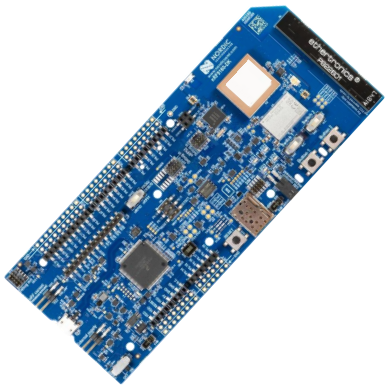
Nordic nRF9160 DK

P822601 LTE-M / NB-IoT FR4 Embedded Antenna in nRF9160 DK

698 - 960 MHz / 1700 - 2200 MHz / 2500 - 2690 MHz

Supports: Cellular IoT development kit for LTE-M, NB-IoT



P822601 Nordic Reference design
Low Band: 698 – 960 MHz
High Band: 1700 - 2200 MHz
Band 7: 2500 - 2690 MHz

The nRF9160 DK is an affordable, pre-certified single-board development kit for evaluation and development on the nRF9160 SiP for LTE-M, NB-IoT and GPS. The dedicated LTE-M and NB-IoT antenna is KYOCERA AVX P822601 and it supports a wide range of bands, to operate globally: LTE bands B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28 and B66 have been certified.

Stays in Tune

KYOCERA AVX antennas use patented IMD technology in many antenna configurations to provide high performance. IMD antennas requires a smaller design keep-out area, carry lower program development risk which yields a quicker time-to-market, without sacrificing RF performance.

Electrical Specifications

Typical performance in Nordic nRF9160 DK

Frequency (MHz)	698-960	1700-2200	2500-2690
Peak Gain	2.6 dBi	3.8 dBi	2.1 dBi
Average Efficiency	61%	50%	40%
VSWR Match	< 2.6:1	< 3.5:1	< 2.9:1
Polarization	Linear		
Feed Point Impedance	50 Ω unbalanced		

Mechanical Specifications

Nordic nRF9160 DK	
Nordic PCB Dimensions (mm)	155.0 X 63.0
P822601 Dimensions (mm)	49.6 x 8.0 x 3.2
P822601 Mounting Type	SMT (P&P)
P822601 Weight (grams)	2..63
P822601 Packaging	Tape and Reel
P822601 Storage Temperature/ Humidity (Sealed shipping package)	+5°C to +35°C 45~75%
P822601 Operating Temperature	-40 to +85 C
Nordic nRF9160 DK Link	

KEY BENEFITS

Reduced Costs and Time-to-Market

Standard antenna eliminates design fees and cycle time associated with a custom solution; getting products to market faster.

Greater Flexibility with Unique Form Factors

KYOCERA AVX' technology helps you deliver more advanced ergonomic designs without adverse impact on product performance.

Environmental Compliance

Comply with latest RoHS requirements

APPLICATIONS

- Healthcare / Medical applications
- Remote monitoring / Smart metering
- M2M, Industrial IoT Devices
- FirstNet
- Manufacturing Automation
- Point of Sale
- Environmental and Asset Tracking devices
- NB IoT
- Sigfox
- LoRa
- Cellular LPWA
- RPMA
- LTE CAT-M

Nordic Reference Design nRF9160 DK with KYOCERA AVX P822601 Embedded LTE Antenna Specifications. KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs.

LTE Bands covered by (nRF9160 DK)

LTE Band	Frequency Band (MHz)	Uplink (UL) (MHz)	Downlink (DL) (MHz)	Region	Covered
1	2100	1920 - 1980	2110 - 2170	Global	Yes
2	1900	1850 - 1910	1930 - 1990	NAM	
3	1800	1710 - 1785	1805 - 1880	Global	
4	1700	1710 - 1755	2110 - 2155	NAM	
5	850	824 - 849	869 - 894	NAM	
6	850	830 - 840	875 - 885	APAC	
7	2600	2500 - 2570	2620 - 2690	EMEA	
8	900	880 - 915	925 - 960	Global	
9	1800	1749.9 - 1784.9	1844.9 - 1879.9	APAC	
10	1700	1710 - 1770	2110 - 2170	NAM	
11	1500	1427.9 - 1447.9	1475.9 - 1495.9	Japan	No
12	700	699 - 716	729 - 746	NAM	Yes
13	700	777 - 787	746 - 756	NAM	
14	700	788 - 798	758 - 768	NAM	
17	700	704 - 716	734 - 746	NAM	
18	850	815 - 830	860 - 875	Japan	
19	850	830 - 845	875 - 890	Japan	
20	800	832 - 862	791 - 821	EMEA	
21	1500	1447.9 - 1462.9	1495.9 - 1510.9	Japan	No
22	3500	3410 - 3490	3510 - 3590	EMEA	
23	2000	2000 - 2020	2180 - 2200	NAM	Yes
24	1600	1626.5 - 1660.5	1525 - 1559	NAM	No
25	1900	1850 - 1915	1930 - 1995	NAM	Yes
26	850	814 - 849	859 - 894	NAM	
27	850	807 - 824	852 - 869	NAM	
28	700	703 - 748	758 - 803	APAC,EU	
29	700	N/A	717 - 728	NAM	
30	2300	2305 - 23151	2350 - 2360	NAM	
31	450	452.5 - 457.5	462.5 - 467.5	Global	
32	1500	N/A	1452 - 1496	EMEA	No
33	1900	1900 - 1920			Yes
34	2000	2010 - 2025			
35	1850	1850 - 1910			
36	1900	1930 - 1990			
37	1900	1910 - 1930			
38	2600	2570 - 2620			
39	1900	1880 - 1920			
40	2300	2300 - 2400			
41	2500	2496 - 2690			
42	3500	3400 - 3600			No
43	3700	3600 - 3800			

tel +(1) 858.550.3820
email: eth.info@kyocera-avx.com
1 Avx Blvd, Fountain Inn, SC 29644

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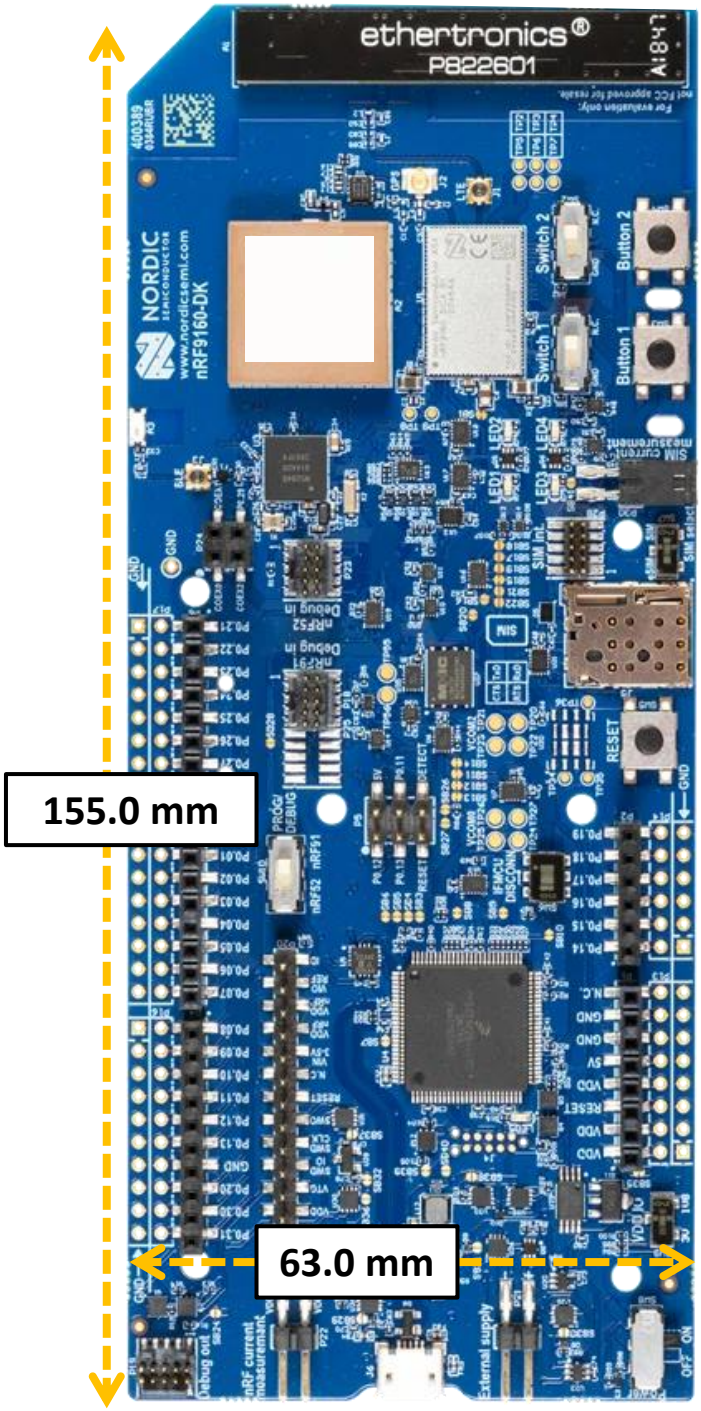
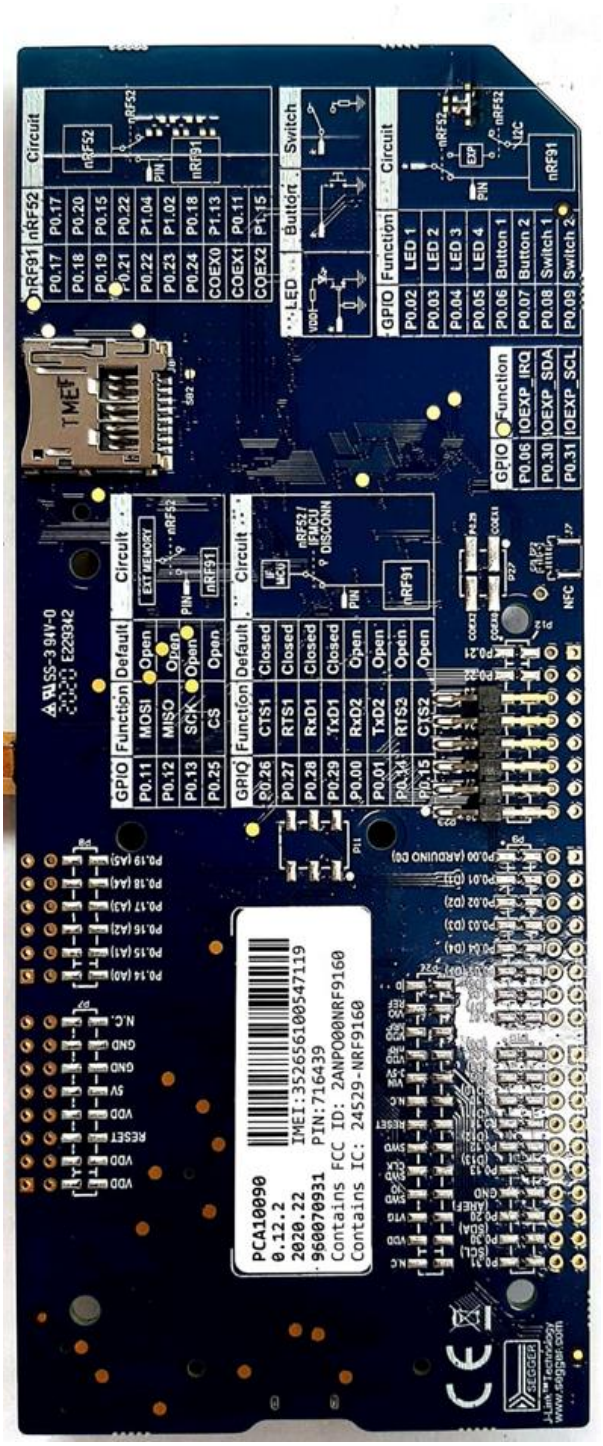
Nordic nRF9160 DK Reference Design

Front and Back View





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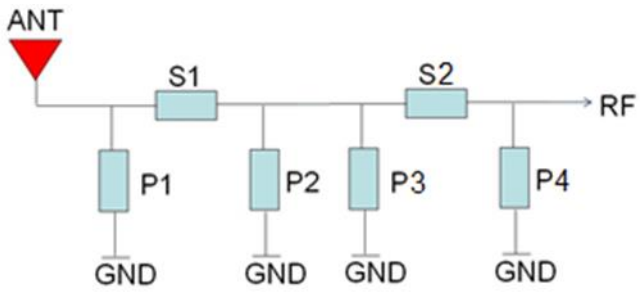
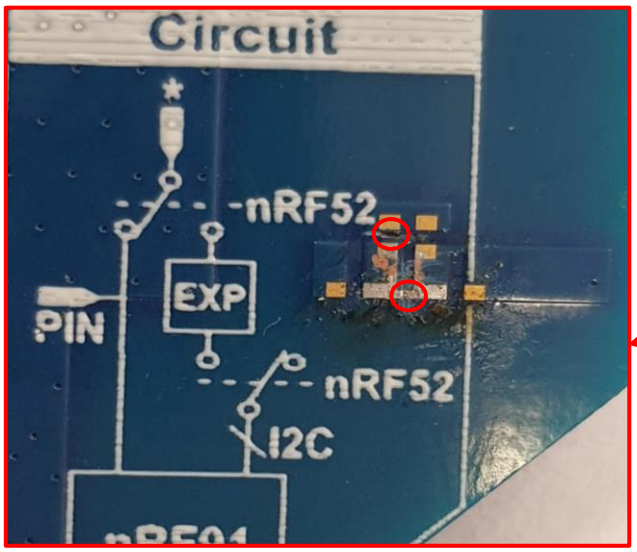
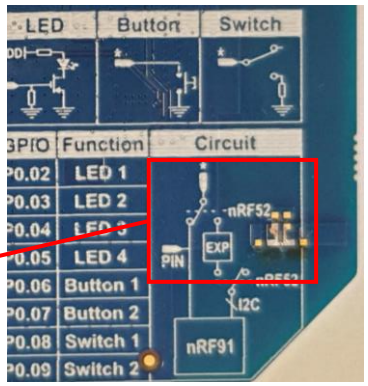
Antenna Matching Structure (Nordic nRF9160 DK)



Matching	Value	Tolerance
P1	22nH	2%
S1	3.9pF	2%
P2	NA	2%
S2	3.9nH	2%
P3	NA	2%
P4	NA	2%





The tuning line is cut at these both locations.

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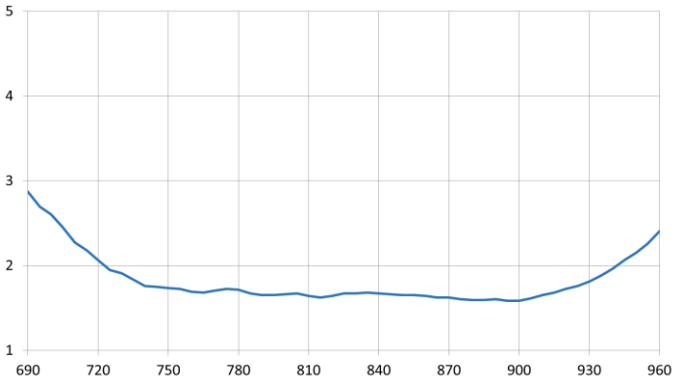
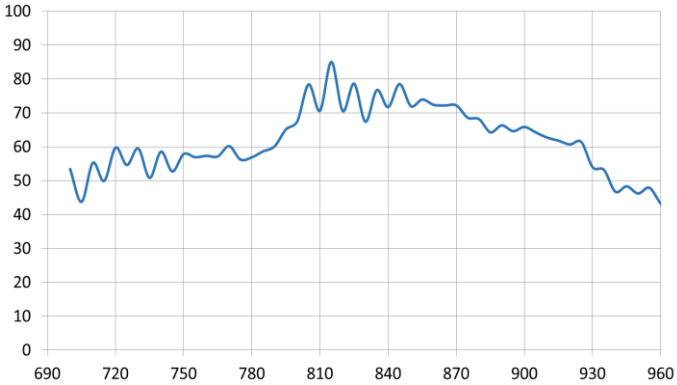
VSWR and Efficiency Plots

Typical P822601 performance in Nordic nRF9160 DK

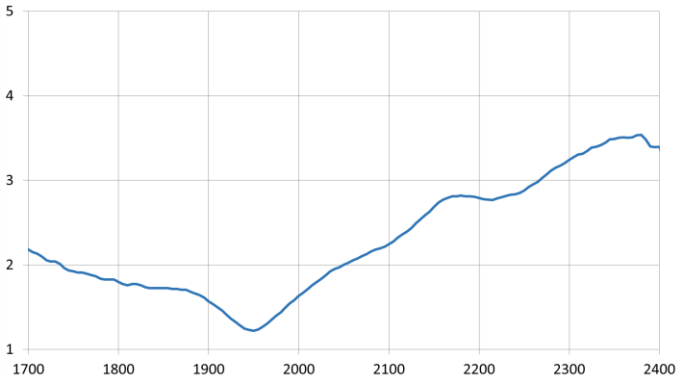
Low Band VSWR



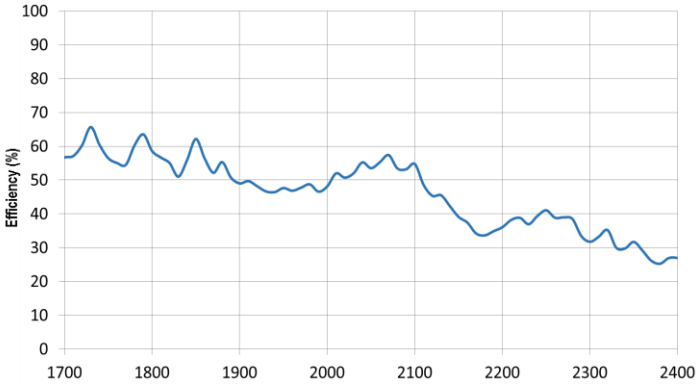
Low Band Efficiency



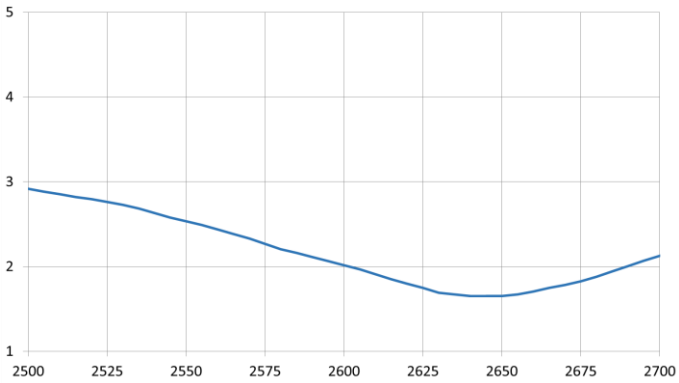
High Band VSWR



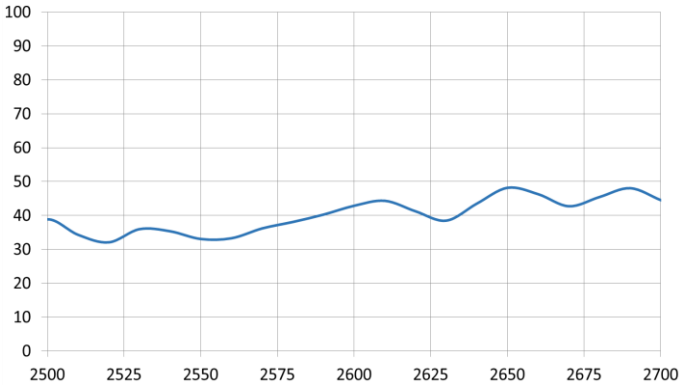
High Band Efficiency



Band 7 VSWR



Band 7 Efficiency



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email: eth.info@kyocera-avx.com
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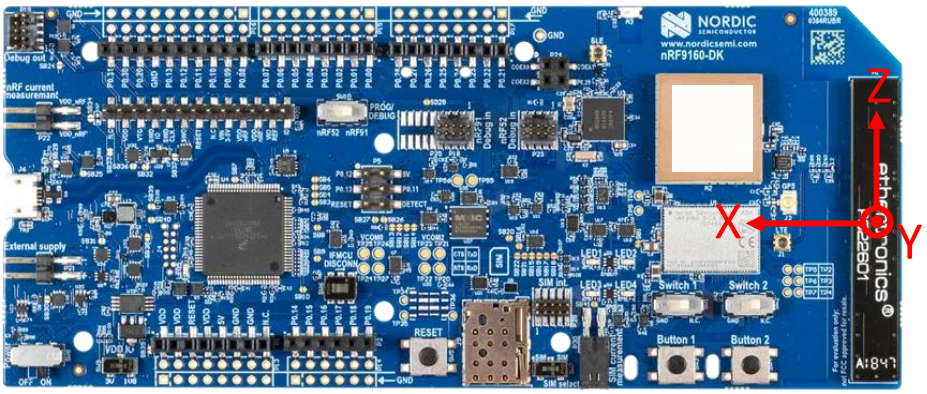
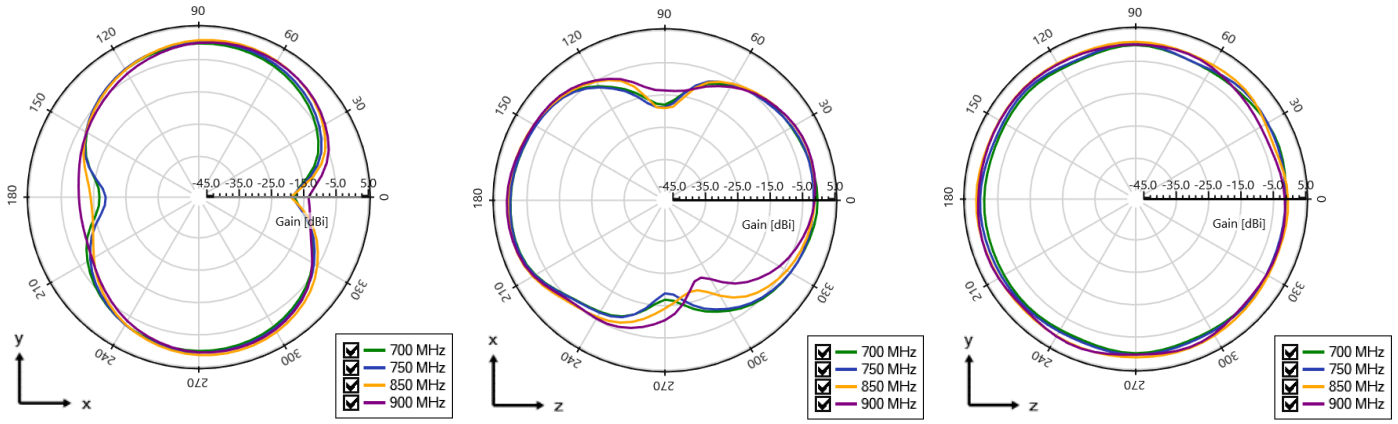
Antenna Radiation Patterns – Low / High Band

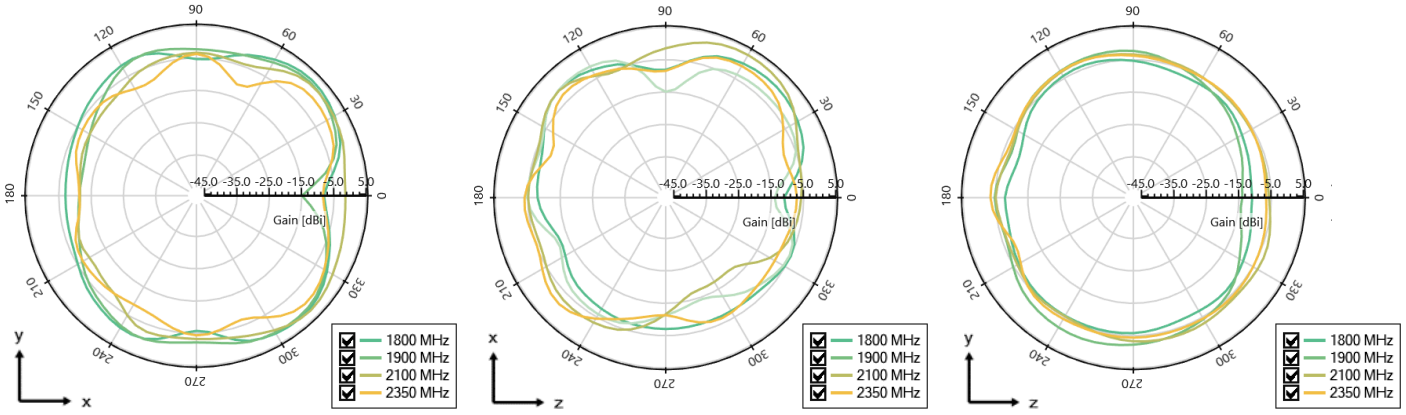
Typical P822601 performance in Nordic nRF9160 DK



Low Band measured at 700, 750, 850, 900 MHz



High Band measured at 1800, 1900, 2100, 2350 MHz



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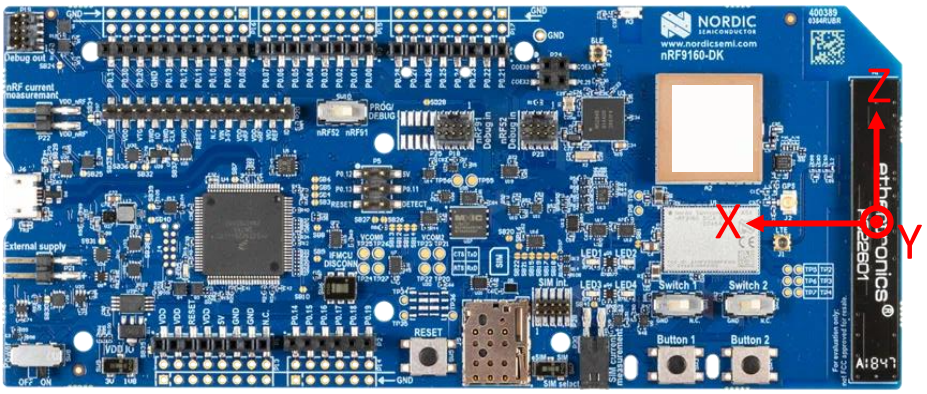
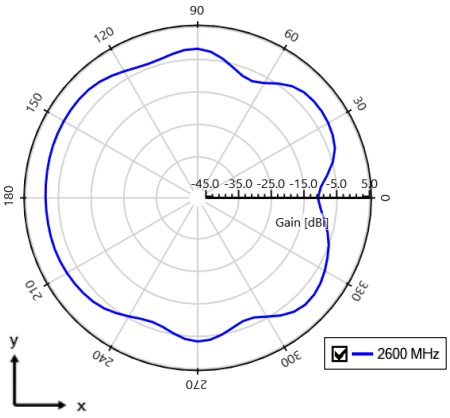
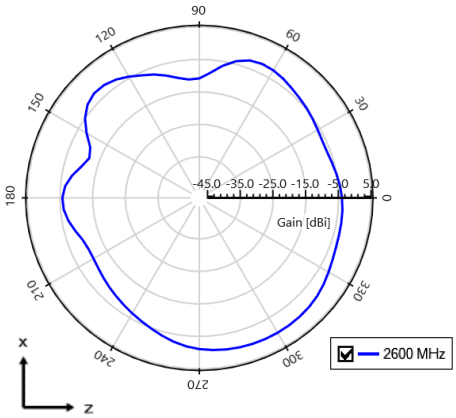
Antenna Radiation Patterns – Band 7

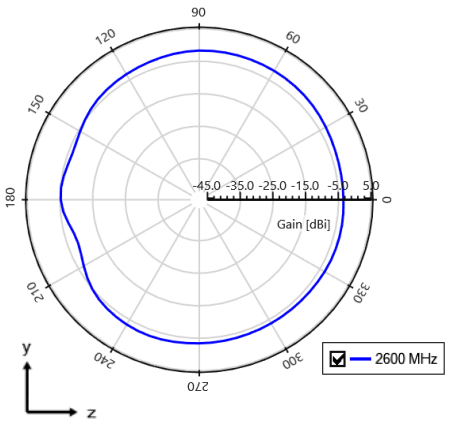
Typical P822601 performance in Nordic nRF9160 DK



Band 7 measured at 2600 MHz







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