STACKRACK

**Rugged Military Airborne COTS Computer**

F1-30

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I. Technical Profile

ATR **(Air Transport Rack)** is a standard that specifies form fit and function of enclosures designed to protect the main internal system. This military enclosure must meet EMI / EMC requirements to prevent noise interference, provide lightning protection and be isolated from small particle contaminants. So, it can be deployed in unmanned aerial vehicles, fighters, and helicopters. To satisfy diverse conditions, ATR chassis are available in different sizes—1/2, 3/4 and Full ATR sizes. Based on 3/4 ATR size, STACKRACK launches a new Rugged Airborne Mission Computer F1-30

As a modular mission computer, F1-30 has mechanical feature for mounting in horizontal orientation, offering open architecture to maximize use of interoperability. For example, together with PCIe104 expansion connectors, F1-30 is able to build a stackable architecture, which can be integrated with PCIe/104 expansion modules depending on customers'need, hence it's highly configurable to specific requirements. Founded on such an open structure, It is an optimum choice for high performance mission computing, demanding graphics generation applications, and GPU-accelerated data processing
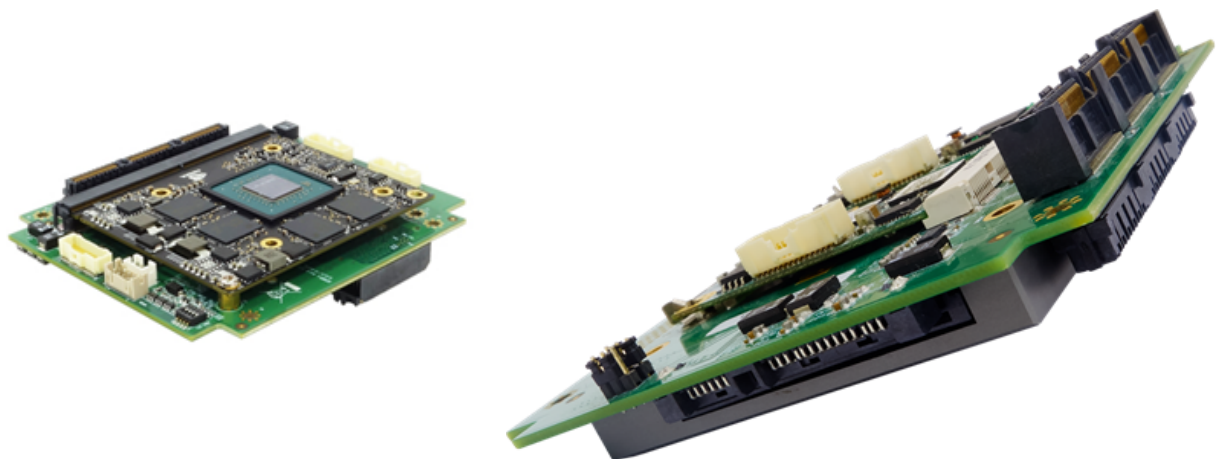
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II. Introduction

F₁₋₃₀ is driven by Intel 5th generation Broadwell i7-5650U processor soldering onboard which is an extremely compact Core I-based fanless rugged airborne computer. Broadwell processor supports outstanding CPU and graphics performance, providing dual cores 3.2GHz clock speed.
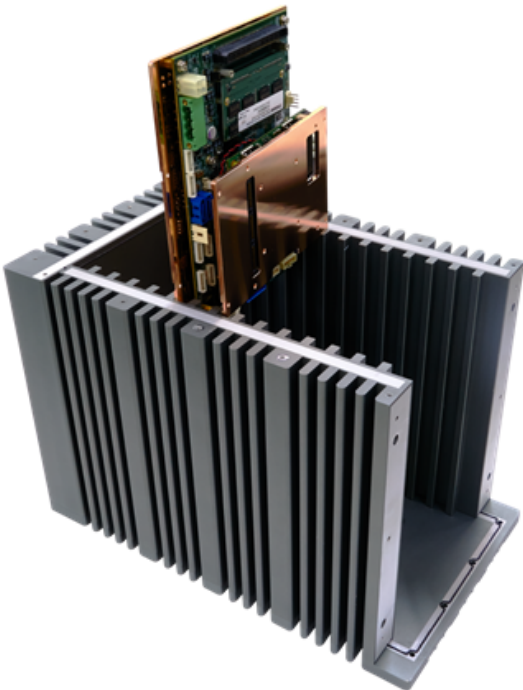
• RICH Feature Support

F1-30 is regarded as a StackPC with a rich-featured board with a various I/O requirements applied to feature compact, rich functionality, solid performance, multi-displays, wide temperature, and low power consumption for applications which size and power efficiency are required . F1-30 can take the advantages of processors soldering onboard and extended operating temperature from -40 to 85°C to ensure ultimate durability, utmost resistance to shock & vibration.

Although F1-30 features a completely sealed enclosure with M12/D38999 connectors for the I/O interfaces and it's compliant to IP65, it's able to maintain CPU and GPU full speed at extreme temperatures by the conduction cooling method developed by STACKRACK

• Expandable Multi I/O Interfaces

F1-30's mainboard equips extensive I/O interface to fulfill different application requirements. The board supports four XR-DIMM RAM up to 16 GB, offers 2x LAN, 6x USB and 4x COM for device connects ability, The versatile expansion compatibility also includes two full-size miniPCIe that could add on additional I/O or additional functionality. And also for reserving the PIN header which can be added on extra feature to meet different embedded applications. With MXM slot can integrate with graphic card for image processing usage.

The StackPC Specification defines new approach to stackable systems design and development. The specification includes all valuable heritages of PCIe/104 standards along with the new features of StackPC connector.

The main competitive distinction of the StackPC connector is the combination of most popular low speed interfaces such as USB, COM, CAN, SPI, LPC and high speed SATA, Gigabit Ethernet and PCI-Express x1, x4 within one stack expansion connector.

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• Rugged DIMM

F1-30 uses the most robust rugged memory module memory XR-DIMM which has the innovative board-to-board connector design to fit tightl and Ā securel onto the motherboard and perfect for critical-mission applications Ā and harsh environments. Furthermore, both ECC and Wide Temperature (-40°C to 85°C) features are available to further optimize the module if needed. In addition, it adopts the highly durable 300-pin connector and mounting holes to effectively prevent memory modules from dislocating or coming away due to vibration or strong impact. This greatly improves the reliability of memory signal transmissions, serving as the strongest support for applications working under severe environments.
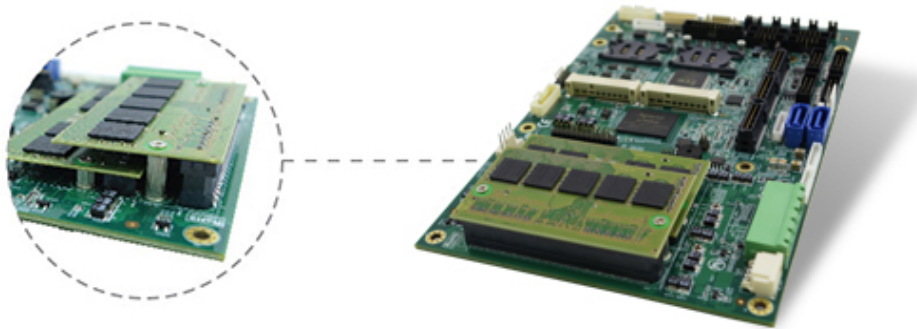

• 64GB SSD Soldered on board

he soldering 64GB military-grade ruggedized onboard SSDs has the technologies of thermal throttling function: When continuously executing intensive reading and writing, the temperature of the SS rises, which could Ā lead to or increase the risk of device malfunction or damage To prevent the Ā system from overheating and sustaining damage, the rugged SSDs are equipped with thermal throttling technology for temperature control, reducing operating speeds during high temperature to prevent hardware damage Moreover, the underfill strengthens the soldering points of BGA Ā packages, enhances anti-vibration properties, and reduces damage from thermal stress. It not only effectively reinforces anti-vibration and ensuring stable operations in highly sulfuric or stringent/extreme climate conditions, but also prolongs product life.

III. MIL-STD-1275/704 Power Supply

F1-30 is designed with MIL-STD-1275/704, protecting against vehicle/aircrafts voltage surges, spikes and transients, and even electromagnetic interference. This characteristic is well suited for the strictest military requirement and deliver optimal performance in harsh conditions.
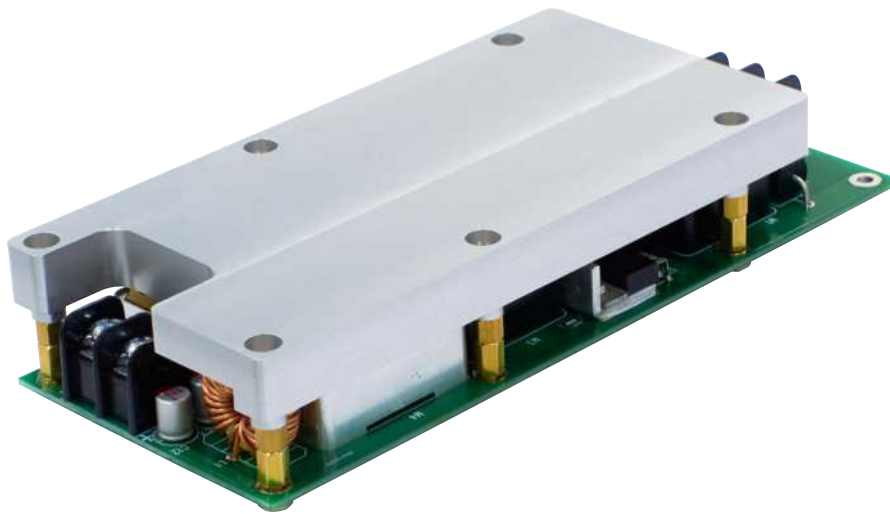
The GAIA Hi-Rel DC/DC CONVERTER also provides under voltage Lockout (UVLO), Output over Current Protection (OCP), Output Overvoltage Protection (OVP) and Over Temperature Protection (OTP) to made stability and safety.
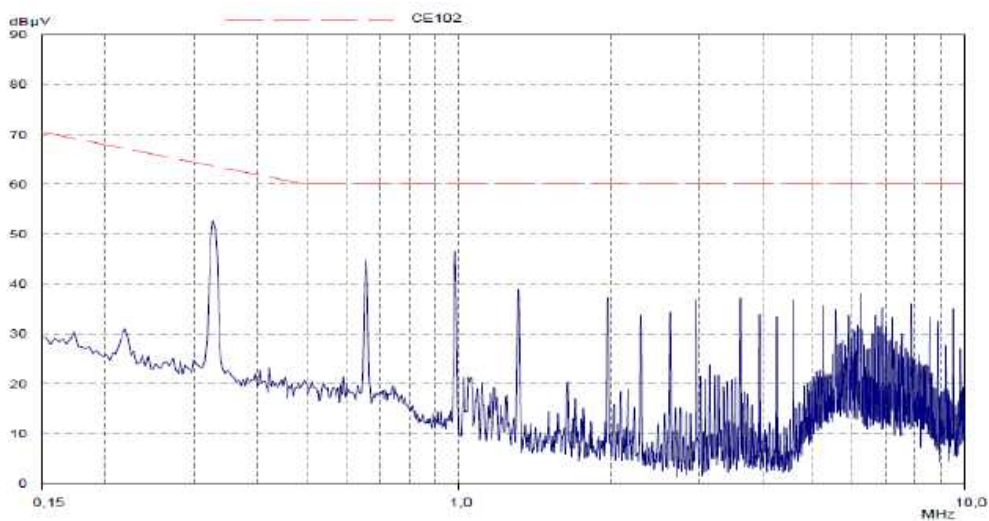
Module Compliance with MIL-STD-461C/D/E Standards

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IV. Thermal Solution

STACKRACK, being the master of advanced 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.

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-Lock mechanism secures inside the chassis, coming up with a thermal interface.

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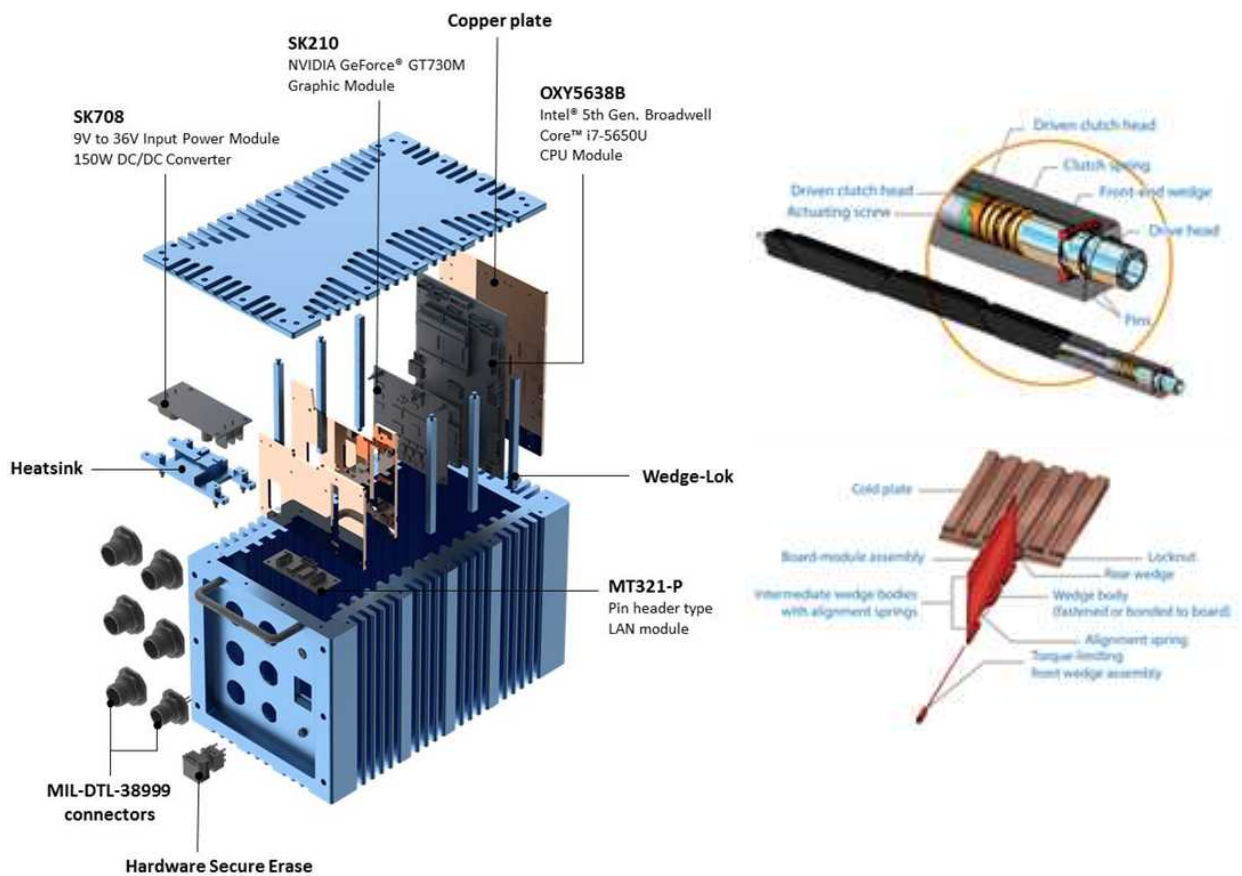
SPECIFICATIONS

General Information	
Model	F1-30D1/F1-30M1
CPU Type	Intel®Core™ i7-5650U (4M Cache, up to 3.2 GHz)
Memory type	2 x DDR3 1333/1600MHz XR-DIMM Up to 16GB

Storage	
HDD/SDD support	1 x 2.5" SSD 2 x mSATA SSD backup storage

I/O	
COM	2
Ethernet	4
USB	4 x USB 2.0
VGA	1
DC-in	1
Power Button	1 x Waterproof Button with Backlight
Connectors	F1-30D1: Amphenol D38999 Connectors F1-30M1: M12 Connectors

Mechanical	
Housing	Aluminum
Weight	16 Kg (35.24 lb)
Ingress Protection	IP65
Dimension (W x H x D)	190.5 x 230 x 320.5 mm

Power Requirement	
Input Voltage	Optional 1: DC-IN 9V~36V, 150W Max Optional 2: DC-IN 10V~40V, 150W Max (Compliant with MIL-STD-1275/704/461)

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SPECIFICATIONS

| Environmental	
Operating Temperature	-40℃ to 75℃
Storage Temperature	-40℃ to 85℃
Relative Humidity	Up to 95%RH @40℃, non-condensing
Ingress Protection	Designed for compliance with IP65, MIL-STD-810G
Test Standard	
EMI/EMC	Designed to meet MIL-STD-461F
Temperature	Designed to meet MIL-STD-810G
Vibration & Shock	Designed to meet MIL-STD-810G
Stackable Module	
SK506	PCIe/104(StackPC FPE module) Expand 4 extra 10/100/1000 mbps Gigabit Ethernet
SK509	PCIe/104(StackPC) I/O module
SK210	NVIDIA GeForce® GT 730M PCIe104-FPE Graphic Module, Supports Four DP outputs
SK220	PCIe/104(StackPC FPE) MXM Graphics Card for 1VGA & 4 DisplayPort Module Support NVIDIA® GT950M/GTX1050Ti/GTX1060M Graphics Card
SK401	Storage carrier with one 2.5" HDD/SSD socket and two mSATA socket PCIe/104 SSD/mSATA/Mini PCIe Carrier, support 1x 2.5" SSD + 2x mini PCIe LAN module (MT321/MT321R)
SK708	Wide Input Range 150W DC/DC Power Converter Module with 9V~36V OXY5638A is DC12V, need to convert with Wide Inout Range Power Module
SK710	Optional module by request :Wide Input Range: 12V to 40V w/ EMI Filter, Compliant with MIL-STD 1275/704/461

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VI. PCIe/104 & StackPC Peripherals
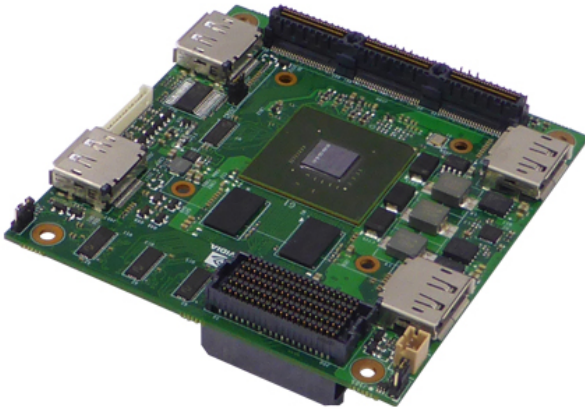
SK210—NVIDIA GT730M Graphics Module

- NVIDIA CUDA technology
- OpenGL 4.4 support
- OCL 1.1 support
- NVIDIA Adaptive Vertical Sync
- Microsoft DirectX 11 support

SK220—MXM GPU Module Carrier

- Utilizes PCIe x16 and PCIe x4, x1 link
- MXM 3.0 and 3.1 graphic card support
- Type A and Type B MXM graphics card
- Operating Temp: -40℃ ~ 85℃

SK401—SSD/mSATA Storage Carrier

- Supports 1 x 2.5" SSD
- Supports 2 x mSATA SSD slot, compatible with JEDEC MO-300B
- SATAII interface supports 1.5Gbps/3.0Gbps
- Reserve PCI/104 connector for different stacking criteria
- Extended temperature -40 to 85℃

SK506—Quad-GbE LAN Module

- Reliable Ethernet technology from Intel i350-AM4 controllers
- Total 6 independent LAN connections (2 from host board, 4 from Intel controllers)
- Flexible options for Ethernets through RJ45 or 10 pin-headers
- High-performing bridgeless design supporting PCI Express Gen 2.1 5GT/s
- Extended temperature -40 to 85℃

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DIMENSIONS

320.5 mm

230 mm

190.5 mm

APPEARANCE