Viper Module

Datasheet

v1.20 | 2025-01-14

Document History

Version	Date	Authors	Description of Change
v1.00	2024-06-25	Neuchips	Initial release
v1.10	2024-11-04	Neuchips	Update PCIe Device ID
v1.20	2025-01-14	Neuchips	Update information

Table of Contents

List of Figures

List of Tables

1 Overview

Thank you for choosing the Neuchips Viper.

The Viper is a state-of-the-art hardware solution that delivers powerful acceleration capabilities for AI-enabled applications – inference to large language model (LLM) and recommendation systems in the most demanding elastic data centers. Viper is a compact PCI Express Gen5 card of HHHL, Half Height Half Length, is built around the Neuchips Raptor series AI chip, which ensures exceptional performance and reliability.

The card features LPDDR5 memory, which delivers an impressive memory bandwidth of up to 6400Mbps, making it suitable for handling large models and massive datasets with ease. Its passive heat sink cooling mechanism with a superior thermal design ensures optimal operation, provided the requiring system airflow is maintained to keep temperatures in check.

With a thermal design power (TDP) level of 75W, Viper can operate unconstrained and provide the high data throughput necessary for accelerating applications that require exceptional performance.

In summary, the Viper is an outstanding hardware solution that delivers exceptional performance, reliability, and flexibility for AI recommendation systems in the most demanding elastic data centers.

2 Specifications

This chapter defines the fundamental parameters of Viper PCIe card and its according environment to sustain the usage. For more information about operation steps and corresponding cautions and warnings, please refer to Viper product databook and user guide.

2.1 Production Specifications

Table 1 through Table 3 elaborate product overview, memory specification, and inter-host communication of PCI Express detailed configurations for Viper.

Table 1 Viper Overview

Specification	Description
Product SKU	Viper-AL
Total Board Power	25 W minimum 45 W default 75 W maximum
Thermal Solution	Active and Passive Cooling Available
Mechanical Form Factor	HHHL-SS (half-height, half-length, single-slot)
PCI Device IDs	Device ID: 0x1001 Vendor ID: 0x1FD9
Processor Clock Speed	1 GHz
FX Engine	2
Embedding	1
TFLOPS (BF16)	32
TOPS (INT8)	206
PCI Express Interface	PCI Express 5.0 x 8 Lane and polarity reversal supported
Weight	412 Grams (including bracket)

Table 2 Memory Specifications

Specification	Description
Memory Type	LPDDR5
Memory Size	64 GB

Memory Clock	6400 Mbps

Table 3 PCIe Configurations

Specification	Description
BAR Address	BAR0: 1 MB BAR2: 1 MB BAR4: 1 GB
Message Signaled Interrupts	MSI (default) MSI-X
PCI Class Code	0x12
PCI Sub-class Code	0x0
SMBus (8-bit Address)	0xD4 (write), 0xD5 (read)
IPMI FRU EEPROM I2C address	0x50 (7-bit), 0xA0 (8-bit)
Reserved I2C addresses	0xA0, 0xEE
SMBus Direct Access	Supported

2.2 Environmental and Reliability Specifications

The environment conditions and specifications for Viper are indicated in Table 4

Table 4 Board Environment and Reliability Specifications

Specification	Description
Ambient Operating Temperature	0 °C to 50 °C
Storage Temperature	-40 °C to 75 °C
Operating Humidity	5% to 85% relative humidity
Storage Humidity	5% to 95% relative humidity

3 Airflow Direction Support

Neuchips Viper employs a bidirectional heat sink, which accepts airflow either left-to-right or right-to-left directions.

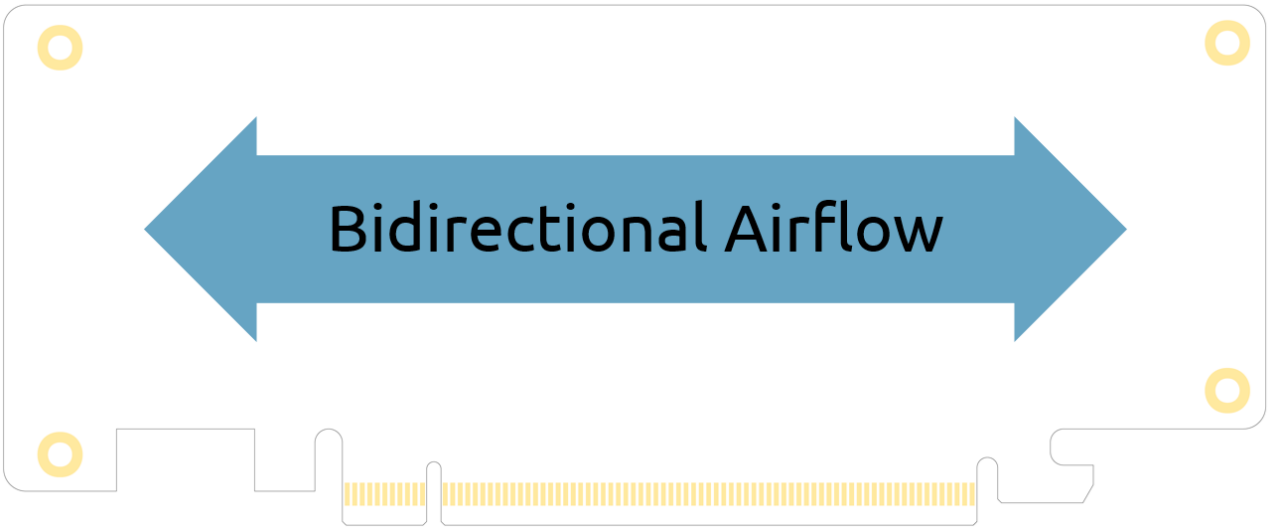

Figure 1 Viper Airflow Direction

Viper is a passively cooled card with requiring system airflow to operate with challenging ambient environments. The system airflow requirement is in Table 5.

Table 5 System Airflow Requirement (for Passive thermal solution SKU)

Ambient Temperature	Airflow (CFM)
25	23.5
35	35.0
45	50.0
50	70.0

4 Product Features

This section highlights features of the Neuchips Viper PCIe module card.

4.1 Form Factor

The Viper conforms to PCIe CEM 5.0 specification for a half-height, half-length (HHHL) single-slot PCIe card. For details, please refer to the PCI Express Card Electromechanical Specification Revision 5.0, Version 1.0.

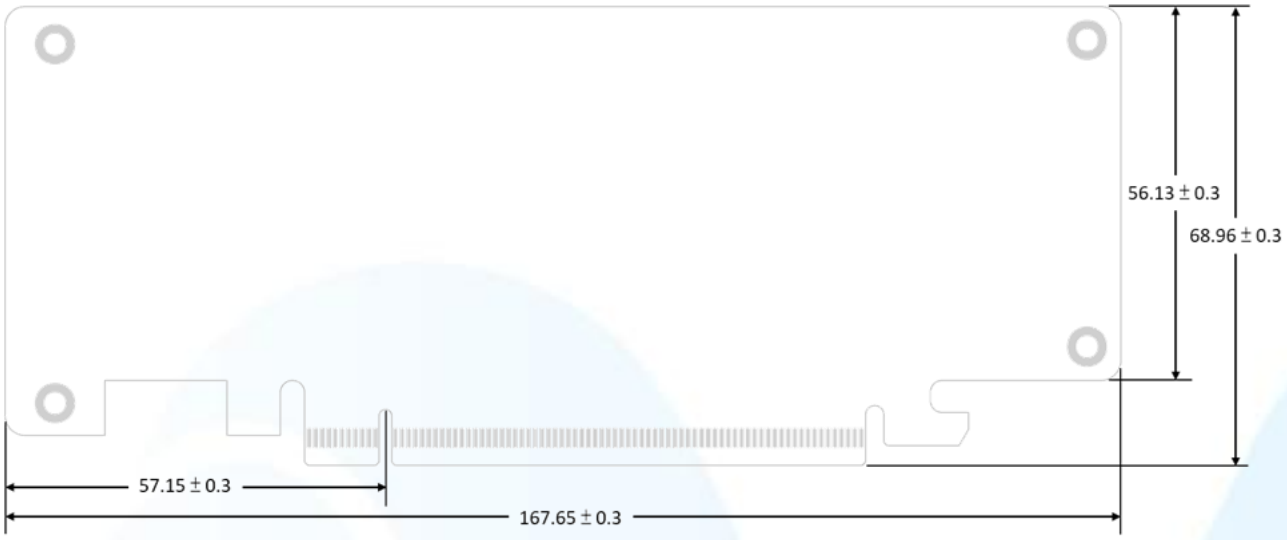

Figure 2 Viper Dimensions

Figure 3 Viper Top View

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