Shenzhen Huaxia Testing Technology Co., Ltd

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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

FCC Test Report

Applicant:	SHENZHEN HYM ORIGINALS LIMITED
Address of Applicant:	No.1 Former Bay, No A Building, Room 201,Former Bay Port Zone, Shenzhen, China
Manufacturer:	Shenzhen Jasmine audio co., Ltd.
Address of Manufacturer:	3th Floor, No.122 Building, Ditang Rd., Baoan District, Shenzhen China.
Factory:	Shenzhen Jasmine audio co., Ltd.
Address of Factory:	3th Floor, No.122 Building, Ditang Rd., Baoan District, Shenzhen China.
Equipment Under Test (EUT):	
Product:	Seed Turntable-Speaker
Model No.:	H1-SEC01 (other models please see page 6)
Brand Name:	HYM
FCC ID:	2AM3IH1-SEC01
Standards:	47 CFR Part 15, Subpart C
Date of Test:	2017-06-10 to 2017-06-25
Date of Issue:	2017-06-25
Report No. :	CQASZ170601302E-02
Test Result :	**PASS***

Tested By: Aaron Ma

(Aaron Ma)

Reviewed By: Owen Zhou

(Owen Zhou)

Approved By: Jack Ai

(Jack Ai)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO.,LTD 华夏准测 APPROVED

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* In the configuration tested, the EUT complied with the standards specified above.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ170601302E-02	Rev.01	Initial report	2017-06-25

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	KDB558074 D01 v04	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	KDB558074 D01 v04	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	KDB558074 D01 v04	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	KDB558074 D01 v04	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	KDB558074 D01 v04	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS

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5 General Information

5.1 Client Information

Applicant:	SHENZHEN HYM ORIGINALS LIMITED
Address of Applicant:	No.1 Former Bay, No A Building, Room 201,Former Bay Port Zone, Shenzhen, China
Manufacturer:	Shenzhen Jasmine audio co., Ltd.
Address of Manufacturer:	3th Floor, No.122 Building, Ditang Rd., Baoan District, Shenzhen China.
Factory:	Shenzhen Jasmine audio co., Ltd.
Address of Factory:	3th Floor, No.122 Building, Ditang Rd., Baoan District, Shenzhen China.

5.2 General Description of EUT

Product Name:	Seed Turntable-Speaker
Model No.:	H1-SEC01 (other models please see page 6)
Trade Mark:	HYM
Hardware version：	V1.0
Software version：	V1.0
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK,BPSK)
Sample Type:	portable production
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	internal antenna with ipex connector
Antenna Gain:	3.23dBi
Power Supply:	Adapter: Model: WT120-2004500-T Input: 100-240Vac 2.0A 50-60Hz Output:DC20V 4.5A

Note:

1. All model: H1-SEC01,H1-SEC02,H1-SEC03,H1-SEC04,H1-SEC05,H1-SEC06,H1-SEC07,H1-SEC08, H1-SEC09,H1-SEC10,H1-SEC12,H1-SEC13,H1-SEC14,H1-SEC015,H1-SEC16,H1-SEC17,H1-SEC18, H1-SEC19,H1-SEC20,H1-SEC21,H1-SEC22,H1-SEC23,H1-SEC24,H1-SEC25,H1-SEC26,H1-SEC27, H1-SEC28,H1-SEC29,H1-SEC30,H1-ONC01,H1-ONC02,H1-ONC03,H1-ONC04,H1-ONC05, H1-ONC06,H1-ONC07,H1-ONC08,H1-ONC09,H1-ONC10,H1-ONC11,H1-ONC12,H1-ONC13, H1-ONC14,H1-ONC15,H1-ONC16,H1-ONC17,H1-ONC18,H1-ONC19,H1-ONC20,H1-ONC21, H1-ONC22,H1-ONC23,H1-ONC24,H1-ONC25,H1-ONC26,H1-ONC27,H1-ONC28,H1-ONC29, H1-ONC30,H1-TWC01,H1-TWC02,H1-TWC03,H1-TWC04,H1-TWC05,H1-TWC06,H1-TWC07, H1-TWC08,H1-TWC09,H1-TWC10,H1-TWC11,H1-TWC12,H1-TWC13,H1-TWC14,H1-TWC15, H1-TWC16,H1-TWC17,H1-TWC18,H1-TWC19,H1-TWC20,H1-TWC21,H1-TWC22, H1-TWC23,H1-TWC24,H1-TWC25,H1-TWC26,H1-TWC27,H1-TWC28,H1-TWC29,H1-TWC30,H1-TRC01, H1-TRC02,H1-TRC03,H1-TRC04,H1-TRC05,H1-TRC06,H1-TRC07,H1-TRC08,H1-TRC09,H1-TRC10, H1-TRC11,H1-TRC12,H1-TRC13,H1-TRC14,H1-TRC15,H1-TRC16,H1-TRC17,H1-TRC18,H1-TRC19, H1-TRC20,H1-TRC21,H1-TRC22,H1-TRC23,H1-TRC24,H1-TRC25,H1-TRC26,H1-TRC27,H1-TRC28, H1-TRC29,H1-TRC30,H1-FOC01,H1-FOC02,H1-FOC03,H1-FOC04,H1-FOC05,H1-FOC06,H1-FOC07, H1-FOC08,H1-FOC09,H1-FOC10,H1-FOC11,H1-FOC12,H1-FOC13,H1-FOC14,H1-FOC15,H1-FOC16, H1-FOC17,H1-FOC18,H1-FOC19,H1-FOC20,H1-FOC21,H1-FOC22,H1-FOC23,H1-FOC24,H1-FOC25, H1-FOC26,H1-FOC27,H1-FOC28,H1-FOC29,H1-FOC30,H1-FIC01,H1-FIC02,H1-FIC03,H1-FIC04, H1-FIC05,H1-FIC06,H1-FIC07,H1-FIC08,H1-FIC09,H1-FIC10,H1-FIC11,H1-FIC12,H1-FIC13,H1-FIC14, H1-FIC15,H1-FIC16,H1-FIC17,H1-FIC18,H1-FIC19,H1-FIC20,H1-FIC21,H1-FIC22,H1-FIC23,H1-FIC24, H1-FIC25,H1-FIC26,H1-FIC27,H1-FIC28,H1-FIC29,H1-FIC30,H1-SEE01,H1-SEE02,H1-SEE03, H1-SEE04,H1-SEE05,H1-SEE06,H1-SEE07,H1-SEE08,H1-SEE09,H1-SEE10,H1-SEE11,H1-SEE12, H1-SEE13,H1-SEE14,H1-SEE15,H1-SEE16,H1-SEE17,H1-SEE18,H1-SEE19,H1-SEE20,H1-SEE21, H1-SEE22,H1-SEE23,H1-SEE24,H1-SEE25,H1-SEE26,H1-SEE27,H1-SEE28,H1-SEE29,H1-SEE30

2. Only the model H1-SEC01, was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Operation Frequency each of channel(802.11n HT40)					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2422MHz	4	2437MHz	7	2452MHz
2	2427MHz	5	2442MHz		
3	2432MHz	6	2447MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11b/g/n (HT20):

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

For 802.11n (HT40):

Channel	Frequency
The Lowest channel	2422MHz
The Middle channel	2437MHz
The Highest channel	2452MHz

Note:

Software (RF test) provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.
Operated Mode for Worst Duty Cycle:	
Note: Continuous transmission (or at least 98% duty cycle) cannot be achieved because of hardware limitations, the EUT was operated at its maximum power control level	
The output power setting of EUT is set in the factory and followed the maximum power control level in below. (average conduct power range)	
802.11b	11dBm±1.0dB
802.11g	8.0dBm±1.0dB
802.11n(HT20)	7.0dBm±1.0dB
802.11n(HT40)	7.0dBm±1.0dB

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
/	/	/	/	/

5.5 Test Location

All tests were performed at:

Shenzhen Tongce Testing Lab,

1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

5.6 Test Facility

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

FCC – Registration No.: 572331

Shenzhen Tongce Testing Lab has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 572331

5.7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Tongce Testing Lab** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for **TCT** laboratory is reported:

Test	Range	Uncertainty	Notes
Radiated Emission	Below 1GHz	±3.92dB	(1)
Radiated Emission	Above 1GHz	±4.28dB	(1)
Conducted Disturbance	0.15~30MHz	±2.56dB	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5.8 Deviation from Standards

None.

5.9 Abnormalities from Standard Conditions

None.

5.10 Other Information Requested by the Customer

None.

5.11 Equipment List

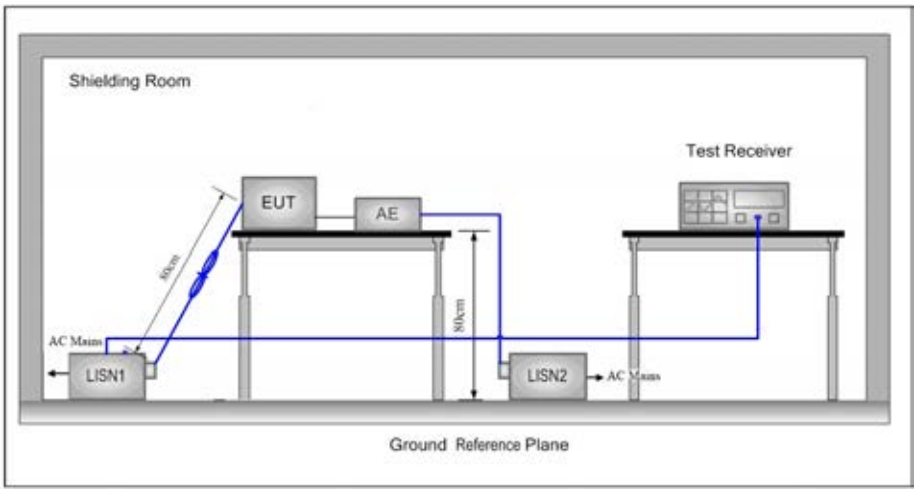
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date
1	ESPI Test Receiver	R&S	ESVD	100008	2017/08/11
2	Spectrum Analyzer	R&S	FSEM	848597/001	2017/08/11
3	Spectrum Analyzer	Agilent	N9020A	MY49100060	2017/08/12
4	Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	2017/08/11
5	Pre-amplifier	HP	8447D	2727A05017	2017/08/11
6	Loop antenna	ZHINAN	ZN30900A	12024	2017/08/13
7	Broadband Antenna	R&S	VULB9163	340	2017/08/13
8	Horn Antenna	R&S	BBHA 9120D	631	2017/08/13
9	Horn Antenna	R&S	BBHA 9170	373	2017/08/13
10	Antenna Mast	CCS	CC-A-4M	N/A	N/A
11	Coax cable (9KHz~40GHz)	TCT	RE-low-01	N/A	2017/08/11
12	Coax cable (9KHz~40GHz)	TCT	RE-high-02	N/A	2017/08/11
13	Spectrum Analyzer	R&S	FSU	200054	2017/08/11
14	Power Sensor	Anritsu	MA2411B	100379	2017/08/16
15	RF cable(9KHz~40GHz)	TCT	RE-06	N/A	2017/08/12
16	Wideband Peak Power Meter	Anritsu	ML2495A	220.23.78	2017/08/12
17	LISN	R&S	NSLK 8126	8126453	2017/08/16

6 Test results and Measurement Data

6.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
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 internal antenna with ipex connector. The best case gain of the antenna is 3.23dBi.	

6.2 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150kHz to 30MHz</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test Procedure:</td><td>1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 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,
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 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</td></tr>
<tr><td>Test Setup:</td><td> 
</td></tr>
<tr><td>Exploratory Test Mode:</td><td>Transmitting with all kind of modulations, data rates at lowest, middle and</td></tr>
</table>

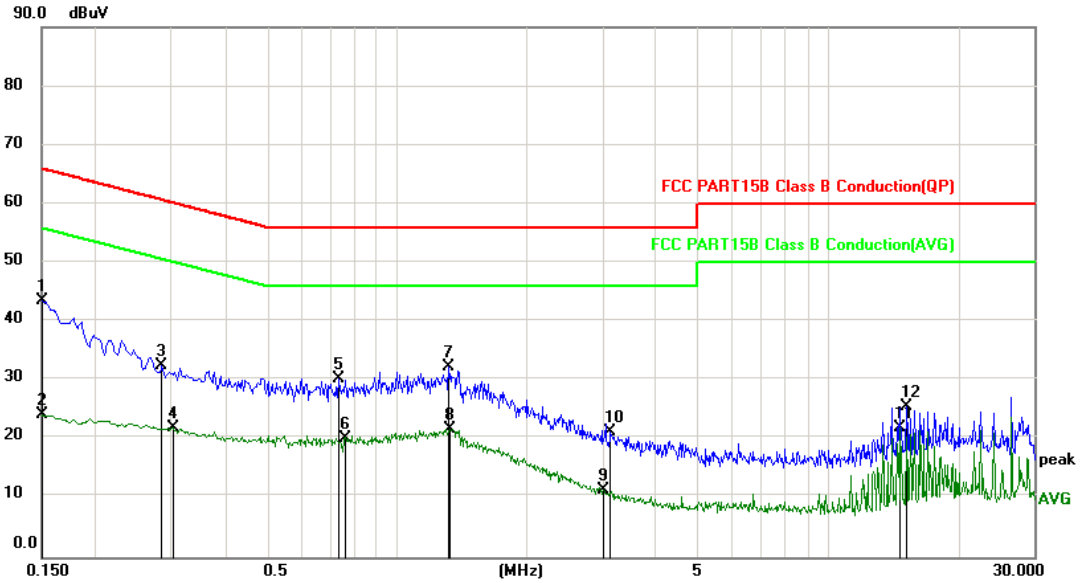
	highest channel. Transmitting mode.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11b at lowest channel is the worst case. Transmitting mode. Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

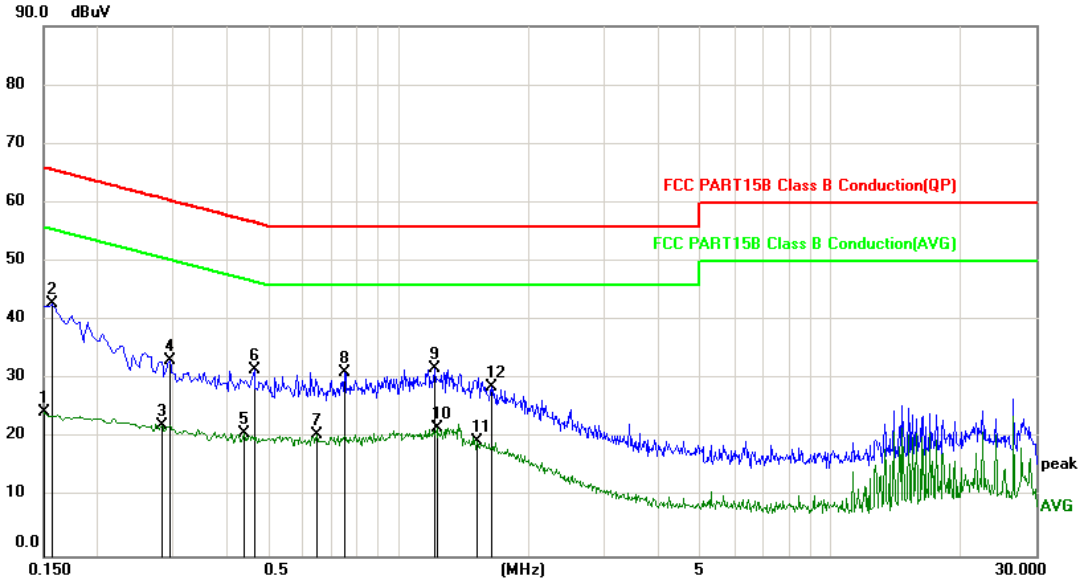
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1500	33.80	9.73	43.53	66.00	-22.47	peak
2		0.1500	14.39	9.73	24.12	56.00	-31.88	AVG
3		0.2860	22.70	9.74	32.44	60.64	-28.20	peak
4		0.3020	12.29	9.74	22.03	50.19	-28.16	AVG
5		0.7340	20.60	9.74	30.34	56.00	-25.66	peak
6		0.7620	10.51	9.74	20.25	46.00	-25.75	AVG
7		1.3180	22.60	9.75	32.35	56.00	-23.65	peak
8		1.3260	11.89	9.75	21.64	46.00	-24.36	AVG
9		3.0180	1.49	9.77	11.26	46.00	-34.74	AVG
10		3.1300	11.39	9.77	21.16	56.00	-34.84	peak
11		14.6100	12.13	9.83	21.96	50.00	-28.04	AVG
12		15.2180	15.82	9.83	25.65	60.00	-34.35	peak

Neutral Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	14.62	9.79	24.41	56.00	-31.59	AVG
2	*	0.1580	33.05	9.79	42.84	65.57	-22.73	peak
3		0.2819	12.46	9.80	22.26	50.76	-28.50	AVG
4		0.2940	23.43	9.80	33.23	60.41	-27.18	peak
5		0.4380	11.01	9.80	20.81	47.10	-26.29	AVG
6		0.4620	21.72	9.80	31.52	56.66	-25.14	peak
7		0.6460	10.80	9.80	20.60	46.00	-25.40	AVG
8		0.7500	21.27	9.80	31.07	56.00	-24.93	peak
9		1.2100	22.02	9.82	31.84	56.00	-24.16	peak
10		1.2260	11.88	9.83	21.71	46.00	-24.29	AVG
11		1.5220	9.69	9.85	19.54	46.00	-26.46	AVG
12		1.6420	18.80	9.85	28.65	56.00	-27.35	peak

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

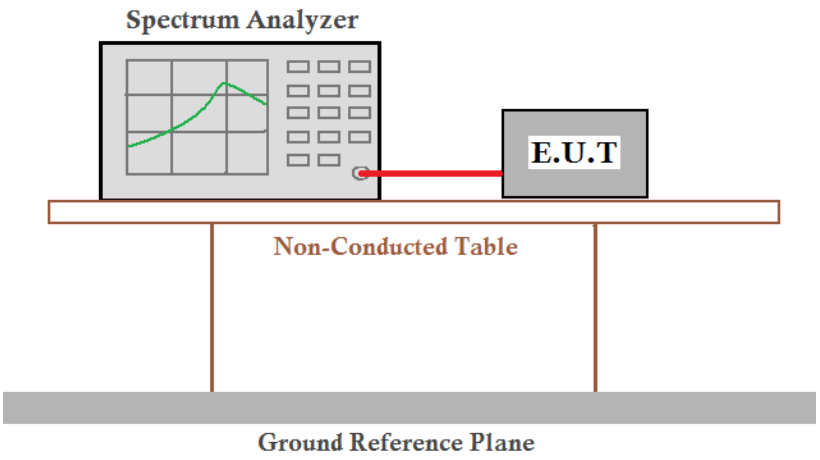
6.3 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	KDB558074 D01 v04
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40) Only the worst case is recorded in the report.
Limit:	30dBm
Test Results:	Pass

Measurement Data

802.11b mode				
Test channel	Peak Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	13.54	11.32	30.00	Pass
Middle	13.67	11.43	30.00	Pass
Highest	13.73	11.51	30.00	Pass
802.11g mode				
Test channel	Peak Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	10.03	7.76	30.00	Pass
Middle	10.07	7.81	30.00	Pass
Highest	10.12	7.86	30.00	Pass
802.11n(HT20)mode				
Test channel	Peak Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	9.86	7.43	30.00	Pass
Middle	9.94	7.49	30.00	Pass
Highest	9.97	7.53	30.00	Pass
802.11n(HT40)mode				
Test channel	Peak Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	9.35	6.76	30.00	Pass
Middle	9.63	6.83	30.00	Pass
Highest	9.76	6.88	30.00	Pass

6.4 6dB Occupy Bandwidth

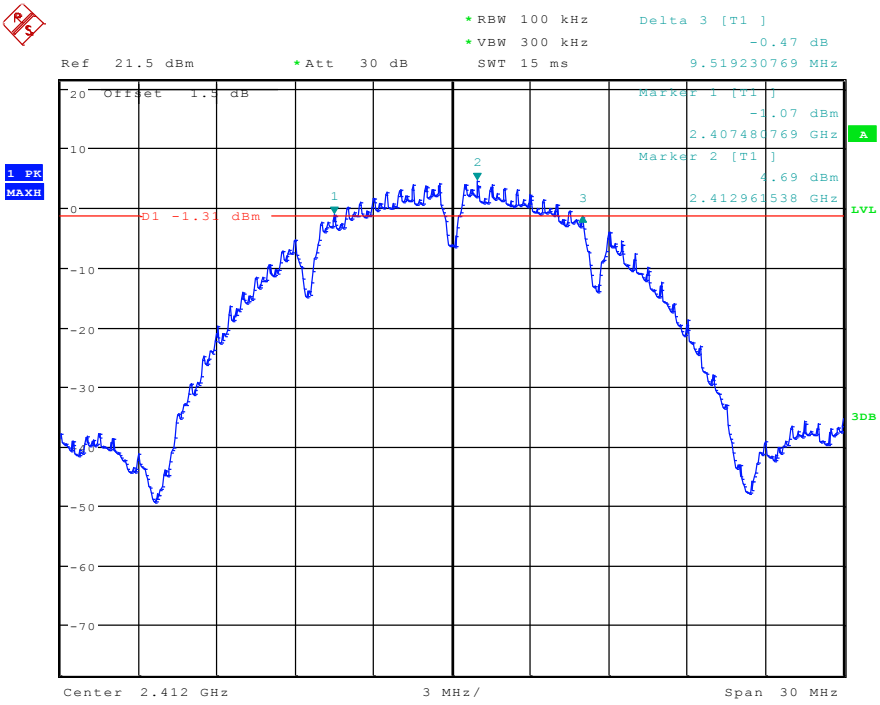
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	KDB558074 D01 v04
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40)
Limit:	≥ 500 kHz
Test Results:	Pass

Measurement Data

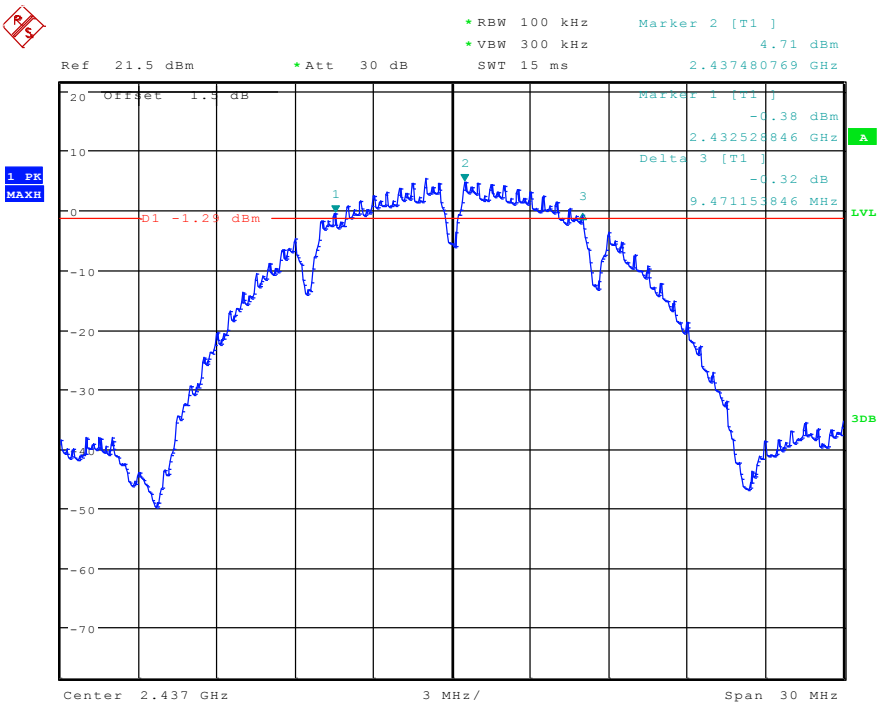
802.11b mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	9.5192	≥500	Pass
Middle	9.4712	≥500	Pass
Highest	10.0481	≥500	Pass
802.11g mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	15.6731	≥500	Pass
Middle	15.5288	≥500	Pass
Highest	15.5288	≥500	Pass
802.11n(HT20) mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	15.1923	≥500	Pass
Middle	15.0000	≥500	Pass
Highest	15.0000	≥500	Pass
802.11n(HT40)mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	35.4167	≥500	Pass
Middle	33.3365	≥500	Pass
Highest	33.9744	≥500	Pass

Test plot as follows:

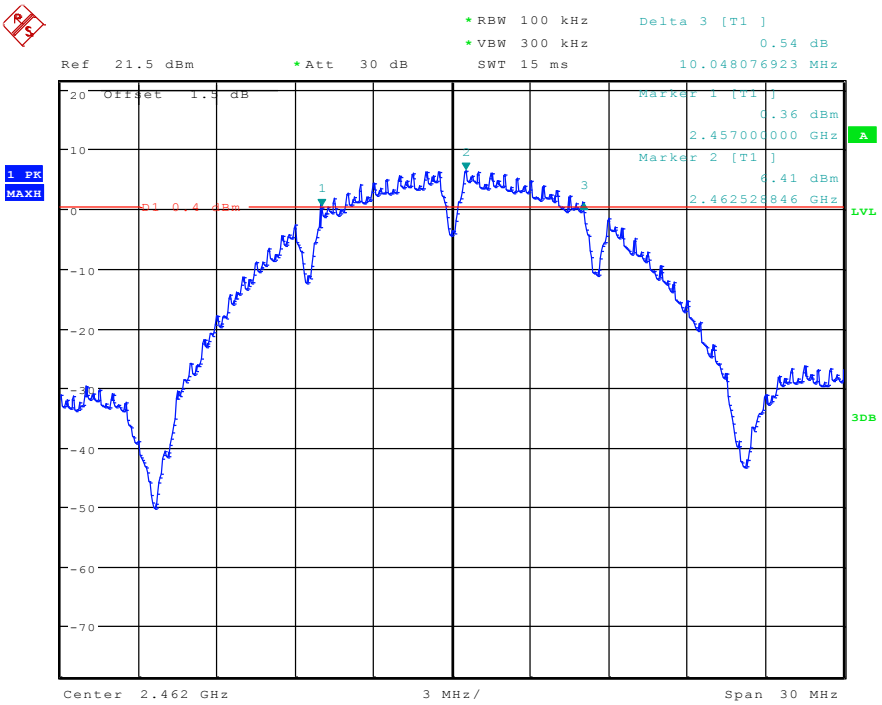
Test mode:	802.11b	Test channel:	Lowest



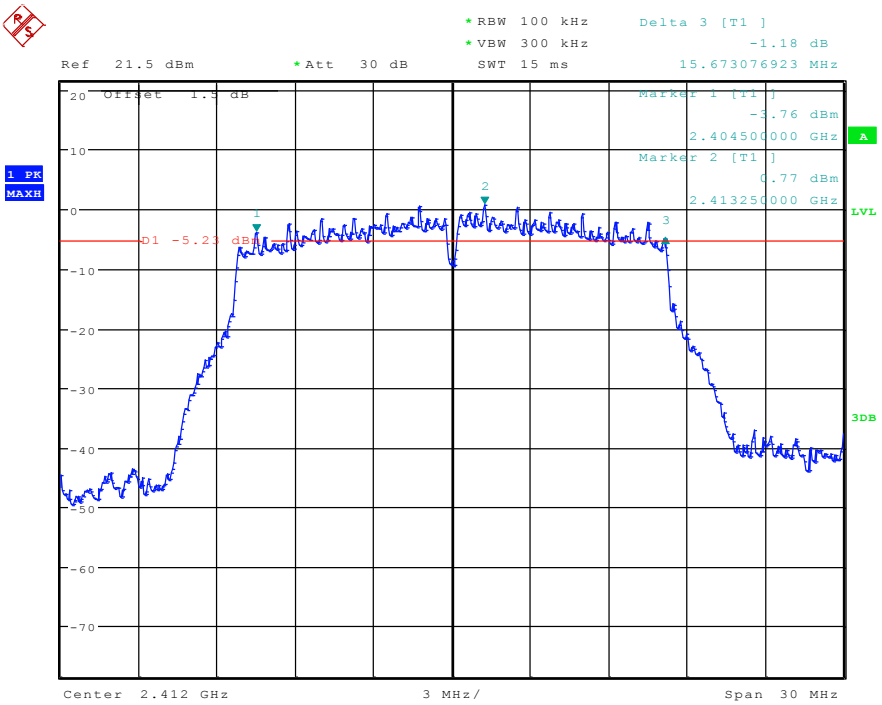
Test mode:	802.11b	Test channel:	Middle



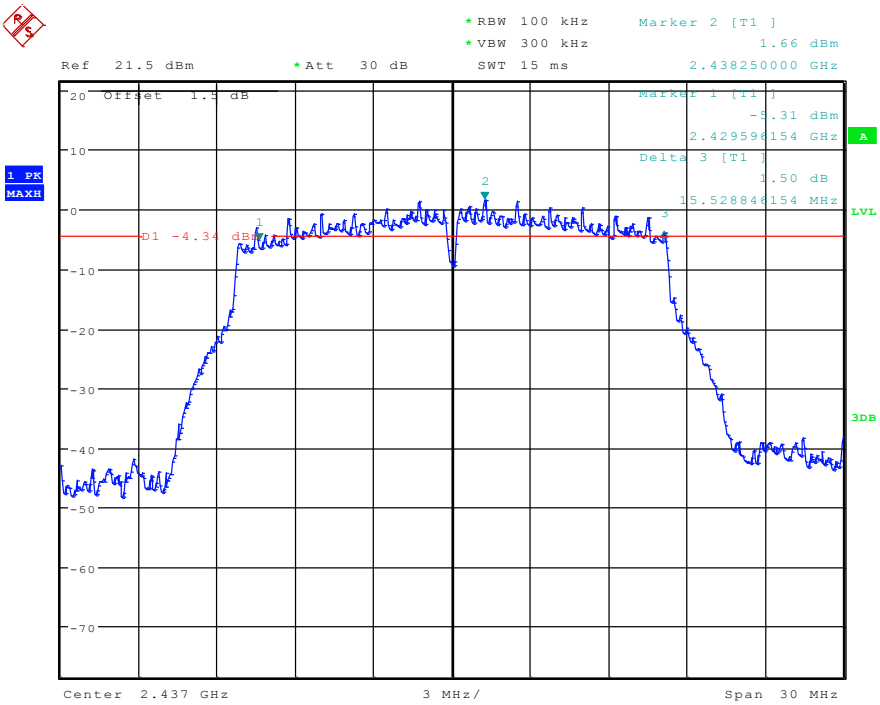
Test mode:	802.11b	Test channel:	Highest



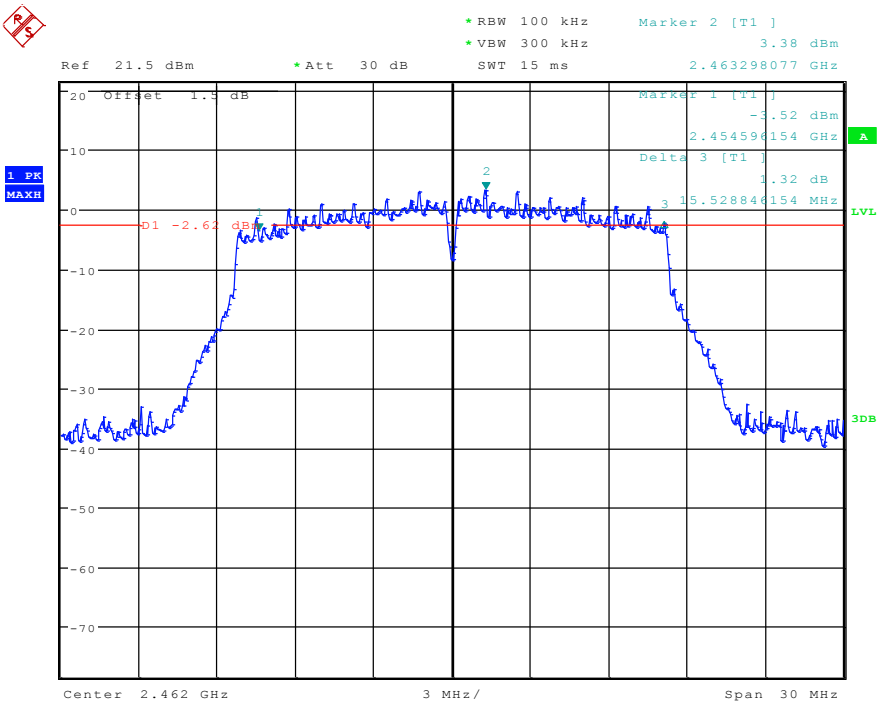
Test mode:	802.11g	Test channel:	Lowest



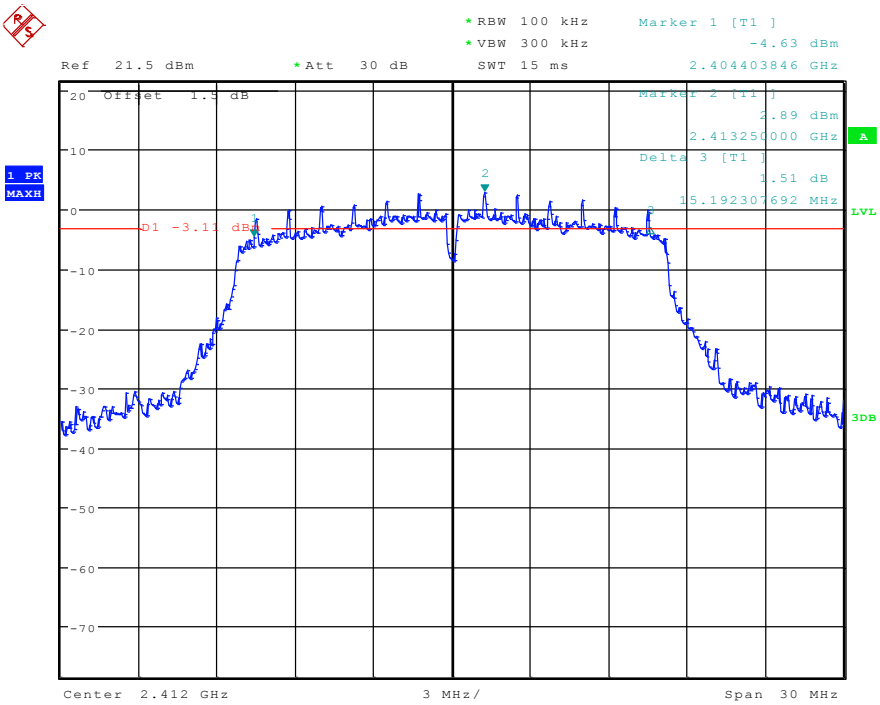
Test mode:	802.11g	Test channel:	Middle



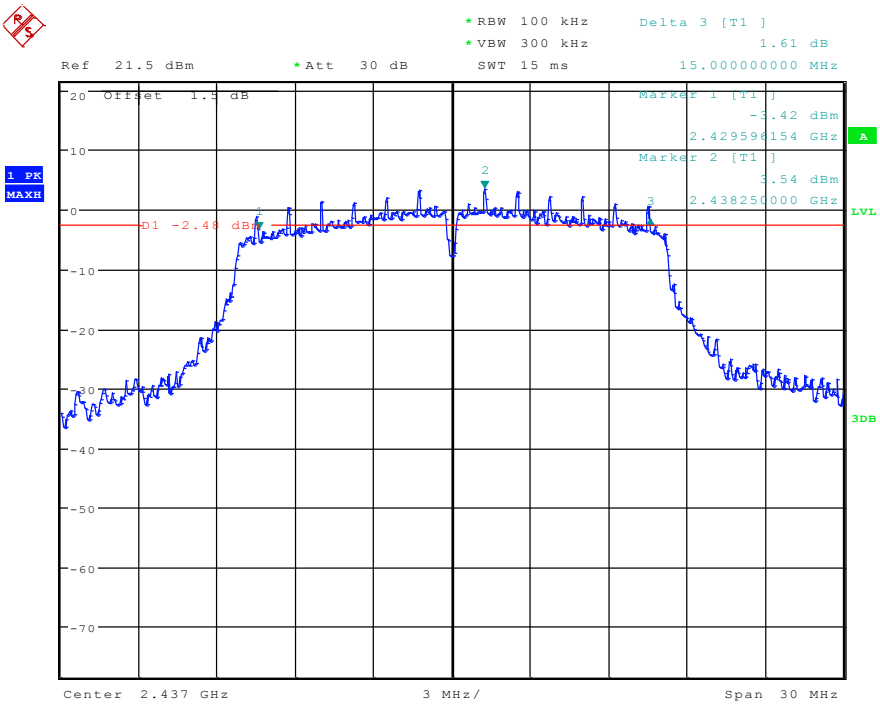
Test mode:	802.11g	Test channel:	Highest



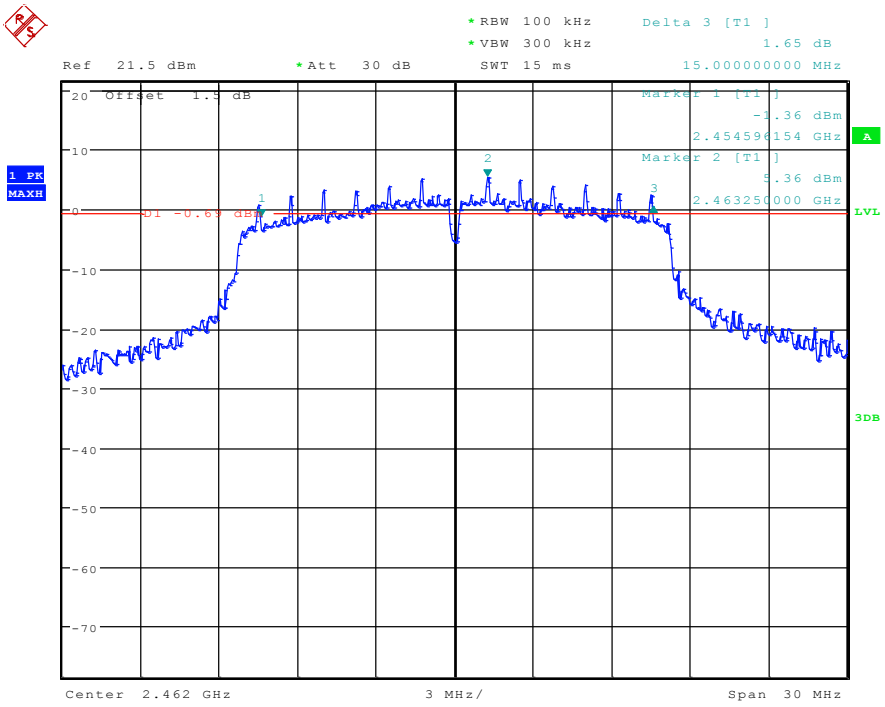
Test mode:	802.11n(HT20)	Test channel:	Lowest



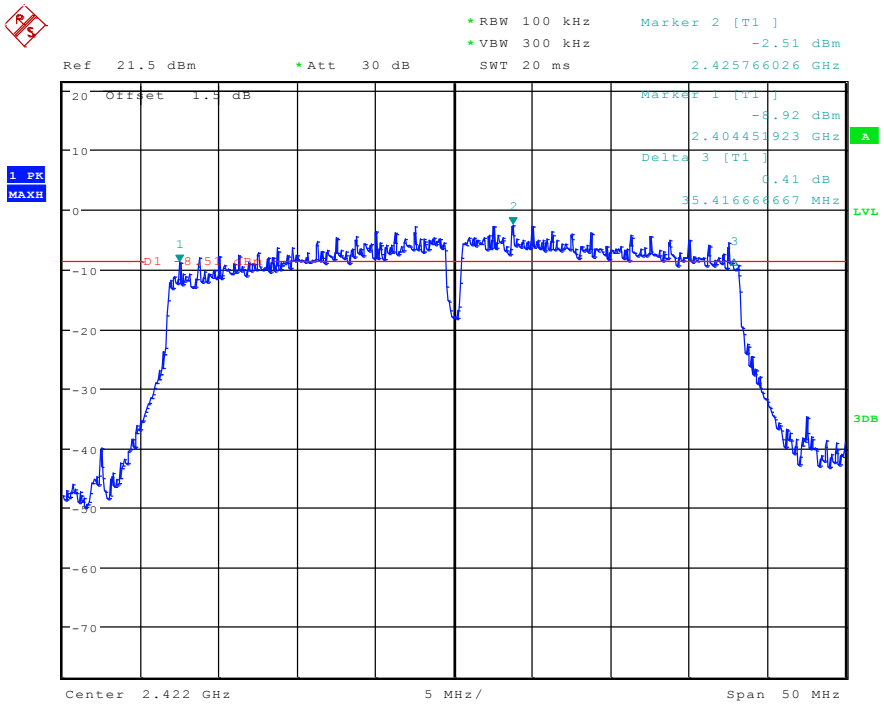
Test mode:	802.11n(HT20)	Test channel:	Middle



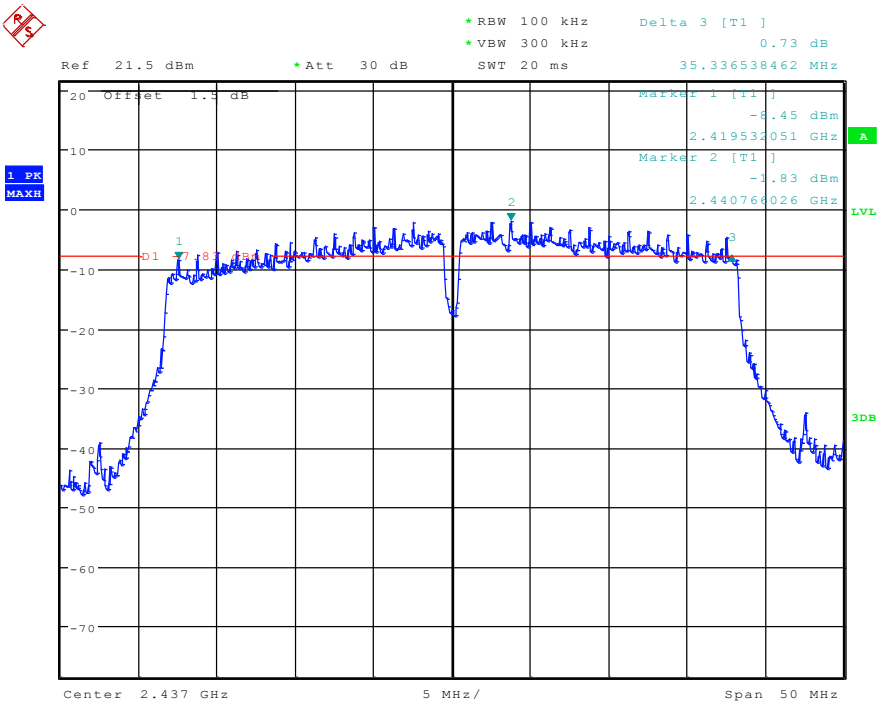
Test mode:	802.11n(HT20)	Test channel:	Highest



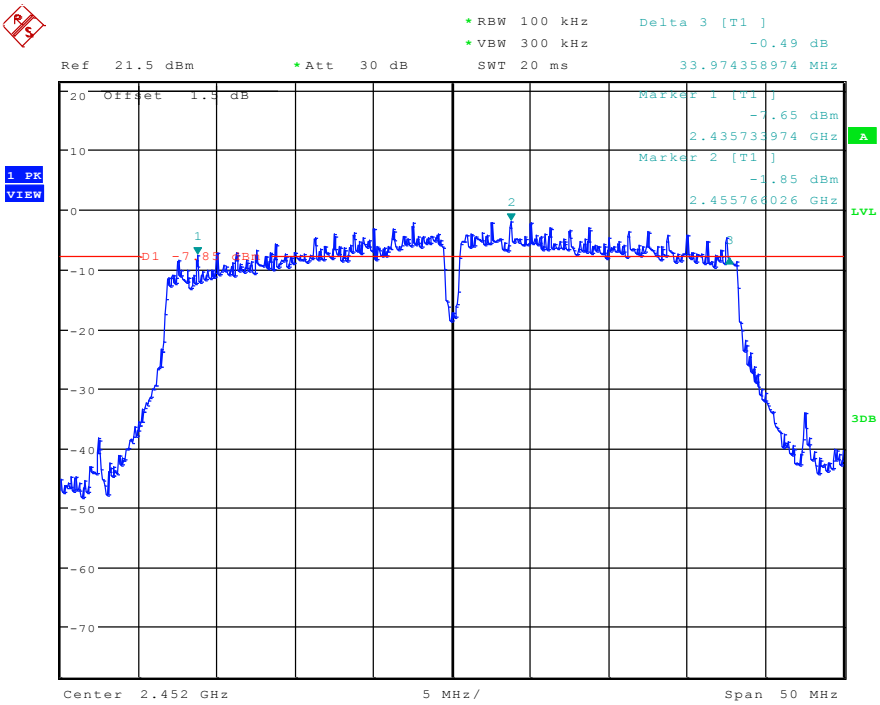
Test mode:	802.11n(HT40)	Test channel:	Lowest



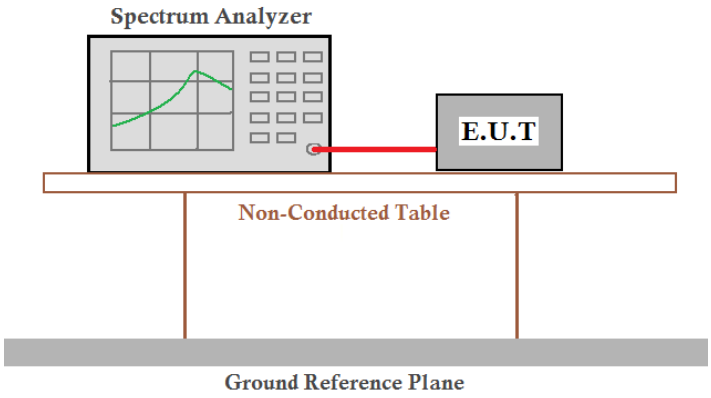
Test mode:	802.11n(HT40)	Test channel:	Middle



Test mode:	802.11n(HT40)	Test channel:	Highest



6.5 Power Spectral Density

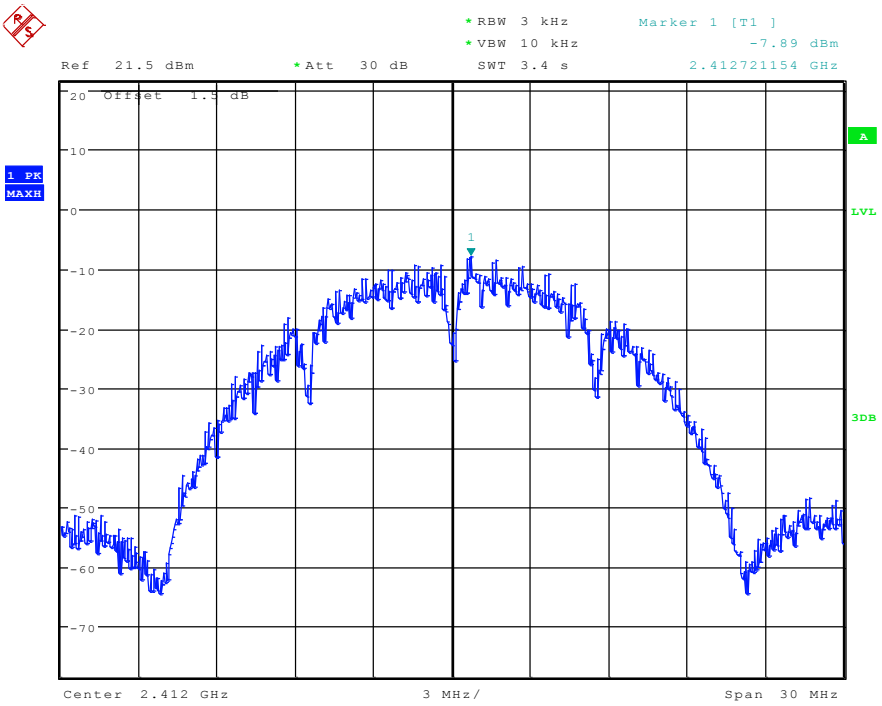
Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	KDB558074 D01 v04
Test Setup:	 *Remark:* *Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.*
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40)
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

Measurement Data

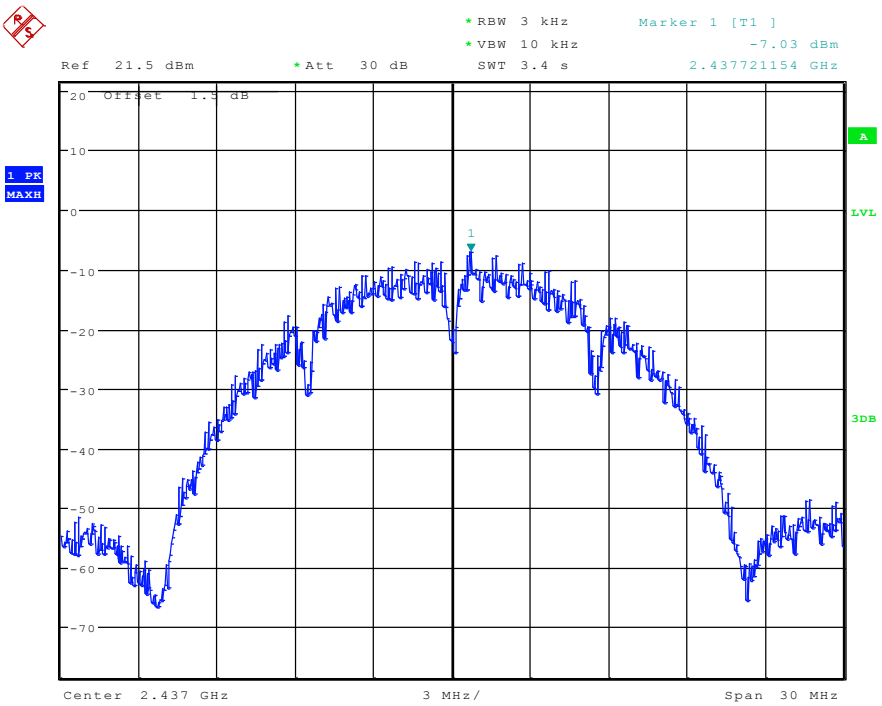
802.11b mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-7.89	≤8.00	Pass
Middle	-7.03	≤8.00	Pass
Highest	-5.84	≤8.00	Pass
802.11g mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-15.55	≤8.00	Pass
Middle	-13.86	≤8.00	Pass
Highest	-11.5	≤8.00	Pass
802.11n(HT20) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-13.92	≤8.00	Pass
Middle	-14.50	≤8.00	Pass
Highest	-11.01	≤8.00	Pass
802.11n(HT40) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-17.91	≤8.00	Pass
Middle	-17.29	≤8.00	Pass
Highest	-16.93	≤8.00	Pass

Test plot as follows:

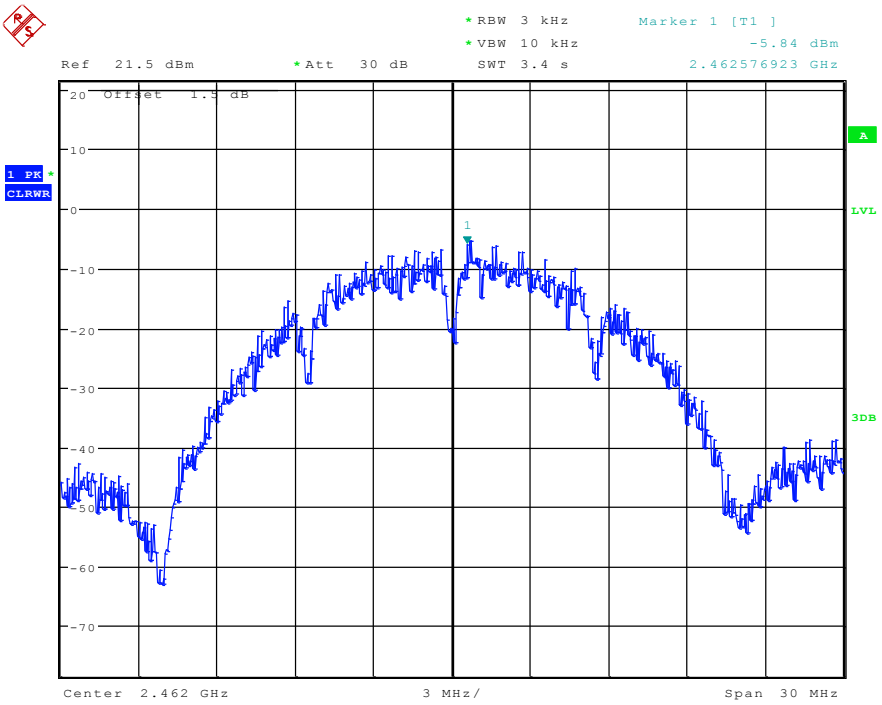
Test mode:	802.11b	Test channel:	Lowest



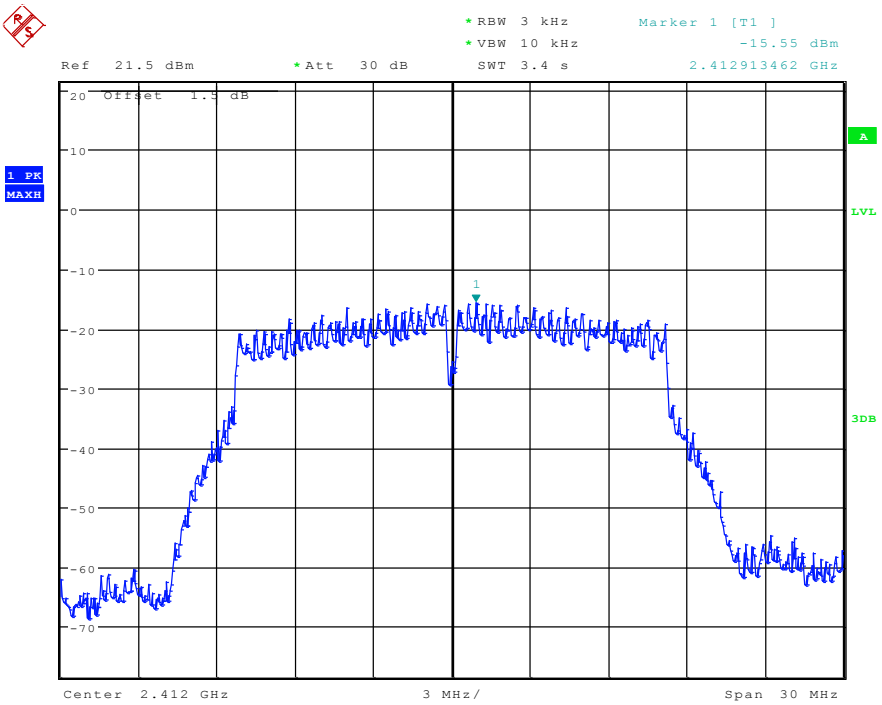
Test mode:	802.11b	Test channel:	Middle



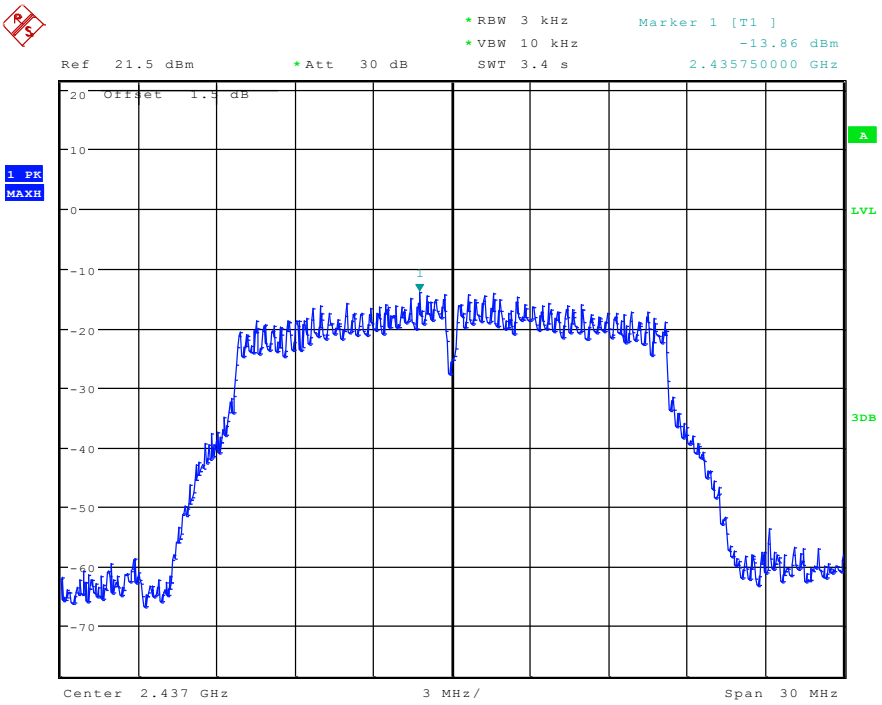
Test mode:	802.11b	Test channel:	Highest



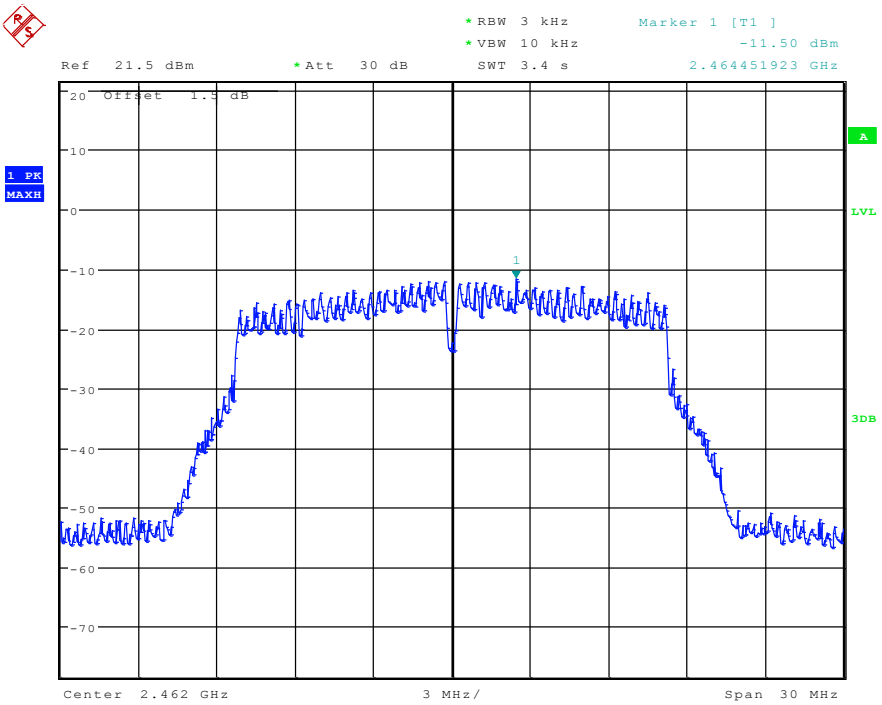
Test mode:	802.11g	Test channel:	Lowest



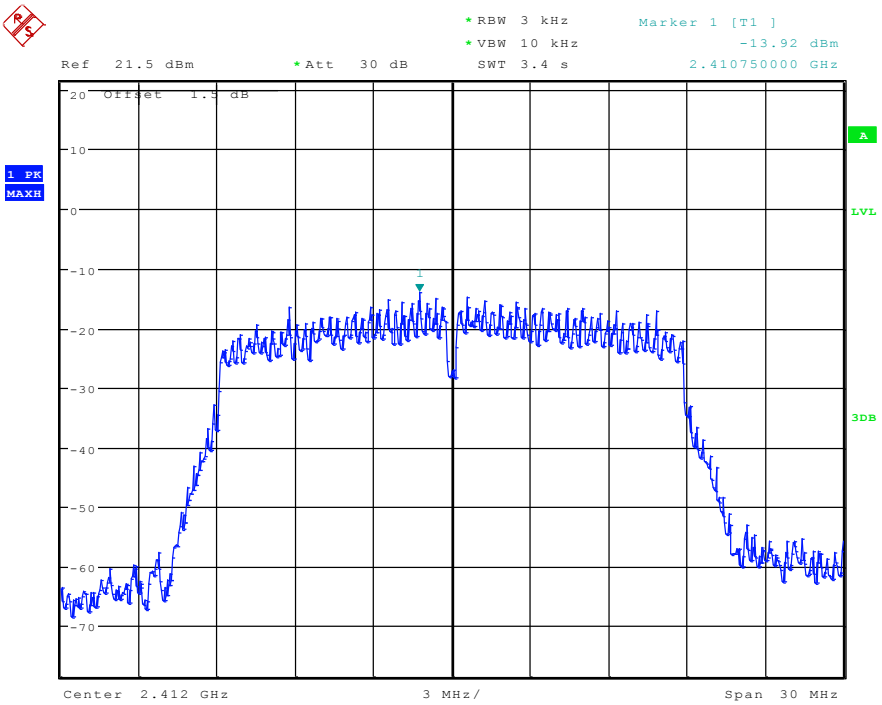
Test mode:	802.11g	Test channel:	Middle



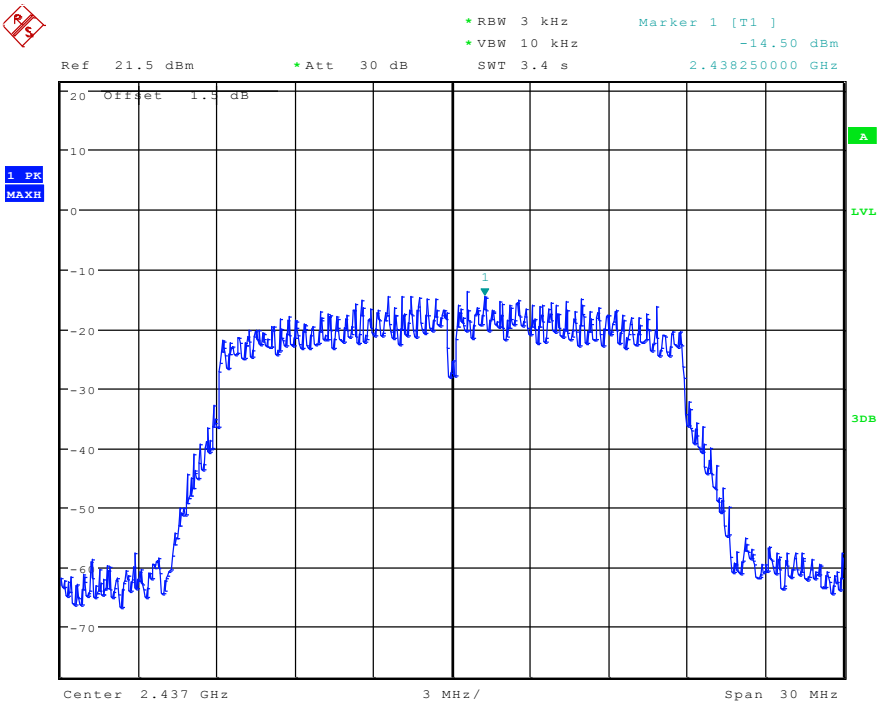
Test mode:	802.11g	Test channel:	Highest



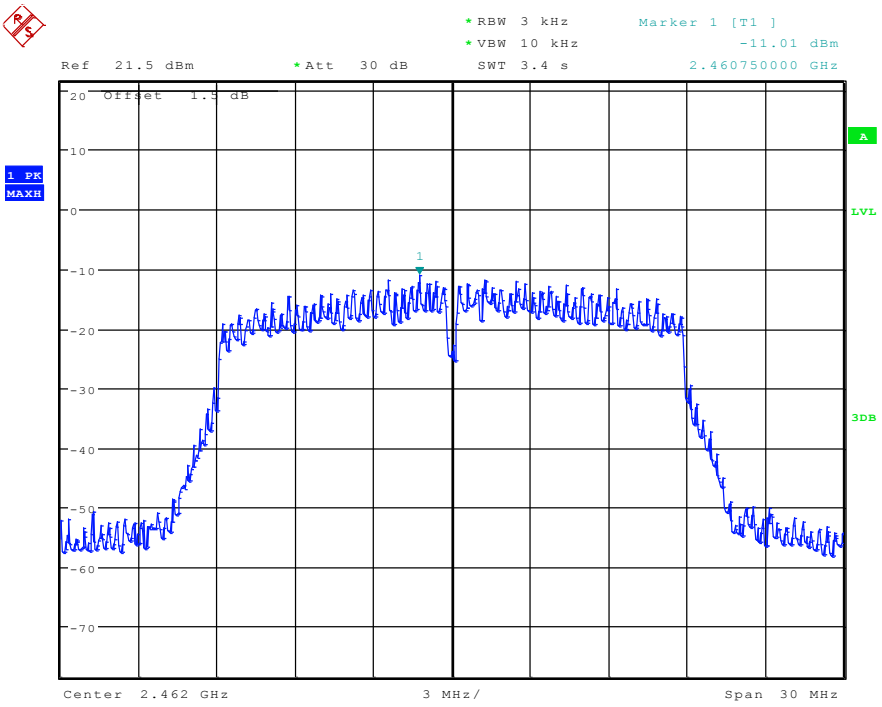
Test mode:	802.11n(HT20)	Test channel:	Lowest



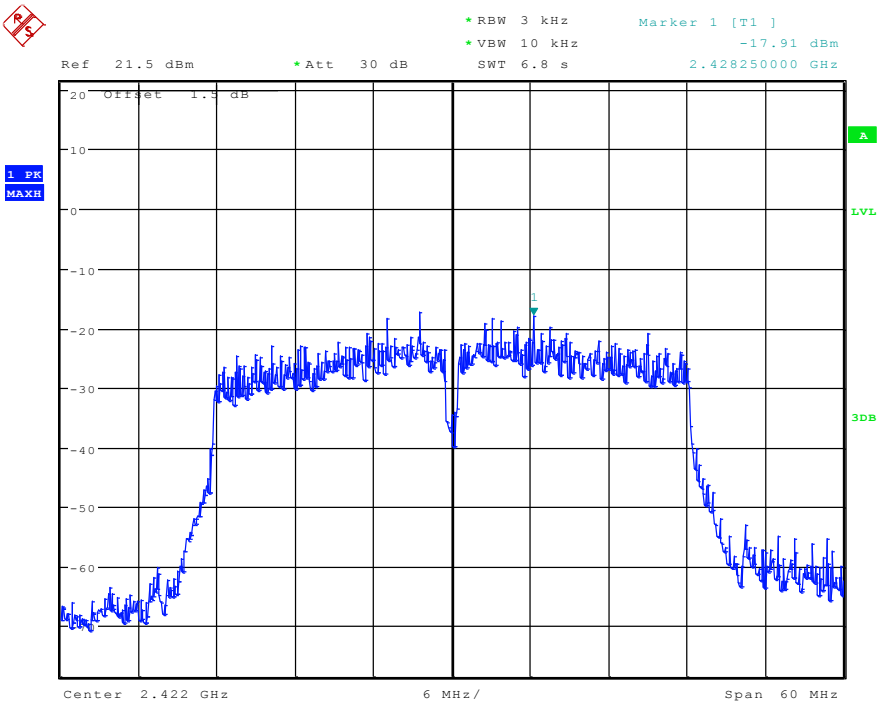
Test mode:	802.11n(HT20)	Test channel:	Middle



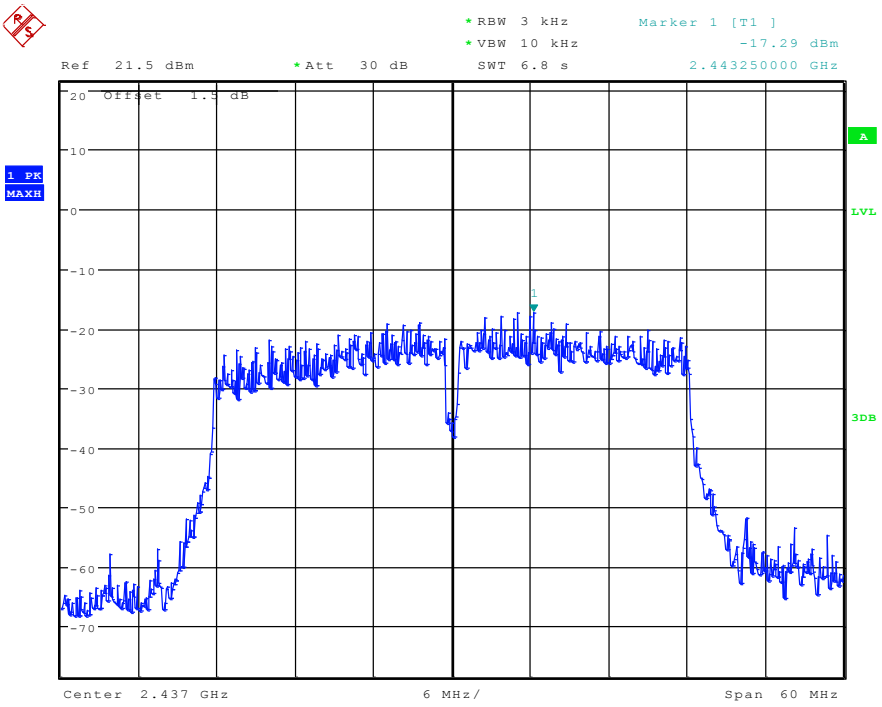
Test mode:	802.11n(HT20)	Test channel:	Highest



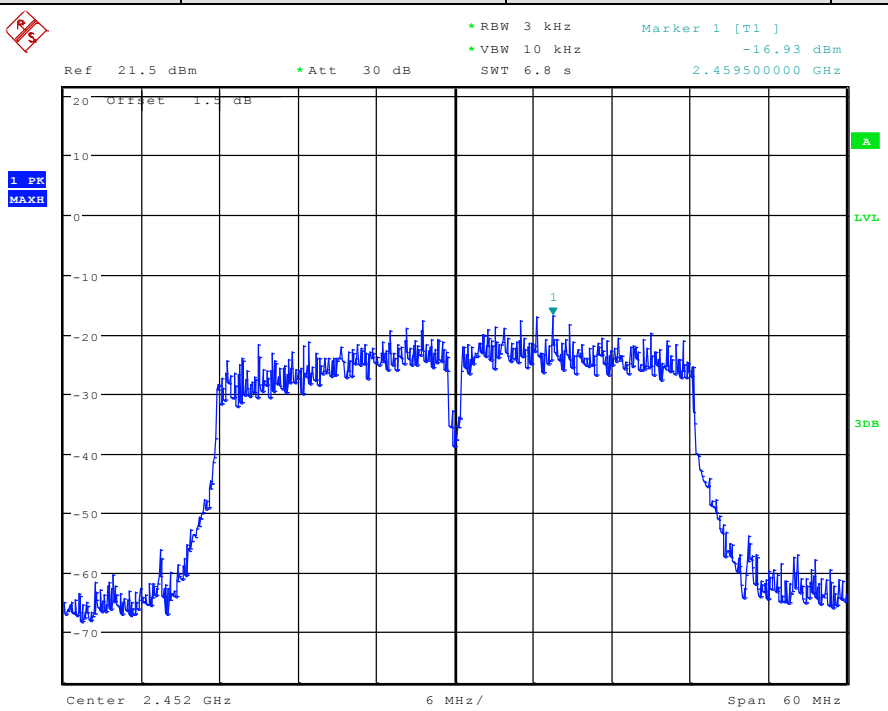
Test mode:	802.11n(HT40)	Test channel:	Lowest



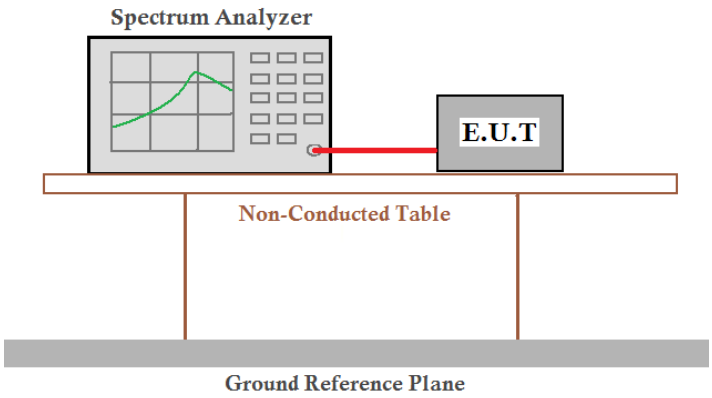
Test mode:	802.11n(HT40)	Test channel:	Middle



Test mode:	802.11n(HT40)	Test channel:	Highest



6.6 Band-edge for RF Conducted Emissions

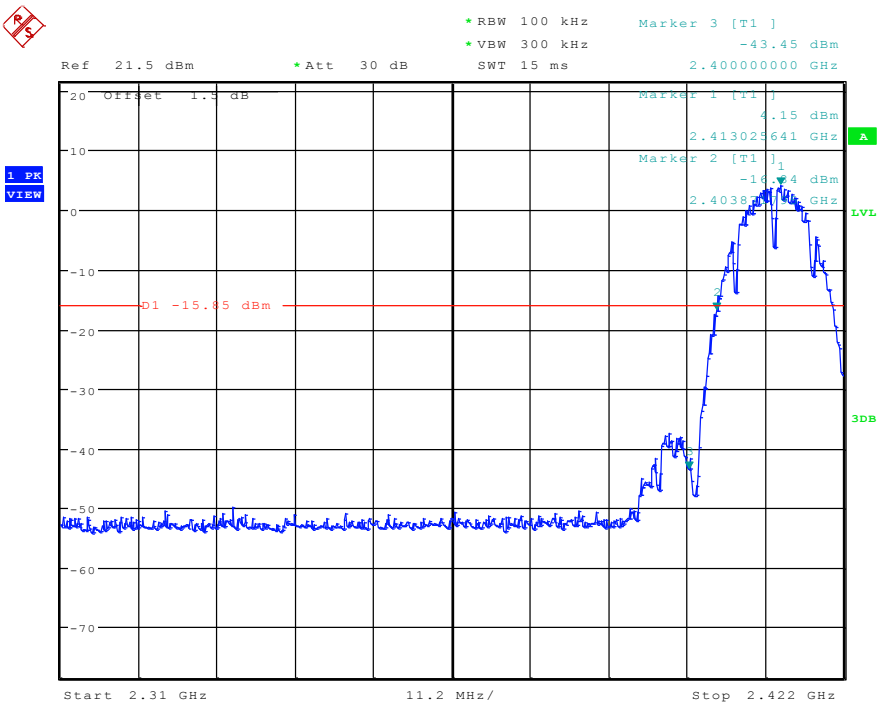
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	KDB558074 D01 v04
Test Setup:	 *Remark:* *Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.*
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass

Test Data:

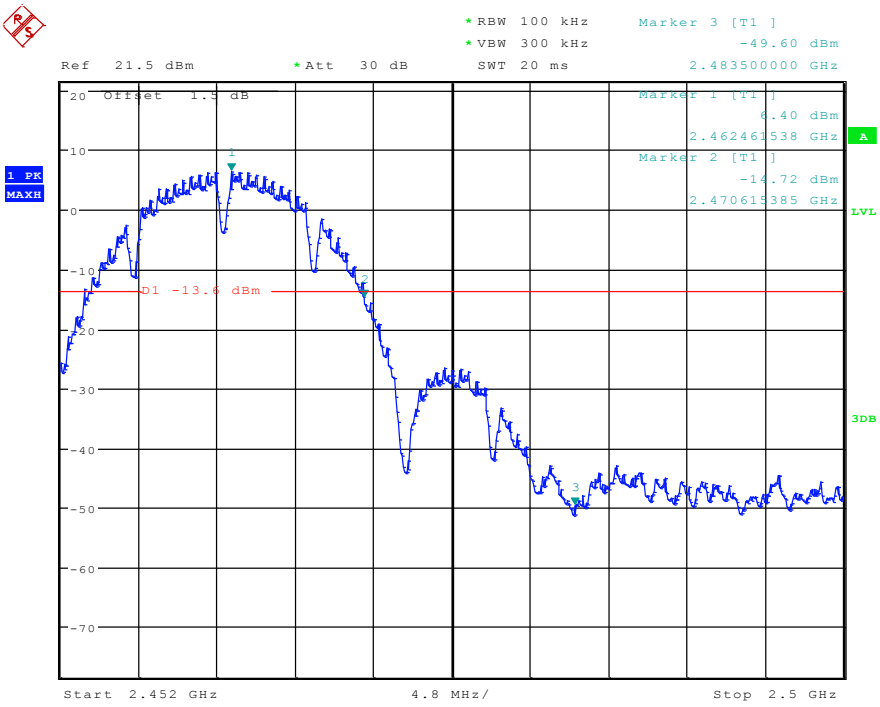
Test mode: 802.11b				
Test channel	Frequency(MHz)	Emission Level(dBm)	Limit(dBm)	Result
Lowest	2400	-43.45	-15.85	Pass
Highest	2483.5	-49.60	-13.6	Pass
Test mode: 802.11g				
Test channel	Frequency(MHz)	Emission Level(dBm)	Limit(dBm)	Result
Lowest	2400	-44.65	-18.78	Pass
Highest	2483.5	-44.39	-16.38	Pass
Test mode: 802.11n(HT20)				
Test channel	Frequency(MHz)	Emission Level(dBm)	Limit(dBm)	Result
Lowest	2400	-43.82	-18.78	Pass
Highest	2483.5	-41.7	-15	Pass
Test mode: 802.11n(HT40)				
Test channel	Frequency(MHz)	Emission Level(dBm)	Limit(dBm)	Result
Lowest	2400	-48.01	-23.08	Pass
Highest	2483.5	-43.72	-21.61	Pass

Test plot as follows:

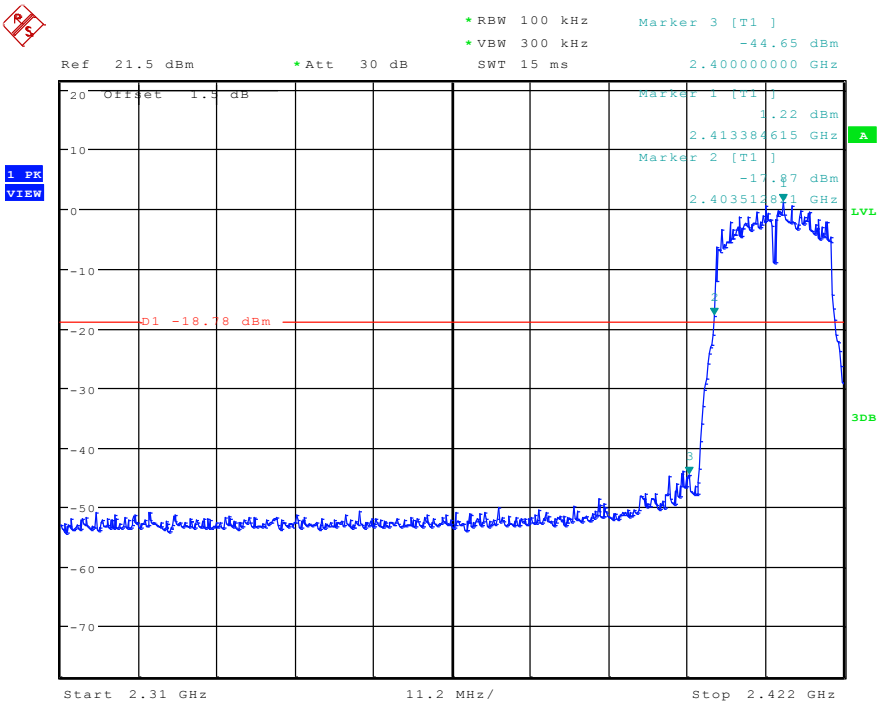
Test mode:	802.11b	Test channel:	Lowest



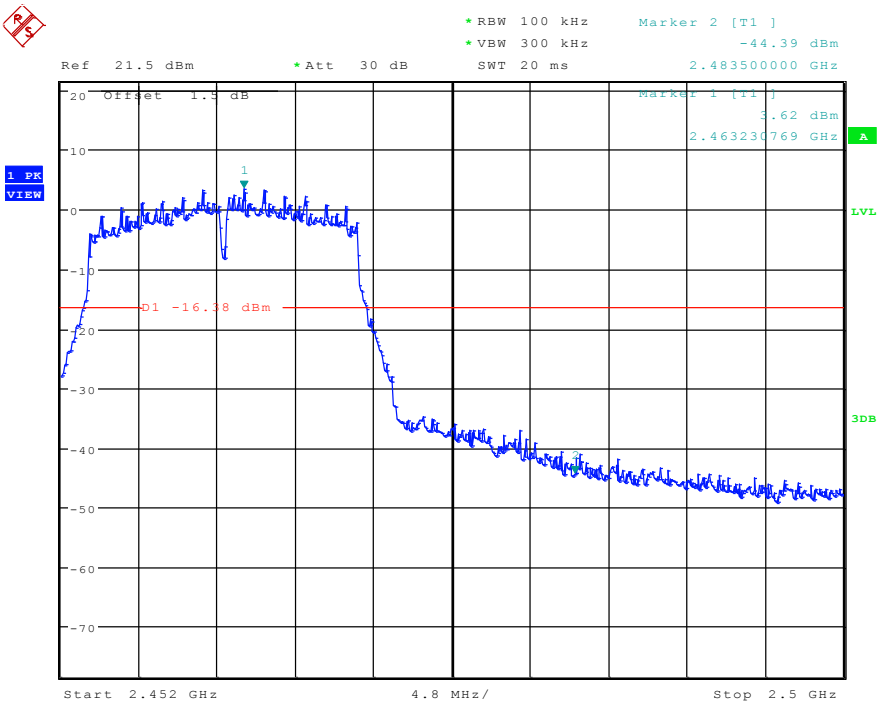
Test mode:	802.11b	Test channel:	Highest



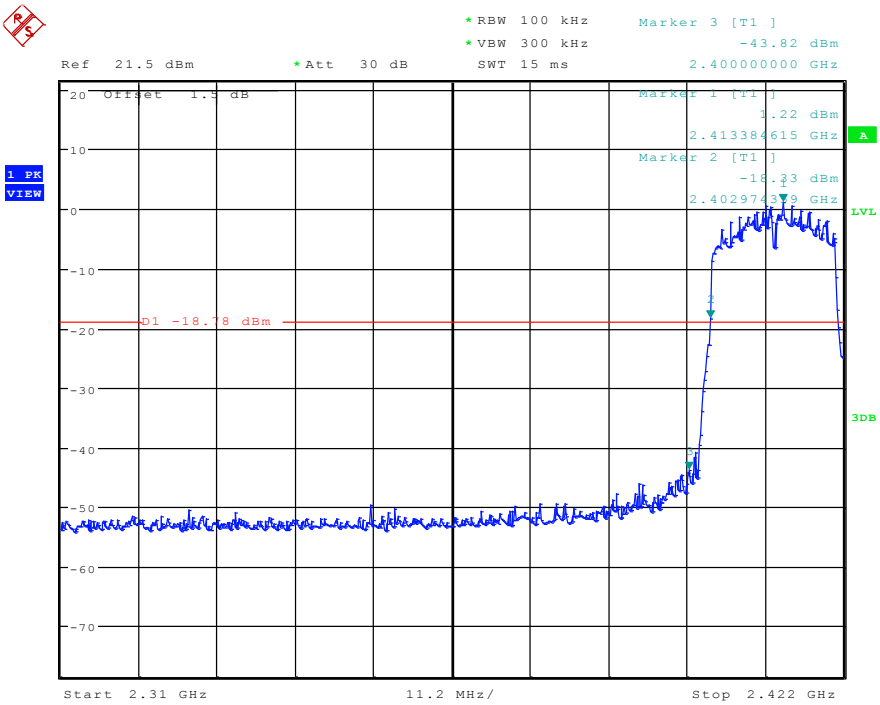
Test mode:	802.11g	Test channel:	Lowest



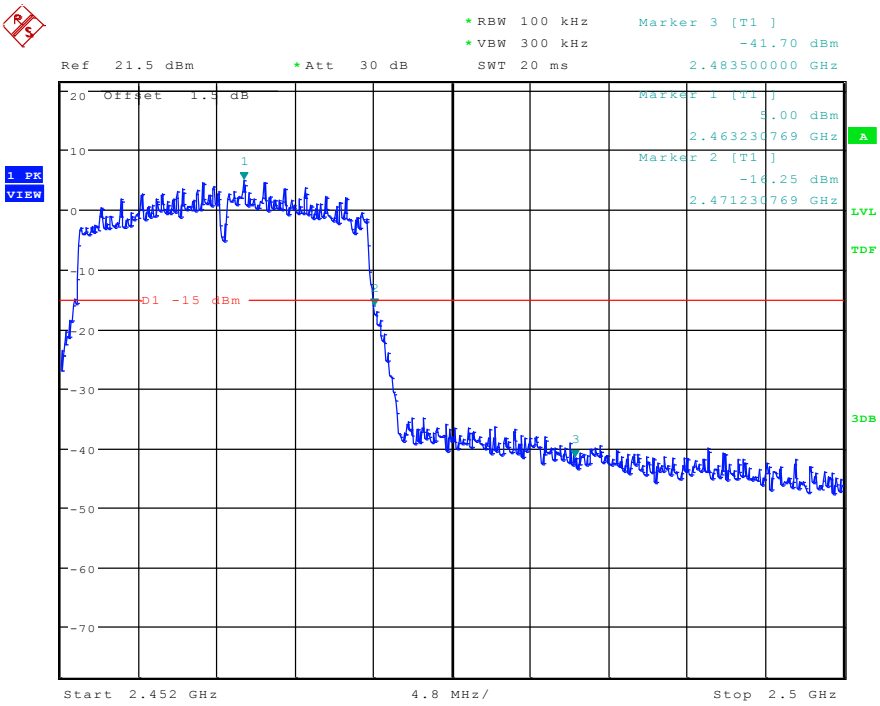
Test mode:	802.11g	Test channel:	Highest



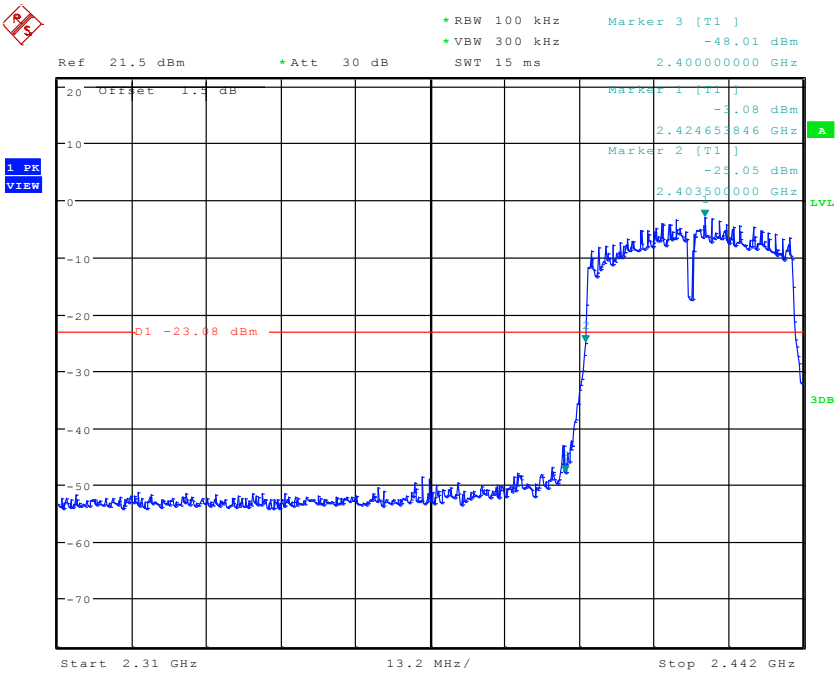
Test mode:	802.11n(HT20)	Test channel:	Lowest



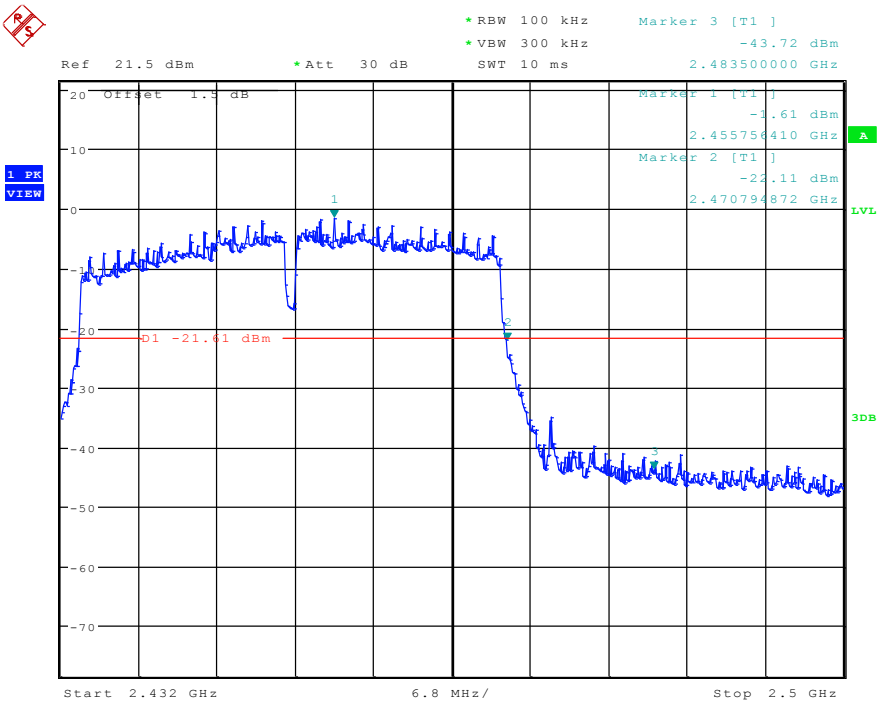
Test mode:	802.11n(HT20)	Test channel:	Highest



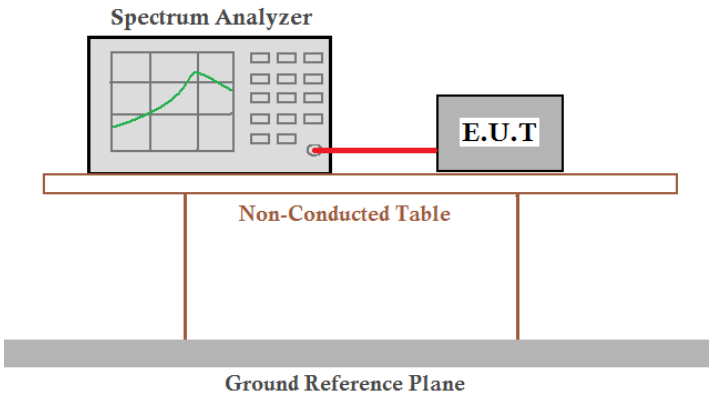
Test mode:	802.11n(HT40)	Test channel:	Lowest



Test mode:	802.11n(HT40)	Test channel:	Highest

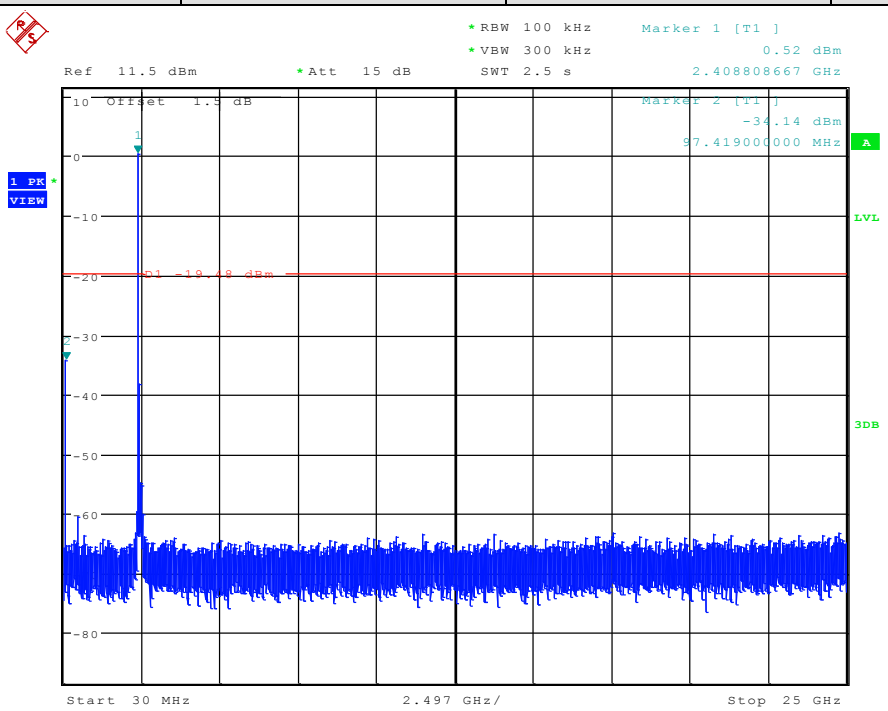


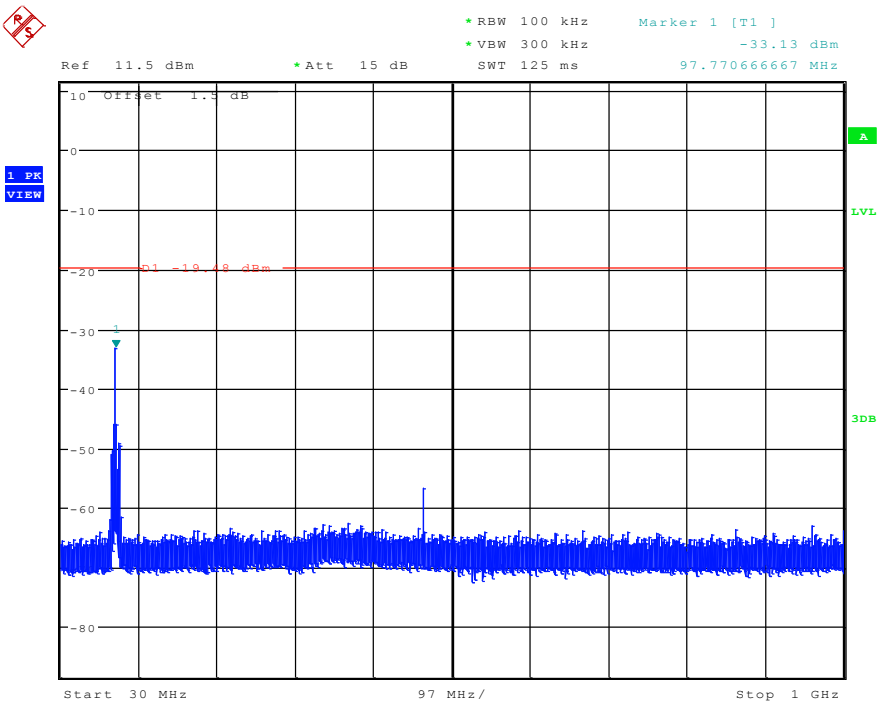
6.7 RF Conducted Spurious Emissions

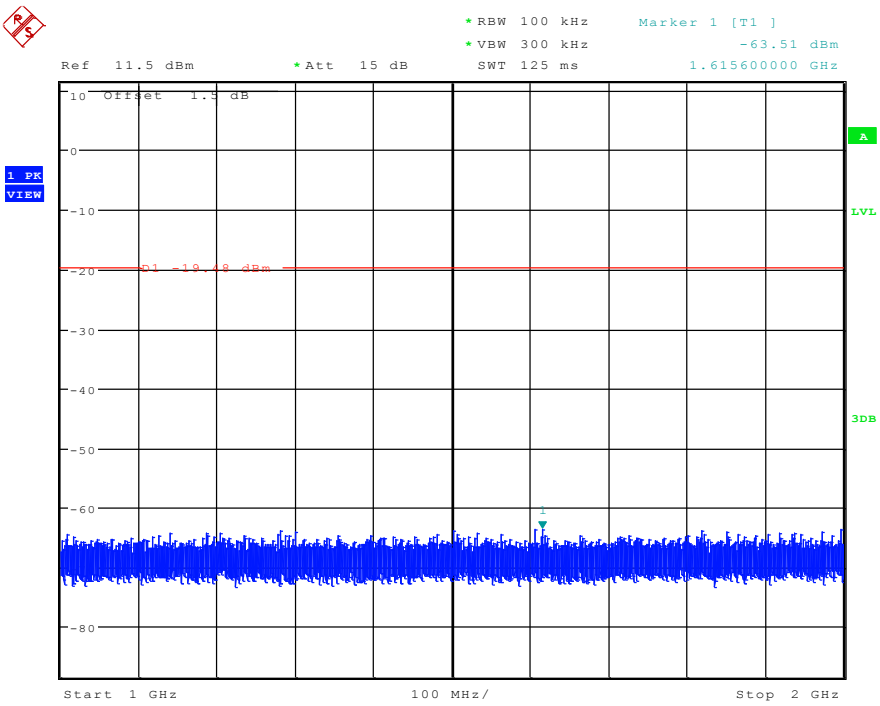
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	KDB558074 D01 v04
Test Setup:	 *Remark:* *Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.*
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass

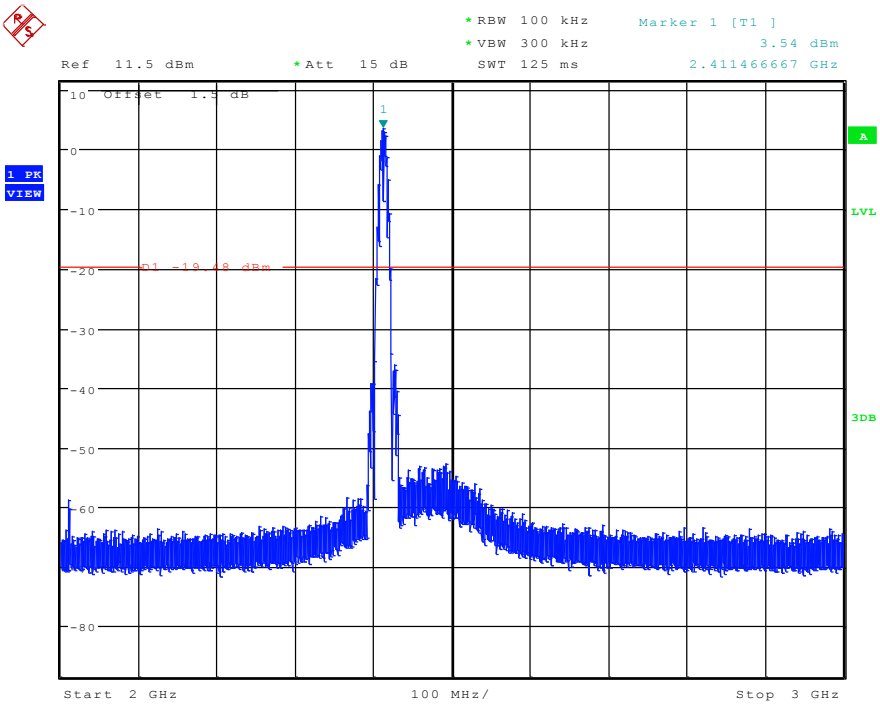
Test plot as follows:

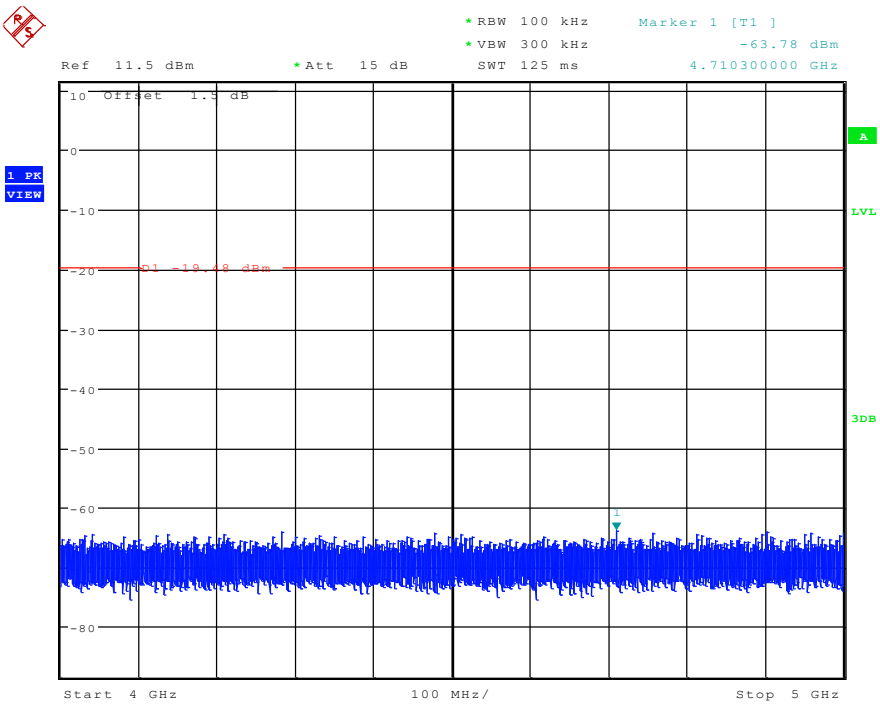
Test mode:	802.11b	Test channel:	Lowest



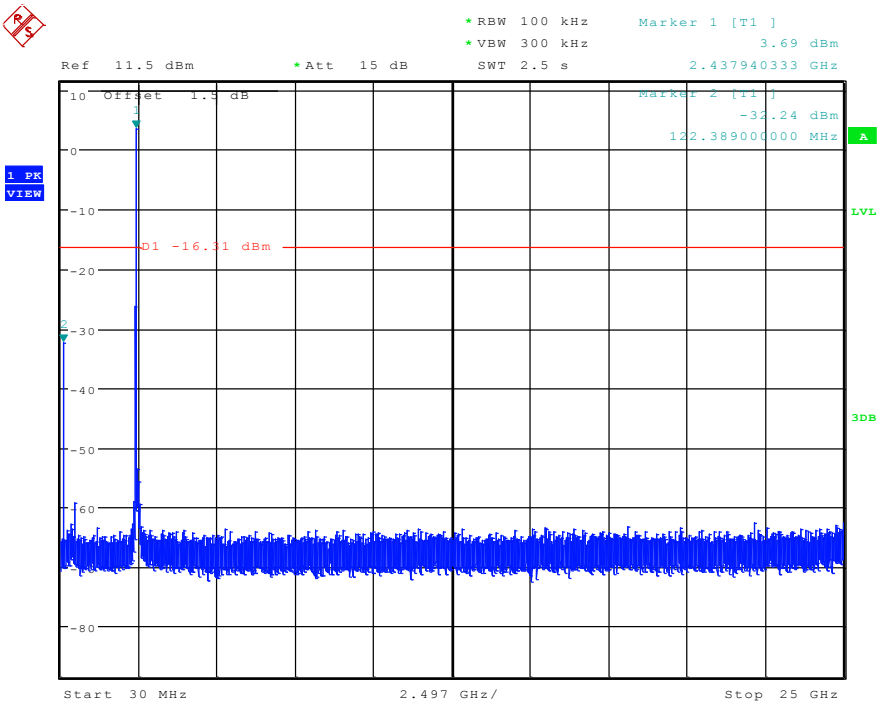


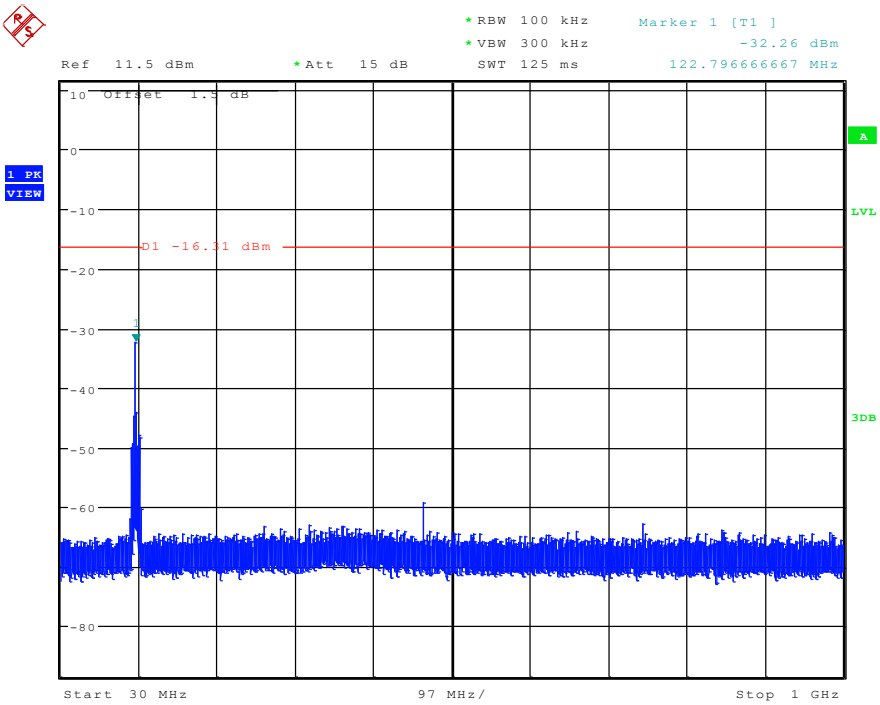

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.51 dBm
1.615600000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -19.48 dBm
Start 1 GHz
100 MHz/
Stop 2 GHz

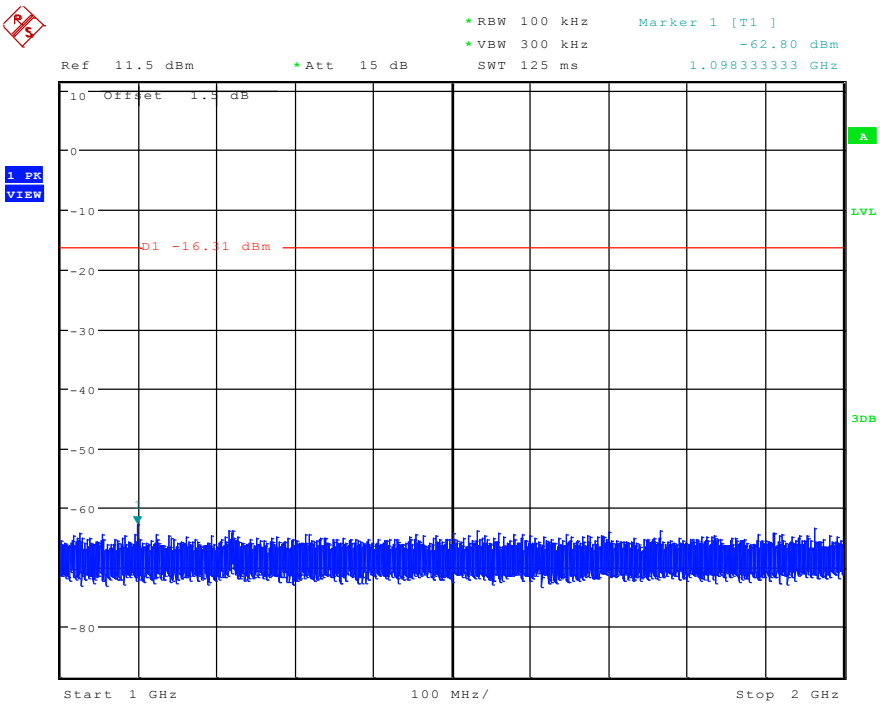

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
3.54 dBm
2.411466667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -19.48 dBm
Start 2 GHz
100 MHz/
Stop 3 GHz

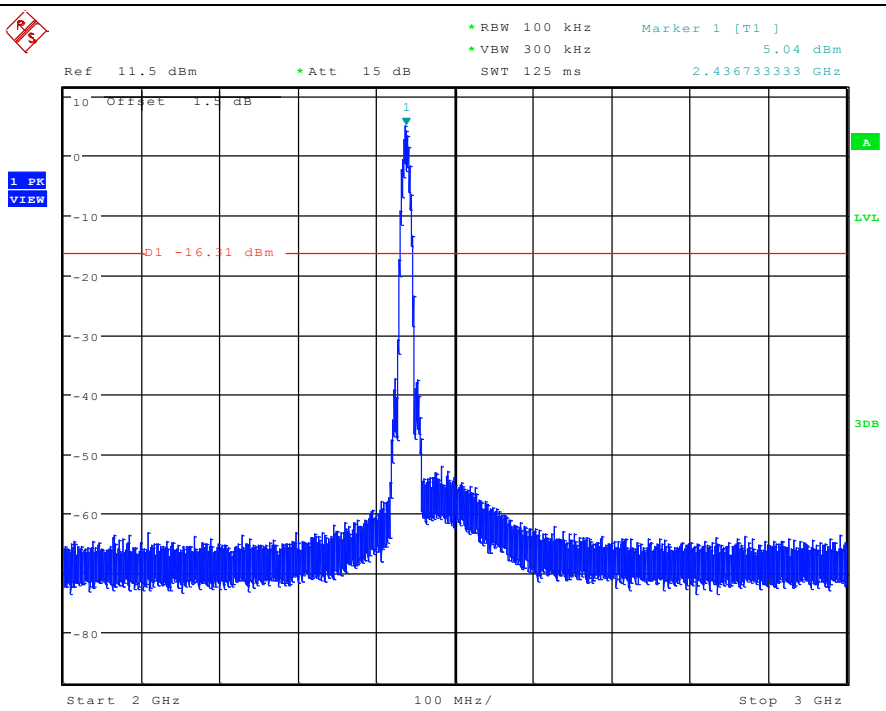

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.78 dBm
4.710300000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -19.48 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

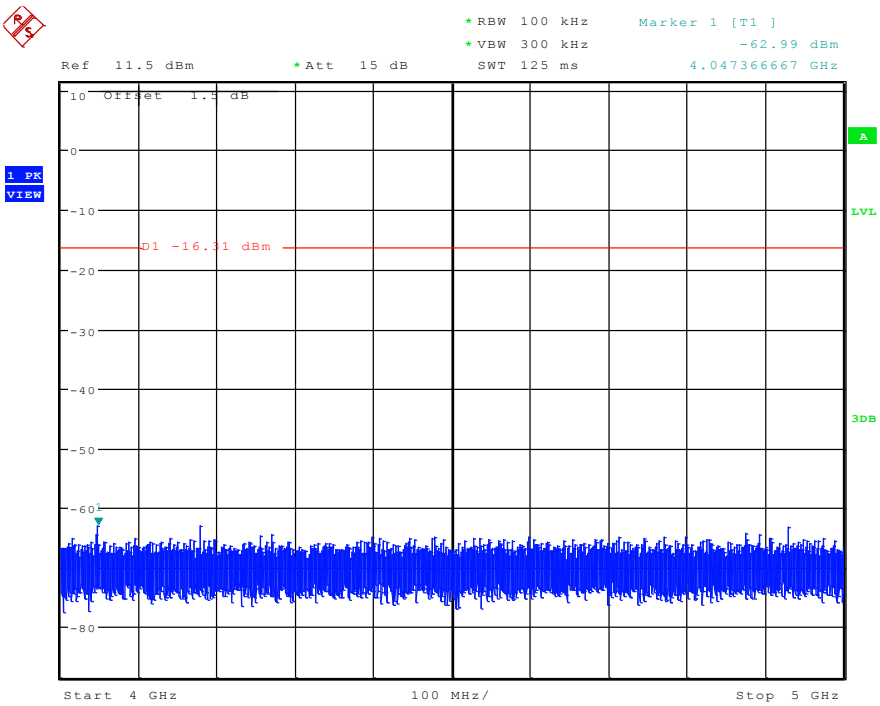
Test mode:	802.11b	Test channel:	Middle



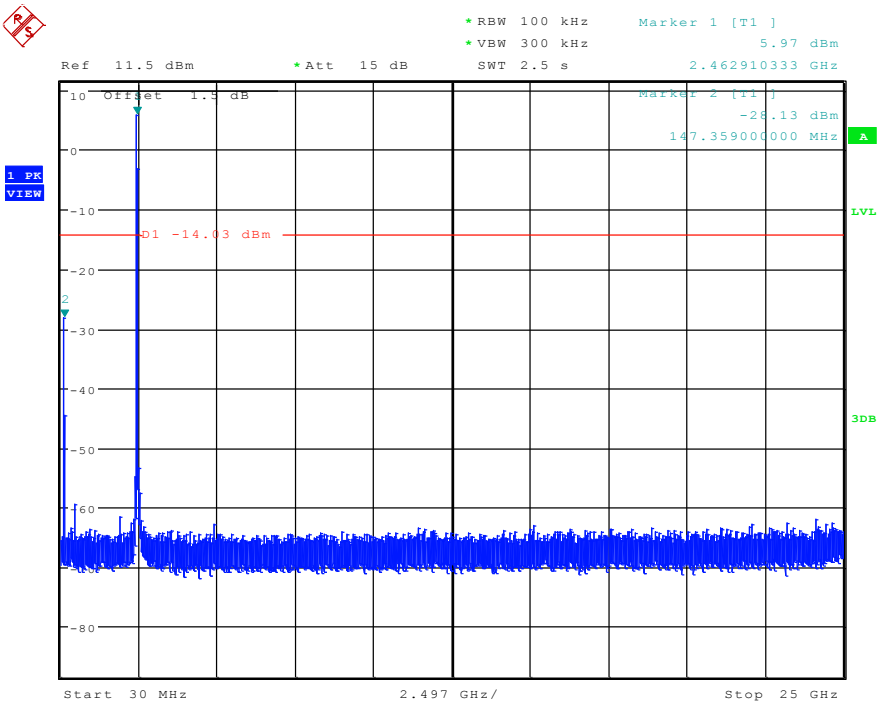


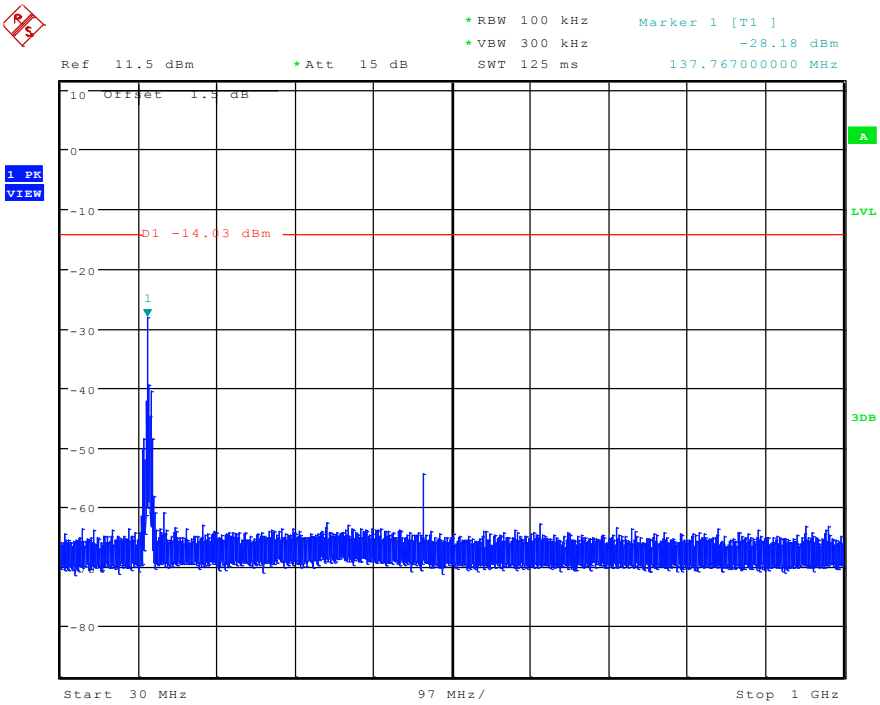

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-62.80 dBm
1.098333333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -16.31 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

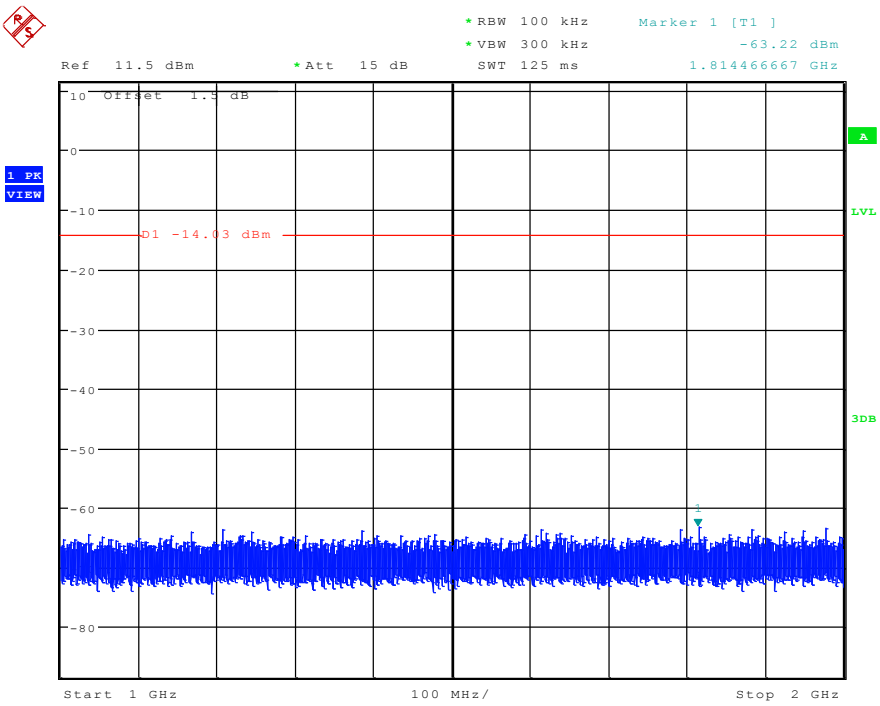

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
5.04 dBm
2.436733333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -16.31 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

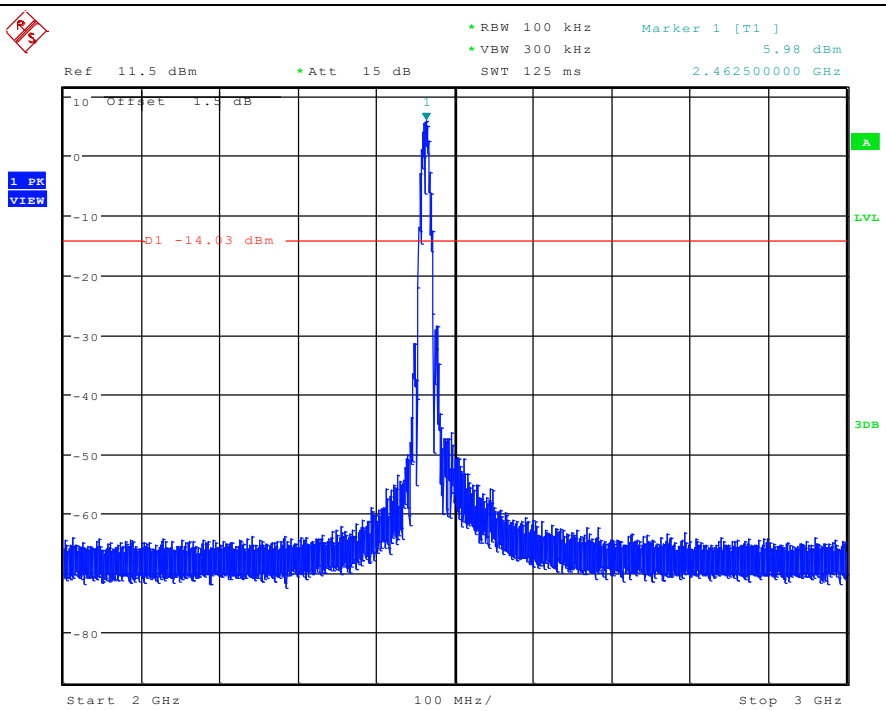

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-62.99 dBm
4.047366667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -16.31 dBm
A
LVL
3DB
Start 4 GHz
100 MHz/
Stop 5 GHz

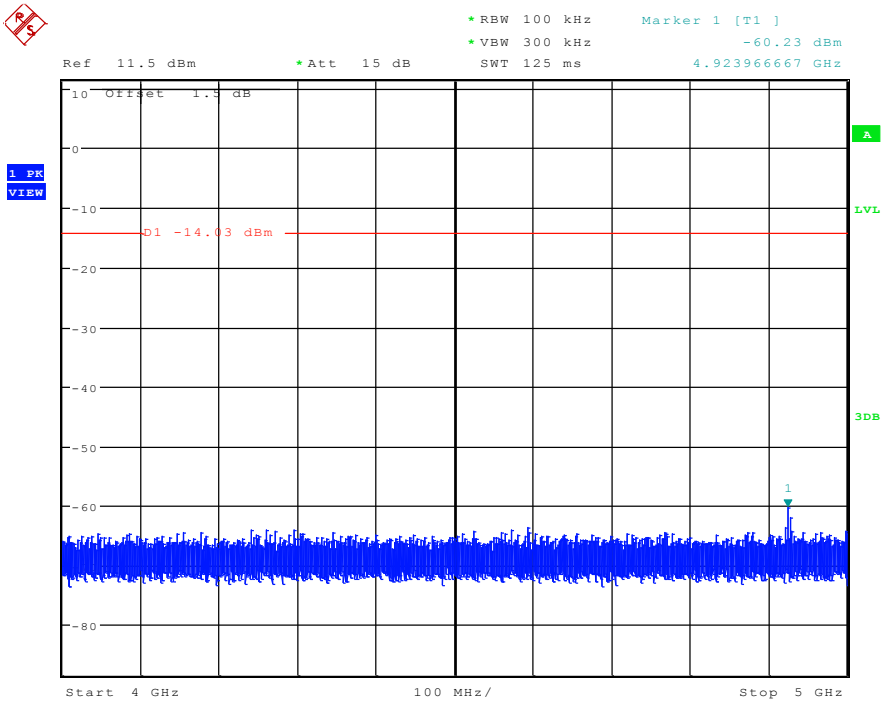
Test mode:	802.11b	Test channel:	Highest



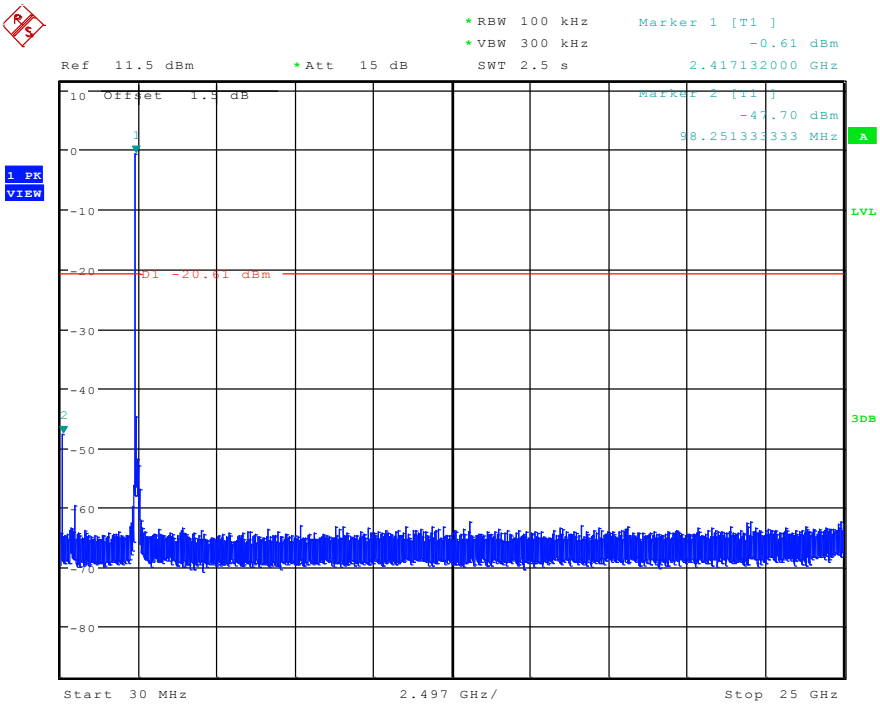


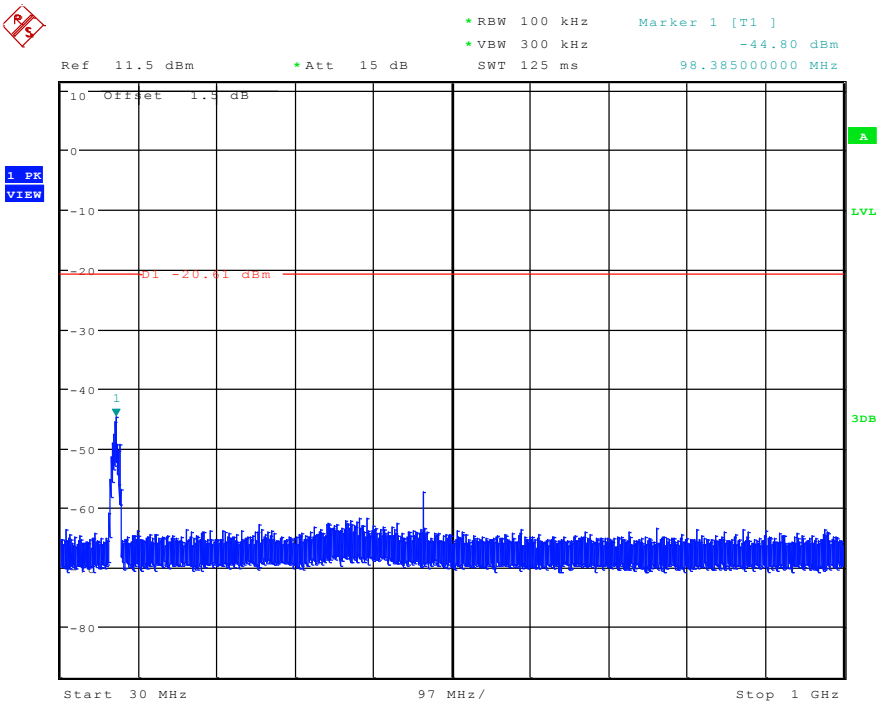

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.22 dBm
1.814466667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -14.03 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

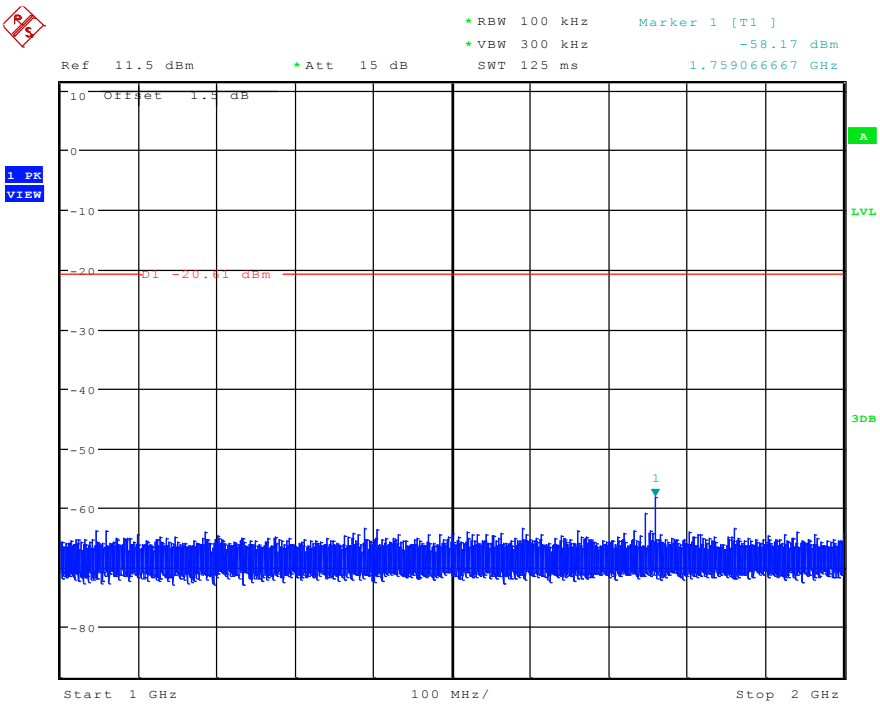

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
5.98 dBm
2.462500000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -14.03 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

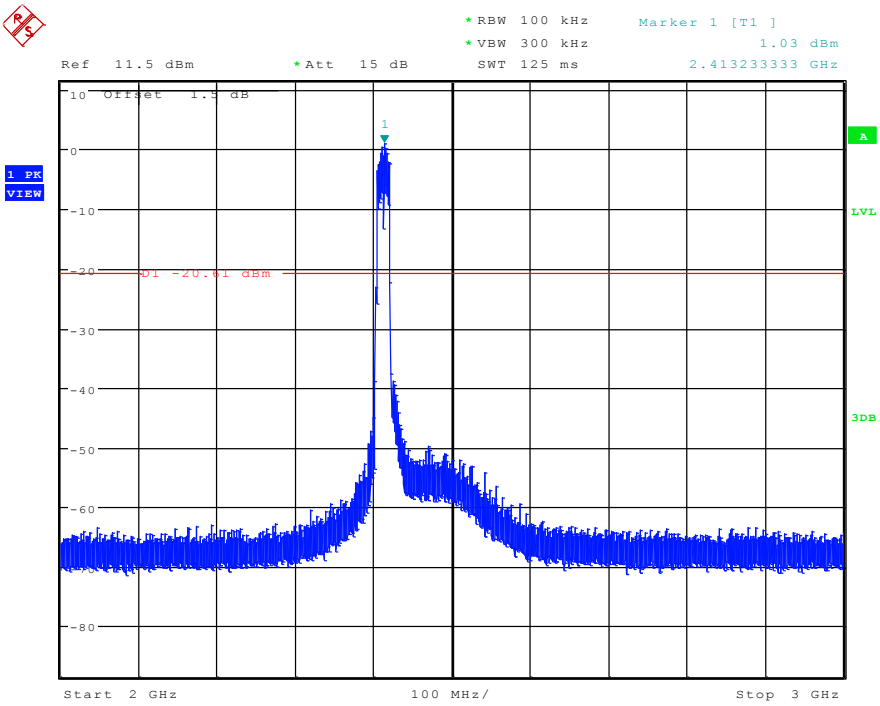

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-60.23 dBm
4.923966667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -14.03 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

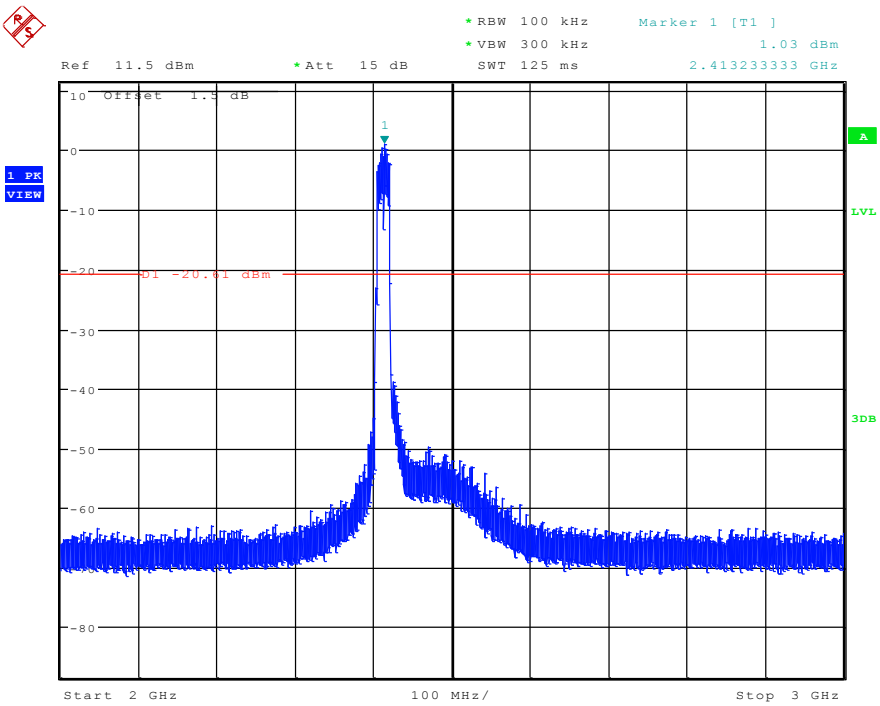
Test mode:	802.11g	Test channel:	Lowest



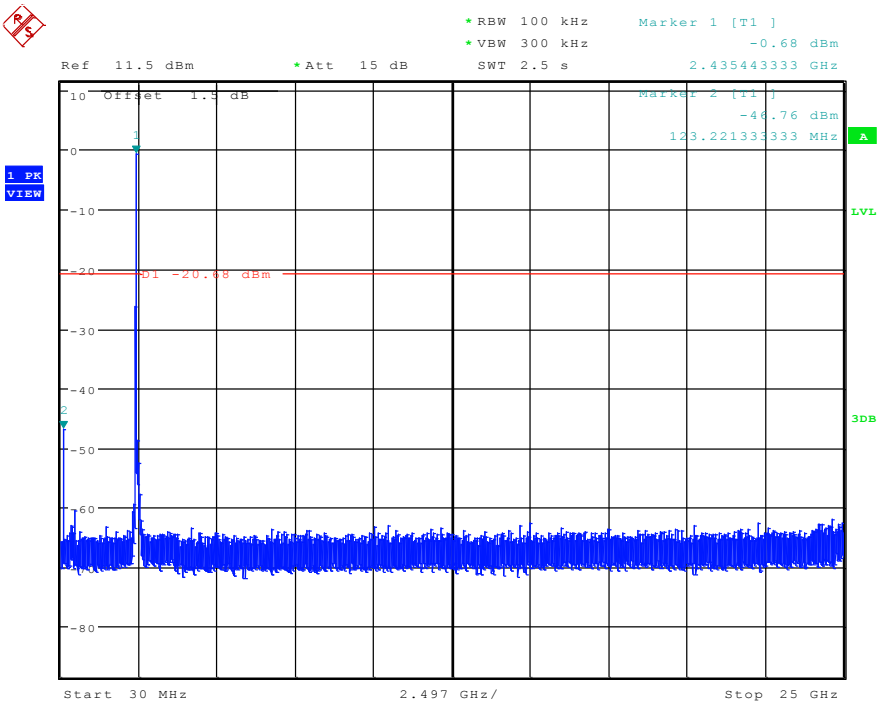


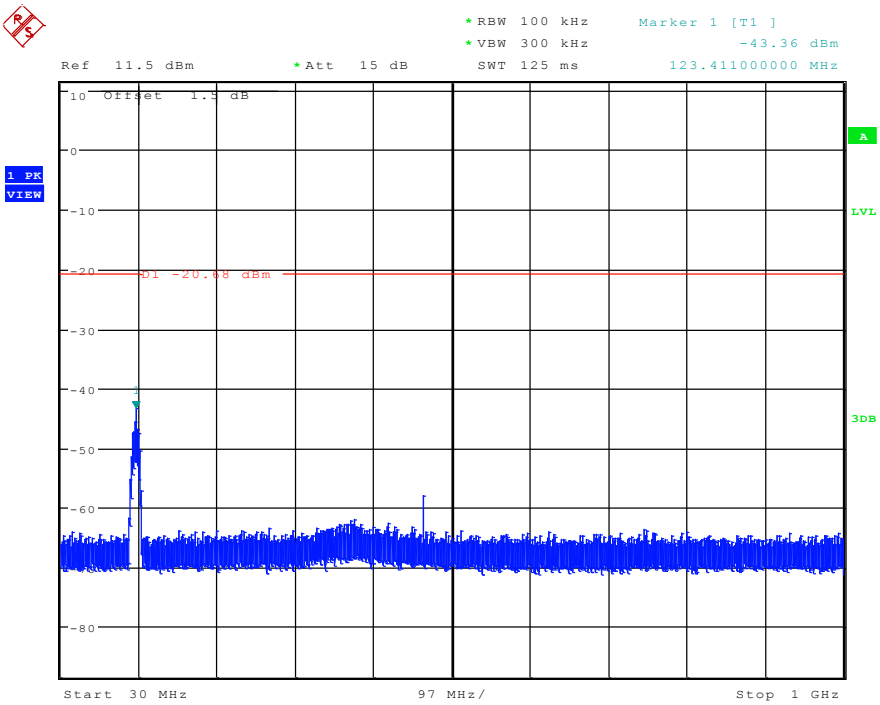

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-58.17 dBm
1.759066667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -20.61 dBm
Start 1 GHz
100 MHz/
Stop 2 GHz

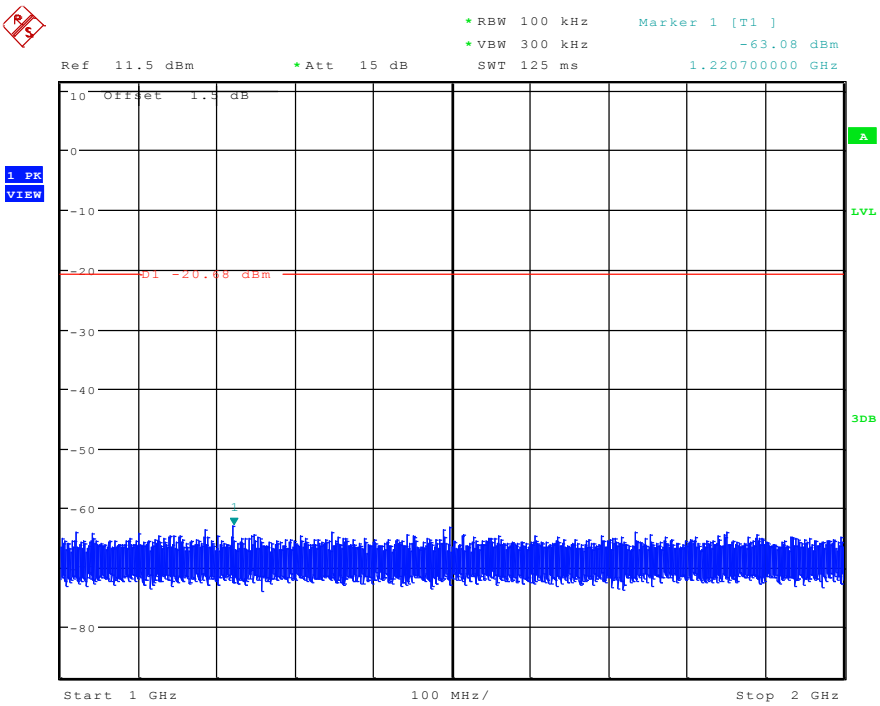

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
1.03 dBm
2.413233333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -20.61 dBm
Start 2 GHz
100 MHz/
Stop 3 GHz

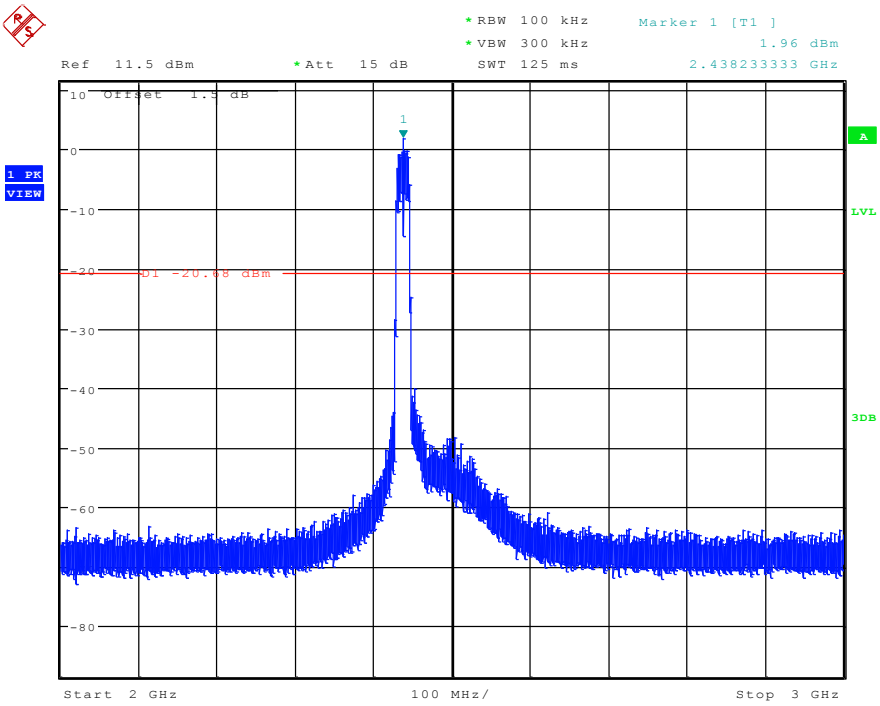

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
1.03 dBm
2.413233333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
D1 -20.61 dBm
1 PK
VIEW
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

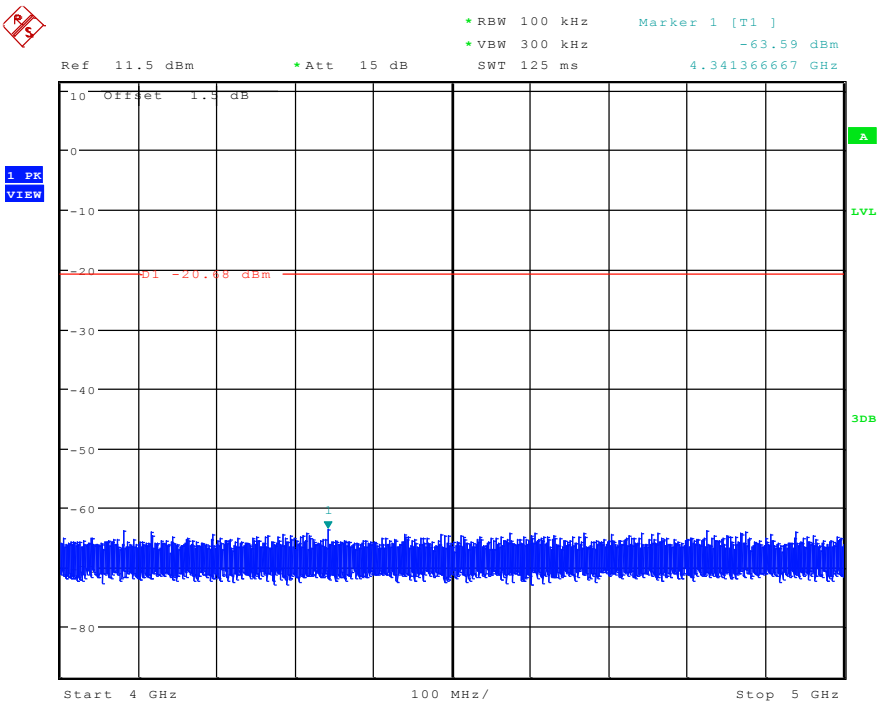
Test mode:	802.11g	Test channel:	Middle



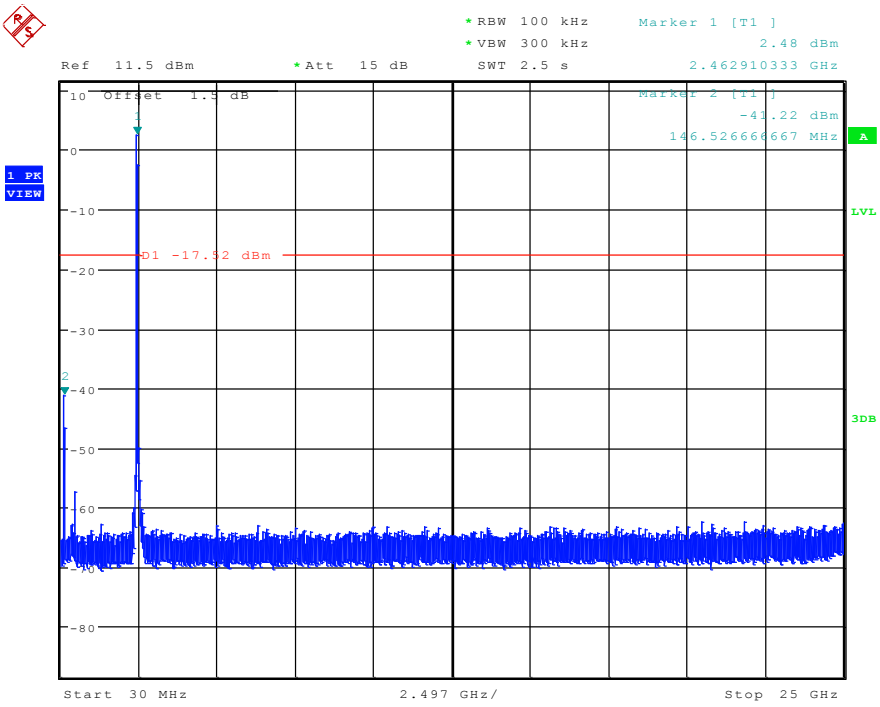


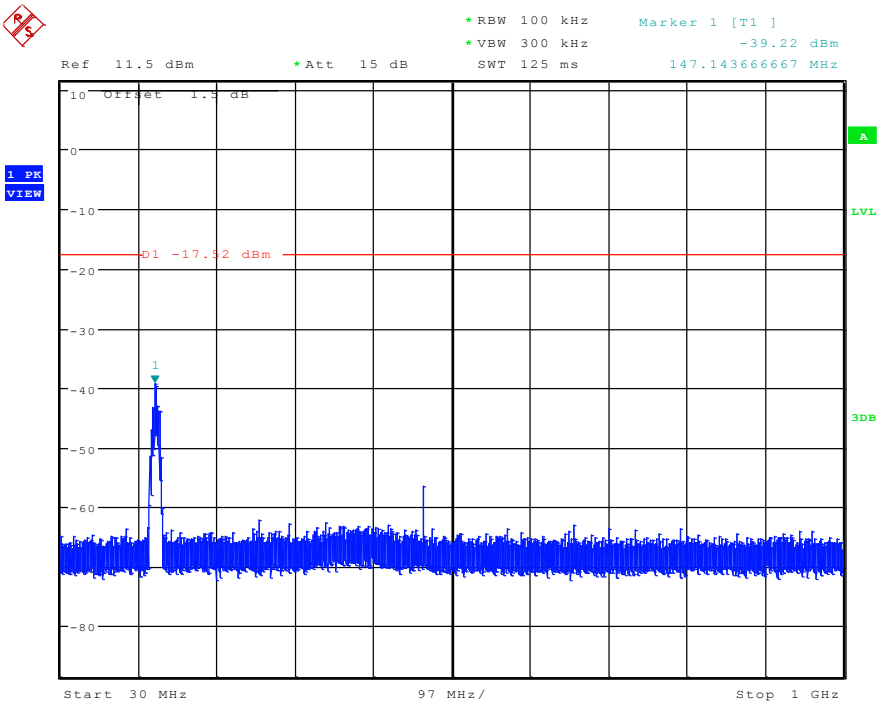

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.08 dBm
1.220700000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -20.68 dBm
Start 1 GHz
100 MHz/
Stop 2 GHz

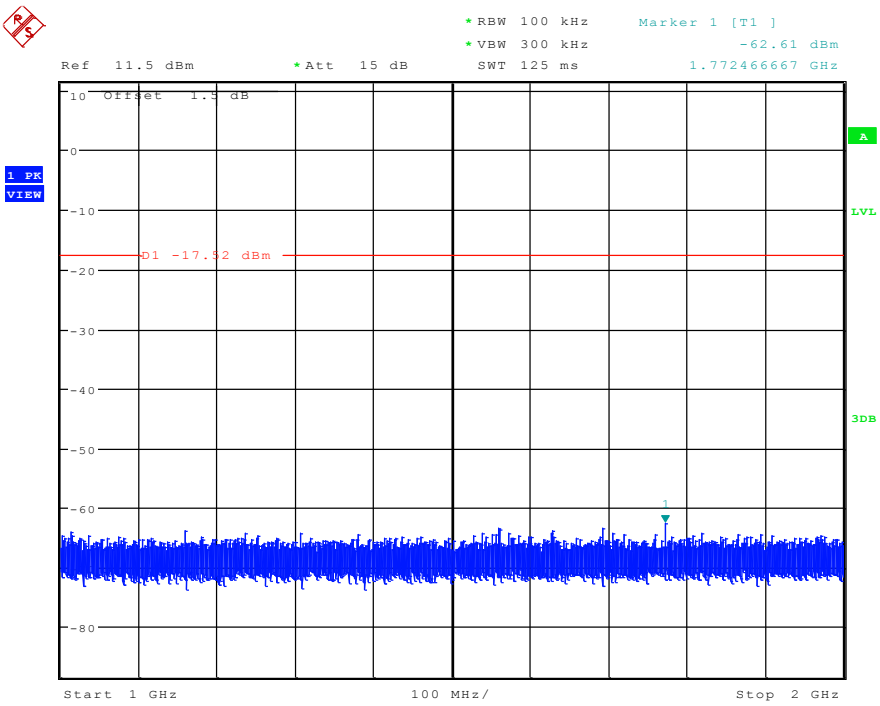

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
1.96 dBm
2.438233333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -20.68 dBm
Start 2 GHz
100 MHz/
Stop 3 GHz

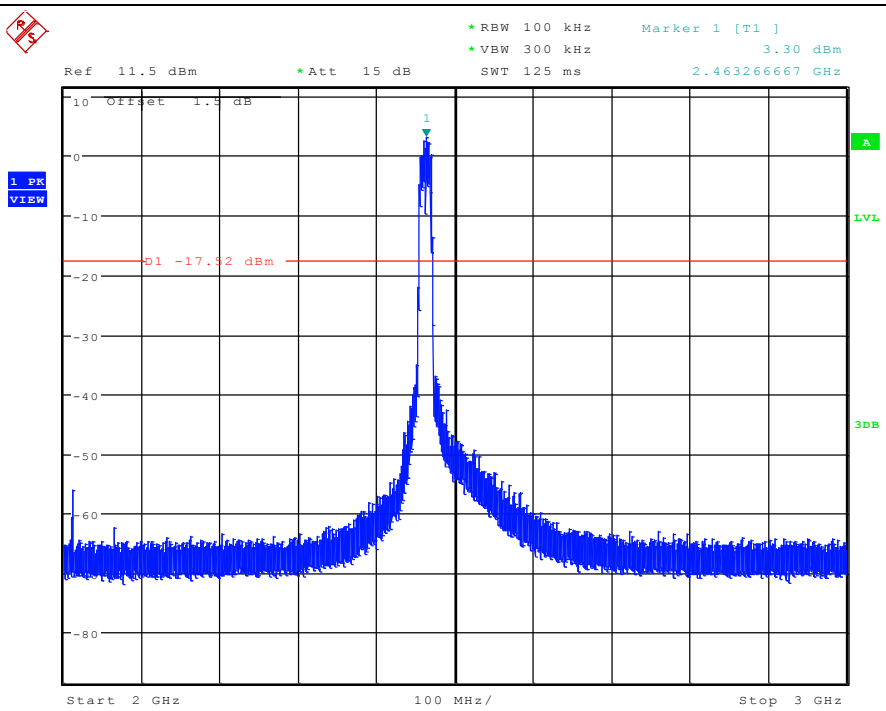

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.59 dBm
4.341366667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -20.68 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

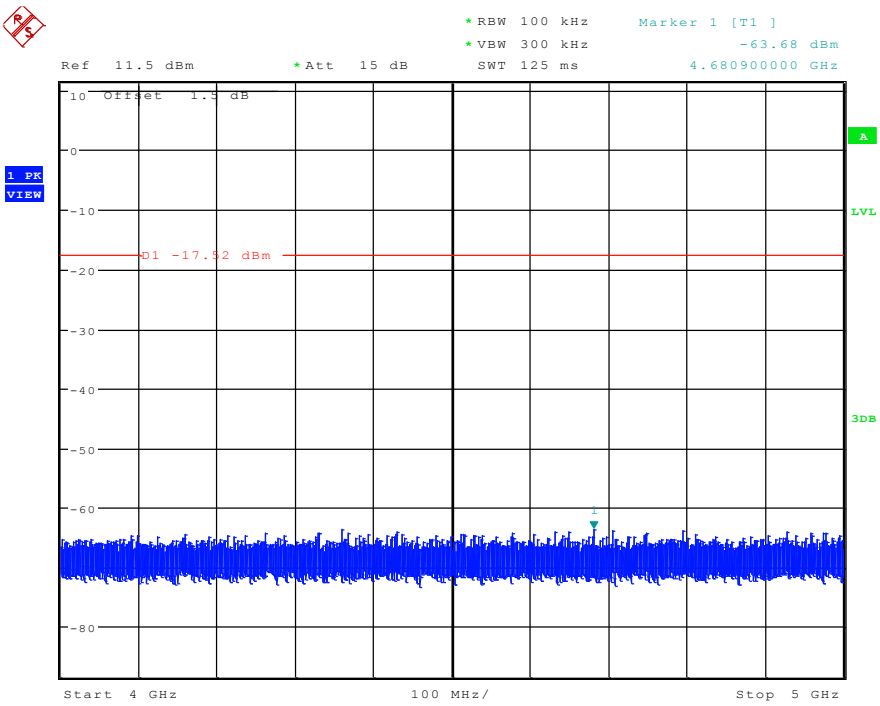
Test mode:	802.11g	Test channel:	Highest



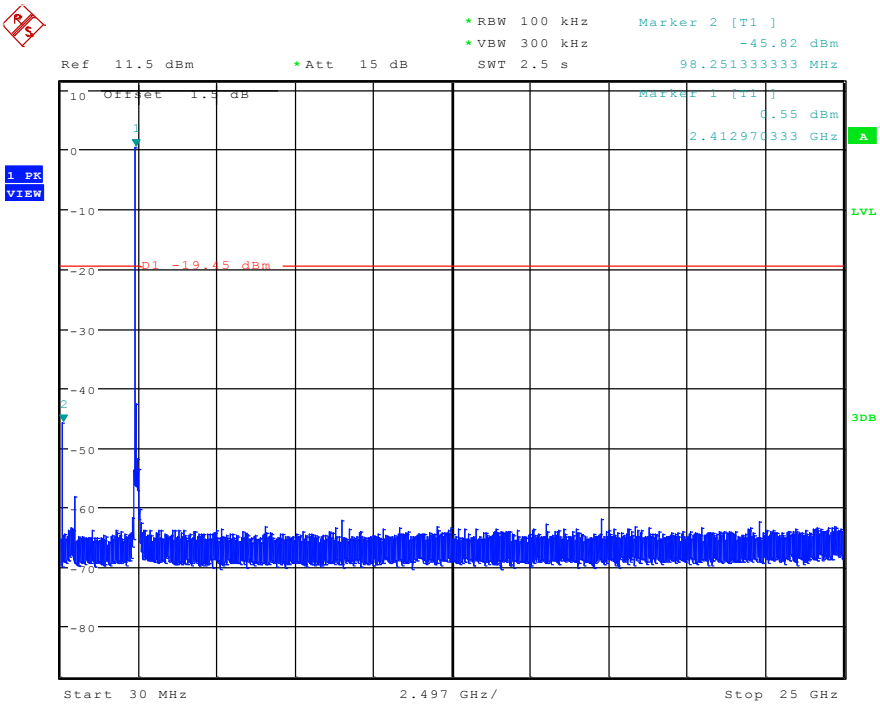


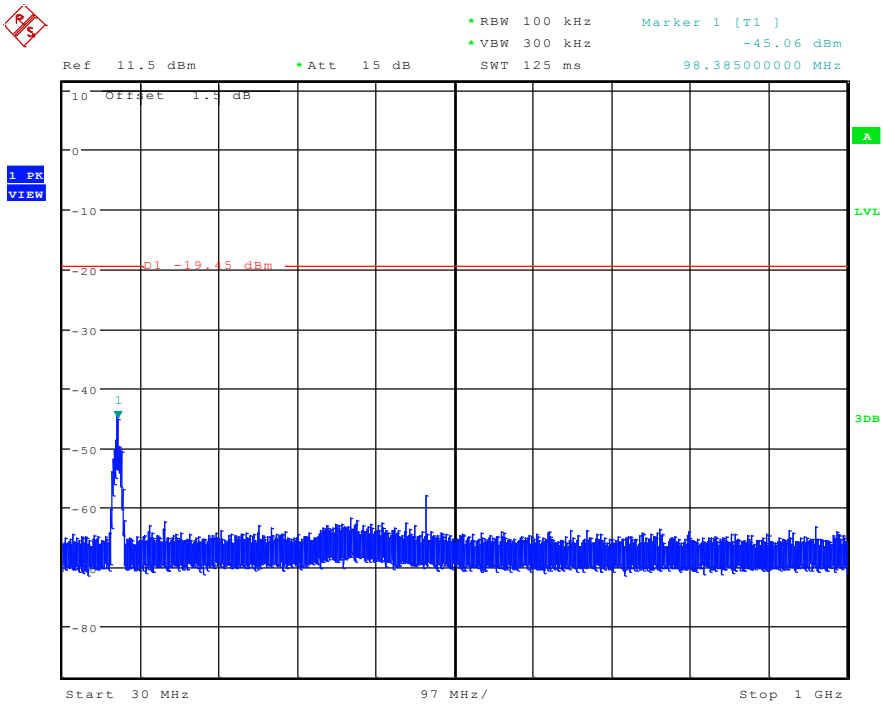

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-62.61 dBm
1.772466667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -17.32 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

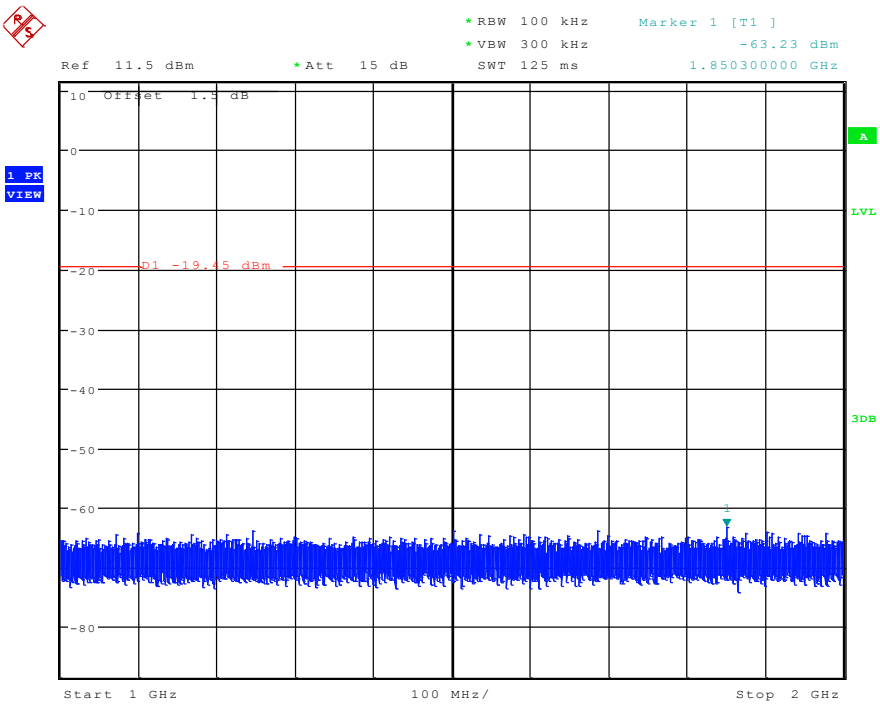

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
3.30 dBm
2.463266667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -17.32 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

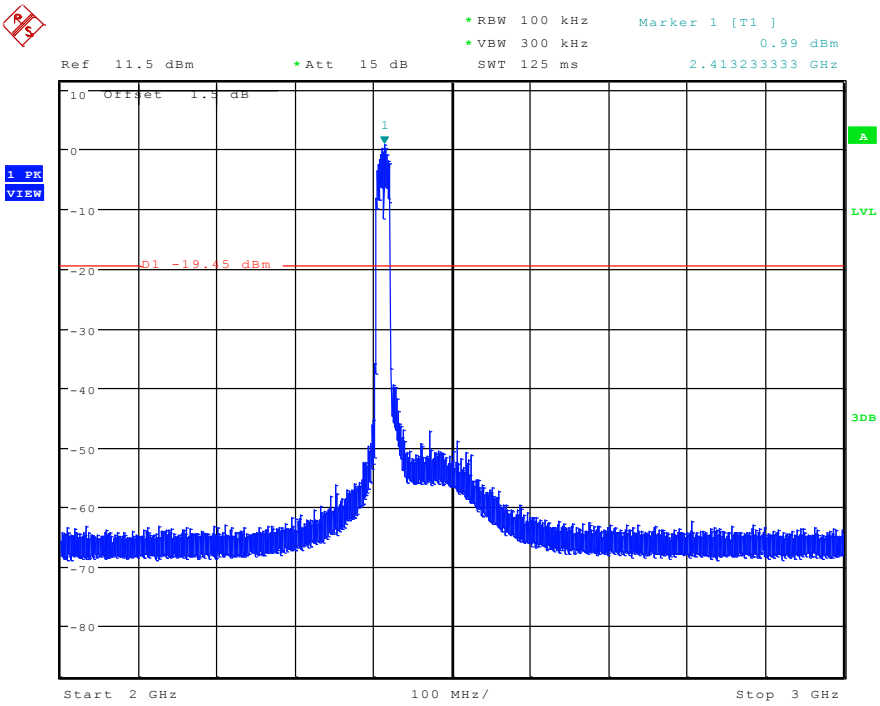

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.68 dBm
4.680900000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -17.32 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

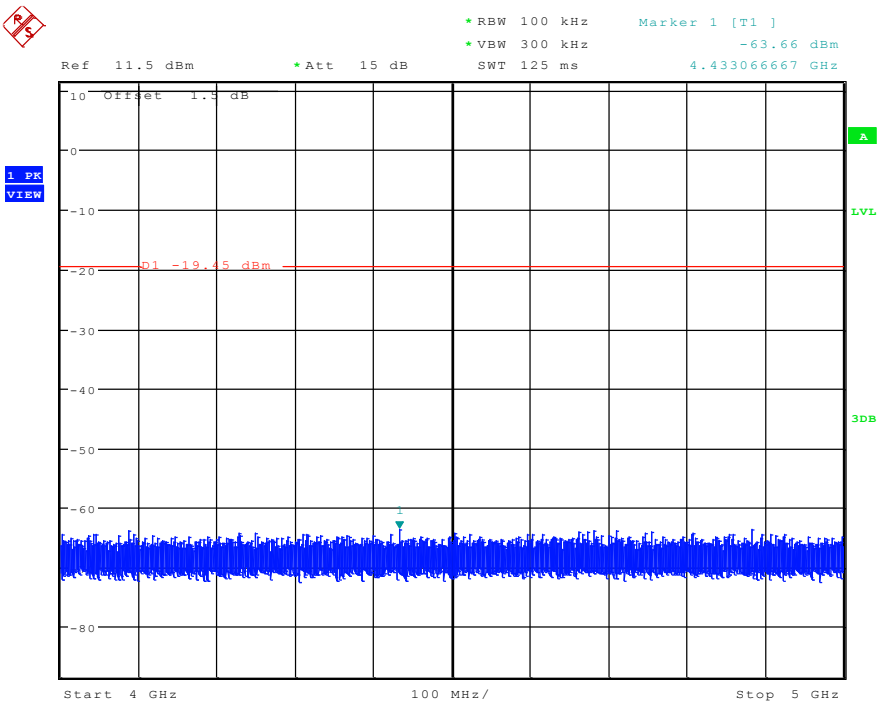
Test mode:	802.11n(HT20)	Test channel:	Lowest



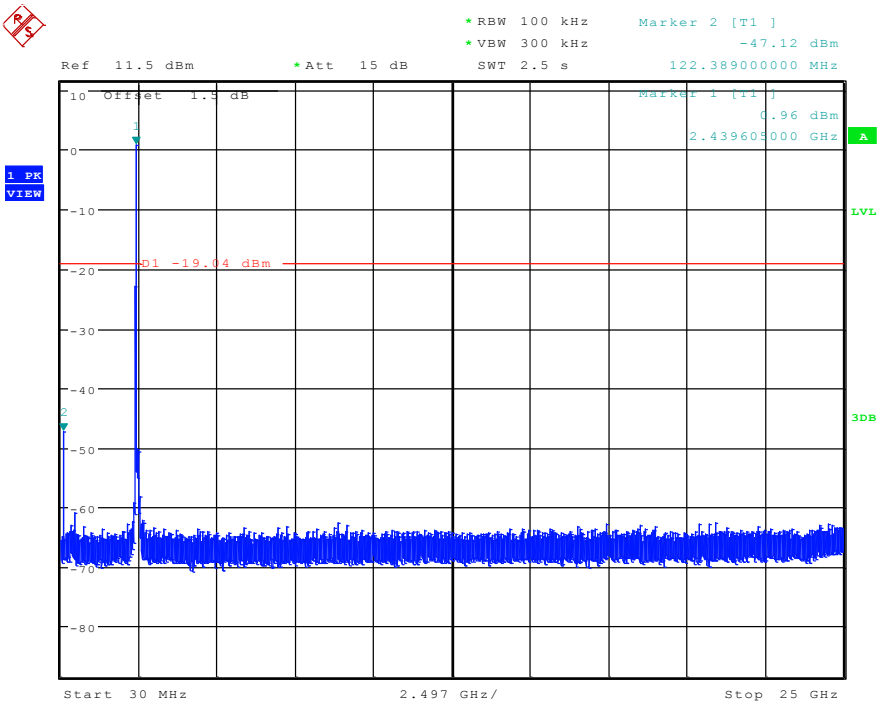


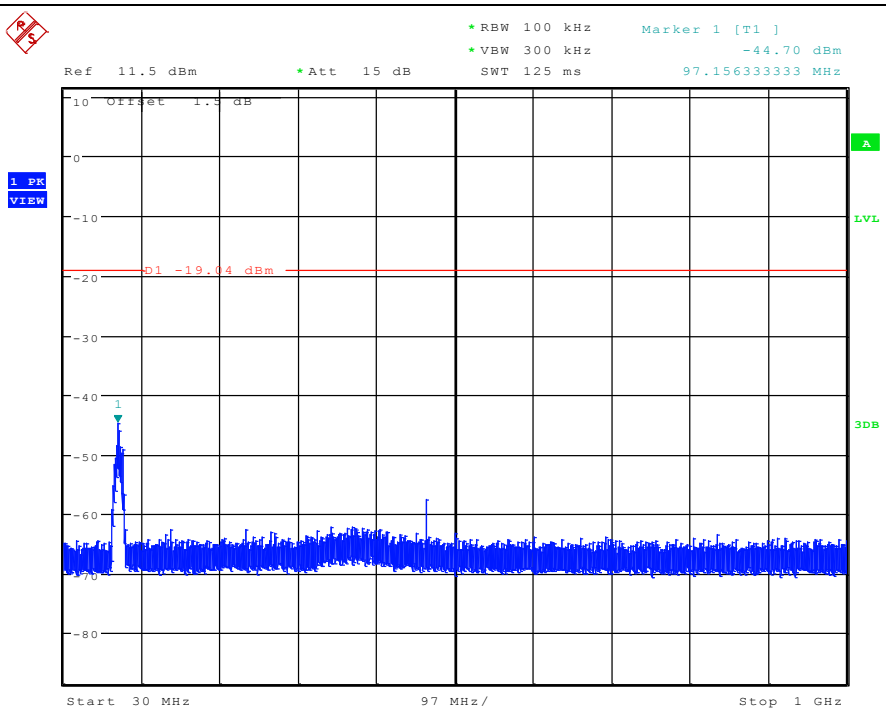

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.23 dBm
1.850300000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -19.45 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

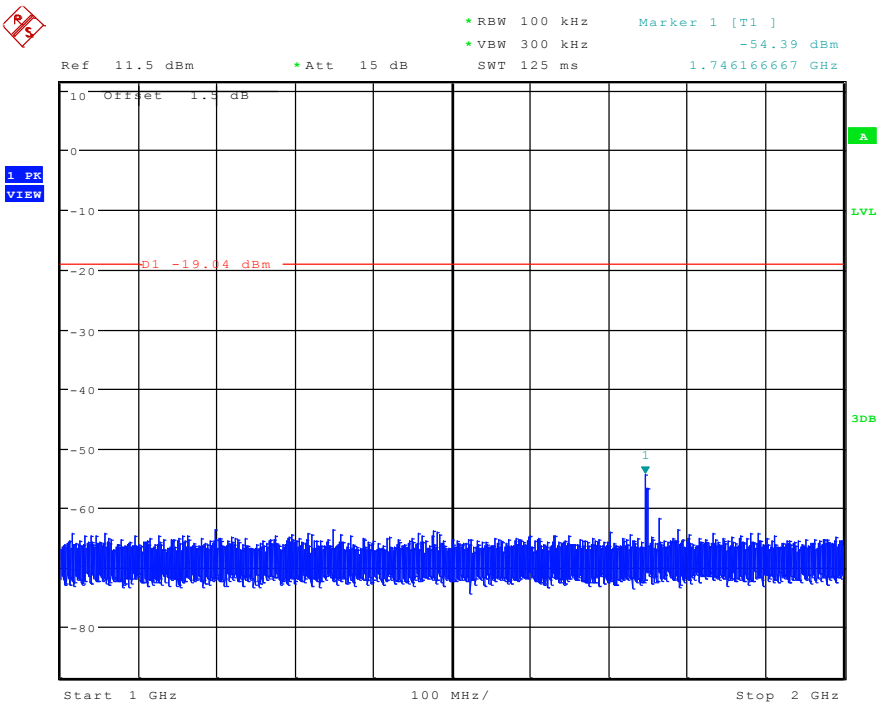

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
0.99 dBm
2.413233333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -19.45 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

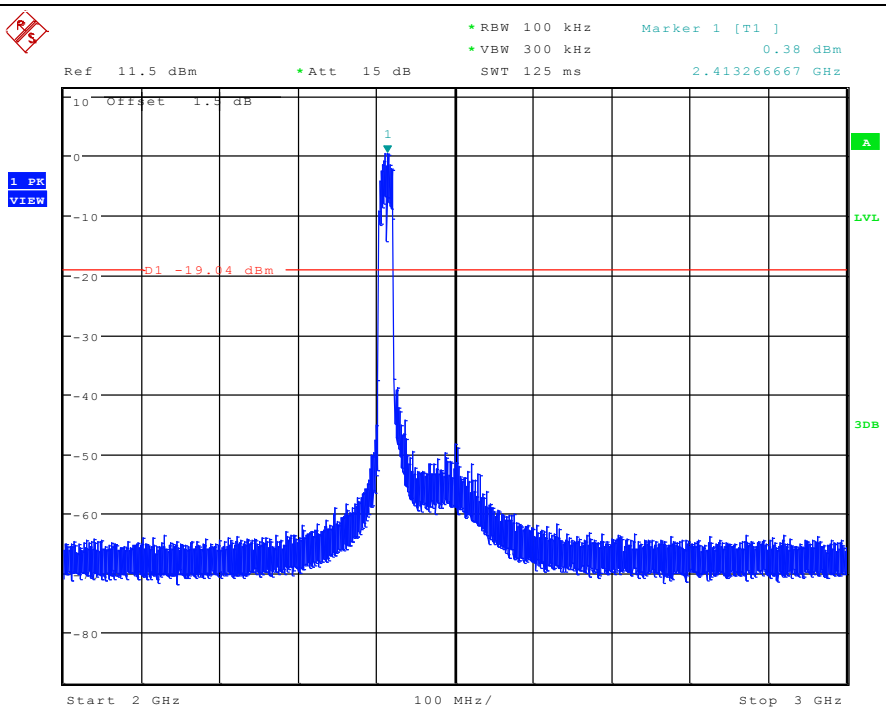

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.66 dBm
4.433066667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -19.45 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

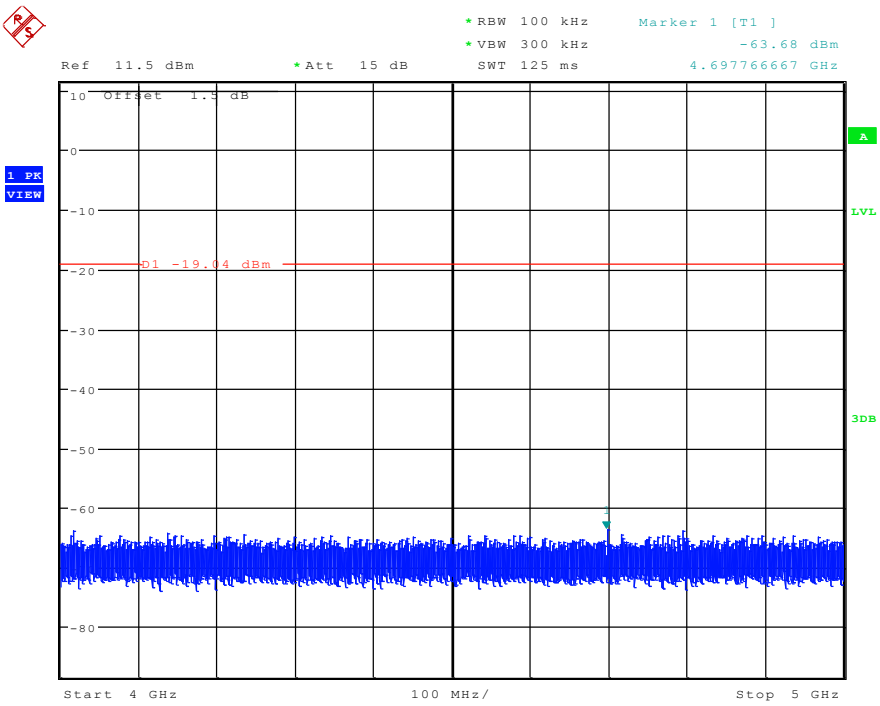
Test mode:	802.11n(HT20)	Test channel:	Middle



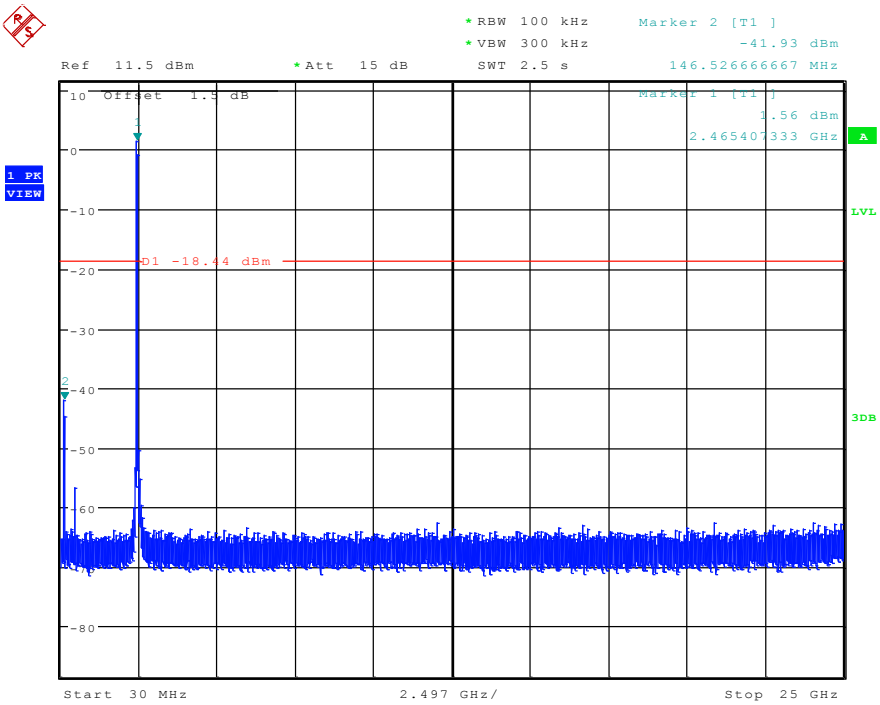


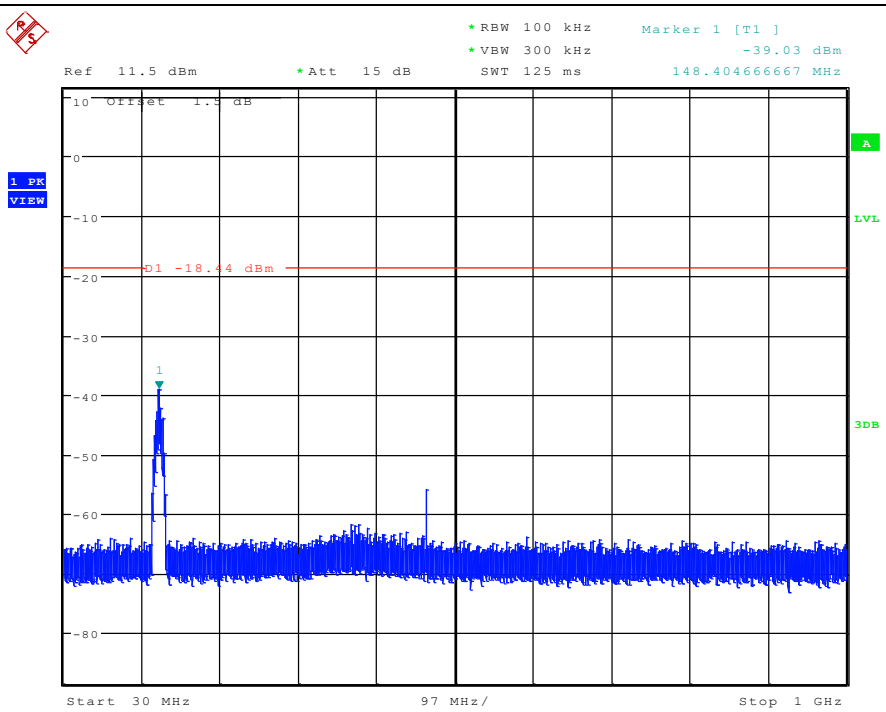

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-54.39 dBm
1.746166667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -19.04 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

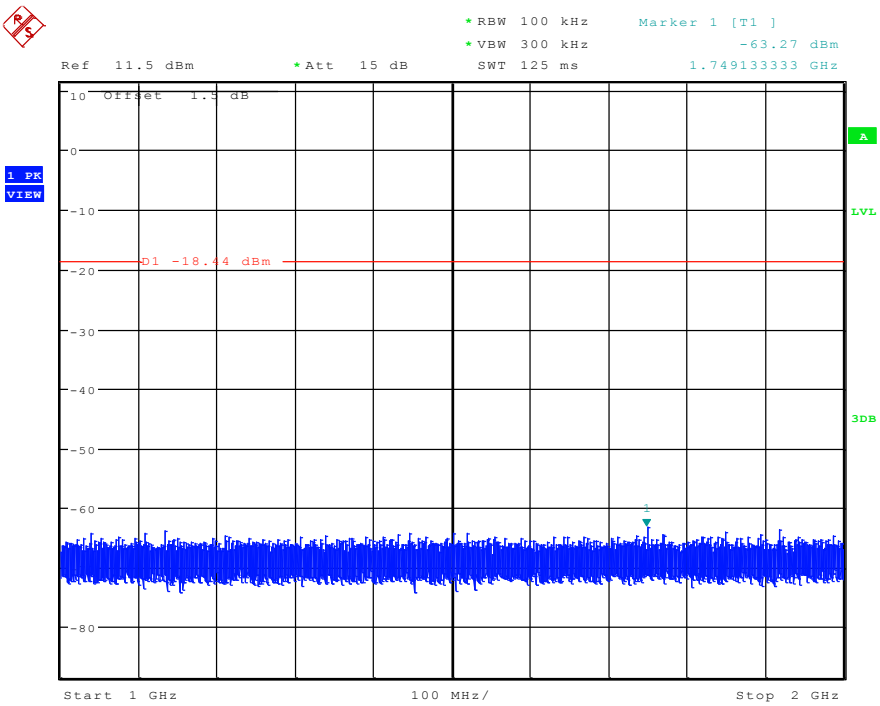

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
0.38 dBm
2.413266667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -19.04 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

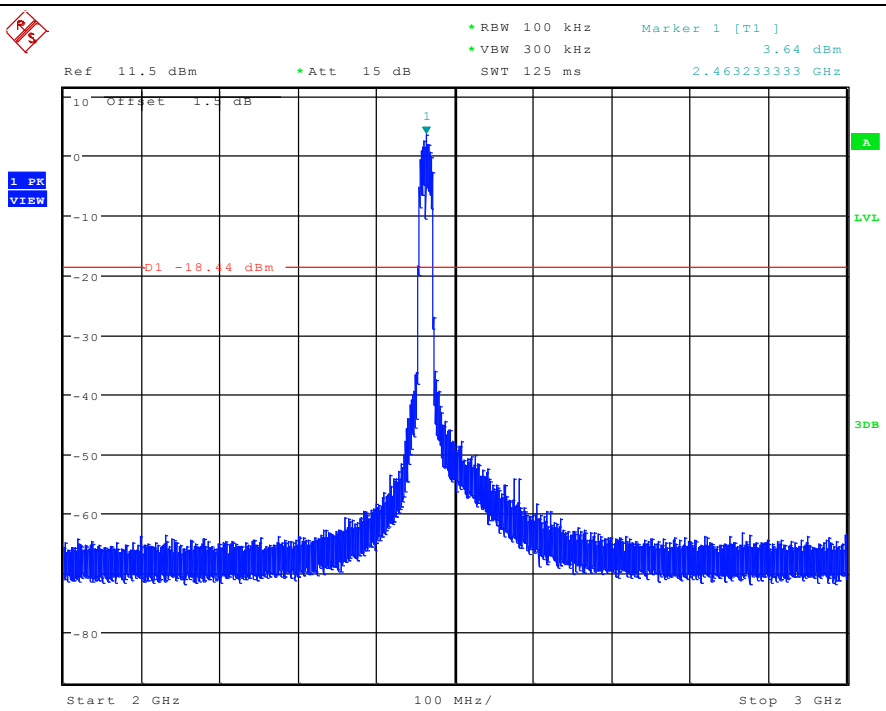

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.68 dBm
4.697766667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -19.04 dBm
A
LVL
3DB
Start 4 GHz
100 MHz/
Stop 5 GHz

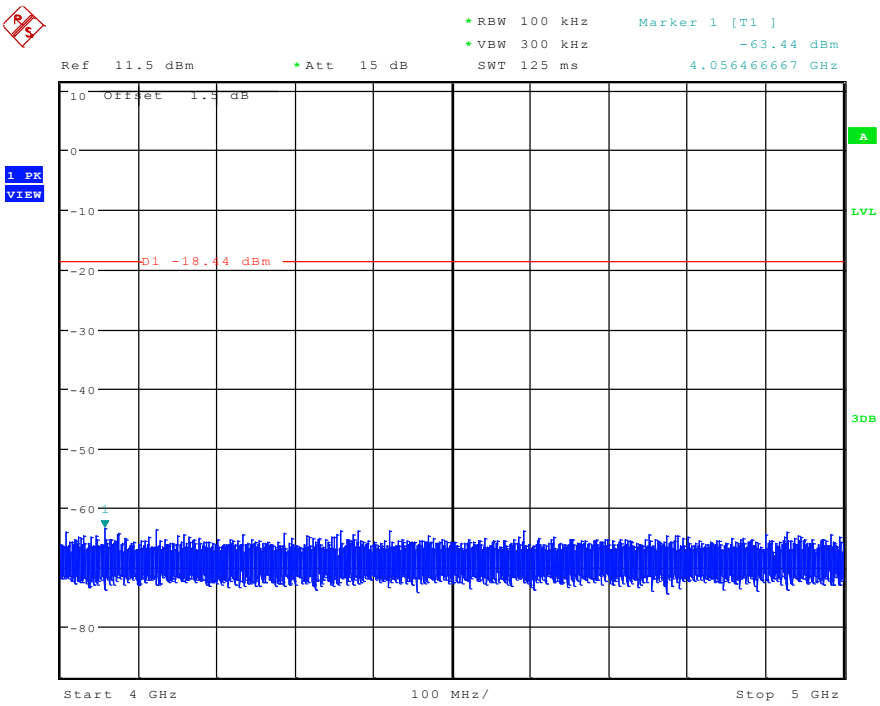
Test mode:	802.11n(HT20)	Test channel:	Highest



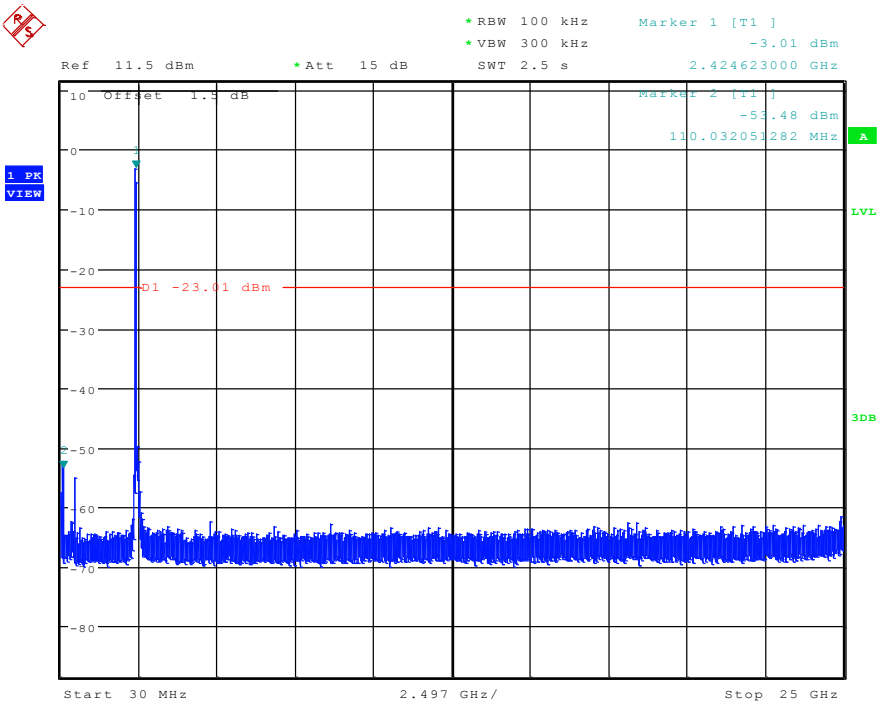


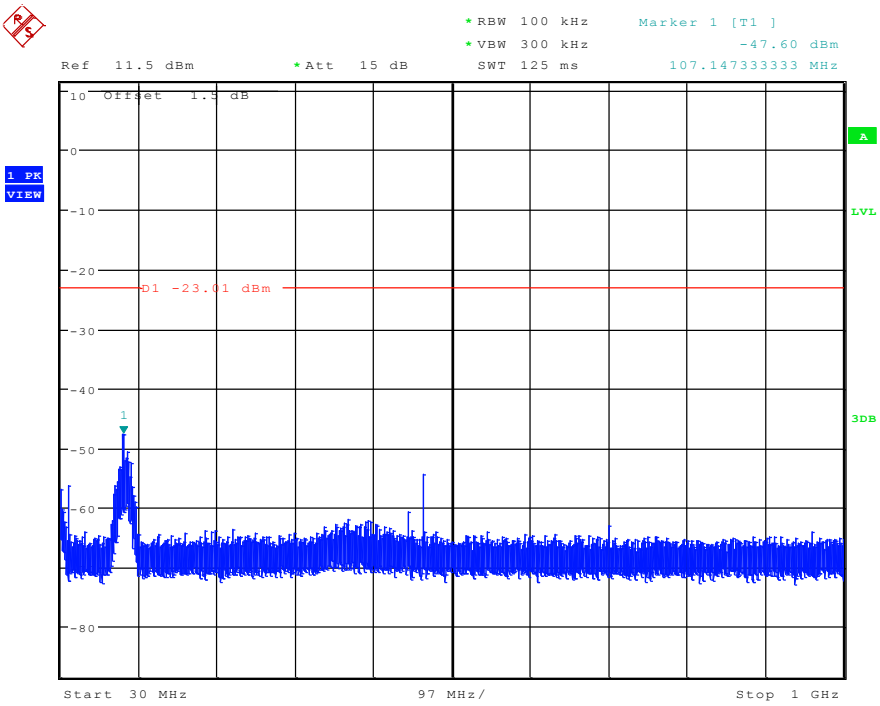

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.27 dBm
1.749133333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -18.44 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

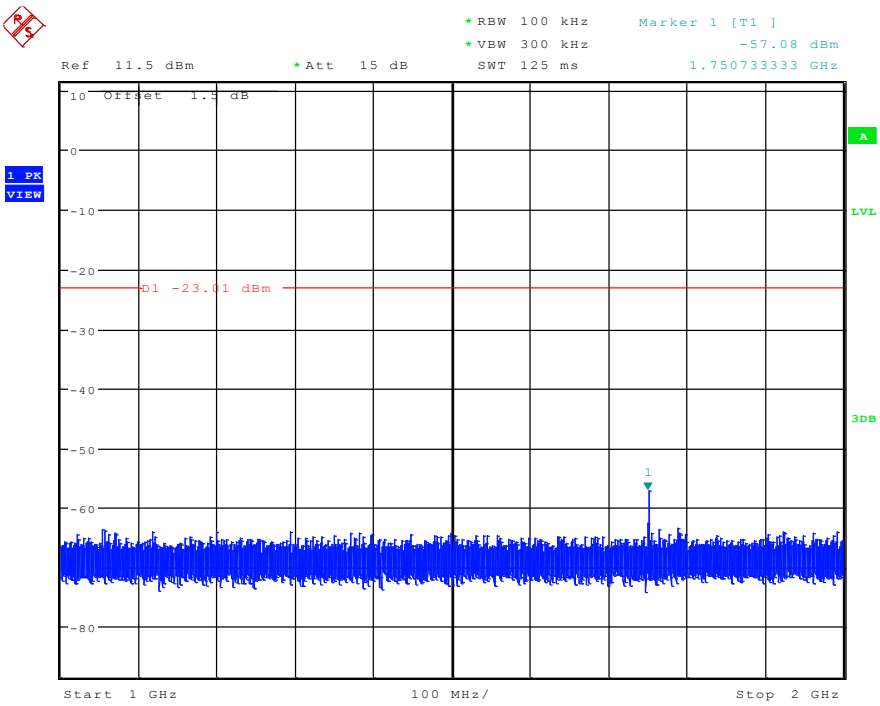

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
3.64 dBm
2.463233333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -18.44 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

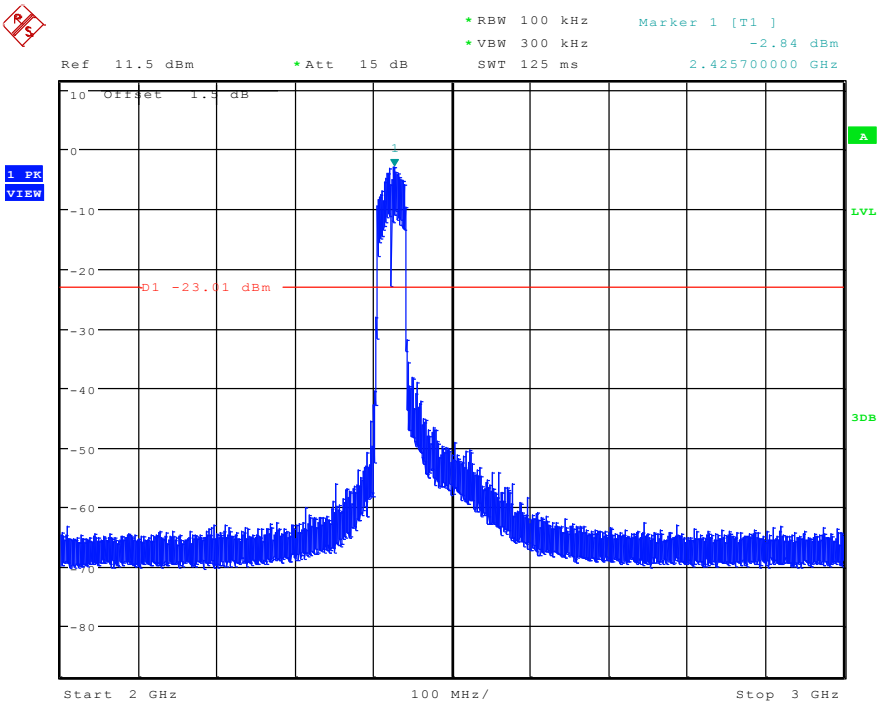

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.44 dBm
4.056466667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -18.44 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

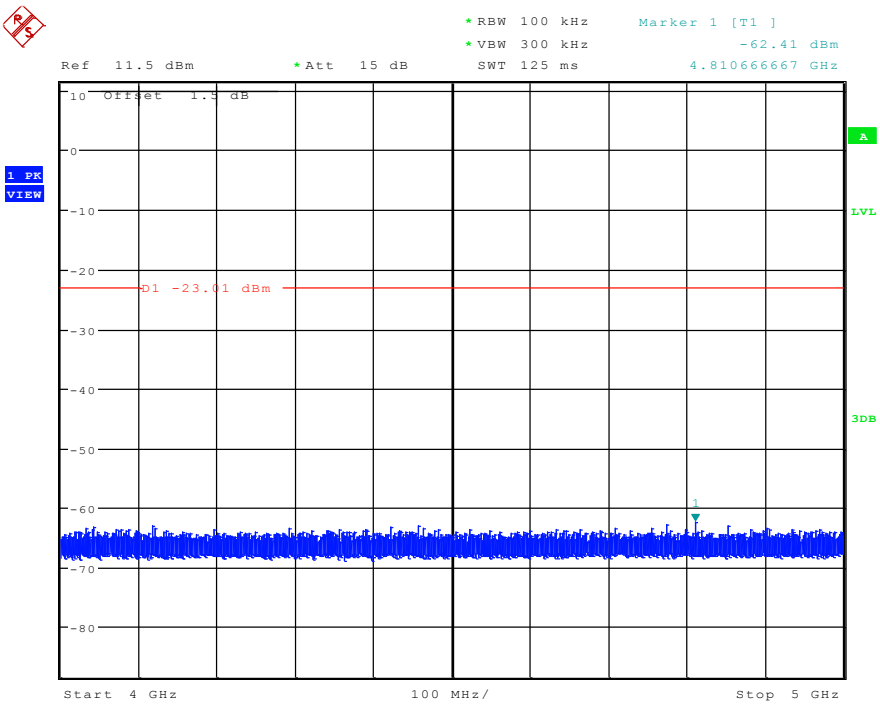
Test mode:	802.11n(HT40)	Test channel:	Lowest



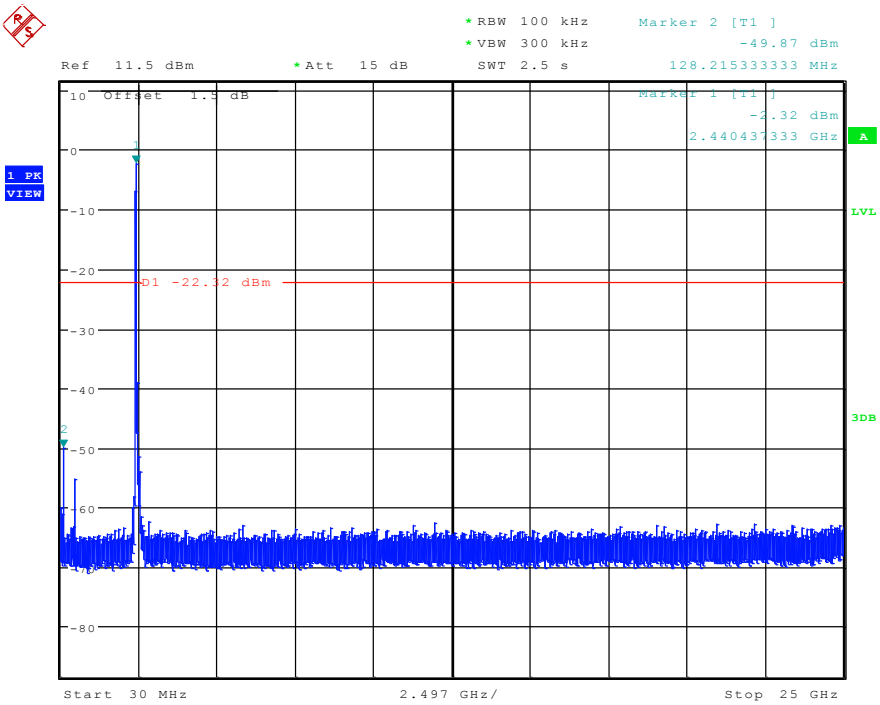


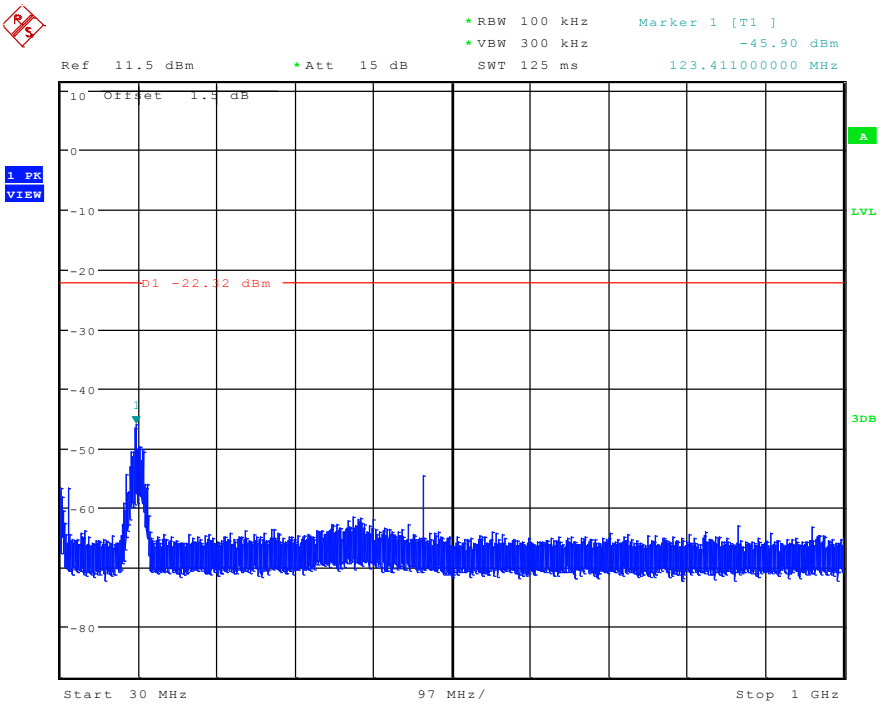

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-57.08 dBm
1.750733333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -23.01 dBm
Start 1 GHz
100 MHz/
Stop 2 GHz

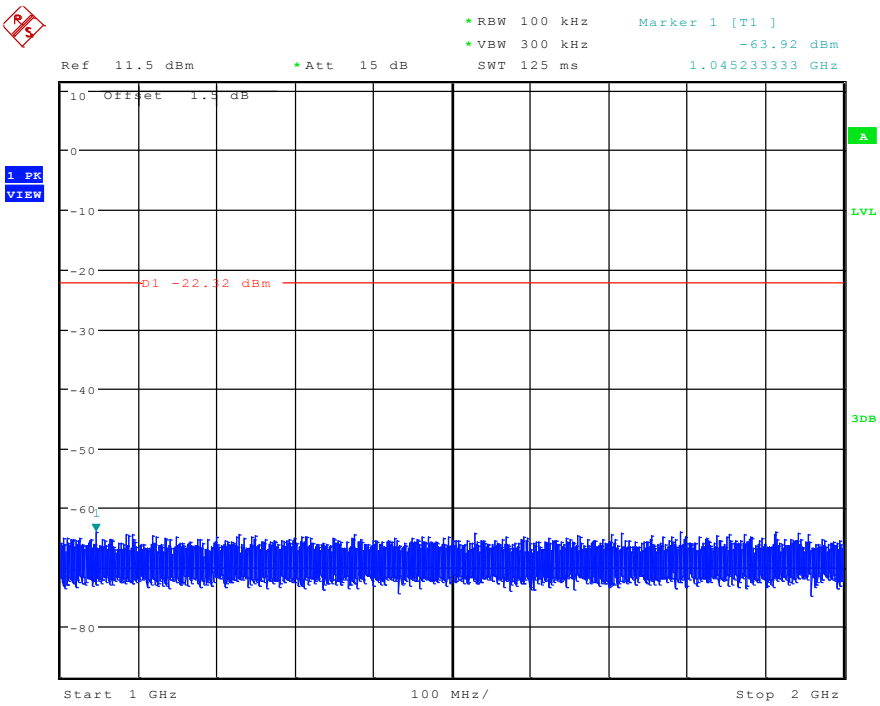

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-2.84 dBm
2.425700000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -23.01 dBm
Start 2 GHz
100 MHz/
Stop 3 GHz

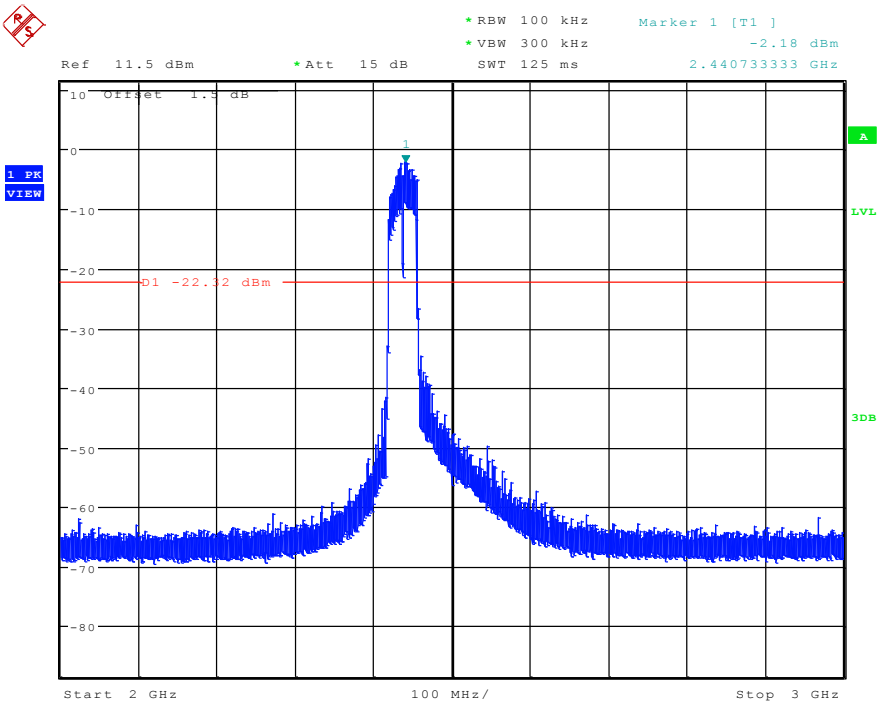

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-62.41 dBm
4.810666667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -23.01 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

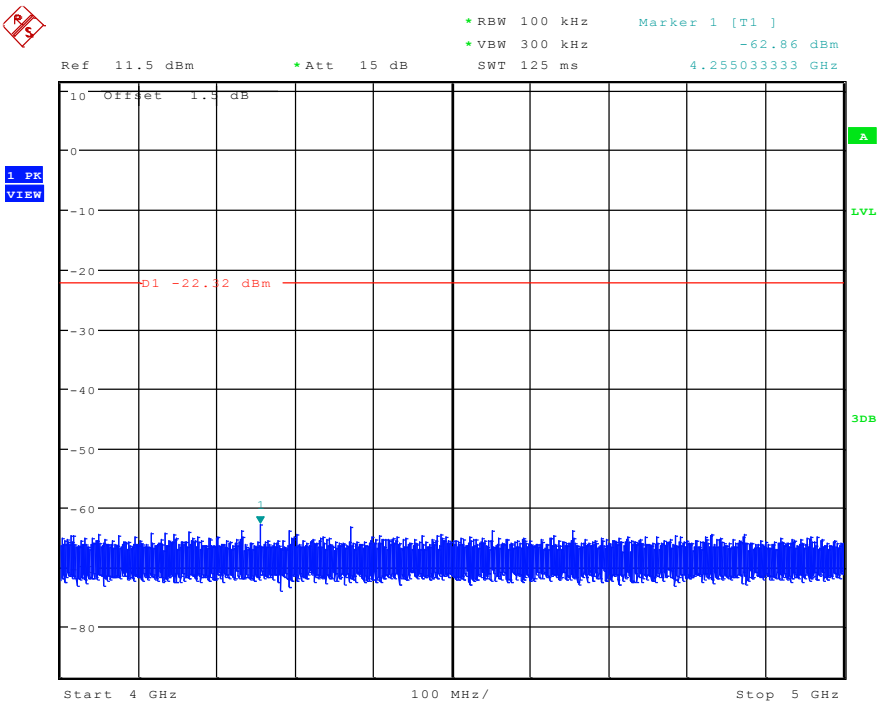
Test mode:	802.11n(HT40)	Test channel:	Middle



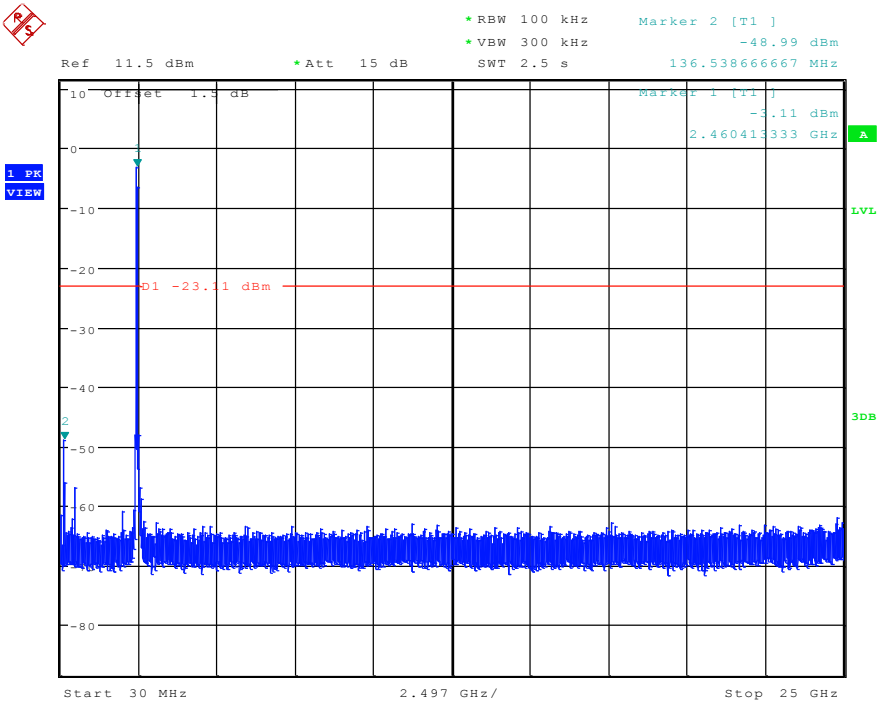


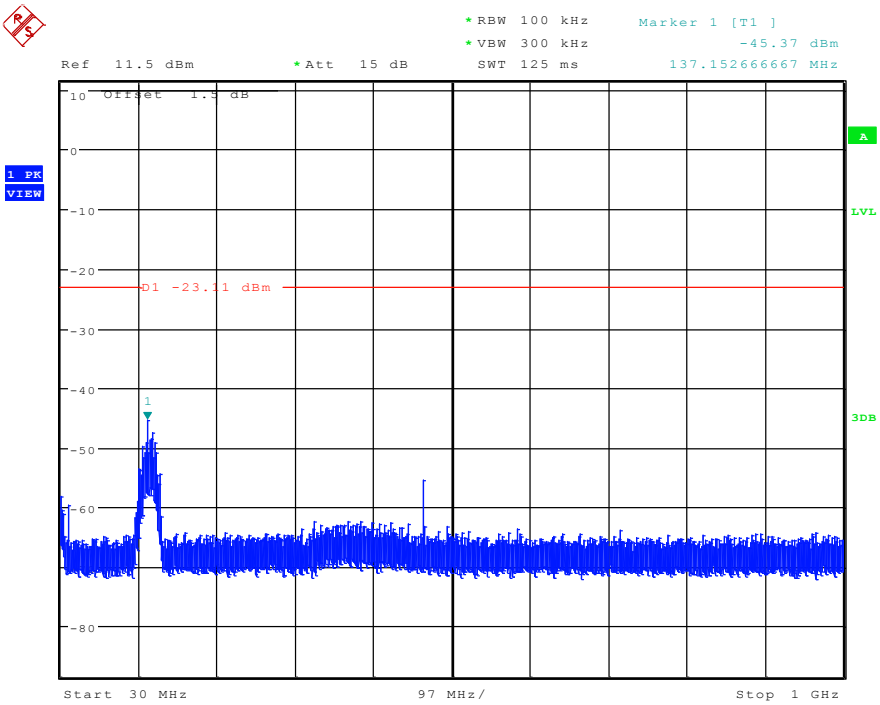

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-63.92 dBm
1.045233333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -22.32 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz

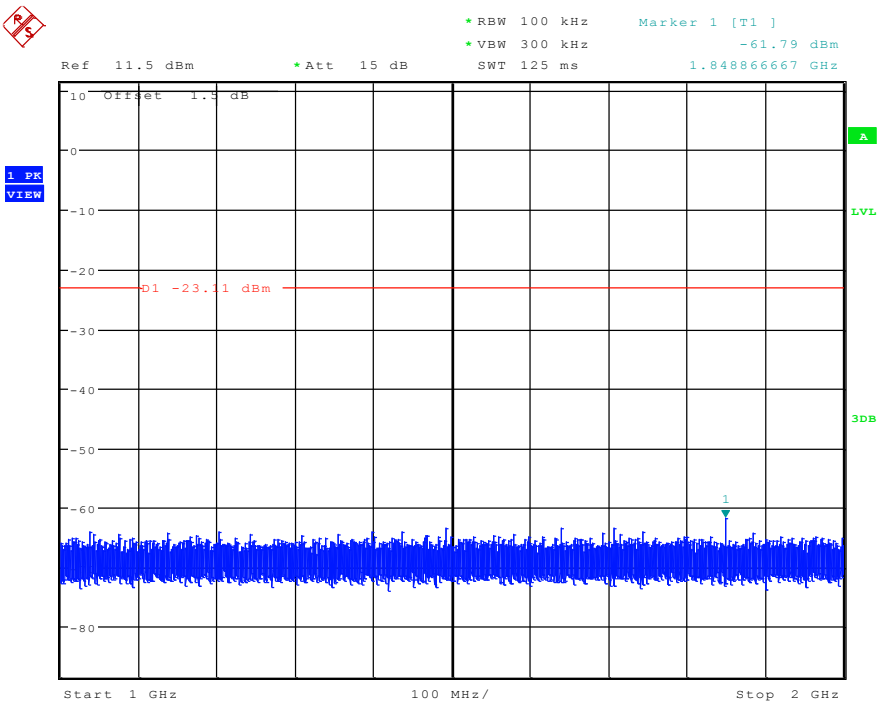

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-2.18 dBm
2.440733333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -22.32 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz

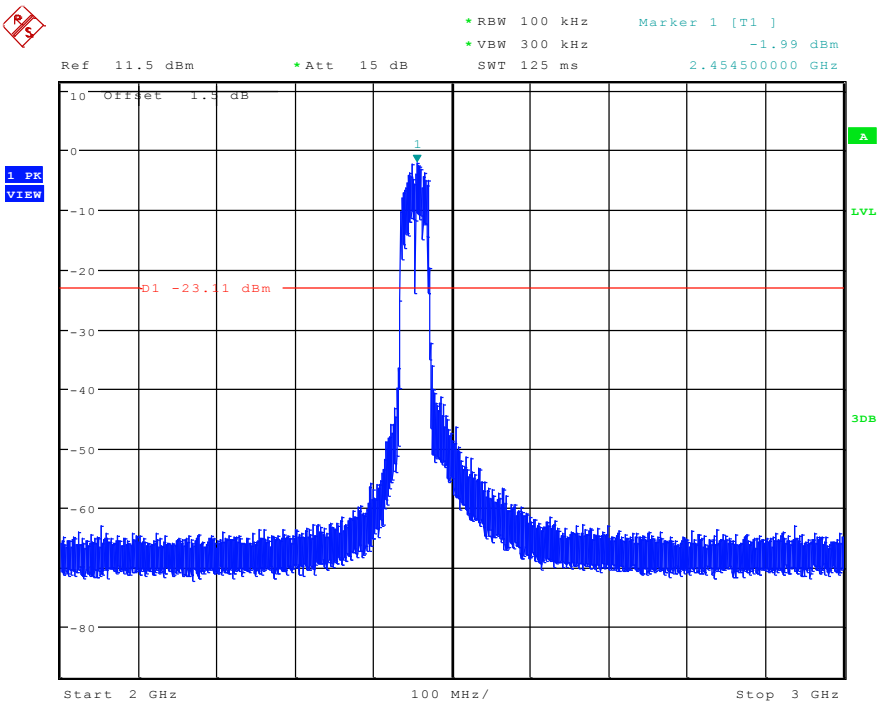

RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-62.86 dBm
4.255033333 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -22.32 dBm
Start 4 GHz
100 MHz/
Stop 5 GHz

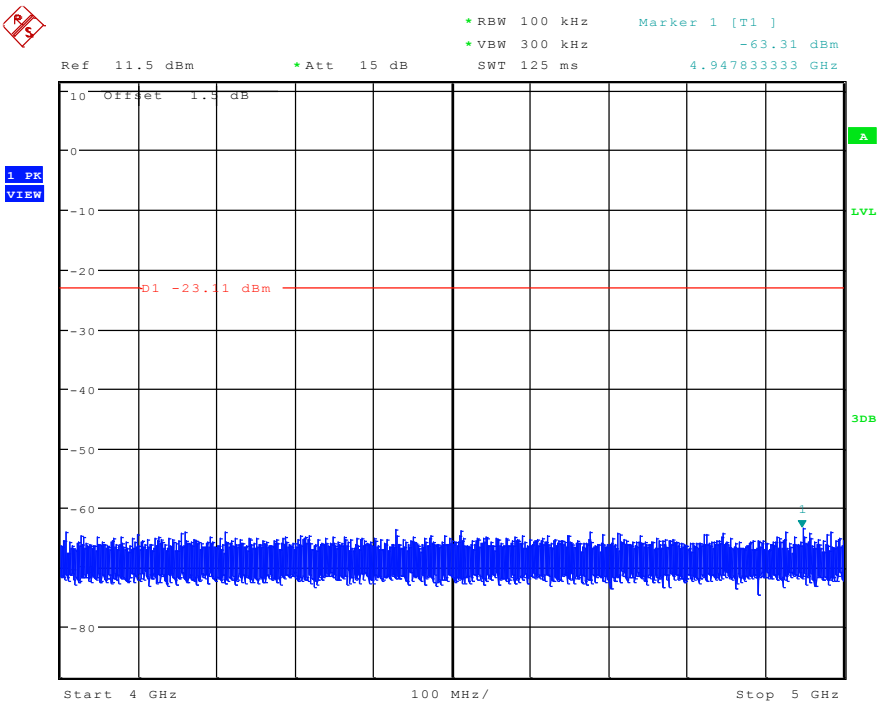
Test mode:	802.11n(HT40)	Test channel:	Highest






RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-61.79 dBm
1.848866667 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -23.11 dBm
A
LVL
3DB
Start 1 GHz
100 MHz/
Stop 2 GHz


RBW 100 kHz
VBW 300 kHz
SWT 125 ms
Marker 1 [T1]
-1.99 dBm
2.454500000 GHz
Ref 11.5 dBm
Att 15 dB
Offset 1.5 dB
1 PK
VIEW
D1 -23.11 dBm
A
LVL
3DB
Start 2 GHz
100 MHz/
Stop 3 GHz



Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205
Test Method:	ANSI C63.10 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

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 Setup:	

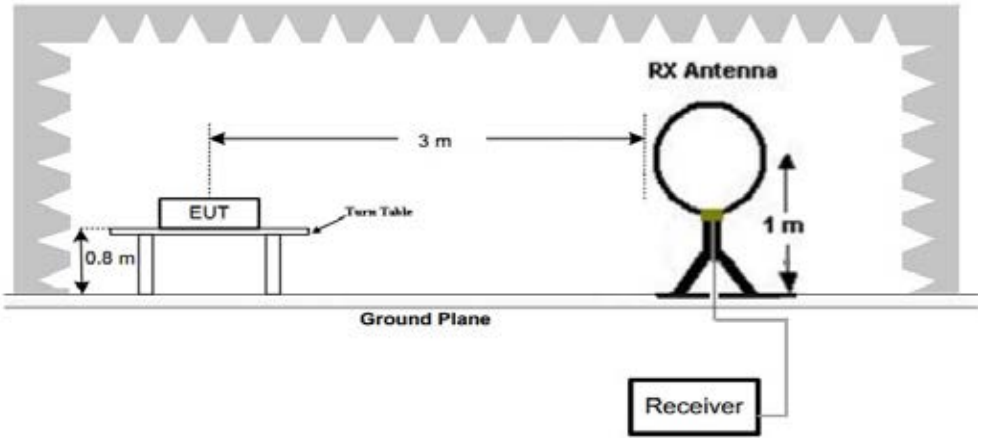


Figure 1. Below 30MHz

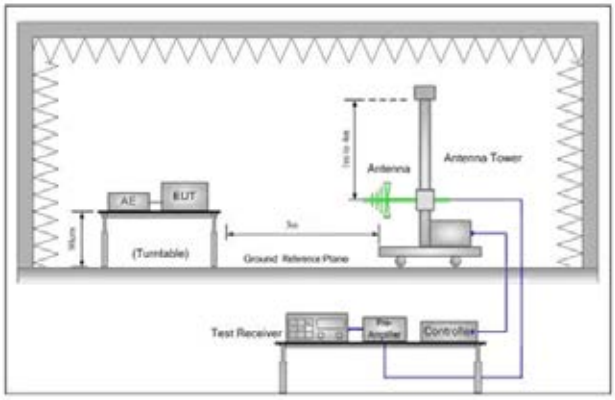


Figure 2. 30MHz to 1GHz

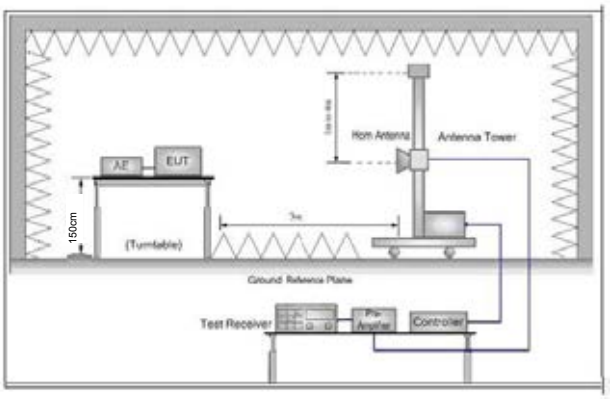


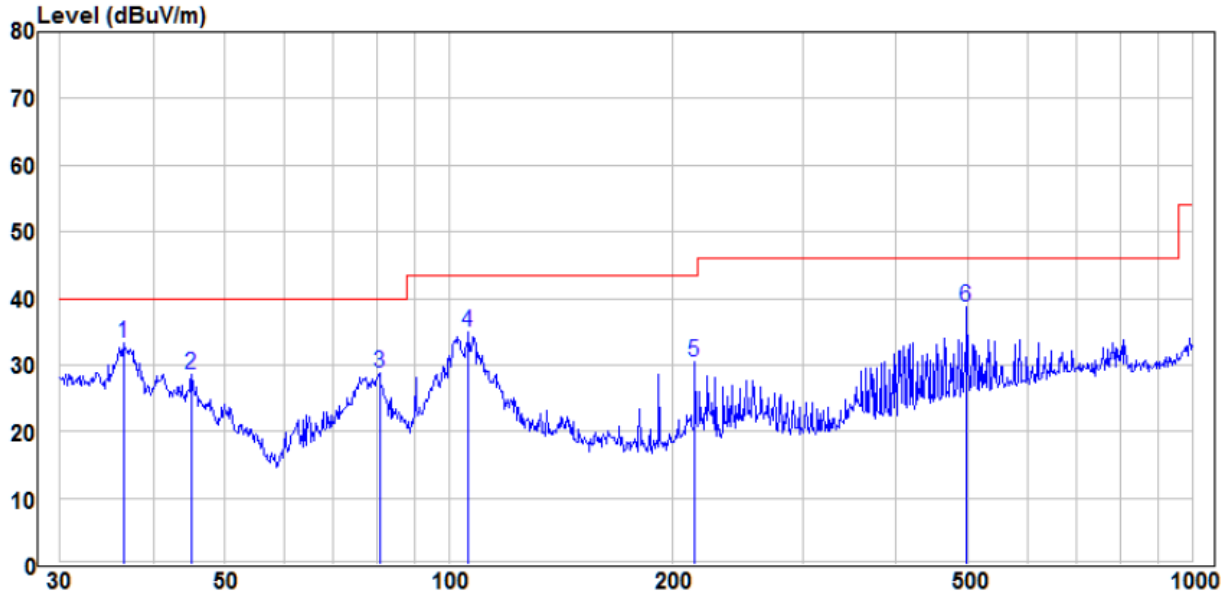
Figure 3. Above 1 GHz

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for

	the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40) For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11b at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

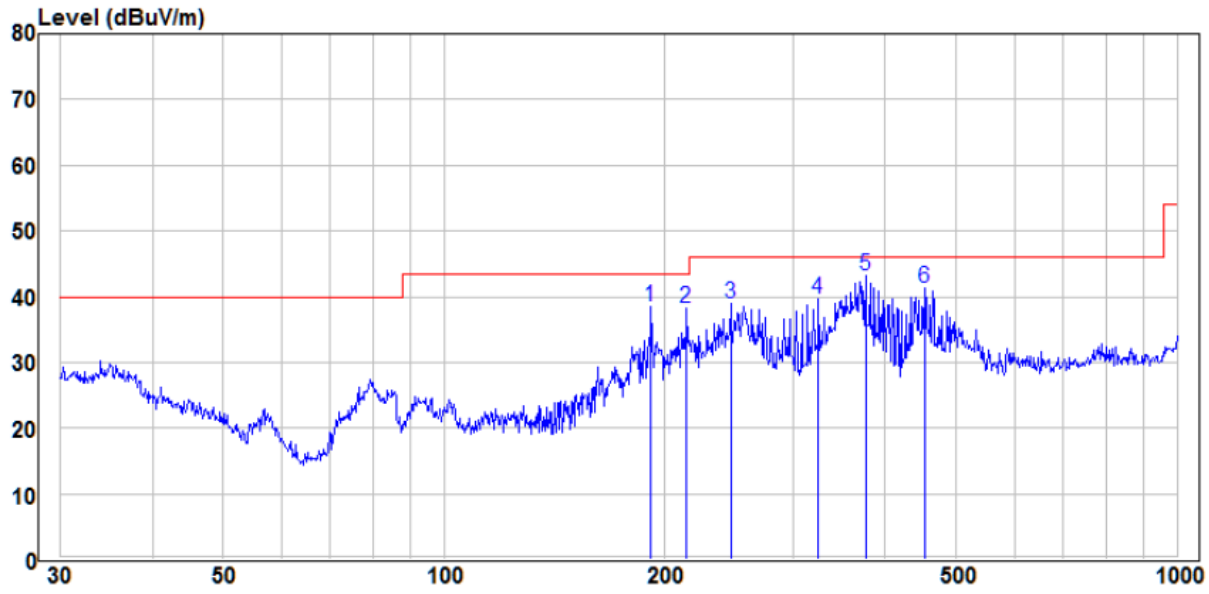
6.8.1 Radiated emission below 1GHz

30MHz~1GHz		
Test mode:	Transmitting	Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	36.51	15.80	17.44	33.24	40.00	-6.76	Peak	VERTICAL
2	45.06	16.64	11.86	28.50	40.00	-11.50	Peak	VERTICAL
3	80.64	18.88	9.90	28.78	40.00	-11.22	Peak	VERTICAL
4	106.39	24.47	10.38	34.85	43.50	-8.65	Peak	VERTICAL
5	214.51	20.36	10.01	30.37	43.50	-13.13	Peak	VERTICAL
6	497.68	21.54	17.11	38.65	46.00	-7.35	Peak	VERTICAL

Test mode:	Transmitting	Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	191.75	30.38	8.04	38.42	43.50	-5.08	Peak	HORIZONTAL
2	214.51	28.16	10.01	38.17	43.50	-5.33	Peak	HORIZONTAL
3	245.95	29.77	9.09	38.86	46.00	-7.14	Peak	HORIZONTAL
4	324.46	27.82	11.87	39.69	46.00	-6.31	Peak	HORIZONTAL
5 pp	375.94	29.27	13.84	43.11	46.00	-2.89	Peak	HORIZONTAL
6	452.72	25.64	15.77	41.41	46.00	-4.59	Peak	HORIZONTAL

6.8.2 Transmitter emission above 1GHz

Test mode:	802.11b(1Mbps)	Test channel:	Lowest

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4824.000	52.19	-5.18	47.01	74	-26.99	peak	H
4824.000	37.66	-5.18	32.48	54	-21.52	AVG	H
7236.000	51.55	-6.45	45.10	74	-28.90	peak	H
7236.000	38.16	-6.45	31.71	54	-22.29	AVG	H
4824.000	53.60	-5.18	48.42	74	-25.58	peak	V
4824.000	39.12	-5.18	33.94	54	-20.06	AVG	V
7236.000	55.45	-6.45	49.00	74	-25.00	peak	V
7236.000	41.65	-6.45	35.20	54	-18.80	AVG	V

Test mode:	802.11b(1Mbps)	Test channel:	Middle

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4874.000	49.51	-5.19	44.32	74	-29.68	peak	H
4874.000	36.81	-5.19	31.62	54	-22.38	AVG	H
7311.000	49.29	-6.47	42.82	74	-31.18	peak	H
7311.000	35.96	-6.47	29.49	54	-24.51	AVG	H
4874.000	48.95	-5.19	43.76	74	-30.24	peak	V
4874.000	36.90	-5.19	31.71	54	-22.29	AVG	V
7311.000	48.62	-6.47	42.15	74	-31.85	peak	V
7311.000	35.73	-6.47	29.26	54	-24.74	AVG	V

Test mode:	802.11b(1Mbps)	Test channel:	Highest

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4924.000	50.95	-5.2	45.75	74	-28.25	peak	H
4924.000	37.27	-5.2	32.07	54	-21.93	AVG	H
7386.000	49.53	-6.47	43.06	74	-30.94	peak	H
7386.000	37.43	-6.47	30.96	54	-23.04	AVG	H
4924.000	50.19	-5.2	44.99	74	-29.01	peak	V
4924.000	37.53	-5.2	32.33	54	-21.67	AVG	V
7386.000	49.77	-6.47	43.30	74	-30.70	peak	V
7386.000	37.23	-6.47	30.76	54	-23.24	AVG	V

Remark:

1) The 1Mbps of rate of 802.11b is the worst case.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz,The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

6.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205
Test Method:	ANSI C63.10 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	

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

Test Setup:

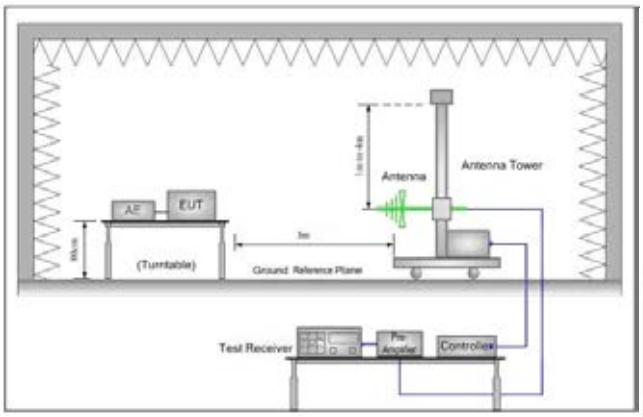


Figure 1. 30MHz to 1GHz

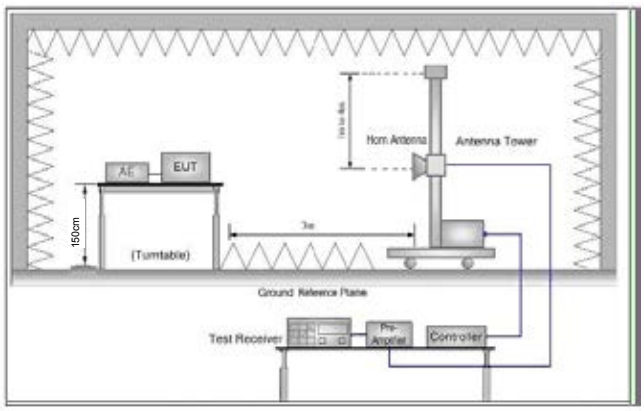


Figure 2. Above 1 GHz

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

	d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel g. Test the EUT in the lowest channel , the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40) Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Test data:

Worse case mode:		802.11b(1Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	48.92	-4.36	44.56	74	-29.44	peak	H
2390.000	35.66	-4.36	31.30	54	-22.70	AVG	H
2400.000	53.01	-4.36	48.65	74	-25.35	peak	H
2400.000	40.14	-4.36	35.78	54	-18.22	AVG	H
2390.000	48.86	-4.36	44.50	74	-29.50	peak	V
2390.000	34.58	-4.36	30.22	54	-23.78	AVG	V
2400.000	53.22	-4.36	48.86	74	-25.14	peak	V
2400.000	40.30	-4.36	35.94	54	-18.06	AVG	V

Worse case mode:		802.11b(1Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	52.28	-4.22	48.06	74	-25.94	peak	H
2483.500	35.98	-4.22	31.76	54	-22.24	AVG	H
2483.500	51.24	-4.22	47.02	74	-26.98	peak	V
2483.500	37.64	-4.22	33.42	54	-20.58	AVG	V

Worse case mode:		802.11g(6Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	48.40	-4.36	44.04	74	-29.96	peak	H
2390.000	35.05	-4.36	30.69	54	-23.31	AVG	H
2400.000	54.47	-4.36	50.11	74	-23.89	peak	H
2400.000	41.01	-4.36	36.65	54	-17.35	AVG	H
2390.000	49.23	-4.36	44.87	74	-29.13	peak	V
2390.000	34.53	-4.36	30.17	54	-23.83	AVG	V
2400.000	54.11	-4.36	49.75	74	-24.25	peak	V
2400.000	41.72	-4.36	37.36	54	-16.64	AVG	V

Worse case mode:		802.11g(6Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	52.26	-4.22	48.04	74	-25.96	peak	H
2483.500	35.67	-4.22	31.45	54	-22.55	AVG	H
2483.500	51.37	-4.22	47.15	74	-26.85	peak	V
2483.500	37.52	-4.22	33.30	54	-20.70	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	48.81	-4.36	44.45	74	-29.55	peak	H
2390.000	35.93	-4.36	31.57	54	-22.43	AVG	H
2400.000	55.05	-4.36	50.69	74	-23.31	peak	H
2400.000	42.39	-4.36	38.03	54	-15.97	AVG	H
2390.000	49.04	-4.36	44.68	74	-29.32	peak	V
2390.000	35.02	-4.36	30.66	54	-23.34	AVG	V
2400.000	53.16	-4.36	48.80	74	-25.20	peak	V
2400.000	40.04	-4.36	35.68	54	-18.32	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	52.42	-4.22	48.20	74	-25.80	peak	H
2483.500	35.83	-4.22	31.61	54	-22.39	AVG	H
2483.500	51.08	-4.22	46.86	74	-27.14	peak	V
2483.500	37.67	-4.22	33.45	54	-20.55	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	49.06	-4.36	44.70	74	-29.30	peak	H
2390.000	35.93	-4.36	31.57	54	-22.43	AVG	H
2400.000	57.57	-4.36	53.21	74	-20.79	peak	H
2400.000	43.17	-4.36	38.81	54	-15.19	AVG	H
2390.000	49.30	-4.36	44.94	74	-29.06	peak	V
2390.000	35.18	-4.36	30.82	54	-23.18	AVG	V
2400.000	55.55	-4.36	51.19	74	-22.81	peak	V
2400.000	41.61	-4.36	37.25	54	-16.75	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	63.04	-4.22	58.82	74	-15.18	peak	H
2483.500	47.53	-4.22	43.31	54	-10.69	AVG	H
2483.500	64.57	-4.22	60.35	74	-13.65	peak	V
2483.500	49.72	-4.22	45.50	54	-8.50	AVG	V

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

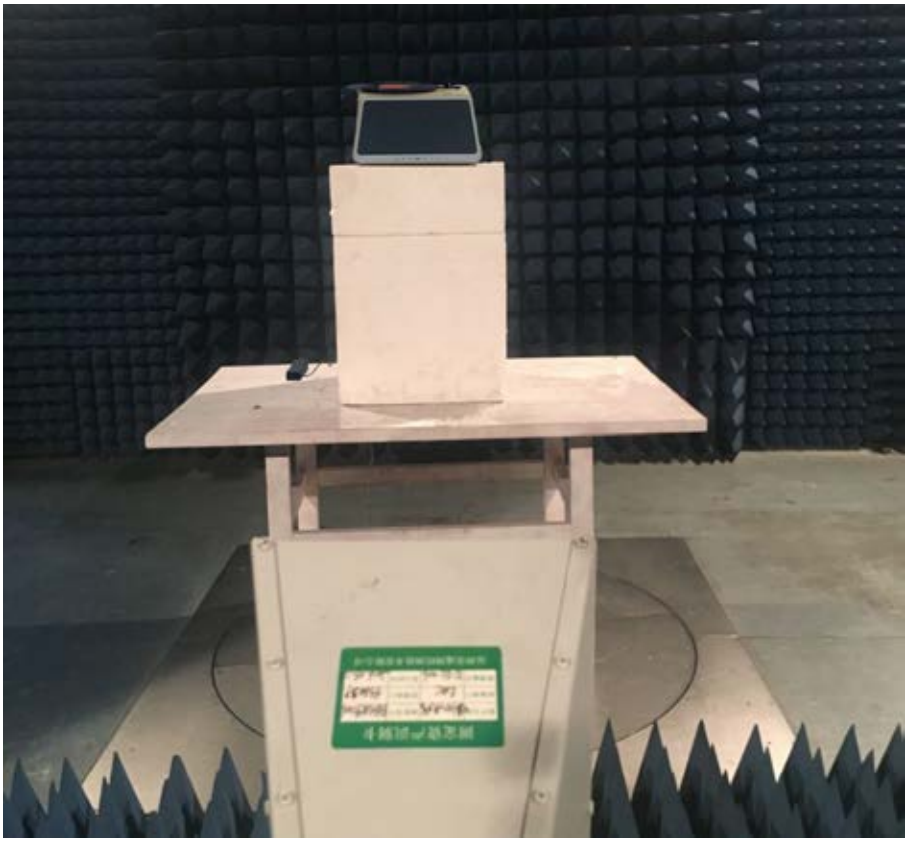
7 Photographs - EUT Test Setup

7.1 Radiated Spurious Emission

9KHz~30MHz:

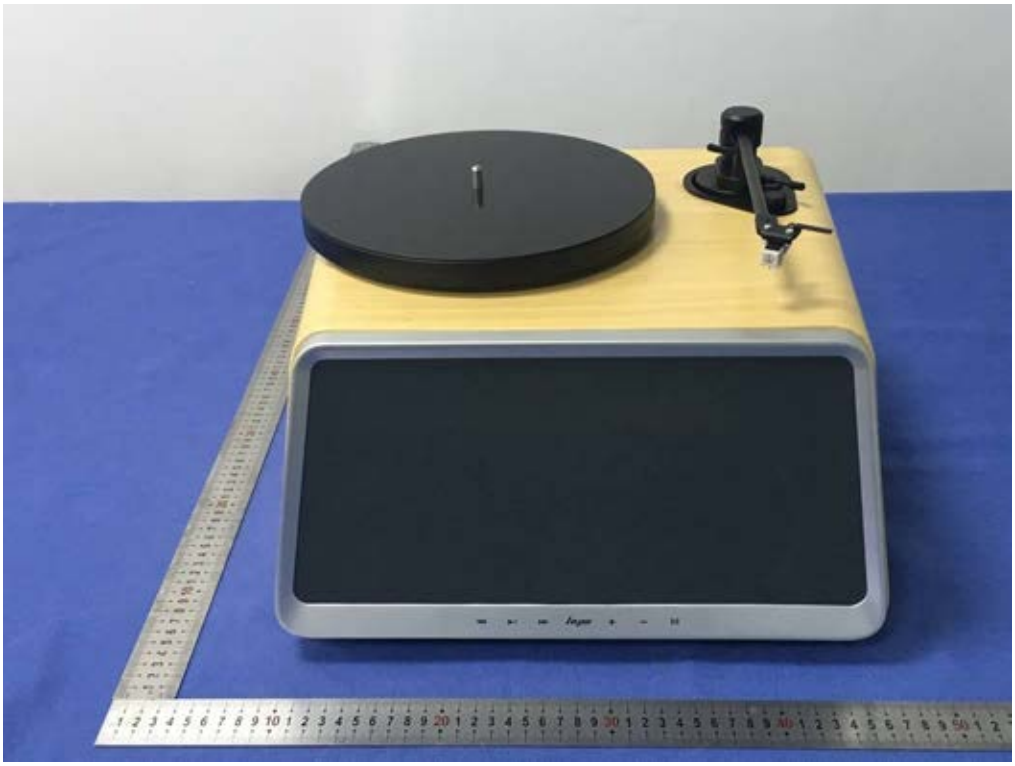
30MHz~1GHz:

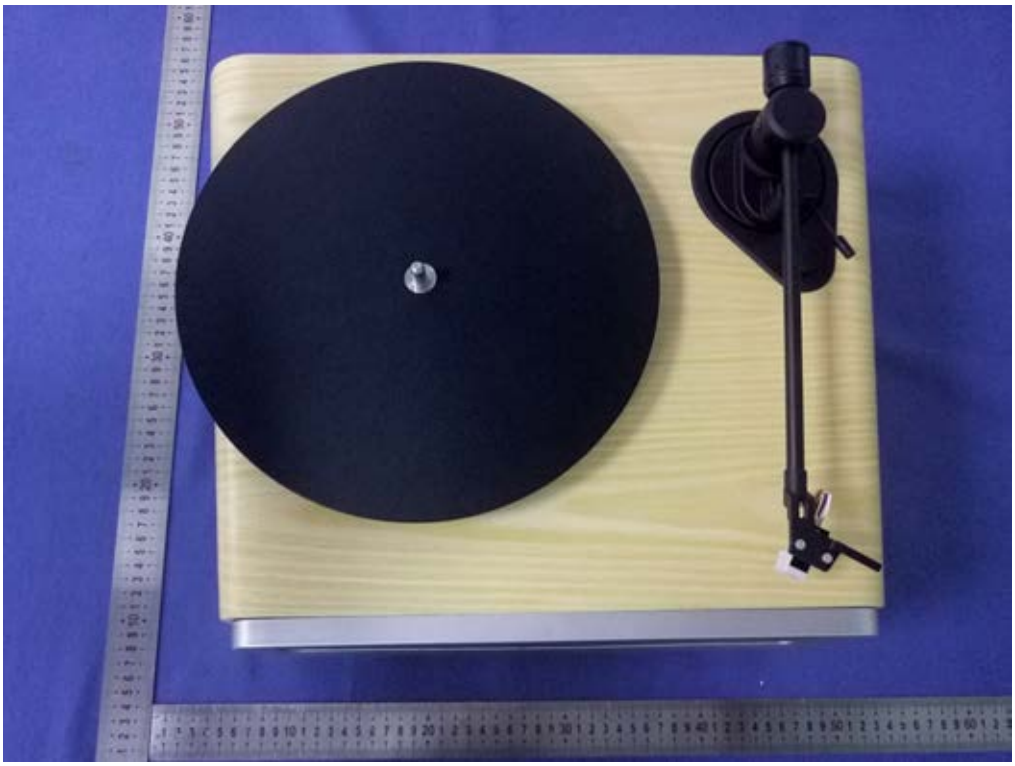
Above 1GHz:

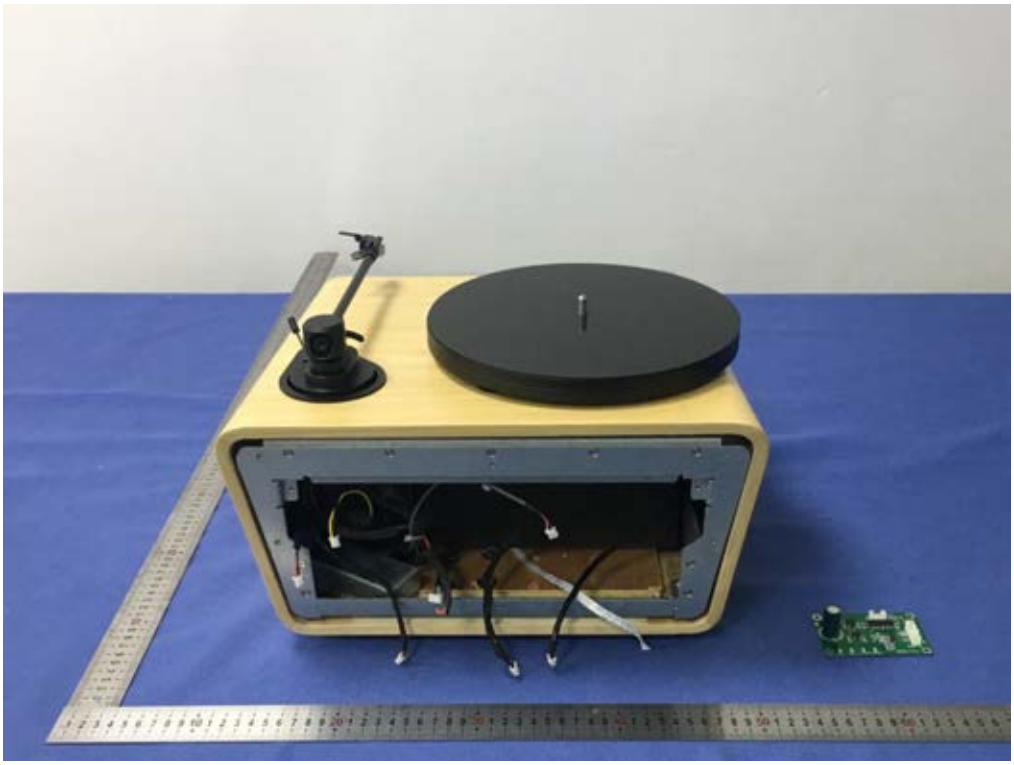


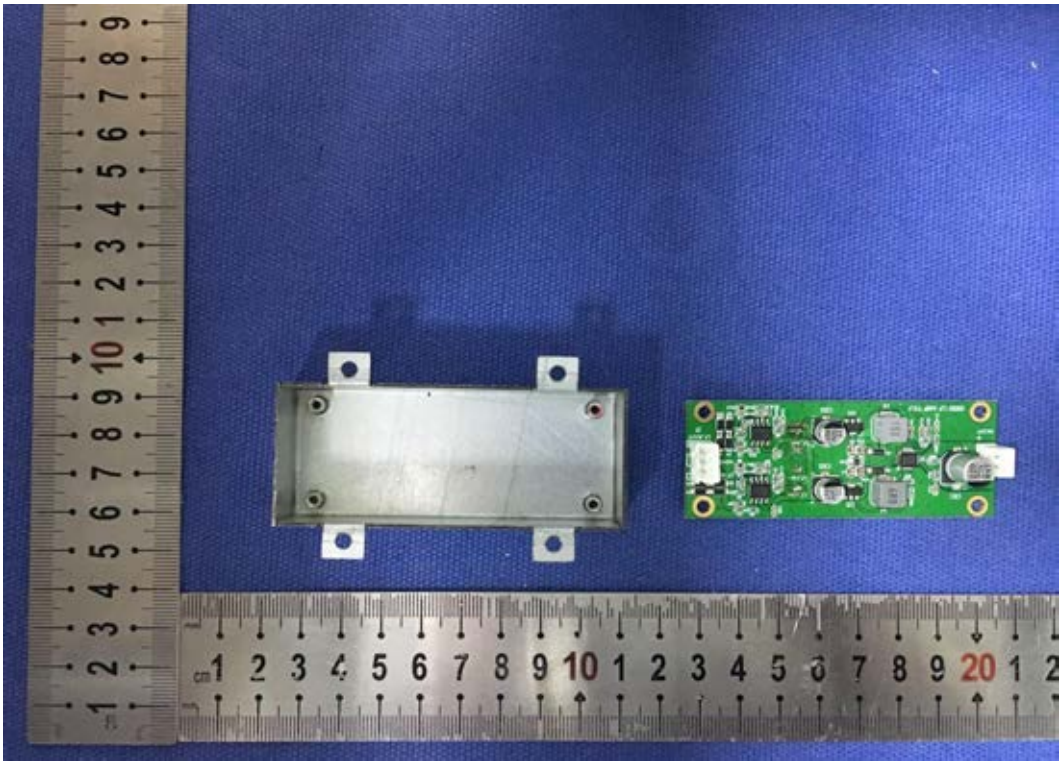
7.2 Conducted Emission

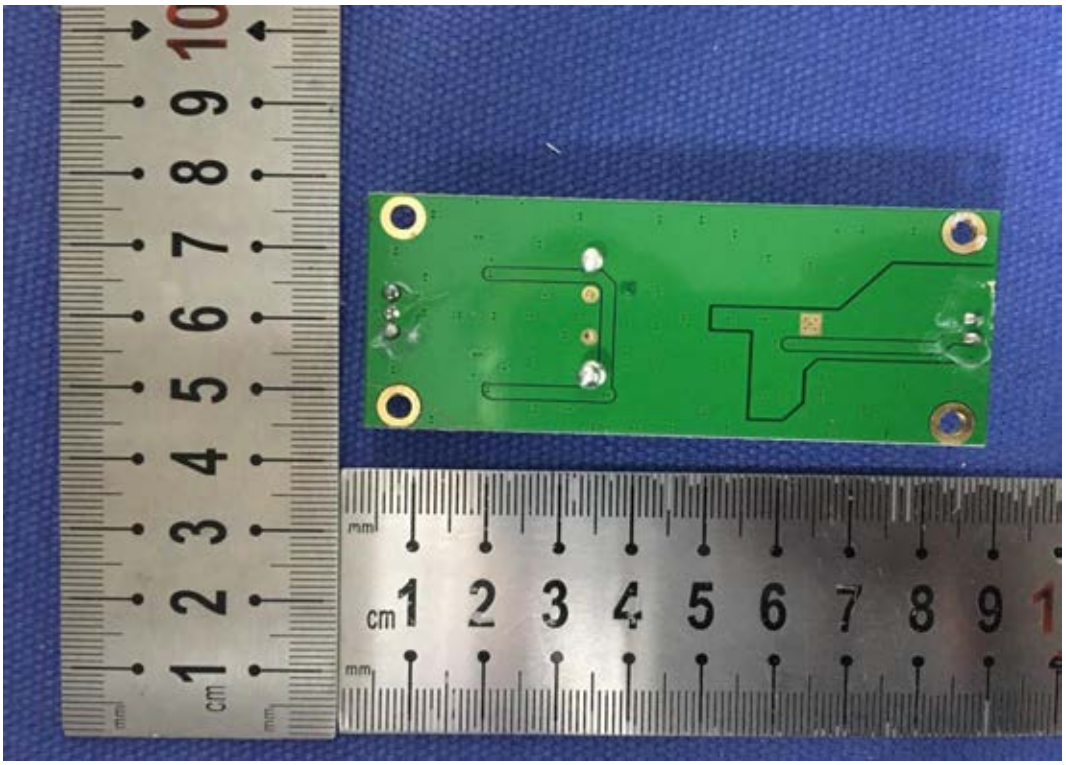
8 Photographs - EUT Constructional Details

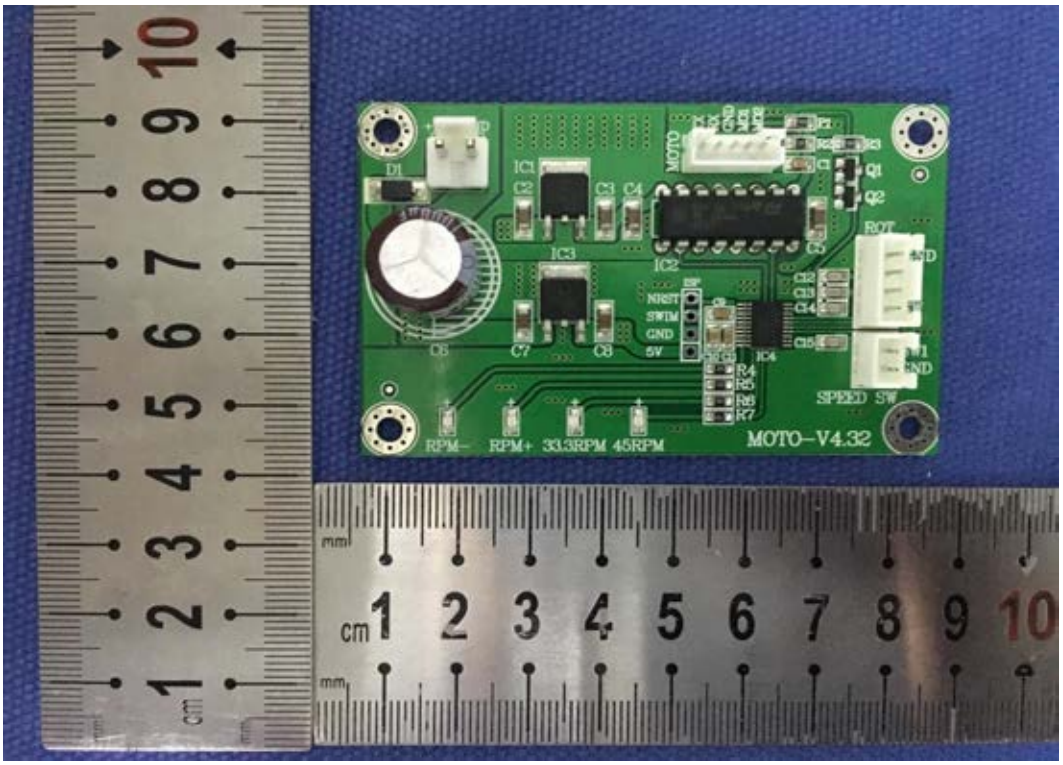


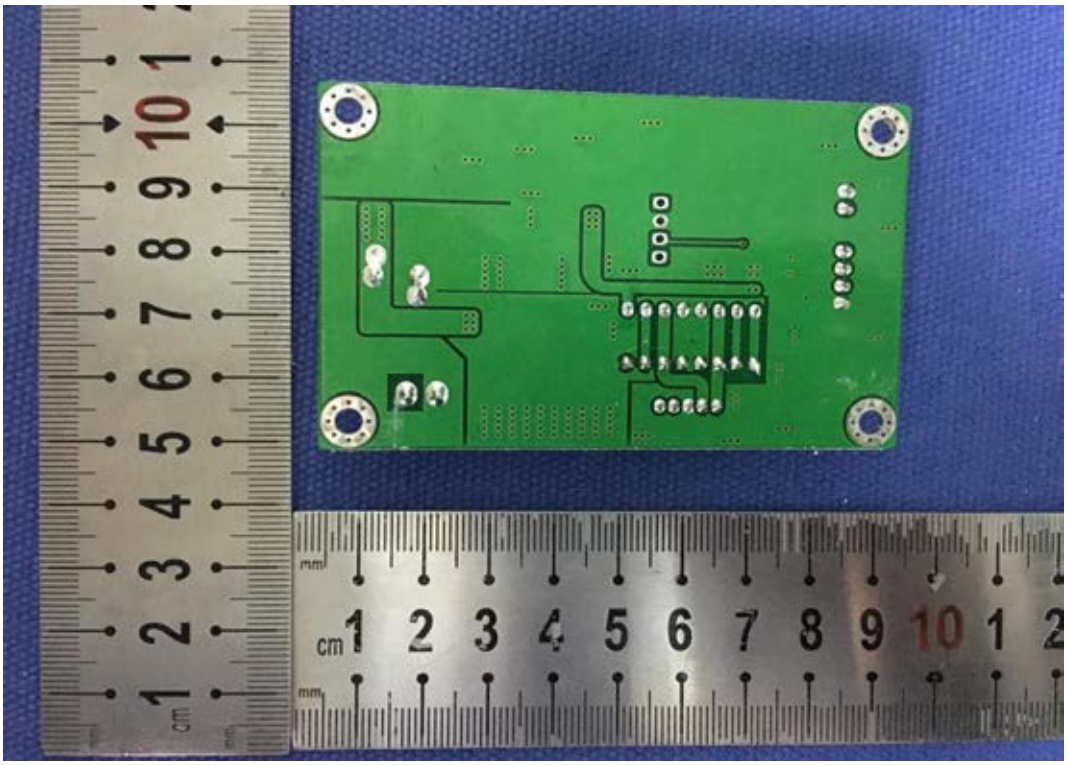


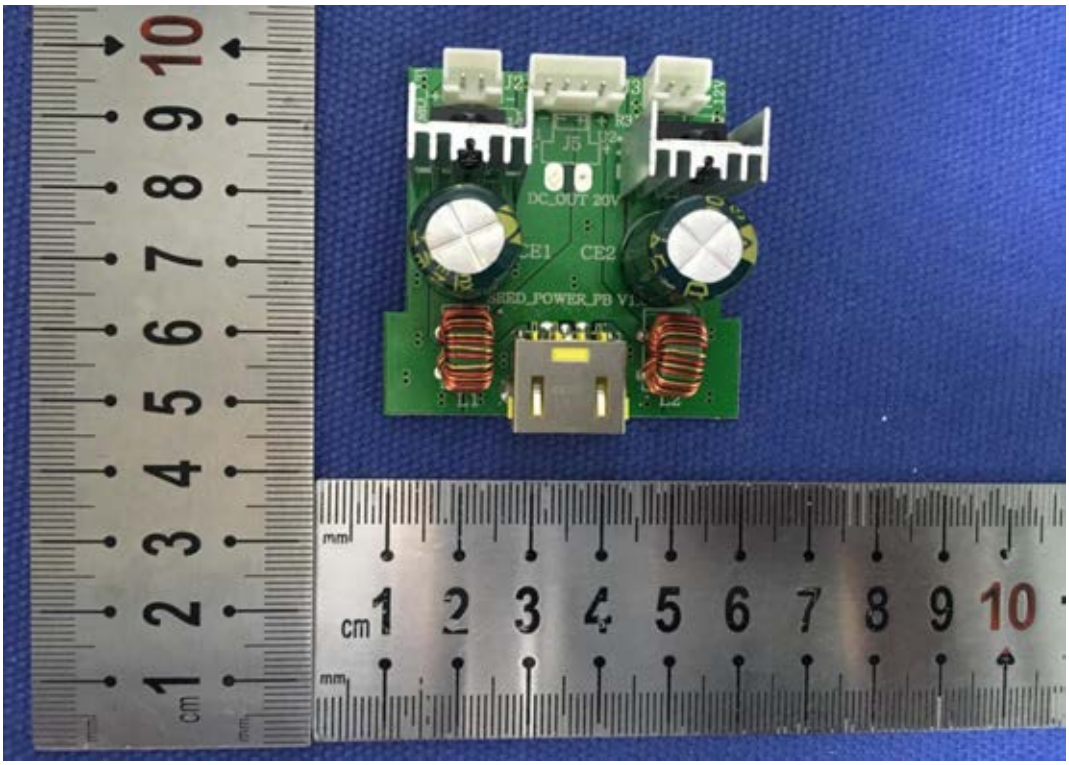


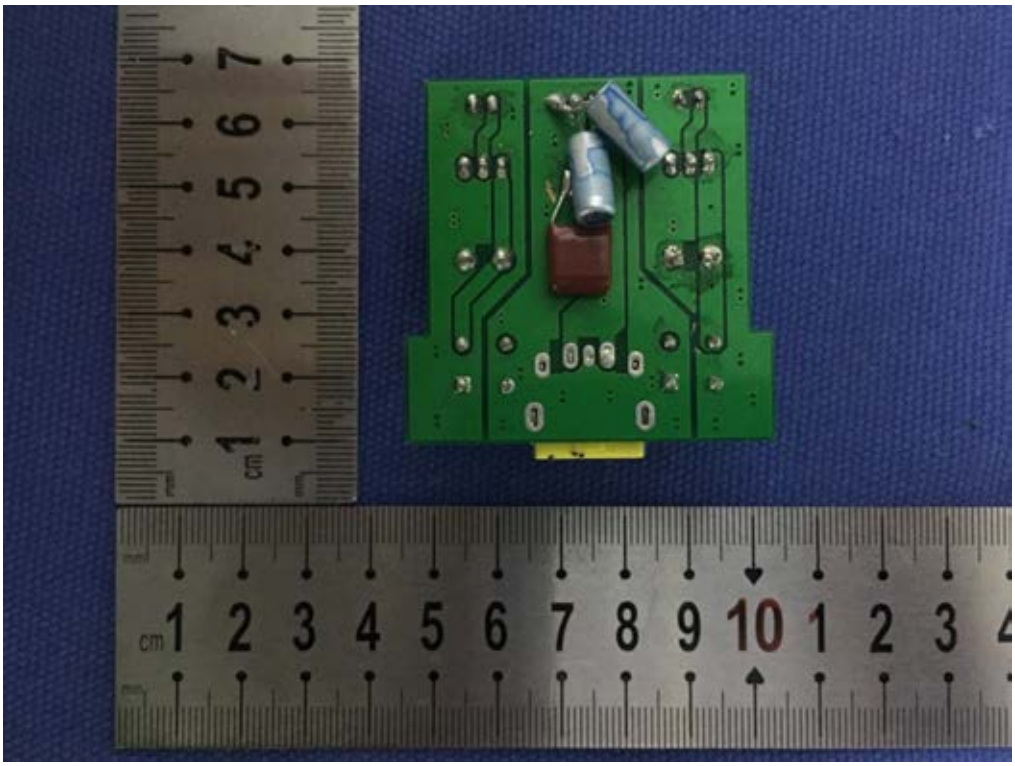


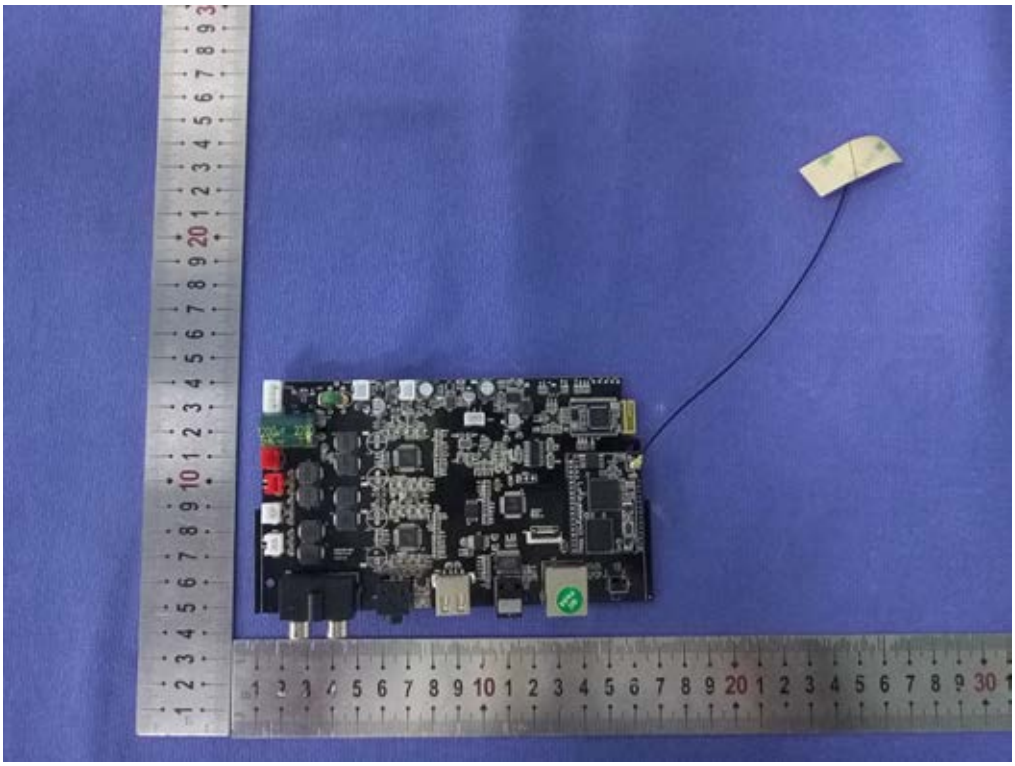


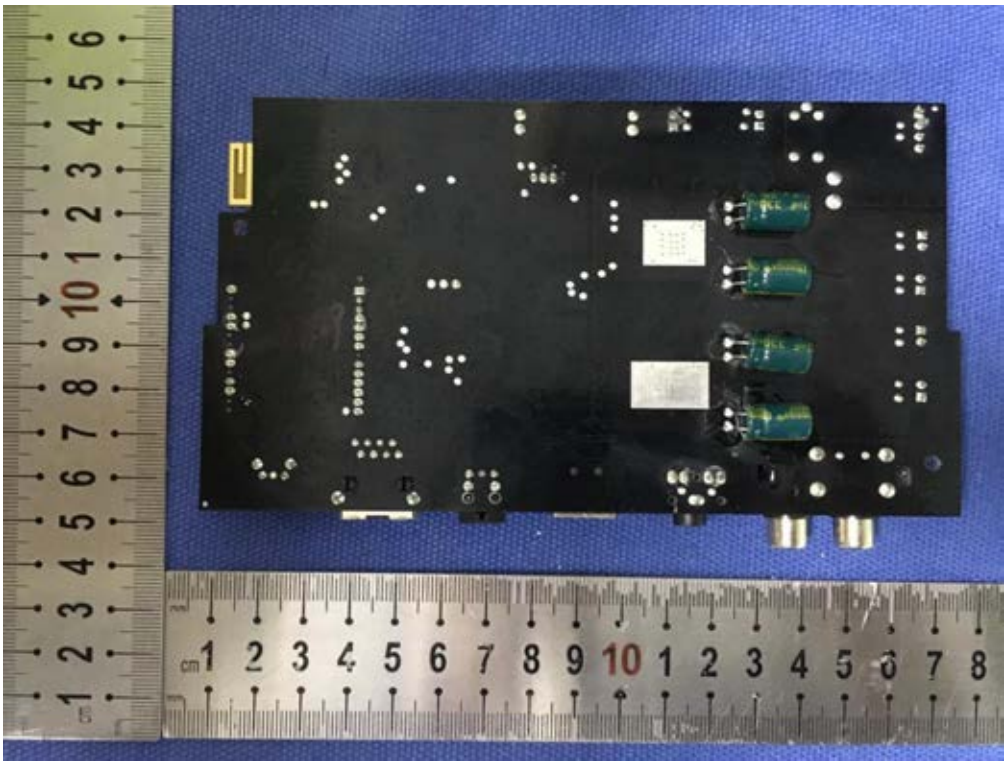

MOTO
IC1
IC2
IC3
IC4
D1
C2
C3
C4
C5
C7
C8
Q1
Q2
R07
SPEED SW
NRST
SWIM
GND
5V
RPM-
RPM+
33.3RPM
45RPM
MOTO-V4.32




DC_OUT 20V
CE1
CE2

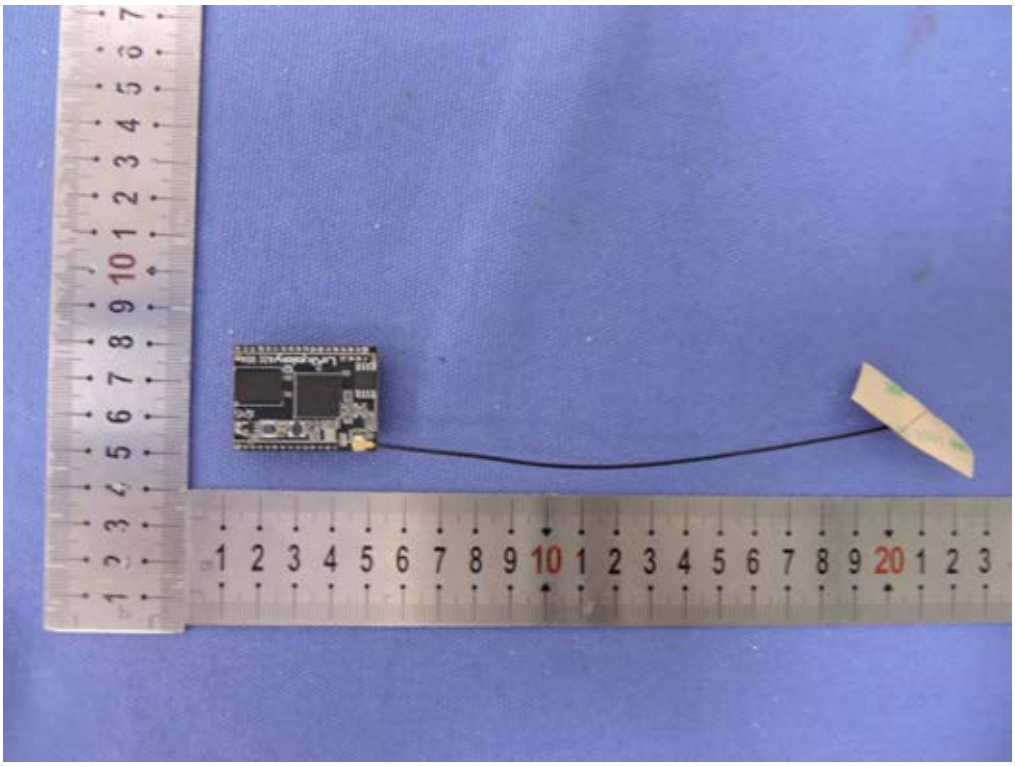


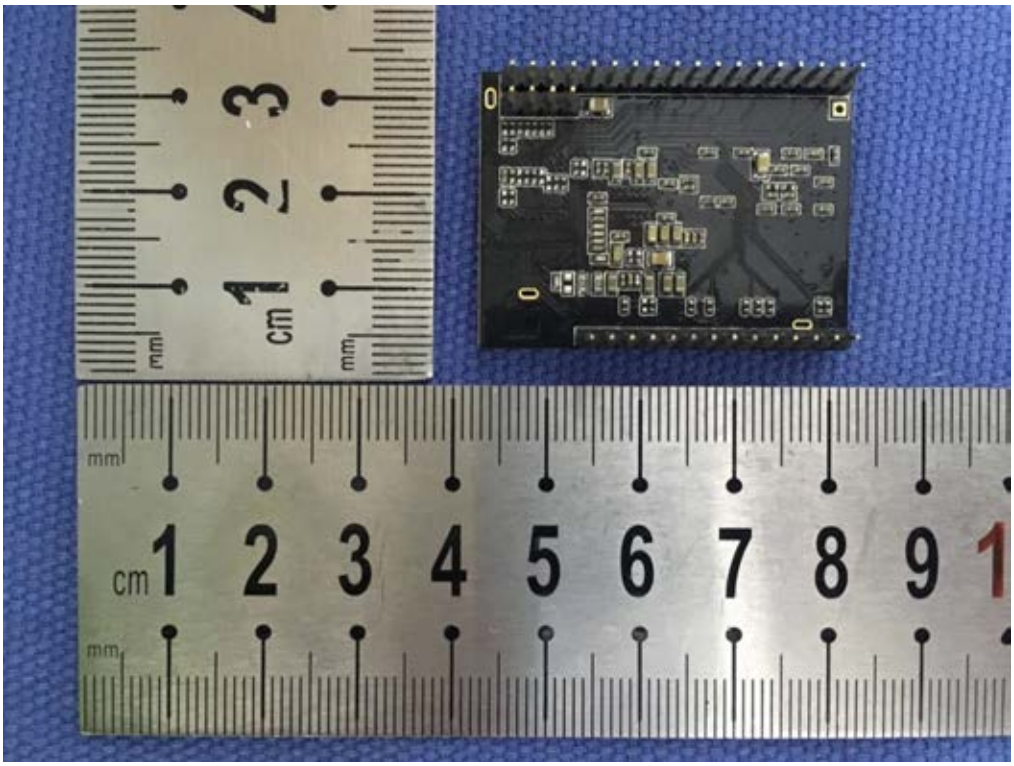


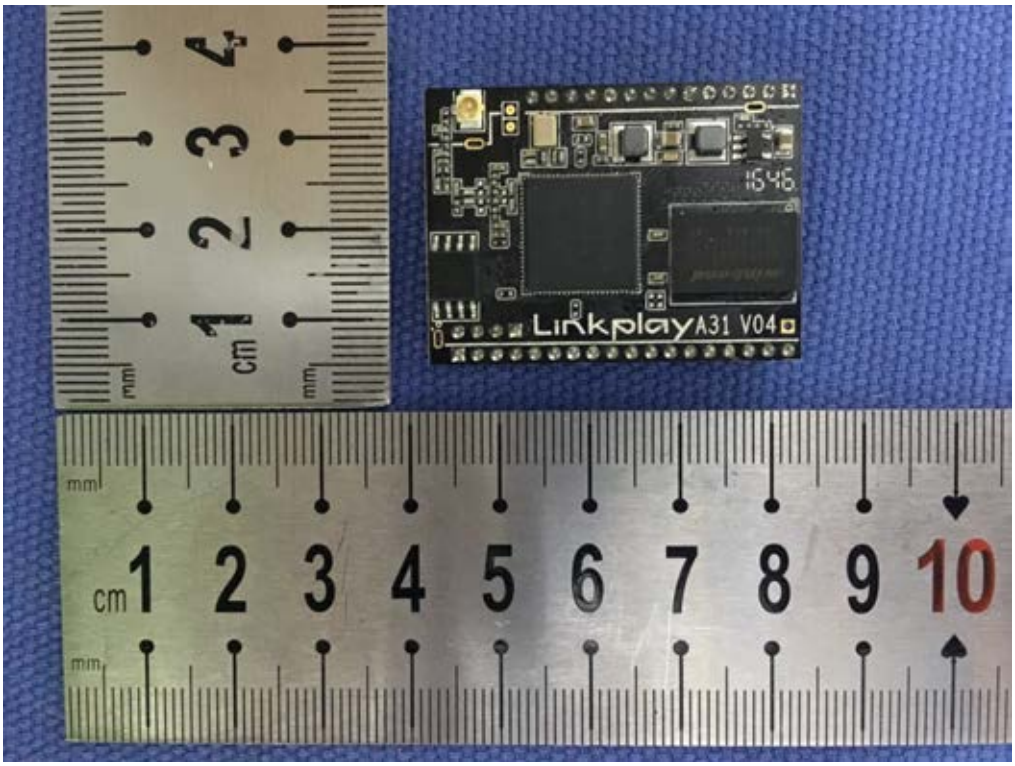


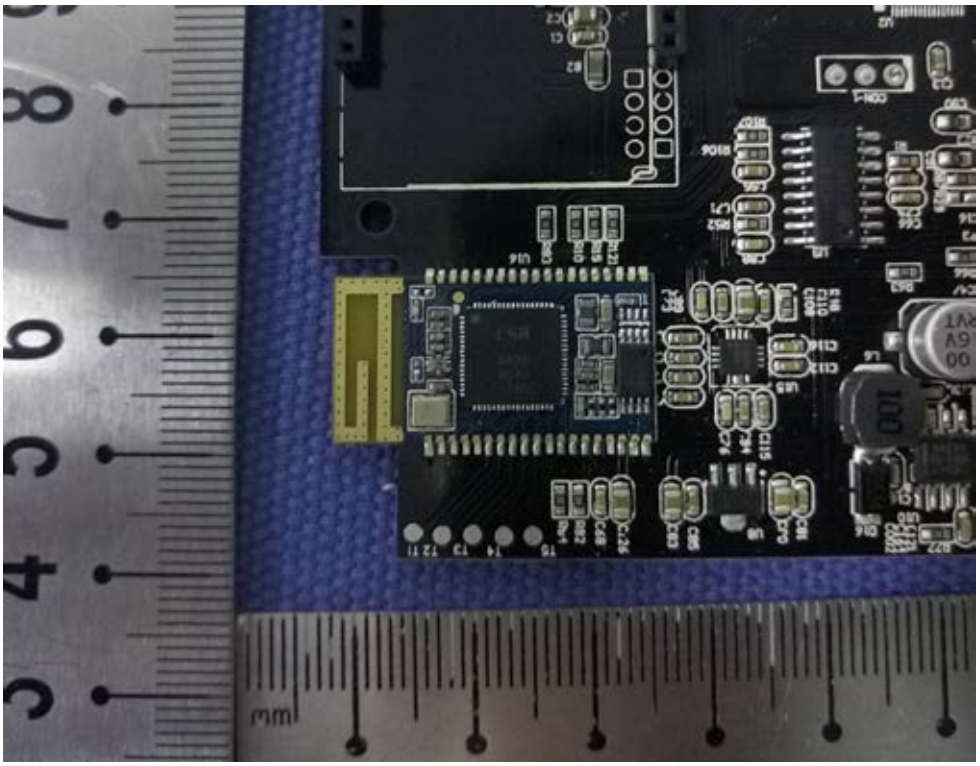

VER:V0.3
2017 05 26
PREV
PLAY
NEXT
POWER
VOL+
VOL-
Mode


VER:V0.3
2017 05 26
PREV
PLAY
NEXT
POWER
VOL+
VOL-
Mode






Linkplay A31 V04



The End