



Smart meters need Smart antenna solutions



Challenge

In today's world of smart meters, companies encounter a challenging task: designing RF devices within sturdy, metallic enclosures that protect the physical security of the equipment while maintaining strong wireless performance.

In addition, the surrounding high-voltage, high-current electronics can interfere with RF functionality, and the RF emissions must not compromise the meter's performance.

But what if this shielding not only safeguards your connectivity but also improves it?

Solution

Antennas are not ordinary electronic components. Metallic enclosures can act as unwanted antennas, distorting electromagnetic fields and degrading antenna performance. However, there are innovative solutions to tackle this challenge.

Slot Antenna

By deliberately opening a "window" in the enclosure, radio waves can be transmitted more efficiently. However, this window must be sufficiently large to achieve a noticeable improvement without compromising the protective function of the enclosure.

External Antenna

External antennas bypass the issue of metal enclosures but are often less practical and aesthetically pleasing. This approach is especially suitable when design considerations are not a top priority.

Integrated Antenna

The antenna can also be integrated directly into the metal enclosure. These hybrid enclosures provide dramatically improved radiation but require extensive testing to ensure that the antenna performs optimally in every usage position.

Ferrite Layer

Multilayer antennas offer an intriguing solution. At Quarterwave, we also use special ferrites that allow the antenna to be positioned close to the metal enclosure without affecting performance.

Summary

The key is developing custom antenna solutions that maximize the performance of your smart meters and IoT devices, even with metal shielding. At Quarterwave, we grasp the complexities of RF signal management and know how to design antennas that deliver optimal performance in the most challenging environments. Our specialized antenna solutions are crafted to effectively utilize the signals reflected by metal enclosures, transforming metal barriers into signal enhancers.



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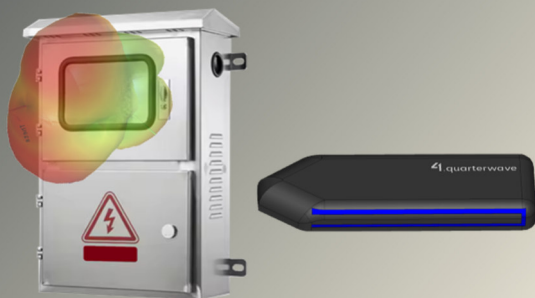
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Smart antennas examples

Example 1: Slot antenna integrated in smart meter

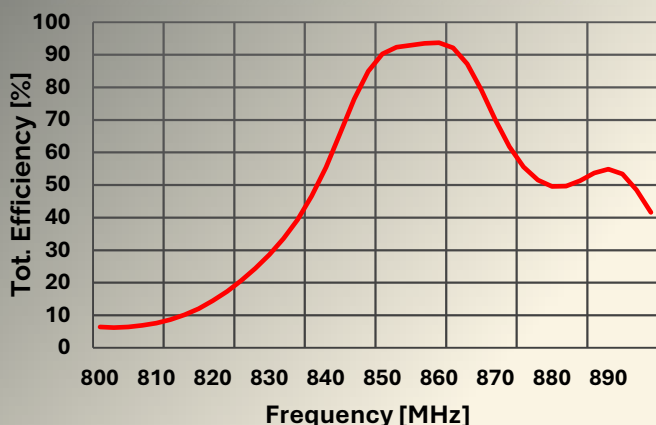


Challenge

Smart meter antennas face key challenges, including the need for compact design and high efficiency within limited space. They must support multi-band communication for seamless connectivity across cellular, Wi-Fi, and IoT networks. Additionally, antennas need to withstand environmental factors like temperature changes and humidity while ensuring effective omnidirectional coverage for strong signal integrity in urban settings.

Solution

Our antenna solution effectively utilizes the metal box as a radiating element, allowing for direct integration within the metal housing without modifications. This design simplifies installation and enhances performance, delivering an efficient solution without complex technologies, ultimately providing a seamless experience for our customers.



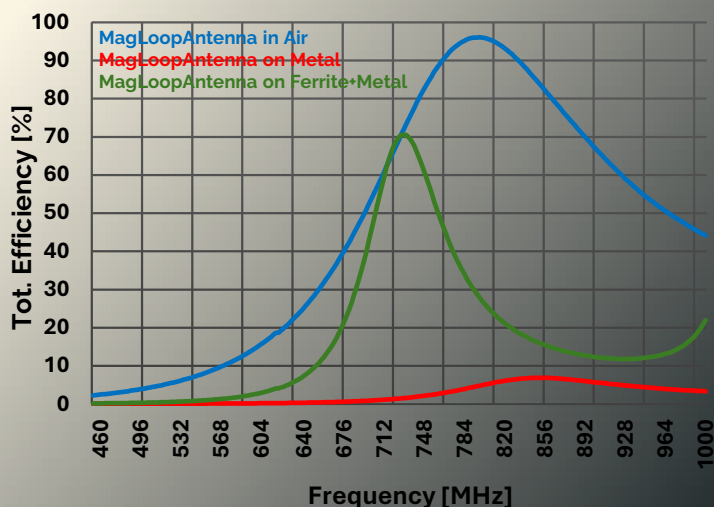
Example 2: Antenna with ferrite layer close to metal

Challenge

Conventional antennas can experience significant efficiency loss when positioned near metallic enclosures, such as a loop antenna just 5 mm from a metal sheet. Without protection, their performance diminishes considerably in these environments.

Solution

At Quarterwave, we utilize specialized ferrite materials to prevent efficiency loss in our antennas. By incorporating a ferrite layer between the antenna and metal, we can almost fully restore performance, ensuring optimal functionality. This solution is particularly suitable for compact designs in metal-close environments, providing our customers with reliable and efficient communication even in challenging conditions.



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