HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

July 28, 2021

National Building Supply, Inc.
2000 East Broadway Suite 225
Columbia, Mo 65201

Dear Michael Thrift,

Enclosed is the EMC test report for compliance testing of the National Building Supply, Inc., ULTRA NT SCIF Barrier – Perforated to be evaluated under 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, Inc. If you have any questions regarding these results or if Eurofins Electrical and Electronic Testing NA, Inc. can be of further service to you, please feel free to contact me.

Sincerely yours,
Eurofins Electrical and Electronic Testing NA, Inc.

Michelle Tawmging
Documentation Department

Reference: (\National Building Supply, Inc.\EMC113344-IEEE)

ACCREDITED
TESTING CERT #0591.01

Eurofins Electrical and Electronic Testing NA, Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

Electromagnetic Compatibility Criteria
Test Report

for the

National Building Supply, Inc.
ULTRA NT SCIF Barrier – Perforated

To be evaluated under the Requirements of
IEEE-299

Report: EMC113344-IEEE

July 28, 2021

Prepared For:

National Building Supply, Inc.
2000 East Broadway Suite 225
Columbia, Mo 65201

Prepared By:
Eurofins Electrical and Electronic Testing NA, Inc.
914 West Patapsco Ave.,
Baltimore MD 21230

Electromagnetic Compatibility Criteria
Test Report

for the

National Building Supply, Inc.
ULTRA NT SCIF Barrier – Perforated

To be evaluated under the Requirements of
IEEE-299

Testing Performed By:

Brandon Tracy
Electromagnetic Compatibility Lab

Prepared By:

Michelle Tawmging
Documentation Department

Steve Pitta
Director, Operations Strategy

Test Report Status Sheet

Revision	Test Report Date	Reason for Revision
∅	July 28, 2021	Initial Issue.

Table of Contents

List of Figures

List of Tables

Overview

A. Overview

Model(s) Tested:	ULTRA NT SCIF Barrier – Perforated
Model(s) Covered:	ULTRA NT SCIF Barrier – Perforated
Size: (HxWxD)	22 x 22 inches
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, Inc. was contracted by National Building Supply, Inc. to perform testing on the ULTRA NT SCIF Barrier – Perforated.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the National Building Supply, Inc., ULTRA NT SCIF Barrier – Perforated.

In accordance with §2.955(a) (3), the following data is presented in support of the verification of the National Building Supply, Inc., ULTRA NT SCIF Barrier – Perforated. National Building Supply, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the ULTRA NT SCIF Barrier – Perforated 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, Inc., 914 West Patapsco Ave., 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, Inc. In accordance with §2.948(d), Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0).

C. Description of Test Sample

The ULTRA NT SCIF Barrier – Perforated is the Equipment Under Test (EUT) which is a foil sheet for shielding.

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 Electro-Magnetic Compatibility Lab for testing was returned to National Building Supply, Inc. upon completion of testing.

IEEE-299

A. Shielding Effectiveness Measurement Data

Test Results: Testing was completed by Brandon Tracy on July 27, 2021.

Environmental Conditions:

Test date:	7/27/2021	***Customer:***	National Building Supply, Inc (NAT46)	***Temperature:***
Engineer:	Brandon Tracy	***METrak #:***	113344	25.5 C
Specification/Yr:	IEEE 299-2006	***EUT Name:***	Perforated Foil Sheet	***Rel. Humidity:***
		Mode/Config:	n/a	40%
		Pass Date:	n/a	***Setup Photo File Name:***
Calibration/Detection System/EUT Setup verified by/Date:	BT 7/27/2021			n/a

Test Data:

Frequency (MHz)	Noise Floor Measurement (dBm)		Direct Measurement (dBm)		Dynamic Range (dB)		RBW	Sig Gen Drive Level (dBm)
	Co-Axial	Co-Planar	Co-Axial	Co-Planar	Co-Axial	Co-Planar		
0.01	-112.38	-111.37	-59.9	-62.92	**52.48**	**48.45**	20 Hz	22
0.15	-115.41	-112.95	-42.95	-45.07	**72.46**	**67.88**	20 Hz	22
15.00	-128.79	-127.58	-53.72	-56.09	**75.07**	**71.49**	20 Hz	22
Frequency (MHz)	**Noise Floor Measurement (dBm)**		**Direct Measurement (dBm)**		**Dynamic Range (dB)**		**RBW**	**Sig Gen Drive Level (dBm)**
	Horizontal	**Vertical**	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**		
30.00	-73.72	-81.67	-17.25	0.61	**56.47**	**82.28**	1 kHz	22
31.30	-108.46	-102.55	-15.26	-3.03	**93.2**	**99.52**	1 kHz	22
34.80	-113.97	-115.68	-7.8	-4.47	**106.17**	**111.21**	1 kHz	22
38.30	-114.18	-111.89	0.21	-8.42	**114.39**	**103.47**	1 kHz	22
100.00	-105.25	-109.3	3.32	6.51	**108.57**	**115.81**	1 kHz	22
400.00	-115.05	-116.37	-1.92	1.72	**113.13**	**118.09**	1 kHz	22
800.00	-114.44	-115.51	-3.13	-2.46	**111.31**	**113.05**	1 kHz	22
1000.00	-114.25	-115.46	-24.43	-22.46	**89.82**	**93**	1 kHz	15
2000.00	-112.55	-112.25	-24.53	-28.26	**88.02**	**83.99**	1 kHz	15
4000.00	-114.1	-113.62	-26.8	-26.38	**87.3**	**87.24**	1 kHz	15
5000.00	-114.69	-113.66	-26.23	-25.96	**88.46**	**87.7**	1 kHz	15
10000.00	-110.83	-111.25	-27.9	-28.22	**82.93**	**83.03**	1 kHz	15
18000.00	-109.89	-108.24	-34.74	-34.41	**75.15**	**73.83**	1 kHz	15

Table 1. Noise Floor Measurement, Direct Measurement, Dynamic Range Measurement

Frequency (MHz)	Foil Sheet Wallpaper Measurement (dBm)		Foil Sheet Wallpaper Shielding Effectiveness (dB)		Minimum SE (dB)
	Co-Axial	Co-Planar	Co-Axial	Co-Planar	
0.01	-86.73	-81.29	26.83	18.37	18.37
0.15	-85.07	-80.33	42.12	35.26	35.26
15.00	-124.17	-123.03	70.45	66.94	66.94
Frequency (MHz)	**Foil Sheet Wallpaper Measurement (dBm)**		**Foil Sheet Wallpaper Shielding Effectiveness (dB)**		**Minimum SE (dB)**
	Horizontal	**Vertical**	**Horizontal**	**Vertical**	
30.00	-84.15	-79.82	66.9	80.43	66.9
31.30	-102.25	-99.82	86.99	96.79	86.99
34.80	-104.23	-103.35	96.43	98.88	96.43
38.30	-99.64	-103	99.85	94.58	94.58
100.00	-81.62	-91.23	84.94	97.74	84.94
400.00	-95.32	-97.08	93.4	98.8	93.4
800.00	-92.19	-97.73	89.06	95.27	89.06
1000.00	-101.82	-103.83	77.39	81.37	77.39
2000.00	-99.37	-102.33	74.84	74.07	74.07
4000.00	-97.56	-100.11	70.76	73.73	70.76
5000.00	-99.46	-103.65	73.23	77.69	73.23
10000.00	-93.45	-98.61	65.55	70.39	65.55
18000.00	-93.43	-97.1	58.69	62.69	58.69
Frequency (GHz)	**Horizontal (dB)**	**Vertical (dB)**	**Min (dB)**		
0.10	84.94	97.74	84.94		
0.40	93.4	98.8	93.4		
0.80	89.06	95.27	89.06		
1.00	77.39	81.37	77.39		
2.00	74.84	74.07	74.07		
4.00	70.76	73.73	70.76		
5.00	73.23	77.69	73.23		
10.00	65.55	70.39	65.55		
18.00	58.69	62.69	58.69		

Table 2. Foil Sheet Wallpaper

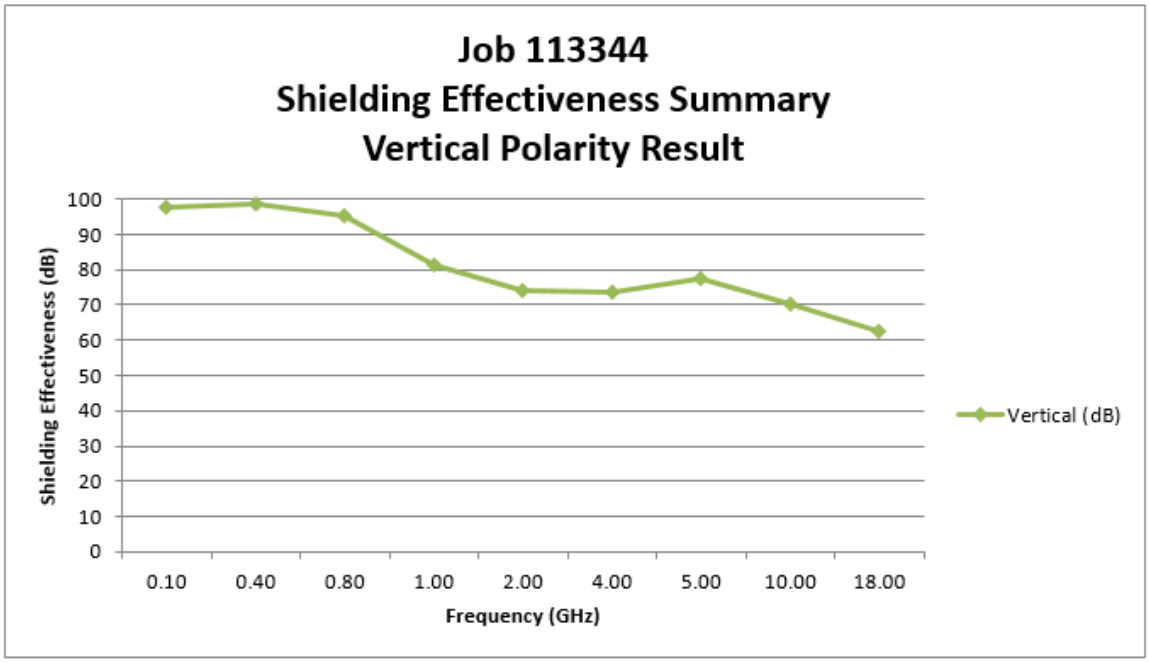

Figure 1. 100MHz to 18GHz Shielding Effectiveness Result Vertical Polarity

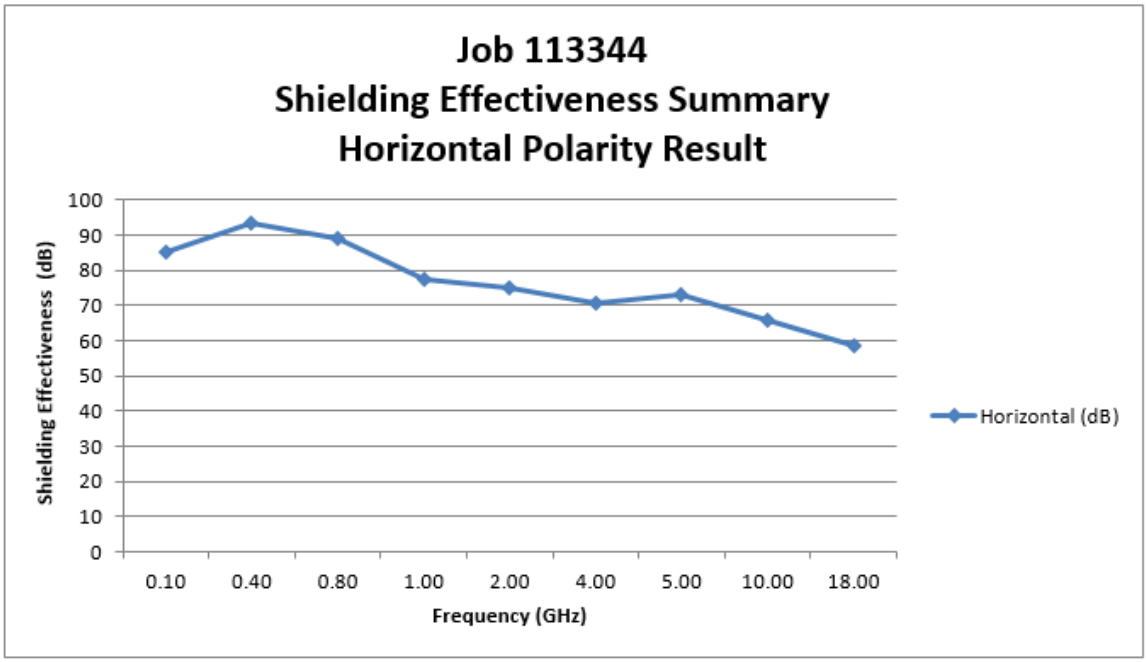

Figure 2. 100MHz to 18GHz Shielding Effectiveness Result Horizontal Polarity

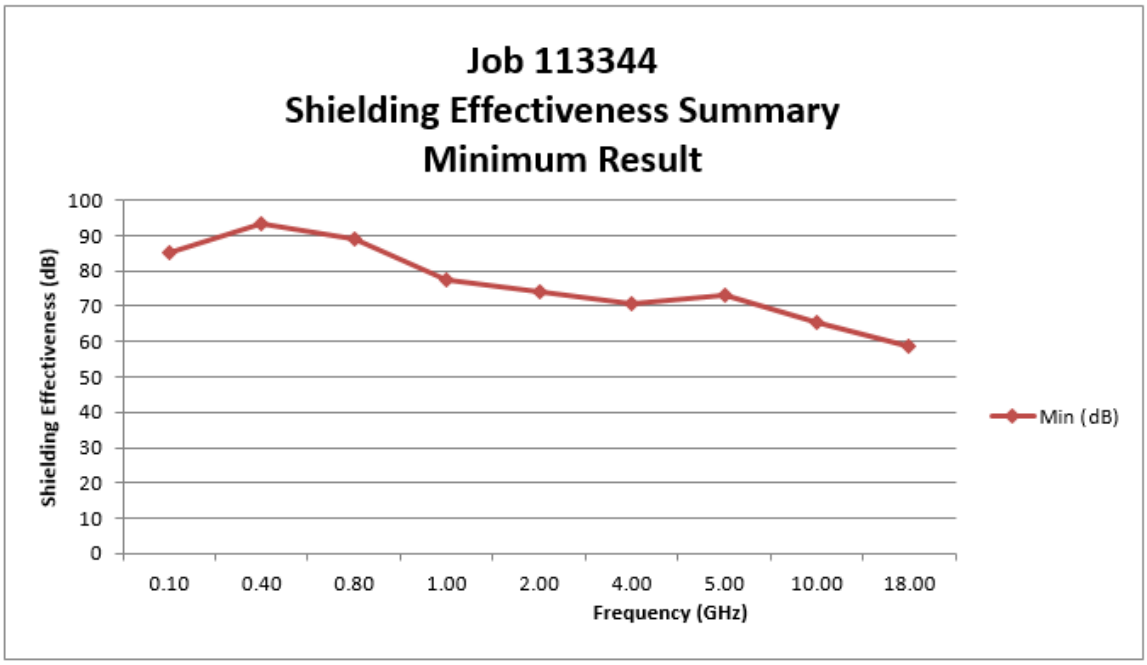

Figure 3. 100MHz to 18GHz Shielding Effectiveness Minimum Result

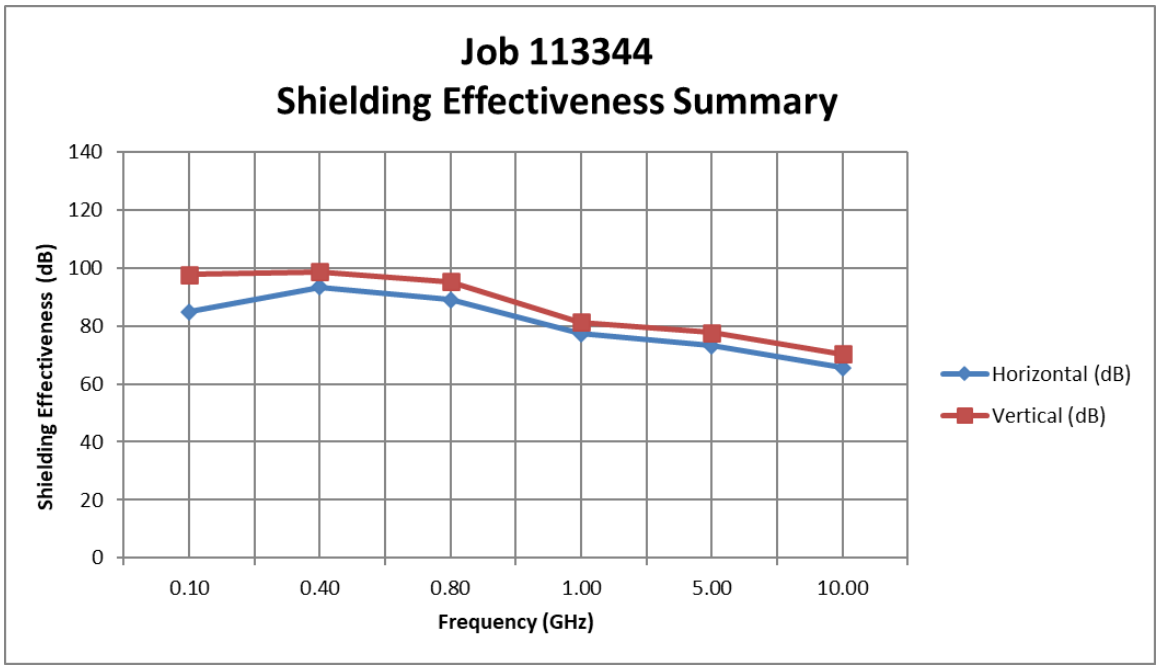

Figure 4. 100MHz to 10GHz Shielding Effectiveness Summary (Both Polarities)

Test Photographs:

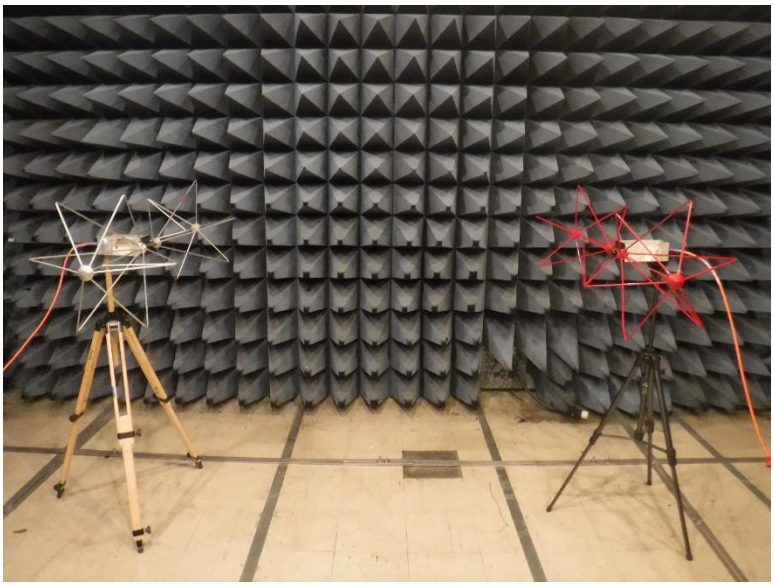

Figure 5: Dynamic Range (Biconical Horizontal)

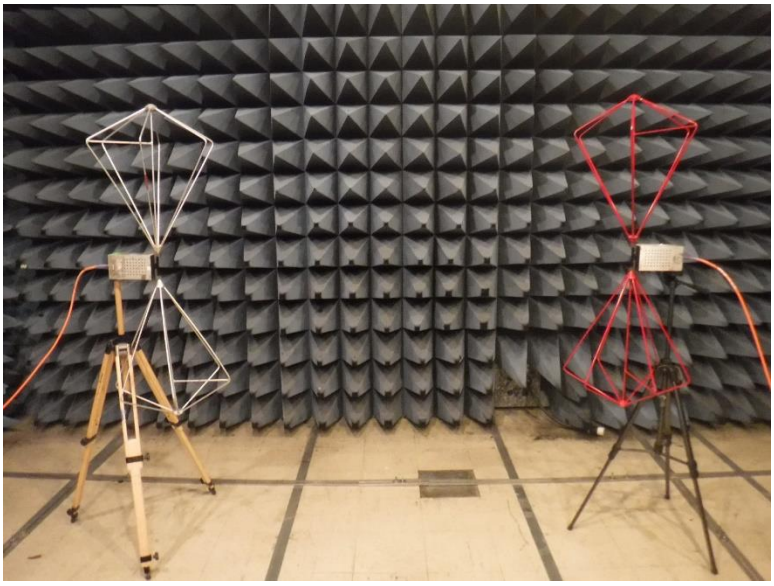

Figure 6: Dynamic Range (Biconical Vertical)

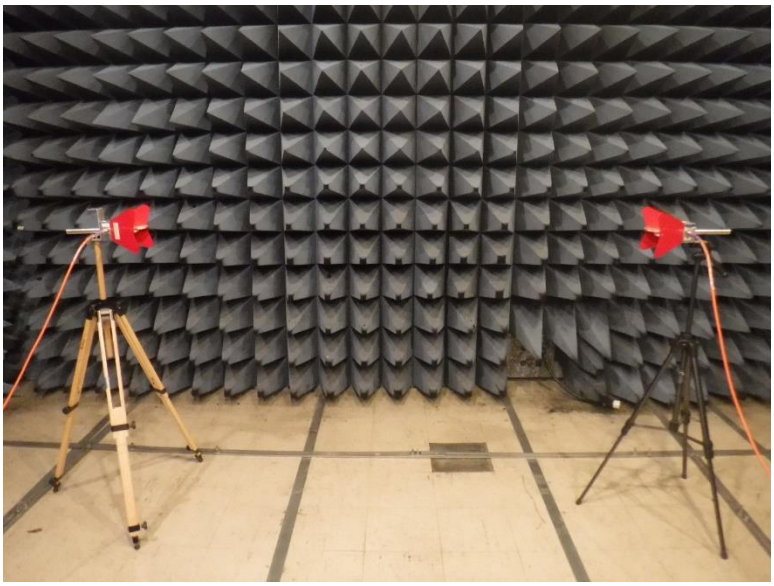

Figure 7: Dynamic Range (Horn Antenna Horizontal)

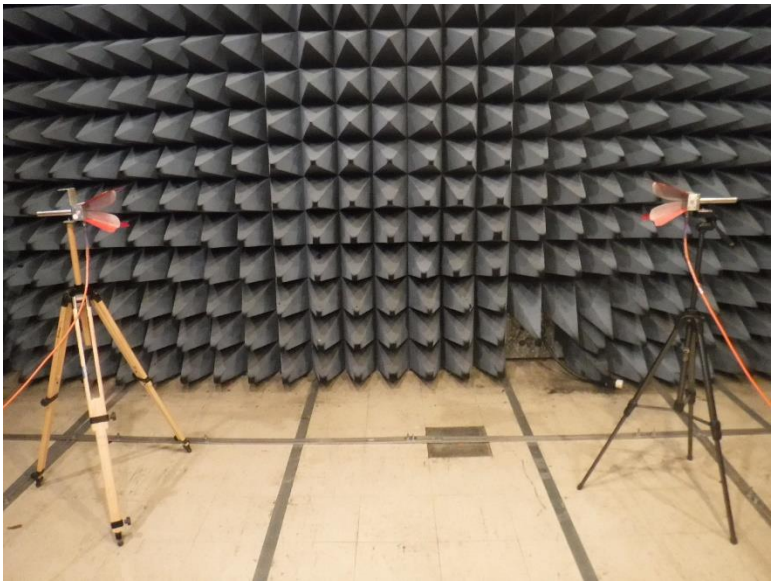

Figure 8: Dynamic Range (Horn Antenna Vertical)

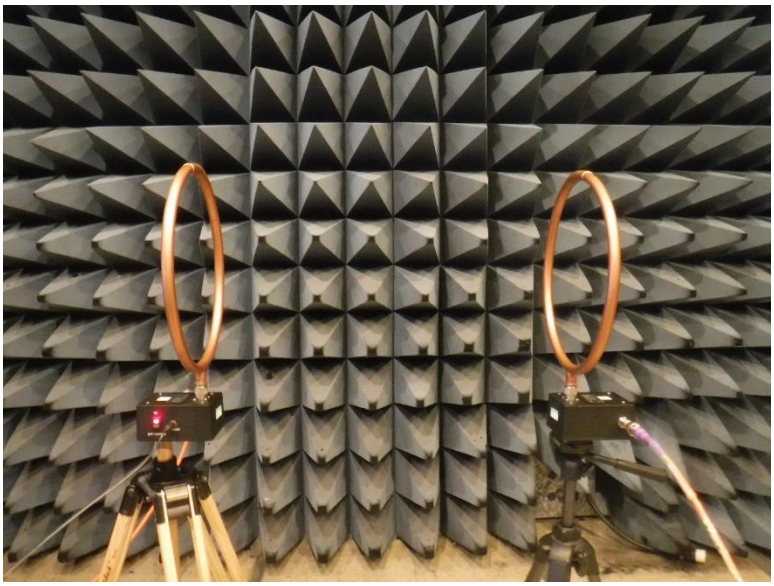

Figure 9: Dynamic Range (Loop Coaxial)

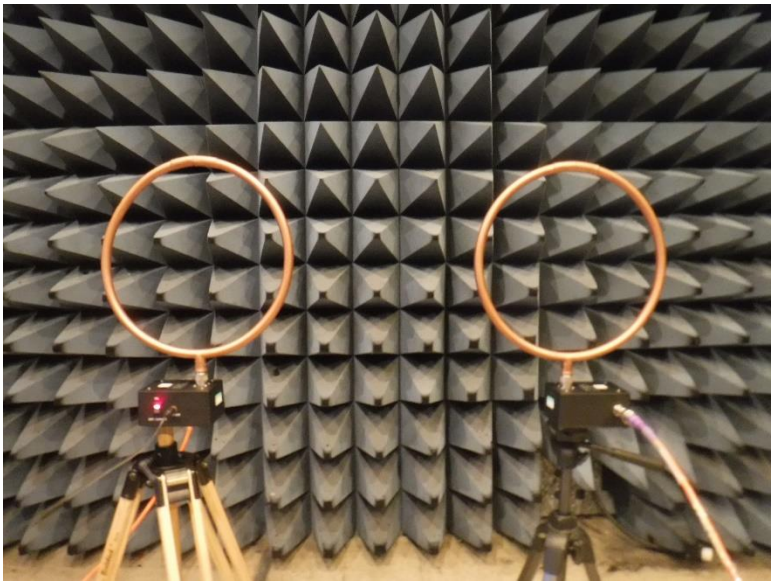

Figure 10: Dynamic Range (Loop Coplanar)

Figure 11: Dynamic Range (LPA Horizontal)

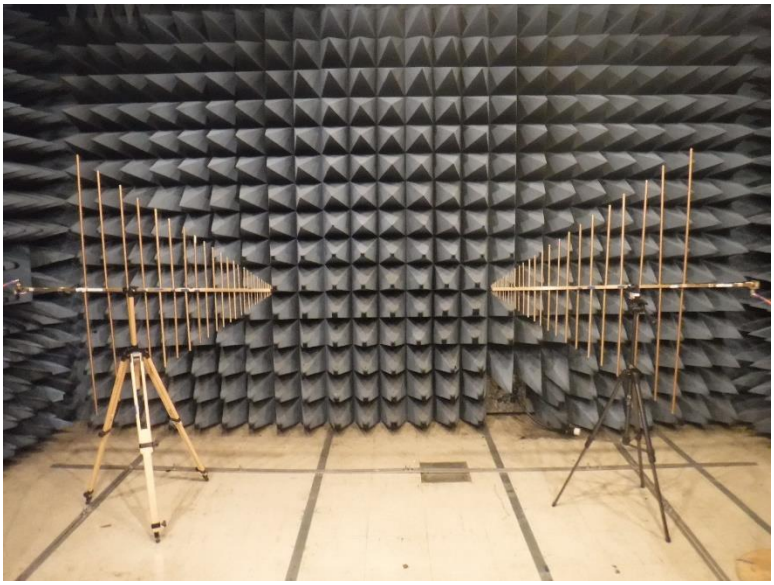

Figure 12: Dynamic Range (LPA Vertical)

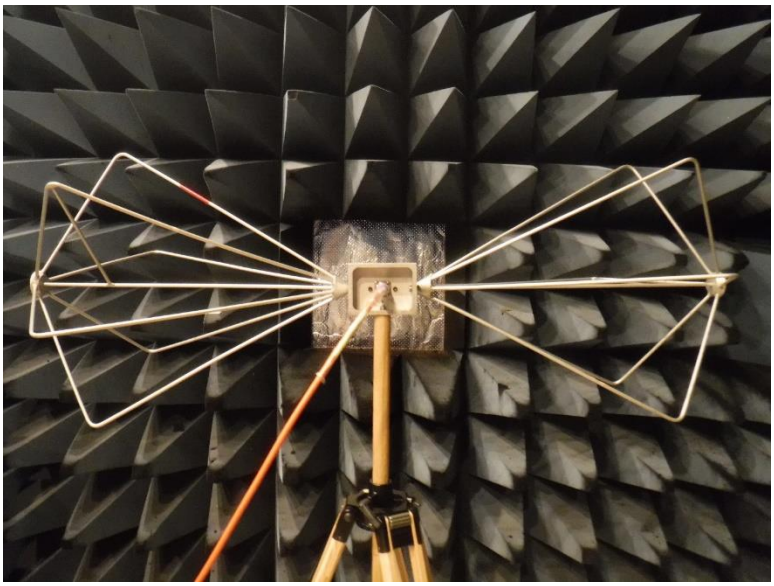

Figure 13: Test Sample (Biconical Horizontal Rx)

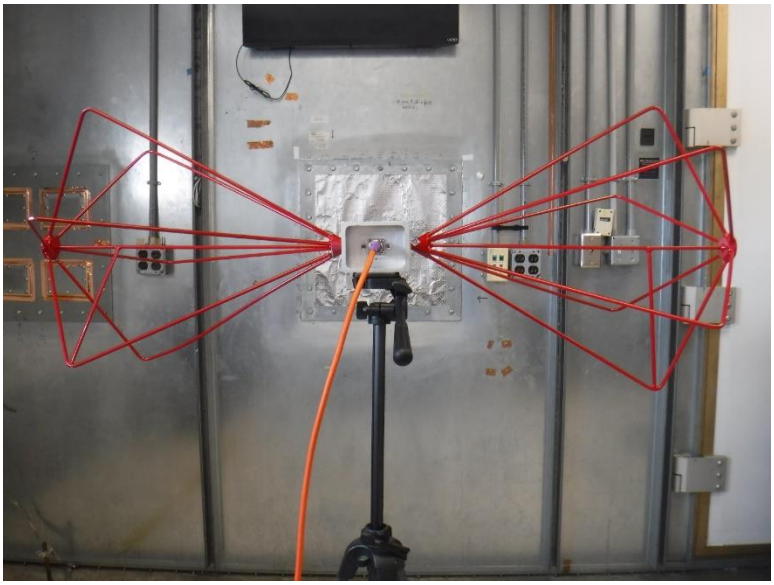

Figure 14: Test Sample (Biconical Horizontal Tx)

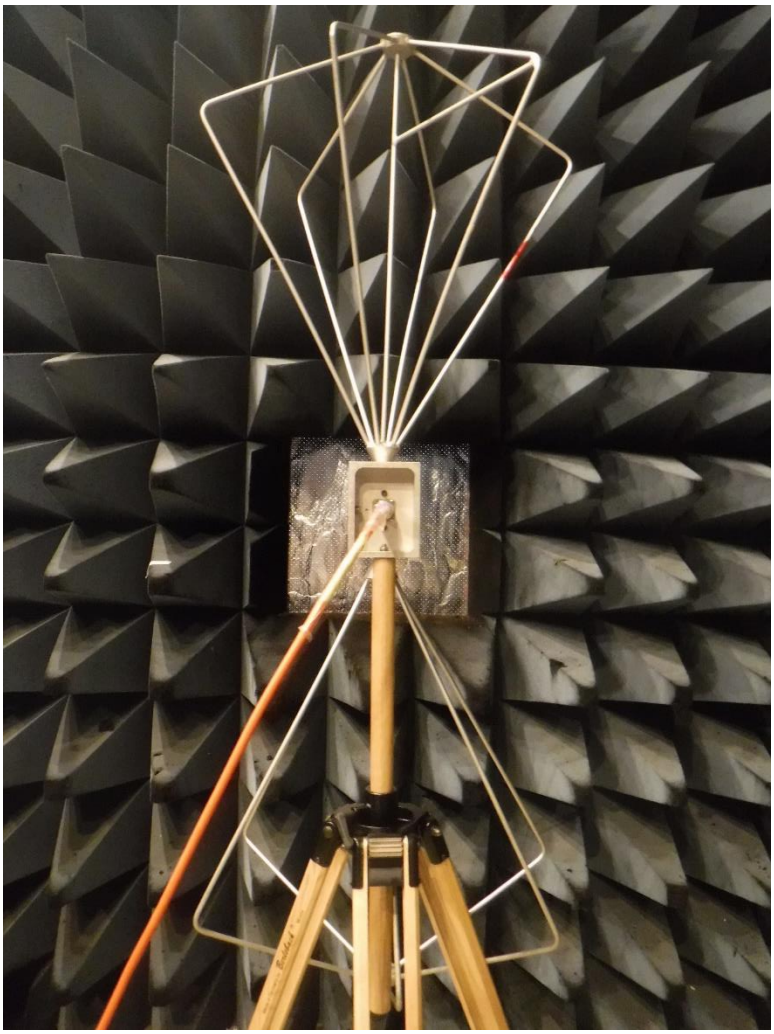

Figure 15: Test Sample (Biconical Vertical Rx)

Figure 16: Test Sample (Biconical Vertical Tx)

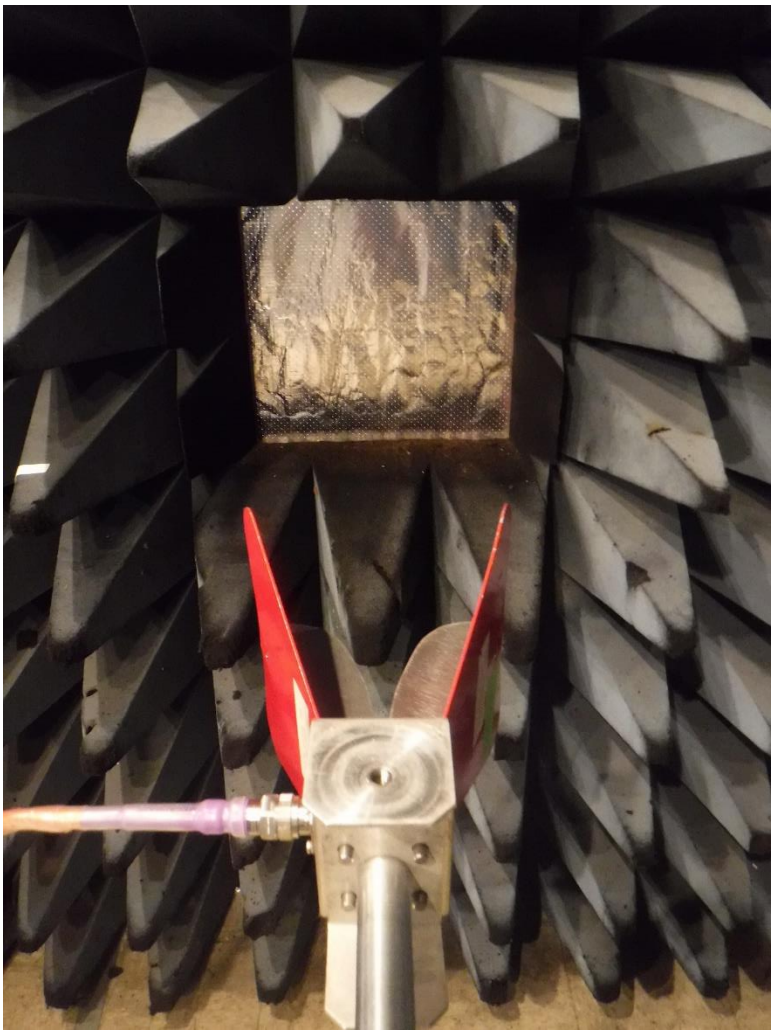

Figure 17: Test Sample (Horn Antenna Horizontal Rx)

Figure 18: Test Sample (Horn Antenna Horizontal Tx)

Figure 19: Test Sample (Horn Antenna Vertical Rx)

Figure 20: Test Sample (Horn Antenna Vertical Tx)

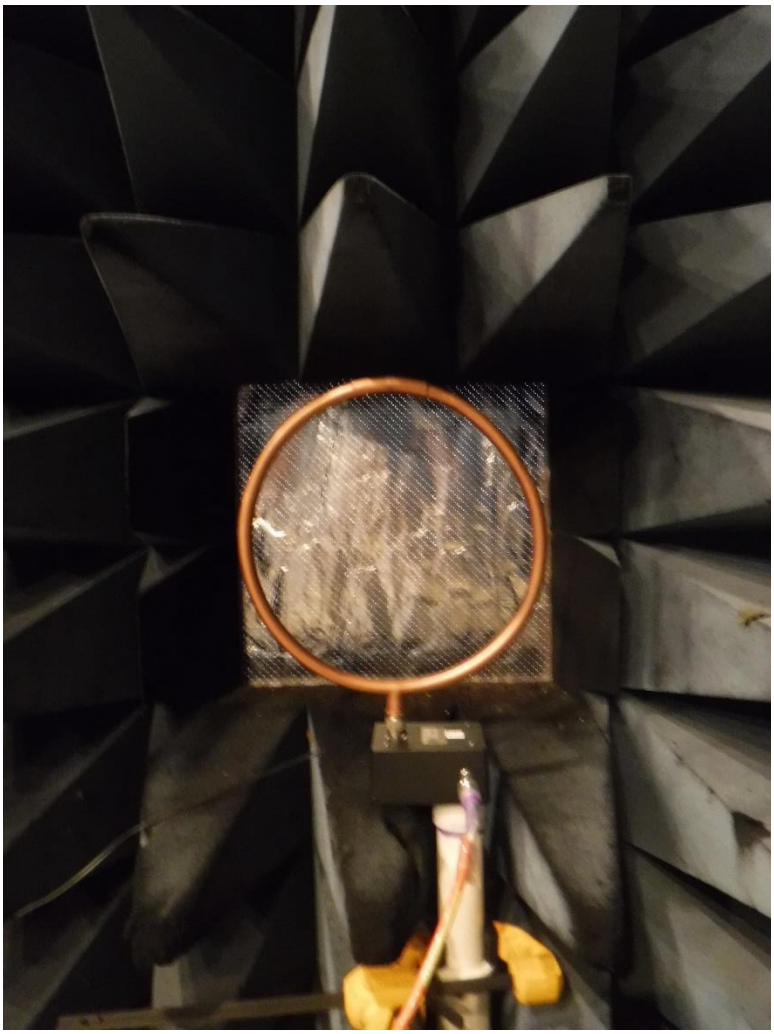

Figure 21: Test Sample (Loop Coaxial Rx)

Figure 22: Test Sample (Loop Coaxial Tx)

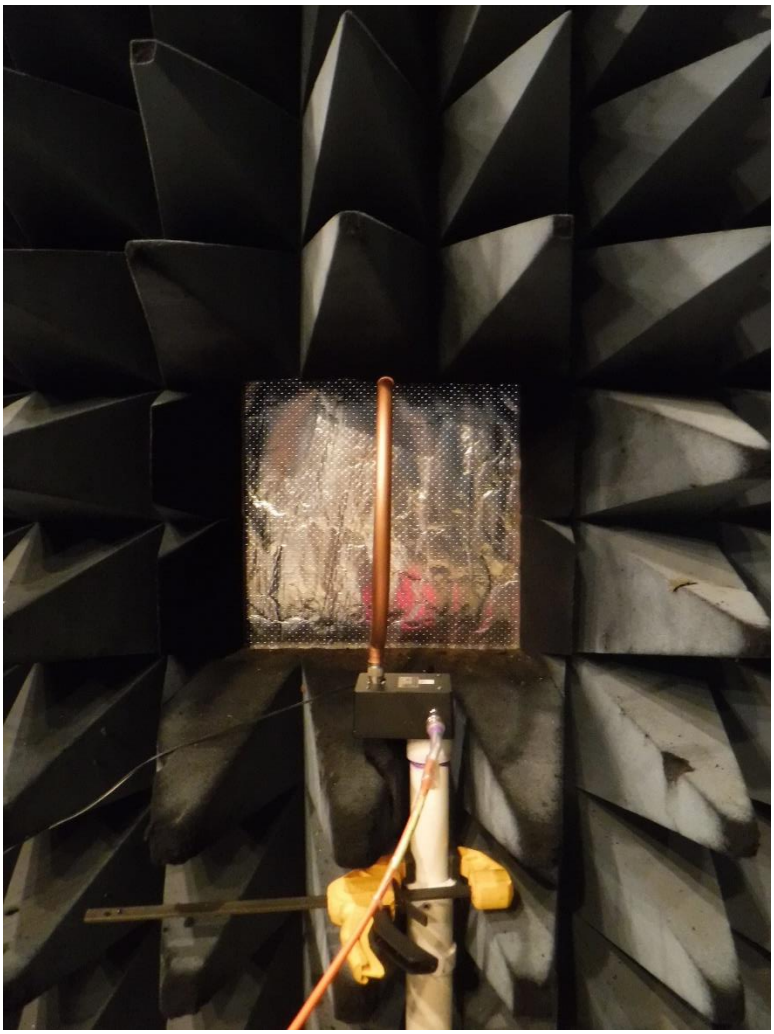

Figure 23: Test Sample (Loop Coplanar Rx)

Figure 24: Test Sample (Loop Coplanar Tx)

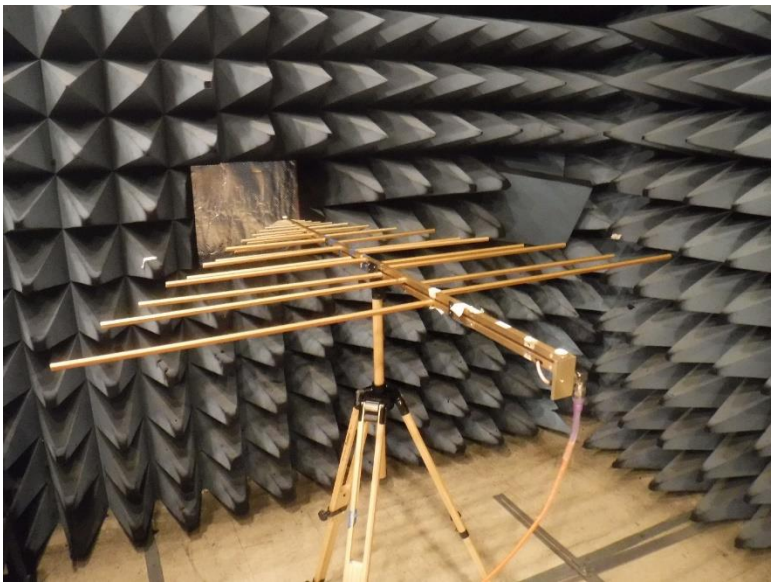

Figure 25: Test Sample (LPA Horizontal Rx)

Figure 26: Test Sample (LPA Horizontal Tx)

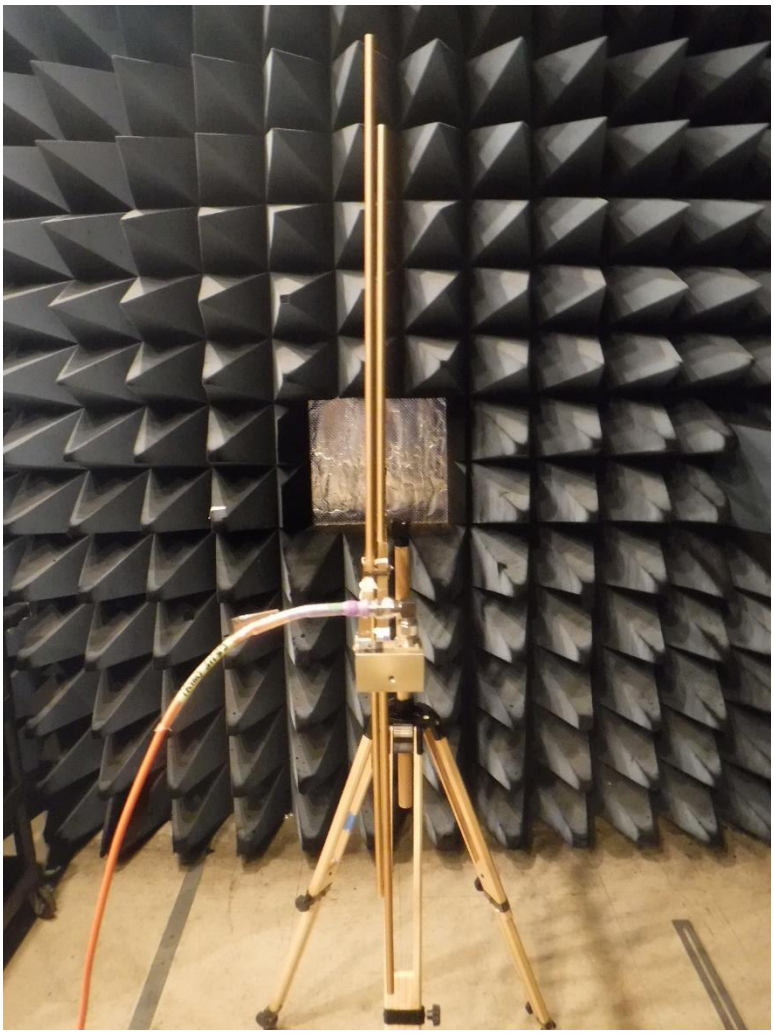

Figure 27: Test Sample (LPA Vertical Rx)

Figure 28: Test Sample (LPA Vertical Tx)

Figure 29: Test Sample Mounted (Rx Side)

Figure 30: Test Sample Mounted (Tx Side)

B. Test Equipment

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

MET #	EQUIPMENT	MANUFACTURER	MODEL#	CAL DATE	CAL DUE
1T8836	ANTENNA (ACTIVE 12" LOOP)	A.H. SYSTEMS	SAS-563P	FUNCTIONALLY VERIFIED	
1T8837	ANTENNA (ACTIVE 12" LOOP)	A.H. SYSTEMS	SAS-563B	FUNCTIONALLY VERIFIED	
1T4701	ANTENNA, BICONICAL	ETS-LINDGREN	3109	FUNCTIONALLY VERIFIED	
1T2658	ANTENNA; BICON	EMCO	3109	03/04/2020	09/04/2021
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	FUNCTIONALLY VERIFIED	
1T4757	ANTENNA; HORN	ETS-LINDGREN	3117	06/29/2020	12/29/2021
1T8372	LOG PERIODIC ANTENNA	A.H.SYSTEMS, INC.	SAS-517	FUNCTIONALLY VERIFIED	
1T8373	LOG PERIODIC ANTENNA	A.H. SYSTEMS, INC.	SAS-517	FUNCTIONALLY VERIFIED	
1T4710	SIGNAL GENERATOR	HP	8648D	07/01/2020	01/01/2022
1T4739	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	N5183A	09/16/2019	09/16/2021
1T4681	SPECTRUM ANALYZER (PSA)	AGILENT TECHNOLOGIES	E4448A	04/07/2020	10/07/2021
1T8854C	RF CABLE	MEGAPHASE	CAGE1GVT4	FUNCTIONALLY VERIFIED	
1T8854D	RF CABLE	MEGAPHASE	CAGE1GVT4	FUNCTIONALLY VERIFIED	

Table 3. Test Equipment

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

End of Test Report