Born to be perfect ▶ **F30**

Military Airborne Modular Computer

HIGH

CPU Full Speed

+70°C
-40°C
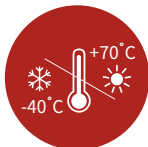
Extended Temperature

Small Form Factor (SFF) with PCIe/104 Architecture

▸ Intel®Xeon E-2276ML (12M Cache, 2.0 GHz, up to 4.20 GHz, 6-cores, 12 threads)

▸ NVIDIA®RTX A2000 MXM GPU (8GB-GDDR6, CUDA 2,560)

▸ Modular rugged chassis with stackable PCIe/104 I/O card expansion.

▸ IP65 sealed chassis with Amphenol D38999 connectors

▸ Extreme rugged temperature : -40°C to 70°C

▸ 28V DC MIL-STD-461/1275 Power supply with Voltage transient protections/EMI_EMC conditions

▸ MIL-STD-810 Thermal Shock, Vibration, Humidity

7STARLAKE

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When PCIe 104 meets ATR Structure…

ATR, which stands for Air Transport Rack, is an universal standard that determines the dimension and function of a rugged system especially dedicated to avionics/aerospace applications.
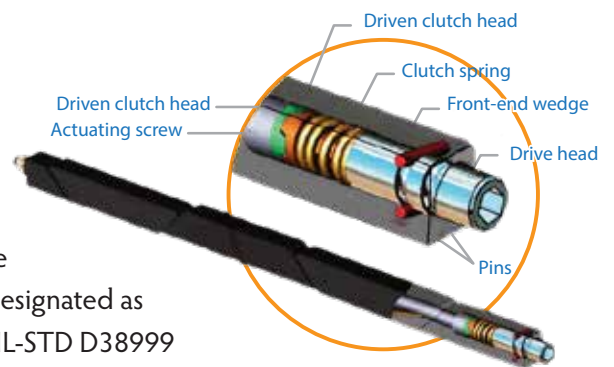
7Starlake's Unique Solution

While usual ATR structure incorporates PCI, VPX, and VME based form factors, 7Starlake's F30 Conduction cooled ATR is powered by PCIe104 small form factor modules. PCIe104 – StackPC architecture provides even more flexibility in designing rugged COTS computers.

Also known as ARINC, the concept has been used universally for not only aviation purpose but also vehicles with wheels and tracks.
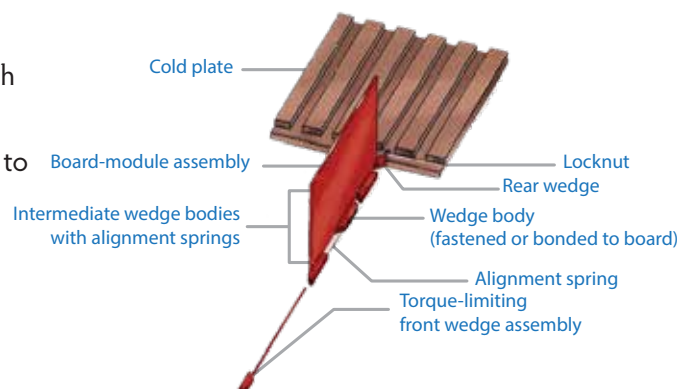
The Power of Conduction Cooling ▶

7Starlake, being the master of thermal design, has once again achieved fanless design through conduction cooling method. With each layer comes a heat plate to touch directly the heated parts, the thermal performance is of the highest level. The top side, which is designated as the customized I/O interface, is equipped with water/dust proof MIL-STD D38999 connectors (enhanced D38999 by request).

Driven clutch head
Clutch spring
Driven clutch head
Actuating screw
Front-end wedge
Drive head
Pins

Wedge-Lok

To ensure maximum reliability in rugged, heavy shock, and high vibration terrains, Wedge-Lok can provide equally satisfying results. With 5 segments, shifted design, Wedge-Lok also help to transfer the heat and ensure best conductivity of heat load.

The multi-segment design highlights on its ability to withstand massive vibration and shock, providing even higher sustainability through the torque-limiting design.

Cold plate
Board-module assembly
Intermediate wedge bodies with alignment springs
Locknut
Rear wedge
Wedge body (fastened or bonded to board)
Alignment spring
Torque-limiting front wedge assembly

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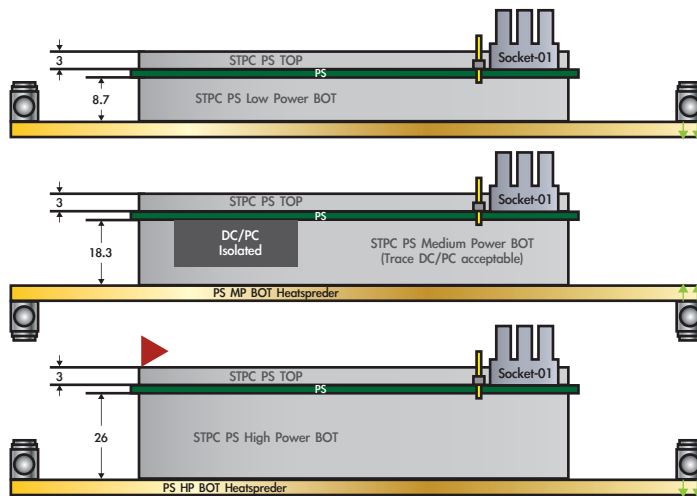## Conductive Cooling Modules for Extreme Power

A solid material that can effectively conduct the heat is used to move the heat to the system enclosure and dissipated to the external surroundings. The machined copper cooling plates matching the component layout are placed between each layer; heat is carried away to the edges where a Wedge-Lok mechanism secures inside the chassis, coming up with a thermal interface.
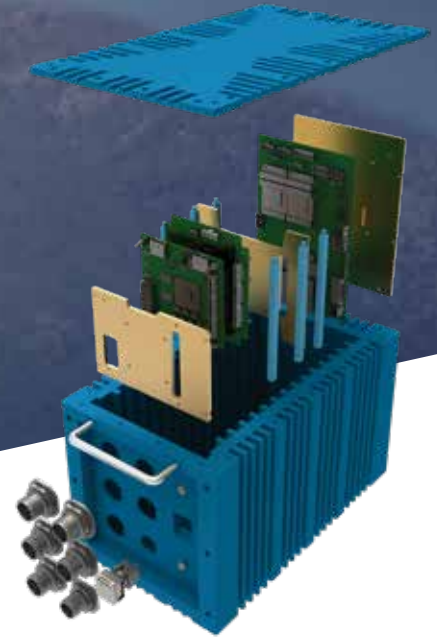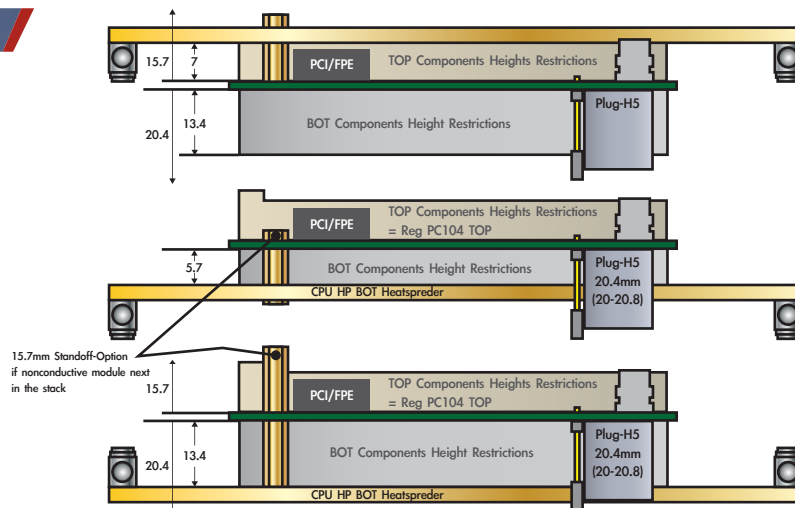
Flexibility in Nature – Configurative Thermal Design

Following the rigid tradition of 7Starlake's thermal concept, F30 is designed with layered heat plates that are in direct touch with the heated areas. Heat dissipation for components that gather a considerable amount of heat is the key in the overall thermal performance. For different modules, we've designed a matched heat plate that fits perfectly into the body for effective conductive cooling.

**StackPC Conductive Power Source**

STPC PS TOP	Socket-01
PS	
3	
8.7	STPC PS Low Power BOT

STPC PS TOP	Socket-01
PS	
3	
DC/PC Isolated	STPC PS Medium Power BOT (Trace DC/PC acceptable)
18.3	
PS MP BOT Heatspreder	

STPC PS TOP	Socket-01
PS	
3	
26	STPC PS High Power BOT
PS HP BOT Heatspreder	

StackPC Conductive HOST

15.7	7	PCI/FPE — TOP Components Heights Restrictions
20.4	13.4	BOT Components Height Restrictions — Plug-H5

PCI/FPE	TOP Components Heights Restrictions = Reg PC104 TOP
5.7	BOT Components Height Restrictions
CPU HP BOT Heatspreder	Plug-H5 20.4mm (20-20.8)

15.7mm Standoff-Option if nonconductive module next in the stack

15.7		PCI/FPE — TOP Components Heights Restrictions = Reg PC104 TOP
20.4	13.4	BOT Components Height Restrictions — Plug-H5 20.4mm (20-20.8)
CPU HP BOT Heatspreder		

Conduction Cooled Chassis Platform up to 10 Slots

7Starlake's ATR solution comes with an all-in-one design enclosure; each slot can securely fit a Wedge-Lok, and each layer comes with a firmly attached, directly touched copper heat plate to complete a effectively cooled interior.

What makes conduction cooling method so practical is that it is without moving parts, therefore suitable for high altitude and underwater applications.
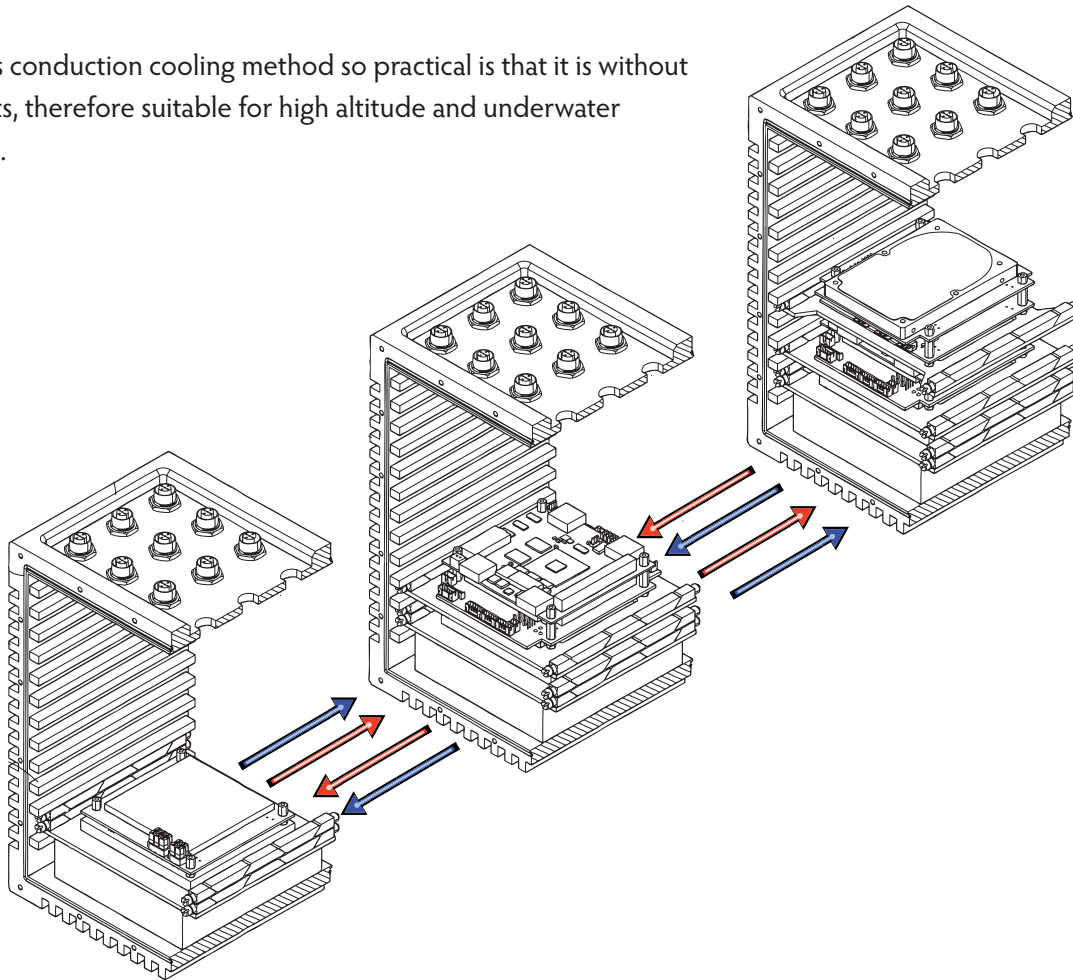
F30 products are built on the solid foundation of 7Starlake's expertise in thermal design and ruggedized system. Supporting tier-one customers to realize diversified critical missions worldwide. Stackable method provides resilience to comprehensive applications.

7Starlake designs ATR with StackPC form factor modules, supporting high speed graphic processing, wide size storage, multi-Ethernet, and wide DC input power module (18-36V).

Applications Overview ▶

Naval/Ground/Aerospace Defense

F30 Rugged COTS system is born to answer the critical demands of defense market. The flexibility of F30 holds a true value. Interface modules like analog and digital input/output , 128 bit DIO modules, 4 CAN bus modules could be applied to compliment different missions.

Stackable design can achieve tailored skews and provide great advantages and resilience to harsh environment and operations.

F30 is capable of withstanding vibration level at 10g peak, 5-2000Hz; shock level at 100g peak.

For modern battlefield scenario, versatility and adaptability are the winning keys. Pairing with SK502– Ethernet Module, which can support dual-port 10 Gigabit Ethernet controller, can greatly enhance faster data transmission and the linking of remote devices.

SK502
Intel® X710-BM2 2 Dual 10 Gigabit Ethernet Controller

Unmanned Systems

F30's slim size and light weight design completes a compact solution perfect for unmanned deployment. F30 can support wide temperature (suitable for various terrains and environments), high-speed I/O (designed and tested to meet MIL-standard), and optimal size, weight, and power. Unmanned systems must be flexible and configurable to match UAV's critical demands.

SK401 – Storage module is a must for mass storage demands, supporting either 1 x 2.5" SSD or 2 x mSATA/mPCIe slot. Data collected from each missions can be safely stored.

SK401
PCIe/104 SSD/mSATA Storage Carrier, Supports 2 x mSATA /mPCIe slots or 1 x 2.5" SATA SSD
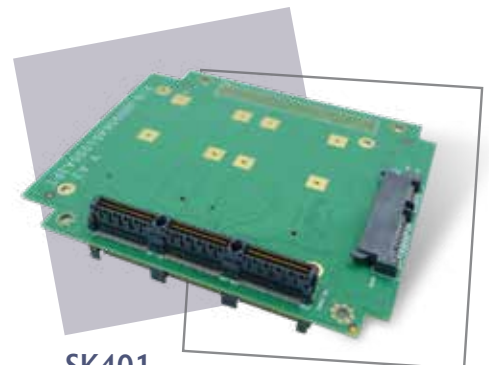
Radar Detection

Radar systems rely highly on the reliability and multi-functionality of the computing device. To support automatic target recognition, high speed computing, and high definition display, small form factor PCIe/104 modules can easily expand with " Wave Form modules ", dual ~ quad channels frame grabber. Radar systems acquire and secure vital data for timely location of targets.

SK220 – Graphic Module is with MXM GPU that can support four independent DisplayPort (3 full HD). High resolution, multi-mega pixel image sensors can be attached to ATR and have satisfactory outcome. GPU can also be incorporated as an even more powerful processing unit.
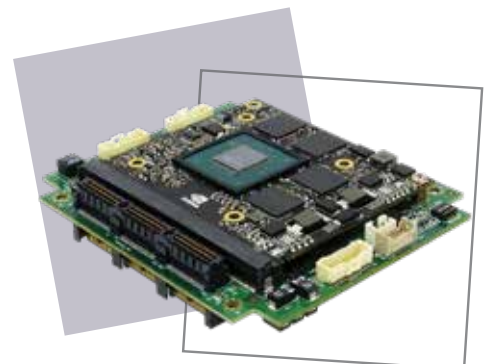

SK220
PCIe104 MXM Graphic Module, Supports Four DP outputs

Technical Specifications ▶

CPU Type
• Intel® 9th Intel®Xeon E-2276ML

Memory type
• 4 x DDR4 SO-DIMM 2666MHz up to 128GB

GPU type
• NVIDIA Quadro RTX A2000
  MXM Type(8GB-GDDR6, CUDA 2,560)

HDD/SDD support
• 1 x M.2 (M-key, type:2280, SATA/PCIe 3.0x4 NVMe)
• Support up to 4x SATAIII (RAID 0,1,5) SSD backup storage

I/O Connectors
X1	2 x DVI with D38999
X2	2 x COM(RS232/422/485) with D38999
X3	1 x DIO(4in/4out) with D38999
X4	2 x LAN with D38999
X5	2 x USB3.0 with D38999
Power	1 x DC-IN with D38999
Power Button	1 x Waterproof Button with Backlight

Housing
• Aluminum

Weight
• 16 Kg (35.24 lb)

Dimension (W x H x D)
• 190 x 260 x325 mm

Input Voltage
• 18 to 36 VDC (MIL-STD-461/1275/704)

Operating temperature
• -40°C to 70°C (-40°C to 158°F)

Storage temperature
• -40°C to 85°C (-40°C to 185°F) *without HDD installed

Relative Humidity
• Up to 95%RH @40°C, non-condensing

Ingress Protection
• Designed for compliance to IP65, MIL-STD-810

EMI/EMC
• Designed to meet MIL-STD-461

Military
• Designed to meet MIL-STD-810/461/1275/704

Vibration & Shock
• Designed to meet MIL-STD-810

Ordering Information ▶

Complete System
F30
Intel®Xeon E-2276ML (12M Cache, 2.0 GHz, up to 4.20 GHz, 6-cores, 12 threads), Extended Temperature -40°C to 70°C

Modules
OXY5741
9th / 8th Gen Intel® Xeon® / Core™ processor with up to 6 Intel® Xeon® E-2276ME / Xeon® E-2276ML ,
Extended Temperature -40°C to 85°C

SK502
Intel® X710-BM2 2 Dual 10 Gigabit Ethernet Controller, Extended Temperature -40°C to 85°C

SK401
PCIe/104 SSD/mSATA Storage Carrier, Extended Temperature -40°C to 85°C

SK220
PCIe/104 MXM Graphic Card for 1VGA & 6 Mini DisplayPort Module, Extended Temperature -40°C to 85°C

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