7STARLAKE

SR 700-X4

AI Inference Optimized GPUCPU

Powerful MXM GPU-CPU structure for sensors fusion Applications.

MIL-STD-810

SFF PCIe/104 unrivaled anti-vibration and shock mezzanine structure.

MIL-STD 461/1275

Military Standard EMI Filter Power Module protect the whole system against voltage surges, spikes and transients.

Rugged IP65 Mission Computer

- Intel Xeon E-2276ML (6xC, 4.2 GHz)
- NVIDIA Quadro MXM RTX4500
- Extreme Temperature -40~+60 Degree
- MIL-STD 810 Vibration 7Grms, Shock 75G

intel

NVIDIA

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SR 700-X4

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SR 700-X4

Introduction

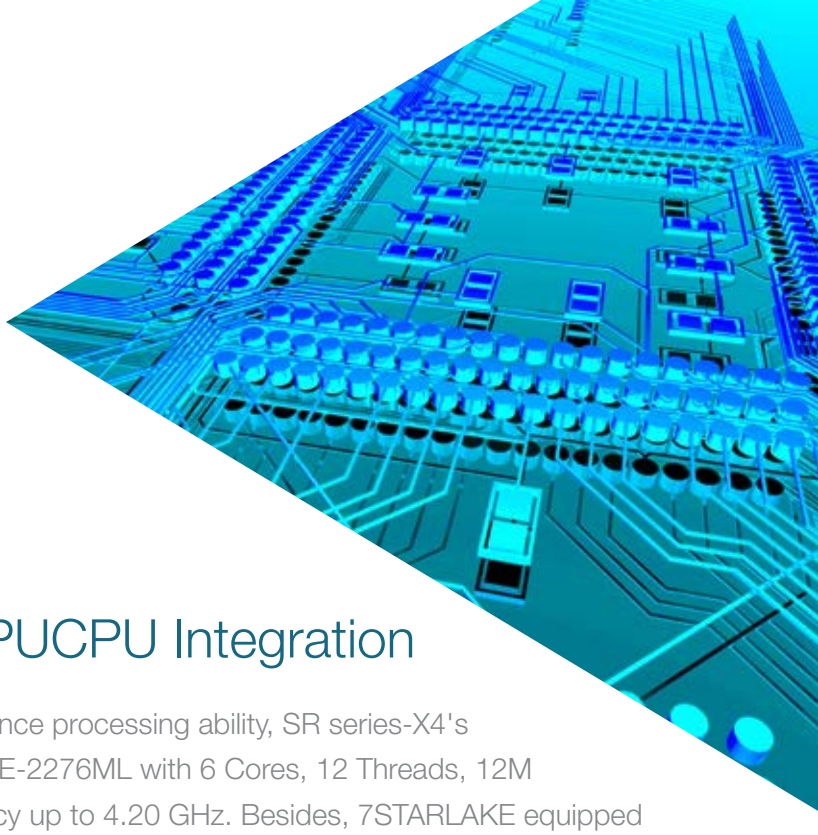
7STARLAKE, a leading provider of military rugged computers, is pleased to declare a new upgrade of Rugged IP65 Mission Computer Stack Rack(SR) series! Compared with previous SR series-X3, SR series-X4 is based on Intel Xeon E-2276ML with 6 Cores, 12 Threads, 12M Cache, and better Max Turbo Frequency up to 4.20 GHz while ensuring internal stability with no moving parts. Adopting NVIDIA RTX A4500 MXM GPU (5,120 CUDA cores, GDDR6) SR series-X4 founded a highly efficient GPUCPU structure for sensor fusion applications. Moreover, MIL-STD 810/461/1275 compliance ensure the reliability and durability of SR series-X4.
With further advantages, such as rugged connectors M12 and D38999, SR series-X4 is a perfect solution to military purposes, such as defense, marine navigation and aviation technology.

- Target Acquistion System
- Unmanned Navigation

1-1 The Need For Military Navigation

In contrast with the past, Unmanned Navigation, Surveillance and Target Acquisition System are widely used in military and bring a great evolution in defense applications. For instance, Surveillance & Target Acquisition System now is applied to detecting and identifying potential enemy. Aimed at reacting promptly, the whole system needs several sensors to find out abnormal objects. So, in order to process a huge amount of data delivered from sensors, a igh-performance processing unit is extraordinarily important for this system.

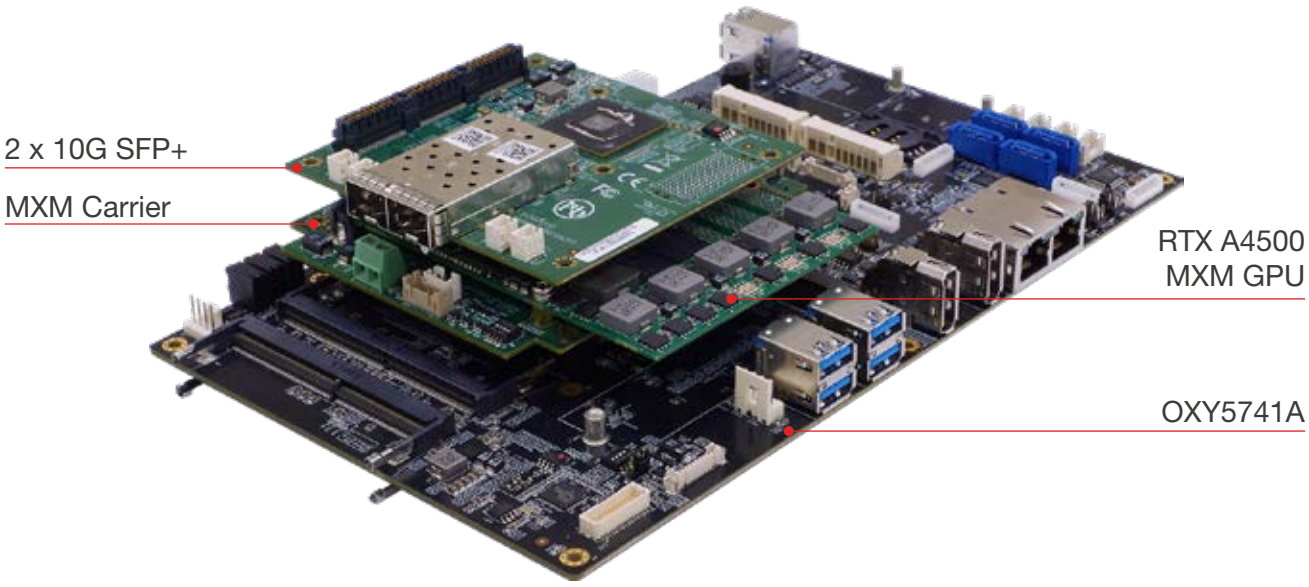
SR 700-X4



1-2 High Performance GPUCPU Integration

response to the need of high-performance processing ability, SR series-X4's CPU has been upgraded to Intel Xeon E-2276ML with 6 Cores, 12 Threads, 12M Cache, and better Max Turbo Frequency up to 4.20 GHz. Besides, 7STARLAKE equipped SR series-X4 with PCIe/104 GPU module which makes SR series-X4 stronger—integrating with NVIDIA RTX A4500 MXM GPU (5,120 CUDA cores, GDDR6), SR series-X4 can build a powerful GPUCPU structure for sensor fusion, which is extremely important for real-time data processing.

Using an offloading process, the CPU can hand specific tasks to the GPU, and then significantly improve performance. This feature is vital for Military Navigation, Surveillance & Target Acquisition System or companies that are specialized in manufacturing and engineering computer design, scientific research, biometrics and healthcare, oil and gas, media and entertainment… etc., where a large amount of data needs to be process efficiently.



Capability

The most demanding of all rugged development systems are military solutions as they are multidisciplinary tasks, demanding both experience and specialist skills.

SR 700-X4

2-1 Extended Temperature Design Principle

01

Design with Extended Temp Grade Components

Every component is crucial to the overall performance and reliability of a product over extended periods. To ensure customer satisfaction, 7starlake uses only industrial grade components that pass strict standards on vendor selection, extended temperature operation, ruggedness specification, reliability and durability.

02

Power Circuit and Layout Optimization

To protect the PCB and its components, the PCB, heat spreader, and case are being viewed as a single thermal system. The PCB's metal layers are designed to conduct heat in a controlled manner from one part of the PCB to another. Using materials that have a high glass transition temperature (Tg) ensures the PCB and its components will not get damaged under high-heat conditions.

03

Wideband Extended Temperature Testing

Every component is crucial to the overall performance and reliability of a product over extended periods. To ensure customer satisfaction, 7starlake uses only industrial grade components that pass strict standards on vendor selection, extended temperature operation, ruggedness specification, reliability and durability.

2-2 MIL-STD-810 Compliance

01

Vibration

Vibration test is conducted to create an environment, in which long-term and high level vibration is simulated. The test is performed with both the system operating/non. Various levels and duration of vibration is simulated in three axis (X, Y, and Z), with up to 7g transitions.

X axis Y axis Z axis

02

Mechanical Shock

Mechanical Shock test is conducted to ensure that equipment can withstand drops encountered during handling, transportation, and normal use. The test is performed with both the system operating/non. We expose the system to 3 pulses/direction of sawtooth shock at 100g 11ms. 6 directions for a total of 18 pulses.

03

Temperature Shock

Temperature Shock test, also named Thermal Shock test, is to ensure that systems can thrive even in extreme temperature range. We place the system at ambient temperature into chamber at -40℃ and stabilize it, then transfer in less than 1 minute to chamber at +85℃ and stabilize. Return the system to ambient temperature and perform operational check.

04

High Temperature

This testing method is broken down into two procedures.

05

Low Temperature

There are two parts in this test to determine whether the system can persevere in extremely cold environment.

X axis Y axis Z axis

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2-3 MIL-STD-1275/461

SR series-X4 was born with MIL-STD-1275/461 compliant power module, protecting whole system against voltage surges, spikes and transients. By adding EMC filter design SR series-X4 is capable of providing the required level of attenuation of the unwanted signals while allowing through the wanted signals. Taking advantage of these characteristics, SR series-X4 can defeat Electromagnetic Disturbance and keep operating efficiently.
Therefore, SR series-X4's products are well suited for the strictest military requirement and available deliver optimal performance in harsh conditions.

▸MIL-STD-1275

The US Department of Defense Standard MIL-STD 1275 is an immunity standard that defines a series of test conditions to be applied to the input of a 28V electrical power system within a military vehicle. These include spikes, surges, operating voltages and

▸MIL-STD-461

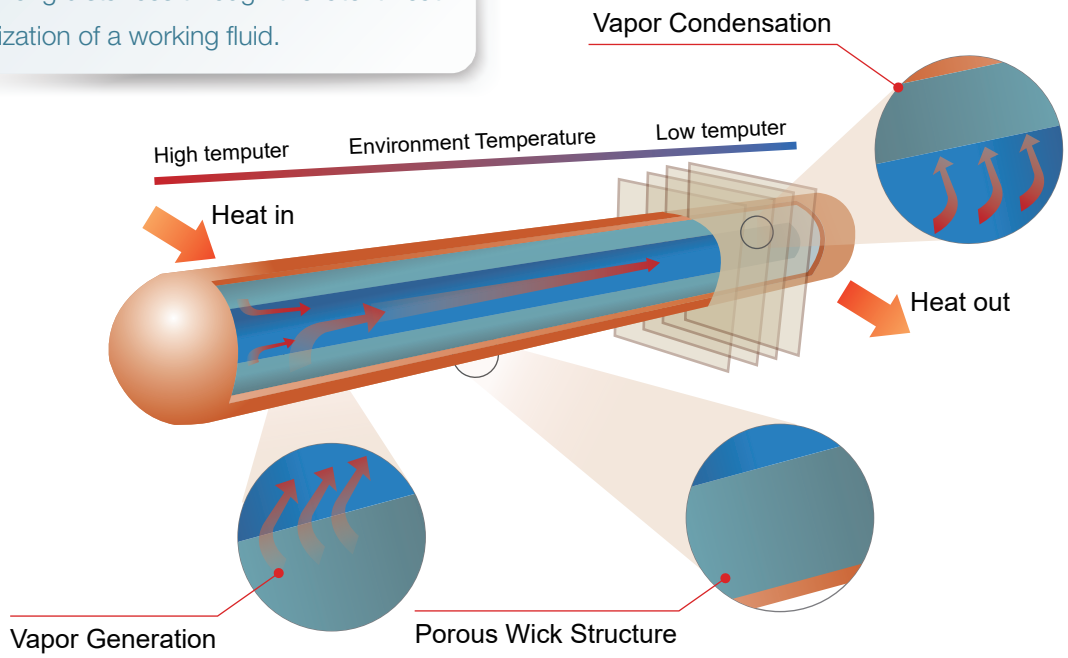
MIL-STD-461 is a United States Military Standard that defines how to test equipment for electromagnetic compatibility(EMC). The United States Department of Defense issued MIL-STD-461 in 1967 to integrate electromagnetic compatibility into the research and development stage for defense communications technology.

SR 700-X4

2-4 Advanced Thermal Solutions

The unique design of 7STARLAKE's stack rack (SR) series integrate both horizontal and vertical placement. Dual-sided aluminum heat sink further secures extreme heat dissipation. In addition, 7STARLAKE incorporates exceptional heat radiating material with unique CNC cutting design, which relies heavily on the precise calculation of the efficiency of each heat dissipating component. Superior fanless design guarantees silent operation that enhances the flexibility of mobility and prevents the intrusion of dust and debris.
Thus, SR Series-X4 supports extended temperature operation, achieving ultimate reliability and stability.

Heat pipes transfer heat from the heat source (evaporator) to the heat sink (condenser) over relatively long distances through the latent heat of vaporization of a working fluid.



Heat pipes typically have 3 sections: an evaporator section (heat input/source), adiabatic (or transport) section and a condenser section (heat output/sink).

SR 700-X4

2-5 IP65 Classified

What's more, SR series-X4 has complete resistance to dust and water, making it even more ruggedized and reliable. With the water and dust protection up to IP65 rating, SR series-X4 can stand against the intrusion of dust, accidental contact, and water. Not just commercial grade waterproof and dustproof, it can reach Dust Tight level, which guarantees complete protection against ingression. Even the strong power of water jet won't pose a threat to it, so our customers can deploy SR series-X4 in outdoor applications without dread of possible loss caused by unpredictable invasion of water.

M12 Connectors

Robust and reliable M12 connectors are implemented for SR series-X4. Compact design meets rugged capability, M12 connectors can seal the connector area securely, operation can continue uninterrupted even under the most severe conditions. What makes SR series-X4 stand out from standard commercial grade product is the fact that all the connectors can be customized to U.S. Military standard connectors (D38999 series) from the famous connector manufacturer Amphenol.

MIL-DTL-38999 Connectors

7STARLAKE also provides MIL-DTL-38999 Connectors as an enhanced alternative choice compared with M12. D38999 is a high-performance cylindrical connector family designed to withstand the extreme shock, exposure and vibration that are commonplace in Defense and aerospace applications. D38999 connectors are lightweight and can stand up to environmental challenges. Made with removable crimp or fixed hermetic solder contacts, these connectors provide high-vibration characteristics and are suitable for severe wind and moisture problem areas. Equipped with MIL-DTL-38999 connectors, SR series-X4 is undoubtedly durable and ruggedized enough despite operating in the harsh environment.

Application

SR700-X4

Unmanned Navigation

- Sensor fusion capability
- Waterproof protection

SR700-X4

Control Room

- Multi-display support
- High-speed data processing

SR100-X4

Intelligent Transportation

- Advanced vibration resistance
- Real-time data transmission

SR700-X4 Specifications

3-1 General information

General information	
Product Name	SR700-X4
Mechanical	
Dimension	360 (W) x 230 (D) x 86 (H) mm
Weight	8.6 Kg (18.91b)
Case	Aluminum Alloy, Corrosion Resistant
Certifcation	
Norms	Compliant with MIL-STD-810 standard
Conformity	EMC: CE and FCC compliance
Electrical	
Input power supply voltage	DC-DC 9V to 36V DC-in
Environmental	
Operating temperature	-40°C to 60°C
Operating humidity:	10 % to 90 % R.H. (40*C @ 95% RH Non-condensing)
Storage:	-40*C to 85C
Front 1/O	
Power button	Waterproof Power Button with LED backlight
Power Input	I x DC input (Rugged MI2 connector)
XI	2 x USB (Rugged M12 connector)
X2	I x GbE LAN , 10/100/100 Mbps, (Rugged MI2 connector)
X3	I x GbE LAN , 10/100/100 Mbps, (Rugged MI2 connector)
X4	I x DVI-D (Rugged MI2 connector)
X5	Ix RS232/422/485 (Rugged M12 connector)
X6	1 x mDP with DTL38999 connector
PC Embedded	
CPU Type	Intel Xeon E-2276ML (6 Cores/12 Threads, up to 4.20 GHz), 25W
CPU cache	12MB
Chipset	Intel@ CM246 Chipset
RAM	2 x DDR4 2666 MHz SODIMM up to 64GB (horizontal type)
Storage	Onboard Micro SSD 64GB
Display	
Graphics Card	NVIDIA® RTX™ A4500 MXM GPU (5,120 CUDA cores, 16GB GDDR6)

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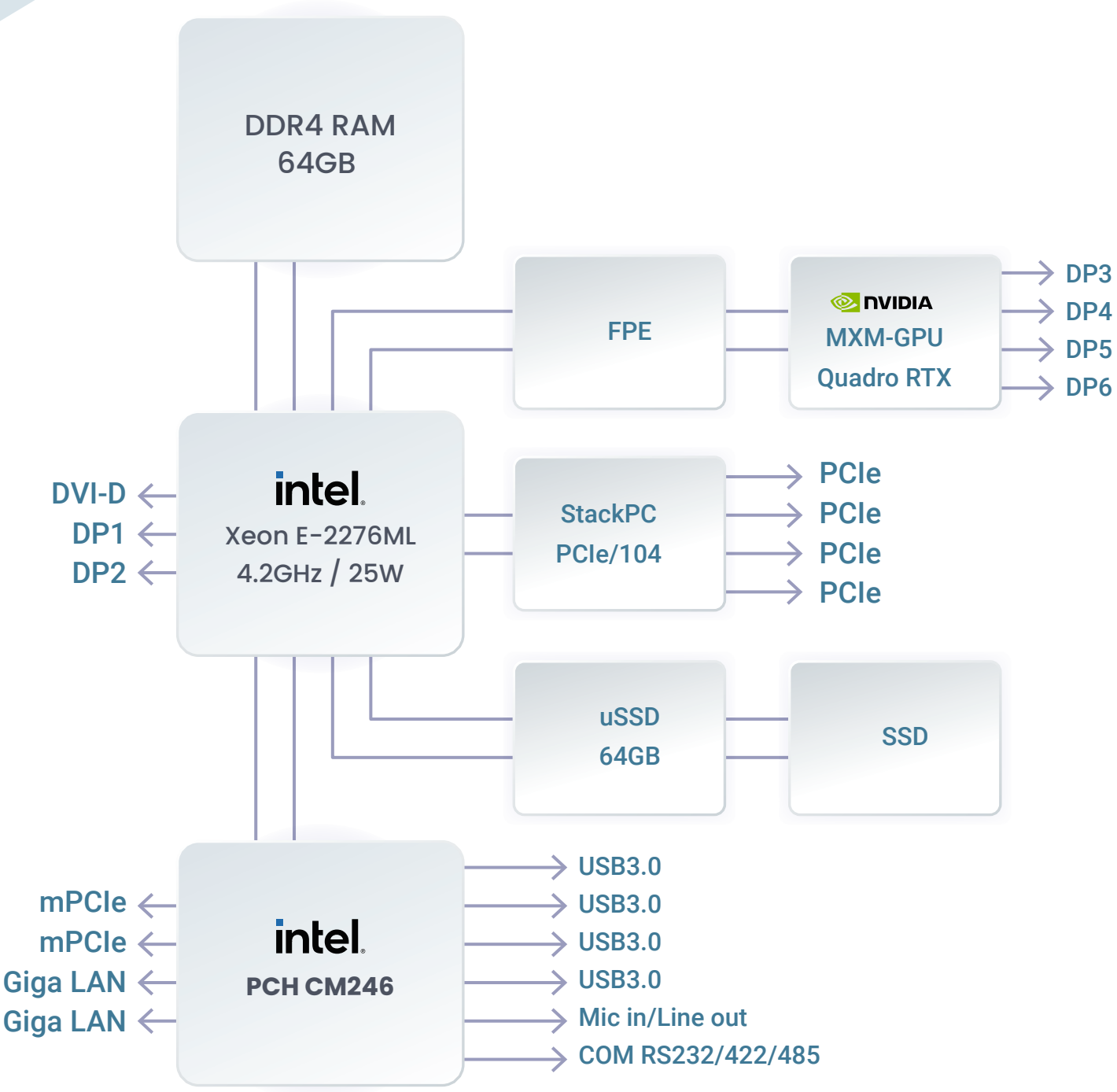
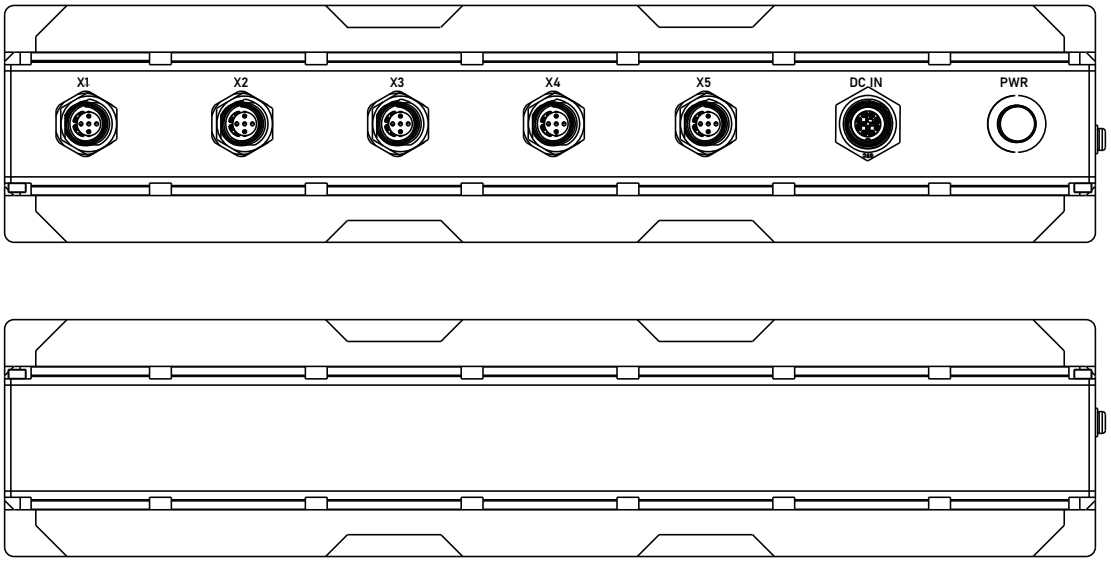
3-2 Block Diagram



MIL-STD SR700-X4

3-3 Mechanical

Appearance



Dimensions