

Building blocks: Enhance IoT products with the RSL10 SiP multisensor platform

AVNET[®] SILICA

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The IoT market's exponential growth owes much to connected devices using Bluetooth technology to capture big data. An estimated 20 billion Bluetooth devices shipped to a broad range of global markets in the last five years. A few market highlights from Statista:

\$15 trillion

Total estimated global IoT spending in the six-year period between 2019 and 2025

152,200

Number of IoT devices by 2025 that will be connected to the internet each minute

\$4–11 trillion

Potential economic value of IoT solutions by 2025

83%

Organizations that have adopted IoT technology have realized efficiency gains

WHY IS IT CALLED "BLUETOOTH?"

The Bluetooth protocol is named after the 10th-century Danish King Harald Blatand (English: Bluetooth) whose teeth were discolored from his love of blueberries.



King Bluetooth is best known for uniting warring Danish factions into a single kingdom – much like Bluetooth unites devices from different manufacturers to work together.

IIOT TECHNOLOGY THAT SENSES ACTION AND INTERCONNECTION

The ways in which IIoT devices realize perception, interconnection and action are continuously expanding. The development speed of sensing technology is accelerated by the business opportunities brought by new and exciting applications. For example, ON Semiconductor has an extensive sensor product portfolio that enables big data capture from a wide range of applications in diverse environments.

IIoT does not conform to the traditional concepts of technology use. It is increasingly data-centric, which brings new challenges for developers. Big data is generated by sensors, which is often transmitted to the cloud for advanced and long-term processing. The IIoTConnect[®] Platform from Avnet includes design consultation services that are central for developing specific and challenging smart applications.



TAKE YOUR PRODUCT TO THE NEXT LEVEL WITH THE RSL10 SENSOR DEVELOPMENT KIT FROM ON SEMICONDUCTOR

The practical applications of Bluetooth technology are limitless, but not all development platforms can match the capabilities of the RSL10. The RSL10 Sensor Development Kit is the ideal toolset for developing the next generation of Bluetooth applications.

RSL10 PLATFORM BENEFITS THAT ACCELERATE INNOVATION:

Ultra-low power: the industry's lowest-power-consumption Bluetooth sensor

Miniaturization: compact device footprint made possible by ON Semiconductor's advanced 3D packaging technologies and manufacturing facilities

Analog front end/DSP: advanced low-noise sensor interfacing and actuation, signal conversion and processing

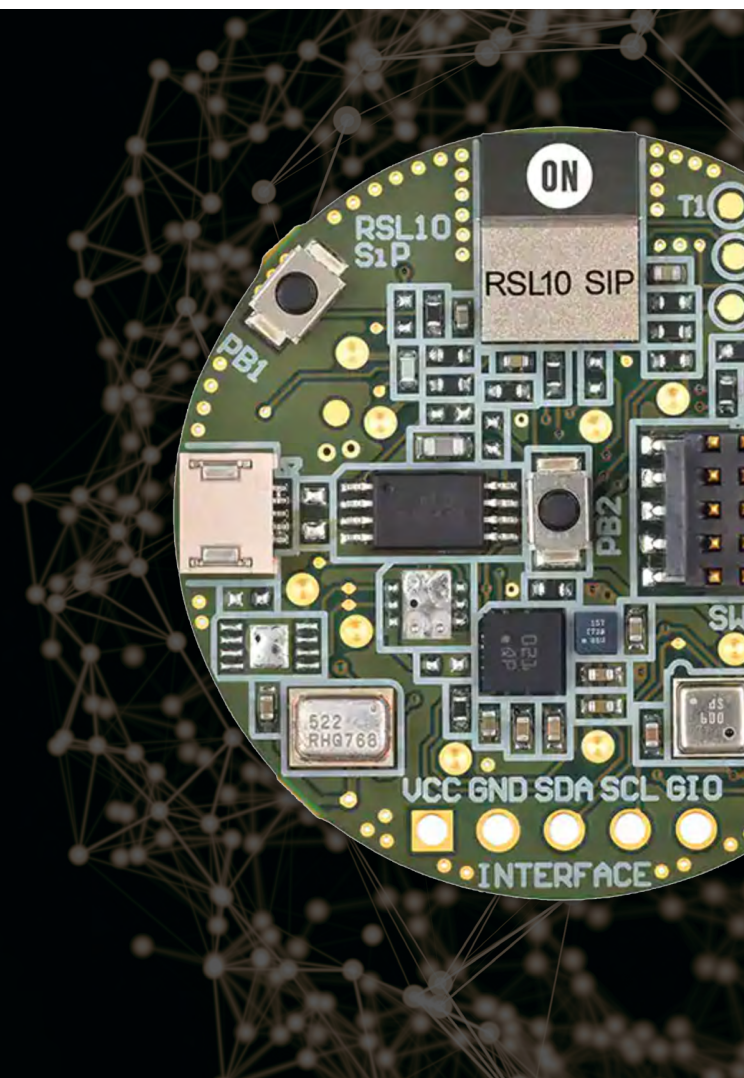
Software tools: a comprehensive library of development software tools that enable rapid application development

Firmware update over the air (FOTA)

GROUNDBREAKING FEATURES CAN HELP DRIVE YOUR IOT DEVELOPMENT

Take your product to the next level with the key features of the RSL10 Bluetooth Development Kit.

- **RSL10 Bluetooth SiP** is the lowest-power Bluetooth sensor available with industry-leading battery life and energy harvesting capability.
- **BME680 integrated environmental sensor** offers 4-in-1 measurement of gas, humidity, pressure and temperature.
- **BMM150 digital geomagnetic sensor** is ideal for augmented reality and location-based services.
- **Integrated ambient light sensor** provides response data similar to that of the human eye.
- **Integrated DSP hardware** is used in signal processing and preventative maintenance applications.
- **Low-power smart hub** for motion sensing and data processing includes a three-axis accelerometer, a three-axis gyroscope and a programmable microcontroller.
- **Additional features include** a programmable RGB LED, three programmable push-buttons, an ultra-low-noise digital microphone, 64kb of EEPROM memory and optional energy harvesting capabilities.



LIBRARY OF SOFTWARE DEVELOPMENT TOOLS SPEEDS TIME TO VALUE

While the RSL10 has the advanced hardware capabilities to meet the needs of cutting-edge connected applications, the kit also comes with a comprehensive selection of software development tools.

The RSL10 Sensor Development Kit, coupled with Avnet's IoTConnect® Platform, powered by Microsoft Azure, speeds time to value by enabling rapid development of ultra-low-power Bluetooth low energy (BLE) applications connected to the cloud.

Key library features include:

- Eclipse-based ON Semiconductor IDE plus support for Keil and IAR
- Complete BLE protocol stack
- Secure firmware over the air (FOTA) with Android and iOS app
- Wizard-based configuration of main firmware functions

SMART DEVICES + SMART POWER CONSUMPTION = LOWER COST OF OWNERSHIP

The majority of IoT smart sensors are battery-powered, which adds to the total cost of ownership on top of the purchase price and installation costs. Whenever the battery needs to be replaced, the owner or operator will have to pay for the cost of on-site inspections.

Although the replacement battery can usually be arranged during the maintenance period, battery failure will inevitably occur during the periods between regular on-site inspections. The environmental costs of manufacturing and replacing billions of batteries are also quite staggering, so the demand for ultra-low-power solutions is flourishing.

With the low power consumption of the revolutionary RSL10 Bluetooth 5/Bluetooth low energy system-on-a-chip (SoC) and system-in-package (SiP) technologies by ON Semiconductor, new efficiencies can be recognized through the reduction of power cell replacement.

RSL10 is not only the Bluetooth solution with the lowest power consumption in the industry – it's also the SoC with the highest EEMBC ULPMark evaluation. RSL10 combines low power consumption and high efficiency, allowing manufacturers to gain a competitive advantage when developing ultra-low power or even battery-free designs to achieve Bluetooth data transmission.

ENERGY HARVESTING IN IOT SENSORS BROADENS THEIR POTENTIAL USES

In the past, it was quite difficult to achieve meaningful communication with collected energy. After continuous technological innovation, developers can now use a complete wireless sensor reference design, which can operate entirely on the collected energy.

The same method can also be applied to the design of other smart sensors, which use energy collected from solar energy actions or temperature differences. This is achieved due to the very low power requirements of the latest devices, allowing smart sensors with long battery life or even battery-free applications to be used everywhere in IoT.



FIVE WAYS ADVERTIZING TECHNOLOGY IS ADVANCING INDUSTRIAL IOT AND INDUSTRY 4.0

The RSL10 Bluetooth Development Kit and sensors are well suited for artificial intelligence, edge computing and smart industrial applications. Advertizing technology is driving industrial IoT (IIoT) systems, which are shaping smart factories and the growth of Industry 4.0.

Advertizing Bluetooth devices and sensors at a single smart factory can gather up to 1.44 billion data points per day, even from legacy equipment. This raw data is extremely valuable in making business decisions once it is collected, secured and analyzed. One such benefit of this collected data is the reduction of equipment failure and downtime. Research by Deloitte shows that poor maintenance can reduce a plant's productivity from varying ranges of 5% to 20% – at an annual \$50 billion cost to manufacturers worldwide.

1. Bluetooth beacons are easily read by most industrial gateways and mobile devices. This alleviates the headaches of custom integration by utilizing standards-based protocols and payload formats.
2. Real-time location capabilities are provided by using the GPS chip on existing gateway or cellular-based location services. This enables advertizing Bluetooth devices to be used in asset tracking applications at a greater cost efficiency than traditional direct locatable devices.
3. The efficiency of high read-range gateway zones created with Bluetooth beacons enables customers to cover large factory and warehouse spaces with just a few devices.
4. Bluetooth beacon devices can transfer a wealth of information like sensor data that includes temperature, humidity, motion and light measurements with greater power efficiency than standard connected Bluetooth devices. This enables battery life of up to five years for Bluetooth beacon devices depending on the configuration of power-down modes. The extended battery life provides for other cost efficiencies by avoiding down time and saving on personnel expenditures needed for battery replacements.
5. Bluetooth beacon devices are cost efficient to deploy and manage. This enables the onboarding of new beacon devices into a solution by simply powering on the device.



DEVELOP ENDLESS OPPORTUNITIES WITH THE RSL10

A powerful platform driving innovation, the RSL10 delivers practical applications limited only by the imaginations of developers. A few of the leading industries that are already benefiting from IoT-enabled products made possible by the RSL10 platform.

- Access control, hospitality and resort accommodations, senior/long-term care/assisted living
- Battery-free switches for building automation, commercial and industrial lighting systems
- Smart tags, asset tracking and management, cold chain/perishables monitoring
- Connected home (smart home)
- Employee monitoring/safety
- Audio assistance devices
- Public/service utilities
- Connected health
- Transportation
- Aerospace and defense



GET STARTED WITH OUR IOT PLATFORM

Building IoT-enabled products and solutions requires a specialized set of skills, a network-enabled infrastructure and much more. It all begins with selecting the best approach. As technologies, compatibilities and protocols continuously evolve, planning and deploying a major system while maintaining your core business can be a real challenge. Few large enterprises have the resources to do this, so many organizations choose to partner with a global team with substantial experience building successful IoT products and services.

FROM CONCEPT TO CREATION, AVNET AND ON SEMICONDUCTOR CAN BRING YOUR IOT SOLUTION TO LIFE

With the substantial number of Bluetooth devices on the market, it's important to have the right tools to help innovate current applications and drive value by engineering new ones. As a global technology provider, Avnet has developed the powerful IoTConnect® Platform, powered by Microsoft Azure, which helps OEMs create IoT-enabled solutions that empower their customers with a smarter way to manage their assets.

While Avnet has engineered the software behind the IoTConnect Platform, ON Semiconductor has engineered the powerful Bluetooth hardware development toolset in its RSL10 kit.

AVNET'S IOTCONNECT PLATFORM DELIVERS SMART SOLUTIONS FOR ALL YOUR END POINTS

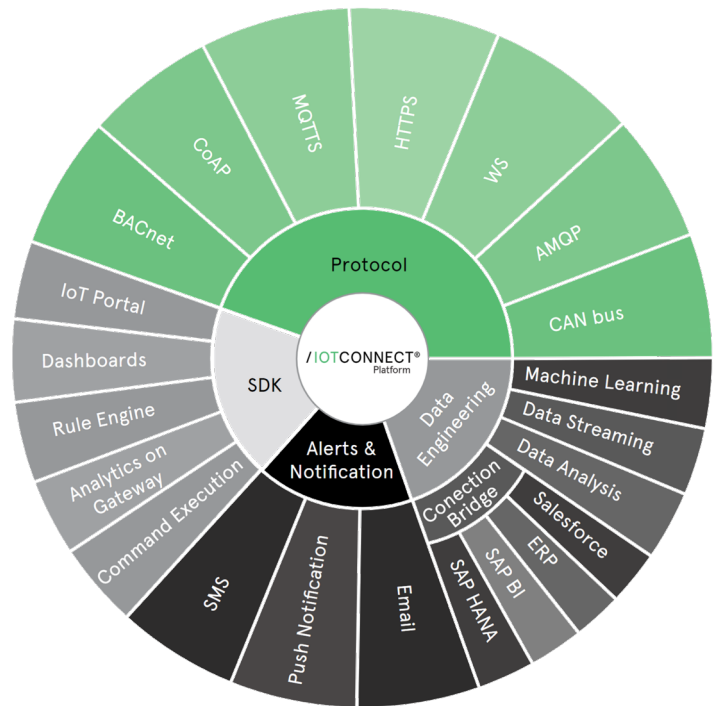
A study by Cisco shows 60% of IoT initiatives stall at the Proof of Concept (PoC) stage and only 26% of companies have had an IoT initiative they considered successful. The study also reported a third of all completed IoT projects weren't successful.

Many companies lack the necessary resources to properly implement IoT initiatives. That's why it's important to choose the right partner in navigating the complexities of an IoT ecosystem; one that can help optimize the convergence of your IT and OT operations.

Capability and experience are a few of the factors that contribute to the success of a project. Avnet draws on these strengths in delivering the IoTConnect Platform, a scalable IoT platform that helps boost efficiency, improves asset management and accelerates innovation. The platform helps enterprises build and deploy innovative IoT solutions to transform big data into practical, actionable insights that improve decision making.

The IoTConnect Platform supports many common protocols to connect your enterprise. It applies today's top data engineering processes to enable information extraction and to connect to existing systems, and it supports multiple types of alerts and notifications. The platform includes a powerful software development kit (SDK) that gives users unparalleled access to data, either with standardized process or by creating their own.

The advanced tools and features of the IoTConnect Platform enable IoT developers to spend less of their valuable time performing mundane tasks like integrating and configuring products, scaling and securing infrastructure, managing SLAs, building software server stacks, etc. This frees up time better spent delivering higher value by refining current IoT applications and developing new innovations.





TAKEAWAYS

By partnering with trusted global technology partners like Avnet and ON Semiconductor, you can focus your valuable resources on intellectual property innovation and other areas that deliver a strong competitive edge. We'll support you through design optimizations that both accelerate your time to market and differentiate your product offerings. Ultimately, a partnership with Avnet and ON Semiconductor can improve business outcomes and customer journeys by providing the safe and reliable operation of advanced Bluetooth devices and IoT applications.

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Avnet Silica is the European semiconductor specialist division of Avnet, Inc., one of the leading global technology distributors and acts as the smart connection between customers and suppliers. The distributor simplifies complexity by providing creative solutions, technology and logistics support. Avnet Silica is a partner of leading semiconductor manufacturers and innovative solution providers over many years. With a team of more than 200 application engineers and technical specialists, Avnet Silica supports projects all the way from the idea to the concept to production.

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ABOUT ON SEMICONDUCTOR

ON Semiconductor engineers products, tools and solutions that help customers design, build and think more efficiently. A leading global supplier of semiconductor-based solutions, ON Semiconductor offers a comprehensive portfolio of energy-efficient power management, analog, sensors, logic, timing, connectivity, discrete, SoC and custom devices. For more than 20 years, ON Semiconductor's prime focus has been delivering practical solutions to unique design challenges in automotive, communications, computing, consumer, industrial, medical, aerospace and defense applications.