

# Seamless, Secure, and Fast: Ferri-UFS at the Heart of Tomorrow's Intelligent Vehicles

WHITE PAPER

The automotive world is no longer just about getting from point A to point B. Today's drivers demand more—a fully connected, data-driven, and intuitive in-car experience that transforms vehicles into smart, responsive environments. From real-time navigation and voice-controlled assistants to immersive infotainment and advanced driver-assistance systems (ADAS), the modern car is becoming an intelligent machine. Yet behind the scenes, making it all possible, is the unsung hero of automotive technology: robust, high-performance data storage.



Image 1: Ferri-UFS powers seamless, secure, and fast data processing for smarter, connected vehicles and intelligent cockpits.

At the core of this vehicle revolution is Silicon Motion's Ferri-UFS, a next-generation storage solution built to meet the growing demands of these intelligent cockpit systems. As vehicles become smarter and more connected, Ferri-UFS is providing the seamless, secure, and fast data processing needed to power the in-car experiences that drivers now expect (Image 1). But what is the technology behind Ferri-UFS, why is it crucial for today's cars, and how is it shaping the future of the automotive industry.

Several trends are driving this shift toward smarter, more connected cockpits. Driver-assistance systems and higher levels of driving automation, for example, demand real-time data processing and

continuous, multi-modality contextual monitoring. Additionally, with vehicle-to-everything (V2X) communication (Figure 1) and the integration of personal devices becoming more common, cars are now part of a larger digital ecosystem. And then there's the growing importance of user experience—drivers want intuitive interfaces, fast load times, and seamless multimedia, all of which require cutting-edge storage solutions to handle the data load.



Figure 1: V2X (Vehicle-to-Everything) enables real-time communication between vehicles and their surroundings, including infrastructure, other vehicles, and pedestrians, to enhance safety and connectivity.

Ferri-UFS is uniquely positioned to address these demands. As an automotive-grade storage solution, it offers the speed, reliability, and energy efficiency needed to keep intelligent cockpits running smoothly. With Ferri-UFS at the heart of the system, automotive designers can deliver the high-performance, connected experiences that their consumers expect.

### Why Silicon Motion Focuses on Ferri-UFS for Automotive Cockpits

Silicon Motion's decision to focus on Ferri-UFS for intelligent cockpit systems was driven by the increasing complexity of modern vehicles (Image 2). Automotive environments are among the most challenging for technology—extreme temperatures, vibrations, and harsh conditions all demand storage solutions that are not only fast and reliable but also durable and energy efficient. Silicon Motion's expertise in NAND flash controllers has enabled the company to develop a tailored solution that meets these stringent requirements.

Ferri-UFS leverages UFS (Universal Flash Storage) 3.1 technology, offering data transfer speeds up to 11.6 Gbps (HS-G3 x 2 lanes), making it significantly faster than older technologies like eMMC, even in 400MB/s HS400 mode. This speed boost enables faster system-boot times that deliver instant-on convenience and ensures meeting user expectations such as real-time multimedia playback, swift system updates, and fast-loading navigation systems. Whether it's starting up a digital assistant or accessing 3D maps in a split second, Ferri-UFS ensures the system

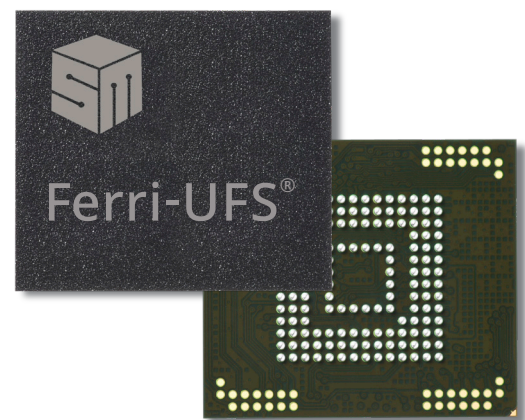


Image 2: Ferri-UFS

responds without delay. High throughput is essential where low latency, real-time response is required for features like managing voice controls, transferring sensor data, creating mixed-reality overlays, and real-time traffic information.

In addition to speed, Ferri-UFS is built for efficiency. With the rapid pace of automotive electrification, power budget is assuming greater importance and features like the deep sleep mode help to minimise power consumption when the system is idle. This is critical for electric vehicles (EVs), where conserving energy is a top priority. Moreover, Silicon Motion has integrated advanced NAND management technologies that maintain data reliability and stability, which are critical to ensure system resilience. These include wear levelling to prevent early wear-out of specific memory blocks, bad block management to identify and isolate defective memory cells, and error-correcting code (ECC) to avoid crashes and data corruption. This is especially important in safety-critical systems like ADAS, where any compromise in data integrity could have serious consequences. For automotive, data integrity is critical over long product lifecycles and in the harsh environments encountered both on and off the road, where durability is crucial. Ferri-UFS shines by maintaining integrity even under stress.

### **Security and Reliability: The Core of Automotive Storage**

With the increasing connectivity of cars comes a growing need for security. As more data is processed and shared between vehicles, personal devices, and cloud platforms, ensuring the integrity and security of that data is vitally important. Ferri-UFS addresses these challenges with a robust set of security features designed specifically for the automotive environment.

One of the most important security features is secure boot, which ensures that only authenticated software can run in the vehicle. This prevents unauthorised access and protects the car's systems from potential security breaches. Secure methods for receiving and supplying firmware and software updates over the air are also critical. Facilitating compliance with applicable standards, Ferri-UFS supports ISO21434 for cyber-security as well as ISO26262 for functional safety.

Ferri-UFS goes through rigorous testing to meet the AEC-Q100 standard, which qualifies it to operate in the extreme conditions found in automotive environments. From temperature extremes to mechanical shock, Ferri-UFS is built to last, providing reliable performance throughout the vehicle's lifecycle.

### **Driving Synergy: Ferri-UFS in Collaboration with Automotive Ecosystem Leaders**

Ferri-UFS doesn't work alone. To power the next generation of intelligent vehicle cockpits, it needs to integrate seamlessly with other advanced technologies. One such key partnership is with Qualcomm, whose automotive platforms provide the AI-driven processing power and multimedia support that automakers need (Image 3). By working together, Ferri-UFS and Qualcomm deliver a comprehensive solution that supports real-time applications, high-speed data transfer, and fast multimedia playback, all while maintaining the security and reliability that modern vehicles require. Silicon Motion's engineering strength is a critical aspect of the collaboration, fine-tuning firmware and software for fast data access and power-efficient operation, ensuring that Ferri-UFS can fully leverage the capabilities of automotive SoC processing technologies.



Image 3: Qualcomm automotive platform with Ferri-UFS

Imagine starting your car and having immediate access to the infotainment system, navigation updates, and driver-assistance features—all without waiting for systems to boot up. This is the kind of real-world impact Ferri-UFS delivers. Its ability to reduce boot times for in-car systems ensures that drivers and passengers can instantly engage with the car's technology. Beyond speed, Ferri-UFS's high data throughput and low latency guarantee smooth, high-definition media playback, creating an enhanced in-car experience for users.

Qualcomm's processing platform, combined with the fast, secure storage capabilities of Ferri-UFS, allows automotive manufacturers to create cockpits that aren't just fast, but responsive, intuitive, and secure.

### **Real-World Applications: Where Ferri-UFS Shines**

Ferri-UFS is already making its mark in the automotive industry. In infotainment, Ferri-UFS's fast data transfer rates ensure seamless playback of high-definition media and quick loading of applications, providing a better user experience for passengers. For navigation and driver assistance, Ferri-UFS delivers the speed and reliability needed to access large datasets—such as 3D maps or real-time traffic data—without delays or glitches.

Some of the world's leading automotive manufacturers are already integrating Ferri-UFS into their vehicles, recognising its ability to meet the demands of real-world automotive environments where reliability and performance are critical.

### **Looking Ahead: The Future of Intelligent Cockpits with Ferri-UFS**

As cars become more complex, the demands on storage solutions will only increase. Silicon Motion is preparing to meet these future challenges with continuous advancements in storage technology, delivering faster data transfer rates, better power efficiency, and larger storage capacities. The rise of AI and the move toward software-defined vehicle architectures will further push the boundaries of



in-car technology. This will raise demand for storage solutions that can handle frequent Full Flash Update and Over-the-Air (FFU/OTA) deployments and support modular upgrades. (Figure 2) Ferri-UFS will continue to play a crucial role in shaping this evolution.

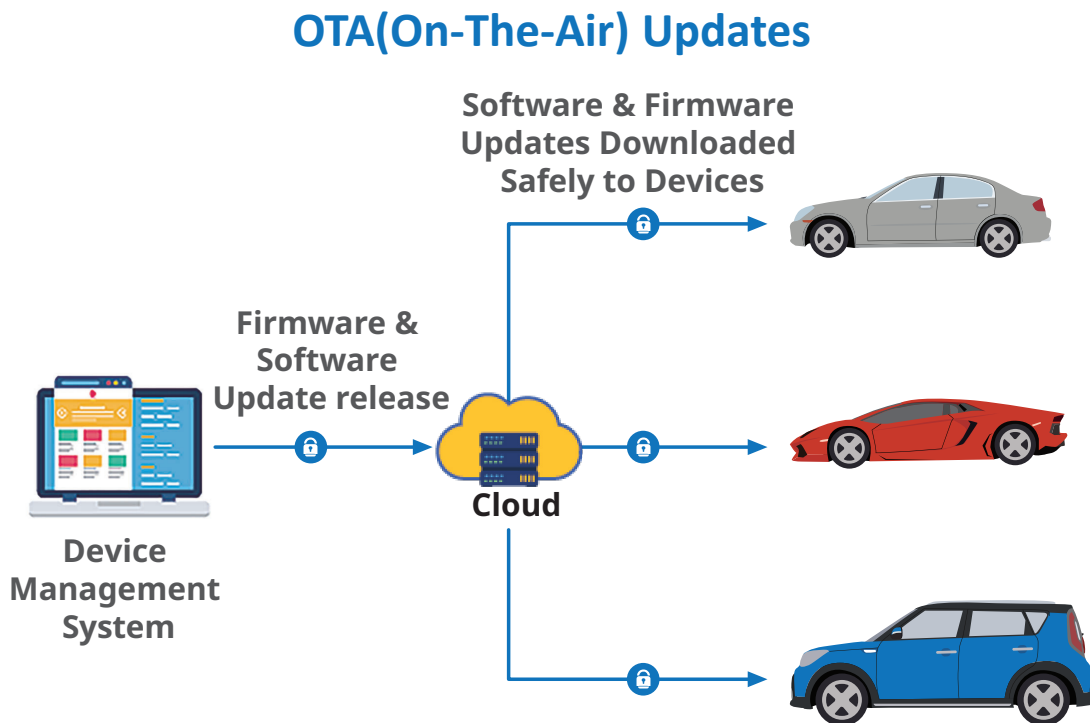


Figure 2: OTA programming enables automatic updates for firmware, software, and encryption keys

Looking ahead, intelligent cockpits will need to handle even more data, integrating augmented reality (AR) navigation, predictive maintenance, and personalised in-car experiences driven by AI. Ferri-UFS is ready to meet these challenges, ensuring that storage solutions keep pace with the increasing complexity of automotive technology.

### Driving the Future with Ferri-UFS

Future vehicles will probably utilise AI-based applications extensively, such as predictive maintenance, driver behaviour analysis, and adaptive user experiences. Storage solutions will evolve to meet the needs of these systems by providing innovative ways to optimize data handling. This will likely involve storage systems that can quickly process and retrieve large datasets. Ferri-UFS is already adapted to this requirement, providing the foundation of tomorrow's intelligent cockpits. Its combination of speed, security, energy efficiency, and durability make it the ideal choice for automakers looking to create the next generation of connected, data-driven vehicles. As cars become smarter, more autonomous, and more integrated into our digital lives, Silicon Motion's Ferri-UFS will be there, powering the transformation and driving the future of the automotive industry forward.

For more information about Ferri Family, please go to [www.siliconmotion.com](http://www.siliconmotion.com) or send email to [ferri@siliconmotion.com](mailto:ferri@siliconmotion.com)