VEHICLE electronics

The monthly magazine for automotive electronics engineers

Nvidia extends physical AI partnership with Toyota

Nvidia has expanded its partnership with Toyota to advance physical AI across automotive, robotics and cities.

From self-driving cars to cities, the next era of mobility will be defined by AI-enabled systems that can perceive, reason and safely act in the physical world. Toyota and Nvidia say they are working together to build that future by connecting AI across vehicles, infrastructure and industry.



Nvidia helps Toyota develop intelligent vehicles

This builds on last year's announcement that Toyota will develop vehicles with L2++ adas capabilities built on Nvidia Drive AGX and running safety-certified DriveOs.

Nvidia has helped Toyota tap into accelerated computing, AI software and simulation technologies to develop safer, more intelligent vehicles.

"Physical AI will bring intelligence to every moving machine from cars, robots and trucks to the cities and factories they operate in," said Rishi Dhall, vice president of automotive at Nvidia.

As vehicles become increasingly software-defined, Toyota is accelerating vehicle software engineering with a Misra-compliant code assistant AI model, trained and fine-tuned using Nvidia Megatron-LM, and referencing various datasets including Nemotron.

By applying a custom automotive AI model to improve automotive-specific code generation and review, Toyota engineers can generate, review and validate safety-critical code more efficiently, accelerating development while adhering to automotive compliance.

Toyota has developed a multimodal vision language model for urban traffic intelligence, using Nvidia H100 Tensor Core GPUs and Megatron-Core. The model can help interpret real-world conditions, anticipate what happens next and support responses across mobility and infrastructure systems.

Issue 152
August 2026

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KPit starts takeover of security firm Cymotive

Mobility software firm KPit Technologies is to acquire a majority stake in Cymotive, an automotive cyber-security expert.

The initial investment by KPit will be $10m. The full acquisition is expected to be completed by mid-2029 and would happen in two tranches depending on performance.

This will see the sale price rise to between $60m and $120m.

KPit says the acquisition will help it focus on building deep, future-ready competencies required to deliver software for mobility OEMs.

As vehicles continue their rapid transformation towards being software defined, cyber security is a core enabler of safety, compliance, trust and long-term differentiation.

Founded jointly by Israeli cyber-security experts and Cariad, VW's automotive software arm, Cymotive specialises in end-to-end vehicle lifecycle cyber security, spanning secure architecture, threat modelling, intrusion detection, continuous monitoring, and regulatory and homologation compliance.

Coupled with Beacon – KPit's mobility intelligence product – AI-led cyber security can help OEMs adopt an integrated approach, embedding cyber security into vehicle platforms from design through production and operations.

"Mobility continues to be transformed by software and AI-defined vehicles," said Kishor Patil, CEO of KPit. "Cyber security is now fundamental to how vehicles are designed, built and trusted. Cymotive brings deep, proven automotive cyber-security expertise, and together we can integrate security into the foundation of mobility software – at scale, across programmes, and across the vehicle lifecycle – creating meaningful value for the entire mobility ecosystem."

Yuval Diskin, chair of Cymotive, added: "Together, we are uniquely positioned to deliver end-to-end, AI-driven products that enable the mobility ecosystem to innovate with confidence, while staying ahead of an increasingly complex cyber-threat landscape."

Cymotive will continue to operate with its existing leadership, talent base and customer relationships, while leveraging KPit's global delivery footprint, domain scale and long-standing presence across automotive programmes worldwide.



VW deepens collaboration with Horizon



Deliveries of L3 capabilities start next year

Volkswagen is accelerating in-house development of L3 and L4 automated driving technologies by deepening its collaboration with Horizon Robotics through their Carizon joint venture in China.

Carizon will gain white-box access to Horizon's AI foundation model, a core technology to develop safe and advanced automated driving, enabling Volkswagen to build its own unified AI driving products.

Deliveries of L3 capabilities are targeted to start by the second half of next year.

At the same time, Carizon's L2++ adas has entered series production and remains on track to be on the roads this year. It will be rolled out across seven new energy vehicle (NEV) models before expanding to the broader portfolio starting next year.

"China has become one of Volkswagen's key innovation and technology hubs, particularly in software, AI and automated driving," said Oliver Blume, CEO of VW.

The unified AI driving model will be trained to handle the entire driving task end to end, from raw sensor input through complex decisions on the road. With this, Volkswagen's own automated driving system will better understand complex traffic situations, anticipate the behaviour of other road users and respond more effectively to rare scenarios.

The result should be a safer and more reliable advanced automated driving experience.

Together with Carizon's proprietary C7H SoC and the Gaia World Model data platform, the AI foundation model will form an in-house technology stack. It is designed to meet the safety and quality standards towards L3 readiness and future L4 automated driving capabilities for passenger cars and robotaxis, while continuously improving the already delivered L2++ options on current models.

The AI-enabled automated driving stack will be integrated with the China Electronic Architecture, Volkswagen's first locally developed zonal EE architecture.

Late last year, Carizon delivered its first L2+ adas, enabling highway navigate on auto pilot and memory parking on ID.

Autoliv and Xpeng work together on safer mobility

Automotive safety specialist Autoliv is cooperating with physical AI technology firm Xpeng to develop safer mobility for global markets.

The partnership reflects both companies' ambition to strengthen collaboration across markets and support mobility development in a rapidly changing global automotive landscape.

Xpeng is one of China's innovators in smart mobility, combining electric vehicles, AI, autonomous driving and humanoid robotics.

Autoliv and Xpeng plan to expand collaboration across technology development, digitalisation, supply chain coordination, sustainability and global expansion, combining Autoliv's worldwide safety expertise with Xpeng's innovation in smart electric mobility.

The partnership is designed to enhance system-level collaboration and improve innovation efficiency as the industry evolves through electrification, connectivity and globalisation.

"Xpeng is striving to explore the future of mobility, and Autoliv is proud to support that journey," said Mikael Bratt, CEO of Autoliv.

• Xpeng has unveiled the X-Mind technical framework. By embedding a predictive world model, X-Mind endows vehicle-side agents with an efficient visual chain-of-thought, resolving the tension between cognitive reasoning and real-time computation, thereby establishing a technical paradigm for achieving safe, human-like autonomous driving.

Surge forecast for cockpit domain controllers

Annual shipments of automotive cockpit domain controllers (CDCs) will reach 49.5m by 2030, according to market watcher Berg Insight.

More than a quarter (26.4%) of all cars sold globally in 2025 were equipped with a CDC. This corresponds to annual shipments of 23m units during the year.

Annual shipments of CDCs are expected to see a CAGR of 16.5% to reach 49.5m in 2030 as an increasing number of OEMs and vehicle models adopt CDC-based cockpit architectures.

In this report, a CDC is defined as an SoC-based cockpit compute unit that consolidates in-vehicle infotainment with at least one additional cockpit subsystem or display domain within one controller architecture.

Automotive OEMs offer increasingly sophisticated digital cockpit experiences, which include larger displays, more advanced user interfaces and AI-enabled functions.

To support increasingly sophisticated digital cockpit experiences, OEMs need more powerful and more integrated cockpit electronics architectures.

CDCs enable consolidation of functions that were previously handled by separate ECUs and provide the compute capacity needed for advanced graphics, multi-display management, voice assistants, in-cabin monitoring and AI-enabled user experiences.

Premium manufacturers are generally taking the lead when it comes to the adoption of highly integrated cockpit systems. Mass-market OEMs are following the approach to some degree.

China is at the forefront of adoption of sophisticated cockpit platforms. Chinese OEMs are rapidly adopting intelligent cockpit platforms, AI assistants and high-performance cockpit SoCs across a broad range of models.

An important role of tier-one suppliers in the digital cockpit market is to act as the integrator for the complete offering including the hardware and software stack.



STM and FocalPoint improve GNSS reliability

FocalPoint and ST Microelectronics have entered a commercial agreement to deliver enhanced GNSS reliability for automotive applications.

The agreement combines FocalPoint's S-GNSS Auto software with STM's Teseo hardware to improve positioning reliability in difficult GNSS environments.

FocalPoint produces GNSS software for automotive, wearables and smartphones.

Building on a collaboration first announced last year, FocalPoint and STM have advanced their joint S-GNSS Auto and Teseo combination to a full commercial offering.

It is said to deliver a significant leap in GNSS reliability, particularly in urban canyons, tree-lined roads and other tough environments where conventional GNSS struggles. It is delivered as a firmware upgrade to Teseo devices, enabling automotive OEMs and tier-one suppliers to achieve improved positioning accuracy in a straightforward and cost-efficient manner.



Combination improves GNSS reliability in urban canyons

Backed by FocalPoint's patented Supercorrelation technology, S-GNSS software has demonstrated consistent accuracy improvements in multipath and signal-degraded conditions.

In recent global trials, S-GNSS Auto on Teseo devices outperformed standard commercial-grade products.

"We're delighted to enter this commercial agreement with STM," said Scott Pomerantz, CEO at FocalPoint. "Together, we deliver significant improvements that make autonomous and connected vehicles safer and more reliable."

Luca Celant from STM added: "Through our commercial agreement with FocalPoint, and by leveraging the flexibility of Teseo's open platform, we are expanding our portfolio with S-GNSS Auto-powered products that help customers push performance beyond traditional GNSS receiver limits and gain a real competitive edge in the market. By adding the S-GNSS roadmap and innovations such as Precise+ to the state-of-the-art Teseo portfolio, we are working to deliver sub-metre accuracy in the toughest environments. Together, we're helping OEMs add value and accelerate adas and V2X capabilities with confidence."

Evaluation kits integrating S-GNSS software on Teseo V and VI are available for OEMs, tier-ones and ecosystem partners.

Diodes acquires Elevate for $250m

Diodes has acquired Elevate Semiconductor for $250m.

A fabless semiconductor company based in California, Elevate specialises in the development of ICs for the automated test equipment (ATE) industry.

The goal is to combine Elevate's IC technology with Diodes' product portfolio, manufacturing scale and global sales reach to increase penetration of the ATE market;

The takeover is anticipated to add approximately $50m of revenue to Diodes in the first year post-close, with revenue expected to see a CAGR above 20% over the next four years.

"The explosive growth, increasing complexity, and higher performance requirements of ICs used in automotive, industrial, data centre and AI applications are driving greater semiconductor production volumes and, in turn, increasing demand for automated test equipment," said Gary Yu, Diodes CEO. "This acquisition positions Diodes to capture accelerated growth opportunities across the ATE market with an expanded analogue and mixed-signal portfolio. "

Jan Gaudestad, CEO of Elevate, added: "Elevate and Diodes share a performance-driven culture and an uncompromising focus on quality, making this combination ideal."

The transaction is expected to close before the end of this year.

SiliconMotion

PCIe NVMe FerriSSD®

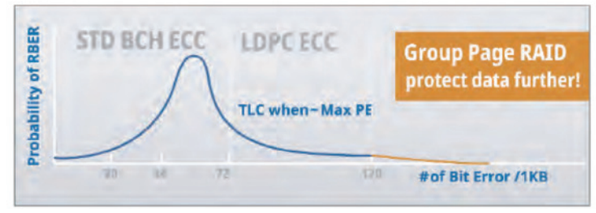
Lifecycle Assurance for Long-Service Embedded Platforms

The need for stable embedded storage across extended service lives Long-service embedded platforms stay in the field for ten years or more. Once deployed, they are rarely revisited, so component behaviour has to remain stable over that entire period.

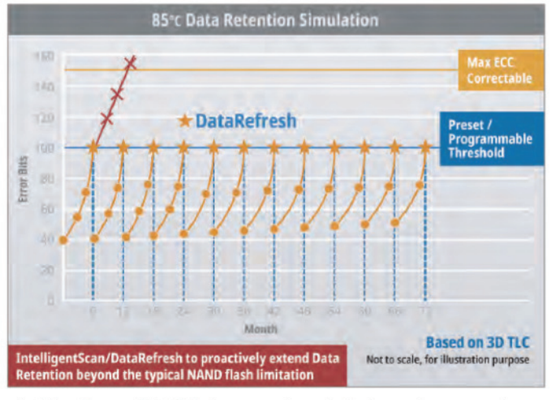


Embedded storage is sensitive because behavior depends on how the controller, NAND, firmware, and power conditions interact in practice, not in isolation. A change in any one of these layers can shift latency, reduce ECC margin, or alter background activity such as garbage collection and wear levelling. These effects are not always visible during validation. They tend to appear under stress, for example during sustained writes, low voltage events, or at temperature limits, where background operations compete with host access and error rates begin to rise.

At that point, nominal performance figures are no longer relevant. What matters is how the storage behaves under sustained stress, and whether that behaviour remains stable over time.



NANDXtend helps extend NAND lifespan while maintaining data integrity.



IntelligentScan and DataRefresh ensure enhanced data-loss and error correction, extending SSD service life.

Integrating the controller and NAND into a single managed device reduces that dependency. Flash management, ECC, and firmware are developed and validated together, rather than relying on external pairing. This limits the risk of behavioural changes being introduced through component substitution later in the lifecycle.

Silicon Motion's Ferri family is designed to manage NAND behaviour internally and maintain alignment with validated performance characteristics across the product lifecycle. Integration, lifecycle control, and internal management of NAND degradation support reliable operation in long-term deployment. That alignment determines whether a system continues to operate as expected or begins to show intermittent faults that are difficult to diagnose once deployed.

FerriSSD's Features

- NANDXtend® ECC Technology to Extended SSD Lifespan
- IntelligentScan monitors block condition and error rates to identify areas approaching endurance limits. DataRefresh relocates data to maintain retention margins and reduce the impact of read disturb over time.
- Security at device level: FerriSSD supports security features such as secure boot, firmware authentication, and hardware-based encryption, depending on the specific model. These features allow integration into system-level security architectures where trust in the storage device is required.

ChatGPT plugin aids configuration at BMW

BMW has launched a vehicle configurator as a dialogue-based plugin in OpenAI's ChatGPT.

The plugin enables AI-assisted, dialogue-based configuration of current BMW models.

Using the plugin, drivers can engage in a natural conversation to configure their car. The plugin combines the dialogue capabilities of generative AI with the BMW product and configuration knowledge base, and is available on both mobile devices and desktop computers.

BMW says it is the first car manufacturer to offer digital vehicle advice directly via ChatGPT.

Instead of step-by-step navigation through menus and submenus, users describe their requirements in natural language – for example, in terms of spaciousness, ground clearance, powertrain or intended use.

They are then given suggestions of suitable models and configurations based on this information. This also makes it easier to compare different configurations.

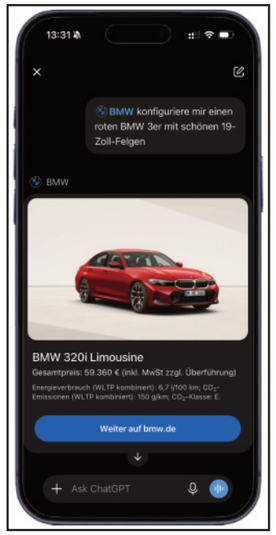
The recommendations can be adjusted, compared and refined at any time in the dialogue. Factors such as running costs, driving dynamics, colour, model or all-wheel drive can be taken into account during the consultation.

For complex specification requirements in particular, dialogue-based interaction opens up intuitive ways to refine individual vehicle configurations.

The desired vehicle specification can then be opened in the BMW Configurator. Customers can also view stock vehicles that have a similar spec.

All recommendations are based on the latest BMW Configurator data. Should any questions arise that go beyond its database, ChatGPT can also access up-to-date information from the internet at large.

On chatgpt.com, it can be accessed by going to the plugins menu item and then searching for BMW. On mobile devices, access is much the same when logged in, via the plugins option in the main menu.



BMW's OpenAI ChatGPT plugin

Elektrobit and Etas produce adas foundation

Elektrobit and Etas have launched of an integrated adas software foundation combining EB Corbos Linux for Safety Applications with the Etas software suite adas profile.

The adas software foundation is designed to simplify integration efforts by delivering operating system and middleware components in a pre-integrated setup. This coordinated approach reduces integration risk compared with sourcing individual components separately, while incorporating EB Corbos Linux for Safety Applications as an open alternative to proprietary, closed operating systems within adas foundational platforms.

Tier-one suppliers and OEMs can already integrate the adas software foundation into their current software stacks and vehicle programmes to run early production evaluations and pilots.

"Determinism, highly efficient handling of huge amounts of data and functional safety are essential requirements for series-ready adas," said Tobias Kreuzinger from Etas. "We're allowing OEMs and tier-ones to efficiently enable Asil-B safety in Linux-based systems while providing series-proven middleware capabilities to adas function developers. The combined offering delivers a robust, production-ready software foundation which helps to build safer adas faster."

Moritz Neukirchner from Elektrobit added: "Adas programmes increasingly require a mature and safety-compliant software foundation that can scale across vehicle platforms. In combination with Etas, we are validating that safety-enabled Linux can serve as a solid foundation for adas when combined with deterministic middleware. Together we provide customers with a complete, integrated adas software foundation from one coordinated source."

Mipi A-Phy compliance effort targets serdes standard

The Mipi Alliance has announced an A-Phy compliance programme for a serdes standard.

This will let member companies validate that Mipi A-Phy devices have been tested and deemed compliant with the relevant specifications and will support the automotive industry's requirements for multi-vendor integration, functional safety, EMI robustness, and reduced development time and cost for A-Phy-based systems.

BitifEye has been named an authorised test lab for the programme. BitifEye has been instrumental in the coordination of A-Phy test events around the globe and will manage the compliance programme for Mipi.

Mipi A-Phy is a long-reach (up to 15m) serdes that enables high-speed connectivity for image sensors and displays in adas, AD and SDV centralised compute. Featuring high noise immunity, it supports multiple higher-layer protocols and forms the foundation of Mipi's automotive serdes end-to-end framework with built-in functional safety and security.

A-Phy chipsets have been selected by several OEMs in design wins and implementations.

The programme was initiated in response to OEMs and tier-one suppliers seeking assurance that implementations of Mipi A-Phy and related specifications meet industry expectations.

The programme is being rolled out in phases, with initial testing focused on physical layer compliance based on the current A-Phy reference compliance test suite.

Future phases will extend coverage to the link layer and protocol adaptation layers, ensuring robust interoperability for higher-layer protocols operating over A-Phy links.

Škoda converts car into tent



Škoda is introducing Camp Mode in its MyŠkoda app, allowing drivers to use their electric vehicle as a comfortable base for overnight stays and longer breaks. By automatically maintaining the selected cabin temperature, including overnight, Camp Mode increases flexibility when travelling.

The feature will be available across all Škoda electric models, provided Škoda Connect services are active, regardless of the vehicle generation or software version.

Activated by tapping an icon in the app, the feature switches on the air conditioning and keeps the interior comfortable during longer breaks and overnight stays.

The feature will be introduced with version 8.14 of the MyŠkoda app, with no need to visit a service partner. To use Camp Mode, the vehicle's high-voltage battery must be charged to at least 30% and Škoda Connect services must be active.

The app provides a mobile link between drivers and their vehicles, offering features such as remote control of selected vehicle functions, charging management, route planning and vehicle-status monitoring.

Nexperia and Semikron Danfoss sign SiC MoU

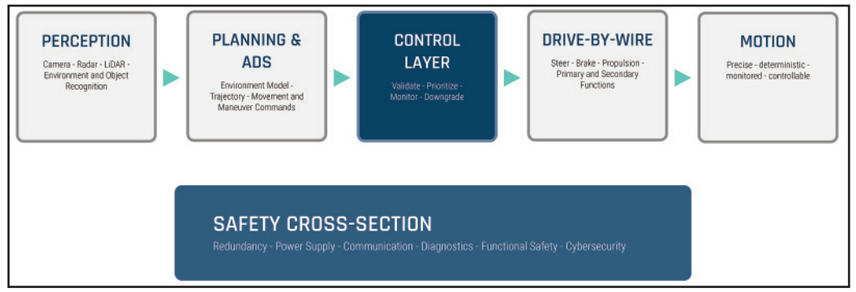
Nexperia and Semikron Danfoss have signed a memorandum of understanding (MoU) to explore a collaboration on SiC-based power modules for automotive traction inverters.

This combines Nexperia's expertise in SiC semiconductor technology with Semikron's capabilities in power module packaging and integration. Together, they intend to evaluate how a joint approach can enable high-performance, scalable products for EVs.

SiC plays a critical role in improving the efficiency, power density and performance of electric drivetrains. By bringing together complementary competencies from chip to module, the companies aim to tailor products to automotive requirements.

As part of the collaboration, both will explore joint engineering approaches, including early integration and co-design, to unlock the performance potential of SiC.

"By combining advanced semiconductor technology from Nexperia with our module expertise, we see strong potential to achieve more together than either could alone," said Carsten Götte, Danfoss senior vice president.



Control layer combines digital intelligence with safe vehicle movement

UNECE harmonises automated driving rules

The UNECE World Forum for the Harmonization of Vehicle Regulations has harmonised requirements for fully automated driving functions for the first time.

This follows its adoption in June of UN Regulation 185 and UN Global Technical Regulation 26 for automated driving systems (ADS), expanding the international reference framework for automated driving.

It also covers applications in which a vehicle is operated within its operational design domain without continuous human control.

The UN regulation establishes an approval framework under the 1958 Convention; the UN GTR creates a globally harmonised technical basis under the 1998 Convention, which is transposed into the respective parties' national or regional systems.

This does not result in a globally identical set of registration laws, but rather in a significantly more common technical standard for safety, validation and verification.

"Autonomy is not resilient simply because an algorithm makes the right decision," said Kevin Arnold, CEO of Arnold NextG. "It is resilient when the vehicle executes that decision in a controlled manner even under relevant fault conditions. The new ADS regulations do not prescribe a specific architecture. However, they make it clear that safety must be demonstrated across the entire chain of effects and the entire life cycle."

The ADS regulations make it clear that the performance of an automated driving system alone is not enough. Only the safe electronic control of steering, braking and propulsion creates the conditions necessary for autonomous driving decisions to be reliably translated into vehicle movements.

In public discourse, autonomous driving is often described in terms of sensor technology, AI and the performance of the AD stack. However, digital driving decisions must be translated into steering, braking and propulsion commands, validated, prioritised, monitored and, in the event of a fault, safely degraded.

Arnold NextG describes this safety-critical level as the control layer. The term is not a regulatory requirement but rather an architectural classification.

The control layer connects the decision-making logic with the actuators and creates a defined, verifiable interface between software and physical systems.

Hinge integrates KD optical transceiver at 10Gbit/s

Hinge Technology has integrated KD's KD7251 optical transceiver into an automotive camera system for 10Gbit/s data transmission.

This validates its applicability in real-world in-vehicle networks.

The system leverages optical connectivity for high-resolution camera data links over a fibre-optic backbone, supporting zonal and centralised architectures.

The KD7251 implements nGbaseAU physical layers compliant with IEEE 802.3cz for multigigabit optical communication over multimode glass optical fibre.

It supports high-speed sensor interconnection and backbone communication in software-defined vehicles (SDVs).

"By combining multiple 10Gbit/s camera inputs and comparing them directly with 1Gbit/s links, we demonstrated clear advantages in image quality, latency and overall system performance for next-generation automotive applications," said Yang Jun, CTO of Hinge Technology. "This proves the readiness of optical multigigabit connectivity for in-vehicle use."

The system is based on a multi-camera architecture with optical links throughout the vehicle network. Two 10Gbit/s optical cameras are connected to each of two ECUs, with data transmitted over a fibre-optic backbone between the ECUs.

One ECU aggregates and processes four high-resolution video streams for functions such as image stitching and display output. In addition, a 1Gbit/s optical camera link is integrated for direct comparison between gigabit and multigigabit transmission.

At the core of the system, the KD7251 is a single-chip optoelectronic transceiver with an integrated optical interface, combining optical and electronic functionality in a compact device.

It enables multigigabit data transmission over multimode glass optical fibre, supporting data rates up to 10Gbit/s as well as backwards-compatible operation at lower speeds for flexible integration of different camera and sensor types.

With low latency, robust EMC performance and support for automotive requirements such as Asil-B functional safety and extended temperature ranges, the KD7251 is designed for reliable high-speed connectivity in in-vehicle environments.

Its integrated bridging capabilities support direct connection of camera sensors and processing units.



Demonstration of multi-camera system by Hinge using KD7251 with 10Gbit/s optical links and fibre-optic backbone

Mazda picks Panasonic for cockpit control

Mazda has selected Panasonic's CDC cockpit domain controller for its all-new CX-5 set to roll out worldwide.

The adoption of Mazda's EE Architecture+ electronic platform has enabled a complete redesign of the HMI, with strengthened and expanded communication functions and applications, and evolved adas.

The CDC is a cockpit platform designed for software-defined vehicles (SDVs), combining centralised control of key systems such as infotainment, head-up display and instrument cluster with seamless, intuitive user experiences.

Its updatable architecture enables continuous enhancements via over-the-air updates.

Panasonic has also integrated VirtIO, an open-standard virtualisation technology, to support scalable software development.

A modular architecture supports ongoing feature upgrades and performance improvements.

Lauterbach and Mathworks ease developer transition

Lauterbach and Mathworks are working together to improve testing of critical safety systems.

This sees the full integration of Polyspace code testing and verification products from Mathworks with Lauterbach's Trace32 tools so developers can seamlessly transition tests from emulators and simulators to real chips, saving time, resources and costs.

Polyspace products help organisations improve software quality by combining static analysis, formal verification, testing and code coverage measurement in a unified workflow. Polyspace analyses C, C++ and Ada code to identify defects, security vulnerabilities and coding-standard violations, and can exhaustively verify the absence of certain run-time errors in critical software components.

Polyspace also supports compliance initiatives through checks for standards such as Misra, Autosar and Cert C/C++, while providing test authoring, execution, management and code coverage measurements on the host and embedded target environments.

Trace32 debug and trace tools support more than 15,000 different chips and over 150 CPU microarchitectures.

In2Tec shines light on circular electronics for JLR project

Sustainable electronics innovator In2tec has played a key role in Jaguar Land Rover's recently announced Project Cornerstone, contributing its patented circular electronics technology to help demonstrate how future vehicles can be designed for repairability, recoverability and reuse.

Project Cornerstone brings together more than 40 supply chain partners to explore how circular economy principles can be embedded into vehicle design from the outset.



Emma Armstrong

As one of the specialist technology partners selected to support the programme, In2tec has applied its proprietary ReUse and ReCycle technologies to one of the automotive industry's most technically demanding applications – vehicle headlamp electronics.

For decades, electronic assemblies have relied on permanent soldered connections, making repair and component recovery difficult once products reach the end of their operational life. In2tec replaces solder with a reversible conductive adhesive so electronic assemblies can be disassembled without compromising performance.

Within Project Cornerstone, this enables electronic components in headlamp systems to be recovered, tested and reused rather than discarded, supporting JLR's wider ambition of creating vehicle systems that can be repaired, reused and ultimately recycled.

Testing has shown no observable difference in performance between recovered electronic components and newly manufactured parts, confirming that circular electronics can meet the standards required for automotive production.

"The transition to circular manufacturing starts at the design stage," said Emma Armstrong from In2tec. "For many years the electronics industry has accepted that soldered assemblies are effectively permanent. Our technology challenges that assumption by enabling electronic components to be recovered and reused while continuing to deliver the performance demanded by automotive applications."

The collaboration also highlights the increasingly important role suppliers play in helping OEMs achieve sustainability targets. By engaging technology partners early in the design process, manufacturers can embed circularity into products from the outset rather than attempting to address it once products reach end of life.

Beyond the environmental benefits, recoverable electronics offer commercial advantages. Reusing high-value components reduces demand for virgin materials, lowers embedded carbon, improves resource security and creates opportunities to recover value from production fallout and end-of-life vehicles.

Although Project Cornerstone is a demonstrator programme, the technologies showcased have been developed using production-relevant components, underlining their potential for future vehicle programmes.



Bosch starts sample SiC chip production in California

The US government has agreed $225m in funding to support Bosch's Roseville, California, plant as it starts production of silicon carbide (SiC) semiconductors.

This adds to the $2bn Bosch is investing to transform the facility, which has more than 40 years of experience in semiconductor manufacturing.

It is evolving into a facility that produces and tests SiC semiconductors.

Bosch has begun sample production in Roseville as the company intends to produce its first commercial production chips on 200mm wafers this year.

"The start of sample production and our agreement with the Department of Commerce is a milestone in providing our local customers with what they have requested – localised US-based manufacturing," said Paul Thomas, CEO of Bosch in North America.

As part of its investment, Bosch has developed a cleanroom space and high-tech manufacturing line for production of SiC chips. It has accelerated its time to market through investment into a long-standing US-based manufacturing facility.

In 2023, Bosch acquired the wafer fab in Roseville as part of its takeover of TSI Semiconductors, and began to transform the site while maintaining employment of existing staff.

Bosch invested in the further development of Roseville staff through training and collaboration with the Bosch production network. The site employs more than 300 people.

The company plans to invest up to $7.5bn over the next five years across its operations in the USA.

"We are focused on growth and investment in the USA to increase the share of our global portfolio that is represented by North America and the USA specifically," Thomas said.

SiC is becoming foundational in electric and future mobility systems as it handles high voltages, high temperatures and fast switching more efficiently.

The chips help enable greater range and more efficient recharging in battery-electric vehicles and plug-in hybrid vehicles. Recently, Bosch announced its third-generation SiC chips that deliver up to 20 per cent higher performance and are smaller than the previous generation.

Bosch has delivered more than 60 million SiC chips worldwide since the first generation went into production in 2021.

Micron signs memory deals with seven suppliers

Memory technology firm Micron has signed agreements with key tier-one suppliers, ecosystem partners and automotive manufacturers.

The firms are Qualcomm, Visteon, Harman, Joynext, Denso, Astemo and Hyundai Mobis.

These agreements are designed to support long-term access to memory and storage as the industry shifts towards increasingly sophisticated AI enabled vehicles.

The agreements aim to provide visibility for production planning as well as increased collaboration on future memory and storage requirements. They support investments in technology development, qualification and manufacturing capacity.

BIKES THAT TALK, ROADS THAT LISTEN

Saneesh Menon and Jerin Joseph Koshy show how connectivity is being extended beyond the car

As cities become more connected, ensuring the safety of vulnerable road users such as cyclists is more important than ever. Vehicle-to-everything (V2X) communication is a key enabler of safer, more efficient transport systems.

This can allow vehicles to exchange real-time data with their surroundings, including other vehicles, infrastructure such as traffic lights and road works, mobile network for traffic updates, and pedestrians.

By sharing information such as position, speed and direction, V2X creates a connected awareness layer between road users.

Unlike conventional safety systems that rely on line-of-sight detection, V2X enables direct communication between road users, allowing detection of potential hazards even when they are not yet visible. This earlier awareness supports faster decision-making and helps reduce the risk of collisions. For example, when a cyclist approaches a blind intersection, nearby vehicles detect it in advance.



Fig. 1: V2X enables direct communication between road users, allowing detection of potential hazards even when they are not yet visible

Micromobility

While originally developed for automotive applications, the growth of micromobility is driving the need to extend this connectivity to cyclists and other vulnerable road users, particularly in complex urban environments, see Fig. 2.

V2X communication is built on two primary, non-interoperable technologies: Dedicated Short-Range Communication (DSRC) and cellular V2X (C-V2X). Both operate in the 5.9GHz spectrum and are designed to deliver low-latency, highly reliable communication for safety-critical applications.

DSRC is based on the IEEE 802.11p standard and evolved from wifi. It enables direct communication between nearby road users without relying on cellular infrastructure. This makes it particularly effective for time-critical scenarios where messages must be exchanged within milliseconds.

C-V2X, defined by 3GPP standards, extends this capability by supporting both direct communication and network-based communication via cellular infrastructure. Safety-critical messages can be delivered directly (device-to-device) using sidelink communication, while additional data can be transmitted via the network, providing greater flexibility and scalability across connected environments.

The evolution of C-V2X continues with NR-V2X, the 5G-based standard designed to deliver higher reliability, lower latency and increased data throughput. These capabilities support more advanced applications, including autonomous driving and coordinated traffic systems.

V2X can be extended to micromobility. An example of this is e-bike integration using V2X-enabled safety technology to connect a bike to surrounding traffic and infrastructure.

Powered by a V2X module and other hardware and software, this e-bike integration enables real-time awareness and early warning capabilities designed specifically for cyclists.

The platform provides the hardware and software foundation required for micromobility applications, enabling real-time communication and processing of safety messages. The V2X module delivers reliable, low-latency connectivity in a compact, power-efficient form factor suited to space-constrained designs.

This requires seamless integration into the bike, without compromising ride quality or design. This integration transforms the bicycle into an active, connected road user, capable of sharing its position, speed and movement in real time with surrounding traffic.

With a V2X test environment, various scenarios and use cases can be tested and demonstrated. This gives users a realistic experience of how V2X technology enhances safety.

This e-bike integration concept operates through the continuous exchange of standardised safety messages. Cooperative awareness messages (CAMs) are transmitted periodically to share information

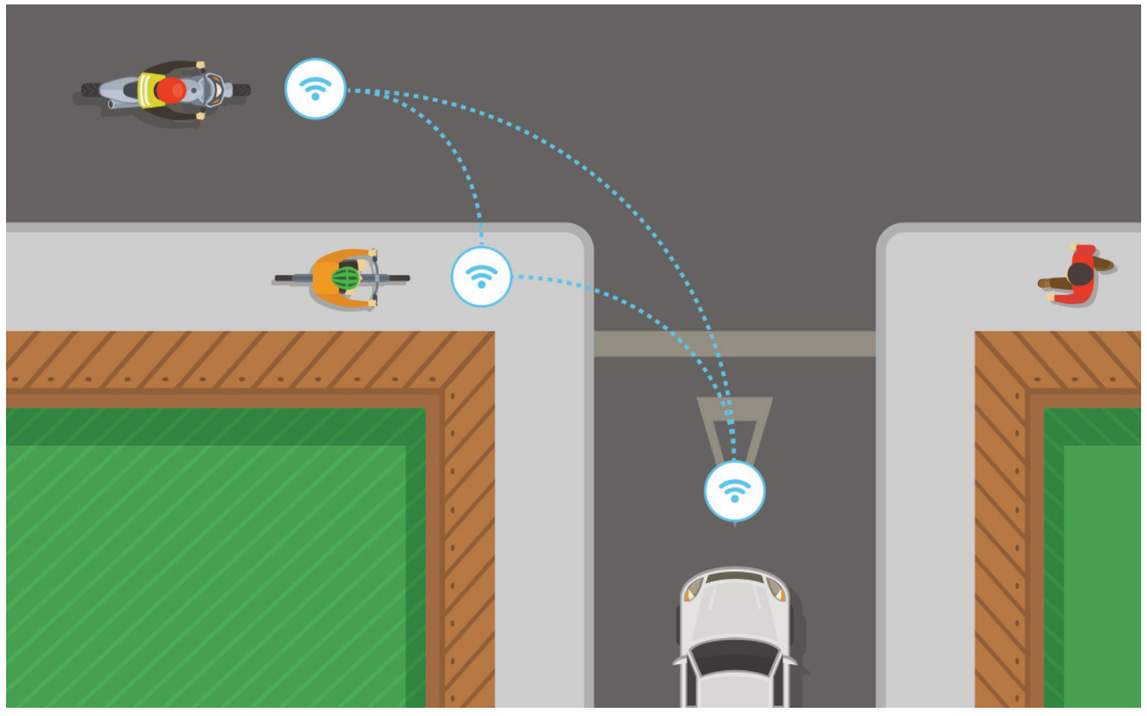


Fig. 2: V2X technology allows bikes, scooters and vehicles to see each other

such as position, speed and heading, ensuring nearby road users maintain an up-to-date view of each other's movements.

Decentralised environmental notification messages (DENMs) are triggered by specific events, such as hazards or unusual conditions, to alert surrounding road users and enable faster responses.

Within this concept, communication is translated into intuitive rider feedback. The rider is alerted via haptic feedback in the handlebars, indicating either a general collision risk when both grips vibrate or the direction of a potential hazard when only one grip vibrates. At the same time, a cyclist approaching an obscured intersection can be detected by nearby vehicles before coming into view. This early, bidirectional awareness improves reaction times and supports safer interactions between road users.

Network

V2X is uniquely capable of integrating bicycles and scooters into the wider vehicle safety network, extending connected safety beyond cars. This creates opportunities to improve safety, optimise traffic flow and enhance urban mobility.

As cities continue to adopt cooperative intelligent transport systems (C-ITS), incorporating micromobility will be essential to building fully connected and inclusive transport ecosystems. Enabling all road users to share information in real time supports safer interactions and more efficient use of infrastructure.

Through concepts such as e-bike integration, bicycles become connected road users, addressing a critical gap in the safety ecosystem and ensuring cyclists are no longer overlooked within traffic systems.

As V2X continues to evolve, particularly with the advancement of 5G-based NR-V2X, it will play an increasingly important role in shaping safer, smarter and more inclusive mobility. The result is a connected environment where every road user is visible, informed and better protected.



Saneesh Menon is a field application engineer and Jerin Joseph Koshy a team leader for automotive modules, both at Murata



OBSOLESCENCE



Ross Turnbull explains how custom IC development is being used to preserve continuity and avoid unnecessary redesign

READY FOR A RAINY DAY

Combustion and hybrid vehicle programmes were never meant to outlive their supply chains, yet that is exactly what is happening. As IC vendors continue to retire legacy portfolios, tier suppliers are increasingly exposed to obsolescence inside systems that remain central to production programmes.

Across automotive manufacturing, electrification continues to advance, but not as a clean replacement of one technology with another.

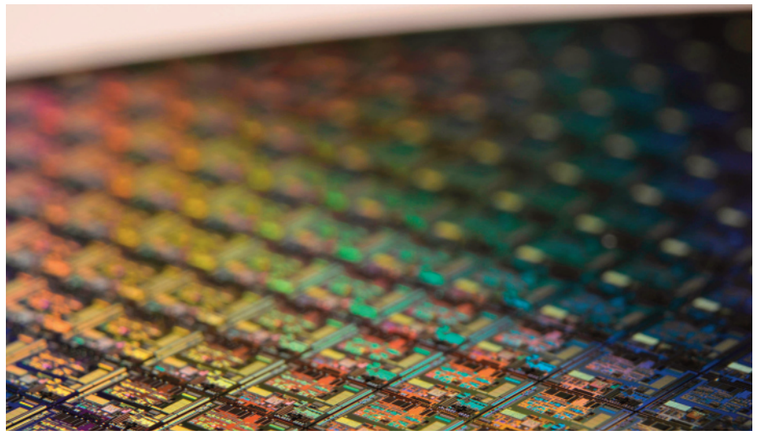
For example, in April this year the UK registered its two millionth battery electric vehicle (BEV), with BEVs taking a 26.2 per cent market share during the month, according to the SMMT. Yet petrol cars still accounted for 42.6 per cent of new registrations, demonstrating the mixed platform reality facing OEMs and tier suppliers.

For suppliers, this creates a practical challenge. An automotive electronic subsystem may still be validated, manufacturable and required in volume, but one of the ICs it depends on may no longer fit the commercial roadmap of the original semiconductor vendor. Once that happens, obsolescence becomes a production continuity issue. The question is whether the supplier can keep a proven vehicle function in production without triggering redesign and revalidation.

Problem

The most difficult obsolescence events aren't found in new vehicle programmes, but in mature platforms where the electronic design has already done exactly what it was meant to do. The subsystem is stable, the production process is understood, the diagnostics are proven and the surrounding vehicle architecture has been validated around known behaviour.

That is particularly true in sensor and control electronics, including braking electronics and



Semiconductor die patterns illustrating the complexity behind long-life automotive electronic systems

motor control, where IC behaviour is closely tied to calibration, timing, thermal performance and diagnostic response. Substitution cannot be treated as like-for-like, because silicon-level changes spread into testing, manufacturing and system sign-off.

Historically, the response to an obsolete component was to identify an alternative device, redesign the affected part of the circuit and requalify. This approach still has its place, but it is increasingly difficult to keep change bounded in mature automotive electronic subsystems.

A replacement device may appear similar on a datasheet, yet still affect analogue performance, timing behaviour, electromagnetic compatibility, production test strategy or software interaction assumptions. In automotive programmes, the burden is not only to prove that the revised design works, but that it behaves consistently with the original system across operating range, tolerance and ageing.

This is why tier suppliers increasingly need to treat continuity as an engineering requirement alongside performance, power and cost. The objective is not simply to replace an obsolete component, but to keep a validated function buildable and supportable for the remaining life of the programme.

Silicon

There are many reasons why an IC may become obsolete. Semiconductor manufacturers may phase out older designs to make room for newer devices, migrate away from mature processes or discontinue a part when sales volumes no longer support continued production.

In these cases, a production end date may be set and a last-time buy (LTB) offered, which can be suitable for products approaching the end of their lifecycle, but less suitable for automotive programmes that still have years of production or service demand ahead of them.

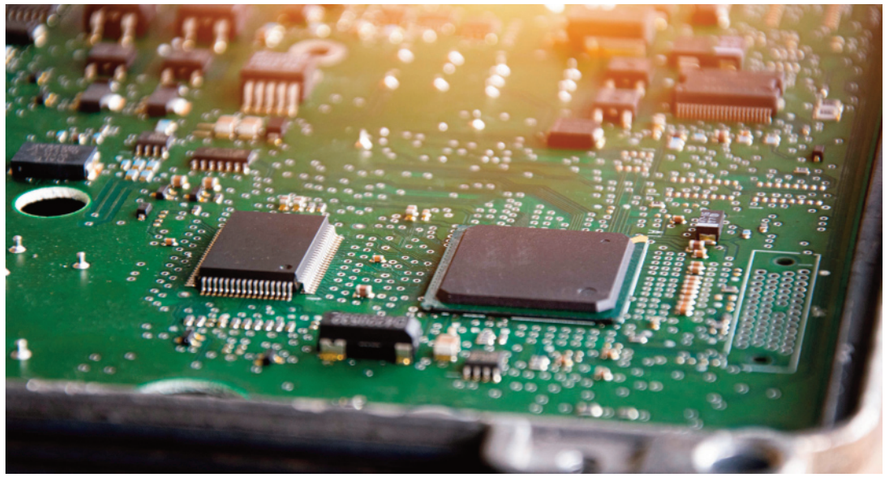
In an asic context, the two areas that typically require long-term planning are the silicon process and the package. Packaging changes can often be managed through an alternative source and requalification activity, but process obsolescence requires earlier engineering judgement because the chosen process must satisfy performance, maturity and longevity requirements at the same time.

An LTB requires confidence in future demand, upfront capital and a storage strategy. If volumes are underestimated, supply may still run out before the programme ends. If volumes are overestimated, the supplier is left carrying unnecessary cost.

This is where an asic can move from being a product differentiation tool to an obsolescence recovery mechanism. When a chip becomes obsolete, an experienced asic designer can replicate the required functions of the original device on a similar silicon process or, where appropriate, migrate the function onto a more modern process. The aim is not novelty for its own sake, but continuity of behaviour in a controlled implementation that can be supported over the programme lifecycle.

Asic development can also reduce future exposure by consolidating surrounding circuitry into a single device, lowering the number of discrete components that may later become the next obsolescence trigger.

If notification of obsolescence arrives at short notice, the transition does not need to happen in one step. An LTB can maintain production while a replacement asic is developed, while existing schematics, proven circuit-block IP and mature design flows can shorten development time and reduce risk, allowing the supplier to move from reactive sourcing to planned continuity.



Automotive ECU, where multiple ICs work together to deliver validated, long-term vehicle functionality

Confidence

The delivery model matters because obsolescence recovery does not end with the design of a replacement chip. Asic development spans specification definition, circuit design, layout, verification, prototyping, production test, qualification, industrialisation and long-term supply management.

A full turnkey asic approach keeps those stages under one operational framework. In practice, the same supplier controls design, verification, foundry and packaging management, production test, quality assurance, failure analysis and order fulfilment. For automotive, this creates a clearer line of accountability from the original specification through to production supply.

This accountability becomes especially important if issues arise in the field or if future changes are needed. Where responsibilities are fragmented between separate design, test and manufacturing partners, resolving faults or making amendments can become slower and more difficult. With one asic partner holding responsibility for the full process, the route to resolution is clearer and continuity planning can be built into the project at the outset.

As combustion, hybrid and electric platforms continue to run in parallel, obsolescence recovery will become a more visible part of automotive electronic system planning. The risk is not that proven vehicle functions become obsolete in operation, but that the ICs supporting them become unavailable while the wider platform still needs to be built and serviced.

Obsolescence in automotive electronics is no longer a late-life procurement issue. It is becoming a structural design constraint in platforms still actively being built. If tier suppliers want to keep long-running programmes viable, continuity cannot be treated as an afterthought to component selection: it must be designed into the silicon itself.



Ross Turnbull is director of business development at Swindon Silicon Systems



Engineer developing and validating asics to ensure continuity when legacy components reach end-of-life

VIRTUALISATION

IN ZONE

Steve Shih discusses emerging zonal automotive architectures



The latest zonal architecture promises to simplify vehicle electrical infrastructures, potentially saving weight and complexity while enhancing reliability, safety and security. As this new approach is adopted, software-based virtual machines with hardware-based IO virtualisation are needed to manage resources and ensure isolation.

As modern vehicles rely increasingly on electronically controlled and software-defined functions, the typical domain-based electrical architecture that dedicates a control unit for each is giving way to a zonal approach.

The domain approach, which groups functions by domain such as powertrain, chassis and infotainment, has driven a rapid increase in the number of ECUs on board the vehicle as well as increased wiring complexity. The zonal approach, where ECUs are classified according to their location in the vehicle, contains a centralised communication gateway and compute module sized to handle workloads from multiple ECUs within the vehicle. It gives the opportunity to reduce the number of ECUs and simplify the wiring, permitting space savings and reduced vehicle weight.

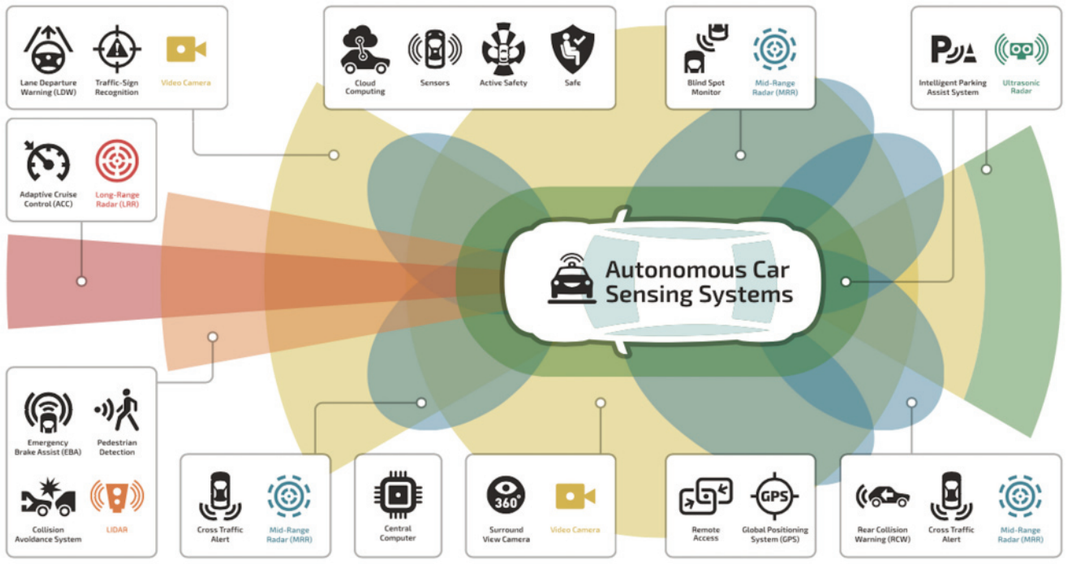
In addition, as vehicles become more complex with the introduction of advanced features and connectivity, zone-based architectures can scale more easily by adding or modifying zones.

Further advantages include the potential to ease system integration by grouping related functions and components together, which reduces complexity during development, as well as the chance to improve fault isolation and improve safety and security by compartmentalising functions into zones.

While transitioning to the zone-based architecture to get savings and improvements, it is important to retain some attributes that have been present in the preceding approaches such as the domain-based architecture. Some critical functions, such as safety-critical systems (for example ABS and airbags), benefit from being isolated within their domains and can permit enhanced safety by reducing the risk of interference from other non-critical functions.

It is also worth noting that domain-based architectures allow for specialised development teams for each domain, for example powertrain and infotainment. These teams can focus on optimising their specific functions, leading to potentially higher performance and efficiency within their respective domains.

Zonal architecture adoption is anticipated to accelerate the trend towards software-defined vehicles as zonal gateways and the central compute cluster can be easily updated with software to improve functionality or add new features. Moreover, the zonal gateway facilitates the integration of powerful edge computing to ensure the vehicle handles critical events that require fast response.



Autonomous vehicles rely on a combination of cameras, radar, lidar and ultrasonic sensors to build a comprehensive view of their surroundings, enabling safer and more intelligent driving decisions

Virtualisation

In a zone-based architecture, virtual machines (VMs) can play a crucial role by offering isolation, resource control, flexibility and security. They are a valuable tool for designing and managing complex systems with multiple functional zones.

Isolation is achieved by running each functional zone on a separate VM. This way, any zone experiencing a failure or security breach is less likely to impact other zones, which enhances overall system reliability and security.

In addition, VMs allow computing resources such as CPU cycles, ram and storage to be precisely allocated to each zone. This enables critical zones to receive the necessary resources, while contentions that can lead to performance issues are avoided.

Also, using VMs allows separation between software stacks for different zones, permitting each VM to have its own operating system and software dependencies. Compatibility issues and conflicts between zones can be reduced.

In addition, security policies and access controls can be configured to allow fine-grained security management within each zone and thus strengthen security for sensitive data and functions.

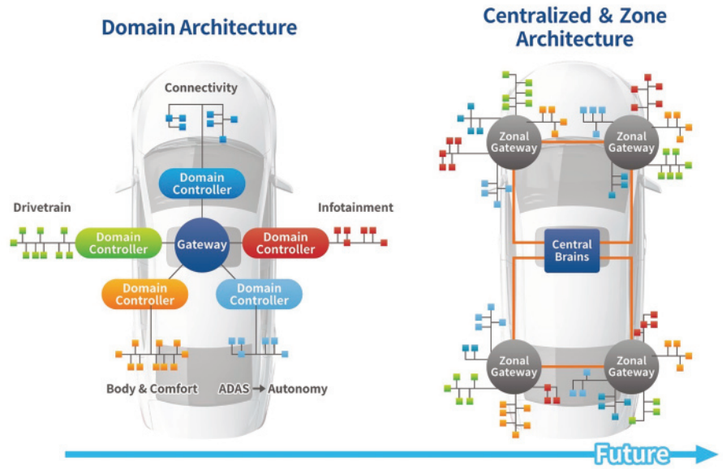
During development, engineers can work on individual zones within separate VMs, allowing for isolated testing and debugging. This reduces the risk of changes in one zone affecting others. On the other hand, VMs can be easily duplicated or scaled to accommodate changing requirements within a particular zone.

In an automotive electrical infrastructure, various functions and components run on different VMs to isolate their software stacks. These VMs are used for specific tasks, such as powertrain control, infotainment or adas. Where this is the case, IO virtualisation is an effective technique that enables the VMs to interact efficiently and securely with physical IO devices such as sensors, actuators and storage.

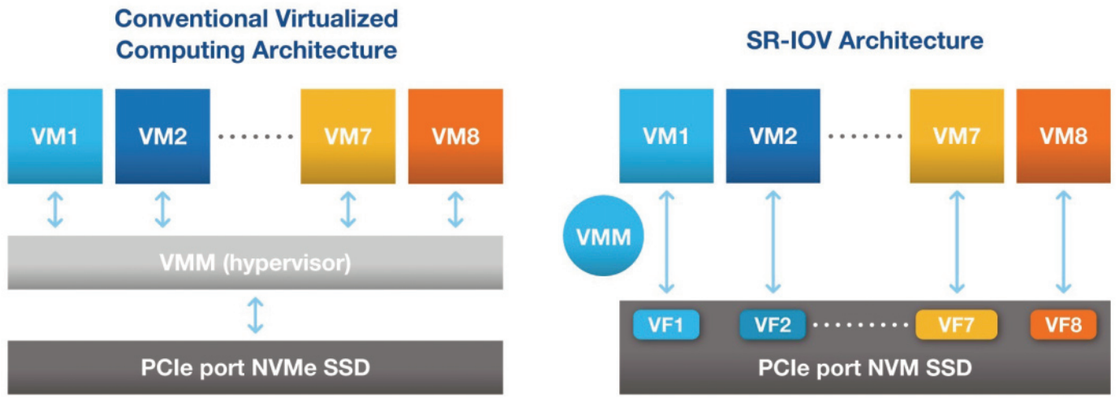
For implementation, single-root IO virtualisation (SR-IOV) delivers several advantages. It includes enhanced system reliability and security, by providing strong isolation between virtual functions and the physical device to prevent conflicts, ensuring that each VM can access the necessary hardware without contention. Also, by providing a standard framework for configuring and monitoring virtualised IO devices, SR-IOV can simplify the management of IO resources.

The key advantage of SR-IOV is it allows data to bypass the hypervisor layer, enabling direct data transfer between the VMs and the PCIe port NVMe SSD. This direct path significantly reduces latency by eliminating the data allocation between PCIe and host, and it lessens the computational load on the CPU that hosts the hypervisor.

In addition, multiple VMs or



Vehicle architectures are shifting from distributed domain controllers to centralised computing platforms with zonal gateways, reducing complexity while supporting the performance and scalability required for software-defined vehicles



SR-IOV architecture allows VMs to direct data transfer with the PCIe port NVMe SSD, streamlining data transfer processes to reduce latency

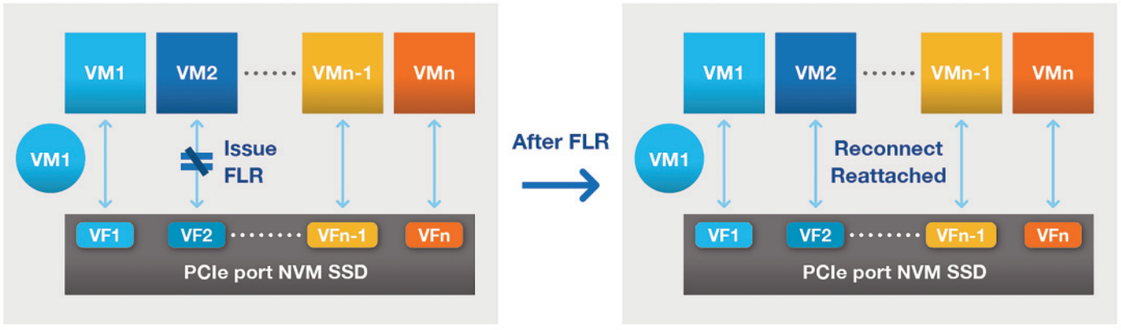
partitions can share a single physical IO device, thereby ensuring efficient resource use that reduces the number of dedicated hardware components needed. This can be especially valuable in space-constrained automotive environments.

In applications where real-time processing of data from sensors and actuators is required, VMs aided by IO virtualisation can access hardware interfaces directly and efficiently, reducing latency and overhead. As more vehicles rely on adas and autonomous driving for improved safety, virtualisation is effective to ensure timely responses to critical events.

IO virtualisation also contributes to fault isolation and recovery. If a VM fails, the function-level reset (FLR) command can reset and reconnect the VM with the SSD without impacting other VMs and virtual functions. This enhances system reliability of automotive systems and is extremely important for safety-critical applications.

Finally, using VMs with IO virtualisation can strengthen security and enhance scalability. Each VM can be configured with specific security measures including access controls and policies tailored to its function, preventing unauthorised access to IO resources. Scalability is ensured by allowing additional VMs or partitions to be added without major changes to the underlying hardware.

As the industry moves towards zonal automotive architectures, seeking efficiency gains and bill-of-materials savings, combining VMs with IO virtualisation ensures efficient, scalable and reliable systems. VMs help



PCIe virtualisation enables individual VFs to be reset and reattached without disrupting other workloads, helping maintain system availability and improving fault isolation in high-performance storage environments

compartmentalise functions, while IO virtualisation enables the VMs to interact with physical IO devices, ensuring isolation, real-time performance and security.

Advantages

The advantages of SR-IOV architectures for the evolving needs of the automotive market include efficiency and low latency.

SR-IOV ensures near-native response times, leading to highly efficient and stable systems. In automotive applications where even millisecond delays matter, this can be crucial. In addition, reduced CPU usage allows data to bypass the hypervisor and go directly to the application. This allows for more CPU resources to be available for other tasks, thereby improving the efficiency of the system.

Scalability

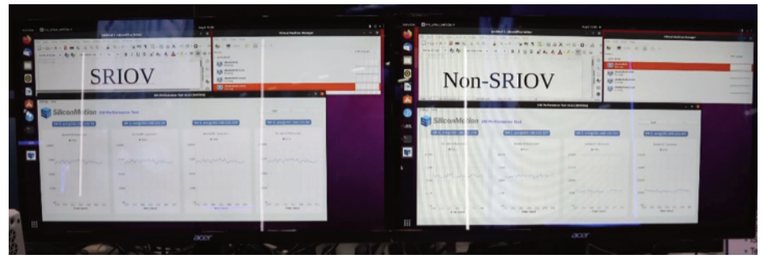
By providing multi-namespace support, SR-IOV permits efficient sharing of IO resources among multiple applications or virtual machines. This is invaluable in automotive contexts that necessitate the simultaneous operation of several services, such as navigation, infotainment and driver-assistance systems.

SR-IOV ensures seamless communication, enabling information sharing among different virtual functions (VFs) thereby bolstering the collaborative capabilities of various automotive systems.

Reliability

Isolation is ensured. The FLR interface can reset the individual SR-IOV functions This ensures that, when a VM fails, it can be reset and use FLR to reconnect with the SSD without impacting other VMs and VFs.

In the automotive context, this ensures critical systems are isolated from non-critical systems, reducing the risk of system-wide failures and enhancing the reliability and security of each application running on the hardware.



Side-by-side demonstration comparing SR-IOV and non-SR-IOV configurations on two separate PCs reveals significant advantages for SR-IOV

Future-proofing

As automotive systems continue to evolve, SR-IOV provides a robust architecture tailored to integrate new technologies seamlessly. Its ability to allocate VFs to support VMs directly reduces latency significantly. SR-IOV thus ensures low latency and high throughput, which meets the critical requirements for real-time data processing in autonomous driving vehicles.

SR-IOV facilitates resource optimisation by reducing CPU usage and aiding efficient use of IO. This can significantly reduce the total cost of ownership (TCO) for automotive companies.

Lower CPU use also means less energy consumption, which is a critical factor in battery-operated electric vehicles.

SR-IOV requires less complex configuration and management compared with traditional IO virtualisation methods, making it easier to deploy and maintain.

From performance gains and reduced CPU usage to better scalability and futureproofing, SR-IOV presents a strong case for being the go-to architecture for future automotive systems.

Summary

The surge in data transmission and computational needs within automotive systems is driving a transformative shift in vehicle architecture. As vehicles become more reliant on electronic control and software, there's an uptick in the demand for controllers and a challenge to manage the complexity and bulk of wiring. The zonal approach can simplify the vehicle architecture as the number of functions continues to increase.



Steve Shih is automotive and embedded product marketing manager at Silicon Motion

NI DAYS 2026 UK

THOSE WERE THE DAYS

Steve Rogerson reports from NI Days in Birmingham, UK

The automotive industry is getting to grips with the challenges the software-defined era brings, but those problems are different depending on whether the company is an established OEM changing the way it operates or one of many enthusiastic start-up companies.

For test and measurement firms such as NI, formerly known as National Instruments and now part of Emerson, this brings a need for flexibility not previously required in what was once a slow-moving sector from an engineering view point.

NI is having to embrace this change, not just for automotive but for all industries as AI speeds up development and brings in new layers of complexity. In automotive, the move to electrification, the increasing use of driver assistance features and the path to full autonomous vehicles, some of which are now on the road, has increased the pressure on test equipment companies. When an autonomous vehicle takes to the streets, if something goes wrong the consequences can be fatal, literally. Test companies are a crucial part of the chain making sure that never happens.

"In the automotive industry, there is a big set of challenges bringing out greener and more autonomous vehicles," said NI's chief business manager Matthew Surridge at July's NI Days event in Birmingham, UK. "It is now much more a software-centric industry."

He said the market had seen a lot more entrants bringing out new vehicles in an increasingly agile way.

"So our discussions are about how we can help them be more productive using AI across the design flow," he said.

Rob Harris, senior director for NI's transportation business, added: "The newer companies have a software mindset. The traditional OEMs and tier-one suppliers need to catch up. We are helping them close that gap."

He said some traditional companies were still struggling while other have made the right choices.

"Not everyone is there yet," he said. "We are helping them catch up in the software-defined era."

Surridge said some managed to do this almost overnight and turned into software-centric companies building cars and buses.

"Some have done that really well," he said. "Others have struggled, but there are not many that are stuck. We are working with both the new companies and the traditional ones. Our platform works for both."

A start-up has no legacy vehicles to deal with and so begins with a blank sheet of paper.

"But as they build their fleet, they start to see the same sort of problems the traditional companies face," said Surridge. He said NI's experience at both ends meant it could use the lessons learned from one to help the others.

The company can also use the experience it has with test equipment for aerospace and defence companies in the automotive field.



NI PXIe-1480 carrier module supports interchangeable interface devices for automotive display and camera testing



Rob Harris (left) and Matthew Surridge

"Our advantage is our platform is stable and tested," said Harris. "We have been doing testing for automotive for decades. They are confident they can work with us when they integrate all the safety requirements into their test flows."

Surridge added: "We position ourselves as a testing partner. We are not developing the vehicle platform, we are helping them build testing into the process, from design all the way to vehicle production. We can help them with rapid prototyping, testing, hardware-in-the-loop simulation, driver assistance. There are many different kinds of test cases."

And this is increasing with the machine learning and autonomous features leading to very different levels of testing, right from the silicon components at the electronics manufacturers.

"We are their test and measurement partner from R&D right through to production," said Harris. "We are involved in testing their AIs. These are taking inputs from cameras, radar and lidar. We look at all the sensor inputs and see how the AIs react. We can help validate these for automatic braking and so on."

NI also works with the simulation companies that have test vehicles on the road collecting data and mapping scenarios that are used to generate the test cases.

"Our tools can be integrated with the simulation tools," said Surridge.

Module

Emerson used the show to introduce a modular test architecture designed to address increasing complexity in



Luke Schreier: "AI is not just a trend."

software-defined vehicles. Built on NI-based technology, the automotive vision device combines a high-performance FPGA core with interchangeable serdes interface devices, letting engineers configure test systems for evolving automotive display and camera requirements.

"We can inject a video signal into an ECU to test the adas," said Harris. "The new capability is to do that for the display. You can do this without having a robot finger pressing buttons. This will have the ability to capture the signal that comes out of the ECU and be able to test it without having an actual display."

Surridge added that it also removed the problem of having cameras pointing at the display as part of the test.

"They can be moved or dislodged, and the test fails," he said. "If you take the screen out of the loop, you don't have issues with cameras or shadows."

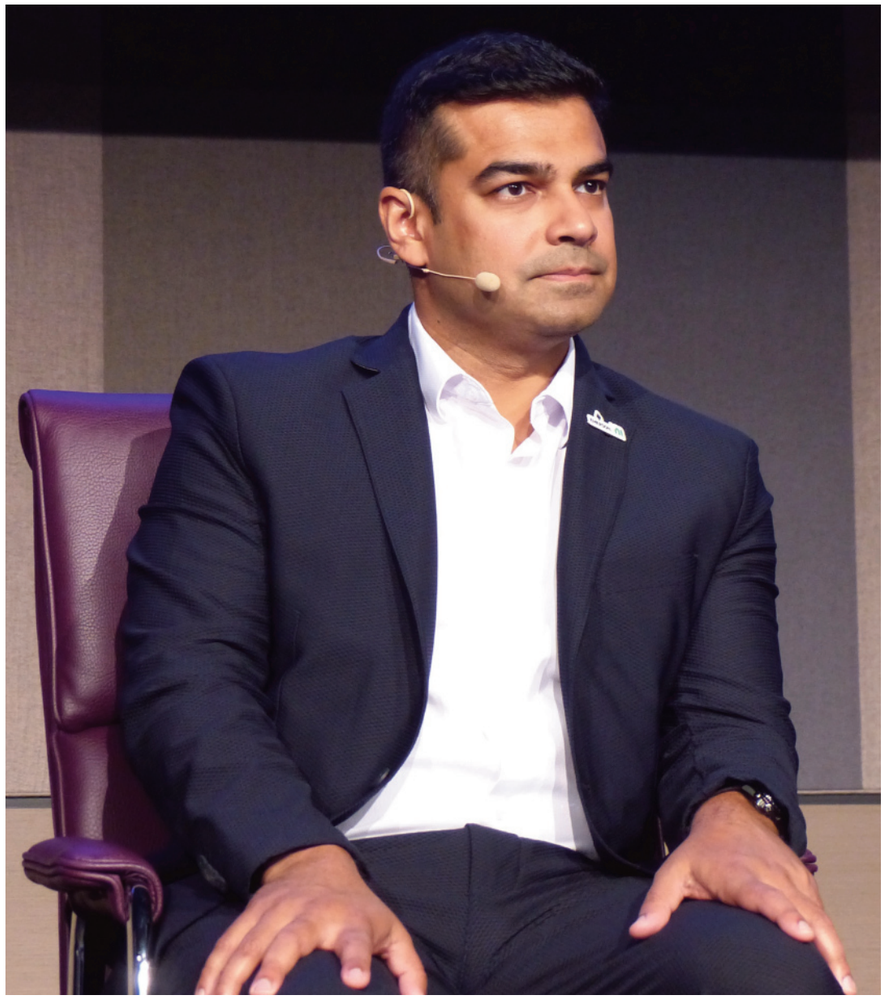
With this launch, Emerson continues to advance the NI PXI platform as an open, modular foundation for evolving test requirements, extending its capabilities for high-performance automotive test applications. It includes the NI PXIe-1480 FlexRIO multiprotocol vision carrier module, which hosts interchangeable interface devices for automotive display and camera testing. The first available interface devices support FPD-Link IV, a high-speed automotive video interface commonly used in adas and in-vehicle display applications.

As vehicle architectures shift towards centralised ECUs, engineers must validate multiple high-speed interfaces on increasingly complex systems. Conventional display test methods, often relying on cameras or visual inspection, limit scalability and introduce variability. By providing a direct interface to ECU and display serdes IO, the modular PXI-based approach improves test coverage through automated, deterministic testing. The result is a single, flexible platform that streamlines validation and improves test repeatability.

"The increasing complexity of automotive electronics requires a more flexible and scalable approach to validation," said Sam Burhans, chief product manager with Emerson's test and measurement business. "This modular architecture allows engineers to adapt their test systems to evolving interface standards without redesigning their entire setup."

The NI PXIe-1480 carrier module serves as the foundation for this architecture, supporting interchangeable interface devices tailored to specific testing requirements. At launch, the available interface devices are focused on display testing. Emerson plans to extend the platform later this year with additional interface devices supporting a broader range of camera and display protocols.

It is designed for engineers in automotive validation and production test environments, including tier-one suppliers and OEMs, supporting applications across in-vehicle infotainment, adas and autonomous driving.



Rudy Sengupta: "It will empower engineers to be extremely productive."

AI

Much of the event focused on NI's work with AI, notably Nigel, an AI assistant it introduced last year and which it is embedding into more of its products.

"The world is changing faster than ever," said Emerson vice president Luke Schreier. "As the products have evolved, so has the pressure of testing them. Now we get to lay AI on top of that. AI is not just a trend. The same force increasing the complexity is also the one increasing the testing. You need a platform designed to evolve as the technology landscape changes. This is not about replacing engineers but enhancing how engineers work. Nigel is about increasing productivity."

This point was emphasised by vice president Rudy Sengupta. He said: "AI will not replace engineers, but engineers who use AI will replace engineers who don't. It will empower engineers to be extremely productive."



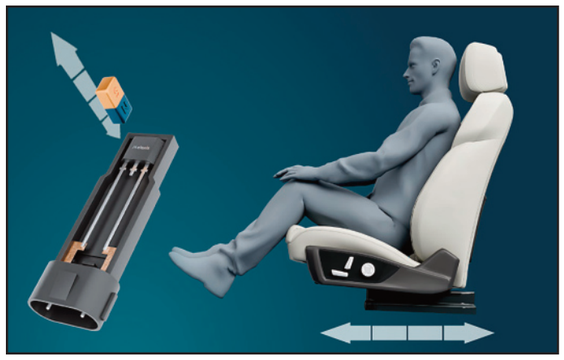
Hall switch improves safety for seat positioning

A two-wire 2bit Hall switch from Melexis is for contactless detection of up to four positions, eliminating the need for bulky microswitches.

The MLX92344 flexible PCB-less device ensures backwards compatibility over two wires and introduces programmable current levels and magnetic thresholds.

This enables body electronics including safety for seat track positioning, smoothness in soft closing doors and size reduction of multi-level boot locks.

The device incorporates a dual programmable architecture that allows engineers to assign output current levels directly to its magnetic operating and release thresholds with temperature compensation for neodymium or ferrite magnets.



Designers can configure up to four current levels, typically 5, 10, 15 and 20mA, within a range of 3 to 28mA, allowing the device to emulate standard microswitch interfaces while maintaining compatibility with existing hardware and ECUs.

It can be sensed via standard IO triggers or an ADC, where one only needs to adjust software readouts.

Operating from 2.7 to 28V (with 32V absolute maximum rating for trucks) and supporting the -40 to +150˚C temperature range, it is an Asil-B, SEooC and AEC-Q100 qualified component and available in tsot23-3L surface-mount and TO92-3L (UA) through-hole packages.

It also offers ESD robustness, supporting 8kV human body model and 15kV system level.

Device parameters, including switching thresholds, current outputs, diagnostic behaviour and the number of output states, are configured through on-chip non-volatile memory.

One application is seat-track position sensing, where accurate seat position detection is critical for occupant safety.

It can also simplify electronic latch (e-latch) mechanisms for doors, bonnets and boots by replacing multiple microswitches with a single contactless device.

Detecting four mechanical states is particularly valuable in soft-close mechanisms, where doors or boots are automatically pulled closed after reaching an intermediate semi-latch position.

Moreover, one can detect fully open, semi-latched, fully-latched and over-pushed, mapping the whole end-start motion.

The device can also support electric vehicle charge port monitoring, detecting the position of the charge port door or connector mechanism.

SiC power module operates up to 205˚C

A 1.3kV SiC power module from Infineon is for use in EV inverters.

It is part of the HybridPack Drive family that can operate continuously at up to 205˚C. Existing designs typically allow up to 175˚C.

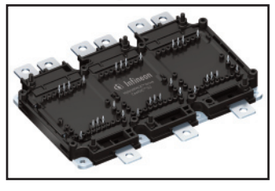
This lets OEMs and tier-one suppliers deliver higher peak and continuous output power from existing inverter designs or, in new designs, reduce complexity and cost.

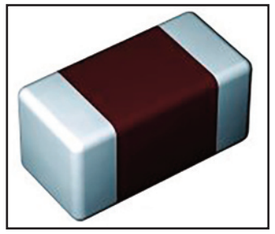
The increased operating temperature enables up to 15% higher output current than existing designs, directly translating into higher inverter power density.

The extended temperature capability can also reduce cooling requirements. By tolerating higher junction temperatures, inverter designs can be optimised with smaller or less complex cooling, helping lower cost, reduce weight and improve overall energy efficiency.

The module is the first in the HybridPack Drive family to come with a 1.3kV blocking voltage to improve inverter performance, efficiency and robustness beyond battery voltages of 900V.

The firm plans to roll out 205˚C capability across existing 1.2kV units.





220µF MLCC

A 3.2 by 2.5 by 2.8mm multilayer ceramic capacitor (MLCC) from Taiyo Yuden complies with AEC-Q200 reliability tests for passive automotive components.

This MLCC more than doubles the capacitance of the firm's conventional MLCC from 100 to 220µF in the same case size.

It is for output smoothing and decoupling applications in automotive, including control systems such as engine ECUs, safety systems including ABS and adas, and information processing in instrument clusters.

Mass production has started at the firm's Tamamura plant.

Modern vehicles are seeing advancements in electronic controls due to adas and functional upgrades through software updates in software-defined vehicles (SDVs).

Achieving this demands advanced electronics including internal and external vehicle networking and the implementation of scalable designs.

The device comes in a 3225-size package.

Ethernet connector addresses adas needs

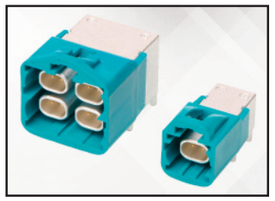
An Automotive Ethernet connector from Molex addresses rising adas and compute demands, and zonal architectures.

The HSAutoLink G delivers differential STP and UTP multi-gig Ethernet performance up to 25Gbit/s, supporting adas, lidar, zonal architectures and central compute modules.

It enhances integration and supply chain flexibility with USCar-compatible design.

Terminal anti-stub feature improve mating quality and a reversible housing shroud adds packaging and routing flexibility.

Engineered to fit within existing USCar Ethernet interfaces, the connector enables flexible, future-proof product designs that reduce space and weight in compact modules while streamlining integration and upgrades.



EMI shielding and controlled differential impedance preserve signal integrity for high-speed communications in dense environments, helping prevent signal failures, validation delays and costly design changes.

The anti-stubbing design protects the contacts during the mating process, reducing the risk of mis-mating. Multiple, uniform ground-contact points enhance EMI suppression for heightened reliability.

The family includes terminals, connectors, PCB headers and cables.

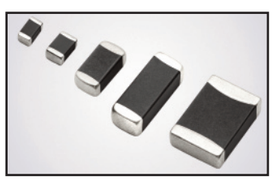
There are qualified alternate connector sources, which are critical for fast-moving, high-volume markets in China, and gaining traction across other global sectors where the shift to 25G Automotive Ethernet is gaining momentum.

High-speed automotive communication protocols, such as HSAutoLink G and Molex HFM, are paired with innovations such as the Molex MX-Dash connector to integrate power, signal and high-speed data transfer seamlessly within a unified architecture.

Ferrite beads ease EMC noise reduction

Vishay has expanded its ILHB series of automotive-grade multilayer chip ferrite beads for high current filtering.

The Dale devices offer higher current capability, smaller case sizes and a wider range of impedance values to meet a broader set of EMC noise reduction requirements.



The series is now available in 0402, 0603, 0805, 1008 and 1206 case sizes with current handling up to 6A and impedance values from 10 to 2700Ω.

The expanded line lets designers achieve higher current handling in smaller packages, while delivering two to three times the current capability for the same size and impedance value.

Applications include high current, high frequency and signal-specific filtering in automotive energy distribution and management systems.

The AEC-Q200 qualified devices have a silver inner conductor with copper, nickel and tin plating. They operate from -55 to +125˚C.

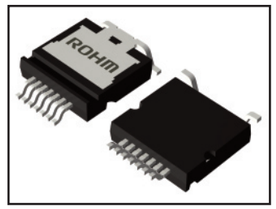
Package dissipates heat for SiC mosfets

Rohm has developed the TSC3Pak 14 by 18.58 by 3.5mm package for SiC mosfets.

By adopting a top-side heat dissipation structure that places the heat dissipation surface on the top of the package, the product enables automated mounting while achieving heat dissipation performance comparable with that of conventional through-hole packages.

This contributes to greater efficiency and reliability in power conversion circuits for onboard chargers (OBCs) and electric compressors used in electric vehicles.

In EVs, the adoption of SiC devices is expanding beyond main inverters to include power conversion circuits such as OBCs and



electric compressors to improve charging speed and extend cruising range.

Conventional SiC devices have generally relied on through-hole packages, which provide heat dissipation during high-power operation. However, through-hole type devices involve manual mounting processes, and their form factor makes it difficult to achieve a lower package profile.

Against this backdrop, surface-mount SiC devices compatible with automated mounting have begun gaining adoption. To address these issues, the TSC3Pak delivers heat dissipation performance comparable with through-hole technology such as TO-247 in a surface-mount package.

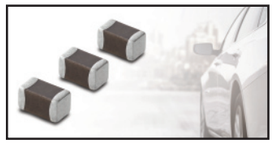
The package incorporates a proprietary groove structure to secure a creepage distance of 6.66mm, allowing it to accommodate an AC peak voltage of 1.2kV in a Pollution Degree 2 environment while maintaining compatibility with products widely adopted in the market.

By enabling safe insulation design in high-voltage applications, it also contributes to reduced mounting costs and higher reliability.

MLCC packs more in smaller size

A soft-termination chip multi-layer ceramic capacitor (MLCC) from Murata is for automotive powertrain and safety equipment.

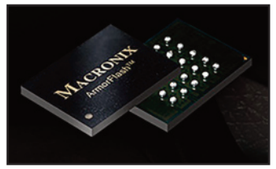
It achieves a capacitance of 2.2μF at 100V DC in the 0805 2.0 by 1.25mm size.



Built on a proprietary ceramic material design, including fine particle size and uniformity control, the MLCC achieves an approximate 51% reduction in board mounting area compared with the firm's previous 2.2μF, 100V DC offering, and an approximate 2.2x increase in capacitance over its previous 0805, 100V DC product.

Soft termination further enhances field reliability by absorbing board flexure stress and reducing post-mount cracking.

Operating range is -55 to +125˚C and it meets X7T temperature characteristics per EIA standards.



Secure flash

Macronix's ArmorFlash MX78 secure NOR flash memory, developed according to the ISO 21434 development process for cyber security, complies with ISO 26262 Asil D.

The device blends reliability with security features and certified development processes to provide automotive manufacturers with a secure NOR flash that meets functional safety and cybersecurity standards.

It can provide value to automotive OEMs, tier-one vehicle system suppliers, and automotive platform and SoC vendors who demand qualified external secure flash.

The device can tackle system-level safety and security risks and shorten qualification cycles, and let engineers deploy secure, safety-critical vehicle systems.

It reduces system integration and certification efforts, and strengthens protection against firmware tampering and cyber attacks.

The integrated design of the memory devices consolidates security functions into one chip, which allows it to meet ISO security standards.

Pre-driver complies with ISO 21780 for 48V systems

With an absolute maximum rating (AMR) of 75V, ST Microelectronics' L98GD8E is a 48V automotive pre-driver combining compliance with ISO 21780 for 48V electrical systems and eight channels for high-side and low-side driving.

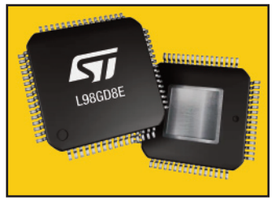
The device's eight outputs are independently configurable for driving external high-side n-channel and p-channel, or low-side n-channel mosfets, allowing flexibility to handle loads in various configurations.

One IC can control up to two H-bridges in DC motor drives, or can manage multiple relays, and resistive or capacitive loads, and provide peak-and-hold control for small valves.

Channel six is suitable for driving safety-relevant loads requiring a dedicated enable pin.

Applications include mild-hybrid systems such as powertrain and energy recovery, as well as auxiliary systems such as e-compressors and integrated starter generators.

Capable of driving multiple loads, its flexibility simplifies leveraging the 48V powernet to increase power delivery, raise energy efficiency, and save weight by reducing wiring and connector current ratings.



It helps meet EMC regulations applying to automotive electrical systems by permitting mosfet slew-rate control during turn on and turn off.

Diagnostic features help fulfil safety demands by protecting loads and detecting faults such as short-to-ground, short-to-battery and open load in both on and off conditions.

Two integrated 10bit ADCs, monitoring battery voltage and device temperature, enable dynamic and automatic overcurrent threshold compensation to adapt to all operating conditions.

The device is compatible with 3.3 and 5V logic and provides a high-speed SPI interface for configuring the IC and sharing diagnostic signals. As well as indicating external faults, the diagnostics also include built-in self-test, hardware self-checking of internal overvoltage-detection circuitry and a communication check watchdog timer.

The SPI gives access to the battery and die temperature measurements. There are two disable pins that provide dual-redundant fast switch-off to enhance system safety.

It is in production now in a 10 by 10mm TQFP64 package.

Sensor checks environment over Can

An air quality monitoring sensor from Metis Engineering is for integration into transport and industrial hvac systems.

Called Air Wise, it delivers real-time measurement of environmental parameters including absolute pressure, NOx, air temperature, VOCs, CO_2, relative humidity, dew point temperature and impact shock, all transmitted over a configurable Can bus.



The sensor is compatible with platforms from passenger and commercial vehicles to off-highway machinery, autonomous pods and compressed air systems.

As regulatory pressure on air quality tightens across transport, construction, agriculture and industrial sectors, it provides the precise, actionable data to support smarter, safer and more sustainable systems.

The sensor integrates directly into hvac Can bus systems via its automotive-grade five-pin Molex Nano-Fit power connector, with a Can DBC file enabling rapid deployment across virtually any Can-compatible platform.

Intelligent monitoring mode lets the sensor continuously observes environmental conditions but refrain from transmitting on the Can bus until a predefined threshold is crossed. Upon breach, it switches to active mode and can trigger a 500mA low-side drive output to initiate a response.

It has been tested to automotive standards including ISO 7637-2:2011, ISO 16750-2:2012 and ISO 16750-4:2010, and optionally supports a triple-axis accelerometer range up to ±24g.

Load switch delivers low on resistance

An automotive-compliant low drain-source on-resistance n-channel mosfet smart load switch from Diodes is for power sequencing and power rail control in automotive applications that include adas, infotainment and display clusters.

The DML1012ALDSQ smart load switch has an input voltage range of 0.8 to 4V, allowing use in numerous subsystem power rail domains.

The $R_{DS(ON)}$ of up to 8mΩ lowers on-state losses and reduces heat generation in and around the device.

A junction-to-case thermal resistance of 8°C/W enables up to 6A of continuous output current. A low quiescent current improves efficiency during power gating and reduces standby power.

In addition, the enable control pin provides precise, microcontroller-driven power sequencing.

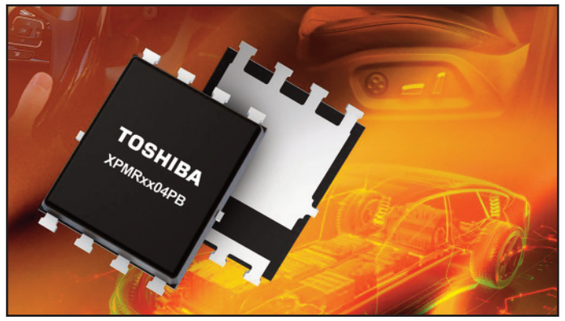
Protection features let engineers reduce PCB area and time to market compared with a discrete option. For example, the device reduces inrush current by controlling the output voltage slew rate during start-up, which benefits system stability.

Integrated quick output discharge ensures downstream components are fully discharged during shutdown. Undervoltage lockout disables system function when the supply voltage falls below a safe threshold, ensuring predictable behaviour and stable supply conditions.

The device is available in the V-DFN3030-8 type R 3 by 3mm package.

It is AEC qualified, manufactured in facilities certified to IATF 16949 and has supporting PPAP documents.





Package boosts mosfet efficiency

Three 40V n-channel power mosfets from Toshiba come in the sop advance EWF package to boost efficiency in automotive applications.

They have post-less and source-coupling structures to achieve a current rating up to 180A and enhanced thermal performance.

The XPMR5904PB is available now, and the XPMR7404PB and XPMR8504PB will be available shortly.

They are for automotive applications, including inverters, semiconductor relays, load switches and motor drives.

The post-less structure connects the chip and outer lead via a copper clip rather than internal posts. This eliminates internal posts and reduces the resistance of the current path.

The source-coupled structure connects the source terminals on the reverse side of the package, increasing the contact area with the PCB land pattern. This internal structural optimisation expands the mountable chip area.

It also improves current-carrying capability, enabling the XPMR5904PB to achieve a drain current rating of 180A, 1.2 times that of existing products using similar packaging.

Performance has been improved to meet high-current automotive requirements and enhance energy efficiency.

Compared with the XPHR7904PS, the XPMR5904PB delivers an approximate 25% reduction in drain-source on-resistance alongside a 38% reduction in channel-to-case thermal impedance. These enhancements contribute directly to lower power loss and higher efficiency in automotive equipment.

The devices meet AEC-Q101.

Four Lin interfaces on single PCIe card

A PCIe four-channel Lin interface from Kvaser is built for deterministic communication, precise timing analysis and scalable validation setups.

The PCIe card integrates galvanic isolation with synchronised timestamping, giving engineers reliable, system-level visibility when testing and debugging Lins.

Applications include ECU development, automotive body electronics, HiL testing, multi-channel logging and industrial Lin communications.

It provides four individually galvanically isolated Lin channels through one PCIe card. FPGA-based Lin-IP technology enables communication up to 20kbaud with 1μs timestamp resolution, allowing developers to capture timing-sensitive events with precision and improve visibility during debugging and validation.

The interface also supports simultaneous operation with multiple Kvaser interfaces, enabling test setups to scale as system complexity grows.

It is compatible with applications built on the standard Kvaser Linlib API, integrating into existing setups without requiring software changes. Applications developed for other Kvaser Lin hardware can run without modification, enabling teams to move quickly between projects and interfaces.

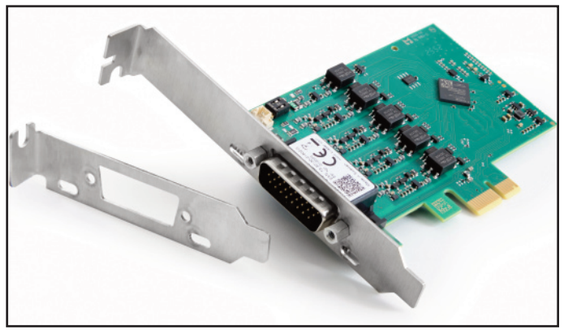
The interface supports Windows and Linux and works with the firm's Canlib SDK, which includes Linlib and other APIs, with examples for C, C++, C#, Python, Delphi and Visual Basic. It is installed directly in a PCI Express slot and powered through the host system, reducing cabling and simplifying integration.

There is support for the software-based TimeSync, helping engineers maintain synchronised timestamps across multiple devices and systems. In distributed test environments, this improves event correlation across Lin and Can while reducing manual log analysis.

On Linux platforms, the interface exposes a PHC device for time synchronisation to a host-referenced clock source, using standard tools such as phc2sys. This provides a foundation for synchronised logging, automated testing and accurate event analysis.

It is for industrial and embedded systems, operating in temperatures from -40 to +85°C.

A 26-pin high-density D-Sub connector provides access to all four Lin channels.



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ISSN 2055-1177

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