

Akida 2 Processor IP

Product Brief

BrainChip's Akida[™] Second Generation Fully-Digital, Neuromorphic Processor IP

Akida is a neural processor platform inspired by the cognitive ability and efficiency of the human brain. The second-generation platform can independently perform complex inferencing and learning on extremely low-power AI devices, thus delivering highly accurate, intelligent, responsive, real-time applications with greater reliability and security. A scalable, self-contained co-processor for advanced neural networks. Extends support for advanced networks with spatio-temporal properties.



Platform

Self-contained neural processor

- Scalable fabric of 1-128 nodes
- Each neural node supports 128 MACs
- 8,4,1, bit arithmetic precision
- Programmable activation functions
- Skip connections
- Configurable 50-130K embedded local SRAM
- DMA for all memory and model operations
- Multi-layer execution without host CPU
- AXI bus interface

Efficient algorithmic hybrid mesh

- Performs as Temporal Neural Processor (TNP), spatial Convolutional Neural Processor (CNP) and Fully-connected Neural Processor (FNP)
- Integrates CNNs, Spatio-Temporal, TENNs Buffer networks



Akida 2 Block Diagram

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Akida efficiently accelerates...

- Image and audio classification
- Object detection
- Scene segmentation
- Gesture and face recognition
- State-of-the-art algorithms in sequence prediction
 - Video object detection
 - Human action recognition
 - Raw-audio classification
 - Vital signs prediction

Notable features:

- Supports 8-,4-, and 1-bit weights and activations
- Supports multiple layers simultaneously
- Supports long-range skip connections in hardware

Software development and deployment:

- Akida leverages standard frameworks and development platforms such as TensorFlow/Keras, Pytorch/ONNX and Edge Impulse
- Akida is model-, network-, and OS-agnostic
- BrainChip MetaTF™ supports model development and optimization for Akida hardware
- Akida model zoo offers a set of pre-built Akidacompatible models, pre-trained weights and training scripts
- Akida TENNs models are offered for evaluation

Milliwatts







Microwatts









Specifications

Scalability (256 Neurons)	2	4	8	32	64
TOPS @ 1GHz	.5	1	2	8	16
In-Memory MB	.132-1	.5- 2	0.92- 4	3.8- 16.4	7.6- 32.8
MAC Engine (8x8 MACs)	256	512	1024	4096	8192
CPU Support ARM RISC-V	M-Type MCU 32b MCU	M/A- Series 32b	M/A- Series 32b/64b	A- Series 32/64 b	A-Series Quad 64b
External Memory	DRAM SRAM Flash	DRAM SRAM Flash	DRAM, SRAM, Flash	DRAM SRAM Flash	DRAM, SRAM, Flash

IP Delivery

- Fully synthesizable RTL.
- IP deliverables package with standard EDA tools.
- Complete test bench with simulation results.
- RTL synthesis scripts and timing constraints. Customized IP packaged targeted for your application.
- Run time software C++ library.
- Processor and OS agnostic.