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THE ULTRA HIGH SPEED DATA STORAGE SYSTEM FOR SPACE REMOTE SENSING PAYLOADS

Abstract

Many remote sensing devices are equipped in Earth observation satellites and spacecraft, including payloads of visible light, infrared light, multi-spectral, hyper-spectral, microwaves, lasers and other ones with advanced technology.

In these devices, the data acquisition rate above Giga bytes per second is very common, and the data rate of some ultra-large-scale push-broom optical observation equipment even reaches dozens of Giga bytes per second. Due to the restriction of transmission bandwidth of space communication systems, a large number of high-speed remote sensing data needs to be temporarily stored in orbit, so the data storage systems with high-speed, large-capacity and high-reliability is urgently required.

This paper gives a brief introduction to an ultra-high speed data storage system supporting the data transfer bandwidth of up to 20Gbps. The system is designed as standard module and can be easily applied on different tasks or rapidly upgraded for higher performance.

The system is made up with power module, central processing module, and storage array module. The high performance SOPC architecture and mixed pipeline technology are used to implement the high data transmission rate.

Other two features should be mentioned here: The first, Commercial-grade NAND flash chips are used as the basic storage media, while the system's reliability is guaranteed by reinforcement measures for space radiation environments and the system redundancy strategy. The second, the CIFS file system (Centralized index catalog high speed file system) is designed for the multi-vector retrieval of the application data, with the full consideration of the features of space remote sensing data.

This high-speed storage system has been completely developed, and will soon be applied in a large scale Earth observation project. With further optimization and improvement, it will provide more effective support for space optical payloads in the future.

Key words: high-speed Data Storage, CIFS, Earth Observation, Remote Sensing Payload