



Application Note

Astra Machina SL2600 Series Power Consumption for Typical Use Case Configurations

Abstract: This document summarizes power consumption across typical use case configurations for the Astra Machina Evaluation System, with SL2600 Series.

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1. Introduction

The Synaptics® Astra™ Machina SL2600 Series of embedded processors are highly integrated AI-Native Linux® and Android™ SoCs optimized for consumer, enterprise and industrial IoT workloads with hardware accelerators for multimodal edge inferencing, security, video, graphics, and audio.

The SL2610 product line offers comprehensive power efficiency features including an ultra-low-power subsystem, fine-grained on-demand control of power domains, multi-level power states, and dynamic voltage and frequency switching

1.1. Typical Power Consumption: SL26xx

In practical applications, when Dynamic Voltage Frequency Scaling (DVFS) is implemented, the software works alongside the hardware to automatically adjust voltage and frequency values according to the specific use case requirements. Therefore, the overall system power consumption depends on both software optimization and how the system hardware is implemented.

1.1. Power Measurement Conditions

- SoC CPU @ 1.7 GHz for all of the testing cases.
 - Nominal voltage
 - WFI: Wake For Interrupt
 - GE: Gigabit Ethernet
 - SM: System Manager
- DRAM Configuration
 - SL2610: x16 4GB DDR memory (2pcs x8 16Gbit DDR4), 3200 Mbps
- System Manager CPU at 200 MHz
- Temperature: Typical part at Tj = 30°C
- Wakeup Mode:
 - System Manager wake-up mode (AON): AON-GPIO

1.1.1. SL2610 Series Power Consumption Measurement Conditions & Results

Table 1. SL2610 Power Consumption Measurement Conditions

| Item | Power Mode | SM | CORE | CPU | Video Display /GPU (on for display) | NPU | Audio DSP / Codec | DDR | Wakeup Modes |
|------|---|-----------|-------------------|---|-------------------------------------|-----|-------------------|-------------------------------|--------------|
| 14 | Active - CPU-A (CPU1- memcpy, CPU2 idle) + CAMERA (CSI:1280x720) | On | On | CPU1 busy, CPU2 idle + CAMERA | No/No | No | No | Normal | — |
| 13 | Active - CPU-A (CPU1- memcpy, CPU2 idle) + DISPLAY | On | On | CPU1 busy, CPU2 idle + DISPLAY | No/No | No | No | Normal | — |
| 12 | Active - CPU-A (CPU1- memcpy (32-bit), CPU2 idle) | On | On | CPU1 busy, CPU2 idle | No/No | No | No | Normal | — |
| 11 | Active - CPU-B (CPU1 -memcpy, CPU2-vdec) | On | On | CPU1 busy, CPU2-busy | No/No | No | No | Normal | — |
| 10 | Active - GPU | On | On | CPU1/2 on + GPU | No/Yes | No | No | Normal | — |
| 9 | Active - NPU | On | On | CPU1/2 on + NPU (image classification) | No/Yes | Yes | No | Normal | — |
| 8 | Active - Idle (CPU1 idle, CPU2 idle) | On | On | CPU1 idle, CPU2-idle | No/No | No | No | Normal | — |
| 7 | Active - Lite (CPU1 idle, CPU2-Power Down) | On | On | CPU1 idle, CPU2-Power Down | No/No | No | No | Normal | — |
| 6 | MCU -Active (MCU-Coremark) | On | Off | MCU-200MHz; CPU1/2 Power down | No/No | No | No | Off | — |
| 5 | MCU - Active, Low Power Display | On | On (clock gating) | MCU 100 MHz; DSI running, CPU1/2 + NPU + GPU Power down, display connected (panel consumption not included) | No/No | No | No | Self-Refresh LPDDR4-estimated | — |
| 4 | Suspend-to-Memory: MCU-only (MCU-Idle, 200 MHz) + DDR4 Self-refresh | On | Off | MCU-Idle; CPU1/2 Power down, DDR4 self-refresh (2x16Gbit) | No/No | No | No | Self-Refresh | — |
| 3 | Suspend-to-Memory: (MCU-Idle, 200 MHz) + DDR3 Self-refresh | On | Off | MCU-Idle; CPU1/2 Power down, DDR3 self-refresh (512MB) | No/No | No | No | Self-Refresh | — |
| 2 | MCU-Deep Sleep | Retention | Off | MCU Deep Sleep Mode (logic and memory in Retention mode) | No/No | No | No | Off | AON-GPI |
| 1 | Standby | Off | Off | MCU Standby; CPU1/2 off | No/No | No | No | Off | AON-GPI |

Table 2. SL2610 Power Consumption Measurement Results

| Item | Power Mode | SM | Core | DDR/LPDDR PHY | DDR/LPDDR Device | DDR-VDDM: 2.5V DDR4 only | 1.8V | 3.3V | SOC_TOTAL |
|------|---|--|-------|---------------|------------------|--------------------------|--------|------|-----------|
| | | Power (Avg): Typ part at Tj = 30 degC (mW) | | | | | | | |
| 14 | Active - CPU-A (CPU1- memcpy, CPU2 idle) + CAMERA (CSI:1280x720) | 26.8 | 349 | 102.2 | 239.8 | 20 | 17.112 | 1.3 | 496.412 |
| 13 | Active - CPU-A (CPU1- memcpy, CPU2 idle) + DISPLAY | 26.8 | 356 | 104.2 | 239.8 | 20 | 24.112 | 1.3 | 512.412 |
| 12 | Active - CPU-A (CPU1- memcpy (32-bit), CPU2 idle) | 26.8 | 458.9 | 161.28 | 376.32 | 20.7 | 13.112 | 1.3 | 661.392 |
| 11 | Active - CPU-B (CPU1 -memcpy, CPU2-vdec) | 26.2 | 387 | 96.3 | 224.7 | 20 | 12.878 | 1.3 | 523.678 |
| 10 | Active - GPU | 26.8 | 466 | 107.4 | 251.6 | 20 | 12.878 | 1.3 | 614.378 |
| 9 | Active - NPU | 26.8 | 425 | 110.4 | 256.6 | 20 | 12.878 | 1.3 | 576.378 |
| 8 | Active - Idle (CPU1 idle, CPU2 idle) | 26.2 | 310 | 86.4 | 201.6 | 20 | 12.878 | 1.3 | 436.778 |
| 7 | Active - Lite (CPU1 idle, CPU2-Power Down) | 25.1 | 218 | 86.4 | 201.6 | 20 | 12.878 | 1.3 | 343.678 |
| 6 | MCU -Active (MCU-Coremark) | 27 | — | — | — | — | 12.878 | 1.3 | 41.178 |
| 5 | MCU - Active, Low Power Display (Haier panel, 4-lane, 500Mbps) | 12 | 35 | 0.4 | 2.3 | 0 | 15 | 1.4 | 63.8 |
| 4 | Suspend-to-Memory: MCU-only (MCU-Idle, 200 MHz) + DDR4 Self-refresh | 25 | — | 0.4 | 17.5 | 10 | 5 | — | 30 |
| 3 | Suspend-to-Memory: (MCU-Idle, 200 MHz) + DDR3 Self-refresh | 25 | — | 0.4 | 13 | — | 5 | — | 30 |
| 2 | MCU-Deep Sleep | 0.096 | — | — | — | — | 0.9 | — | 0.996 |
| 1 | Standby | 0.0194 | — | — | — | — | 0.9 | — | 0.9194 |

2. References

- *SL2610 Product Line of Embedded Processors Datasheet* (PN: 505-001501-01)
- *SL2610 Product Line Technical Reference Manual* (PN: 511-001449-01)
- *Astra Machina SL2600 Series Developer Kit User Guide* (PN: 511-001453-01)

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3. Revision History

| Revision | Description |
|----------|------------------|
| A | Initial release. |

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