mobilint

MLM-1 System-on-Module (SoM) Datasheet

Hardware Datasheet

Version 2| MRH002-02-001
Release Date: Feb. 5, 2025

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Document Revision History

Revision	Date	Description
Ver 1.0	Dec. 12, 2025	Initial Draft
Ver 2.0	Feb. 5, 2026	REGULUS AI System-on-Module has been renamed as MLM-1 SoM.

List of Terms

List	Description
Note	All referenced brands, product names, service names and trademarks are property of their respective owners
SoM	System-on-Module

Table of Contents

1. Introduction

This document describes the configuration and operation of the **MLM-1 System-on-Module** (hereinafter **MLM-1 SoM**).

1.1. Overview

MLM-1 SoM (shown in Figure 1-1) consists of REGULUS, the neural processing unit (NPU), and other configurations including DRAM, eMMC, SPI.

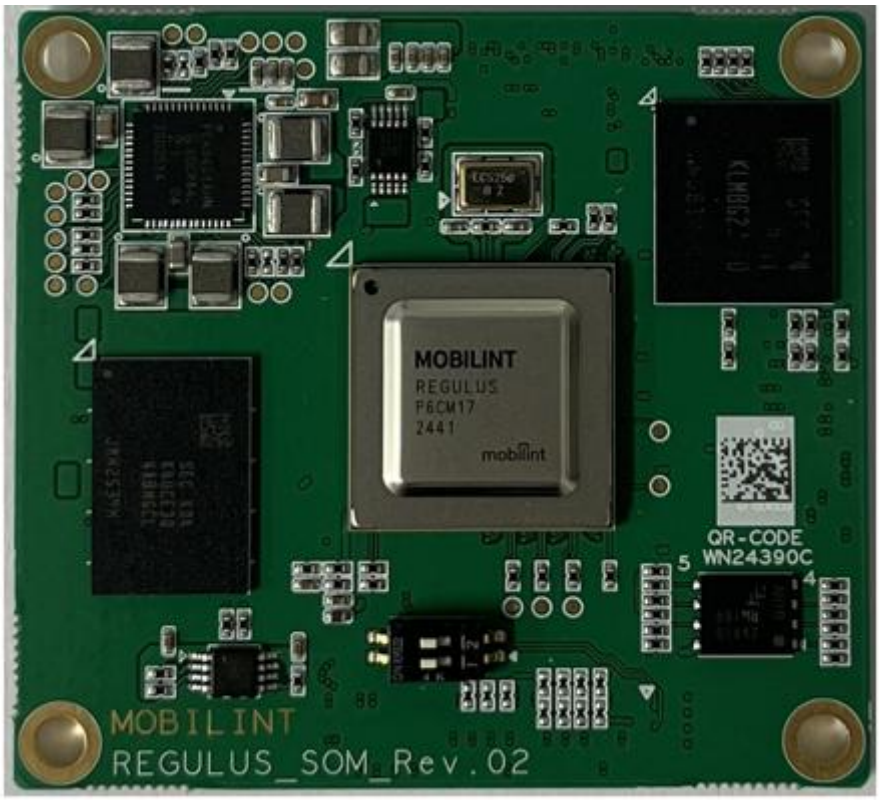

Figure 1-1. Board Overview - SOM Board

REGULUS, MLM-1 SoM's core neural processing unit, is an AI SoC (System on Chip) designed for deep learning applications in edge computing, on-device AI, and digital multimedia systems. It integrates advanced multimedia capabilities with high-performance processing optimized for low power consumption.

REGULUS features a fully coherent core complex built on a quad-core ARM Cortex-A53 and an ARM Cortex-M0+ coprocessor, along with dedicated hardware blocks for image signal processing, video encoding/decoding, and deep learning acceleration, making it well-suited

for real-time AI workloads on embedded systems.

REGULUS Evaluation Kit (EVK) is a development board for MLM-1 SoM. The EVK consists of MLM-1 SoM and REGULUS Carrier (carrier board).

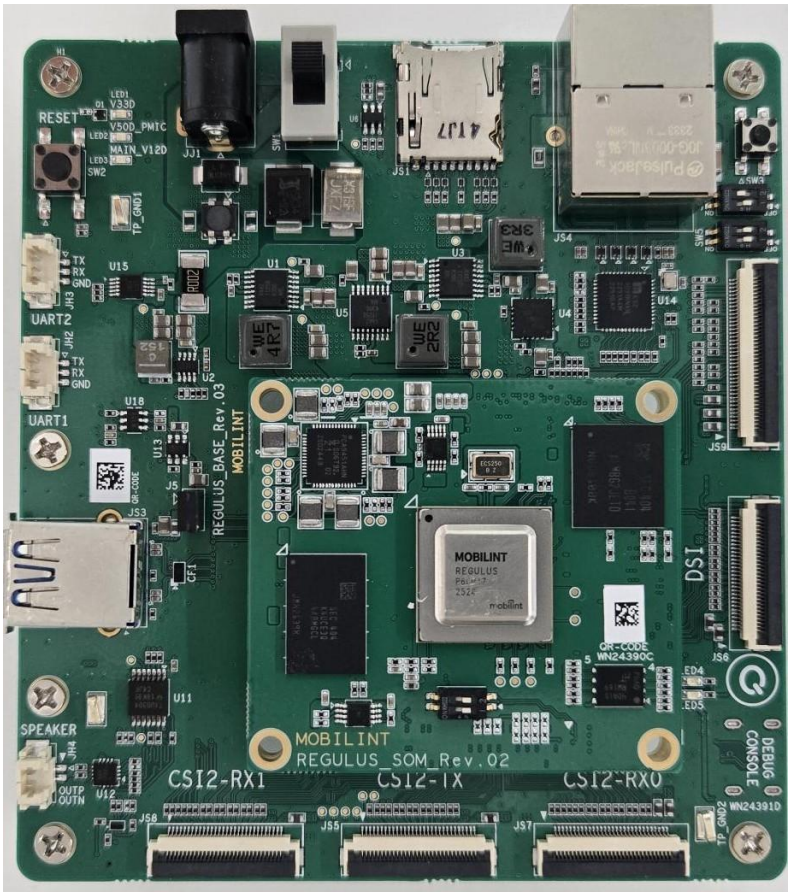

Figure 1-2. Board Overview – REGULUS EVK Board (SoM mounted on top)

1.2. Features

The REGULUS EVK board contains various communication interfaces and features that assist the development of application programs using REGULUS. Refer to Table 1-1 for the full set of features available on the REGULUS EVK.

Table 1-1. Board Features

Feature	Description
Processor	REGULUS (NPU included)
DRAM Memory	8 GByte LPDDR4X
Mass Storage	32GByte eMMC v5.1

Feature	Description
	256Mbit Dual/Quad SPI Flash
	microSD Card Socket
Camera	MIPI CSI2-RX 2CH
	BT1120 1CH
ISP	**Control Scheme:** Frame by frame **Input Format for Display Input:** 8/10-bit YUV420, YUV422, YUV444, and RGB **Input/Output Image Size:** 128×32 to 3840×2160 **Input Format for C&M Frame Compression (CF10):** 8/10-bit C&M frame compression format **Input Format for Uncompressed Image:** 8/10-bit YUV420, YUV422, YUV444, and RGB - 2-plane for YUV420, YUV422, and YUV444 - 1-plane for YUV422, YUV444, and RGB **Output Format for Display Output:** 8/10-bit YUV420, YUV422, YUV444, and RGB **Output Format for AFBC:** Can be connected to stand-alone ARM AFBC module **Output Format for Uncompressed Image:** 8/10-bit YUV420, YUV422, YUV444, and RGB - 2-plane for YUV420, YUV422, and YUV444 - 1-plane for YUV422, YUV444, and RGB **Scaler:** Arbitrary scaling ratio from 1/8 to 8 with 128 phases - Horizontal/vertical scaling ratio is independent - Input and output pixels must be multiples of 4

Feature	Description
	Color Space Converter: - Supports YUV to RGB conversion - Supports RGB to YUV conversion **Direct I/F:** Supports direct interface to reduce system bandwidth **AFBC Interface:** Output can be connected to ARM AFBC for YUV420/422/444 and RGB formats **Built-in Film Grain Noise for AV1:** CF10 input supports film grain noise for AV1
Multimedia	**Formats:** HEVC and H.264/AVC, up to 8-bit 4K @ 60fps **Encoders:** - H.265/HEVC Encoder ■ Main and Main Still Picture Profiles @ Level 5.1, High Tier - H.264/AVC Encoder ■ Baseline, Constrained Baseline, Main, and High Profiles @ Level 5.2 - MJPEG Encoder ■ Baseline and Extended Sequential ■ ISO/IEC 10918-1 JPEG compliant **Decoders:** - H.265/HEVC Decoder ■ Main and Main Still Picture Profiles @ Level 5.1, High Tier - H.264/AVC Decoder ■ Baseline, Constrained Baseline, Main, and High Profiles @ Level 5.2 - MJPEG Decoder ■ Baseline and Extended Sequential ■ ISO/IEC 10918-1 JPEG compliant

Feature	Description
Display	MIPI CSI2-TX 1CH
	MIPI DSI
Ethernet	1Gbit/s Ethernet with RJ45 1CH
USB	USB 3.1 Type A, C Connector
UART	Type C USB for UART0, 3-pin connector for UART1
Audio	I2S Interfaces, Speaker OUT & MIC
Debug Connector	JTAG 12Pin Connector
Power	DC +12V

The figures below illustrate the configuration of the SOM board and Carrier board.

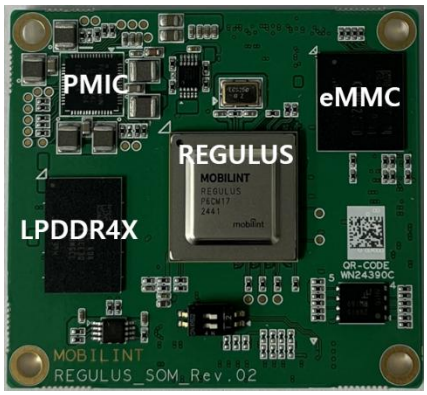

Figure 1-2. Configuration - SOM Board

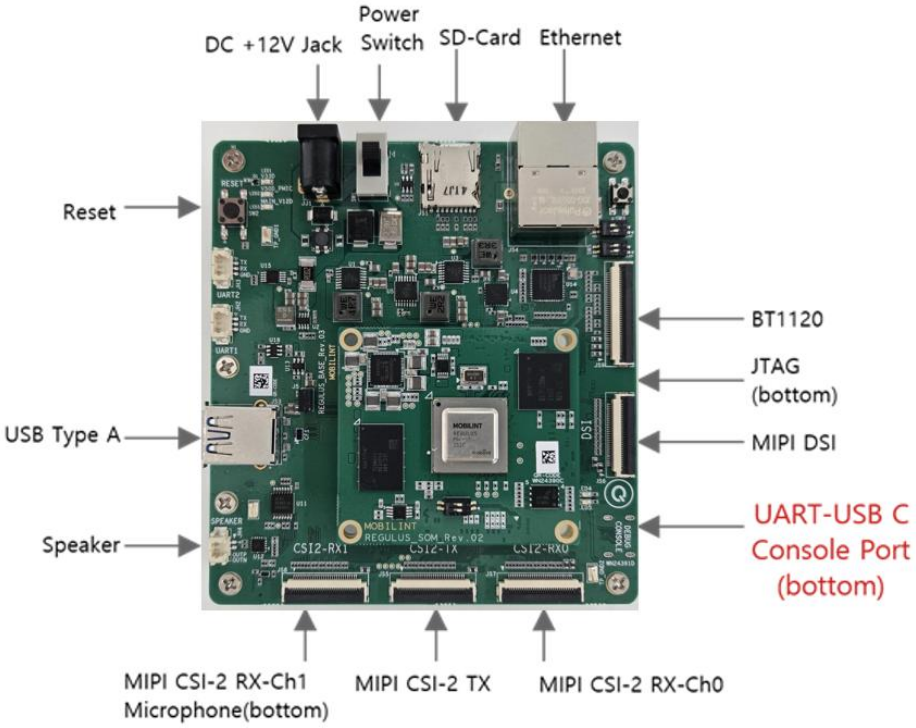

Figure 1-3. EVK Board Configuration

2. Dimensions

The dimensions of MLM-1 SoM are 55 × 50 mm.

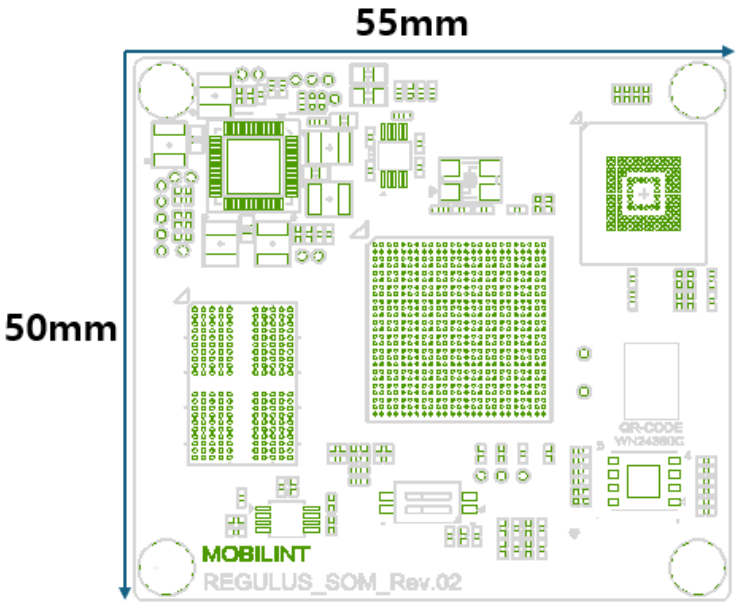

Figure 2-1. REGULUS SOM dimension

3. Pin Map

REGULUS SoM includes three 100-pin connectors, and the signal definitions for each connector are assigned according to the pin map below.

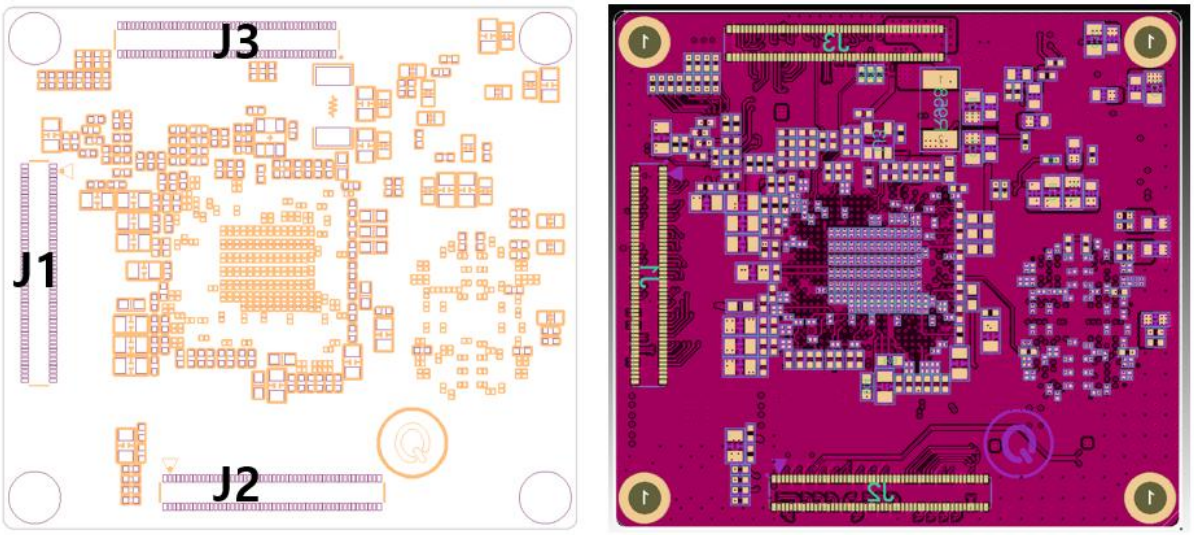

Figure 3-1. Development Configuration

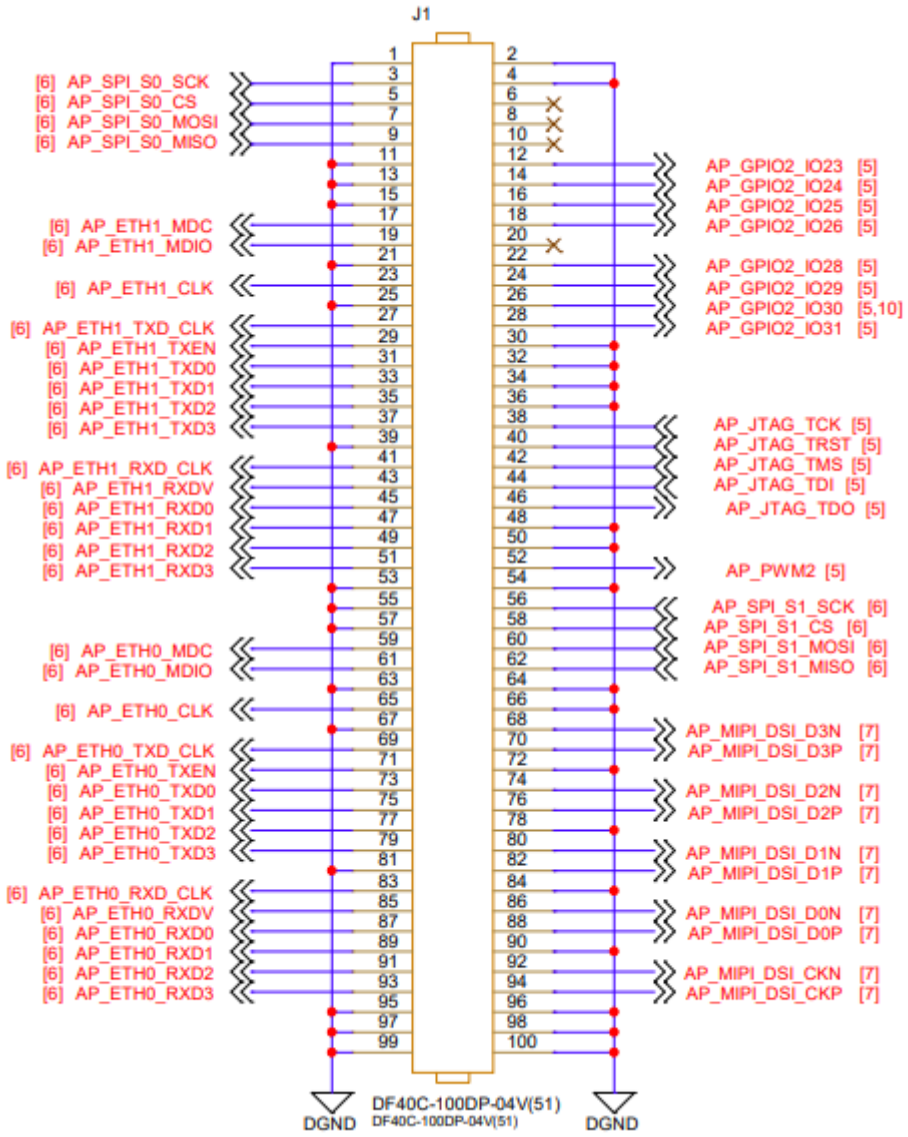

Figure 3-2. J1 pin configuration

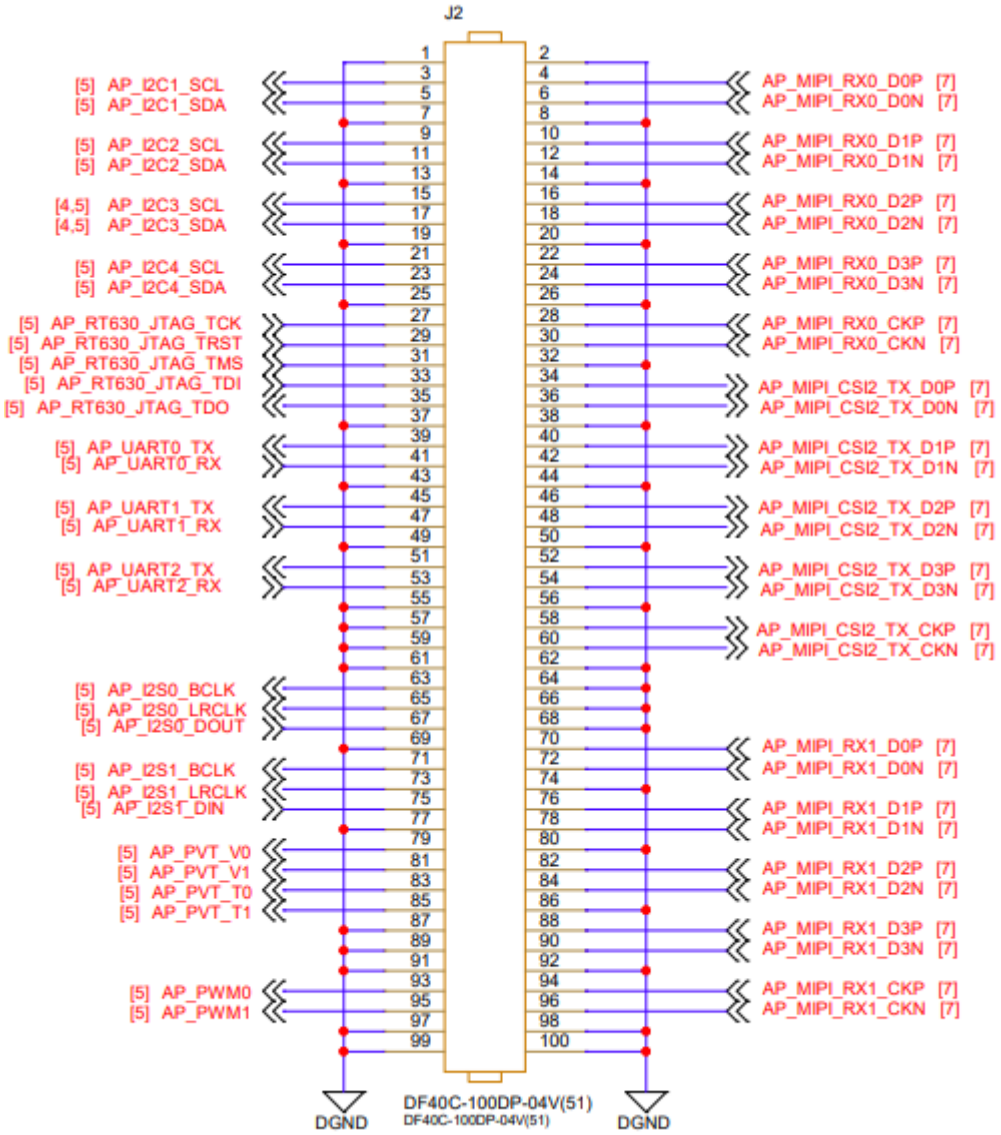

Figure 3-3. J2 pin configuration

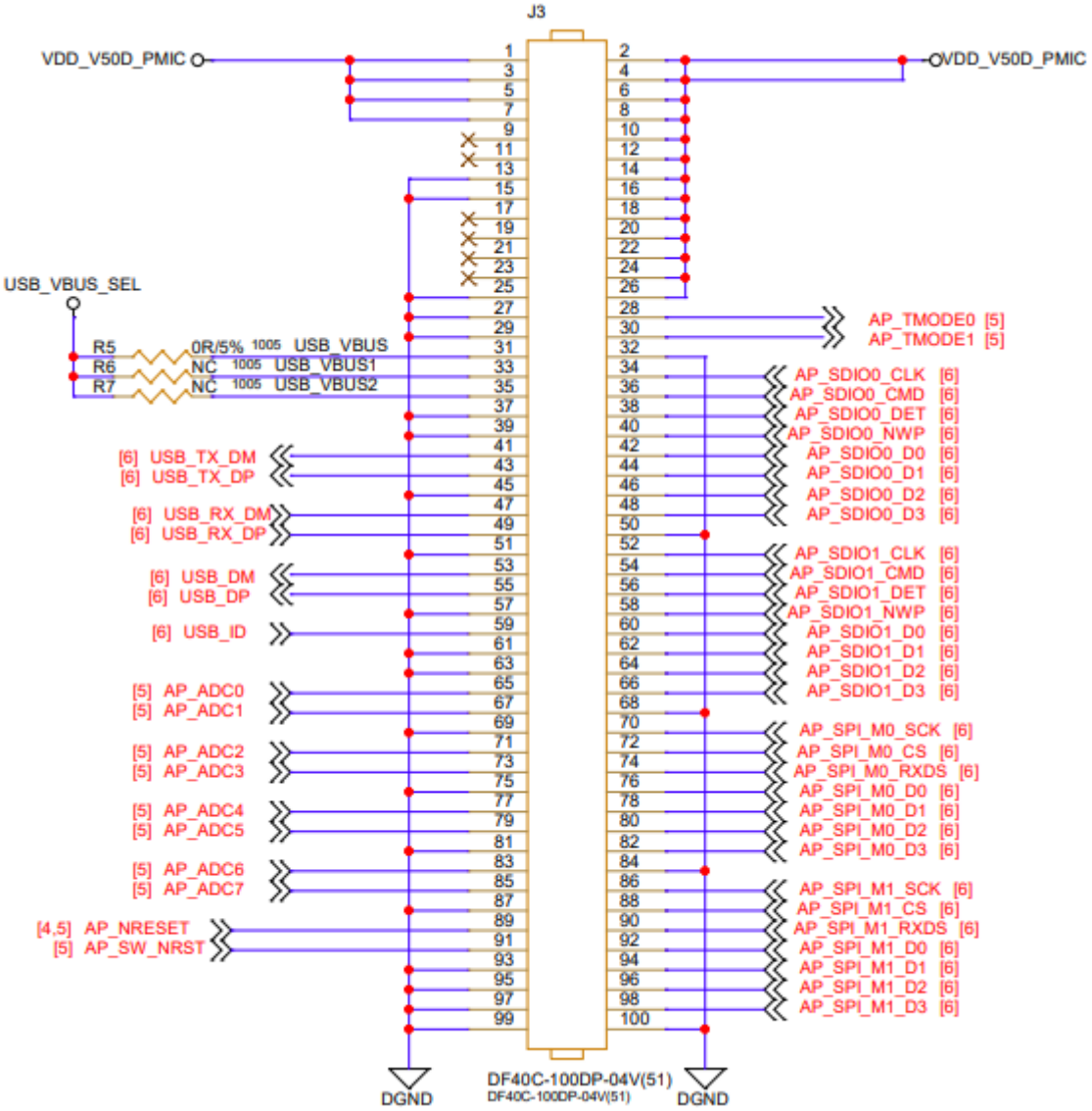

Figure 3-4. J3 pin configuration

4. Power Tree

The power tree for MLM-1 SoM and the Carrier board comprising the EVK is shown in the following figure 3-1.

MLM-1 SoM requires only a 5 V input power supply.

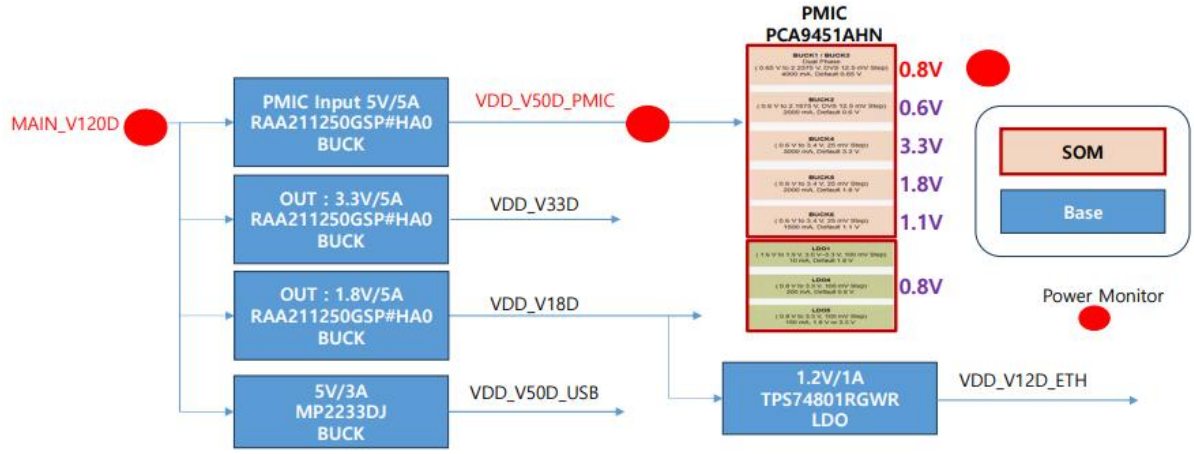

Figure 4-1. Power Tree (SOM+Carrier)

5. Power Efficiency

With a power efficiency of 3 TOPS/W, the MLM-1 SoM enables high-performance AI inference within a constrained power envelope. This allows for integration into power-sensitive environments without requiring active thermal management, supporting reliable operation across a range of embedded and edge computing applications.

6. Installation

6.1. Instructions

1. To connect the EVK carrier board with a host PC, prepare a USB Type-A to Type-C cable, and plug it into the USB Type-C port on the bottom of the carrier board.
2. Ensure the system is fully powered off before connecting the cable.
3. Connect the power cable.
4. Plug the other end of the USB Type-C cable into the host PC.
5. Turn on the power switch, and the board will boot immediately.
6. You can check its power status via the onboard LED.
7. Power on the host PC.

6.2. Important Notes Before Installation

1. The installation instructions above is for reference only. Actual installation may vary depending on the system environment.
2. Before installing the product, discharge any static electricity from your body by touching the metal frame inside the powered-off system.
3. Handle the product by its edges to avoid contact with circuitry.
4. Ensure that clothing or accessories do not come in contact with electronic components.

6.3. Warnings and Cautions

1. Do not connect or disconnect the product while the system is powered on.
2. Keep your hands, tools, or cables away from the board while it is in operation.
3. Do not disassemble or modify the product without proper guidance. This may result in product damage, electric shock, or other unexpected hazards.
4. Do not touch the product with wet hand(s) to prevent electric shock.
5. Operating the product in environments with high humidity or insufficient ventilation may reduce its lifespan.
6. Ensure that water or other liquids do not come in contact with the product, as this may cause serious damage.

6.4. Software Installation

REGULUS Evaluation Kit comes preloaded with Linux OS, SDK qb driver, runtime, and other essential utilities. Mobilint SDK qb is available upon request through our official support channel, which also provides user guides and documentation.

- Support Channel: tech-support@mobilint.com

For a comprehensive guide and application notes for REGULUS, refer to the following resources available in Mobilint's documentation page (docs.mobilint.com) and Download Center (dl.mobilint.com).

Type	Document Title	Available Languages
Compiler	qb Compiler Manual	English
Software Manual	REGULUS qb Software Manual	English
Hardware Manual	REGULUS Datasheet	English