



**OUR GLOBAL  
COMPETENCE  
CENTRES**

 APOLLO DISPLAY  
TECHNOLOGIES



**FORTEC**  
INTEGRATED



**FORTEC**  
UNITED KINGDOM



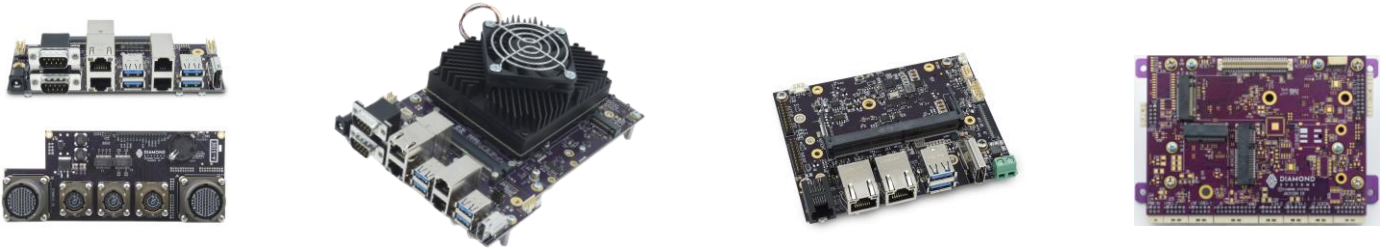
# Product Guide

## Diamond Systems

Diamond Systems' family of NVIDIA embedded solutions delivers cost-effective, rugged and I/O-rich AI-at-the-edge computing solutions. NVIDIA's latest Orin Nano, Orin NX, and AGX Orin modules are now available pre-configured and imaged onboard our latest embedded carrier boards, industrial box PCs, and rugged mission compute platforms, providing a turn-key solution ready for deployment.

Our range of NVIDIA solutions target both industrial and military applications. With a focus on expandable rugged technology, we specialize in vehicle, outdoor, and other harsh environment applications. Diamond Systems were the first NVIDIA partner to marry the world of Jetson with the world of rugged PCIe/104 I/O expansion, enabling the creation of next-generation high performance, I/O-intensive, rugged embedded systems. **Speak to Diamond Systems about our custom Jetson system design and manufacturing services.**

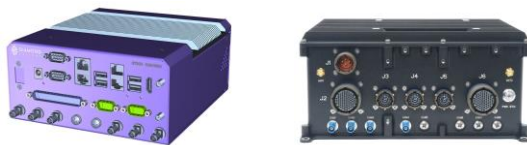
## NVIDIA ORIN CARRIER BOARD SOLUTIONS



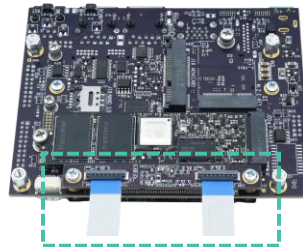
|                  | OSBOURNE                                     | JACKSON                                      | JACKSON-ER                                   |
|------------------|--|--|--|
| Jetson module    | AGX Orin                                     | Orin NX & Orin Nano                          | Orin NX & Orin Nano                          |
| I/O Connectors   | Commercial / Military                        | Commercial                                   | Latching                                     |
| Camera Connector | 120-Pin Samtec Connector                     | 80-Pin Amphenol Connector                    | 80-Pin Amphenol Connector                    |
| Display          | 1x HDMI                                      | 1x HDMI                                      | 1x HDMI                                      |
| Mass storage     | M.2 PCIe x4 NVMe 2280                        | M.2 PCIe x4 NVMe 2280                        | M.2 PCIe x4 NVMe 2280                        |
| Serial ports     | 2x RS-232, 2x RS-485/422/485                 | 1x RS-232, 1x RS-485/422/485                 | 1x RS-232, 1x RS-485/422/485                 |
| USB ports        | 3x USB3.2, 4x USB2.0                         | 3x USB3.0, 1x USB2.0                         | 3x USB3.0, 1x USB2.0                         |
| Ethernet         | 1x 10GbE, 1x GbE                             | 2x GbE                                       | 2x GbE                                       |
| CAN              | 2x CAN 2.0                                   | 1x CAN 2.0                                   | 1x CAN 2.0                                   |
| Integrated GPIO  | 8x DIO                                       | 16x GPIO                                     | 16x GPIO                                     |
| Integrated DAQ   |  |  |  |
| Expansion        | 2x PCIe/USB MiniCard<br>1x PCIe/USB M.2 2230 | 1x PCIe/USB MiniCard<br>1x PCIe/USB M.2 2230 | 1x PCIe/USB MiniCard<br>1x PCIe/USB M.2 2230 |
| Size             | 120x115mm / 4.7x4.5"                         | 110x85mm / 4.33x3.35"                        | 110x85mm / 4.33x3.35"                        |



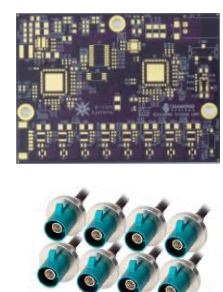
## RUGGED NVIDIA ORIN SYSTEMS



|               | JETBOX   | GEODE   |
|---------------|--|---|
| Jetson module | Orin Nano, Orin NX & AGX Orin  | AGX Orin  |
| Description   | JETBOX industrial box PCs are now configured with Diamond's latest carrier board solutions built on the new Orin series, including Jackson and Osbourne. Offering fanless GPU-based computing, our JETBOX systems offer top quality I/O rich industrial-grade solutions which are configured and imaged to exact requirements. | The GEODE mission computer is based on Diamond's Osbourne carrier board for AGX Orin. The I/O connector scheme offers a mix of standard 38999 connectors plus dedicated SJT style connectors, with easy customization for additional onboard I/O. IP67 Fakra connectors are utilized for camera breakout. |



**8-LANE CSI ADAPTER BOARD**

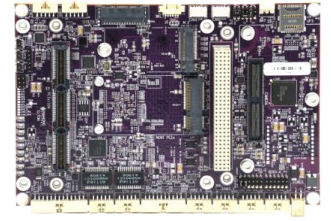


**8-CH GMSL DESERIALIZER**

As Edge AI Vision capabilities advance, it's crucial to seamlessly integrate sensors with embedded hardware for efficient product development and field deployment. Diamond Systems have teamed up with top vision camera and sensor providers to create pre-integrated solutions. These packages include all the necessary camera and sensor software installed on top of our board support packages, helping customers minimize their application development time.



## LEGACY NVIDIA CARRIER BOARDS



|                 | FLOYD                          | STEVIE                                      | ELTON  |
|-----------------|--------------------------------|---|--|
| Jetson module   | Nano & Xavier NX               | AGX Xavier                                  | AGX Xavier   |
| Camera          | 3x CSI-2 4-lane ports          | Camera module socket supports 8x CSI 2-lane | Camera module socket supports 8x CSI 2-lane  |
| Display         | 2x HDMI                        | 2x HDMI                                     | HDMI, LVDS   |
| Mass storage    | mPCIe, M.2 NVME 2280, Micro SD | M.2 PCIe x4 NVMe 2280                       | M.2 PCIe x4 NVMe 2242  |
| Serial ports    | 2x RS-232/422/485              | 2x RS-232                                   | 2x RS-232  |
| USB ports       | 1x 3.0, 2x 2.0                 | 1x USB 3.0/2.0, 2x USB 2.0                  | 2x USB 3.1, 2x USB 2.0   |
| Ethernet        | 2x Gbe PoE+, RJ-45             | 2x Gbe, RJ-45                               | 2x Gbe   |
| CAN             | 1 CAN 2.0 wth NX module        | 2   | 2  |
| Integrated GPIO | 8                              | 13  | 13   |
| Integrated DAQ  |                                | 6x 12-16-bit A/D<br>2x 12-bit D/A           | 6x 12-16-bit A/D<br>2x 12-bit D/A  |
| Expansion       | 1x PCIe/USB MiniCard           | 1x PCIe/USB MiniCard                        | 1x PCIe/USB MiniCard<br>SkyWire modem socket<br><b>PCI/104-Express with 1x PCIe x8,<br/>4x PCIe x1 and PCI bus links</b> |
| Size            | 143x76mm / 5.8x3.0"            | 100x87mm / 3.9x3.4"                         | 102x152mm / 4.0x6.0"   |

## CUSTOM NVIDIA SOLUTIONS



### Satellite application requirements

- Capable of managing high-speed satellite-to-satellite data connections within global low earth orbit with multiple 1Gbps Ethernet ports for internal device connections, and two 10Gbps Ethernet for inter-satellite communication
- Compact, rugged, and I/O rich
- Extended operating temperature support

### Diamond custom NVIDIA AGX Orin solution

- Compact main carrier board featuring core functionality
- Dual daughterboard design featuring I/O and expansion via PCIe x8 link
- Various I/O configurations including RJ45 for development, and Micro-D for deployment in space



### IoT application requirements

- Specialist camera interfaces
- LiDAR interface to track the motion of people and objects through a pre-defined secured area.
- GPIO to sound alarm for unauthorized access
- Cost-sensitive

### Diamond custom NVIDIA SBC solution

- Dual BSP support for Nano & Xavier NX
- Ability to interface to 2 different types of cameras, using one carrier board
- 5VDC@6A power output for 4 independent cameras
- 10 Mbits/s throughput to all camera interfaces
- Achieved a price point under ~\$400 per unit



### Smart parking application requirements

- Compact industrial GPU computer with high-density Ethernet, serial, USB, and GPIO to control lighting and guidance for parking availability.
- Extended operating temperature support.

### Diamond custom NVIDIA box PC solution

- USB2.0 set to device mode
- Access to debug port in front of the enclosure

Diamond's SBCs feature rugged designs with thicker PCBs, latching connectors, integrated data acquisition circuitry, and wide temperature performance. Available with COM Express architecture, we offer performance scalability and longer lifecycle.

**Our complete range of SBCs can be integrated inside rugged enclosures.**



|                            | JASPER   | GEMINI  | SATURN                              | ZETA   | ATHENA IV                          |
|----------------------------|--|---|-------------------------------------|--|------------------------------------|
| <b>Architecture</b>        | COM-based SBC  | COM-based SBC   | Single-Board                        | COM-based SBC                                      | COM-based SBC                      |
| <b>Form Factor</b>         | 3.5 inch   | PCI/104-Express                                       | PCIe/104                            | COM Express Mini                                   | COM Express Mini                   |
| <b>Processor</b>           | Tiger Lake Gen11 i7<br>1185G7E / 1185GRE<br>Raptor Lake Gen13 i7<br>1365URE / 13800HRE | Tiger Lake Gen11 i7<br>1185G7E / 1185GRE              | Apollo Lake:<br>E3950 1.6GHz 4C     | Alder Lake-N: x7425E<br>1.5GHz 4C                  | Alder Lake-N: x7425E<br>1.5GHz 4C  |
| <b>RAM</b>                 | 32GB . 64GB DDR4   | 16GB / 32GB DDR4<br>SODIMM                            | 4GB / 8GB DDR3<br>ECC Support       | E3845 4GB down<br>E3940 4GB down<br>N4200 8GB down | E3845 4 GB down                    |
| <b>Expansion Interface</b> | PCIe/104 Expansion<br>PCIe x1 & x16  | PCI/104-Express<br>(PCIe + PCI)<br>PCIe MiniCard      | PCIe/104 Expansion<br>4x PCIe x1    | PCIe + SATA expansion<br>connector                 | PC/104 ISA                         |
| <b>Display Support</b>     | 2x HDMI<br>1x VGA<br>Dual-channel 24-bit<br>LVDS                                       | 2x HDMI<br>Dual-channel<br>24-bit LVDS                | 2x HDMI<br>Dual-channel 24-bit LVDS | LVDS single-channel<br>VGA                         | VGA, single-channel 24-bit<br>LVDS |
| <b>USB Ports</b>           | 2x USB 2.0<br>3x USB 3.0   | 4x USB 2.0<br>2x USB 3.0                              | 2x USB 2.0<br>2x USB 3.0            | 4x USB 2.0<br>1x USB 3.0                           | 4x USB 2.0<br>1x USB 3.0           |
| <b>Serial Ports</b>        | 4x RS-232/422/485  | 4x RS-232/422/485                                     | 1x RS-232<br>2x RS-232/422/485      | 4x RS-232/422/485                                  | 4x RS-232/422/485                  |
| <b>Network</b>             | 2x Gigabit Ethernet  | 2x Gigabit Ethernet                                   | 2x Gigabit Ethernet                 | 2x Gigabit Ethernet                                | 2x Gigabit Ethernet                |
| <b>Mass Storage</b>        | 2x PCIe Minicard   | 1x PCIe Minicard<br>1x M.2 2242 SATA<br>1x SATA 7-pin | 1x M.2 2242 SATA<br>1x SATA 7-pin   | 1x mSATA<br>1x Micro SD                            | 1x M.2 2230 SATA<br>1x SATA 7-pin  |
| <b>Audio</b>               |  | HDA audio   | HDA audio                           | HDA audio via<br>Daughterboard                     | HDA audio                          |
| <b>Power In</b>            | 12VDC<br>18-36VDC  | 16-34VDC  | 5VDC                                | 6-36VDC  | 5VDC                               |
| <b>Operating Temp</b>      | -40°C to +85°C   | -40°C to +85°C  | -40°C to +85°C                      | -40°C to +85°C                                     | -40°C to +85°C                     |
| <b>Dimensions</b>          | 5.75" x 4.0"   | 4.0" x 4.0"   | 4.5" x 4.0"                         | 3.30" x 2.16"                                      | 4.2 x 4.5"                         |
| <b>Weight</b>              | 146 x 102mm  | 102 x 102mm   | 114 x 102mm                         | 84 x 55mm  | 106 x 114mm                        |
|                            |  | 4.3 oz (121g)   |                                     | 7.7 oz (220g)                                      | 4.4oz (125g)                       |

### 2-IN-ONE DATA ACQUISITION FEATURES

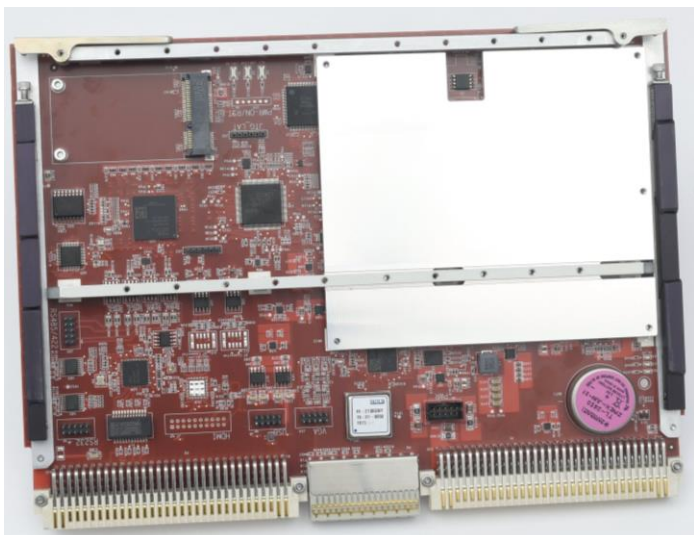
|                      |  |                    |  |  |  |
|----------------------|--|--------------------|--|--|--|
| <b>Analog In</b>     | 16 single-ended /<br>8 differential<br>16-bit resolution |                    | 16 single-ended /<br>8 differential<br>16-bit resolution | 16 single-ended /<br>8 differential<br>16-bit resolution | 16 single-ended /<br>8 differential<br>16-bit resolution |
| <b>Max Rate</b>      | 250KHz   |                    | 250KHz   | 100KHz   | 100KHz   |
| <b>Input Ranges</b>  | ±10V, ±5V,<br>±2.5V, ±1.25V, 0-10V,<br>0-5V, 0-2.5V      |                    | ±10V, ±5V, ±2.5V, ±1.25V,<br>0-10V, 0-5V, 0-2.5V         | 10V, ±5V,<br>0-10V, 0-5V                                 | ±10V, ±5V, ±2.5V, ±1.25V,<br>0-10V, 0-5V, 0-2.5V         |
| <b>Accuracy</b>      | < ±2LSB  |                    | < ±2LSB  | < ±28LSB   | < ±3LSB  |
| <b>A/D FIFO</b>      | 2048 samples with<br>programmable<br>threshold           |                    | 2048 samples with<br>programmable threshold              | 2048 samples with<br>programmable threshold              | 2048 samples   |
| <b>Analog Out</b>    | 4 16-bit   |                    | 4 16-bit   | 4 16-bit   | 4 12-bit   |
| <b>Output Ranges</b> | ±5V, ±10V, 0-5V, 0-10V                                   |                    | ±5V, ±10V, 0-5V, 0-10V                                   | 0-5V, 0-2.5V   | ,±10V, ±5V, 0-10V, 0-5V,                                 |
| <b>Digital I/O</b>   | 22 GPIO 3.3V/5V  | 8 GPIO, 3.3V logic | 22 GPIO 3.3V/5V  | 27 GPIO 3.3V/5V  | 24 GPIO 3.3V & 5V  |
| <b>Direction</b>     | Programmable   |                    | Programmable   | Programmable   | Programmable   |
| <b>Pull-up</b>       | Prog. up/down  |                    | Prog. up/down  | Prog. up/down  | Prog. up / down  |
| <b>Counters</b>      | 8 32-bit up/down   |                    | 8 32-bit up/down   | 8 32-bit up/down   | 8 32-bit up/down   |







|   | HELIX  | HELIOS   | ARIES  | VENUS  |
|---|--|--|--|--|
| <b>Architecture</b>                       | <b>Single-Board</b>                                      | <b>Single-Board</b>                                      | <b>Single-Board</b>                                      | <b>Single-Board</b>  |
| <b>Form Factor</b>                        | PC/104   | PC/104   | PC/104-Plus  | 3.5 inch   |
| <b>Processor</b>                          | DMP Vortex86DX3 1GHz                                     | DMP Vortex86DX 800MHz / 1GHz                             | Bay Trail E3845 1.91GHz 4C<br>Bay Trail E3826 1.46GHz 2C | Skylake Gen6 Core i7-6600U<br>2.6GHz 2C<br>Kaby Lake Gen7 Core i7-7600U<br>2.8GHz 2C |
| <b>RAM</b>                                | 1-2GB down   | 256MB down   | E3826 2GB down<br>E3845 4GB down                         | 4GB down +<br>4-16GB DDR4 SODIMM   |
| <b>Expansion Interface</b>                | PC/104 ISA   | PC/104 ISA   | PC/104-Plus<br>(ISA & PCI)<br>PCIe MiniCard              | PCI/104-Express<br>(PCIe + PCI)<br>2x PCIe MiniCard                                  |
| <b>Display Support</b>                    | VGA, single-channel 24-bit<br>LVDS                       | VGA, single-channel 24-bit<br>LVDS                       | LVDS dual-channel<br>HDMI, VGA<br>DisplayPort            | LVDS dual-channel<br>HDMI<br>VGA   |
| <b>USB Ports</b>                          | 3x or 6x USB 2.0   | 4x USB 2.0   | 3x USB 2.0<br>1x USB 3.0                                 | 2x USB2.0<br>4x USB3.0/USB2.0  |
| <b>Serial Ports</b>                       | 2x RS-232 +<br>2x RS-232/422/485                         | 2x RS-232 +<br>2x RS-232/422/485                         | 4x RS-232/422/485  | 4x RS-232/422/485  |
| <b>Network</b>                            | 1x 10/100 Ethernet<br>1x Gigabit Ethernet                | 1x 10/100 Ethernet                                       | 2x Gigabit Ethernet                                      | 2x Gigabit Ethernet  |
| <b>Mass Storage</b>                       | 1x SATA 7-pin<br>mSATA flashdisk                         | IDE 2mm connector  | 1x SATA-DOM<br>1x mSATA                                  | 1x SATA 7-pin<br>1x SATA-DOM<br>1x mSATA   |
| <b>Audio</b>                              | HDA audio with Line in, Line<br>out, Mic in              | Line in, Line out,<br>and Mic in                         | HDA audio with Line in, Line<br>out, Mic in              | HDA audio with Line in, Line<br>out, Mic in  |
| <b>Power In</b>                           | 5VDC   | 5VDC   | 5VDC   | 9-18VDC  |
| <b>Operating Temp</b>                     | -40°C to +85°C   | -40°C to +85°C   | -40°C to +85°C   | -40°C to +85°C   |
| <b>Dimensions</b>                         | 3.550" x 3.775"<br>90mm x 96mm                           | 3.550" x 3.775"<br>90mm x 96mm                           | 4.5" x 4.0"<br>114mm x 102mm                             | 5.75" x 4.0"<br>146 x 102mm  |
| <b>Weight</b>                             | 2.5oz (71g)  | 2.5oz (71g)  | 10.4oz (296g)  | 12.4 oz (352g)   |
| <b>2-IN-ONE DATA ACQUISITION FEATURES</b> |  |  |  |  |
| <b>Analog In</b>                          | 16 single-ended /<br>8 differential<br>16-bit resolution | 16 single-ended /<br>8 differential<br>16-bit resolution | 16 single-ended /<br>8 differential<br>16-bit resolution |  |
| <b>Max Rate</b>                           | 100KHz   | 250KHz   | 250KHz   |  |
| <b>Input Ranges</b>                       | ±10V, ±5V,<br>0-10V, 0-5V                                | ±10V, ±5V, ±2.5V, ±1.25V, 0-<br>10V, 0-5V, 0-2.5V        | ±10V, ±5V, ±2.5V, ±1.25V, 0-<br>10V, 0-5V, 0-2.5V        |  |
| <b>Accuracy</b>                           | < ±28LSB   | < ±3LSB  | < ±2LSB  |  |
| <b>A/D FIFO</b>                           | 2048 samples with<br>programmable threshold              | 2048 samples with<br>programmable threshold              | 2048 samples with<br>programmable threshold              |  |
| <b>Analog Out</b>                         | 4 16-bit   | 4 16-bit   | 4 16-bit   |  |
| <b>Output Ranges</b>                      | 0-5V, 0-2.5V   | ±5V, ±10V, 0-5V, 0-10V                                   | ±5V, ±10V, 0-5V, 0-10V                                   |  |
| <b>Digital I/O</b>                        | 19-27 GPIO 3.3V/5V                                       | 24-40 GPIO 3.3V/5V                                       | 22 GPIO 3.3V/5V  | 16 GPIO 3.3V/5V  |
| <b>Direction</b>                          | Programmable   | Programmable   | Programmable   | Programmable   |
| <b>Pull-up</b>                            | Prog. up/down  |  | Prog. up/down  | Prog. up/down  |
| <b>Counters</b>                           |  | 1 24-bit, 1 16-bit                                       | 8 32-bit up/down   |  |



#### **US Army M1 tank application requirements**

- VME form factor SBC to replace EOL product in long term military vehicle upgrade program to add diagnostic capabilities
- Desired risk reduction using proven solutions
- x86 mid-level SBC with soldered memory
- 2 CAN ports
- MIL-STD-1553 communications
- Soldered flashdisk / no sockets

#### **Diamond VME64x SBC solution**

- Custom SBC based on Aries (Bay Trail E3845, 4GB soldered RAM)
- 2 CAN ports based on JNMM-2L-XT board with FPGA CAN core
- MIL-STD-1553 from Holt using minicard reference design including FPGA code and drivers
- Soldered flashdisk IC from Innodisk
- Reused existing mechanical components (board stiffeners etc.)
- Custom heat spreader to fit within height limits

Diamond Systems offers a wide range of I/O modules in PC/104 and PCIe MiniCard form factors. Our analog and digital I/O modules are supported by our industry-leading Universal Driver software, consisting of a C language programming library along with example programs and GUI demos that provide instant verification of system operation. All products meet -40 to +85°C operating temperature.

## ANALOG I/O

| Product        | Form Factor | # A/D        | Res | Max  | Min     | Gain    | Max  | Autocal | FIFO | # D/A | Res    | Max  | Min    | GPIO        |
|----------------|-------------|--------------|-----|------|---------|---------|------|---------|------|-------|--------|--|--------|-------------|
| DMM-32DX-AT    | PC/104      | 32 SE, 16 DI | 16  | ±10V | 0-625V  | Program | 250K | Auto    | 1024 | 4     | 16     | ±10V   | 0-5V   | 24 I/O      |
| DMM-16R-AT     | PC/104      | 16SE, 8 DI   | 16  | ±10V | 0-1.25V | Program | 100K | Yes     | 512  | 4     | 12     | ±10V   | 0-5V   | 8 In, 8 Out |
| DMM-16RP-AT    | PC/104-Plus | 16SE, 8 DI   | 16  | ±10V | 0-1.25V | Program | 100K | Yes     | 512  | 4     | 12     | ±10V   | 0-5V   | 8 In, 8 Out |
| DS-MPE-DAQ0804 | MiniCard    | 8SE, 4 DI    | 16  | ±10V | 0-5V    | Program | 100K |         | 2048 | 4     | 16     | 0-5V   | 0-2.5V | 14 I/O      |
| RMM-1616A-XT   | PC/104      |              |     |      |         |         |      |         |      | 16    | 16     | Voltage ranges:<br>±10V, ±5V,<br>0-10V, 0-5V     |        | 48 I/O      |
| RMM-816A-XT    | PC/104      |              |     |      |         |         |      |         | 8    | 16    | 48 I/O |  |        |             |
| RMM-416A-XT    | PC/104      |              |     |      |         |         |      |         | 4    | 16    | 48 I/O |  |        |             |
| RMM-1616AP-XT  | PC/104-Plus |              |     |      |         |         |      |         |      | 16    | 16     | Current ranges:<br>0-20mA,<br>0-24mA, 4-<br>20mA |        | 48 I/O      |
| RMM-816AP-XT   | PC/104-Plus |              |     |      |         |         |      |         | 8    | 16    | 48 I/O |  |        |             |
| RMM-416AP-XT   | PC/104-Plus |              |     |      |         |         |      |         | 4    | 16    | 48 I/O |  |        |             |



DMM-32DX-AT



DMM-16RP-AT



RMM-1616AP-XT



GPIO-MM-XT



DS-MPE-DAQ0804

DS-MPE-GPIO



DS-MPE-GE210  
Ethernet Minicard

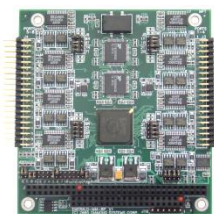
DS-MPE-CAN2L  
Ethernet Minicard

## DIGITAL I/O

| Product      | Form Factor | # GPIO | Voltage | Buffered | Direction    | Opto          | Relays  | Load     | Counters | Ctr Bits | Max Rate |
|--------------|-------------|--------|---------|----------|--------------|---------------|---------|----------|----------|----------|----------|
| GPIO-MM-XT   | PC/104      | 100    | 5V      | Yes      | Programmable |               |         |          | 10       | 16       | 10MHz    |
| DS-MPE-GPIO  | MiniCard    | 36     | 5V/3.3V | Yes      | Programmable |               |         |          | 8        | 32       | 50MHz    |
| PMM-P        | PC/104      |        |         |          |              |               | 16 SPDT | 30VDC/2A |          |          |          |
| OPMM-1616-XT | PC/104      |        |         |          |              | 16 In 3-30VDC | 16 SPDT | 30VDC/2A |          |          |          |
| IR104-PBF    | PC/104      |        |         |          |              | 20 In 3-24V   | 20 SPST | 30VDC/5A |          |          |          |



EMM-8EL-XT



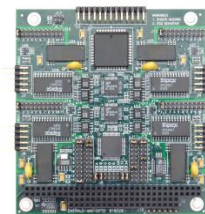
EMM-8PL-XT



EMM-8PLUS-XT



EMM-4M-XT



EMM-OPT4-XT



DS-MPE-SER4M

DS-MPE-OPT4232

## SERIAL I/O

| Product        | Form Factor | # RS-232 | Max Rate | # RS-422 | Max Rate | # RS-485 | Max Rate | Isolated | Protocol | Address | GPIO |
|----------------|-------------|----------|----------|----------|----------|----------|----------|----------|----------|---------|------|
| EMM-8EL/4EL-XT | PCIe/104    | 8/4      | 1Mbps    | 8/4      | 1Mbps    | 8/4      | 1Mbps    | Yes      | Program  | Program | 8    |
| EMM-8E/4E-XT   | PCIe/104    | 8/4      | 1Mbps    | 8/4      | 20Mbps   | 8/4      | 20Mbps   |          | Program  | Program | 8    |
| EMM-8PL-XT     | PC/104      | 8        | 115Kbps  | 8        | 1.5Mbps  | 8        | 1.5Mbps  |          | Program  | Program | 8    |
| EMM-4M-XT      | PC/104      | 4        | 230kbps  | 4        | 1.5Mbps  | 4        | 1.5Mbps  |          | Jumper   | Jumper  |      |
| EMM-OPT4-XT    | PC/104      | 4        | 230Kbps  | 4        | 6.25Mbps | 4        | 6.25Mbps | Yes      | Jumper   | Jumper  | 24   |
| EMM-8PLUS-XT   | PC/104-Plus | 8        | 460Kbps  | 8        | 6.25Mbps | 8        | 6.25Mbps |          | Jumper   | Program | 8    |
| DS-MPE-SER4M   | MiniCard    | 4        | 1Mbps    | 4        | 10Mbps   | 4        | 10Mbps   |          | Software | Auto    |      |
| DS-MPE-OPT4232 | Minicard    | 4        | 1Mbps    | 0        |          | 0        |          | Yes      | N/A      | Auto    |      |
| DS-MPE-OPT4485 | Minicard    | 0        |          | 0        |          | 4        | 1Mbps    | Yes      | N/A      | Auto    |      |





Diamond Systems specializes in the provision of military-grade rugged embedded computing systems for mission critical applications. Our offerings encompass features such as a solid-body aluminium CNC construction, MIL-DTL-38999 connectors, IP67 waterproof protection, and an extended temperature range spanning from -40 to +85 degrees Celsius.

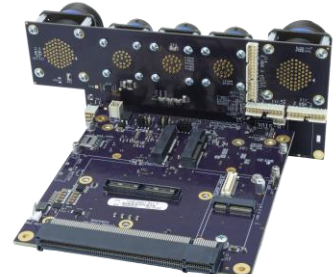
## GEODE RUGGED MISSION COMPUTERS

**GEODE** is our newest generation rugged system platform featuring design efficiencies to support rapid delivery of custom systems. A PCB assembly containing the I/O connectors is direct-mounted on the main processor board. In this way the system is more compact, more rugged, and easier to produce, and complex and expensive 38999 cable assemblies are eliminated. The connector board contains extra 38999 connectors to support additional I/O boards installed inside the enclosure via low-cost cabling, so customizing the I/O requires no changes to the case in most cases. This technique significantly reduces the time and cost for realizing custom rugged systems.

|                             | GEODE-JSP   | GEODE-OSB  |
|-----------------------------|---|--|
| Architecture                | COM Express Type 6  | NVIDIA Jetson AGX Orin                             |
| Processor                   | Tiger Lake Core i7 [15W]<br>Raptor Lake Core i7 [45W]             | ARM Cortex-A78AE                                   |
| GPU                         | Intel Iris XE   | NVIDIA Ampere                                      |
| RAM                         | Up to 64GB RAM  | 32GB / 64GB  |
| Mass storage                | 1x mSATA M.2<br>2x mSATA MiniCard                                 | 64GB eMMC<br>1x M.2 NVMe Storage                   |
| Serial ports                | 4x RS-232/422/485   | 2x RS-232<br>2x RS-232/422/485                     |
| USB ports                   | 2x USB 3.2<br>2x USB 2.0  | 2x USB 3.2<br>2x USB 2.0                           |
| Ethernet                    | 2x GbE  | 1x GbE<br>1x 10GbE                                 |
| Integrated GPIO             | 22x GPIO 3.3V/5V  | 8x GPIO 3.3V                                       |
| Integrated data acquisition | 16x 16-bit A/D<br>4x 16bit D/A                                    |  |
| Expansion                   | PCIe/104<br>2x MiniCard   | PCIe<br>2x MiniCard<br>1x M.2 2230 E-Key           |
| Standard enclosure size     | 9.1W x 0.7D x 4.1H in.<br>230W x 179D x 104H mm                   | 9.49W x 8.46D x 4.45H in.<br>241W x 215D x 113H mm |
| Operating system support    | Windows 10 IOT LTSC;<br>Linux Ubuntu 20.04 LTS;<br>64-bit support | JetPack 5<br>Linux Ubuntu 20.04                    |



GEODE JASPER



GEODE OSBOURNE

## SABRE COMPACT & TOWER MISSION COMPUTERS



The **SABRE** family of rugged mission computers offer a compact form factor and are primarily designed for use in the most challenging vehicle environments. Built up with our range of rugged power supplies, MIL-STD-461, 704, and 1275 compliance is available. Systems have been tested to MIL-STD-810G specifications up to 75G shock.

|                             | SabreCom VNS  |
|-----------------------------|---|
| Processor                   | Skylake 6 <sup>th</sup> Gen Core i7<br>i7-6600U 2C 2.6GHz         |
| RAM                         | 4-20GB  |
| Mass storage                | 32-256GB SSD  |
| Serial ports                | 4x RS-232/422/485   |
| USB ports                   | 4x USB 2.0, 2x USB 3.0  |
| Ethernet                    | 2x 10/100/1000  |
| Integrated GPIO             | 16  |
| Integrated data acquisition |   |
| Expansion                   | PCIe/104, PCI-104, and<br>MiniCard sockets                        |
| Standard enclosure size     | 7.8W x 6.9D x 2.6H in.<br>198W x 175D x 66H mm                    |
| Operating system support    | Windows 10 IOT LTSC;<br>Linux Ubuntu 16.04 LTS;<br>64-bit support |





## OCTAVIO-SATURN RUGGED INDUSTRIAL COMPUTER

**OCTAVIO** systems are compact, I/O-rich embedded computers for industrial applications. The form factor maximizes the space available for I/O connectors in a wall mounted or DIN-rail mounted form-factor. Additional I/O boards can be installed in the enclosure and accessed via the ready-made cut-out on the front panel. **OCTAVIO-SATURN** is based on Diamond's Saturn SBC, featuring "Apollo Lake" E3950 Atom series quad-core processor running at 1.6GHz, with 4GB soldered RAM. With latching I/O connectors and -40/+85C operation, Saturn provides a rugged platform for embedded computing solutions in harsh environments. Featuring a PCIe / USB MiniCard socket and a PCIe/104 OneBank socket, Octavio-Saturn can be used to install additional I/O boards in the enclosure and bring the I/O out to predefined cut-outs on the front panel.



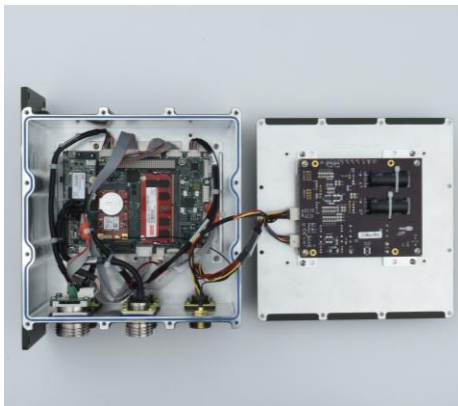
SATURN  
2-in-1 SBC



SATURN-OCTAVIO

| 2-IN-ONE DATA ACQUISITION FEATURES |   |
|------------------------------------|---|
| <b>Analog In</b>                   | 16 single-ended / 8 differential<br>16-bit resolution |
| <b>Max Rate</b>                    | 250KHz  |
| <b>Input Ranges</b>                | ±10V, ±5V, ±2.5V, ±1.25V,<br>0-10V, 0-5V, 0-2.5V      |
| <b>A/D FIFO</b>                    | 2048 samples with programmable threshold              |
| <b>Analog Out</b>                  | 4 16-bit  |
| <b>Output Ranges</b>               | ±5V, ±10V, 0-5V, 0-10V                                |
| <b>Digital I/O</b>                 | 22 GPIO 3.3V/5V                                       |
| <b>Counters</b>                    | 8 32-bit up/down                                      |

| OCTAVIO-SATURN      |  |
|---------------------|--|
| Form Factor         | PCIe/104                                     |
| Processor           | Apollo Lake:<br>E3950 1.6GHz 4C              |
| RAM                 | 4GB / 8GB DDR3<br>ECC Support                |
| Expansion Interface | PCIe/104 Expansion<br>4x PCIe x1             |
| Display Support     | 2x HDMI                                      |
| USB Ports           | 2x USB 2.0<br>2x USB 3.0                     |
| Serial Ports        | 1x RS-232<br>2x RS-232/422/485               |
| Network             | 2x Gigabit Ethernet                          |
| Mass Storage        | 1x M.2 2242 SATA<br>1x SATA 7-pin            |
| Audio               | HDA audio                                    |
| Power In            | 5VDC   |
| Operating Temp      | -40°C to +85°C                               |
| Dimensions          | 5.75"W x 5.5"H x 5.25"D<br>146 x 140 x 133mm |



Custom SabreCOM Rugged Tower for Leonard DRS

## Power Supplies

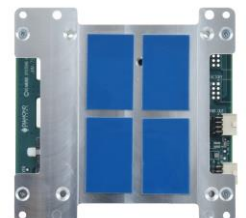
Diamond offers a wide selection of rugged, wide-temperature, PC/104-sized DC/DC power supplies offering options of up to 218W output power, multiple output voltages, and fixed and variable voltage inputs.

| Model            | JMM-512-V512 | JMM-5000 | JMM-5012 | JMM-5312 | JMM-7500 |
|------------------|--------------|----------|----------|----------|----------|
| Input voltage    | 7-34VDC      | 7-34VDC  | 7-34VDC  | 7-34VDC  | 9-36VDC  |
| Max power        | 50W          | 100W     | 196W     | 218W     | 80W      |
| +5V              | 10A          | 20A      | 20A      | 20A      | 16A      |
| +12V             | 2A           |          | 8A       | 8A       | 6.66A    |
| +3.3V            |              |          |          | 5A       |          |
| PC/104           | Y            | Y        | Y        | Y        |          |
| PC/104-Plus      |              | Y        | Y        | Y        |          |
| Smarts           |              |          |          | Y        |          |
| Isolation option |              |          |          |          | Y        |
| UPS option       |              |          |          |          | Y        |
| MIL 461/704/1275 |              |          |          |          | Y        |
| Heat spreader    | Y            | Y        | Y        | Y        | Y        |
| Heat sink        |              | Y        | Y        | Y        |          |

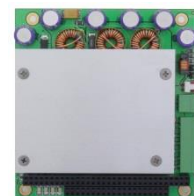
JMM-7500



CONDUCTION COOLED  
MOUNTING PLATES



JMM-512

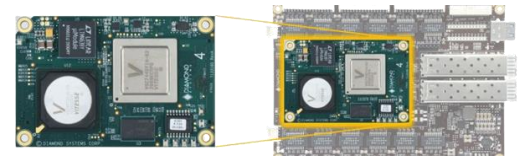


JMM-5000



Diamond's **Epsilon** line of Ethernet switches provide compact, convenient, industrial/military grade solutions for managed gigabit Ethernet switching.

- ◆ Layer 2 / Layer 3 switching / routing capability with feature-rich embedded software
- ◆ Up to 24 1G ports + 4 10G on a single rugged board
- ◆ In-band web GUI and out-of-band serial port interfaces
- ◆ IEEE 1588 / PTP capability available on most products
- ◆ Embedded software can be customized with your own branding
- ◆ Latching connectors, thicker PCBs, and industrial -40/+85C operating temperature
- ◆ Qualified to MIL standards for shock and vibration



Ethernet switch with Conduction cooling used in SabreNet-2400



## EPSM ETHERNET SWITCH MODULES

Our **EPSM** Epsilon Ethernet switch modules provide compact off-the-shelf solutions that eliminate 95% of the design effort and risk for a custom managed Ethernet switch. Customers have the flexibility to define their own form factor and connectors while enjoying vastly reduced development time and cost.



EPSM-12G2F



EPSM-10GX



EPSM-10GX4

| Model      | Copper Ports | Fiber Ports | Form Factor      | Dimensions              | Notes  |
|------------|--------------|-------------|------------------|-------------------------|--|
| EPSM-12G2F | 24x 1G       | 2x 1G/2.5G  | COM Express Mini | 84 x 55mm / 3.3 x 2.2in | Switch module for custom solutions; Layer 3 and IEEE-1588 capability |
| EPSM-10GX  | 24x 1G       | 2x 10G      | COM Express Mini | 84 x 55mm / 3.3 x 2.2in | Switch module for custom solutions; Layer 3 and IEEE-1588 capability |
| EPSM-10GX4 | 24x 1G       | 4x 10G      | COM Express Mini | 84 x 55mm / 3.3 x 2.2in | Switch module for custom solutions; Layer 3 and IEEE-1588 capability |

## EPS RUGGED ETHERNET CARRIER BOARDS



EPS-24G4X



EPS-24026



EPS-12002L



EPS-12000-CM



EPS-8100

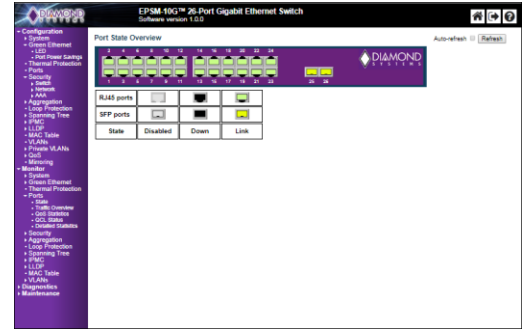
| Model         | Copper Ports | Fiber Ports | Form Factor      | Dimensions                  | Notes  |
|---------------|--------------|-------------|------------------|-----------------------------|--|
| EPS-24G4X     | 24x 1G       | 4x 10G      | 3.5 inch         | 146 x 102mm / 5.75 x 4.00in | Full featured switch, 10G Layer 3 and IEEE-1588 capability           |
| EPS-24026-104 | 24x 1G       | 2x 1G/2.5G  | PC/104           | 90 x 96mm / 3.55 x 3.775in  | High port density, rugged design                                     |
| EPS-24016-104 | 16x 1G       |             | PC/104           | 90 x 96mm / 3.55 x 3.775in  | High port density, rugged design                                     |
| EPS-12G2      | 12x 1G       | 2x 1G/2.5G  | COM Express      | 125 x 95mm / 4.9 x 3.7in    | Economical 12 port rugged switch with dual fiber backbone capability |
| EPS-12G1      | 12x 1G       | 1x 1G/2.5G  | COM Express      | 125 x 95mm / 4.9 x 3.7in    | Economical 12 port rugged switch with fiber uplink                   |
| EPS-12G0      | 12x 1G       |             | COM Express      | 125 x 95mm / 4.9 x 3.7in    | Economical 12-port rugged switch                                     |
| EPS-12000     | 12x 1G       |             | COM Express Mini | 84 x 55mm / 3.3 x 2.2in     | Ultra-compact, rugged, IEEE-1588 capable                             |
| EPS-8100      | 8x 1G        |             | PC/104           | 90 x 96mm / 3.55 x 3.775in  | Industry-leading rugged compact switch for vehicle applications      |





# EMBEDDED SWITCH SOFTWARE

| LAYER 2+ SOFTWARE  | LAYER 3 SOFTWARE   |
|--|--|
| <ul style="list-style-type: none"> <li>- 8K MAC addresses and 4K VLANs (IEEE 802.1Q)</li> <li>- 8K IPv4 and IPv6 multicast group support</li> <li>- Jumbo frame support at all speeds</li> <li>- Flexible link aggregation support based on Layer-2 through Layer-4 information (IEEE 802.3ad)</li> <li>- Multicast and broadcast storm control, as well as flooding control</li> <li>- Rapid Spanning Tree protocol (RSTP) and MSTP</li> <li>- Multiple protocol support: IEEE 802.1d, IEEE 802.1w, IEEE 802.1s, and IEEE 802.1X</li> <li>- 8 priorities and 8 QoS queues per port with scheduling</li> </ul> | <ul style="list-style-type: none"> <li>- Hardware and software based IPv6 L3 static routing</li> <li>- RFC 2328 OSPFv2 dynamic routing</li> <li>- IEEE 1588 precision time protocol (PTP)</li> <li>- RADIUS accounting</li> <li>- Port and Queue policers</li> </ul> |



**Example screenshot of embedded software for Diamond's EPSILON Ethernet switch modules.** The software can be customized with customer branding, port configuration, and other features.

# SABRE RUGGED ETHERNET SWITCHES

| ETHERNET SWITCHES | SabreNet 12000 | SabreNet 24000    |
|-------------------|----------------|-------------------|
| Copper ports      | 12x 1G         | 24x 1G<br>4x 10G  |
| Fiber ports       |                | 4x 10G [Optional] |
| Input voltage     | 6-34VDC        | 5-34VDC           |
| PTP option        | Yes            | Yes               |
| Dimensions in     | 6.4Wx5.4Dx2.6H | 7.8Wx6.9Dx2.6H    |
| Dimensions mm     | 162Wx137Dx66H  | 198Wx175Dx66H     |

The **SABRE** family of rugged Ethernet switches provide guaranteed reliability in the most challenging vehicle environments. MIL-STD-461, 704, and 1275 compliance is available. Systems have been tested to MIL-STD-810G specifications up to 75G shock.



SabreNet 12000



SabreNet 24000

# CUSTOM ETHERNET SOLUTIONS

## Airborne application requirements

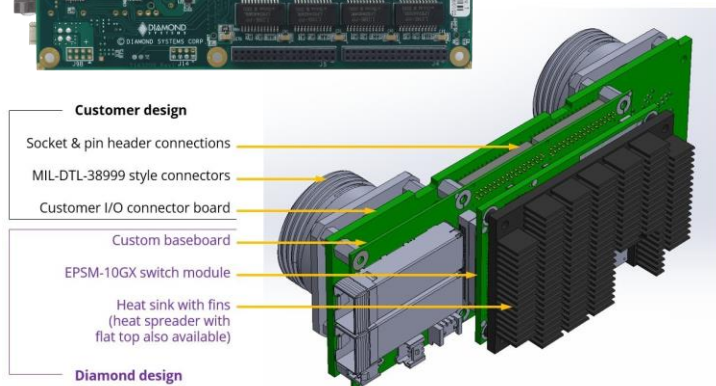
- Gigabit Ethernet switch with copper and fiber ports
- Compact sized carrier board
- Quick development time
- Rugged design with as few cables as possible

## Diamond EPSC-12002 solution

- EPSILON compact Ethernet switch module with custom carrier
- 2-board solution based on off-the-shelf switch module achieved lowest development cost and smallest size



EPSC-12002 Bottom Connectors

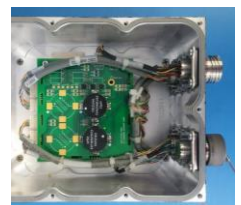


## Ship-to-shore military application requirements

- 8 Gigabit Ethernet ports with layer 2 support
- Rugged military solution

## Diamond EPSC-12002 solution

- MIL-DTL-38999 connectors, IP67 design
- EPS-8100-XT switch with 8 gigabit Ethernet ports
- WebStaX Layer 2+ software
- Serial port for configuration and management
- MIL-STD-202G, 461, and other qualification testing completed by customer and system passed
- Dimensions: 5.5"W x 7.0"D x 3.75"H / 140x178x95mm



Our company network supports you worldwide with offices in Germany, Austria, Switzerland, the UK and the USA. For more information please contact:

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