

FCC Part 15C Measurement and Test Report

For

mophie LLC

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

FCC ID: 2ACWB-SP6

FCC Rule(s):	<u>FCC Part 15.247</u>	
Product Description:	<u>mophie space pack</u>	
Tested Model:	<u>SP-IP6-32GB-BLK</u>	
Report No.:	<u>STR15058279I-1</u>	
Tested Date:	<u>2015-06-03 to 2015-06-11</u>	
Issued Date:	<u>2014-06-11</u>	
Tested By:	<u>Jason Su / Engineer</u>	<i>Jason Su</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u>	<i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy So / PSQ Manager</u>	<i>Jandyso</i>
Prepared By:	<p>Shenzhen SEM.Test Technology Co., Ltd. 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101) Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn</p>	

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 space pack
Brand Name:	mophie
Model No.:	SP-IP6-32GB-BLK
Adding Model(s):	SP-IP6-64GB-BLK ; SP-IP6-128GB-BLK SP-IP6-64GB-GLD ; SP-IP6-128GB-GLD
Rated Voltage:	USB DC 5V ; Battery:DC3.8V
Rated Current:	Input 1.8A ; Output max 1.0A
<p><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 SP-IP6-32GB-BLK, but the circuit and the electronic construction do not change, declared by the manufacturer.</i></p>	

Technical Characteristics of EUT	
Bluetooth Version:	V4.0 (BLE mode only)
Frequency Range:	2402-2480MHz
RF Output Power:	-2.556dBm (Conducted)
Data Rate:	GFSK
Modulation:	25Mbps
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	Ceramic Chip Antenna
Antenna Gain:	-1.0dBi

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 C63.4-2009, 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 V03r02 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
Notebook	Lenovo	E23	EB12648265
Adapter	DELL	PSA110R-050Q	/
iPhone 6	Apple	A1549	/

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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2015-05-28	2016-05-27
Attenuator	ATTEN	ATS100-4-20	/	2015-05-28	2016-05-27

5.3 Test Procedure

According to the KDB 558074 D01 V03r02, 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.

5.4 Environmental Conditions

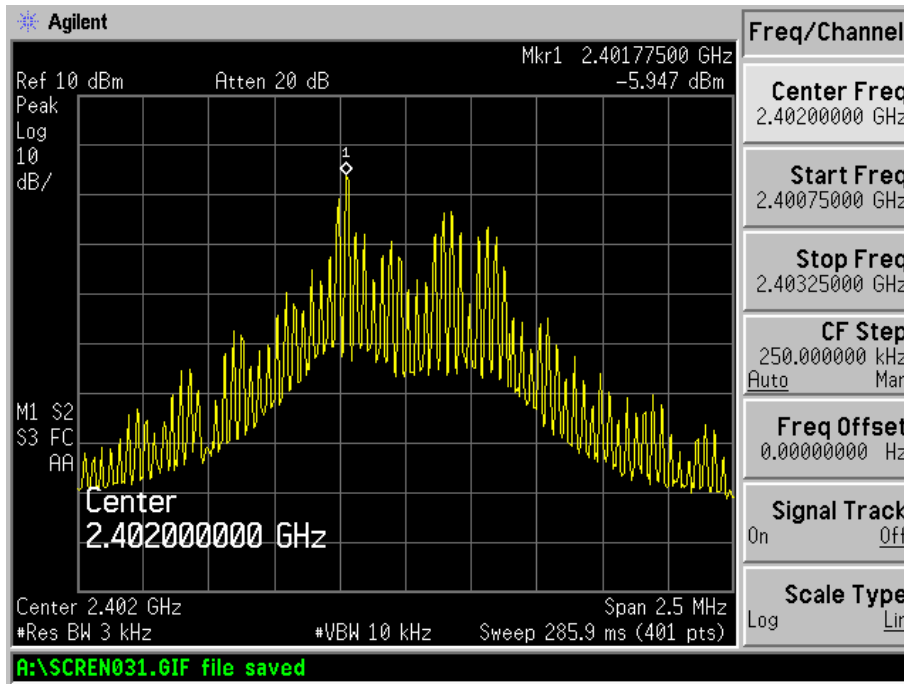
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

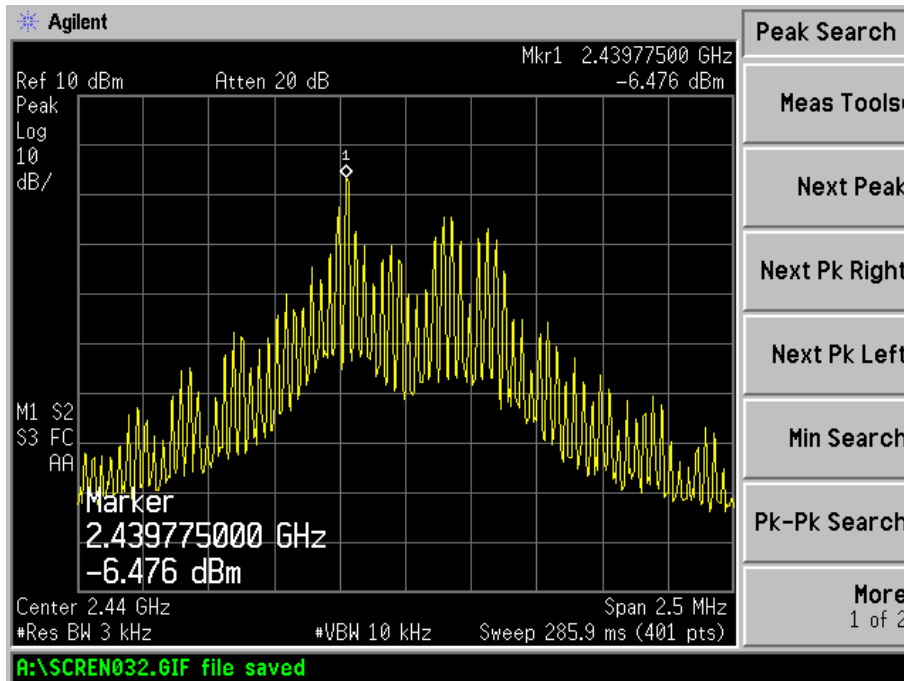
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
GFSK(BLE)	2402	-5.947	8
	2440	-6.476	8
	2480	-7.237	8

Please refer to the following test plots:

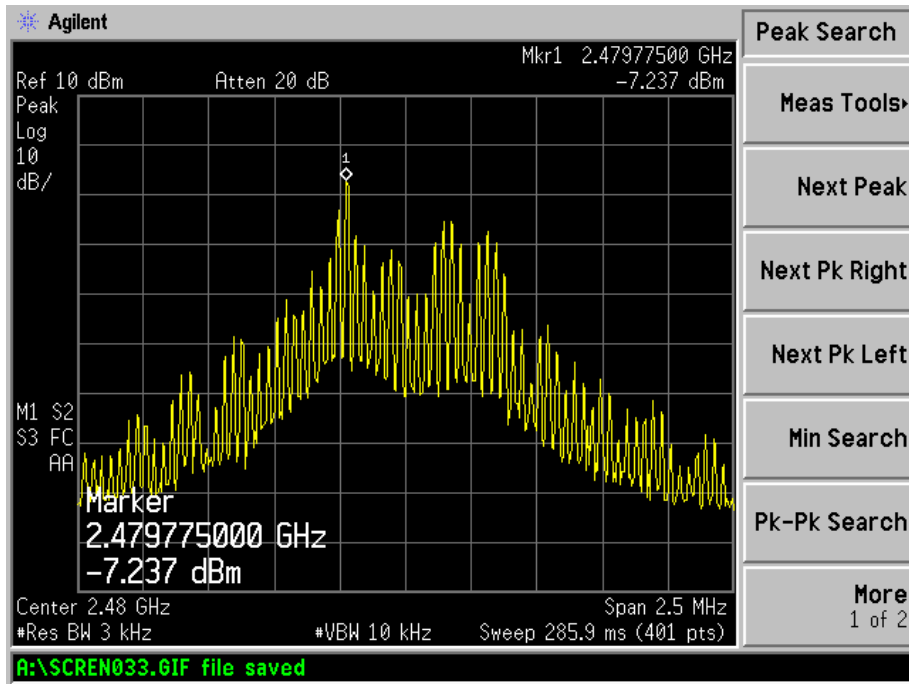
Low Channel



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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2015-05-28	2016-05-27
Attenuator	ATTEN	ATS100-4-20	/	2015-05-28	2016-05-27

6.3 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.

6.4 Environmental Conditions

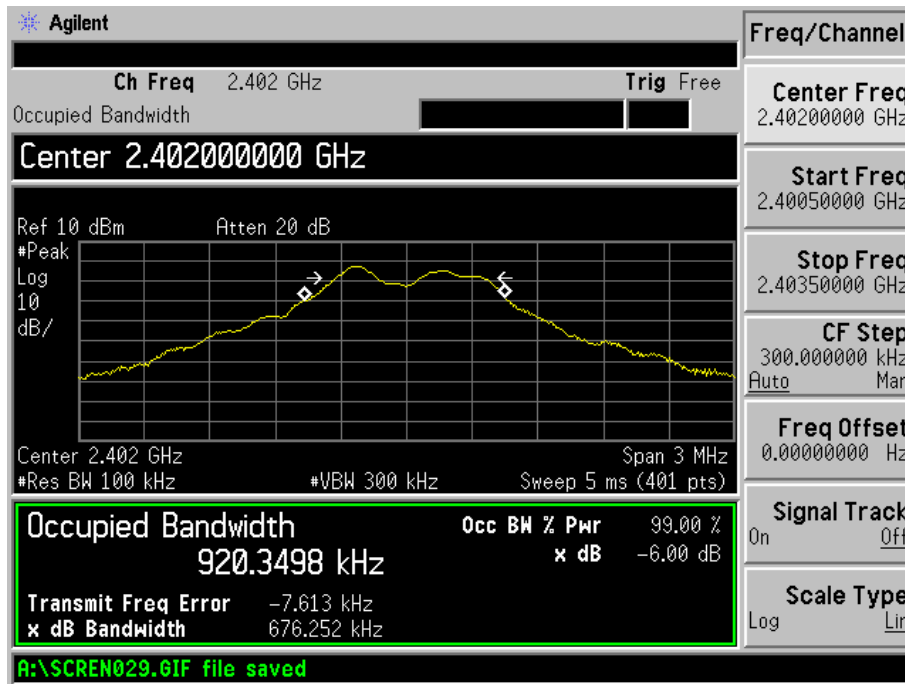
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.5 Summary of Test Results/Plots

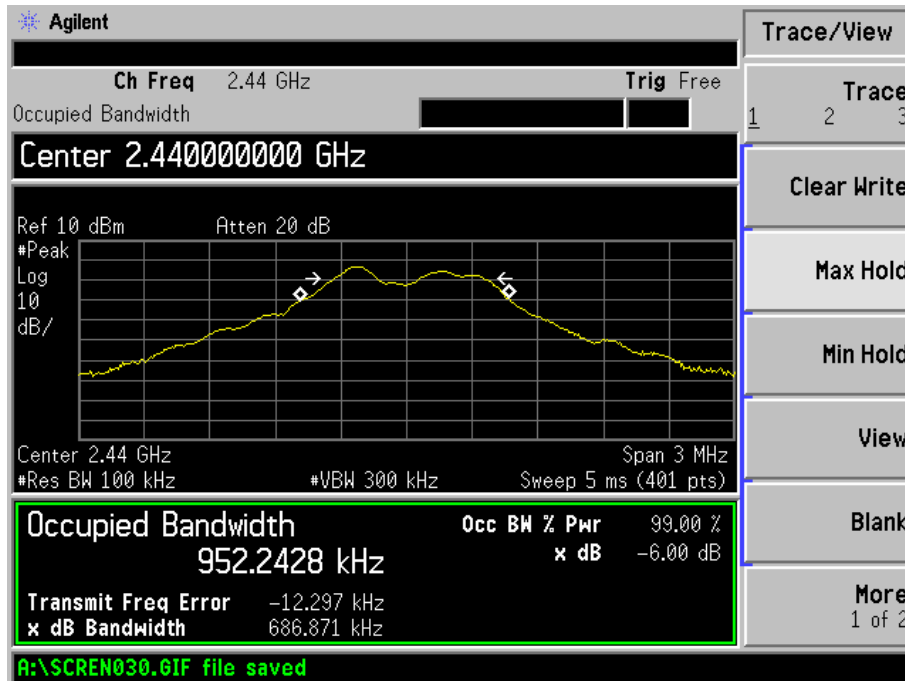
Test Mode	Test Channel MHz	6 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz
GFSK(BLE)	2402	676.252	920.3498	>500
	2440	686.871	952.2428	>500
	2480	693.761	959.1864	>500

Please refer to the following test plots:

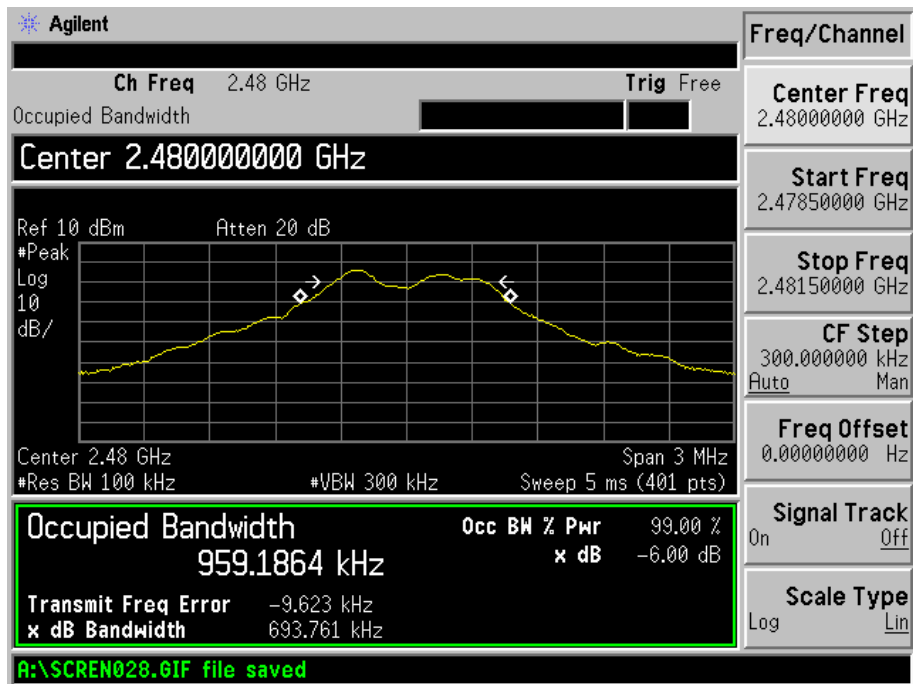
For BLE
Low Channel:



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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2015-05-28	2016-05-27
Attenuator	ATTEN	ATS100-4-20	/	2015-05-28	2016-05-27

7.3 Test Procedure

According to section 15.247(b)-power output of the KDB-558074 D01 V03r02 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.

7.4 Environmental Conditions

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

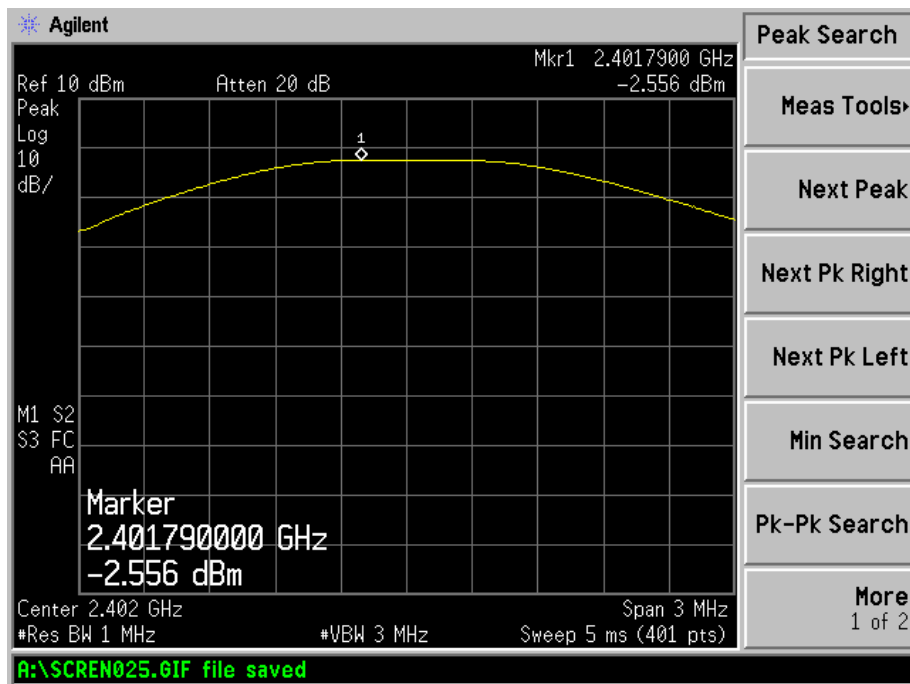
7.5 Summary of Test Results/Plots

Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
GFSK(BLE)	2402	-2.556	0.555	1000
	2440	-3.228	0.475	1000
	2480	-3.947	0.403	1000

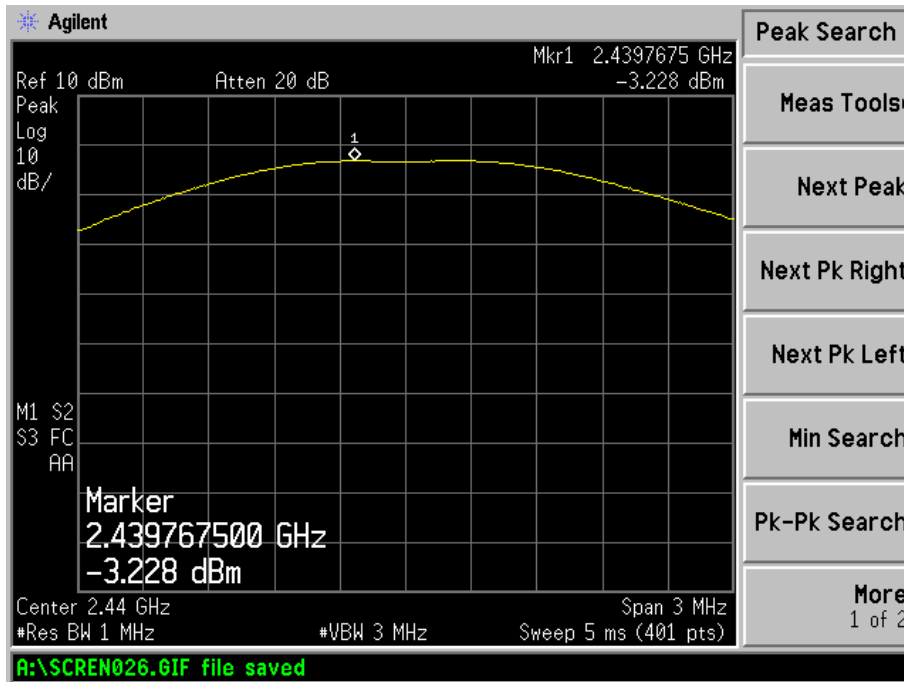
Note: the antenna gain of -1dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

Please refer to the following test plots:

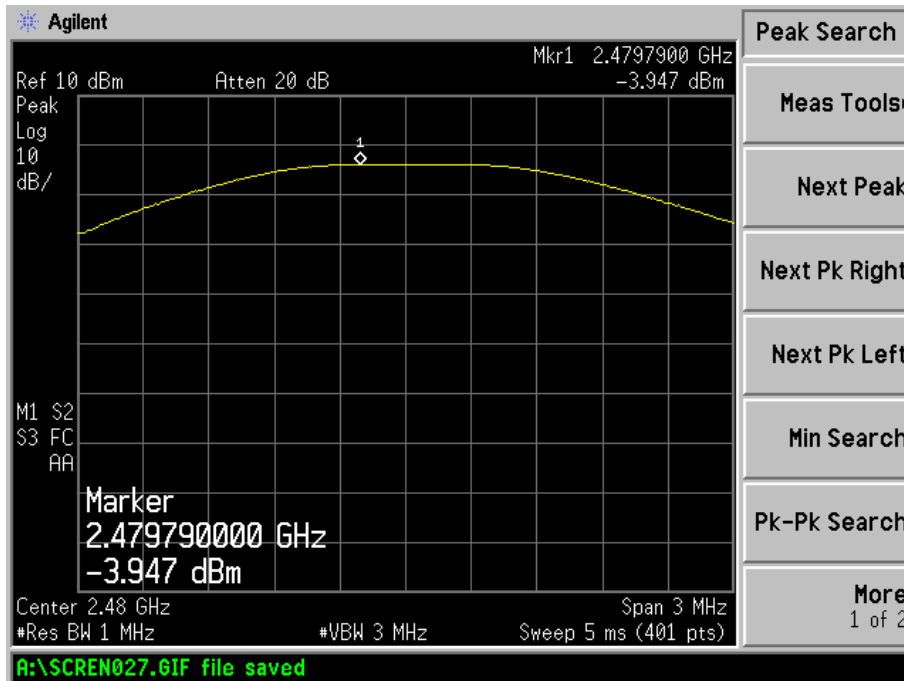
For BLE
Low Channel:



Middle Channel:



High Channel:



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 Equipment List and Details

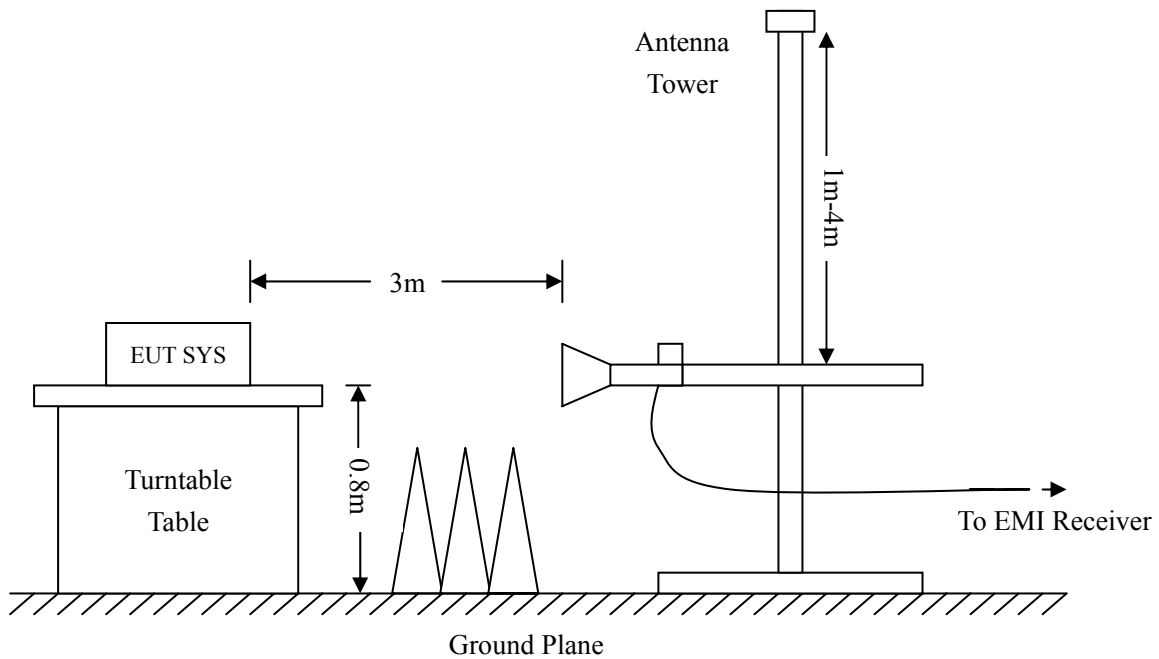
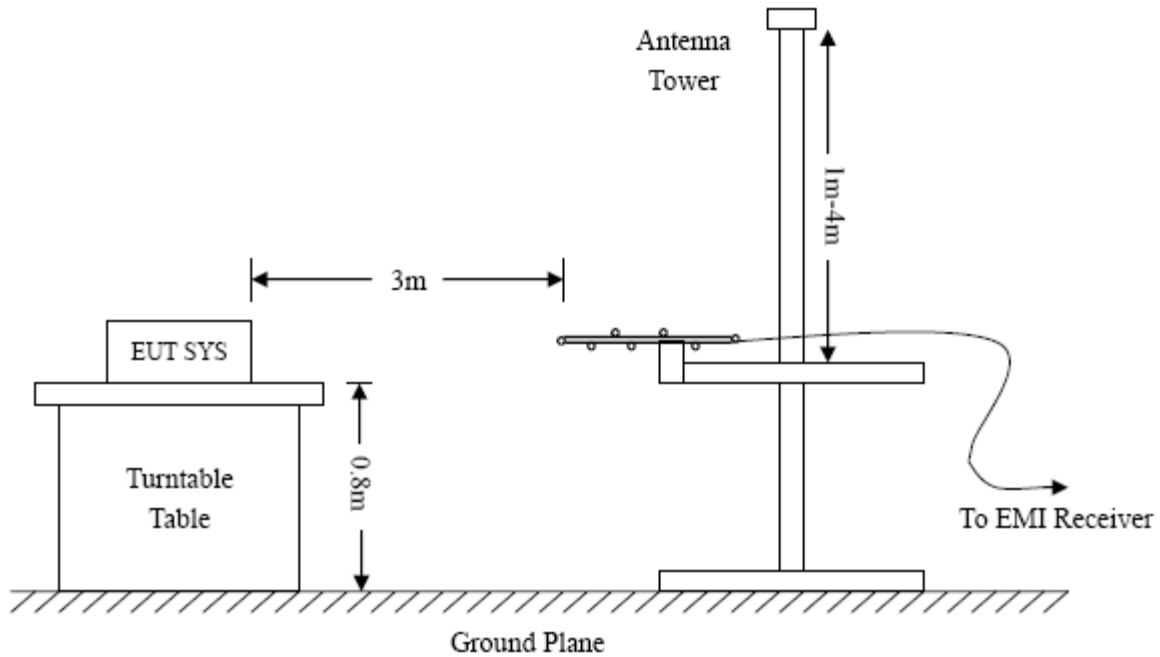
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2015-05-28	2016-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2015-05-28	2016-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2015-05-28	2016-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2015-05-28	2016-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2015-05-24	2016-05-23
Horn Antenna	ETS	3117	00086197	2015-05-24	2016-05-23
Horn Antenna	ETS	3116B	00088203	2015-05-24	2016-05-23
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2015-05-24	2016-05-23

8.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2009 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

8.5 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:

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

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

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

8.6 Environmental Conditions

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

8.7 Summary of Test Results/Plots

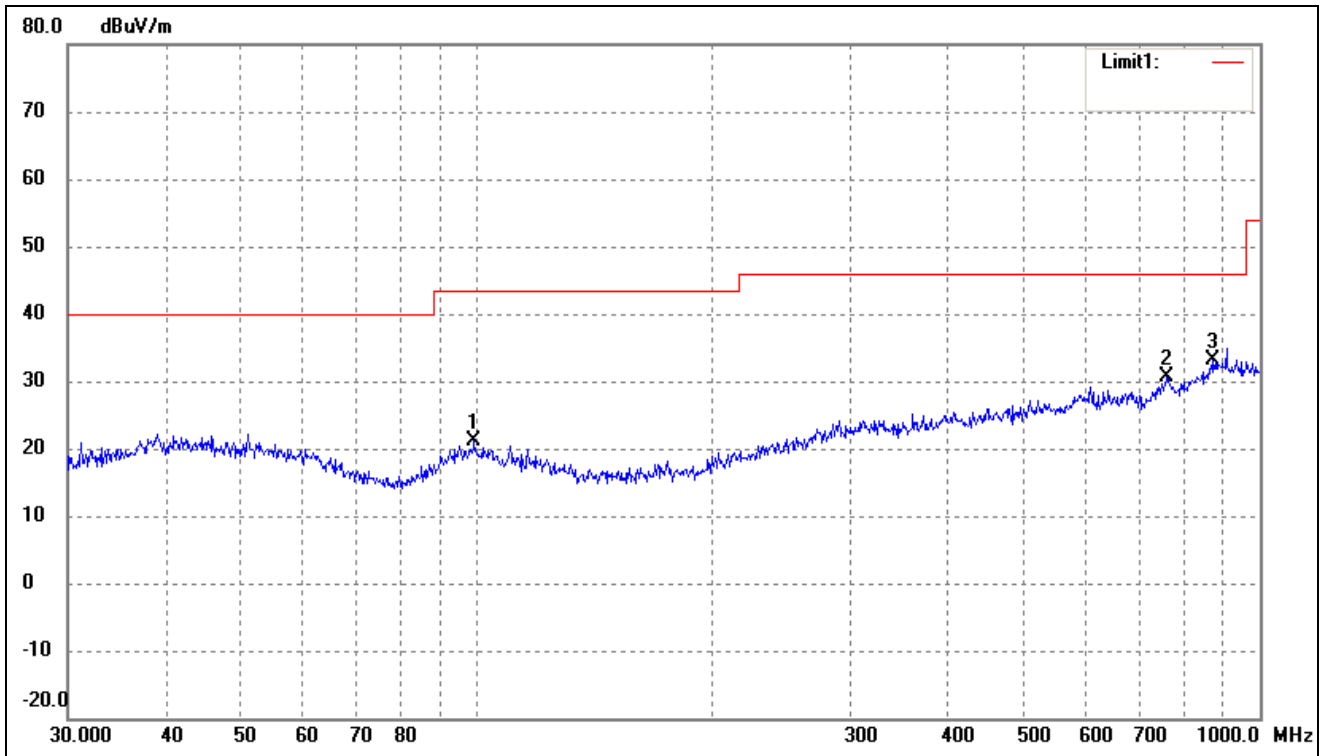
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

*Note: this EUT was tested in 3 orthogonal positions, the **antenna vertically** is worst case position and the data was reported.*

Plot of Radiated Emissions Test Data

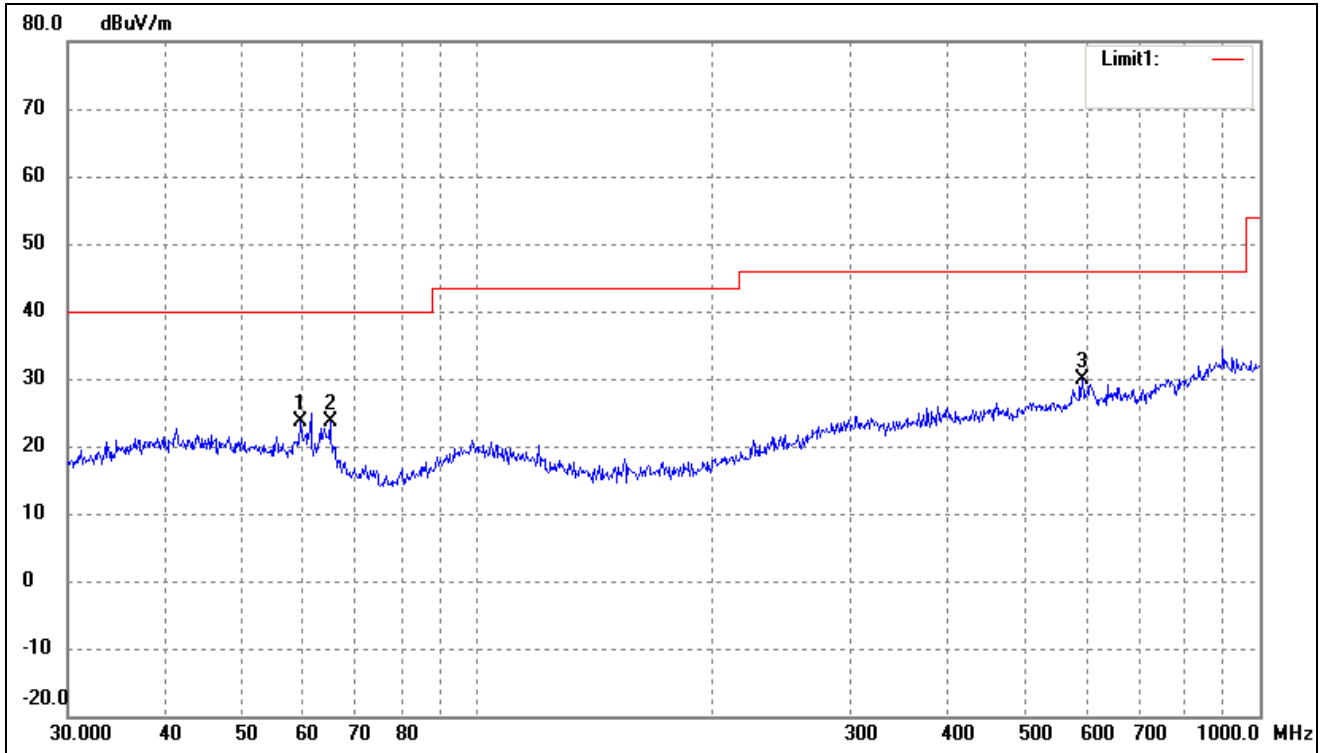
EUT: *mophie space pack*
 Tested Model: *SP-IP6-32GB-BLK*
 Operating Condition: *Transmitting-Low channel (2402MHz)*
 Comment: *Battery:DC3.8V*

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	99.1797	15.33	5.92	21.25	43.50	-22.25	85	100	QP
2	760.7036	16.02	14.61	30.63	46.00	-15.37	116	100	QP
3	872.1832	16.45	16.61	33.06	46.00	-12.94	332	100	QP

Test Specification: Vertical

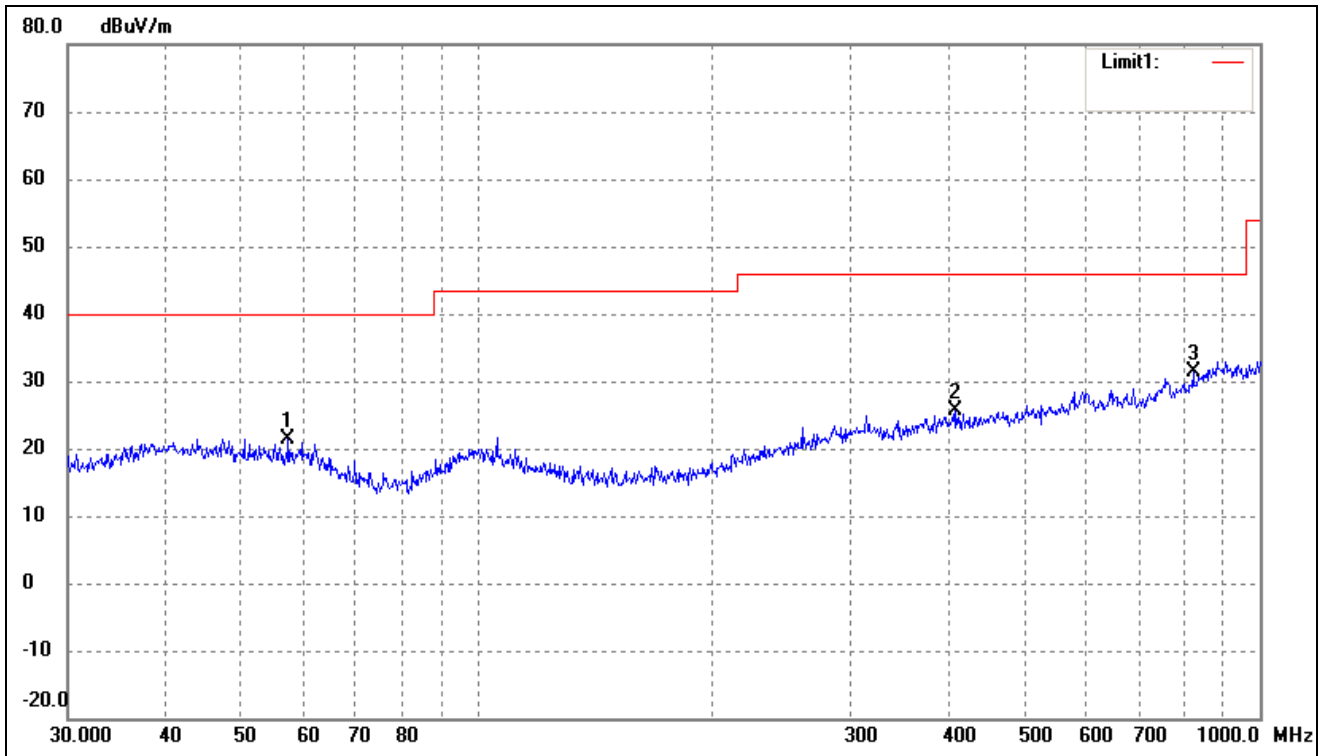


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	59.4405	18.27	5.43	23.70	40.00	-16.30	56	100	QP
2	64.8865	19.87	3.82	23.69	40.00	-16.31	165	100	QP
3	593.0497	16.87	13.06	29.93	46.00	-16.07	231	100	QP

Plot of Radiated Emissions Test Data

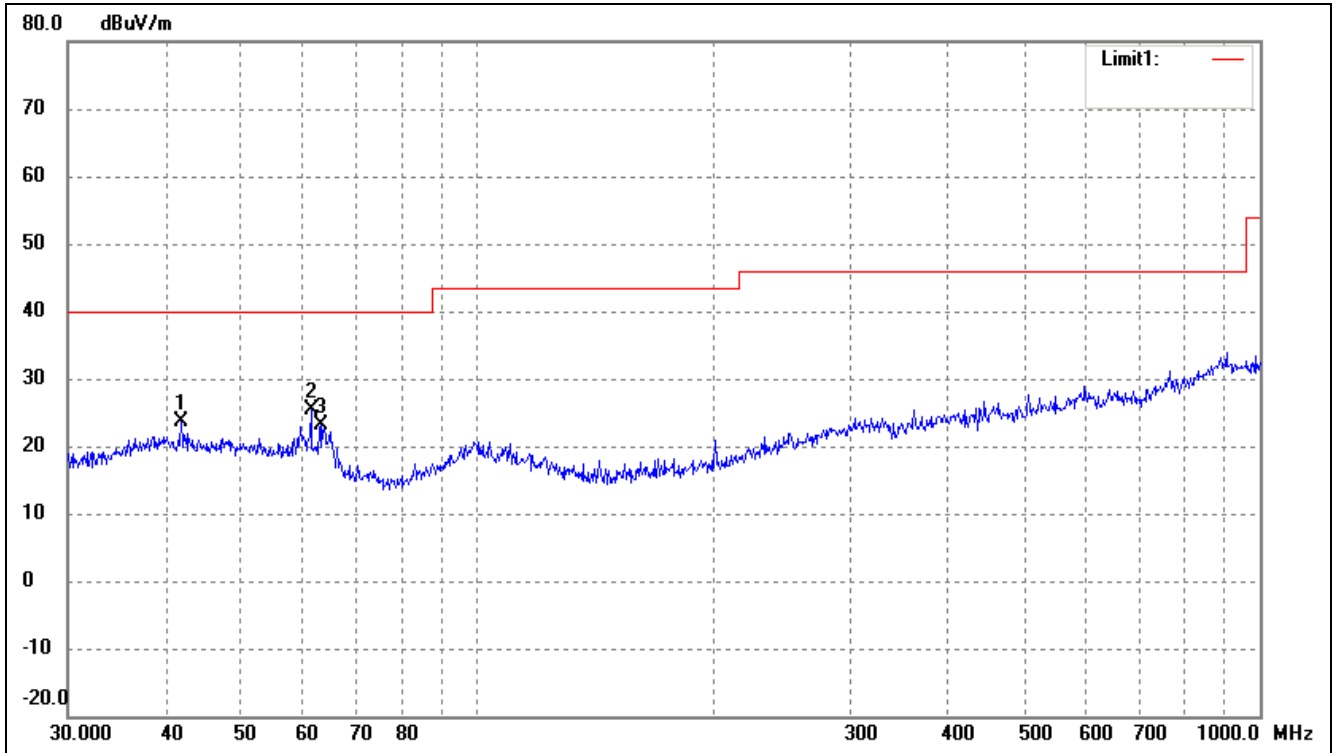
EUT: *mophie space pack*
 Tested Model: *SP-IP6-32GB-BLK*
 Operating Condition: *Transmitting-Middle channel (2440MHz)*
 Comment: *Battery:DC3.8V*

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	57.3923	15.88	5.60	21.48	40.00	-18.52	85	100	QP
2	408.9460	15.85	9.80	25.65	46.00	-20.35	314	100	QP
3	821.7104	16.47	14.98	31.45	46.00	-14.55	165	100	QP

Test Specification: Vertical

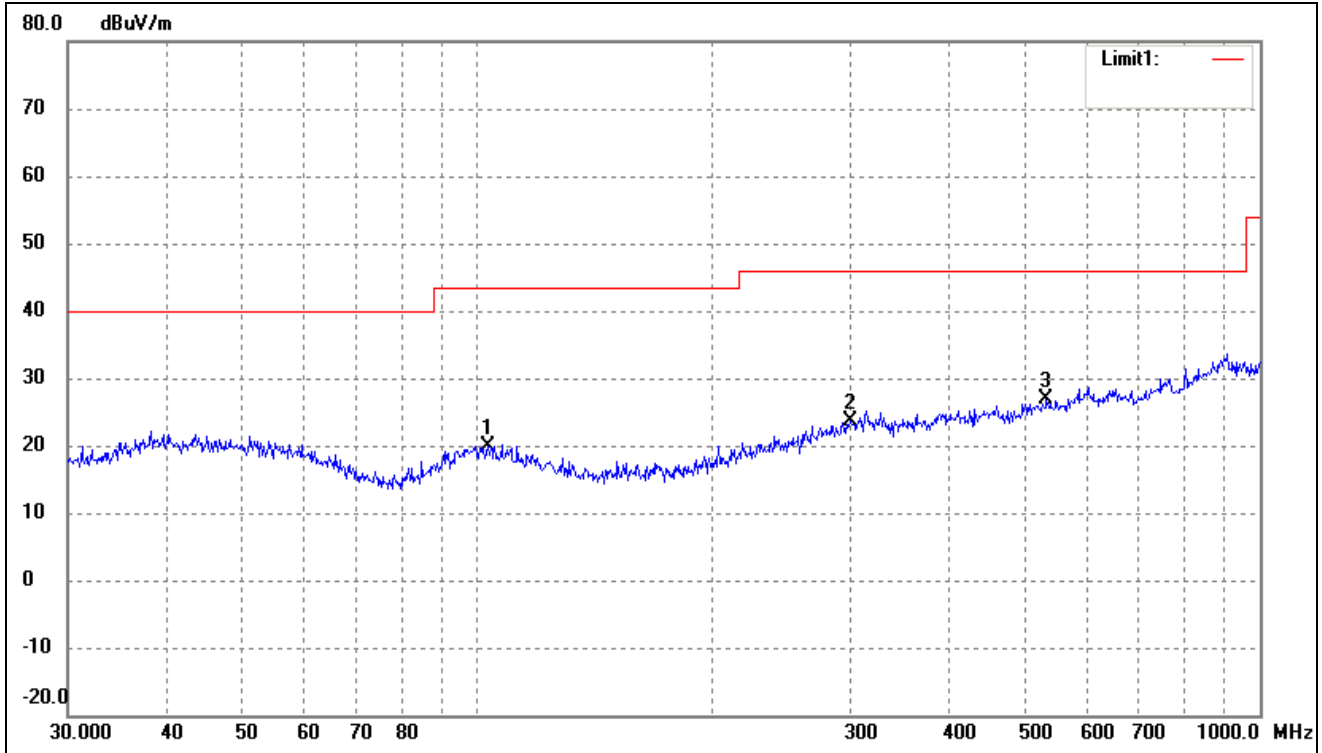


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	41.8596	15.03	8.69	23.72	40.00	-16.28	85	200	QP
2	61.3463	20.50	4.95	25.45	40.00	-14.55	165	100	QP
3	63.0916	18.77	4.39	23.16	40.00	-16.84	156	200	QP

Plot of Radiated Emissions Test Data

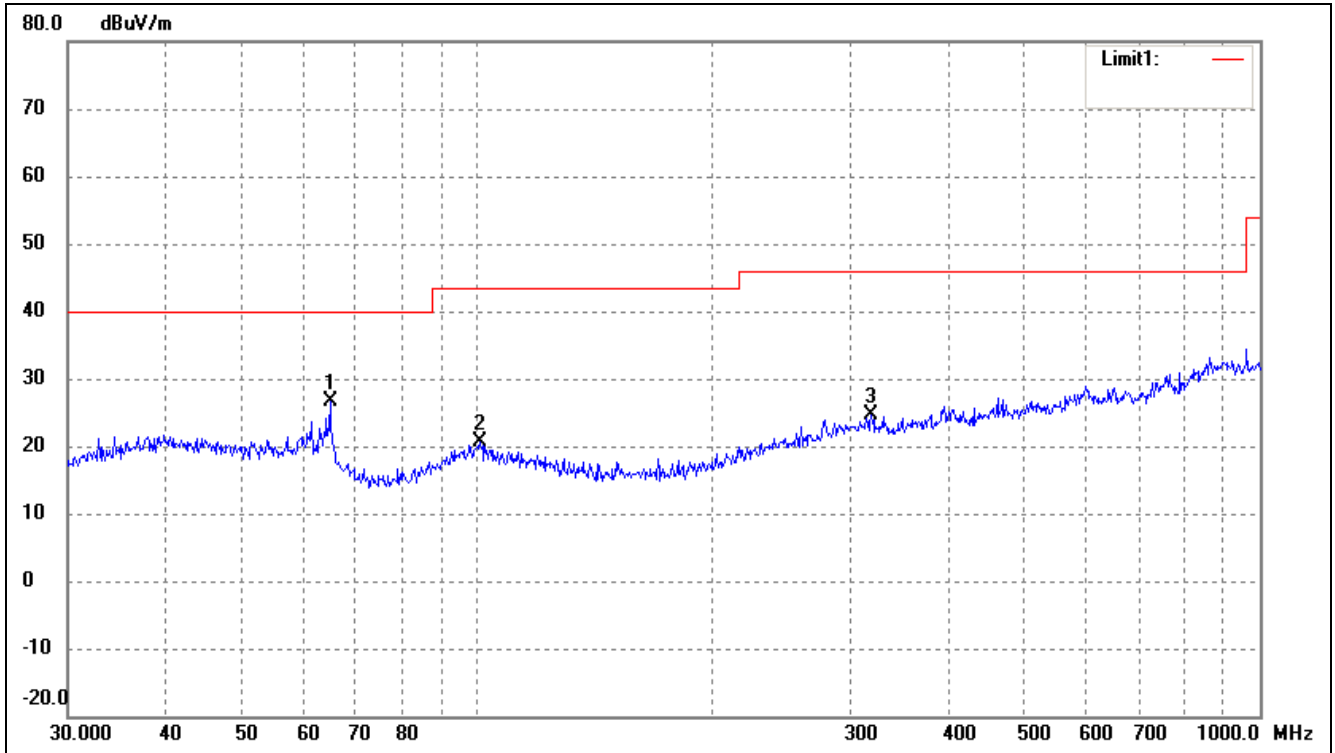
EUT: *mophie space pack*
 Tested Model: *SP-IP6-32GB-BLK*
 Operating Condition: *Transmitting-High channel (2480MHz)*
 Comment: *Battery:DC3.8V*

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	103.4421	14.09	5.77	19.86	43.50	-23.64	65	200	QP
2	300.3673	14.41	9.18	23.59	46.00	-22.41	135	100	QP
3	533.8321	15.62	11.32	26.94	46.00	-19.06	98	200	QP

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	64.8865	22.69	3.82	26.51	40.00	-13.49	56	100	QP
2	100.9340	14.72	6.03	20.75	43.50	-22.75	157	100	QP
3	318.8170	15.37	9.28	24.65	46.00	-21.35	98	100	QP

*Spurious Emissions Above 1GHz**Transmitting: BLE mode:*

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
4804	40.33	0.53	40.86	74.00	-33.14	H	PK
4804	28.71	0.57	29.28	54.00	-24.72	H	AV
7206	28.91	3.66	32.57	74.00	-41.43	H	PK
7206	17.65	3.68	21.33	54.00	-32.67	H	AV
4804	42.06	0.53	42.59	74.00	-31.41	V	PK
4804	29.40	0.55	29.95	54.00	-24.05	V	AV
7206	28.95	3.66	32.61	74.00	-41.39	V	PK
7206	17.80	3.69	21.49	54.00	-32.51	V	AV
Middle Channel-2440MHz							
4880	41.21	0.65	41.86	74.00	-32.14	H	PK
4880	28.99	0.70	29.69	54.00	-24.31	H	AV
7320	30.70	3.75	34.45	74.00	-39.55	H	PK
7320	19.52	3.80	23.32	54.00	-30.68	H	AV
4880	40.85	0.65	41.50	74.00	-32.50	V	PK
4880	28.82	0.70	29.52	54.00	-24.48	V	AV
7320	30.49	3.75	34.24	74.00	-39.76	V	PK
7320	19.50	3.80	23.30	54.00	-30.70	V	AV
High Channel-2480MHz							
4960	44.76	0.77	45.53	74.00	-28.47	H	PK
4960	32.06	0.77	32.83	54.00	-21.17	H	AV
7440	31.74	3.85	35.59	74.00	-38.41	H	PK
7440	19.92	3.88	23.80	54.00	-30.20	H	AV
4960	44.59	0.77	45.36	74.00	-28.64	V	PK
4960	28.45	0.79	29.24	54.00	-24.76	V	AV
7440	31.01	3.85	34.86	74.00	-39.14	V	PK
7440	19.62	3.83	23.45	54.00	-30.55	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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2015-05-28	2016-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2015-05-28	2016-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2015-05-28	2016-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2015-05-28	2016-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2015-05-24	2016-05-23
Horn Antenna	ETS	3117	00086197	2015-05-24	2016-05-23

9.3 Test Procedure

According to the KDB 558074 D01 v03r02, 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 V03r02, 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.

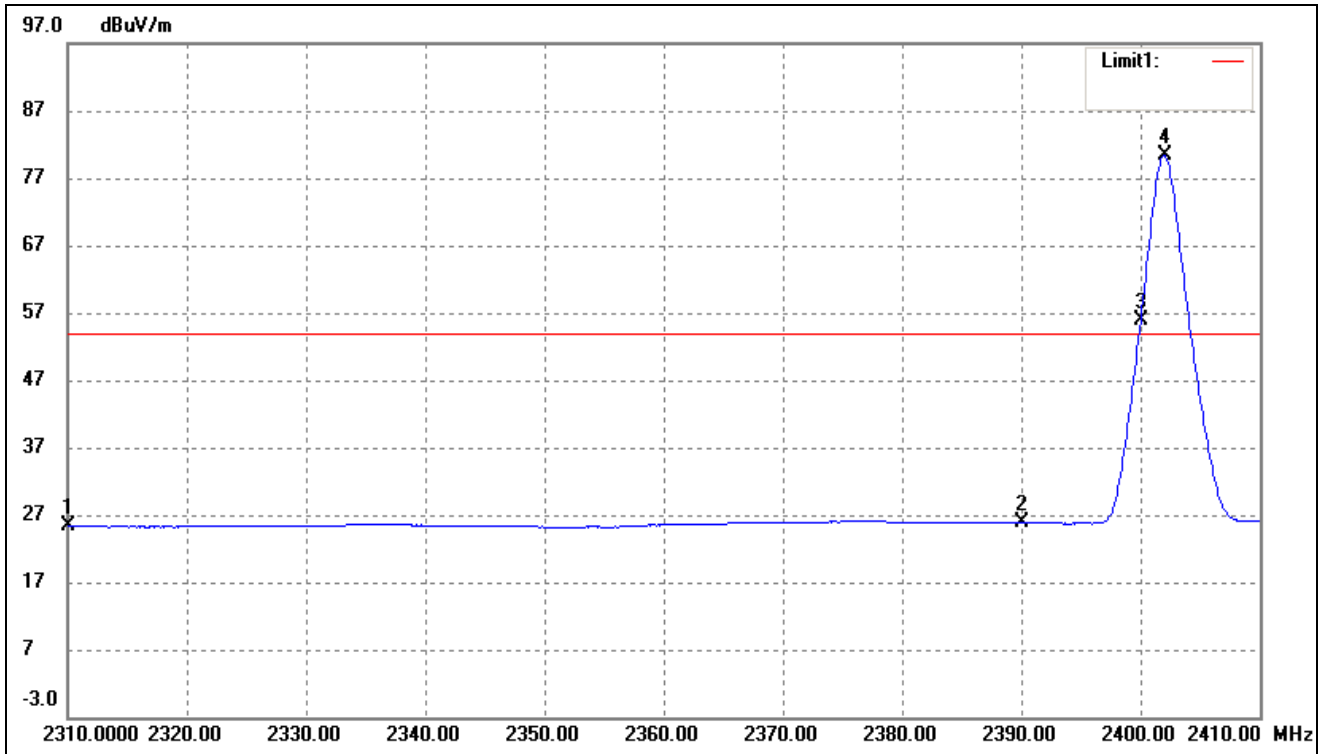
9.4 Environmental Conditions

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

9.5 Summary of Test Results/Plots

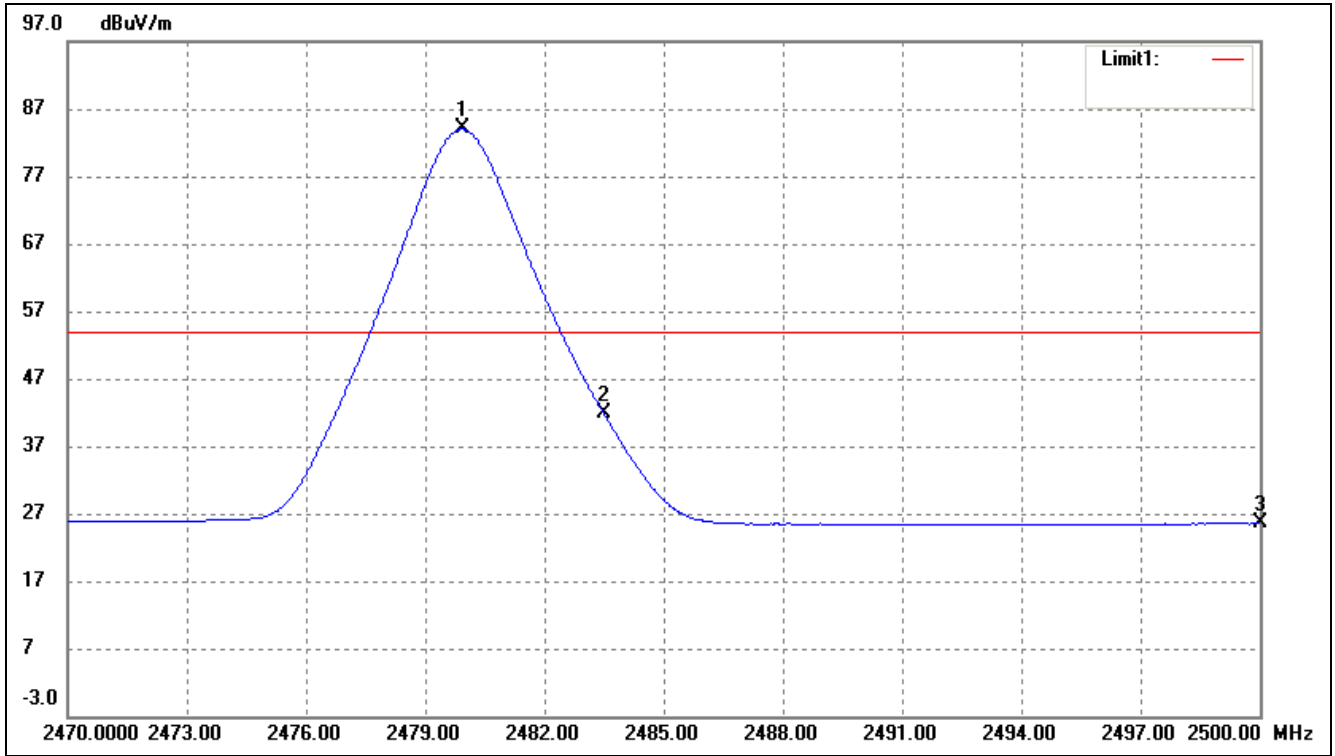
Please refer to the test plots as below.

Bandedge (Radiated)
 Lowest Bandedge-BLE
 Horizontal (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	28.99	-3.71	25.28	54.00	-28.72	Average Detector
	2310.000	42.38	-3.71	38.67	74.00	-35.33	Peak Detector
2	2390.000	29.44	-3.54	25.90	54.00	-28.10	Average Detector
	2390.000	42.90	-3.54	39.36	74.00	-34.64	Peak Detector
3	2400.000	59.38	-3.51	55.87	Delta = 24.49 dBc		Average Detector
4	2402.000	83.87	-3.51	80.36			Average Detector

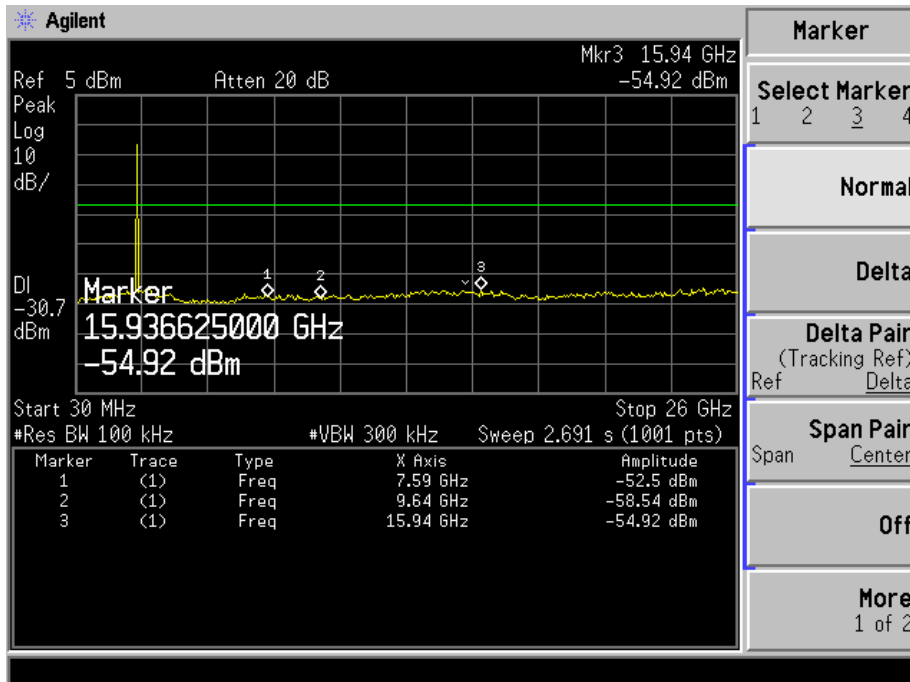
Highest Bandedge-BLE
Horizontal (Worst case)



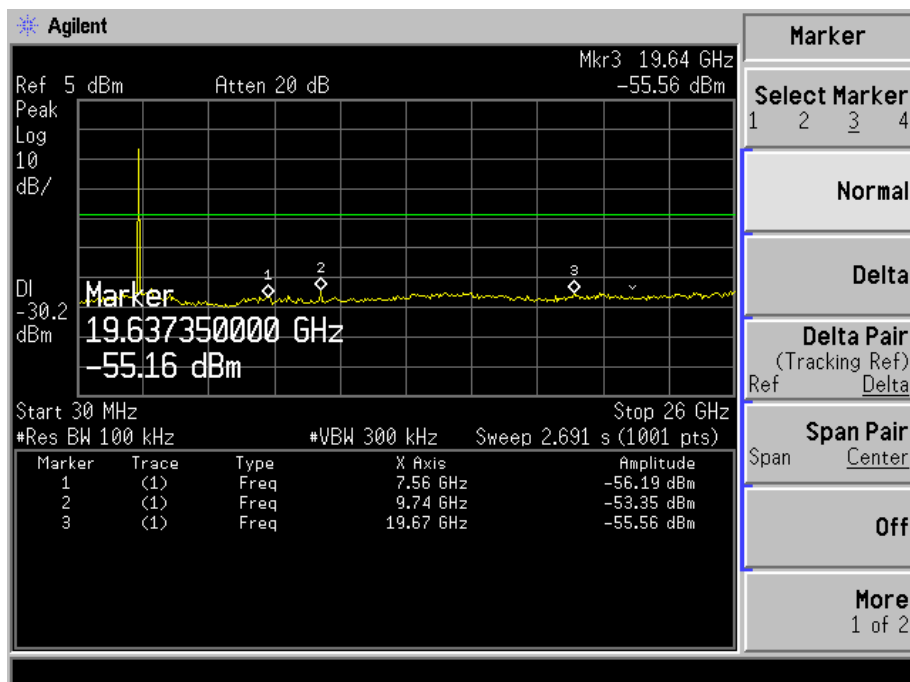
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	87.37	-3.33	84.04	/	/	Average Detector
	2480.000	88.44	-3.33	85.11	/	/	Peak Detector
2	2483.500	26.69	-3.30	23.39	54.00	-30.61	Average Detector
	2483.500	27.75	-3.30	24.45	74.00	-49.55	Peak Detector
3	2500.000	28.86	-3.28	25.58	54.00	-28.42	Average Detector
	2500.000	42.13	-3.28	38.85	74.00	-35.15	Peak Detector

Bandedge (Conducted)

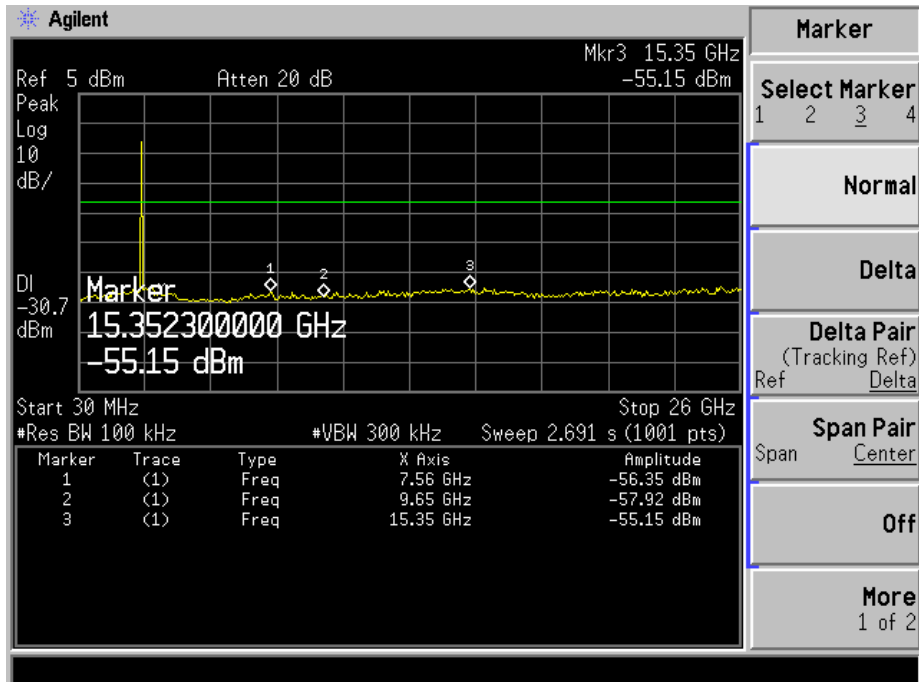
Low Channel



Middle Channel



High Channel



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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-05-28	2016-05-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-05-28	2016-05-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-05-28	2016-05-27

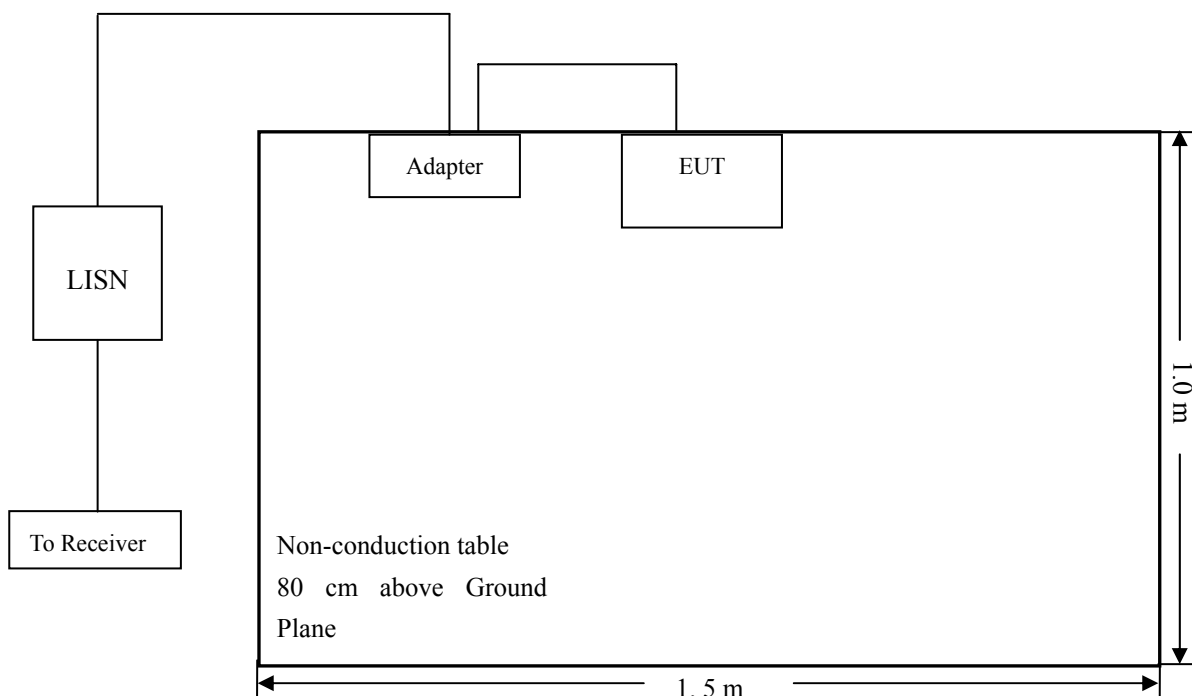
10.3 Test Procedure

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

10.4 Basic Test Setup Block Diagram



10.5 Environmental Conditions

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

10.6 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

10.7 Summary of Test Results/Plots

According to the data in section 9.8, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

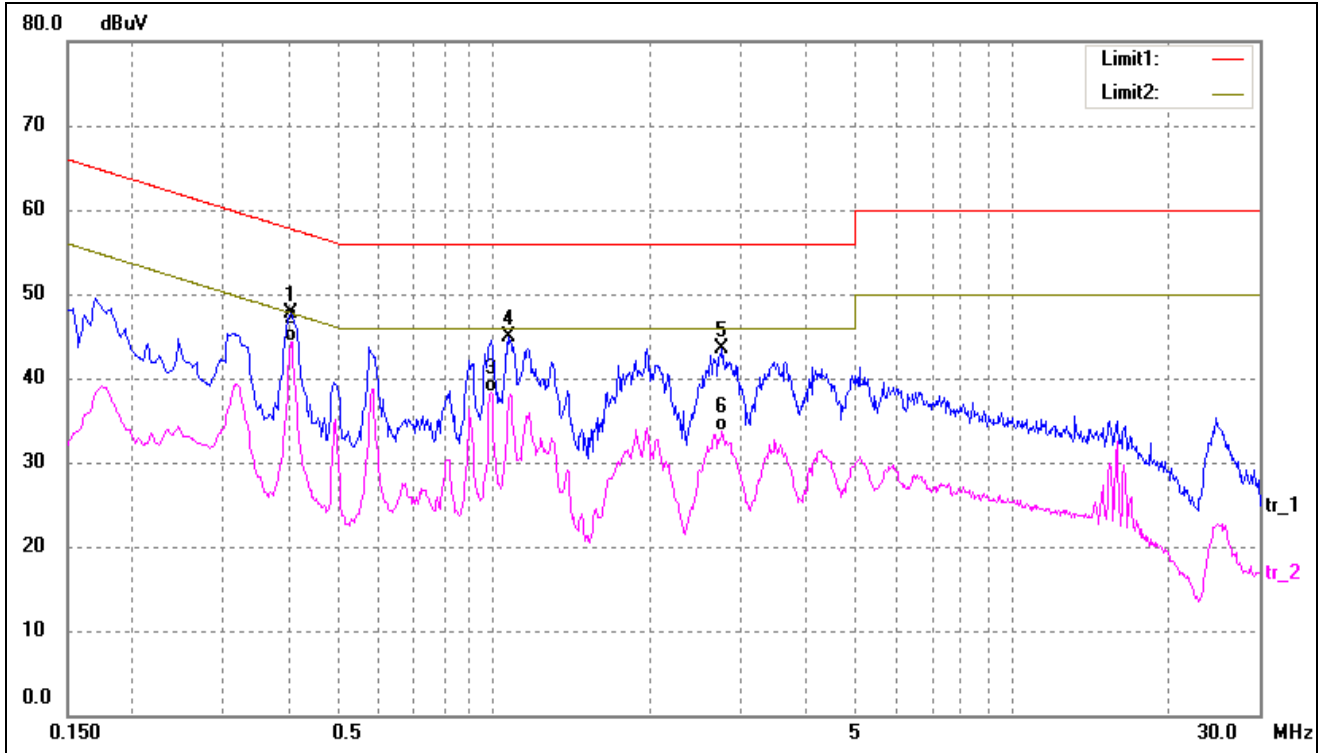
-3.41 dB at 0.4060 MHz in the Neutral, **AVG** detector, 0.15-30MHz

10.8 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

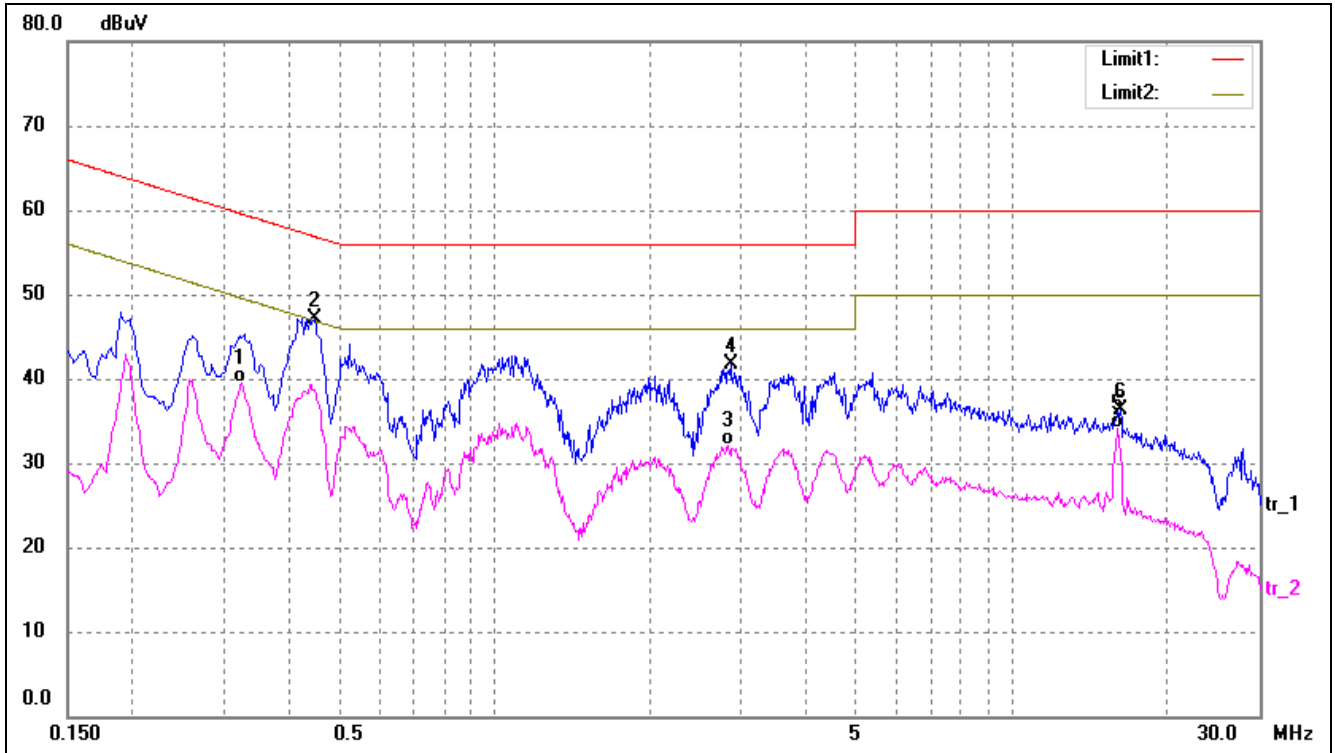
EUT: *mophie space pack*
 Tested Model: *SP-IP6-32GB-BLK*
 Operating Condition: *Transmitting*
 Comment: *AC 120V/60Hz; Notebook USB 5V*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.4060	38.12	9.50	47.62	57.73	-10.11	QP
2	0.4060	34.82	9.50	44.32	47.73	-3.41	AVG
3	0.9860	28.36	9.99	38.35	46.00	-7.65	AVG
4	1.0700	34.81	10.00	44.81	56.00	-11.19	QP
5	2.7620	33.45	10.00	43.45	56.00	-12.55	QP
6	2.7620	23.80	10.00	33.80	46.00	-12.20	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3260	29.96	9.50	39.46	49.55	-10.09	AVG
2	0.4500	37.69	9.50	47.19	56.88	-9.69	QP
3	2.8300	22.11	10.00	32.11	46.00	-13.89	AVG
4	2.8660	31.74	10.00	41.74	56.00	-14.26	QP
5	16.0300	22.89	11.21	34.10	50.00	-15.90	AVG
6	16.1580	25.06	11.23	36.29	60.00	-23.71	QP

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