# NORA-W3 with Yageo / Pulse ANTX100P001B24553 antenna

Lab measurements Technical report





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#### This document applies to the following products:

Product name	Type number
NORA-W300	NORA-W300-00B
NORA-W301	NORA-W301-00B
NORA-W360	NORA-W360-01B
NORA-W361	NORA-W361-01B

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## **1** Functional description

### 1.1 Overview

Certain models of the NORA-W3 series utilize an external antenna. This report provides test results for use of the Yageo / Pulse ANTX100P001B24553 patch antenna for the 2.4 GHz and 5 GHz ISM bands for Bluetooth LE and Wi-Fi operation. The antenna is provided from the factory with a soldered 100 mm coaxial jumper and a U.FL connector, which connects directly to the module.

### 1.2 ANTX100P001B24553 antenna



Figure 1: Yageo / Pulse ANTX100P001B24553 patch antenna

### 1.3 Antenna specifications

Table 1 shows the antenna specifications.

Feature	Details	
Manufacturer	Yageo / Pulse	
Manufacturer P/N	ANTX100P001B24553	
Туре	Patch	
Antenna element dimensions	50 mm x 10 mm x 2.3 mm	
Frequencies	2400 MHz to 2483.5 MHz, 5100 MHz to 5850 MHz	
Nominal impedance	50 Ω	

Table 1: Antenna specifications

## 2 Measurements

The NORA-W300 module is used for measurements. It is soldered to its evaluation board.

The antenna with U.FL coaxial jumper and evaluation board are mounted onto a plastic bracket, oriented with the antenna on the X-Z plane and the longest side along the X-axis. The assembly is then mounted into a positioning apparatus inside the anechoic chamber. Figure 2 shows the antenna orientation in X-Y-Z cartesian coordinate system. In the anechoic chamber, the initial DUT orientation is such that the Z-axis initially points toward the receive antenna at the far end of the chamber.



Figure 2: ANTX100P001B24553 connected to NORA-W3, mounted in chamber

Radiation patterns are measured in a far-field anechoic chamber with a measurement distance of 3 m. The device under test (DUT) is positioned using a 2-axis positioning apparatus, allowing rotation along azimuth (phi  $\varphi$ ) and elevation (theta  $\theta$ ). The intensity of the received (*r*) signal is plotted as the distance from the origin at the azimuth and elevation angles. Measurements are taken at 15° angular increments for azimuth and elevation. Horizontal and vertical polarizations are measured.



Figure 3: Spherical coordinate system and rotated sphere showing test point orientation

## 3 Antenna performance

### 3.1 Maximum gain

Table 2 shows the measured performance. Maximum gain is 5.3 dBi for the 2.4 GHz band and 4.6 dBi for the 5 GHz band.

Frequency	Maximum gain (dBi)	Efficiency (%)	Orientation at maximum gain
2412	5.3	89.9	270° azimuth, 180° elevation
2442	3.3	57.3	270° azimuth, 180° elevation
2472	3.3	53.5	270° azimuth, 180° elevation
5180	4.3	68.0	195° azimuth, 165° elevation
5260	4.6	77.1	195° azimuth, 165° elevation
5540	4.5	68.5	195° azimuth, 165° elevation
5865	3.3	55.9	240° azimuth, 120° elevation

Table 2: Maximum antenna gain per band

### 3.2 Radiation patterns

Figure 4 shows the 2.4 GHz, 2D, X-Y plane antenna gain plot as a function of direction.



### Figure 4: ANTX100P001B24553 antenna – 2.4 GHz, 2D X-Y plane radiation pattern

Figure 5 shows the 5 GHz, 2D, X-Y plane antenna gain plot as a function of direction.



Figure 5: ANTX100P001B24553 antenna – 5 GHz, 2D X-Y plane radiation pattern



#### Figure 6 shows the 2.4 GHz, 2D, X-Z plane antenna gain plot as a function of direction.



#### Figure 6: ANTX100P001B24553 antenna – 2.4 GHz, 2D X-Z plane radiation pattern





Figure 7: ANTX100P001B24553 antenna – 5 GHz, 2D X-Z plane radiation pattern

### Figure 8 shows the 2.4 GHz, 2D, Y-Z plane antenna gain plot as a function of direction.



#### Figure 8: ANTX100P001B24553 antenna –2.4 GHz, 2D Y-Z plane radiation pattern

Figure 9 shows the 5 GHz, 2D, Y-Z plane antenna gain plot as a function of direction.



Figure 9: ANTX100P001B24553 antenna – 5 GHz, 2D Y-Z plane radiation pattern



#### Test equipment and dates 4

Equipment name	Model number	Manufacturer	Serial Number	Date of last calibration
RF chamber	Space Saver PC	ETS Lindgren	AP563	N/A
Spectrum analyzer	N9000B	Keysight	MY60251554	26-May-2022
300 MHz to 6 GHz Quad- ridged Horn Antenna	3164-06	ETS Lindgren	00092216	N/A

Table 3: Test equipment

Test date	
18-Jul-2023	

Table 4: Test date

## **Related documentation**

- [1] NORA-W30 series data sheet, UBX-22021117
- [2] NORA-W36 series data sheet, UBX-22021118
- [3] NORA-W30 series system integration manual, UBX-22021119
- [4] NORA-W36 series system integration manual, UBX-22021120
- [5] Yageo / Pulse ANTX100P001B24553 data sheet

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## **Revision history**

Revision	Date	Author	Description
R01	12-Mar-2024	brec	Initial release
R02	26-Mar-2024	brec	Updated antenna data sheet link [5]

## Contact

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