RFID JOURNAL LIVE! Europe

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Using RFID to Overcome Rugged Conditions

A system which uses RFID tags to get wireless and battery-less sensors to save costs in challenging conditions

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Schneider Electric

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- Make the most of your energy™:
  - Safe
  - Reliable
  - Efficient
  - Productive
  - Green

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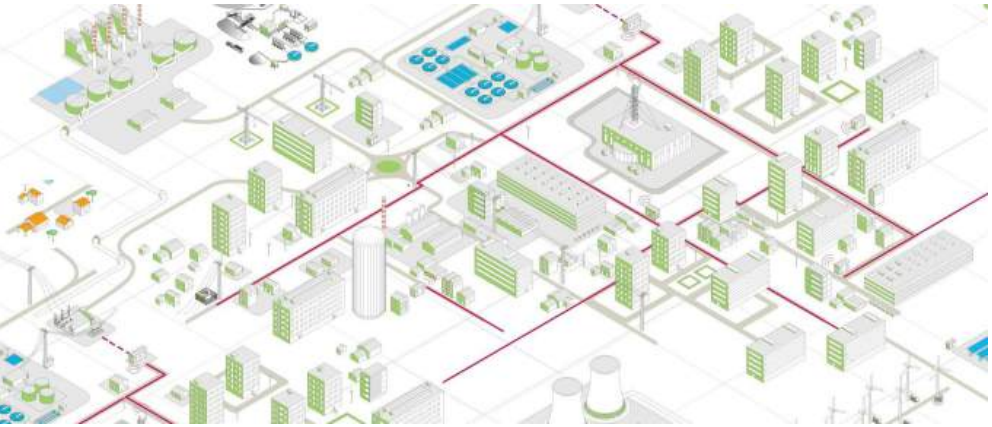
- From plant to plug™, helping customers make the most of their energy

up to 30% energy saving

5 end markets
- Energy and infrastructure
- Industry
- Data centers & networks
- Buildings
- Residential

72%
part of the worldwide energy consumption of these five markets



Offering integrated solutions for segments like…
- Electric utilities
- Water & waste water
- Oil & Gas
- Marine
- Mining, Mineral, Metals
- Machine builders
- Data centres/IT
- Hospitals
- Hotels
- Office buildings
- Retail
- Residential

An increasing need for monitoring

- Energy management requires monitoring of electrical parameters:
  - Current
  - Voltage
- And some non electrical ones:
  - Temperature
  - Position
- As a lot of our products are mainly mechanical devices, their status could be known by monitoring the position of a specific part

Harsh environment constraints

- Products targeted are working under hard environment constraints
  - Dielectric and galvanic insulation
  - Accessibility

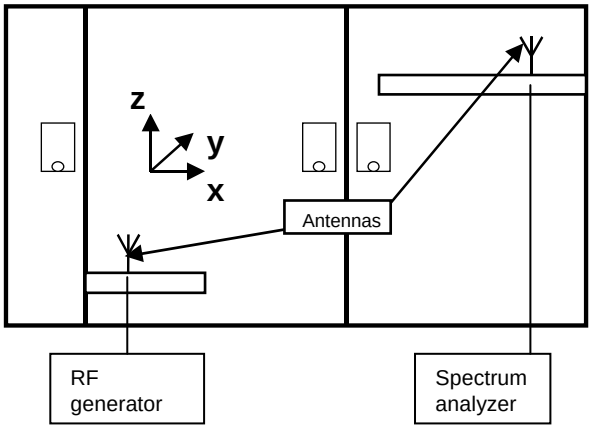
Customer requirements

- Battery-less
- Wireless
- Ease of installation
- Maintenance free

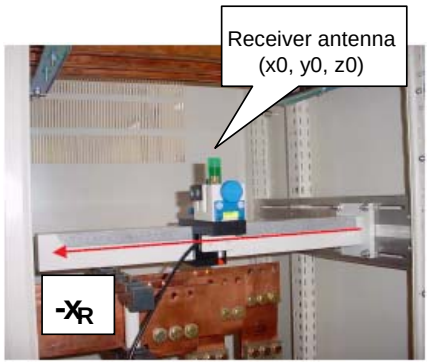
RFID

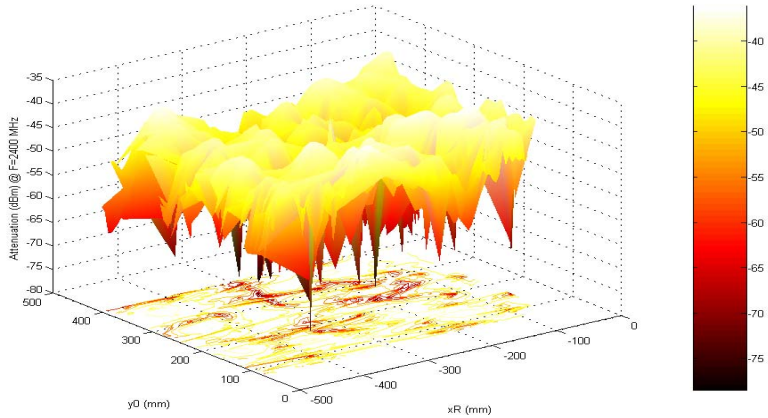
- Basically satisfies requirements
- A wide offer is available
- Standards exist

RFID: Which frequency?



- Huge fading effects in UHF band and at 2.45GHz led us to select HF band.

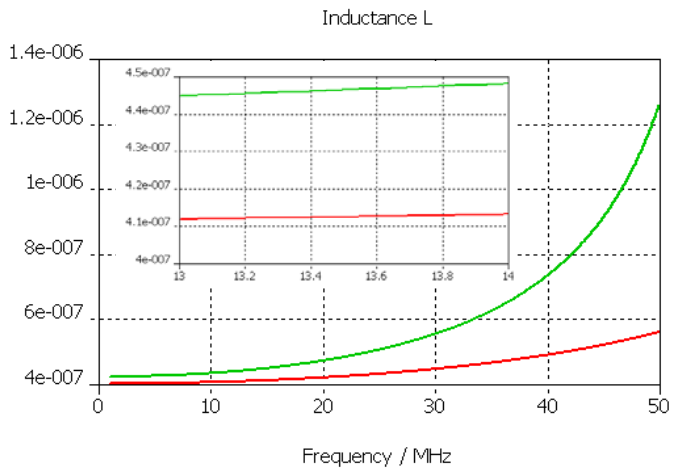




RFID: Which reader antenna

- A shielded current-carrying wire as antenna

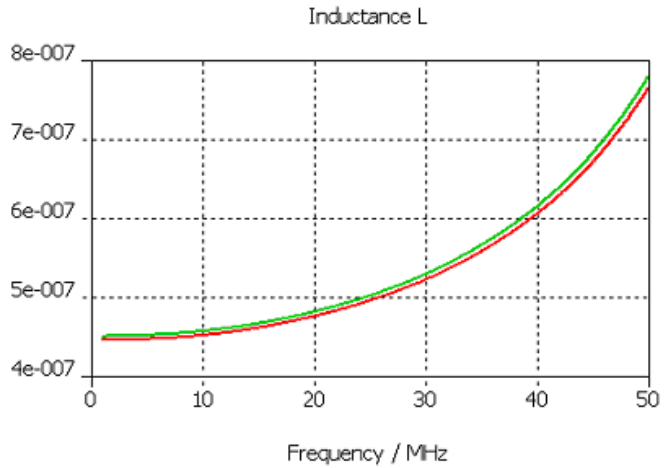
Standard wire



Without metal

With metal

Shielded wire



How to catch the position information?

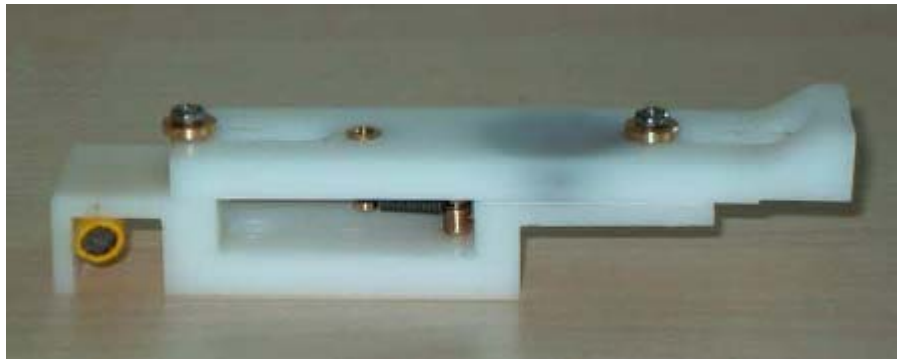
- The aim of our works was to select only standard components available on the market: No specific tags with I/O

  – Communication interruption principle

	Pos. 1	Pos. 2
Communication	Yes	No

How to interrupt communication?

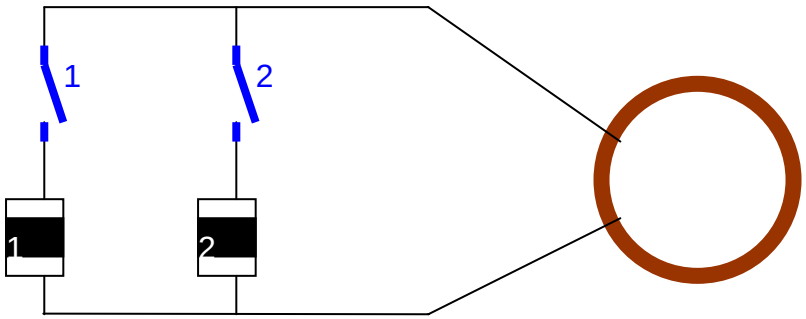
- By hiding the tag



- Complicated to implement into our products
  - Positioning of antenna and hiding device
  - Small displacements with more than 2 positions
  - Frequently need to dissociate location of functions: communication and measure

How to interrupt communication?

- By “opening” the antenna or disconnecting the chip thanks to mechanical switch



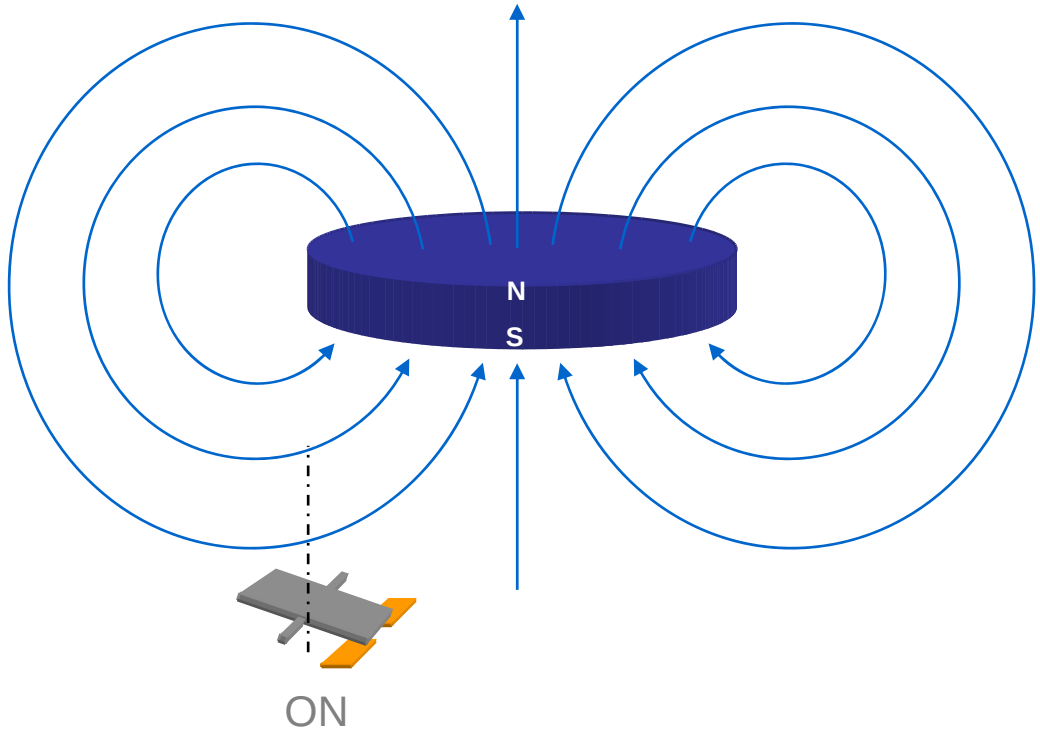
	Pos. 1	Pos. 2	Pos. 3	Pos. 4
Chip 1	0	0	1	1
Chip 2	0	1	0	1

Switch requirements

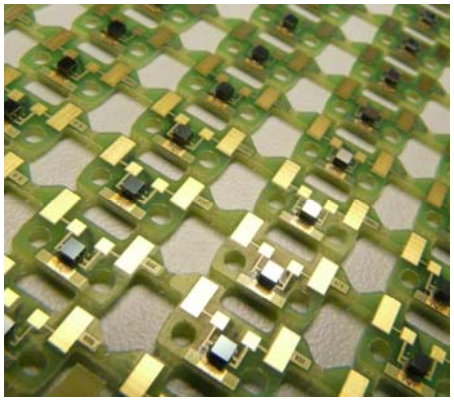
- Small dimensions
  - For integration into products offering limited space
- Precision
  - For discrimination of multiple positions
  - For small displacements detection (<1mm)
- Powerless
  - To comply with RFID

Magnetic actuated MEMS switch

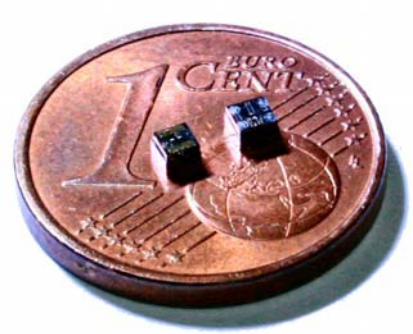
- 3 years development project
- Main driver for switching is geometry



Main characteristics



Surface mountable



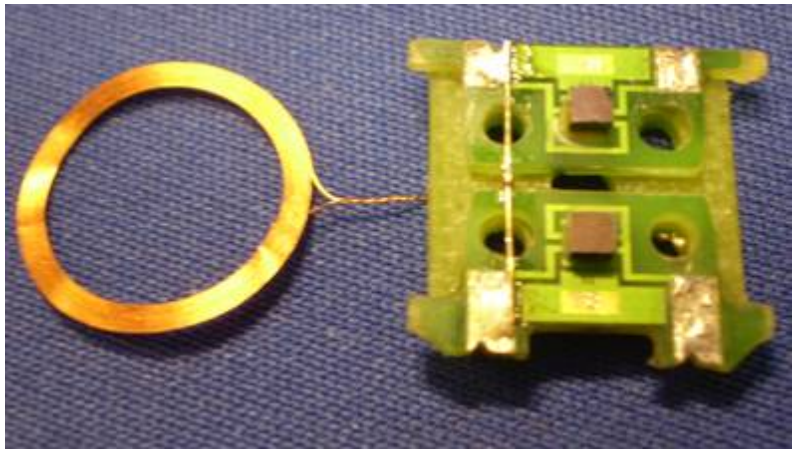
High level of integration

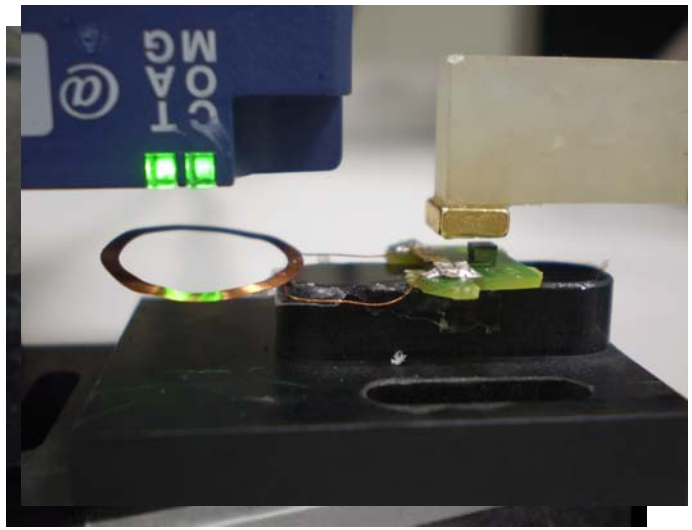
Footprint	3 mm²
Switching precision	100 µm
Packaging	Hermetic
Electrical endurance	10^8 cycles
Dielectric strength	100 Veff
ESD into application	+/- 2 kV
EMC	insensitive

RFID+MEMS

Ositrack

- Prototypes validated up to 4 positions





Temperature sensor need

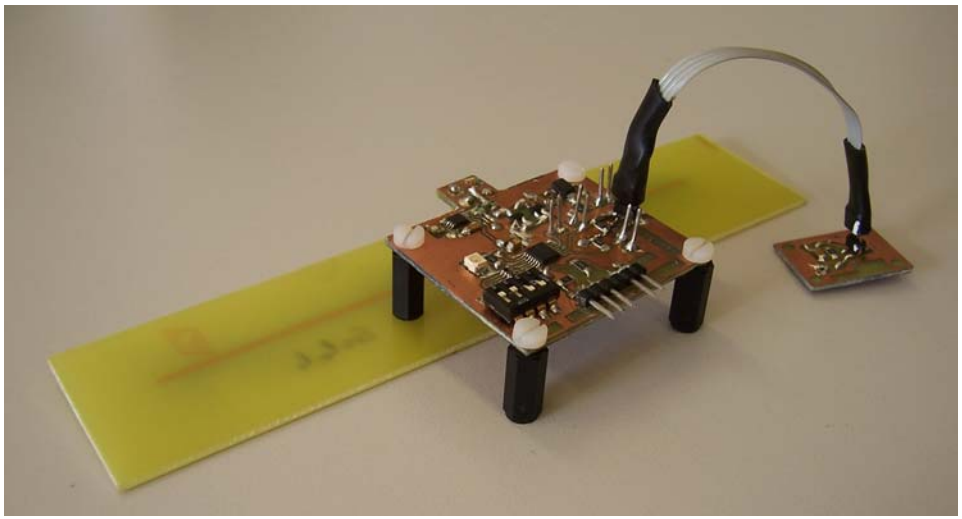
- Communication distance > 50 cm
- No battery
- Use of standards

RFID + temperature sensor

- ISO 18000 – 6D
- Microcontroller MSP430F2002
- Sensor TMP102 (-40 / +110˚C)
- Up to 16 sensors

RFID + temperature sensor

- Works at 1 meter (500mW at 868 MHz)
- 1 measurement every 350 µsecond



Advantages

- Powerless
- Compact size
- Use of components available on the market: tag and reader
- Strong synergy with MEMS project

Where we are

- Device RFID+MEMS is ready
- RFID+temperature sensor has to optimized
- Product development projects embedding this function are in progress

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Thank You