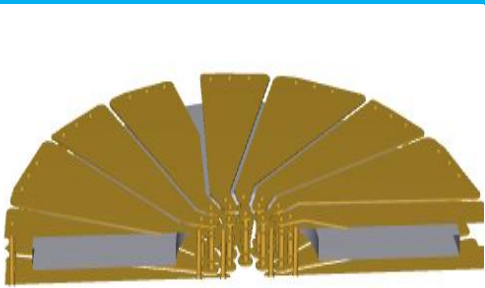
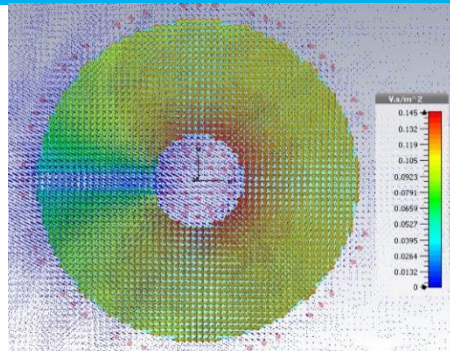


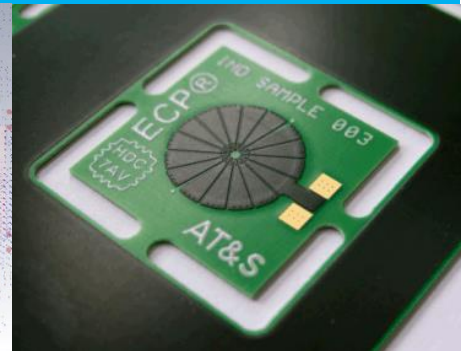
## PCB Inductor with Embedded Magnetic Core



Design



Simulation



Production

### Target Applications

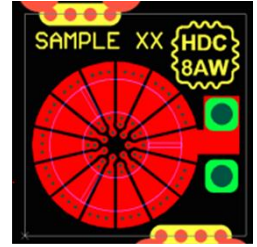
- Wireless power charging
- Inductor for non-isolated DC/DC converters
- Transformer for isolated DC/DC converters

### Advantages

- Miniaturization (footprint and height reduction)
- Improved yields due to automated production
- Anti-tamper and security (prevent reverse engineering)
- In comparison to manually wound magnetic components
  - Reduced labor of production
  - Consistant performance

## Design

ECP<sup>®</sup> uses the free space in an organic, laminate substrate (Printed Circuit Board) for active and/or passive components. We use this technology for the embedding of a magnetic core.



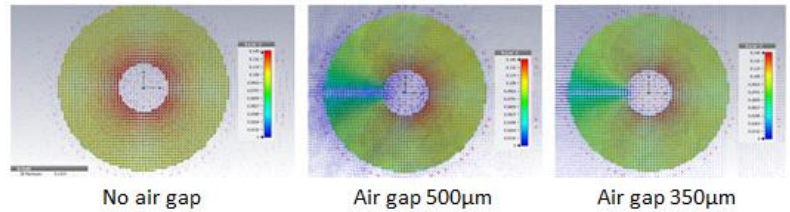
Demonstrator design

## Simulation

Simulation and calculations were done to foresee the products properties:

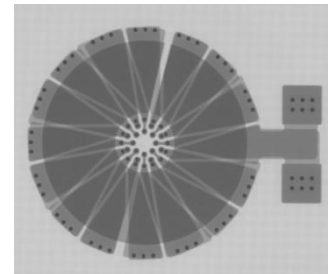
- Distribution of B-field lines
- Inductance over frequency
- DC resistance
- Thermal behaviour
- Fringing effect

Magnetic field lines distribution at 2.5 A



## Production

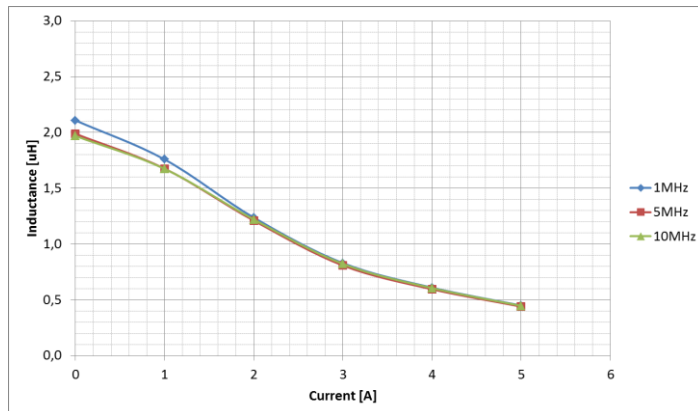
- Manufactured using standard PCB processes
- Assembly of inlays can be done by automatic process
- High flexibility in core shape design (eg. EI-, UI-shape, toroid)



X-ray of demonstrator

## Technical Data

Properties	Symbol	Value
Inductance	$L$ (@ 1MHz)	2.2 $\mu$ H
Rated Current	$I_R$ (@ $\Delta T = 40K$ )	1.8 A
Saturation Current	$I_{sat}^*$	1.5 A
DC Resistance	$R_{DC}$ (@ 0.1A)	79 m $\Omega$
Self-resonance frequency	$f_{res}$	35 MHz
Coil inner diameter	$D_i$	3mm
Coil outer diameter	$D_o$	10.5mm
Total thickness	$h$	0.5mm



Inductance vs. current characteristic

\* Inductance drops 30% at  $I_{sat}$



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