



TEST REPORT

Report No.:	EM201100490-2	Application No.:	ZJ00011879
Client:	Harman Consumer, Inc.		
Address:	8500 Balboa Blvd. Northridge California 91329 United States		
Sample Description:	AirPlay speaker dock for iPod/iPhone/iPad		
Model:	JBL ONBEAT™ AIR		
Test Location:	EMC Laboratory of Guangzhou GRG Metrology and Test Co., Ltd		
Test Specification:	FCC Part 15 Subpart C(Section 15.247)		
Issue Date:	2011-12-29		
Test Result:	Pass.		
Prepared By:	Reviewed By:	Approved By:	
Shi Gang/ Test Engineer	Angel Liu / Technical Assistance	Gavin Wu / Manager	
Date:	Date:	Date:	
Other Aspects:			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			

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Ver.:1.0 / 01.Jan.2011

DIRECTIONS OF TEST

1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.
2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.
3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.

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1. TEST RESULT SUMMARY

Section B of FCC Part 15.247:2009			
Standard	Item	Limit / Severity	Result
FCC Part 15 Subpart C (15.247)	Antenna Requirement	§15.203	PASS
	Conducted Emissions	§15.207 (a)	PASS
	Spurious Emissions at Antenna Port	§15.247(d)	PASS
	Restricted Bands	§15.205	PASS
	Spurious Emissions	§15.209, §15.205, §15.247(d)	PASS
	6 dB Bandwidth	§15.247 (a)(2)	PASS
	Maximum Peak Output Power	§15.247(b)(3)	PASS
	Band Edge	§15.247(d)	PASS
	Power Spectral Density	§15.247(e)	PASS

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Harman Consumer, Inc.
Address: 8500 Balboa Blvd. Northridge California 91329 United States

2.2 MANUFACTURER

Name: Harman Consumer, Inc.
Address: 8500 Balboa Blvd. Northridge California 91329 United States

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: AirPlay speaker dock for iPod/iPhone/iPad
Model No.: JBL ONBEAT™ AIR
Adding Model /
Trade Name: JBL
Power Supply: Model: YJS048A-1302500D;
Input: 100-240V;50/60Hz 1.2A max;
Output: 12V 2500mA
Frequency Range 2412MHz~2472MHz:802.11b; 802.11g;
Channel: Channel with 5MHz step
Type of emission WIFI
Note: /

2.4 LOCAL SUPPORTIVE INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number
iphone	APPLE	A1303	/
ipad	APPLE	Ipad 2	/
PC	Lenovo	E46L	EB22867264
TV	SONGPU	SP-1458	/

3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests and measurements refer to this report were performed by EMC Laboratory of Guangzhou GRG Metrology and Test CO., LTD.

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3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab (No. 688188)
China	CNAS (No.L0446)
China	DILAC (No.DL175)
Canada	Registration No.:8355A-1

3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.2dB
		1GHz~26.5GHz	4.2dB
	Vertical	30MHz~1000MHz	4.4dB
		1GHz~26.5GHz	4.4dB
Conducted Emission		9kHz~30MHz	3.1 dB

This uncertainty represents an expanded uncertainty factor of $k=2$.

3.4 LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conducted Emissions				
EMI Receiver	R&S	ESCI	100529	2012-06-16
L.I.S.N	SCHWARZBECK	NSLK 8127	8127450	2012-08-21
Spurious Emissions at Antenna Port				
Receiver	R&S	ESU40	100106	2012-09-26
Restricted Bands				
Receiver	R&S	ESU40	100106	2012-09-26
Spurious Emissions				
Receiver	R&S	ESU40	100106	2012-09-26
Receiver	R&S	ESU40	100106	2012-06-09
Horn antenna	SCHWARZBECK	BBHA9120D	D752	2013-10-14
6 dB Bandwidth				
Receiver	R&S	ESU40	100106	2012-09-26
Maximum Peak Output Power				
Receiver	R&S	ESU40	100106	2012-06-09
100kHz Bandwidth of Frequency Band Edge				
Receiver	R&S	ESU40	100106	2012-09-26
Power Spectral Density				
Receiver	R&S	ESU40	100106	2012-09-26

4. ANTENNA REQUIREMENT

Standard requirement

15.203 requirement:

For intentional device. 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 3.4dBi.



Test result: The unit does meet the FCC requirements.

5. CONDUCTED EMISSION MEASUREMENT

5.1 LIMITS

Frequency range	Limits (dB μ V)	
	Quasi-peak	Average
150kHz $\sim$ 0.5MHz	66 $\sim$ 56	56 $\sim$ 46
0.5 MHz $\sim$ 5 MHz	56	46
5 MHz $\sim$ 30 MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

5.2 TEST PROCEDURES

Procedure of Preliminary Test

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

- Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

- 1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

- 2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

- All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

- The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

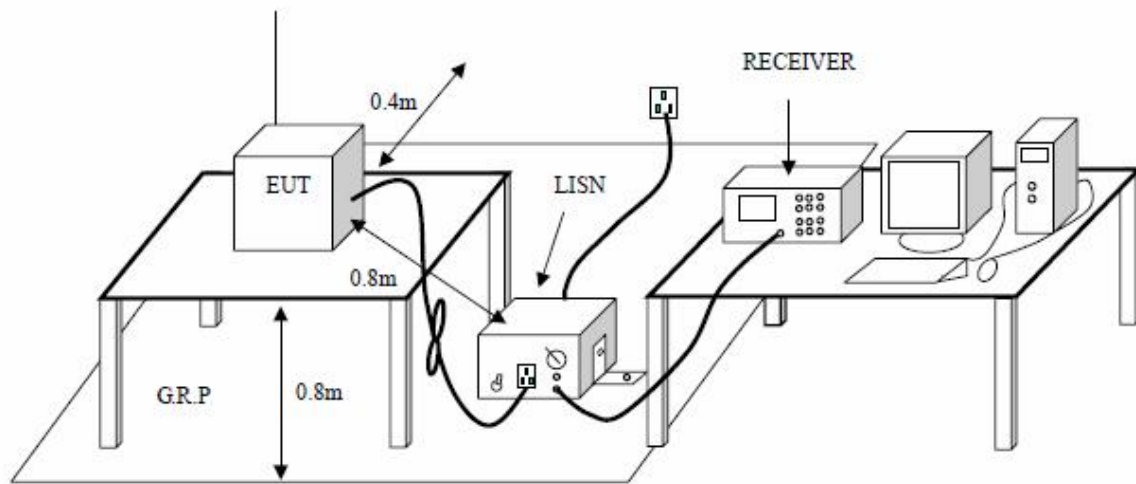
- I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

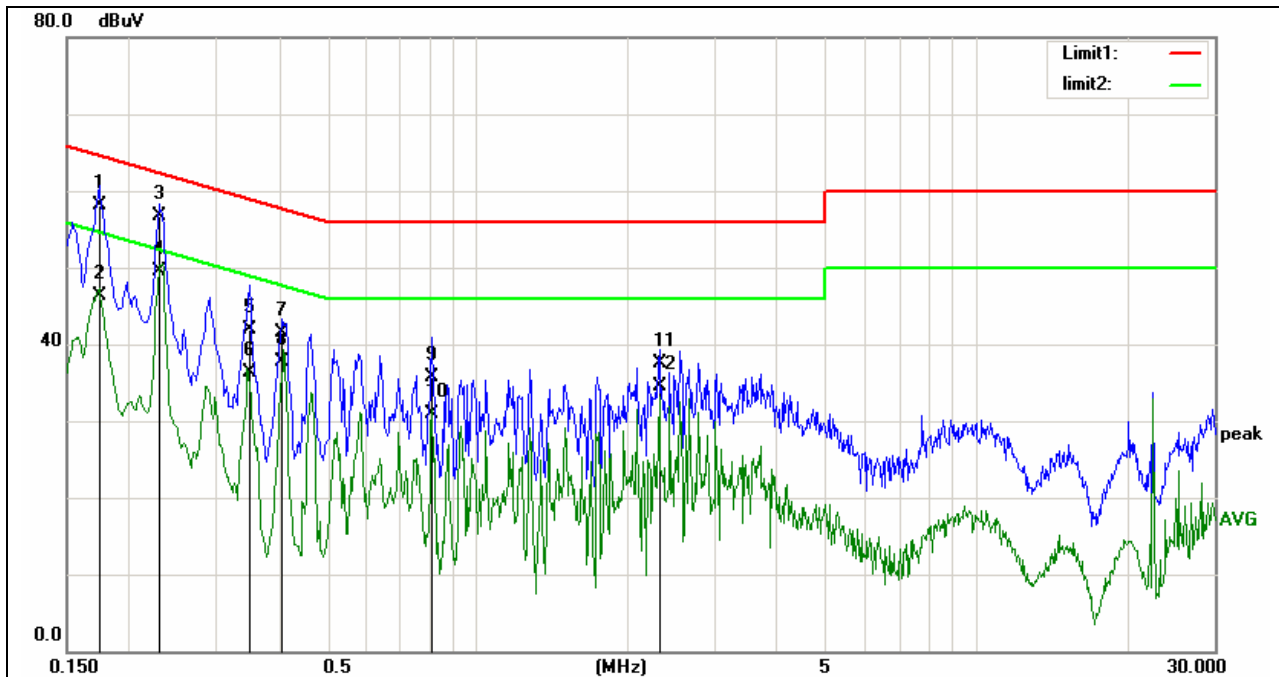
EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.3 TEST SETUP



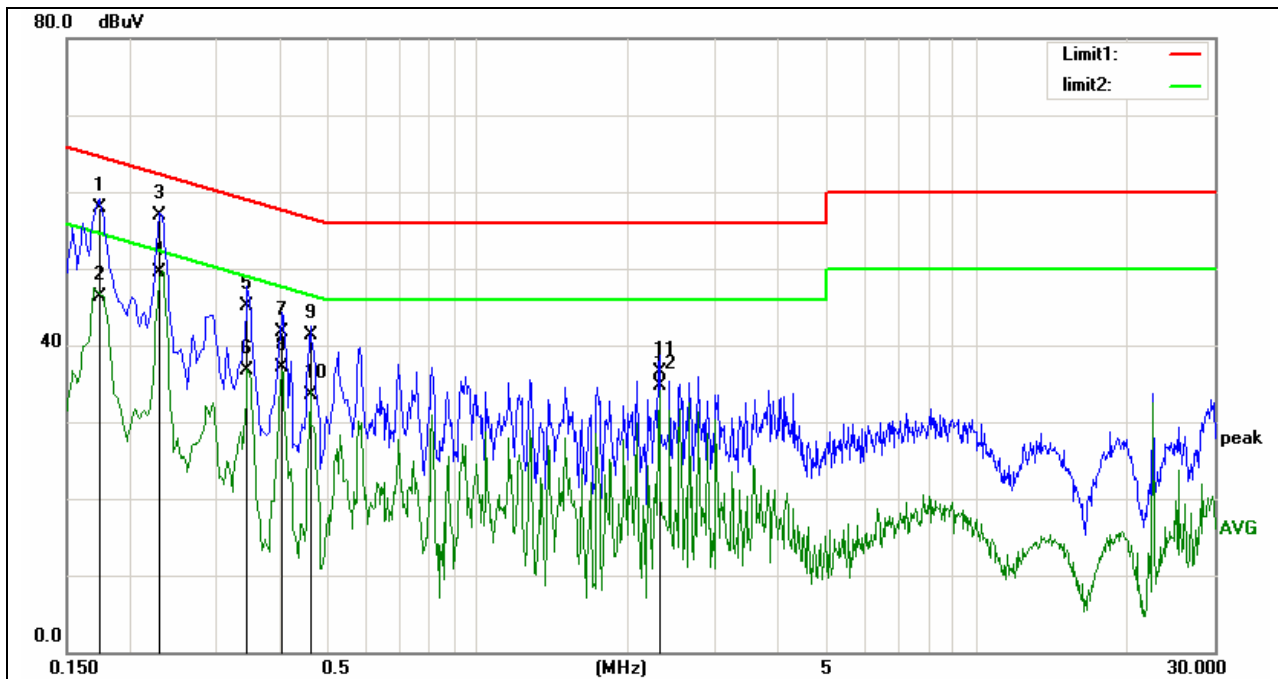
5.4 TEST RESULTS

Test Result:	Pass	Probe:	L1
Standard:	(CE)FCC PART 15 class B_QP	Power Source:	AC 120V/60Hz
Test item:	Conduction Test	Date:	2011-12-13
Temp./Hum.(%RH):	25/57%RH	Time:	14:24:00
EUT:	AirPlay speaker dock for iPod/iPhone/iPad	Model:	JBL ONBEAT™ AIR
Note:	Test the EUT in transmitting mode		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.1740	56.53	1.57	58.10	64.76	-6.66	QP
2	0.1740	44.73	1.57	46.30	54.76	-8.46	AVG
3	0.2300	55.85	0.95	56.80	62.45	-5.65	QP
4	0.2300	48.65	0.95	49.60	52.45	-2.85	AVG
5	0.3500	41.08	0.82	41.90	58.96	-17.06	QP
6	0.3500	35.58	0.82	36.40	48.96	-12.56	AVG
7	0.4060	40.78	0.72	41.50	57.73	-16.23	QP
8	0.4060	36.98	0.72	37.70	47.73	-10.03	AVG
9	0.8100	35.39	0.41	35.80	56.00	-20.20	QP
10	0.8100	30.49	0.41	30.90	46.00	-15.10	AVG
11	2.3100	36.89	0.61	37.50	56.00	-18.50	QP
12	2.3100	33.99	0.61	34.60	46.00	-11.40	AVG

Test Result:	Pass	Probe:	N
Standard:	(CE)FCC PART 15 class B_QP	Power Source:	AC 120V/60Hz
Test item:	Conduction Test	Date:	2011-12-13
Temp./Hum.(%RH):	25/57%RH	Time:	14:19:00
EUT:	AirPlay speaker dock for iPod/iPhone/iPad	Model:	JBL ONBEAT™ AIR
Note:	Test the EUT in transmitting mode		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.1740	56.43	1.57	58.00	64.76	-6.76	QP
2	0.1740	44.73	1.57	46.30	54.76	-8.46	AVG
3	0.2300	55.95	0.95	56.90	62.45	-5.55	QP
4	0.2300	48.65	0.95	49.60	52.45	-2.85	AVG
5	0.3460	44.37	0.83	45.20	59.06	-13.86	QP
6	0.3460	35.97	0.83	36.80	49.06	-12.26	AVG
7	0.4060	40.98	0.72	41.70	57.73	-16.03	QP
8	0.4060	36.38	0.72	37.10	47.73	-10.63	AVG
9	0.4620	40.78	0.62	41.40	56.66	-15.26	QP
10	0.4620	32.98	0.62	33.60	46.66	-13.06	AVG
11	2.3100	35.99	0.61	36.60	56.00	-19.40	QP
12	2.3100	34.09	0.61	34.70	46.00	-11.30	AVG

6. 6dB BANDWIDTH TESTING

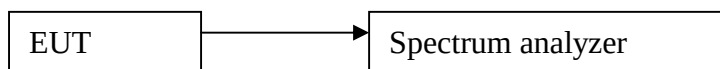
6.1 LIMITS

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 TEST PROCEDURES

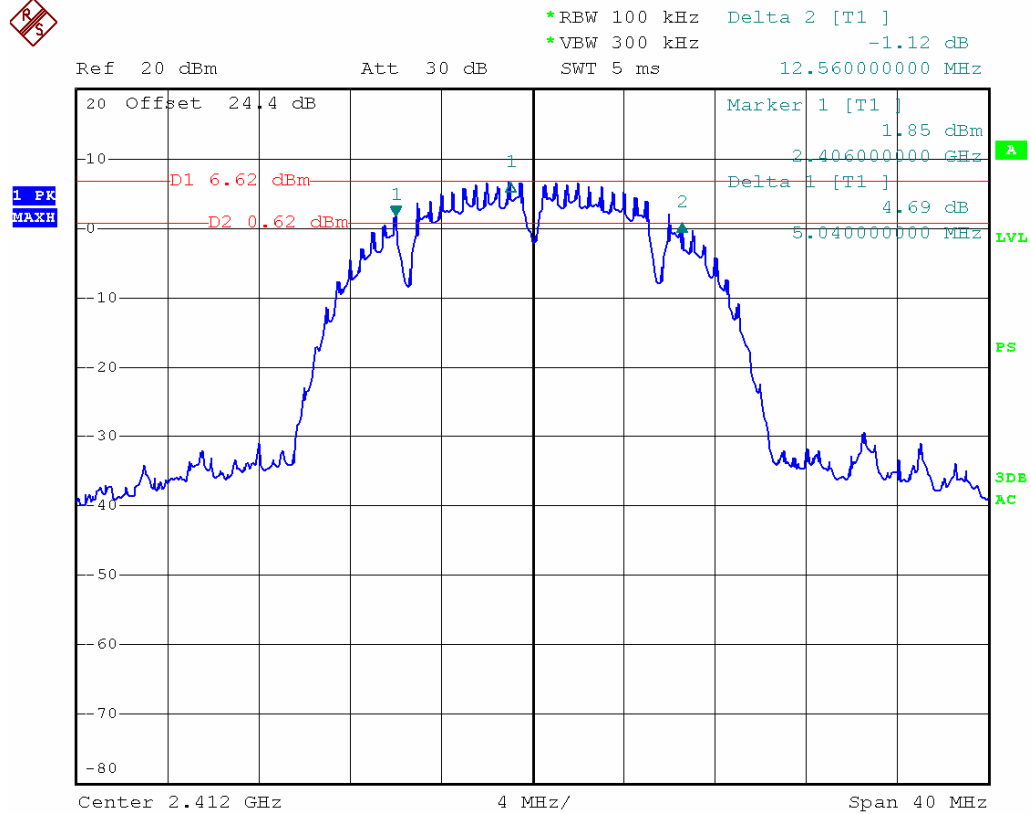
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer;
2. Set the spectrum analyzer: RBW=100KHz. VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max Hold, Set span to encompass the entire emission bandwidth of the signal.
3. Mark the peak power frequency and -6dB(upper and lower) power frequency.
4. Repeat until all the test status are investigated.
5. Report the worse case.

6.3 TEST SETUP

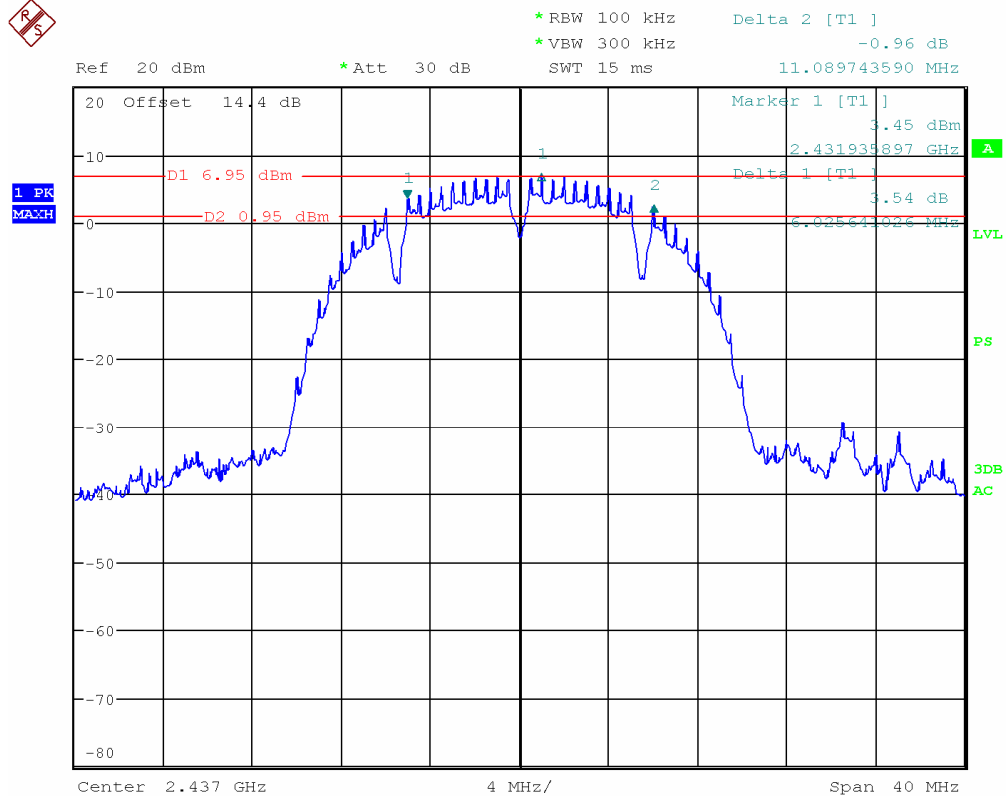


6.4 TEST RESULTS

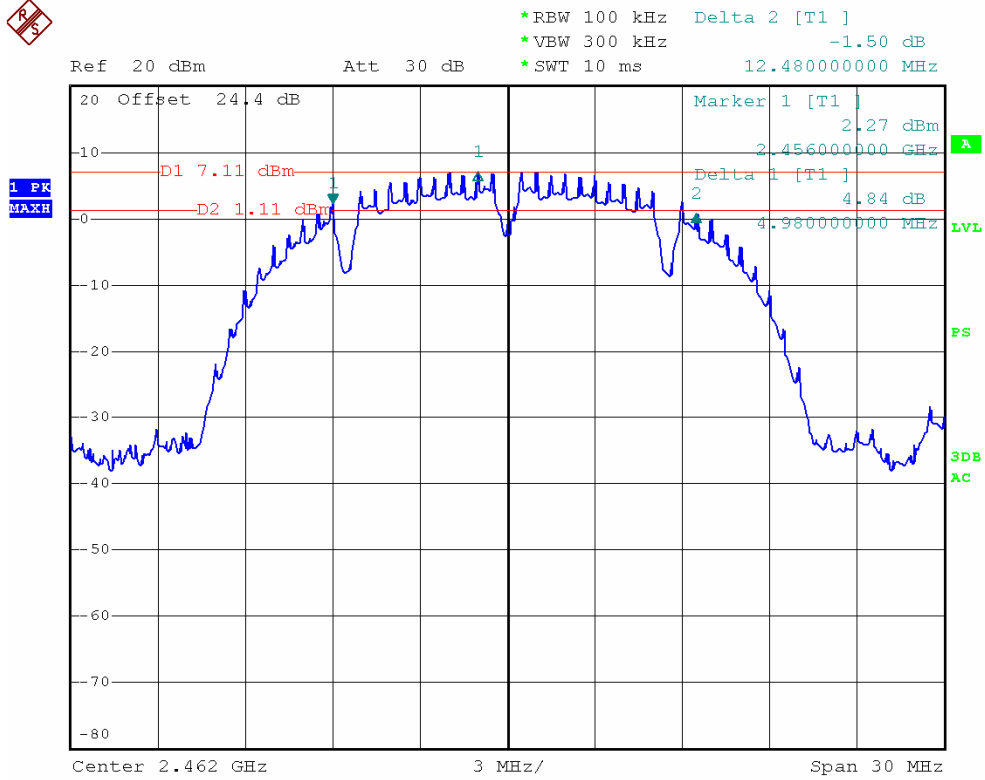
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)
Low Channel	2412	12.56	> 500
Middle Channel	2437	11.08	> 500
High Channel	2462	12.48	> 500

802.11b mode:
Channel 2412MHz

Channel 2437MHz

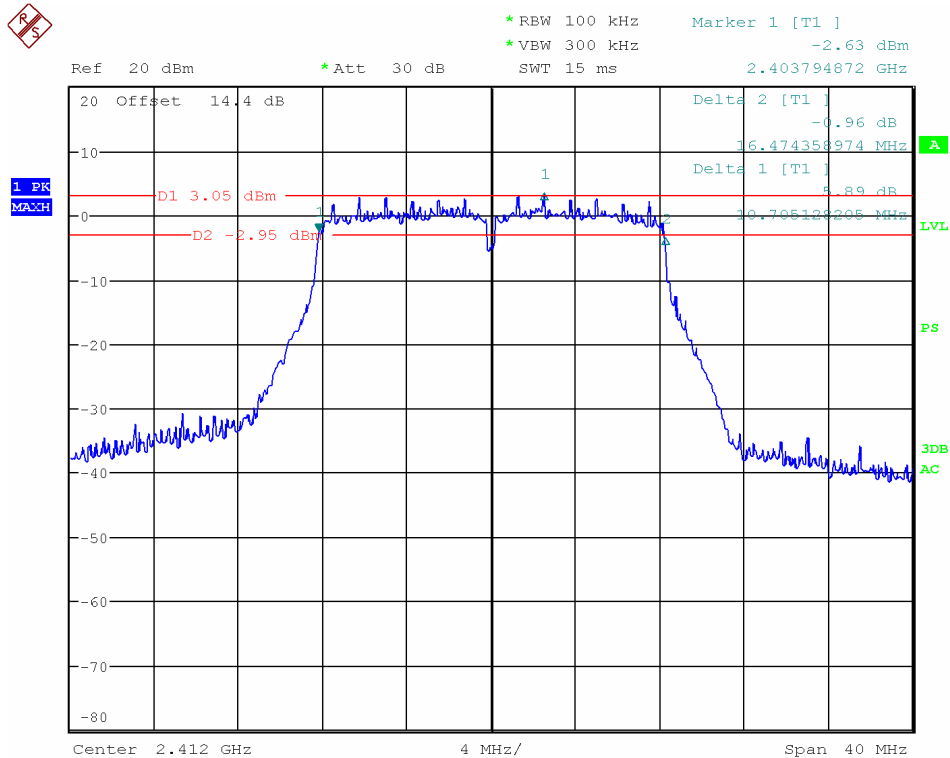


Channel 2462MHz

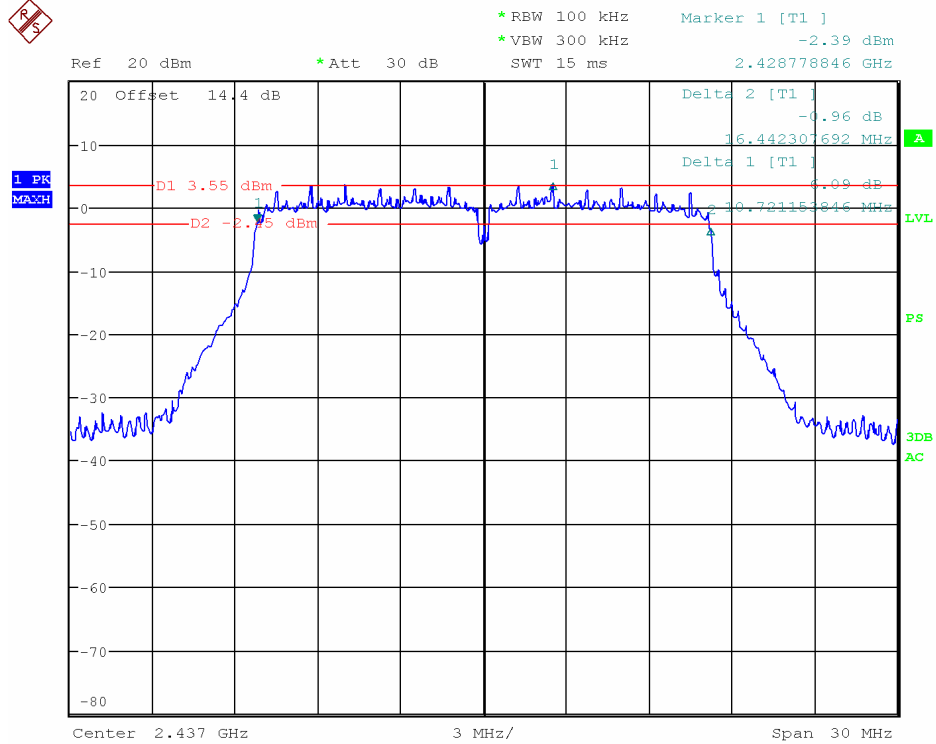


Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)
Low Channel	2412	16.47	>500
Middle Channel	2437	16.44	>500
High Channel	2462	14.47	>500

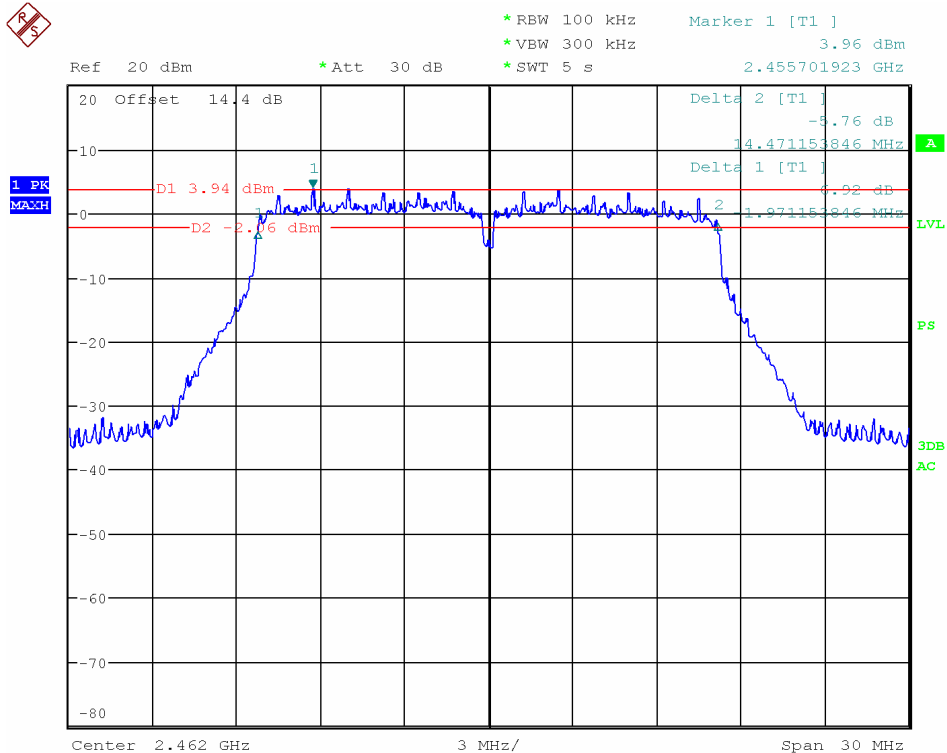
802.11g mode:
Channel 2412MHz



Channel 2437MHz



Channel 2462MHz



7. MAXIMUM PEAK OUTPUT POWER

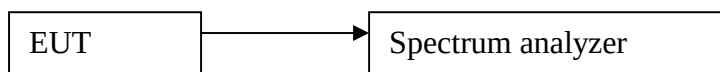
7.1 LIMITS

The maximum Peak output power measurement is 1W

7.2 TEST PROCEDURES

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
3. Add a correction factor to the display.

7.3 TEST SETUP

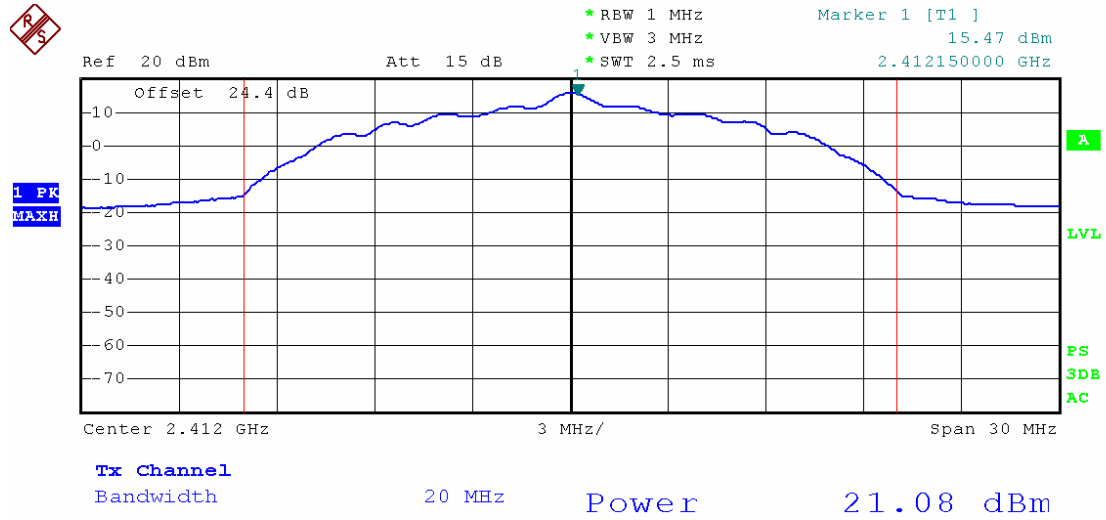


7.4 TEST RESULTS

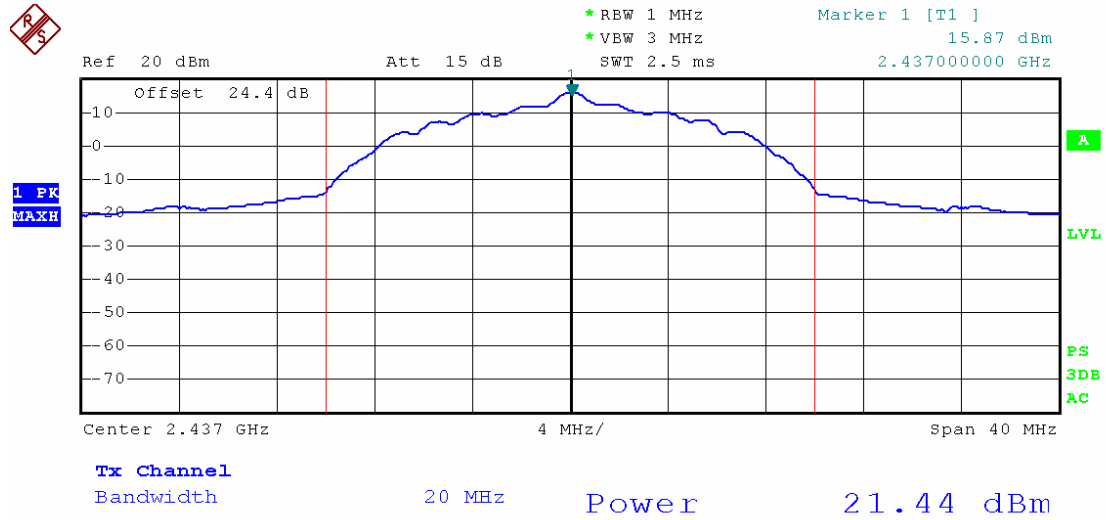
802.11b Mode:

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
1	2412	802.11b	1Mbps	21.08	1W(30dBm)	Pass
6	2437			21.44		Pass
11	2462			21.39		Pass
1	2412		2Mbps	20.89		Pass
6	2437			21.02		Pass
11	2462			21.00		Pass
1	2412		5.5Mbps	20.76		Pass
6	2437			20.88		Pass
11	2462			20.82		Pass
1	2412		11Mbps	20.12		Pass
6	2437			20.23		Pass
11	2462			20.06		Pass

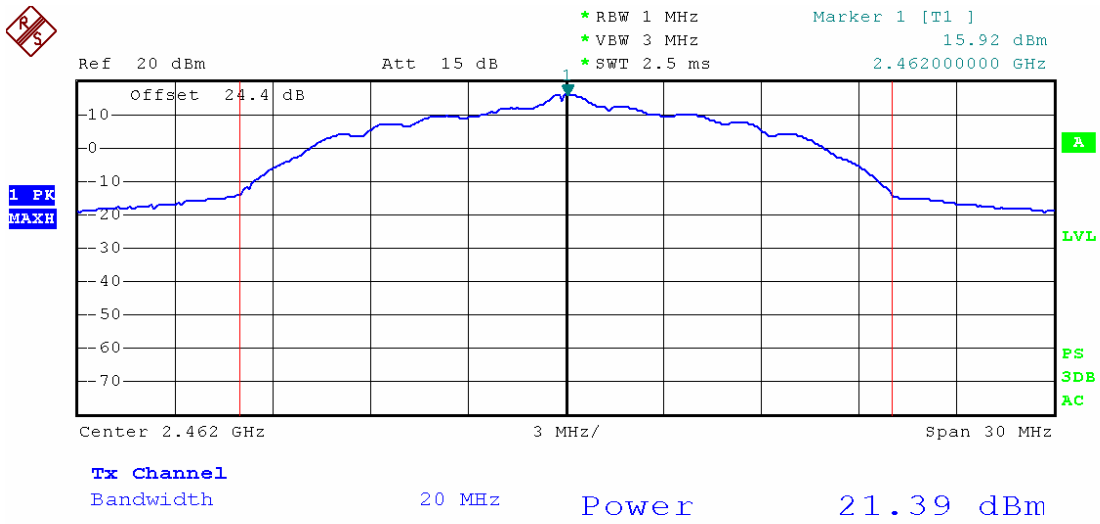
802.11b mode:
Channel 2412MHz



Channel 2437MHz

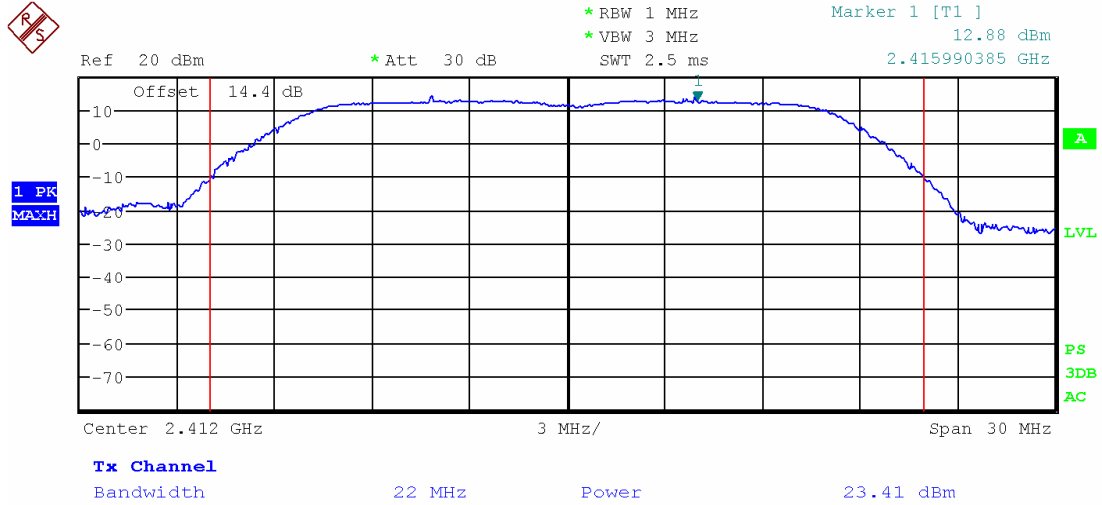


Channel 2462MHz

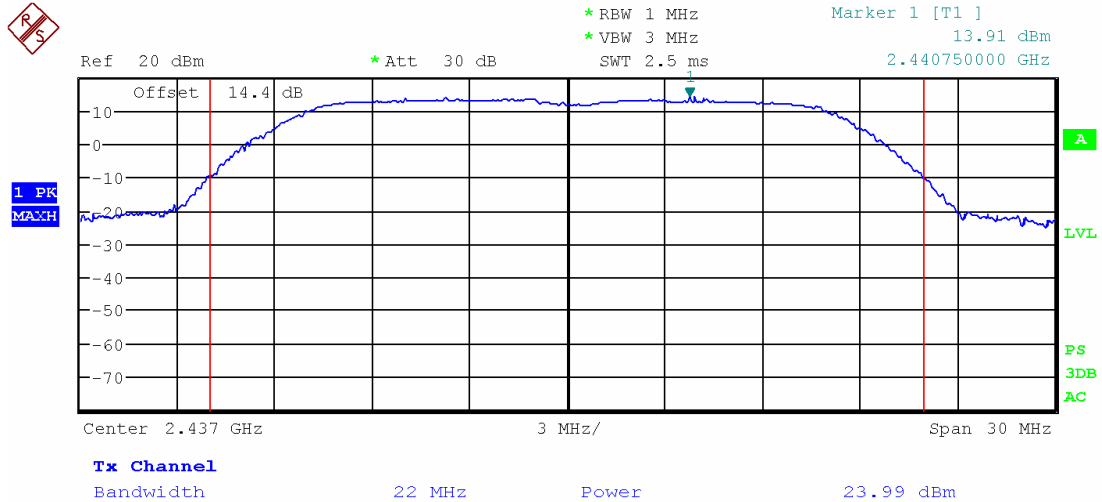


802.11g Mode:

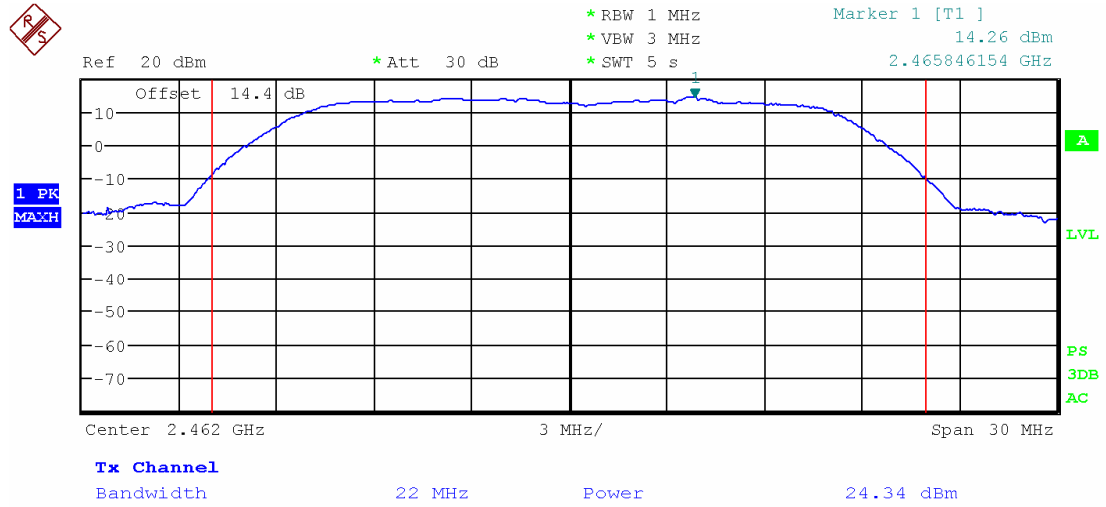
Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
1	2412	802.11g	6Mbps	23.41	1W(30dbm)	Pass
6	2437			23.99		Pass
11	2462			24.34		Pass
1	2412		9Mbps	23.28		Pass
6	2437			23.73		Pass
11	2462			24.05		Pass
1	2412		12Mbps	23.18		Pass
6	2437			23.56		Pass
11	2462			23.89		Pass
1	2412		18Mbps	23.12		Pass
6	2437			23.49		Pass
11	2462			23.78		Pass
1	2412		24Mbps	22.78		Pass
6	2437			23.20		Pass
11	2462			23.51		Pass
1	2412		36Mbps	22.60		Pass
6	2437			22.98		Pass
11	2462			23.23		Pass
1	2412		48Mbps	22.47		Pass
6	2437			22.62		Pass
11	2462			22.42		Pass
1	2412		54Mbps	22.12		Pass
6	2437			22.38		Pass
11	2462			22.16		Pass

802.11g mode:
Channel 2412MHz

Channel 2437MHz



Channel 2462MHz



8. POWER SPECTRAL DENSITY

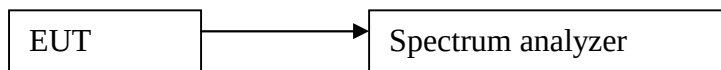
8.1 LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

8.2 TEST PROCEDURES

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer: RBW=3KHz. VBW = 10KHz. sweep= (SPAN/3 kHz); Detector Function = Peak. Trace = Max Hold, Centre = the Peak Power of the signal.
3. Measure the Power Spectral Density of the test frequency with special test status.
4. Repeat until all the test status are investigated.
5. Report the worse case.

8.3 TEST SETUP

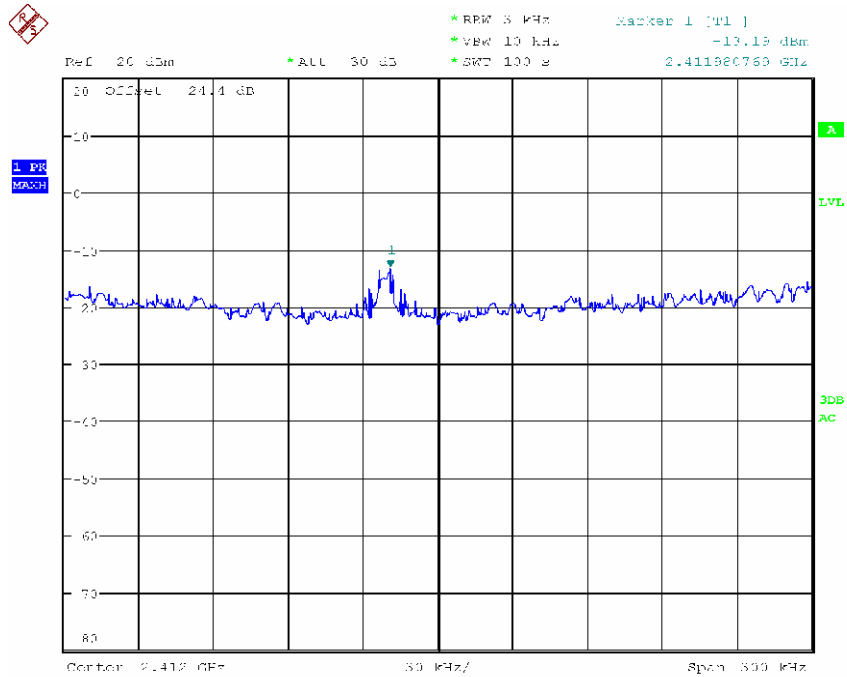


8.4 TEST RESULTS

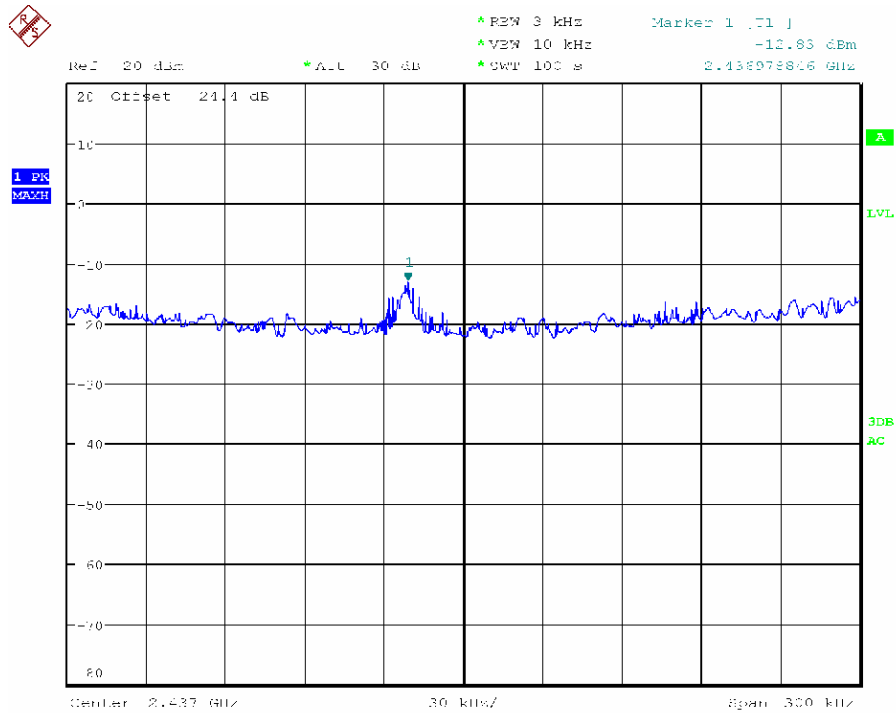
802.11b Mode:

Channel No.	Frequency (MHz)	Mode	Measured Channel Power (dBm)	Limit	Result
1	2412	802.11b	-13.19	8dBm/3KHz	Pass
6	2437		-12.83		Pass
11	2462		-13.29		Pass

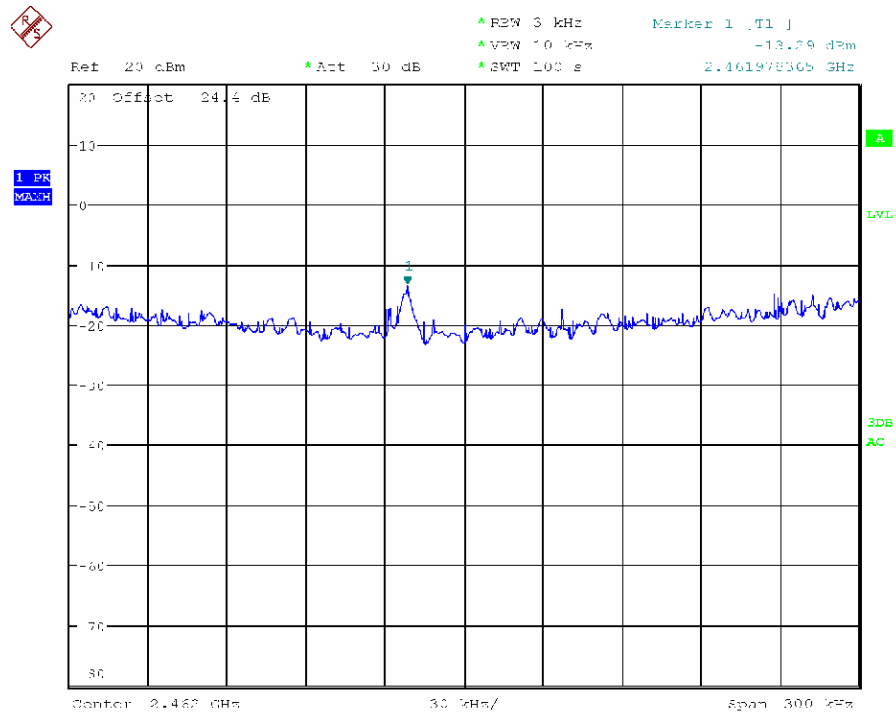
802.11b mode:
Channel 2412MHz



Channel 2437MHz



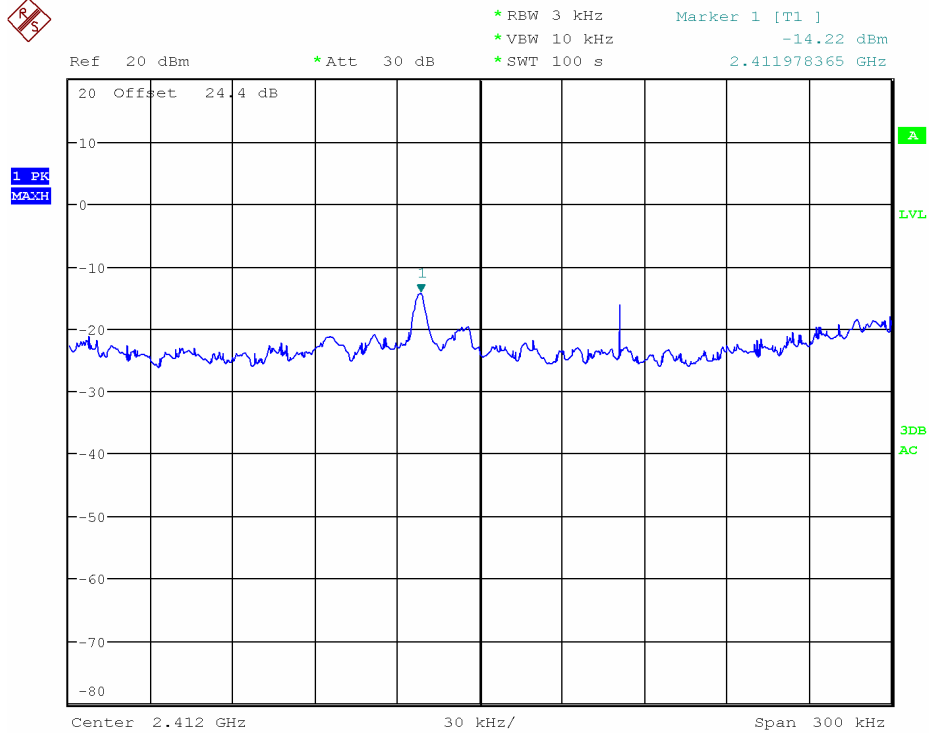
Channel 2462MHz



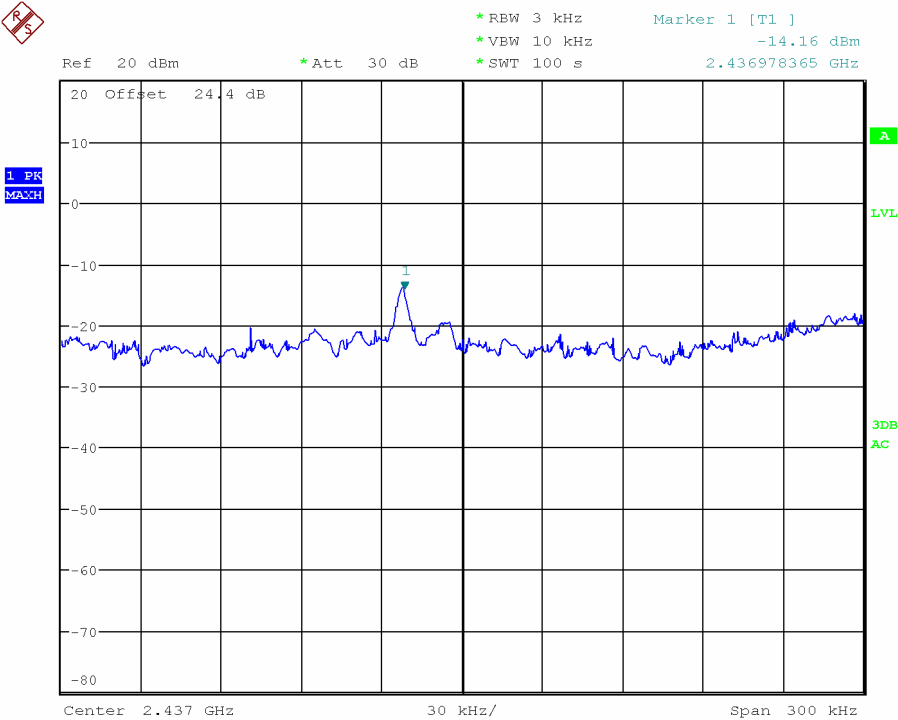
802.11g Mode:

Channel No.	Frequency (MHz)	Mode	Measured Channel Power (dBm)	Limit	Result
1	2412	802.11g	-14.22	8dBm/3KHz	Pass
6	2437		-14.16		Pass
11	2462		-12.01		Pass

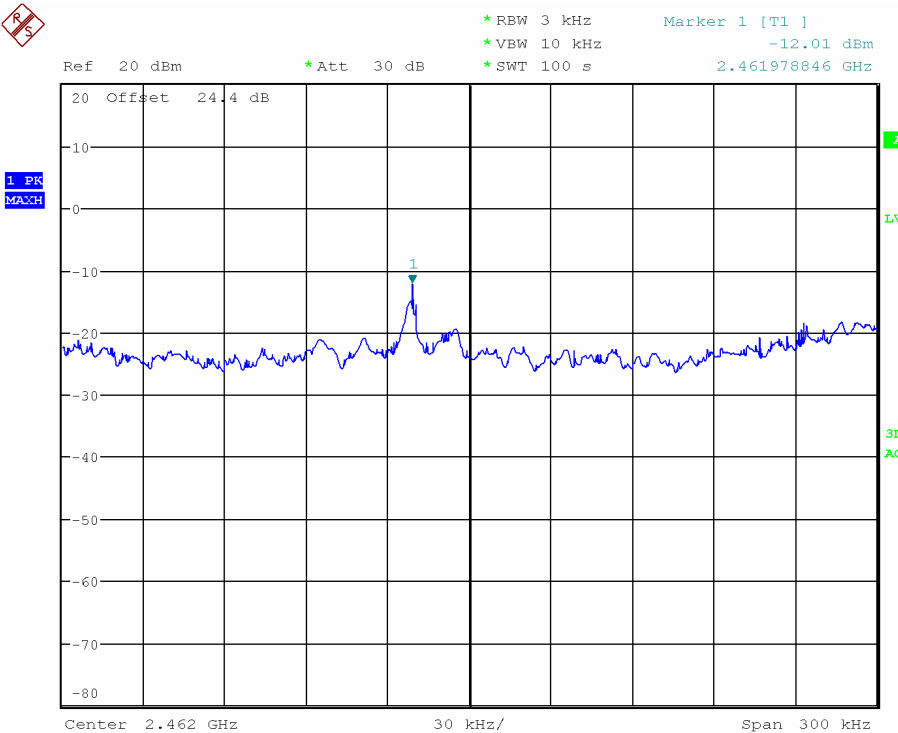
802.11g mode:
Channel 2412MHz



Channel 2437MHz



Channel 2462MHz



9. CONDUCTED SPURIOUS EMISSIONS

9.1 LIMITS

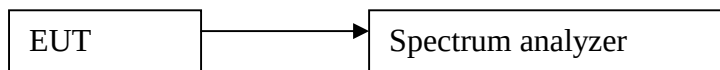
At least 15 channels frequency

9.2 TEST PROCEDURES

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.

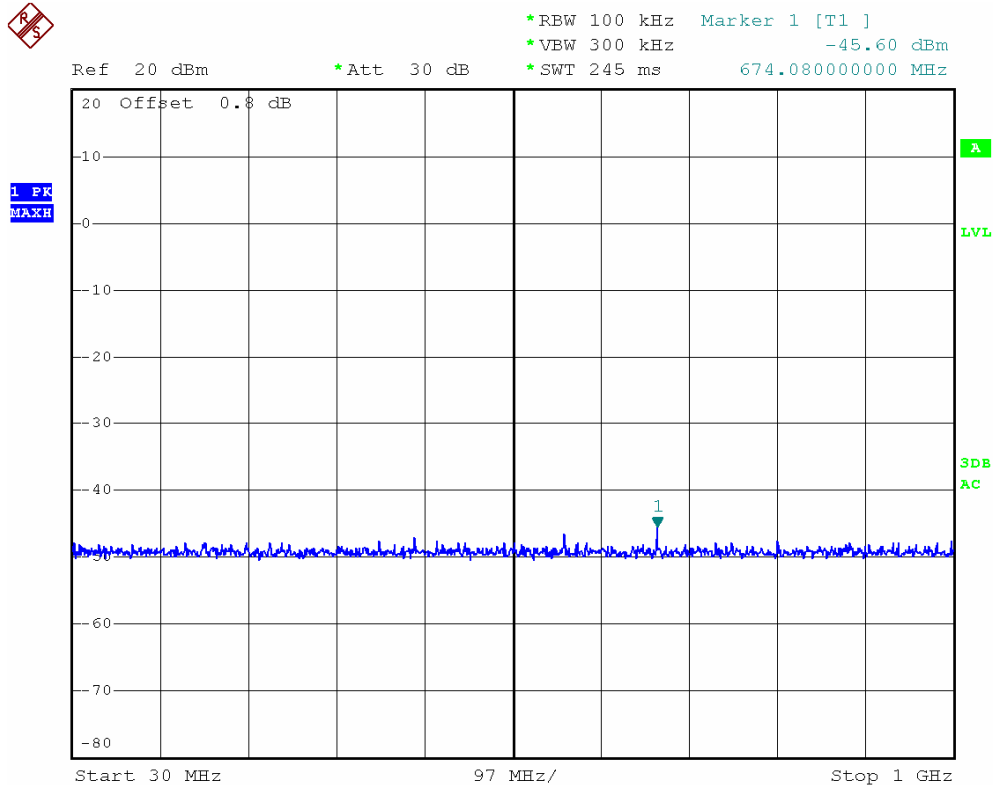
Below 1GHz Set the spectrum analyzer: RBW =100KHz VBW >= RBW , Span = enough to captch the trace. Sweep = auto; Detector Function = Peak. Trace = Max,hold.

9.3 TEST SETUP

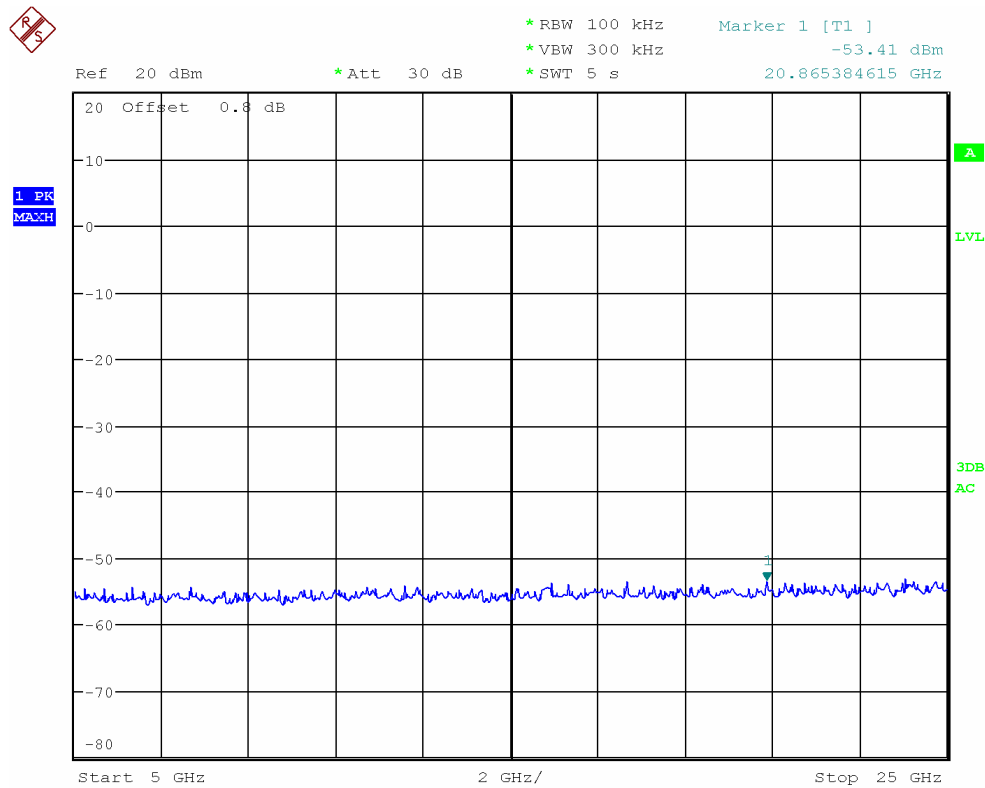
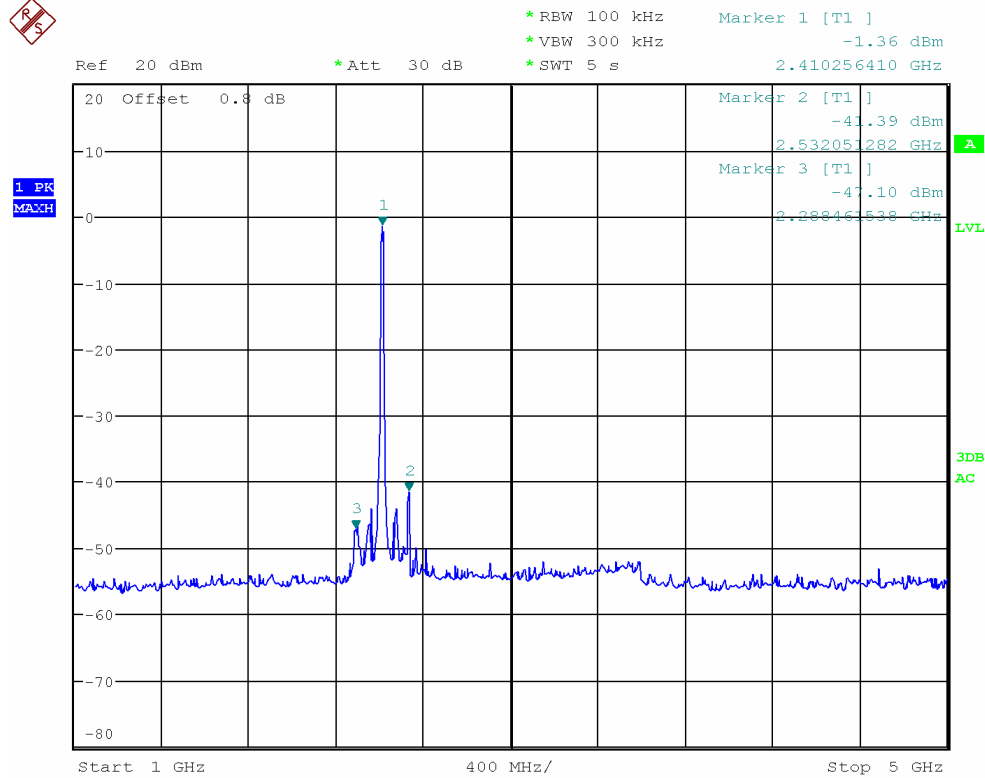


9.4 TEST RESULTS

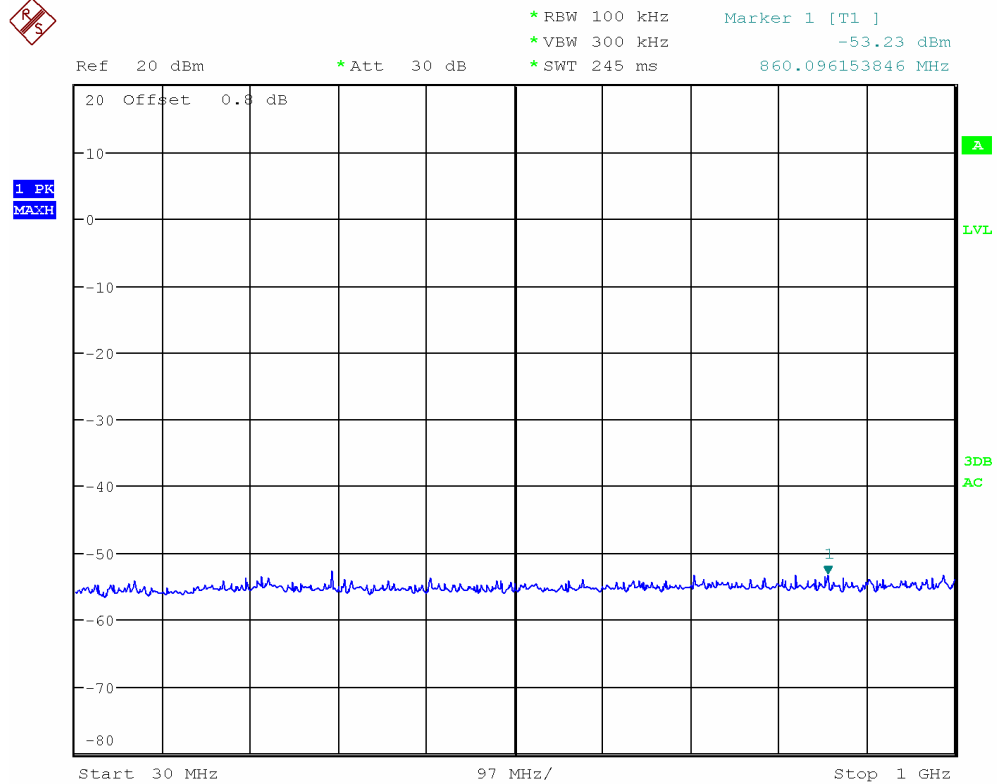
802.11b mode:
Channel 2412MHz
30MHz~1GHz



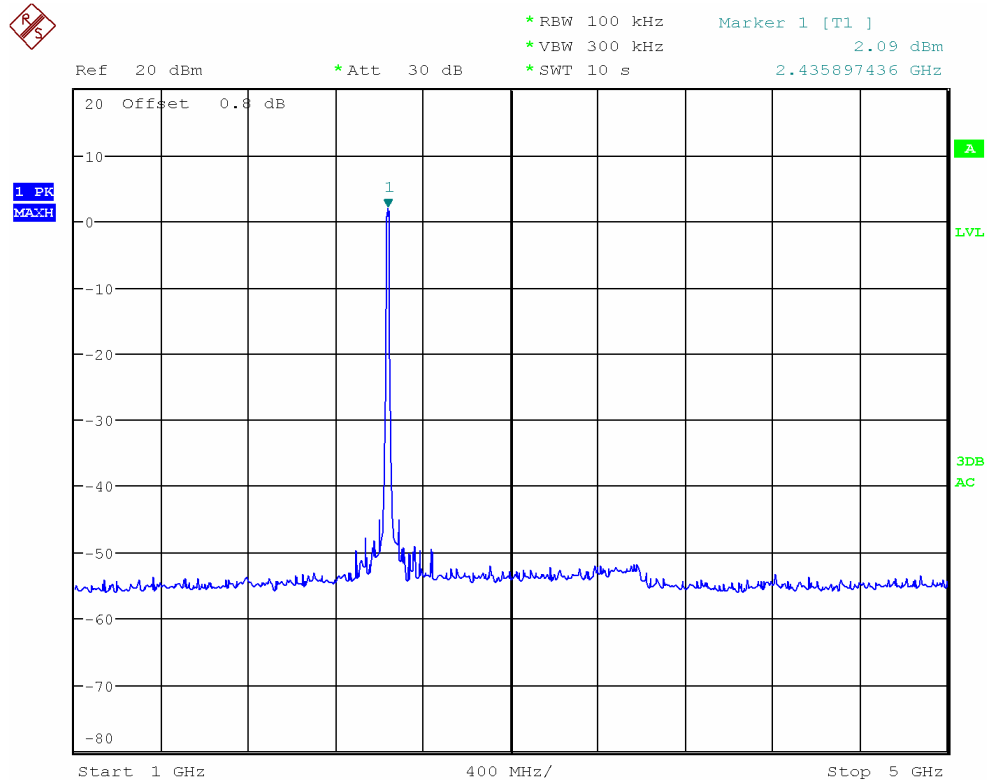
Channel 2412MHz
1GHz~25GHz

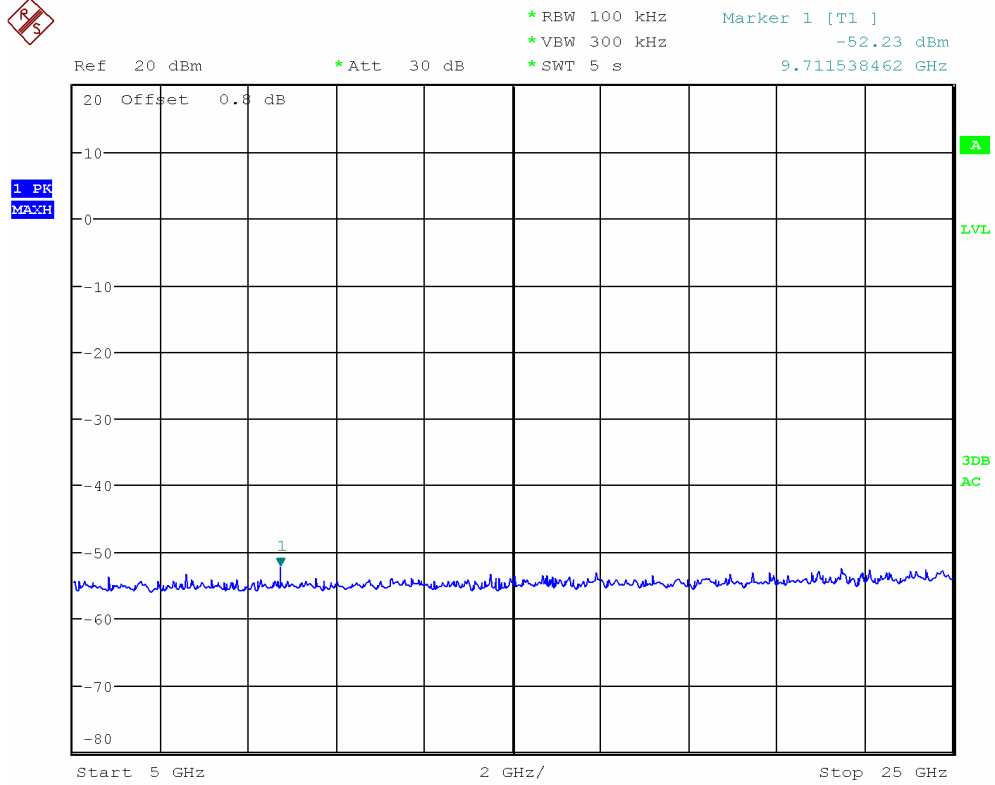


802.11b mode:
Channel 2437MHz
30MHz~1GHz

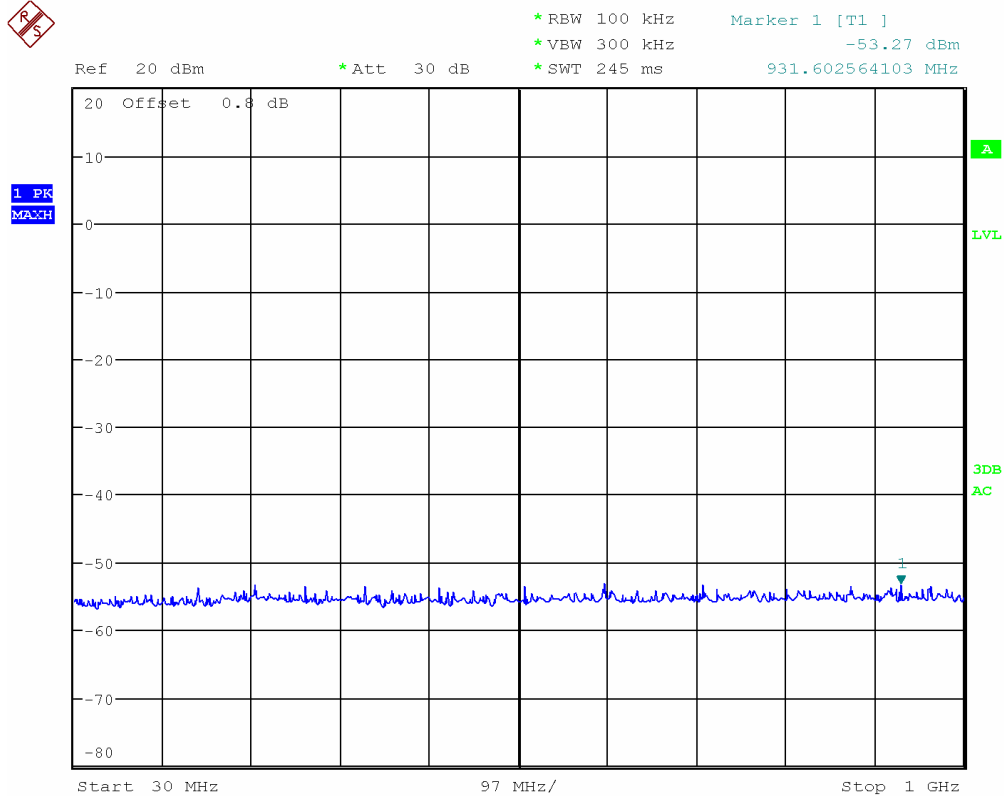


Channel 2437MHz
1GHz~25GHz

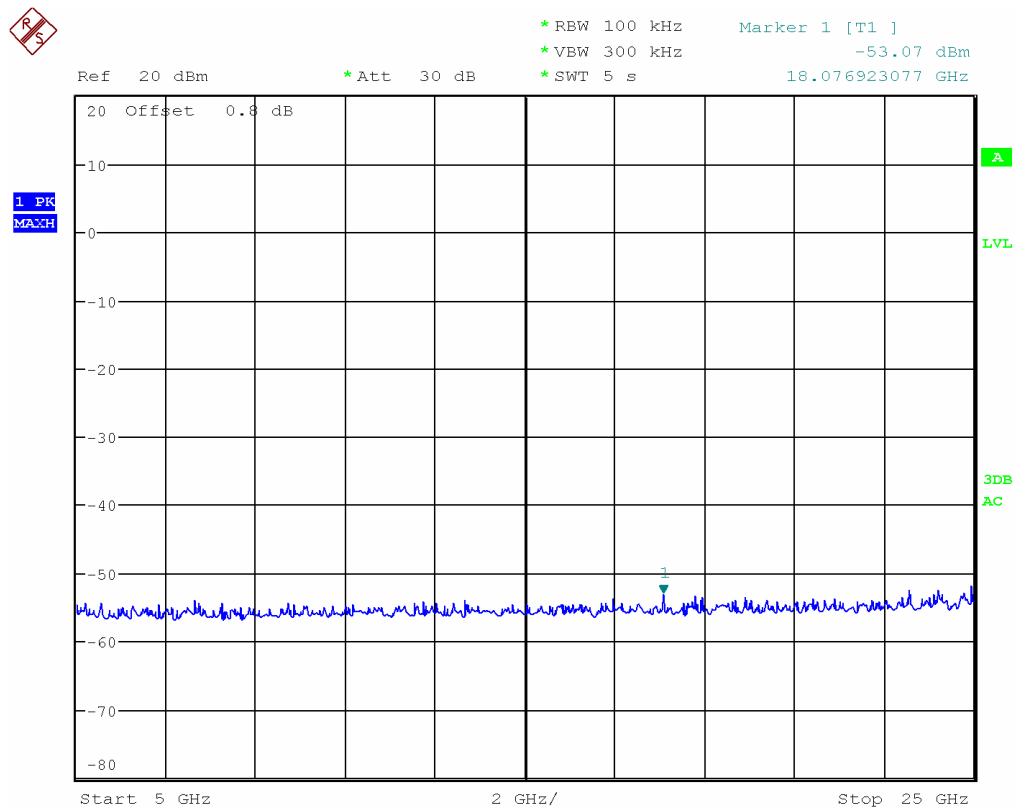
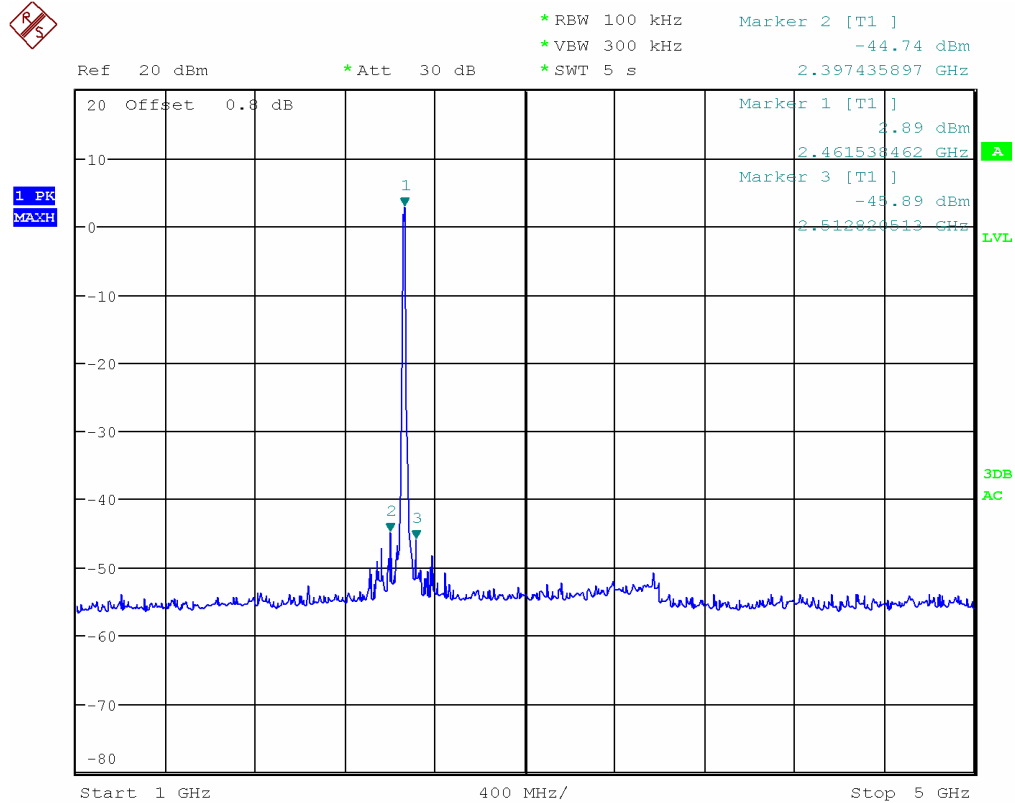




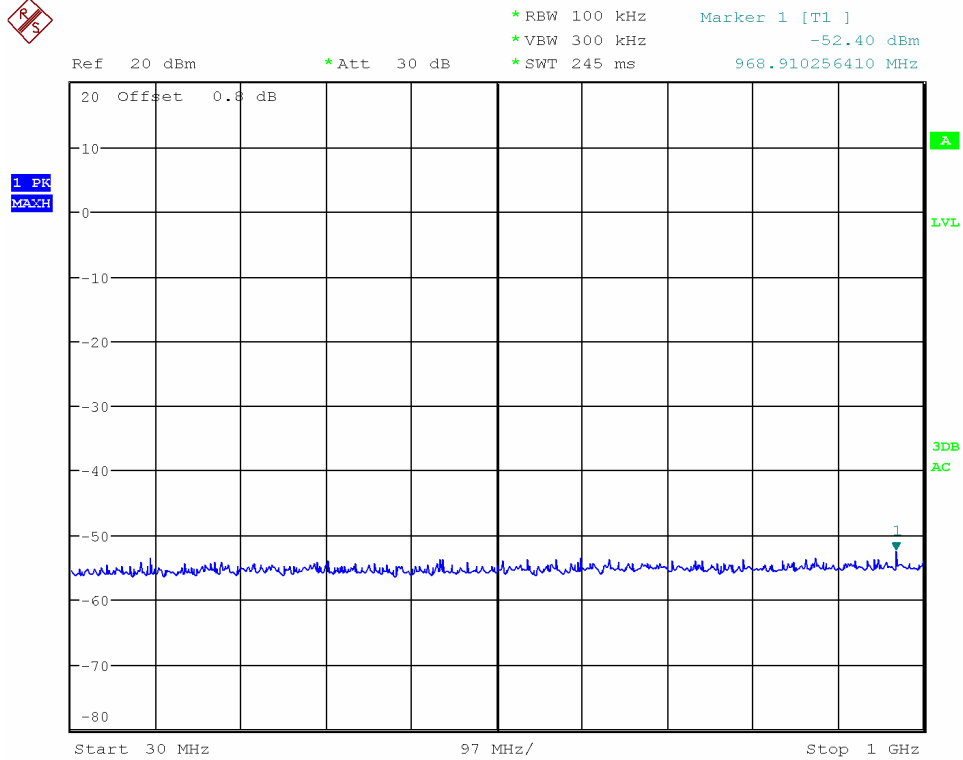
802.11b mode:
Channel 2462MHz
30MHz~1GHz



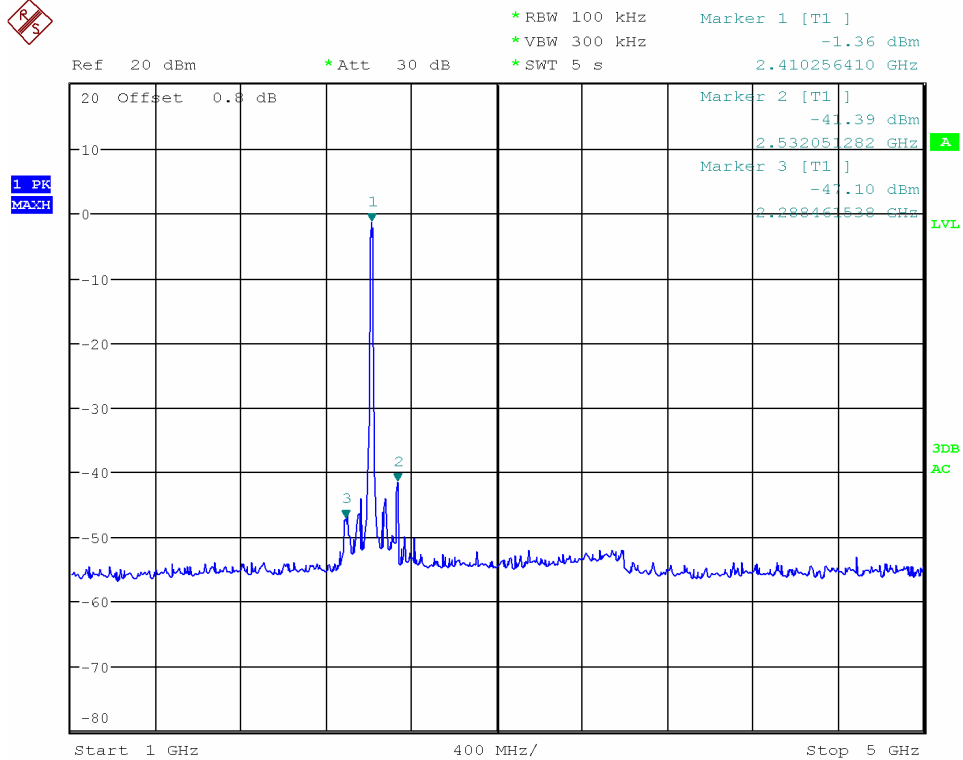
Channel 2462MHz
1GHz~25GHz



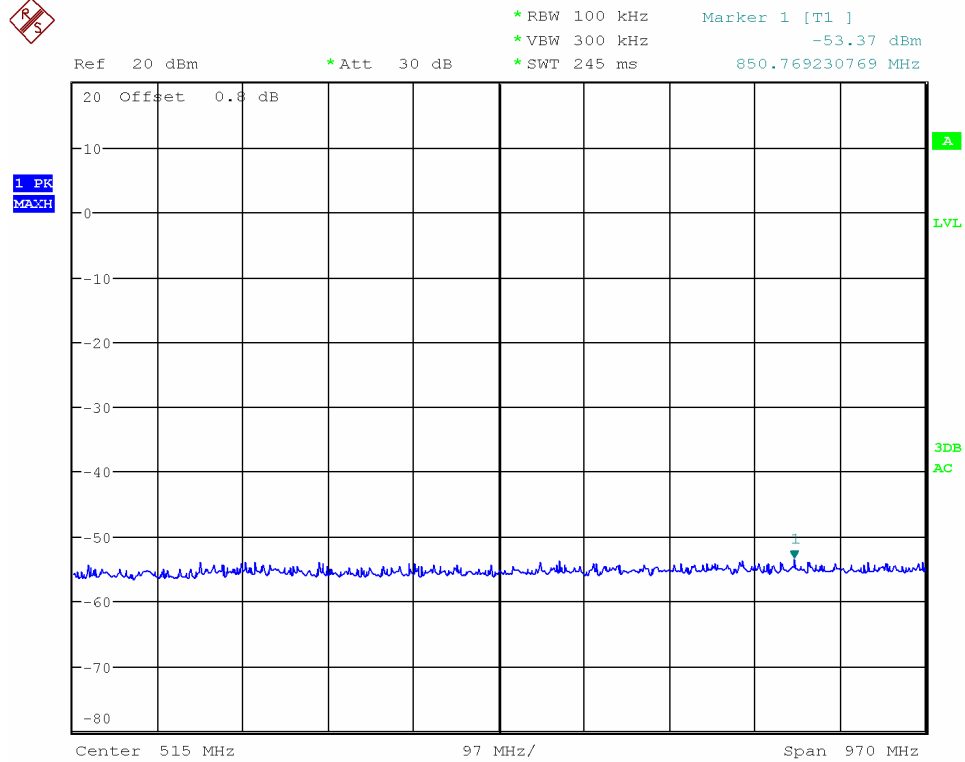
802.11G mode:
Channel 2412MHz
30MHz~1GHz



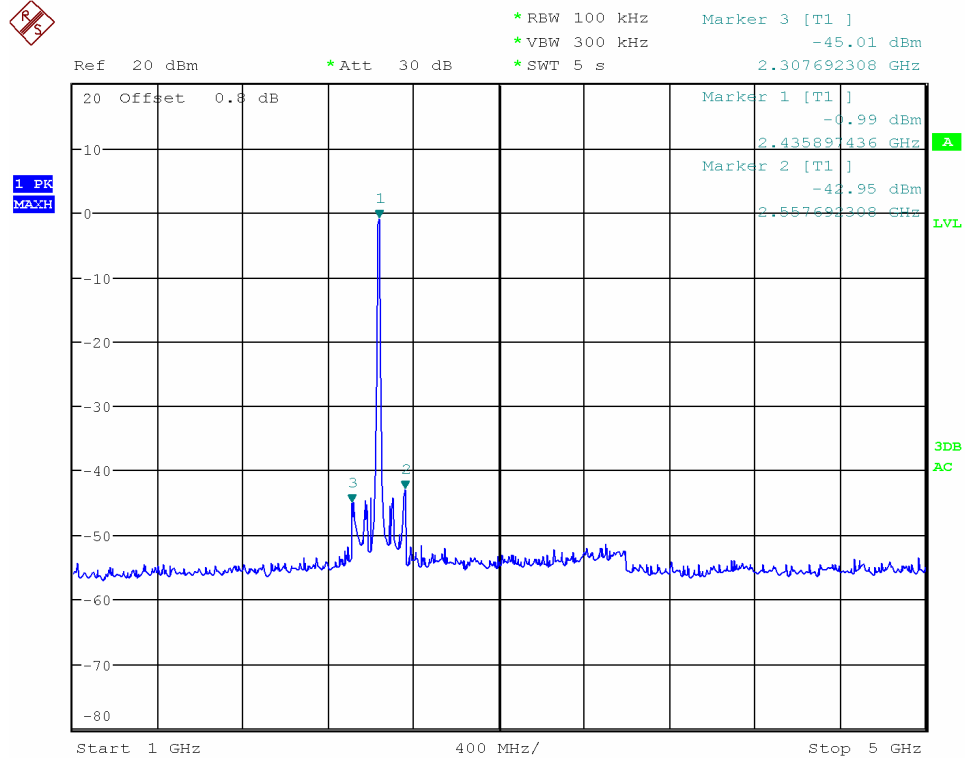
Channel 2412MHz
1GHz~25GHz

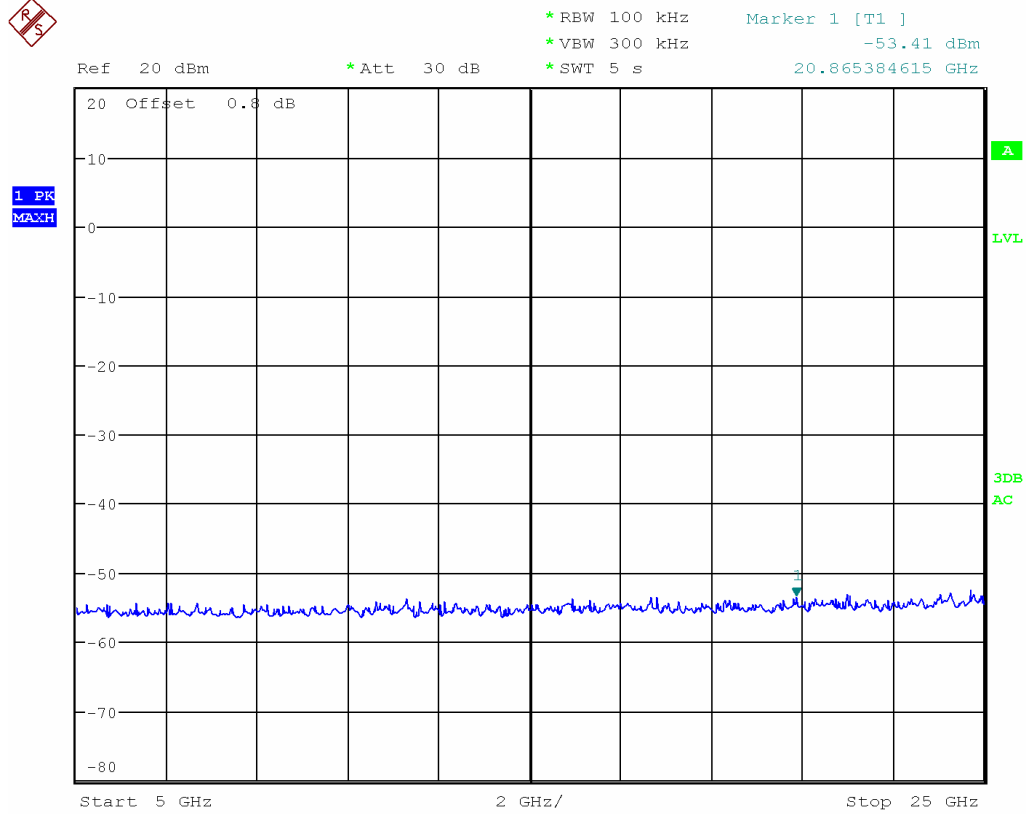


802.11G mode:
Channel 2437MHz
30MHz~1GHz

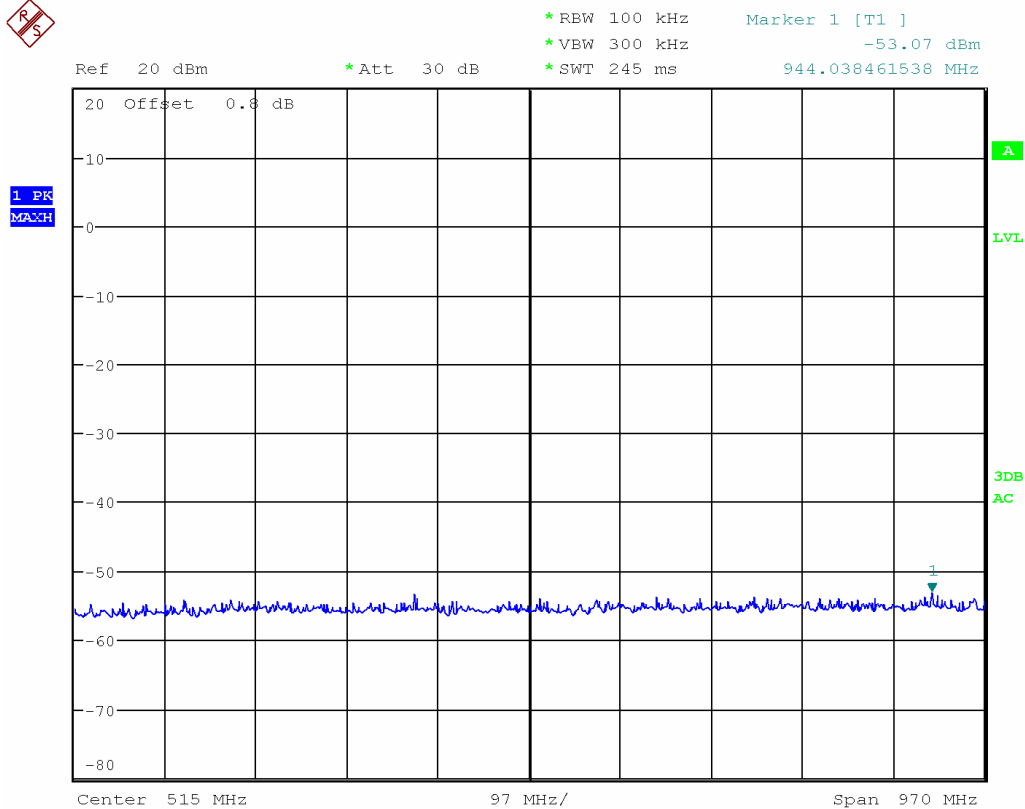


Channel 2437MHz
1GHz~25GHz

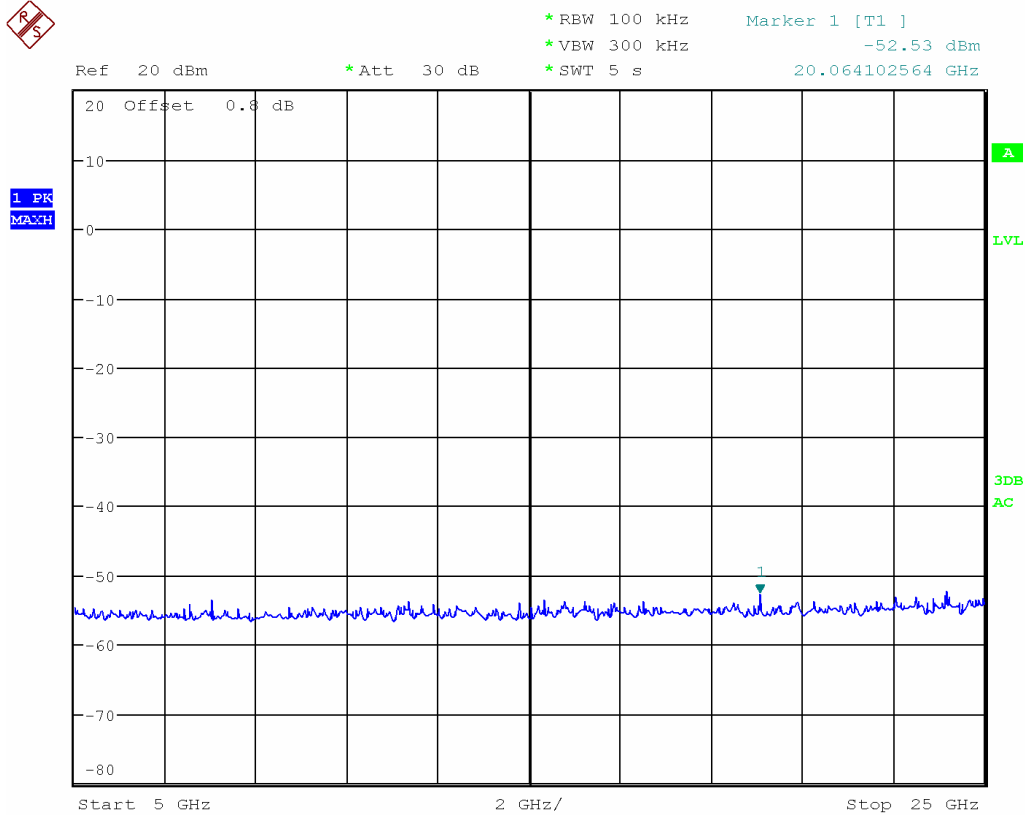
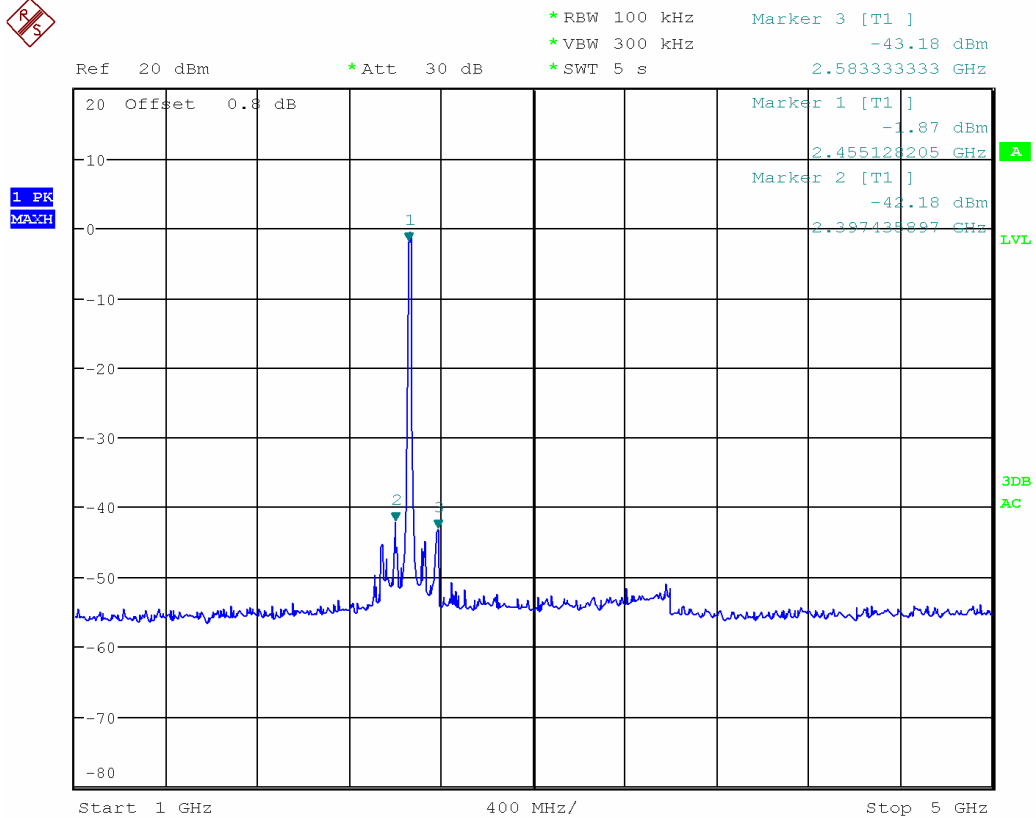




802.11G mode:
Channel 2462MHz
30MHz~1GHz



Channel 2462MHz
1GHz~25GHz



10. RADIATED SPURIOUS EMISSIONS

10.1 LIMITS

Frequency (MHz)	Quasi-peak(dB μ V/m)
30 ~ 88	40
88~216	43.5
216 ~ 960	46
Above 960	54

NOTE: (1) The lower limit shall apply at the transition frequencies.

Frequency (GHz)	Quasi-peak(dB μ V/m)
1 ~ 26.5	74
1~ 26.5	54

10.2 TEST PROCEDURES

Procedure of Preliminary Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height $0,8\text{ m} \pm 0,01\text{ m}$, ANSI C63.4 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test. The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level. Record at least six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only QP reading is presented. The test data of the worst-case condition(s) was recorded.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

10.3 TEST SETUP

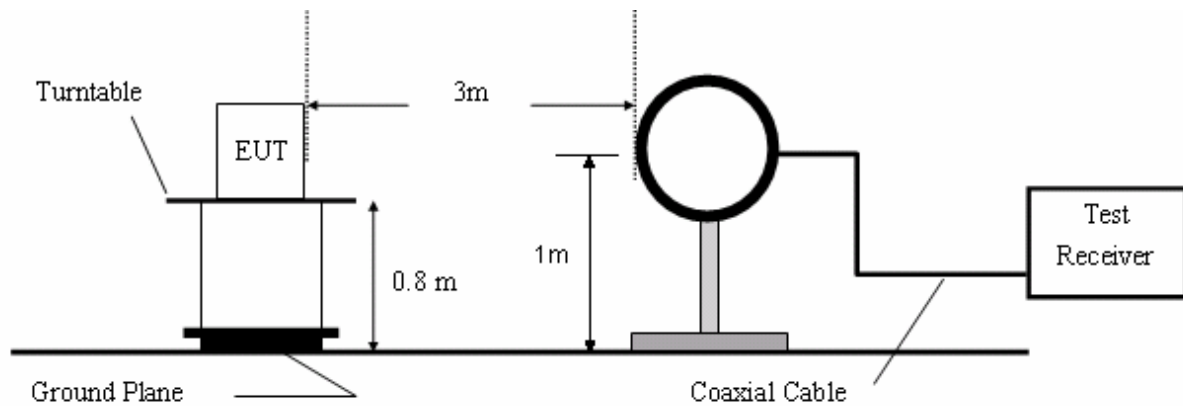


Figure 1. 9KHz to 30MHz radiated emissions test configuration

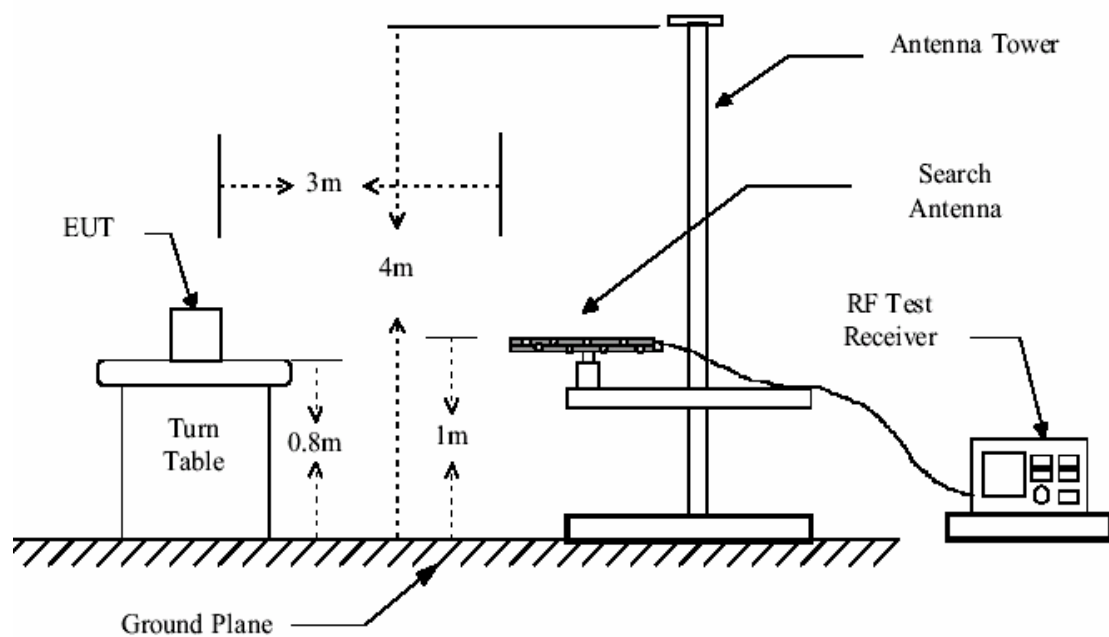


Figure 2. 30MHz to 1GHz radiated emissions test configuration

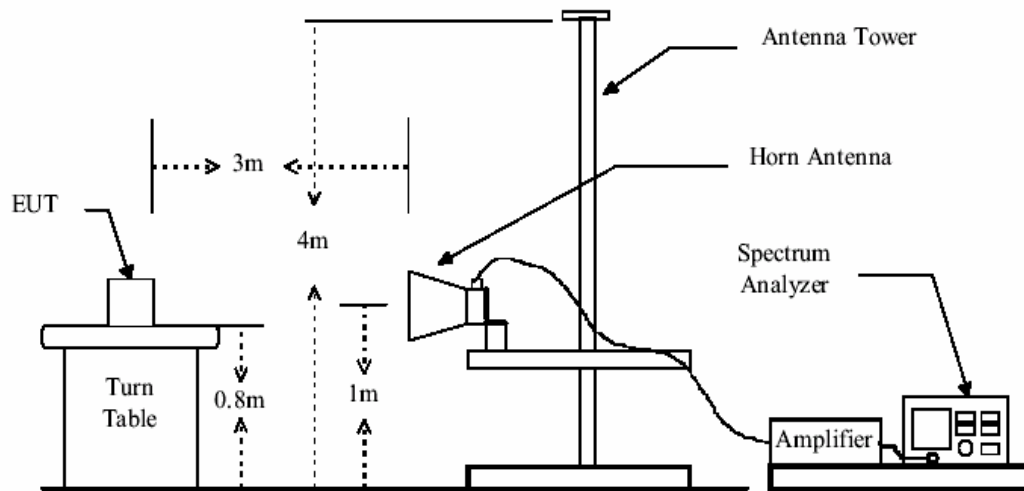


Figure 3. Above 1GHz radiated emissions test configuration

10.4 HARMONIC AND OTHER SPURIOUS EMISSIONS

10.4.1 Test in the EUT in 9KHz to 30MHz:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	13.26	18.82	2.80	21.62	29.54	-7.92	Y axis
2	21.67	20.42	3.25	23.67	29.54	-5.87	Y axis

Note: Y axis was the worse mode. EUT as Radiated Emission test setup photograph in section APPENDIX A of this report.

10.4.2 Test in 802.11b mode lowest channel 2412MHz with 1Mbps data rate:

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	203.860	21.40	12.80	34.20	43.50	-9.30	Horizontal
2	481.650	21.35	21.25	42.60	46.00	-3.40	H
3	43.4705	21.27	12.73	34.00	40.00	-6.00	Vertical
4	50.5928	21.22	10.38	31.60	40.00	-8.40	V

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1752.225	40.35	-2.21	38.14	74.00	-35.86	Horizontal
2	4828.000	55.52	4.42	59.94	74.00	-14.06	H
3	7236.000	39.29	9.83	49.12	74.00	-24.88	H
4	1721.154	42.88	-2.52	40.36	74.00	-33.64	Vertical
5	4828.000	54.65	4.39	59.04	74.00	-14.96	V
6	7236.000	40.02	9.74	49.76	74.00	-24.24	V

Average Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1752.225	36.05	-2.21	33.84	54.00	-20.16	Horizontal
2	4828.000	48.34	4.42	52.76	54.00	-1.24	H
3	7236.000	33.42	9.83	43.25	54.00	-10.75	H
4	1721.154	37.89	-2.52	35.37	54.00	-18.63	Vertical
5	4828.000	46.81	4.39	51.20	54.00	-2.80	V
6	7236.000	34.68	9.74	44.42	54.00	-9.58	V

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correct Factor

10.4.3 Test in 802.11b mode middle channel 2437MHz with 1Mbps data rate:

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	203.880	21.42	12.80	34.22	43.50	-9.28	Horizontal
2	319.577	24.52	16.20	40.72	47.00	-6.09	H
3	44.709	24.78	11.66	36.44	40.00	-1.56	Vertical
4	113.000	23.64	9.31	32.95	40.00	-7.05	V

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1752.225	40.42	-2.21	38.21	74.00	-35.79	Horizontal
2	4874.000	55.67	4.46	60.13	74.00	-13.87	H
3	7311.000	39.00	9.80	48.80	74.00	-25.20	H
4	1723.005	42.05	-2.52	39.53	74.00	-34.47	Vertical
5	4874.000	54.65	4.46	59.11	74.00	-14.89	V
6	7311.000	40.02	9.80	49.82	74.00	-24.18	V

Average Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1752.225	36.11	-2.21	33.90	54.00	-20.10	Horizontal
2	4874.000	48.56	4.46	53.02	54.00	-0.80	H
3	7311.000	34.78	9.80	44.58	54.00	-9.42	H
4	1723.005	36.83	-2.52	34.31	54.00	-19.69	Vertical
5	4874.000	48.22	4.46	52.68	54.00	-1.32	V
6	7311.000	34.65	9.80	44.45	54.00	-9.55	V

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correct Factor

10.4.4 Test in 802.11b mode highest channel 2462MHz with 1Mbps data rate:

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	160.100	28.12	10.69	38.81	40.00	-1.19	Horizontal
2	248.172	30.53	13.60	44.13	47.00	-2.87	H
3	45.002	24.60	11.66	36.26	40.00	-3.74	Vertical
4	114.230	23.72	9.31	33.03	40.00	-6.97	V

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1591.346	41.11	-3.85	37.26	74.00	-36.74	Horizontal
2	4924.000	54.86	4.43	59.29	74.00	-14.71	H
3	7386.000	39.15	9.81	48.96	74.00	-25.04	H
4	1721.154	42.88	-2.52	40.36	74.00	-33.64	Vertical
5	4924.000	54.65	4.43	59.08	74.00	-14.92	V
6	7386.000	39.02	9.81	48.83	74.00	-25.17	V

Average Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1591.346	37.43	-3.85	33.58	54.00	-20.42	Horizontal
2	4924.000	47.65	4.43	52.08	54.00	-1.92	H
3	7386.000	33.74	9.81	43.55	54.00	-10.45	H
4	1721.154	37.85	-2.52	35.33	54.00	-18.67	Vertical
5	4924.000	49.48	4.43	53.91	54.00	-0.09	V
6	7386.000	33.09	9.81	42.90	54.00	-11.1	V

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correct Factor

10.4.5 Test in 802.11g mode lowest channel 2412MHz with 6Mbps data rate:

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	207.245	21.56	12.97	34.53	43.50	-8.97	Horizontal
2	485.430	21.27	21.21	42.48	46.00	-3.52	H
3	45.471	21.21	12.70	33.91	40.00	-6.09	Vertical
4	51.206	21.62	10.42	32.04	40.00	-7.96	V

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1753.000	40.35	-2.18	38.17	74.00	-35.83	Horizontal
2	4828.000	56.23	4.42	60.65	74.00	-13.35	H
3	7236.000	39.46	9.83	49.29	74.00	-24.71	H
4	1721.154	42.90	-2.52	40.38	74.00	-33.62	Vertical
5	4828.000	54.67	4.39	59.06	74.00	-14.94	V
6	7236.000	40.00	9.74	49.74	74.00	-24.26	V

Average Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1753.000	36.00	-2.18	33.82	54.00	-20.18	Horizontal
2	4828.000	48.28	4.42	52.7	54.00	-1.30	H
3	7236.000	33.46	9.83	43.29	54.00	-10.71	H
4	1721.154	38.84	-2.52	36.32	54.00	-17.68	Vertical
5	4828.000	46.85	4.39	51.24	54.00	-2.76	V
6	7236.000	34.79	9.74	44.53	54.00	-9.47	V

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correct Factor

10.4.6 Test in 802.11g mode middle channel 2437MHz with 6Mbps data rate:

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	203.860	21.40	12.80	34.20	43.50	-9.30	Horizontal
2	481.650	21.35	21.25	42.60	46.00	-3.40	H
3	43.4705	21.27	12.73	34.00	40.00	-6.00	Vertical
4	50.5928	21.22	10.38	31.60	40.00	-8.40	V

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1752.225	40.42	-2.21	38.21	74.00	-35.79	Horizontal
2	4874.000	56.72	4.46	61.18	74.00	-12.82	H
3	7311.000	39.23	9.80	49.03	74.00	-24.97	H
4	1723.005	42.23	-2.52	39.71	74.00	-34.29	Vertical
5	4874.000	54.76	4.46	59.22	74.00	-14.78	V
6	7311.000	40.21	9.80	50.01	74.00	-23.99	V

Average Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1752.225	36.05	-2.21	33.84	54.00	-20.16	Horizontal
2	4874.000	48.34	4.46	52.80	54.00	-1.20	H
3	7311.000	33.42	9.80	43.22	54.00	-10.78	H
4	1723.005	37.89	-2.52	35.37	54.00	-18.63	Vertical
5	4874.000	46.81	4.46	51.27	54.00	-2.73	V
6	7311.000	34.68	9.80	44.48	54.00	-9.52	V

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correct Factor

10.4.7 Test in 802.11g mode highest channel 2462MHz with 6Mbps data rate:

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	203.860	21.40	12.80	34.20	43.50	-9.30	Horizontal
2	481.650	21.35	21.25	42.60	46.00	-3.40	H
3	43.4705	21.27	12.73	34.00	40.00	-6.00	Vertical
4	50.5928	21.22	10.38	31.60	40.00	-8.40	V

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1591.346	41.34	-3.85	37.49	74.00	-36.51	Horizontal
2	4924.000	55.54	4.43	59.97	74.00	-14.03	H
3	7386.000	39.88	9.81	49.69	74.00	-24.31	H
4	1721.154	42.65	-2.52	40.13	74.00	-33.87	Vertical
5	4924.000	54.43	4.43	58.86	74.00	-15.14	V
6	7386.000	39.23	9.81	49.04	74.00	-24.96	V

Average Measurement:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	1591.346	37.28	-3.85	33.43	54.00	-20.57	Horizontal
2	4924.000	47.46	4.43	51.89	54.00	-2.11	H
3	7386.000	33.69	9.81	43.50	54.00	-10.5	H
4	1721.154	37.98	-2.52	35.46	54.00	-18.54	Vertical
5	4924.000	48.00	4.43	52.43	54.00	-1.57	V
6	7386.000	33.45	9.81	43.26	54.00	-10.74	V

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correct Factor

Remark: No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

Remark:

- 1). N/A: For this intentional radiator operates below 25 GHz. The spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 3rd harmonic.
- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test result: The unit does meet the requirements.

10.5 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

10.5.1 LIMITS

According to Section 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Table 2 Limit:	40.0 dB μ V/m between 30MHz & 88MHz;
	43.5 dB μ V/m between 88MHz & 216MHz;
	46.0 dB μ V/m between 216MHz & 960MHz;
	54.0 dB μ V/m above 960MHz.

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

10.5.2 TEST RESULT

1. Lowest Channel

No.	Frequency (MHz)	PK Reading (dBuV/m)	AV Reading (dBuV/m)	Correct Factor(dB/m)	Peak (dBuV/m)	Average (dBuV/m)
1	2390.000	49.63	45.20	1.02	50.65	46.06
2	2483.500	49.25	45.00	0.89	50.14	45.89

2. Highest Channel

No.	Frequency (MHz)	PK Reading (dBuV/m)	AV Reading (dBuV/m)	Correct Factor(dB/m)	Peak (dBuV/m)	Average (dBuV/m)
1	2390.000	48.58	44.06	1.02	48.60	45.08
2	2483.500	48.03	43.95	0.89	48.92	44.94

Remark: No any other emission which falls in restricted bands can be detected and be reported.
The unit does meet the FCC requirements.

11. BAND EDGE

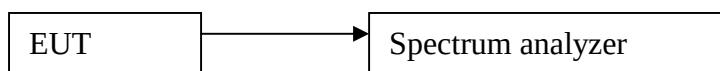
11.1 LIMITS

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)).

11.2 TEST PROCEDURES

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. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
Note: For Restricted Band
RBW=100 kHz
VBW=300 kHz
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.

11.3 TEST SETUP



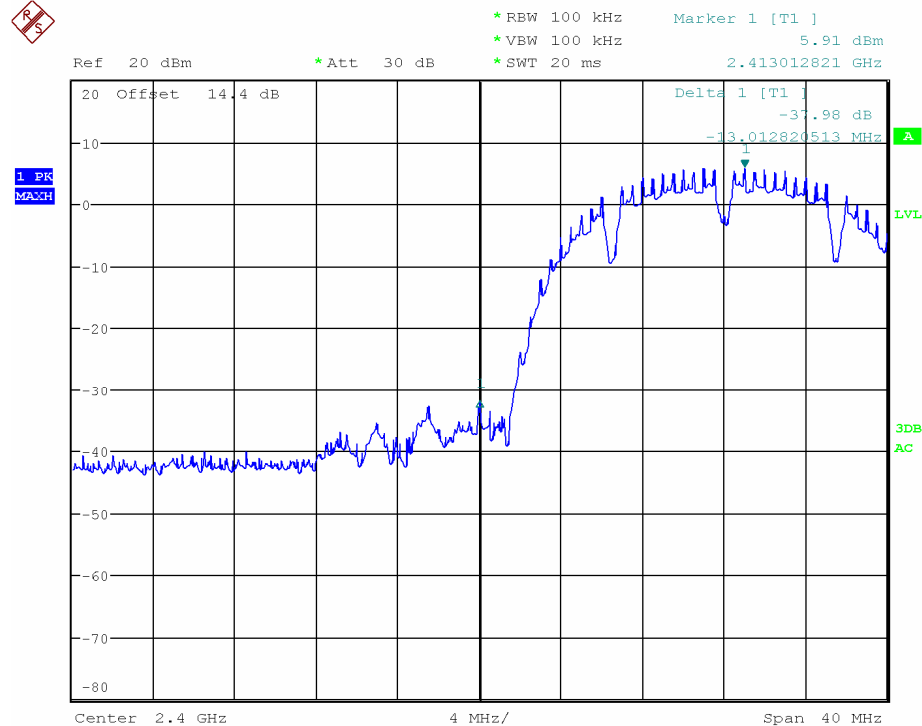
11.4 TEST RESULTS

The band edges were measured and recorded Result:

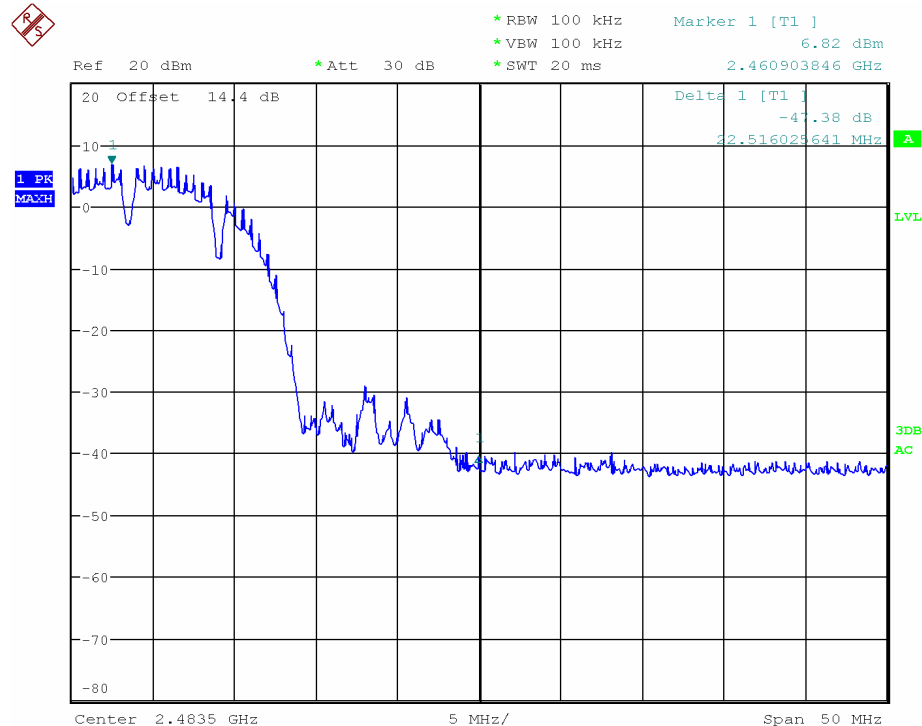
The Lower Edges attenuated more than 20dB.

The Upper Edges attenuated more than 20dB.

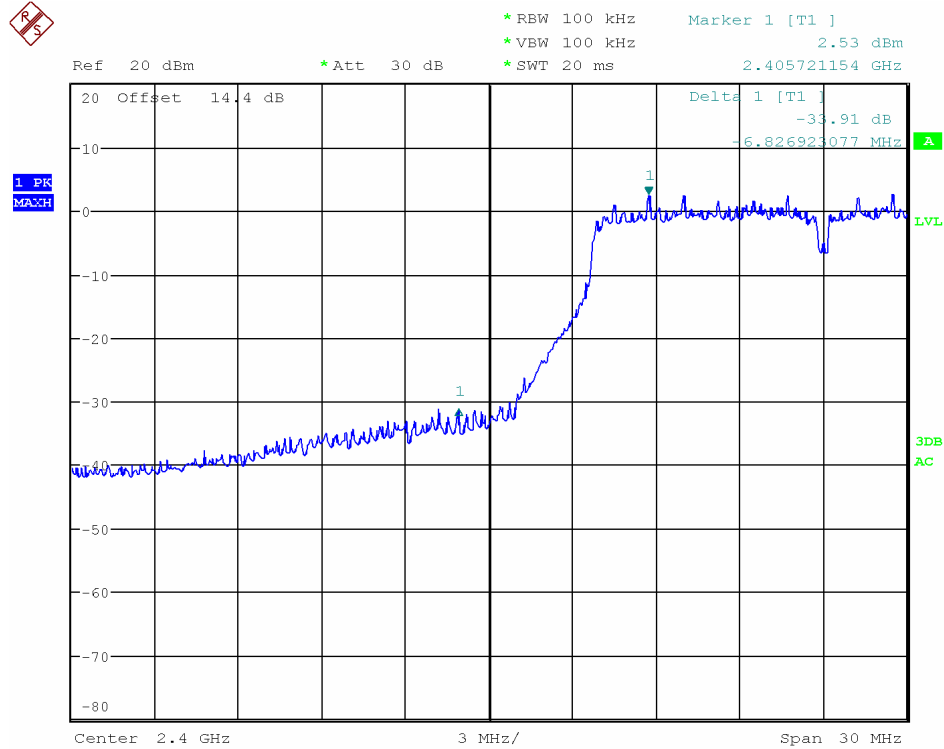
802.11b mode with 11Mbps data rates:
Channel 2412MHz



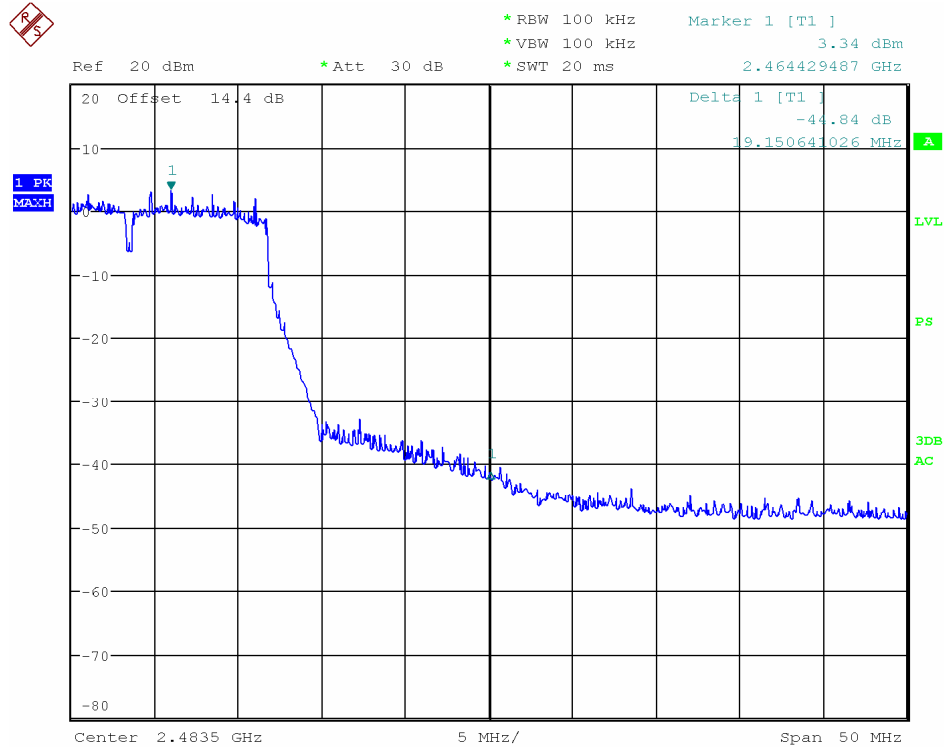
Channel 2462MHz



802.11g mode with 54Mbps data rates::
Channel 2412MHz



Channel 2462MHz



APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT

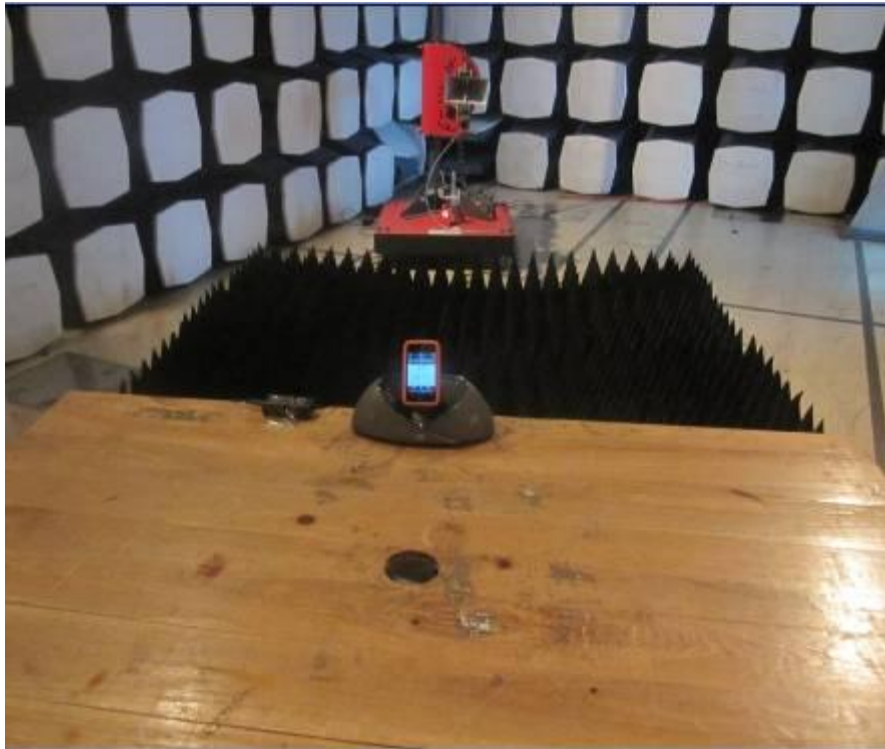
RE (9KHz – 30MHz)



RE (30MHz - 1GHz)



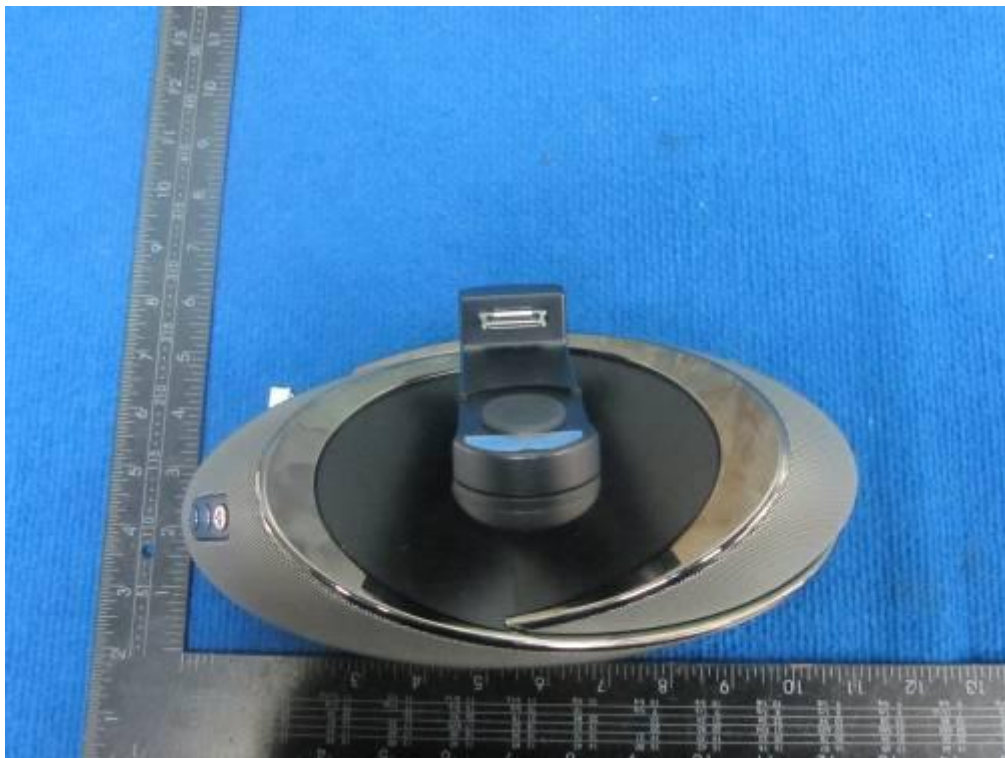
RE (Above 1GHz)

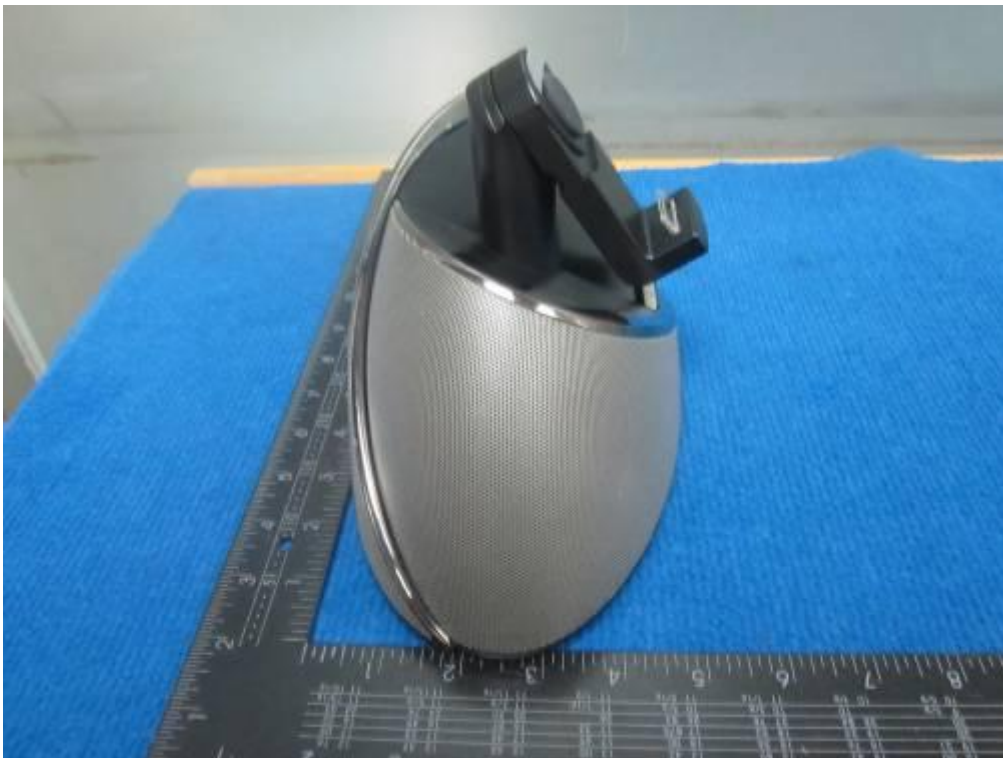


CE



APPENDIX B: PHOTOGRAPH OF THE EUT













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