Shanghai Fudan Microelectronics Group Company Limited

复旦微电子

FM11NT0X1D

NFC Forum Type2 Tag compliant IC with Dual Interface

Datasheet

Dec.2014

Trademarks

Contents

1 Product Overview

1.1 Introduction

FM11NT0X1D is a NFC Forum Type 2 Tag chip offering both contactless and contact interfaces. In addition to the passive NFC Forum compliant contactless interface, the IC features an I2C(FM11NT0X1DI) or SPI(FM11NT0X1DS) contact interface, which can communicate with a microcontroller.

FM11NT0X1D features a configurable Field Detection Pin, which provides a trigger to an external device depending on the activities at the RF interface.

FM11NT0X1D can also supply power to external (low power) devices (e.g., a microcontroller) via the embedded energy harvesting circuitry.

FM11NT0X1D can be used in applications such as electronic shelf lables, Home automation, Consumer electronics, Healthcare, etc.

Please consult Fudan Micro Electronics Company for more documents.

1.2 Features

1.2.1 Key features

- Ø RF interface NFC forum Type 2 Tag compliant.
- Ø I2C or SPI interface, zero power consumption on standby mode.
- Ø Configurable field detection pin based on open drain implementation that can be triggered upon the following events:
  - l A RF field presence
  - l The first Start-of-Frame
  - l The selection of the tag only
- Ø Energy harvesting from the field to power external devices by the VOUT pin. The voltage of VOUT can be configured to 1.5V, 1.8V, 2.5V or 3.3V. Current limitation ability during energy harvesting can be configured.

1.2.2 RF Interface

- Ø ISO/IEC 14443A
- Ø Contactless transmission of data and supply energy (no battery needed)
- Ø Operating distance: up to 100 mm (depending on various parameters as e.g. field strength and antenna geometry)
- Ø Operating frequency: 13.56 MHz
- Ø Fast data transfer: 106 Kbit/s
- Ø High data integrity: 16-bit CRC, parity, bit coding, bit counting

- Ø True anticollision
- Ø 7 byte serial number (cascade level 2 according to ISO/IEC 14443-3)
- Ø UID ASCII mirror for automatic serialization of NDEF messages
- Ø Automatic NFC counter triggered at read command
- Ø NFC counter ASCII mirror for automatic adding the NFC counter value to the NDEF message
- Ø ECC based originality signature
- Ø Fast read command
- Ø 50 pF input capacitance

1.2.3 Contact Interface

- Ø Zero standby power consumption for contact interface
- Ø Operating voltage for contact interface: 1.8~5.5V
- Ø Contact interface: SPI or I2C
- Ø Max data rate for I2C: 1Mbps
- Ø Max data rate for SPI: 5Mbps

1.2.4 EEPROM

- Ø 180, 540 or 924 bytes organized in 45, 135 or 231 pages with 4 bytes per page
- Ø 144, 504 or 888 bytes freely available user Read/Write area (36, 126 or 222 pages)
- Ø 4 bytes initialized capability container with one time programmable access bits
- Ø Field programmable read-only locking function per page for the first 16 pages
- Ø Field programmable read-only locking function above the first 16 pages per double page for FM11NT021D or per 16 pages for FM11NT041D and FM11NT081D
- Ø Configurable password protection with optional limit of unsuccessful attempts
- Ø Anti-tearing support for capability container (CC) and lock bits
- Ø ECC supported originality check
- Ø Data retention of 50 years
- Ø Write endurance 200000 cycles

1.2.5 NFC Forum Tag 2 Type compliance

FM11NT0X1D IC provides full compliance to the NFC Forum Tag 2 Type technical specification and enables NDEF data structure configurations.

1.2.6 Security

- Ø Manufacturer programmed 7-byte UID for each device
- Ø Pre-programmed Capability container with one time programmable bits
- Ø Field programmable read-only locking function
- Ø ECC based originality signature
- Ø 32-bit password protection to prevent unauthorized memory operations. The protected memory's size can be configured.

1.2.7 Cascaded UID

The anticollision function is based on an IC individual serial number called Unique IDentifier. The UID of the FM11NT0X1D is 7 bytes long and supports cascade level 2 according to ISO/IEC 14443-3.

1.2.8 Anticollision

An intelligent anticollision function according to ISO/IEC 14443 allows operating 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.

1.3 Block diagram

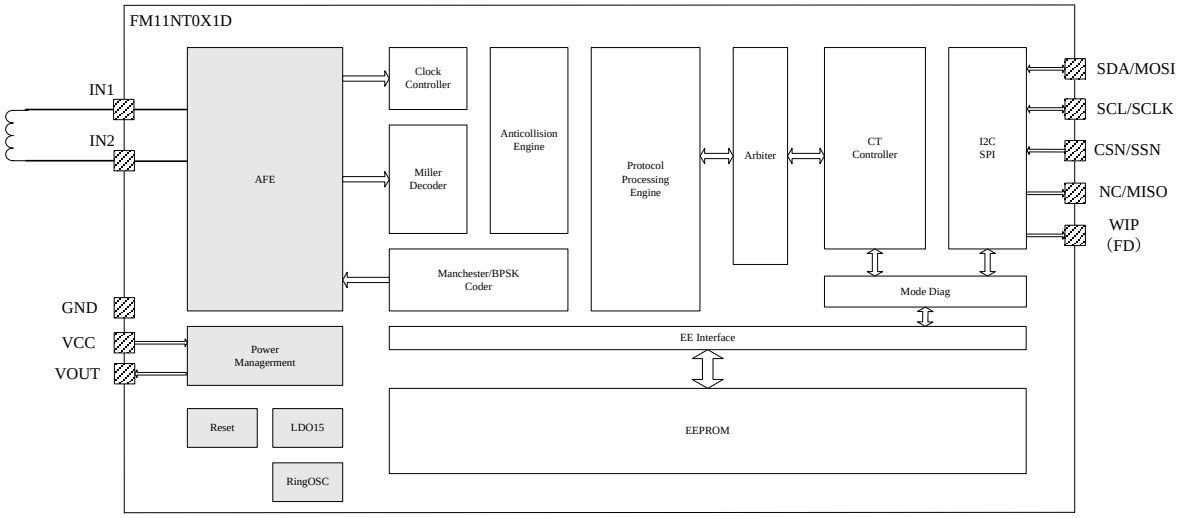


Figure 1-1 FM11NT0X1D Block diagram

1.4 Pinning information

1.4.1 DFN10 Pinning Assignment（Top View） for FM11NT0X1DS

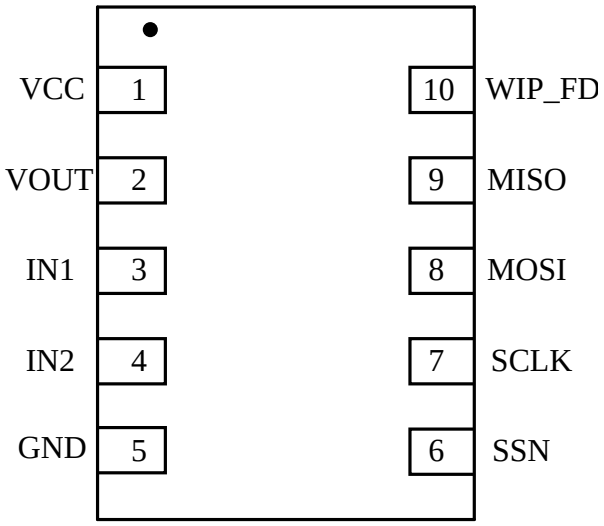


Figure 1-2 FM11NT0X1DS DFN10 Pinning assignment

1.4.2 Pin description for FM11NT0X1DS

Pin No.	Pin Name	Type	Description
1	VCC	PWR	contact interface power supply
2	VOUT	ANA	regulated voltage output for energy harvesting
3	IN1	ANA	RF antenna pin
4	IN2	ANA	RF antenna pin
5	GND	GND	chip ground
6	SSN	DI	SPI chip-selection, low-effective
7	SCLK	DI	SPI clock input
8	MOSI	DIO	SPI slave data input
9	MISO	DO	SPI slave data ouput
10	WIP_FD	OD	The flag of EEPROM's write/erase by the contactless interface, or the flag of field detection. Low-effective.

Table 1-1 FM11NT0X1DS DFN10 PIN description

1.4.3 DFN10 Pinning Assignment（Top View） for FM11NT0X1DI

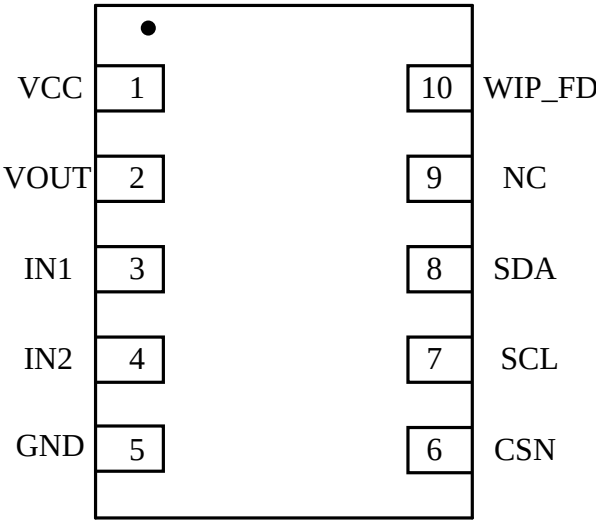


Figure 1-3 FM11NT0X1DI DFN10 Pinning assignment

1.4.4 Pin description for FM11NT0X1DI

Pin No.	Pin Name	Type	Description
1	VCC	PWR	contact interface power supply
2	VOUT	ANA	regulated voltage output for energy harvesting
3	IN1	ANA	RF antenna pin
4	IN2	ANA	RF antenna pin
5	GND	GND	chip ground
6	CSN	DI	I2C chip-selection, low-effective
7	SCL	DI	I2C clock input
8	SDA	DI/OD	I2C data, pull up resistor is needed
9	NC	DO	high-Z after power up
10	WIP_FD	OD	The flag of EEPROM's write/erase by the contactless interface, or the flag of field detection. Low-effective.

Table 1-2 FM11NT0X1DI DFN10 PIN description

2 Ordering information

Type Number	Package Name	Packing
FM11NT0X1DS-DN-T-G	DFN10	Tape and Reel

FM 11NT 0X 1 D -XXX -C -H

Company Name

FM=Shanghai Fudan Microelectronics Group Company Limited

Product Family Name

11NT=NFC TAG Product

Memory

02: about 2k bit EEPROM

04: about 4k bit EEPROM

08: about 8k bit EEPROM

Generation number

1: The second generation

Product type

D: Dual interface

Package

DN: DFN10

Packing

T: Tape and Reel

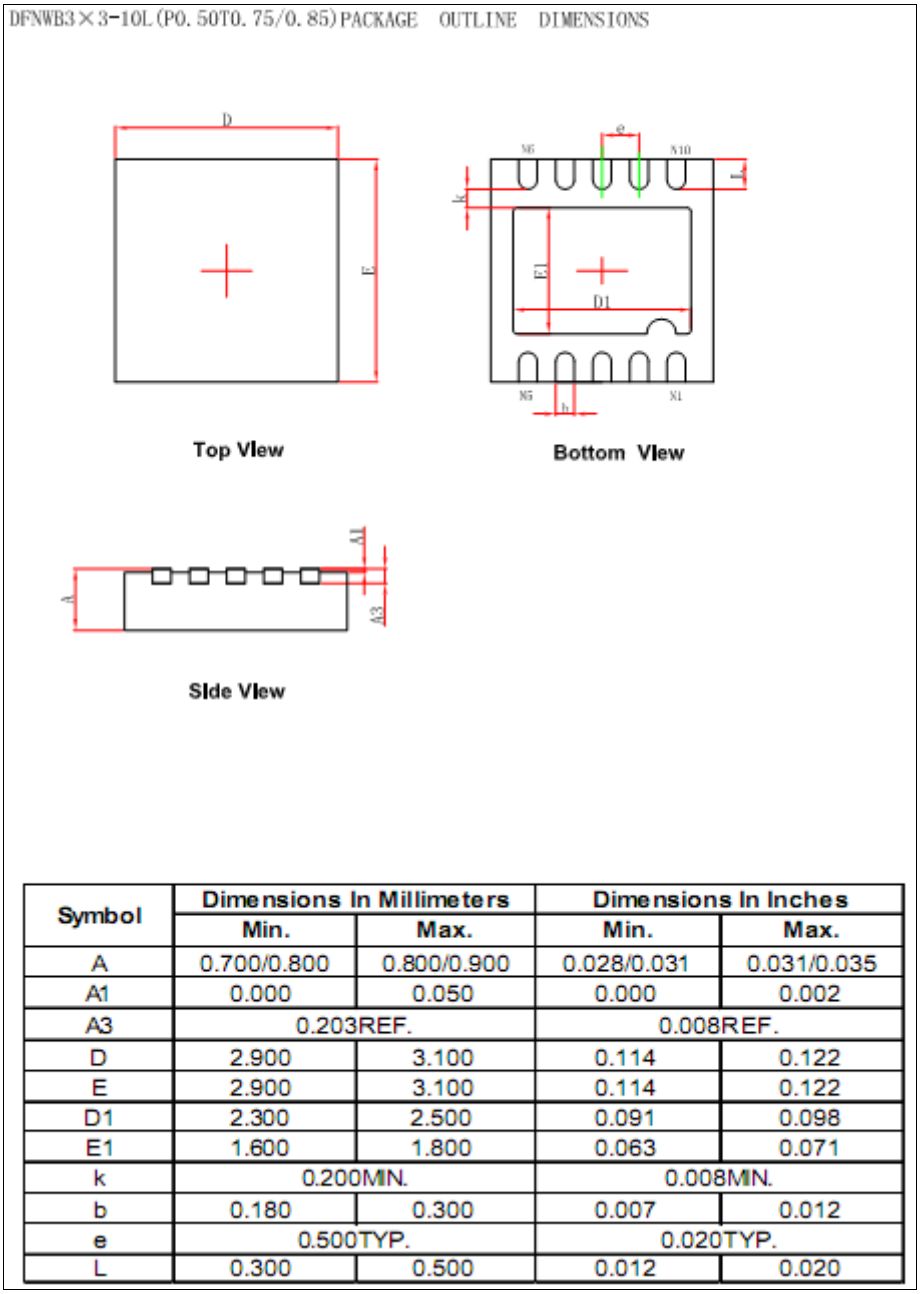
U: Tube

HSF code

G: ROHS Compliant, Halogen-free, Antimony-free

3 Package outline

3.1 DFN10



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
D1	2.300	2.500	0.091	0.098
E1	1.600	1.800	0.063	0.071
k	0.200MIN.		0.008MIN.	
b	0.180	0.300	0.007	0.012
e	0.500TYP.		0.020TYP.	
L	0.300	0.500	0.012	0.020

Figure 3-1 DFN10 package size

Revision history

Version	Publication date	Pages	Paragraph or Illustration	Revise Description
1.0	Dec.2014	12		Initial release

Sales and Service

Shanghai Fudan Microelectronics Group Co., Ltd.
Address: Bldg No. 4, 127 Guotai Rd,
Shanghai City China.
Postcode: 200433
Tel: (86-021) 6565 5050
Fax: (86-021) 6565 9115

Shanghai Fudan Microelectronics (HK) Co., Ltd.
Address: Unit 506, 5/F., East Ocean Centre, 98 Granville Road, Tsimshatsui East, Kowloon, Hong Kong
Tel: (852) 2116 3288 2116 3338
Fax: (852) 2116 0882

Beijing Office
Address: Room 423, Bldg B, Gehua Building,
1 QingLong Hutong, Dongzhimen Alley north Street,
Dongcheng District, Beijing City, China.
Postcode: 100007
Tel: (86-010) 8418 6608
Fax: (86-010) 8418 6211

Shenzhen Office
Address: Room.1301, Century Bldg, No. 4002, Shengtingyuan Hotel, Huaqiang Rd (North),
Shenzhen City, China.
Postcode: 518028
Tel: (86-0755) 8335 0911 8335 1011 8335 2011 8335 0611
Fax: (86-0755) 8335 9011

Shanghai Fudan Microelectronics (HK) Ltd Taiwan Representative Office
Address: Unit 1225, 12F., No 252, Sec.1 Neihu Rd., Neihu Dist., Taipei City 114, Taiwan
Tel : (886-2) 7721 1889
Fax: (886-2) 7722 3888

Shanghai Fudan Microelectronics (HK) Ltd Singapore Representative Office
Address : 237, Alexandra Road, #07-01 The Alexcier, Singapore 159929
Tel : (65) 6472 3688
Fax: (65) 6472 3669

Shanghai Fudan Microelectronics Group Co., Ltd NA Office
Address :2490 W. Ray Road Suite#2
Chandler, AZ 85224 USA
Tel : (480) 857-6500 ext 18

Web Site: http://www.fmsh.com/