

Shielding Effectiveness Test Report

Project Number: 5008285

Proposal Number: SUW-202301004001

Report Number: 5008285EMC01

Revision Level: 0

Client: V Technical Textiles Inc.

Equipment Under Test: Portable RF Shielded Enclosure

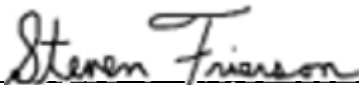
Model Name: 81797T

Applicable Standards: IEEE 299

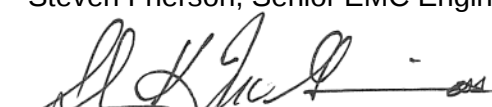
Report issued on: March 10, 2023

Test Result: Comparative

Tested by:


Steven Frierson, Senior EMC Engineer

Reviewed by:


Shawn McGuinness, EMC Engineering Leader

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 General Information

1.1 Client Information

Name: V Technical Textiles Inc
Address: 320 South Main Street
City, State, Zip, Country: Newark, NY 14513, USA

Test Site Location: Same as client address

1.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

1.3 General Information of EUT

Model Name: Portable RF Shielded Enclosure
81797T
Serial Number: 021-0383
Sample Received Date: March 06, 2023
Dates of testing: March 06-07, 2023

1.4 Purpose:

To measure the shielding effectiveness of Electromagnetic Interference (EMI).

Test Method of the shielding effectiveness:

The shielding effectiveness, SE is a parameter for the reduction of EMI at a specific frequency due to a shield and is defined as:

$$SE = 10 \times \log \left(\frac{P_0}{P_t} \right) = 20 \times \log \left(\frac{E_0}{E_t} \right) = 20 \times \log \left(\frac{H_0}{H_t} \right)$$

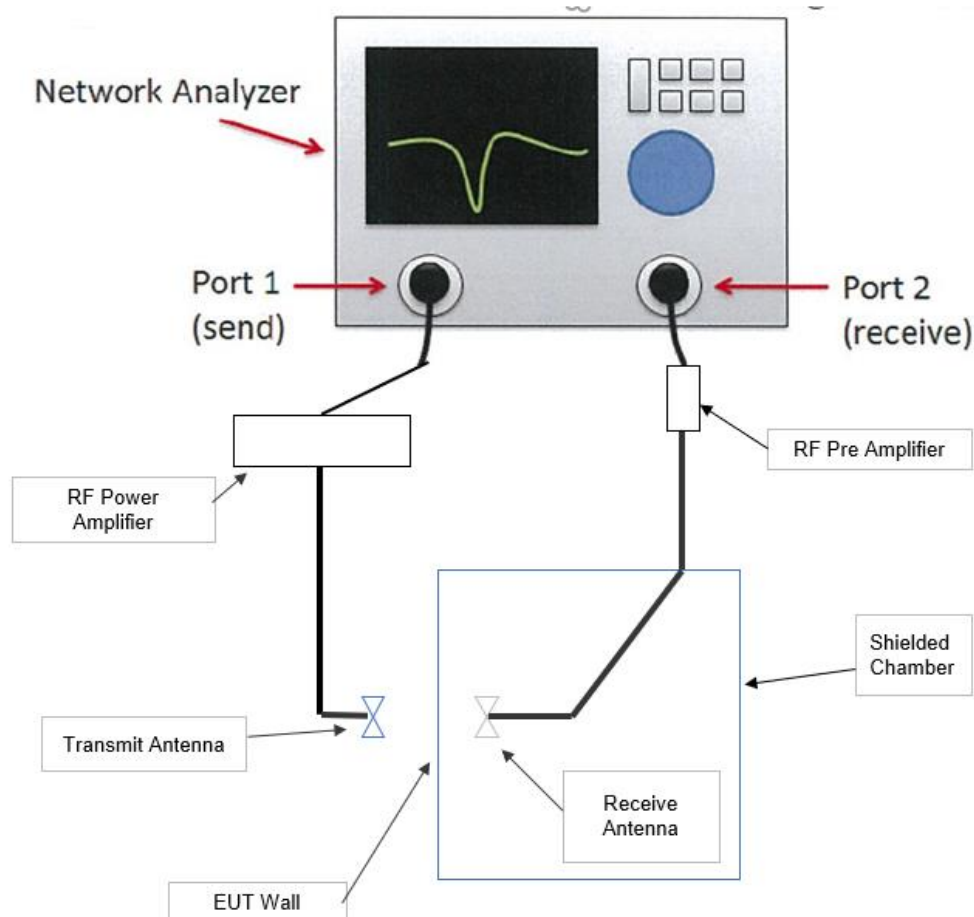
Where P_0 , E_0 and H_0 are the energy, the electric and magnetic field intensity incident on the shield and P_t , E_t and H_t are the counter parts transmitted through the shield.

In this report, the shielding effectiveness (SE) of the test specimen was analyzed using near-field antenna measurement systems. The schematic of measurement system is illustrated in Fig.1, which consisted of a vector network analyzer and a pair of antennas. The test specimen was placed symmetrically in the path of radiation between the send and the receive antennas. Calibration of the system was carried out before each test to adjust changes in the calibration level and ambient conditions. The SE of the test specimen can be estimated by measuring the signal reached from port 1 to port 2.

Summary of the test procedure:

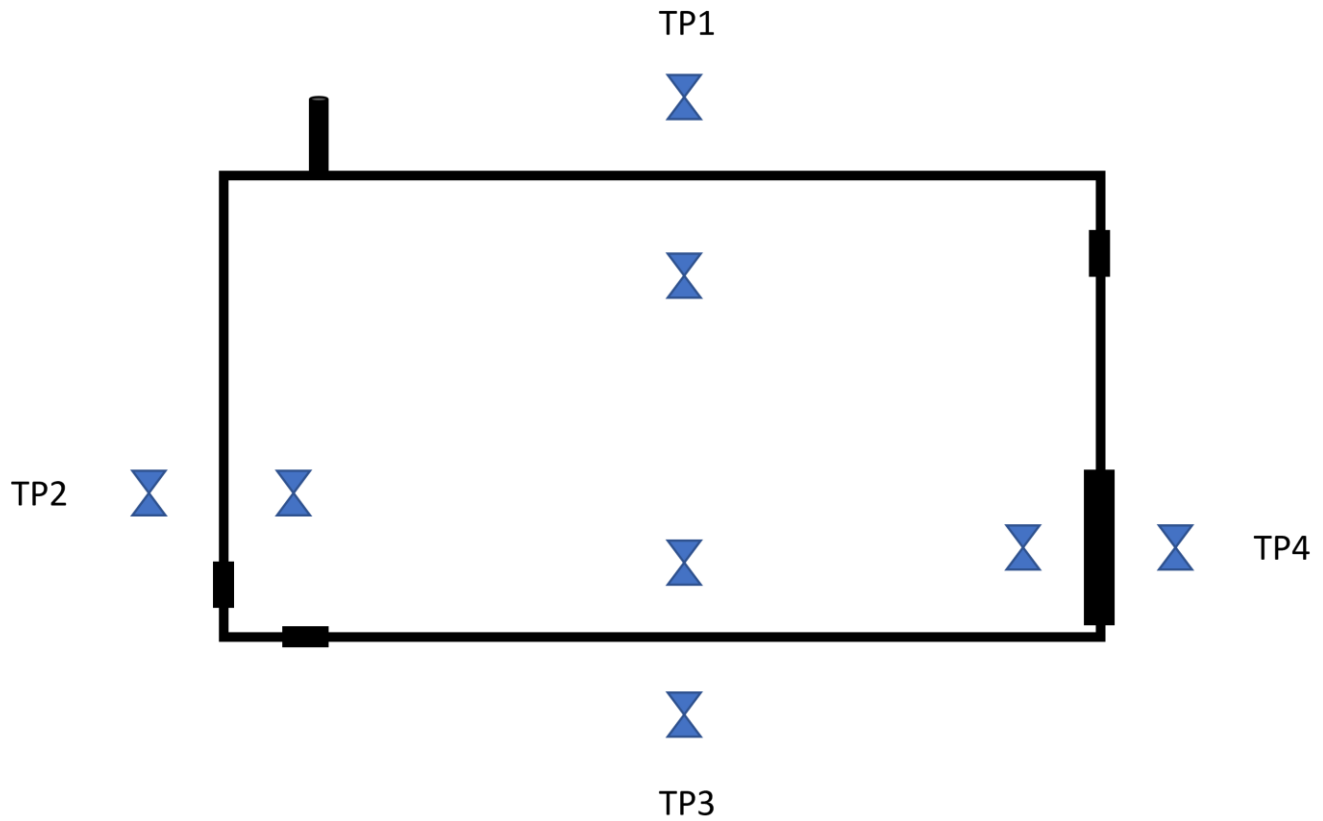
1. Calibrate signal level and ambient noise of the free space measurement.
2. Insert the test specimen in between the antenna pair.
3. Perform the measurement of the shielding effectiveness by a Spectrum Analyzer and Signal Generator and a Vector Network Analyzer.

1.5 EUT Connection Block Diagram



Note: In cases where the Signal Generator and Spectrum Analyzer were used for testing the above illustrated Network analyzer is substituted with the Signal Generator and Spectrum Analyzer.

Test Point Locations



Electromagnetic Interference (EMI) Shielding Electromagnetic wave Adsorption and Shielding Effectiveness Report

1.6 Test Method

The Spectrum Analyzer/Signal Generator and VNA were programmed to transmit across the appropriate frequency range.

Transmit power emits from one side and receives on the other side of the EUT. The transmit power is measured in free space before placing the EUT in the transmit path. Delta between free space and EUT is the shielding effectiveness.

1.7 Test Site

V Technical Textiles Inc, Newark NY, USA

1.8 Test Equipment

Test End Date: 7-Mar-2023

Tester: SF

Description	Manufacturer	Model	Serial No.	Cal. Due
Spectrum Analyzer	Hewlett Packard	8564E	3442A00245	14-Feb-2024
Signal Generator	Rohde & Schwarz	SMP04	DE33813	14-Feb-2024
Preamplifier	The EMC Shop	PA18G-HA	1323	23-Jun-2023
Preamplifier	The EMC shop	PA40G	18752-01	17-Feb-2025
RF Amplifier	Hewlett Packard	8349B	2644A01939	UWCE
RF Amplifier	Plus Advanced Communica	AMP4037	10005	UWCE
DRG Horn Antenna	EMCO	3115	2436	UWCE
DRG Horn Antenna	EMCO	3115	2434	7-Apr-2024
DRG Horn Antenna	ETS Lindgren	3116	26390	2-May-2024
DRG Horn Antenna	EMCO	3160-08	1147	UWCE
Software, Tile (Version 3.4.k.6)	Quantum Change	None	None	UWCE
Laptop	Dell	E6420	9J3LDS1	N/A
(4x) GPIB to USB Adapters	National Instruments	GPIB-USB-HS & GPIB-USB-B	E3B81 ; 109FB	N/A
Fiber Extender Set	Black Box	--	404A-06R-A091	N/A
(2x) Fiber (Comms) Cables	--	--	--	N/A
(2x) GPIB Cables	--	--	--	N/A
(12x) RF Coax Cables	--	--	--	N/A
(12x) RF Connector/Adaptors	--	--	--	N/A
(2x) Tripods	--	--	--	N/A
(2x) Carts	--	--	--	N/A
(2x) Tape Measures	--	--	--	N/A
(8x) Power Cables	--	--	--	N/A
(4x) Power Strips	--	--	--	N/A
VECTOR NETWORK ANALYZER	S5243	COPPER MOUNTAIN	23001	17-Jan-2024
VECTOR NETWORK ANALYZER	S5180	COPPER MOUNTAIN	19012	19-Oct-2023

Note: The calibration period equipment is 1 year.

1.9 Test Setup Photographs

1-18 GHz Calibration



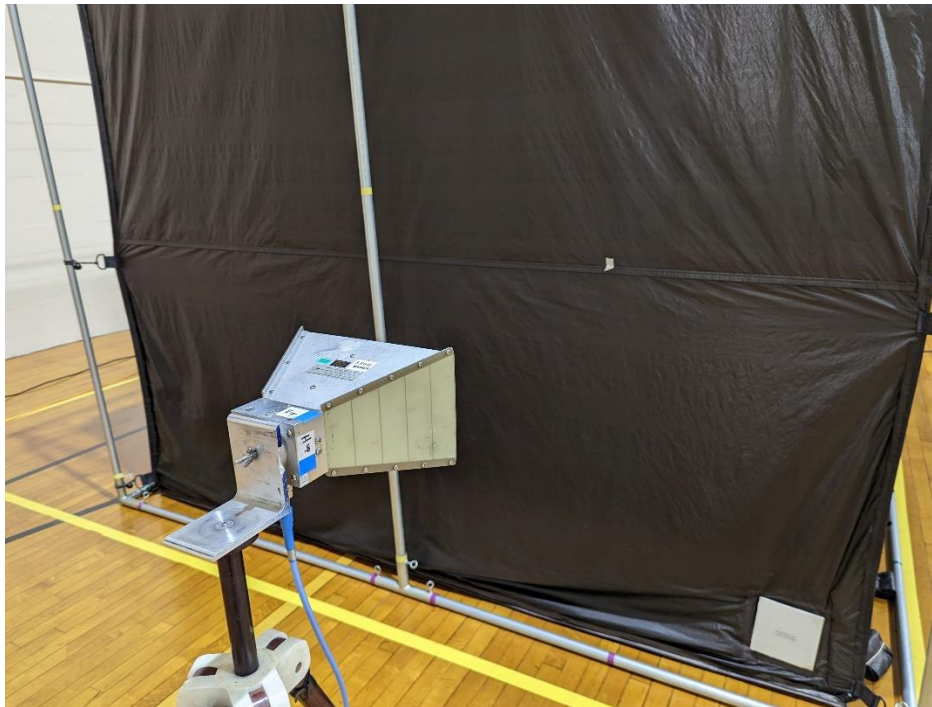
18-40 GHz Calibration



Test Point 1



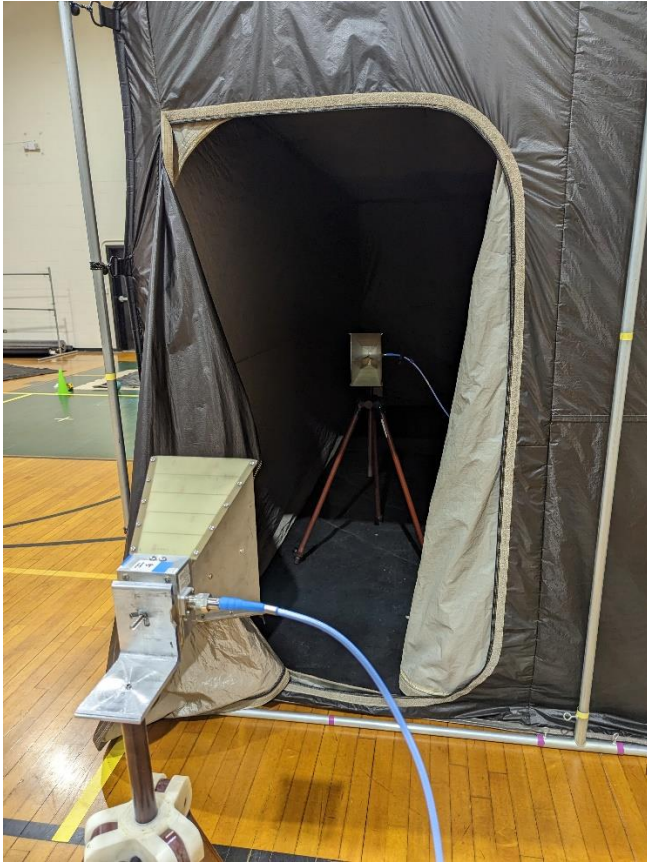
Test Point 2



Test Point 3

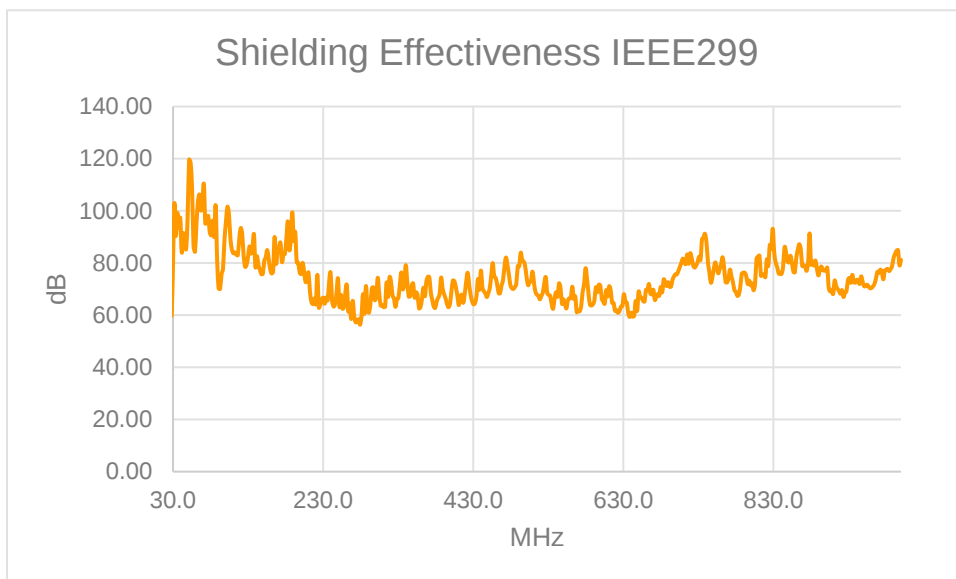


Test Point 4

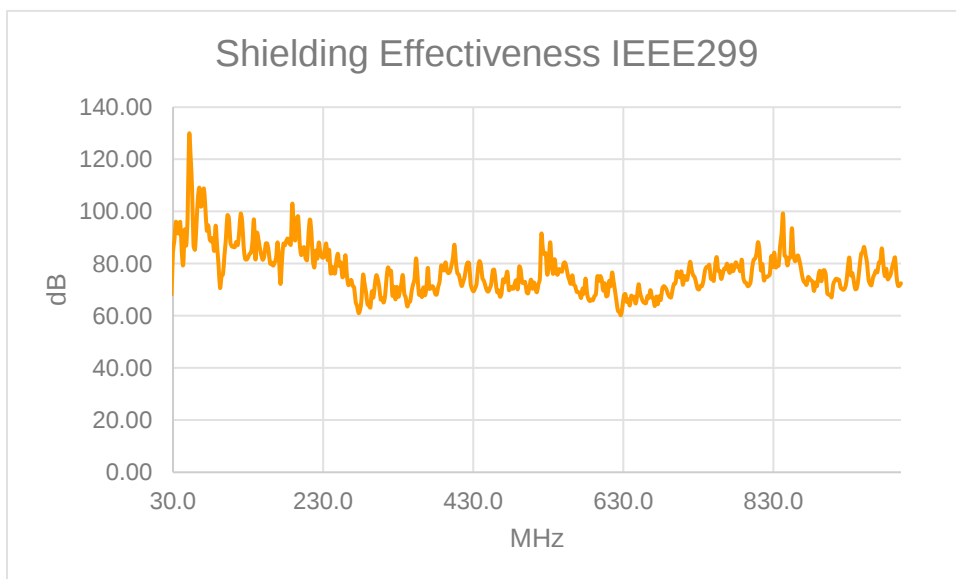


1.10 Test Data

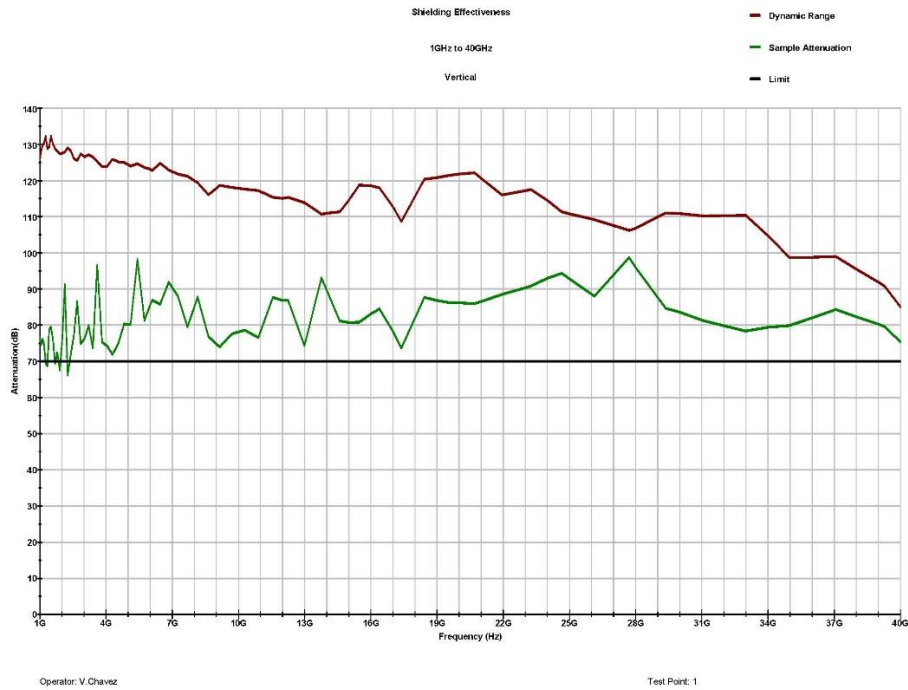
Test Position 1, 30-1000 MHz Vertical



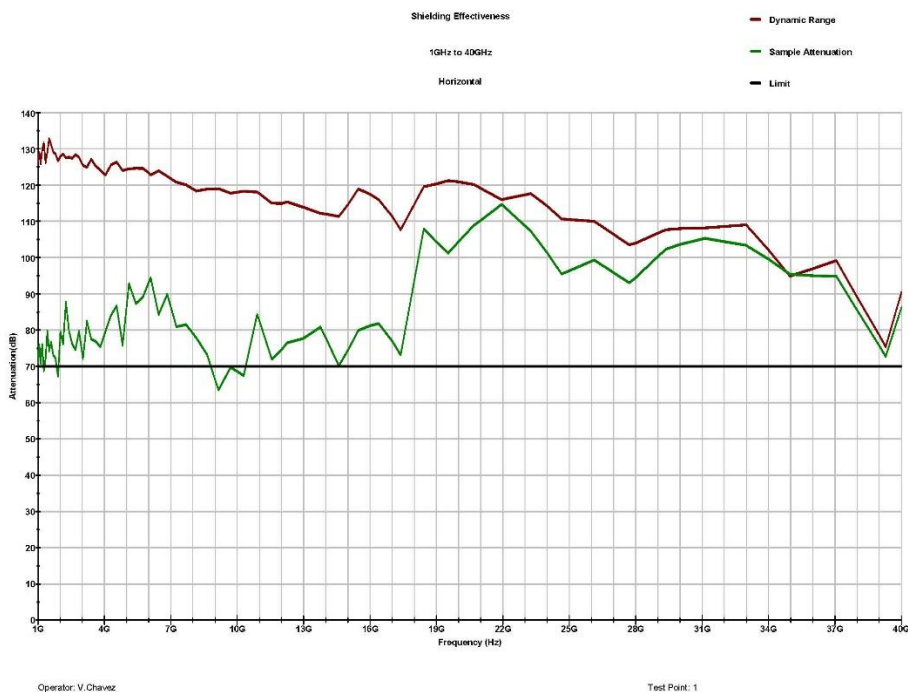
Test Position 1, 30-1000 MHz Horizontal



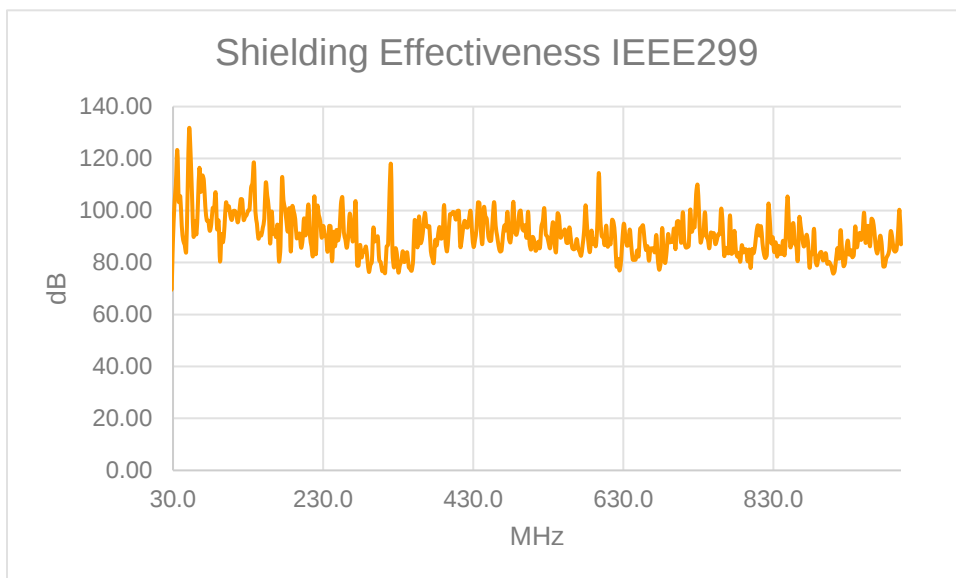
Test Position 1: 1,000 – 40,000 MHz Vertical



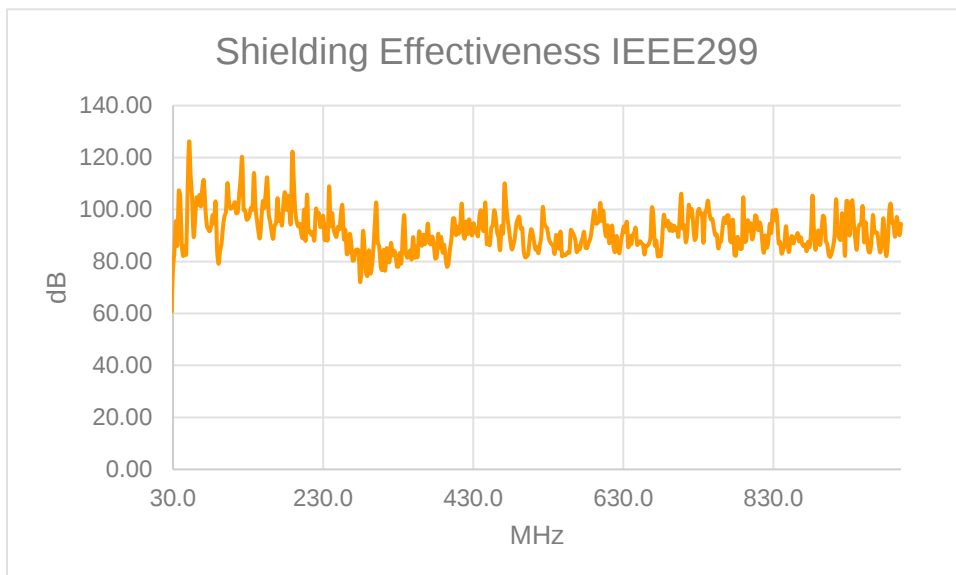
Test Position 1: 1,000 – 40,000 MHz Horizontal



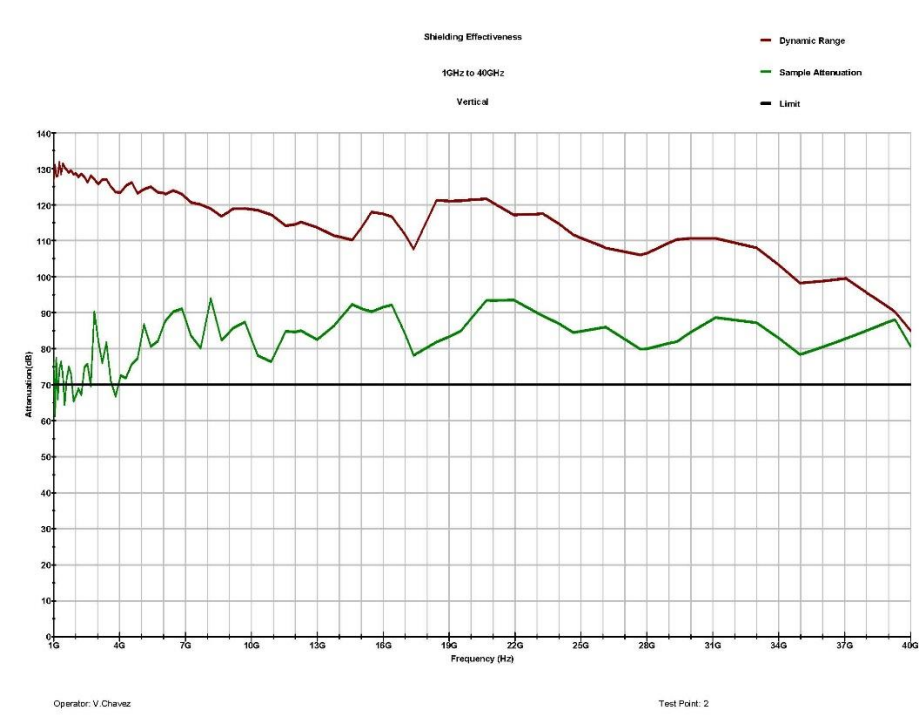
Test Position 2, 30-1000 MHz Vertical



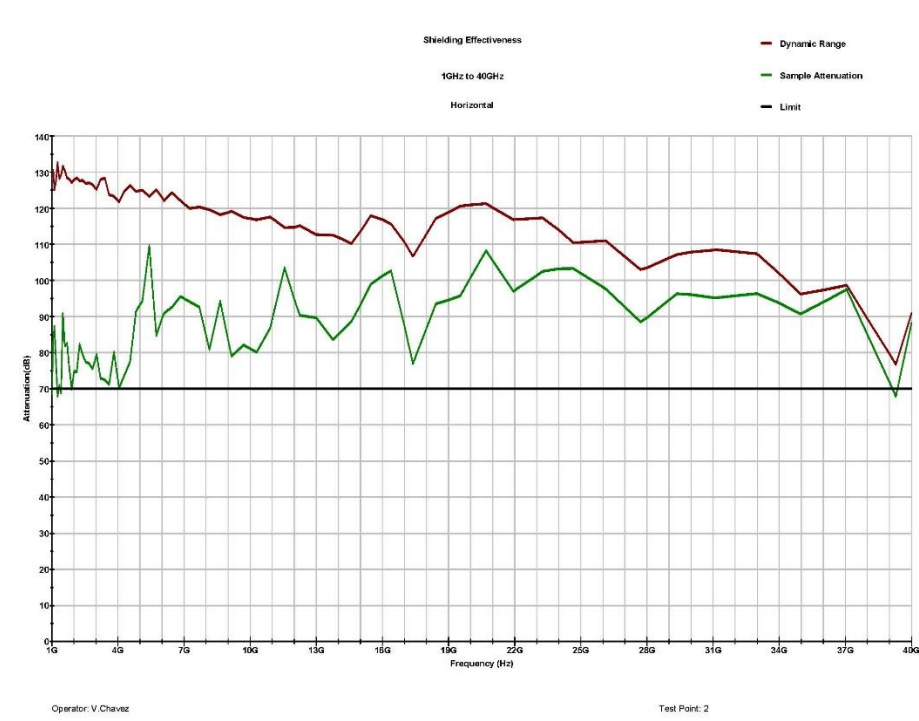
Test Position 2, 30-1000 MHz Horizontal



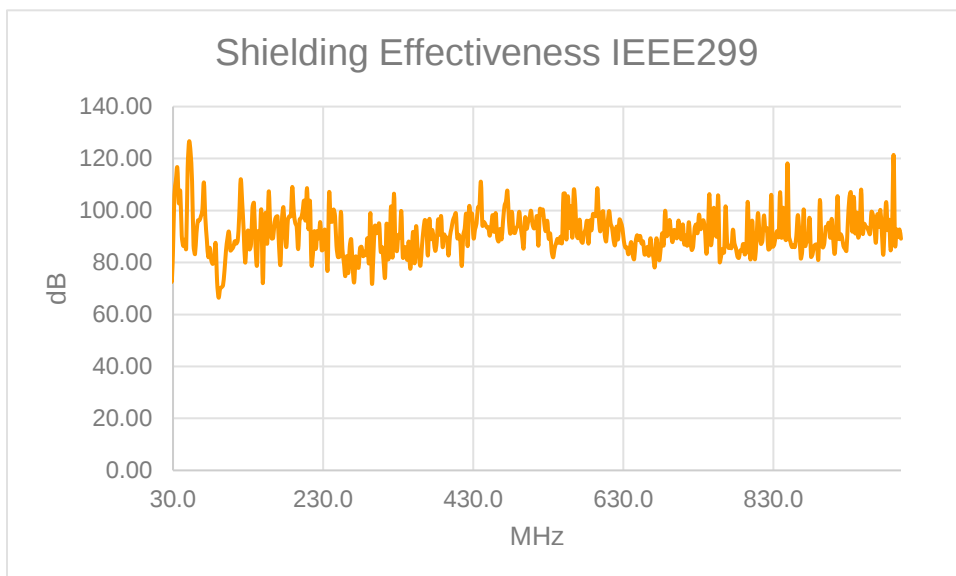
Test Position 2: 1,000 – 40,000 MHz Vertical



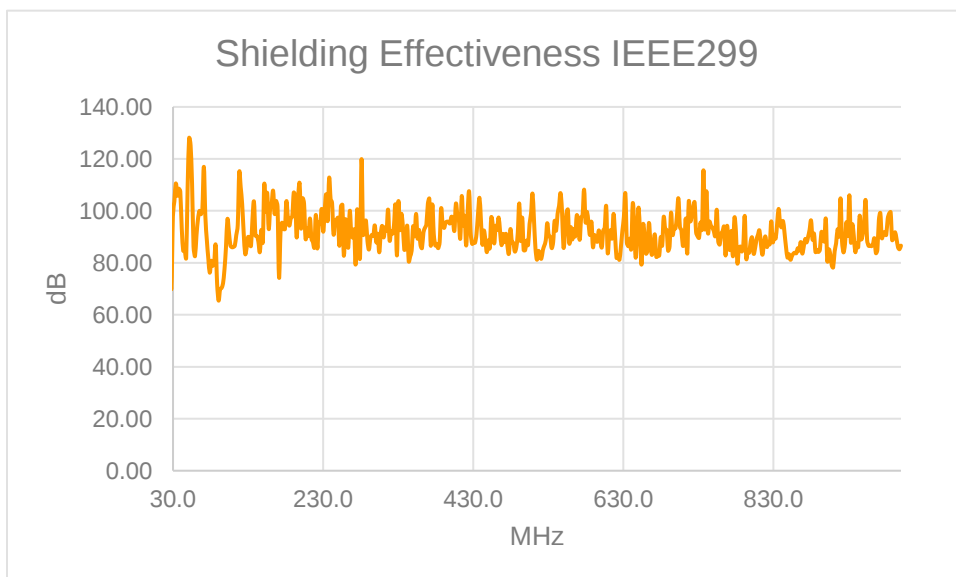
Test Position 2: 1,000 – 40,000 MHz Horizontal



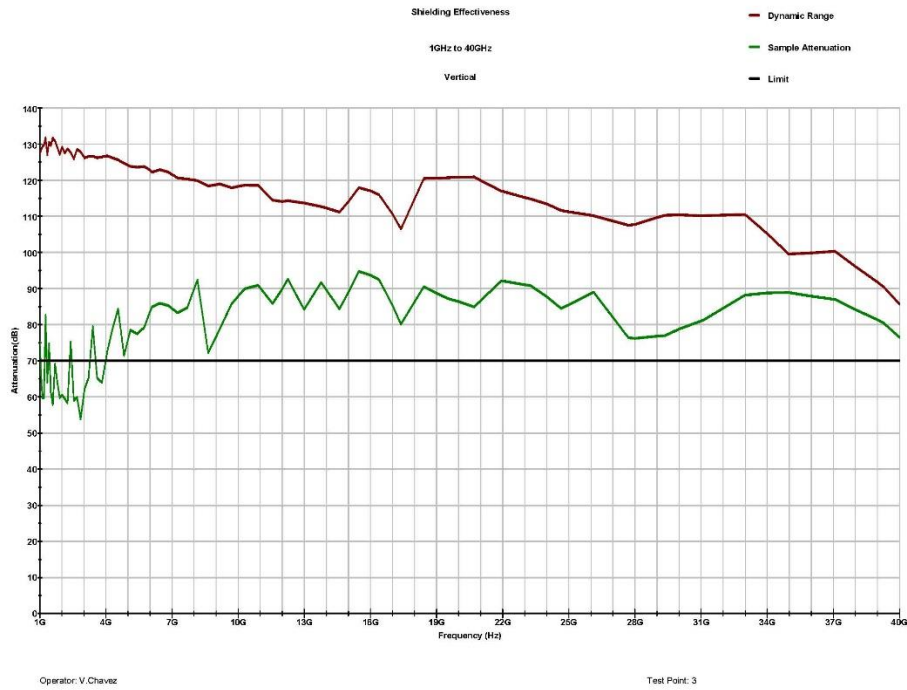
Test Position 3, 30-1000 MHz Vertical



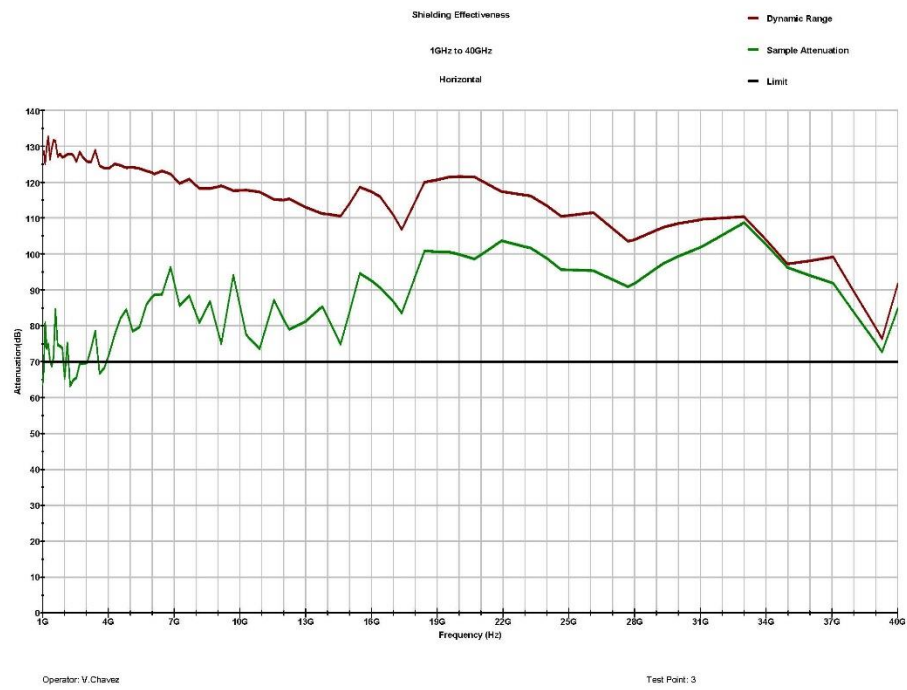
Test Position 3, 30-1000 MHz Horizontal



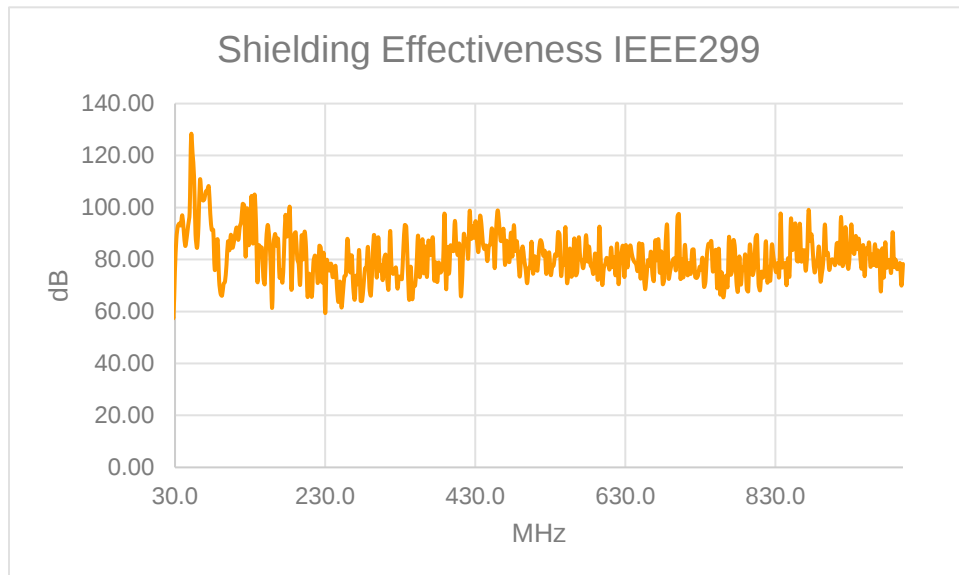
Test Position 3: 1,000 – 40,000 MHz Vertical



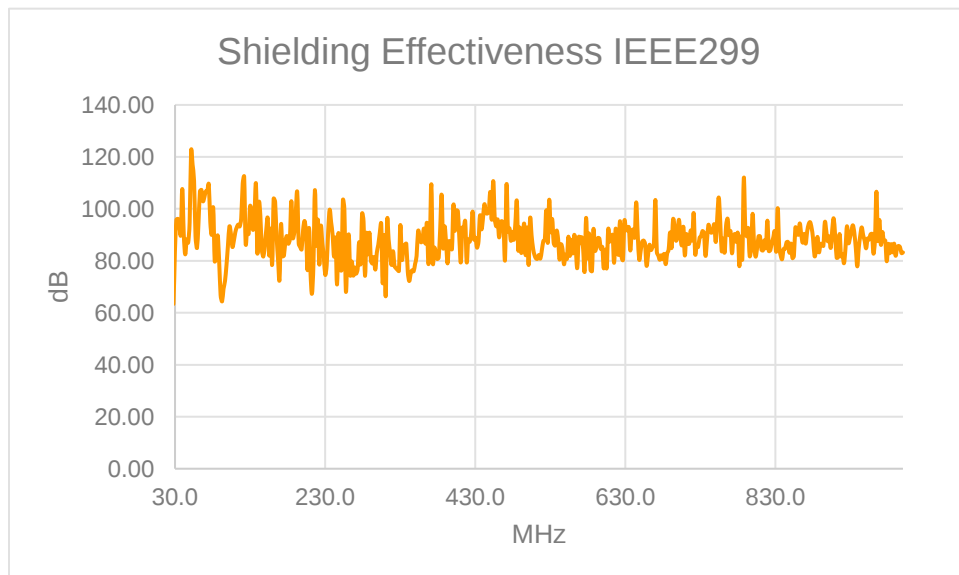
Test Position 3: 1,000 – 40,000 MHz Horizontal



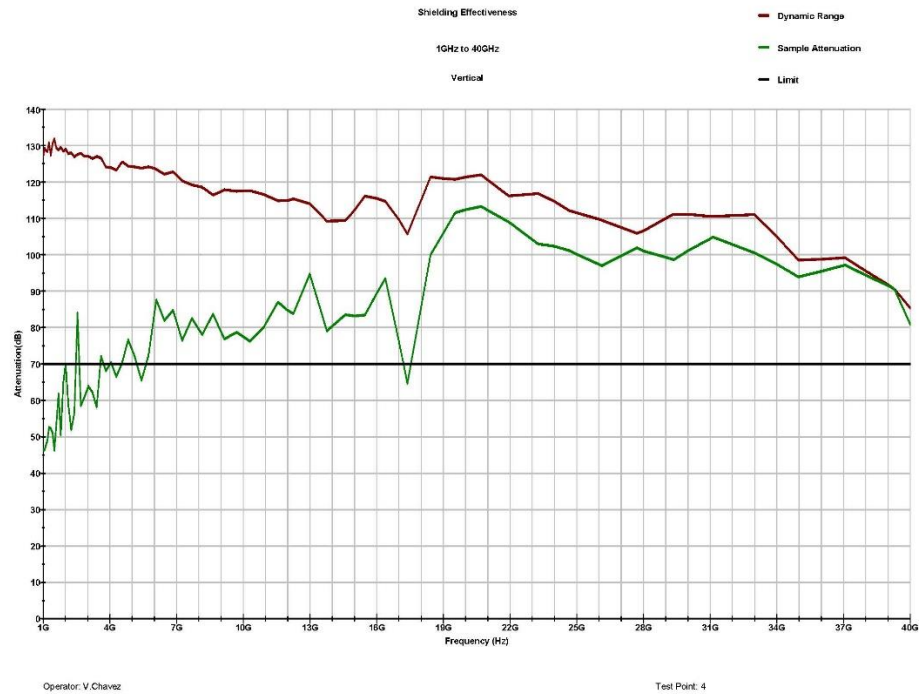
Test Position 4, 30-1000 MHz Vertical



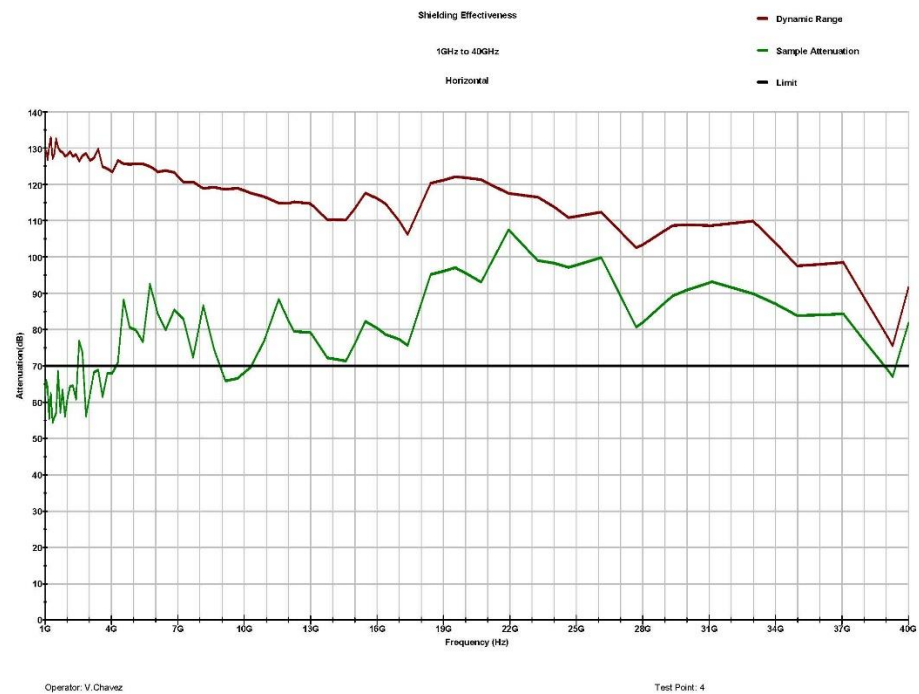
Test Position 4, 30-1000 MHz Horizontal



Test Position 4: 1,000 – 40,000 MHz Vertical



Test Position 4: 1,000 – 40,000 MHz Horizontal



2 Revision History

Revision Level	Description of changes	Revision Date
DRAFT	--	March 13, 2023
0	Initial Release	