

## A10SA4

### Arria® 10 GX Low Profile PCIe Board with QSFP and DDR4 on BittWare Spider Platform

#### High-performance FPGA

Arria 10 FPGA with up to 1150K logic elements

#### Optimized for thermal performance

BittWare Spider platform with passive heatsink supports large FPGA loads

#### OpenCL Support

Software-like FPGA development



OpenCL



BittWare's A10SA4 is a low-profile PCIe x8 card based on the Intel Arria 10 GX FPGA. Designed specifically to support large FPGA loads, the board offers an FPGA with up to 1150K logic elements, optional 10/40GbE high-speed networking, and up to 16GBytes DDR4 SDRAM – all of which make it ideal for server-based applications. OpenCL support enables a high-level software-like development flow, which greatly simplifies FPGA development.

#### Spider Platform for Thermal Performance

The A10SA4 is designed with BittWare's Spider platform, which is a low-profile PCIe platform optimized for thermal performance. The Spider platform combines a low-profile PCIe form-factor for high density, the ability to run larger loads, and a robust passive heatsink option designed for servers.

### Key Features

- Intel Arria 10 GX 1150 FPGA
  - Up to 1150K logic elements
  - Gen3 PCIe Hard IP block
  - Up to 1.3 TFLOPS floating point performance
- PCIe x8 Gen3 (x16 mechanical)
- Optional QSFP for 40GbE or 4x 10GbE
- Up to 16 GBytes of DDR4 SDRAM with ECC (x72)
- Board Management Controller for Intelligent Platform Management
- Complete software support and FPGA examples
- Aggressive volume pricing

# A10SA4

## Optional High-Speed Networking

The A10SA4 is enabled for high-speed networking with an optional QSFP interface supporting 40GbE or four 10GbE channels. The QSFP SerDes channels are connected directly to the Arria 10 FPGA, thus removing the latency of external PHYs. A 1 PPS input allows precise timestamping.

## OpenCL™ Support

The A10SA4 supports the Open Computing Language (OpenCL™) programming model, providing an incredibly powerful solution for system acceleration. Development tools for OpenCL include Intel's SDK for OpenCL and BittWare's OpenCL Developer's Bundle.

## Board Management Controller

Boards in BittWare's A10 family feature an advanced system monitoring subsystem, similar to those typically found on today's server platforms. At the heart of the board's monitoring system lies a Board Management Controller (BMC), which accepts Intelligent Platform Management Interface (IPMI) messaging protocol commands. The BMC provides a wealth of features, including control of power and resets, monitoring of board sensors, FPGA boot loader, voltage overrides, configuration of programmable clocks, access to I2C bus components, field upgrades, and IPMI messaging. Access to the BMC is via PCIe or USB. BittWare's BittWorks II Toolkit also provides utilities and libraries for communicating with the BMC components at a higher, more abstract level, allowing developers to remotely monitor the health of the board.

## Development Tools

### BittWorks II Toolkit

BittWare offers complete software support for the A10SA4 with its BittWorks II software tools. The BittWorks II Toolkit is a suite of development tools that serves as the main interface between the BittWare board and the host system. The Toolkit includes drivers, libraries, utilities, and example projects for accessing, integrating, and developing applications for the BittWare board.

### FPGA Development Kit

BittWare's FPGA Development Kit (FDK) provides FPGA board support IP to simplify integration and development. The FDK includes example projects that illustrate how to move data between the board's different interfaces and is designed to integrate easily with Intel's Quartus II tools.

# A10SA4

## A10SA4 Specifications

### BOARD SPECIFICATIONS

#### FPGA

- Intel Arria® 10 GX115 FPGA
- Up to 1150K logic elements available
- Up to 3,300 18x19 variable-precision multipliers
- High-performance, multi-gigabit transceivers @ up to 17 Gbps

#### On-Board Memory

- Two banks DDR4 with ECC, up to 8 GBytes (x72) each
- Flash with support for multiple boot images
- PROM for access to the board's MAC ID

#### PCIe Interface

- x8 Gen1, Gen2, Gen3
- x16 mechanical interface

#### USB

- USB 2.0 interface for debug and programming FPGA and Flash
- Built-in Intel USB-Blaster

#### QSFP Cage

- Optional QSFP cage on front panel, supporting 40GbE or 4x 10GbE
- Can be optionally adapted for use as SFP+

### Board Management Controller

- Voltage, current, temperature monitoring
- Power sequencing and reset
- Field upgrades
- FPGA configuration and control
- Clock configuration
- I<sup>2</sup>C bus access
- USB 2.0 and JTAG access
- Voltage overrides

### Size

- Low profile (Half-height, half-length) PCIe slot card; x16 mechanical
- 168mm x 68.9mm
- Max. component height: 14.47mm

### DEVELOPMENT TOOLS

#### System Development

- [BittWorks II Toolkit](#) - host, command, and debug tools for BittWare hardware

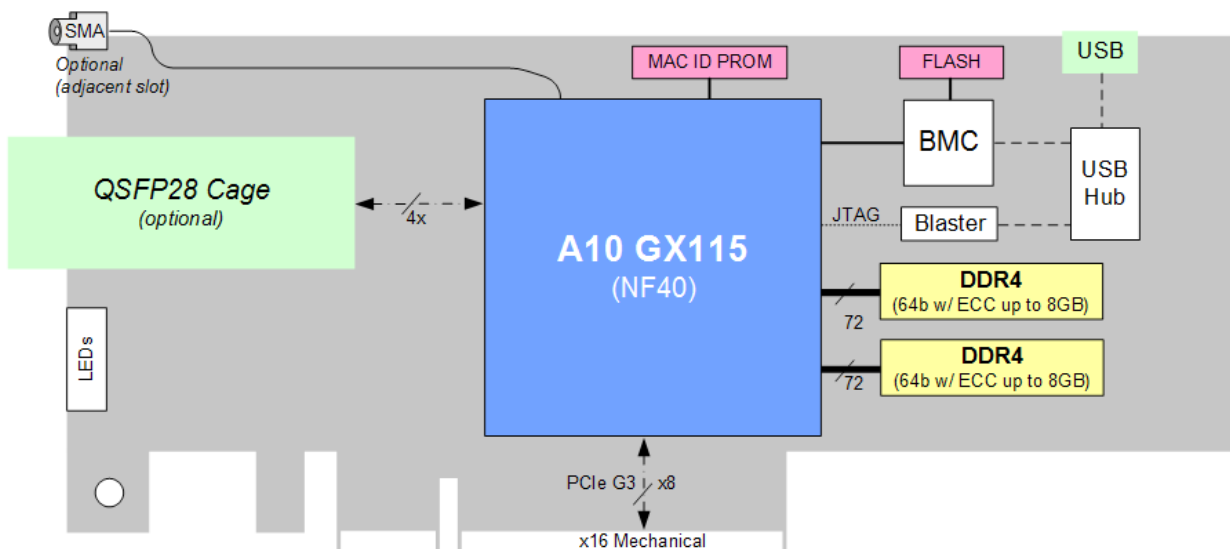
#### FPGA HDL Development

- [FPGA Development Kit](#) - Example Quartus projects
- [Intel tools](#) - Quartus II software

#### OpenCL Development

- [OpenCL Developer's Bundle](#) - BittWorks II Toolkit, Board Support Packages, Intel SDK for OpenCL, Intel Quartus II

Figure 2: A10SA4 System Block Diagram



## A10SA4 Ordering Options

A10SA4-[TBD]			
RW	Ruggedization 0U = Air cooled (0°C to 50°C)*	I	Front Panel H = Low-profile (no SMA) * F = Standard-height (no SMA) G = Standard-height (SMA) B = Standard-height (with Baffle)
A	A10 Printed Wiring Board B = Optimized for 1150 FPGA*		
BBBB	Arria 10 Type and Size 115X = Arria 10 GX 1150*	J	Flash Configuration 0 = Blank Flash 1 = Standard (HDL tool flow)* 2 = OpenCL
C	Arria 10 Transceiver Speed 3 = 14.2 Gbps for GX* 4 = 12.5 Gbps for GX	K	Oscillator A = Adjustable TCXO* T = TCXO
D	Arria 10 Temperature Range E = 0C to 100C*		
E	Arria 10 Core Speed Grade 1 = Faster 2 = Standard* 3 = Slower	L	QSFP 0 = Not installed 1 = Installed*
F	Arria 10 Power Options L = Low static power S = Standard*	M	Heatsink P = Passive* A = Active O = Open Frame
G	DDR4 Bank A 0 = None 2 = 4 GB* 3 = 8 GB		
H	DDR4 Bank B 0 = None 2 = 4 GB* 3 = 8 GB	N	Timing Configuration 0 = No on-board circuit S = On-board circuit with SMA X = On-board circuit only
		O	Miscellaneous 1 = Default
		P	Assembly 6 = RoHS 6/6

\* Contact Sky Blue or Zerif

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