (max sampling rate of 250 kSps)
- 4 single-ended analog output channels, configured to operate either in voltage-mode or current-mode (max update rate of 2 MSps)
- 9 digital input signals (max rate 10 MHz)
- 4 digital output (configurable)
- Can provide up to 2.5 W to different 12 V and 5 V sensors

Motor Drive Module

- Information can be provided upon request