Rocket 7604A (R7604A)

NVMe RAID AIC User Guide

V1.01 - June 23, 2025

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1. Overview

The R7604A is the latest member of our PCIe Gen5 NVMe RAID AIC product family.

HighPoint Rocket Series NVMe connectivity AICs address the needs of solution providers and system integrators that cater to vertical marketplaces for high-speed industrial, corporate, and media applications. They were designed for professional applications that demand uncompromised storage performance, scalability, and adaptability in a compact, easy-to-integrate package that is universally compatible with industry-standard x86-64 (Intel/AMD) platforms.

The R7604A's four independent device ports can support M.2 NVMe SSDs.

All major Windows operating systems and current distributions of Linux support the R7604A. The Comprehensive Temperature Monitoring & Management solution enables administrators to have full control over fan speed, audible alarm and LED indication.

1.1. Key Features

- Dedicated PCIe 5.0 x16 host interface
- Support data transfer rate 64GB/s
- Support four dedicated M.2 NVMe devices
- Synthetic Hierarchy
- Host CPU Architect Support (X86/ ARM)
- Software Secure Boot
- Hardware Secure Boot
- FRU Inventory support
- Support LED Management
- Support Power Measurement
- Support the following Operating Systems:
  - Windows 11,10/ Server 2022,2019,2016/ Microsoft Hyper-V
  - RHEL/Debian/Ubuntu/Fedora/Proxmox/Rocky Linux

1.1.1. FRU

The *Field Replacement Unit (FRU)* ensures smooth operation and efficient maintenance of complex systems. The unit is designed to house and protect vital product data (VPD).

Information fields within a VPD resource type contain a three-byte header and some data. The three-byte header contains a two-byte keyword and a one-byte length. A keyword is a two-character (ASCII) mnemonic that uniquely identifies the information in the field. The last byte of the header is binary and represents the length value (in bytes) of the following data.

In the event of a hardware failure, the *FRU* can be quickly replaced, returning the device to a fully functional state without requiring extensive diagnostics or data recovery. This reduces downtime and minimizes the possibility of data loss, ensuring that critical operations can continue uninterrupted.

The following table describes the details and descriptions of the VPD.

Table 1: Details and Descriptions of the VPD

Key Word	Details	Descriptions
PN	AIC Part Number	This keyword is an extension to the Device ID (or Subsystem ID) in the Configuration Space header.
EC	Engineering Change Level	The characters are alphanumeric and represent the engineering change level for this add-in card.
MN	Manufacture ID	This keyword is provided as an extension to the Vendor ID (or Subsystem Vendor ID) in the Configuration Space header. This allows vendors to identify an additional level of detail regarding the sourcing of this device.
SN	Serial Number	The characters are alphanumeric and represent the unique add-in card Serial Number.
Vx	Vendor Specific	This is a vendor-specific item, and the characters are alphanumeric. The keyword's second character (x) can be 0 through 9 or A through Z. V0 indicates the Vendor Name V1 indicates the Main Chip

1.1.2. Synthetic Hierarchy

A synthetic hierarchy can be created to isolate the host from these physical PCIe topology changes and errors.

1.1.3. Hardware Secure Boot

The secure boot feature permits only authenticated firmware to execute. The switch boots the root of the trusted firmware from the internal boot ROM(IBR)and uses that firmware to authenticate the external firmware stored in the SPI flash and prevent the execution of unauthenticated code.

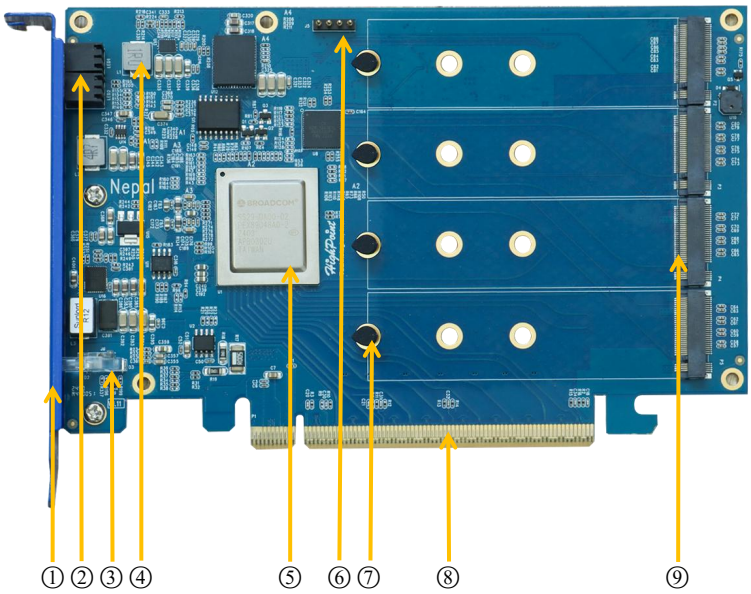
2. R7604A Hardware Description

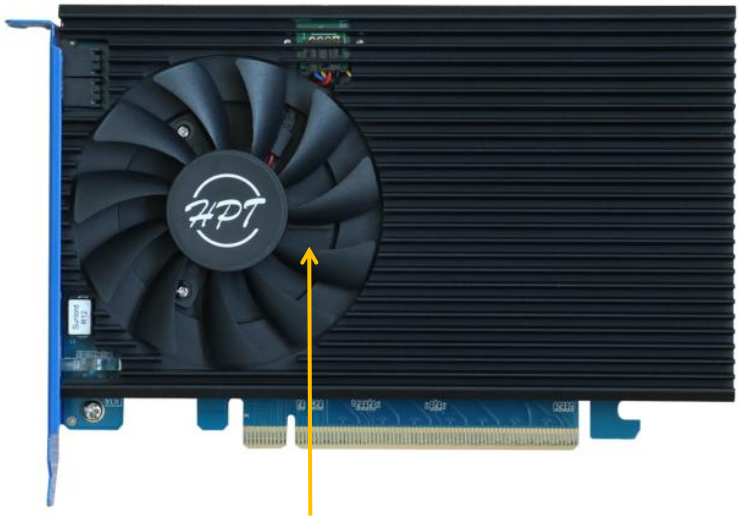
2.1. R7604A Layout

The layout of the R7604A is presented in four parts.

2.1.1. Front View

The following figure shows the key components of the R7604A.





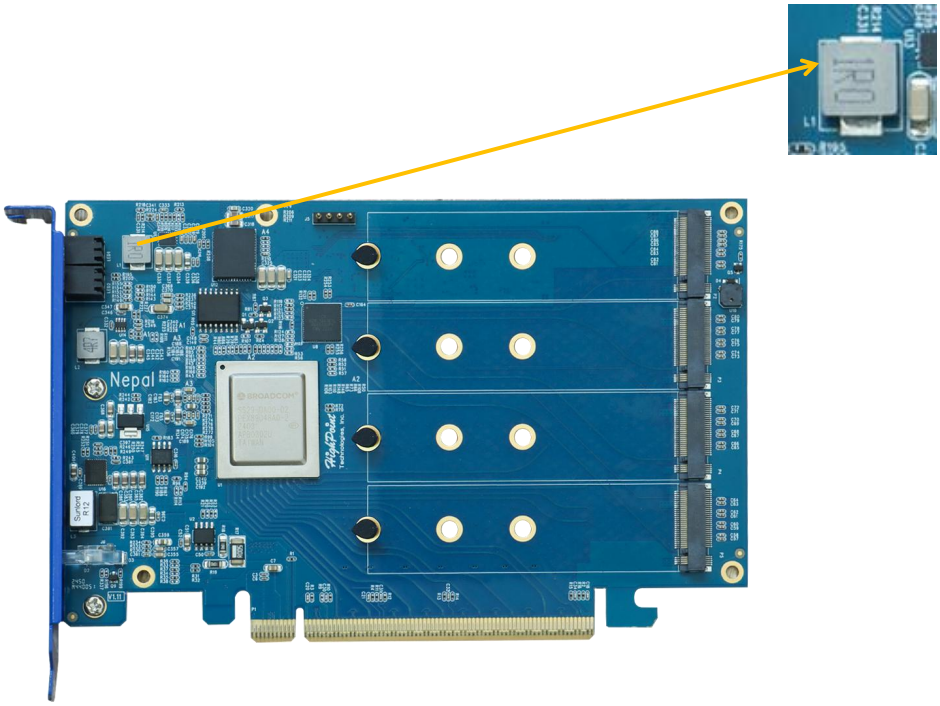
The following table describes the key components of the R7604A.

Table 2: Key component of the R7604A

Number	Type	Description
①	Bracket	Full-height bracket The R7604A is secured to the chassis by a bracket.
②	LED	Four SSD LED. SSD LED indicates the state of SSD.
③	RGB	Status LED and Fault LED. ● Status LED -- The state of R7604A PCIe bandwidth. ● Fault LED -- The state of the RAID fault, Broadcom chipset temperature, SSD temperature, and fan speed.
④	Beeper	Alerts the user to abnormal conditions by means of a beeper.
⑤	Chip	Broadcom PEX 89048 chip.
⑥	J5	Fan module probe. Used to connect the fan module on the heatsink. Used to power the fan module.
⑦	Rubber	Four rubbers. Used to secure the retention hole on the end of the NVMe SSD.
⑧	PCIe Host Interface	PCIe 5.0 x16 host interface. The interface between the R7604A and the host system. With the PCIe interface, this connector provides power to the board.
⑨	Storage Interface	Four PCIe 5.0 x4 M.2 connector. Connect the NVMe SSD to the R7604A.
⑩	Cooling System	Heatsink with a built-in fan. Used to dissipate heat from electronic components that are prone to heat generation.

2.1.2. Beeper

The following figure shows the key components of the R7604A beeper.



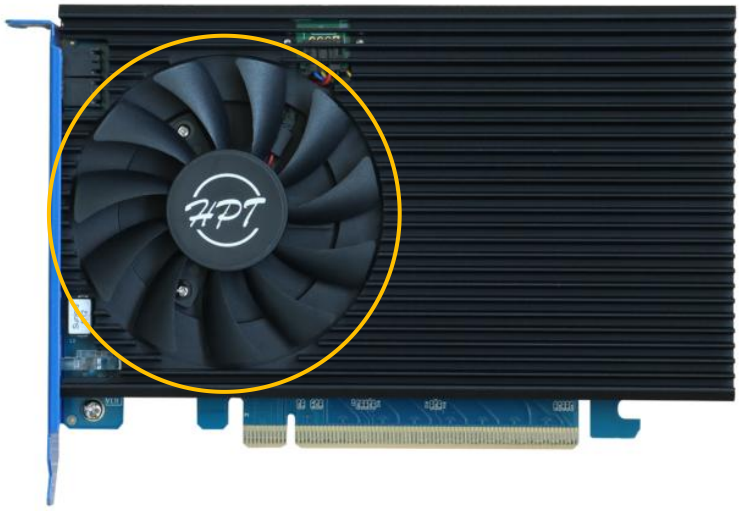
The following table describes the key components of the R7604A beeper.

Table 3: Key component of the R7604A beeper

Type	Description	
Beeper	1-0-1-0-1-0	The SSD has failed.
	1-0-0-1-0-0	The beeper will chirp when any of the following conditions are triggered. ● The Broadcom chipset temperature is > 105℃. ● The SSD temperature is > the SSD warning threshold. ● The fan speed is < 600RPM.
	1-1-1-1-1-1	Both "**1-0-1-0-1-0**" and "**1-0-0-1-0-0**" above occur simultaneously.
Note: 1 for beeper beeping, 0 for beeper not beeping.		

2.1.3. Cooling System

The following figure shows the key components of the R7604A cooling system.



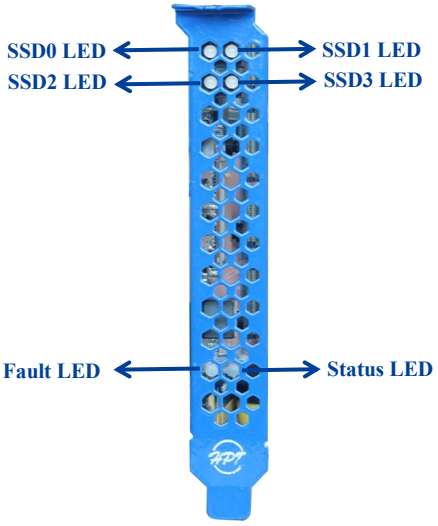
The following table describes the key components of the R7604A cooling system.

Table 4: Key component of the R7604A cooling system

Type	Description	
Cooling System	Heatsink with a built-in fan. Used to dissipate heat from electronic components that are prone to heat generation.	
	Smart Fan Control	**Low Speed:** The SSD temperature and Broadcom chipset temperature are < 30°C.
		Linear Speed: The SSD temperature and Broadcom chipset temperature are between 30°C and 60°C.
		Full Speed: Situation 1: The SSD temperature is > 60°C. Situation 2: The Broadcom chipset temperature is > 70°C.
	Note: The fan speed choice depends on the higher temperature of the SSD or Broadcom chipset.	
	Manual Fan Control	OFF
		Low Speed (ducty cycle: 40%, Around 1800 RPM)
		Medium Speed (ducty cycle: 60%, Around 2340 RPM)
		High Speed (ducty cycle: 80%, Around 2790 RPM)
		Full Speed (ducty cycle: 100%, Around 3150 RPM)

2.1.4. Diagnostic LED View

The following figure shows the LED Indicators of the R7604A.



The following table describes the SSD LED, Status LED, and Fault LED of the R7604A.

Table 5: Description of LED

LED	Color	Status	Description
SSD LED		**OFF**	The R7604A is powered off, or the SSD is not detected.
		Solid Green	The SSD is detected.
		Fast Flash Green	The LED blinks green at 4 Hz to indicate that the SSD is doing I/O in the PCIe 5.0 x4 status.
		Interval Flash Green	The LED blinks green twice in the first second, then goes out for one second and continues to cycle this process. This indicates the SSD is doing I/O in the PCIe 5.0 x2 or PCIe 4.0 x4 status.
		Slow Flash Green	The LED blinks green at 1 Hz to indicate that the SSD is doing I/O at a bandwidth not shown above.
		Solid Red	The SSD has failed.
		Fast Flash Red	The LED blinks red at 4 Hz to indicate the disk's location, which can be accessed through the HighPoint RAID Management Software--**Identify LED** function.
		Interval Flash Red	The LED blinks red twice in the first second, then goes out for one second and continues to cycle this process. This indicates the disk is greater than or equal to the SSD warning threshold.
		Slow Flash Red	The LED blinks red at 1 Hz to indicate that the reinserted disk is in the rebuild state.
Status LED		**OFF**	The R7604A is powered off.

	Notes: The LED blinks at 4 Hz. The following represents the bandwidth status of the R7604A.		
		Fast Flash Blue	PCIe 5.0 x16.
		Fast Flash Green	PCIe 5.0 x8 or PCIe 4.0 x16.
		Fast Flash Yellow	PCIe 5.0 x4, PCIe 4.0 x8, or PCIe 3.0 x16.
		Fast Flash Cyan	PCIe 4.0 x4 or PCIe 3.0 x8.
		Fast Flash White	PCIe 3.0 x4.
		Fast Flash Red	Not appear as above.
Fault LED		**OFF**	The R7604A is powered off or not in error.
		Fast Flash Red	The LED blinks red at 4 Hz to indicate that any of the following have been triggered. ● The Broadcom chipset temperature > 105℃. ● The SSD temperature is > the SSD warning threshold. ● The fan speed is < 600 RPM.
		Slow Flash Red	The LED blinks red at 1 Hz to indicate that the initialized RAID is not in normal status.
		Solid Red	Both "**Fast Flash Red**" and "**Slow Flash Red**" above occur at the same time.

2.2. PCIe Host Interface

The R7604A's PCIe 5.0 host interface provides maximum transmission.

Other PCIe host interface features include the following:

- 16-lane PCIe host interface
- Support of x16 link width
- 16-lane aggregate bandwidth of up to 64GB/s

2.3. Storage Interface

The R7604A has four M.2 connectors.

Other storage interface features include the following:

- Dedicated PCIe 5.0 x4 per port
- Supports up to four NVMe devices (up to x4 lanes, M.2 media)
- Data transfer at 16 GB/s

2.4. Basic Specifications

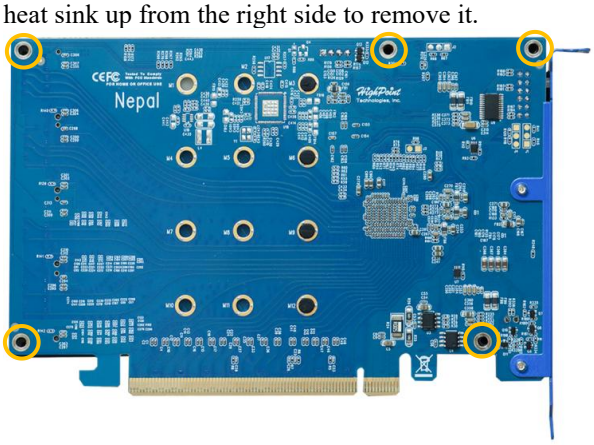
The following table describes the basic specifications of the R7604A.

Table 6: Basic Specifications of R7604A

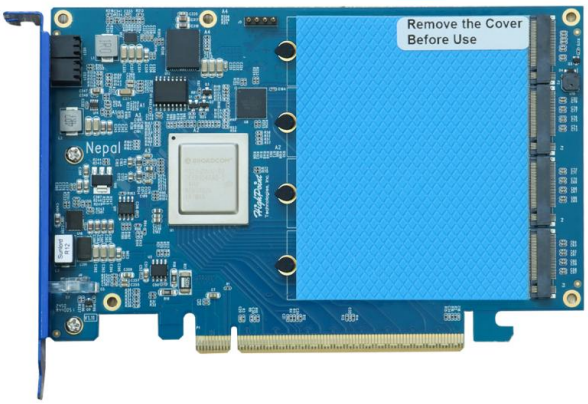
Model		**R7604A**
Form Factor		Full-Height, Half Length, Single-Width
Weight		365g
Dimension	**Length**	167mm
	Height	110mm
Power consumption		● **Idle mode**: 11.46W ● **I/Os mode**: 56.52W Notes: The I/Os mode power consumption is measured with the four Crucial T705 2TB SSDs. Actual power consumption may differ based on system hardware and configuration.
Power supply		PCIe: 12V(±8%), 3.3V (±8%)
Work temperature		+5°C ~ + 55°C
Storage temperature		-20°C ~ +80°C
MTBF (Mean Time Before Failure)		920,585 Hours

3. R7604A Installation Instructions

1. Use a wired ESD wrist strap that is properly grounded.
2. Unpack and remove the R7604A and check it for damage. If it appears damaged, please get in touch with HighPoint Technical Support.
3. Remove the five screws on the back of the R7604A that secure the heat sink to the PCB and lift the heat sink up from the right side to remove it.

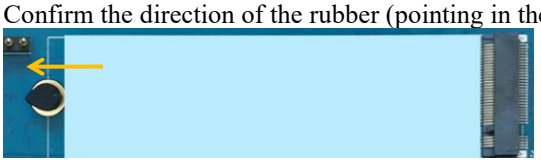


4. Install the thermal pads onto the R7604A PCB.
   Note: Omission of thermal pads on the R7604A PCB is permissible if your disk exhibits adequate heat dissipation.
   1) Remove the blue film from one side of the thermal pads.
   2) Align the thermal pad with the M.2 port and press gently to ensure a tight fit.

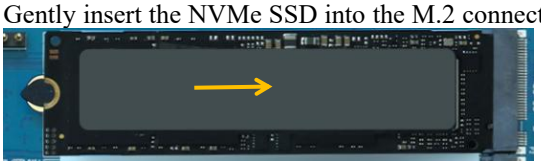


   3) Remove the blue film from the other side of the thermal pads.

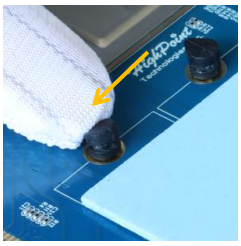
5. Install the NVMe SSDs to the R7604A.
   1) Confirm the direction of the rubber (pointing in the opposite direction of the M.2 port).



   2) Gently insert the NVMe SSD into the M.2 connector.

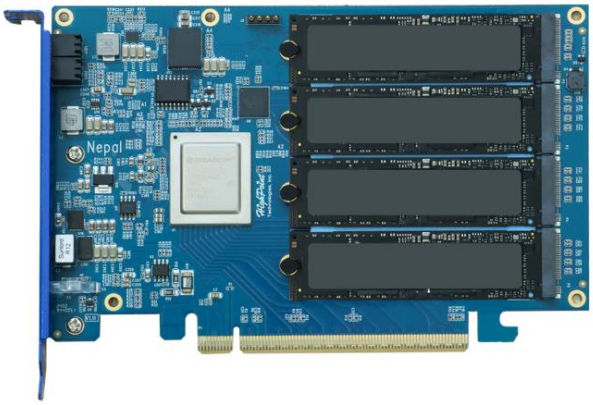


   3) Press the side of the rubber to align it and insert it into the retention hole on the end of the NVMe SSD.

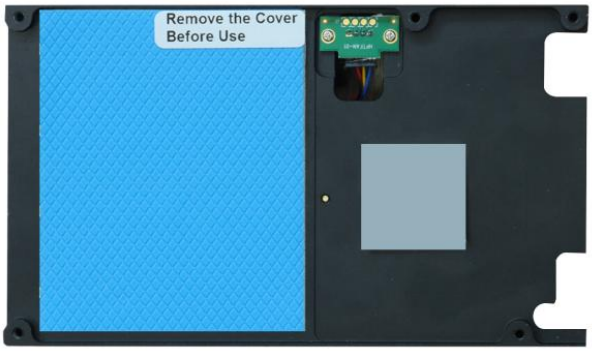


   4) Rotate the direction of the rubber so that it points to the M.2 port to secure the NVMe SSD better.

   5) Repeat the above steps to install the remaining NVMe SSDs.

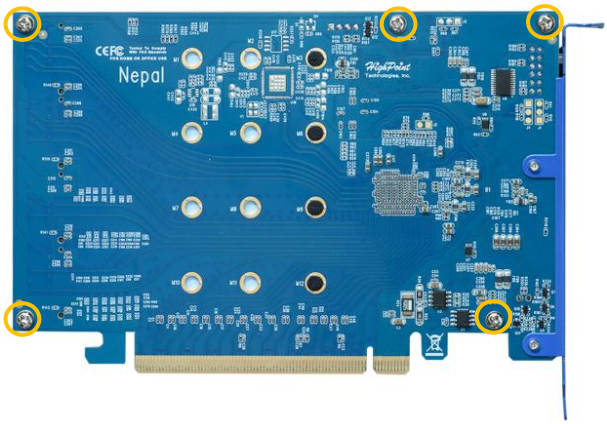


6. Install the heat sink to the R7604A PCB.
   1) Remove the blue film from the thermal pad on the heat sink.



   2) Align the left side of the heat sink with the PCB and carefully lower the right side.

3) Carefully and properly align the heat sink with the PCB and retighten the five screws that were removed in step 3.



Note: If the screws are not tightened, there will be fan stalling, poor heat dissipation, and other situations.

7. Insert the R7604A into an available PCIe slot.
   1) Shut down the system and disconnect the AC power cord.
   2) Align the R7604A to one of the motherboard's available slots. Press down gently but firmly to seat the R7604A correctly in the slot.

8. Turn on the power to the system.

4. Revision History

4.1. Version 1.00, April 14, 2025

Initial version.

4.2. Version 1.01, June 23, 2025

Adjust the description format of the Status LED (be more concise).