UHF RFID tag IC, 224-bit memory

SPECIFICATION

1 FEATURES

- SMIC EEPROM CMOS 180 nm
- Operating temperature range -40…+65 °C
- EPC Class 1 Generation 2 compliant
- Operating frequency 860 - 960 MHz
- 224 bit memory organized in 3 banks: EPC, TID and RESERVED
- Two pads with combined on-wafer testing and RF operation functionality
- Small area (0.185 mm^2)

2 APPLICATIONS

- Supply chain management and logistics
- Airline baggage handling
- Mail and parcel delivery
- Automobile billing systems
- Asset tagging

3 FUNCTIONAL DESCRIPTION

The chip is intended for use in passive UHF transponder applications. IC derives its operating power from an RF electromagnetic field generated by a reader, which is received and rectified by the chip. The chip sends the answer back to the reader using a backscatter modulation technique. Chip can be connected to external dipole-like antenna. NT1025A provides a fast and flexible anti-collision protocol based on internal random number generator according to EPC standard. NT1025A supports all EPC C1G2 mandatory command as well as optional Access command.
NT1025A has a 224 bit EEPROM organized in 3 banks as shown in Table 1.

Table 1: NT1025A EEPROM map.

Bank address	Bank name	Bank size
“01”	EPC	128 bit
“10”	TID	32 bit
“00”	RESERVED	64 bit

Short-time memory block provides 4-bit storage with persistence values according to EPC C1G2 standard.
IC is designed on SMIC EEPROM CMOS 180 nm technology.

4 STRUCTURE

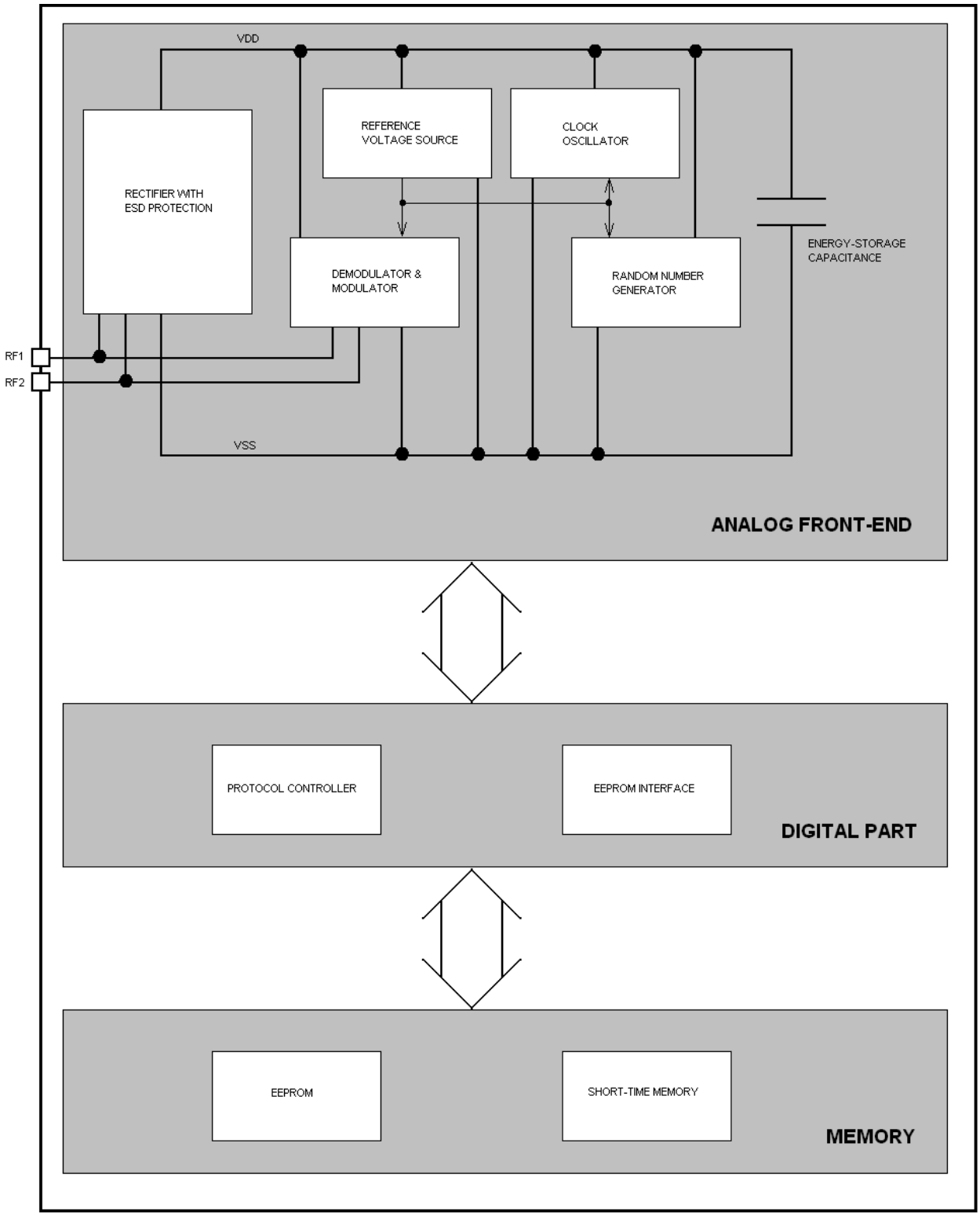

Figure 1: UHF RFID tag IC structure.

5 PIN DESCRIPTION

Name	Direction	Description
RF1	IO	Test pad 1 / antenna port 1
RF2	IO	Test pad 2 / antenna port 2

6 LAYOUT DESCRIPTION

The IC dimensions are given in the table 2.

Table 2: IC dimensions.

Dimension	Value	Unit
Height	420	µm
Width	440	µm

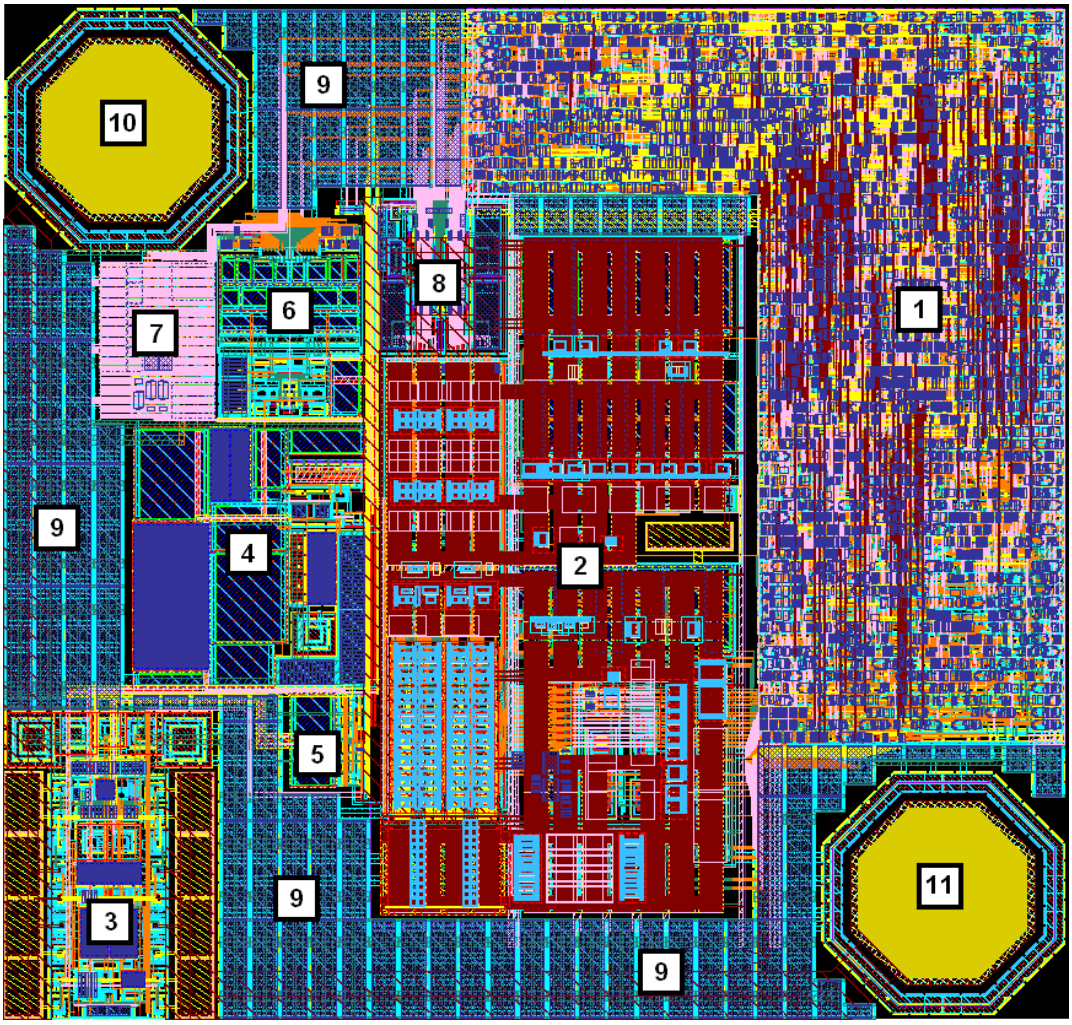

Figure 2: Device layout view.

1. Digital part
2. EEPROM
3. Rectifier
4. Reference voltage source
5. Demodulator
6. Clock oscillator
7. Random number generator
8. Short-time memory
9. Energy-storage capacitance
10. Pad RF1
11. Pad RF2

7 OPERATION CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology SMIC EEPROM CMOS 180 nm
Status silicon proven
Area 0.185 mm^2

7.2 ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Operating temperature	T_A		-40	25	+65	°C
Operating carrier frequency	F_c		860	-	960	MHz
Read sensitivity	P_{rd_min}	T_A = 25 °C	-	30	-	µW
Write sensitivity	P_{wr_min}	T_A = 25 °C	-	50	-	µW
Impedance[1]	Z	F_c = 867 MHz	-	16-j350	-	Ω

Note: 1 Measured for QFN32 package.

8 DELIVERABLES

IP contents:

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