

## TRANSPONDER DESIGNED FOR USE ON A METAL STRUCTURE

Main Technological Area → Logistics

Keywords → RFID | Metallic surfaces

A passive RFID transponder appropriately designed for use on a metal structure or, more in general, on an electrically conductive structure, is manufactured to operate at a nominal frequency  $F_1$ , when the transponder is assembled to an electrically conductive structure; the same transponder is designed to operate at a shifted frequency ( $F_1+FS$ ) when it is not assembled to the above structure. The frequency shift ( $FS$ ) depends on a stray capacitance between the electrically conductive structure and the transponder. An object of the present invention is to provide a transponder appropriately manufactured for assembly to a metal or more in general electrically conductive structure in an installation, and which provides for eliminating the frequency shift induced by the conductive structure itself, in order to be interrogable from a data gathering and management system operating at nominal frequency  $F_1$ .

The patented solution is designed to work as a part of an automatic remote acquisition system for determining the configuration of an installation – patent **EP1886259B**, internal reference: LDO-416.

### TECHNICAL SPECIFICATIONS

With reference to the Figure 1, the LC resonant circuit (43) is coupled to the antenna and designed to resonate, when assembled to an electrically conductive structure, at nominal frequency  $F_1$ .

When the transponder is not assembled to the electrically conductive structure, the stray capacitance between the electrically conductive structure and the transponder will disappear, subtracting to the capacitance of the whole LC circuit, and making the transponder LC circuit (47) to resonate at a shifted frequency  $F_1+FS$ .

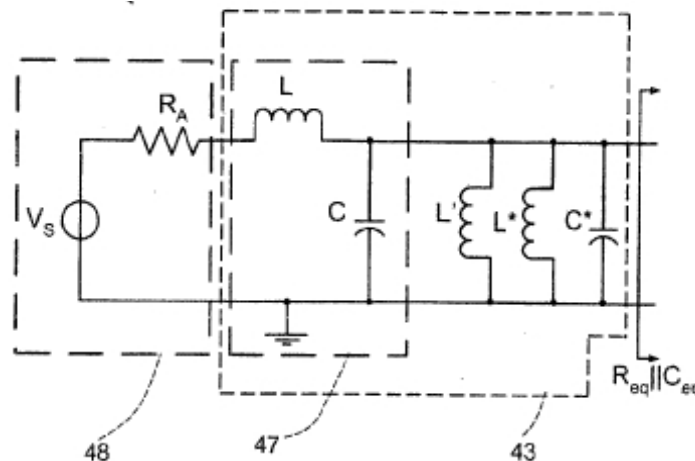


Figure 1 – Resonant circuit of the transponder

The "Programmed" frequency shift  $FS$  and subsequent realignment, with nominal value  $F_1$  in operating conditions, improve the signal/noise  $S/N$  ratio of the passive transponder up to values typical of operation in high-immunity conditions to ambient electromagnetic noise.

By simply making a cross-shaped incision on the electrically conductive structure, and applying passive transponder to it, tests have shown an increase in magnetic coupling between antenna of passive transponder and the antenna of an interrogating device.

**INNOVATION/ADVANTAGES**

The patented solution eliminates or at least reduces the effect of parasitic capacitances between passive transponder and the metal walls of elementary units of an installation, to which passive transponder is fitted; it also reduces the signal/noise S/N ratio of passive transponder to values enabling it to be applied to operating electronic circuits; and it improves magnetic coupling between antenna of passive transponder and the antenna of the interrogating RFid read/write device.

Main advantages:

- Expanding the possibility of RFid usage in several fields of application
- Providing an integrated solution to a classic RFid setup, using a single RFid read/write device

**FIELDS OF APPLICATION**✓ **Industrial plants**

- Plants consisting of a large number of subsystems, equipment and elementary parts that require a constant and punctual corrective and/or predictive maintenance service to guarantee their efficiency and availability over time

✓ **Logistics and distribution**

- Large warehouses (including port, railway or airport warehouses) of spare parts or any other products, in order to identify pallets on which the objects are stored, so to maintain supply levels. The solution could be integrated with the automation of supply and withdrawal of warehouse stock.
- Lifecycle management of materials that are particularly sensitive to environmental conditions (e.g. carbon fibers) before their use in the production line.

✓ **Archives**

- Similarly to the previous cases, when the elementary units consist of documentary elements or cataloged items of other nature (museum artifacts, judicial findings, etc.).

**PATENT INFORMATION**

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**Priority Code** – TO2005A000350

**IPC Codes** – G06K17/00 | G06K19/07 | G06K19/077

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National Extensions: Italy - Germany – France – United Kingdom – Spain - Switzerland/Liechtenstein

USA - US8628010; filing date: 14/06/2012; grant date: 14/01/2014

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