

### BrainChip's Akida PCIe Card, powered an AKD1000 Edge SoC

Akida AKD1000 PCIe Card accelerates CNN-based neural network models using BrainChip's ultra energy-efficient, and purely digital, event-based processing architecture. The Akida AKD1000 PCIe can be paired with existing Single-Board Computers to enable model development on target, demonstrations and AI applications. It's low power consumption and cost supports the creation of very compact, low-power, compact and intelligent devices for Healthcare, Consumer, Smart Home and AIoT applications. The Akida Runtime software manages network processing to fully utilize available resources and can automatically partition execution into multiple passes.

#### Key Features

- Event-based computing leveraging inherent data and activation sparsity
- Fully configurable neural processing cores, supporting convolutional, separable-convolutional, pooling, and fully connected layers
- On-chip few-shot training
- Programmable data to event converter
- Runs full neural networks in hardware
- On-chip communication via mesh network
- On-chip learning in event domain
- Network size customizable to application needs
- Event-based NPU engines running on a single clock
- PCIe Install Drivers
- 28nm TSMC device



**AKD1000 PCIe Card**

#### AKD1000 PCIe use cases include:

**Smart Factories**

**Security**

**Smart Retail**

**Smart Logistics**

**Smart Cities**

**Automotive**

**Healthcare**

**Transportation**

### Akida Software Development Tools

MetaTF is a complete Akida machine learning framework enabling the seamless creation, training, and testing of neural networks on the Akida AKD1000 Processor. With MetaTF's support for models created with TensorFlow/Keras, users avoid the need to learn a new ML framework while rapidly developing and deploying AI Applications for the Edge. MetaTF supplies tools to convert a model with floating point weights and activations to a model with low bit-width weights and activations while maintaining model performance. These tools also convert quantized models trained using traditional deep learning methods to event-domain models for execution with low-latency and low-power on the Akida Processor.

MetaTF provides the platform-agnostic Akida Runtime with a Hardware Abstraction Layer (HAL) for execution of models on Akida hardware. The Akida runtime also contains a software simulator for model evaluation without Akida hardware.

The Akida Development Platform is the foundation supporting multiple AI Application development and deployment scenarios for users with different levels of AI expertise and network model customization needs. BrainChip supports a range of AI application development platforms - all of which ultimately deploy on the Akida event-based processing engine.

The QuantizeML & Compilation python packages provide tools to quantize Tensorflow/Pytorch models and convert models to the event domain for inference on the Akida Event-based Processor Platform.

### Specifications

Form Factor	PCIe short card
Host Interface	PCIe PHY 2-lane
Memory Interface	LPDDR4 via DMA
NPU	1 x Akida AKD1000
Peak INT4 OPs	1.5 TOPs with 20 Akida Nodes, 78 NPUs
On-Chip Memory	8MB high-speed near-compute SRAM.
Clock Frequency	300MHz
Operating Temperature	0-70
Application Power	1-3 Watts