# Modalix MLSoC


## Overview

Modalix is the first multi-modal, machine-learning system-on-a-chip (MLSoC) designed for scalable physical AI applications. Allowing local AI processing rather than relying on the cloud.

Modalix is purpose build for executing generative artificial intelligence (GenAI) inference, computer vision, and machine learning (ML) inference utilizing a pipeline architecture with a highly programmable ML accelerator assisted by the on-chip Arm™ application processor (APU) and a Digital Signal Processor (DSP), which serves as a Computer Vision Unit (CVU). The Modalix chip delivers 25 to 50 Tera Operations per Second (TOPS) in an incredibly compact and low-power 25mmx25mm package.

The Modalix innovative system architecture seamlessly integrates a set of compute engines and peripherals, delivering best-in-class performance per watt for advanced workloads, including multimodal Transformers, Large Language Models (LLMs), Large Multimodal Models (LMMs), and Generative AI (GenAI). It also maintains full support for legacy convolutional neural networks (CNNs) and traditional computer vision algorithms, ensuring broad compatibility across both modern and established ML pipelines.

## Modalix MLSoC Key Features

- 8x ARM Cortex-A65 @ 1.4GHz
- 4 x LPDDR5 memory interfaces
  - Flexible 128-bit memory interface supporting 4 x 32 LPDDR 5/4x/4 or 2 x64 LPDDR5/4x/4 configuration with a maximum speed of 6400 Mbps (LPDDR5)
- x8 PCIe Gen5 root-complex and endpoint, with bifurcation
- 4 x 10G Ethernet interfaces
- 4 x MIPI CSI-2 interfaces
- MIPI CSI-2 in 4 x 4 configuration
- Video encode/decode engines for H.264/265 up to 4K60
- ARM Mali-C71AE operating at 1.2GHz and support for 24-bit Wide Dynamic
- Computer Vision Unit (CVU) – Quad-core Synopsys ARC EV74 video processor, operating at 1GHz quad-core, delivering up to 720 16-bit GOPS
- Secure boot and security block
- Boot and security unit (BSU)
  - HW secure boot engine ensuring “chain of trust”, decrypting and authenticating of the boot image with OTP secure keys

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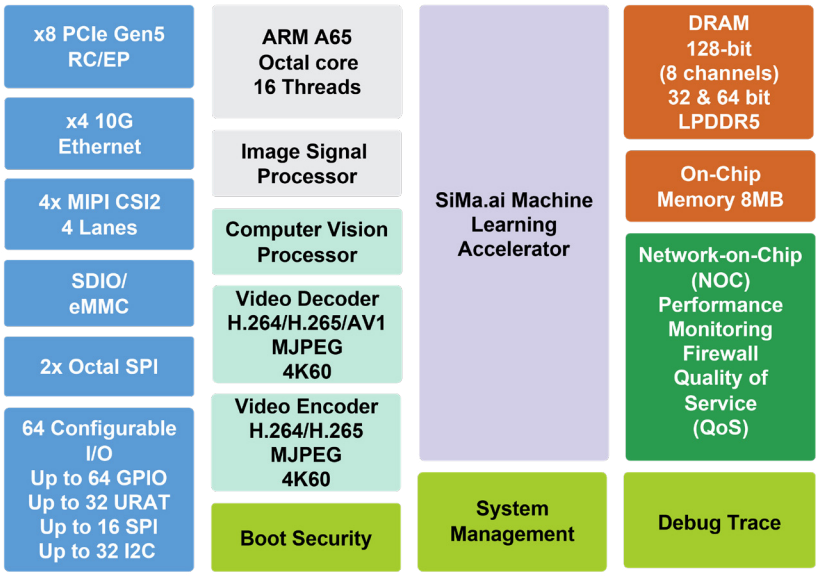
## Modalix Architecture




All architectural building blocks are seamlessly integrated via an **internal, secure Network-on-Chip (NoC)** architecture.

Developing AI solutions with Modalix is streamlined through the **SiMa.ai ONE Platform**, which includes the **Palette software suite**. Palette enables unified programming of the APU, CVU, and ML accelerators utilizing end-to-end pipelines, tailored for applications such as:

- Smart Vision
- Drones
- Robotics
- Industry 4.0
- Automotive
- Smart Retail
- Healthcare
- Military & Defense
- Smart City

## Accelerated Development

SiMa.ai's ONE Platform™ enables fast AI development and deployment on device. With its user-friendly Palette™ software suite and Edgematic, users enjoy efficient, streamlined workflows.

Bring your ONNX model, tune it with SiMa's Model SDK and develop applications using popular frameworks, like OpenCV. Developers can iterate quickly and flexibly across various AI applications.

## Ordering Information

| Description | Package |
|---|---|
| Modalix Chip Packaged - ComTemp (0 - +70C) 50TOPS | FCBGA (1369 balls) package, 25mm × 25mm |
| Modalix Chip Packaged - IndTemp (-40 - +85C) 50TOPS | FCBGA (1369 balls) package, 25mm × 25mm |

## About SiMa

SiMa.ai is a leader in Physical AI, delivering a purpose-built, software-centric platform that brings best-in-class performance, power efficiency, and ease of use to Physical AI applications. Focused on scaling Physical AI across robotics, automotive, industrial automation, aerospace & defense, smart vision, and healthcare, SiMa.ai is led by seasoned technologists and backed by top-tier investors. Headquartered in San Jose, California.
Learn more at www.sima.ai.

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