AKD1500 Edge AI Co-Processor
Product Brief

The AKD1500 is an Edge AI acceleration co-processor built on the Akida™ 1 Neuromorphic processing engine. It accelerates most available neural network models using a highly energy-efficient, event-based, and purely digital, neuromorphic processing architecture. It has built-in capabilities to learn on-device, enabling secure application personalization, without the need for a Cloud connection or retraining. BrainChip's unique MetaTF™ software flow enables developers to compile and optimize their chosen models for the AKD1500. The Intelligent Runtime software manages network processing to fully utilize available resources and automatically partitions execution into multiple passes if resources are insufficient. The AKD1500 pairs with a host CPU or MCU to create compact, low-power, portable and intelligent devices for Internet of things (IoT), Industrial, Automotive, Healthcare, Consumer, Smart Home and Smart City applications.

AKD1500 comes in two host-interface variants in the same 7×7 mm FCBGA169 package. **AKD1500 PCIe** (PCIe Gen2 x2 endpoint, SPI host also supported) suits application processors and models that use host memory. **AKD1500 SPI** (single/dual/quad/octal SPI peripheral) pairs with low-power MCUs. Both are offered in Commercial, Industrial and Extended temperature grades.

Key Benefits

- **Designed for Low-Power AI NN Acceleration**
  - Unsurpassed images/second/watt
  - Maximum 800 Effective GOPS at 05 mW/GOP
- **On-Chip Learning**
  - Personalized Edge AI systems
- **Industry Standard Development Environment**
  - TensorFlow/Keras and Pytorch APIs
- **Cost Effective**
  - 22 nm FD-SOI CMOS digital logic process
  - 7x7 mm FCBGA169 package, 0.5 mm pitch

Applications Areas

- **Personalized Learning Edge AI Systems**
- **Edge AI Vision Systems**
  - ADAS/AV
  - Vision Guided Robotics
  - Drones
  - Video Surveillance
- **Industrial Internet of Things**
  - Environmental monitoring/control
  - Predictive maintenance
- **Smart Home**
  - Appliances
  - Speakers
  - Voice Control

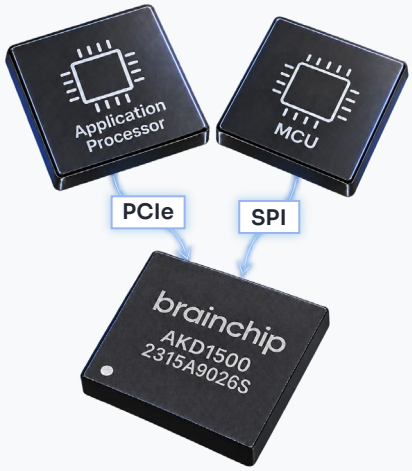


Specifications

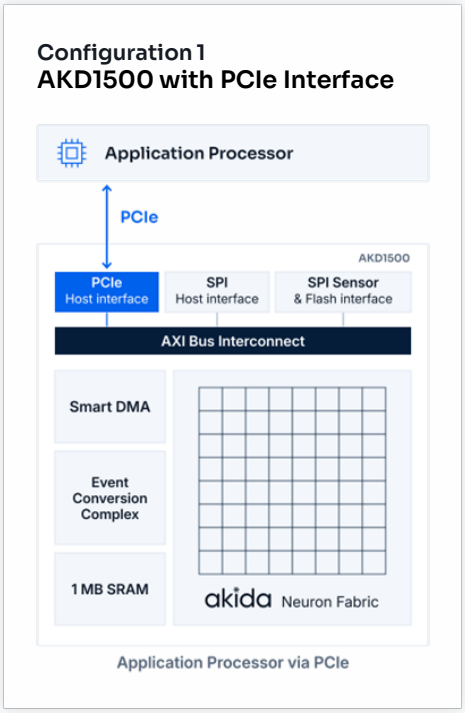
- **Akida 1.0 neural fabric:** 8 nodes, 32 NPUs
- 24-bit data-to-events converter
- 1 MB on-chip SRAM
- **Host interface:** PCIe Gen2 x2 (PCIe variant) or SPI S/D/Q/O (SPI variant)
- **Memory expansion:** SPI D/Q/O, SDR/DDR, HyperBus
- Core clock up to 400 MHz (varies by SKU)
- **Supplies:** 0.8 V core, 1.8 V I/O (+3.3 V PCIe)

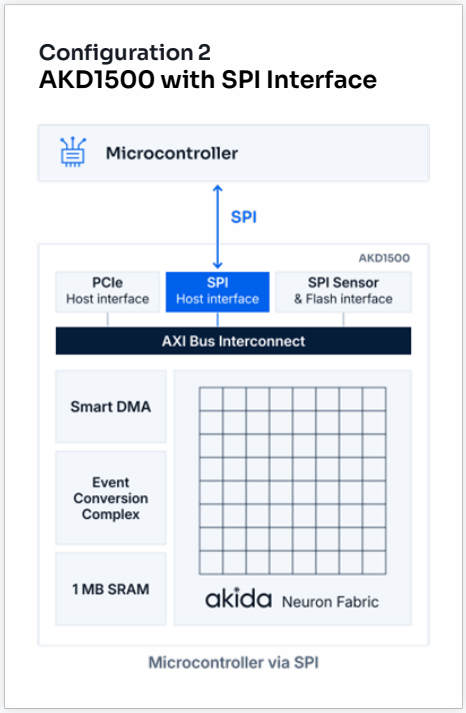
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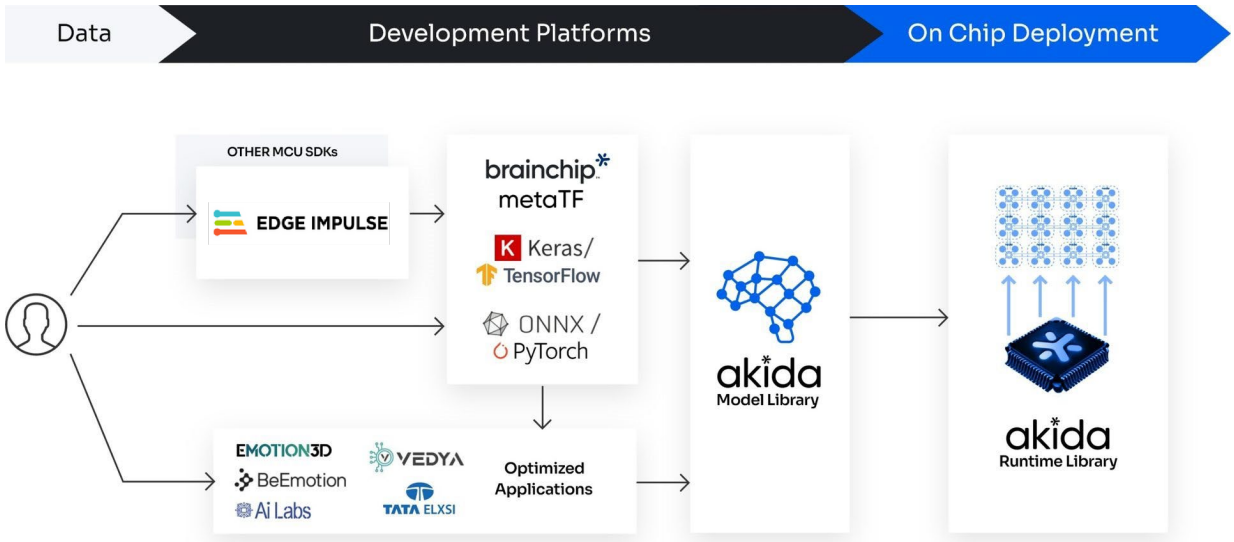
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Two Ways to Integrate the AKD1500 Co-Processor







Model Development Methodology

The Akida co-processor offers support for complex neural processing with compelling performance-per-watt at the Edge. Akida is an event-based neural networks processor, it is therefore taking advantage of activation sparsity, further reducing power consumption. It supports today's models and networks and leverages the benefits of event-based processing. Entire neural networks can be placed into the fabric, removing or minimizing the need to swap weights in and out of DRAM, which reduces power and increases throughput.

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