



DM.2 Module

Datasheet

Document History

Version	Date	Authors	Description of Change
v1.00	2024-03-21	Neuchips	Initial release
v1.10	2024-11-04	Neuchips	Update information
v1.20	2025-01-14	Neuchips	Update information

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1 Overview

Neuchips DM.2 is a state-of-the-art hardware solution that delivers power-efficiency acceleration capabilities for AI-enabled applications – inference to large language model (LLM) and recommendation systems in the most demanding elastic data centers. This compact OCP Dual M.2 card is built around the Neuchips Raptor AI chip, which ensures exceptional performance and efficiency.

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 ensures optimal operation, provided the system airflow is maintained to keep temperatures in check.

With a thermal design power (TDP) level of 35W, DM.2 can operate and provide the high data throughput necessary for accelerating applications that require exceptional performance.

In summary, the DM.2 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

2.1 Product Specifications

The section shows block diagram of DM.2, Table 1 through Table 3 provide the product, memory, and software specification for DM.2.

Table 1 Product Specifications

Specification	Description
Product SKU	DM2-BL
Total Board Power	25W minimum 35W default 40W maximum
Thermal Solution	Upon request
Mechanical Form Factor	OCP Dual M.2
PCI Device IDs	Device ID: 0x1102 Vendor ID: 0x1FD9
Processor Clock Speed	1 GHz
FX Engine	2
Embedding	1
TFLOPS (BF16)	16
TOPS (INT8)	110
PCI Express Interface	PCI Express 4.0 x 8 Lane and polarity reversal supported

Table 2 Memory Specifications

Specification	Description
Memory Type	LPDDR5
Memory Size	64 GB
Memory Clock	6400 Mbps

Table 3 Software Specifications

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 specifications for DM.2 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 Product Features

3.1 Form Factor

The DM.2 conforms to OCP Dual M.2 Accelerator Module Hardware Specification for a dual M.2 22110 Socket 3 key M card. For details, please refer to the OCP Dual M.2 Accelerator Module Hardware Specification 1.0.

The DM.2 nominal dimensions are shown as Figure 1, and the PCB thickness is 0.8 ± 0.08 mm. The details of PCB specification can be referred on Chap 8 PCB specification on the OCP Dual M.2 Accelerator Module Hardware Specification 1.0.

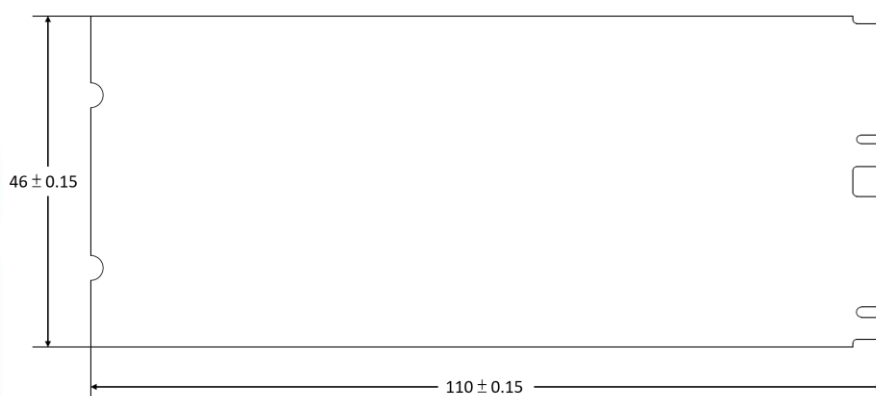


Figure 1 DM.2 Dimensions

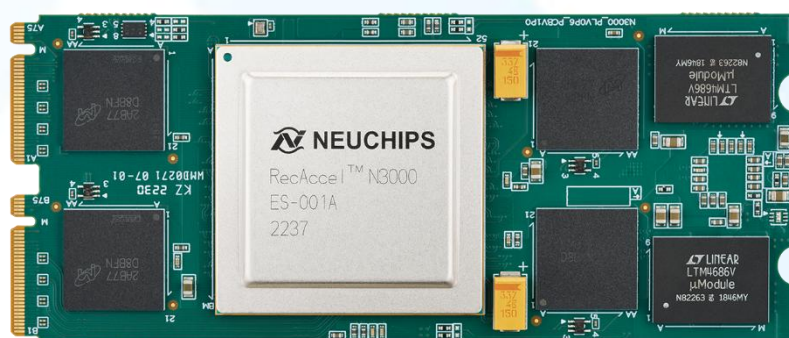


Figure 2 DM.2 (Top View)

3.2 Pin Definition

The DM.2 pin definitions are shown below, and the detail description can be referred on Chap 7.1 Pin Definition on the OCP Dual M.2 Accelerator Module Hardware Specification

1.0. A Dual M.2 connector is designed to support this form factor (Amphenol-Part No: DT670M0X005). This connector can support both Dual M.2 and Standard M.2 hardware at the same time. Each Dual M.2 module supports 8x PCIe lanes.

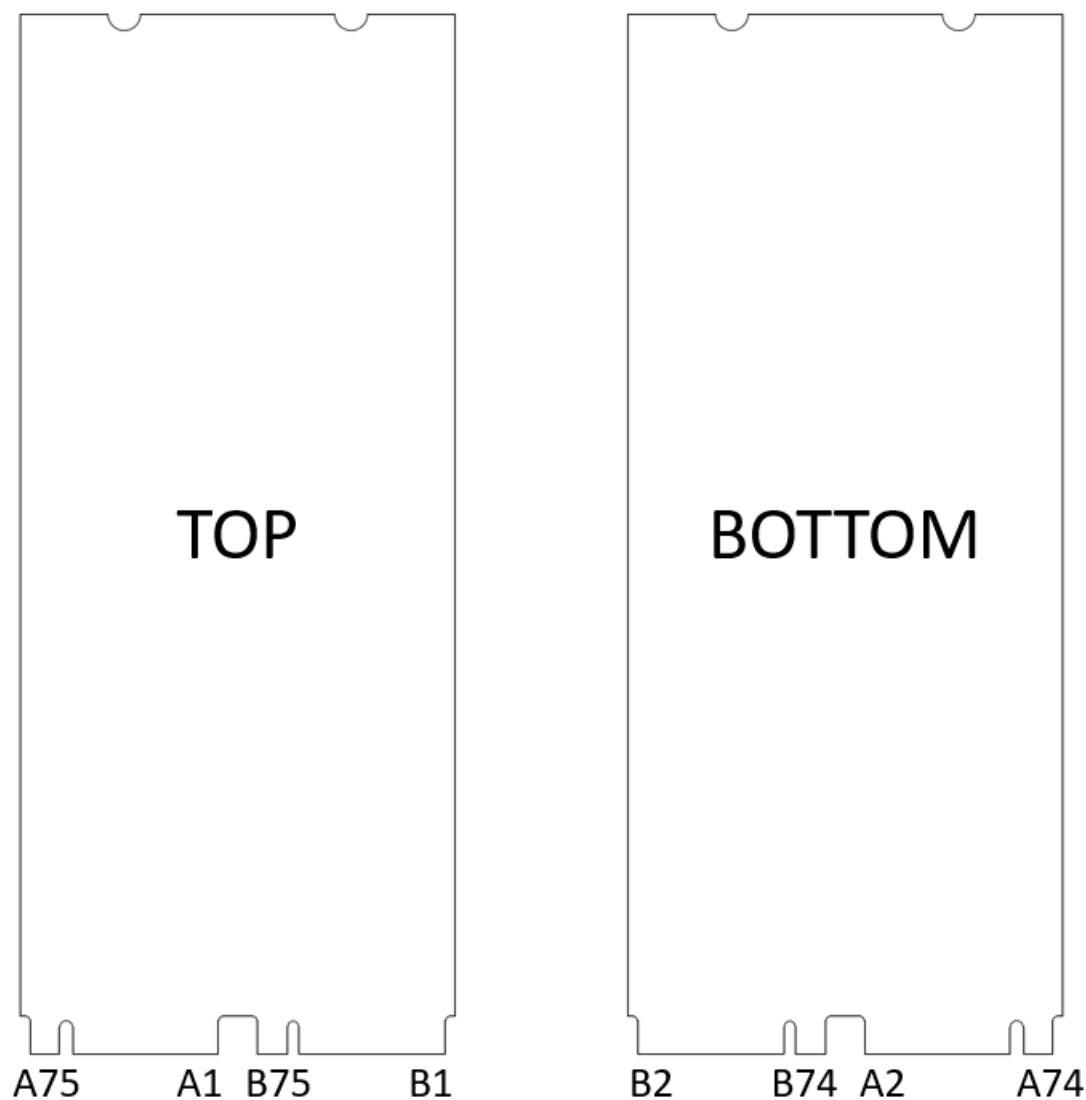


Figure 3 DM.2 Pin Diagram

Table 5 DM.2 Pin Definition

Pin	Signal	I/O	Voltage	Pin	Signal	I/O	Voltage
A1	GND		0	B1	GND		0
A2	3.3V	I	3.3	B2	3.3V	I	3.3
A3	GND		0	B3	GND		0
A4	3.3V	I	3.3	B4	3.3V	I	3.3

Product Features

A5	PETn3	O		B5	PETn7	O	
A6	PWRDIS	I	3.3	B6	NC		
A7	PETp3	O		B7	PETp7	O	
A8	PLN#	I	3.3	B8	NC		
A9	GND		0	B9	GND		0
A10	LED_1#(0)	O	3.3	B10	NC		
A11	PERn3	I		B11	PERn7	I	
A12	3.3V	I	3.3	B12	3.3V	I	3.3
A13	PERp3	I		B13	PERp7	I	
A14	3.3V	I	3.3	B14	3.3V	I	3.3
A15	GND		0	B15	GND		0
A16	3.3V	I	3.3	B16	3.3V	I	3.3
A17	PETn2	O		B17	PETn6	O	
A18	3.3V	I	3.3	B18	3.3V	I	3.3
A19	PETp2	O		B19	PETp6	O	
A20	TRST	I	1.8	B20	NC		
A21	GND		0	B21	GND		0
A22	VIO_1V8	I	1.8	B22	NC		
A23	PERn2	I		B23	PERn6	I	
A24	TDI	I	1.8	B24	NC		
A25	PERp2	I		B25	PERp6	I	
A26	TDO	O	1.8	B26	NC		
A27	GND		0	B27	GND		0
A28	TCK	I	1.8	B28	NC		
A29	PETn1	O		B29	PETn5	O	
A30	PLA_S3#	O	3.3	B30	NC		
A31	PETp1	O		B31	PETp5	O	
A32	GND		0	B32	NC		
A33	GND		0	B33	GND		0
A34	USB_D+	I/O		B34	NC		
A35	PERn1	I		B35	PERn5	I	
A36	USB_D-	I/O		B36	NC		
A37	PERp1	I		B37	PERp5	I	

Product Features

A38	GND		0	B38	NC		
A39	GND		0	B39	GND		0
A40	SMB_CLK	I/O	1.8	B40	NC		
A41	PETn0	O		B41	PETn4	O	
A42	SMB_DATA	I/O	1.8	B42	NC		
A43	PETp0	O		B43	PETp4	O	
A44	ALERT#	O	1.8	B44	NC		
A45	GND		0	B45	GND		0
A46	UART_Rx	I	1.8	B46	NC		
A47	PERn0	I		B47	PERn4	I	
A48	UART_Tx	O	1.8	B48	NC		
A49	PERp0	I		B49	PERp4	I	
A50	PERST#	I	3.3	B50	NC		
A51	GND		0	B51	GND		0
A52	CLKREQ#	I/O	3.3	B52	NC		
A53	REFCLKn	I		B53	NC		
A54	PEWAKE#	I/O	3.3	B54	NC		
A55	REFCLKp	I		B55	NC		
A56	MFG_DATA			B56	NC		
A57	GND		0	B57	GND		0
A58	MFG_CLK			B58	NC		
A59				B59			
A60				B60			
A61				B61			
A62				B62			
A63				B63			
A64				B64			
A65				B65			
A66				B66			
A67	TMS	I	1.8	B67	NC		
A68	NC			B68	NC		
A69	NC			B69	NC		
A70	3.3V	I	3.3	B70	3.3V	I	3.3

Product Features

A71	GND		0	B71	GND		0
A72	3.3V	I	3.3	B72	3.3V	I	3.3
A73	VIO_CFG_GND	O	0	B73	GND		0
A74	3.3V	I	3.3	B74	3.3V	I	3.3
A75	GND		0	B75	GND		0

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