

Micro coil NFC antenna

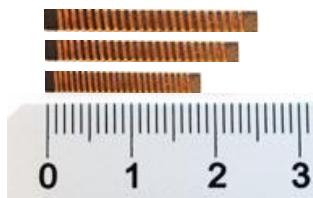
Micro coil NFC antennas are off-the-shelf antennas that eliminate major considerations for NFC antennas – size, placement, layout and RF performance. Micro coil NFC antenna has more benefits compared to planar NFC antenna; mainly while used in specific applications.

Antenna Design

Micro coil NFA antenna is a solenoid type of antenna with a small size ferrite core wound with multiple wires. It is available in various sizes, starting from (L x W x T): 9mm x 0,93mm x 0,785mm.

Basic portfolio (L x W x T)

- * 18 x 1.385 x 3.14 mm
- * 23 x 1.185 x 3.14 mm
- * 25 x 1.685 x 3.14 mm
- * 9 x 0,93 x 0,785 mm
- * 18 x 1,73 x 0,785 mm
- * 23 x 1,73 x 0,785 mm
- * 28 x 1,73 x 0,785 mm



Performance Characteristics

Supported standards

- * ISO/IEC 14443 Type A, B, F (up to 848 kbit/s) with ALM
- * Supports both ALM and PLM
- * EMVCO NFC CE and Mobile NFC Association MoNA
- * RoHS

Electrical Features

Electrical features of Micro coil antenna systems were measured on LGM antenna measurement system

Antenna Coil Part Number	Nominal Inductance - Current 100mArms		Rated current		Q - quality@13.56MHz Current 100mArms	Self-resonance min.
	Open Air	Metal environment	Continuous current	Up to 1s		
9mm A.6.21	1.25 uH	1.2 uH	100mArms	250mArms	15	100 MHz
9mm B.5.21	1.23 uH	1.15 uH			15	
18mm B.9.21	1.26 uH	1.15 uH			23	
23mm B.9.23	1.4 uH	1.29 uH			23	
28mm B.9.25	1.47 UH	1.36 uH			23	

Influence of Metal

Coil antennas have stable performance in metal environment. From approximately 3 mm distance between a metal plate and the antenna the influence of the metal on the antenna inductance is negligible. Properly designed metal housing may even increase the effectiveness of the antenna performance.

NFC performance examples (9mm antenna)

- * In **PLM** with NXP tag ICODE SL2S2002: 25mm (read by HTC U11)
- * In **ALM – CE mode**: 42 mm in plastic / 35mm in metal casing. **R/W mode** 5-27mm

Assembling

Micro coil NFC antenna is SMT component. Having electrodes at both ends it is capable of reflow soldering and surface mounting, and thus requires no additional pin connectors. Coil antenna can be picked from a tape and directly placed on PCB.

Comparison with planar antennas used in smartphones

NFC antennas – CE and R/W modes (example for smartphones)	Planar antennas	Micro coil antennas
Size – area	400mm ²	80mm ²
Omni-directional performance	No	Yes
Functionality in metal environment	No	Yes
NFC product design complexity	High	Low
Tuning under cover complexity	High	Lower
BOM – ground plane, ferrite shielding	Yes	No
BOM assembly costs	High	Lower

Applications

- * tiny devices with size limits to place standard NFC planar antenna – under skin glass tubes, bracelets, glasses, earphones, speakers (NFC tag, pairing, secure access)
- * in any metal housing objects and complicated electronic environments (ALM and PLM)
- * micro paying wearables – rings, watches, key fobs (EMVCo CE mode)
- * smartphones and feature phones (EMVCo CE mode, R/W mode)
- * secure microSD cards (CE mode) and SD cards (CE and R/W mode) – for payments, secure access, pairing, flash memory locking

Development Areas

We have developed various combinations of Micro coil NFC antenna modules. These NFC modules passed EMVCo (CE), MoNA and NFC Forum Power transfer (R/W) criteria in various environments - plastic, glass and metal. We will help you with selection of Micro NFC coil antenna design and tuning with a particular NFC controller, NFC tag, sensor or secure chip.