Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15 Subpart B:2017

On

HSA-15

Prepared for:

Harman International Industries Incorporated
636 Ellis St
Mountain View CA 94043

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane, Ste. A
Pleasanton, CA 94566 U.S.A.

Revisions

Revision No.	Date	Reason for Change	Author
1	May 29, 2018	Original Document	N/A

Note: Latest revision report will replace all previous reports.

ATTESTATION OF TEST RESULTS

Client:	Harman International Industries Incorporated 633 Ellis St. Palo Alto, CA 94303 U.S.A	Sireesha Mallipeddi Tel. (408) 318 8245	
Model Name:	HSA-15	***Serial Number:***	bd41b8ac
Model Numbers:	HSA-15	***Date(s) Tested:***	April 12, 2018
Test Location:	TUV Rheinland of North America 1279 Quarry Lane, Ste. A Pleasanton, CA 94566 U.S.A. Tel. (925) 249-9123		
Test Specifications:	Emissions:	FCC Part 15 Subpart B:2017	
	Immunity:	N/A	
Test Result:	**The above product was found to be Compliant to the above test standard(s)**		

Prepared by: **Isaac Aguilar**	***Reviewed by:*** **Arndt Stocker**
	
May 24, 2017	May 24, 2017
Date Name Signature	***Date Name Signature***

Other aspects:	**None**

PLEASANTON

US1131	**Testing Cert #3331.02**	**Innovation, Science and Economic Development Canada (ISED) 2932M-1**	**1097 (A-0261)**

TABLE OF CONTENTS

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 12th 2018 Model: HSA-15, 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.

1.3 Summary of Test Results

Applicant	Harman International Industries Incorpated 633 Ellis St Mountain View CA 94043
Contact	Sireesha Mallipeddi
Tel.	+1 (408) 318 – 8245
E-mail	N/a
Description	OBD II Sensor
Model Name	HSA-15
Model Number	HSA-15
Serial Number	bd41b8ac
Input Power	12 VDC
Test Date(s)	April 12th s2018
Environment	Nominal Voltage/Nominal Temperature

Standards	Description	Severity Level or Limit	Criteria	Test Result
FCC Part 15 Subpart B:2017	Radiated Emissions	Class B 30 MHz - 18 GHz	Limit	Complies
FCC Part 15 Subpart B:2017	Conducted Emissions	Class B 150 kHz - 30 MHz	Limit	N/A**Error! Reference source not found.**

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 2305 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 (Pleasanton/Fremont Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

2.1.2 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 17025:2005 (Testing Certificate #3331.02). The Scope of Laboratory Accreditation includes emission and immunity testing. The accreditations are updated annually.

2.1.3 Innovation, Science and Economic Development Canada (ISED)

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 Santa Clara 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.

2.1.4 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 2305 Mission College Blvd, Ste. 105, Santa Clara, CA 95054, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0261

VCCI Registration No. for Santa Clara: A-0032

2.2 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 U.S.A. (Fremont is the Pleasanton Annex).

2.2.1 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 C63.4:2009 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).

2.2.2 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 kΩ 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 kΩ 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.

2.2.3 EMC Software – Fremont

Manufacturer	Name	Version	Test Type
Hewlett-Packard	HP85876B	A.01.00 970825	Radiated & Conducted Emissions
EMISoft	Vasona	5.0	Radiated & Conducted Emissions
ETS-Lindgren	TILE	4.2.A	Radiated Emissions > 1 GHz

Manufacturer	Name	Version	Test Type
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

2.2.4 EMC Software - Pleasanton

Manufacturer	Name	Version	Test Type
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

2.3 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 measurand. The fraction may be viewed as the coverage probability or level of confidence of the interval.

2.3.1 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:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

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

Sample radiated emissions calculation @ 30 MHz

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

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 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 ± 5.0%.	Per CISPR 16-4-2

2.3.3 Measurement Uncertainty Immunity

The estimated expanded uncertainty for ESD immunity measurements is ± 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 ± 5.84%.	Per IEC 61000-4-4
The estimated expanded uncertainty for surge immunity measurements is ± 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 ± 11.6%.	Per IEC 61000-4-8
The estimated expanded uncertainty for voltage variation and interruption measurements is ± 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.

2.4 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 17025:2005. Equipment calibration records are kept on file at the test facility.

2.5 Measurement Equipment Used

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yy	Next Cal mm/dd/yy	Test
EMI Receiver	Rohde & Schwarz	ESIB40	839283/005	01/16/2017	01/16/2018	CE
Transient Limiter	HP	11947A	2820A00154	01/16/2017	01/16/2018	CE
LISN	Com-Power	LI-215	12111	01/16/2017	01/16/2018	CE
EMI Receiver	Agilent	N9038A	MY52260210	01/16/2017	01/16/2018	RE
Preamplifier	Sonoma Instruments	310	185516	01/16/2017	01/16/2018	RE
Bilog Antenna	Sunol Sciences	JB3	A102606	06/15/2016	06/15/2018	RE
Signal Generator	HP	8648C	3642U01274	01/16/2017	01/16/2018	RI
Bilog Antenna	EMCO	3142	9701-1117	NCR	NCR	RI
Antenna, Horn	A.H. Systems	SAS-571	725	NCR	NCR	RI
Amp. System, , 10 kHz - 1 GHz, 500 W	IFI	SMX5005	K332-1106	NCR	NCR	RI
AR Wide Band Amplifier	AR	60S1G3	27207	NCR	NCR	RI
RF Power Meter	Agilent	E4418A	MY45103902	01/19/2017	01/19/2018	RI
Power Sensor	Agilent	8482A	US37292296	01/19/2017	01/19/2018	RI
Field Probe	Holaday	4455	104653	06/30/2016	06/30/2017	RI
ESD Simulator	Schaffner	NSG 435	005185	01/20/2017	01/20/2018	ESD
EMC-Test System	TESEQ	NSG 3060	1437.215.204	01/19/2017	01/19/2018	EFT/SI/VDSI
Capacitive Clamp	Haefely	093506.1	082039-02	01/19/2016	01/19/2017	EFT
Signal Generator	HP	8656B	2630A4476	01/18/2016	01/18/2017	CI
RF Power Amplifier	IFI	404P	A017-0297	NCR	NCR	CI
Directional Coupler	Werlatone	C5086-10	38507	01/18/2017	01/18/2018	CI
6dB High Power Attenuator	Aeroflex/Weinschel	40-6-33	PZ638	01/18/2017	01/18/2018	CI
RF Power Meter	Agilent	E4418B	MY45103859	01/19/2017	01/19/2018	CI
Power Sensor	HP	8481A	US37295801	01/19/2017	01/19/2018	CI
CDN	FCC	FCC-801-M3-32A	06069	01/16/2017	01/16/2018	CI
Injection Probe	Fischer	F-120-9B	12	01/17/2017	01/17/2018	CI
Current Probe	Fischer	F-35	382	01/17/2017	01/17/2018	CI
Magnetic field generator	FCC	F1000-4-8-G-125 A	06025	CBU	VBU	MF
Mag Field Immunity Loop	FCC	F1000-4-8/9/10-L-1M	06015	CBU	VBU	MF
Electromagnetic field meter	Walker Scientific	ELF-60D/66D	K72488050605	01/26/2017	01/26/2018	MF

Note: CE=Conducted Emissions, CI=Conducted Immunity, DP=Disturbance Power, EFT=Electrical Fast Transients, ESD=Electrostatic Discharge, FLI=Flicker, HAR=Harmonics, MF=Magnetic Field Immunity, NCR=No Calibration Required, RE=Radiated Emissions, RI=Radiated Immunity, SI=Surge Immunity, VDSI=Voltage Dips and Short Interruptions

3 Product Information

3.1 Product Description

See Section 6.4.

3.2 Equipment Modifications

None

3.3 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.

3.4 External Photos

Figure 1: External Photo (Front)

Figure 2: External Photo (Bottom)

Figure 3: External Photo (Side 1)

Figure 4: External Photo (Side 2)

Figure 5: External Photo (Side 3)

Figure 6: External Photo (side 4)

4 Emissions

4.1 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.

4.1.1 Overview of Test

Results	**Complies** (as tested per this report)			**Test Date(s)**		April 12, 2018	
Standard	FCC Part 15 Subpart B:2017						
Model Number	HAS-15			**Serial #**		bd41b8ac	
Configuration	See test plan for details.						
Test Setup	Tested in the 5-meter chamber, placed on turntable: see test plan for details.						
EUT Powered By	12VDC						
Environmental Conditions	April 12, 2018	**Temp**	21º C	**Humidity**	34%	**Pressure**	1002 mbar
	April 12, 2017	**Temp**	21º C	**Humidity**	34%	**Pressure**	1003 mbar
Frequency Range	30 - 18000 MHz						
Perf. Criteria	Class B			**Perf. Verification**		Readings Under Limit	
Mod. to EUT	Refer to Section 3.2			**Test Performed By**		Isaac Aguilar	

4.1.2 Test Procedure

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 - 18000 MHz was investigated for radiated emissions.

4.1.3 Deviations

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

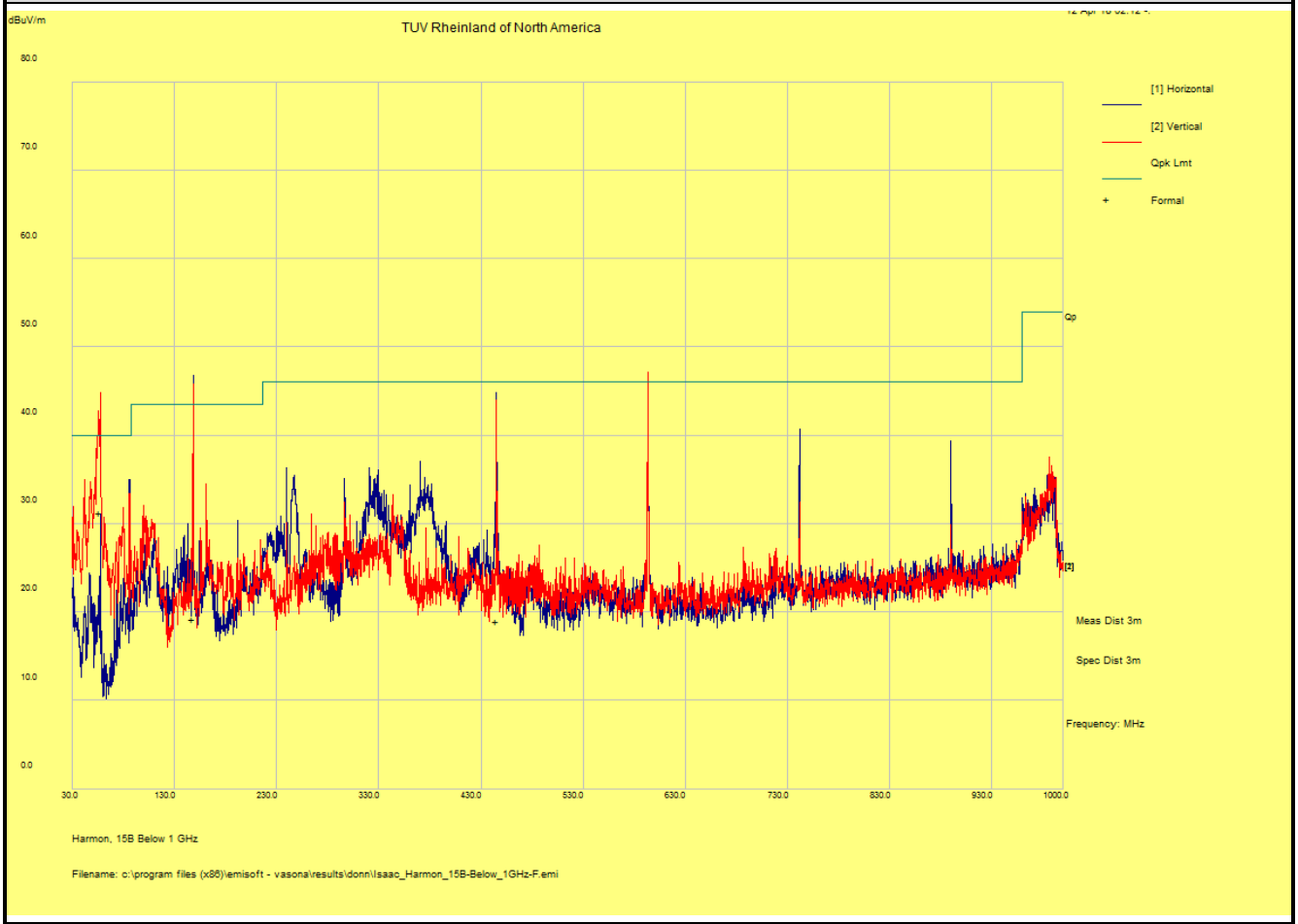
4.1.4 Final Test

All final radiated emissions measurements were below the specification limits.

4.1.5 Plots

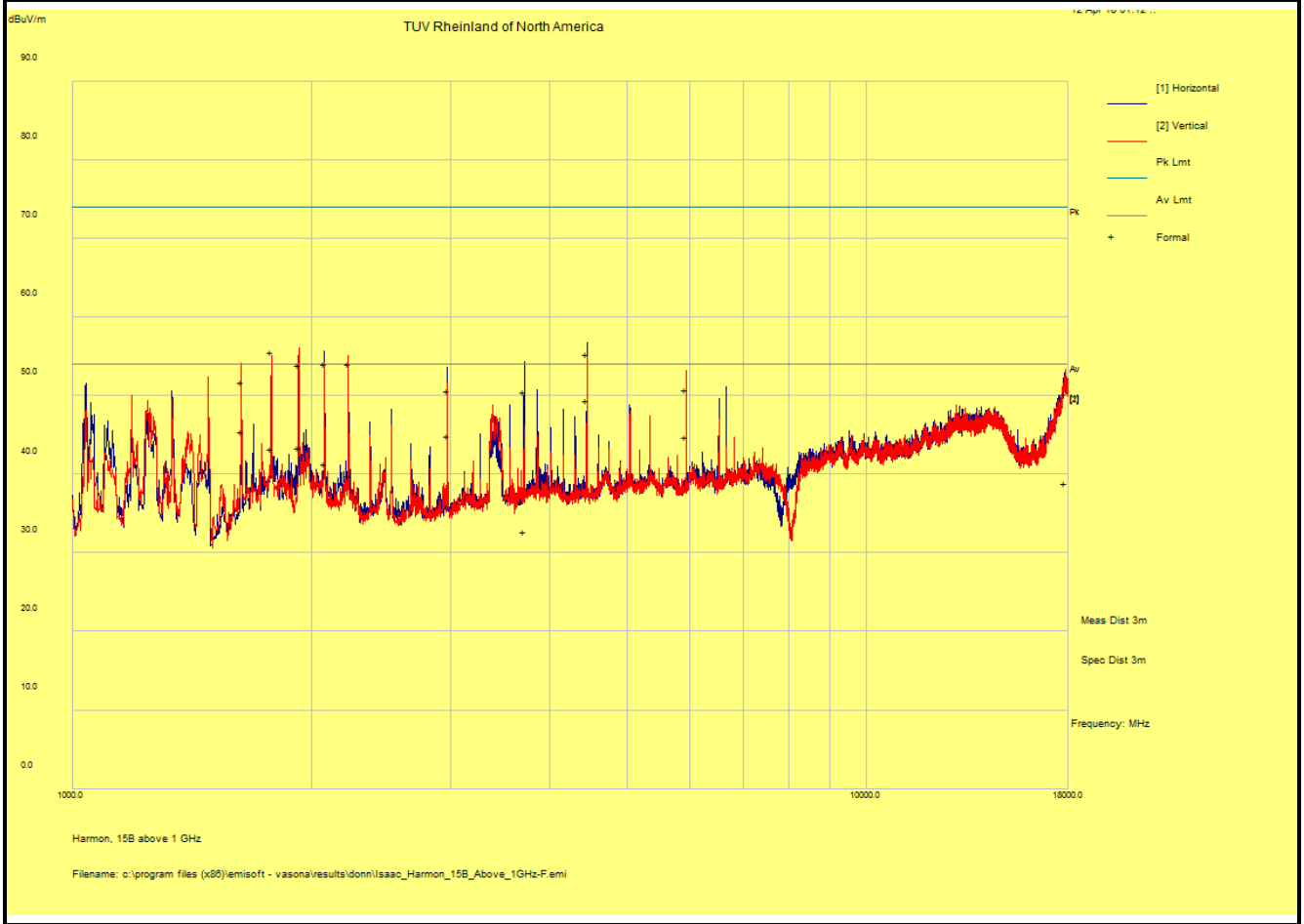
Note: 110V/ 60Hz

30 MHz to 1 GHz Radiated Emissions Full Scan
Vertical / Horizontal



Notes:

1 GHz to 18 GHz Radiated Emissions Full Scan
Vertical / Horizontal



Notes:

4.1.6 Final Tabulated Data – 30 - 1000 MHz

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµ/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB
593.39781	51.05	3.35	-9	45.4	Quasi Max	V	138	107	46	-0.6
85.895313	57.29	2.5	-20.95	38.84	Quasi Max	H	243	35	40	-1.16
57.080625	49.79	2.41	-20.87	31.33	Quasi Max	V	212	0	40	-8.67
41.865938	42.07	2.34	-15.29	29.12	Quasi Max	V	122	0	40	-10.88
148.42156	32.15	2.66	-15.64	19.17	Quasi Max	H	147	179	43.5	-24.33
445.05156	27.11	3.16	-11.24	19.04	Quasi Max	H	193	314	46	-26.96

4.1.7 Final Tabulated Data – Above 1 GHz

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB
4450.51	65.17	3.4	-19.12	49.45	Average Max	H	236	8	54	-4.56
1631.74	69.36	2.06	-26.02	45.4	Average Max	V	242	152	54	-8.6
2966.95	63.55	2.8	-21.52	44.83	Average Max	H	126	124	54	-9.17
5933.96	58.58	3.9	-17.67	44.81	Average Max	V	172	300	54	-9.19
1928.65	65.18	2.26	-24.08	43.36	Average Max	V	220	148	54	-10.65
1780.23	65.81	2.16	-24.76	43.21	Average Max	H	103	152	54	-10.79
2077.04	62.92	2.3	-23.84	41.37	Average Max	H	104	224	54	-12.63
2225.14	61.23	2.4	-23.75	39.88	Average Max	V	100	226	54	-14.12
17841.59	35.74	6.8	-3.69	38.85	Average Max	V	207	196	54	-15.15
1780.23	78.17	2.16	-24.76	55.56	Peak Max	H	103	152	74	-18.44
4450.51	70.96	3.4	-19.12	55.24	Peak Max	H	236	8	74	-18.76
2225.14	75.42	2.4	-23.75	54.07	Peak Max	V	100	226	74	-19.93
2077.04	75.59	2.3	-23.84	54.04	Peak Max	H	104	224	74	-19.96
1928.65	75.69	2.26	-24.08	53.87	Peak Max	V	220	148	74	-20.13
3708.77	49.03	3.1	-19.41	32.72	Average Max	H	248	112	54	-21.28
1631.74	75.74	2.06	-26.02	51.79	Peak Max	V	242	152	74	-22.21
5933.96	64.59	3.9	-17.67	50.82	Peak Max	V	172	300	74	-23.18
2966.95	69.37	2.8	-21.52	50.65	Peak Max	H	126	124	74	-23.35
3708.77	66.79	3.1	-19.41	50.48	Peak Max	H	248	112	74	-23.52
17841.59	47.13	6.8	-3.69	50.24	Peak Max	V	207	196	74	-23.76

4.1.8 Photos

Figure 2: 30 - 1000 MHz Radiated Emissions Test Setup - Front

Figure 3: 30 - 1000 MHz Radiated Emissions Test Setup – Back

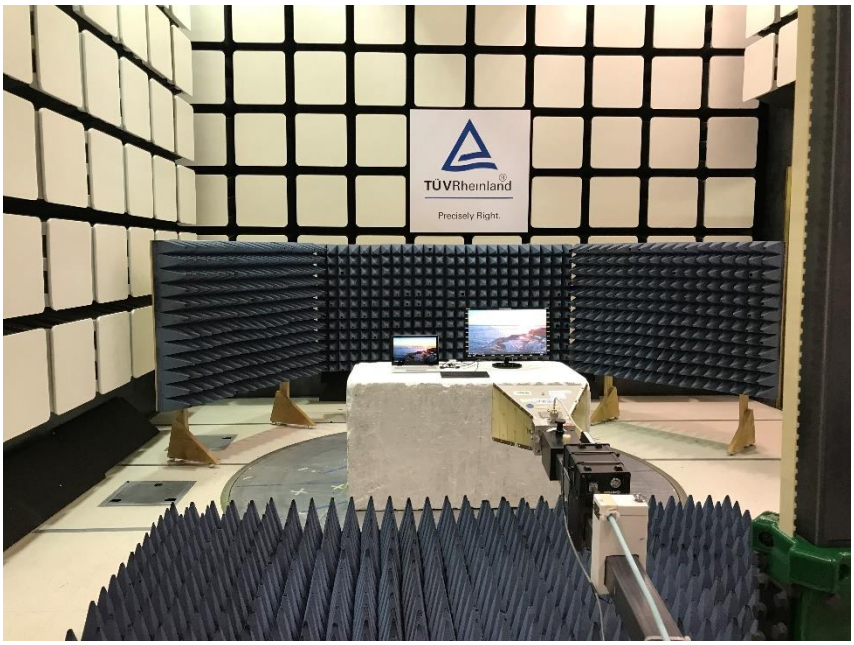


Figure 4: Above 1 GHz Radiated Emissions Test Setup - Front

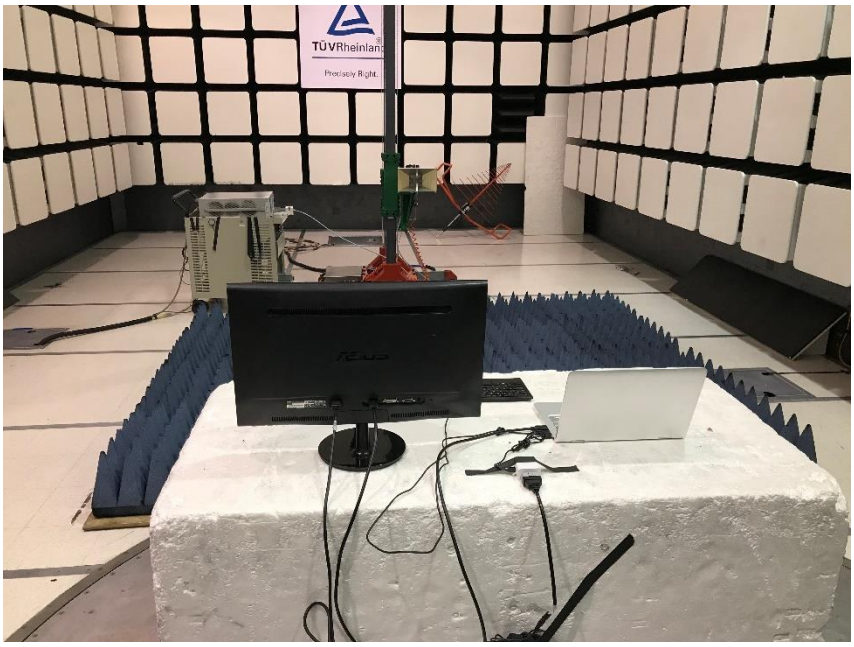


Figure 5: Above 1 GHz Radiated Emissions Test Setup – Back

4.2 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.

4.2.1 Final Test

N/A since source is DC power from a motor vehicle.

Appendix A

5 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.

5.1 General Information

Client	Suitable Technologies, Inc.
Address	921 E. Charleston Road
	Palo Alto, CA 94303 U.S.A
Contact Person	Conrad Schapira
Telephone	(650) 293-0545
e-mail	cschapira@suitabletech.com

5.2 EUT Designation

Model Name	HSA-15
Model Number(s)	HSA-15

5.3 EUT Description

Smart Presence System

5.4 Equipment Under Test (EUT) Description

The HSA-15 OBD II Sensor 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 and 802.11 b/g/n (only 20 MHz modulation).

5.5 Product Environment(s)

☐	**Domestic/Residential**		☐	**Hospital**
☐	**Light Industrial/Commercial**		☐	**Small Clinic**
☐	**Industrial**		☐	**Doctor's office**
☐	**Telecommunications Center**		☐	**Other than Telecommunications Center**
☒	**Other**	**Motor Vehicle**		

*Check all that apply

5.6 Applicable Documents

Standards	Description
FCC Part 15 Subpart B:2017	Radiated Emissions
FCC Part 15 Subpart B:2017	Conducted Emissions

5.7 EUT Electrical Power Information

Name	# of Phases	Type	Input Voltage		AC Voltage Frequency	Current Max.	Power
			Min	Max			
Wall Charger	1 ☐ 3 ☐ None ☒	AC ☐ DC ☐ Host ☐ Batteries ☐	--	--	-- to -- Hz	-- A	--
Battery	1 ☐ 3 ☐ None ☒	AC ☐ DC ☒ Host ☐ Batteries ☐	--	--	NA	-- A	--
Notes	None						

5.8 EUT Clock/Oscillator Frequencies

Reference Designation	Speed (MHz)	Type
Block Diagram	19.8 MHz	☒ Oscillator ☐ Microprocessor

5.8.1 Radiated Emissions, Upper Frequency

☐	**Less than 108 MHz**	**Scan to 1 GHz**
☐	**Less than 500 MHz**	**Scan to 2 GHz**
☐	**Less than 1000 MHz**	**Scan to 5 GHz**
☒	**Greater than 1000 MHz**	**Scan to 5th Harmonic or 40 GHz (whichever is lower)**

5.9 Electrical Support Equipment

Reference Designation	Manufacturer	Model	Serial Number	BSMI #
N/A				

5.10 Non - Electrical Support Equipment

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

5.11 EUT Equipment/Cabling Information

EUT Port	Connected To	Cable Type				
		Length (Meters)	Shielded Yes / No		Bead Yes / No	
DC Power	Testing System Charger	>3	☐	☒	☐	☒

5.12 EUT Test Program

N/A

5.13 EUT Modes of Operation

All radios in idle mode and EUT side 1 orientation.

5.14 Monitoring of EUT during Testing – N/A

A call will be established from the test computer running the beam client software to the test device. During the test the client application will display two video feeds from the devices cameras. This should be monitored for any interference or signal loss. Furthermore the 2 way audio can be monitored for any interference.

Since the connection from the computer to the Beam device is routed out to the internet and back there are chances that the call can experience interference from sources outside or beyond what is being tested ie. Internet bandwidth degradation.

In some cases of call loss or signal degradation, the test may need to be executed again.

5.15 EUT Configuration

5.15.1 Description

Configuration	Description
1	All radios in idle mode
Notes None.	

5.16 Emissions

5.16.1 Radiated Emissions

5.16.1.1 Final Radiated Emissions Test Setup

Standard	FCC Part 15 Subpart B:2017			**TUV Test Procedure**	MS-0005192
Limit	Class B	**Emissions Verification**		Emissions Under Limit	
Frequency Range	30 - 18000 MHz				
Scan #1	30 – 1000 MHz at	**Antenna Distance**	3 m	**Detector**	Quasi Peak
Scan #2	1 – 18 GHz	**Antenna Distance**	3 m	**Detector**	Average
Configuration	See Section 6.15				
Notes	None				

5.16.2 Conducted Emissions – N/A

5.16.2.1 Final Conducted Emissions Test Setup

Standard	FCC Part 15 Subpart B:2017	**TUV Test Procedure**	MS-0005180
Limit(s)	Class B: Quasi Peak Average	**Emissions Verification**	Emissions Under Limit
AC Mains Line	1 AC Line	**LAN Cable(s)**	NA
Frequency Range	Class B 150 kHz - 30 MHz	**Detectors**	Quasi Peak Average
Scan #1	100 Vac, 50 Hz	**EUT Powered By**	See Section 6.8
Scan #2	110 Vac, 60 Hz	**EUT Powered By**	See Section 6.8
Scan #3	220 Vac, 60 Hz	**EUT Powered By**	See Section 6.8
Scan #4	230 Vac, 50 Hz	**EUT Powered By**	See Section 6.8
Configuration	See Section 6.15		
Notes	Test Not Applicable sense device doesn't connect to AC Mains.		