VEHICLE electronics

The monthly magazine for automotive electronics engineers

Blackberry works with LG on connected cars

Blackberry and LG are expanding their partnership to improve connected and autonomous vehicle technology.

LG will use Blackberry QNX software and services to build digital consolidated cockpits with infotainment, digital instrument clusters and telematics for OEMs.



Kaivan Karimi: "We are thrilled."

"Blackberry has been a trusted supplier to LG for nearly 15 years, providing flexible QNX-based software that has helped them to deliver millions of high-quality systems to the world's leading automakers," said Kaivan Karimi, senior vice president at Blackberry. "We are thrilled to expand our relationship."

Blackberry will provide LG with QNX software including the SDP 7.0 software development platform, OS for Safety, hypervisor, acoustics middleware, SDK for apps and media, as well as professional engineering services for system-level integration, performance optimisation and validation.

"Blackberry QNX has been our long-term, reliable partner for more than a decade, providing high performance, secure and trusted mission-critical software that has helped LG delivered millions of high-quality systems to the world's automakers," said Hwang Won-yong from LG. "We are pleased to further expand and strengthen our partnership with Blackberry QNX, using its innovations in connected and autonomous technologies including the future of in-vehicle infotainment."

Blackberry provides OEMs and tier-ones around the world with safety-certified foundational software and cybersecurity technologies. QNX technology has been embedded in more than 150 million vehicles on the road. It is used by the top seven automotive tier-ones, and by more than 40 OEMs including Audi, BMW, Ford, GM, Honda, Hyundai, Jaguar Land Rover, Kia, Maserati, Mercedes-Benz, Porsche, Toyota and Volkswagen.

The company partners automotive tier-ones such as Aptiv, Denso, Panasonic and Visteon, and silicon partners such as Intel, Qualcomm, Nvidia, NXP and Renesas.

Issue 67
July 2019

IN THIS ISSUE

2: Renault, Nissan and Waymo partner

3: Nvidia and Volvo AI for lorries

8: OTA updates for Renesas 28nm flash

9: Gaming influence on Jaguar plants

12: Continental radar at 77GHz

13: Automechanika Birmingham report

19: Mobility for smart cities

24: Flat packages for TVS diodes

27: Analog Devices moves UK home

32: Connected car trials in London

33: Product news

38: Contact details

Renault and Nissan partner Waymo

Renault and Nissan are working with Google's Waymo self-driving car project to explore driverless mobility services for passengers and deliveries in France and Japan.

The agreement is designed to bring together the strengths of each party and expand expertise by assessing market opportunities, working together to research commercial, legal and regulatory issues related to driverless transportation-as-a-service offerings in France and Japan.

"This is an ideal opportunity for Waymo to bring our autonomous technology to a global stage, with an innovative partner," said John Krafcik, CEO of Waymo. "With the alliance's international reach and scale, our Waymo Driver can deliver transformational mobility to safely serve riders and commercial deliveries in France, Japan and other countries."

The Renault-Nissan-Mitsubishi alliance, with a global footprint and portfolio covering every segment of passenger and light commercial vehicles, is suited to join this business exploration with Waymo, a self-driving technology company with more than ten million miles on public roads.

"The story of tomorrow's mobility will be jointly written, with the cooperation of the alliance with Waymo, as industry leaders, opening new perspectives for driverless mobility services," said Thierry Bolloré, CEO of Renault.

The agreement marks a first step to developing long-term, profitable driverless mobility services operations. This analysis will first take place in France and Japan, home to Renault and Nissan headquarters, and may expand to other markets, excluding China, in the future.

Olli joins the army



Myer-Henderson Hall, an army and marine joint base near Arlington National Cemetery in Virginia, plans to use autonomous shuttles to transport personnel to various stops, including the community centre, restaurants, a health clinic and barracks. Engineers from car maker Local Motors have been working with base personnel over the past few weeks to map the route the vehicles will use.

Local Motors, known for 3D-printed mobility vehicles, will deploy the Olli fleet of autonomous shuttles at the base.

The deployment is months in the making and comes as the result of the base winning a regional fleet challenge, which asked entrants to propose use-case scenarios for the electric, self-driving shuttle.

"It's always exciting to see conceptual plans come to life, especially when those plans involve innovative technology, and we're looking forward to seeing how Olli can teach others about the impact a self-driving vehicle can make at a military installation," said Jay Rogers, CEO and co-founder of Local Motors.

Olli uses obstacle avoidance technology to find routes around objects that block its path and employs a responsive cognitive function.

Blickfeld and Koito look to integrate lidar into headlight



Blickfeld lidar sensor

Blickfeld a provider of solid-state lidar technology, and Koito Manufacturing, a tier-one supplier of exterior automotive lighting, are jointly exploring technologies to develop a lidar sensor that can be integrated into a headlight.

The integration of Blickfeld's lidar into Koito headlamps will let automobile manufacturers possess lidar technology in which the sensor is fully integrated into the vehicle, which will in turn facilitate progress in serial adas and autonomous vehicle systems.

The core of Blickfeld's 3D solid-state lidar technology is a proprietary silicon mems mirror developed for lidar applications. This enables not only safe and in-depth information about the surrounding environment, but also mass-market availability.

The compact design of the miniature solid-state lidar allows direct integration into a vehicle's lighting system, enabling real-time 3D mapping and object detection, classification, and tracking, without marring the design of the vehicle.

"With its renowned expertise and strong market position, Koito is a proven pioneer in the field of automotive headlights," said Mathias Müller, co-founder and CEO of Blickfeld. "We have been working very successfully with the Koito team since early 2018 and are thrilled to develop the next generation of lighting products."

Yuji Yokoya. executive vice president of Koito, added: "Koito has been in search of innovative, high-performance lidar technology from around the world and, among what we have found, we regard Blickfeld as one of the most promising companies in the field."

Nvidia and Volvo plan AI platform for autonomous lorries

Volvo and Nvidia are jointly developing the decision-making system of autonomous commercial vehicles and machines.

Using Nvidia's end-to-end artificial intelligence platform for training, simulation and in-vehicle computing, the resulting system should handle fully autonomous lorries driving safely on public roads and highways.

It will be built on Nvidia's software stack for sensor processing, perception, map localisation and path planning.



Jensen Huang (left) and Martin Lundstedt

"Automation creates real-life benefits for both our customers and the society in terms of safety, energy efficiency and as a consequence productivity," said Martin Lundstedt, president and CEO of the Volvo Group.

The partnership will focus on the development of a flexible, scalable autonomous driving system, which is planned to be used first in commercial pilots and later in commercial offerings from Volvo. The agreement is a long-term partnership spanning several years. Work will begin immediately with personnel from the two companies in Sweden and California.

"Trucking is the world's largest network, a network that through online shopping puts practically anything, anywhere in the world, quickly within our reach," said Jensen Huang, Nvidia founder and CEO. "The latest breakthroughs in AI and robotics bring a new level of intelligence and automation to address the transportation challenges we face."

Fujitsu and Autonomic ease journey to MaaS

Fujitsu and Autonomic, a subsidiary of Ford Smart Mobility, are collaborating to support OEMs worldwide making the transformation to mobility-as-a-service (MaaS).

Using Autonomic's expertise in cloud services for connected vehicles and Fujitsu's technology integration and experience in automotive, the companies will initially deliver the TMC transportation mobility cloud and Fujitsu integration services to Ford Motor, followed by a rollout to other car makers globally.

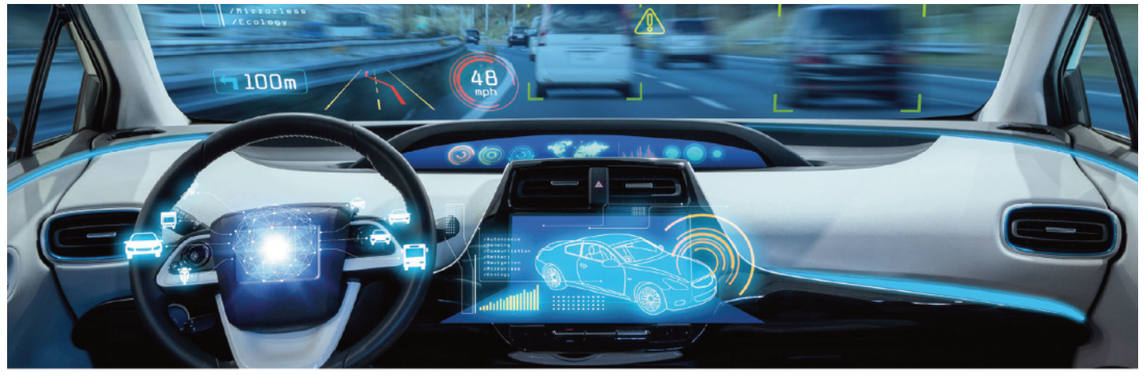
With the growth in connected cars, autonomous driving, sharing services, ride-hailing and electric vehicles, the automotive industry is moving towards a services-led ecosystem commonly known as MaaS. This has increased demand for a fast and flexible mobility platform that's capable of processing the vast quantity of data that mobility innovation generates, as well as streamlining applications' access to those data and vehicles.

Fujitsu and Autonomic will combine their business acumen, industry expertise, and digital technologies to accelerate MaaS adoption.

The TMC gives car makers and developers the infrastructure to build experiences for connected vehicles. Supported by Amazon Web Services, the TMC connects diverse elements of urban mobility systems such as connected vehicles, mass transit, personal mobile devices, city infrastructure and service providers with the goal of orchestrating a safer, more efficient and sustainable transportation network.

It provides car makers and other developers the building blocks for connected mobility applications such as self-driving car routing, management of large-scale fleets and transit planning.

Fujitsu's Dracena stream data processing technology speeds up the deployment of mobility services to individual users through the continuous and dynamic processing of vast quantities of IoT data from OEMs, insurance companies and other vertical inputs.



Let Microchip's Oscillators Do the Driving for You

Industry's Most Reliable Automotive Clocks and Oscillators

Automotive evolution is accelerating at a blistering pace. Innovative features like autonomous driving, ADAS and in-vehicle Ethernet require highly reliable timing devices with robust performance and tight stability in harsh environments. There will soon be over 100 timing devices in every new vehicle. Microchip offers the industry's most reliable and robust clock and oscillator products by leveraging the industry-leading MEMS technology, cutting-edge PLL design and semiconductor packaging.

- AEC-Q100 qualified, ten times lower DPPM than crystal oscillators
- Wide operating temperature range: –40 to 125°C, meeting Automotive Grade 1
- 500 times the shock tolerance and five times the vibration tolerance of crystal oscillators
- Smallest size: 1.6 x 1.2 mm, saving 50% board space
- Multiple output replaces up to four crystals/oscillators

Learn More www.microchip.com/timing/automotive

MICROCHIP

The Microchip name and logo and the Microchip logo are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. All other trademarks are the property of their registered owners. © 2018 Microchip Technology Inc. All rights reserved. MEC2257Eng12/18

Astri and Intel combine 5G and AI for C-V2X

At last month's Mobile World Congress in Shanghai, the Hong Kong Applied Science & Technology Research Institute (Astri) revealed a collaboration with Intel for using the 5G standalone core network and artificial intelligence (AI) at the roadside for cellular V2X (C-V2X).

In 3GPP release 15, the 5G standalone core network enables flexibility for application and service requirements. The enhanced mobile broadband services have high traffic capacity and data rate requirements, as much as 1000 times that of 4G.

Astri and Intel have collaborated on the research, development and optimisation of the 5G core network, especially on user plane function (UPF) throughput, to meet 5G requirements. They have achieved on a single sever over 200Gbit/s processed by Astri's 5G UPF without packet loss.

Dynamic device personalisation technology was used on Intel Ethernet network adapters to achieve fine-grade load balancing to allow throughput to scale up linearly with additional CPU cores

Astri's 5G standalone core network can scale down to a single hardware platform for small scale deployments, or scale out and be distributed in cloud architecture.



Astri stand at MWC in Shanghai

They collaborated to enable edge AI and visual-sensing capabilities for evolving smart roadside infrastructure. The initial focus will be on enabling real-time object recognition by Astri's C-V2X edge software to detect imminent danger on roads and issue real-time alerts to the respective drivers via C-V2X communications between vehicles and roadside infrastructure.

The smart roadside computing unit is powered by Intel Xeon D-2100 processors, delivering Intel's data centre processor architecture in a form factor optimised for cloud edge computing. It brings the architectural innovations of the Xeon scalable platform to an SoC for a low-power, high-density, small footprint, integrating network, security and acceleration capabilities.

The AI and visual data processing in the smart roadside unit is accelerated by the Intel Myriad X visual processing unit and OpenVino toolkit.

"Network transformation, AI and edge computing are converging to create some of the most amazing innovations we've seen in decades," said Caroline Chan, vice president at Intel.

Looking forward, it is expected to see more sensors on the roadside infrastructure to collect massive data and be transferred via 5G. Smart mobility applications will process the data at the roadside edge and provide a fast response to C-V2X enabled road users.

"Thanks to Intel, and as we are moving into the 5G era, the combinations of wireless, network, computing and intelligence to enable 5G and C-V2X applications shall be increasingly important," said Justin Chuang, vice president at Astri.

AI mechanic

Start-up Carnostic has developed a pocket mechanic that uses AI and runs algorithm software to educate users about their cars through their smartphones.

The tool lets anyone understand their vehicle by providing information in simple, understandable terms and taking away the stress in dealing with vague lights or confusing technical definitions.

Cloud-based pre-emptive algorithm software collects, analyses and uses data from 600 sensors on the car to predict problems before the engine light comes on.

ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™

A²B® DELIVERS REVOLUTIONARY ARCHITECTURES FOR VOICE AND AUDIO IN A SIMPLE DESIGN

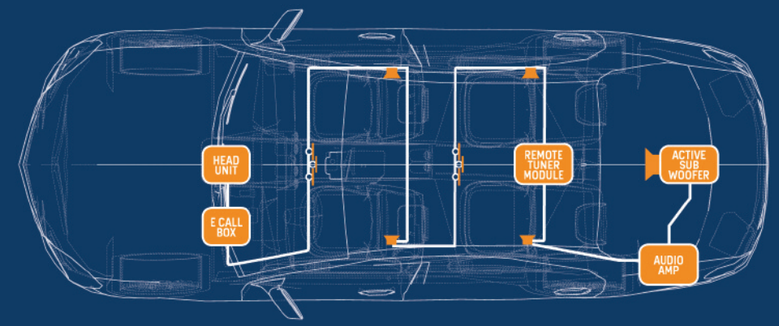
▶ Lowest latency digital audio, control and power over a single, unshielded twisted pair ensures lowest system cost

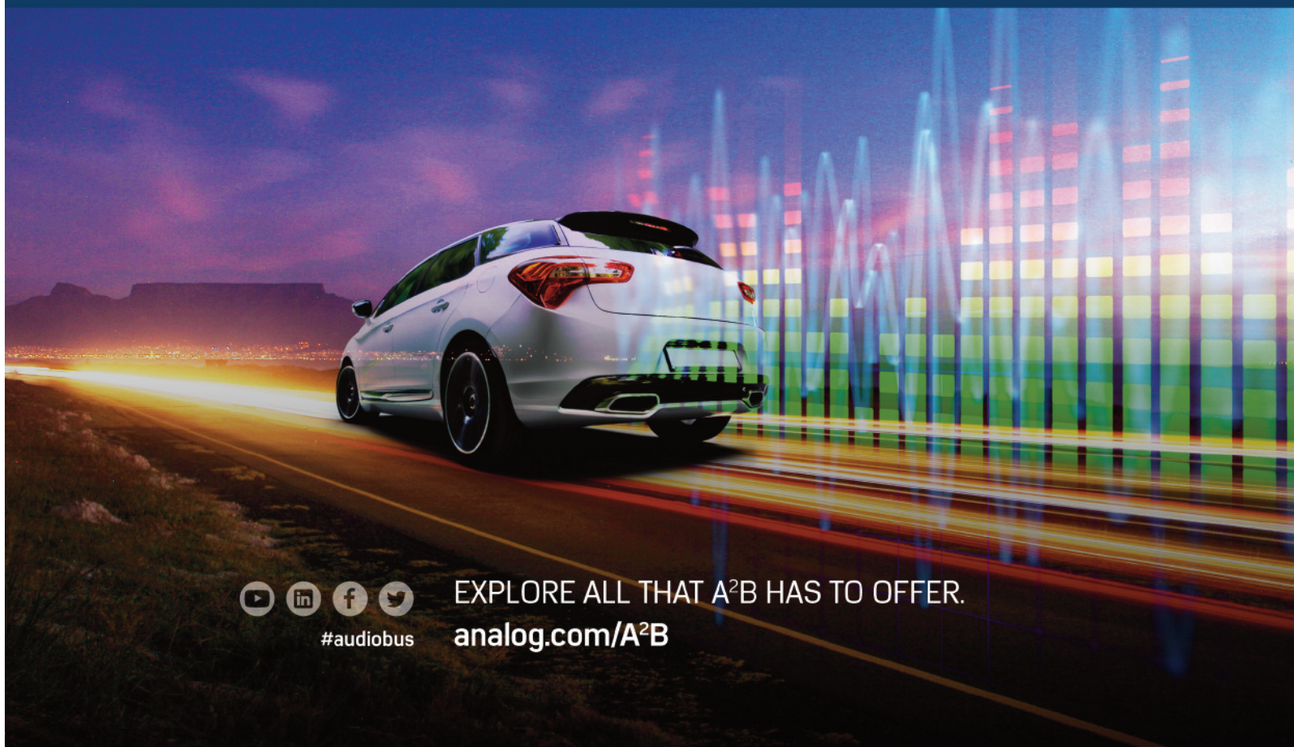
▶ Easy-to-use SigmaStudio™ with ecosystem of third-party development, prototyping, and evaluation solutions

▶ Engaged with 90% of global automakers to deliver innovative infotainment experiences

A²B® AUTOMOTIVE AUDIO BUS

WE HEAR LEADING AUTO-MAKERS LOUD AND CLEAR.





#audiobus
EXPLORE ALL THAT A²B HAS TO OFFER.
analog.com/A²B

Autumn launch set for Nissan hands-off driving

Nissan is combining navigated highway driving with hands-off single-lane driving capabilities in an expansion of its ProPilot system. The technology will debut on the Japanese-market Nissan Skyline in autumn this year.



Driver monitor confirms driver is attentive

Designed for on-ramp to off-ramp highway driving, the system engages with the vehicle's navigation system to help manoeuvre the car according to a predefined route on designated roadways. It also enables hands-off driving while cruising in a single lane.

Drivers must first set their destination in the navigation system, creating a predefined travel route.

Once the car enters the highway, navigated driving becomes available.

Upon activation, the system will assist the driver with traveling on a multi-lane highway until reaching the highway exit on a predefined route, helping handle passing, lane diversions and lane exiting.

It will also enable hands-off driving while cruising in a given lane. When the vehicle approaches a road divide, or when passing a slower vehicle is possible, it judges the appropriate timing of branching off or passing based on information from the navigation system and 360-degree sensing.

Intuitive audio and visual guidance is given to the driver, who is prompted to put both hands on the steering wheel and confirm the start of these operations with a switch.

The vehicle uses a combination of cameras, radars, sonars, GPS and 3D high-definition map data to provide 360-degree, real-time information of the surrounding environment and the vehicle's precise location on the road. A monitoring system in the cabin continually confirms that the driver's attention is on the road.

Audio cues and visual notifications alert the driver when the navigated driving feature becomes available.

If the preceding vehicle is driving more slowly than the speed set by the driver, and the system detects it can pass, the driver will be notified through audio and visual guidance. The driver can agree to pass by placing both hands on the steering wheel and operating a switch.

When wishing to change lanes, the driver places both hands on the steering wheel and activates the turn signal. The vehicle will change lanes once the system has determined that a lane change is possible.

When the vehicle approaches the highway exit of a predefined route, audio and visual guidance is given to notify the driver that navigated driving is about to end. Once the vehicle reaches the highway exit ramp, navigated driving is disengaged and the driver takes full control of the vehicle.

Tata Elxsi licenses Autosar Adaptive to GWM

Tata Elxsi has licensed its Autosar Adaptive platform to Great Wall Motors (GWM).

The platform, developed in collaboration with a European OEM, will help accelerate the development of connected autonomous and driverless vehicles.

"Tata Elxsi has been a premium member of the Autosar Consortium since 2008 and provides a comprehensive suite of products and tools for automotive OEMs, suppliers and chip vendors to integrate their Autosar requirements," said Zhang Kai, deputy chief engineer at GWM. "Also, they will help us with the integration."

Tata Elxsi licenses modules and the stack for Classic version 4.3 as well as high computing applications such as autonomous driving, V2X, predictive analysis and OTA to OEMs, tier-ones and semiconductor companies worldwide.

"This win gives our Autosar product suite a strong entry into the China market, one of the most advanced automotive markets," said Nitin Pai, SVP at Tata Elxsi.

Renesas previews 28nm flash that supports OTA updates

At last month's Symposia on VLSI Technology & Circuits in Kyoto, Japan, Renesas announced the development of flash memory technology that achieves larger memory capacities, higher readout speeds and over-the-air (OTA) support for automotive MCUs using a 28nm process.

This technology achieves what is claimed to be the industry's largest capacity of embedded flash memory on an MCU – 24Mbyte – and reaches 240MHz random access read speeds, said to be the industry's fastest for embedded flash memory.

The technology also achieves low noise write operations when performing OTA wireless software updates, and high-speed and robust operation for OTA software updates.

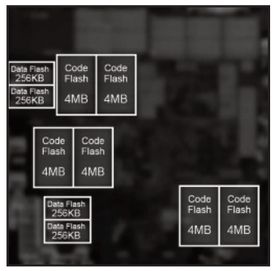
Recently in technologies used in car systems, such as autonomous driving and electric drive, there have been increasing demands for larger embedded flash memory capacities in the MCUs due to the increasing scale of the control software.

The introduction of OTA technology accelerates the demand for larger capacities to assure adequate storage area for updated programmes.

Since it is necessary to assure real-time performance given the addition of new functions such as functional safety, faster random access read times from the flash memory are also strongly desired.

Renesas continues to use the SG-Monos (metal-oxide-nitride-oxide-silicon) technology for the embedded flash memory used in its MCUs. The memory cell size of this 28nm technology is reduced by more than 15 per cent, from the earlier 0.053μm^2 to smaller than 0.045μm^2.

While suppressing increases in the chip size, this technology allows the inclusion of 24Mbyte of code storage flash memory; also included is 1Mbyte of data storage flash memory in the test chip for parameters and other data.



Renesas flash memory technology based on 28nm process

By changing the write current applied to each memory cell between initial operation and later operation when programming the flash memory, Renesas has reduced the peak current consumption from the external power supply (Vcc) by 55 per cent without reducing the throughput compared with earlier devices.

This suppresses the adverse influence of supply voltage noise on the MCU itself during OTA operations when the car is running.

By varying the write current to high-speed write mode, in which the number of simultaneously programmed cells is increased, the device achieves programming at 6.5Mbyte/s in this mode, making it possible to suppress the increased test times associated with the large memory capacity.

Göpel transforms R-Car SoC

Göpel Electronic has extended its Vario Tap technology for universal processor emulation to the R-Car V3M SoCs from Renesas.

This transforms the processor into a design-integrated test and programming instrument via the control of the debug port. Vario Tap lets developers of assemblies with R-Car V3M components perform on-board programming of connected flash components and fast ram connection tests.

The low-power image recognition SoC is optimised for use in front and surround view camera systems as well as lidar sensor systems.

The Vario Tap model for the R-Car V3M is software that enables the use of the various controller modules via the corresponding debug interface. Thus the different functions of the modules can be used for test programmes. The controller itself becomes a test and programming instrument.

After selecting the controller model, the connected hardware units can be tested and validated and flash memory can be programmed.

Jaguar sees gaming influence on manufacturing

Jaguar Land Rover is taking a lead from the gaming industry as it introduces virtual and augmented reality into its design and manufacturing, according to Brian Waterfield, digital manufacturing manager at JLR, speaking at last month's AR & VR World Summit in London.

"We are starting to bring what is happening in the gaming industry to our engineering," he said. "Our accuracy has to be better, but it is the same concept."

He said AR and VR were starting to give the car maker an insight into data.

"We are passionate about AR and VR," he said. "We can use VR as part of the design process. We can compare the virtual world to the real world to see what we have got. We can go into the physical world virtually."

He described a digital twin as not a copy of the physical world but the author of the physical world.

"The digital world allows imagination, and with imagination we can change the real world," he said.



Brian Waterfield: "Product design is not a sexy area."

He stressed though that the digital world was about collaboration.

"It is about bringing areas together, bringing companies together," he said. "A lot of work is being done in isolation, in silos. It needs to be brought together."

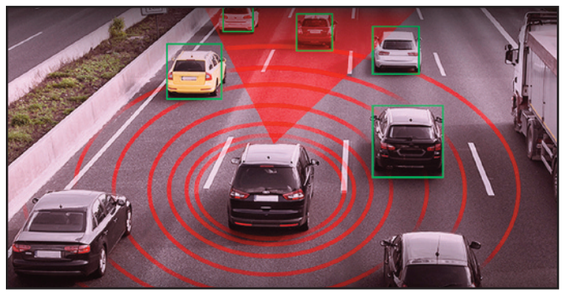
However, he said while the skills for this existed, it was hard to attract them into manufacturing.

"The skills are there but they haven't crossed over to manufacturing," he said. "Product design is not a sexy area. We are trying to attract the right people. We want to make it more rewarding to come into the business."

TowerJazz and Lumotive demonstrate solid-state lidar

Bill Gates-funded start-up Lumotive and foundry TowerJazz have demonstrated a beam steering IC for automotive lidar that has no moving parts.

Based on Lumotive's liquid crystal metasurface (LCM) technology, the IC is expected to improve performance and reliability, and be more compact, while providing longer range, fast response, high resolution and wider projection angle.



Lumotive and TowerJazz solid-state lidar

"It enables a truly solid-state lidar system with unprecedented range, resolution and frame rate, all crucial requirements for the fast-growing autonomous vehicle market," said Bill Colleran, president of Lumotive. "Our partnership with TowerJazz enabled us to achieve this important milestone and will allow us to bring our revolutionary technology to production thanks to both companies' highly skilled engineering teams and deep domain expertise."

Lumotive's beam-steering ICs use TowerJazz's 130nm Cu back-end-of-line technology, customised to meet specific optical performance requirements with optimised lithography and custom dielectrics. The complete lidar system based on this beam steering chip coupled with a custom silicon photomultiplier sensor, using TowerJazz's single photon avalanche diode technology, will be available for prototype testing late this year.

Analog Devices partners First Sensor on lidar development

Analog Devices is collaborating with First Sensor to develop lidar technology to accelerate the move towards autonomous driving.

The two companies aim to develop products for autonomous sensing technology serving unmanned automotive, aerial and underwater vehicles in transportation, smart agriculture, industrial manufacturing and other industries.

As part of the collaboration, they are developing offerings that shrink the lidar signal chain to enable higher system performance as well as reduce size, weight, power and cost for manufacturers designing sensing and perception technology into their autonomous safety systems.

The companies also plan to develop other lidar products that will serve automotive and industrial manufacturing applications.

"The first step in our working together is to optimise ADI's industry leading transimpedance amplifiers (TIAs) with First Sensor's avalanche photodiodes (APDs) so we can offer our customers more powerful and efficient lidar, and better support the mass commercial launch of lidar systems into the autonomous transportation market," said Stewart Sellars, general manager for lidar at Analog Devices.

For more than 25 years, Analog Devices has been developing sensor technology for transportation safety.

Recent developments include multi-channel TIAs to convert wide dynamic range photocurrent into a low-impedance voltage signal.

First Sensor also has more than 25 years of experience manufacturing lidar APDs, which are highly sensitive detector arrays that convert light into photocurrent.

Optimising the interconnection between the APDs and TIAs is critical as it significantly influences the noise floor and bandwidth achieved. Improvements in these two parameters directly translate to lidar systems that can detect objects at longer range and with higher precision.

"The market for lidar systems is maturing with customers expecting a renewed focus on implementing economically and technically compatible solutions," said Dirk Rothweiler, chief executive officer of First Sensor. "Adapting APDs and TIAs to each other is a logical next step in this evolution. By expanding our cooperation with Analog Devices, our customers will benefit from better lidar performance."

Lidar is a growth driver for First Sensor. The company is preparing for the requirements of volume production with forward integration and an accelerated cost roadmap in line with its strategy for profitable growth.

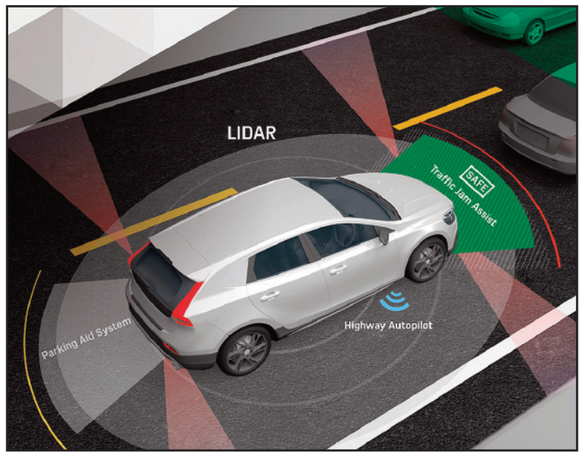
First Sensor and Analog Devices will each offer a common evaluation board with which system manufacturers can test the combined products.

This cooperation with First Sensor marks Analog Devices' next phase in implementing its Drive360 autonomous driving strategy.

This suite of technologies leverages ADI's core competencies in mems, RF and mm-wave, and photonics and optics technologies to provide the automotive industry with holistic products for highly automated and autonomous driving technology needs.

First Sensor was founded in Berlin in 1991 and develops and produces standard products and customer-specific devices for the growing number of applications in the industrial, medical and mobility markets.

• Analog Devices moves into new UK home, p27.



Lidar technology can improve sensing for autonomous vehicles

The World's LARGEST* Show for Advanced Automotive Technologies

*"Largest" in reference to the exhibitor number and the net exhibit space of trade shows with the same concept.

AUTOMOTIVE WORLD

NAGOYA 2019

Sept. 18 [Wed] – 20 [Fri], 2019

Venue Portmesse Nagoya, Japan Organiser Reed Exhibitions Japan Ltd.

370* Exhibitors & 20,000* Visitors will Gather

*Including concurrent shows



Visit and Find your Business Partners at AUTOMOTIVE WORLD

www.automotiveworld-nagoya.jp/en/ AUTOMOTIVE WORLD NAGOYA 2019

Organised by Reed Exhibitions®

Organiser: Reed Exhibitions Japan Ltd. AUTOMOTIVE WORLD Nagoya Show Management
TEL: +81-3-3349-8502 FAX: +81-3-3349-4900
A division of Reed Business Registered in England, Number 678540

Altair and ERM combine automotive IoT offering

Altair Semiconductor is partnering with ERM Advanced Telematics to develop low-powered and installation-free automotive IoT products.

ERM's IoT and asset management products will use Altair's cellular IoT chipsets to provide installation-free devices for IoT, asset management, stolen vehicle recovery and vehicle financial services.

These will include event-based platforms for automatic vehicle location and asset management applications using various sensors. The low power consumption of Altair's chipsets will allow the devices to be connected without having to be powered by the vehicle's battery, reducing installation costs.



Kfir Lavi: "This will usher in a new dawn."

"As installation costs continue to rise in comparison to hardware prices, Altair's unparalleled low power figures and extended battery life means we can provide on-board solutions with minimal installation requirements that are able to remain in the field for up to two years," said Kfir Lavi, senior vice president at ERM. "This will usher in a new dawn for IoT and asset management, opening up a whole new market of applications for a wide range of automotive IoT scenarios."

Altair's cellular IoT chipsets use a hardware-based security framework and a set of host, peripheral and sensor interfaces.

"Low power consumption is essential for the efficient and long-term growth of the automotive IoT space," said Gili Friedman, director of business management for Altair Semiconductor. "We are delighted that ERM Advanced Telematics has selected Altair's cellular IoT technology to provide the low cost and power-efficient connectivity necessary to enable new markets and use cases."

Continental moves radar to 77GHz to aid cyclist detection

Continental has unveiled a short-range radar for more precise detection of the vehicle surroundings.

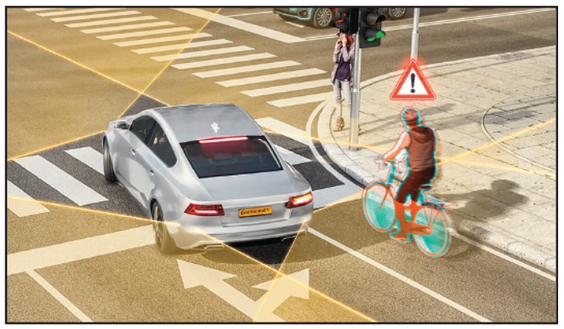
In place of 24GHz technology, the radar operates using 77GHz. This means the sensor detects the environment at a much higher resolution and level of accuracy to detect other road users, obstacles and cyclists more precisely.

The 77GHz sensor also detects movement directions and speeds more precisely than with 24GHz. In addition, the integration density has been increased.

As a result, the individual components of the system, such as the antenna and RF chip, are housed in a smaller istallation space, rendering the sensor more compact.

Sensors can be placed at each of the four corners of the vehicle body to ensure almost seamless 360° monitoring of the vehicle surroundings.

Radar systems such as this already form the basis for adas, such as monitoring the blind spots to the left and right of the vehicle, detecting the vehicle surroundings for the lane change assist, monitoring cross-traffic and intersections, as well as monitoring the area behind the vehicle to ensure vehicle occupants can get out safely.



Short-range radar detects cyclists when turning

automechanika
BIRMINGHAM



Steve Rogerson reports from last month's Automechanika in Birmingham, UK

Getting to grips with autonomy

There is no such thing as an autonomous vehicle. Autonomous cars are here and now. These two apparently contradictory statements are both correct; it all depends on the definition of the word autonomous.

The statements came from two separate speakers at last month's Automechanika show in Birmingham, and they show a little bit of the turmoil that garages are facing as they realise they are going to need a steep learning curve to continue repairing and maintaining cars.

The first of the statements came from Dean Lander, head of repair sector services at Thatcham Research, talking about how to carry out safe repairs of vehicles equipped with adas.

"Adas is not new," he said. "It is also a myth that adas means it is on an autonomous vehicle. There is no such thing yet as an autonomous vehicle. It is far into the future. What there is are highly assisted vehicles."

The early adas, he said, was just a radar at the front of the vehicle that led to the vehicle automatically braking if something got too close.

"The range of sensors is now far greater than any of us would have envisaged a few years ago," he said. "They are doing a lot of the observation work for the driver. On top of that, a car can make decisions on whether an object is dangerous."

But, he stressed, this was not autonomy. The driver is still in control and can ignore what the vehicle is saying.

The different view was taken by Peter Lawton, senior section



Wayne McCluskey: "When one vehicle learns, they all learn."

manager at the Society of Motor Manufacturers & Traders (SMMT).

"Autonomous cars are here and now," he said. "We are already seeing levels of autonomy in vehicles, but this is not what we think of as an autonomous car but as driver assistance. We think of autonomy as reading a book while the car drives. This needs a much greater level of processing, and it is very difficult."

Levels zero to two, he said, were run of the mill. He said level-three autonomy would start to arrive in 2022 and account for around 12 per cent of vehicles by 2030. Level four will be in the same time frame, reaching 17 per cent by 2030, and level five is way off and will probably not reach the roads until 2035.

Connected cars though, he said, have been on the road for about 20 years and new cars now have to have ecall, the technology that automatically calls the emergency services if the vehicle is in an accident.

More than two-thirds of vehicles registered today have some form of connectivity, he said, and that would rise to 90 per cent in the next five years and by 2026 all new registration would be connected.

Ignoring these changes in technology was not an option, said Wayne McCluskey, technical training manage at ZF Aftermarket.

"People should not bury their heads in the sand and pretend the changes are not happening," he said. "If you do, you will get left behind. Even for those of us in the business, the changes are very fast. Autonomous driving is a disruptive change. The way we do this will completely change within the next ten years. The way we order and drive vehicles will change."

He said there were still problems that needed overcoming, such as the legal requirements as to who will be responsible in an accident involving an autonomous vehicle. Would it be the vehicle manufacturer? There will be ethical problems such as making decisions about who to run over if it can't miss both.

He said he expected to see level four vehicles in production by 2025 but that level five was still a long way off.

"There are billions of euros going into developing these systems, so it will happen," he said. "It is a question of when."

Artificial intelligence would be important, he said, because it was impossible to programme every scenario into a vehicle.

"It will have to learn from experience and recognise more situations," he said. "But this will be linked through the cloud, so the experience of one vehicle can be passed to others. When one vehicle learns something new, they all learn."



Peter Lawton: "Data need to be available to the aftermarket."

Blockchain, he said, could help verify the data so errors in the data from one vehicle did not also get passed on.



Dean Lander: "Calibration must take place after a repair."

Aftermarket

Lawton looked at how this would affect the aftermarket, which he said would have to go through both an evolution and revolution.

"The aftermarket has always evolved, and it needs to do that now," he said. "It also needs some revolutionary thinking in terms of what the customer wants and expects."

For garages, Lander advised them not to focus on the features that modern cars have but just the sensors and what they are doing.

"If the sensor is operating correctly, then the feature will," he said. "But what happens if it goes wrong."

As an example, he said consider a radar at the front of a vehicle, controlled by a small grub screw. A small turn of the screw can put the radar well out of line.

"That is why calibration is so important in repair situations," said Lander. "The industry has been struggling with that. Calibration must take place after a repair. And it must be carried out be a competent technician."

Lawton agreed. He said: "Adas is here now and needs to be maintained and calibrated properly, and that means access to data. Even replacing a windscreen may mean the recalibration of adas devices. Data need to be available to the aftermarket at the same time as franchised dealers and manufacturers."

Electric vehicles

Garages are facing difficulties in the maintenance and repair of hybrid and full electric vehicles, according to Eliot Smith, a director at training company Pro-Moto.

Even though there has been an increase in hybrid and EV sales, they still only represent about one to two per cent of the market. But this is predicted to grow to 11m on UK roads by 2030 and 36m by 2040, which means garages need to be prepared.

"It is not a question of if but when we are going to have to deal this equipment," said Smith. "We have to adapt to the challenges."

And some of these challenges were still unknown, he said, as car makers were worried that there may be weaknesses in the technologies that they did not know about yet because the technologies had not been around long enough.

The main problem facing garages, he said, was that there were life-threatening risks dealing with these high voltages and often the garage owners were not taking them seriously.

"The decision makers have been blind to these for many years," he said. "Unless we get



Eliot Smith: "The decision makers have been blind."



Dan Bunting: "It is about delivering jobs and growth."

understanding at the top level, how can we educate the people who actually do the work?"

On top of that, the technical information repairers need was often not readily available. However, he said the good news was that most electric vehicles use roughly the same technologies so repairers can learn the basics that they can apply to all EVs.

"Where different bits are and how they are arranged may be different, but if you have the base technical knowledge you can use that on all vehicles," he said.

Future

While garages and the rest of the aftermarket come to grips with the new technologies arriving today, the Advanced Propulsion Centre (APC) is looking for ways to ensure the UK can take advantage of the latest technology developments, and collaboration is the key.

"There is a whole range of new technologies that will be on vehicles of the future," said Dan Bunting from the APC. "To develop these in silos is difficult, so we want to fund collaborations."

He stressed it was important to develop the manufacturability of components rather than just developing technologies.

"In the past, technology would get developed but not get through to production and end up being licensed by other companies in other countries," he said. "That is why our funding is here."

Out of the £1bn it has available, the APC has already allocated £710m to 44 projects with a clear route to market. Universities can be involved but not lead the projects.

"It is not just about R&D and technology, it is about delivering jobs and growth and saving CO_2," he said.

His colleague Jon Regnart, an automotive trend strategist at the APC, said it was also important to look at the supply chain.

"We are looking at how the UK economy can build supply chains for electric motors, batteries and power electronics," he said. "This creates opportunities and challenges. We have identified 14 opportunities that can lead to €24bn in value with the main beneficiaries being in the chemical and electronic sectors."

Conclusion

While the industry plots its path towards autonomous driving, connected cars and driver assistance are here today, and garages have to learn how to repair and calibrate these systems. They need training and they need the data from the car makers themselves. Without that there could soon be a lot of failed adas on the market, and that may be more dangerous than not having adas at all.



Jon Regnart: "This creates opportunities and challenges."

Organised by SENSE MEDIA

17 – 19 September 2019

AutoWorld Brussels Belgium

AutoSens 2019

AutoSens brings together 450+ engineers and technical experts at the world's most forward thinking ADAS technology event. Created by engineers for engineers.

Book your ticket today – early bird discounts available

Vehicle Electronics readers receive a further 15% discount

Visit go.auto-sens.com/VEb

"AutoSens has established itself as the event of the year to see, hear and meet the key companies and people in the driverless car and ADAS space."

SMART CITIES

SMART TRANSPORT

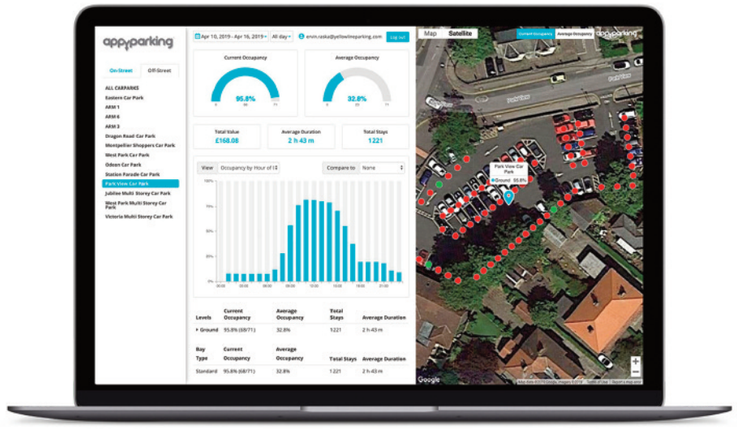
Gary Thompson discusses intelligent mobility for modern cities

Transport and citizen mobility are high on the agenda of local communities. This is due to the financial costs of congestion and, more importantly, the high levels of air pollution that directly impact citizen health.

In 2018 it was reported that more than 40 UK towns and cities had exceeded or already reached the air pollution limits set by the World Health Organisation. Infrastructural decisions taken by local government over the next few years have the potential to contribute significantly to tackling this air quality crisis.

Several forward-thinking cities are looking to initiate smart transport projects to improve the efficiency of local services, enhance sustainability and improve living conditions of their city while helping support economic and business growth. Many are doing so via smaller smart projects that help to generate savings and effectively pay for the initial investment.

These projects, costing a few thousand to a few million pounds, can offer highly dependable return on investment (RoI), helping to ease continued pressure on public budgets.



Smart parking has been introduced in Harrogate town centre

Smart transport projects generally focus on four key areas for improvement – routing, parking, congestion and buses. Effective and efficient transport provides a lifeline in many cities. Citizens rely on bus networks and drivers depend on accessible routes and parking. By digitalising these aspects of city infrastructure, city authorities can make use of relevant data to streamline services.



Helsinki has measures to encourage use of public transport

Smart routing

Smart vehicle routing aims to improve the management and flow of fleets of vehicles delivering public services such as waste collection and school transport across cities. Geographical information systems (GISs), which can help to optimise the routing of services, are being installed across the globe so better services can be delivered with fewer assets such as vehicles, people and equipment. The investment cost for such routing systems can be rapidly recouped when compared with the savings gained.

For example, smart waste collection routes are planned to be more efficient so that local councils can look to reduce carbon emissions and save time and money. Newcastle City Council has implemented smart wheelie bins that are linked to intelligent routing systems. Connected sensors let refuse collectors know when they are ready for collection, which improves waste management efficiency and, undoubtedly, the day-to-day lives of residents. Combined with route optimisation software with data from the Ordinance Survey to remap the city's waste routes, this enables refuse collection fuel costs savings of £100,000.

Smart parking

Ample, easily accessible parking is vital to improving traffic management, which in turn is vital to increasing access to city centres. The installation of parking systems that simplify driver decision-making with the provision of valuable information on parking availability ultimately reduces congestion and frustration. The new systems can also increase a city's potential parking charge revenue to underpin a clear RoI model.

Drivers are guided to their final parking destination along the shortest possible route via in-car navigation or with the help of programmable dynamic message signs, giving commuters the current occupancy levels in the surrounding parking zones.

Early this year, North Yorkshire County Council and Harrogate Borough Council introduced smart parking measures in Harrogate town centre. Using a combination of smart sensors and a phone application, drivers can identify available parking spaces and pay for them in real time. Westminster Council in London introduced a similar system in 2014 to tackle high parking demand, congestion and poor air quality. The scheme has been such a success it has since been rolled out to the borough's remaining 7000 on-street parking spots.



Reducing emissions from public transport is a global problem and many cities around the world are investing in green buses

Congestion

Overcrowded roads constitute a significant financial burden that shows no signs of allaying.

The implementation of road pricing systems helps reduce the traffic flow in congested urban and interurban areas, in turn creating funds to pay for the initial project and reinvest in other environmental projects. Road pricing can work particularly well in small cities where a high concentration of traffic is an issue in a particular area.

In Durham, a successful congestion charge system has been in place for fifteen years. The mediaeval city centre has narrow roads that are unable to cope with high volumes of traffic. The scheme has achieved an 85% reduction in vehicular traffic leading to a major drop in emissions. Revenues raised have been reinvested to support a frequent bus service to and from the charging area.

Other cities in Europe are looking to emulate such examples and introduce charges as a way of reducing congestion. The local government in Helsinki, for example, already has a number of measures in place to encourage use of public transport, and is looking to introduce a congestion charge when the next elections take place in 2021.

Amsterdam is another city investigating such a measure to encourage public transport use and reduce the number of cars in the city centre.

Hybrid buses

The 2017 Bus Services Act has given UK local authorities the power to take a front seat in deploying their bus networks. This includes increased control over fares, the ability to introduce multi-operator ticketing and to designate

frequency and scheduling.

Complementary to controlling how buses operate is ensuring that citizens have access to low emission technology that will contribute to meeting air quality targets. Road traffic is responsible for around 40% of emissions of nitrogen oxides in the EU and around four fifths of nitrogen oxides that come from traffic emanate from diesel-powered vehicles.

Electric vehicles produce no pollutants at street level and up to 40% less CO_2 emissions as a whole, compared with similar-sized petrol or diesel vehicles. Upgrading bus fleets therefore has the potential to impact a city's air quality greatly.

Reducing emissions from public transport is a global problem and many cities around the world are investing in green bus technology. One Chinese bus company invested €11.8m in hybrid and electric buses. Finance enabled this state-run bus company in the Shandong Province to acquire 111 hybrid buses and 20 electric buses and contribute towards meeting the local government's environmental and emission-reduction targets.

Also, in a Scandinavian city, the authorities invested in double articulated 24-metre buses powered by hybrid technology combining biogas with electricity to reduce impact on the environment.

Despite the obvious benefits of such projects, public sector budgets are often insufficient to implement the technology in the first place. Local authorities need to access a blend of public and private sector finance to accelerate their smart initiatives in a timely way and benefit from the resulting savings, efficiency, quality and citizen service improvements as quickly as possible.



Traffic light with Bluetooth detector for road pricing system

Diverse public and private funding sources allow a city to make the full range of desired technology investments in a timely fashion. Different financiers can be sourced for the different types of technology investment. The sooner the smart investments are implemented, the quicker the savings or revenues, or inward investments begin to accrue.



Gary Thompson is UK sales director for Siemens Financial Services



Going flat

Ahad Ahmed Buksh looks at the evolution of TVS diodes from standard to flat packages

TVS (transient voltage suppression) diodes are used to protect sensitive semiconductor devices from the harmful influence of transient voltages. In today's automotive applications, the on-board devices are connected to the battery and alternator.

The alternator causes most of the transients in a vehicle's electrical system and requires further conditioning before it can be used to power the vehicle's other systems.

Today, most of the alternators have auto protected diode bridges to clamp load dump surges but these are insufficient. During the powering or switching of inductive loads, the battery is disconnected so unwanted spikes or transients are generated. If this is left uncorrected, the transient voltages would be transmitted along the power line. This will cause individual devices and sensors to malfunction or permanently damage the vehicle's electronic system.

Once the voltage at the TVS node exceeds the breakdown voltage VBR, the TVS will clamp

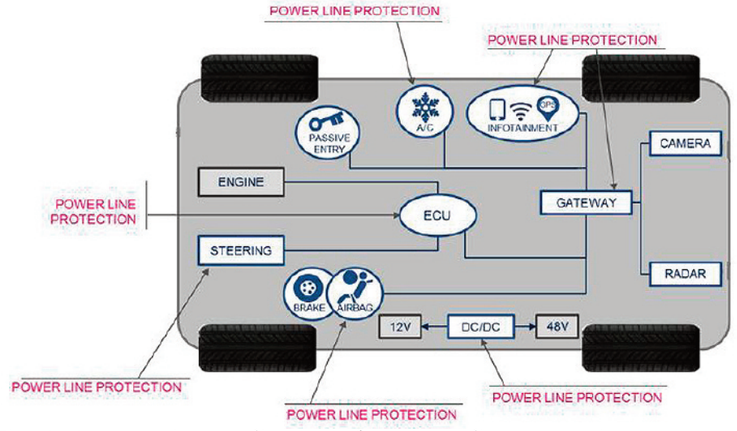


Fig. 1: Automotive applications for power line protection

the voltage across it to reach the clamped level VCL, see Fig. 2.

VCL depends on the current flowing through the TVS and the surge duration. Primarily two kinds of TVS can be used – unidirectional or bidirectional.

For unidirectional shown in Fig. 2, a unidirectional TVS clamps the voltage differently depending on the direction (V > 0 or V < 0).

For positive polarity, the voltage will be able to vary from 0V to VBR and will be clamped to VCL during a surge. For negative polarity, it will act as a diode in forward conduction, with a clamping voltage below 1V, generally around 0.7V.

A bidirectional TVS (see Fig. 3) clamps the voltage in the same way whatever the direction (V > 0 or V < 0). The voltage will be able to vary from -VBR to +VBR but

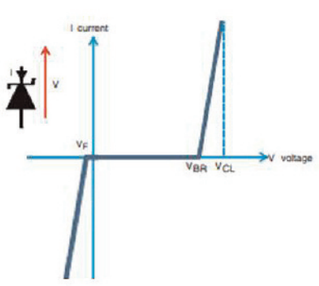


Fig. 2: Unidirectional TVS behaviour

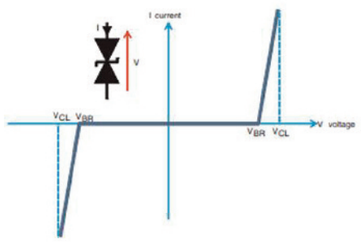


Fig. 3: Bidirectional TVS behaviour

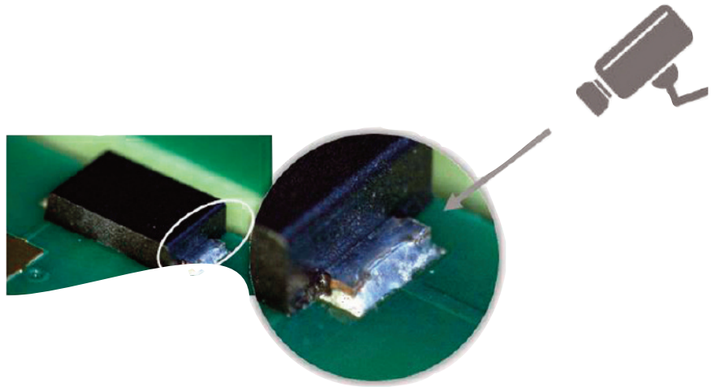


Fig. 4: Flat TVS diodes have AOI compatibility

will be clamped to -VCL or +VCL if a surge tries to push voltage out of boundaries.

The choice of a unidirectional or bidirectional TVS product depends on the properties of the circuit being protected. Unidirectional TVS products protect signal or DC power nodes with unidirectional signal swings and bidirectional TVS products protect signal or AC power nodes with bidirectional signal swings.

Evolution

Apart from the multiple TVS devices available in the standard package, such as SMA, SMB and SMC, there are new and evolved TVS diodes available in flat packages. The footprint of most of these devices is fully compatible with the standard versions but their uniqueness is in their packaging. The new packages are flat and thinner. The standard devices have an average thickness of 2.1mm whereas the flat devices have a thickness of only 1.1mm.

These flat packages have a few more advantages as well. These devices have wettable flanks, which is required by some of the automotive equipment makers. The wettable flanks allow for automatic optical inspection (AOI) compatibility, which helps in checking solder joints, see Fig. 4.

Along with the footprint, the electrical parameters such as stand-off voltage and leakage current of the flat devices remain similar to the standard ones.

Fig. 5 gives the comparison between the standard and flat package sizes. For both the SMA and SMB packages, the size of the device remains the same but the thickness is reduced.

To increase cost effectiveness, it is possible to move from SMB to SMA flat while keeping the 600W capability. For the 1500W devices, it is also possible to save space on the PCB by moving from the SMC to SMB flat devices,

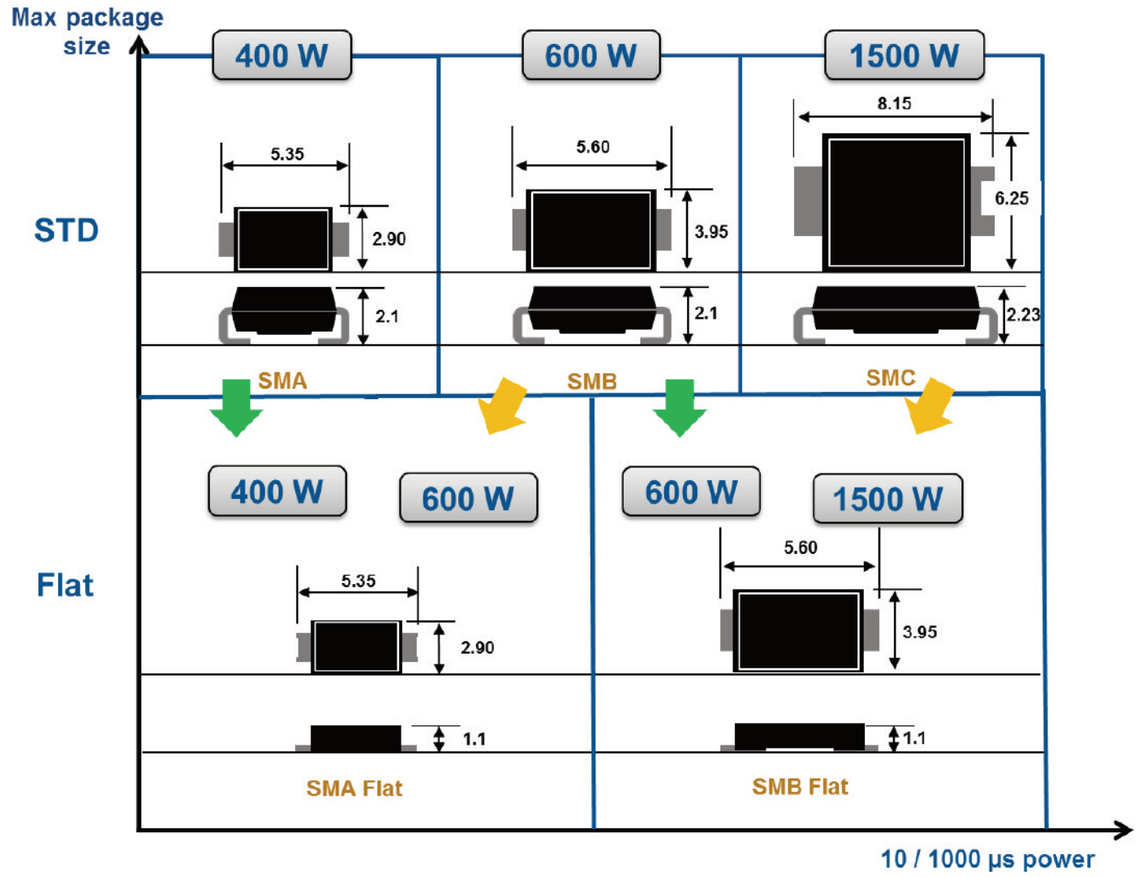


Fig. 5: Comparison of standard and flat TVS package size

although a PCB layout optimisation would be needed in this case.

In Fig. 6 is the footprint comparison of SMA flat (right) on SMB (left). Multiple tests have been conducted to verify if there is a significant misplacement or rotation appearing when SMA flat is soldered onto an SMB footprint. The results showed that there was a negligible misplacement of less than 320μm and a rotation of less than 2˚, hence verifying that SMA flat and SMB footprints are fully compatible.

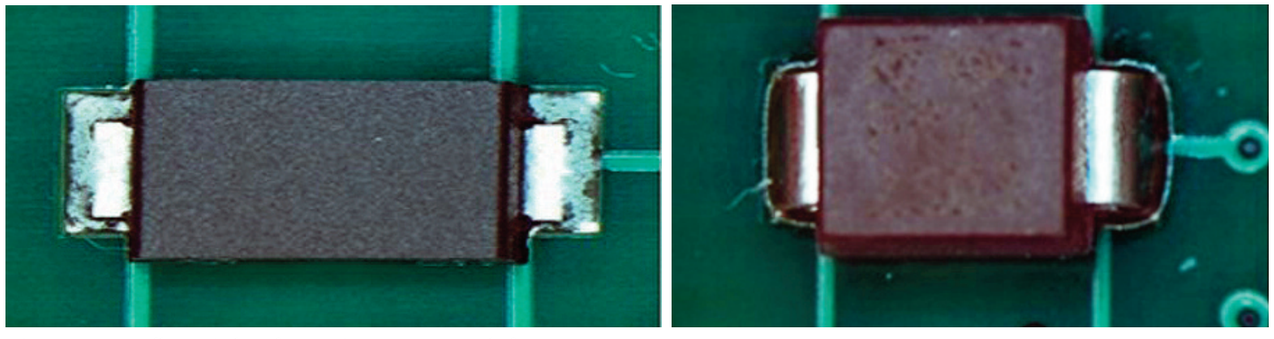


Fig. 6: SMA flat (right) footprint on SMB (left)

With the newly evolved TVS diodes, the market will not only get the benefits of having high power density TVS diodes but will also save costs.

Ahad Ahmed Buksh is a technical marketing engineer with ST Microelectronics

INVESTMENT

SATISFACTION



Analog Devices has moved into its new UK home, an office built on the site of the old EMI vinyl record plant that produced discs from the likes of the Beatles and the Rolling Stones. Steve Rogerson reports



Shalini Palmer: "There is a lot of opportunity."

Switching from industrial and healthcare to automotive could be daunting for many people, but not so Shalini Palmer, now in charge of mobility and transportation for Analog Devices at its recently opened UK offices in Hayes, close to Heathrow Airport.

Palmer has been with Analog Devices for eleven years, and in her new role 95% of the company's worldwide automotive business will be under her jurisdiction.

"It is a very exciting time," she said during the inauguration of the new offices, once the site of the EMI vinyl record pressing factory that produced the discs containing music from the Beatles and the Rolling Stones among others.

She takes over the job during a transformational period for the automotive industry as it moves simultaneously towards more electric and hybrid vehicles and more connected cars, and now what is just a short step from the vision of autonomous transportation.

"There are a lot of societal challenges," she said. "There is a slump in car sales, trade wars, a need to reduce pollution. Ninety per cent of the air we breathe does not meet World Health Organisation standards. We are looking at greener cars such as electric vehicles and hybrids."

On top of that, 1.3 million people die every year in road traffic accidents and the industry in a short time wants that to fall to zero.

On top of that, there is now a new attitude to transportation with people beginning to regard owning a car as no longer a necessity.

"When I was 17, I couldn't wait to learn to drive and own a car," said Palmer. "This is changing with the notion of ride hailing and shared vehicles. All these changes require a different type of thinking."

Her task now, she said, was to help Analog Devices' customers be part of this revolution.

"We want them to have the best technology in electrification and battery management," she said. "We want them to have the best radar. We want to help them reduce the weight of the vehicles. We want to look at the health of the driver. There is a lot of opportunity and exciting things in which Analog Devices has a role to play."

A shift the company is getting to grips with is the increasing interest the car makers play all the way down the supply chain. Once, a company such as Analog Devices would supply components just to the tier-one suppliers, or even tier twos, and never deal directly with the OEMs.

"The OEMs now want to be involved," said Palmer. "They want to be much more active in being involved in the technologies going into the car. They want to do this because they want to differentiate as a brand."

Even though she said the company still worked with tier ones, there was now much more balance between working with tier ones and OEMs.

"They want to talk about cabin electronics, radar, lidar and so on, so they can differentiate," she said.

A²B

One area the company has been involved in from the start is the Automotive Audio Bus (A²B), a wiring system that promises to reduce the weight of the wiring in vehicles and is already being pioneered by the likes of Ford.



Andrew Waller at the A²B demonstration

"But every major OEM is adopting A²B is some form," said staff field application engineer Andrew Waller in a demonstration at the new office inauguration. "It is on the road with Ford. There are other US, European and Asian vehicles also on the road. We will see some very sophisticated A²B systems on the road for the 2020 model year."

Waller predicted that the number of A2B systems on the road was set to grow exponentially.



Mike Britchfield: "The UK is rewriting itself."

"The value add of A²B is such a compelling argument," he said.

Offices

The new building has nearly 8500 square metres of office space and Analog Devices is taking up almost one whole floor of the building's five floors. The site's music heritage stretches too to the local railway station where the first stereo recording took place, of trains going in and out.

However, falling vinyl sales saw EMI eventually close the plant. The new building pays heritage to its history though with large gramophone funnels leading up to the entrance and a giant statue of Nipper, the famous dog in the HMV logo, in the building's car park.

Though the company will keep its European headquarters in Munich, it regards the new UK office, which replaces separate offices in Marlow and Weybridge, as significant for drawing in new talent. It has established close links with Brunel University, just 3km away, and the area is growing into a high-tech hub.

"The UK is rewriting itself as a centre of new ecosystems," said Mike Britchfield, vice president for Emea. "This is helping us understand growing market trends. We are working with small companies. The UK is a good place to do that. There was £2.5bn in new investment in 2018 in the UK tech sector. The UK has a healthy environment for start-ups and investment in technology."

The office, which has a distinctly contemporary look in contrast to the bland aesthetic commonly adopted by many engineering companies, underpins Analog Devices' plans for growth in the UK: it easily accommodates all the staff who previously worked at Analog Devices and legacy Linear Technology offices in Weybridge and Marlow, with an additional floating capacity to accommodate customer meetings, visits by field engineers, training facilities and an expanding staff headcount. There are 40 staff employed there at the moment.



Alastair Boyd masterminded the move

"Our new UK office beautifully combines the past and the future," said Britchfield. "The site's history as a record factory is appropriate given our many customers in the UK's renowned audio equipment manufacturing industry. But we are also excited to be at the heart of London's newest technology cluster, which gives us the opportunity to build our diverse, creative and talented workforce."

The move was masterminded by Alastair Boyd, sales manager for northern Europe, and Palmer. Boyd said he was proud that Analog Devices had committed to a large long-term investment in the UK's electronics sector.

Palmer concluded: "The UK is a hub of innovation and knowledge with many world-class companies in specific technology domains; the market is large, but fragmented. That means you have to have a prominent and enduring presence in the country if you are going to be successful here. This beautiful and impressive new office is a signal to the UK market that Analog Devices is in the UK for the long term and committed to providing all the technology and applications support that British customers need."



LONDON'S CALLING

Connected vehicle trials in London could shape future standards

The UK's Transport Research Laboratory (TRL) is carrying out trials of connected and automated vehicles (CAVs) on public roads in London in one of the most complex urban environments ever used for CAV testing.

Working with the Streetwise project, TRL believes the safety case development behind the trials has the potential to improve safety for future CAV initiatives. It has virtual validation methodology for CAV testing that could provide the blueprint for CAV safety standards and certification.

This is a milestone for the entire CAV sector, according to David Hynd, chief scientist for TRL.

"Automated vehicles represent the future of transport and have the potential to deliver tangible, wide-reaching benefits in relation to reduced congestion, faster and cheaper commutes, fewer collisions and cleaner air," said Hynd. "With a recent report highlighting the UK is the world's number one location for mass-market potential for CAV, with a £62bn annual economic opportunity by 2030, it is vital that the need to ensure safety does not stand in the way of success."

Testing on public roads in real-world environments is an essential stage in the development of automated driving systems.

The test routes in the London boroughs of Croydon and Bromley represent some of the most complex urban environments ever used for CAV trials.

Hynd said the virtual validation methodology created for Streetwise vehicles would form the template for CAV safety standards and certification.

The Streetwise project is part-funded by the Centre for Connected & Autonomous Vehicles (CCAV), delivered in partnership with Innovate UK. It is part of the government's £100m Intelligent Mobility Fund, supporting the Future of Mobility Grand Challenge.

The challenge was announced in 2017 to encourage and support innovation in UK engineering and technology, with the goal of making the UK a world leader within the transport industries. This includes facilitating changes in transport technologies and business models to make the movement of people, goods and services across the nation greener, safer, easier and more reliable.

Streetwise began in 2017 and is led by FiveAI, a UK-based company focused on creating a fully automated, shared transport service for Europe's cities. Also involved are TRL, Transport for London and the Warwick Manufacturing Group, part of the University of Warwick.

And component technology provider Torr Vision Group, part of the University of Oxford, and McLaren Applied Technologies are working with modelling and simulation firm Claytex and automotive insurance provider Direct Line.

The aim is to develop and demonstrate the technology, safety validation methods, insurance and service models for delivering autonomous, shared personal mobility as an alternative to the urban commuter car.

Upon completion, scheduled for 2020, Streetwise hopes to show the technology is mature enough to be safe in urban environments and sufficiently intelligent to co-exist with human drivers, road users and pedestrians.

Ultimately, Streetwise wants to facilitate implementation of a shared, autonomous passenger service within 12 to 18 months of project completion, providing cities, such as London, with a clean, safe, convenient and affordable commuting alternative.

Choke coil handles high vibrations

To handle the growing number of ECUs mounted in vehicle engines that need a high-temperature rating, support large currents and have to sustain severe vibration conditions, Panasonic has introduced a power choke coil that uses ferrous alloy magnetic material.

The ETQP5M2R5YSK provides inductance stability at high bias current input and over a temperature range up to +150˚C.



It is AEC-Q200 qualified and has a low audible buzz noise.

Vibration durability conditions are 50G (490m/s²) or higher acceleration, 5-200Hz frequency and 5mm maximum amplitude.

These make it suitable for automotive use in ECUs placed in the engine itself and mechanical-electrical-integrated ECUs. Also it can be used as a noise filter for drive circuitry that requires high temperature operation and peak current handling capabilities.

Similarly, it can be used for boost-converter and buck-converter DC-DC applications.

Typically, this means it can be used as an input filter in an electric pump, electric fan motor, direct injection, braking system, EGR, electric compressor, EPS, start-and-stop buck-boost and body electric system.

Case size is 8.5 by 8.0mm. Inductance at 100kHz is 2.45μH. Typical DC resistance at -20˚C is 7.4mΩ and rated current is 12A.

Oscillators work to +125˚C

Wide operating temperature crystal oscillators from Mercury Electronics suit automotive applications.

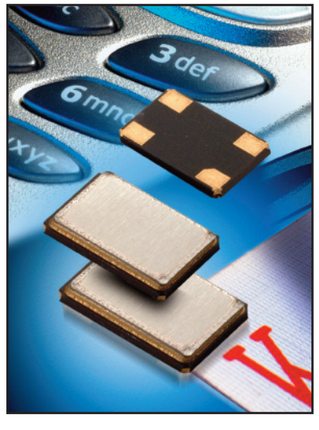
The surface mount HY series provides 15pF load LV-cmos output at frequencies from 1.25 to 50.0MHz over the temperature range -40 to +125˚C with a choice of frequency stability of ±50 and ±100ppm.

Frequency stability of ±25ppm is also available over commercial (-10 to +70˚C) and industrial (-40 to +85˚C) ranges. Non-standard frequency stability specifications are available if required, for example ±20 or ±30ppm.

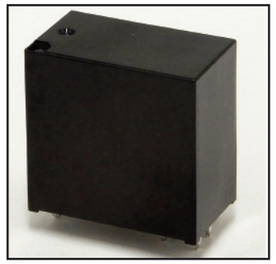
With phase noise characteristics of -155dBc/Hz at 10kHz and -160dBc/Hz at 100kHz offset, the oscillators come in three package sizes – 3.2 by 2.5 by 1.0mm, 5.0 by 3.2 by 1.2mm and 7.0 by 5.0 by 1.4mm.

Supply voltages for these are 1.8, 2.5 and 3.3V, respectively, and typical current consumption is 2 to 4mA from 1.25 to 19.99MHz and 4 to 6mA from 20 to 50MHz depending on package size.

RMS phase jitter is 150fs typical at 12kHz to 20MHz integrated.



Specifications include ageing of ±2.0ppm/year maximum for the first year, start-up time of 5.0ms maximum, rise-fall time of 10ns maximum and duty cycle (symmetry) of 50% ±10% typical with ±5% available as an option.



EV relay

A 6.6kW (32A, 250V AC) automotive relay for on-board battery chargers in electric and plug-in hybrid vehicles is sampling from Fujitsu with volume production expected to begin in March 2020.

The FTR-K5 PCB relay assists with faster battery charging while meeting automotive vibration and shock resistance specifications. It has +105˚C temperature rating and 8mm insulation distance between coil and contact.

The relay has a 5kV AC withstand voltage between coil and contact and 1kV AC between adjacent contacts. Despite its 900mW power consumption, it can sustain a 40A continuous power supply without switching.

Available in either a flux-free or plastic-sealed enclosure with a life of 30,000 operations, the flux-free type is recommended for sealed charger units. The plastic-sealed type has a higher resistance to dust and exhaust gas, making it suitable for non-sealed charger units.

Single-port USB hub ICs optimise costs

Single-port USB smart hub ICs from Microchip give automotive manufacturers the ability to provide connectivity while optimising costs.



The USB4912 and USB4712 provide what is required for single-port implementations and can be used to add a single port under the radio, in the centre console or together with wireless charging implementations.

The USB 2.0-compliant devices use the same patented methods as the multi-port family. Now with both single-and multi-port options that share the same software, designers can choose configurations and seamlessly implement their designs. They support smartphones, tablets and other connected devices, without compromising signal integrity.

By using native USB drivers and mechanisms such as the company's role-swapping technologies, multi-host reflector and FlexConnect, the ICs can integrate with infotainment head units, allowing a seamless connection with the smartphone ecosystem of software and applications.

Each device includes an embedded 32bit microcontroller for the implementation of USB IO bridging.

Both devices support USB 2.0 Low Speed, Full Speed and Hi-Speed with a single USB 2.0 Hi-Speed upstream port for host connection.

As a low-power, configurable USB 2.0 hub controller, the USB4912 allows connectivity to be extended to GPIO, I²C, SPI and uart so the hub becomes the centre for system connectivity and control.

They come in 40-pin VQFN packages and have passed AEC-Q100, grade three testing.

GNSS module improves positioning accuracy

A multi-band GNSS module from U-Blox has built-in inertial sensors.

The Zed-F9K module combines signal processing algorithms and correction services to deliver decimetre-level accuracy within seconds, addressing adas and automated driving markets.

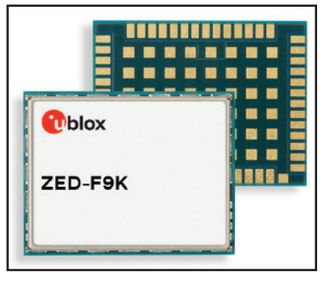
The dead reckoning module builds on the company's F9 technology. Compatibility with modern GNSS correction services improves positioning accuracy by compensating ionospheric and other errors.

The multi-band, multi-constellation RTK (real-time kinematics) receiver module receives GNSS signals from all orbiting GNSS constellations. More visible satellites improve positioning performance in partially obstructed conditions, while increased satellite signal diversity delivers faster convergence times when signals are interrupted.

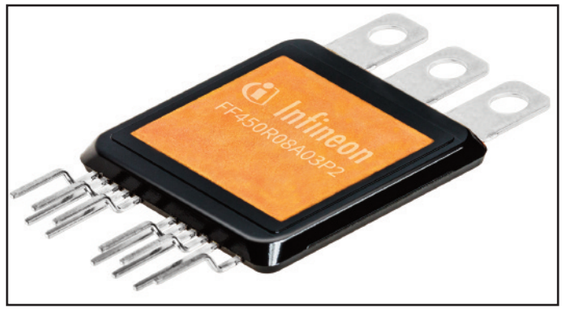
Inertial sensors integrated into the module constantly monitor changes in the moving vehicle's trajectory and continue to deliver lane accurate positioning when satellite signals are partially or completely obstructed as when the vehicle is in parking garages, tunnels, urban canyons or forested areas.

When satellite signals become available again, the module combines inertial sensor data with GNSS signals to deliver fast convergence times and high availability.

The module's accuracy and low latency make it suitable for automotive OEMs and tier-ones developing V2X communications.



Power modules suit EV inverters



Power modules from Infineon are for use in the main inverters of hybrid and electric vehicles. The four HybridPack Drive modules are for inverter performance levels between 100 and 200kW.

Also available is the HybridPack DSC S2 with double sided cooling. This module targets main inverters up to 80kW in hybrid and plug-in hybrid electric vehicles.

All have the same footprint as the FS820R08A6P2x lead device.

At the lower-performance end, the HybridPack Drive Flat (FS660R08A6P2Fx) and Wave (FS770R08A6P2x) are for 100 to 150kW inverters, respectively. Their baseplates, which connect to the cooler of the inverter, have different structures and thus lead to different capabilities of thermal dissipation.

Instead of the established PinFin baseplate, which has the highest cooling performance, the Flat version uses a flat baseplate without any structure at all. This leads to a lower power output at lower cost. The Wave fills the performance gap between the Flat and PinFin with a ribbon bond baseplate structure.

At the upper end, the Drive Performance (FS950R08A6P2B) targets 200kW inverters. It has the same PinFin baseplate as the lead product. However, a dedicated ceramic material used instead of the aluminium oxide improves cooling by more than 20 per cent and thus enables higher current capabilities.

Just like the Flat and Wave versions, the Performance product comes with the EDT2 electric drive train IGBT generation. All derivatives with this chipset have similar electric behaviour.

The fourth device (FS380R12A6T4x) is an alternative version of the Performance module, targeting 150kW inverters. While it includes the same PinFin baseplate and performance ceramic, a different chipset of IGBT4 dies makes it the first derivative with a 1.2kV blocking voltage. This will be necessary in electric vehicles with a battery voltage of more than 700V for fast charging.

For switching frequencies in the range of 8kHz, the IGBT4 is a less expensive alternative to SiC modules.

The company will also equip the DSC module with EDT2 technology. The chipset with a 750V blocking voltage shows benchmark current density and short circuit ruggedness. The DSC S2 uses the double-sided cooling package concept and provides an extended short-term operating capability up to a chip junction temperature of +175˚C.

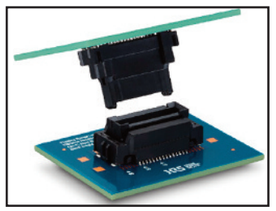
The upgrade and the higher chip temperature lead to a 40 per cent increase in performance from the same footprint compared with the DSC S1. This leads to a high power density, which helps developers meet the space requirements in hybrid and plug-in hybrid vehicles.

Powertrain connector

Hirose Electric has developed a high contact reliability connector with a -40 to +140˚C operating temperature that maintains performance in high vibration environments.

The durable board-to-board FX26 connector suits powertrain connection. It has a 1mm pitch.

While the shift to hybrid cars and full electric vehicles is gaining momentum, the motors and inverters used are subject to problems of heat generation and vibration. In addition, the lifespan of a car, which was said to be ten years and 100,000km, is increasing rapidly, so vehicles need to operate safely for longer. Therefore, automotive connectors must also be tough enough to withstand the high heat and vibration conditions of powertrains for long time spans.



A floating structure solves the problem of contact failure caused by vibration. It has passed vibration conditions for equipment installed in the engine room.

Image signal processor combines algorithms

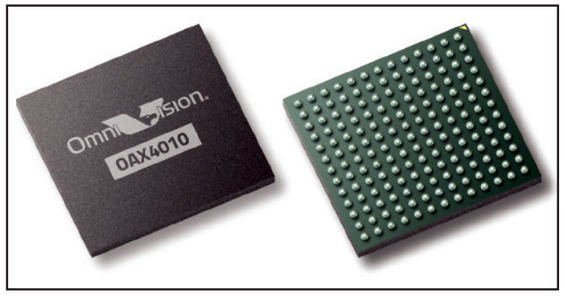
An automotive image signal processor (ISP) from Omnivision uses the HDR and LFM Engine (Hale) combination algorithm.

In tandem with the firm's OX01A10 and OX02A10 LFM image sensors, the OAX4010 enables more intelligent decision-making by providing LFM and HDR simultaneously, while operating over the automotive temperature range.

Additionally, it can process the images from one camera at 60fps or two cameras at 30fps, which halves the number of ISPs required for surround-view system (SVS) cameras.

Previously, designers had to choose between optimising flicker mitigation or dynamic range, especially at temperatures above +80˚C. With this device with its Asil features, designers can provide drivers with additional bright and dark scene details while eliminating LED flicker, thus increasing safety.

It can be used for automotive imaging applications, including rear-view cameras, e-mirrors and SVS. Its ability to provide LFM and HDR at high temperatures is important



because applications such as e-mirrors are often running continuously in extreme temperature conditions.

The device also enables emerging AR camera systems to overlay real-time images on GPS navigation displays, which requires LED traffic signs and signals to be flicker-free.

The ISP is pin-to-pin compatible with the company's previous ISPs. And it lets tier-one suppliers design one camera that can be used in both SVS and e-mirrors.

It is AEC-Q100 grade two certified and meets ASpice CL-2 for automotive applications.

AWGs help with multi-sensor simulations

Four- and eight-channel high-definition arbitrary waveform generators (AWGs) from Teledyne LeCroy complement the company's 12bit oscilloscopes for stimulus-response test applications including multi-sensor simulations in the automotive market.

Users can sync up to four eight-channel AWGs to form an instrument with up to 32 channels.



By virtue of their high-definition 16bit vertical voltage resolution, the T3 AWGs produce waveforms with clean, crisp details.

The AWGs have 16bit of vertical voltage resolution, an output voltage window of up to ±24V, and waveform memory of up to 1GS/channel. With frequency ranges of 250 and 350MHz, they serve as arbitrary function generators, digital pattern generators or AWGs.

They combine high-resolution signal generation with an output voltage range of 12V peak-peak (50Ω output into 50Ω input) that is enhanced by the ability to shift the offset to ±6V.

Additionally, when driving waveforms from a 50Ω output into high impedance, the voltage output window widens to ±24V. This helps generate mosfet gate-drive pulses in automotive and power-semiconductor test applications.

In a stimulus-response test scenario, the AWG applies a stimulus to the DUT's input while the oscilloscope analyses the response at the DUT's output. The AWG delivers a pristine stimulus so that the DUT's response behaviour is unaffected by distortion

The output comprises playback of previously acquired real-world signals from its waveform memory. It emulates problematic or corner-case inputs to the DUT, and emulates expected interference signals to its output to test the DUT's response behaviour.

Three functional modes are available.

Inductor saves space under the bonnet



An automotive grade, low-profile, high-current inductor is available from Vishay Intertechnology in the 6767 case size.

To save space in under-the-bonnet applications, the Dale IHLP-6767GZ-8A combines a continuous operating temperature to +180˚C with a profile of 7mm.

The AEC-Q200 qualified device is for energy storage in DC-DC converters up to 2MHz. It also provides attenuation of noise in high current filtering applications up to the SRF of the inductor.

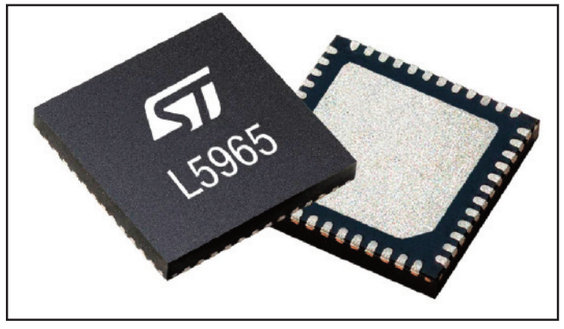
The device is for filtering and DC-DC conversion in engine and transmission control units, diesel injection drivers, and other under-the-bonnet applications, in addition to noise suppression for motors, windshield wipers, power mirrors and seats, HID and LED lighting, and heating and ventilation blowers.

Typical DCR is from 0.89 to 52.7mΩ and inductance from 0.47 to 47.0μH. The device provides rated current to 76.0A and handles high transient current spikes without saturation.

Packaged in a 100% lead (Pb)-free shielded, composite construction that reduces buzz to low levels, the inductor provides resistance to thermal shock, moisture and mechanical shock. It is RoHS-compliant, halogen-free and Vishay Green.

Seven-output PMIC operates direct from battery

A seven-output power-management IC (PMIC) from ST Microelectronics is said to enable more compact and reliable ECUs for automotive-vision systems and other in-vehicle applications, leveraging direct operation from battery voltage with register-programmable output voltages and sequencing and integrated functional-safety mechanisms.



A single L5965 can power an entire camera- or radar-based driver-assistance system including the sensors, memory ICs, processor and Can interface circuitry. One-time programmable cells for setting the output voltages and sequencing give flexibility to configure the PMIC for adas and other in-car applications.

Its ability to operate directly from the vehicle battery allows its use without a pre-regulator. Its register-programmable outputs also eliminate voltage-setting resistors, and the on-chip regulators can be used without external compensation circuitry.

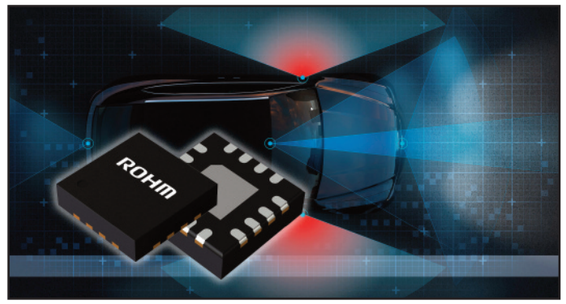
Integrated functional-safety features comply with ISO 26262 and enable systems to fulfil requirements up to Asil D. The mechanisms include a failure status pin, voltage monitors, ground-loss comparators, analogue and digital built-in self test, and temperature monitors.

Samples are available in a 7 by 7mm QFN48 package that requires no heatsink.

• STM has also introduced the A7987 automotive switching regulator, which has a wide input-voltage range that allows use in lorries and buses.

It also has an adjustable output voltage that ensures flexibility and stable performance so that it can power the numerous voltage rails in automotive applications, such as body, infotainment and telematics.

Monitoring IC self-test supports functional safety



A power supply monitoring IC from Rohm has bist (built-in self test) that supports functional safety for automotive power supply systems requiring fail-safe measures such as electric power steering as well as sensors and cameras for autonomous driving and adas.

The BD39040MUF-C is a power monitoring IC that provides monitoring functions for functional safety in the power supply systems of adas sensor modules. In addition to voltage monitoring functions (power good, reset) and a watchdog timer for monitoring the ECU for functional safety, the IC has a self-diagnostic function.

This makes it possible to detect potential failure of the power supply IC itself without affecting existing systems.

These functions are integrated in a 3mm square package. Samples are available now with OEM quantities next month.

For functional safety to clear the highest Asil, it is necessary to detect potential failures of the power supply monitoring function itself. For example, where a failure occurs when a monitoring function (such as overvoltage) cannot detect an abnormality, it becomes a hidden fault that masks the breakdown, creating a dangerous situation.

To overcome this, the self-diagnostic function uses circuit technology that lets it detect potential failures beforehand. Both the reference voltage and oscillator circuits are multiplexed to enable continuous mutual monitoring between systems to improve safety during normal operation.

The device supports functional safety in existing systems without any changes of power supply sequences. Additionally, the watchdog timer for the ECU can be adjusted via external resistance and the monitoring timing arbitrarily set on or off.

Monitoring functions include overvoltage and undervoltage for power supplies, and watchdog timer and reset functions for ECUs. The watchdog timer is a window-type that monitors whether the ECU is stuck in a loop within a programmable timeout period.

Input voltage range is 2.7 to 5.5V. It has a four-channel voltage monitoring function. Monitoring time can be set via external resistor. It is AEC-Q100 grade one qualified.

Editor and Publisher:
Steve Rogerson
editor@vehicle-electronics.biz

Advertising Manager:
Diane Trotman
diane@vehicle-electronics.biz

Web Site Manager:
Martin Wilson
admin@vehicle-electronics.biz

Published by: Vehicle Electronics Magazine,
72 Westwood Road, Nottingham NG2 4FS, UK

Web site: vehicle-electronics.biz
Twitter: @velectronicsmag

© 2019 Vehicle Electronics
ISSN 2055-1177

Vehicle Electronics is available to readers worldwide. It will be published twelve times a year in a digital-only format. The magazine complies with GDPR. All rights reserved. No part of Vehicle Electronics may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying or recording on any information storage system, without the written consent of the publisher. The publisher cannot be held responsible for loss or damage to unsolicited press releases or photographs. Views of contributors and advertisers do not necessarily refelect the policy of Vehicle Electronics or those of the publisher.