

NFC NUTSHELL KIT

NFC Antennas

USER MANUAL

REVISION 1.2

Document information

| Info | Content |
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| Keywords | User Manual GMMC Nutshell Kit |
| Abstract | This document describes how to use NFC Antennas of the GMMC's NFC Nutshell KIT |

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1. NFC Nutshell Antenna Modules

1.1 General Topology

The Kit consists of different types of modules, which can be connected application specific. Each module type has a different color.

- Interface
- MCU
- NFC
- Antenna

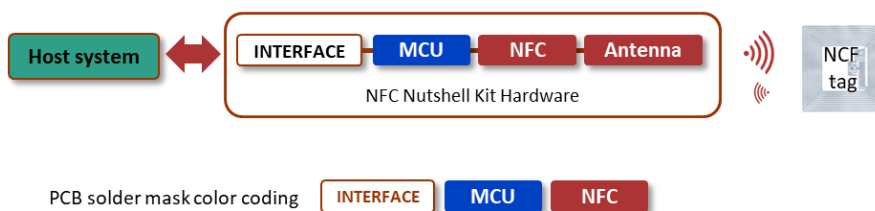


Fig 1 Kit modules and PCB solder mask color coding

1.2 Module interconnection concept

The Nutshell Kit can be operated in different configurations. The connection between the different modules is done via FFC cables and zero force sockets.

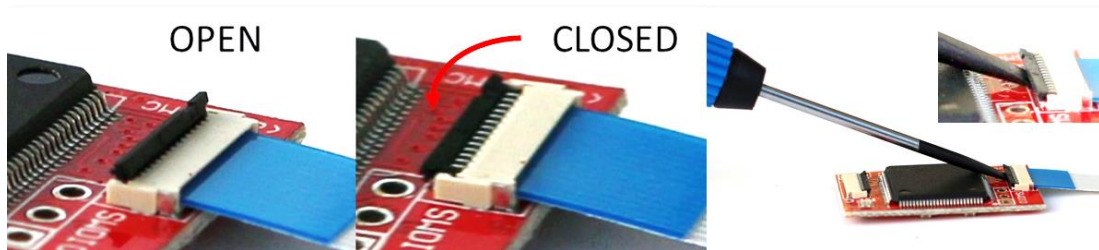


Fig 2 Kit modules interconnection via FFC cables

For ensuring a proper connection the cable must be inserted straight at any time



Fig 3 correct insertion of the FFC cable

The Kit modules can be connected to a host via different interface modules see details in the NFC Nutshell Kit interface module user manual.

Important Notes:

- *Open and close the connector **carefully***
- *Always **insert straight** – do not apply force*
- *Avoid cable/connector misalignment – potential short cut and damage*
- *If you observe communication issues over time, exchange the FFC cable with a spare one*
- *DO NOT disconnect, bend or move the Kit while modules are powered to avoid short circuits*

1.2.1 Module Connector Signal pin-out

The following figure describes the signal which can be analyzed using the Extender module.

Detailed information can be found in the user manual of the interface modules.

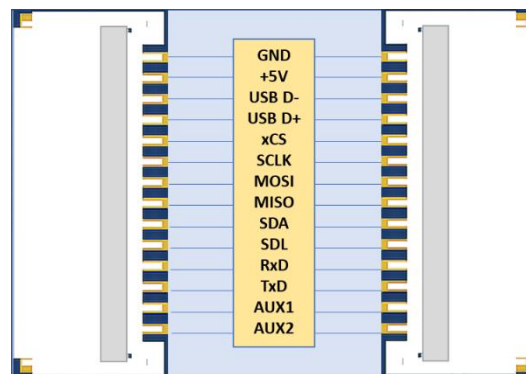


Fig 4 Module Zero Force FFC Connector Signal Pinout

1.3 Module power concept

The Kit requires a power supply of +5V DC. This can be applied using one of the following options:

- Using one of the interface module
 - USB supply voltage (4.75V to 5.25 V) is available on all connected modules using the USB plug.
- Using an external power supply and the Signal extender module
 - +5V is required

If other voltages than 5V are needed by the module, this is generated onboard with an LDO.

Important Note:

If using an external power supply, ensure the correct amplitude and polarity before power up of the Kit.

2. Antenna Modules



Fig 5 Antenna Module

Different antennas are available which can be easily connected to the NFC Nutshell kit using a twisted 30cm 3 wire cable which is shown next.

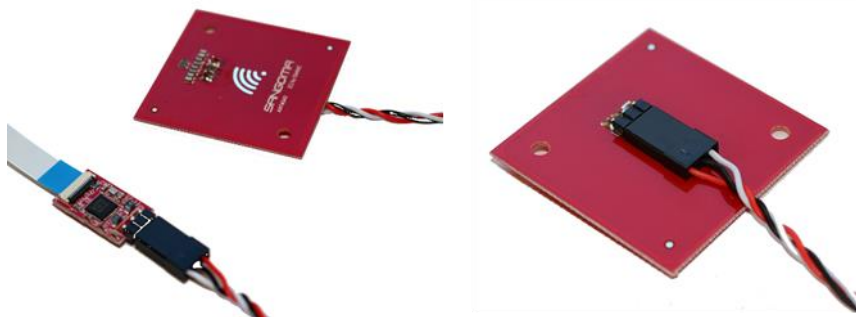


Fig 6 Available Kit components and PCB solder mask color coding

Note: 3 pin antenna connection is symmetrical with no preferred direction

The matching of each antenna is optimized for using with all different featured NFC Modules.

The following Antennas are currently available for the NFC Nutshell Kit

2.1 Antenna 72x48mm (ID-1)



Fig 7 Antenna 72x48mm

This Antenna is ideal for using together with standard ID-1 tags. It has a good performance and also features 2 additional symmetric pins for Dynamic Power control (This feature is only supported by some NFC front-ends like the PN5180).

2.2 Antenna 40x40mm



Fig 8 Antenna 40x40mm

This Antenna has performance of up to 10 cm and can be used in application with limited area.

2.3 Antenna 20x20mm



Fig 9 Antenna 20x20mm

This tiny antenna has an excellent range of about 8 cm. beside the small form factor the mounting holes can be used for easy integration.

2.4 Antenna 20x10mm



Fig 10 Antenna 20x10mm

This is the tiniest antenna available for the NFC Nutshell kit. It is ideal for small tags, but also ID-1 Tags can be used in a range up to 1 cm.

3. Antenna Selection guide

Different applications require different antennas. In general, it can be said that the read/write distance is about the size of the diagonal of the reader antenna. So a bigger antenna results in a higher maximum distance.

Another important factor is the used tag. These are manufacturer-dependent and matched at different frequencies. This leads to different performance for same-sized tags from different manufacturers.

The used protocol has also a huge impact on the performance. ISO 15693-based tags need less energy for correct operation, so these can be used in much higher distances.

NFC NUTSHELL KIT

NFC Antennas

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Revision history

| Rev | Date | Description |
|-----|----------------------------|----------------------|
| 1.0 | 2018 Feb. 4 th | Initial version MGA |
| 1.1 | 2018 Feb. 5 th | Updated Template TPI |
| 1.2 | 2018 Mar. 17 th | Added features TPI |

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