HW Platforms / R&D
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Antenna technical document for Polar 5P

Revision History:

Rev	Date	By	Description of Change
v.1.0	3.05.2023	PN	Initial release
v.2.0	30.05.2023	PI	Content unchanged, formatting fixes
v.3.0	29.09.2023	PI	Internal pictures of the device removed

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1 General information

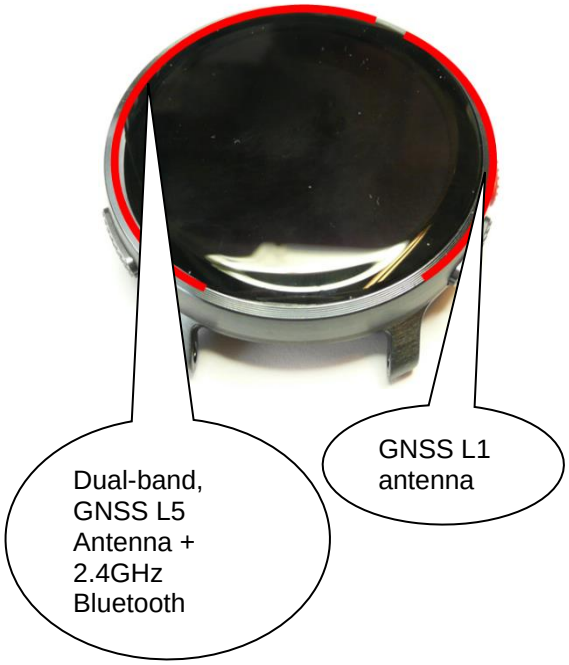
1.1 Antenna information

Antennas:
- Dual-band, 1164-1215MHz GNSS L5 Antenna + 2402-2480MHz Bluetooth Antenna
- 1559 – 1610 MHz GNSS L1 antenna

Antenna type: LDS integrated antenna

Features:
- size:
  - GNSS L1 WxLxH (0.05x31.4x2.5) mm^3
  - GNSS L5 + Bluetooth WxLxH (0.05x55.6x2.5) mm^3
- linear/omnidirectional
- material: LDS

Antenna location: Antenna radiators are on the inner surface of the front cover of the device.



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1.2 Antenna feeding and matching information and description

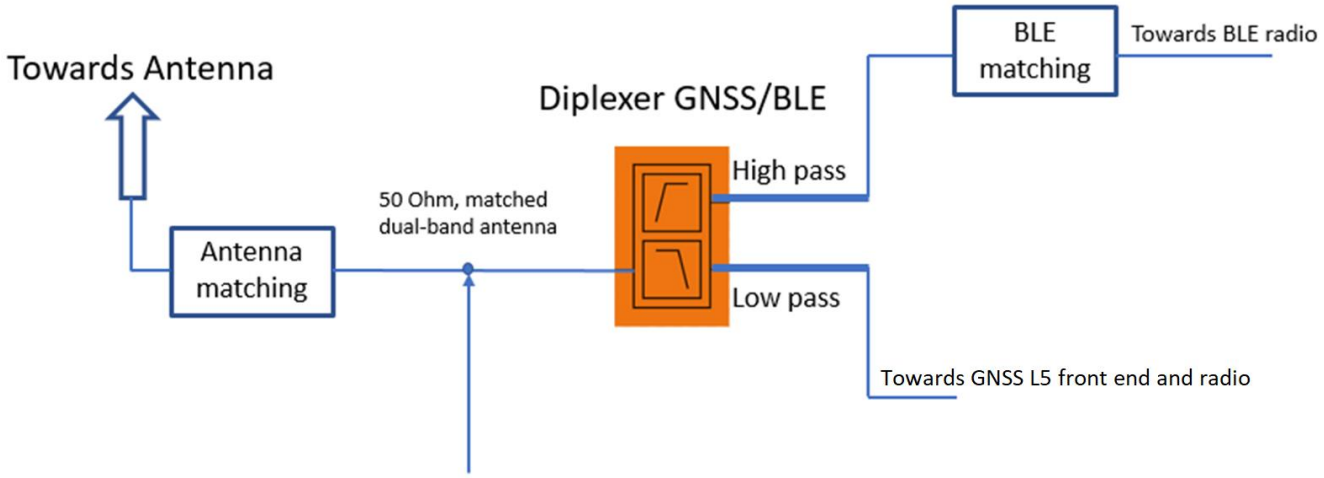

Figure 1: GNSS L5 + Bluetooth antenna feeding and matching structure

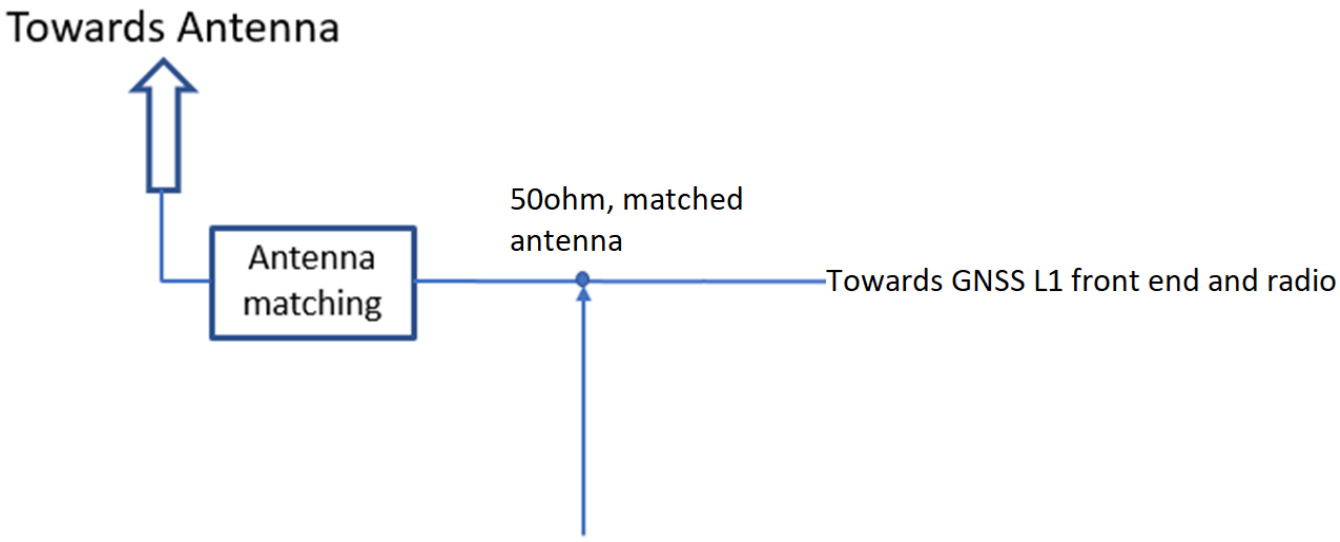

Figure 2: GNSS L1 antenna feeding and matching structure

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2 Measurement coordinate system

Antenna efficiency and radiation pattern were measured with Satimo StarLab -antenna measurement system.

The coordinate system of the measurement chamber.

5.2. *Cuts diagrams (1D, 2D, 3D)*

5.2.1. Measurement coordinate system

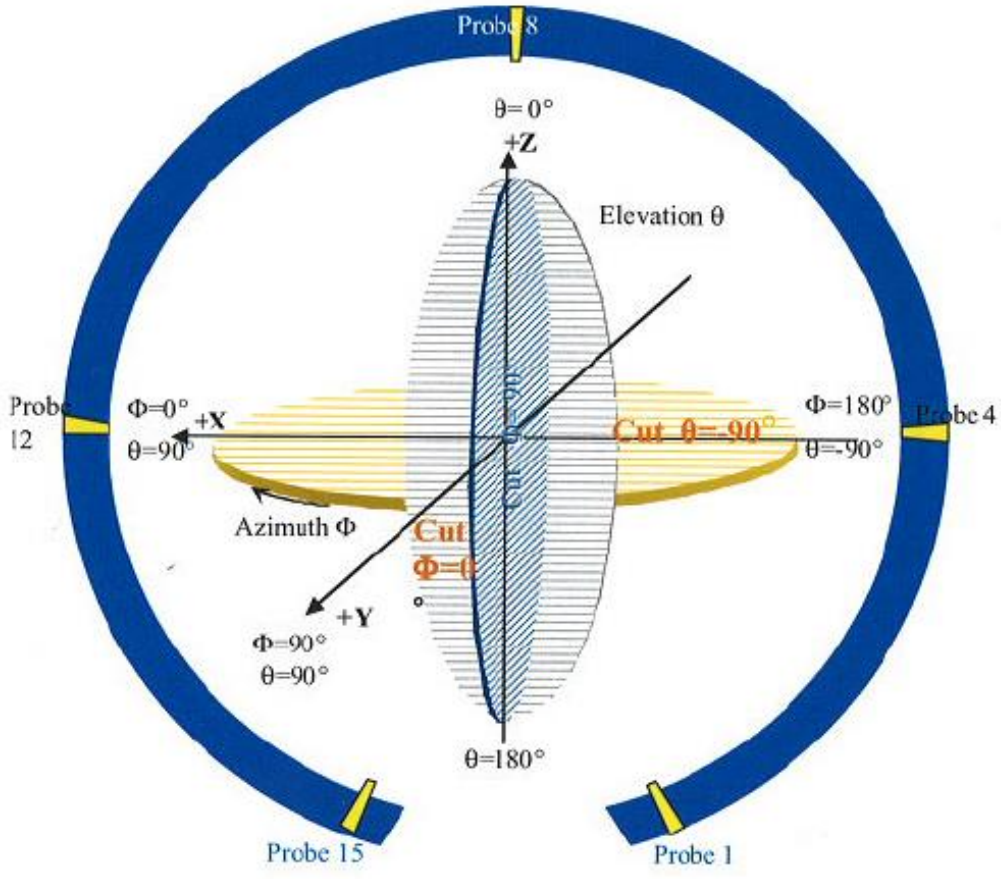

***Figure 56** : Starlab measurement coordinate system; back side Starlab view (as shown in figure 2)*

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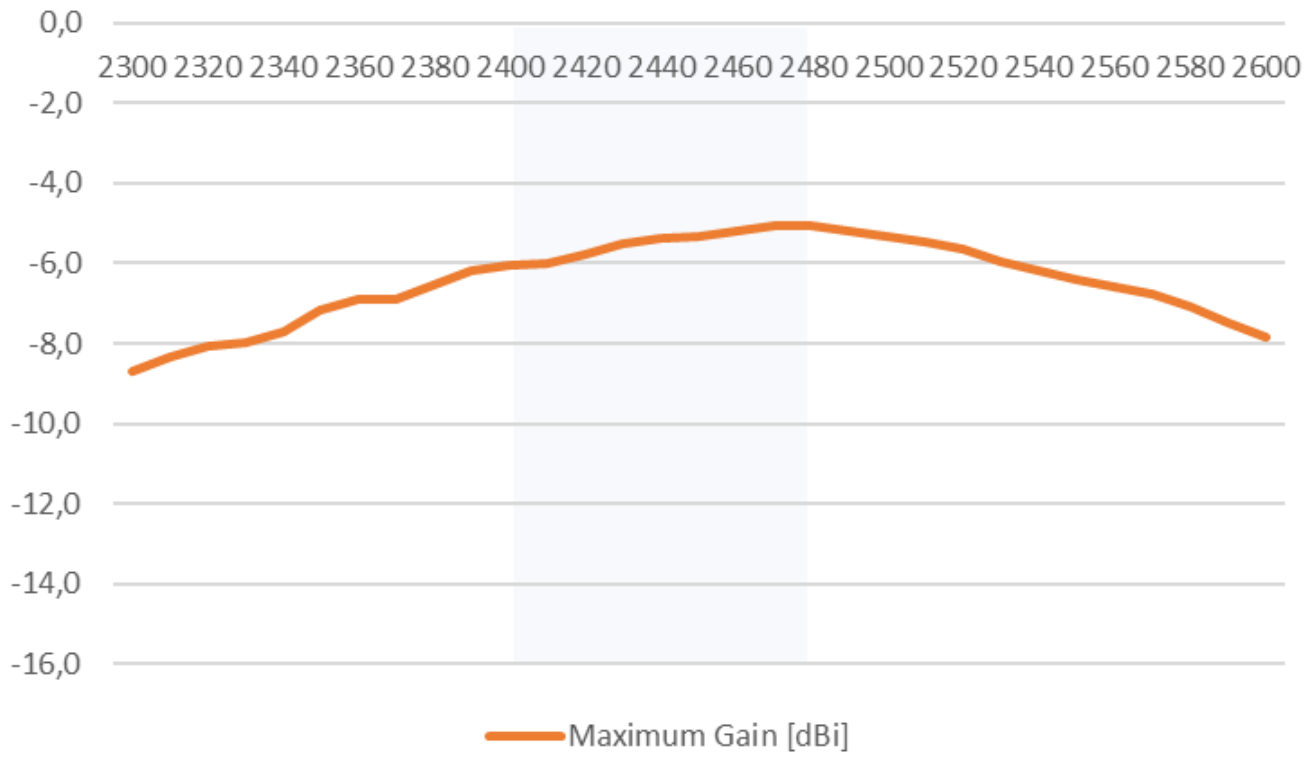
2.1 Bluetooth antenna measurements

2.1.1 Bluetooth antenna maximum gain

Antenna gain is -5,0dBi



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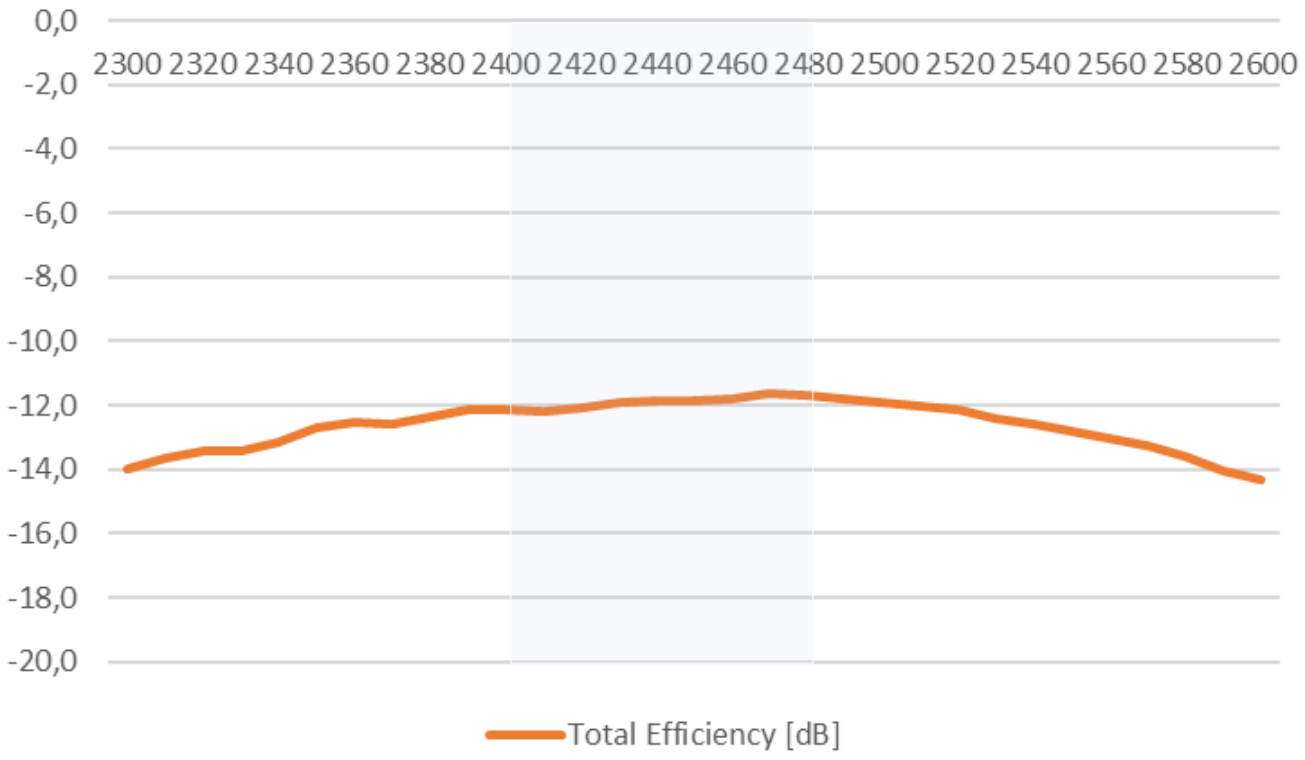
2.1.2 Bluetooth antenna efficiency

Antenna efficiency is -11,7dB



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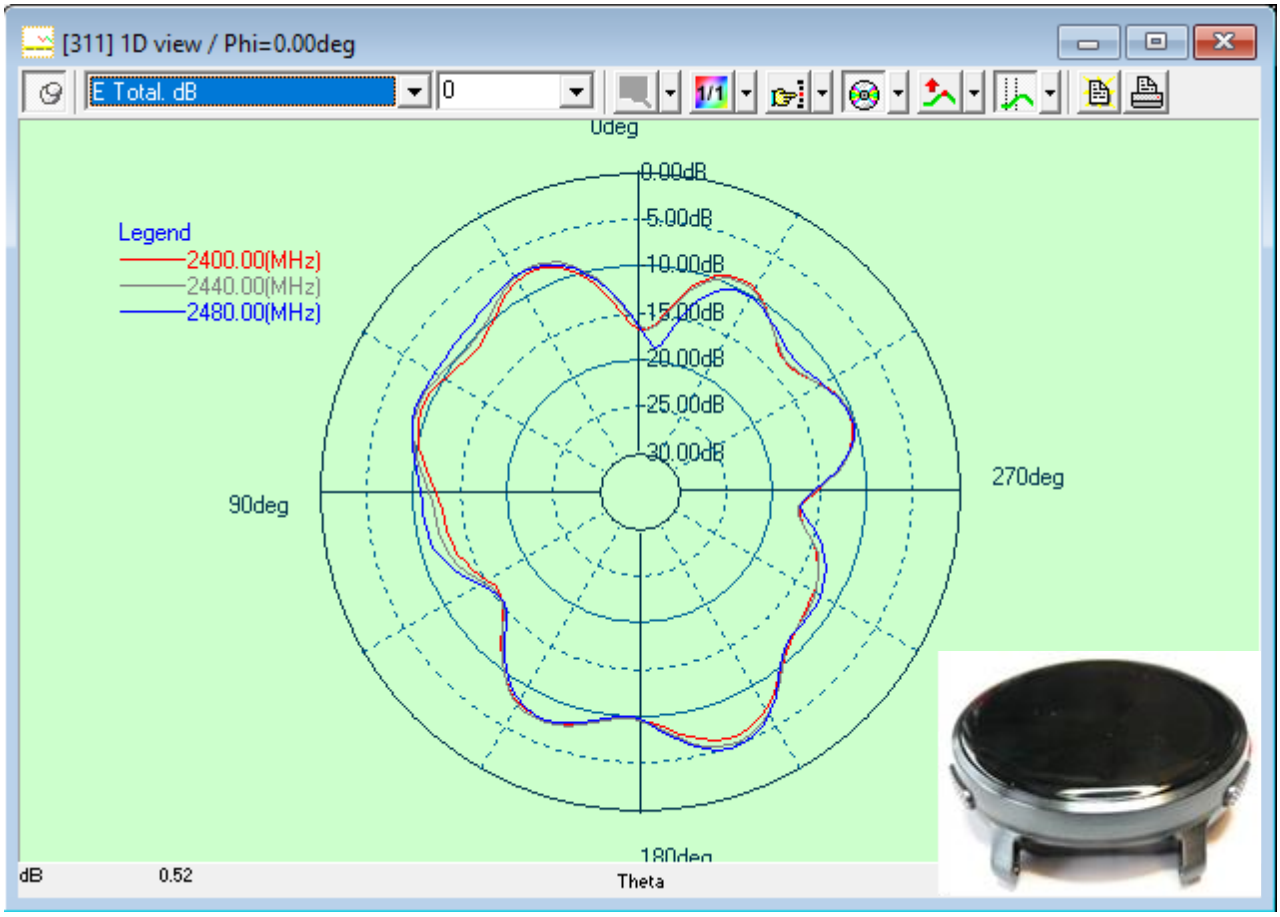
2.1.3 Bluetooth antenna cut diagrams

2.1.3.1 Phi = 0 deg (XZ-plane)



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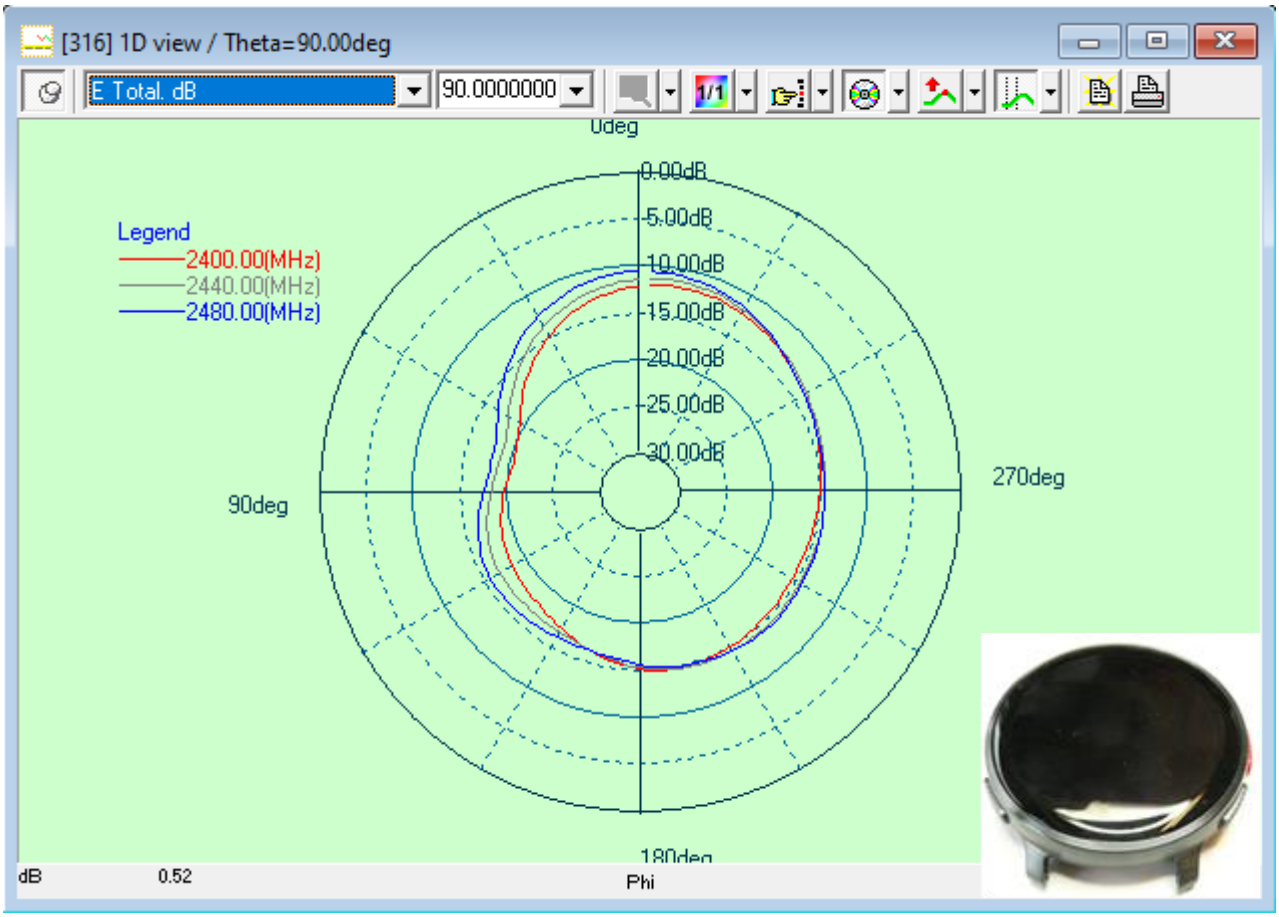
2.1.3.2 Theta = 90 deg (XY-plane)



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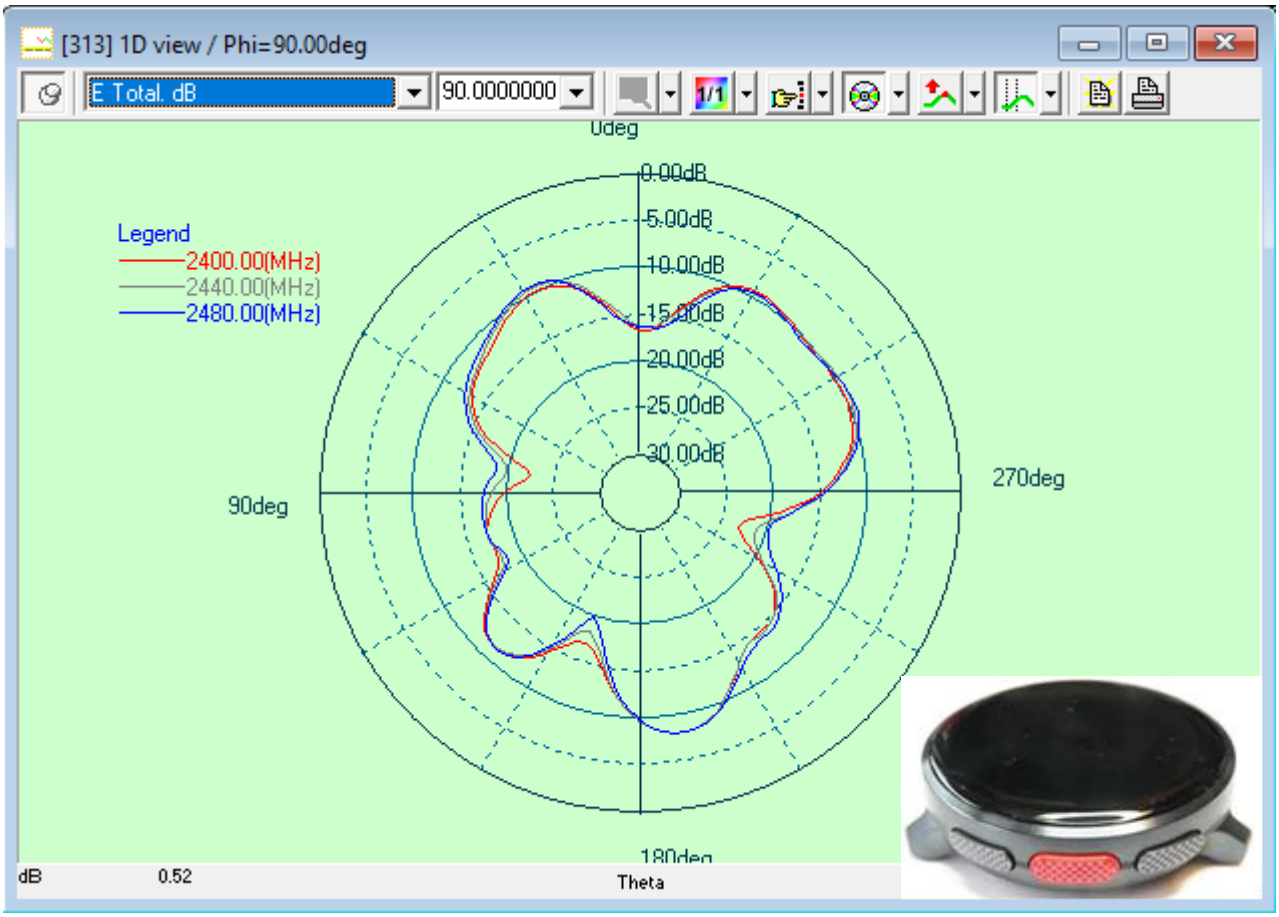
2.1.3.3 Phi = 90 deg (YZ-plane)



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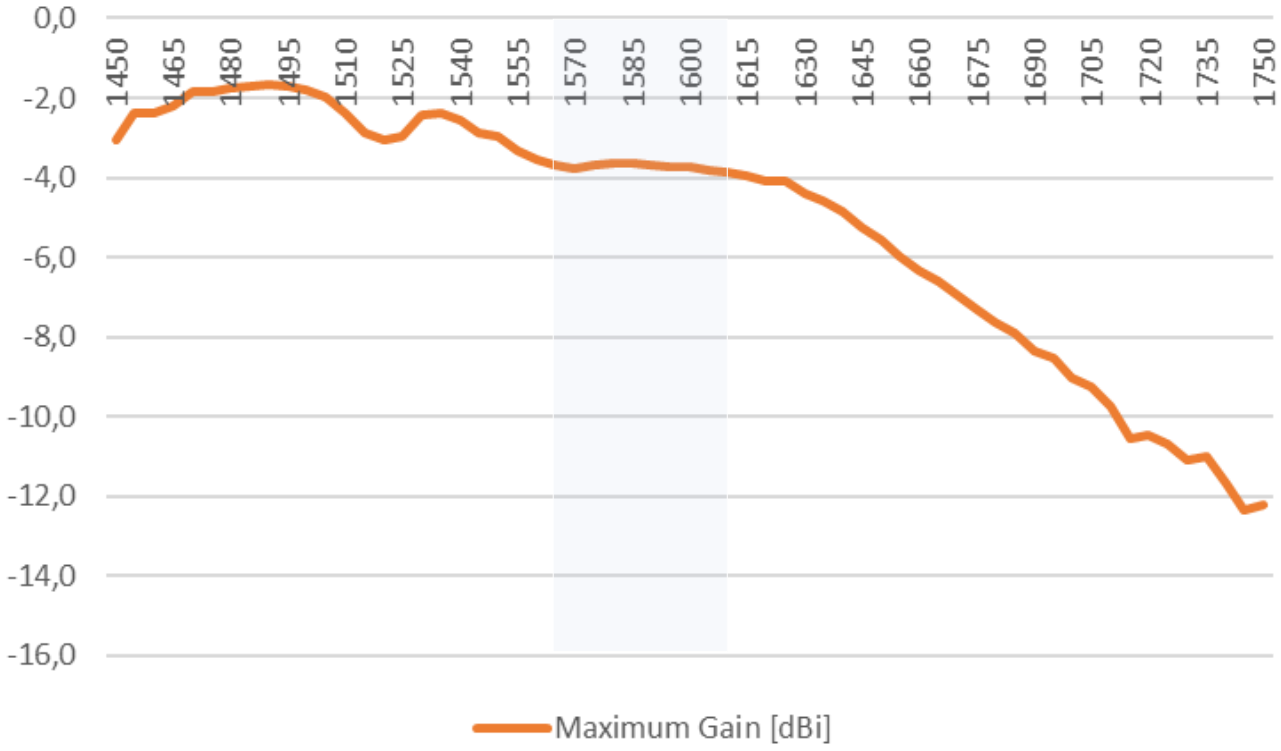
2.2 GNSS antenna measurements

2.2.1 GNSS L1 antenna maximum gain

Antenna gain is -3,6dBi



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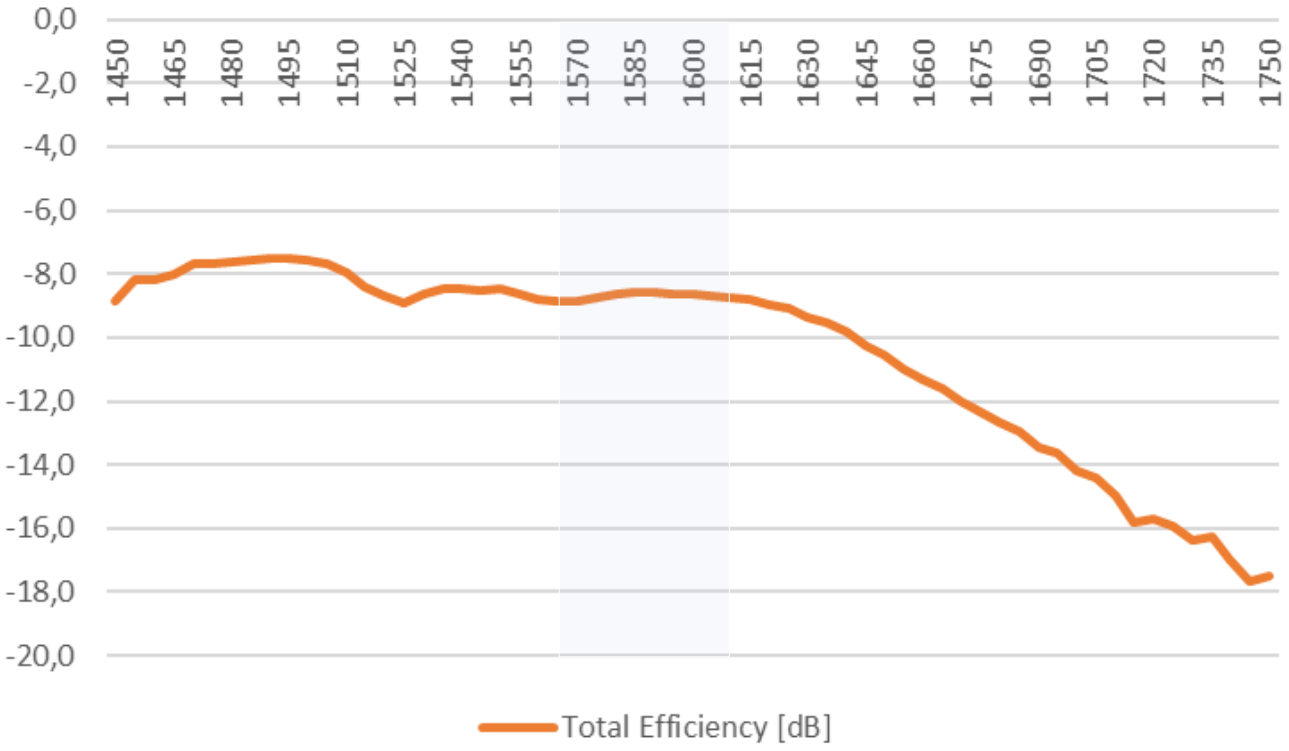
2.2.2 GNSS L1 antenna efficiency

Antenna efficiency is -8,6dB



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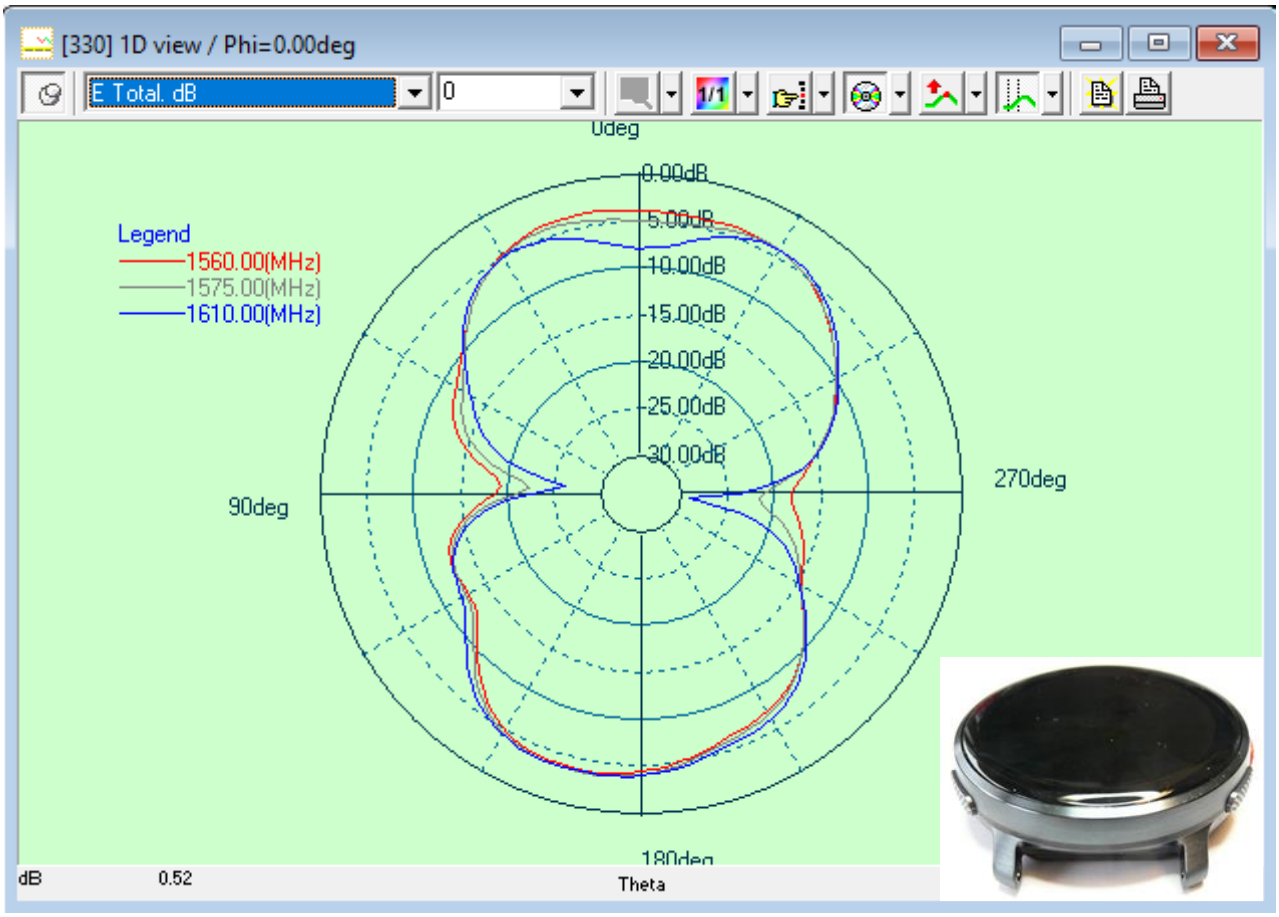
2.2.3 GNSS L1 antenna cut diagrams

2.2.3.1 Phi = 0 deg (XZ-plane)



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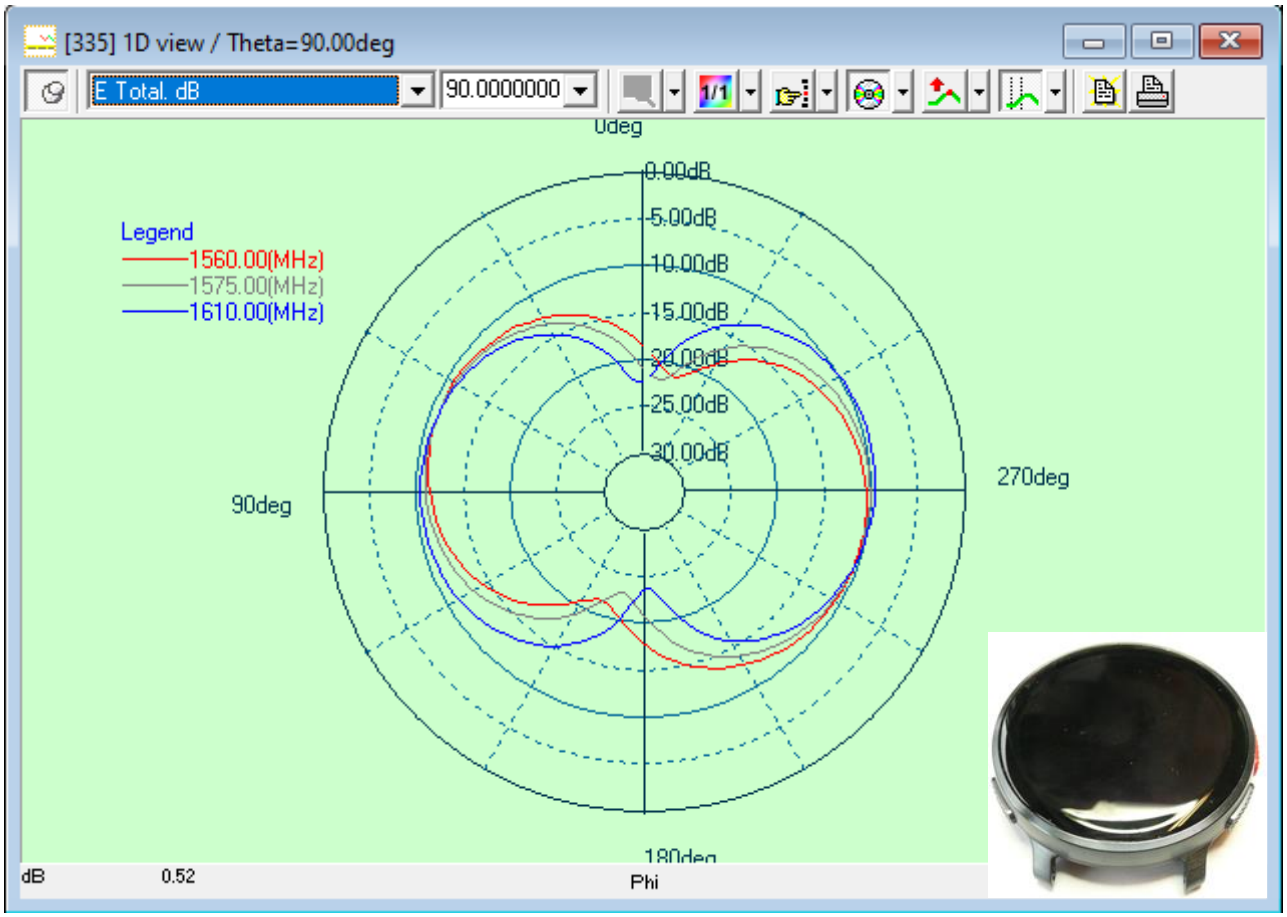
2.2.3.2 Theta = 90 deg (XY-plane)



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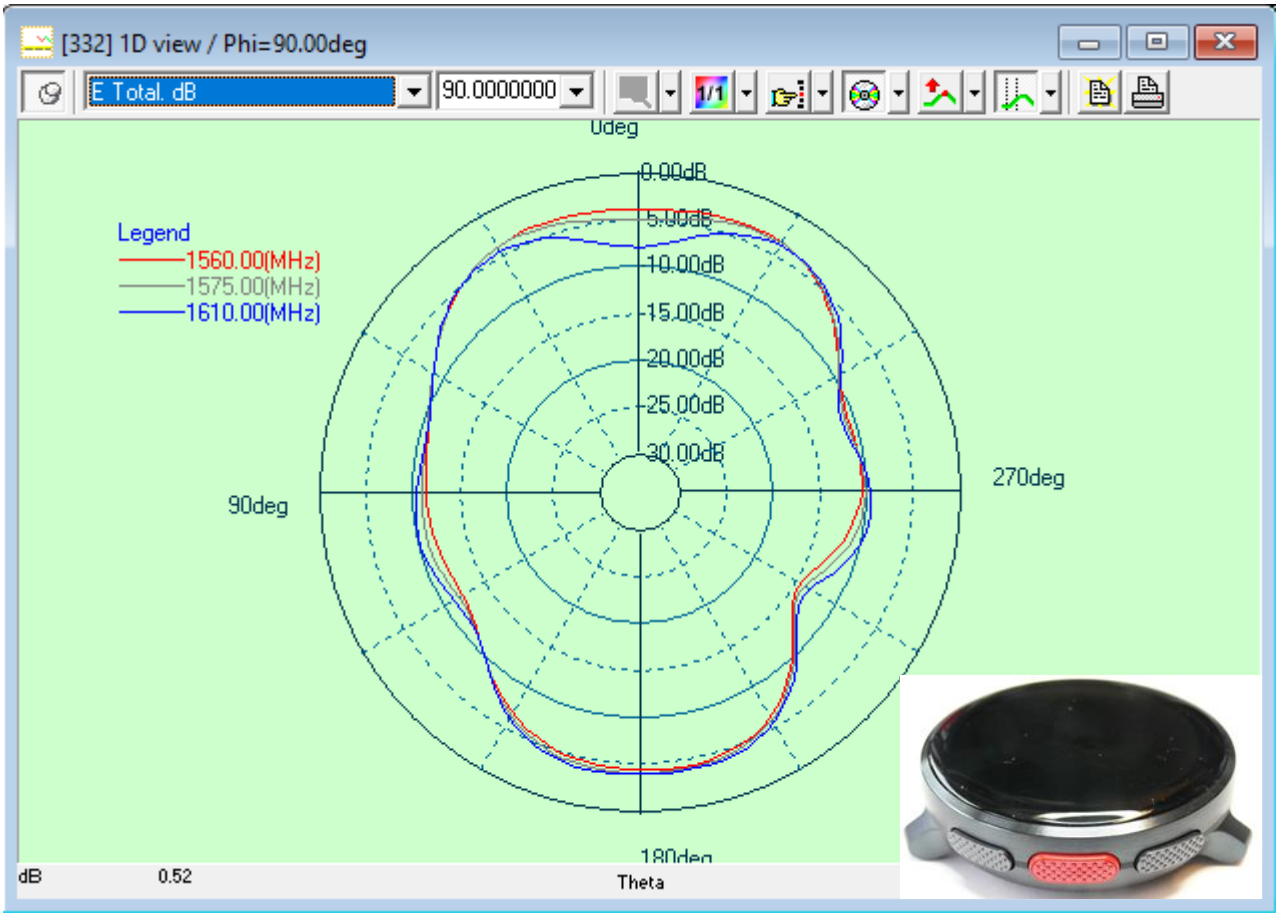
2.2.3.3 Phi = 90 deg (YZ-plane)



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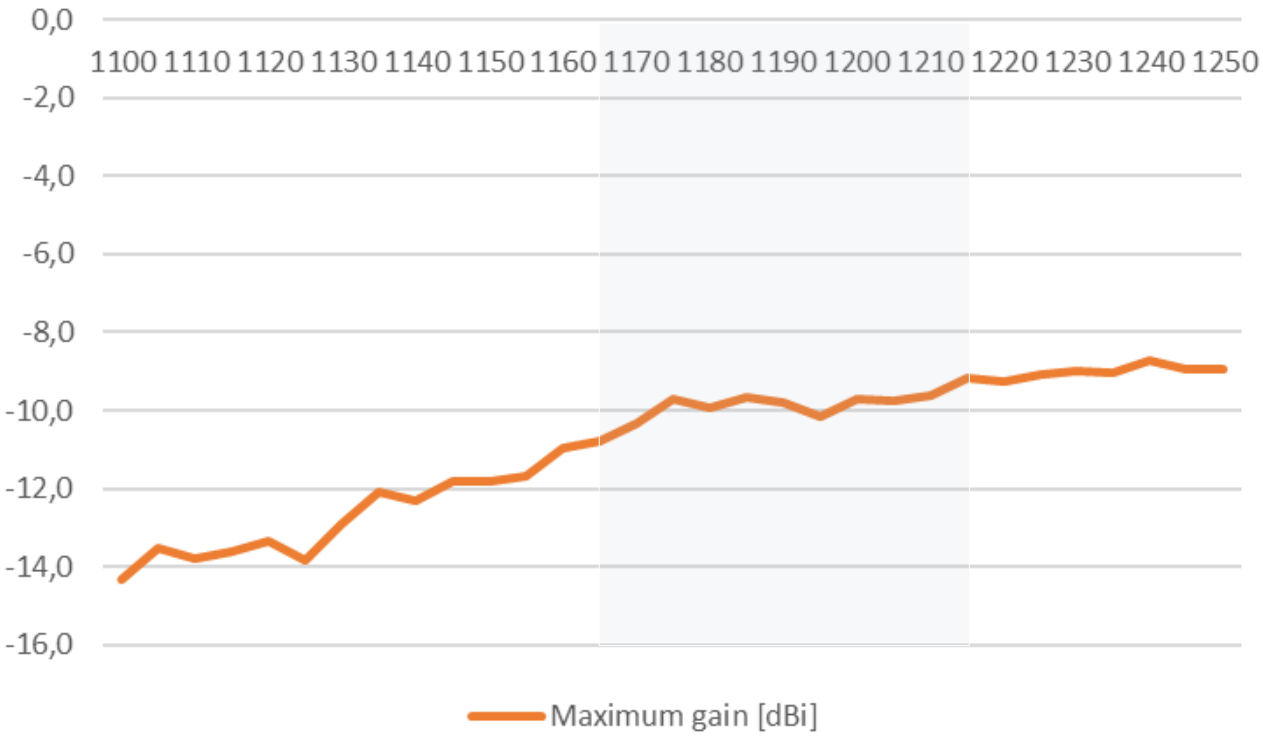
2.2.4 GNSS L5 antenna maximum gain

Antenna gain is -9.2dBi



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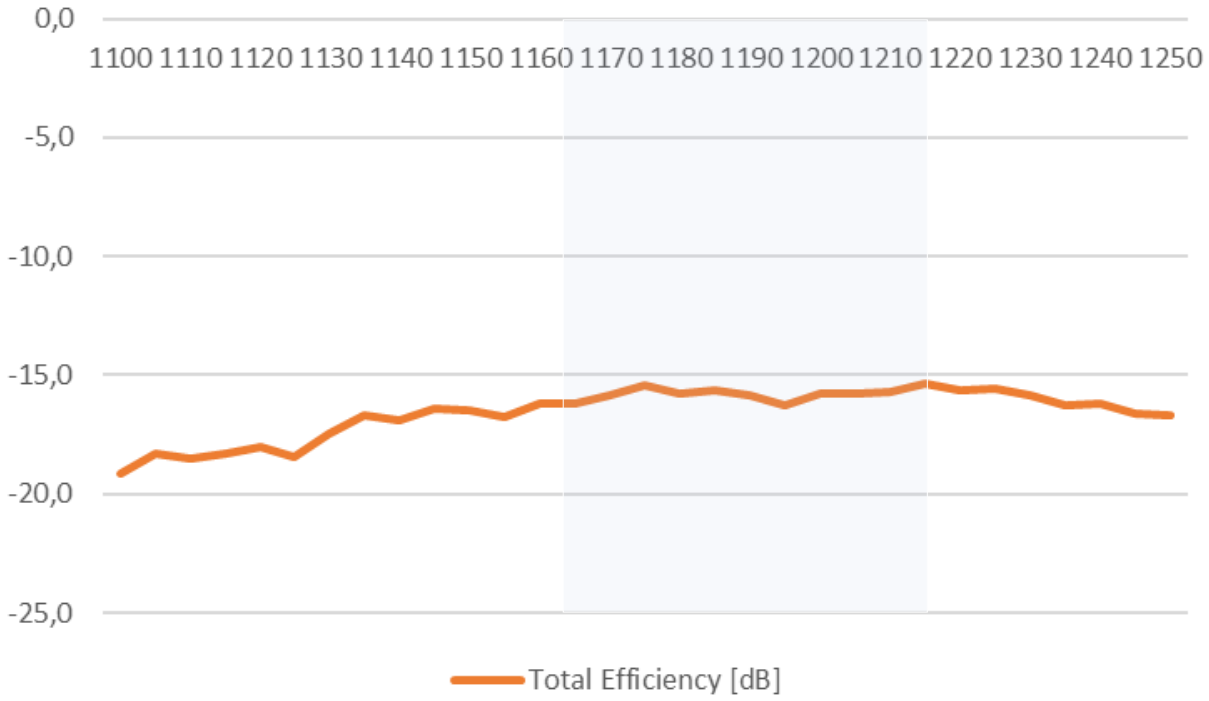
2.2.5 GNSS L5 antenna efficiency

Antenna efficiency is -15,4dB



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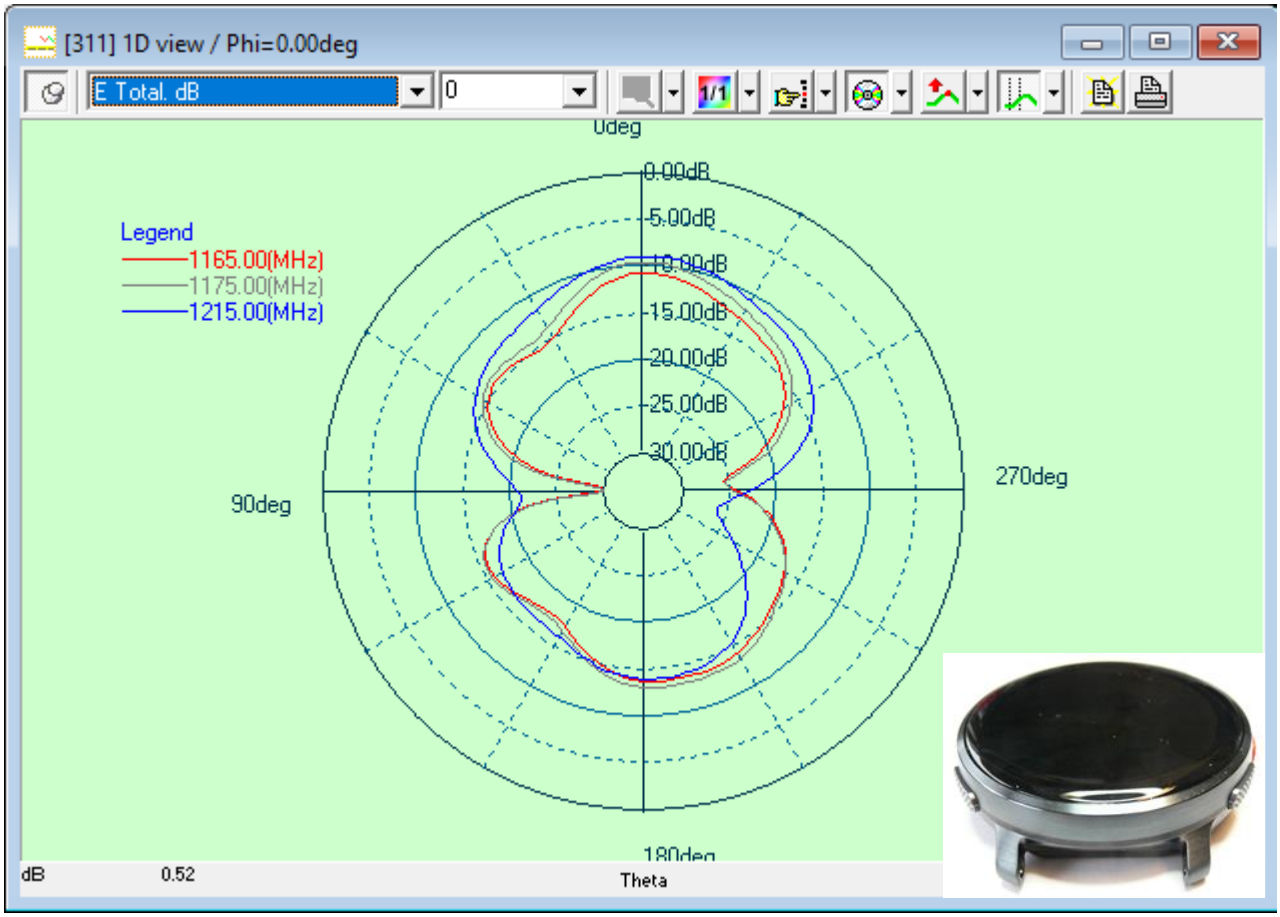
2.2.6 GNSS L5 antenna cut diagrams

2.2.6.1 Phi = 0 deg (XZ-plane)



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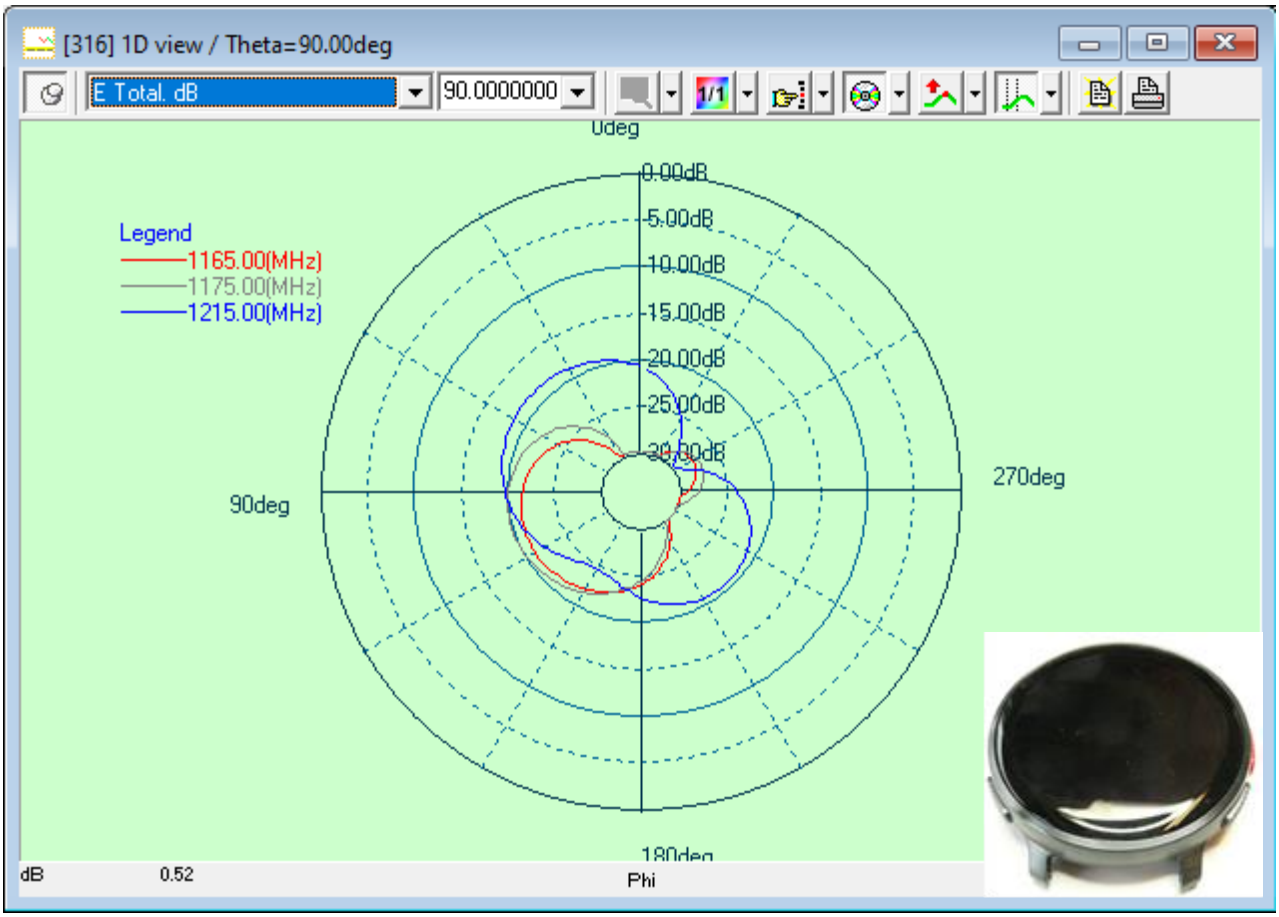
2.2.6.1 Theta = 90 deg (XY-plane)



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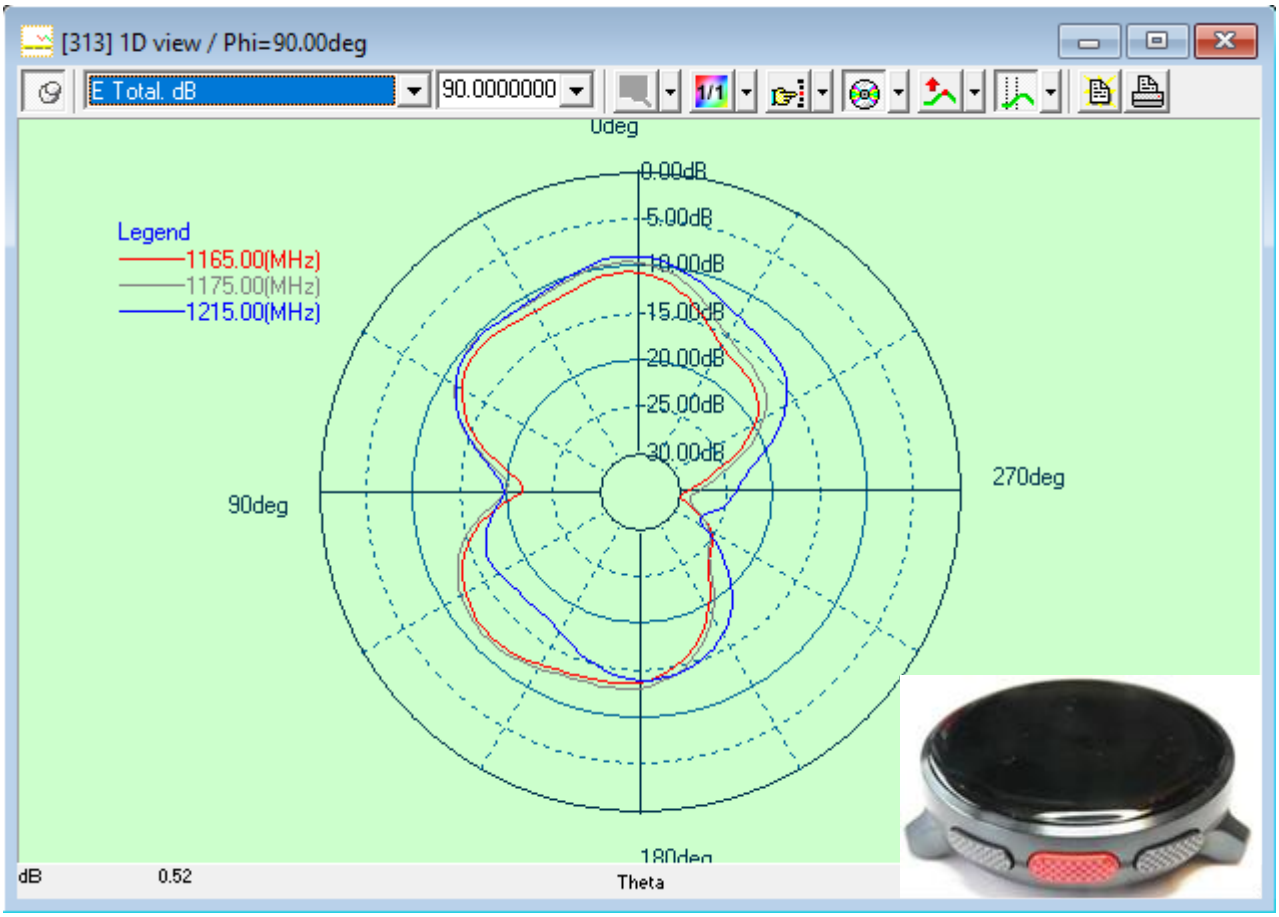
2.2.6.2 Phi = 90 deg (YZ-plane)



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3 Measurement system

Main Specifications of antenna measurement system

Equipment:

StarLab with anechoic enclosure, delivered by Satimo, France

Frequency range 0.65 GHz – 6 GHz

Accuracy: Peak antenna gain < +/- 1.1 dB within 0.8 – 1.0 GHz
< +/- 0.8 dB within 1.0 – 6.0 GHz

Dynamic range: 50 dB (VNA driven)

Measurement device:

VNA Agilent E5071C, 9 kHz – 8.5 GHz

Calibration antenna:

Horn antenna SH650, 0.65 GHz – 12 GHz

Satimo StarLab block diagram