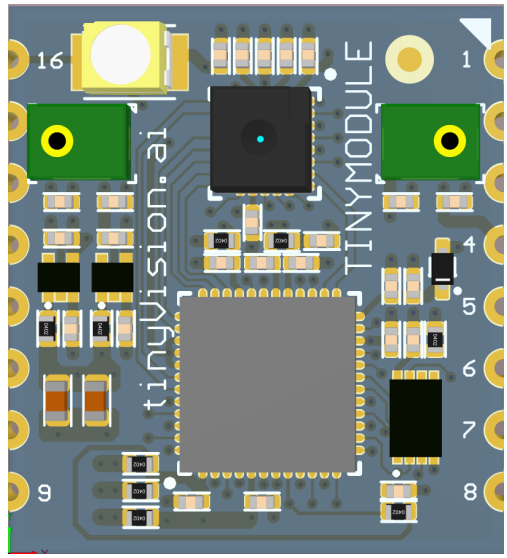
tinyVision.ai

Embedded Computer Vision Module



22.5 mm

20.3 mm

Key Benefits

- **Integrated low cost/power solution for embedded Computer Vision and Audio**
- **qVGA (320x240) resolution, monochrome, global shutter imager, IR LED for illumination**
- **On board Computer Vision processing**
- **On board 4Mb SPI flash to store FPGA and firmware images, 64Mb SRAM**
- **Microphone and 6 axis IMU for sensor fusion**
- **Easy to use API over 4 wire SPI port**

tinyModule

The tinyModule enables embedded Computer Vision and sensor applications by tightly integrating a low power monochrome imager, ultra low power FPGA, Flash and SRAM in a small form factor, low cost module. The imager has excellent low light performance and is augmented by an IR LED for illumination under low light conditions. Audio applications are supported by a MEMS microphone and motion processing by a 3-axis Accelerometer/Gyroscope.

The module supports the Lattice SensAI© framework implementing Binary and Convolutional Neural Nets for object recognition

On-board CV algorithms include machine vision tuned auto exposure, raw image and video capture (limited resolution), intelligent motion detection and object recognition. Other CV and audio processing on the device can be supported on request.

Typical applications include interactive toys, human presence trigger for surveillance and security, AR/VR devices.

Key Specifications

Temperature

All parts specified to commercial temperature range of 0-85C

Reflow compatible module

Optical Performance

320 x 240 monochrome imager with 3x3 um pixels for excellent low light performance

Horizontal FoV: 72 deg

Vertical FoV: 54 deg

Light sensitivity: TBD

On board IR LED for active illumination, exposure synchronization for external illumination.

Dimensions

20.3mm x 22.5mm SoM. Castellated board edge connections for direct soldering on main board to eliminate connectors. Alternative of a high density board-board/flex mount connector.

Power

Single 3.3V supply. On board regulators can source 1.2V, 2.8V at low currents to the host.

On-board FPGA and Memory

Ultra low power Lattice iCE40UP5K FPGA with 5K LUT's

4 Mb high speed flash to load FPGA images and firmware, 64Mb qSPI IoT SRAM for processing

Audio and IMU

I2S digital MEMS microphone for Audio applications

3 axis accelerometer/Gyro for motion processing

Reference

Soft core RISCV based design with DMA offload for data paths and hardware acceleration of commonly used ML functions.

Interfaces

Interrupt driven 4 wire SPI port for the host interface.

Programmable GPIO.

Firmware

Open source processor and toolchain allow user applications to be integrated directly into the firmware

Algorithms (under development)

Machine vision optimized Auto Exposure Correction

Raw image access

Compressed video

Intelligent motion detection with compressed video capture

Video and audio signal capture on external trigger

TensorFlow and Lattice SensAI© for AI development

Other algorithms can be developed on request.

Developer Board

Breaks out all module IO, USB based programming and debug interface to develop firmware and FPGA download

Power measurement capability

Wifi/BLE connectivity

Sample end-end application demonstrating various module features