MOSARC INPUT/OUTPUT MODULE

Safety-critical interface management

Extendable avionics I/O distribution service

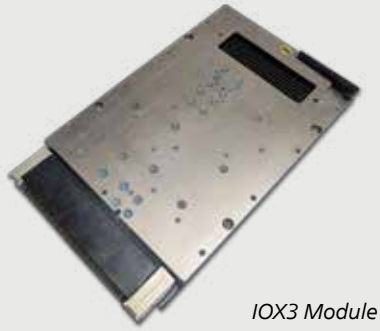
Collins Aerospace's low-latency Mosarc® Input/Output (I/O) Module is used in all of our safety-critical avionics computers. Its design meets Open/VPX standards in a 3U form factor. The module provides the interface between application-specific line-replaceable units (LRUs) and subsystem data planes, including drivers, receivers, transformers and other circuitry.

The Mosarc I/O Module features the avionics I/O node (AION), a field-programmable gate array (FPGA) that offloads management of I/O interfaces from software through the use of Direct Memory Access (DMA). The AION was designed for expandability, including a serial peripheral interface (SPI) allowing controlling of additional discrete and analog devices. The base Mosarc I/O module provides all control, drivers, and receivers required for common military interfaces such as MIL-STD-1553B, ARINC 429, RS-422, RS-485 and ground/open or 28V/open discretes. An expansion connector is available to allow for a customized 3U OpenVPX card to provide additional interface types and quantities.

The I/O server works in conjunction with the AION to allow any application in any core on the interconnected processing resources to receive and publish data across the system via any assigned interface. AION uses a Gen 2.1 dual-lane peripheral component interconnect express (PCIe) interface protocol to facilitate subsystem-level I/O.

The server's safety-critical data router function supports safety-critical data handling. The data router minimizes latency for functions that require it. Intelligent interface controllers handle data sorting, routing and direct memory access to buffer structures in the shared memory to offload the host CPU. A generic, low-level set of drivers allow a user to configure and control the data flow from and to all implemented interfaces.

All Collins Mosarc modules contain Collins developed firmware and portable/reusable platform software, middleware and application software components.



IOX3 Module

KEY FEATURES & BENEFITS

- HOST/SOSA-aligned 3U OpenVPX module
- Handles safety-critical data with minimal latency and offloads the CPU
- Provides MIL-STD-1553B bus control (BC), remote terminal (RT) and backup bus control (BBC) capability
- Supports significant quantities of ARINC 429, RS-422 and RS-485 serial I/O, as well as discretes
- Includes I/O server distribution services that enable applications on any core to receive or publish data on these interface media

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Model: IOX3

FIRMWARE

- AION – IOX3's AION FPGA provides low-latency, safety-critical I/O handling on behalf of applications on any core within the air vehicle computer (AVC). It supports MIL-STD-1553B, ARINC 429, RS-422/485 and general purpose I/O and is extendable to support cases where more I/O concentration is required
- Module manager (MM) – IOX3 includes an MM FPGA that uses system management bus (SMBus) protocols to send health data to the chassis manager on the SCX3

CORE PLATFORM SOFTWARE

- AION device drivers – IOX3 platform software includes drivers for the various interface types supported, including ARINC 429, RS-422/485, GPIO and analogs
- MM device driver – The MM FPGA is supported with a driver to pull or push data from/to the SMBus

CORE MIDDLEWARE

- I/O framework – The I/O server provides an XML-configurable I/O distribution service with transport and connection layers for each interface type, and libraries that push/pull data to applications through shared memory or network interfaces
- 1553 client/server – The server uses a special 1553 client library to simplify communication with the 1553 server. The server provides BC/RT/BBC capabilities. Configuration tools are available for scheduling 1553 traffic

CORE APPLICATIONS

- I/O distribution – The distribution service of the I/O server is an application layer service. In typical designs, one core of the SCX3 processor is dedicated as the I/O server to provide scheduling flexibility and isolation. A critical data router component within I/O server provides a low-latency bypass medium so that applications handling safety critical functions can access critical data over 1553 as fast as possible.

APPLICABLE RELEASES

- 828-4A70-003 and -013 (IOX3 CCA)
- 983-8048-013 (Complete module assembly with IOX3 CCA, heatsink and wedgelocks)

SPECIFICATIONS

The 3U OpenVPX IOX3 base module with the AION FPGA supports the I/O types and quantities common to military applications. I/O support can be extended within limits of the connectors and backplane interfaces by adding a 3U OpenVPX daughter card for special cases where more I/O is required. The following list shows the maximum I/O supported in base and extended configurations:

- ARINC 429 Rx (16x base, 37x extended)
- ARINC 429 Tx (8x base, 17x extended)
- RS-422/485 Rx (4x base, 16x extended)
- RS-422/485 Tx (4x base, 16x extended)
- MIL-STD-1553B (2x base):
  - dual redundant terminals
  - operating as BC/RT/BBC
- Discretes (base):
  - 28 V/ground/open Rx (18x)
  - 28 V/ground/open Tx (8x)
- Other IO (extended):
  - General purpose/externally defined Rx (64x)
  - General purpose/externally defined Tx (64x)
  - 28V/ground/open Rx (256x)
  - 28V/ground/open Tx (256x)
  - Analog Rx (32x)
  - Analog Tx (32x)
- SWaP
  - Size – 3U OpenVPX form factor (100 mm x 160 mm)
  - Weight – 1.05 lb.
  - Power – 26.0 W (typical)

Specifications subject to change without notice.

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