

FCC Part 15B Measurement and Test Report

For

mophie LLC

6244 Technology Ave. Kalamazoo, MI 49009 U.S.A

FCC ID: 2ACWB-SS6K

Test Rule(s): FCC Part 15 Subpart B

Product Description: mophie spacestation

Tested Model: SPSTION-32GB-BLK

Report No.: STR15028105I-2

Tested Date: 2015-02-27 to 2015-03-03

Issued Date: 2015-03-05

Tested By: Jason Su / Engineer

Reviewed By: Lahm Peng / EMC Manager

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: mophie LLC
Address of applicant: 6244 Technology Ave. Kalamazoo, MI 49009 U.S.A

Manufacturer: mophie LLC
Address of manufacturer: 6244 Technology Ave. Kalamazoo, MI 49009 U.S.A

General Description of EUT	
Product Name:	mophie spacestation
Trade Name:	mophie
Model No.:	SPSTION-32GB-BLK
Adding Model(s):	SPSTION-64GB-BLK, SPSTION-128GB-BLK
<i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model SPSTION-32GB-BLK, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Rated Voltage:	Input: DC5V ; Output:DC5V
Rated Current:	Input:2.1A ; Output: 2.4A
Rated Power:	/
Power Adapter Model:	PSAI10R-050Q
Lowest Internal Frequency:	12MHz
Highest Internal Frequency:	84MHz
Classification of ITE:	Class B

1.2 Test Standards

The following report is prepared on behalf of the mophie LLC in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Charging	/
TM2	Discharging	/
TM3	Downloading	/

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	0.8	Shielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	LR-63C8R
Adapter	DELL	PSAI10R-050Q	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.107 (a)	Conducted Emissions	Compliant
§ 15.109 (a)	Radiated Emissions	Compliant

N/A: not applicable

3. Conducted Emissions

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

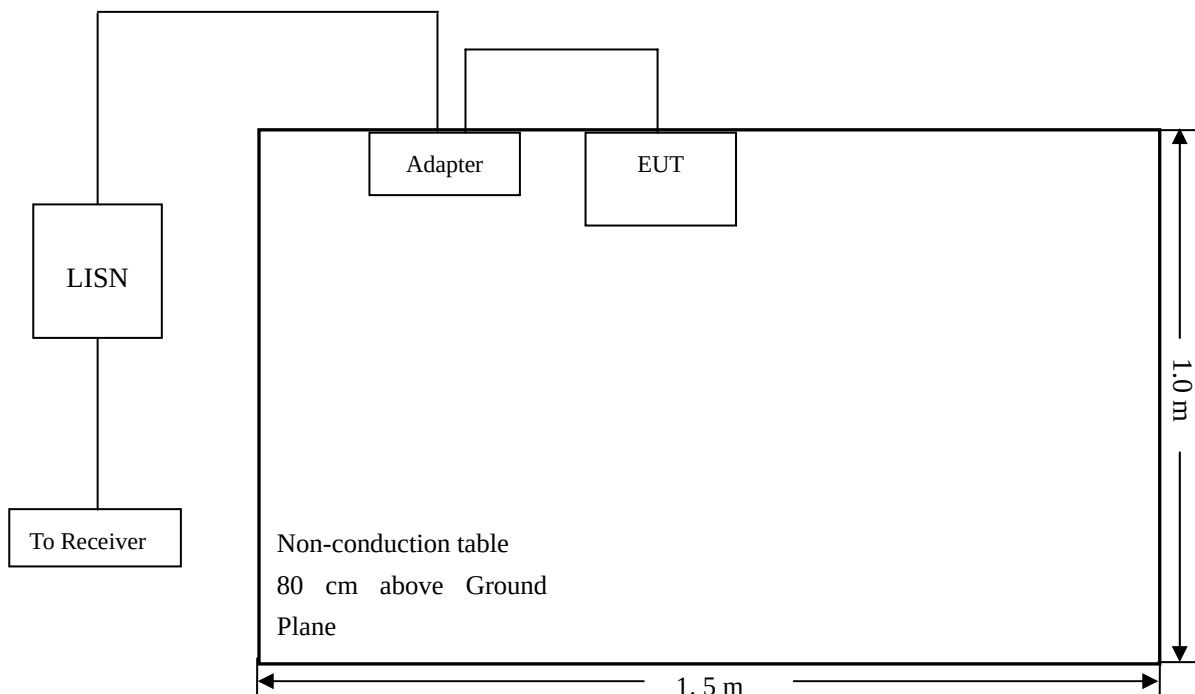
3.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2014-05-28	2015-05-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2014-05-28	2015-05-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2014-05-28	2015-05-27

3.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

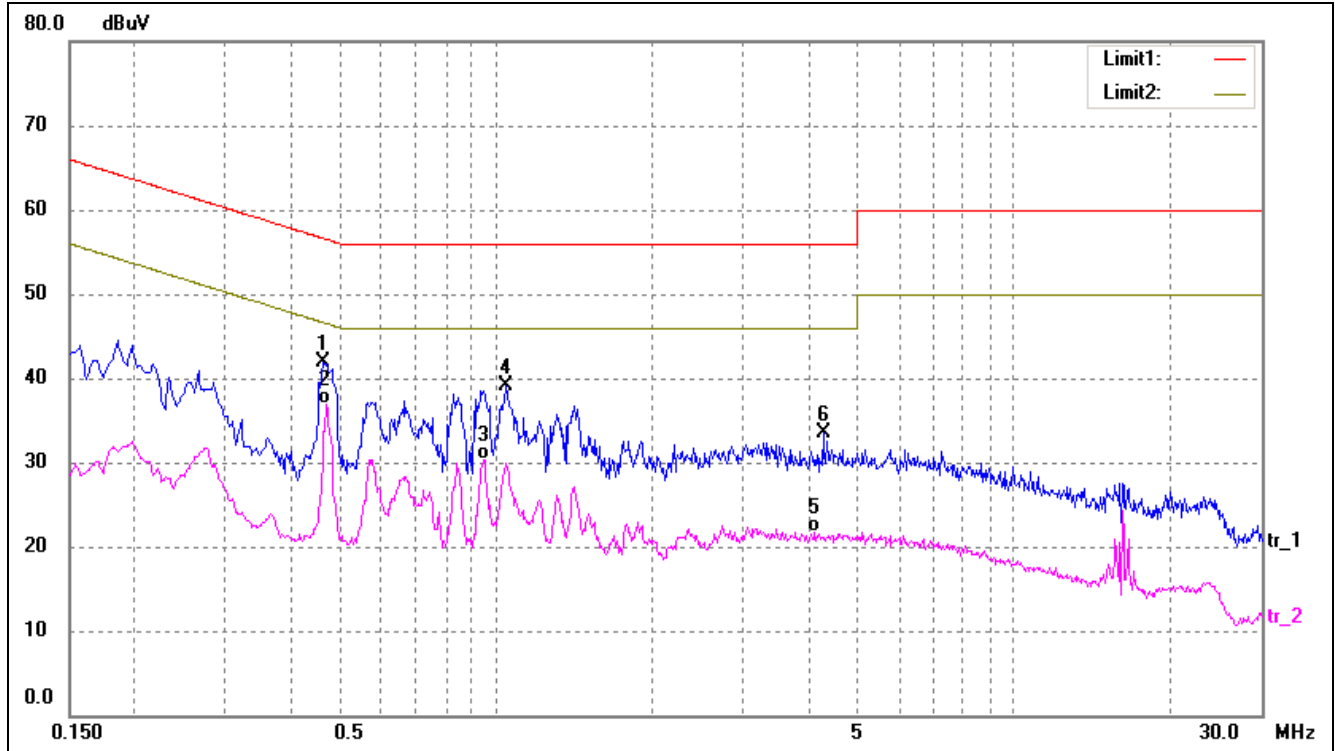
-9.30 dB at **4.2420 MHz** in the *Line, Peak* detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

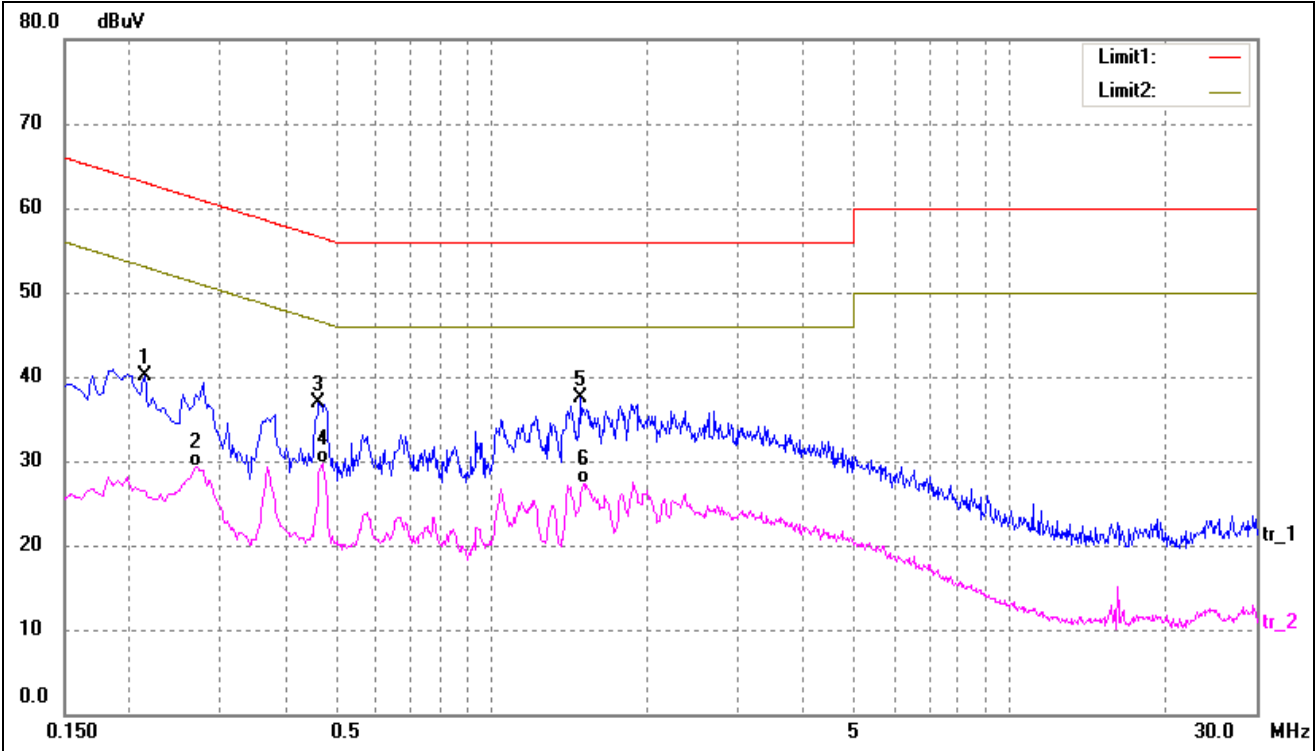
EUT: mophie spacestation
 Tested Model: SPSTION-32GB-BLK
 Operating Condition: TM1
 Comment: AC 120V/60Hz; Adapter DC5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.4620	32.48	9.50	41.98	56.66	-14.68	peak
2	0.4700	27.46	9.50	36.96	46.51	-9.55	AVG
3	0.9460	20.43	9.95	30.38	46.00	-15.62	AVG
4	1.0460	29.15	10.00	39.15	56.00	-16.85	peak
5	4.1180	11.71	10.00	21.71	46.00	-24.29	AVG
6	4.2700	23.53	10.00	33.53	56.00	-22.47	peak

Test Specification: Line

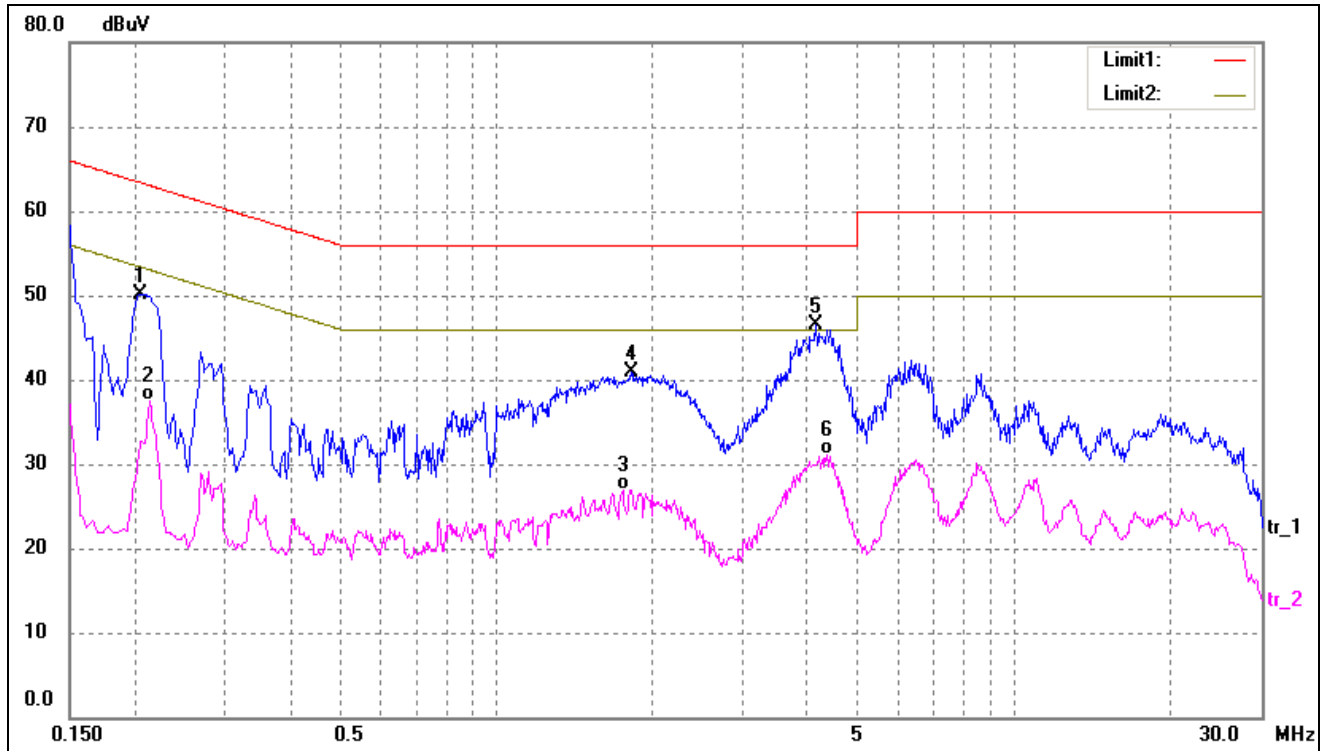


No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.2140	30.61	9.50	40.11	63.05	-22.94	peak
2	0.2700	19.77	9.50	29.27	51.12	-21.85	AVG
3	0.4660	27.37	9.50	36.87	56.58	-19.71	peak
4	0.4740	20.13	9.50	29.63	46.44	-16.81	AVG
5	1.4820	27.42	10.00	37.42	56.00	-18.58	peak
6	1.5140	17.34	10.00	27.34	46.00	-18.66	AVG

Plot of Conducted Emissions Test Data

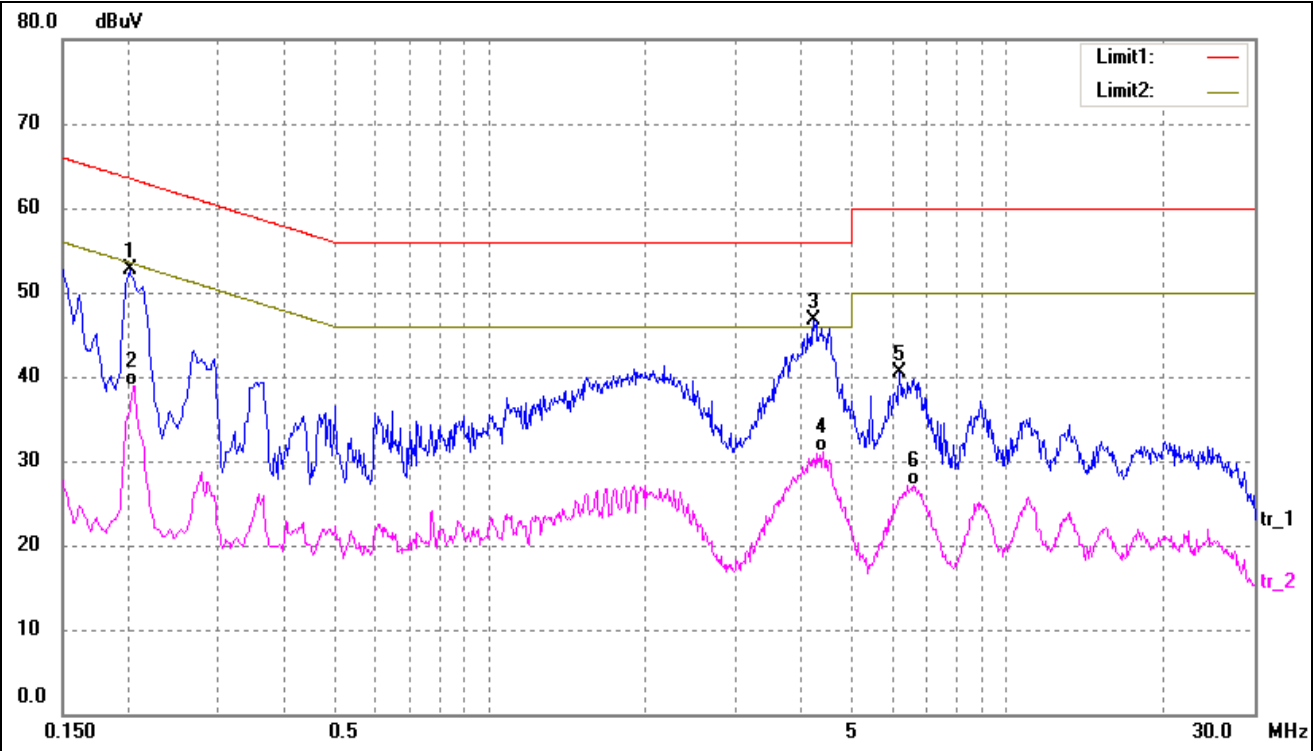
EUT: *mophie spacestation*
 Tested Model: *SPSTION-32GB-BLK*
 Operating Condition: *TM3*
 Comment: *AC 120V/60Hz;USB 5V*

Test Specification: *Neutral*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.2060	40.61	9.50	50.11	63.37	-13.26	peak
2	0.2140	27.97	9.50	37.47	53.05	-15.58	AVG
3	1.7540	16.93	10.00	26.93	46.00	-19.07	AVG
4	1.8220	30.87	10.00	40.87	56.00	-15.13	peak
5	4.1380	36.48	10.00	46.48	56.00	-9.52	peak
6	4.3500	21.05	10.00	31.05	46.00	-14.95	AVG

Test Specification: Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.2020	43.20	9.50	52.70	63.52	-10.82	peak
2	0.2060	29.44	9.50	38.94	53.36	-14.42	AVG
3	4.2420	36.70	10.00	46.70	56.00	-9.30	peak
4	4.4140	21.04	10.00	31.04	46.00	-14.96	AVG
5	6.1900	30.42	10.00	40.42	60.00	-19.58	peak
6	6.6100	17.07	10.00	27.07	50.00	-22.93	AVG

4. Radiated Emissions

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

4.2 Test Equipment List and Details

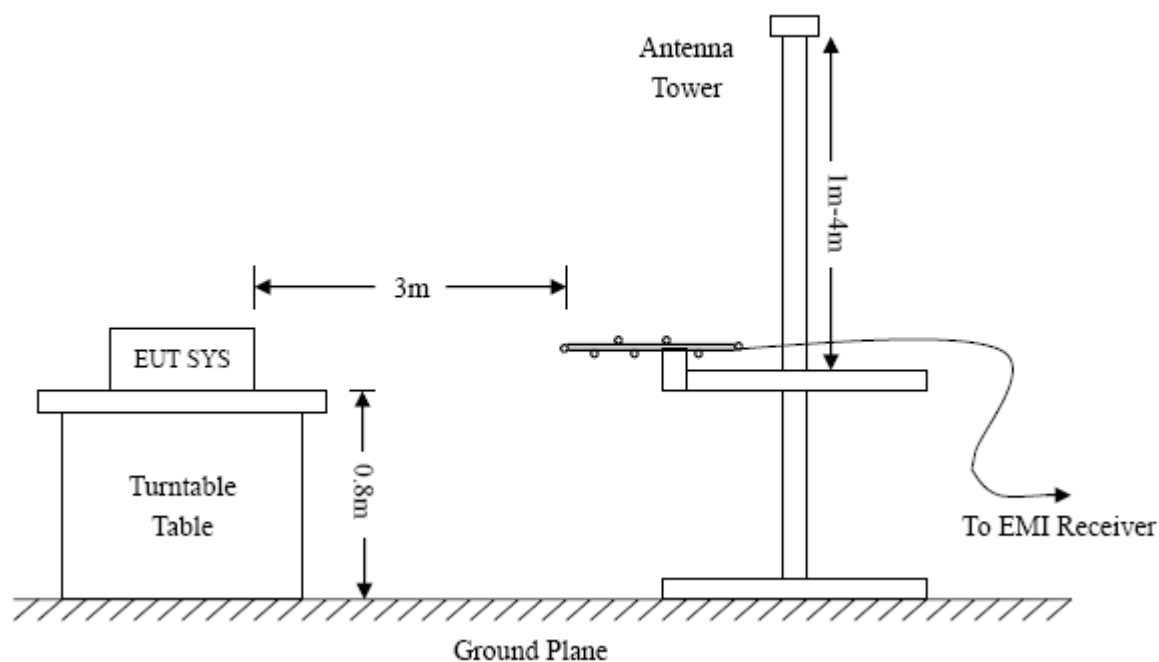
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2014-05-24	2015-05-23

4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.109 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



4.4 Test Receiver Setup

Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

4.6 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

4.7 Summary of Test Results/Plots

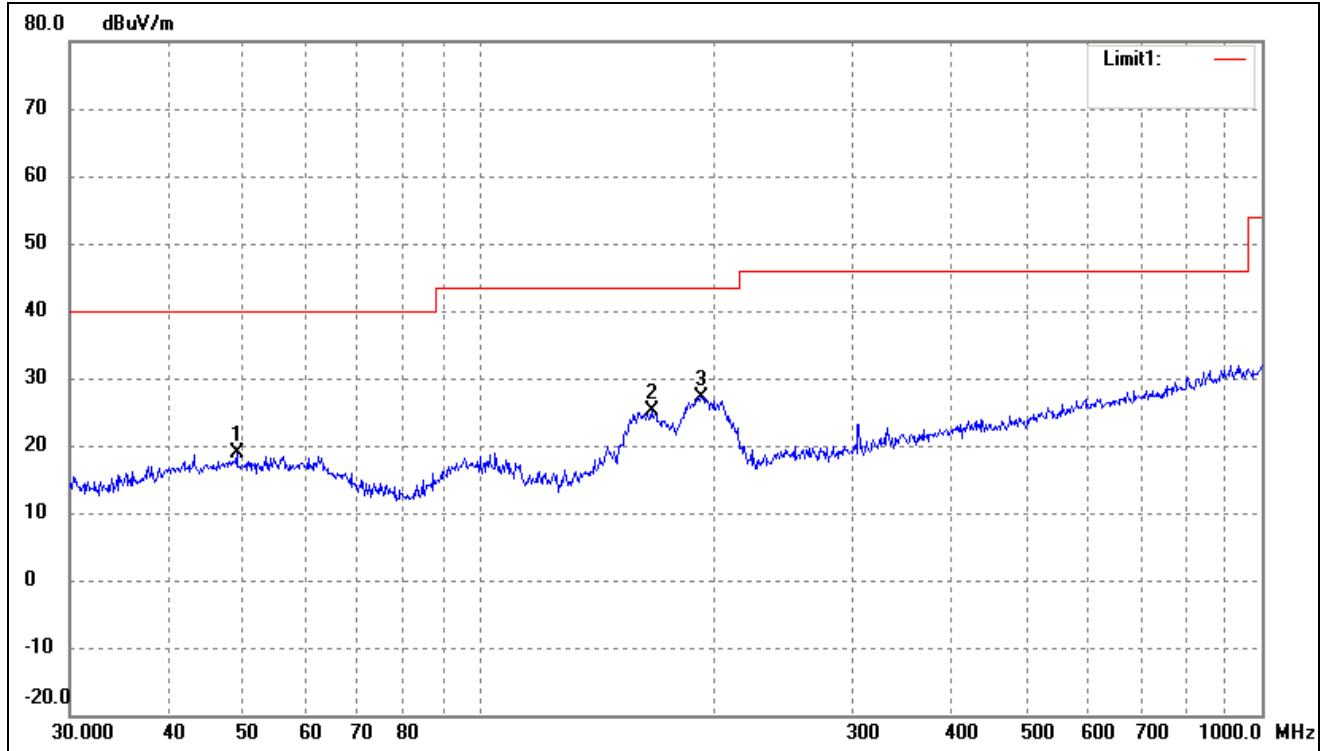
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-4.15 dB at 480.5276 MHz in the Horizontal polarization, 9 kHz to 1 GHz, 3Meters

Plot of Radiated Emissions Test Data

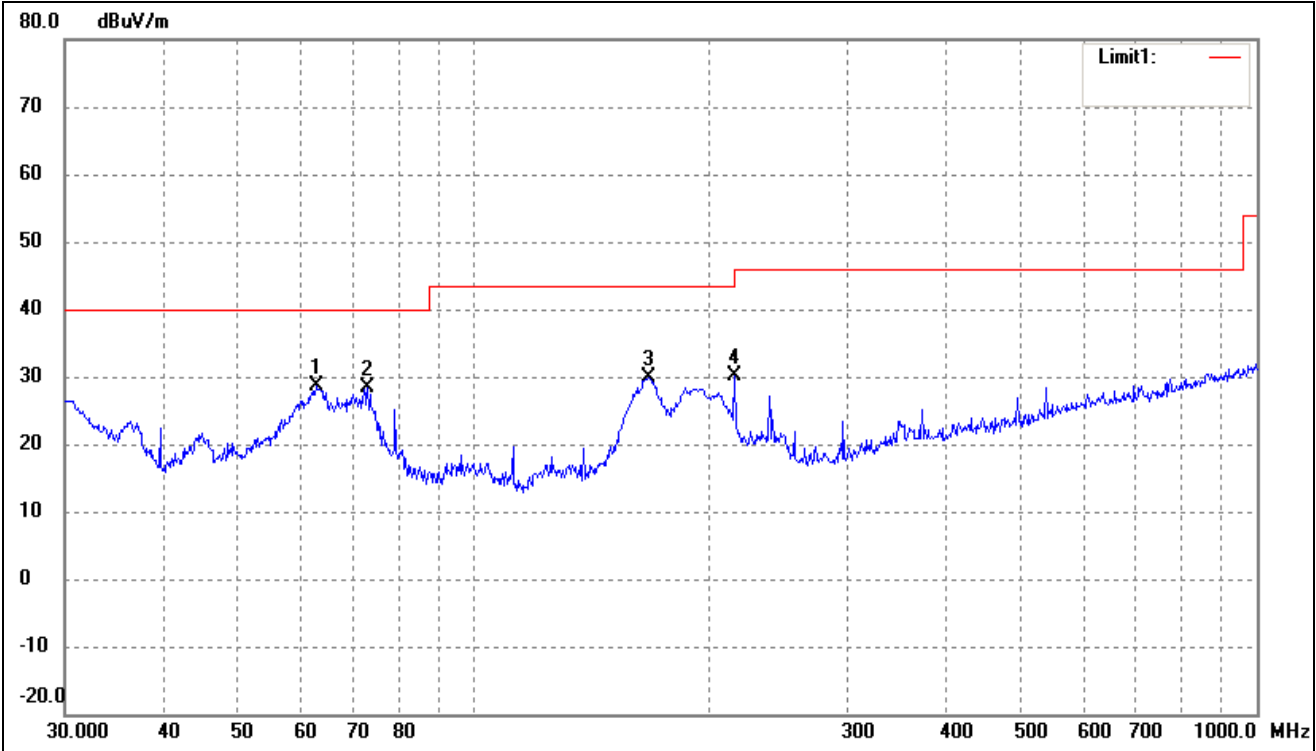
EUT: mophie spacestation
 Tested Model: SPSTION-32GB-BLK
 Operating Condition: TM1
 Comment: AC 120V/60Hz; Adapter DC5V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	49.0145	26.41	-7.44	18.97	40.00	-21.03	126	100	peak
2	166.0680	37.23	-12.03	25.20	43.50	-18.30	201	100	peak
3	192.4186	36.98	-9.81	27.17	43.50	-16.33	98	100	peak

Test Specification: Vertical

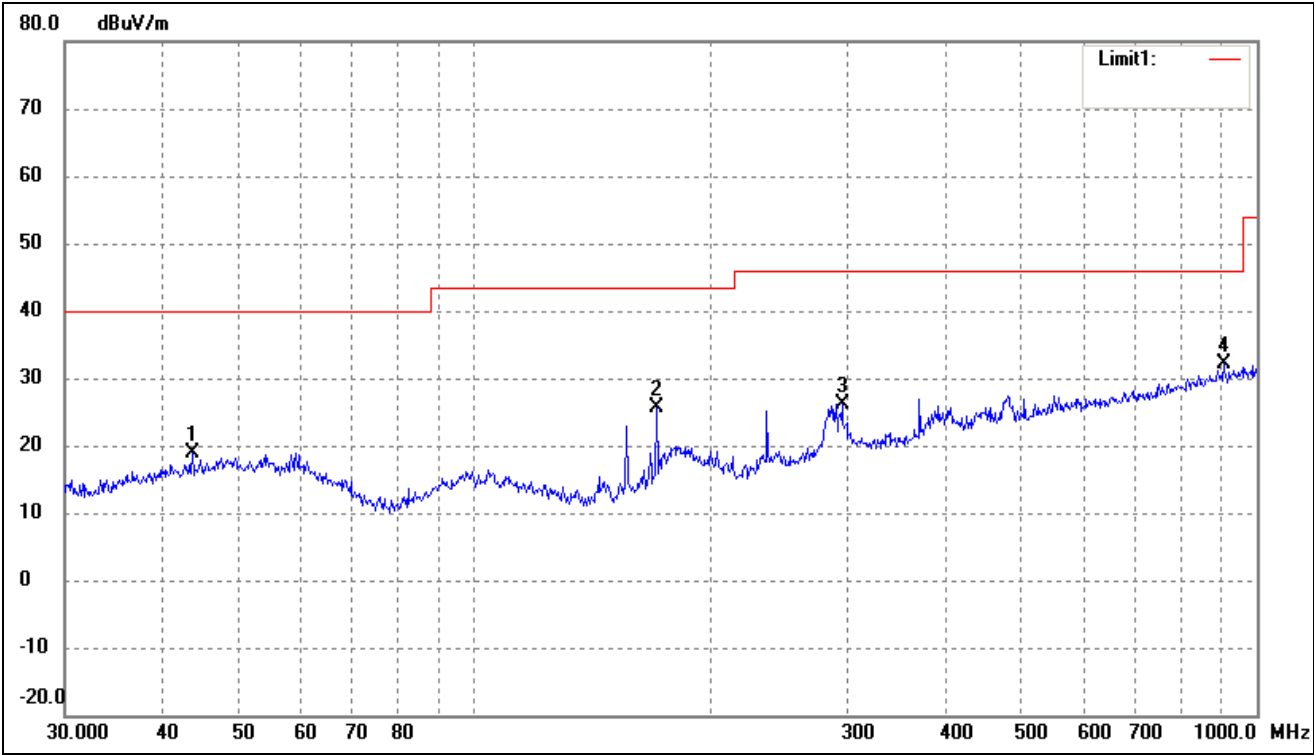


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	62.8708	38.08	-9.50	28.58	40.00	-11.42	96	100	peak
2	73.1025	40.99	-12.65	28.34	40.00	-11.66	125	100	peak
3	167.2368	41.87	-11.98	29.89	43.50	-13.61	36	100	peak
4	215.2678	39.02	-8.95	30.07	43.50	-13.43	231	100	peak

Plot of Radiated Emissions Test Data

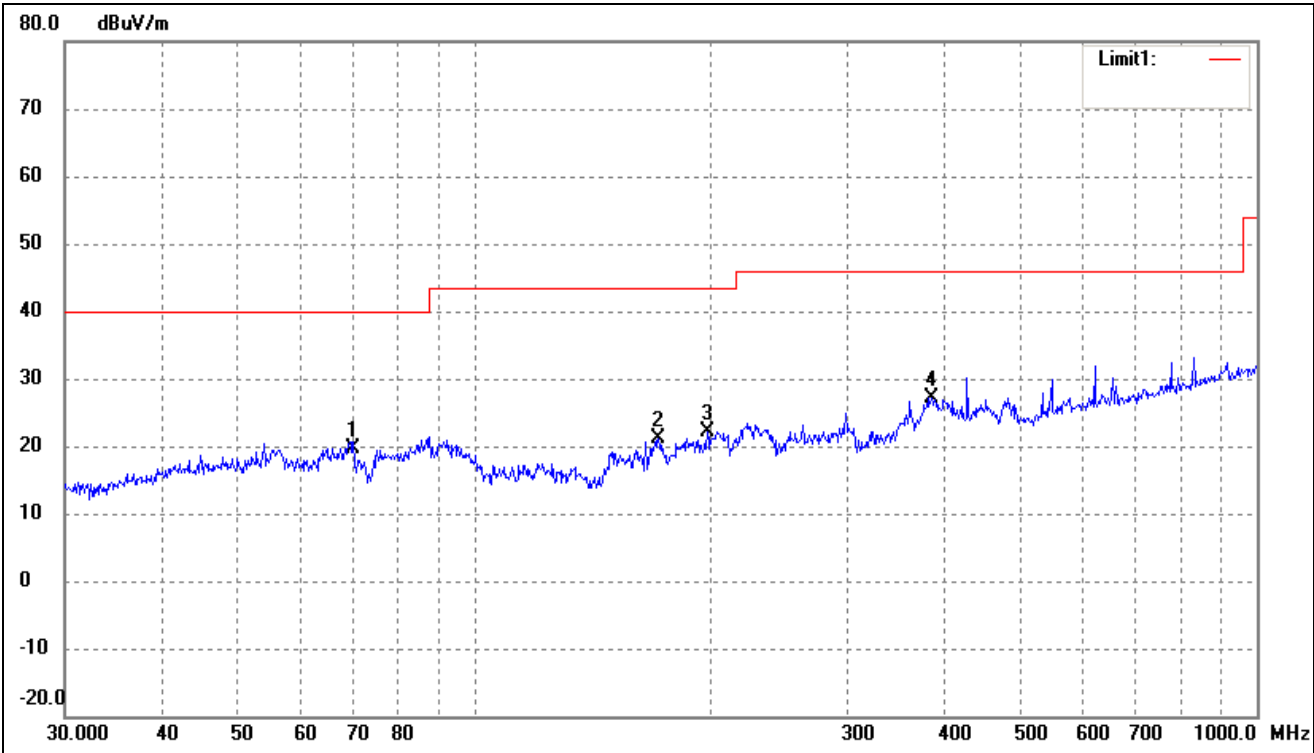
EUT: mophie spacestation
Tested Model: SPSTION-32GB-BLK
Operating Condition: TM2
Comment: DC5V output

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	43.6584	26.71	-7.73	18.98	40.00	-21.02	32	100	peak
2	171.3926	37.29	-11.74	25.55	43.50	-17.95	98	100	peak
3	295.1469	32.60	-6.46	26.14	46.00	-19.86	215	100	peak
4	906.4824	26.68	5.34	32.02	46.00	-13.98	315	100	peak

Test Specification: Vertical

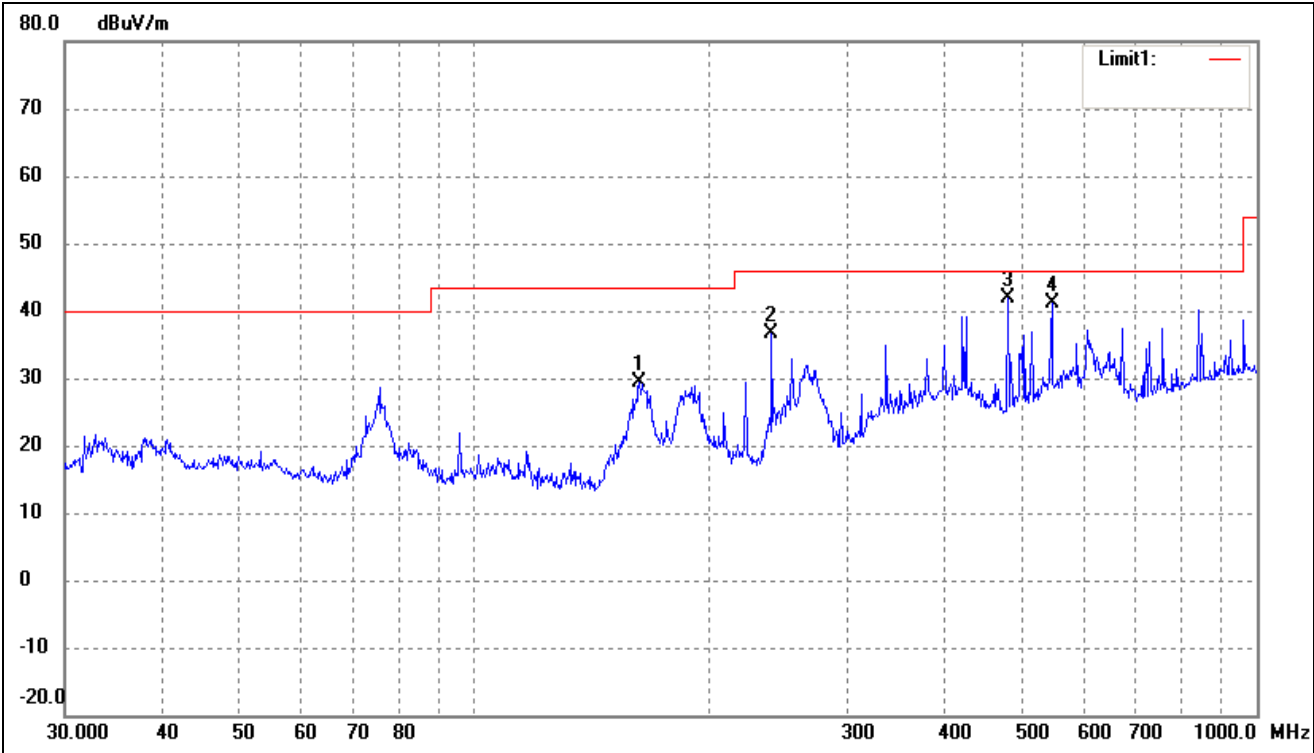


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
	70.0902	31.42	-11.72	19.70	40.00	-20.30	78	100	peak
2	171.9945	32.89	-11.70	21.19	43.50	-22.31	168	100	peak
3	198.5879	31.45	-9.20	22.25	43.50	-21.25	289	100	peak
4	383.9318	30.66	-3.46	27.20	46.00	-18.80	65	100	peak

Plot of Radiated Emissions Test Data

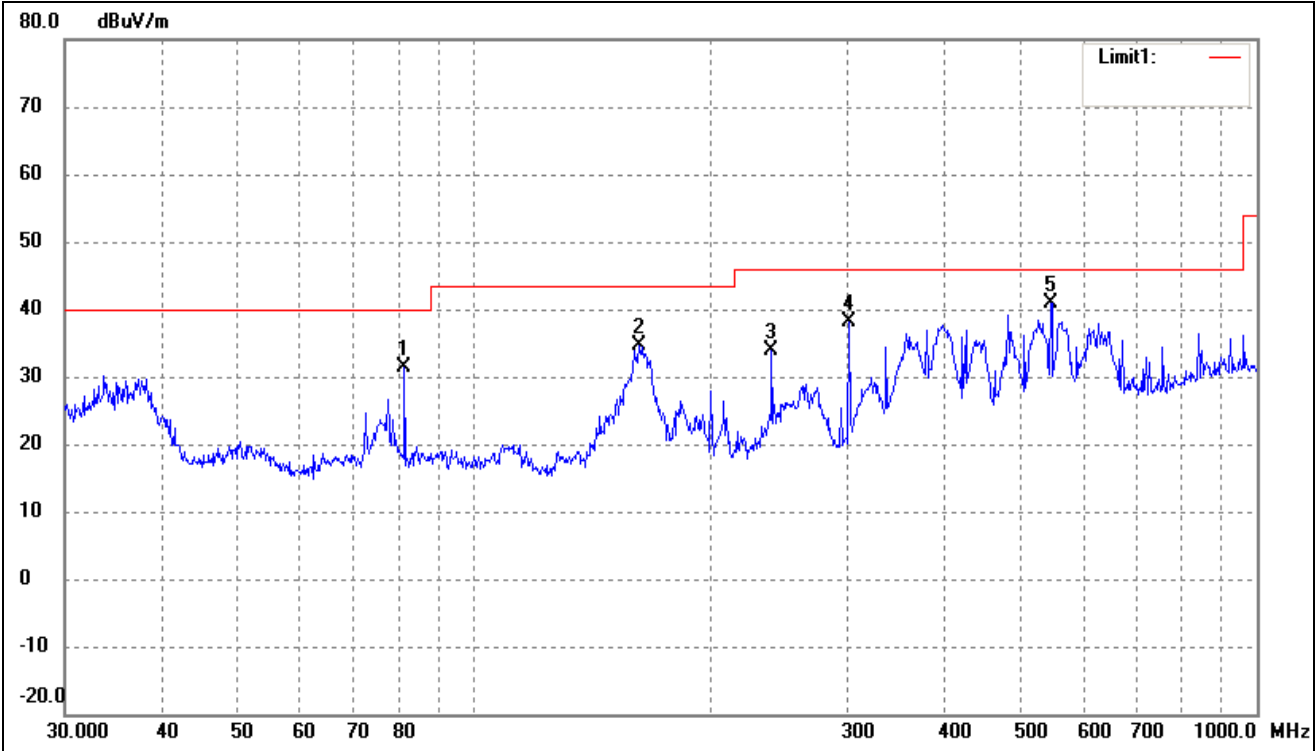
EUT: mophie spacestation
Tested Model: SPSTION-32GB-BLK
Operating Condition: TM3
Comment: AC 120V/60Hz; USB 5V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	162.6106	41.71	-12.22	29.49	43.50	-14.01	89	100	peak
2	239.9874	44.32	-7.79	36.53	46.00	-9.47	162	100	peak
3	480.5276	43.55	-1.70	41.85	46.00	-4.15	169	100	peak
4	547.0977	42.48	-1.36	41.12	46.00	-4.88	214	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	81.4970	44.48	-13.21	31.27	40.00	-8.73	62	100	peak
2	162.6106	46.82	-12.22	34.60	43.50	-8.90	156	100	peak
3	239.9874	41.58	-7.79	33.79	46.00	-12.21	315	100	peak
4	301.4224	44.32	-6.30	38.02	46.00	-7.98	332	100	peak
5	545.1826	40.91	0.00	40.91	46.00	-5.09	165	100	peak

The measurements greater than 20dB below the limit from 9kHz to 30MHz and test data are not provided.

***** END OF REPORT *****