

For Immediate Release

Miniaturized Wireless Medical Wearables

Tiny RF chip antennas are no longer relegated to PCB “keep out” area, allowing product designers to further miniaturize wireless biosensors and medical wearables

Traditionally, small chip antennas used in RF-enabled medical devices have required a designated ground “keep out” area to minimize interference from other components and ensure the ideal radiation pattern for wireless signals. In some cases, this reserved space can eat up as much as 15 x 20mm of the printed circuit board.



However, with the drive to further miniaturize next generation medical biosensors and wearables, new alternatives are entering the market that allow the chip antenna to be mounted directly above metal surfaces. By doing so, as much as 10-20% of the space traditionally reserved for the keep out area is no longer required, allowing designers to reduce the overall size of the product.

This has major implications for wireless medical devices in which even miniaturized PCBs along with coin-cell batteries often utilized are limiting factors in the minimum form factor. Products that could be positively affected by this development include an array of “smart” devices such as watches, clothing, eye glasses, patches, pills and even adhesive bandages.

Mobile Health Biosensors and Wearables

For the medical industry, the “future is now” when it comes to miniature battery powered sensor devices that can be located near, attached to, or implanted in the body to monitor physiological signs such as temperature, blood pressure and pulse rate.

These smart devices will soon monitor everything from fitness to health, environment, lifestyle and behavior. Biological parameters that can be tracked include vital signs, sleep, emotions, stress, breathing, movement, efforts, posture, gait, body shape, lesions, mental acuity, toxins, blood glucose, ECGs, and drug adherence.

The information collected is then wirelessly transmitted to nearby cell phones, remote monitoring stations or through Wi-Fi over the Internet to back-end servers for further analysis, assessment and decision making.

Collecting data in this manner is expected to facilitate the development of disease models and an understanding of the complex behavior of biological networks. Mobile health data can also be a valuable tool for drug discovery and clinical research.

Among the products already incorporating this type of technology are adhesive bandages that contain built-in sensors that measure heart rhythm, respiratory rate and temperature.

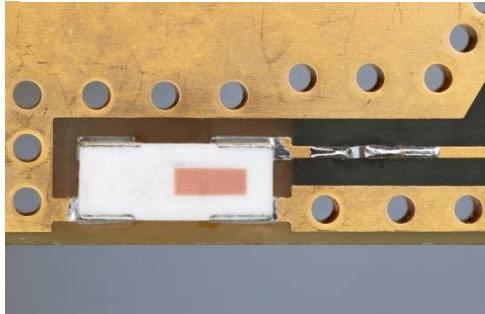
These readings can be used, for example, to determine the precise amount of insulin that should be dispensed from wirelessly controlled insulin pumps worn by diabetics.

Embedded Chip Antennas

To transmit and receive RF wireless signals in the appropriate frequency range, smart devices must contain small RF chip antennas embedded on the PCB or behind the scenes underneath the encasement of the product.

These chip antennas radiate and receive electromagnetic waves as other types of antennas, but the most notable difference is its small size. In fact, today's mobile phones incorporate a minimum of four antennas and up to 13 in some models. Smaller wearable devices may only contain one or two antennas.

To work properly, chip antennas have typically been ground plane dependent, meaning they require an appropriately sized and positioned ground plane to form a complete, resonant circuit.



While the PCB can serve as the ground plane, the antenna itself must typically be placed on the edge of the board in an isolated section which is free from ground and metal components that would distort its radiation. Without the isolation distance, the performance of the antenna is significantly affected.

“The ‘keep out area’ is fundamental to ensure the chip antenna can electromagnetically radiate to antenna applications, because everything affects the radiation pattern including the package size, where the antenna is mounted and its proximity to the human body,” says Manuel Carmona of Johanson Technology, a leader in high frequency ceramic components including chip antennas, High Q capacitors and EMI chip filters.

According to Carmona, Johanson Technology has been able to eliminate the requirement for a designated ground keep out area through optimization of materials (ceramics and inks), manufacturing processes and RF circuit design.

The new 2.4 GHz antenna can now be mounted directly onto the metal ground plane. The product measures 2 x 5mm and is designed for small coin-cell battery operated IoT, 2.4 BLE, wearable, ISM, ZigBee, and 802.11-standard applications where metal or a battery/display covers the entire length or side of the PCB.

“With PCB real estate at a prime, the size and placement of the chip antenna is critical because as everything gets smaller it becomes increasingly difficult to place more components on the board,” explains Carmona. “Therefore, design engineers are looking

to component manufacturers to deliver miniaturized solutions that occupy next to no real board space.”

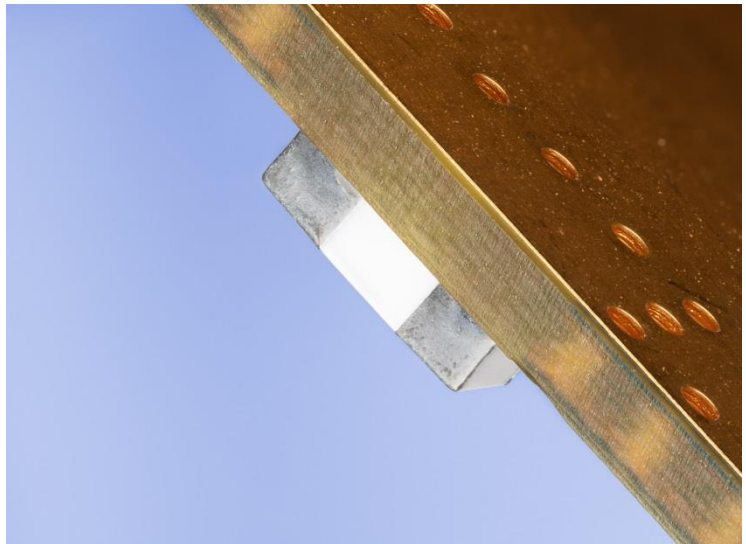
The design of the antenna itself is also critical to its range and performance. With medical devices, radio interference or some other glitch could result in interrupted connectivity.

There can be legal ramifications as well. As with any wireless device, products that utilize RF technology, including Bluetooth, to collect or transmit information are subject to regulation by the Federal Communications Commission (FCC). Therefore it is critical the device perform at the designated frequency and the design and placement of the antenna is critical to proper tuning.

Despite the critical nature of the antenna, Carmona says it is often overlooked until late in the design process, at which point optimal antenna performance may not be achievable within the space provided.

To assist with chip antenna design and selection, Johanson Technology offers a program where design engineers can send in a miniaturized device and the company will tune the antenna for optimum functionality.

“A chip antenna that can be mounted over a ground plane opens up many applications for products that want to incorporate wireless,” says Carmona. “To date, we have received everything from smart shirt buttons to jewelry and other wearables in various shapes and sizes.”



For more information, contact Johanson Technology at (805) 389-1166, e-mail antenna@johansontechnology.com or visit www.johansontechnology.com/ant. The company is located at 4001 Calle Tecate, Camarillo, CA 93012