480KW Double Power Density AI Data Center Rack with Liquid Cooling Solution

2025/09/30

NIKO SEMICONDUCTOR CO.,LTD.
尼克森微電子股份有限公司

SG-SEM 帥群微電子股份有限公司
SUPER GROUP SEMICONDUCTOR CO,. LTD.

Advantages:

1. Amount or specification of power devices can be reduced under same output power.
2. Greater output power can be achieved under same amount and specification of power devices.
3. Cooling fan can be skipped to reduce system noise.
4. System space can be saved.

Comparison between NVL36 and 240KW Rack Power Configuration

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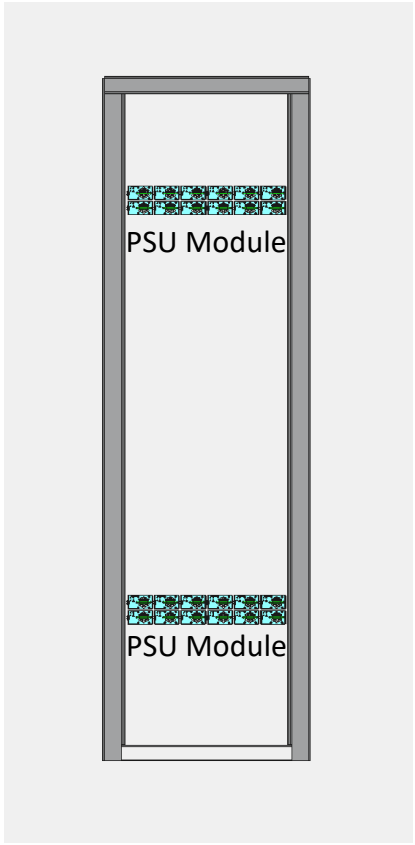
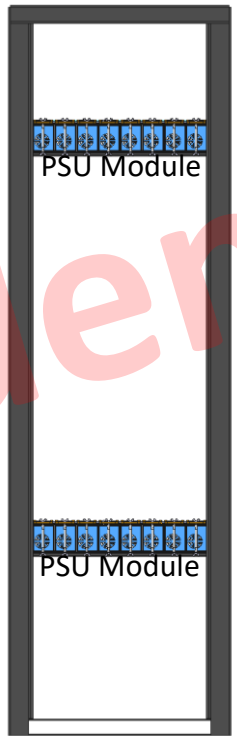
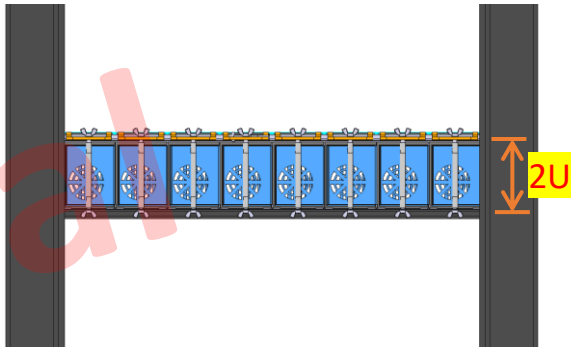
NVL36 132KW Rack Power Configuration

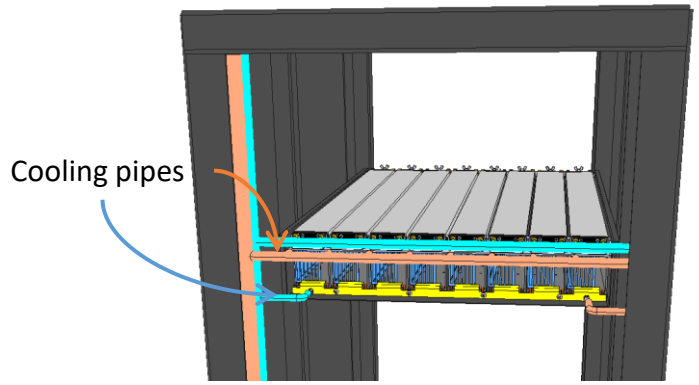


- 5.5KW PSU with single phase AC input + air cooling
- 12 PSUs per PSU Module
- 2 x 2U 66KW PSU Module (12 x 5.5KW PSUs), total power 132KW

240KW Rack Power Configuration with Liquid Cooling







- 15KW PSU with three-phase AC input and liquid cooling
- 8 PSUs per 2U PSU Module
- 2 x 2U 120KW PSU Module (8 x 15KW PSUs), total power 240KW

Comparison between NVL72 and 480KW Rack Power Configuration

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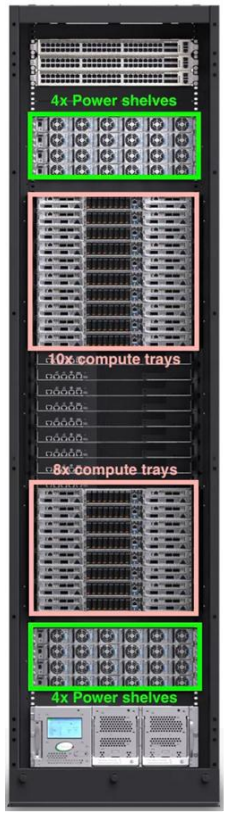
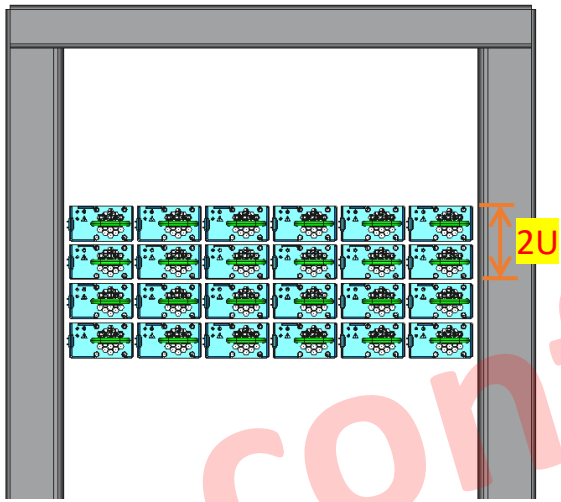
NVL72 264KW Rack Power Configuration



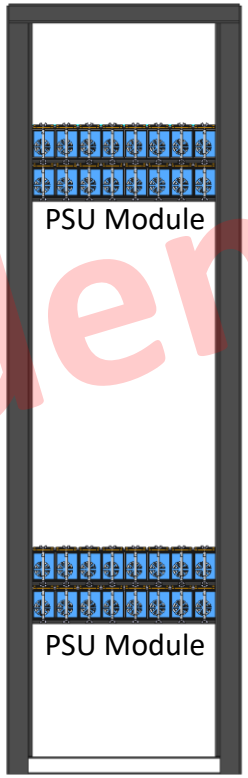
PSU Module

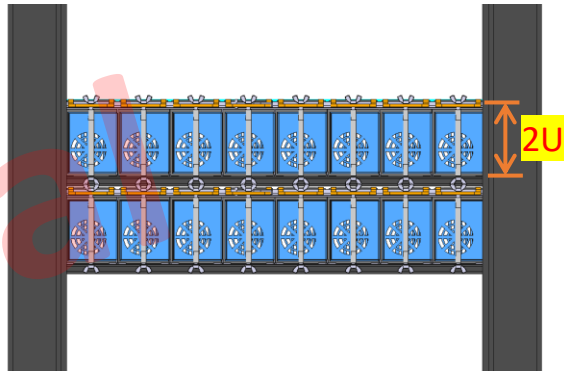


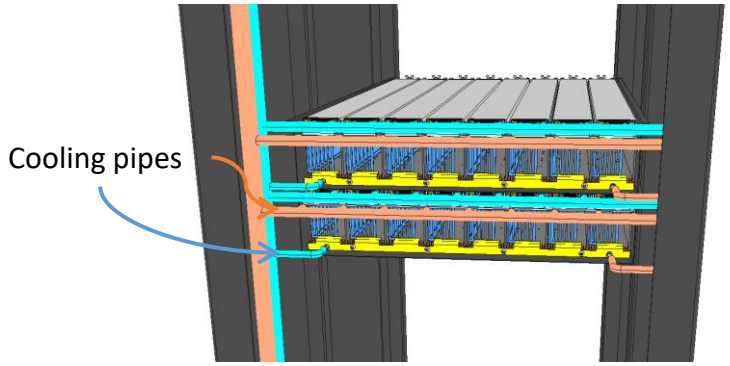
PSU Module

- 5.5KW PSU with single phase AC input + air cooling
- 12 PSUs per 2U PSU module
- 4 x 2U 66KW PSU Module (12 x 5.5KW PSUs), total power 264KW

480KW Rack Power Configuration with Liquid Cooling







- 15KW PSU with three-phase AC input and liquid cooling
- 8 PSUs per 2U PSU Module
- 4 x 2U 120KW PSU Module (8 x 15KW PSUs), total power 480KW

PSU Module

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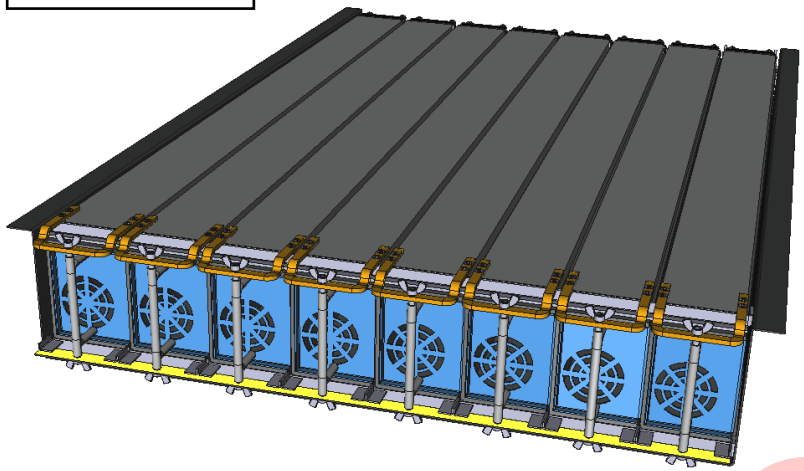
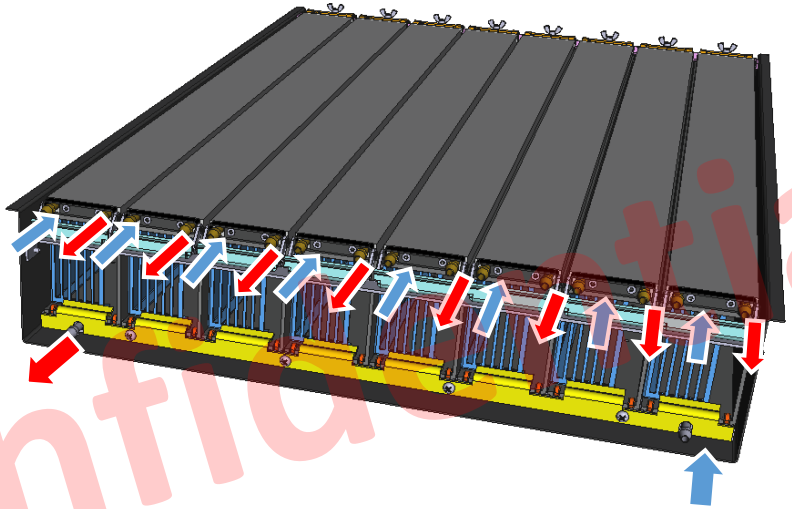
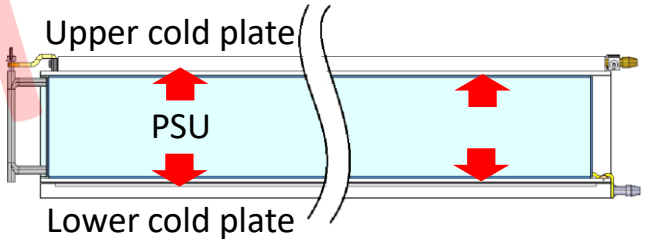
Front view



Rear view



Side view



Key Features

- 2U height, 19 inches wide, compatible with 19 inch standardized rack
- 1 lower cold plate and 8 upper cold plates to provide 6KW cooling capacity
- 8x 15KW PSUs to generate 120KW total power
- Liftable upper cold plates to providing easy replacement for PSUs
- Heat of PSU is removed through upper/lower sidewalls of PSU housing

PSU Design

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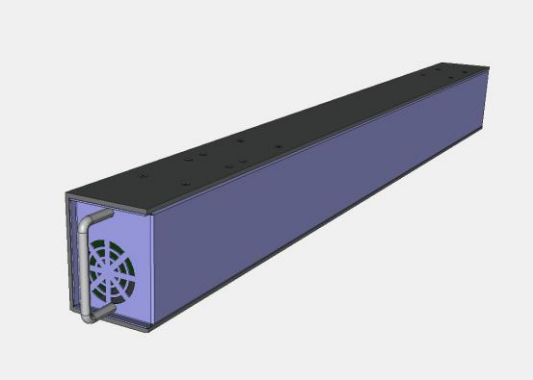
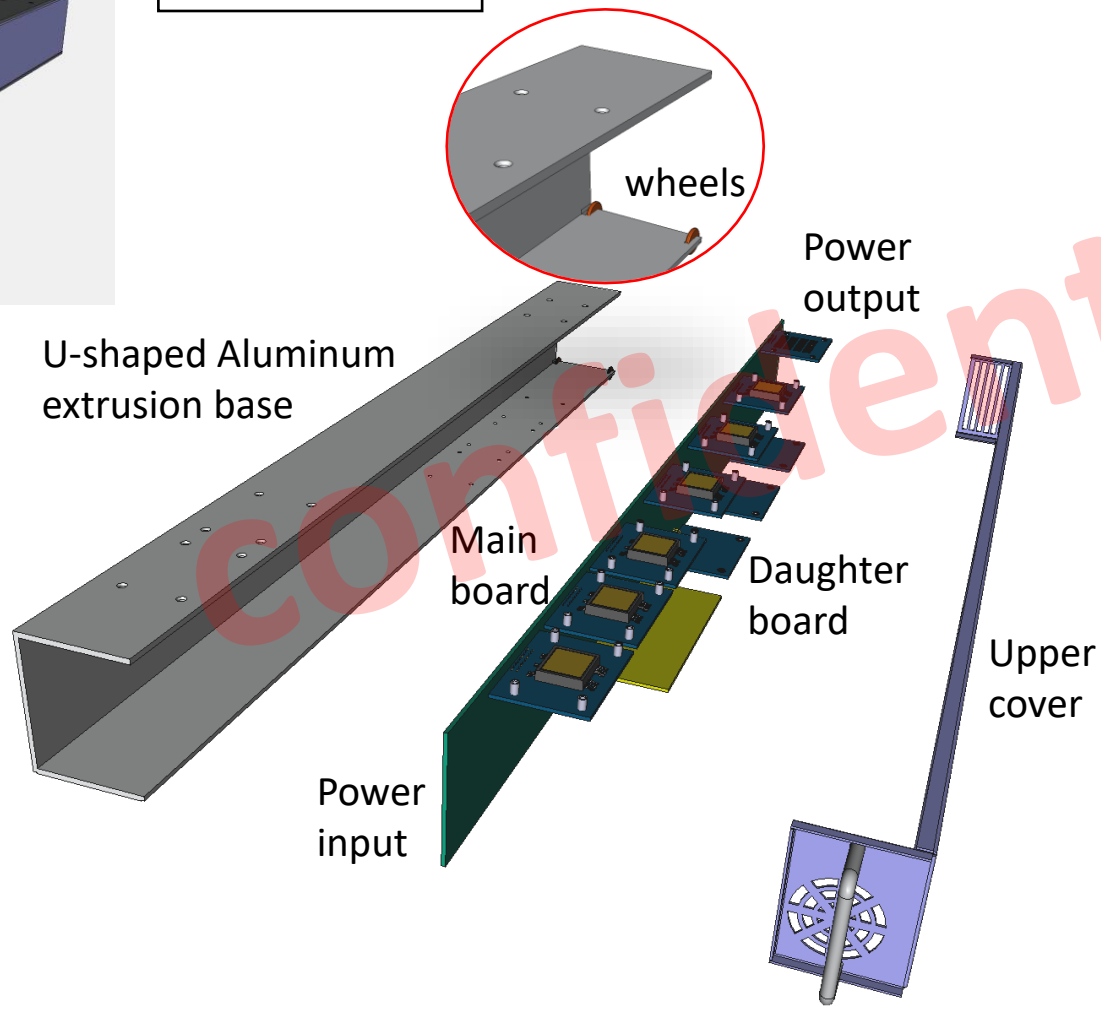


explosive view



Key Features

- U-shaped Aluminum extrusion Base enclosed by metal cover (the purple portion)
- Vertically placed main board
- Daughter boards placed at the edges of the main board with top side cooling power devices facing outwards
- Daughter boards screw-fixed to the U-shaped base to ensure reliable thermal contact between power devices and U-shaped Aluminum extrusion base

Assembling Examples

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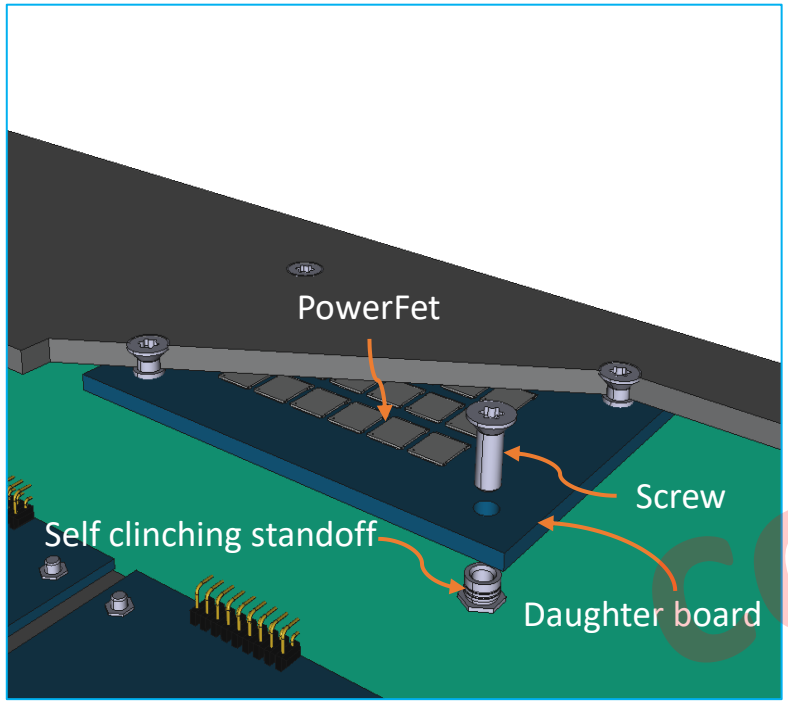
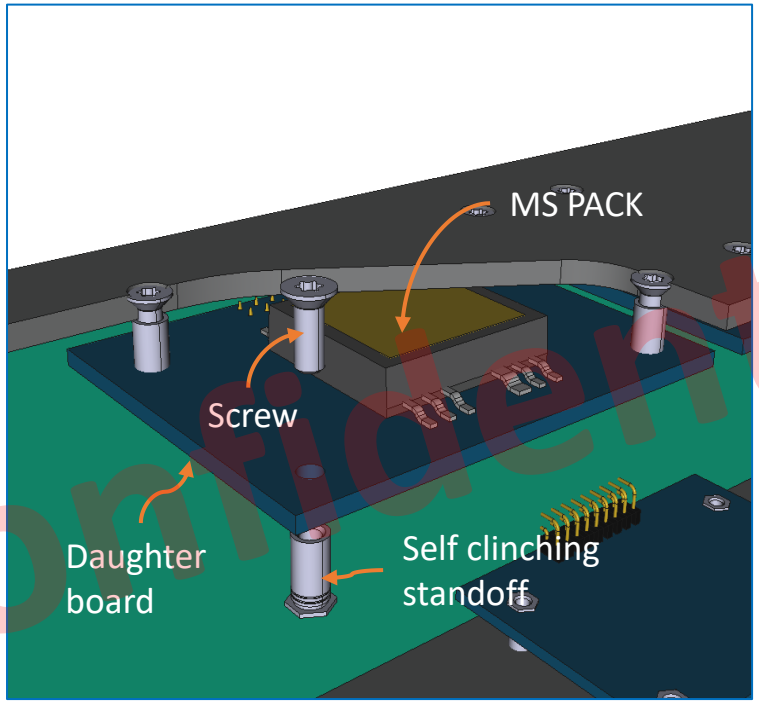
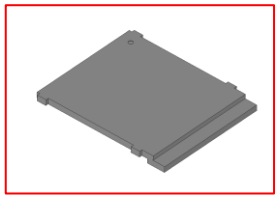
PowerFet



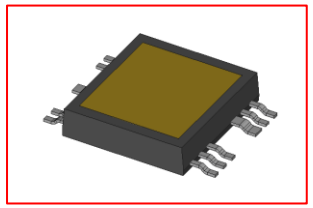
MS PACK



PowerFet



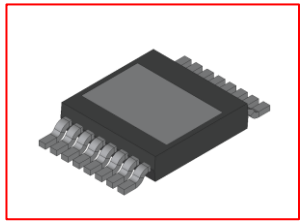
MS PACK



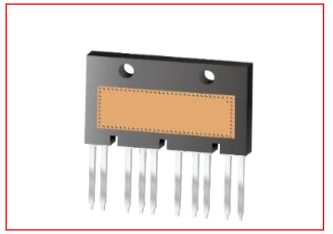
Remark

- TIM is needed for non-insulated devices, such as PowerFet
- Self clinching standoff with suitable height inserted in daughter board to withstand assembly stress
- PowerFETs should be mounted on the daughter board with bottom filled
- Similar architecture can be applied to the other top side cooling power devices such as TOLT, Soft PACK shown below

TOLT



Soft PACK



PSU Replacement Mechanism

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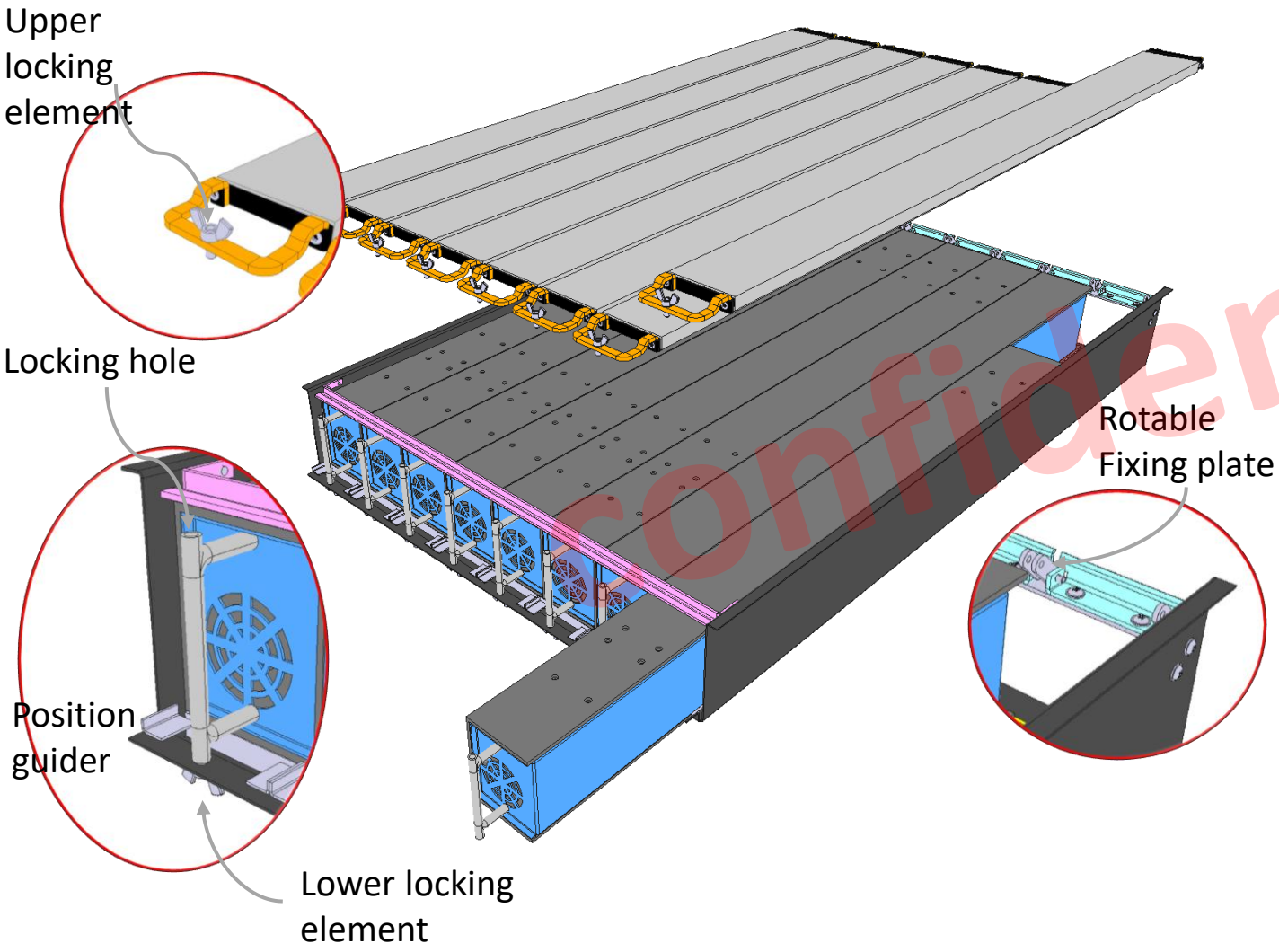

Key Features

- 8 upper cold plates correspond to 8 PSUs
- Special lifting mechanism for upper cold plate and position guider in front of lower cold plate to facilitate PSU replacement
- Reliable locking mechanism for holding the upper cold plate, the PSU, and the lower cold plate together to improve thermal contact

PSU Replacement Process

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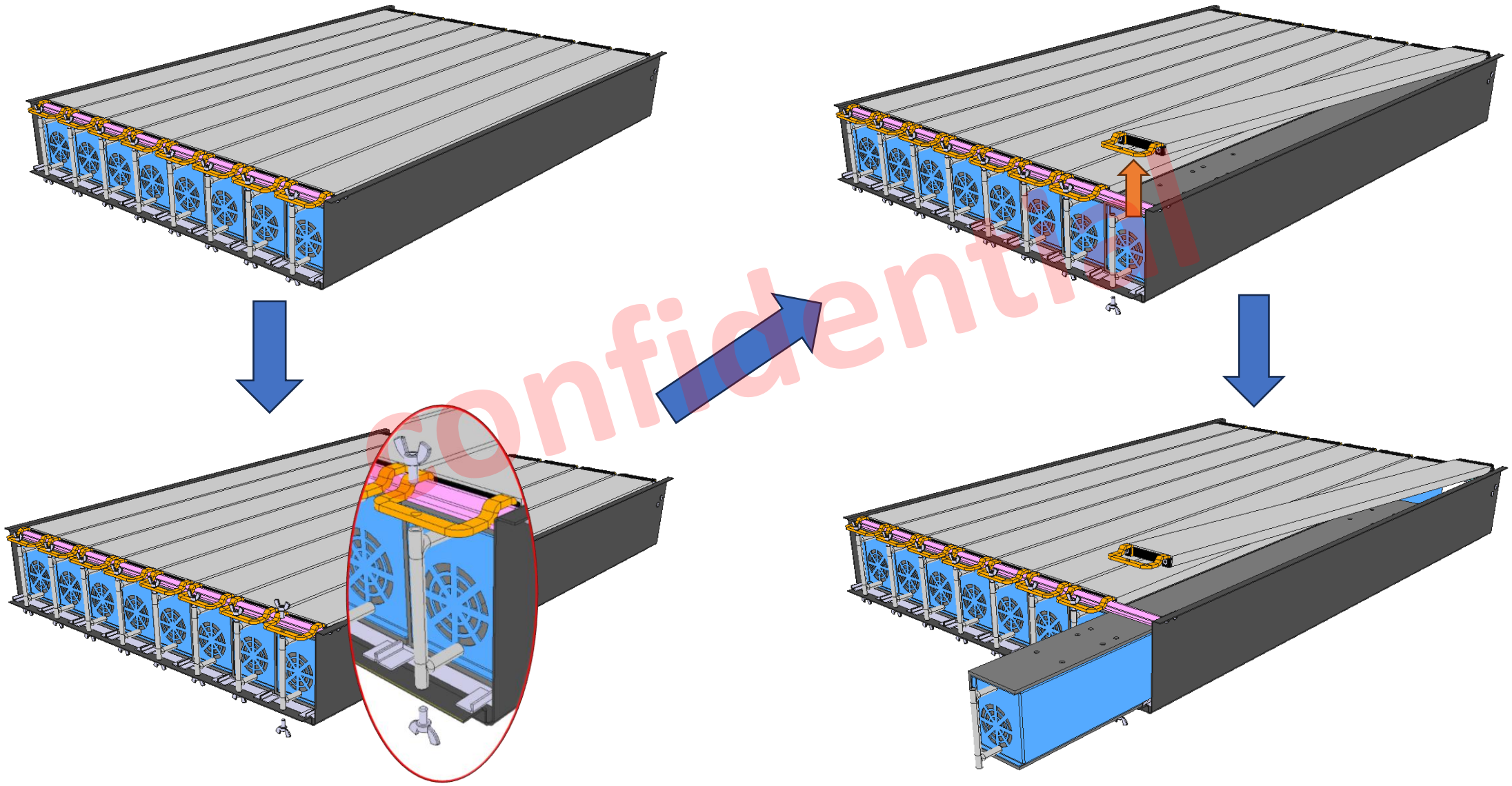

15KW DEMO Board

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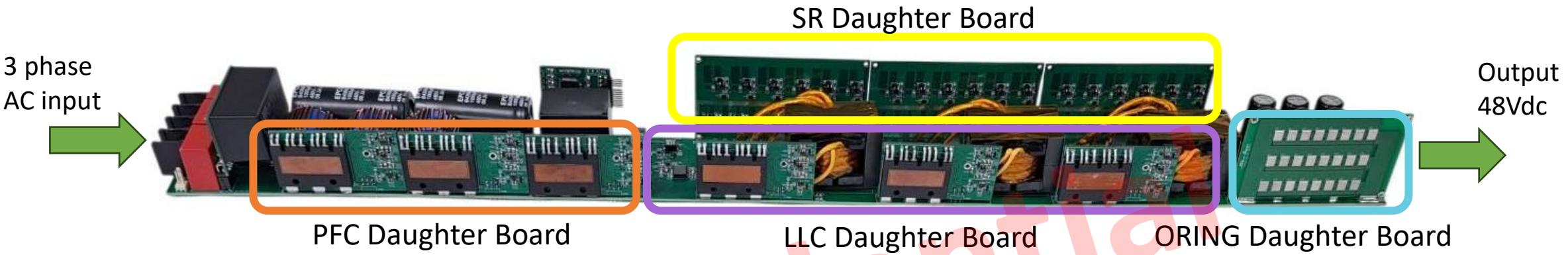
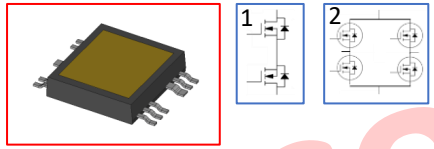
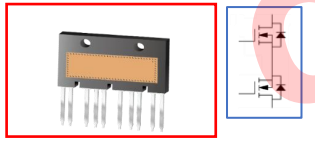


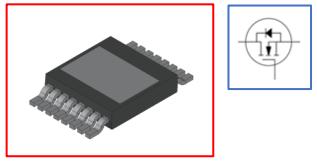
MS PACK

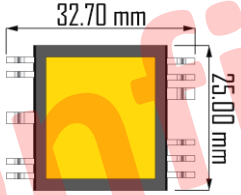


SFT PACK

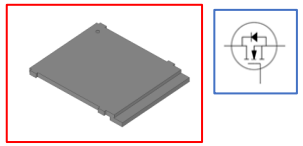


TOLT
(2026 Q2)

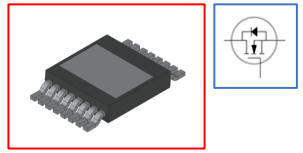




PowerFet



TOLT
(2026 Q2)



Product Specification and Schedule - Module

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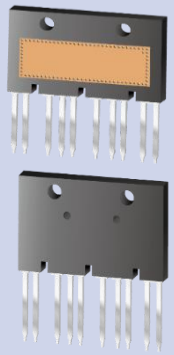
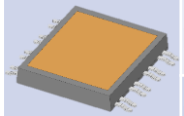
SFT PACK	Device Name	Topology	Spec	Sample Status
	HRAB-120011BXC	Half Bridge	1200V 11mR SiC	Ready
	HRAB-120S18BXC	Half Bridge	1200V 18mR SiC	Ready
	HRAB-120036BXC	Half Bridge	1200V 36mR SiC	Ready
	HEAB-120028BXC	Half Bridge	1200V 28mR SiC	2025 Q4
	HRCE-120062BXC	Half Bridge	1200V 62mR SiC	Ready
	HRAB-075026BXC	Half Bridge	750V 26mR SiC	Ready
	HRAB-075013BXC	Half Bridge	750V 13mR SiC	Ready
	HMCE-065090BXC	Half Bridge	650V 90mR SJ	Ready
	HMCE-065115BXC	Half Bridge	650V 115mR SJ	Ready

MS PACK	Device Name	Topology	Spec	Sample Status
	HARM120011-BXC	Half Bridge	1200V 11mR SiC	2025 Q4
	HCRM075026-BXC	Half Bridge	750V 26mR SiC	Ready
	HCRM075013-BXC	Half Bridge	750V 13mR SiC	Ready
	HCRM120036-BXC	Half Bridge	1200V 36mR SiC	2025 Q4
	HCRM120018-BXC	Half Bridge	1200V 18mR SiC	2026 Q2
	HCEM120028-BXC	Half Bridge	1200V 28mR SiC	2025 Q4
	FCRM120036-BXC	Full Bridge	1200V 36mR SiC	2025 Q2
	FCRM075026-BXC	Full Bridge	750V 26mR SiC	2026 Q2
	FCRM075013-BXC	Full Bridge	750V 13mR SiC	2026 Q2

Product Specification and Schedule - Discrete

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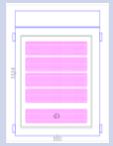
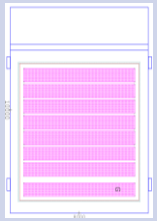
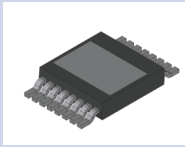
PowerFet 5x6	Device Name	Topology	Spec	Sample Status
	PMC06BP56	Discrete	80V, 2.3mR	Sample Ready
	PMB00BP56	Discrete	100V, 2.2mR	Sample Ready
	P250700024	Discrete	80V, 1.64mR	2026 Q1
	P250700025	Discrete	100V, 2.1mR	2026 Q1
	P250700026	Discrete	150V, 9.2mR	2026 Q3
	P250700030	Discrete	60V, 1.0mR	2026 Q3
	P250700032	Discrete	200V, 23mR	2026 Q3

PowerFet 8x10	Device Name	Topology	Spec	Sample Status
	P250700027	Discrete	80V, 0.64mR	2026 Q1
	P250700028	Discrete	100V, 0.82mR	2026 Q1
	P250700029	Discrete	150V, 3.6mR	2026 Q3
	P250700031	Discrete	60V, 0.4mR	2026 Q3
	P250700033	Discrete	200V, 8.7mR	2026 Q4

TOLT	Device Name	Topology	Spec	Sample Status
	TBD	Discrete	100V	TBD
	TBD	Discrete	150V	TBD
	TBD	Discrete	650V	TBD

Roadmap—Top Side Cooling Products

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