

The SMART7 polls for a card (tag) in its field twice a second with a duty cycle of 400ms/on - 100ms/off. Once a card is encountered the carrier turns on 100% energizing the card and data is sent to the SMART7 from the card in support of cashless transaction.

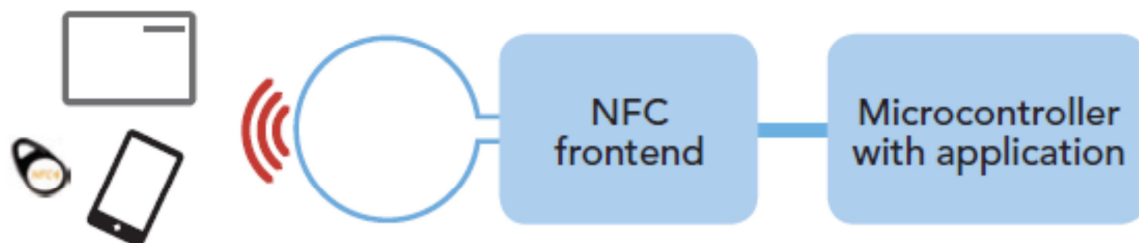
The NFC (RFID) driver PN5180 from NXP is used in the SMART7 reader

The NFC frontend IC from NXP operates on a carrier frequency of 13.56MHz and transmits contactless energy and data. This frontend IC uses a modulation and demodulation concept that is fully integrated for various types of contactless communication methods and protocols.

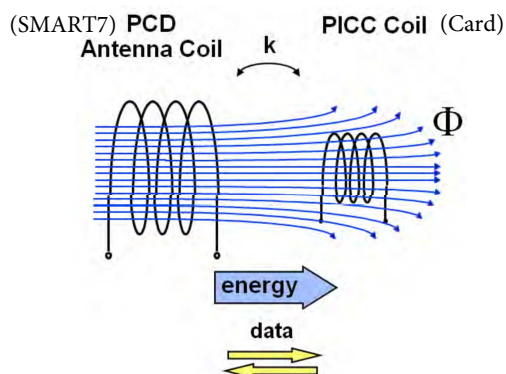
The PN5180 frontend IC supports the following RF operating modes:

- Reader/Writer mode supporting ISO/IEC 14443 type A up to 848 kBit/s
- Reader/Writer communication mode for MIFARE Classic contactless IC
- Reader/Writer mode supporting ISO/IEC 14443 type B up to 848 kBit/s
- Reader/Writer mode supporting JIS X 6319-4 (comparable with FeliCa scheme)
- Supports reading of all NFC tag types (type 1, type 2, type 3, type 4A and type 4B)
- Reader/Writer mode supporting ISO/IEC 15693
- Reader/Writer mode supporting ISO/IEC 18000-3 Mode 3
- ISO/IEC 18092 (NFC-IP1) • ISO/IEC 21481 (NFC-IP-2)

Functionality of the NFC frontend type PN5180 from NXP



Magnetic coupling between reader (PCD) and card (PICC)



Calculations of the SMART7 antenna gain

INPUTS

Efficiency in % (η) = 10%

Physical Aperture Area in meters² (A) = 0.0016m²

Wave Length (λ) = 22.123894 [Frequency 13.56MHz]

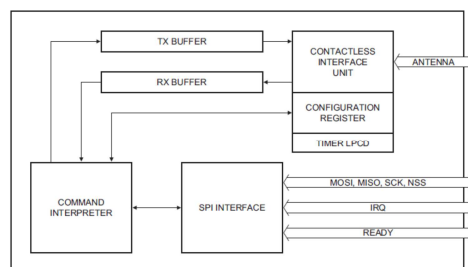
OUTPUT

Formula

$$G_{dBi} = 10 \log_{10} (\eta 4 \pi A / \lambda^2)$$

Antenna Gain = -34dBi

Block diagram of PN5180 NFC frontend



Block diagram of the SMART7 antenna design

