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1 Cover Page

RF TEST REPORT for DTS

Application No.:	SHEM1402000360RF
Applicant:	Nocs AB
FCC ID:	A48-NS2N
Equipment Under Test (EUT): **NOTE:** The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	NS2 Air Monitors
Model No.(EUT):	NS2V2
Standards:	FCC PART 15 Subpart C: 2012
Date of Receipt:	February 21, 2014
Date of Test:	February 24, 2014 to March 03, 2014
Date of Issue:	March 04, 2014
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	/	March 04, 2014	/	Original

Authorized for issue by:				
Engineer		Eddy Zong **Print Name**		Eddy Zong
Clerk		Susie Liu **Print Name**		Susie Liu
Reviewer		Keny Xu **Print Name**		Keny.xu

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3 Test Summary

Test Item	Test Requirement	Result
Antenna Requirement	FCC Part 15, Subpart C Section 15.203/15.247 (c)	PASS
AC Power Line Conducted Emission	FCC Part 15, Subpart C Section 15.207	PASS
Minimum 6dB Bandwidth	FCC Part 15, Subpart C Section 15.247 (a)(2)	PASS
Conducted Peak Output Power	FCC Part 15, Subpart C Section 15.247 (b)(3)	PASS
Power Spectrum Density	FCC Part 15, Subpart C Section 15.247 (e)	PASS
RF Conducted Spurious Emissions and Band-edge	FCC Part 15, Subpart C Section 15.247(d)	PASS
Radiated Spurious Emissions and Band-edge	FCC Part 15, Subpart C Section 15.209&15.205	PASS

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5 General Information

5.1 Client Information

Applicant:	Nocs AB
Address of Applicant:	Frejgatan 17, 113 49 Stockholm, Sweden
Manufacturer:	Nocs AB
Address of Manufacturer:	Frejgatan 17, 113 49 Stockholm, Sweden
Factory:	Hansong (Nanjing) Technology Ltd.
Address of Factory:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China

5.2 General Description of E.U.T.

Product Description:	Mobile product

5.3 Technical Specifications

Operation Frequency:	2412MHz~2462MHz
Modulation Technique:	802.11b: DSSS(CCK, DQPSK, DBPSK) 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
Data Rate:	802.11b: 1Mbps, 5.5Mbps, 11Mbps, 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 36Mbps, 48Mbps, 54Mbps
Number of Channel:	11
Antenna Type	Integral
Antenna Gain	2 dBi
Power Supply:	AC 100-240V 50/60Hz 1.5A
Cable Type:	About 180cm length (2 Wires)

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Supplied by
Laptop	Lenovo	ThinkPad X100e	SGS

Software name	Manufacturer	Supplied By
HyperTerminal	/	SGS

5.5 Test Mode

Test Mode	Description of Test Mode
Engineering mode	Using test software to control EUT working in continuous transmitting, and select channel and modulation type.

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5.6 Test Channel

Using test software was control EUT work in continuous transmitter mode. And select test channel as below:

For 802.11b/g

Channel	Frequency
The lowest channel(CH1)	2412MHz
The middle channel(CH6)	2437MHz
The Highest channel(CH11)	2462MHz

Through Pre-scan under all rate at lowest channel 1(CH1), the data rate as below table described is the worst case, so we chose these data rate for test.

Type	Data rate
802.11b	1Mbps
802.11g	6Mbps

5.7 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.
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5.8 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.

5.9 Measurement Uncertainty

No.	Parameter	Measurement Uncertainty
1	Radio Frequency	< ±1 x 10^{-5}
2	Total RF power, conducted	< ±1.5 dB
3	RF power density, conducted	< ±3 dB
4	Spurious emissions, conducted	< ±3 dB
5	All emissions, radiated	< ±6 dB (30MHz – 1GHz) < ±6 dB (above 1GHz)
6	Temperature	< ±1°C
7	Humidity	< ±5 %
8	DC and low frequency voltages	< ±3 %

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6 Equipments Used during Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Spectrum Analyzer	Rohde & Schwarz	FSP-30	2705121009	2014-02-23	2015-02-22
2	EMI test receiver	Rohde & Schwarz	ESU40	100109	2014-02-23	2015-02-22
3	Horn Antenna (1GHz to 18GHz)	SCHWARZBECK	BBHA9120D	9120D-679	2013-03-07	2014-03-06
4	Horn Antenna (14GHz to 40GHz)	SCHWARZBECK	BBHA 9170	BBHA917037 3	2013-03-07	2014-03-06
5	ANTENNA (25MHz to 2GHz)	SCHWARZBECK	VULB9168	9168-313	2013-03-07	2014-03-06
6	Ultra broadband antenna (30MHz to3GHz)	Rohde & Schwarz	HL562	100227	2013-10-09	2014-10-08
7	Horn Antenna (1GHz to 18GHz)	Rohde & Schwarz	HF906	100284	2013-06-02	2014-06-01
8	Active Loop ntenna (9kHz to 30MHz)	Rohde & Schwarz	FMZB 1519	1519-034	2013-07-28	2014-07-27
9	High-low temperature cabinet	Suzhou Zhihe	TL-40	50110050	2013-04-13	2014-04-12
10	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT800.0 /880.0-0.2/40-5SSK	9	2013-06-02	2014-06-01
11	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	2013-06-02	2014-06-01
12	Low noise amplifier	TESEQ	LNA6900	70133	2014-02-23	2015-02-22
13	Attenuator	HUAXIANG	TS2-6dB	11051002	/	/
14	Attenuator	HUAXIANG	TS2-6dB	11051001	/	/
15	AC power stabilizer	WOCEN	6100	51122	2013-06-02	2014-06-01
16	DC power	QJE	QJ30003SII	611145	2013-06-02	2014-06-01

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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:	99.2 -102.0 kPa

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top. 1 near middle and 1 near bottom

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

Test frequency is the lowest channel: 1 channel (2412MHz), middle channel: 39 channel (2437MHz) and highest channel: 11 channel (2462MHz) with fixed at channel.

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7.2 Antenna Requirement

Standard requirement:

15.203 requirement:

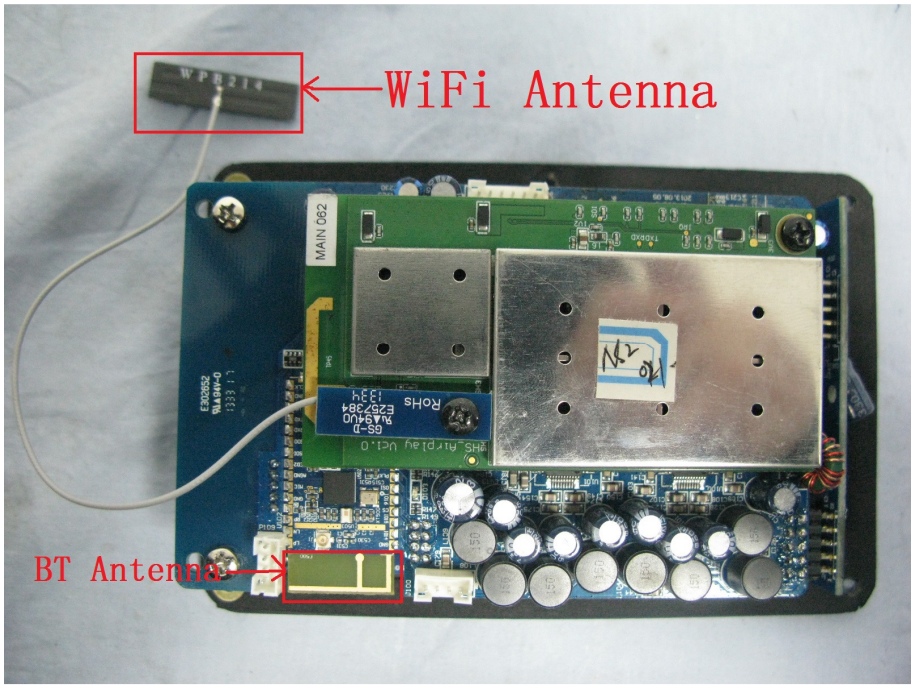
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 Plug-in PCB antenna. The gain of the antenna is less than 2.0 dBi.



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7.3 Conducted Emissions on Mains Terminals

Test Requirement: FCC Part 15C, Section 15.207

Test Method: ANSI C63.10:2009 Section 6.2

Frequency Range: 150 KHz to 30 MHz

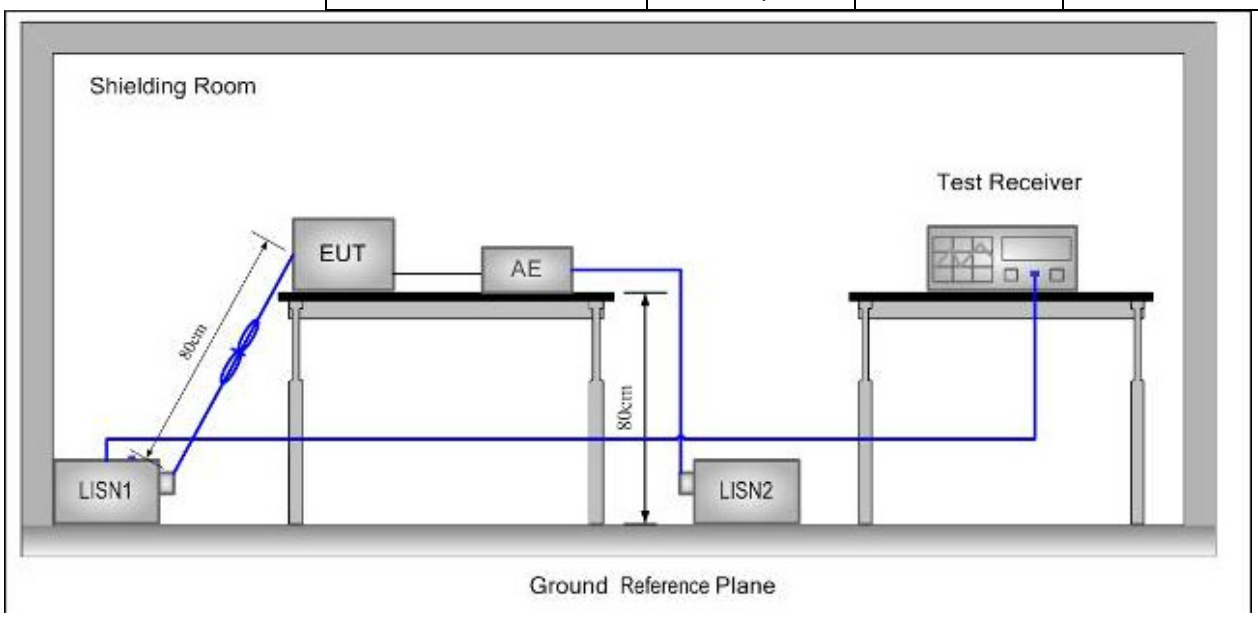
Class/Severity: Class B

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
Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz. Note2: The lower limit is applicable at the transition frequency.		

Test site/setup: Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
9KHz to 150Hz	Quasi-peak	200Hz	500Hz
150KHz to 30MHz	Quasi-peak	9kHz	30kHz



Test 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 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were 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

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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 were at least 0.8 m from the LISN.

Remark: 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. Pretest under all modes; choose the worst case mode (802.11b in Middle channel) record on the report. Please see the attached Quasi-peak and Average test results.

Test Result: Pass

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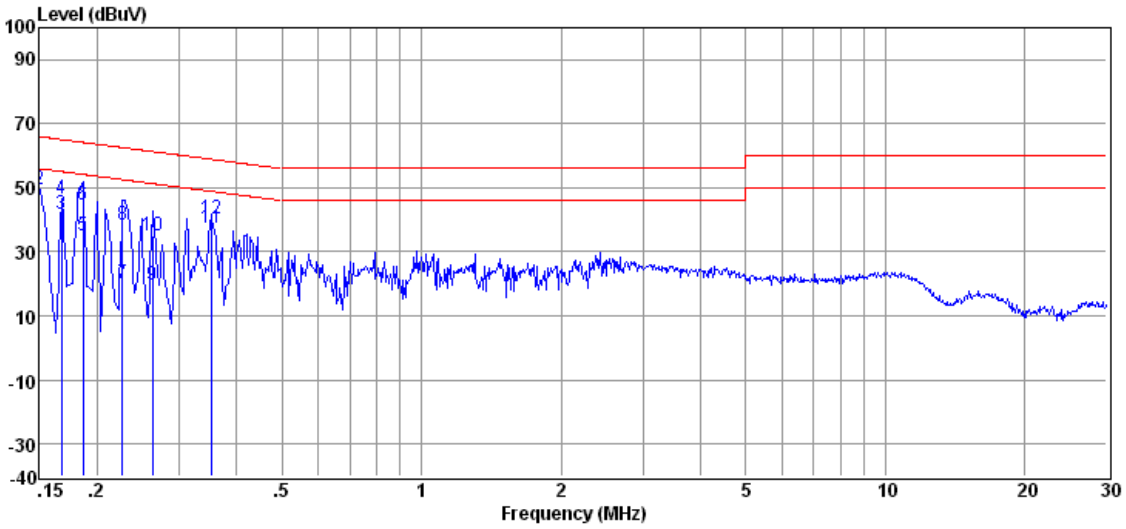
Test Data:

Test Mode: Engineering mode **Test Port:** AC Live Line



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)	
1	0.150	45.47	0.20	0.10	45.77	56.00	-10.23	Average
2	0.150	49.17	0.20	0.10	49.47	66.00	-16.53	QP
3	0.168	41.70	0.16	0.10	41.96	55.08	-13.12	Average
4	0.168	46.38	0.16	0.10	46.64	65.08	-18.44	QP
5	0.186	34.91	0.13	0.10	35.14	54.20	-19.06	Average
6	0.186	44.36	0.13	0.10	44.59	64.20	-19.61	QP
7	0.227	19.83	0.11	0.10	20.04	52.57	-32.53	Average
8	0.227	38.05	0.11	0.10	38.26	62.57	-24.31	QP
9	0.263	19.63	0.12	0.10	19.85	51.34	-31.49	Average
10	0.263	34.87	0.12	0.10	35.09	61.34	-26.25	QP
11	0.352	37.35	0.15	0.10	37.60	48.91	-11.31	Average
12	0.352	40.18	0.15	0.10	40.43	58.91	-18.48	QP

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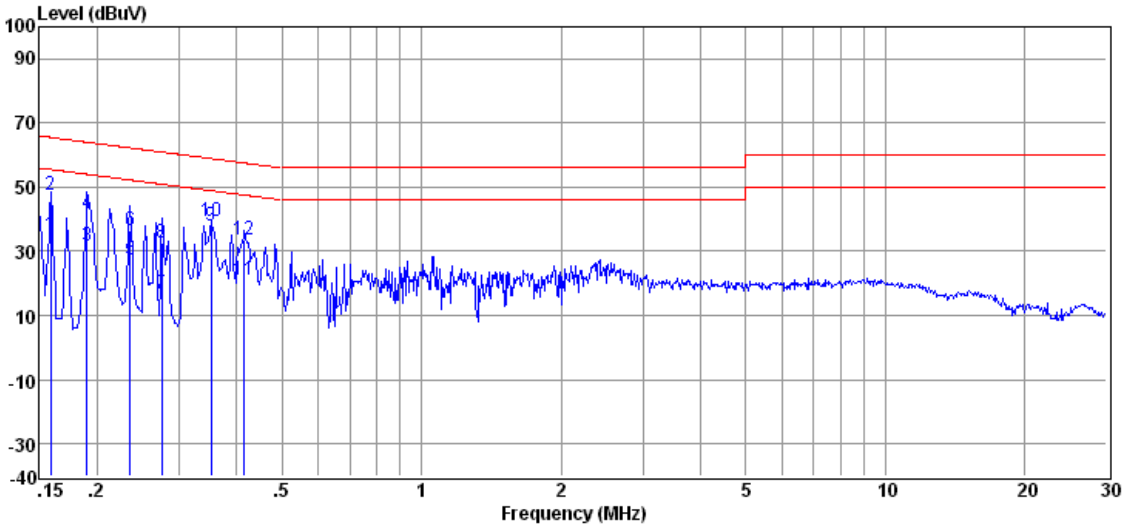
Test Mode: Engineering mode **Test Port:** AC Neutral Line



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)	
1	0.159	34.54	0.18	0.10	34.82	55.52	-20.70	Average
2	0.159	47.11	0.18	0.10	47.39	65.52	-18.13	QP
3	0.190	31.27	0.12	0.10	31.49	54.02	-22.53	Average
4	0.190	41.79	0.12	0.10	42.01	64.02	-22.01	QP
5	0.235	27.36	0.10	0.10	27.56	52.26	-24.70	Average
6	0.235	36.29	0.10	0.10	36.49	62.26	-25.77	QP
7	0.276	16.63	0.10	0.10	16.83	50.94	-34.11	Average
8	0.276	32.21	0.10	0.10	32.41	60.94	-28.53	QP
9	0.352	37.92	0.10	0.10	38.12	48.91	-10.79	Average
10	0.352	39.30	0.10	0.10	39.50	58.91	-19.41	QP
11	0.415	20.89	0.10	0.10	21.09	47.55	-26.46	Average
12	0.415	33.55	0.10	0.10	33.75	57.55	-23.80	QP

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

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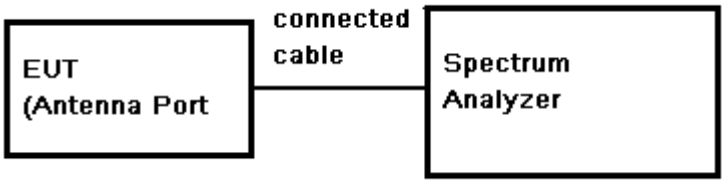
7.4 6dB Occupied Bandwidth

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

Test Method: ANSI C63.10:2009 Section 6.9.1

Test Configuration:



Test Procedure:
1. Place the EUT on the table 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 the spectrum analyzer.
3. Set the spectrum analyzer as RBW=300KHz, VBW =3* RBW, Span=30/50MHz, Sweep=auto
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured was complete.

Limit: ≥ 500 kHz

Test Result: Pass

Test Data:

Test mode: 802.11b

CH	Frequency (MHz)	Bandwidth (MHz)	Limit Bandwidth (KHz)	Result
Low	2412	10.80	500	PASS
Mid	2437	10.88	500	PASS
High	2462	10.96	500	PASS

Test mode: 802.11g

CH	Frequency (MHz)	Bandwidth (MHz)	Limit Bandwidth (KHz)	Result
Low	2412	16.68	500	PASS
Mid	2437	16.64	500	PASS
High	2462	16.72	500	PASS

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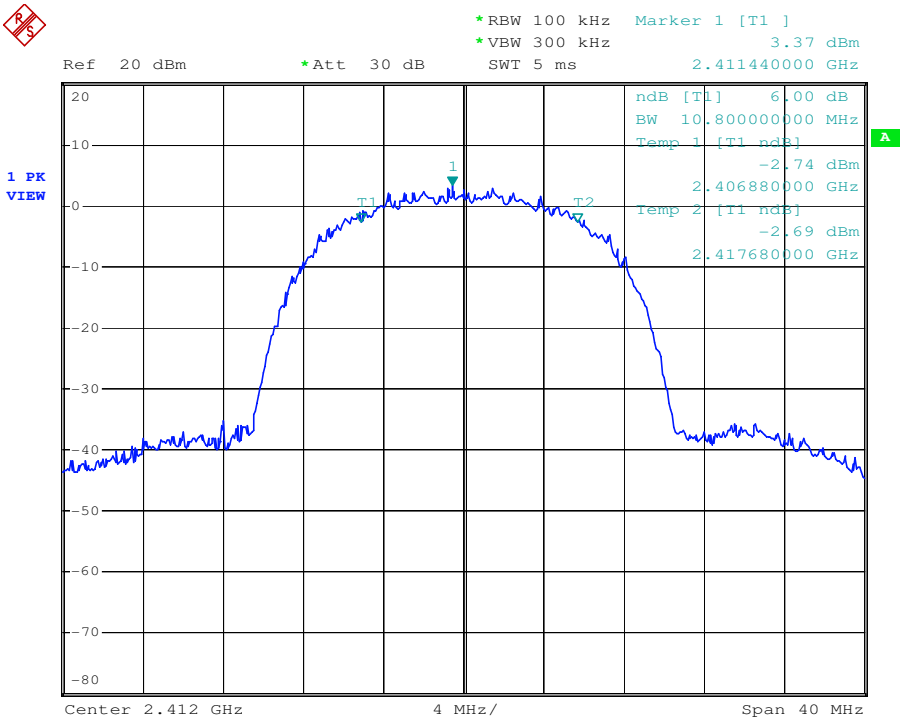
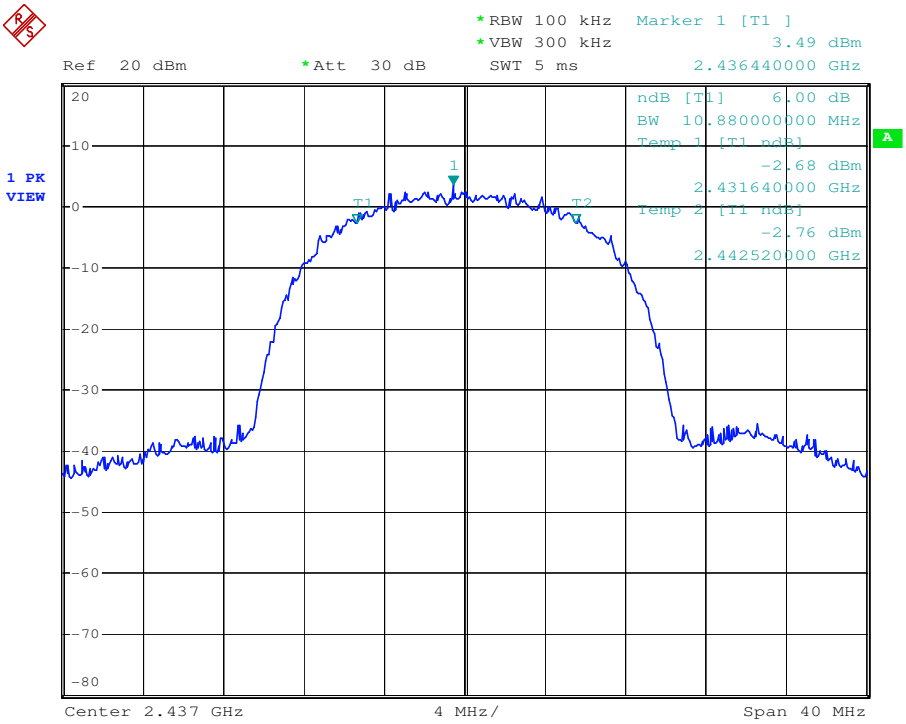
Test plot as follows:

Test mode: 802.11b **Channel: Lowest**



Test mode: 802.11b **Channel: Middle**



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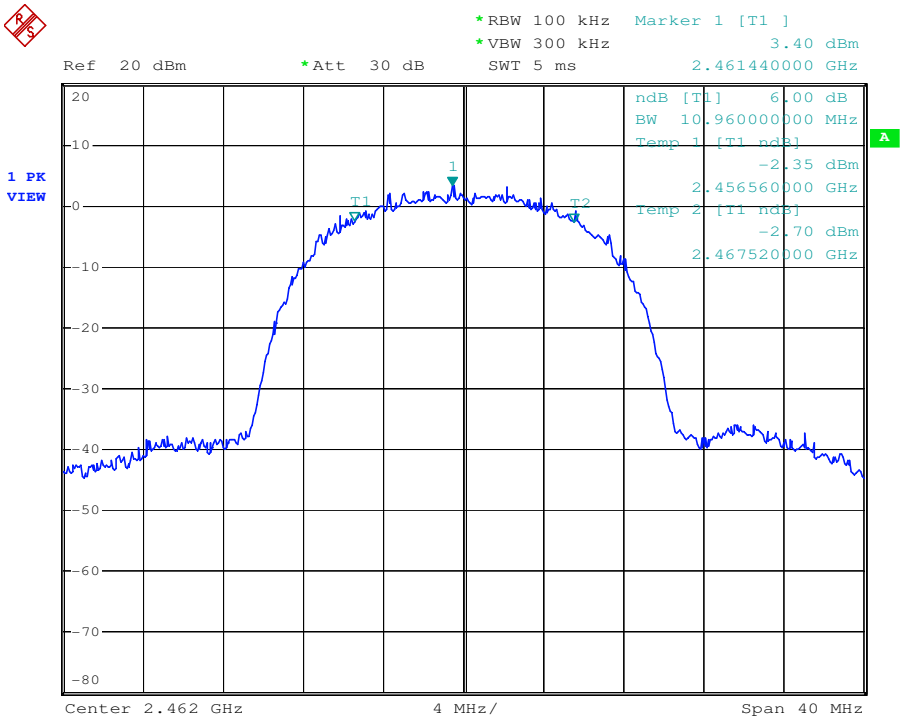
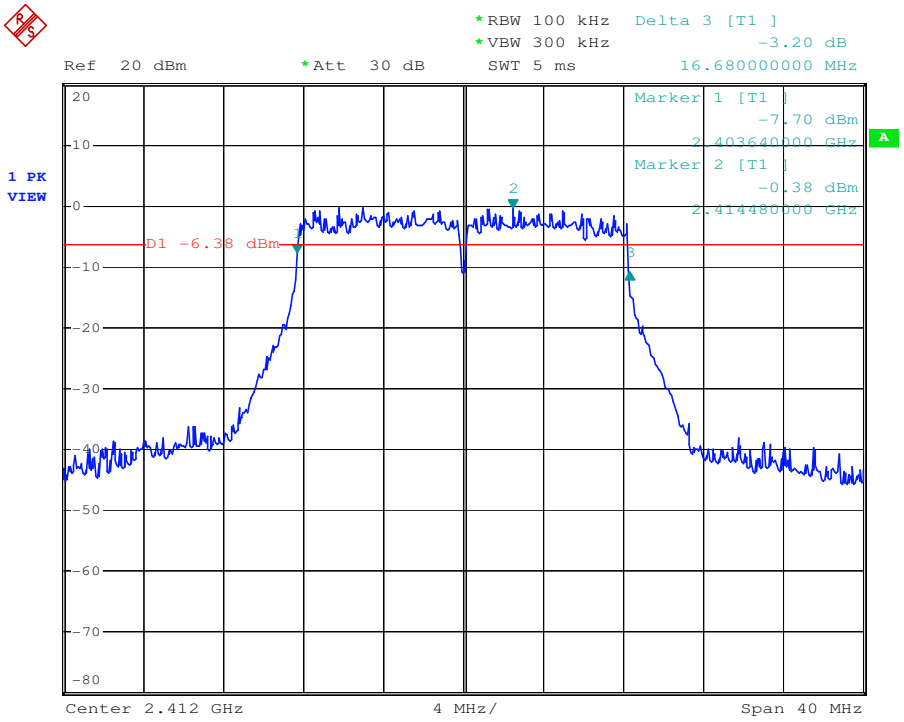
Test mode: 802.11b **Channel: Highest**



Test mode: 802.11g **Channel: Lowest**



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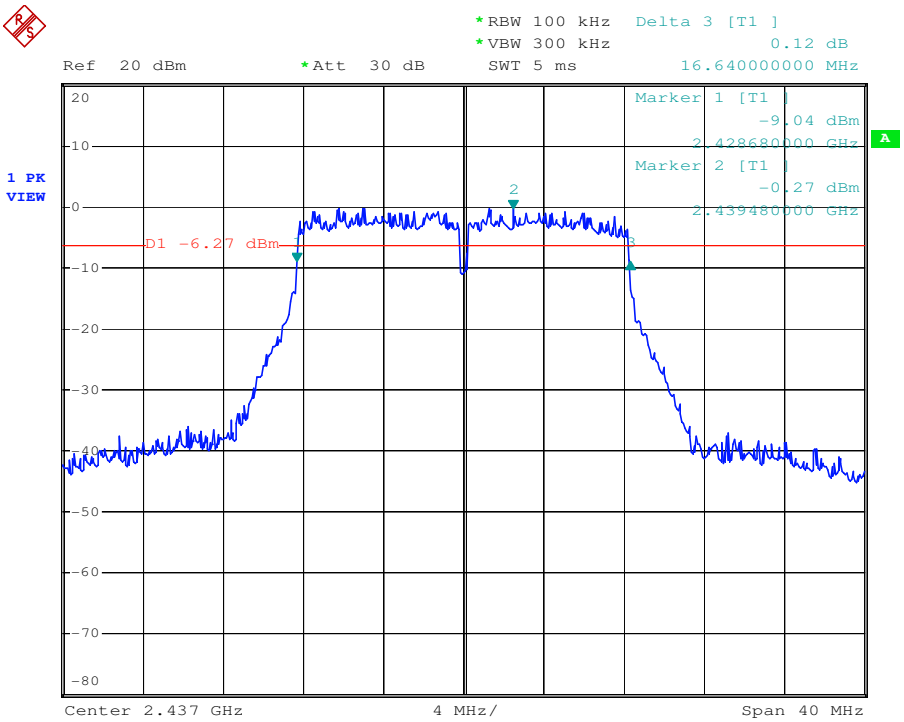
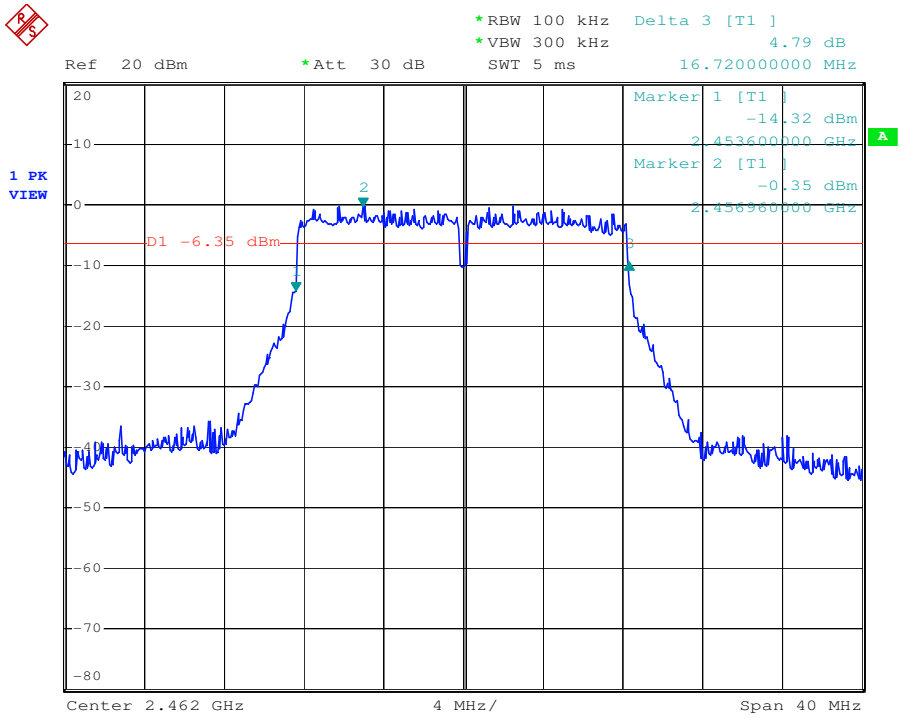
Test mode: 802.11g **Channel: Middle**



Test mode: 802.11g **Channel: Highest**



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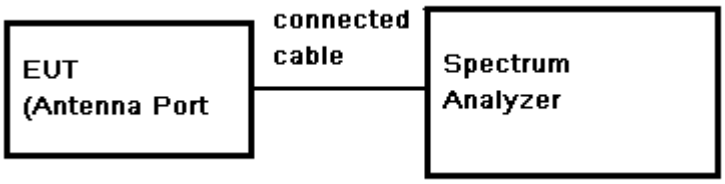
7.5 Conducted Peak Output Power

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

Test Method: ANSI C63.10:2009 Section 6.10.2

Test Configuration:



Test Procedure:

1. Place the EUT on the table 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 the spectrum.
3. Set the occur band to the entire emission 26dB bandwidth of the signal.
4. Record the max. Power channel reading.
5. Repeat above procedures until all the frequency measured were complete.

Test Limit: 30dBm

Test Result: Pass

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Test Data:

Test mode: 802.11b

CH	Frequency (MHz)	Reading Peak Power (dBm)	Cable Loss (dB)	Output Peak Power (dBm)	Output Peak Power (mW)	Peak Power Limit (dBm)	Result
Low	2412	19.02	0.5	19.52	89.54	30	PASS
Mid	2437	19.46	0.5	19.96	99.08	30	PASS
High	2462	19.21	0.5	19.71	93.54	30	PASS

Test mode: 802.11g

CH	Frequency (MHz)	Reading Peak Power (dBm)	Cable Loss (dB)	Output Peak Power (dBm)	Output Peak Power (mW)	Peak Power Limit (dBm)	Result
Low	2412	19.85	0.5	20.35	108.39	30	PASS
Mid	**2437**	**20.32**	**0.5**	**20.82**	**120.78**	30	PASS
High	2462	20.27	0.5	20.77	119.40	30	PASS

Remark: Output Peak Power = Reading Peak Power + Cable loss

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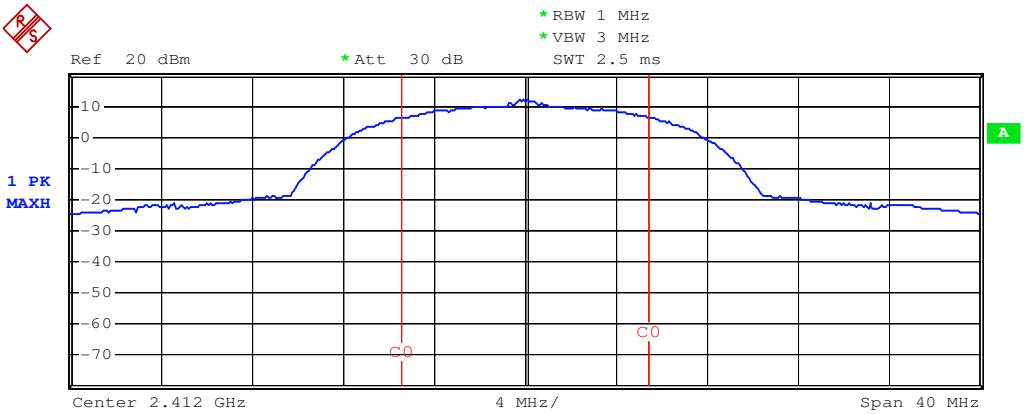
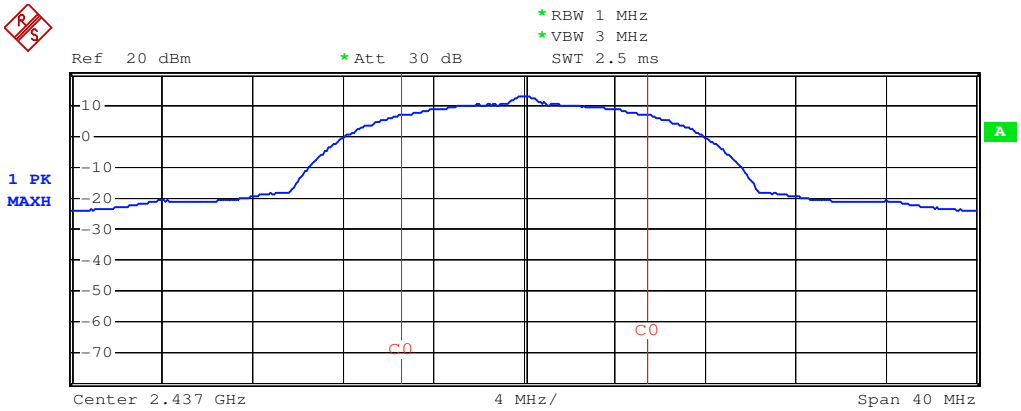
Test result plot as follows:

Test mode: 802.11b **Channel: lowest**



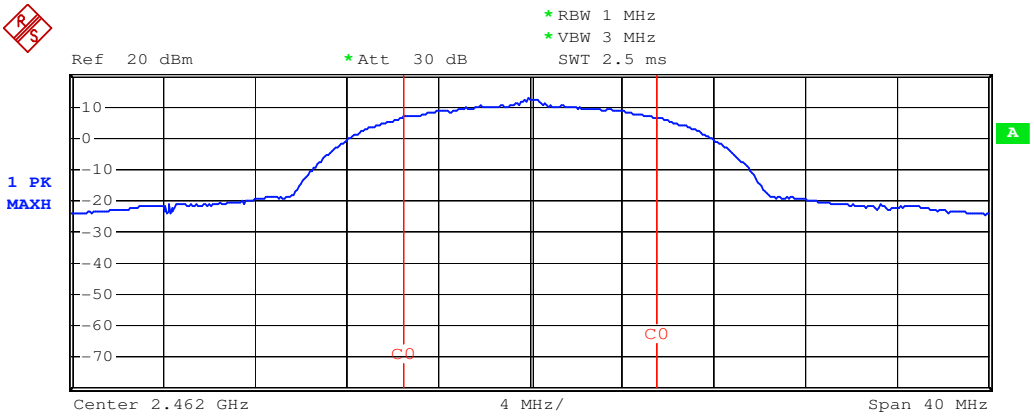
Tx Channel
Bandwidth 10.8 MHz Power 19.02 dBm

Test mode: 802.11b **Channel: Middle**



Tx Channel
Bandwidth 10.88 MHz Power 19.46 dBm

Test mode: 802.11b **Channel: Highest**



Tx Channel
Bandwidth 10.96 MHz Power 19.21 dBm

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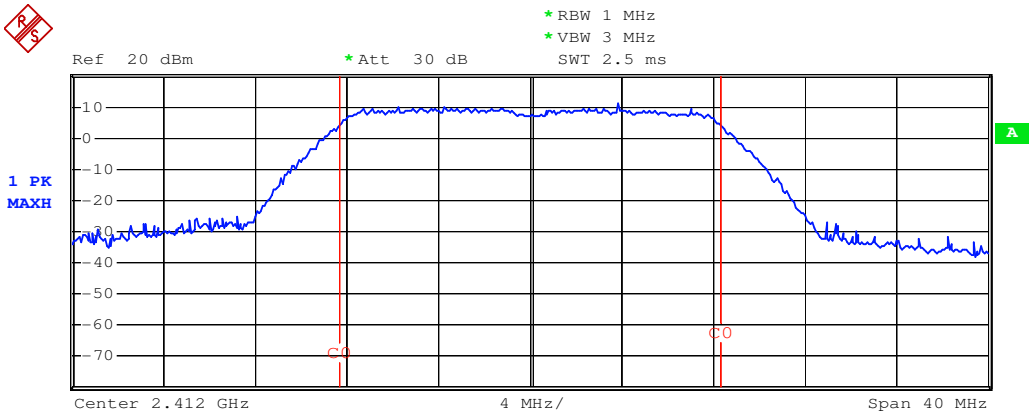
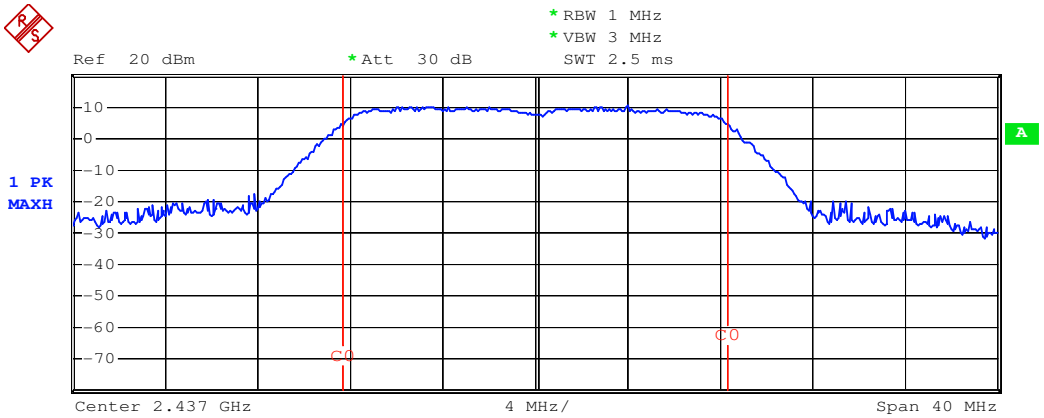
Test mode: 802.11g **Channel: lowest**



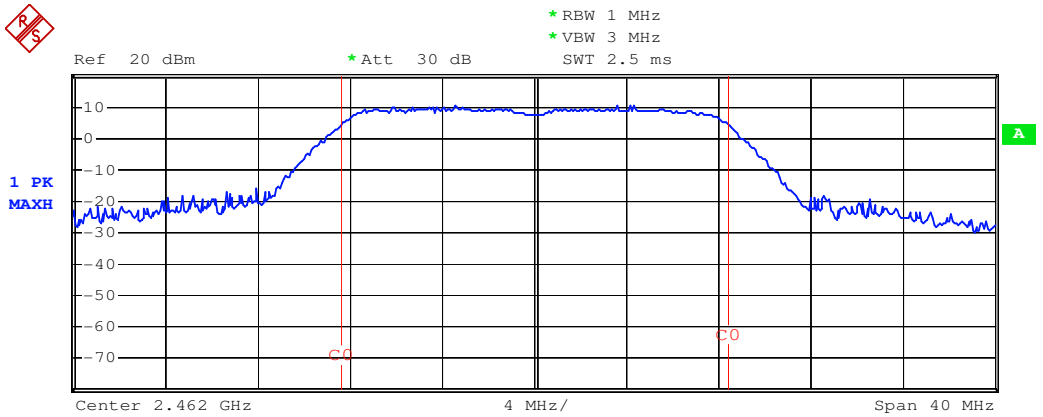
Tx Channel
Bandwidth 16.68 MHz Power 19.85 dBm

Test mode: 802.11g **Channel: Middle**



Tx Channel
Bandwidth 16.64 MHz Power 20.32 dBm

Test mode: 802.11g **Channel: Highest**



Tx Channel
Bandwidth 16.72 MHz Power 20.27 dBm

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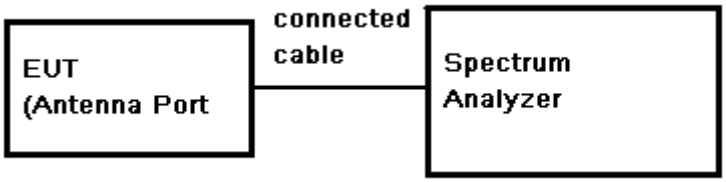
7.6 Peak Power Spectral Density

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

Test Method: ANSI C63.10,2009 Section 6.11.2

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: Center Frequency= Channel Frequency, RBW = 3 kHz VBW = 10 kHz. Span= fully encompass the bandwidth, Sweep = auto; Detector Function = Peak Trace mode=max hold,
3. Set MKR=Center Frequency, Trace=Clear Write.
4. Adjust the Span = 300 kHz, 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 Limit: 8dBm/3kHz

Test Result: Pass

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Test Data:

Test mode: 802.11b

CH	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	RF Power Density (dBm)	Limit (dBm)	Result
LOW	2412	-10.44	0.5	-7.94	8	PASS
MID	2437	-0.36	0.5	2.14	8	PASS
HIGH	2462	-10.36	0.5	-7.86	8	PASS

Test mode: 802.11g

CH	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	RF Power Density (dBm)	Limit (dBm)	Result
LOW	2412	-15.10	0.5	-12.6	8	PASS
MID	2437	-13.84	0.5	-11.34	8	PASS
HIGH	2462	-15.00	0.5	-12.50	8	PASS

Remark: RF Power Density = Reading + Cable loss + Antenna Gain

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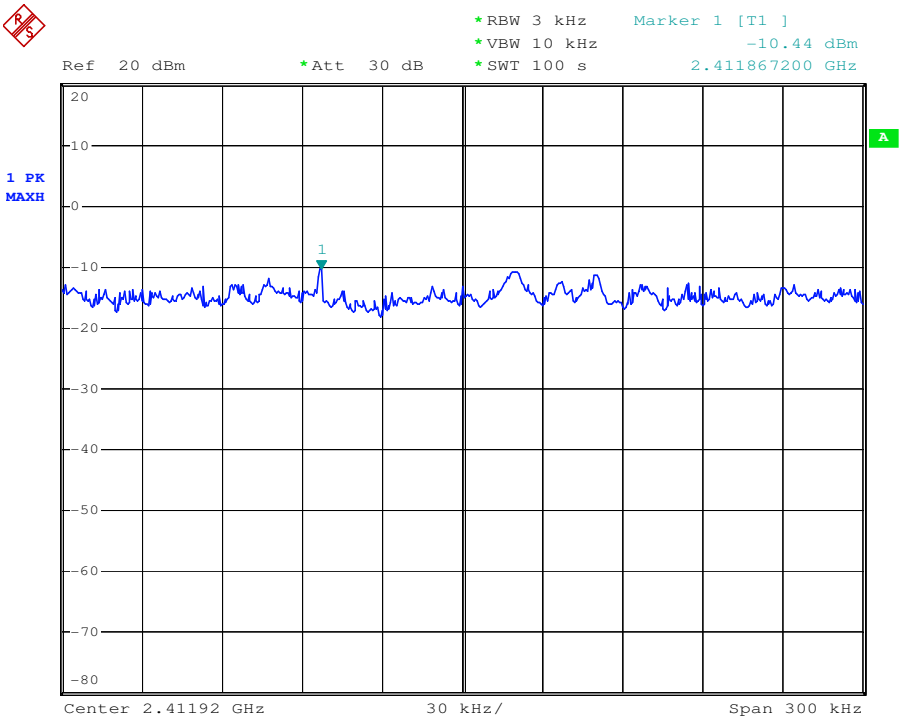
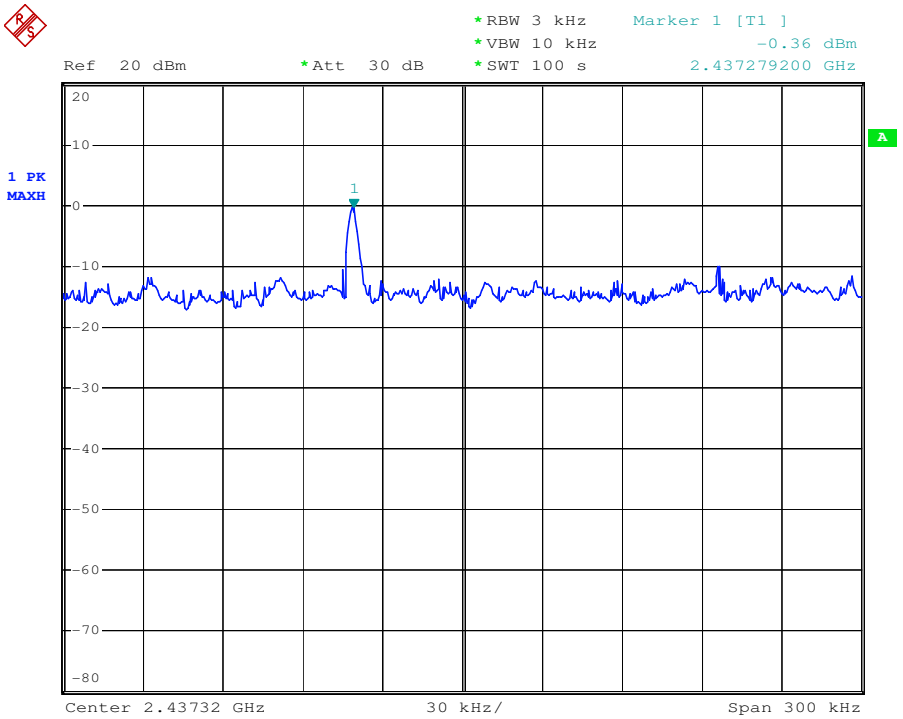
Test result plot as follows:

Test mode: 802.11b **Channel: lowest**



Test mode: 802.11b **Channel: Middle**



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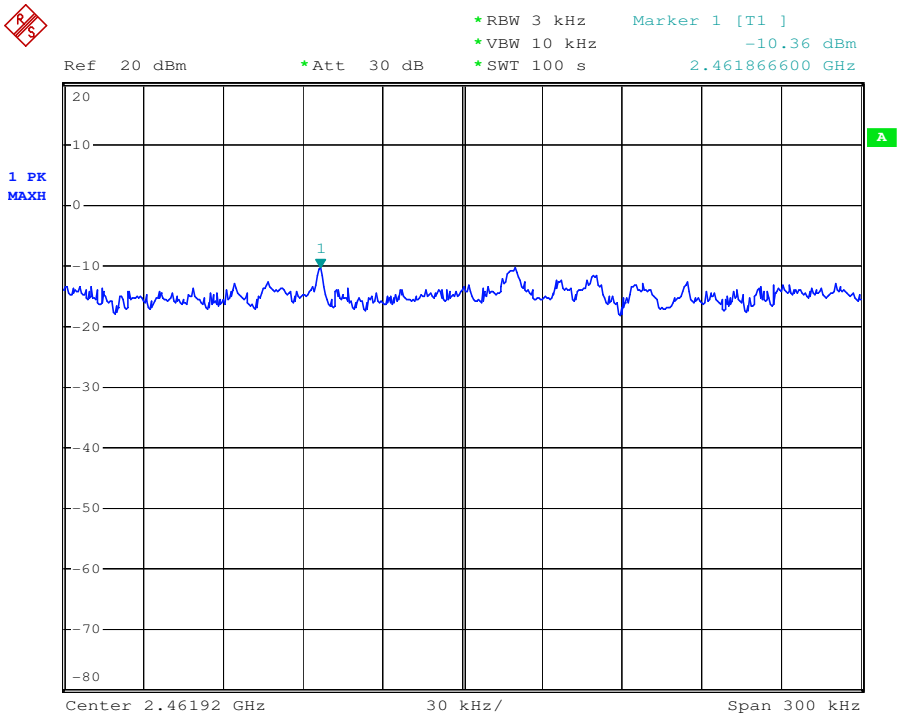
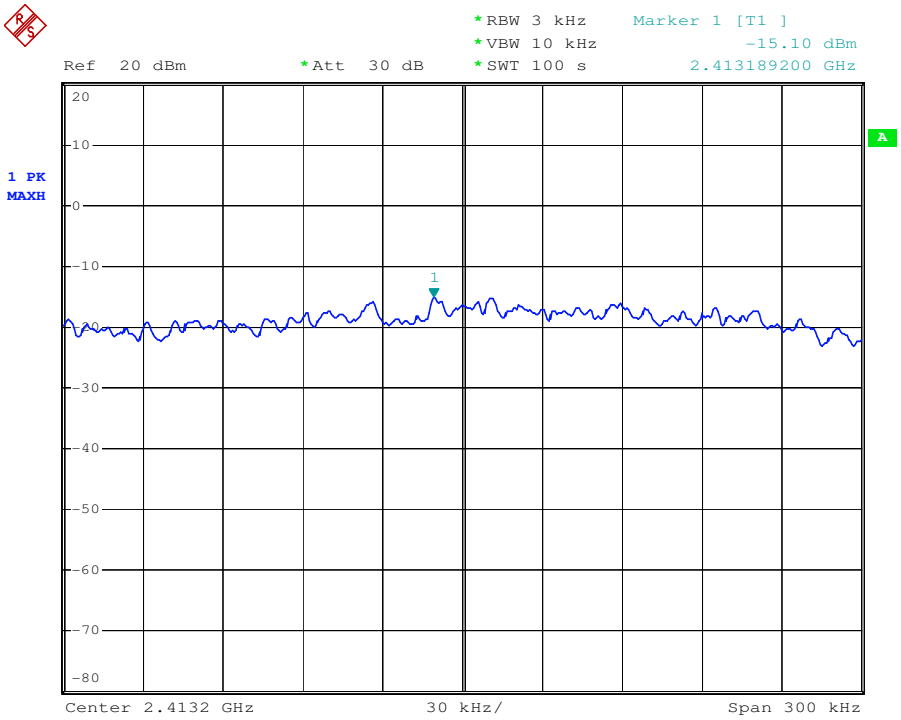
Test mode: 802.11b **Channel: Highest**



Test mode: 802.11g **Channel: Lowest**



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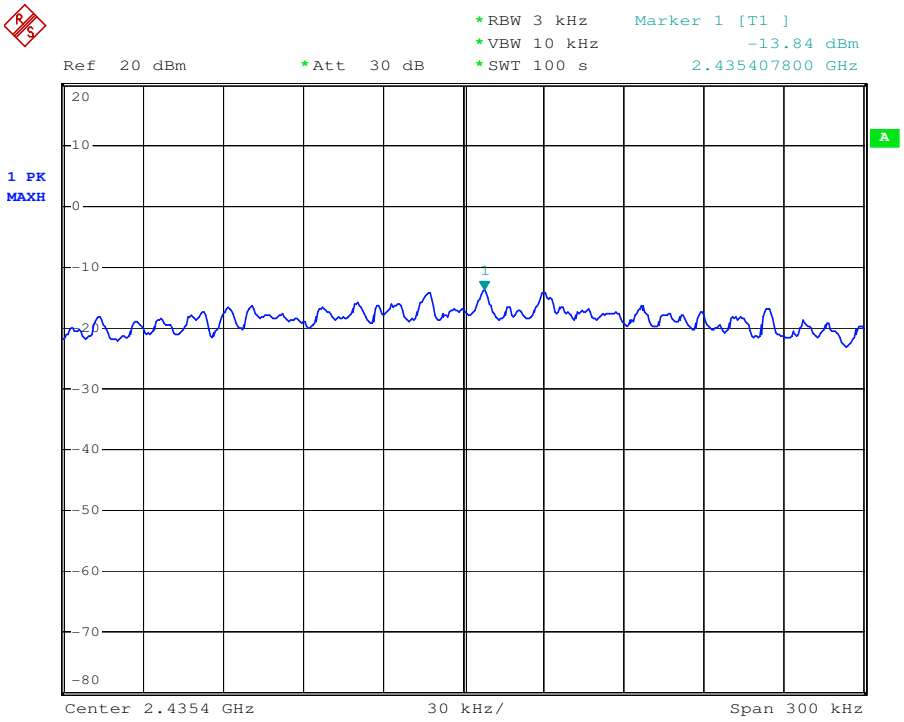
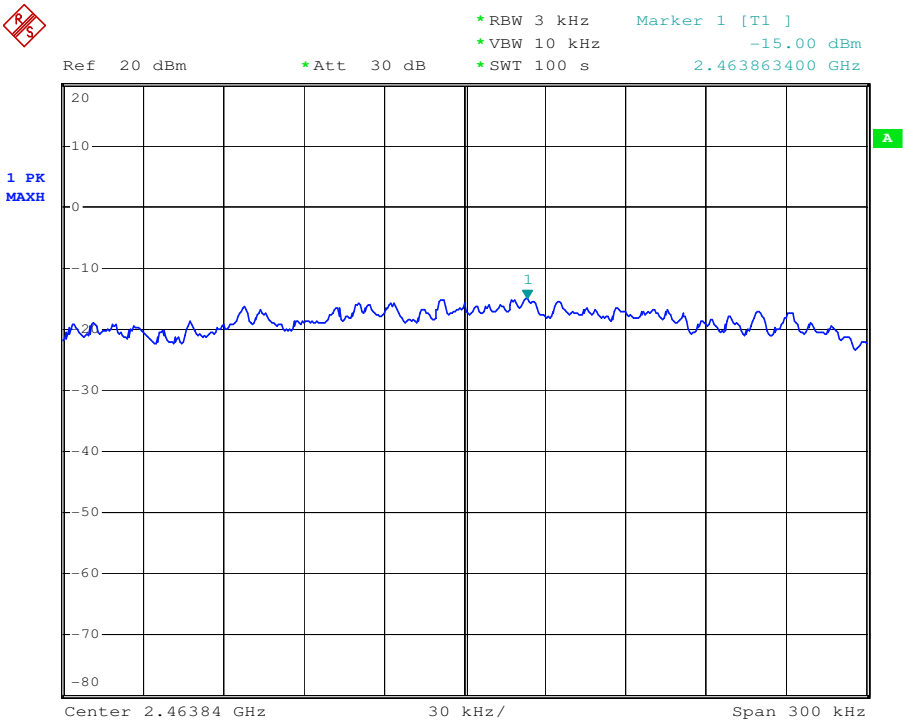
Test mode: 802.11g **Channel: Middle**



Test mode: 802.11g **Channel: Highest**



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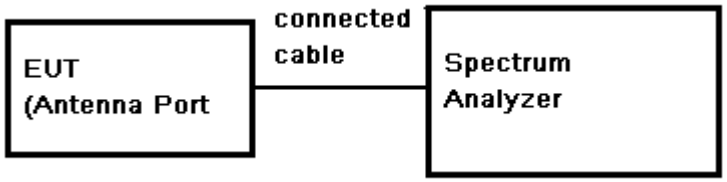
7.7 Conducted Spurious Emissions and Band-edge

Test Requirement: FCC Part 15 Section 15.247(d)
RSS-210 Issue 8 Annex 8.5

Test Method: ANSI C63.10:2009 Clause 7.7.9&7.7.10

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).

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.

Test Result: Pass

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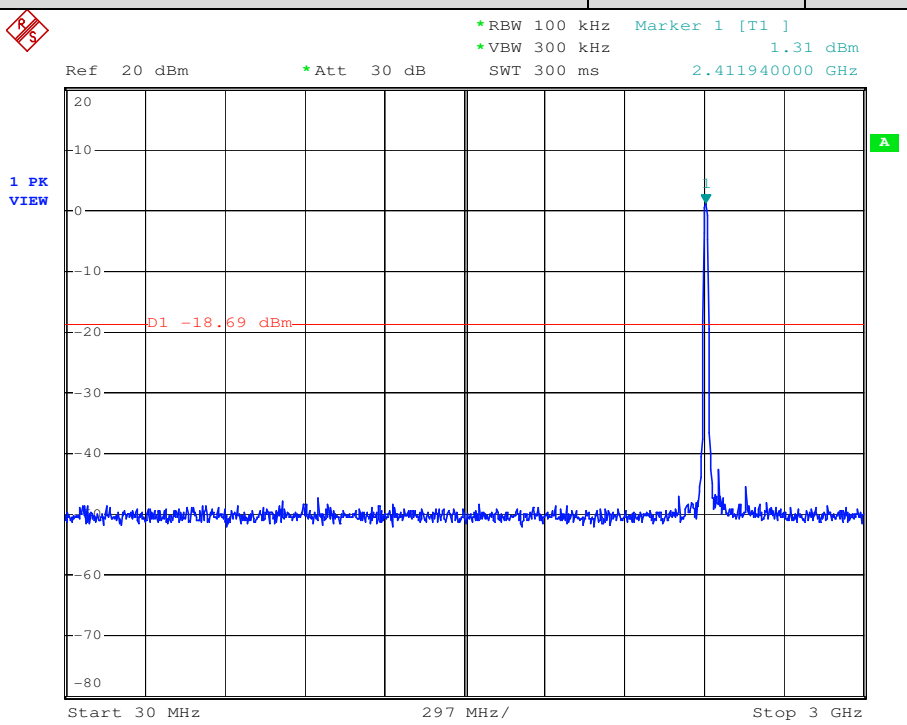
7.7.1 Conducted spurious emission

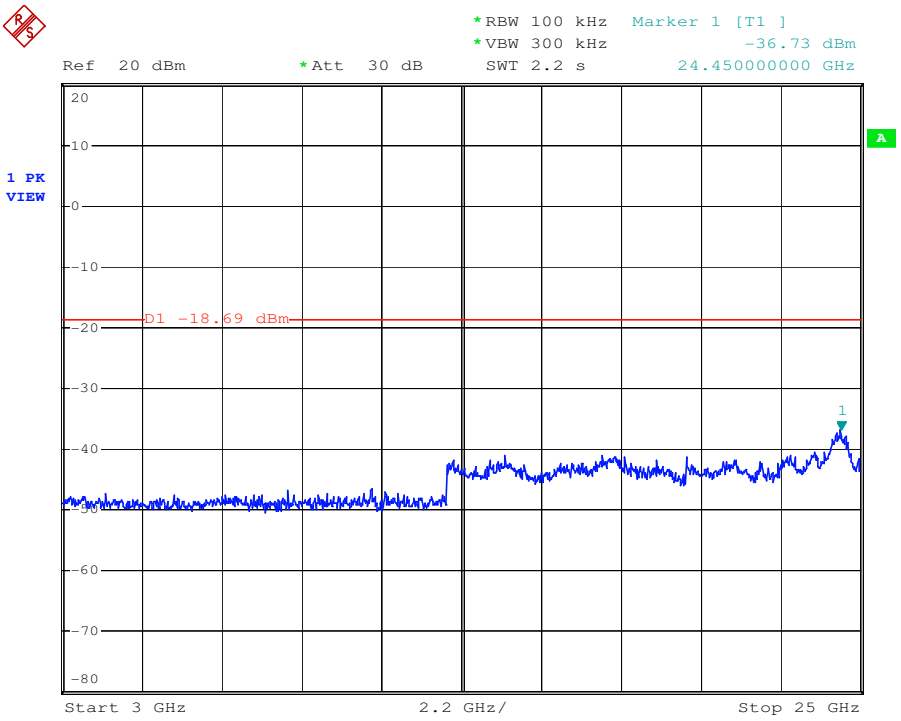
Test plot as follows:

Test mode:	802.11b	Channel:	lowest

30MHz-3GHz:



3GHz-25GHz:



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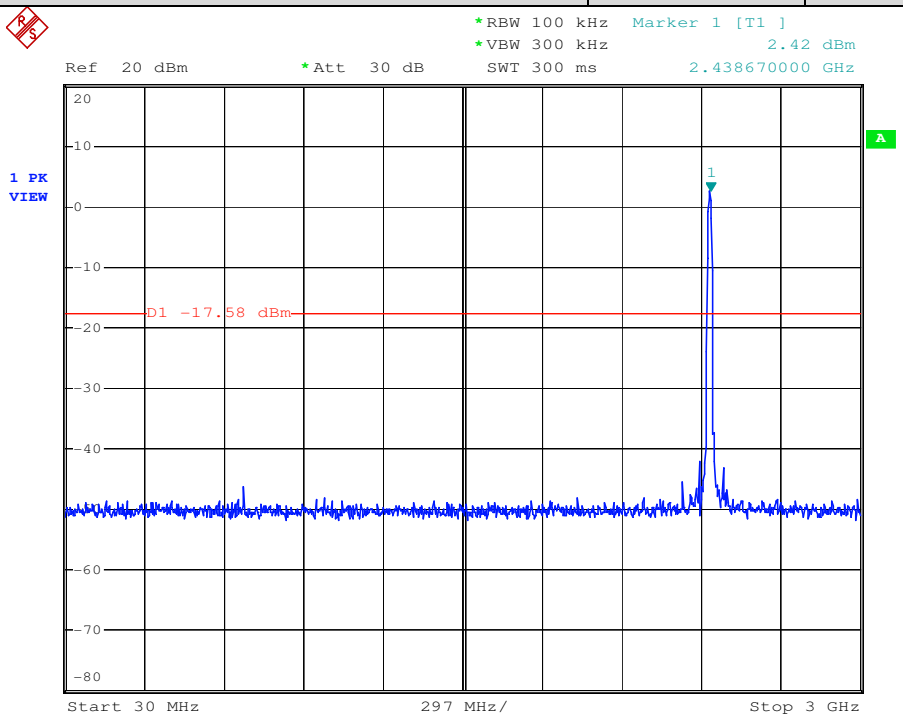
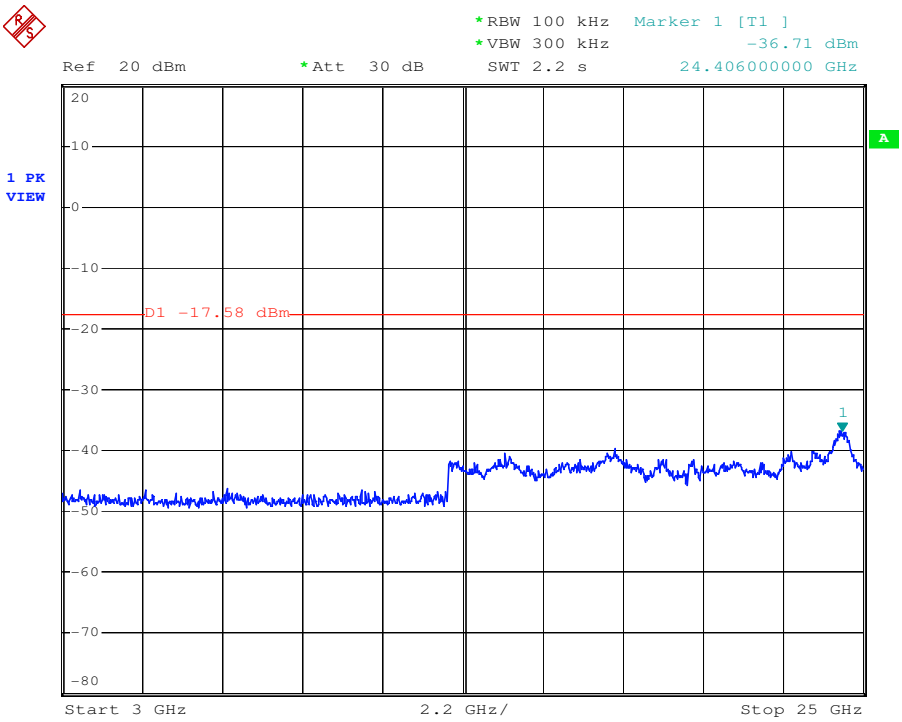
Test mode:	802.11b	Channel:	Middle

30MHz-3GHz:



3GHz-25GHz:



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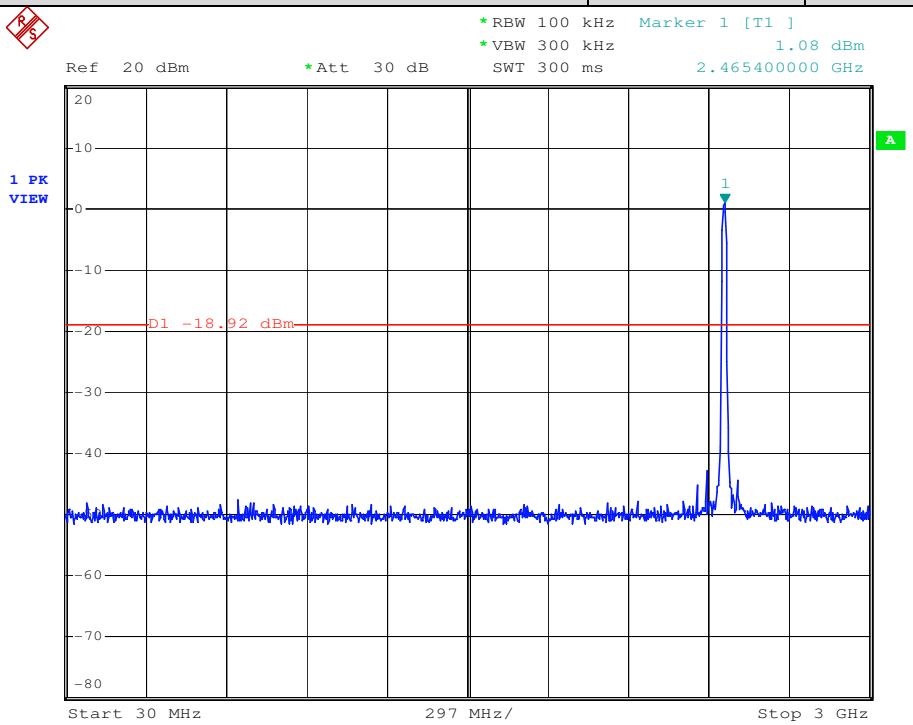
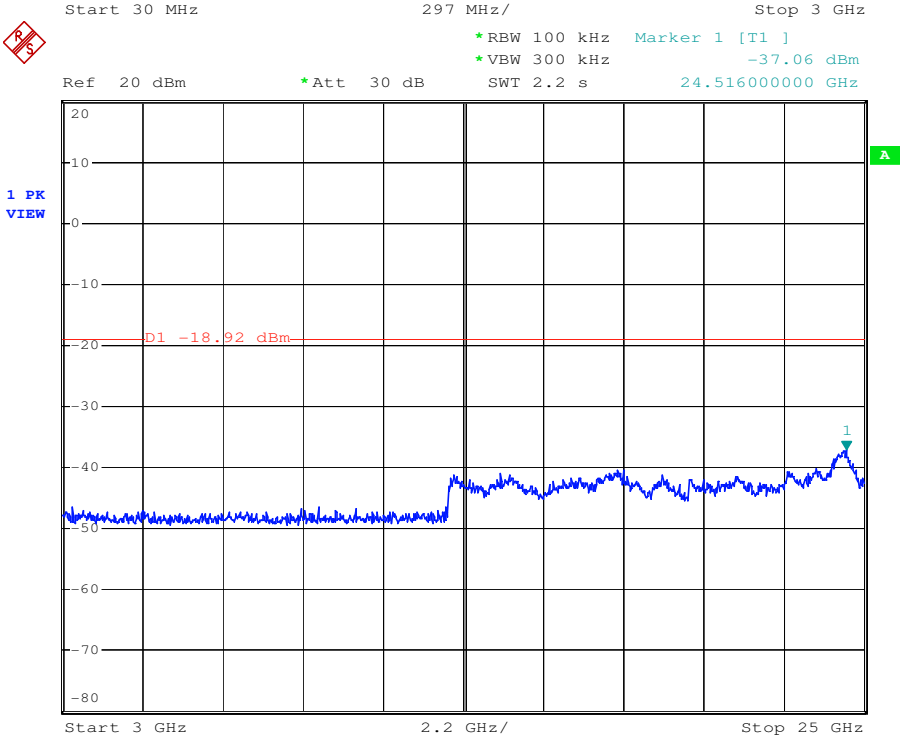
Test mode:	802.11b	Channel:	Highest

30MHz-3GHz:



3GHz-25GHz:



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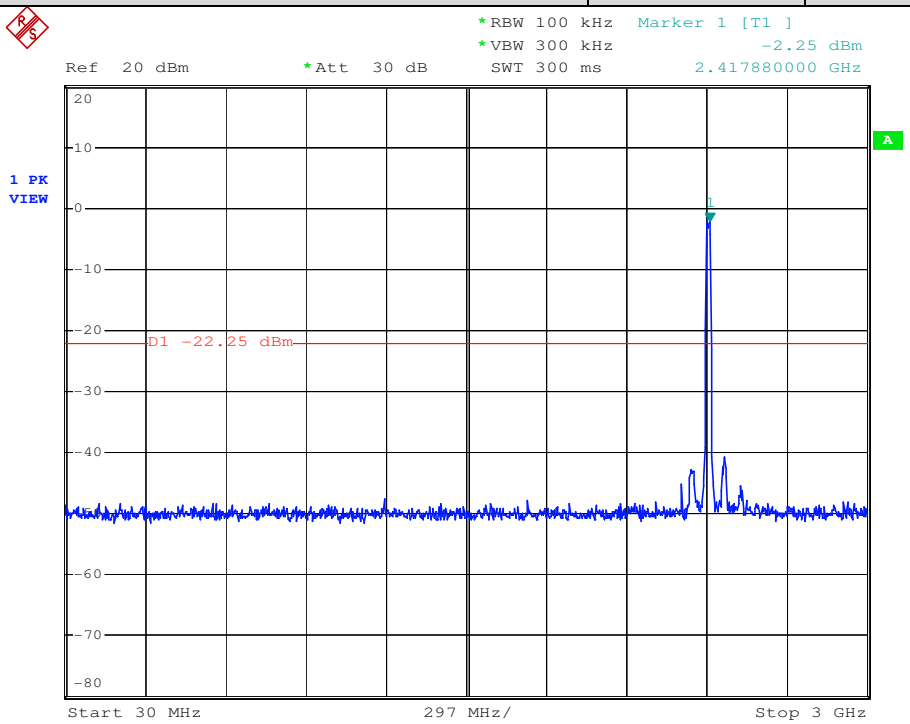
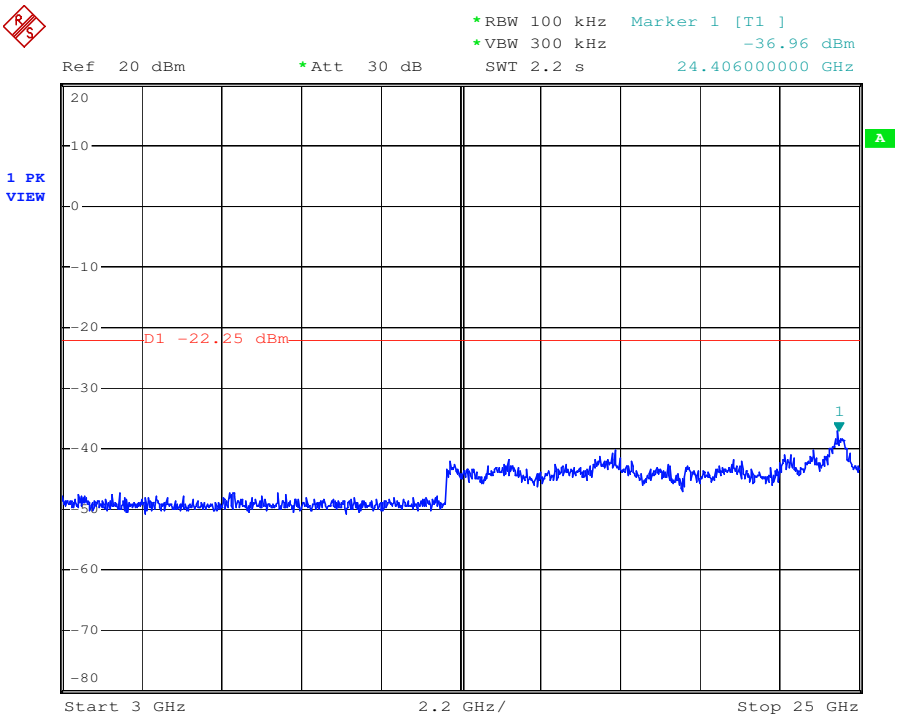
Test mode:	802.11g	Channel:	lowest

30MHz-3GHz:



3GHz-25GHz:



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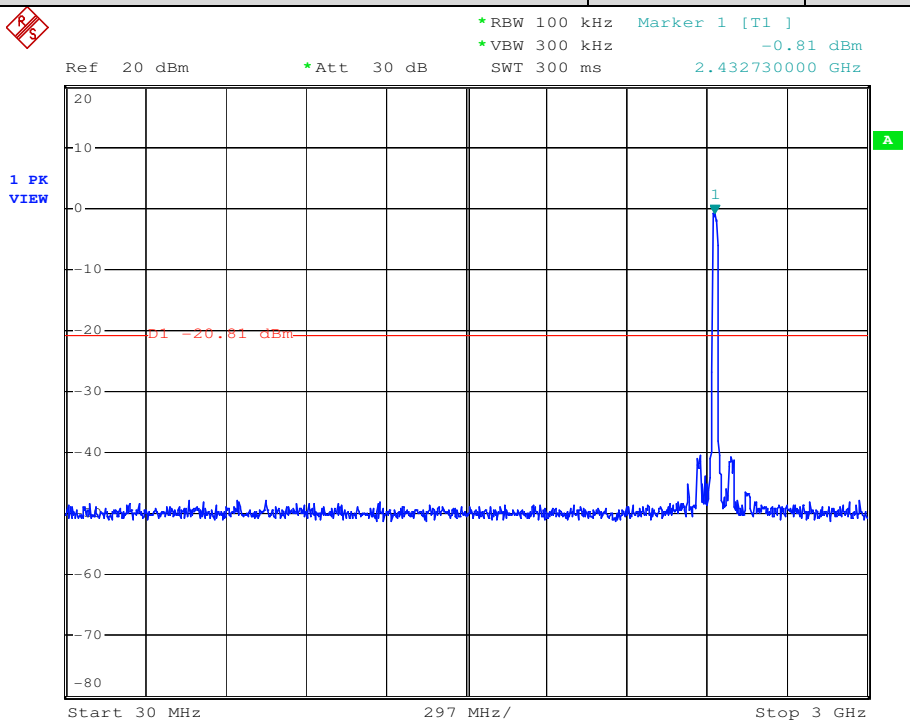
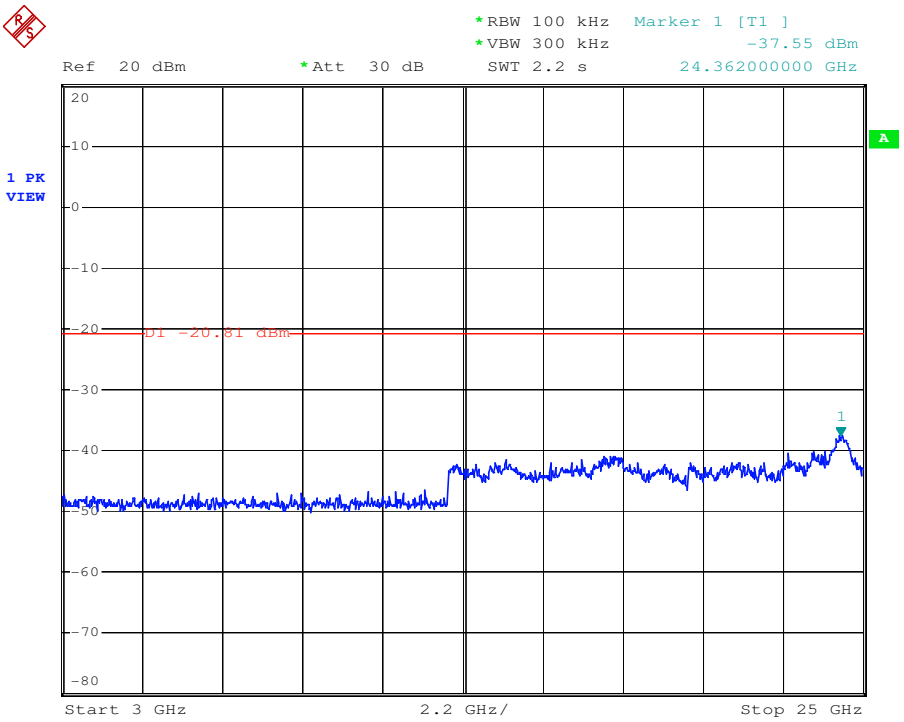
Test mode:	802.11g	Channel:	Middle

30MHz-3GHz:



3GHz-25GHz:



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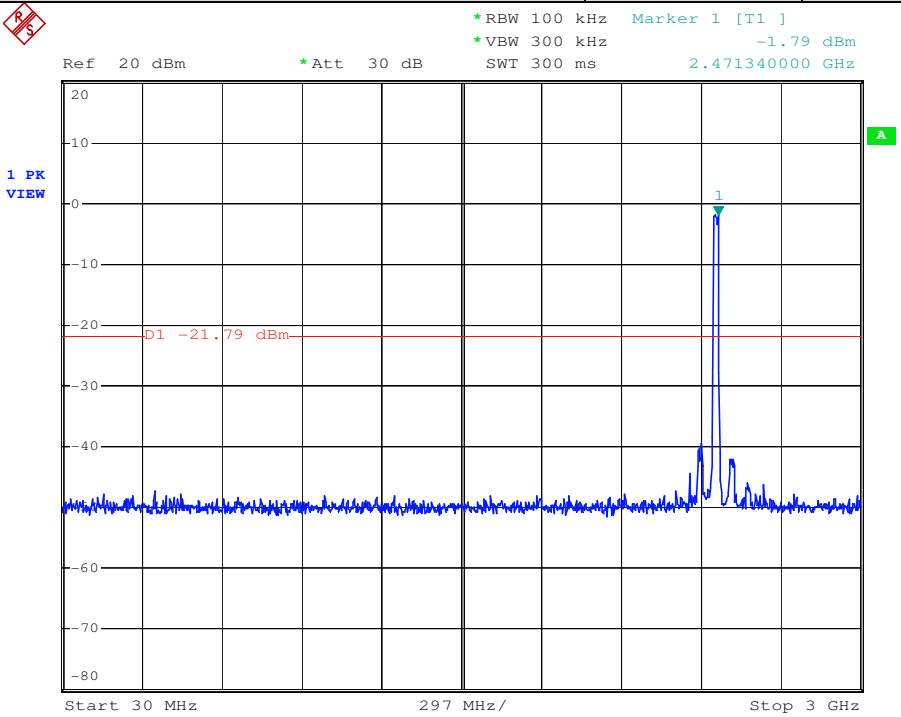
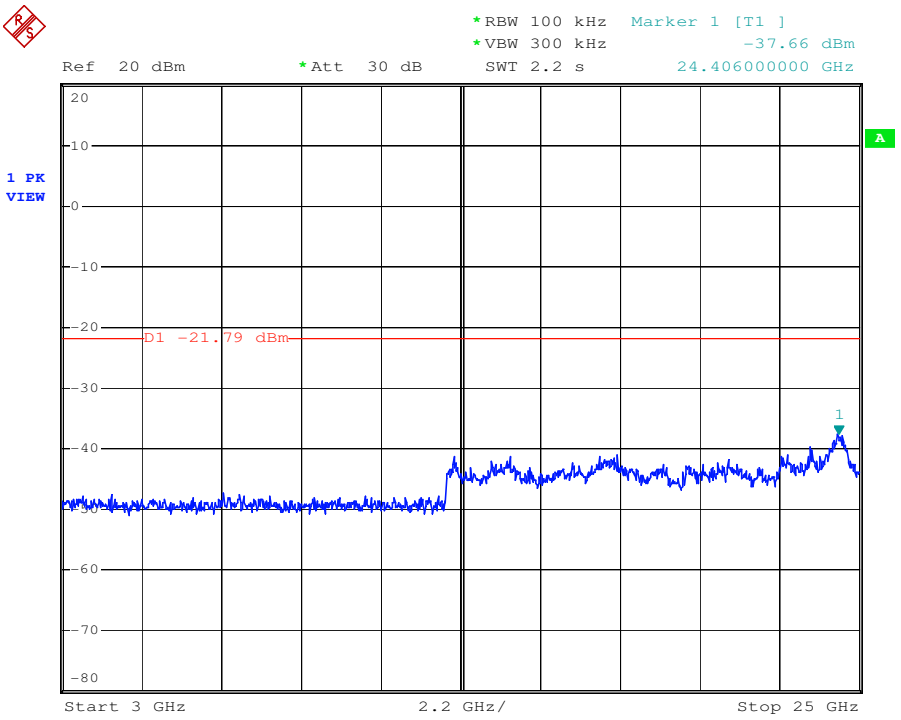
Test mode:	802.11g	Channel:	Highest

30MHz-3GHz:



3GHz-25GHz:



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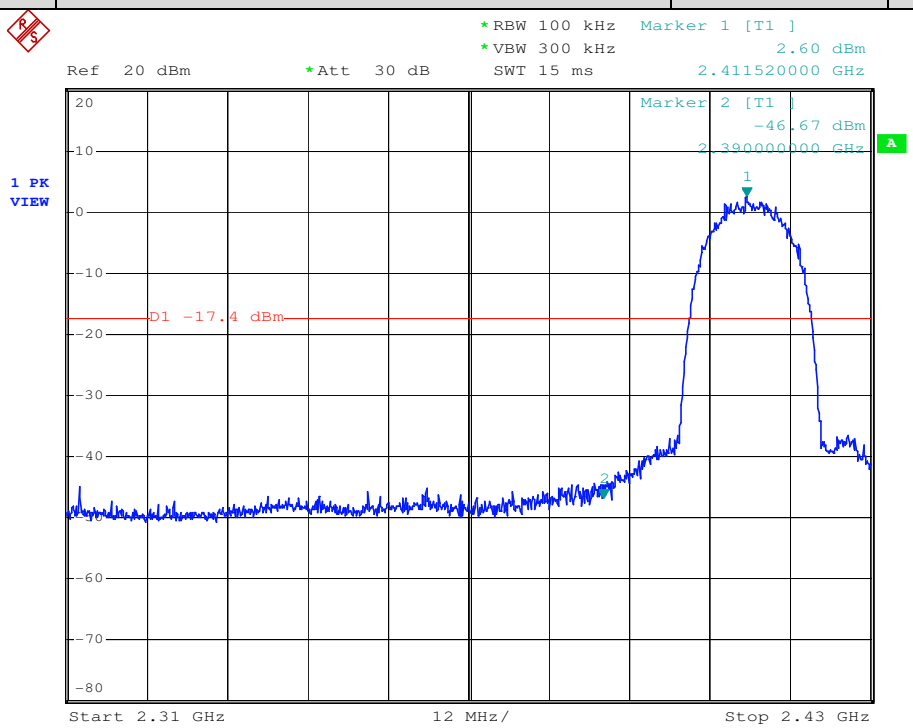
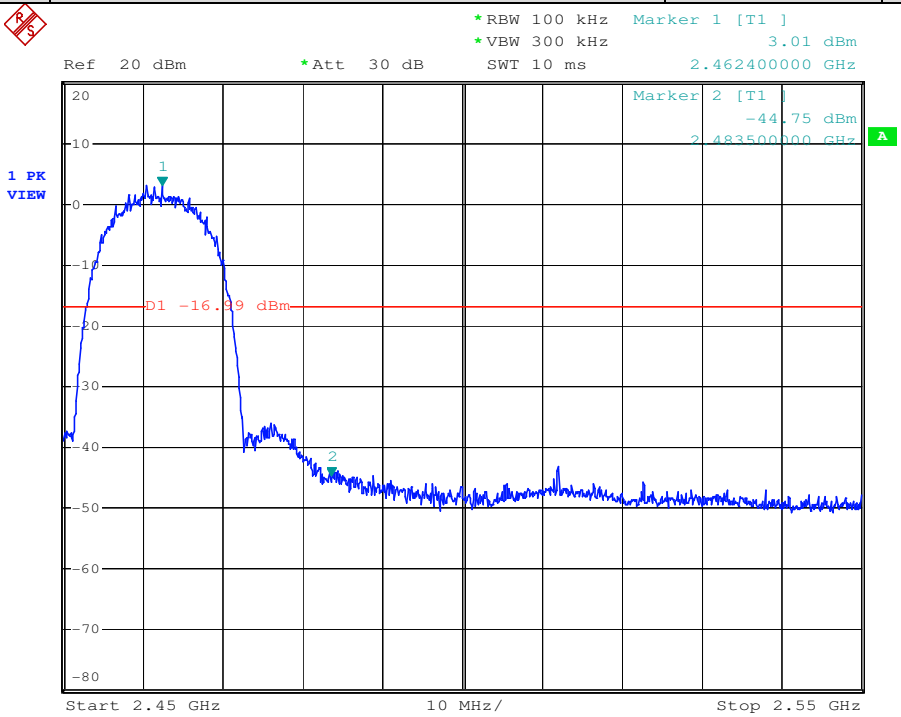
7.7.2 Conducted Band-edge

Test plot as follows:

Test mode:	802.11b	Channel:	lowest



Test mode:	802.11b	Channel:	Highest



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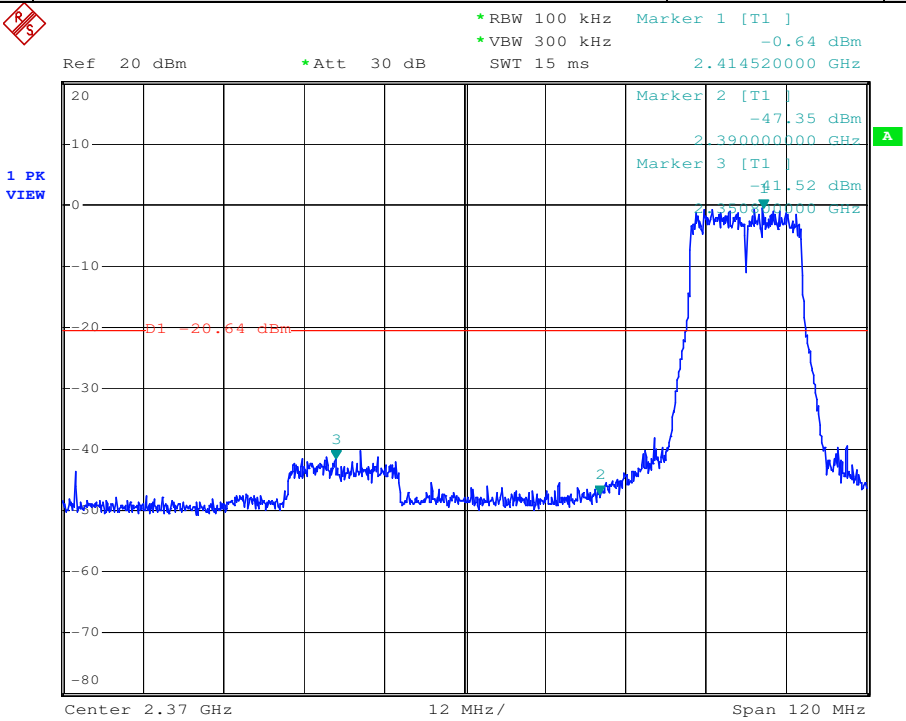
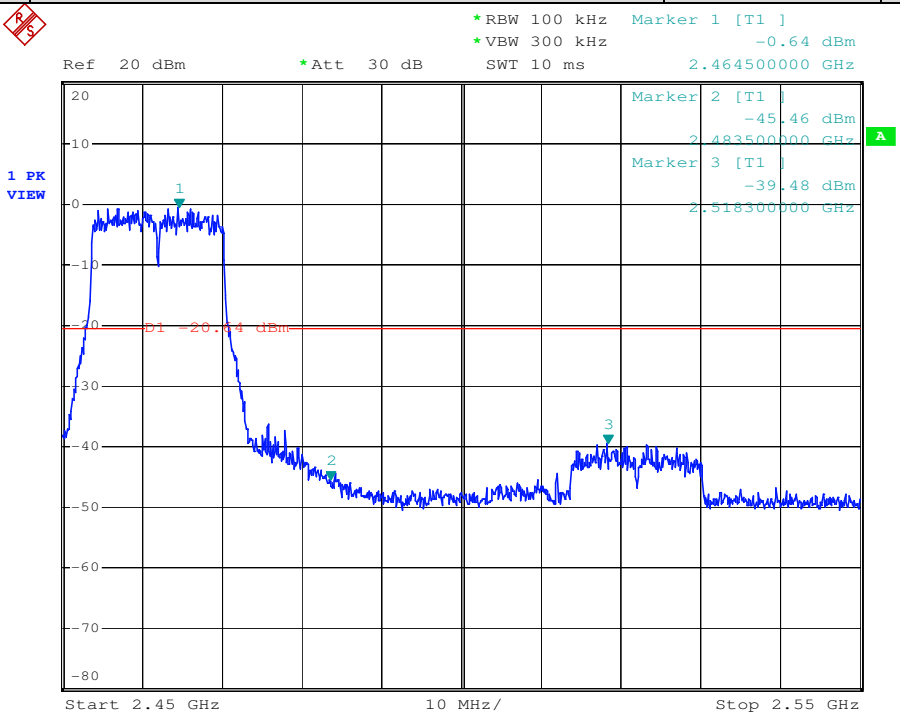
Test mode:	802.11g	Channel:	lowest



Test mode:	802.11g	Channel:	Highest



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7.8 Radiated Spurious Emissions and Band-edge

Test Requirement: FCC Part 15 Section 15.209 and Section 15.205
RSS-Gen section 4.9

Test Method: ANSI C63.10:2009 Clause 6.5&6.6&6.7

Frequency Range: 9KHz to 25GHz

Test site/setup: Measurement Distance: 3m (Semi-Anechoic Chamber)
Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
0.009MHz-0.090MHz	Peak	10kHz	30kHz
0.009MHz-0.090MHz	Average	10kHz	30kHz
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz
0.110MHz-0.490MHz	Peak	10kHz	30kHz
0.110MHz-0.490MHz	Average	10kHz	30kHz
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz
30MHz-1GHz	Quasi-peak	100kHz	300kHz
Above 1GHz	Peak	RBW=1MHz	VBW≥RBW
	Average		VBW=10Hz

Sweep=Auto

15.209 Limit:

Frequency	Limit (dBuV/m)
0.009MHz-0.490MHz	128.5 ~ 93.8
0.490MHz-1.705MHz	73.8 ~63.0
1.705MHz-30MHz	69.5
30MHz-88MHz	40.0
88MHz-216MHz	43.5
216MHz-960MHz	46.0
960MHz-1GHz	54.0
Above 1GHz	54.0

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

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Test Configuration: Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal

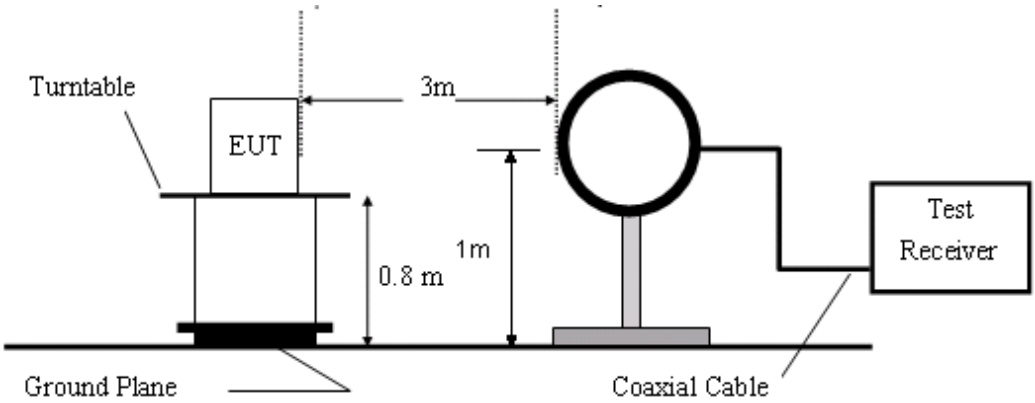

Figure1. 30MHz to 1GHz radiated emissions test configuration

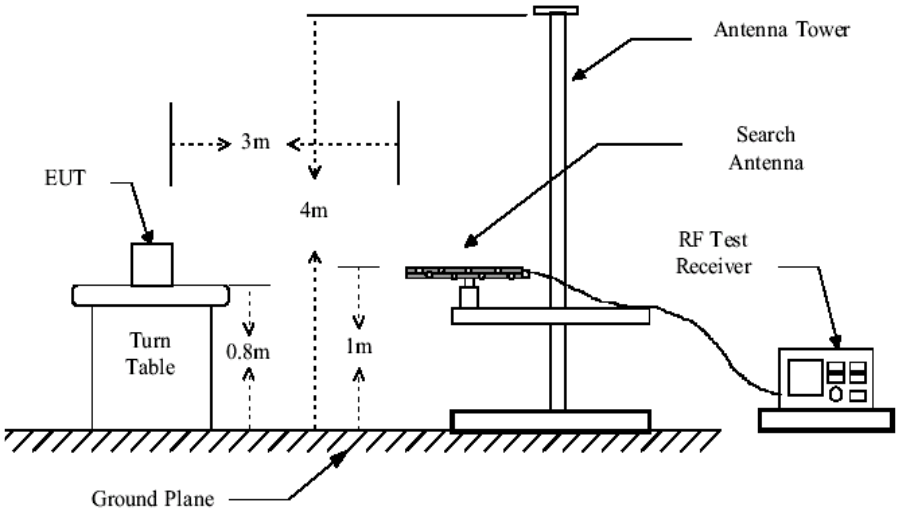

Figure2. 30MHz to 1GHz radiated emissions test configuration

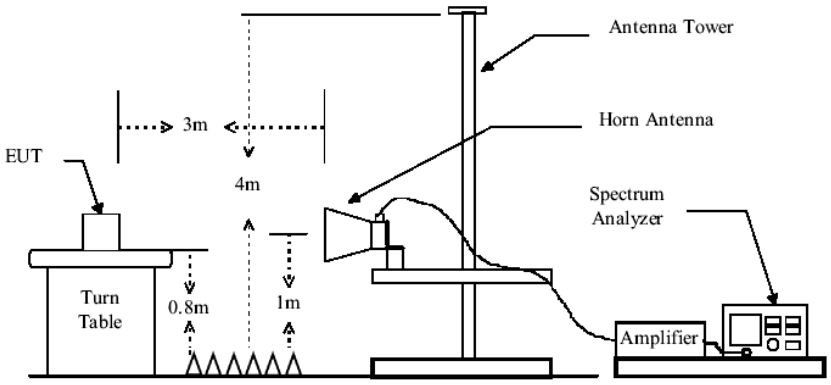

Figure3. Above 1GHz radiated emissions test configuration

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Test Procedure: The procedure used was ANSI Standard C63.10:2009. The receiver was scanned from 9KHz 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.

Test were performed for their 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.
2) As shown in Section, for frequencies above 1000MHz. 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.

Test Result: Pass

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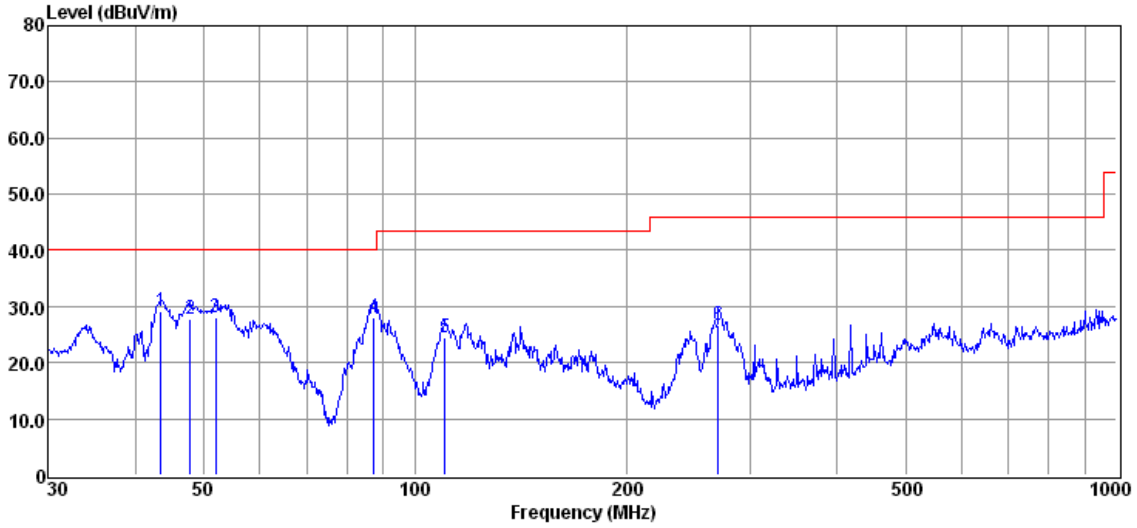
7.8.1 Radiated Spurious Emissions

30MHz-1GHz:

Vertical:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
1	43.35	40.12	13.17	24.70	0.59	29.18	40.00	-10.82	QP
2	47.83	38.93	12.93	24.70	0.63	27.79	40.00	-12.21	QP
3	52.03	39.39	12.68	24.70	0.67	28.04	40.00	-11.96	QP
4	87.42	43.15	8.58	24.70	0.93	27.96	40.00	-12.04	QP
5	110.18	37.97	10.10	24.70	1.09	24.46	43.50	-19.04	QP
6	270.38	38.00	11.48	24.50	1.82	26.80	46.00	-19.20	QP

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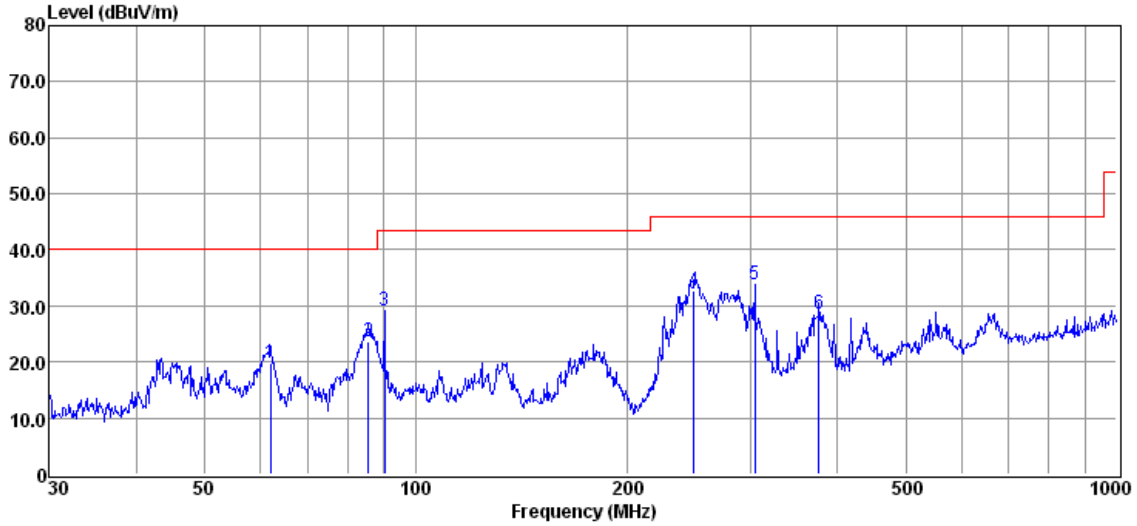
Horizontal:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
1	62.00	31.74	11.92	24.70	0.74	19.70	40.00	-20.30	QP
2	85.60	38.87	8.63	24.70	0.91	23.71	40.00	-16.29	QP
3	90.22	44.25	8.52	24.70	0.95	29.02	43.50	-14.48	QP
4	249.43	45.00	10.49	24.50	1.73	32.72	46.00	-13.28	QP
5	304.61	43.83	12.53	24.50	1.97	33.83	46.00	-12.17	QP
6	375.94	36.40	14.29	24.40	2.21	28.50	46.00	-17.50	QP

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Above 1GHz:

Test mode: 802.11b **Channel: lowest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4842.25	43.74	8.60	52.34	74	-21.66	peak	Horizontal
2	7239.25	42.77	10.71	53.48	74	-20.52	peak	Horizontal
3	9659.75	43.46	14.28	57.74	74	-16.26	peak	Horizontal
4	9659.75	32.47	14.28	46.75	54	-7.25	AV	Horizontal
5	4842.25	43.40	8.60	52.00	74	-22.00	peak	Vertical
6	7239.25	41.28	10.71	51.99	74	-22.01	peak	Vertical
7	9659.75	40.85	14.28	55.13	74	-18.87	peak	Vertical
8	9659.75	31.38	14.28	45.66	54	-8.34	AV	Vertical

Test mode: 802.11b **Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4877.50	43.72	8.83	52.55	74	-21.45	peak	Horizontal
2	7321.50	42.96	10.90	53.86	74	-20.14	peak	Horizontal
3	9753.75	42.14	14.41	56.55	74	-17.45	peak	Horizontal
4	9753.75	31.35	14.41	45.76	54	-8.24	AV	Horizontal
5	4877.50	41.49	8.83	50.32	74	-23.68	peak	Vertical
6	7321.50	41.70	10.90	52.60	74	-21.40	peak	Vertical
7	9753.75	42.52	14.41	56.93	74	-17.07	peak	Vertical
8	9753.75	32.74	14.41	47.15	54	-6.85	AV	Vertical

Test mode: 802.11b **Channel: Highest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4924.50	44.78	8.95	53.73	74	-20.27	peak	Horizontal
2	7380.25	45.08	11.04	56.12	74	-17.88	peak	Horizontal
3	7380.25	36.25	11.04	47.29	54	-6.71	AV	Horizontal
4	9847.75	43.76	14.57	58.33	74	-15.67	peak	Horizontal
5	9847.75	34.20	14.57	48.77	54	-5.23	AV	Horizontal
6	4924.50	41.48	8.95	50.43	74	-23.57	peak	Vertical
7	7380.25	42.37	11.04	53.41	74	-20.59	peak	Vertical
8	9847.75	41.23	14.57	55.80	74	-18.20	peak	Vertical
9	9847.75	33.75	14.57	48.32	54	-5.68	AV	Vertical

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Test mode: 802.11g **Channel: lowest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4818.75	44.30	8.46	52.76	74	-21.24	peak	Horizontal
2	7215.75	43.09	10.65	53.74	74	-20.26	peak	Horizontal
3	9636.25	42.38	14.26	56.64	74	-17.36	peak	Horizontal
4	9636.25	33.28	14.26	47.54	54	-6.46	AV	Horizontal
5	4818.75	43.60	8.46	52.06	74	-21.94	peak	Vertical
6	7215.75	41.68	10.65	52.33	74	-21.67	peak	Vertical
7	9636.25	41.20	14.26	55.46	74	-18.54	peak	Vertical
8	9636.25	32.19	14.26	46.45	54	-7.55	AV	Vertical

Test mode: 802.11g **Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4889.25	43.08	8.90	51.98	74	-22.02	peak	Horizontal
2	7309.75	43.71	10.88	54.59	74	-19.41	peak	Horizontal
3	7309.75	34.58	10.88	45.46	54	-8.54	AV	Horizontal
4	9730.25	42.65	14.38	57.03	74	-16.97	peak	Horizontal
5	9730.25	32.63	14.38	47.01	54	-6.99	AV	Horizontal
6	4889.25	41.08	8.90	49.98	74	-24.02	peak	Vertical
7	7309.75	41.48	10.88	52.36	74	-21.64	peak	Vertical
8	9730.25	40.68	14.38	55.06	74	-18.94	peak	Vertical
9	9730.25	31.44	14.38	45.82	74	-8.18	AV	Vertical

Test mode: 802.11g **Channel: Highest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4912.75	44.23	8.97	53.20	74	-20.80	peak	Horizontal
2	7368.50	44.54	11.00	55.54	74	-18.46	peak	Horizontal
3	7368.50	35.83	11.00	46.83	54	-7.17	AV	Horizontal
4	9859.5	43.78	14.59	58.37	74	-15.63	peak	Horizontal
5	9859.5	33.57	14.59	48.16	54	-5.84	AV	Horizontal
6	4912.75	42.81	8.97	51.78	74	-22.22	peak	Vertical
7	7368.50	41.93	11.00	52.93	74	-21.07	peak	Vertical
8	9859.50	44.19	14.59	58.78	74	-15.22	peak	Vertical
9	9859.50	32.43	14.59	47.02	54	-6.98	AV	Vertical

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Remark: 1. Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.
2. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.
3. The disturbance below 30M was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

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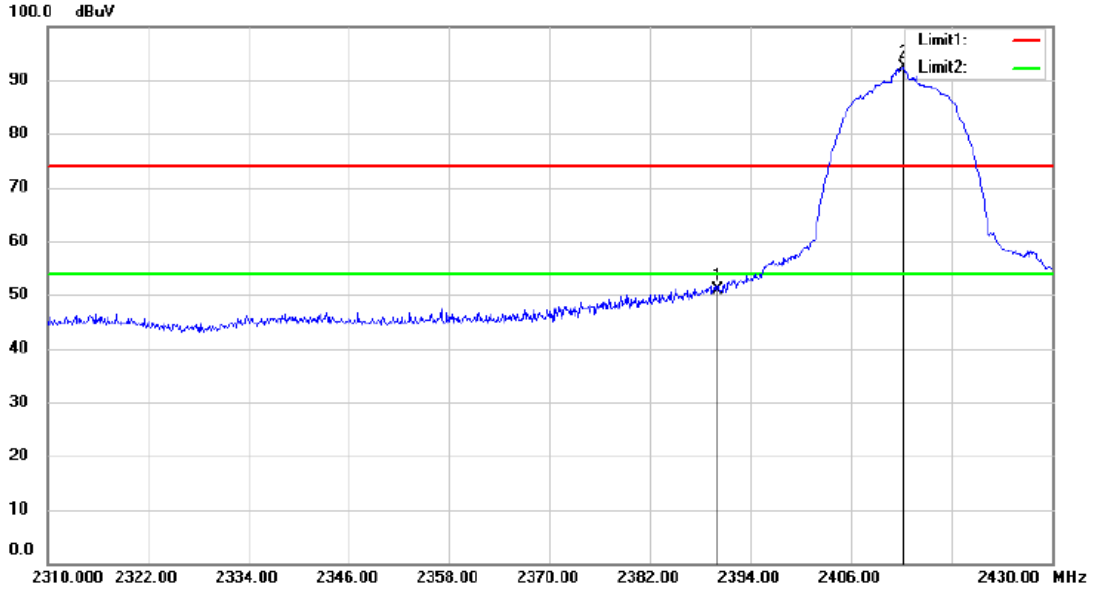
7.8.2 Radiated Band edge

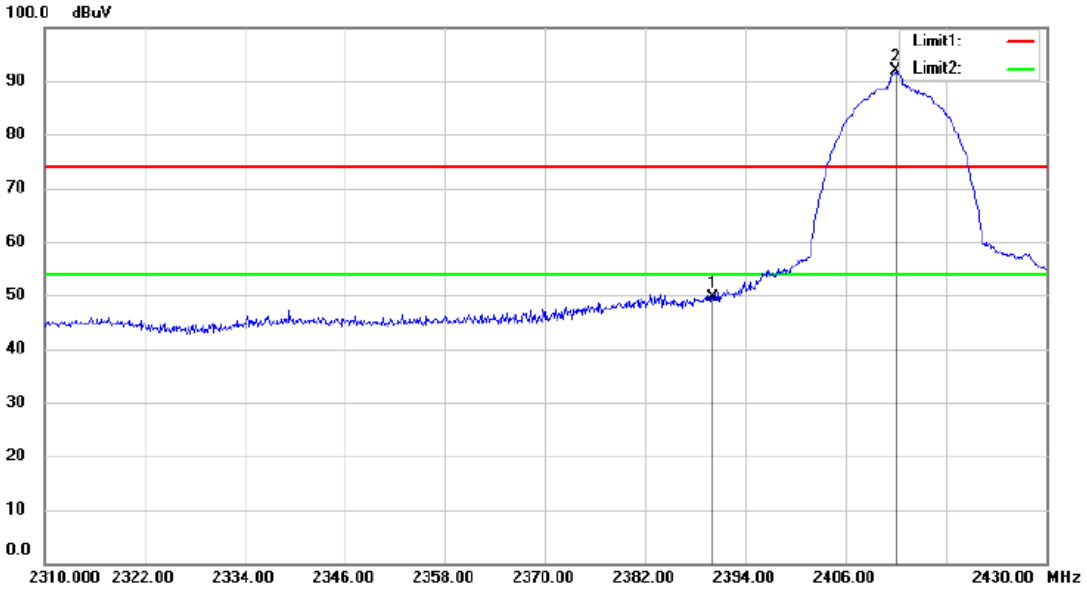
Test mode: 802.11b **Channel: lowest**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2390.00	51.44	-0.56	50.88	74.00	-23.12	Peak	Horizontal
2	2412.36	93.09	-0.68	92.41	74.00	18.41	Peak	Horizontal
1	2390.00	50.21	-0.56	49.65	74.00	-24.35	Peak	Vertical
2	2412.00	92.59	-0.67	91.92	74.00	17.92	Peak	Vertical

Horizontal:



Vertical:



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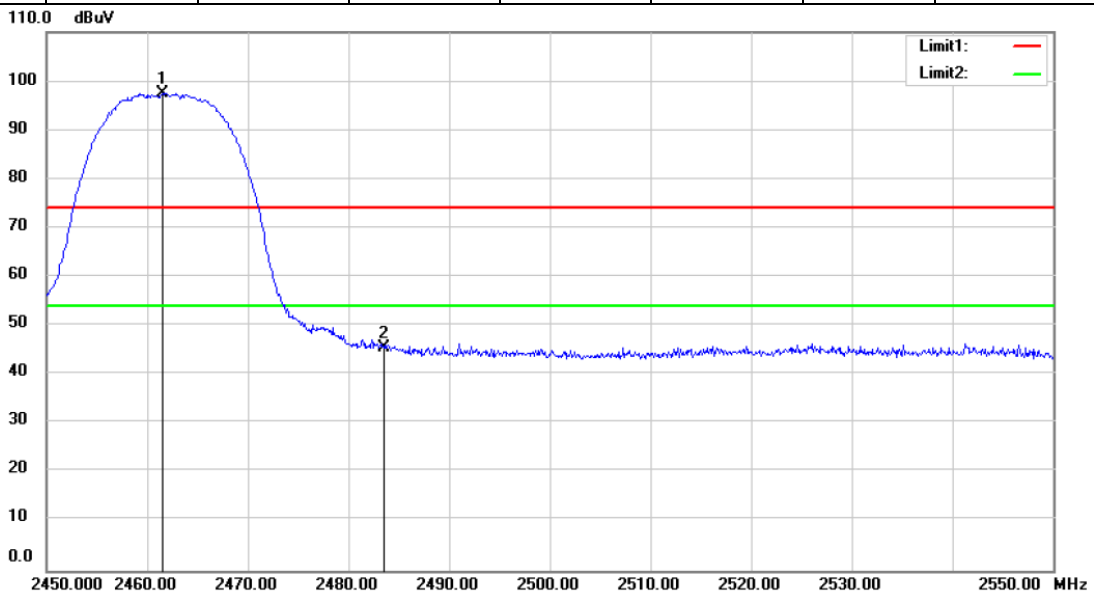
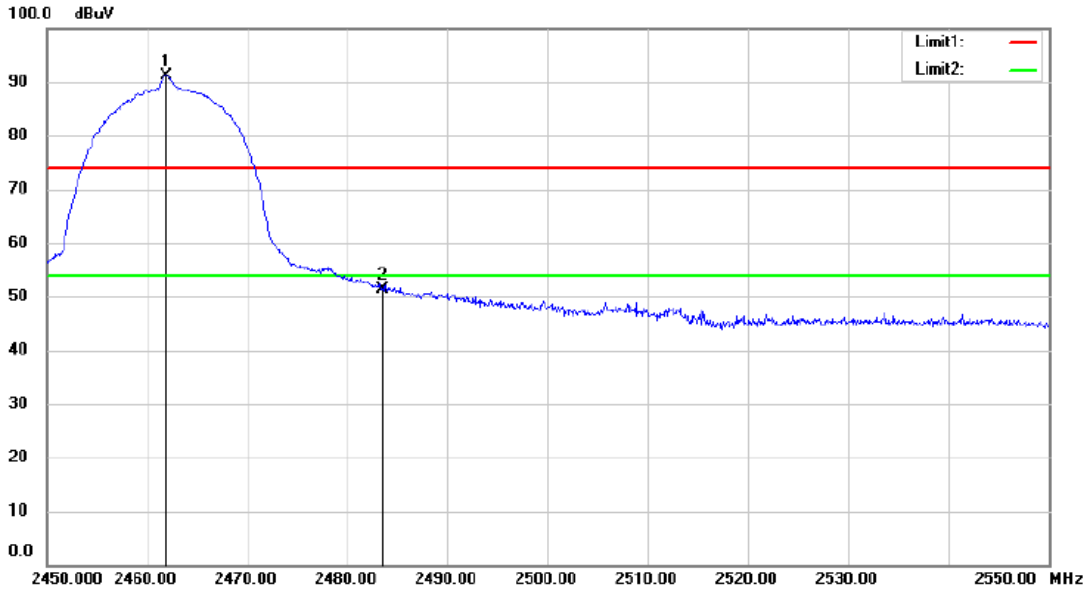
Test mode: 802.11b **Channel: Highest**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2461.50	98.33	-0.91	97.42	74.00	-23.42	Peak	Horizontal
2	2483.50	46.59	-1.01	45.58	74.00	28.42	Peak	Horizontal
1	2461.90	92.15	-0.91	91.24	74.00	17.24	Peak	Vertical
2	2483.50	52.51	-1.01	51.50	74.00	-22.50	Peak	Vertical

Horizontal:



Vertical:



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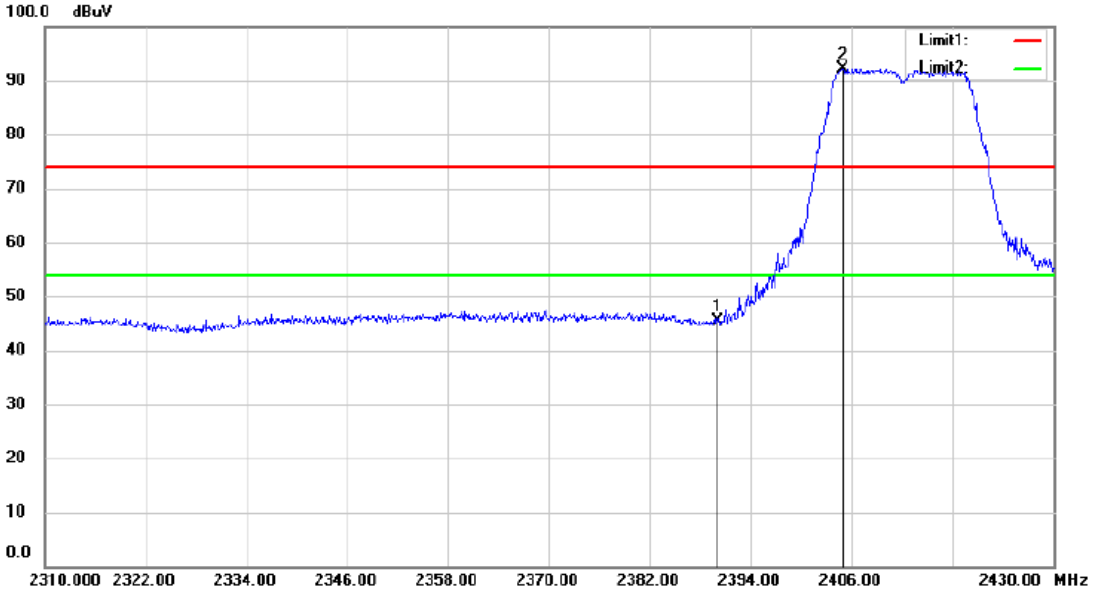
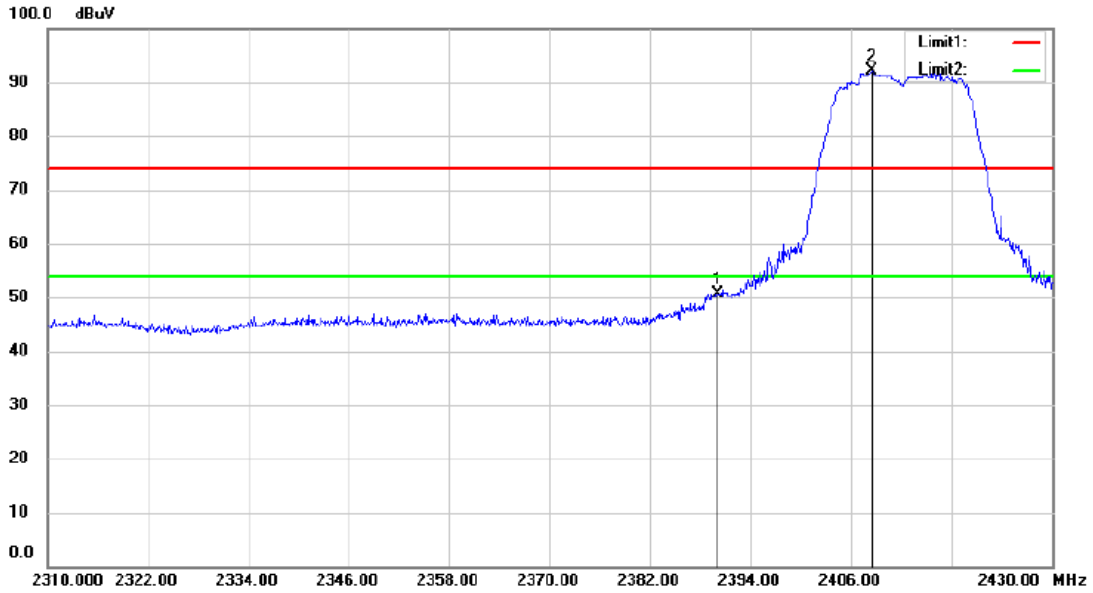
Test mode: 802.11g **Channel: lowest**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2390.00	46.06	-0.56	45.50	74.00	-28.50	Peak	Horizontal
2	2404.92	92.87	-0.63	92.24	74.00	18.24	Peak	Horizontal
1	2390.00	51.18	-0.56	50.62	74.00	-23.38	Peak	Vertical
2	2408.00	92.71	-0.65	92.06	74.00	18.06	Peak	Vertical

Horizontal



Vertical



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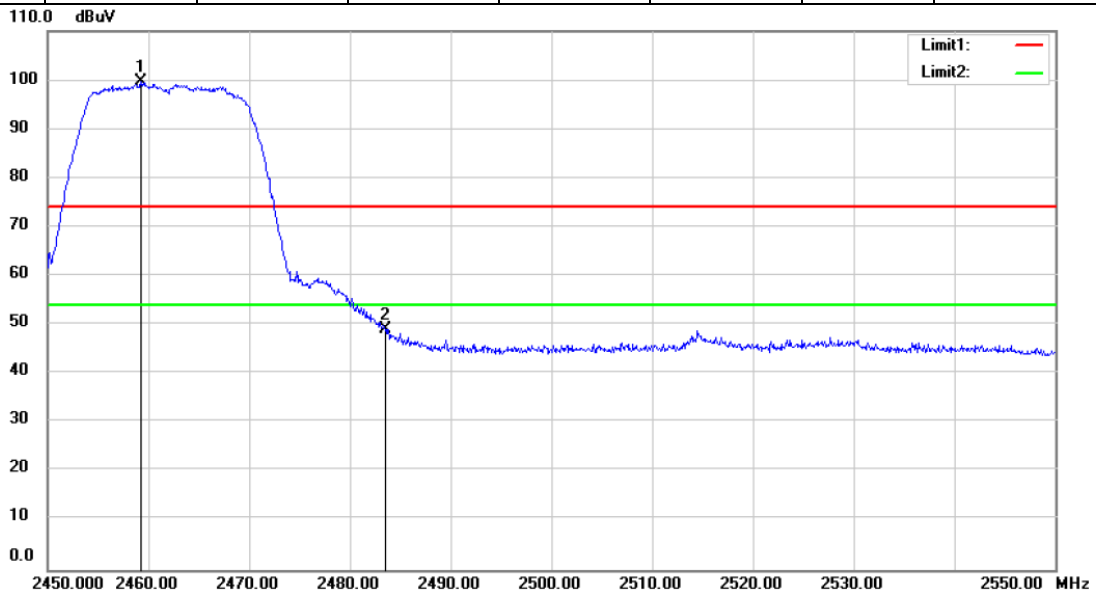
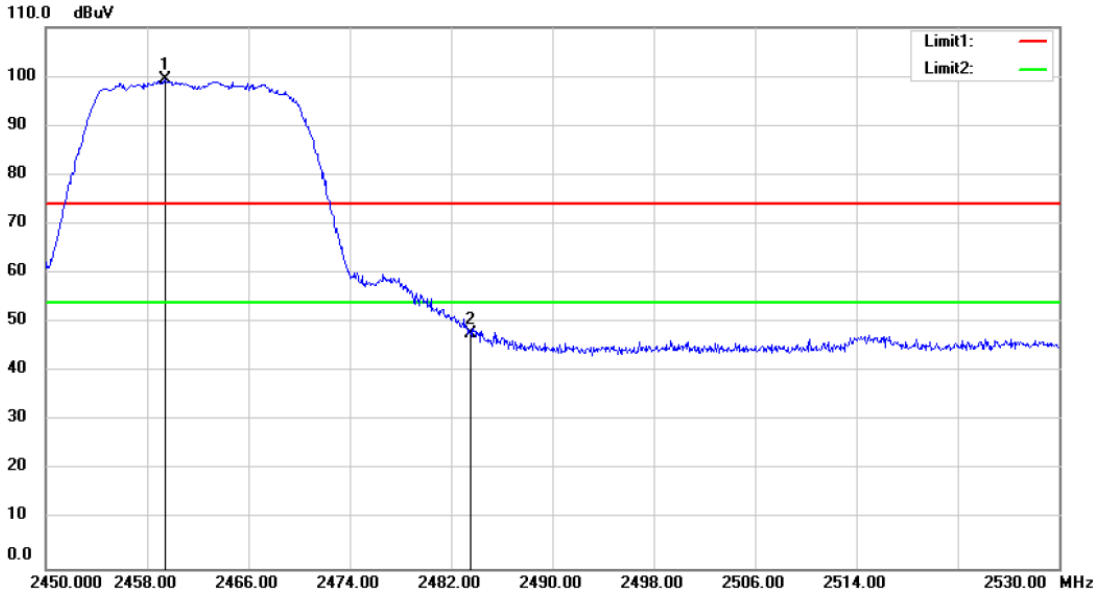
Test mode: 802.11g **Channel: Highest**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2459.20	100.64	-0.90	99.74	74.00	25.74	Peak	Horizontal
2	2483.50	50.10	-1.01	49.09	74.00	-24.91	Peak	Horizontal
1	2459.44	100.37	-0.90	99.47	74.00	25.47	Peak	Vertical
2	2483.50	48.79	-1.01	47.78	74.00	-26.22	Peak	Vertical

Horizontal:



Vertical:



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Remark: 1. Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor

2. No any other emission which falls in restricted bands can be detected and be reported.

3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

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

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	10.5 - 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	([2])
13.36 - 13.41	322 - 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

[2] Above 38.6

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8 Test Setup Photographs

Refer to the < NS2V2 _Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < NS2V2 _External Photos-FCC > & < NS2V2 _Internal Photos-FCC>.

--End of the Report--

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