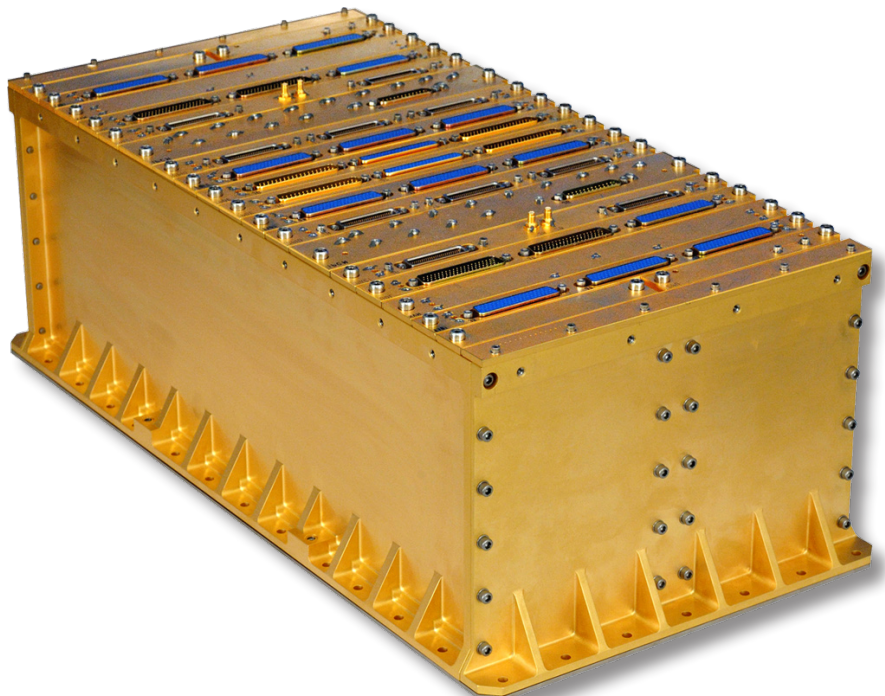


Integrated Electronics Module for spacecraft avionics/controls

Features

- cPCI-based single string or redundant
- RAD750® cPCI processor
- Uplink/Downlink
- Attitude control actuators and sensors interfaces
- 1553 bus controller
- General purpose I/O
- Gimbal/SADA drive electronics
- Propulsion drive electronics
- Autonomous redundancy manager
- Non-volatile memory
- Power converter module
- Narrowband I/F for commands and telemetry
- CCSDS compliant
- High reliability, space qualified
- Error correction
- Radiation and SEU tolerant
- Test software, scripts, and AstroRT database used with Electrical Ground Support Equipment (EGSE)
- Mass, maximum: 53 lbs (24 kg)
- Dimensions, maximum:
55.9 x 27.7 x 20.1 cm
(22.0 x 10.9 x 7.9 inches)
- Temperature:
-25 to +52°C (Qualification)
-40 to +74°C (Survival)



General Dynamics' Integrated Electronics Module (IEM) provides a hardware platform for running C&DH and ACS software, and for receiving commands and sending telemetry from the spacecraft. The IEM is an 18-slot chassis based on industry standard cPCI form factor. It is a block-redundant design with automated hand-over-to-backup system, providing ground commanding and hardwired telemetry independent of CPU.

The IEM design makes use of years of General Dynamics bus avionics experience combined with evolutionary enhancements to existing designs and the use of the latest FPGA technology. These strengths, combined with a flexible board suite that has 100% on-orbit success, results in an architecture that is scalable and reliable, and enables tailoring to specific program needs.

Integrated Electronics Module

for spacecraft avionics/controls

Performance Characteristics

General

- Mass: 53 pounds (24 kg) maximum
- Size: 22"L x 10.9"W x 7.9"H max envelope
- Temperature: -25° C to +52° C (Qualification)
-40° C to +74° C (Survival)

Input Power

- Operating Voltage: 22 - 37 VDC
- Power Consumption: 78 W max

User Interfaces

- Differential LVDS, RS-422, RS-485
- Differential/single-ended analog, bi-level, opto-isolated, RTD, Thermistors, AD590, and reaction wheels
- Mil-STD-1553B bus

Payload Interface

- General Dynamics Payload Interface Electronics (PIE): A and B sides

ACS Interfaces

- GPS Receivers: 2
- Coarse Sun Sensors: 12
- Reaction Wheels: 6
- Star Trackers: 3
- Inertial Measurement Unit (IMU): 2
- Three-axis Magnetometer: 2
- Motor Drive Electronic Control Unit: 1 - 6

General Purpose Interfaces

- 80 differential or 160 single-ended
- Bi-Levels: 16 Opto Isolated; 8 Pull-Ups

Comm Interfaces

- S-Band Transmitters: 2
- MDU Decryptor: 2

Data Encoding/Formatting

- Reed-Solomon Code: (255/223) Reed-Solomon outer code with interleave depth $l=5$ (variable)
- Compliant to CCSDS standards
- Uplink Command rate: 2 kbps, 64kbps (variable)
- Downlink telemetry rate: 2 kbps, 4 kbps, 32kbps, 1Mbps, 2.5 Mbps, and 4 Mbps (other rates supported as required)
- Autonomous telemetry scanning at 50Hz and downlink at 10Hz
- Authenticated and un-authenticated uplink

Timing Interfaces

- OCXO: 2
- GPS 1PPS: 2 (operates with and without)
- Autonomous clock adjustment to maintain 1.5 μ s clock accuracy over mission life

EPS Interfaces

- Charge Control Unit: 2
- Load Control Unit: 2

Propulsion Interfaces

- Catbed Heaters: 16
- Latch Valves: 2
- Spacecraft separation detection
- Launch vehicle separation detection
- Thrusters: 8

Thermal Interfaces

- Thermistor/RTD: 192
- AD590: 8
- Internal AD590: 10
- Internal temperature, voltage, and current

SSR Interfaces

- HK Record: A and B sides
- HK Playback: A and B sides
- Record and playback operates simultaneously

1553 Bus Controller

- A and B Busses
- Command and Telemetry
- Mil-Std-1553B

Memory

- 16 Mbytes of Non-Volatile EEPROM
- ED AC and scrubbing

For More Information, Contact:

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GENERAL DYNAMICS
Advanced Information Systems