

Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15 Subpart B: 2020

On

May 26th, 2020

Prepared for:




**Harman International Industries Incorporated
636 Ellis St.
Mountain View, CA 94043 U.S.A**

Prepared by:

**TUV Rheinland of North America, Inc.
5015 Brandin Ct. Fremont CA 94538 USA**

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ATTESTATION OF TEST RESULTS

Client:	Harman International Industries Incorporated 636 Ellis St Mountain View, CA 94043 U.S.A.		Arvind Gupta Tel. +91-9873387741	
EUT Name:	HARMAN Spark		Serial Number:	N/A
Model Numbers:	HSA-15UA-BR		Date(s) Tested:	April 04, 2020
Test Location:	TUV Rheinland of North America Inc. 5015 Brandin Ct. Fremont CA 94538 USA			
Test Specifications:	Emissions:	FCC Part15 Subpart B:2020		
	Immunity:	N/A		
Test Result:	The above product was found to be Compliant to the above test standard(s)			
Prepared by: Rachana Khanduri			Reviewed by: Osvaldo Casorla	
<u>05/26/2020</u> Date Name Signature			<u>05/26/2020</u> Date Name Signature	
Other aspects:	None			
FREMONT				
 US1131	 Testing Cert #3331.02		INDUSTRY CANADA 2932D	 1097 (A-0268)

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1 General Information

1.1 Scope

This report is intended to document the status of conformance with the listed standards based on the results of testing performed on April 04, 2020April 04, 2020 on the HSA-15UA-BR manufactured by Harman International Industries Incorporated. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

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1.3 Summary of Test Results

Applicant	Harman International Industries Incorporated 636 Ellis St Mountain View, CA 94043 U.S.A.
Description	OBD II Telematics Device
Model Name	HARMAN Spark
Model Number	HSA-15UA-BR
IMEI Number	356233110000350
Input Power	AC 120V, 60Hz (Wall Charger)
Test Date(s)	April 04, 2020

Standards	Description	Severity Level or Limit	Criteria	Test Result
FCC Part15 Subpart B:2020	Radiated Emissions	Class B 30 MHz - 18 GHz	Limit	Complies
FCC Part15 Subpart B:2020	Conducted Emissions	Class B 150 kHz- 30 MHz	Limit	Complies
Note	Device input power is 12VDC from car battery. Wall Charger is used to provide 12 VDC for testing only.			

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Laboratory Information

1.4 Accreditations & Endorsements

1.4.1 US Federal Communications Commission



TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

1.4.2 A2LA



TUV Rheinland of North America EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2017 (Testing Certificate #3331.02). The Scope of Laboratory Accreditation includes emission and immunity testing. The accreditations are

updated annually.

1.4.3 Industry Canada



Industry
Canada Industrie
Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M-1, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2009. The Fremont 10-meter Semi-Anechoic Chamber, Registration No. 2932D-1, has been accepted by Industry Canada to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2009.

1.4.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0326

VCCI Registration No. for Fremont: A-0327

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1.5 Test Facilities and EMC Software

Test facilities are located at 1279 Quarry Lane, Ste. A, Pleasanton, California 94566, U.S.A. and 5015 Brandin Ct. Fremont CA 94538 USA (Fremont is the Pleasanton Annex).

1.5.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Fremont 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

1.5.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 3.7 m x 3.175 mm thick aluminum floor connected to PE ground. For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470 k Ω resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470 k Ω resistors. For each of the other tests, the HCP is removed.

RF Field Immunity testing is performed in a 10m semi-anechoic chamber with absorber added to floor.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.9 m x 3.7 m x 3.175 mm thick aluminum ground plane which is connected to one end of the anechoic chamber.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

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1.5.3 EMC Software - Fremont

Manufacturer	Name	Version	Test Type
Rohde & Schwarz	EMC32	10.50.00	Radiated & Conducted Emissions
EMISoft	Vasona	5.0	Radiated & Conducted Emissions
ETS-Lindgren	TILE	4.2.A	Radiated Emissions > 1 GHz
ETS-Lindgren	TILE	V.3.4.K.22	Radiated & Conducted Immunity
Haefely	WinFEAT	1.6.3	Surge
Thermo Electron - Keytek	CEWare32	3.0	EFT/Surge/Voltage Dips & Interrupt
Voltech	IEC61000-3	1.15.07RC	Harmonic & Flicker

1.5.4 EMC Software - Pleasanton

Manufacturer	Name	Version	Test Type
Rohde & Schwarz	EMC32	10.50.00	Radiated & Conducted Emissions
ETS-Lindgren	TILE	3.4.K.14 @ 4.0.A.5	Radiated & Conducted Emissions
EMISoft	Vasona	5.0	Radiated & Conducted Emissions
Agilent	Agilent MXE	A.11.02	Radiated & Conducted Emissions
ETS-Lindgren	TILE	3.4.K.14	Radiated & Conducted Immunity
Thermo Electron - Keytek	CEWare32	4.00	EFT/Surge/Voltage Dips & Interrupt
Voltech	IEC61000-3	1.21.07RC2	Harmonic & Flicker

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1.6 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or co-variances of these other quantities weighted according to how the measurement result varies with changes in these quantities. The term standard uncertainty is the result of a measurement expressed as a standard deviation.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement and the fraction may be viewed as the coverage probability or level of confidence of the interval.

1.6.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dB μ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V/m}}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

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1.6.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	U_{lab}	U_{cispr}
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		

Voltech PM6000A

The estimated combined standard uncertainty for harmonic current and flicker measurements is $\pm 5.0\%$.	Per CISPR 16-4-2
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1.6.3 Measurement Uncertainty Immunity

The estimated expanded uncertainty for ESD immunity measurements is $\pm 8.2\%$.	Per IEC 61000-4-2
The estimated expanded uncertainty for radiated immunity measurements is ± 4.10 dB.	Per IEC 61000-4-3
The estimated expanded uncertainty for EFT fast transient immunity measurements is $\pm 5.84\%$.	Per IEC 61000-4-4
The estimated expanded uncertainty for surge immunity measurements is $\pm 5.84 \%$.	Per IEC 61000-4-4
The estimated expanded uncertainty for conducted immunity measurements with CDN is ± 3.66 dB	Per IEC 61000-4-6
The estimated expanded uncertainty for power frequency magnetic field immunity is $\pm 11.6\%$.	Per IEC 61000-4-8
The estimated expanded uncertainty for voltage variation and interruption measurements is $\pm 3.48\%$.	Per IEC 61000-4-11

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

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1.7 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2017. Equipment calibration records are kept on file at the test facility.

1.8 Measurement Equipment Used

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
EMI Receiver	Rohde & Schwarz	ESW44	101663-dv	07/06/2018	07/06/2020
L.I.S.N.	Com-Power	LI-215	192000	01/16/2019	01/16/2021
Transient Limiter	Com-Power	LIT-930	531582	01/16/2019	01/16/2021
EMI Receiver	Agilent	MXE N9038A	MY51210195	01/16/2019	01/16/2021
Preamplifier, 9 kHz – 1 GHz	Sonoma	310N	213221	01/16/2019	01/16/2021
Bilog Antenna	Sunol Sciences	JB3	A061907	12/19/2018	12/19/2020
Amplifier	Miteq	TTA1800-30-HG	1842452	01/15/2019	01/15/2021
Horn Antenna	Sunol Sciences	DRH-118	A040806	03/05/2019	03/05/2021
1 GHz High Pass Filter	Micro-Tronics	HPM50115	-	N/A (See Note)	

Note: Equipment is characterized before use.

2 Product Information

2.1 Product Description

See Section 4.

2.2 Equipment Modifications

No modifications were needed to bring product into compliance.

2.3 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in Appendix A of this report.

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2.4 EUT External Photos



Figure 1 - External Photo (Top)



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Figure 2- External Photo (Bottom)



Figure 3 - External Photo (Side 1)



Figure 4- External Photo (Side 2)

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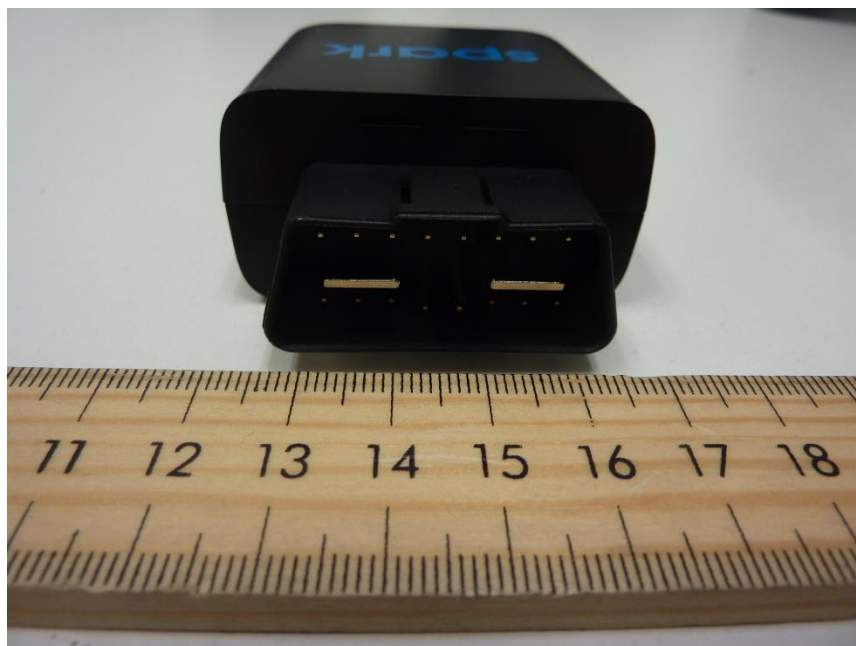


Figure 5 - External Photo (Side 3)



Figure 6- External Photo (Side 4)

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3 Emissions

3.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

3.1.1 Overview of Test

Results	Compliant (as tested per this report)			Test Date(s)	April 04, 2020		
Standard	FCC Part15 Subpart B:2020						
Model Number	HSA-15UA-BR			Serial #	N/A		
Configuration	Unintentional Radiated Emissions - see test plan for details.						
Test Setup	Tested in the 10-meter Semi-Anechoic chamber, placed on table: see test plan for details.						
EUT Powered By	120VAC, 60Hz (Wall Charger)						
Environmental Conditions	April 04, 2020	Temp	21.1° C	Humidity	38.8%	Pressure	1017 mbar
Frequency Range	30 MHz to 18 GHz						
Perf. Criteria	Class B			Perf. Verification	Readings under limit		
Mod. to EUT	None			Test Performed By	Quang Nguyen		

3.1.2 Test Procedure

Unintentional Radiated emissions tests were performed using the procedures of ANSI C63.4:2014 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 30 MHz to 18 GHz was investigated for radiated emissions.

3.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

3.1.4 Final Test

All final radiated emissions measurements were below the specification limits.

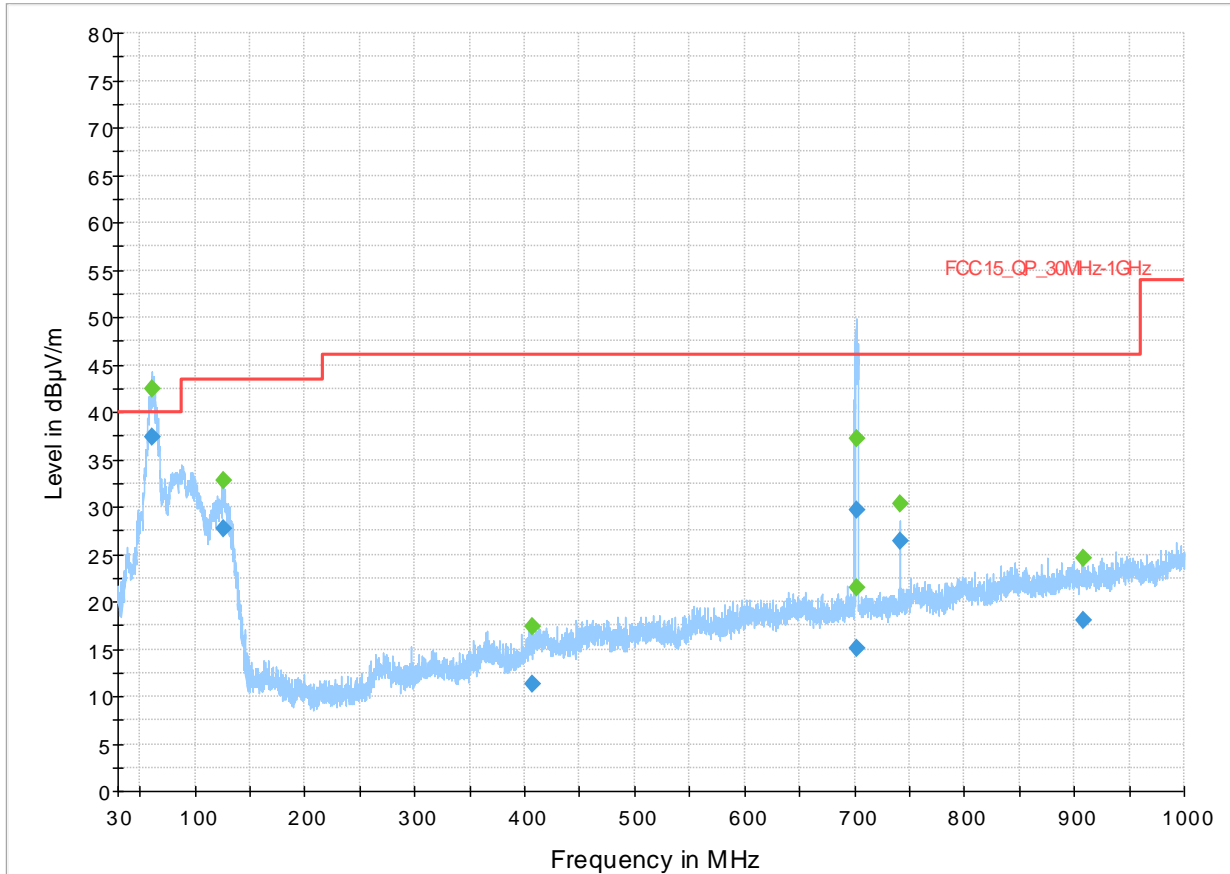
Note: Device input power is 12VDC from car battery. Wall Charger is used to provide 12 VDC for testing only.

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3.1.5 Plots

NOTES:

Radiated Emissions Full Scan
30 MHz – 1000 MHz
Vertical / Horizontal



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3.1.6 Final Tabulated Data

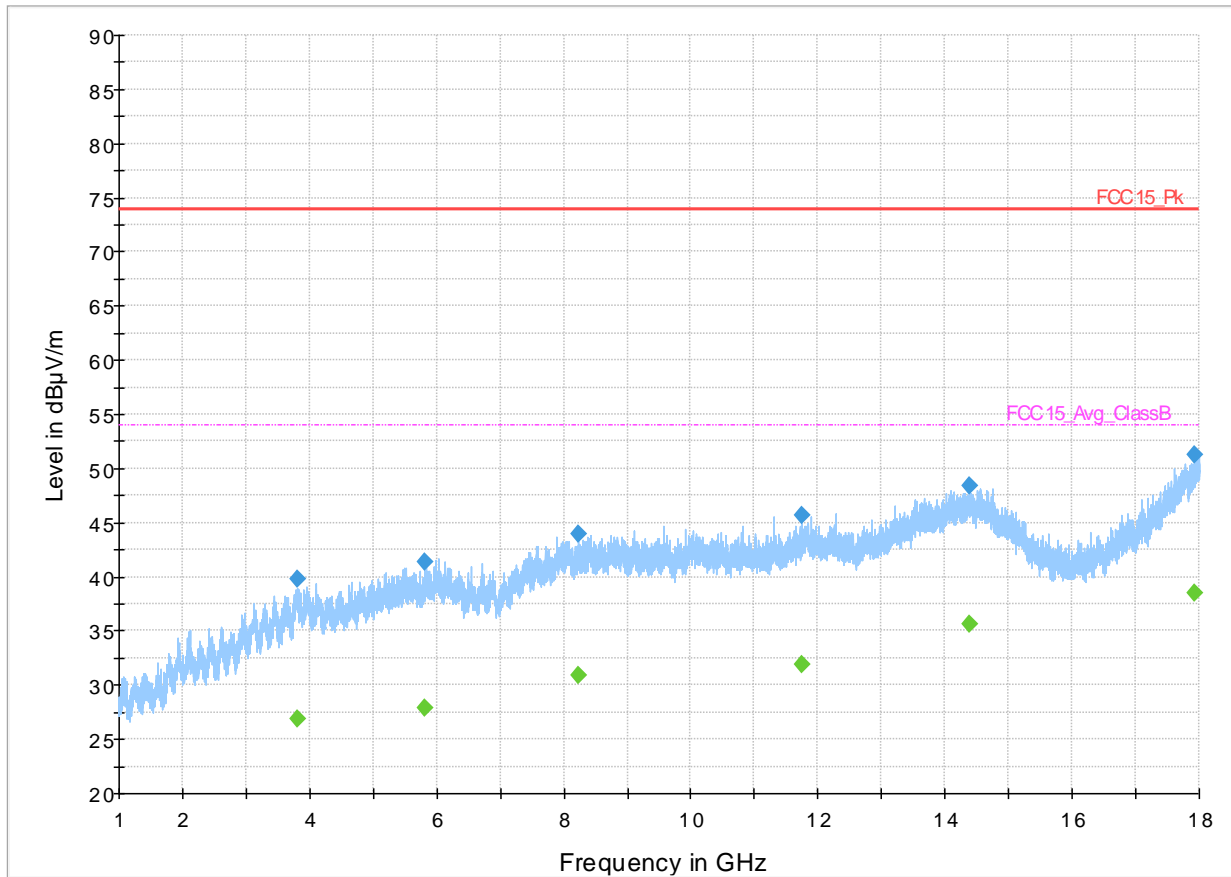
30 MHz – 1000 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
61.411480	37.33	40.00	2.67	1000.0	120.000	103.0	V	-180.0	-17.2	
126.438640	27.66	43.52	15.86	1000.0	120.000	103.0	V	-180.0	-11.4	
406.766840	11.26	46.00	34.74	1000.0	120.000	400.0	V	-180.0	-9.5	
701.921240	29.59	46.00	16.41	1000.0	120.000	200.0	H	-180.0	-4.8	
702.063680	15.00	46.00	31.00	1000.0	120.000	200.0	H	-180.0	-4.8	
741.755640	26.46	46.00	19.54	1000.0	120.000	200.0	V	-180.0	-4.4	
908.387920	18.11	46.00	27.89	1000.0	120.000	200.0	H	-180.0	-1.4	

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NOTES:

Radiated Emissions Full Scan
1000 MHz – 18,000 MHz
Vertical / Horizontal



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3.1.1 Final Tabulated Data

1000 MHz – 18,000 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
3805.050500	---	26.90	54.00	27.10	1000.0	1000.000	103.0	H	-180.0	-25.3	
3805.050500	39.80	---	74.00	34.20	1000.0	1000.000	103.0	H	-180.0	-25.3	
5807.477000	---	27.90	54.00	26.10	1000.0	1000.000	104.0	V	141.0	-21.8	
5807.477000	41.34	---	74.00	32.66	1000.0	1000.000	104.0	V	141.0	-21.8	
8236.050500	43.98	---	74.00	30.02	1000.0	1000.000	103.0	V	180.0	-17.6	
8236.050500	---	30.87	54.00	23.13	1000.0	1000.000	103.0	V	180.0	-17.6	
11753.351000	45.69	---	74.00	28.31	1000.0	1000.000	103.0	H	-36.0	-14.0	
11753.351000	---	31.84	54.00	22.16	1000.0	1000.000	103.0	H	-36.0	-14.0	
14386.549500	48.38	---	74.00	25.62	1000.0	1000.000	103.0	H	-180.0	-11.2	
14386.549500	---	35.56	54.00	18.44	1000.0	1000.000	103.0	H	-180.0	-11.2	
17938.676500	51.27	---	74.00	22.73	1000.0	1000.000	103.0	H	180.0	-6.0	
17938.676500	---	38.46	54.00	15.54	1000.0	1000.000	103.0	H	180.0	-6.0	

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3.2 Conducted Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other nearby electronic equipment.

3.2.1 Overview of Test

Results	Compliant (as tested per this report)	Test Date(s)	12/19/2019, 1/2/2020
Standard	FCC Part15 Subpart B:2020		
Model Number	HSA-15UA-BR		
Configuration	See test plan for details.		
Test Setup	Tested inLab 2, EUT placed on table: see test plan for details.		
EUT Powered By	120 VAC, 60 Hz (Wall Charger)		
Frequency Range	0.15 – 30 MHz		
Perf. Criteria	None	Perf. Verification	Readings Under Limit for L1 & Neutral
Mod. to EUT	None	Test Performed By	Colton Aliff

3.2.2 Test Procedure

Conducted emissions tests were performed using the procedures of ANSI C63.4:2014 including methods for signal maximizations and EUT configuration. Maximum emissions reported below.

The frequency range from 150 KHz- 30 MHz was investigated for conducted emissions.

Conducted Emissions measurements were performed in the shielded room using procedures specified in the test plan and standard.

3.2.3 Deviations

There were no deviations from the test methodology listed in the test plan for the conducted emission test.

3.2.4 Final Test

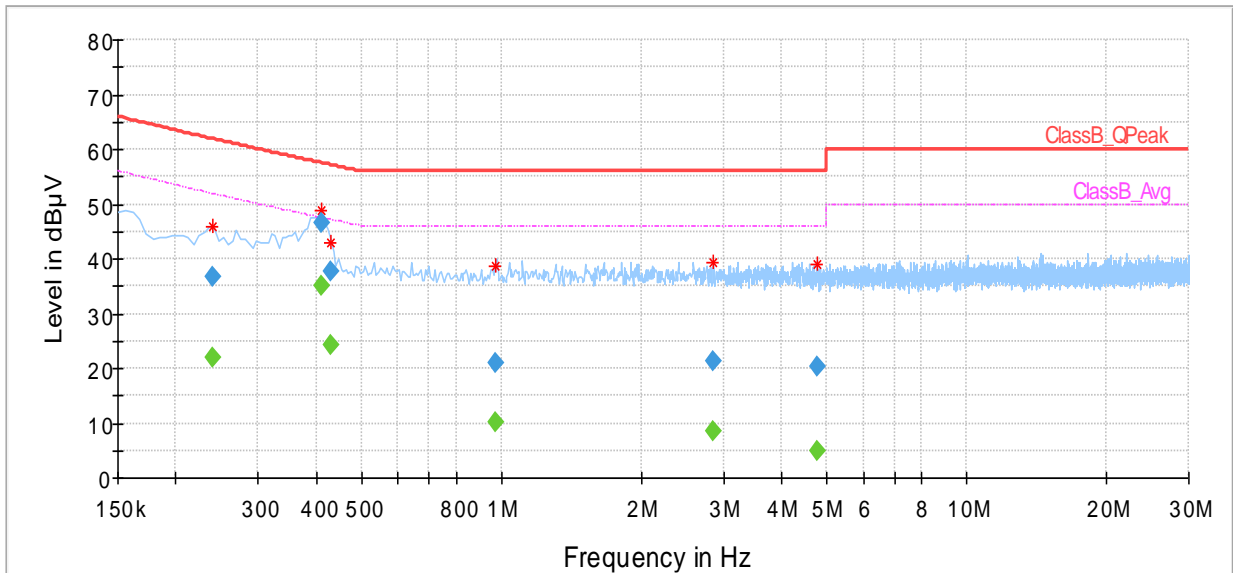
All final conducted emissions measurements were below the specification limits.

Note: Device input power is 12VDC from car battery. Wall Charger is used to provide 12 VDC for testing only.

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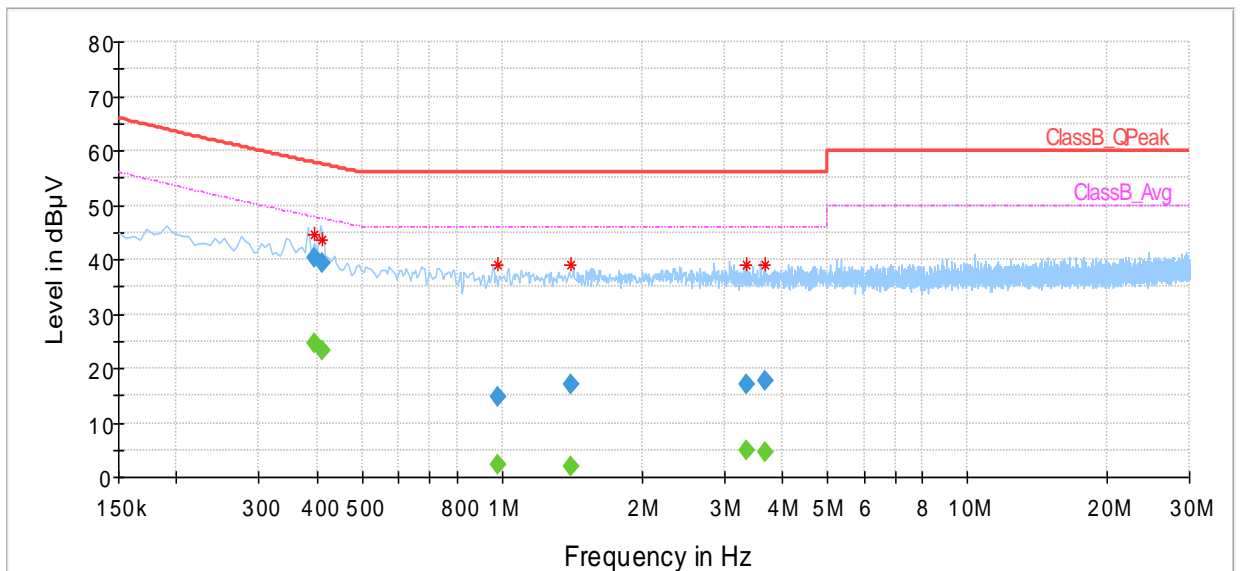
Conducted Emissions @ 120 Vac/60 Hz

Line: Live



Conducted Emissions @ 120 Vac/60 Hz

Line: Neutral



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3.2.5 Final Tabulated Data at 120 VAC, 60 Hz

Line

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
0.239288	---	22.05	51.89	29.83	1000.0	10.000	L1	GND	9.8	
0.239288	36.74	---	61.93	25.19	1000.0	10.000	L1	GND	9.8	
0.411253	---	34.97	47.49	12.52	1000.0	10.000	L1	GND	9.7	
0.411253	46.60	---	57.51	10.91	1000.0	10.000	L1	GND	9.7	
0.431573	---	24.23	47.12	22.89	1000.0	10.000	L1	GND	9.7	
0.431573	37.68	---	57.14	19.45	1000.0	10.000	L1	GND	9.7	
0.974298	---	10.32	46.00	35.68	1000.0	10.000	L1	GND	9.7	
0.974298	21.10	---	56.00	34.90	1000.0	10.000	L1	GND	9.7	
2.853603	---	8.50	46.00	37.50	1000.0	10.000	L1	GND	9.8	
2.853603	21.15	---	56.00	34.85	1000.0	10.000	L1	GND	9.8	
4.758994	---	4.98	46.00	41.02	1000.0	10.000	L1	GND	9.8	
4.758994	20.23	---	56.00	35.77	1000.0	10.000	L1	GND	9.8	

Neutral

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
0.395341	---	24.74	47.80	23.05	1000.0	10.000	N	GND	9.6	
0.395341	40.35	---	57.82	17.48	1000.0	10.000	N	GND	9.6	
0.411072	---	23.39	47.50	24.10	1000.0	10.000	N	GND	9.6	
0.411072	39.41	---	57.52	18.10	1000.0	10.000	N	GND	9.6	
0.979209	---	2.41	46.00	43.59	1000.0	10.000	N	GND	9.7	
0.979209	14.91	---	56.00	41.09	1000.0	10.000	N	GND	9.7	
1.408166	---	2.04	46.00	43.96	1000.0	10.000	N	GND	9.6	
1.408166	17.18	---	56.00	38.82	1000.0	10.000	N	GND	9.6	
3.357065	---	4.88	46.00	41.12	1000.0	10.000	N	GND	9.7	
3.357065	17.02	---	56.00	38.98	1000.0	10.000	N	GND	9.7	
3.685421	---	4.44	46.00	41.56	1000.0	10.000	N	GND	9.7	
3.685421	17.62	---	56.00	38.38	1000.0	10.000	N	GND	9.7	

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3.2.6 Photos

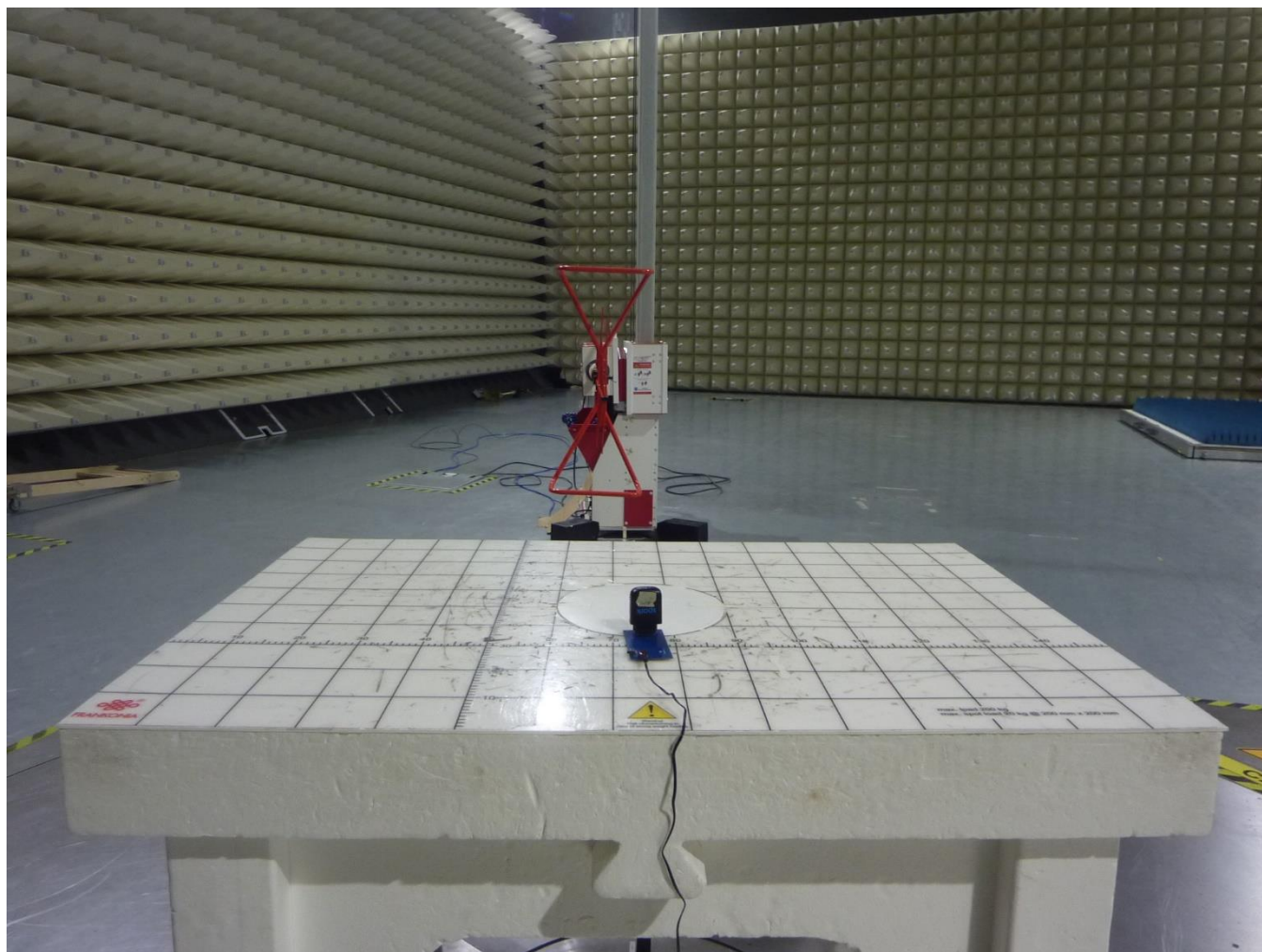


Figure 7 - Radiated Emissions Test Setup 30 - 1000 MHz – Front

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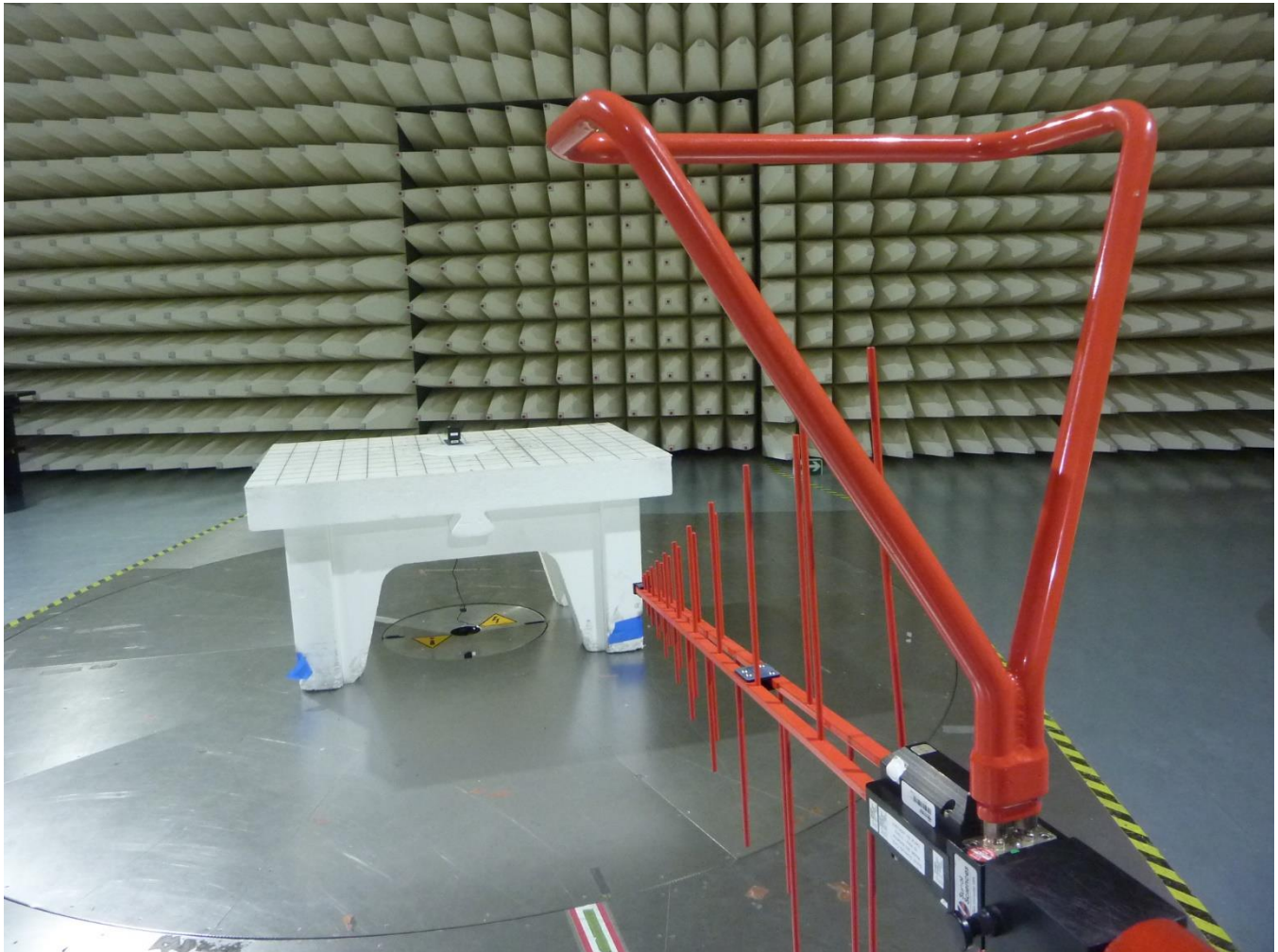


Figure 8 - Radiated Emissions Test Setup 30 - 1000 MHz – Back

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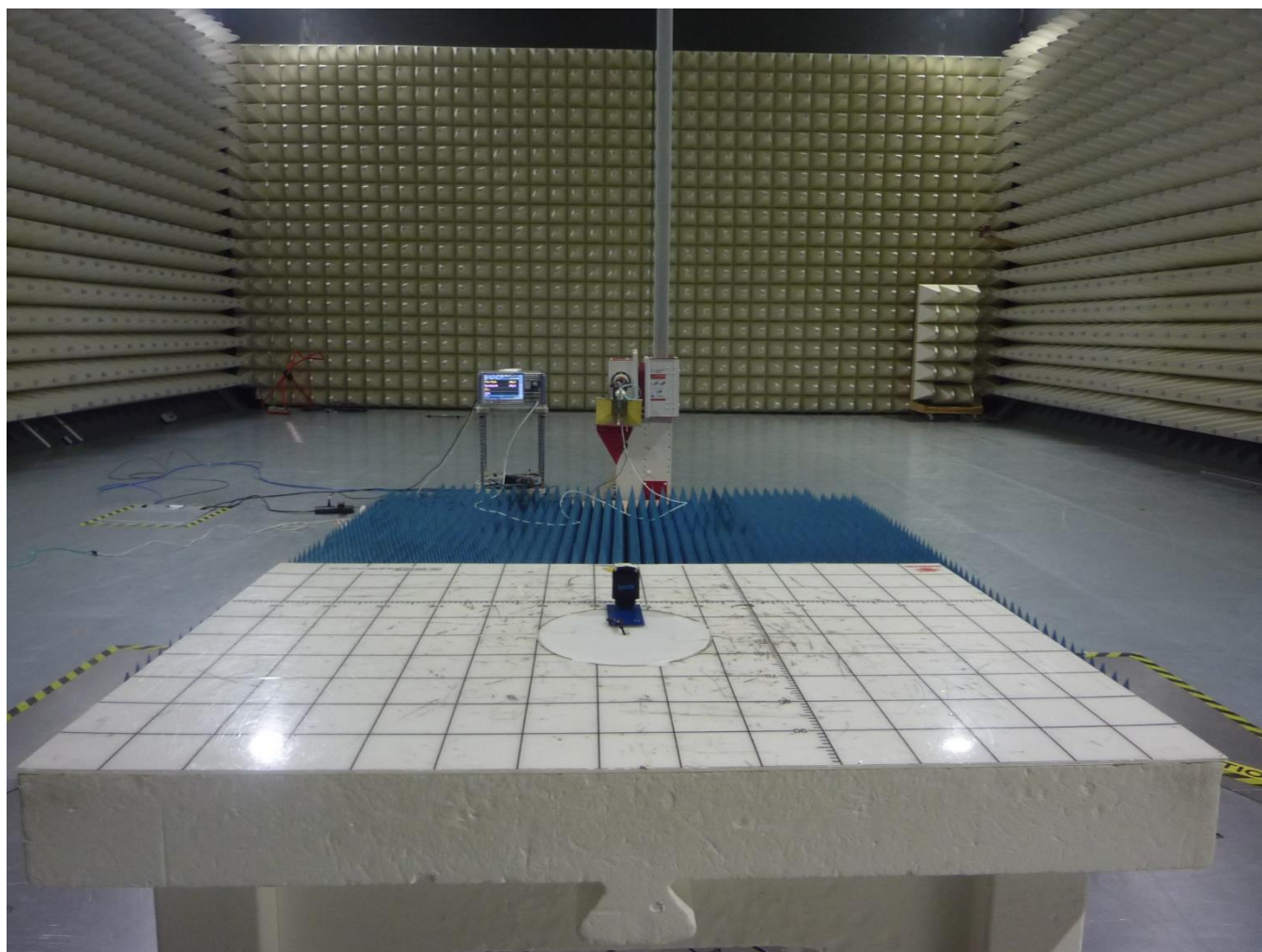


Figure 9 - Radiated Emissions Test Setup 1000 - 18000 MHz – Front

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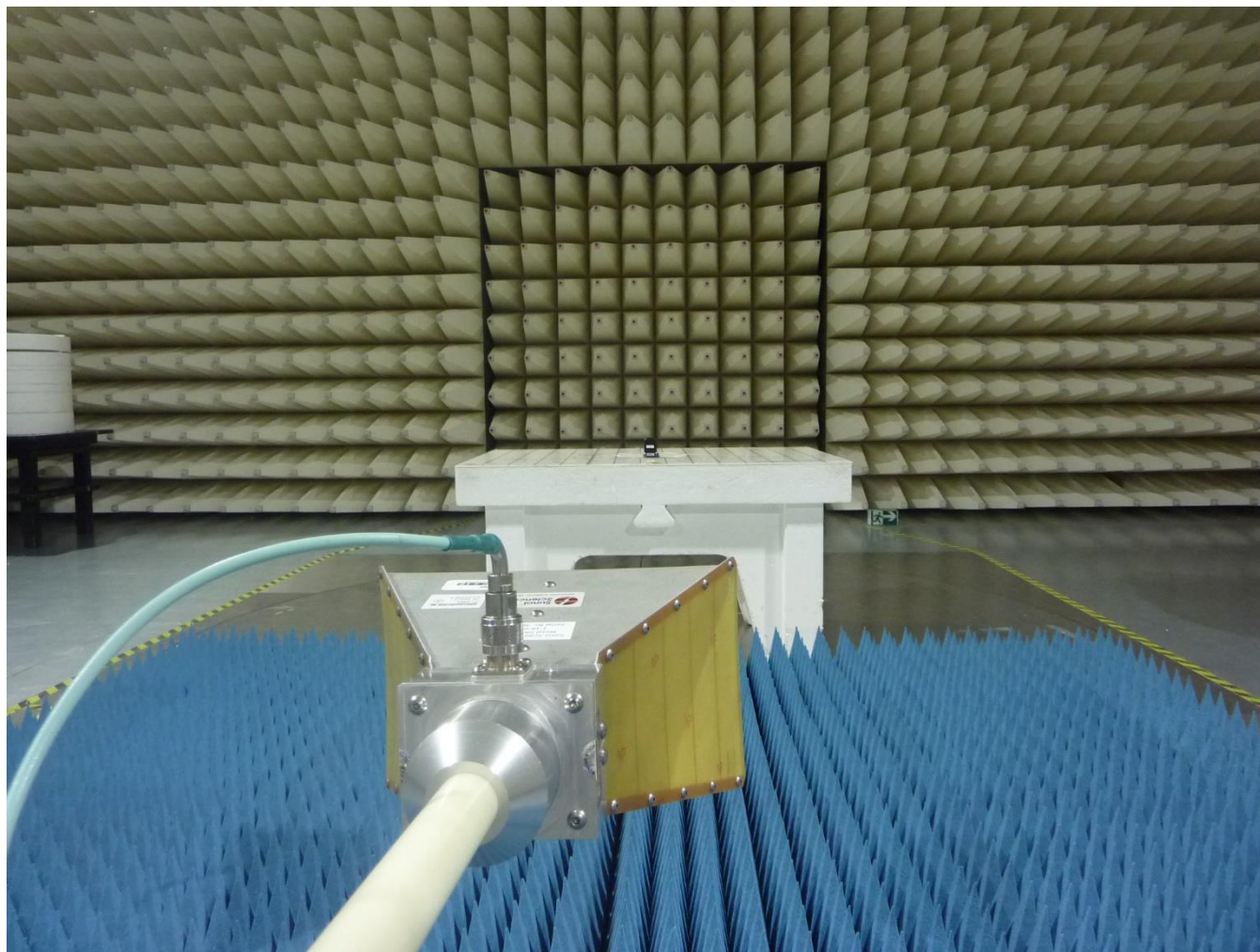


Figure 10 - Radiated Emissions Test Setup 1000 - 18000 MHz – Rear

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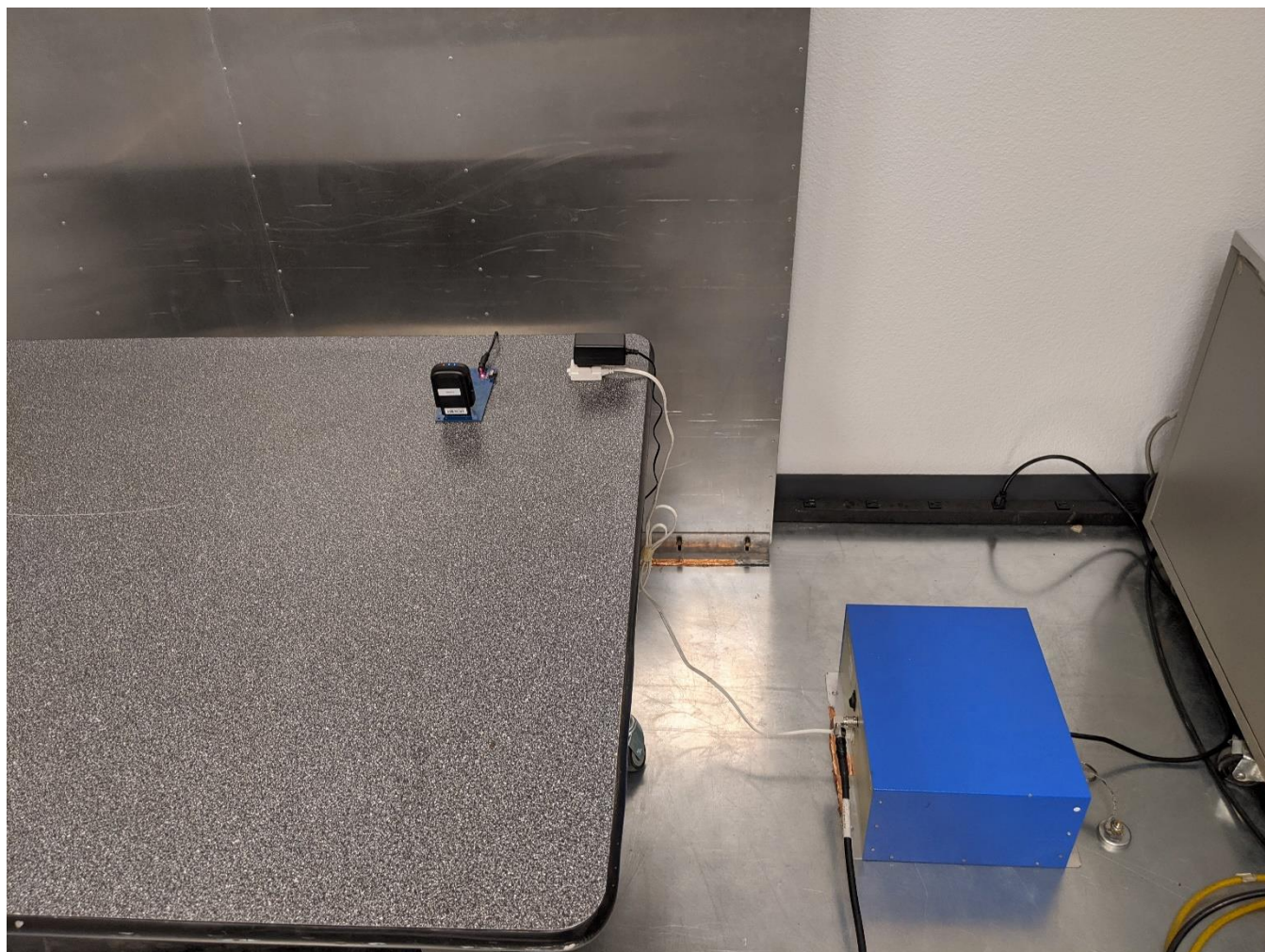


Figure 11 - Conducted Emissions Test Setup – Front

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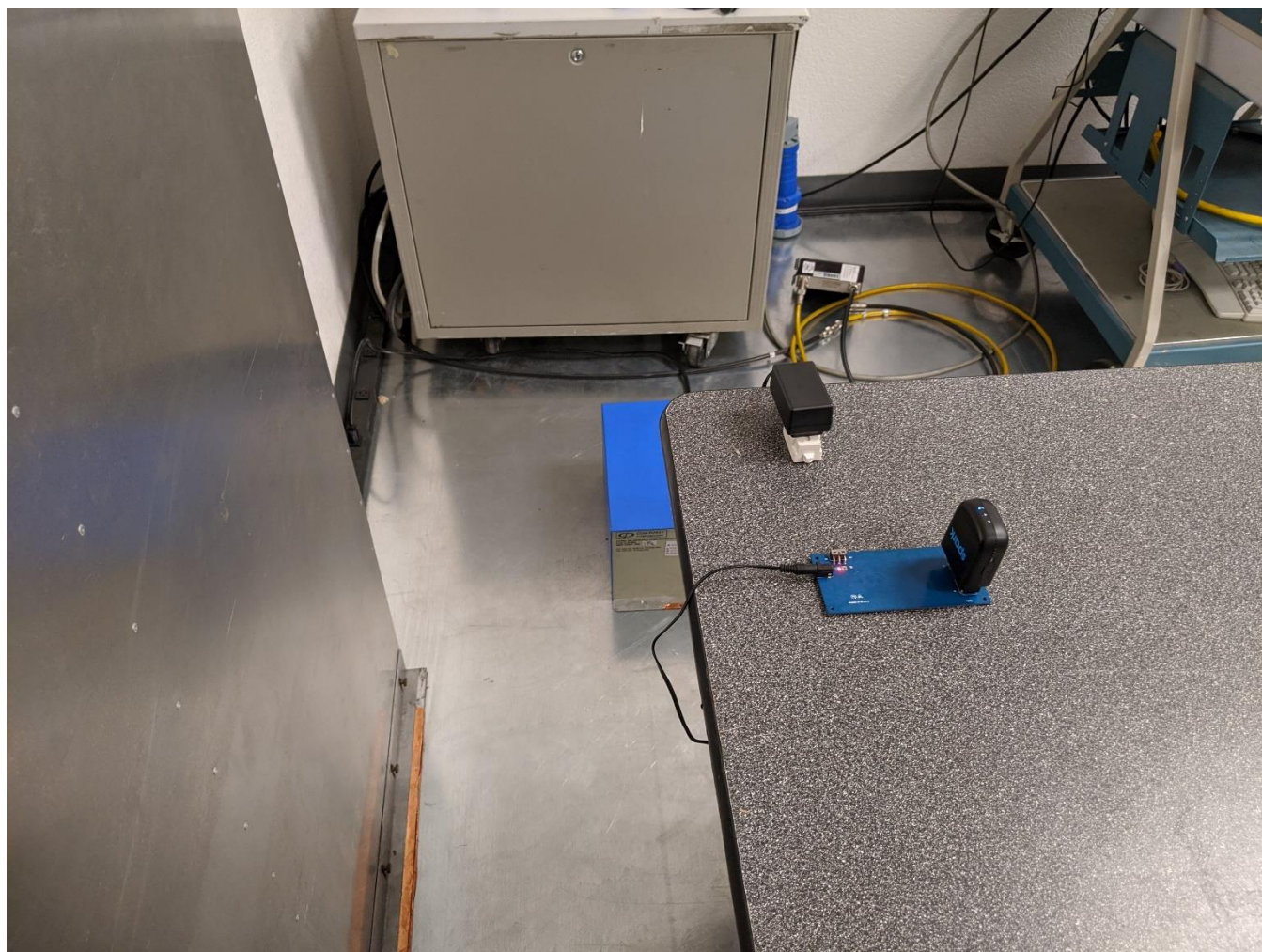


Figure 12 - Conducted Emissions Test Setup – Rear

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Appendix A

4 Test Plan

This test report is intended to follow this test plan outlined here in unless otherwise stated in this here report. The following test plan will give details on product information, standards to be used, test set ups and refer to TUV test procedures. The test procedures will give the steps to be taken when performing the stated test. The product information below came via client, product manual, product itself and or the internet.

4.1 General Information

Client	Harman International Industries Incorporated
Address	636 Ellis St
	Mountain View CA 94043, USA

4.2 EUT Designation

Model Name	HARMAN Spark
Model Number(s)	HSA-15UA-BR

4.3 EUT Description

Configuration	Description
1	Charging Mode (Wall Charger)
2	Battery Mode
Notes	Wall Charger is used to provide 12 VDC for testing only. Worse case of Charging Mode is reported.

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4.4 Equipment Under Test (EUT) Description

The HSA-15UA-BR, OBD II Telematics device is and OBD to monitor the statistics of a motor vehicle. The sensor contains radios which operate using the following technologies: WCDMA Bands 2/5, LTE Bands 2/4/5/12/14 and 802.11 b/g/n (only 20 MHz modulation).

4.5 Product Environment(s)

<input type="checkbox"/>	Domestic/Residential	<input type="checkbox"/>	Hospital
<input type="checkbox"/>	Light Industrial/Commercial	<input type="checkbox"/>	Small Clinic
<input type="checkbox"/>	Industrial	<input type="checkbox"/>	Doctor's office
<input type="checkbox"/>	Telecommunications Center	<input type="checkbox"/>	Other than Telecommunications Center
<input checked="" type="checkbox"/>	Other	Motor Vehicle	

*Check all that apply

4.6 Applicable Documents

Standards	Description
FCC Part15 Subpart B:2020	Radiated Emissions
FCC Part15 Subpart B:2020	Conducted Emissions

4.7 EUT Electrical Power Information

Name	# of Phases	Type	Input Voltage		AC Voltage Frequency	Current Max.	Power
			Min	Max			
Wall Charger	1 <input type="checkbox"/> 3 <input type="checkbox"/> None <input checked="" type="checkbox"/>	AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Host <input type="checkbox"/> Batteries <input type="checkbox"/>	-	-	120VAC	-	-
Battery	1 <input type="checkbox"/> 3 <input type="checkbox"/> None <input checked="" type="checkbox"/>	AC <input type="checkbox"/> DC <input checked="" type="checkbox"/> Host <input type="checkbox"/> Batteries <input type="checkbox"/>	-	12VDC	-	-	-
Notes	Wall Charger is used to provide 12 VDC only and not sold by customer.						

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4.8 EUT Clock/Oscillator Frequencies

Reference Designation	Speed (MHz)	Type
Block Diagram	19.8	<input checked="" type="checkbox"/> Oscillator <input type="checkbox"/> Microprocessor

4.8.1 Radiated Emissions, Upper Frequency

<input type="checkbox"/>	Less than 108 MHz	Scan to 1 GHz
<input type="checkbox"/>	Less than 500 MHz	Scan to 2 GHz
<input type="checkbox"/>	Less than 1000 MHz	Scan to 5 GHz
<input checked="" type="checkbox"/>	Greater than 1000 MHz	Scan to 5 th Harmonic or 40 GHz (whichever is lower)

4.9 Electrical Support Equipment

Reference Designation	Manufacturer	Model	Serial Number	BSMI #
N/A	N/A	N/A	N/A	N/A

4.10 Non - Electrical Support Equipment N/A

Reference Designation	Manufacturer	Model	Serial Number or Description (e.g., Type of Gas or Liquid)
N/A	N/A	N/A	N/A

4.11 EUT Equipment/Cabling Information N/A

EUT Port	Connected To	Cable Type			
		Length (Meters)	Shielded Yes / No	Bead Yes / No	
DC power	Testing System Charger	> 3m	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>	

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4.12 EUT Test Program

N/A

4.13 EUT Modes of Operation

All radios in idle mode and EUT side 1 orientation.

4.14 Monitoring of EUT during Testing

Once the device is activated, can check its status lights for network connectivity and other information.

- GPS – Solid if GPS is latched otherwise blinking
- WiFi – Blinking
- Network
 - > Solid green – great signal
 - > Solid blue – good signal
 - > Flashing Red – No network

4.15 EUT Configuration

4.15.1 Description

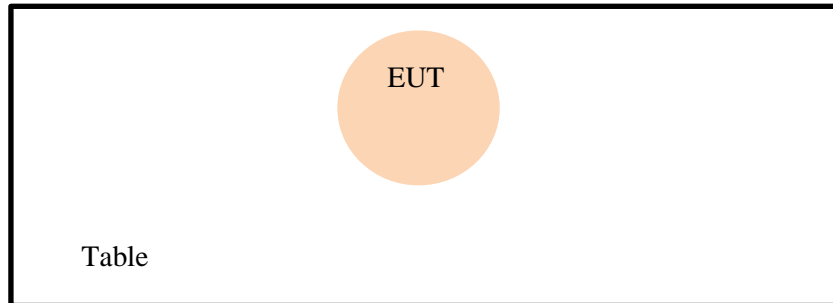
Configuration	Description
1	All radios in idle mode
Notes	

4.16 Subassemblies

Reference Designation	Manufacturer	Model No.	Revision	Serial No.	Description
N/A					

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4.16.1 Block Diagram



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4.17 Emissions

4.17.1 Radiated Emissions

4.17.1.1 Preliminary Radiated Emissions Test Setup

Standard	FCC Part15 Subpart B:2020			Procedure	ANSI C63.4
Limit	Class B	Emissions Verification	Emissions Under Limit		
Frequency Range	30 MHz – 18 GHz				
Scan #1	Final Scan 30 – 1000 MHz	Antenna Distance	3m	Detector	Peak Scan
Scan #2	Final Scan 1 – 18 GHz	Antenna Distance	3m	Detector	Peak Scan
Configuration	See Section 4.15				
Notes	None				

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4.17.1.2 Final Radiated Emissions Test Setup

Standard	FCC Part15 Subpart B:2020			Procedure	ANSI C63.4
Limit	Class B	Emissions Verification	Emissions Under Limit		
Frequency Range	30 MHz – 18 GHz				
Scan #1	Final Scan 30 – 1000 MHz	Antenna Distance	3m	Detector	Quasi Peak
Scan #2	Final Scan 1 – 18 GHz	Antenna Distance	3m	Detector	Peak/Average
Configuration	See Section 4.15				
Notes	None				

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4.17.2 Conducted Emissions**4.17.2.1 Final Conducted Emissions Test Setup**

Standard	FCC Part15 Subpart B:2020	Procedure	ANSI C63.4
Limit(s)	Class B: Quasi Peak Average	Emissions Verification	Emissions Under Limit
AC Mains Line	1 AC Line	LAN Cable(s)	None
Frequency Range	150KHz-30MHz	Detectors	Quasi Peak Average
Scan #1	120 VAC, 60 Hz	EUT Powered By	Wall Charger
Configuration	See Section 4.16		
Notes	None		

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Appendix B

5 Modification(s)

N/A

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END OF REPORT

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