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ANDANTE

**AI for New Devices And Technologies at
the Edge**

D4.6 Design, test and evaluation of Mixed-signal DNN ASICs

Deliverable No.	D4.6	Due Date	30-Nov-2023
Type	Report	Dissemination Level	Confidential
Version	1.0	Status	Final
Description	This deliverable provides the design, test and evaluation of the mixed signal DNN ASICs within ANDANTE project.		
Work Package	WP4 – Implementation of ICs and Platforms.		

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Abstract (Published Summary)

ANDANTE's overarching goal is to leverage innovative hardware accelerators and associated platforms for artificial neural networks (ANN) and spiking neural networks (SNN) as a basis for future products in the Edge domain. IoT. The focus of WP4 "Implementation of Integrated Circuits and Platforms" is the development of ASICs, SoCs and neuromorphic platforms, based on the use cases and system requirements defined in WP1 "Description use case system architectures and application requirements" and implemented in WP5 "Applications". Integration, Validation and Evaluation". Additionally, ASIC developments from WP4 will also consider the silicon technologies covered in WP2 "New Memory Technologies for AI Applications" as well as the hardware building blocks and core IPs defined by WP3 "AI Building Blocks, Methods and Tools."

This deliverable is part of WP4 Task 4.3, which targets the implementation of multiple mixed signal ASICs for ANN application. First, it details the design of ASICs. Second, the deliverable defines the ASIC characterization methods and test bench. Finally, it shows the measurement results and a state-of-the-art comparison.

The following table lists mixed-signal neuromorphic ASICs for Edge Computing solutions.

AI Components	ANDANTE ID	Description	Technology	Design Owner
Mixed-signal ANN	ASIC 3.1	Inference accelerator with a multi-core architecture using analog in-memory computing; targeting voice activity detection (VAD)	22nm FDX	Fraunhofer IIS and EMFT
Mixed-signal ANN	ASIC 3.1b	FeFET based inference accelerator targeting on people counting and people tracking use case	28nm FeFET	Fraunhofer IPMS
Mixed-signal ANN	ASIC 3.2	Analogue neuronal network (aNN) for tinyML applications. To be evaluated in the context of one-key-word-spotting for a limited amount of accents	28nm CMOS with RRAM	Infineon