Mission Critical: Ruggedized Applications

Case Study

Current Issue: Extreme Operating Conditions and Ruggedized Operation

Computing system design for Defense and Aerospace applications are always a big challenge; they need to cope with dramatic changes in operating environments such as wide temperature fluctuations and humidity. They also need to cope with high vibration and shock impacts during operation. When a Unmanned Aerial Vehicle (UAV) customer had a project involving equipping a UAV with a suitable surveillance system, this prompted Advantech to develop a customized version 1T stamp hole SSD with extended temperature.

Considerations: National Security and Impact on Storage

Considering the environmental vibrations resulting from aircraft operations and the differing climates at each flight stage, the surveillance system needed to be super rugged and support a wide range of temperature fluctuations. To further reduce the vibration impact on the storage, the UAV designer was requested to solder the SSD or Flash IC directly onto the main board. Additionally, considering the data carried in the storage included content related to national security, it needed functions for the prevention of unauthorized access and theft, and this necessitated enhanced security measures including lock and erase mechanisms to reduce the risk of information leakage.

"The main board design became very compact and robust, retaining the possibility for future product upgrades"

How to Reduce Vibration Impact on Storage

1. Solder SSD/ Flash IC onto main board
2. Transform SSD into a stamp module

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Leveraging Storage Product Design to Deliver Highly Integrated and Reliable SSD Solution

The surveillance system included two high speed SATA ports that were requested with 1TB high capacity storage. The original idea was to lay out the whole SSD circuit onto the mainboard and solder all of the SSD components onto it. However, considering Flash IC quality control, complex integration, and the flexibility for future product upgrades, Advantech proposed a unique solution to transform the SSD into a stamp module form factor, which allowed the UAV designer to leave most of the quality control effort for the storage part to the SSD provider. More importantly, the main board design became very compact and robust, and retained the possibility of storage product upgrades in the future.

Enhanced Security and Peace of Mind

For enhanced security, Advantech offers SQFlash Design-to-Order Service, a reliable total storage solution for Defense and Aerospace. Advantech's SQFlash SSD controller IC supports AES-256 internal encryption with the inclusion of an AES chip that encrypts all data before it is written to the Flash IC. Thus, even if raw Flash IC data is maliciously obtained, the data will not be decodable. Also, this provides a quick erase possibility under critical situations, so all of the data in the SSD can be erased within 10ms.

Reliable, ruggedized industrial-grade SSDs allow Unmanned Aerial Vehicles (UAVs), the chance to improve their overall system security and data protection.