NTAG203F

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

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Product short data sheet
COMPANY PUBLIC

1. General description

NXP Semiconductors has developed NTAG203F - NFC Forum Type 2 Tag compliant IC - to be used with NFC enabled devices according to NFC Forum technical specifications (see Ref. 8 and Ref. 9), according to NFC Forum recommendations or Proximity Coupling Devices (PCD), according to ISO/IEC 14443A (see Ref. 1). The communication layer (RF Interface) complies to parts 2 and 3 of the ISO/IEC 14443A standard. The NTAG203F is primarily designed for NFC Forum Type 2 Tag applications in electronics (i.e. connection handover, Bluetooth simple pairing, Wi-Fi Protected set-up, device authentication, gaming 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.

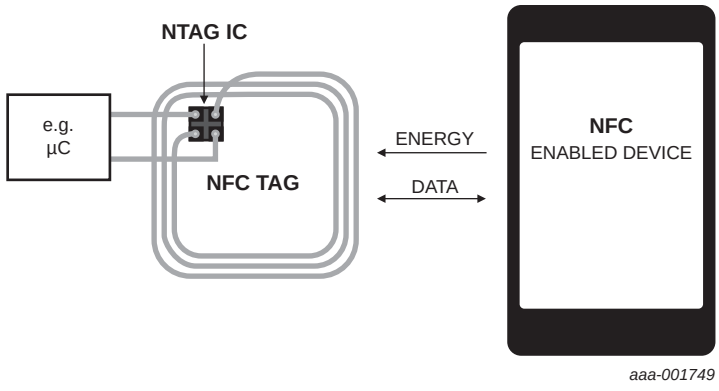

Fig 1. NFC Tag interacting with NFC enabled device

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	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

NTAG203F IC provides full compliance to the NFC Forum Tag 2 Type technical specification (see Ref. 8) and enables NDEF data structure configurations (see Ref. 9).

2.4 Field detection

NTAG203F features an additional RF field detection functionality. The corresponding output signal can be used as interrupt source to e.g. wake up an embedded microcontroller or trigger further actions. Typical applications are Bluetooth and Wi-Fi pairing.

For detailed information refer to Application note Ref. 11 “How to use the FD pin”.

2.5 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

2.6 Cascaded UID

The anticollision function is based on an IC individual serial number called Unique IDentifier. The UID of the NTAG203F is 7 bytes long and supports cascade level 2 according to ISO/IEC 14443-3.

2.7 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	[4]	44	50	56	pF
V_o	output voltage	FD pin		1.2	1.8	2.0	V
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
NT2H0301F0DTP	HWSON8	plastic leadless module carrier package; 35 mm wide tape	-

5. Block diagram

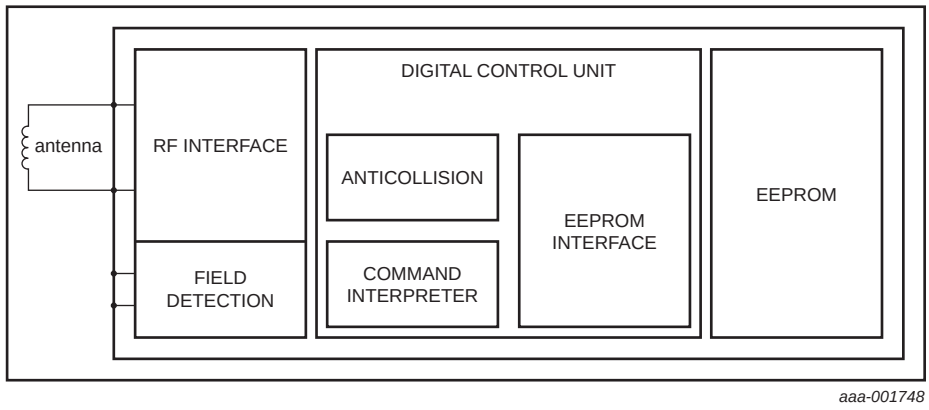

Fig 2. Block diagram

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
I_{load}	load current	FD-V_{SS}	[4]	-	10	µA
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.

[4] For safe operation the suggested maximum static current from the VDD pin shall not be above the maximum load current (refer to Application note Ref. 11 “How to use the FD pin”).

7. References

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

[2] **Interface Platform Type Identification Procedure —** Application note, BU-ID Doc. No.: 0184**[1]

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

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

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

1. ** ... document version number

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

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

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

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

[10] **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

[11] **How to use the FD pin —** Application note, BU-ID Doc. No.: 2214*

8. Revision history

Table 5. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NTAG203F_SDS v.3.0	20111215	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".

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