Sensor Fusion
AI Computing Solutions

DETAILED TECHNICAL SPECIFICATIONS
AND PERFORMANCE ANALYSIS

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1_INTRODUCTION

Purpose

This white paper provides an in-depth analysis of the IV320 and AV710, NV200 and NV300 HPC systems, highlighting their advanced technical capabilities and performance across various demanding applications.

Scope

This document examines the core hardware components, performance benchmarks, and potential use cases for these systems. In response to the evolving landscape of AI-driven asymmetric warfare, military integrators are continuously seeking robust computational systems that offer superior multifaceted-computing capabilities and can endure harsh environmental conditions, such as shock, vibration, and extreme temperature variations.

These systems cater to diverse applications requiring high computing power and ruggedness, ranging from ground surveillance and reconnaissance to mobile navigation and vehicle monitoring. The IV320, AV710, NV200 and NV300 are engineered to consolidate ISR (Intelligence, Surveillance, and Reconnaissance) platforms, heralding a new era of edge AI computing.

This paper delves into the technological advancements and capabilities of the IV320, AV710, NV200 and NV300, demonstrating how they enhance situational awareness, optimize decision-making, and provide a strategic advantage on the battlefield.

IV320

The IV320 is a high-performance, rugged HPC system designed for applications requiring robust computational power and real-time data processing in harsh environments.

Key Features

Intel® 13th Gen. Raptor Lake-H Processor
Core i7-13800HE/HRE, featuring 14 cores and 20 threads with clock speeds up to 5.0 GHz, ensuring exceptional computational throughput.

8xChannel 3G-SDI Frame Grabber
Enables low-latency video capture and processing, creating a 360-degree protection screen for comprehensive situational awareness.

NVIDIA® Quadro MXM RTX A4500
Equipped with 16GB GDDR6 and 5888 CUDA cores, this GPU excels in AI inference, 3D rendering, and processing high-resolution visual data.

Full IP65 Sealed Enclosure
Provides protection against dust, water, and extreme weather conditions, ensuring reliable operation in harsh environments.

MIL-STD-810 Compliance
Ensures resistance to shock and vibration, making it suitable for deployment in military and industrial settings.

AV710

The AV710 is an ultra-small-form-factor (USFF) MIL-SPEC rugged edge AI computing solution, designed for next-generation edge applications requiring real-time AI processing.

Key Features

NVIDIA® Jetson AGX Orin
Offers up to 275 TOPS of AI performance, making it ideal for AI and machine learning workloads, including autonomous systems, robotics, and smart city applications.

4CH 3G-SDI Frame Grabber
Supports capturing high-definition 1920x1080p video at 60/50fps from up to four 3G-SDI inputs, providing high-quality video streams for tactical decision-making.

MIL-STD-810 Compliance
robust performance under thermal, shock, vibration, and humidity conditions, with IP65 classification for environmental protection.

Compact Design
Dimensions of 250 x 220 x 100mm, making it suitable for space-constrained installations.

Extended Temperature Range
Operates reliably in temperatures ranging from -20 to +55ºC, ensuring functionality in extreme conditions.

NV200, NV300

The NV200, NV300 is an ultra-small-form-factor (USFF) MIL-SPEC rugged edge compute solution. Designed using a Modular Open Systems Approach (MOSA) with a modular chassis and architecture design, NV200, NV300 integrate the NVIDIA Jetson AGX Orin/Orin NX as next-gen and power-efficient edge AI computing solutions.

Key Features

NVIDIA⒟ Jetson AGX Orin
Offers up to 275 TOPS of AI performance, configurable power consumption 15W - 60W, designed for the demanding AI projects, like autonomous systems, robotics, and smart city applications.

NVIDIA⒟ Jetson Orin NX
Offers up to 100 TOPS of AI performance, configurable between 10W and 25W, Jetson Orin NX is a balanced option for power consumption and computing performance, targeting the market of drones, robotics and other embedded AI system.

Support GMSL2 Camera Input
Supports GMSL2 input, a SerDes technique, to carry high-speed video, bidirectional control data, and power over a single coaxial cable.

Ultra Compact Design
Being ultra-compact for edge AI deployment, SWaP-optimized for integration in highly space-constrained platforms

Extended Temperature Range
Operates reliably in temperatures ranging from -20 to +55°C, ensuring functionality in extreme conditions.

3_TECHNICAL SPECIFICATIONS

CPU

IV320 CPU

The Intel® 13th Gen. Raptor Lake-H, Core i7-13800HE/HRE features 14 cores and 20 threads, with clock speeds reaching up to 5.0 GHz. This processor is supported by up to 96 GB of DDR5 memory, delivering exceptional computational performance for AI targeting, scientific computations, and object detection tasks.

AV710 CPU

Utilizes the NVIDIA® Jetson AGX Orin, which integrates 12-core Arm® Cortex®-A78AE v8.2 64-bit CPU, 3MB L2 and 6MB L3 is tailored for real-time AI inference, sensor fusion, and high-performance computing applications.

IV320 GPU

The NVIDIA Quadro RTX A4500, with 16GB GDDR6 VRAM and 5888 CUDA cores, excels in transforming high- resolution visual data into actionable insights, supporting applications such as EO/IR, thermal cameras and 3D radar.

AV710 GPU

The NVIDIA Jetson AGX Orin module provides robust AI processing capabilities with up to 275 TOPS. This high-performance module is optimized for complex AI tasks, including image recognition and object detection, making it ideal for edge AI applications.

GPU

Video Input/ Output

3G-SDI is a broadcast-grade digital video interface standard that supports video resolutions up to 1080p at 60 frames per second. It enables high-speed, uncompressed digital video transmission over coaxial cables, providing superior image quality and minimal latency. This technology is crucial in professional video environments where maintaining signal integrity and high resolution is paramount.

IV320

Equipped with an 8-channel 3G-SDI configuration, the IV320 is designed for demanding video applications that require simultaneous input from multiple video sources. This capability ensures comprehensive coverage and monitoring, essential for complex operations.

AV710

Featuring advanced video processing capabilities, the AV710 supports up to 4 channels 3G-SDI, making it ideal for environments where space and power efficiency are critical without compromising on video quality.

NV200 and NV300

Both models are equipped with 4-channel 3G-SDI configurations, providing robust and reliable video transmission for various applications. These systems are optimized for scenarios requiring multiple video feeds with high fidelity and low latency.

Frame Grabber Card

This component is vital for real-time data analysis and integration with central command systems for comprehensive ISR operations
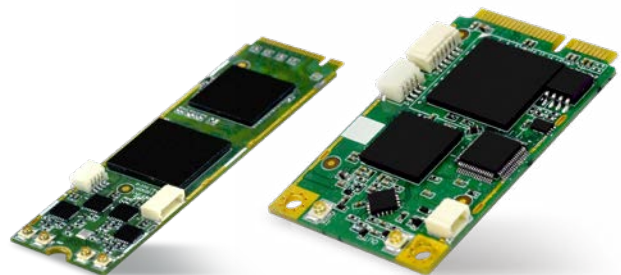
Mini-PCIe Frame Grabber Card
《for HD-SDI & PAL in/out put》

M.2 M-Key 2280 Frame Grabber Card
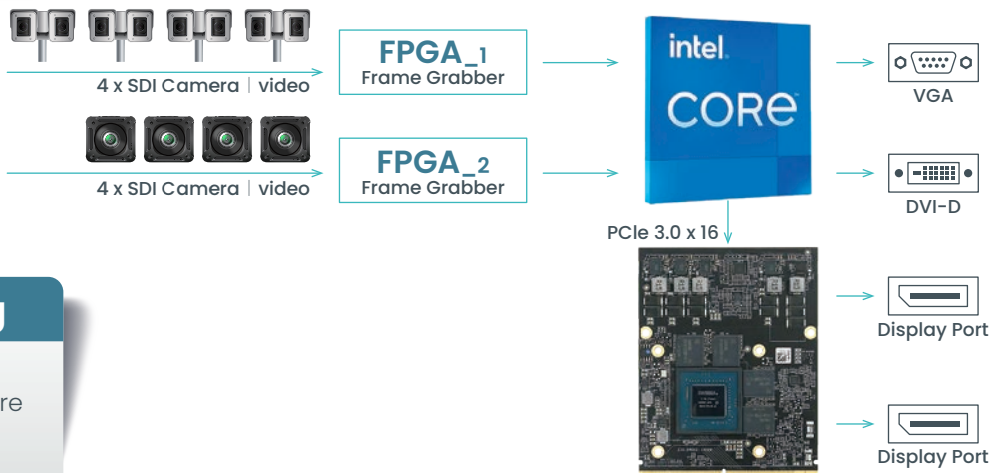《for 3G-SDI & PAL in/out put》

4_HIGH-PERFORMANCE GPU COMPUTING

GPU computing is essential for high-performance computing (HPC) applications, enabling accelerated data processing and complex computational tasks.

IV320 GPU Computing

The NVIDIA Quadro RTX A4500 supports advanced GPU computing capabilities with libraries such as CUDA and OpenCL. This GPU excels in AI inferencing, scientific simulations, and rendering tasks, providing substantial performance improvements in HPC workloads.

4 x SDI Camera | video

FPGA_1 Frame Grabber

4 x SDI Camera | video

FPGA_2 Frame Grabber

intel CORE

VGA

DVI-D

PCIe 3.0 x 16

Display Port

Display Port

AI Processing
▸ AI Object Detection
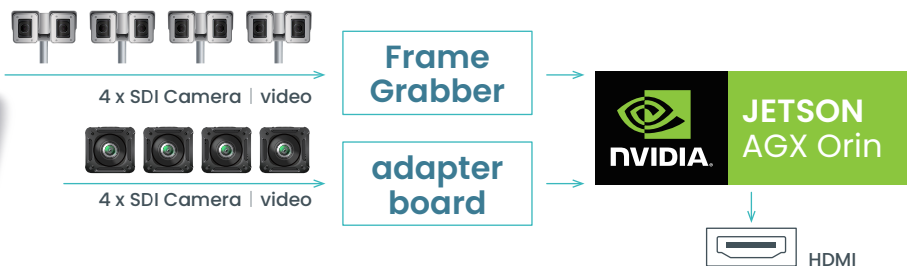▸ HD-SDI video capture
▸ Video Encoding

AV710 GPU Computing

The NVIDIA Jetson AGX Orin module is optimized for AI and machine learning workloads, featuring powerful CUDA cores for neural network computations. This enables efficient execution of tasks like image recognition and object detection, making it ideal for edge AI applications in constrained environments.

Video Processing & Management Unit

◆ Situational Awareness x2
◆ Commander's Sight
◆ Driver Camera
◆ Simulator

◆ Commander Display
◆ Driver Display
◆ Crew Display

4 x SDI Camera | video

Frame Grabber

4 x SDI Camera | video

adapter board

NVIDIA **JETSON** AGX Orin

HDMI

AI Processing
▸ AI Object Detection
▸ HD-SDI video capture
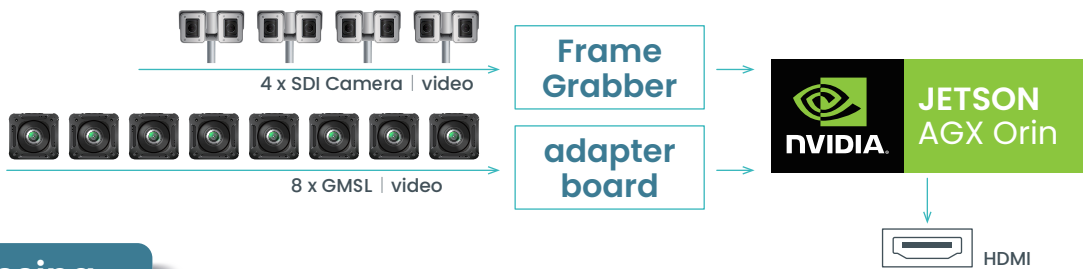▸ Video Encoding

NV300 GPU Computing

The NVIDIA Jetson AGX Orin module offers top-tier performance for AI applications, featuring an Ampere GPU with 2048 CUDA and 64 Tensor cores, a 12-core ARM CPU, 32GB LPDDR5, and 64GB eMMC storage. It supports real-time AI inference, sensor fusion, and high-performance computing for demanding workloads.
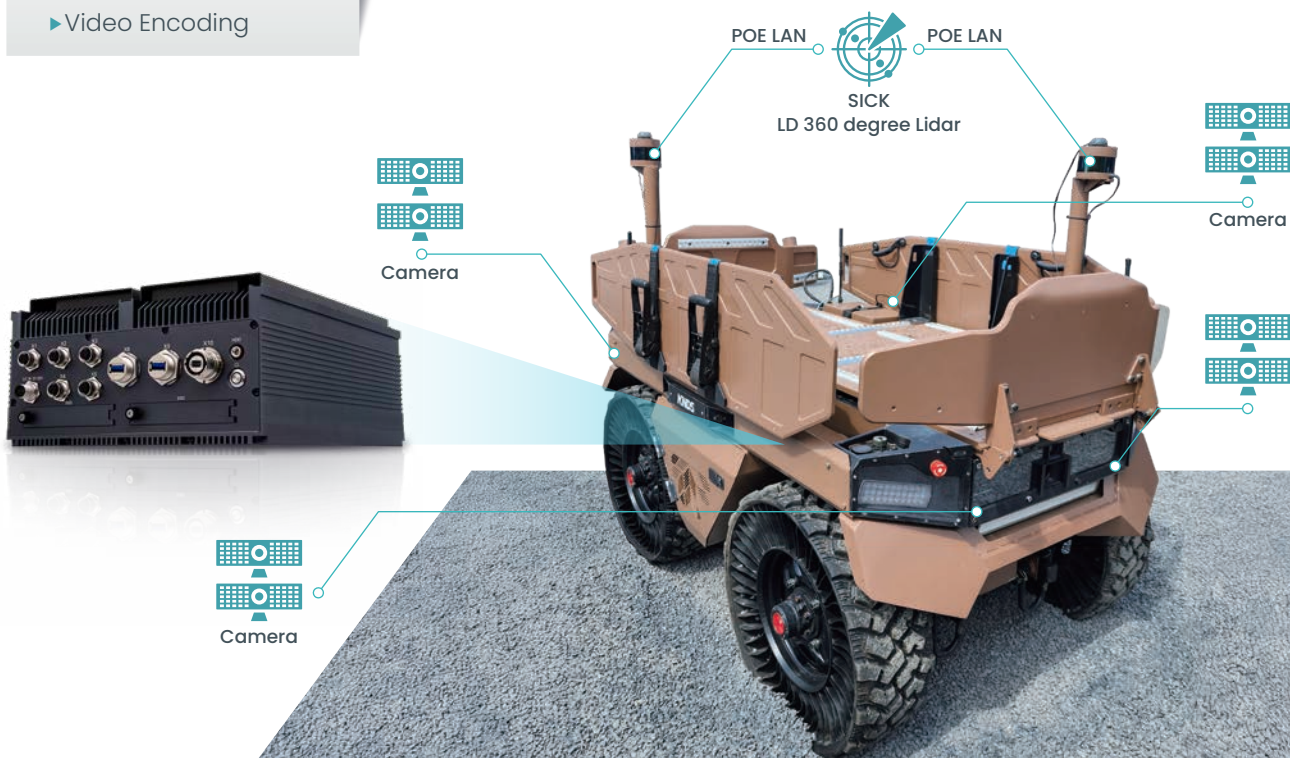
NV200 GPU Computing

The NVIDIA Jetson Orin NX module is optimized for AI and machine learning workloads, featuring powerful CUDA cores for neural network computations. This enables efficient execution of tasks like image recognition and object detection, making it ideal for edge AI applications in constrained environments. It powers applications such as autonomous robots, smart cameras, drones, and IoT devices, providing advanced AI capabilities while maintaining energy efficiency and compact form factor.

4 x SDI Camera | video

8 x GMSL | video

Frame Grabber

adapter board

JETSON AGX Orin

NVIDIA.

HDMI

AI Processing

▸AI Object Detection
▸HD-SDI video capture
▸Video Encoding

POE LAN

POE LAN

SICK
LD 360 degree Lidar

Camera

Camera

Camera

Camera

5_APPLICATIONS AND USE CASES

Armored Vehicle Security

Implementing a 360-degree panoramic defensive bubble with the IV320's 8x 3G-SDI channels and GPGPU integration, these systems provide early detection and tracking of air and surface targets, enhancing vehicle protection and decision-making capabilities in combat scenarios.

Gunner

COMMANDER   Driver

AV710-X4   **IV320-RH-KD**
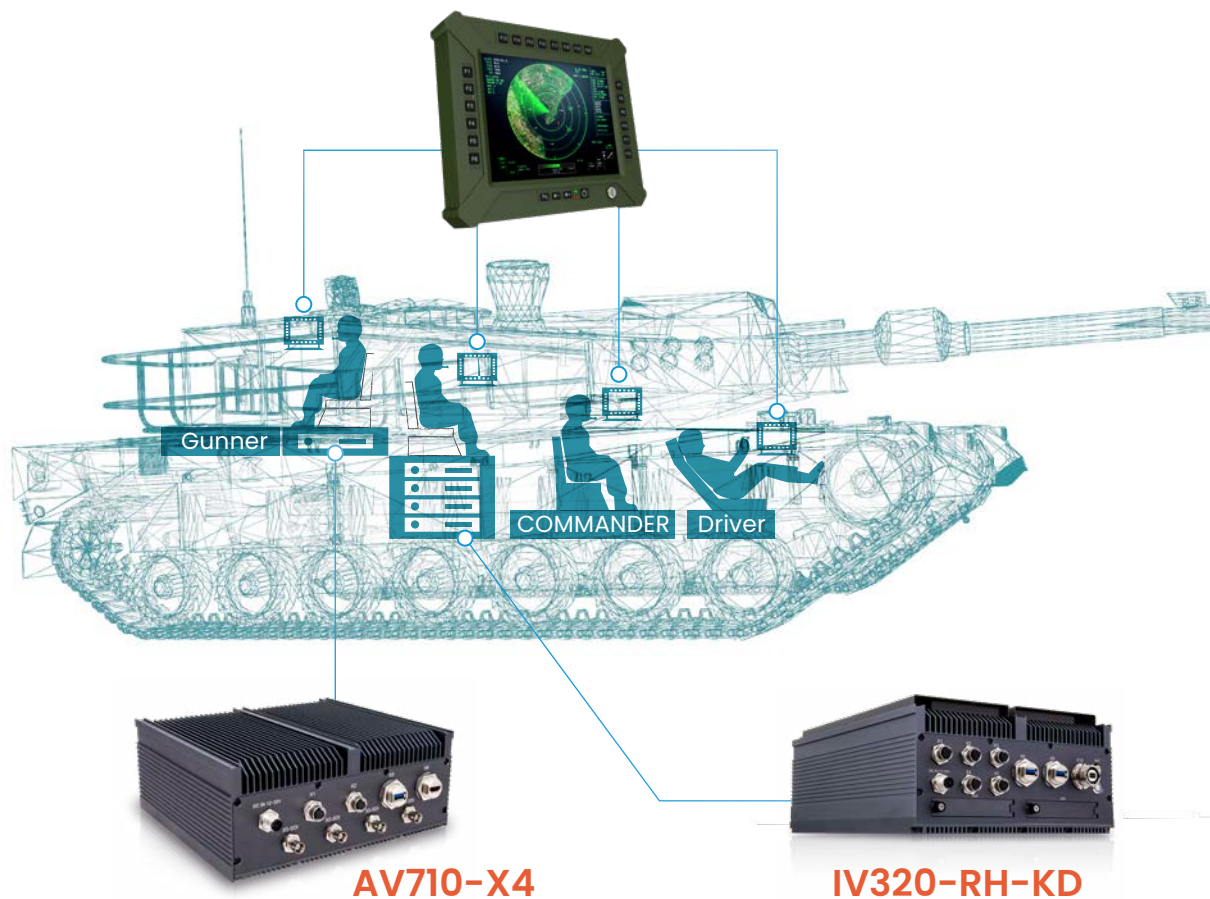
6_CONCLUSION

Summary

The IV320 , AV710, NV200 and NV300 HPC systems, powered by Intel and NVIDIA technologies, integrate advanced 3G-SDI and frame grabber capabilities to deliver high-performance computing solutions for defense and industrial applications. These systems enhance ISR capabilities, enable quick decision-making, and provide robust computational power in harsh environments.

7_PRODUCT LISTS_IV320

IV320 series

IV320-RH-KD

- Intel ®13th Gen. Raptor Lake-H, Core i7-13800HRE/HE
- NVIDIA®Quadro RTX A4500(16GB GDDR6, 5,888 CUDA)
- 8 x Channel 3G-SDI Input Frame Grabber

IV320-RH

- Intel® 13th Gen. Raptor Lake-H, Core i7-13800HE/HRE
- NVIDIA® Quadro MXM RTX A4500 (16GB GDDR6, 5888 CUDA)

IV320-RS

- Intel ®14/13/12 Gen. Raptor Lake-R/S, Alder Lake-S, Core i9/i7
- NVIDIA®Quadro RTX A4500(16GB GDDR6, 5,888 CUDA)
- 4 x POE (2 x POE for 30W ; 2 x POE for 60W)

> Future developments and enhancements for the AV710 will focus on increasing computational performance, expanding AI capabilities, and further ruggedizing these systems to meet evolving defense and industrial needs.

AV710 series

AV710
- Intel® Core™ i7-6822EQ
- NVIDIA®1050Ti CUDA 768 GDDR5-4GB/Quadro® RTX3000 CUDA 1920 GDDR6-6GB

AV710-X2
- AGX Xavier 32GB with 8-core NVIDIA Carmel Arm®, 32TOPs
- 512-core NVIDIA Volta architecture GPU with 64 Tensor Cores
  - 1CH HD-SDI

AV710-X3
- Intel® Xeon® D-1577, 45W, Broadwell, Freq. 1.3/2.1GHz, 16C, 24M Cache
- NVIDIA® Quadro® RTX5000 CUDA 3072

AV710-X4
- AGX Orin 32GB with 8-core Arm® Cortex®, 200TOPs
- 1792-core NVIDIA Ampere with 56 Tensor Cores
- 4CH 3G-SDI

AV710-VM-E
- Intel® Xeon® W-11865MRE, 8 Cores, 24M Cache,2.6GHz (4.7GHz), 45W (RM590E)
- NVidia® RTX A2000, 4G/8G 2560 CUDA Cores, PCIe Gen3.0 x164
- 4 x 3G-SDI video channels and 8 x composite (PAL) channels.

The NV200 and NV300 series

represent a robust and versatile range of video transmission solutions designed to meet the demanding requirements of various applications. These series are engineered to deliver high-performance, reliability, and advanced features for seamless integration into any professional video setup.

NV300 series

NV300-2L32

▶ AGX Orin 32GB with 8-core Arm® Cortex®, 200TOPs

▶ 1792-core NVIDIA Ampere with 56 Tensor Cores

NV300-2LS64

▶ AGX Orin 64GB with 12-core Arm® Cortex®, 275TOPs

▶ 2048-core NVIDIA Ampere with 64 Tensor Cores

▶ 4CH 3G-SDI

NV300-2LGS64

▶ AGX Orin 64GB with 12-core Arm® Cortex®, 275TOPs

▶ 2048-core NVIDIA Ampere with 64 Tensor Cores

▶ 4CH 3G-SDI   ▶ 4CH GMSL

NV200 series

NV200-2L16

▶ Orin NX 16GB with 8-core Arm® Cortex®, 100TOPs

▶ 1024 NVIDIA® CUDA® cores with 32 Tensor cores

NV200-2LS16

▶ Orin NX 16GB with 8-core Arm® Cortex®, 100TOPs

▶ 1024 NVIDIA® CUDA® cores with 32 Tensor cores

NV200-2LGS16

▶ Orin NX 16GB with 8-core Arm® Cortex®, 100TOPs

▶ 1024 NVIDIA® CUDA® cores with 32 Tensor cores

▶ 4CH 3G-SDI   ▶ 4CH GMSL

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