



Rocket 1604L

PCIe Gen5 x16 4x M.2 NVMe Retimer AIC

Near Zero-Latency for Quad-AIPU & High-Velocity Clusters

For AI Architects, the Rocket 1604L represents the ultimate solution for maximizing compute-per-watt and compute-per-slot. By leveraging a high-density PCIe Gen5 x16 host interface, this AIC transforms a single slot into a quad-core AI powerhouse, hosting up to four M.2 AI Acceleration modules (AIPUs) or NVMe drives in a parallel, non-blocking architecture. This 4-AIPU Density allows for the simultaneous processing of massive data streams—such as multi-channel 4K video analytics or high-frequency sensor fusion—without the thermal and power overhead of a traditional full-length GPU. Equipped with Astera Labs’ PCIe Gen5 Retimer technology, the Rocket 1604L ensures each accelerator receives a pristine, low-latency data path, delivering deterministic performance and eliminating the "GPU starvation" that plagues passive expansion solutions. Now, you can pack server-grade inference capabilities into compact 1U and 2U Edge chassis, effectively quadrupling your TOPS (Tera Operations Per Second) without expanding your physical footprint.

Feature Highlights

- **4x M.2 Ports** (dedicated x4 lanes per port)
- **No. of Devices:** Up to 4
- **PCIe M.2 Devices:** (2242 / 2260 / 2280)
- **Bus Interface:** PCIe 5.0 x 16 (x4/x4/x4/x4)
- Natively supported by Mainstream Operating systems
- Supports x86 Intel/AMD Platforms

Key Features

PCIe GEN5 RETIMER

Unmatched Signal Integrity: Beyond Passive Bifurcation

Most bifurcation cards are "passive," meaning they simply pass the signal through, often carrying electrical noise and interference. The Rocket 1604L is different. It re-clocks and regenerates a fresh, perfect data stream. **Flexible Placement:** Whether installed directly on the host CPU slot or via a remote PCIe slot through MCIO cabling, you never have to worry about signal degradation or dropped IOPS.

40% Smaller, 100% Faster

Space is at a premium in compact AI servers. The Rocket 1604L features the shortest board length in its class—over 40% shorter than standard 4-bay M.2 cards. Despite its compact dimensions, it inherits our proven Pro-Class M.2 cooling solution, ensuring your Gen5 devices never thermal throttle, even under 24/7 heavy AI workloads.

Smart Monitoring & Transparent Performance

Server-class architects require visibility. The Rocket 1604L Intelligent Firmware Layer allows you to monitor:

- **Bus Lane Allocation:** Ensure each drive receives maximum bandwidth.
- **Power Consumption:** Track real-time storage power draws.
- **Health Status:** Get board-level diagnostics to preemptively manage hardware lifecycle.

FRU Module (Field Replacement Unit): stores Vital Product Data (VPD) to ensure seamless replacement while minimizing downtime for the host server.

Zero Friction Integration

We believe in performance without proprietary headaches. The Rocket 1604L utilizes Native OS Drivers, making it a true Plug-and-Play solution for any modern Linux or Windows server environment. No special software is required to boot or manage your high-speed arrays. Ready to optimize your AI Server density?



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PCB Version: 1.0
Firmware Version: 0.12.72.0
MCU Version: 1.0.4
Retimer Version: 2.12.4

Chip temperature: 64 (C)/147 (F)
M2 chip temperature: 39 (C)/102 (F)
Enclosure 3.3V Voltage: 3.308 V
Enclosure 1.1V Voltage: 1.098 V
Enclosure 5V Voltage: 5.056 V
Power Consumption: 32.24 W
Fan Speed: Auto(960 RPM, 1020 RPM)

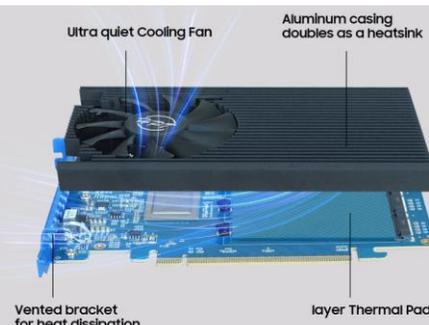
Channel(Port) Status MaxLinkSpeed LinkSpeed MaxLinkWidth Linkwidth
1( 16) 0W 32.0 GT/s 16.0 GT/s x16 x16

Vital Product Data
    
```



Pro-Class M.2 Cooling Solution

Rocket 1604L AICs are equipped with a powerful, ultra-efficient hardware cooling solution comprised of an anodized aluminum heatsink with an integrated low-decibel cooling fan, multiple layers of high-efficiency thermal padding, and a ventilated PCIe bracket. The solution rapidly transfers waste heat away from the hosted M.2 modules and Switch chipset, and keep the performance-sapping threat of thermal throttling at bay.



HighPoint Gen5x16 Retimer Architecture

Direct Gen5 x16 CPU Connectivity

Leverages a full PCIe Gen5 x16 host interface with required x4/x4/x4/x4 CPU bifurcation.

- **Direct Lane Mapping:** Each onboard M.2 device receives a dedicated Gen5 x4 lane.
- **True Parallel Architecture:** Eliminates shared-bandwidth bottlenecks and nearly Zero PHY-Level latency
- **Near-Zero-Latency Execution:** Native CPU-driven connectivity for maximum throughput.

Active Signal Conditioning – Retimer Engine

At 32GT/s speeds, signal integrity is critical. The integrated **Advanced Retimer Engine** ensures stable Gen5 performance.

- **Signal Regeneration:** Re-clocks and restores weakened I/O signals.
- **Jitter & Loss Compensation:** Eliminates insertion loss from PCB traces or cabling.
- **Bit-Perfect Distribution:** Delivers clean Gen5 signals to all 4x M.2 ports — including remote MCIO-connected devices.

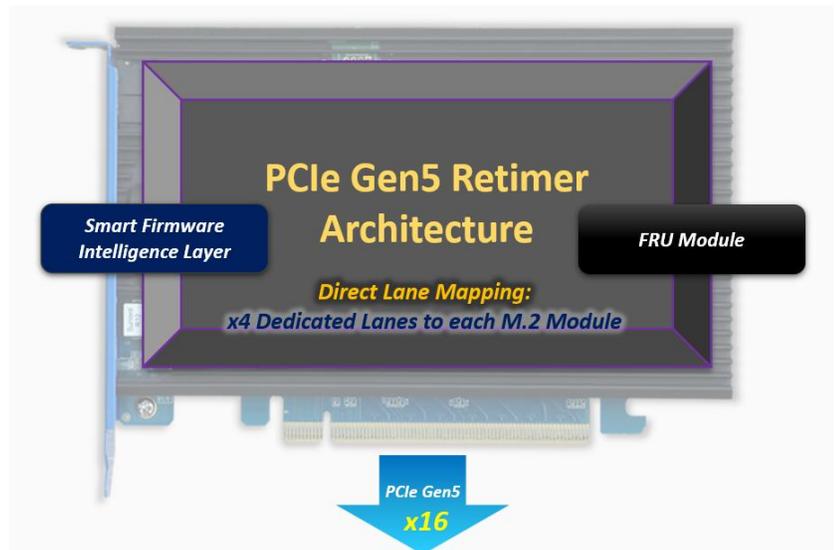
Smart Firmware Intelligence Layer

Unlike passive adapters, the Rocket 1604L features onboard management firmware providing real-time system insight:

- **Power Monitoring:** Per-device wattage visibility for rack-level optimization.
- **Lane Verification:** Confirms each device negotiates full Gen5 x4 speed.
- **Thermal Telemetry:** Real-time board and slot temperature monitoring to prevent throttling.

FRU Module (Field Replaceable Unit)

The Rocket 1604L feature an FRU Module to streamline maintenance and service workflows. It stores Vital Product Data (VPD), including the AICs hardware revision and firmware history to ensure seamless replacement while minimizing downtime for the host server.



Applications & Use Cases



Across manufacturing, transportation, healthcare, security, and infrastructure monitoring, organizations increasingly require compact AI platforms capable of delivering data center-class performance at the edge.

By combining PCIe Gen5 bandwidth, retimer-based signal integrity, and a short-depth form factor, the Rocket 1604L provides the foundation for deploying high-density AI acceleration in environments where space, latency, and reliability are critical.

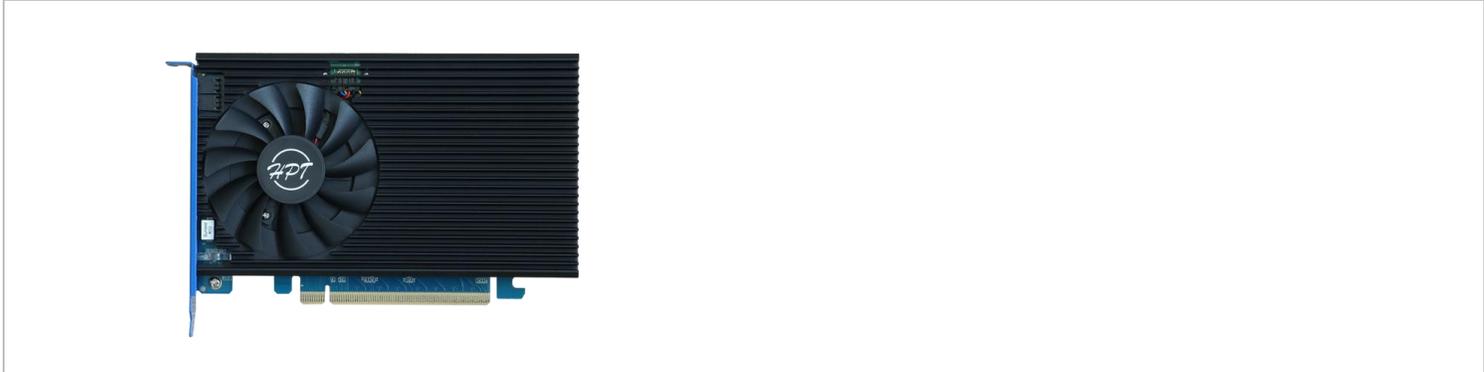
HighPoint’s Smart Firmware Telemetry allows remote engineers to monitor accelerator health, PCIe lane status, and system performance from anywhere in the world. This remote visibility is essential for maintaining reliability in far-edge deployments where physical access may be limited.



Hardware Features	
Bus Interface	PCIe 5.0 x16
Mode	Working Mode: 4 x 4-Lane (M.2 connectors)
Chipset	Asteralabs PT5161LRS
Number of Channel / Port	4 x NVMe Ports (Dedicated PCIe 5.0 x4 per port)
Port Type	M.2
Data Transfer Rate	64GB/s
Number of devices	4
SSD Form Factor	M.2 2242, 2260, 2280
Diagnostic LED Support	Supports Present LED and Active LEDs (SSD status)
Power Measurement	Integrated Power Monitoring – Provides real-time measurement of AIC power consumption for system monitoring and diagnostics
SSD Control	<ol style="list-style-type: none"> 1. Each SSD's power state (On/Off) can be independently controlled via MCU (Optional: control SSD's POWERDIS signal; requires SSDs with this feature) 2. Each SSD can be Reset independently via MCU
OOB Control	<p>The OOB Port (USB-C) supports the following OOB functions:</p> <ol style="list-style-type: none"> 1. SSD Control Functions – Supports SSD power on/off (SSD-dependent) and drive reset 2. Advanced Hardware Telemetry – Real-time monitoring of retimer IC temperature, onboard fan speed, and AIC power consumption 3. NVMe-MI support (subject to NVMe SSD support) 4. Firmware update for both Retimer IC and MCU 5. Report Retimer IC's status - Report Retimer Health Status
OOB Connectors	Accessible via PCIe bracket:1. USB-C Connector
Fan and Audible Alarm Control	Yes
FRU Support	Yes (stores VPD)
Host CPU Architecture Support	
CPU Architecture Support	x86
Mechanical Features	
Form Factor	FH-HL (Full-Height, Half-Length)
Card Dimensions	6.57" x 4.33" x 0.72"
Card Width	Single-Width
Card Weight	0.79 lbs.
Cooling System	Full-Length aluminum heatsink with integrated cooling fan
Bracket	Full-Height Ventilated Bracket with access to USB-C connector
Cooling System	<ol style="list-style-type: none"> 1. Full-length aluminum heatsink 2. 8010 cooling-fan (integrated into heatsink) 3. The AIC with heatsink conforms with PCIe Specifications
Toolless	SSD Installation: Yes (toolless installation/removal)
Supported Systems	
OS Support	Any Windows / Linux OS Platform/Distribution with native NVMe driver support
Secure Boot	Yes
NVMe RAID Management	
Management Suites	HighPoint CLI Utility (via USB-C Port)
Operating Environment	
Working Temp	+5°C ~ + 55°C
Storage Temp	-20°C ~ +80°C
Operating Voltage	PCIe: 12V, 3.3V
Power	TBA
MTBF (Mean Time Before Failure)	920,585 Hours

Kit Contents	R1604L PCIe 5.0 Retimer AIC
	QIG
	Thermal pad: 70*90*0.75mm, K=8, Gray ; V100 ; x1 Thermal pad: 70*90*1.5mm, K=3, Blue ; V100 ; x1 Thermal pad: 70*90*1mm, K=8, Gray ; V100; x1
	4 x additional M.2 rubber twist-pins for M.2 SSDs

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