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Integrated Connections:

AI at the Edge

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The AI at the Edge Guide

This guide focuses on two of the most demanding sectors in edge AI computing: industrial and transportation. In these highly competitive markets, Avnet and its technology partners provide not only the innovative hardware to handle evolving edge computing needs, but also the product development ecosystem — including design expertise, component selection, supply chain, logistics and more — to keep ahead of the competition. Now more than ever, **edge AI is truly changing the game.**

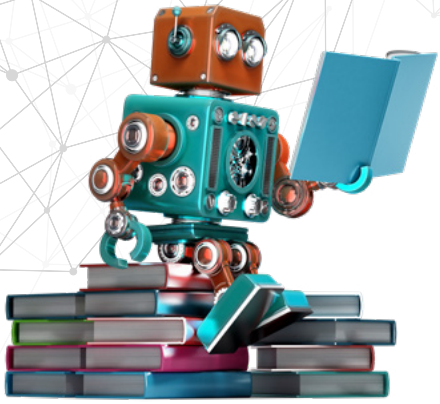
Industrial

Transportation

TABLE OF CONTENTS

For the latest AI at the edge information, visit:
avnet.com/EdgeAI

Industry Overview



ACCELERATE EDGE COMPUTING INNOVATION WITH AVNET SOLUTIONS

Artificial intelligence. Decentralized computing. Machine learning. Connected devices. Autonomous platforms. These advanced technologies are all key components of edge AI computing. Continued advancements in hardware and modules are fueling future possibilities for edge AI. Edge devices and gateway-to-edge devices are now more powerful and enable the secure local collection, storage and real-time analysis of data without waiting for value to be derived from the cloud and then passed back to the device. That's critical in everything from an autonomous driving vehicle that needs to stop on a dime, to a factory floor where an instant of unscheduled machine downtime can mean hours or days of production delay and negatively impact revenue. With Avnet and our technology partners, we can help ensure innovative solutions for edge AI that improve efficiency, safety and are ready for use in the field.

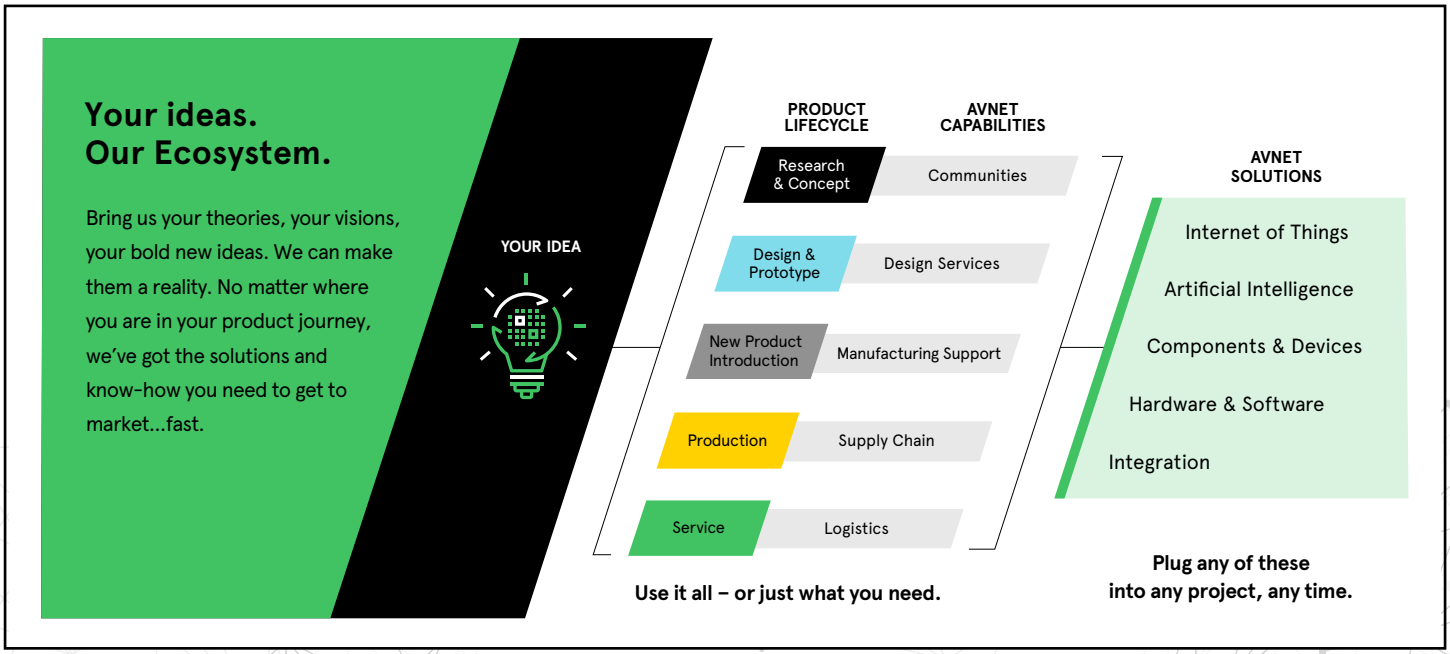
WITH THE EXPONENTIAL GROWTH OF AUTONOMOUS TECHNOLOGY IN TRANSPORTATION AND INDUSTRIAL MARKETS, AND THE RAPID ADOPTION OF SMART DEVICES WORLDWIDE, THE MARKET IS PRIMED FOR CONTINUED INNOVATION AND GROWTH.

As the strong demand for smart and autonomous solutions continues to foster the growth of edge AI technology, it's critical for developers, engineers and innovators to keep pace. With a trusted technology partner like Avnet, you have access to a complete solution, featuring best-in-class suppliers, dedicated internal experts and integration partners all helping accelerate the development and adoption of game-changing edge AI solutions.

Avnet's Global Ecosystem

Avnet's end-to-end global ecosystem supports a wide range of edge AI applications

Avnet's end-to-end global ecosystem supports all facets of next-generation technology in the edge AI market, including product development, design expertise, component selection, supply chain, logistics and more. Avnet is unique in the market, with a dedicated team of highly skilled professionals and premier technology partners. That means our solutions team can lend support as you design complete proof-of-concept solutions, helping to speed your time to market and value. Once you are ready for production, we have the supply chain experts on staff who can augment your expertise with additional support around testing or regulatory concerns as well. With Avnet, you have unmatched support at every stage and facet of the product cycle.



For information visit:
avnet.com/EdgeAI

INDUSTRIAL

AI AT THE EDGE TRANSFORMS INDUSTRIAL DEPLOYMENTS

Revolutionize the factory floor with insight, speed and security

Edge computing is ideal for increasing the level of automation in today's factories. For manufacturing companies that have already installed sensors, actuators and other low-level devices in their existing industrial automation systems, upgrading and retrofitting IoT-enabled devices is an easy step — one that can gather up to 1.44 billion data points ripe for actionable insights to improve efficiency and effectiveness across every touch-point of Industry 4.0.

The advanced capabilities of AI at the edge have also been shown to increase quality, improve worker safety and greatly reduce resource expenditures.

Avnet and its technology partners provide innovative hardware to help accelerate the deployment of AI at the edge solutions. Discover how leading suppliers are offering the cutting-edge technology to make it happen.

TRANSPORTATION

AI AT THE EDGE DRIVES TRANSPORTATION

Instant decision-making means improved safety and efficiency

From personal automobiles to large commercial fleets, transportation is poised to undergo significant technological advances thanks to the benefits of edge computing.

The autonomous vehicle market alone is projected to reach nearly $600 billion by 2026. But while self-driving cars might be seen as the primary focus, artificial AI at the edge will transform autonomous trucks, drones, military vehicles, heavy construction and mining machinery, farm equipment, delivery services, municipal vehicles, ships and aircraft. All of these transportation solutions benefit from the security and real-time decision-making of localized data analysis that can mean the difference between proper functioning and major disruption for companies and consumers alike.

Featured Suppliers

CLICK ON ANY SUPPLIER LOGO THROUGHOUT THIS GUIDE TO VISIT THEIR PAGE.

Intel is a world leader in computing innovation. The company designs and builds the essential technologies that serve as the foundation for the world's computing devices. As a leader in corporate responsibility and sustainability, Intel also manufactures the world's first commercially available "conflict-free" microprocessors.

Molex makes a connected world possible by enabling technology that transforms the future and improves lives. By continually adapting to help customers advance designs in the areas of greatest impact, we join those who share our mission to create breakthroughs that propel the world forward. With a presence in more than 40 countries, Molex offers a full range of connectivity solutions for markets that include data communications, medical, industrial, automotive and consumer electronics.

NXP Semiconductors enables secure connections and infrastructure for a smarter world, advancing solutions that make lives easier, better and safer. As the world leader in secure connectivity solutions for embedded applications, NXP is driving innovation in the secure connected vehicle, end-to-end security & privacy and smart connected solutions markets.

ST is a global semiconductor leader delivering intelligent and energy-efficient products and solutions that power the electronics at the heart of everyday life. ST's products are found everywhere today, and together with their customers, they are enabling smarter driving and smarter factories, cities and homes, along with the next generation of mobile and Internet of Things devices.

Their portfolio includes analog, discrete, digital logic, memory, ARM based microcontrollers, power management ICs and MEMS sensors.

Xilinx develops highly flexible and adaptive processing platforms that enable rapid innovation across a variety of technologies—from the endpoint to the edge to the cloud. Xilinx is the inventor of the FPGA, hardware programmable SoCs and the ACAP, designed to deliver the most dynamic processor technology in the industry and enable the adaptable, intelligent and connected world of the future.

Infineon designs, develops, manufactures and markets a broad range of semiconductors and system solutions. The focus of its activities is on automotive electronics, industrial electronics, RF applications, mobile devices and hardware-based security. Infineon's components play an essential role wherever electric energy is generated, transmitted and used efficiently. Furthermore, they safeguard data communication, improve safety on roads and reduce automotive emissions.

Microchip Technology Inc. is a leading semiconductor supplier of smart, connected and secure embedded control solutions. Its easy-to-use development tools and comprehensive product portfolio enable customers to create optimal designs that reduce risk while lowering total system cost and time to market. The company's solutions serve more than 125,000 customers across the industrial, automotive, consumer, aerospace and defense, communications and computing markets.

Nexperia is a leader in high-volume production of essential semiconductors, components that go in every electronic design in the world. Originally part of Philips and recently NXP, this new company was formed in February 2017. The company's extensive portfolio includes diodes, bipolar transistors, ESD protection devices, MOSFETs, GaN FETs and analog & logic ICs that meet stringent automotive standards. Nexperia annually ships more than 90B products that are recognized as benchmarks in size, power and performance efficiency.

ON Semiconductor is a preferred supplier of high performance silicon solutions to customers in the computing, communications, consumer, automotive, medical, industrial, and military/aerospace markets. The company's broad portfolio includes power management, image sensor solutions, signal, logic, discrete, and custom devices.

As innovators in embedded design, Renesas Electronics provides solutions to enable billions of connected and intelligent devices that enhance the way people work and live safely and securely. Renesas delivers a broad range of leading-edge semiconductor technologies and is now a worldwide leader in microcontrollers, microprocessors, sensors, analog and power ICs and SoCs.

Programmable Logic

Programmable logic components are used to build reconfigurable digital circuits, shortening development cycles for manufacturers, and helping them get their product to market faster. Two major types are Complex Programmable Logic Devices (CPLD) and Field-Programmable Gate Arrays (FPGA). Applications for programmable logic are varied but are featured in industrial, automotive, high-reliability, radar, sonar and communication applications.

XILINX

SPARTAN-7 FPGA SP701 EVALUATION KIT

The SP701 Evaluation Kit, equipped with the best-in-class performance-per-watt Spartan®-7 FPGA, is built for designs requiring sensor fusion such as industrial networking, embedded vision, and automotive applications. The SP701 features high I/O availability and I/O expansion capability via Pmods and FMCs. The included XC7S100 FPGA is the highest density device of the Spartan-7 family. With 102K logic cells and 400 I/O pins, the XC7S100 pairs expandable connectivity with high processing capability, all in a form factor ideal for edge applications.

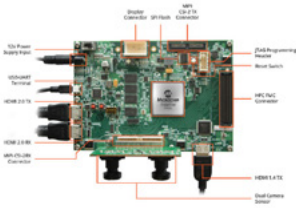
MICROCHIP

SMARTFUSION2

SmartFusion2 SoC FPGAs Offer More Resources in Low-Density Devices with the Lowest Power, Proven Security, and Exceptional Reliability. SmartFusion2 SoC FPGAs offer 5K–150K LEs with a 166 MHz ARM Cortex-M3 processor, including ETM and instruction cache with on-chip eSRAM and eNVM, and a complete microcontroller subsystem with extensive peripherals, including CAN, TSE, and USB. These devices are also ideal for general purpose functions such as Gigabit Ethernet or dual PCI Express control planes, bridging functions, input/output (I/O) expansion and conversion, video/image processing, system management, and secure connectivity.

The Hello FPGA Kit, based on the SmartFusion®2 FPGA with its Arm® Cortex®-M3 processor with embedded Flash to enable you to kickstart your FPGA journey. The kit simplifies FPGA evaluation, allowing you to experience the benefits of employing an FPGA in your design and accelerate prototype development.

SMART EMBEDDED VISION (SEV) KIT



Our new PolarFire FPGA Video and Imaging Kit offers high-performance evaluation of 4K image processing and rendering using dual camera sensors as well as numerous display interfaces. Now featuring the PolarFire MPF300T production device, the kit is purpose-built for effortless prototyping of popular imaging and video protocols including MIPI CSI-2 TX, MIPI CSI-2 RX, HDMI 1.4 TX, HDMI2.0, DSI, and HD/3G SDI. The kit is part of our broader Smart Embedded Vision solutions for implementing systems that rely on visual data to make decisions across a broad spectrum of applications like drones, machine vision, thermal imaging, gaming, video surveillance, robotics, Advanced Driver Assistance Systems (ADAS), machine learning and Human-Machine Interfaces (HMIs).

MACHINE LEARNING USING MICROCHIP'S POLARFIRE FPGA'S

Microchip's programmable hardware enables a power efficient imaging and video solution platform for embedded and edge computing applications. The techniques include quantization of the CNN (Convolutional Neural Networks) at 8-bit integer precision, neural network optimization based on the underlying FPGA architecture and the INT8 dot product mode of the Math block to efficiently deploy Microchip FPGAs for machine learning inference.

Programmable Logic

VECTORBLOX

Machine Learning involves two stages - Training and Inference. An AI/ML model needs to be trained with use cases where large datasets are involved. More data means more accuracy. Training is power and compute intensive that can be done in workstations with GPUs or through servers for high work loads.

Inference involves running the pre-trained AI/ML model on sensor inputs (video, image, audio, any sensor data) at the edge to "infer" or evaluate. Inference on the edge enables determinism and reduces latency from input to "inference." Edge devices need to be secure and reliable, deployed in the open, and inaccessible to tamper.

HELLO FPGA

The Hello FPGA kit is a low cost, compact-sized, entry-level platform targeted towards end-users with low to medium FPGA knowledge. The kit supports powerful demos in Image Processing, Signal Processing, Artificial Intelligence, and can measure the live FPGA core power consumption while running designs. The kit also allows users to freeze the design while maintaining the i/o state for low power applications, using Flash Freeze mode. The kit features Arduino & Mikrobus connectors for flexibility when it comes to prototyping, and expansion kits, allowing for easy adoption in future projects.

Security IC

Security ICs, computers on a chip or microprocessors, provide hardware-based crypto-accelerators and secure key storage, plus some anti-tampering and side channel attack protections to make it easy to embed trust in any system.

OPTIGA™ TPM

The Infineon OPTIGA™ TPM is a full featured security chip supporting all the necessary use cases for an Edge Gateway application. The TPM is compatible with many embedded application processors and operating systems. Infineon OPTIGA™ TPMs have been certified to Common Criteria Evaluation Assurance Level 4+ and FIP 140-2.

Embedded boards

Embedded boards are boards with processors, multiple integrated circuits, interfaces and other essential components assembled on them to serve a dedicated function. Embedded boards are composed of multiple technologies, including processors, core logic, networking, connectivity and multimedia components to provide functionality and performance for embedded system design applications. Systems in the electronic industry include processing, software, storage and external interface components. In a system all of these sub-components would work together to form one central processing system. Applications include Super Computing, Transport, Automotive, Industrial, Military and Audio/Video applications.

XILINX

MICROZED SOM I-GRADE

MicroZed is a low-cost SOM that is based on the Xilinx Zynq-7000 SoC, available in commercial and industrial-grade options. The Zynq-7000 SoC features a dual-core Arm Cortex-A9 processing system tightly coupled with programmable logic in a single device for performance-per-watt optimization in applications such as machine vision and motion control. In addition to the Zynq-7000 SoC, the module contains the common functions and interfaces required to support the core of most SoC designs, including memory, configuration, Ethernet, USB, and clocks. On the bottom side of the module, MicroZed contains two 100-pin I/O headers that provide connection to two I/O banks on the programmable logic (PL) side of the Zynq-7000 SoC device. When plugged onto a user designed baseboard or carrier card, these 100-pin connectors provide connectivity between the Zynq-7000 SoC PL I/Os and the user circuits on the carrier card. MicroZed also includes on-board power regulation that supports 5 V input with an option to support 12 V input.

ULTRA96-V2 INDUSTRIAL GRADE

The Ultra96-V2 is an Arm-based, Xilinx Zynq UltraScale+ MPSoC development board based on the Linaro 96Boards Consumer Edition (CE) specification. Available in both commercial and industrial grade options, the Ultra96-V2 is a perfect entry-level board for prototyping and developing edge compute applications.

ULTRAZED-EV SOM

UltraZed-EV SOM is a high performance, full-featured, System-On-Module (SOM) based on the Xilinx Zynq UltraScale+ MPSoC EV family of devices that have an integrated H.264 / H.265 video codec unit is capable of simultaneous encode and decode up to 4Kx2K (60fps). Designed in a small form factor, the UltraZed-EV SOM on-board dual system memory, high-speed transceivers, Ethernet, USB, and configuration memory provides an ideal platform for embedded video processing systems. The UltraZed-EV provides easy access to 152 user I/O pins, 26 PS MIO pins, 4 highspeed PS GTR transceivers along with 4 GTR reference clock inputs, and 16 PL high-speed GTH transceivers along with 8 GTH reference clock inputs through three I/O connectors on the backside of the module. These connectors provide USB 2.0, USB 3.0, PCIe Gen2, DisplayPort, SATA 3.0, FMC-HPC and more!

Accelerator Cards

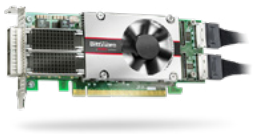
Accelerator cards are a special type of expansion cards designed specifically for the purpose of accelerating various workloads. Generally, those cards are plugged via a PCIe slot and are seen as standard PCIe devices by the host processor.

BittWare
a molex company

BITTWARE XUP-VV8 CARD

BittWare provides enterprise-class compute, network, storage and sensor processing accelerator products featuring FPGA technology. The XUP-VV8 is a PCIe accelerator card featuring the Xilinx Virtex UltraScale+ VU9P or VU13P FPGA. The card supports up to 8x 100GbE or 32x 10/25 GbE through four QSFP-DD cages. The XUP-VV8 includes OCuLink expansion ports and up to 512 GBytes DDR4. Customers can also choose the ultra-low latency VU9P SCD 4821 and QDR-II+ memory.

BITTWARE 250-SOC CARD



BittWare has a 30-year track record of successfully designing and deploying advanced FPGA accelerator products. Ideal for acceleration applications requiring a low-profile PCIe card, the 250-SoC features a Xilinx Zynq UltraScale+ MPSoC. The card has OCuLink expansion for NVMe storage acceleration, PCIe, OpenCAPI or other uses. There is 4GB DDR4 for the FPGA fabric of the MPSoC and 4GB for the on-chip ARM processors.

Processors

Processors are the logic circuitry that responds to and processes the basic instructions that drive logical commands normally controlled and programmed by software. Processor components span computers, application-specific integrated circuits, digital signal and image processing, as well as video and data processing.

intel

INTEL ATOM® PROCESSOR E3900 SERIES

The Intel Atom® processor E3900 series achieves new levels of CPU performance, fast graphics and media processing, imaging processing, and security. From manufacturing machines that can see, to intelligent video systems that can analyze data, these processors enable amazing new possibilities. These are now available with a dual- or quad-core processor running at up to 2.5 GHz and memory speeds up to LPDDR4 2400. All of this performance resides in a compact flip chip ball grid array (FCBGA) utilizing 14nm silicon technology, making it an excellent fit for a wide range of IoT applications when space and power are at a premium.

INTEL ATOM® C3000 PROCESSOR

The Intel Atom® C3000 processor delivers new options for cost and infrastructure optimization, by bringing the efficient performance and intelligence of Intel Atom® processor into a dense, lower-power system-on-a-chip (SoC), designed specifically for network and edge solutions. The Intel Atom® C3000 processor is Intel's third generation system-on-a-chip based CPU manufactured on Intel's optimized 14nm process technology. It can be deployed for a variety of light scale-out workloads that require very low power, high density, and high I/O integration including network routers, switches, storage, security appliances, dynamic web serving, and more.

INTEL® XEON® D-2100 PROCESSOR

The Intel® Xeon® Scalable processor delivers the ultimate performance to support the largest variety of high-demand applications and services, from the data center core to the edge. As the needs of the edge become more complex and varied, some services and applications will require a different balance of performance, power consumption, and size. The Intel® Xeon® D-2100 processor brings the advanced intelligence of the Intel® Xeon® Scalable processor architecture into an optimized, dense, lower-power system-on-a-chip (SoC) form factor for environments constrained by space and power. Along all points, from the data center core, to the edge, to the endpoint device, Intel offers a portfolio of products with advanced data center intelligence to build and accelerate data-driven services and solutions.

MCU-BASED SOLUTION FOR FACE RECOGNITION – SLN-VIZN-IOT

NXP's MCU-based machine vision solution leverages the i.MX RT106F crossover MCU enabling developers to quickly and easily add face recognition capabilities to their products. This ultra-small form-factor, production ready hardware design comes with fully integrated software running on FreeRTOS, for quick out-of-the-box implementation. This turnkey solution minimizes time to market, risk, and development effort, enabling OEMs to easily add machine vision to their smart home and smart appliance products without the need for an expensive Linux-based MPU implementation, and without Wi-Fi and cloud connectivity, addressing the privacy concerns of many consumers.

- Facial Recognition Solution SLN-VIZN-IOT
- Silicon MIMXRT106FDVL6A

MCU-BASED SOLUTION FOR ALEXA VOICE SERVICE – SLN-ALEXA-IOT

The i.MX 8M family combines high-performance computing with industry-leading audio, voice and video capabilities. Devices in this family enable up to 4K High Definition (HD) video streaming, 1080p video encode and decode, professional audio quality, speech recognition, AI, machine vision, machine learning and edge computing.

The i.MX 8M family provides scalability and maximizes design and software reuse across multiple applications. All i.MX 8M processors are qualified to robust industrial standards, to operate 24×7 in harsh environments such as the factory floor, outdoor installation in unconditioned cabinets and tight enclosures without any air flow.

- Alexa Voice Solution SLN-ALEXA IOT
- Silicon MIMXRT106ADVL6A

MCU-BASED SOLUTION FOR LOCAL VOICE CONTROL – SLN-LOCAL-IOT

NXP's MCU-based solution for local voice control leverages the i.MX RT106L crossover MCU, enabling developers to quickly and easily add local voice commands to their products. This ultra-small form-factor, production ready hardware design comes with fully integrated software running on FreeRTOS, for quick out-of-the-box evaluation and proof of concept development. After using the included example wake word and command sets for audio players, smart home, washing machine and generic commands, developers can then engage NXP to create custom models for their own application specific command sets and wake word. This turnkey solution minimizes time to market, risk, and development effort enabling OEMs to easily add voice to their smart home and smart appliance products without the need for Wi-Fi and cloud connectivity, addressing the privacy concerns of many consumers.

- Local Voice Solution SLN-LOCAL-IOT
- Silicon MIMXRT106LDVL6A

I.MX 8M APPLICATIONS PROCESSOR FAMILY

The i.MX 8M family combines high-performance computing with industry-leading audio, voice and video capabilities. Devices in this family enable up to 4K High Definition (HD) video streaming, 1080p video encode and decode, professional audio quality, speech recognition, AI, machine vision, machine learning and edge computing.

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FRWY-LS1046A-TP EDGE COMPUTING PLATFORM WITH CORAL INTELLIGENCE

The Freeway LS1046A (FRWY-LS1046A) family is a set of high-performance, low-cost edge computing platforms, based on the QorIQ LS1046A quad-core 64-bit processor, capable of more than 45,000 CoreMark performance. The FRWY-LS1046A platform supports onboard DDR4 memory, multiple Gigabit Ethernet, USB3.0 and M2_Type_E interfaces over PCIe Gen3 for Wi-Fi. The new FRWY-LS1046A-TP variant has AI/ML acceleration courtesy of an included Coral TPU module and supports up to 3 additional TPU modules. It is ideal for use in a wide range of high compute AI/ML applications.

The FRWY-LS1046A family is supported in NXP's eIQ[1] machine learning software development environment, which provides a shell script to install machine learning applications targeted at NXP QorIQ Layerscape processors. The NXP eIQ software is concerned only with neural networks inference and standard machine-learning algorithms; leaving neural network training to other specialized software tools and dedicated hardware. The NXP eIQ is continuously expanding to include data-acquisition and curation tools and model conversion for a wide range of NN frameworks and inference engines, such as TensorFlow, TensorFlow Lite, Arm® NN, and Arm Compute Library.

I.MX 8QUADMAX APPLICATIONS PROCESSORS

The i.MX 8 applications processor family is built with a high-level integration to support graphics, video, image processing, audio, and voice functions, and is ideal for safety-certifiable and efficient performance requirements. Build multiple platforms with multiple operating systems on a single i.MX 8 applications processor. The i.MX 8 full-chip hardware-based virtualization, system MMU, resource partitioning and split GPU and display architecture enable faster time-to-market and lower cost than simple hypervisor techniques alone.

- Development board MCIMX8QM-CPU
- Base board MCIMX8-8X-BB
- MIPI-CSI Camera Module MINISASTOCSI
- OLED Display MX8-DSI-OLED1
- 4 Camera Board with miniSAS connector for MIPI camera MX8XMIPI4CAM2

i.MX 8X APPLICATIONS PROCESSORS

Built with a high-level of integration, the i.MX 8X family supports graphics, video, image processing, audio, and voice functions. This is the ideal processor family for safety-certifiable and efficient performance requirements.

Extending the scalable range of the i.MX 8 series, the i.MX 8X family is comprised of common subsystems and architecture from the higher-end i.MX 8 family, establishing an unmatched range of cost-performance scaling with pin-compatible options and the highest level of software reuse. Built with high-level integration to support graphics, video, image processing, audio, and voice functions, the i.MX 8X processor family is ideal for safety-certifiable and efficient performance requirements. Example applications include industrial automation & control, HMI, robotics, building control, automotive cluster, display audio, infotainment, and telematics applications.

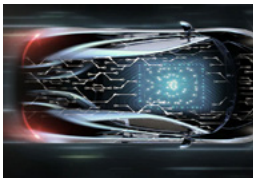
- Development board MCIMX8QXP-CPU
- Base board MCIMX8-8X-BB
- MIPI-CSI Camera Module MINISASTOCSI
- OLED Display MX8-DSI-OLED1
- 4 Camera Board with miniSAS connector for MIPI camera MX8XMIPI4CAM2

S32V234 VISION PROCESSOR - AUTOMOTIVE GRADE

Targeted for ASIL B/C ADAS applications, the high-performance S32V234 automotive processor supports secure, computation-intensive vision and sensor fusion applications.

The integrated automotive-grade hardware accelerators in the NXP S32V2 are ideal for computer vision processing because they can reduce CPU usage and save computing resources which are critical for applications such as driver monitoring systems. NXP aims at helping automotive engineers develop their applications swiftly by offering a cost-competitive evaluation board and development platform (SBC-S32V234) that can be coupled with NXP software development kits and NXP design studios that are specifically tailored for the S32V processor.

EIQ AUTO TOOLKIT - DEEP LEARNING ENABLEMENT - AUTOMOTIVE GRADE



The NXP eIQ™ Auto deep learning (DL) toolkit enables developers to introduce DL algorithms into their applications and to continue satisfying automotive standards. The eIQ Auto software and accompanying tools within the toolkit help developers move quickly and easily from a development environment to full implementation of AI applications in automotive-grade embedded processors.

Target applications:

- Front camera advanced driver assistance systems (ADAS), including applications such as pedestrian detection, object detection, lane departure warning, smart head beam control and traffic sign recognition
- Surround view applications where the image data can be received in encoded form (MJPEG or H.264) via Ethernet or in raw formats via the MIPI-CSI2 or VIU interfaces
- Smart rearview camera applications
- Sensor fusion computing in communication with a radar MCU

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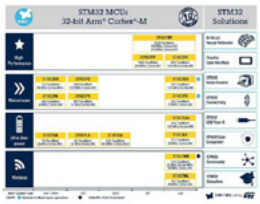


STM32 PORTFOLIO

STM32 Solutions for Artificial Neural Networks based on the STM32 Arm® Cortex® M4/M33/M7 based microcontrollers and STM32 Arm® Cortex®-A7® microprocessor series. The STM32 family is designed to offer new degrees of freedom to MCU users. It offers products combining very high performance, real-time capabilities, digital signal processing, low-power / low-voltage operation, and connectivity, while maintaining full integration and ease of development. The unparalleled range of STM32 microcontrollers with over 1500 different part numbers, comes with a vast choice of tools and software to support project development, making this family of products ideal for both small projects and end-to-end platforms. The ST32Cube.AI configuration and code generation tool makes it possible to run AI on the STM32 family.

STM32CUBE.AI

The STM32Cube. AI is an extension pack of the widely used STM32CubeMX configuration and code generation tool enabling AI on STM32 Arm® Cortex®-M-based microcontrollers. Artificial Neural Network mapping is made simple with the STM32Cube.AI: It is interoperable with popular deep learning training tools, compatible with many IDEs and compilers, sensor and RTOS agnostic and allows multiple Artificial Neural Networks to be run on a single STM32 MCU. ST makes it easy for designers to quickly prototype their innovative application thanks to integrated software packages - Function Packs. These packs are end-to-end examples embedding a combination of low-level drivers, middleware libraries and sample applications assembled into a single software package. Developers can easily start from these examples.

XILINX

ZYNQ ULTRASCALE+ RFSOC ZCU111 EVALUATION KIT

Zynq® UltraScale+™ RFSoC ZCU111 evaluation kit enables designers to jumpstart RF-Class analog designs for wireless, cable access, early-warning(EW)/radar, and other high-performance RF applications. This kit features a Zynq UltraScale+ RFSoC supporting 8 12-bit 4.096GSPS ADCs, 8 14-bit 6.554GSPS DACs, and 8 soft-decision forward error correction (SD-FECs). Complete with Arm® Cortex®-A53 and Arm Cortex-R5 subsystems, UltraScale+ programmable logic, and the highest signal processing bandwidth in a Zynq UltraScale+ device, this kit provides a rapid, comprehensive RF Analog-to-Digital signal chain prototyping platform.

ZYNQ ULTRASCALE+ MPSOC ZCU102 EVALUATION KIT

The ZCU102 Evaluation Kit enables designers to jumpstart designs for Automotive, Industrial, Video and Communications applications. This kit features a Zynq UltraScale+ MPSoC device with a quad-core ARM Cortex-A53, dual-core Cortex-R5 real-time processors, and a Mali-400 MP2 graphics processing unit based on Xilinx's 16nm FinFET+ programmable logic fabric. The ZCU102 supports all major peripherals and interfaces enabling development for a wide range of applications.

MICROZED SOM I-GRADE

MicroZed is a low-cost SOM that is based on the Xilinx Zynq-7000 SoC, available in commercial and industrial-grade options. The Zynq-7000 SoC features a dual-core Arm Cortex-A9 processing system tightly coupled with programmable logic in a single device for performance-per-watt optimization in applications such as machine vision and motion control. In addition to the Zynq-7000 SoC, the module contains the common functions and interfaces required to support the core of most SoC designs, including memory, configuration, Ethernet, USB, and clocks. On the bottom side of the module, MicroZed contains two 100-pin I/O headers that provide connection to two I/O banks on the programmable logic (PL) side of the Zynq-7000 SoC device. When plugged onto a user designed baseboard or carrier card, these 100-pin connectors provide connectivity between the Zynq-7000 SoC PL I/Os and the user circuits on the carrier card. MicroZed also includes on-board power regulation that supports 5 V input with an option to support 12 V input.

XILINX

ULTRA96-V2 I-GRADE

The Ultra96-V2 is an Arm-based, Xilinx Zynq UltraScale+ MPSoC development board based on the Linaro 96Boards Consumer Edition (CE) specification. Available in both commercial and industrial grade options, the Ultra96-V2 is a perfect entry-level board for prototyping and developing edge compute applications.

ULTRAZED-EV SOM

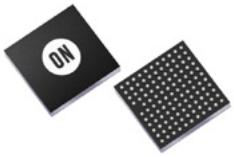
UltraZed-EV SOM is a high performance, full-featured, System-On-Module (SOM) based on the Xilinx Zynq UltraScale+ MPSoC EV family of devices that have an integrated H.264 / H.265 video codec unit is capable of simultaneous encode and decode up to 4Kx2K (60fps). Designed in a small form factor, the UltraZed-EV SOM on-board dual system memory, high-speed transceivers, Ethernet, USB, and configuration memory provides an ideal platform for embedded video processing systems. The UltraZed-EV provides easy access to 152 user I/O pins, 26 PS MIO pins, 4 highspeed PS GTR transceivers along with 4 GTR reference clock inputs, and 16 PL high-speed GTH transceivers along with 8 GTH reference clock inputs through three I/O connectors on the backside of the module. These connectors provide USB 2.0, USB 3.0, PCIe Gen2, DisplayPort, SATA 3.0, FMC-HPC and more!

Infineon

AURIX™ – TC3XX ARTIFICIAL INTELLIGENCE MICROCONTROLLERS

AURIX™ performance enables optimization of AI algorithms, to face the challenge posed with the growing amount of data vs. communication and processing technology. High safety level (ASIL-D support) AURIX™ microcontrollers with AI on the edge results in very high system reliability, enables data analytics and delivers true low-latency processing power.

ON Semiconductor



LC823455 LOW POWER & HIGH RESOLUTION AUDIO PROCESSING SOC

LC823455 is an audio processing System-on-Chip (SoC) for recording and playback with High-Resolution 32-bit & 192 kHz audio processing capability. It provides required key functions for Portable Sound Solutions which are; Dual CPU configuration, DSP providing intensive processing capability, 4316 KB of internal SRAM that supports the implementation of large-scale programs for WLAN applications, and multiple interfaces to extensively increase its connectivity. It features a broad range of functions including SBC/AAC codec and Active Noise Canceller applicable for wearable audio applications.

RENESAS

RX65N

RX65N 32-bit MCU family are ideal for IoT edge devices development.
RX65N and RX651 32-bit MCUs are optimized for IoT devices with enhanced security, connectivity, and HMI.
Connect to Amazon Web Services (AWS) cloud easily with the RX65N Cloud Kit.

Processors

RENESAS

RX66T

RX66T 32-bit MCU failure detection e-AI solution for motor-equipped appliances.
RX66T MCUs are optimized for Motor Control in Industrial, Home Appliance, and Robotics devices. Extra processing capacity allows developers to add programs utilizing embedded AI (e-AI) for motor fault detection or predictive failure diagnostics requires endpoint MCUs to be securely updated with learning results generated in the cloud. Also includes built-in Trusted Secure IP (TSIP) provides secure firmware updates and encrypted communication.

RZ/A2M

High-speed embedded AI-based image processors with DRP technology.
Designed for e-AI based imaging in smart appliances, networked cameras, service robots, scanner products, and industrial machinery requiring high-speed image processing.

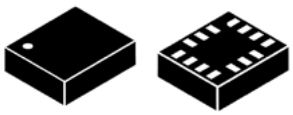
Sensors

Sensors and transducers are products designed to detect the state of the world that enables electronic systems to sample their surroundings in order for control systems to act upon them. Examples include temperature, pressure, light levels, sound, moisture, gas presence, proximity, field strength, vibration and movement.

life.augmented

SENSORS FOR MACHINE LEARNING

Machine Learning is an application of Artificial Intelligence (AI) through which a machine can learn, by itself or in a supervised way, without explicit programming. It provides a system the ability to automatically learn and improve from experience without compromising the accuracy of the data collected. The Machine Learning processing capability allows moving some algorithms from the host processor to the IMU. The IMU would therefore only consume less than one hundredth of the MCU power used for the same typical tasks. The MLC is designed to run in a highly power-efficient manner and provides accurate results in the shortest possible time. A meta-classifier is also available to further enhance data accuracy in specific cases.



INEMO® 6-AXIS INERTIAL MODULES

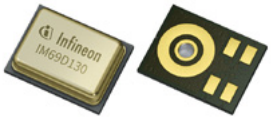
The LSM6DSOX is a system-in-package featuring a 3D digital accelerometer and a 3D digital gyroscope boosting performance at 0.55 mA in high-performance mode while tracking complex movements using the Machine Learning Core and enabling always-on low-power features for an optimal motion experience for the consumer.

The ISM330DHCX is a system-in-package featuring a high-performance 3D digital accelerometer and 3D digital gyroscope tailored for Industry 4.0 applications with its 10-Year product longevity assurance, extended temperature range from -40C to 105C and embedded temperature compensation for superior stability.

life.augmented

SENSORTILE WIRELESS INDUSTRIAL NODE (STWIN)

The STWIN SensorTile wireless industrial node (STEVAL-STWINKT1) is a development kit and reference design that simplifies prototyping and testing of advanced industrial IoT applications such as condition monitoring and predictive maintenance.



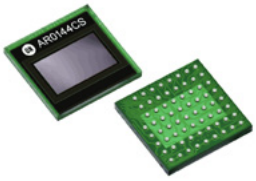
MEMS MICROPHONE

IM69D130 is a high performance digital MEMS microphone making use of Infineon's Dual Backplate MEMS technology to deliver 105dB dynamic range and high output linearity up to 130dBSPL. The application benefits are crystal clear audio signals, extended pick-up distance and sensitivity to both soft and loud signals - from whispered speech to rock concerts.

PRESSURE SENSOR

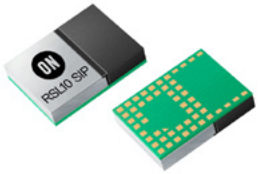
The barometric pressure sensor DPS310 offers excellent pressure noise performance and high stability with temperature.

ON Semiconductor



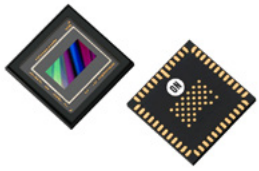
IMAGING SOLUTIONS FOR BUILDING ACCESS

Imaging technology is used across numerous access control and security applications including smart video doorbells and locks. To prevent security threats, 3D technology is now being used to enhance the application's facial recognition.



LOW POWER IOT: (RSL10, ARX3A0, AXM0F243)

ON Semiconductor RSL10 Ultra-Low Power BLE5 Radio and ARX3A0 Ultra Low Power CMOS Image Sensor combine to enable Low Power Image Sensing IoT Applications. The ARX3A0 is designed to be ultra-miniature (1/10th-inch optical format) and ultra-low-power image sensor, bringing new options to IoT devices, drones, and robotics. The product has an innovative super low power mode which draws only 3.2 mW while active and can detect motion or changes in lighting conditions and wake the rest of the system up. With its high frame rate of 360 frames per second (fps), the ARX3A0 can behave like a global shutter sensor in many circumstances, while still having all the benefits of power, size and performance of a 2.2 µm rolling shutter pixel. The AXM0F243 is a System on Chip (Soc) for true single chip wireless applications. The SoC contains the field proven narrow-band AX5043 RF transceiver core and a high performance ARM® Cortex®-M0+ microcontroller (MCU) core.



IMAGING SOLUTIONS FOR MACHINE VISION

As the needs of industrial imaging applications such as machine vision inspection and industrial automation continue to advance, the design and performance of the image sensors targeting this growing market must continue to evolve. ON Semiconductor's XGS CMOS image sensors provide end users with access to the performance and imaging capabilities they need for these applications, while camera manufacturers have the flexibility they require to develop next-generation camera designs for their customers both today and in the future.

Sensors

ON Semiconductor

IMAGING SOLUTIONS FOR ADAS

Today's modern vehicles are equipped with computational, sensing, and actuating capabilities that enable the design of systems that can autonomously control vehicle motion in order to assist the driver. These automated vehicles have the capabilities to actively assist the driver in the operation of the vehicle and prevention of accidents.

RENESAS

WIRELESS SENSOR HUB

Wireless flow rate, humidity, and temp sensing eval kit. Communicates humidity, temperature, and flow sensor measurement data to the kit's 6LoWPAN-WiFi hub. The SDAWIR03 hub functions as a WiFi hub, allowing a linked device to display and graph the measured data in real time.

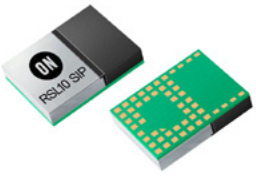
Wireless and RF

Radio Frequency (RF) and Microwave communication is the ability to communicate over Standard Radio or Micro Frequency waves. This allows communication of data over relatively large distances without the need for computing or communication devices to be physically connected together via a cable. Sometimes known as wireless communication, the main applications are Industrial, Automotive, Consumer, Communication, IoT and Military.

Infineon

24GHZ RADAR

Infineon's range of radar offerings provide unique benefits not possible with traditional motion sensing technology. Whether you require increased range coverage for outdoor lighting or a small form factor solution to enable soft landing in your multicopter, our radar provides you with the ability to make your motion sensing applications perform in a way previously not possible.



LOW POWER IOT

ON Semiconductor RSL10 Ultra-Low Power BLE5 Radio and ARX3A0 Ultra Low Power CMOS Image Sensor combine to enable Low Power Image Sensing IoT Applications.

Antennas

Antennas are used to convert electric energy into radio waves, which enables communication/ instruction between two points. Standard products include Yagi antennas, Patch antennas, Helical antennas and Whip antennas.

molex

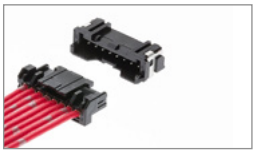
3-IN-1 EXTERNAL ANTENNAS

Cabled External Antennas offer best-in-class RF performance in ruggedized thermoplastic enclosures that are resistant to moisture, extreme thermal conditions, shock and vibration for convenient mounting in a range of locations.

Interconnect

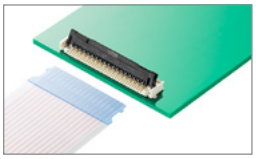
Devices are used to create a physical interface and electrical circuit in a multitude of applications ranging from cable, audio and video, fiber optics, interface, to jumpers and shunts. Thousands of configurations of connectors are manufactured and are characterized by pinout, method of connection, materials, size, contact resistance, insulation, mechanical durability, ingress protection, lifetime and ease of use.

molex



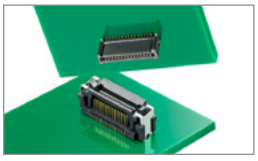
MICRO-LOCK PLUS 2.00MM CONNECTOR SYSTEM

Ideal for compact applications, the Micro-Lock Plus 2.00mm pitch Wire-to-Board Connector System provides electrical and mechanical reliability in a high-temperature design that meets industry requirements. Engineers no longer have to choose between compactness and retention security.



FFC/FPC EASY-ON CONNECTORS – FD19 FRONT FLIP

Versatile dual-contact FD19 Series FFC/FPC Connectors meet temperature requirements up to 125°C and come in a wide range of circuit sizes for maximum design flexibility across multiple markets and applications.



FLOATING BOARD-TO-BOARD SLIMSTACK FSB5 CONNECTOR

SlimStack Board-to-Board Connectors, 0.40mm Pitch Floating, FSB5 Series feature a large floating range for space-saving and design flexibility, making them ideal for a wide range of applications in the automotive, industrial and consumer industries.

MICRO-LOCK PLUS 1.25MM WIRE-TO-BOARD SYSTEM

The Micro-Lock Plus 1.25mm pitch Wire-to-Board Connector System is one of the smallest 1.25mm pitch connectors currently on the market with a positive lock. It provides electrical and mechanical reliability in a high-temperature design that meets industry requirements.

PICO-CLASP WIRE-TO-BOARD SYSTEM

Molex's core 1.00mm-pitch, wire-to-board Pico-Clasp Connectors offer a versatile system that offers a variety plating and design options, ideal for nearly all applications.

Discretes

A discrete is a semiconductor device that has at least one active component other than an integrated circuit. The term is used to distinguish the component from integrated circuits and hybrid circuits which are built from several circuit elements in one package. It typically refers to semiconductor devices.

nexperia

LFPAK P-CHANNEL MOSFET

In virtually every application, getting the right balance of power density and RDS(on) in the right footprint is becoming increasingly critical. Nexperia offers a broad portfolio of N- and P-channel power MOSFETs, ranging from 12 V to 100 V, in space-saving and efficient package options including our proven copper-clip LFPAK technology. And as a long-term supplier to the automotive industry, you can be assured we maintain the highest quality and reliability standards.

DFN0606 MOSFET

Ultra-small footprint, increased power efficiency, 0.35 mm pitch. Nexperia's smallest MOSFET package DFN0606 provides the most minute DFN solution in today's commonly used pitch size of 0.35 mm. An ideal replacement solution where space is paramount, this ultra-small package offers significant space efficiency whilst providing minimal efforts on assembly adjustment. The ideal MOSFET of choice for wearable applications such as mobile and portable products, enhanced by Nexperia's in-house production capacity for high-volume production.

TRENCH SCHOTTKYS IN CFP PACKAGES

Ideal for automotive, industrial, and computing applications, the Schottky rectifier portfolio in CFP meets the challenging demands of efficient and space-saving designs. Clip-bonded FlatPower (CFP) packages with high power capabilities offer a true alternative to SMA, with better thermal performance.

TREOS HIGH-SPEED ESD PROTECTION

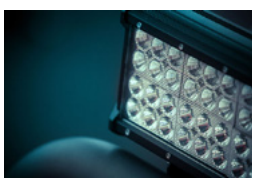
Uncompromising ESD protection for sensitive high-speed interfaces, Nexperia invented TrEOS to offer a combination of low capacitance, low clamping voltage and high ESD robustness, effectively safeguarding systems with 10Gbps+ data lines. Our TrEOS portfolio is comprised of extremely high surge robustness and extremely low peak voltage devices. TrEOS solutions are available in single- and multi-line packages.

ZENER DIODES IN LEADED AND LEADLESS PACKAGES

You can use our Zener diodes as voltage regulator diodes in most of your electronic applications. Our broad AEC-Q101 portfolio includes both Japanese and European selection groups in a wide variety of voltage,package and configuration options. In fact our comprehensive selection (± 1500 product types) gives you the option of customized designs in small scale, high density circuit designs.

LFPAK33 TRENCH 9 AUTOMOTIVE

The LFPAK33 is the ultimate in automotive MOSFET performance within a compact power footprint. Bringing Nexperia's robust and reliable copper clip technology to the Power33 (3.3 mm x 3.3 mm) footprint. It is an extension of the LFPAK family into smaller power systems. The LFPAK33 uses advanced copper clip technology and its portfolio can address a wide range of automotive applications. The LFPAK33 supports easy optical inspection and enhanced board level reliability and is compatible with alternative packages in the power33 footprint.



SMALL SIGNAL LOW RDSON AUTOMOTIVE

Nexperia's automotive, small signal MOSFETs with low RDS(ON) of 15 mΩ minimum to 6 A maximum drain current are available with +175°C TJ maximum, and they fully comply with the automotive AEC-Q101 standard. A few of the many suitable applications include body control units such as window lifts and seat controls, entertainment systems such as car radios and navigation, and safety and control systems such as air bags.

Logic and timing

Logic devices and timing components include a wide variety of components dedicated to discrete fixed-functions. These products include legacy logic gate devices, application-specific digital processing chipsets, and dedicated components for clock generation and precision timing applications. All applications require some sort of timing and logic within their sub design.

nexperia

MICROPAK AUTOMOTIVE Q100

As the leader in Mini Logic for Automotive, Nexperia is addressing space constraints in automotive applications with innovative MicroPak solutions that exceed AEC-Q100 requirements. The Q100 portfolio now includes more than 20 Automotive-qualified functions in XSON leadless extremely-thin small-outline packages. Single-gate and dual-gate functions in LVC (1.65 V to 5.5 V), AUP (0.8 V to 3.6 V) and AVC (1.2 V to 3.6 V) technologies are now available in Automotive-ready XSON6 and XSON8 packages. Functions include buffers/inverters, gates, translators, Schmitt-triggers, transceivers and more.

Power Management

Power management is used to manage and control the power to multiple devices within a design. In today's green environment processing, interface and other solutions are designed with onboard power saving features that need controlling, such as standby, shut down, and different power input sources for core and peripheral power. Power management is used typically in all applications, but low power applications such as hand held devices, Industrial, Communication, and IoT all use power management and control devices.

nexperia

LED DRIVER

Comprising a resistor-equipped PNP transistor with two diodes on one chip, our LED drivers come in small SOT23 and SOT457 plastic packages. High current accuracy and stabilized output currents of 10 – 50 mA. These space saving solutions are ideal for constant current source and automotive applications.

RENESAS

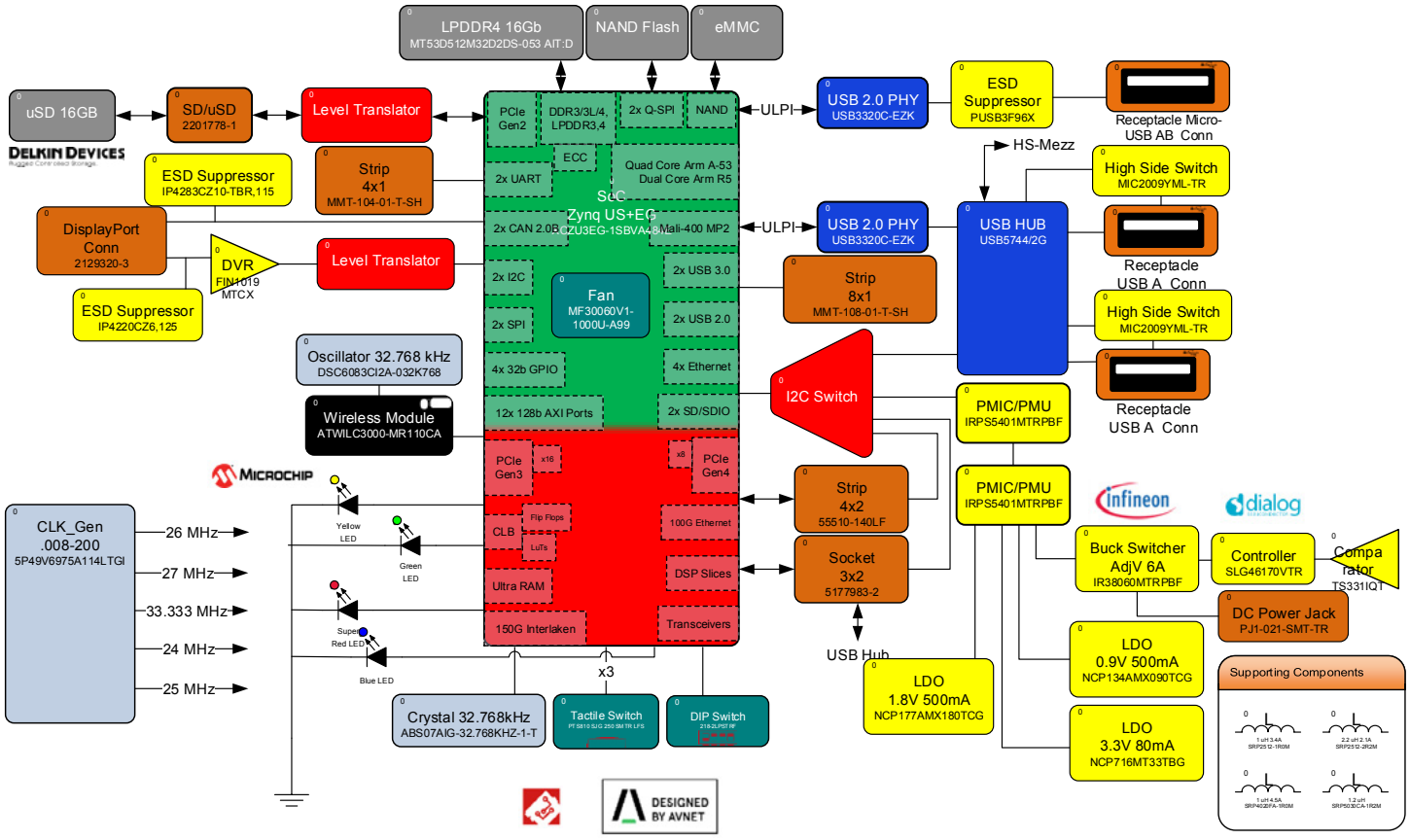
IOT POWER SOLUTIONS

The ISL912x family of small, ultra-low IQ and low-power switching regulators are compact high efficiency, low-power Buck and Buck-Boost regulators designed for IoT, battery-operated applications.

Block Diagram

AVNET ULTRA96 V2

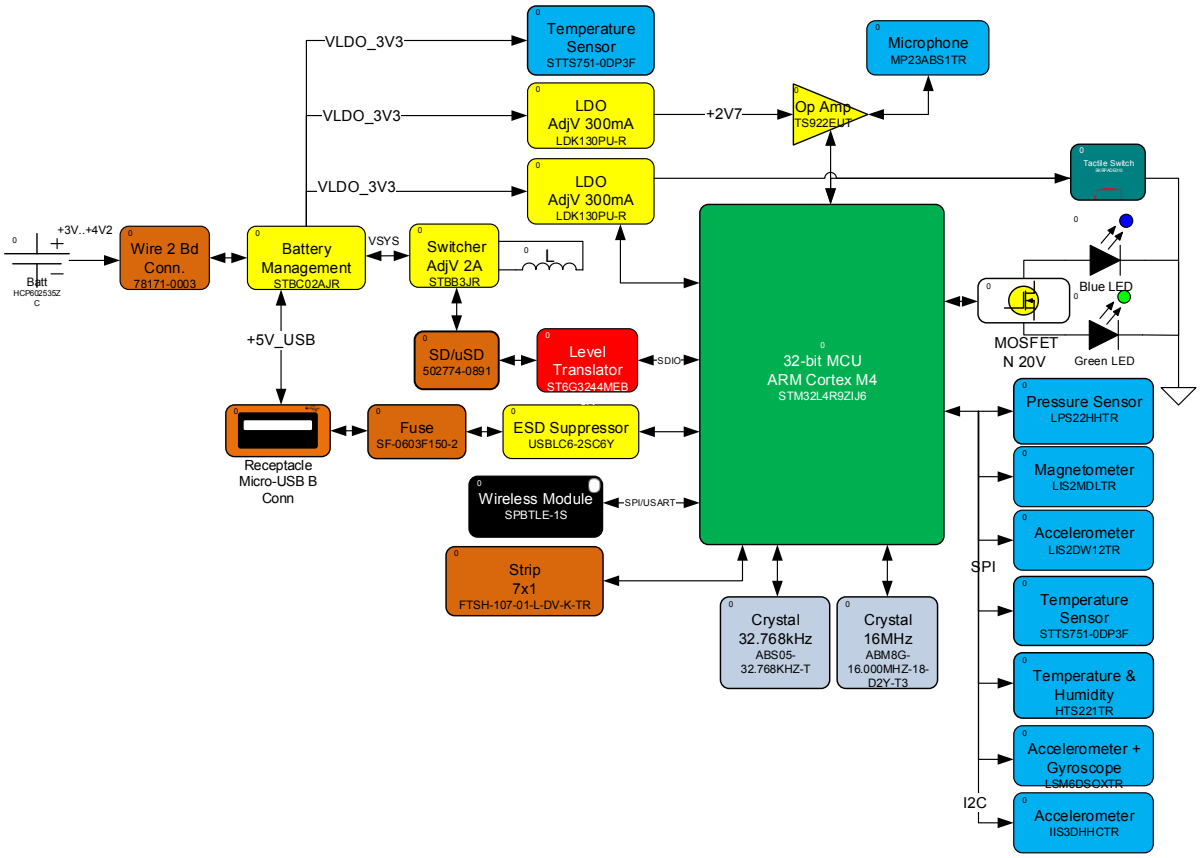
Avnet Single board computer built with a powerful Xilinx Zynq UltraScale+ MPSoC with Wireless Capabilities (Microchip) targeting applications as Artificial Intelligence, Machine Learning, Embedded Computing.



Block Diagram

STMICROELECTRONICS SENSORTILE BOX

Inertial module with Machine Learning Capabilities, with STM32 Cube. AI software can be programmed to process and analyze new data using trained Neural Networks. Also with "Microsoft IoT Services ready" to make available on a web dashboard the result of the embedded processing.

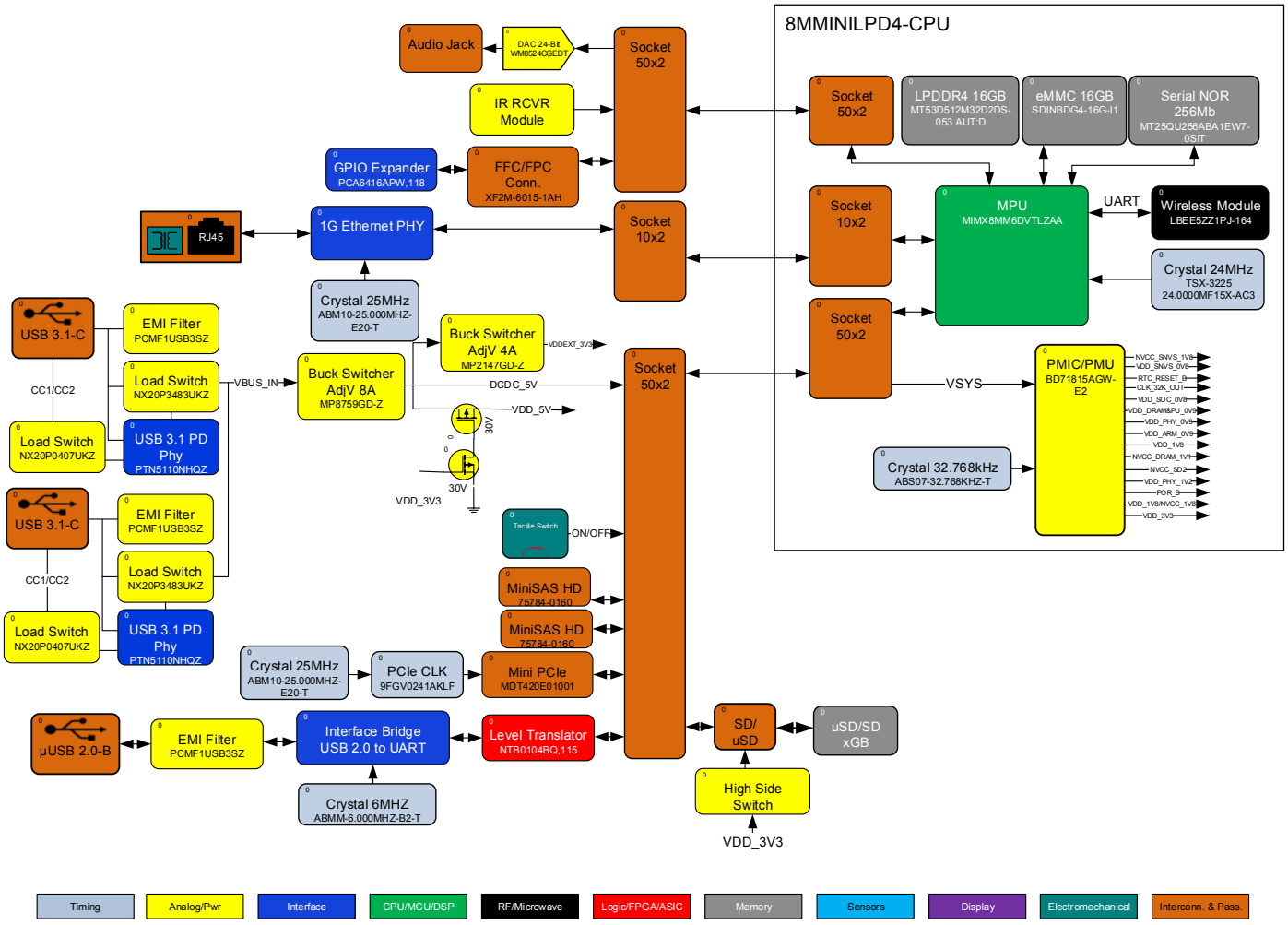


Timing | Analog/Pwr | Interface | CPU/MCU/DSP | RF/Microwave | Logic/FPGA/ASIC | Memory | Sensors | Display | Electromechanical | Interconn. & Pass.

Block Diagram

NXP I.MX 8M MINI EVK

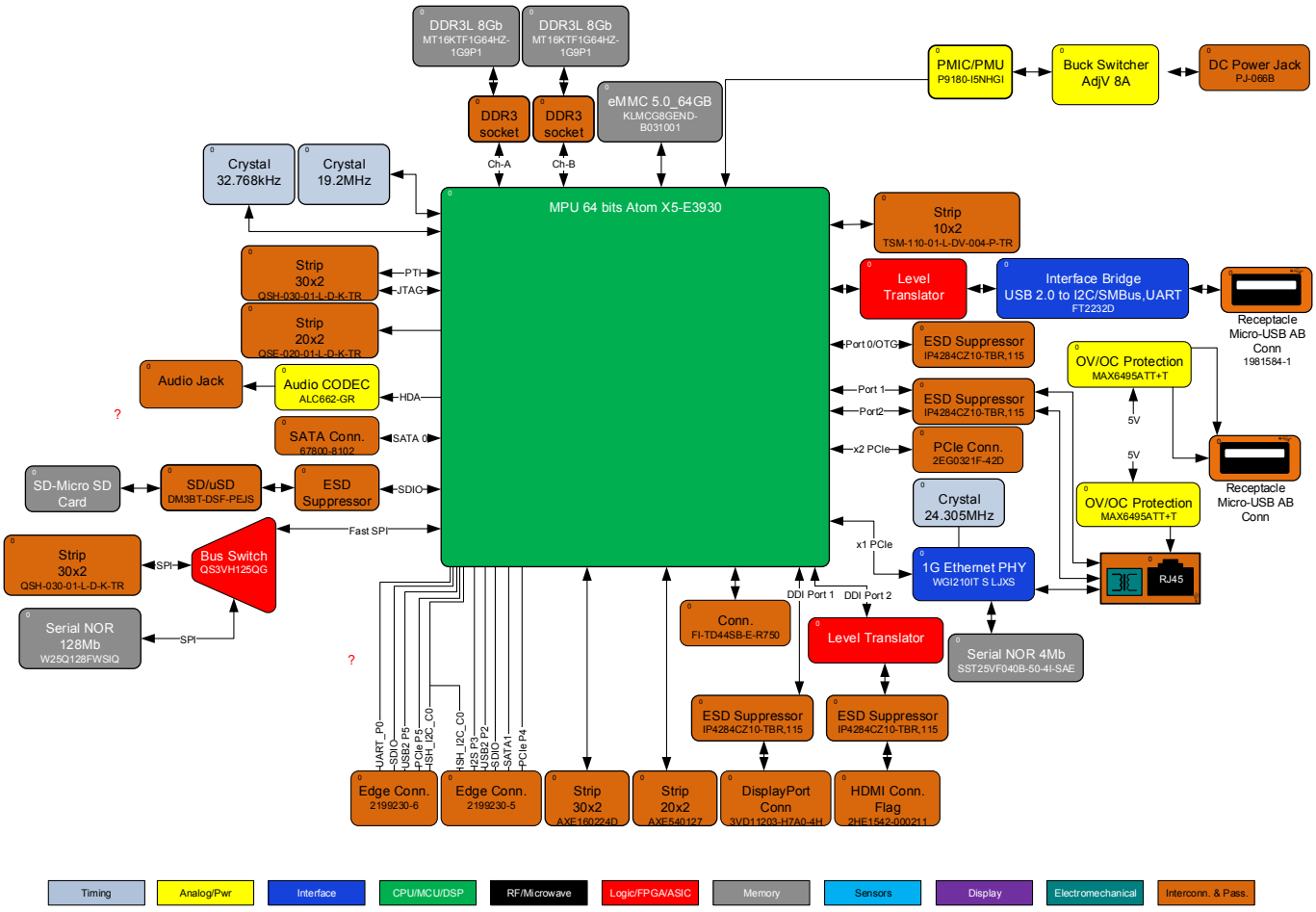
Evaluation Kit based on i.MX 8M Processor with Wi-Fi and Bluetooth connectivity targeting applications of IoT, Home Appliances System Control, Anesthesia Unit Motor.



Block Diagram

INTEL ATOM PROCESSOR E3900 SERIES PLATFORM

Formerly Apollo Lake, empowers real-time computing in digital surveillance, new in-vehicle experiences, advancements in industrial and office automation, new solutions for retail and medical, and more.

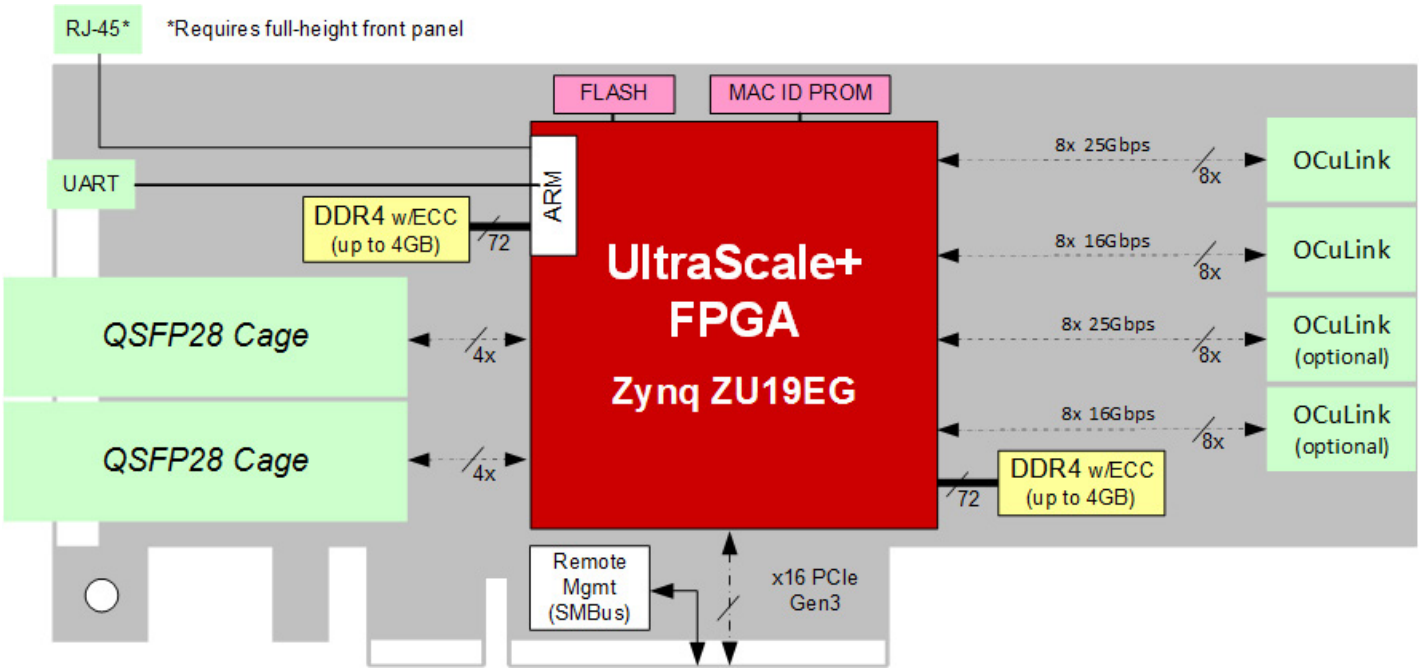


Block Diagram

BittWare a molex company

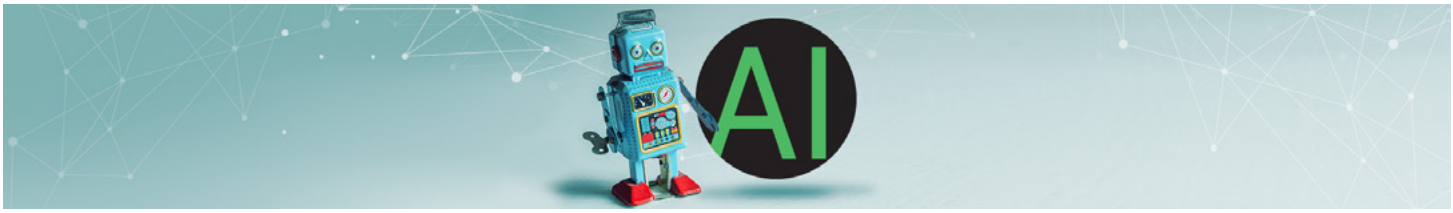
BITTWARE 250-SOC FPGA CARD

The 250-SoC features a Xilinx Zynq UltraScale+ MPSoC device that coordinates data transfer between two 100GbE network ports, on-board DDR4 memory and a PCIe Gen 3 host interface.



Americas linecard for AI at the Edge

AVNET
Reach Further™



Avnet and its technology partners are delivering next-generation edge AI technology for developing dynamic solutions that move, store and analyze data faster. Edge AI is having a massive impact on businesses by increasing productivity, improving decision-making quality and enhancing security — all in real time.

The Avnet product development ecosystem can help successfully bring edge AI innovation to life in the competitive spheres of industrial and transportation development through leading-edge hardware, software and design expertise. Visit www.avnet.com/EdgeAI to learn more.

ACCELERATOR CARDS
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Broadcom
Intel
Molex
Xilinx

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Abracon
Advantech
Anaren
AVX
CEL
Digi International
Eaton
Infineon Technologies
Laird Connectivity
Microchip
MikroElektronika
Molex
Multi-Tech Systems
Murata Electronics
NIC Components
Omron
Pulse Electronics
Radial
Taiyo Yuden
Taoglas
TDK
TE Connectivity
Texas Instruments
Vishay
Weidmuller
Winstron NeWeb (WNC)

DISCRETES (MOSFETS, IGBTS, DIODES)
Ampleon
AVX
Bourns
Central Semi
Diodes, Inc.
Infineon Technologies
Keysight Technologies
Microchip
Micross Semiconductor
Nexperia
NXP Semiconductors
ON Semiconductor
Panasonic
Power Integrations
Renesas
ROHM Semiconductor
Semtech
STMicroelectronics
Taiwan Semiconductor
Texas Instruments
Toshiba TAEC
Vishay
WeEn Semiconductor

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DFI-ITOX
Digi International
Emulex
Eurotech
Future Designs, Inc.
Gateworks
Gigabyte
HP, Inc.
IBASE
IEI Technology
Intel
Jetway
Kontron
Logic PD
Microchip
MikroElektronika
MiTAC
MSC Technologies
MSI
NEXCOM
Onyx Healthcare
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Portwell
RadiSys
Sapphire Technology
SECO
Supermicro
TechNexion
Tyan
VIA
Wandboard
Xi3
Xilinx

INTERCONNECT
3M Interconnect Solutions
Aero-Electronic Connector
Alps Electric
Amphenol
AVX/ELCO
Bel
Conesys
Cvilux
Eaton
Foxconn Interconnect Technology
Glenair
Greenconn
ITT Interconnect Solutions
Kyocera
Lantronix
Molex
Murata Electronics
ODU
Panduit
Radiall
Samtec
TE Connectivity
Vishay
Weidmuller

LOGIC
Ablic
Diodes Inc.
IDT
Infineon Technologies
Maxim Integrated
Microchip
Nexperia
NXP Semiconductors
ON Semiconductor
Pericom Semiconductor
Renesas
ROHM Semiconductor
STMicroelectronics
Texas Instruments
Toshiba TAEC

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Broadcom
CEL
Cirrus Logic
CTS
Delta
Dialog Semiconductor
Diodes, Inc.
Elmos
Endicott Research
HALO Electronics
Infineon Technologies
ISSI
Laird
Lantronix
Marvell
Maxim Integrated
Mean Well
Microchip
Micross Components
MPS
Murata Power Solutions
Nexperia
NXP Semiconductors
ON Semiconductor
Panasonic
Power Integrations
Renesas
ROHM Semiconductor
Schneider Electric
Semtech
Sensitron Semiconductor
Silergy

STMicroelectronics
Taiwan Semiconductor
Texas Instruments
Toshiba
Tripp Lite
Vishay

PROCESSING
AMD
Broadcom
Dialog Semiconductor
Digi International
e2v
Infineon Technologies
Intel
Marvell
Maxim Integrated
Microchip
NXP Semiconductors
ON Semiconductor
Renesas
Rochester
ROHM Semiconductor
STMicroelectronics
Texas Instruments
Toshiba TAEC
VIA
Xilinx

PROGRAMMABLE LOGIC
Dialog
Microchip
Xilinx

SECURITY IC
Infineon Technologies
Microchip
NXP
Maxim Integrated
STMicroelectronics
Texas Instruments

SENSORS
3M
Ablic
Abracon
Alps Alpine
Amphenol
Ampleon
AVX
BEL
Bourns
Broadcom
C&K
CTS
Crossmatch
Diodes, Inc.
Elmos
Everlight
Grayhill
Infineon Technologies
ISSI
Laird Connectivity
Lite-On Optoelectronics
Maxim Integrated
Microchip
MikroElektronika
Molex
MPS
Murata Electronics
Nexperia
NIC Components
Nidec Copal Electronics
NXP Semiconductors
OMRON Electronics
ON Semiconductor
OSRAM Opto Semiconductor
Panasonic
Panduit
PUI Audio
Renesas
ROHM Semiconductor
Safran Colibrys
Silergy
Sharp
STMicroelectronics
TDK (EPCOS)
TDK InvenSense
TE Connectivity
Texas Instruments
Toshiba TAEC
Vishay

RF & WIRELESS
3M Interconnect Solutions
Amphenol
Ampleon
Anaren
AVX/ELCO
Broadcom
CEL
Cinch Connectivity Solutions
CTS
Dialog Semiconductor
Digi International
Infineon Technologies
Inventek Systems
ITT Interconnect Solutions
Keysight Technologies
Laird Connectivity
Lantronix
Maxim Integrated
Microchip
MMB Networks
Murata Electronics
NIC Components
Nordic
NXP Semiconductors
ON Semiconductor
Panasonic
Pulse
Qualcomm-RF360
Quectel
Radiall
Renesas
Samtec
Sequans
STMicroelectronics
TAIYO YUDEN
Taoglas
TD Next
TDK (EPCOS)
Texas Instruments
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- Testing services
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- Bill of materials (BOM) analysis
- Inventory optimization services
- Green initiative programs

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