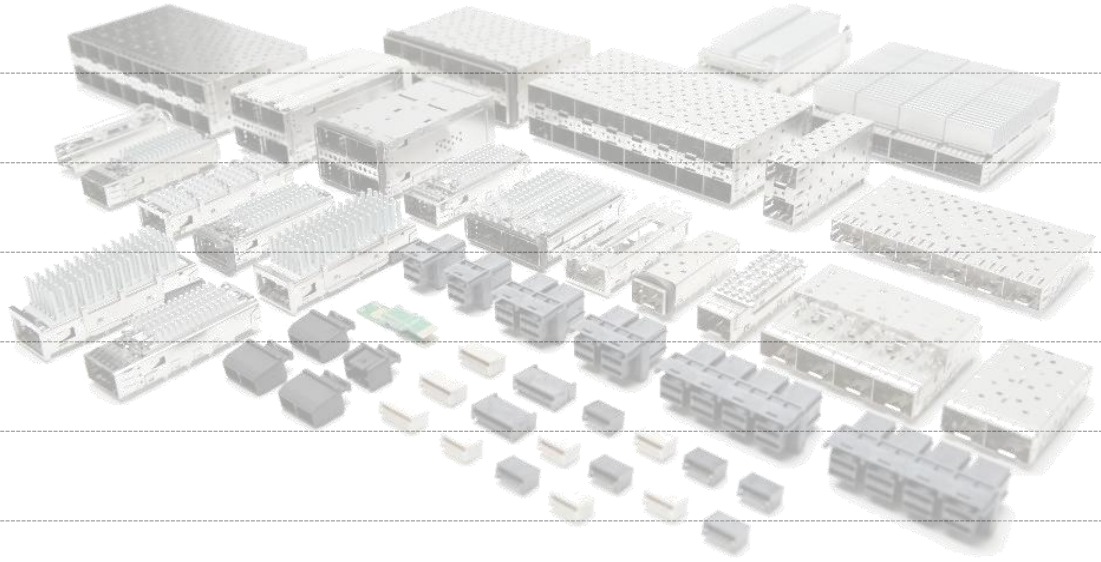
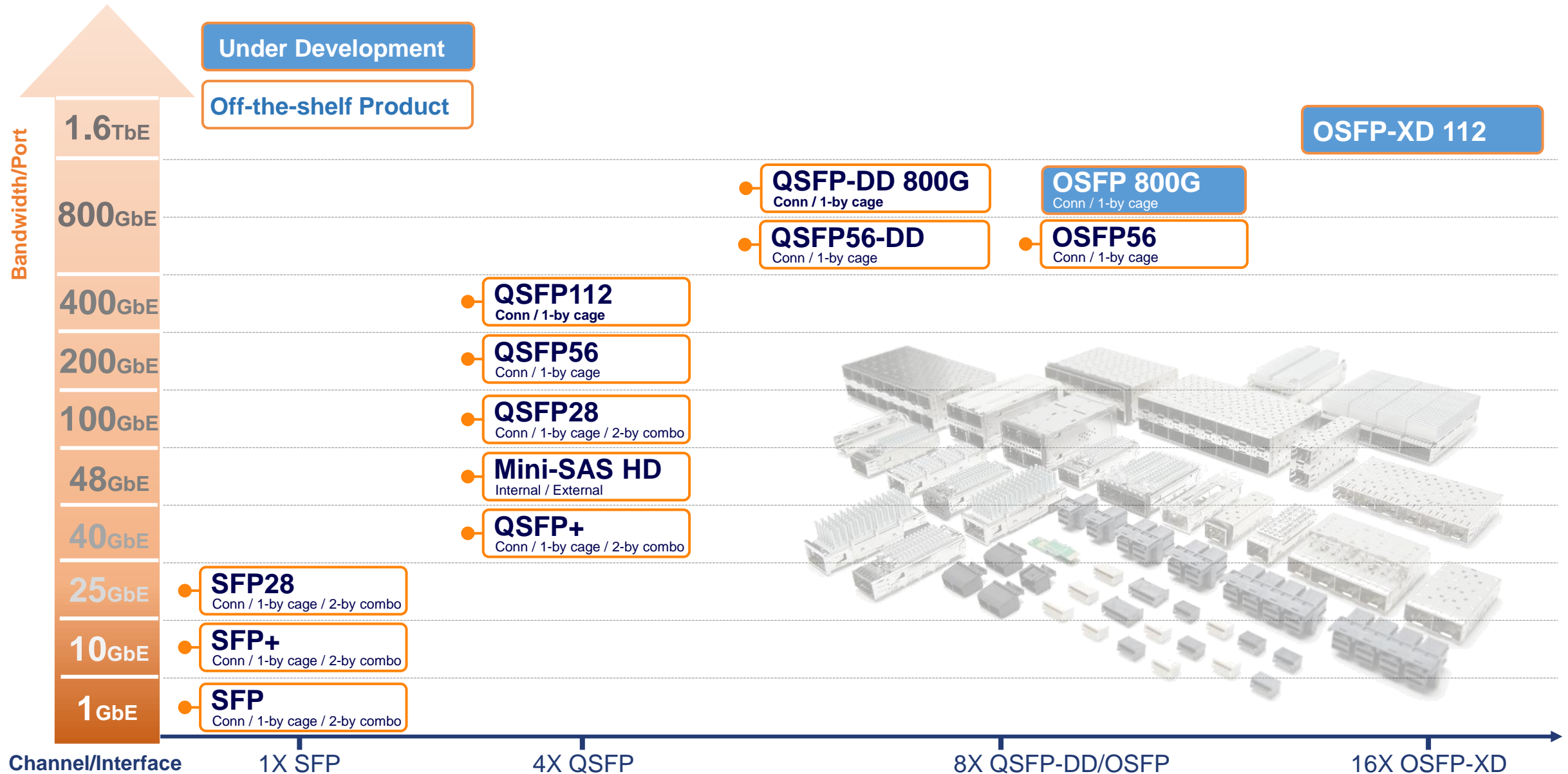


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High Speed I/O Connector

High Speed I/O Connector Roadmap



High Speed I/O

• Connector & Cage



Signal Port Cages









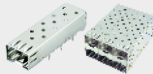
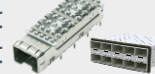



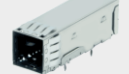
1-by Ganged Cages



Belly to Belly Cages



2-by Stacked Cages

	1Gbps	10Gbps	10Gbps	28Gbps	40Gbps	48Gbps
Series	SFP	SFP+	XFP	SFP28	QSFP+	Mini SAS HD
Connector	<ul style="list-style-type: none"> 1 Gbps 20 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 10 Gbps 20 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 10 Gbps 30 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 28 Gbps 20 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 40 Gbps 38 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 48 Gbps 36 pins 250 cycles -55 to +80 °C 
Cage	<ul style="list-style-type: none"> 1*N port 2*N port 	<ul style="list-style-type: none"> 1*N port 2*N port 	<ul style="list-style-type: none"> 1*1 port 	<ul style="list-style-type: none"> 1*N port 2*N port 	<ul style="list-style-type: none"> 1*N port 2*N port 	<ul style="list-style-type: none"> 1*N port 
Light-pipe	V	V		V	V	V
Heat-sink	V	V	V	V	V	
Tail Type	Solder / Press-fit	Solder / Press-fit	Press-fit	Press-fit	Press-fit	Press-fit

High Speed I/O

• Connector & Cage



Signal Port Cages



1-by Ganged Cages



Belly to Belly Cages



2-by Stacked Cages

	100Gbps	200Gbps	400Gbps	400Gbps	800Gbps
Series	QSFP28	QSFP56	OSFP	QSFP-DD	QSFP-DD 800G
Connector	<ul style="list-style-type: none"> 100 Gbps 38 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 200 Gbps 38 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 400 Gbps 60 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 400 Gbps 76 pins 250 cycles -55 to +85 °C 	<ul style="list-style-type: none"> 800 Gbps 76 pins 250 cycles -40 to +85 °C 
Cage	<ul style="list-style-type: none"> 1*N port 2*N port 	<ul style="list-style-type: none"> 1*N port 	<ul style="list-style-type: none"> 1*N port 	<ul style="list-style-type: none"> 1*N port 	
Light-pipe	V	V		V	
Heat-sink	V	V		V	
Tail Type	press-fit	press-fit	press-fit	press-fit	

High Speed I/O Connector Roadmap

Style	Type	Port	SFP (1G)	SFP+ (10G)	SFP28/56 (25G/50G)	QSFP+ (40G)	QSFP28/56 (100G/200G)	QSFP-DD (400G)	OSFP (400G)	QSFP112 (400G)	QSFP-DD (800G)	OSFP (800G)
1XN	Single Connector	Conn	V	V	V	V	V	V	V	V	V	Design
1XN	Cage	1X1	V	V	V	V	V	V	V	V	V	
		1X2	V	V	V	V	V	V	V	V	V	
		1X3			V	V	V			V		
		1X4	V	V	V	V	V	V	V	V	V	
		1X6	V	V		V	V			V		
2XN	Cage + Connector	2X1	V	V	V	V	V					
		2X2	V	V	V	V	V					
		2X3	V	V		V	V					
		2X4	V	V	V							
		2X5	V	V								
		2X6	V	V	V							
		2X8	V	V								
DAC CABLE			V	V	V	V	V	V				

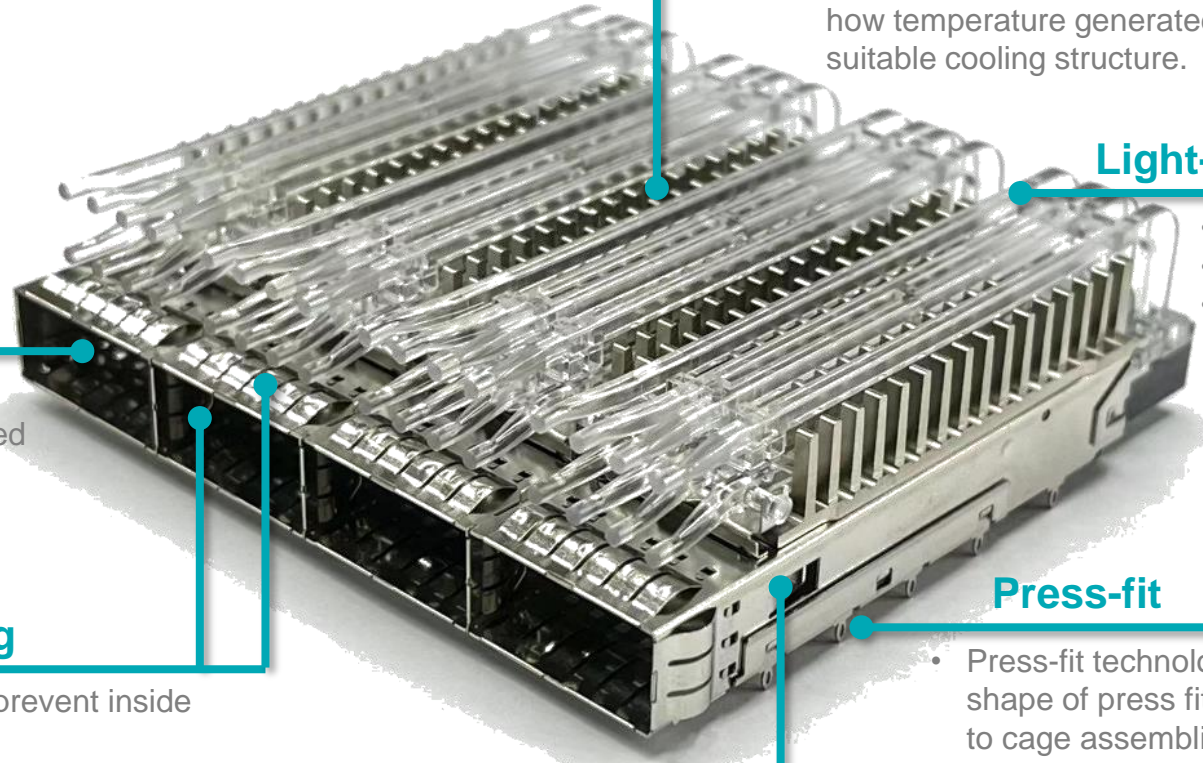
High Speed Module & Cable

Product Type	Speed	Application	Port Type	Package	Latch Option	Others	
Rj45 Mag Jack	10/100 Base-T	Ethernet(non PoE)	1x1	THT	Tab up	LED	
	1000 Base-T	PoE	1xN [N=2,4,6,8]	SMT	Tab down	Bob-Smith	
	2.5G Base-T	PoE+	2xN [N=2,4,6,8]	THR	Up & Down	DC Rectifier	
	5G Base-T	PoE++	2xN[N=2,3,4,6,8]	Low Profile		GDT	
	10G Base-T		Vertical	Mid PCB		TVS	
			Rj45 With USB				
Product Type	Speed	Application	Port Type	Package			
Lan Discrete Module	10/100 Base-T	Ethernet(non PoE)	Single Port	THT			
	1000 Base-T	PoE	Dual Port	SMT			
	2.5G Base-T	PoE+	Quad Port	Low Profile			
	5G Base-T	PoE++					
	10G Base-T						
Product Type	Speed	Orientation	Port Type	Package	Latch Option	LED	Shield
RJ Modular Jack	Cat3,Cat5,Cat5e,Cat6	90°	1x1	THT	Tab up	With	With
(None Magnetic)		180°	1xN [N=2,3,4,5,6,8]	SMT	Tab down	Without	Without
		45°	2x1	THR	Up & Down		
			2xN[N=2,3,4,6,8]	Low Profile			
				Mid PCB			

High Speed Module & Cable

Product Type	Package	Data Rate (b/s)	Distance	Fiber	Connector	Wavelength
Optical Transceiver	Copper RJ45 SFP	155M/ 1000M/ 2.5G/10G	SR (200m, 300m, 500m)	MM	Rj45	850nm
	SFP/SFP+/SFP28	1.25G/10G/25G	LR (2km, 10km, 20km)	SM	SC	1270nm
	XFP	10G	ER (40km, 60km)		Duplex LC	1310nm
	QSFP+/QSFP28	40G/100G	ZR (80km, 100km, 120km)		Simplex LC	1490nm
	QSFP56/QSFP-DD	200G/400G			MPO	1550nm
	OSFP	400G				CWDM
	CFP					DWDM
	1x9					
	SFF					
	GPON/EPON/XGPON/XGSPON					
AOC/DAC						
Product Type	Package	Speed	Port Type	Assembly	Light Pipe	Heat Sink
SFP Cage & Connector	SFP/SFP+/SFP28/ZSFP+	155M/1G/10G/25G	1x1	Press-Fit	With	With
	XFP	10G	1xN [N=2,3,4,6,8]	Solder Pin	Without	Without
	QSFP+/QSFP28/ZQSFP+	40G/100G	2xN [N=1,2,4,6,8,12]			
	QSFP56/QSFP-DD	200G/400G				
	OSFP	400G				
	CFP	100G				
	CXP	150G				
	Mini-SAS/MINI-SAS HD	24G/48G				

VALUE ADDED SERVICE



High Speed

Simulation and actual measurement of high-speed signals



EMI Shielding

Design of cage to prevent inside and outside EMIs



Locking

Knowledge of the normal force affect the heat dissipation performance.

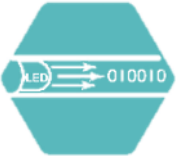
Cooling

According to the product use situation and how temperature generated, give the most suitable cooling structure.



Light-pipe (Optional)

- Number of light-pipe
- Vacuum sputtering
- Lampshade



Press-fit

- Press-fit technology: The size & shape of press fit design are critical to cage assembling into PCB.
- Press-fit machine
- Press-fit assembly service



COOLING SOLUTION FOR I/O



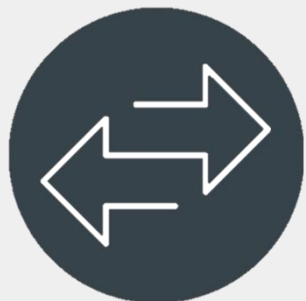
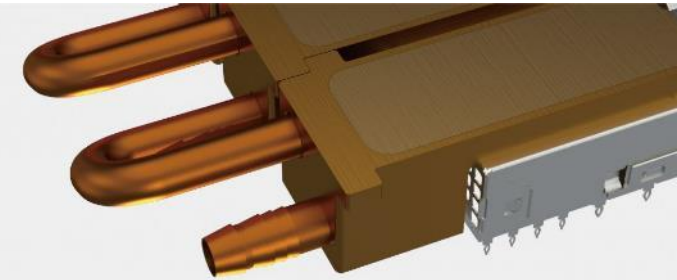
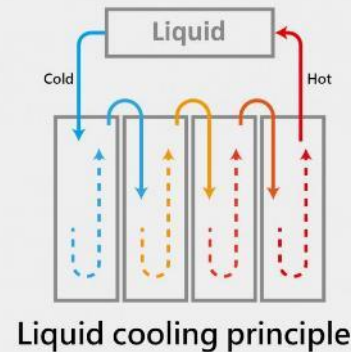
Air Cooling Methods

- Heat sinks and heat pipes
- **Situation: Low wattage products and devices can be designed to conduct heat externally.**
- Provide efficient and reliable cooling ability, dissipating up to 20W/pole in different configurations.



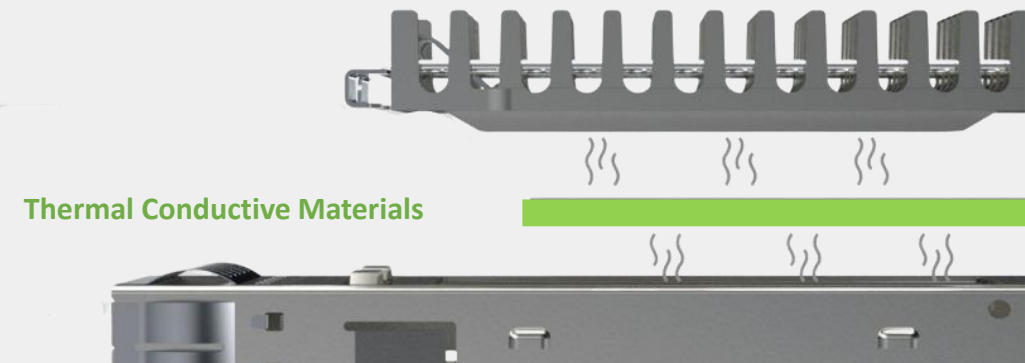
Liquid Cooling Systems

- Liquids perform better thermal conductivity over air.
- **Situation:**
 - ✓ Confined space
 - ✓ Heat source power /temperature too high



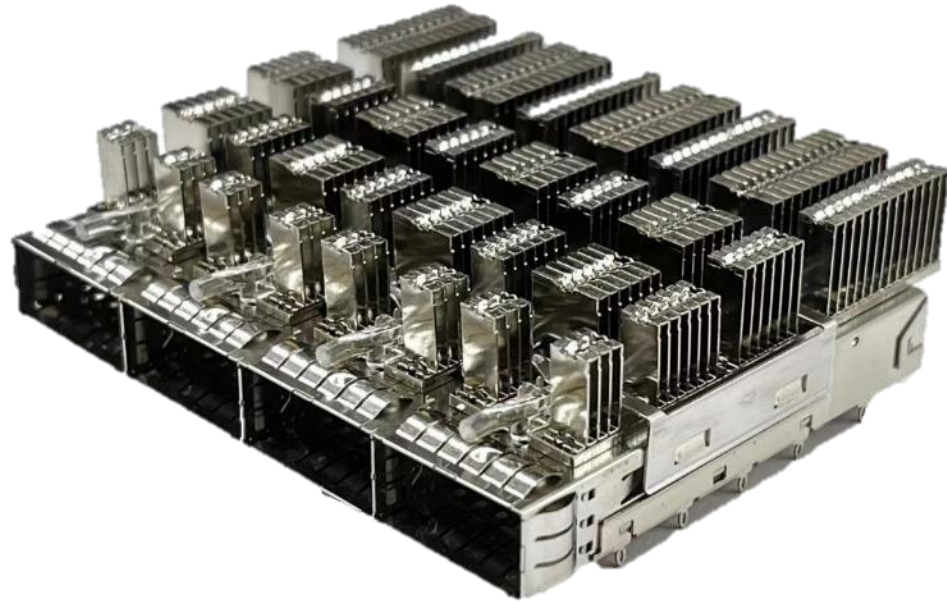
Thermal Conductive Material and Additions

- Special choice of thermal conductive materials, thermal pads / tapes and thermal interface coatings are suggested.
- Also expected to withstand multiple insertions and removals without degrading performance.
- **Situation: Environments where fans can't be used / Product structure is limited**





ZIPPER FIN COOLING



Product Information

- Application: **Air Cooling**
- The Zipper Fin design allows for increased airflow by using thinner fins that can be stacked more densely compared to traditional heat sinks

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The thickness of single fin can reach **0.3mm**

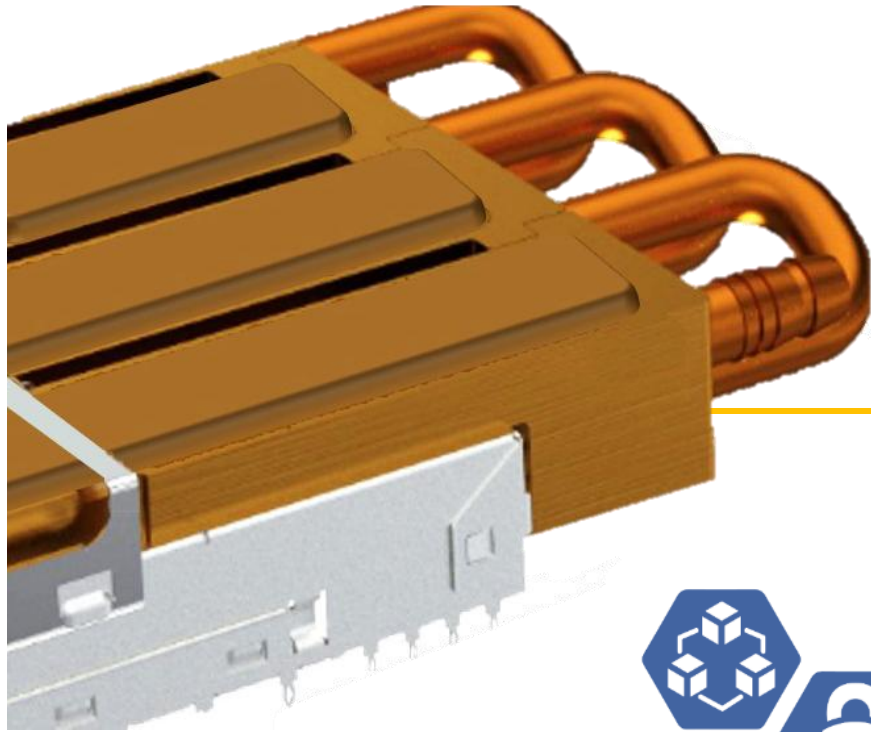
Zipper fin with **copper alloy** material help enhance heat dissipation performance

The general heat dissipation can be learned from the **thermal simulation** before kicking off the tooling.



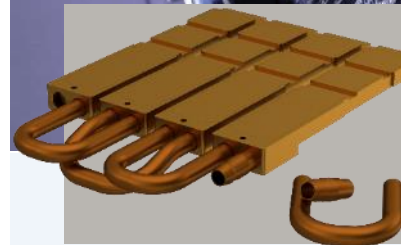
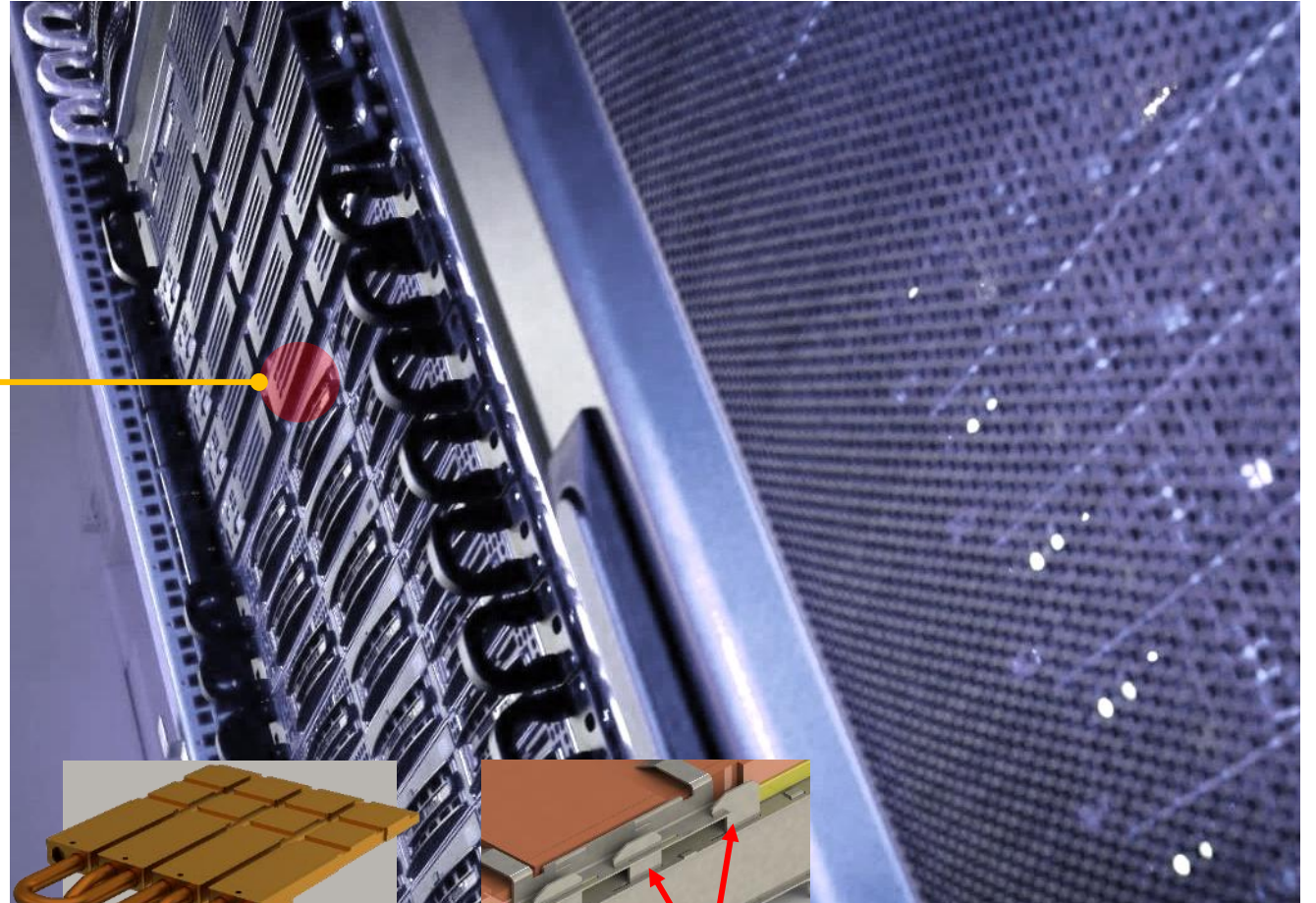
LIQUID COOLING MODULARIZED

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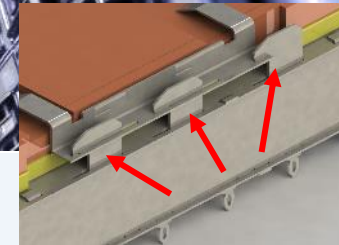
Product Information

- Application: **Data center (high performance computing/server)**
- Horizontal buckle type: can be easily assembled and disassembled, and the buckle can be reused



Water cooling fins modularize (Patented)

It can be extended according to the number of cages



One-piece snap-on design

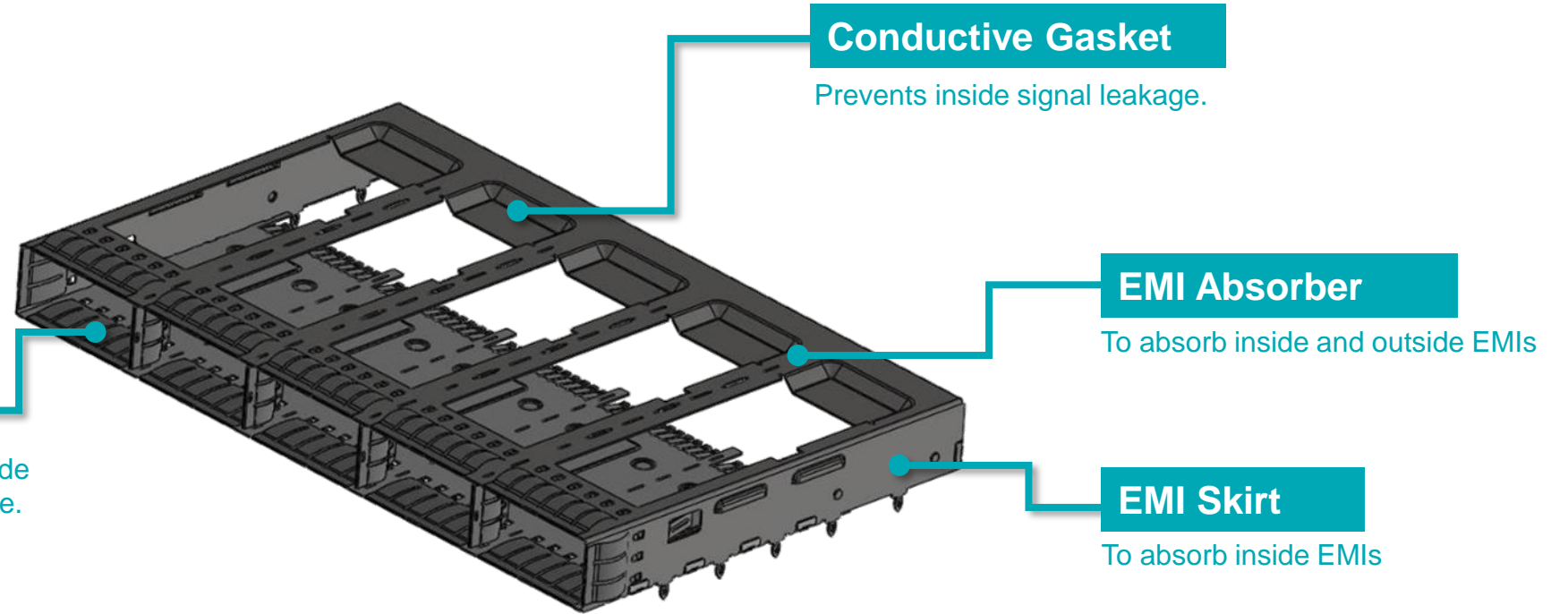
Modular structure design

Accessories can be expanded according to different needs, such as heat sinks or light pipes

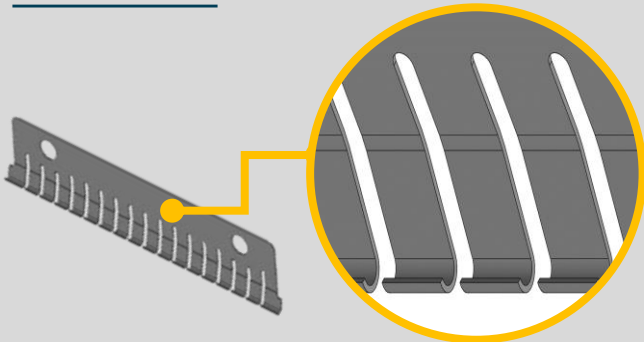


EMI SHIELDING SOLUTION

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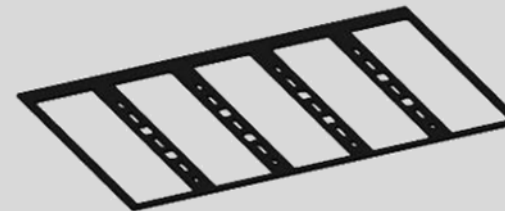


EMI Skirt



To fulfill the EMI standard, we adjust spring pitch and appearance, simultaneously, meet the manufacturing feasibility through the simulation.

EMI Absorber



After inserting the optical module, there is a gap between the heat sink and the cage, by increasing the EMI Absorber, enhanced EMI shielding effect



THANKS

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