

# Arm Ethos-U Processor Series

## microNPU

arm

Product Brief

### KEY FEATURES & BENEFITS

#### + Performance Efficiency

Unlock new vision, voice, and vibration use cases with minimal impact to existing design across a wide range of ML performance requirements (GOP/s to TOP/s).

#### + Flexible Integrations

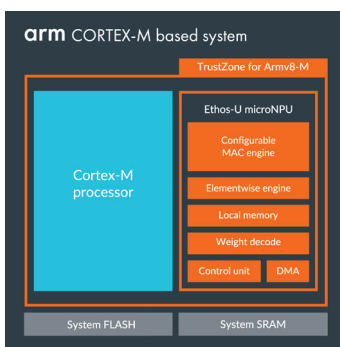
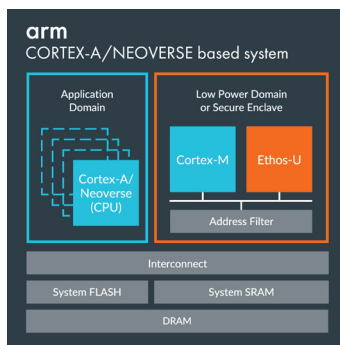
Build low cost, highly efficient systems in high-performance Cortex-A and Neoverse systems, and low-power Cortex-M embedded systems.

#### + Optimized Design

Highly optimized with integrated DMA, MAC array, and element wise engines.

#### + Unified Software and Tools

Develop, deploy and debug AI applications with the Arm Endpoint AI solution using a common toolchain across Arm Cortex and Ethos-U processors.



Ethos-U65 can target numerous different applications with use in high-performance Cortex-A and Neoverse systems or low power Cortex-M based embedded devices.

## Unlock a New World of AI Applications into Edge and Endpoint Devices

Build low-cost, highly efficient AI solutions in a wide range of embedded devices with Arm's Ethos-U microNPUs which enable systems based on Arm Cortex and Arm Neoverse. Ethos-U provides a scalable range of performance and memory interfaces and integrates low-power Cortex-M SoCs, as well as SoCs based on high-performance Arm Cortex-A, Cortex-R, and Arm Neoverse. Develop, deploy, and debug AI applications with the Arm endpoint AI solution using a common toolchain across Arm Cortex and Ethos-U processors.

### Highlights

#### + Energy Efficient

Provides up to 90% energy reduction for ML workloads, such as ASR, compared to previous Cortex-M generations.

#### + Network Support

Flexible design supports a variety of popular neural networks, including CNNs and RNNs, for audio processing, speech recognition, image classification, and object detection.

#### + Future-Proof Operator Coverage

Heavy compute operators run directly on the micro NPU, such as convolution, LSTM, RNN, pooling, activation functions, and primitive element-wise functions. Other kernels run automatically on the tightly coupled Cortex-M using CMSIS-NN.

#### + Reduce Memory Footprint

Up to 70% reduction in model size with compression allows for the execution of larger networks and speeds up the execution of networks.

#### + Offline Optimization

Offline compilation and optimization of neural networks, performing operator, and layer fusion, as well as layer reordering to increase performance and reduce system memory requirements by up to 90%. Delivers increased performance and lower power compared to non-optimized ordering.

#### + Develop Multiple Products

Target multiple markets with a single processor IP architecture that provides the system flexibility to configure the performance and desired memory system and OS.

#### + Quickly Create Applications

Accelerate time to market by leveraging the Arm AI ecosystem with partners developing optimized algorithms ahead of hardware availability.

## KEY USE CASES FOR THE ETHOS-U PROCESSOR SERIES

- + Object classification
- + Object detection
- + Face detection/identification
- + Human pose estimation
- + Image segmentation
- + Image beautification
- + Super resolution
- + Speech recognition
- + Sound recognition
- + Noise cancellation
- + Speech synthesis
- + Language translation
- + Natural Language Processing

## Specifications

		Ethos-U55	Ethos-U65
Key Features	Performance (At 1 GHz)	64 to 512 GOP/s	512 GOP/s to 1 TOP/s
	MACs (8x8)	32, 64, 128, 256	256, 512
Memory System	Internal SRAM	18 to 50 KB	55 to 104 KB
	System Interfaces	Two 64-bit AXI	Two 128-bit AXI
	External Memory	SRAM and Flash	SRAM, DRAM, and/or FLASH
Development Platform	Recommended Host CPU	Cortex-M55, Cortex-M7, Cortex-M4, Cortex-M33	Cortex-M55, Cortex-M7
	Operating Systems	Bare-metal or RTOS	Bare-metal, RTOS, or Linux

## MARKET SEGMENTS



Mobile



Smart Camera



Smart Home



STB/DTV



Consumer



AR/VR



Medical



Robotics



Drones



Rich IoT



Automotive IVI/ADAS



Infrastructure

To find out more about the Ethos-U processor series, visit [developer.arm.com/ethos-u](https://developer.arm.com/ethos-u)