

---

## NFC/RFID controller

---

### SPECIFICATION

#### 1 FEATURES

- UMC CMOS 180 nm technology
- Supports Near Field Communication standards NFCIP-1 and NFCIP-2
- Supports ISO14443A/B standards in both reader and card emulation mode
- Supports NFC Initiator in both Active and Passive modes with speeds 106, 212 and 424 Kbps
- Supports NFC Target in both Active and Passive modes with speeds 106, 212 and 424 Kbps
- Supports ISO15693 standard in reader mode
- Supports high-speed transmissions up to 848 Kbps
- Complete RFID reader solution including 8051-based MCU and USB interface for “desktop” applications
- “On the fly” 8051 firmware downloading via USB interface (controlled by driver for Windows)
- Possibility of boot from SPI flash
- Sleep mode with ultra-low power consumption ( $<1 \mu\text{A}$ )
- Wake-up with programmable RF field level
- SPI interface in stand-alone configuration
- Dual channel receiver architecture for elimination of “blind spots”
- Integrated voltage regulators for analog and digital parts and I/O
- DES crypto co-processor
- AES crypto co-processor
- CRYPTO1 co-processor
- SWP interface
- ISO7816 interface

#### 2 APPLICATIONS

- Mobile devices (tablets, handsets)
- Secure pairing (Bluetooth, Wi-Fi, other paired wireless networks)
- Public transport or event ticketing
- Passport or payment (POS) reader systems
- Short-range wireless communication tasks (firmware updates)
- Product identification or authentication
- Medical equipment or consumables
- Access control, digital door locks
- Sharing of electronic business cards

#### 3 OVERVIEW

NT1046 is a single-chip RFID reader solution. This IC also can be used for adding NFC functionality to mobile devices and other applications, using integrated MCU to perform some

high-level RFID protocol tasks. NT1046 can perform in one of three modes: RFID/NFC reader, NFC Peer, or Card Emulation mode.

Firmware for 8051 MCU can be downloaded via USB interface on device plug-in. This feature significantly simplifies firmware updates. Alternatively, MCU can detect presence of an SPI flash and boot from it.

NT1046 is composed of an integrated RF front-end, RFID framing engine supporting ISO15693, ISO14443A, ISO14443B and NFCIP standards, 128-byte FIFO, 8051-based MCU with full-speed USB 2.0 compliant interface, and RAM for 8051 code and data.

Extension of standards set and implementation of custom RFID protocols can be achieved by using direct modes with MCU-controlled bit coding and framing. Direct access to RF Frontend control registers allows fine tuning of various parameters at physical layer.

## 4 STRUCTURE

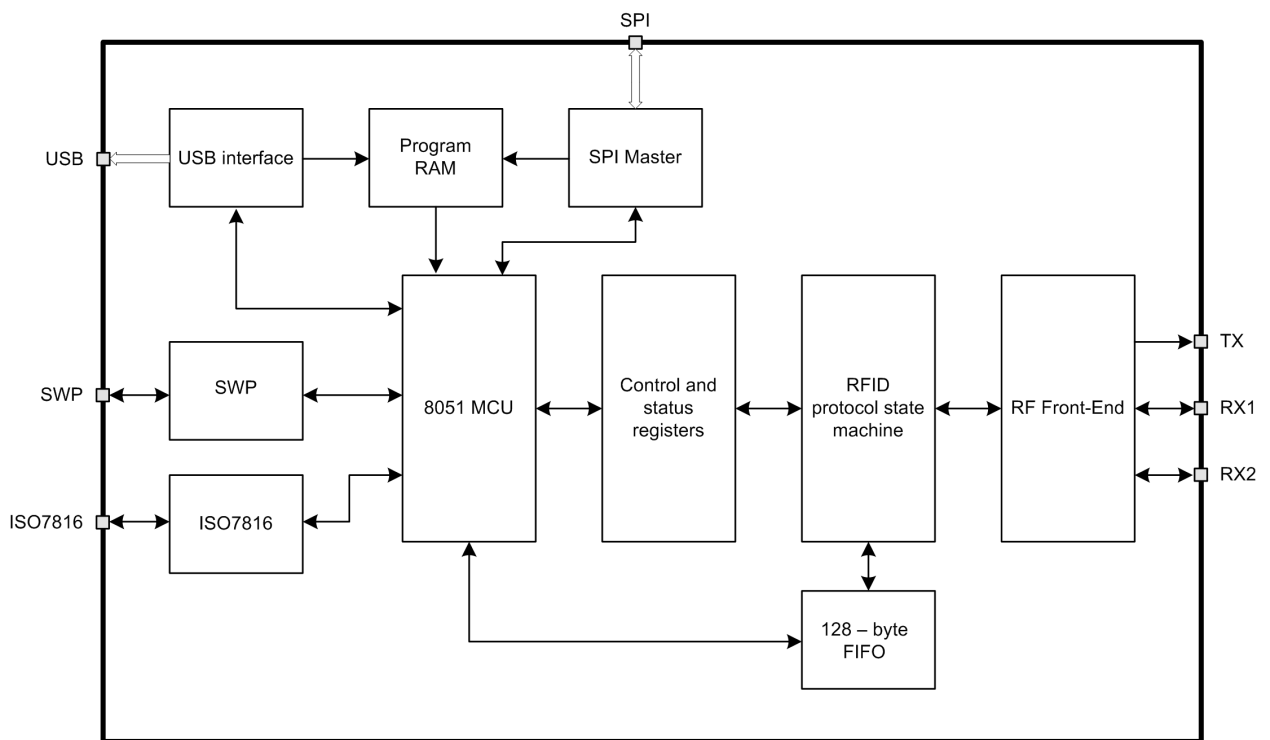


Figure 1: NT1046 structure.

## 5 PIN DESCRIPTION

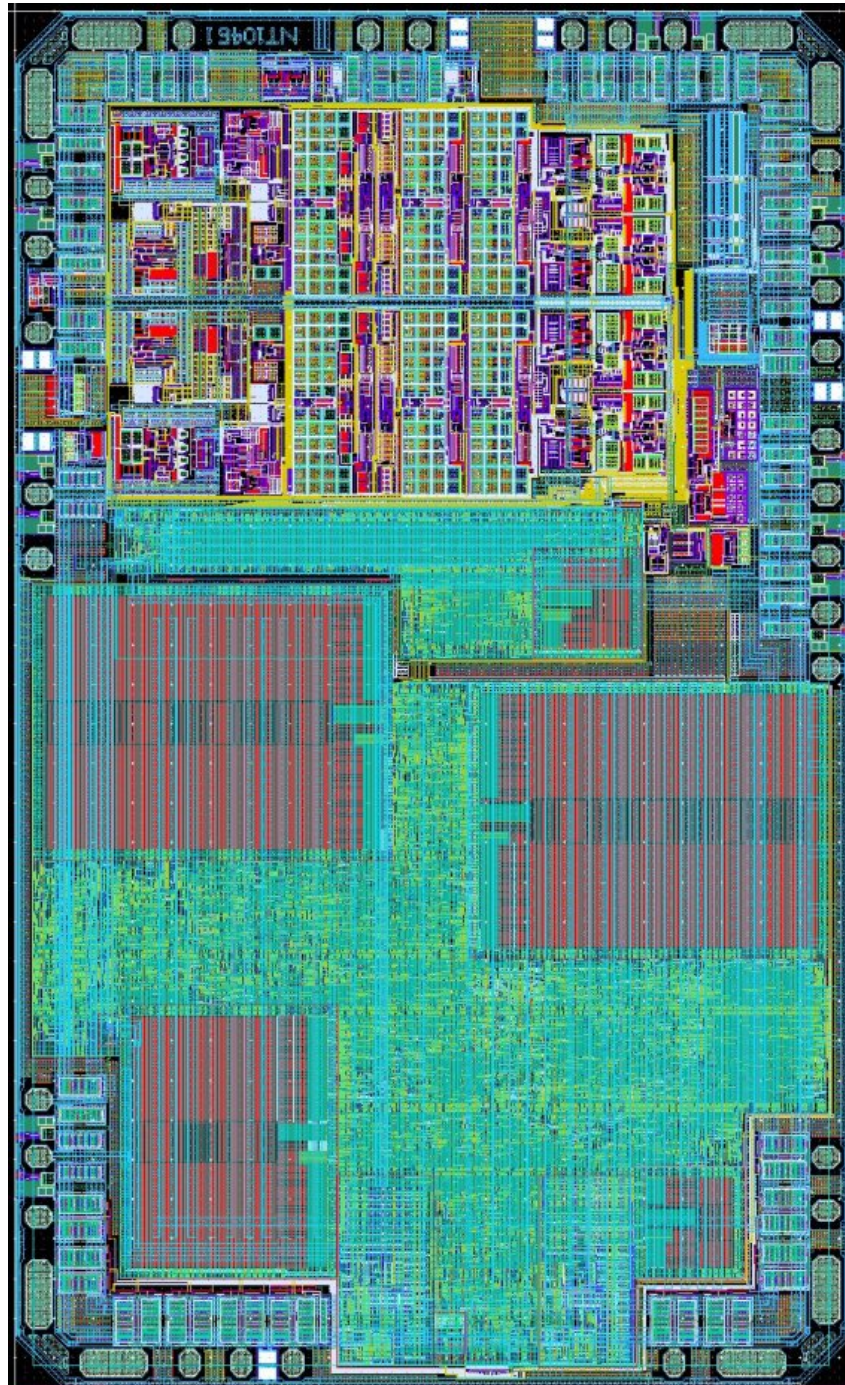
Name	Direction	Description
V_in	IO	External supply
Vdd_a	O	Internal regulated supply for analog part
Vdd_io	O	Internal regulated supply for I/O
Vdd_rf	O	Internal supply for RF power amplifier
Vdd_pa	I	Supply input for power RF power amplifier
TX_OUT	O	RF power amplifier output
RX_IN1	I	Main RX input
RX_IN2	I	Auxiliary RX input
SWP	IO	SWP line
DP	IO	USB D+ line
DM	IO	USB D- line
SS	O	Slave Select SPI output
DATA_CLK	O	SPI clock output
MOSI	O	SPI data output
MISO	I	SPI data input
EN	I	Chip Enable input
GPIO0	IO	Multi-purpose digital inout
GPIO1	IO	Multi-purpose digital inout
GPIO4	IO	Multi-purpose digital inout
GPIO5	IO	Multi-purpose digital inout
GPIO6	IO	Multi-purpose digital inout
GPIO7	IO	Multi-purpose digital inout
OSC_OUT	O	Crystal or oscillator output
OSC_IN	I	Crystal or oscillator input
GND	IO	Ground

## 6 LAYOUT DESCRIPTION

The IC dimensions are given in the table 1.

**Table 1:** IC dimensions.

Dimension	Value	Unit
Height	3005	$\mu\text{m}$
Width	1840	$\mu\text{m}$



**Figure 2:** NT1046 layout view

## 7 OPERATION CHARACTERISTICS

### 7.1 TECHNICAL CHARACTERISTICS

Technology \_\_\_\_\_ UMC CMOS 180 nm  
Status \_\_\_\_\_ pre-silicon verification  
Area \_\_\_\_\_ 5.53 mm<sup>2</sup>

### 7.2 OPERATING CONDITIONS

Parameter	Symbol	Value			Unit
		min	typ	max	
Operating input voltage	V <sub>in</sub>	2.7	3.3	3.6	V
Operating ambient temperature	T <sub>a</sub>	-40	27	85	°C

## 8 DELIVERABLES

IP contents include:

- Datasheet
- Layout View (GDSII)
- Evaluation kit based on packaged IC
- Characterization Report
- Behavioral Model
- SPICE netlist (.cdl)
- Integration Support