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GRAUGEAR G-M2U4-40G-F

GRAUGEAR 40Gbps M.2 NVMe SSD Enclosure User Manual

Model: G-M2U4-40G-F

1. Introduction

This manual provides detailed instructions for the installation, operation, and maintenance of your GRAUGEAR 40Gbps M.2 NVMe SSD Enclosure. This high-performance enclosure is designed for M.2 NVMe SSDs, offering ultra-fast data transfer speeds up to 40Gbps via USB4 and Thunderbolt 4/3 compatibility. It features an advanced cooling system with a built-in fan and dual-pipe heatsink to ensure optimal performance and longevity of your SSD.

Figure 1: GRAUGEAR 40Gbps M.2 NVMe SSD Enclosure with included cables.

2. Package Contents

Please verify that all items listed below are included in your package. If any items are missing or damaged, please contact GRAUGEAR customer support.

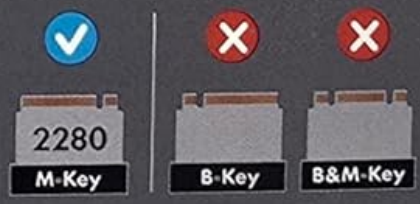
- GRAUGEAR 40Gbps M.2 NVMe SSD Enclosure (G-M2U4-40G-F)
- USB-C to USB-C Cable
- Screw driver
- Screw set
- Thermal pad
- User Manual (this document)
- Service Card

GRAUGEAR

USB 4.0 Enclosure

for M.2 2280 PCIe Gen4x4 NVMe SSD

- Supports PCIe 4.0 x4 transfer speed up to 40 Gbit/s USB 4.0
- Premium aluminium case with excellent cooling capabilities
- Compatible with M.2 NVMe SSD in M Key spec and size of 2280
- Heat Pipe from Copper maximum performance
- 30mm fan for active cooling
- LED indicator for power and access
- Supports Windows® and MacOS®



DE USB 4.0 Gehäuse für M.2 NVMe SSD
FR Boîtier USB 4.0 pour SSD M.2 NVMe
ES Carcasa USB 4.0 para SSD NVMe M.2
IT Enclosure USB 4.0 per SSD M.2 NVMe
GR Περίβλημα USB 4.0 για SSD M.2 NVMe
PL Obudowa USB 4.0 do dysków SSD M.2 NVMe
CZ USB 4.0 pro SSD M.2 NVMe
NL USB 4.0 behuizing voor M.2 NVMe SSD
HU USB 4.0 ház az M.2 NVMe SSD-hez

PACKAGING

1 x G-M2U4-40G-F
1 x Type-C® to C Cable
1 x Screwdriver
1 x SSD mounting screw
1 x Thermal Pad
1 x User Manual
1 x Service Card

Figure 2: The retail packaging of the GRAUGEAR enclosure, indicating included accessories.

3. Features

- **40Gbps Ultra High Speed:** Supports USB 4.0 with ASM2464PD chipset for data transmission speeds up to 40Gbps. Compatible with Thunderbolt 4/3 and backward compatible with USB 3.2/3.1/3.0/2.0.
- **Efficient Heat Dissipation:** Features a built-in cooling fan, copper heat pipes, and an aluminum heatsink to prevent SSD overheating and maintain high transfer rates.
- **Optimal Cooling:** Highly optimized 30mm fan with low-noise operation reduces M.2 SSD heat by up to 60%.
- **Direct Touch Heatpipes:** Dual copper heat pipes with Direct Touch Heatpipes (DTH) technology ensure even and fast heat conduction from the SSD.
- **Stability and Safety:** Advanced ASM2464PD controller provides short-circuit, over-current, and multi-protection for data safety.
- **Auto Sleep Function:** Automatically enters sleep mode after 10 minutes of inactivity to conserve power and extend SSD lifespan.

Figure 3: Key features of the GRAUGEAR 40Gbps M.2 NVMe SSD Enclosure, including speed, chip, auto-sleep, heat pipe, and fan.

Figure 4: Illustration of the direct contact heat pipe technology for efficient heat transfer.

4. Compatibility

4.1 Supported SSD Types

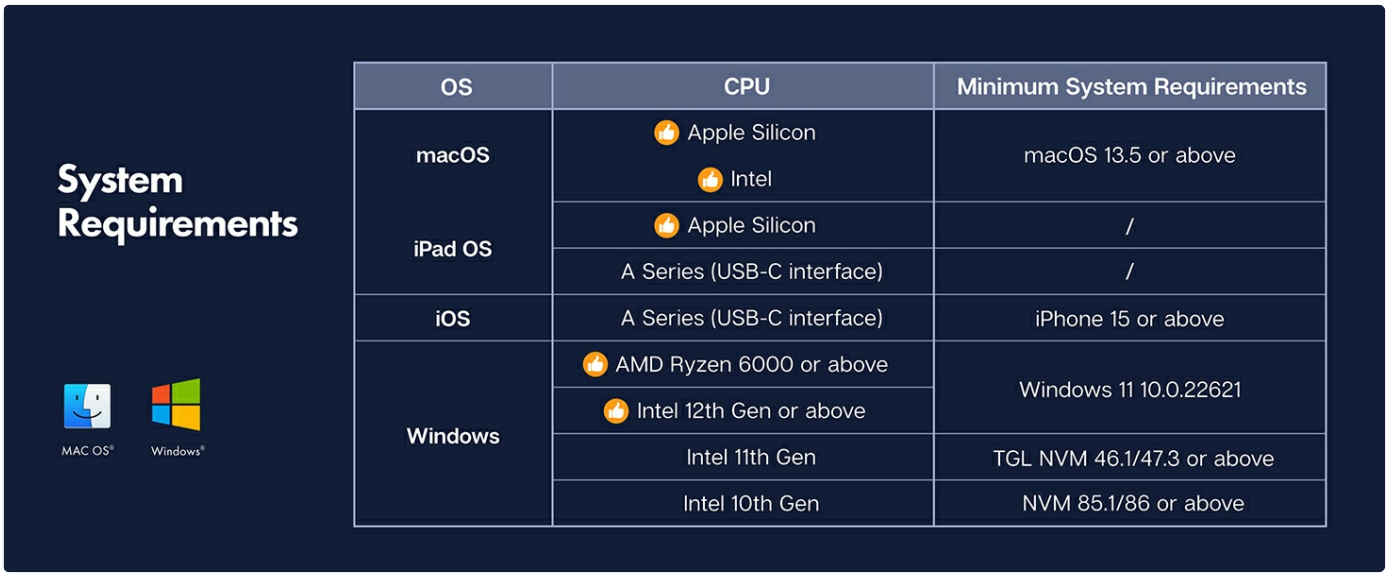
The GRAUGEAR enclosure exclusively supports **M.2 NVMe SSDs** with a form factor of **2280mm** (22mm width, 80mm length). It does *not* support M.2 SATA/SATA SSDs or other NVMe SSD sizes (e.g., 2230, 2242, 2260).

Figure 5: Visual guide indicating support for 2280 M-Key NVMe/PCIe SSDs only.

4.2 Compatible Devices and Operating Systems

The enclosure is compatible with a wide range of devices and operating systems, leveraging its USB-C (USB4) interface.

Figure 6: Overview of compatible devices (Desktop, Laptop, PS5, iPad, iPhone, Smart TV, Router, Computer, Tablet) and operating systems (Windows, macOS, iPadOS, Android, Linux).



OS	CPU	Minimum System Requirements
macOS	Apple Silicon Intel	macOS 13.5 or above
iPad OS	Apple Silicon	/
	A Series (USB-C interface)	/
iOS	A Series (USB-C interface)	iPhone 15 or above
Windows	AMD Ryzen 6000 or above	Windows 11 10.0.22621
	Intel 12th Gen or above	
	Intel 11th Gen	TGL NVM 46.1/47.3 or above
	Intel 10th Gen	NVM 85.1/86 or above

Figure 7: Detailed system requirements for various operating systems and CPU architectures.

For optimal 40Gbps transfer speeds, ensure your device has a USB 4.0 or Thunderbolt 4 interface and that your operating system and NVMe firmware are updated to the latest versions. Backward compatibility will limit the speed, and some older devices may not recognize the enclosure.

5. Setup and Installation

Follow these steps to install your M.2 NVMe SSD into the GRAUGEAR enclosure.

1. **Prepare the Enclosure:** Using the provided screwdriver, carefully remove the screws securing the enclosure's cover. Gently slide open the enclosure to reveal the internal M.2 slot.
2. **Install the SSD:** Align your 2280 M.2 NVMe SSD with the M-Key slot inside the enclosure. Insert the SSD firmly but gently into the slot at an angle. Once seated, press down the end of the SSD and secure it with the provided screw.

3. **Apply Thermal Pad:** Peel off the protective films from both sides of the thermal pad. Carefully place the thermal pad onto the top surface of the installed SSD, ensuring it covers the main controller chip and NAND flash modules for effective heat transfer.
4. **Reassemble the Enclosure:** Carefully slide the enclosure cover back into place, ensuring it aligns correctly. Secure the cover with the screws you removed earlier.
5. **Connect to Device:** Use the provided USB-C to USB-C cable to connect the enclosure to your computer or compatible device.

Important Note:

- Ensure the SSD is correctly oriented before insertion to prevent damage.
- Only 2280 M-Key NVMe SSDs are supported. Attempting to install other types may damage the enclosure or SSD.
- For new SSDs, you may need to initialize and format the drive through your operating system's Disk Management (Windows) or Disk Utility (macOS) before it can be used.

6. Operating Instructions

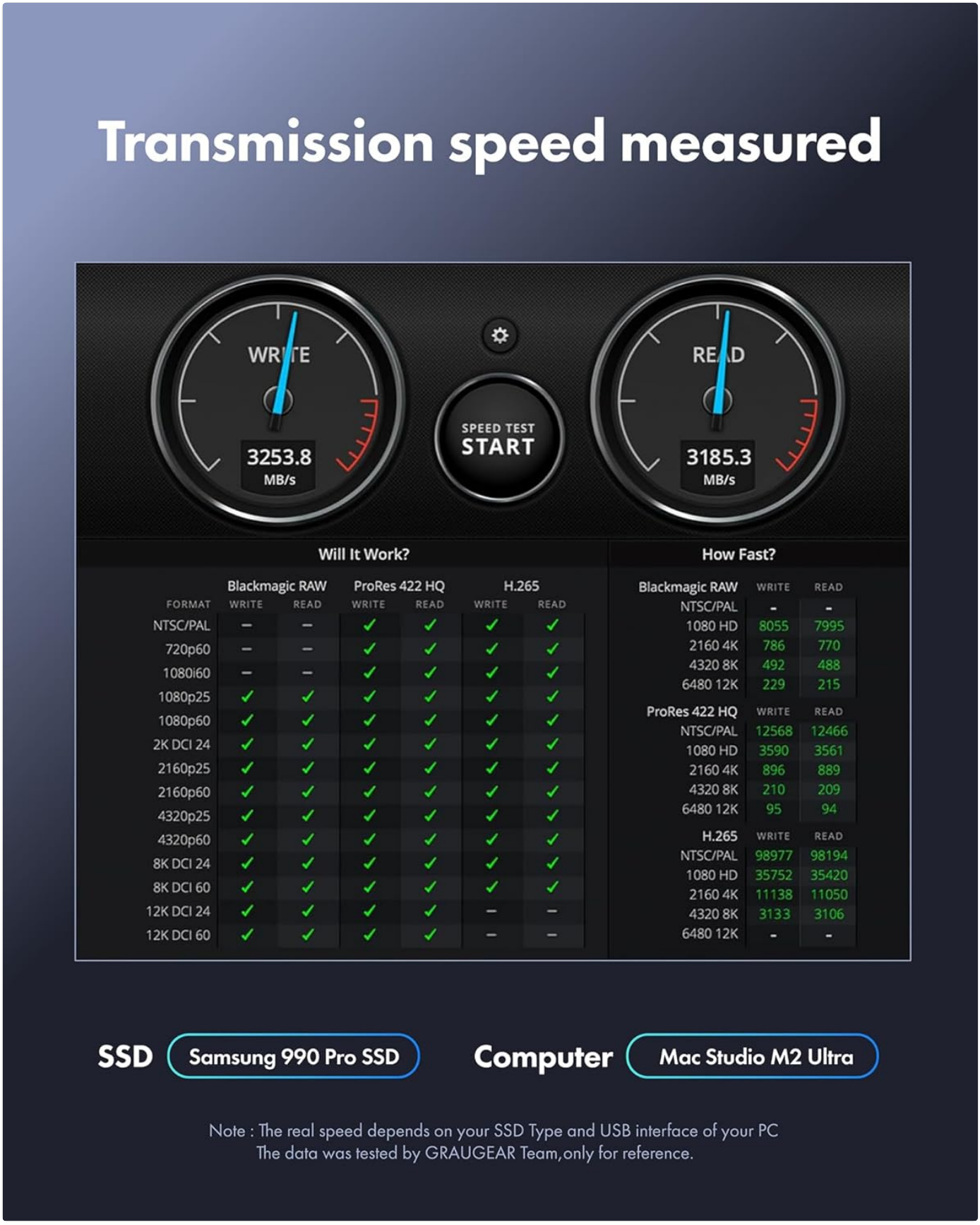
6.1 Connecting and Disconnecting

Connect the enclosure to your device using the supplied USB-C cable. The enclosure is plug-and-play and should be recognized automatically by compatible operating systems. To safely disconnect, always eject the drive through your operating system's safe removal procedure before unplugging the cable.

6.2 Data Transfer

Once connected and recognized, the SSD in the enclosure will appear as an external drive. You can drag and drop files, copy, paste, and perform other file operations as you would with any other storage device.

Figure 8: The enclosure connected to a laptop, demonstrating high-speed data transfer capabilities (up to 40Gbps).



FORMAT	Blackmagic RAW WRITE	Blackmagic RAW READ	ProRes 422 HQ WRITE	ProRes 422 HQ READ	H.265 WRITE	H.265 READ
NTSC/PAL	–	–	✓	✓	✓	✓
720p60	–	–	✓	✓	✓	✓
1080i60	–	–	✓	✓	✓	✓
1080p25	✓	✓	✓	✓	✓	✓
1080p60	✓	✓	✓	✓	✓	✓
2K DCI 24	✓	✓	✓	✓	✓	✓
2160p25	✓	✓	✓	✓	✓	✓
2160p60	✓	✓	✓	✓	✓	✓
4320p25	✓	✓	✓	✓	✓	✓
4320p60	✓	✓	✓	✓	✓	✓
8K DCI 24	✓	✓	✓	✓	✓	✓
8K DCI 60	✓	✓	✓	✓	✓	✓
12K DCI 24	✓	✓	✓	✓	–	–
12K DCI 60	✓	✓	✓	✓	–	–

Blackmagic RAW	WRITE	READ
NTSC/PAL	-	-
1080 HD	8055	7995
2160 4K	786	770
4320 8K	492	488
6480 12K	229	215
ProRes 422 HQ	**WRITE**	**READ**
NTSC/PAL	12568	12466
1080 HD	3590	3561
2160 4K	896	889
4320 8K	210	209
6480 12K	95	94
H.265	**WRITE**	**READ**
NTSC/PAL	98977	98194
1080 HD	35752	35420
2160 4K	11138	11050
4320 8K	3133	3106
6480 12K	-	-

Figure 9: Example of measured transmission speeds, showcasing the enclosure's performance with a high-end SSD.

6.3 LED Indicator

The enclosure features an LED indicator for power and activity status. Refer to the following table for LED behavior:

LED Status	Meaning
Solid Blue	Power On / Idle

LED Status	Meaning
Flashing Blue	Data Transfer / Activity
Off	No Power / Sleep Mode

7. Maintenance

Proper maintenance ensures the longevity and optimal performance of your GRAUGEAR SSD enclosure.

- **Cleaning:** Use a soft, dry cloth to clean the exterior of the enclosure. Avoid liquid cleaners or abrasive materials.
- **Cooling System:** The built-in fan and heatsink are designed for efficient cooling. Ensure the fan vents are not obstructed to allow proper airflow.
- **Temperature Management:** While the enclosure has an active cooling system, avoid operating it in excessively hot environments or direct sunlight.
- **Firmware Updates:** Periodically check the GRAUGEAR website (www.graugear.de) for any firmware updates for the enclosure's controller chip (ASM2464PD) to ensure continued compatibility and performance.

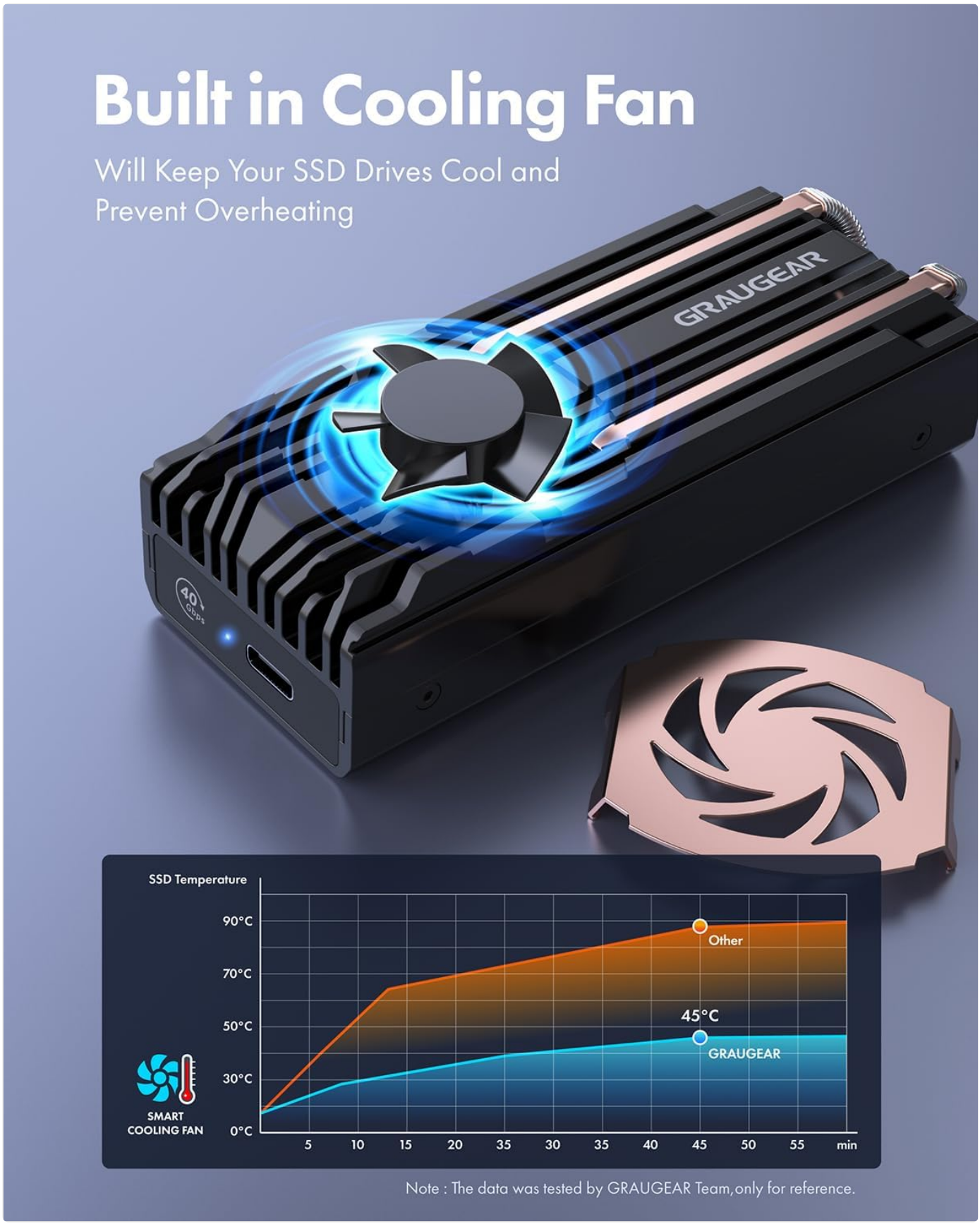


Figure 10: Graph illustrating the temperature reduction achieved by the built-in cooling fan compared to other solutions.

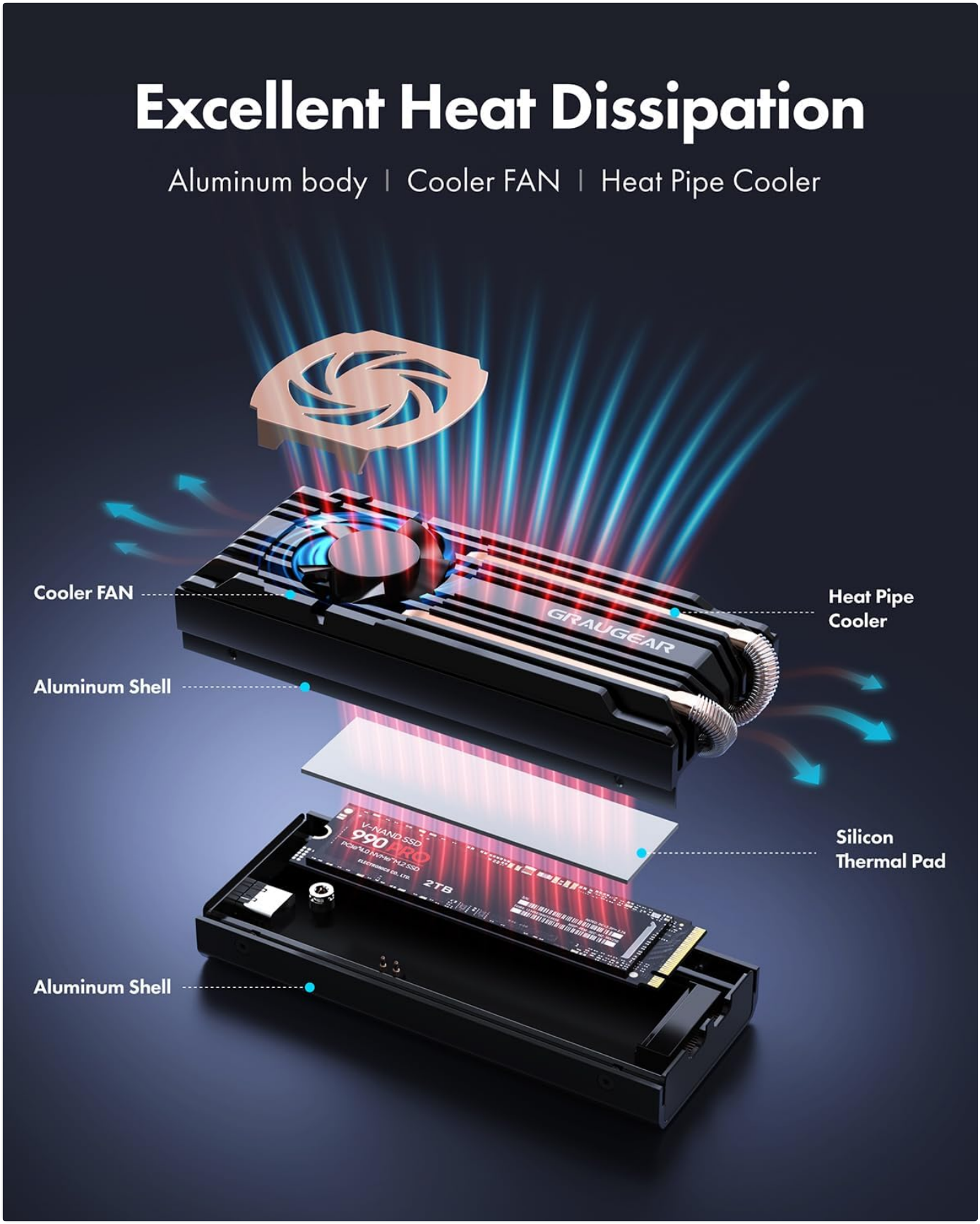


Figure 11: Exploded view showing the aluminum body, cooler fan, heat pipe cooler, and silicon thermal pad contributing to excellent heat dissipation.

8. Troubleshooting

If you encounter issues with your GRAUGEAR SSD enclosure, refer to the following common problems and solutions:

Problem	Possible Cause / Solution
Enclosure not recognized by computer.	◦ Ensure the USB cable is securely connected to both the enclosure and the computer. ◦ Try a different USB port on your computer. ◦ Verify the SSD is correctly installed and seated in the enclosure. ◦ For new SSDs, ensure it is initialized and formatted in Disk Management (Windows) or Disk Utility (macOS). ◦ Check if your operating system meets the minimum requirements (refer to Section 4.2). ◦ Test with a different USB-C cable if available.
Slow data transfer speeds.	◦ Ensure you are connected to a USB 4.0 or Thunderbolt 4 port on your device. Backward compatibility will result in lower speeds. ◦ Verify your SSD is a high-performance NVMe drive. ◦ Check for background processes or other devices consuming bandwidth. ◦ Ensure the thermal pad is correctly applied and the cooling fan is operating to prevent thermal throttling.
Enclosure feels hot.	◦ Some heat is normal during high-speed operation. The cooling system is designed to dissipate this. ◦ Ensure the fan vents are not blocked. ◦ Verify the thermal pad is correctly placed on the SSD. ◦ If the fan is not spinning, check for obstructions or contact customer support.
Fan making unusual noise.	◦ Ensure no foreign objects are obstructing the fan blades. ◦ If the noise persists and is disruptive, contact GRAUGEAR customer support.

9. Specifications

Detailed technical specifications for the GRAUGEAR 40Gbps M.2 NVMe SSD Enclosure (Model: G-M2U4-40G-F).

Feature	Detail
Model Number	G-M2U4-40G-F
Internal Interface	M.2 M-Key (PCIe Gen4x4)
External Interface	USB4 (USB-C)
Controller Chipset	ASM2464PD
Supported SSD	M.2 NVMe SSD 2280
Max Data Transfer Rate	40Gbps (USB4)
Max Memory Storage Capacity	8 TB
Cooling System	Built-in 30mm Fan, Dual Copper Heat Pipes, Aluminum Heatsink
Material	Aluminum, Metal
Color	Black

Feature	Detail
Product Dimensions (L x W x H)	3.21" x 1.65" x 1.02" (8.15 cm x 4.19 cm x 2.59 cm)
Item Weight	9.6 ounces (272 grams)
Cable Length	35 cm / 13.78 inches
Manufacturer	CHAB GmbH

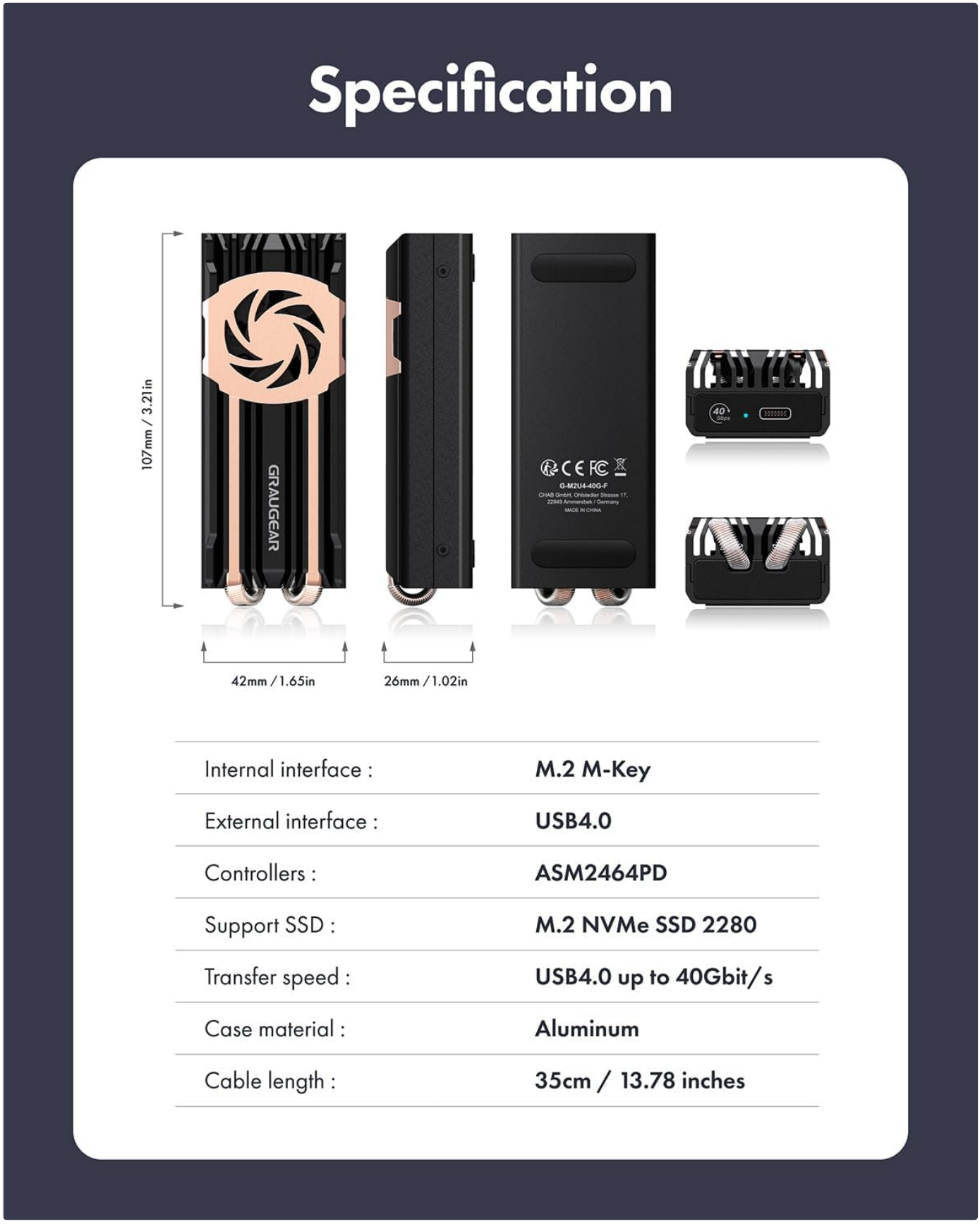


Figure 12: Diagram showing the physical dimensions and key specifications of the enclosure.

10. Warranty and Support

GRAUGEAR products come with a standard warranty. For specific warranty terms and conditions, please refer to the service card included in your package or visit the official GRAUGEAR website.

For technical support, troubleshooting assistance, or warranty claims, please contact GRAUGEAR customer service:

- **Website:** www.graugear.de
- **Email:** info@graugear.de
- **Phone:** +49 (0)40 7163 6372 (Germany)

Please have your model number (G-M2U4-40G-F) and purchase information ready when contacting support.

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Related Documents - G-M2U4-40G-F

	GRAUGEAR G-M2HS08-F Heat Pipe Cooler for M.2 2280 SSD - Installation and Safety Guide Comprehensive guide for the GRAUGEAR G-M2HS08-F Heat Pipe Cooler, detailing package contents, features, specifications, installation steps, and essential safety information for M.2 2280 SSDs.
	GRAUGEAR G-M2DK-AC-10G M.2 NVMe/NGFF SSD Docking Station User Manual User manual and specifications for the GRAUGEAR G-M2DK-AC-10G M.2 NVMe/NGFF SSD Docking Station. Features USB 3.2 Gen2 10Gbps connectivity, active cooling with a 50mm fan, and support for various M.2 SSD sizes (2230-22110). Includes installation guide and safety information.
	GRAUGEAR G-M2HS03-F Heat Pipe Cooler for M.2 2280 SSD Enhance your M.2 2280 SSD performance and longevity with the GRAUGEAR G-M2HS03-F Heat Pipe Cooler. This guide provides installation steps, key features, specifications, and essential safety information for optimal cooling of your SSD.
	GRAUGEAR M.2 2280 SSD Heat Pipe Cooler Installation and Safety Guide Comprehensive guide for the GRAUGEAR M.2 2280 SSD Heat Pipe Cooler, covering package contents, features, specifications, installation steps, and essential safety information.
	GrauGear USB 3.2 Gen2x2 Clone Station for 2x M.2 NVMe SSD - User Manual This document provides instructions and safety information for the GrauGear USB 3.2 Gen2x2 Clone Station, a device designed for cloning M.2 NVMe SSDs. It covers setup, standalone cloning, PC/Notebook mode, and important safety precautions.
	GRAUGEAR G-2501-AC-10G USB Type-C 2.5" HDD/SSD Enclosure: Features, Installation, and Safety Comprehensive guide to the GRAUGEAR G-2501-AC-10G USB Type-C enclosure for 2.5-inch HDDs and SSDs. Details package contents, features, specifications, installation steps, and essential safety information.

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