



## SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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Report No.: SHEM140800195003  
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### 1 Cover Page

# RF TEST REPORT

Application No.:	SHEM1408001950RF
Applicant:	Shanghai IGOO Smartlamp Technology Co., Ltd
FCC ID:	2ACWVIGOO1SC
<b>Equipment Under Test (EUT):</b> <b>NOTE:</b> The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Smartlamp Control
Model No.(EUT):	IGOO 1
Standards:	FCC PART 15 Subpart C: 2013
Date of Receipt:	August 29, 2014
Date of Test:	September 03, 2014 to September 20, 2014
Date of Issue:	October 13, 2014
Test Result:	<b>Pass*</b>

\*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.



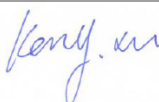
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		October 13, 2014		Original

Authorized for issue by:			
Engineer	Eddy Zong		
	Print Name		
Clerk	Susie Liu		
	Print Name		
Reviewer	Kenx Xu		
	Print Name		

### 3 Test Summary

Test Item	FCC Requirement	Test method	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	ANSI C63.10 (2009) Section 6.2	PASS
Minimum 6dB Bandwidth	FCC Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 (2009) Section 6.9.1	PASS
Conducted Peak Output Power	FCC Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 (2009) Section 6.10.2	PASS
Power Spectrum Density	FCC Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 (2009) Section 6.11.2	PASS
RF Conducted Spurious Emissions and Band-edge	FCC Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2009) Section 7.7.9&7.7.10	PASS
Radiated Spurious Emissions and Band-edge	FCC Part 15, Subpart C Section 15.209&15.205	ANSI C63.10 (2009) Section 6.5&6.6&6.7	PASS

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## 5 General Information

### 5.1 Client Information

Applicant: Shanghai IGEO Smartlamp Technology Co.,Ltd  
Address of Applicant: Floor 11, Building 90, #1122 North Qinzhou Rd., Shanghai, P.R.China 200233  
Manufacturer: Shanghai Grandar Light Art& Technology Co.,Ltd  
Address of Manufacturer: Floor 11, Building 90, #1122 North Qinzhou Rd., Shanghai, P.R.China 200233  
Factory: Shanghai Grandar Light Art& Technology Co.,Ltd  
Address of Factory: Factory 6, No.466 Chengjian Road, Minhang District, Shanghai P.R.China

### 5.2 General Description of E.U.T.

Product Description: Portable product

### 5.3 Technical Specifications

Operation Frequency: 802.11 b/g/n(HT20): 2412MHz-2462MHz  
802.11 n(HT40): 2422MHz-2452MHz  
Modulation Type: 802.11 b: DSSS(CCK, DQPSK, DBPSK)  
802.11 g/n(HT20)/n(HT40): OFDM(64QAM, 16QAM, QPSK, BPSK)  
Number of Channel: 802.11 b/g/n(HT20):11 Channels  
802.11 n(HT40): 7 Channels  
Data Rate: 802.11 b: 1Mbps, 5.5Mbps, 11Mbps,  
802.11 g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 36Mbps, 48Mbps, 54Mbps  
802.11 n(HT20)/n(HT40): MCS0-MCS7  
Antenna Type: Monopole  
Antenna Gain: -4dBi  
Power Supply: Battery Model: I01C01Ba01  
Spec. DC 3.7V 2500mAh(9.25Wh), Rechargeable Polymer Battery  
Remark: Supply the EUT with fully charged battery during the testing.  
Adapter Model No.: C-P17  
Rated Input: AC 100V-240V 50/60Hz 0.3A  
Rated Output: DC 5V 1000mA  
Cable length: AC port: 2 wires  
DC port: 120 cm

### 5.4 Test Mode

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

Preliminary tests were performed in all tests in different data rate

Modulation	Peak Power (dBm) for Data Rates (Mbps)								
	Channel	1	2	5.5	11	/	/	/	/
802.11b	1	19.24	19.11	18.64	18.42	/	/	/	/
	6	19.14	18.54	18.43	18.38	/	/	/	/
	11	18.50	18.38	18.26	17.94	/	/	/	/
802.11g	Channel	6	9	12	18	24	36	48	54
	1	20.74	20.67	19.63	19.78	19.35	19.52	19.46	19.63
	6	20.84	20.63	20.15	20.33	20.23	20.52	20.78	20.42
	11	20.71	20.63	20.23	19.44	20.53	19.83	19.55	19.63
802.11n (HT20)	Channel	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	1	15.81	15.19	15.43	14.94	15.26	15.13	14.78	14.63
	6	15.35	15.14	14.74	14.79	14.39	14.52	15.19	14.53
	11	14.83	14.74	14.36	14.30	14.65	14.42	14.12	14.24
802.11n (HT40)	Channel	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	3	11.86	11.53	11.72	11.68	11.16	11.25	11.42	11.36
	6	11.50	11.47	11.36	11.46	10.75	11.23	10.76	10.95
	9	11.29	11.24	11.27	10.74	11.12	10.68	10.44	10.64

The data rates of worse case as below were chosen for final test.

Modulation Type	Channel	Frequency	Power Level	Data rate
802.11 b	The lowest channel(CH1)	2412MHz	15	1Mbps
	The middle channel(CH6)	2437MHz	15	1Mbps
	The Highest channel(CH11)	2462MHz	15	1Mbps
802.11 g/n(HT20)	The lowest channel(CH1)	2412MHz	12	6Mbps
	The middle channel(CH6)	2437MHz	12	6Mbps
	The Highest channel(CH11)	2462MHz	12	6Mbps
802.11 n(HT20)	The lowest channel(CH1)	2412MHz	12	MCS 0
	The middle channel(CH6)	2437MHz	12	MCS 0
	The Highest channel(CH11)	2462MHz	12	MCS 0
802.11 n(HT40)	The lowest channel(CH3)	2422MHz	12	MCS 0
	The middle channel(CH6)	2437MHz	12	MCS 0
	The Highest channel(CH9)	2452MHz	12	MCS 0

## 5.5 Description of Support Units

The EUT has been tested independently

Description	Manufacturer	Model No.	Supplied By
/	/	/	/

Software name	Manufacturer	Version	Supplied By
/	/	/	/

## 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: 2017-07-14.

- **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-1. Expiry Date: 2017-06-18.

- **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.

## 5.8 Measurement Uncertainty

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

## 6 Equipments Used during Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2014-02-14	2015-02-13
2	Line impedance stabilization network	SCHWARZBECK	NSLK8127	8127-490	2014-02-14	2015-02-13
3	Line impedance stabilization network	ETS	3816/2	00034161	2014-02-14	2015-02-13
4	Spectrum Analyzer	Rohde & Schwarz	FSP-30	2705121009	2014-02-14	2015-02-13
5	EMI test receiver	Rohde & Schwarz	ESU40	100109	2014-02-14	2015-02-13
6	Active Loop Antenna (9kHz to 30MHz)	Rohde & Schwarz	FMZB 1519	1519-034	2014-03-19	2015-03-18
7	Broadband UHF-VHF ANTENNA (25MHz to 2GHz)	SCHWARZBECK	VULB9168	9168-313	2014-02-14	2015-02-13
8	Ultra broadband antenna (25MHz to 3GHz)	Rohde & Schwarz	HL562	100227	2013-10-09	2014-10-08
9	Horn Antenna (1GHz to 18GHz)	Rohde & Schwarz	HF906	100284	2014-02-14	2015-02-13
10	Horn Antenna (1GHz to 18GHz)	SCHWARZBECK	BBHA9120D	9120D-679	2014-07-28	2015-07-27
11	Horn Antenna (14GHz to 40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170373	2014-02-14	2015-02-13
12	Pre-amplifier (9KHz – 2GHz)	LNA6900	TESEQ	71033	2014-02-14	2015-02-13
13	Pre-amplifier (1GHz – 26.5GHz)	Rohde & Schwarz	SCU-F0118-G40-BZ4-CSS(F)	10001	2014-02-14	2015-02-13
14	Pre-amplifier (14GHz – 40GHz)	Rohde & Schwarz	SCU-F1840-G35-BZ3-CSS(F)	10001	2014-02-14	2015-02-13
15	Tunable Notch Filter	Wainwright instruments GmbH	WRCT800.0/8 80.0-0.2/40-5SSK	9	2014-06-02	2015-06-01
16	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	2014-06-02	2015-06-01
17	High-low temperature cabinet	Suzhou Zhihe	TL-40	50110050	2014-04-13	2015-04-12
18	AC power stabilizer	WOCEN	6100	51122	2014-06-02	2015-06-01
19	DC power	QJE	QJ30003SII	611145	2014-06-02	2015-06-01
20	Signal Generator (Interferer)	Agilent	SMR40	100555	2014-02-14	2015-02-13
21	Signal Generator (Blocker)	Rohde & Schwarz	SMJ100A	02.20.360.142	2014-02-14	2015-02-13
22	Splitter	Anritsu	MA1612A	M12265	/	/
23	Coupler	e-meca	803-S-1	900-M01	/	/



## 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.

<b>Operating Environment:</b>	Temperature:	20.0 -25.0 °C
	Humidity:	35-75 % RH
	Atmospheric Pressure:	99.2 -102 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, middle channel and highest channel with fixed at channel.

## 7.2 Antenna Requirement

### Standard requirement:

15.203 requirement:

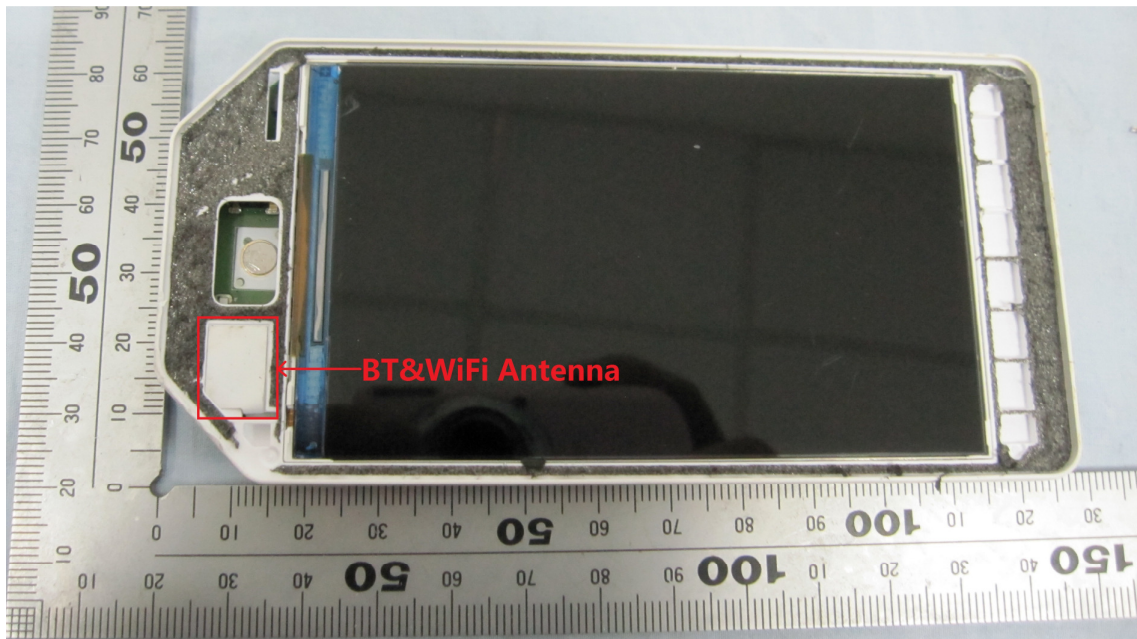
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 antenna. The gain of the antenna is less than -4dBi dBi.



### 7.3 Conducted Emissions on Mains Terminals

**Frequency Range:** 150 KHz to 30 MHz

**Class/Severity:** Class B

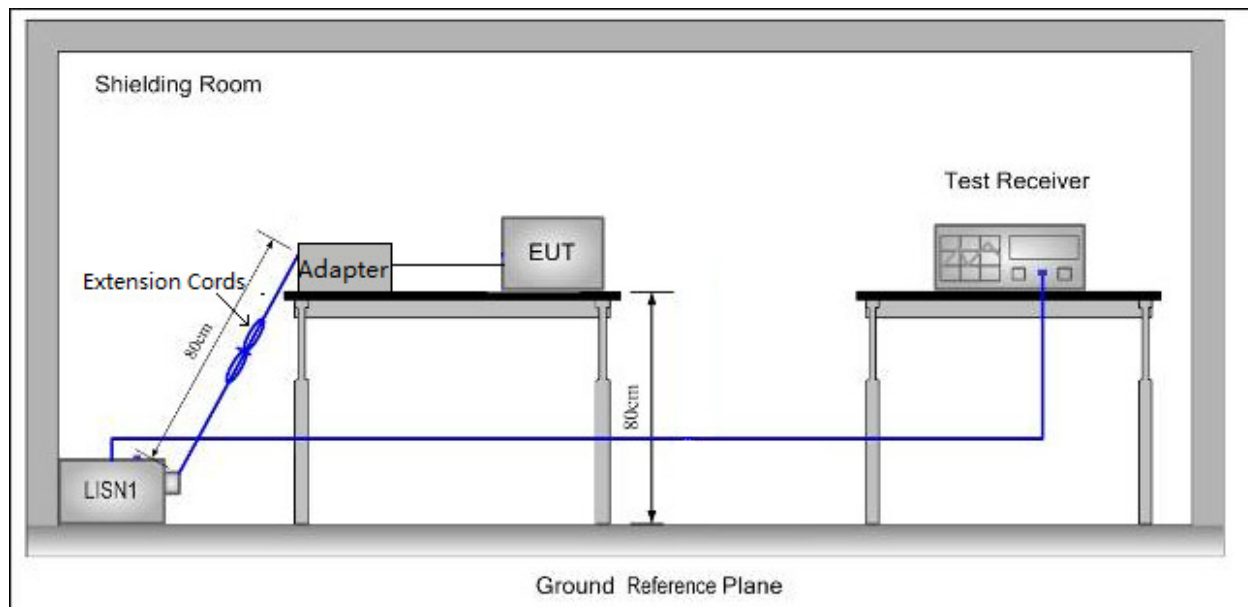
**Limit:**

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 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.

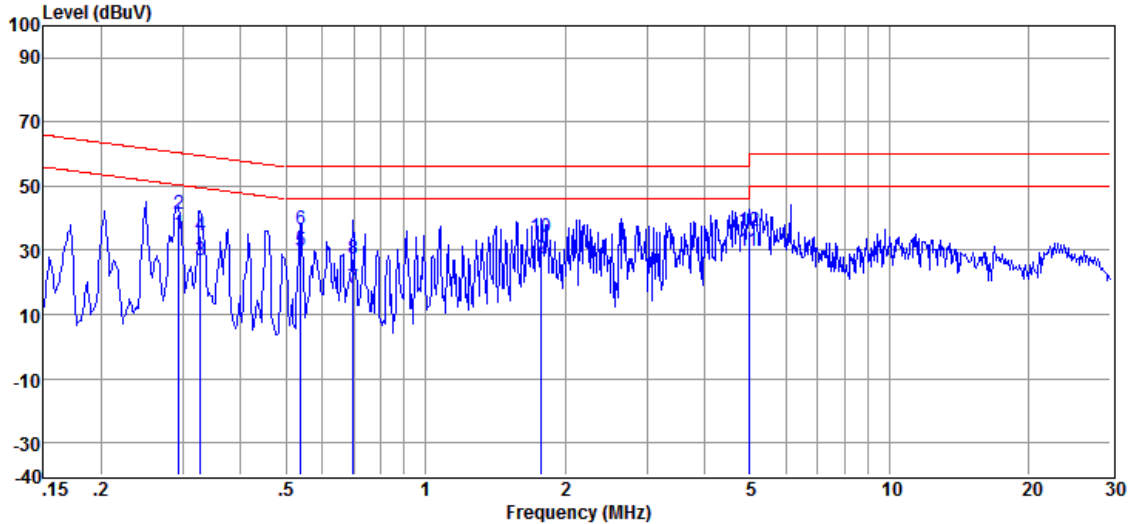
**Test Result:** Pass

**Test Data:**

**Test Mode:** 802.11b

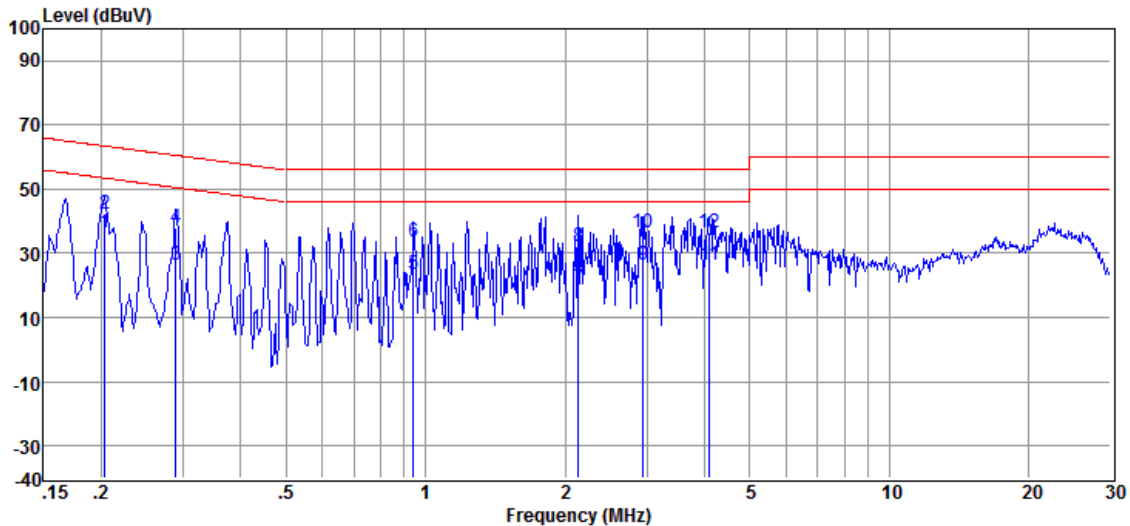
**Test Channel:** Middle

**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	0.294	34.42	0.29	0.10	34.81	50.41	-15.60	Average
2	0.294	40.71	0.29	0.10	41.10	60.41	-19.31	QP
3	0.327	26.62	0.30	0.10	27.02	49.53	-22.51	Average
4	0.327	34.24	0.30	0.10	34.64	59.53	-24.89	QP
5	0.538	29.19	0.28	0.10	29.57	46.00	-16.43	Average
6	0.538	36.12	0.28	0.10	36.50	56.00	-19.50	QP
7	0.697	17.85	0.19	0.10	18.14	46.00	-27.86	Average
8	0.697	27.06	0.19	0.10	27.35	56.00	-28.65	QP
9	1.781	26.16	0.87	0.10	27.13	46.00	-18.87	Average
10	1.781	33.23	0.87	0.10	34.20	56.00	-21.80	QP
11	4.978	29.15	0.42	0.20	29.77	46.00	-16.23	Average
12	4.978	35.28	0.42	0.20	35.90	56.00	-20.10	QP

**Test Port:** AC Neutral Line

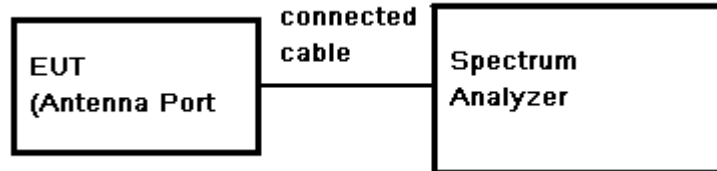


Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB)	(dB)	(dBμV)	(dBμV)	(dB)	
1	0.204	36.35	0.26	0.10	36.71	53.45	-16.74	Average
2	0.204	41.76	0.26	0.10	42.12	63.45	-21.33	QP
3	0.289	26.20	0.26	0.10	26.56	50.54	-23.98	Average
4	0.289	37.82	0.26	0.10	38.18	60.54	-22.36	QP
5	0.943	23.35	0.18	0.10	23.63	46.00	-22.37	Average
6	0.943	33.15	0.18	0.10	33.43	56.00	-22.57	QP
7	2.133	18.75	0.36	0.11	19.22	46.00	-26.78	Average
8	2.133	31.46	0.36	0.11	31.93	56.00	-24.07	QP
9	2.946	26.06	0.37	0.14	26.57	46.00	-19.43	Average
10	2.946	36.10	0.37	0.14	36.61	56.00	-19.39	QP
11	4.092	25.78	0.38	0.18	26.34	46.00	-19.66	Average
12	4.092	36.00	0.38	0.18	36.56	56.00	-19.44	QP

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

## 7.4 6dB Occupied Bandwidth

### 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 $\geq$ 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:

$\geq 500$  kHz

### Test Data:

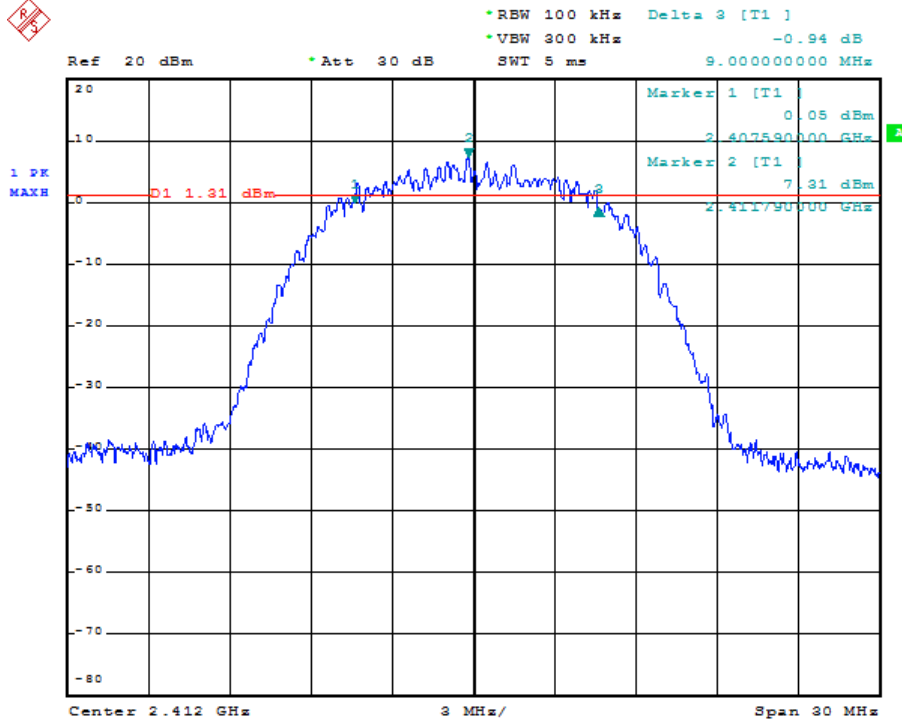
Modulation	Test Frequency (MHz)	Bandwidth (MHz)	Limit (KHz)	Result
802.11 b	2412	9.00	500	PASS
	2437	9.00		PASS
	2462	9.00		PASS
802.11 g	2412	16.50		PASS
	2437	16.38		PASS
	2462	16.38		PASS
802.11 n(HT20)	2412	16.62		PASS
	2437	16.77		PASS
	2462	16.68		PASS
802.11 n(HT40)	2422	36.80		PASS
	2437	36.80		PASS
	2452	37.04		PASS

Test plot as follows:



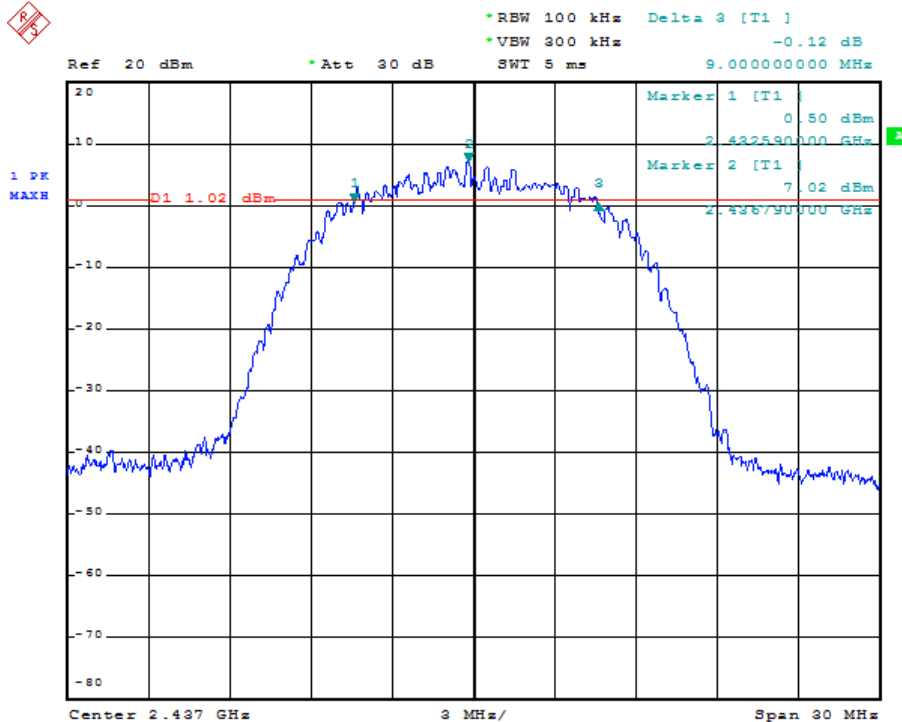
Test mode: 802.11b

Channel: Lowest



Test mode: 802.11b

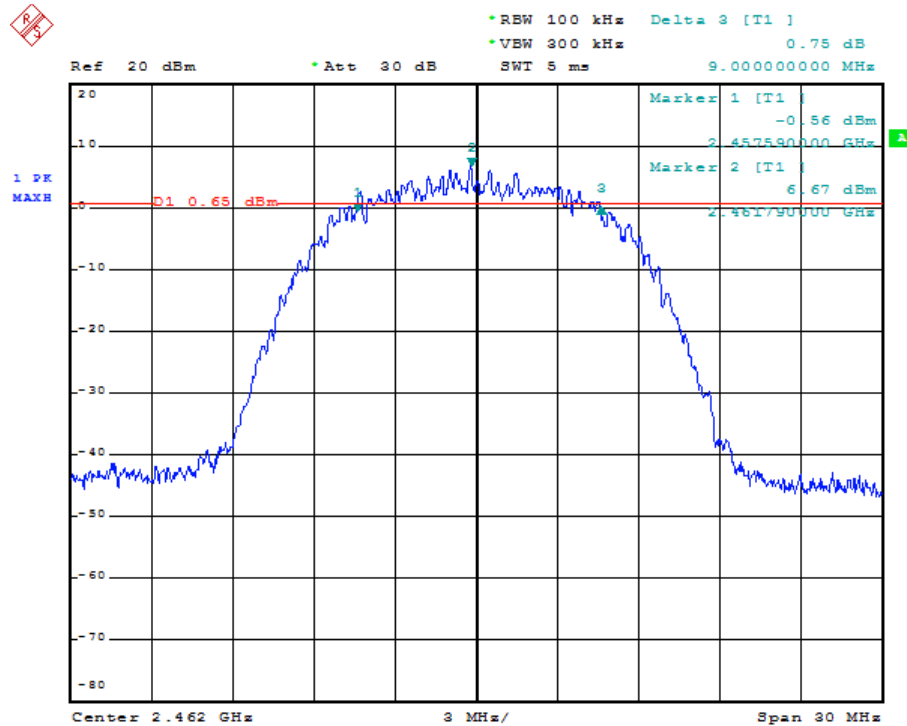
Channel: Middle





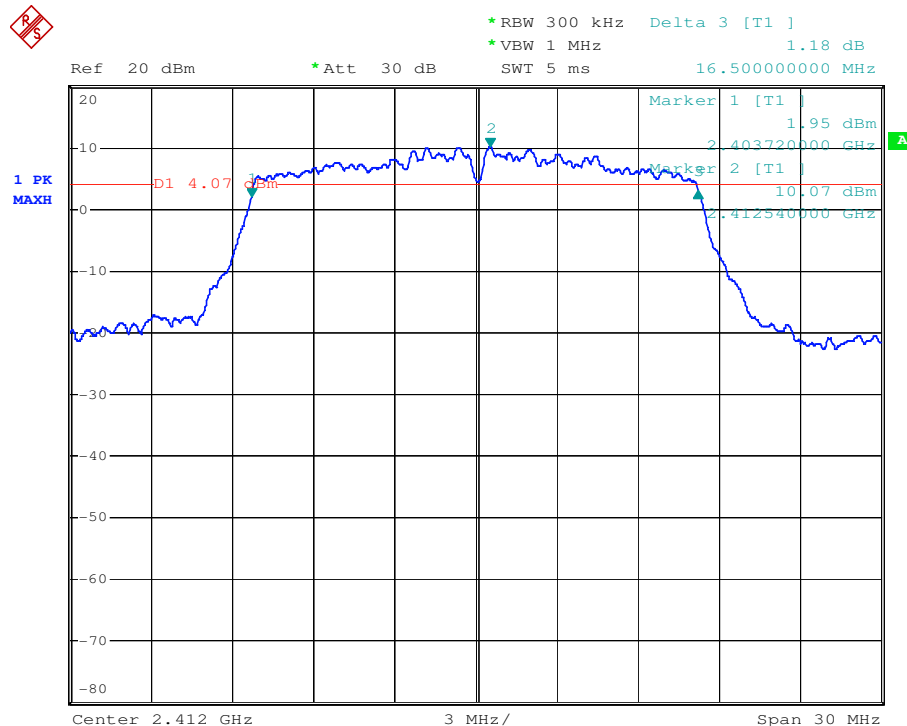
Test mode: 802.11b

Channel: Highest



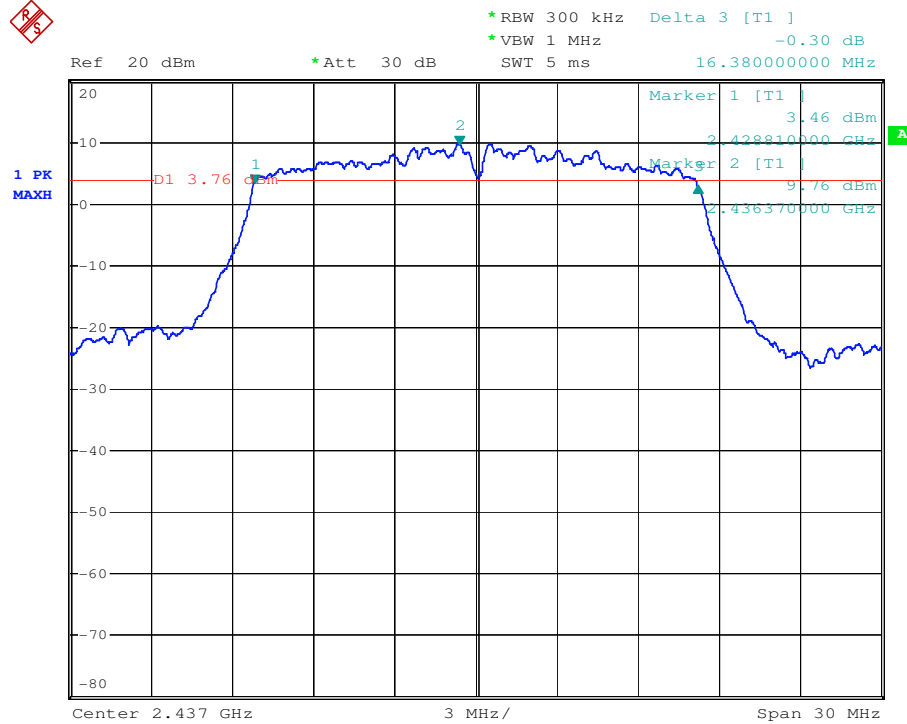
Test mode: 802.11g

Channel: Lowest



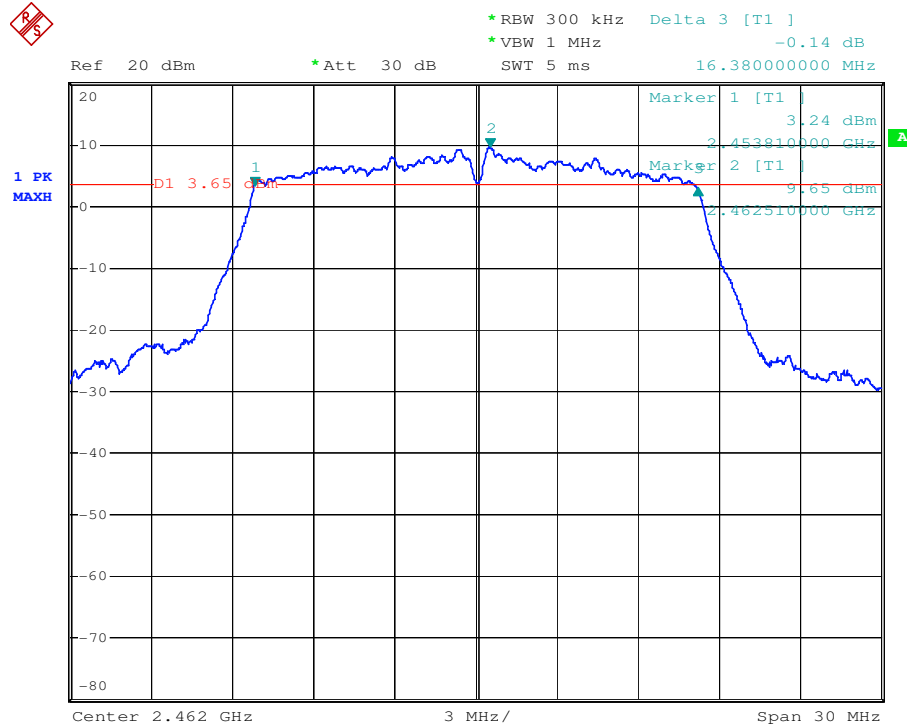
Test mode: 802.11g

Channel: Middle



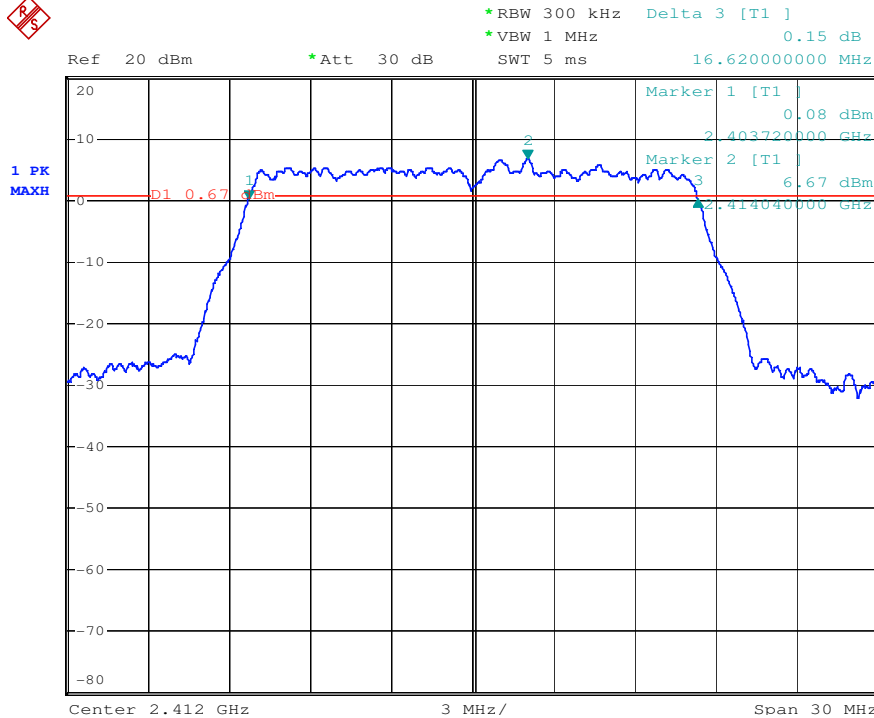
Test mode: 802.11g

Channel: Highest



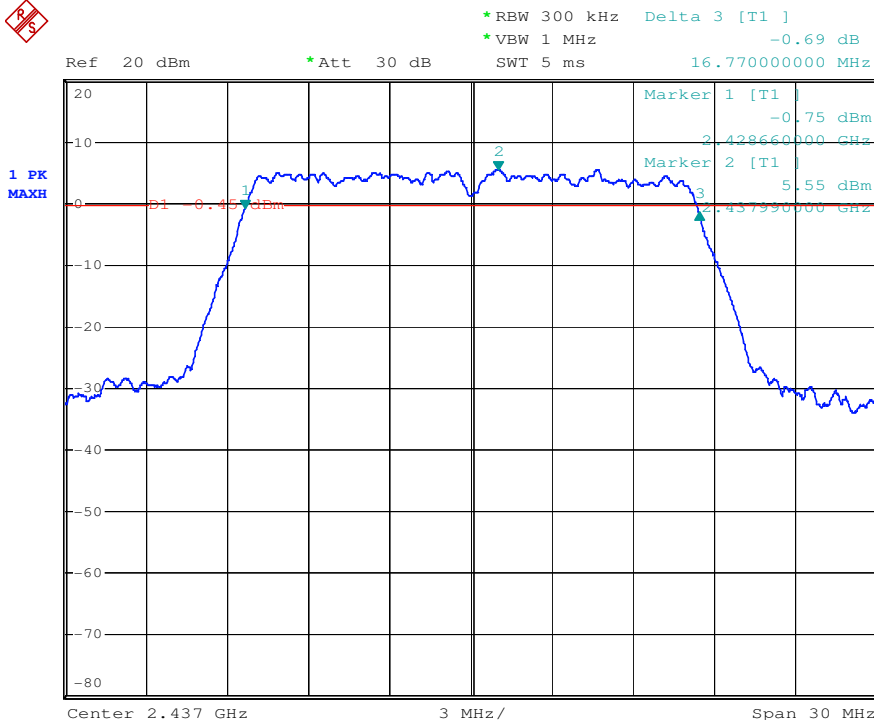
Test mode: 802.11n(HT20)

Channel: Lowest



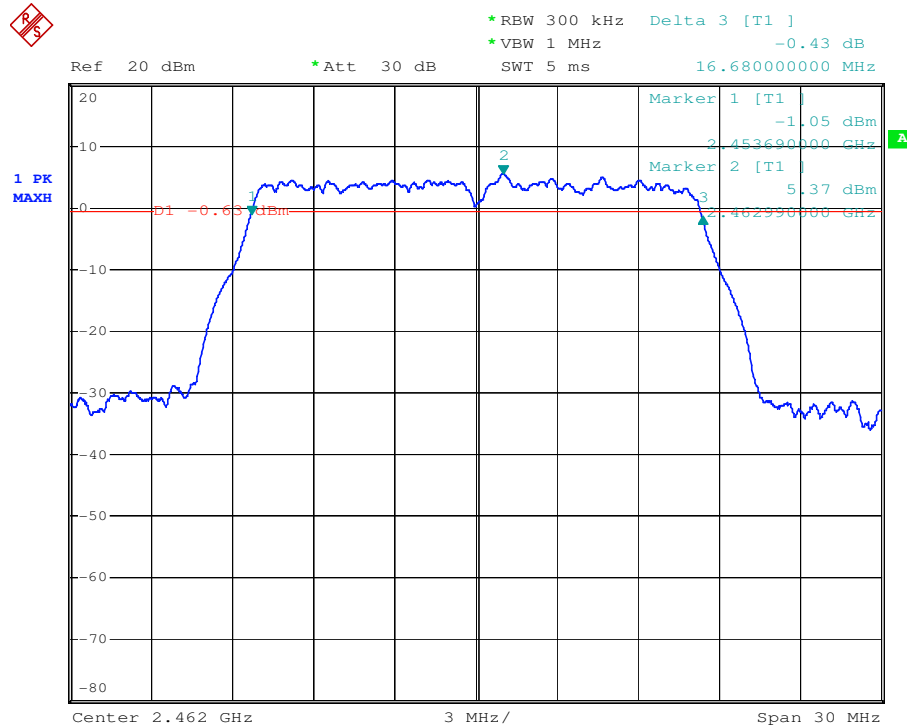
Test mode: 802.11n(HT20)

Channel: Middle



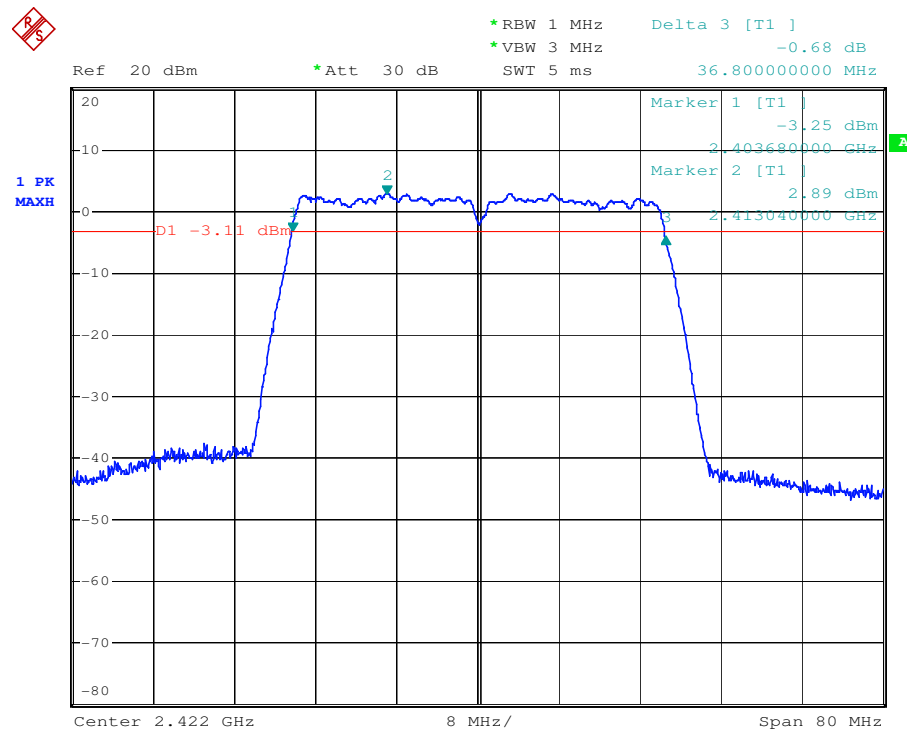
Test mode: 802.11n(HT20)

Channel: Highest



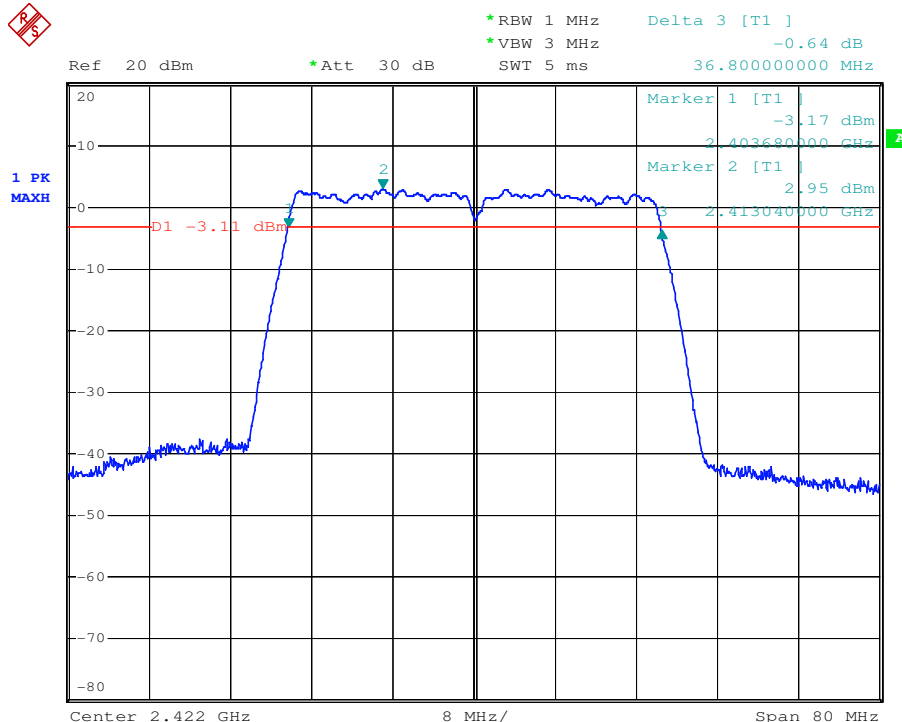
Test mode: 802.11n(HT40)

Channel: Lowest



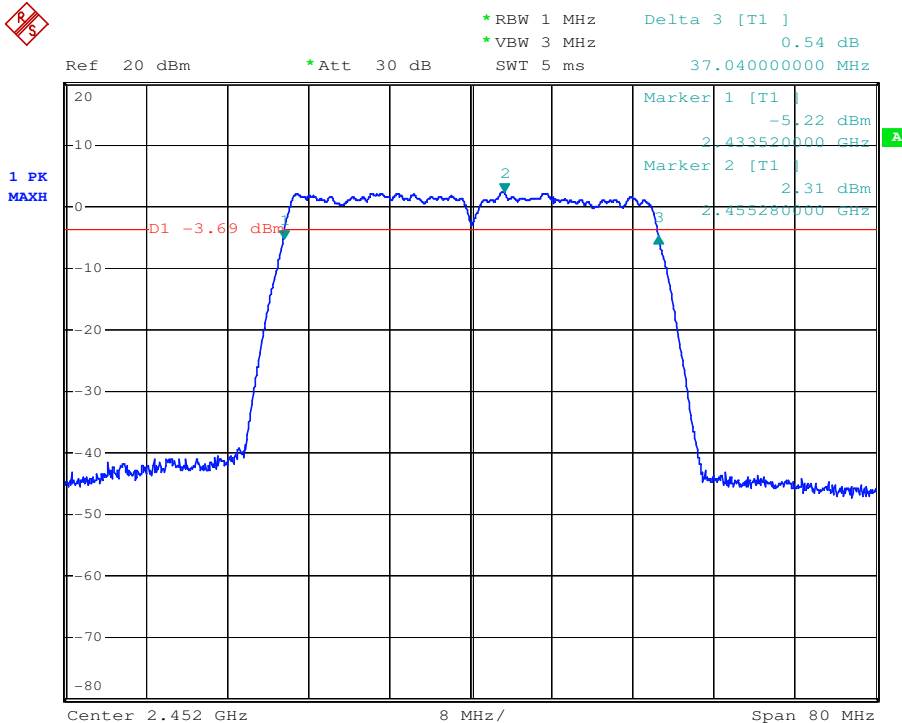
Test mode: 802.11n(HT40)

Channel: Middle



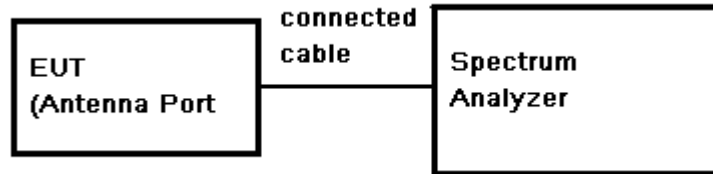
Test mode: 802.11n(HT40)

Channel: Highest



## 7.5 Conducted Peak Output Power

**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 6dB 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

**Test Data:**

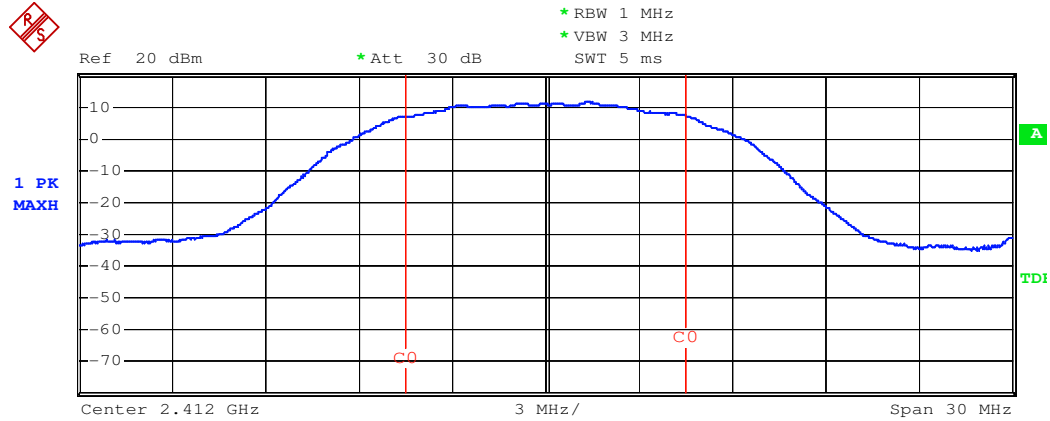
Test mode	Test Frequency (MHz)	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Output Power (mW)	Limit (dBm)	Result
802.11b	2412	18.74	0.5	19.24	83.95	30	PASS
	2437	18.64		19.14	82.04		PASS
	2462	18.00		18.50	70.79		PASS
802.11g	2412	20.24		20.74	118.58		PASS
	<b>2437</b>	<b>20.34</b>		<b>20.84</b>	<b>121.34</b>		PASS
	2462	20.21		20.71	117.76		PASS
802.11n(HT20)	2412	15.31		15.81	38.11		PASS
	2437	14.85		15.35	34.28		PASS
	2462	14.33		14.83	30.41		PASS
802.11n(HT40)	2422	11.36		11.86	15.35		PASS
	2437	11.00		11.50	14.13		PASS
	2452	10.79		11.29	13.46		PASS

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

Test result plot as follows:

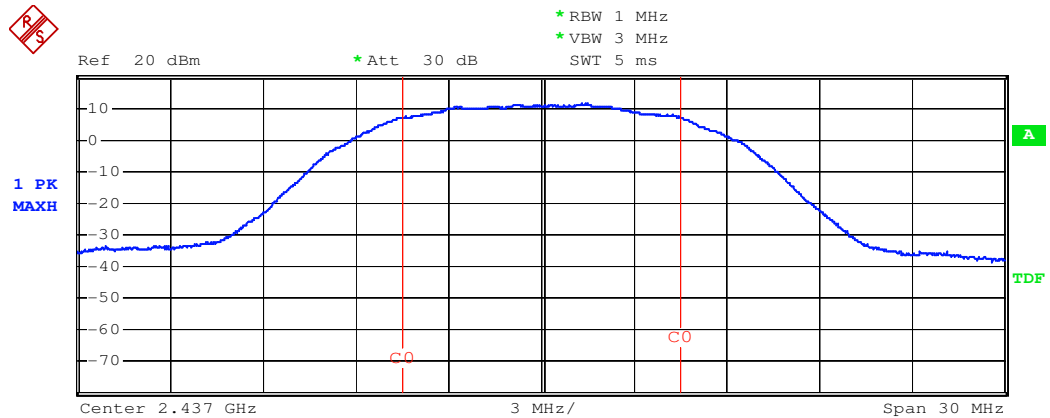
Test mode: 802.11b

Channel: Lowest



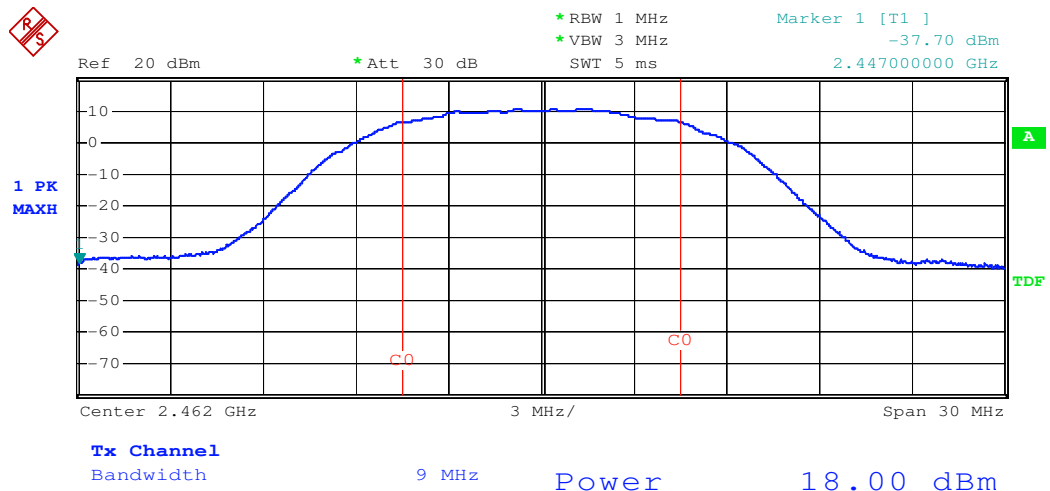
Test mode: 802.11b

Channel: Middle



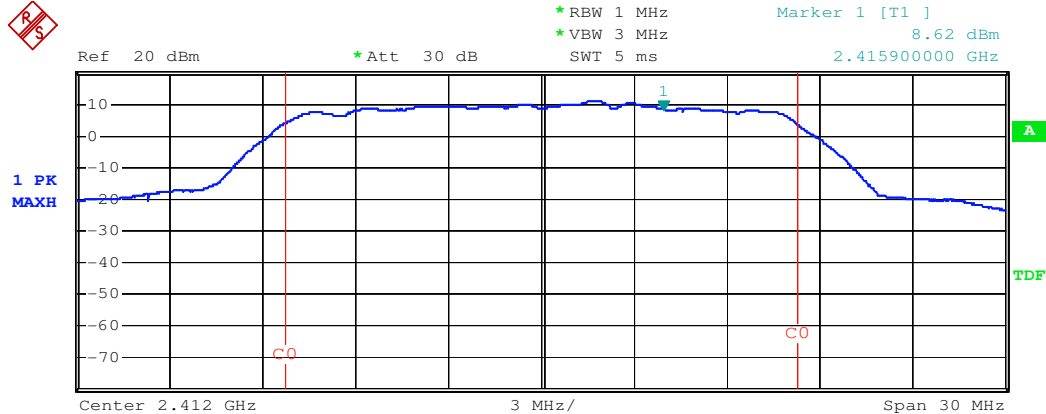
Test mode: 802.11b

Channel: Highest



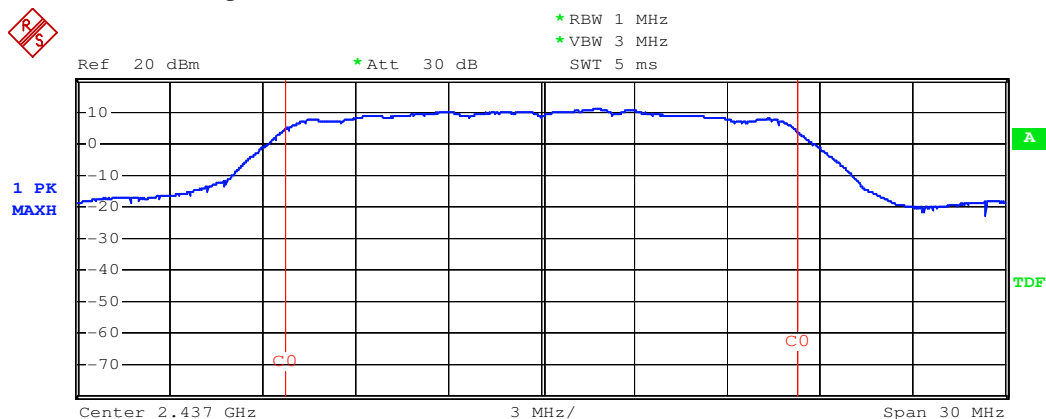
Test mode: 802.11g

Channel: Lowest



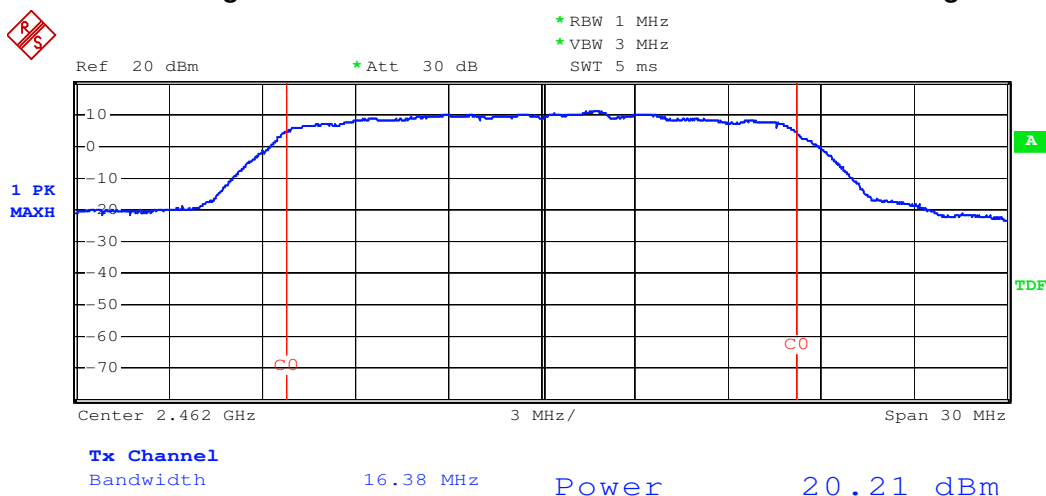
Test mode: 802.11g

Channel: Middle



Test mode: 802.11g

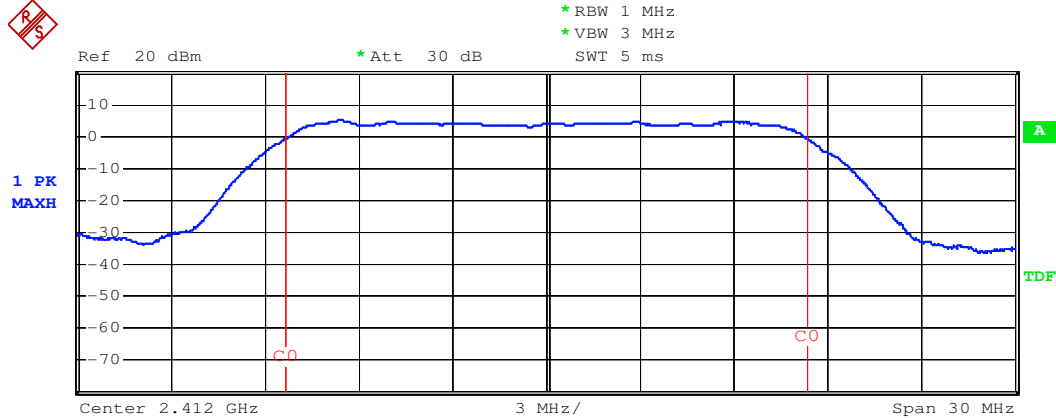
Channel: Highest





Test mode: 802.11n(HT20)

Channel: Lowest



Tx Channel

Bandwidth

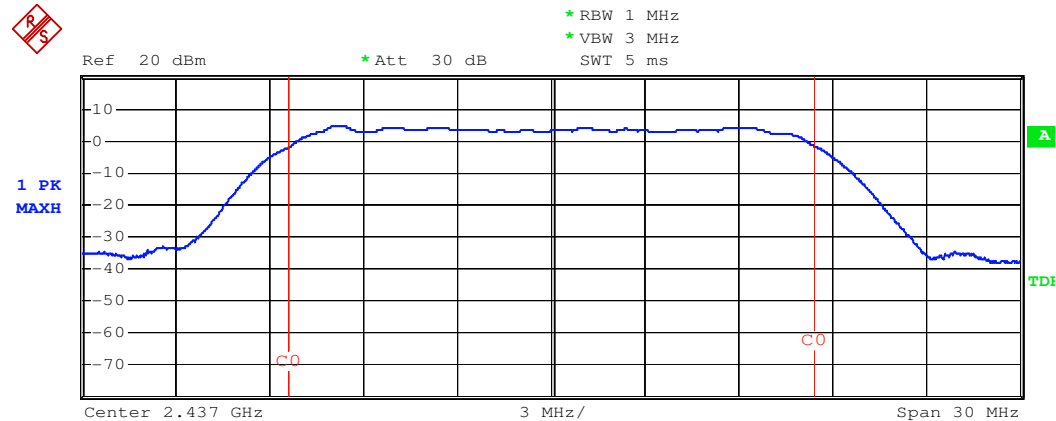
16.62 MHz

Power

15.31 dBm

Test mode: 802.11n(HT20)

Channel: Middle



Tx Channel

Bandwidth

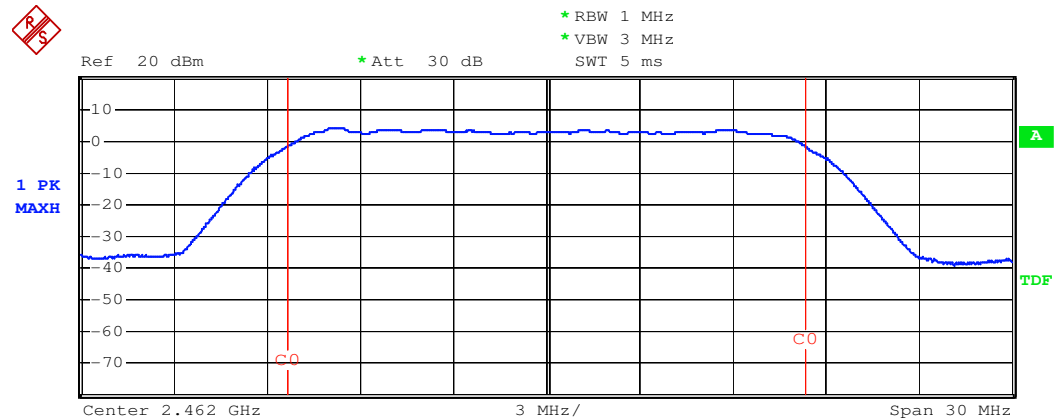
16.77 MHz

Power

14.85 dBm

Test mode: 802.11n(HT20)

Channel: Highest



Tx Channel

Bandwidth

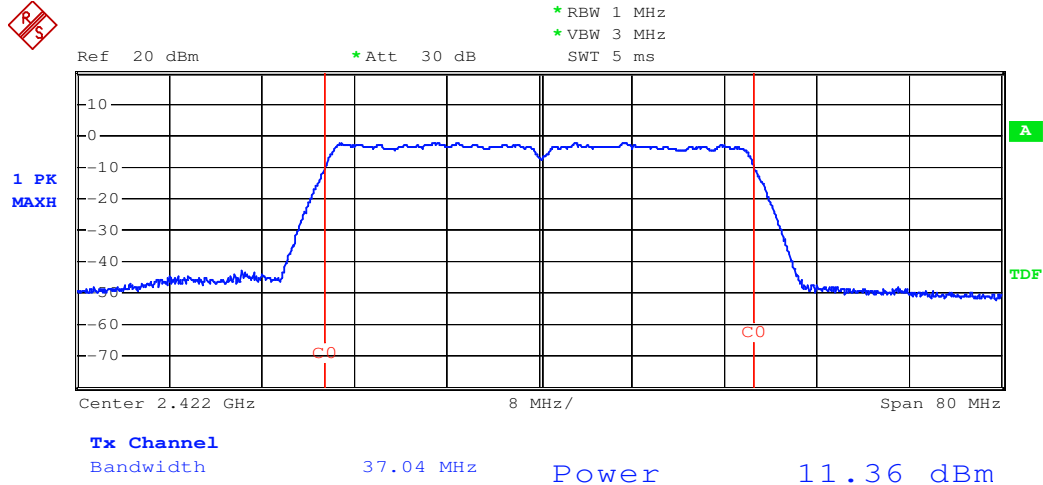
16.68 MHz

Power

14.33 dBm

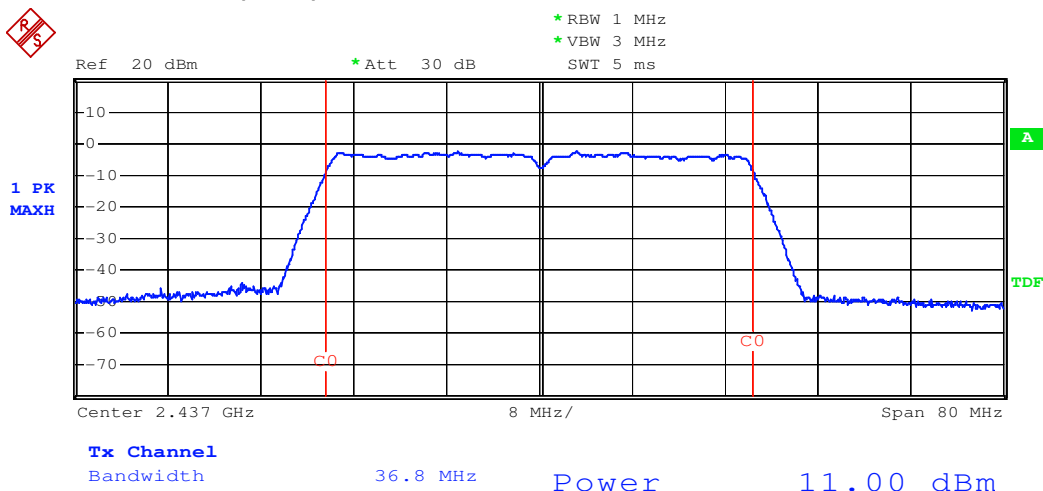
Test mode: 802.11n(HT40)

Channel: Lowest



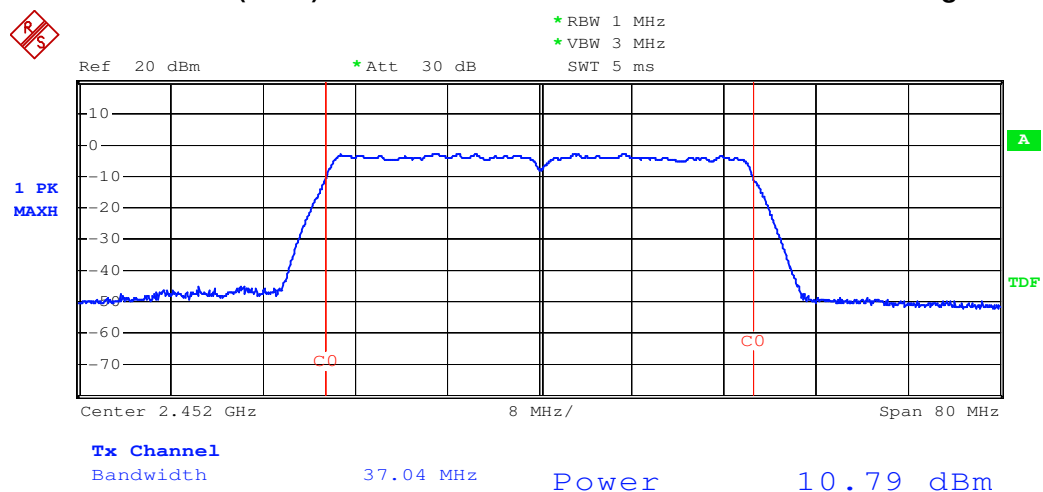
Test mode: 802.11n(HT40)

Channel: Middle



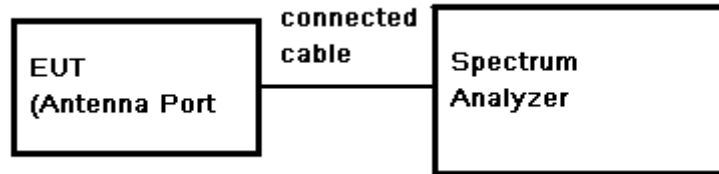
Test mode: 802.11n(HT40)

Channel: Highest



## 7.6 Peak Power Spectral Density

### 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, MKR=Center Frequency, Trace=Clear Write.
- 3) Set the marker on the peak of the signal and then adjust the center frequency of the spectrum analyzer to the marker frequency.
- 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 Data:

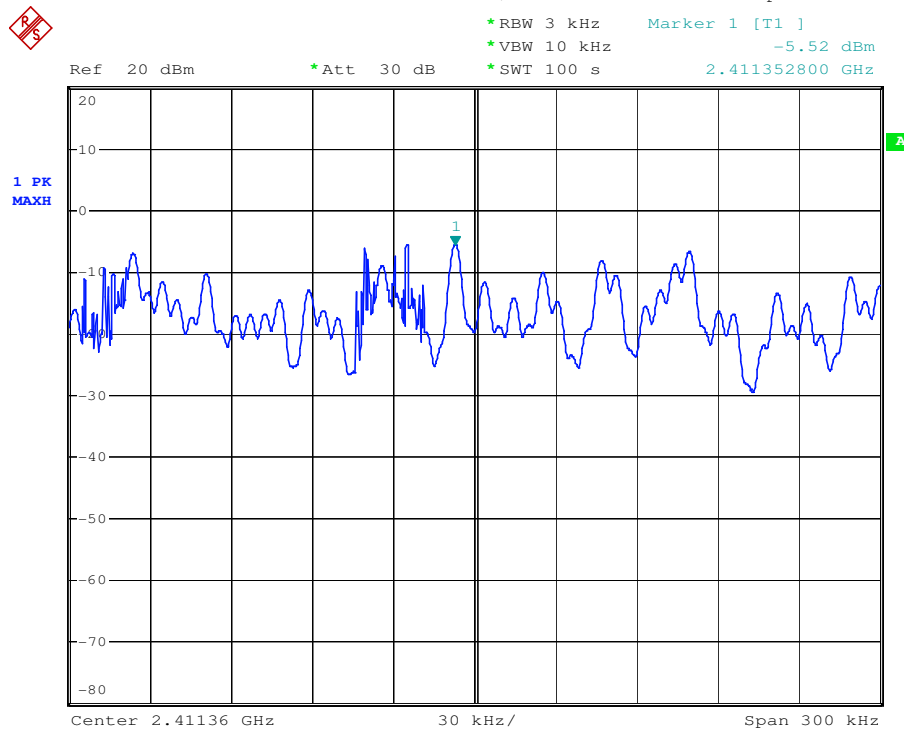
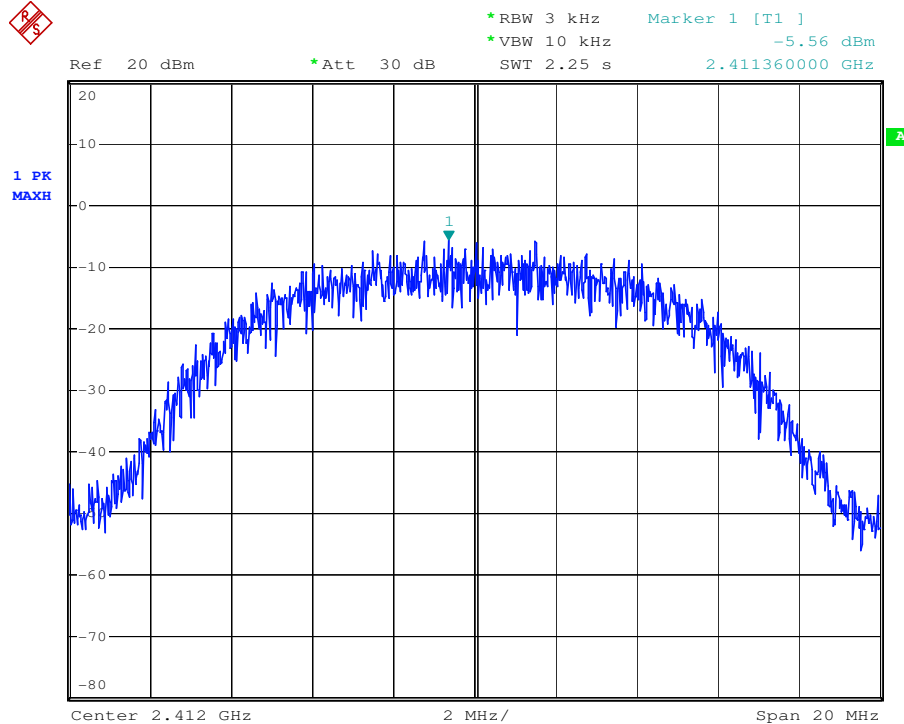
Test mode:	Test Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	RF Power Density (dBm)	Limit (dBm)	Result
802.11b	2412	-5.52	0.5	-5.02	8	PASS
	2437	-5.84		-5.34		PASS
	2462	-5.83		-5.33		PASS
802.11b	2412	-10.18		-9.68		PASS
	2437	-10.94		-10.44		PASS
	2462	-11.60		-11.10		PASS
802.11n(HT20)	2412	-15.19		-14.69		PASS
	2437	-15.53		-15.03		PASS
	2462	-15.43		-14.93		PASS
802.11n(HT20)	2422	-21.34		-20.84		PASS
	2437	-22.15		-21.65		PASS
	2452	-22.08		-21.58		PASS

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

Test result plot as follows:

Test mode: 802.11b

Channel: Lowest



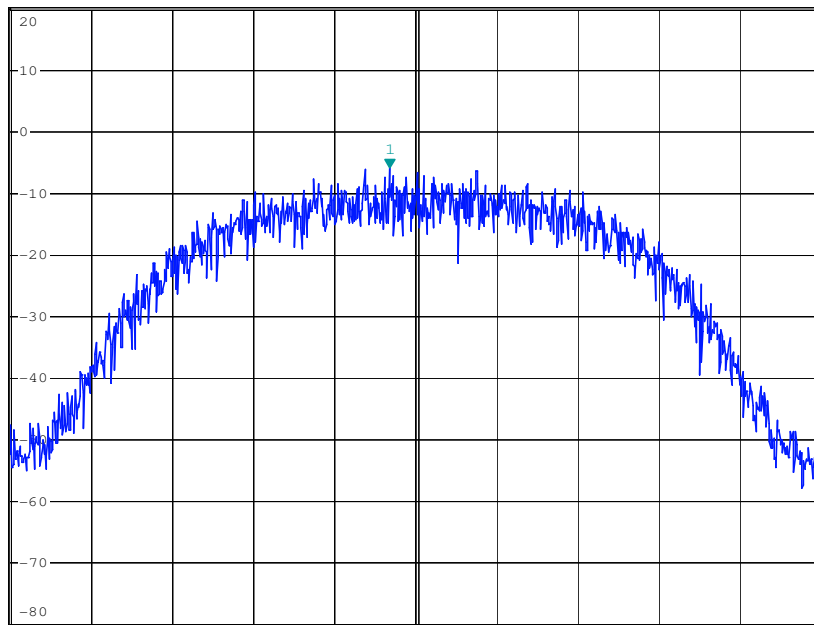
Test mode: 802.11b

Channel: Middle



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz \*SWT 2.25 s Marker 1 [T1] -5.85 dBm 2.436360000 GHz

1 PK  
MAXH

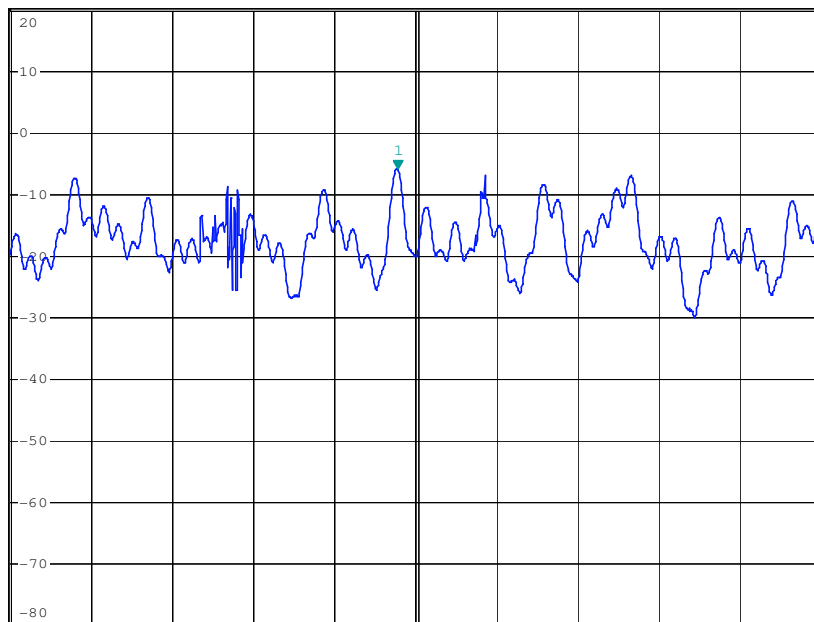


Center 2.437 GHz 2 MHz/ Span 20 MHz



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz \*SWT 100 s Marker 1 [T1] -5.84 dBm 2.436353100 GHz

1 PK  
MAXH



Center 2.43636 GHz 30 kHz/ Span 300 kHz

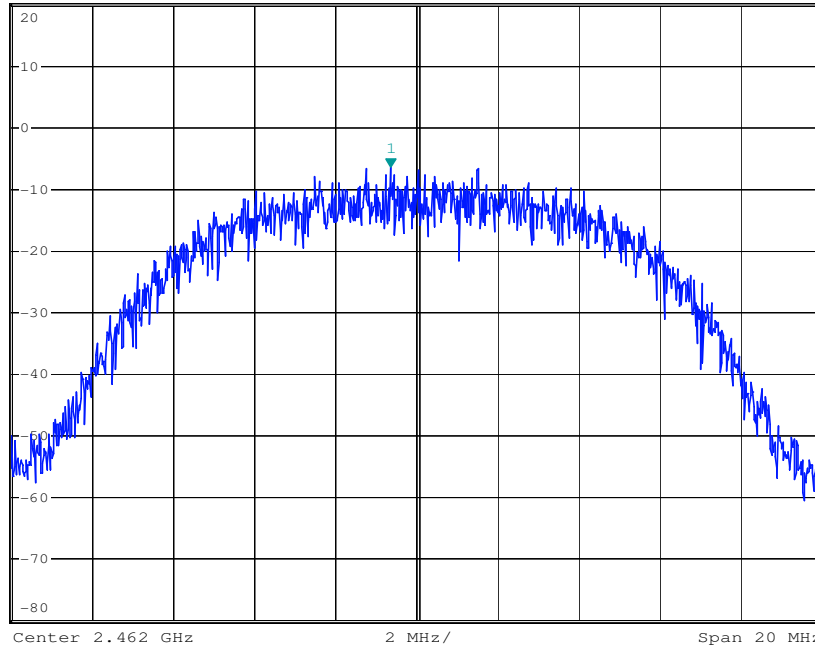
Test mode: 802.11b

Channel: Highest



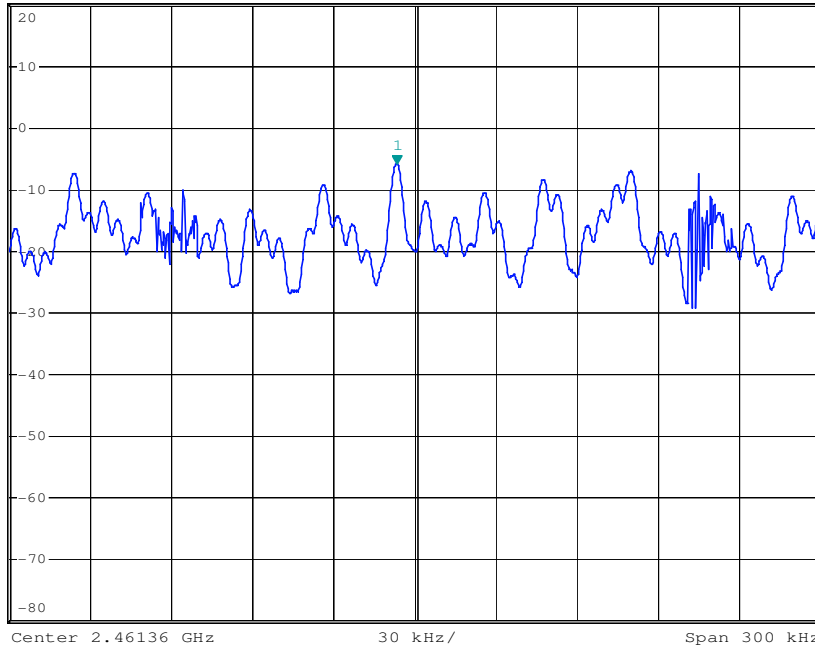
Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 2.25 s Marker 1 [T1] -6.32 dBm 2.461360000 GHz

1 PK  
MAXH



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 100 s Marker 1 [T1] -5.83 dBm 2.461353400 GHz

1 PK  
MAXH



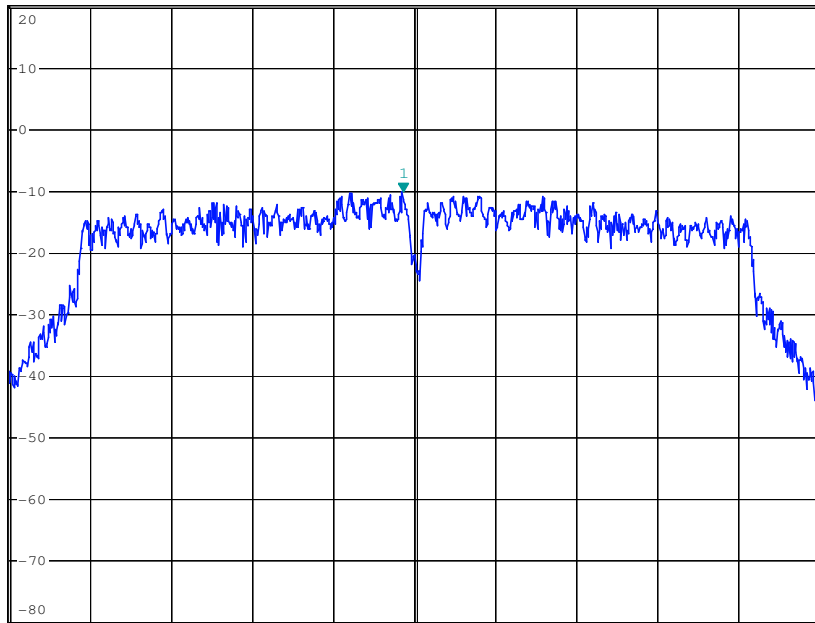
Test mode: 802.11g

Channel: Lowest



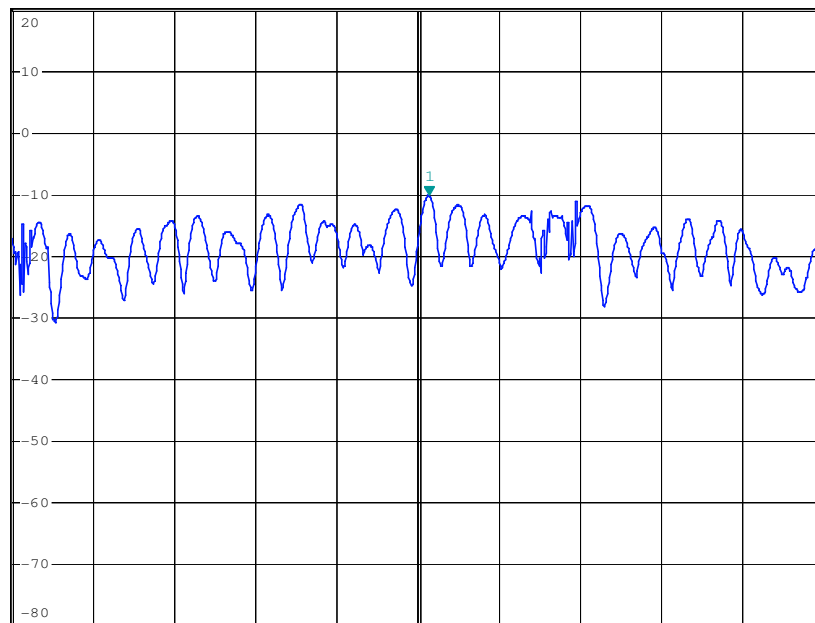
Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 2.25 s Marker 1 [T1] -10.03 dBm 2.411700000 GHz

1 PK  
MAXH



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 100 s Marker 1 [T1] -10.18 dBm 2.411703900 GHz

1 PK  
MAXH



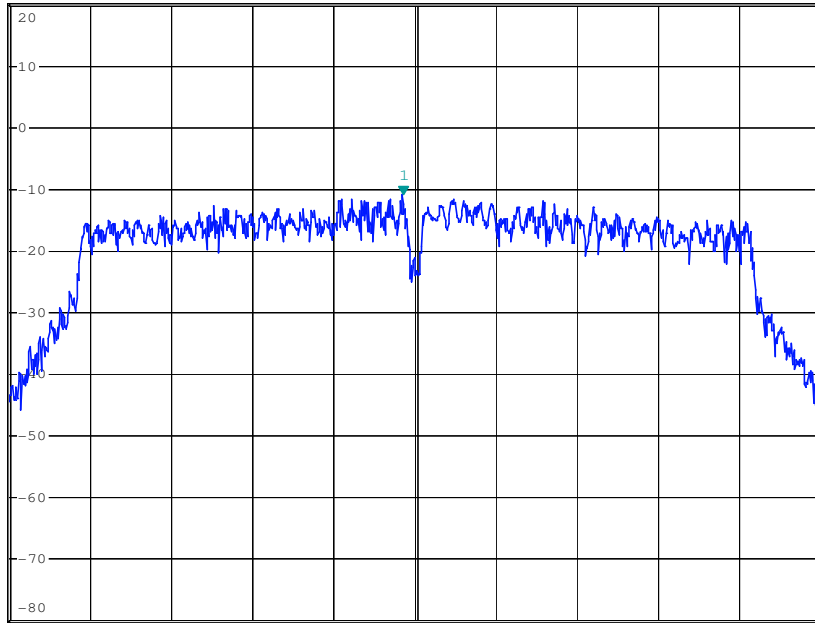
Test mode: 802.11g

Channel: Middle



Ref 20 dBm \*Att 30 dB RBW 3 kHz Marker 1 [T1] -10.89 dBm  
\*VBW 10 kHz 2.43670000 GHz  
SWT 2.25 s

1 PK  
MAXH

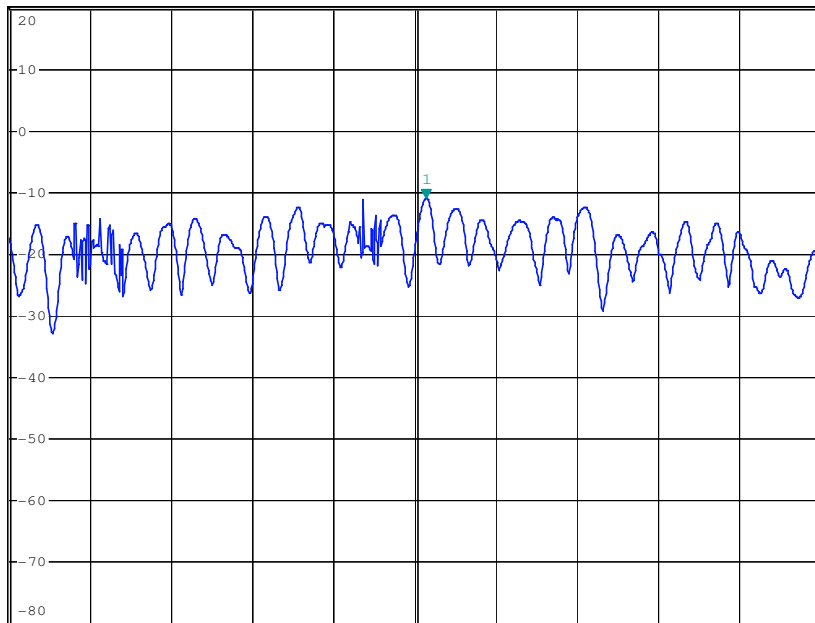


Center 2.437 GHz 2 MHz/ Span 20 MHz



Ref 20 dBm \*Att 30 dB RBW 3 kHz Marker 1 [T1] -10.94 dBm  
\*VBW 10 kHz 2.436704200 GHz  
\*SWT 100 s

1 PK  
MAXH



Center 2.4367 GHz 30 kHz/ Span 300 kHz



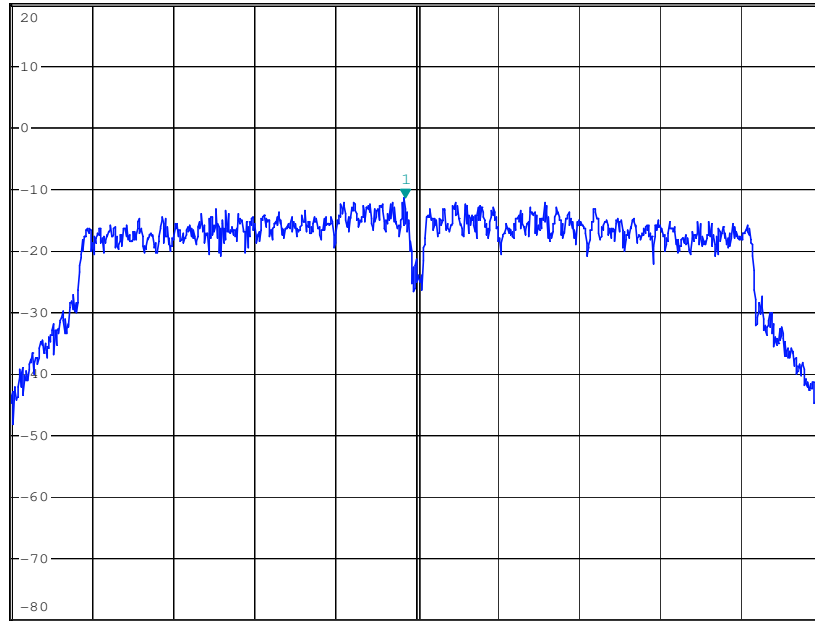
Test mode: 802.11g

Channel: Highest



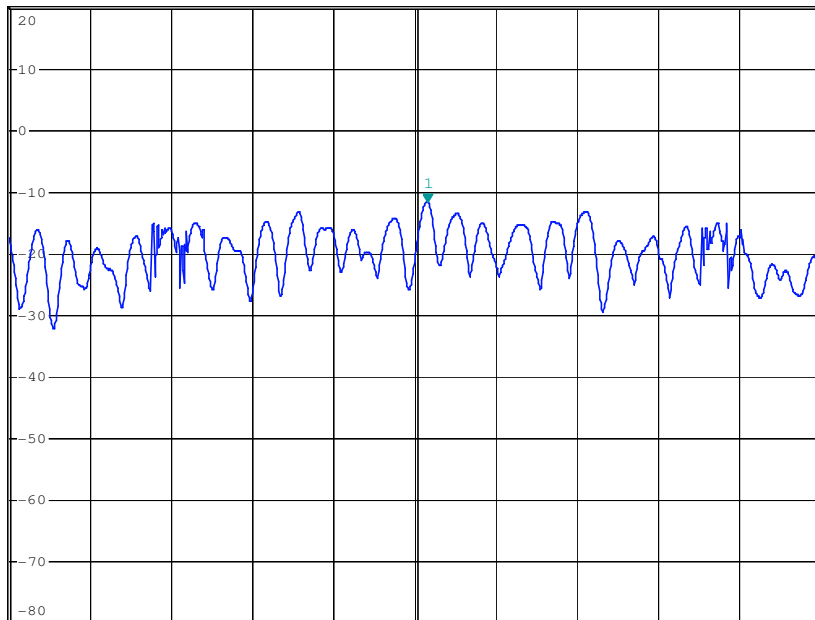
Ref 20 dBm \*Att 30 dB RBW 3 kHz Marker 1 [T1] -11.38 dBm  
VBW 10 kHz SWT 2.25 s 2.461700000 GHz

1 PK  
MAXH



Ref 20 dBm \*Att 30 dB RBW 3 kHz Marker 1 [T1] -11.60 dBm  
VBW 10 kHz SWT 100 s 2.461704500 GHz

1 PK  
MAXH



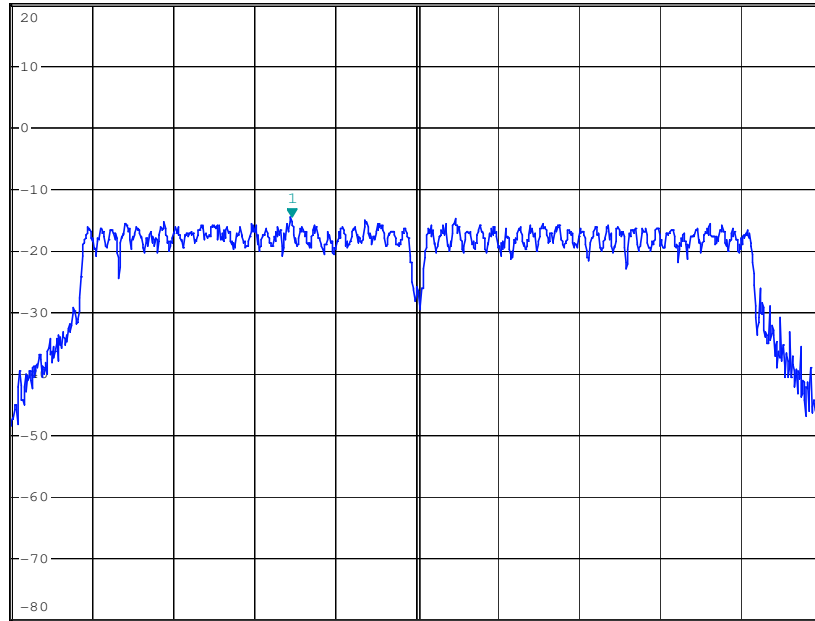
Test mode: 802.11n(HT20)

Channel: Lowest



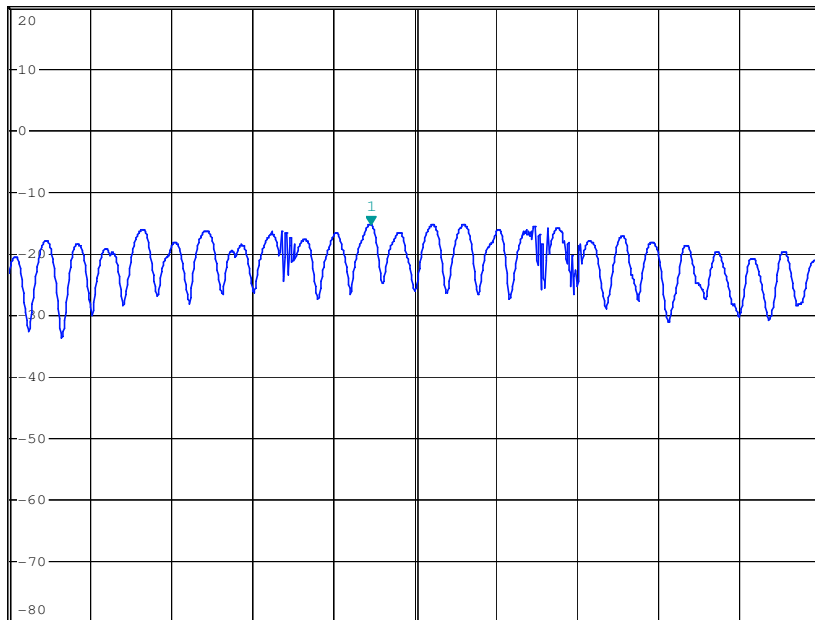
Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 2.25 s Marker 1 [T1] -14.55 dBm 2.408900000 GHz

1 PK  
MAXH



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 100 s Marker 1 [T1] -15.19 dBm 2.408883500 GHz

1 PK  
MAXH



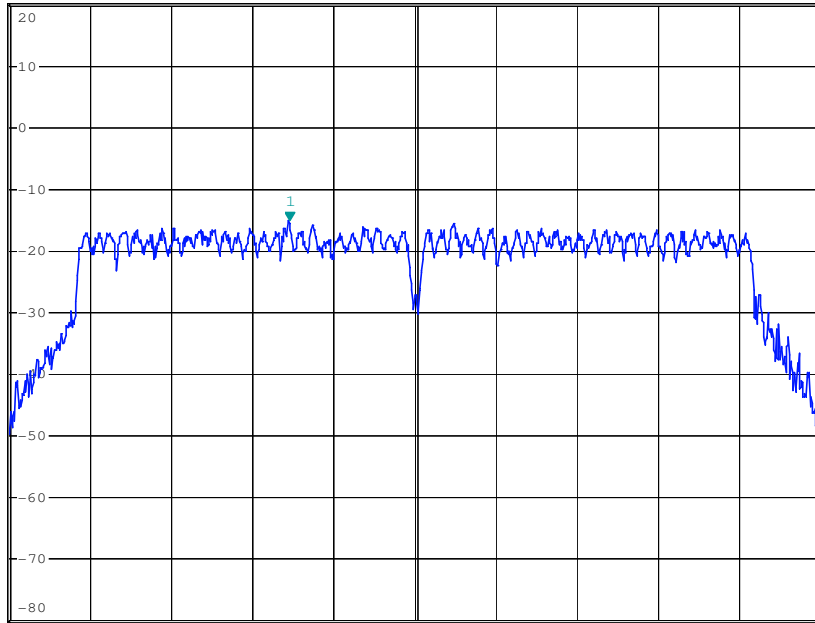
Test mode: 802.11n(HT20)

Channel: Middle



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz \*SWT 2.25 s Marker 1 [T1] -15.13 dBm 2.43390000 GHz

1 PK  
MAXH

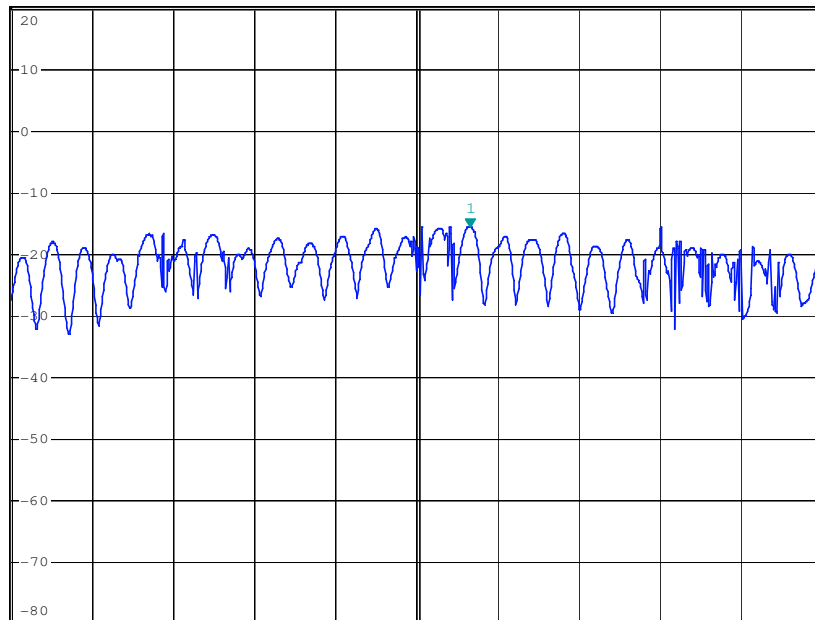


Center 2.437 GHz 2 MHz/ Span 20 MHz



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz \*SWT 100 s Marker 1 [T1] -15.53 dBm 2.433919500 GHz

1 PK  
MAXH



Center 2.4339 GHz 30 kHz/ Span 300 kHz

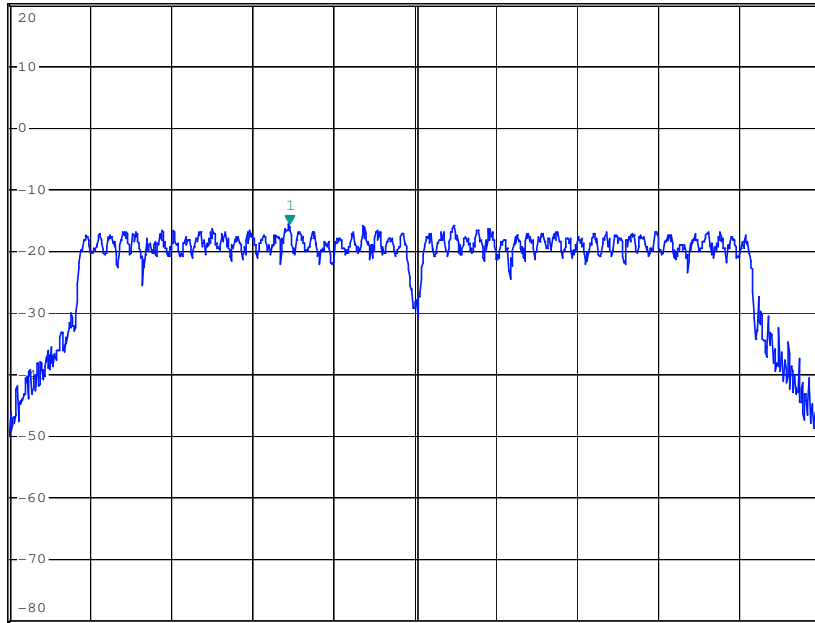
Test mode: 802.11n(HT20)

Channel: Highest



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz \*SWT 2.25 s Marker 1 [T1] -15.65 dBm 2.458900000 GHz

1 PK  
MAXH

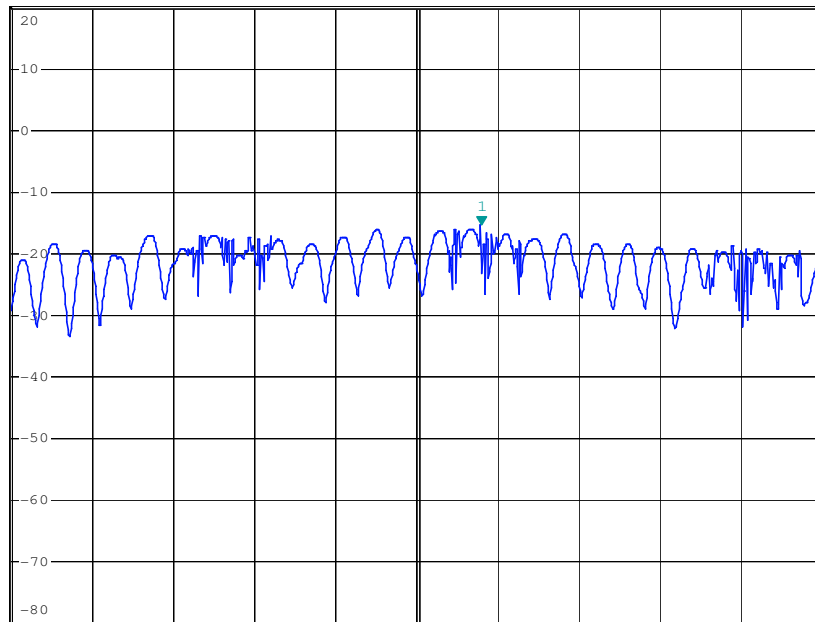


Center 2.462 GHz 2 MHz/ Span 20 MHz



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz \*SWT 100 s Marker 1 [T1] -15.43 dBm 2.458923700 GHz

1 PK  
MAXH



Center 2.4589 GHz 30 kHz/ Span 300 kHz

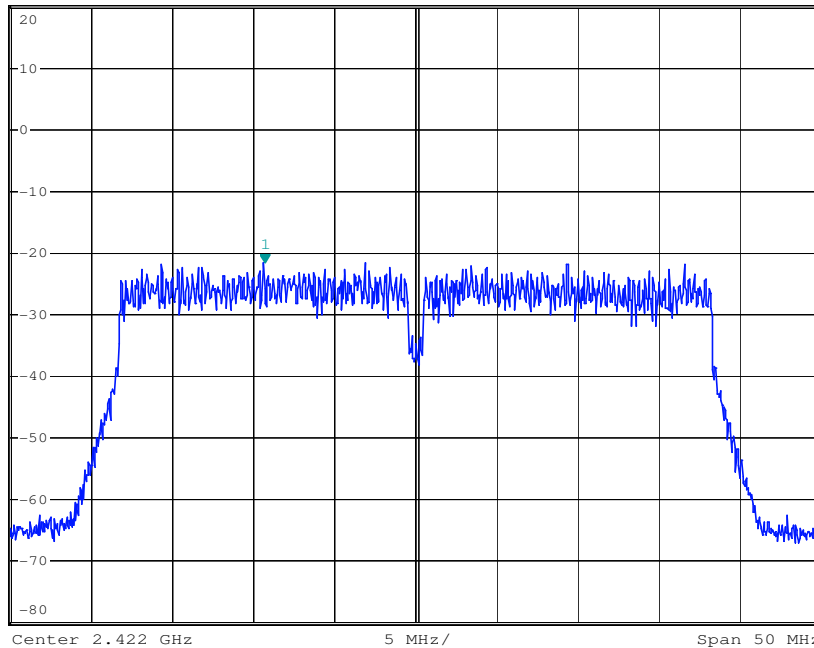
Test mode: 802.11n(HT40)

Channel: Lowest



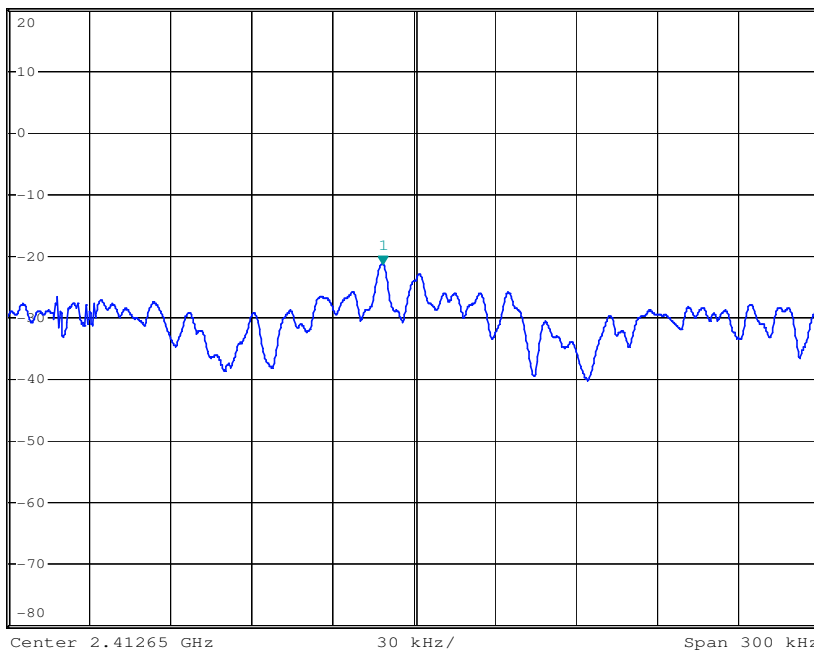
Ref 20 dBm \*Att 30 dB RBW 3 kHz VBW 10 kHz SWT 5.6 s Marker 1 [T1] -21.60 dBm 2.412650000 GHz

1 PK  
MAXH



Ref 20 dBm \*Att 30 dB RBW 3 kHz VBW 10 kHz SWT 100 s Marker 1 [T1] -21.34 dBm 2.412638300 GHz

1 PK  
MAXH



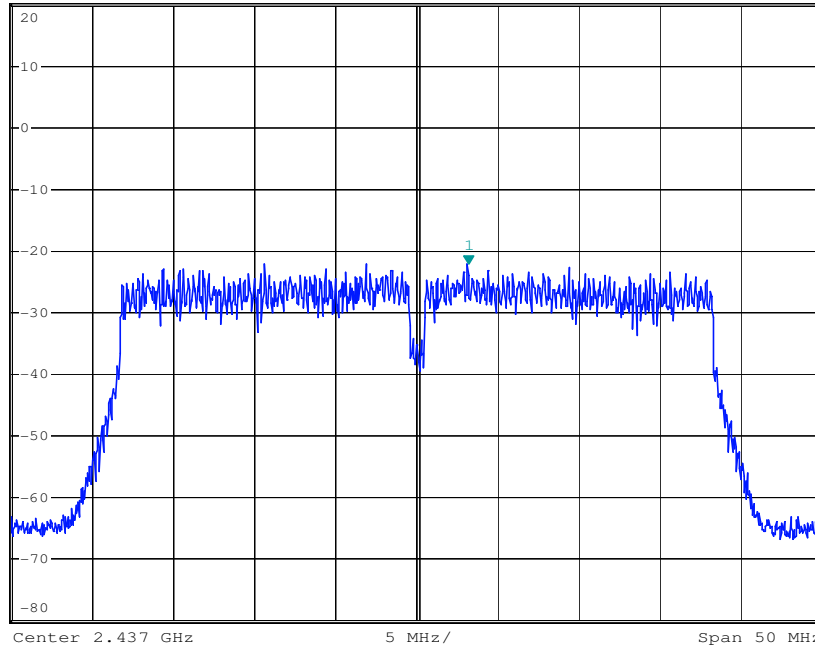
Test mode: 802.11n(HT40)

Channel: Middle



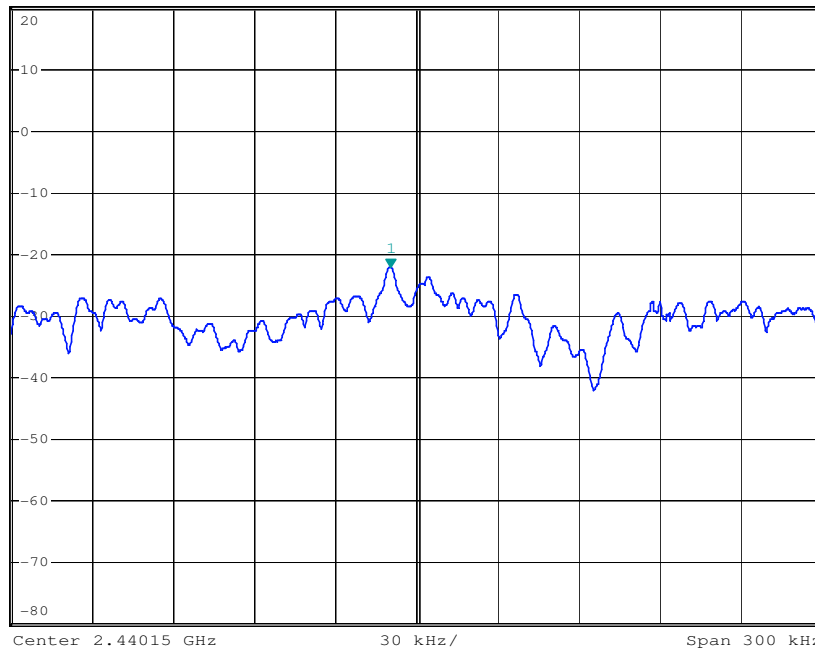
Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 5.6 s Marker 1 [T1] -22.05 dBm 2.440150000 GHz

1 PK  
MAXH



Ref 20 dBm \*Att 30 dB \*RBW 3 kHz \*VBW 10 kHz SWT 100 s Marker 1 [T1] -22.15 dBm 2.440140100 GHz

1 PK  
MAXH



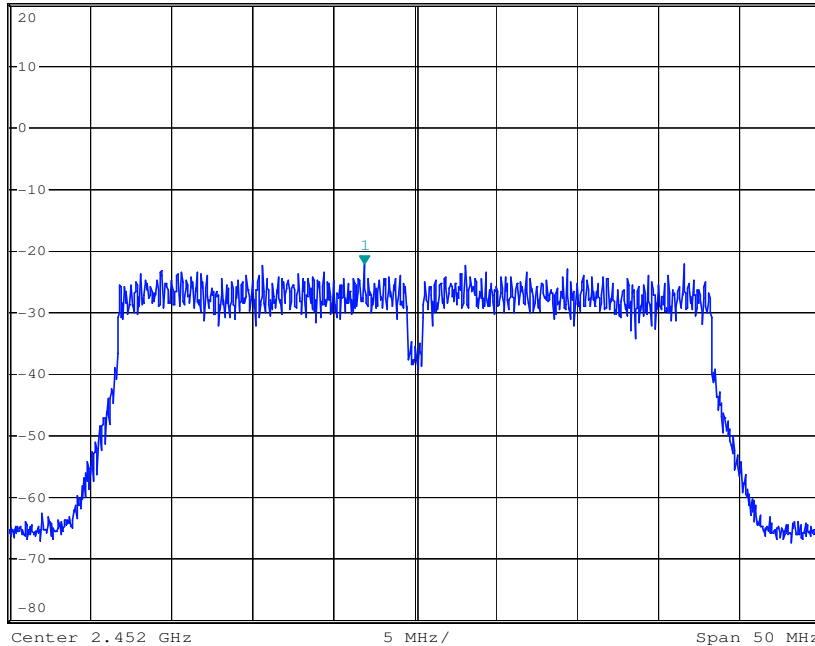
Test mode: 802.11n(HT40)

Channel: Highest



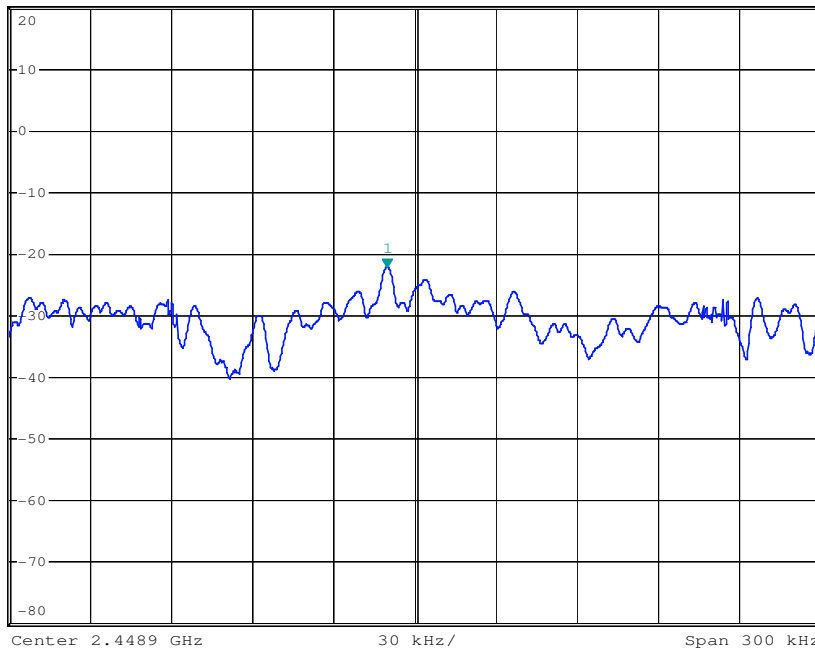
Ref 20 dBm \* Att 30 dB \* RBW 3 kHz \* VBW 10 kHz \* SWT 5.6 s Marker 1 [T1] -22.13 dBm 2.448900000 GHz

1 PK  
MAXH



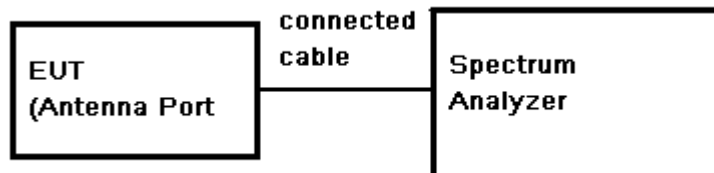
Ref 20 dBm \* Att 30 dB \* RBW 3 kHz \* VBW 10 kHz \* SWT 100 s Marker 1 [T1] -22.08 dBm 2.448889800 GHz

1 PK  
MAXH



## 7.7 Conducted Spurious Emissions and Band-edge

**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



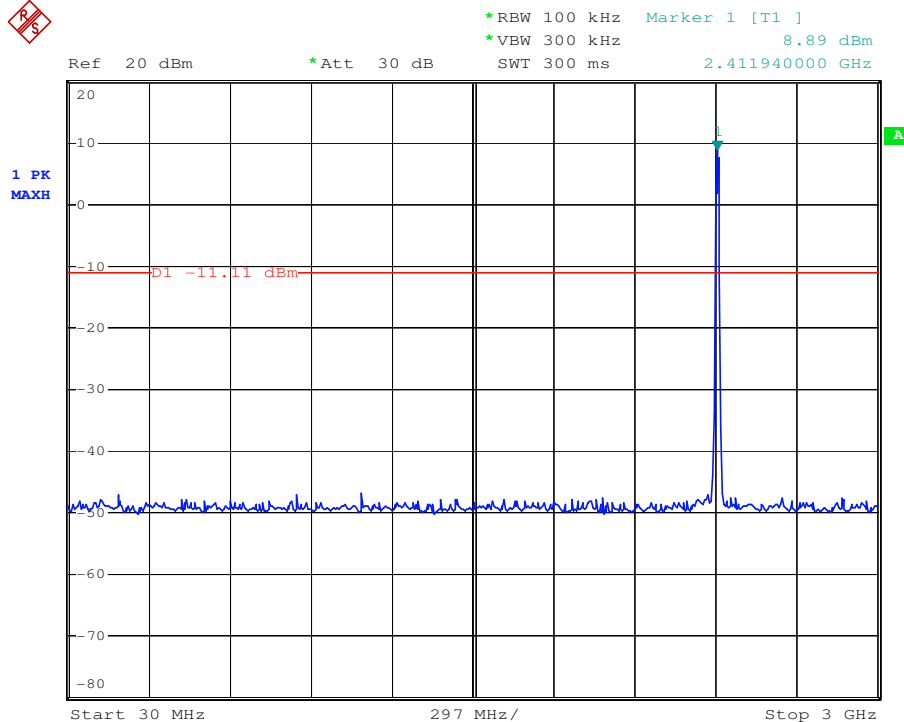
### 7.7.1 Conducted spurious emission

Test plot as follows:

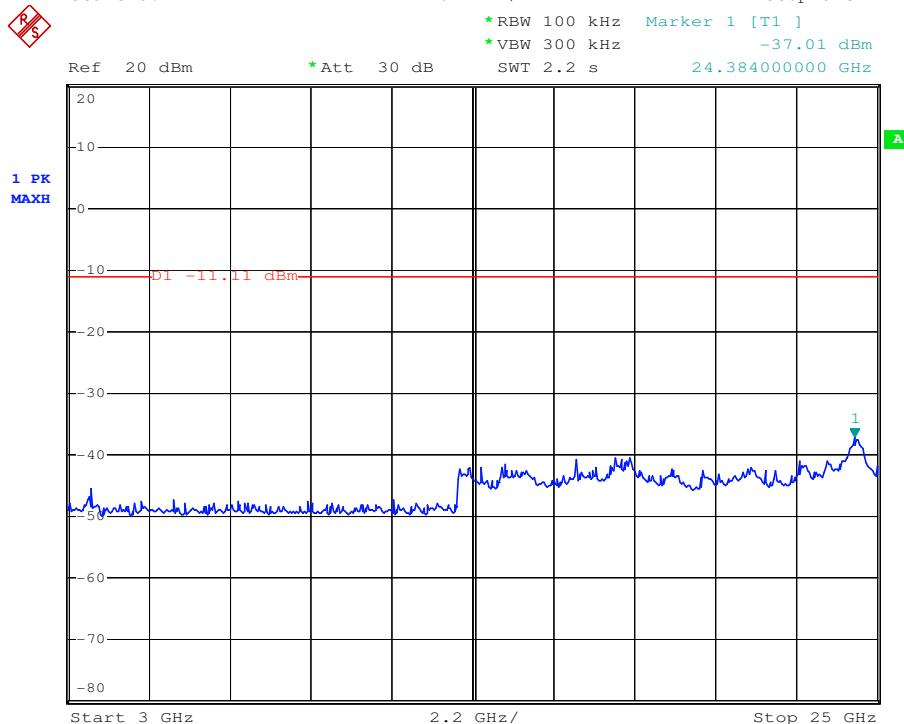
Test mode: 802.11b

Channel: Lowest

30MHz-3GHz:



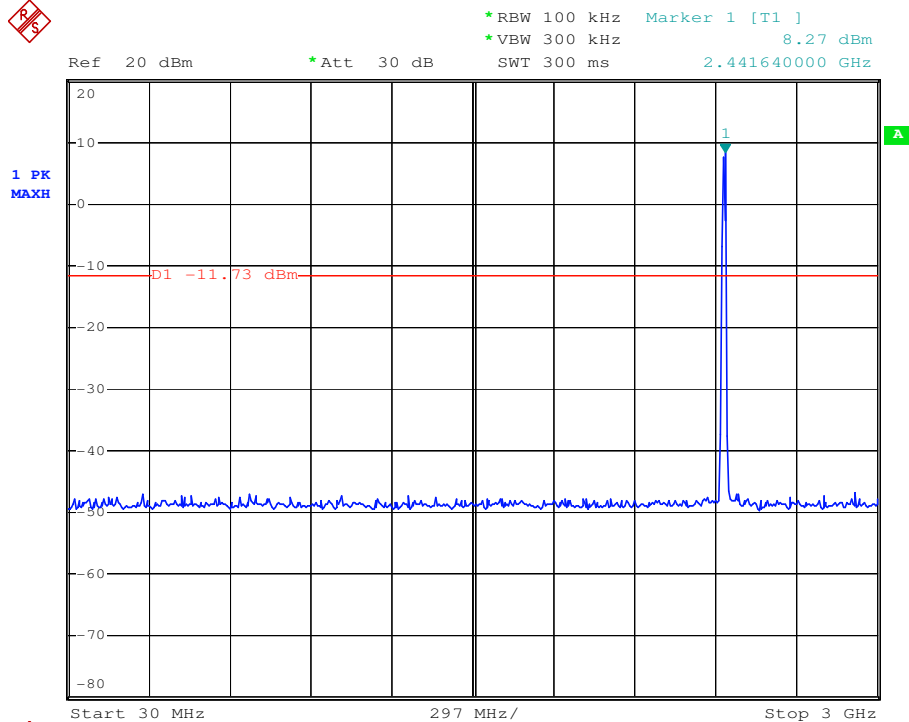
3GHz-25GHz:



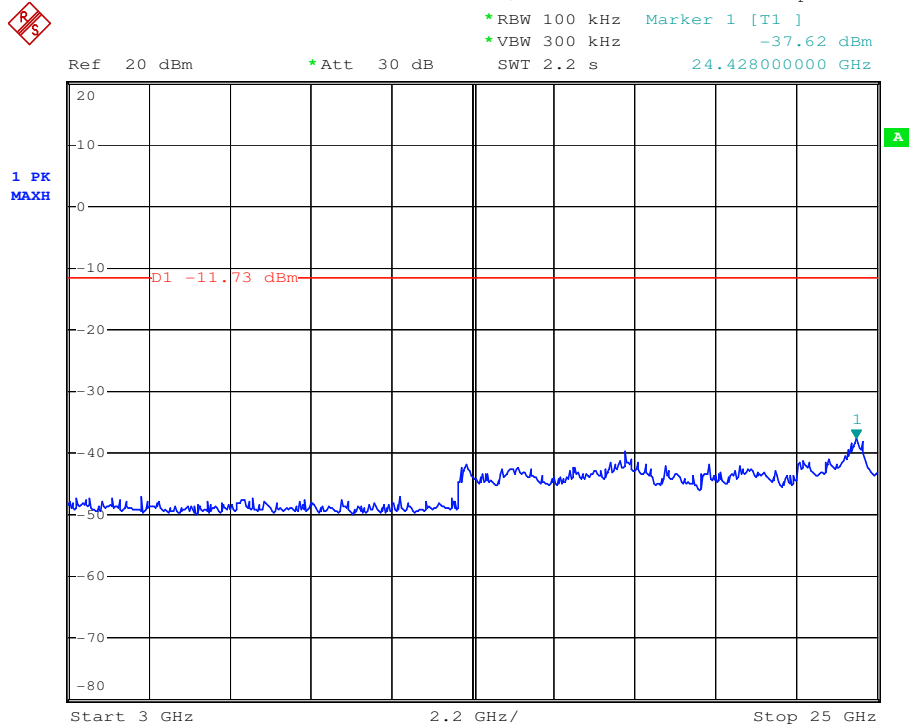
Test mode: 802.11b

Channel: Middle

30MHz-3GHz:



3GHz-25GHz:



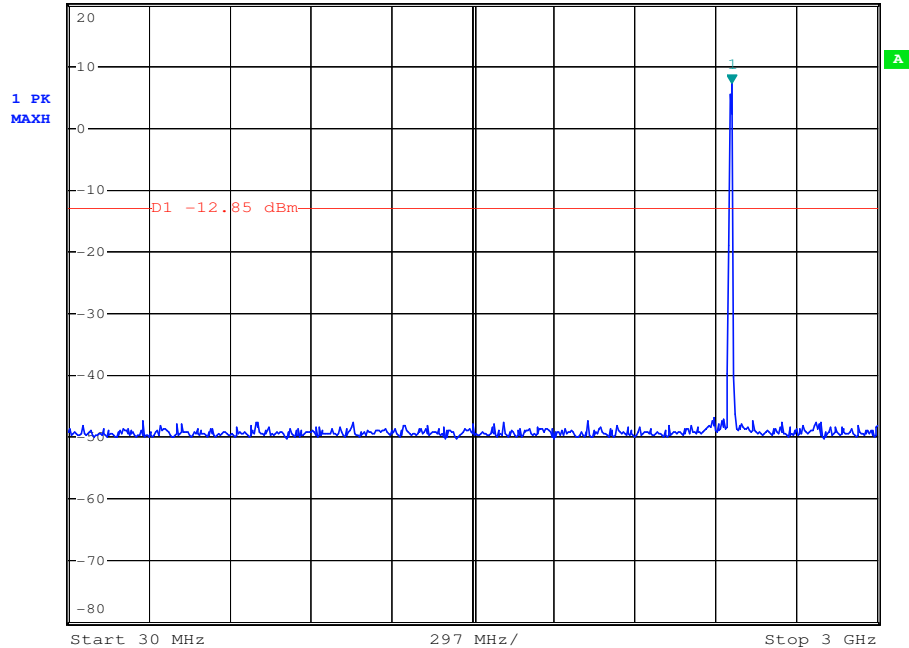
Test mode: 802.11b

Channel: Highest

30MHz-3GHz:



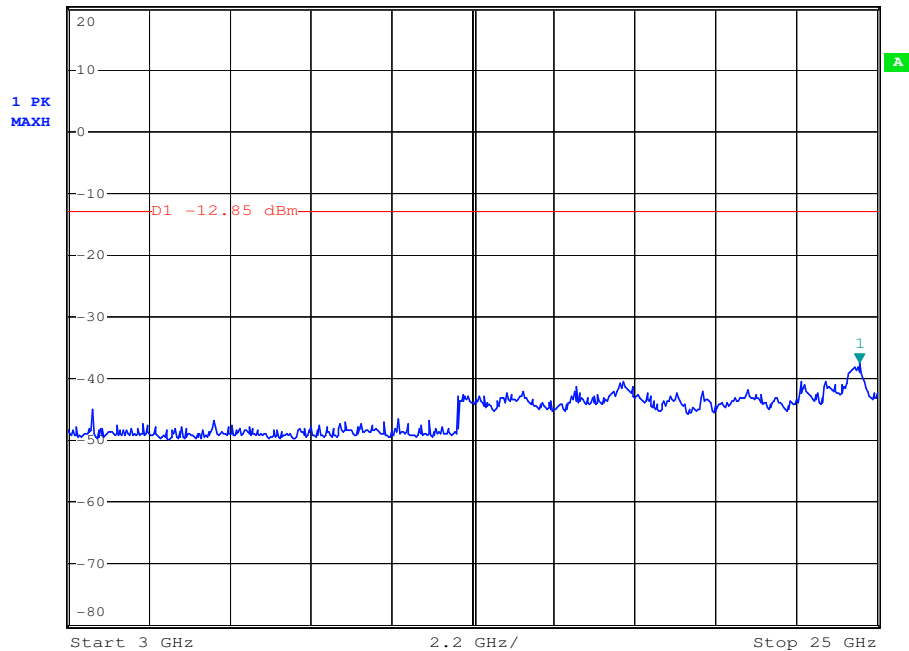
Ref 20 dBm \*Att 30 dB \*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 7.15 dBm  
SWT 300 ms 2.465400000 GHz



3GHz-25GHz:



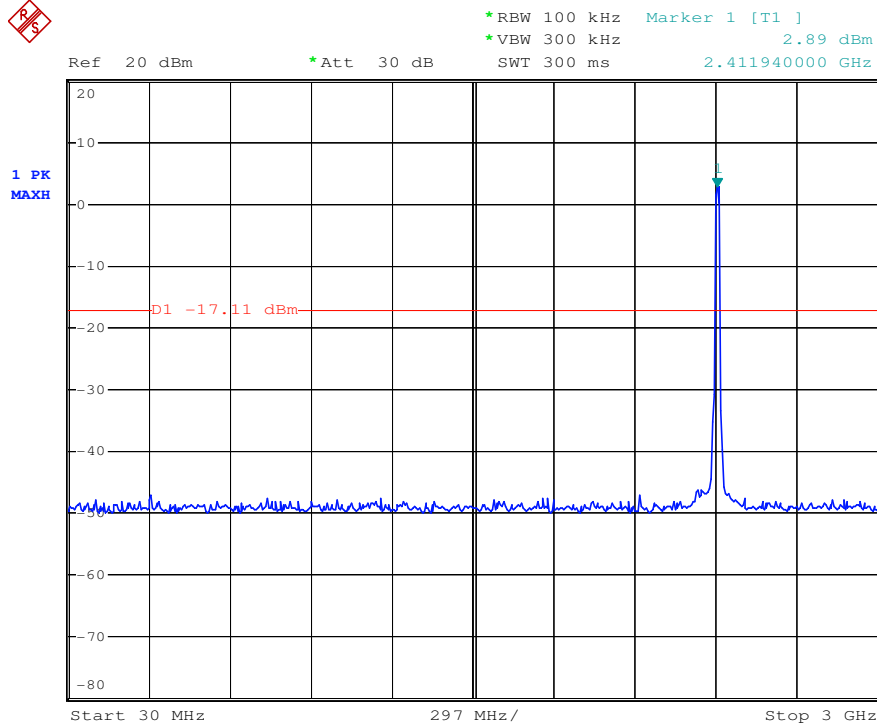
Ref 20 dBm \*Att 30 dB \*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz -37.33 dBm  
SWT 2.2 s 24.516000000 GHz



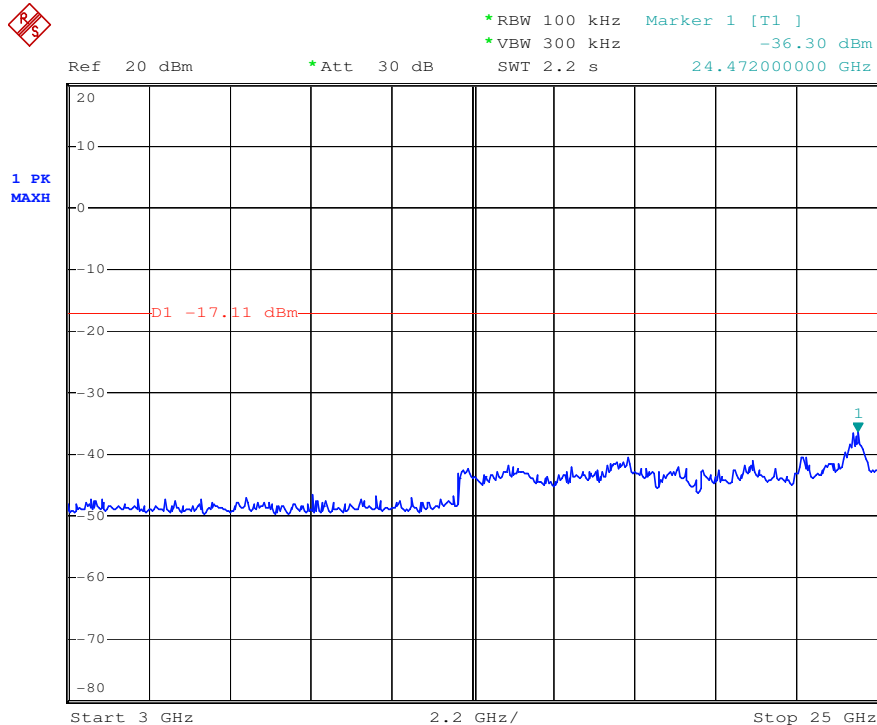
Test mode: 802.11g

Channel: Lowest

30MHz-3GHz:



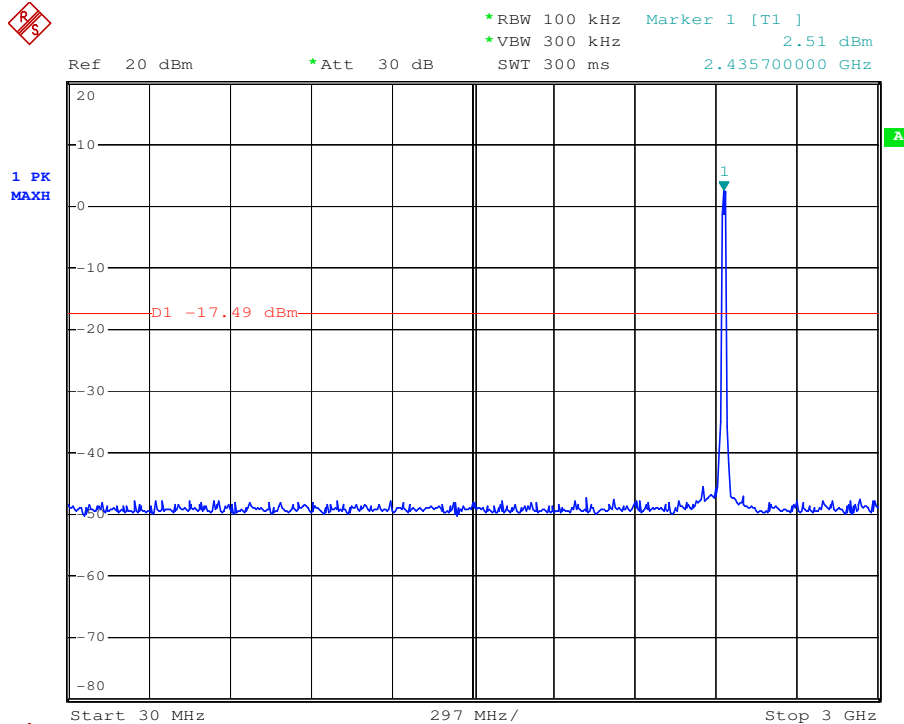
3GHz-25GHz:



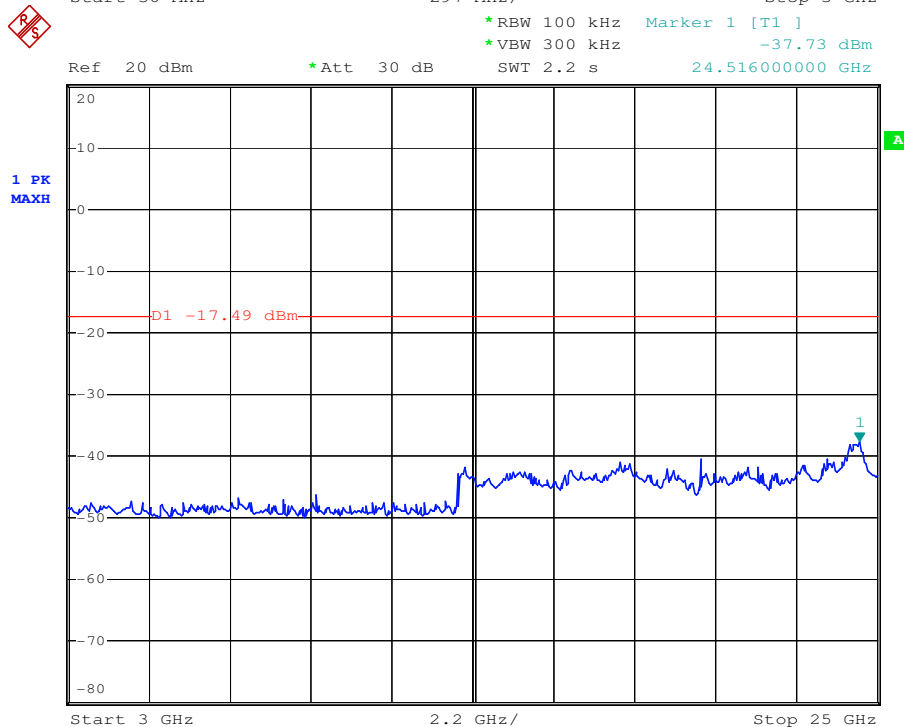
Test mode: 802.11g

Channel: Middle

30MHz-3GHz:



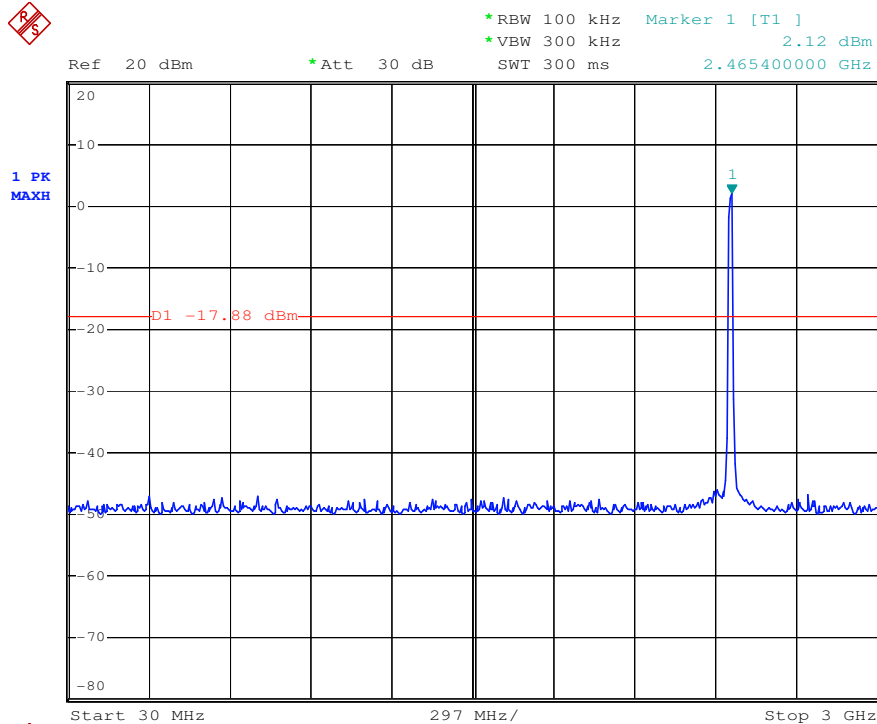
3GHz-25GHz:



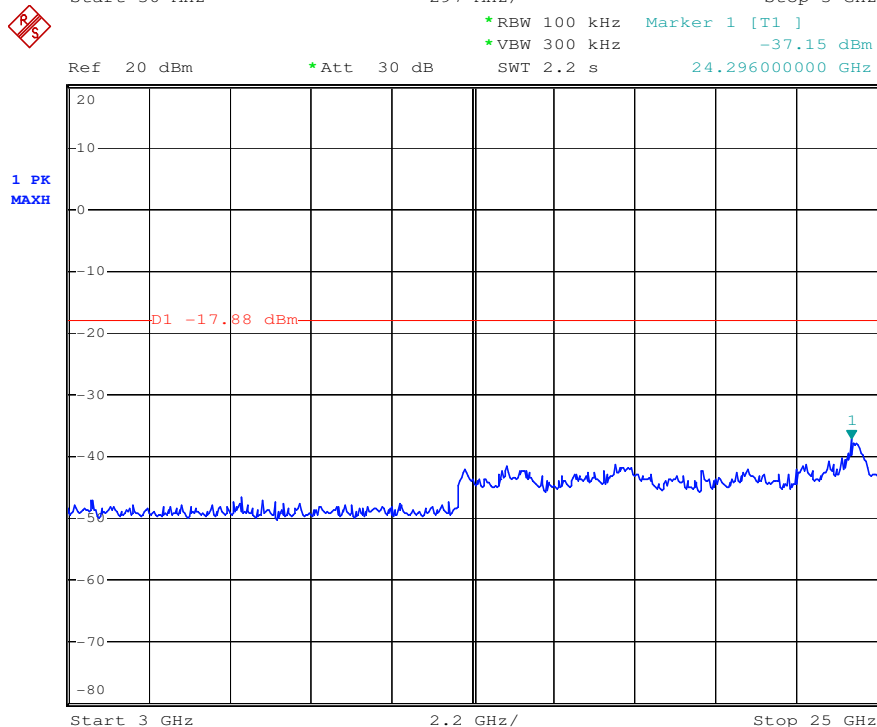
Test mode: 802.11g

Channel: Highest

30MHz-3GHz:



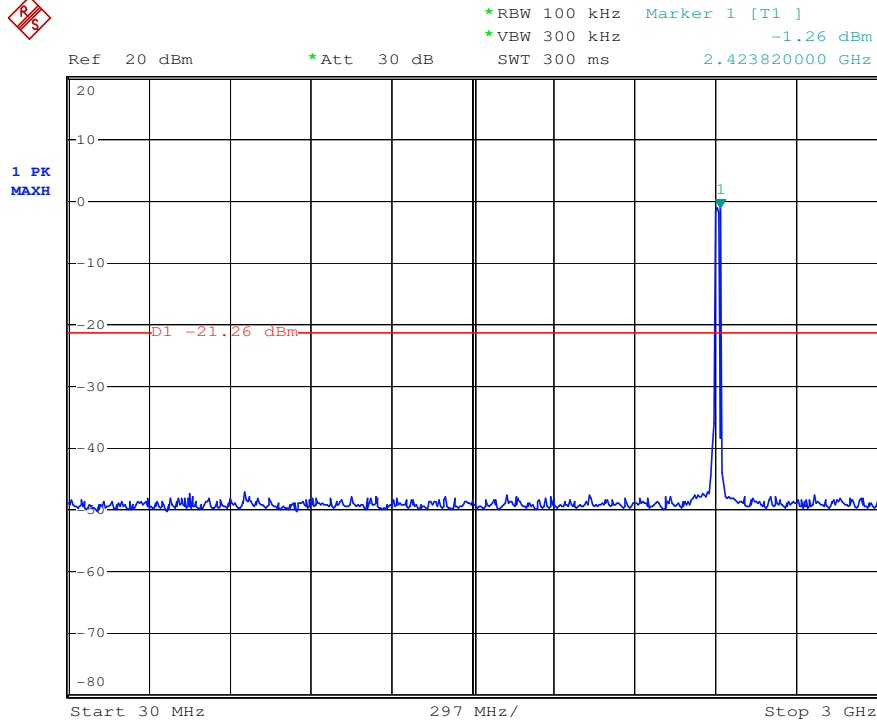
3GHz-25GHz:



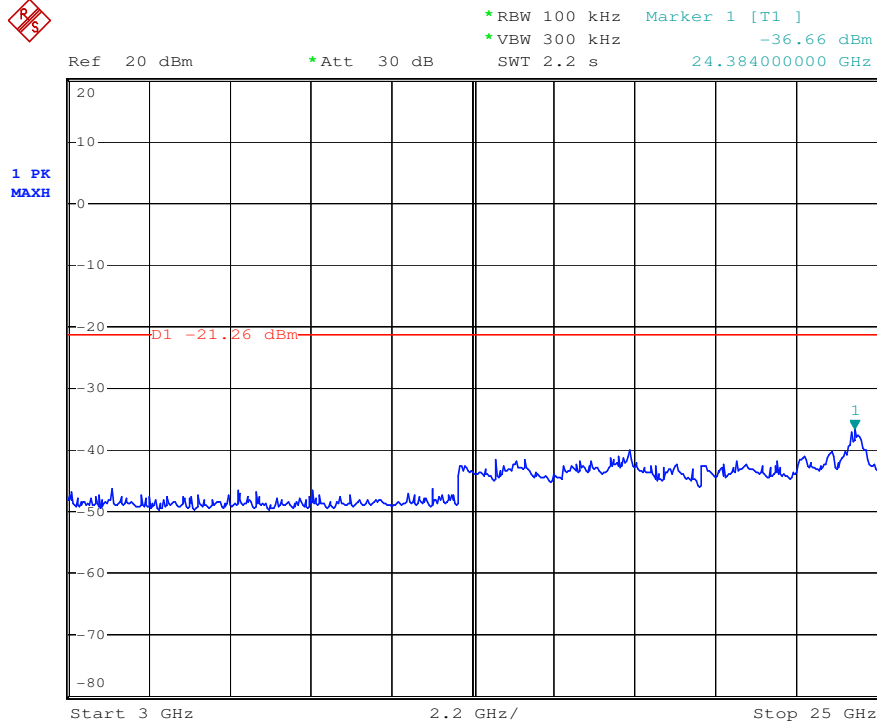
Test mode: 802.11n(HT20)

Channel: Lowest

30MHz-3GHz:



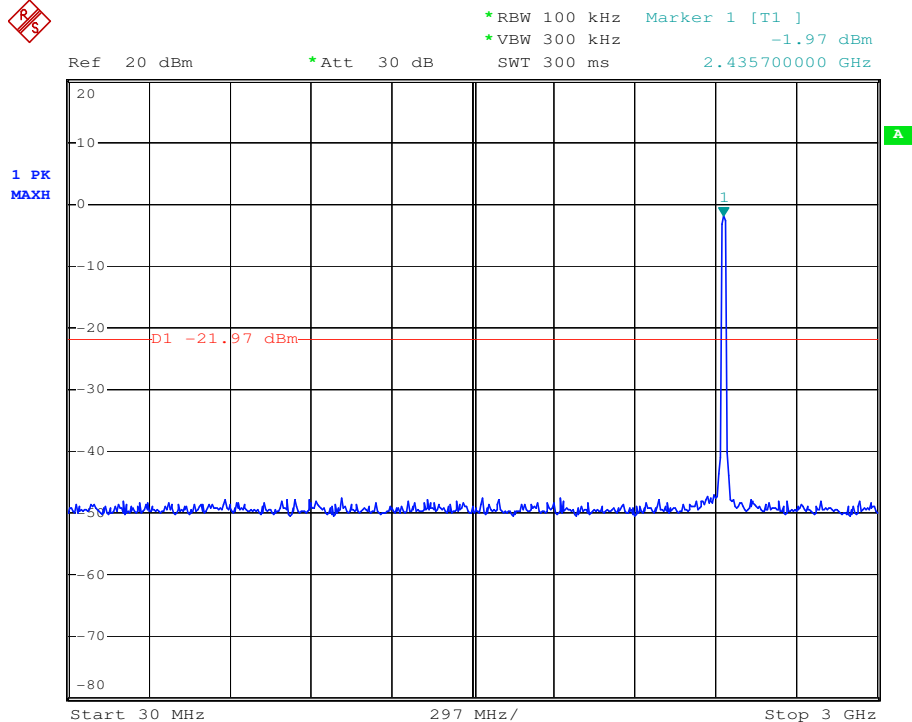
3GHz-25GHz:



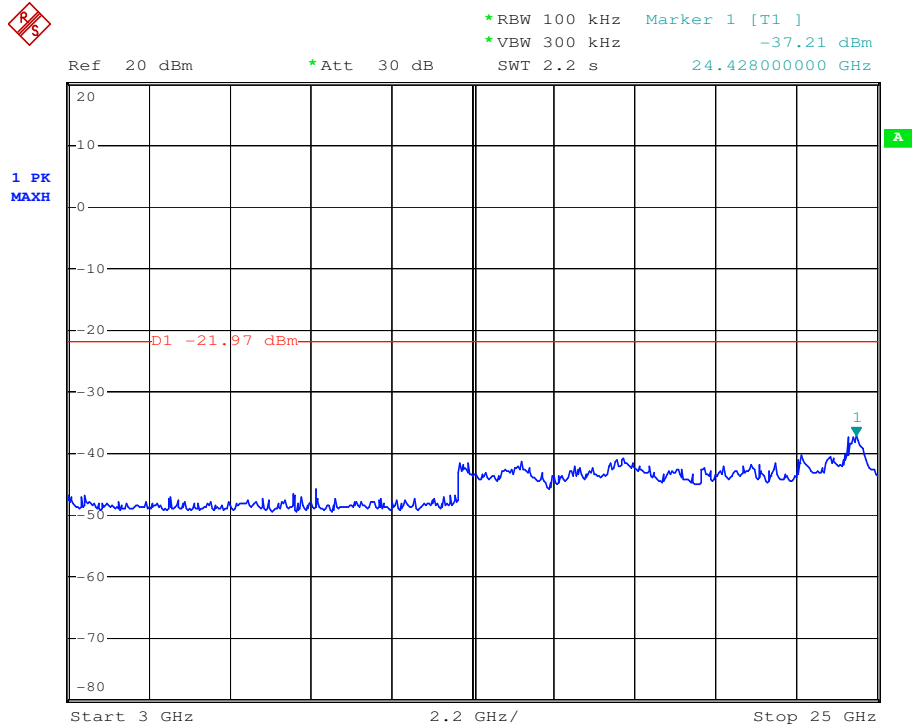
Test mode: 802.11n(HT20)

Channel: Middle

30MHz-3GHz:



3GHz-25GHz:

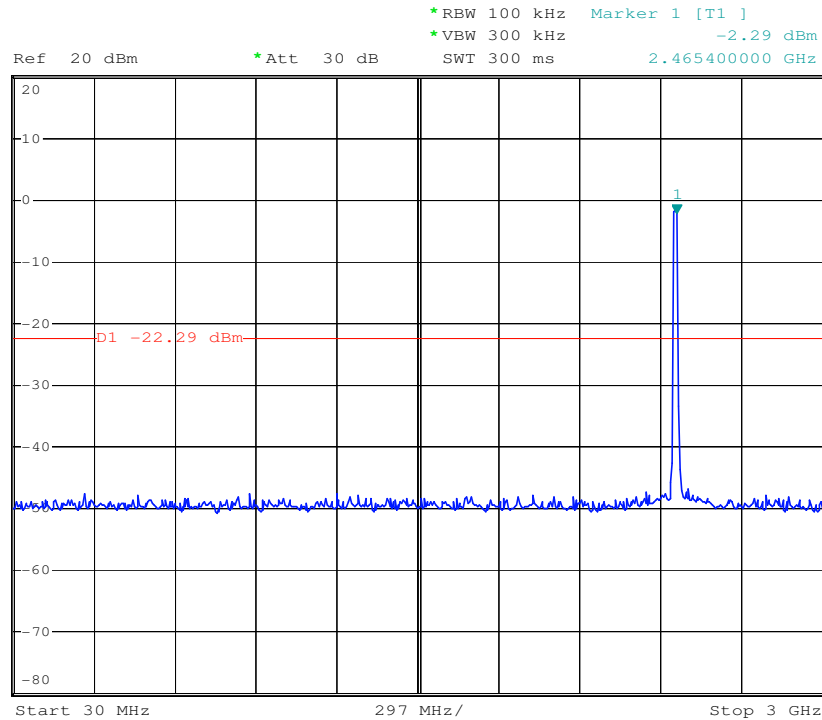




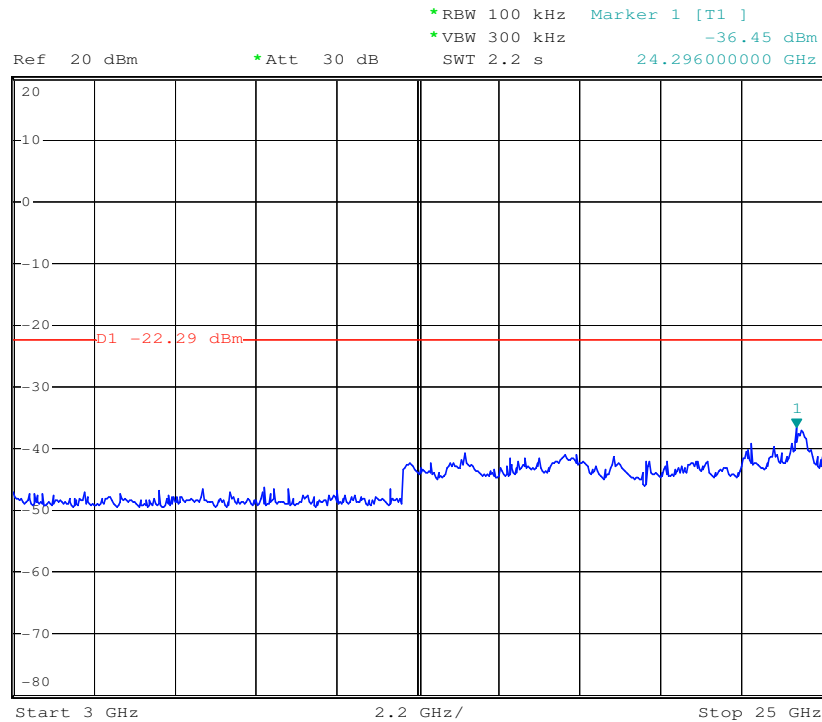
Test mode: 802.11n(HT20)

Channel: Highest

30MHz-3GHz:



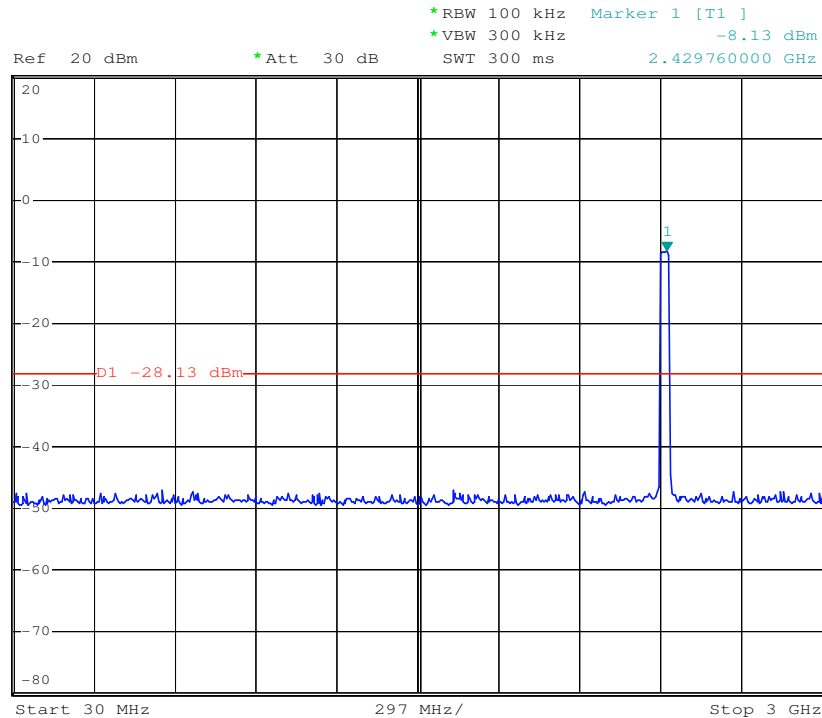
3GHz-25GHz:



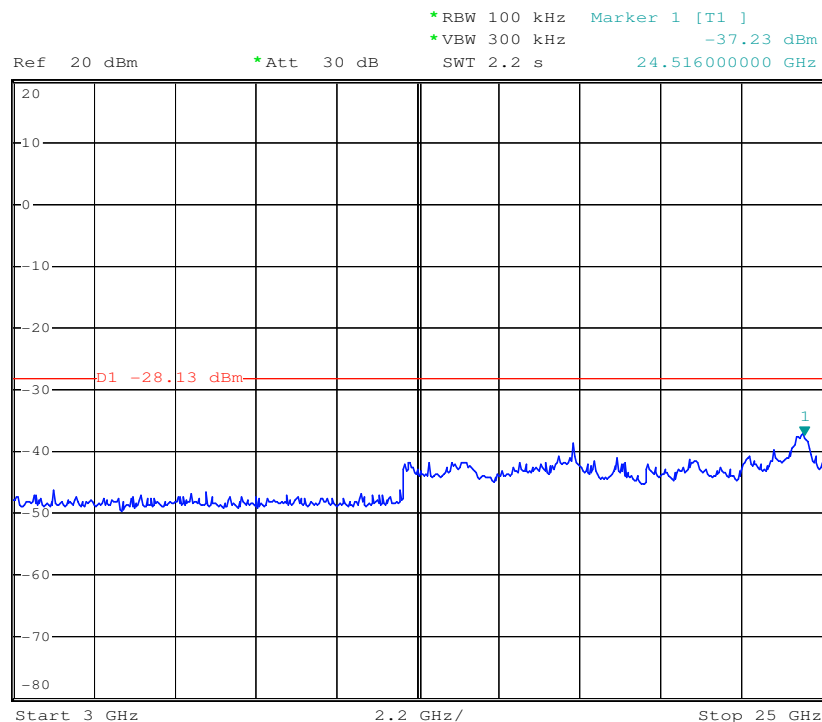
Test mode: 802.11n(HT40)

Channel: Lowest

30MHz-3GHz:



3GHz-25GHz:



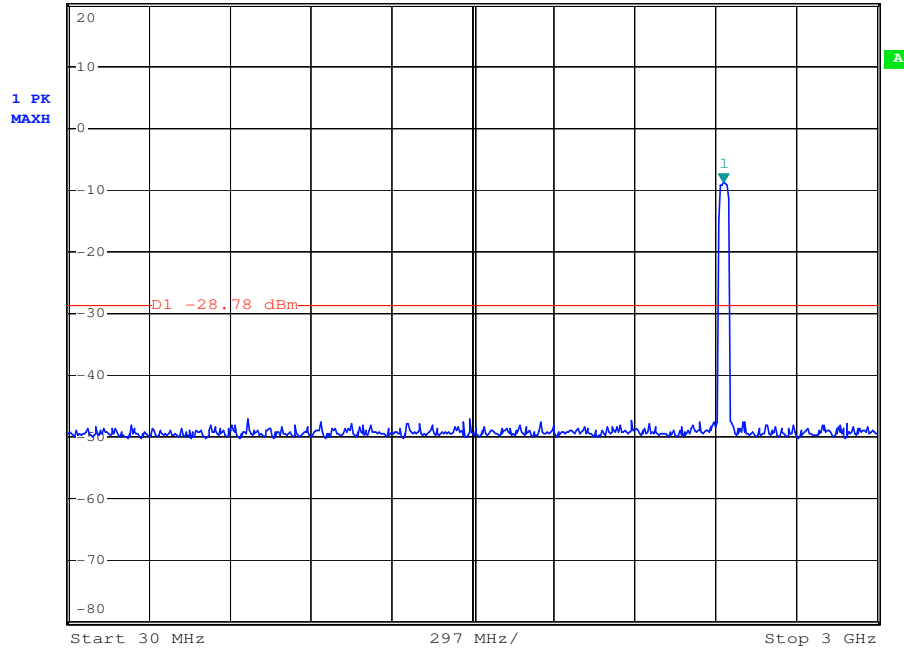
Test mode: 802.11n(HT40)

Channel: Middle

30MHz-3GHz:



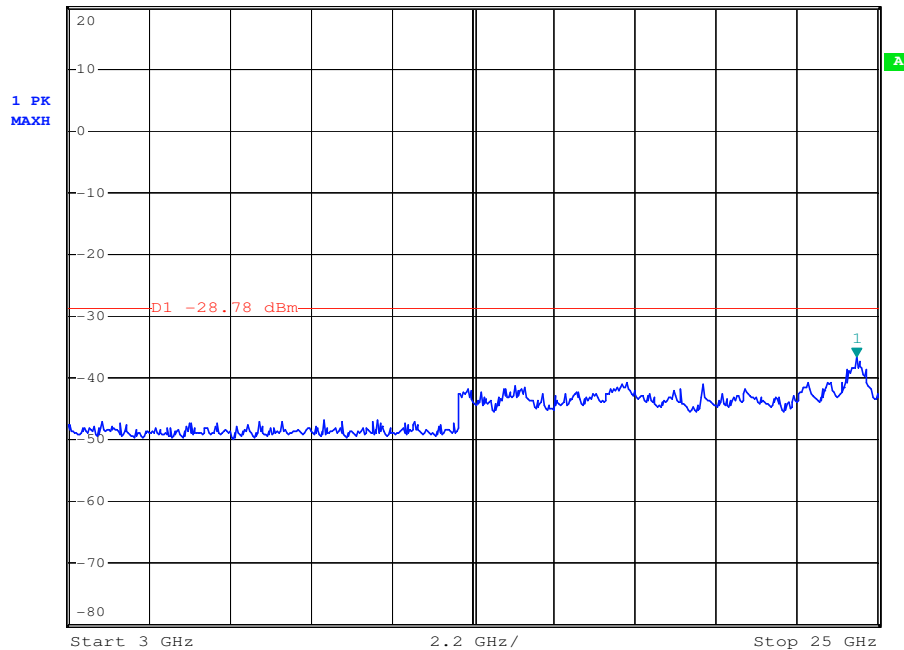
Ref 20 dBm \*Att 30 dB \*RBW 100 kHz \*VBW 300 kHz SWT 300 ms Marker 1 [T1] -8.78 dBm 2.435700000 GHz



3GHz-25GHz:



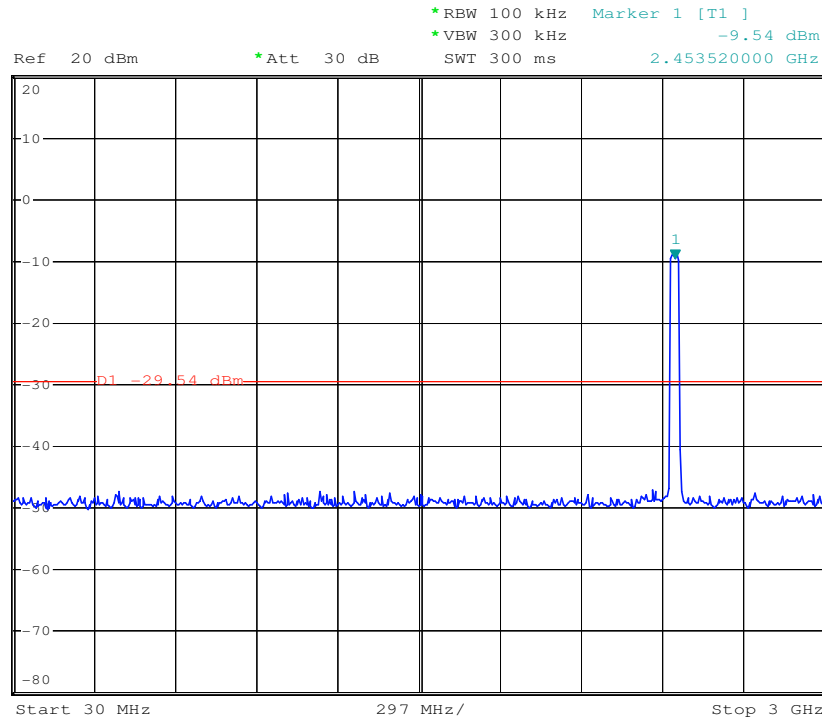
Ref 20 dBm \*Att 30 dB \*RBW 100 kHz \*VBW 300 kHz SWT 2.2 s Marker 1 [T1] -36.56 dBm 24.428000000 GHz



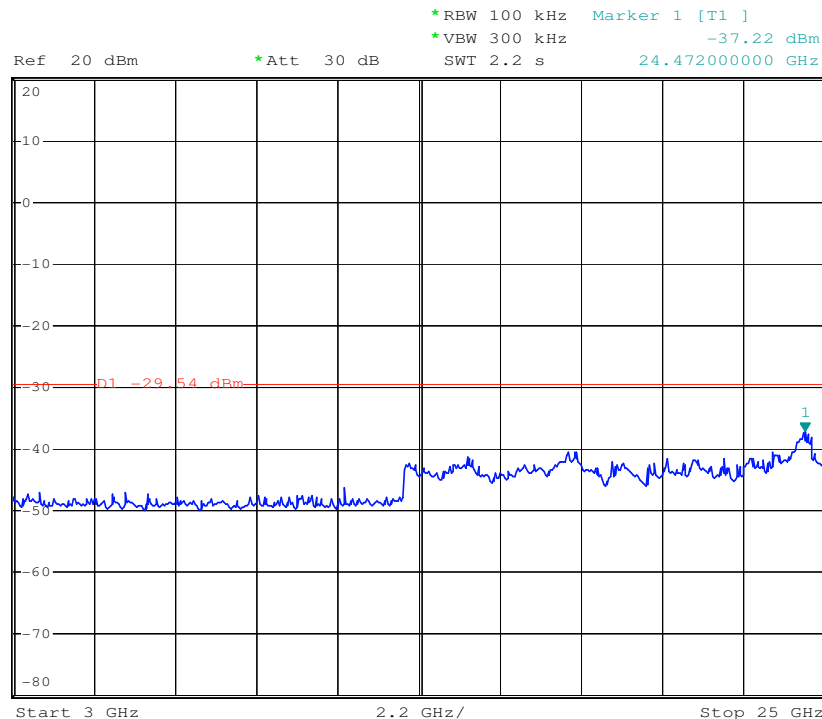
Test mode: 802.11n(HT40)

Channel: Highest

30MHz-3GHz:



3GHz-25GHz:

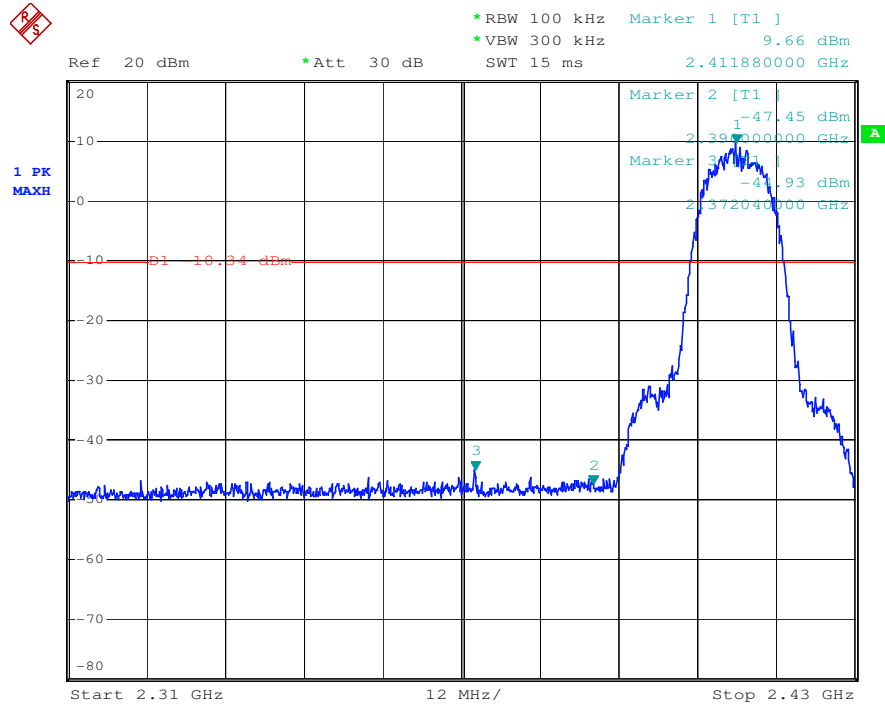


## 7.7.2 Conducted Band-edge

Test plot as follows:

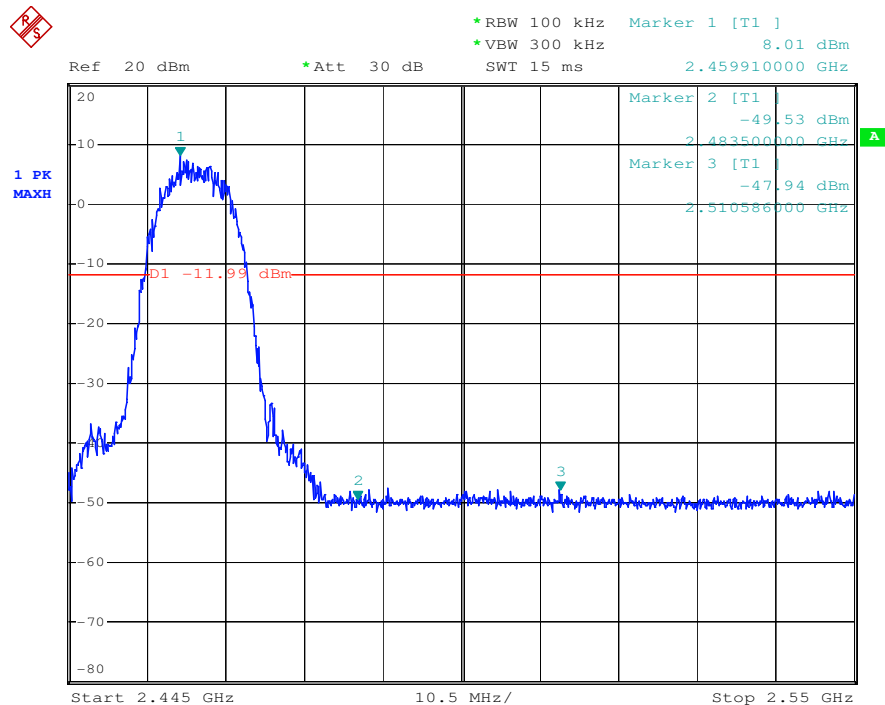
Test mode: 802.11b

Channel: Lowest



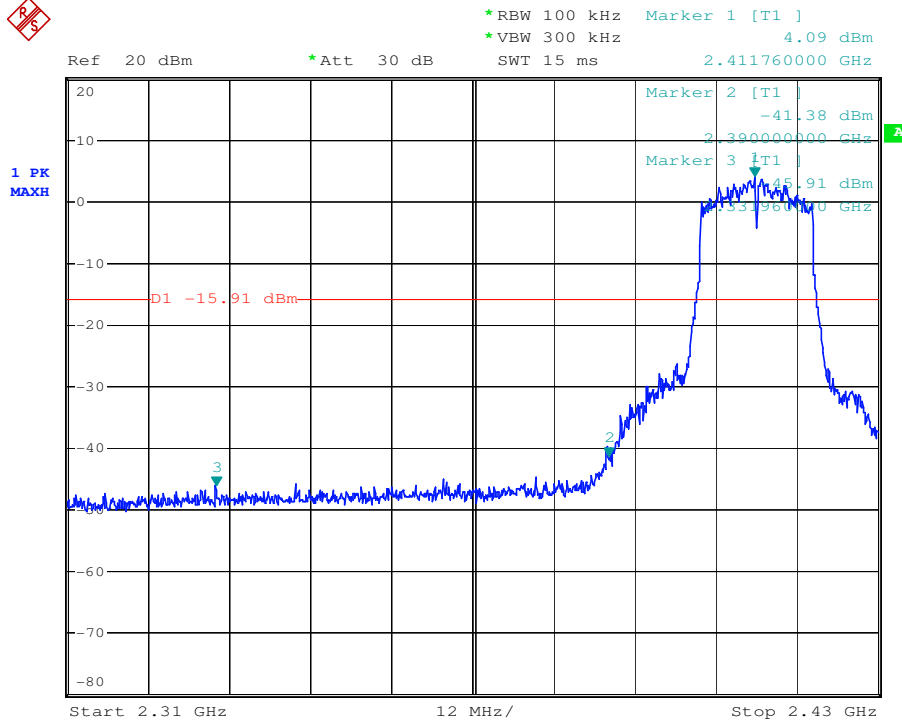
Test mode: 802.11b

Channel: Highest



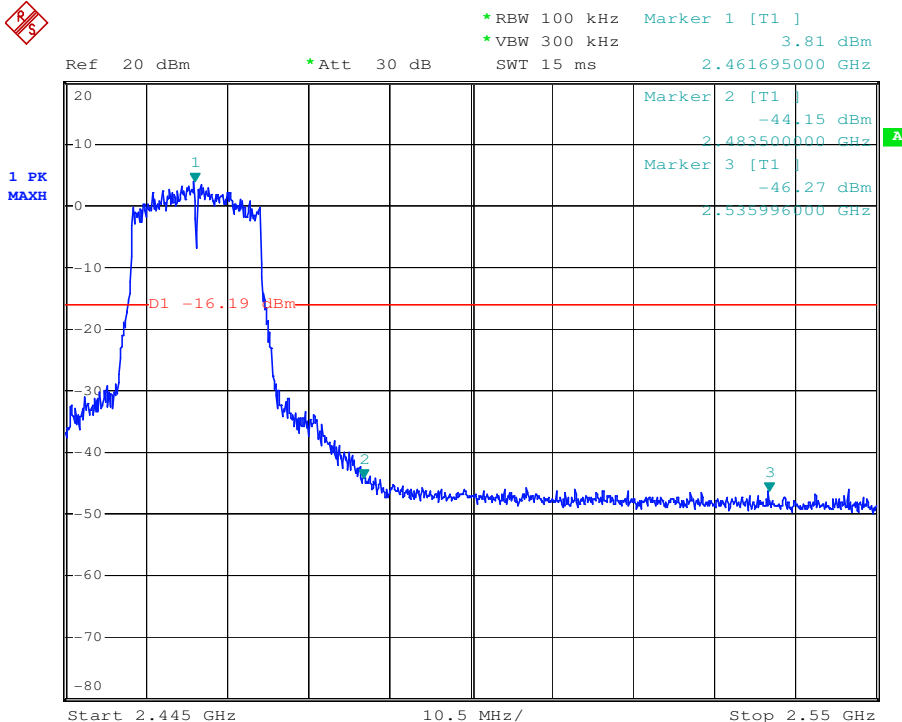
Test mode: 802.11g

Channel: Lowest



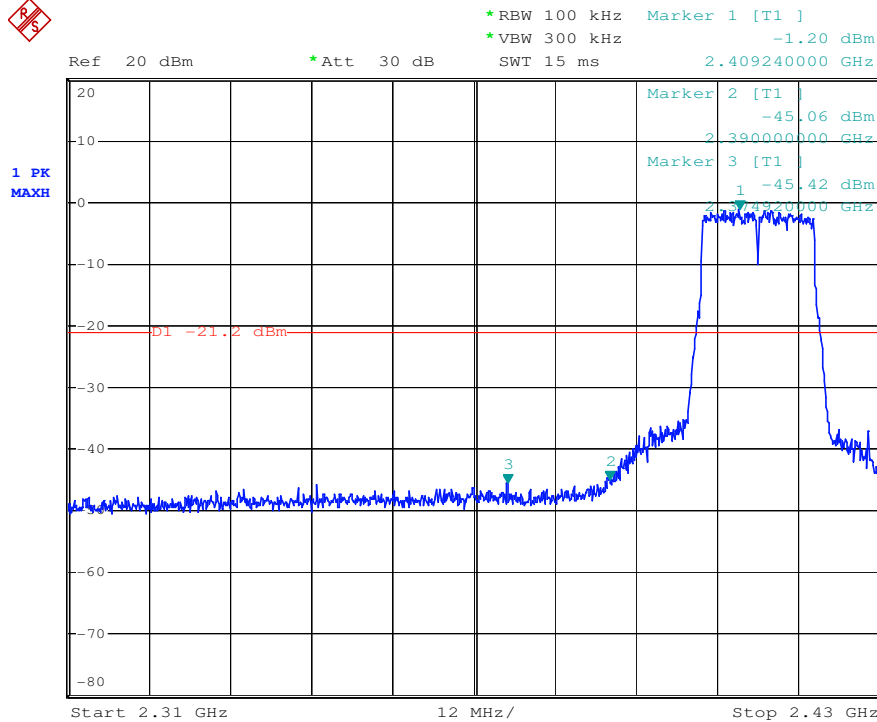
Test mode: 802.11g

Channel: Highest



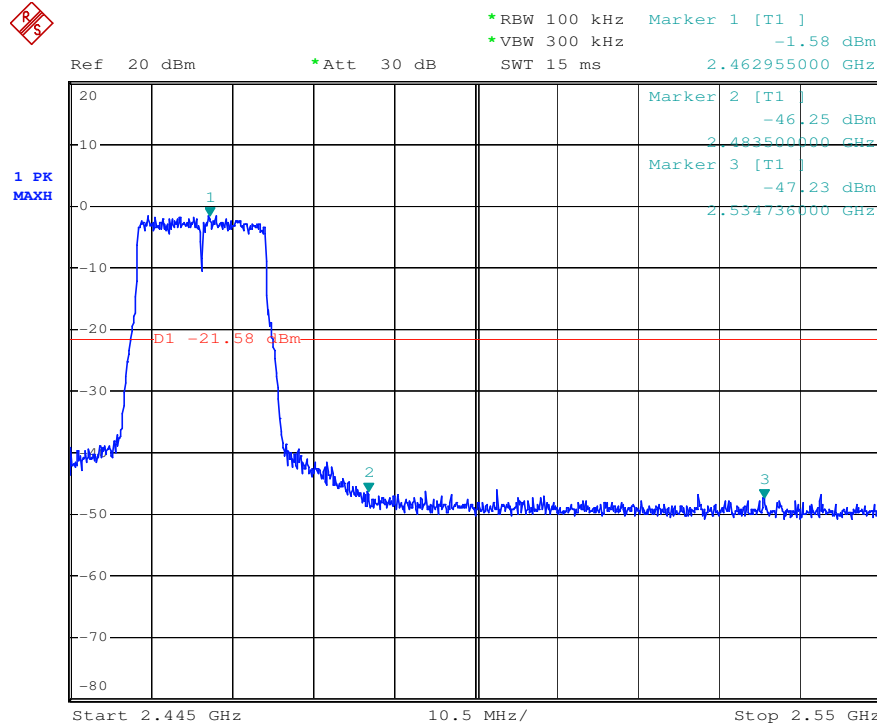
Test mode: 802.11n(HT20)

Channel: Lowest



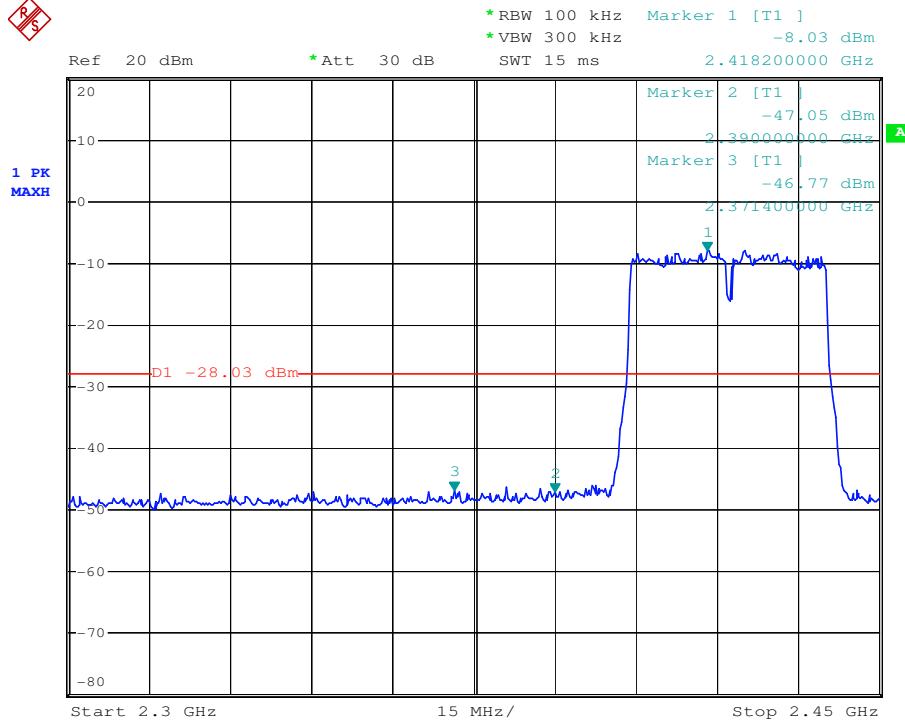
Test mode: 802.11n(HT20)

Channel: Highest



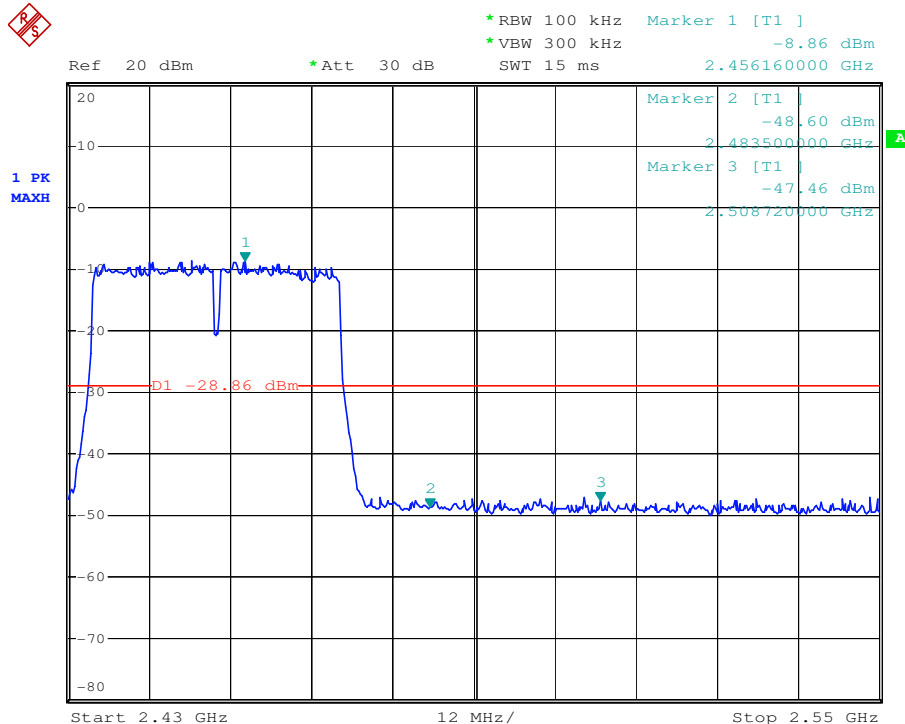
Test mode: 802.11n(HT40)

Channel: Lowest



Test mode: 802.11n(HT40)

Channel: Highest





## 7.8 Radiated Spurious Emissions and Band-edge

**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

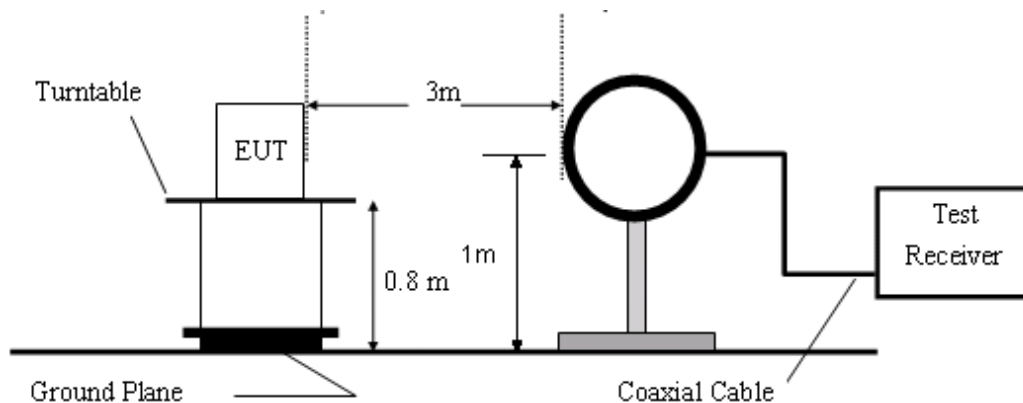
Sweep=Auto

**15.209 Limit:**

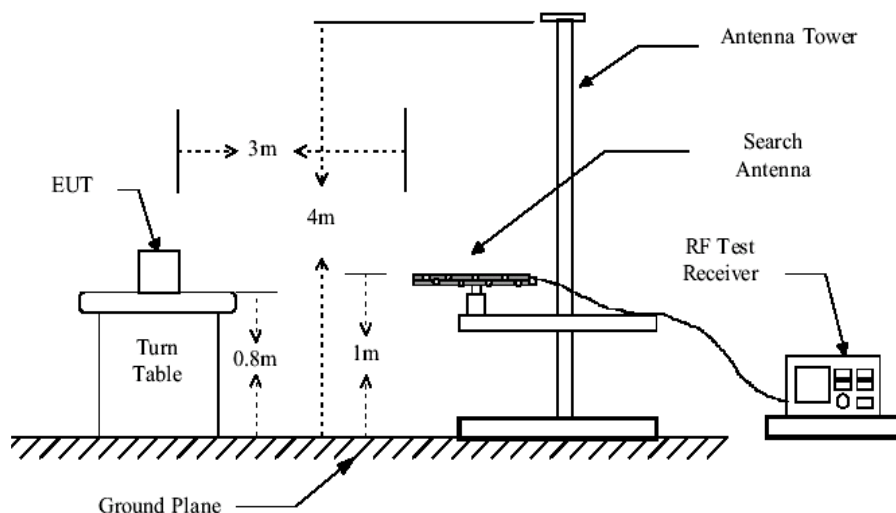
Frequency	Limit (dBuV/m)
0.009MHz-0.490MHz	128.5 ~ 93.8
0.490MHz-1.705MHz	73.8 ~63.0
1.705MHz-30MHz	69.5
30MHz-88MHz	40.0
88MHz-216MHz	43.5
216MHz-960MHz	46.0
960MHz-1GHz	54.0
Above 1GHz	54.0

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.

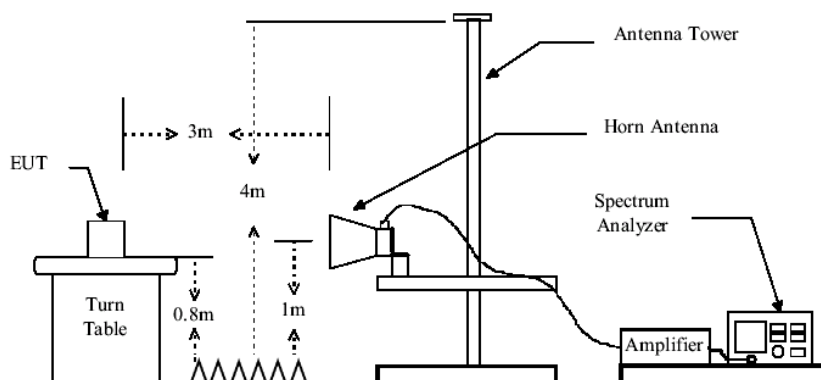
### Test Configuration:



**Figure1. Below 30MHz radiated emissions test configuration**



**Figure2. 30MHz to 1GHz radiated emissions test configuration**



**Figure3. Above 1GHz radiated emissions test configuration**

**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.

Pre-test was performed on Antenna A and Antenna B mode, Compliance test was performed on worse case (Antenna A mode).

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.

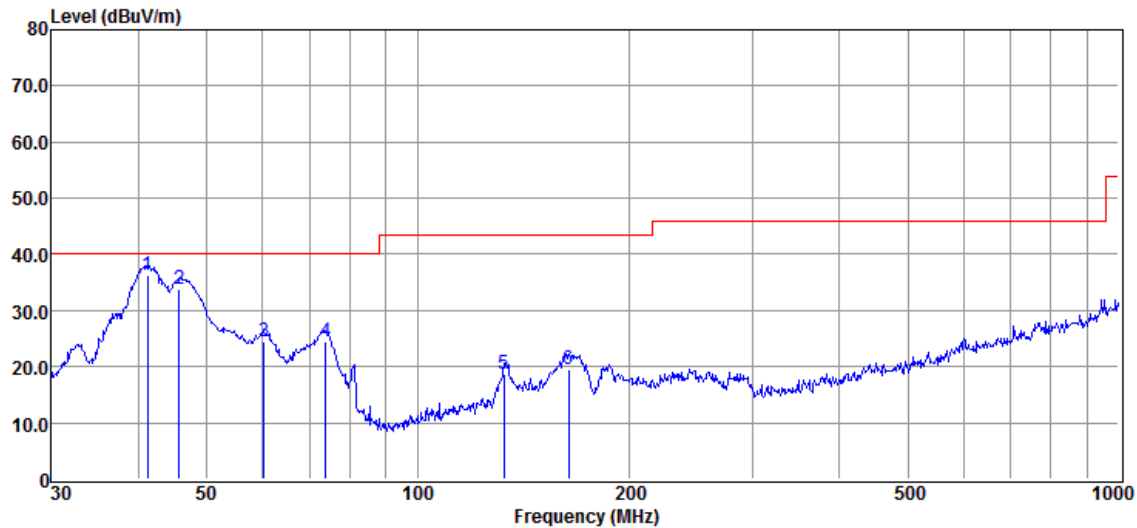
The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

**Test Result:** Pass

### 7.8.1 Radiated Spurious Emissions

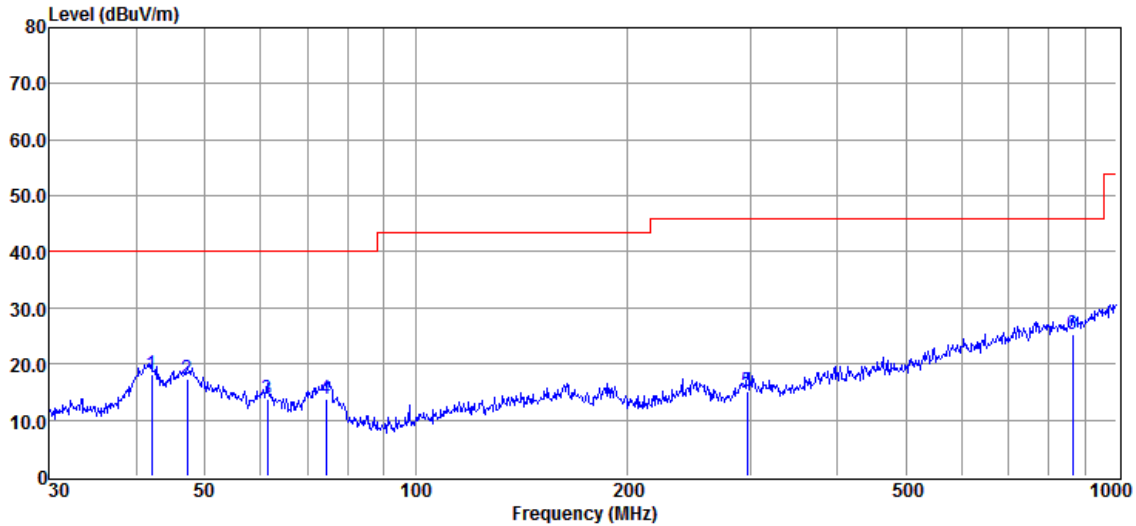
30MHz-1GHz:

Vertical:



Item	Freq.	Read Level	Antenna Factor	Preamplifier Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	41.132	45.38	13.10	23.70	0.29	36.30	40.00	-3.70	QP
2	45.695	42.95	13.05	23.70	0.34	33.75	40.00	-6.25	QP
3	60.280	34.49	12.07	23.68	0.53	24.47	40.00	-15.53	QP
4	73.876	36.70	9.71	23.67	0.63	24.46	40.00	-15.54	QP
5	132.685	29.03	11.27	23.64	1.10	18.70	43.50	-24.80	QP
6	164.330	28.60	12.26	23.63	1.25	19.39	43.50	-24.11	QP

Horizontal:



Item	Freq.	Read Level	Antenna Factor	Preamplifier Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	42.007	27.38	13.10	23.70	0.29	18.27	40.00	-21.73	QP
2	47.160	26.77	12.92	23.70	0.37	17.43	40.00	-22.57	QP
3	61.346	23.73	11.94	23.68	0.53	13.62	40.00	-26.38	QP
4	74.396	26.09	9.68	23.67	0.64	13.83	40.00	-26.17	QP
5	297.224	24.30	11.64	23.67	1.86	15.09	46.00	-30.91	QP
6	866.088	20.67	22.27	23.93	3.37	25.31	46.00	-20.69	QP

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	4795.25	42.34	8.31	50.65	54	-3.35	peak	Horizontal
2	7192.25	41.98	10.60	52.58	54	-1.42	peak	Horizontal
3	9612.75	41.13	14.24	52.37	54	-1.63	peak	Horizontal
4	4795.25	41.72	8.31	50.03	54	-3.97	peak	Vertical
5	7192.25	41.98	10.6	52.58	54	-1.42	peak	Vertical
6	9612.75	40.63	14.24	52.87	54	-1.13	peak	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	41.31	8.83	50.14	54	-3.86	peak	Horizontal
2	7309.75	41.10	10.88	51.98	54	-2.02	peak	Horizontal
3	9765.50	41.76	14.43	51.19	54	-2.81	peak	Horizontal
4	4877.50	42.12	8.83	50.95	54	-3.05	peak	Vertical
5	7309.75	41.11	10.88	51.99	54	-2.01	peak	Vertical
6	9765.50	42.31	14.43	51.74	54	-2.26	peak	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	4959.75	42.15	8.94	51.09	54	-2.91	peak	Horizontal
2	7427.25	43.49	11.14	53.63	54	-0.37	peak	Horizontal
3	9918.25	41.36	14.69	52.05	54	-1.95	peak	Horizontal
4	4959.75	42.79	8.94	51.73	54	-2.27	peak	Vertical
5	7427.25	42.58	11.14	53.72	54	-0.28	peak	Vertical
6	9918.25	41.45	14.69	52.14	54	-1.86	peak	Vertical

**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	4795.25	42.36	8.31	50.67	54	-3.33	peak	Horizontal
2	7227.5	42.75	10.69	53.44	54	-0.56	peak	Horizontal
3	9624.5	42.64	14.25	52.89	54	-1.11	peak	Horizontal
4	4795.25	42.81	8.31	51.12	54	-2.88	peak	Vertical
5	7227.5	41.93	10.69	52.62	54	-1.38	peak	Vertical
6	9624.5	42.73	14.25	52.98	54	-1.02	peak	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	42.17	8.9	51.07	54	-2.93	peak	Horizontal
2	7356.75	43.67	10.98	52.65	54	-1.35	peak	Horizontal
3	9753.75	42.74	14.41	53.15	54	-0.85	peak	Horizontal
4	4889.25	41.85	8.9	50.75	54	-3.25	peak	Vertical
5	7356.75	44.3	10.98	52.28	54	-1.72	peak	Vertical
6	9753.75	42.08	14.41	51.49	54	-2.51	peak	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	4983.25	43.16	8.94	52.1	54	-1.90	peak	Horizontal
2	7450.75	42.94	11.19	52.13	54	-1.87	peak	Horizontal
3	9906.5	42.4	14.67	53.07	54	-0.93	peak	Horizontal
4	4983.25	42.85	8.94	51.79	54	-2.21	peak	Vertical
5	7450.75	42.82	11.19	51.01	54	-2.99	peak	Vertical
6	9906.5	42.32	14.67	50.99	54	-3.01	peak	Vertical

**Test mode: 802.11n(HT20)**

**Channel: lowest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4818.75	38.79	8.46	47.25	54	-6.75	peak	Horizontal
2	7227.50	38.54	10.69	49.23	54	-4.77	peak	Horizontal
3	9659.75	38.02	14.28	52.30	54	-1.70	peak	Horizontal
4	4818.75	40.05	8.46	48.51	54	-5.49	peak	Vertical
5	7227.50	39.53	10.69	50.22	54	-3.78	peak	Vertical
6	9659.75	36.14	14.28	50.42	54	-3.58	peak	Vertical

**Test mode: 802.11n(HT20)**

**Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4877.50	37.75	8.83	46.58	54	-7.42	peak	Horizontal
2	7333.25	38.13	10.93	49.06	54	-4.94	peak	Horizontal
3	9765.50	37.20	14.43	51.63	54	-2.37	peak	Horizontal
4	4877.50	38.84	8.83	47.67	54	-6.33	peak	Vertical
5	7333.25	36.89	10.93	47.82	54	-6.18	peak	Vertical
6	9765.50	36.72	14.43	51.15	54	-2.85	peak	Vertical

**Test mode: 802.11n(HT20)**

**Channel: Highest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4842.25	37.99	8.60	46.59	54	-7.41	peak	Horizontal
2	7239.25	38.22	10.71	48.93	54	-5.07	peak	Horizontal
3	9636.25	37.10	14.26	51.36	54	-2.64	peak	Horizontal
4	4842.25	39.71	8.60	48.31	54	-5.69	peak	Vertical
5	7239.25	38.8	10.71	49.51	54	-4.49	peak	Vertical
6	9636.25	36.42	14.26	50.68	54	-3.32	peak	Vertical



**Test mode: 802.11n(HT40)**

**Channel: lowest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4830.50	39.76	8.53	48.29	54	-5.71	peak	Horizontal
2	7262.75	37.97	10.77	48.74	54	-5.26	peak	Horizontal
3	9624.50	37.28	14.25	51.53	54	-2.47	peak	Horizontal
4	4830.50	38.48	8.53	47.01	54	-6.99	peak	Vertical
5	7262.75	38.76	10.77	49.53	54	-4.47	peak	Vertical
6	9624.50	36.97	14.25	51.22	54	-2.78	peak	Vertical

**Test mode: 802.11n(HT40)**

**Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4865.75	36.94	8.76	45.7	54	-8.30	peak	Horizontal
2	7321.5	37.26	10.9	48.16	54	-5.84	peak	Horizontal
3	9730.25	35.76	14.38	50.14	54	-3.86	peak	Horizontal
4	4865.75	36.73	8.76	45.49	54	-8.51	peak	Vertical
5	7321.5	37.53	10.9	48.43	54	-5.57	peak	Vertical
6	9730.25	36.67	14.38	51.05	54	-2.95	peak	Vertical

**Test mode: 802.11n(HT40)**

**Channel: Highest**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4912.75	39.07	8.97	48.04	54	-5.96	peak	Horizontal
2	7403.75	38.72	11.08	49.80	54	-4.20	peak	Horizontal
3	9824.25	35.90	14.53	50.43	54	-3.57	peak	Horizontal
4	4912.75	40.18	8.97	49.15	54	-4.85	peak	Vertical
5	7403.75	38.11	11.08	49.19	54	-4.81	peak	Vertical
6	9824.25	36.48	14.53	51.01	54	-2.99	peak	Vertical

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

2. 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.

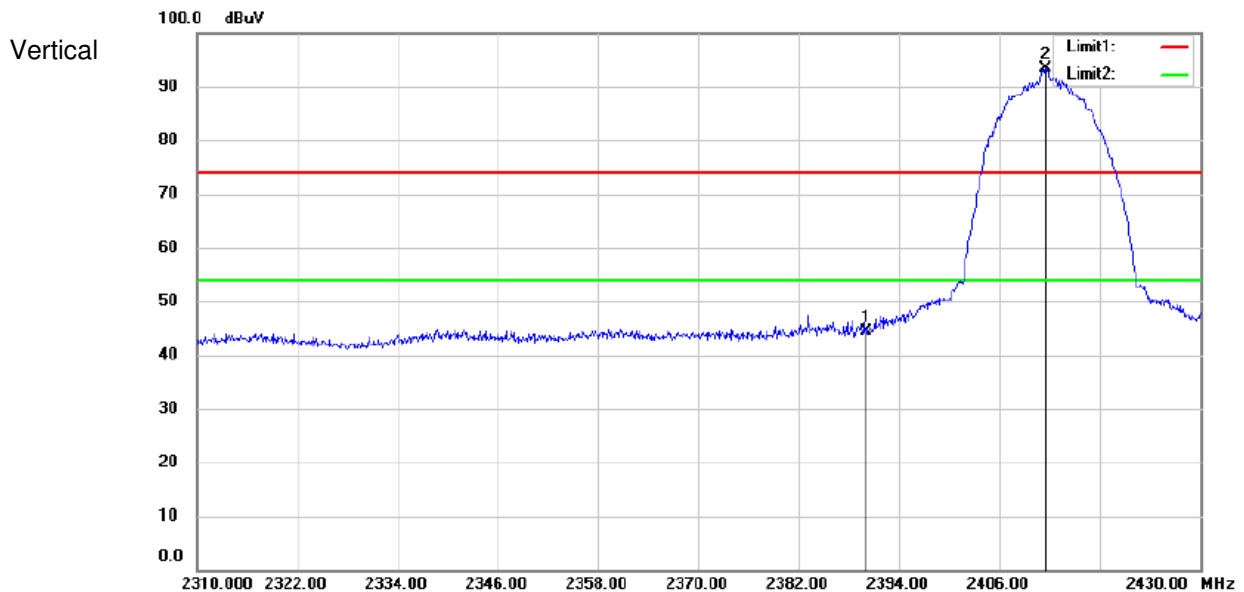
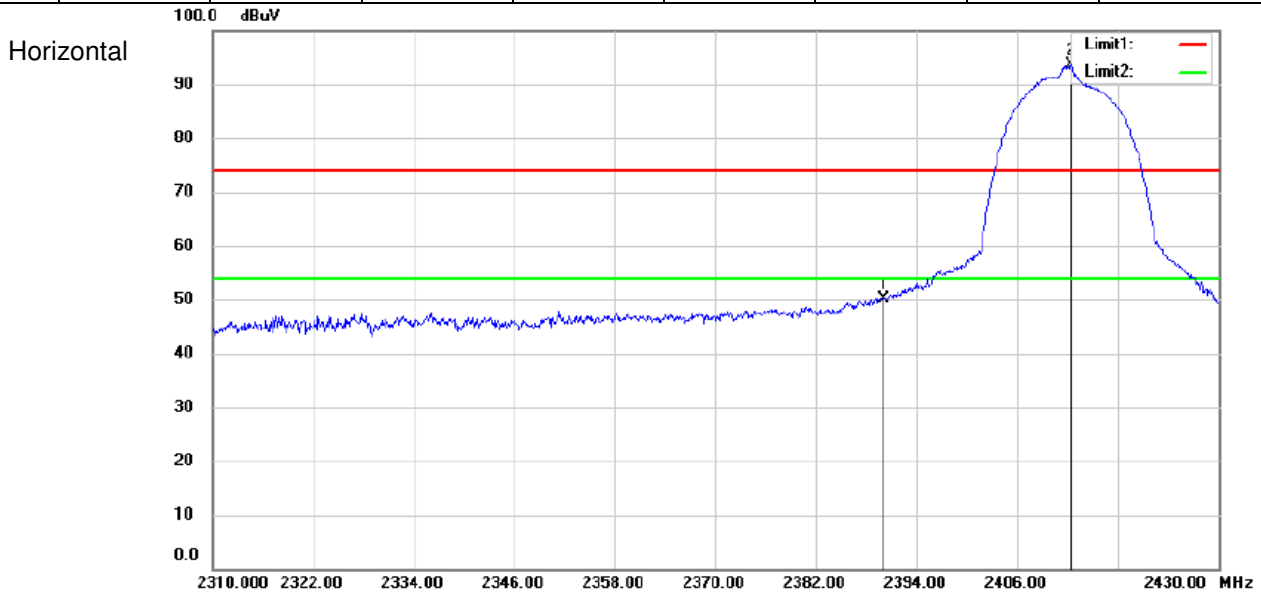
3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

## 7.8.2 Radiated Band edge

Test Mode: 802.11b

Channel: lowest

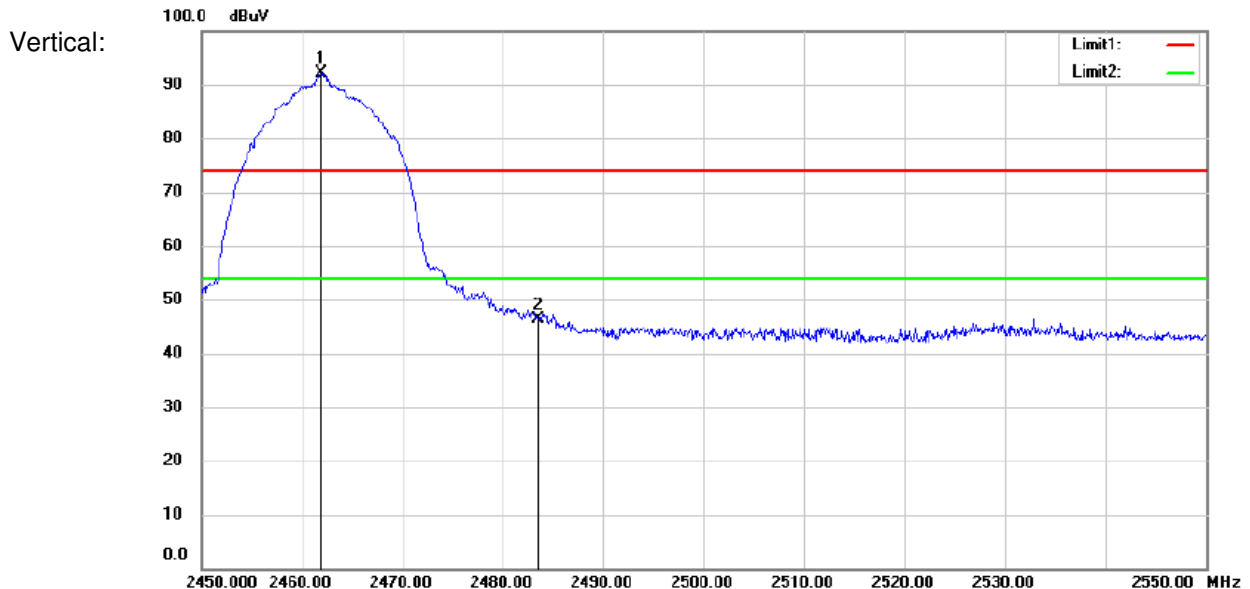
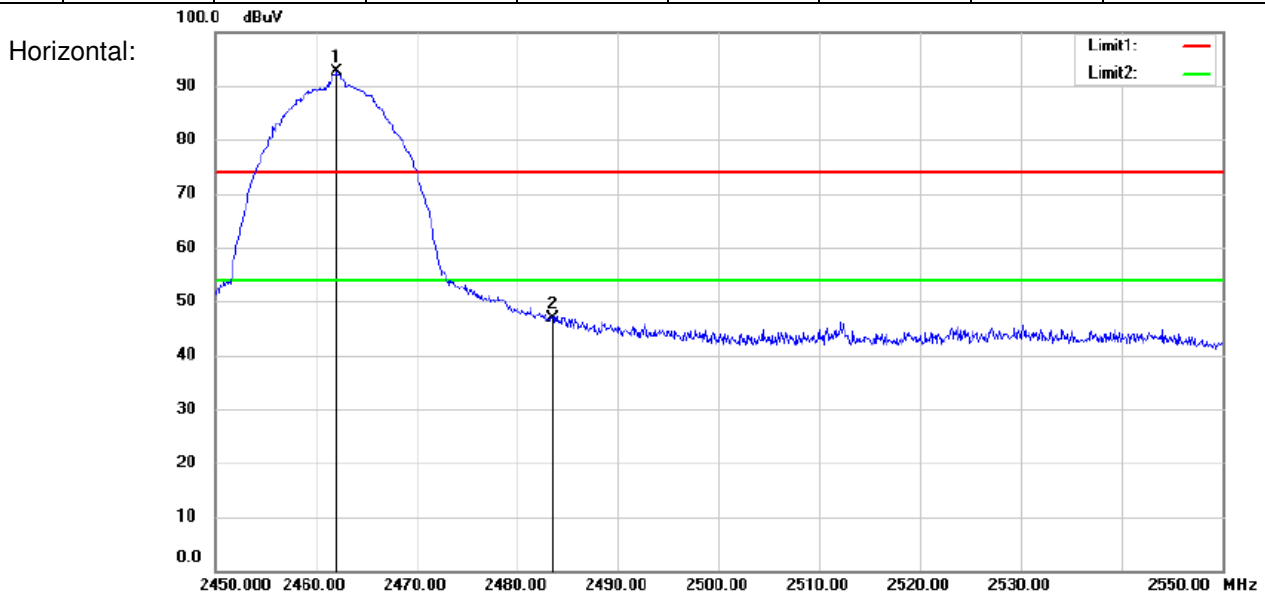
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2390.00	50.70	-0.56	50.14	74.00	-23.86	Peak	Horizontal
2	2412.48	94.20	-0.68	93.52	74.00	19.52	Peak	Horizontal
1	2390.00	44.89	-0.56	44.33	74.00	-29.67	Peak	Vertical
2	2411.52	94.15	-0.67	93.48	74.00	19.48	Peak	Vertical



Test Mode: 802.11b

Channel: Highest

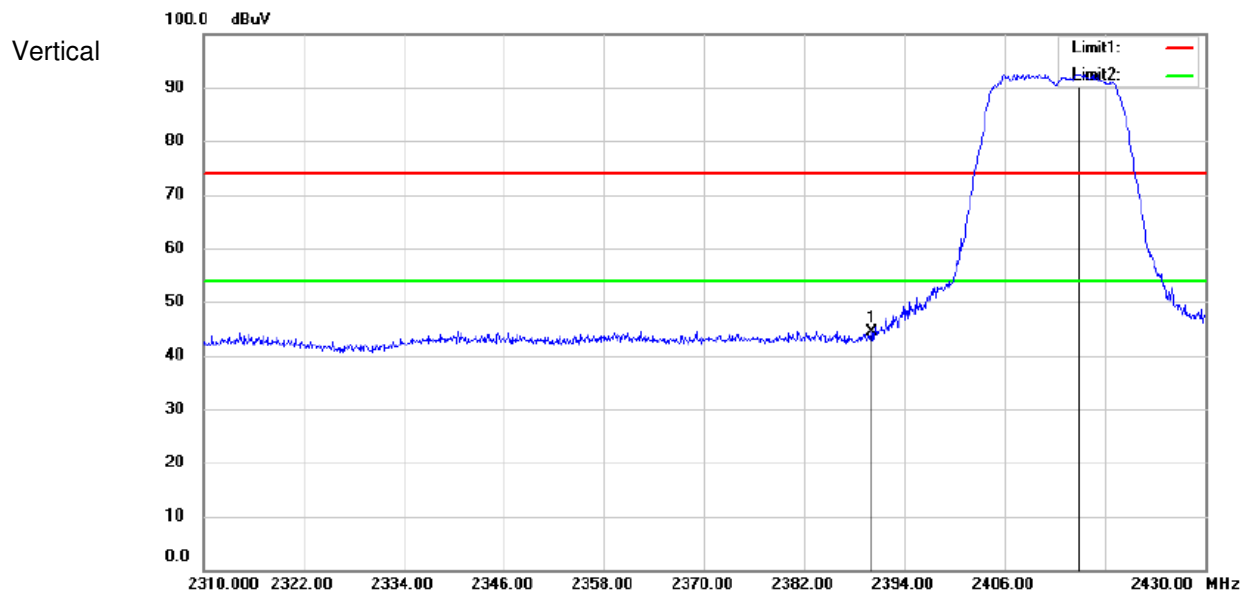
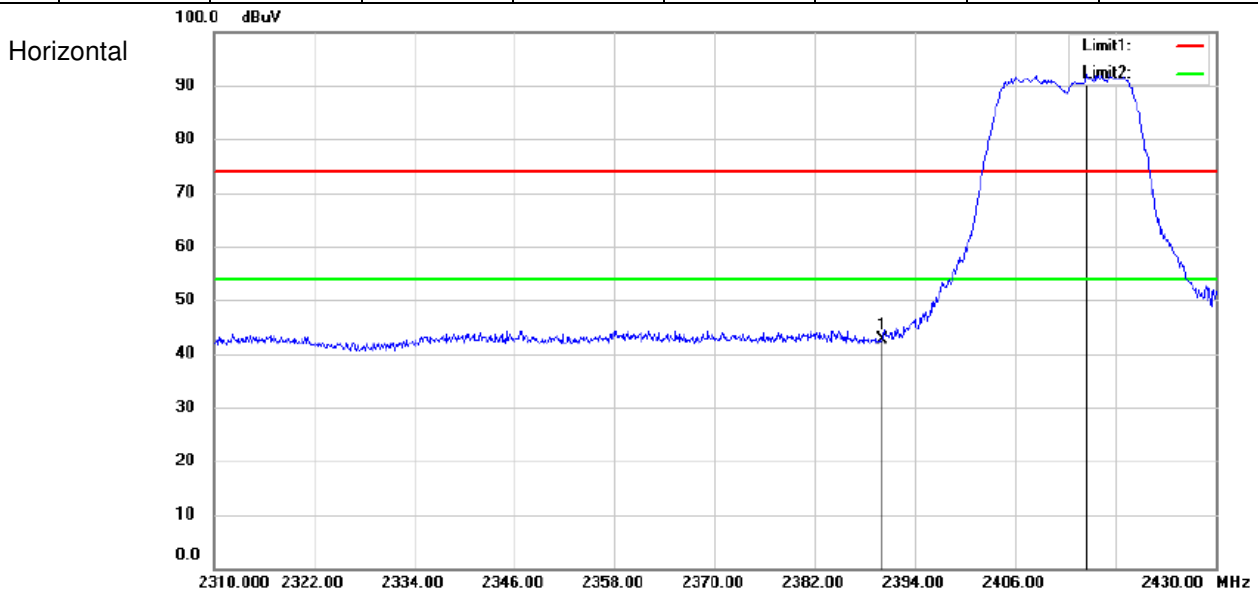
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2462.10	93.45	-0.91	92.54	74.00	148.54	Peak	Horizontal
2	2483.50	47.87	-1.01	46.86	74.00	-27.14	Peak	Horizontal
1	2461.90	92.98	-0.91	92.07	74.00	18.07	Peak	Vertical
2	2483.50	47.44	-1.01	46.43	74.00	-27.57	Peak	Vertical



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	43.14	-0.56	42.58	74.00	-31.42	Peak	Horizontal
2	2414.52	92.76	-0.68	92.08	74.00	18.08	Peak	Horizontal
1	2390.00	44.87	-0.56	44.31	74.00	-26.69	Peak	Vertical
2	2414.88	93.18	-0.68	92.50	74.00	18.50	Peak	Vertical

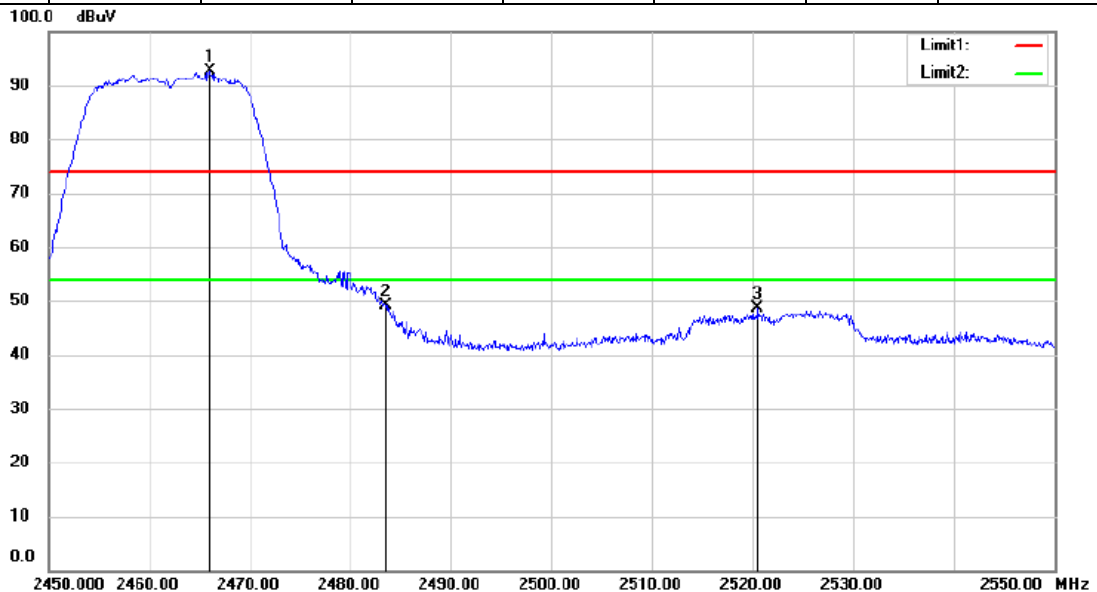


**Test Mode: 802.11g**

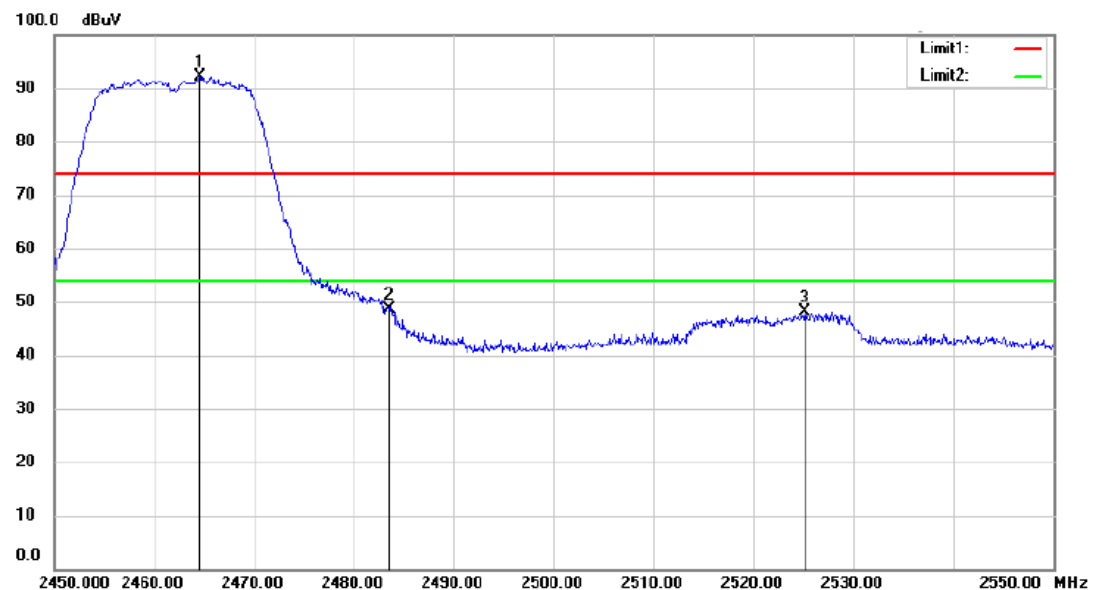
**Channel: Highest**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2466.00	93.62	-0.93	92.69	74.00	18.69	Peak	Horizontal
2	2483.50	50.21	-1.01	49.20	74.00	-24.80	Peak	Horizontal
3	2520.50	49.41	-0.87	48.54	74.00	-25.46	Peak	Horizontal
1	2464.60	93.16	-0.91	92.25	74.00	18.25	Peak	Vertical
2	2483.50	49.70	-1.01	48.69	74.00	-25.31	Peak	Vertical
3	2525.10	48.85	-0.82	48.03	74.00	-25.97	Peak	Vertical

Horizontal:



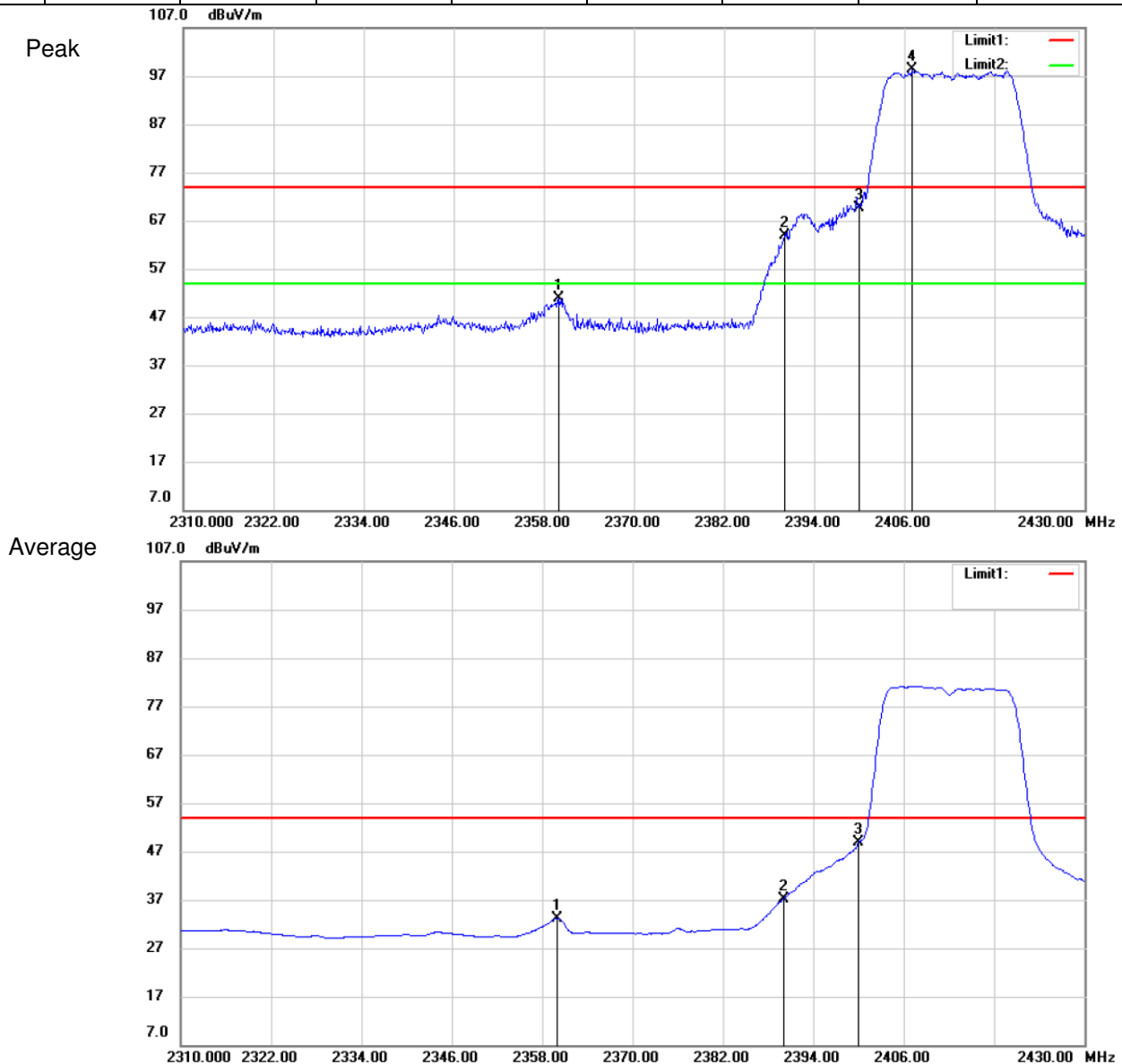
Vertical:



Test Mode: 802.11n(HT20)

Channel: lowest

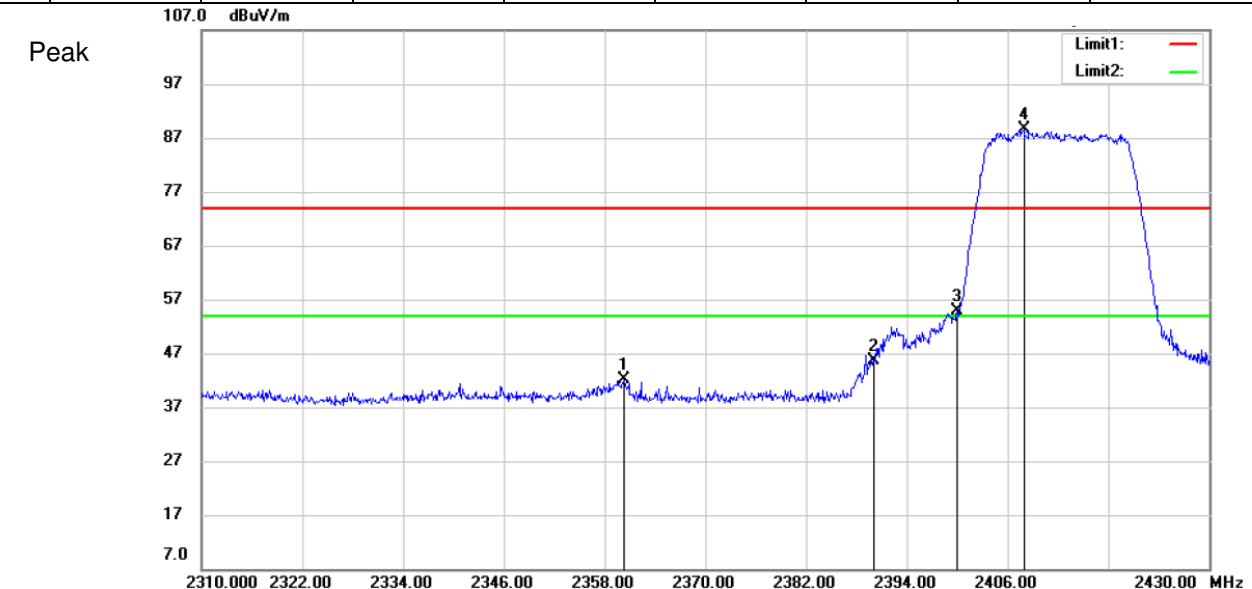
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2360.04	54.67	-3.8	50.87	74	-23.13	Peak	Horizontal
2	2390.00	67.77	-3.89	63.88	74	-10.12	Peak	Horizontal
3	2400.00	73.56	-3.92	69.64	74	-4.36	Peak	Horizontal
1	2360.04	36.92	-3.8	33.12	54	-20.88	AV	Horizontal
2	2390.00	41.11	-3.89	37.22	54	-16.78	AV	Horizontal
3	2400.00	52.73	-3.92	48.81	54	-5.19	AV	Horizontal



Test Mode: 802.11n(HT20)

Channel: lowest

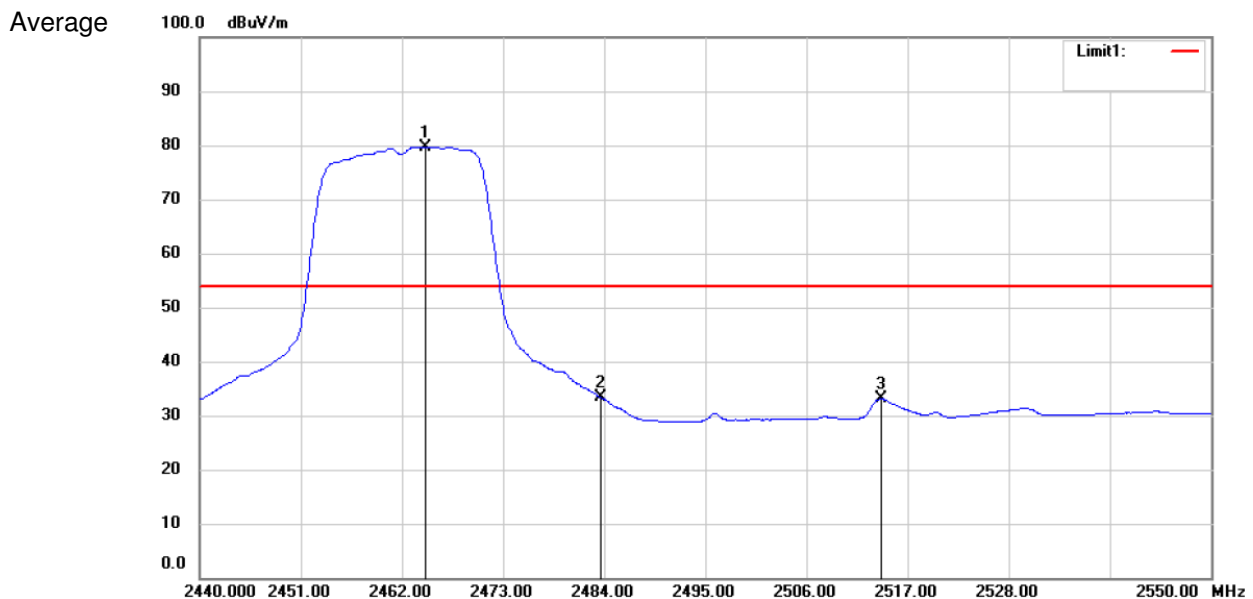
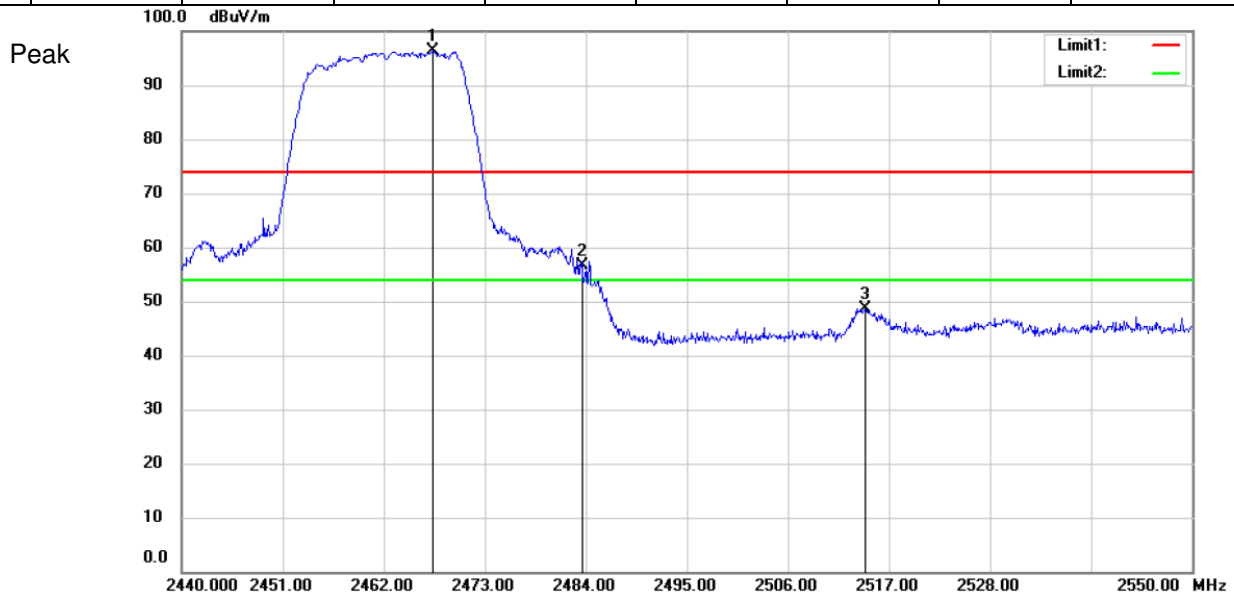
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2360.28	45.85	-3.80	42.05	74	-31.95	Peak	Vertical
2	2390.00	49.54	-3.89	45.65	74	-28.35	Peak	Vertical
3	2400.00	58.69	-3.92	54.77	74	-19.23	Peak	Vertical
4	2407.92	92.53	-3.93	88.6	74	14.6	Peak	Vertical
1	2360.16	31.13	-3.80	27.33	54	-26.67	AV	Vertical
2	2390.00	31.09	-3.89	27.2	54	-26.8	AV	Vertical
3	2400.00	40.54	-3.92	36.62	54	-17.38	AV	Vertical
4	2413.56	75.13	-3.93	71.2	54	17.2	AV	Vertical



Test Mode: 802.11n(HT20)

Channel: Highest

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2467.28	100.31	-4.00	96.31	74	22.31	Peak	Horizontal
2	2483.50	60.71	-4.01	56.7	74	-17.3	Peak	Horizontal
3	2514.36	52.61	-3.87	48.74	74	-25.26	Peak	Horizontal
1	2464.53	83.73	-3.99	79.74	54	25.74	Average	Horizontal
2	2483.5	37.38	-4.01	33.37	54	-20.63	Average	Horizontal
3	2514.14	36.96	-3.87	33.09	54	-20.91	Average	Horizontal

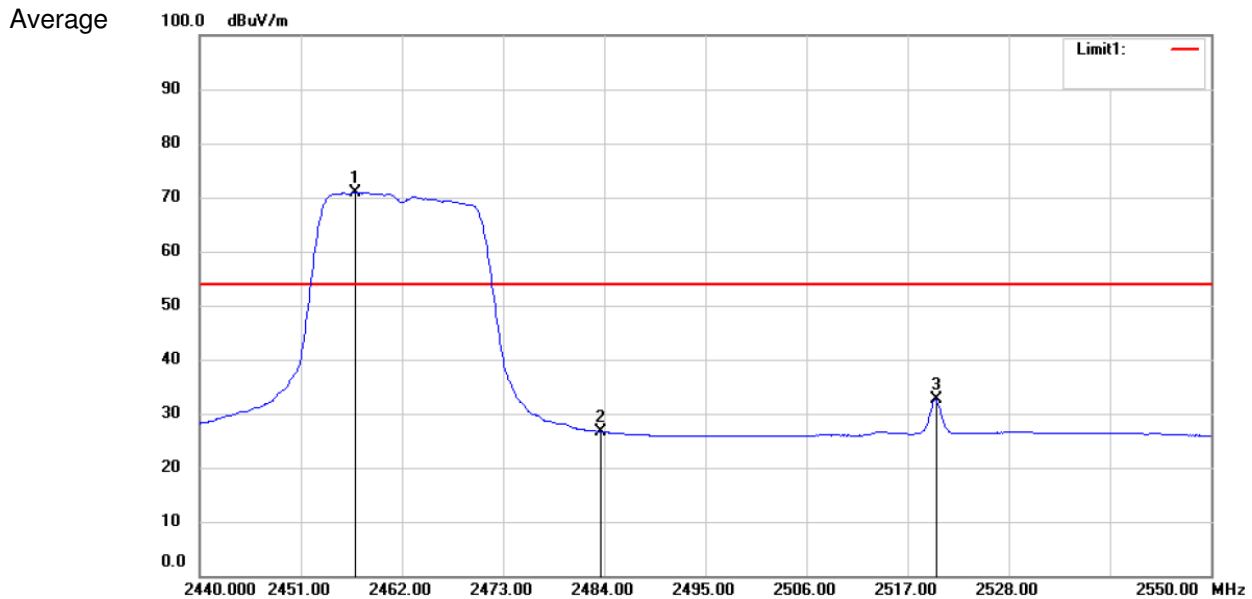
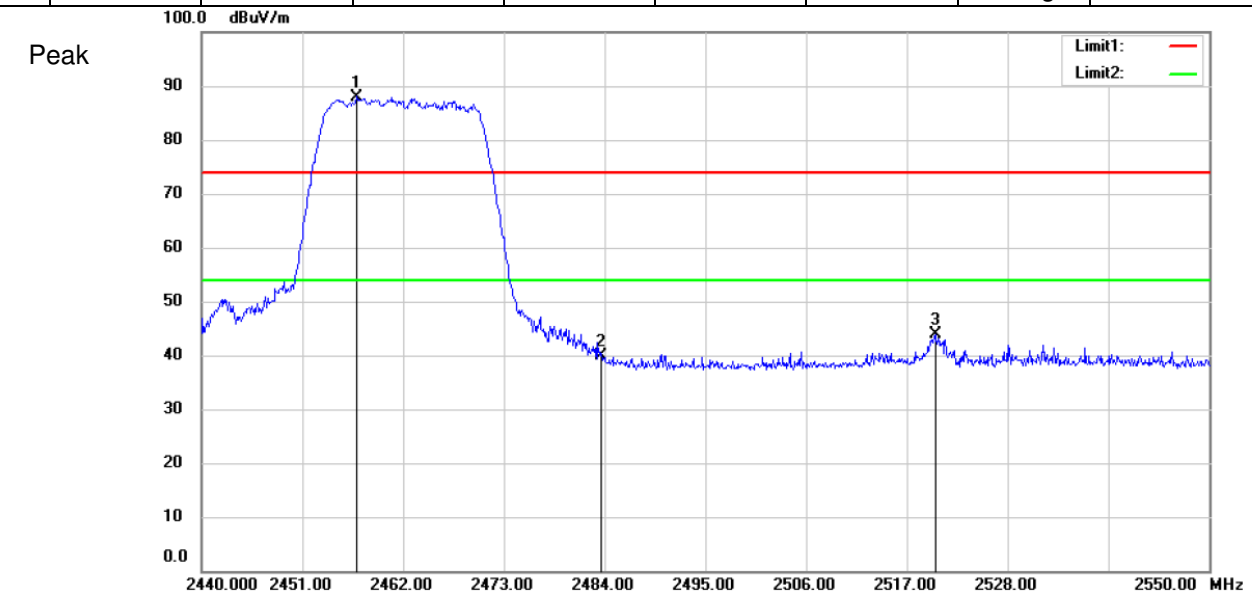




Test Mode: 802.11n(HT20)

Channel: Highest

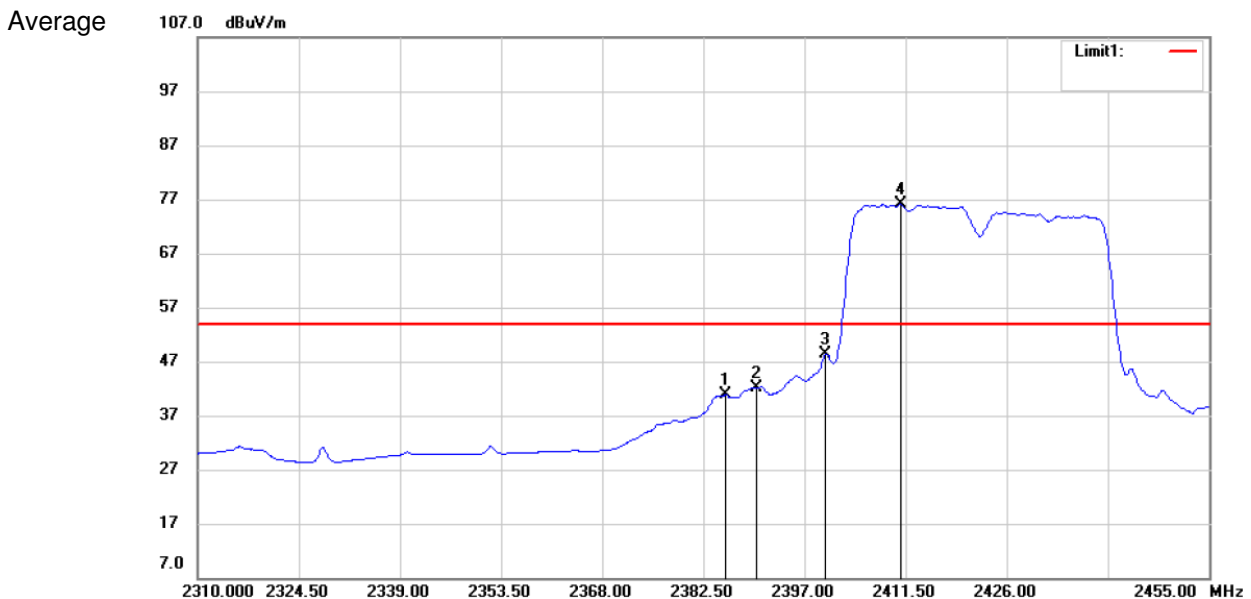
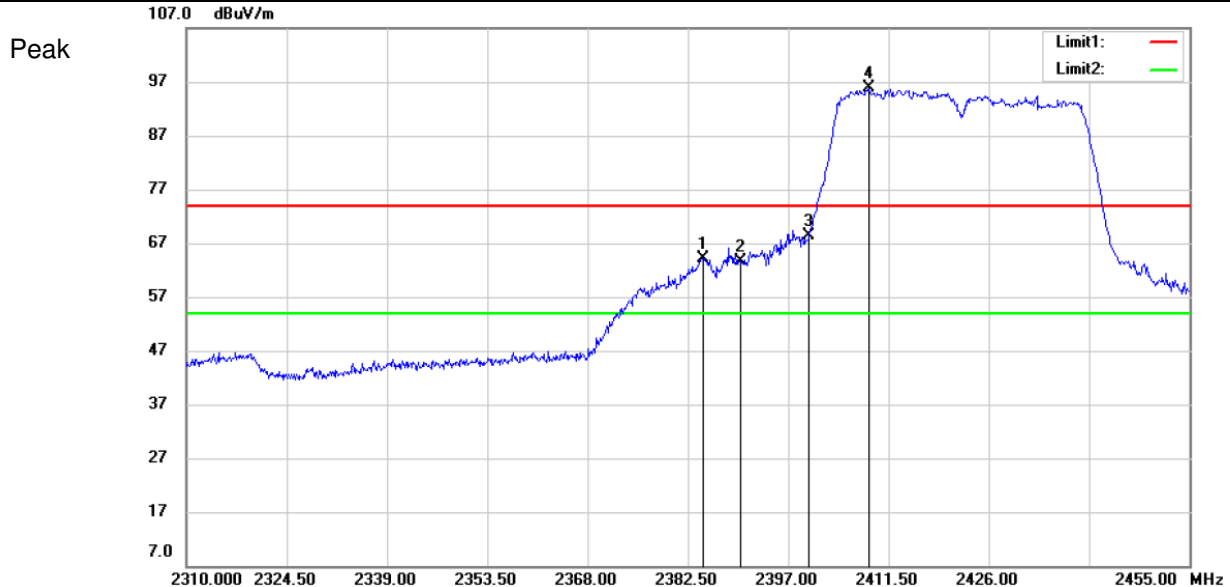
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2456.94	91.99	-3.99	88.00	74	14.00	Peak	Vertical
2	2483.50	43.81	-4.01	39.8	74	-34.20	Peak	Vertical
3	2520.08	47.61	-3.79	43.82	74	-30.18	Peak	Vertical
1	2456.94	74.96	-3.99	70.97	54	16.97	Average	Vertical
2	2483.50	30.65	-4.01	26.64	54	-27.36	Average	Vertical
3	2520.08	36.38	-3.79	32.59	54	-21.41	Average	Vertical



Test Mode: 802.11n(HT40)

Channel: lowest

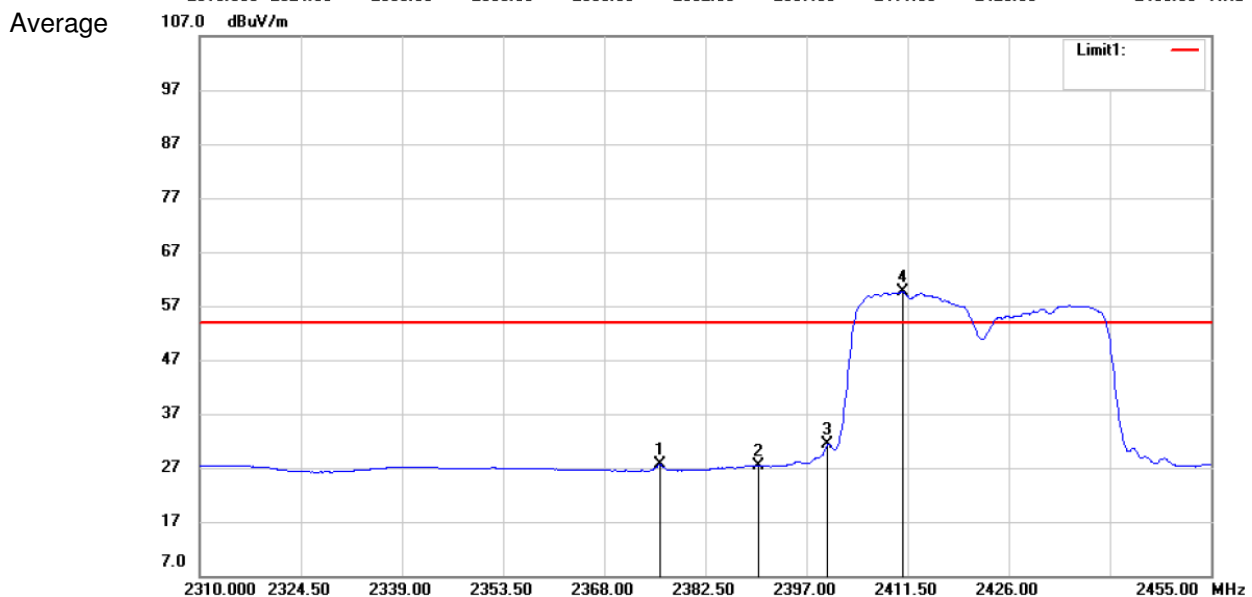
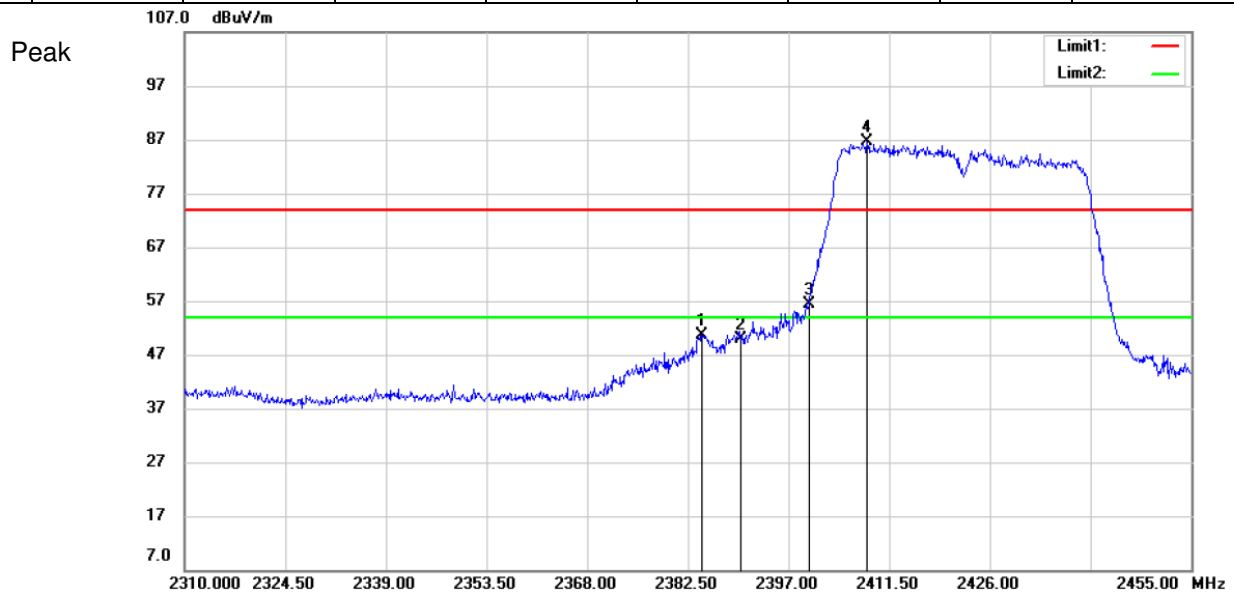
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2384.675	67.97	-3.87	64.1	74	-9.9	Peak	Horizontal
2	2390.00	67.52	-3.89	63.63	74	-10.37	Peak	Horizontal
3	2400.00	72.32	-3.92	68.4	74	-5.6	Peak	Horizontal
4	2408.745	99.86	-3.92	95.94	74	21.94	Peak	Horizontal
1	2385.69	44.74	-3.88	40.86	54	-13.14	AV	Horizontal
2	2390.00	45.98	-3.89	42.09	54	-11.91	AV	Horizontal
3	2400.00	52.37	-3.92	48.45	54	-5.55	AV	Horizontal
4	2410.775	79.99	-3.92	76.07	54	22.07	AV	Horizontal



Test Mode: 802.11n(HT40)

Channel: lowest

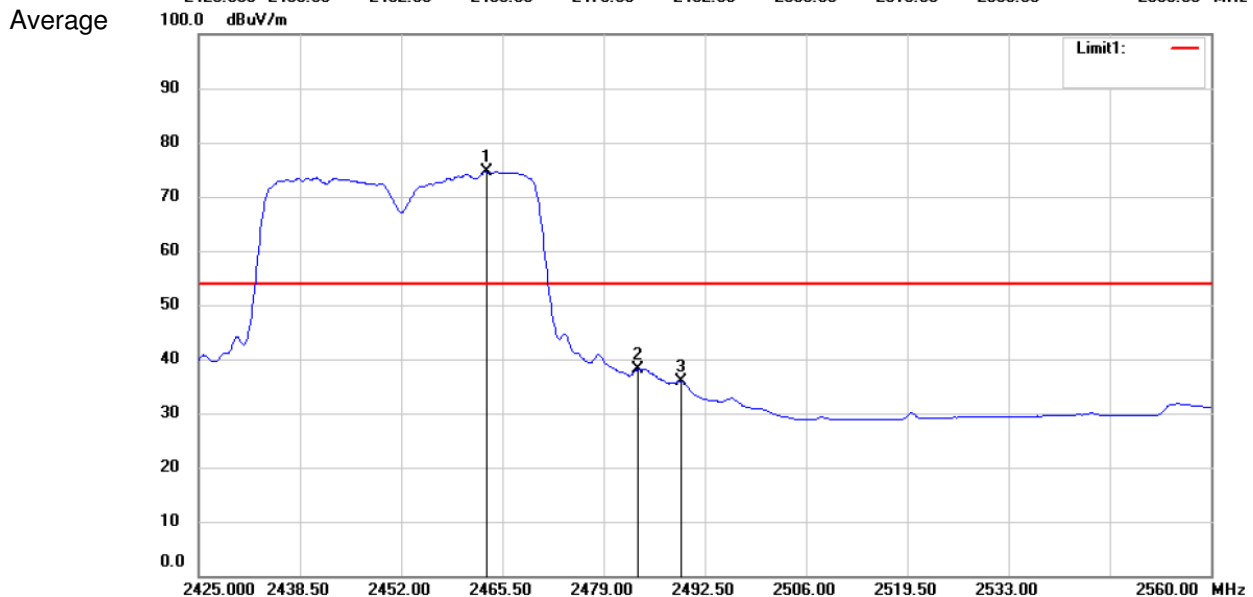
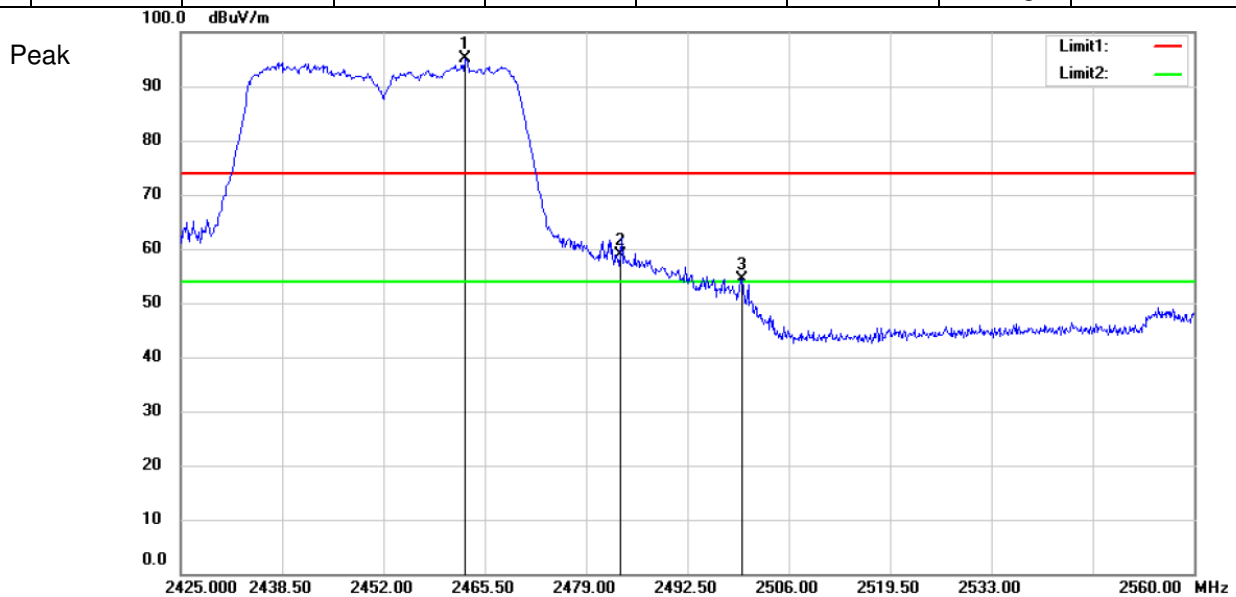
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2384.53	54.6	-3.87	50.73	74	-23.27	Peak	Vertical
2	2390.00	53.87	-3.89	49.98	74	-24.02	Peak	Vertical
3	2400.00	60.22	-3.92	56.3	74	-17.7	Peak	Vertical
4	2408.31	90.45	-3.93	86.52	74	12.52	Peak	Vertical
1	2375.975	31.5	-3.84	27.66	54	-26.34	AV	Vertical
2	2390.00	31.34	-3.89	27.45	54	-26.55	AV	Vertical
3	2400.00	35.33	-3.92	31.41	54	-22.59	AV	Vertical
4	2410.775	63.65	-3.92	59.73	54	5.73	AV	Vertical



Test Mode: 802.11n(HT40)

Channel: Highest

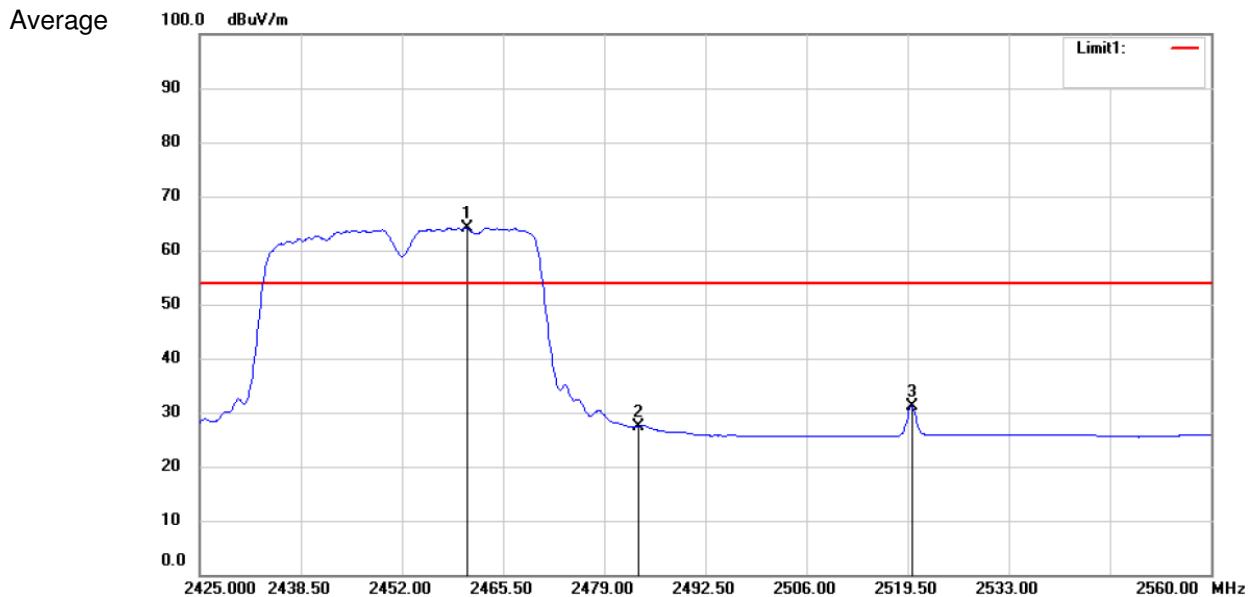
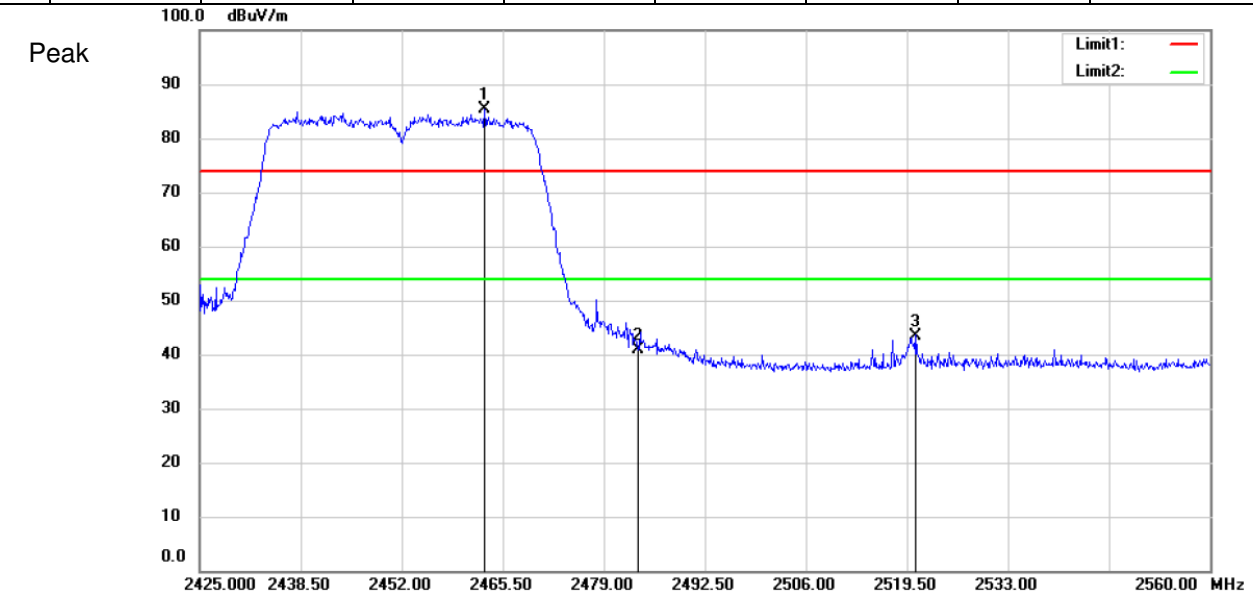
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2462.935	99.14	-3.99	95.15	74	21.15	Peak	Horizontal
2	2483.50	62.95	-4.01	58.94	74	-15.06	Peak	Horizontal
3	2499.79	58.36	-4.03	54.33	74	-19.67	Peak	Horizontal
1	2463.34	78.64	-3.98	74.66	54	20.66	Average	Horizontal
2	2483.50	42.09	-4.01	38.08	54	-15.92	Average	Horizontal
3	2489.395	39.86	-4.02	35.84	54	-18.16	Average	Horizontal



Test Mode: 802.11n(HT40)

Channel: Highest

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2463.07	89.29	-3.99	85.30	74	11.3	Peak	Vertical
2	2483.5	44.9	-4.01	40.89	74	-33.11	Peak	Vertical
3	2520.715	47.29	-3.79	43.50	74	-30.5	Peak	Vertical
1	2460.64	68.17	-3.99	64.18	54	10.18	Average	Vertical
2	2483.5	31.5	-4.01	27.49	54	-26.51	Average	Vertical
3	2520.04	35.02	-3.8	31.22	54	-22.78	Average	Vertical



- 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:  
FCC Part 15, Subpart C Section 15.205 Restricted bands of operation.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
1.495 - 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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

## **8 Test Setup Photographs**

Refer to the < Smartlamp Control \_Test Setup photos-FCC>.

## **9 EUT Constructional Details**

Refer to the < Smartlamp Control \_External Photos-FCC > & < Smartlamp Control \_Internal Photos-FCC>.

**--End of the Report--**