

HDCOTS

Mass Memory based on Hard-Disks in a RAID configuration

The COTS (Commercial-Off-The-Shelf) -based RAID (Redundant Array of Independent Disk Driver) Memory system consists of a stack of hard disks inclusive of the RAID controller and interfaces with an external computer. The RAID system will be capable of up to 8 pairs of hard disks each with 73 GB capacity (for a total of 1.2 terabytes). A last-generation SCSI interface is adopted to speed up the write/read performance, which is further enhanced by the inherent shared operation of the RAID system.



This RAID intends to compete, in terms of cost, mass and power consumption, with the equivalent solid-state products available on the space market. The target applications address mainly the bulk temporary storage of remote sensing images, in the visible, hyper-spectral or radar bands.

The HDCOTS is a High-Capacity Memory system for space application at low cost. It is composed by memory devices (Hard Disks) and control electronics in a single box; the power supply can be a separated unit. The unit is maintained in a pressurised box such as the internal pressure does not go down to the minimum required by the disk heads since they work on an air cushion, in addition suitable provisions against vibrations are implemented to reduce induced mechanical stresses on the Hard Disks.

The basic unit is composed by 2 counter-rotating Disks to give a resulting null angular momentum to the satellite during read/write operations.

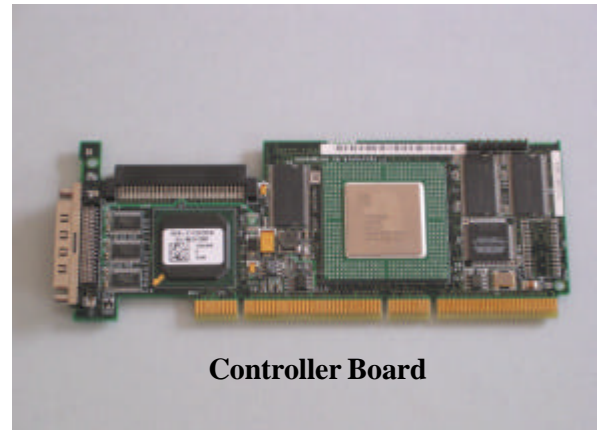
To increase significantly the capacity, modularity and reliability of the memory system, a RAID (Redundant Array of Independent Disk Driver) architecture is implemented, by using a single control electronics to manage all Disks.

Of course, the system can be composed by a multiple of 2 Disks, formed by pairs of counter-rotating Disks.

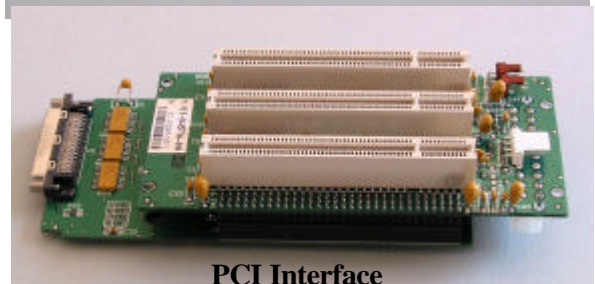
As far as the Disks, the SCSI technology has been selected, because the high read/write speed. In addition the significant number of Disks that can be managed will be useful for the development of more complex RAID systems.

The Ultra 160 SCSI interface have been selected, because it is a consolidated standard at low cost w.r.t. the very new Ultra 320.

An additional interface, compatible with the controller, as a PCI slot and an expansion cable are included to allow the connection with a remote computer.

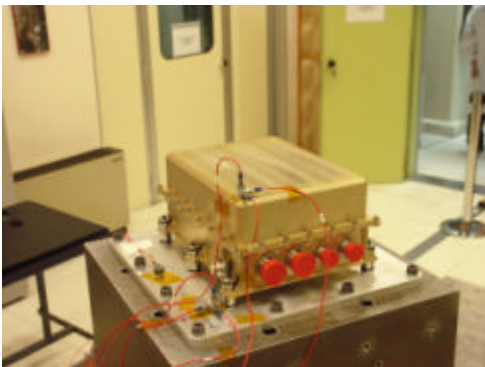


Controller Board

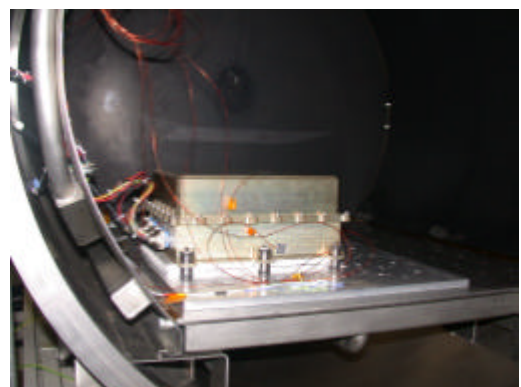


PCI Interface

Possible applications of HDCOTS are space applications in LEO, avionics and military applications.



The HDCOTS has been fully characterised and tested against the environmental and life requirements for the space applications (**Vibration, Thermal Cycles and Thermal Vacuum tests** have been performed according to the applicable ECSS-E-10-03A standard). In addition, a Total Dose Radiation Test has been performed [Rad tolerant up to 170Gy(Si)].



A complete demonstration unit is available for customer verification. A flight unit development would need about 20 weeks for delivery.

HD COTS Specification

ELECTRICAL

Power Supply: + 12V, + 5V, + 3,3V

Power consumption: 31 Watts (Operation)

25 Watts (Stand-by)

0 Watts (non-volatile data hold)

Data Interface: Bus PCI

Connectors (hermetic): 2 circular, 10 pins (Power supply) + 2 circular, 55 pins for data.

DATA STORAGE

146 Gbytes with possible extension to 1,168 Gbytes (Box modification is needed) – RAID 0 configuration

DATA TRANSFER

> 40 MB/sec

MECHANICAL

Dimensions: 300 mm * 250 mm * 146 mm

Weight: about 5 Kg

ENVIRONMENTAL

Temperature: -20°C ÷ +60°C (Qualification)

Vibration: 21 g max - sinusoidal – 20 ÷ 60 Hz (Qualification) 12 g rms - random (Qualification)

Radiation: Rad tolerant up to 170 Gy (Si) [17 Krads (Si)]

LIFE

5 years for LEO applications (< 1000Km)

RELIABILITY

MTBF > 100.000 hrs (space conditions); R(3 years)= 0.947 for a hot redundant unit (1 out of 2).

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