

Mobile video security meets security-grade microSD cards

Growing concern about public safety is prompting wider deployment of video security by government agencies, private organizations, and consumers. The mobile video security market grew from USD 2.71 billion in 2023 to USD 2.96 billion in 2024. It is expected to continue growing at a CAGR of 9.58%, reaching USD 5.15 billion by 2030.

With wide implementation of mobile video security systems in these vehicles, a huge volume of data will be generated that will require system optimization among data storage, processing and communication from an end-to-end topology perspective—driving the next innovation in mobile video security solutions.



Mobile video security systems generally fall into two categories: cameras mounted in a vehicle with onboard storage, and cameras connected to a mobile recorder mounted in the vehicle.

In both scenarios, cameras cover the view of driver, passengers and outside activities. In addition to video monitoring, these solutions may be integrated with GPS tracking and other vehicle-related monitoring (such as fuel, speed, temperature, etc.). With system connectivity improvements, it is possible to transmit the data to a centralized management system; however, for cost efficiency and connection reliability reasons, security video archives are typically stored in a local storage device (for example, mobile recorder) in the vehicle and then synchronized to a central management system upon return to the station. Therefore, a robust storage solution is critical for successful operation of mobile video security systems. This brief discusses how to select a suitable storage solution for your mobile video security system.

Storage options for mobile video security systems

Mobile video security systems generally use one of three options for storing recorded video:

1. Hard disk drive (HDD): Typically used in mobile recorders, HDDs require additional designs for protection from external vibration and shock.
2. Solid state drive (SSD): Primarily used in mobile recorders given their capability of operating in harsh environments, SSDs offer protection from vibration and shock.
3. microSD card: Broadly used in dash cameras, mobile IP cameras and recorders, microSD cards offer flexibility and size advantages.

Storage requirements for mobile video security systems

To determine the most suitable storage option for a mobile video security system, four key factors should be considered:

1. Operation in a harsh environment

Since the system is installed in a vehicle, the solution must be resistant to vibration and shock, while also supporting a wide temperature range.

2. Size of footprint:

Mobile design aesthetics are trending to smaller, less obvious form factors; therefore, the size of the memory footprint is an important consideration. The figure below shows an example comparison among these three storage options.

Footprint: HDD vs. SSD vs. microSD card

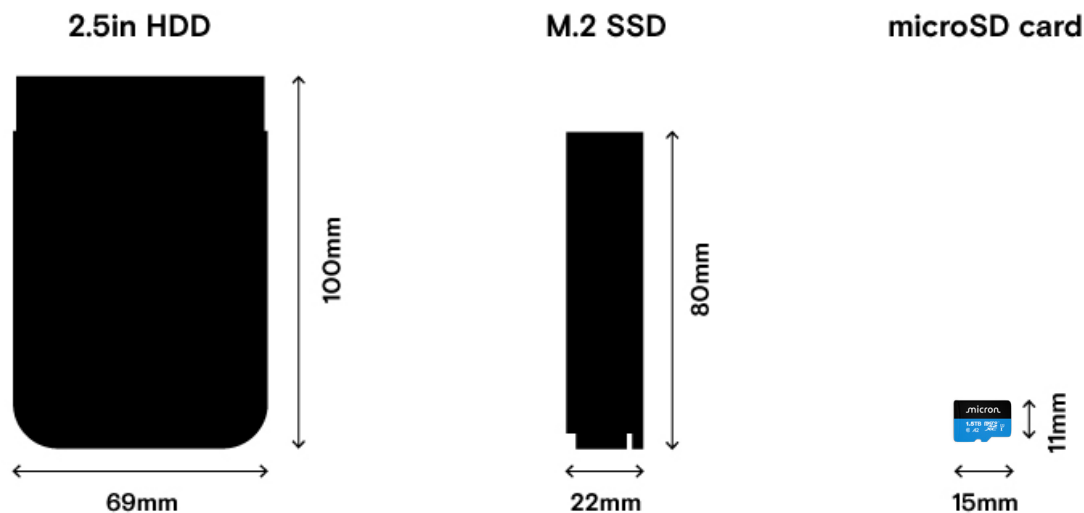


Figure 1: HDD vs. SSD vs. microSD card footprint

3. Storage retention

In general, a seven-day storage retention period covers most mobile video security application usage models in the transportation sector. (See below for the range of storage size requirements depending on camera resolution and number of channels needed in the mobile video security system.)

Storage capacity requirement (GBs)

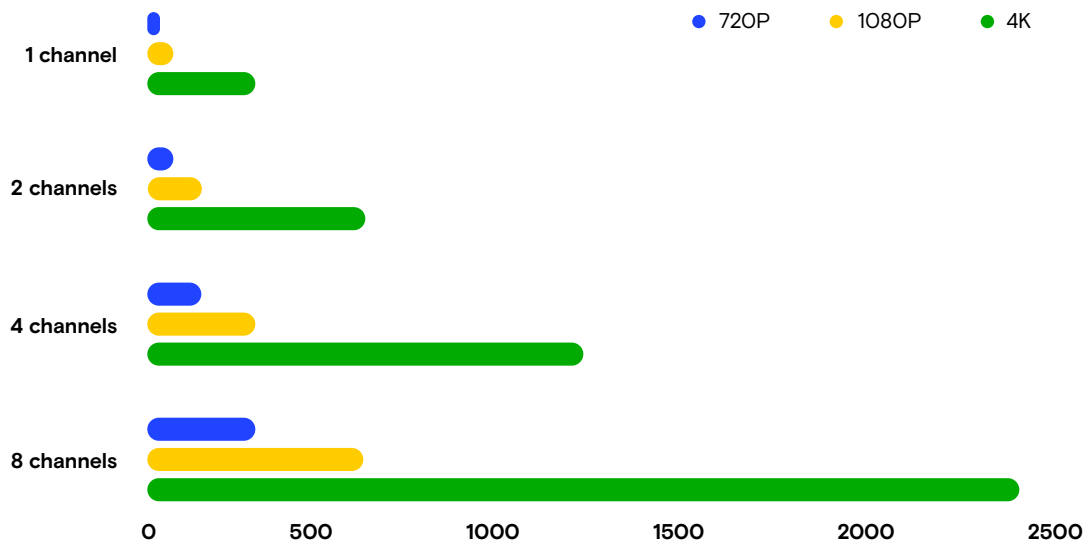


Figure 2: Storage capacity requirement for mobile video security system

The analysis is based on above configurations:

- Camera bit rate: 1 Mb/s (720P) / 2 Mb/s (1080P) / 8 Mb/s (4K)
- Recording hours per day: 12 hours
- Connected camera channel per system: 1 - 8 channels
- Storage retention: 7 days

4. Upgradability

A microSD card's removability makes it perfect for storage upgrade requirements in the field. Increasing days of retention, upgrading camera resolution requirements, or adding additional cameras in a vehicle are all scenarios that are easily serviced by simply opening the camera/recorder slot and replacing the card with the appropriate density.

Design considerations using microSD cards as primary storage

Given the requirements discussed above, solid state storage with industrial, ruggedized design and up to 1TB capacity can address most use cases. Industry advancements in NAND technology have enabled high-density solutions in the microSD card form factor, enabling smaller footprint and removability features that provide additional system design benefits. As the microSD card becomes the mainstream primary storage in mobile security, system designers, installers and end users must be aware that not all microSD products are the same. Key considerations with using microSD cards in mobile security include:

- Endurance and quality: Is the microSD card designed to handle three years of continuous recording? A typical mobile video security system needs to be ruggedized toward all-weather resistance. To reduce maintenance and decommission costs during service years and lower TCO, a high-endurance, security-optimized microSD card is essential.

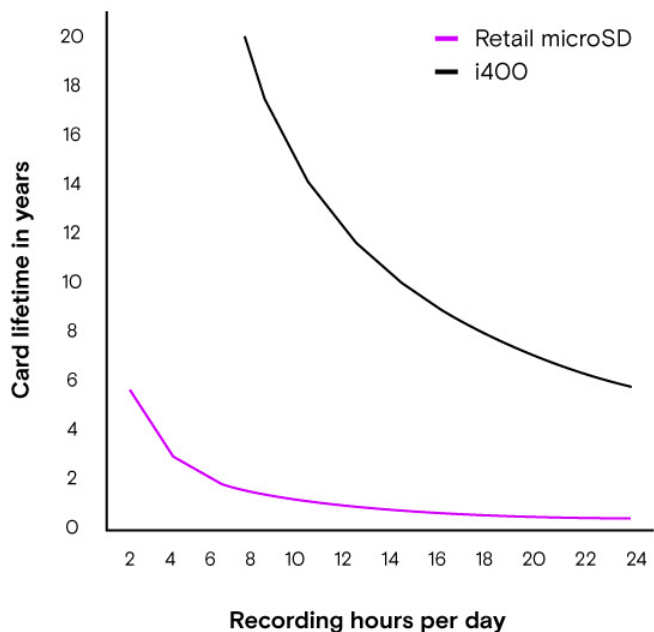
How long can a microSD card last in security?

NAND flash cell architecture (SLC/MLC/TLC) has a big impact on the reliability of storage solutions based on said memory components.

Card lifetime can vary depending on:

- Different NAND memory offers different level of endurance
- Combination of random and sequential access
- Firmware optimization with respect to background operation

Figure 3: microSD card endurance



- Recording performance: Does the solution give confidence that the card is capturing all essential and critical footage at all times? Continuous video recording into a microSD card can cause frame drop issues. The microSD card must optimize its recording performance for security usage to reduce the risk of data loss.

What is the expected recording performance?

- Sustained recording with minimum/no lost frames is a key focus for security (Frame capture, test conditions 30FPS @ Mbps).

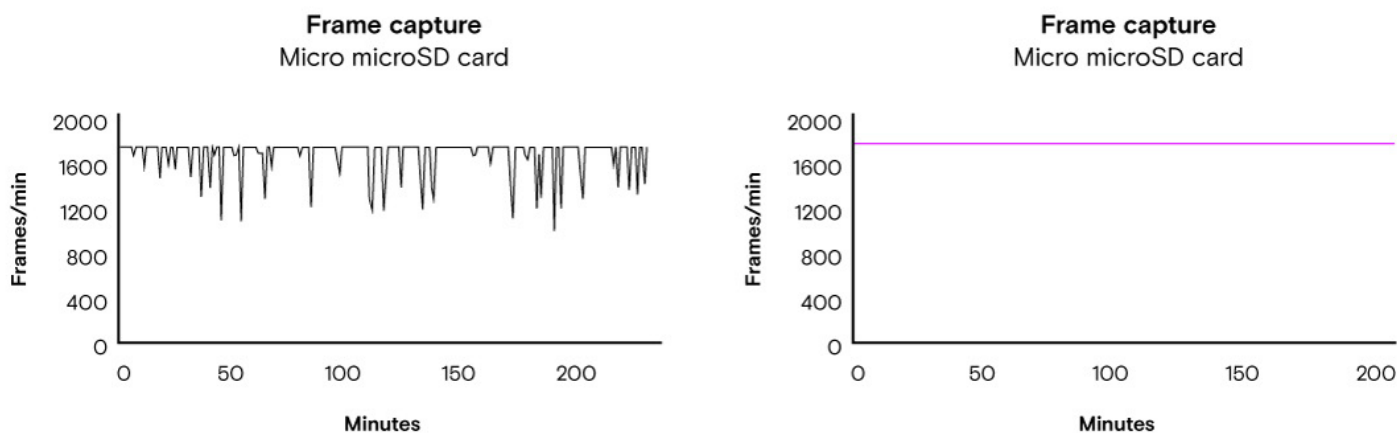


Figure 4: microSD card recording performance

Introducing Micron's industrial microSD card for mobile video security systems

Unlike most memory cards on the market that are consumer-grade and have limited write capability, Micron's i400 microSD cards are designed for AI-enhanced video applications with features such as:

- High capacity (64GB to 1.5TB): Supports up to 5 years of high-quality, continuous, 24/7 video recording and up to 4 months of storage
- Outstanding recording performance: Optimized design delivers sustained performance for concurrent 4K video recording and up to 8 AI capture events every second
- Industrial quality: Reliable high quality provides a 2 million hour mean time to failure (MTTF) rating, plus 5-proof protection encompassing water, shock, x-ray, magnet and impact
- Smart management: Health monitoring tracks usage and card health, and the field firmware update provides a secure way for the card to be updated remotely when needed



About Micron Technology

We are an industry leader in innovative memory and storage solutions transforming how the world uses information to enrich life for all. With a relentless focus on our customers, technology leadership, manufacturing, and operational excellence, Micron delivers a rich portfolio of high-performance DRAM, NAND, and NOR memory and storage products through our Micron® and Crucial® brands. Every day, the innovations that our people create fuel the data economy, enabling advances in artificial intelligence (AI) and compute-intensive applications that unleash opportunities — from the data center to the intelligent edge and across the client and mobile user experience.

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