


**FCC PART 15.249**  
**MEASUREMENT AND TEST REPORT**  
**FOR**

**Shanghai Multak Technology Co., LTD.**

**4/F, No.71, 1066 North Qin Zhou Road, Shanghai, China**

**FCC ID: URRMIIC-STAR**

<b>Report Concerns:</b> Original Report	<b>Equipment Type:</b> Wireless MICROPHONE
<b>Model:</b>	<u>MS61</u>
<b>Report No.:</b>	<u>STR08018103I</u>
<b>Test/Witness Engineer:</b>	<u>Susam Su</u>
<b>Test Date:</b>	<u>2008-02-12 to 2008-02-15</u>
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<b>Approved &amp; Authorized By:</b>	 _____ Jandy So / PSQ Manager

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.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Shanghai Multak Technology Co., LTD.  
Address of applicant: 4/F, No.71, 1066 North Qin Zhou Road, Shanghai, China

Manufacturer: Shanghai Multak Technology Co., LTD.  
Address of applicant: 4/F, No.71, 1066 North Qin Zhou Road, Shanghai, China

#### General Description of E.U.T

Items	Description
EUT Description:	Wireless MICROPHONE
Trade Name:	MIIC STAR
Model Tested:	MS61
Adjusted Model:	MS62
Rated Voltage:	DC 3V battery
Output Power:	300mW
Frequency Range:	2405~2480MHz
No. of Channel:	16
Antenna Type:	Fixed antenna
Size:	26.9x3.2x3.2 cm
For more information refer to the circuit diagram form and the user's manual.	

*The test data is gathered from a production sample, model MS61, provided by the manufacturer. The other model listed in the report has different appearance of MS61 without circuit and electronic construction changed, declared by the manufacturer.*

### 1.2 Test Standards

The following report is prepared on behalf of Shanghai Multak Technology Co., LTD. in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, 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 according to the Operating Instructions and let the EUT keep transmitting.

## 1.5 Test Facility

The 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 files which the Registration No.: **759397**. Measurement required was performed at laboratory of Solid Industrial Co., Ltd. at 333 Bulong Highway Buji Longgang, Shenzhen, Guangdong, China.

## 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 Core/Without Core
/	/	/	/

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	Compliant
§ 15.249(a)	Field Strength	Compliant
§ 15.249(d)	Out of Band Emission	Compliant

### **3. §15.203 - ANTENNA REQUIREMENT**

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#### **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 fix antenna, fulfill the requirement of this section.

## 4. §15.205, §15.209, §15.249 (a) - RADIATED EMISSION

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### 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  $\pm 3.0$  dB.

### 4.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

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.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209,WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

### 4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Rohde & Schwarz	EMI Test Receiver	ESIB26	830245/009	2007-06-30	2008-06-29
ETS	Multi Controller	2090	57230	2007-06-30	2008-06-29
ETS	Receiver Antenna	2175	57337	2007-06-30	2008-06-29
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2007-06-30	2008-06-29
Schwarz beck	Horn Antenna	BBHX	BBHX9120-00 2	2007-06-30	2008-06-29

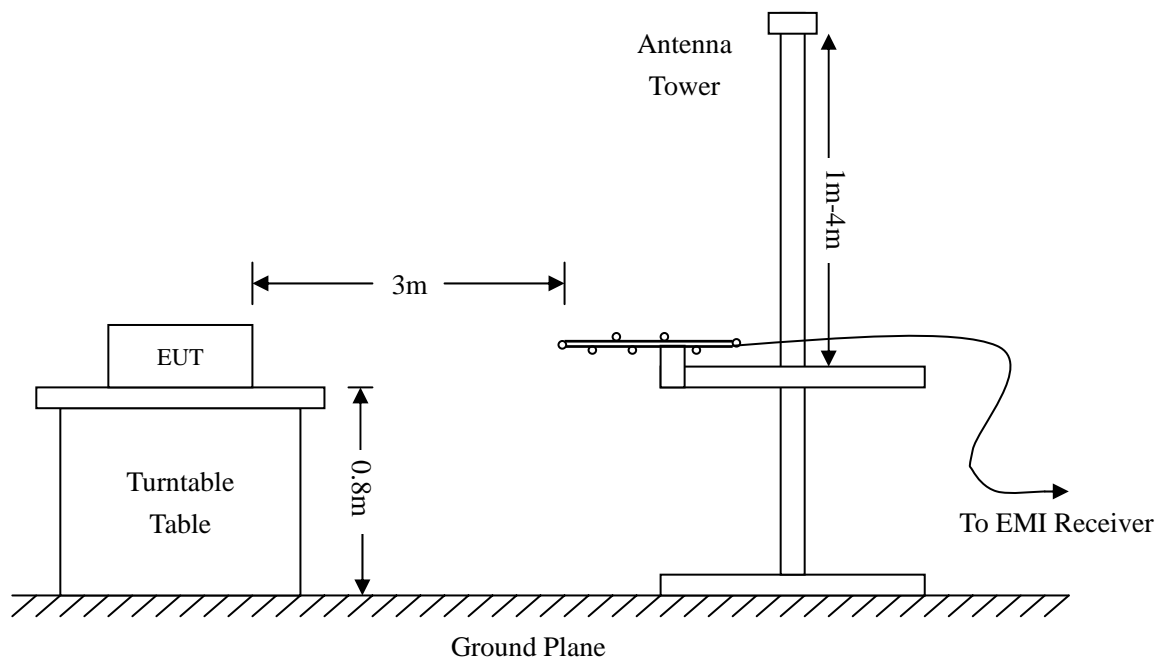
**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 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 15.247(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.





#### 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:

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V 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:	18° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

#### 4.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

**-1.40 dB $\mu$ V at 4810.00 MHz in the Vertical polarization, above 1GHz, 3Meters**

Frequency	Meter Reading	Detector	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier Gain	Corr. Ampl.	FCC Part 15.249 & 15.209	
MHz	dBuV	PK/ QP/AV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB
Transmitting Low CH (Above 1GHz) Low CH											
4810	48.9	AV	66	1	H	23.8	2.72	10.8	51.2	54.0	-2.8
4810	50.3	AV	135	1.2	V	23.8	2.72	10.8	52.6	54.0	-1.4
7215	45.6	AV	45	1	H	23.8	3.15	11.1	48.3	54.0	-5.7
7215	47.8	AV	60	1.3	V	23.8	3.15	11.1	50.5	54.0	-3.5
2405	81.3	AV	98	1.4	H	23.8	1.97	9.7	82.3	/	(Fund.)
2405	83.7	AV	56	2	V	23.8	1.97	9.7	85.2	/	(Fund.)
4810	50.6	PK	45	1.2	H	23.8	2.72	10.7	62.9	74.0	-11.1
4810	51.4	PK	98	1.2	V	23.8	2.72	10.7	63.7	74.0	-10.3
7215	47.2	PK	56	1.4	H	23.8	3.15	11.1	59.9	74.0	-14.1
7215	49.5	PK	60	2	V	23.8	3.15	11.1	62.2	74.0	-11.8
2405	83.8	PK	266	1	H	23.8	1.97	9.7	95.3	/	(Fund.)
2405	86.3	PK	185	1.2	V	23.8	1.97	9.7	97.8	/	(Fund.)
Transmitting Low CH (Above 1GHz) Mid CH											
4880	48.4	AV	66	1	H	23.8	2.72	10.7	50.7	54.0	-3.3
4880	50.2	AV	135	1.2	V	23.8	2.72	10.7	52.5	54.0	-1.5
7320	45.4	AV	45	1	H	23.8	3.17	11.2	48.1	54.0	-5.9
7320	47.6	AV	60	1.3	V	23.8	3.17	11.2	50.3	54.0	-3.7
2440	80.5	AV	60	1	H	23.8	1.99	9.8	82.1	/	(Fund.)
2440	83.3	AV	266	1.3	V	23.8	1.99	9.8	84.9	/	(Fund.)
4880	50.1	PK	45	1.2	H	23.8	2.72	10.7	62.4	74.0	-11.6
4880	51.5	PK	98	1.2	V	23.8	2.72	10.7	63.8	74.0	-10.2
7320	46.9	PK	56	1.4	H	23.8	3.17	11.2	59.6	74.0	-14.4
7320	49.4	PK	60	2	V	23.8	3.17	11.2	62.1	74.0	-11.9
2440	83.0	PK	266	1	H	23.8	1.99	9.8	94.6	/	(Fund.)
2440	85.6	PK	185	1.2	V	23.8	1.99	9.8	97.2	/	(Fund.)
Transmitting Low CH (Above 1GHz) High CH											
4960	47.8	AV	45	1	H	23.8	2.74	10.6	50.1	54.0	-3.9
4960	50.0	AV	60	1.3	V	23.8	2.74	10.6	52.3	54.0	-1.7
7440	44.3	AV	45	1.2	H	23.8	3.19	11.2	47.1	54.0	-6.9
7440	46.1	AV	98	1.2	V	23.8	3.19	11.2	48.9	54.0	-5.1
2480	78.6	AV	45	1.2	H	23.8	1.99	9.9	79.9	/	(Fund.)
2480	82.1	AV	98	1.2	V	23.8	1.99	9.9	79.7	/	(Fund.)
4960	49.3	PK	56	1.4	H	23.8	2.74	10.6	61.6	74.0	-12.4
4960	51.5	PK	60	2	V	23.8	2.74	10.6	63.8	74.0	-10.2
7440	45.9	PK	266	1	H	23.8	3.19	11.2	58.7	74.0	-15.3

7440	47.3	PK	185	1.2	V	23.8	3.19	11.2	60.1	74.0	-13.9
2480	81.5	PK	90	1.5	H	23.8	1.99	9.9	93.1	/	(Fund.)
2480	85.2	PK	43	1	V	23.8	1.99	9.9	96.8	/	(Fund.)

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 4<sup>th</sup> Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

Emissions 20dB lower than the limit are not reported.

### Plot of Radiation Emissions Test

*Radiated Disturbance*

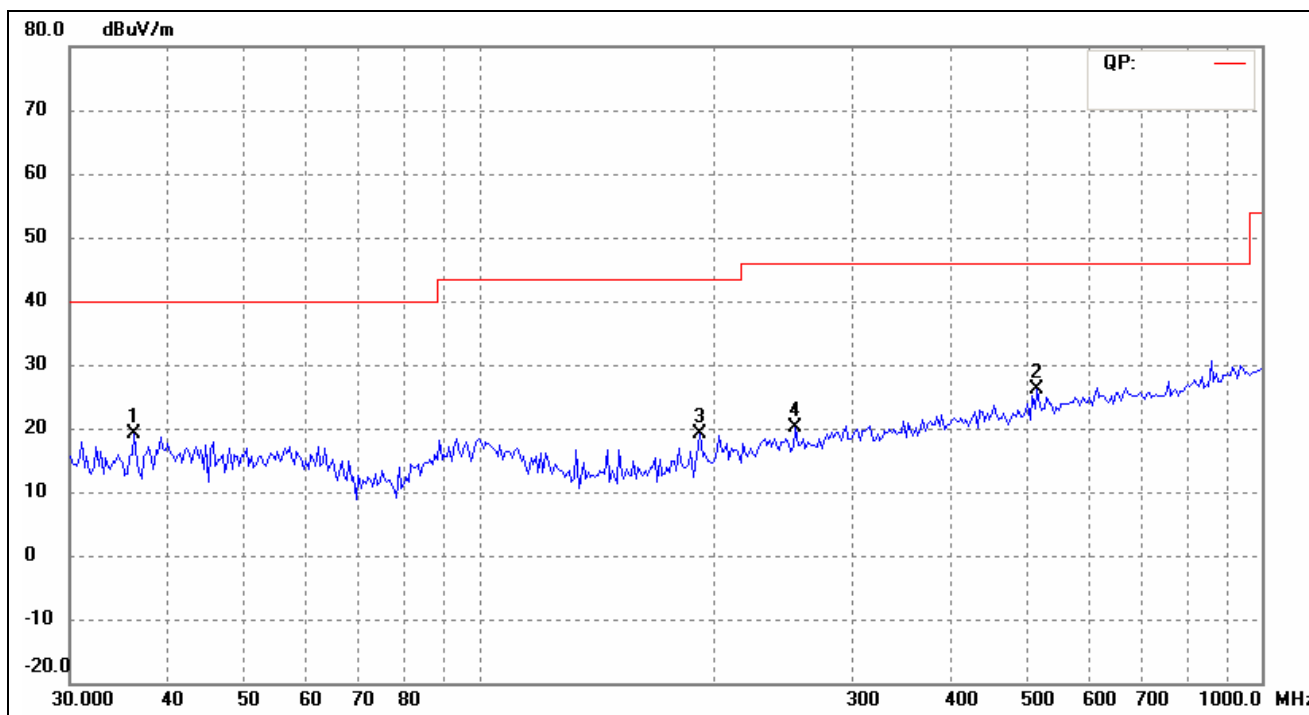
*EUT: Wireless MICROPHONE*

*M/N: MS61*

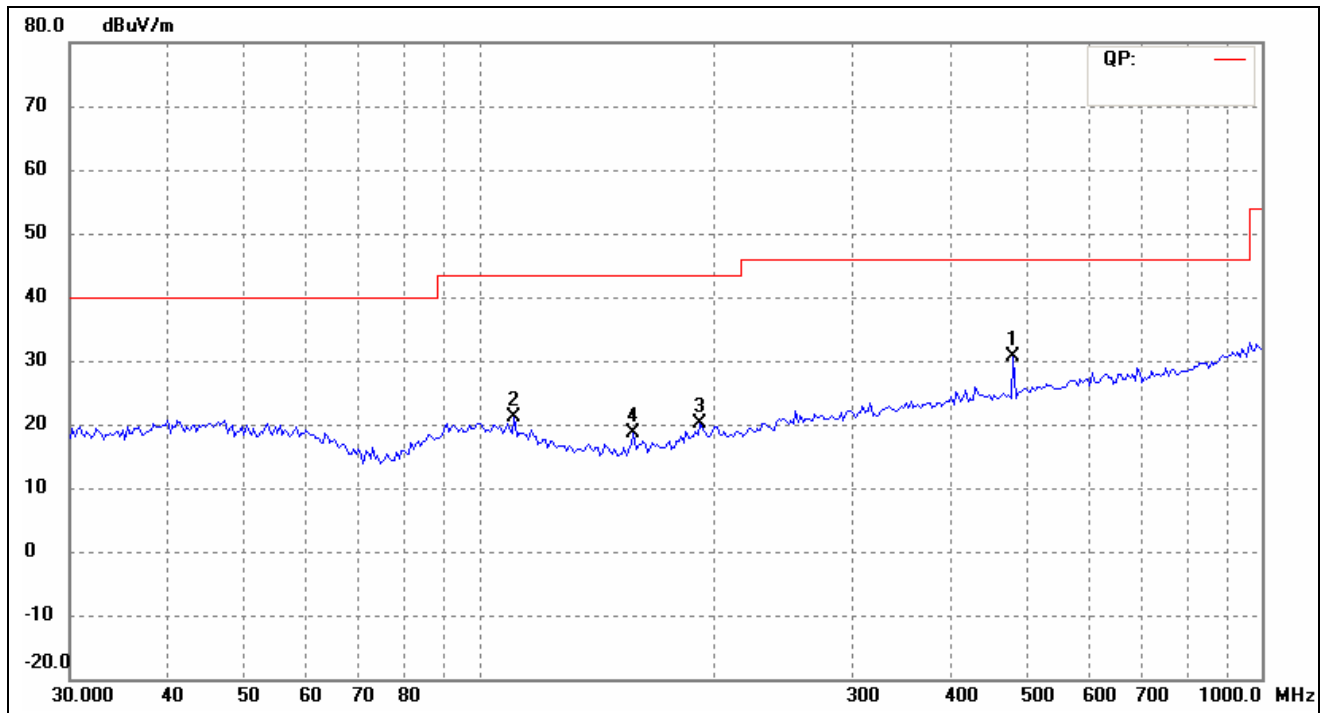
*Operating Condition: Transmitting below 1GHz*

*Test Specification: Horizontal*

*Comment: DC 3V Battery*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	36.2678	11.92	7.11	19.03	40.00	-20.97	120	1.1	peak
2	516.5651	13.53	12.70	26.23	46.00	-19.77	112	1.3	peak
3	191.7841	12.61	6.54	19.15	43.50	-24.35	135	1.2	peak
4	254.0312	11.39	8.80	20.19	46.00	-25.81	140	1.4	peak

*Radiated Disturbance**EUT: Wireless MICROPHONE**M/N: MS61**Operating Condition: Transmitting below 1GHz**Test Specification: Horizontal**Comment: DC 3V Battery*

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	( ° )	(cm)	
1	481.5112	19.10	11.53	30.63	46.00	-15.37	120	1.1	peak
2	110.8581	13.71	7.45	21.16	43.50	-22.34	112	1.3	peak
3	191.7841	13.58	6.54	20.12	43.50	-23.38	135	1.2	peak
4	157.5290	14.17	4.42	18.59	43.50	-24.91	140	1.4	peak

## 5. §15.249(b) OUT OF BAND EMISSIONS

### 5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

### 5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2007-06-30	2008-06-29
ETS.LINDGR EN	Receiver Antenna	2175	57337	2007-06-30	2008-06-29
ETS.LINDGR EN	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2007-06-30	2008-06-29
Schwarz beck	Horn Antenna	BBHX	BBHX9120-00 2	2007-06-30	2008-06-29

**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 Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, than mark the higher-level emission for comparing with the FCC rules.

### 5.4 Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1012 mbar

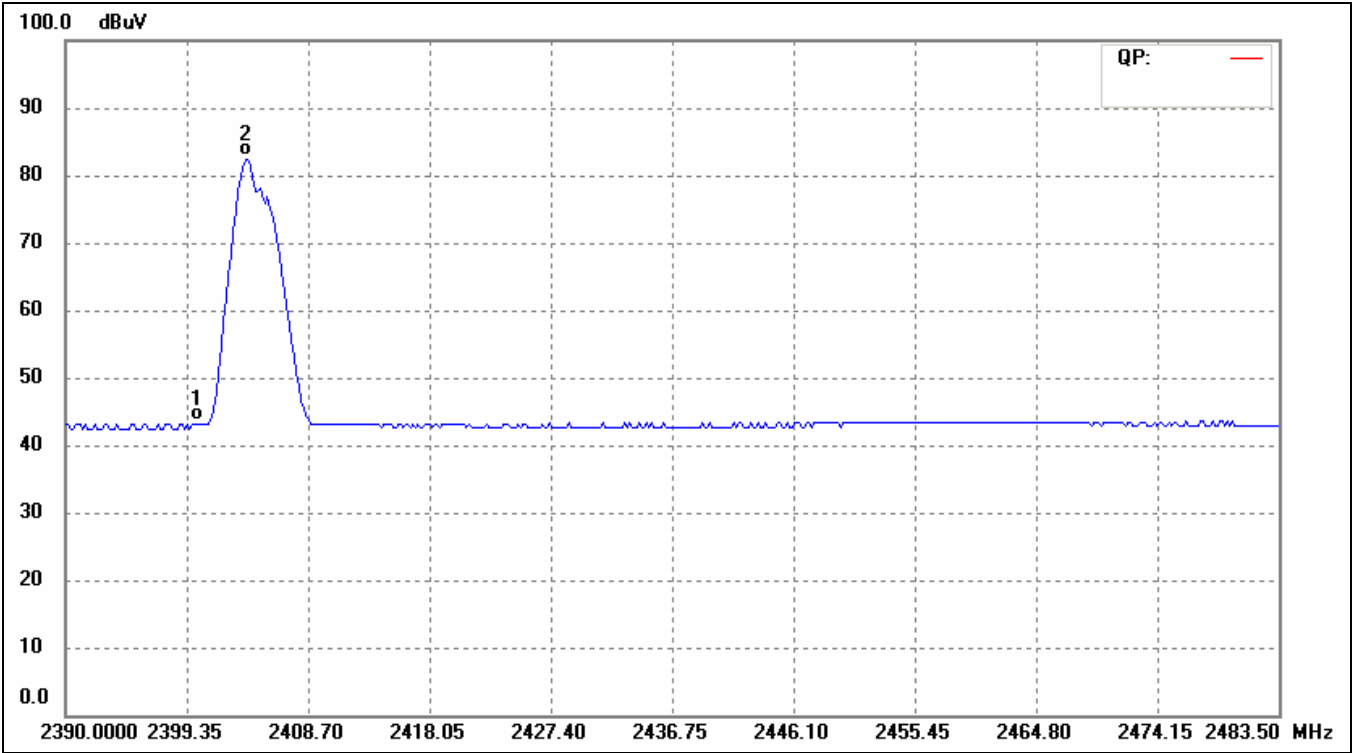
### 5.5 Summary of Test Results/Plots

Frequency MHz	Emission dB $\mu$ V/m	Limit dB $\mu$ V/m
2400.0	43.12	54
2483.5	45.22	54

**Test Result Pass**

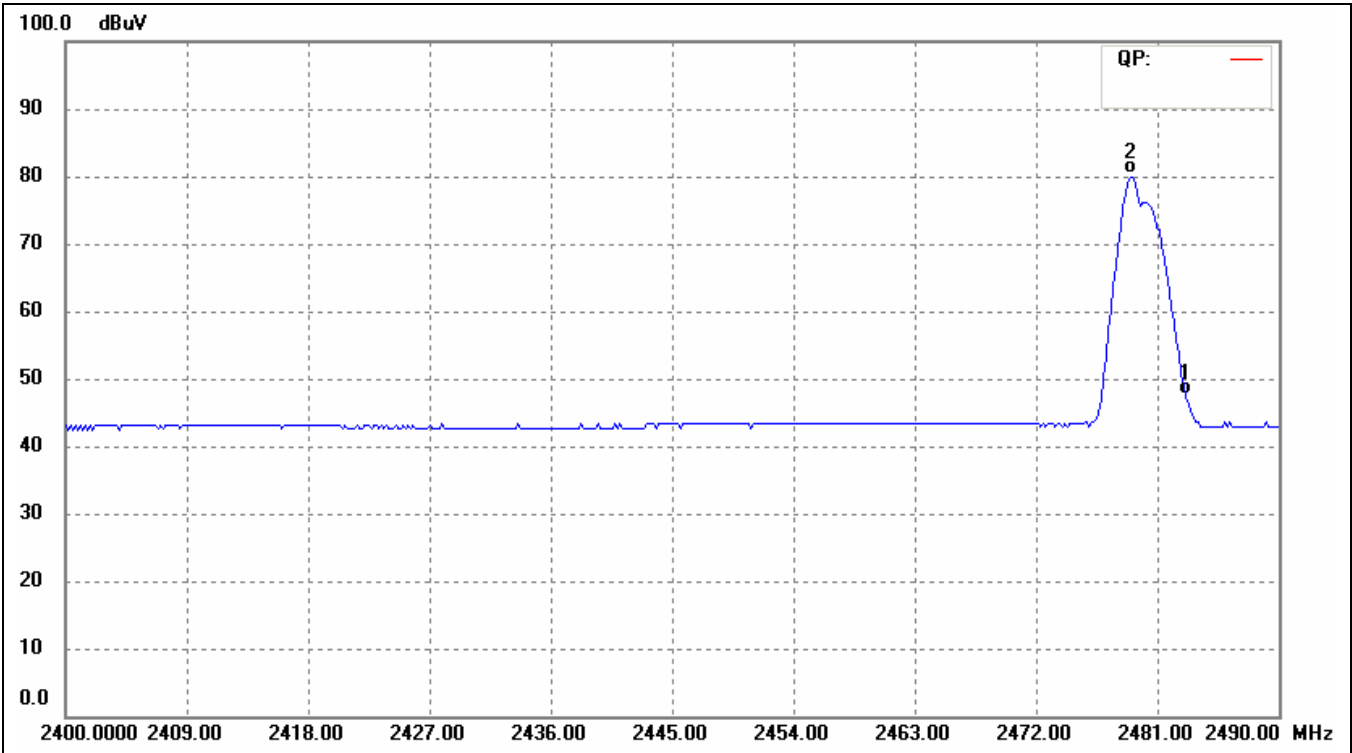
Refer to the attached plots.

Lower Bandedge



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	2400.000	7.36	35.76	43.12	54	-10.88	68	1.2	AVG
2	2403.866	46.56	35.78	82.34	54	/	47	1.2	AVG

Upper Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	( ° )	(cm)	
1	2483.500	9.04	36.18	45.22	54	-8.78	68	1.2	AVG
2	2478.998	43.74	36.17	79.91	54	/	47	1.2	AVG