PHILIPS

Innovation Services

Design for reliability solutions

RF Interference and wireless coexistence design

Our approach, your wireless design services

When developing your wireless design, our technicians support you during all development phases, or just during a single step, creating or optimizing your wireless design. We offer a proven design for wireless reliability methodology for your connected product. Our wireless design services are:

1. System specification and RF architecture

When you have a clear idea of the purpose of your device and corresponding high-level specifications, we support you in developing the wireless system architecture and the system specifications including:

- **Building block selection (radio modules / chips selection)**
  In order to select the right building blocks, the intended use and the end-user environment of the device will be defined in addition to the type of information (data) for which the wireless connection is intended. Accordingly, we help you select the right building blocks. As part of this, we help you select the right radio modules and chips from the right vendor that are most appropriate for your intended product.
- **Communication protocol selection**
  We help you choose the right protocol for communication between hardware and software.
- **Antenna selection**
  We support you in choosing the right antenna for your product and optimize it (when necessary) for integration into your product (later during the design phase.)
- **Frequency band selection**
  We help you select the right frequency band. Some examples are 868-930 MHz (RFID, Z-wave, ZigBee, LORA), 2.4 GHz (Wi-Fi, Bluetooth, ZigBee) and 5-6 GHz (Wi-Fi, car radar). Where the current frequency bands are very congested, many of our new developments make use of other, higher frequency bands.
- **Wireless technology selection**
  Which technology is most applicable: ZigBee, Wi-Fi or Bluetooth? We help you make the right choice.
- **Mapping the wireless related risks (safety (FDA) and performance risks)**
  According to the medical product standard IEC 60601-1-2 and the FDA, potential risks related to basic safety and essential performance need to be identified at all stages of a product's development. This structured risk management task is something we can perform for you or we can simply support your process.

2. Design & prototyping

You want a prototype of your product with wireless functionality? We make a working prototype! In no time we create your prototype integrating hardware (electronics, antenna and radio chips) and software. During the design of your prototype, points of improvement become visible. Also during this phase, design for cost is important, trying to find components at a lower price, without compromising the quality of the medical device.

- **Modeling and simulation**
  We develop design guidelines based on dedicated 3D electromagnetic modeling and simulations. This helps to understand the physics and to optimize your antenna integration and RF design, cost and time efficiency.
- **Electronic radio frequency (RF) design**
  Our experts develop an electronic schematic and a PCB (Printed Circuit Board) layout. Also key component selection is part of the procedure (antennas, radio chips and modules, etc.)

3. Verification

- **Design verification**
  Based on effective workbench tests and dedicated wireless / RF performance tests, the performance and quality of designs can quickly be verified.
  The transmitter properties as well as the receiver properties are important. Therefore, self-pollution RF tests of the radio receiver (interference caused by electronics in proximity) should also be performed carefully. We deliver these tests. The antenna RF performance also needs to be tested (antenna pattern, matching, efficiency.) Our effective workbench tests can be used to evaluate EMC and RF behavior during an early design phase.
- **System level verification**
- **Wireless propagation range tests (free-space or multipath)**
- **Wireless coexistence and interference wireless performance test configuration (according to ANSI C 63.27)**
- **Regulatory EMC pre-compliance tests**
- **Regulatory Radio/RF pre-compliance tests**
- **Risk management and evaluation**
  Risk management is important and is compulsory for medical products during all phases of your development cycle. We deliver risk analysis according to FDA requirements, which are defined for wireless functionality in medical products, like wireless coexistence (ANSI C 63.27) robustness against RF interference, effect of multipath, EMC, performance (QoS), etc. Moreover, we are very experienced in preventing EMC problems and corresponding hazards when a function fails due to electromagnetic and RF interference.

4. Certification

We can support you with the selection of the required standards and which parts of these standards are applicable to the customer's product. We can perform pre-compliance tests and arrange compliance tests. We also support you by writing the Declaration of Conformity (DoC) needed for the certification of the product.

5. Review of your existing design

You have designed a wireless application. Is the design optimal and robust? Our experts review your design at various levels (design, performance, robustness and safety risks) and give recommendations.

6. Small series production

Interested how Philips Innovation Services can support your wireless development project?
Please contact Dr. Nico van Dijk for more information.

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