C4ISR LAND SYSTEM DEFENSE SOLUTIONS

STAR LAKE

Rugged Virtualization Supercomputer

Product Specifications - Technology Procurement Guide

- Design for reliability under demanding MIL-STD-810G Thermal, Shock, Vibration, Humidity/EMI/EMC conditions
- Ultra-high performance Intel®Xeon® D-2796NT (2.0GHz, 20Cores, 40Threads)
- Up to 512GB DDR4 ECC RDIMM
- Dual removable solid-state disk
- Hardware secure erase
- 18-36V DC-in power supply
- MIL-STD-810, MIL-STD-1275, MIL-STD-461

intel XEON

vmware

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Overview

Harnessing information and data as new source of powerful weapon has become crucial nowadays. And real-time reaction is vital. That's why 7StarLake Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) solutions emphasize on ultra-high performance system integration. We focus on the capabilities to control - because control lead to dominance.

AV800-D27 & THOR11-D27 are equipped with Ultra-High Performance Intel® Xeon® D-2796NT CPU. In a scenario where virtual machine is integrated with C4ISR system, the 20-core processor allows the CPU resources be reallocated to one or more virtual machines. For instance, four cores are assigned to one virtual machine would mean the user now has maximum four different operating systems running on the same physical computer at the same time.

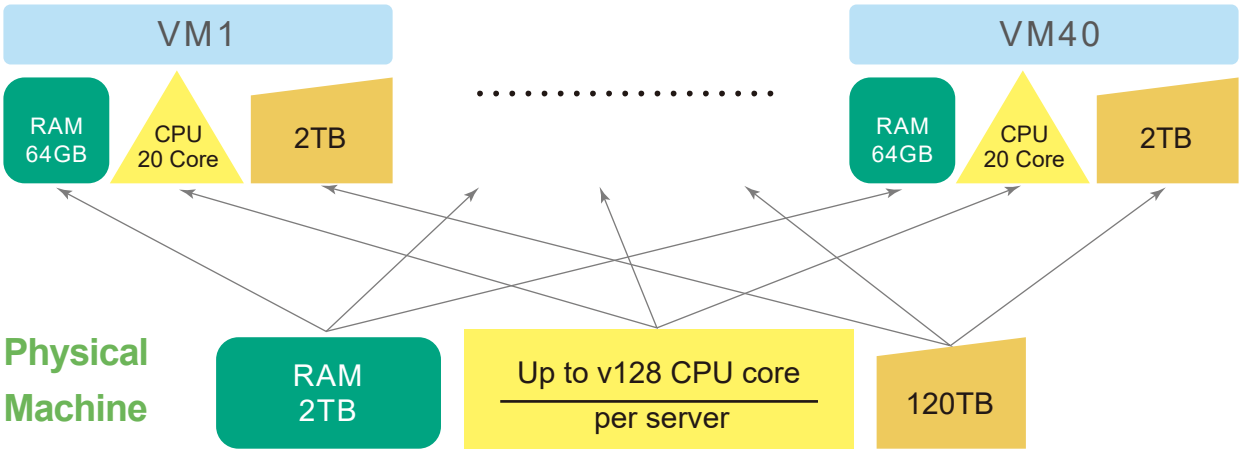
In this way, IT operators will no longer be disturbed by numerous interfaces, monitors and humongous servers. Various and complex system connecting one another should work coordinately, interpreting the received data and representing the commander's order. All data and assets can be managed from one location. Ideal hardware utilization, expansion potentials and high efficiency operation are further guaranteed. In battlefield reality, where one second difference defines success and failure, the application of virtualization machine has become indispensable.

Introduction

We want to synergize tactical, operational, and strategic performance. Therefore, information and data flowing through multiple systems must be received by the commander timely and accurately; same as those to be disseminated.

Virtual Machine Application

Less physical hardware and more expansion potentials, they are not the only reason why organizations and enterprises are turning more to Virtual Machine. In fact, authorities and private sectors are using virtual machines because it grants users multiple available fields for running operation system under a limited situation. That is to say, the utilization of virtual machine effectively save cost and achieves ultra-high efficiency.



Take **AV800-D27 & THOR11-D27** for example, the CPU resources of their 20-core Ultra-High Performance Intel® Xeon® D-2796NT processor can be allocated to one or more virtual machines. Various operating systems can thus run at the same time, without having to adopt extra physical hardware and server. Meanwhile, all data and assets can be managed from one location. It achieves an ideal hardware utilization and lead to unlimited expansion potentials, which undoubtedly are the keys to mission success.

Virtual machine not only helps saving money on hardware and energy costs. Nowadays enterprises are also taking advantage of its safe virtual environment. Damage to the virtual machine would not cause damage to the physical server. Disaster recovery is quick. In addition, when running operating system in virtual environment, license key required by the virtual OS would be the same as that of the hard drive ID. Virtual machine is therefore an ideal choice for system testing and software licensing. While carrying out the function above, virtual machine also ensures forward compatibility and legacy OS supports. The powerful capability of virtual machine has make it an unparalled choice for considerable data computing.

MIL-STD-1275/461

Power Supply with Voltage Transient Protections

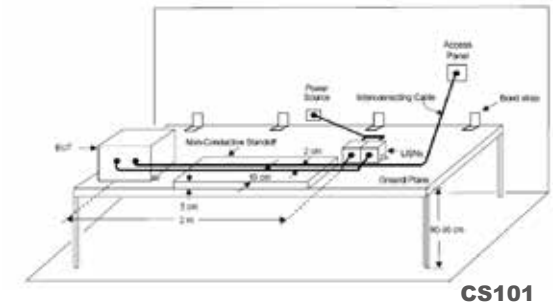
SK711, the power board adopted by AV800-D27 & THOR11-D27, supports input range from 18V to 36V. Possessing military standard filter for EMI avoidance, SK711 guarantees a stability of voltage and electric current under system operation. It is especially suitable for application in military or other harsh environment.

SK711

Furthermore, with parallel design, two SK711 combining can generate double power of 300W, supporting prominent system performance. Compliant with MIL-STD 1275/461, DO-160F and extended operating temperature from -40 to 85°C, SK711 performs as an ideal converter module for severe environmental usage.

Its GAIA Hi-Rel DC/DC CONVERTER also provides Undervoltage Lockout (UVLO), Output Over Current Protection (OCP), Output Overvoltage Protection (OVP) and Over Temperature Protection (OTP) to made stability and safety. They module is compliant with MIL-STD-461 C/D/E/F Standards.

Test Configuration

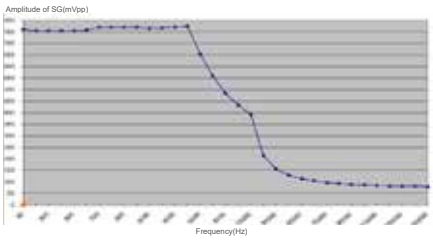


MIL-STD-461

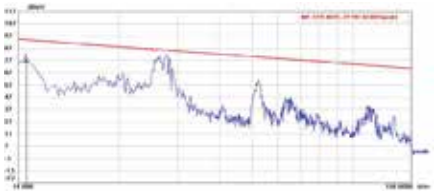
MIL-STD-461 is a military standard that establishes the control of electromagnetic interference (EMI) emissions and susceptibility characteristics of electronic, electrical & electromechanical equipment and subsystems for military equipment.

EMI encompasses any undesired signals, “noise”, generated by electronic equipment. Keeping EMI under control is crucial for military applications, because if it’s out of control, the military will be detected by the enemy and it might cause a great loss. To design a product that meets strict requirements, engineers should possess extensive knowledge of both electrical and mechanical design to avoid unintentional generation, propagation and reception of electromagnetic energy, which may cause unwanted effects, for example, physical damage in operational equipment.

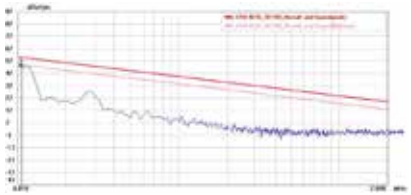
CS101



CS102



RE102



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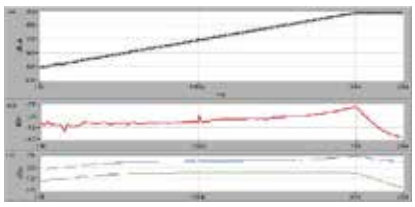
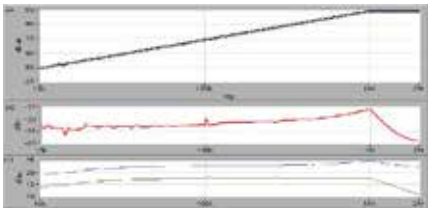
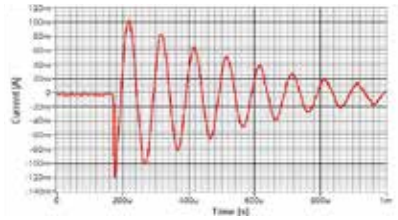


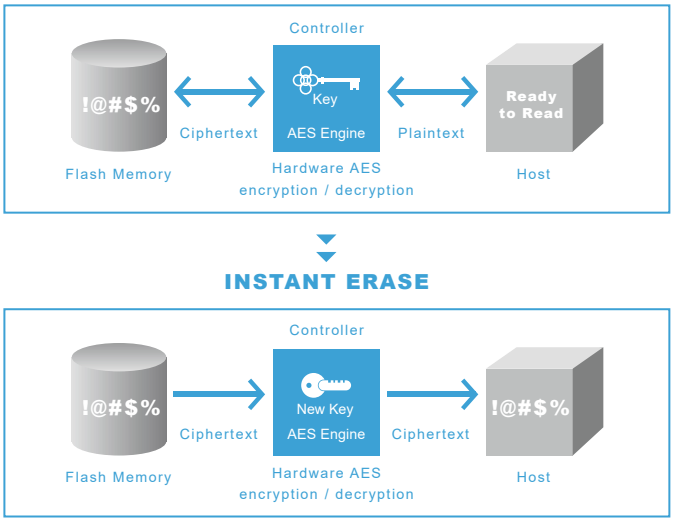
CS115



CS116



Hardware Secure Erase - AES Encryption



Under emergency situation, when written data needs to be erased immediately, a Secure Erase Button is indispensable. Instant Erase is a particular feature for SED (Self Encryption Drive). It is faster than Quick Erase to make all written data invalid. The encryption and decryption is controlled by an AES key on the path; once the AES key is replaced by a new one, the data becomes unrecognizable.

1. Open the Protection cap
2. Press button for destroyed SSD AES key
3. Data/partition becomes unrecognizable

The Advanced Encryption Standard (AES) is one of the block cipher specification adopted by U.S. government. AES is enhanced and approved by the U.S. National Security Agency (NSA), and is now used worldwide.

High speed and low RAM requirements

The kind of cryptographic module can encrypt and decrypt rapidly on software and hardware with relatively less memory, thus is easier to practice and implement.

Unbreakable Encryption Algorithms

The larger size of key adopted, the more possible keys there are. Take 256-bit encryption for instance, it generates 2^256 possible keys, taking more years than the age of the universe (13.8 billion years) for hackers to break through.

Perfectly Secure Environment

AES Key is generated randomly through various rounds of algorithms. Each round consists of several processing steps, even the supplier and the user cannot access to the cypher. To date, AES encryption has never been broken in a way its predecessor DES (Data Encryption Standard) was way back in 1999.

Taking into consideration the strength, versatility, and speed of the cipher, AES Encryption is undoubtedly the best encryption program out there. To guard top-secret information, given the current state of technology, governments and the military select, and only use the AES Encryption.

NVMe U.2 Conduction Cooled Pack

A Quantum Leap in Speed : NVMe Gen 4.0 x 4

In the world of NVMe interface architecture, a direct connection to the CPU is established through the PCIe interface, allowing for efficient memory-like access as data transactions exclusively follow the PCIe bus protocol. The Super High-Performance **Gen 4.0x4 NVMe** drive stands out with an impressive read/write speed of **7,880 MB** per second, disrupting the conventional use of hard drives in SATA and SAS.

Rugged Conduction Cooled Pack

With increased speed and performance comes a higher generation of heat which causing higher chance of malfunction. In environments where active cooling is impractical, conventional removable SSD cages struggle to cope with the elevated heat levels, particularly from ultra-high capacity NVMe U.2 SSDs (up to 32TB per pack). Enter the 7StarLake NVMe U.2 **Conduction Cooled Pack**—a game-changer. Each U.2 SSD is equipped with its own standalone, and anti-corrosive aluminum cooling pack. This innovative solution efficiently redirects heat flow through thermal pads and heat-spreader. The distinctive and high-efficiency modular design of the 7StarLake solution distinguishes it from traditional storage alternatives, ensuring exceptional thermal solution even in the face of the intense heat generated by demanding processing tasks.

Steadfast Against Extreme Pressures

In addition to its outstanding thermal solution, 7StarLake ultra-compact **Conduction Cooled Pack** features a meticulously designed enclosure specifically tailored to accommodate U.2 SSD dimensions. This meticulous design guarantees that U.2 SSDs remain immune to vibrations and shocks, making them resilient in diverse scenarios such as airborne missions, naval operations, or ground deployments. The precision-engineered enclosure adds an extra layer of protection, ensuring enhanced resilience and improved durability of the U.2 SSDs even in the most demanding and challenging environments.

Swappable CMOS Battery

Generally speaking, to exchange the battery from a rugged solution is complicated and has the possibility to affect the original function of water and dust resistance. AV800-D27 has an easy swappable battery tray allowing users to directly replace. Pull the tray fully out of the computer and a coin-cell battery can be seen. Replace it with a new CR2032 battery and push the tray back into the computer. Lock the screw, and the replacement is completed.

AV800-D27

is designed in cooperation with global tier one defense system integrator. The rugged virtualization supercomputer is born to meet the demanding requirements of C4ISR land system. It is of the highest quality, both internally and externally.

During combat operation, the computer is hitched directly to the inside of tanks. Its robust enclosure effectively diminishes the sudden impact of extreme shock, vibration and bumping while operating on site. AV800-D27 embodies authentic ruggedness by standing up to the intrusion of dust, accidental contact, and water with its IP65 compliant sealed compact chassis, along with the Souriau D38999 connectors.

Almighty Ruggedness

D38999 connectors offer the highest performance capabilities and reliability for severe environment applications. This cylindrical connector family is particularly designed to withstand extreme temperatures (-65 to 200°C), high vibration and highly corrosive fluids. The connectors are compliant to the main mil-spec standards (MIL-DTL-38999 series III, EN3645, BACC63, CECC) and answers the most stringent requirements in harsh environments.

SOURIAU®

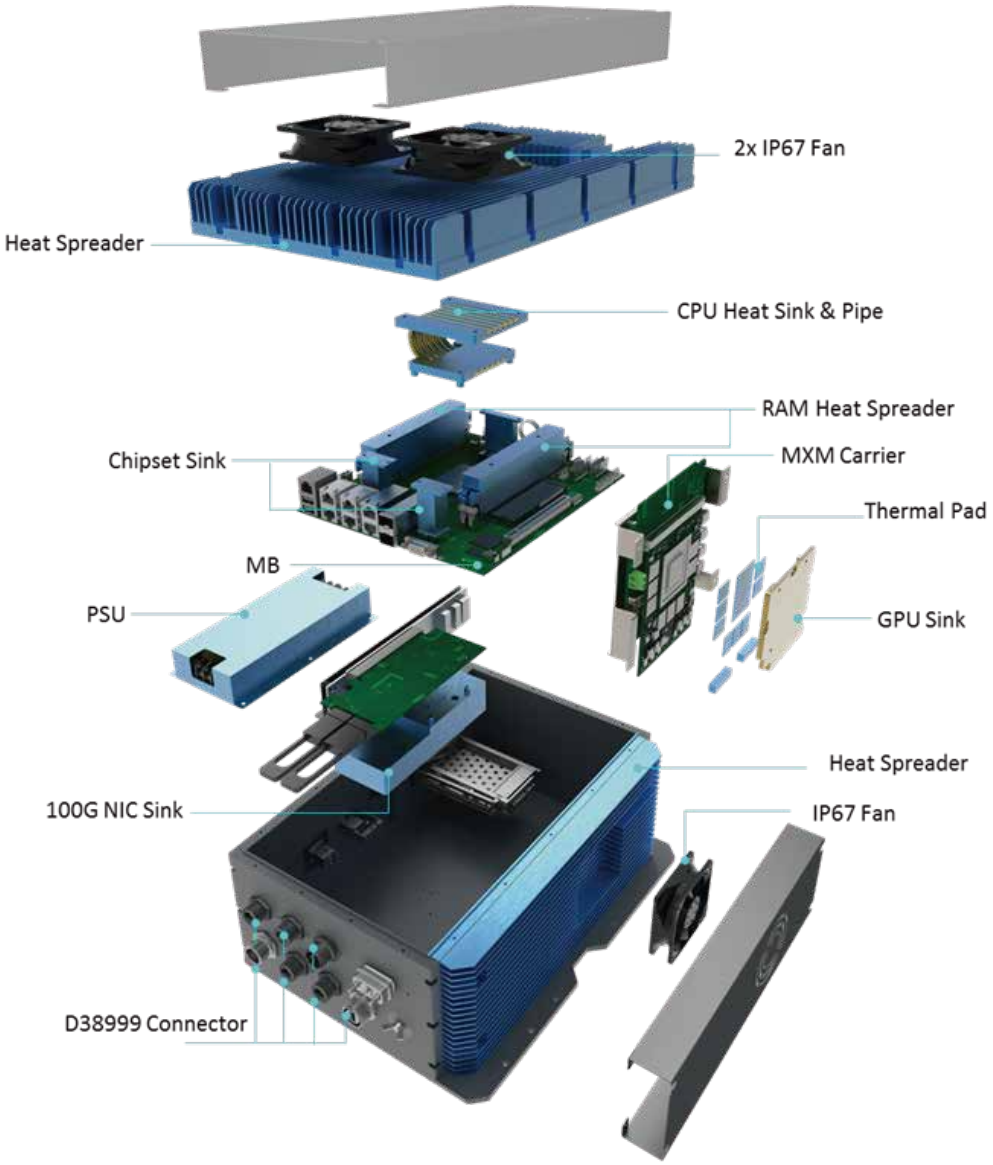
Amphenol®

AV800-D27 Specification

System	
CPU	Intel® Xeon® Processor D-2796NT (Frequency 2.0GHz, Turbo Boost Frequency up to 3.1GHz), 20-Core, 40 Thread Support, 24MB Smart Cache. Build-in Turbo Boost Technology 2.0, VPro and Hyper-Threading
Memory type	256GB RDIMM ECC DDR4-2933 / 512G LRDIMM DDR4-2933 in 4 DIMM Slot
GPU	
Graphics Processor	NVidia® RTX A4500 5888 CUDA Cores PCIe Gen4.0 x16
Storage	
HDD/SSD	2x NVMe PCIe GEN 4.0 x 4 Hardware Secure Erase (AES) by option
Front I/O	
X1	DC-IN connector
X2	1x USB3.0 Amphenol USB3FTV7AZNF 312 connector
X3	1x 1GBase-T TV07RW-13-98S connector
X4	1x 1GBase-T TV07RW-13-98S connector
X5	1x 10GBase-T M20 RJ45 CAT6A connector
X6	1x 10GBase-T M20 RJ45 CAT6A connector
X7	2x 100G Fiber Ethernet Amphenol FSI MPOFTV70ZNN
VGA	D-sub 15 connector with waterproof cap
Side I/O	
SSD Tray	2 x Dual 2.5" HDD/SSD Easy Swap Tray
Power Button	1x Power Button with LED backlight
Power Requirement	
Power Input	MIL-STD-461 EMI power supply, 18V~36V DC-IN (300W)
Application, Operating System	
Application	Commercial and Military Platforms Requiring Compliance to MIL-STD-810G. Embedded Computing, Process Control, Intelligent Automation and manufacturing applications where Harsh Temperature, Shock, Vibration, Altitude, Dust and EMI Conditions. Used in all aspects of the military
Operating System (UEFI BOOT Support)	Windows 10 64bit Enterprise, Windows 10 64bit Pro Workstations, Windows 10 IoT 64bit Enterprise, Windows 11 64bit Enterprise, Windows 11 64bit Pro Workstations, Windows 11 IoT 64bit Enterprise, Windows Server 2019 64bit, Windows Server 2022 64bit, RHEL 8.3 64bit, RHEL 8.4 64bit, CentOS 8.3 64bit, CentOS 8.4 64bit, Oracle 8.3 64bit, Oracle 8.4 64bit, SLES 12 SP5 64bit, SLES 15 SP3 64bit, Ubuntu 20.04.3 64bit Server, Ubuntu 21.10 64bit Server, FreeBSD 12.1, VMWare ESXi 7.0u3 x64
Physical	
Dimension (WxDxH)	405 x 316 x 195 mm
Weight	10Kg
Chassis	Aluminum Alloy, Corrosion Resistant.
Finish	Anodic aluminum oxide (Color Iron gray)
Cooling	Natural Passive Convection / Conduction. No Moving Parts

Patented Thermal Architecture

7StarLake guarantees reliable and supreme solutions for industrial and military applications. All of our selected components are of authentic industrial grade, and have verified their stability and durability through a series of Wide-range Temperature tests.



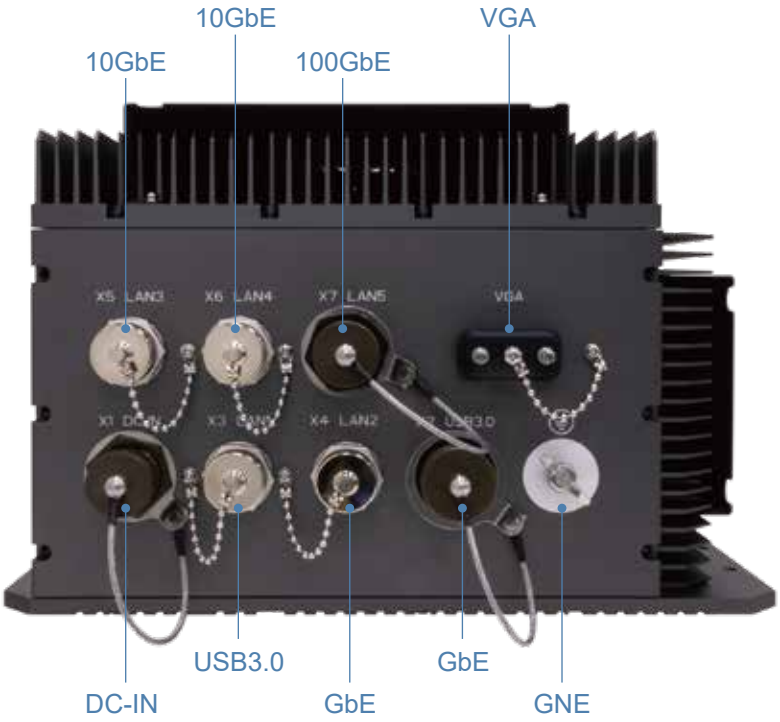
Aluminum Upper Cover

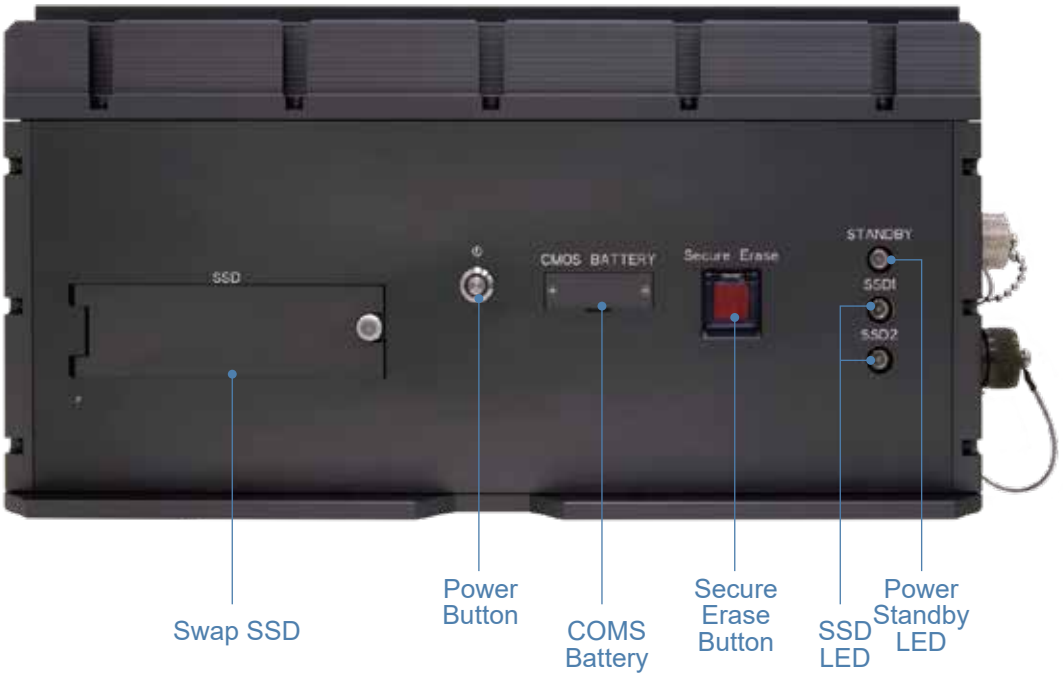
7StarLake's unique high thermal conductivity enclosure is designed with high and low fin plus wave line, creating adequate airflow and increasing the surface area in contact with the cooling medium up to 30-40%.

Exclusive Aluminum Heat Spreader for 512GB RDIMM

RAM generates intense heat while the sever is operating in high speed. The aluminum heat spreader touches the RAM and the upper cover directly, efficiently dissipate heat from the heat source to the external enclosure.

AV800-D27 Appearance





AV800-D27 Environmental Testing

Environmental Condition	
Operating Temperature	-20 to 55°C
Storage Temperature	-40 to 85°C
MIL-STD-810 Test	Method 507.5, Procedure II (Temperature & Humidity) Method 516.6 Shock-Procedure V Non-Operating (Mechanical Shock) Method 516.6 Shock-Procedure I Operating (Mechanical Shock) Method 514.6 Vibration Category 24/Non-Operating (Category 20 & 24, Vibration) Method 514.6 Vibration Category 20/Operating (Category 20 & 24, Vibration) Method 501.5, Procedure I (Storage/High Temperature) Method 501.5, Procedure II (Operation/High Temperature) Method 502.5, Procedure I (Storage/Low Temperature) Method 502.5, Procedure II (Operation/Low Temperature) Method 503.5, Procedure I (Temperature shock)
Reliability	No Moving Parts; Passive Cooling. Designed & Manufactured using ISO 9001/2000 Certified Quality Program.
MIL-STD-461G Test	CE102 10KHz-10Mhz CS101 30Hz-150KHz CS114 10KHz to 200MHz, curves 3&4 CS115 bulk cable injection, impulse excitation CS116 damped sinusoidal transients, cables and power leads, 10KHz to 100MHz RE102 10KHz-18GHz RS103 2Mhz to 18GHz, 50V/m
EN61000-4-2	EN 61000-4-2: Air discharge: 8 kV, Contact discharge: 6kV EN 61000-4-4: Signal and DC-Net: 1 Kv EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 EN 55022, Class A EN 61000-4-3: 10V/m
CE	EN55032:2015 + A11:2020 Class A CISPR32:2015. (Ed 2.0) +C1:2016 BS EN55032:2015 + A11:2020 EN IEC 61000-3-2: 2019 + A1: 2021 BS EN IEC 61000-3-2: 2019 + A1: 2021 EN 61000-3-3: 2013 + A1:2019 + A2:2021 BS EN 61000-3-3: 2013 + A1:2019 + A2:2021 EN 55035: 2017 + A11: 2020 BS EN 55035: 2017 + A11: 2020 IEC 61000-4-2: 2008; IEC 61000-4-3: 2020 (Ed. 4.0) IEC 61000-4-4: 2020; IEC 61000-4-5: 2014 + A1: 2017 IEC 61000-4-6: 2013 + COR1: 2015; IEC 61000-4-8: 2009 IEC 61000-4-11:2020 + COR1: 2020 + COR2: 2022 (Ed. 3.0)

In reality, **THOR11-D27**, the 1U Rackmount Virtual computer, is placed in military transit rackmount. It is connected to various IT devices, including communication equipment, information extractor and data storage center. In order to run under high-speed and stable transmission, naturally, THOR11-D27 is equipped with dual 25GbE LAN, supporting the best parallel working system.

THOR11-D27

Dual 25G Ethernet for Virtual Machine

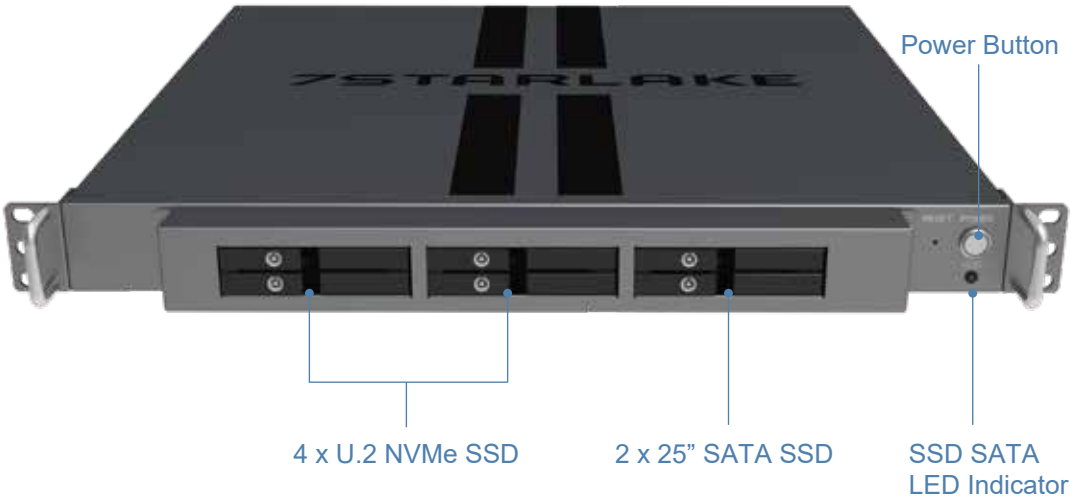
The Intel® Ethernet Connection Dual 25GbE SFP28 (SoC), Dual 10GBase T (Intel X550 AT2), Quad 1GBase T (Intel i350 AM4)networking Physical Layer (PHY) for workstation, server, and embedded designs that have critical space and power constraints. THOR11-D27 equipped with Dual 25GbE SFP28 (SoC), Dual 10GBase T (Intel X550 AT2), Quad 1GBase T (Intel i350 AM4), allowing system to run under high-speed and stable transmission.

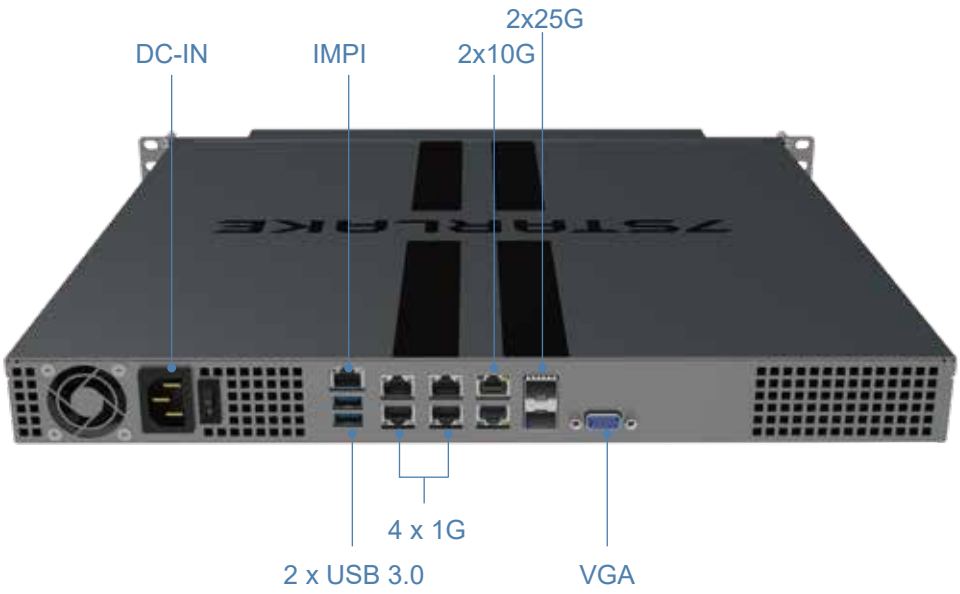
Comparing to general 1GbE.10GbE LAN, 25GbE LAN Provides in terms of bandwidth, latency, scalability, reliability and application performance. Moreover, 25GbE LAN is possible to support Virtual Machine application, which is a considerable function for parallel working system. Allowing multiple operation environments which are isolated from one another, yet through the same server, Virtual Machine enable several tasks to be done in one server simultaneously, suitable for limited space or portable control and command center.

THOR11-D27 Specification

System	
CPU	Intel IceLake-D SoC, High Core Count 4/8/16/20 Cores, up to 120W
Memory type	Up to 512GB LRDIMM/256GB RDIMM, 4CH DDR4 3200MHz in 4 Slots
Chipset	SoC
GPU	Nvidia RTX A2000 MXM or PEG RTX A4000
Storage	
HDD/SSD	6x NVMe or SATA III SSD with Hot-swap tray
Ethernet	
Ethernet	Dual 25GbE SFP28 (SoC) Dual 10GBase-T (Intel X550-AT2) Quad 1GBase-T (Intel i350-AM4)
RAID	
RAID	Support RAID 0,1,5,10
OS	
OS	(UEFI BOOT Support) : Windows 10 64bit Enterprise, Windows 10 64bit Pro Workstations, Windows 10 IoT 64bit Enterprise, Windows 11 64bit Enterprise, Windows 11 64bit Pro Workstations, Windows 11 IoT 64bit Enterprise, Windows Server 2019 64bit, Windows Server 2022 64bit, RHEL 8.3 64bit, RHEL 8.4 64bit, CentOS 8.3 64bit, CentOS 8.4 64bit, Oracle 8.3 64bit, Oracle 8.4 64bit, SLES 12 SP5 64bit, SLES 15 SP3 64bit, Ubuntu 20.04.3 64bit Server, Ubuntu 21.10 64bit Server, FreeBSD 12.1, VMWare ESXi 7.0u3 x64
Power	
Power Requirement	AC 110/220V 500W Power Supply
	MIL-STD-461 EMI 18~36V 500W DC Power Supply
Dimension	410 x 400 x 44 mm (W x D x H)
Weight	Under 12kg
Front I/O	
LED	1x HDD LED (Red)
	1x Power on LED (Green)
SSD	6x Hot Swap SSD tray
Switch	1x Power On switch
Rear I/O	
Power Switch	1x AC Power switch (AC version)
AC-IN	1x AC-IN (IEC socket) (AC version)
DC-IN	1x 4P DC-IN Phoenix Jack (DC version)
IPMI	1x IPMI
USB	2x USB 3.0
LAN1, 2	2x 25GbE SFP28
LAN3, 4	2x 10G Base-T
LAN5, 6, 7, 8	4x 1G Base-T
Display	1x VGA
Environment	
Operating Temp.	-20°C to 60°C
Storage Temp.	-40°C to 85°C
Relative Humidity	5% to 95%, non-condensing
RoHS	RoHS Compliant

THOR11-D27 Appearance





THOR11-D27 Environmental Testing

Environmental Condition	
Operating Temperature	-20 to 55°C
Storage Temperature	-40 to 85°C
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CE	EN55032:2015 + A11:2020 Class A CISPR32:2015. (Ed 2.0) +C1:2016 BS EN55032:2015 + A11:2020 EN IEC 61000-3-2: 2019 + A1: 2021 BS EN IEC 61000-3-2: 2019 + A1: 2021 EN 61000-3-3: 2013 + A1:2019 + A2:2021 BS EN 61000-3-3: 2013 + A1:2019 + A2:2021 EN 55035: 2017 + A11: 2020 BS EN 55035: 2017 + A11: 2020 IEC 61000-4-2: 2008; IEC 61000-4-3: 2020 (Ed. 4.0) IEC 61000-4-4: 2020; IEC 61000-4-5: 2014 + A1: 2017 IEC 61000-4-6: 2013 + COR1: 2015; IEC 61000-4-8: 2009 IEC 61000-4-11:2020 + COR1: 2020 + COR2: 2022 (Ed. 3.0)