FCC PART 15.247

TEST REPORT

For

Grandstream Networks, Inc.

126 Brookline Ave, 3rd Floor Boston, MA 02215, USA

FCC ID: YZZGWN7610

Report Type:	**Product Type:**
Class II Permissive Change	Wireless Access point

Report Number:	RSZ170328002-00BA1
Report Date:	2017-05-11
Reviewed By:	Oscar Ye Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Grandstream Networks, Inc.'s* product, model number: *GWN7610 (FCC ID: YZZGWN7610)* in this report was a *Wireless Access point,* which was measured approximately: 20.5 cm (L) x20.5 cm (W) x 5.1 cm (H), rated with input voltage: DC 24 V from adapter or powered by POE supply.

**All measurement and test data in this report was gathered from production sample serial number: 1700517 (Assigned by BACL, Kunshan).The EUT supplied by the applicant was received on 2017-03-28.*

Objective

This report is prepared on behalf of *Grandstream Networks, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

This is a CIIPC application of the device; the differences between the original device and the current one are as follows:

1. Changing the 802.11n low channel and high channel power level.

For the change made to the device, the test item "Spurious Emissions", "Maximum Conducted Output Power" ,"100 kHz Bandwidth of Frequency Band Edge" and "Power Spectral Density" was performed.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP and Part 15E NII submissions with FCC ID: YZZGWN7610.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
RF conducted test with spectrum		±0.9dB
RF Output Power with Power meter		±0.5dB
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB
Occupied Bandwidth		±0.5kHz
Temperature		±1.0℃
Humidity		±6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11n-HT20 mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

For 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11

For 802.11n-HT40 mode, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2422	6	2447
2	2427	7	2452
3	2432	/	/
4	2437	/	/
5	2442	/	/

EUT was tested with Channel 1, 4 and 7.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Soft ware: “artgui.exe”

Wi-Fi test in the engineer mode.

Power Level:

802.11n-HT20: 14(low channel and high channel)
802.11n-HT40: 12(low channel and high channel)

Support Equipment List and Details

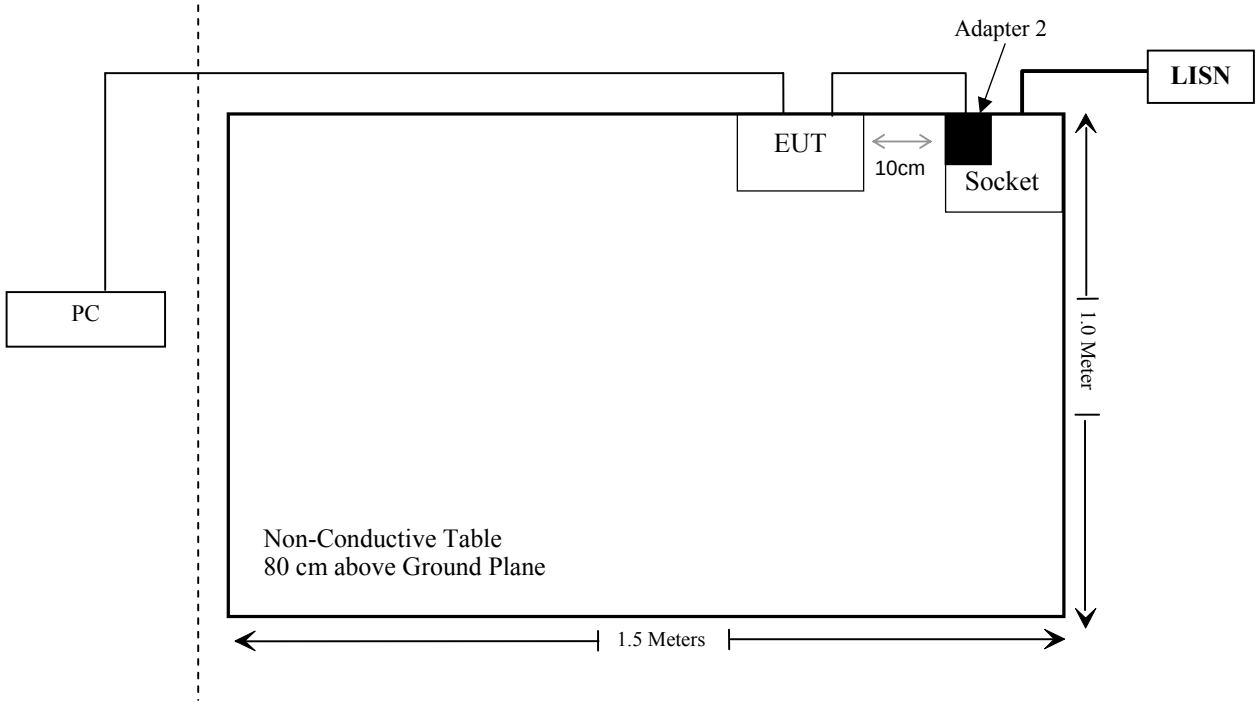
Manufacturer	Description	Model	Serial Number
intel	PC	CQ45	N/A
NETGEAR	POE	FS108P	1DL294310006A
NETGEAR	Adapter 1	DSA-0421S-50	330-10142-01
Mass power	Adapter 2	NBS24J240100VU	1604

External I/O Cable

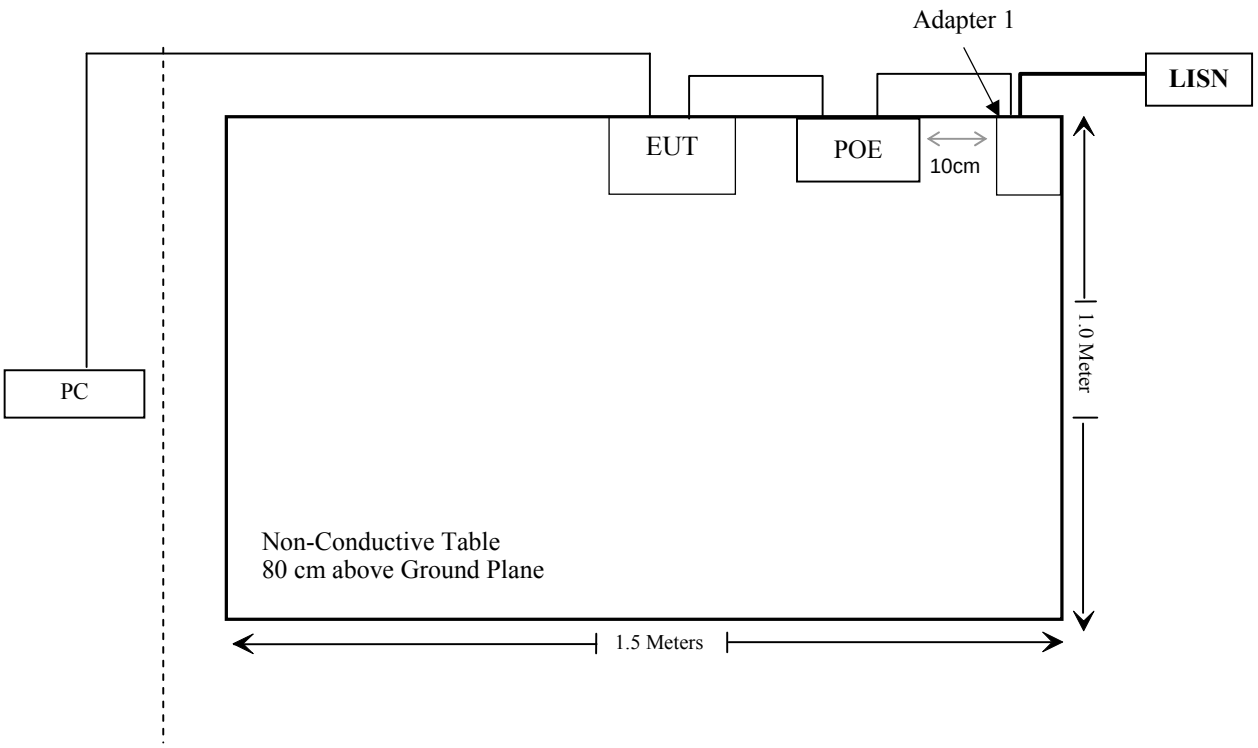
Cable Description	Length (m)	From Port	To
Un-shielding Un-detachable DC cable	0.8	POE	Adapter 1
Un-shielding detachable RJ45 cable	1.0	POE	EUT
Un-shielding detachable RJ45 cable	3.0	EUT	PC
Un-shielding detachable AC cable	0.9	Adapter 1	LISN
Un-shielding detachable AC cable	0.9	Adapter 2	LISN
Un-shielding Un-detachable DC cable	1.5	EUT	Adapter 2

Block Diagram of Test Setup

Powered by Adapter



Powered by POE



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance*
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance*
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

Compliance*: Please referred to FCC ID: **YZZGWN7610** granted on 2016-08-15, report No.: RSZ160602008-00B, which was tested by Simon Wang, Bay Area Compliance Laboratories Corp. (Shenzhen).

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation test					
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-12
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
EMCO	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-12
RF Conducted test					
BACL	TS 8997 Cable-01	T-KS-EMC086	T-KS-EMC086	2016-12-09	2017-12-08
BACL	RF cable	KS-LAB-012	KS-LAB-012	2016-12-15	2017-12-15
WEINSCHEL	3dB Attenuator	5326	N/A	2016-06-18	2017-06-18
Agilent	Power Meter	N1912A	MY5000492	2016-11-17	2017-11-16
Agilent	Power Sensor	N1921A	MY54210024	2016-11-17	2017-11-16
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.247 (i), §1.1307 (b) (1) & §2.1091 –Maximum Permissible exposure (MPE)

Applicable Standard

According to subpart 15.247(i)and subpart §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data (Worst case):

Frequency (MHz)	**Antenna Gain**		**Tune-up Conducted Power**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
	(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
2412-2462	3.0	2.0	27.00	500	20	0.2	1.0

Simultaneous transmitting consideration: (referring to the DTS report, the highest MPE for 5G band is $0.224mW/cm^2$)

The ratio=MPE_{DTS}/limit+MPE_{UNII}/limit=0.2+0.224=0.424＜1.0, simultaneous exposure is not required.

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has three internal antenna arrangement, which was permanently attached and the antenna gain is 3.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

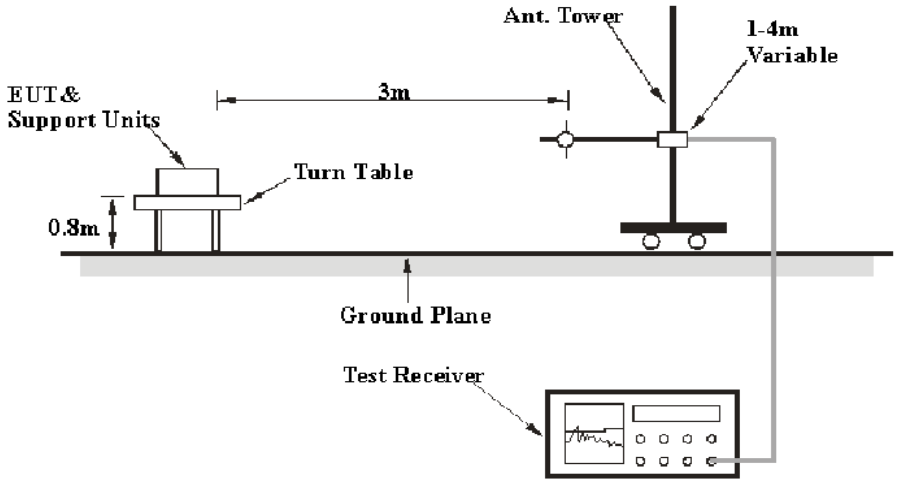
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

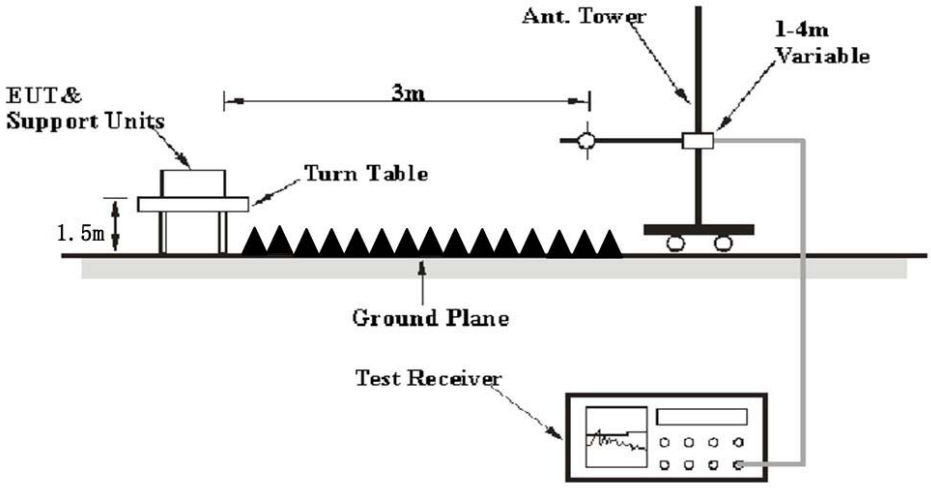
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Ave.
	1MHz	＞1/T Note 2	/	Ave.

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-04-05.

EUT operation mode: Transmitting (worst case: simultaneous transmission for all the three transmitters)

30 MHz-25 GHz

802.11n-HT20 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
265.4	42.13	QP	38	1.2	H	-11.97	30.16	46	15.84
2412.00	116.48	PK	183	2.4	H	-6.19	110.29	/	/
2412.00	103.93	Ave.	183	2.4	H	-6.19	97.74	/	/
2412.00	120.72	PK	340	1.7	V	-6.19	114.53	/	/
2412.00	108.15	Ave.	340	1.7	V	-6.19	101.96	/	/
2369.48	72.22	PK	159	2.5	V	-6.19	66.03	74	7.97
2369.48	59.05	Ave.	159	2.5	V	-6.19	52.86	54	1.14
2372.04	72.83	PK	87	2.4	V	-6.19	66.64	74	7.36
2372.04	59.06	Ave.	87	2.4	V	-6.19	52.87	54	1.13
2486.21	68.47	PK	49	2.2	V	-5.97	62.50	74	11.50
2486.21	54.51	Ave.	49	2.2	V	-5.97	48.54	54	5.46
4824.00	50.66	PK	137	1.5	V	1.6	52.26	74	21.74
4824.00	35.77	Ave.	137	1.5	V	1.6	37.37	54	16.63
High Channel(2462 MHz)									
265.4	42.42	QP	165	1.2	H	-11.97	30.45	46	15.55
2462.00	114.88	PK	170	1.9	H	-5.97	108.91	/	/
2462.00	101.75	Ave.	170	1.9	H	-5.97	95.78	/	/
2462.00	119.77	PK	141	2.4	V	-5.97	113.80	/	/
2462.00	107.43	Ave.	141	2.4	V	-5.97	101.46	/	/
2363.06	68.75	PK	152	2.4	V	-6.19	62.56	74	11.44
2363.06	54.81	Ave.	152	2.4	V	-6.19	48.62	54	5.38
2487.73	73.17	PK	211	2.1	V	-5.97	67.20	74	6.80
2487.73	56.31	Ave.	211	2.1	V	-5.97	50.34	54	3.66
2483.86	71.5	PK	84	1.8	V	-5.97	65.53	74	8.47
2483.86	56.4	Ave.	84	1.8	V	-5.97	50.43	54	3.57
4924.00	48.96	PK	4	1.3	V	1.83	50.79	74	23.21
4924.00	35.25	Ave.	4	1.3	V	1.83	37.08	54	16.92

802.11n-HT40 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2422 MHz)									
265.4	42.36	QP	152	1.4	H	-11.97	30.39	46	15.61
2422.00	111.85	PK	248	1.6	H	-6.19	105.66	/	/
2422.00	98.78	Ave.	248	1.6	H	-6.19	92.59	/	/
2422.00	116.14	PK	236	1.8	V	-6.19	109.95	/	/
2422.00	102.73	Ave.	236	1.8	V	-6.19	96.54	/	/
2388.39	70.58	PK	337	1.6	V	-6.19	64.39	74	9.61
2388.39	56.22	Ave.	337	1.6	V	-6.19	50.03	54	3.97
2388.55	69.73	PK	93	1.6	V	-6.19	63.54	74	10.46
2388.55	56.41	Ave.	93	1.6	V	-6.19	50.22	54	3.78
2484.19	68.84	PK	163	1.7	V	-5.97	62.87	74	11.13
2484.19	54.45	Ave.	163	1.7	V	-5.97	48.48	54	5.52
4844.00	50.3	PK	65	1.3	V	1.6	51.90	74	22.10
4844.00	35.7	Ave.	65	1.3	V	1.6	37.30	54	16.70
High Channel(2452 MHz)									
265.4	42.15	QP	302	1.1	H	-11.97	30.18	46	15.82
2452.00	111.83	PK	224	1.3	H	-5.97	105.86	/	/
2452.00	98.97	Ave.	224	1.3	H	-5.97	93.00	/	/
2452.00	116.11	PK	334	2.3	V	-5.97	110.14	/	/
2452.00	103.06	Ave.	334	2.3	V	-5.97	97.09	/	/
2372.20	68.28	PK	330	2.0	V	-6.19	62.09	74	11.91
2372.20	54.72	Ave.	330	2.0	V	-6.19	48.53	54	5.47
2487.50	70.46	PK	200	1.7	V	-5.97	64.49	74	9.51
2487.50	55.2	Ave.	200	1.7	V	-5.97	49.23	54	4.77
2484.69	70.47	PK	281	1.1	V	-5.97	64.50	74	9.50
2484.69	55.17	Ave.	281	1.1	V	-5.97	49.20	54	4.80
4904.00	49.75	PK	278	1.4	V	1.83	51.58	74	22.42
4904.00	36.02	Ave.	278	1.4	V	1.83	37.85	54	16.15

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude
The other spurious emission which is 20dB to the limit was not recorded.

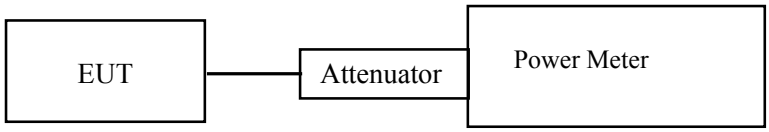
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

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



Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	46 %
ATM Pressure:	101.0 kPa

The testing was performed by Nefertari Xu on 2017-05-09.

Test Result: Compliance. Please refer to following table and plots.

EUT operation mode: Transmitting

802.11n-HT20 Mode:

Frequency (MHz)	Antenna Port	Output Power (dBm)	Output Power (dBm) Chain0+Chain1+chain 2	Limit (dBm)
2412	0	14.35	19.00	30
	1	14.33		
	2	14.01		
2462	0	14.54	18.98	30
	1	14.13		
	2	13.92		

802.11n-HT40 Mode:

Frequency (MHz)	Antenna Port	Output Power (dBm)	Output Power (dBm) Chain0+Chain1+chain 2	Limit (dBm)
2412	0	12.14	16.95	30
	1	12.49		
	2	11.89		
2462	0	12.34	17.03	30
	1	12.43		
	2	12.01		

Note: This Device Emploies Cyclic Delay Diversity.
When determining reductions in conducted power limits, array gain is calculated as follows:
As to this device, $N_{ANT} \leq 4$, Array Gain = 0 dB.
Total directional gain (dBi) = gain of individual transmit antennas (dBi) + 0 (dB) =3dBi.

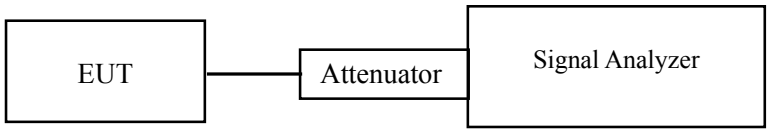
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

Temperature:	28 ℃
Relative Humidity:	50 %
ATM Pressure:	103.0 kPa

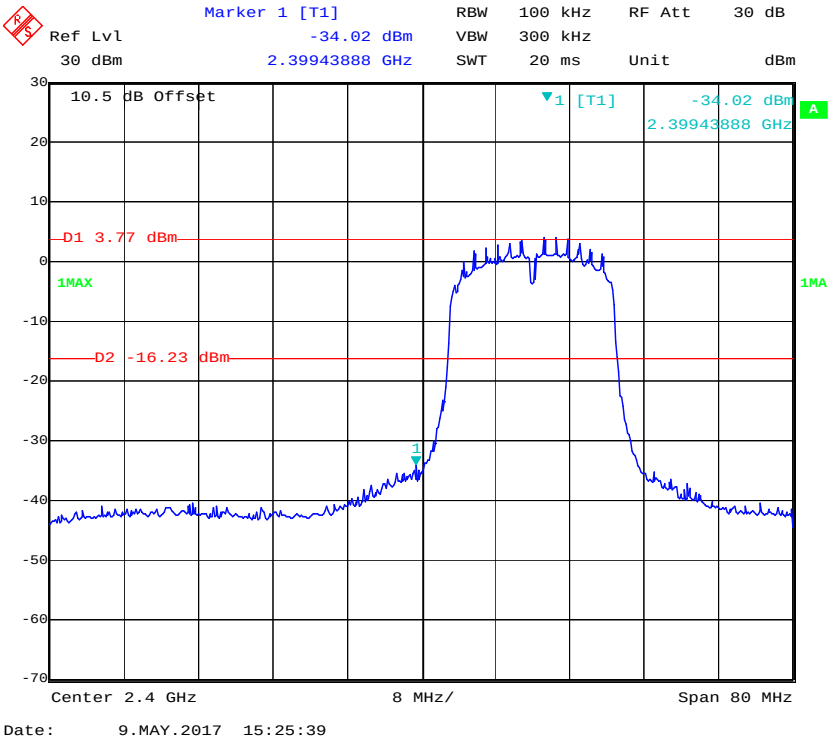
The testing was performed by Nefertari Xu on 2017-05-09.

Test Result: Compliance. Please refer to the following plots.

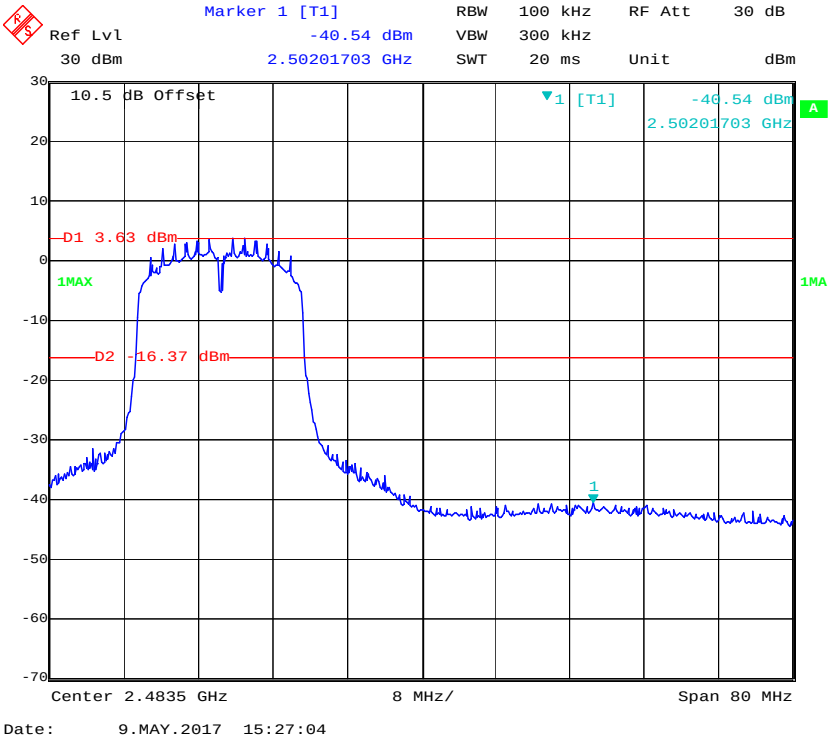
EUT operation mode: Transmitting

For Antenna 0:

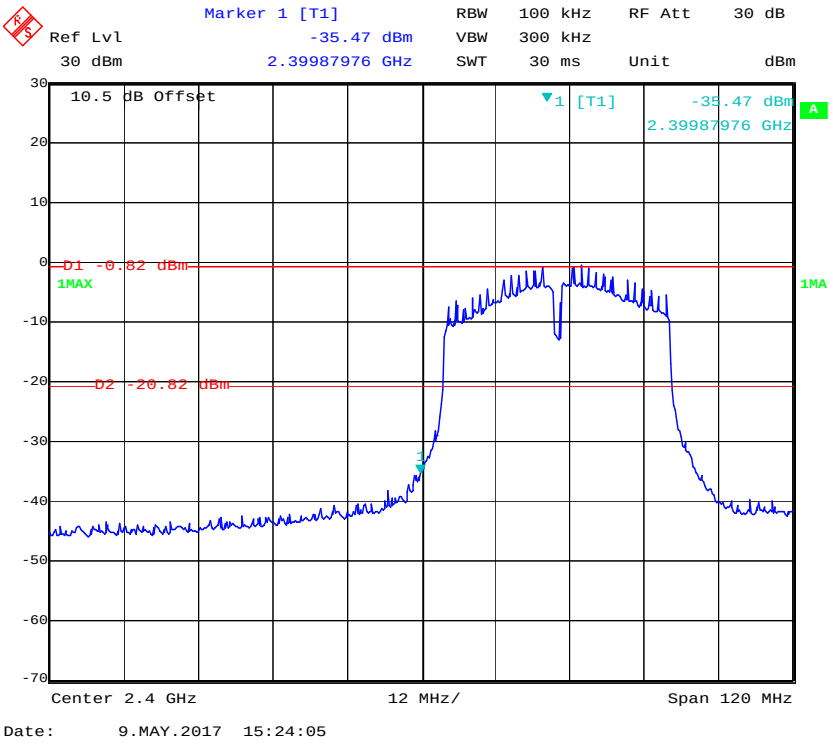
802.11n-HT20: Band Edge, Left Side



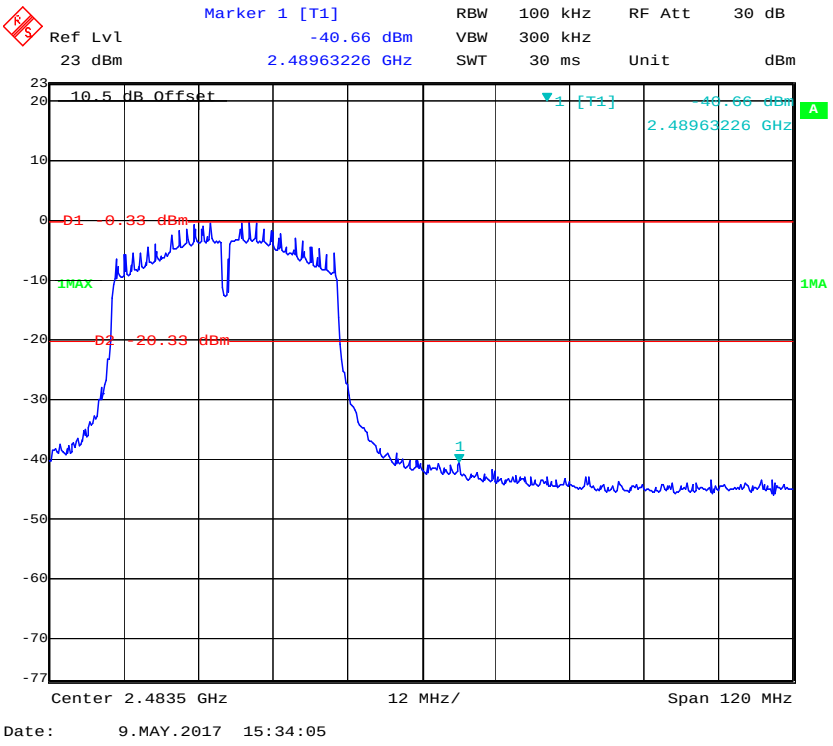
802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Left Side

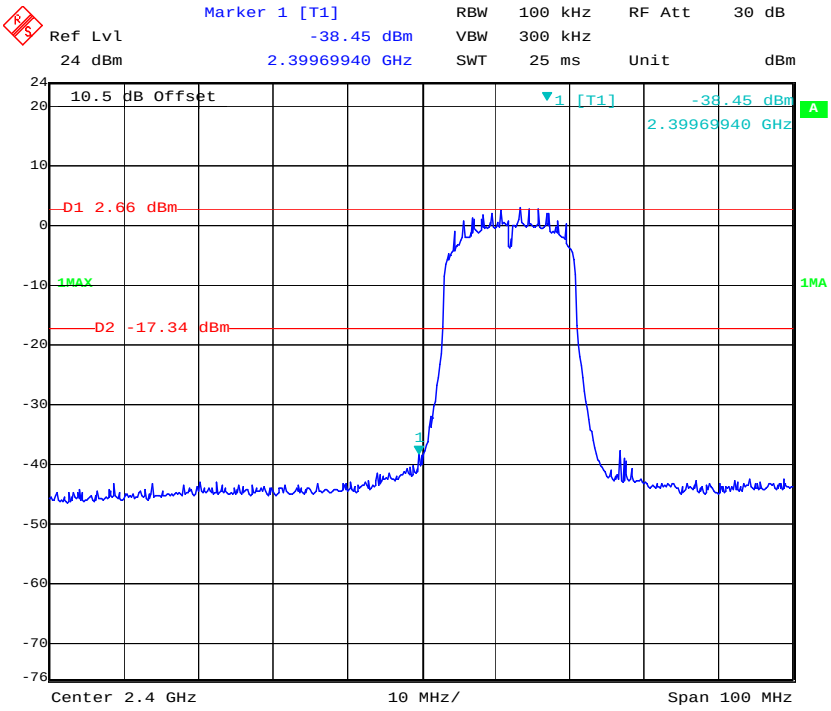


802.11n-HT40: Band Edge, Right Side



For Antenna 1:

802.11n-HT20: Band Edge, Left Side



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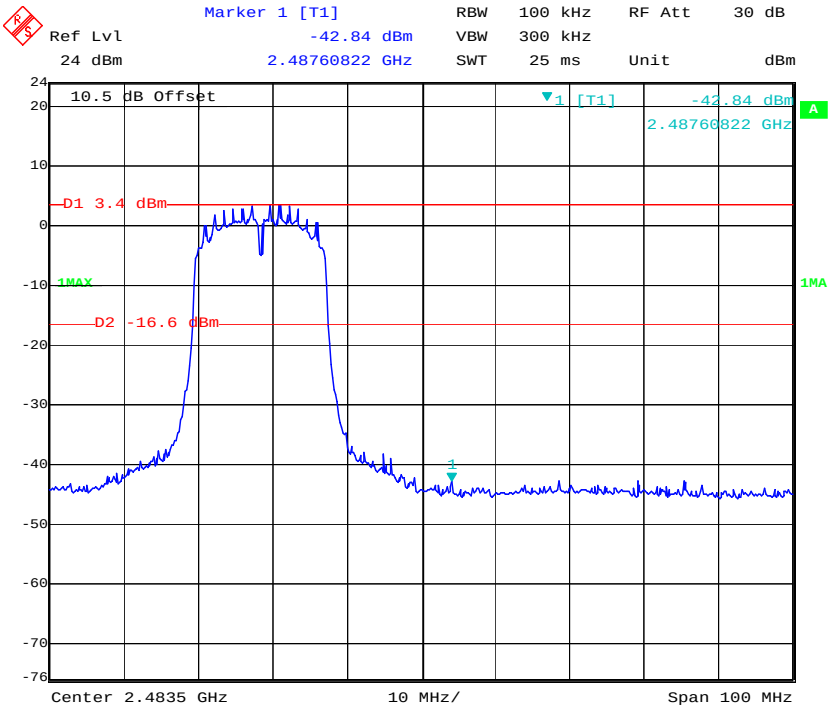
802.11n-HT20: Band Edge, Right Side



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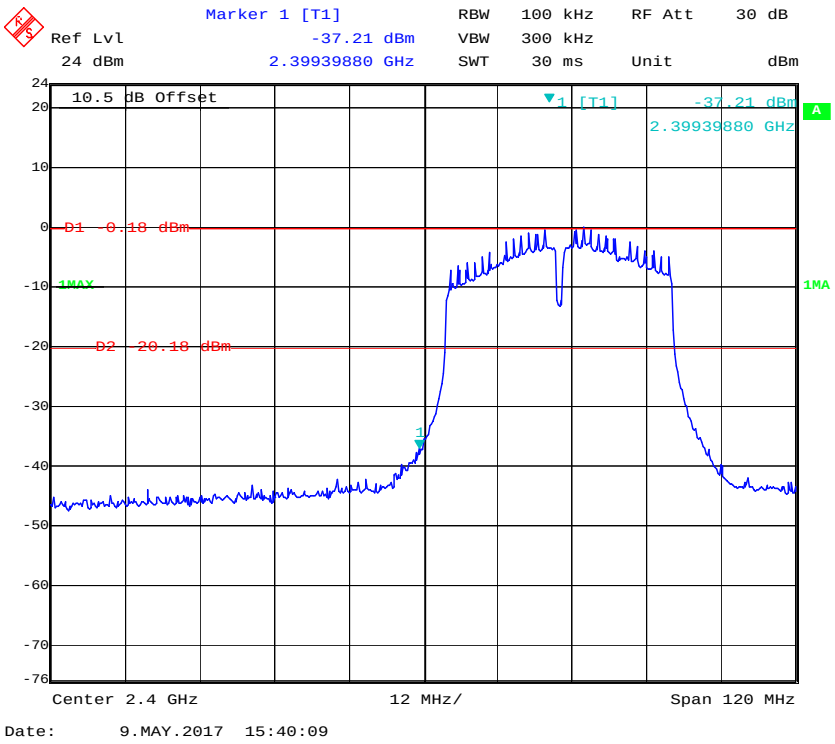
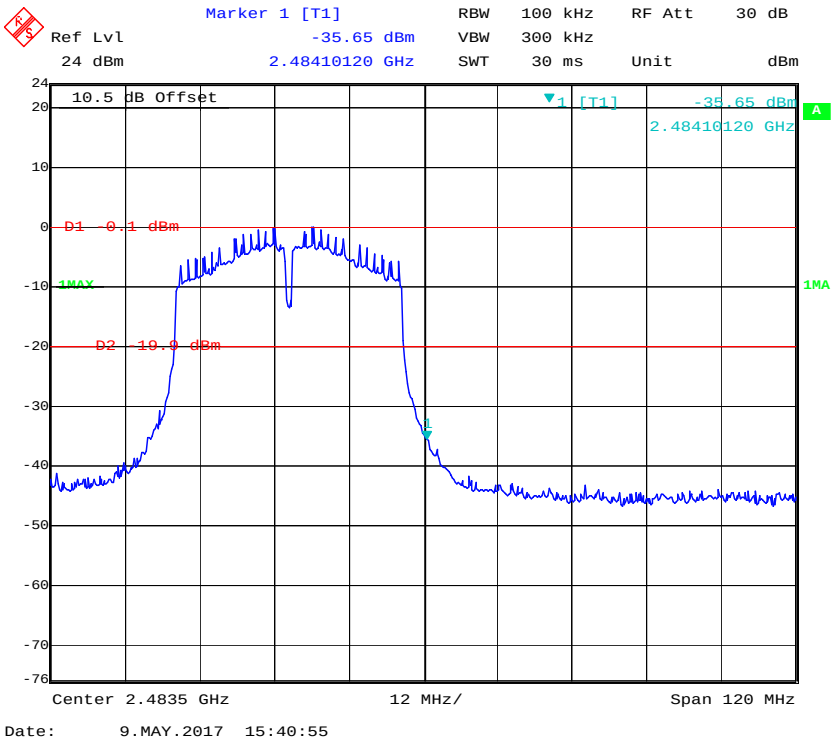
802.11n-HT40: Band Edge, Left Side

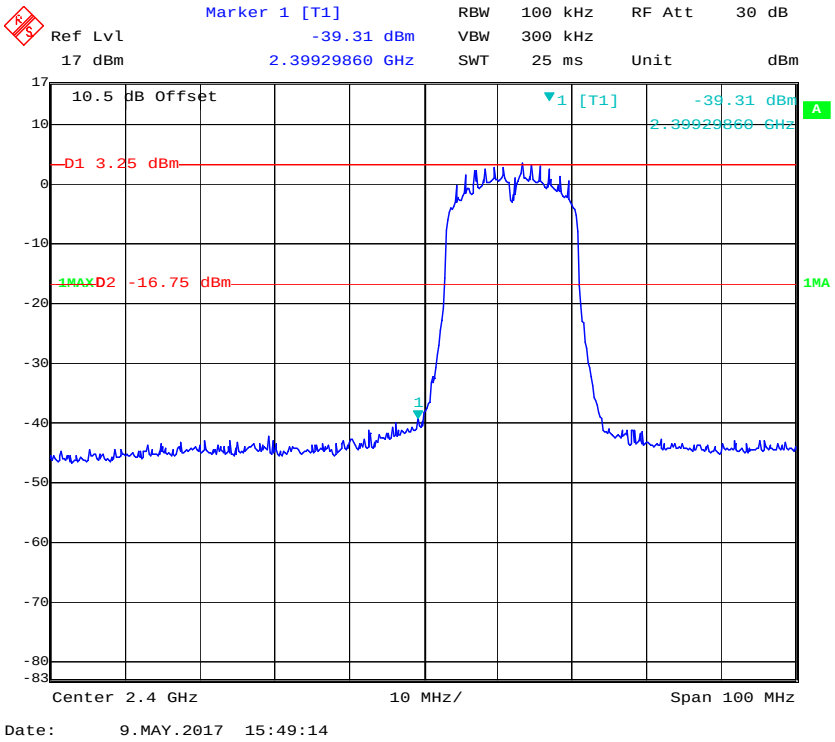


802.11n-HT40: Band Edge, Right Side

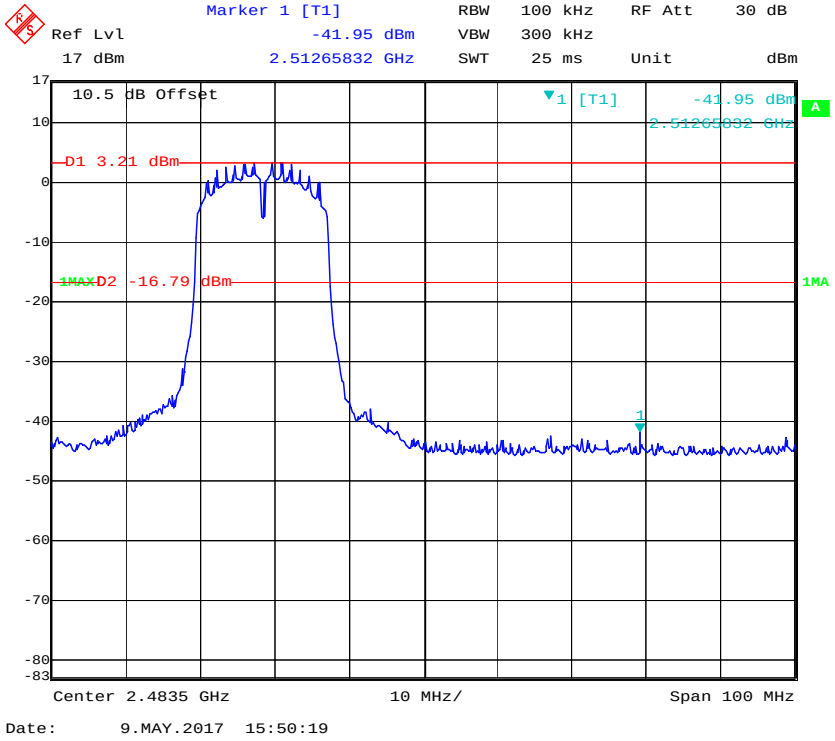


For Antenna 2:

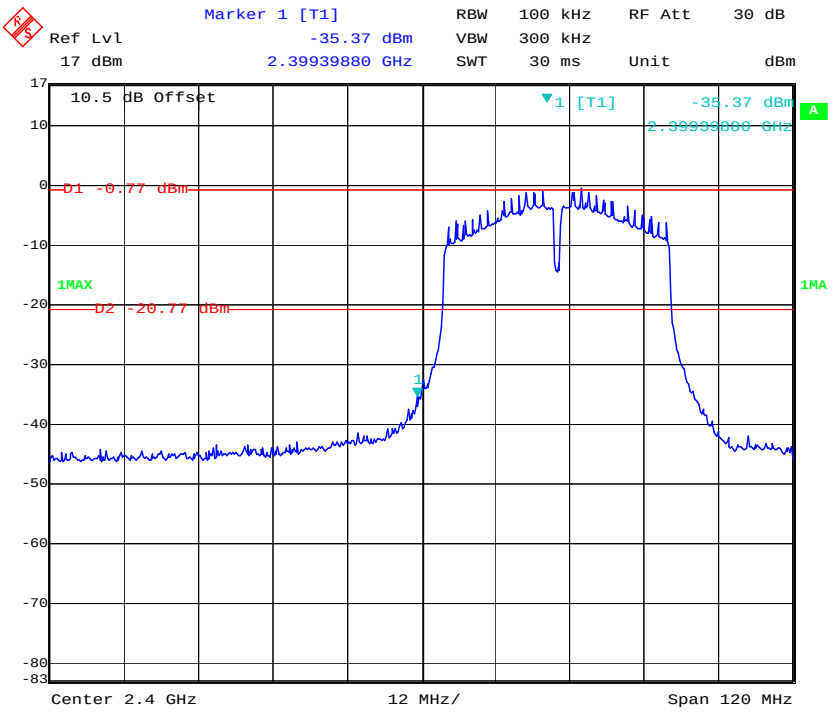
802.11n-HT20: Band Edge, Left Side



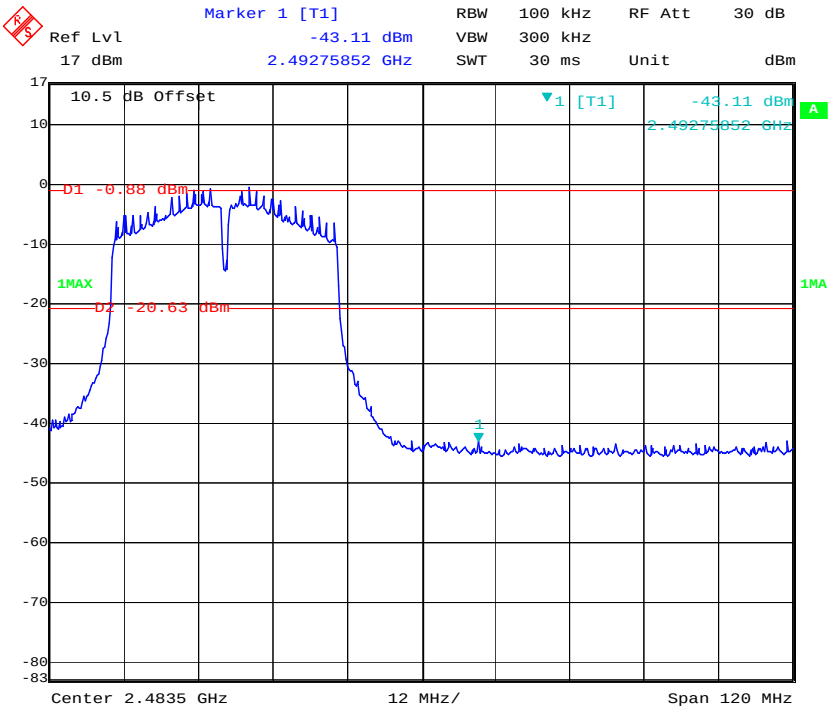
802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Left Side



802.11n-HT40: Band Edge, Right Side



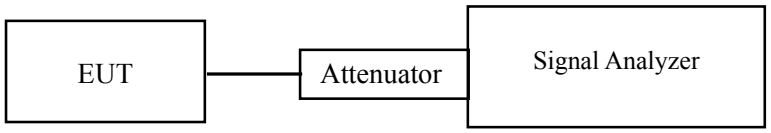
FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	28 ℃
Relative Humidity:	50 %
ATM Pressure:	103.0 kPa

The testing was performed by Nefertari Xu on 2017-05-09.

Test Result: Compliance. Please refer to following table and plots.

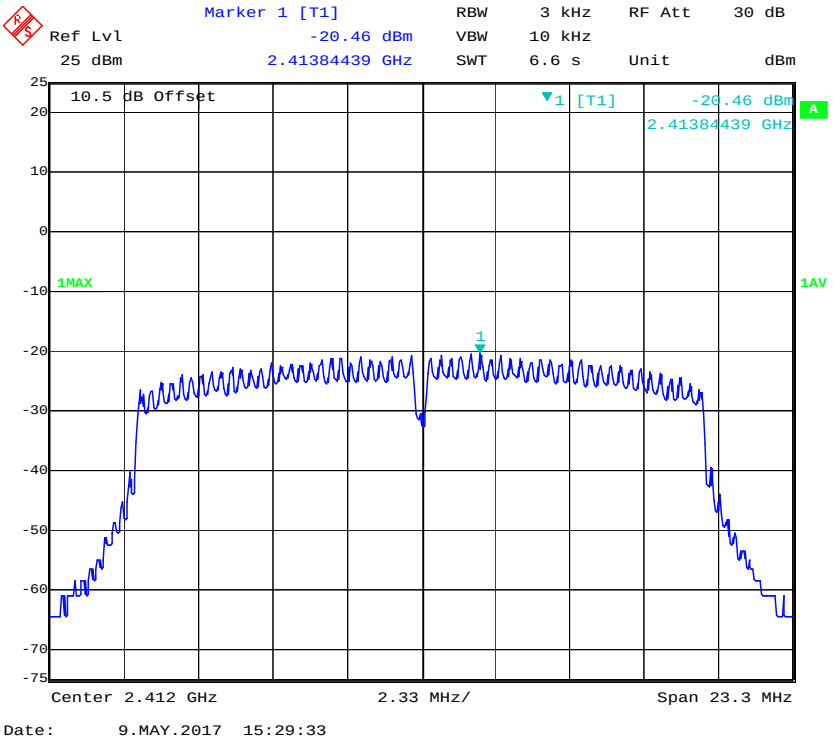
EUT operation mode: Transmitting

Frequency (MHz)	Antenna Port	PSD (dBm/3kHz)	Output Power spectral density (dBm) ant0+ant1+ant2	Limit (dBm/3kHz)
802.11n-HT20				
2412	0	-20.46	-15.74	≤6.2
	1	-20.77		
	2	-20.33		
2462	0	-20.97	-16.01	≤6.2
	1	-20.54		
	2	-20.86		
802.11n-HT40				
2422	0	-25.80	-21.00	≤6.2
	1	-25.63		
	2	-25.90		
2452	0	-25.64	-20.98	≤6.2
	1	-25.54		
	2	-26.08		

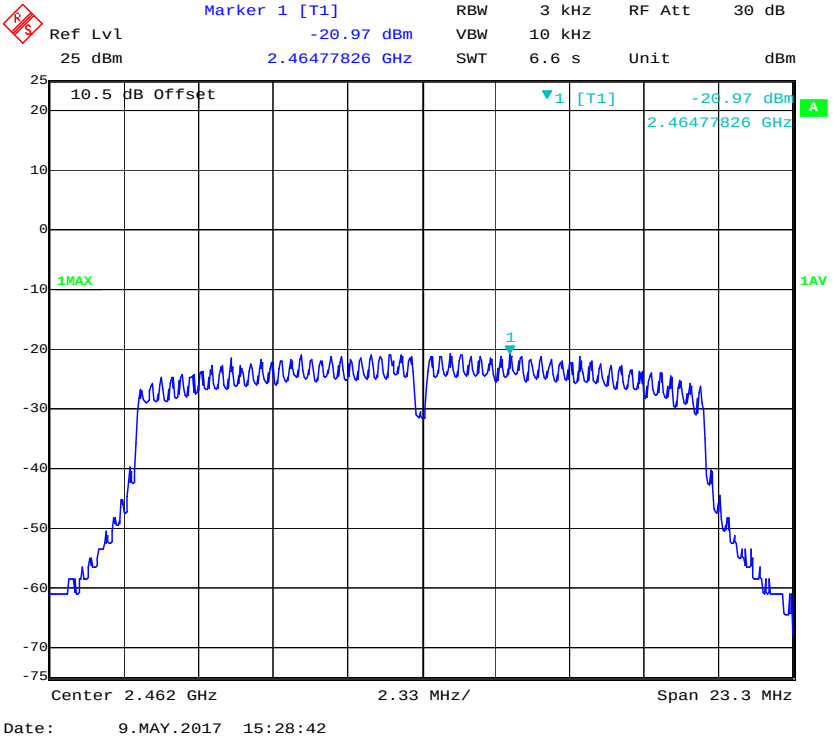
Note: This Device Employs Cyclic Delay Diversity.
When determining reductions in power spectral density limits, array gain is calculated as follows:
Array gain = 10 log (N_{ANT}), where N_{ANT} is the number of transmit antennas.
Total directional gain (dBi) = gain of individual transmit antennas (dBi) +4.8 (dB) =7.8dBi, which is 1.8dB higher than 6dBi, so a 1.8dB reduction should be applied for power spectral density limits.

For Antenna 0:

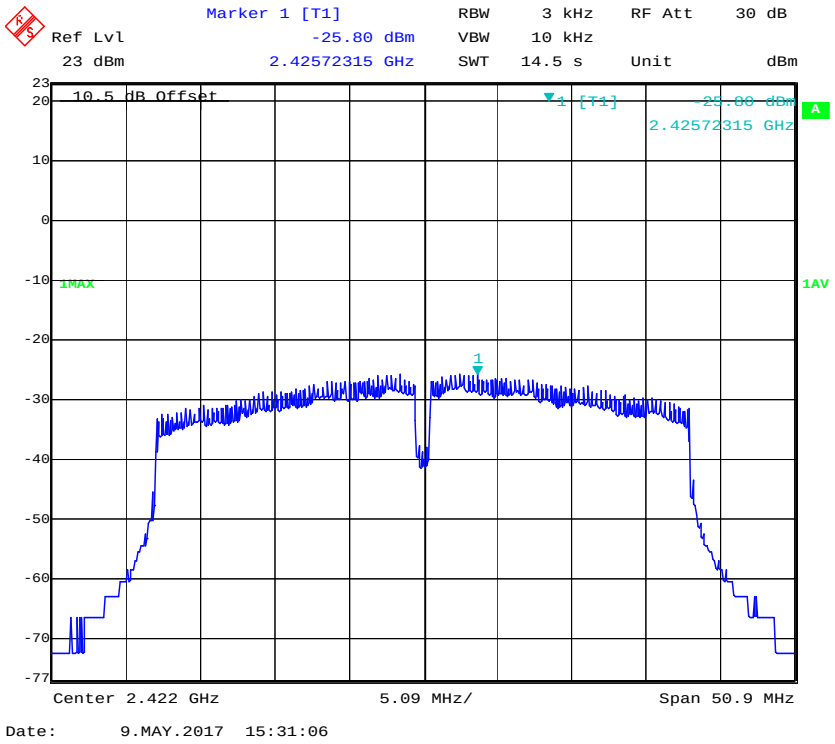
Power Spectral Density, 802.11n-HT20 Low Channel



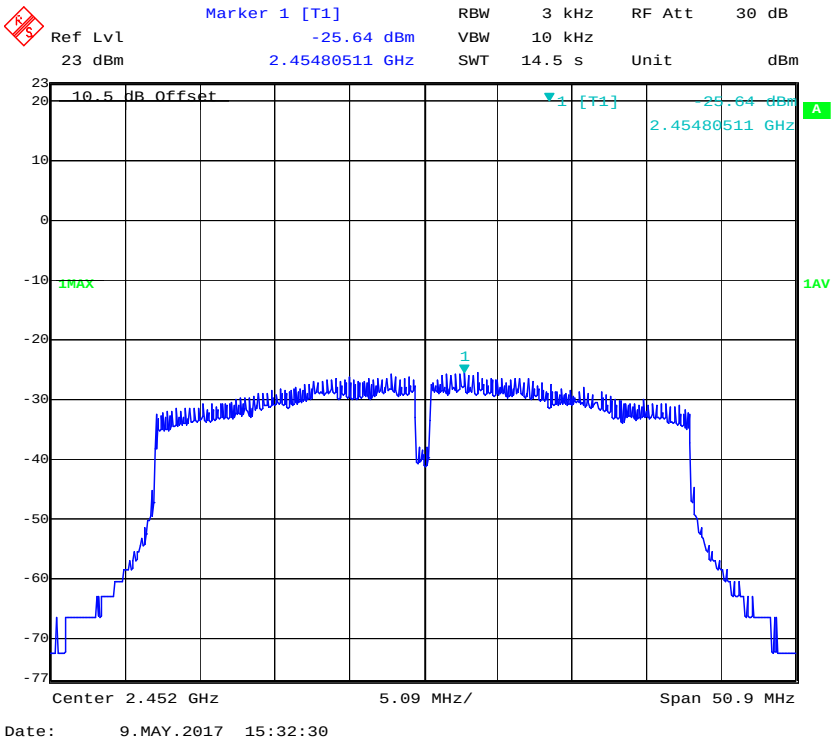
Power Spectral Density, 802.11n-HT20 High Channel



Power Spectral Density, 802.11n-HT40 Low Channel

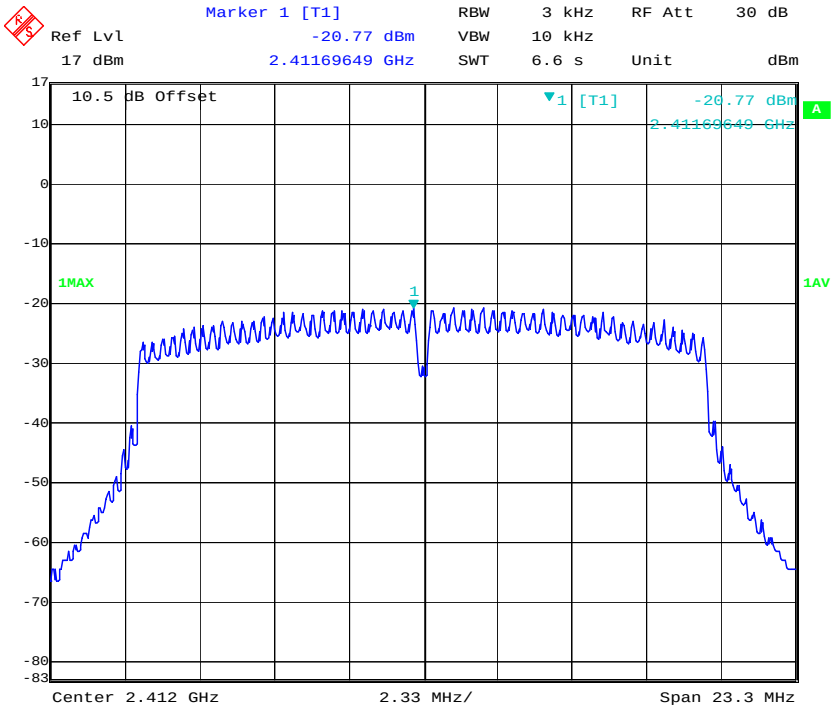


Power Spectral Density, 802.11n-HT40 High Channel

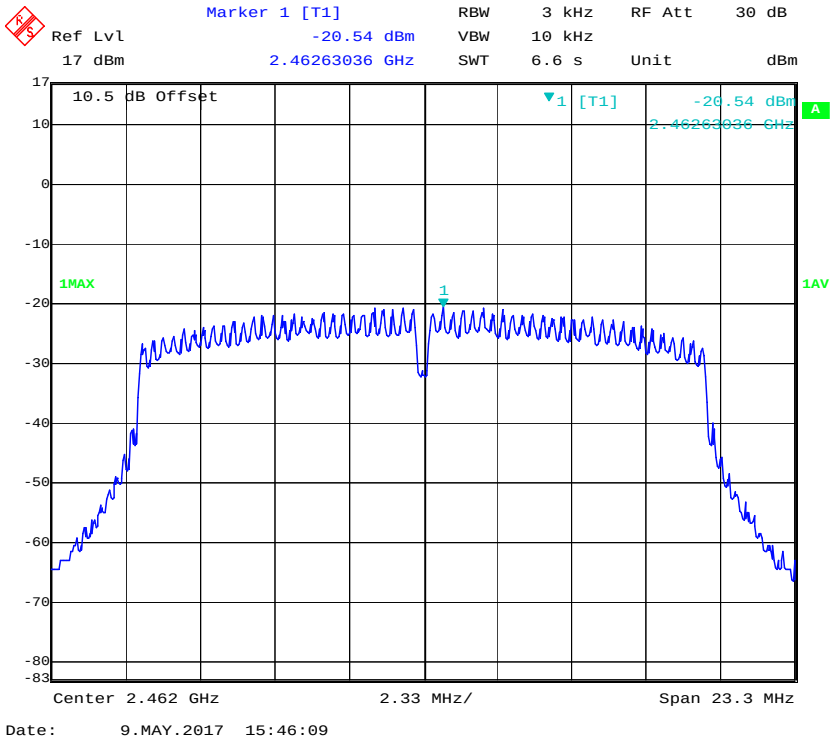


For Antenna 1:

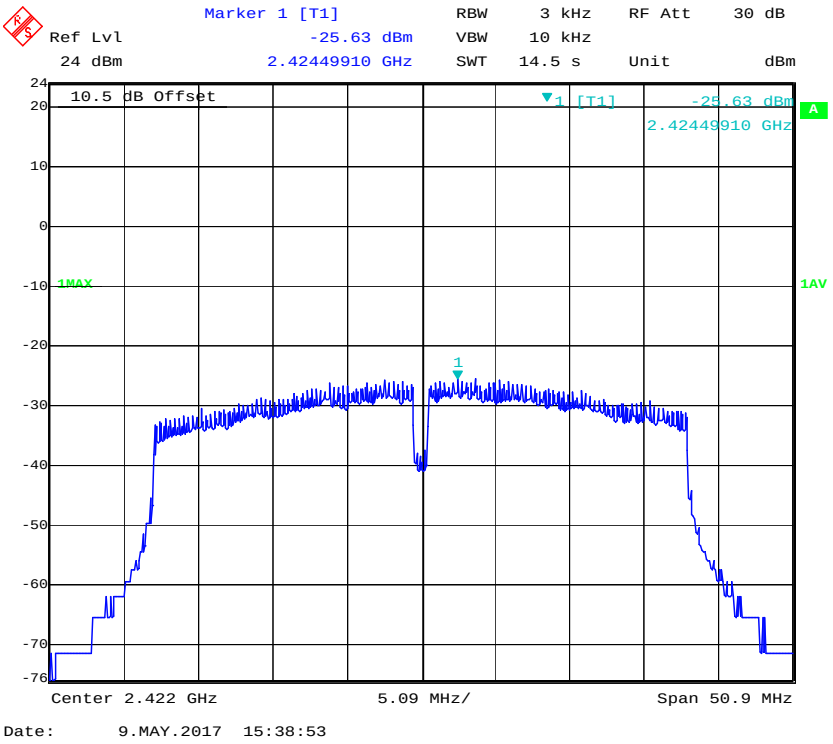
Power Spectral Density, 802.11n-HT20 Low Channel



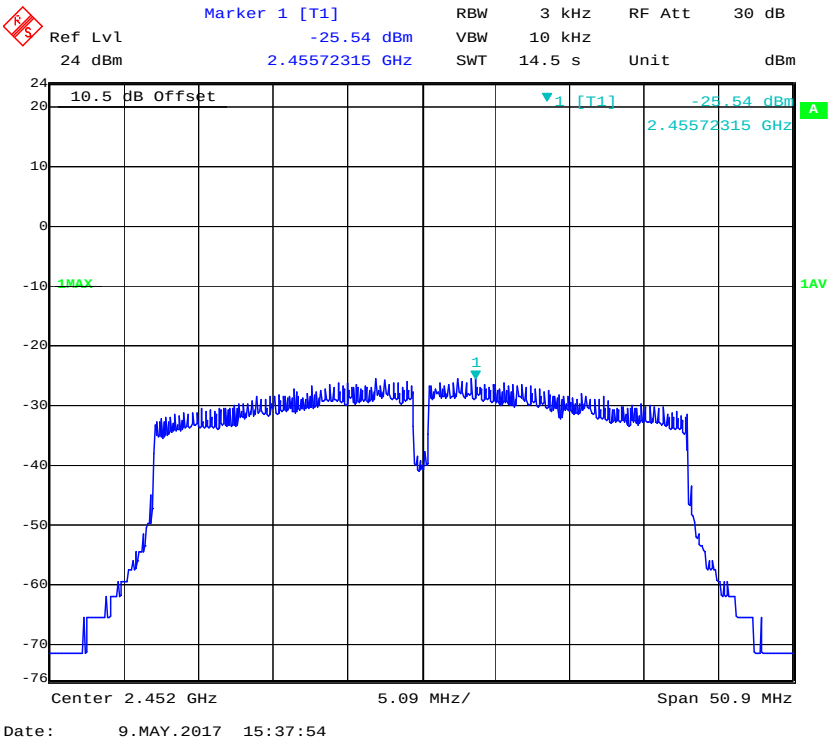
Power Spectral Density, 802.11n-HT20 High Channel



Power Spectral Density, 802.11n-HT40 Low Channel

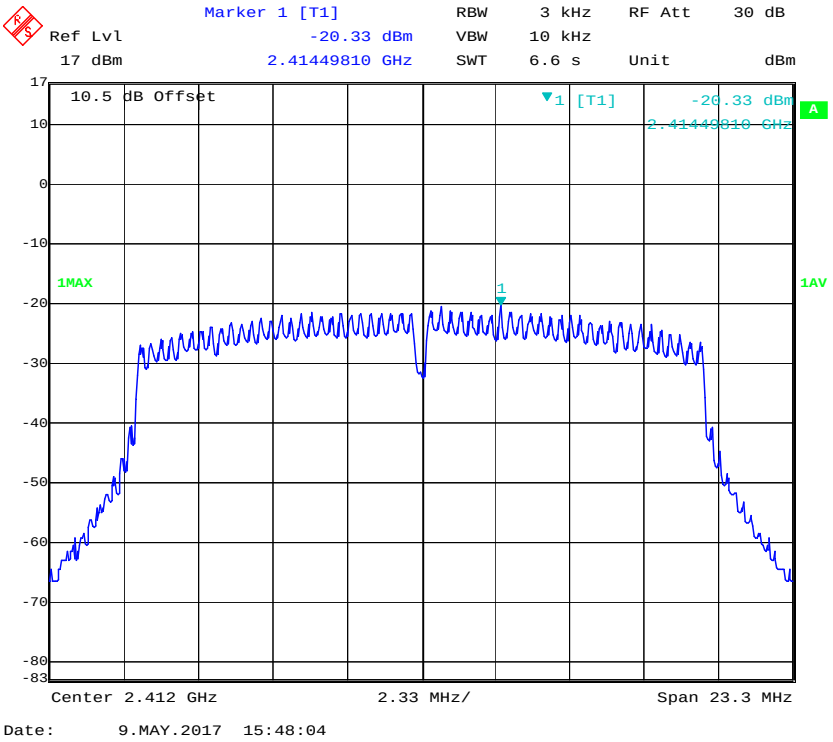


Power Spectral Density, 802.11n-HT40 High Channel

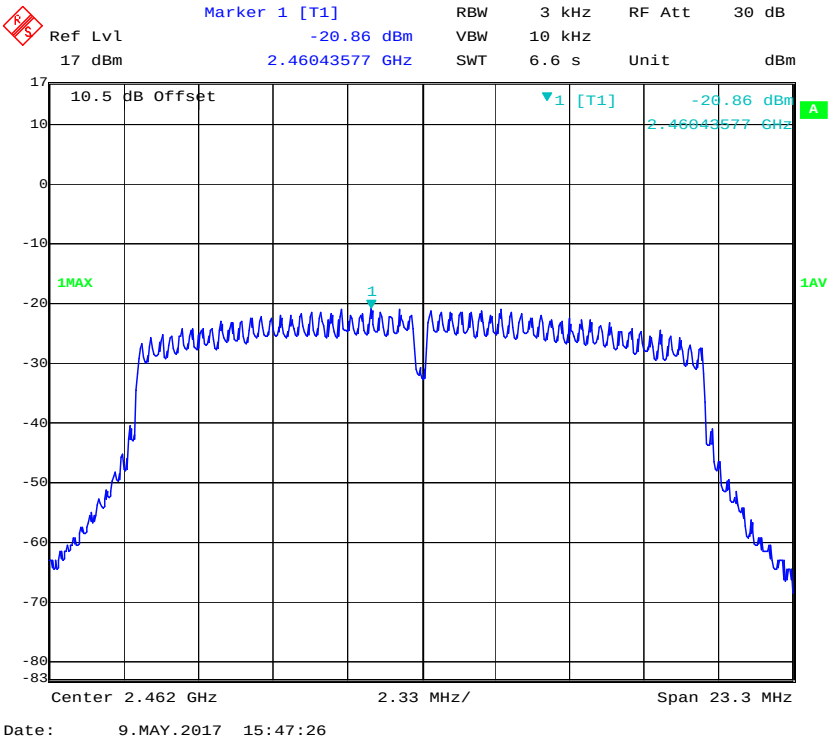


For Antenna 2:

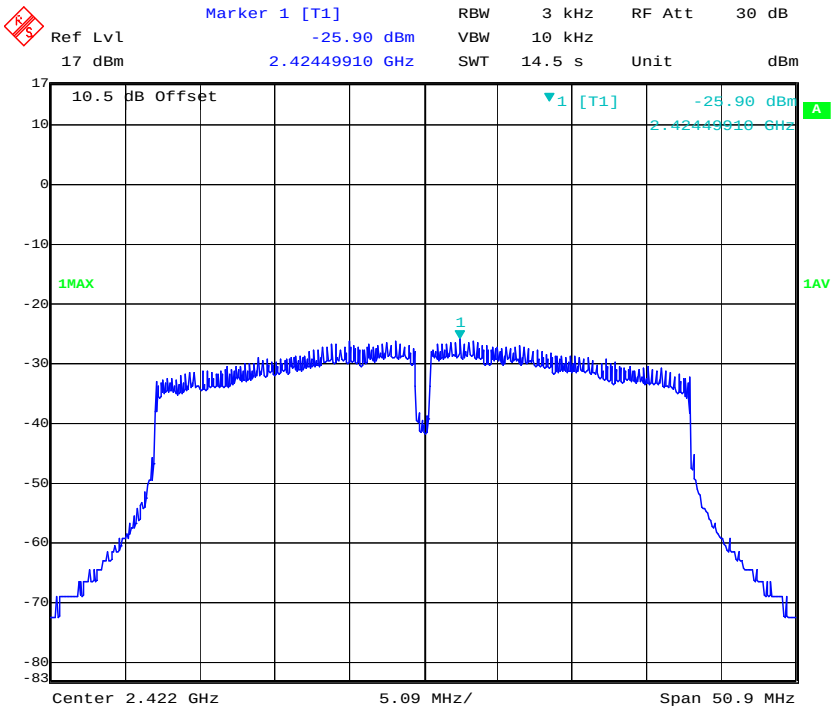
Power Spectral Density, 802.11n-HT20 Low Channel



Power Spectral Density, 802.11n-HT20 High Channel



Power Spectral Density, 802.11n-HT40 Low Channel



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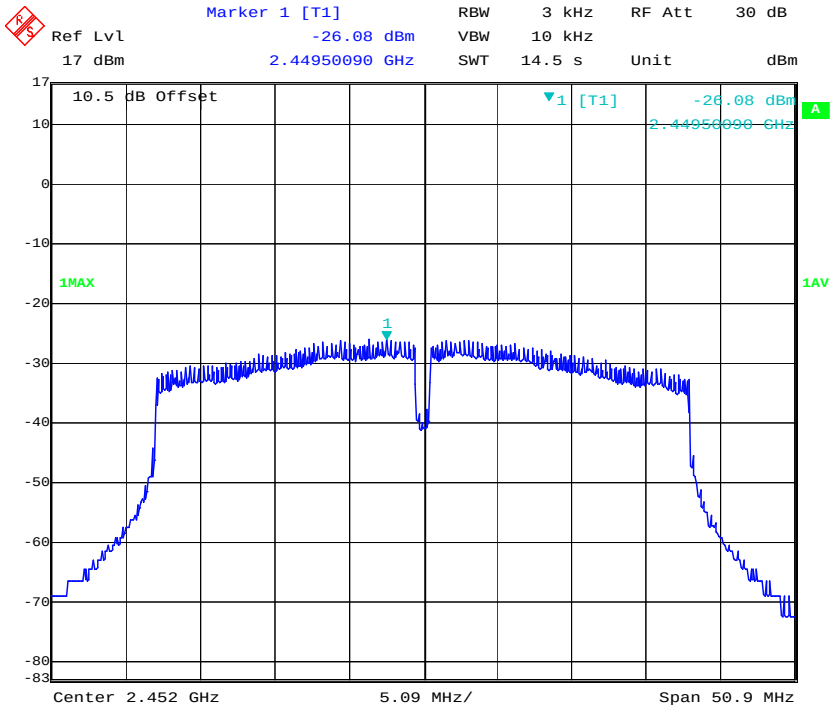
Power Spectral Density, 802.11n-HT40 High Channel



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******* END OF REPORT *******