

Networked Video/Control Processor

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MCOTS DuraCOR 8042 Core i7 Mission Processor with
Video Capture, 1553 and Ethernet Switch

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Key Features

- Rugged mission processor with quad-core 2.7 GHz 5th Gen Intel Core i7 CPU
- Video frame grabbers for RS170 and HD-SDI cameras
- Dual-redundant MIL-STD-1553 interfaces
- 20-port managed GbE Switch with 1588 PTP support
- Rugged SFF IP67 (dust and waterproof) aluminum chassis with MIL-DTL-38999 connectors
- Designed for MIL-STD-810/461 reliability (thermal, shock, vibration, altitude, humidity, EMI/EMC)
- 28 VDC MIL-1275/704 and DO-160 power supply with transient protection

Applications

- Civil and military in-vehicle and airborne mission computing
- Multi-core fanless x86 embedded processor for SWaP-sensitive platform
- Fixed and rotary wing (un)manned aircraft
- Tactical ground vehicles and missile defense
- Interface for platform sensors, vetronics, and communications subsystems
- C4ISR technology refresh and LRU upgrades
- Embedded applications with demanding temp, shock, vibration, altitude, etc.

Overview

This Modified COTS (MCOTS) variant of the rugged Parvus® DuraCOR® 8042 modular mission computer has been integrated with add-on I/O modules (including video frame grabbers, vehicle data bus controllers, isolated RS422 interfaces, and Ethernet network switch) to support vehicle sensor control and IP network distribution requirements. Based on a 5th gen Intel® Core™ i7 (Broadwell) processor, integrated with CVBS and HD-SDI video capture cards, along with a 2-channel MIL-STD-1553 interface module, 8-port opto-isolated serial port module, and 20-port GbE switch, this highly-configured unit can output high-definition video from on-board cameras, control a host of legacy serial devices, and connect 20 Ethernet devices on a Gigabit Ethernet backbone. These system enhancements add to an already comprehensive set of native I/O offered by the base 8042, including multiple Ethernet NIC ports, USB 3.0/2.0 ports, RS232/422/485 COM ports, and GPIO interfaces, along with triple display outputs, audio, and eSATA.

Delivering new capabilities for C4ISR, image processing and surveillance applications, the DuraCOR 8042 is optimally designed for size, weight, and power (SWaP)-sensitive mobile, airborne, ground, manned/unmanned vehicle and sensor requirements. It combines powerful graphics and multi-core processing with ultra-reliable modularity, mechanical robustness in a fanless IP67 design (dust and waterproof) designed to support mission-specific payloads using mini-PCIe and PCIe104 add-on modules. The unit also supports an internal mSATA Solid State Disk (SSD) and/or optional removable 2.5" solid state disk add-on segments, capable of hosting high-capacity solid state media to support mission-specific video recording and data storage requirements.

This MCOTS variant takes advantage of Curtiss-Wright's cost competitive and quick-turn application engineering services, leveraging the unit's PCI Express® (PCIe) Mini Card and stackable PCIe/104™ bus I/O architecture to support turnkey integration of add-on high-speed I/O and graphics card expansion without NRE cost. The unit requires no active cooling nor cold plate, and includes a military-grade power supply supporting aircraft (MIL-STD-704F, DO-160G) and ground vehicle (MIL-STD-1275D) voltages with capabilities for optional 50/200 ms power hold-up and N+1 failover redundancy. Minimizing risk, the base DuraCOR 8042 product was previously qual tested to extreme MIL-STD- 810G, MIL-STD-461G, MIL-STD-1275D, MIL-STD-704F and RTCA/ DO-160G conditions for environmental, power and EMI compliance.

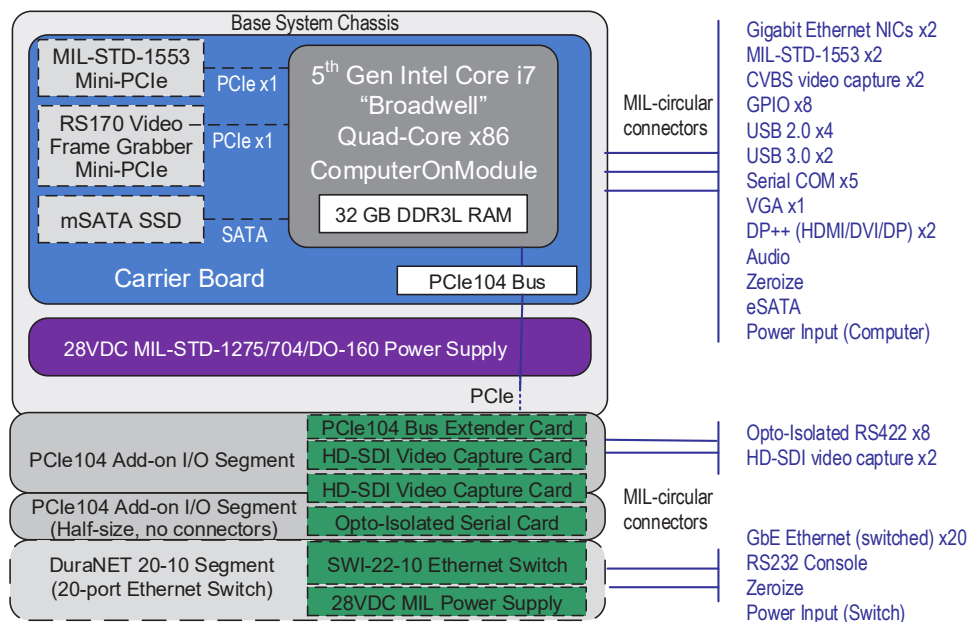


Figure 1: Block diagram of DuraCOR 8042 MCOTS system architecture

Features

High performance CPU and GPU

- Intel 5th Gen Core i7-5850EQ @ 2.7 GHz (Broadwell) processor, quad-core (8-thread), 32 GB DDR3L RAM
- Intel Iris Pro Graphics 6200 (GT3e) with up to 1 GHz performance, and 40 graphics execution units with up to 640 GFLOPS performance

Connectivity and I/O

- 2 x Gigabit Ethernet NIC ports
- 20 x Gigabit Ethernet Switch ports (with QoS, VLAN, RSTP, 1588, ACL, CLI, HTTPS support)
- 2 x CVBS RS170 and 2 x HD-SDI inputs
- 2 x BC/MT MIL-STD-1553 interfaces or multi-RT/MT per channel, IRIG-B time input
- 2 x USB 3.0 + 4 x USB 2.0
- 10 x RS422 + 2 x RS232 + 1x RS485 (8 x 422 are opto-isolated)
- 8 x DIO (5V tolerant)
- Stereo audio, microphone
- eSATA for external direct attached storage
- 3 x independent display outputs (VGA, 2 x HDMI/DVI/DP)
- Other pre-integrated I/O by special order (i.e. ARINC 429, CAN, video encoder/streamer, DIO, etc)

Data storage

- Internal mSATA Flash SSD
- External SATA (eSATA) interface on DTL-38999 connector
- Optional removable 2.5" SSD storage

Rugged mechanical design

- Designed for MIL-STD-810G and DO-160G shock, vibration, thermal, altitude, humidity as well as MIL-STD-461F and DO-160 conducted/radiated emissions and susceptibility (base unit without add-on I/O fully qualified; delta qual testing can be performed)
- -40 to +71°C fanless extended temp operation with no moving parts (passive natural convection)
- Filtered, transient and EMI-protected MIL-STD-1275/704/DO-160 compliant power supply for aircraft and vehicles
- Corrosion-resistant, aluminum chassis sealed against water immersion, dust exposure (IP67 / MIL-STD-810G)
- Rugged circular MIL-DTL-38999 Series III I/O connectors

Modular/expandable

- Pre-integrated rugged COTS Mini-PCIe I/O cards and stackable, PCIe104 I/O modules (other configs possible)
- Modular interlocking chassis design supports add-on segments for I/O and storage with pre-integrated DTL-38999s for I/O integration without mechanical changes

Power Specifications

- 28V nominal power input voltage (11 to 35.5 VDC continuous; 1500 VDC galvanic isolation (input to system power))
- MIL-STD-704F 28 VDC compliant for aircraft electrical operation
- MIL-STD-1275D 28 VDC compliant for ground vehicle operation
- RTCA/DO-160 compliant for aircraft operation
- Power consumption: <90W maximum (approx)

Physical Specifications

- Dimensions (H x D x W, excluding connectors/mounts):
 - + Approx. 7.64 x 6.75 x 6.25" (19.39 x 17.15 x 15.85 cm)
- Chassis: aluminum alloy, corrosion resistant
- Ingress protection: dust and water proof (similar to IP67)
- Finish: black anodize finish per MIL-A-8625, Type II, Class 2
- Connectors: LEMO M Series circular (power) and MIL-DTL-38999 Series III (for I/O), includes coax contacts in 38999 for HD-SDI signals
- Installation: base flange mount or side boss mount (90° rotated orientation)
- Cooling: natural passive convection/conduction, no moving parts

Environmental Specifications

Designed to meet MIL-STD-810G, RTCA/DO-160G (base 8042 fully qualified; MCOTS variant qual by similarity)

- Operating temperature: -40 to +71°C (-40 to +160°F) ambient
- Storage temperature: -55 to +85°C (-67 to +185°F)
- Humidity (operating/transport): Up to 95% RH @ 40°C, non-condensing
- Operating shock: 40 g, 11 ms, 3 pos/neg per axis
- Crash hazard shock: 75 g, 11 ms, 12 terminal peak shock pulses
- Random vibration: Combined jet-helo-tracked vehicle profile
- Ingress (dust/sand): No ingress (similar to IP67)
- Water immersion: No leakage per 1 meter submersion, 30 minutes
- Operating altitude: 50,000 ft (15,240 meters)
- Storage altitude: 60,000 ft (18,288 meters)

EMI Compliance

EMI/EMC isolation

Designed to meet MIL-STD-461G, RTCA/DO-160G, EN55022/55024 (base 8042 fully qualified; MCOTS variant qual by similarity)

- Conducted emissions:
 - + MIL-STD-461F, CE102
 - + DO-160G Sec. 21; Category L
 - + EN 55022 Class A
- Conducted susceptibility:
 - + MIL-STD-461F, CS101
 - + MIL-STD-461F, CS114
 - + MIL-STD-461F, CS115
 - + MIL-STD-461F, CS116
 - + RTCA/DO-160G Sec. 20
 - + EN 55024 electrical fast transient/conducted immunity
- Radiated emissions:
 - + MIL-STD-461F, RE102
 - + DO-160G Sec. 21
 - + EN 55022, class A
- Radiated susceptibility
 - + MIL-STD-461F RS-103
 - + DO-160G Sec. 20
 - + EN 55024 radiated electromagnetic field and immunity

Other Specifications

Reliability

- Designed and manufactured using AS9100 aerospace grade/ISO 9001:2000 certified quality program

Export jurisdiction

- ITAR-free, U.S. Commerce EAR controlled (ECCN 5A002)

Ordering Information

- C8042-2EO-100: DuraCOR 8042 mission computer with 64 GB mSATA SSD-Win 7 OS, 2 x PC104 expansion segments and integrated I/O:
 - + Added features: 2 x 1553 channels, 2 x CVBS frame grabber inputs, 2 x HD-SDI frame grabber inputs, 8 x optically isolated RS-422 serial ports (other MCOTS I/O configurations possible - consult sales)
- Starter breakout cable set from DTL-38999 connectors to commercial PC-style connectors can be provided
- Delta qual testing/qual by similarity analysis available

Refer to full Parvus DuraCOR 8042 product sheet for more detailed technical specifications on the base COTS system architecture and capabilities. Tailored MCOTS variants like shown here can be integrated to satisfy platform-specific requirements at minimal/no NRE cost, including pre-integration of add-on Mini-PCIe and PCIe/104 I/O cards.

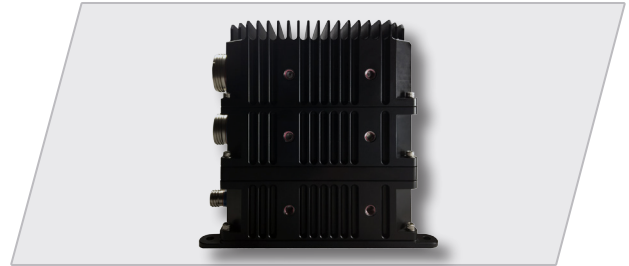


Figure 2: Side view



Figure 3: Rear view

Line Drawings

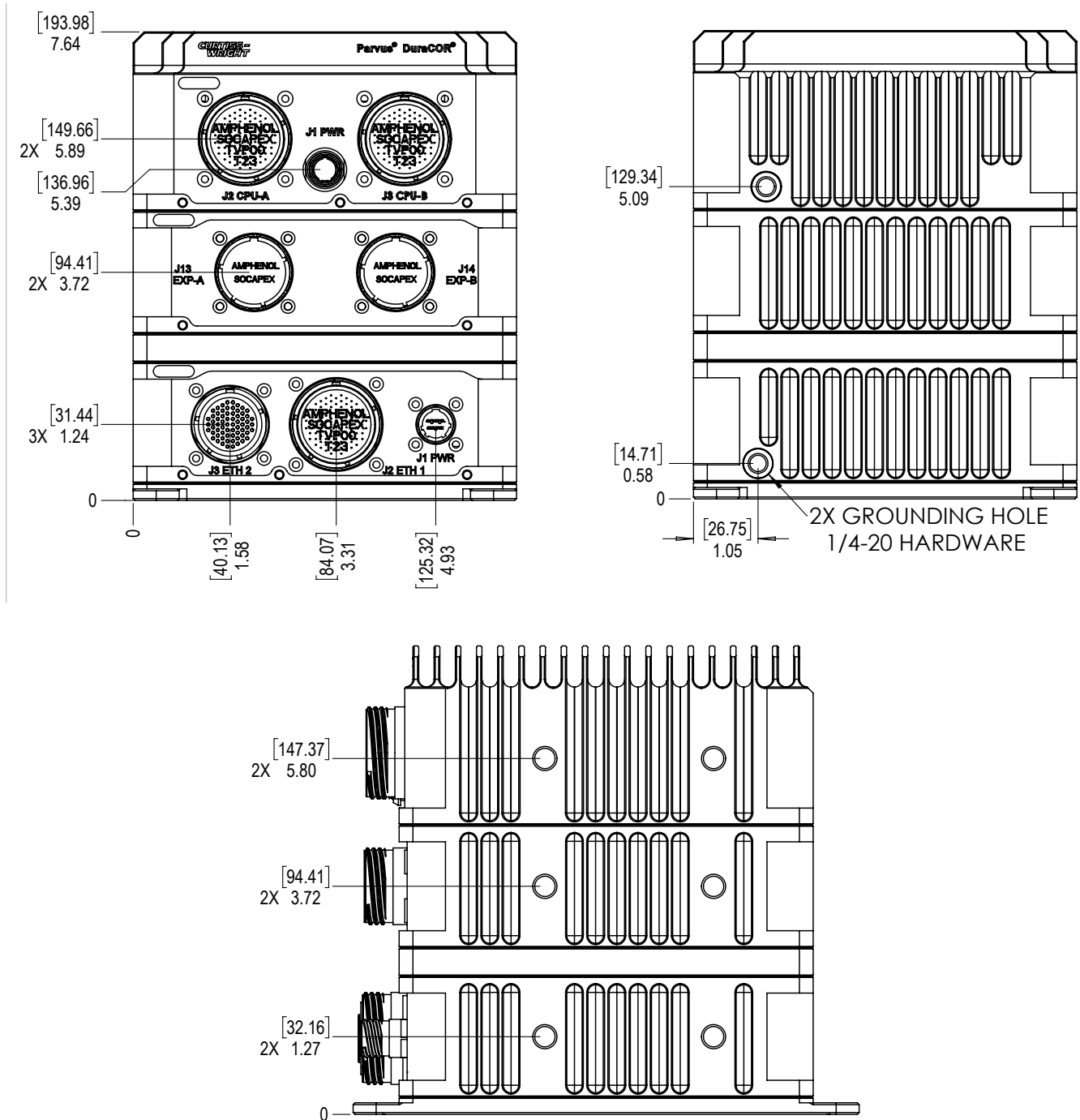


Figure 4: DuraCOR 8042 MCOTS unit dimensional line drawings (measurements shown are in inches and [cm])