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Report On

RF Exposure MPE Evaluation
Viableware, Inc. (DBA TableSafe)
Model: TS-CS10

FCC Part 1.1310 and Part 2.1091
KDB 680106 D01 V02

Report No. RD72128524.400 **November 2017**

TÜV SÜD America Inc., 2320 Presidential Drive Ste. 101, Durham, NC 27703
Tel: (919) 381-4235. Website: www.TUVamerica.com

REPORT ON	RF Exposure MPE Evaluation Viableware, Inc. Model: TS-CS10 FCC ID: 2AAUJ-C001
TEST REPORT NUMBER	RD72128524.400
REPORT DATE	November 17, 2017
PREPARED FOR	Viableware, Inc. 12220 - 113th Ave, NE Suite 210 Kirkland, WA 98034
CONTACT PERSON	Joshua Pederson Hardware Program Manager 206-516-6108 jpederson@tablesafe.com
PREPARED BY	**Randle Sherian** Title: EMC Lab Manager, RTP
APPROVED BY	**Jean Tezil** Title: Wireless Test Engineer
DATED	November 17, 2017

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Revision History

Report Number: RD72128524.400 Client Name: Viableware, Inc. Client Model: TS-CS10					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
November 17, 2017	Initial Release	.400			J. Tezil

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SECTION 1

INTRODUCTION

1.1 INTRODUCTION

The information contained in this report is intended to show conformance of the Viableware Inc model TS-CS10 to the requirements of the FCC Part 1.1310, Part 2.1091 and KDB 680106 D01 v02 which provides the exposure limits and test procedure.

Objective	To perform magnetic and electric field strength measurements to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Viableware, Inc.
Model Name	Rail Charger
Model Number(s)	TS-CS10
Serial Number(s)	Sample #19
Number of Samples Tested	1
Date sample(s) received	March 21, 2017
Highest Frequency Generated or Used	132kHz
Input Voltage Used/Verified	120VAC/60Hz
Test Specifications	KDB 680106 D01 v02
Test Start Date	November 13, 2017
Test End Date	November 14, 2017
Name of Engineer(s)	Jean Tezil
Related Document(s)	None

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with standards listed in Section 1.1 is shown below.

Emissions Product Standards			
Standard	Test Description	Test Level/Limits	Results
FCC Part 1.1310	Electric Field	614 V/m	Pass
FCC Part 1.1310	Magnetic Field	1.63 A/m	Pass

1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The TS-CS10 is comprised of 10 wireless charging ports. It is based on the Qi standard, version 1.0.2 for wireless power transfer, a loosely coupled inductive charging system. The dock contains transmitter design A1 of the Qi specification which is basically a series loaded LC resonant half bridge converter which operates within 110kHz to 205kHz to provide 5W of power to the receiver circuit. Due to the nature of the LC resonance, a quasi-sinusoidal current waveform is induced in the receiver coil, which is full-wave rectified. This power is then used to feed the battery charger. The whole system can be seen as a 'smart transformer' with loosely coupled primary and secondary windings.

The transmitter and receiver communicate by modulating the power signal with a specific protocol to monitor energy transmission to achieve a target system efficiency and thus control the power transmitter using PWM signals. Both transmitter and receiver are capable of measuring power and thus perform various system control strategies, e.g. efficiency, foreign object detection and fault detection.

Photo 1.3.1-1 - Front View

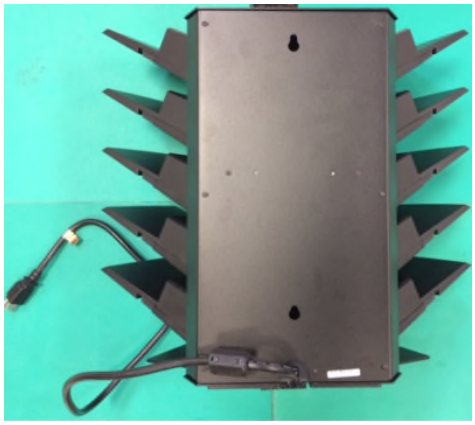


Photo 1.3.1-2 - Rear View

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	A RAIL with a discharged battery (10 each) were installed into each wireless charging pad slot of the EUT to produce maximum output charge state which is worst-case. All 10 wireless charging pads were actively charging at the same time during the evaluation.

1.4.2 EUT Exercise Software

No special software was used as the EUT was tested in a normal operating mode.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
TableSafe, Inc	Equipment	EUT
TableSafe, Inc	Equipment	Test RAILS with discharged battery.
N/A	Cable	Power Cable

1.4.4 Simplified Test Configuration Diagram

As the EUT was tested in a standalone fashion, a connection diagram was not necessary.

1.5 MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMITS

1.5.1 FCC Part 1.1310 MPE Limits

In accordance with FCC Part 1.1310, the limits are as follows:

Table 1.5.1-1 –FCC Part 1.1310 Limits

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*($900/f^2$)	6
30-300	61.4	0.163	1.0	6
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the standard were taken.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted in accordance with KDB 680106 D01 v02 guidance document.

The H-Field and E-Field field strength were measured at a separation distance of 10cm from the probe to the EUT. The measurements were made on all sides which come into close contact to the user. See section 2.2.9 for photos identifying the sides. During testing, the probe was slowly maneuvered on each side maintaining the 10cm distance to capture the peak emissions.

For H-Field measurements, a Narda EHP-200AC magnetic probe was used. The frequency response was set to 9kHz – 30 MHz. Scans were performed and the peak measurement was recorded in A/m for each side of the EUT.

For E-Field measurements, a a Narda EHP-200AC E-Field probe was used. The frequency response was set to 9kHz – 30 MHz. Scans were performed and the peak measurement was recorded in V/m for each side of the EUT.

See section 1.4 for mode and configuration of the EUT during testing.

1.8 TEST FACILITY

1.8.1 FCC – Site Registration

The TUV SUD America Inc. (Durham), test facility has been registered with the Federal Communication Commission as an ISO/IEC 17025 accredited test laboratory and assigned the designation number US1921.

1.8.2 Canadian ISED Site Registration

The TUV SUD America Inc. (Durham), test facility has been registered with Innovation, Science and Economic Development Canada and assigned the site number 20446.

SECTION 2

FIELD STRENGTH TEST DETAILS

2.1 FIELD STRENGTH LEVEL

2.1.1 Specification Reference

KDB 680106 D01 v02

2.1.2 Test Methodology

Per KDB 680106 D01 v02

2.1.3 Test Limits

Limits described in Section 1.5.1 of this test report.

2.1.4 Equipment Under Test and Modification State

Serial No: Sample #19/ Default Test Configuration

2.1.5 Date of Test/Test Engineer's Initials

November 13, 2017 – November 14, 2017/JT

2.1.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.7 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	38 %

2.1.8 Test Results

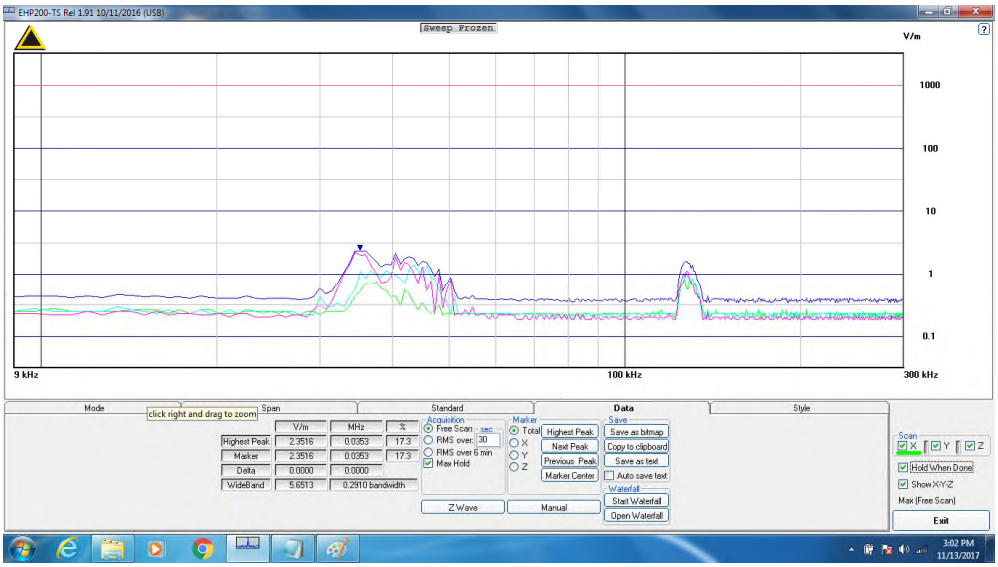
Table 2.1.8-1 – E-Field Measurement Results Summary

Distance	Side A (V/m)	Side B (V/m)	Side C (V/m)	Side D (V/m)	Side E (V/m)	Side F (V/m)	Side G (V/m)	Limit (V/m)	Results
10cm	4.76	5.49	5.19	5.66	4.86	5.20	5.15	614.00	Pass

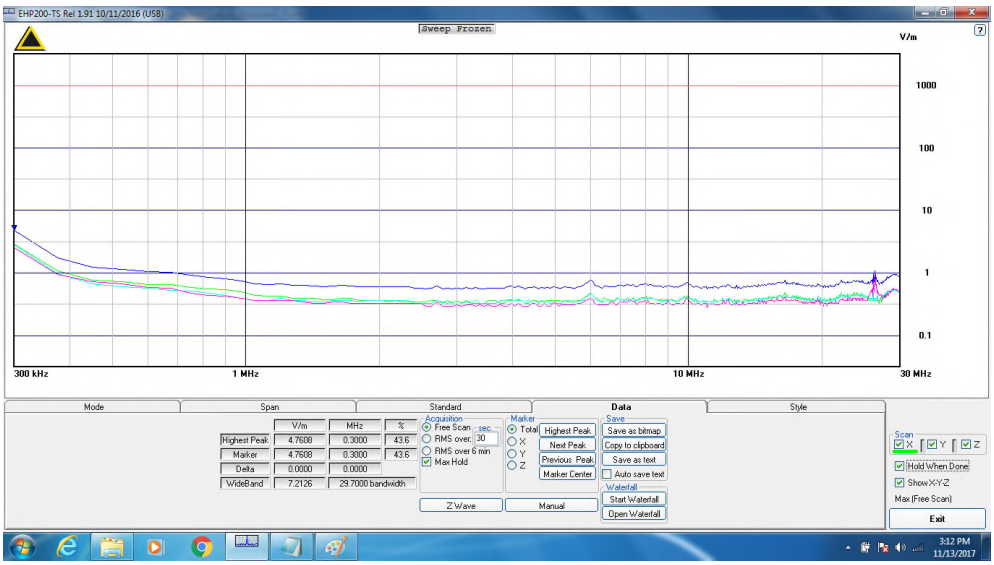
Table 2.1.8-2 – H-Field Measurement Results Summary

Distance	Side A (A/m)	Side B (A/m)	Side C (A/m)	Side D (A/m)	Side E (A/m)	Side F (A/m)	Side G (A/m)	Limit (A/m)	Results
10cm	0.39	0.21	0.64	0.46	0.50	0.28	1.06	1.63	Pass

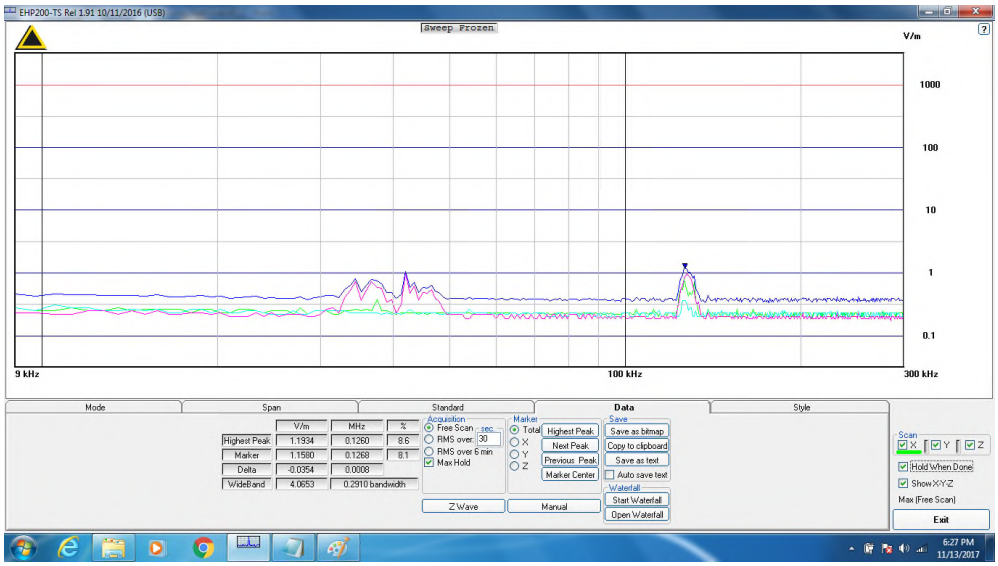
2.1.8.1 Plots



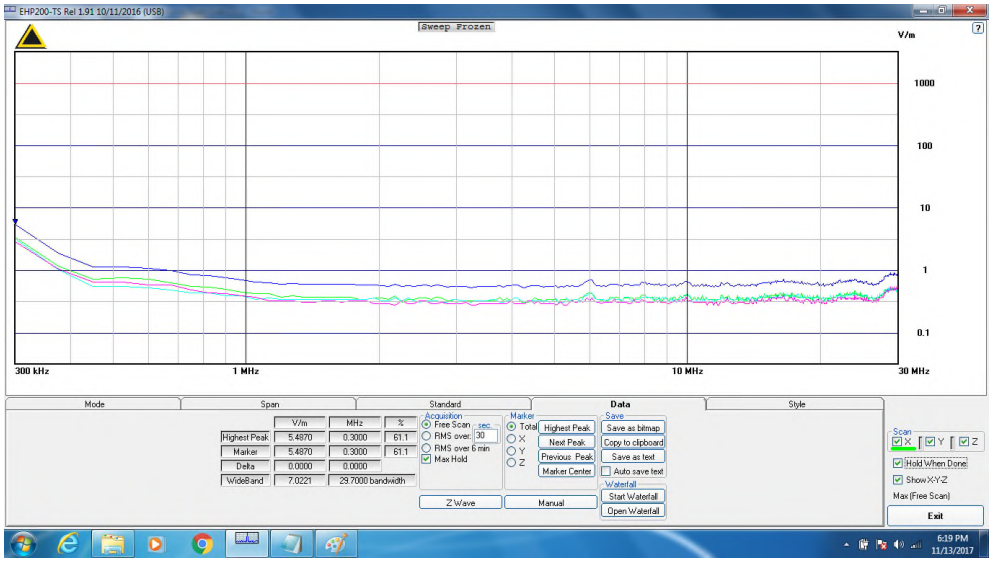
Graph 2.1.8.1-1 – E-Field Side A Plot 9kHz to 300kHz



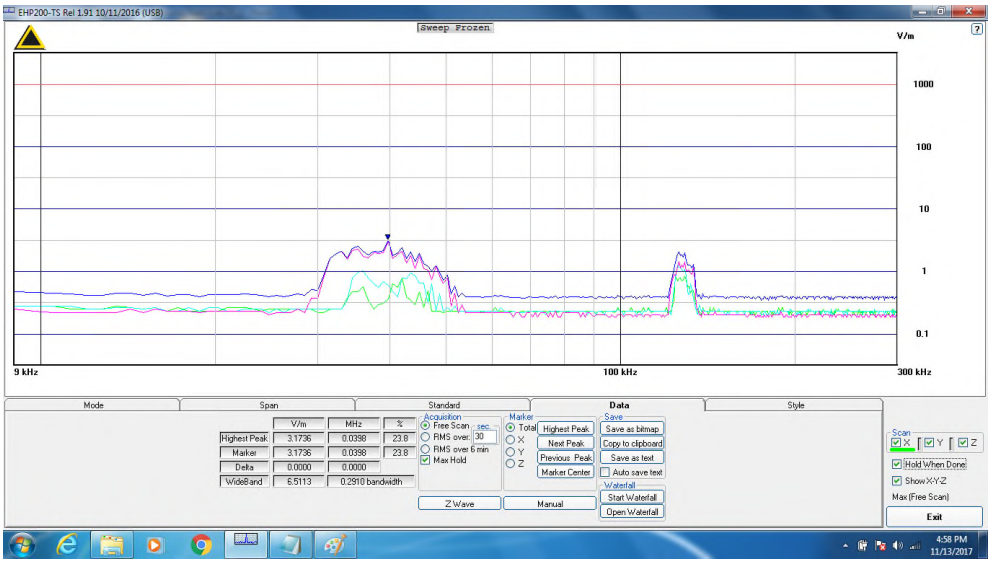
Graph 2.1.8.1-2 – E-Field Side A 300kHz to 30MHz



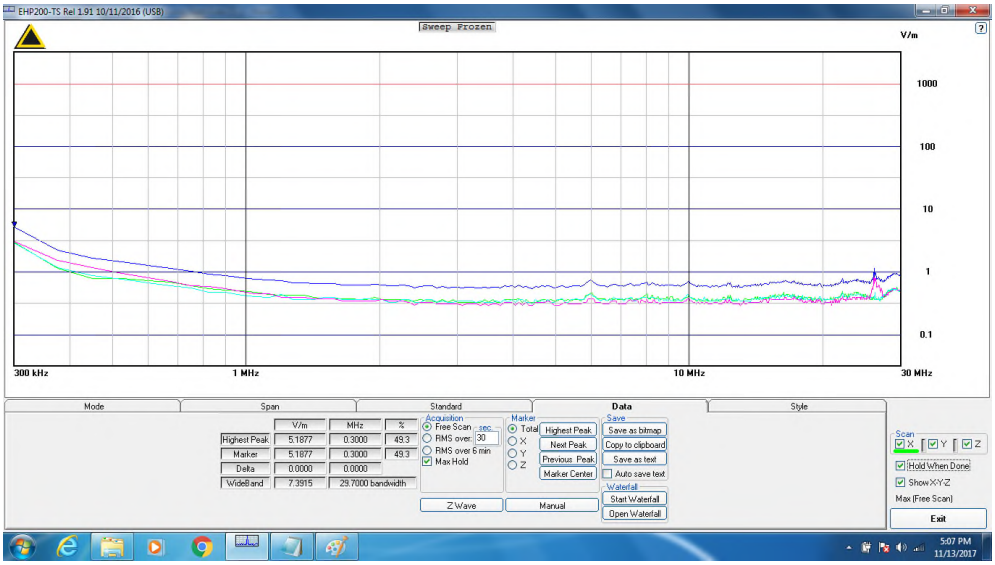
Graph 2.1.8.1-3 – E-Field Side B Plot 9kHz to 300kHz



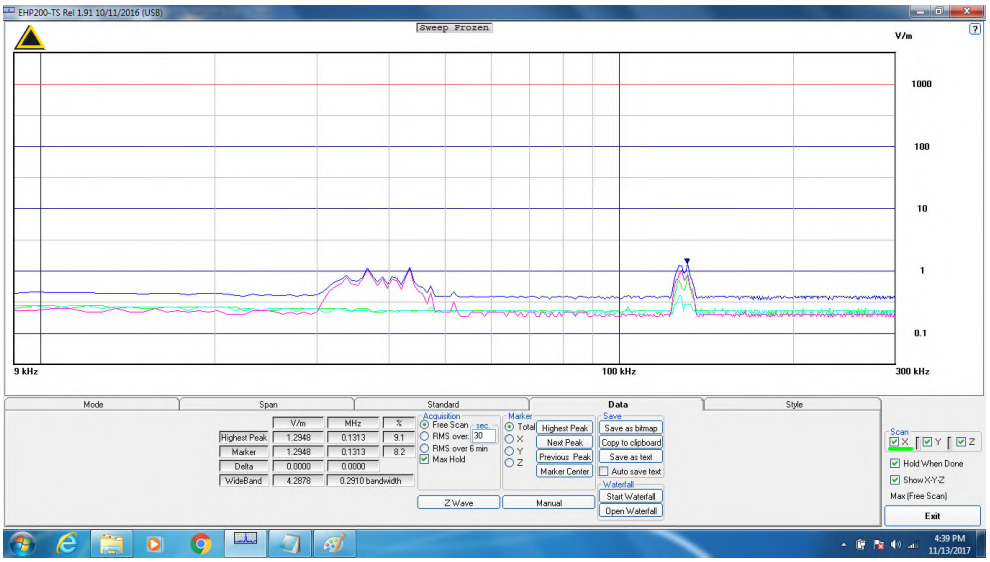
Graph 2.1.8.1-4 – E-Field Side B 300kHz to 30MHz



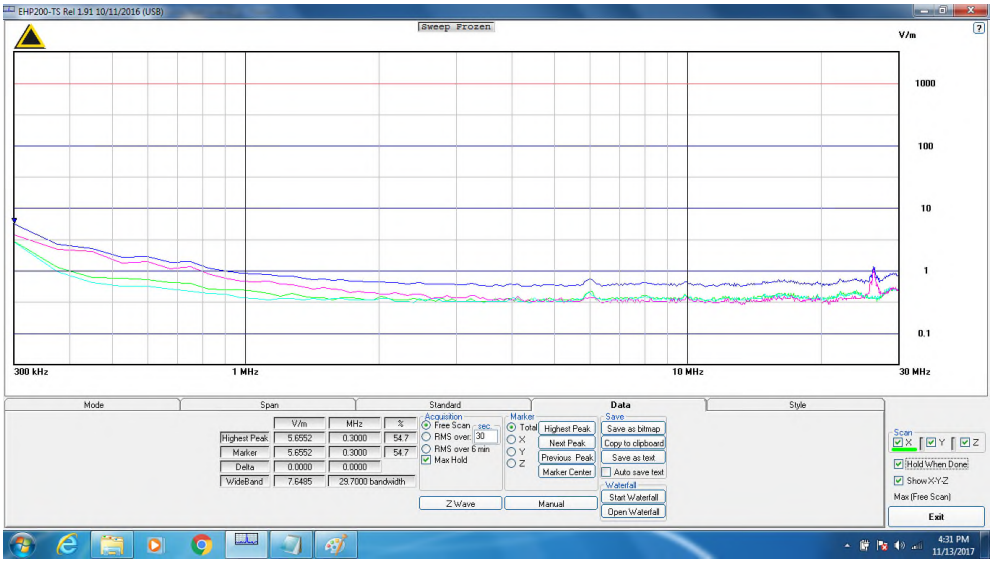
Graph 2.1.8.1-5 – E-Field Side C Plot 9kHz to 300kHz



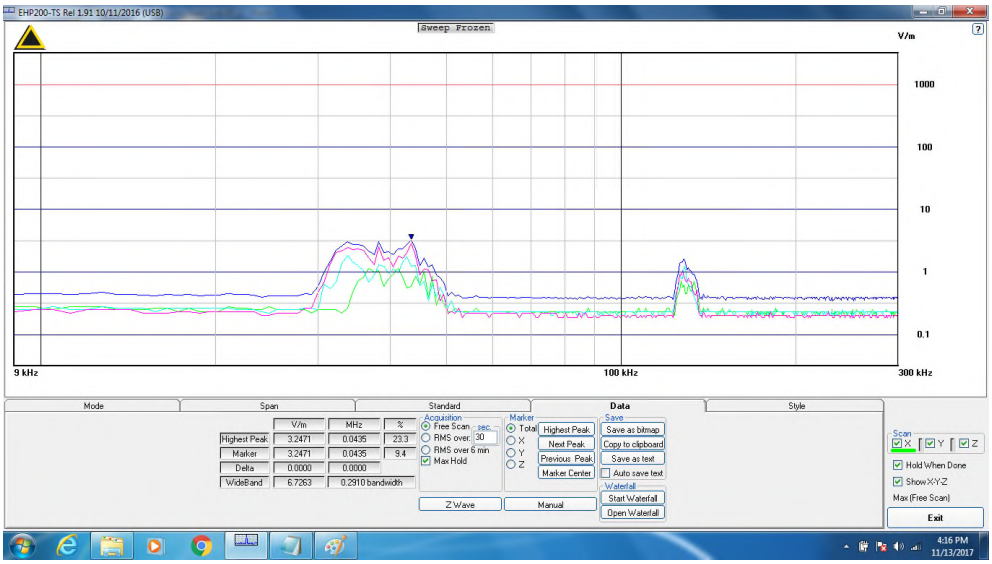
Graph 2.1.8.1-6 – E-Field Side C 300kHz to 30MHz



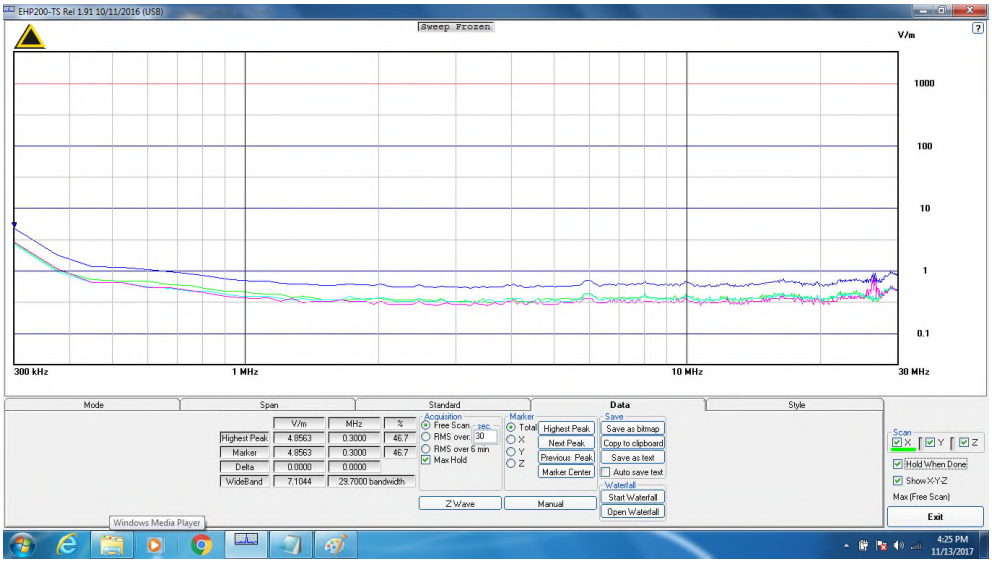
Graph 2.1.8.1-7 – E-Field Side D Plot 9kHz to 300kHz



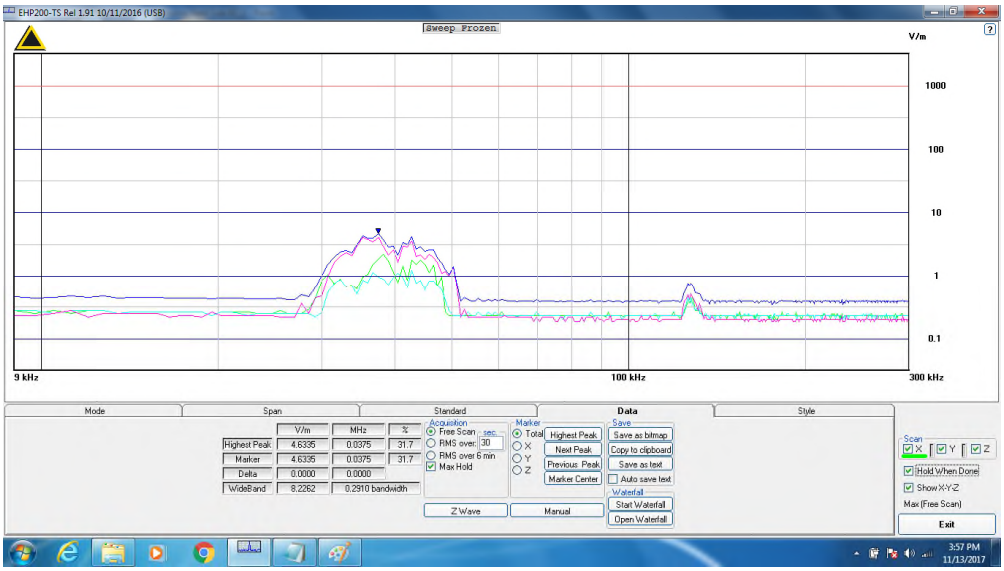
Graph 2.1.8.1-8 – E-Field Side D 300kHz to 30MHz



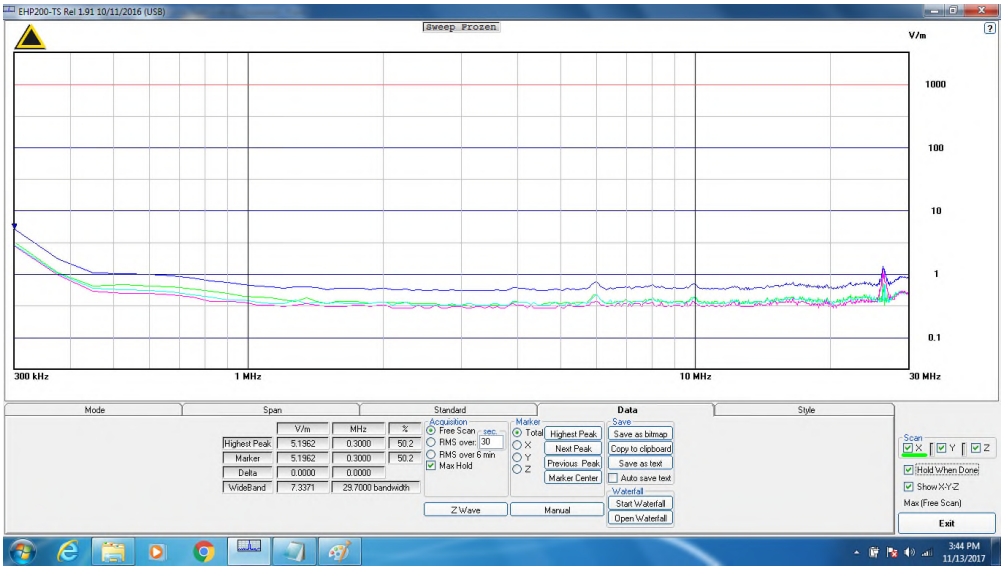
Graph 2.1.8.1-9 – E-Field Side E Plot 9kHz to 300kHz



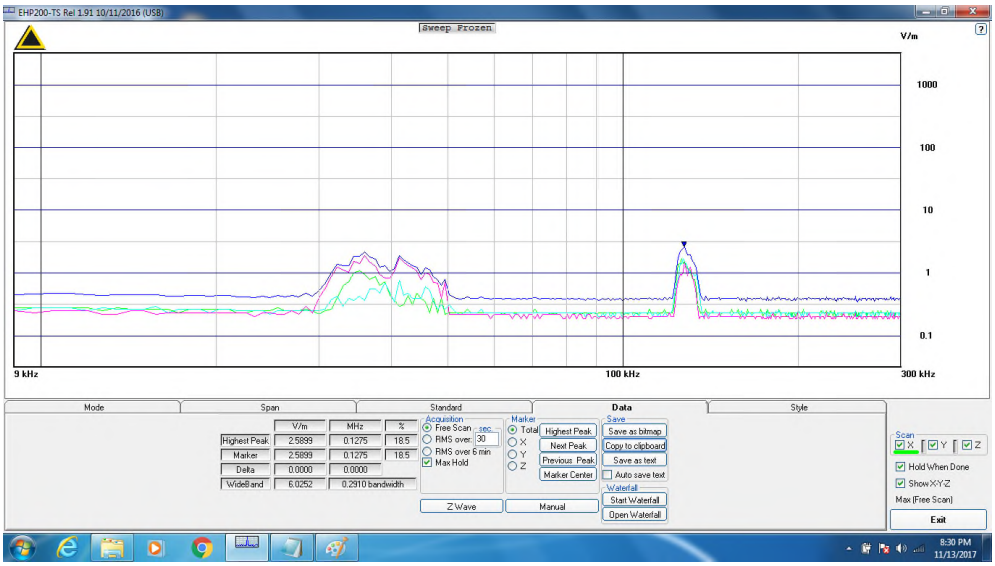
Graph 2.1.8.1-10 – E-Field SideE 300kHz to 30MHz



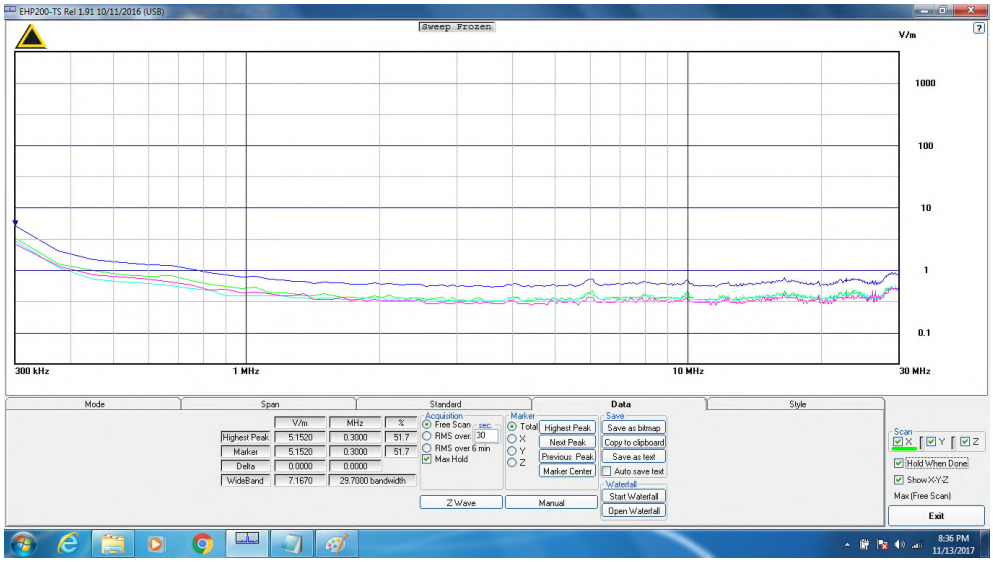
Graph 2.1.8.1-11 – E-Field Side F Plot 9kHz to 300kHz



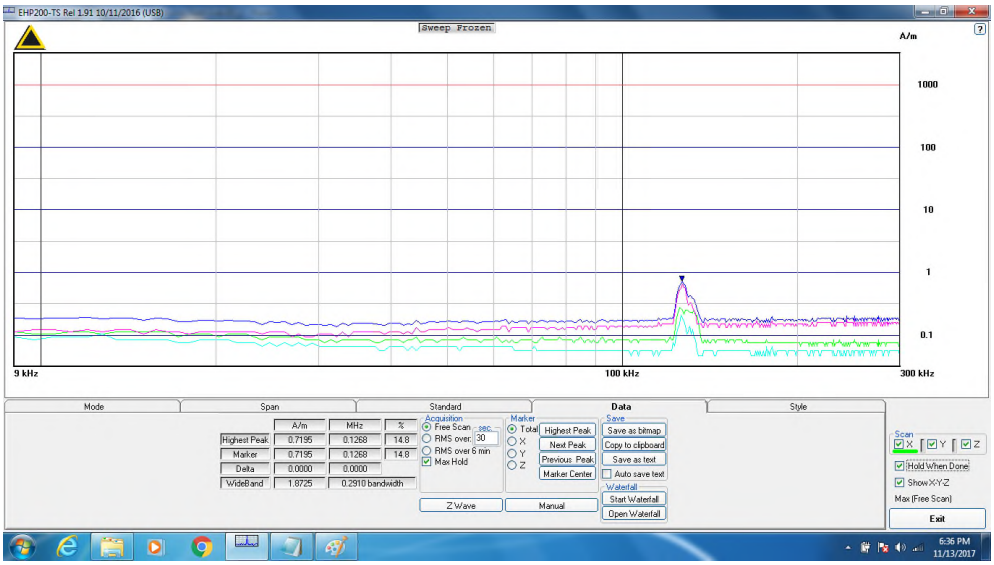
Graph 2.1.8.1-12 – E-Field Side F 300kHz to 30MHz



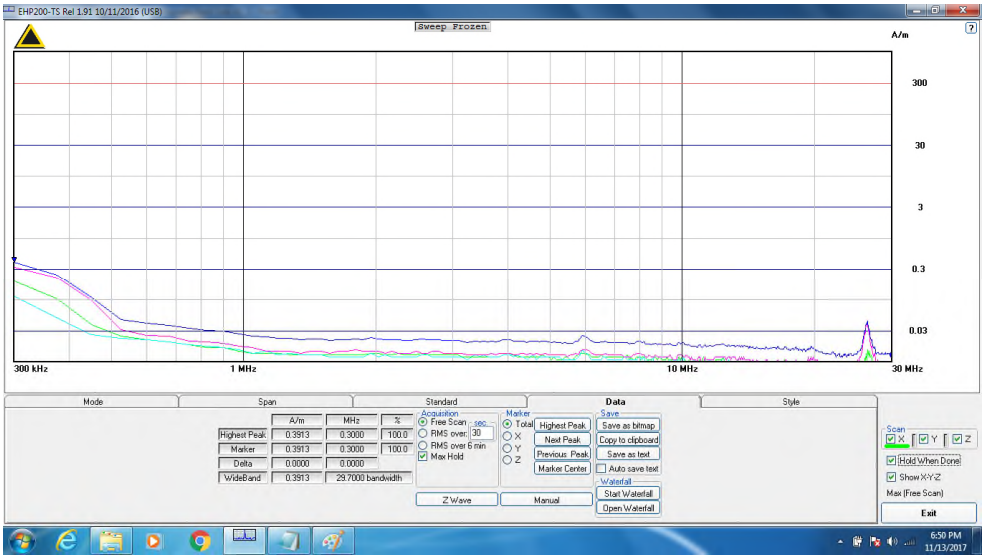
Graph 2.1.8.1-13 – E-Field Side G Plot 9kHz to 300kHz



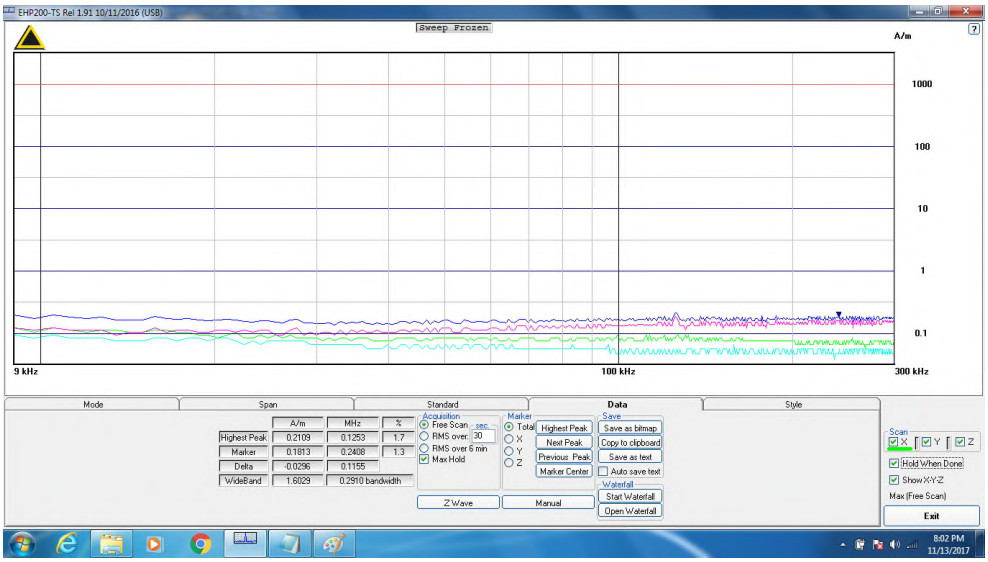
Graph 2.1.8.1-14 – E-Field Side G 300kHz to 30MHz



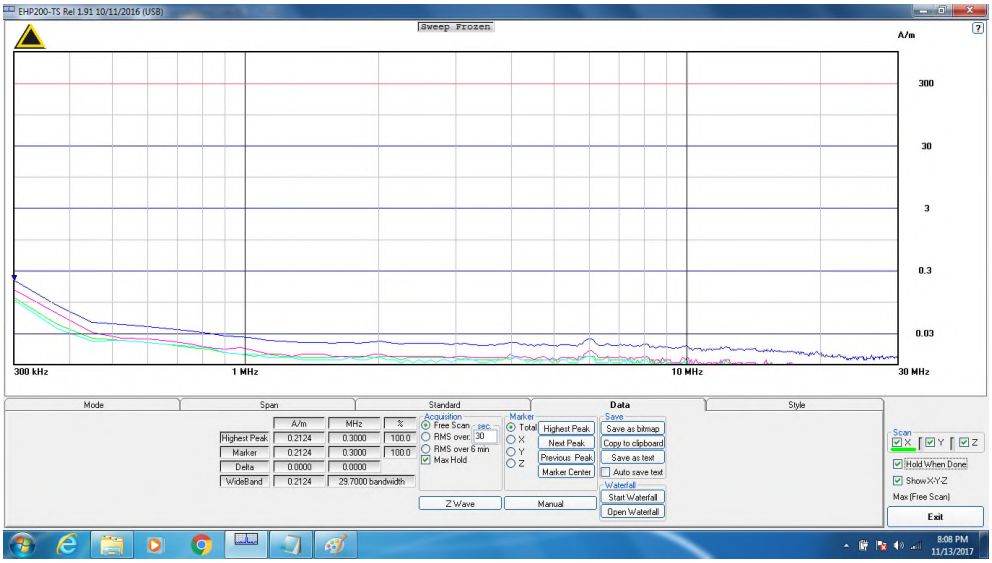
Graph 2.1.8.1-15 – H-Field Side A Plot 9kHz to 300kHz



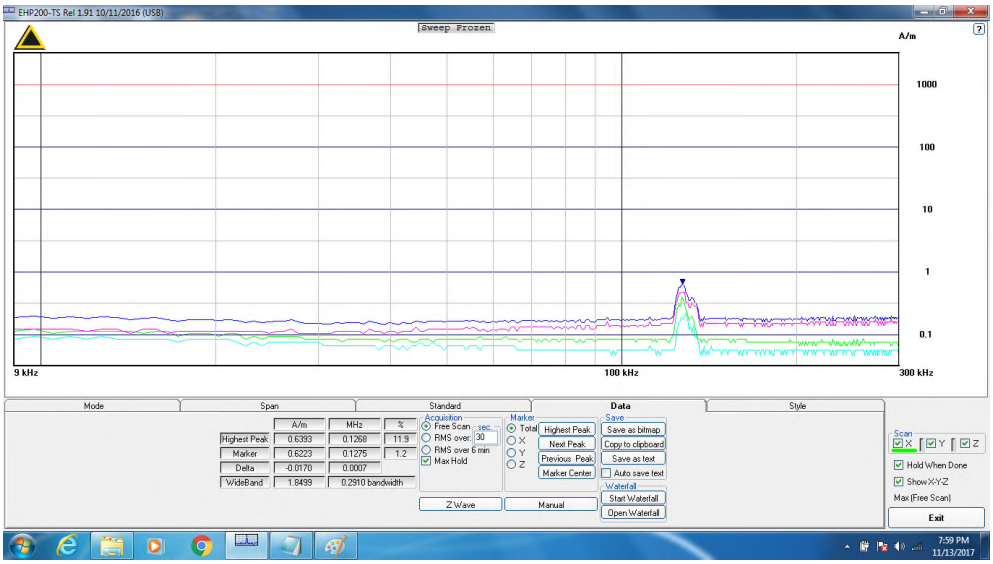
Graph 2.1.8.1-16 – H-Field Side A 300kHz to 30MHz



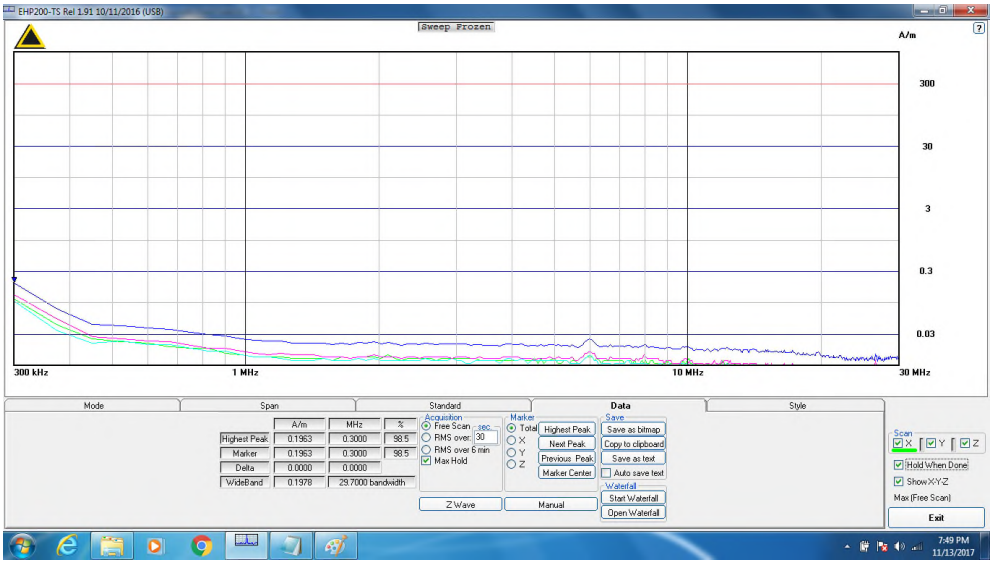
Graph 2.1.8.1-17 – H-Field Side B Plot 9kHz to 300kHz



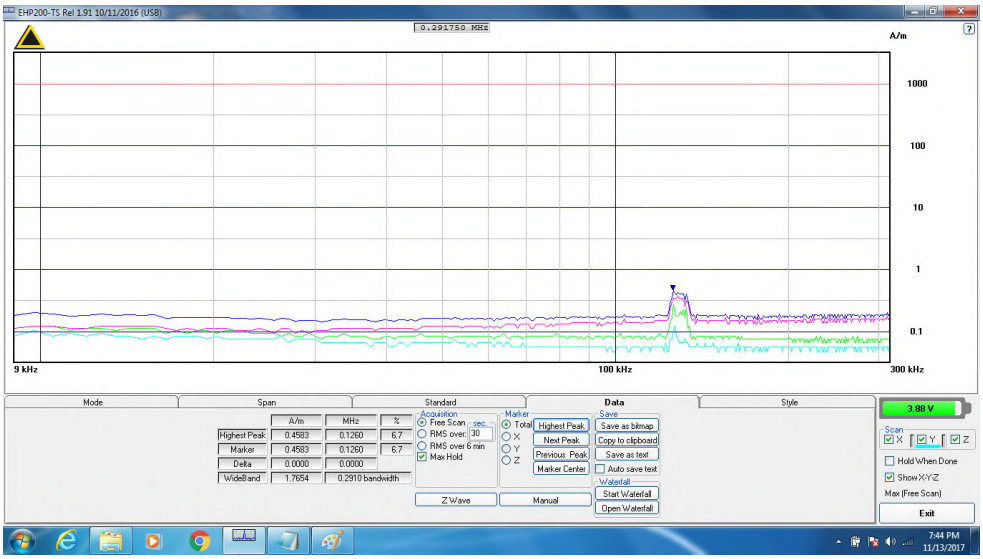
Graph 2.1.8.1-18 – H-Field Side B 300kHz to 30MHz



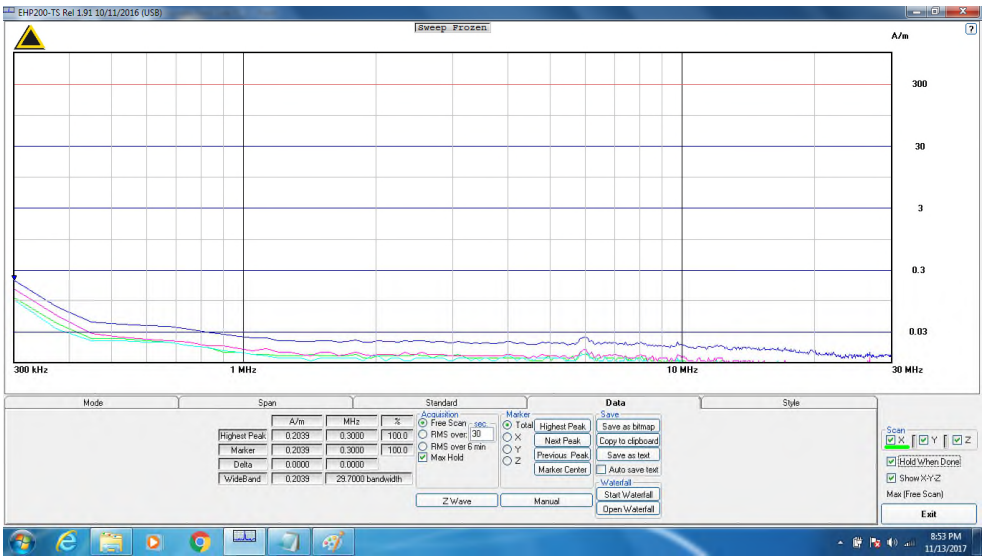
Graph 2.1.8.1-19 – H-Field Side C Plot 9kHz to 300kHz



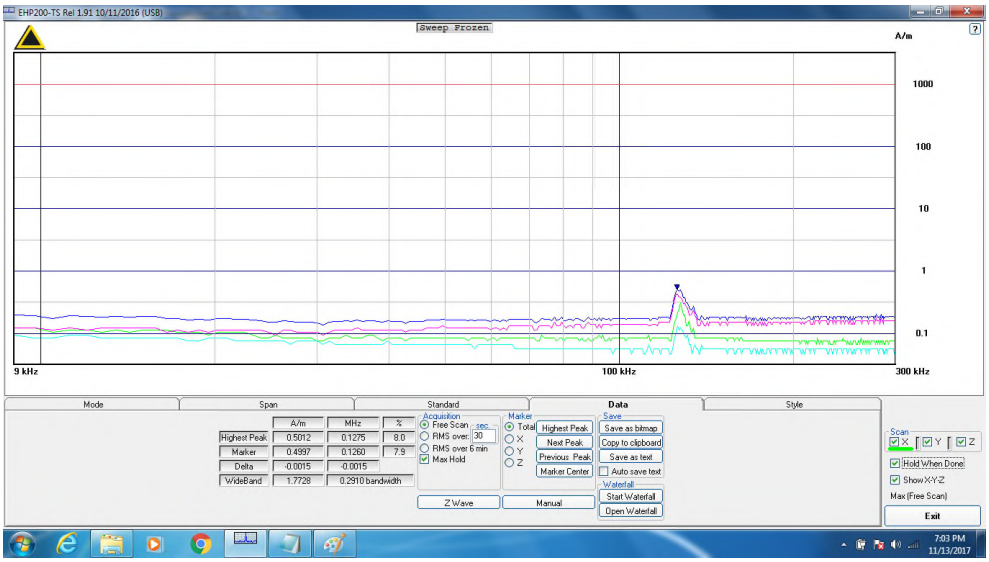
Graph 2.1.8.1-20 – H-Field Side C 300kHz to 30MHz



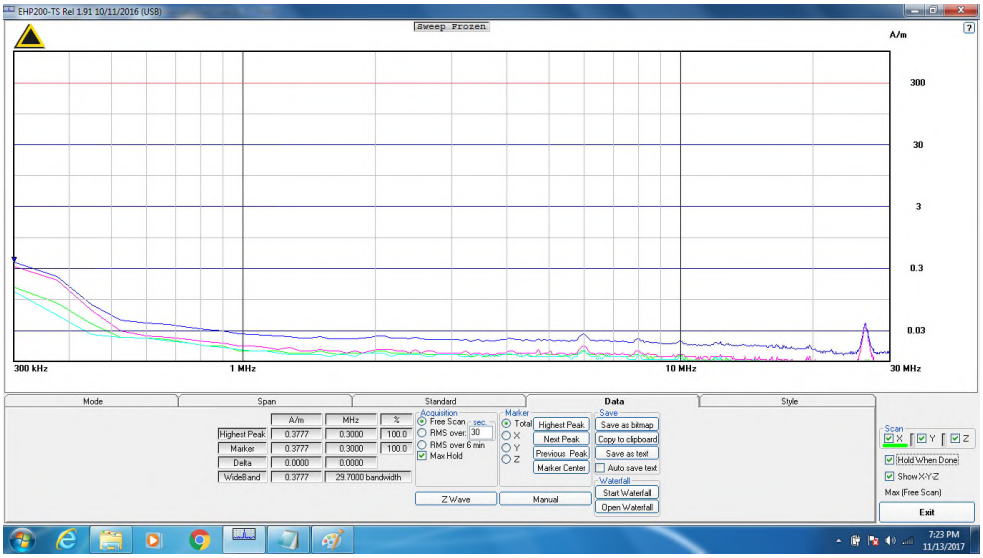
Graph 2.1.8.1-21 – H-Field Side D Plot 9kHz to 300kHz



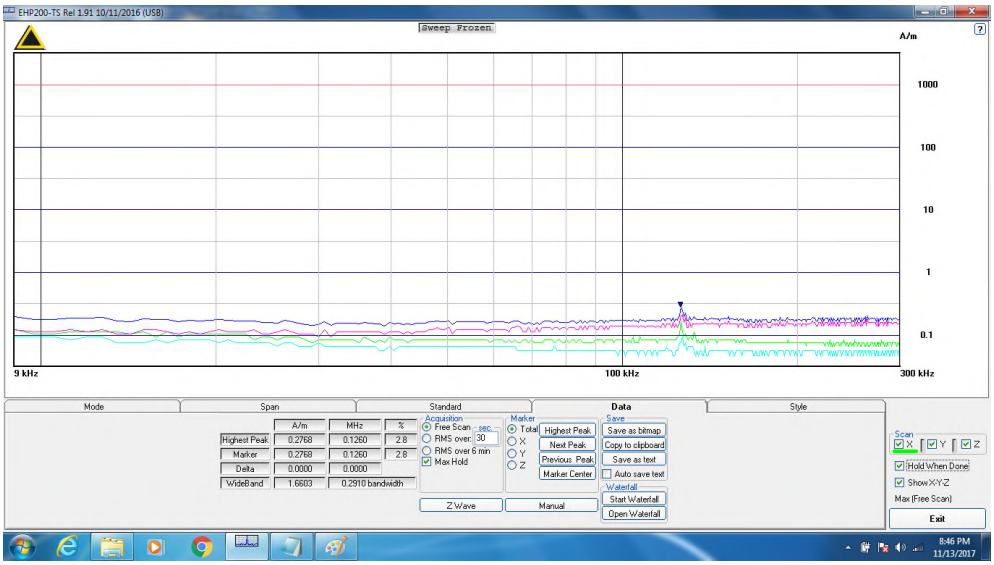
Graph 2.1.8.1-22 – H-Field Side D 300kHz to 30MHz



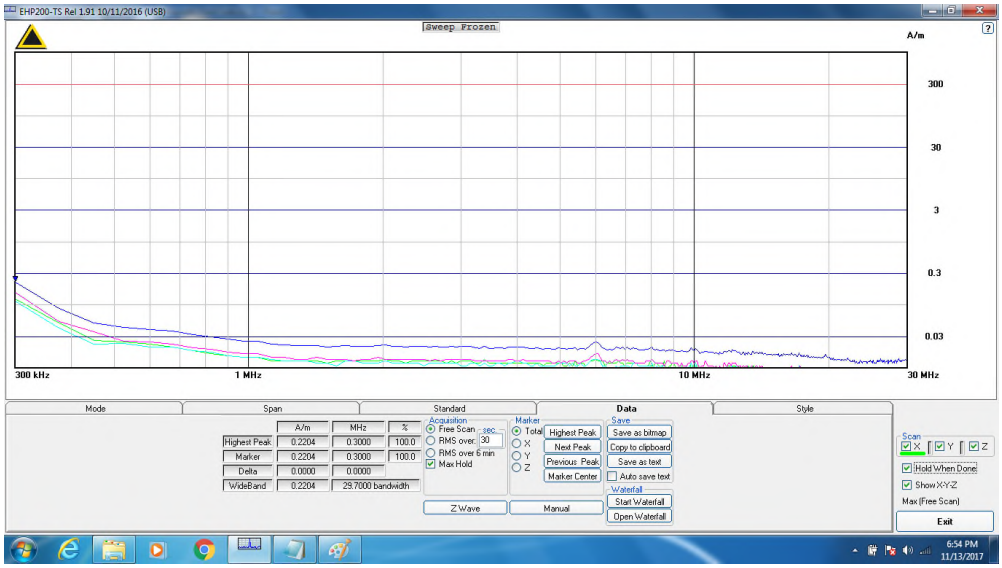
Graph 2.1.8.1-23 – H-Field Side E Plot 9kHz to 300kHz



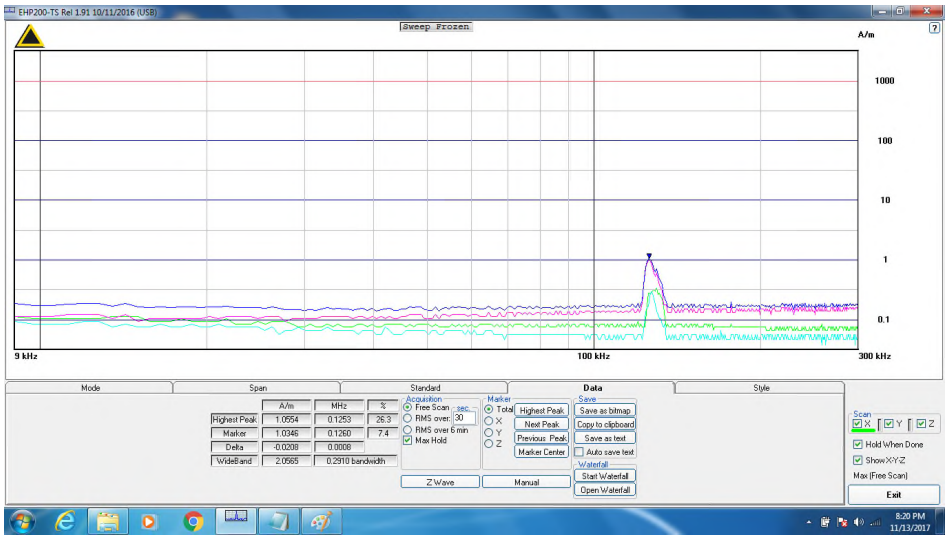
Graph 2.1.8.1-24 – H-Field SideE 300kHz to 30MHz



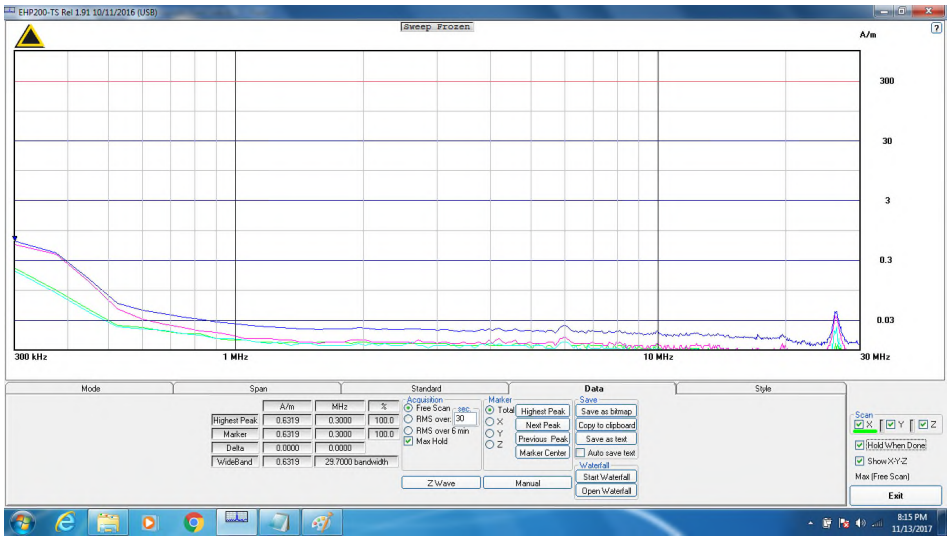
Graph 2.1.8.1-25 – H-Field Side F Plot 9kHz to 300kHz



Graph 2.1.8.1-26 – H-Field Side F 300kHz to 30MHz



Graph 2.1.8.1-27 – H-Field Side G Plot 9kHz to 300kHz



Graph 2.1.8.1-28 – H-Field Side G 300kHz to 30MHz

2.1.9 Test Setup Photo

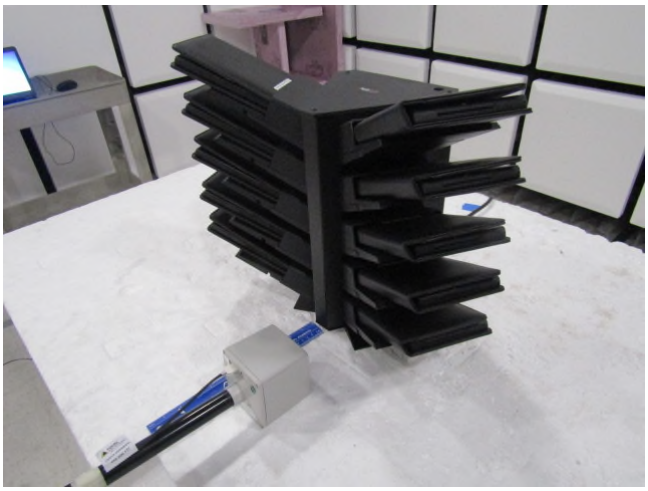


Photo 2.1.9-1 –View of the Test Set-up

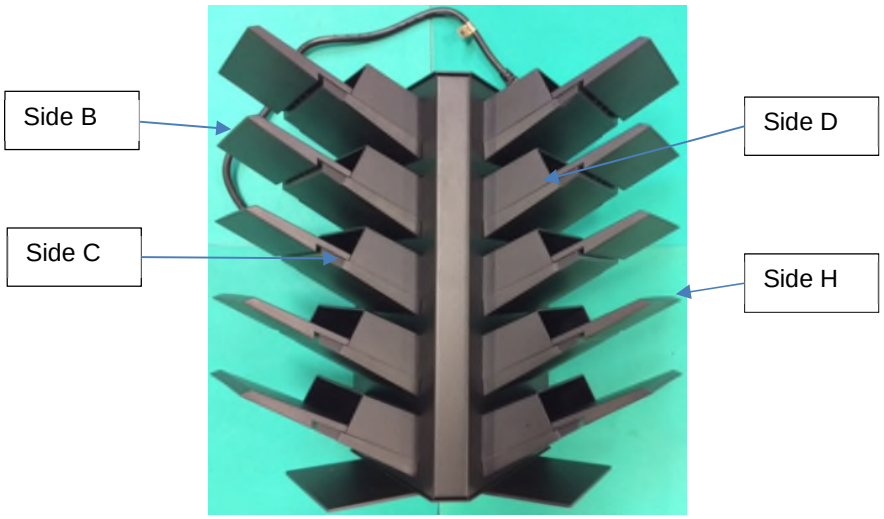


Photo 2.1.9-2 – Side Identification

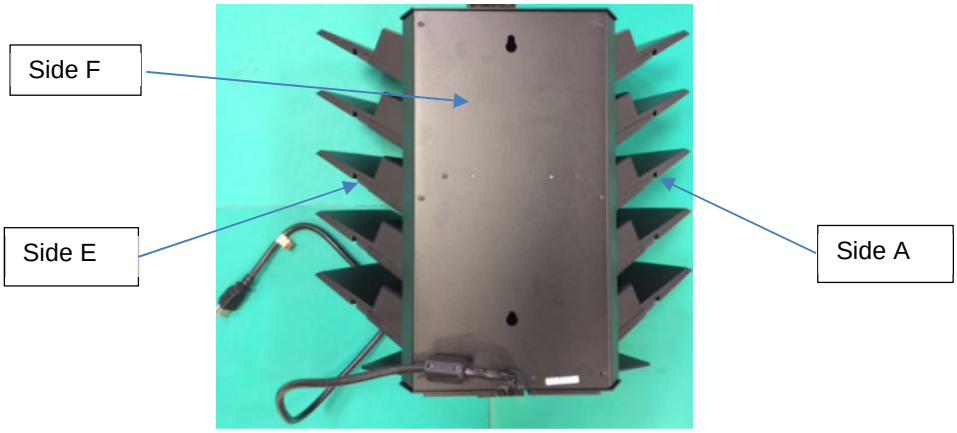


Photo 2.1.9-3 – Side Identification

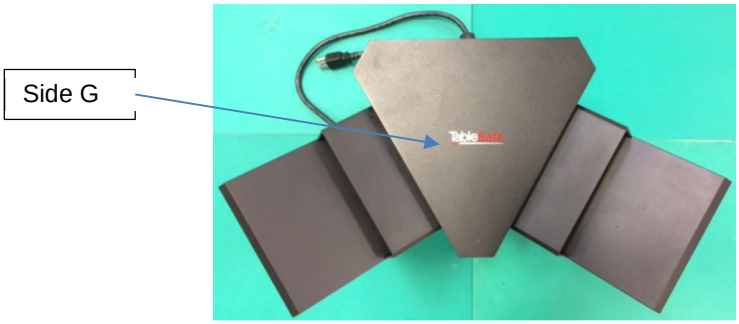


Photo 2.1.9-4 – Top Identification

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number	Test Equipment	Type	Serial Number	Manufacturer	Cal Due Date
AEMC818	Electric and Magnetic Field Probe	EHP-200AC	170WX71004	Narda	10/18/2018

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 MU for Magnetic Field Strength Measurement

1.1 dB

3.2.2 MU for Electric Field Strength Measurement

0.97 dB

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

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