

FCC PART 15.227
MEASUREMENT AND TEST REPORT
FOR

MANOVA International Limited

FLAT A, 13th FLOOR, CENTURY INDUSTRIAL CENTER, 33~35 AU PUI

WAN STREET, FO TAN, N.T., HONG KONG

FCC ID: UKWMANOVA-219CH

Report Concerns: Original Report	Equipment Type: Executive Traveler Rechargeable Wireless Mouse
Model:	<u>UM-219CH</u>
Report No.:	<u>STR09058041I</u>
Test/Witness Engineer:	<u>Seven Song</u>
Test Date:	<u>2009-05-13 to 2009-05-19</u>
Issue Date:	<u>2009-05-21</u>
Prepared By:	SEM.Test Compliance Service Co., Ltd. 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C. (518101)
Approved & Authorized By:	 PSQ Manager / Jandy So

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 SEM.Test Compliance Service Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
1.2 TEST STANDARDS.....	3
1.3 RELATED SUBMITTAL(S)/GRANT(S)	3
1.4 TEST METHODOLOGY	3
1.5 TEST FACILITY	4
1.6 EUT EXERCISE SOFTWARE	4
1.7 ACCESSORIES EQUIPMENT LIST AND DETAILS	4
1.8 EUT CABLE LIST AND DETAILS	4
2. SUMMARY OF TEST RESULTS	5
3. §15.203 - ANTENNA REQUIREMENT	6
3.1 STANDARD APPLICABLE.....	6
3.2 TEST RESULT.....	6
4. §15.205, §15.209, §15.227- RADIATED EMISSION	7
4.1 MEASUREMENT UNCERTAINTY	7
4.2 STANDARD APPLICABLE.....	7
4.3 TEST EQUIPMENT LIST AND DETAILS	7
4.4 TEST PROCEDURE.....	7
4.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	8
4.6 ENVIRONMENTAL CONDITIONS	8
4.7 SUMMARY OF TEST RESULTS/PLOTS	8
5. §15.227(B) OUT OF BAND EMISSIONS	11
5.1 STANDARD APPLICABLE.....	11
5.2 TEST EQUIPMENT LIST AND DETAILS	11
5.3 TEST PROCEDURE.....	11
5.4 ENVIRONMENTAL CONDITIONS	11
5.5 SUMMARY OF TEST RESULTS/PLOTS	11

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: MANOVA International Limited
Address of applicant: FLAT A, 13th FLOOR, CENTURY INDUSTRIAL CENTER,
33~35 AU PUI WAN STREET, FO TAN, N.T., HONG KONG

Manufacturer: MANOVA International Limited
Address of manufacturer: FLAT A, 13th FLOOR, CENTURY INDUSTRIAL CENTER,
33~35 AU PUI WAN STREET, FO TAN, N.T., HONG KONG

General Description of E.U.T

Items	Description
EUT Description:	Executive Traveler Rechargeable Wireless Mouse
Trade Name:	/
Model No.:	UM-219CH
Rated Voltage:	3V Battery
Frequency Range:	27.045MHz
Output Power:	<-30 dBm
Channel Spacing:	/
Antenna Type:	Integral Antenna
Size:	9.5X5.8X2.0 cm
For more information refer to the circuit diagram form and the user's manual.	

The test data gathered are from a production sample, provided by the manufacturer.

1.2 Test Standards

The following report of is prepared on behalf of the MANOVA International Limited in accordance with FCC Part 15, Subpart C, and section 15.203,15.205,15.209 and 15.227 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203,15.205,15.209 and 15.227 rules.

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

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4 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.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.5 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services 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 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.7 Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
\	\	\	\
\	\	\	\

1.8 EUT Cable List and Details

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

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Band of Operation	Compliant
§ 15.209	Radiated Emission Limit	Compliant
§ 15.227(a)	Field Strength	Compliant
§ 15.227(b)	Out of Band Emission	Compliant

3. §15.203 - ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 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.

3.2 Test Result

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

4. §15.205, §15.209, §15.227- RADIATED EMISSION

4.1 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 ± 4.0 dB.

4.2 Standard Applicable

According to §15.227(a), The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. 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.

According to §15.227(b) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in §15.209.

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-07-08	2009-07-07
Positioning Controller	C&C	CC-C-1F	N/A	2008-07-08	2009-07-07
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-07-08	2009-07-07
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-07-08	2009-07-07
RF Switch	EM	EMSW18	SW060023	2008-07-08	2009-07-07
Amplifier	Agilent	8447F	3113A06717	2008-07-08	2009-07-07
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-07-08	2009-07-07
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-07-08	2009-07-07

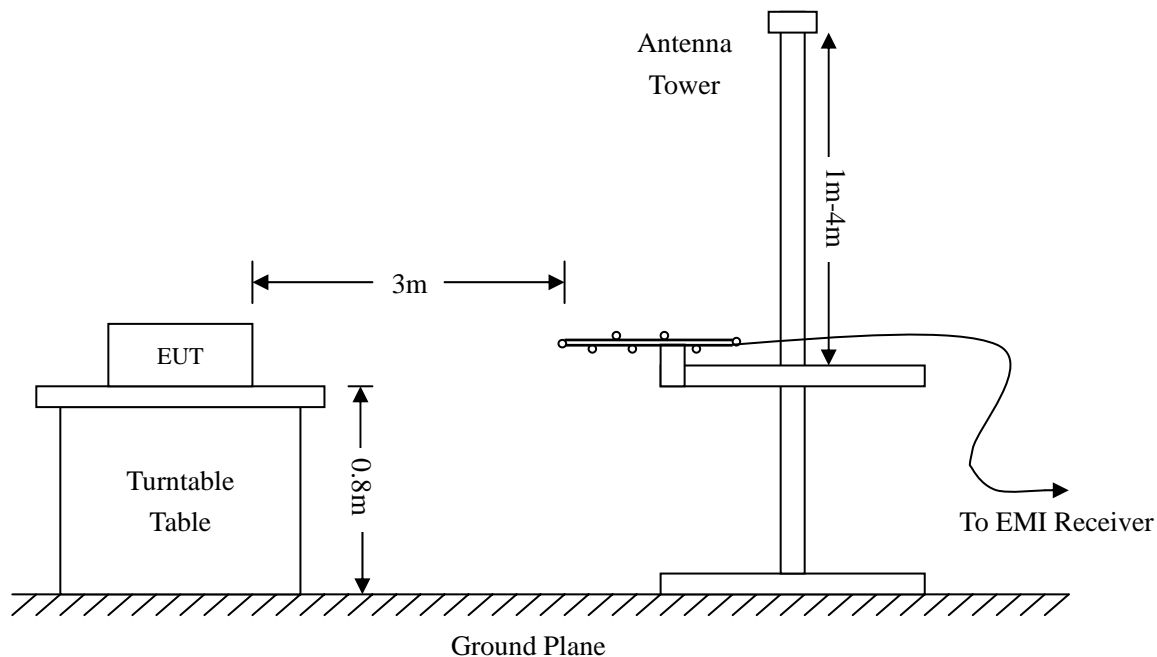
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.227(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.



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 -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

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

4.6 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1022 mbar

4.7 Summary of Test Results/Plots

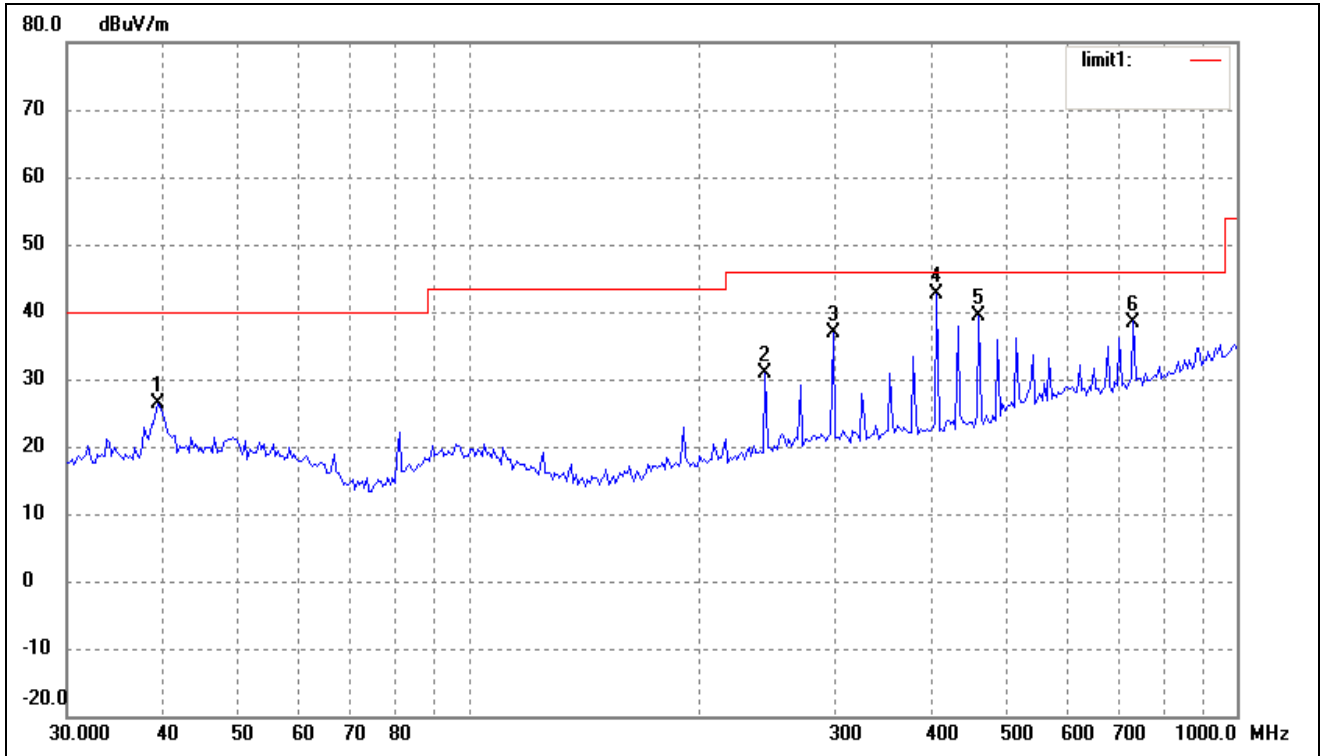
According to the data below, the FCC Part 15.205, 15.209 and 15.227 standards, and had the worst margin of:

-3.47 dBμV at 406.7820 MHz in the Horizontal polarization, 30 MHz to 1 GHz, 3Meters

Test Mode: Transmitting

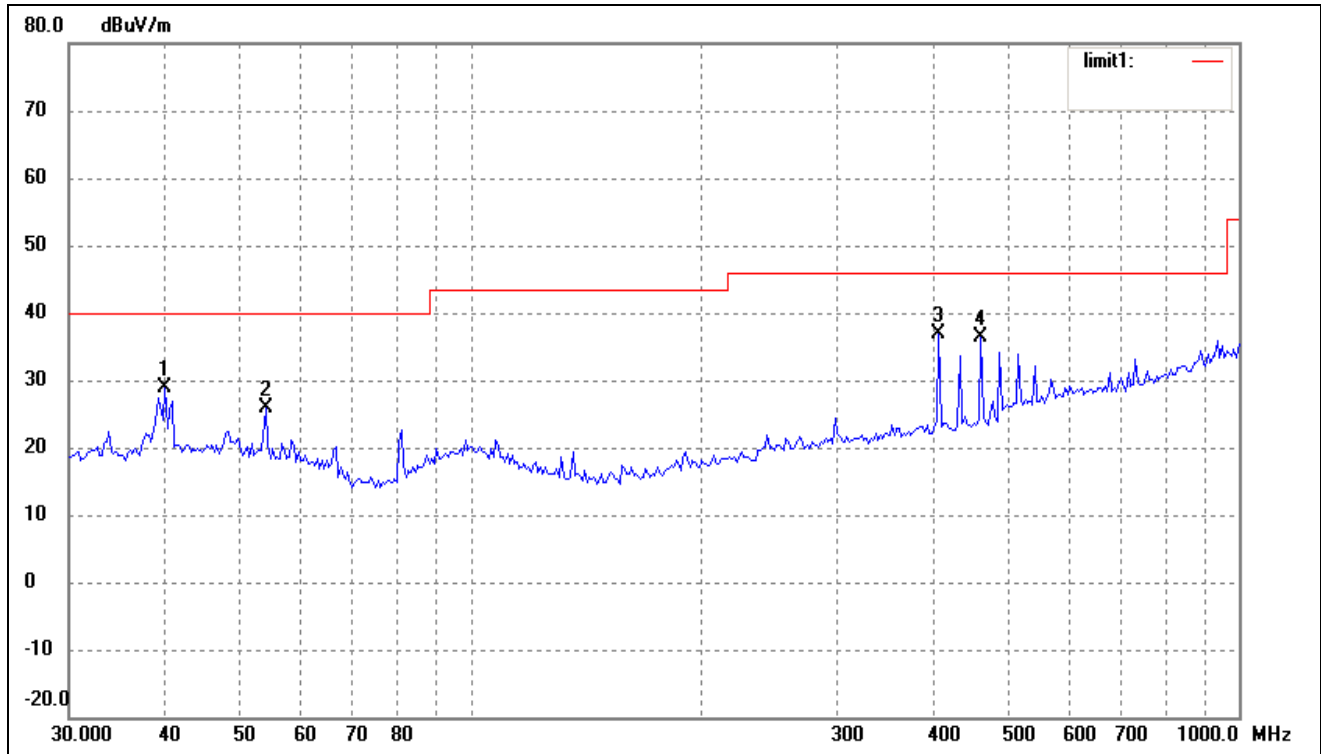
Plot of Radiation Emissions Test

Horizontal:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
Fundamental	27.045	33.97	6.85	40.82	100.0	-59.18	360	100	peak
Fundamental	27.045	33.60	6.85	39.45	80.0	-40.55	360	100	Ave
1	39.4588	18.53	7.78	26.31	40.00	-13.69	360	100	peak
2	243.5431	23.47	7.53	31.00	46.00	-15.00	360	100	peak
3	298.5932	28.17	8.63	36.80	46.00	-9.20	360	100	peak
4	406.7820	32.47	10.06	42.53	46.00	-3.47	360	100	peak
5	461.6313	28.92	10.39	39.31	46.00	-6.69	360	100	peak
6	734.0373	22.34	16.16	38.50	46.00	-7.50	360	100	peak

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
Fundamental	27.045	39.01	6.85	45.86	100.0	-54.14	360	100	peak
Fundamental	27.045	38.57	6.85	44.42	80.0	-35.58	360	100	Ave
1	40.0172	21.04	7.93	28.97	40.00	-11.03	360	100	peak
2	54.1349	18.33	7.50	25.83	40.00	-14.17	360	100	peak
3	406.7819	26.72	10.06	36.78	46.00	-9.22	360	100	peak
4	461.6313	26.01	10.39	36.40	46.00	-9.60	360	100	peak

5. §15.227(b) OUT OF BAND EMISSIONS

5.1 Standard Applicable

According to FCC 15.227 (b) The field strength of any emissions which appear outside of 26.96MHz to 27.28MHz shall not exceed the general radiated emission limits in §15.209.

5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-07-08	2009-07-07
Positioning Controller	C&C	CC-C-1F	N/A	2008-07-08	2009-07-07
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-07-08	2009-07-07
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-07-08	2009-07-07
RF Switch	EM	EMSW18	SW060023	2008-07-08	2009-07-07
Amplifier	Agilent	8447F	3113A06717	2008-07-08	2009-07-07
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-07-08	2009-07-07
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-07-08	2009-07-07

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3 Test Procedure

As the radiation test, set the RBW=10kHz VBW=30kHz, observed the outside band of 26.96MHz to 27.28MHz, than mark the higher-level emission for comparing with the FCC rules.

5.4 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1022 mbar

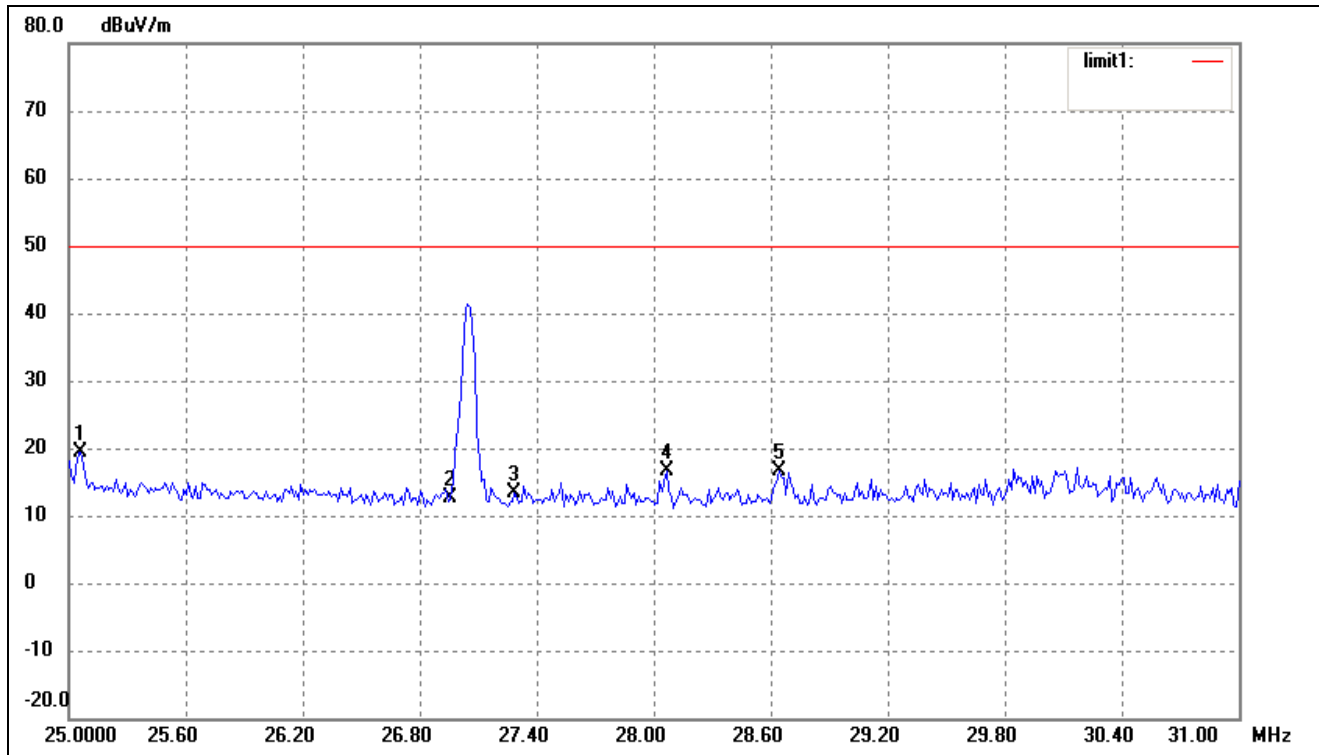
5.5 Summary of Test Results/Plots

Frequency MHz	Emission dB μ V/m	Limit dB μ V/m
26.96	14.55	50
27.28	13.37	50
25.06	21.98	50
28.64	16.63	50

Test Result Pass

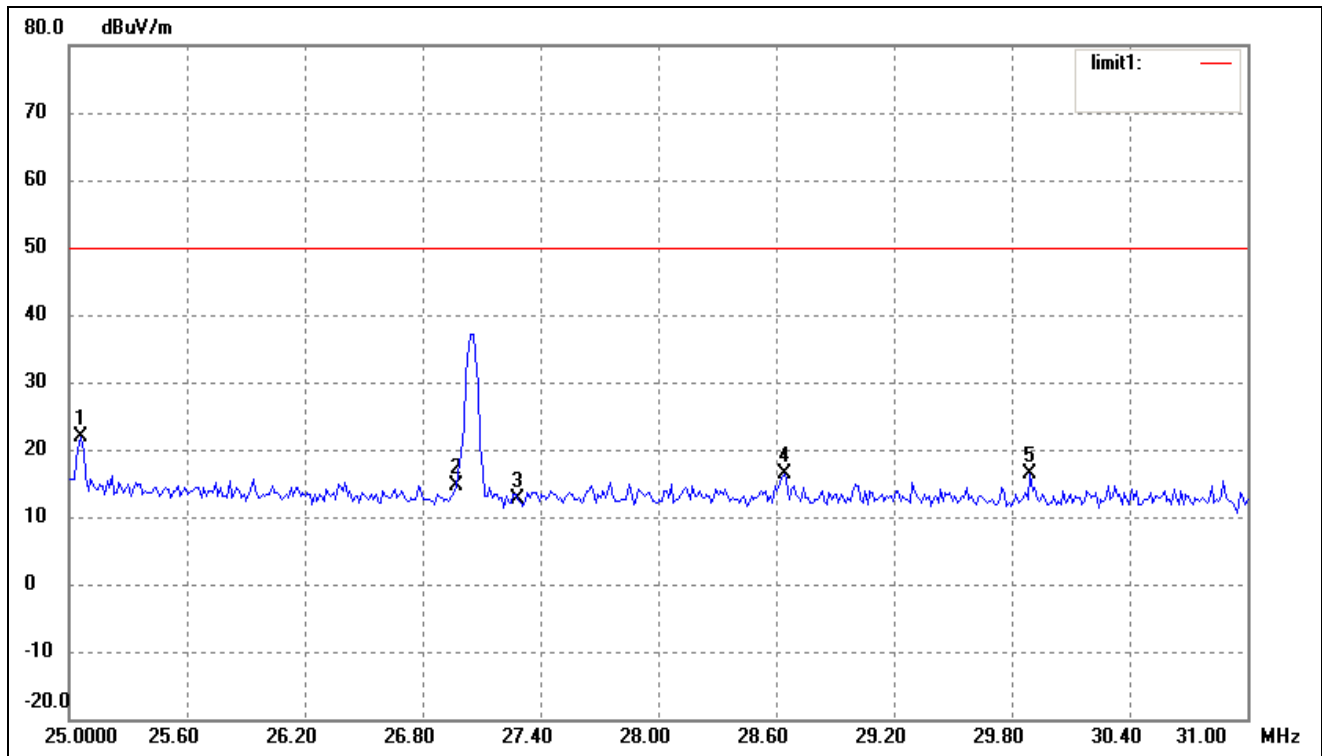
Refer to the attached plots.

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	25.0601	11.18	8.29	19.47	50.00	-30.53	0	100	peak
2	26.9599	5.87	6.82	12.69	50.00	-37.31	0	100	peak
3	27.2800	6.59	6.78	13.37	50.00	-36.63	0	100	peak
4	28.0661	9.81	6.74	16.55	50.00	-33.45	0	100	peak
5	28.6433	9.93	6.70	16.63	50.00	-33.37	0	100	peak

Horizontal:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	25.0600	13.69	8.29	21.98	50.00	-28.02	0	100	peak
2	26.9600	7.73	6.82	14.55	50.00	-35.45	0	100	peak
3	27.2800	5.90	6.78	12.68	50.00	-37.32	0	100	peak
4	28.6432	9.65	6.70	16.35	50.00	-33.65	0	100	peak
5	29.8937	9.63	6.64	16.27	50.00	-33.73	0	100	peak

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