Front View



Rear View

## Block Diagram

- 4x 3G SDI → Equalizer/Reciever → PVideo / 4x FPGA Logic
- 4x Camera Control
- 4x 10GigE → 4x MAG → 4x 10GigE
- 10GigE → MAG → 2x 10GigE
- 10GigE (Optional)
- CAN Bus — x8
- SD Socket — x4
- CSI / I2S / 4x COM
- **NVIDIA® JETSON AGX ORIN**
- x2 → M.2 2280 → Display Port
- x1 → M.2 2280 → USB-C
- x1 → M.2 2280 → Service Port
- Shock Sensor
- Tamper Sensor
- Temp. Sensor — LocalPWR
- Power Supplies → PWR/PMB
- 40GigE (Optional)
- 10GigE
- MAG

## X9 HOST AI

*Small form-factor artificial intelligence (AI) processor using NVIDIA® Jetson Orin, 3G-SDI and camera control, 6x 10Gb Ethernet, USB, M.2 storage, and optional 40Gb Ethernet ports*

- NVIDIA™ Jetson AGX Orin GPU/CPU
- Supports High-Definition Display Port
- Six 10GigE ports with optional POE+
- One 40GigE fiber port (lose 4 10GigE ports)
- Quad HD-SDI ports (3G) ports with camera control serial ports
- Three I2S ports to support audio processing directly from SDI Cameras
- Gigabit Ethernet port and USB-C 3.2 (10Gbps) port for host communication
- Service port with Dual COM, and Triple USB-2 ports
- SD Card and CAN bus support (optional)
- Three M.2 80mm sites for expansion such as Storage, Wi-Fi or Cellular
- Voltage, Temperature, Shock and Tamper sensors for safe operation

## ENVIRONMENTAL SPECS

- **Size:**            4.75" x 2" X 6"
- **Weight:**       1.4 lbs.
- **MIL-STD:**     MIL-STD-810G, MIL-STD-1275D, MIL-S-901D, MIL-STD-461F, DO-160D, IP67 compliant
- 
- **Temperature:**  Optional extended temperature -40°C to +85°C
- **Ruggedness:**   Available up to ruggedization level R5

## SYSTEM OVERVIEW

Battlefield edge processing with the X9 Host AI means Artificial Intelligence (AI), Augmented Reality (AR), deep learning, array processing, and massive sensor fusion is now available in a super-small, self-contained 1.4 pound small form factor chassis. Based on NVIDIA's® latest in-production Jetson AGX Xavier or Orin, the GPU/CPU image/data processing module is intended for direct-connect to plug-and-play sensor interfaces in self-driving or autonomous vehicles. In military applications, X9 Host AI applies to ground or UAS air vehicles, C5ISR, multi-sensor/-spectral sensor fusion, situational awareness, and augmented reality situations in both mounted and dismounted platforms.

The GMS X9 Host AI module supplements the rest of the X9 family including the X9 Host processor, or it can run standalone and directly connect to four sensors such as 2nd- or 3rd-gen FLIR, LIDAR or radar inputs. The standard interface is 3G-SDI with CSI, but optional CoaXPress, Camera Link or GigE Vision is available with programmable data and protocol conversion. PTZ and other sensor control is provided by quad serial ports (RS-232/RS-422/RS-485) or CANbus. Three I2S ports support audio processing from SDI cameras.

Inter-connectivity between other X9 modules such as the GMS Ethernet Switch, Mass Storage or Workstation I/O (WSIO) is via up to six 10GigE ports. There are four 10GigE ports standard which can be converted to a single 40GigE port. An additional 10GigE Service port supplements an additional optional 10GigE port—bringing the total to six 10GigE ports or one 40GigE plus up to two 10GigE ports. An optional CANbus provides SAE vehicle connectivity or US Army VICTORY compliance.

Data storage for mission profiles or data recorder applications is via a single SD card slot and three M.2 NVMe SSD sites. A Service port provides dual serial ports and three USB 2.0 ports. Video is provided via DisplayPort and a ruggedized but commercial-style USB-C port provides USB 3.1 Gen 2 (10 Gbps).

Part of the X9 family of modular, scalable, distributed, rugged computers and displays, X9 Host AI fits in the palm of the hand, is infinitely expandable and designed from the ground up for rugged use in either conduction- or air-cooled applications. All X9 modules and displays are passively cooled with no moving parts (except for the cooling module). Using GMS's patented diamond-enhanced RuggedCool2™ technology, X9 Host AI can optionally operate from -40°C to +85°C and is sealed to IP66.

## DIMENSIONAL DRAWINGS
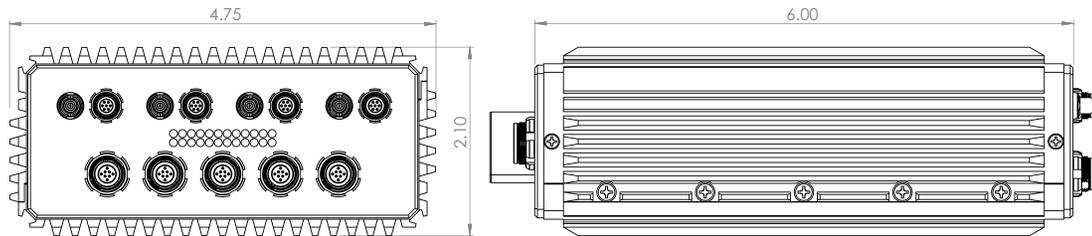


## I/O AND EXPANSION OPTIONS

- NVIDIA® Jetson Xavier or Orin GPU/CPU processing module
- Four 3G-SDI sensor inputs with CSI and serial camera/sensor control
- CoaXPress, Camera Link or GigE Vision with programmable FPGA
- Three I2S ports for audio processing from 3G-SDI cameras
- CANbus for vehicle connectivity or US Army VICTORY compliance
- Three M.2 sites for SSD storage or I/O
- One SD card slot for removable SSD storage
- Four 10GigE ports plus 10GigE Service port
- 40GigE port in lieu of quad 10GigE
- POE+ on all six 10Gig Ethernet ports
- DisplayPort video, dual COM ports, three USB 2.0 ports
- USB 3.1 Gen 2 port via ruggedized USB-C commercial-style
- GMS SecureDNA™ panic support for system Zeroize
- Anti-tamper plus temperature and shock sensor(s)
- Write-protect of mass storage devices
- Passive APNT via accelerometer for "dead reckoning"
- MIL-STD-1275-style power via regulated 24VDC input
- MIL-STD-1275 9-36VDC unregulated input with PCM
- 50ms hold-up power
- I/O via MIL-circular connectors (optional GMS-style Type-C)
- IP66 rated for particulate and water ingress protection

## GPU PERFORMANCE MATRIX

|  | Jetson AGX Xavier | Jetson AGX Orin |
|---|---|---|
| Memory | 64GB 256-bit LPDDR4x | 64GB 256-bit LPDDR5 |
| AI Performance | 32 Dense INT8 TOPS | 138 Dense INT8 TOPS |
| GPU | NVIDIA® Volta™ 512 cores | NVIDIA® Volta™ 2048 cores |
| CPU | NVIDIA Carmel ARM® 64-bit, 8 cores | ARM® Cortex® AE 64-bit, 12 cores |
| PCIe | Gen 4 | Gen 4 |
| Video encoder (H.265) | 4x 4K @60Hx, 16x 1080p @60Hz, 32x 1080p @30Hz | 2x 4K @60Hz, 4x 4K @30Hz, 8x 1080p @60Hz, 16x 1080p @30Hz |
| Video decoder (H.265) | 2x 8K @30Hz, 6s 4K @60Hz, 26x 1080p @60Hz, 52x 1080p @30Hz | 1x 8K @30Hz, 3x 4K @60Hz, 7x 4K @30Hz, 11x 1080p @60Hz, 22x 1080p @30Hz |

## GMS

*GENERAL MICRO SYSTEMS, INC.*
*THE FUTURE OF DISTRIBUTED COMPUTING*
*800-307-4863 / WWW.GMSINC.COM*

# X9 SPIDER
## THE WORLD'S FIRST DISTRIBUTED COMPUTING ARCHITECTURE



HOST AI

WORKSTATION I/O

STORAGE

CPU SUPPORT SUB SYSTEMS

I/O SUPPORT SUB SYSTEMS

SWITCH

POWER

**USB4 /THUNDERBOLT™ 4**
USB 4.0  DISPLAY PORT  POWER (UP TO 50m)

**USB4 /THUNDERBOLT™ 4**
USB 4.0  DISPLAY PORT  POWER (UP TO 50m)

GPGPU

COOLER

2x 100GIG   TB4-1   TB4-2   TB4-3   TB4-4
PWR   ANT   GPI/O
1   2   3   4

12"/24" DISPLAY

X9 CPU & HS I/O

3U VPX (3x)

## X9 DISTRIBUTED SYSTEM ADVANTAGE

The X9 modular, scalable, distributed architecture simplifies applications that require rugged high-performance computing, high-definition video, sensor processing, artificial intelligence (AI) battlefield edge processing, storage, display, and I/O in a small, rugged enclosure with amazing performance per dollar per Watt. All X9 products are modular, expandable or scalable, with Thunderbolt™ 4 technology and our patented LightBolt™ 40Gbps connections in copper or fiber, with optional 100W per-port power for up-/down-stream sensors and system expansion.

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