

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: URRDUAL-STAR

Report Concerns: Original Report	Equipment Type: Wireless MICROPHONE
Model:	<u>MS62</u>
Report No.:	<u>STR08098004I</u>
Test/Witness Engineer:	<u>Jason</u>
Test Date:	<u>2008-09-01 to 2008-09-10</u>
Issued Date:	<u>2008-09-11</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:	 _____ 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 manufacturer: 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 No.:	MS62
Rated Voltage:	DC 6V
Output Power:	<0dBm
Frequency Range:	2404~2480MHz
No. of Channel:	16
Channel Separation:	5MHz
Antenna Type:	Integral Antenna
Size:	15x11.5x2.4 cm
For more information refer to the circuit diagram form and the user's manual.	

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

1.2 Test Standards

The following report is prepared on behalf of the 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.: **994117**. Measurement required was performed at laboratory of SEM.Test Compliance Service Co., Ltd. at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C. (518101).

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
TCL	TV	T5531C	/

1.8 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
AV Cable	1.2	Shielded	Without Core
Power Cable	1	Unshielded	With Core

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	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

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 an integral antenna, fulfill the requirement of this section.

4. §15.207 (a)- CONDUCTED EMISSION

4.1 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 ± 1.5 dB.

4.2 Test Equipment List and Details

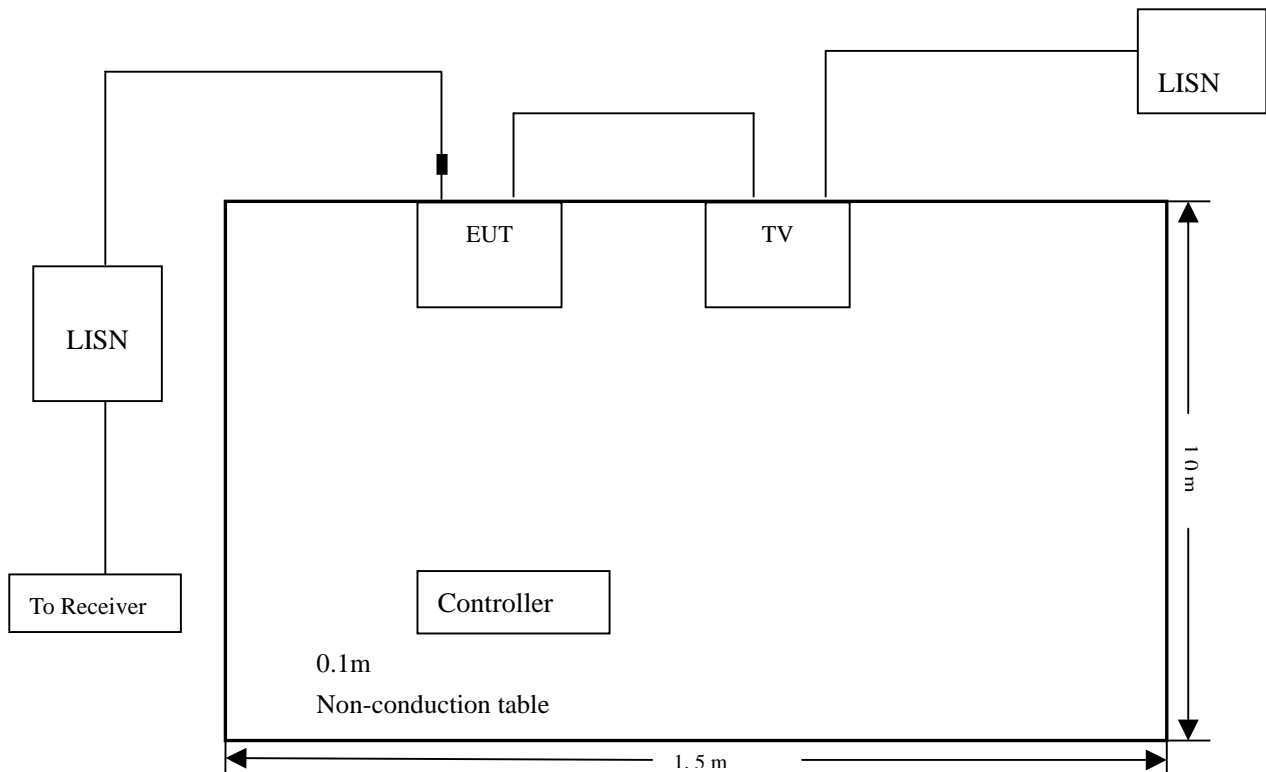
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2008-01-25	2009-01-24
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2008-01-25	2009-01-24
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2008-01-25	2009-01-24
AMN	Rohde & Schwarz	ESH3-Z5	828304/014	2008-01-25	2009-01-24

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 15.207 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.

4.4 Basic Test Setup Block Diagram



4.5 Environmental Conditions

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

4.6 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

4.7 Summary of Test Results/Plots

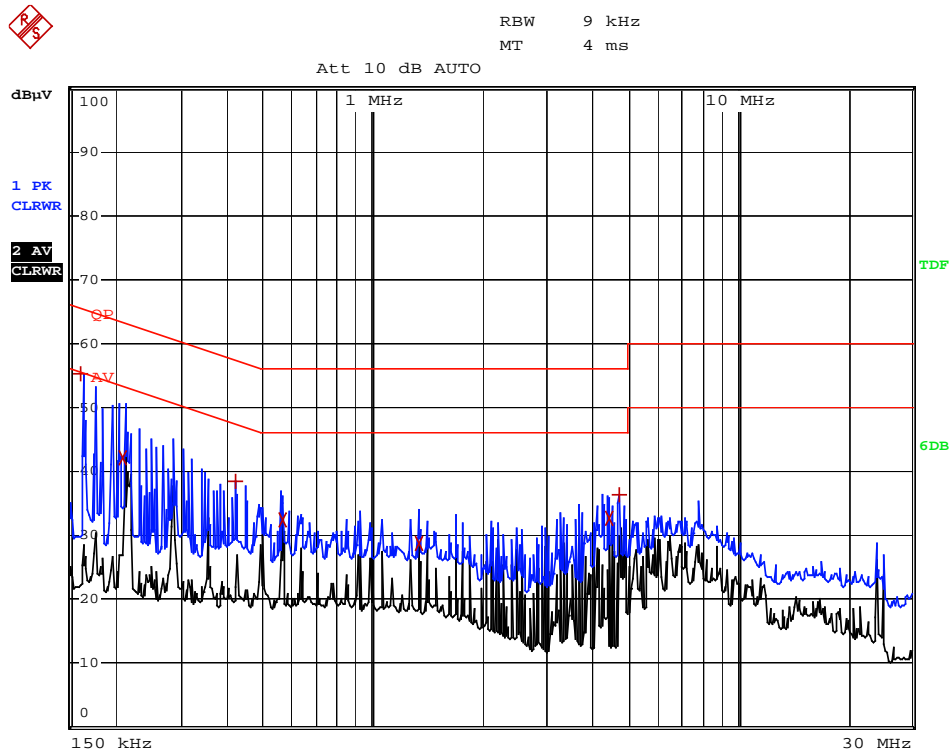
According to the data in section 3.8, the EUT complied with the FCC 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-10.22 dB μ V at 1.274 MHz in the Neutral mode, Peak detector, 0.15-30MHz

4.8 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.207	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dB μ V	QP/Ave/Pk	Line/Neutral	dB μ V	dB
0.16	55.13	Peak	Neutral	65.35	-10.22
0.21	42.58	AV	Line	53.20	-10.62
0.15	55.32	Peak	Line	66	-10.67
0.21	42.15	AV	Neutral	53.19	-11.04
4.46	32.76	AV	Neutral	46	-13.23
0.57	32.56	AV	Neutral	56.19	-13.63
4.66	30.63	AV	Line	46	-15.36
0.50	29.05	AV	Line	46.12	-16.97
1.35	28.62	AV	Neutral	46	-17.37
4.11	37.24	Peak	Line	56	-18.75
0.42	38.55	Peak	Neutral	57.53	-18.98
0.92	26.61	AV	Line	46	-19.38
4.75	36.34	Peak	Neutral	56	-19.65

Note: Emission attenuated more than 20dB is not reported.

Plot of Conducted Emissions Test Data*Conducted Disturbance**EUT: Wireless MICROPHONE**M/N: MS62**Operating Condition: Operating**Test Specification: N**Comment: AC 120V/60Hz; DC 6V adapter*

Date: 10.SEP.2008 15:06:59

5. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

5.1 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 ± 3.0 dB.

5.2 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.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-01-25	2009-01-24
Positioning Controller	C&C	CC-C-1F	N/A	2008-01-25	2009-01-24
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-01-25	2009-01-24
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-01-25	2009-01-24
RF Switch	EM	EMSW18	SW060023	2008-01-25	2009-01-24
Amplifier	Agilent	8447F	3113A06717	2008-01-25	2009-01-24
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-01-25	2009-01-24

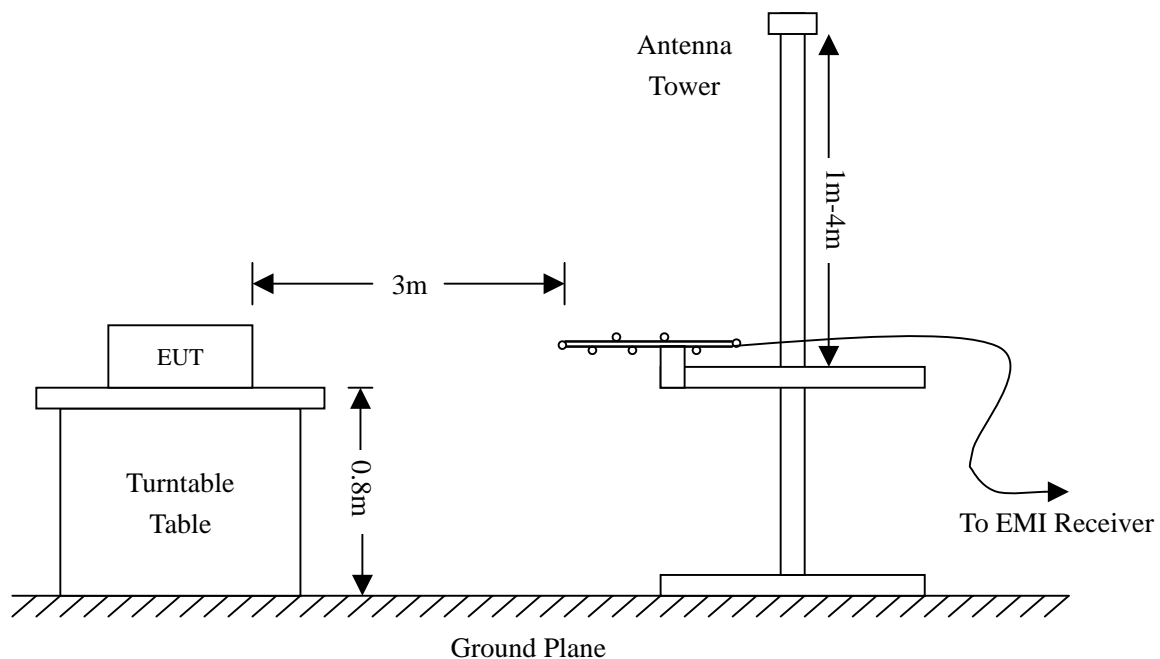
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.4 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.



5.5 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:

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

5.6 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

5.7 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:

-2.04 dBμV at 360.9775 MHz in the Horizontal polarization, 30 MHz to 25 GHz, 3Meters

Plot of Radiation Emissions Test

Radiated Disturbance

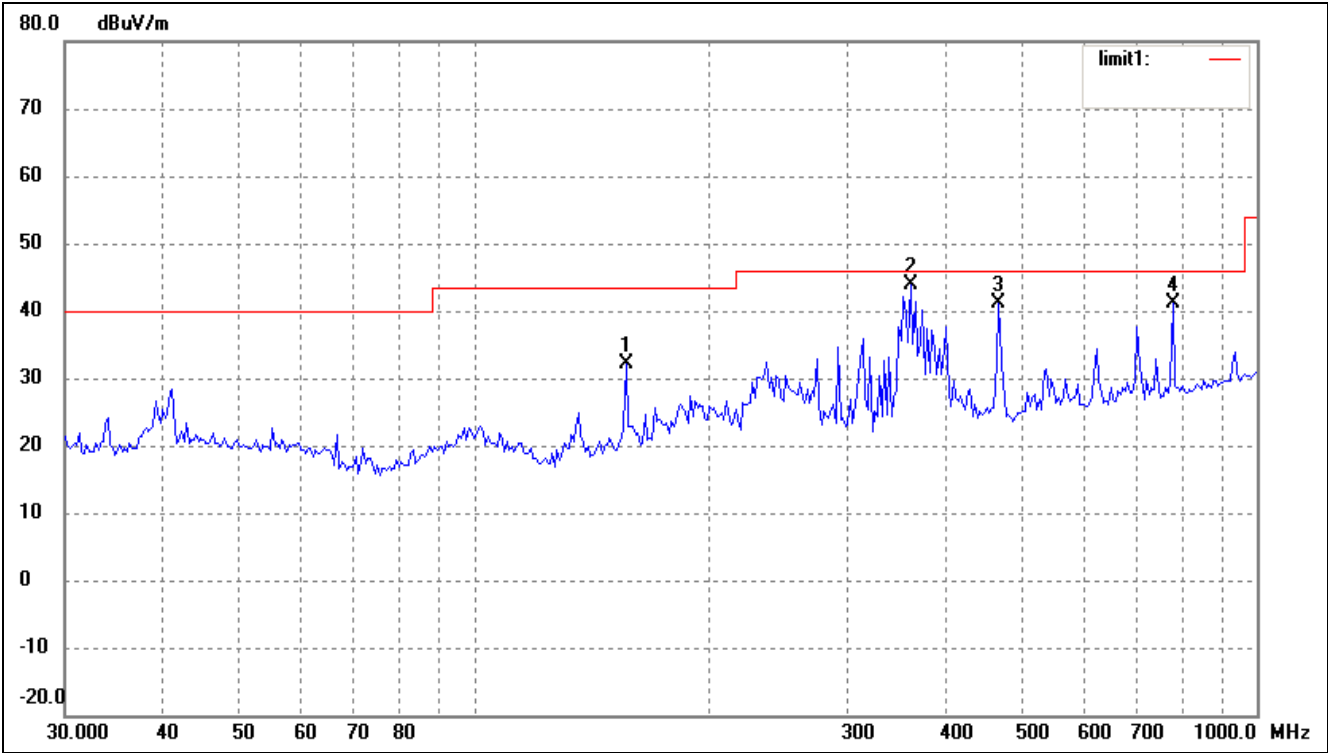
EUT: Wireless MICROPHONE

M/N: MS62

Operating Condition: Transmitting below 1GHz

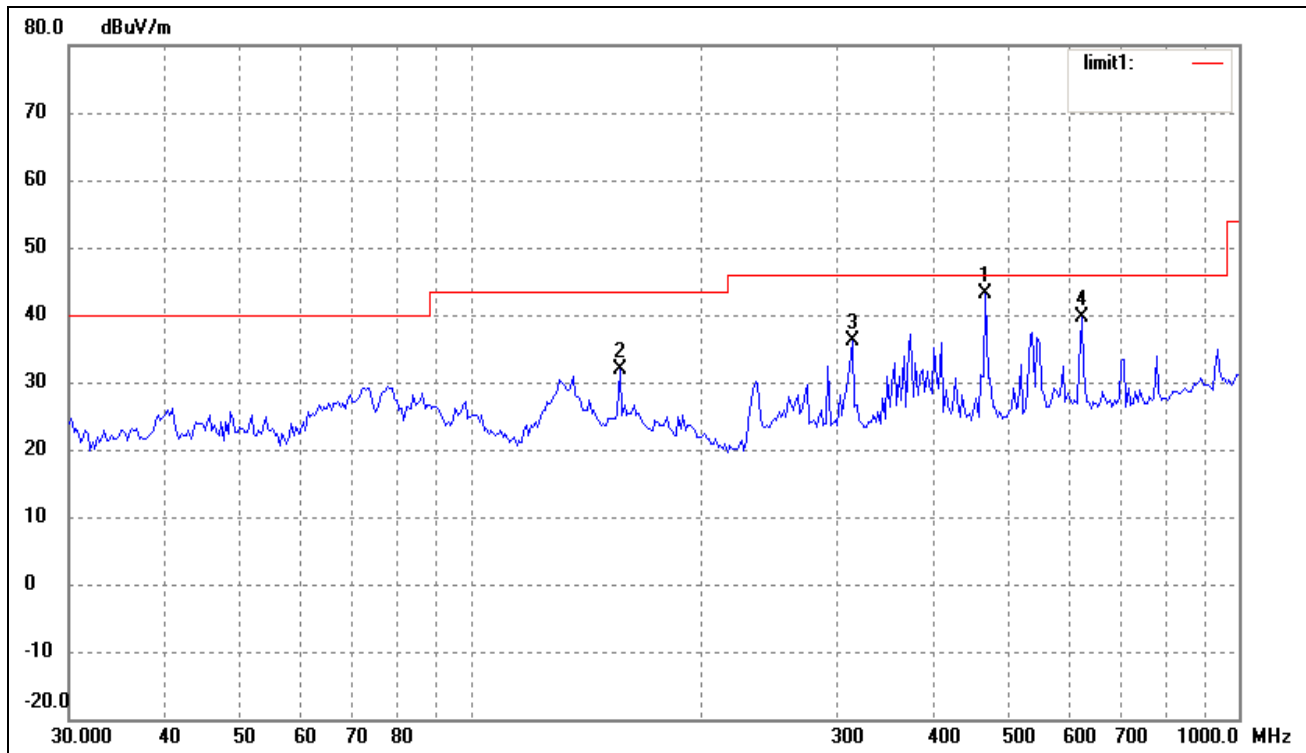
Test Specification: Horizontal & Vertical

Horizontal:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	156.4259	28.61	3.59	32.20	43.50	-11.30	205	105	peak
2	360.9775	34.30	9.66	43.96	46.00	-2.04	227	120	QP
3	468.1650	31.23	9.86	41.09	46.00	-4.91	207	117	QP
4	781.9606	27.79	13.39	41.18	46.00	-4.82	221	104	QP

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	468.1650	33.26	9.86	43.12	46.00	-2.88	203	115	QP
2	156.4259	28.31	3.59	31.90	43.50	-11.60	227	105	peak
3	313.6482	27.42	8.77	36.19	46.00	-9.81	107	117	peak
4	624.4897	27.14	12.56	39.70	46.00	-6.30	251	104	peak

Spurious Emission Above 1GHz

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4810.0	AV	38.9	270	V	34.1	5.2	33.0	47.6	54	-6.4
4810.0	AV	38.0	270	H	34.1	5.2	33.0	44.7	54	-9.3
4810.0	PK	62.3	270	V	34.1	5.2	33.0	68.6	74	-5.4
4810.0	PK	60.8	270	H	34.1	5.2	33.0	67.5	74	-6.5
7215.0	AV	38.5	90	V	37.4	6.1	33.5	48.1	54	-5.9
7215.0	AV	37.4	45	H	37.4	6.1	33.5	48.6	54	-5.4
7215.0	PK	45.9	270	V	37.4	6.1	33.5	56.8	74	-17.2
7215.0	PK	44.8	180	H	37.4	6.1	33.5	57.2	74	-16.8
2405.0	AV	75.0	60	V	29.1	3.7	34.0	74.6	94	-19.4
2405.0	AV	72.6	270	H	29.1	3.7	34.0	73.4	94	-20.6
2405.0	PK	93.7	45	V	29.1	3.7	34.0	92.4	114	-21.6
2405.0	PK	91.8	90	H	29.1	3.7	34.0	93.2	114	-20.8
Middle Channel (1G to 25GHz)										
4880	AV	39.2	90	V	34.1	5.2	33.0	46.5	54	-7.5
4880	AV	37.5	270	H	34.1	5.2	33.0	44.1	54	-9.9
4880	PK	61.6	45	V	34.1	5.2	33.0	68.4	74	-5.6
4880	PK	60.2	60	H	34.1	5.2	33.0	67.3	74	-6.7
7320	AV	38.2	270	V	37.4	6.1	33.5	47.8	54	-6.2
7320	AV	36.8	45	H	37.4	6.1	33.5	47.2	54	-6.8
7320	PK	45.2	180	V	37.4	6.1	33.5	55.2	74	-18.8
7320	PK	44.5	45	H	37.4	6.1	33.5	53.8	74	-20.2
2440	AV	75.4	45	V	29.1	3.7	34.0	75.2	94	-18.8
2440	AV	73.3	90	H	29.1	3.7	34.0	72.1	94	-21.9
2440	PK	93.0	90	V	29.1	3.7	34.0	92.2	114	-21.6
2440	PK	91.4	60	H	29.1	3.7	34.0	91.4	114	-22.6

High Channel (1G to 25GHz)										
4960	AV	38.8	90	V	34.1	5.2	33.0	46.2	54	-7.8
4960	AV	37.9	270	H	34.1	5.2	33.0	45.5	54	-8.5
4960	PK	59.4	60	V	34.1	5.2	33.0	66.4	74	-7.6
4960	PK	58.5	60	H	34.1	5.2	33.0	64.8	74	-9.2
7440	AV	38.6	270	V	37.4	6.1	33.5	47.8	54	-6.2
7440	AV	37.2	180	H	37.4	6.1	33.5	46.9	54	-7.1
7440	PK	45.3	45	V	37.4	6.1	33.5	56.7	74	-17.3
7440	PK	43.8	45	H	37.4	6.1	33.5	55.3	74	-18.7
2480	AV	74.7	45	V	29.1	3.7	34.0	73.6	94	-20.4
2480	AV	73.0	90	H	29.1	3.7	34.0	72.4	94	-21.6
2480	PK	93.2	90	V	29.1	3.7	34.0	92.8	114	-21.2
2480	PK	91.9	90	H	29.1	3.7	34.0	91.5	114	-22.5

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th 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.

6. §15.249(b) OUT OF BAND EMISSIONS

6.1 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.

6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-01-25	2009-01-24
Positioning Controller	C&C	CC-C-1F	N/A	2008-01-25	2009-01-24
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-01-25	2009-01-24
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-01-25	2009-01-24
RF Switch	EM	EMSW18	SW060023	2008-01-25	2009-01-24
Amplifier	Agilent	8447F	3113A06717	2008-01-25	2009-01-24
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-01-25	2009-01-24
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24

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

6.3 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.

6.4 Environmental Conditions

Temperature:	22° C
Relative Humidity:	54%
ATM Pressure:	1012 mbar

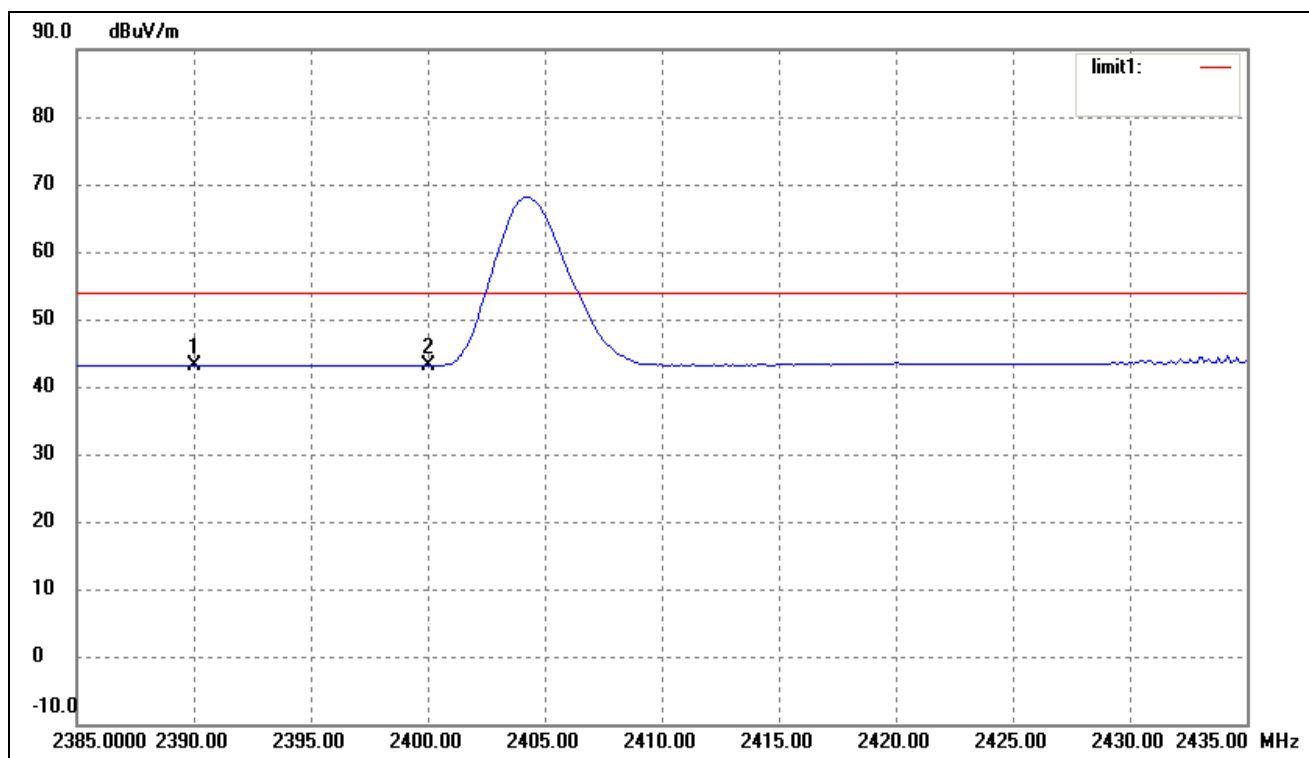
6.5 Summary of Test Results/Plots

Frequency MHz	Emission dB μ V/m	Limit dB μ V/m
2390.0	43.33	54
2400.0	43.50	54
2483.5	44.34	54

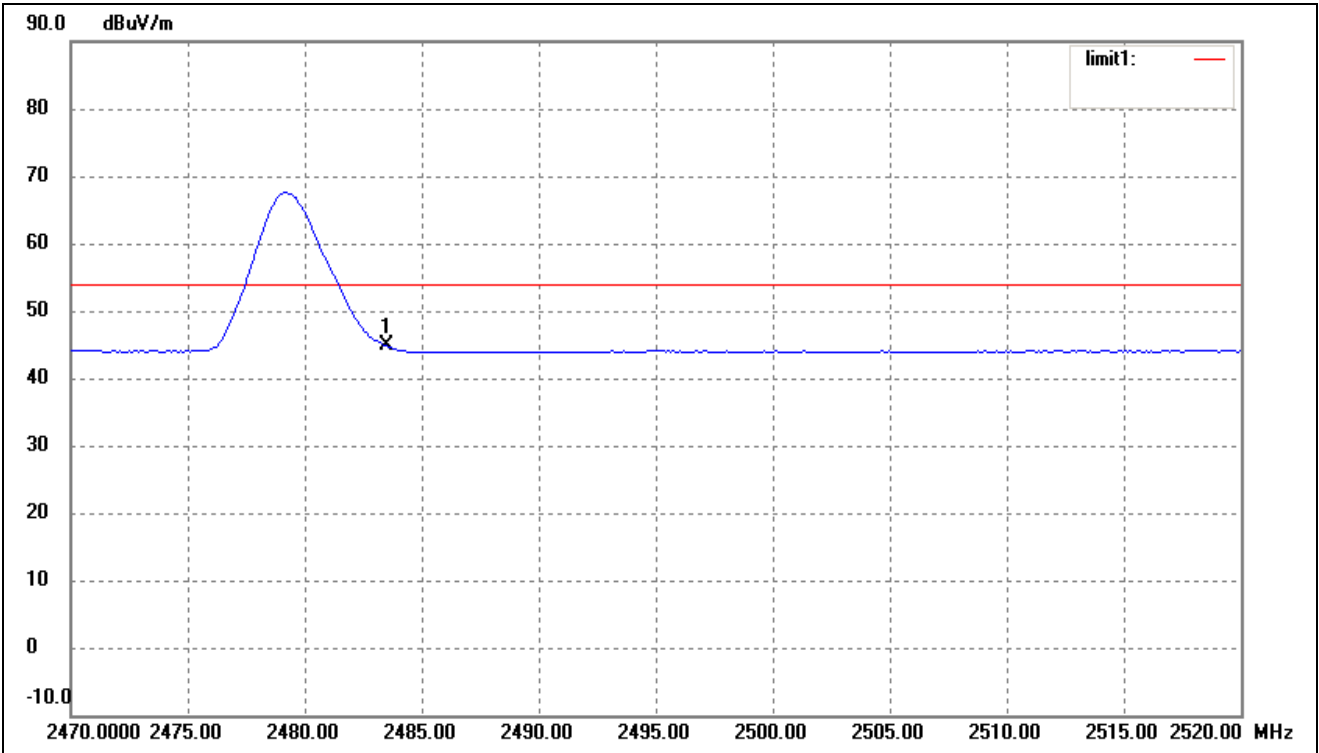
Test Result Pass

Refer to the attached plots.

Lower Bandedge



Upper Bandedge



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