

## A New Embedded NFC Antenna for Full Metal Mobile Devices

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As new generations of wireless communication devices become smaller and packed with more multi-band functions, designing antenna systems for such devices becomes more challenging especially when they have partial or complete metallized back covers, such as a metal back cover on a cell phone or tablet. It is particularly difficult for embedded NFC antennas which operates in the 13.56 MHz band. This low frequency requires the use of large coil acting as antenna radiator (typical size is around 55mm x 30 mm).

In typical devices, such as mobile devices or laptop, these antenna radiators are provided with a magnetic sheet that improves the communication efficiency in the 13.56 MHz band, and are mounted in the back cover of the device.

The Ethertronics NFC jack antenna is an embedded NFC antenna for metallized enclosures and housings used with wireless communication devices. The antenna, is located on one side of the device and provides a directive magnetic field along its main axis. The antenna is designed to be located against one of the side of the metallized enclosure having a small opening (typically a 3.5mm circular diameter) in its metallization. This NFC antenna system allows the user of the device to hold the device without disturbing the NFC antenna, offering a user-friendly NFC functionality as the host device can be directly pointed toward the NFC reader (see fig 1)

In “tag card mode” the reading distances measured (see fig 2) on a test bench (see fig 3) show that the tag attached to the NFC jack can be read at a 5mm which is roughly twice the distance to read a passive tag, with a NFC coil, behind a metal frame.

In “reader mode” the device equipped with the Ethertronics NFC jack antenna can read NFC tags up to 8mm distance.



Figure 1

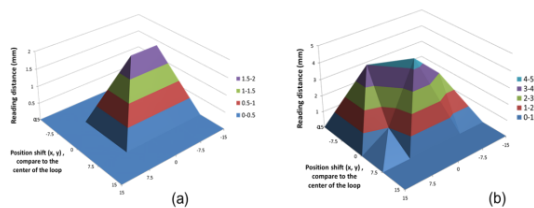


Figure 2: Reading distance for Ethertronics NFC jack within a full metal phone (a) and for a typical NFC loop behind a mobile phone metal cover (b)



Figure 3: Card mode test bench

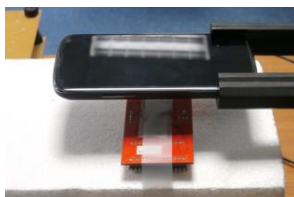


Figure 4: Example of reader mode tests