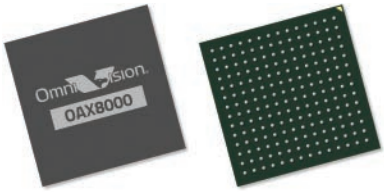


OAX8000 automotive video processor product brief

lead free

available in a lead-free package

Dedicated Driver Monitoring System ASIC with Integrated AI Neural Processing Unit, Image Signal Processor and DDR3 Memory

OmniVision's OAX8000 is an AI-enabled, automotive application-specific integrated circuit (ASIC) optimized for entry-level, stand-alone driver monitoring systems (DMS). The OAX8000 uses a stacked-die architecture to provide on-chip DDR3 SDRAM memory (1GB). It also integrates a neural processing unit (NPU) and image signal processor (ISP), which provides dedicated processing speeds up to 1.1 trillion operations per second for eye gaze and eye tracking algorithms. These fast processing speeds with 1K MAC of convolutional neural network (CNN) acceleration, along with integrated SDRAM, enable the lowest power consumption available for DMS systems—the OAX8000 and OmniVision automotive image sensor consume just 1 watt in typical conditions, combined. This integration also reduces the board area for the engine control unit (ECU).

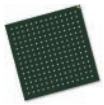
The OAX8000's on-chip NPU is supported by the popular TensorFlow, Caffe, MXNet and ONNX tool chains. Additionally, this ASIC embeds quad Arm® Cortex® A5 CPU cores with Neon™ technology for accelerated video encoding/decoding and on-chip video analytics algorithms, along with hardware for image processing, video encoding and RGB/IR processing. Its high dynamic range (HDR) processing capability allows the ASIC to accept input from RBG/IR image sensors and support high quality output, for videos taken during the day or at night, in conditions with widely contrasting bright and dark images. The integrated video encoder accepts up to 5 megapixel captures from OmniVision's automotive image sensors, and outputs up to 2K resolution video at 30 frames per second (fps).

Boot-up time for the OAX8000 is significantly faster than its nearest competitor. This rapid startup eliminates any delay between ignition and activation of the DMS camera. Additionally, it supports secure boot features to provide cybersecurity.

Find out more at www.ovt.com.

OmniVision

OAX8000



Applications

- Automotive
  - Driver Monitoring System (DMS)
  - In-cabin Monitoring System (IMS)

Technical Specifications

- **power supply:**
  - **core:** 0.9V
  - **analog:** 1.8V
  - **DDR I/O:** 1.35V (DDR3L)
  - **I/O:** 1.8V/3.3V
  - **PLL:** 1.8V
- **temperature range:**
  - **automotive grade operational temperature:** -40°C to +105°C ambient temperature and -40°C to +125°C junction temperature
- **package dimensions:** 10 mm x10 mm

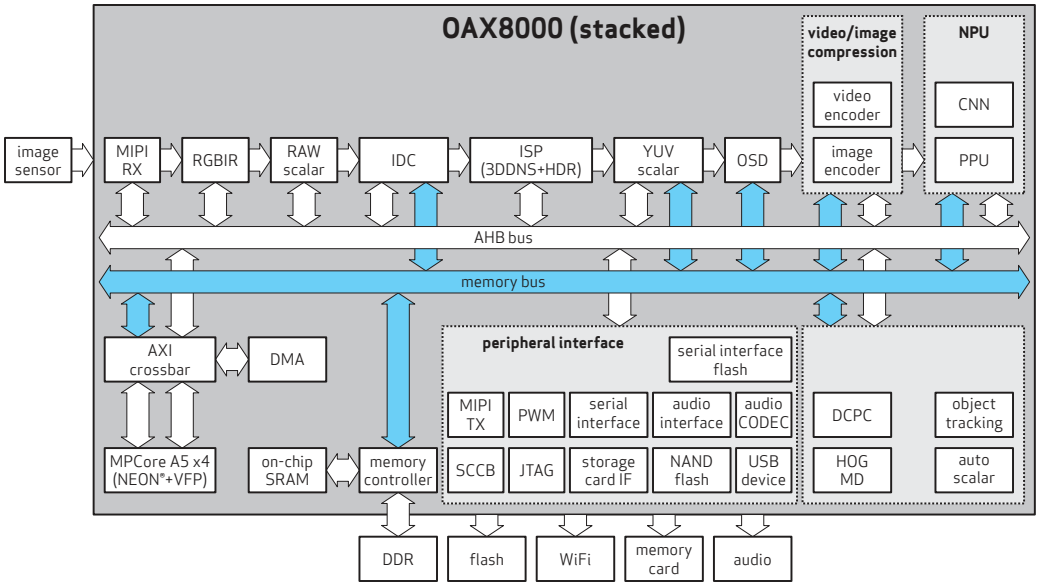
Ordering Information

- **OAX8000-U96G-1A-Z** (lead-free)
  196-pin BGA

Product Features

- general features
  - highly integrated, extreme low power and fast boot up AI video processor with neural network (CNN) accelerator
- camera interfaces
  - MIPI receiver: one 4-lanes, two 2-lanes
  - supports up to 5 Mpixel image sensor
  - SCCB master to access image sensor
- image signal processor
  - RGB-Ir processing
  - HDR processing
  - dual-sensor 12-bit RAW to YUV processing
  - adjustable AEC/AGC, AWB, and auto focus
  - color correction/adjustment, gamma correction, and contrast adjustment
  - 16x16 zone lens shading correction and online color shading correction
  - lens distortion and perspective correction
  - defective pixel correction
  - mirror and flip
  - supports up to 4x digital zoom
  - 3D/2D de-noise filter
- video engine
  - supports single-stream video recording with a maximum resolution of up to 5 megapixels
  - supports dual-video-stream recording with one 4 megapixels stream and one 2 megapixels stream
  - rate control to support variable and constant bit rates
- video processing
  - cropping and scaling
  - de-warping and rotation
- neural network accelerator
  - 1K MAC NPU
  - pixel processor (SIMD) for pixel processing in CNN inference layer, and control of neural processing unit
- USB device
  - USB 2.0 HS/FS device controller
- video analytics
  - built-in advanced motion-detection engine
  - built-in object tracking accelerator
- display interface
  - supports MIPI two-lane transmitter
  - supports on-screen-display (OSD) and scaling functions
- still picture
  - supports still picture capture up to 5 megapixels
  - supports still picture compression
- storage interfaces
  - one storage I/O peripheral interface, that can be used for an external WiFi module
  - one storage card peripheral interface
  - NAND flash parallel interface for 8-bit and 16-bit, with up to 8-bit BCH ECC
  - NAND flash serial interface, with or without ECC engine
- audio CODEC and audio engine
  - built-in 16-bit sigma delta ADC and 16-bit mono DAC, with full-duplex audio, AGC and echo/ noise cancellation
  - embedded audio engine for audio recording and playback
  - full-duplex audio serial interface support left/right 16-bit data mode
  - supports various audio formats
- security engine
  - supports AES/DES/3DES encryption/decryption
  - supports secure boot
- embedded microcontrollers
  - quad core ARM® Cortex® A5, each with NEON® and FPU, 32KB I-cache, 32KB D-cache
- DDR-SDRAM controller
  - DDR3L 16-bits wide
- miscellaneous
  - UART, timers, watchdog timer, general-purpose I/O, JTAG

Functional Block Diagram



4275 Burton Drive
Santa Clara, CA 95054
USA

Tel: + 1 408 567 3000
Fax: + 1 408 567 3001
www.ovt.com

Version 1.0, December 2020