

Low Power/Telemetry I/O card



DESCRIPTION

The MDA Low Power/Telemetry I/O card provides an extensive selection of interfaces to Spacecraft Platform devices & sensors for many applications ranging from Command & Data Handling, scientific instrumentation and payload controllers. It provides over 200 external I/O's consisting of analog & bi-level telemetry acquisition channels, analog command, RS-422 serial digital Tele-commands & Telemetry/UARTS, bi-level and pulse command outputs.

The card interfaces through backplane connectors for power from the unit DC/DC Converter, and for data to the unit controller (CPU) through a serial CAN bus or a 32-bit standard compact PCI interface. External I/O interfaces are available through front panel connectors using three high density HD-78 position receptacles (J3, J4 and J5). All circuits that interface to the front panel connectors are protected against ESD, external faults and can operate into an open or short circuit without damage.

FUNCTIONAL CHARACTERISTICS

1) Analog Multiplexing Functions

- 64 channels (4 X 16:1) analog multiplexer for thermistor temperature telemetry
- 48 analog input channels (3 X 16:1) configured for a mix of single-ended or true bipolar differential inputs (up to 14 channels)
- +/- 10 V range, +/-30V over-voltage tolerance, and high impedance with power off
- Each multiplexer provided with BITE voltage input on one channel
- Configurable scanning rate/sampling through control FPGA for different acquisition channels

Thermistors Channels

Conditioning for up to 60 S311-P18 thermistors, types 3 to 10, includes:

- Bandwidth limiting
- Thermistor linearization & biasing (excited with +5.00 V reference)
- Temperature accuracy of better than $\pm 3^{\circ}\text{C}$ between -20°C to $+60^{\circ}\text{C}$ range

Analog Telemetry Interfaces

- Signal conditioning, low pass filters, gain & scaling, and biasing to interface to a variety of analog sensors: 4-wire RTD, pressure transducer (bridge with bias), current telemetry, etc.
- 0-10V range, 13 bits resolution, and -10V to +10V with 14 bits resolution.

Analog to Digital Converter (ADC)

- 14-bit converter.
- Bipolar input voltage range of $\pm 3\text{V}$ full scale
- Integral Track and Hold amplifier, and voltage reference

2) Analog Command Output (D/A Converter)

- 12 bit Digital to Analog converter
- Output Buffer Amplifier with configurable gain/range setting.

3) Bi-Level TLM Converter

- 14 bi-level telemetry channels into two 16:1 analog MUX
- High Common Mode Rejection, with true bipolar level inputs & hysteresis

4) 16 Digital Telemetry channels (0-5V logic telemetry and micro-switch status sense)

- Micro-switch inputs conditioning (noise and switch bounce filtering)
- Each channel providing interrupt capability on signal transition.

5) Bi-level controls & Pulse Commands Outputs

- Qty 8 bi-level control outputs, Qty 4 pulse commands outputs with 12V/10mA drive capability.
- Configurable Output pulse duration (50 to 150msec)

6) Serial Data Channels/UART Ports

- Six RS-422 receivers with dedicated FPGA inputs can be used as:
 - Serial digital data/telemetry (tachometers pulses, optical shaft encoders inputs, etc)
 - Serial digital telemetry (SD16 TTC-B-01), or Asynchronous (UART) receive ports,
- Eight RS-422 drivers with dedicated FPGA outputs can be used as:
 - Serial digital Tele-commands (ML16 TTC-B-01), or UART transmit ports, with RS-422 physical interface.

UART Port Characteristics

Two full duplex UART ports, with the following characteristics:

- Independent Tx & Rx FIFO message buffers, soft or hardware handshake signals, programmable standard Baud rates from 9600 to 115 K Baud

CAN Interface: CAN 2.0 serial bus at 1 Mb/s.

- RS485 compatible voltage levels, with biasing resistors, consistent with the CAN bus standard levels
- Cold Redundant compatible (high impedance when powered off.)
- Dual redundant A/B bus with separate transceivers on each bus.

Control I/O FPGA

The card incorporates a high performance Rad-tolerant Field Programmable Gate Array (FPGA) to implement the CAN node function, PCI target interface (optional), FDIR BITE functions, and all I/O interfaces for the core telemetry acquisition/control and command functions.

Physical Performance

Operating temperature	-30°C to +65°C at board thermal interface
Power consumption	Less than 6.5 W typical (full operation)
Radiation Hardness	60 Krads No Latch-up, Tolerant to SEU
Dimension	160 mm x 233.35 mm (Compact PCI 6U standard form factor)
Random Vibration	20 Grms (Qualification level)
Mass	800 grams
Operating Voltages	+5V DC, +3.3V DC, +12V DC, -12V DC

Other Features

Support cold stand-by redundancy Interfaces are high impedance when the card power is switched-off.
Technology Space Qualified Radiation tolerant EEE parts, MIL-PRF-38535 QML Q/V
Double-sided SMT assembly
Conduction cooled card, stiffener ribs and wedgelock retainers

Software Support Extensive selection of software development tools, including EM and Engineering Breadboards.
Includes Board Support Package (BSP) and driver set

Low Power /Telemetry I/O Card Functional Diagram

