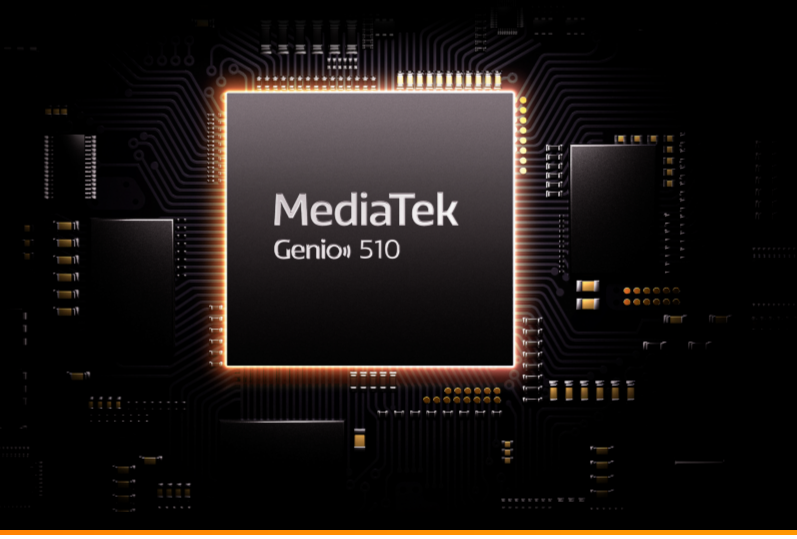
MediaTek Genio 510

Powering Mainstream IoT Applications with Rich Multimedia and Edge AI



Key Overview

The MediaTek Genio 510 is a versatile, 6nm, mainstream edge AI platform for demanding IoT applications. It provides a strong computing capability with a hexa-core CPU cluster, consisting of 2x Arm Cortex-A78 performance and 4x Arm Cortex-A55 efficiency cores; a powerful Arm Mali G57 MC2 GPU with 3D acceleration, and a 5th generation MediaTek NPU (Neural Processing Unit) capable of 3.2 TOPS for edge AI acceleration. Rich multimedia applications are supported by dual display capability, integrated camera ISP supporting up to 32MP@30fps, 4K video decode/encode and an integrated HiFi 5 DSP for audio algorithm processing.

With a rich I/O capability that includes PCIe 2.0, multiple USB and GbE MAC, and multiple UART/I2C/SPI connections, the Genio 510 provides a flexible and scalable platform for many applications. Various wireless connectivity options are supported with external combo chips and modules including 2x2 Wi-Fi 6 and Bluetooth 5 support. The Genio 510 is pin-to-pin and software compatible with the higher-performance Genio 700 allowing for a seamless upgrade path. Android, IoT Yocto, and Ubuntu OS support provides developers with the flexibility to create scalable IoT and intelligent embedded solutions.

Target Applications

- Home automation & smart home hubs
- Smart retail kiosks
- AI-driven digital signage
- Industrial HMI
- Industrial edge AI devices
- Fleet & traffic management
- Smart parking & charging systems
- Enterprise video conferencing
- Multimedia streaming devices
- Healthcare & remote patient monitoring

Highlights

Power-Efficient Edge AI Platform

Built on TSMC's advanced 6nm process, the platform features 2x Arm Cortex-A78 and 4x Arm Cortex-A55 cores, each operating at up to 2.0GHz. This heterogeneous computing architecture delivers enhanced performance for compute-intensive edge applications while maintaining power efficiency for sustained operation.

Advanced Multimedia and Graphics

Equipped with an Arm Mali-G57 MC2 GPU and image signal processor, the MediaTek Genio 510 supports up to 4K resolution displays and multi-camera configurations up to 32 MP. It offers advanced multimedia capabilities, including video encoding and decoding, and supports a wide range of display and camera applications.

Flexible and Scalable Platform – Pin Compatible with Genio 700

The Genio 510 is pin-compatible with the Genio 700, providing enhanced design flexibility. It also supports consumer & industrial temperature ranges, as well as a 10-year longevity guarantee, making it suitable for a variety of demanding environments.

Advanced AI and Neural Processing

The platform incorporates a MediaTek 5th generation NPU that can deliver up to 3.2 TOPS for edge AI acceleration, and a Candence Tensilica VP6 DSP tailored for visual applications. These enable real-time, low-latency AI inference at the edge for applications like object detection, image classification, and speech recognition, reducing reliance on cloud-based processing.

Enhanced Connectivity

Equipped with powerful interfaces like PCIe 2.0, USB 3.2/2.0, GbE MAC, and multiple UART/I2C/SPI connections, the Genio 510 allows for scalability and expansion to a wide array of IoT applications.

Multi-OS Support

With support for Android, AOSP, IoT Yocto and Ubuntu operating systems and a rich ecosystem of partners, the Genio 510 can support a wide variety of applications & use-cases.

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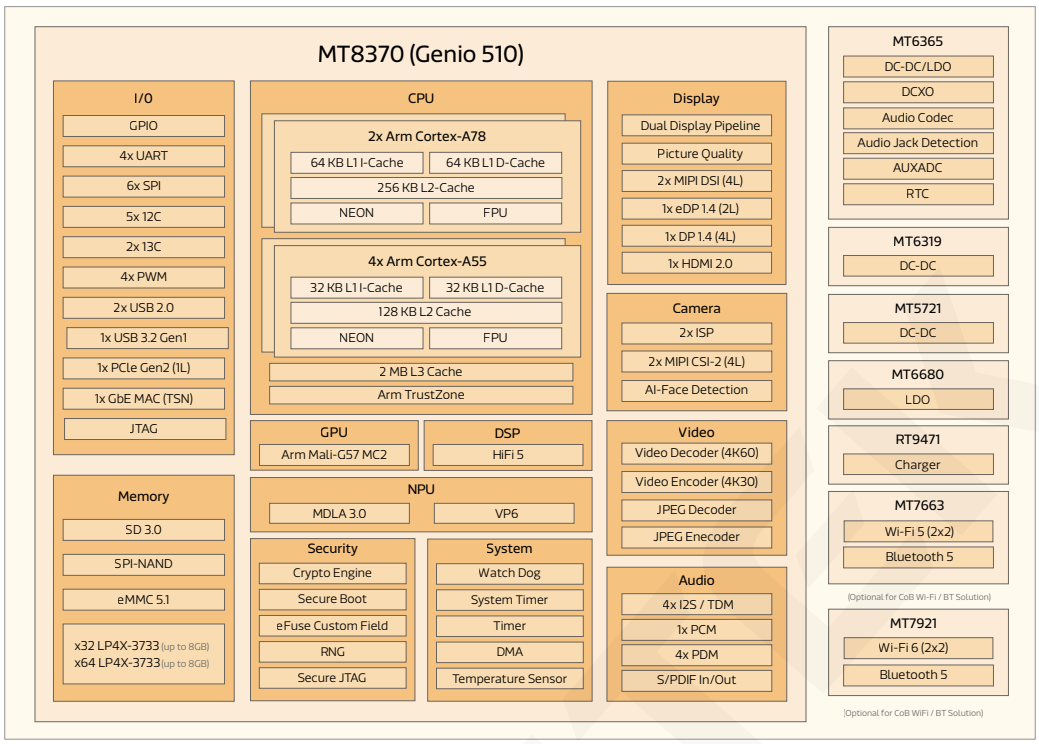
Block Diagram



Specifications

Processors	CPU	2xArm Cortex-A78 @ 2.2GHz 4xArm Cortex-A55 @ 2.0GHz
Memory & Storage	Memory Type & Speed	LPDDR4x up to 3733Mbps, up to 8GB
	Storage Type	eMMC 5.1 SD 3.0 SPI-NOR
AI	NPU	MediaTek 5th generation NPU (3.2 TOPS) Cadence Tensilica VP6 DSP
Graphics	GPU	Arm Mali-G57 MC2 Supports OpenGL, Vulkan, OpenCL
Display & Video	Display Suppport	Dual display (4K60 + 4K30) Single display (4K60)
	Video Encode	H.264/H.265 (4K30)
	Video Decode	H.264/H.265/AV1/VP9 (4K60) MPEG4/VP8 (FHD60)
	JPEG Encode	250 MP/s
	JPEG Decode	250 MP/s
Peripheral Interfaces (IO)	Host/Host Device	2x USB 2.0 (Host/Device) 1x USB 3.2 Gen1 (Host/Device)
	Interfaces	1x GbE MAC (TSN) 1x PCIe 2.0 (1L, RC) 4x UART 5x I2C, 2x I2C/I3C 6x SPI Master 4x PWM
	Audio	Integrated Cadence Tensilica HiFi5 DSP 2x I2S/TDM input 2x I2S/TDM output 4x PDM input 1x PCM input/output 1x SPDIF input, 1x SPDIF output
Wireless Connectivity	Wi-Fi/Bluetooth	External MT7663 Combo (2x2 Wi-Fi 5/BT 5) Or External MT7921 Combo (2x2 Wi-Fi 6/BT 5)
Camera	ISP	2x ISP Single camera: 32MP @ 30fps Dual camera: 16MP + 16MP @ 30fps
Package	Type	VFBGA 15x15x0.9mm, 0.4mm ball pitch

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