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Ridder SmartDrive – antenna description

1. Introduction

Ridder SmartDrive is equipped with the Nordic Semiconductor nRF52840 Bluetooth 2.4 GHz transceiver, which transmits through an antenna on the PCBA.

This document describes this antenna.

2. Antenna information

2.1. Antenna type

The antenna is a quarter wavelength monopole, and was taken over from nrf52840-development-kit---hardware-files-3_0_0 that can be found on the Nordic Semiconductor website.

Physical antenna length is $12 + 2.2 + 4.3 = 18.5\text{mm}$. Antenna width is 0.2mm .

Antenna trace thickness is $17\mu\text{m}$. Antenna trace is copper, covered with solder mask.



2.2. Resonance frequency

The antenna was tuned to the frequency 2440 MHz.

2.3. Antenna gain

Theoretical gain of monopole antennas over a perfect conducting ground plane is 5.19dBi^1 . This is also the case for the antenna used in the Ridder SmartDrive.

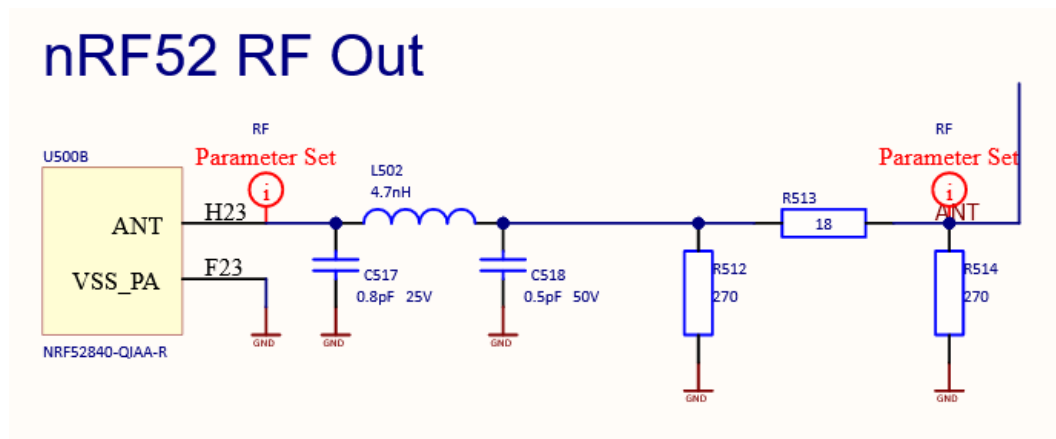
2.4. Effective radiated power

Effective Isotropic Radiated Power EIRP is $+8.31\text{dBm}$. The power level of the nRF52840 SoC in the SmartDrive application is set to 4 dBm , followed by an attenuator on the PCBA. The measured power to the antenna is $+3.12\text{dBm}^2$. EIRP comes to $+3.12\text{ dBm} + 5.19\text{ dBi} = +8.31\text{ dBm}$.

2.5. Implementation

The monopole antenna is connected to the nRF52840 Bluetooth 2.4 GHz transceiver via a transmission line that contains a Pi-configuration low pass filter around L502 and a 3dB attenuator for matching purposes with R512, R513, R514.

2.5.1. Schematic implementation



¹ Source: https://en.wikipedia.org/wiki/Monopole_antenna#Gain_and_input_impedance

² Source: Kiwa Netherlands measurement report number 210401342 004

2.5.2. Physical implementation

