

FCC Part 15B

Measurement and Test Report

For

mophie LLC

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

FCC ID: 2ACWB-SPIM

Test Rule(s): FCC Part 15 Subpart B

Product Description: mophie space pack for iPad mini

Tested Model: SP-IPAD-MINI-32GB-BLK

Report No.: STR14078015I-2

Tested Date: 2014-07-03 to 2014-8-18

Issued Date: 2014-08-18

Tested By: Jason Su / Engineer

Reviewed By: Lahm Peng / EMC Manager

Approved & Authorized By: Jandy so / PSQ Manager

Prepared By:

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

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 space pack for iPad mini
Trade Name:	mophie
Model No.:	SP-IPAD-MINI-32GB-BLK
Adding Model(s):	SP-IPAD-MINI-64GB-BLK, SP-IPAD-MINI-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 SP-IPAD-MINI-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:1.8A ; Output: 2.1A
Rated Power:	/
Power Adapter Model:	/
Lowest Internal Frequency:	32.768KHz
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 C63.4-2003, 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	PC to SD Card add Ipad
TM4	Downloading	SD Card add Ipad to PC

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
iPad	Apple	A1432	/
Notebook	Lenovo	E10	LR-63C8R

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.

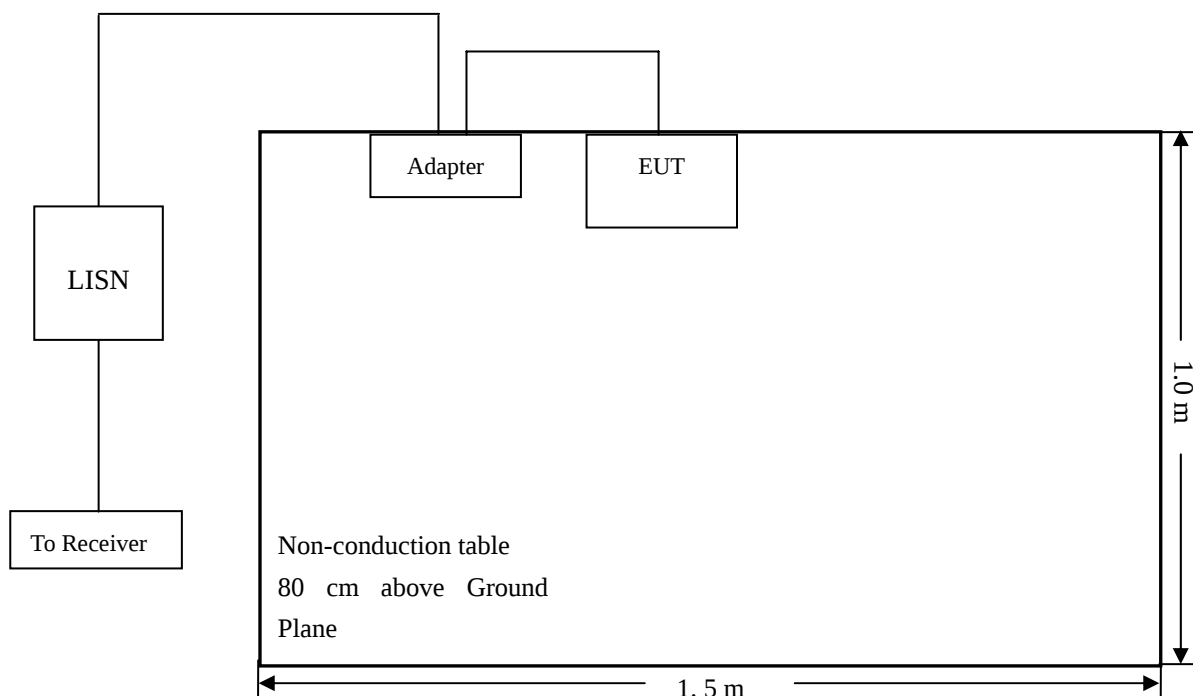
3.2 Test Equipment List and Details

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 C63.4-2003, 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:

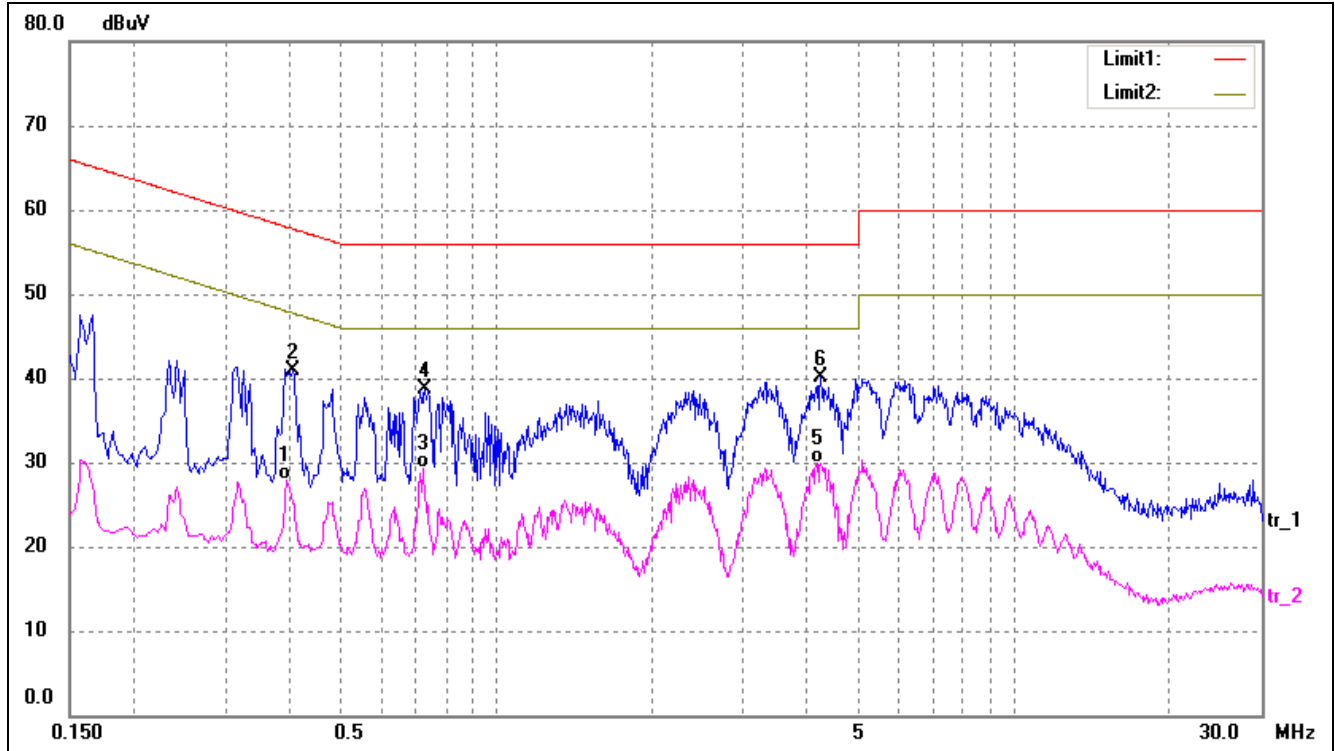
-11.55 dB at **4.1260 MHz** in the *Neutral, Peak* detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

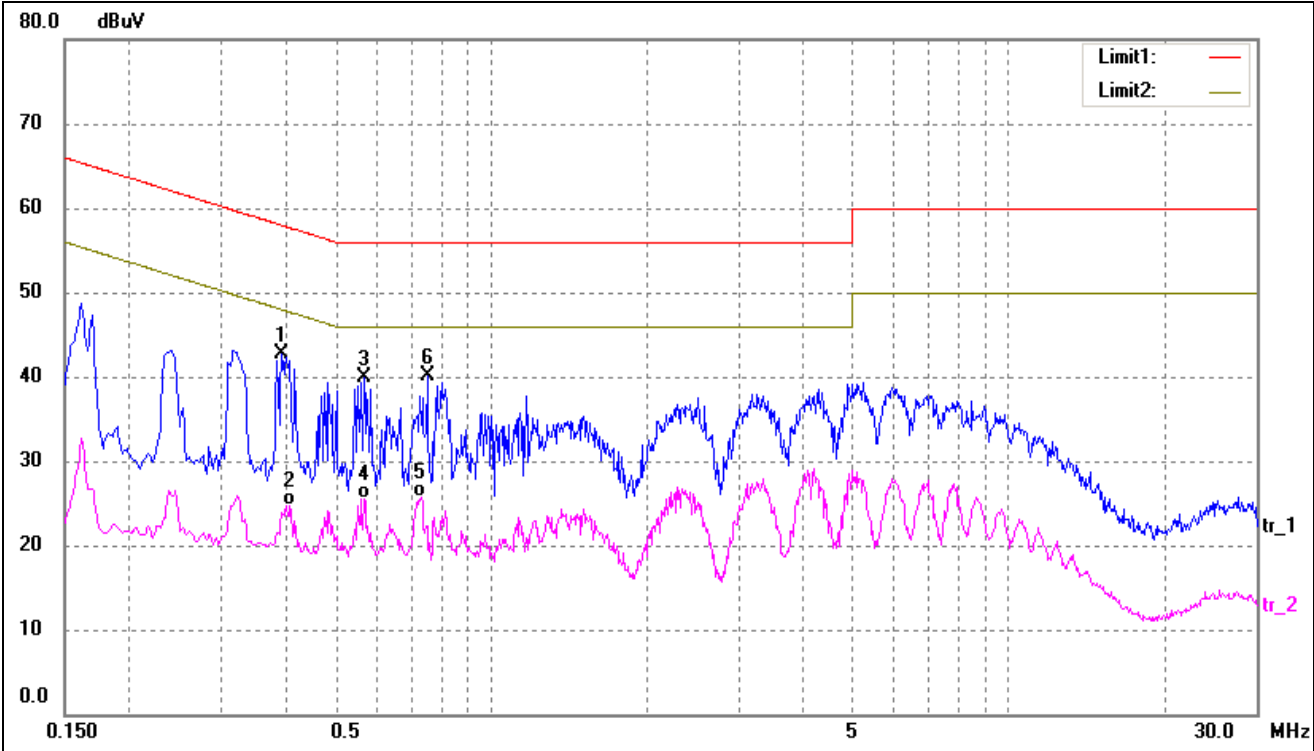
EUT: mophie space pack for iPad mini
 Tested Model: SP-IPAD-MINI-32GB-BLK
 Operating Condition: TM1
 Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.3940	18.31	9.50	27.81	47.98	-20.17	AVG
2	0.4060	31.36	9.50	40.86	57.73	-16.87	peak
3	0.7220	19.50	9.72	29.22	46.00	-16.78	AVG
4	0.7300	28.88	9.73	38.61	56.00	-17.39	peak
5	4.1580	19.98	10.00	29.98	46.00	-16.02	AVG
6	4.2260	30.17	10.00	40.17	56.00	-15.83	peak

Test Specification: Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.3940	33.13	9.50	42.63	57.98	-15.35	peak
2	0.4100	15.25	9.50	24.75	47.65	-22.90	AVG
3	0.5700	30.38	9.57	39.95	56.00	-16.05	peak
4	0.5700	15.91	9.57	25.48	46.00	-20.52	AVG
5	0.7340	15.95	9.73	25.68	46.00	-20.32	AVG
6	0.7540	30.26	9.75	40.01	56.00	-15.99	peak

Plot of Conducted Emissions Test Data

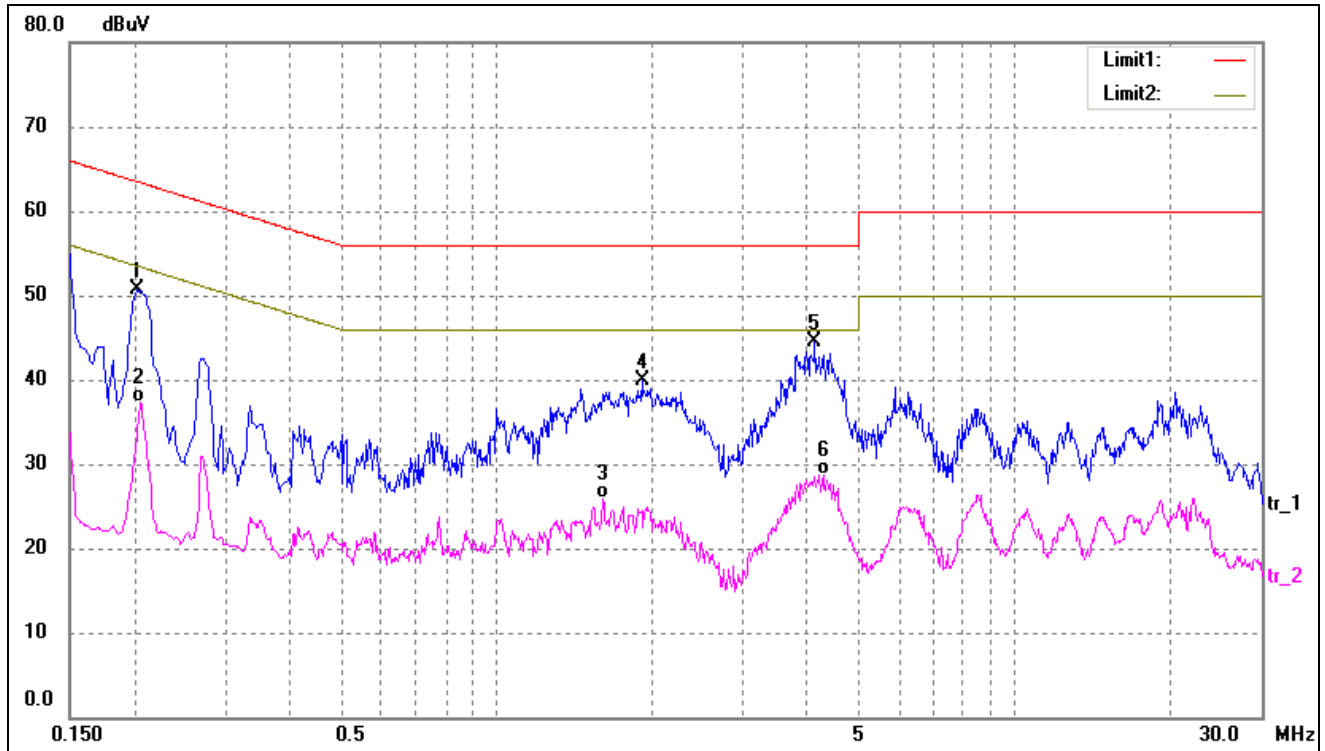
EUT: mophie space pack for iPad mini

Tested Model: SP-IPAD-MINI-32GB-BLK

Operating Condition: TM3

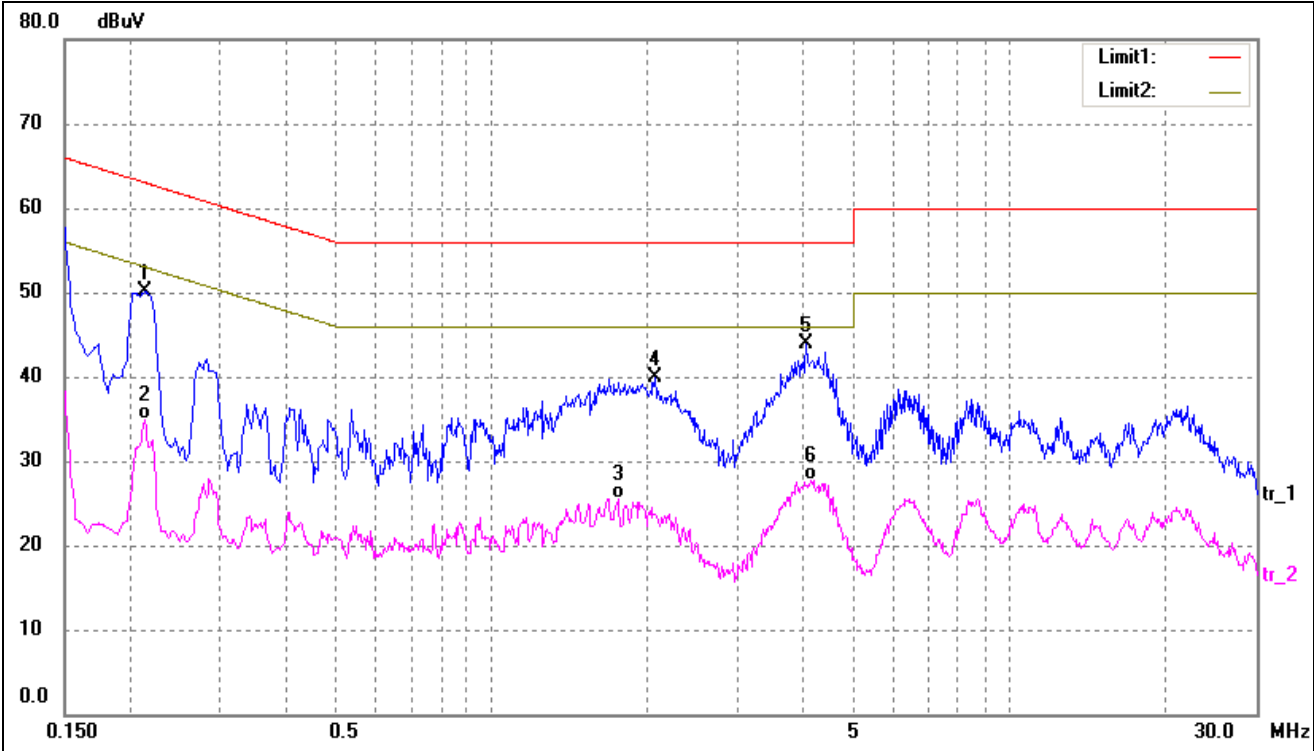
Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2020	41.17	9.50	50.67	63.53	-12.86	peak
2	0.2060	27.79	9.50	37.29	53.37	-16.08	AVG
3	1.6100	15.90	10.00	25.90	46.00	-20.10	AVG
4	1.9100	29.89	10.00	39.89	56.00	-16.11	peak
5	4.1260	34.45	10.00	44.45	56.00	-11.55	peak
6	4.2740	18.79	10.00	28.79	46.00	-17.21	AVG

Test Specification: Line

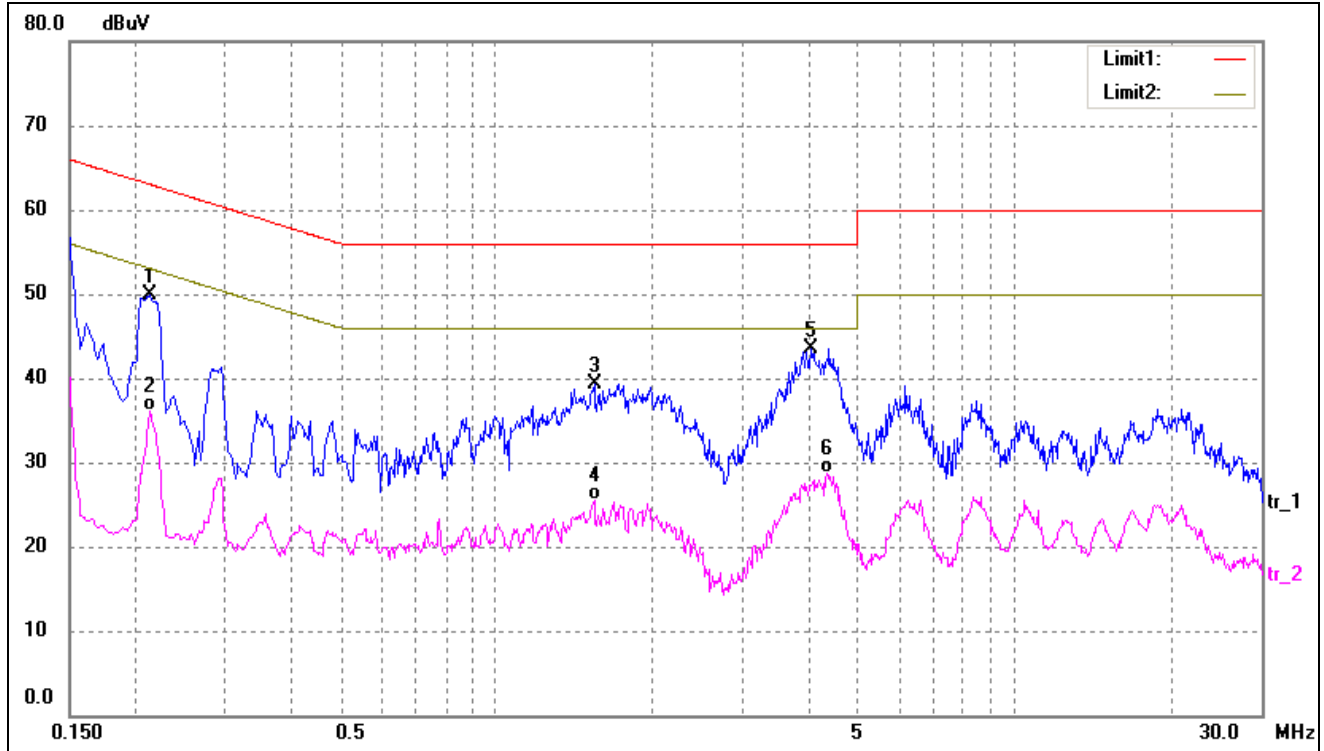


No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.2140	40.61	9.50	50.11	63.05	-12.94	peak
2	0.2140	25.49	9.50	34.99	53.05	-18.06	AVG
3	1.7540	15.52	10.00	25.52	46.00	-20.48	AVG
4	2.0740	29.90	10.00	39.90	56.00	-16.10	peak
5	4.0500	33.92	10.00	43.92	56.00	-12.08	peak
6	4.1500	17.78	10.00	27.78	46.00	-18.22	AVG

Plot of Conducted Emissions Test Data

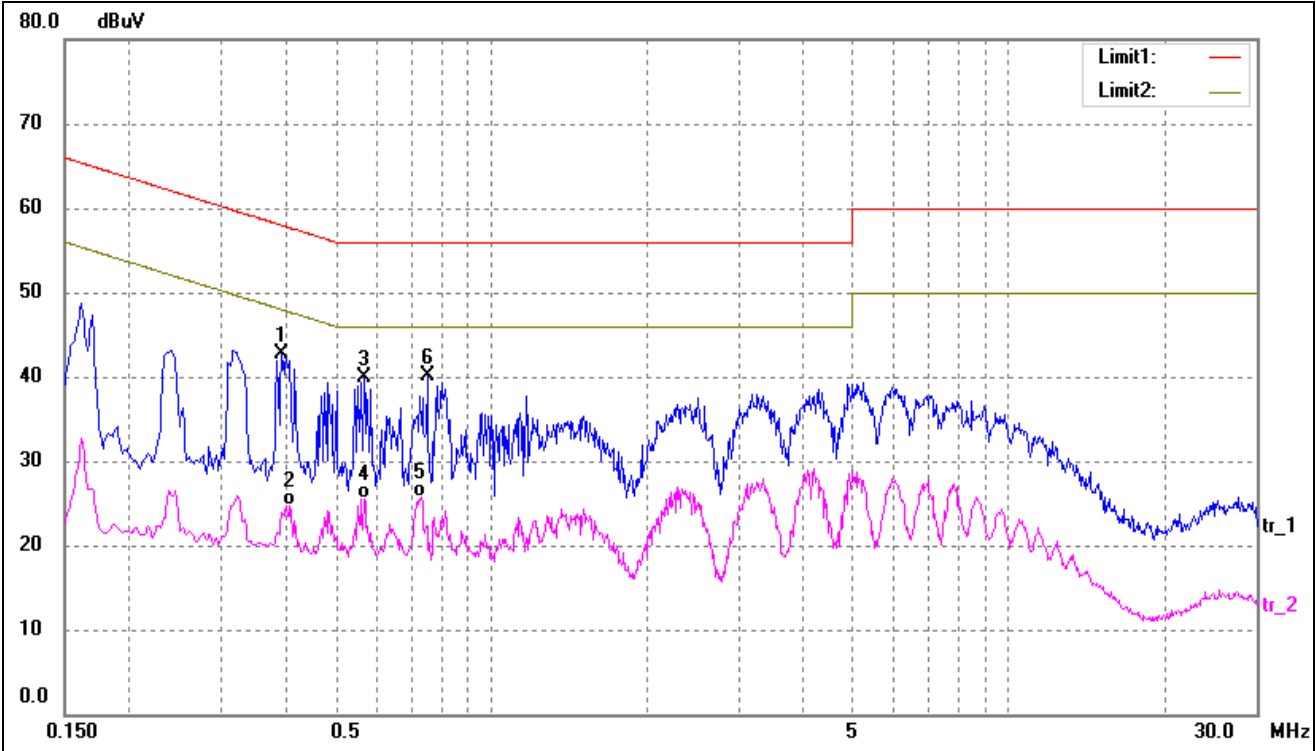
EUT: mophie space pack for iPad mini
 Tested Model: SP-IPAD-MINI-32GB-BLK
 Operating Condition: TM4
 Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.2140	40.37	9.50	49.87	63.05	-13.18	peak
2	0.2140	26.56	9.50	36.06	53.05	-16.99	AVG
3	1.5460	29.30	10.00	39.30	56.00	-16.70	peak
4	1.5460	15.50	10.00	25.50	46.00	-20.50	AVG
5	4.0540	33.57	10.00	43.57	56.00	-12.43	peak
6	4.3420	18.61	10.00	28.61	46.00	-17.39	AVG

Test Specification: Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.3940	33.13	9.50	42.63	57.98	-15.35	peak
2	0.4100	15.25	9.50	24.75	47.65	-22.90	AVG
3	0.5700	30.38	9.57	39.95	56.00	-16.05	peak
4	0.5700	15.91	9.57	25.48	46.00	-20.52	AVG
5	0.7340	15.95	9.73	25.68	46.00	-20.32	AVG
6	0.7540	30.26	9.75	40.01	56.00	-15.99	peak

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

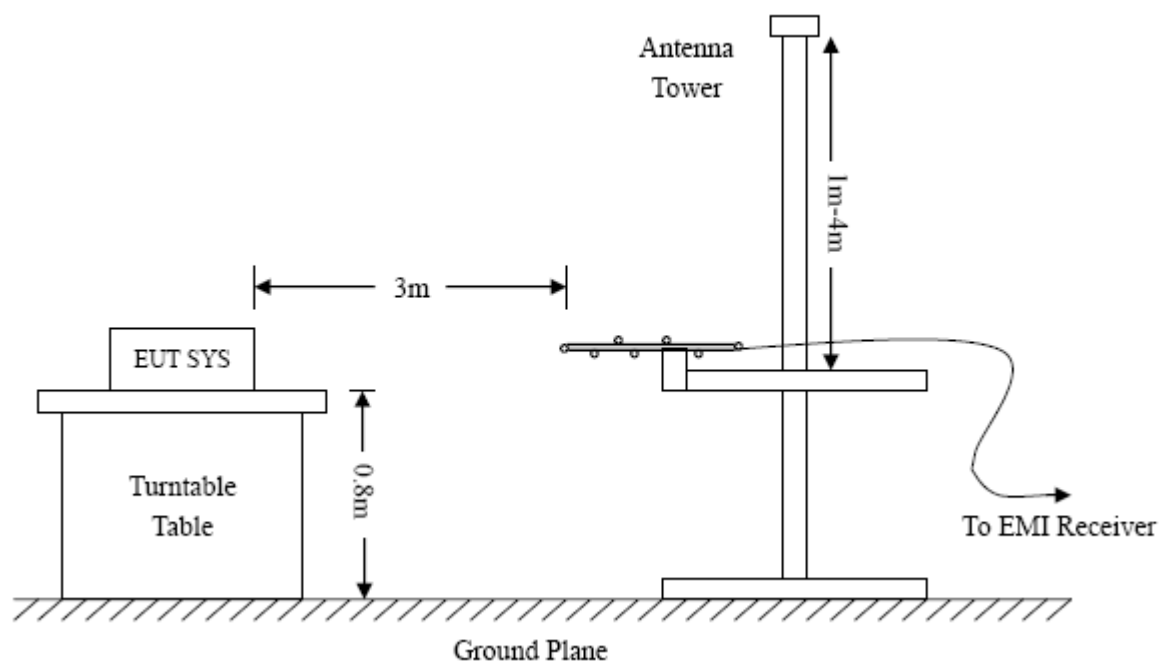
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	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 C63.4-2003 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

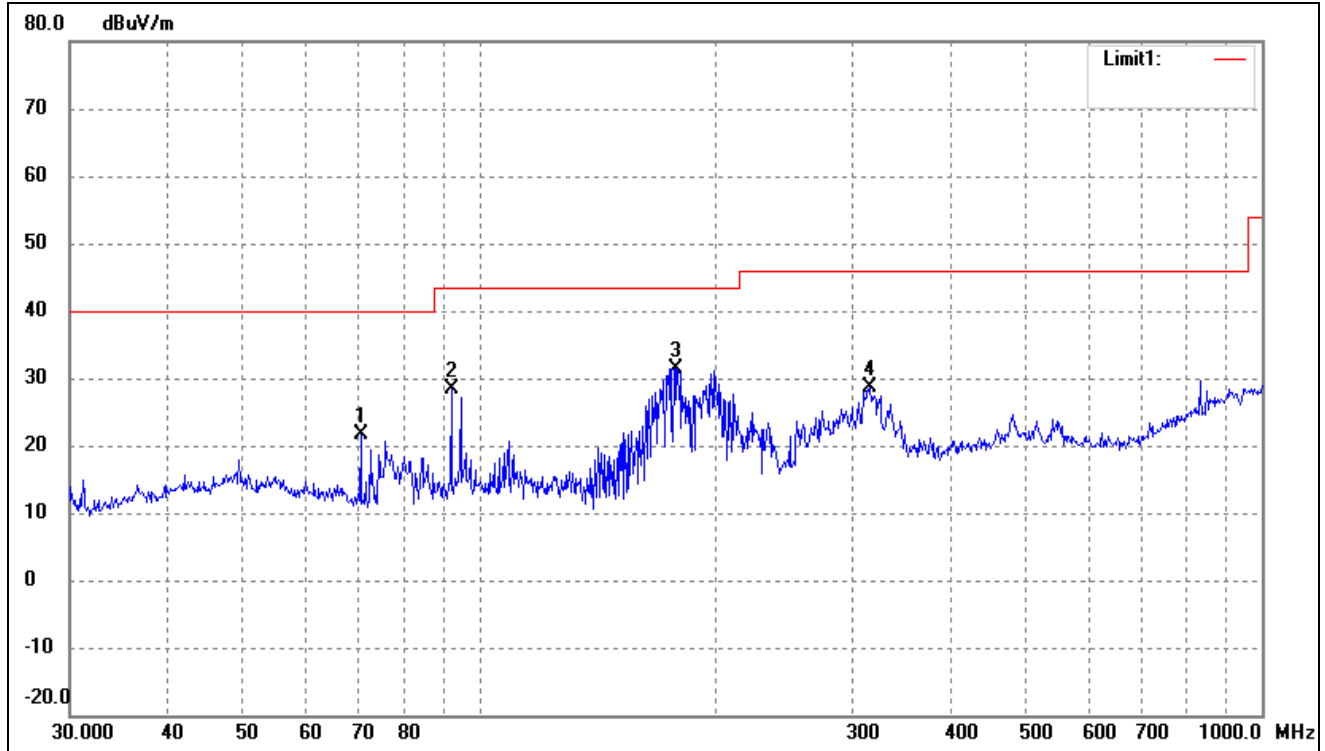
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-1.08 dB at 323.3204 MHz in the Horizontal polarization, 9 kHz to 1 GHz, 3Meters

Plot of Radiated Emissions Test Data

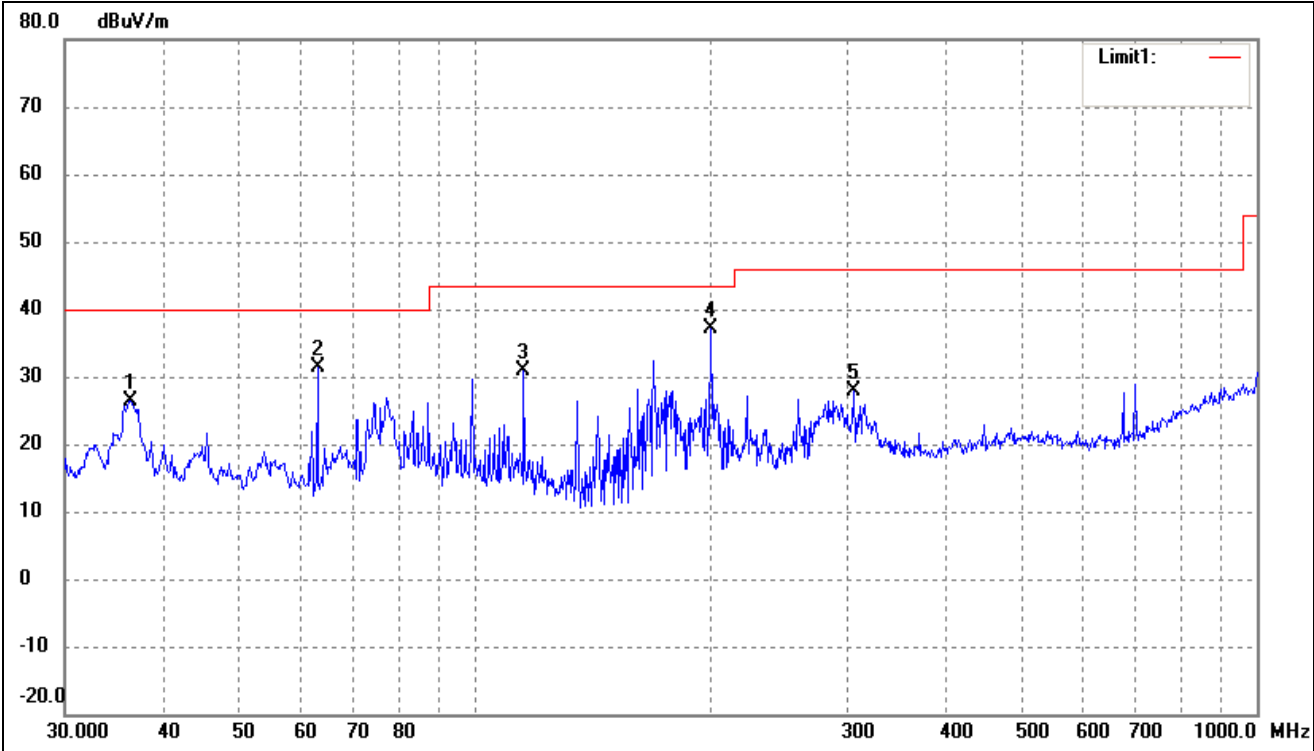
EUT: mophie space pack for iPad mini
 Tested Model: SP-IPAD-MINI-32GB-BLK
 Operating Condition: TM1
 Comment: AC 120V/60Hz; USB 5V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	70.5836	33.55	-11.87	21.68	40.00	-18.32	58	100	peak
2	92.1388	39.24	-10.76	28.48	43.50	-15.02	156	100	peak
3	178.1327	42.78	-11.28	31.50	43.50	-12.00	29	200	peak
4	315.4808	34.23	-5.68	28.55	46.00	-17.45	255	100	peak

Test Specification: Vertical

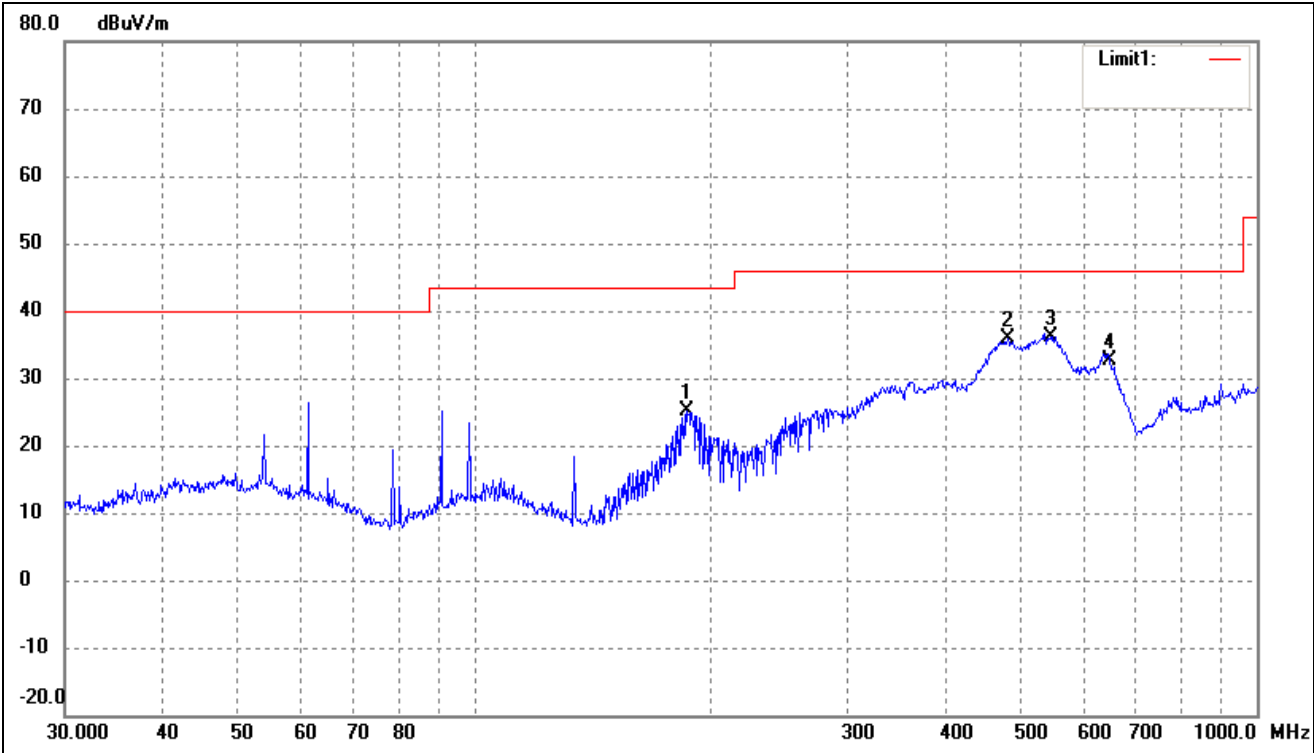


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	36.3814	36.00	-9.52	26.48	40.00	-13.52	51	100	peak
2	63.0916	40.82	-9.53	31.29	40.00	-8.71	155	100	peak
3	115.7256	41.45	-10.55	30.90	43.50	-12.60	33	100	peak
4	200.6881	46.26	-9.06	37.20	43.50	-6.30	31	100	peak
5	305.6800	33.89	-5.98	27.91	46.00	-18.09	235	100	peak

Plot of Radiated Emissions Test Data

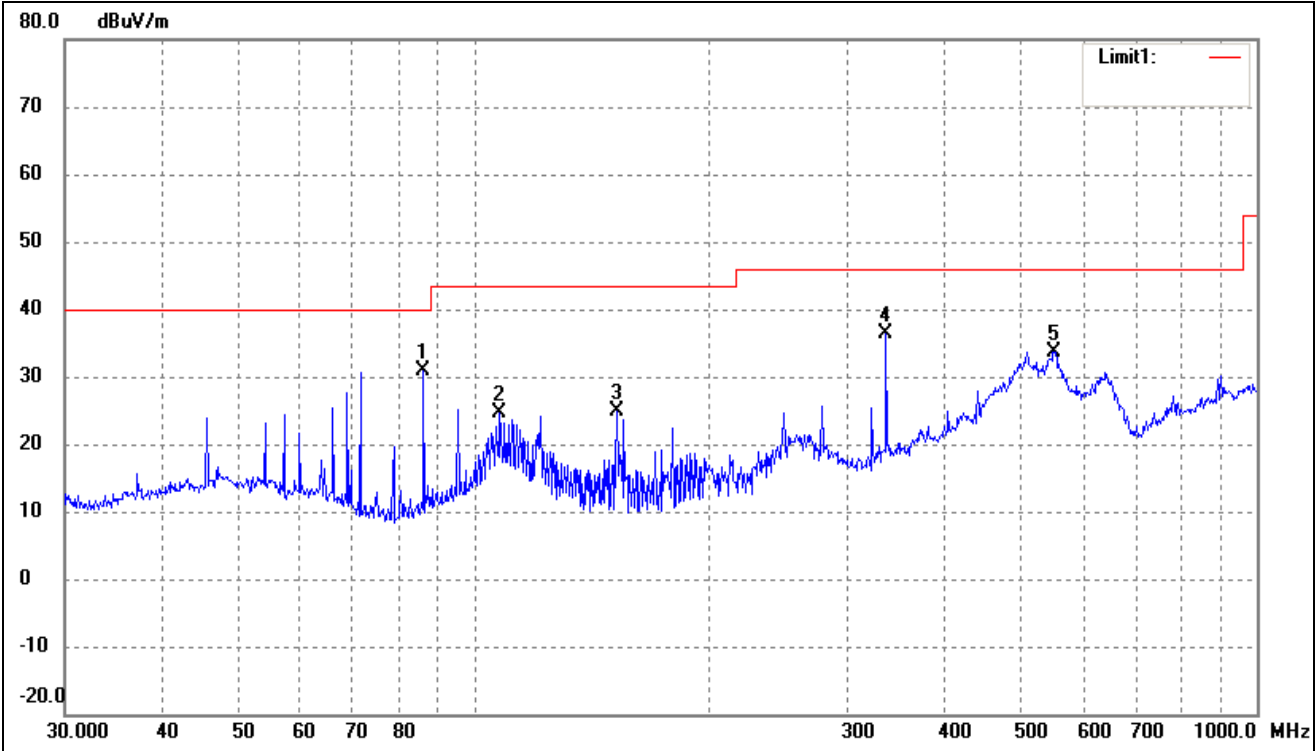
EUT: mophie space pack for iPad mini
Tested Model: SP-IPAD-MINI-32GB-BLK
Operating Condition: TM2
Comment: DC5V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	187.0958	35.42	-10.36	25.06	43.50	-18.44	23	100	peak
2	480.5276	37.34	-1.55	35.79	46.00	-10.21	158	100	peak
3	545.1826	37.48	-1.34	36.14	46.00	-9.86	120	200	peak
4	649.6597	33.85	-1.16	32.69	46.00	-13.31	169	100	peak

Test Specification: Vertical

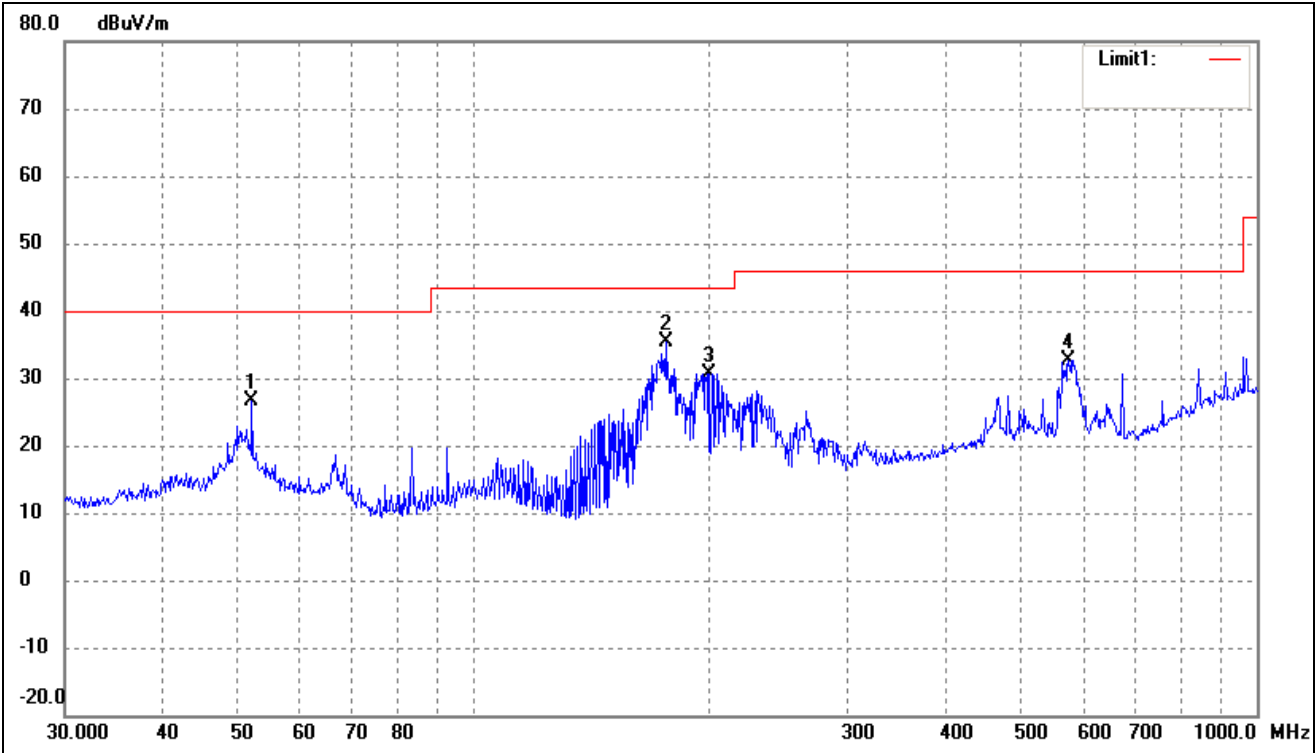


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1*	86.2001	43.10	-12.24	30.86	40.00	-9.14	32	100	peak
2	107.8877	34.13	-9.59	24.54	43.50	-18.96	128	100	peak
3	152.1297	37.81	-12.81	25.00	43.50	-18.50	198	100	peak
4	336.0352	40.99	-4.69	36.30	46.00	-9.70	102	100	peak
5	550.9480	33.57	0.16	33.73	46.00	-12.27	136	200	peak

Plot of Radiated Emissions Test Data

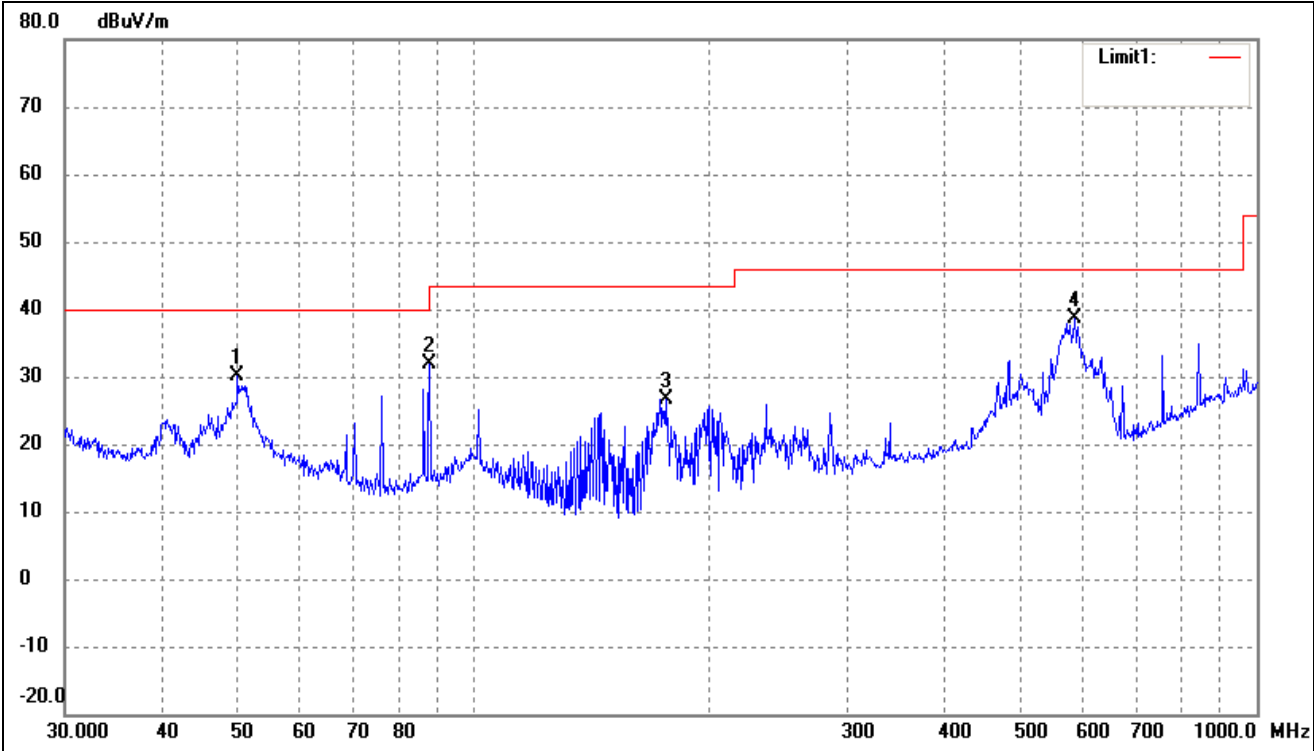
EUT: mophie space pack for iPad mini
Tested Model: SP-IPAD-MINI-32GB-BLK
Operating Condition: TM3
Comment: AC 120V/60Hz; USB 5V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	52.0251	34.31	-7.65	26.66	40.00	-13.34	32	200	peak
2	175.6516	46.80	-11.45	35.35	43.50	-8.15	102	100	peak
3	199.9856	39.77	-9.06	30.71	43.50	-12.79	88	100	peak
4	574.6258	34.33	-1.61	32.72	46.00	-13.28	89	200	peak

Test Specification: Vertical

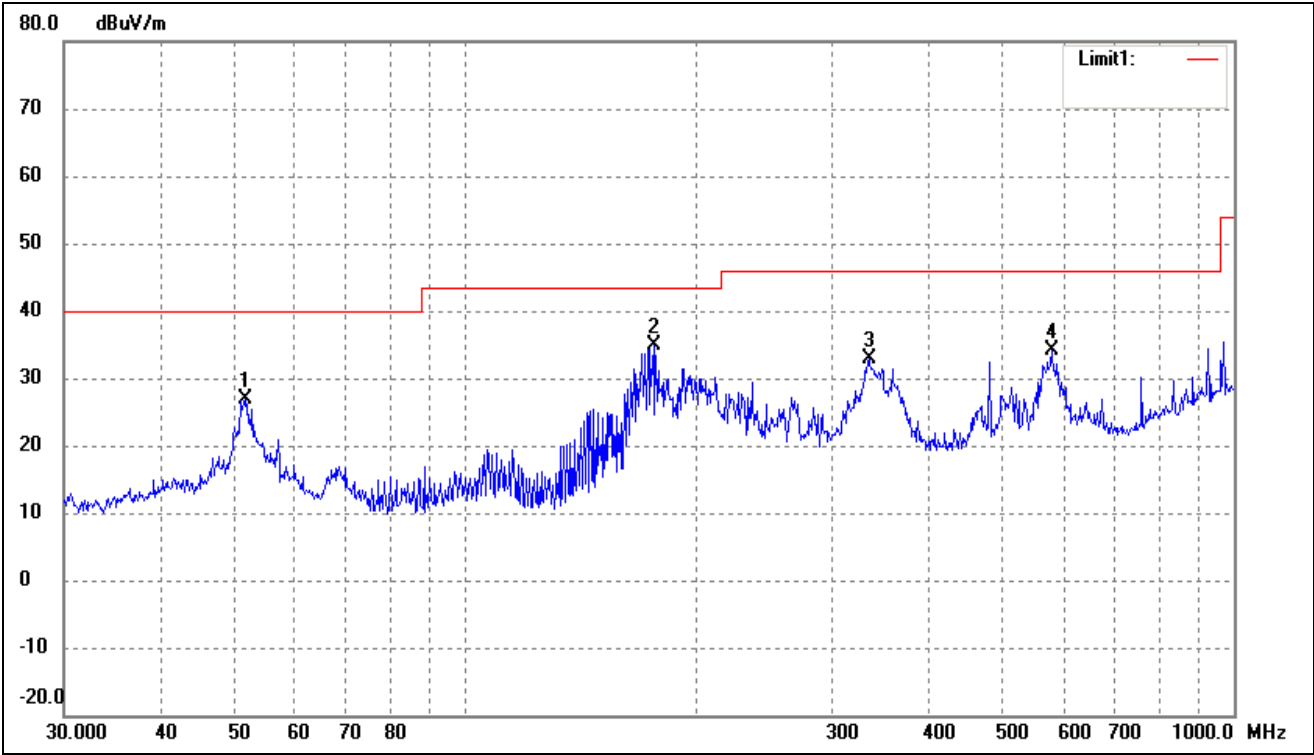


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	49.8814	37.51	-7.44	30.07	40.00	-9.93	24	100	peak
2	87.7248	43.61	-11.81	31.80	40.00	-8.20	89	100	peak
3	175.6516	38.18	-11.45	26.73	43.50	-16.77	214	200	peak
4*	584.7895	37.92	0.83	38.75	46.00	-7.25	23	100	peak

Plot of Radiated Emissions Test Data

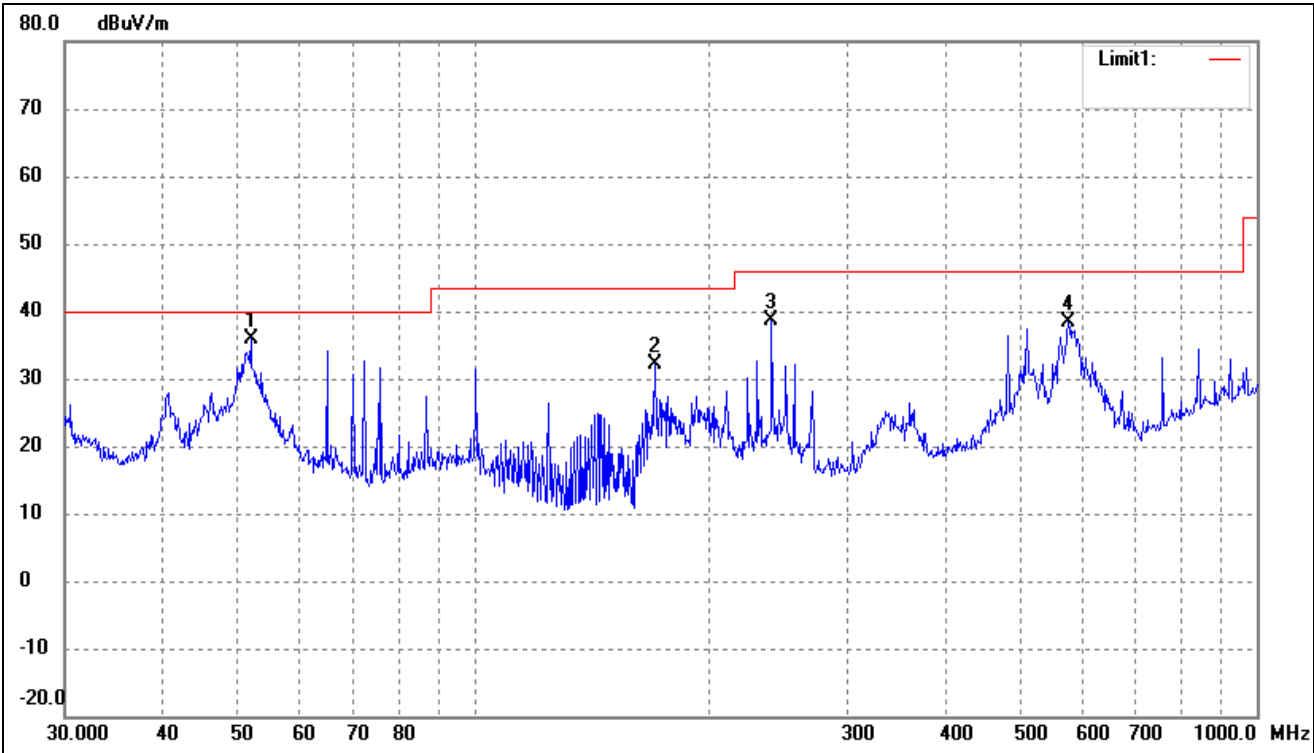
EUT: mophie space pack for iPad mini
Tested Model: SP-IPAD-MINI-32GB-BLK
Operating Condition: TM4
Comment: AC 120V/60Hz; USB 5V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	51.6616	34.58	-7.61	26.97	40.00	-13.03	35	100	peak
2	175.6516	46.41	-11.45	34.96	43.50	-8.54	108	100	peak
3	334.8589	37.56	-4.75	32.81	46.00	-13.19	155	200	peak
4	578.6699	35.80	-1.64	34.16	46.00	-11.84	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	51.8430	43.39	-7.63	35.76	40.00	-4.24	214	100	peak
2	170.1948	43.93	-11.82	32.11	43.50	-11.39	102	100	peak
3	239.9874	46.32	-7.79	38.53	46.00	-7.47	189	100	peak
4	574.6258	37.66	0.63	38.29	46.00	-7.71	210	200	peak

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

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