# Introduction

The Astra SR MCU from Synaptics is a cutting-edge, high-performance microcontroller designed to bring advanced AI and vision capabilities to a wide range of applications. The Astra SR MCU seamlessly integrates powerful processing, sophisticated vision systems, and exceptional energy efficiency into a compact package.

Harness the power of artificial intelligence with the Astra SR MCU’s dual-core architecture and specialized neural network (NN) accelerators. Featuring an Arm® Cortex®-M55 CPU running up to 400MHz and an Ethos™-U55 micro NPU core, the Astra SR MCU™ delivers robust AI performance for real-time inferencing and tiered processing. The Astra SR MCU is equipped with the relevant interfaces to communicate with other devices in the system such as the application processor (AP), camera sensors, digital microphones, and other sensors.

Astra MCU SDK 1.1.0 Release is a software development kit supporting SR110 MCUs and which is a collection of source code files, tools and documents. SDK is based on CMSIS that can be compiled with GCC and AC6.

The high-level components included in this SDK are described below:

* Free RTOS
* Source codes of various peripheral drivers, image processing, low power sensing blocks.
* Applications showcasing camera-based sensing and wakeup, person detection/classification/pose detection, segmentation, JPEG pre-roll with frame transfer over USB CDC to host PC or SPI to another receiver (SPI capable device) and audio.
* Astra MCU SDK VSCode Extension now supports Docker-based build and image generation, along with integrated video streaming capabilities.
* Related SDK Documents

# General

|  |  |
| --- | --- |
| **Date** | 22nd August 2025 |
| Version number | 1.1 |
| Based on version | 3.6.0 |
| Supported SoCs | SR110 Rev. B (B0) FCCSP & WLCSP |
| Supported Platforms | SR110 RDK Board Rev A/B/C/D |
| Release folder |  |
| File name | ASTRA\_MCU\_SDK1.1.0.tgz |
| SYNA Toolkit | SynaToolkit v2.5 |
| APBL | APBL v012F |
| SPK | SPK RC3.0 |

# Supported Peripherals

|  |  |
| --- | --- |
| **HW Component** | **CM55-B0** |
| UART 0/1/LP | √ |
| IOMUX | √ |
| GPIO | √ |
| DMA | √ Memory to Memory |
| I2C-S/M | √ |
| Cache | √ |
| Watchdog | √ |
| Clocks | √ |
| Timers | √ |
| LP-Sense | √ |
| USB 2.0 Device | √ |
| SPI-S/M | √ |
| I2S M | √ |
| xSPI (1/4 bits) | √ |
| MIPI CSI RX -0 | √ |
| MIPI CSI RX -1 | X |
| DVP Serial | √ |
| DVP Parallel | X |
| SDIO | √ |

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# Supported Software Components

|  |  |
| --- | --- |
| **SW Component** | **CM55-B0** |
| Free RTOS | √ |
| DMEM Service | √ |
| Logger Service | √ |
| USB Tiny USB Stack | √ |
| Flash Services | √ |
| Host API Service | √ |

# Supported Power Modes

|  |  |  |
| --- | --- | --- |
| **Mode** | **Description** | **CM55-B0** |
| **Active** | Full Operational mode: Gear1 (G1), Gear2 (G2), Gear3 (G3)  Mode Entry: boot process  Mode Exit: N/A | √  (400MHz) |
| **Hibernation** | All memories: in retention  Gear 3: (HP Proc) - disabled  Gear 2: (LP Proc) - disabled  Gear 1: (LP Sense) – disabled  Gear 0 (AON): awake  Mode entry: Host API’s power manager commands (0x1-0x4)  Mode exit: internal/external event (timer, GPI) | √ |

# VS Code Extension

|  |  |
| --- | --- |
| **SW Tool** | **CM55-B0** |
| Code Development | √ |
| Debug | √ |
| Image Generator | √ |
| Image Flashing | √ |
| Video Streamer | √ |

# SynaToolkit Suite

|  |  |
| --- | --- |
| **SW Tool** | **CM55-B0** |
| Logger | √ |
| Control Interface (using embedded Host API protocol) | √ |
| Script Loader & Runner | √ |
| Video/Image Streamer | √ |
| Image Generator | √ |

# Reference Applications

|  |  |
| --- | --- |
| **Use Case** | **CM55-B0 w/ Ethos U55** |
| Vision: Person Detection | √ |
| Vision: Person Classification | √ |
| Vision: Person Pose Detection | √ |
| Vision: Person Segmentation | √ |
| Vision: Pre-roll | √ |
| Audio: PDM to I2S | √ |

# Sample Applications

|  |  |
| --- | --- |
| **Example** | **CM55-B0 w/ Ethos U55** |
| Inference - Single SRAM NN Model | √ |
| Inference - Single Flash NN Model | √ |
| UART Sample Application with flow control | √ |
| I2C Sample Application | √ |
| PINMUX Sample Application | √ |
| GPIO Sample Application | √ |
| CLK Sample Application | √ |
| SPI Sample Application | √ |
| SDIO Sample Application (SDCARD & SDIO devices) | √ |
| FATFS Sample Application | √ |
| DMA Memory to Memory Sample Application | √ |

# Supported Sensors and Configuration

|  |  |  |  |
| --- | --- | --- | --- |
| **Sensor** | **CSI configuration** | **Parallel Configuration** | **Serial**  **Configuration** |
| OV2C | * SDR: 480x270 3FPS 160Mbps per lane, lane count = 1 * SDR: 1920x1080 60FPS 1.5Gbps per lane, lane count = 1 |  |  |
| OV5647 | * SDR: 480x270 30FPS 280Mbps per lane, lane count = 2 * SDR: 640x480 60FPS 280Mbps per lane, lane count = 2 |  |  |
| K351 | SDR: Serial Camera 500x500 4FPS |  |  |

# Supported Flash List

|  |  |
| --- | --- |
| Vendor | Flash Part Number |
| Macronix | MX25U12843G |
| GigaDevice | GD25LE128E |
| WINBOND | W25Q128JW |

# Known Issues

|  |  |  |  |
| --- | --- | --- | --- |
| Issue | Summary | Components | Severity |
| SRSDKI-655 | SPI Transfer gets corrupted beyond 1M speed. | SPI | Major |
|  |  |  |  |

# Revision History

|  |  |  |
| --- | --- | --- |
| Last Modified | Revision | Description |
| June 2025 | 0.1 | Astra MCU SDK Release 1.0.0 |
| August 2025 | 0.2 | Astra MCU SDK Release 1.1.0 |
|  |  |  |
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