



Flash Memory Summit

Autonomous Vehicles: Direction, Growth, and Challenges

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Who We Are

“Data I/O enables the secure digital world by designing, manufacturing, and selling programming systems to global electronic device manufacturers.”



Software for Automotive Applications

Automotive PAK



Version Control



Confirm Input Device



Remote Monitor



Tape Label Generator

Industry 4.0



Reporting & Traceability



MES Integration

Serialization



Serial Number Server

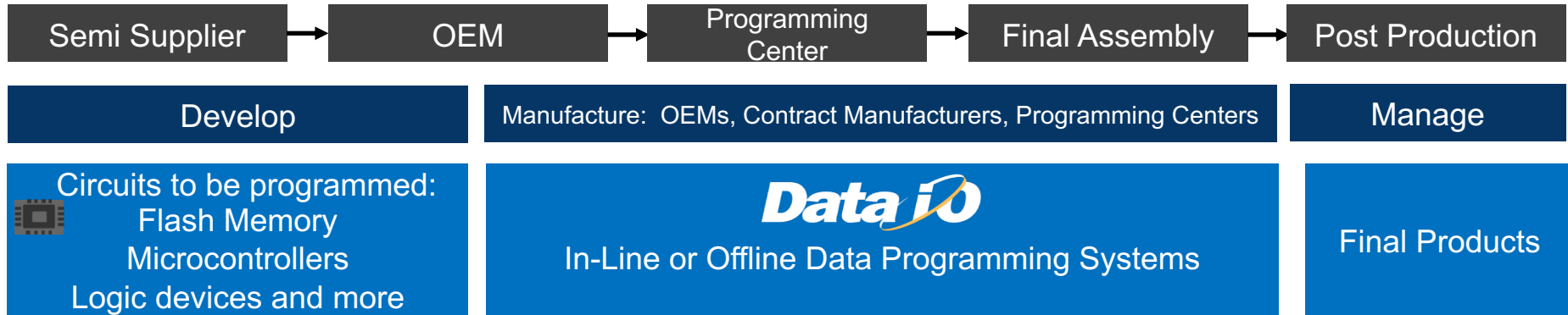


Dynamic Data Injection



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What We Do



Automotive	IoT/Industrial/Consumer
Programming Centers and EMS	



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Autonomous Vehicle Growth & Trends

Industry Trends Driving Flash Growth:



Electric Vehicles



Connected Vehicles



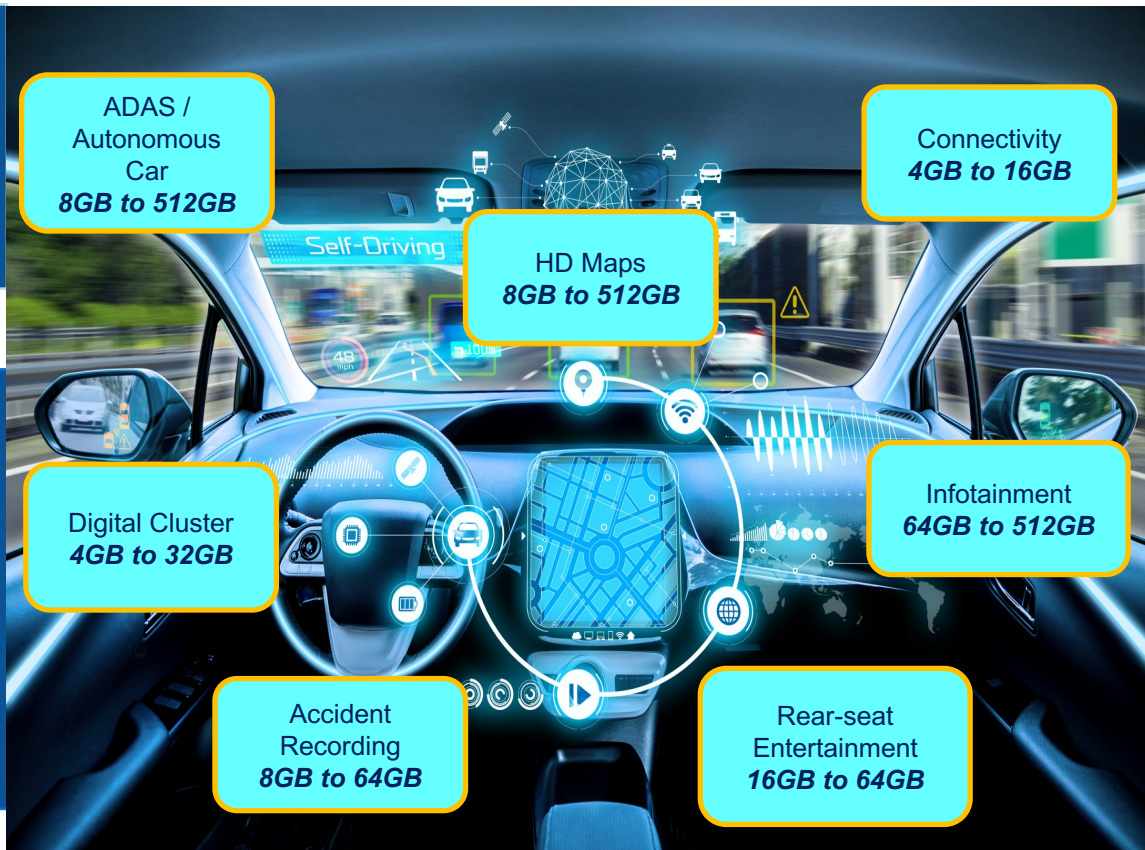
Autonomous Vehicles



More Compute: ECU, MPU, GPU

More Storage: MCUs RAM, FLASH
>2 TB

More Connectivity: Ethernet, CAN,
Wifi, BT, LTE etc.





Autonomous Vehicle Growth & Trends

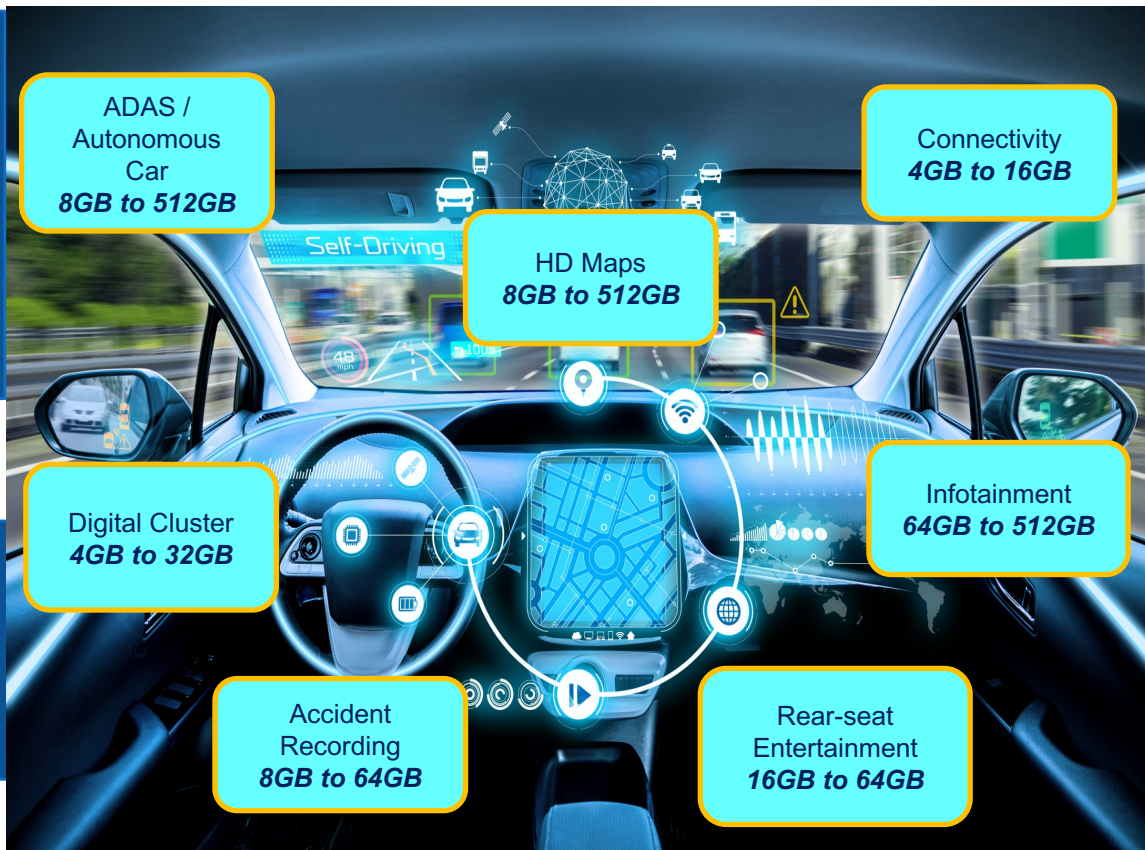
More Compute: ECU, MPU, GPU

More Storage: RAM, FLASH >2 TB

More Connectivity: Ethernet, CAN, Wifi, BT, LTE etc.



- Faster Silicon, Higher Density, Smaller Lithography & TLC
- Larger threat surface for attacks & higher value target





Industry Challenges Impact Design & Manufacturing

Design Engineering Concerns

Transition designs from eMMC to UFS & NVMe

- Application performance read/write performance
- Storage capacity
- Cost

Security :

- Protect car operation from intrusions
- Protect data & communication
- Recover from a security breach

Manufacturing Concerns

- Data retention through reflow & x-ray for 3D and TLC Flash
- Maintain production throughput
- Minimize disruption to existing production processes

- Secure supply chain
- Minimize disruption to existing production processes



Addressing the Challenges

Manufacturing Concerns

- Data retention through reflow & x-ray for 3D & TLC Flash
- Maintain production throughput
- Minimize disruption to existing production processes

Solutions

- Fast, forward compatible programming technology for new Flash
 - Support for hundreds of installed base
- Partnership across the ecosystem to
 - Align roadmaps
 - Develop best practices

Security :

- Secure supply chain
- Minimize disruption to existing production processes

- IC Authentication
- IP Transport Protection
- Automated Security Provisioning during pre-programming



Executive Summary

- Connected and autonomous vehicles will continue to drive innovation in Flash technology to meet speed, data & storage requirements >2TB
- Advancements in Flash technology require forward compatible programming technology
- Data I/O partners with Flash Memory Vendors, OEMs and manufacturers to solve the critical issues facing the design and production



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Thank You!

For more information visit:
www.dataio.com/automotive

Data iO



Back-up



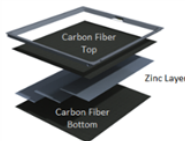
To Ensure Data Retention for Managed NAND at X-ray

Filtering is the Most Important Requirement

- All target based X-ray sources produce a spectrum of high and low energy photons, which enable imaging of devices
 - However, for radiation sensitive silicon components, **low energy photons <12kV can cause problems**
 - This is because they have a **>95% probability of being absorbed by the device**. This near complete absorption means **they play almost no part in the image formation**
- The zinc filter layer absorbs these low energy photons, preventing them from reaching the silicon device, but leaving higher energy photons for inspection purposes
 - This reduces the silicon dose typically by a factor of 5x



Nordson DAGE
Quadra 7



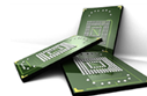
Nordson DAGE
Filtering tray



Data I/O
LumenX™ Programmer



Semi-vendor A (32GB)
15nm Lithography



Semi-vendor B (8GB)
20nm Lithography