



NTAG I<sup>2</sup>C *plus*  
connected NFC tag  
solution by NXP

## Your entryway to NFC: The simplest, most cost-effective NFC solution

Designed to be the perfect enabler for NFC in home-automation and consumer applications, this feature-packed, next-generation connected NFC tag is the fastest, most BoM optimized way to add tap-and-go connectivity to just about any electronic device.

### KEY FEATURES

- ▶ Interoperability
  - NFC interface ISO/IEC 14443A Part 2&3 compliant
  - NFC Forum Type 2 Tag compliant
  - Input capacitance of 50 pF
  - Unique 7-byte serial number
  - GET VERSION command for easy identification of chip type and supported features
- ▶ I<sup>2</sup>C interface
  - Standard (100 kHz) and fast (400 kHz) modes
- ▶ Memory
  - 888/1912 bytes of EEPROM-based user memory
  - Clear arbitration between NFC and I<sup>2</sup>C memory access
- ▶ Data transfer
  - Pass-through mode with 64-byte SRAM buffer
  - FAST READ and FAST WRITE commands for higher data throughput
- ▶ Security and memory-access management
  - Full, read-only, or no memory access from NFC interface, based on 32-bit password protection
  - Full, read-only, or no memory access from I<sup>2</sup>C interface
  - Originality signature based on Elliptic Curve Cryptography (ECC) for simple, genuine authentication
  - NFC silence to disable the NFC interface

### ▶ Power management

- Configurable field-detection output signal for data-transfer synchronization and device wake-up
- Energy harvesting from NFC field, so as to power external devices (e.g. connected microcontroller)

### KEY BENEFITS

- ▶ Full interoperability with every NFC-enabled device
- ▶ Smooth end-user experience with super-fast data exchange via NFC and I<sup>2</sup>C interface
- ▶ Zero-power operation with non-volatile data storage
- ▶ Lowest bill of materials and smallest footprint for NFC solution in embedded electronics
- ▶ Data protection to prevent unauthorized data manipulation
- ▶ Multi-application support, enabled by memory size and segmentation options



## APPLICATIONS

- ▶ IoT nodes (home automation, smart home, etc.)
- ▶ Pairing and configuration in consumer applications
- ▶ NFC accessories (headsets, speakers, etc.)
- ▶ Wearable infotainment
- ▶ Fitness equipment
- ▶ Consumer electronics
- ▶ Healthcare
- ▶ Smart printers
- ▶ Meters
- ▶ Electronic shelf labels

NXP NTAG I<sup>2</sup>C *plus* is a family of connected NFC tags that combine a passive NFC interface with a contact I<sup>2</sup>C interface. As the second generation of NXP's industry-leading connected-tag technology, these devices maintain full backward compatibility with first-generation NTAG I<sup>2</sup>C products, while adding new, advanced features for password protection, full memory-access configuration from both interfaces, and an originality signature for protection against cloning.

The second-generation technology provides four times higher pass-through performance, along with energy harvesting capabilities, yet NTAG I<sup>2</sup>C *plus* devices are optimized for use in entry-level NFC applications and offer the lowest BoM of any NFC solution.

## DONE IN AN INSTANT

I<sup>2</sup>C and NFC communications are based on simple, standard command sets, and are augmented by the demo board OM5569/NT322E, which includes online reference source code. All that's required is a simple antenna design, with no or only limited extra components, and there are plenty of reference designs online for inspiration. The very small footprint (as low as 1.6 x 1.6 x 0.5 mm) shrinks PCB space and enables very compact designs.

## ZERO POWER BUDGET

NFC tags are passive by default, meaning they can be powered by another device, to save battery power. Energy harvesting even lets the tag power an external device, such as an MCU. The field-detection mechanism enables device wake-up as soon as an NFC field is detected, for longer battery life. Data storage can be done offline, via non-volatile memory, from the NFC or I<sup>2</sup>C interface. Also, since the NFC interface

complies with NFC Forum guidelines, the tag can interact with a full range of NFC-enabled devices.

## BEST USER EXPERIENCE

The integrated SRAM buffer offers faster data transfer than a standard EEPROM, and is a convenient mechanism for managing I<sup>2</sup>C/NFC communication handoffs while keeping both interfaces active. Fast data transfer is guaranteed by the pass-through mode, which works with the FAST READ and FAST WRITE commands to push data in one shot, and thereby limiting command overhead. The high data-transfer rates, along with reliable multi-interface communication, create smoother end-user interactions.

## SECURE DATA, CONTROLLED INTERACTIONS

Every type of memory access, including the SRAM buffer, can be fully configured for both interfaces. For NFC, a 32-bit password segments the memory into open and restricted access, to secure data according to specified access rights. For I<sup>2</sup>C, access can be restricted to ensure proper data exchange between embedded electronics and the NFC device. Anti-cloning protection is supplied by an authentication mechanism based on a 32-byte, ECC-based signature that uses a standard algorithm. The result is easy software integration of the originality check procedure, without the need for specific hardware requirements.

| Feature  | NTAG I <sup>2</sup> C 1k <i>plus</i>         | NTAG I <sup>2</sup> C 2k <i>plus</i> |
|--|--|--------------------------------------|
| <b>Memory</b>                                    |  |                                      |
| User memory size [bytes]                         | 888  | 1.912                                |
| Write endurance [cycles]                         | 500  |                                      |
| Data retention [years]                           | 20   |                                      |
| Operating temperature [°C]                       | -40 to +105                                  |                                      |
| Storage temperature [°C]                         | -55 to +125                                  |                                      |
| <b>NFC interface</b>                             |  |                                      |
| ISO/IEC compliance                               | ISO 14443 A Part 2&3                         |                                      |
| NFC Forum compliance                             | Type 2 Tag                                   |                                      |
| Baudrate [kbits/s]                               | 106  |                                      |
| Resonance capacitance [pF]                       | 50   |                                      |
| <b>I<sup>2</sup>C interface</b>                  |  |                                      |
| Speed [kbit/s]                                   | 100/400                                      |                                      |
| Supply [V]                                       | 1.67 to 3.6                                  |                                      |
| <b>Security</b>                                  |  |                                      |
| Unique serial number [bytes]                     | 7  |                                      |
| Access conditions                                | Lock bits / 32-bit password                  |                                      |
| <b>Special features</b>                          |  |                                      |
| 64-byte SRAM buffer                              | Yes  |                                      |
| FAST WRITE                                       | Yes  |                                      |
| FAST READ  | Yes  |                                      |
| ECC-based originality signature                  | Yes  |                                      |
| Configurable field detection                     | Yes  |                                      |
| Wake-up signal for data-transfer synchronization | Yes  |                                      |
| Energy harvesting                                | Yes  |                                      |
| <b>Delivery form</b>                             |  |                                      |
| Packages   | XQFN8 / TSSOP8 / SO8                         |                                      |
| Wafer  | Bumped, 8 inch, 150µm, on film frame carrier |                                      |

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