

FCC Part 15C Measurement and Test Report

For

mophie LLC

6224 Technology Ave. Kalamazoo, MI 49009 U.S.A.

FCC ID: 2ACWB-PS10K

FCC Rule(s):	<u>FCC Part 15.247</u>
Product Description:	<u>mophie powerstation</u>
Tested Model:	<u>PWRSTION-10K-ALM</u>
Report No.:	<u>STR15098283I</u>
Tested Date:	<u>2015-09-25 to 2015-10-21</u>
Issued Date:	<u>2015-10-21</u>
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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

Client Information

Applicant: mophie LLC
Address of applicant: 6224 Technology Ave. Kalamazoo, MI 49009 U.S.A.

Manufacturer: mophie LLC
Address of manufacturer: 6224 Technology Ave. Kalamazoo, MI 49009 U.S.A.

General Description of EUT

Product Name:	mophie powerstation
Brand Name:	mophie
Model No.:	PWRSTION-10K-ALM
Rated Voltage:	I/P: DC 5V/1.8A or DC 9V/1.67A O/P: DC 5V/2.4A*2 or DC 9V/1.67A (only for USB 2)
Battery:	DC3.8V/39.56Wh
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT

Bluetooth Version:	V4.0 (BLE mode)
Frequency Range:	2402-2480MHz
RF Output Power:	-1.274dBm (Conducted)
Data Rate:	25Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	Ceramic Chip Antenna
Antenna Gain:	0.5dBi
Lowest Internal Frequency:	16MHz

1.2 Test Standards

The following report is prepared on behalf of the mophie LLC in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions 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 C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and 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. The measurement guide KDB 558074 D01 V03r03 for digital transmission systems shall be performed also.

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 Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	GFSK(BLE)	2402MHz, 2440MHz, 2480MHz

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	0.8	Shielded	Without Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adapter	/	ASUC51w-05091224 0-18W	/
Adapter	Apple	A1357	/

1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	6 dB Bandwidth	Compliant
§ 15.247(b)(3)	RF Output Power	Compliant
§ 15.209(a)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has a Ceramic Chip antenna, fulfill the requirement of this section.

5. Power Spectral Density

5.1 Standard Applicable

According to 15.247(a)(1)(iii), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.2 Test Procedure

According to the KDB 558074 D01 V03r03, the test method of power spectral density as below:

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3 Environmental Conditions

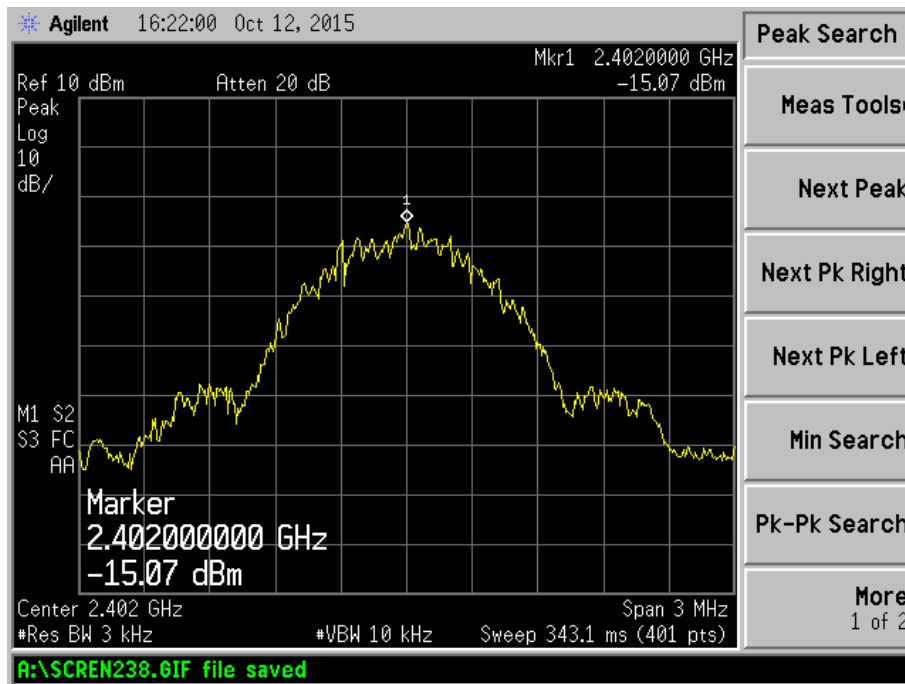
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results/Plots

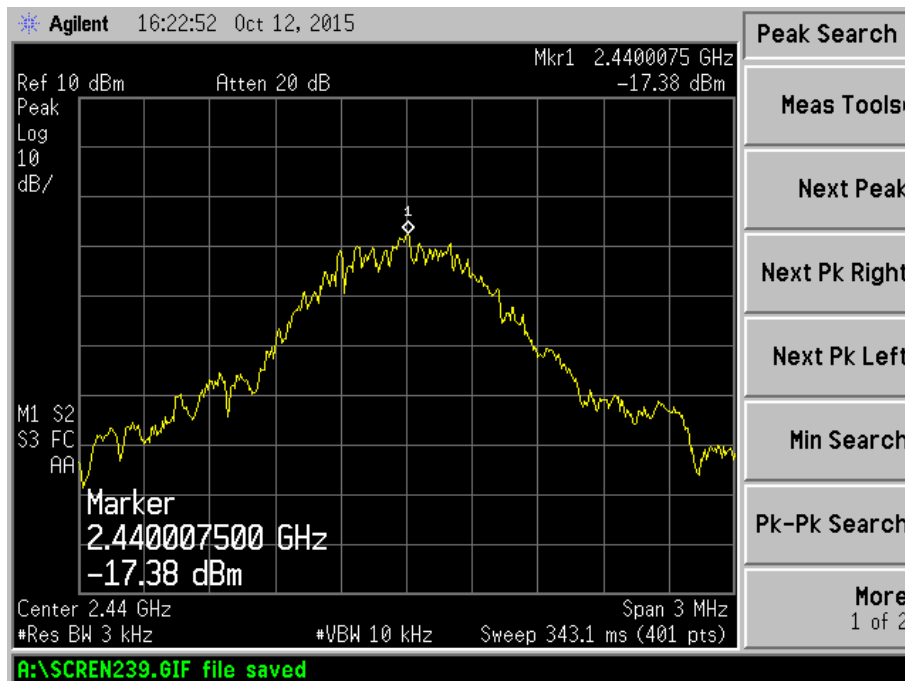
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
GFSK(BLE)	2402	-15.07	8
	2440	-17.38	8
	2480	-19.05	8

Please refer to the following test plots:

Low Channel



Middle Channel



High Channel



6. 6dB Bandwidth

6.1 Standard Applicable

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 Environmental Conditions

Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

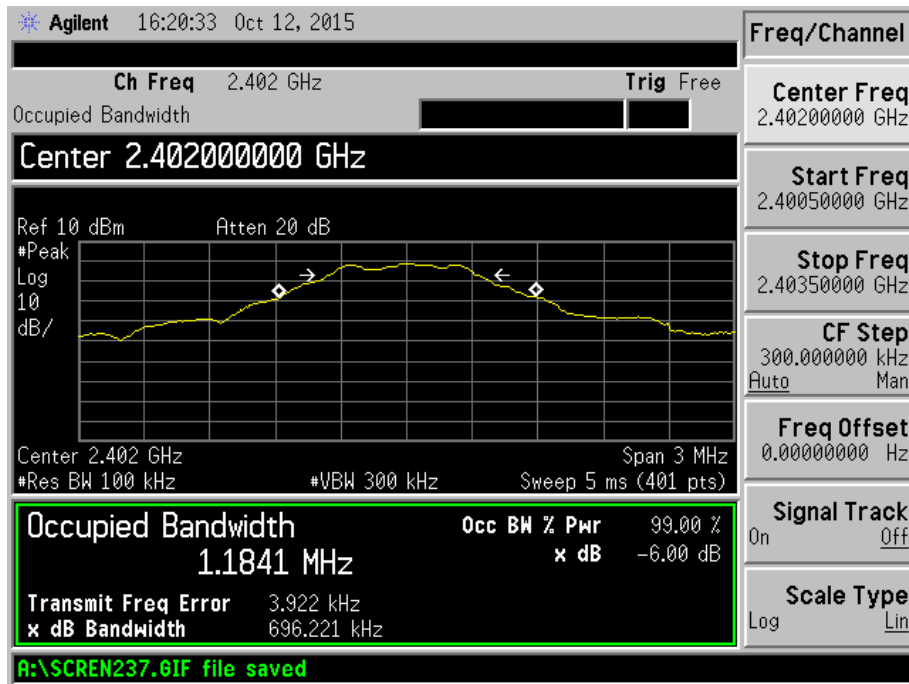
6.4 Summary of Test Results/Plots

Test Mode	Test Channel MHz	6 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz
GFSK(BLE)	2402	696.221	1184.1	≥ 500
	2440	697.256	1537.2	≥ 500
	2480	698.370	1549.7	≥ 500

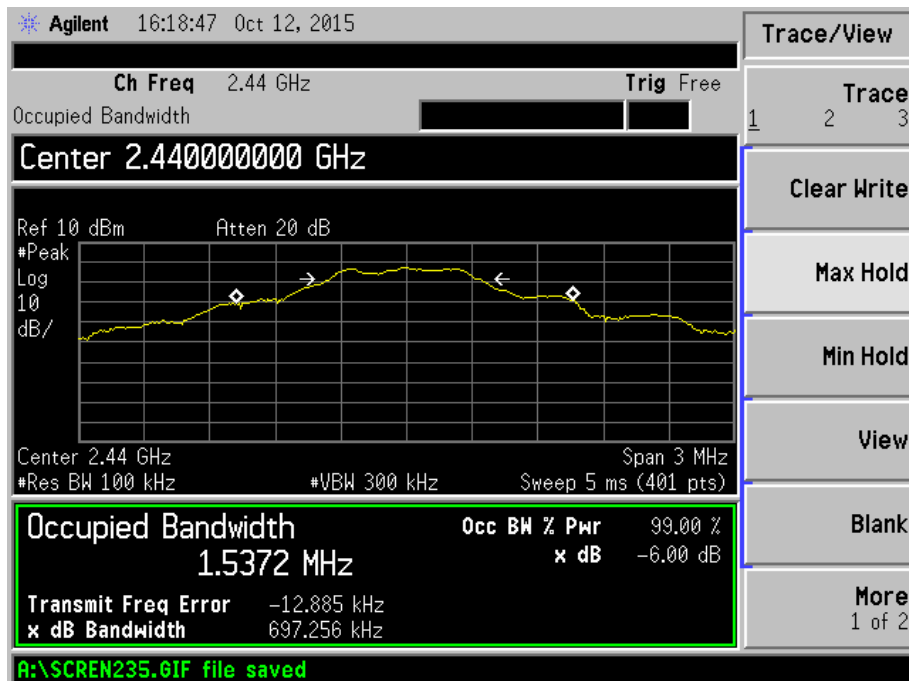
Please refer to the following test plots:

For BLE

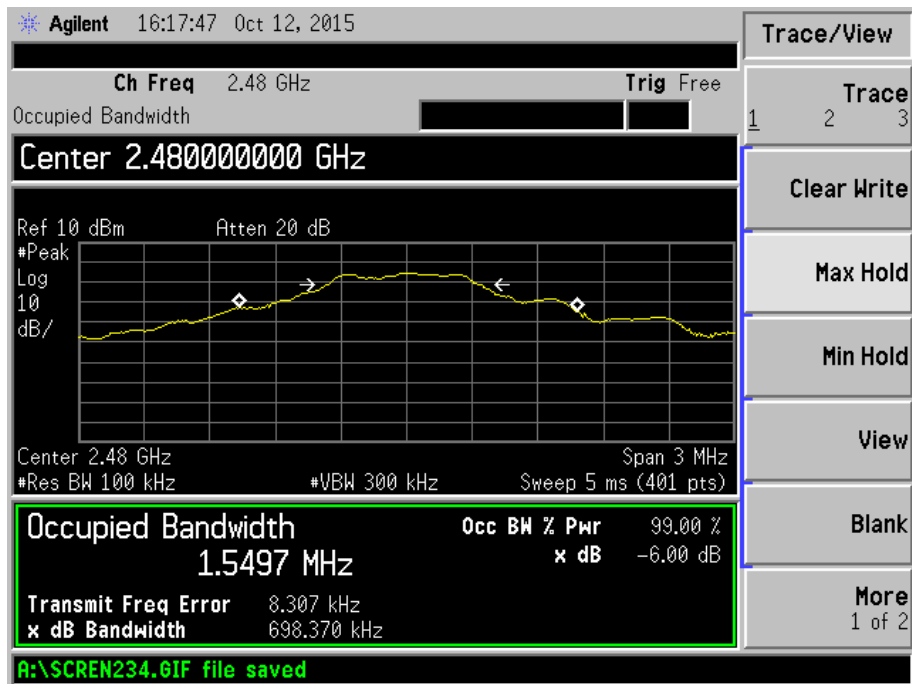
Low Channel:



Middle Channel:



High Channel:



7. RF Output Power

7.1 Standard Applicable

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

7.2 Test Procedure

According to section 15.247(b)-power output of the KDB-558074 D01 V03r03 section 9.1.1, this procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the RBW $\geq$ DTS bandwidth.
- b) Set VBW $\geq 3 \times$ RBW.
- c) Set span $\geq 3 \times$ RBW.
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

7.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

7.4 Summary of Test Results/Plots

Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
GFSK(BLE)	2402	-1.274	0.7458	1000
	2440	-2.739	0.5322	1000
	2480	-5.270	0.2972	1000

Note: the antenna gain of 0.5dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

8. Field Strength of Spurious Emissions

8.1 Measurement Uncertainty

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

8.2 Standard Applicable

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

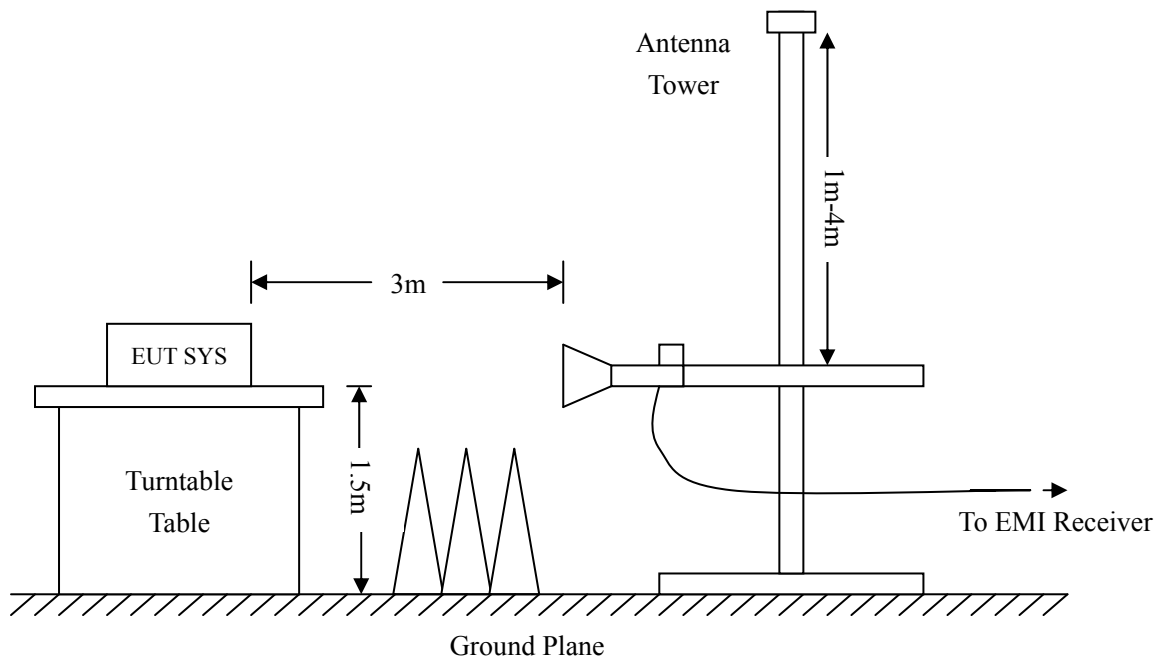
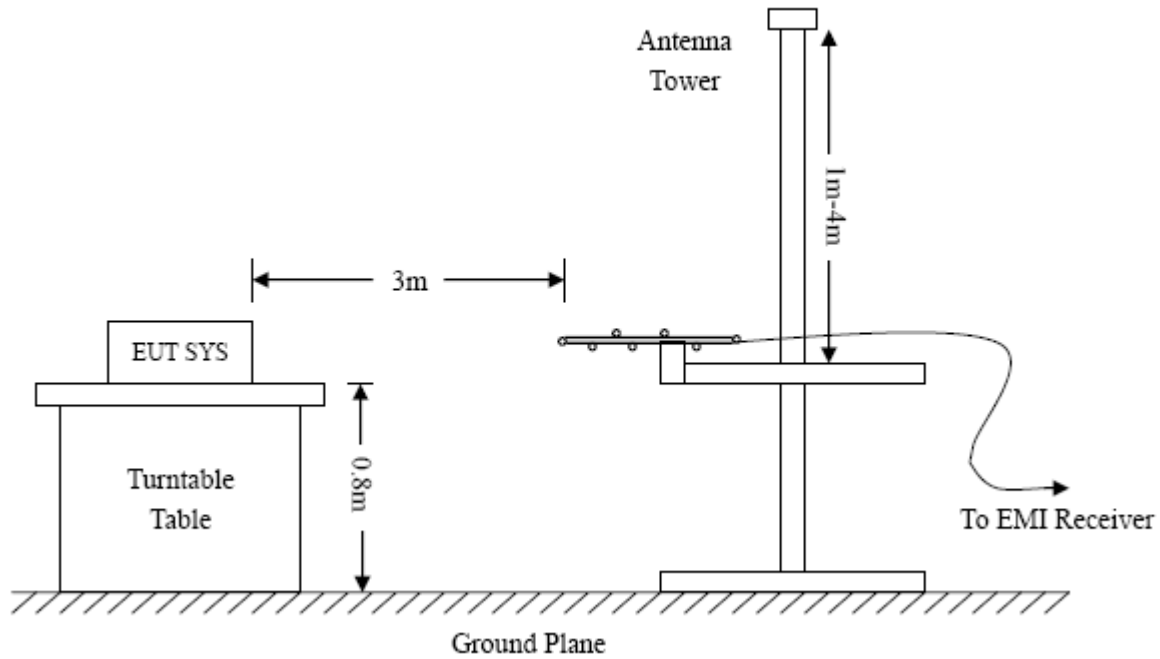
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 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.



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

8.4 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

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. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.6 Summary of Test Results/Plots

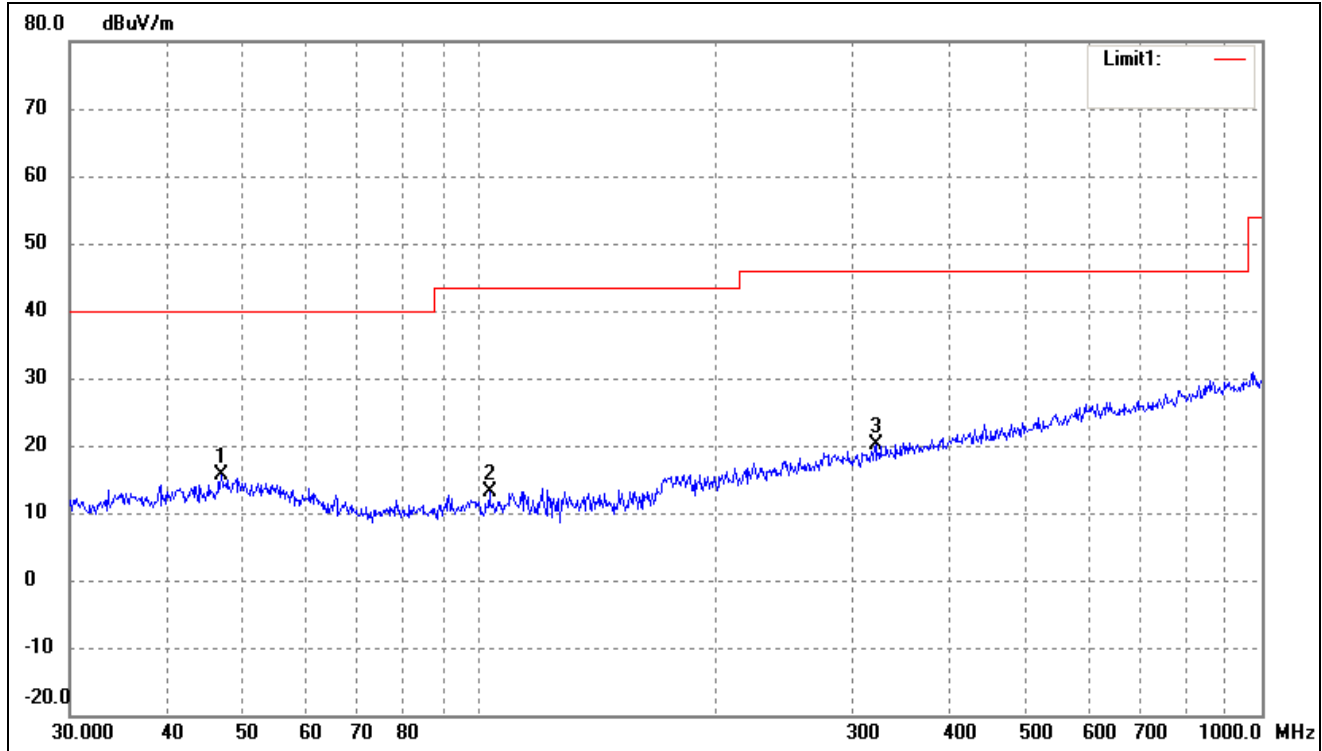
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Plot of Radiated Emissions Test Data

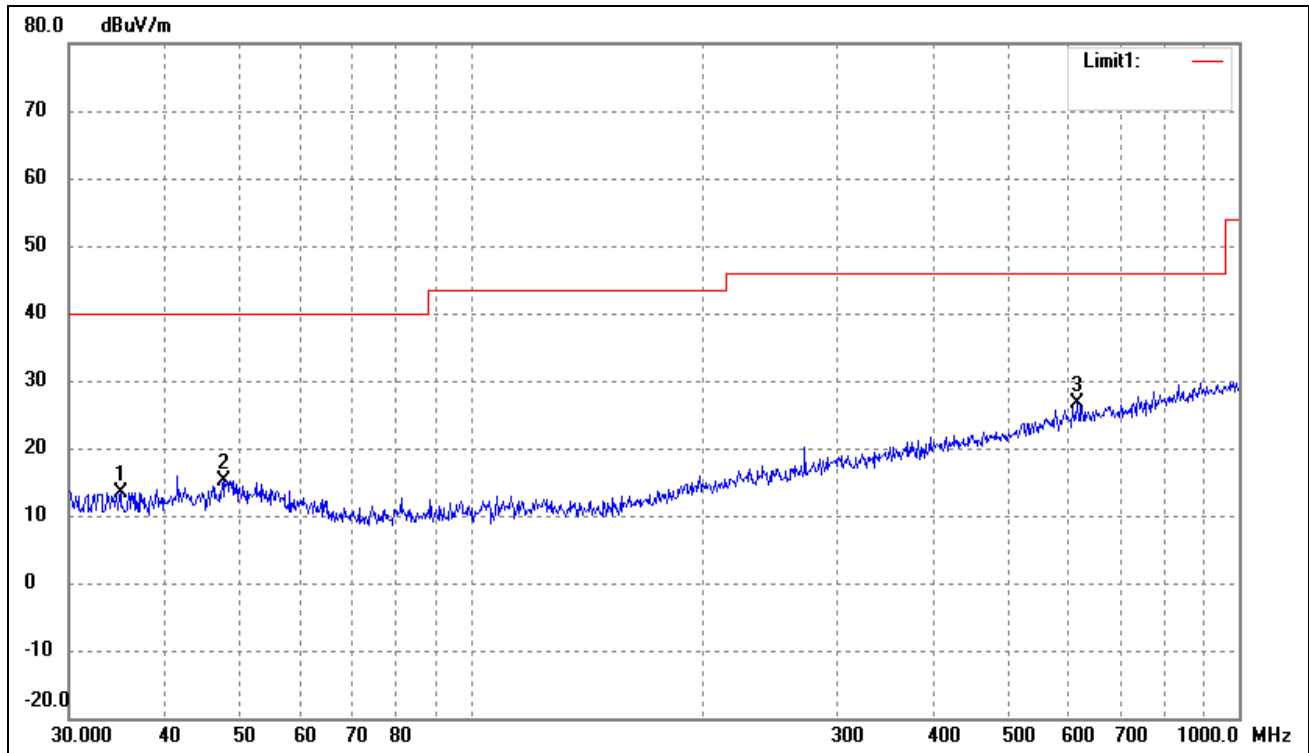
EUT: mophie powerstation
Tested Model: PWRSTION-10K-ALM
Operating Condition: Transmitting-Low channel (2402MHz)
Comment: Battery DC3.8V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	46.8303	24.95	-9.43	15.52	40.00	-24.48	168	100	peak
2	103.0800	24.85	-11.65	13.20	43.50	-30.30	201	100	peak
3	321.0608	24.87	-4.79	20.08	46.00	-25.92	178	100	peak

Test Specification: Vertical

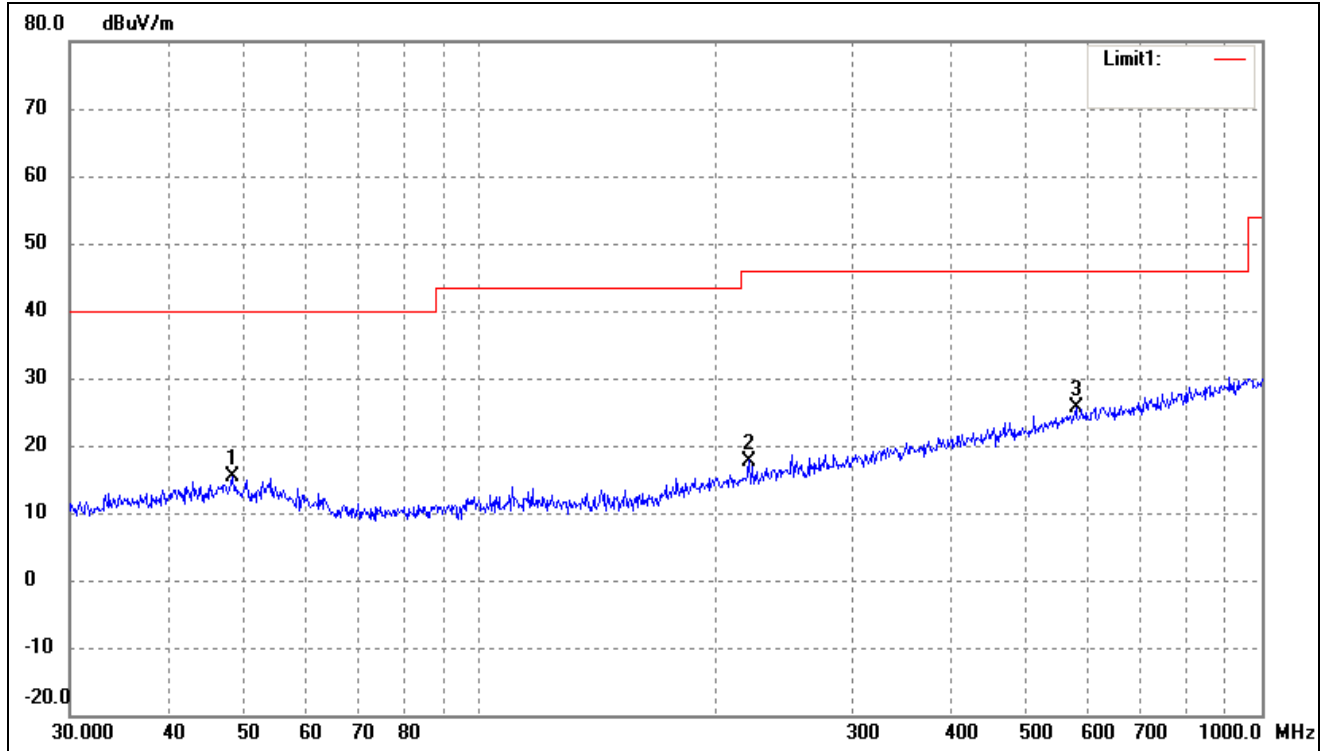


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	35.0048	24.62	-11.12	13.50	40.00	-26.50	187	100	peak
2	47.8260	24.45	-9.29	15.16	40.00	-24.84	265	100	peak
3	616.3718	25.31	1.30	26.61	46.00	-19.39	164	100	peak

Plot of Radiated Emissions Test Data

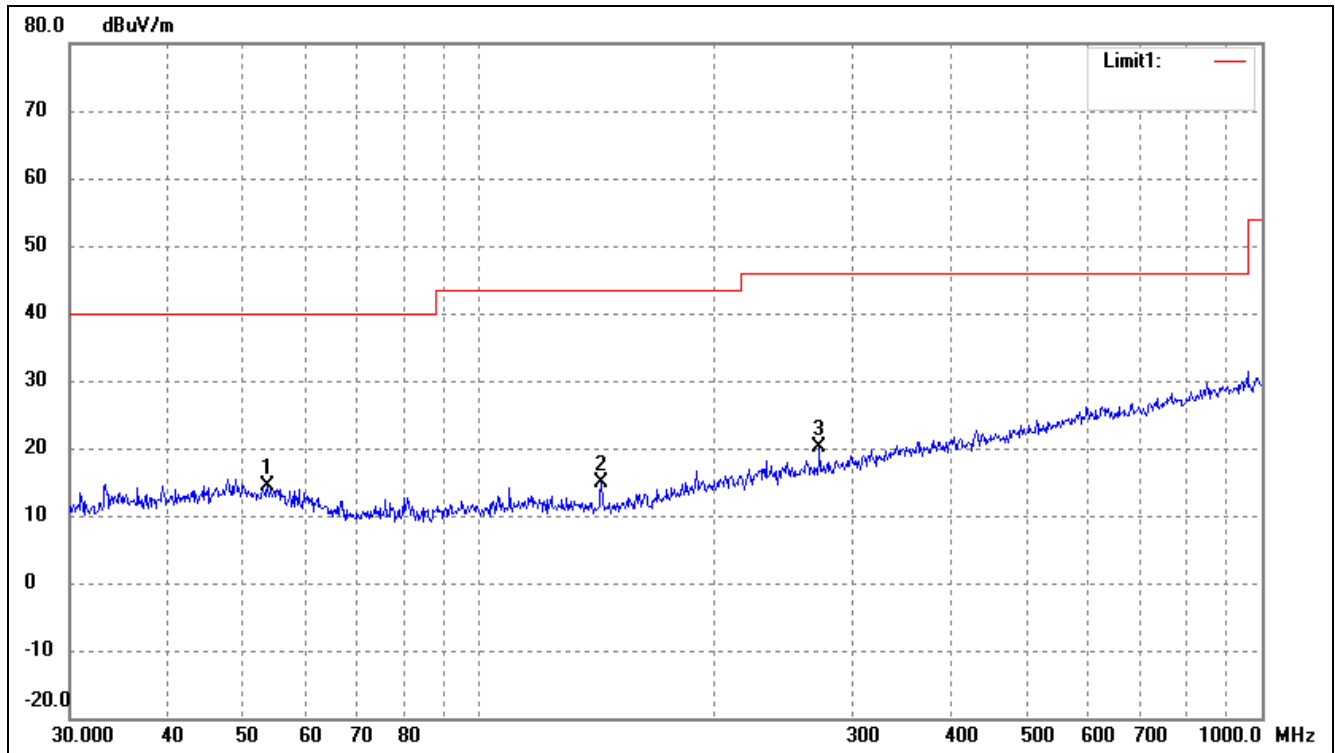
EUT: mophie powerstation
Tested Model: PWRSTION-10K-ALM
Operating Condition: Transmitting- Middle channel (2440MHz)
Comment: Battery DC3.8V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	48.3318	24.71	-9.21	15.50	40.00	-24.50	185	100	peak
2	221.3921	25.37	-7.62	17.75	46.00	-28.25	265	100	peak
3	578.6699	25.01	0.57	25.58	46.00	-20.42	214	100	peak

Test Specification: Vertical

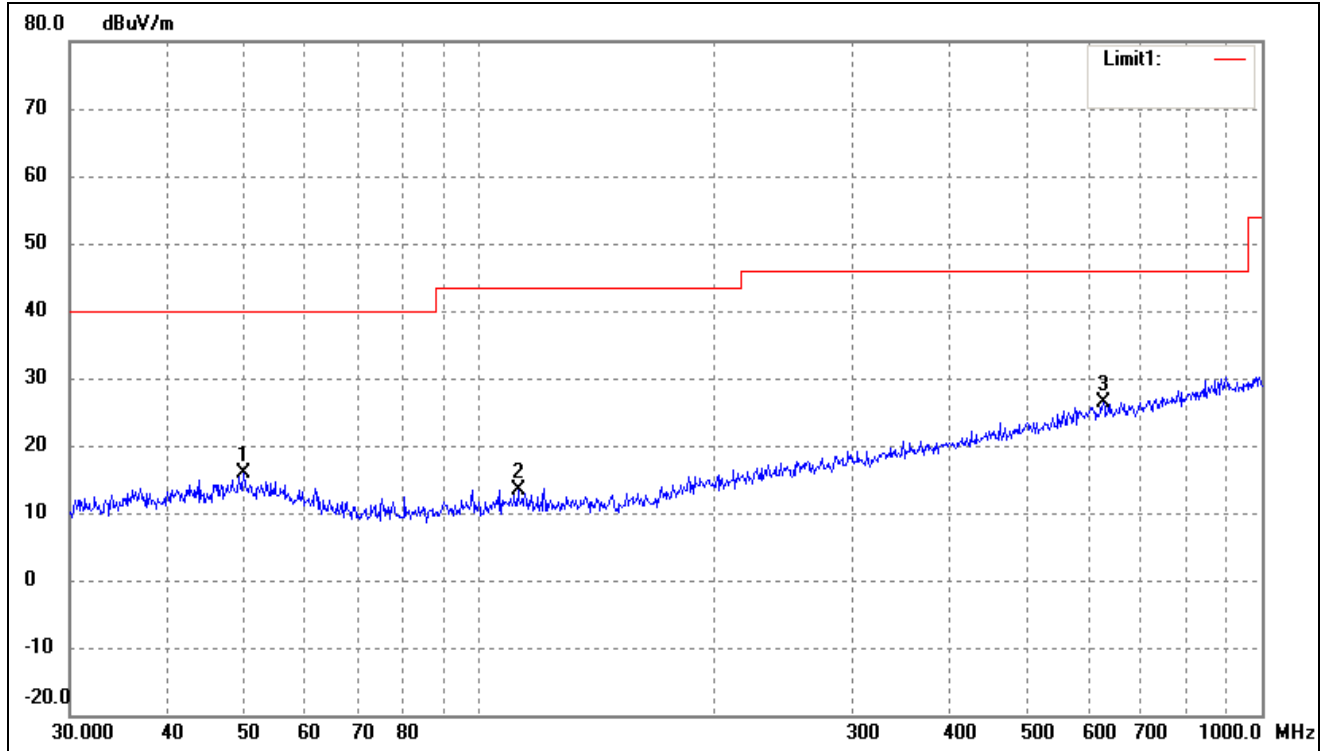


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	53.6932	24.14	-9.76	14.38	40.00	-25.62	155	100	peak
2	143.3261	26.36	-11.49	14.87	43.50	-28.63	15	100	peak
3	272.2776	26.45	-6.34	20.11	46.00	-25.89	39	100	peak

Plot of Radiated Emissions Test Data

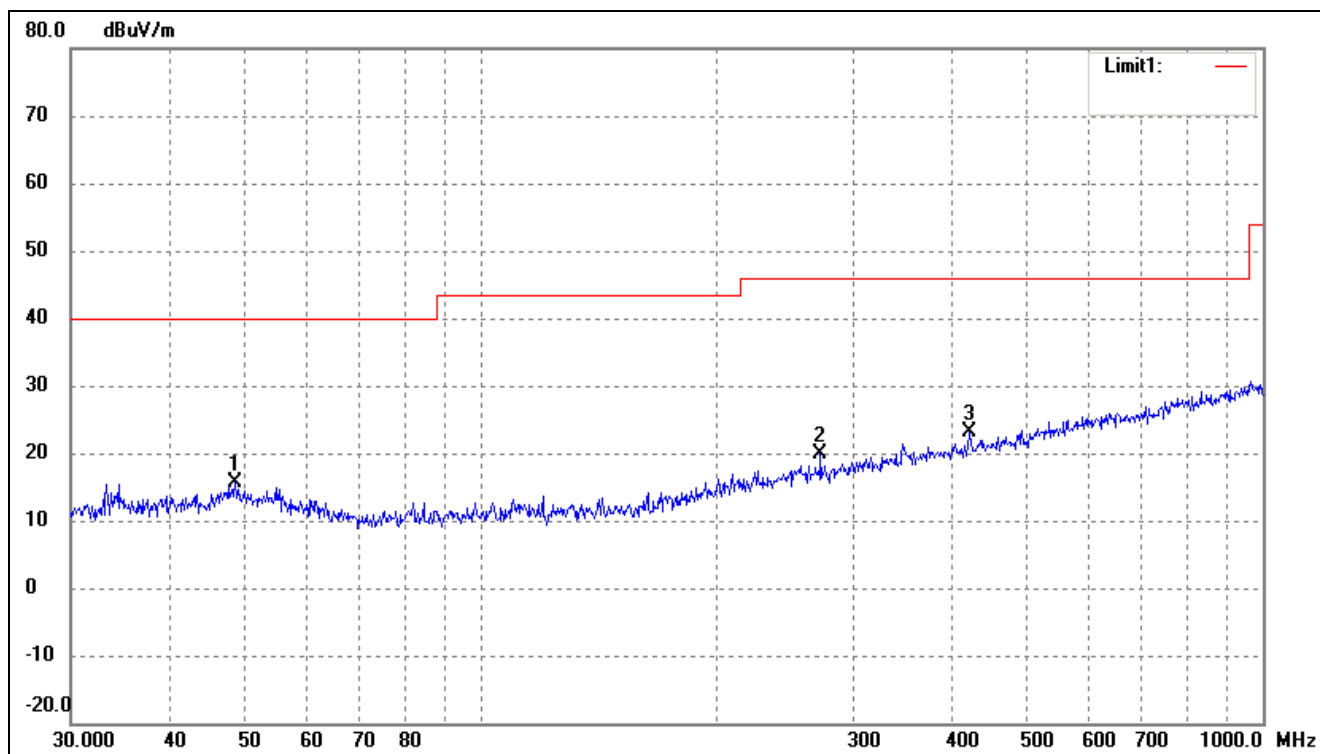
EUT: mophie powerstation
Tested Model: PWRSTION-10K-ALM
Operating Condition: Transmitting- High channel (2480MHz)
Comment: Battery DC3.8V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	50.0566	24.81	-8.98	15.83	40.00	-24.17	154	100	peak
2	112.1305	24.53	-11.14	13.39	43.50	-30.11	215	100	peak
3	627.2738	24.90	1.41	26.31	46.00	-19.69	98	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	48.6719	24.74	-9.16	15.58	40.00	-24.42	185	100	peak
2	272.2776	26.10	-6.34	19.76	46.00	-26.24	165	100	peak
3	422.0577	25.41	-2.37	23.04	46.00	-22.96	152	100	peak

Spurious Emissions Above 1GHz

Transmitting: BLE mode:

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2402MHz							
4804	61.18	-3.59	57.59	74	-16.41	H	PK
4804	50.69	-3.59	47.10	54	-6.90	H	AV
7206	59.11	-0.52	58.59	74	-15.41	H	PK
7206	44.25	-0.52	43.73	54	-10.27	H	AV
4804	59.16	-3.59	55.57	74	-18.43	V	PK
4804	48.19	-3.59	44.60	54	-9.40	V	AV
7206	60.11	-0.52	59.59	74	-14.41	V	PK
7206	44.35	-0.52	43.83	54	-10.17	V	AV
Middle Channel-2440MHz							
4880	58.10	-3.49	54.61	74	-19.39	H	PK
4880	47.61	-3.49	44.12	54	-9.88	H	AV
7320	58.14	-0.47	57.67	74	-16.33	H	PK
7320	43.50	-0.47	43.03	54	-10.97	H	AV
4880	60.24	-3.49	56.75	74	-17.25	V	PK
4880	49.19	-3.49	45.70	54	-8.30	V	AV
7320	60.11	-0.47	59.64	74	-14.36	V	PK
7320	45.12	-0.47	44.65	54	-9.35	V	AV
High Channel-2480MHz							
4960	64.21	-3.41	60.80	74	-13.2	H	PK
4960	49.53	-3.41	46.12	54	-7.88	H	AV
7440	53.46	-0.42	53.04	74	-20.96	H	PK
7440	44.19	-0.42	43.77	54	-10.23	H	AV
4960	57.67	-3.41	54.26	74	-19.74	V	PK
4960	44.51	-3.41	41.10	54	-12.90	V	AV
7440	59.16	-0.42	58.74	74	-15.26	V	PK
7440	43.95	-0.42	43.53	54	-10.47	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz.

9. Out of Band Emissions

9.1 Standard Applicable

According to §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Test Procedure

According to the KDB 558074 D01 v03r03, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)

RBW = 1MHz, VBW = 1MHz for peak value measured

RBW = 1MHz, VBW = 10Hz for average value measured

Sweep = auto; Detector function = peak/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 V03r03, the conducted spurious emissions test method as follows:

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW $\geq$ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

9.3 Environmental Conditions

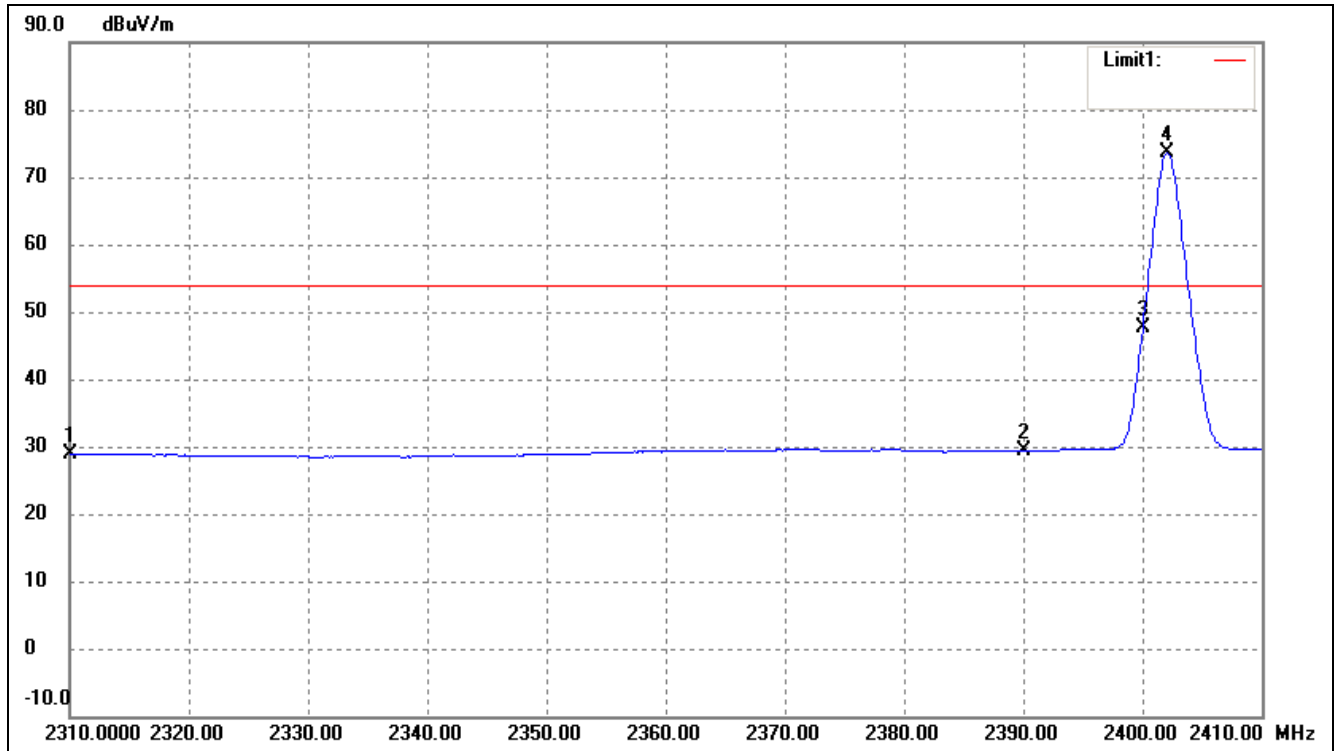
Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

Bandedge (Radiated)

Lowest Bandedge-BLE

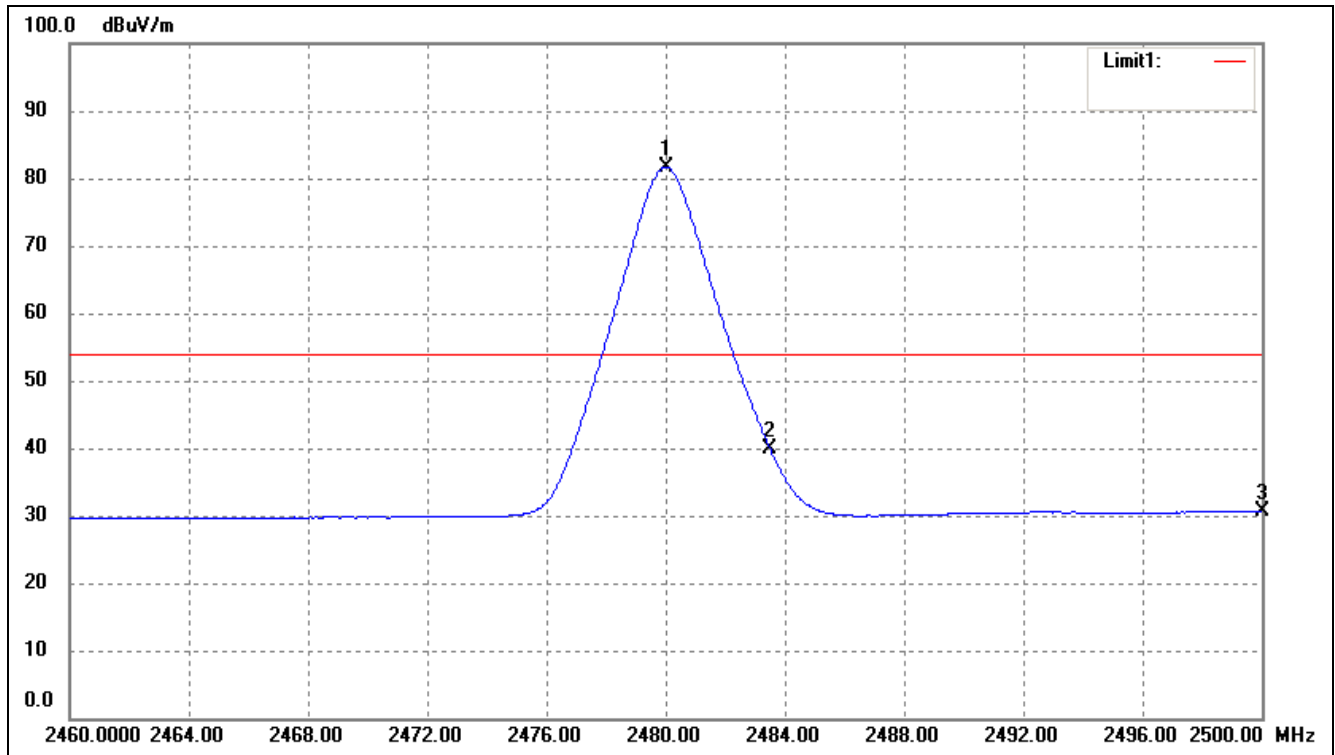
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	33.96	-4.98	28.98	54.00	-25.02	Average Detector
	2310.000	45.98	-4.98	41.00	74.00	-33.00	Peak Detector
2	2390.000	33.56	-4.26	29.30	54.00	-24.70	Average Detector
	2390.000	46.64	-4.26	42.38	74.00	-31.62	Peak Detector
3	2400.000	51.85	-4.18	47.67	Delta = 25.94 dBc		Average Detector
4	2402.100	77.78	-4.17	73.61			Average Detector

Highest Bandedge-BLE

Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	85.28	-3.55	81.73	/	/	Average Detector
	2480.000	94.72	-3.55	91.17	/	/	Peak Detector
2	2483.500	Delta = 54.59 dBc		27.12	54.00	-26.88	Average Detector
	2483.500			36.58	74.00	-37.42	Peak Detector
3	2500.000	33.92	-3.39	30.53	54.00	-23.47	Average Detector
	2500.000	46.60	-3.39	43.21	74.00	-30.79	Peak Detector

10. Conducted Emissions

10.1 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.

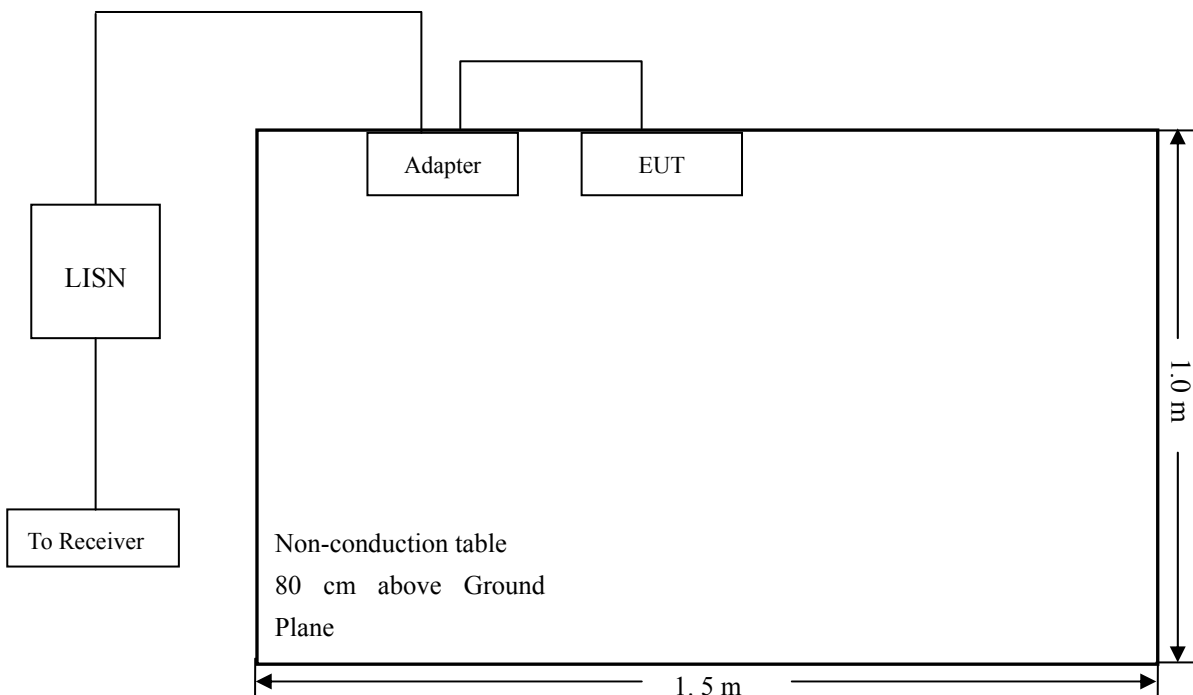
10.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 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.

10.3 Basic Test Setup Block Diagram



10.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.5 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency	150 kHz
Stop Frequency.....	30 MHz
Sweep Speed	Auto
IF Bandwidth.....	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

10.6 Summary of Test Results/Plots

According to the data in section 10.7, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin reading of:

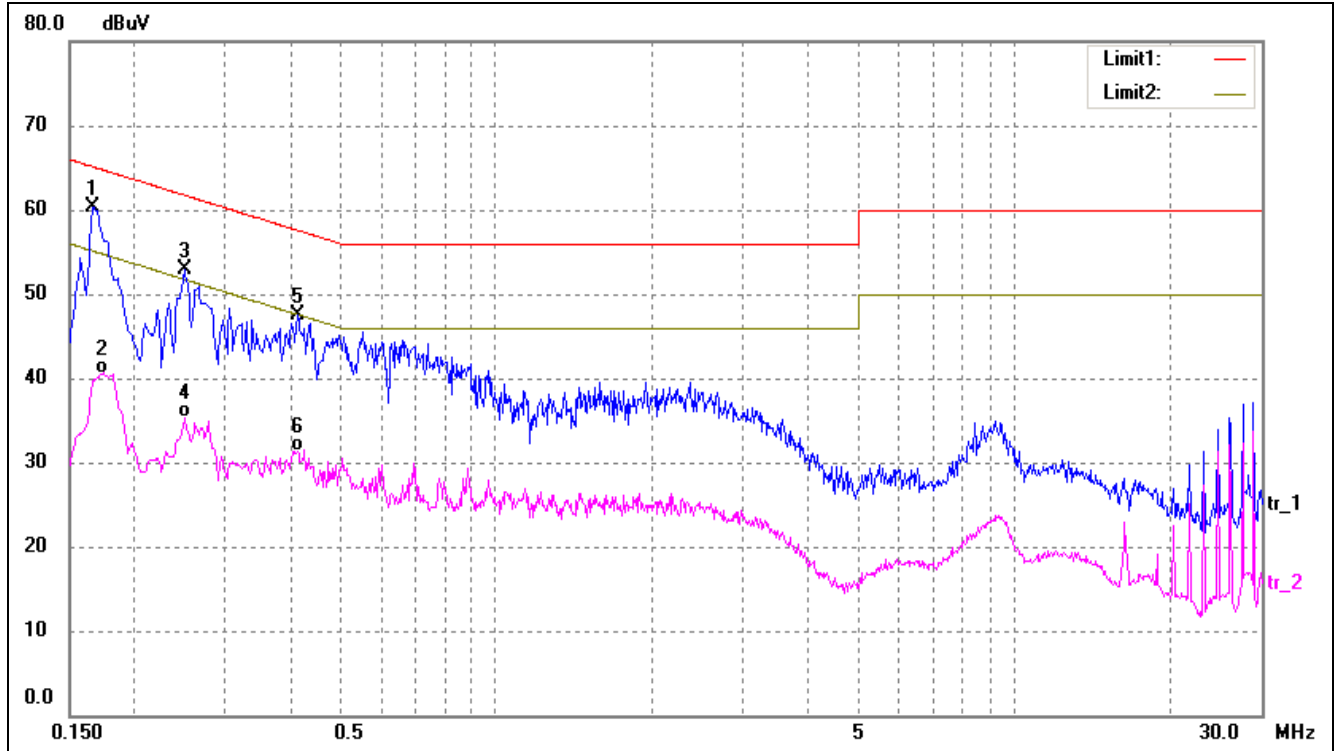
-4.81 dB at **0.1660 MHz** in the **Neutral, Peak** detector, 0.15-30MHz

10.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

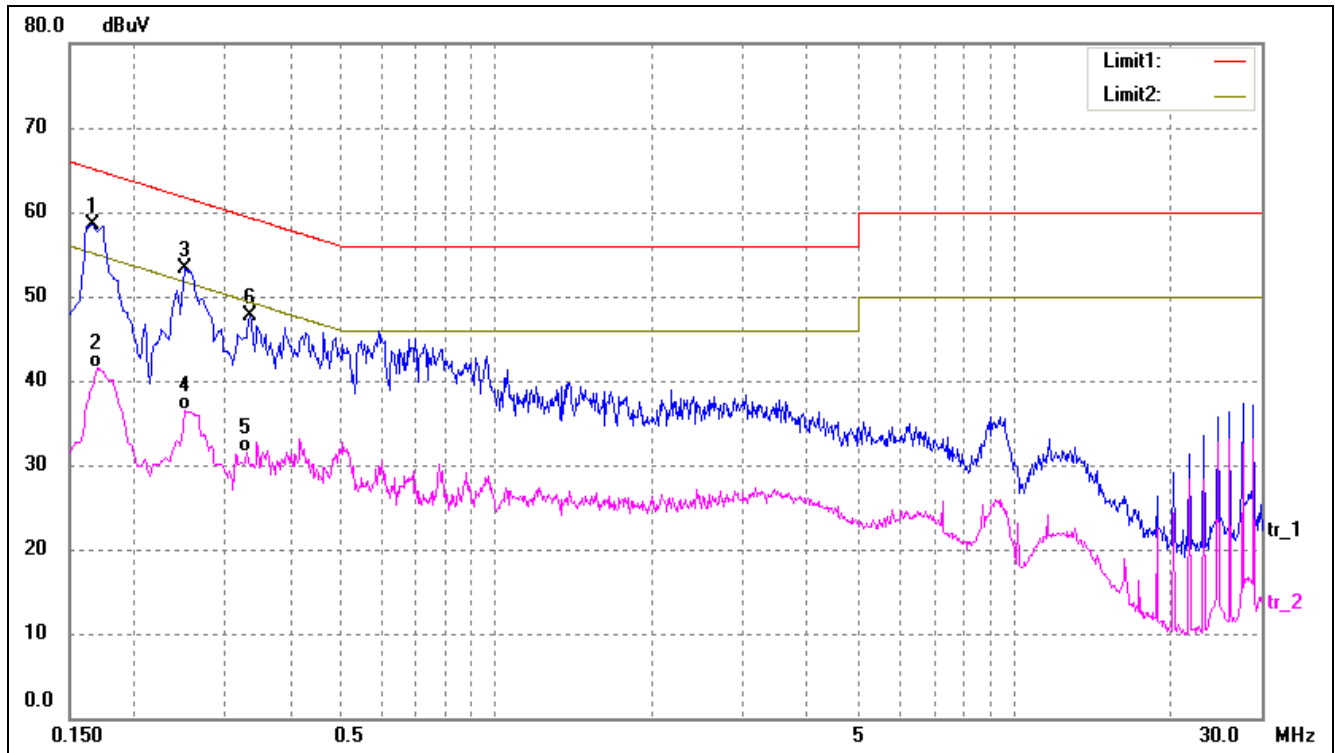
EUT: mophie powerstation
 Tested Model: PWRSTION-10K-ALM
 Operating Condition: Transmitting
 Comment: AC 120V/60Hz; Adpater DC 5V

Test Specification: Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1660	47.85	12.50	60.35	65.16	-4.81	peak
2	0.1740	28.10	12.50	40.60	54.77	-14.17	AVG
3	0.2500	40.38	12.50	52.88	61.76	-8.88	peak
4	0.2500	22.83	12.50	35.33	51.76	-16.43	AVG
5	0.4140	35.09	12.50	47.59	57.57	-9.98	peak
6	0.4140	18.75	12.50	31.25	47.57	-16.32	AVG

Test Specification: Line

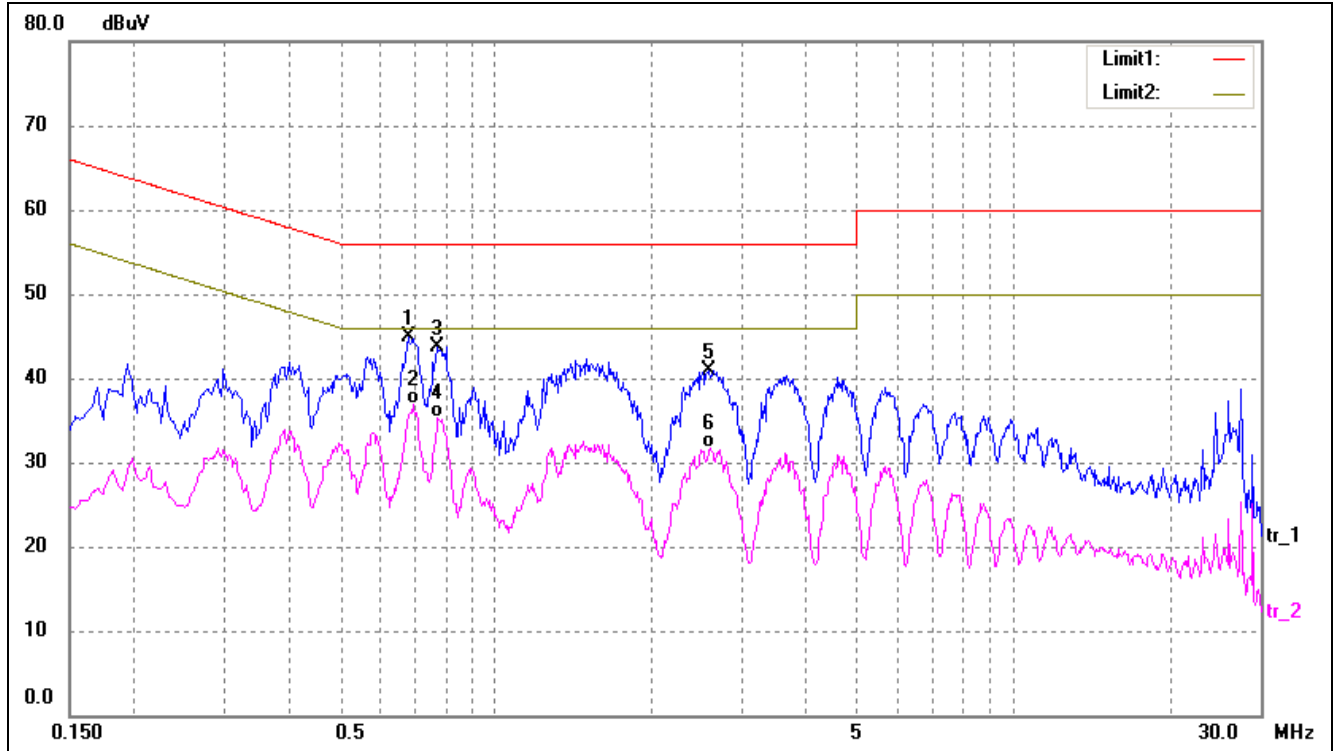


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1660	45.91	12.50	58.41	65.16	-6.75	peak
2	0.1700	28.98	12.50	41.48	54.96	-13.48	AVG
3	0.2500	40.80	12.50	53.30	61.76	-8.46	peak
4	0.2500	23.91	12.50	36.41	51.76	-15.35	AVG
5	0.3300	18.93	12.50	31.43	49.45	-18.02	AVG
6	0.3340	35.27	12.50	47.77	59.35	-11.58	peak

Plot of Conducted Emissions Test Data

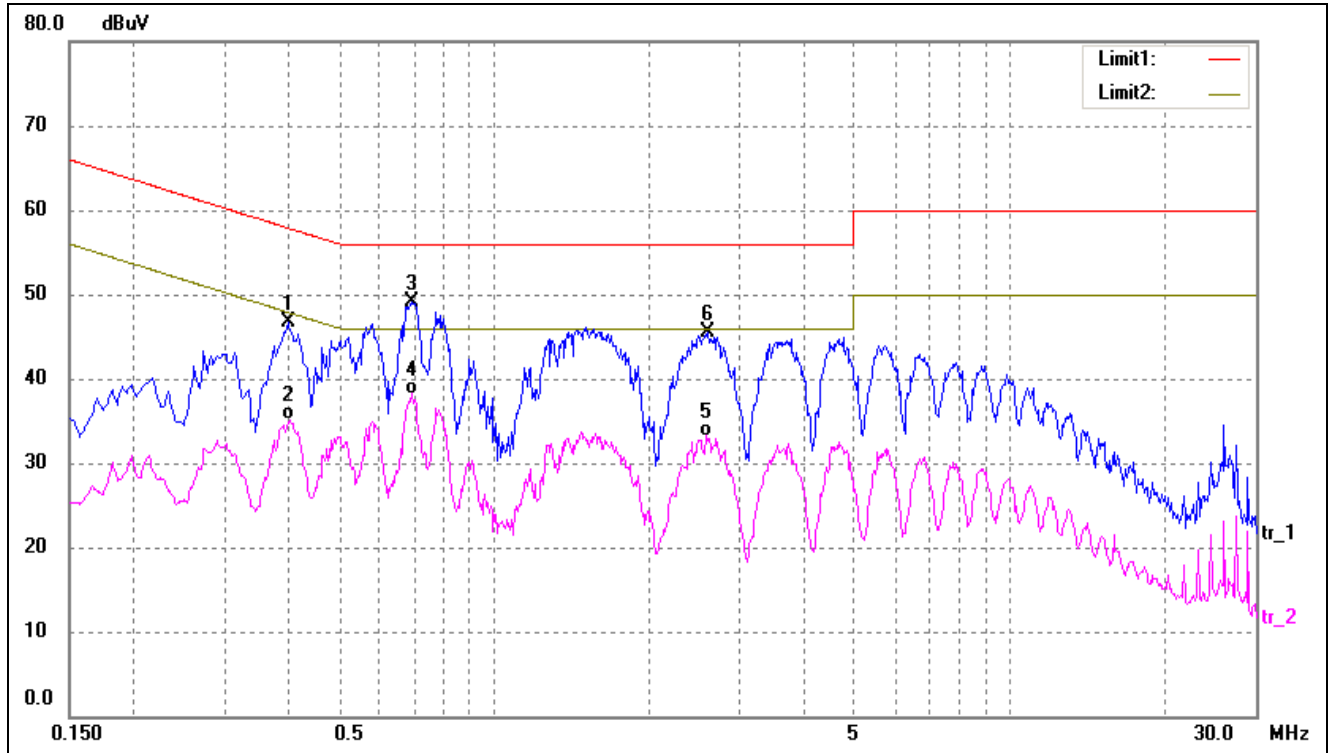
EUT: *mophie powerstation*
 Tested Model: *PWRSTION-10K-ALM*
 Operating Condition: *Transmitting*
 Comment: *AC 120V/60Hz; Adpater DC 9V*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.6780	32.18	12.68	44.86	56.00	-11.14	peak
2*	0.6900	24.27	12.69	36.96	46.00	-9.04	AVG
3	0.7740	31.02	12.77	43.79	56.00	-12.21	peak
4	0.7740	22.49	12.77	35.26	46.00	-10.74	AVG
5	2.5780	27.92	13.00	40.92	56.00	-15.08	peak
6	2.6020	18.70	13.00	31.70	46.00	-14.30	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3980	34.15	12.50	46.65	57.90	-11.25	peak
2	0.4020	22.66	12.50	35.16	47.81	-12.65	AVG
3*	0.6900	36.42	12.69	49.11	56.00	-6.89	peak
4	0.6940	25.51	12.69	38.20	46.00	-7.80	AVG
5	2.5940	20.20	13.00	33.20	46.00	-12.80	AVG
6	2.6020	32.46	13.00	45.46	56.00	-10.54	peak

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