

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-1587 (2.3GHz, 16 Cores, 32 Threads)
- Up to 128GB DDR4 ECC RDIMM
- Dual removable solid-state disk
- Hardware secure erase
- Windows 10/Server, Linux, VMware compatible
- 12-40V DC-in MIL-1275/704 power supply
- MIL-461E EMI/EMC compliance



Features



Overview

Discover why Stackrack's HORUS200 & SR800 is just perfect for C4ISR system and military application

Introduction

C4ISR Land System Solutions:
Virtual Machine Application, MIL-STD-1275/704
Power Supply with Voltage Transient Protections,
Hardware Secure Erase

SR800 Specification

General Information,
Patented Thermal Architecture,
Mechanical 2D Drawing,
Environmental Testing

HORUS200 Specification

General Information,
Patented Thermal Architecture,
Mechanical 2D Drawing,
Environmental Testing



Harnessing information and data as new source of powerful weapon has become crucial nowadays. And real-time reaction is vital. That's why Stackrack's 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.

SR800 & HORUS200 are equipped with Ultra-High Performance Intel® Xeon® D-1587 CPU. In a scenario where virtual machine is integrated with C4ISR system, the 16-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.

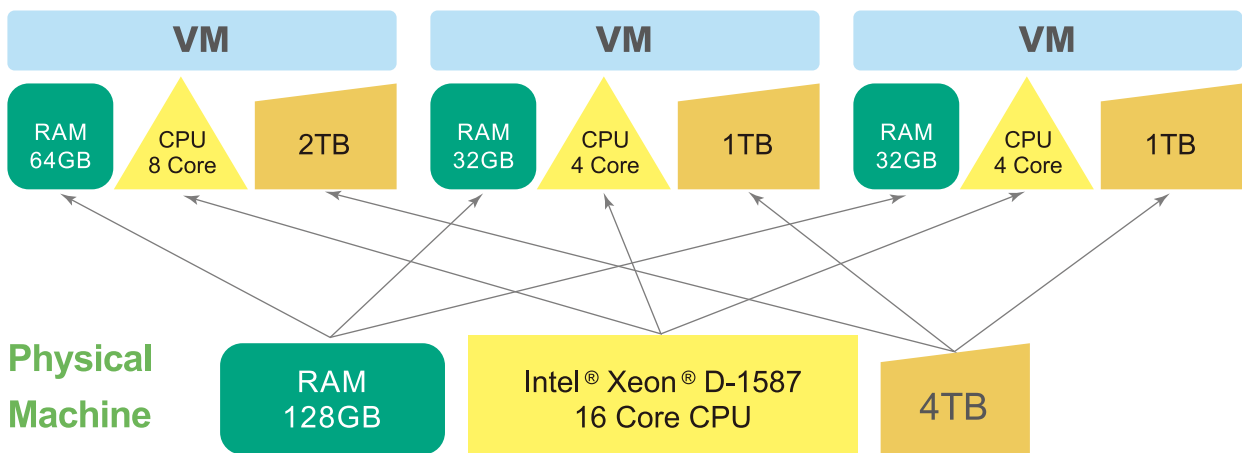
In this way, IT operators will no longer be disturbed by numerous interfaces, monitors and humongous servers. Various and complex system connecting one another should work coordinately, interpreting the received data and representing the commander's order. All data and assets can be managed from one 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 **SR800 & HORUS200** for example, the CPU resources of their 16-core Ultra-High Performance Intel® Xeon® D-1587 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 unparalleled choice for considerable data computing.

MIL-STD-1275/704 Power Supply with Voltage Transient Protections

SK710, the power board adopted by SR800 & HORUS200, supports input range from 12V to 40V. Possessing military standard filter for EMI avoidance, SK710 guarantees a stability of voltage and electric current under system operation. It is especially suitable for application in military or other harsh environment.

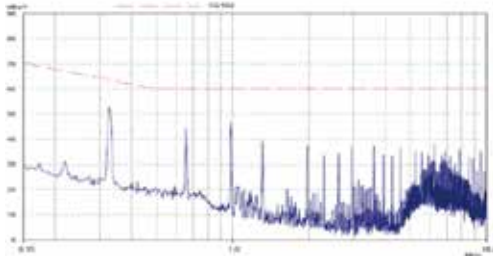
SK710



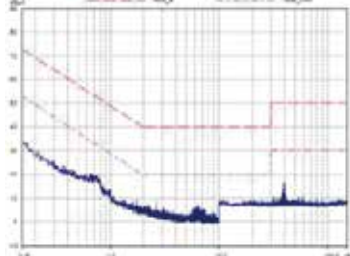
Furthermore, with parallel design, two SK710 combining can generate double power of 150W, supporting prominent system performance. Compliant with MIL-STD 1275/704/461, DO-160F and extended operating temperature from -40 to 85°C, SK710 performs as an ideal converter module for severe environmental usage.

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-461C/D/E Standards.

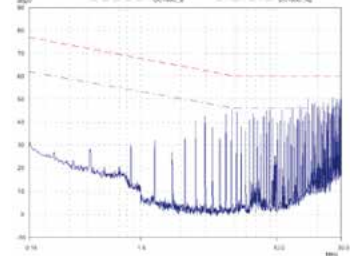
Module Compliance with MIL-STD-461C/D/E Standards



DO-160G : MGDS-15x-H-J with FGDS-10A-50V



MIL-STD-461E : MGDS-15x-H-J with FGDS-10A-50V

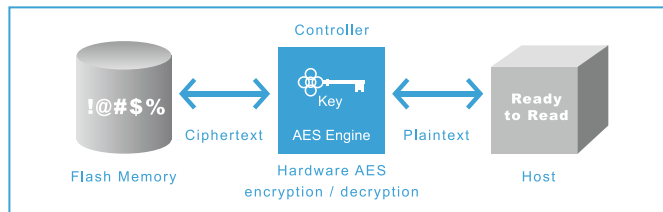


SRP12

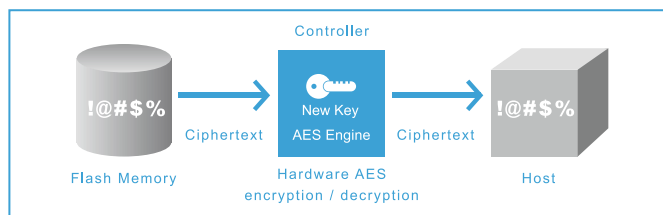
150W MIL-STD-461/1275/704 DC/DC PSU with Gaia Solution,
12V to 40V Input /12V Output, Extended Temp.-40 to 85°C
MIL-STD-704 & MIL-STD-1275 Compliance
Comply with MIL-STD-461 & DO-160
12-40V DC-In, 12V Output up to 12.5 Amp
Input EMI filtering
Over-current, over-voltage and over-temperature protection
Design for reliability under demanding MIL-STD-810G Thermal, Shock, Vibration, Humidity/EMI/EMC conditions



Hardware Secure Erase - AES Encryption



INSTANT ERASE



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.

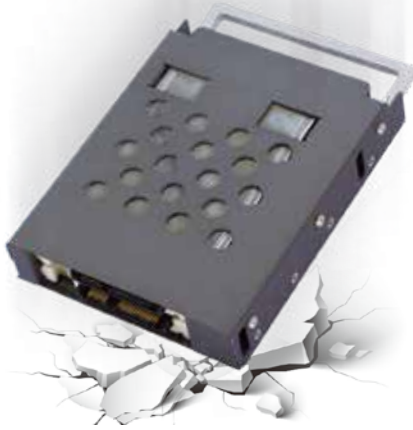
Perfectly Secure Environment

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.

Dual Removable SSD

Solid-state Disk



The dual Removable SSD (Solid-state Disk) provides a compact self-contained system to store and retrieve data from ruggedized and removable 2.5" Flash Disks and have been qualified to meet the most demanding MIL-STD-810 environments. The ultra durable metal casing along with the handle allow the dual 2.5" SSD be removed and inserted at the same time from the single drive bay easily and quickly. Maintenance and replacement conveniences are therefore guaranteed.

The dual Removable SSD Disk System is the perfect DTU for military, aerospace, avionics and ground vehicle systems. These systems include flight management, cockpit instrument display, terrain awareness and warning, map systems, radar systems, cockpit/ground communications, navigation positioning, and satellite communications.

MLC-SSD (2TB) - Anti Drop Protection

Stackrack customizes the MLC-SSD slot in a way the Disk does not fall off during clash and collision. We envisage different scenarios where the unique anti drop protection prevents the pins from moving, ensuring a optimum environment for operating the computer.



Further, Stackrack offers an unique enclosure that covers the entire component. The design ensures the pin header be covered and protected completely. Removal and installation of the SSD thus will not cause any minor damage to the pin headers as well as the components.



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. SR800 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.



SR800

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. SR800 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®



SR800 Specification

System	
Model	SR800
CPU	Intel®Xeon®Processor D-1587 (Frequency 1.7GHz, Turbo Boost Frequency up to 2.3GHz), 16-Core, 32 Thread Support, 24MB Smart Cache. Build-in Turbo Boost Technology 2.0, VPro and Hyper-Threading
Memory	support. 4 x DIMMs Up to 128GB ECC RDIMM DDR4 2133MHz
Chipset	SoC, integrated with CPU
Display	
Graphics Processor	ASPEED AST2400
Display Port	Resolution up to 1920x1200@60Hz 32bpp
Storage	
SSD/HDD	2 x 2.5" SSD
Ethernet	
Ethernet	1 x Intel I350-AM2 Gigabit LAN Interfaces (10/100/1000Mbps)
Rear I/O	
VGA	1 (M20 connector)
IPMI	1 (M20 connector)
USB3.0	2 (M20 connector)
USB2.0	1 (M20 connector)
X1 (DC-IN)	1 (Souriau 8ST7-10G05PN)
X5 (Gigabit Ethernet)	1 (Souriau 8ST7-10G35SA)
X6 (100M Ethernet)	1 (Souriau 8ST7-08G35SN)
X9 (RS232)	1 (Souriau 8ST7-10G35SB)
Side I/O	
Button	1 x Secure Erase Button (SSD2 support AES Secure Erase) 1 x Power Switch with Dedicated LED
HDD Tray	1 x Dual 2.5" HDD/SSD Easy Swap Tray
CMOS Battery Tray	1 x Removable CR2032 CMOS Battery Tray
Dedicated LED	3 x SDD LED (Leftside x 2, Rightside x 1) 4 x Dual Color LED for 8bit GPIO (Reserved)
Power Requirement	
Power Input	MIL-STD-1275, MIL-STD 704 and DO-160 power supply ,12 to 40V (150W max)
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	Windows 10 64Bit, Windows Server 2008 R2, Windows Server 2012 R2 Ubuntu14.04, Fedora 20/23, RedHat Linux EL 7.1/7.2, Vmware ESXi 6.0, ESXi 6.5
Physical	
Dimension (WxDxH)	260 x 350x 102mm
Weight	7.5Kg (16.5lbs)
Chassis	Aluminum Alloy, Corrosion Resistant.
Finish	Anodic aluminum oxide (Color Iron gray)
Cooling	Natural Passive Convection / Conduction. No Moving Parts
Ingress Protection	IP50

Patented Thermal Architecture

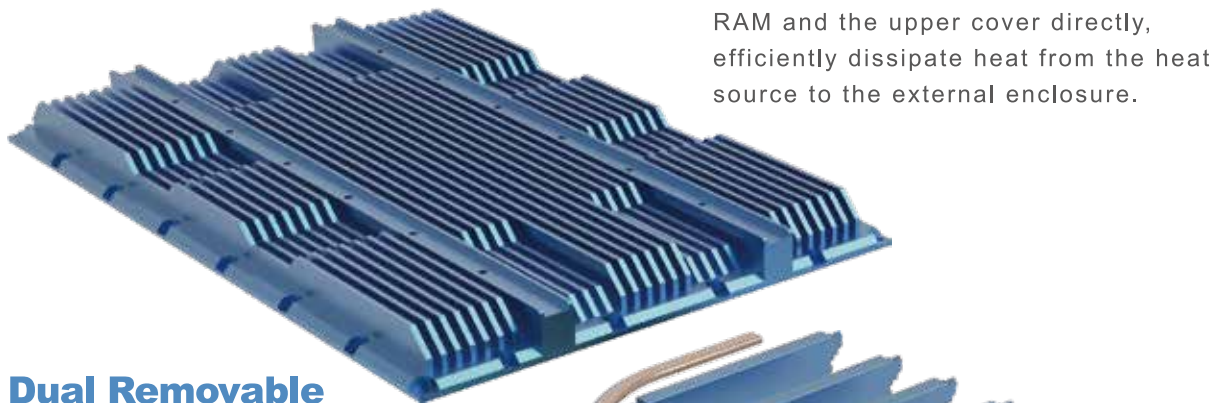
STACKRACK guarantees reliable and supreme solutions for industrial and military applications. All of our selected components are of authentic industrial grade, and have verified their stability and durability through a series of Wide-range Temperature tests.

Aluminum Upper Cover

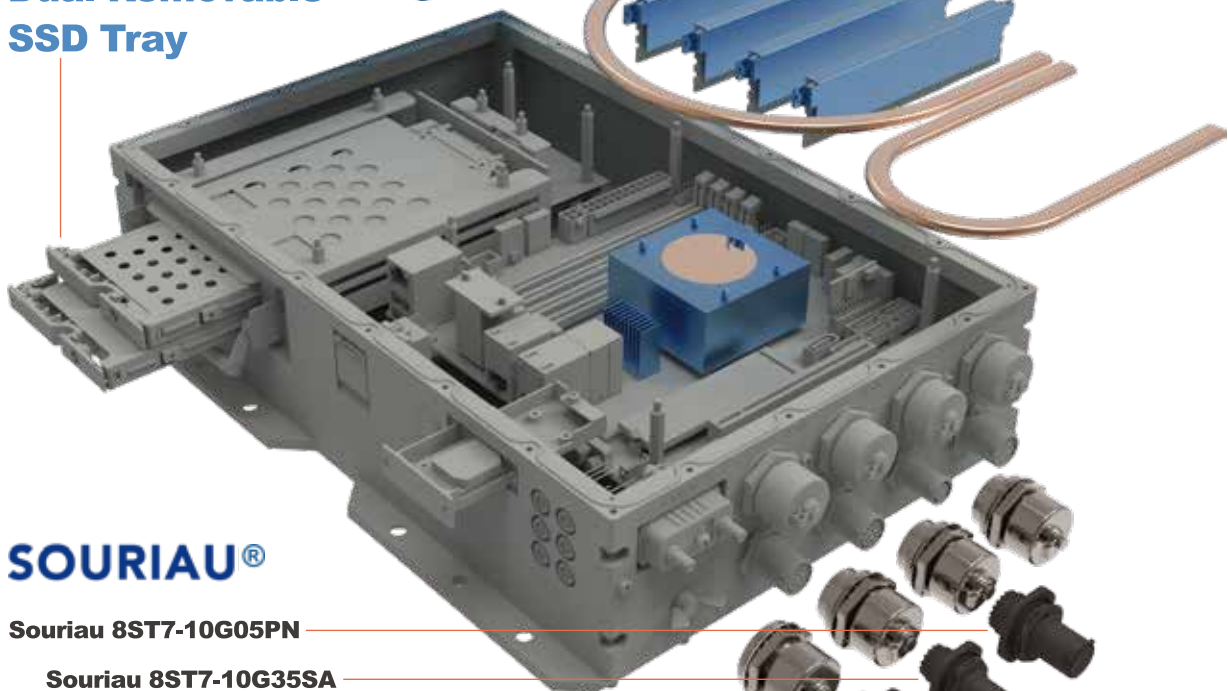
Stackrack's unique high thermal conductivity enclosure is designed with high and low fin plus wave line, creating adequate airflow and increasing the surface area in contact with the cooling medium up to 30-40%.

Exclusive Aluminum Heat Spreader for 128GB RDIMM

RAM generates intense heat while the server 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.



Dual Removable SSD Tray



SOURIAU®

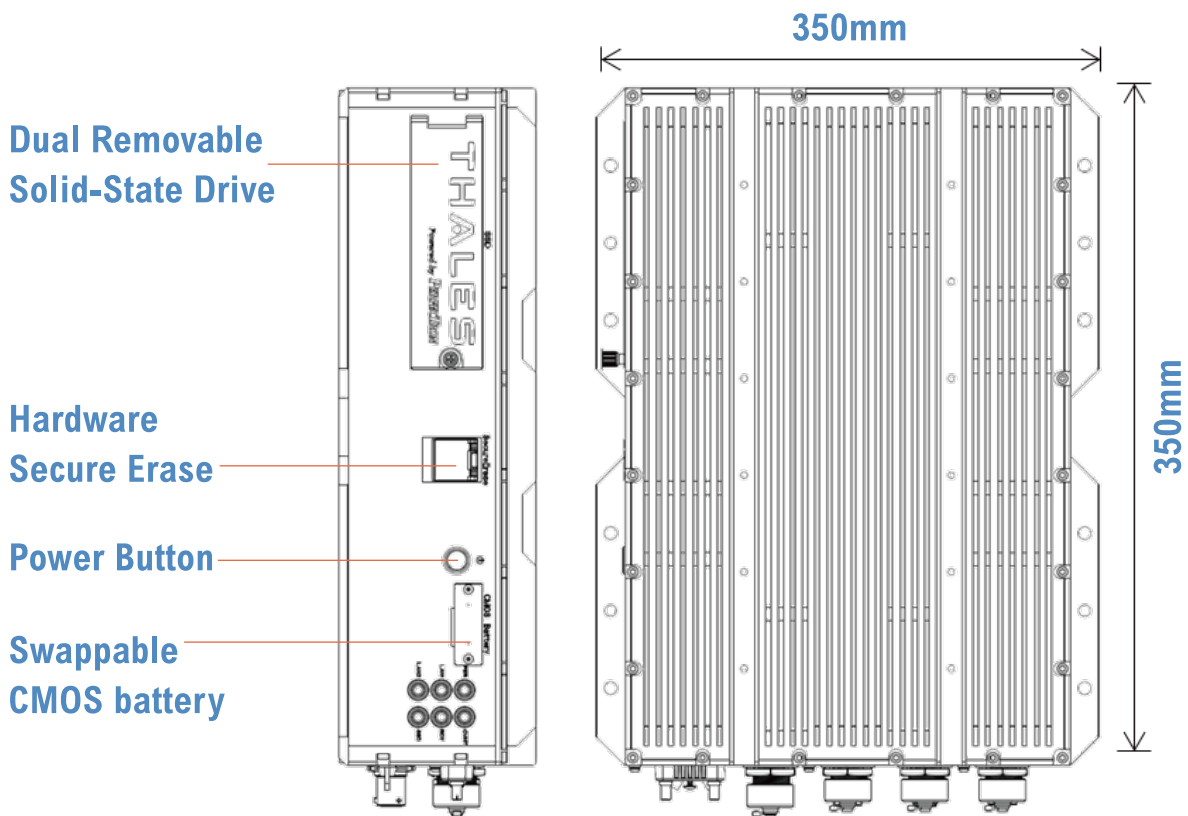
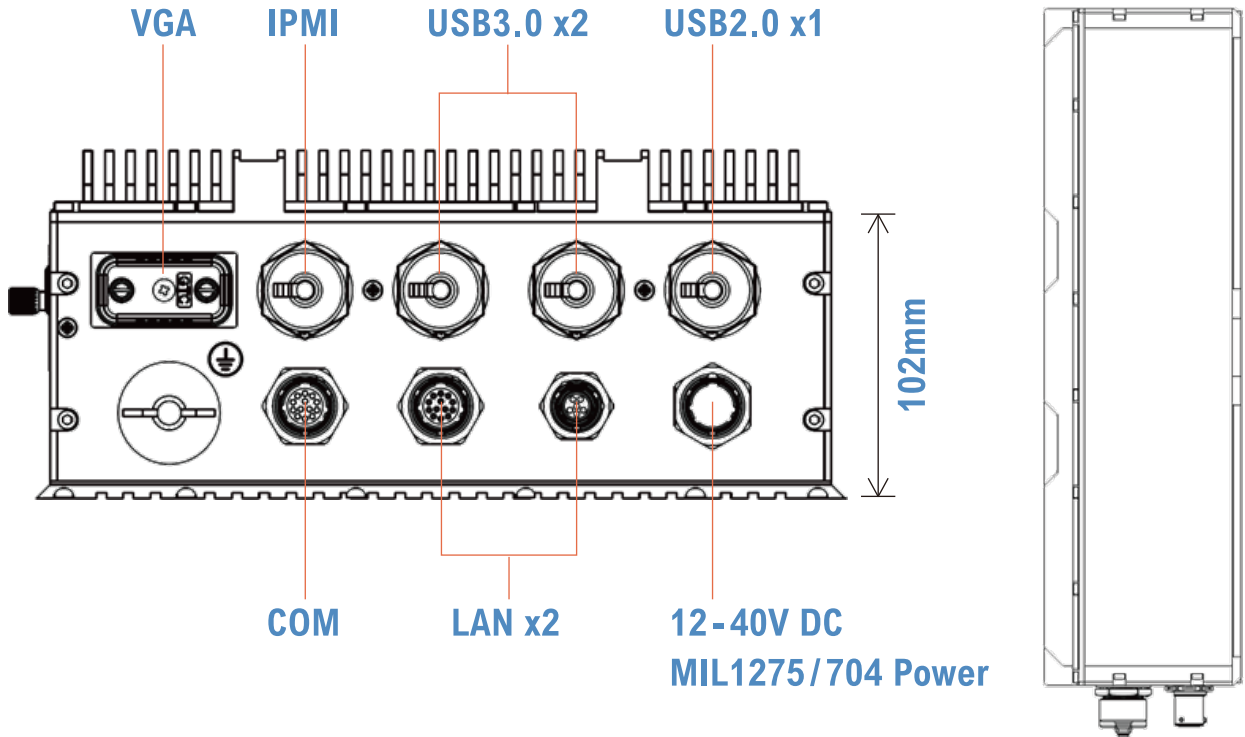
Souriau 8ST7-10G05PN

Souriau 8ST7-10G35SA

Souriau 8ST7-08G35SN

Souriau 8ST7-10G35SB

SR800 Mechanical 2D Drawing



SR800 Environmental Testing

Environmental Condition	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 85°C
MIL-STD-810G Test	<p>Method 507.5, Procedure II (Temperature & Humidity)</p> <p>Method 516.6 Shock-Procedure V Non-Operating (Mechanical Shock)</p> <p>Method 516.6 Shock-Procedure I Operating (Mechanical Shock)</p> <p>Method 514.6 Vibration Category 24/Non-Operating (Category 20 & 24, Vibration)</p> <p>Method 514.6 Vibration Category 20/Operating (Category 20 & 24, Vibration)</p> <p>Method 501.5, Procedure I (Storage/High Temperature)</p> <p>Method 501.5, Procedure II (Operation/High Temperature)</p> <p>Method 502.5, Procedure I (Storage/Low Temperature)</p> <p>Method 502.5, Procedure II (Operation/Low Temperature)</p> <p>Method 503.5, Procedure I (Temperature shock)</p>
Reliability	<p>No Moving Parts; Passive Cooling.</p> <p>Designed & Manufactured using ISO 9001/2000 Certified Quality Program.</p>
EMC compliance	<p>MIL-STD-461E :</p> <p>CE102 basic curve, 10kHz - 30 MHz</p> <p>RE102-4, (1.5 MHz) -30 MHz - 5 GHz</p> <p>RS103, 1.5 MHz - 5 GHz, 50 V/m equal for all frequencies EN 61000-4-2:</p> <p>Air discharge: 8 kV,</p> <p>Contact discharge: 6kV EN 61000-4-4: Signal and DC-Net: 1 kV</p> <p>EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 kV</p> <p>EN 61000-4-2: Air discharge: 8 kV, Contact discharge: 6kV</p> <p>EN 61000-4-4: Signal and DC-Net: 1 kV</p> <p>EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 kV</p> <p>EN 61000-4-2: Air discharge: 8 kV, Contact discharge: 6kV</p> <p>EN 61000-4-4: Signal and DC-Net: 1 kV</p> <p>EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 kV</p> <p>EN 55022, class A</p> <p>EN 61000-4-3: 10V/m</p> <p>CE and FCC</p>

In reality, **HORUS200**, 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, HORUS200 is equipped with dual 10GbE LAN, supporting the best parallel working system.



HORUS200



Dual 10-Gigabit Ethernet for Virtual Machine

The Intel® Ethernet Connection X557 family is a 10 Gigabit Ethernet copper networking Physical Layer (PHY) for workstation, server, and embedded designs that have critical space and power constraints. HORUS200 equipped with dual 10GbE LAN, allowing system to run under high-speed and stable transmission.

Comparing to general 1GbE LAN, 10GbE LAN provides key improvements in terms of bandwidth, latency, scalability, reliability and application performance. Moreover, 10GbE 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.

HORUS200 Specification

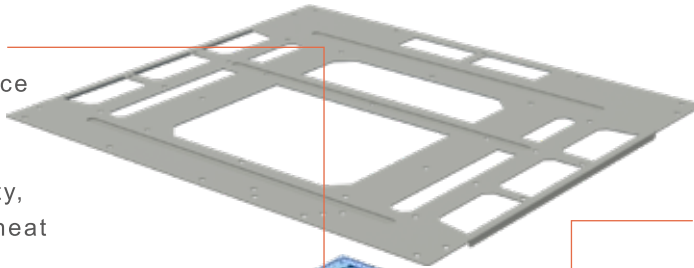
System	
Model	HORUS200
CPU	Intel®Xeon®Processor D-1587 (Frequency 1.7GHz, Turbo Boost Frequency up to 2.3GHz), 16-Core, 32 Thread Support, 24MB Smart Cache. Build-in Turbo Boost Technology 2.0, VPro and Hyper-Threading support.
Memory	4 x DIMMs Up to 128GB ECC RDIMM DDR4
Chipset	2133MHz SoC, integrated with CPU
Display	
Graphics Processor	ASPEED AST2400
Display Port	Resolution up to 1920x1200@60Hz 32bpp
Storage	
SSD/HDD	2 x 2.5" SSD
Ethernet	
Ethernet	Quad Gigabit Ethernet via Intel® i350-AM2 Dual 10GBase-T LAN via Intel® X557-AT2 Realtek RTL8201N PHY (dedicated IPMI)
Front I/O	
USB	2 x USB 2.0 Ports
Serial Port	1 x RS-232 Port
Ethernet	2 x 10/100/1000 Gigabit Ethernet
DC-IN	1 x Rugged Souriau Connector (8ST7-08G98PN)
Rear I/O	
Button	1 x Secure Erase Button (SSD2 support AES Secure Erase) 1 x Power Switch with Dedicated LED
USB	2 x USB 3.0 Ports
Ethernet	2 x 10/100/1000 Gigabit Ethernet 2 x 10GBase-T Ethernet 1 x IPMI
Dedicated LED	2 x SDD LED 4 x Dual Color LED for 8bit GPIO (Reserved)
SSD/HDD Tray	1 x Dual 2.5" HDD/SSD Easy Swap Tray
CMOS Battery Tray	1 x Removable CR2032 CMOS Battery Tray
Power Requirement	
Power Input	MIL-STD-1275, MIL-STD 704 and DO-160 power supply ,12 to 40V (150W max)
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	Windows 10 64Bit, Windows Server 2008 R2, Windows Server 2012 R2 Ubuntu14.04, Fedora 20/23, RedHat Linux EL 7.1/7.2, Vmware ESXi 6.0, ESXi 6.5
Physical	
Dimension (WxDxH)	430 x 325 x 44.6mm
Weight	7.5Kg (16.5lbs)
Chassis	SECC +Aluminum Alloy, Corrosion Resistant.
Finish	Anodic aluminum oxide (Color Iron gray)
Cooling	Natural Passive Convection / Conduction. No Moving Parts
Ingress Protection	IP50

Patented Thermal Architecture

STACKRACK adopts special metal composed of high thermal conductive materials and particular CNC cutting to further ensure compliance with extreme temperature requirements. Both HORUS200 and SR800 could operate under +55°C with the 16-core CPU (Intel®Xeon®D-1587, 65W) running full speed non-throttling(2.1GHz). Further, they never shuts down under 85°C.

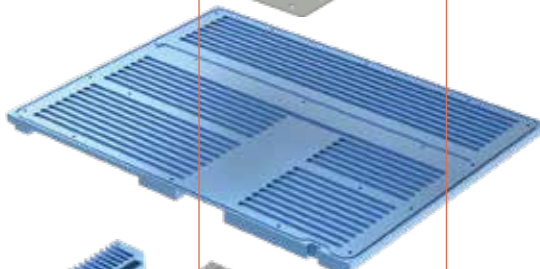
Exclusive Heat Spreader for MIL-STD-461 Power Module

Power module generates fierce heat while operating. To ensure stability, an aluminum heat spreader is placed directly on the EMI Filter/MIL-STD-461 compliance power module to absorb and transfer heat to the external cooling medium. Through the mechanism, the operating temperature can decrease up to 15~20%.

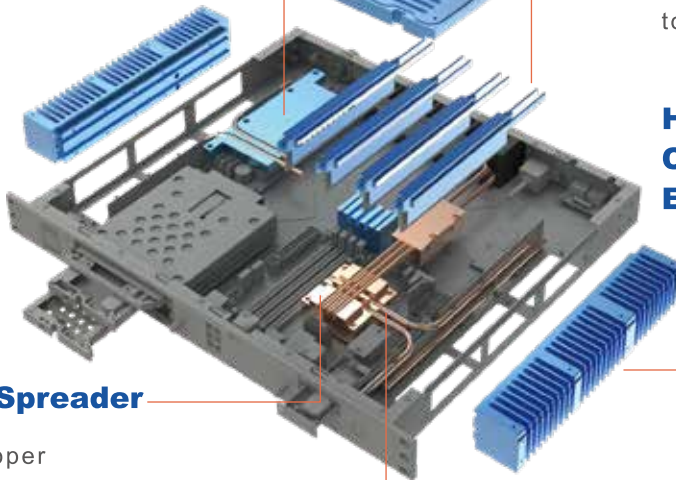


Exclusive Aluminum Heat Spreader for 128GB RDIMM

Copper heat pipes absorb heat efficiently from the RDIMM, then spread the collected heat to the aluminum cover as well as upper aluminum heat sink to dissipate.



High Thermal Conductivity Enclosure



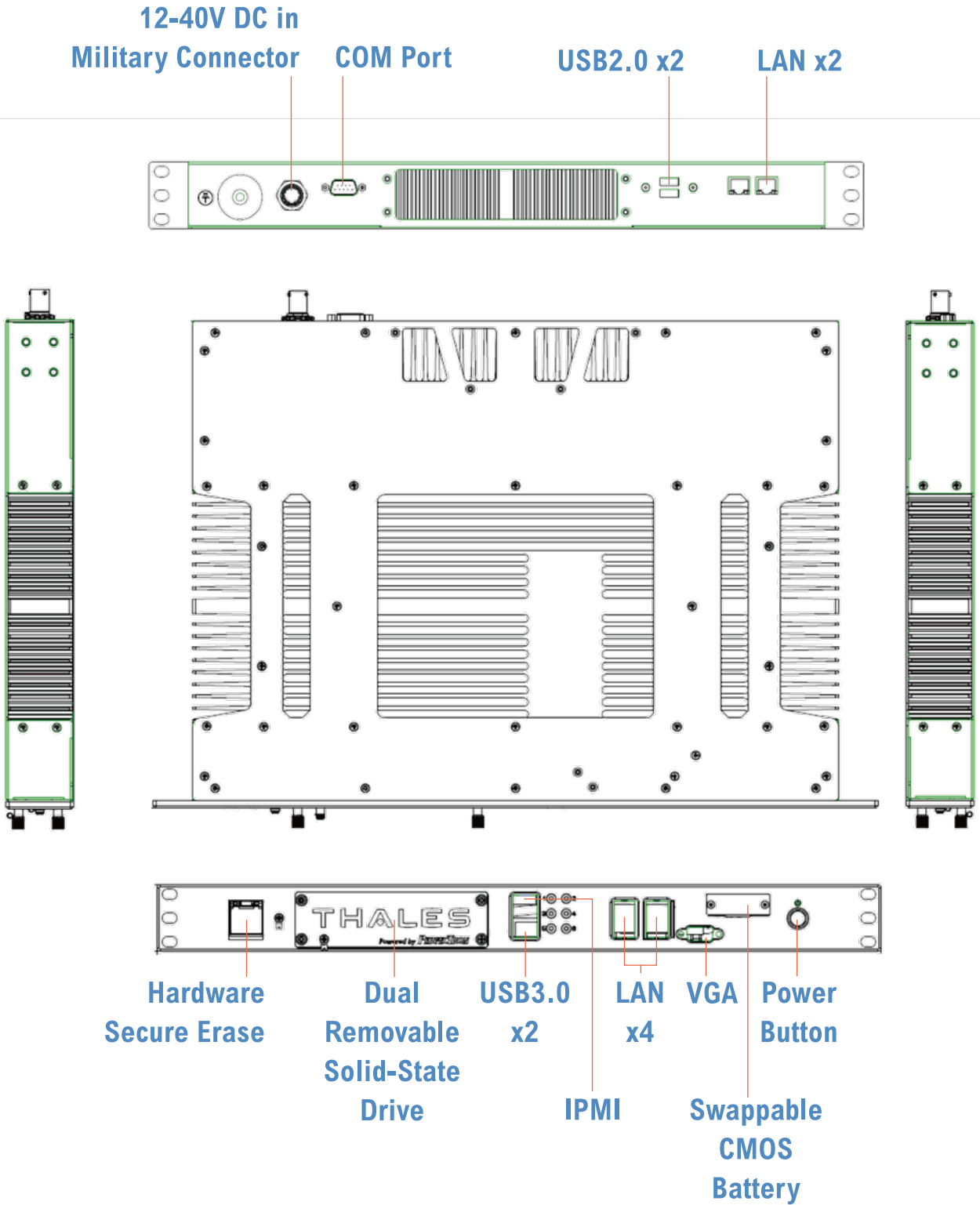
Copper Heat Spreader

99.9 % purity copper
Nickel plated to prevent corrosion and rust after long-term use

High Efficiency Copper Heat Pipe

Placed directly on the CPU, the copper heat pipes evaporates the inside liquid while absorbing heat from the unit. The vapor then flows from the heat source (evaporator) to the cold interface (condenser) through heat pipes, and condenses back into a liquid – releasing the latent heat. The cycle of the liquid-vapor repeats by capillary forces, and the temperature of the device can be dropped significantly due to high heat transfer coefficients for boiling and condensation.

HORUS200 Mechanical 2D Drawing



HORUS200 Environmental Testing

Environmental Condition	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 85°C
MIL-STD-810G Test	<p>Method 507.5, Procedure II (Temperature & Humidity)</p> <p>Method 516.6 Shock-Procedure V Non-Operating (Mechanical Shock)</p> <p>Method 516.6 Shock-Procedure I Operating (Mechanical Shock)</p> <p>Method 514.6 Vibration Category 24/Non-Operating (Category 20 & 24, Vibration)</p> <p>Method 514.6 Vibration Category 20/Operating (Category 20 & 24, Vibration)</p> <p>Method 501.5, Procedure I (Storage/High Temperature)</p> <p>Method 501.5, Procedure II (Operation/High Temperature)</p> <p>Method 502.5, Procedure I (Storage/Low Temperature)</p> <p>Method 502.5, Procedure II (Operation/Low Temperature)</p> <p>Method 503.5, Procedure I (Temperature shock)</p>
Reliability	<p>No Moving Parts; Passive Cooling.</p> <p>Designed & Manufactured using ISO 9001/2000 Certified Quality Program.</p>
EMC compliance	<p>MIL-STD-461E :</p> <p>CE102 basic curve, 10kHz - 30 MHz</p> <p>RE102-4, (1.5 MHz) -30 MHz - 5 GHz</p> <p>RS103, 1.5 MHz - 5 GHz, 50 V/m equal for all frequencies EN 61000-4-2:</p> <p>Air discharge: 8 kV,</p> <p>Contact discharge: 6kV EN 61000-4-4: Signal and DC-Net: 1 kV</p> <p>EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 kV</p> <p>EN 61000-4-2: Air discharge: 8 kV, Contact discharge: 6kV</p> <p>EN 61000-4-4: Signal and DC-Net: 1 kV</p> <p>EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 kV</p> <p>EN 61000-4-2: Air discharge: 8 kV, Contact discharge: 6kV</p> <p>EN 61000-4-4: Signal and DC-Net: 1 kV</p> <p>EN 61000-4-5: Leads vs. ground potential 1kV, Signal und DC-Net: 0.5 kV</p> <p>EN 55022, class A</p> <p>EN 61000-4-3: 10V/m</p> <p>CE and FCC</p>