

LLM630 Compute Kit



M5STACK

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1. OUTLINE

The **LLM630 Compute Kit** is an AI large language model inference development platform designed for edge computing and intelligent interaction applications. The kit's mainboard is equipped with the Aixin AX630C SoC processor, integrating a high-efficiency NPU with 3.2 TOPs@INT8 computing power, providing powerful AI inference capabilities to efficiently execute complex vision (CV) and large language model (LLM) tasks, meeting the needs of various intelligent application scenarios. The mainboard is also equipped with a JL2101-N040C gigabit Ethernet chip and an **ESP32-C6** wireless communication chip, supporting Wi-Fi 6@2.4G, used as the device's network card, providing high-speed data transmission capabilities and achieving Wi-Fi and Ethernet bridging functionality. Whether through wired connections for large-scale data exchange or through wireless communication for real-time interaction with remote servers or other smart devices, this platform ensures efficient data interaction. The mainboard also integrates an SMA antenna interface to further enhance wireless signal stability and transmission distance, ensuring stable communication in complex network environments. It features built-in 4GB LPDDR4 memory (2GB for user use, 2GB dedicated to hardware acceleration) and 32GB eMMC storage, supporting parallel loading and inference of multiple models, ensuring efficient and smooth task processing.

The baseboard, perfectly complementing the mainboard, significantly expands the functionality and applicability of the LLM630 Compute Kit. It integrates a BMI270 six-axis sensor, providing precise attitude sensing and motion detection capabilities, suitable for various dynamic applications. The built-in NS4150B Class D amplifier and microphone and speaker interfaces support high-quality voice input and audio output, achieving full-duplex communication mode, enhancing user interaction experience. The baseboard also features dual Grove interfaces and LCD/DSI and CAM/CSI MIPI interfaces, facilitating the expansion of peripherals such as displays and camera modules. Additionally, the baseboard integrates an external antenna interface and a gigabit Ethernet port, providing flexible network connections and enhanced wireless performance for the device. Furthermore, the device's user buttons enable functions such as power on/off and mode switching, improving the device's usability and interactivity.

The baseboard's charging chip and reserved battery socket support custom battery configurations, ensuring the platform can run stably for a long time even without external power. The integrated battery detection chip monitors the battery status in real-time. The MicroSD card slot supports storage expansion, as well as future support for AI model update functions. Dual USB Type-C interfaces not only support efficient data transmission but also provide OTG functionality, making device connections more flexible and ensuring high efficiency in data exchange and device connection.

The LLM630 Compute Kit supports the **StackFlow** framework, allowing developers to easily implement edge intelligent applications with just a few lines of code, quickly launching various AI tasks. The platform supports a variety of AI applications, including visual recognition, speech recognition, text-to-speech, and wake word recognition, and supports separate invocation or pipeline automatic flow, facilitating development. The platform also supports vision models like Yolo11 DepthAnything, multi-modal large models like InternVL2.5-1B, large language models like Qwen2.5-0.5/1.5B Llama3.2-1B, and speech models like Whisper Melotts, supporting hot updates, and will continue to support the most advanced popular large models in the future, empowering intelligent recognition and analysis, ensuring the platform keeps pace with technological development and community trends.

The LLM630 Compute Kit is suitable for fields such as security monitoring, smart sales, smart agriculture, smart home control, interactive robots, and education, providing powerful computing capabilities and flexible expandability for edge intelligent applications.

1.1. LLM630 Compute Kit

1. Communication Capabilities

- **Wired Network:** Equipped with a JL2101-N040C Gigabit Ethernet chip for high-speed data exchange.
- **Wireless Network:** Integrates an ESP32-C6 chip supporting Wi-Fi 6 (2.4GHz) and BLE, ensuring efficient wireless data interaction.
- **Bridge Function:** Enables Ethernet-to-Wi-Fi bridging, facilitating data transmission in various network environments.
- **External Antenna Interface:** SMA connector for external antennas, enhancing wireless signal stability and transmission range.

2. Processor and Performance

- **Main SoC:** AX630C from AXERA, featuring a dual-core Cortex-A53 (1.2GHz).
- **NPU (Neural Processing Unit):** Provides 3.2 TOPS@INT8 (1.2T@FP16) computing power, efficiently handling AI inference tasks (e.g., computer vision and large language model inference).
- **Multi-Model Parallelism:** Robust processing capability supports loading and running multiple models simultaneously, ideal for complex edge intelligence scenarios.

3. Display and Input

- **Sensors:** Integrated BMI270 six-axis sensor (accelerometer + gyroscope) for motion detection and posture sensing.
- **Audio:**
 - Built-in NS4150B Class D amplifier
 - Onboard microphone and speaker interface for high-quality audio I/O and full-duplex voice communication
- **Interfaces:**
 - LCD/DSI (MIPI) for external displays
 - CAM/CSI (MIPI) for camera modules
- **User Buttons:** Provide power control, mode switching, and enhance device interactivity.

4. Memory

- **RAM:**
 - 4GB LPDDR4 total (2GB for user system, 2GB dedicated to hardware accelerators such as the NPU)
- **Storage:**
 - 32GB eMMC for OS, AI models, and application data
 - MicroSD card slot for expanded storage and future AI model updates

5. Power Management

- **Battery Support:**
 - Onboard charging chip and battery connector for customizable battery configurations
 - Power monitoring chip provides real-time battery status feedback
- **Power Supply:**
 - Supports USB Type-C power input
 - Can operate off battery power for extended runtime without external power

6. GPIO Pins and Programmable Interfaces

- **Expansion Interfaces:**
 - Two Grove ports for easy connection to sensors and peripherals
 - MIPI DSI/CSI interfaces for displays and cameras
 - Two USB Type-C ports for high-speed data transfer and OTG functionality, enhancing connectivity
- **Development and Programming:**
 - Compatible with M5Stack's StackFlow framework, enabling rapid edge AI application development with minimal coding
 - Supports various AI algorithms and models for vision, speech, text, and more

7. Others

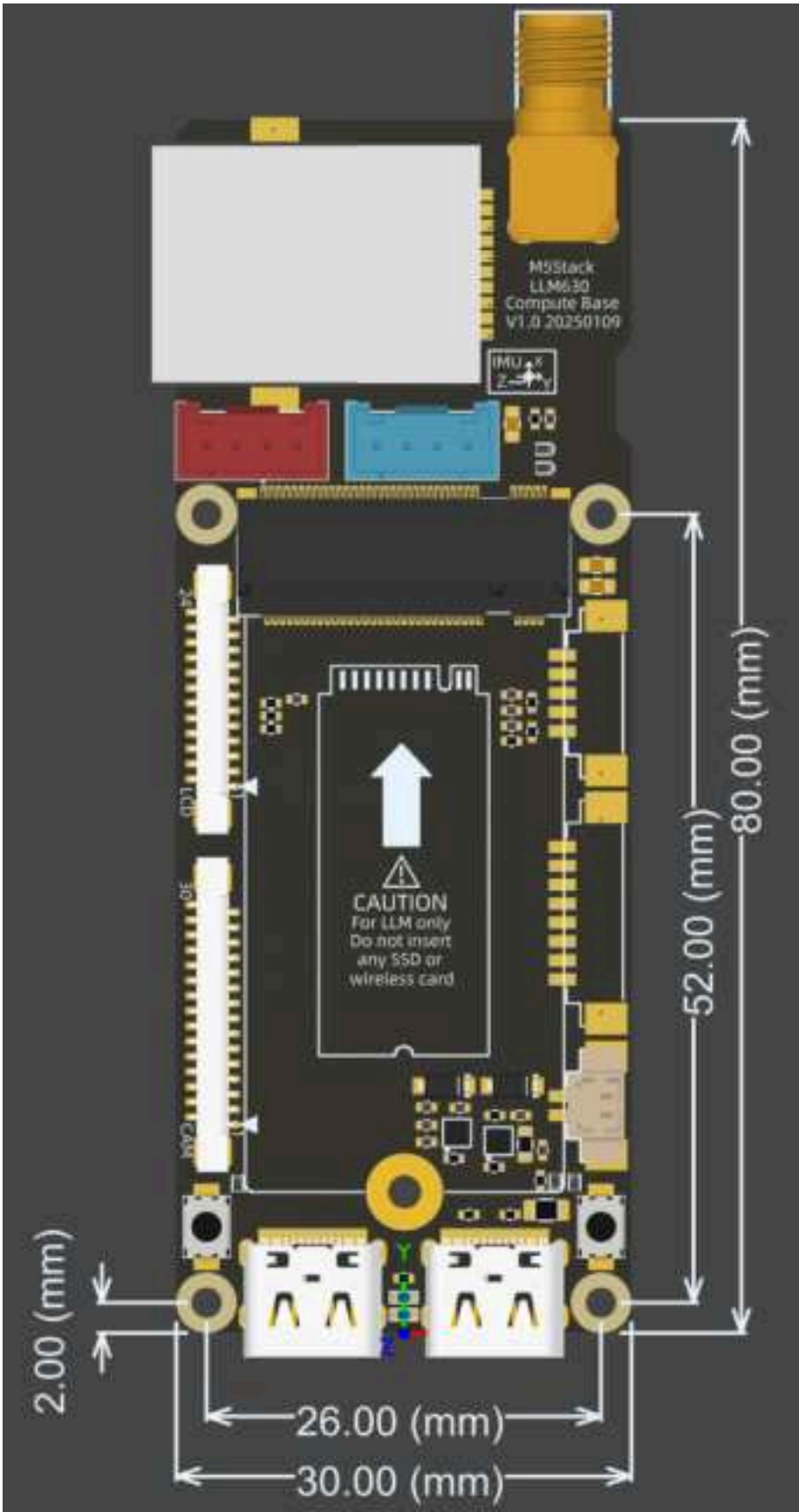
- **AI Model Support:**
 - Pre-loaded or loadable models such as Yolo11, DepthAnything for vision, InternVL2.5-1B for multimodal, and large language models (Qwen2.5-0.5/1.5B, Llama3.2-1B, etc.) plus Whisper Melotts for speech
 - Hot update capability to keep the platform current with the latest AI developments
- **Application Scenarios:**
 - Suitable for security surveillance, smart retail, smart agriculture, smart home control, interactive robotics, education, and more
 - Offers powerful computing and flexible expansion for a wide range of AIoT use cases
- **Device Dimensions and Weight:** Compact form factor for easy integration into diverse applications and rapid prototyping.

2. SPECIFICATIONS

2.1. Specifications

Parameter and Specification	Value
Processor	AX630C@Dual Cortex A53 1.2 GHz MAX.12.8 TOPs @INT4, and 3.2 TOPs @INT8
NPU	3.2TOPs @ INT8
RAM	4GB LPDDR4 (2GB system memory + 2GB hardware acceleration dedicated memory)
eMMC	eMMC5.1 @ 32GB
Wired Network	JL2101B-N040C @ 1GbE
Wireless Network	ESP32-C6 @ Wi-Fi6 2.4G
USB-UART	CH9102F @ USB to Serial Port
USB-OTG	USB 2.0 Host or Device
Antenna Interface	SMA inner hole
Audio Interface	MIC and SPK Header 5P @ 1.25mm
Display Interface	MIPI DSI 1x 2Lane MAX 1080p @ 30fps @ 1.25mm
Camera Interface	MIPI CSI 1x 4Lane MAX 4K @ 30fps @ 1.25mm
Additional Features	Programmable RGB LED for low power control, buzzer, reset button
Battery Management	1.25mm specification battery interface terminal
Battery Interface Terminal	4 high-speed coreless motors
Compatible Battery Specification	3.7V lithium battery (lithium-ion or lithium-polymer)
USB Interface	2 Type-C interfaces (data transfer, OTG functionality)
USB Power Input	5V @ 2A
Grove Interface	PortA Header 4P @ 2.0mm (I2C)
	PortC Header 4P @ 2.0mm (UART)
Storage Expansion Interface	Micro SD card slot
External Function Interface	FUNC Header 8P @ 1.25mm system wake-up, power management, external LED control, and I2C communication, etc.
Buttons	2 buttons for power on/off, user interaction, and reset functions
Sensor	BMI270 @ 6-axis
Manufacturer	M5Stack Technology Co., Ltd

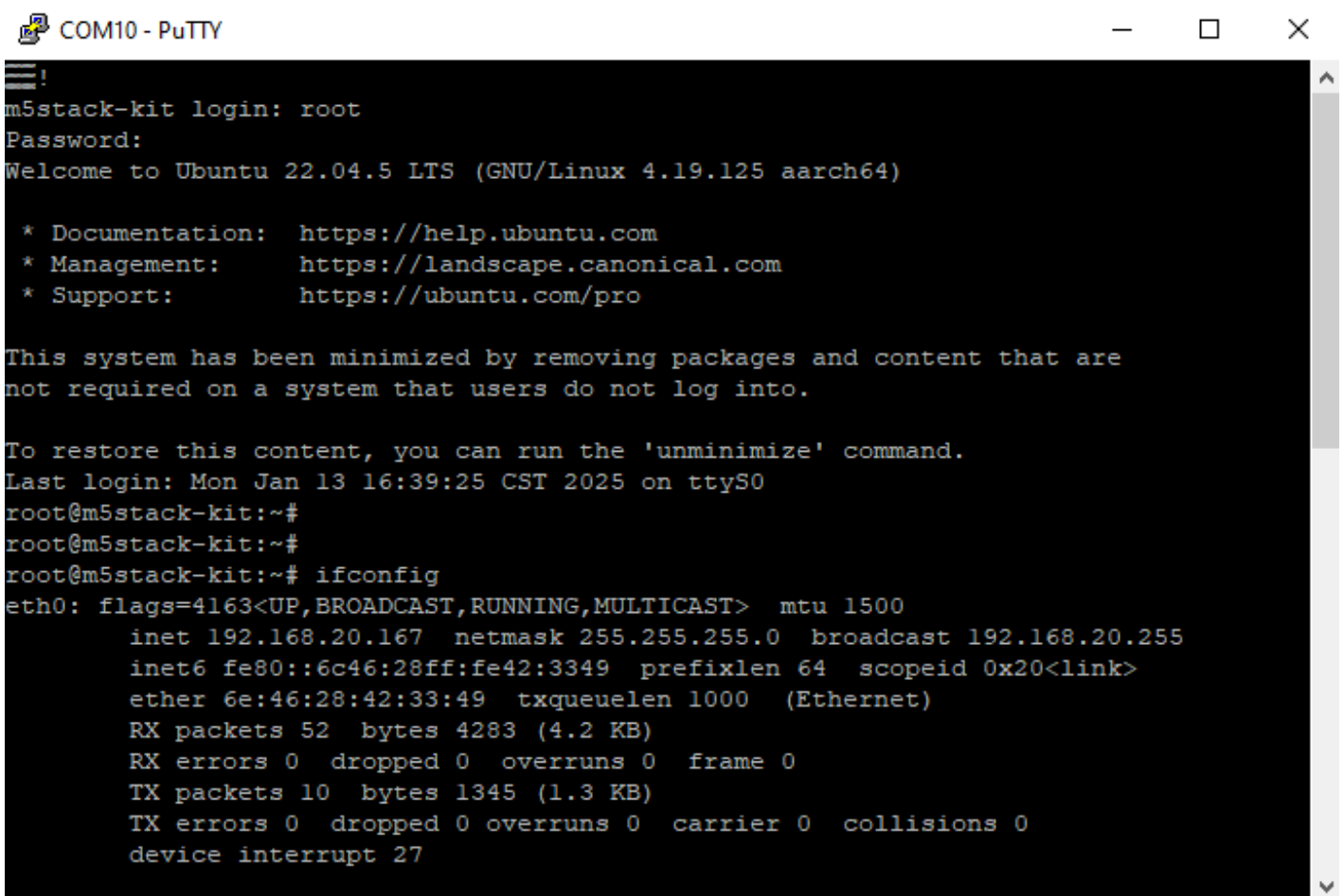
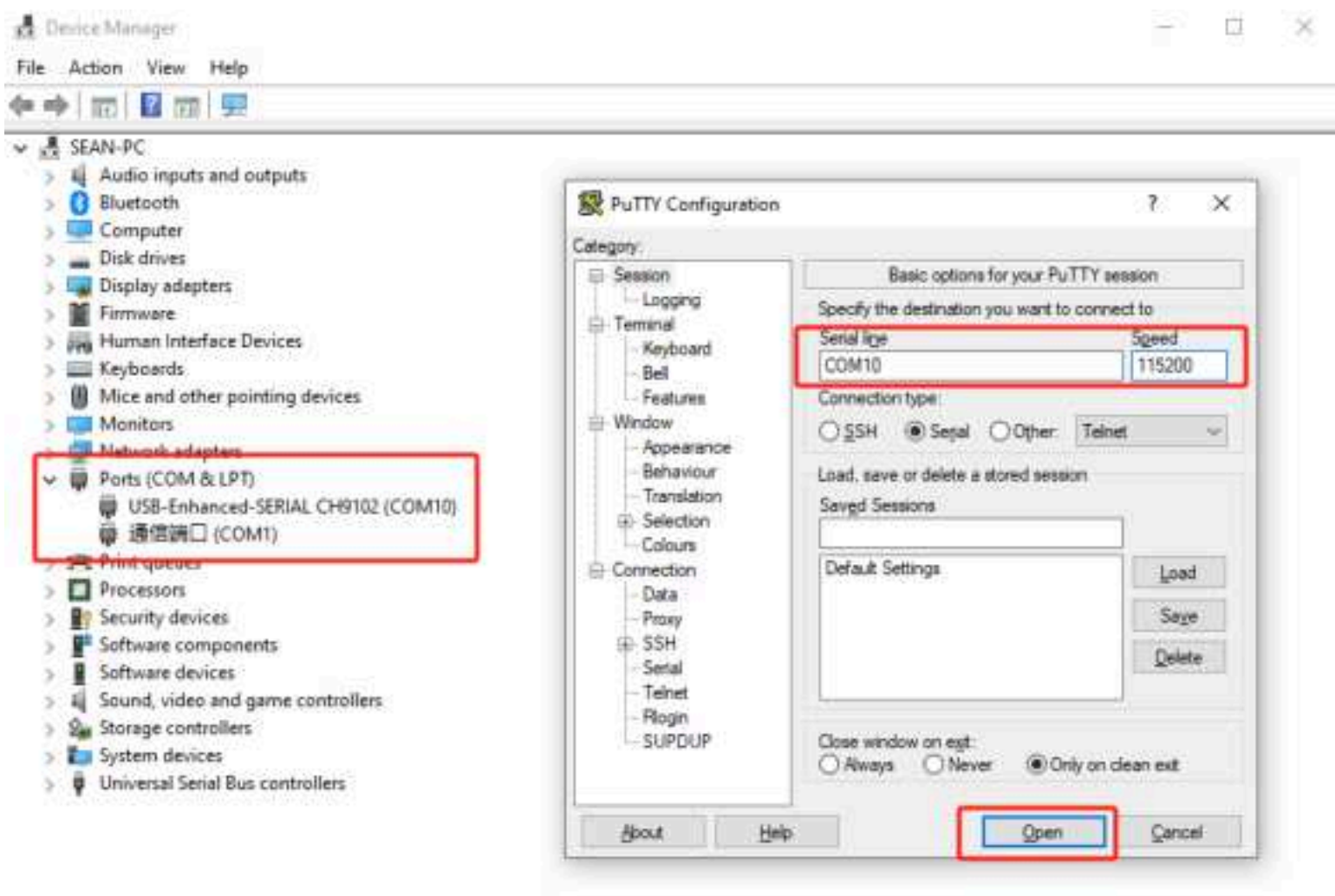
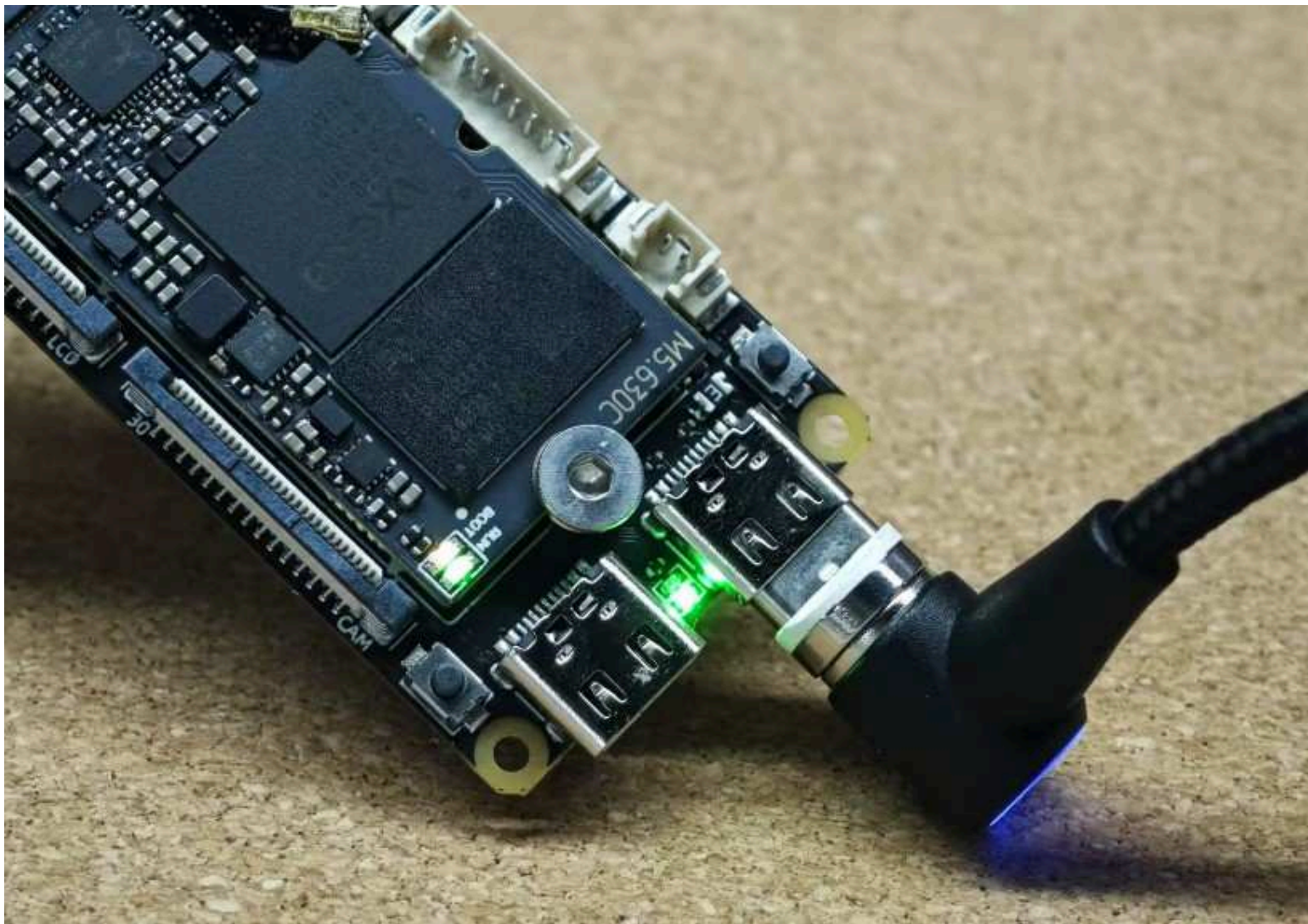
2.2. Module Size



3. QUICK START

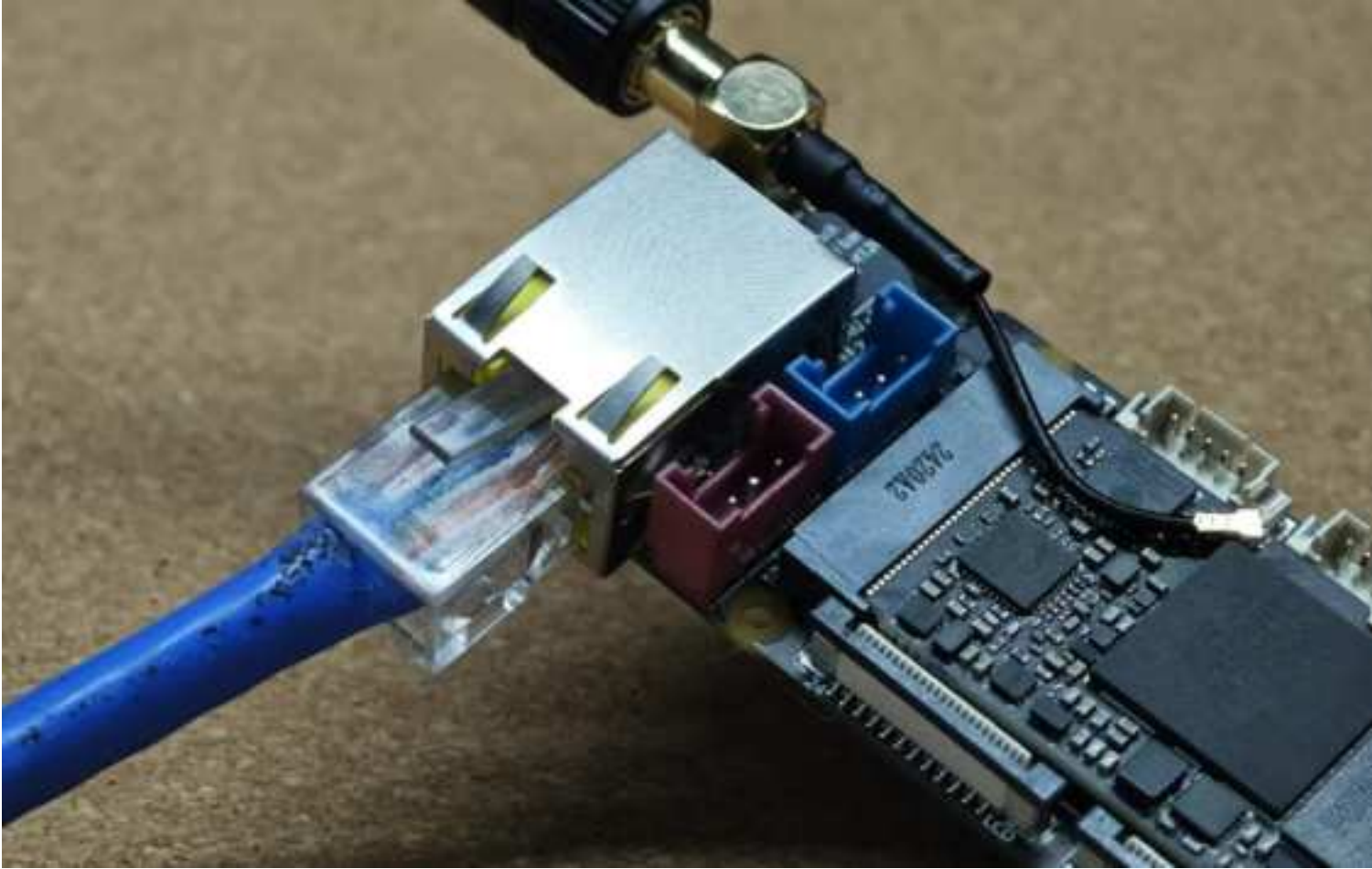
3.1. UART

1.Connect the LLM630 Compute Kit's UART interface to your computer. You can use debugging tools like Putty to log into the device terminal via serial port for debugging and control. (Default: 115200bps 8N1, default username is root, password is root.)



3.2. Ethernet

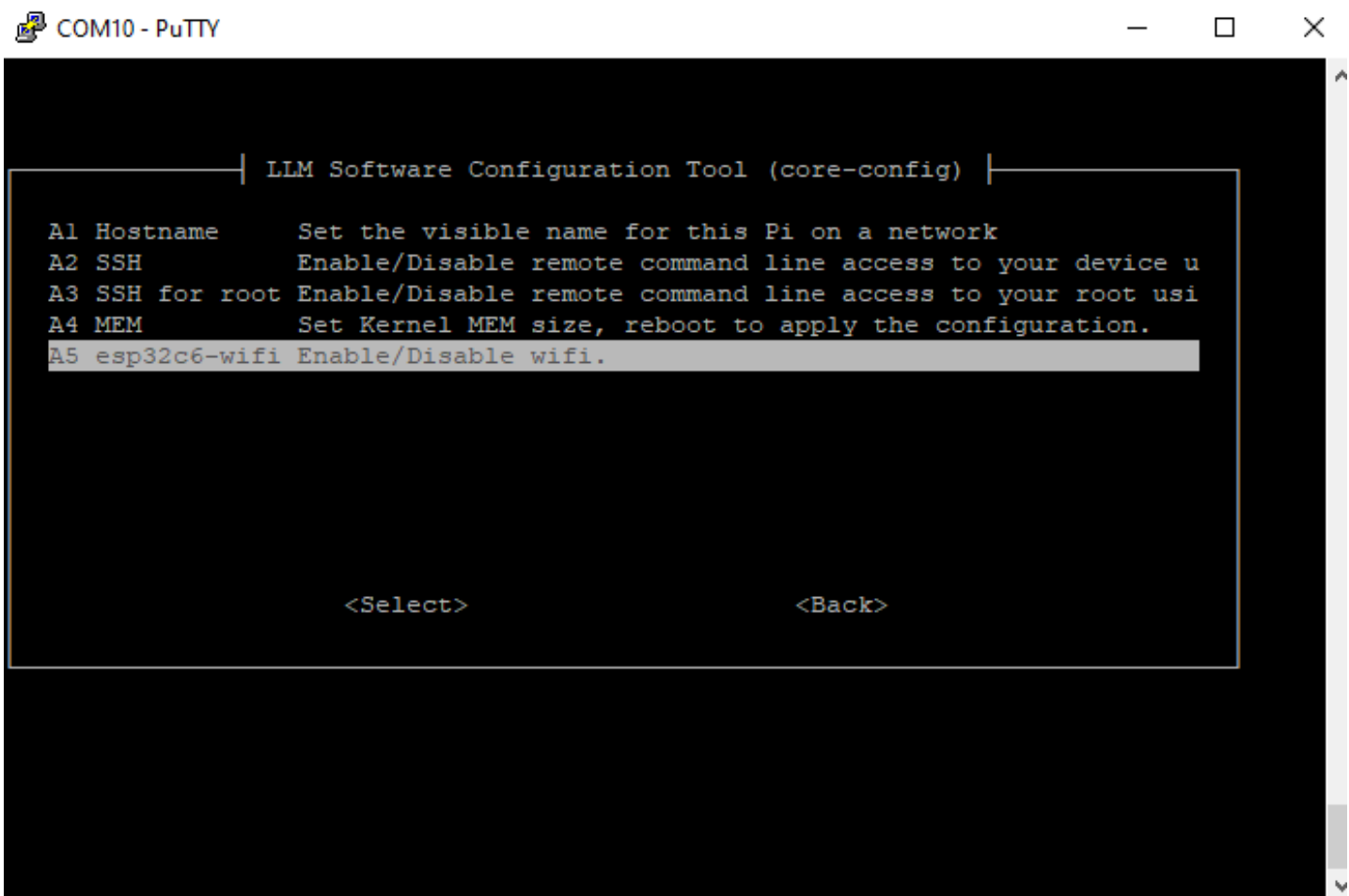
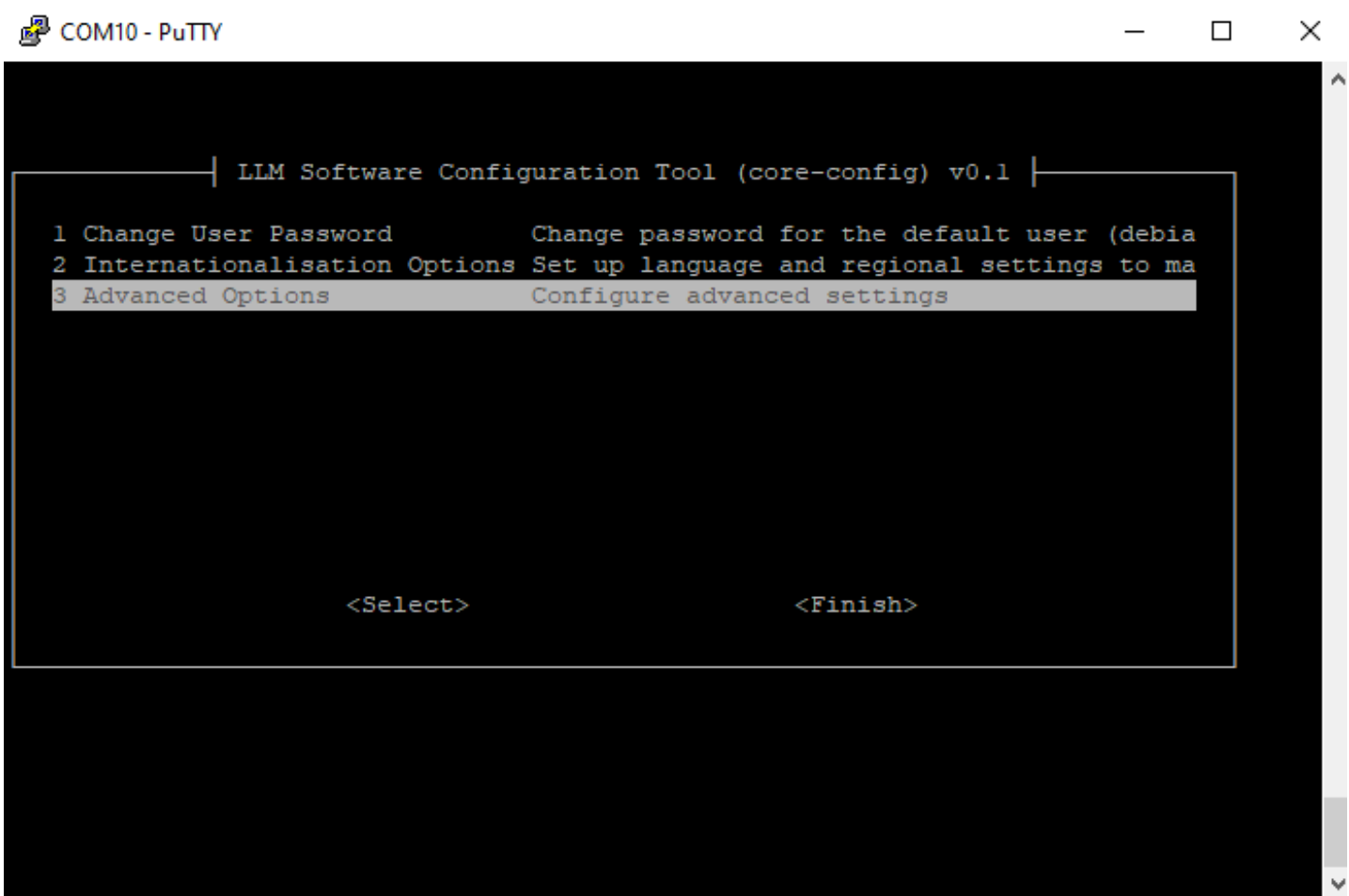
1. The LLM630 Compute Kit provides an Ethernet interface for easy network access and functional debugging.

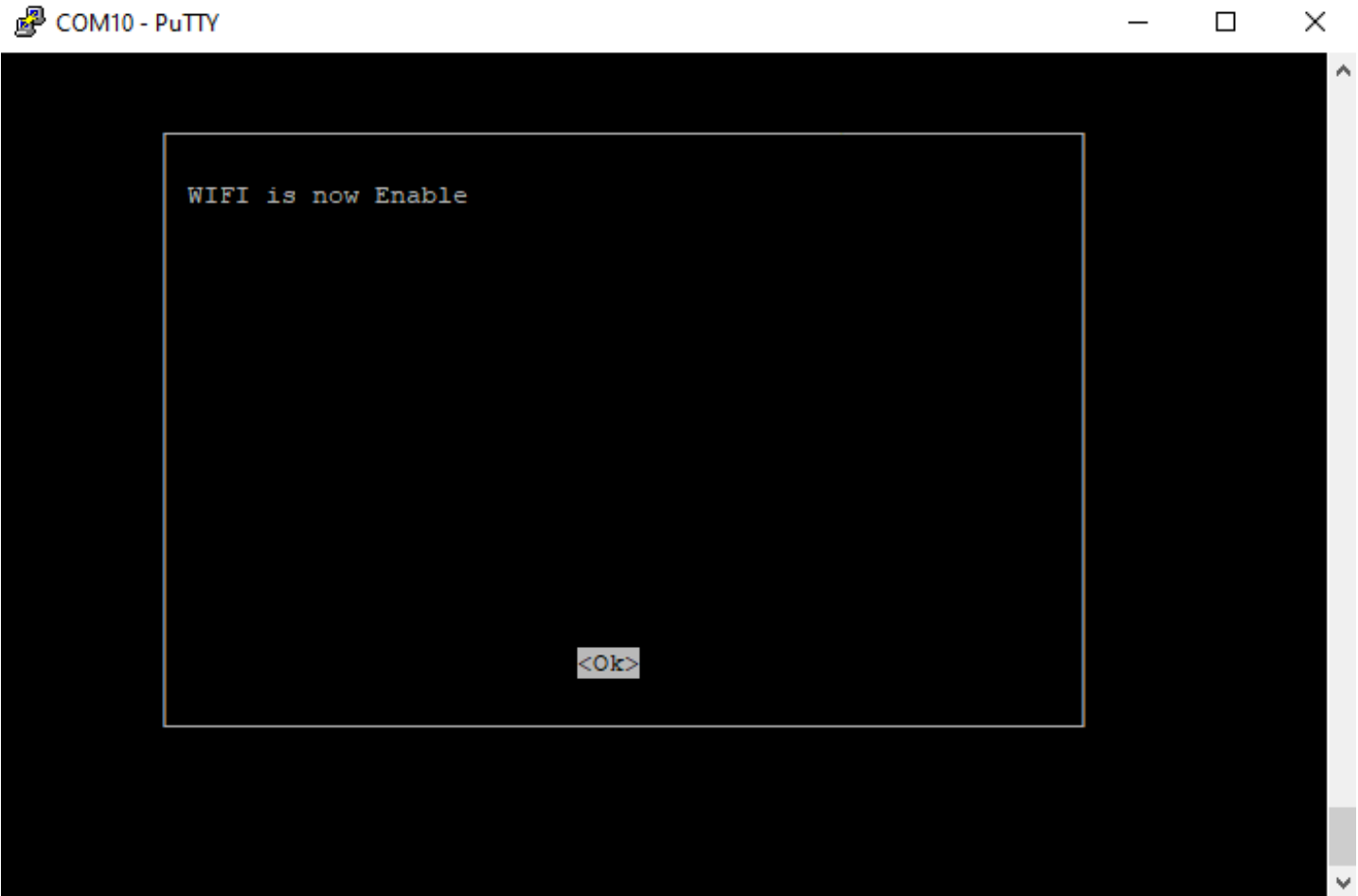


3.3. Wi-Fi

1. The LLM630 Compute Kit features an onboard ESP32-C6 as the Wi-Fi chip, making it easy to connect to wireless networks. Refer to the following steps to enable Wi-Fi and configure the connection. Please install the accompanying SMA external antenna before use.

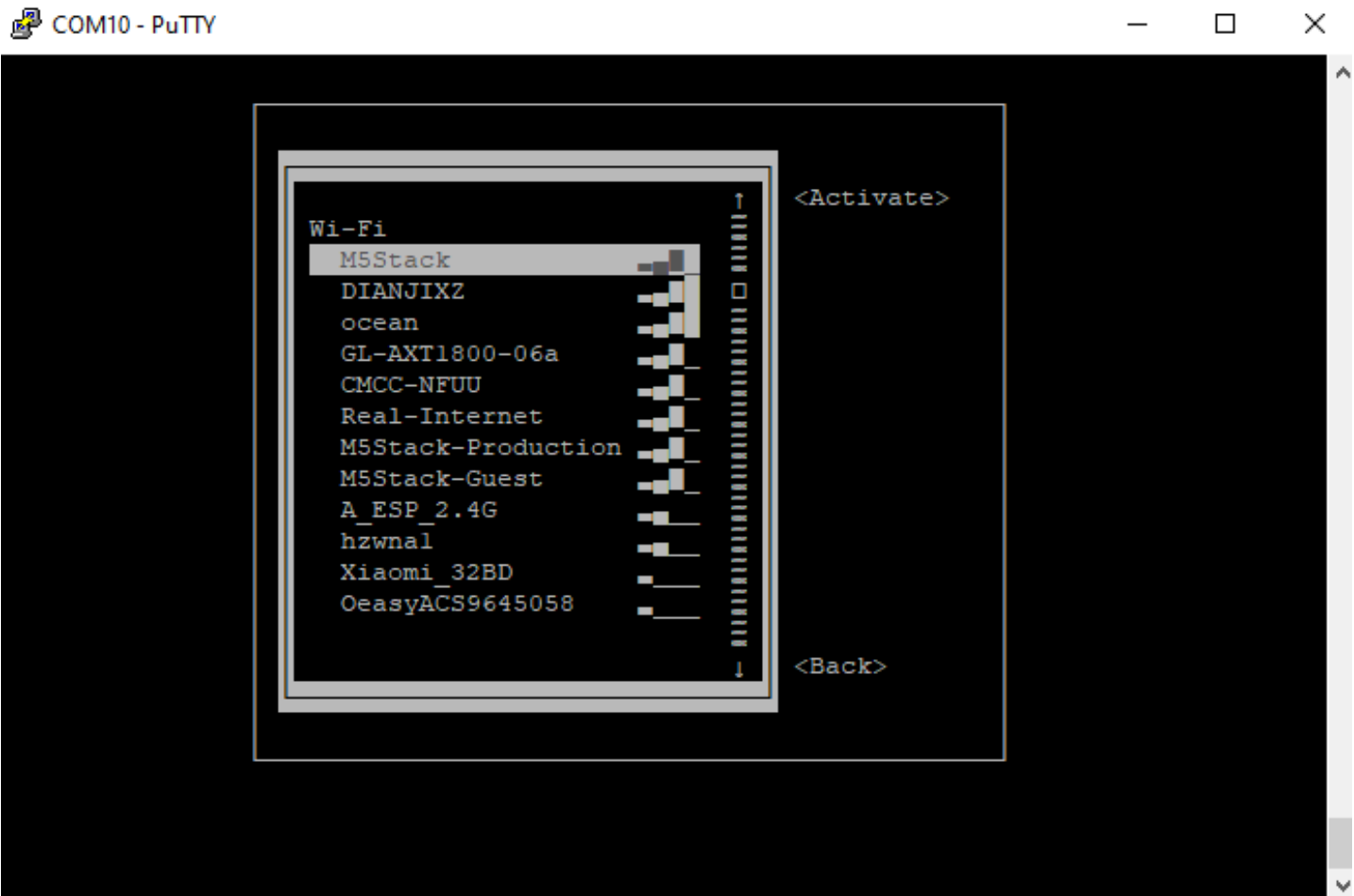
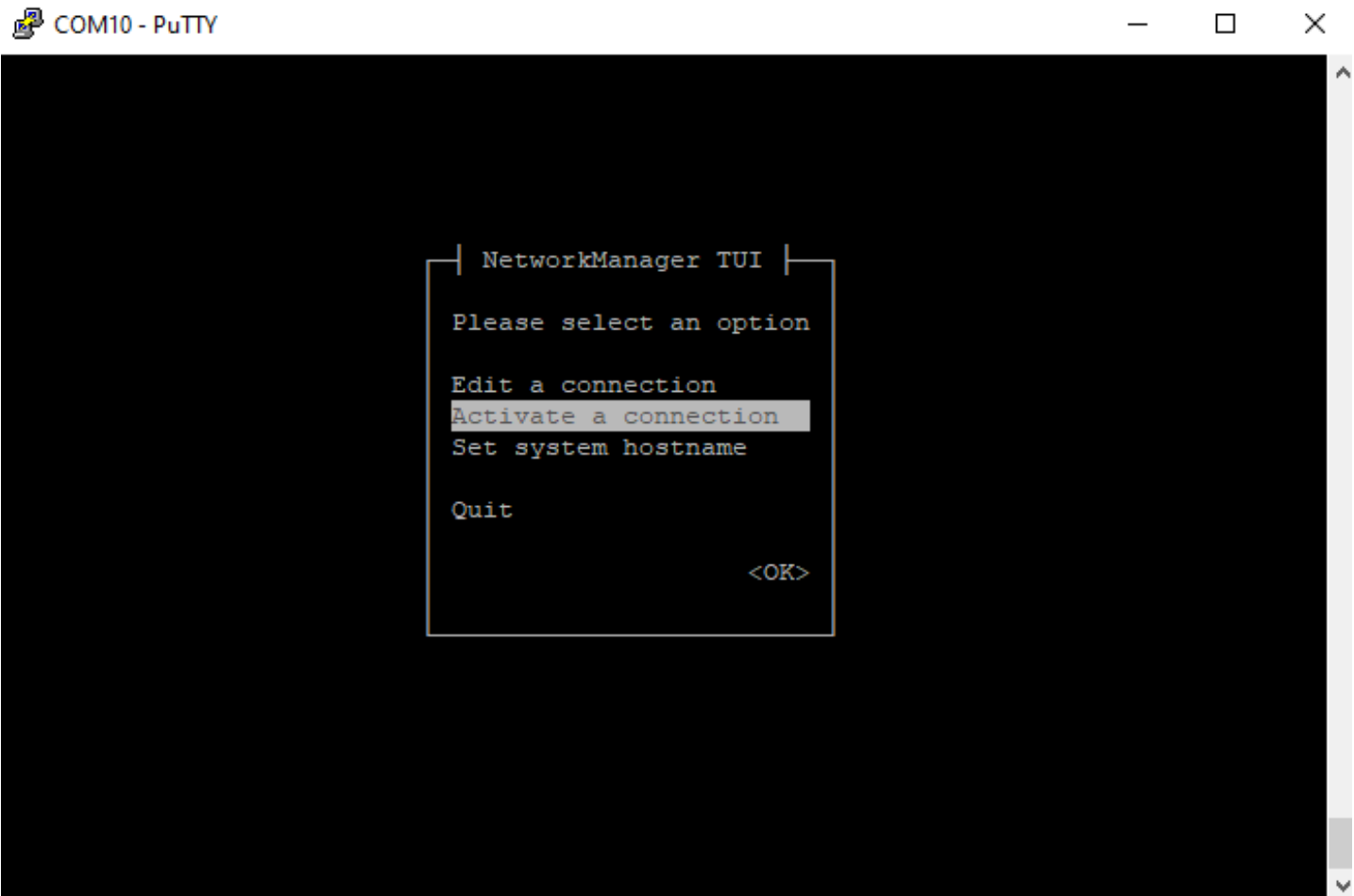
core-config

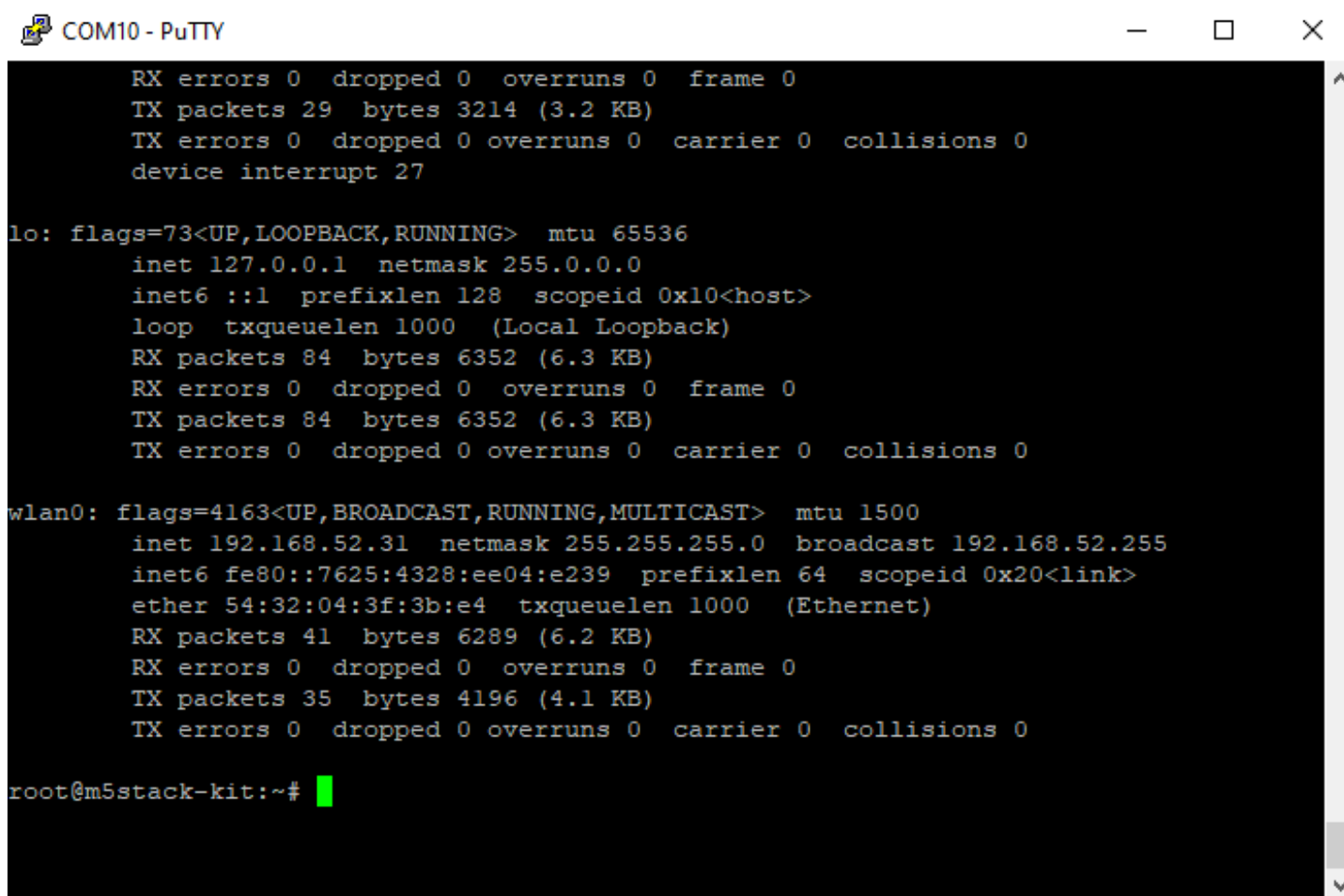
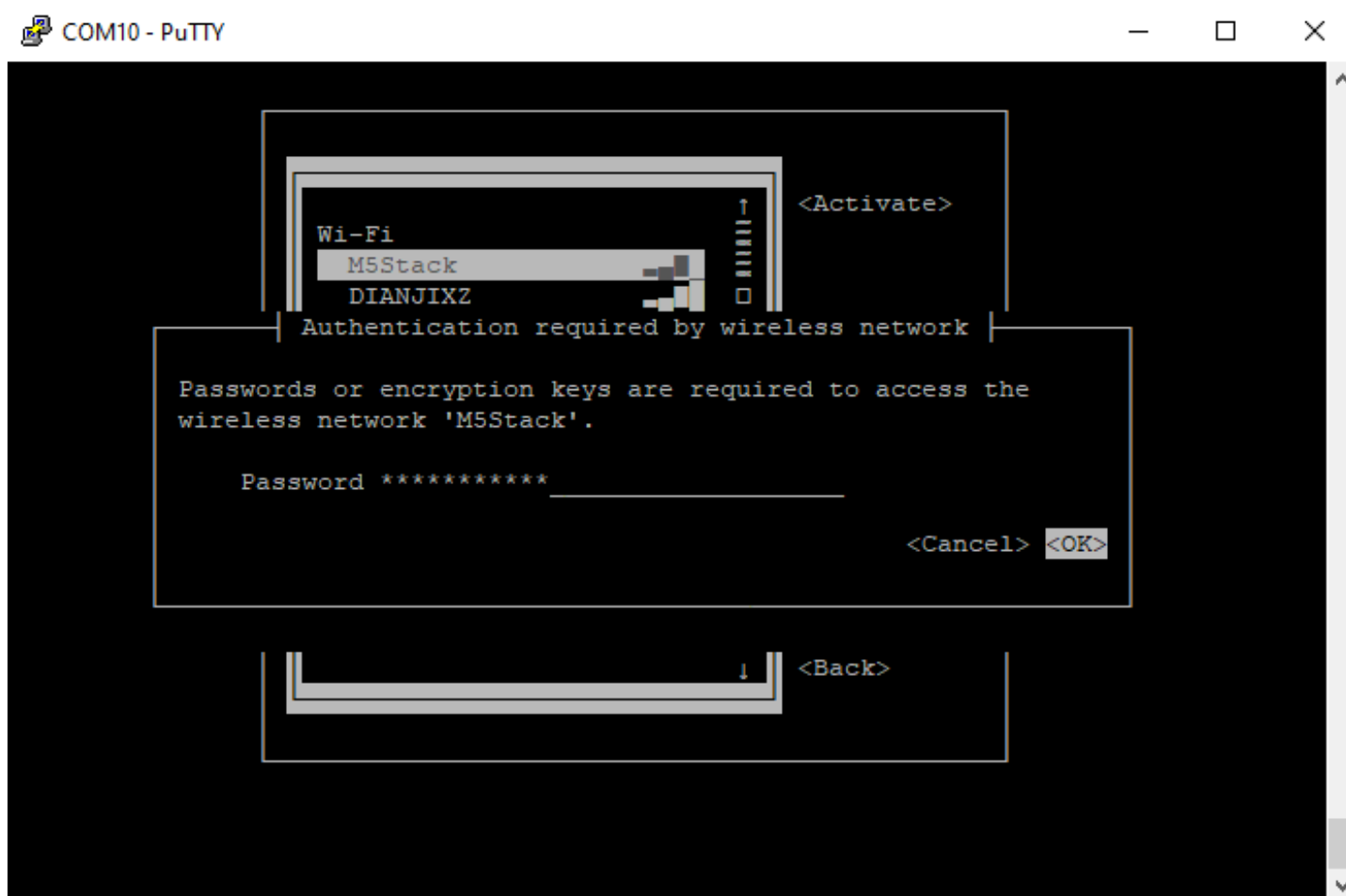




The default network configuration tool in the LLM630 Compute Kit is nmtui. You can use the nmtui tool to easily configure Wi-Fi connections.

nmtui





4. FCC Warning

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

— Reorient or relocate the receiving antenna. — Increase the separation between the equipment and receiver. — Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. — Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.