November 4, 2024

Covertech Fabricating Inc.
Harshpreet Kaur
279 Humberline Drive
Toronto, Ontario
Canada M9W 5T6

Dear Harshpreet Kaur,

Enclosed is the Electromagnetic Compatibility for the Covertech Fabricating Inc., Solid Foil Sheet, tested to the requirements of IEEE-299: 2006 – IEEE Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, LLC. Please contact me if you have any questions regarding these results or if Eurofins E&E can be of further service to you.

Sincerely,

Michelle Tawmging

Documentation Department
Eurofins Electrical and Electronic Testing NA, LLC

Reference: EMC133864-IEEE Rev. 1

ACCREDITED
TESTING CERT #0591.01

Electromagnetic Compatibility Criteria Test Report

for the

Covertech Fabricating Inc.
Solid Foil Sheet

To be evaluated under the Requirements of
IEEE-299

Eurofins Report: EMC133864-IEEE Rev. 1

November 4, 2024

Prepared For:

Covertech Fabricating Inc.
279 Humberline Drive
Toronto, Ontario Canada M9W 5T6

Prepared By:
Eurofins Electrical and Electronic Testing NA, LLC
914 West Patapsco Avenue,
Baltimore, MD 21230

Electromagnetic Compatibility Criteria
Test Report

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Solid Foil Sheet

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Eurofins Report: EMC133864-IEEE Rev. 1

Brandon Tracy
EMC Laboratory Engineer

Michael Griffiths
Manager, Electromagnetic Compatibility Lab

Test Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	October 13, 2024	Initial Issue.
1	November 4, 2024	Updated Table 1 - Table 4; Updated Figure 1 - Figure 3.

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Overview

A. Overview

Model(s) Tested:	Solid Foil Sheet
Model(s) Covered:	Solid Foil Sheet
EUT Specifications:	Primary Power Tested: N/A
Analysis:	The results obtained relate only to the item(s) tested.
Prepared by:	Michelle Tawmging

B. References

IEEE-299: 2006	Measuring the Effectiveness of Electromagnetic Shielded Enclosures
ISO/IEC 17025: 2017	General Requirements for the Competence of Testing and Calibration Laboratories

Equipment Configuration

A. Overview

Eurofins Electrical and Electronic Testing NA, LLC was contracted by Covertech Fabricating Inc. to perform testing on the Solid Foil Sheet, under purchase order number COV30187.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of Covertech Fabricating Inc., Solid Foil Sheet.

In accordance with §2.955(a) (3), the following data is presented in support of the verification of the Covertech Fabricating Inc., Solid Foil Sheet. Covertech Fabricating Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Solid Foil Sheet has been **permanently** discontinued, as per §2.955(b).

The results obtained relate only to the item(s) tested.

B. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, LLC, 914 West Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a semi anechoic chamber. In accordance with §2.948(a)(3), a complete site description is contained at Eurofins Electrical and Electronic Testing NA, LLC. In accordance with §2.948(d), Eurofins Electrical and Electronic Testing NA, LLC has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0).

C. Equipment Details

Qty: 1 Solid Sample, 23”x 23” Sample

D. Modifications

i. Modifications to the EUT

No modifications were made to the EUT.

ii. Modifications to the Test Standard

No modifications were made to the test standard.

E. Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to Covertech Fabricating Inc. upon completion of testing.

IEEE-299

A. Shielding Effectiveness Measurement Data

Test Results: Testing was completed by Brandon Tracy on October 8 - 9, 2024
Retesting was completed by Michael Griffiths on October 31, 2024

Environmental Conditions: **Temperature:** 18°C
Relative Humidity: 47%

Test date:	10/8/2024 - 10/9/2024 and 10/31/2024	*Customer:*	Covertech Fabricating Inc.	*Temperature:*	18°C
Engineer:	Brandon Tracy / Michael Griffiths	*METrak #:*	133864	*Rel. Humidity:*	47%
Specification/Yr.	IEEE 299-2006	*EUT Name:*	Solid Foil Sheet	*Setup Photo File Name:*	
Calibration/Detection System/EUT Setup verified by/Date:	BT 10/8/2024	*Mode/Config:*	1 Mode/1 Config	Dynamic Range (Various)	
		Pass Date:	Completed 10/9/2024	Test Sample (Various)	

Table 1. Shielding Effectiveness Test Information

Frequency (MHz)	Noise Floor Measurement		Direct Measurement (dBm)		Dynamic Range (dB)		RBW	Sig Gen Drive Level (dBm)
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical		
20.00	-111.09	-114.20	-23.48	-19.78	**87.61**	**94.42**	1 kHz	20
30.00	-111.00	-112.99	-22.38	-4.16	**88.62**	**108.83**	1 kHz	20
100.00	-103.75	-100.62	-1.97	-3.13	**101.78**	**97.49**	1 kHz	9.9
200.00	-108.48	-108.63	-5.31	-6.45	**103.17**	**102.18**	1 kHz	9.9
400.00	-95.22	-96.88	-2.88	1.31	**92.34**	**98.19**	10 kHz	20
800.00	-92.92	-97.42	-2.98	-3.59	**89.94**	**93.83**	10 kHz	20
1000.00	-90.17	-96.76	-3.28	-4.35	**86.89**	**92.41**	10 kHz	20
2000.00	-76.25	-75.27	12.94	12.69	**89.19**	**87.96**	100 kHz	9.9
4000.00	-76.42	-76.44	10.52	10.25	**86.94**	**86.69**	100 kHz	9.9
8000.00	-120.29	-120.13	-26.20	-26.42	**94.09**	**93.71**	10 Hz	14
10000.00	-119.80	-120.41	-27.47	-27.26	**92.33**	**93.15**	10 Hz	14
18000.00	-121.92	-121.11	-35.39	-35.40	**86.53**	**85.71**	10 Hz	14
40000.00	-71.01	-71.43	-14.48	-14.85	**56.53**	**56.58**	100 kHz	9.9

Table 2. Noise Floor and Direct Measurement Data

Frequency (MHz)	Foil Sheet Wallpaper Measurement (dBm)		Foil Sheet Wallpaper Shielding Effectiveness (dB)		Minimum SE (dB)
	Horizontal	Vertical	Horizontal	Vertical	
20.00	-93.32	-93.32	69.84	73.54	69.84
30.00	-94.47	-95.80	72.09	91.64	72.09
100.00	-83.86	-88.60	81.89	85.47	81.89
200.00	-101.55	-95.95	96.24	89.50	89.50
400.00	-89.82	-87.35	86.94	88.66	86.94
800.00	-94.00	-93.26	91.02	89.67	89.67
1000.00	-85.38	-88.36	82.10	84.01	82.10
2000.00	-75.82	-74.95	88.76	87.64	87.64
4000.00	-76.33	-76.41	86.85	86.66	86.66
8000.00	-118.19	-111.81	91.99	85.39	85.39
10000.00	-119.54	-118.64	92.07	91.38	91.38
18000.00	-120.45	-119.71	85.06	84.31	84.31
40000.00	-70.61	-69.83	56.13	54.98	54.98

Table 3. Shielding Effectiveness Data

Frequency (GHz)	Foil Sheet Wallpaper Shielding Effectiveness Summary		
	Horizontal (dB)	Vertical (dB)	Minimum SE (dB)
0.02	69.84	73.54	69.84
0.03	72.09	91.64	72.09
0.10	81.89	85.47	81.89
0.20	96.24	89.50	89.50
0.40	86.94	88.66	86.94
0.80	91.02	89.67	89.67
1.00	82.10	84.01	82.10
2.00	88.76	87.64	87.64
4.00	86.85	86.66	86.66
8.00	91.99	85.39	85.39
10.00	92.07	91.38	91.38
18.00	85.06	84.31	84.31
40.00	56.13	54.98	54.98

Table 4. Shielding Effectiveness Summary

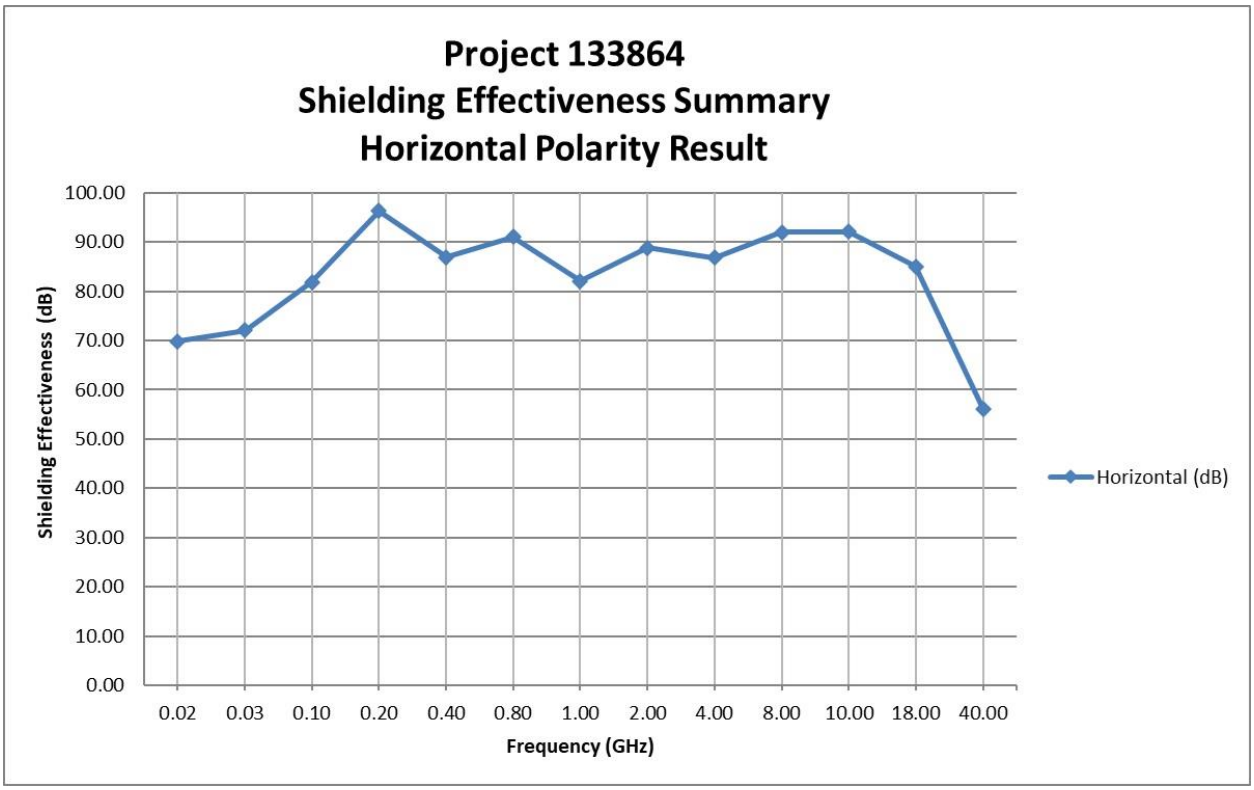


Figure 1. Shielding Effectiveness (Horizontal)

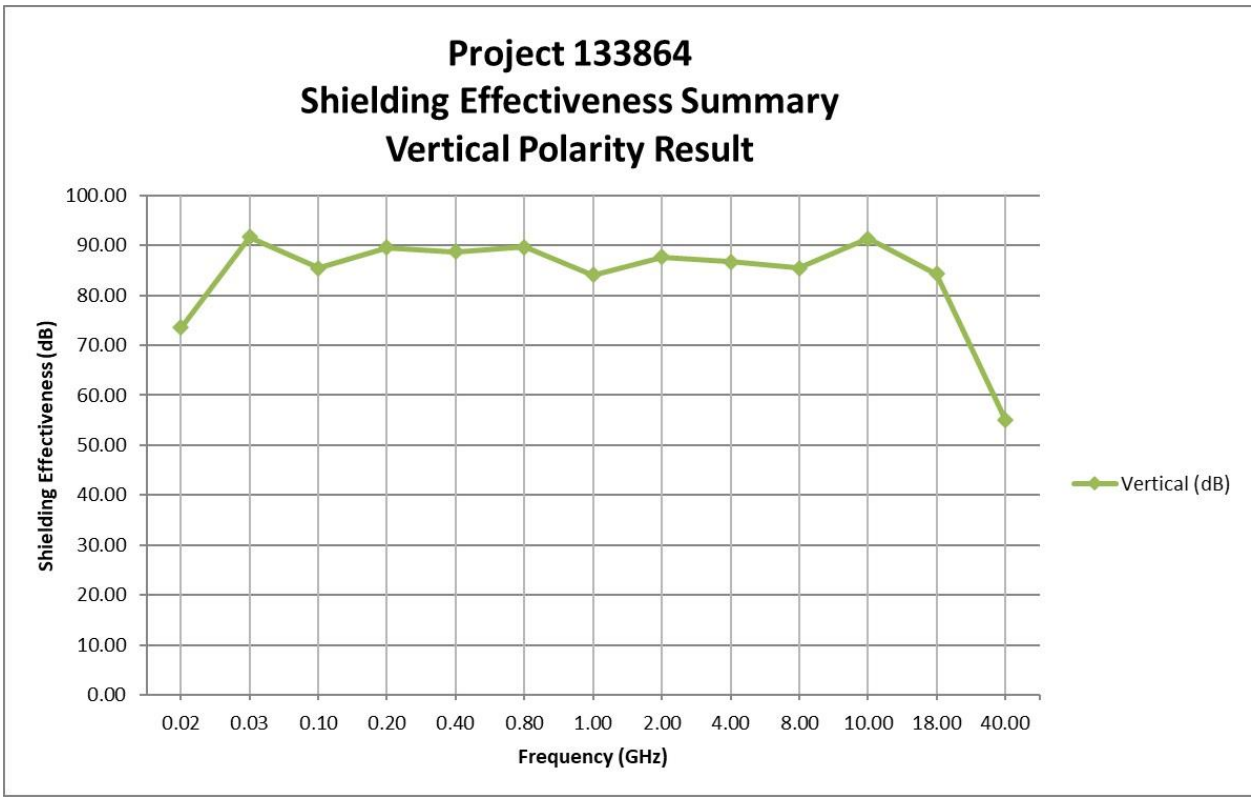


Figure 2. Shielding Effectiveness (Vertical)

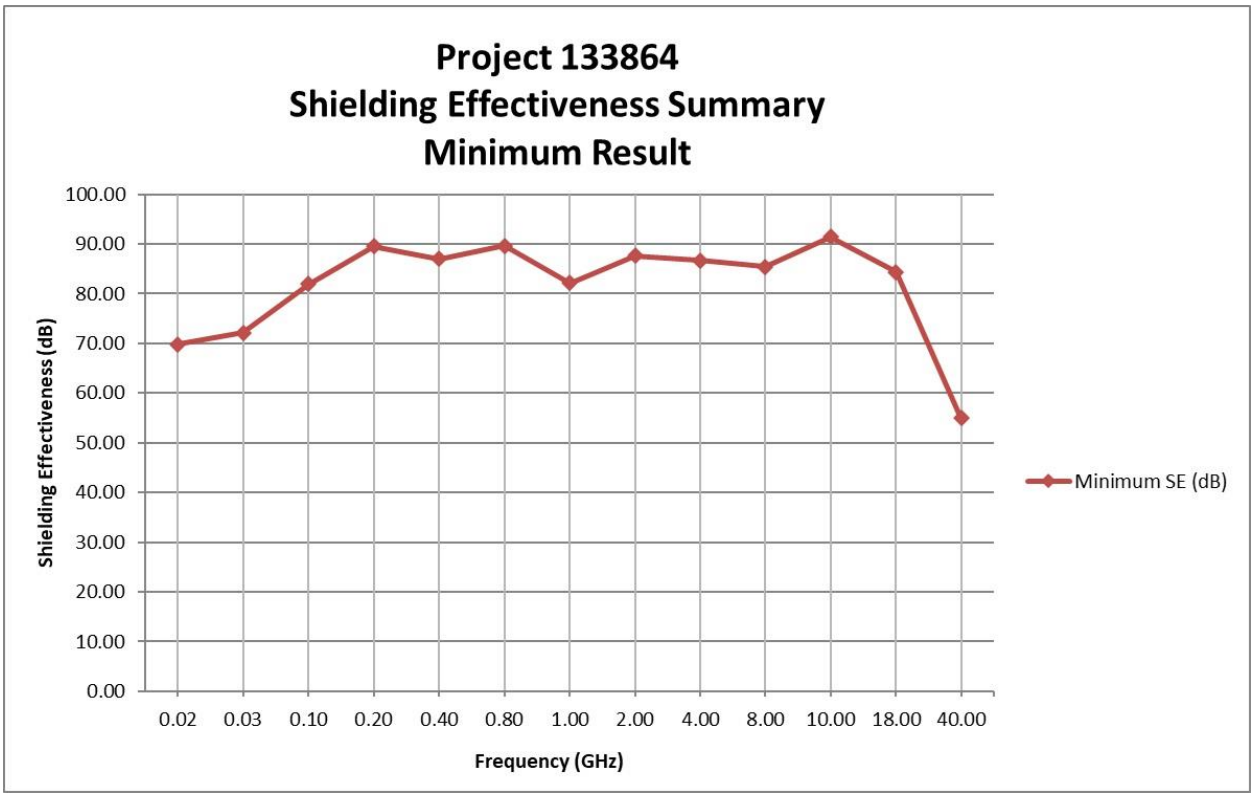
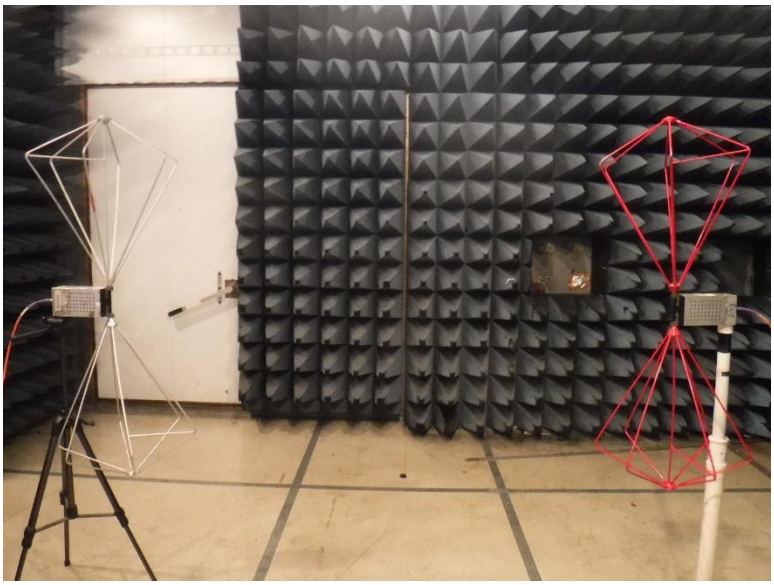


Figure 3. Shielding Effectiveness (Minimum)

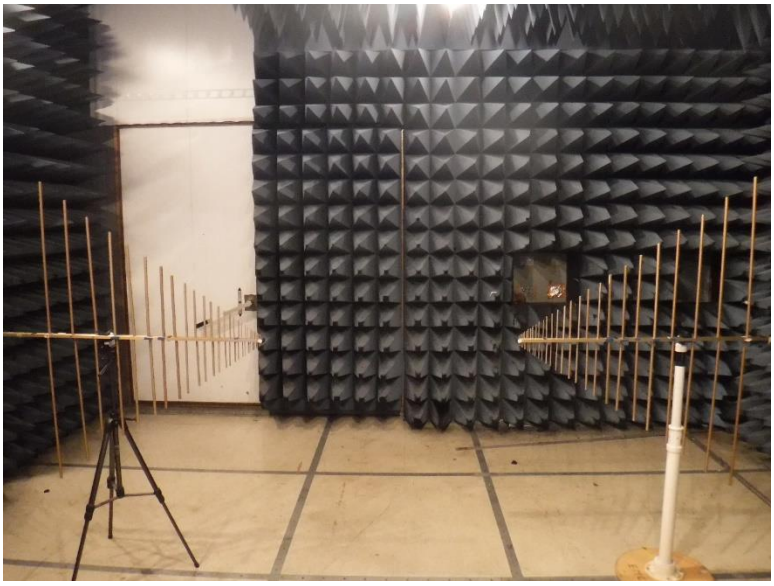
B. Shielding Effectiveness Measurement Photographs

Photograph 1. Dynamic Range (Biconical Antenna, Horizontal)

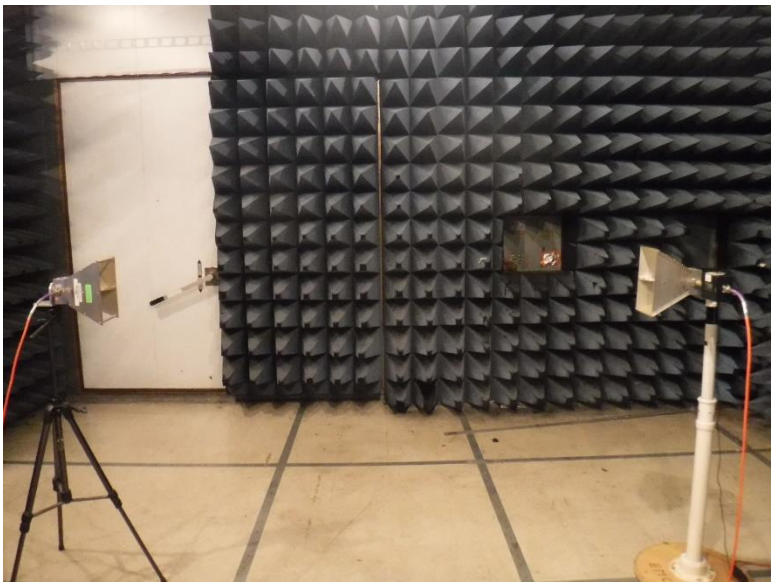


Photograph 2. Dynamic Range (Biconical Antenna, Vertical)

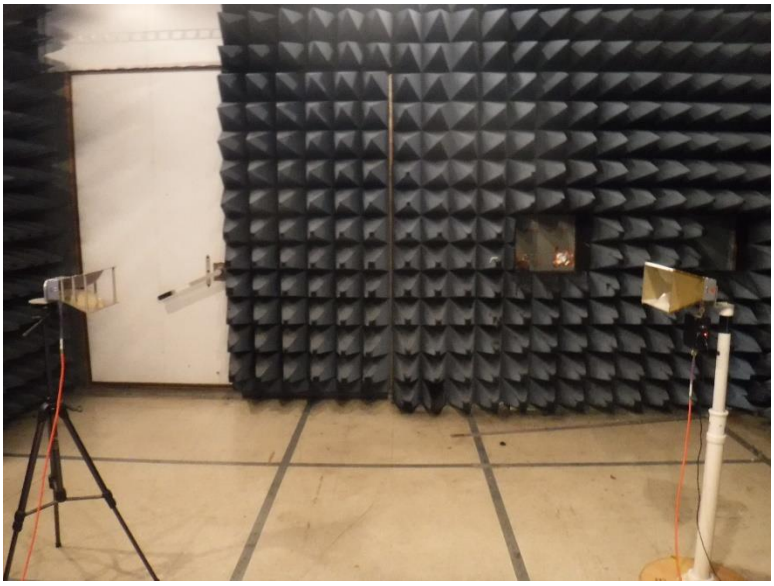
Photograph 3. Dynamic Range (Log Periodic Antenna, Horizontal)



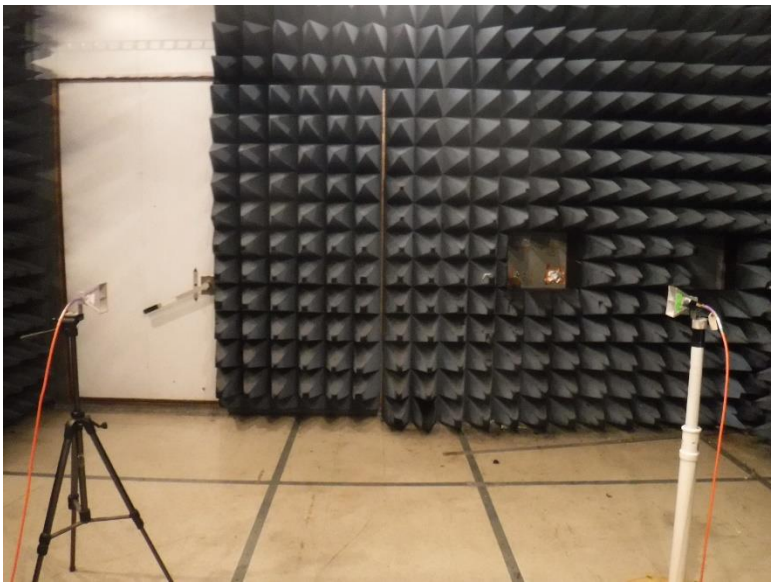
Photograph 4. Dynamic Range (Log Periodic Antenna, Vertical)



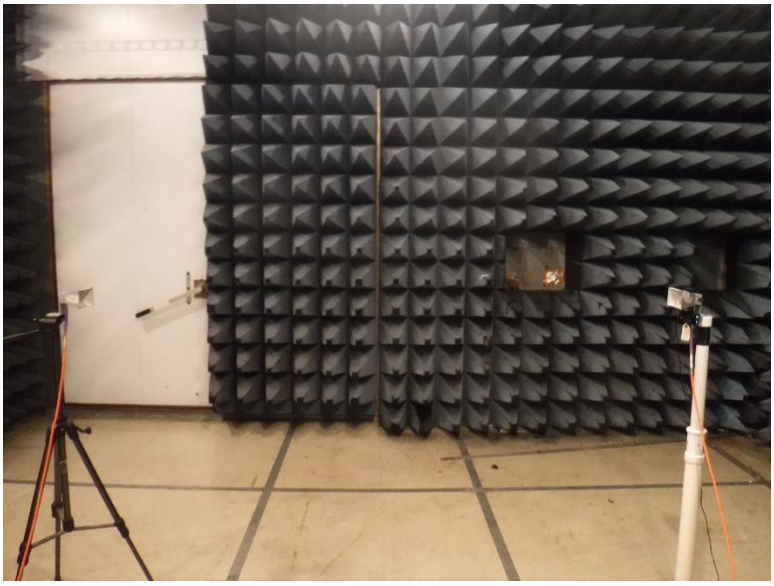
Photograph 5. Dynamic Range (1 GHz to 18 GHz Horn Antenna, Horizontal)



Photograph 6. Dynamic Range (1 GHz to 18 GHz Horn Antenna, Vertical)



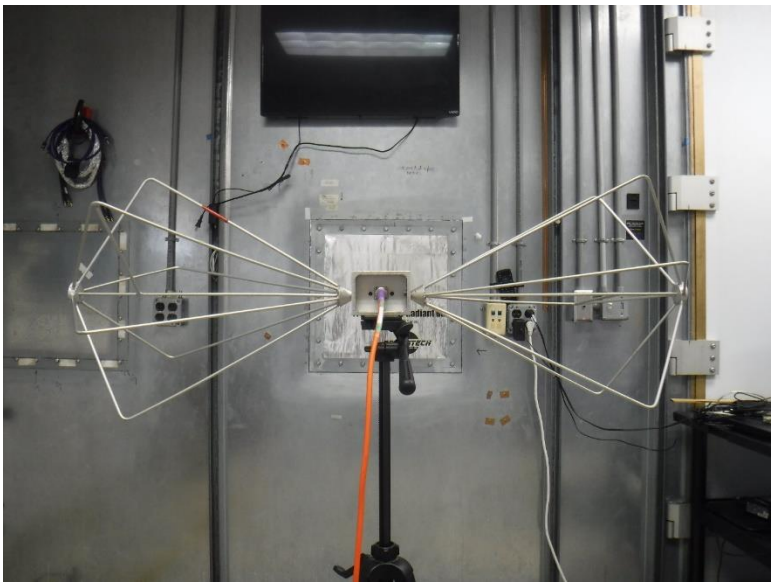
Photograph 7. Dynamic Range (18 GHz to 40 GHz Horn Antenna, Horizontal)



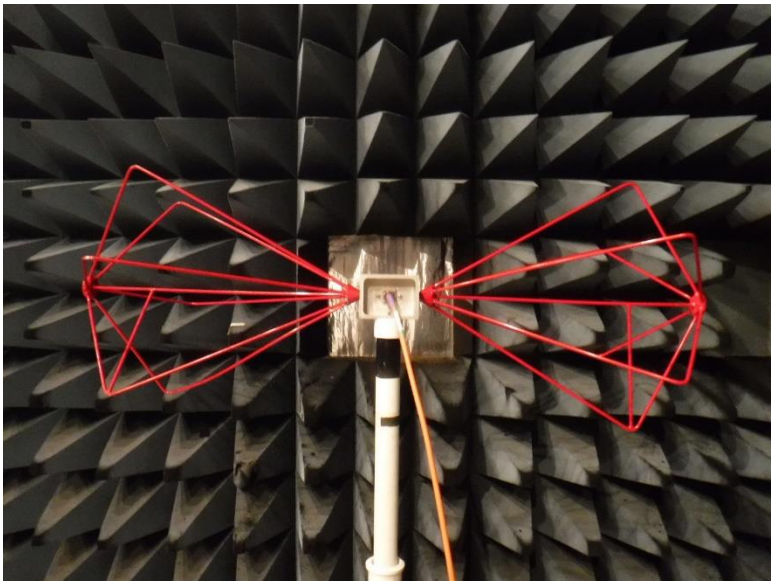
Photograph 8. Dynamic Range (18 GHz to 40 GHz Horn Antenna, Vertical)

Photograph 9. Test Sample Mounted (Tx Side)

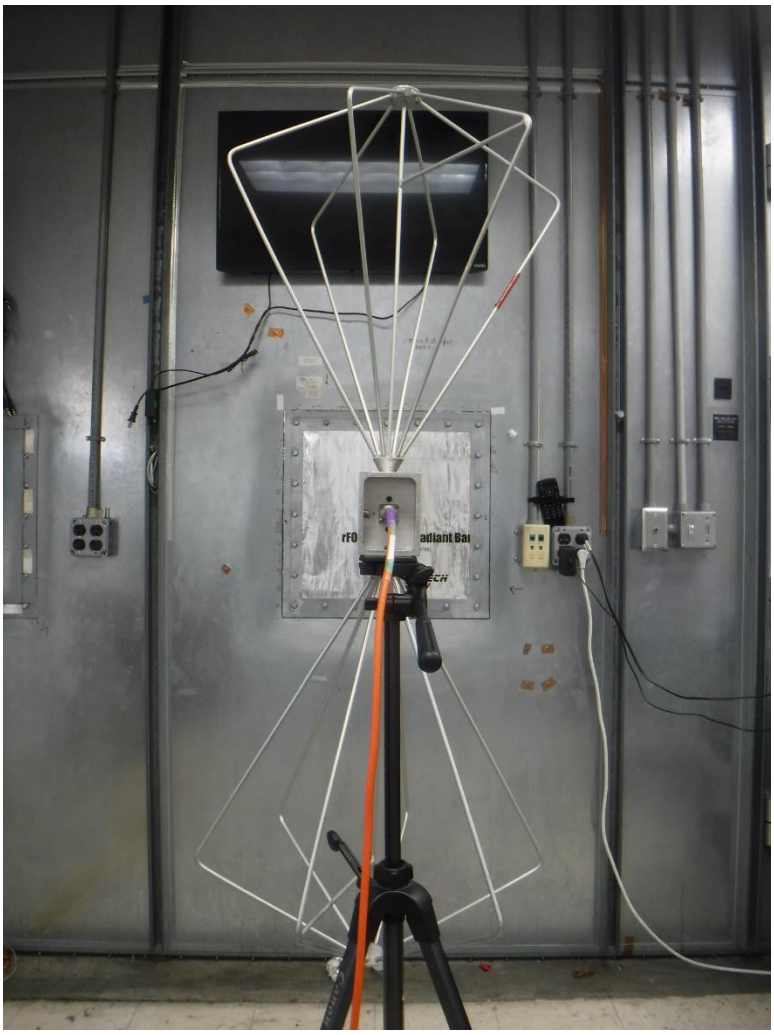
Photograph 10. Test Sample Mounted (Rx Side)



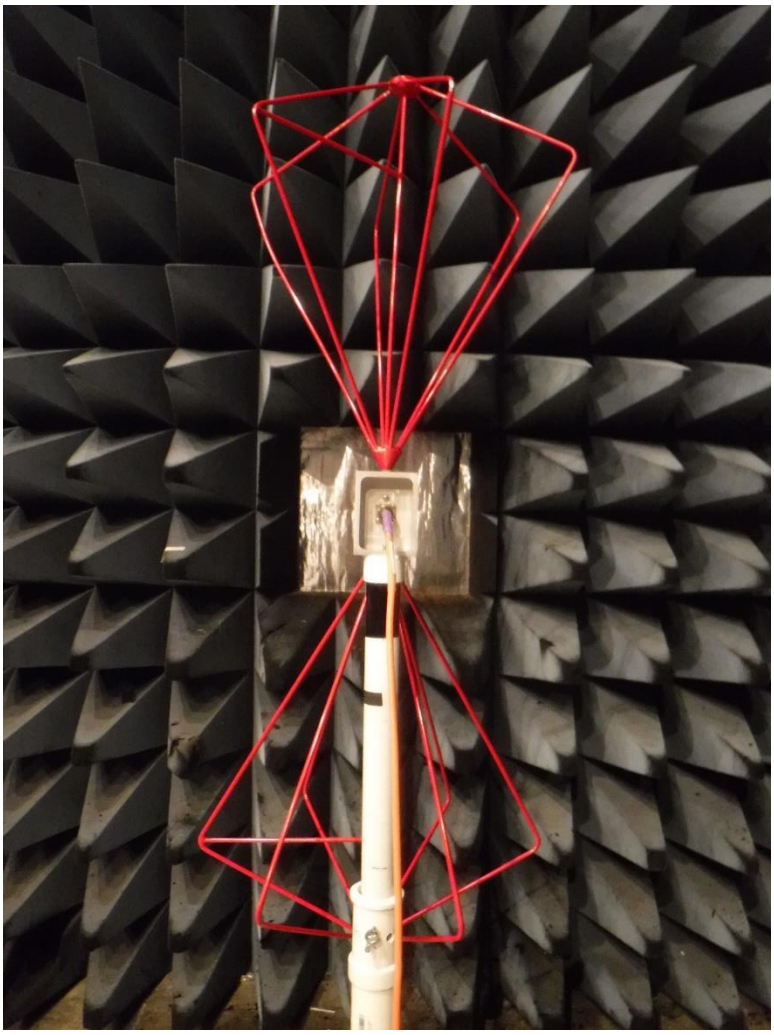
Photograph 11. Test Sample (Biconical Antenna, Horizontal, Tx Side)



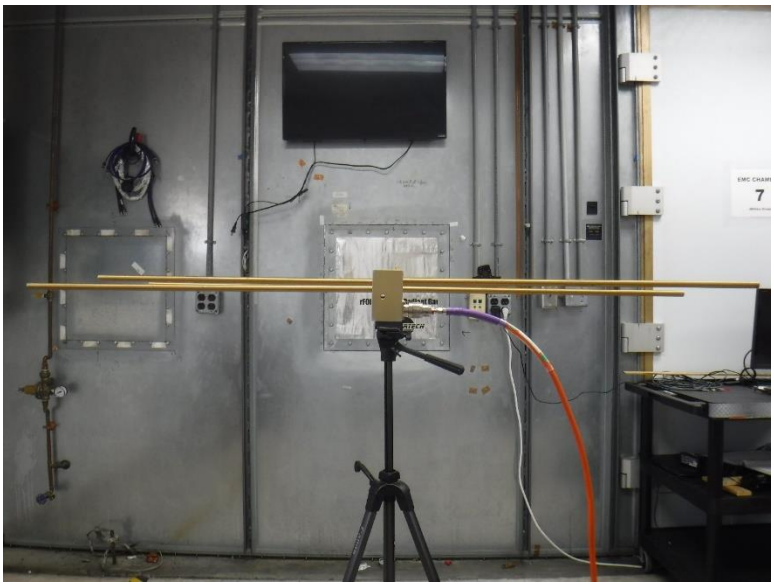
Photograph 12. Test Sample (Biconical Antenna, Horizontal, Rx Side)



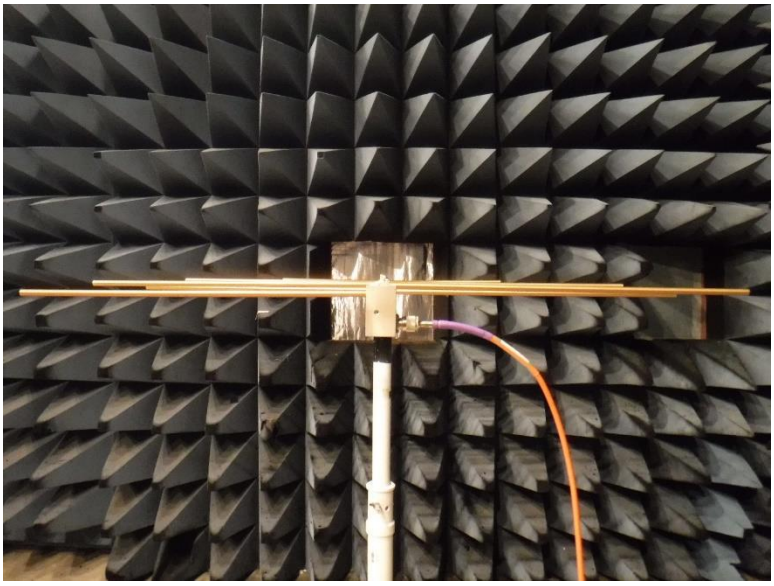
Photograph 13. Test Sample (Biconical Antenna, Vertical, Tx Side)



Photograph 14. Test Sample (Biconical Antenna, Vertical, Rx Side)

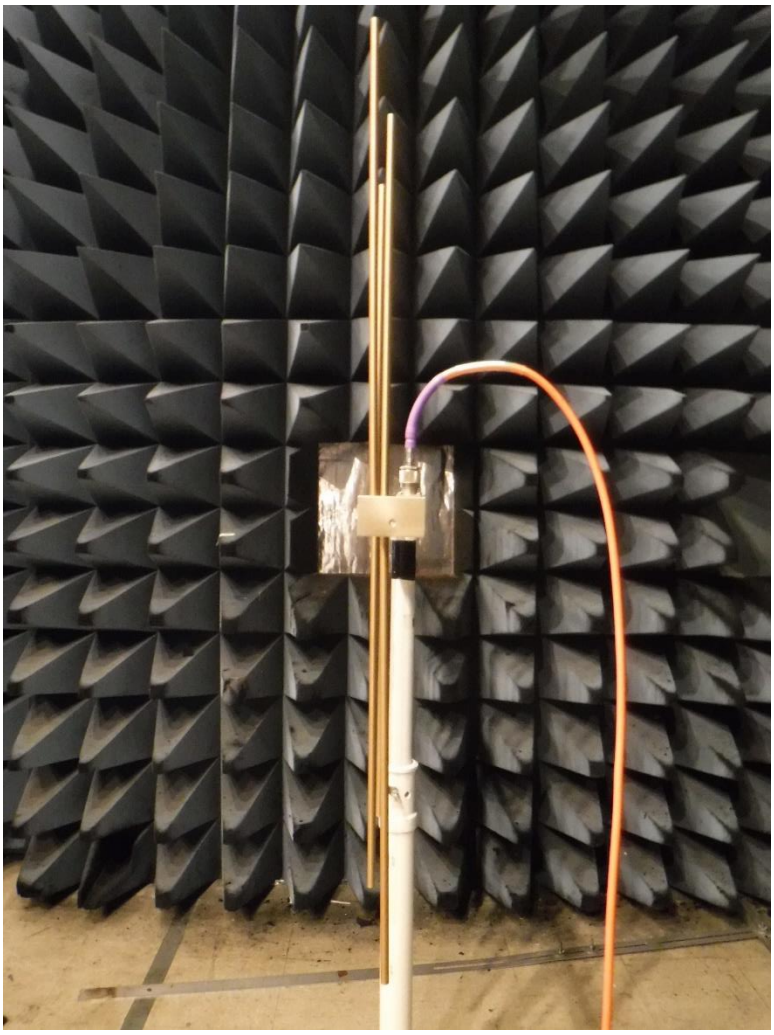


Photograph 15. Test Sample (Log Periodic Antenna, Horizontal, Tx Side)

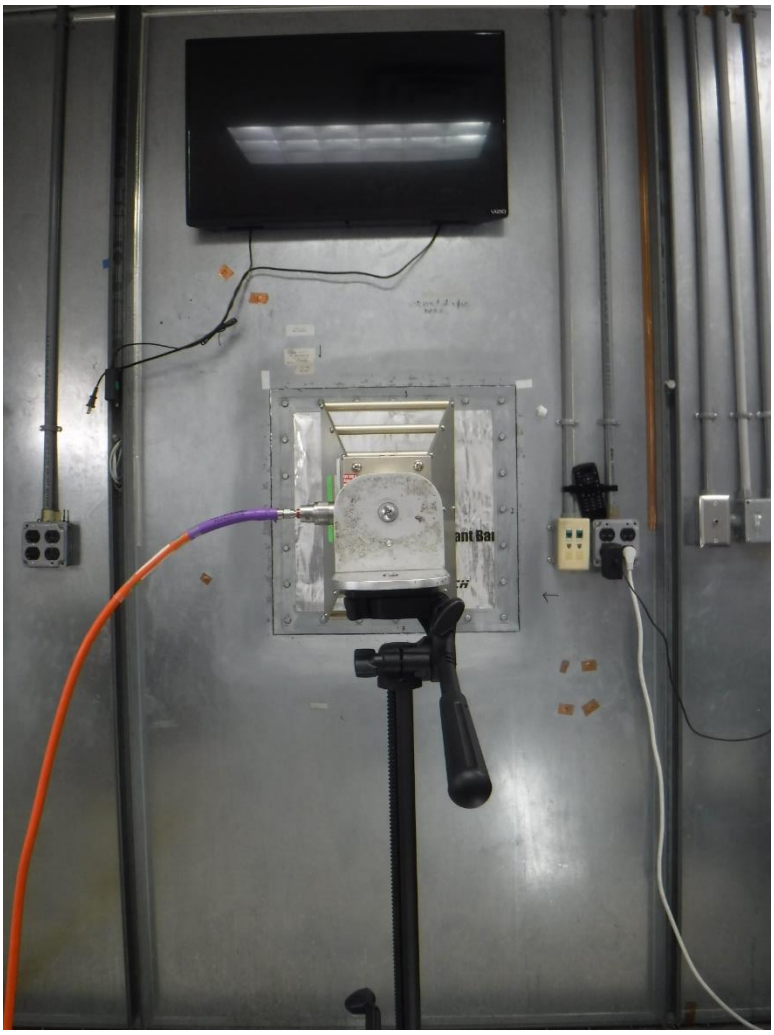


Photograph 16. Test Sample (Log Periodic Antenna, Horizontal, Rx Side)

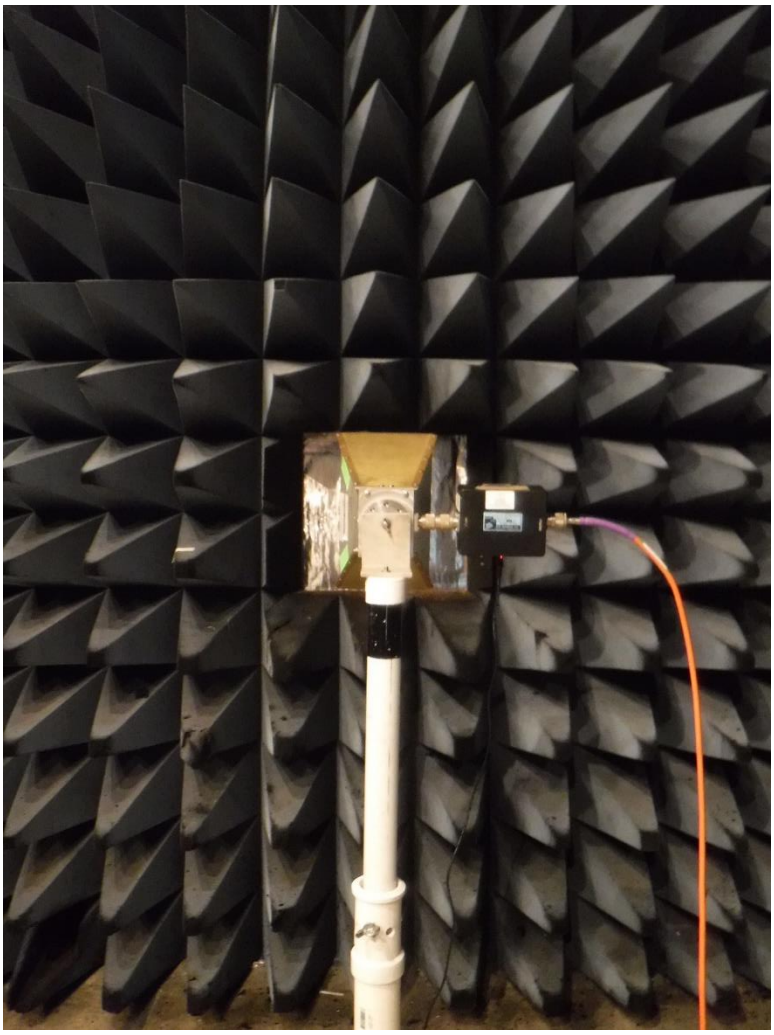
Photograph 17. Test Sample (Log Periodic Antenna, Vertical, Tx Side)



Photograph 18. Test Sample (Log Periodic Antenna, Vertical, Rx Side)

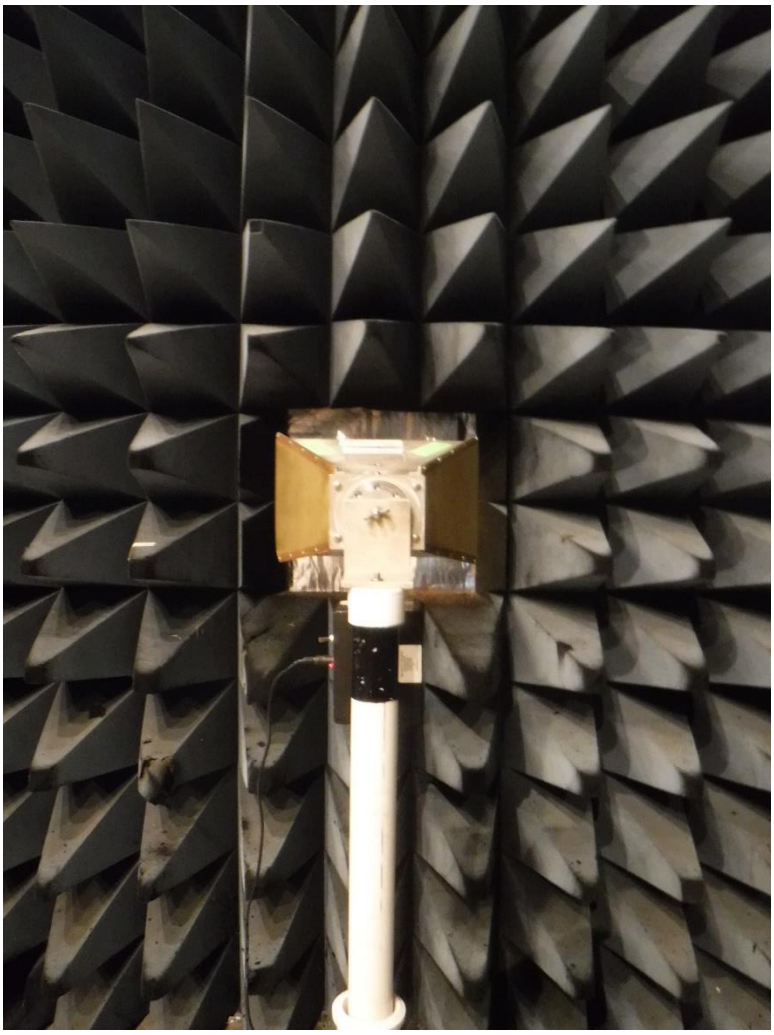


Photograph 19. Test Sample (1 GHz to 18 GHz Horn Antenna, Horizontal, Tx Side)

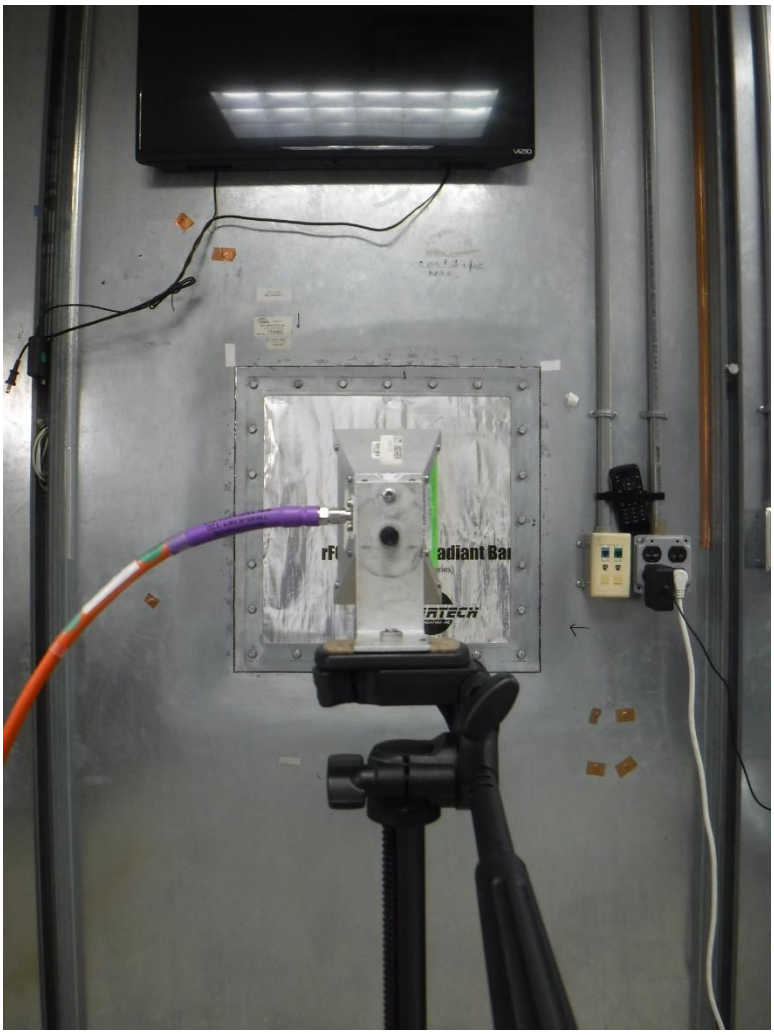


Photograph 20. Test Sample (1 GHz to 18 GHz Horn Antenna, Horizontal, Rx Side)

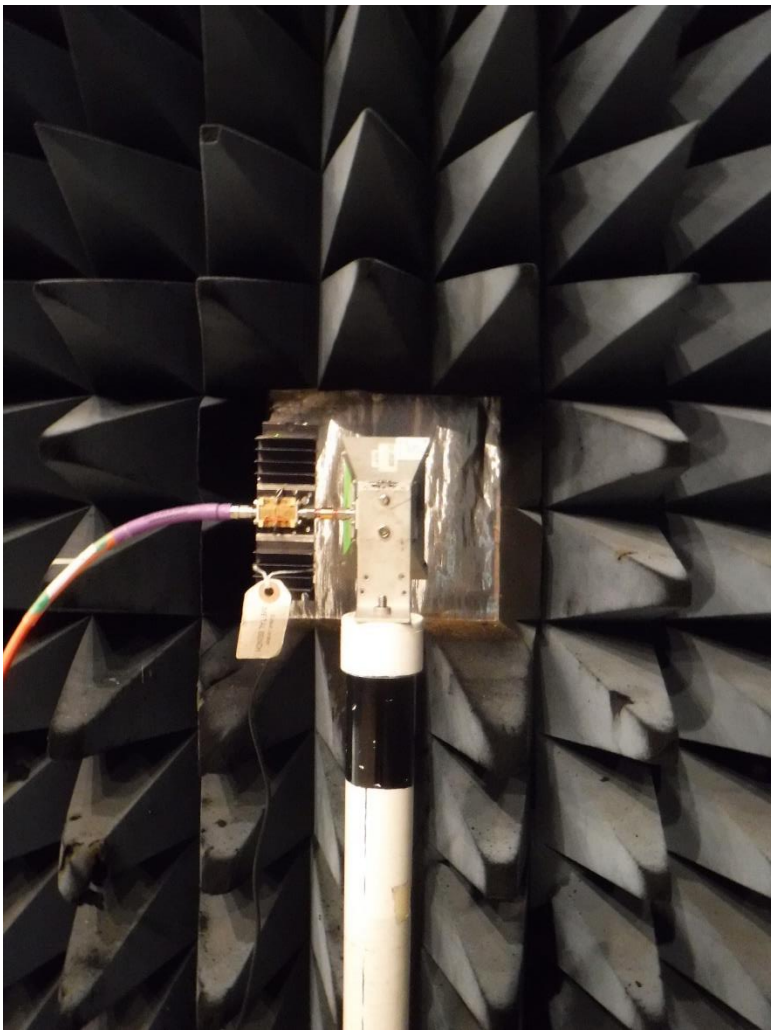
Photograph 21. Test Sample (1 GHz to 18 GHz Horn Antenna, Vertical, Tx Side)



Photograph 22. Test Sample (1 GHz to 18 GHz Horn Antenna, Vertical, Rx Side)

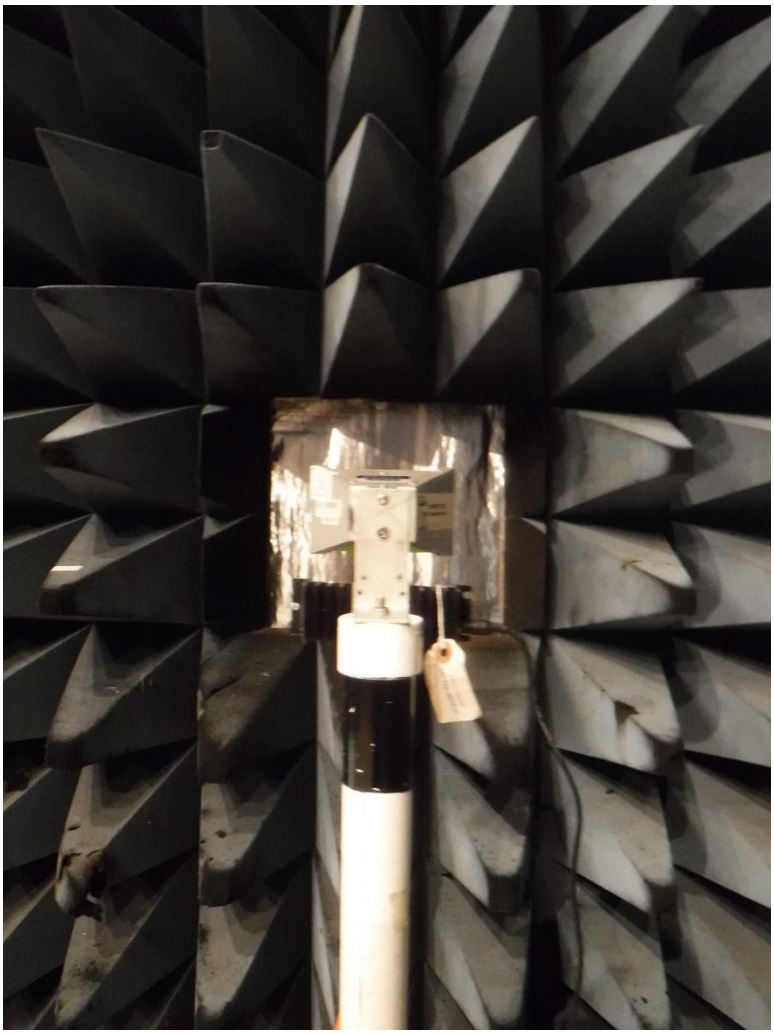


Photograph 23. Test Sample (18 GHz to 40 GHz Horn Antenna, Horizontal, Tx Side)



Photograph 24. Test Sample (18 GHz to 40 GHz Horn Antenna, Horizontal, Rx Side)

Photograph 25. Test Sample (18 GHz to 40 GHz Horn Antenna, Vertical, Tx Side)



Photograph 26. Test Sample (18 GHz to 40 GHz Horn Antenna, Vertical, Rx Side)

C. Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

	Test Date	10/9/2024			
MET #	**Equipment**	**Manufacturer**	**Model#**	**Cal Date**	**Cal Due**
1T2658	Antenna; Bicon	EMCO	3109	Functionally Verified	
1T4701	Antenna, Biconical	EMCO	3109	09/18/2024	03/18/2026
1T8372	Log Periodic Antenna	A.H. Systems, Inc.	SAS-517	Functionally Verified	
1T8373	Log Periodic Antenna	A.H. Systems, Inc.	SAS-517	Functionally Verified	
1T4905	Horn Antenna	Com-Power	AH-118	Functionally Verified	
1T2665	Antenna; Horn	EMCO	3115	Functionally Verified	
1T4745	Antenna, Horn	ETS-Lindgren	3116	Functionally Verified	
1T4744	Antenna, Horn	ETS-Lindgren	3116	07/18/2024	01/18/2026
1T4414	Microwave Pre-Amplifier	A.H. Systems, Inc.	PAM-0118	Functionally Verified	
1T4752	Pre-Amplifier	Miteq	JS44-18004000-35-8P	Functionally Verified	
1T4739	Signal Generator	Agilent Technologies	N5183A	10/02/2024	04/30/2026
1T4771	Spectrum Analyzer (PSA)	Agilent Technologies	E4446A	11/02/2023	05/31/2025
1T8804	RF Cable	Megaphase	TM40-K1K1-120	Not Required	
1T8805	RF Cable	Megaphase	TM40-K1K1-120	Not Required	
1T10002	Thermometer/Hygrometer/Barometer	Fisher Scientific	14-650-118	03/06/2024	03/06/2026

Table 5. Shielding Effectiveness Equipment Table

Note: Functionally verified test equipment is verified using calibrated instrumentation at time of testing.

END OF REPORT