

FCC Part 15B Measurement and Test Report

For

LM Technologies Ltd.

Unit19, Spectrum House, 32-34, Gordon House Road, London, NW5 1LP,

United Kingdom

FCC ID: VVXLM540-1

Test Rule(s):	<u>FCC Part 15 Subpart B</u>
Product Description:	<u>LM540 Class 1 Bluetooth USB Adapter</u>
Tested Model:	<u>540-0542</u>
Report No.:	<u>SEM13108076-1</u>
Tested Date:	<u>2013-10-24 to 2013-11-12</u>
Issued Date:	<u>2013-11-12</u>
Tested By:	<u>Susan Su / Engineer</u> <i>Susan 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:	

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: LM Technologies Ltd.
 Address of applicant: Unit19, Spectrum House, 32-34, Gordon House Road,London, NW5 1LP, United Kingdom
 Manufacturer: LM Technologies Ltd.
 Address of manufacturer: Unit19, Spectrum House, 32-34, Gordon House Road,London, NW5 1LP, United Kingdom

General Description of EUT	
Product Name:	LM540 Class 1 Bluetooth USB Adapter
Trade Name:	LM540 Bluetooth USB Adapter
Model No.:	540-0542
Adding Model(s):	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Rated Voltage:	USB 5V
Rated Current:	/
Rated Power:	/
Lowest Internal Frequency:	26MHz
Highest Internal Frequency:	26MHz
Classification of ITE:	Class B

1.2 Test Standards

The following report is prepared on behalf of the LM Technologies Ltd. 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.

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	Operating	Connected to PC
TM2	/	/

EUT Cable List and Details

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

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E23	/

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.

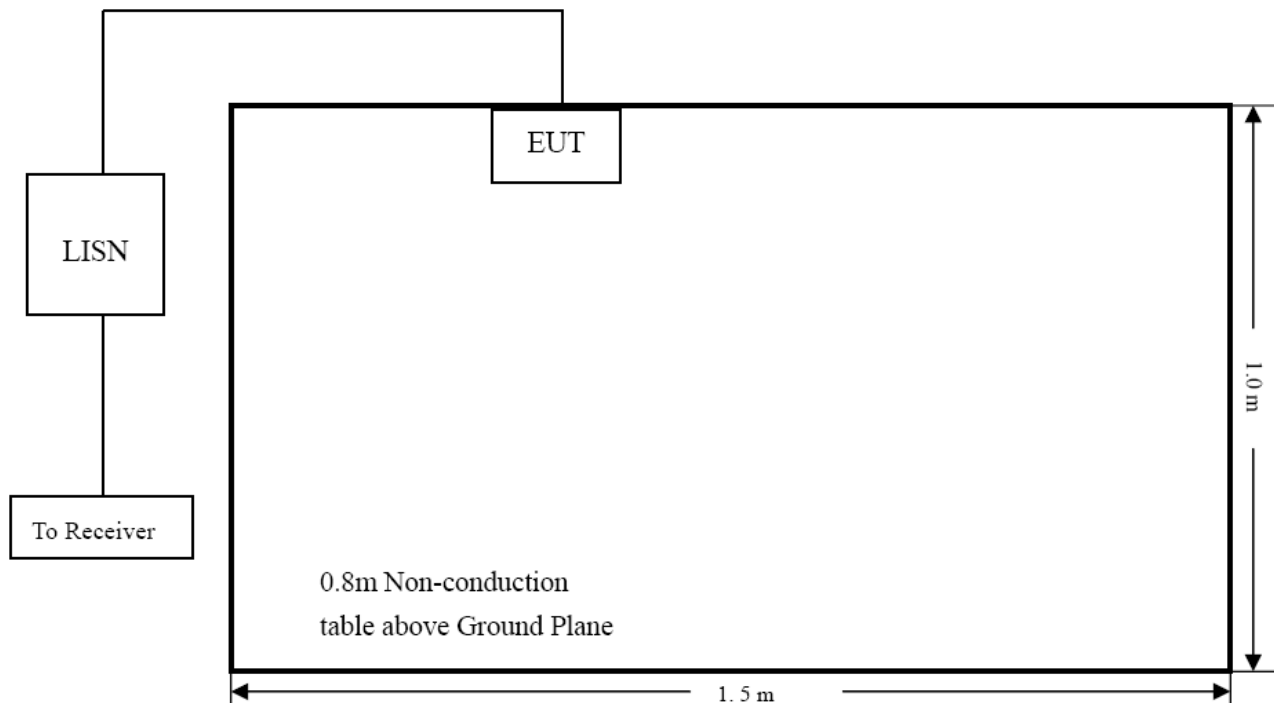
3.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2013-05-07	2014-05-06
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2013-05-07	2014-05-06
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2013-05-07	2014-05-06

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:

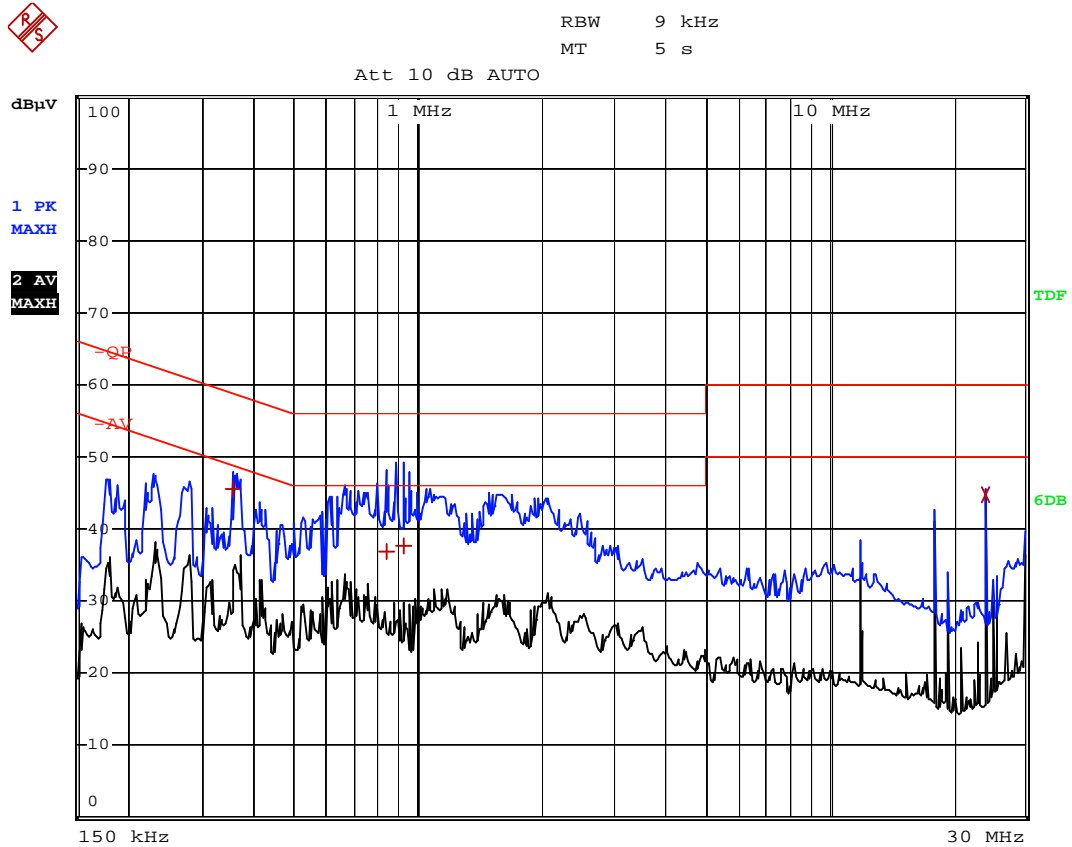
-5.36 dB at 23.978 MHz in the **Neutral, Average** detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

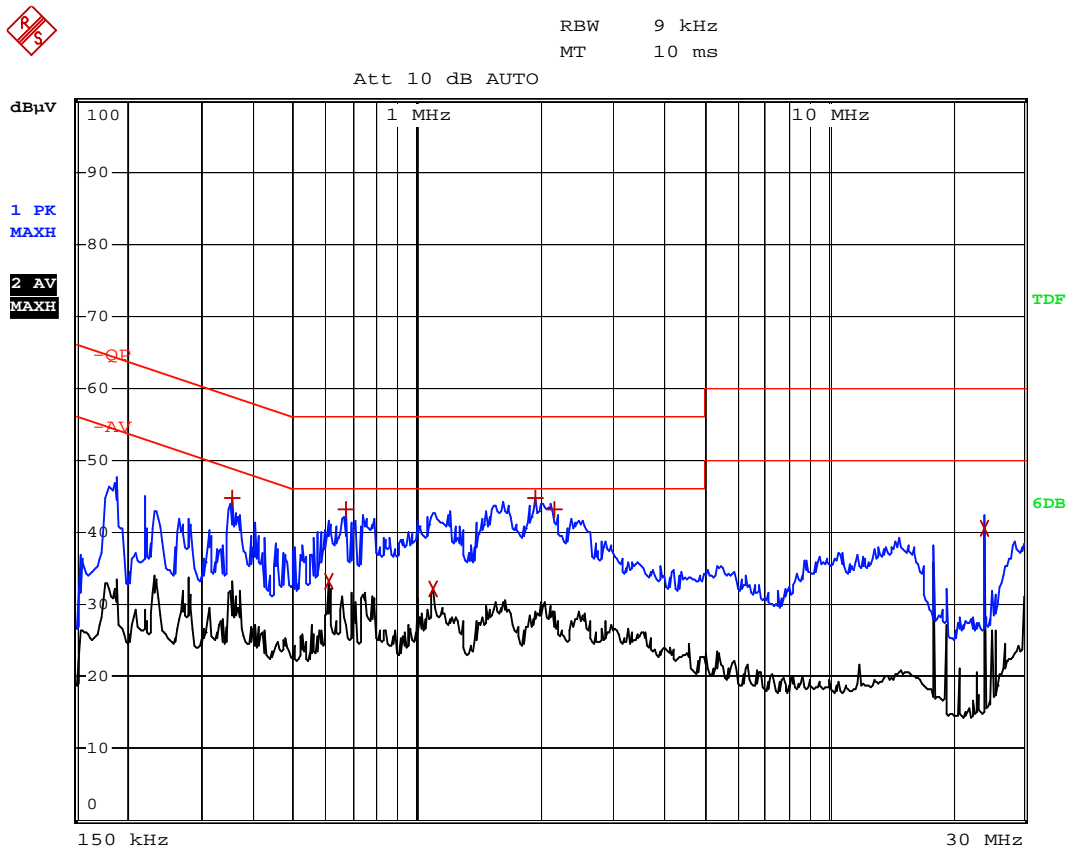
EUT: LM540 Class 1 Bluetooth USB Adapter
 Tested Model: 540-0542
 Operating Condition: TM1
 Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



EDIT PEAK LIST (Final Measurement Results)				
Trace1:		-QP		
Trace2:		-AV		
Trace3:		---		
TRACE		FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	354 kHz	45.60	-13.26
1	Quasi Peak	838 kHz	36.85	-19.14
1	Quasi Peak	922 kHz	37.69	-18.30
2	Average	23.978 MHz	44.63	-5.36

Test Specification: Line



EDIT PEAK LIST (Prescan Results)			
Trace1:		-QP	
Trace2:		-AV	
Trace3:		---	
TRACE		FREQUENCY	LEVEL dBµV
1	Max Peak	354 kHz	44.83
2	Average	610 kHz	33.20
1	Max Peak	670 kHz	43.07
2	Average	1.094 MHz	32.03
1	Max Peak	1.95 MHz	44.83
1	Max Peak	2.166 MHz	43.16
2	Average	23.978 MHz	40.47
		DELTA LIMIT dB	
		-14.03	
		-12.79	
		-12.92	
		-13.96	
		-11.16	
		-12.83	
		-9.52	

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

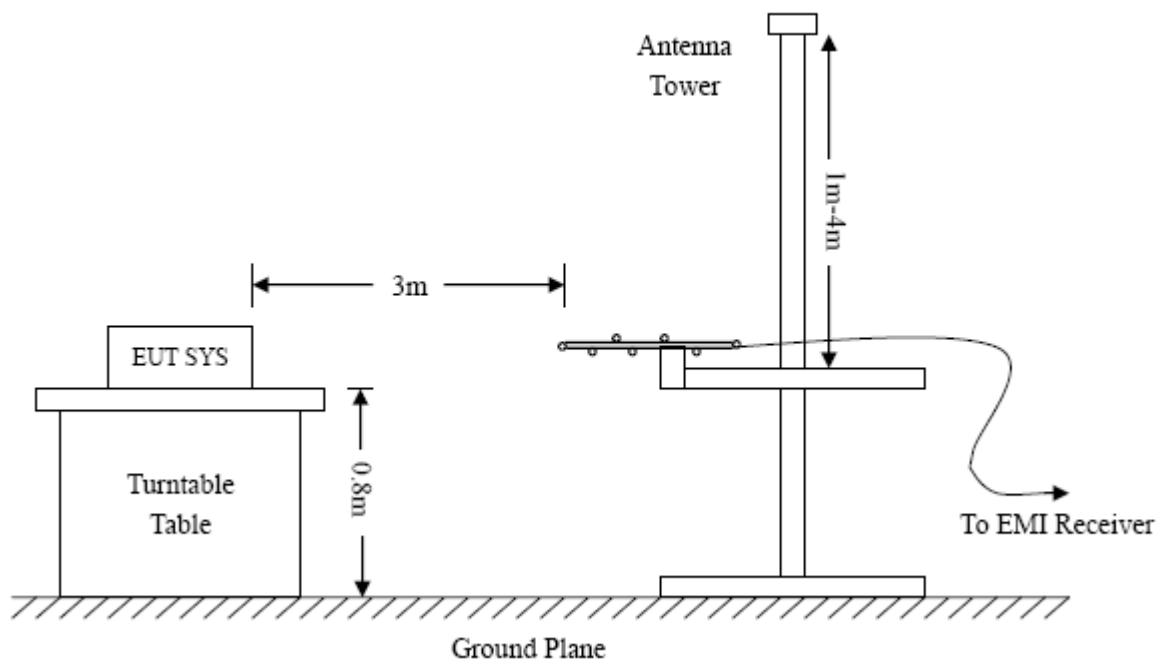
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2013-04-20	2014-04-19

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:

-1.04 dB at **675.2080 MHz** in the **Horizontal** polarization, **9 kHz** to **1 GHz**, **3Meters**

Plot of Radiated Emissions Test Data

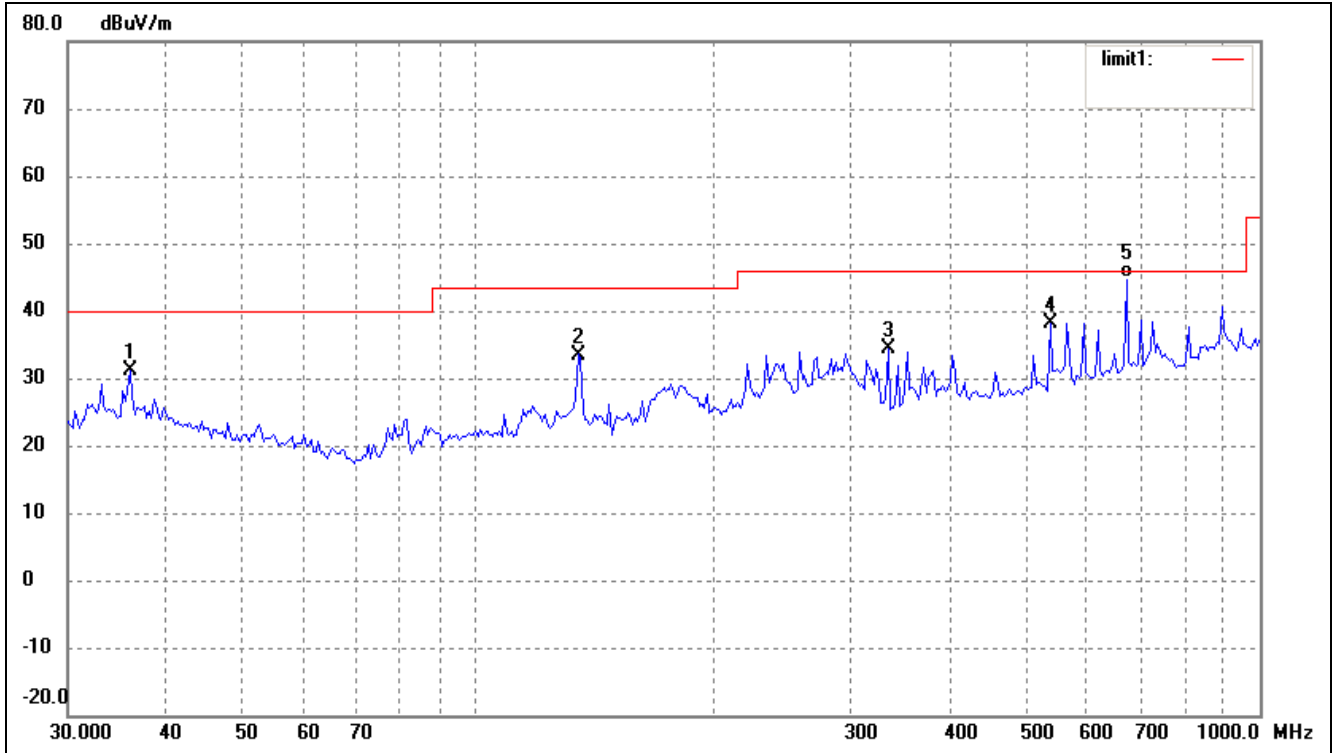
EUT: LM540 Class 1 Bluetooth USB Adapter

Tested Model: 540-0542

Operating Condition: TM1

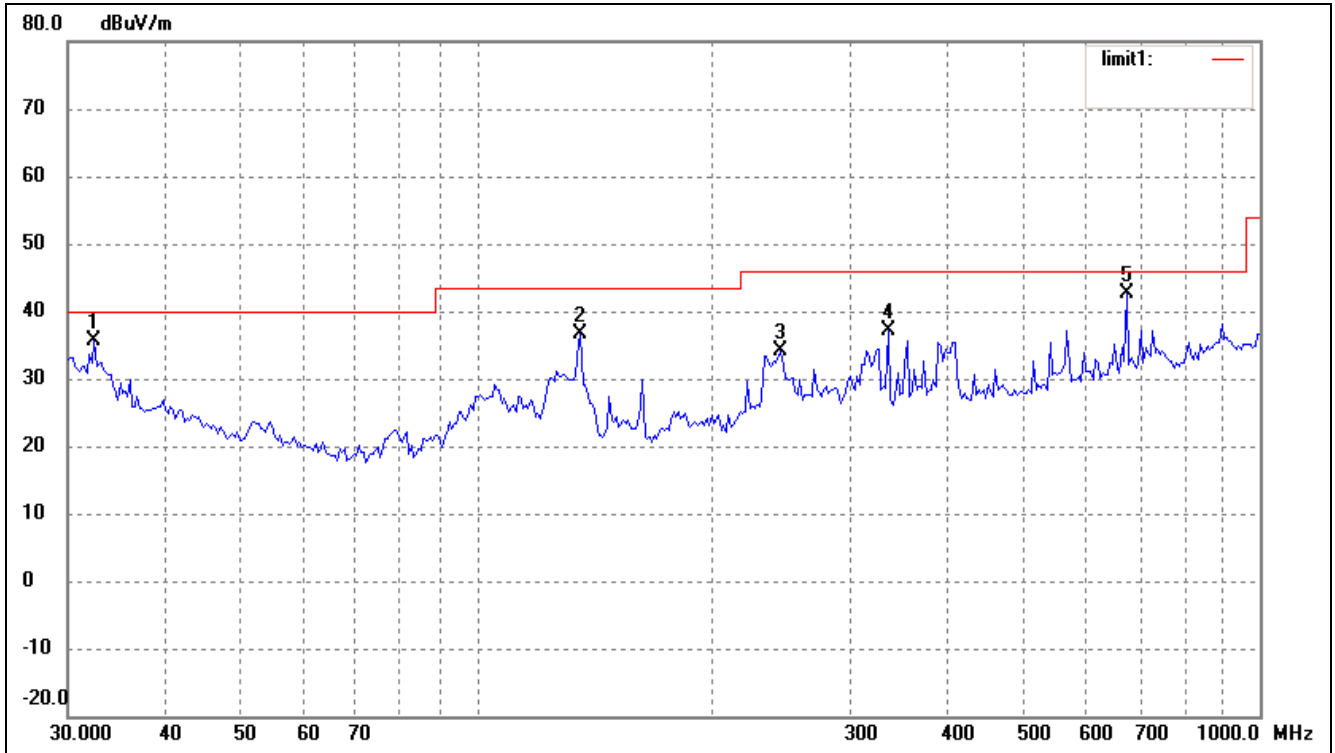
Comment: AC 120V/60Hz; USB 5V

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	36.0007	21.98	9.04	31.02	40.00	-8.98	360	100	peak
2	134.5592	29.72	3.78	33.50	43.50	-10.00	360	100	peak
3	334.8589	24.27	10.19	34.46	46.00	-11.54	360	100	peak
4	539.4775	25.11	13.04	38.15	46.00	-7.85	360	100	peak
5	675.2080	29.60	15.36	44.96	46.00	-1.04	3170	100	QP

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4059	27.15	8.44	35.59	40.00	-4.41	360	100	peak
2	135.5062	32.85	3.72	36.57	43.50	-6.93	360	100	peak
3	244.2321	27.01	7.12	34.13	46.00	-11.87	360	100	peak
4	334.8589	26.84	10.19	37.03	46.00	-8.97	360	100	peak
5	675.2080	27.20	15.36	42.56	46.00	-3.44	360	100	peak

Note: Testing is carried out with frequency rang 9kHz to the 1GHz.

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

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