

An abstract graphic on the left side of the image, composed of numerous thin, light green lines that curve and swirl together to form a complex, organic shape resembling a stylized 'C' or a tunnel. The lines are set against a solid dark blue background.

Open. Together.



OCP
SUMMIT

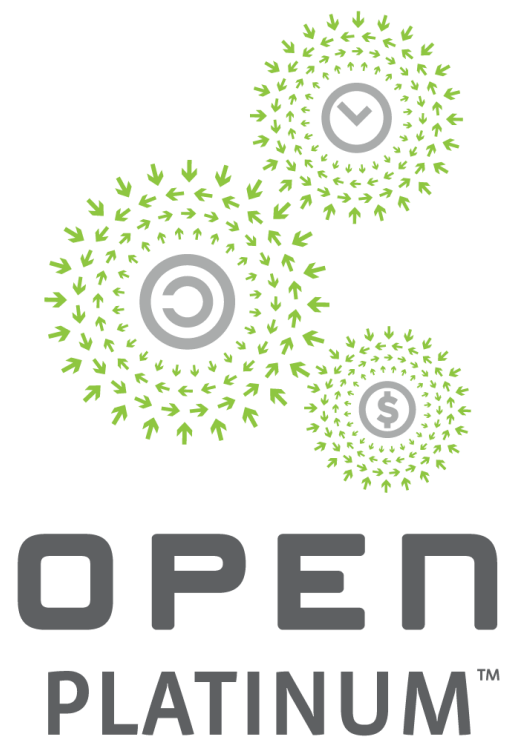
Hardware Specification Contribution:

- Glacier Point V2
- M.2 Accelerator
- Dual M.2 Accelerator

Hao Shen

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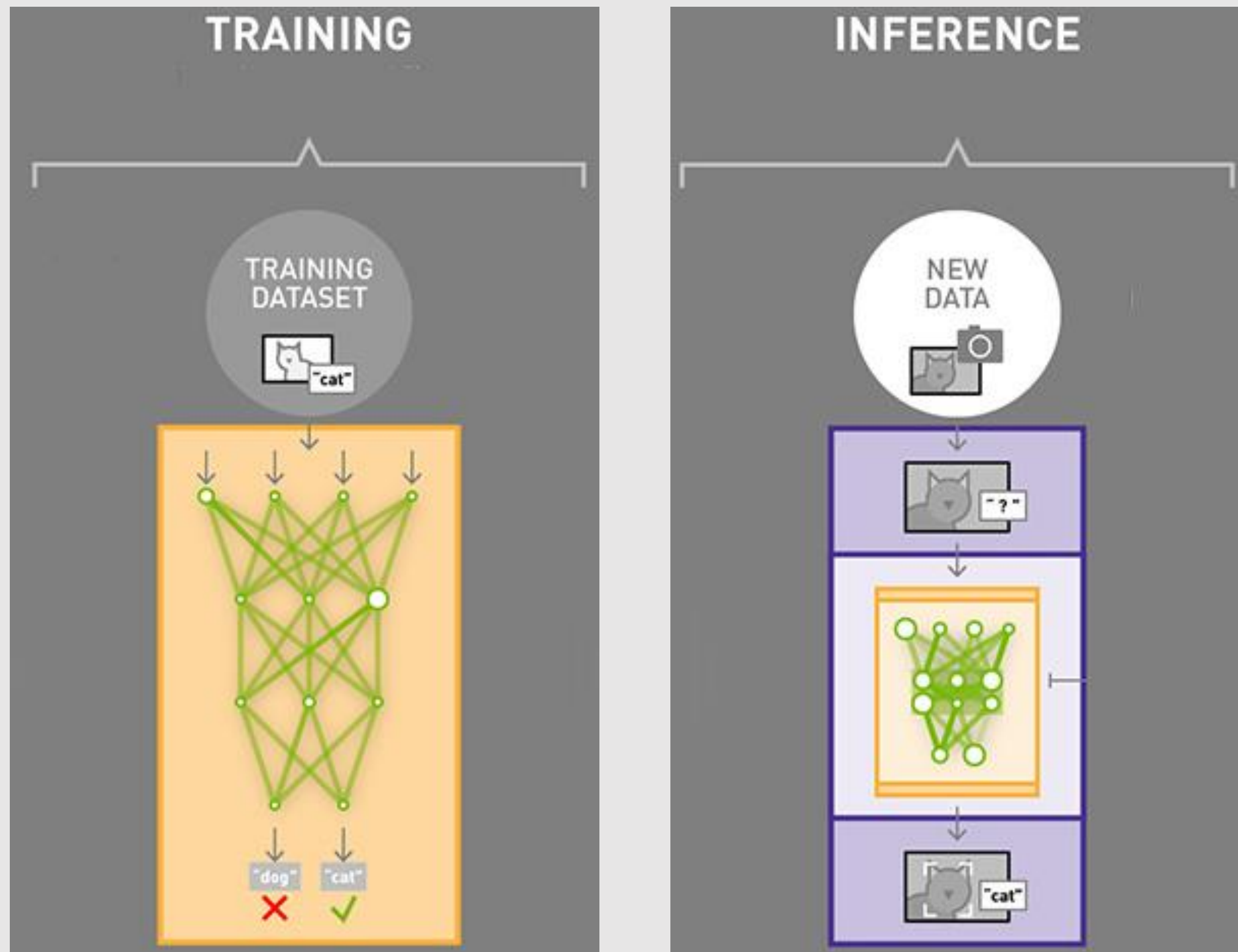
Facebook



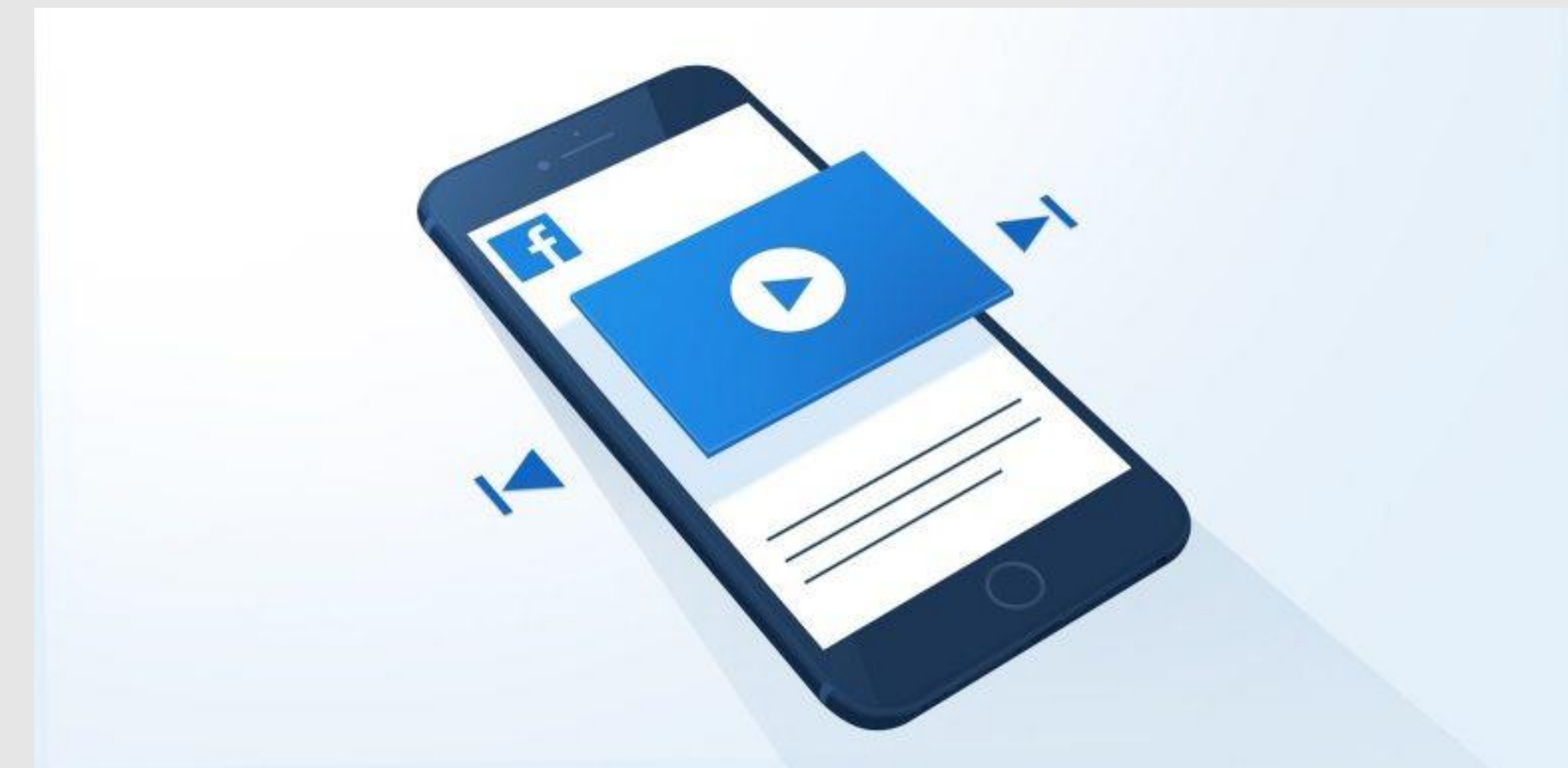
Open. Together.

Hardware Acceleration

Machine Learning - Inference



Video Transcoding



How does FB use Machine Learning?

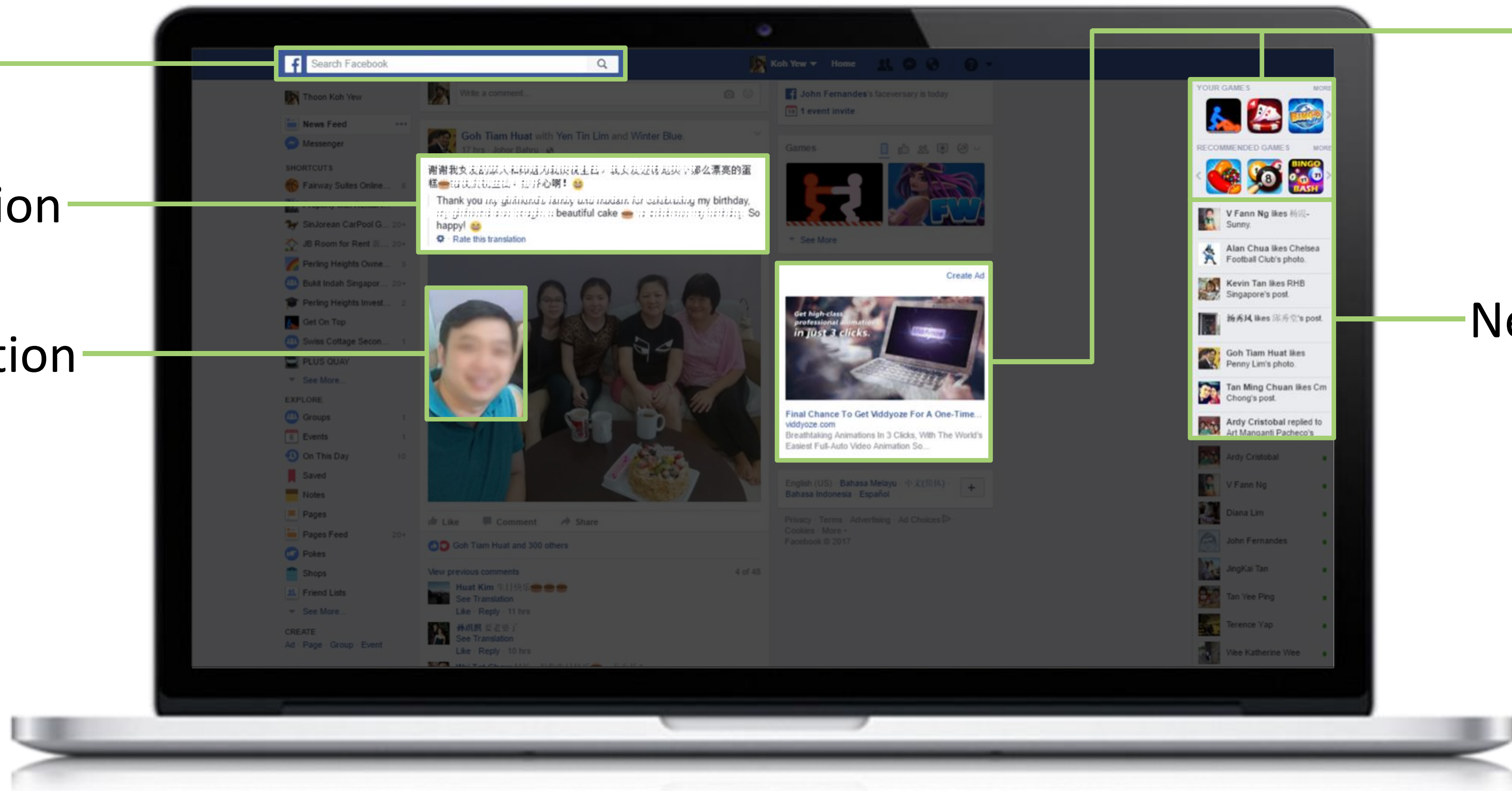
Search

Translation

Recognition

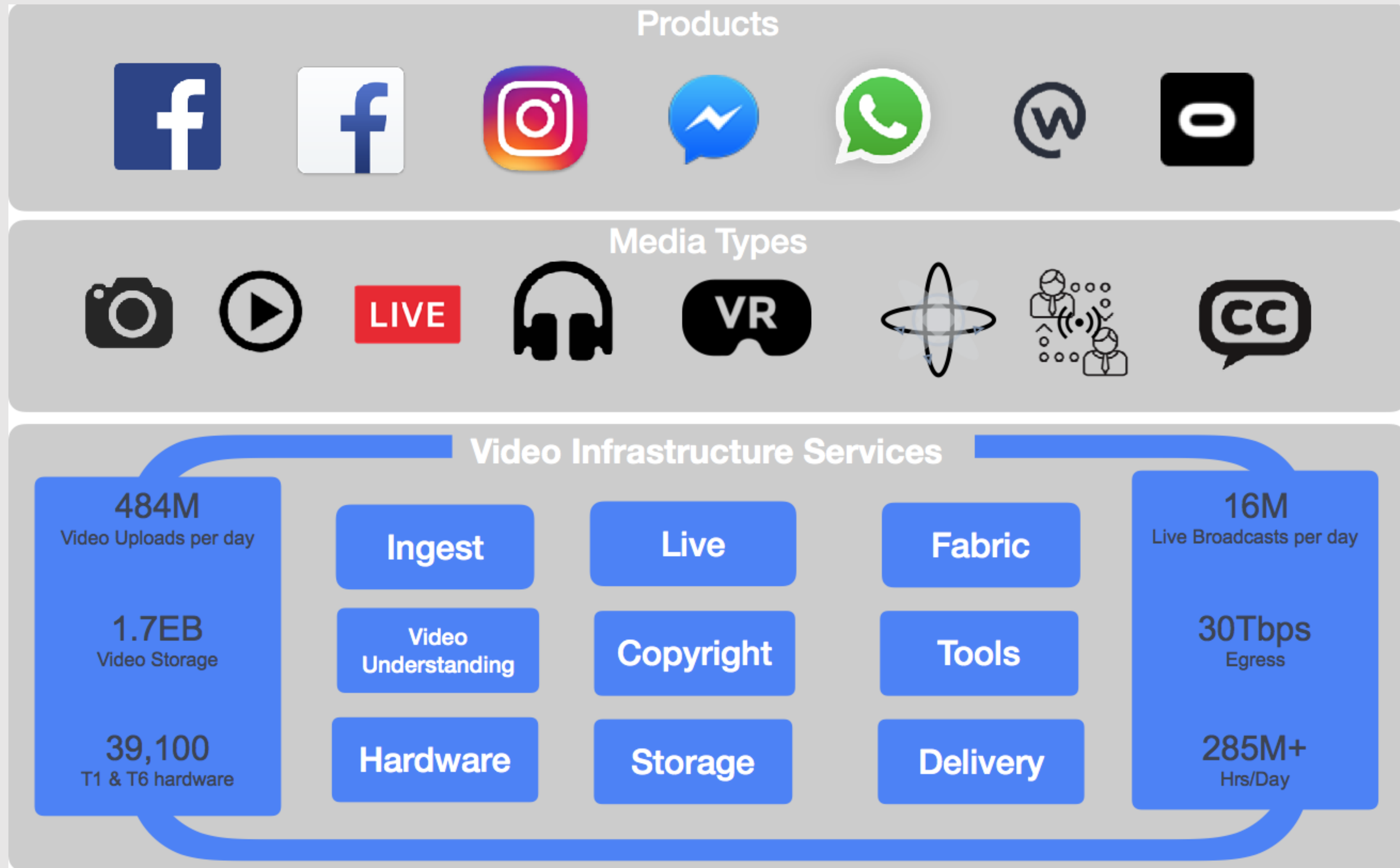
Ads

News Feed



Video In Facebook

Many Use-Cases



Facebook AI Hardware Today

Deployment Platform
Artificial Intelligence Framework
Backend: Compiler/Optimizer/Library
Hardware Infrastructure



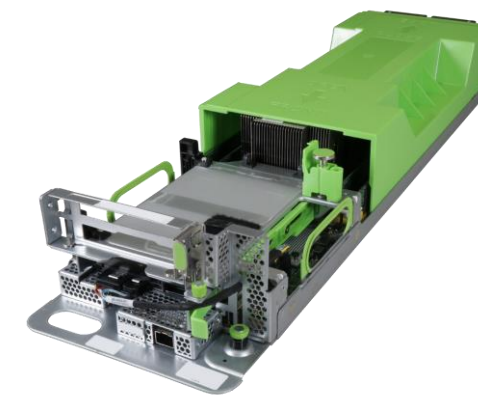
Bryce Canyon

- High density storage
- Storage-heavy tasks



Big Basin

- 8 NVIDIA P100s/V100s
- Very compute-heavy tasks



Tioga Pass

- Dual socket, many cores CPU
- Compute & mem-heavy tasks



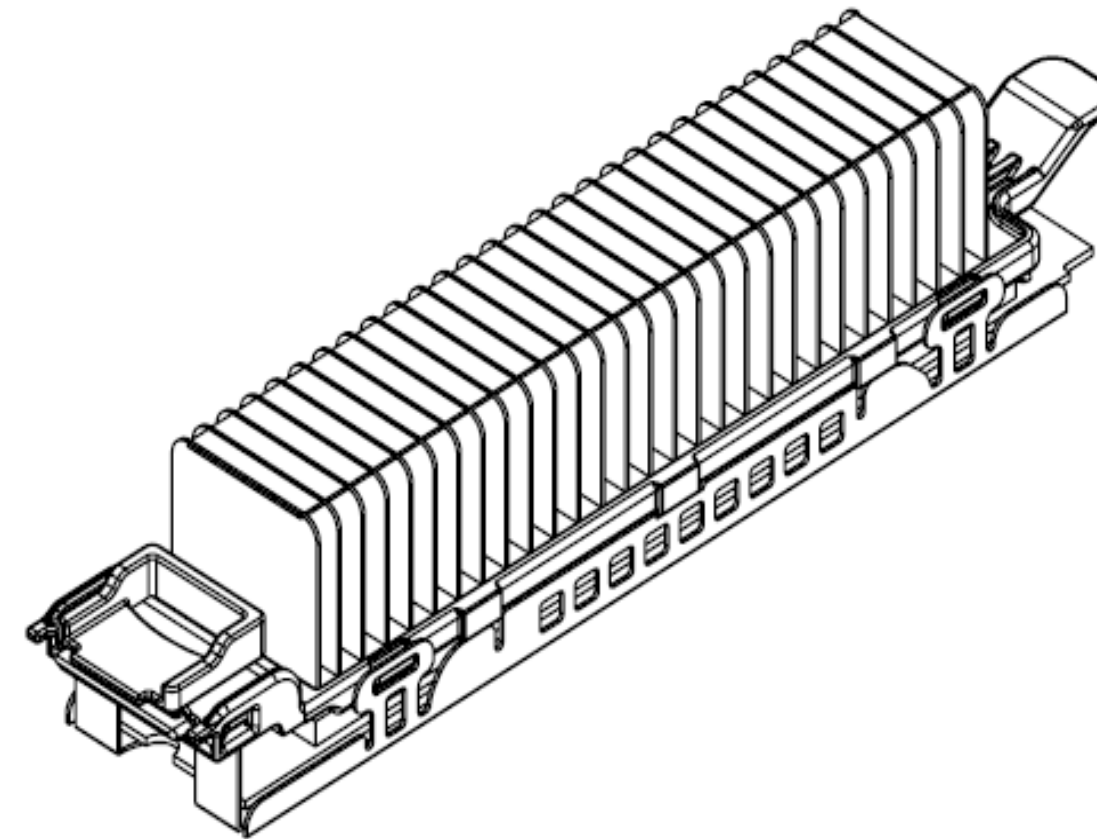
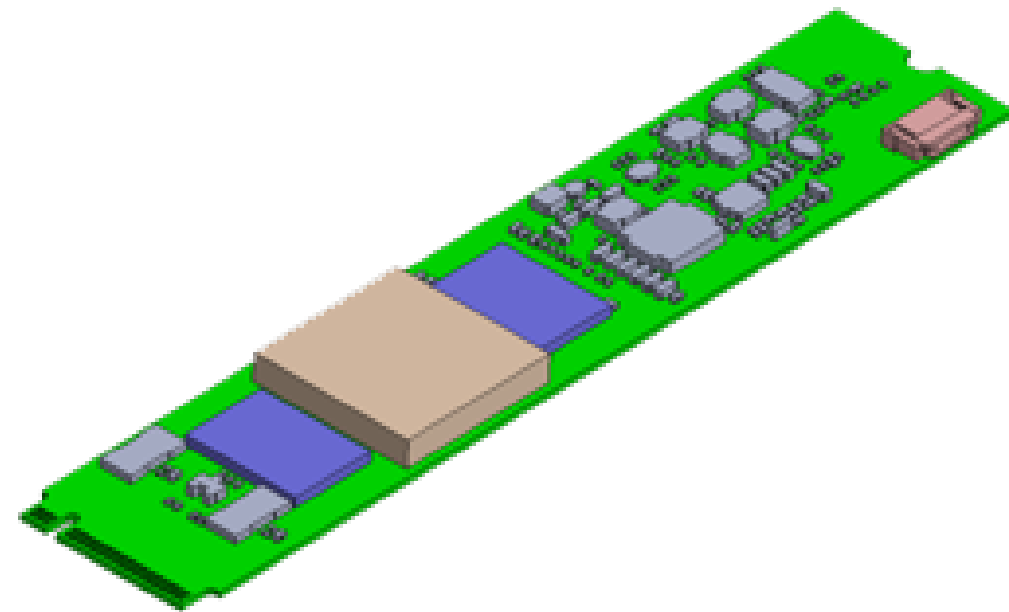
Twin Lakes

- Single socket, fewer cores CPU
- Compute & low latency tasks



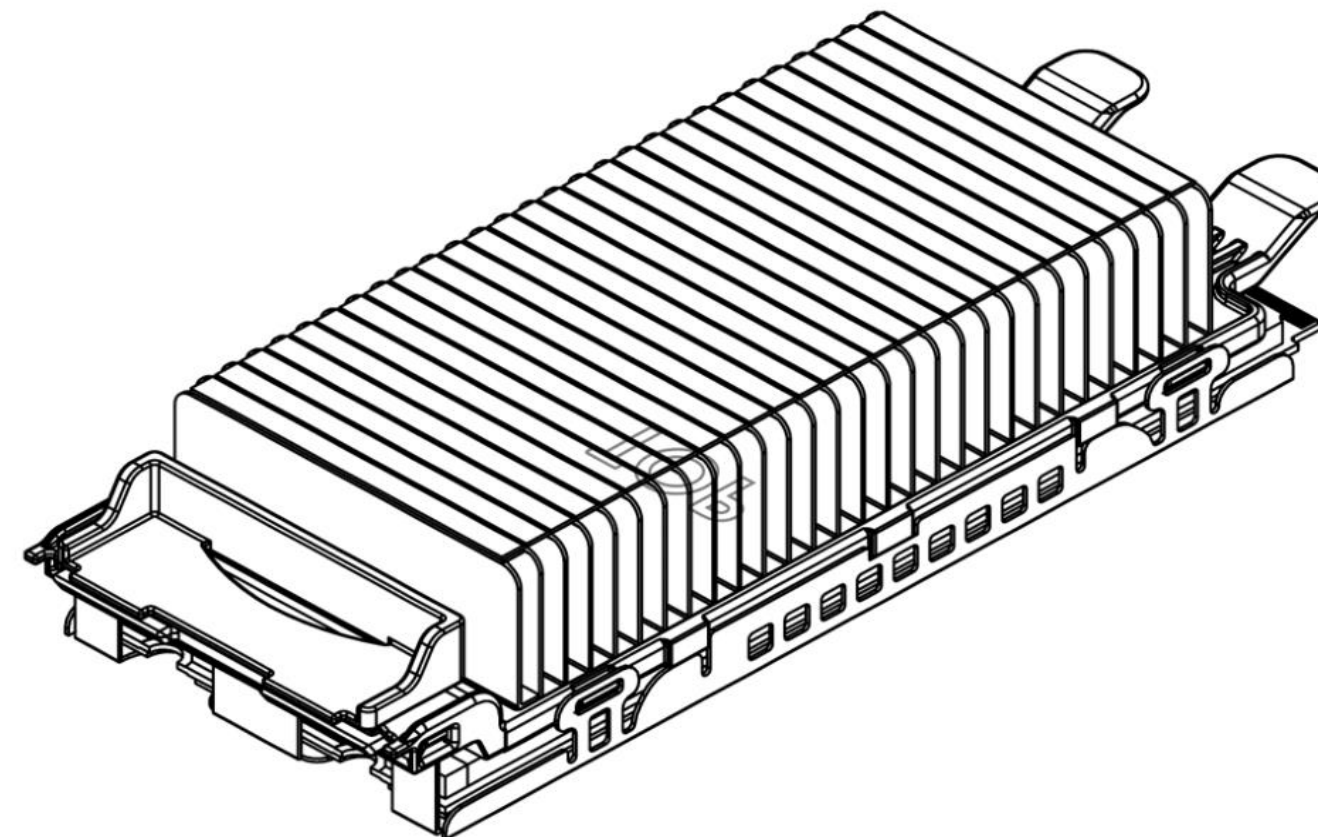
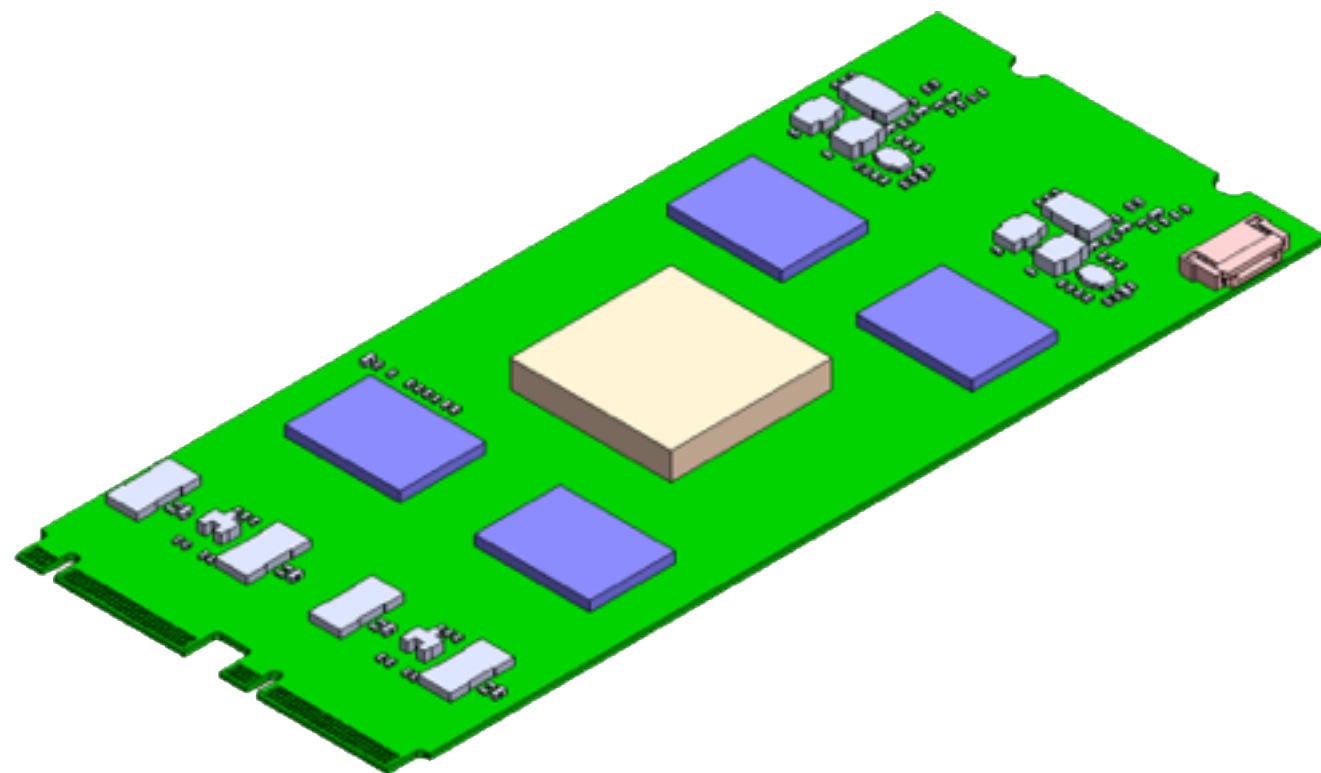
Facebook Accelerator Module – M.2 and Dual M.2 form factor

Standard M.2 Form Factor



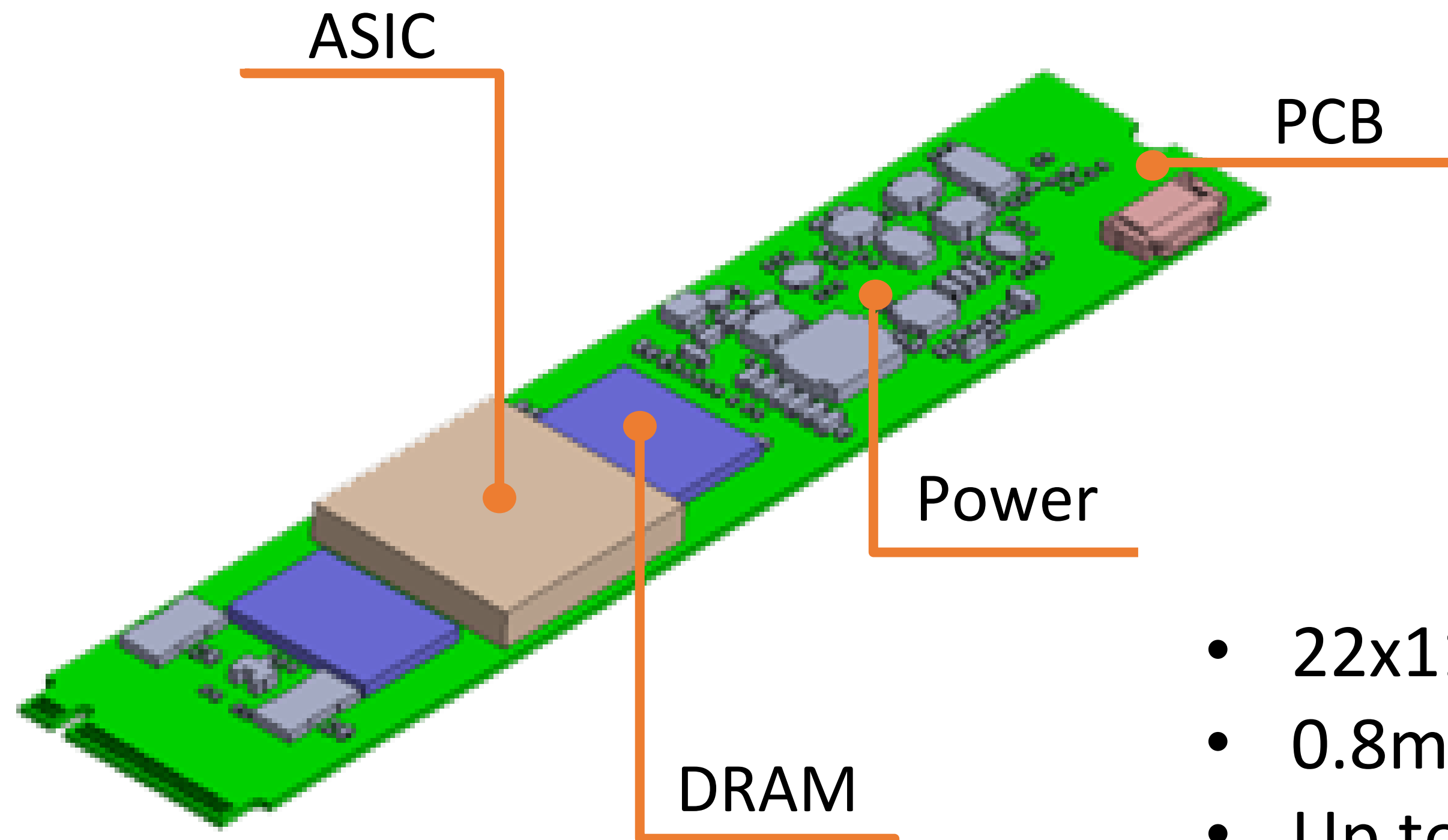
- ASIC
- DRAM
- 12W TDP
- PCIe x4
- UART/JTAG

Dual M.2 Form Factor

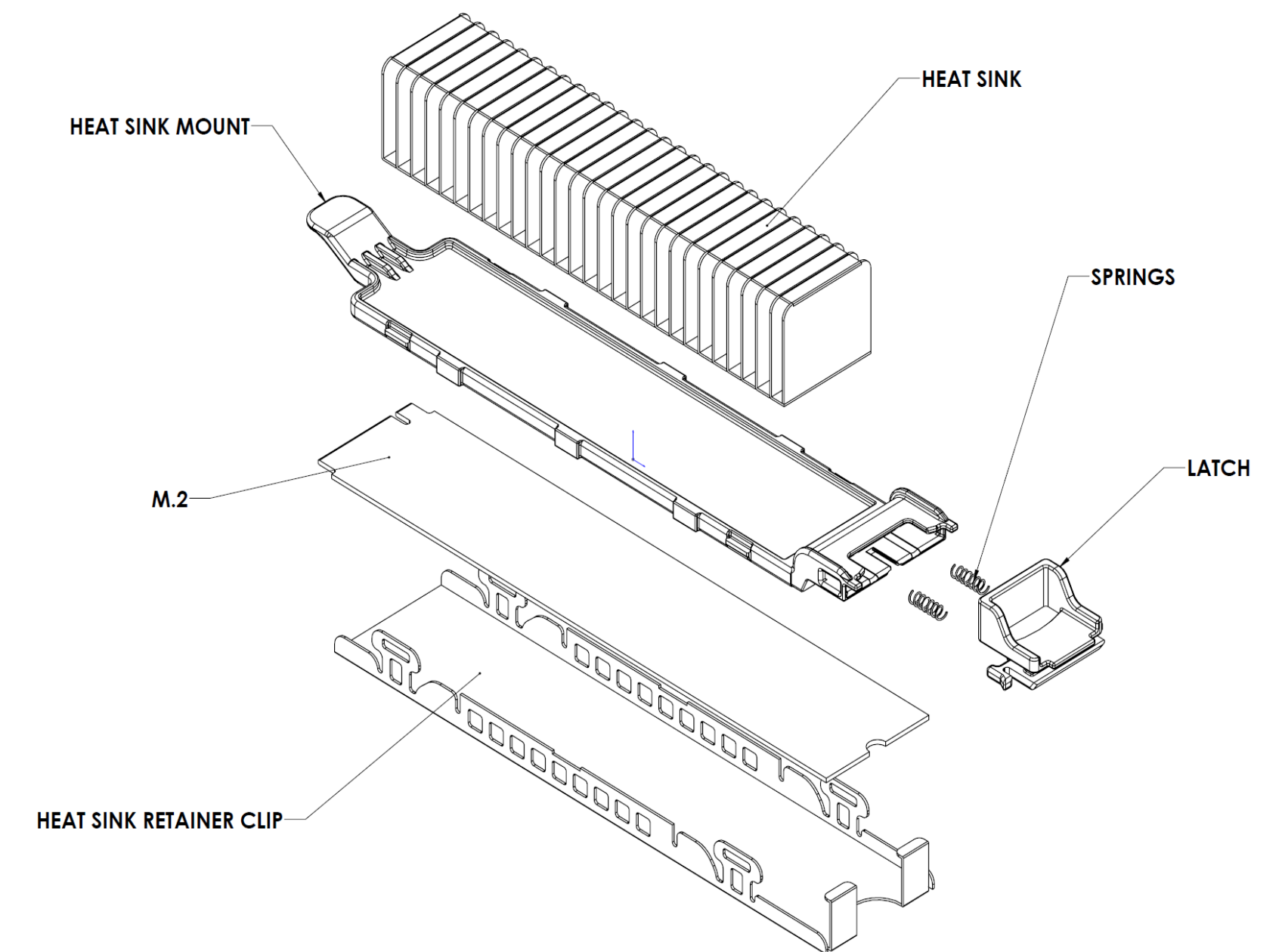


- ASIC
- DRAM
- 20W TDP
- PCIe x8
- UART/JTAG

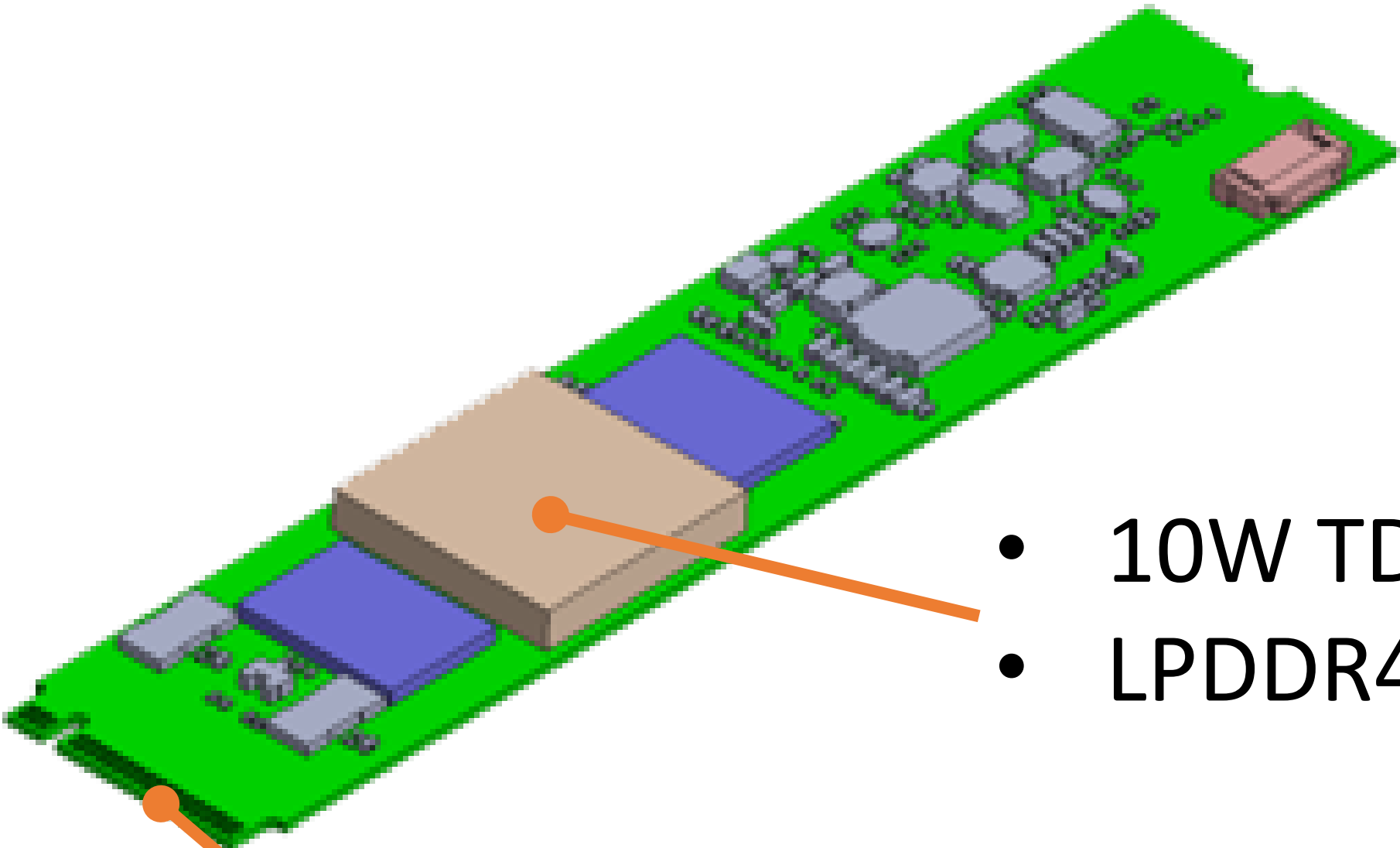
M.2 Accelerator Module - PCBA



- 22x110mm
- 0.8mm thick
- Up to 12 layers
- 2.5mm height on top
- 1.5mm height on bottom



M.2 Accelerator Module – Power, Interface

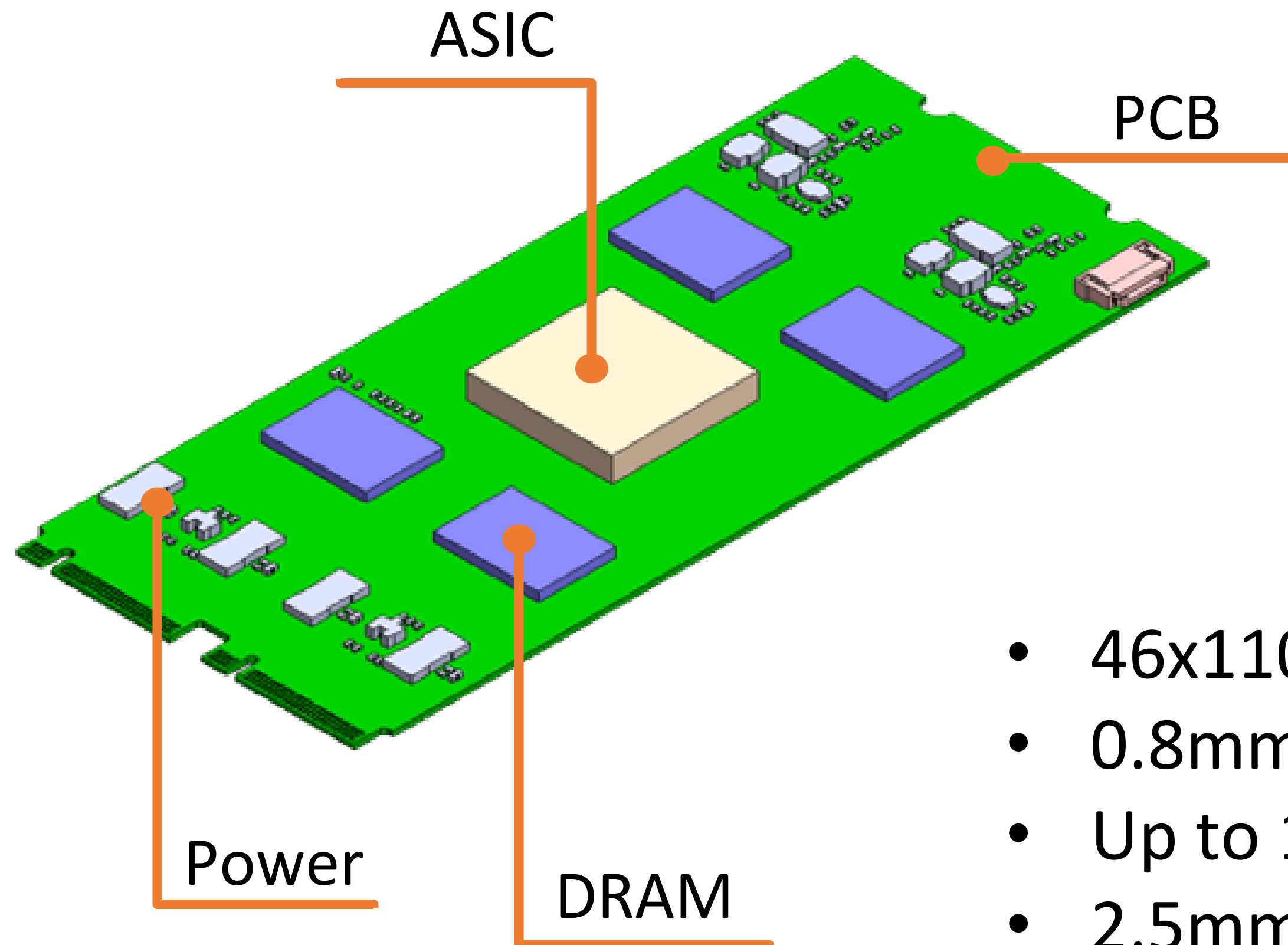


- 10W TDP (module)
- LPDDR4x 64bit x2

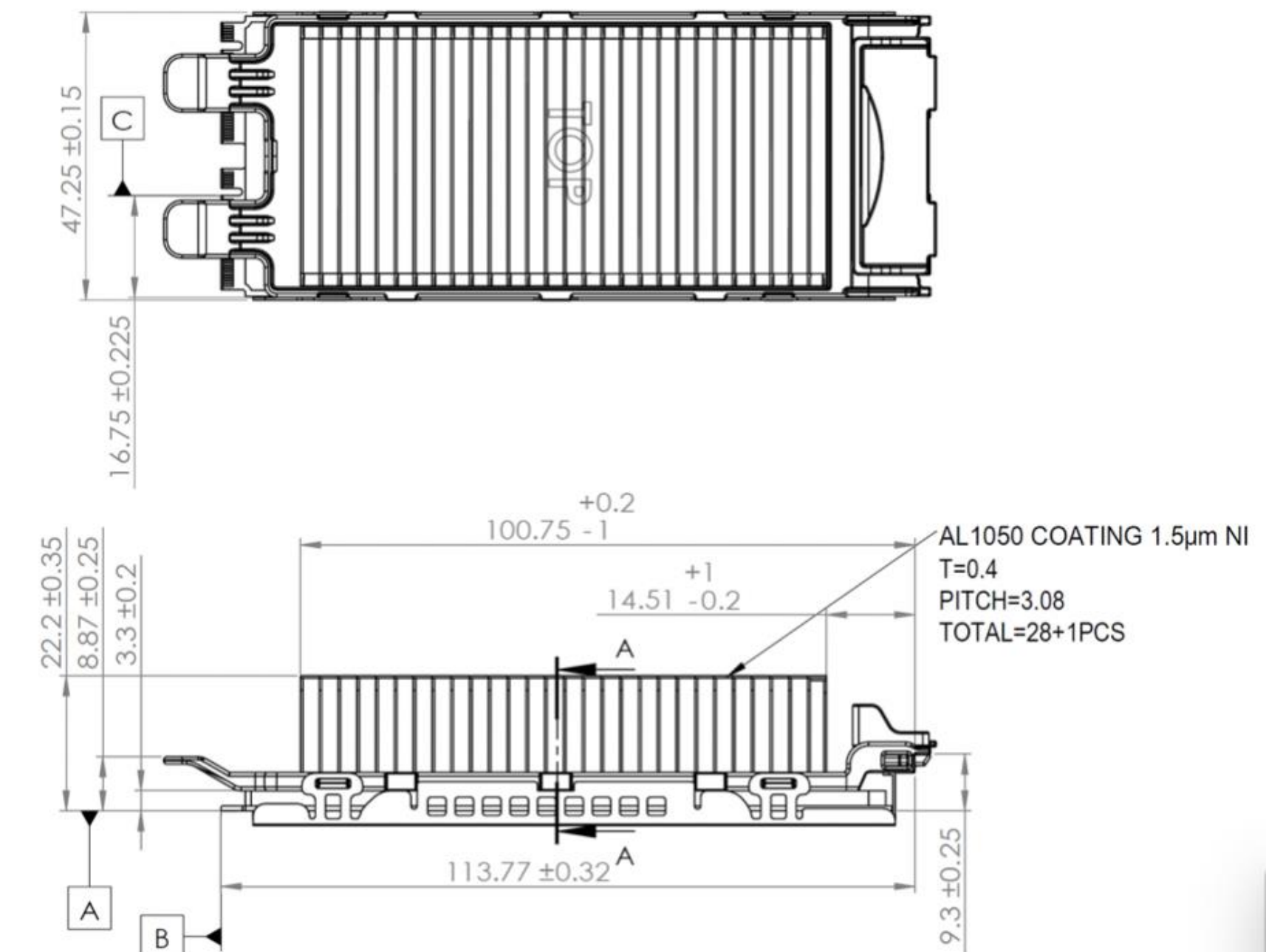
- PCIe x4
- SMBus
- UART
- JTAG
- USB*

M.2			
Signal	Pin	Pin	Signal
3.3V	2	1	GND
3.3V	4	3	GND
PWRDIS	6	5	PETn3
PLN#	8	7	PETp3
LED_1#(0)	10	9	GND
3.3V	12	11	PERn3
3.3V	14	13	PERp3
3.3V	16	15	GND
3.3V	18	17	PETn2
TRST	20	19	PETp2
VIO_1V8	22	21	GND
TDI	24	23	PERn2
TDO	26	25	PERp2
TCK	28	27	GND
PLA_S3#	30	29	PETn1
GND	32	31	PETp1
USB_D+	34	33	GND
USB_D-	36	35	PERn1
GND	38	37	PERp1
SMB_CLK (I/O)(0/1.8V)	40	39	GND
SMB_DATA (I/O)(0/1.8V)	42	41	PETn0
ALERT# (O)(0/1.8V)	44	43	PETp0
Reserved_UART_Rx	46	45	GND
Reserved_UART_Tx	48	47	PERn0
PERST# (I)(0/3.3V)	50	49	PERp0
CLKREQ# (I/O)(0/3.3V)	52	51	GND
PEWAKE#(I/O)(0/3.3V)	54	53	REFCLKn
Reserved for MFG DATA	56	55	REFCLKp
Reserved for MFG CLOCK	58	57	GND
ADD IN CARD KEY M			ADD IN CARD KEY M
ADD IN CARD KEY M			ADD IN CARD KEY M
ADD IN CARD KEY M			ADD IN CARD KEY M
ADD IN CARD KEY M			ADD IN CARD KEY M
NC	68	67	TMS
3.3V	70	69	NC
3.3V	72	71	GND
3.3V	74	73	VIO_CFG_GND
		75	GND

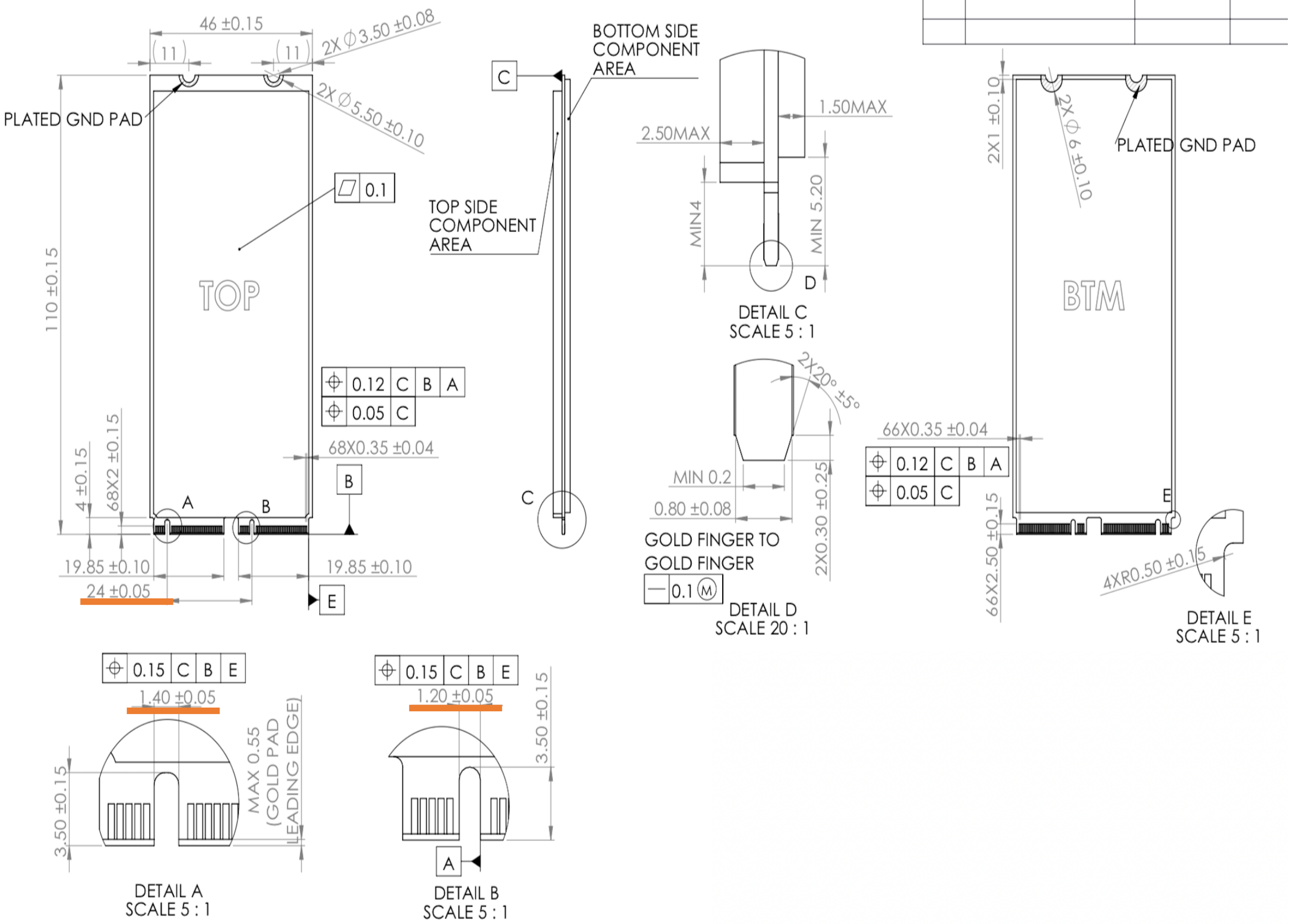
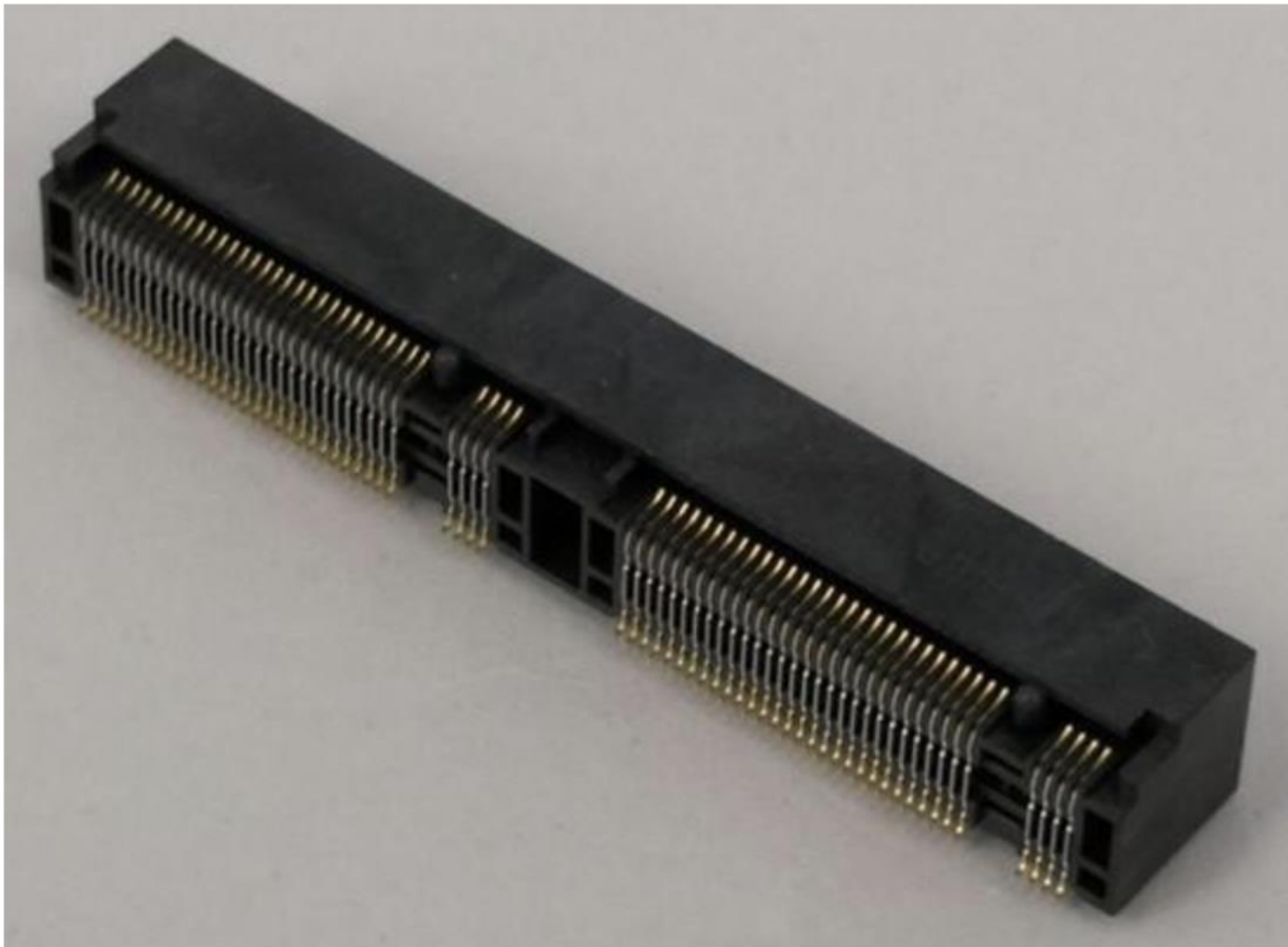
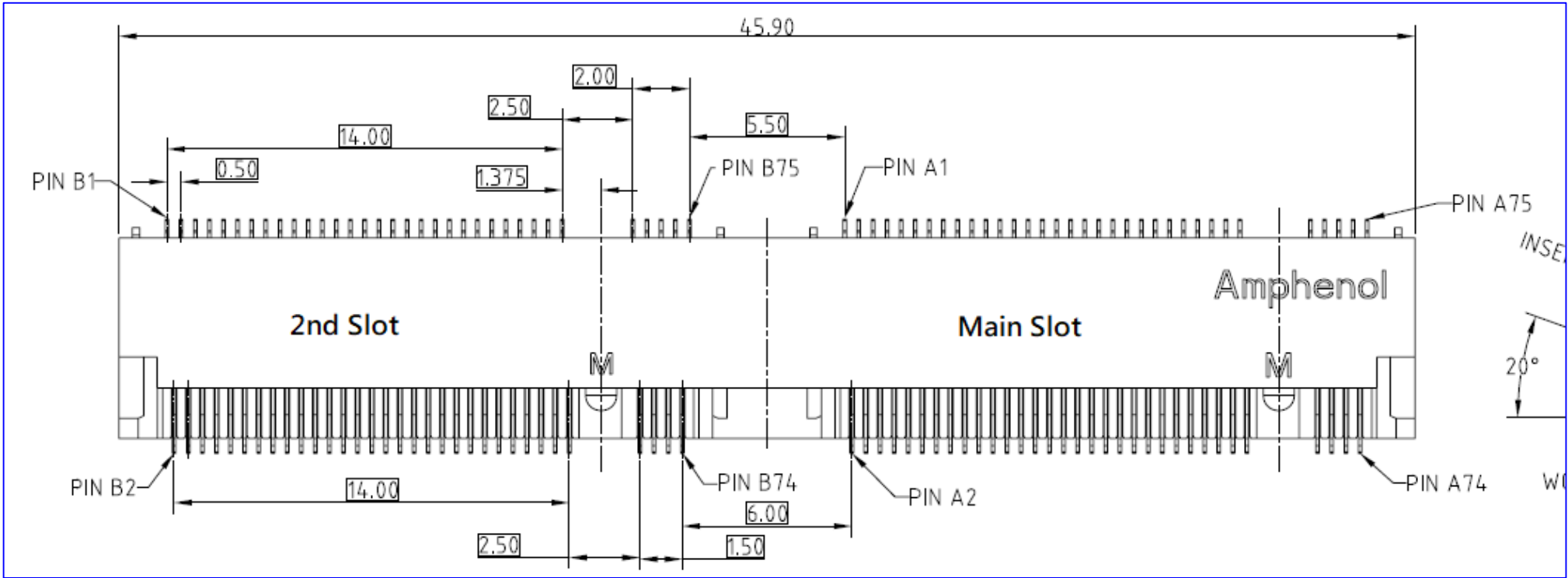
Dual M.2 Accelerator Module - PCBA



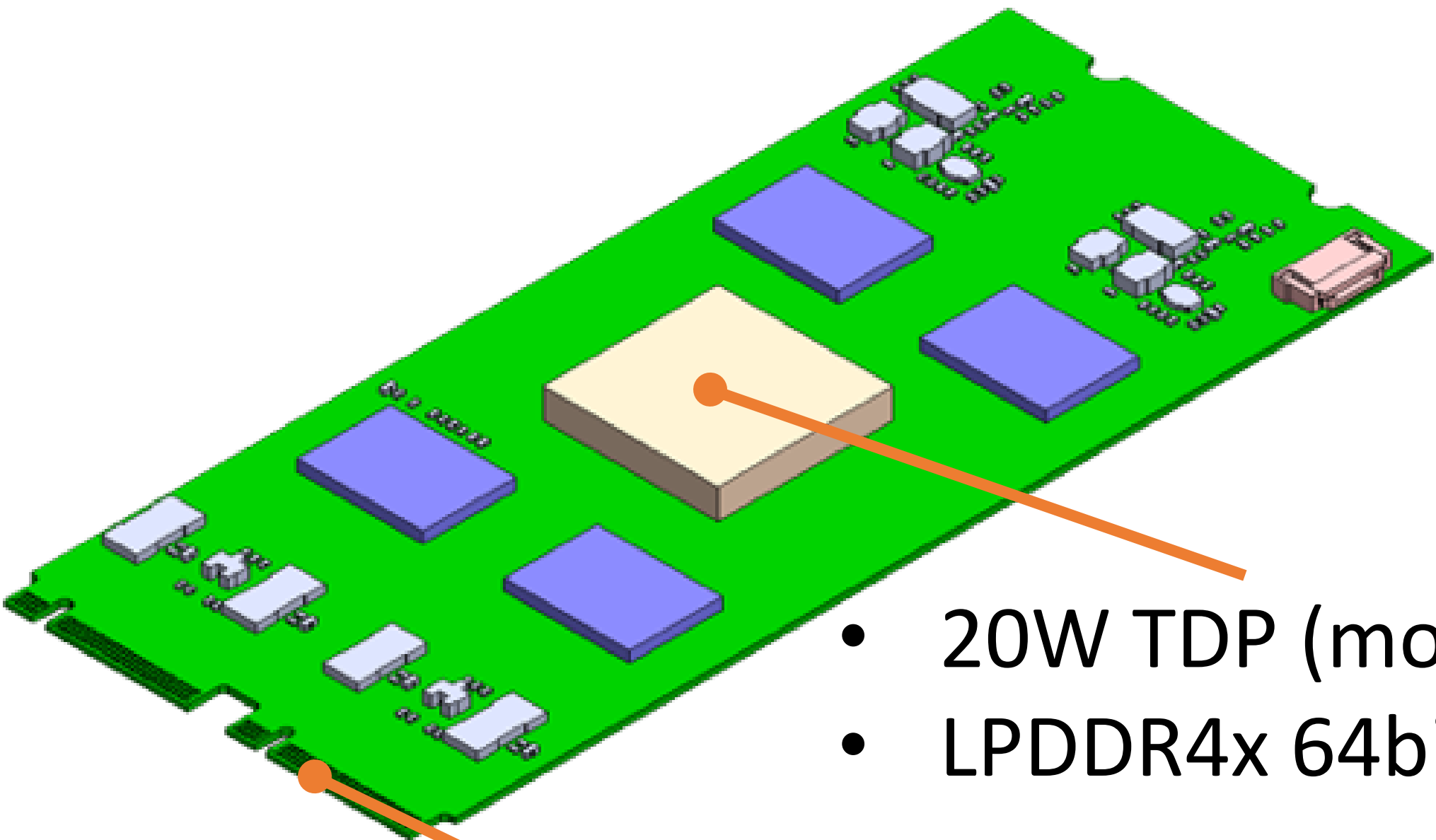
- 46x110mm
- 0.8mm thick
- Up to 12 layers
- 2.5mm height on top
- 1.5mm height on bottom



Dual M.2 Accelerator Module - Connector



Dual M.2 Accelerator Module – Power, Interface



- 20W TDP (module)
- LPDDR4x 64bit x4
- PCIe x8
- SMBus
- UART
- JTAG
- USB*

Dual M.2							
Main Slot (SlotA)				2nd Slot (SlotB)			
Signal	Pin	Pin	Signal	Signal	Pin	Pin	Signal
3.3V	A2	A1	GND	3.3V	B2	B1	GND
3.3V	A4	A3	GND	3.3V	B4	B3	GND
PWRDIS	A6	A5	PETn3	NC	B6	B5	PETn7
PLN#	A8	A7	PETp3	NC	B8	B7	PETp7
LED_1#(0)	A10	A9	GND	NC	B10	B9	GND
3.3V	A12	A11	PERn3	3.3V	B12	B11	PERn7
3.3V	A14	A13	PERp3	3.3V	B14	B13	PERp7
3.3V	A16	A15	GND	3.3V	B16	B15	GND
3.3V	A18	A17	PETn2	3.3V	B18	B17	PETn6
TRST	A20	A19	PETp2	NC	B20	B19	PETp6
VIO_1V8	A22	A21	GND	GND	B22	B21	GND
TDI	A24	A23	PERn2	NC	B24	B23	PERn6
TDO	A26	A25	PERp2	NC	B26	B25	PERp6
TCK	A28	A27	GND	GND	B28	B27	GND
PLA_S3#	A30	A29	PETn1	NC	B30	B29	PETn5
GND	A32	A31	PETp1	NC	B32	B31	PETp5
USB_D+	A34	A33	GND	NC	B34	B33	GND
USB_D-	A36	A35	PERn1	NC	B36	B35	PERn5
GND	A38	A37	PERp1	NC	B38	B37	PERp5
SMB_CLK (I/O)(0/1.8V)	A40	A39	GND	NC	B40	B39	GND
SMB_DATA (I/O)(0/1.8V)	A42	A41	PETn0	NC	B42	B41	PETn4
ALERT# (O)(0/1.8V)	A44	A43	PETp0	NC	B44	B43	PETp4
Reserved_UART_Rx	A46	A45	GND	NC	B46	B45	GND
Reserved_UART_Tx	A48	A47	PERn0	NC	B48	B47	PERn4
PERST# (I)(0/3.3V)	A50	A49	PERp0	NC	B50	B49	PERp4
CLKREQ# (I/O)(0/3.3V)	A52	A51	GND	NC	B52	B51	GND
PEWAKE#(I/O)(0/3.3V)	A54	A53	REFCLKn	NC	B54	B53	NC
Reserved for MFG DATA	A56	A55	REFCLKp	NC	B56	B55	NC
Reserved for MFG CLOCK	A58	A57	GND	NC	B58	B57	GND
ADD IN CARD KEY M			ADD IN CARD KEY M	ADD IN CARD KEY M			ADD IN CARD KEY M
ADD IN CARD KEY M			ADD IN CARD KEY M	ADD IN CARD KEY M			ADD IN CARD KEY M
ADD IN CARD KEY M			ADD IN CARD KEY M	ADD IN CARD KEY M			ADD IN CARD KEY M
ADD IN CARD KEY M			ADD IN CARD KEY M	ADD IN CARD KEY M			ADD IN CARD KEY M
NC	A68	A67	TMS	NC	B68	B67	NC
3.3V	A70	A69	NC	3.3V	B70	B69	NC
3.3V	A72	A71	GND	3.3V	B72	B71	GND
3.3V	A74	A73	VIO_CFG_GND	3.3V	B74	B73	GND
		A75	GND			B75	GND

M.2/Dual M.2 Accelerator Module Specification Contents

- Power transient spec
- PCIe details
- Reset Architecture
- FRU information
- Reliability
- Compliance

Facebook Accelerator System

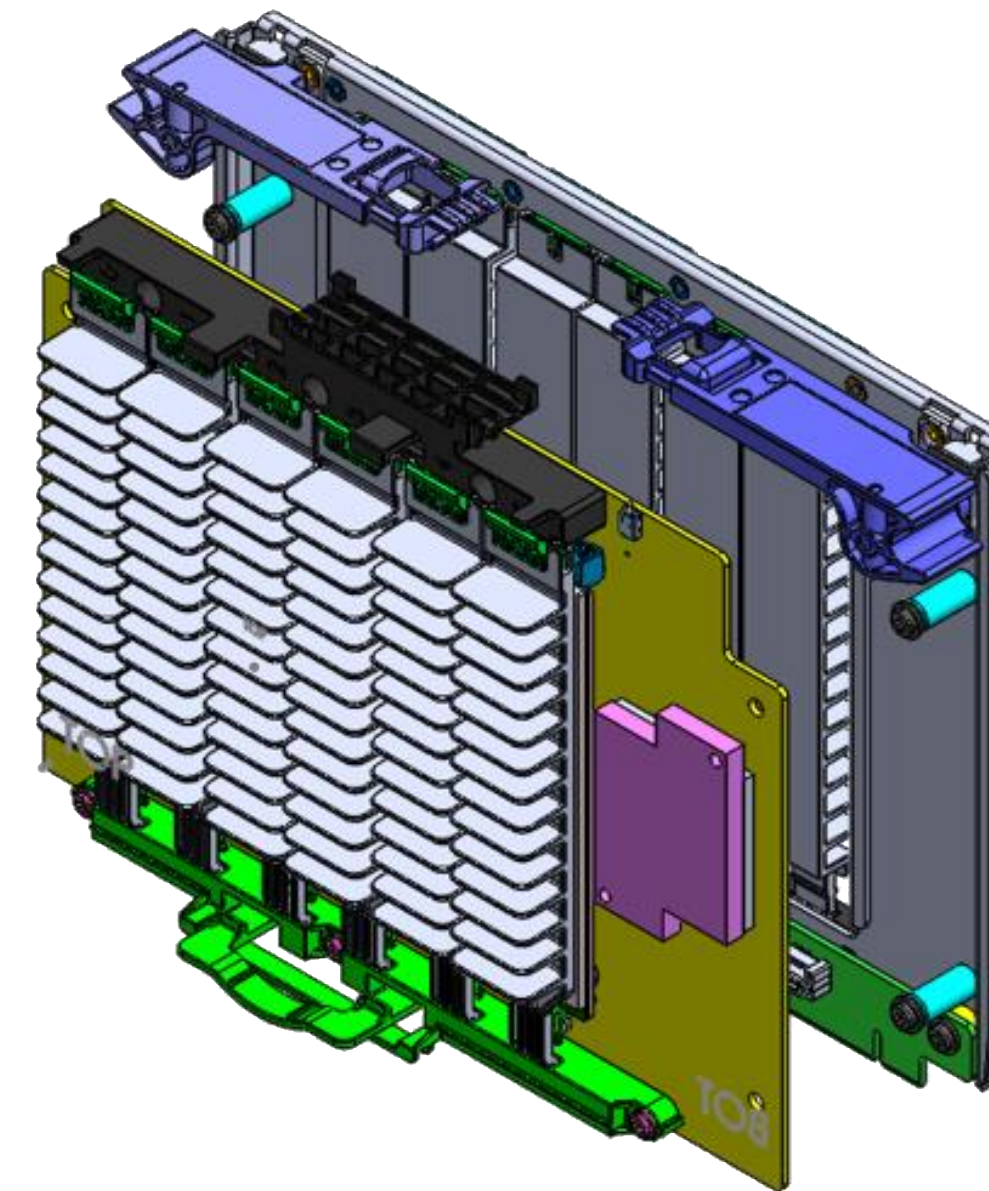
Module

Glacier Point v2 Card

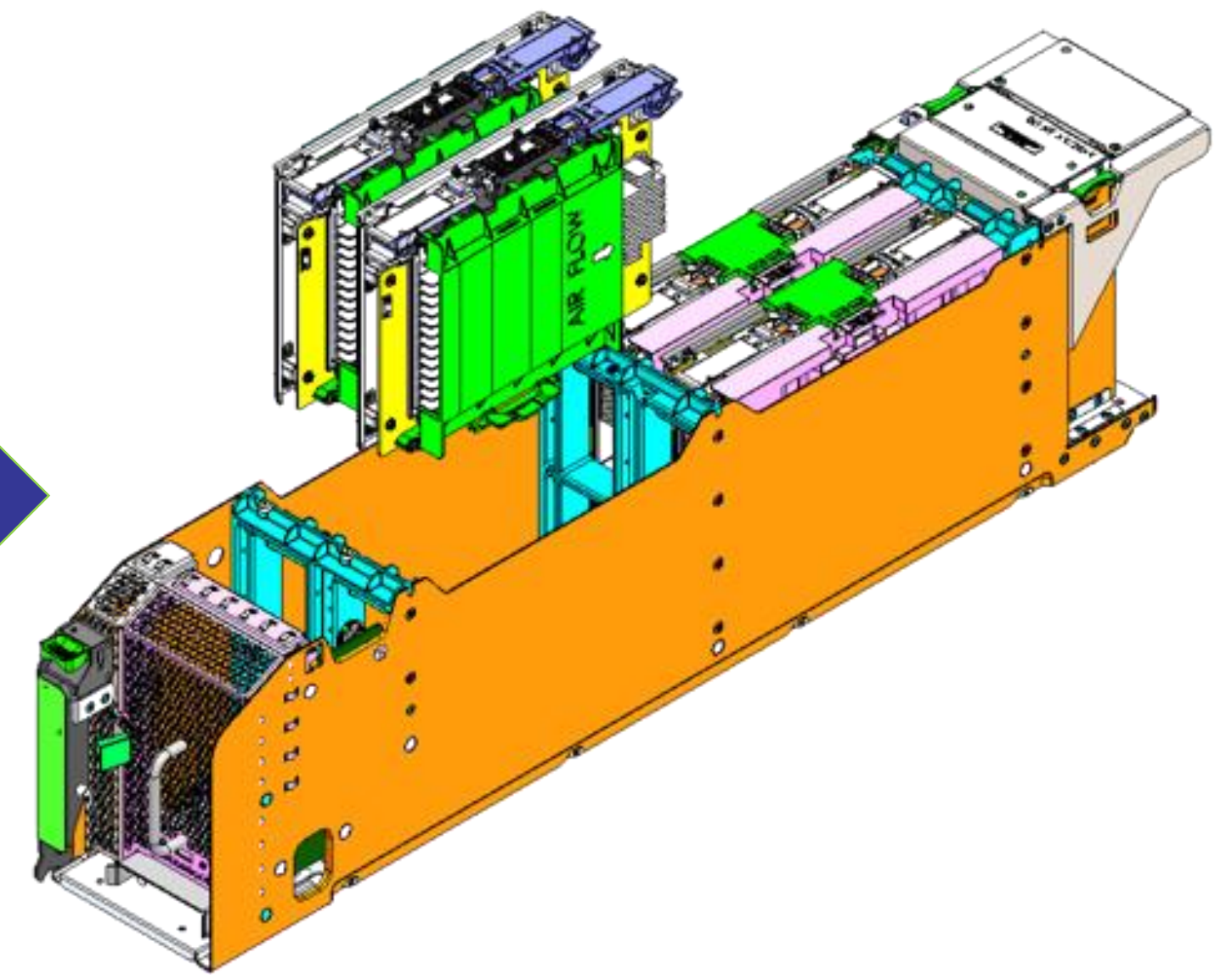
Yosemite V2

Single
M.2

Dual M.2

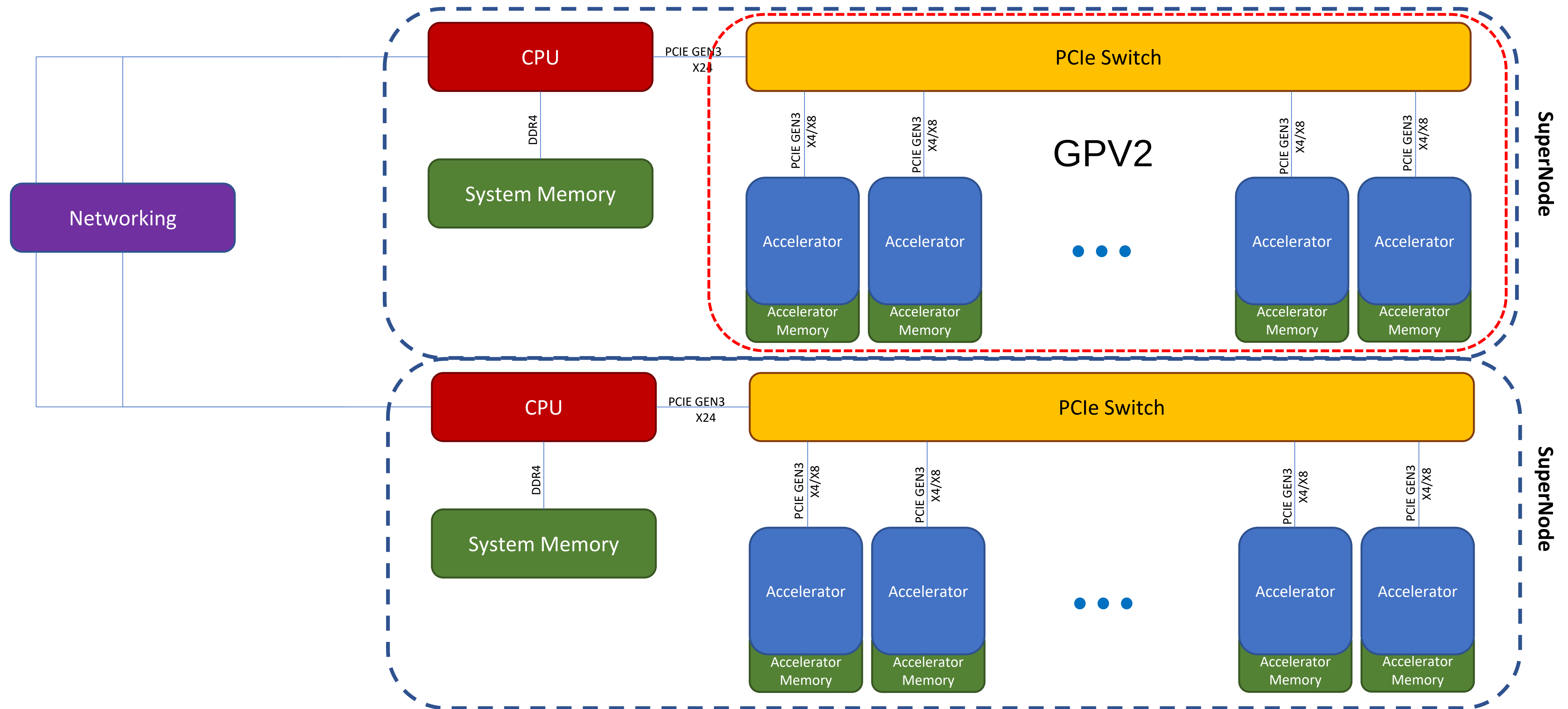


Up to 12x single/
6x dual M.2

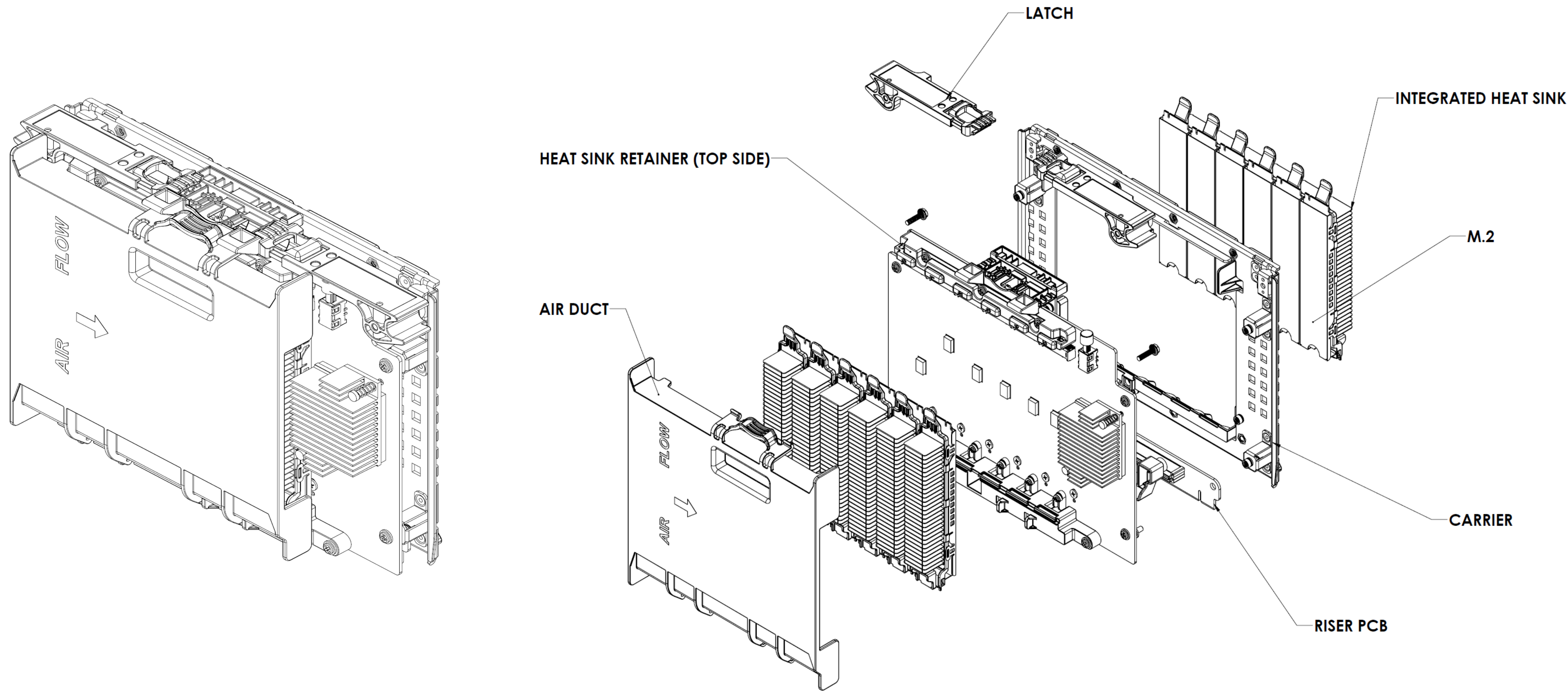


2x TwinLakes with 2x Glacier
Point V2 Cards

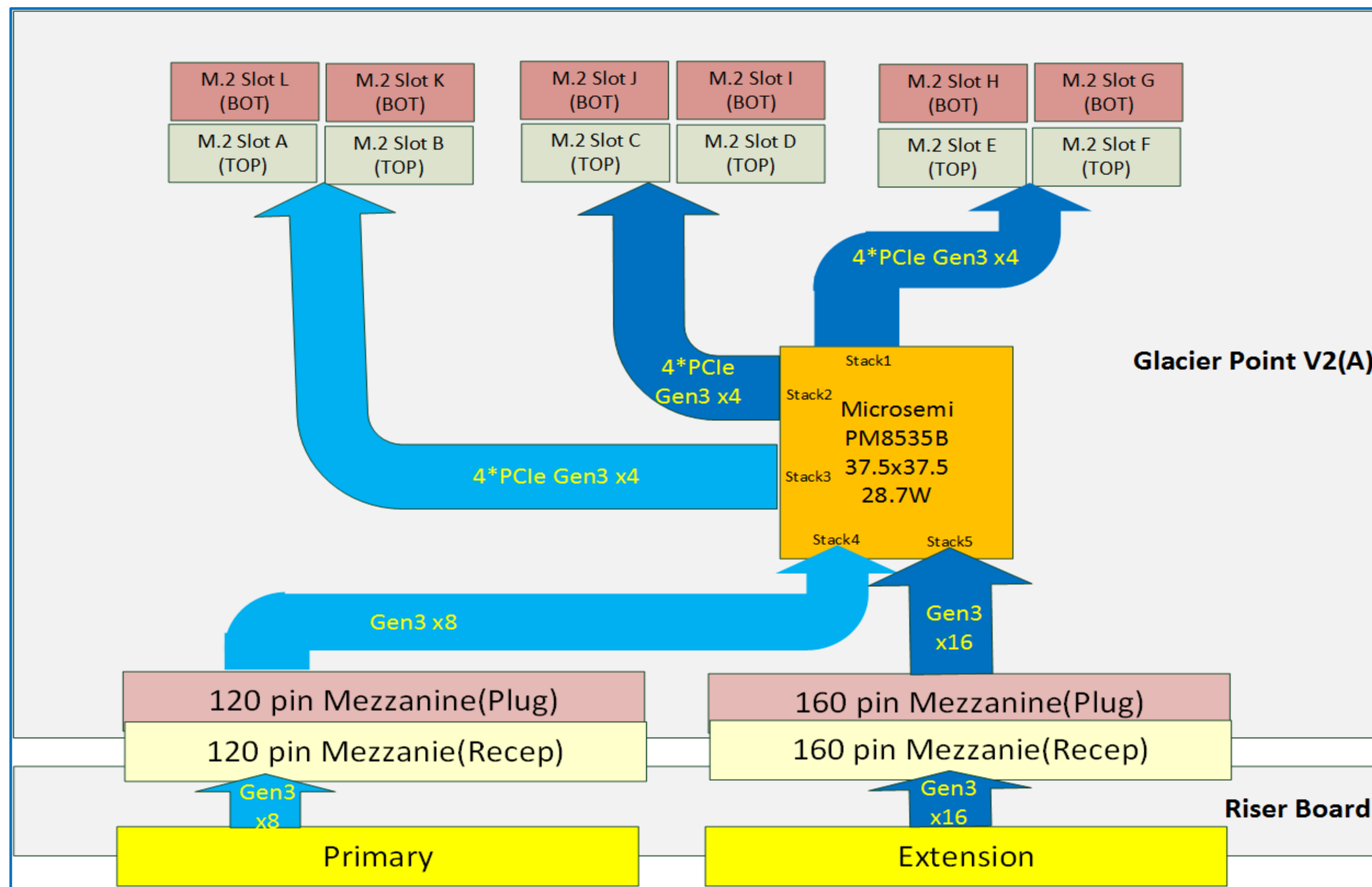
YV2 Platform Block Diagram



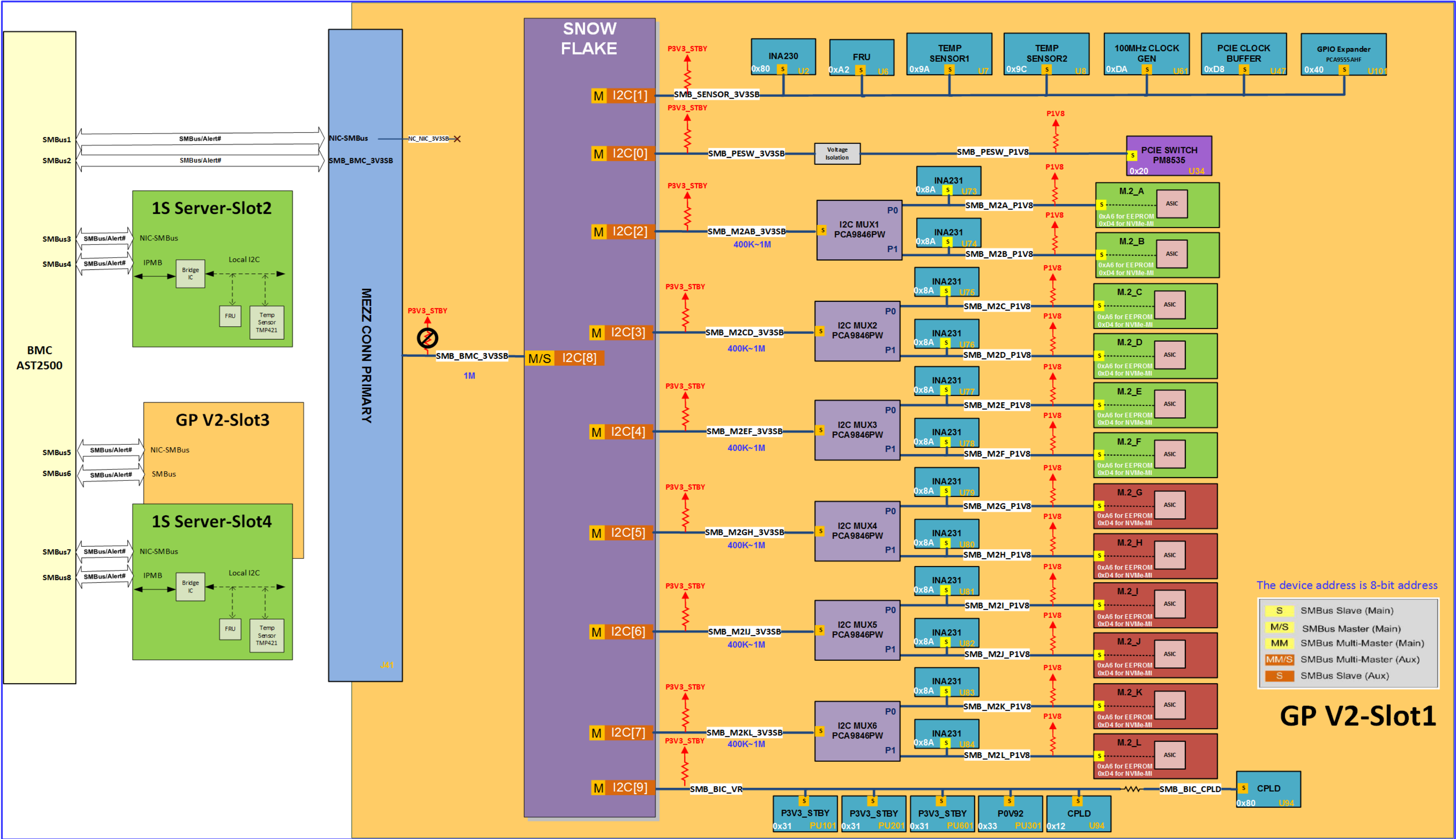
GPv2 Mechanical Drawing



GPv2 PCIe Block Diagram



GPv2 I2C Block Diagram



GPv2 UART/JTAG Block Diagram

