

FCC TEST REPORT
for
Shandong Mingwah Aohan Smart Tech Co., Ltd.

UHF RFID Reader and Writer
Model No.:MS-9601H, MS-9801H, MS-9211H, MS-9814H

Prepared for : Shandong Mingwah Aohan Smart Tech Co., Ltd.
Address : 3-1005-1, Yinhe Building, 2008 Xinluo St., High-Tech District,
Jinan, Shandong, China

Prepared By : Anbotek Compliance Laboratory Limited
Address : 1/F, 1 /Building, SEC Industrial Park, No.4 Qianhai Road,
Nanshan District, Shenzhen, 518054, China
Tel: (86) 755-26066544
Fax: (86) 755-26014772

Report Number : 201211812F
Date of Test : Nov. 15 , 2012~Mar. 20 , 2013
Date of Report : Mar. 20, 2013

TABLE OF CONTENT

Description	Page
Test Report	
1. GENERAL INFORMATION	4
1.1. Description of Device (EUT).....	4
1.2. Auxiliary Equipment Used during Test.....	5
1.3. Description of Test Facility	6
1.4. Measurement Uncertainty.....	7
2. ANTENNA REQUIREMENT	8
3. TEST METHODOLOGY	9
3.1. Summary of Test Results.....	9
3.2. Description of Test Channels.....	10
4. CONDUCTED EMISSION TEST.....	11
4.1. Block Diagram of Test Setup	11
4.2. Power Line Conducted Emission Measurement Limits (15.207).....	11
4.3. Configuration of EUT on Measurement	11
4.4. Operating Condition of EUT	11
4.5. Test Procedure	12
4.6. Test equipment	12
4.7. Power Line Conducted Emission Measurement Results	12
5. §15.205, §15.209, §15.247- RADIATED EMISSION	15
5.1 Standard Applicable	15
5.5 EUT Setup	15
5.6 Test Procedure	16
5.7 Test Receiver setup.....	16
5.8 Test Limit	17
5.9 Test date&result.....	17
6. MAXIMUM PEAK OUTPUT POWER TEST	20
7. 20DB OCCUPY BANDWITH	23
8. DWELL TIME	26
9. HOPPING CHANNEL NUMBER	29
10. CHANNEL SEPARATION TEST	31
11. BAND EDGES MEASUREMENT.....	34
12. PHOTOGRAPH.....	36
12.1. Photo of Conducted Emission Measurement.....	36
12.2. Photo of Radiation Emission Test	36

TEST REPORT

Applicant : Shandong Mingwah Aohan Smart Tech Co., Ltd.
Manufacturer : Jinan H-RFID Information Technology Co., Ltd.
EUT : UHF RFID Reader and Writer
Model No. : MS-9601H, MS-9801H, MS-9211H, MS-9814H
Serial No. : N/A
Rating : DC 9V/3A
Trade Mark : N.A.

Measurement Procedure Used:
FCC Part15 Subpart C, Paragraph 15.247: 2010

The device described above is tested by Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Anbotek Compliance Laboratory Limited

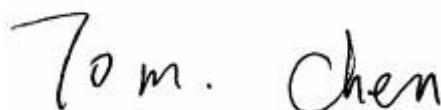
Date of Test : Nov. 15 , 2012~Mar. 20 , 2013



Prepared by : (Tested Engineer / Rock Zeng)



Reviewer : (Project Manager / Andy Chen)



Approved & Authorized Signer : (Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: UHF RFID Reader and Writer
Model Number	: MS-9601H, MS-9801H, MS-9211H, MS-9814H (Note: All the samples are the same except the model number & Colour&Size, so we prepare "MS-9601H" for EMC test only.)
Test Power Supply : DC 9V/3A	
Type of Modulation	ASK
Frequency Band	902.5-927.5 MHz
Channel Spacing	0.5 MHz
Rated Power	0-20.88dBm
Antenna Type	Build-in 7dBi circularly polarized antenna
Applicant	: Shandong Mingwah Aohan Smart Tech Co., Ltd.
Address	: 3-1005-1, Yinhe Building, 2008 Xinluo St., High-Tech District, Jinan, Shandong, China
Manufacturer	: Jinan H-RFID Information Technology Co., Ltd.
Address	: Room 114, 2269 Kaltuo Road, High-Tech District, Jinan, Shandong, China
Date of receiver	: Nov. 15 , 2012
Date of Test	: Nov. 15 , 2012~Mar. 20, 2013

1.2. Auxiliary Equipment Used during Test

NOTEBOOK

Manufacturer: DELL

Network Cable

: Non-Shielded, 1.5m

1.3. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS - LAB Code: L3503

Anbotech Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Anbotech Compliance Laboratory Limited, 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. Registration 752021, August 20, 2010.

IC-Registration No.: 8058A-1

Anbotech Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, August 30, 2010.

Test Location

All Emissions tests were performed at

Anbotech Compliance Laboratory Limited. at 1/F, 1 /Building, SEC Industrial Park, No.4 Qianhai Road, Nanshan District, Shenzhen, 518054, China

1.4. Measurement Uncertainty

Radiation Uncertainty : $U_r = 4.3\text{dB}$

Conduction Uncertainty : $U_c = 3.4\text{dB}$

2. ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.

b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT have a antenna, is a Build-in antenna The gain is 7dBi, Which in accordance to section 15.203, please refer to the internal photos.

According with FCC 15.247(b)(4),the conducted out put power at antenna limits should be reduced 1 dB, the Limit is 29dB.

Result: Compliance

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2003 and FCC Part 15, Paragraph 15.247

3.1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107, 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15, Paragraph 15.205, 15.209	Radiation Emission Test	PASS	Complies
FCC Part 15, Paragraph 15.247(b)	Peak Output Power	PASS	Complies
FCC Part 15, Paragraph 15.247(a)	20dB Bandwidth	PASS	Complies
FCC Part 15, Paragraph 15.247(a)	Dwell time	PASS	Complies
FCC Part 15, Paragraph 15.247(a)	Quantity of Hopping channel Test	PASS	Complies
FCC Part 15, Paragraph 15.247(a)	Channel Separation	PASS	Complies
FCC Part 15, Paragraph 15.247(d)	Bandedge	PASS	Complies

3.2. Description of Test Channels

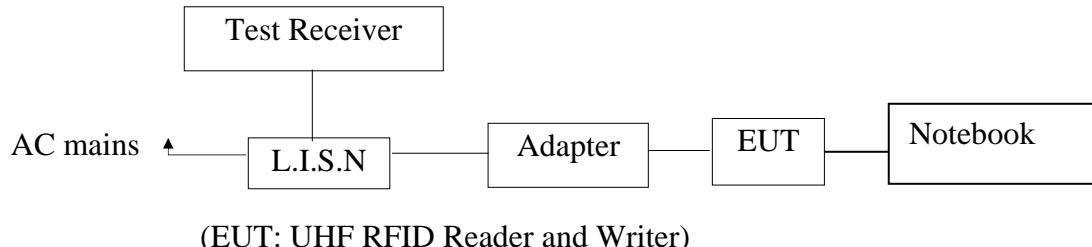
Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	902.5 MHz	21	912.5 MHz	41	922.5 MHz
2	903 MHz	22	913 MHz	42	923 MHz
3	903.5 MHz	23	913.5 MHz	43	923.5 MHz
4	904 MHz	24	914 MHz	44	924 MHz
5	904.5 MHz	25	914.5 MHz	45	924.5 MHz
6	905 MHz	26	915 MHz	46	925 MHz
7	905.5 MHz	27	915.5 MHz	47	925.5 MHz
8	906 MHz	28	916 MHz	48	926 MHz
9	906.5 MHz	29	916.5 MHz	49	926.5 MHz
10	907 MHz	30	917 MHz	50	927 MHz
11	907.5 MHz	31	917.5 MHz	51	927.5 MHz
12	908 MHz	32	918 MHz		
13	908.5 MHz	33	918.5 MHz		
14	909 MHz	34	919 MHz		
15	909.5 MHz	35	919.5 MHz		
16	910 MHz	36	920 MHz		
17	910.5 MHz	37	920.5 MHz		
18	911 MHz	38	921 MHz		
19	911.5 MHz	39	921.5 MHz		
20	912 MHz	40	922 MHz		

Channel	Frequency
The lowest channel	902.5MHz
The middle channel	915MHz
The Highest channel	927.5MHz

4. Conducted Emission Test

4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



4.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

4.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT : UHF RFID Reader and Writer
 Model Number : MS-9601H
 Applicant : Shandong Mingwah Aohan Smart Tech Co., Ltd.

4.4. Operating Condition of EUT

- 4.4.1. Setup the EUT and simulator as shown as Section 4.1.
- 4.4.2. Turn on the power of all equipment.
- 4.4.3. Let the EUT work in test mode (ON) and measure it.

4.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 4.6.

4.6. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Receiver	Rohde & Schwarz	ESCI	100627	May. 12, 2012	1 Year
2.	LISN	SchwarzBeck	NSLK 8126	8126377	May 19, 2012	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2012	1 Year
4.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A

Conduction Uncertainty : $U_c = 3.4\text{dB}$

4.7. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150KHz to 30 MHz is investigated.

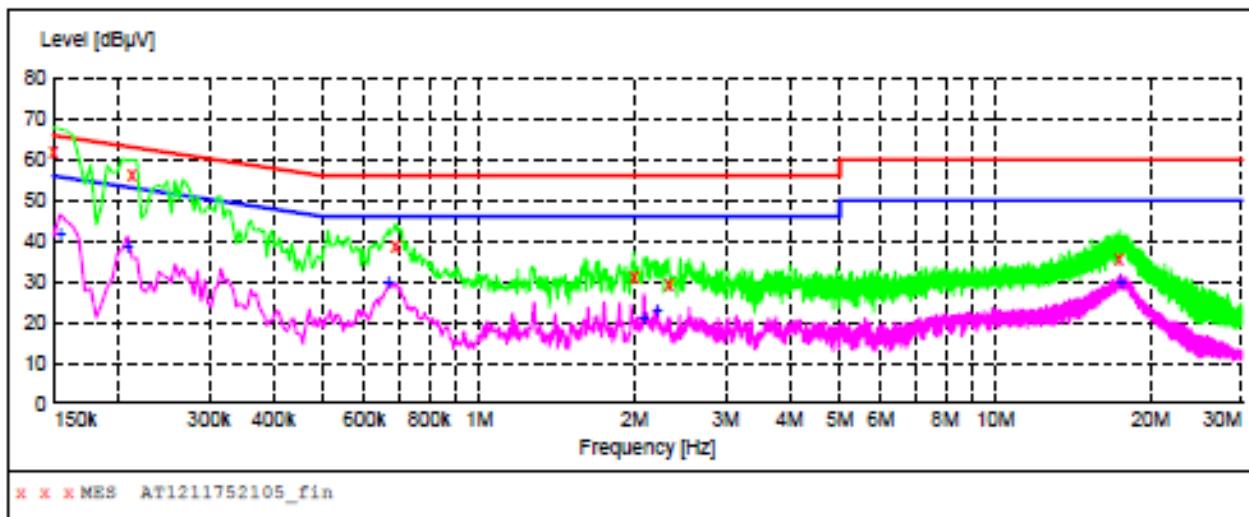
Please refer the following pages.

FCC ID: RVAMS-9601H

CONDUCTED EMISSION TEST DATA

EUT: UHF RFID Reader and Writer M/N:MS-9601H
 Operating Condition: Charging with Adapter
 Test Site: 1# Shielded Room
 Operator: Andy Chen
 Test Specification: DC 9V Via Adapter
 Comment: Live Line
 Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"
 Short Description: 150K-30M Disturbance Voltages

**MEASUREMENT RESULT: "AT1211752105_fin"**

12/6/2012 8:04PM	Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
	MHz	dB μ V	dB	dB μ V	dB			
	0.150000	61.60	20.1	66	4.4	QP	L1	GND
	0.213000	56.00	20.1	63	7.1	QP	L1	GND
	0.690000	38.60	20.1	56	17.4	QP	L1	GND
	1.994500	31.30	20.3	56	24.7	QP	L1	GND
	2.332000	29.00	20.3	56	27.0	QP	L1	GND
	17.389000	35.50	20.8	60	24.5	QP	L1	GND

MEASUREMENT RESULT: "AT1211752105_fin2"

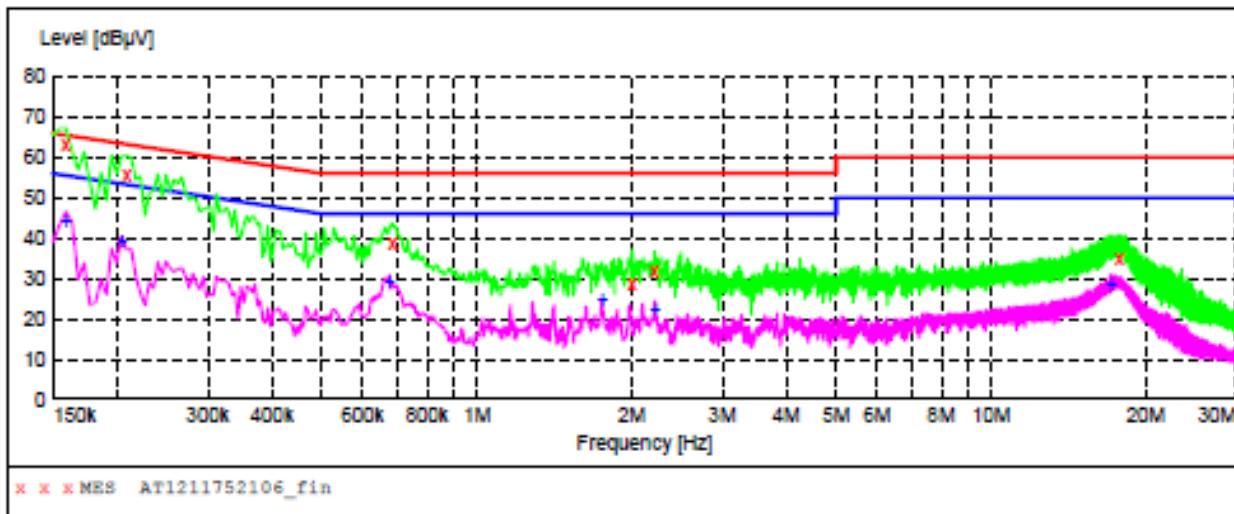
12/6/2012 8:04PM	Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
	MHz	dB μ V	dB	dB μ V	dB			
	0.154500	42.00	20.1	56	13.8	AV	L1	GND
	0.208500	38.90	20.1	53	14.4	AV	L1	GND
	0.667500	29.90	20.1	46	16.1	AV	L1	GND
	2.084500	21.30	20.3	46	24.7	AV	L1	GND
	2.215000	22.80	20.3	46	23.2	AV	L1	GND
	17.483500	29.70	20.8	50	20.3	AV	L1	GND

FCC ID: RVAMS-9601H

CONDUCTED EMISSION TEST DATA

EUT: UHF RFID Reader and Writer M/N:MS-9601H
 Operating Condition: Charging with Adapter
 Test Site: 1# Shielded Room
 Operator: Andy Chen
 Test Specification: DC 9V Via Adapter
 Comment: Neutral Line
 Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"
 Short Description: 150K-30M Disturbance Voltages

**MEASUREMENT RESULT: "AT1211752106_fin"**

12/6/2012 8:06PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.159000	63.30	20.1	66	2.7	QP	N	GND
0.208500	55.90	20.1	63	7.4	QP	N	GND
0.685500	38.60	20.1	56	17.4	QP	N	GND
2.003500	28.90	20.3	56	27.1	QP	N	GND
2.215000	31.80	20.3	56	24.2	QP	N	GND
17.762500	34.70	20.8	60	25.3	QP	N	GND

MEASUREMENT RESULT: "AT1211752106_fin2"

12/6/2012 8:06PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.159000	44.30	20.1	56	11.2	AV	N	GND
0.204000	39.60	20.1	53	13.8	AV	N	GND
0.676500	29.30	20.1	46	16.7	AV	N	GND
1.751500	24.70	20.3	46	21.3	AV	N	GND
2.219500	22.60	20.3	46	23.4	AV	N	GND
17.060500	28.40	20.7	50	21.6	AV	N	GND

5. §15.205, §15.209, §15.247- RADIATED EMISSION

5.1 Standard Applicable

Fcc Part 15C Section 15.205&15.209&15.247(d)

5.2 Test Method

ANSI C63.4: 2003

5.3 Test Frequency

30MHz~25GHz

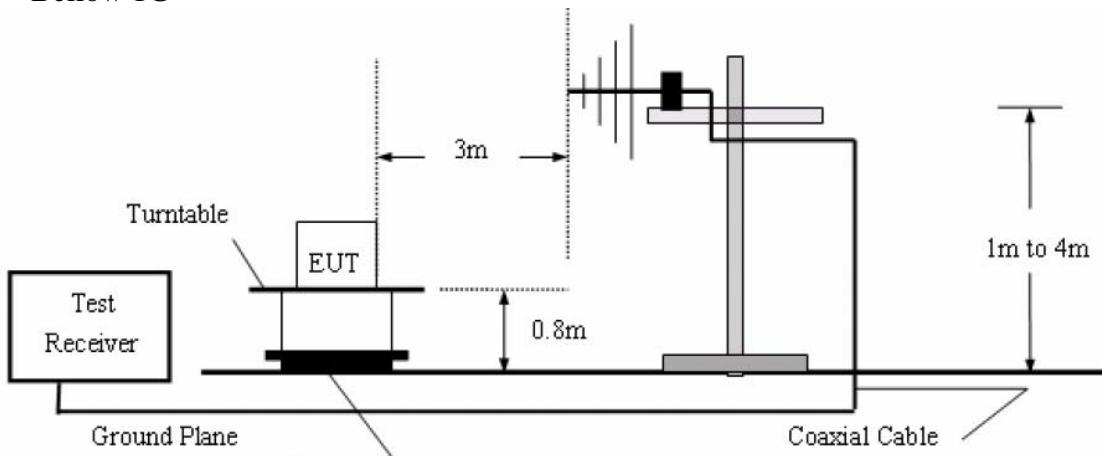
5.4 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 12, 2012	1 Year
2.	Trilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 17, 2012	1 Year
3.	Pre-amplifier	Compliance Direction	PAP-0203	22008	May 19, 2012	1 Year
4.	Horn Antenna	Electro-Metrics	EM-6961	103314	May 19, 2012	1 Year
5.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 07, 2012	1 Year
6.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

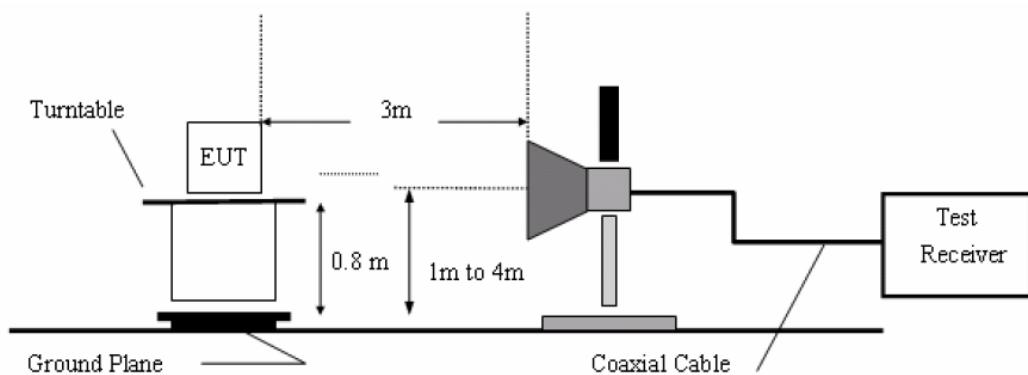
Radiation Uncertainty : Ur = 4.3dB

5.5 EUT Setup

Bellow 1G



Above 1G



5.6 Test Procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

5.7 Test Receiver setup

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

5.8 Test Limit

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

5.9 Test data&result

30M-1G

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
96.10	22.01	12.90	2.00	36.91	43.50	-6.59	Horizontal
120.28	23.15	10.38	2.17	35.70	43.50	-7.80	Horizontal
199.99	27.32	10.57	2.87	40.76	43.50	-2.74	Horizontal
225.31	30.40	11.41	2.84	44.65	46.00	-1.35	Horizontal
275.16	26.71	12.55	2.87	42.13	46.00	-3.87	Horizontal
63.54	23.81	11.24	1.38	36.43	40.00	-3.57	Vertical
120.28	19.87	10.38	2.17	32.42	43.50	-11.08	Vertical
150.01	23.05	8.26	2.52	33.83	43.50	-9.67	Vertical
199.99	21.23	10.57	2.87	34.67	43.50	-8.83	Vertical
225.31	29.61	11.41	2.84	43.86	46.00	-2.14	Vertical

Above 1G low Channel Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1805.00	35.00	31.78	5.32	24.09	48.29	74.00	-25.71	Vertical
2707.50	32.99	36.15	6.87	26.38	50.09	74.00	-23.91	Vertical
3610.00	30.27	37.95	8.94	25.40	52.40	74.00	-21.60	Vertical
4512.50	*					74.00		Vertical
5415.00	*					74.00		Vertical
1805.00	36.88	31.78	5.32	24.09	49.89	74.00	-24.11	Horizontal
2707.50	33.77	36.15	6.87	26.38	50.41	74.00	-23.59	Horizontal
3610.00	32.12	37.95	8.94	25.40	53.61	74.00	-20.39	Horizontal
4512.50	*					74.00		Horizontal
5415.00	*					74.00		Horizontal

Above 1G low Channel Average

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1805.00	24.23	31.78	5.32	24.09	37.52	54.00	-16.48	Vertical
2707.50	19.65	36.15	6.87	26.38	36.75	54.00	-17.25	Vertical
3610.00	18.00	37.95	8.94	25.40	40.13	54.00	-13.87	Vertical
4512.50	*					54.00		Vertical
5415.00	*					54.00		Vertical
1805.00	24.03	31.78	5.32	24.09	37.04	54.00	-16.96	Horizontal
2707.50	20.45	36.15	6.87	26.38	37.09	54.00	-16.91	Horizontal
3610.00	16.32	37.95	8.94	25.40	37.81	54.00	-16.19	Horizontal
4512.50	*					54.00		Horizontal
5415.00	*					54.00		Horizontal

Above 1G Middle Channel Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1830.00	35.94	31.85	5.40	24.01	49.46	74.00	-24.54	Vertical
2745.00	34.10	36.37	6.91	26.62	51.22	74.00	-22.78	Vertical
3660.00	30.69	38.35	9.01	25.29	53.40	74.00	-20.60	Vertical
4575.00	*					74.00		Vertical
5490.00	*					74.00		Vertical
1830.00	37.89	31.85	5.40	24.01	51.13	74.00	-22.87	Horizontal
2745.00	32.90	36.37	6.91	26.62	49.56	74.00	-24.44	Horizontal
3660.00	30.95	38.35	9.01	25.29	53.02	74.00	-20.98	Horizontal
4575.00	*					74.00		Horizontal
5490.00	*					74.00		Horizontal

Above 1G Middle Channel Average

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1830.00	25.37	31.85	5.40	24.01	38.89	54.00	-15.11	Vertical
2745.00	20.86	36.37	6.91	26.62	37.98	54.00	-16.02	Vertical
3660.00	16.99	38.35	9.01	25.29	39.70	54.00	-14.30	Vertical
4575.00	*					54.00		Vertical
5490.00	*					54.00		Vertical
1830.00	22.93	31.85	5.40	24.01	36.17	54.00	-17.83	Horizontal
2745.00	20.06	36.37	6.91	26.62	36.72	54.00	-17.28	Horizontal
3660.00	16.63	38.35	9.01	25.29	38.70	54.00	-15.30	Horizontal
4575.00	*					54.00		Horizontal
5490.00	*					54.00		Horizontal

Above 1G High Channel Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1855.00	35.64	31.93	5.47	23.93	49.39	74.00	-24.61	Vertical
2782.50	33.18	36.59	6.95	26.95	50.23	74.00	-23.77	Vertical
3710.00	31.07	38.81	9.07	25.22	54.37	74.00	-19.63	Vertical
4637.50	*					74.00		Vertical
5565.00	*					74.00		Vertical
1855.00	38.03	31.93	5.47	23.93	51.50	74.00	-22.50	Horizontal
2782.50	34.11	36.59	6.95	26.95	50.70	74.00	-23.30	Horizontal
3710.00	30.52	38.81	9.07	25.22	53.18	74.00	-20.82	Horizontal
4637.50	*					74.00		Horizontal
5565.00	*					74.00		Horizontal

Above 1G High Channel Average

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1855.00	23.45	31.93	5.47	23.93	37.20	54.00	-16.80	Vertical
2782.50	20.92	36.59	6.95	26.95	37.97	54.00	-16.03	Vertical
3710.00	15.69	38.81	9.07	25.22	38.99	54.00	-15.01	Vertical
4637.50	*					54.00		Vertical
5565.00	*					54.00		Vertical
1855.00	22.68	31.93	5.47	23.93	36.15	54.00	-17.85	Horizontal
2782.50	19.46	36.59	6.95	26.95	36.05	54.00	-17.95	Horizontal
3710.00	15.99	38.81	9.07	25.22	38.65	54.00	-15.35	Horizontal
4637.50	*					54.00		Horizontal
5565.00	*					54.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. "", means this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

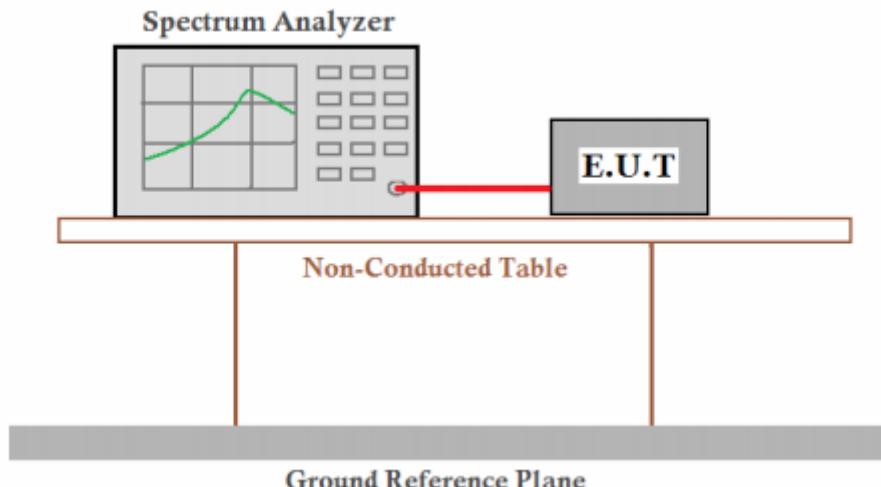
6. MAXIMUM PEAK OUTPUT POWER TEST

a. Test requirement

b. FCC 15C Part 15C Section 15.247(b)(2) ANSI C63.4: 2003

(2) For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

c. Configuration of Measurement



d. Test Limit

30 dBm

e. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 25, 2012	1 Year

f. Test Results

Pass

g. Test Data

Channel	Frequency (MHz)	Maximum transmit power		Limit (dBm)	Result
		(dBm)	(dBm)		
Low	902.5	19.73		29	Pass
Mid	915.0	20.52			Pass
High	927.5	20.88			Pass

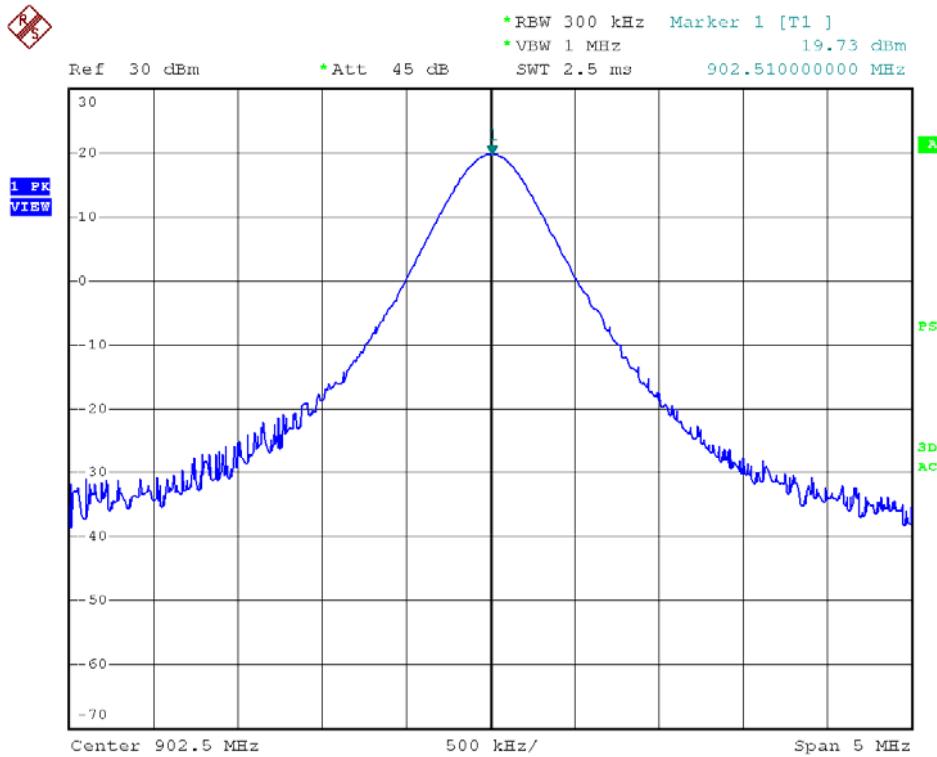
Note: the data was tested in conducted mode.

The antenna gain is 7dBi, so the limit should be reduce 1 dBi, So the Limit should be 29dBm.

h. Test Plot

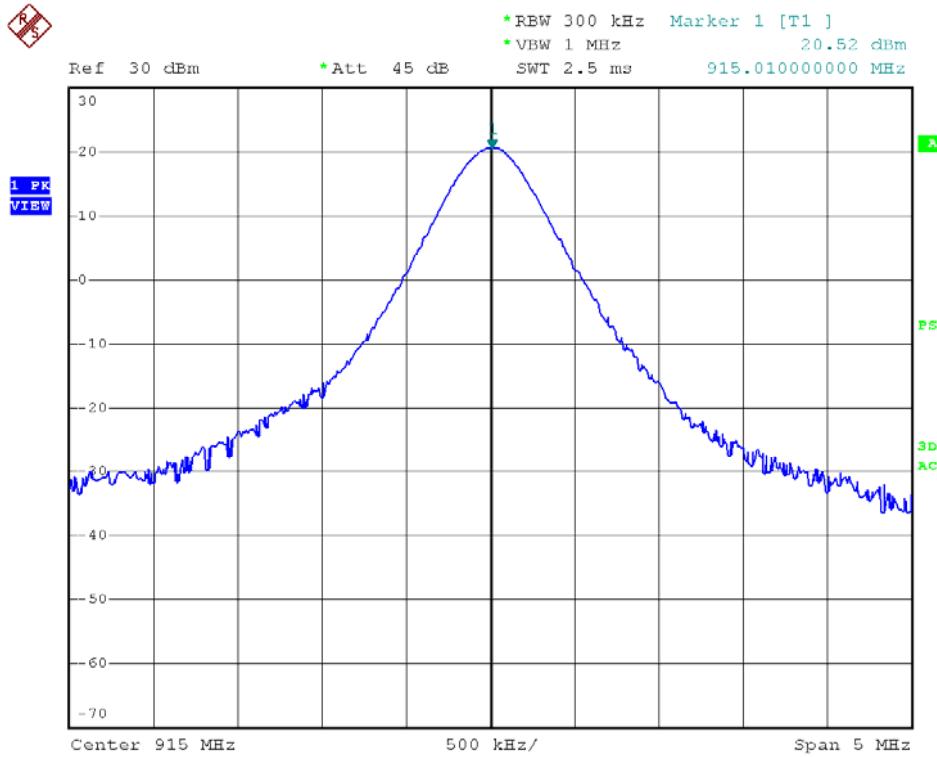
FCC ID: RVAMS-9601H

Test Mode: Low Channel



Date: 20.MAR.2013 09:46:10

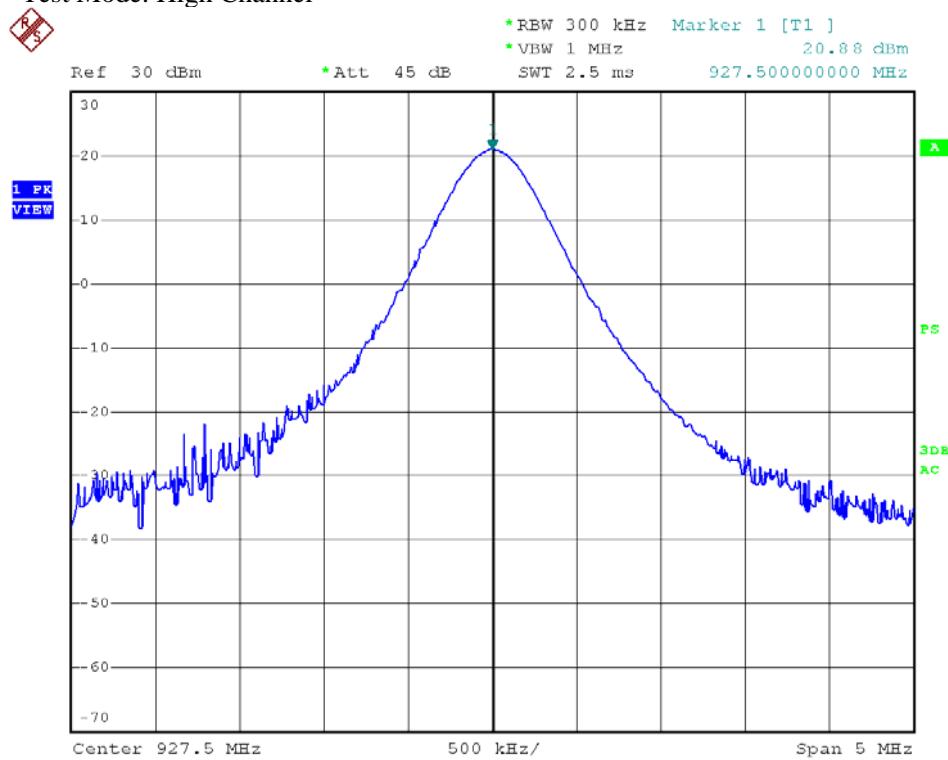
Test Mode: Mid Channel



Date: 20.MAR.2013 09:47:27

FCC ID: RVAMS-9601H

Test Mode: High Channel



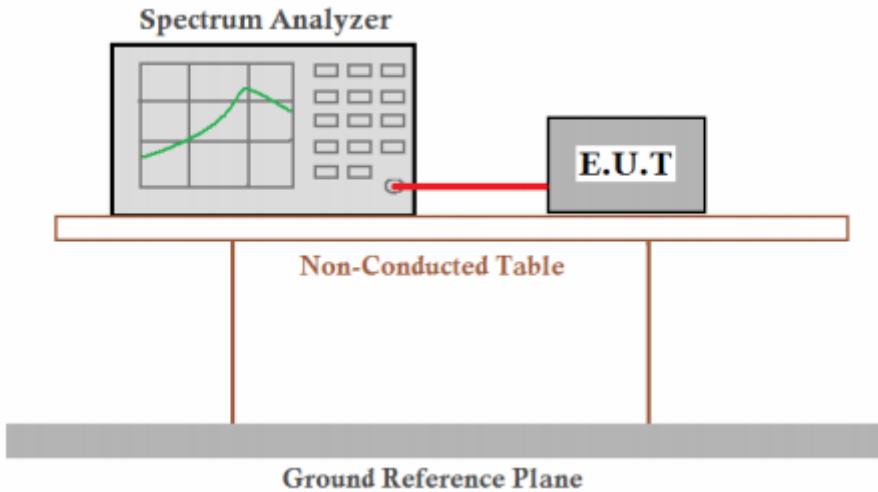
Date: 20.MAR.2013 09:52:59

7. 20DB OCCUPY BANDWITH

a. Test requirement

FCC 15C Part 15C Section 15.247(a)(1)

b. Configuration of Measurement



c. Test Limit

N/A

i. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 25, 2012	1 Year

d. Test Results

Pass

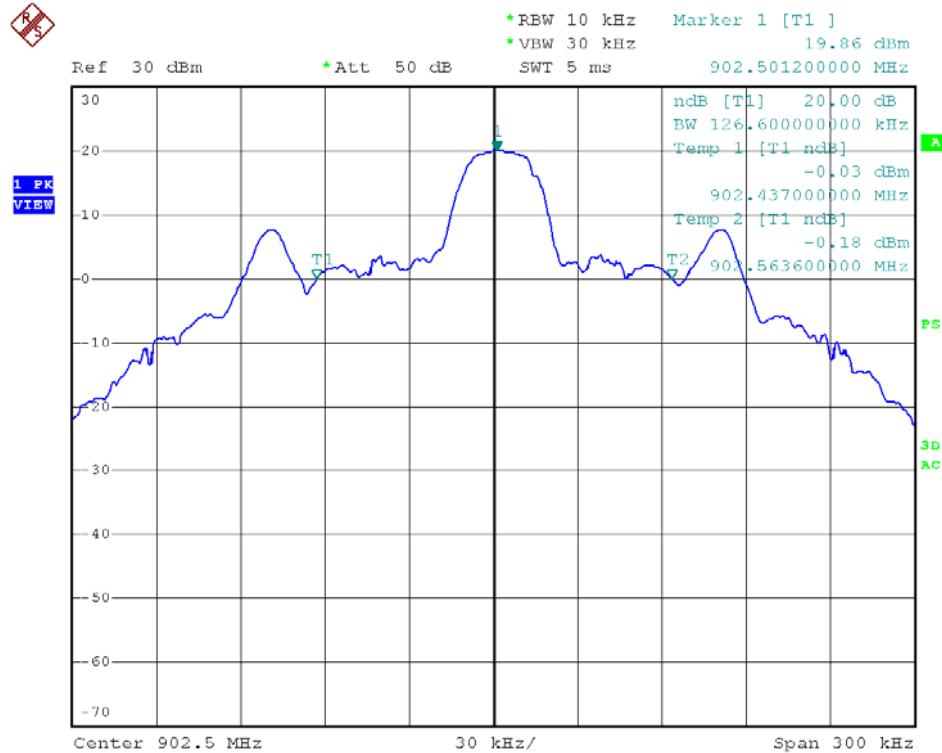
e. Test Data

Channel	Frequency (MHz)	20dB Bandwith
		(kHZ)
Low	902.5	126.6
Mid	915.0	124.8
High	927.5	123.6

j. Test Plot

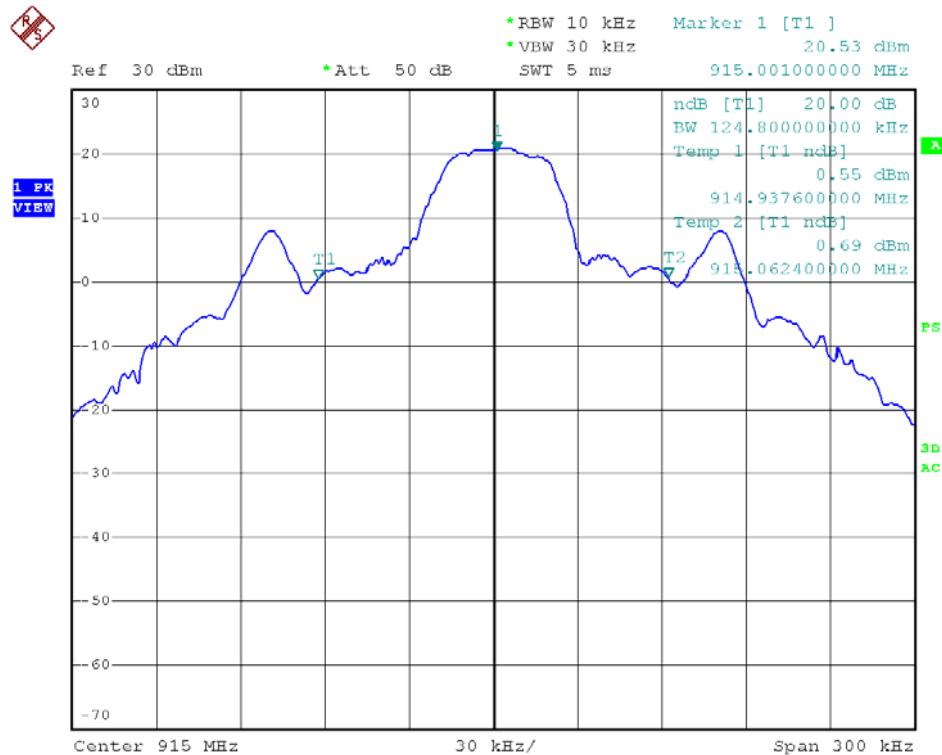
FCC ID: RVAMS-9601H

Low Channel



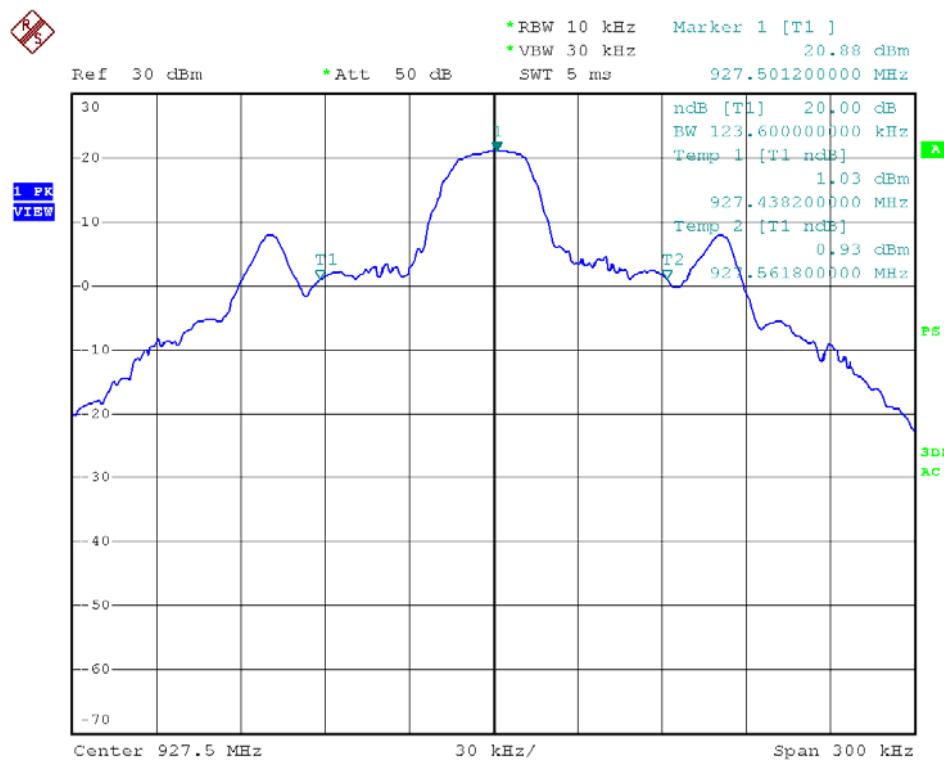
Date: 19.MAR.2013 13:57:35

Middle Channel



Date: 19.MAR.2013 13:53:24

High Channel



Date: 19.MAR.2013 13:55:15

8.DWELL TIME

a. Test Requirements

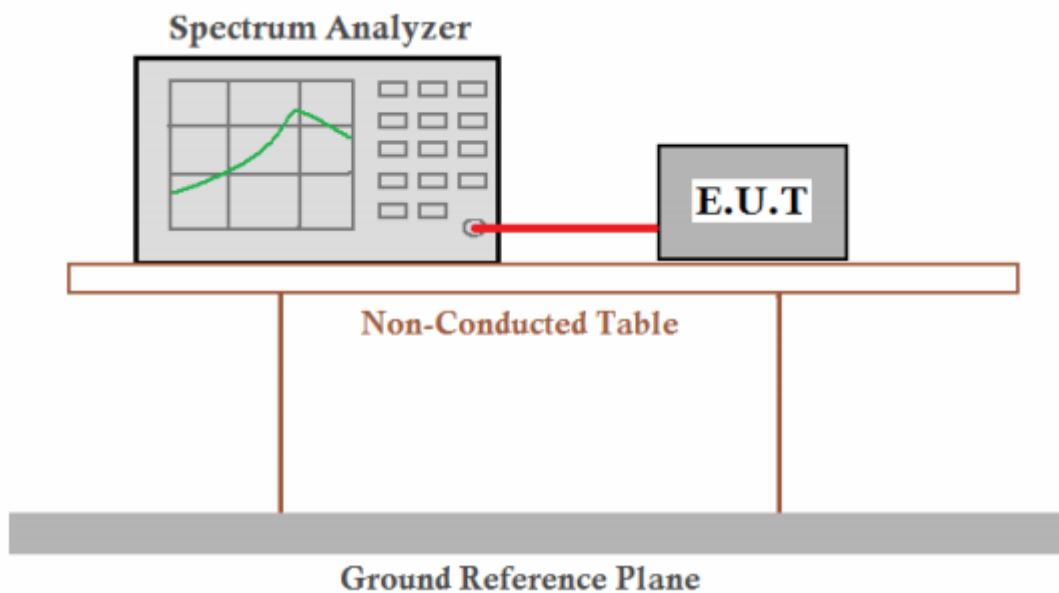
FCC 15C Section 15.247 (a)(1)(i)

For frequency hopping systems operating in the 902-928MHz band, if the 20 dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

b. Method

ANSI C63.4: 2003

c. Test Setup

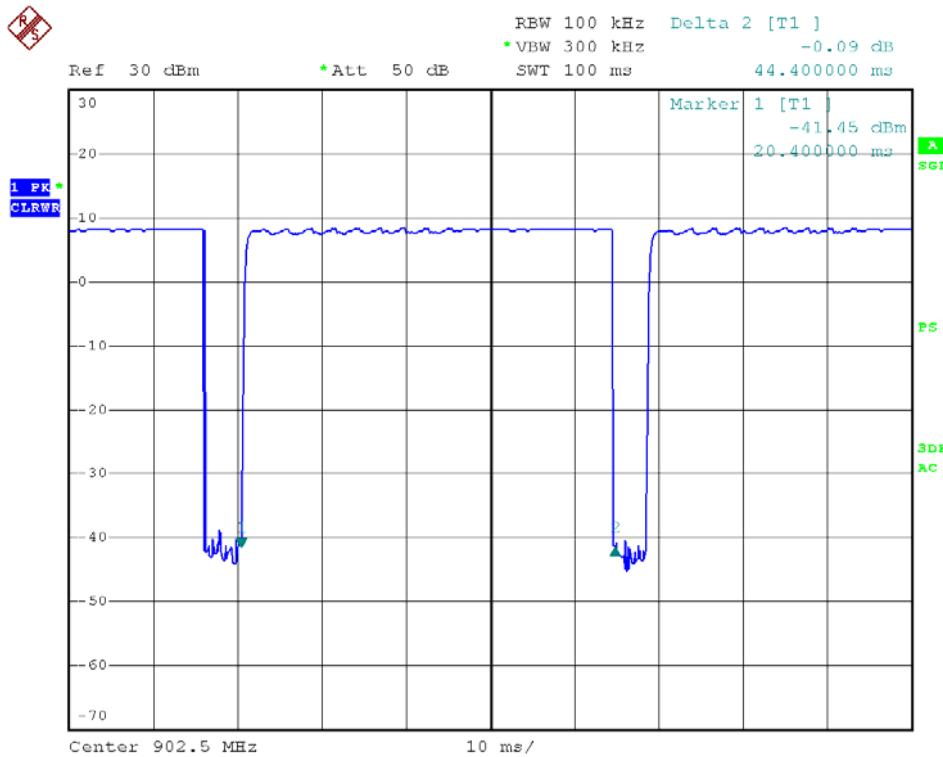


d. Test Result

Passed see the following plots

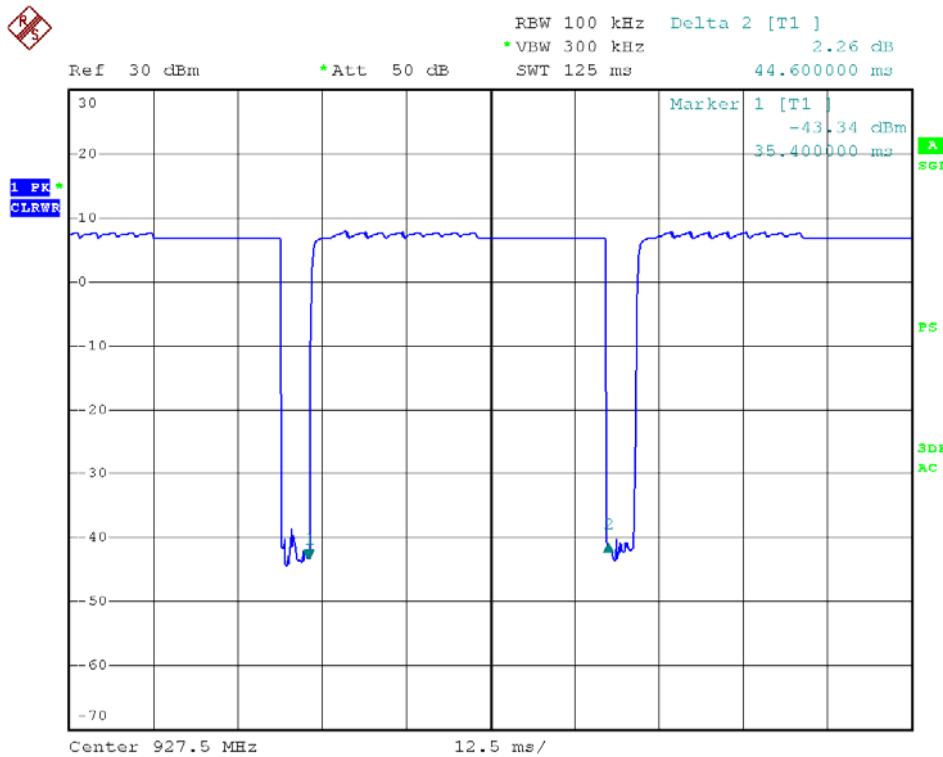
FCC ID: RVAMS-9601H

Low channel



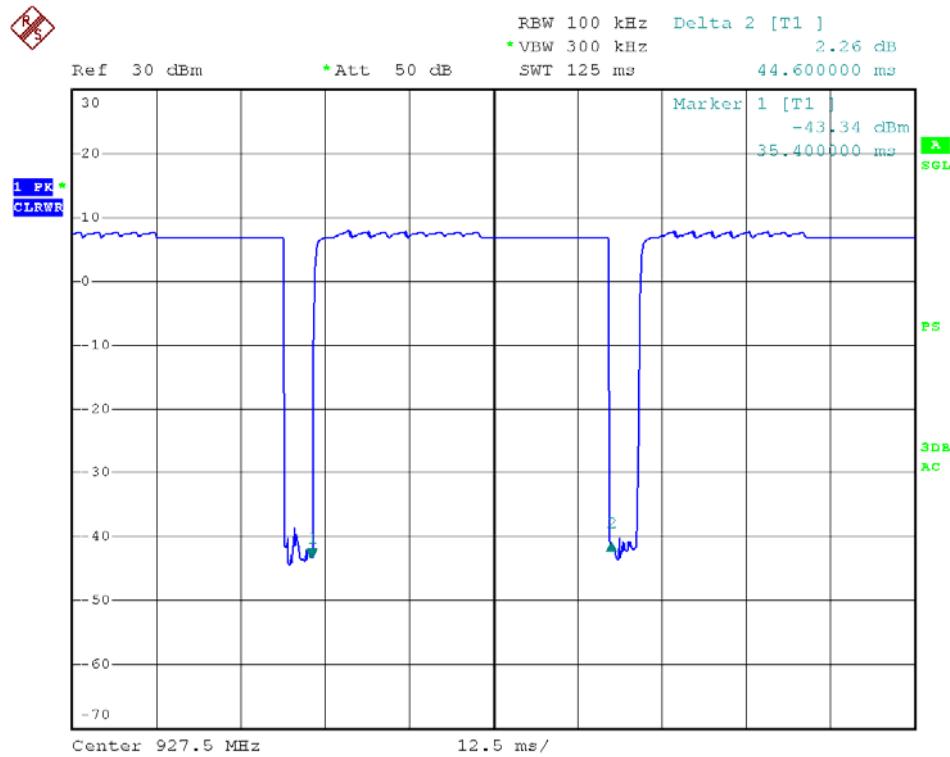
Date: 19.MAR.2013 14:00:15

Middle Channel



Date: 19.MAR.2013 14:06:08

High Channel



Date: 19.MAR.2013 14:06:08

9.HOPPING CHANNEL NUMBER

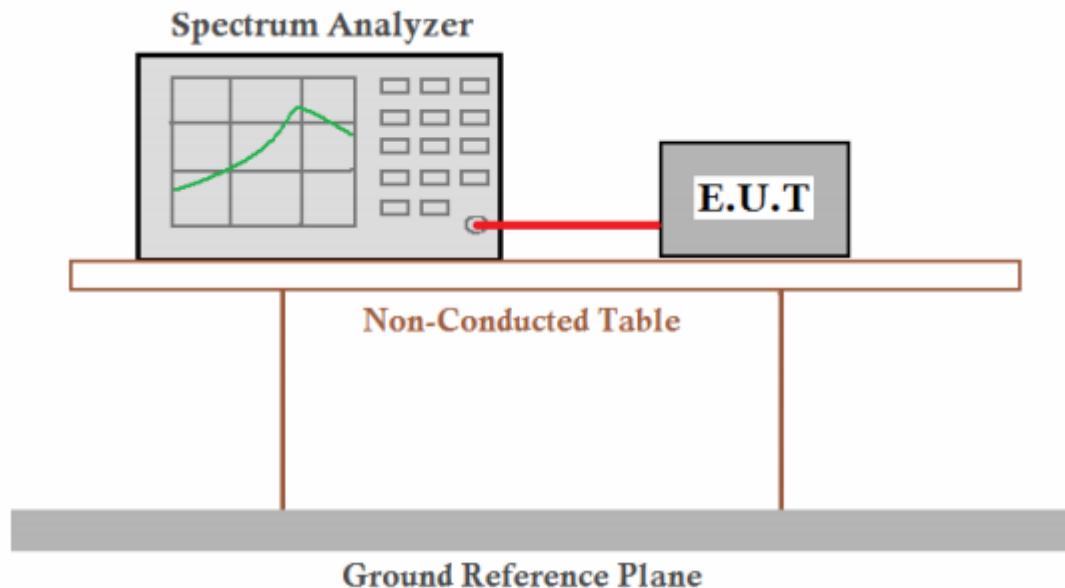
a. Test Requirements

FCC 15C Section 15.247 (a)(1)(i)

b. Method

ANSI C63.4: 2003

c. Test Setup



e. Test Limit

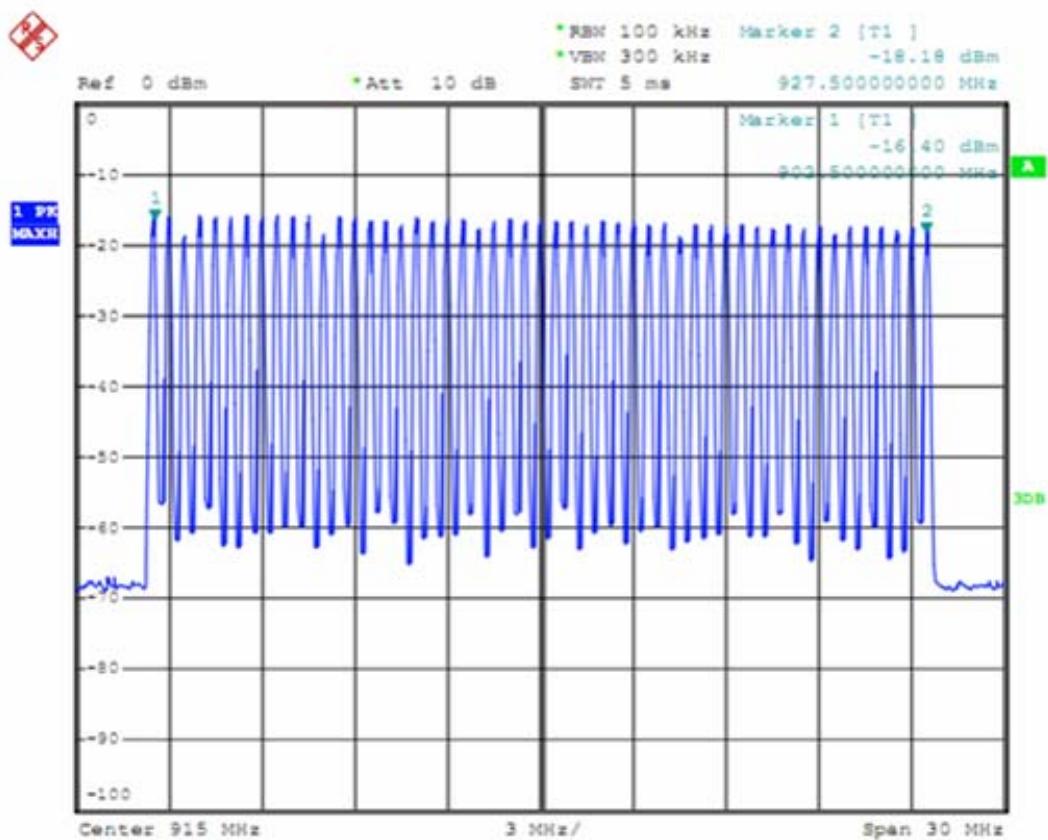
At least 50 Channels

f. Test result

Hopping channel numbers	Limit	Result
51	50	Pass

The test plot see the following plot:

FCC ID: RVAMS-9601H



10. CHANNEL SEPARATION TEST

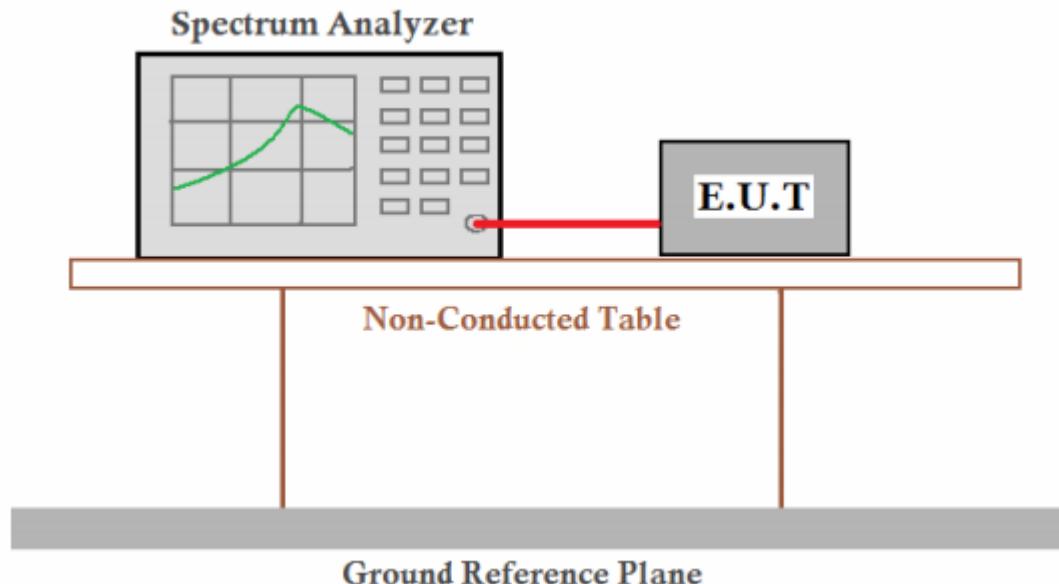
a. Test Requirements

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25 kHz, or the 20dB Bandwidth of the hopping channel, whichever is greater.

b. Method

ANSI C63.4: 2003

c. Test Setup



d. Test Procedure

Set the EUT in the operating mode, radio spectrum bandwidth was set at 10kHz, maxhold the channel.

Set the adjacent channel of the EUT maxhold another trace.

Measure the channel separation

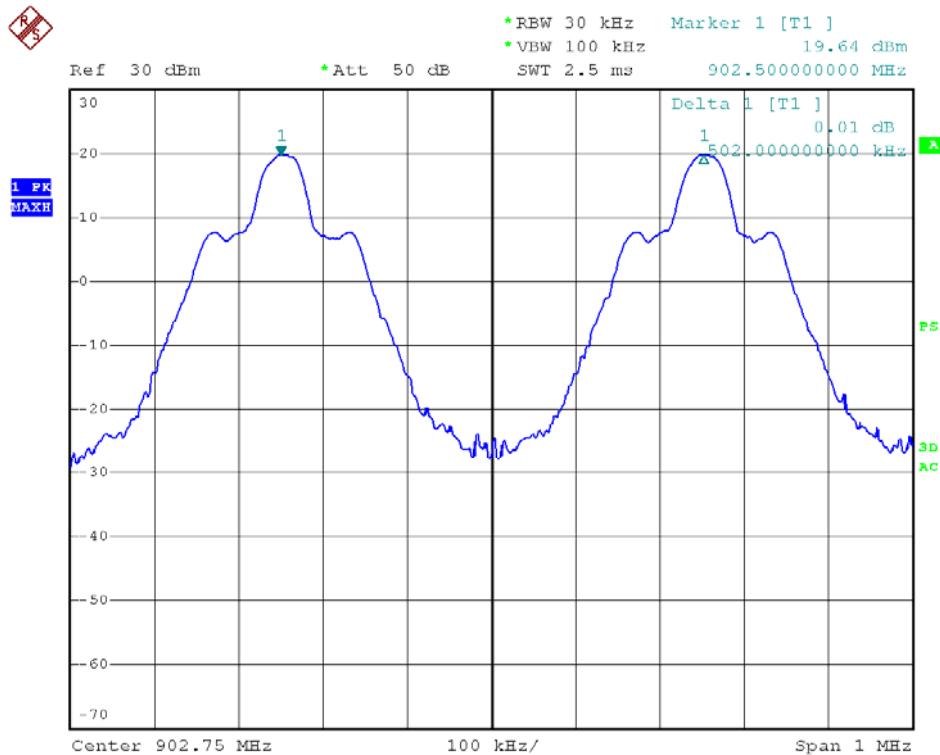
e. Test result

Channel	Channel Frequency (MHz)	Channel Separation (KHz)	Limit (KHz)	Result
Low	902.75	502	126.6	PASS
Adjacent	903.0		124.8	
Middle	915.25		123.6	
Adjacent	915.5			
High	927.25			
Adjacent	927.0			

The test plot see the following plot:

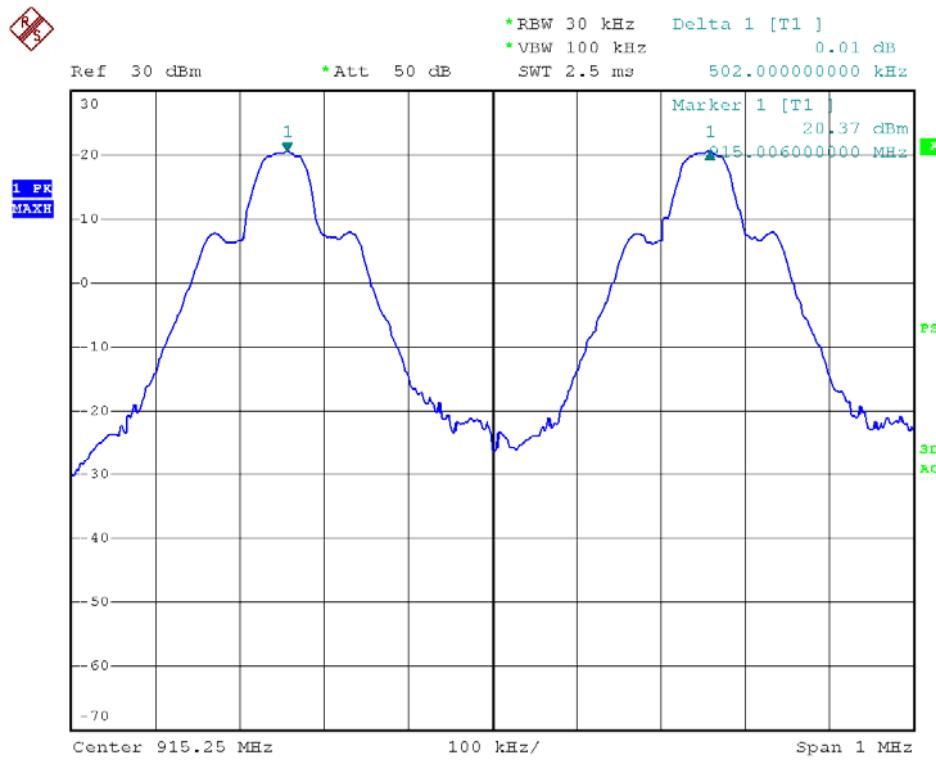
FCC ID: RVAMS-9601H

Low channel



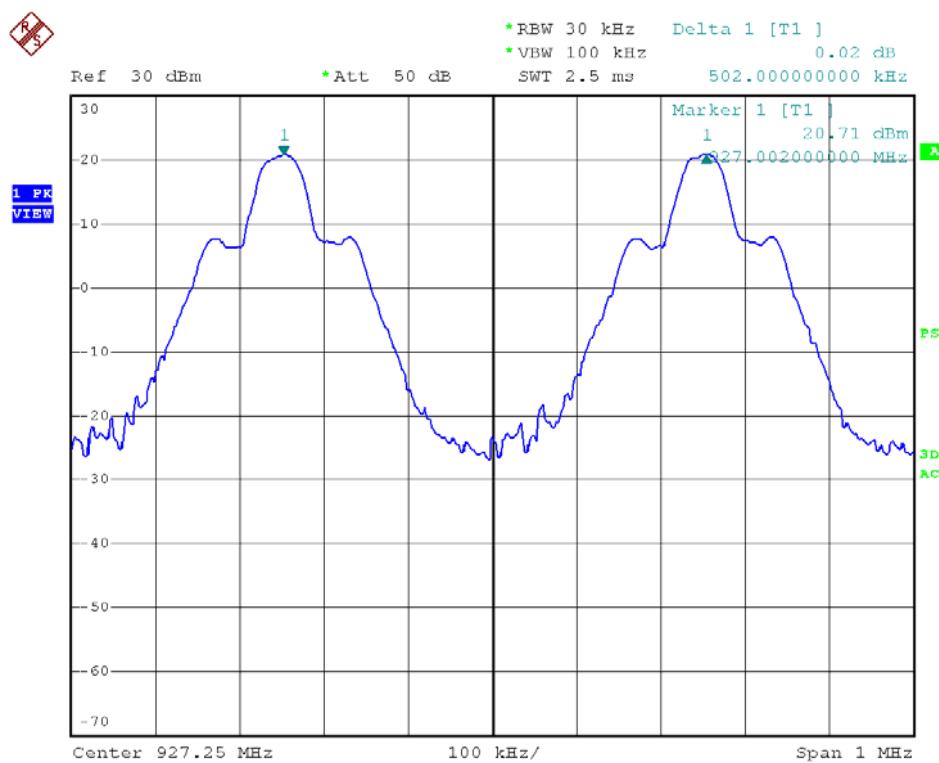
Date: 19.MAR.2013 14:16:50

Middle Channel



Date: 19.MAR.2013 14:15:29

High Channel



Date: 19.MAR.2013 14:12:58

11. BAND EDGES MEASUREMENT

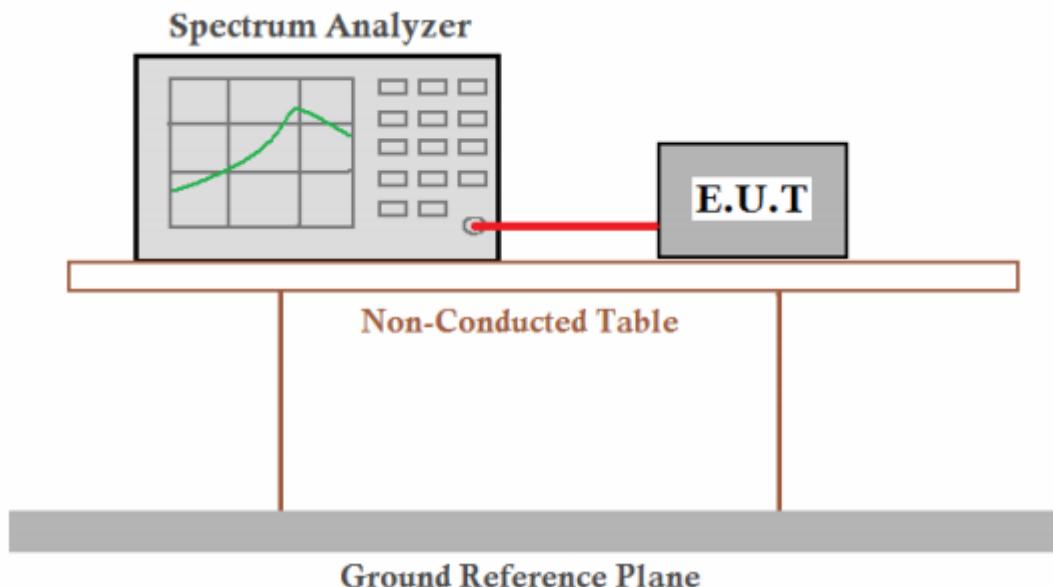
a. Limit

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

b. Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in Operating mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

c. Test Setup



d. Test Results

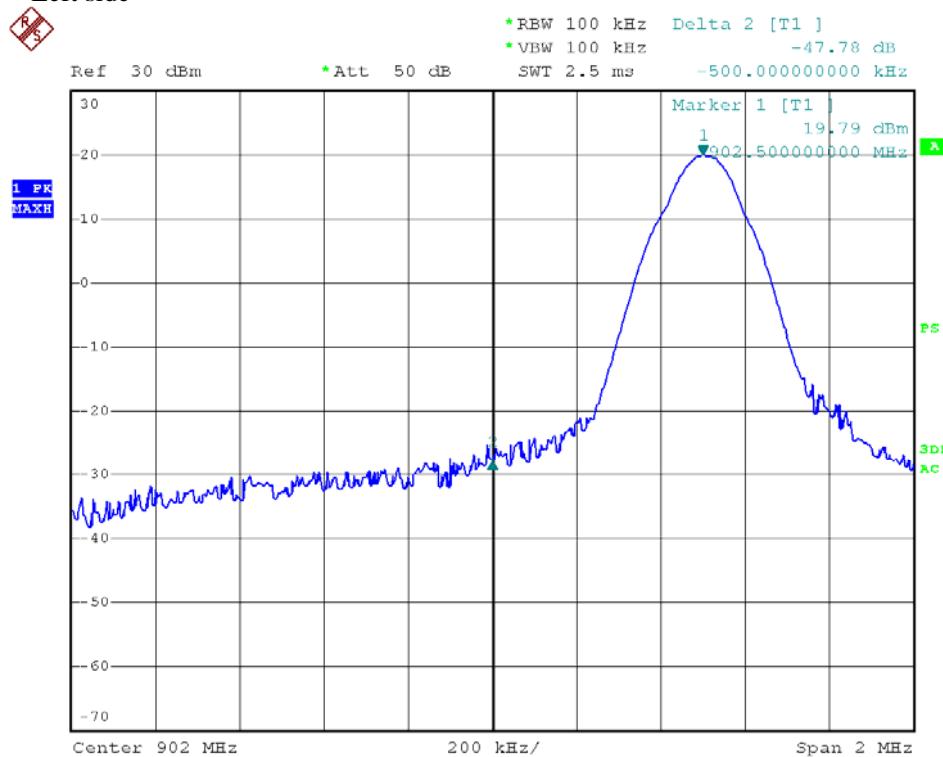
Pass

e. Test Plots

Frequency (MHz)	Delta Peak To Band Emission (dBc)	≥Limit (dBc)
902	47.78	20
928	49.09	20

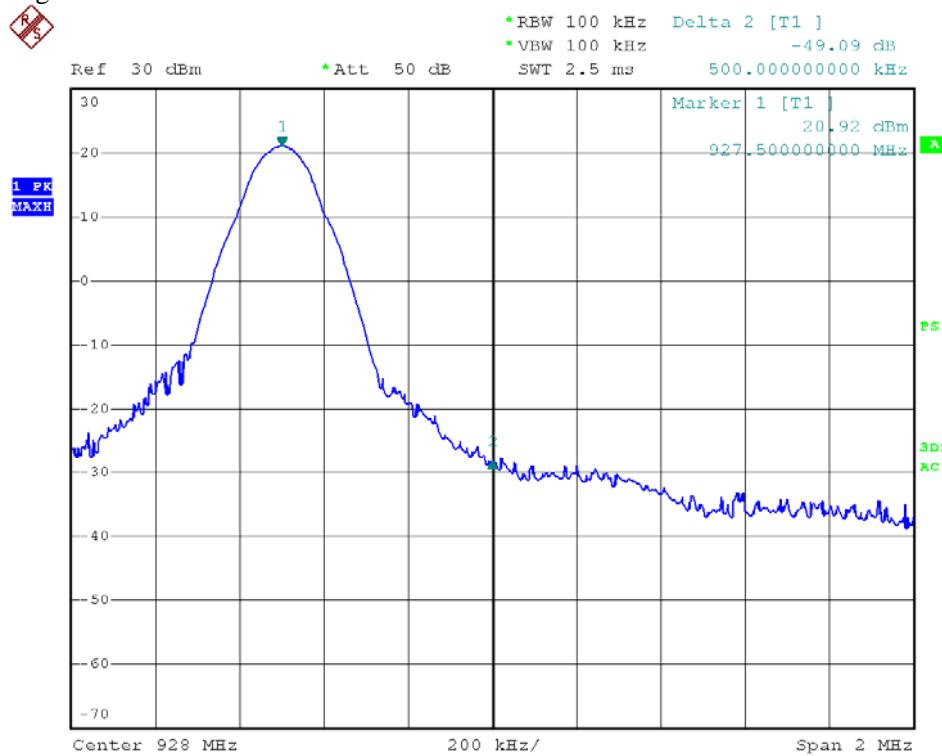
FCC ID: RVAMS-9601H

Left side



Date: 19.MAR.2013 14:21:08

Right side



Date: 19.MAR.2013 14:22:59