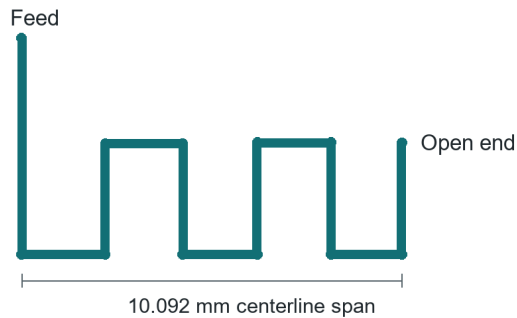


Mopeka Pro200 Antenna Report

Meandered PCB monopole | Reference design and simulation

Permanent attachment. The antenna is etched directly into the PCB copper and permanently attached to the device. It is not a separately replaceable component, and the product has no detachable RF antenna connector. This construction uses the permanently attached antenna provision of 47 CFR 15.203.

Nordic nRF52840 USB Dongle reference



Unshorted printed meandered monopole.

Native layout: 15 June 2018; schematic/layout PDF pp. 1-3.

Trace width: 0.254 mm.

Copper envelope: 10.346 x 5.981 mm.

Board: approximately 46.04 x 15.24 mm.

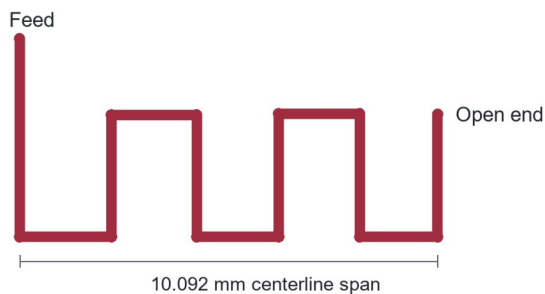
Two layers; 2.0 mm FR-4 core in the CAD stack.

Nordic's published hardware files and dimension drawing provide the geometry reference. Mopeka antenna gain is calculated from the product model on the following pages.

PCA10059 v1.0.0 / PCB 400250

Design comparison. PRO200 rev D shares the ten meander-turn segments and the 0.254 mm trace width of PCA10059. Its feed-side extent, ground plane, PCB stack and matching network are product-specific. PCA10040 provides an additional printed-monopole reference.

Mopeka PRO200 antenna



M2006201D / M2006202D

Trace width: 0.254 mm.

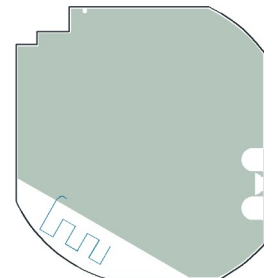
Copper envelope: 10.346 x 5.047 mm.

Centerline: 29.674 mm from A1 feed.

No grounded shorting arm.

Board: 36.00 x 39.26 mm.

Four layers; FR-4/prepreg, approximately 0.8 mm CAD stack.



Ground-envelope inset; inner voids omitted. Blue: antenna projection.

Top copper / rev D

Construction and feed. Integral copper for BLE channel centers 2402-2480 MHz. The nRF52810-QCAA ANT pin 19 feeds C15 0.8 pF shunt and L3 3.9 nH series; C36 is not fitted. The radiator lies over a copper-recessed region on all layers. The rev D layout incorporates the antenna shortening.

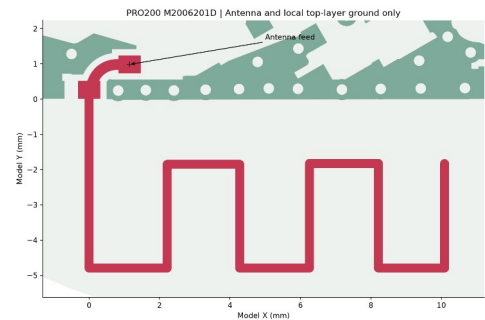
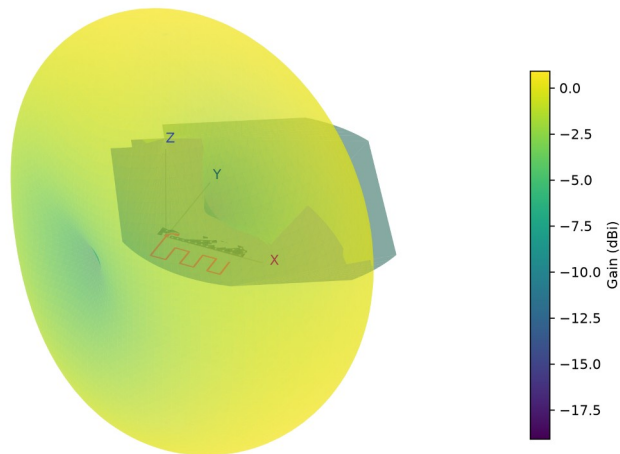
Dimensions follow native layout coordinates. The main-route length excludes matching pads and extra feed copper; its starting point is the A1 feed.

Simulation result. Highest sampled total gain is 0.91 dBi at 2480 MHz for the bare PCB model. Results cover 2402, 2440 and 2480 MHz on a 3-degree spherical angular grid. The model configuration and numerical results follow.

Copper based Full Wave Analysis

PRO200 Rev D | M2006201D | Bare PCB | 2480 MHz

PRO200 Rev D | 2480 MHz
Simulated total gain | Peak 0.91 dBi



M2006201D copper and native layer stack. Antenna-side feed at L3. Model loss tangent: 0.02 at 2440 MHz.

PCB outline and antenna; unrelated copper omitted from view.

Peak gain

0.91 dBi

S11 at 50 ohms

-3.11 dB

Radiation efficiency

74.9%

X/Y: PCB plane. Z: board normal. Pattern radius is normalized field amplitude. Enclosure, cable, potting, mounting structures and populated component loads are excluded.

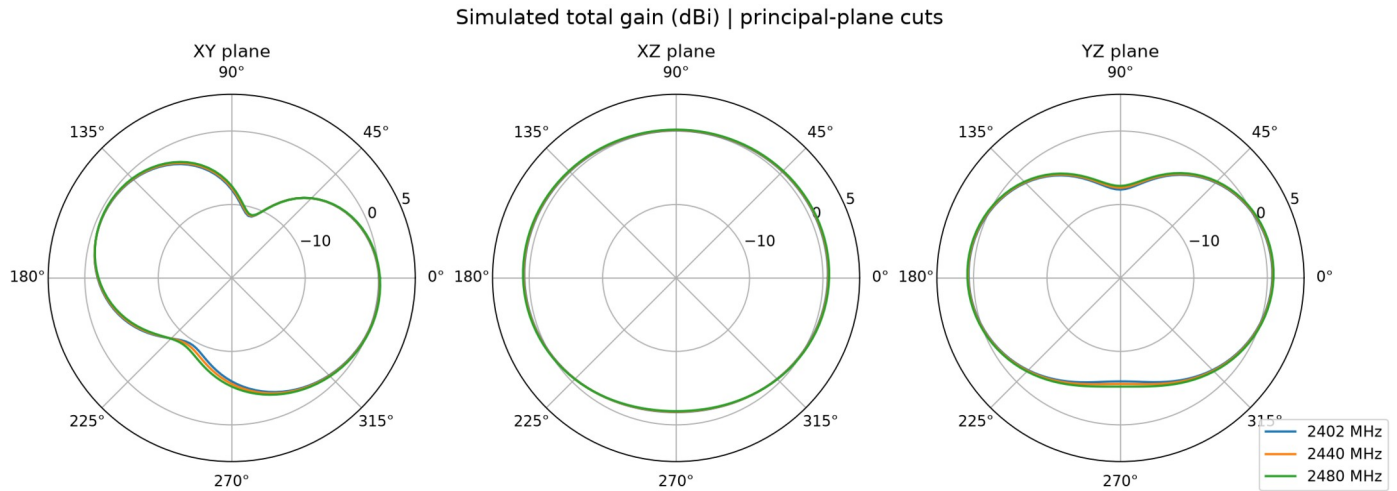
Results

MHz	Gain dBi	Realized dBi	S11 dB	Efficiency
2402	0.75	-1.99	-3.31	72.4%
2440	0.83	-1.96	-3.25	73.6%
2480	0.91	-2.00	-3.11	74.9%

HTML result set: pro200_d_m127. Total gain uses accepted feed power; realized gain includes mismatch at the 50-ohm port. Reported peaks are sampled over a 3-degree spherical grid at the three listed frequencies. Values are simulated.

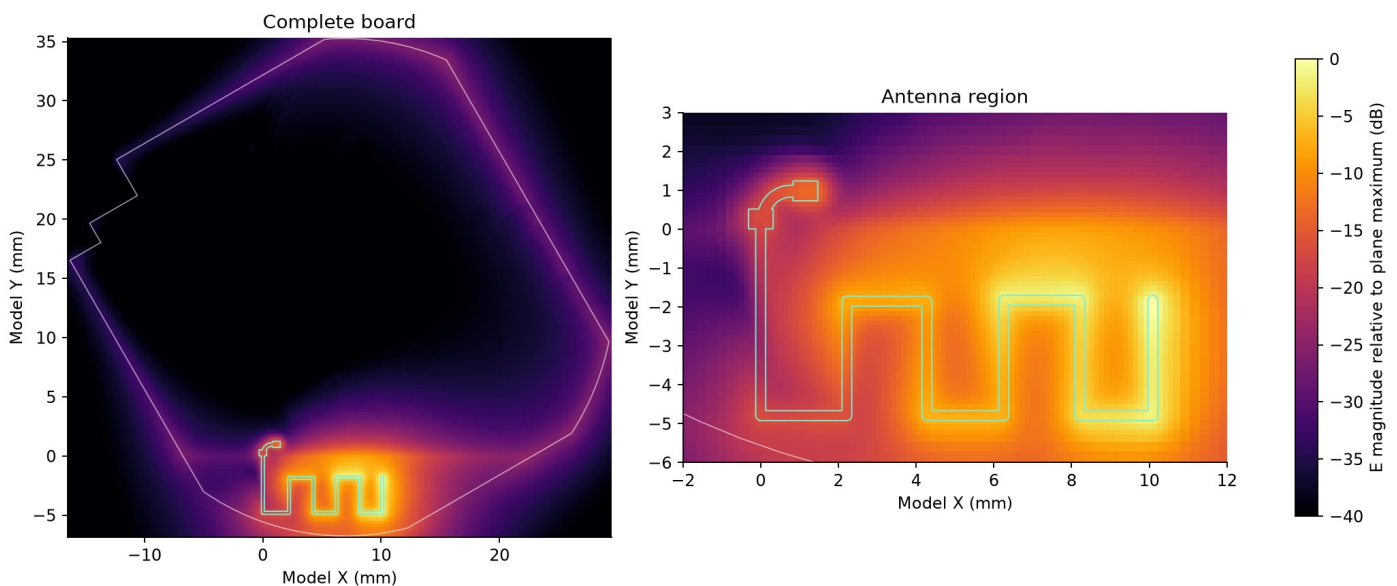
Radiation Pattern Results

Principal Plane Radiation Patterns



Near Field at 2440 MHz

Computed near field | 2440 MHz | $z = 0.397$ mm above top copper



Computed electric-field magnitude 0.397 mm above top copper. Both views use the plane maximum as 0 dB. The field map presents relative electric-field amplitude.

Source Geometry

PCB M2006201D. Four copper layers retain the released board geometry in the electromagnetic model. This illustration shows the antenna and its local ground region.

openEMS 0.37.0rc2, Cartesian FDTD and near-to-far-field transformation. PCB dielectric inputs: relative permittivity 4.1 / 4.5 / 4.1 and loss tangent 0.02 at 2440 MHz. Hardware correlation and production-tolerance sweeps are outside this model.

Source: PRO200 simulation index.html, viewer_data.js, simulation_report.md and verification.json. The displayed result set and original image assets are retained together.