Geekworm X1001

Geekworm X1001 PCIe to M.2 HAT NVMe SSD Board for Raspberry Pi 5 User Manual

Model: X1001 | Brand: Geekworm

1. Product Overview

The Geekworm X1001 is a PCIe to M.2 HAT (Hardware Attached on Top) peripheral board designed specifically for the Raspberry Pi 5. It enables the use of M.2 Key-M NVMe Solid State Drives (SSDs) with your Raspberry Pi 5, providing significantly faster storage performance compared to traditional microSD cards. This board supports various M.2 NVMe SSD lengths, including 2230, 2242, 2260, and 2280.

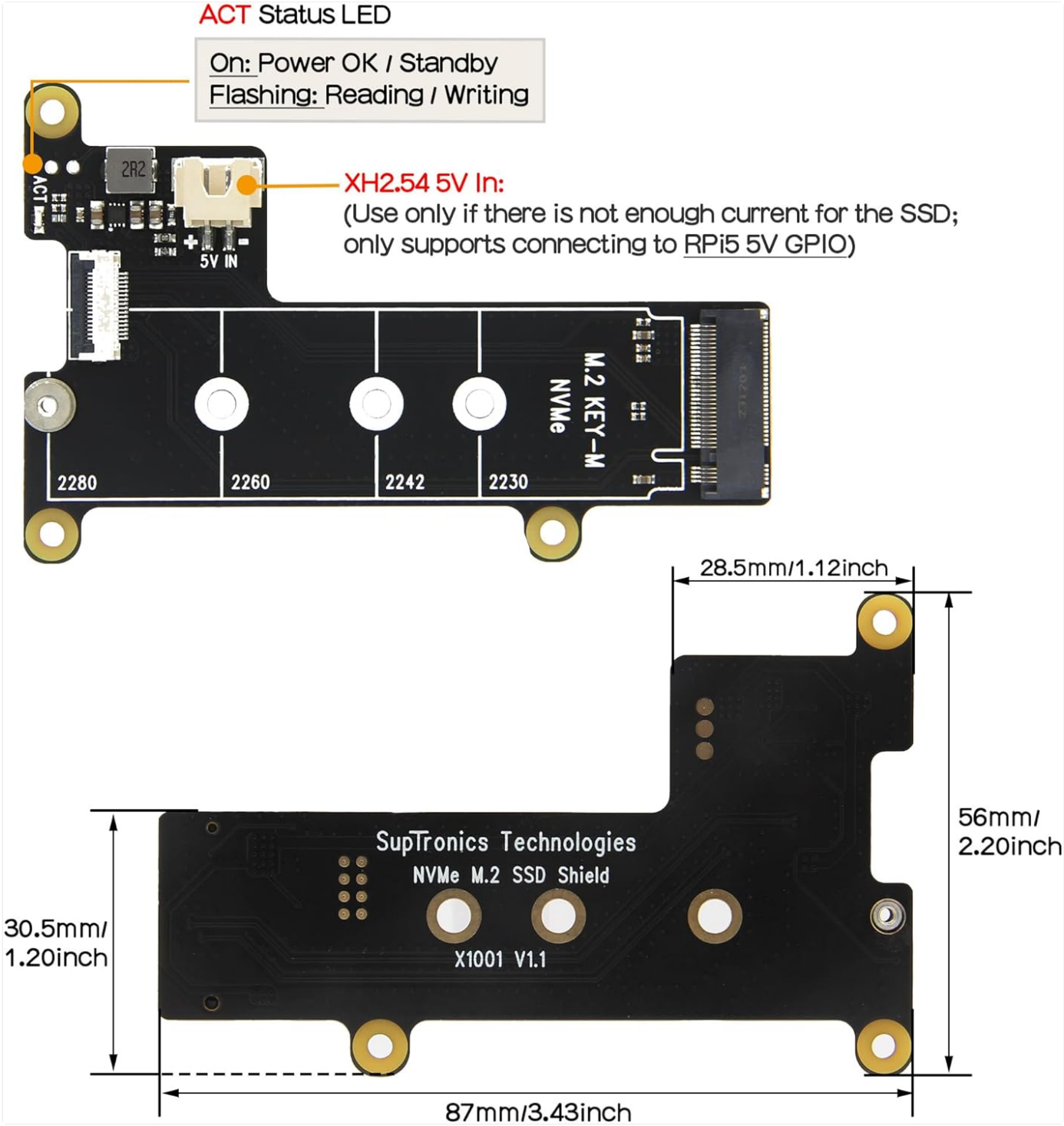


Figure 1: Geekworm X1001 board showing dimensions and LED status indicators. The board measures approximately 87mm x 56mm (3.43 x 2.20 inches). The ACT Status LED indicates power (ON/Standby) and read/write activity (Flashing). An XH2.54 5V In port is available for additional power if the SSD requires more current than provided by the FFC PCIe ribbon.

2. Compatibility

- **Raspberry Pi:** Compatible only with Raspberry Pi 5 (2GB/4GB/8GB/16GB SBC models).
- **NVMe SSDs:** Supports M.2 Key-M NVMe SSDs of lengths 2230, 2242, 2260, and 2280.
- **SSD Keying:** Only supports M-Key (notch on the top right) and B&M Key (notch on both sides) NVMe SSDs. SATA SSDs (B-Key) are not supported.
- **Cooling:** Designed to support most Raspberry Pi 5 coolers, including the official active cooler, and is compatible with other HAT shields.

3. What's in the Box

The Geekworm X1001 package includes the following components:

- 1 x X1001 V1.1 Shield
- 1 x Screws Pack Accessories (including M2.5x5mm screws, M2.5x17mm spacers, M2x4mm screws, SSD copper pillar, and 8.5x30mm FFC cable)

Figure 2: Contents of the X1001 packing list, showing the X1001 board, various screws, spacers, an SSD copper pillar, and an FFC cable.

4. Setup and Installation

Follow these steps to install the X1001 board and an M.2 NVMe SSD onto your Raspberry Pi 5.

4.1. Pre-installation (Cooler)

Before installing the X1001, ensure any active cooler or third-party cooler is properly installed on your Raspberry Pi 5. Plug the cooling fan connector into the Pi 5's cooling fan port with the correct orientation.

4.2. Attaching Spacers and FFC Cable

1. Fix three M2.5x5mm screws with M2.5x17mm F/F spacers onto the Raspberry Pi 5.
2. Insert the FFC (Flexible Flat Cable) into the Raspberry Pi 5's PCIe connector with the blue side facing up. Gently lift the connector's cover, insert the cable, and then press the cover down firmly to secure it.

4.3. Installing the X1001 Board

3. Place the X1001 shield above the installed spacers on the Raspberry Pi 5.
4. Fix the X1001 board using three M2.5x5mm screws.
5. Insert the other end of the FFC cable into the X1001 board's FFC connector. Ensure the blue side faces up and the cable is firmly seated.

4.4. Installing the M.2 NVMe SSD

6. Insert your M.2 Key-M NVMe SSD (e.g., 2280 length) into the X1001's M.2 slot.
7. Secure the SSD using an M2x4mm screw. For 2230/2242/2260 SSDs, use the provided SSD copper pillar and an M2x4mm screw. Do not reserve the nut column for 2230/2242/2260 SSDs; users may need to find an appropriate method to fix shorter SSDs if the copper pillar is not suitable for their specific SSD.

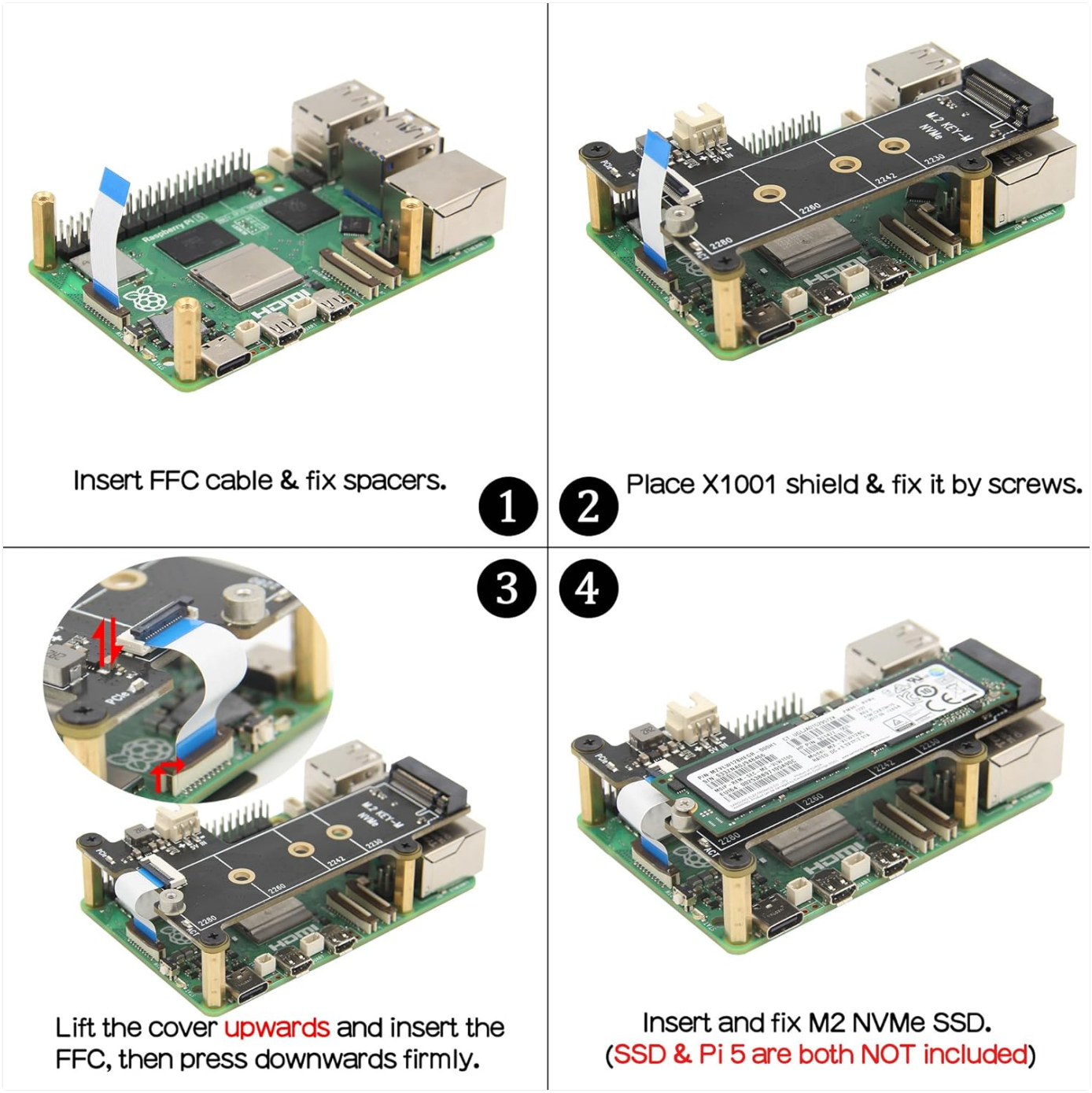


Figure 3: Visual guide for installing the X1001 board and NVMe SSD onto the Raspberry Pi 5. Steps include inserting the FFC cable, placing and fixing the X1001 shield, and inserting and fixing the M.2 NVMe SSD.

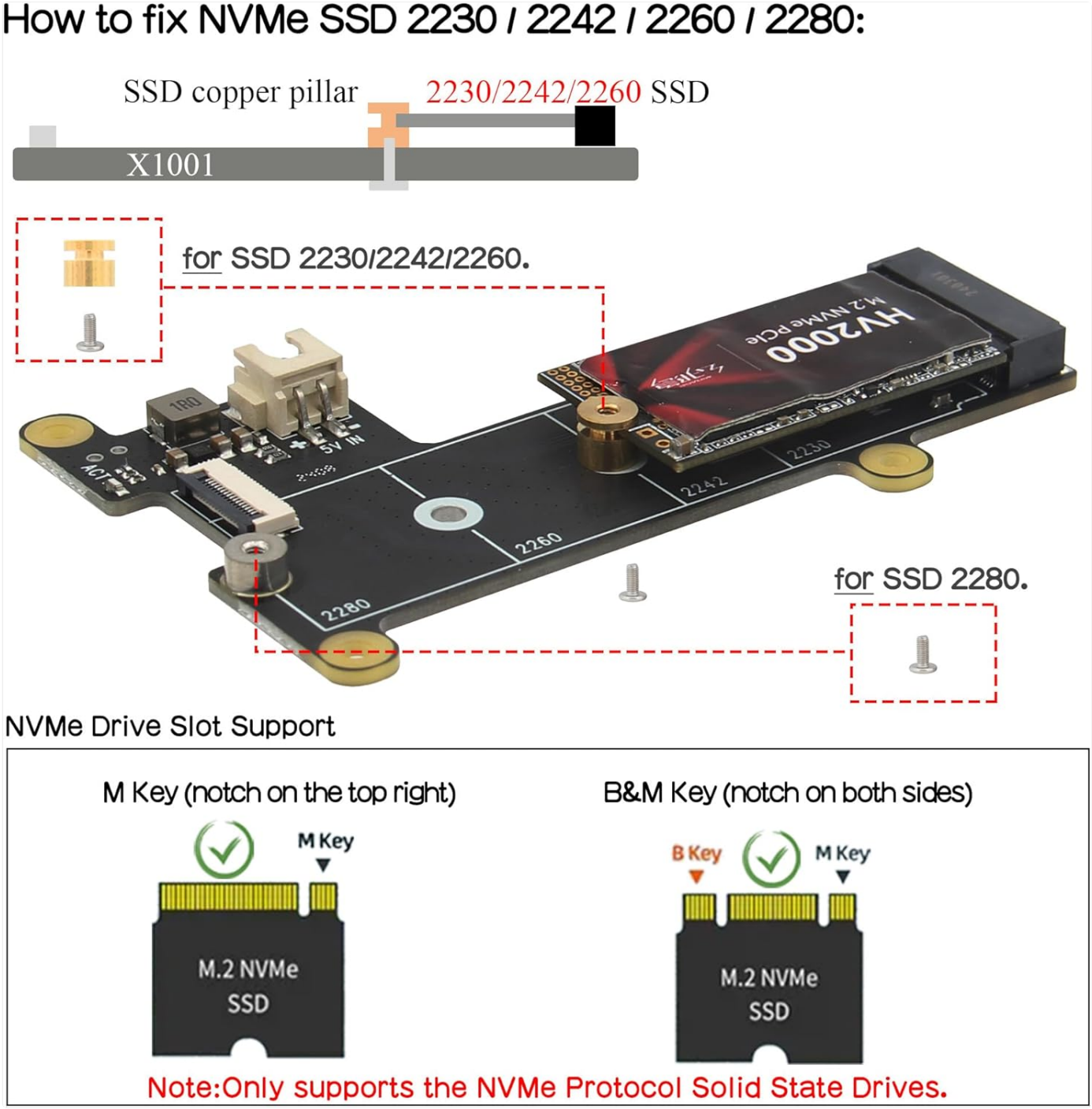
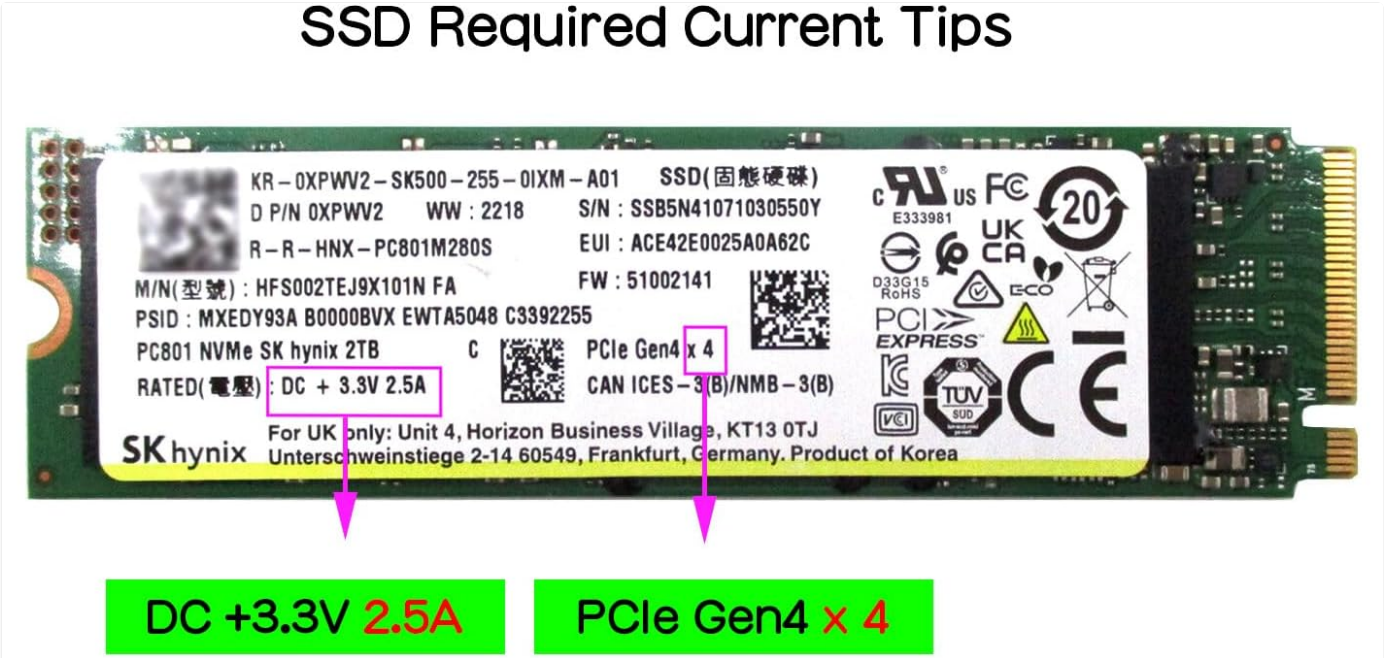


Figure 4: Details on how to fix different M.2 NVMe SSD lengths (2230/2242/2260/2280) using the SSD copper pillar and M2x4mm screws. Also illustrates supported M-Key and B&M Key NVMe SSDs, and explicitly states that M.2 SATA SSDs (B-Key) are not supported.

4.5. Powering the Device

The X1001 shield is powered directly from the FFC PCIe ribbon. For stable operation, especially with power-hungry SSDs, it is recommended to use a PD 27W power adapter for the Raspberry Pi 5. The FFC cable power supply is generally sufficient for most NVMe M.2 SSDs (PCIe x3 or x4) as the Raspberry Pi 5 only supports PCIe x1, reducing the actual current requirement.



Although the maximum current required by this SSD is 2.5A, it is actually the current requirement when it works on PCIe x4; Raspberry Pi 5 only supports PCIe x1, so the required current is only 2.5A/4=0.625A; Currently the NVMe M.2 SSDs sold on on the market are PCIe x4 or PCIe x3. The FFC cable power supply we provide is sufficient!

Figure 5: Information regarding SSD power requirements. Although an SSD might require 2.5A for PCIe x4 operation, the Raspberry Pi 5's PCIe x1 support means the actual required current is significantly lower (approximately 0.625A), which the FFC cable can supply.

4.6. Installation Video Guide

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Video 1: Official Geekworm installation guide for the X1001 board and P579 case. This video demonstrates the complete assembly process, including cooler installation, FFC cable connection, X1001 board mounting, SSD installation, and final enclosure assembly.

5. Operating Instructions

After physical installation, proper software configuration is required for the Raspberry Pi 5 to recognize and boot from the NVMe SSD.

- **OS Configuration:** Refer to the official Raspberry Pi documentation or the Geekworm WiKi for detailed instructions on configuring your Raspberry Pi OS (e.g., Bookworm) to recognize and boot from an NVMe SSD. This typically involves updating firmware and modifying boot order settings.
- **PCIe Generation:** For optimal performance, ensure your Raspberry Pi 5's PCIe settings are configured correctly.

Some users report performance improvements by setting dtparam=pciex1_gen=3 in the config.txt file, enabling PCIe Gen 3 speeds.

6. Troubleshooting

If you encounter issues with your X1001 board or NVMe SSD, consider the following:

- **SSD Not Recognized/Boot Failure:**
  - Verify the FFC cable connection is secure and correctly oriented on both the Raspberry Pi 5 and the X1001 board.
  - Ensure your Raspberry Pi 5 firmware is up to date.
  - Check the compatibility of your specific NVMe SSD model with the Raspberry Pi 5 and X1001 board. Some SSDs, particularly certain WD drives, have known compatibility issues with Raspberry Pi.
  - Confirm the SSD is properly seated and secured in the M.2 slot.
  - Consult the Geekworm WiKi by searching for "X1001 FAQ" for step-by-step troubleshooting guides.
- **Power Issues:** If your SSD requires more power than the FFC ribbon can provide, use the XH2.54 5V In port on the X1001 board, connecting it to the Raspberry Pi 5's 5V GPIO pins. Ensure you are using a sufficient power supply for your Raspberry Pi 5 (e.g., Geekworm PD 27W).
- **Physical Damage:** Handle the FFC cable and connectors with care. The FFC cable connector on the Raspberry Pi 5 can be delicate.

7. Specifications

Brand	Geekworm
Model Number	X1001
Product Dimensions	3.42 x 2.2 x 0.04 inches (87 x 56 x 1 mm)
Item Weight	0.776 ounces (22 Grams)
Hardware Interface	PCI Express x1
Supported SSD Types	M.2 Key-M NVMe SSD (2230/2242/2260/2280)
Operating System Compatibility	Raspberry Pi OS Bookworm (and compatible versions)

8. Warranty and Support

For warranty information, technical support, and additional resources, please visit the official Geekworm website or their Amazon store page. The Geekworm WiKi is a valuable resource for detailed guides and frequently asked questions.

- **Geekworm Store:** https://www.amazon.com/stores/Geekworm/page/F81710CF-C58D-4189-A48E-AD35BBAECDB7
- **Geekworm WiKi:** Search "Geekworm WiKi" online and look for X1001 related documentation.