

# "High Frequency Ceramic Solutions"

NFC antenna with ferrite shielding feature for over-metal/battery/rugged/industrial/ home/automotive and extended reading distance environments. P/N NFC1AT80A01N7

Applications: Lock Access, Pairing, Data Communications, Payment systems, RFID

Detail Specification: 1/7/2016

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For optimized reading distance and speed, other inductance values<sup>1</sup> may be selected, go to: [www.johansontechnology.com/antennas](http://www.johansontechnology.com/antennas)

## General Specifications

|                                    |               |                |
|------------------------------------|---------------|----------------|
| Part Number                        | NFC1AT80A01N7 |                |
| Frequency (MHz)                    | 13.56         |                |
| Reading Distance <sup>2</sup> (mm) | >40 EMVCO     | >20 Card (Avg) |
| Inductance @ 13.56MHz              | 1.7 ±10% µH   |                |
| Quality Factor @ 13.56 MHz         | >30           |                |

<sup>1</sup>Depending on design and end product environment

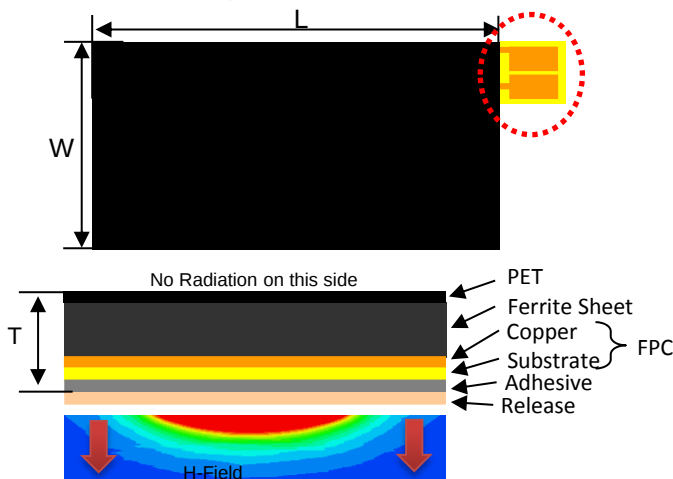
<sup>2</sup>Reading distance measured using QP3000 and NXP-PN65N

## Part Number Explanation

| P/N    | Packing | Bulk (loose) | Suffix = S | eg. NFC1AT80A01N7S |
|--------|---------|--------------|------------|--------------------|
| Suffix | Style   | Trays        | Suffix = E | eg. NFC1AT80A01N7E |

## Mechanical Dimensions

|   | In            | mm           |  |
|---|---------------|--------------|--|
| L | 1.969 ± 0.012 | 50.00 ± 0.30 |  |
| W | 1.181 ± 0.012 | 30.00 ± 0.30 |  |
| A | 0.256 ± 0.012 | 6.50 ± 0.30  |  |
| B | 0.354 ± 0.008 | 9.00 ± 0.20  |  |
| T | 0.015 Max.    | 0.38 Max.    |  |
| a | 0.177 ± 0.012 | 4.50 ± 0.30  |  |
| b | 0.118 ± 0.012 | 3.00 ± 0.30  |  |
| c | 0.039 ± 0.012 | 1.00 ± 0.30  |  |
| d | 0.039 ± 0.012 | 1.00 ± 0.30  |  |
| e | 0.039 ± 0.012 | 1.00 ± 0.30  |  |

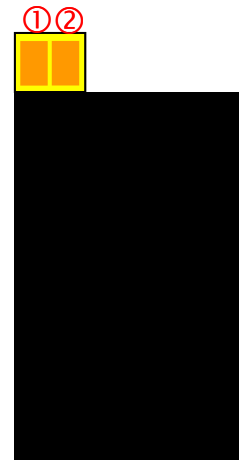


## Applications

- Data Communications
- Lock entry systems
- Payment systems
- RFID Tags reader/writer
- Instant, High Data Rate transfers
- Contactless smart cards
- Transit Access systems
- Security

## Terminal/Contact Pads' Configuration

| No. | Function |
|-----|----------|
| 1   | Feed     |
| 2   | Feed     |



\*Feed 1/2 interchangeable

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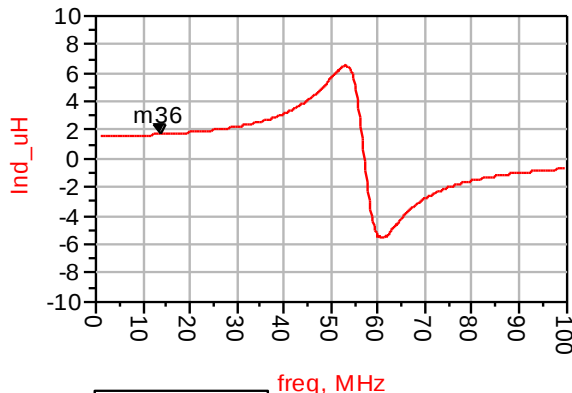
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## Typical Electrical Characteristics (T=25 °C) without metal plane

Antenna Inductance (uH)

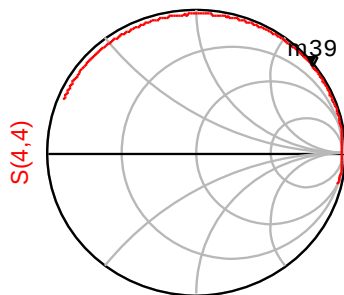


m36  
freq=13.56MHz  
Ind\_uH=1.701

### Features

- Can be mounted on top of metal
- Available in various inductance values depending on environment
- No custom antenna layout design needed
- Near field inductive coupling
- Ferromagnetic material for fast, instant coupling
- Shape, dimensions and matching circuit design for easy integration of all 13.56MHz NFC applications
- Thin profile

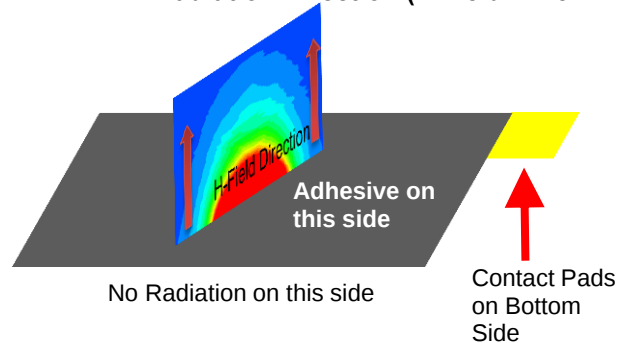
Antenna Impedance (Ohms)



freq (1.000MHz to 100.0MHz)

m39  
freq=13.56MHz  
S(4,4)=0.988 / 38.062  
impedance = 2.865 + j144.90

Radiation Direction (H Field  $\geq 1.5A/m$ )



<sup>1</sup>Depending on design and end product environment

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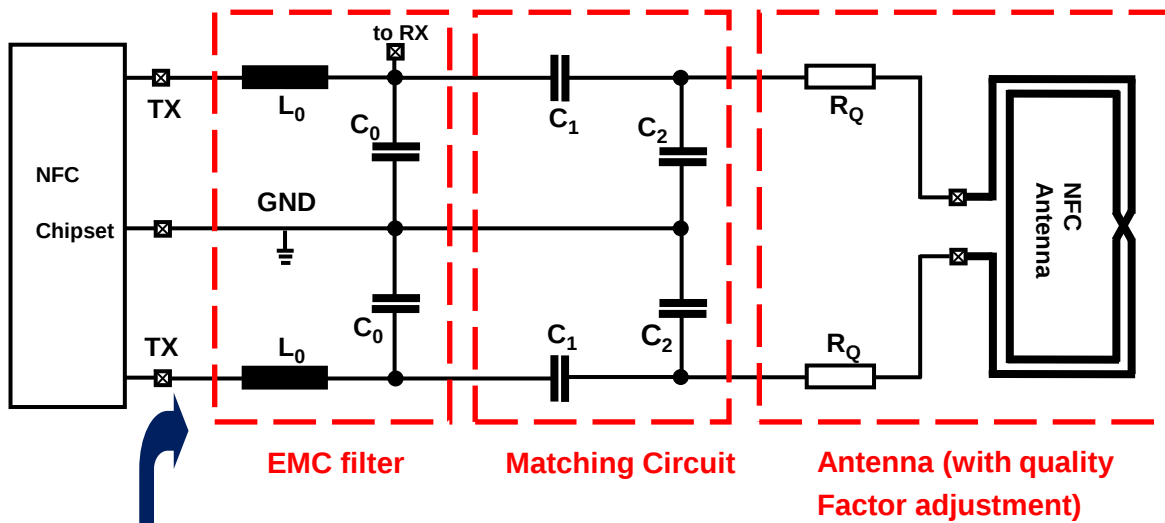
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## Antenna Matching Application Note



| Component | Note                                                                                                                                                                    |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $L_0$     | The EMC filter is used to reduce harmonics of the 13.56 MHz carriers and perform as an impedance transformer                                                            |
| $C_0$     |                                                                                                                                                                         |
| $C_1$     | The matching circuit elements $C_1$ and $C_2$ must be tuned to get the required matching resistance $R_{match}$ ( $X_{match}=0$ ) at the I/O pins of NFC IC             |
| $C_2$     |                                                                                                                                                                         |
| $R_q$     | The quality factor damping resistors $R_Q$ are used to obtain a certain pulse shape as required by the standard. Normally, $R_Q$ is chosen to make the antenna $Q < 35$ |

Let us help you tune your antenna for proper operation and maximum readout distance!

Details here: [www.johansontechnology.com/ipc-antenna-services](http://www.johansontechnology.com/ipc-antenna-services)

Contact our RF Engineers here: <http://www.johansontechnology.com/ask-a-question>

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## Cable Recommendation

When deciding what type of cable is best for your application, there are a few key factors to keep in mind. While a larger gauge cable provides lower losses, they are typically more rigid and difficult to bend. The opposite is true for thinner gauge wires in that they are more flexible at the cost of increased loss. **For this reason, we feel that the 1.13 mm micro coax cable strikes the best balance between performance, flexibility, and even cost.**

**We recommend a minimum cable length of 10cm. This helps to reduce stress that the cable experiences when connecting to the main PCB. And while there isn't a maximum length, keep in mind that increased cable length does contribute to increased loss.**

## Cable Soldering

**We recommend directly soldering the RF cable onto the NFC antenna pads**

1. Strip RF cable exposing roughly 2mm of each layer
2. Solder center conductor to one of the feeds (the two are interchangeable)
3. Solder the braided shield to the remaining feed (the two are interchangeable)
4. Ensure solid solder joints between cable and corresponding NFC feeds



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**For layout positioning review assistance, contact our Applications Team at:**

[www.johansontechnology.com/component/techquestion](http://www.johansontechnology.com/component/techquestion)

**For more antennas and download measured S-parameters, go to:**

[www.johansontechnology.com/antennas](http://www.johansontechnology.com/antennas)

**RoHS Compliance**

[www.johansontechnology.com/technical-notes/rohs-compliance.html](http://www.johansontechnology.com/technical-notes/rohs-compliance.html)

**MSL Info**

[www.johansontechnology.com/technical-notes/msl-rating.html](http://www.johansontechnology.com/technical-notes/msl-rating.html)

**Packaging information**

[www.johansontechnology.com/ipcpackaging.html](http://www.johansontechnology.com/ipcpackaging.html)

**Soldering Information**

[www.johansontechnology.com/ipcsoldering-profile](http://www.johansontechnology.com/ipcsoldering-profile)

**Recommended Storage Condition and Max Shelf Life**

[www.johansontechnology.com/ipcstorage-shelflife](http://www.johansontechnology.com/ipcstorage-shelflife)

## Why use a Ferrite Shielded NFC antenna Vs a regular flex PCB NFC antenna?

- When a metal-content object (i.e. battery, plate, GND PCB, LCD display) is placed near, above underneath the NFC antenna, the magnetic field will generate undesired EM current on metal plate, which are called eddy currents which will not permit communication unless customization is done
- These eddy currents will absorb power, weaken the E-field and lead to detuning of the antenna, rendering it non-operational
- Most of the time it is necessary to "load" or "shield" the antenna with ferrite or other mechanically precise metals for proper operation in metallic environments/layouts

### End Product Examples

|                          |                       |
|--------------------------|-----------------------|
| Payment Terminal         | Tablets/Notebooks     |
| Transit access receivers | Lock/Security Systems |
| Smartphones              | In-store reward tags  |
| Wearables/Fitness Reader | Vehicle entry locks   |



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