



Coral System-on-Module (SoM) - 2GB RAM Version

SKU 102110459

The Coral System-on-Module (SoM) is a fully-integrated system that helps you build embedded devices that demand fast machine learning (ML) inferencing. It contains NXP's iMX8M system-on-chip (SoC), eMMC memory, LPDDR4 RAM, Wi-Fi, and Bluetooth, but its unique power comes from Google's Edge TPU coprocessor for high-speed machine learning inferencing.

- Coral SoM - 1GB RAM Version
- Coral SoM - 2GB RAM Version**
- Coral SoM - 4GB RAM Version

Tags Coral Google Coral Tensor Processing Unit SoM Coral SoM

Product Details Wiki & Learn Reviews

Description

Documents Certification

Description

Attention
This product has shipping restriction to certain countries. It can only be sent to countries and regions listed as below: United States, Japan, Korea, Hong Kong, Taiwan, Australia, New Zealand, India, Ghana, Singapore, Oman, Philippines, Thailand, Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Fiji, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom, Switzerland, Iceland, Liechtenstein, Norway, Turkey

Features

- Provides a complete system:** The Coral SoM is a fully-integrated Linux system that includes NXP's iMX8M system-on-chip (SoC), eMMC memory, LPDDR4 RAM, Wi-Fi, and Bluetooth, and the Edge TPU coprocessor for ML acceleration. It runs a derivative of Debian Linux we call Mendel.
- Performs high-speed ML inferencing:** The onboard Edge TPU coprocessor is capable of performing 4 trillion operations (tera-operations) per second (TOPS), using 0.5 watts for each TOPS (2 TOPS per watt). For example, it can execute state-of-the-art mobile vision models such as MobileNet v2 at 400 FPS, in a power-efficient manner.
- Integrates with your custom hardware:** The SoM connects to your own baseboard hardware with three 100-pin connectors.
- Supports TensorFlow Lite:** No need to build models from the ground up. TensorFlow Lite models can be compiled to run on the Edge TPU.
- Supports AutoML Vision Edge:** Easily build and deploy fast, high-accuracy custom image classification models to your device with AutoML Vision Edge.

Description

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The Edge TPU is a small ASIC designed by Google that provides high-performance ML inferencing with a low power cost. For example, it can execute state-of-the-art mobile vision models such as MobileNet v2 at almost 400 FPS, in a power-efficient manner. This on-device processing reduces latency, increases data privacy, and removes the need for a high-bandwidth connection used to perform ML inferencing in the cloud.

Key benefits of the SoM:

- High-speed and low-power ML inferencing (4 TOPS @2 W)
- A complete Linux system (running Mendel, a Debian derivative)
- Small footprint (40 x 48 mm)

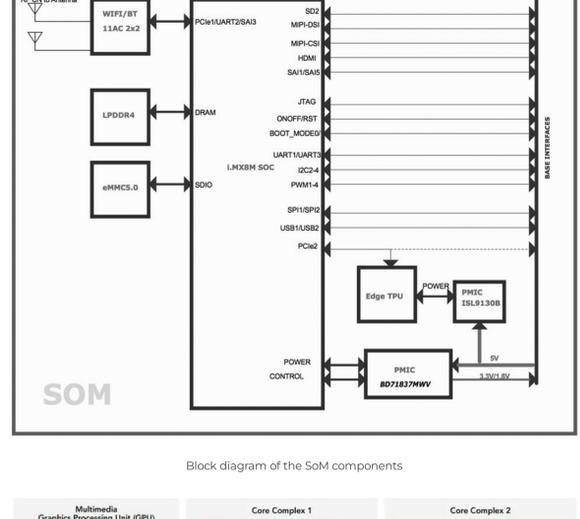
The SoM is also included in the [Coral Dev Board](#), which is a single-board computer that enables fast prototyping and evaluation of the standalone SoM.

Specifications

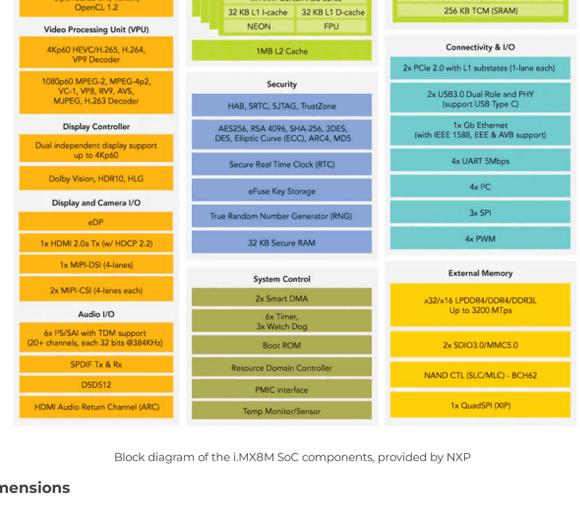
- NXP i.MX8M SoC
- Quad-core ARM Cortex-A53, plus Cortex-M4F
- 2D/3D Vivante GC7000 Lite GPU and VPU
- Google Edge TPU ML accelerator
- Cryptographic coprocessor
- Wi-Fi 2x2 MIMO (802.11b/g/n/ac 2.4/5 GHz)
- Bluetooth 4.2
- 8GB eMMC
- 2GB LPDDR4
- USB 3.0
- Gigabit Ethernet
- HDMI and MIPI-DSI
- MIPI-CSI-2
- Up to 95x GPIO (including SPI, I2C, PWM, UART, SAI, and SDIO)

Feature	Details
Main system-on-chip (i.MX8M)	
Arm Cortex-A53 MPCore platform	Quad symmetric Cortex-A53 processors: <ul style="list-style-type: none"> 32 KB L1 Instruction Cache 32 KB L1 Data Cache Support L1 cache RAMs protection with parity/ECC Support of 64-bit Armv8-A architecture: <ul style="list-style-type: none"> 1 MB unified L2 cache Support L2 cache RAMs protection with ECC Frequency of 1.5 GHz
Arm Cortex-M4 core platform	<ul style="list-style-type: none"> 16 KB L1 Instruction Cache 16 KB L1 Data Cache 256 KB tightly coupled memory (TCM)
Graphic Processing Unit (GPU)	<ul style="list-style-type: none"> Vivante GC7000Lite 4 shaders 267 million triangles/sec 1.6 Gigapixel/sec 3.2 GFLOPs 32-bit or 64 GFLOPs 16-bit Supports OpenGL ES 1.1, 2.0, 3.0, 3.1, Open CL 1.2, and Vulkan
Video Processing Unit (VPU)	<ul style="list-style-type: none"> 4Kp60 HEVC/H.265 main, and main 10 decoder 4Kp60 VP9 and 4Kp30 AVC/H.264 decoder (requires full system resources) 1080p60 MPEG-2, MPEG-4p2, VC-1, VP8, RV9, AVS, MJPEG, H.263 decoder
I/O connectivity	<ul style="list-style-type: none"> 2x USB 3.0/2.0 controllers with integrated PHY interfaces 1x Ultra Secure Digital Host Controller (USDHC) interfaces 1x Gigabit Ethernet controller with support for EEE, Ethernet AVB, and IEEE 1588 2x UART modules 2x I2C modules 2x SPI modules 16x GPIO lines with interrupt capability 4x PWM lines Input/output multiplexing controller (IOMUXC) to provide centralized pad control Note: The list above is the number of signals available to the baseboard (after considering SoC signals used by the SoM).
On-chip memory	<ul style="list-style-type: none"> Boot ROM (128 KB) On-chip RAM (128 KB + 32 KB)
External memory	<ul style="list-style-type: none"> 32/16-bit DRAM interface: LPDDR4-3200, DDR4-2400, DDR3L-1600 8-bit NAND-Flash eMMC 5.0 Flash SPI NOR Flash QuadSPI Flash with support for XIP
Display	HDMI Display Interface: <ul style="list-style-type: none"> HDMI 2.0a supporting one display up to 1080p Upscale and downscale between 4K and HD video (requires full system resources) 20+ Audio interfaces 32-bit @ 384 kHz fs, with Time Division Multiplexing (TDM) support SPDIF input and output Audio Return Channel (ARC) on HDMI MIPI-DSI Display Interface: <ul style="list-style-type: none"> MIPI-DSI 4 channels supporting one display, resolution up to 1920 x 1080 at 60 Hz LCDIF display controller Output can be LCDIF output or DC display controller output
Audio	<ul style="list-style-type: none"> 1x SPDIF input and output 2x synchronous audio interface (SAI) modules supporting I2S, AC97, TDM, and codec/DSP interfaces 1x SAI for 8 Tx channels for HDMI input audio 1x SPDIF input for HDMI ARC input
Camera	<ul style="list-style-type: none"> 2x MIPI-CSI2 camera inputs (4-lane each)
Security	<ul style="list-style-type: none"> Resource Domain Controller (RDC) supports four domains and up to eight regions Arm TrustZone (TZ) architecture On-chip RAM (OCRAM) secure region protection using OCRAM controller High Assurance Boot (HAB) Cryptographic acceleration and assurance (CAAM) module Secure non-volatile storage (SNVS): Secure real-time clock (RTC) Secure JTAG controller (SJC)
ML accelerator	
Edge TPU coprocessor	<ul style="list-style-type: none"> ASIC designed by Google that provides high-performance ML inferencing for TensorFlow Lite models Uses PCIe and I2C/GPIO to interface with the iMX8M SoC 4 trillion operations per second (TOPS) 2 TOPS per watt
Memory and storage	
Random-access memory (SDRAM)	<ul style="list-style-type: none"> 2 GB LPDDR4 SDRAM (4-channel, 32-bit bus width) 1600 MHz maximum DDR clock Interfaces directly to the iMX8M build-in DDR controller
Flash memory (eMMC)	<ul style="list-style-type: none"> 8 GB NAND eMMC flash memory 8-bits MMC mode Conforms to JEDEC version 5.0 and 5.1
Expandable flash (MicroSD)	<ul style="list-style-type: none"> Meets SD/SDIO 3.0 standard Runs at 4-bits SDIO mode Supports system boot from SD card
Network & wireless	
Ethernet	<ul style="list-style-type: none"> 10/100/1000 Mbps Ethernet/IEEE 802.3 networks Reduced gigabit media-independent interface (RGMI)
Wi-Fi	Murata LBEE5U91CQ module: <ul style="list-style-type: none"> Wi-Fi 2x2 MIMO (802.11a/b/g/n/ac 2.4/5 GHz) Supports PCIe host interface for W-LAN
Bluetooth	Murata LBEE5U91CQ module: <ul style="list-style-type: none"> Bluetooth 4.2 (supports Bluetooth low-energy) Supports UART interface
Security	
Cryptographic coprocessor	Microchip ATECC608A cryptographic coprocessor: <ul style="list-style-type: none"> Asymmetric (public/private) key cryptographic signature solution based on Elliptic Curve Cryptography and ECDSA signature protocols
Hardware interface	
Baseboard connectors	3x 100-pin connectors (Hirose DF40C-100DP-0.4V)
Antenna connectors	2x coaxial cable connectors (Murata MM8930-2600)

Block Diagrams

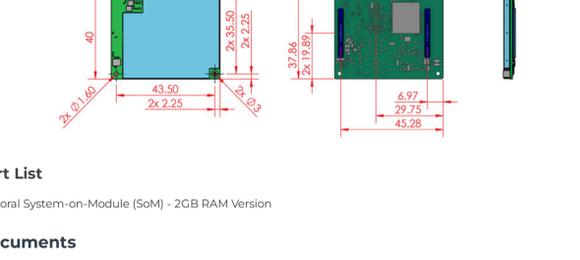


Block diagram of the SoM components



Block diagram of the iMX8M SoC components, provided by NXP

Dimensions



Part List

1x Coral System-on-Module (SoM) - 2GB RAM Version

Documents

- System-on-Module datasheet
- Get started with the System-on-Module
- Model compatibility on the Edge TPU
- Edge TPU inferencing overview
- Run multiple models with multiple Edge TPUs
- Pipeline a model with multiple Edge TPUs
- Edge TPU compiler
- Pre-compiled models

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