Nordic Semiconductor ASA

Direction Finding Antenna Board (PCA20054)

DESIGN NOTES LEGEND

DESIGN NOTE:
Informational notes are Text Frames
with a grey medium frame.
Use 20 mil Text Margin.

DESIGN NOTE:
Cautionary notes are Text Frames
with a yellow medium frame.
Use 20 mil Text Margin.

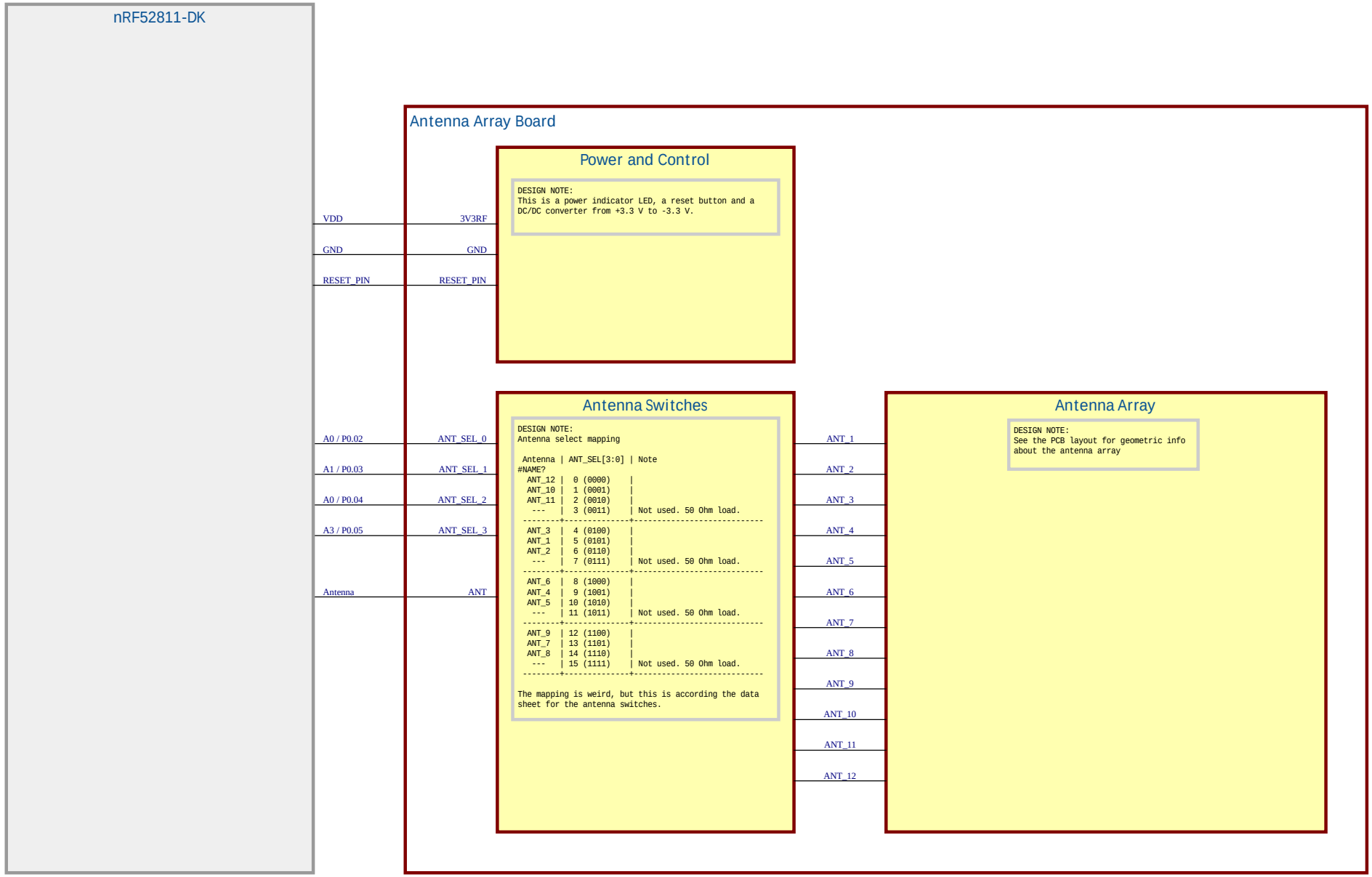
DESIGN NOTE:
Debug notes are Text Frames
with an orange medium frame.
Use 20 mil Text Margin.

DESIGN NOTE:
Critical notes are Text Frames
with a red large frame.
Use 10 mil Text Margin.

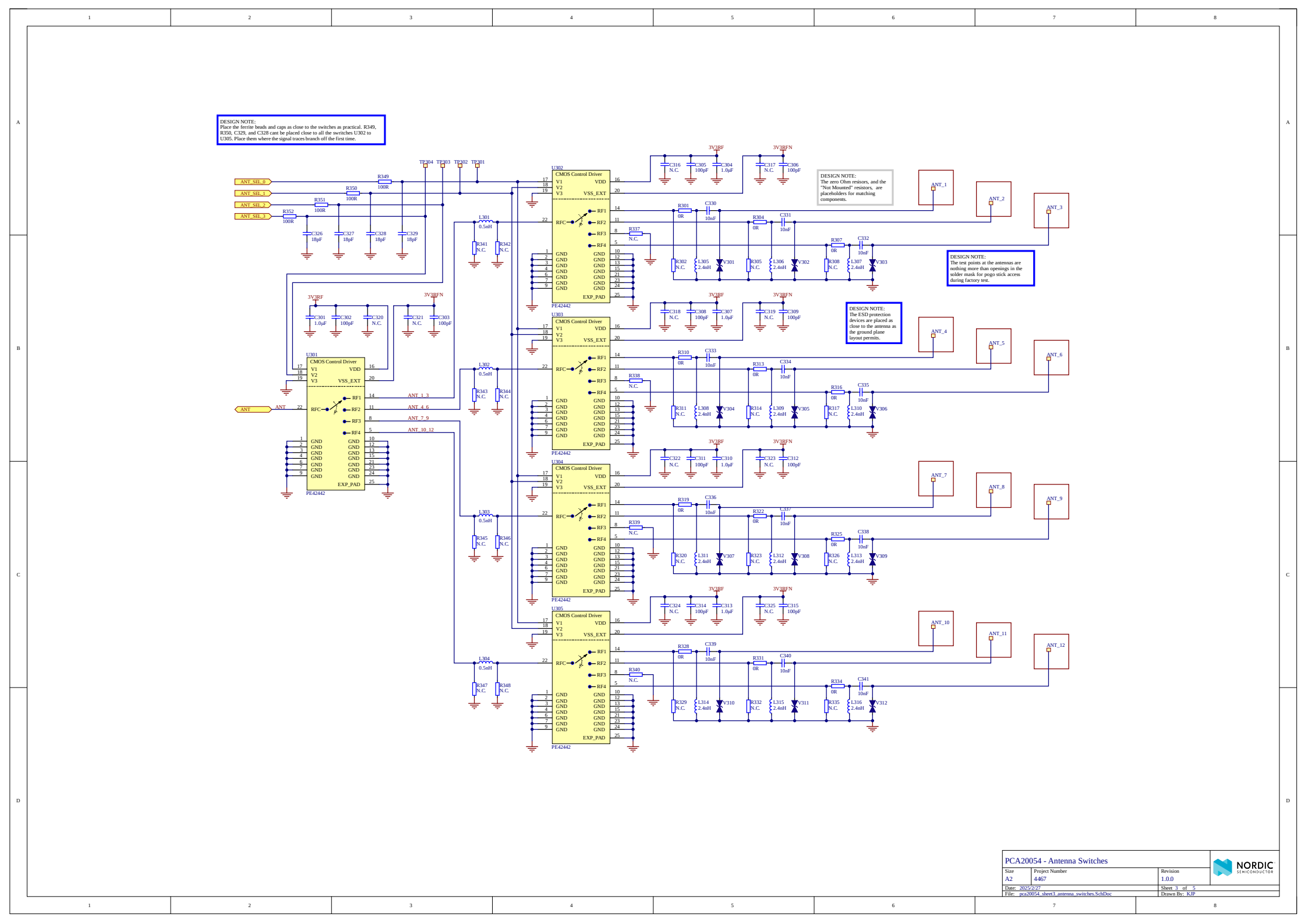
DESIGN NOTE:
Critical layout notes are Text Frames
with a blue medium frame.
Use 20 mil Text Margin.

PCA20054 - Cover		
Size: A3	Project Number: 4467	Revision: 1.0.0
Date: 2025/2/27		Sheet 1 of 5
File: pca20054_sheet1_cover.SchDoc		Drawn By: KJP

NORDIC SEMICONDUCTOR



PCA20054 - Block Diagram		
Size: A3	Project Number: 4467	Revision: 1.0.0
Date: 2020/2/19		Sheet 2 of 5
File: pca20054_sheet2_block_diagram.SchDoc		Drawn By: KJP


DESIGN NOTE:
Place the ferrite beads and caps as close to the switches as practical. R349, R350, C329, and C328 cant be placed close to all the switches U302 to U305. Place them where the signal traces branch off the first time.
DESIGN NOTE:
The zero Ohm resisors, and the "Not Mounted" resistors, are placeholders for matching components.
DESIGN NOTE:
The test points at the antennas are nothing more than openings in the solder mask for pogo stick access during factory test.
DESIGN NOTE:
The ESD protection devices are placed as close to the antenna as the ground plane layout permits.
ANT_SEL_0
ANT_SEL_1
ANT_SEL_2
ANT_SEL_3
ANT
TP304 TP303 TP302 TP301
R349 100R
R350 100R
R351 100R
R352 100R
C326 18pF
C327 18pF
C328 18pF
C329 18pF
3V3RF
3V3RFN
C301 1.0µF
C302 100pF
C320 N.C.
C321 N.C.
C303 100pF
U301
U302
U303
U304
U305
CMOS Control Driver
V1
V2
V3
VDD
VSS_EXT
RF1
RF2
RF3
RF4
RFC
GND
EXP_PAD
PE42442
ANT_1_3
ANT_4_6
ANT_7_9
ANT_10_12
L301 0.5nH
L302 0.5nH
L303 0.5nH
L304 0.5nH
R341 N.C.
R342 N.C.
R343 N.C.
R344 N.C.
R345 N.C.
R346 N.C.
R347 N.C.
R348 N.C.
C316 N.C.
C305 100pF
C304 1.0µF
C317 N.C.
C306 100pF
R301 0R
C330 10nF
R304 0R
C331 10nF
R337 N.C.
R307 0R
C332 10nF
R302 N.C.
L305 2.4nH
V301
R305 N.C.
L306 2.4nH
V302
R308 N.C.
L307 2.4nH
V303
C318 N.C.
C308 100pF
C307 1.0µF
C319 N.C.
C309 100pF
R310 0R
C333 10nF
R313 0R
C334 10nF
R338 N.C.
R316 0R
C335 10nF
R311 N.C.
L308 2.4nH
V304
R314 N.C.
L309 2.4nH
V305
R317 N.C.
L310 2.4nH
V306
C322 N.C.
C311 100pF
C310 1.0µF
C323 N.C.
C312 100pF
R319 0R
C336 10nF
R322 0R
C337 10nF
R339 N.C.
R325 0R
C338 10nF
R320 N.C.
L311 2.4nH
V307
R323 N.C.
L312 2.4nH
V308
R326 N.C.
L313 2.4nH
V309
C324 N.C.
C314 100pF
C313 1.0µF
C325 N.C.
C315 100pF
R328 0R
C339 10nF
R331 0R
C340 10nF
R340 N.C.
R334 0R
C341 10nF
R329 N.C.
L314 2.4nH
V310
R332 N.C.
L315 2.4nH
V311
R335 N.C.
L316 2.4nH
V312
ANT_1
ANT_2
ANT_3
ANT_4
ANT_5
ANT_6
ANT_7
ANT_8
ANT_9
ANT_10
ANT_11
ANT_12
PCA20054 - Antenna Switches
Size A2
Project Number 4467
Revision 1.0.0
Date: 2025/2/27
File: pca20054_sheet3_antenna_switches.SchDoc
Sheet 3 of 5
Drawn By: KJP
NORDIC SEMICONDUCTOR

DESIGN NOTE:
Parts above the line go on the top of the PCB, and parts below the line go on the bottom side.

PCB top side

PCB bottom side

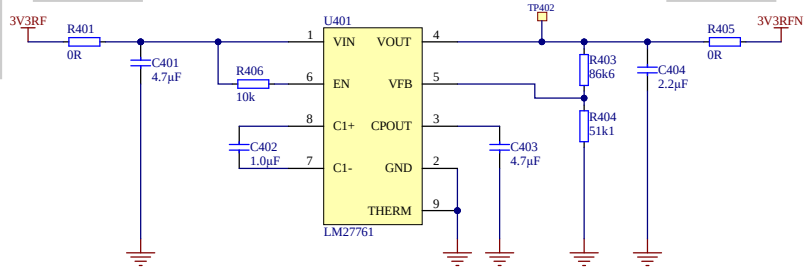
DESIGN NOTE:
3V3RF ≈ 3.1 V from the DK board. We use it to supply the RF switches. It's fine. They work down to 2.3 V

See also [05] Connectors sheet, pos B3

DESIGN NOTE:
Placeholder for ferrite bead

DESIGN NOTE:
Placeholder for ferrite bead

DESIGN NOTE:
3V3RFN is only used to supply the negative voltage to Vss_EXT to the antenna switches. The load is expected to be low.

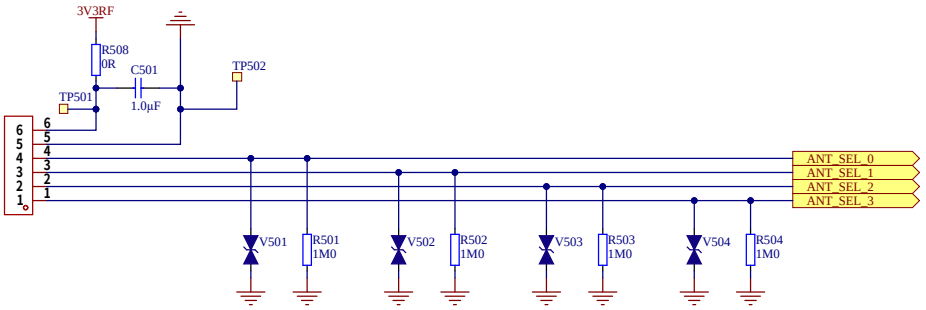


PCA20054 - Power and Control		
Size: A3	Project Number: 4467	Revision: 1.0.0
Date: 2025/2/27		Sheet 4 of 5
File: pca20054_sheet4_power_control.SchDoc		Drawn By: KJP

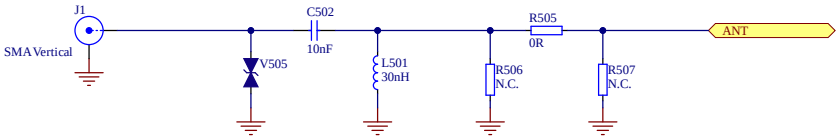
NORDIC SEMICONDUCTOR

DESIGN NOTE:
VDD ≈ 3.1 V from 3.3V regulator and fed through a Shottky diode. All on the Nordic DK.

DESIGN NOTE:
R508 is a place-holder for a ferrite bead.



DESIGN NOTE:
The SMA connector might be replaced by a smaller SMT coaxial connector, e.g. HIROSE U.FL-R-SMT-1.

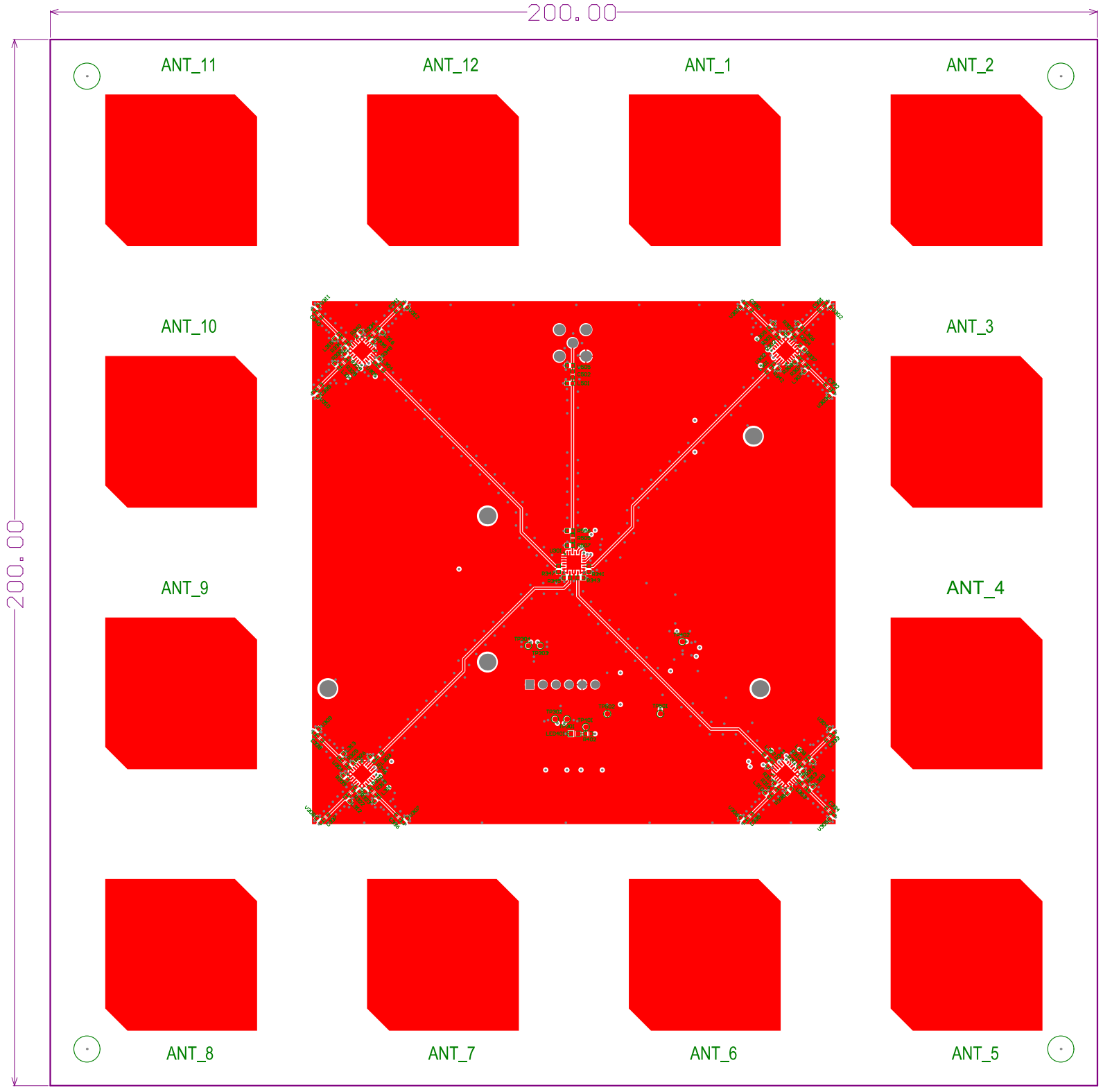


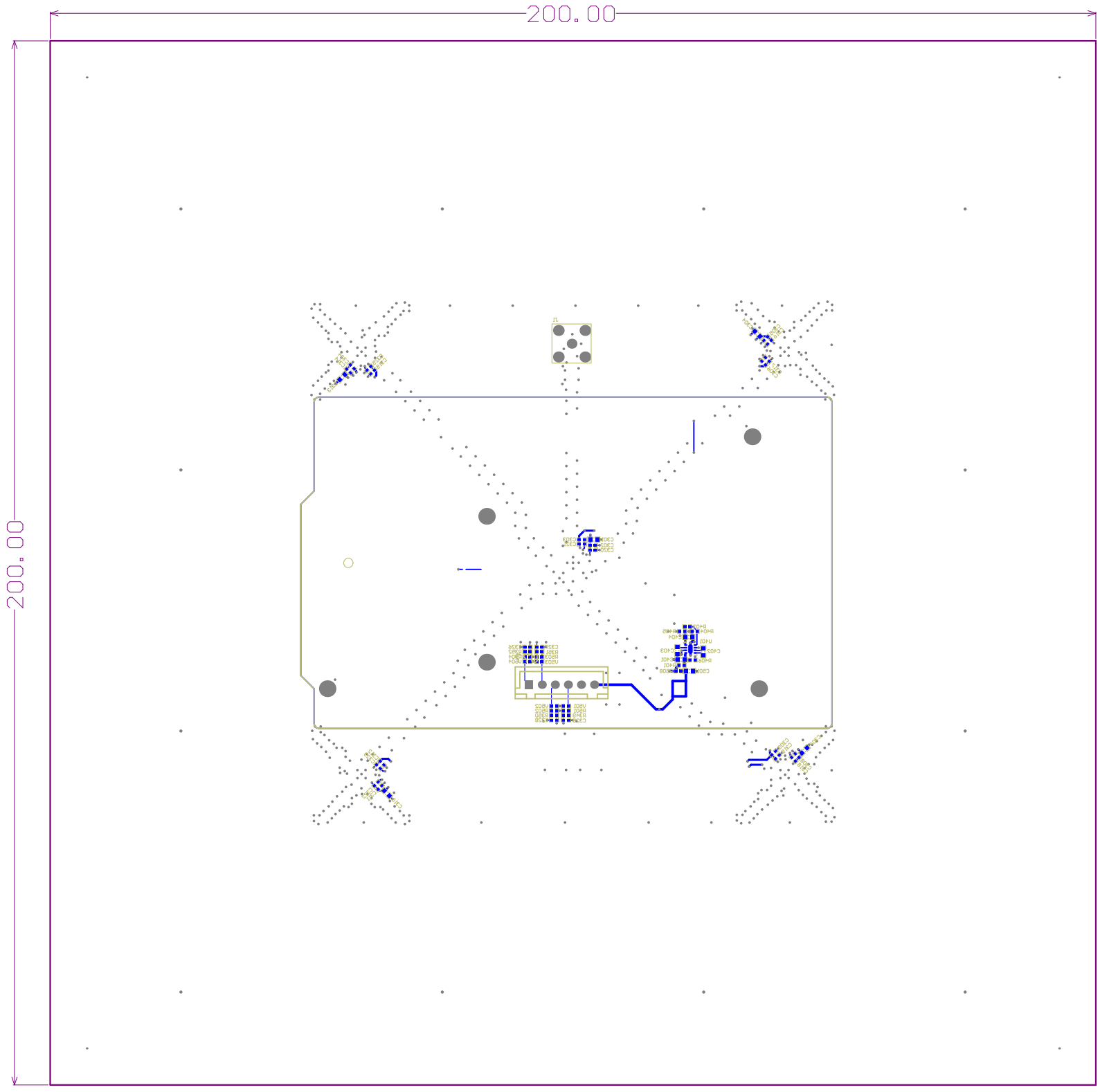
DESIGN NOTE:
Place holder for matching network.

DESIGN NOTE:
Place this matching network close to the switch U301

PCA20054 - Connectors		
Size: A3	Project Number: 4467	Revision: 1.0.0
Date: 2025/2/27		Sheet 5 of 5
File: pca20054_sheet5_connectors.SchDoc		Drawn By: KJP

NORDIC SEMICONDUCTOR


200.00
200.00
ANT_11
ANT_12
ANT_1
ANT_2
ANT_10
ANT_3
ANT_9
ANT_4
ANT_8
ANT_7
ANT_6
ANT_5


200.00
200.00