

FCC Part 15C

Measurement and Test Report

For

TENSHO MODEL CO., LTD

5TH FLOOR, XIESHENG INDUSTRIAL BUILDING, NO.70, MIDDLE

LONGSHAN ROAD, XIAMEN, CHINA 361009

FCC ID: TNGTTX050912

Report Concerns: Original Report	Equipment Type: 2.4Ghz Radio
Model:	<u>TTX06</u>
Report No.:	<u>STR09118074I</u>
Test/Witness Engineer:	<u>Susan Su</u>
Test Date:	<u>2009-11-19 to 2009-11-24</u>
Issued Date:	<u>2009-11-27</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.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
1.2 TEST STANDARDS.....	4
1.3 RELATED SUBMITTAL(S)/GRANT(S).....	5
1.4 TEST METHODOLOGY.....	5
1.5 TEST FACILITY.....	5
1.6 EUT EXERCISE SOFTWARE.....	5
1.7 ACCESSORIES EQUIPMENT LIST AND DETAILS.....	5
1.8 EUT CABLE LIST AND DETAILS.....	5
2. SUMMARY OF TEST RESULTS.....	6
3. §15.203 - ANTENNA REQUIREMENT.....	7
3.1 STANDARD APPLICABLE.....	7
3.2 TEST RESULT.....	7
4. MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	8
4.1 STANDARD APPLICABLE.....	8
4.2 MPE CALCULATION METHOD.....	8
4.3 MPE CALCULATION RESULT.....	9
5. NUMBER OF HOPPING CHANNELS AND CHANNEL SPACING.....	10
5.1 STANDARD APPLICABLE.....	10
5.2 TEST EQUIPMENT LIST AND DETAILS.....	10
5.3 TEST PROCEDURE.....	10
5.4 ENVIRONMENTAL CONDITIONS.....	10
5.5 SUMMARY OF TEST RESULTS/PLOTS.....	11
6. DWELL TIME OF A HOPPING CHANNEL.....	13
6.1 STANDARD APPLICABLE.....	13
6.2 TEST EQUIPMENT LIST AND DETAILS.....	13
6.3 TEST PROCEDURE.....	13
6.4 ENVIRONMENTAL CONDITIONS.....	13
6.5 SUMMARY OF TEST RESULTS/PLOTS.....	14
7. 20-DB BANDWIDTH.....	17
7.1 STANDARD APPLICABLE.....	17
7.2 TEST EQUIPMENT LIST AND DETAILS.....	17
7.3 TEST PROCEDURE.....	17
7.4 ENVIRONMENTAL CONDITIONS.....	17
7.5 SUMMARY OF TEST RESULTS/PLOTS.....	17
8. POWER OUTPUT.....	20
8.1 STANDARD APPLICABLE.....	20
8.2 TEST EQUIPMENT LIST AND DETAILS.....	20
8.3 TEST PROCEDURE.....	20
8.4 ENVIRONMENTAL CONDITIONS.....	20
8.5 SUMMARY OF TEST RESULTS/PLOTS.....	20
9. FIELD STRENGTH OF SPURIOUS EMISSIONS.....	21
9.1 MEASUREMENT UNCERTAINTY.....	21
9.2 STANDARD APPLICABLE.....	21
9.3 TEST EQUIPMENT LIST AND DETAILS.....	22
9.4 TEST PROCEDURE.....	22
9.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	23
9.6 ENVIRONMENTAL CONDITIONS.....	23
9.7 SUMMARY OF TEST RESULTS/PLOTS.....	23
10. OUT OF BAND EMISSIONS.....	28
10.1 STANDARD APPLICABLE.....	28
10.2 TEST EQUIPMENT LIST AND DETAILS.....	28
10.3 TEST PROCEDURE.....	28
10.4 ENVIRONMENTAL CONDITIONS.....	28

10.5 SUMMARY OF TEST RESULTS/PLOTS29

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: TENSHO MODEL CO., LTD
Address of applicant: 5TH FLOOR, XIESHENG INDUSTRIAL BUILDING, NO.70,
MIDDLE LONGSHAN ROAD, XIAMEN, CHINA 361009

Manufacturer: TENSHO MODEL CO., LTD
Address of manufacturer: 5TH FLOOR, XIESHENG INDUSTRIAL BUILDING, NO.70,
MIDDLE LONGSHAN ROAD, XIAMEN, CHINA 361009

General Description of E.U.T

Items	Description
EUT Description:	2.4Ghz Radio
Trade Name:	TENSHO
Model No.:	TTX06
Adding model:	TTX05
Rated Voltage:	12V DC battery
Max. Output Power	15.2dBm
Frequency range:	2405-2454MHz
Number of channels:	20
Channel Separation:	Minimum 1005kHz
Type of Antenna:	Integral Antenna
Size:	7.7x29.2x8.0 cm

Note: The test data is gathered from a production sample, provided by the manufacturer. The others models listed in the report have different apperance only of TTX06 without curcuit and electronic construction changed, declared by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the TENSHO MODEL CO., LTD in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions 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 Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4 Test Methodology

All measurements contained in this report were conducted with DA 00-705 and 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 with Low Channel, Middle Channel and High Channel, 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.

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; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§ 1.1307(b)	Maximum Permissible Exposure	Compliant
§ 15.247(a)(1)(iii)	Quantity of Hopping Channel	Compliant
§ 15.247(a)(1)	Channel Separation	Compliant
§ 15.247(a)(1)(iii)	Time of Occupancy (Dwell time)	Compliant
§ 15.247(a)	20dB Bandwidth	Compliant
§ 15.247(b)(1)	Power Output	Compliant
§ 15.209(a)(f)	Radiated Emission	Compliant
§ 15.247(c)	Band edge	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 permanent antenna, fulfill the requirement of this section.

4. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

4.1 Standard Applicable

The evaluation method of the Maximum Permissible Exposure is according to DA 00-705.

According to § 1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100000			1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

4.2 MPE Calculation Method

$$S = (P \cdot G) / (4 \cdot \pi \cdot R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,
the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

4.3 MPE Calculation Result

Maximum peak output power at antenna input terminal: 15.17(dBm)

Maximum peak output power at antenna input terminal: 32.8852(mW)

Prediction distance: 20 (cm)

Prediction frequency: 2453.445 (MHz)

Antenna gain (typical): 0 (dBi)

Antenna gain (numeric): 1 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.006542 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

$$0.006542 \text{ (mw/cm}^2\text{)} < 1 \text{ (mw/cm}^2\text{)}$$

Result: Pass

5. NUMBER OF HOPPING CHANNELS AND CHANNEL SPACING

5.1 Standard Applicable

According to FCC 15.247(a)(1), frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, and frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

The test method of the Number of Hopping Frequencies and Channel Spacing are according to DA 00-705.

5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2009-08-12	2010-08-11
SCHWARZBECK	Trilog Broadband Antenna	VULB9163	9163-333	2009-08-12	2010-08-11

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

5.3 Test Procedure

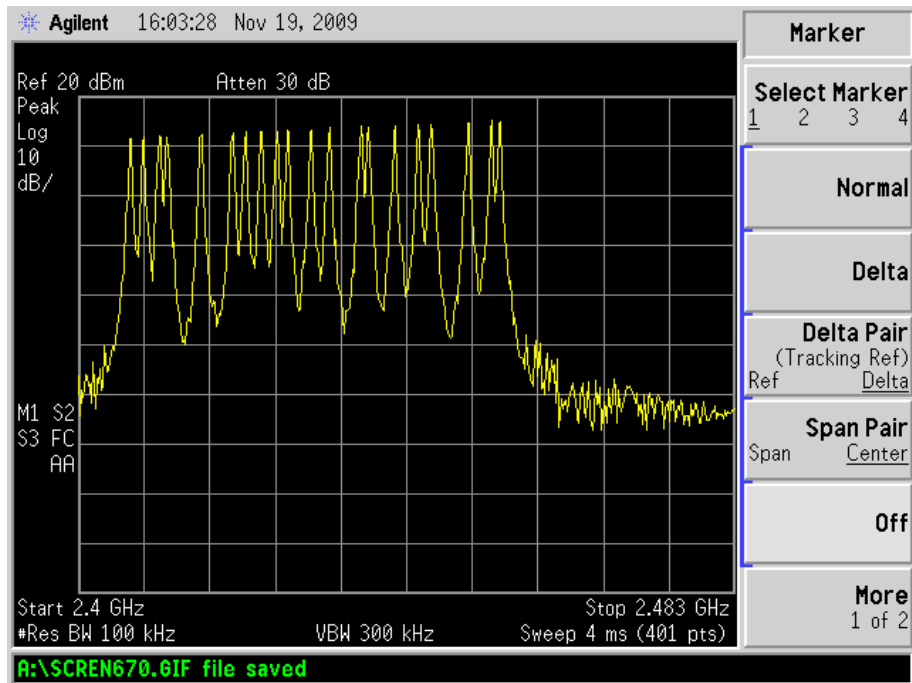
Set the Lowest channel to the Highest Channel, observed the band of 2400MHz to 2438.5MHz, than count it out the number of channels for comparing with the FCC rules. Adjust channel spacing can be read by adjusting the Analyzer SPAN.

5.4 Environmental Conditions

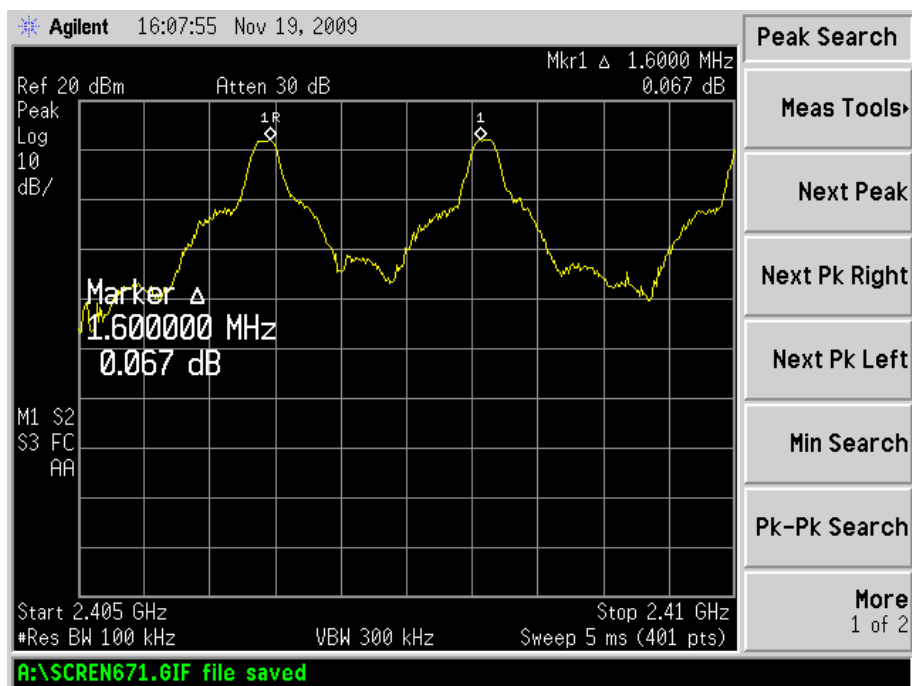
Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

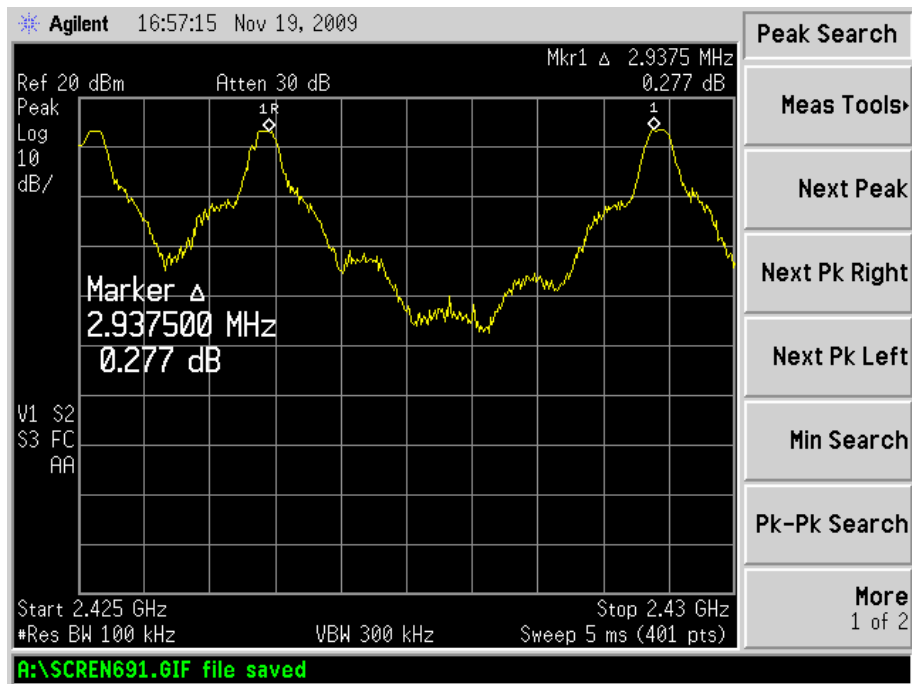
No. of Channel=20



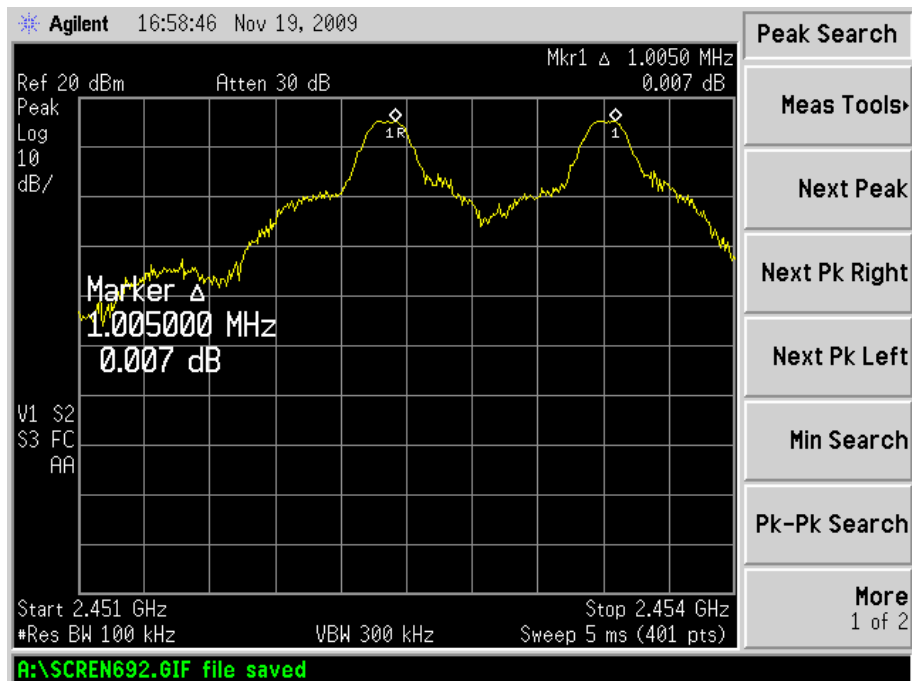
Channel Spacing (Low CH=1.6MHz)



Channel Spacing (Middle CH=2.9375MHz)



Channel Spacing (High CH=1.005MHz)



6. DWELL TIME OF A HOPPING CHANNEL

6.1 Standard Applicable

According to 15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

The test method of the Dwell Time is according to DA 00-705.

6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2009-08-12	2010-08-11
SCHWARZBECK	Trilog Broadband Antenna	VULB9163	9163-333	2009-08-12	2010-08-11

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

6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 0Hz.
4. Repeat above procedures until all frequency measured was complete.

6.4 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

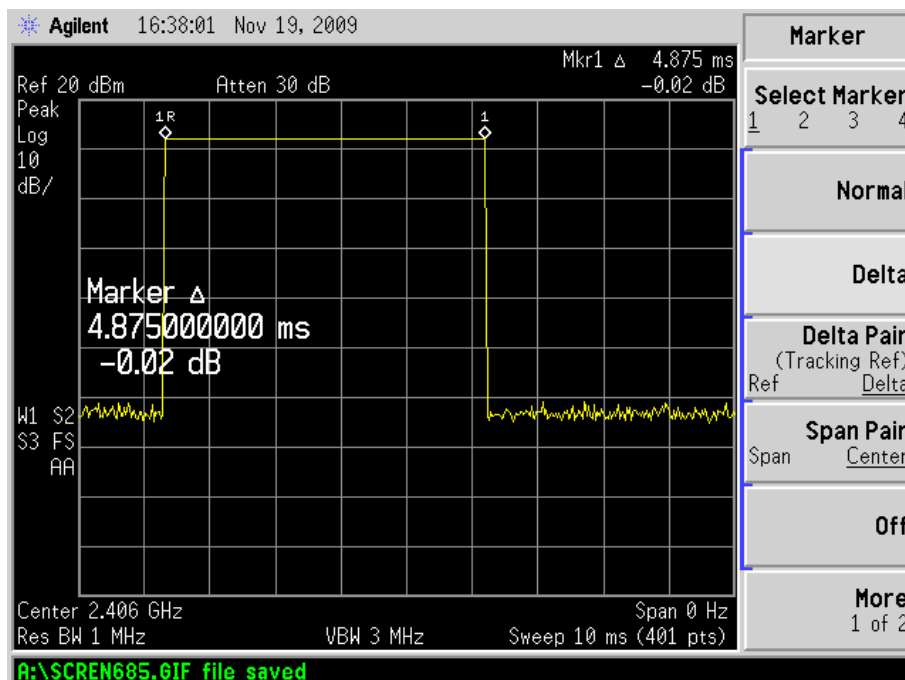
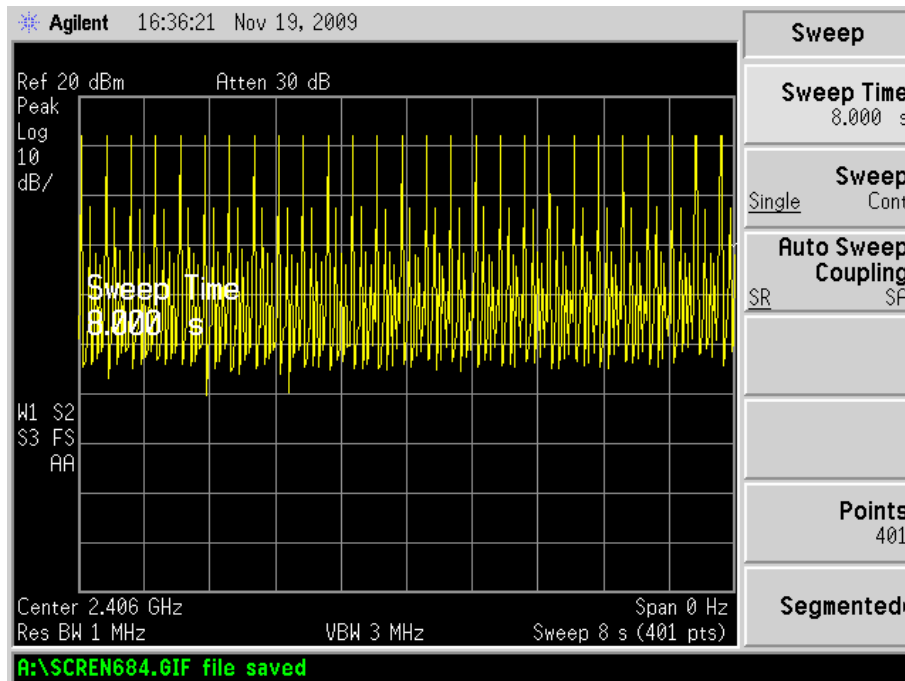
6.5 Summary of Test Results/Plots

The dwell time within a 8 second period in data mode is independent from the packet type (packet length). The calculation for a 8 second period is as follows:

Dwell time = time slot length * quantity of pulse

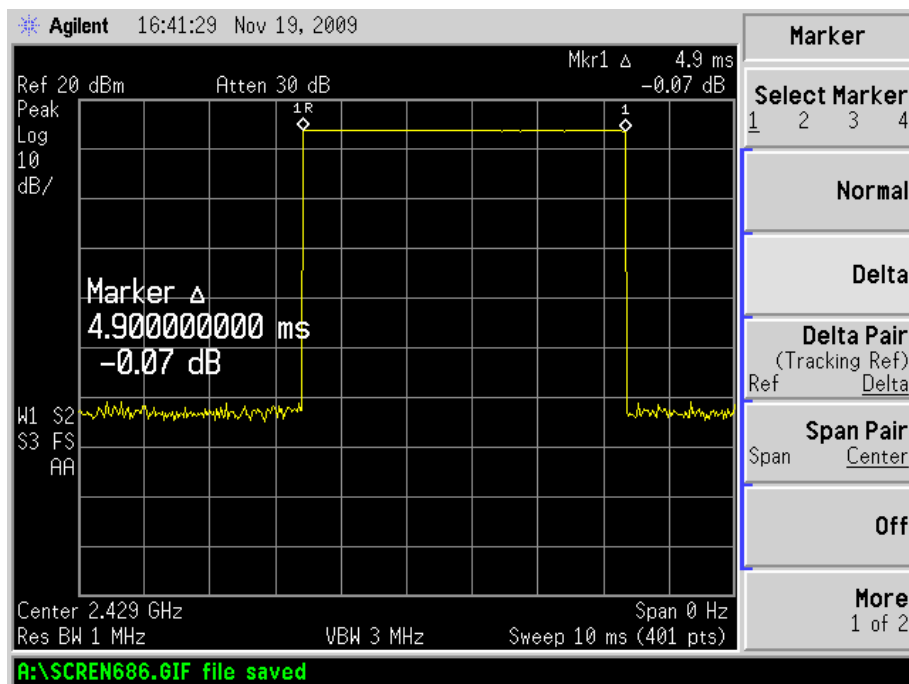
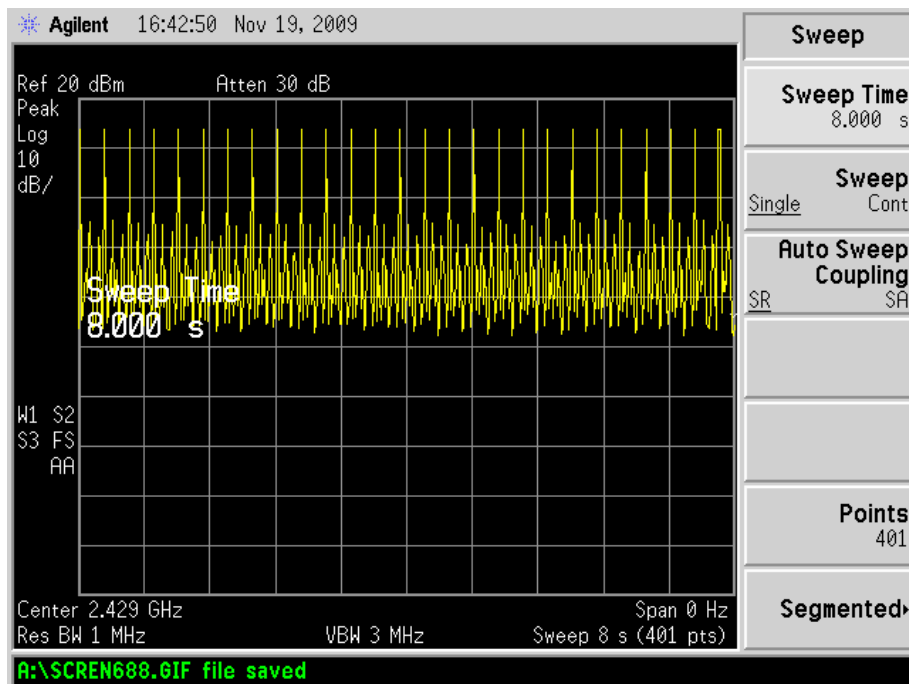
Test data is corrected with the worse case.

CH Low:



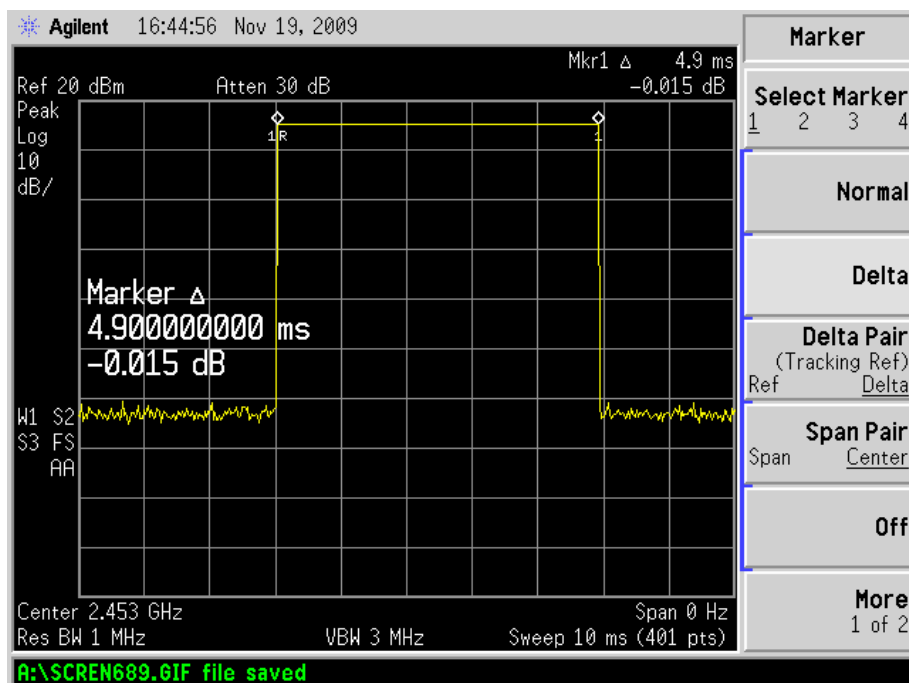
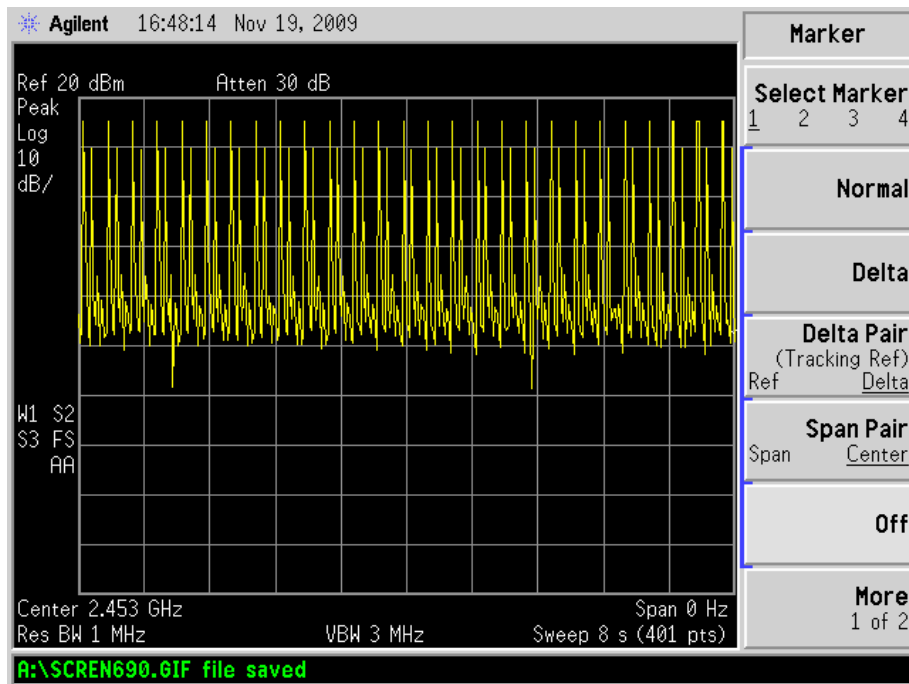
$$\text{Dwell time} = 4.875(\text{ms}) * 27 = 131.625 (\text{ms}) < 400 (\text{ms})$$

CH Mid:



$$\text{Dwell time} = 4.9 \text{ (ms)} * 27 = 132.3 \text{ (ms)} < 400 \text{ (ms)}$$

CH High:



$$\text{Dwell time} = 4.9 \text{ (ms)} * 27 = 132.3 \text{ (ms)} < 400 \text{ (ms)}$$

7. 20-dB BANDWIDTH

7.1 Standard Applicable

According to 15.247(a)(1)(iii). For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

The test method of the 20 dB Bandwidth is according to ANSI C63.4 2003 and DA 00-705.

7.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2009-08-12	2010-08-11
SCHWARZBECK	Trilog Broadband Antenna	VULB9163	9163-333	2009-08-12	2010-08-11

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

7.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=100KHz (10 % of Bandwidth.), Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.

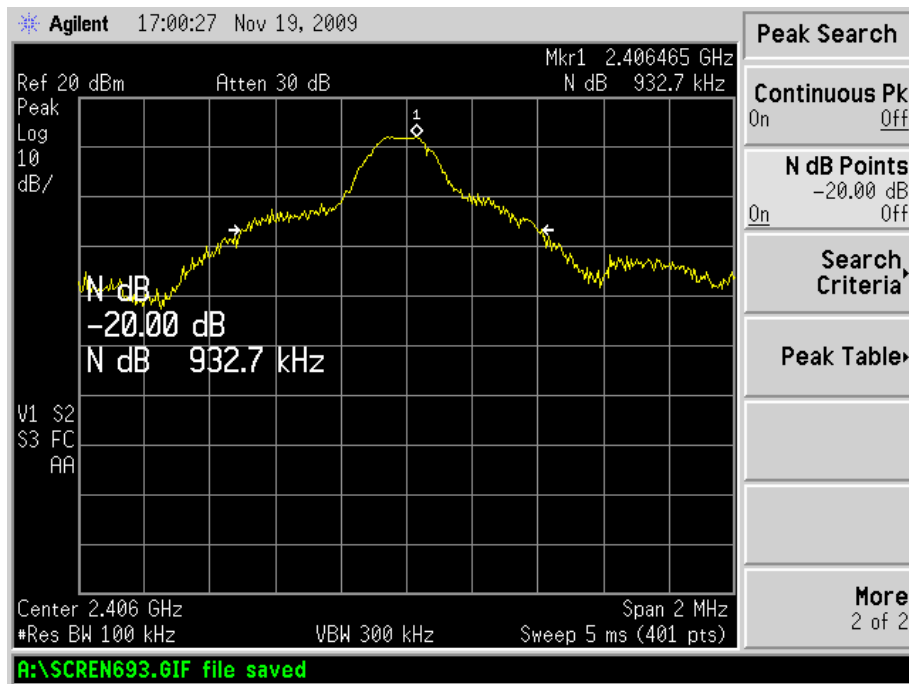
7.4 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

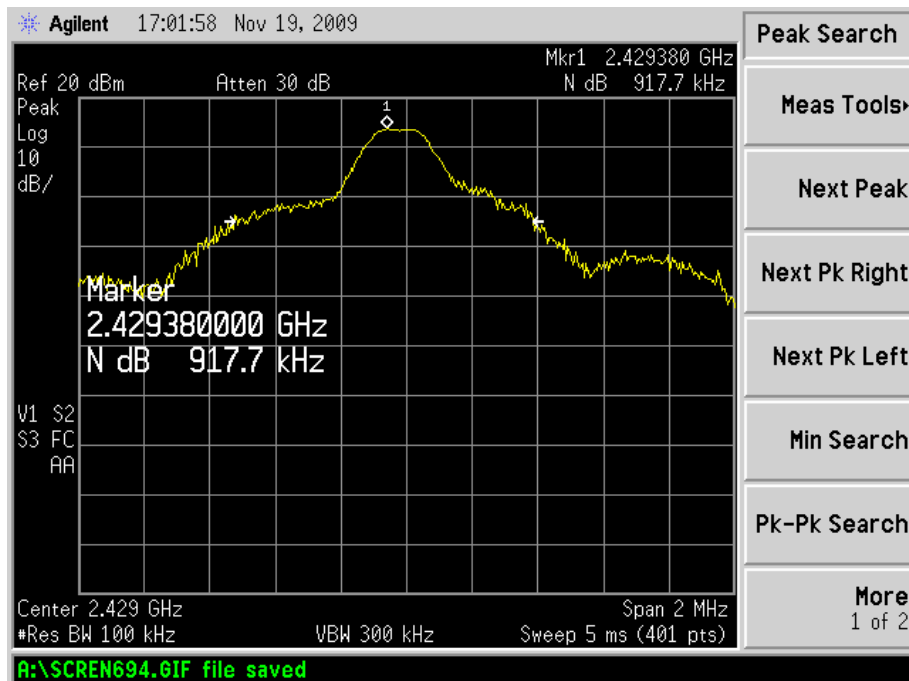
7.5 Summary of Test Results/Plots

Frequency MHz	20 dB Bandwidth kHz	Limit dB
2406.465	932.7	/
2429.380	917.7	/
2453.445	967.6	/

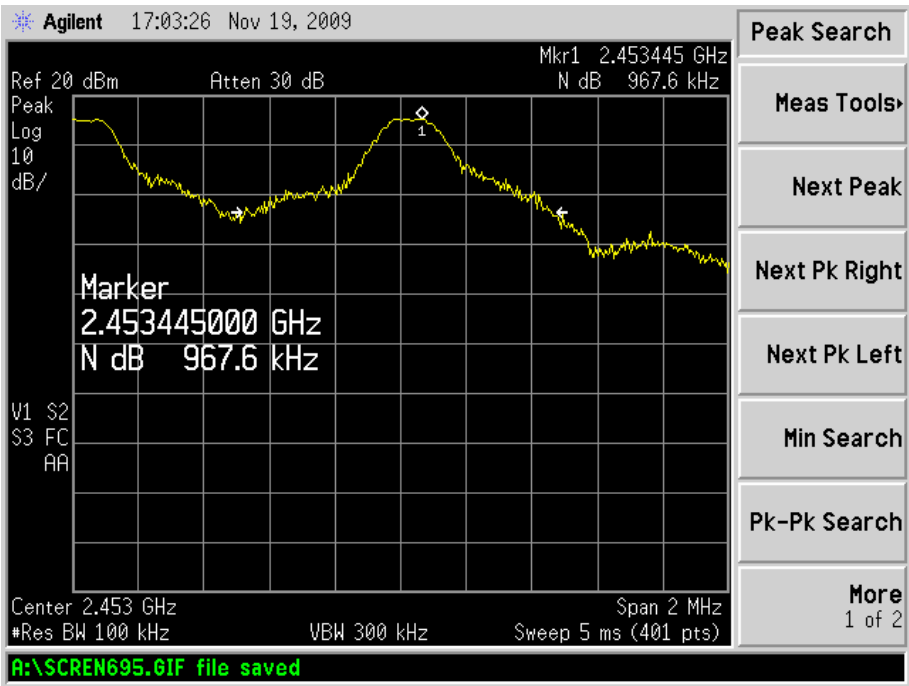
CH Low:



CH Mid:



CH High:



8. POWER OUTPUT

8.1 Standard Applicable

According to 15.247(b)(1). For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

The test method of the Power Output is according to DA 00-705.

8.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSP	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2009-08-12	2010-08-11
Horn Antenna	ROHDE&SCHWARZ	HF906	100013	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/103	2009-08-12	2010-08-11

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

8.3 Test Procedure

The device under test has an integral antenna and the power was measured on a radiated basis.

8.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

8.5 Summary of Test Results/Plots

2406.465 MHz 15.6315 mW EIRP

2429.380 MHz 22.7510 mW EIRP

2453.445 MHz 32.8852 mW EIRP

Note: The Antenna Gain is under considering.

9. FIELD STRENGTH OF SPURIOUS EMISSIONS

9.1 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.

9.2 Standard Applicable

According to §15.247(c), 15.205 15.209(b) & 15.35 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Section 15.209:

30 - 88 MHz 40 dBuV/m @3M

88 -216 MHz 43.5 dBuV/m @3M

216 -960 MHz 46 dBuV/m @3M

Above 960 MHz 54dBuV/m @3M

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.

The test method of the Spurious Emissions is according to ANSI C63.4 2003 and DA 00-705.

9.3 Test Equipment List and Details

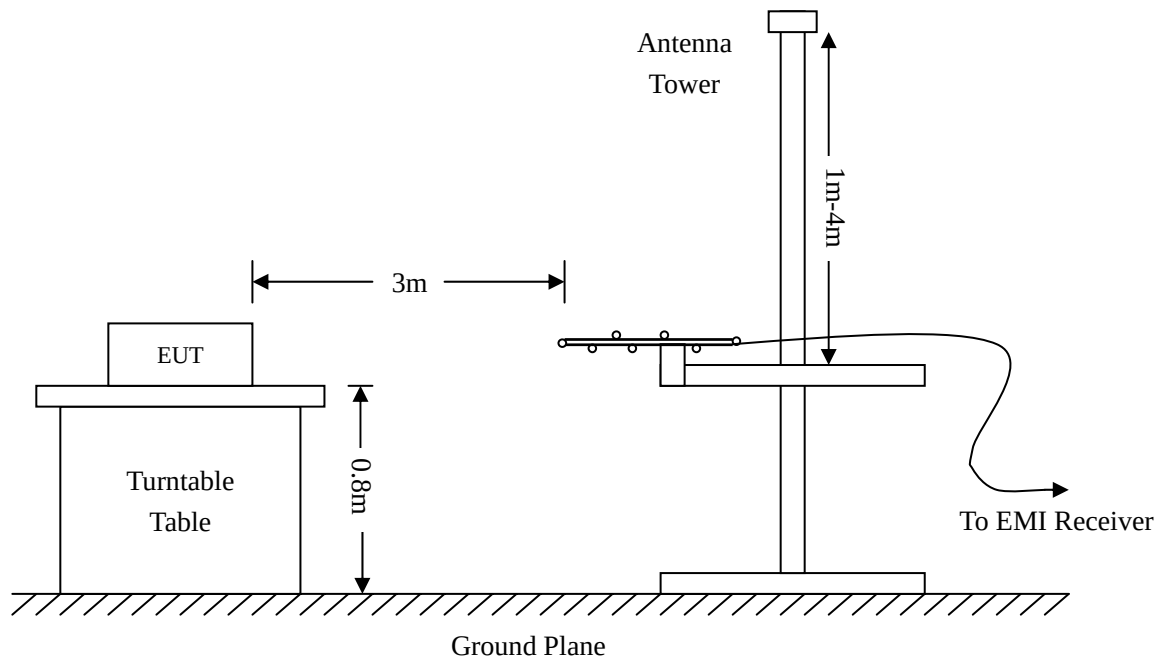
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSP	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2009-08-12	2010-08-11
Horn Antenna	ROHDE&SCHWARZ	HF906	100013	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/103	2009-08-12	2010-08-11

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

9.4 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.



9.5 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:

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

9.6 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

9.7 Summary of Test Results/Plots

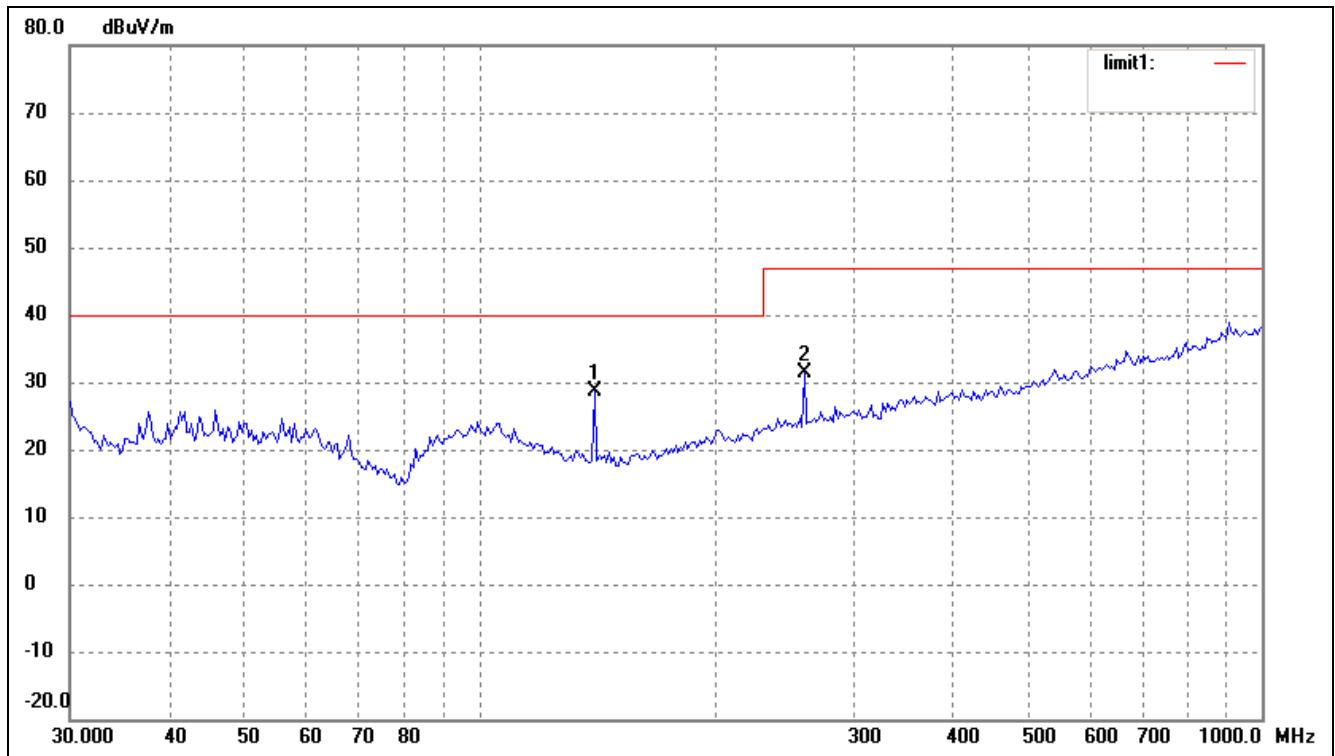
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst margin of:

-1.2 dBμV at 4906.890 MHz in the Horizontal polarization for High Channel, 30 MHz to 25 GHz, 3Meters

From 30 MHz to 1 GHz

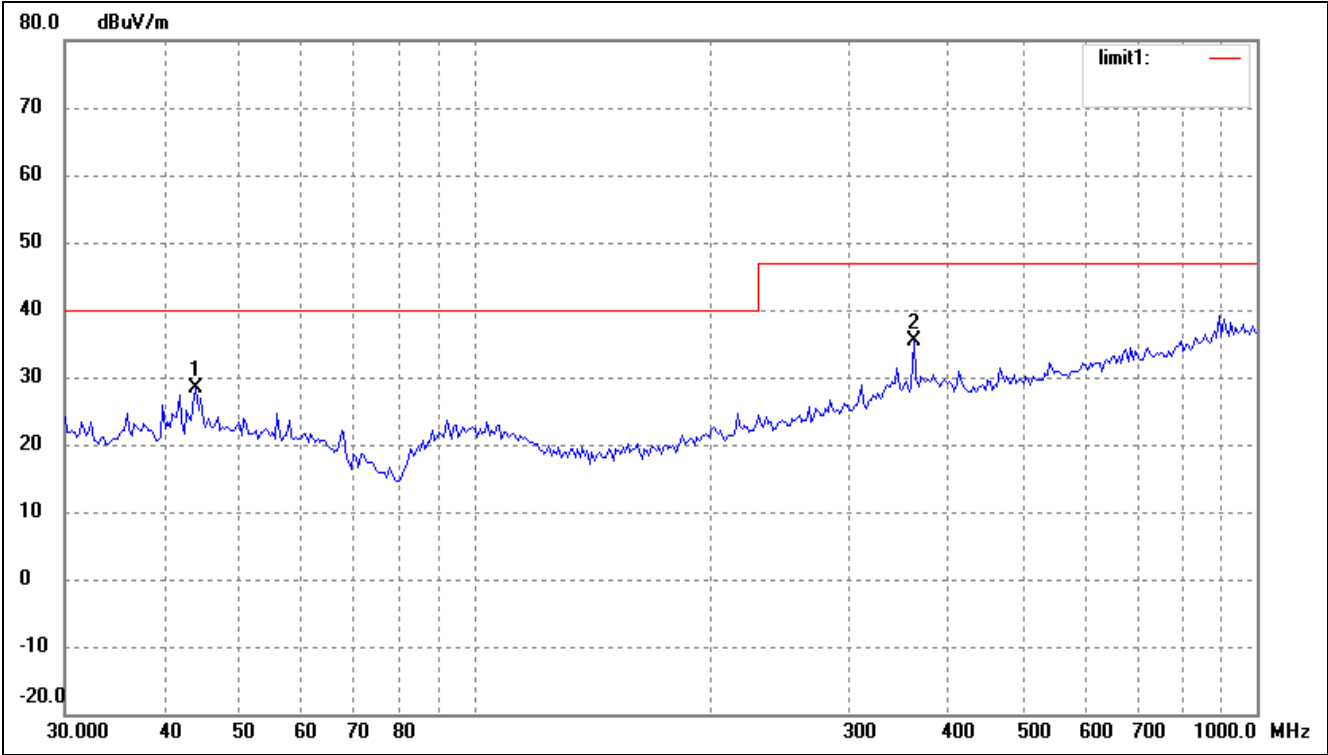
Test Mode: Transmitting

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	140.3421	24.56	3.96	28.52	40.00	-11.48	201	100	peak
2	260.1444	22.39	8.95	31.34	47.00	-15.66	66	100	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	44.1202	20.41	7.98	28.39	40.00	-11.61	321	100	peak
2	364.2595	23.16	12.14	35.30	47.00	-11.70	101	100	peak

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)										
4812.930	AV	45.2	289	H	34.1	5.2	33.0	51.5	54	-2.5
4812.930	AV	46.4	60	V	34.1	5.2	33.0	52.7	54	-1.3
7219.395	AV	38.0	56	H	37.4	6.1	33.5	48.0	54	-6.0
7219.395	AV	40.9	185	V	37.4	6.1	33.5	50.9	54	-3.1
2406.465	AV	92.7	90	H	29.1	3.7	34.0	91.5		(Fund.)
2406.465	AV	95.4	147	V	29.1	3.7	34.0	94.2		(Fund.)
4812.930	PK	56.7	289	H	37.4	6.1	33.5	66.7	74	-7.3
4812.930	PK	61.6	60	V	34.1	5.2	33.0	67.9	74	-6.1
7219.395	PK	56.9	56	H	34.1	5.2	33.0	63.2	74	-10.8
7219.395	PK	56.1	185	V	37.4	6.1	33.5	66.1	74	-7.9
2406.465	PK	107.9	90	H	29.1	3.7	34.0	106.7		(Fund.)
2406.465	PK	110.6	147	V	29.1	3.7	34.0	109.4		(Fund.)
Middle Channel (1G to 25GHz)										
4858.760	AV	43.9	333	H	34.1	5.2	33.0	50.2	54	-3.8
4858.750	AV	45.2	43	V	34.1	5.2	33.0	51.5	54	-2.5
7288.140	AV	35.3	99	H	37.4	6.1	33.5	45.3	54	-8.7
7288.140	AV	37.5	79	V	37.4	6.1	33.5	47.5	54	-6.5
2429.380	AV	93.5	45	H	29.1	3.7	34.0	92.3		(Fund.)
2429.380	AV	96.2	44	V	29.1	3.7	34.0	95.0		(Fund.)
4858.760	PK	55.4	333	H	37.4	6.1	33.5	65.4	74	-8.6
4858.750	PK	60.4	43	V	37.4	6.1	33.5	66.7	74	-7.3
7288.140	PK	54.2	99	H	34.1	5.2	33.0	60.5	74	-13.5
7288.140	PK	52.4	79	V	34.1	5.2	33.0	62.4	74	-11.6
2429.380	PK	108.7	45	H	29.1	3.7	34.0	107.5		(Fund.)
2429.380	PK	111.4	44	V	29.1	3.7	34.0	110.2		(Fund.)

High Channel (1G to 25GHz)										
4906.890	AV	44.9	270	H	37.4	6.1	33.5	51.2	54	-2.8
4906.890	AV	46.5	45	V	37.4	6.1	33.5	53.1	54	-1.2
7360.335	AV	37.4	95	V	34.1	5.2	33.0	47.4	54	-6.6
7360.335	AV	39.6	359	H	34.1	5.2	33.0	49.6	54	-4.4
2453.445	AV	95.9	0	H	29.1	3.7	34.0	94.7		(Fund.)
2453.445	AV	97.8	63	V	29.1	3.7	34.0	96.6		(Fund.)
4906.890	PK	56.4	270	H	34.1	5.2	33.0	66.4	74	-7.6
4906.890	PK	61.7	45	V	34.1	5.2	33.0	68.3	74	-6.0
7360.335	PK	56.3	95	V	37.4	6.1	33.5	62.6	74	-11.4
7360.335	PK	54.8	359	H	37.4	6.1	33.5	64.8	74	-9.2
2453.445	PK	111.1	0	H	29.1	3.7	34.0	109.9		(Fund.)
2453.445	PK	113.0	63	V	29.1	3.7	34.0	111.8		(Fund.)

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.

10. OUT OF BAND EMISSIONS

10.1 Standard Applicable

According to §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

The test method of the Bandedge Emissions is according to ANSI C63.4 2003 and DA 00-705.

10.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSP	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2009-08-12	2010-08-11

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

10.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW, VBW=100KHz, Span=50MHz, Sweep = auto
3. Set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, then mark the higher-level emission for comparing with the FCC rules.

10.4 Environmental Conditions

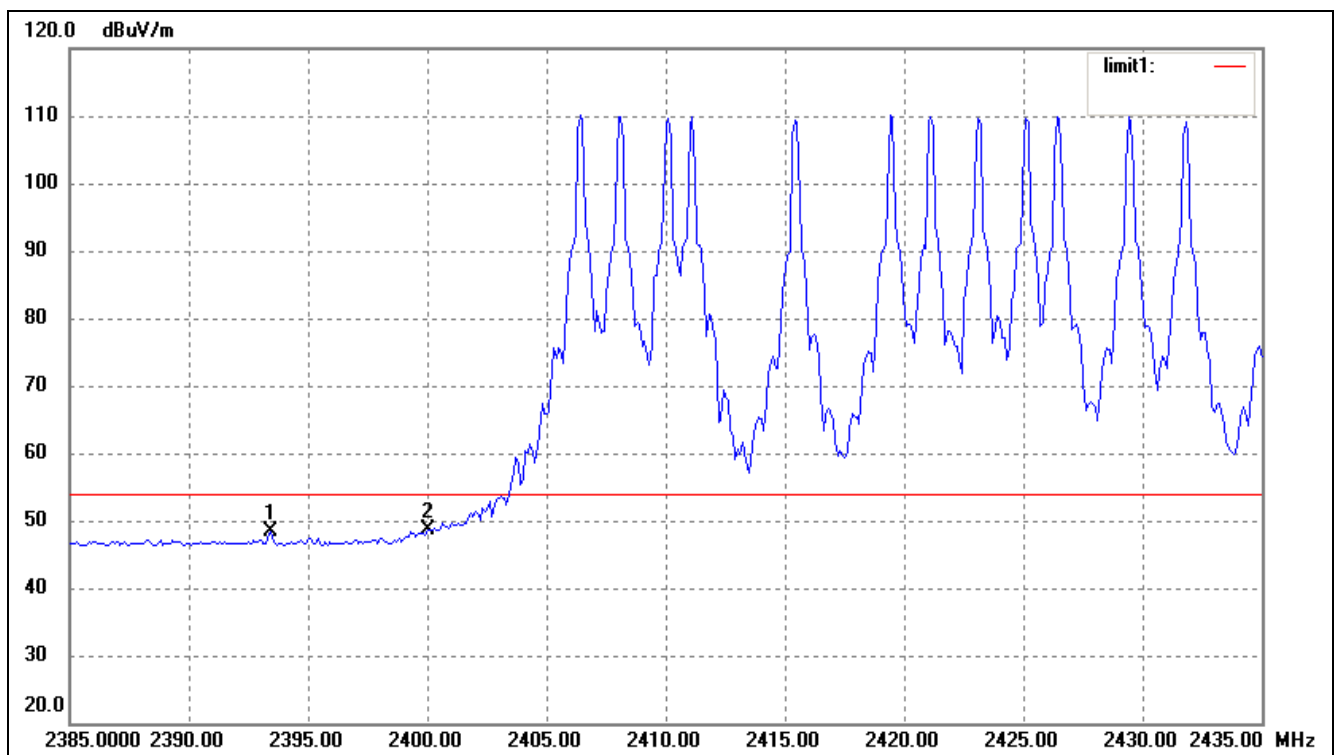
Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

10.5 Summary of Test Results/Plots

Test mode	Frequency MHz	Limit dBuV /dB	Result
Lowest	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
Highest	2483.50	<54dBuv	Pass

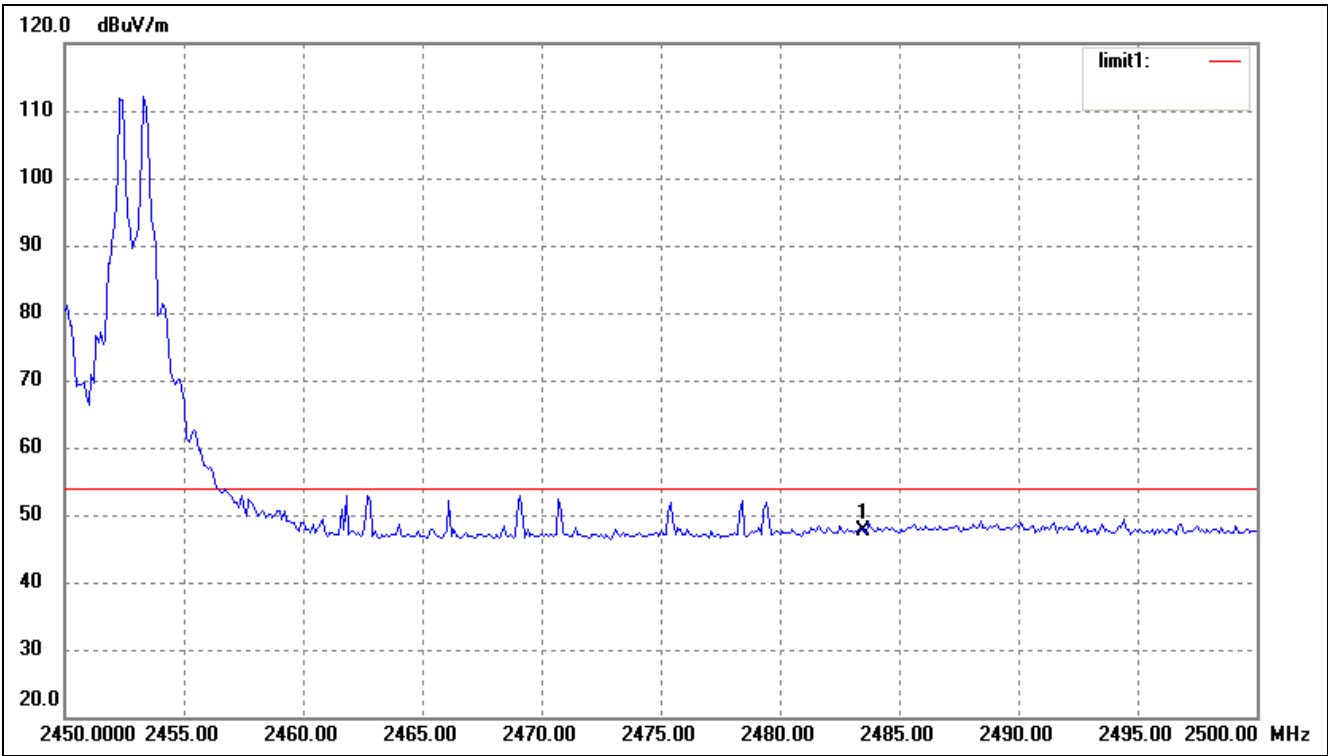
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2393.400	8.56	39.72	48.28	54.00	-5.72	peak
2	2400.000	8.76	39.76	48.52	54.00	-5.48	peak

Highest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	7.52	40.18	47.70	54.00	-6.30	peak

END OF REPORT