

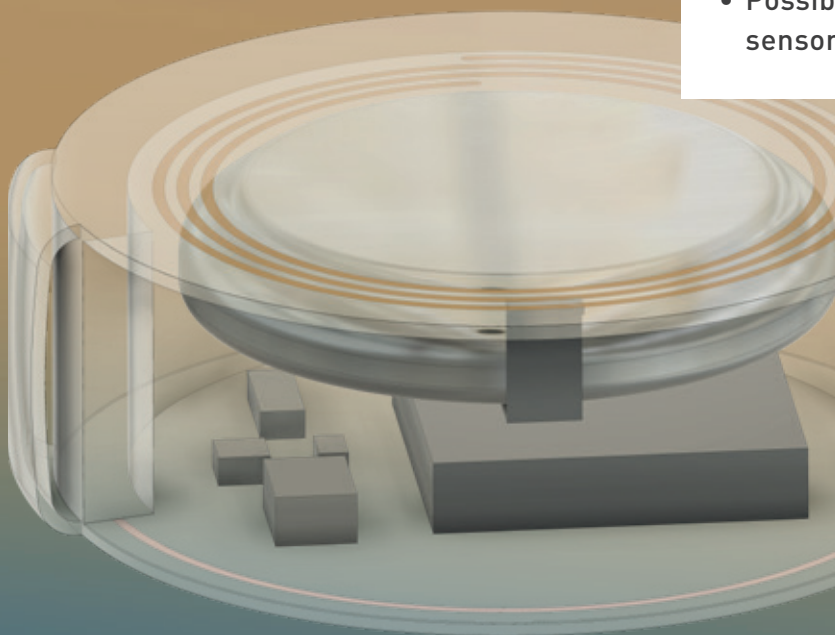


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## Smallest Form Factor Active NFC Tag for Sensor Applications in Harsh Environments

### HIGHLIGHTS

- LCP (Liquid Crystal Polymer) base material
- As small as 6 mm in diameter
- Integration of active and passive components, as well as batteries
- Integrated NFC coil with excellent readability for standard RFID tag readers
- Near hermetic
- Suitable for chemically aggressive environments
- Washable at 60°C and steam sterilizable
- Possible applications: data logger, wireless sensor for wearables, wound healing sensor



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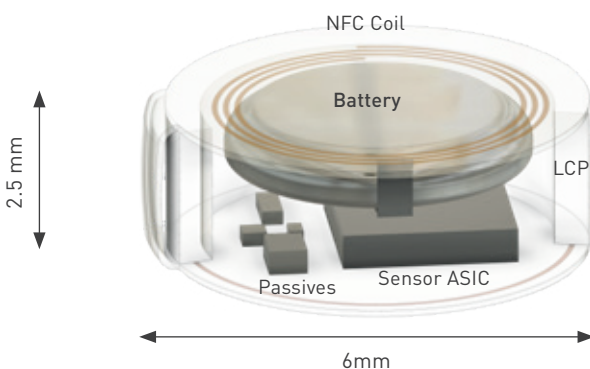
# Smallest Form Factor Active NFC Tag for Sensor Applications in Harsh Environments



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Smallest form factor, miniaturized NFC (Near Field Communication) tags comprising sensors, microprocessors and batteries can be built using Liquid Crystal Polymer (LCP), a high performance thermoplastic polymer, both used as the substrate and encapsulation material. The modules have diameters as small as 6 mm and are still readable with standard NFC tag readers. The encapsulation with LCP provides good protection against chemically aggressive environments, such as acids, and salty water at minimal wall thicknesses. At the same time LCP is transparent to electromagnetic fields providing excellent readability for standard RFID tag readers.

## Module Construction



## Module Features

### Wireless Sensor Module

- Diameter = 6mm
- Thickness = 2.5mm
- Includes battery and ASIC
- Near hermetic
- For acidic and salty water conditions
- Low cost due to plastic molding
- Can be washed at 60°C
- Can be steam sterilized

## Assembly



## Liquid Crystal Polymer (LCP)

- Very flexible thermoplastic material
- High temperature stability:  $T_m > 280^\circ\text{C}$ ,  $T_d > 320^\circ\text{C}$
- Very low water absorption:  $< 0.04\%$
- Excellent chemical stability
- Excellent high frequency properties:  $\epsilon_r = 2.9$ ,  $\tan \theta = 0.0025$
- Light weight:  $1.4 \text{ g/cm}^3$
- CTE  $x,y = 17 \text{ ppm/K}$  CTE  $z = 150 \text{ ppm/K}$

## LCP Substrate Features

- Traces fully embedded in LCP
- Low inductance and controlled impedance
- Line  $25 \mu\text{m}$  / Spacing  $25 \mu\text{m}$  / Via  $50 \mu\text{m}$
- Trace material: Cu
- Other metals sputtered for sensor functionality
- Operating temperature up to  $150^\circ\text{C}$
- Components can be attached by SMT, Flip-Chip, Wire Bonding, etc.

Based in Switzerland, DYCONEX has been in the PCB business for more than 50 years and delivers leading edge interconnect solutions in flex, rigid-flex and rigid technology. DYCONEX core competence lies in the production of highly complex HDI, high-frequency and high-reliability circuit boards for medical, defense, aerospace, industrial and semiconductor applications. DYCONEX is an MST company.



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