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Report No.: SHEM130400052204
Page 1 of 576

FCC Part 15C TEST REPORT

Application No. :	SHEM1304000522RF
Applicant:	Hansong (Nanjing) Technology Ltd.
FCC ID:	XCO-KMCSTADIUM
IC:	7756A-KMCSTADIUM
Equipment Under Test (EUT):	
NOTE: The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Airplay Speaker
Brand Name:	Klipsch
Model:	Klipsch STADIUM
Added Model:	N/A
Standards:	FCC PART 15 SUBPART C, Section 15.247:2012 RSS-210 Issue 8 (December 2010) RSS-Gen Issue 3 (December 2010)
Date of Receipt:	April 17, 2013
Date of Test:	July 11, 2013 to July 12, 2013
Date of Issue:	July 16, 2013
Test Result:	PASS *

*In the configuration tested, the EUT detailed in this report complied with the standards specified above.



Tony Wu

E&E Section Manager

SGS-CSTC (Shanghai) Co., Ltd.

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00	/	July 16, 2013	/	Original

Authorized for issue by:				
Engineer		Zenger Zhang		Zenger Zhang
		Print Name		
Clerk		Susie Liu		Susie Liu
		Print Name		
Reviewer		Keny Xu		Keny. xu
		Print Name		



3 Test Summary

TEST ITEM	FCC REFERENCE	IC REFERENCE	Test Procedure	RESULT
Power line conducted emission	15.207	RSS-Gen Issue 8 Clause 7.2.4	ANSI C63.4,2009 Clause 7.3	Pass
Radiated emission	15.205 & 15.209	RSS-Gen Issue 8 Clause 7.2.5	ANSI C63.4,2009 Clause 8.3	Pass
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-210 Issue 8 Annex 8	KDB 558074 D01 Clause 8.1	Pass
Maximum peak output power	15.247(b)	RSS-210 Issue 8 Annex 8	KDB 558074 D01 Clause 9.1.2	Pass
Power spectrum density	15.247(e)	RSS-210 Issue 8 Annex 8	KDB 558074 D01 Clause 10.2	Pass
RF Conducted Spurious Emissions	15.247(d)	RSS-210 Issue 8 Annex 8	KDB 558074 D01 Clause 11 & Clause 12	Pass
Radiated Emission BandEdge	15.247(d)	RSS-210 Issue 8 Annex 8	KDB 558074 D01 Clause 12	Pass
Emission outside the Frequency band	15.247(d)	RSS-210 Issue 8 Annex 8	KDB 558074 D01 Clause 11 & Clause 12	Pass
Occupied bandwidth	---	RSS-Gen Issue 3 Clause 4.6.1	RSS-Gen Issue 3 Clause 4.6.1	Tested

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5 General Information

5.1 Client Information

Applicant:	Hansong (Nanjing) Technology Ltd.
Address of Applicant:	8th Kangping Road, Jiangning Economy& Technology Development Zone, 211106 Nanjing, People's Republic of China
Manufacturer:	Klipsch Group Inc
Address of Manufacturer:	3502 Woodview Trace, Indianapolis IN 46268, USA
Factory:	Not supplied by the client.

5.2 General Description of E.U.T.

Product Name	Airplay Speaker
Brand Name:	Klipsch
Model No:	Klipsch STADIUM
Added Model:	N/A
Product Description:	Audio Speaker

5.3 Technical Specifications:

Operation Frequency:	802.11b/g:2412MHz~2462MHz	
Modulation Technique:	802.11b: DSSS, 802.11g: OFDM	
Power Supply:	Rated Input:	AC 100V-240V
Cable:	AC Cable:	About 1.8m Length (2 Wires)
Antenna Type	Integral	
Antenna Gain	3.0dBi	

5.4 Support equipments for Testing

The EUT has been tested with support equipments as below.

Software name	Manufacturer	Supplied By
Hypertrm	N/A	SGS

5.5 Details of Test Mode

Test Mode	Description of Test Mode
Wi-Fi Wi-Fi transmitting mode	Keep the EUT on continue Wi-Fi Wi-Fi transmitting mode.

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Test Channel:

For 802.11b/g:

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
No.588 West Jindu Road, Songjiang District, Shanghai, China.201612.

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

5.7 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2015-02-22.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively. Date of Registration: 2012-05-29. Date of Expiry: 2015-05-28.

6 Equipments Used during Test

Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2013-02-23	2014-02-22
2	Line impedance stabilization network	SCHWARZBECK	NSLK8127	8127-490	2013-02-23	2014-02-22
3	Line impedance stabilization network	ETS	3816/2	00034161	2013-02-23	2014-02-22

 RF Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100109	2013-02-23	2014-02-22
2	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-679	2013-03-07	2014-03-06
3	Horn Antenna	Rohde & Schwarz	HF906	100284	2013-06-03	2014-06-01
4	ANTENNA	SCHWARZBECK	VULB9168	9168-313	2013-03-07	2014-03-06
5	Horn Antenna	SCHWARZBECK	BBHA9170 373	BBHA9170 373	2013-03-07	2014-03-06
6	Ultra broadband antenna	Rohde & Schwarz	HL562	100227	2012-10-09	2013-10-08
7	Atmosphere pressure meter	Shanghai ZhongXuan Electronic Co.;Ltd	BY 2009P	--	2012-10-09	2013-10-08
8	CLAMP METER	FLUKE	316	86080010	2013-06-03	2014-06-01
9	Thermo-Hygrometer	ZHICHEN	ZC1-2	01050033	2012-10-09	2013-10-08



10	Tunable Notch Filter	Wainwright instruments GmbH	WRCT180 0.0/ 2000.0- 0.2/40- 5SSK	11	2013-06-03	2014-06-01
11	Tunable Notch Filter	Wainwright instruments GmbH	WRCT800. 0/880.0- 0.2/40- 5SSK	9	2013-06-03	2014-06-01
12	High pass Filter	FSCW	HP 12/2800- 5AA2	19A45-02	2013-06-03	2014-06-01
13	Low nosie amplifier	TESEQ	LNA6900	70133	2013-02-23	2014-02-22

7 Test Results

7.1 E.U.T. test conditions

Test Power:	AC 120V, 60Hz
Requirements:	15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.
Operating Environment:	
Temperature:	20.0 -25.0 °C
Humidity:	35-75 % RH
Atmospheric Pressure:	992 -1020 mbar

7.2 Antenna Requirement

Standard requirement

15.203 requirement:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

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 gain of the antenna is less than 3.0 dBi.

7.3 Conducted Emissions on Mains Terminals

Test Requirement: FCC Part 15C, Section 15.207

RSS-Gen Issue 8 Clause 7.2.4

Test Method: ANSI C63.4:2009 Section 7.3

Test Date: July 11, 2013

Test Result: Pass

Test Voltage: AC 120V 60Hz

Frequency Range: 150 KHz

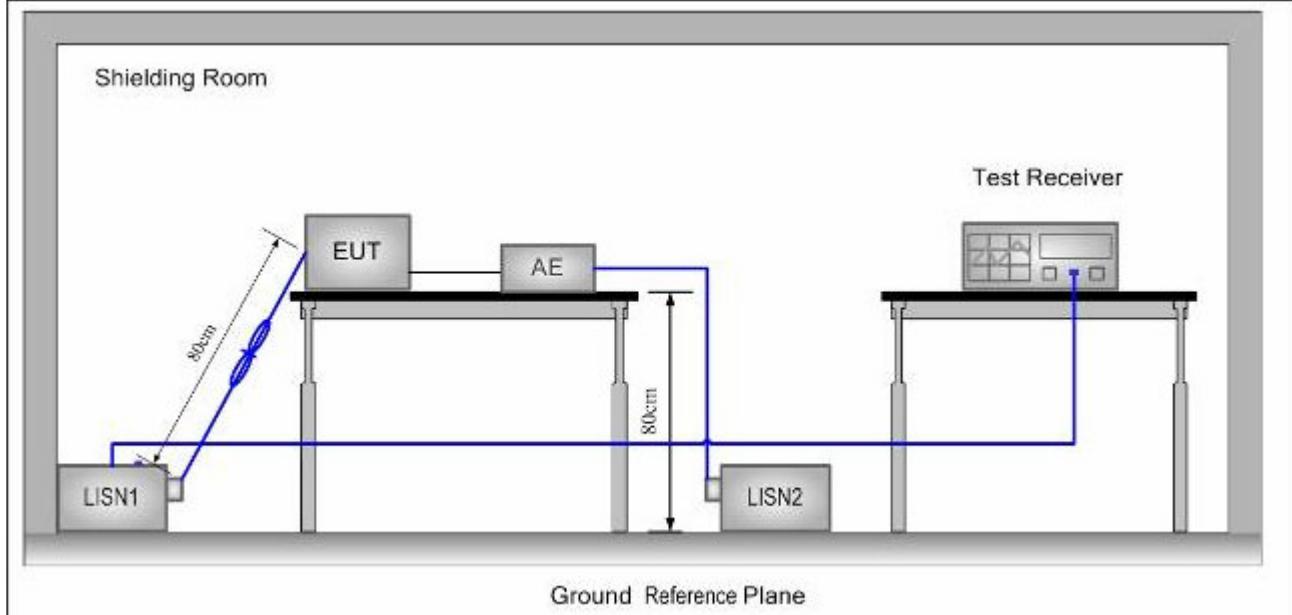
Class/Severity: Class B

Test mode: Wi-Fi transmitting mode

Limit:

Frequency range MHz	Class B Limits dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Test Setup and Procedure



1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT was connected to a second LISN, which was bonded to the ground reference plane in the same way as the



LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded

3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment was at least 0.8 m from the LISN.

Measurement Data

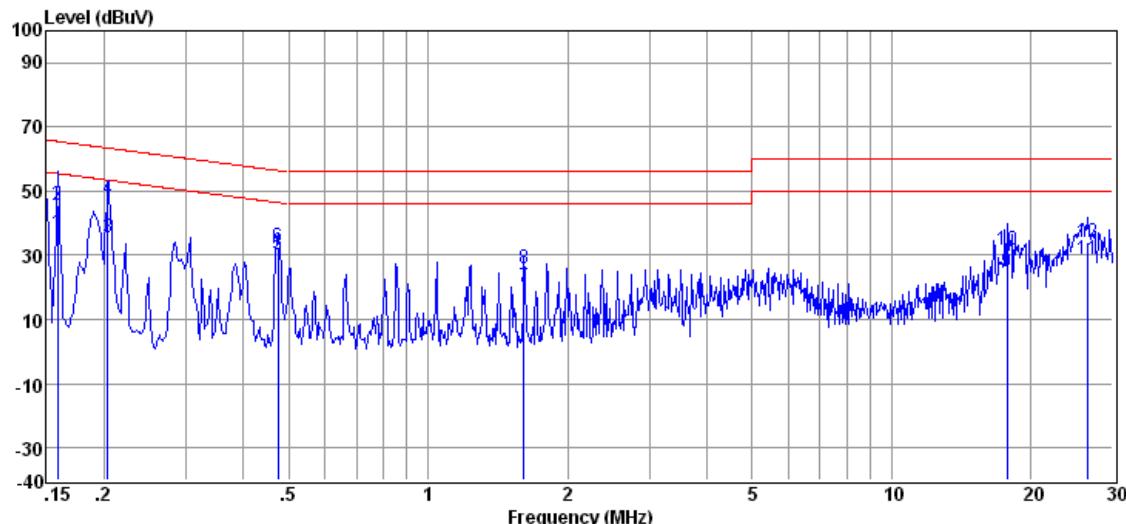
Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected.

Please see the attached Quasi-peak and Average test results.

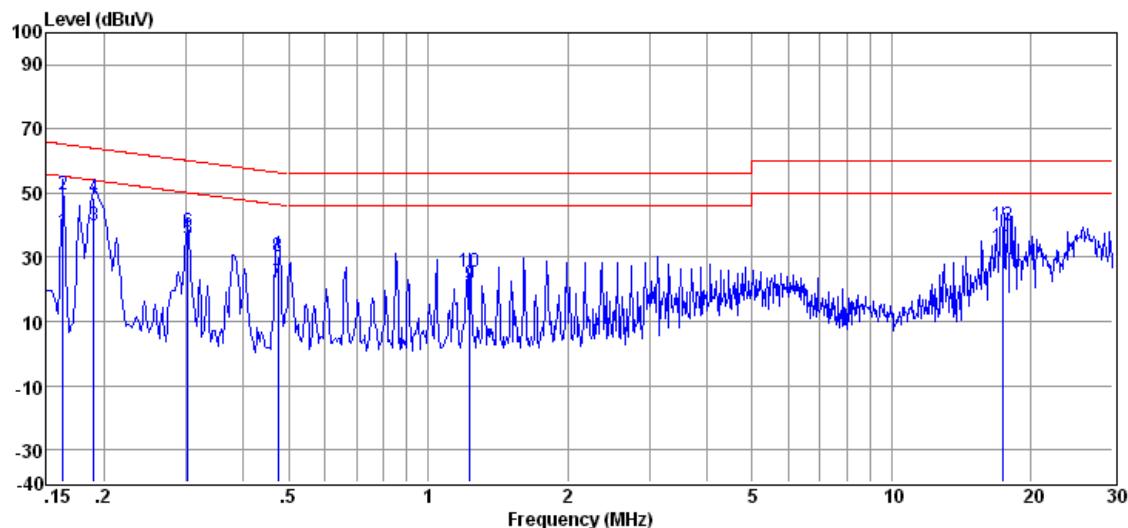
Level = Read Level + LISN/ISN Factor + Cable Loss.

Test Mode: Wi-Fi transmitting mode

Test Port: AC Live Line



Freq (MHz)	Read Level (dB μ V)	LISN Factor (dB)	Cable Loss (dB)	Level (dB μ V)	Limit Line (dB μ V)	Over Limit (dB)	Detector	Phase
0.159	36.87	0.18	0.10	37.15	55.52	-18.37	Average	Live
0.159	45.52	0.18	0.10	45.80	65.52	-19.72	QP	Live
0.204	35.41	0.10	0.10	35.61	53.45	-17.84	Average	Live
0.204	47.57	0.10	0.10	47.77	63.45	-15.68	QP	Live
0.474	29.89	0.19	0.10	30.18	46.45	-16.27	Average	Live
0.474	32.47	0.19	0.10	32.76	56.45	-23.69	QP	Live
1.610	19.80	0.26	0.10	20.16	46.00	-25.84	Average	Live
1.610	25.63	0.26	0.10	25.99	56.00	-30.01	QP	Live
17.755	24.02	0.60	0.16	24.78	50.00	-25.22	Average	Live
17.755	30.77	0.60	0.16	31.53	60.00	-28.47	QP	Live
26.558	27.91	0.83	0.20	28.94	50.00	-21.06	Average	Live
26.558	33.02	0.83	0.20	34.05	60.00	-25.95	QP	Live

Test Mode: Wi-Fi transmitting mode**Test Port:** AC Neutral Line

Freq (MHz)	Read Level (dB μ V)	LISN Factor (dB)	Cable Loss (dB)	Level (dB μ V)	Limit Line (dB μ V)	Over Limit (dB)	Detector	Phase
0.163	37.55	0.17	0.10	37.82	55.30	-17.48	Average	Neutral
0.163	49.06	0.17	0.10	49.33	65.30	-15.97	QP	Neutral
0.190	39.50	0.12	0.10	39.72	54.02	-14.30	Average	Neutral
0.190	48.26	0.12	0.10	48.48	64.02	-15.54	QP	Neutral
0.303	35.46	0.10	0.10	35.66	50.15	-14.49	Average	Neutral
0.303	37.84	0.10	0.10	38.04	60.15	-22.11	QP	Neutral
0.474	21.83	0.10	0.10	22.03	46.45	-24.42	Average	Neutral
0.474	30.16	0.10	0.10	30.36	56.45	-26.09	QP	Neutral
1.229	21.30	0.23	0.10	21.63	46.00	-24.37	Average	Neutral
1.229	24.87	0.23	0.10	25.20	56.00	-30.80	QP	Neutral
17.383	32.21	0.55	0.15	32.91	50.00	-17.09	Average	Neutral
17.383	39.32	0.55	0.15	40.02	60.00	-19.98	QP	Neutral

7.4 6dB Occupied Bandwidth

Test Requirement: FCC Part 15 C Section 15.247 (a)(2)
RSS-210 Issue 8 Annex 8

Test Method: KDB558074 D01 Section 8.1

Test Date: July 11, 2013

Test Result: Pass

Final Test Mode: Wi-Fi transmitting mode

Limit: ≥ 500 kHz

Test Procedure:

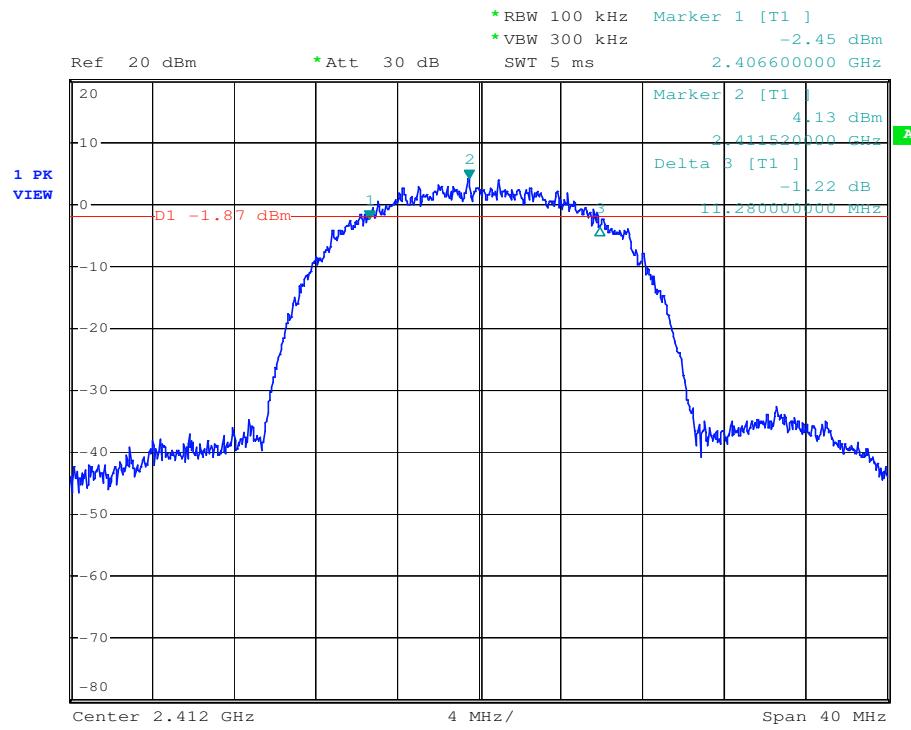
1. Place the EUT on the table and set it in Wi-Fi transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW =3* RBW, Span=30/50MHz, Sweep=auto
4. Mark the peak frequency and -6 dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

Test date

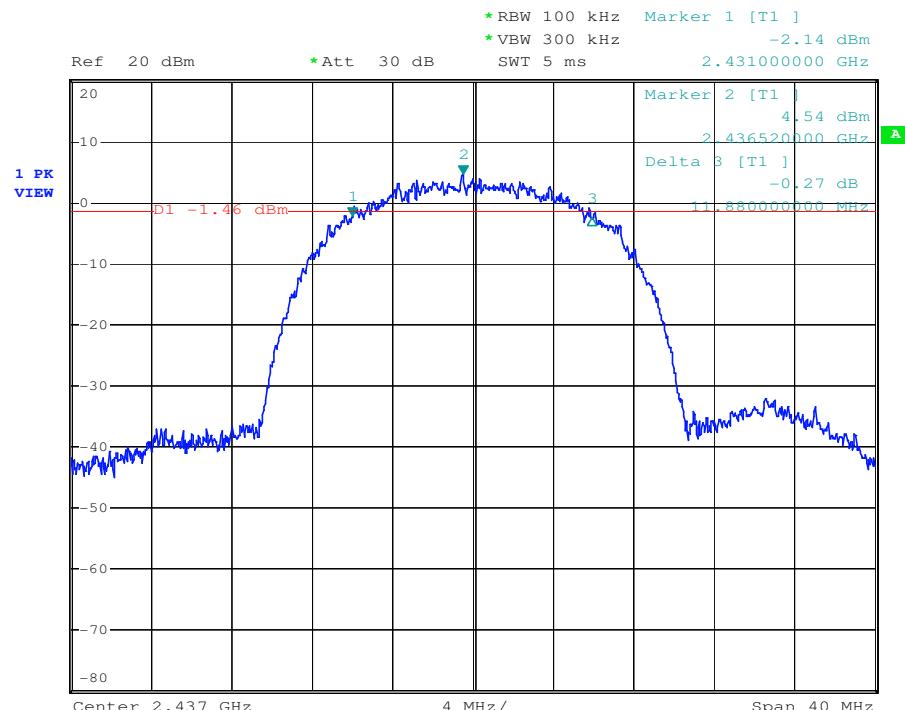
EUT Mode	Test Channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Results
802.11b	Low	11.28	500	Pass
	Middle	11.88	500	Pass
	High	11.80	500	Pass
802.11g	Low	16.60	500	Pass
	Middle	16.60	500	Pass
	High	16.64	500	Pass

Test plot as follows:

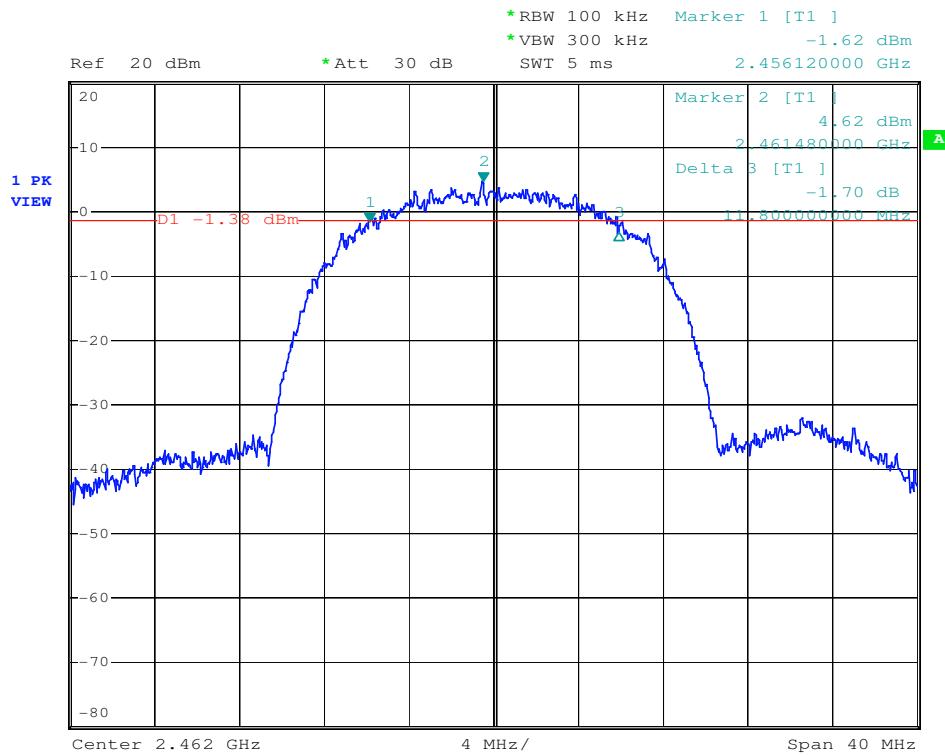
Test mode:	802.11b	Test channel:	Lowest
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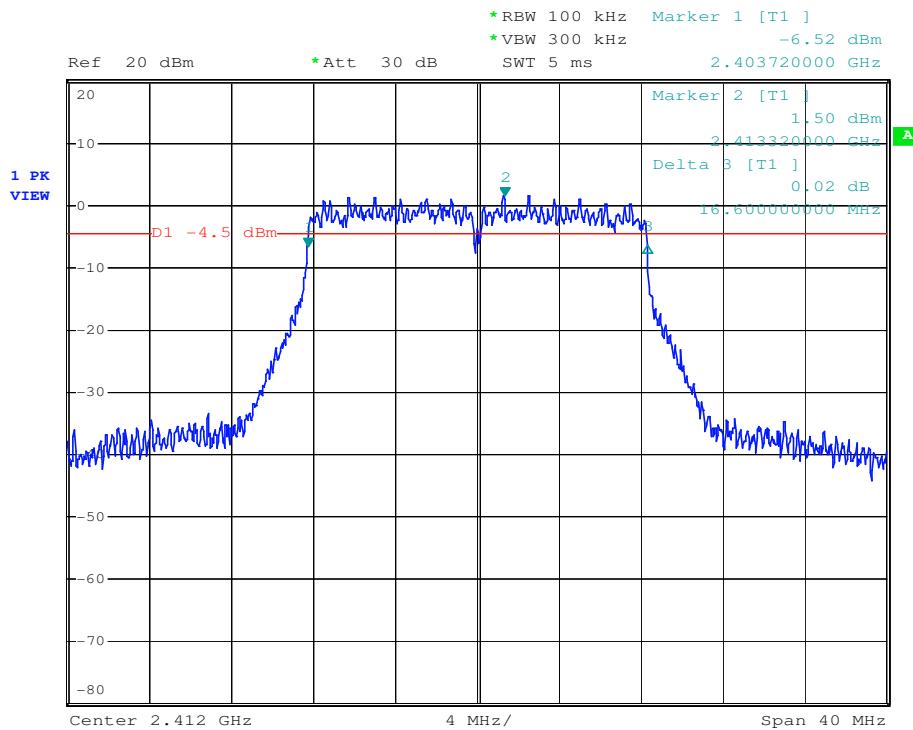
Test mode:	802.11b	Test channel:	Middle
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Test mode:	802.11b	Test channel:	Highest
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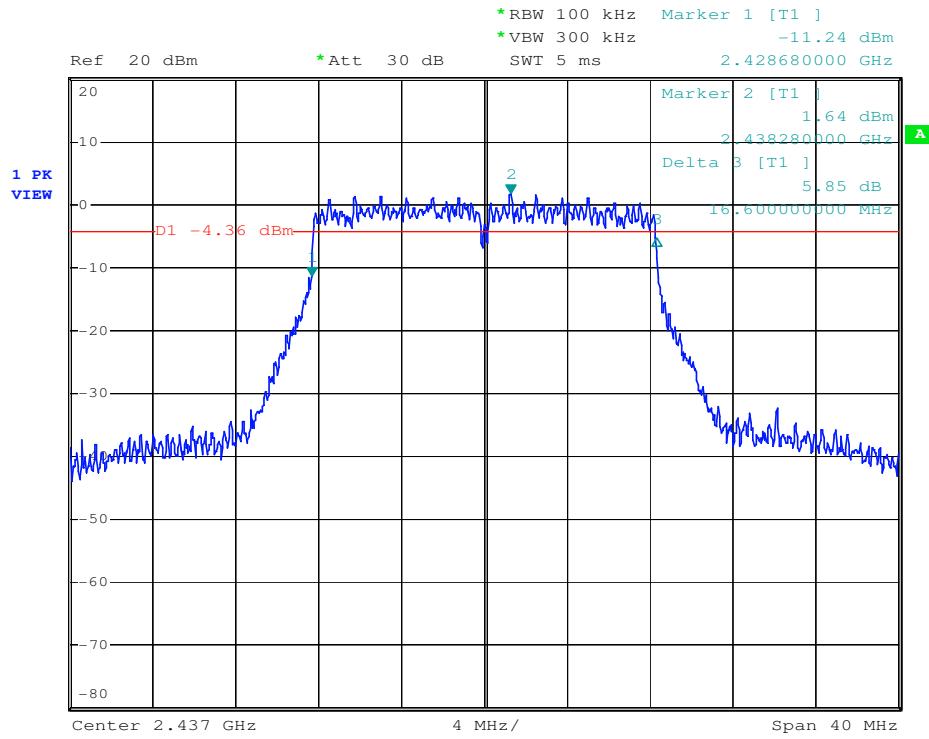


Test mode:	802.11g	Test channel:	Lowest
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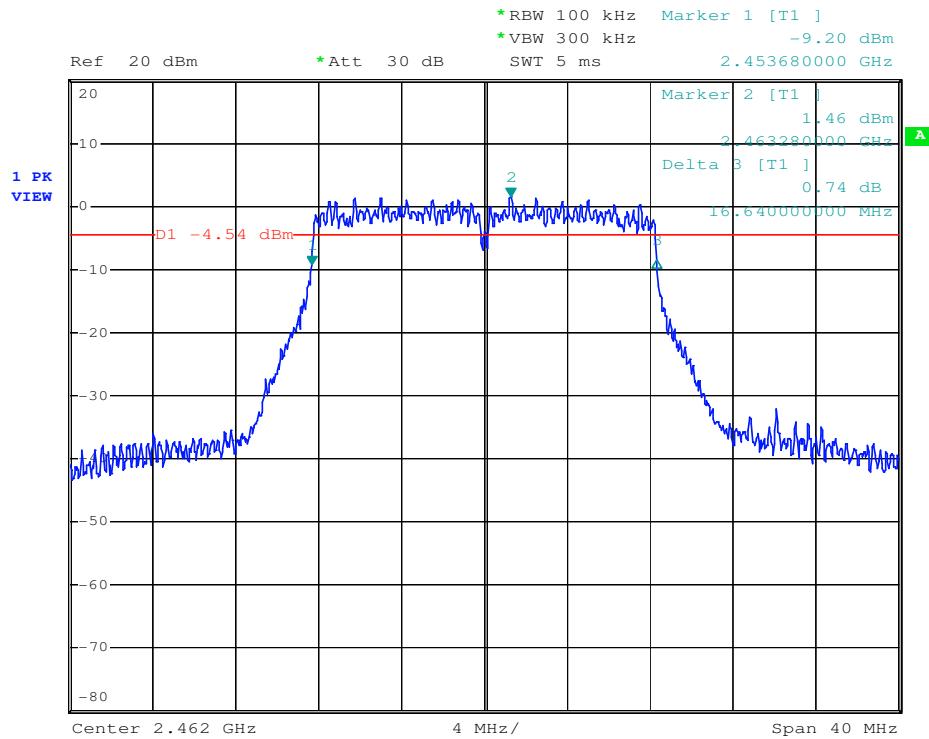


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Test mode:	802.11g	Test channel:	Middle
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Test mode:	802.11g	Test channel:	Highest
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7.5 Conducted Peak Output Power

Test Requirement: FCC Part 15.247 Section 15.247(b)(3)
RSS-210 Issue 8 Annex 8

Test Method: KDB558074 D01 Section 9.1.2

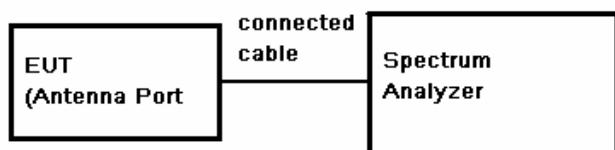
Test Date: July 11, 2013

Test Result: Pass

Test Limit: 30dBm

Final Test Mode: Wi-Fi transmitting mode

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Span= fully encompass the bandwidth, Sweep = auto; Detector Function = Peak Trace mode=max hold
3. Use the spectrum analyzer's channel power measurement function with the band limits set equal to the bandwidth edges.
4. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

Test Results record:

Pre-scan under all rate at lowest channel 1

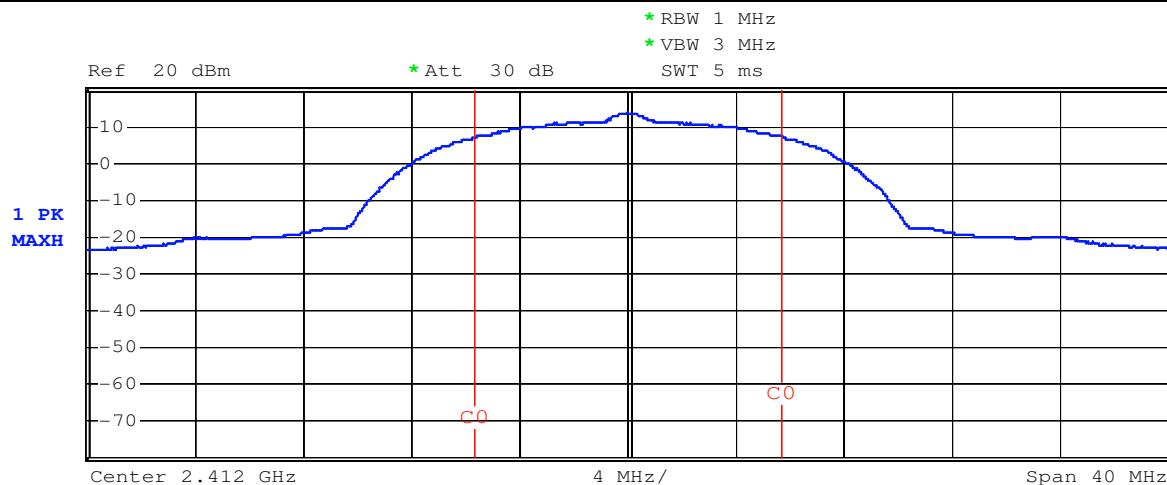
Mode	802.11b			
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps
Power (dBm)	13.85	13.86	13.92	14.03
Mode	802.11g			
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps
Power (dBm)	12.30	12.28	12.32	12.47
				24Mbps
				36Mbps
				48Mbps
				54Mbps

Final test Results:

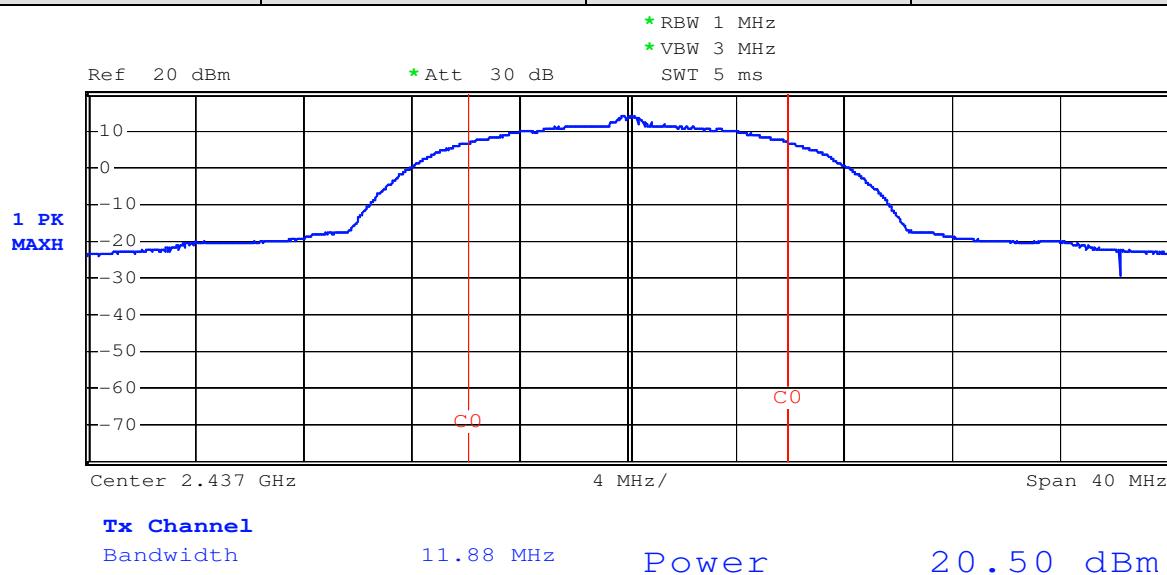
Test mode	Channel	Reading Peak Power (dBm)	Cable Loss (dB)	Output Peak Power (dBm)	Output Peak Power (mW)	Peak Power Limit (dBm)	Result
802.11b	Low	20.42	1.5	21.92	155.60	30	PASS
	Mid	20.50	1.5	22.00	158.49	30	PASS
	High	20.53	1.5	22.03	159.59	30	PASS
802.11g	Low	22.06	1.5	23.56	226.99	30	PASS
	Mid	21.86	1.5	23.36	216.77	30	PASS
	High	22.09	1.5	23.59	228.56	30	PASS

Test result plot as follows:

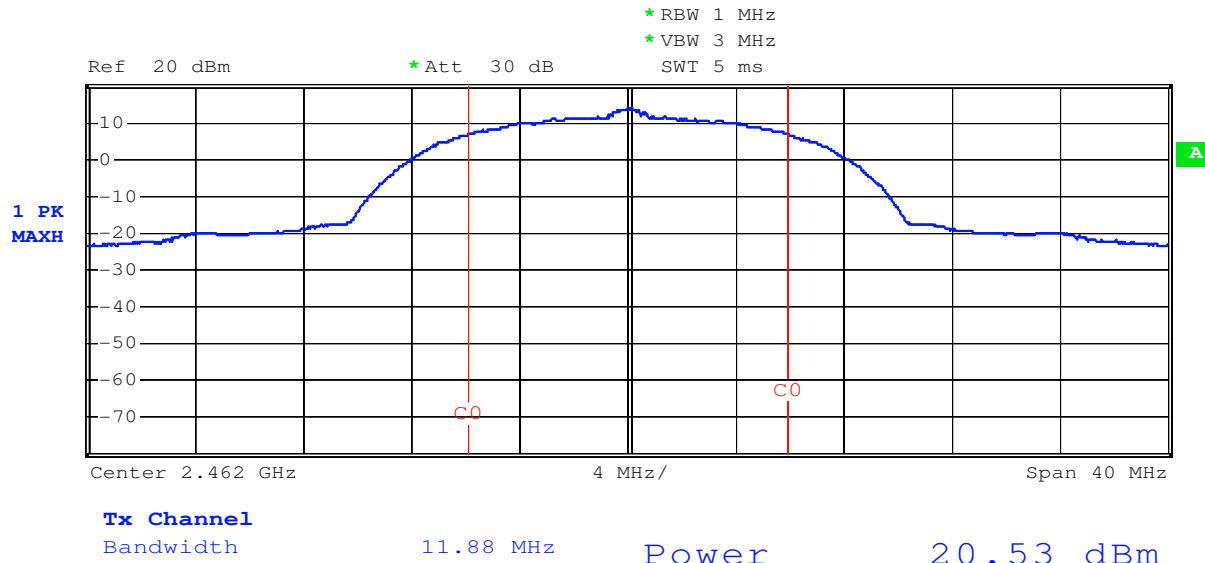
Test mode:	802.11b	Test channel:	Lowest
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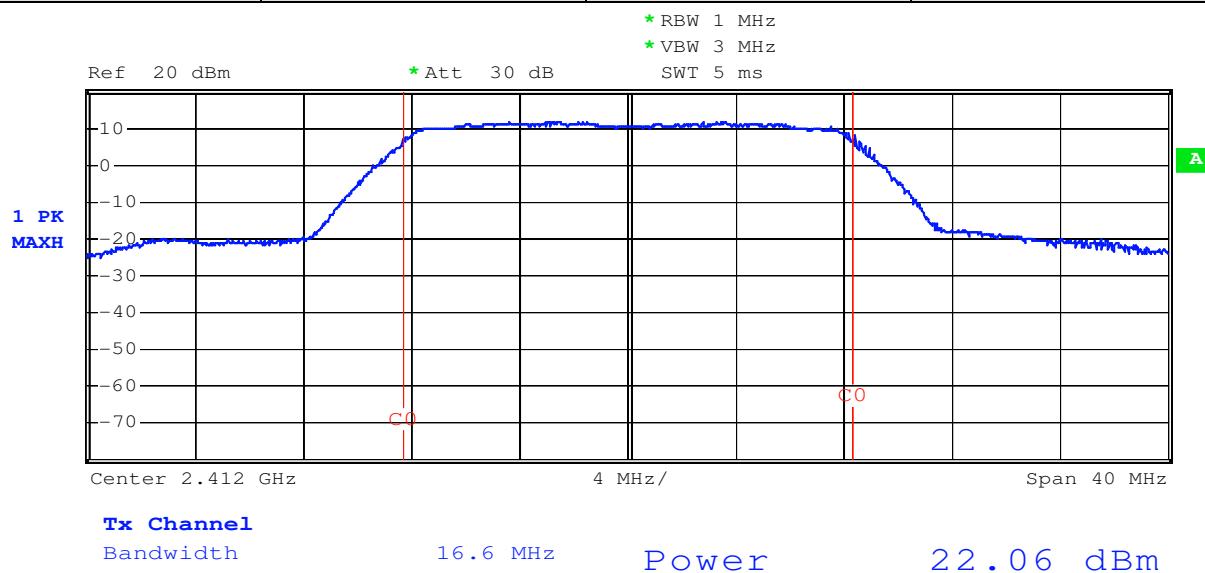
Test mode:	802.11b	Test channel:	Middle
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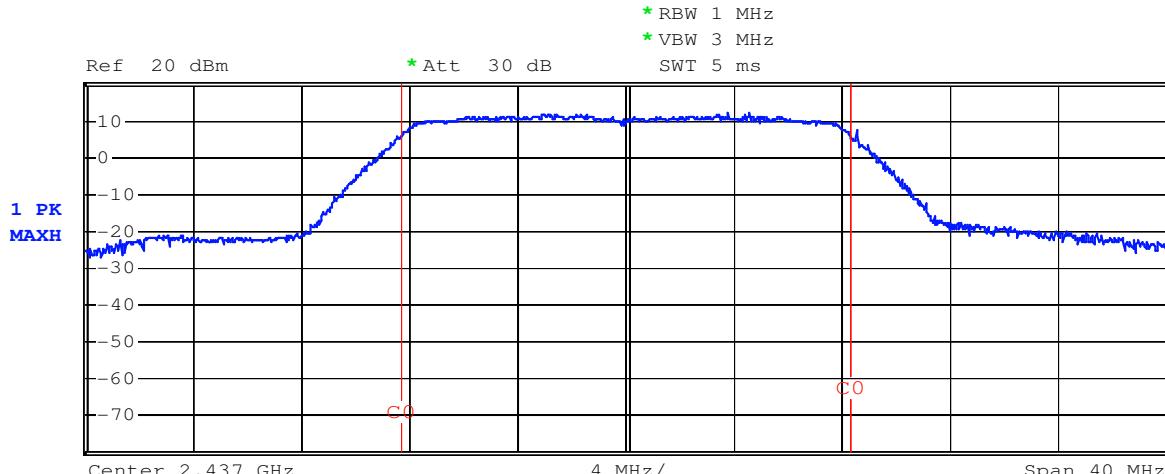
Test mode:	802.11b	Test channel:	Highest
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Test mode:	802.11g	Test channel:	Lowest
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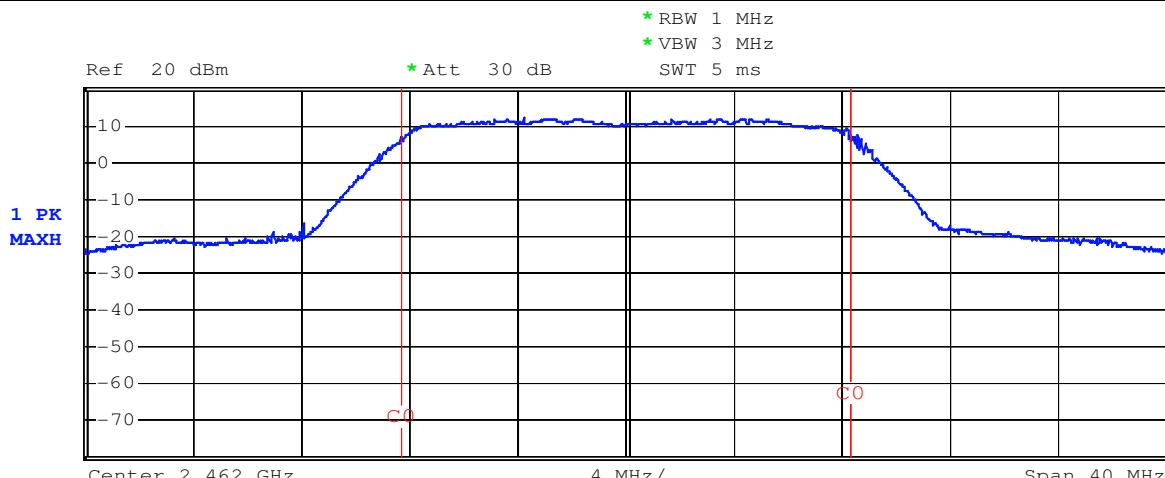


Test mode:	802.11g	Test channel:	Middle
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Tx Channel
Bandwidth 16.6 MHz Power 21.86 dBm

Test mode:	802.11g	Test channel:	Highest
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Tx Channel
Bandwidth 16.64 MHz Power 22.09 dBm

7.6 Peak Power Spectral Density

Test Requirement: FCC Part 15, Subpart C Section 15.247 (e)
RSS-210 Issue 8 Annex 8

Test Method: KDB 558074 D01 Clause 10.2

Test Date: July 11, 2013

Test Result: Pass

Test Limit: 8dBm/3kHz

Final Test Mode: Wi-Fi transmitting mode

Measurement Procedure:

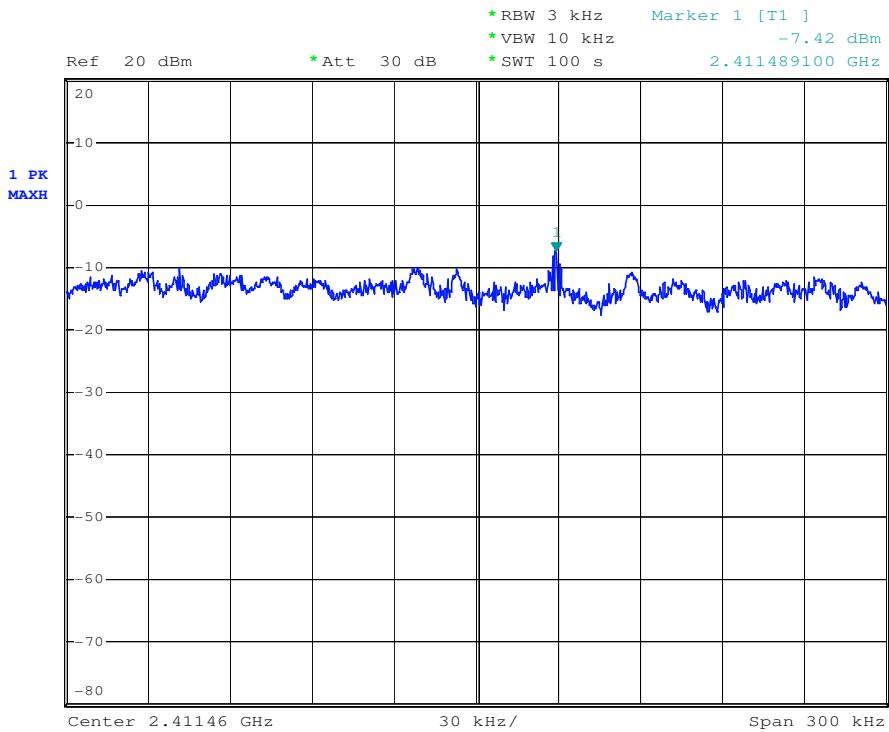
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: Center Frequency= Channel Frequency, RBW = 3kHz VBW = 10kHz. Span= fully encompass the bandwidth, Sweep = auto; Detector Function = Peak Trace mode=max hold,
3. Set MKR=Center Frequency, Trace=Clear Write.
4. **Error! Hyperlink reference not valid.** the Span = 300kHz, Sweep Time=100s, Trace=Max Hold, MKR=Peak Search.
5. Record the marker level for the particular mode.
6. Repeat these steps for other channel and device modes.

Test Results record:

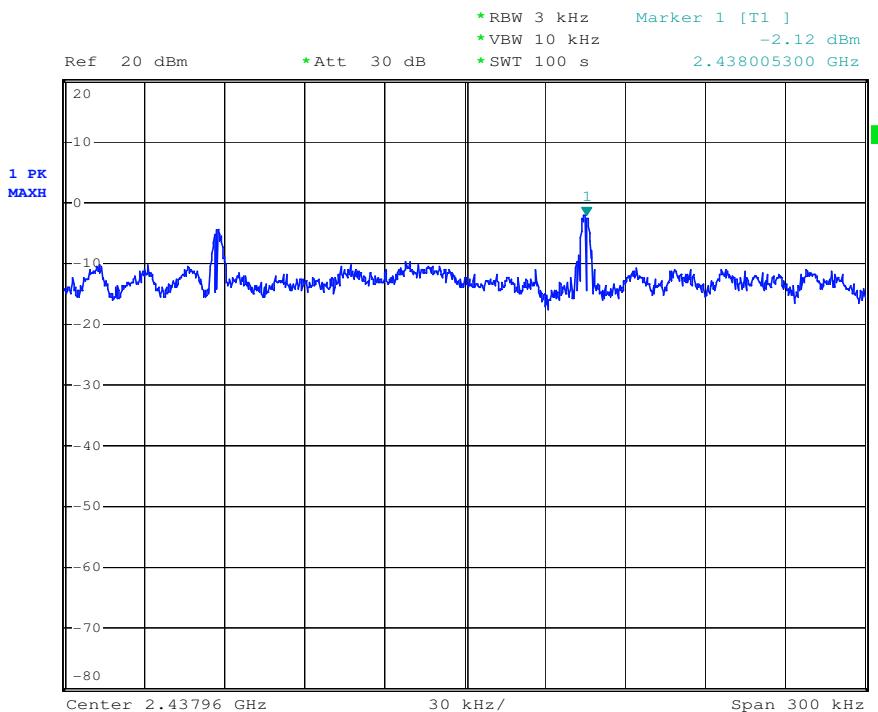
Test mode	Channel	Reading (dBm)	Cable Loss (dB)	RF Power Density (dBm)	Peak Power Limit (dBm)	Result
802.11b	Low	-7.42	1.9	-5.52	8	PASS
	Mid	-2.12	1.9	-0.22	8	PASS
	High	-7.20	1.9	-5.30	8	PASS
802.11g	Low	-11.70	1.9	-9.80	8	PASS
	Mid	-11.85	1.9	-9.95	8	PASS
	High	-12.15	1.9	-10.25	8	PASS

Test plot as follows:

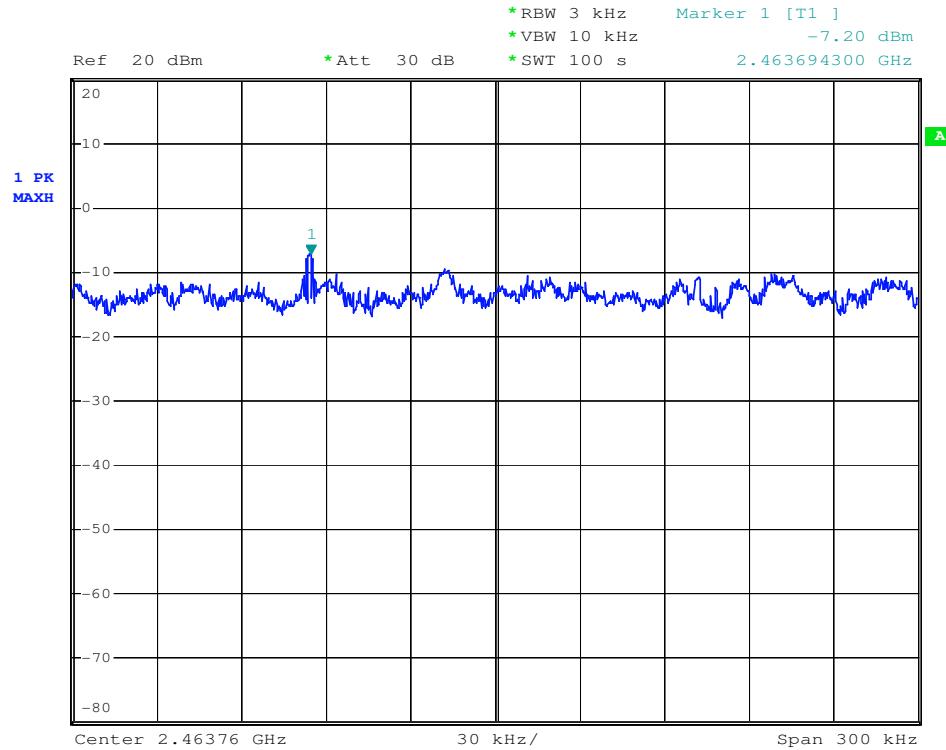
Test mode:	802.11b	Test channel:	Lowest
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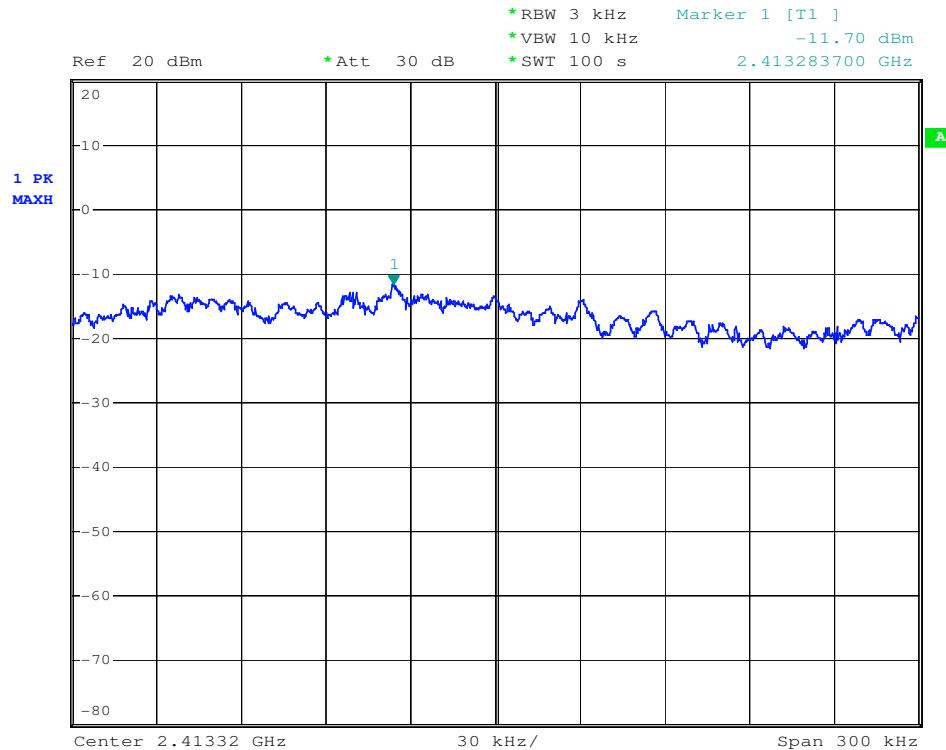
Test mode:	802.11b	Test channel:	Middle
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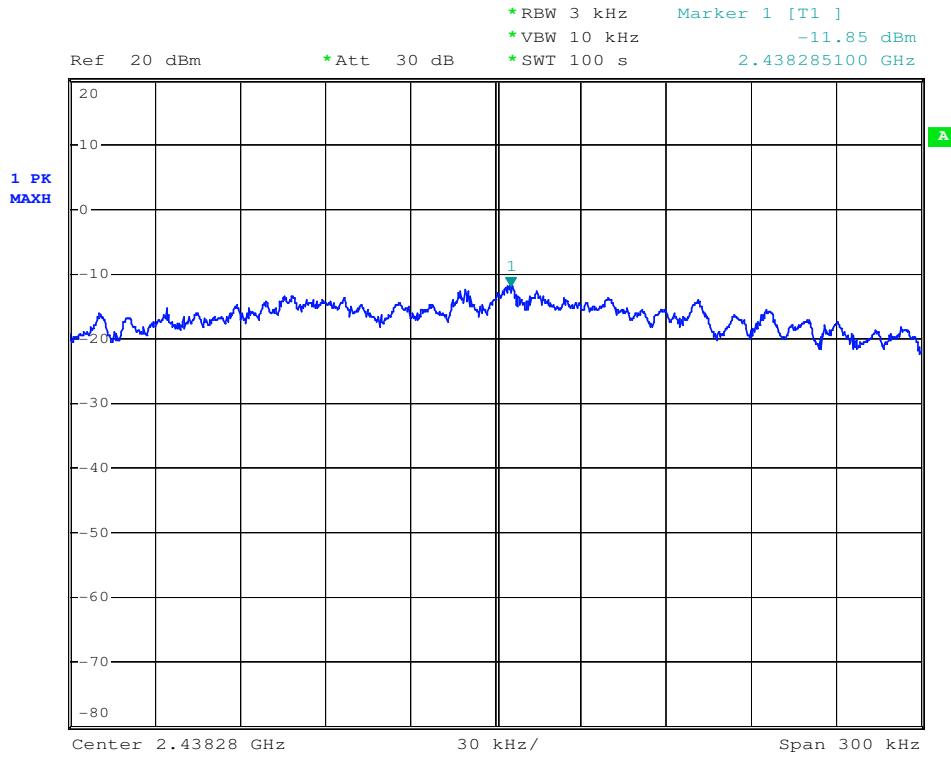
Test mode:	802.11b	Test channel:	Highest
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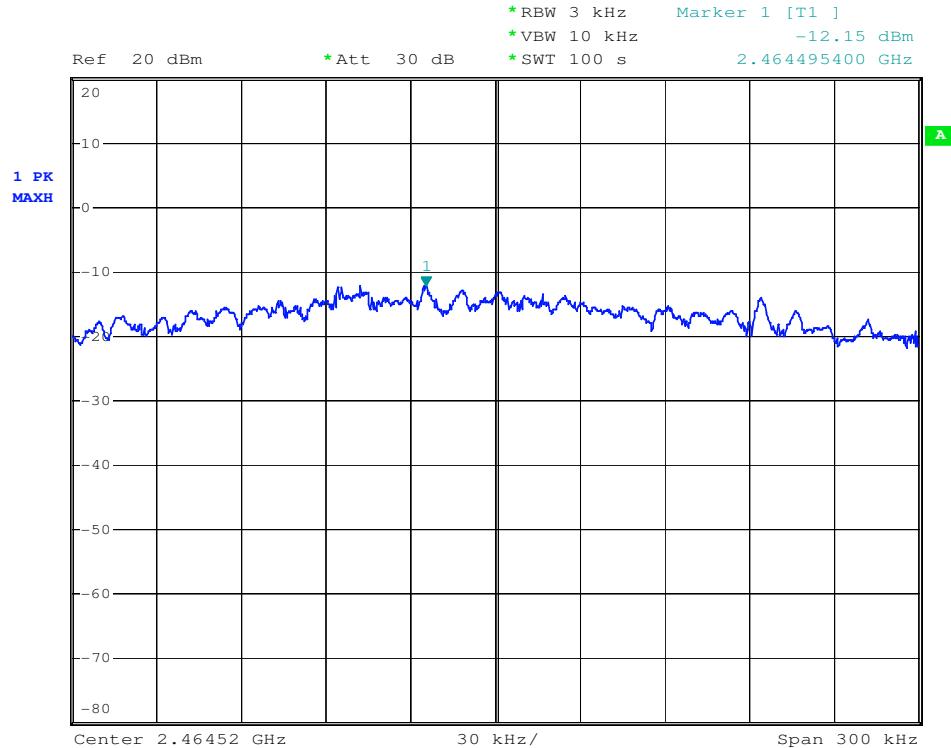
Test mode:	802.11g	Test channel:	Lowest
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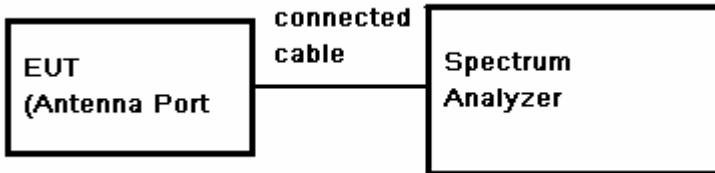
Test mode:	802.11g	Test channel:	Middle
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Test mode:	802.11g	Test channel:	Highest
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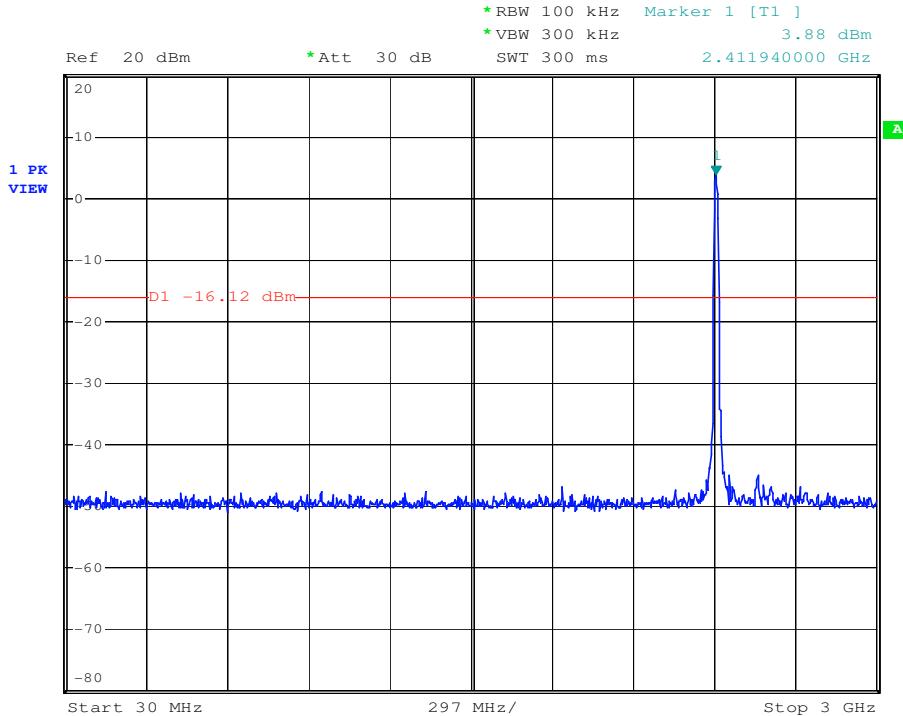
7.7 Conducted Spurious Emissions

Test Requirement:	FCC Part 15 Section 15.247(d) RSS-210 Issue 8 Annex 8
Test Method:	KDB 558074 Clause 11
Test Date:	July 11, 2013
Test Result:	Pass
Limit:	(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.
Final Test Mode:	Wi-Fi transmitting mode
Test Configuration:	 <pre>graph LR; EUT["EUT
(Antenna Port)"] --- CA["Spectrum
Analyzer"]; CA --- EUT;</pre>
Test Procedure:	<ol style="list-style-type: none">1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

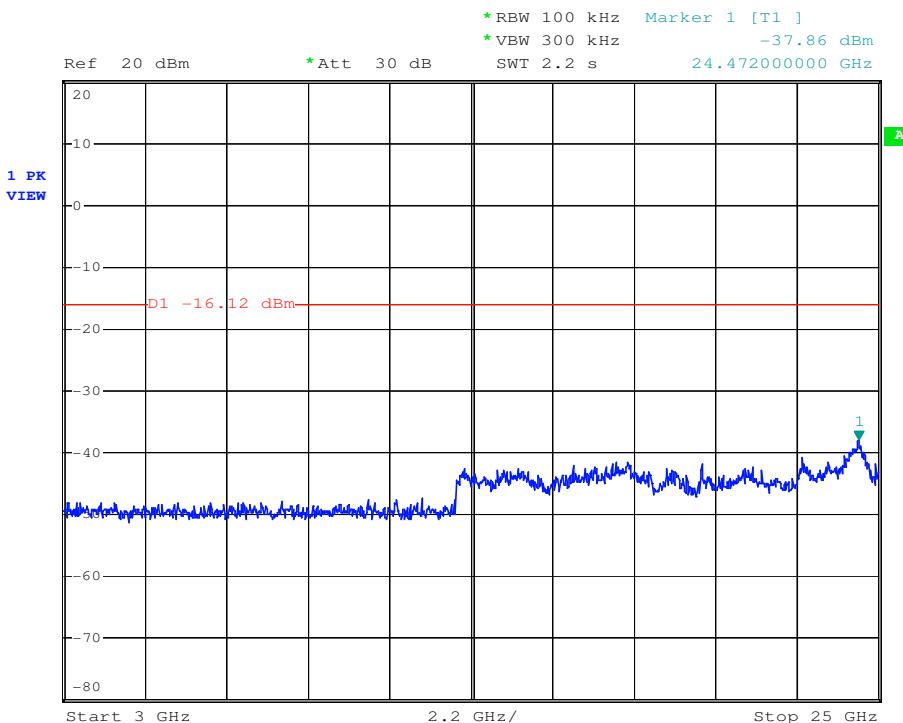
Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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30MHz-3GHz



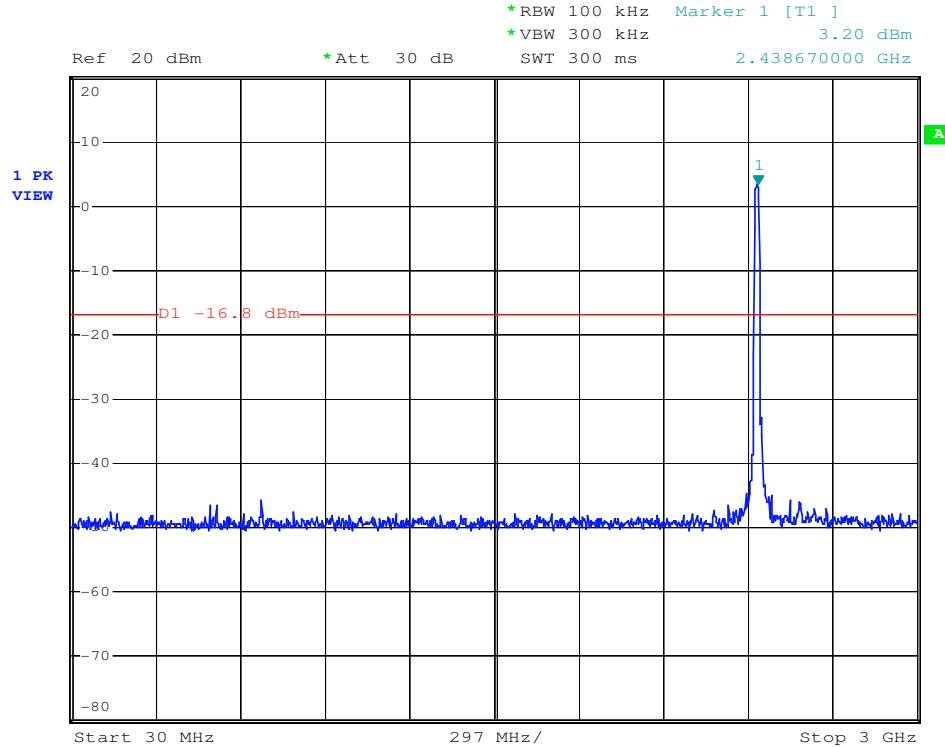
3GHz-25GHz



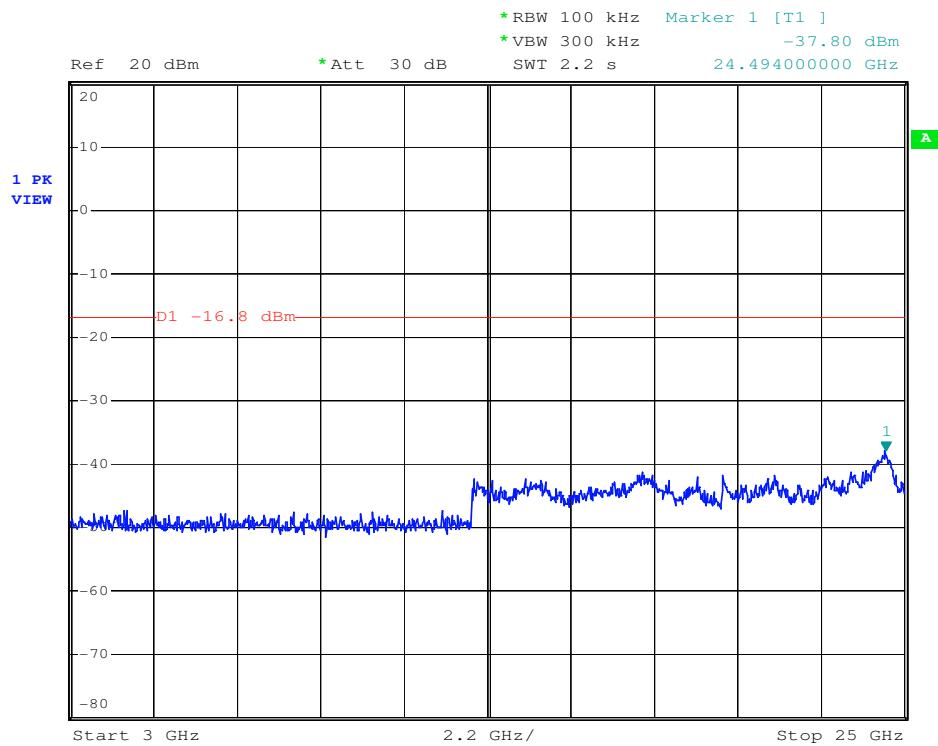
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Test mode:	802.11b	Test channel:	Middle
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30MHz-3GHz



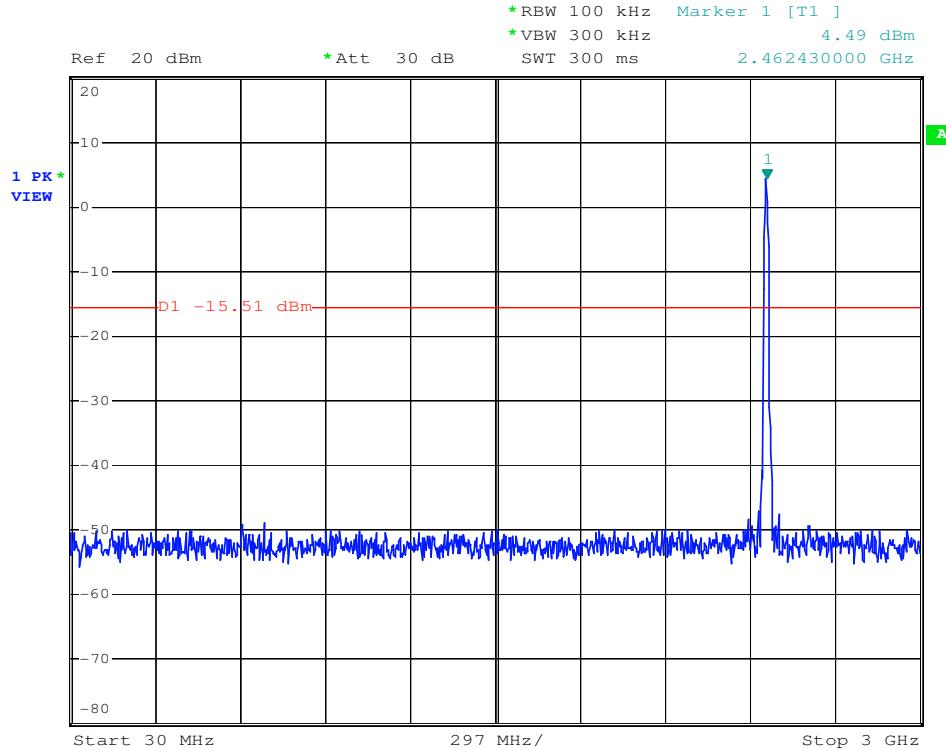
3GHz-25GHz



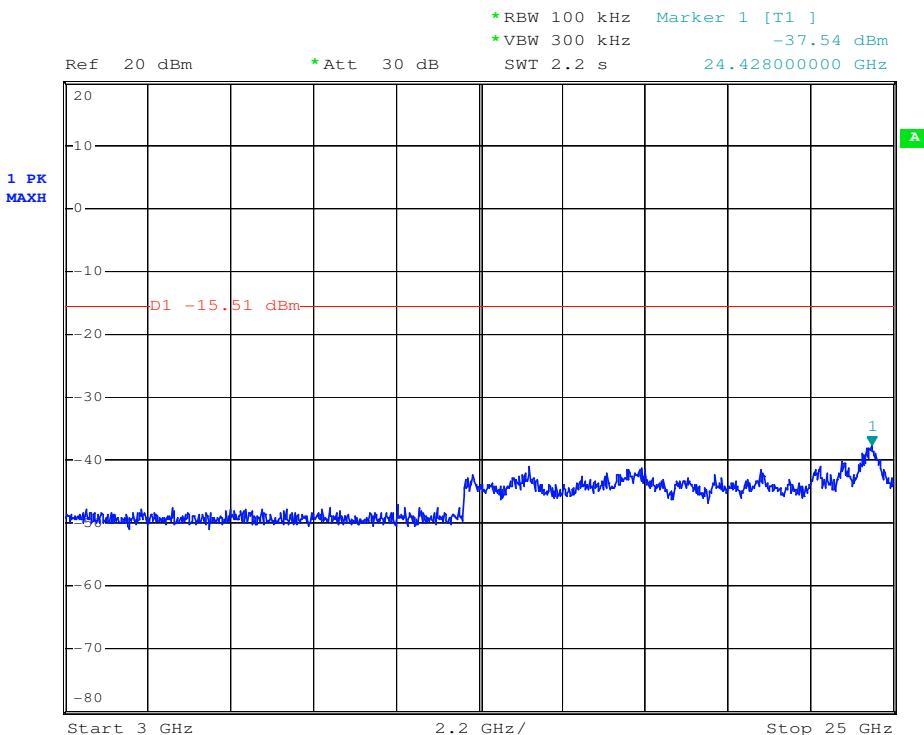
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Test mode:	802.11b	Test channel:	Highest
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30MHz-3GHz



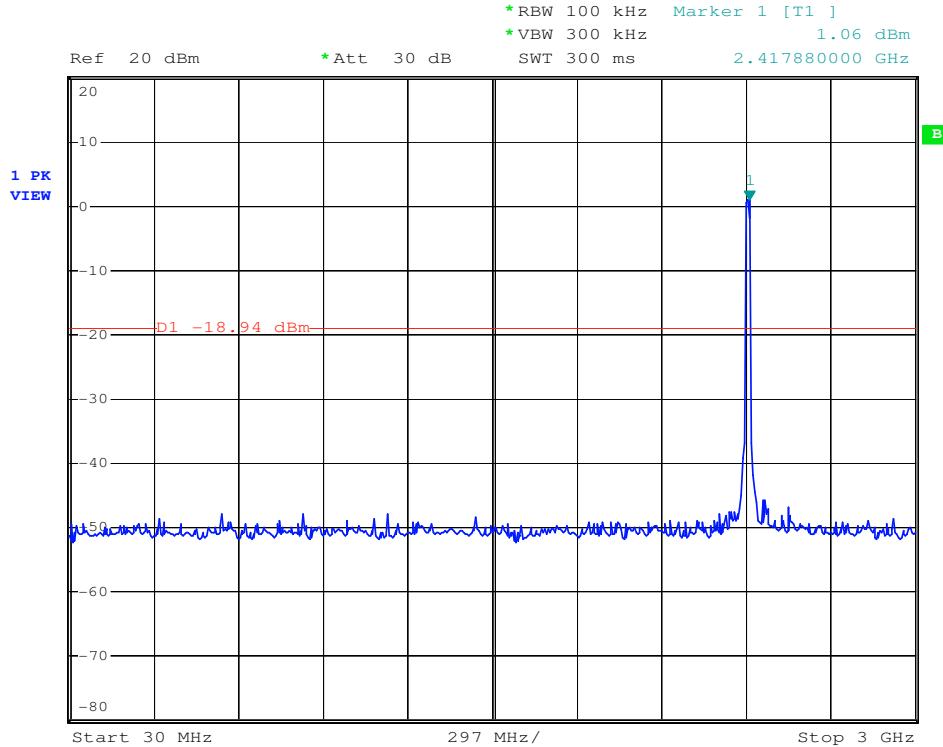
3GHz-25GHz



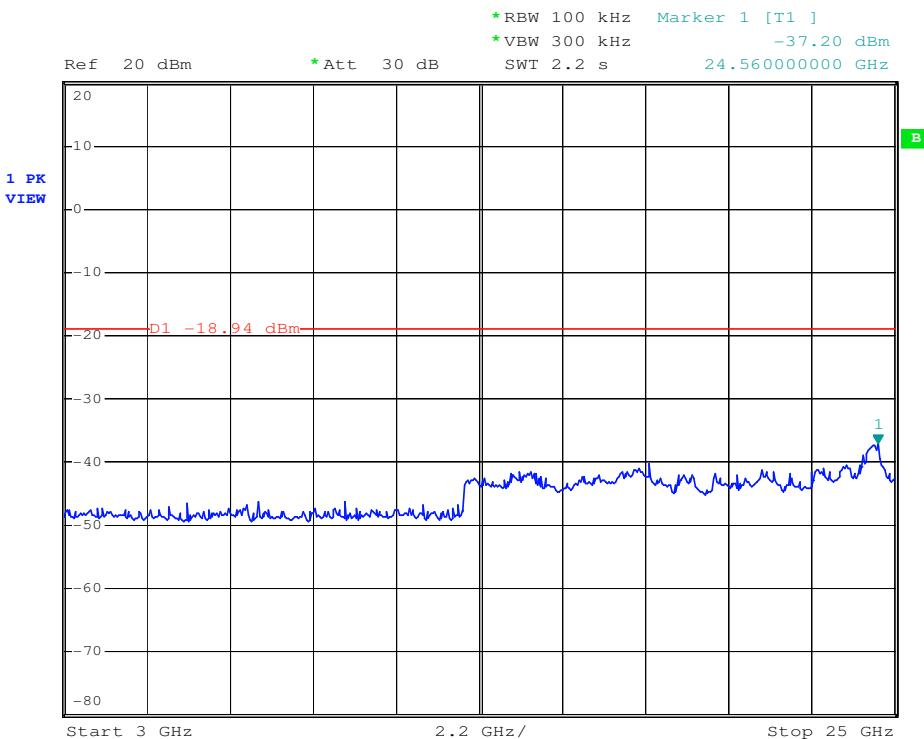
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Test mode:	802.11g	Test channel:	Lowest
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30MHz-3GHz



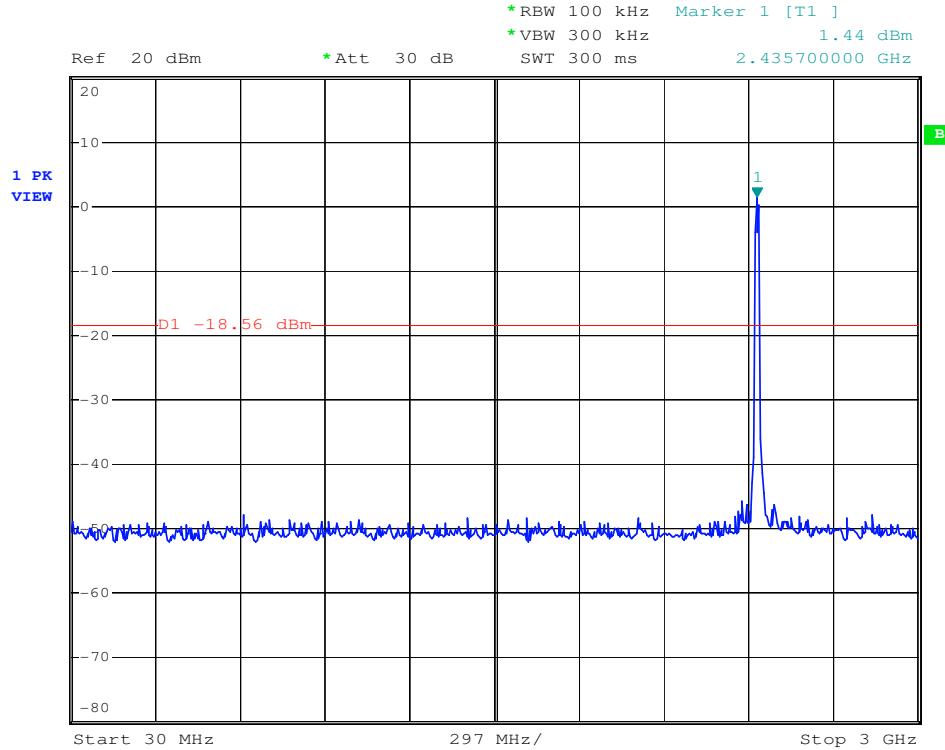
3GHz-25GHz



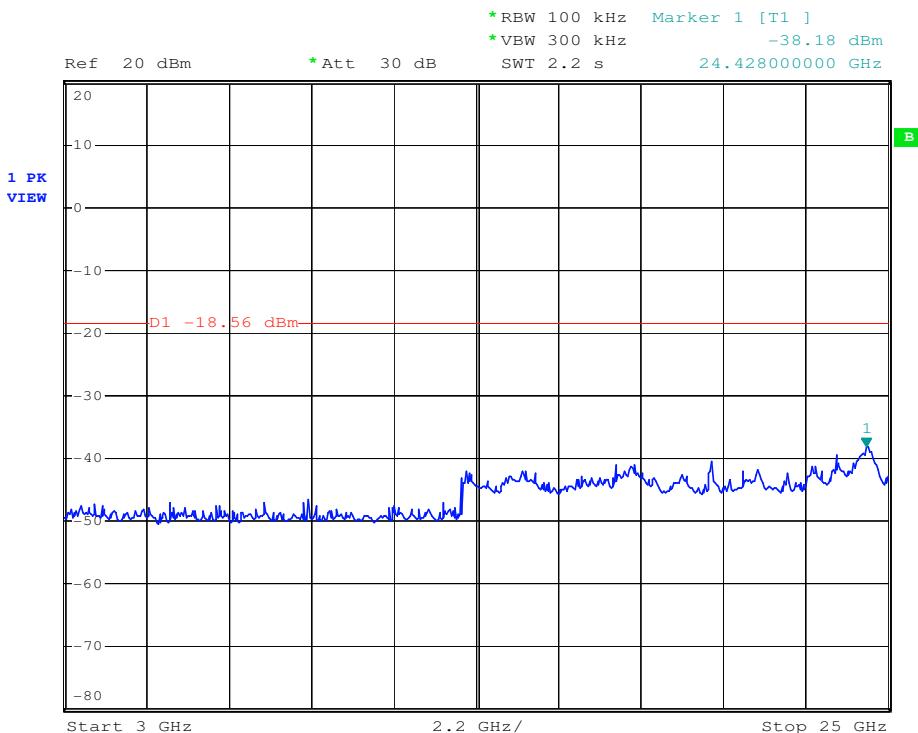
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Test mode:	802.11g	Test channel:	Middle
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30MHz-3GHz



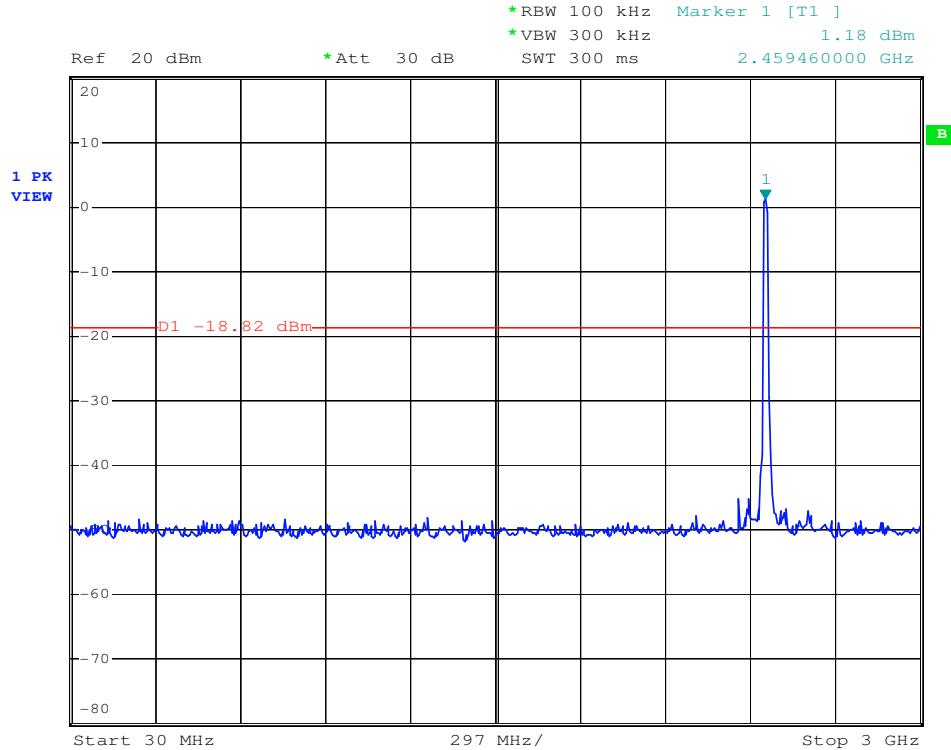
3GHz-25GHz



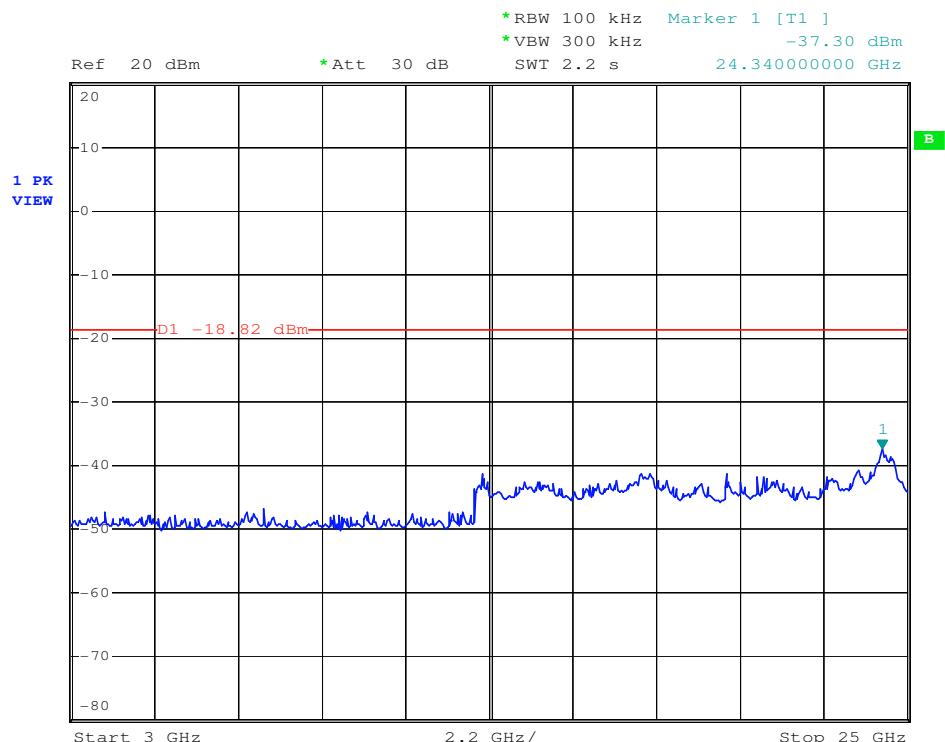
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Test mode:	802.11g	Test channel:	Highest
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30MHz-3GHz



3GHz-25GHz



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7.8 Conducted Band-edge

Test Requirement: FCC Part 15 Section 15.247(d)

RSS-210 Issue 8 Annex 8

Test Method: KDB 558074 D01 Clause 12

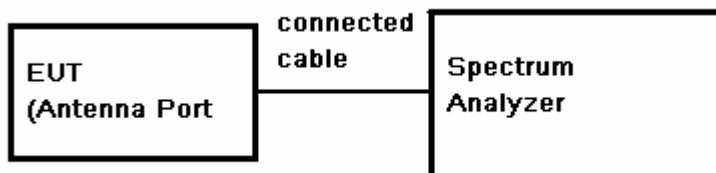
Test Date: July 11, 2013

Test Result: Pass

Limit: (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.

Final Test Mode: Wi-Fi transmitting mode

Test Configuration:

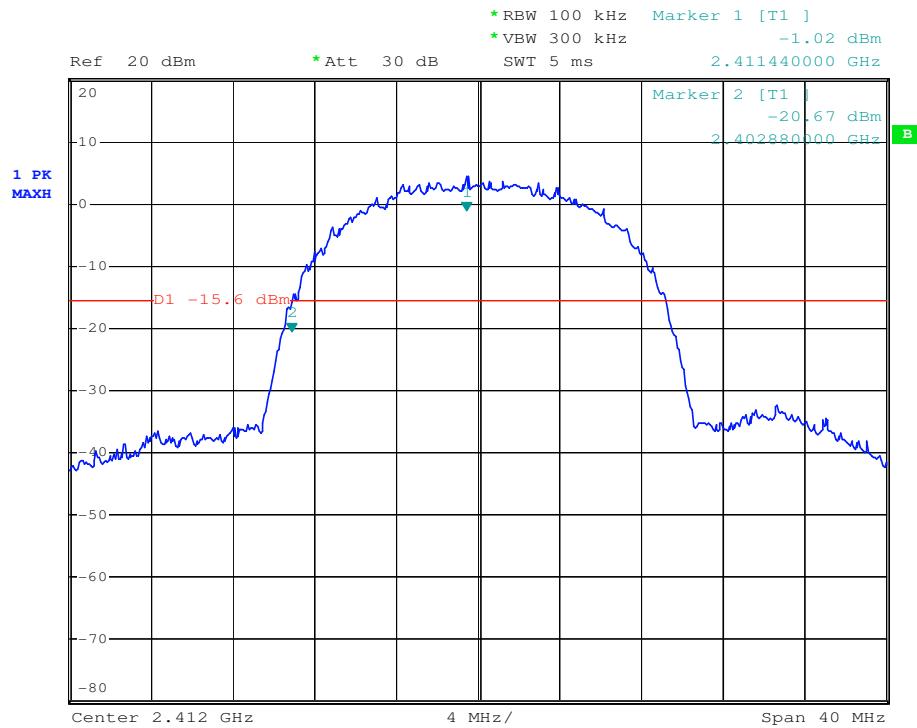


Test Procedure:

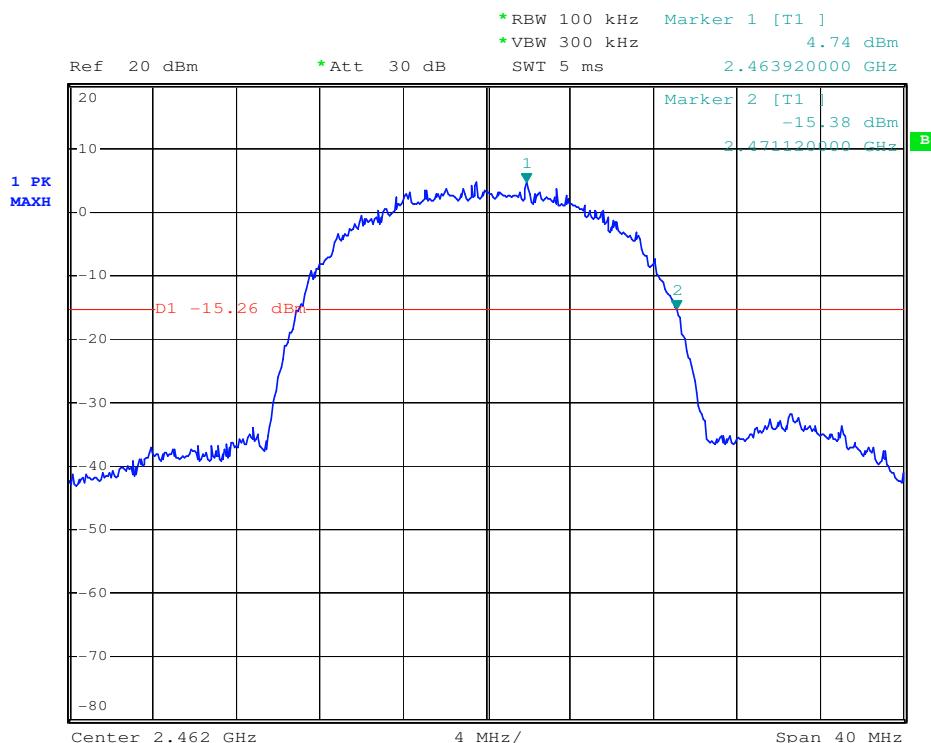
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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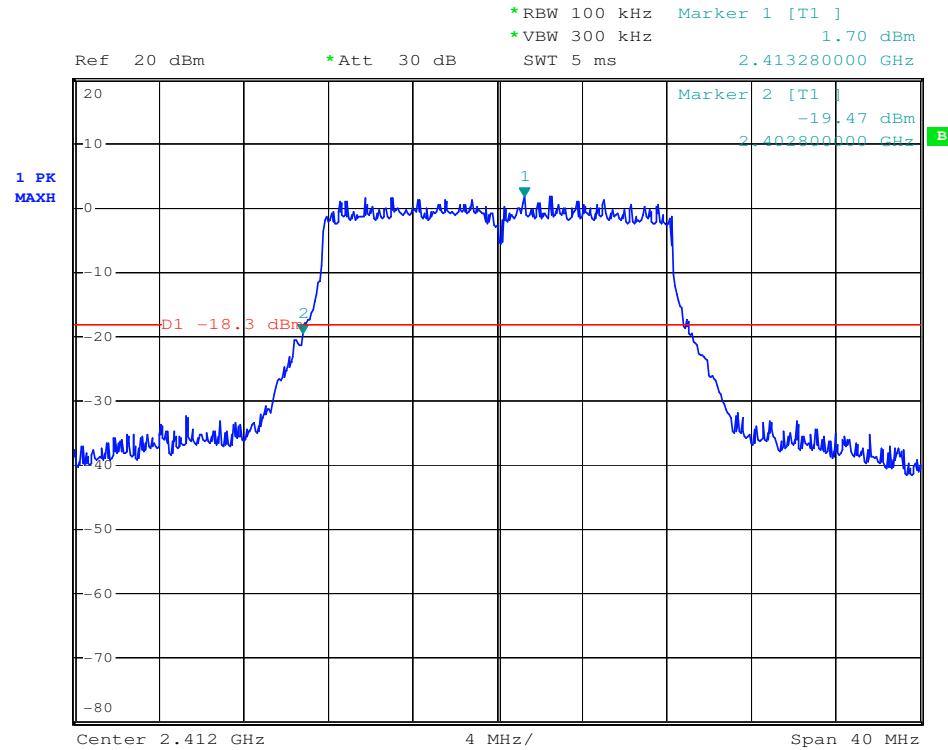


Test mode:	802.11b	Test channel:	Highest
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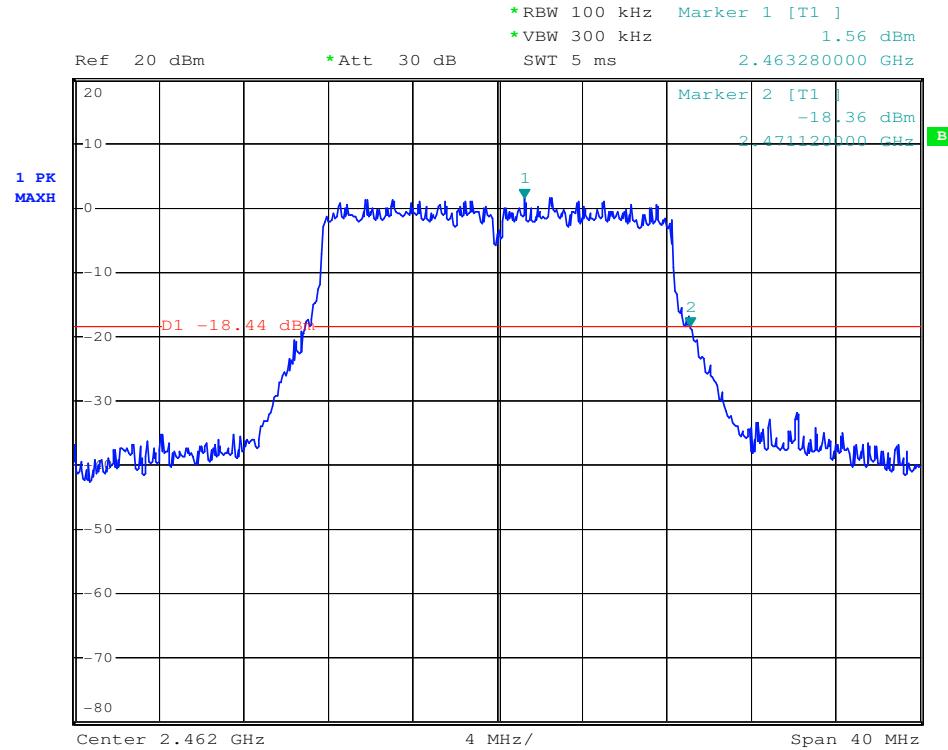


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Test mode:	802.11g	Test channel:	Lowest
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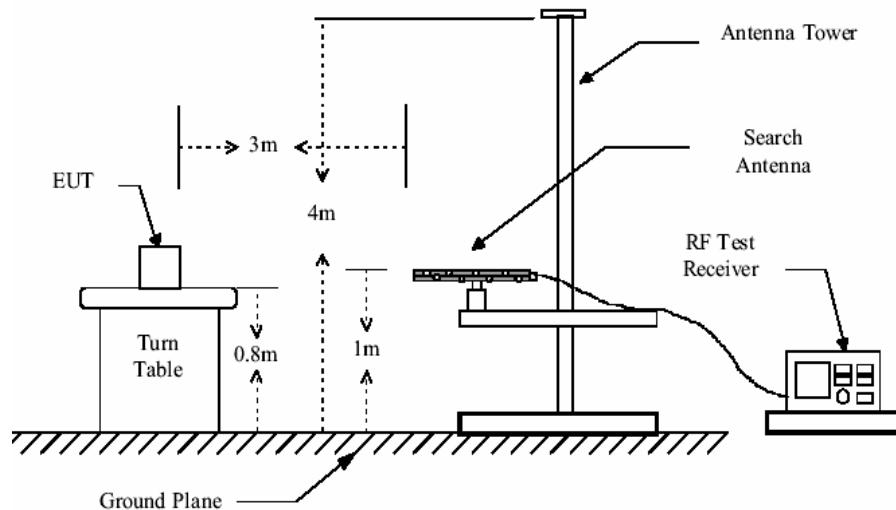
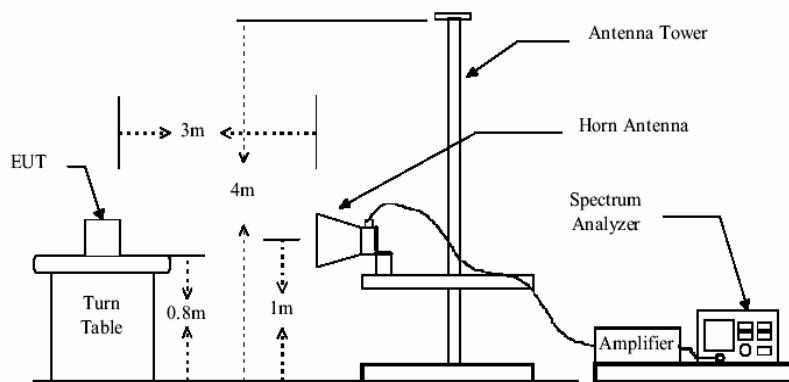


Test mode:	802.11g	Test channel:	Highest
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7.9 Radiated Spurious Emissions

Test Requirement:	FCC Part 15 Section 15.209 and Section 15.205 RSS-210 Issue 8 Annex 8
Test Method:	ANSI C63.4:2009 Clause 8.3
Test Date:	July 11, 2013
Test Result:	Pass
Final Test Mode:	Wi-Fi transmitting mode
Test site/setup:	Measurement Distance: 3m (Semi-Anechoic Chamber) Test instrumentation resolution bandwidth 120 kHz and Quasi-Peak detector applies (30 MHz - 1000 MHz). For PK value: RBW = 1 MHz for $f \geq 1$ GHz VBW \geq RBW; Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz VBW = 10Hz; Sweep = auto Detector function = peak Trace = max hold Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal
15.209 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

Test Configuration:**Figure 1. 30MHz to 1GHz radiated emissions test configuration****Figure 2. Above 1GHz radiated emissions test configuration****Test Procedure:**

The procedure used was ANSI Standard C63.10:2009. The receiver was scanned from 30MHz to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

Low noise amplifier was used below 1GHz, High pass Filter was used above 3GHz. Between 1G and 3GHz, we did not use any amplifier or filter.

Pre-test was performed on GFSK and EDR mode with charging mode and only battery power mode, Compliance test was performed on worse case (GFSK mode with charging).

Test were performed for there spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was submitted.

1) 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 5rd harmonic.

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.

The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

1GHz-12GHz For 802.11b:

Test Antenna: Horizontal**Test Channel: Low**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4818.75	37.13	8.26	45.39	54	-8.61	peak
2	7274.50	39.08	9.78	48.86	54	-5.14	peak
3	9636.25	37.30	11.72	49.02	54	-4.98	peak

Test Antenna: Vertical**Test Channel: Low**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4783.50	38.96	8.21	47.17	54	-6.83	peak
2	7239.25	36.88	9.76	46.64	54	-7.36	peak
3	9706.75	36.17	11.67	47.84	54	-6.16	peak

1GHz-12GHz For 802.11b:

Test Antenna: Horizontal**Test Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4889.25	35.74	8.35	44.09	54	-9.91	peak
2	7321.50	37.18	9.81	46.99	54	-7.01	peak
3	9753.75	36.44	11.64	48.08	54	-5.92	peak



Test Antenna: Vertical

Test Channel: Middle

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4818.75	37.91	8.26	46.17	54	-7.83	peak
2	7309.75	37.42	9.80	47.22	54	-6.78	peak
3	9753.75	37.10	11.64	48.74	54	-5.26	peak

1GHz-12GHz For 802.11b:

Test Antenna: Horizontal

Test Channel: High

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4924.50	38.62	8.40	47.02	54	-6.98	peak
2	7333.25	37.90	9.82	47.72	54	-6.28	peak
3	9812.5	36.50	11.60	48.10	54	-5.90	peak

Test Antenna: Vertical

Test Channel: High

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4842.25	36.21	8.29	44.50	54	-9.50	peak
2	7380.25	37.41	9.85	47.26	54	-6.74	peak
3	9824.25	35.45	11.59	47.04	54	-6.96	peak

1GHz-12GHz For 802.11g:

Test Antenna: Horizontal

Test Channel: Low

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4830.50	37.65	8.27	45.92	54	-8.08	peak
2	7286.25	36.60	9.79	46.39	54	-7.61	peak
3	9636.25	36.37	11.72	48.09	54	-5.91	peak

Test Antenna: Vertical

Test Channel: Low

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4830.50	36.61	8.27	44.88	54	-9.12	peak
2	7180.50	37.86	9.72	47.58	54	-6.42	peak
3	9659.75	36.84	11.7	48.54	54	-5.46	peak

1GHz-12GHz For 802.11g:

Test Antenna: Horizontal**Test Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4889.25	35.68	8.35	44.03	54	-9.97	peak
2	7286.25	36.41	9.79	46.20	54	-7.80	peak
3	9765.50	38.09	11.63	49.72	54	-4.28	peak

Test Antenna: Vertical**Test Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4865.75	35.71	8.32	44.03	54	-9.97	peak
2	7321.50	38.03	9.81	47.84	54	-6.16	peak
3	9800.75	37.91	11.61	49.52	54	-4.48	peak

1GHz-12GHz For 802.11g:

Test Antenna: Horizontal**Test Channel: High**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4971.50	39.23	8.47	47.70	54	-6.30	peak
2	7439.00	39.39	9.89	49.28	54	-4.72	peak
3	9777.25	39.67	11.62	51.29	54	-2.71	peak

Test Antenna: Vertical**Test Channel: High**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Detector
1	4948.00	38.27	8.44	46.71	54	-7.29	peak
2	7345.00	38.22	9.83	48.05	54	-5.95	peak
3	9836.00	38.73	11.58	50.31	54	-3.69	peak

Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier 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.

7.10 Band edge (Radiated Emission)

Test Requirement:

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)).

Test Method:

KDB 558074 D01 Clause 12

Test Date:

July 12, 2013

Test Result:

Pass

Measurement Distance:

3m (Semi-Anechoic Chamber)

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.

Detector:

For PK value:

RBW = 1 MHz for $f \geq 1$ GHz

VBW \geq RBW; Sweep = auto

Detector function = peak

Trace = max hold

For AV value:

RBW = 1 MHz for $f \geq 1$ GHz

VBW = 10Hz; Sweep = auto

Detector function = peak

Trace = max hold

According to section 15.35(b) 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.

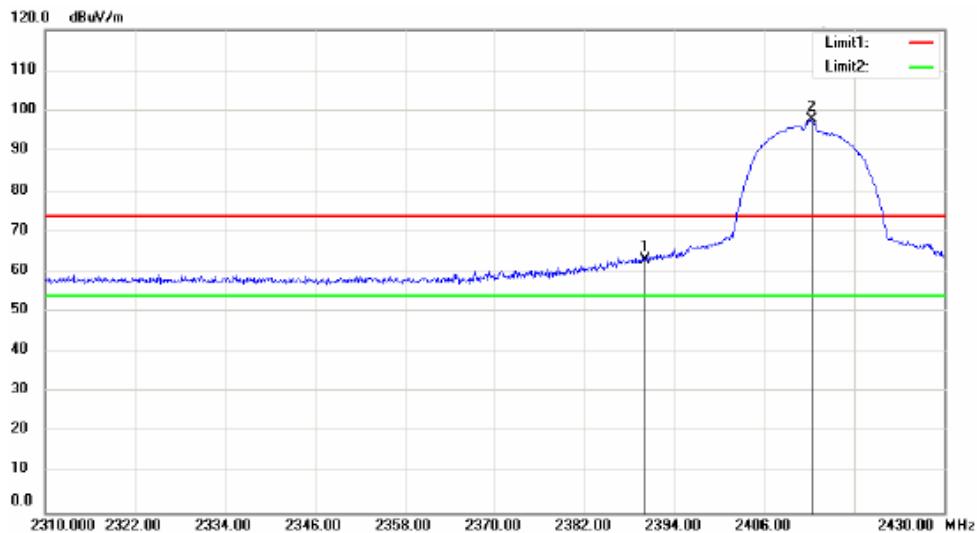
Pre-test were performed for three spatial orthogonal (X, Y, Z), the worst test data (X orthogonal) was submitted.

Test Result:

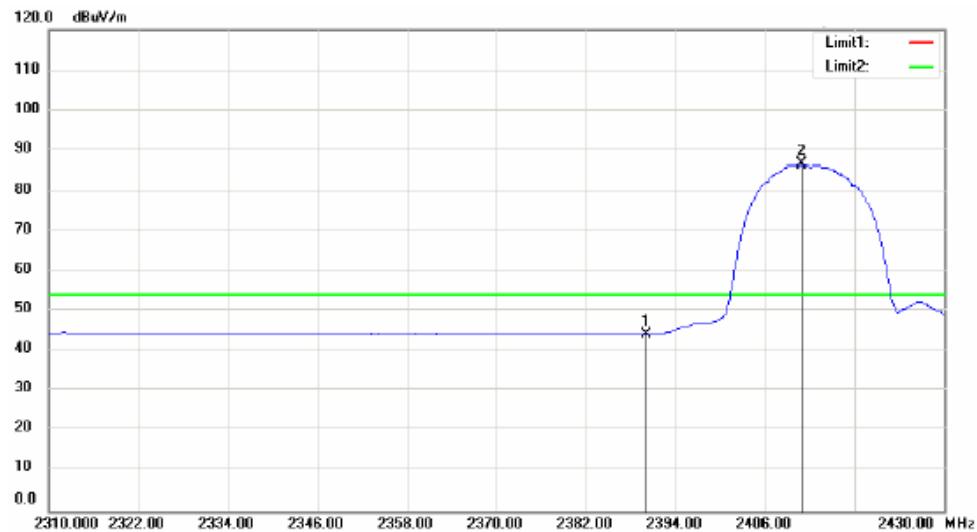
The EUT does meet the FCC requirements.

Measurement Result:

Test mode:	802.11b	Test channel:	Lowest
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Horizontal, Peak Detector:

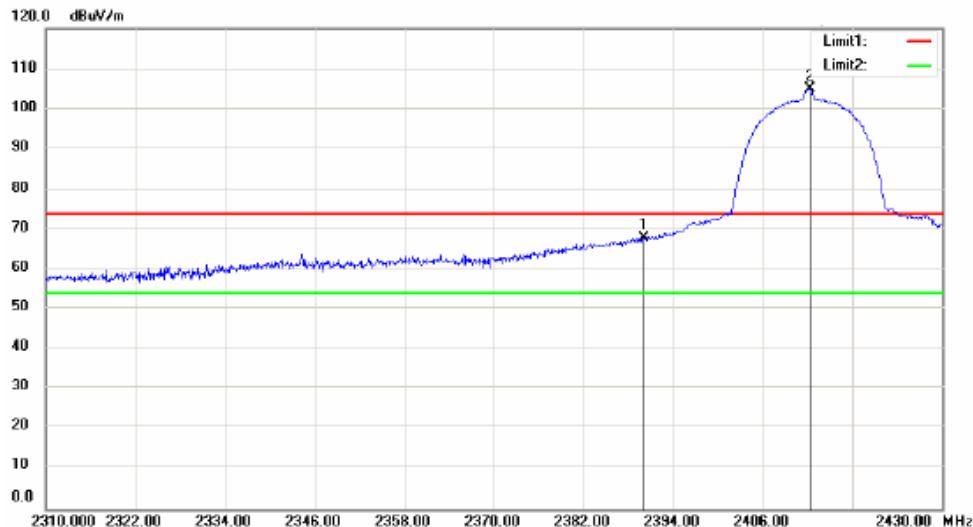
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.040	29.52	peak	33.61	63.13	74.00	-10.87
2	2412.240	63.93	peak	33.65	97.58	74.00	23.58

Horizontal, Average Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	10.74	peak	33.61	44.35	54.00	-9.65
2	2410.920	52.97	peak	33.65	86.62	54.00	32.62

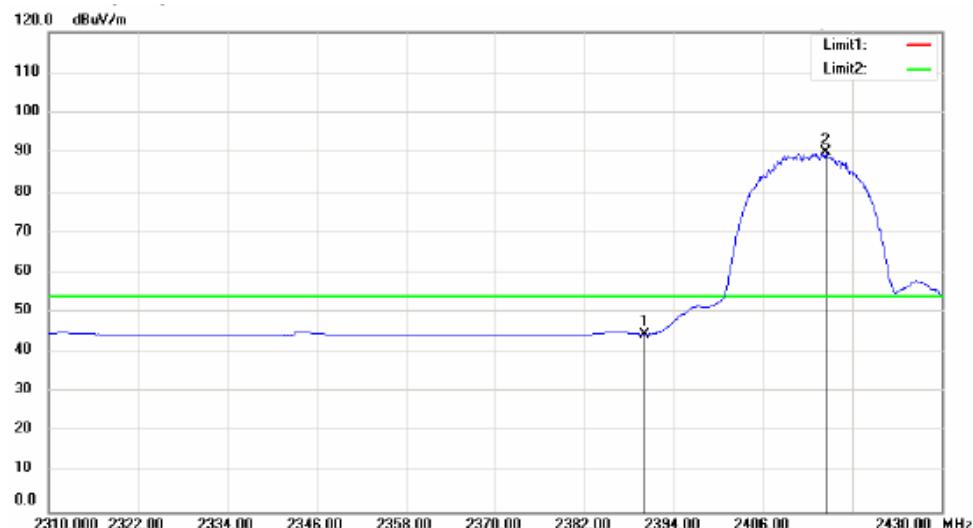
Test mode:	802.11b	Test channel:	Lowest
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Vertical, Peak Detector:



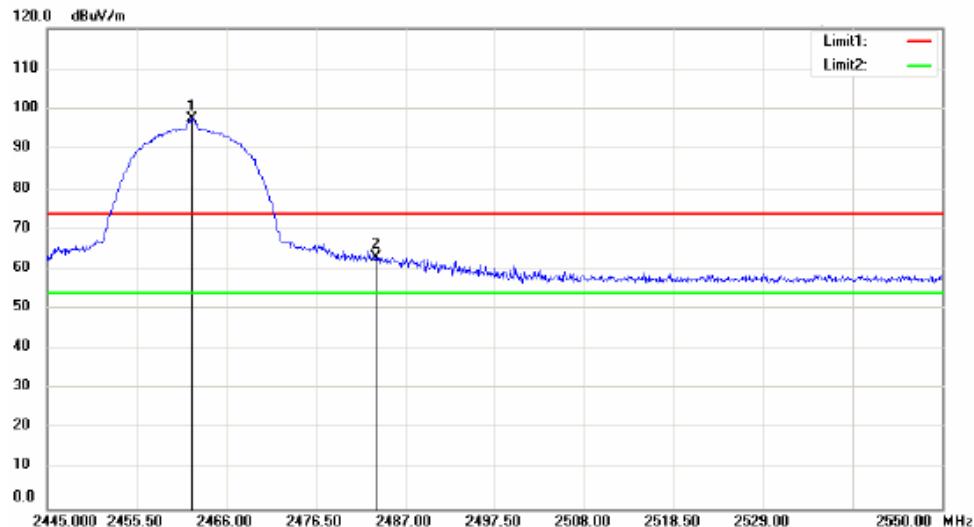
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	34.26	peak	33.61	67.87	74.00	-6.13
2	2412.240	71.17	peak	33.65	104.82	74.00	30.82

Vertical, Average Detector:

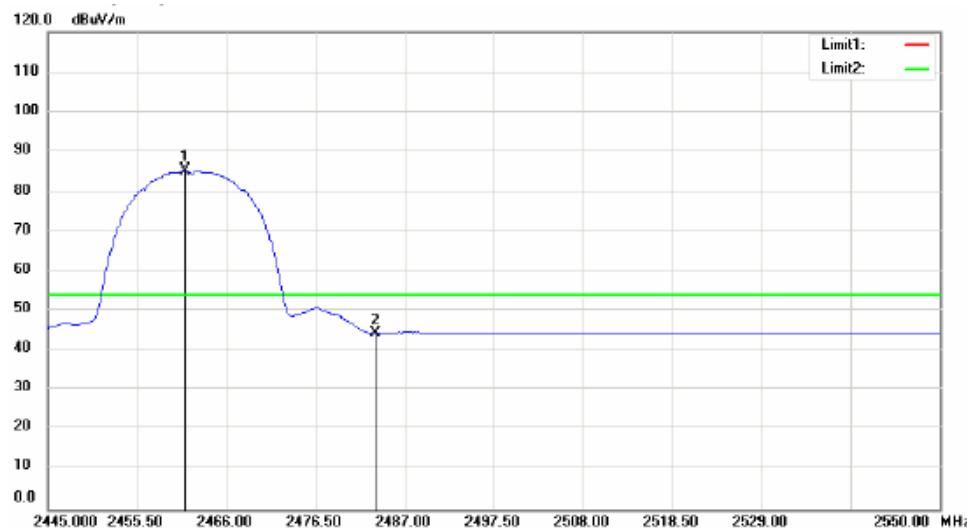


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	11.05	peak	33.61	44.66	54.00	-9.34
2	2414.400	56.13	peak	33.65	89.78	54.00	35.78

Test mode:	802.11b	Test channel:	Highest
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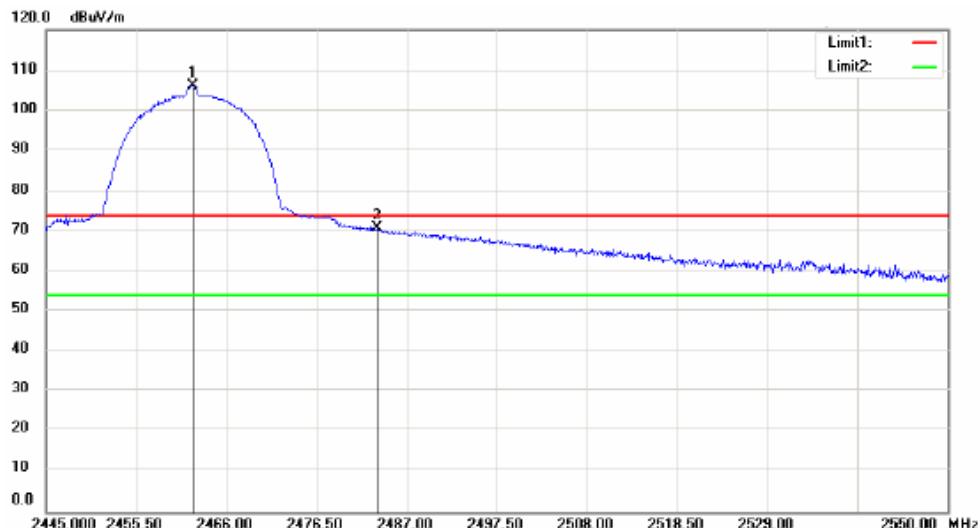
Horizontal, Peak Detector:


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2462.010	63.74	peak	33.74	97.48	74.00	23.48
2	2483.500	29.40	peak	33.78	63.18	74.00	-10.82

Horizontal, Average Detector:


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2461.170	51.74	peak	33.74	85.48	54.00	31.48
2	2483.500	10.81	peak	33.78	44.59	54.00	-9.41

Test mode:	802.11b	Test channel:	Highest
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Vertical, Peak Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2462.115	72.34	peak	33.74	106.08	74.00	32.08
2	2483.500	37.08	peak	33.78	70.86	74.00	-3.14

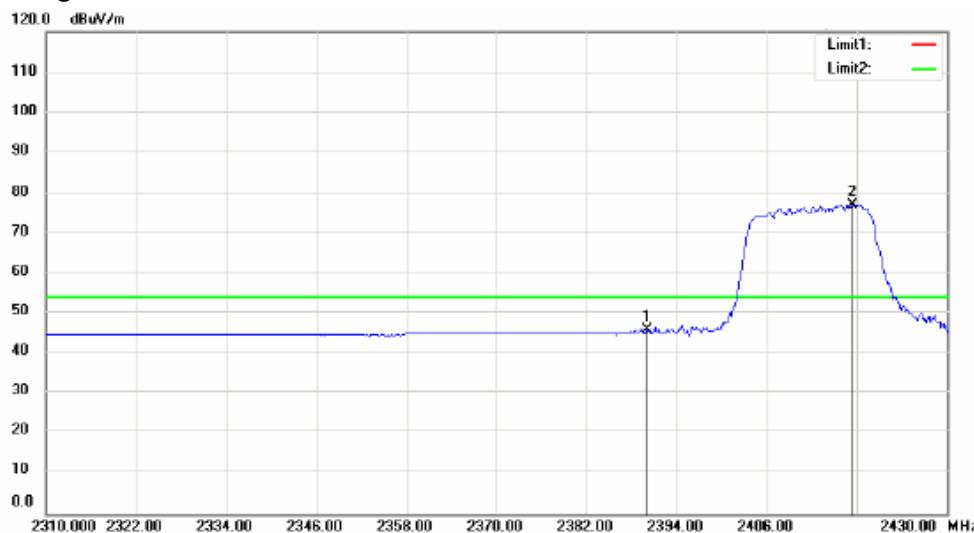
Vertical, Average Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2462.430	60.37	peak	33.74	94.11	54.00	40.11
2	2483.500	11.92	peak	33.78	45.70	54.00	-8.30

Test mode:	802.11g	Test channel:	Lowest
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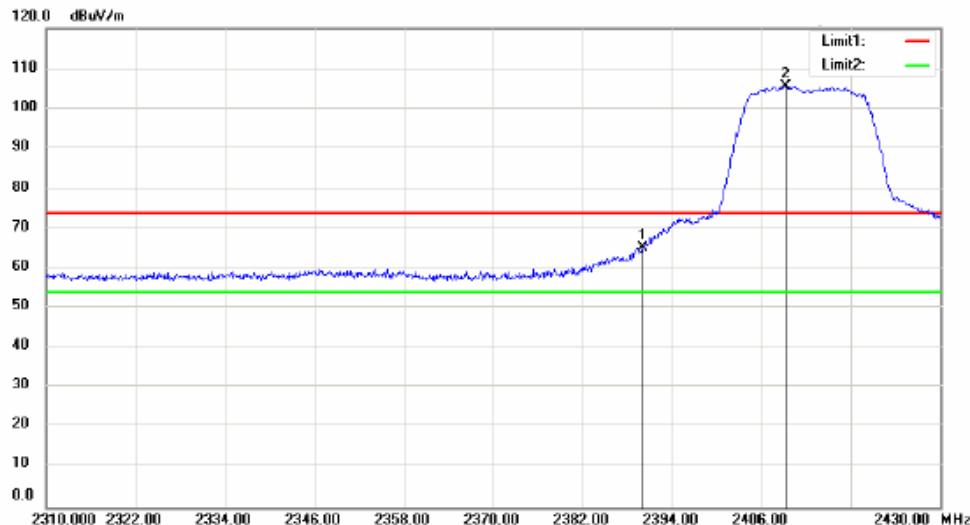
Horizontal, Peak Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	24.60	peak	33.61	58.21	74.00	-15.79
2	2409.480	63.58	peak	33.64	97.22	74.00	23.22

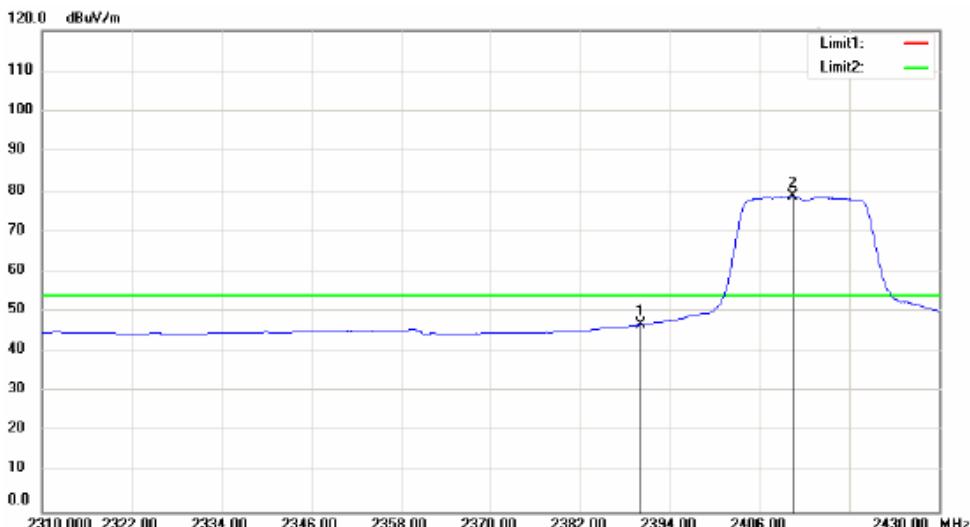
Horizontal, Average Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	12.45	peak	33.61	46.06	54.00	-7.94
2	2417.400	43.62	peak	33.65	77.27	54.00	23.27

Test mode:	802.11g	Test channel:	Lowest
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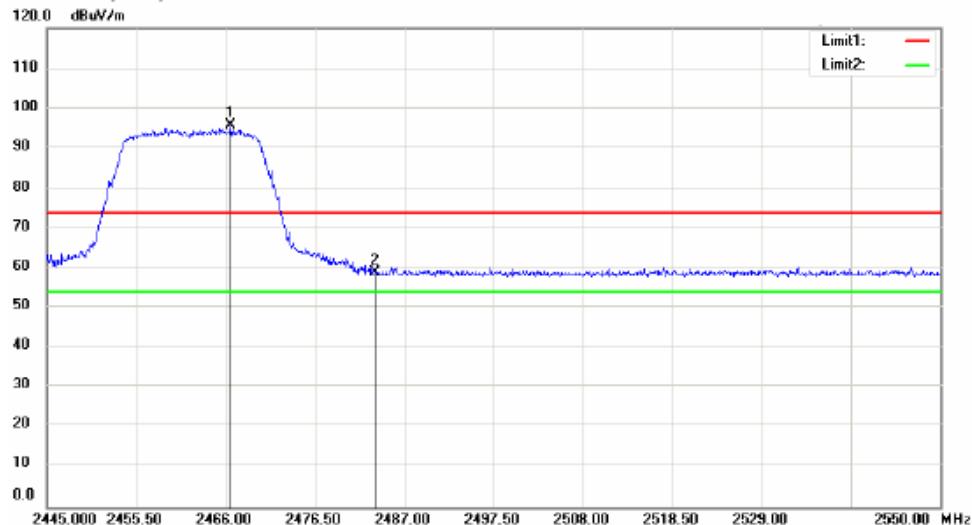
Vertical, Peak Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	31.52	peak	33.61	65.13	74.00	-8.87
2	2409.240	71.95	peak	33.64	105.59	74.00	31.59

Vertical, Average Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2390.000	13.29	peak	33.61	46.90	54.00	-7.10
2	2410.320	45.44	peak	33.64	79.08	54.00	25.08

Test mode:	802.11g	Test channel:	Highest
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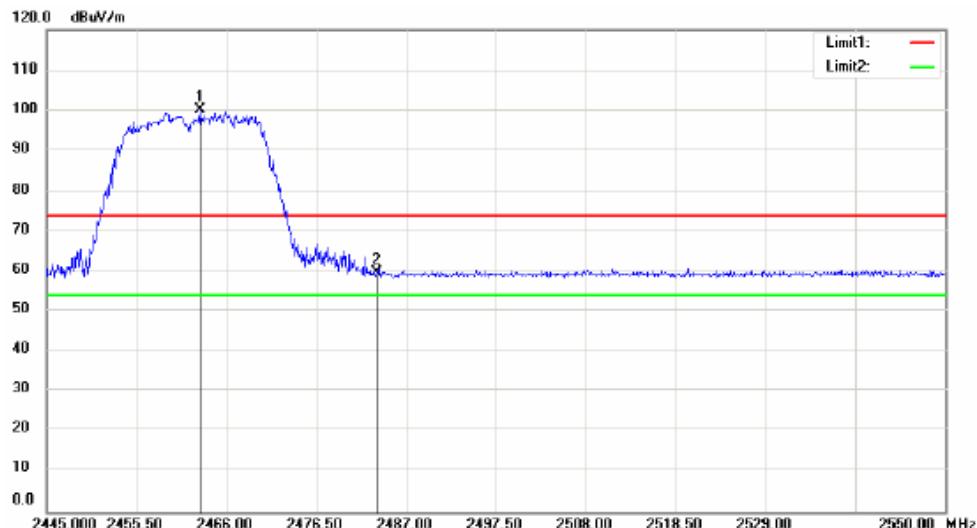
Horizontal, Peak Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2466.630	61.85	peak	33.74	95.59	74.00	21.59
2	2483.500	25.11	peak	33.78	58.89	74.00	-15.11

Horizontal, Average Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2465.790	49.33	peak	33.74	83.07	54.00	29.07
2	2483.500	12.72	peak	33.78	46.50	54.00	-7.50

Test mode:	802.11g	Test channel:	Highest
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Vertical, Peak Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2462.955	66.31	peak	33.74	100.05	74.00	26.05
2	2483.500	26.13	peak	33.78	59.91	74.00	-14.09

Vertical, Average Detector:

Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2465.580	45.97	peak	33.74	79.71	54.00	25.71
2	2483.500	13.72	peak	33.78	47.50	54.00	-6.50

Remark: No any other emission which fall in restricted bands can be detected and be reported.

Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor

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All frequencies within the "Restricted bands" have been evaluated to compliance. Section 15.205 Restricted bands of operation.

7.11 Occupied Bandwidth Test

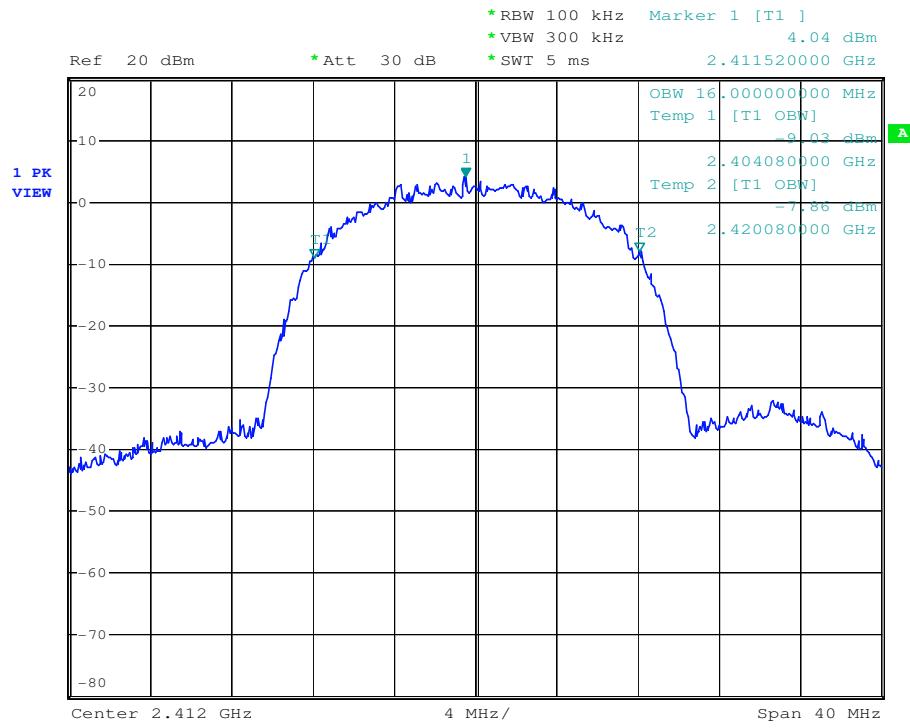
Test Requirement: RSS-Gen Issue 3 Clause 4.6.1

Standard Applicable According to the section RSS-Gen Issue 3 Clause 4.6.1

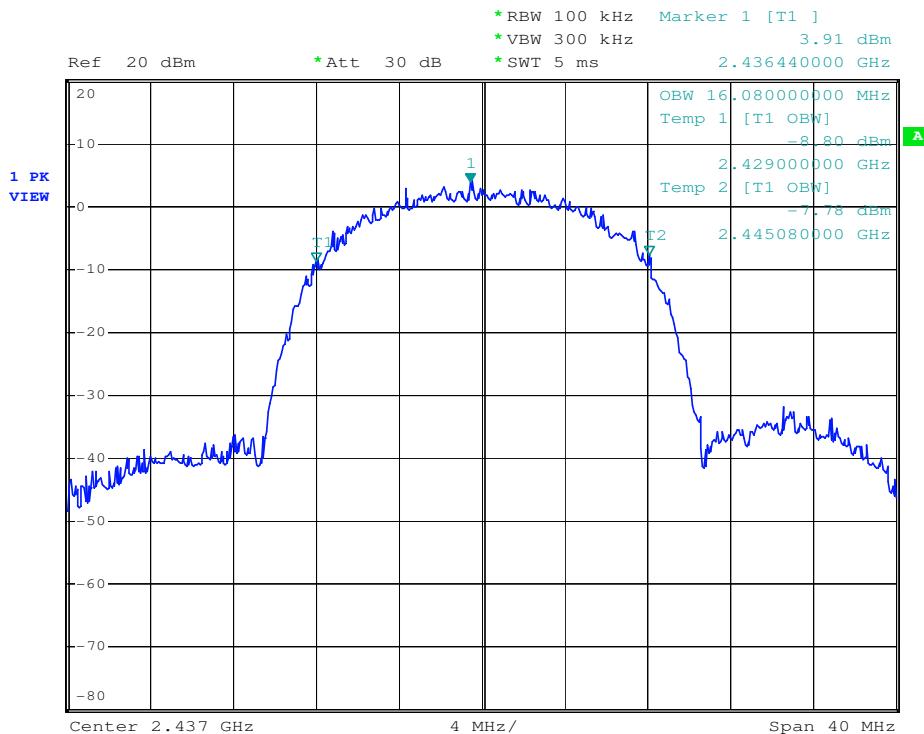
EUT Setup The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer with the resolutions set at 100kHz, the video bandwidth set at 300kHz.

Test mode	Channel	Frequency (MHz)	Bandwidth (MHz)
802.11b	Low	2412	16.00
	Middle	2437	16.08
	High	2462	15.92
802.11g	Low	2412	16.48
	Middle	2437	16.48
	High	2462	16.48

Test mode:	802.11b	Test channel:	Low
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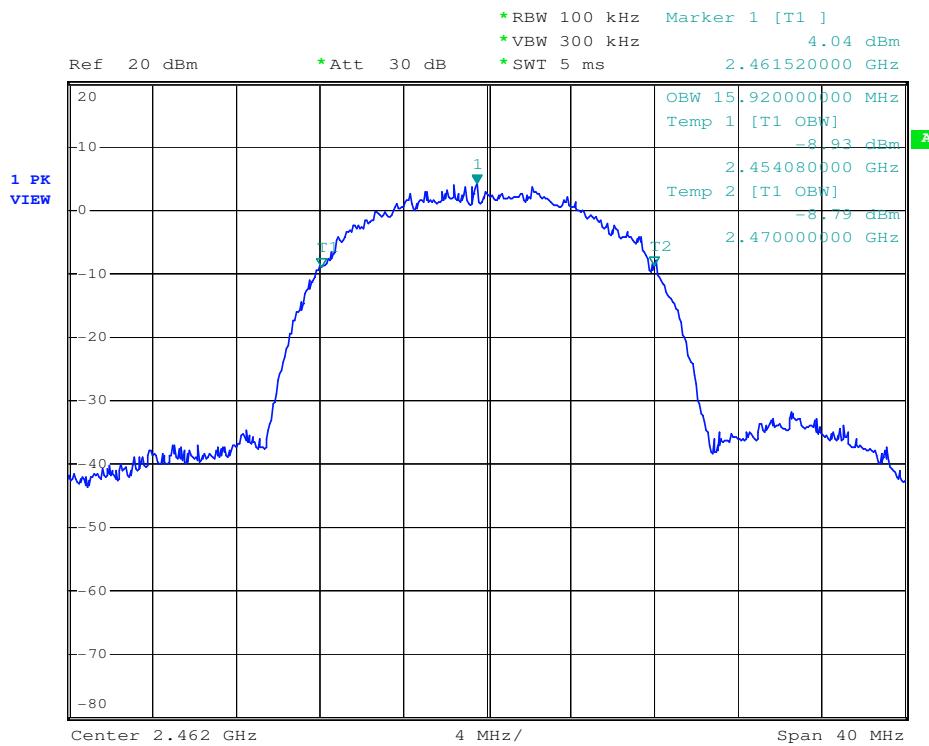


Test mode:	802.11b	Test channel:	Middle
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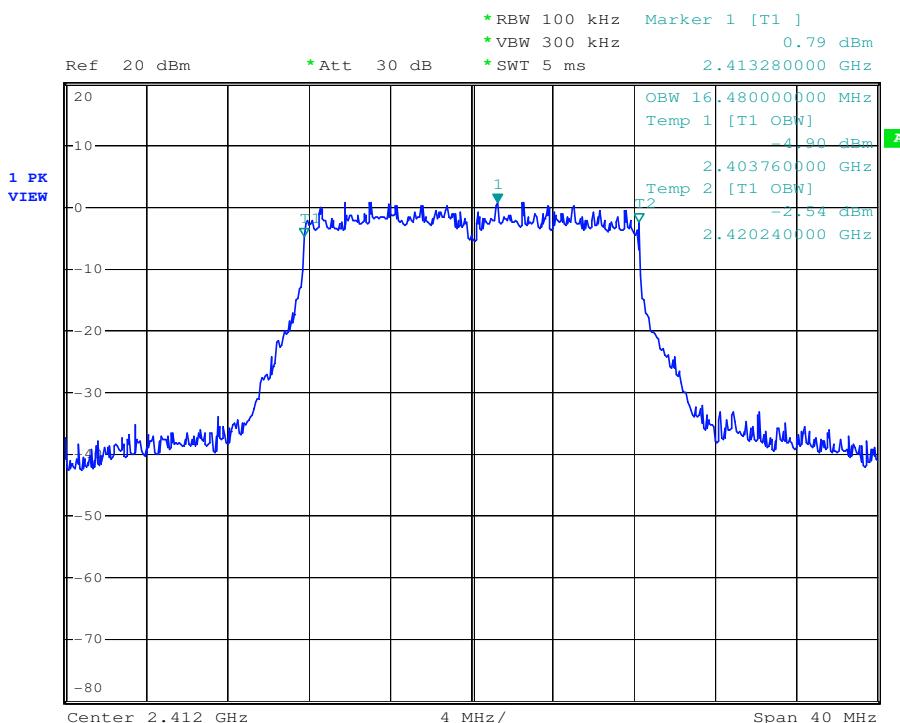


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Test mode:	802.11b	Test channel:	High
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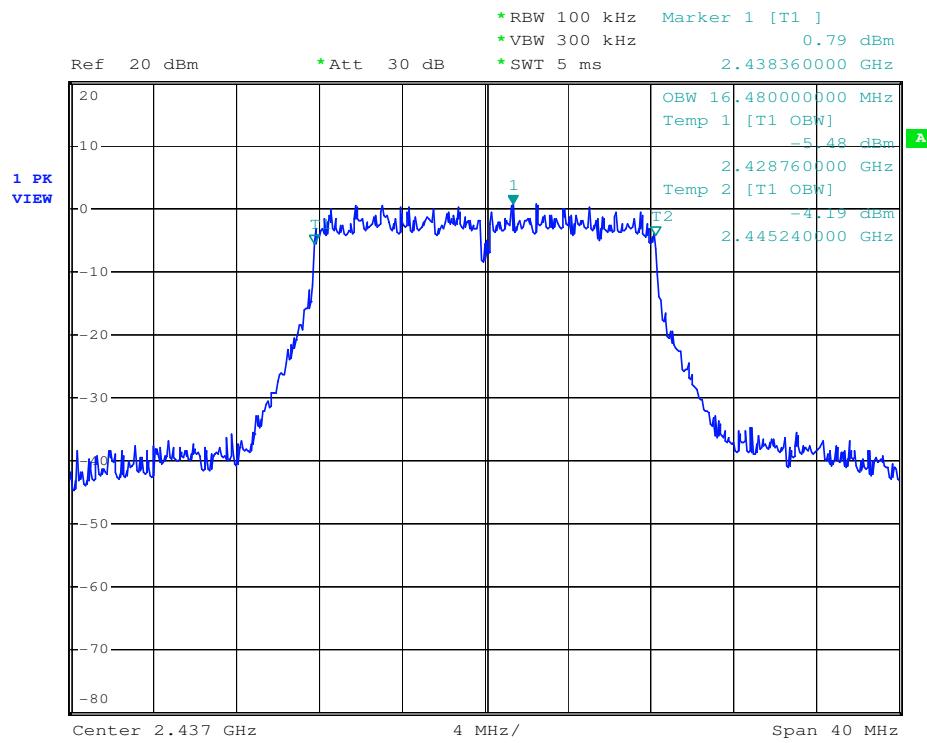


Test mode:	802.11g	Test channel:	Low
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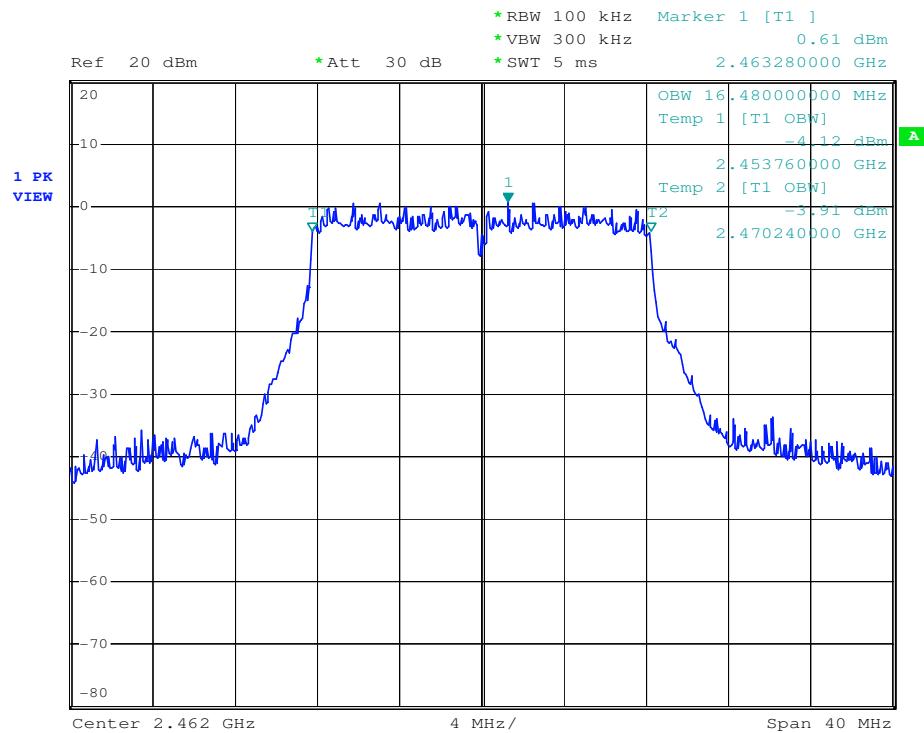


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Test mode:	802.11g	Test channel:	Middle
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Test mode:	802.11g	Test channel:	High
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8 Test Setup Photographs

Refer to the < stadium_ Test Setup photos>.

9 EUT Constructional Details

Refer to the < stadium _External Photos > & < stadium _Internal Photos >.

End of Report