IoT Wireless Vibration / Pressure sensor module LoRa, BLE ANTENNA

Part Numbers: 2195912-1 (20022844-00)

Manufacturer: TE Connectivity Ltd.
Address:
No. 21 Deshun Bei Road
Huanhai Economic Development Zone
Qingdao 266108
China

FEATURES & BENEFITS

LDS(Laser Direct Structuring) Antenna

- Ability to selectively and repeatable plate 3 dimensionally
- Implementation of two antennas (LoRa & BLE) on one substrate
- Ability to produce thin traces
- Flexibility of pattern design without changing tool

SPECIFICATIONS

	Vibration Sensor		
Frequency Range (MHz)	863 to 870 MHz	902 to 928 MHz	2400 to 2480 MHz
Efficiency	40.3 %	39.4 %	22.1 %
Average Gain	-3.95dBi	-4.06dBi	-6.57dBi
Peak Gain[dBi]	-1.47dBi	-1.22dBi	-1.61dBi
Target Frequency	868 MHz	915 MHz	2450 MHz
Target Frequency Gain	-3.74dBi	-4.22dBi	-6.72dBi
Feed Point Impedance	50 ohms unbalanced		
Polarization	Linear		
Size	Dia. 29.54 mm x 21.50 mm Height		
Weight	< 20.5 g		
Operating Temperature	-40 to +85°C		
Storage Temperature	-40 to +85°C		
Packaging Specification	Box		
Hazardous Materials	A certificate of conformance is available from the product page on TE website.		
Data measured Free Space condition			

SPECIFICATIONS

	Pressure Sensor		
Frequency Range (MHz)	863 to 870 MHz	902 to 928 MHz	2400 to 2480 MHz
Efficiency	60.5 %	59.4 %	27.9 %
Average Gain	-2.19dBi	-2.27dBi	-5.56dBi
Peak Gain[dBi]	+0.39dBi	+0.68dBi	+0.00dBi
Target Frequency	868 MHz	915 MHz	2450 MHz
Target Frequency Gain	-1.99dBi	-2.46dBi	-5.72dBi
Feed Point Impedance	50 ohms unbalanced		
Polarization	Linear		
Size	Dia. 29.54 mm x 21.50 mm Height		
Weight	< 20.5 g		
Operating Temperature	-40 to +85°C		
Storage Temperature	-40 to +85°C		
Packaging Specification	Box		
Hazardous Materials	A certificate of conformance is available from the product page on TE website.		
Data measured Free Space condition			

Revision updated :

- Rev 1_Oct. 29th. 2021 : Old PCB version of the vibration sensor
- Rev 2_Mar. 22nd .2023 : Modified PCB and Antenna design for the vibration & the pressure sensor

RF DATA – Vibration Sensor condition

3D Chamber : Efficiency Measurement

	1	2	3	4	5	6	7	8
Frequency [MHz]	863	864	865	866	867	868	869	870
Efficiency [dB]	-4.35	-4.29	-4.22	-3.82	-3.77	-3.74	-3.73	-3.72
Efficiency [%]	36.7	37.3	37.9	41.5	42.0	42.3	42.3	42.5
Peak Gain [dB]	-2.12	-2.05	-1.97	-1.58	-1.52	-1.50	-1.49	-1.47

	1	2	3	4	5	6	7	8	9
Frequency [MHz]	902	905	909	912	915	918	922	925	928
Efficiency [dB]	-3.52	-3.52	-3.79	-4.20	-4.22	-4.27	-4.28	-4.36	-4.41
Efficiency [%]	44.5	44.5	41.8	38.0	37.9	37.4	37.3	36.7	36.3
Peak Gain [dB]	-1.22	-1.24	-1.55	-1.97	-2.03	-2.12	-2.13	-2.21	-2.25

	1	2	3	4	5	6	7	8	9
Frequency [MHz]	2400	2410	2420	2430	2440	2450	2460	2470	2480
Efficiency [dB]	-5.96	-6.24	-6.28	-6.44	-6.67	-6.72	-6.80	-7.03	-7.00
Efficiency [%]	25.4	23.8	23.6	22.7	21.5	21.3	20.9	19.8	19.9
Peak Gain [dB]	-1.61	-1.83	-1.80	-1.92	-2.13	-2.14	-2.16	-2.33	-2.29

RF DATA – Pressure Sensor condition

3D Chamber : Efficiency Measurement

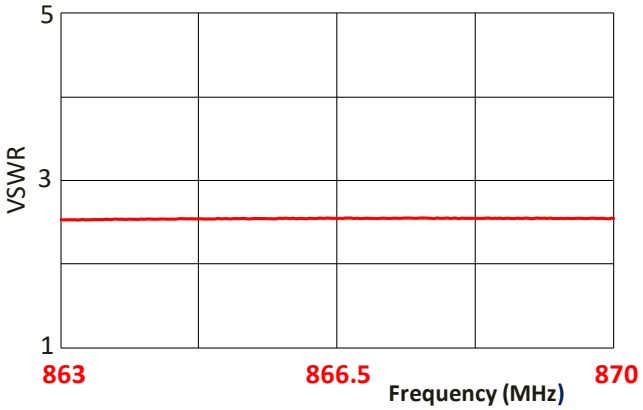
	1	2	3	4	5	6	7	8
Frequency [MHz]	863	864	865	866	867	868	869	870
Efficiency [dB]	-2.56	-2.52	-2.45	-2.08	-2.02	-1.99	-1.97	-1.94
Efficiency [%]	55.4	55.9	56.8	62.0	62.8	63.3	63.6	63.9
Peak Gain [dB]	-0.26	-0.21	-0.14	0.24	0.30	0.33	0.35	0.39

	1	2	3	4	5	6	7	8	9
Frequency [MHz]	902	905	909	912	915	918	922	925	928
Efficiency [dB]	-1.87	-1.86	-2.08	-2.47	-2.46	-2.46	-2.39	-2.40	-2.40
Efficiency [%]	65.0	65.2	61.9	56.6	56.8	56.7	57.6	57.6	57.5
Peak Gain [dB]	0.68	0.68	0.46	0.07	0.08	0.07	0.14	0.13	0.12

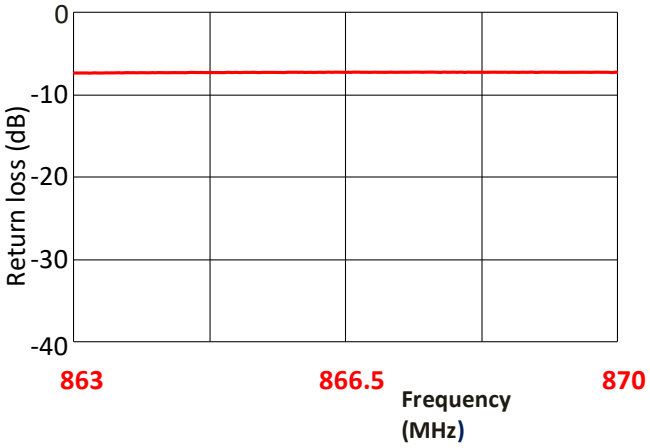
	1	2	3	4	5	6	7	8	9
Frequency [MHz]	2400	2410	2420	2430	2440	2450	2460	2470	2480
Efficiency [dB]	-5.07	-5.30	-5.29	-5.41	-5.67	-5.72	-5.73	-5.96	-5.88
Efficiency [%]	31.1	29.5	29.6	28.8	27.1	26.8	26.7	25.3	25.9
Peak Gain [dB]	0.00	-0.19	-0.16	-0.26	-0.48	-0.51	-0.49	-0.77	-0.68

RF DATA – Vibration Sensor condition

VSWR



Return Loss



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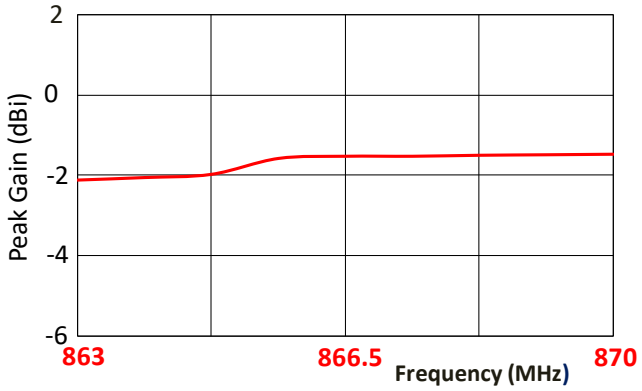

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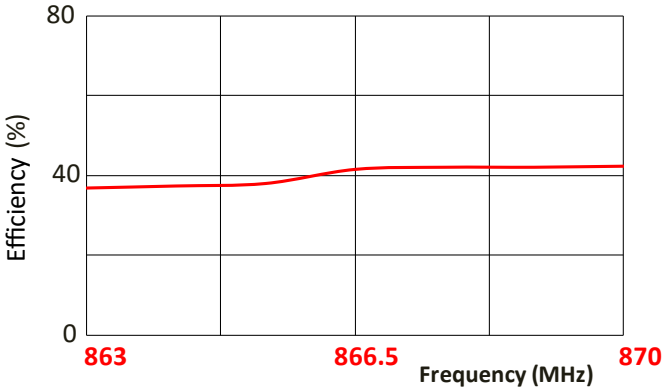
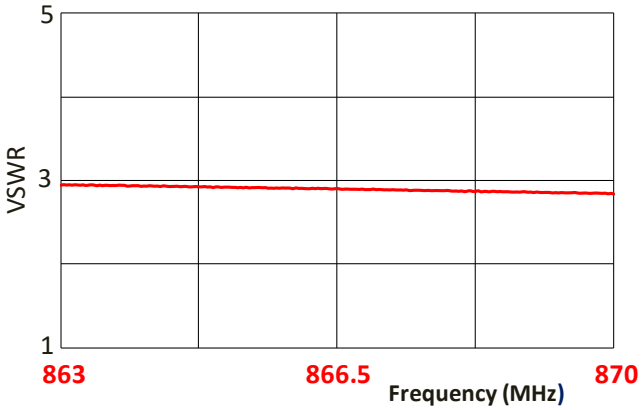


RF DATA – Pressure Sensor condition

VSWR



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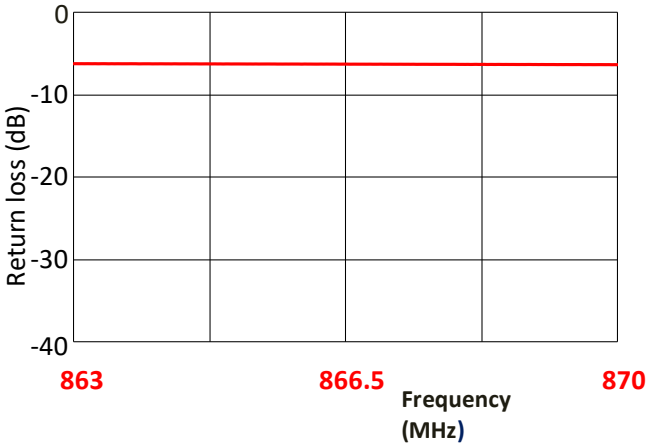
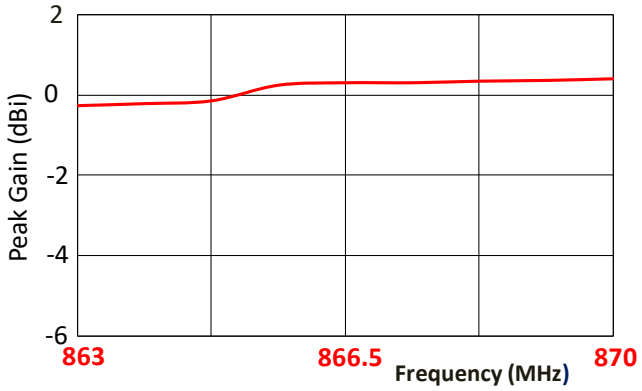


Peak Gain



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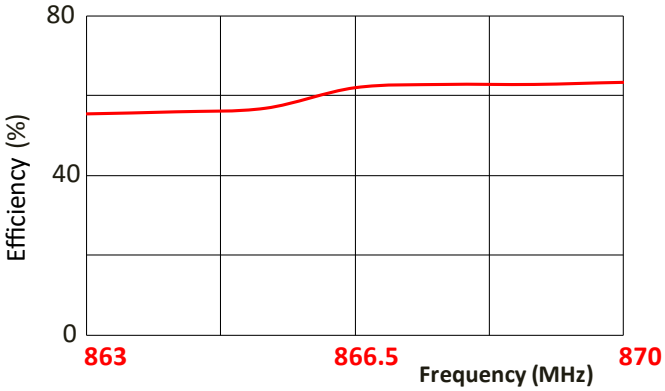

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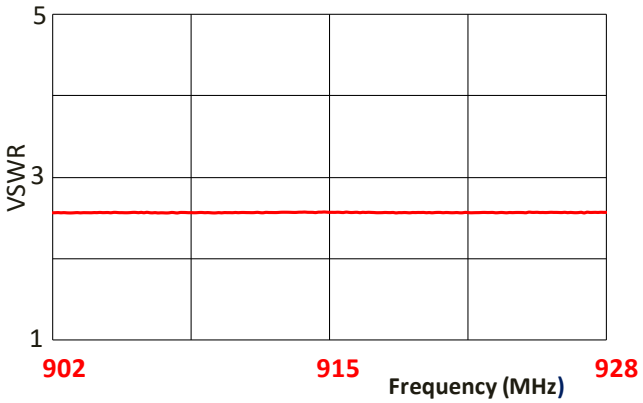

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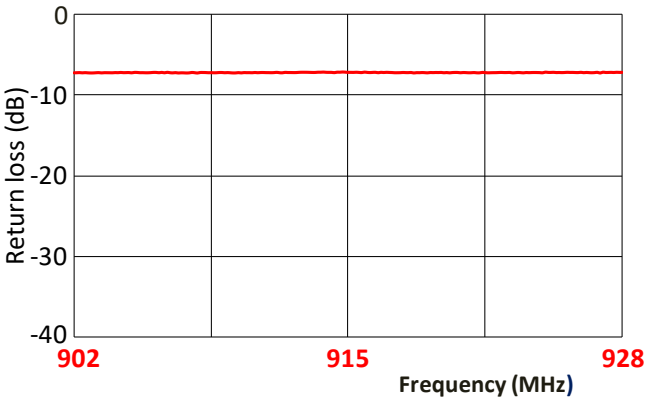
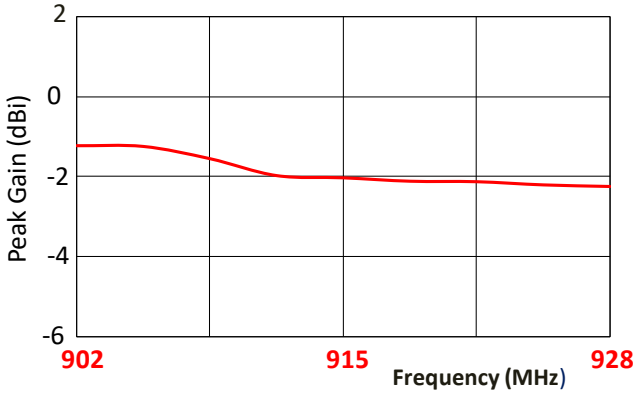


Peak Gain



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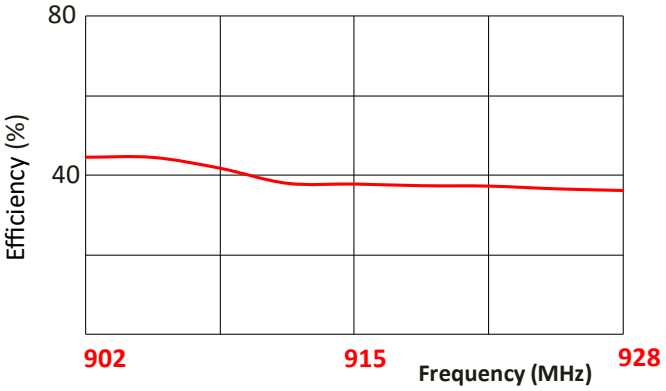
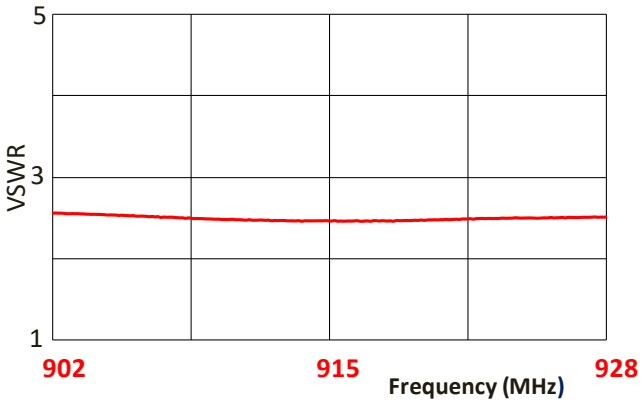


RF DATA – Pressure Sensor condition

VSWR



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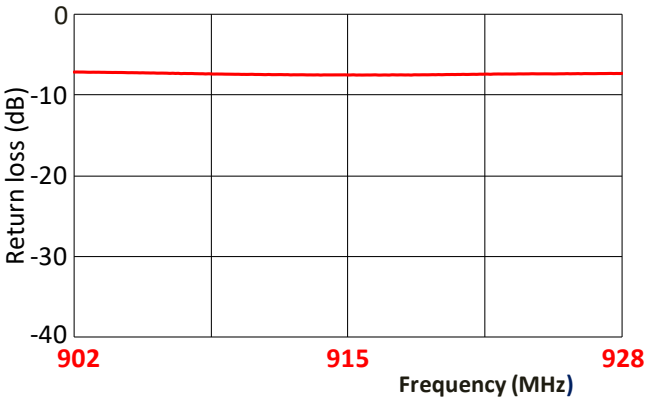
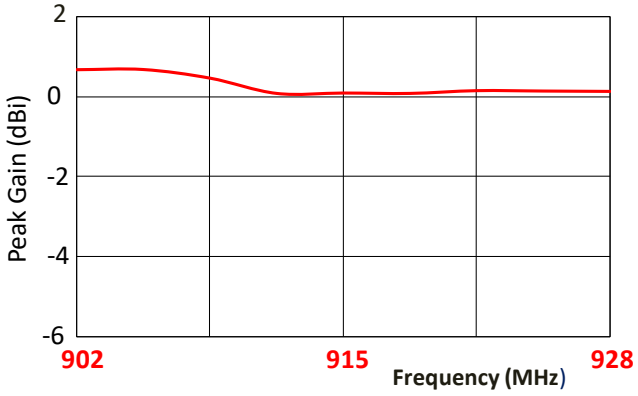
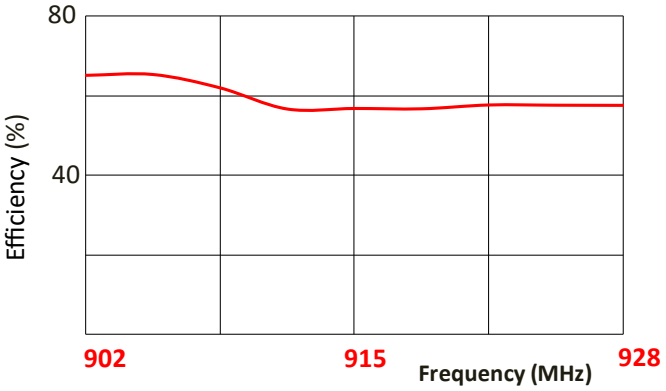


Peak Gain



Efficiency



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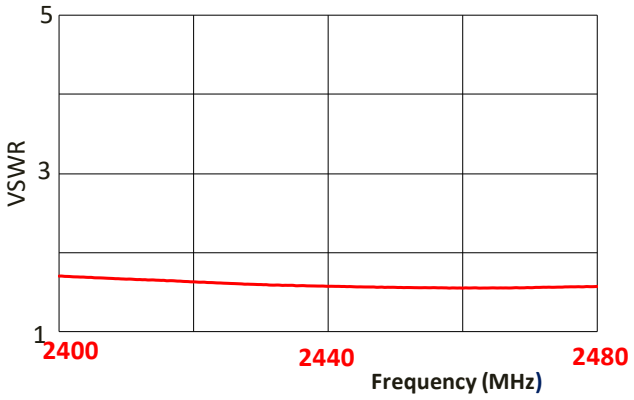

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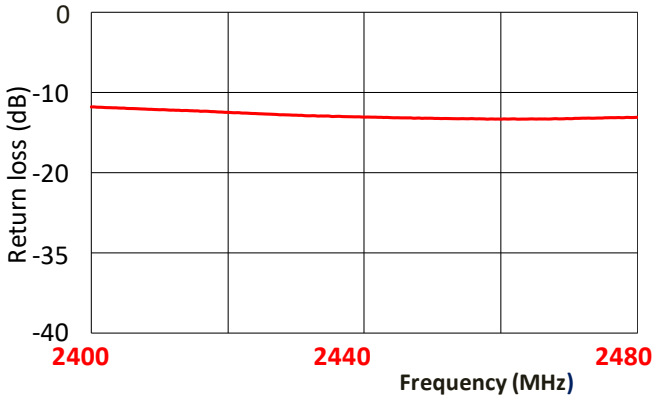
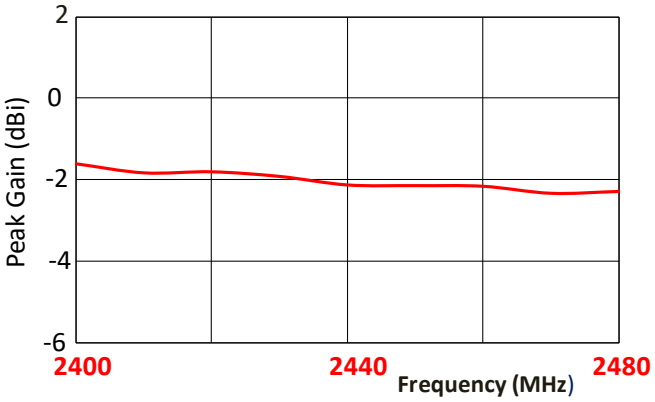


Peak Gain



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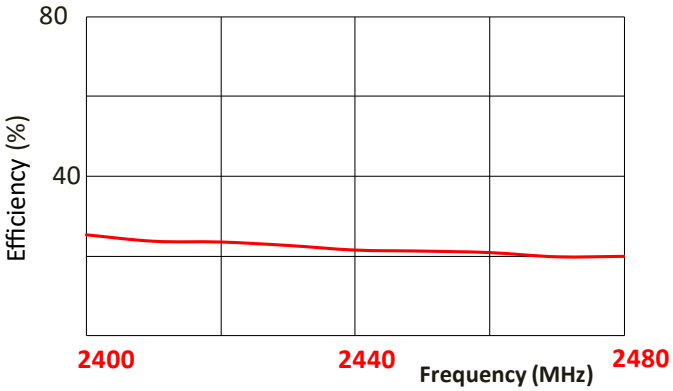

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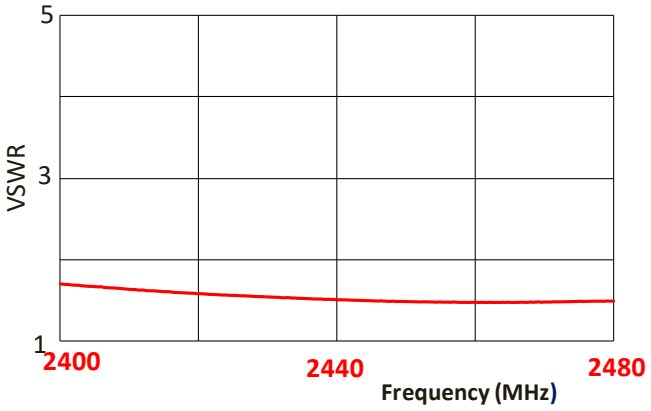

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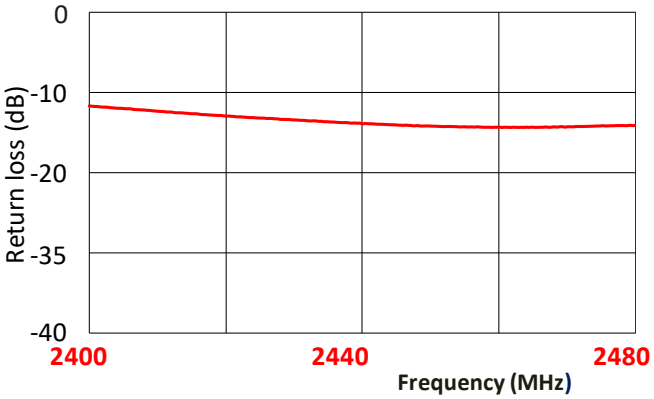
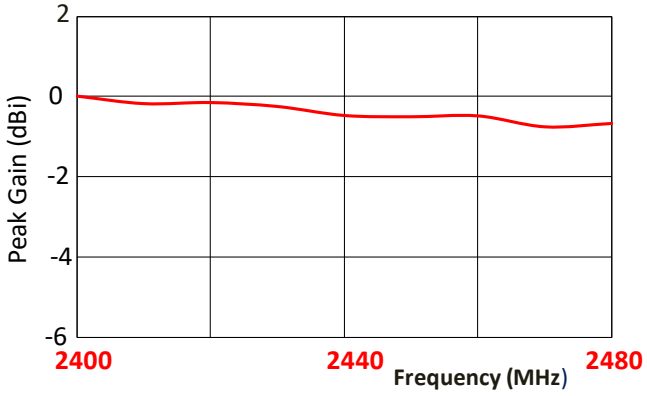
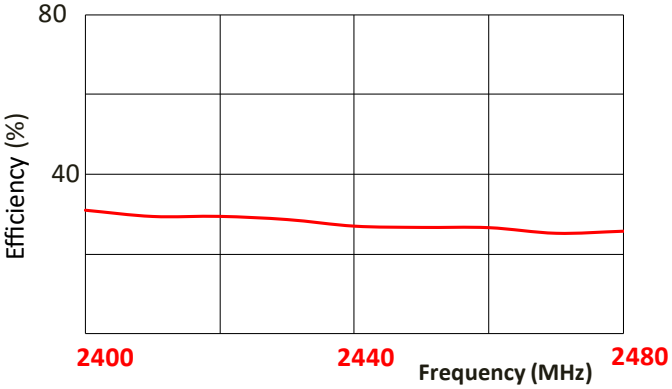


Peak Gain

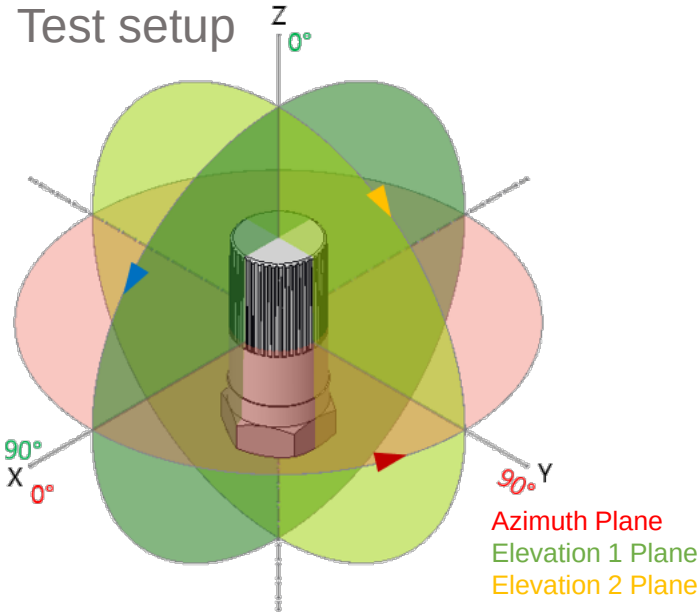


Efficiency

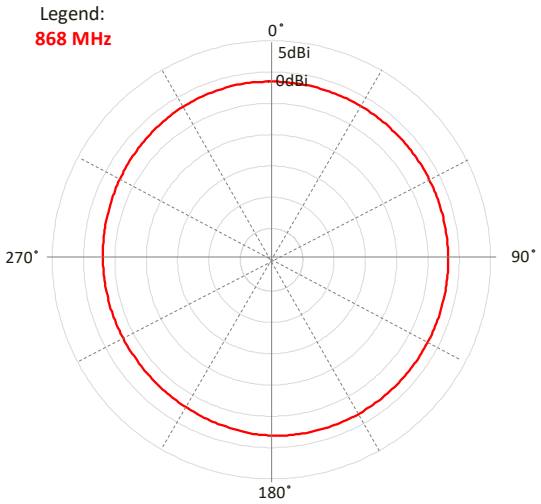


RADIATION PATTERN – Vibration Sensor condition

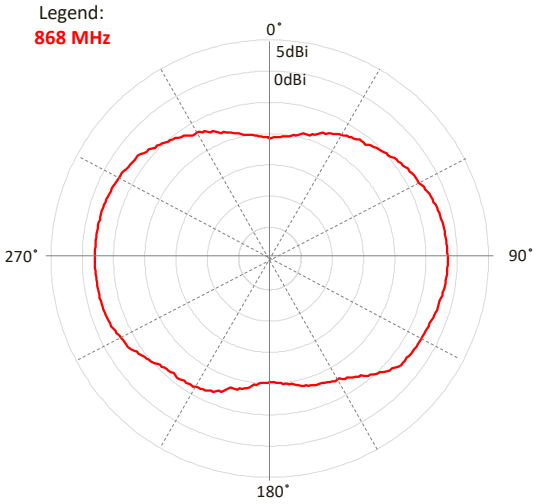
Test setup



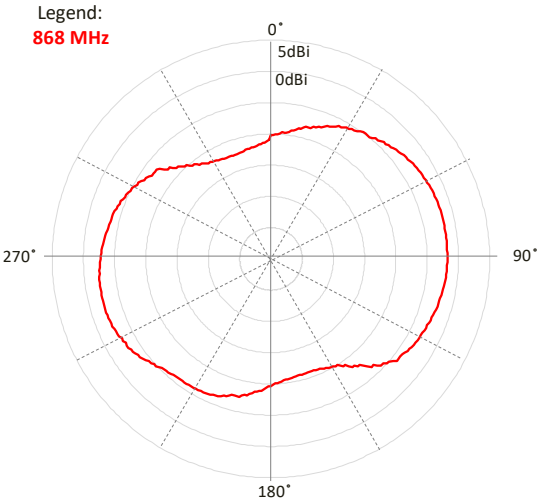
Azimuth



Elevation 1

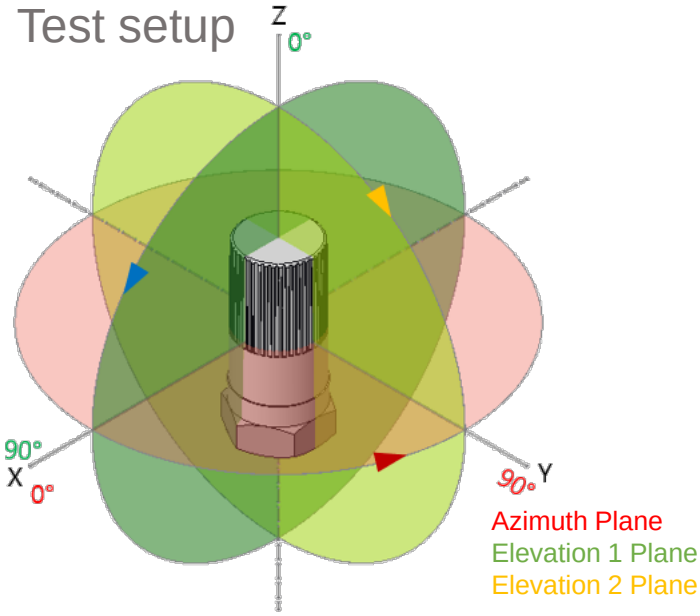


Elevation 2

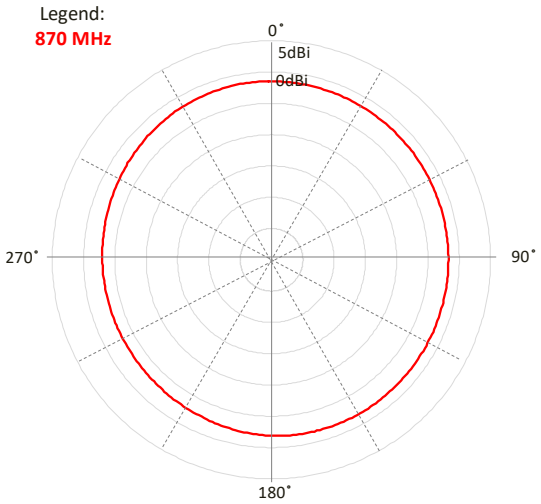


RADIATION PATTERN – Vibration Sensor condition

Test setup



Azimuth



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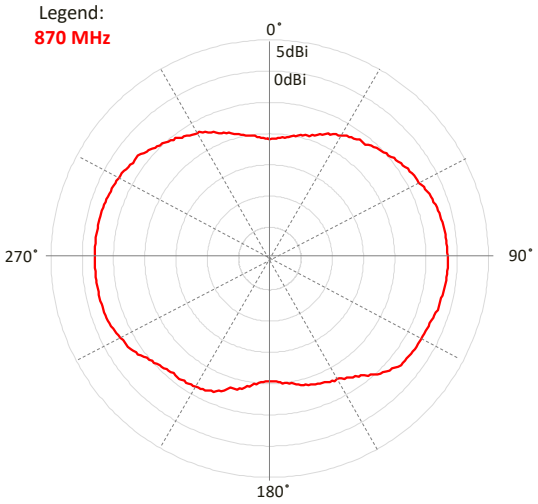
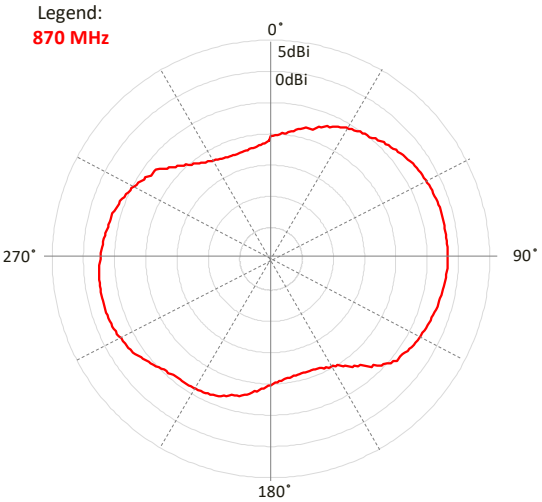
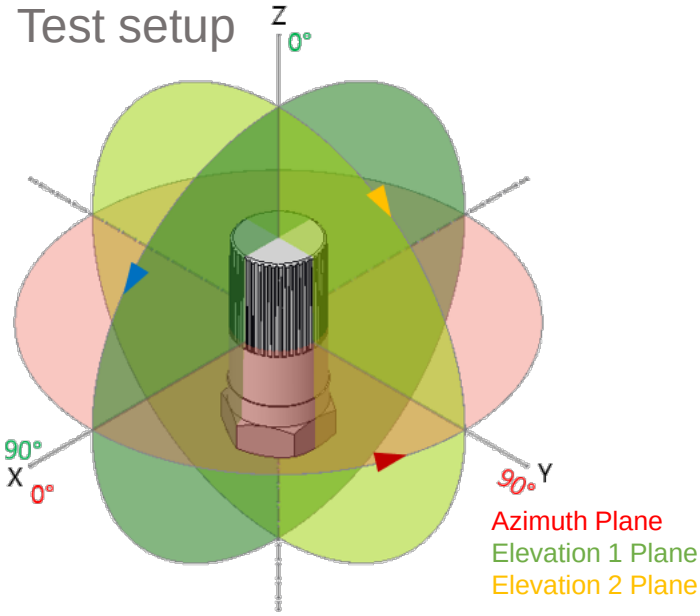


Elevation 2

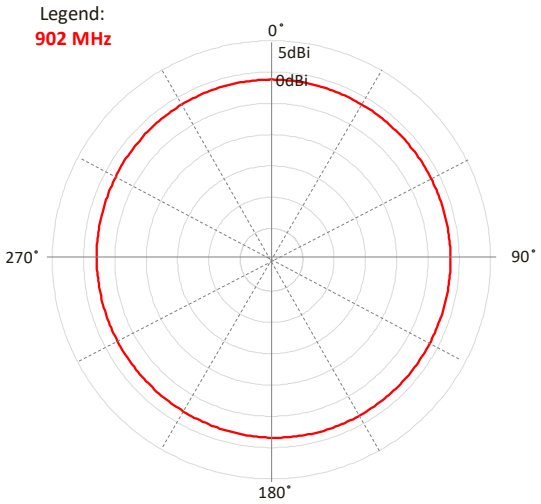


RADIATION PATTERN – Vibration Sensor condition

Test setup



Azimuth



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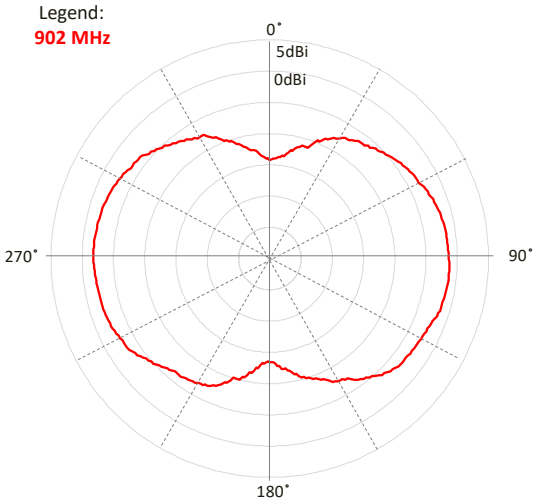
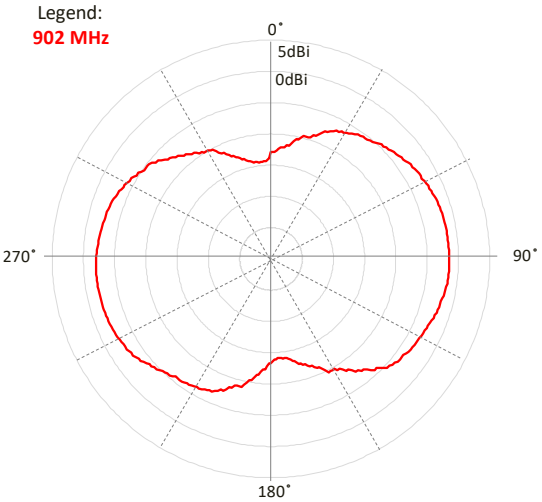


Elevation 2



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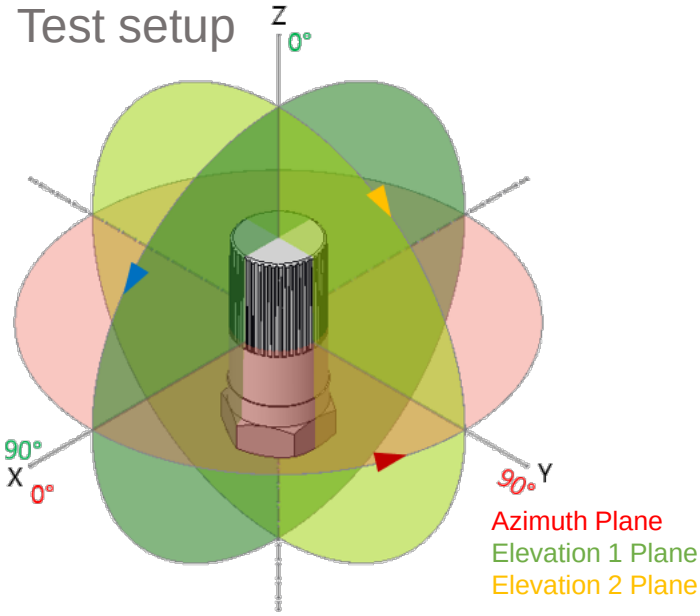
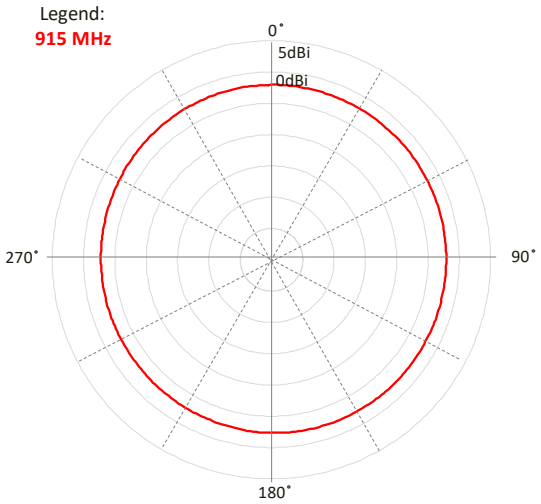


Azimuth



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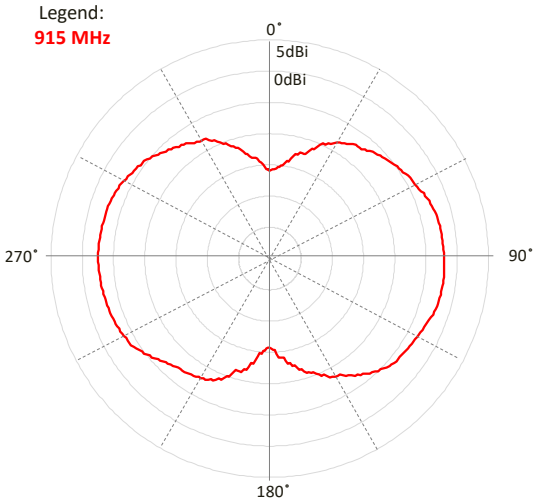
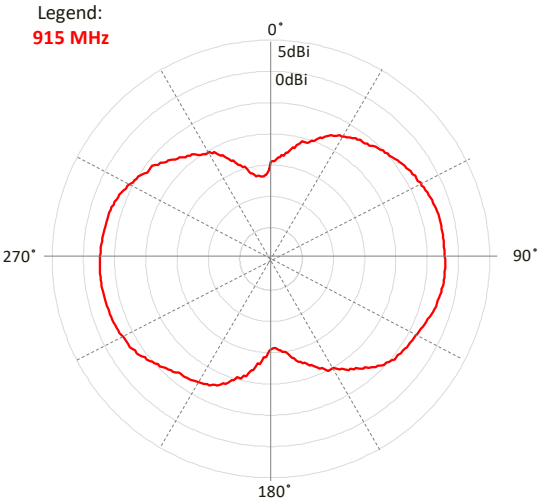


Elevation 2



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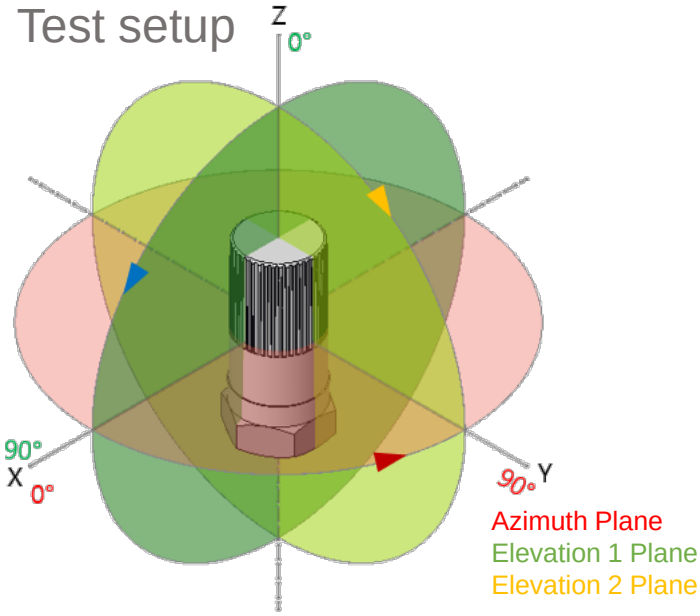
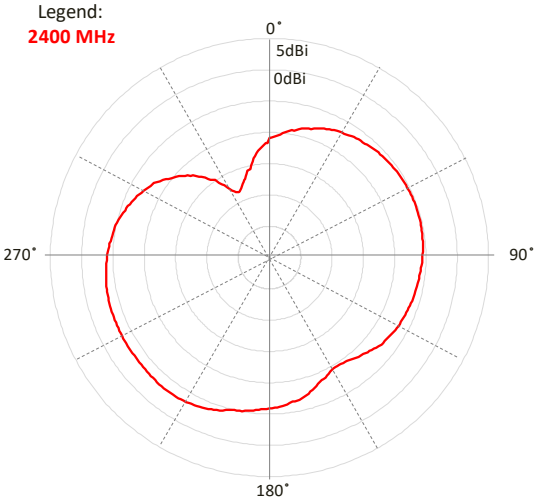
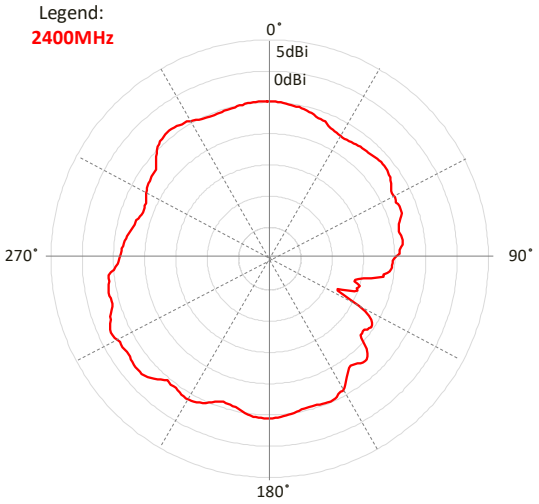


Azimuth



Elevation 1



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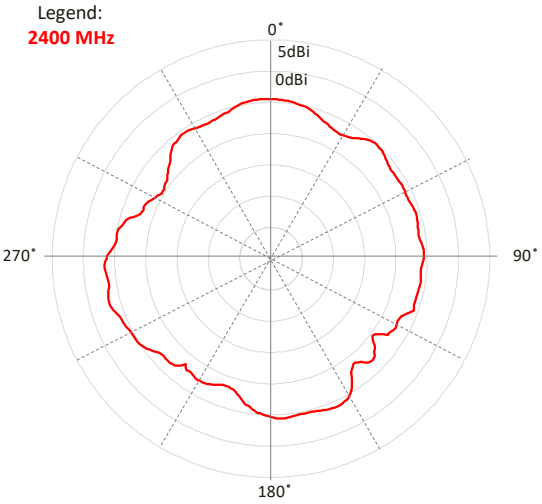
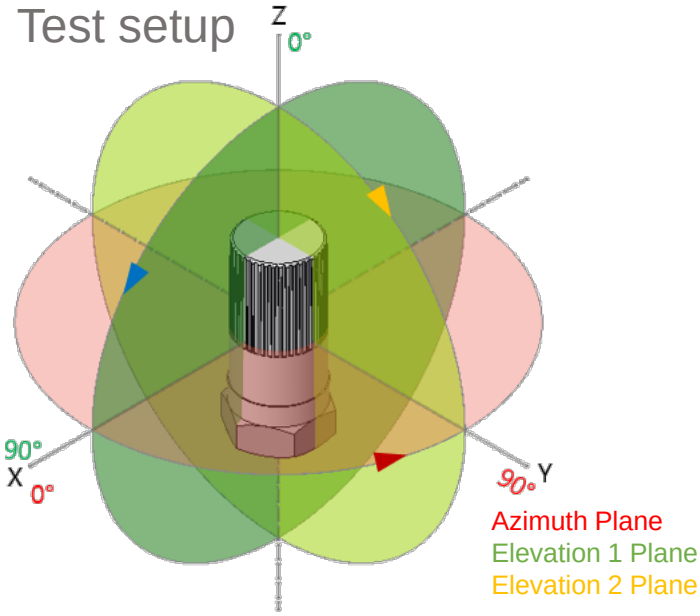
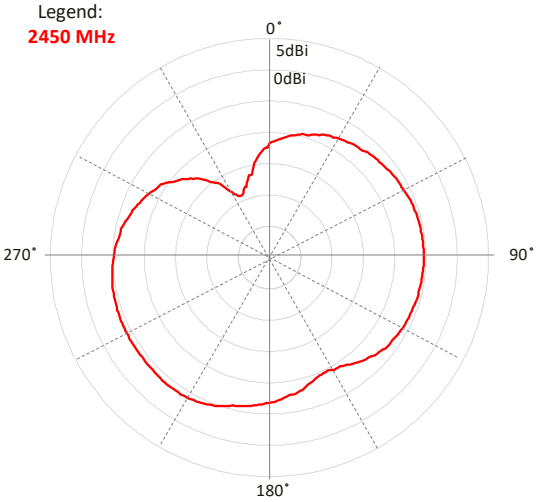


RADIATION PATTERN – Vibration Sensor condition

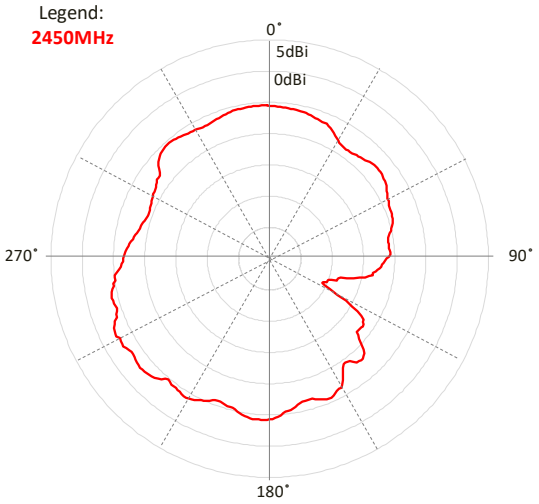
Test setup



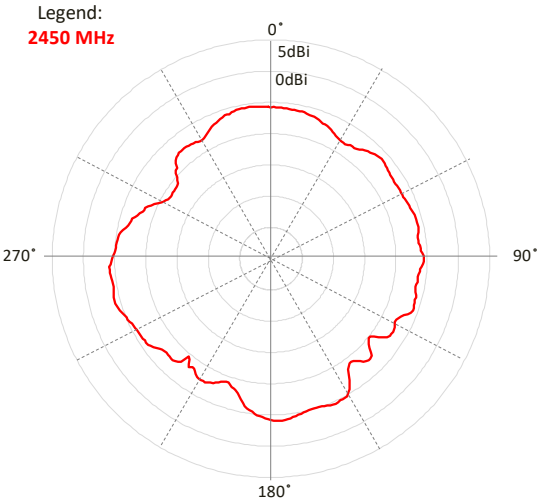
Azimuth



Elevation 1

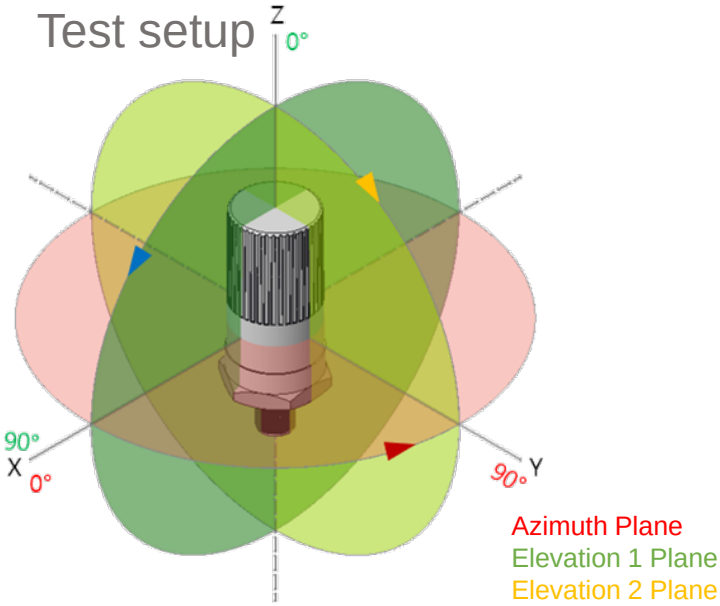


Elevation 2

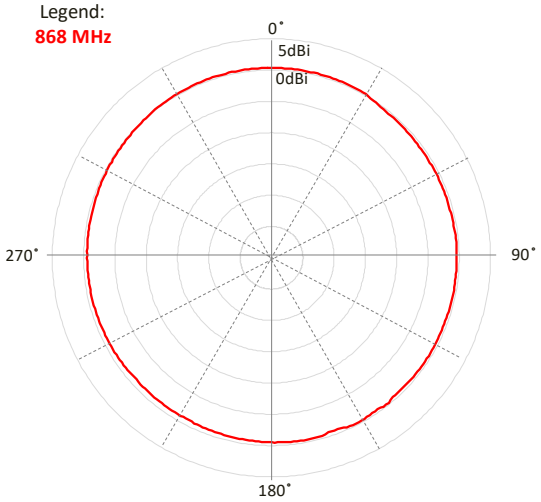


RADIATION PATTERN – Pressure Sensor condition

Test setup



Azimuth



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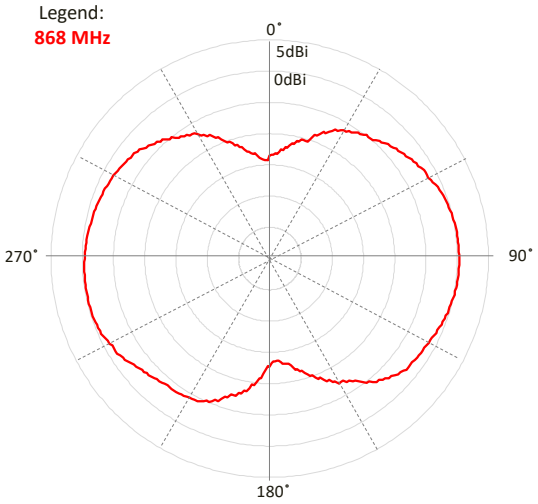

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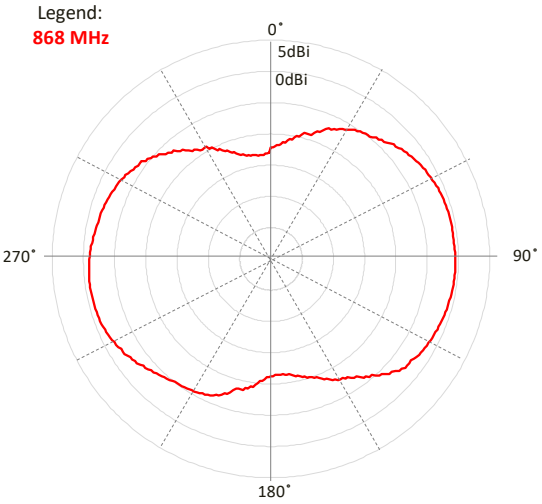
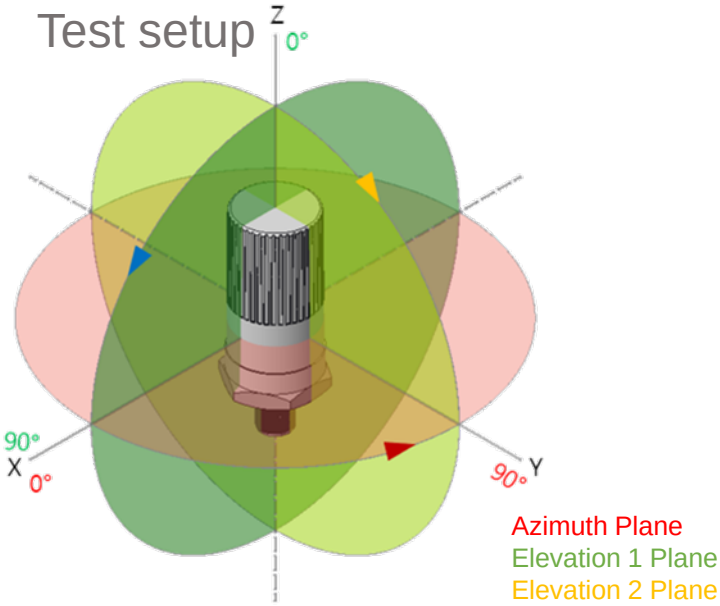
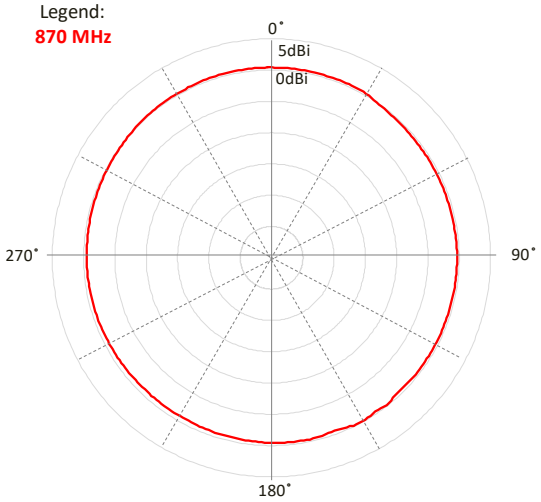


RADIATION PATTERN – Pressure Sensor condition

Test setup



Azimuth



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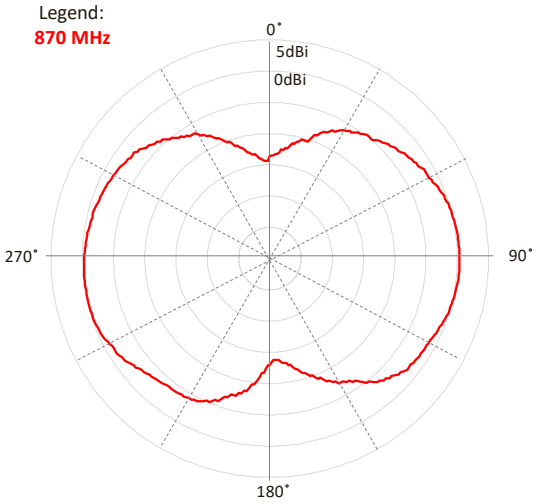

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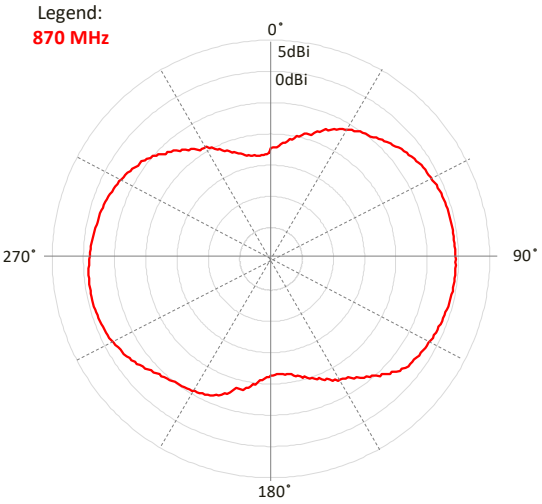
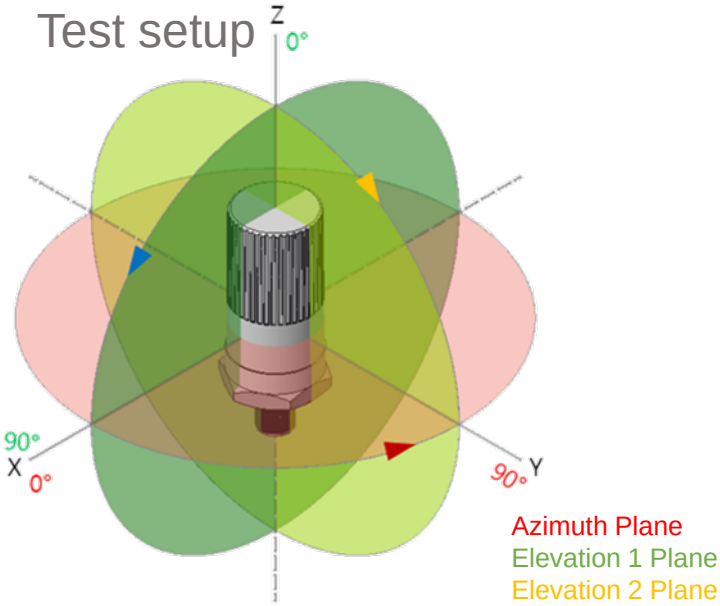


RADIATION PATTERN – Pressure Sensor condition

Test setup



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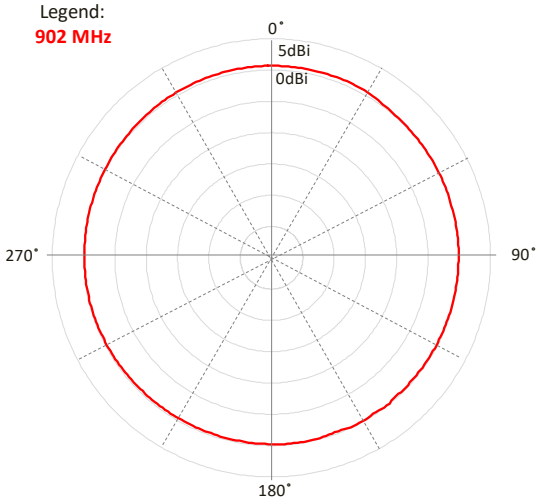
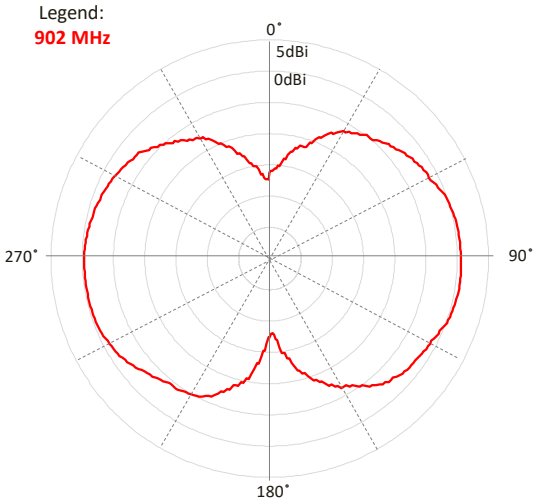


Elevation 1



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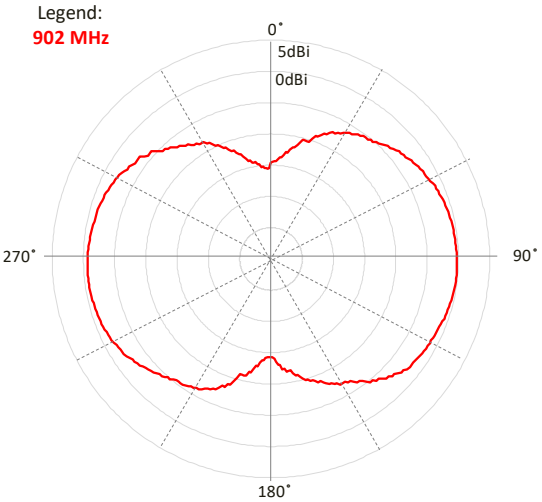
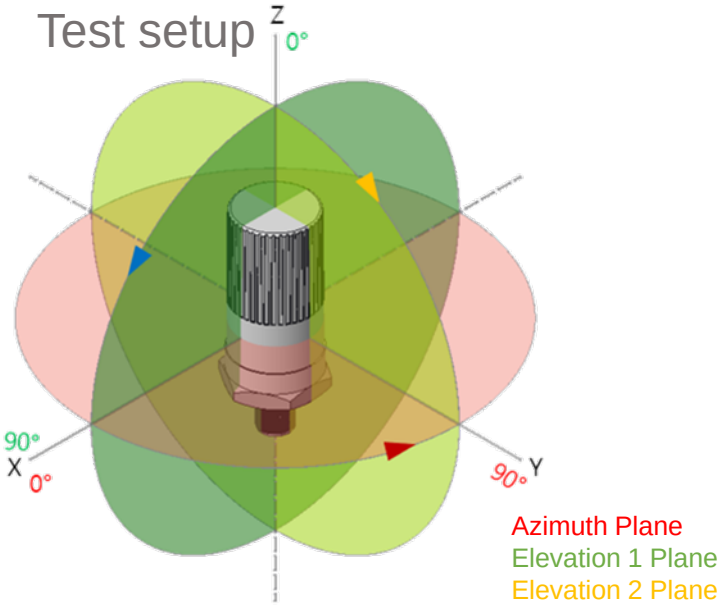


RADIATION PATTERN – Pressure Sensor condition

Test setup



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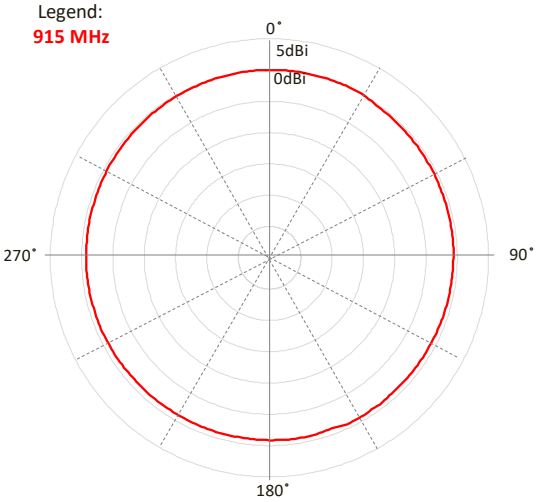
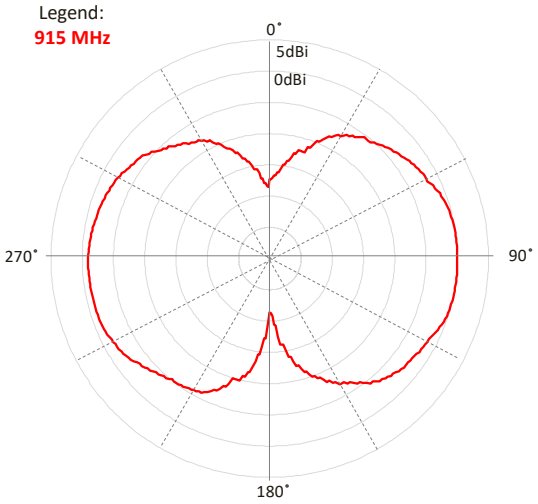


Elevation 1



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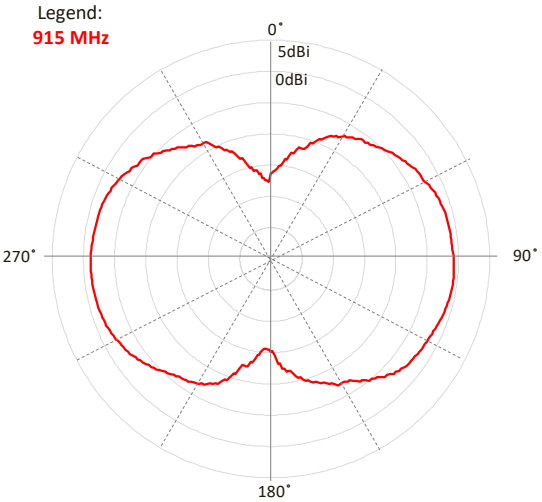
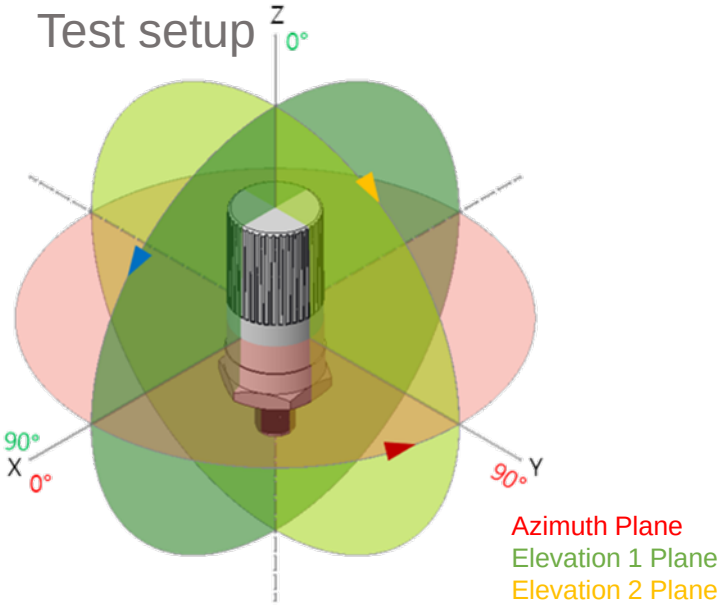
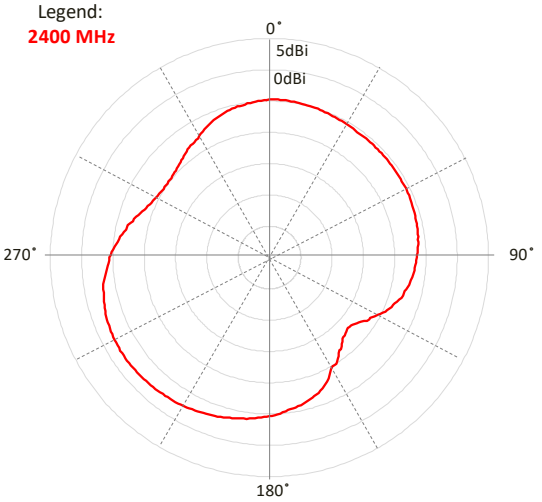


RADIATION PATTERN – Pressure Sensor condition

Test setup



Azimuth



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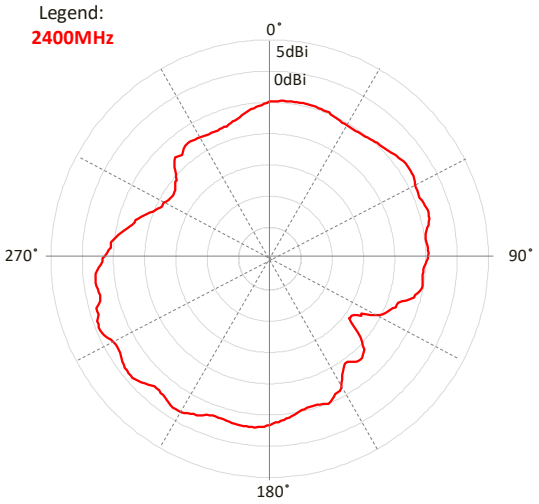

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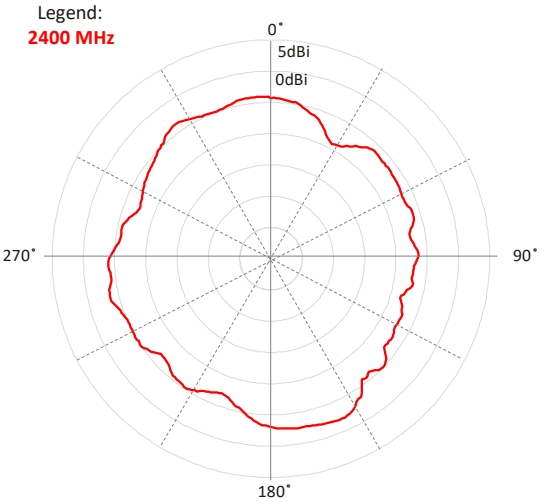
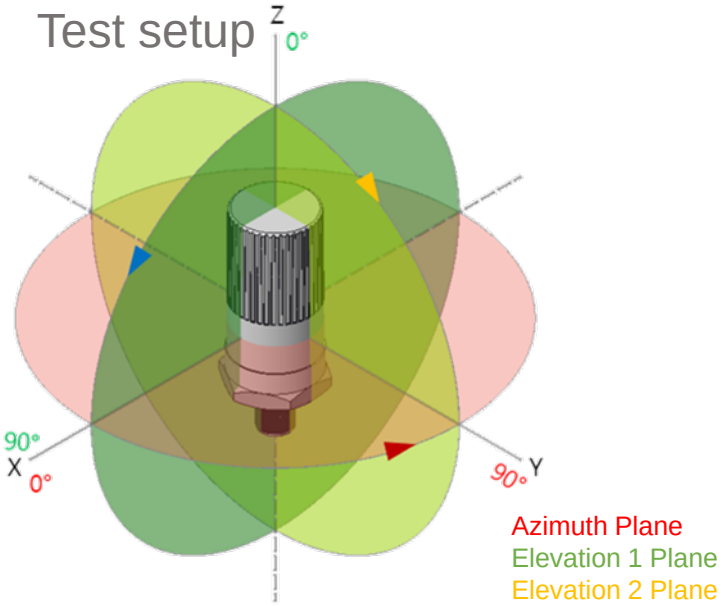


RADIATION PATTERN – Pressure Sensor condition

Test setup



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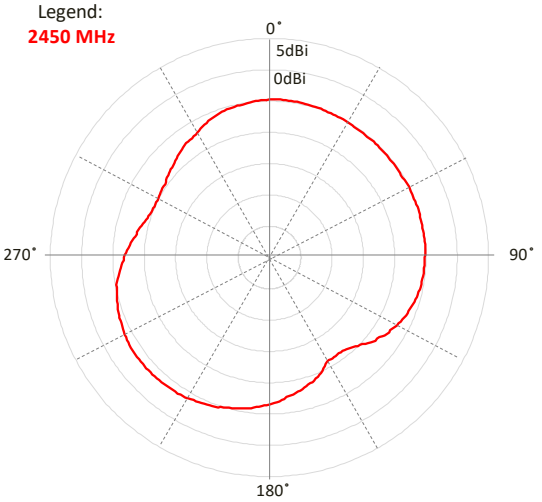
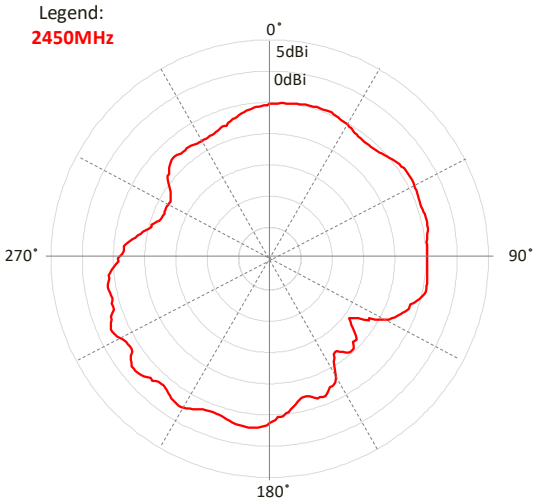
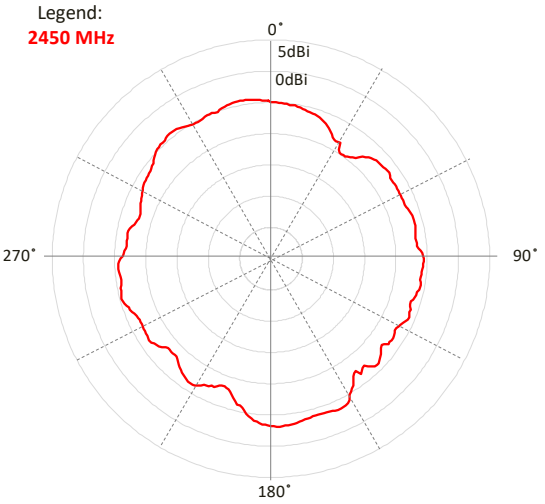


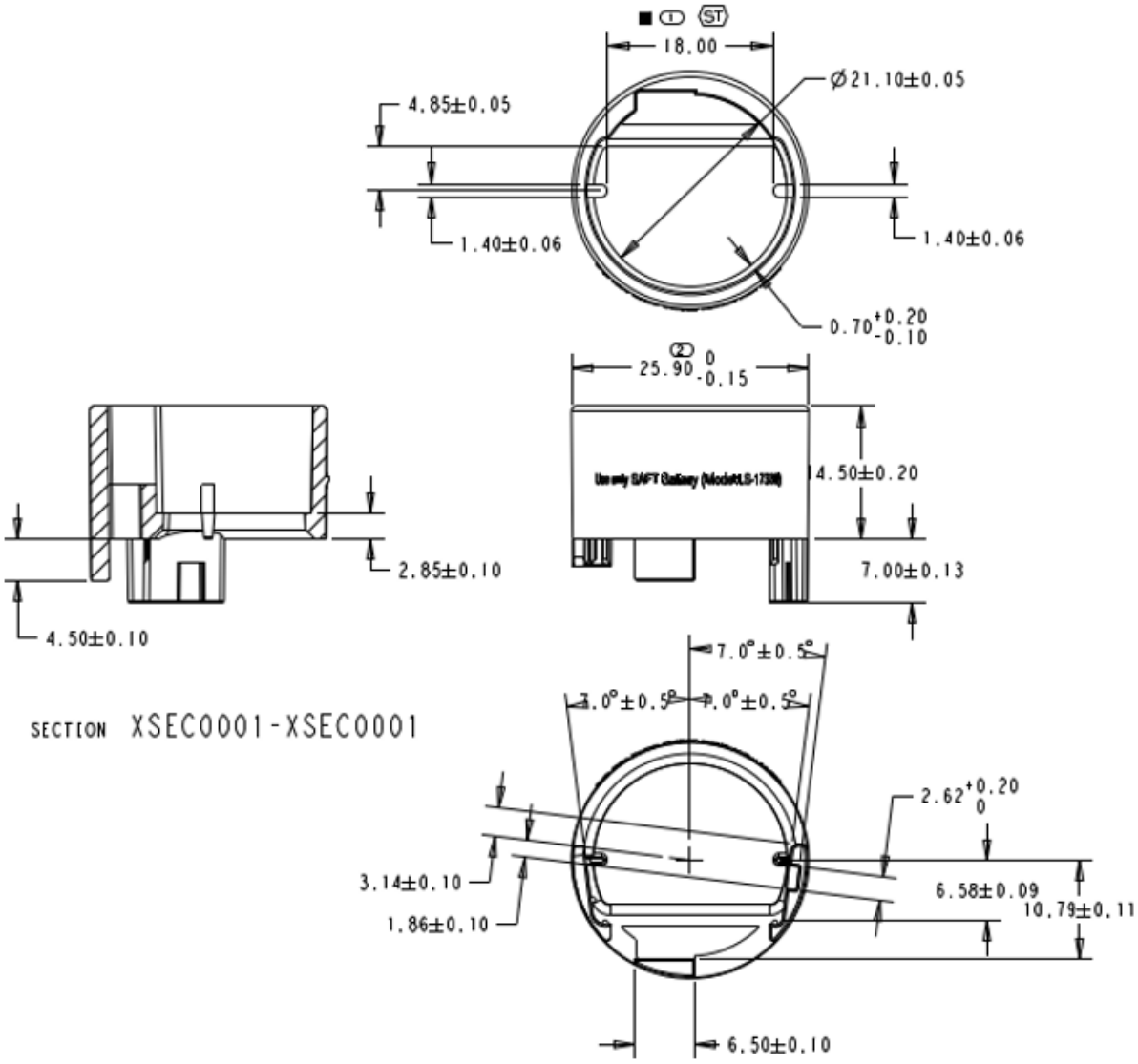
Elevation 1



Elevation 2



DIMENSIONS



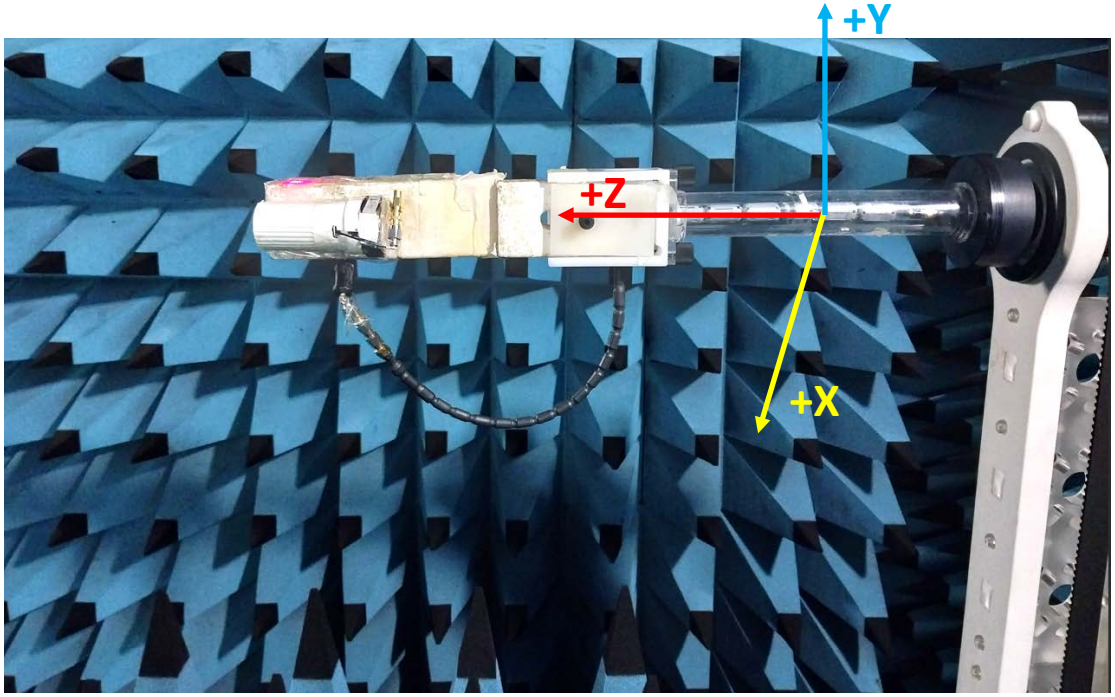
Dimension: mm
Diagrams is not to scale

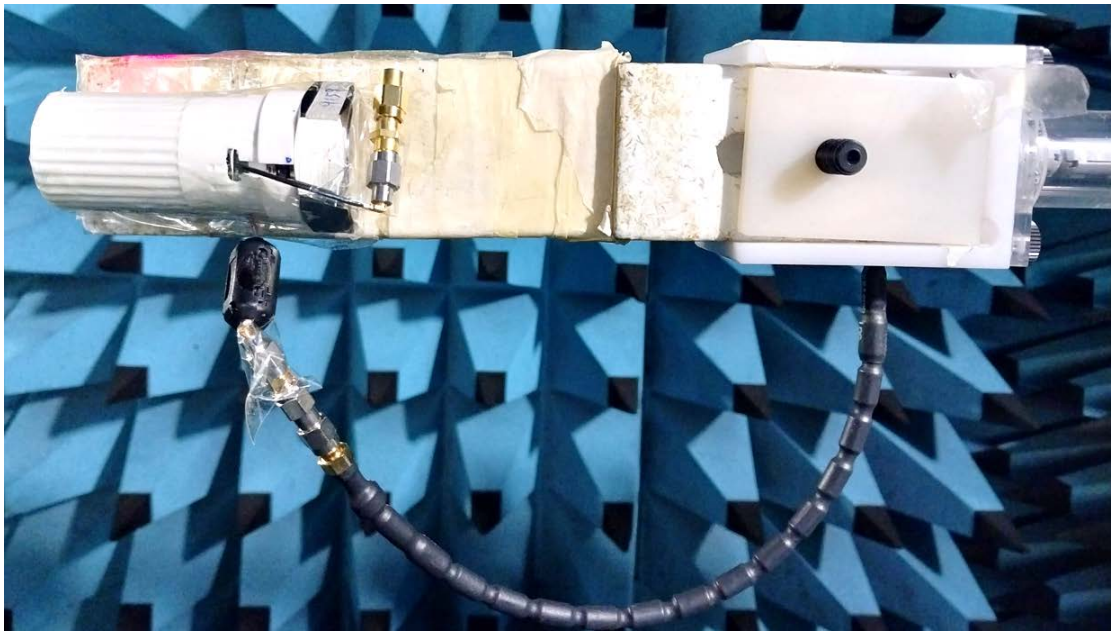
APPENDIX

Vibration sensor

Pressure sensor

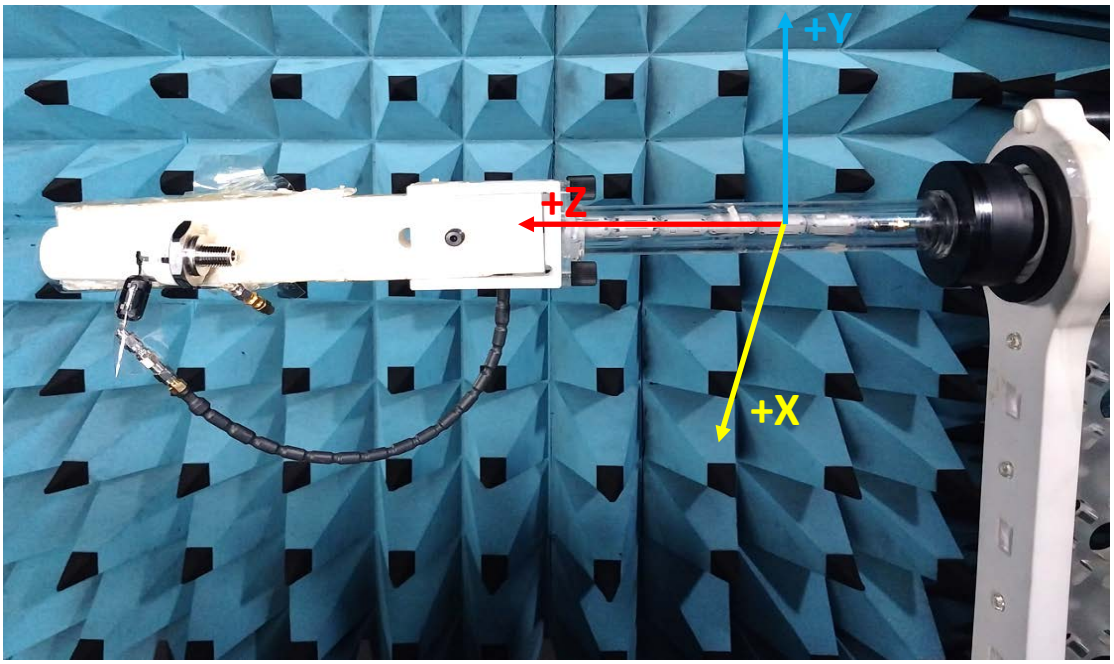
Test condition – Free space / Orientation

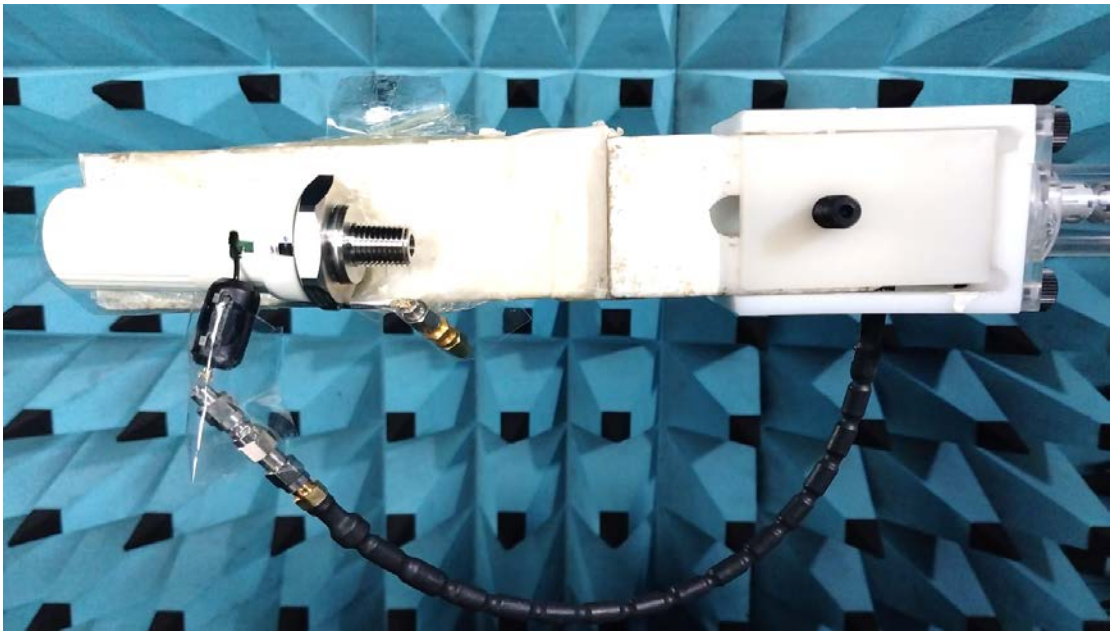




- Antenna measurement cables : Ferrite ring / 50 Ω Termination
- Chamber Measurement cable : With Ferrite rings

Test condition – Free space / Orientation



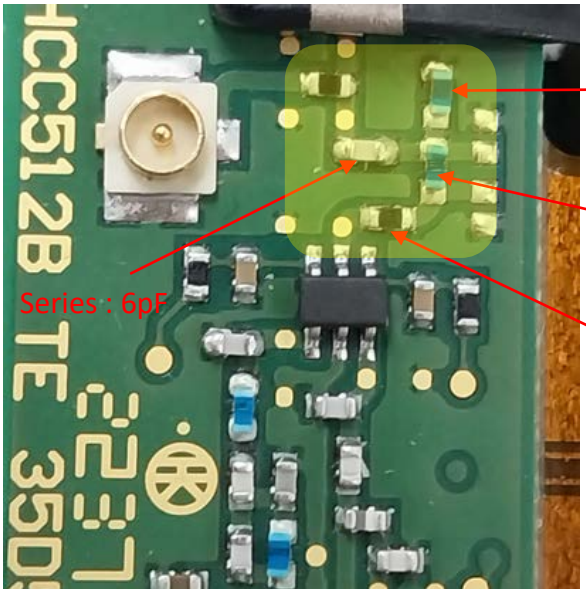


- Antenna measurement cables : Ferrite ring / 50 Ω Termination
- Chamber Measurement cable : With Ferrite rings

Matching circuit values

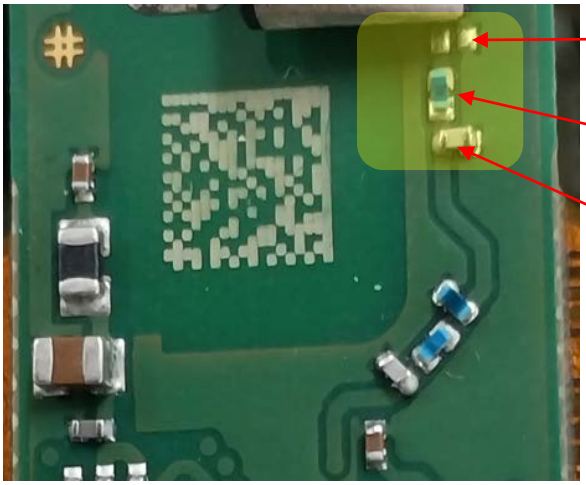
Vibration / Pressure Sensor condition

LoRa Antenna



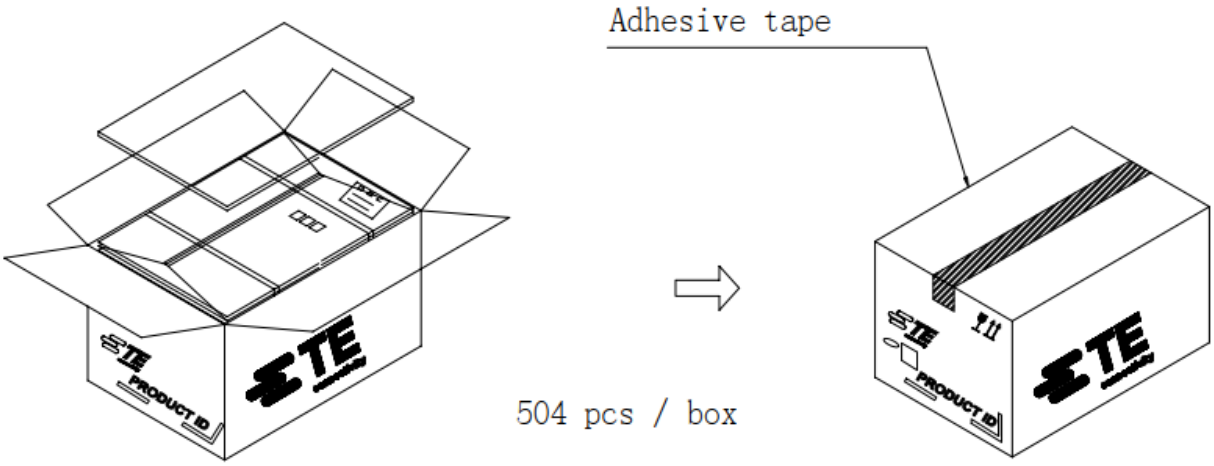
Matching circuit values
Ant – Series 6pF – shunt 20nH – Series 5.6nH – Series 0 Ω

BLE Antenna



Matching circuit values
Ant – shunt NC – Series 4.3nH - Shunt 0.8pF

PACKAGING



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