NTAG203

NFC Forum Type 2 Tag compliant IC with 144 bytes user memory

Rev. 3.2 — 12 December 2011
218632

Product short data sheet
COMPANY PUBLIC

1. General description

NXP Semiconductors has developed NTAG203 - NFC Forum Type 2 Tag compliant IC - to be used with NFC enabled devices according to NFC Forum technical specifications (see Ref. 9 and Ref. 10), according to NFC Forum recommendations or Proximity Coupling Devices (PCD), according to ISO/IEC 14443A (see Ref. 2). The communication layer (RF Interface) complies to parts 2 and 3 of the ISO/IEC 14443A standard. The NTAG203 is primarily designed for NFC Forum Type 2 Tag applications (i.e. Smart Advertisement, connection handover, Bluetooth simple pairing, WiFi Protected set-up, call request, SMS, goods and device authentication and others).

1.1 Contactless energy and data transfer

Communication to NTAG can be established only when the IC is connected to a coil. Form and specification of the coil is out of scope of this document.

When the NTAG is positioned in the RF field, the high speed RF communication interface allows the transmission of the data with a baud rate of 106 kbit/s.

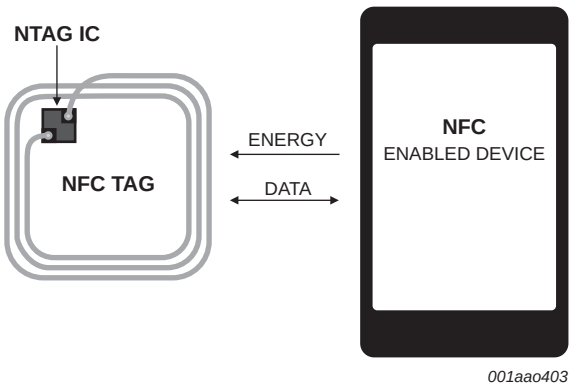

Fig 1. NFC Tag interacting with NFC enabled device

1.2 Naming conventions

Table 1. Short naming convention (for easier product identification)

Family name	Description
NTAG	NXP NFC Tag product family name
2	Platform indicator
0	Generation number (starting from 0)
3	Code number for memory size (0 : < 64 bytes, 1 : 64-96 bytes; 2 : 96-128 bytes; 3 : 128-256 bytes)
F	Delivery option: if stated, it is a HWSON8 package with Field Detection pin

2. Features and benefits

2.1 RF Interface (ISO/IEC 14443A)

- Contactless transmission of data and supply energy (no battery needed)
- Operating distance: up to 100 mm (depending on field strength and antenna geometry)
- Operating frequency: 13.56 MHz
- Fast data transfer: 106 kbit/s
- High data integrity: 16-bit CRC, parity, bit coding, bit counting
- True anticollision
- 7 byte serial number (cascade level 2 according to ISO/IEC 14443-3)

2.2 EEPROM

- 168 bytes of total memory, divided in 42 pages (4 bytes each)
- 144 bytes of user r/w memory area, divided in 36 pages (4 bytes each)
- Field programmable read-only locking function per page for first 64 bytes
- Field programmable read-only locking function per block
- 32-bit user definable One-Time Programmable (OTP) area
- 16-bit counter
- Data retention of 5 years
- Write endurance 10000 cycles

2.3 NFC Forum Tag 2 Type compliance

NTAG203 IC provides full compliance to the NFC Forum Tag 2 Type technical specification (see Ref. 9) and enables NDEF data structure configurations (see Ref. 10).

2.4 Security

- Anti-cloning support by unique 7-byte serial number for each device
- 32-bit user programmable OTP area
- Field programmable read-only locking function per page for first 512 bits
- Read-only locking per block for rest of memory

2.5 Cascaded UID

The anticollision function is based on an IC individual serial number called Unique IDentifier. The UID of the NTAG203 is 7 bytes long and supports cascade level 2 according to ISO/IEC 14443-3.

2.6 Anticollision

An intelligent anticollision function according to ISO/IEC 14443 allows to operate more than one card in the field simultaneously. The anticollision algorithm selects each card individually and ensures that the execution of a transaction with a selected card is performed correctly without data corruption resulting from other cards in the field.

3. Quick reference data

Table 2. Quick reference data

In accordance with the Absolute Maximum Rating System (IEC 60134). [1][2][3]

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
f_i	input frequency			-	13.56	-	MHz
C_i	input capacitance	50 pF version (bare silicon and HWSON8)	[4]	44	50	56	pF
EEPROM characteristics							
$t_{cy(W)}$	write cycle time			-	4.1	-	ms
t_{ret}	retention time	T_{amb} = 22 °C		5	-	-	year
$N_{endu(W)}$	write endurance	T_{amb} = 22 °C		10000	-	-	cycle

[1] Stresses above one or more of the limiting values may cause permanent damage to the device.

[2] These are stress ratings only. Operation of the device at these or any other conditions above those given in the Characteristics section of the specification is not implied.

[3] Exposure to limiting values for extended periods may affect device reliability.

[4] LCR meter HP 4285, T_{amb} = 22 °C, Cp-D, f_i = 13.56 MHz, 2Veff.

4. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
NT2H0301G0DUD	wafer	8 inch wafer (sawn, laser diced; 120 μm thickness, on film frame carrier; electronic fail die marking according to SECSII format)	-

5. Block diagram

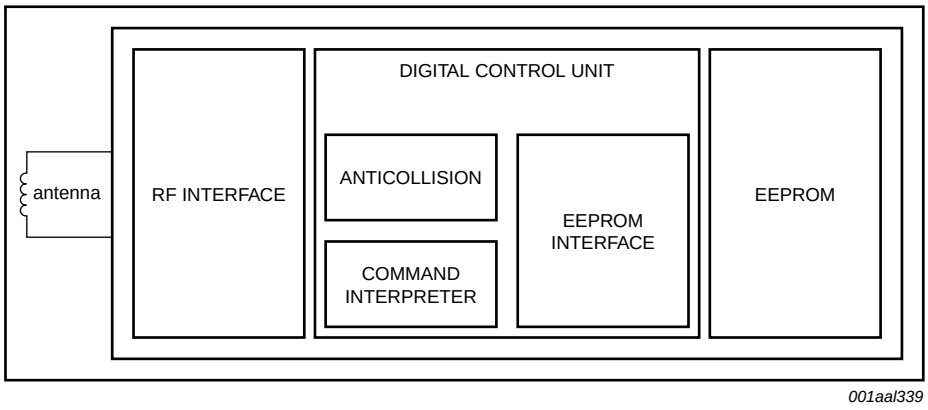

Fig 2. Block diagram

6. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). [1][2]

Symbol	Parameter	Conditions		Min	Max	Unit
I_I	input current			-	30	mA
T_{stg}	storage temperature			–55	+125	°C
T_{amb}	ambient temperature			–25	+70	°C
V_{ESD}	electrostatic discharge voltage	measured on pin LA-LB	[3]	2	-	kV

[1] Stresses above one or more of the limiting values may cause permanent damage to the device.

[2] Exposure to limiting values for extended periods may affect device reliability.

[3] MIL Standard 883-C method 3015; Human body model: C = 100 pF, R = 1.5 kΩ.

7. References

[1] **Data sheet —** NTAG203 NFC Forum Type 2 Tag compliant IC with 144 bytes user memory, BU-ID Doc.No.: 2138**[1]

[2] **ISO/IEC —** International Organization for Standardization/International Electrotechnical Commission

[3] **Interface Platform Type Identification Procedure —** Application note, BU-ID Doc. No.: 0184**

[4] **ISO/IEC 14443 PICC Selection —** Application note, BU-ID Doc. No.: 1308**

[5] **Ultralight Features and Hints —** Application note, BU-ID Doc. No.: 0731**

[6] **Ultralight as Type 2 Tag —** Application note, BU-ID Doc. No.: 1303**

[7] **(Card) Coil Design Guide —** Application note, BU-ID Doc. No.: 0117**

1. ** ... document version number

[8] **MF0ICU1 Functional specification MIFARE Ultralight —** Product data sheet, BU-ID Doc. No. 0286**

[9] **Tag 2 Type Operation, Technical Specification —** NFC Forum, 09.07.2007

[10] **NFC Data Exchange Format (NDEF), Technical Specification —** NFC Forum, 24.07.2006

[11] **NXP Semiconductors guidance for soldering the HWSON8 package; URL: http://www.nxp.com/#/page/content=[f=/packages/SOT1069-2.xml] —** NXP Semiconductors, 21.08.2009

8. Revision history

Table 5. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NTAG203_SDS v.3.2	20111212	Product short data sheet	-	NTAG203_SDS v.3.1
Modifications:	• Section 9.4 “Licenses”: added			
NTAG203_SDS v.3.1	20111206	Product short data sheet	-	NTAG203_SDS v.3.0
Modifications:	• Table 3 “Ordering information”: Type number changed from MF0ICU1701NDUD into NT2H0301G0DUD • Section 7 “References”: updated			
NTAG203_SDS v.3.0	20111019	Product short data sheet	-	-

9. Legal information

9.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

9.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

9.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

9.4 Licenses

Purchase of NXP ICs with NFC technology

Purchase of an NXP Semiconductors IC that complies with one of the Near Field Communication (NFC) standards ISO/IEC 18092 and ISO/IEC 21481 does not convey an implied license under any patent right infringed by implementation of any of those standards. A license for the patents portfolio of NXP B.V. for the NFC standards needs to be obtained at Via Licensing, the pool agent of the NFC Patent Pool, e-mail: info@vialicensing.com.

9.5 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

MIFARE — is a trademark of NXP B.V.

MIFARE Ultralight — is a trademark of NXP B.V.

10. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

11. Tables

12. Figures

13. Contents

For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 12 December 2011
218632