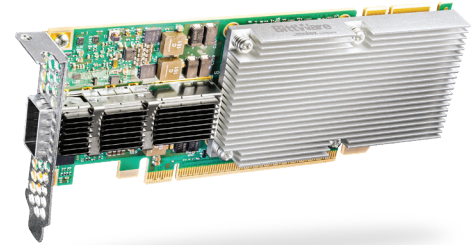


BittWare IA-441i PCIe Card

The BittWare IA-441i is an Altera Agilex™ I-series FPGA card designed for building SmartNICs or other accelerators requiring a powerful FPGA in a single-slot form factor.

The NIC-sized card provides a balance of I/O and memory using the Agilex chip's unique tiling architecture with a QSFP-DD (400GbE), DDR4 SDRAM, and PCIe Gen5 x16. The card also includes enhanced local clocking features with support for White Rabbit.



FEATURES AND ADVANTAGES

1x 400G or 4x 100G

Ideal for network-intensive applications

PCIe Gen5 with CXL support

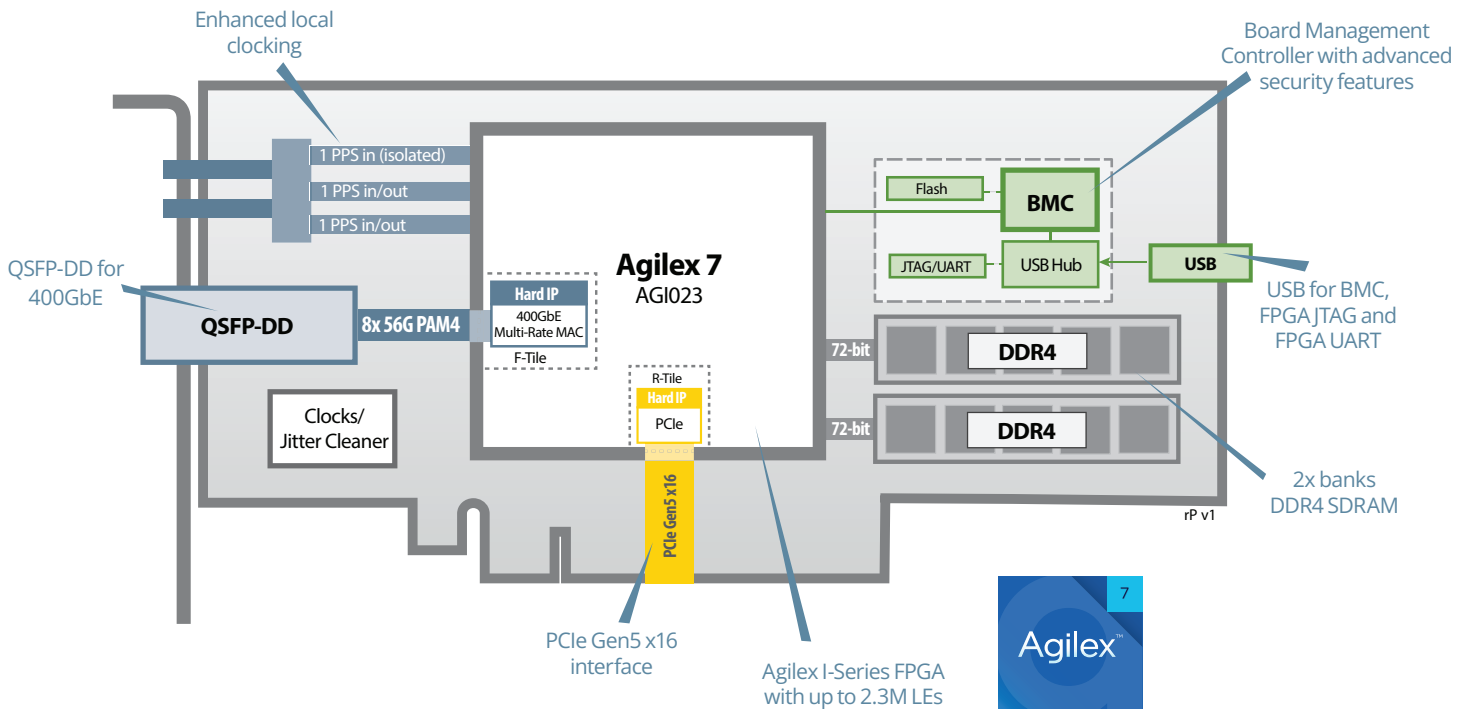
High-speed, low-latency host interface

Altera Agilex I-Series FPGA

Powerful FPGA resources with 2.3m LEs

Designed for White Rabbit

Ideal for high-accuracy timing



BittWare IA-441i PCIe Card >

BOARD SPECIFICATIONS

FPGA

- Altera Agilex 7 I-Series AGI023
- Core speed grade -1
- XCVR speed grade -1

On-board Flash

- 2Gbit Flash memory for booting FPGA

External memory

- 2x banks on-board DDR4, 8GB each (16GB total)

Host interface

- x16 Gen5 interface direct to FPGA, connected to PCIe hard IP

QSFP-DD cage

- 400 Gbps (8x 50Gbps PAM4)
- PAM4: 1x 400GbE, 2x 200GbE, 4x 100GbE, 8x 50GbE
- NRZ: 1x 200GbE, 2x 100GbE, 4x 50GbE, 8x 10/25 GbE
- Multi-rate hard MAC supports all combinations
- Jitter cleaner for network recovered clocking

Clocking

- Enhanced local clocking: Stratum 3E precision TCXO and jitter cleaner combination
- PPS support: isolated 1PPS input, two non-isolated 1PPS input/output (GPIO capable)

USB

- USB access to BMC, USB-UART

Board Management Controller

- Power sequencing and reset
- Voltage, current, temperature monitoring
- Protection shut-down
- Clock configuration
- Low bandwidth BMC-FPGA comms with SPI link
- USB 2.0
- PLDM support
- Card-level security
- BMC Root of Trust
- BMC and FPGA secure boot
- BMC and FPGA secure upgrade
- Key management

Cooling

- Standard: single-width passive heatsink

Electrical

- On-board power derived from PCIe slot
- Power dissipation is application dependent
- Max power consumption 75W

Environmental

- Operating temperature: 5°C to 35°C

Quality

- Manufactured to IPC-A-610 Class 2
- RoHS compliant
- CE, FCC, UKCA & ICES approvals

Form factor

- Low profile (half-height, half-length) PCIe slot card
- Size: 68.90mm x 167.65mm (2.713in x 6.600in)

ACCESSORY CABLES

Access to USB and JTAG requires accessory cables. Cables are sold separately.

USB-only cable	ico-lock to USB A cable Part number: RS-PL12-UAP-83 Designed for deployment in servers
JTAG-only cable	Pico-lock to JTAG cable Part number: RS-PL12-JTB-13 Recommended for development
USB+JTAG breakout card	Breakout card with access to both USB and JTAG Part number: ACC-IA-JTUSB-BKO Recommended for development

DEVELOPMENT TOOLS

System development

BittWare SDK including libraries and board monitoring utilities

Application development

Supported design flows - Altera High-Level Synthesis (C/C++) and Quartus Prime Pro (HDL, Verilog, VHDL, etc.)

IEEE 1588 HIGH-ACCURACY TIME SYNCHRONIZATION

The IA-442m includes dedicated timing circuitry and front-panel connectivity to support IEEE 1588 Precision Time Protocol (PTP) High Accuracy Profile (White Rabbit). This enables sub-nanosecond time and phase synchronization across networked systems, supporting deterministic, tightly aligned operation in distributed RF and signal-processing applications.



To learn more, visit bittware-molex.com