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ThunderSoft and Geely bring AI to mass production cars

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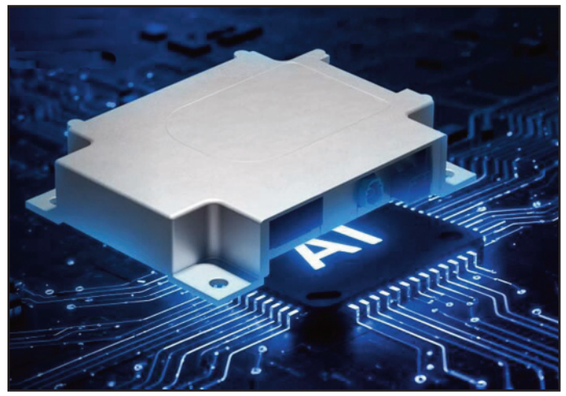
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At IAA Mobility in Munich, ThunderSoft and Geely Auto unveiled AIBox to bring large AI models into mass-production vehicles.

Accelerated by ThunderSoft's AquaDrive AIos and the Nvidia Drive AGX automotive computing platform, it delivers seamless real-time model inference, unlocking intelligent in-car experiences.



Large AI models added to mass-production cars

ThunderSoft, Geely and Nvidia developed the AIBox to provide automakers with a plug-and-play, configurable, full-stack AI compute offering, lowering costs, accelerating deployment and democratising access to large-model capabilities across vehicle lines.

ThunderSoft's AquaDrive AIos, using the safety-certified Nvidia DriveOs automotive operating system, integrates compute allocation, model scheduling and scenario adaptation for millisecond-level multi-modal responses.

Multi-agent capabilities include rapid deployment of AI agents for scenarios such as personalised greeting, proactive recommendations, enhanced sentry mode, parking memory and gui-based interactions.

It supports air- and liquid-cooling modes for stable operation in diverse environments.

Open-standard interfaces ensure seamless integration with cockpit domains and enable multi-modal data fusion.

"The race in smart vehicles ultimately comes down to AI compute and real-world deployment," said Larry Geng, executive president of ThunderSoft. "The AIBox, with its software-hardware co-optimisation plus cross-domain integration, directly addresses in-cabin compute bottlenecks while balancing cost and performance."

The Geely Galaxy M9, equipped with AI, received over 40,000 pre-orders within 24 hours."

Infineon software speeds safety app development

Infineon has launched a software portfolio for its latest Aurix TC4x microcontrollers to enable automotive safety applications with production ready Asil-D drivers for the Autosar MCal and safety software.

By reducing efforts for software partitioning and system level safety argumentation, and simplifying virtual control units, it should speed time to market.

The portfolio includes the production-grade MC-Isar Autosar MCal, SafeTlib safety software, complex device drivers, a library for the converter digital signal processor, which is a dedicated DSP for signal post-processing, and data routing software that reduces latency and CPU load to enable high-speed data transfer.

The software complies with safety and security standards and has recently passed a combined assessment according to ASpice 4.0, ISO 26262 with Asil D, and ISO 21434.

As part of this assessment, the software also achieved ASpice level three for the first time.

The software is complemented by several partner software products for the Autosar stack, non-Autosar operating systems, communication, security, hypervisors, middleware and tools.

"The feedback from first customers has been very positive, particularly highlighting the software's features, quality and ease of use," said Patrick Will, senior director at Infineon. "Our portfolio accelerates the development of electronic control units, strengthens safety argumentation and allows seamless migration from Arm architectures to Aurix-MCUs."

MC-Isar provides Asil-D-compliant drivers with features for multicore processing, virtualisation and Asil software partitioning.

SafeTlib facilitates rapid integration of the Aurix TC4x into safety applications, and supports the plug-and-play functionality of the TC4x safety manual. It also includes a test handler with a test library and management of the external watchdog PMIC TLF4x.

The CDSP filter chain library enables ADC post-processing, offloading DSP algorithms from the TriCore.

• Infineon and Lingji Innovation have signed a memorandum of understanding to drive GaN technology for light electric vehicles.



Rohm and Schaeffler partner on SiC inverter for Chinese car maker

Rohm and Schaeffler have started mass production of a high-voltage inverter brick for a major Chinese car manufacturer.

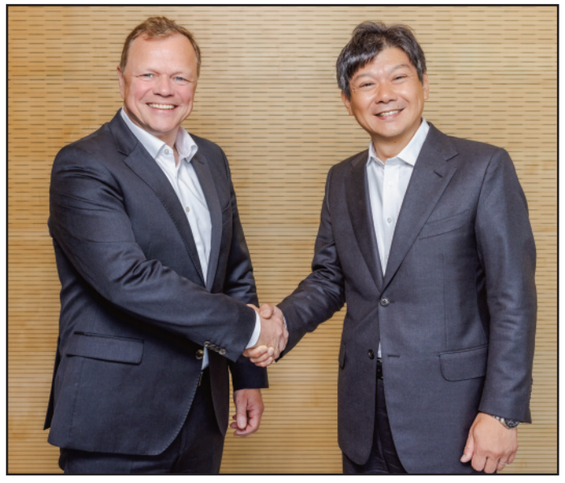
The brick is equipped with Rohm's SiC mosfet bare chips.

The Schaeffler inverter subassembly is the power device building block (brick) to control the electric drive via logic signals. This is where the high-frequency current pulses are produced that set the vehicle's electric motor in motion.

Schaeffler increased the output of the brick by increasing the maximum possible battery voltage to more than the usual 800V, and with RMS currents of up to 650A, which turn the sub-module into a compact power pack.

"Through our strategic approach of incorporating scalability and modularity into our e-mobility – from individual components to a highly integrated electric axle – we developed the readily integrated inverter brick," said Thomas Stierle, CEO of the e-mobility division at Schaeffler. "Based on our generic platform development, it took us just one year to bring this optimal product for the popular X-in-1 architectures to volume production readiness."

Rohm's SiC power semiconductors enable the frame-mounted sub-module with high power density to be compact, efficient and readily integrated into various inverters through its modular and scalable design.



Thomas Stierle (left) and Kazuhide Ino

The sub-module incorporates the power module for pulse width modulation (PWM) of the current pulses, the DC link capacitor, a DC link and a cooler. Moreover, the brick has a DC boost function, thanks to which a vehicle with 800V architecture can also be charged at a 400V charging station at a charging speed of 800V.

"We are glad about the launch of volume production for Schaeffler's inverter brick with our fourth-generation SiC mosfet," said Kazuhide Ino, managing executive officer at Rohm. "With our SiC technology we are making a substantial contribution to increasing the efficiency and performance of electric cars. Working with Schaeffler as our partner, we are thus fostering innovation and sustainability in the automotive industry."

The partnership between Schaeffler, originally initiated under Vitesco Technologies, and Rohm has existed since 2020 and serves to secure capacity for energy-efficient SiC power semiconductors.

Lauterbach backs Nvidia Drive AGX Thor

Lauterbach is supporting the Nvidia Drive AGX Thor development platform to help developers accelerate design, validation and deployment of intelligent mobility.

The Nvidia offering delivers performance for gen AI and deep learning, unifying automated driving and AI cockpit.

Lauterbach's Trace 32 ensures system-level visibility, supporting functional safety, complementing auto MCUs and virtualised SDV platforms with multiple OSs.

It provides Autosar-aware debugging, containerised workloads support and multicore debugging across heterogeneous Arm architectures.

The Trace 32 debug and trace tools support the full automotive software stack on current and future SoCs, from virtual ECU to real silicon.

With expertise in safety certification, debugging and system profiling, Trace 32 helps engineers build safe and secure automotive systems.

Its hypervisor- and OS-awareness gives deep insight into applications, operating systems and virtualised environments.

"Nvidia has delivered an impressive platform for autonomous vehicles," said Stephan Lauterbach, managing director of Lauterbach.

Wind River and Hyundai boost SDV development

Wind River and Hyundai Mobis are collaborating to advance software-defined vehicle (SDV) development.

The Mobis Development Studio is an integrated software development environment for SDVs that combines Hyundai's cloud-based vehicle development infrastructure with Wind River Studio Developer.

The web-based, unified development platform provides an intuitive user interface tailored to specific ECUs, along with high-speed build capabilities and automated testing tools. By supporting software lifecycle management, the platform improves software quality and development efficiency, enabling Hyundai to advance its transformation into a software-centric mobility technology company.

This environment leverages features from Wind River Studio Developer, including collaboration tools, automation frameworks and shift-left testing modules for earlier validation in the development lifecycle.

"As the automotive industry continues to evolve towards a more intelligent and autonomous future, software is the key driver of transformation," said Sandeep Modhvadia, chief product officer at Wind River. "In collaboration with Hyundai Mobis, we have introduced a next-generation development framework that spans both cloud and edge environments and delivers robust lifecycle management."

The partnership has delivered a software infrastructure optimised for SDVs. The teams have aligned methods to accelerate the design, development and deployment of automotive systems while supporting scalable and sustainable delivery across the entire vehicle lifecycle.

"We expect to significantly enhance automation across the entire vehicle development lifecycle and accelerate innovation in next-generation intelligent vehicle software development," said Soo-Kyung Jung, executive vice president at Hyundai Mobis.



Samsung makes Valens Mipi A-Phy chipsets

Samsung is partnering with Valens Semiconductor to develop the Mipi A-Phy standard for high-speed sensor connectivity products, in response to strong demand from global car makers.

Samsung' foundry will fabricate Valens s Mipi A-Phy chipsets using its automotive process node, which has a proven track record. This process is supported by Samsung's expertise in automotive foundry processes, IP and service package development, enabling manufacturers to create innovations in assisted and automated mobility.

Samsung FinFet technology for automotive-grade applications presents tight process controls and IP for reliability and traceability.

"The growth of the Mipi A-Phy standard is increasingly evident across the industry," said Taejoong Song, corporate vice president at Samsung Electronics. "OEMs are demanding next-generation connectivity that can ferry them to higher levels of adas and autonomous driving, and A-Phy offers the key technical breakthroughs necessary to achieve this. Samsung FinFet technology for automotive applications carries remarkable performance."

Mipi A-Phy was developed for in-vehicle high-speed sensor and display connectivity.

The standard has attracted a growing ecosystem that is designing products based on Mipi A-Phy.

Valens is offering the first chipsets on the market to comply with the standard, the VA7000 series, and is the first to achieve design wins with OEMs.

"The support of Mipi A-Phy by an electronics giant like Samsung is proof positive that this standard is the future of automotive connectivity," said Gideon Ben Zvi, CEO of Valens Semiconductor. "After announcing three design wins with leading European OEMs, and then receiving the backing of Mobileye, we're continuing to build strong momentum for Valens' A-Phy offering "

Valens and Samsung have a long history of collaboration. Samsung was among the earlier investors in Valens, and the two companies were among the founding members of the HDbaseT Alliance, ProAV's largest interoperable ecosystem with over 200 member companies.



Valeo's new Shanghai plant

Valeo opens adas and SDV facility in Shanghai

Valeo has opened a production facility in Shanghai to support software-defined vehicles (SDVs), focusing on R&D and making domain controllers and adas.

The manufacturing facility is in the Waigang Industrial Park, located in the Jiading District of north-western Shanghai.

"Valeo attaches great importance to China's automotive market as a global innovation hub, especially with Shanghai leading the global trend in software-defined vehicle, adas and electrification technologies," said Christophe Périllat, Valeo Group CEO. "The opening of our new production unit is a key measure to strengthen our innovation capabilities. It demonstrates our strong commitment and confidence in actively participating in the ongoing transformation of China's automotive industry."

The plant covers an area of approximately 30,000 square metres. Its activity is mainly R&D and manufacturing of various types of adas sensors, including lidar technology, for enabling autonomous driving from level three and above, and computing products such as domain and zonal controllers.

China is a significant source of innovation for Valeo's Brain division, hosting three integrated R&D and manufacturing facilities, as well as an independent R&D centre.

• Qualcomm and Valeo have expanded their long-standing collaboration on adas and automated driving technology. This integrates Qualcomm's scalable Snapdragon Ride Pilot, including SoCs and the adas software stack, with Valeo's expertise in hardware and software including automatic parking software algorithms, sensors, ECU systems, integration and validation.

STM extends MCU availability to 20 years

ST Microelectronics has extended its longevity programme for its widely deployed SPC58 automotive MCUs from 15 to 20 years, ensuring availability of the general-purpose product lines until at least 2038.

Among these, the SPC58 H containing up to 10Mbyte non-volatile memory for code and data storage will be available until at least 2041.

"Our long-term commitment to supporting the SPC58 family for automotive customers globally lets system designers confidently start new projects and continue to leverage their investments in device validations, software and tooling," said Luca Rodeschini, vice president at ST Microelectronics. "The MCUs enable a flexible, platform-based approach and future-proof scalability, presenting a broad selection of device variants that support evolving automotive electrical architectures."

The complete portfolio comprises five general-purpose lines for smart gateways and body applications such as lighting and door locking, with communication, analogue and security peripherals.

The SPC58 E and SPC58 N lines are also available and target powertrain-electrification and chassis-safety use cases. These provide additional features including multiple types of timers and Flex PWM to address complex motor-control challenges.

The firm's in-house manufacturing model ensures control over all aspects of device design, support and production at its own semiconductor fabrication plants.

Togg unveils AI platform at IAA



Mobility brand Togg unveiled its Can.ai AI platform, developed in collaboration with Microsoft Türkiye, at IAA Mobility in Munich.

Visitors experienced Can.ai in real-life scenarios such as an agentic AI that goes beyond traditional voice assistants; it features contextual awareness, operates without a traditional user interface, makes decisions and automatically initiates processes.

Visitors tested real-world applications such as intelligent charging route management and voice-controlled vehicle services, as well as media and health services, all seamlessly enabled and free from reliance on a conventional interface.

Can.ai processes multilayered data such as user intention, time, location, vehicle condition and past behaviour. It provides an AI infrastructure that enables context-aware interaction. Its structure goes beyond responding to requests; it shows empathy, learns, makes predictions and acts proactively in the best interest of users.

"With Can.ai, we are redefining more than mobility," said Togg CEO Gürcan Karaka.

Levent Özbilgin, general manager of Microsoft Türkiye, added: "With Togg, we developed a platform that understands needs, operates seamlessly across ecosystems and significantly enhances user experiences."

Beep and Adastec accelerate autonomous public transport

Autonomous mobility firm Beep is working with Adastec, a software company specialising in level-four automated driving software for public transport, to accelerate the safe deployment of shared autonomous transportation at scale.

Through this alliance, they will combine Beep's expertise in planning, deploying, integrating and operating autonomous mobility networks with Adastec's automated driving technology and OEM partnerships.

The goal is to establish an end-to-end offering for municipalities, transit agencies, campuses, airports and private communities that complies with federal motor vehicle safety standards, the Americans with Disabilities Act, and other applicable state and federal requirements.

"Partnering with Adastec allows us to extend our autonomous mobility to higher capacity, production-grade vehicles," said Kevin Reid, CEO of Beep. "This is about helping more people connect to jobs, healthcare, education and each other more quickly and more safely than ever before."

Beep's AV-agnostic supervision and management platform, AutonomOs, enables operators and agencies to deliver transit-integrated AV mobility services at scale, providing for vehicle and cabin supervision, fleet orchestration, and integrated workflow management.

"Beep's proven track record in operating shared autonomous networks makes them an ideal partner to bring Adastec's technology to scalable deployment across more routes and regions," said Ali Peker, CEO of Adastec. "Together, we are enabling scalable deployments of factory-fitted, full-size automated buses, combining our advanced automated driving technology with Beep's operational expertise to deliver public transportation that is safer, more efficient and truly accessible. "



SAE level-four bus using Adastec technology

Adastec's Flowride.ai level-four automated driving software, together with its sensor suite, has already been proven in commercial deployments worldwide on open public roads. It delivers automated driving capabilities in mixed traffic, designed for fully automated operation without on-board human intervention.

The system is designed to handle diverse driving conditions and maintain reliable operation under adverse weather conditions.

The combination of Flowride.ai and its sensor suite, consisting of lidars, RGB cameras, high-precision GNSS and radar, enables full-size buses, factory-fitted with Adastec's technology, to operate at speeds of up to 56km per hour without the need for on-board human intervention.

The companies expect to share details on their first confirmed joint deployments in Georgia and Florida later this year.

Futurus and Visteon to co-develop HUDs

Visteon and Futurus, a Chinese innovator in head-up displays (HUDs) and augmented reality (AR), have partnered to co-develop HUD systems for global car makers.

The collaboration will focus on developing AR, windshield and panoramic HUD systems that seamlessly project real-time driving data and adas alerts directly into the driver's line of sight and onto the road ahead.

By combining Visteon's cockpit electronics and Futurus' optical, panoramic AR display and computing technologies, the partnership aims to elevate and redefine the in-cabin experience.

"This partnership reflects our shared vision of smarter, safer and seamlessly connected mobility," said Visteon VP Francis Kim. "Augmented reality HUDs are central to the future of connected mobility and we're ready to lead that transformation."

Futurus CEO Xu Junfeng, added: "Visteon's global reach and deep understanding make them an ideal partner."


He Xiaopeng with the Next P7 at IAA Mobility

XPeng shows off AI at IAA Mobility

September's IAA Mobility in Munich saw the European debut of XPeng's Next P7 electric sedan to showcases the Chinese company's strengths in AI technology, intelligent driving systems and engineering.

Alongside this, XPeng officially opened a Munich R&D centre, its first in Europe.

"With the Next P7, we are demonstrating to users around the world how AI can transform the car into a warm, intelligent companion," said He Xiaopeng, CEO of XPeng. "It demonstrates our full-stack, self-developed AI capabilities."

He said the Munich R&D centre showed its commitment to creating experiences with Europe, deepening partnerships, driving local innovation and serving European users with the latest mobility technology.

The Munich centre is the firm's ninth global R&D hub, joining Silicon Valley and San Diego, and will help XPeng get closer to European users and ensure their needs are reflected in its future mobility innovations.

At the core of XPeng's strategy is its self-developed AI system, which underpins every dimension of the company's mobility ecosystem, from AI cars and flying vehicles to humanoid robots.

The AI architecture integrates cloud, vehicle, computing power and hardware.

These capabilities are supported by integrated central computing and zonal control architecture, enabling deep hardware-software synergy throughout the vehicle.

Powered by these breakthroughs, XPeng is advancing towards mass-producing L4 autonomous driving vehicles by 2026 and launching robotaxi trials in China. Its NGP smart driving system has also started global adaptation, with the goal of offering smart driving experiences to users by the fourth quarter of 2026.

The Next P7 sports sedan accelerates from 0 to 100km/h in 3.7s, and reaches 230km/h. It also set a benchmark for EV durability, covering 3961-km in 24 hours, an endurance record for mass-produced electric vehicles.

Founded in 2014, XPeng is an AI-driven mobility company that designs, develops, manufactures and markets smart EVs.

Based in Guangzhou, China, it also operates offices in Beijing, Shanghai, Silicon Valley and Amsterdam.

Its smart EVs are primarily manufactured at its facilities in Zhaoqing and Guangzhou.

Quintauris integrates Tasking Risc-V compiler

Quintauris will integrate Tasking's Risc-V compiler into its future Risc-V reference platform to strengthen development for automotive.

This should let software developers working on automotive and industrial systems benefit from a reliable development environment tailored to real-world needs.

"With Risc-V gaining traction in automotive, there is a clear need for robust, certifiable development tools," said Pedro Lopez, market strategy officer at Quintauris.

The integration brings together Tasking's expertise in compiler technology and safety requirements with Quintauris' focus on real-time, high-performance Risc-V reference platforms developed in alignment with industry leaders.

It should help developers build performant software while aligning with industry standards and upcoming certifications.

"We're excited to support Quintauris in advancing the Risc-V ecosystem," said Christoph Herzog, CTO of Tasking.

Quintauris wants to advance the adoption of Risc-V globally by enabling hardware development through ecosystem alignment. Tasking supports this path to the common goal with a complete toolset for software development, enabling ecosystem readiness, compiler optimisation and developer adoption.



Pony.ai and Mowasalat Karwa trial in Doha, Qatar

Pony.ai to start autonomous driving trials in Singapore

Pony.ai is about to enter the Singapore market, joining hands with partner ComfortDelGro, the largest local transportation service provider, to deploy autonomous vehicles and facilitate daily commuting for residents.

The two companies plan to introduce autonomous mobility services initially in the Punggol area with fixed routes. They will begin services in the coming months after obtaining regulatory approval.

The programme aligns with Singapore's plan to introduce autonomous mobility to supplement existing transportation infrastructure such as taxis, private hailing cars and subways, while providing services during off-peak hours, which have been consistently constrained by driver shortages.

Pony.ai and ComfortDelGro built a collaborative foundation prior to this Singapore initiative. The partnership began when the two companies signed a memorandum of understanding (MoU) in July last year to accelerate the large-scale commercial deployment of autonomous vehicles.

It was followed by a pilot programme in Guangzhou, China, which was launched in March this year and served as a precursor for their expanded efforts in Singapore.

In June, Singapore's Ministry of Transport announced a plan to deploy autonomous vehicles in housing estates by the end of the year, integrating them into the national public transport network. The initial rollout will focus on Punggol district. This initiative is part of a broader governmental effort to address driver shortages while enhancing connectivity across public transportation.

Pony.ai operates fully driverless commercial robotaxi services in four cities in China – Beijing, Shanghai, Guangzhou and Shenzhen. These services cover an area of over 2000km^2. The company has accumulated over 50 million kilometres of autonomous driving globally.

Last month, Pony.ai announced a partnership with Qatar transport service provider Mowasalat Karwa to bring autonomous vehicles to the country's roads. This builds on the company's partnership with Dubai's RTA, as well as its cooperation with Uber in the region.

Furthermore, Pony.ai is conducting on-road testing in Luxembourg with local partner Emile Weber, and round-the-clock testing in Seoul's Gangnam district.

Aston Martin integrates Pirelli tyre technology

Aston Martin is integrating Pirelli Cyber Tyre technology to add integrated functionalities into the vehicle's electronic control systems.

This intelligent system uses hardware and software data to optimise driving and vehicle performance, enabled by Pirelli's algorithms.

Cyber Tyre collects data and information from sensors located directly in the tyres, processes those data with Pirelli's proprietary software and algorithms and, in real time, communicates with the vehicle's electronics to create functionalities integrated within the driving and control systems.

Thanks to cooperation with Bosch, it will be fully integrated within the electronic architecture that governs the vehicle's dynamics in future Aston Martin models.

The technology lets the car gather crucial information from the tyres via sensors positioned in the inner part of the tread.

SGS-TÜV certifies ESol rtos to Asil D

SGS-TÜV Saar has certified ESol's core os product eMCos Posix v3.0, included in the eMCos SDK software development kit, to Asil D as a SEooC (safety element out of context) according to ISO 26262: 2018.

This is the first certification of a commercial rtos based on a multikernel architecture. Its stable performance, regardless of the complexity of software and hardware, means it suits mission-critical use in software-defined systems.

This has seen the scale of software development increase, reaching hundreds of millions of lines of code, and hardware configurations become more sophisticated, with the number of processor cores doubling with each SoC generation.

In this context, being able to operate these complex systems with efficiency and stability, even though they combine intricate software and hardware, has become a major challenge. In such an environment, the role of the os is important in increasing overall performance.

AWS and Here create SDV development platform

Here and Amazon Web Services (AWS) have created a development platform for software-defined vehicles (SDVs).

The SDV Accelerator includes architecture and sample code, as well as AWS services and partner offerings in AWS Marketplace to help automakers fast-track the development of their SDVs.

This is an expansion of the AWS-Here collaboration that began in 2022 to help automakers deliver smarter driving experiences and help enable businesses to optimise their supply chains.

The SDV industry faces challenges with fragmented development environments, traditional supply chain models and lack of standard practices. SDV Accelerator accelerates the path to SDV development through a curated collection of services offered in AWS Marketplace, jointly selected by AWS and Here.

This list features offerings from independent software vendors (ISVs), who play a central role in the automotive industry's shift to cloud-native implementations.

Additionally, SDV Accelerator provides guidance to help integrate these services into existing development environments, empowering teams working across adas, in-vehicle infotainment and other parts of the vehicle to use partner tools while maintaining control over their development processes and architectural choices.

Here's mapping and location technology is enabled in a unified manner to power smooth, consistent experiences across navigation, automated driving and electric vehicle range management.

This seamless integration helps automakers use the Here Navigation software development kit (SDK) to build differentiated, branded navigation interfaces, while helping build, test and validate adas, all within the user's virtualised development environment.

SceneXtract, a simulation tool developed by Here and AWS, helps enable rapid generation of virtual driving scenes, accelerating the validation of adas and autonomous driving functions.

SDV Accelerator brings together technology companies such as Arm, Elektrobit, Forvia, Micware, Mireo, NTT Docomo, Panasonic and QNX.

Additional partner technologies are planned.

The open architecture is designed to help enhance development environments that align with standards such as Soafee to aid interoperability and scalability, while preserving automakers' control over their architecture and user experience.

ISVs can modernise their offerings with API-first, cloud-native approaches via the AWS Marketplace workbench ready programme.

"We're helping empower automotive manufacturers to focus on what truly matters – breakthrough innovation," said Ozgur Tohumcu, AWS general manager. "This game-changing platform allows OEMs to maintain control over their technology decisions and supplier networks while eliminating traditional integration bottlenecks that have historically slowed progress."



How SDV Accelerator works

QNX and VVDN accelerate embedded software development

VVDN Technologies, a provider of software, product engineering and electronics manufacturing services, is working with QNX to help companies in mission-critical sectors such as automotive accelerate embedded software development.

Combining QNX's safety-certified software stack, including the Neutrino rtos and Hypervisor for Safety, with VVDN's expertise in automotive electronics, hardware design and manufacturing, the engagement aims to deliver an integrated foundation for innovation, functional safety and faster time to market.

VVDN's capabilities in ECU development and OTA updates should simplify SDV development and enable continuous improvements.

It will leverage QNX's real-time performance and safety certifications with VVDN's sensor fusion, AI-ML integration and camera-based products for adas and autonomous driving.

Integrating QNX's operating systems with VVDN's capabilities in UI and UX development and multimedia customisation could boost future in-vehicle experiences.

The offering also combines VVDN's expertise in battery management, power electronics and EV chargers with QNX's secure software to address the growing demands of the e-mobility market.

By providing VVDN's hardware with BSP and device drivers optimsed with QNX software, the engagement aims to deliver greater value to OEMs via high-performance, scalable and secure embedded systems.

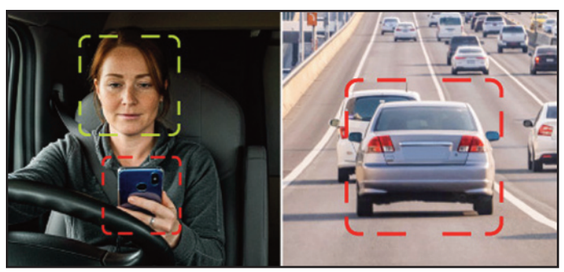
"This engagement with QNX reinforces our commitment to delivering safety-critical and real-time options across sectors," said Vivek Bansal, president of VVDN.

Geotab dashcam coaches driver to improve safety

Geotab has launched a dual-facing dashcam that delivers proactive, in-cabin support to help drivers self-correct risky habits.

The Go Focus Plus AI dashcam and its video intelligence platform can help fleets improve driver safety by delivering instant and accurate voice feedback to drivers, while providing fleet managers with a coaching platform to deliver targeted and effective training.

In a recent large pilot, the voice coaching functionality helped reduce tailgating by 90% and phone use by 95%.



Dashcam detects phone use and tailgating

This system turns every alert into a coaching opportunity, aiming to prevent accidents and create a measurable impact on fleet safety culture.

"We believe the safest fleet is a well-supported fleet," said Charlie Elliott, senior vice president at Geotab. "By uniting the power of video with Geotab data intelligence, we are providing drivers with an in-cab partner that helps them correct risks instantly. This system empowers fleet managers to move beyond reactive incident review and instead foster a culture of safety that protects their most valuable asset, which is their people."

The AI dashcam provides instant, in-cabin voice prompts to drivers when risky behaviour such as distracted driving caused by phone use or fatigue, or tailgating are detected, helping them correct bad habits.

AI-driven video intelligence surfaces the most urgent risks and repeat patterns for quick review, eliminating the need for fleet managers to sort through extensive footage. Each alert includes video and contextual data, enabling targeted and effective coaching.

The MyGeotab platform allows for a seamless workflow, including the assignment, tracking and recognition of progress, reinforcing a culture of safety in fleets.

The video intelligence is built to evolve continuously. Its AI models refine detection and coaching automatically with every update, ensuring fleets always have the smartest, sharpest tools to stay ahead of risk without extra admin work.

The platform's open architecture is designed to support a growing family of cameras, with new models and capabilities planned in the coming months.



BMW iX3 equipped with AD technology

BMW and Qualcomm deploy automated driving in Neue Klasse

Qualcomm and BMW have developed an automated driving (AD) system resulting from three years of collaboration.

The Snapdragon Ride Pilot was unveiled at September's IAA Mobility show in Munich.

This AD system is built on Qualcomm's Snapdragon Ride systems-on-chip (SoCs) using an AD software stack co-developed by both companies. The system is engineered to meet afety standards and supports AD levels ranging from entry-level NCap to Level 2+ highway and urban navigation on autopilot capabilities.

It made its debut in the BMW iX3, the first production car in BMW's Neue Klasse, and has been validated for use in 60 countries with expected expansion to over 100 countries in 2026.

Snapdragon Ride Pilot is available to all global automakers and tier-one suppliers.

More than 1400 specialists from Germany, USA, Sweden, Romania and the BMW AD test centre in the Czech Republic worked for three years on this technology.

The software stack features a perception stack developed by Qualcomm and a drive policy engine co-developed with BMW. It is engineered to let automakers and tier-one suppliers build scalable products with flexibility, cost savings and fast time-to-market, with their own drive policy or with a turnkey platform.

The system uses a camera-based vision stack for object detection, surround view, lane recognition, traffic sign interpretation, parking assistance, driver monitoring and mapping.

There is a commitment to Asil and functional safety standards, supporting compliance with the latest safety regulations. It also addresses sotif and incorporates cyber-security measures, featuring multi-layered encryption and threat detection.

A balance of rule and AI-based models are used for for behaviour prediction and planning to enable safe handling of complex scenarios.

Stack development and testing is supported by a data and simulation factory in Snapdragon Ride. This toolchain integrates real-world data with synthetic data and AI-based simulations to create driving scenarios.

Snapdragon Ride Pilot supports OTA updates and is customisable via the Snapdragon Ride SDK.

The automated driving system initiates manoeuvres based on subtle driver cues such as mirror glances or steering nudges. BMW's Superbrain central intelligent computer powered by Snapdragon SoCs combines automated driving functions.

The system uses a unified architecture which includes an array of high definition 8M pixel and 3M pixel cameras and radar sensors enabling 360-degree coverage.

SOFTWARE-DEFINED VEHICLES

TRUTH ABOUT SDVS



BMW uses Neue Klasse architecture in iX3 prototype

Shihao Fu asks if software-defined vehicles are built for users or the industry

The concept of the software-defined vehicle (SDV) has rapidly emerged as a transformative trend reshaping the automotive industry. Yet, despite widespread use of the term, there remains significant confusion around its core meaning, structural elements and real-world driving forces.

Practically speaking, SDV serves as a catch-all phrase encompassing various technological advancements, from the evolution of EE (electrical and electronic) architectures and decoupling software layers to reconfiguring operating systems.

Simply put, if it involves flexible, software-driven deployment, it likely falls under the SDV umbrella.

Traditionally, the automotive industry attributes the rise of SDVs to increasing consumer expectations, such as smarter functions, personalised experiences and seamless digital integration. However, without proactive marketing or consumer education from automakers, most users still have limited awareness of the deeper value behind software-defined capabilities.

Consumer demand remains largely rooted in tangible comfort and convenience features, such as voice commands, navigation or heated seats, rather than more complex digital services, such as AI assistants or in-vehicle ecommerce. Additionally, consumer familiarity with over-the-air (OTA) updates remains surprisingly low, resulting in slow adoption of subscription-based features.

From an industry perspective, however, the drive towards SDVs is primarily motivated by internal imperatives such as cost reduction of wiring and validation, platform standardisation, and data control. For automakers, SDV represents more than a shift in user experience; it's a fundamental overhaul of vehicle development and system architectures.

Against this backdrop, the evolution of EE architecture has become a fundamental enabler, transitioning from distributed architectures with over 70 electronic control units, several kilometres of wiring and thousands of components, to domain control, then to zonal architectures and centralised computing platforms. The aim is to standardise platforms, shorten vehicle development cycles, reduce wiring complexity and enable flexible function deployment through software configuration.

By standardising hardware platforms across multiple vehicle models, automakers can flexibly differentiate features using software, enhancing profitability and market agility.

Technologies such as firmware over-the-air (FOTA) and software over-the-air (SOTA) have become critical tools enabling long-term revenue generation through feature unlocks, subscriptions and service monetisation.

From a systems engineering standpoint, SDV is also driving a shift towards greater system cohesion. Legacy automotive systems, defined by isolated ECUs and fragmented development practices, are marked by complexity and limited integration. Conversely, SDVs are built around centralised, coherent software platforms where functions are orchestrated and coordinated through unified software layers.

This centralised model significantly enhances maintainability and scalability, and supports advanced capabilities such as real-time AI decision-making and edge computing.

At the middleware level, attention has been increasingly focused on frameworks such as Autosar. Although Autosar has long provided mature tools and modular standards, there are several challenges facing its broader adoption. High licensing costs, steep learning curves, inconsistent implementation among vendors and limited cross-toolchain compatibility present hurdles, especially for smaller enterprises and start-ups entering the automotive software space.

Regarding architecture implementation, there is an emerging preference for zonal controllers paired with centralised computing platforms. Zonal controllers manage localised sensor inputs and actuator outputs, while centralised processors handle higher-order tasks such as sensor fusion, planning and system coordination.

BMW's Neue Klasse architecture exemplifies this model, integrating high-performance computing (HPC) modules for adas, cabin management, vehicle dynamics and powertrain control, interconnected via gigabit Ethernet for seamless task management. This setup enables flexible, service-oriented software deployment, simplifying updates and facilitating dynamic cross-domain interactions.

For a mid-to-high-end SDV, the hardware investment in centralised computing platforms and zonal controllers alone can exceed $2000 per vehicle, with future architectural convergence expected to lower total wiring costs by $50 to $200 per unit.

Some automakers, including Tesla, are pushing even further towards highly centralised architectures. Tesla uses dual-HPC designs consolidating virtually all vehicle functions into two primary computing nodes, delivering unprecedented integration and efficiency.

Despite these advancements, achieving the ultimate vision, often termed "super core" architecture, faces numerous technical, commercial and regulatory problems.

Issues include managing power demands of advanced processors, ensuring robust safety compliance to ISO 26262 Asil D, and harmonising software update cycles across diverse vehicle systems.

The global annual revenue from software related to connected and software-defined vehicles is projected to exceed $700bn by 2034, with a forecasted CAGR of 34%.

IDTechEx Research Metric	Level 0 'Legacy Distributed'	Level 1 'Connected Entry'	Level 2 'Domain-Based'	Level 3 'Central Compute'	Level 4 'Zonal Compute'	Level 5 'Software-Centric'
Cockpit						
EE Architecture & Compute Topology	Distributed ECUs, multiple CAN buses + gateways	Distributed ECUs + central infotainment SoC (gateway-centric)	Early Domain architecture; powertrain / ADAS domains, partial Ethernet	Domain + first Central HPC; Gb Ethernet backbone, CAN still present	Zonal controllers + Central HPC; full-vehicle Time-Sensitive Ethernet	Fully central compute + multiple zonal controllers; redundant power & comms
OTA Coverage	None	Infotainment only (via Wi-Fi / phone tether)	Infotainment + selected domains	Multi-domain OTA	Full-vehicle OTA	Continuous delivery (CI/CD) for entire vehicle
Middleware / Service Abstraction	None	Basic proprietary APIs	Basic OTA manager layer	Containerisation / partial SOA	Full SOA + hypervisor support	Dynamic service orchestration & digital-twin support
Cockpit	Analog cluster only	Analog + small center display	Digital cluster + medium touchscreen	Digital cluster + large touchscreen	Multiple large touchscreens	Screens available for all passengers
Connection	None	3G / 4G	4G	4G	5G	5G / 6G
Display	Type	Non-touch	Small (non-touch or touch)	Medium touchscreen	Large touchscreen	Multiple large touchscreens
App Store & In-vehicle Payments	None	First-party apps only (e.g., Sports app)	App store with some 3rd-party apps (e.g., Google Maps)	App store with many 3rd-party apps (e.g., YouTube, Angry Birds)	App store with many 3rd-party apps + biometric payment	Multiple app stores (Steam, Google) + per-passenger biometric ID
Autonomy Level	Level 0	Level 1	Level 1 / 2/L2+	Level 2/L2+	L2+/Level 3	Level 3 / 4+

Defining SDV performance using six levels



Tesla is pushing towards highly centralised architecture



Shihao Fu is technology analyst at IDTechEx

DISPLAYS

Yujie Bai discusses power techniques for TFT LCD, OLED and micro-LED displays

POWER IN THE DARKNESS

Vehicle Electronics

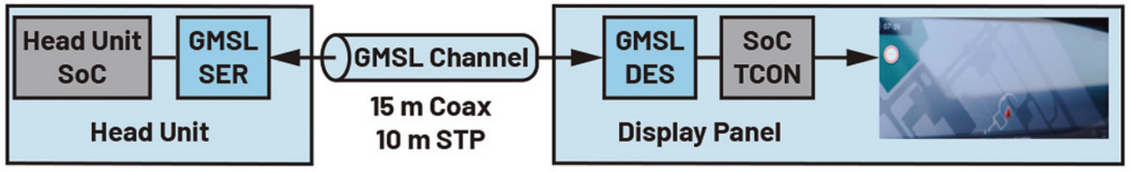


Fig. 1: Simplified automotive display system with Gigabit Multimedia Serial Link (GMSL)

For automotive displays, TFT LCDs dominate but OLED and micro-LED displays are drawing increasing attention. Power techniques need to be developed for different display technologies.

The edge-lit backlight and direct-lit backlight are commonly used in TFT LCDs. Local dimming based on the direct-lit backlight with mini-LEDs can improve display performance. OLED displays are more common in smartphones, with automotive OLED and micro-LED displays still in development.

Expectations

With the electrification of vehicles, drivers and passengers expect vehicles to deliver more features across safety, convenience, entertainment, productivity, comfort and sustainability. Meeting this demand will require different technologies from OEMs and tier-one suppliers.

One of the challenges is the increased power consumption with the incorporation of more hardware in the vehicle. A sound answer is proactively considering the power management capabilities in the early design stage.

Fig. 1 shows a simplified automotive display system, which comprises a head unit, display panel and shielded twisted pair (STP) or coaxial cables. The automotive head unit, also called the infotainment system, is the central control interface for audio, entertainment, navigation and connectivity features in a vehicle.

Advanced human-machine interfaces, such as precise voice recognition, smooth and responsive touchscreens, and sophisticated gesture control, have become common features in modern vehicles.

Inside the display panel, the timing controller (Tcon) serves as the interface between the video or image stream and the display pattern. The connectivity between the head unit and Tcon is established by a pair of serialiser and deserialiser (serdes) chips, which enable high-speed chip-to-chip communications via up to 10m shielded STP or 15m coaxial cables.

For a 114 to 150cm, 7680 by 2160 pixels pillar-to-pillar display, the data transmission needs to be up to 28Gbit/s payload.

As an example, Fig. 2 demonstrates the TFT-LCD display panel. The entire display panel system consists of a Tcon, microcontroller (MCU), LED panel (backlight) and TFT bias PMIC.

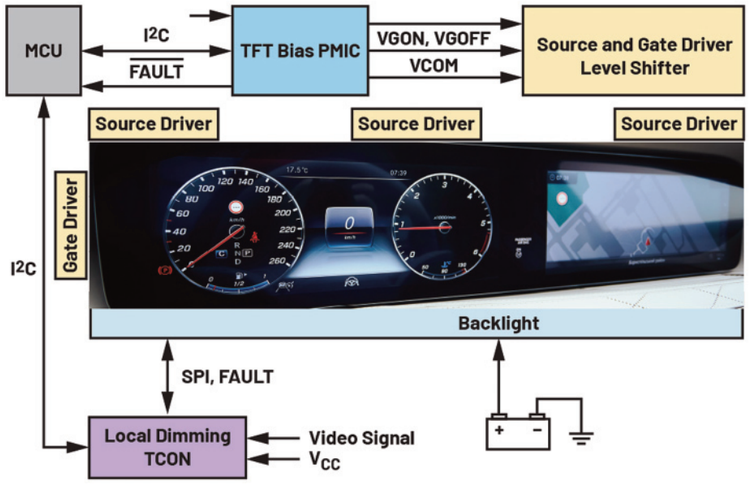


Fig. 2: Block diagram of LCD system

Backlight

The backlight power techniques can be classified as two common types: edge-lit and direct-lit, as shown in Fig. 3.

The edge-lit backlights are the conventional method to power the backlight, which allocates LEDs at the edge of the display panel. Typically, four to eight LED strings are used in an edge-lit backlight. The method to control LED string brightness is called global dimming, where the whole backlight or a specific LED string dimming is performed.

As shown in Fig. 4, the LED strings are powered by the boost converter. The dimming function can be performed by the external PWM, or an internal 18bit register.

Hybrid dimming combines analogue dimming and PWM dimming. The dimming ratio with 200Hz dimming frequency is 16,667:1. With hybrid dimming, it can be doubled to 33,333:1.

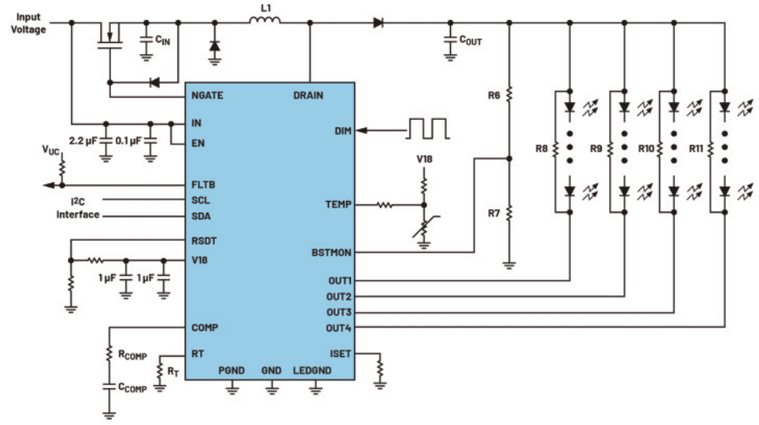


Fig. 4: Backlight driver

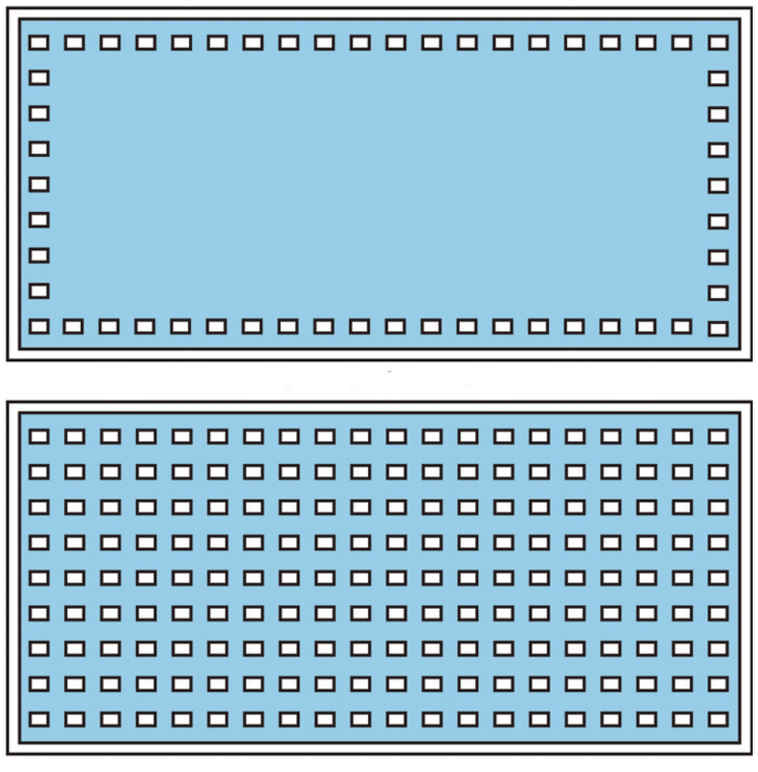


Fig. 3: Backlight power: edge-lit (top) and direct-lit (bottom)

As shown in Fig. 3, the mini-LEDs are allocated uniformly at the LED matrix where they are located directly behind the LCD panel. Each mini-LED's brightness can be controlled individually and dynamically to adopt the image content.

This dimming method is called local dimming, which improves the contrast ratios.

Compared with the edge-lit display, the direct-lit backlight has low power consumption. When the dark content in the image is displayed, the direct-lit backlight can turn off the LEDs in the dark image region. It can also mitigate the light leakage when the dark content image is displayed.

The display size, resolution and brightness depend on the number of LED strings and LEDs per string in edge-lit backlight. In direct-lit backlight, the large size, high resolution and contrast ratio of the display panel are achieved by the LED zones.

Fig. 5 shows the configuration of one LED in series and two LEDs in parallel (1S2P). The backlight driver and backlight requirement decide the LED configuration, such as 1S2P or 2S1P. The V_{LED} is provided for the LED forward voltage and V_{SINK} is the voltage to maintain

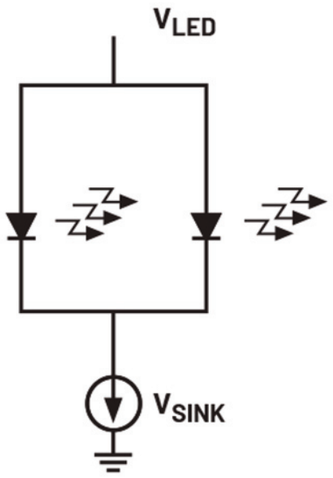


Fig. 5: 1S2P LED zone

the desired constant current for the LEDs.

The two different types of local dimming LED drivers are shown in Fig. 6. The matrix LED driver uses time-sharing multiplexing technology.

As shown in Fig. 6a, four LEDs share the same current source with four p-mos devices. The LEDs in the direct drive LED driver are powered by the same VLED and individual current source as shown in Fig. 6b.

The direct drive LED driver could have higher current driving capability than the matrix LED driver. Fewer matrix LED drivers can be used to drive the same number of LED zones than the direct drive LED driver.

A matrix LED driver that integrates the p-mos and VLED can operate at 14V. Thus, it can support up to four LEDs in series (4S1P) in one zone. The internal p-mos improves the current loop for better EMI performance and eliminates ghost images.

Furthermore, it reduces system complexity and size due to the internal control of the p-mos.

Also, a feedback control function means the forward voltage of the LEDs exhibits a monotonical drop as the junction temperature increases. If the V_{LED} varies for the full range of the operating temperature, the V_{SINK} voltage increases, and it causes higher power dissipation, especially under +85°C.

The feedback control function optimises the V_{SINK} voltage by adjusting V_{LED}. Ideally, V_{LED} is the sum of the LED forward voltage and V_{SINK}. As shown in Fig. 7, the feedback in the backlight driver sinks the current and increases the V_{LED} when the V_{SINK} voltage is at a lower voltage.

Both the matrix LED driver and the direct drive LED driver have the dot correction function. LED dot calibration is pixel-by-pixel correction technology for the LED backlight display. It calibrates the individual LED outputs for the same brightness.

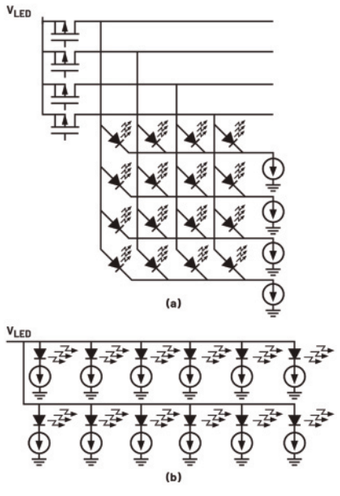


Fig. 6: Local dimming LED driver: (a) matrix LED driver, and (b) direct drive LED driver

To achieve display uniformity performance with the same display colour and brightness, there are two methods to set the individual LED current: each of the LED zones have the individual 5bit current setting and the individual 17bit PWM setting. The 5bit current setting can be used for each LED brightness calibration and the 17bit PWM setting can be used with a global setting when all LED zones have the same brightness setting.

Furthermore, the matrix LED driver can achieve the tell-tale indicator, which indicates the malfunction or operating system by an illuminated symbol, such as low fuel or charge.

With specific current settings and PWM settings, the peak current can be boosted by registers.

TFT bias

External power circuits for TFT bias are required for display panels larger than 15cm with higher resolutions. For smaller display panels, the power circuit is integrated into the glass. Typically, the supply voltage is 3.3 and 5V. The 5V rail is mostly used in automotive display panels for a reliable and robust lifetime.

As shown in Fig. 8, an integrated TFT circuit powers the source driver, also called the column driver, with AVDD and NAVDD, which are supplied by a boost converter. The gate driver, also called the row driver, is powered by V_{GH} and V_{GL}, which are generated by two separate charge pumps.

This circuit also integrates V_{COM} and V_{COM} temperature compensation.

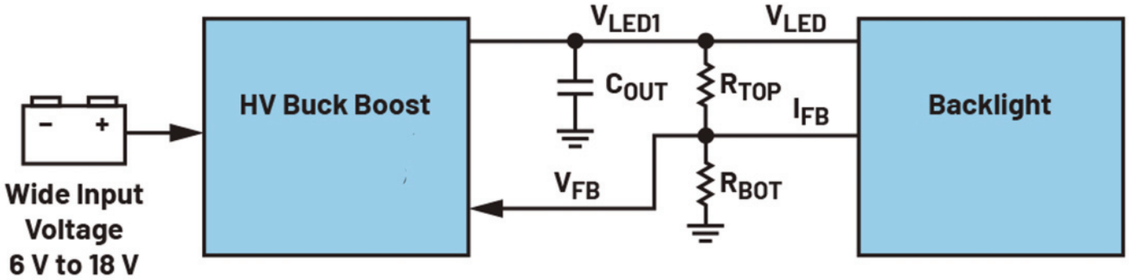


Fig. 7: Feedback control configuration

The targeted voltages for the column driver, row driver, V_{COM} and power on-off sequence can be programmed and stored in non-volatile memory. This functionality guarantees a reference backplane voltage for TFT LCDs that can be tuned for different panels, helping reduce display aberrations and improve system robustness.

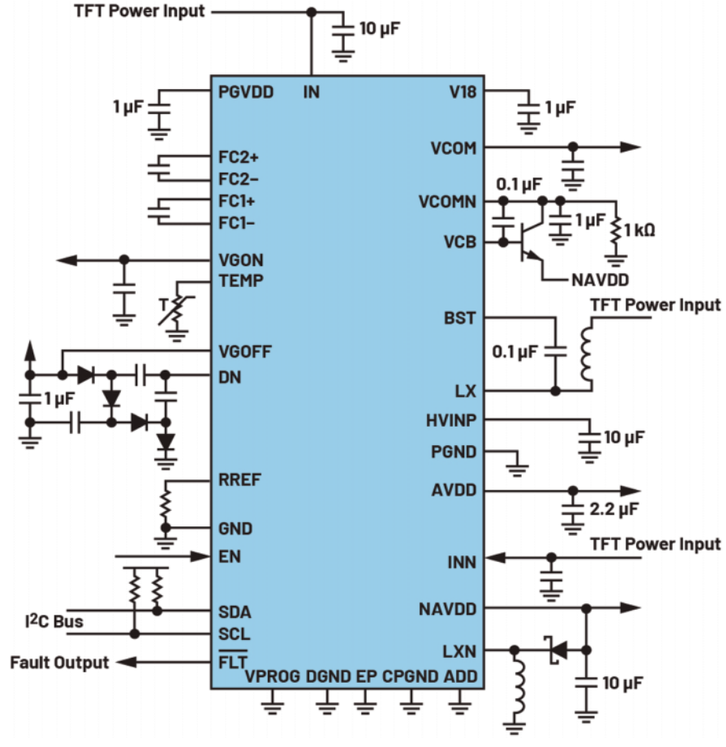


Fig. 8. TFT bias power supplies with VCOM

Driver

Comparing OLED/micro-LED and LCDs, the power circuitry is similar, which includes the TFT bias PMIC and OLED/micro-LED power supply. At present, the technology of OLED displays in consumer electronics is more mature.

A 5V rating PMIC, which combines the TFT bias power and OLED/micro-LED power and integrates with two boost converters and one inverting buck-boost converter, is typically powering the OLED display.

For automotive OLED/micro-LED displays, the power PMIC is still under development. The supply current required by OLED/micro-LED in automotive displays is higher than in consumer electronics due to the large size. Also, more reference voltages are needed for TFT bias PMICs.

Conclusion

Display technology is evolving rapidly with the emergence of new display types, such as OLED and micro-LED. These require more advanced pixel drivers and TFT bias PMICs to achieve optimal performance. As LED drivers and TFT PMICs become more efficient, better performing, more intelligent and cooler, they can better meet the demands of these new display technologies.



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The monthly magazine for automotive electronics engineers

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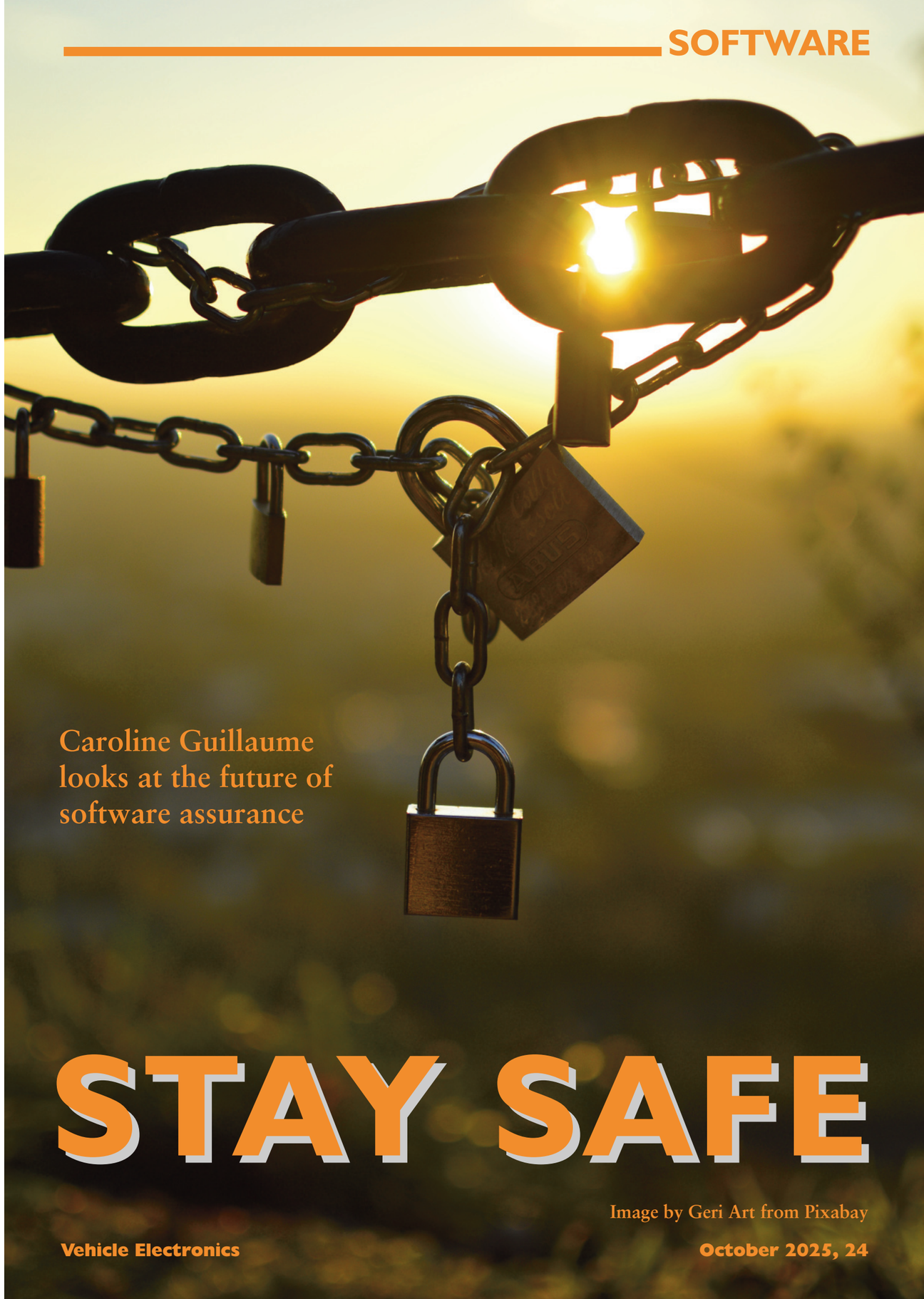
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Memory safety is becoming non-negotiable. Within five years, memory safety will be a baseline requirement for mission-critical software, driven by the need to eliminate vulnerabilities such as buffer overflows and dangling pointers.

Automotive teams often allocate significant testing time, up to 40 to 50% of development cycles, to meet compliance and ensure system reliability. Beyond compliance, several other factors have led to a gap between expectation and execution of legacy software analysis tools.

The ISO 26262 standard encourages the use of formal methods for software elements at Asil C and D, but adoption remains uneven due to barriers such as tool readiness, team expertise and integration challenges.

When asked how their organisations classify their approach to safety and reliability, most software engineers selected safety-critical, for example ISO 26262 or DO-178C, see Fig. 1. A smaller, but still significant, share described their systems as business-critical but not regulated. This distinction is more than semantic. Safety-critical environments often follow rigorous validation workflows, include fault-tolerant system design and require formal documentation for certification.

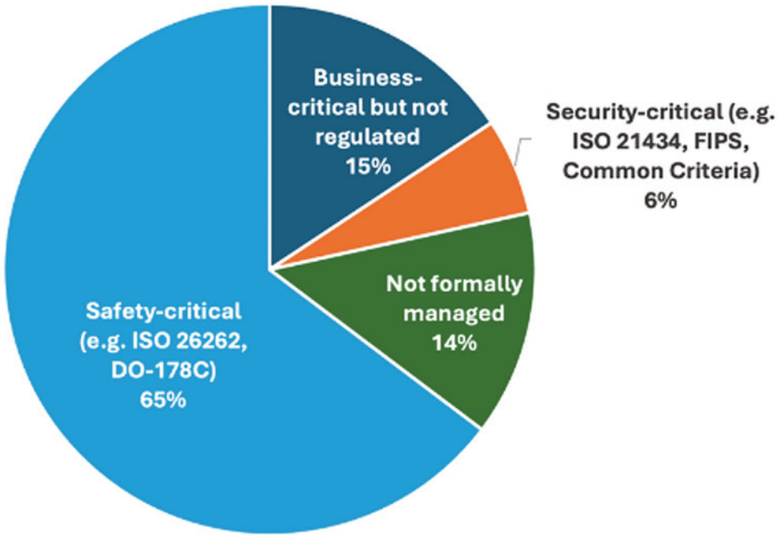


Fig. 1: How software engineers classify their organisation's approach to safety and reliability

Tools

Tool qualification is a multi-step process involving the identification, classification, verification and documentation of features to establish confidence in the tool's ability to produce accurate and reliable results, which are crucial in assessing the impact on the final product's safety.

Teams working under standards such as ISO 26262 or DO-178C overwhelmingly see memory safety as essential, not optional. This is not just an abstract belief, it reflects lived experience; these teams are the ones dealing with failure mode analyses, safety cases and real-world consequences of undefined behaviour.

The stakes are high. A buffer overflow or use-after-free bug is not just a QA headache, it is a risk to compliance, safety and business continuity. These are not hypothetical risks either. Teams have seen audits stall, certifications fail or production systems falter because of hidden memory errors.

And yet the tools that dominate most testing workflows still operate on heuristics. They are noisy. They miss things. Or, worse, they bury teams in false positives that erode trust.

Other standards such as ISO 21434, Cert C and Misra, for example, are also driving factors. However, they are not the only drivers behind the drive for better memory safety and formal verification.

Legacy

Traditional testing tools are nearing their limits. Dynamic testing cannot see every path. Static analysers produce more alerts than answers. And when engineers stitch five tools together to find out if their code is actually safe, confidence gets diluted fast.

Automotive teams must produce extensive documentation for audits and certification, which can be time consuming and prone to errors without robust tooling

Especially when high test coverage is demanded, there is more dissatisfaction with current options.

One engineer said it best: "We use five tools to approximate what we really want to know, which is: can this system fail in production?"

What has been found is that they are not looking for more tools. They are looking for assurance. That is different.

Exhaustiveness and precision are in demand. Teams are frustrated with false positives and false negatives in traditional tools and want testing strategies that reduce uncertainty. Vendors and advocates should target these inflection points as entry opportunities for more rigorous options.

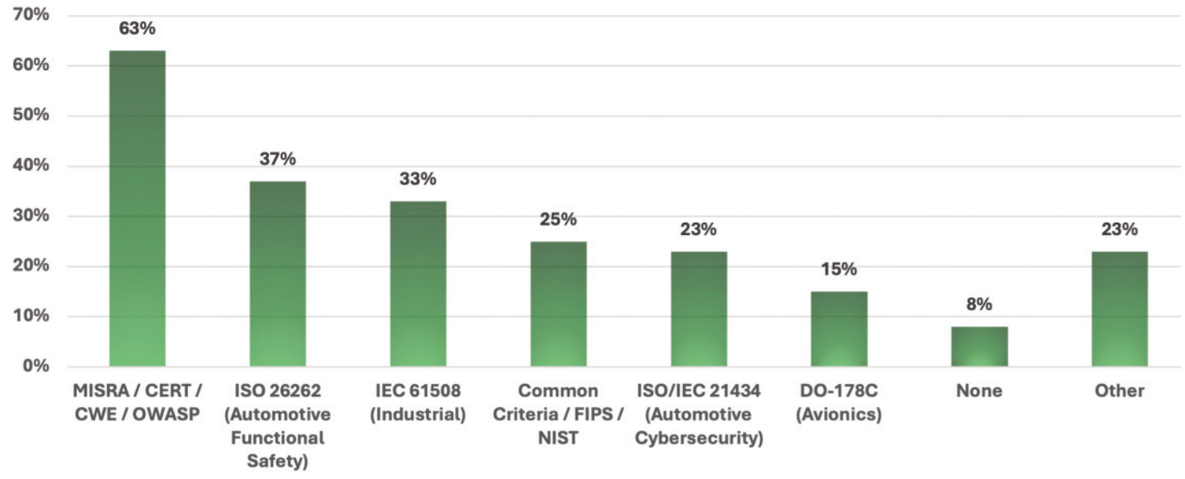


Fig. 2: Regulatory standards influencing testing strategies

Formal

Formal methods were once considered as more of an academic tool, too complicated and useful in theory, but impractical. However, that perception is starting to change.

More teams are exploring exhaustive static analysis, symbolic execution and mathematically sound approaches to software verification. It is not because the standards demand it, though, increasingly, they do. It is because the tools they have relied on for decades do not scale with the complexity of modern systems, especially when those systems are a blend of legacy C, newer C++ and an increasing amount of Rust complete with unsafe blocks and tricky FFI boundaries.

In the case of hybrid Rust, C and C++ codebases where legacy C and C++ would be very costly and time consuming to rebuild, formal methods can help ensure memory safety is still maintained.

Hybrid

Rust is on the rise. That is good news for memory safety, but it introduces new problems when mixed with C or C++.

In theory, Rust protects from whole classes of bugs. In practice, most codebases are not purely Rust.

And the moment someone crosses into legacy territory, or even just calls a C library, they are back in the danger zone.

The risks of mixed-language testing are real. Teams know that. They are just not sure how to eliminate them yet.

Whether managing a team, writing compliance policy or just trying to make systems a little more predictable, it is good to understand where software testing is headed, and how to stay ahead of it.



Caroline Guillaume is CEO of TrustInSoft

AI

sustAInable

Philipp Pfister sees AI in action, explaining how smarter logistics can drive sustainability gains

How do you decarbonise an industry built on movement? Freight alone is responsible for an estimated 7% of global greenhouse gas emissions according to McKinsey: a stark reminder of the sector's environmental footprint. The cost of inefficiency is simply too big to ignore.

As supply chains stretch and demand for fast, flexible delivery keeps rising, the pressure is only mounting. From underserviced fleets to empty mileage and poor routing, the industry suffers from breakdowns in planning and execution that don't just drive up emissions, they also chip away at profits.

But these problems can be tackled.

Change

AI is already delivering real sustainability gains across two critical areas that one wouldn't necessarily consider at first sight: fleet maintenance and transport operations. By enabling faster decisions, streamlined processes and smarter systems, it is allowing logistics to move cleaner, without compromising performance.

The stakes are high. According to Siemens, the world's 500 biggest companies lose almost $1.4tn annually through unplanned downtime. This is equivalent to a staggering 11% of their revenues. Logistics operations, with their tight delivery windows and high asset use, acutely feel this impact.

Fleet maintenance is often overlooked in the sustainability conversation, but it's a critical area for impact. Vehicles that are overserviced waste resources, not just materials but time. Those underserviced are prone to breakdowns, costly repairs and early replacement.

Either way, it is bad news for both business and the environment.

Maintenance

AI offers a better way forward, starting with standardised maintenance. Predictive and optimised maintenance is gaining traction, particularly in North America, where new industry standards are pushing AI-driven approaches to the forefront.



AI is reshaping how goods move

At the heart of this evolution is the need for standardised data. Without them, fleets rely on inconsistent or proprietary codes to track service intervals, making it almost impossible to train AI models at scale or share insights across systems.

New frameworks such as the Vehicle Maintenance Reporting Standards (VMRS), developed through the American Trucking Association's Technology & Maintenance Council, are changing that. By creating a universal language for tracking maintenance items, they lay the foundation for adaptive, AI-powered decisions, such as when to change oil based on real-world engine load and usage, not arbitrary intervals.

While VMRS is a strong step forward in North America, there is still a long way to go globally, where much of today's maintenance data remain fragmented. To unlock AI's full potential, the industry needs a shared data foundation: code key standards that act as a common language across fleets, platforms and regions. Some platforms are already building towards that future by developing open, interoperable data models designed for global adoption.

The impact is tangible. AI can identify the sweet spot for servicing, reducing waste from premature oil changes while avoiding unnecessary wear and tear.

Today, maintenance often relies on a dashboard light, but AI enables a future where the vehicle doesn't just alert the driver. It books its own appointment, sends performance data to a third party and rolls into the shop at exactly the right moment.

Operations

Beyond the vehicle itself, AI is transforming how freight is planned, routed and executed. One of the biggest challenges in logistics today is empty mileage: trucks that travel without cargo, burning fuel and time. While some inefficiencies are structural – rooted in geography or how the freight network is organised – many can be addressed with the right technology.

AI-powered systems now analyse real-time and historical data to recommend the most efficient routes, plan multi-stop loads and continuously recalculate in transit to adapt to delays, traffic or weather.

Planning

Cloud-based platforms are already putting these capabilities into practice, using AI to match loads dynamically with carriers and reduce waiting times at docks. They are also reducing the strain of just-in-time logistics, where tight delivery windows leave little room for error.

Autonomous procurement tools can now handle transport sourcing with little human input, using statistical and symbolic AI to analyse unstructured requests, identify suitable partners, and select the best fit across time, cost and environmental criteria.

Combined with intelligent load planning tools that increase truck space and reduce the total number of journeys required, these systems help cut emissions across every kilometre travelled.



AI can drive significant sustainability gains in logistics

Future

When applied across maintenance, execution and operational processes, AI can help drive significant sustainability gains in the logistics sector. While AI does consume considerable energy, particularly in generative AI models, the types of applications used in transportation and logistics are far less compute-intensive.

The efficiency gains and emissions reductions they enable usually outweigh their footprint. It is the net effect that matters. And in this context, AI is already showing transformative potential in building a more sustainable future for the industry.

However, sustainability in logistics depends on shared data, interoperable systems and collaboration between carriers, shippers, OEMs and tech providers. Whether it's maintenance schedules or routing algorithms, AI only works when it can access reliable data and apply it across a broad enough sample to generate meaningful insights.

That is why standardisation is so important. The industry is not just building tools, it is shaping a smarter ecosystem, one where every decision, whether on the road or in the yard, contributes to a more efficient and sustainable whole.

AI won't transform logistics in a single leap, but, by focusing on the fundamentals, it is already reshaping how goods move, how fleets are managed and how sustainability goals are met. Because, when the industry moves together, it lays the groundwork for a cleaner, more resilient future.



Philipp Pfister is sector vice president at Transporeon

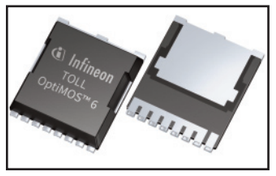
Three options for mosfets suit EVs

Infineon has expanded its OptiMos 6 portfolio by introducing an automotive 150V mosfet family.

The devices were developed to meet the requirements of modern electric vehicles and come in three package options: Toll, Tolg and Tolt.

They are based on the firm's sixth-generation OptiMos technology, offering two drain-source resistance levels across all device variants.

All variants are rated for the 150V class and deliver $R_{DS(on)}$ as low as 2.5mΩ. This enables small conduction losses and improves efficiency.



The tight distribution of the gate threshold voltage supports optimal synchronisation when multiple mosfets are used in parallel, which is relevant for high-power automotive systems.

The devices also have low switching losses up to high frequencies, allowing for efficient operation in fast-switching applications such as modern DC-DC converters.

Thermal resistance is down to 0.4K/W. This improves heat dissipation, reduces system-level cooling requirements and lowers associated expenses.

The TO-leadless (Toll) 10 by 12mm enables a compact design. The 10 by 12mm Tolg package is footprint-compatible with Toll, with gullwing leads for high robustness against thermal-mechanical stress.

The 10 by 15mm Tolt package has a top-side cooling concept that enables efficient heat dissipation at system level, making it suitable for thermally demanding applications in space-constrained environments.

They exceed the requirements of AEC-Q101, and are PPAP capable.

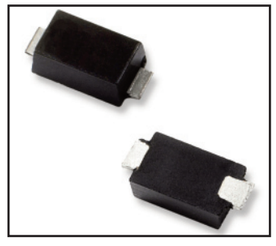
TVS diodes protect against transients

Unidirectional and bidirectional TVS diodes from Littelfuse are 600W automotive-grade devices that protect against high-energy transients in a compact, surface-mount SOD-123FL package.

The SZSMF6L devices are suitable for increasingly space-constrained automotive and electric vehicle (EV) designs.

Building on the 400W SZSMF4L series introduced in 2023, they deliver 50% higher peak power handling while maintaining the same footprint.

The improved surge protection and enhanced clamping performance help safeguard critical automotive systems exposed to voltage spikes from switching events, load dumps or ESD.



ESD rating is above 16kV. Working peak reverse voltage is 5 to 75V unidirectional and 10 to 75V bidirectional.

Response time is less than 1ns to reduce the threat window for transient events.

Operating temperature is up to 175°C. They are AEC-Q101 qualified.



Parking switch

Alps Alpine has started mass production of the SPVQF series, part of its two-pole two-position switch range for automobile parking brakes.

The product is characterised by its quiet operation and compact size, being approximately half the width of the conventional SPVQC series.

As the transition from conventional pull handles and pedals to electric parking brakes using buttons progresses, the car interior layout is also changing due to the introduction of liquid crystal panels at the centre of the console, leading to an increasing demand for parking brake buttons.

The detection switch allows one circuit to compensate when the other malfunctions.

It is quieter by 5dB than the SPVQC series, and is protected to IP6K7.

Outer dimensions are 6.3 by 8.5 by 7.0mm. Actuating force is up to 1.8N. Maximum rating is 50mA, 18V DC. Initial contact resistance is 75mΩ maximum.

PMIC supports Asil-B functional safety

A compact, power-management IC (PMIC) from ST Microelectronics has configurable parameters and is qualified to AEC-Q100.

The SPSA068 supports ISO 26262 functional safety approval up to Asil B.

For use with MCUs that operate from a single-supply voltage, it implements all the features required in a turnkey product for MCU power management.

It integrates a 1A battery-compatible buck voltage regulator, precise (1%) voltage reference, watchdog supervisors, diagnostic indicators, MCU reset control, and SPI for configuration and status checking.

The device parameters are customisable via non-volatile memory (NVM).

The buck regulator output can be configured to 5, 3.3 or 1.2V, and other voltages can be achieved using external resistors, with load-current options of 0.5 or 1A, while the switching frequency can be set to 0.4 or 2.4MHz.

The voltage reference is adjustable to 5.0, 3.3 or 1.2V, designed for 20mA load current. Integrated protection includes over and undervoltage, overcurrent, short circuit and thermal shutdown.

A low-power mode for light-load conditions produces a quiescent current of 50μA.

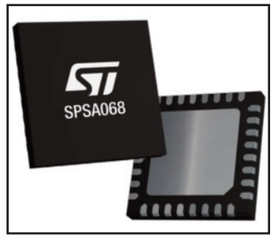
For direct connection to the battery, the PMIC has a feature set and design that ensures efficient use of PCB space and shortens design time. The integrated NVM and low-power mode relieve system-level sensitivity to environmental conditions, cut the bill of materials, and enhance precision and safety.

With digital and analogue built-in self-test capabilities, input, output and ground loss monitors, and a dedicated fault pin, this PMIC can simplify functional safety considerations.

Programming, diagnostics and monitoring are available via SPI, with an MCU watchdog and a regulator status indicator in case of faults or warnings.

Designers can start projects with the SPSA068 using the Steval-SPSA068 dedicated evaluation board.

The device comes in a 32-pin 5.0 by 5.0 by 1.0mm QFN package.

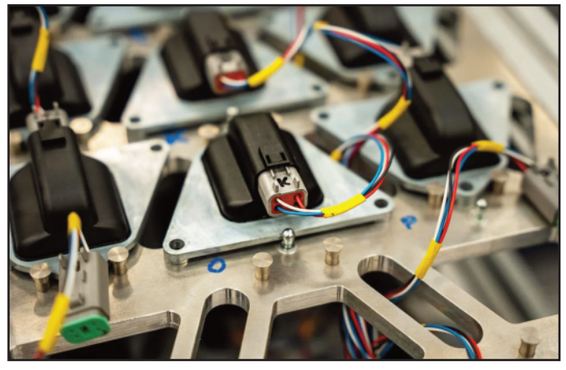


Tilt-position sensor gets extra channel

Curtiss-Wright has launched a two-channel version of its VTS2021 tilt position sensor for off-highway industrial vehicles.

The VTS2022 retains the same footprint and rugged design.

This dual-axis, vibration-tolerant tilt position sensor combines performance, safety and cost in dynamic industrial applications, making it suitable for pitch and roll detection for off-highway industrial-vehicle applications, including mobile elevating work platforms.



Like the single-channel version, it uses IMU technology and fast-acting software algorithms to filter out disturbances caused by vibration and vehicle motion to provide output stability without the measurement delays usually associated with heavily damped, traditional sensing methods.

Each measurement axis has two sensing elements, which are constantly compared to ensure correct operation. If an error is detected, its condition is communicated to the host electronics to ensure a safe operating situation is assumed. Additionally, each output signal is calibrated to account for thermal drift, ensuring accuracy over the operating temperature range.

It operates from a 6 to 48V DC supply for use on 12 and 24V DC vehicle systems.

The SAE J1939 Canbus output has a choice of baud and frame rates. Outputs are thermally compensated over a -40 to +85°C operating range.

LED driver with 48-channel source



An automotive-compliant matrix LED driver from Diodes with 48-channel constant current source is capable of up to 32 scans.

The AL5958Q enables automotive dynamic lighting, bringing improved safety, personalisation and aesthetics to vehicle platforms.

The device suits narrow pixel mini- and micro-LED displays, which require multiple RGB LEDs to produce animated, dynamic lighting with data and info.

Applications include central information displays, cluster displays, head-up displays, grill and emblem lights, body LED panels, interior lights, and rear lights.

It incorporates built-in intelligent matrix display command functions that reduce the processing overhead on the local microcontroller.

These functions encompass automatic black-frame insertion to mitigate blurs caused by scanning switches, reduction of last scan and next scan-line ghost images to eliminate ghosting from parasitic capacitors, and suppression of short-LED caterpillars.

Open-LED fail lines and staggered current output delay reduce inrush current. Included are greyscale enhancement (also known as low-brightness uniformity compensation), greyscale clock (GCK) watchdog timer and sleep mode to deliver power savings.

The differentiated capability is underscored by integrated 16 n-mosfet switches and scan control per device. This allows them to support static and dynamic systems, ranging from 0 to 32 scans with a flexible scan sequence, enabling animated lighting displays.

For larger applications, multiple devices can be daisy-chained without limitation. This allows the creation of expansive and complex RGB displays while facilitating local dimming.

The 16bit resolution dimming, coupled with its RGB support, provides precise brightness control and colour mixing. The current output for each colour group can be configured either through three external current-sensing resistors or by programming three 6bit global current control registers.

Furthermore, the distinctive multiplex-pulse density modulation (M-PDM) technology enhances the refresh rate of dynamic scanning systems without increasing the frequency of the GCK, thereby effectively mitigating EMI due to high clock frequencies.

Integrated diagnostic features and protection mechanisms provide monitoring capabilities. These include error flag registers applied to LED open or short to read out each channel using open or short detection, undervoltage lockout protection, and a watchdog timer.

Operating across a -40 to +125°C ambient temperature range, the device comes in the wettable W-QFN9090-76/SWP, type A1 package, which meets the needs of the general automotive market.

MLCC for hybrid EV inverters

An automotive-grade MLCC from Samsung is for mild hybrid and hybrid EV inverters.

The capacitor measures 2.0 by 1.2mm, operates from -55 to +25°C, and is rated at 250V and 100nF.



Samples and technical support are available.

As the requirements regarding the reliability and stability for automotive electronics systems increase, so do the demands for high-reliability MLCCs that support stable operation even in high-temperature and high-voltage environments.

This product meets AEC-Q200 standards.

This capacitor can enable efficient control of transient responses and contribute to the miniaturisation of the sets.

Inductors stable at high temperatures

Two IHDM automotive-grade edge-wound, through-hole inductors from Vishay come in the 1107 case size with soft saturation current to 422A.

Featuring a powdered iron alloy core, the IHDM-1107BBEV-2A and -3A provide stable inductance and saturation over an operating range from -40 to +180°C with low power losses and good heat dissipation.

The edge-wound coil of the devices provides DCR down to 0.22mΩ, which reduces losses and improves rated current performance for increased efficiency.

Compared with competing ferrite-based products, they are said to offer 30% higher rated current and 30% higher saturation current levels at +125°C.

The inductors' soft saturation provides a predictable inductance decrease with increasing current, independent of temperature.

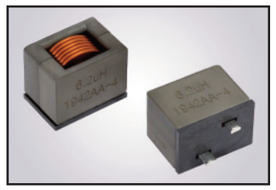
With a isolation voltage up to 350V, the AEC-Q200 qualified devices are for high current, high temperature power applications, including DC-DC converters, inverters, on-board chargers (OBCs), domain control units (DCUs), and filters for motor and switching noise suppression in internal combustion, hybrid and full-electric vehicles.

They are available with a selection of two core materials for optimised performance depending on the application.

Standard terminals are stripped and tinned for through-hole mounting. Vishay can customise the devices' performance – including inductance, DCR, rated current and voltage rating – on request. Customisable mounting options include bare copper, surface-mount and press fit.

To reduce the risk of whisker growth, the inductors have a hot-dipped tin plating. The devices are RoHS-compliant, halogen-free and Vishay Green.

Samples and production quantities are available now with lead times of 14 weeks.



Keypads include Can rotary cursor control

EAO has extended its 09 series of rugged HMI keypads for automotive and machinery control applications to include a Can-based rotary cursor controller (RCC) module.

This combines rotary control functionality with integrated pushbuttons and a digital joystick that operates through a three-axis tilt mechanism.

A version also includes a rugged rotary encoder pushbutton (RPB) module without the joystick.

Both provide two independent RGB illuminated pushbuttons each with four LED-illuminated segments that can be customised with ISO 7000 legends.

The modules target safety-critical external vehicular applications that rely on precise operator control even under harsh conditions, such as construction and agricultural machinery and special vehicles.



The joystick tilt function in the x-y direction has integrated protection against unintentional contact and triggering to ensure safe, intuitive operation even under difficult conditions, for example when the vehicle or machinery is vibrating.

They are sealed to IP6K9K protection, and have intelligent Can-bus integration.

Programmable symbol and four-segment RGB halo ring illumination improves brightness and provides modern function feedback.

They are made to the IATF 16949 automotive standard and, like existing series 09 rugged keypads, are available in two variants – Super with RGB halo illuminated twin pushbuttons and Plus with red halo illuminated twin pushbuttons.

Most modules can be customised with application-specific symbols and individual halo ring and symbol illumination.

Regulator reduces current consumption

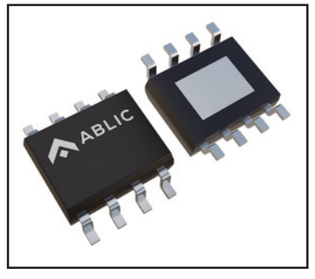
An automotive high-withstand voltage regulator IC from Ablic achieves a current consumption of 2.0μA, said to be the lowest in the industry.

This reduces the overall system standby current when powering constantly operating sensors, Can and Lin transceivers, and other components.

The S-19230/1 series supports 48, 24 and 12V auxiliary batteries, thanks to its input voltage tolerance up to 80V.

This product is the firm's first voltage regulator to integrate an open-loop protection circuit. The circuit suppresses the rise in output voltage to a certain level if the wiring between the external resistor and the IC – used for setting the output voltage – is broken (open fault).

This eliminates the need for conventional external components that are used for overvoltage protection, contributing to cost reduction, space savings and safety.



It supports 48V auxiliary batteries. Additionally, when the output current is 10mA or less, it supports 24 and 12V auxiliary batteries due to a minimum operating voltage of 3.0V.

The product undergoes low, normal and high temperature tests. It is also planned to meet AEC-Q100 reliability and quality standards, with PPAP compliance forthcoming.

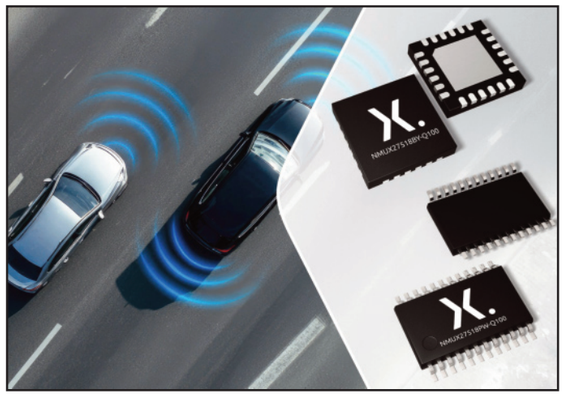
Input voltage is 6 to 66V, or 3 to 66.0V when output current is less than 10mA.

Output voltage internally set is 1.8, 3.0, 3.3 or 5.0V, and externally set from 1.8 to 12.0V. Output voltage accuracy is ±1.8% at -40 to +125°C.

Current consumption during operation is 2.0μA typical, and power-off current consumption is 0.1μA typical. Output current is up to 100mA at 3V or up to 200mA at 5.0V.

It has built-in open-loop protection circuit, overcurrent protection circuit and thermal shutdown circuit at a typical detection temperature of 170°C.

Packages available are TO-252-5S(A), HSOP-8A and HTMSOP-8.



Multiplexer enables memory expansion

The latest addition to Nexperia's portfolio of AEC-Q100 grade-one qualified devices is the NMUX27518-Q100 bidirectional six-channel 2:1 multiplexer.

This is suitable for enabling memory expansion via a qSPI port in safety-critical in-vehicle applications such as the adas domain controller, automotive head unit and telematics control units.

The multiplexer operates from an extended 1.08 to 3.63V range. It can accommodate digital and analogue signals and transmit signals up to the supply voltage level in either direction.

Two control pins, which simultaneously control three 1:2 multiplexers, are compatible with 1.8V logic thresholds and are backwards compatible with 2.5 and 3.3V logic thresholds, while unused outputs can be placed in a high-impedance state.

The 500MHz bandwidth is said to be twice that of similar competing devices to preserve fast rise and fall times. In addition, port skew of 150ps typical between channels helps optimise setup and hold times.

The device comes in a tssop-24 that has a body width of 4.4mm. It is also available in a plastic thermal enhanced leadless thin quad flat package with 24 terminals (HWQFN24) that has 0.5mm pitch and 4 by 4 by 0.75mm body dimensions.

It can operate at temperatures between -40 and +125°C.

A standard version of this switch can also be used for audio and video signal routing in consumer and enterprise applications such as notebooks, tablets, motherboards and rack servers.

Latch variant improves magnetic position sensing

A variant of the Melexis MLX92211 three-wire Hall-effect latch is for lateral magnetic position sensing, with high ESD protection and a high output current limit.

This enables motor miniaturisation by providing enhanced integration and cost-effective performance, suitable for automotive compact motors used in applications such as seat motors, sunroofs and thermal expansion valves.

Across the automotive sector, there is a rising demand for smaller, slimmer motor modules that do not compromise on robustness or diagnostics. This is critical in seat actuators, where multiple motors must be integrated into compact assemblies without sacrificing adjustability, comfort or compliance with safety requirements.

The device has an integrated magnetic concentrator (IMC) that enables lateral sensing in a surface-mount TSOT-3L package, eliminating the need for through-hole components and aligning with modern automated assembly processes.

The result is a reduced motor height, improved packaging flexibility and optimised manufacturing workflows.

The IMC variant is built on the MLX92211 platform, delivering an optimised lateral-sensing option.

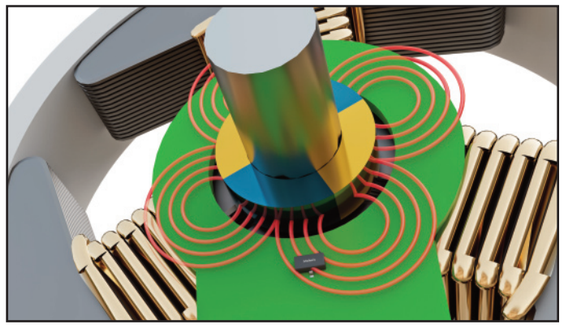
The single-package device integrates a voltage regulator with 2.7 to 24V operating range, a Hall effect sensor with offset cancellation, and an open-drain output driver.

The magnetic core's enhanced offset cancellation facilitates faster, more accurate and robust processing, irrespective of temperature and stress, and includes a negative temperature coefficient to counteract the natural weakening of magnets at high temperatures.

The latch sensor can be in three- and two-wire (with external resistor) configurations, with the 30mA current limit sufficient for maintaining safe and consistent operation in environments such as seat motors, where continuous current up to 25mA is often required.

Combined with 8kV ESD protection, automatic output shut-off with self-recovery, and Asil-A functional safety readiness, the device meets modern automotive reliability requirements.

It supports the development of smaller motor and actuator assemblies that meet size, performance and safety constraints.



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