

## FCC PART 15.247


## TEST REPORT

For

### Weccan Industrial Limited

Room209, 2/F, Building W1-A, No.34 Gaoxin South 4th St Hi-tech Industrial Park, Nanshan District, Shenzhen, China

**FCC ID: Z3CDRW358F60**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 2.4 G RC Drone With WIFI Camera(camera unit)
<b>Report Number:</b> RSZ170623802-00B	
<b>Report Date:</b> 2017-08-04	
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Weccan Industrial Limited's* product, model number: *DRW358S (FCC ID: Z3CDRW358F60)* or the "EUT" in this report was a *2.4 G RC Drone With WIFI Camera*(camera unit), which was measured approximately: 380 mm (L) x 380 mm (W) x 80 mm (H), rated with input voltage: 3.7V from battery.

*Notes: This series products model: SG-F50, SG-F51, SG-F52, SG-F53, SG-F54, SG-F55, SG-F56, SG-F57, SG-F58, SG-F59, SG-F60, SG-F61, SG-F62, SG-F63, SG-F64, SG-F65, SG-F66, SG-F67, SG-68, SG-F69, SG-F70, SG-F71, SG-F72, SG-F73, SG-F74, SG-F75, SG-F76, SG-F77, SG-F78, SG-F79, SG-F80, SG-F81, SG-F82, SG-F83, SG-F84, SG-F85, SG-F86, SG-F87, SG-F88, SG-F89, SG-F90, SG-F91, SG-F92, SG-F93, SG-F94, SG-F95, SG-F96, SG-F97, SG-F98, SG-F99 and DRW358S are identical; they have the identical schematics, they have different model number and color. Model DRW358S was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.*

*\* All measurement and test data in this report was gathered from production sample serial number: 170623802 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2017-06-23.*

### Objective

This report is prepared on behalf of *Weccan Industrial Limited* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

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

### Related Submittal(s)/Grant(s)

The remote control Unit of a system submission with FCC ID: Z3CDRW358F60W.

### 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°C
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

Bay Area Compliance Laboratories Corp. (Kunshan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L9963). And accredited to ISO/IEC 17025 by A2LA(Lab code: 4323.01), the FCC Designation No. CN1185 under the KDB 974614 D01.

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.

Bay Area Compliance Laboratories Corp. (Kunshan) was registered with ISED Canada under ISED Canada Registration Number 3062E.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

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

### Equipment Modifications

No modification was made to the EUT tested.

### EUT Exercise Software

BLE & Wi-Fi test in the engineer mode.

802.11b: Data rate: 11 Mbps, Power level: 15

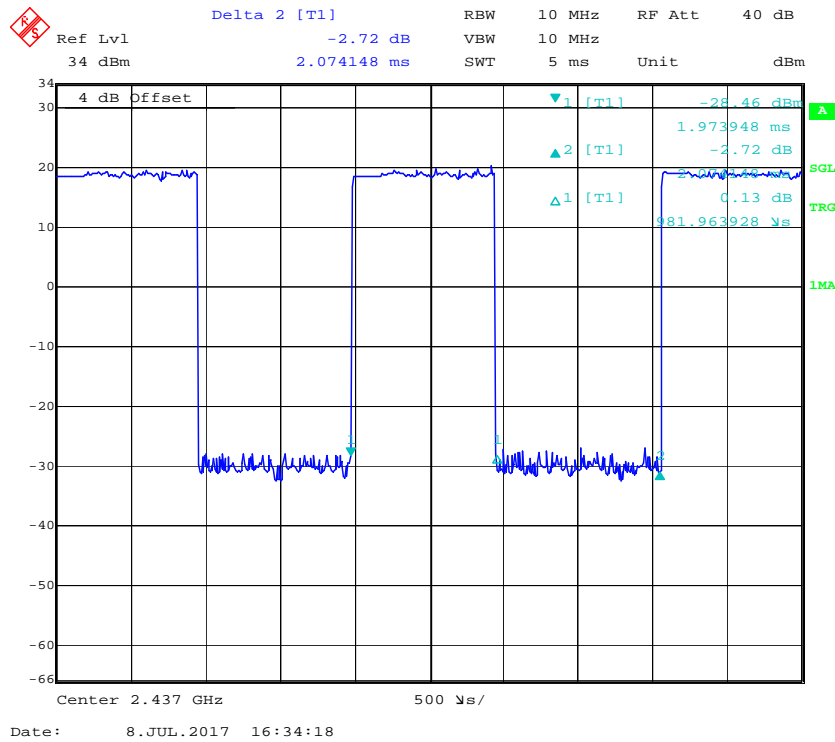
802.11g: Data rate: 54 Mbps, Power level: 10

802.11n-HT20: Data rate: MCS7, Power level: 10

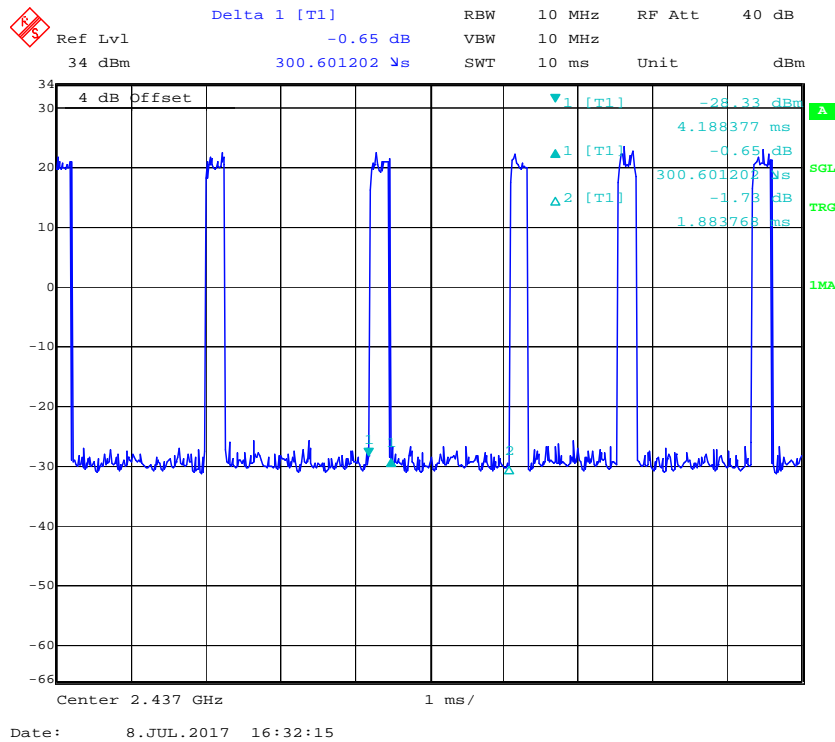
Pre-scan with all the data rates, the above data rate is the worst case for Wi-Fi test.

# Duty cycle

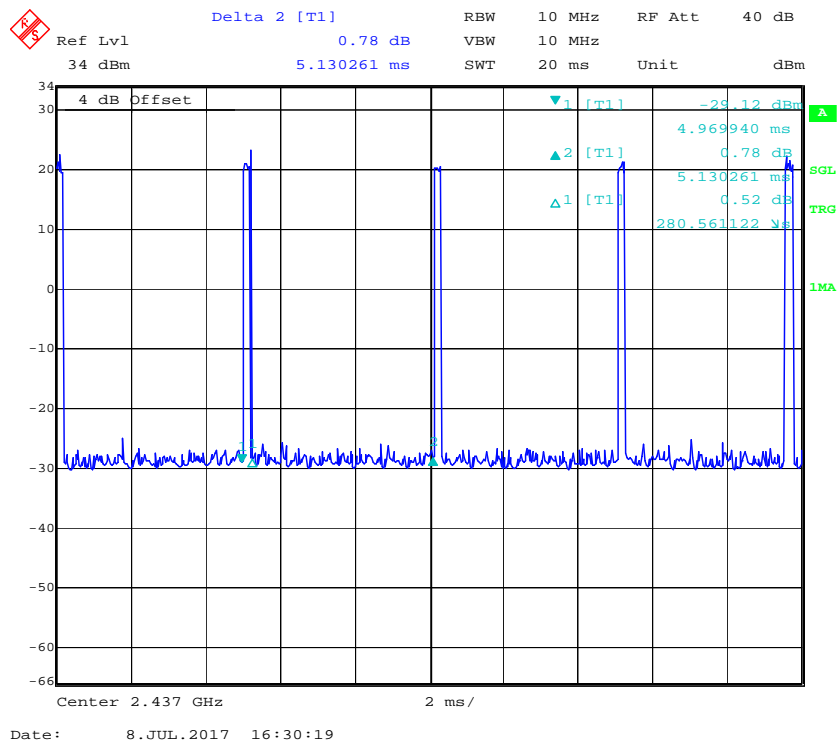
## 802.11b mode



## 802.11g mode



## 802.11n-HT20 Mode



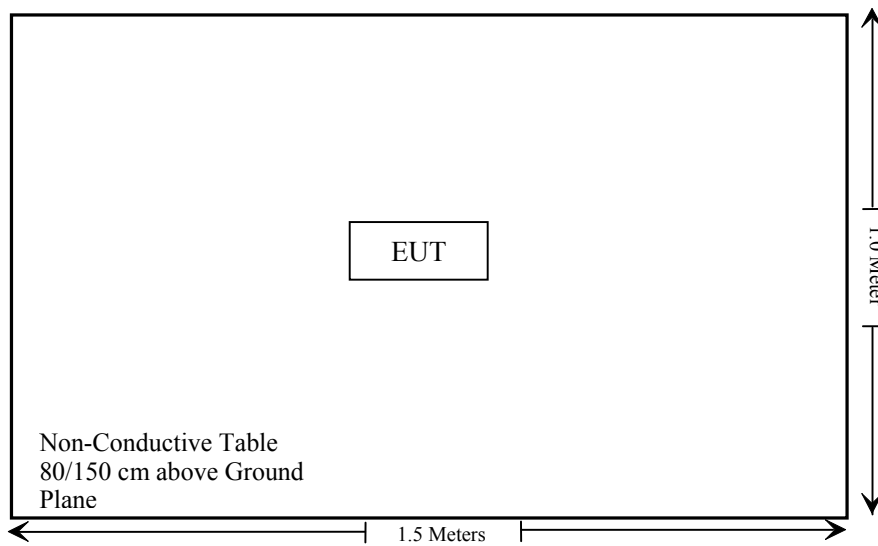
Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	47	982.0	1.02	3kHz	3.28
802.11g	16	300.6	3.32	10kHz	7.96
802.11n-HT20	5	280.6	3.56	10kHz	13.01

## External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

## Block Diagram of Test Setup

For radiated emission





**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
FCC §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	Not Applicable
§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

Note: EUT power by battery. The battery need to pull out while it in charging.

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiation test</b>					
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	9311-4159	2016-12-12	2019-12-12
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
BACL	RF cable	KS-LAB-012	KS-LAB-012	2016-12-15	2017-12-15
Ducommun technologies	RF Cable	104PEA	218124002	2017-04-22	2018-04-22
<b>RF Conducted test</b>					
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	2017-06-18	2018-06-18
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	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), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	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

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

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)

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2462	1.5	1.41	24	251.19	20	0.07	1

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**

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**Applicable Standard**

According to FCC § 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 use of a standard antenna jack or electrical connector is prohibited.

**Antenna Connector Construction**

The EUT has one internal antenna arrangement which was permanently attached and the antenna gain is 1.5 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

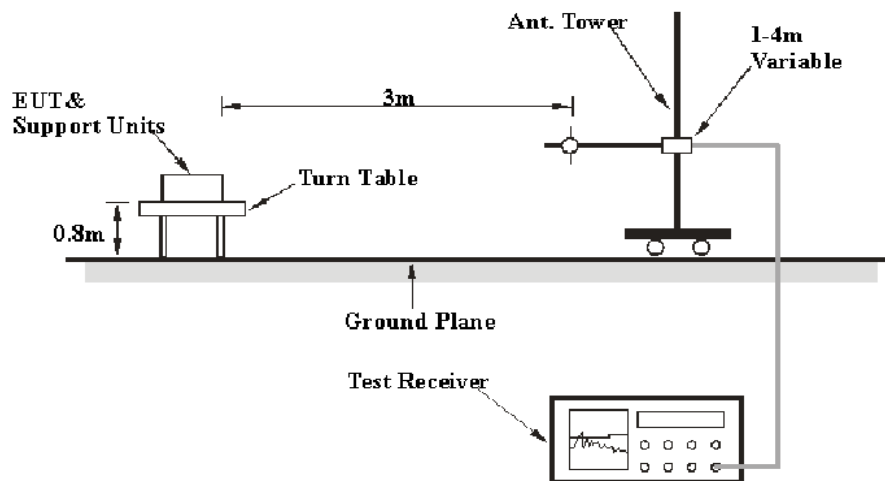
**Result:** Compliance.

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

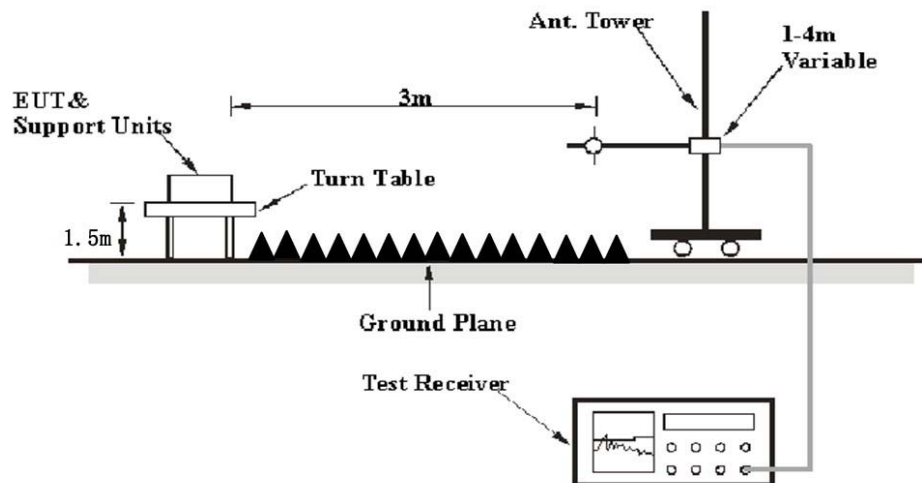
FCC §15.247 (d); §15.209; §15.205;

**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.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

## 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 <sup>Note 1</sup>	/	Ave.
	1MHz	> 1/T <sup>Note 2</sup>	/	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.

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz to 1GHz and peak and Average detection modes for frequencies above 1GHz.

## 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## 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 compliance with the limit if

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

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

**Test Data****Environmental Conditions**

<b>Temperature:</b>	21 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101 kPa

The testing was performed by Layne Li on 2017-07-01.

Test Mode: Transmitting

**30 MHz -25 GHz:****802.11b Mode:**

Frequency (MHz)	Receiver		Turn table 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(2412MHz)									
748.72	29.17	QP	150	2.0	H	8.58	37.75	46	8.25
2412.00	115.75	PK	295	1.5	H	-6.19	109.56	/	/
2412.00	107.43	Ave.	295	1.5	H	-6.19	101.24	/	/
2412.00	111.58	PK	258	1.7	V	-6.19	105.39	/	/
2412.00	103.08	Ave.	258	1.7	V	-6.19	96.89	/	/
2386.95	69.29	PK	81	1.7	H	-6.19	63.10	74	10.90
2386.95	54.03	Ave.	81	1.7	H	-6.19	47.84	54	6.16
2389.51	68.53	PK	60	1.9	H	-6.19	62.34	74	11.66
2389.51	53.99	Ave.	60	1.9	H	-6.19	47.80	54	6.20
2496.56	66.85	PK	123	1.7	H	-5.97	60.88	74	13.12
2496.56	53.39	Ave.	123	1.7	H	-5.97	47.42	54	6.58
4824.00	49.9	PK	42	1.9	H	1.6	51.50	74	22.50
4824.00	35.18	Ave.	42	1.9	H	1.6	36.78	54	17.22

Frequency (MHz)	Receiver		Turn table 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)
Middle Channel(2437MHz)									
748.72	28.47	QP	112	1.9	H	8.58	37.05	46	8.95
2437.00	116.35	PK	42	2.4	H	-6.19	110.16	/	/
2437.00	109.15	Ave.	42	2.4	H	-6.19	102.96	/	/
2437.00	110.49	PK	342	1.3	V	-6.19	104.30	/	/
2437.00	102.62	Ave.	342	1.3	V	-6.19	96.43	/	/
2345.11	68.32	PK	284	1.4	H	-6.42	61.90	74	12.10
2345.11	54.16	Ave.	284	1.4	H	-6.42	47.74	54	6.26
2337.41	67.65	PK	355	1.0	H	-6.42	61.23	74	12.77
2337.41	54.25	Ave.	355	1.0	H	-6.42	47.83	54	6.17
2496.36	67.06	PK	14	2.0	H	-5.97	61.09	74	12.91
2496.36	53.5	Ave.	14	2.0	H	-5.97	47.53	54	6.47
4874.00	49.04	PK	273	1.8	H	1.83	50.87	74	23.13
4874.00	34.5	Ave.	273	1.8	H	1.83	36.33	54	17.67
High Channel(2462 MHz)									
748.72	30.59	QP	158	1.8	H	8.58	39.17	46	6.83
2462.00	116.21	PK	147	1.5	H	-5.97	110.24	/	/
2462.00	108.69	Ave.	147	1.5	H	-5.97	102.72	/	/
2462.00	111.87	PK	312	2.5	V	-5.97	105.90	/	/
2462.00	103.24	Ave.	312	2.5	V	-5.97	97.27	/	/
2366.91	67.71	PK	149	1.2	H	-6.19	61.52	74	12.48
2366.91	54.05	Ave.	149	1.2	H	-6.19	47.86	54	6.14
2493.48	67.58	PK	301	2.5	H	-5.97	61.61	74	12.39
2493.48	53.43	Ave.	301	2.5	H	-5.97	47.46	54	6.54
2499.47	66.86	PK	47	2.2	H	-5.97	60.89	74	13.11
2499.47	53.7	Ave.	47	2.2	H	-5.97	47.73	54	6.27
4924.00	48.78	PK	40	1.0	H	1.83	50.61	74	23.39
4924.00	34.45	Ave.	40	1.0	H	1.83	36.28	54	17.72



**802.11g 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)									
748.72	28.86	QP	124	1.9	H	8.58	37.44	46	8.56
2412.00	112.56	PK	336	2.2	H	-6.19	106.37	/	/
2412.00	101.36	Ave.	336	2.2	H	-6.19	95.17	/	/
2412.00	109.98	PK	202	1.9	V	-6.19	103.79	/	/
2412.00	98.74	Ave.	202	1.9	V	-6.19	92.55	/	/
2389.03	73	PK	102	1.6	H	-6.19	66.81	74	7.19
2389.03	54.34	Ave.	102	1.6	H	-6.19	48.15	54	5.85
2384.19	71.56	PK	216	1.5	H	-6.19	65.37	74	8.63
2384.19	54.23	Ave.	216	1.5	H	-6.19	48.04	54	5.96
2489.87	68.07	PK	156	1.3	H	-5.97	62.10	74	11.90
2489.87	53.42	Ave.	156	1.3	H	-5.97	47.45	54	6.55
4824.00	49.36	PK	45	1.1	H	1.6	50.96	74	23.04
4824.00	33.71	Ave.	45	1.1	H	1.6	35.31	54	18.69
Middle Channel (2437MHz)									
748.72	27.8	QP	184	1.5	H	8.58	36.38	46	9.62
2437.00	112.26	PK	204	1.4	H	-6.19	106.07	/	/
2437.00	101.30	Ave.	204	1.4	H	-6.19	95.11	/	/
2437.00	109.25	PK	221	1.0	V	-6.19	103.06	/	/
2437.00	98.87	Ave.	221	1.0	V	-6.19	92.68	/	/
2387.15	69.25	PK	324	1.8	H	-6.19	63.06	74	10.94
2387.15	54.08	Ave.	324	1.8	H	-6.19	47.89	54	6.11
2389.10	68.67	PK	323	1.8	H	-6.19	62.48	74	11.52
2389.10	54.07	Ave.	323	1.8	H	-6.19	47.88	54	6.12
2490.57	67.21	PK	24	1.4	H	-5.97	61.24	74	12.76
2490.57	53.41	Ave.	24	1.4	H	-5.97	47.44	54	6.56
4874.00	49.05	PK	148	1.9	H	1.83	50.88	74	23.12
4874.00	34.21	Ave.	148	1.9	H	1.83	36.04	54	17.96

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)
High Channel (2462 MHz)									
748.72	28.26	QP	224	1.5	H	8.58	36.84	46	9.16
2462.00	112.6	PK	315	1.7	H	-5.97	106.63	/	/
2462.00	101.28	Ave.	315	1.7	H	-5.97	95.31	/	/
2462.00	110.89	PK	227	1.5	V	-5.97	104.92	/	/
2462.00	99.18	Ave.	227	1.5	V	-5.97	93.21	/	/
2389.03	73	PK	271	1.3	H	-6.19	66.81	74	7.19
2389.03	54.34	Ave.	271	1.3	H	-6.19	48.15	54	5.85
2483.50	71.25	PK	311	2.4	H	-5.97	65.28	74	8.72
2483.50	53.64	Ave.	311	2.4	H	-5.97	47.67	54	6.33
2483.56	68.07	PK	222	1.5	H	-5.97	62.10	74	11.90
2483.56	53.66	Ave.	222	1.5	H	-5.97	47.69	54	6.31
4924.00	48.23	PK	275	1.7	H	1.83	50.06	74	23.94
4924.00	34.17	Ave.	275	1.7	H	1.83	36.00	54	18.00

**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)									
748.72	29.87	QP	167	1.8	H	8.58	38.45	46	7.55
2412.00	110.81	PK	124	1.7	H	-6.19	104.62	/	/
2412.00	99	Ave.	124	1.7	H	-6.19	92.81	/	/
2412.00	106.4	PK	86	1.1	V	-6.19	100.21	/	/
2412.00	93.56	Ave.	86	1.1	V	-6.19	87.37	/	/
2389.51	68.13	PK	325	1.9	H	-6.19	61.94	74	12.06
2389.51	54.05	Ave.	325	1.9	H	-6.19	47.86	54	6.14
2495.53	66.85	PK	290	2.4	H	-5.97	60.88	74	13.12
2495.53	53.39	Ave.	290	2.4	H	-5.97	47.42	54	6.58
2497.86	66.95	PK	318	1.3	H	-5.97	60.98	74	13.02
2497.86	53.4	Ave.	318	1.3	H	-5.97	47.43	54	6.57
4824.00	47.53	PK	36	2.0	H	1.6	49.13	74	24.87
4824.00	33.34	Ave.	36	2.0	H	1.6	34.94	54	19.06
Middle Channel (2437MHz)									
748.72	28.44	QP	117	1.2	H	8.58	37.02	46	8.98
2437.00	110.56	PK	138	1.9	H	-6.19	104.37	/	/
2437.00	97.98	Ave.	138	1.9	H	-6.19	91.79	/	/
2437.00	106.58	PK	288	1.4	V	-6.19	100.39	/	/
2437.00	94.07	Ave.	288	1.4	V	-6.19	87.88	/	/
2333.72	68.16	PK	108	1.1	H	-6.42	61.74	74	12.26
2333.72	54.22	Ave.	108	1.1	H	-6.42	47.80	54	6.20
2383.58	67.87	PK	45	1.8	H	-6.19	61.68	74	12.32
2383.58	54.05	Ave.	45	1.8	H	-6.19	47.86	54	6.14
2490.57	67.17	PK	40	2.1	H	-5.97	61.20	74	12.80
2490.57	53.39	Ave.	40	2.1	H	-5.97	47.42	54	6.58
4874.00	48.21	PK	235	1.5	H	1.83	50.04	74	23.96
4874.00	33.83	Ave.	235	1.5	H	1.83	35.66	54	18.34

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)
High Channel (2462 MHz)									
748.72	26.9	QP	285	1.6	H	8.58	35.48	46	10.52
2462.00	109.13	PK	42	2.2	H	-5.97	103.16	/	/
2462.00	96.72	Ave.	42	2.2	H	-5.97	90.75	/	/
2462.00	105.44	PK	29	1.8	V	-5.97	99.47	/	/
2462.00	92.53	Ave.	29	1.8	V	-5.97	86.56	/	/
2387.56	68.05	PK	212	1.5	H	-6.19	61.86	74	12.14
2387.56	54.03	Ave.	212	1.5	H	-6.19	47.84	54	6.16
2484.19	72.92	PK	249	2.0	H	-5.97	66.95	74	7.05
2484.19	53.46	Ave.	249	2.0	H	-5.97	47.49	54	6.51
2485.05	70.5	PK	220	1.1	H	-5.97	64.53	74	9.47
2485.05	53.39	Ave.	220	1.1	H	-5.97	47.42	54	6.58
4924.00	48.43	PK	2	2.4	H	1.83	50.26	74	23.74
4924.00	34.02	Ave.	2	2.4	H	1.83	35.85	54	18.15

**Note:**

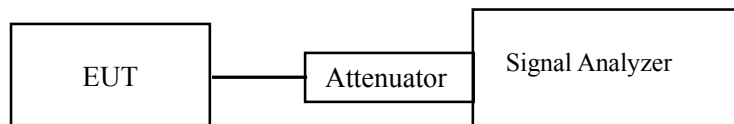
1. Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor
  2. Corrected Amplitude = Corrected Factor + Receiver Reading
  3. Margin = Limit- Corrected Amplitude
- The other spurious emission which is 20dB to the limit was not recorded.

**FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH****Applicable Standard**

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

**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 it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

**Test Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

*The testing was performed by Ada Yu on 2017-07-08.*

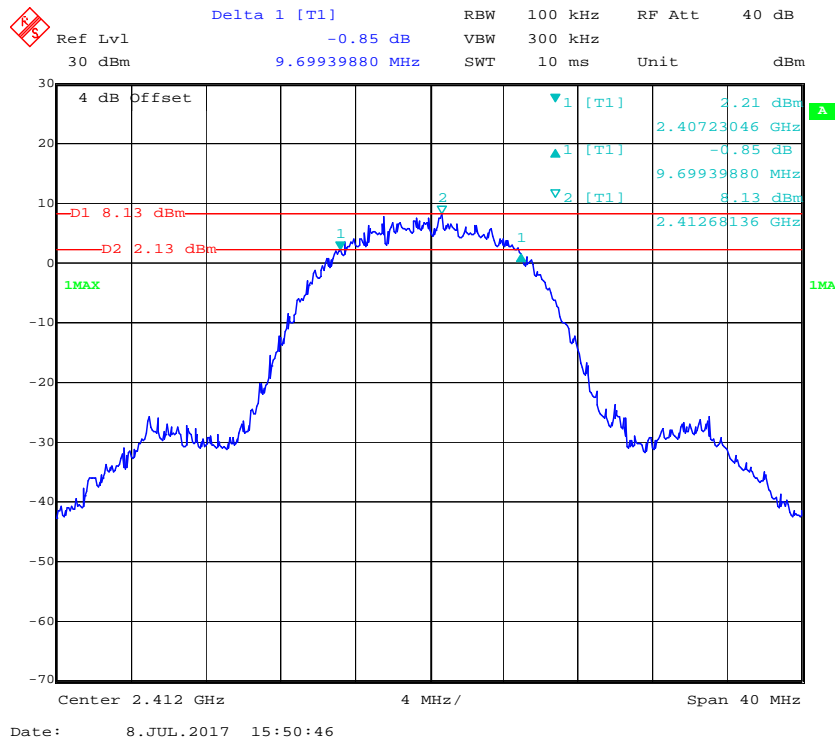
*Test Result: Compliance.*

*EUT operation mode: Transmitting*

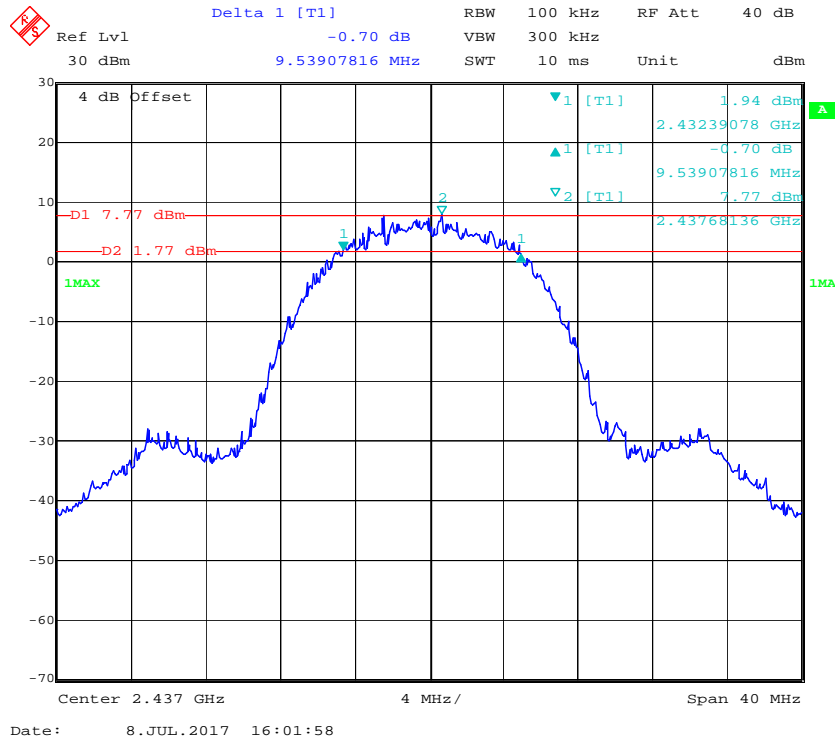
Please refer to following table and plots.

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
802.11b mode			
Low	2412	9.7	$\geq 500$
Middle	2437	9.54	$\geq 500$
High	2462	9.78	$\geq 500$
802.11g			
Low	2412	16.51	$\geq 500$
Middle	2437	16.59	$\geq 500$
High	2462	16.59	$\geq 500$
802.11n-HT20 mode			
Low	2412	17.72	$\geq 500$
Middle	2437	17.72	$\geq 500$
High	2462	17.72	$\geq 500$

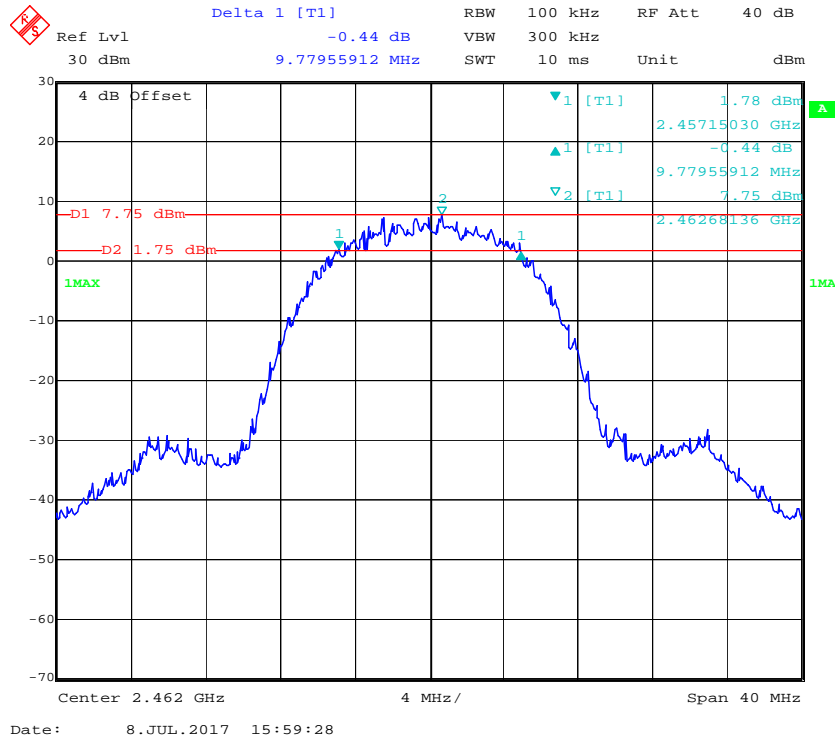
## 802.11b Low Channel



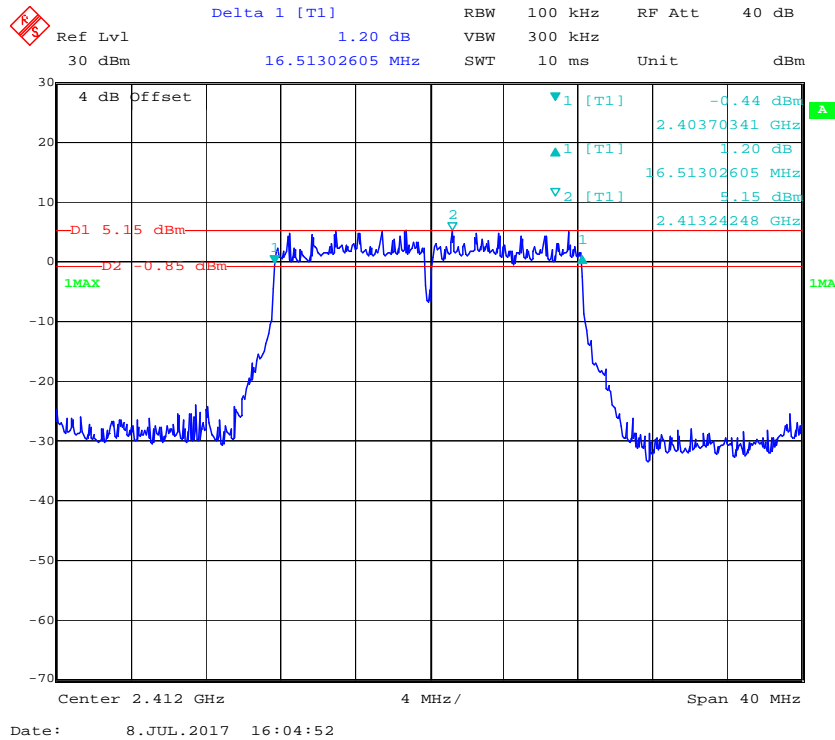
## 802.11b Middle Channel



### 802.11b High Channel

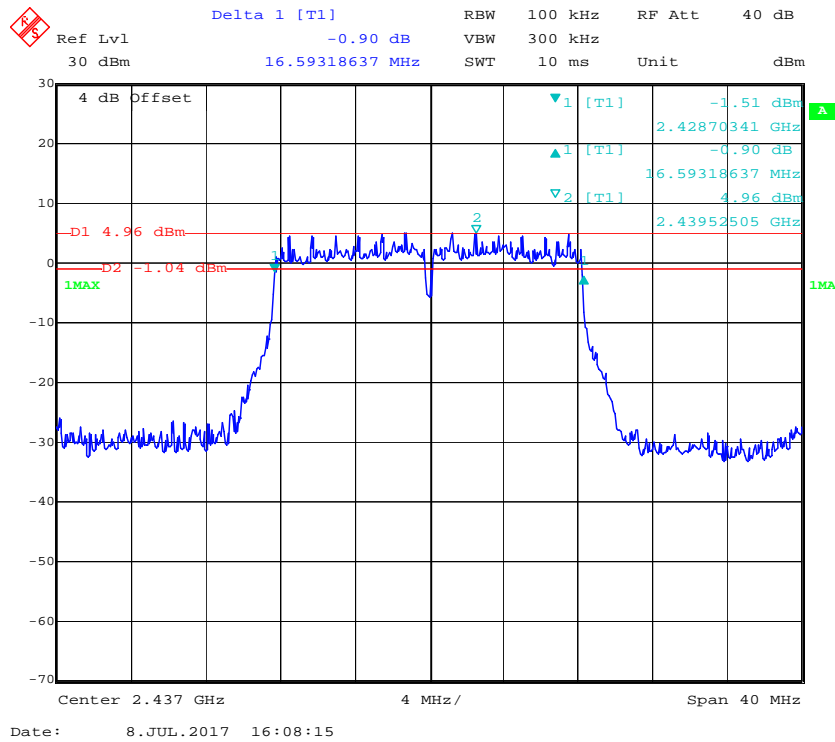


### 802.11g Low Channel

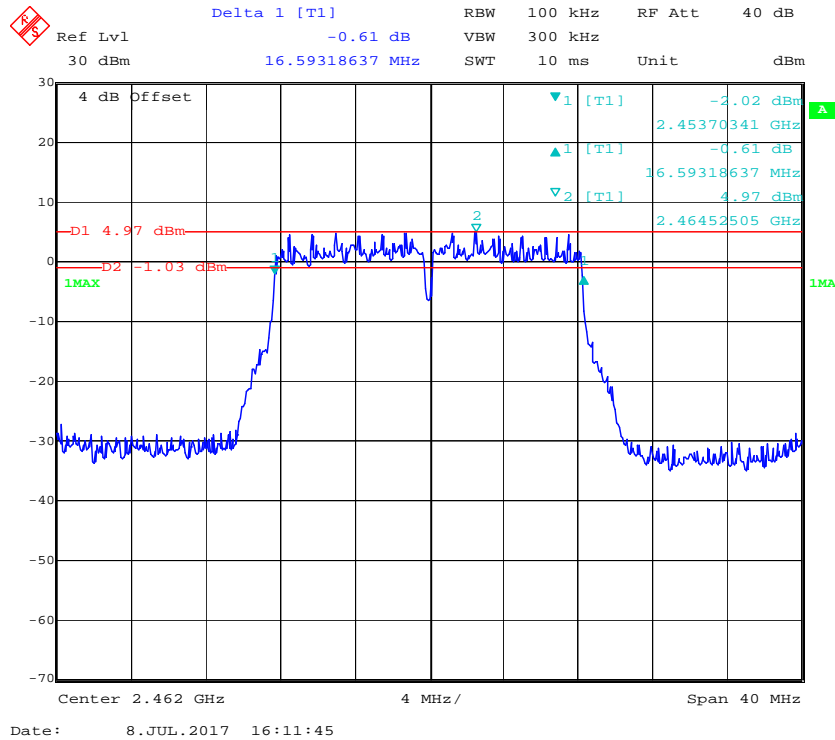




### 802.11g Middle Channel



### 802.11g High Channel



Delta 1 [T1]

Ref Lvl 30 dBm

1.31 dB

VBW 300 kHz

SWT 10 ms

Unit dBm

4 dB Offset

1MAX

D1 5.06 dBm

D2 -0.94 dBm

1 [T1] -0.34 dBm

2 [T1] 1.31 dB

1 [T1] 17.71543086 MHz

2 [T1] 2.41324248 GHz

Center 2.412 GHz

4 MHz/

Span 40 MHz

Date: 8.JUL.2017 16:15:47

Delta 1 [T1]

Ref Lvl 1.52 dB

30 dBm 17.71543086 MHz

RBW 100 kHz RF Att 40 dB

SWT 10 ms Unit dBm

4 dB Offset

D1 4.84 dBm

D2 -1.16 dBm

1MAX

1 [T1] -1.58 dBm

2 [T1] 4.84 dBm

1 [T1] 2.42814228 GHz

2 [T1] 2.43952505 GHz

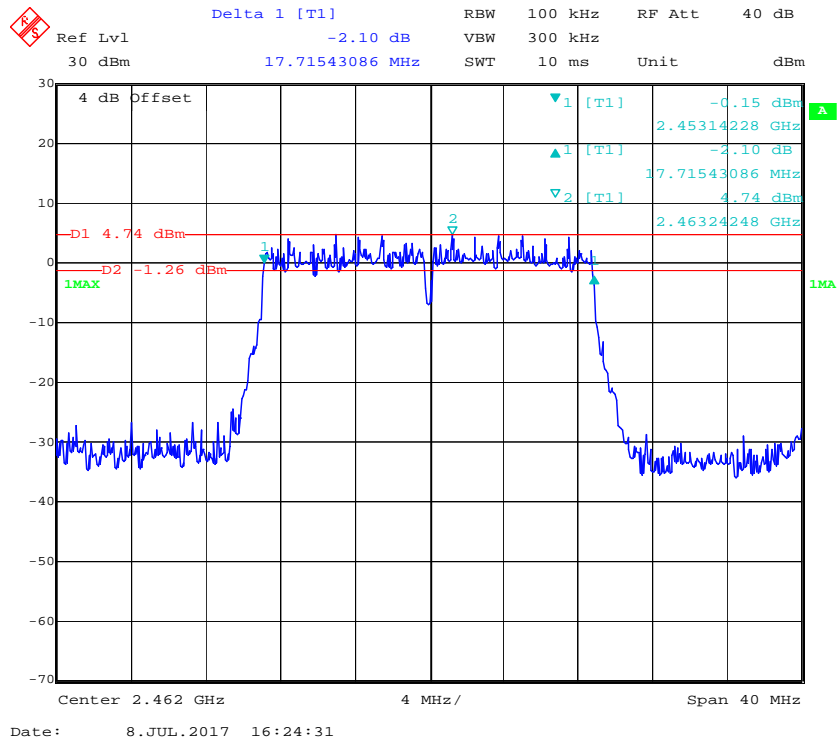
Center 2.437 GHz

4 MHz/

Span 40 MHz

Date: 8.JUL.2017 16:20:40

# 802.11n-HT20 High Channel



## **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**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	55 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Ada Yu on 2017-07-08.*

*Test Result: Compliance.*

*EUT operation mode: Transmitting*

Please refer to following table and plots.

**Wi-Fi mode**

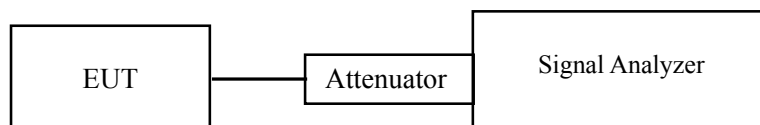
Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)
802.11b			
Low	2412	23.49	30
Middle	2437	22.81	30
High	2462	22.91	30
802.11g			
Low	2412	18.53	30
Middle	2437	18.32	30
High	2462	18.13	30
802.11n HT20			
Low	2412	17.01	30
Middle	2437	17.62	30
High	2462	17.27	30

**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**

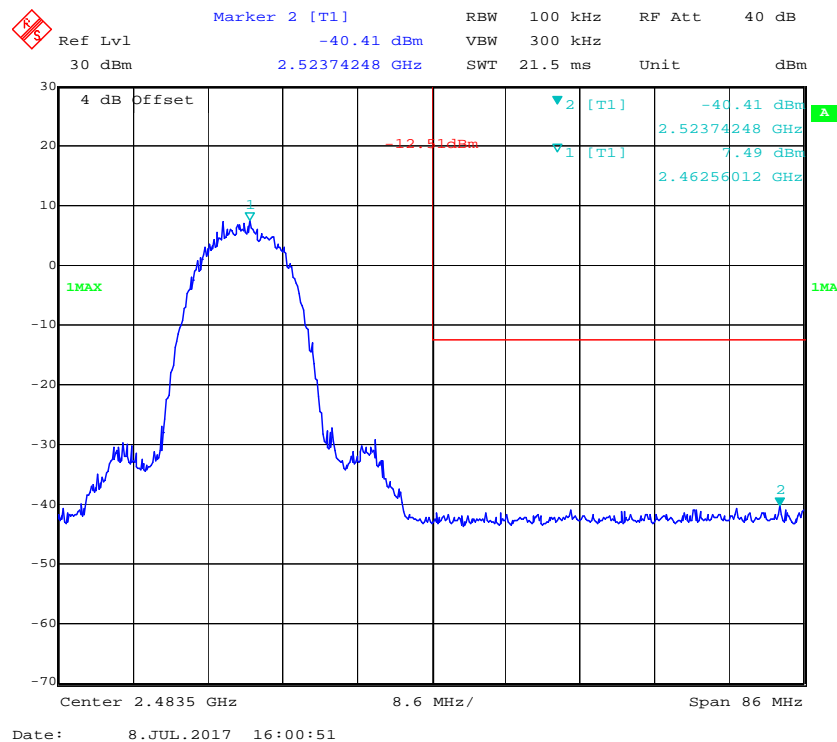
<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	55 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Ada Yu on 2017-07-08.*

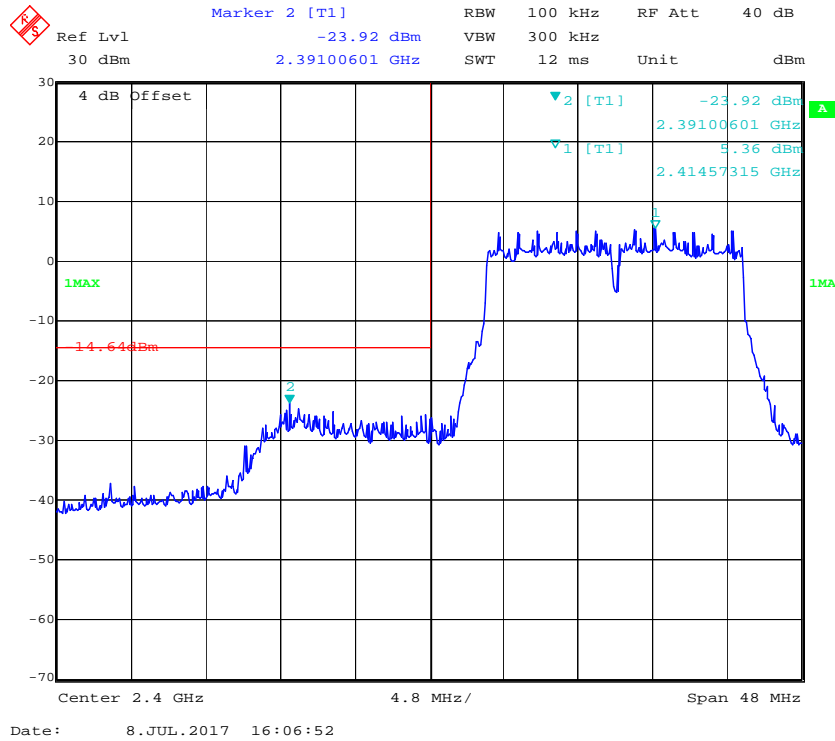
*Test Result: Compliance.*

*EUT operation mode: Transmitting*

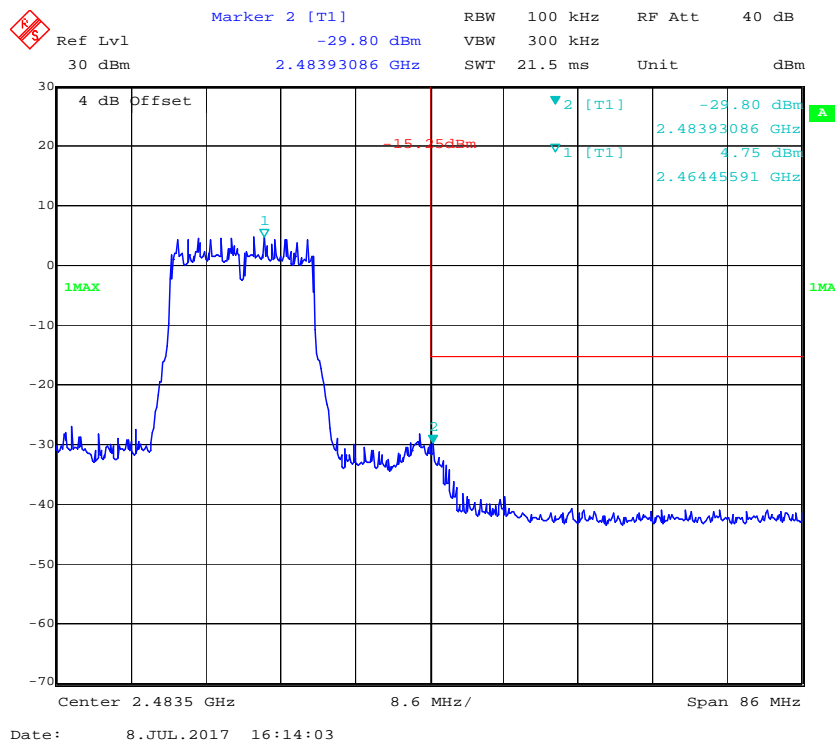
### 802.11b: Band Edge, Left Side



### 802.11g: Band Edge, Left Side

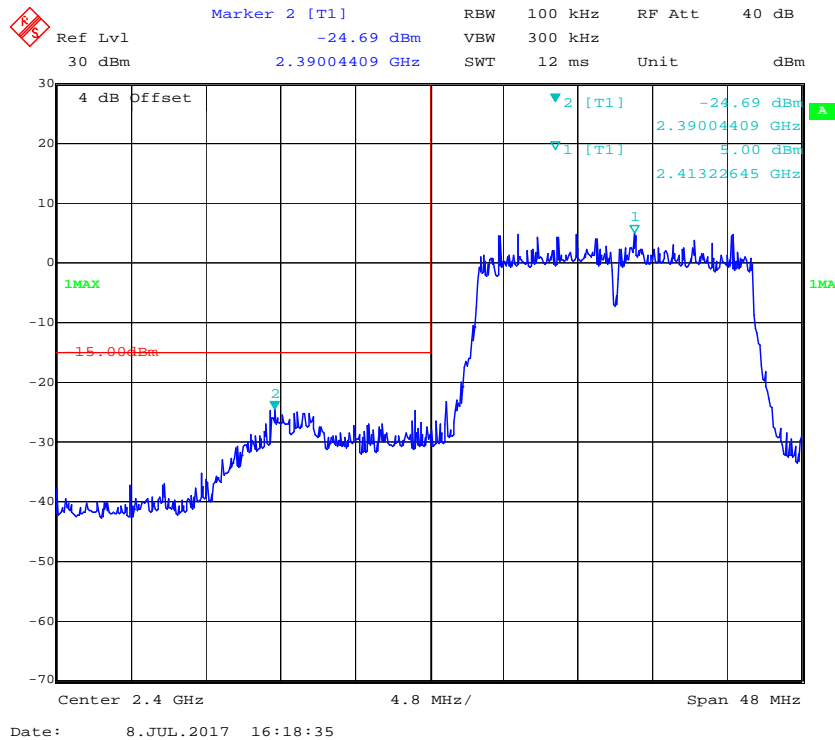


### 802.11g: Band Edge, Right Side

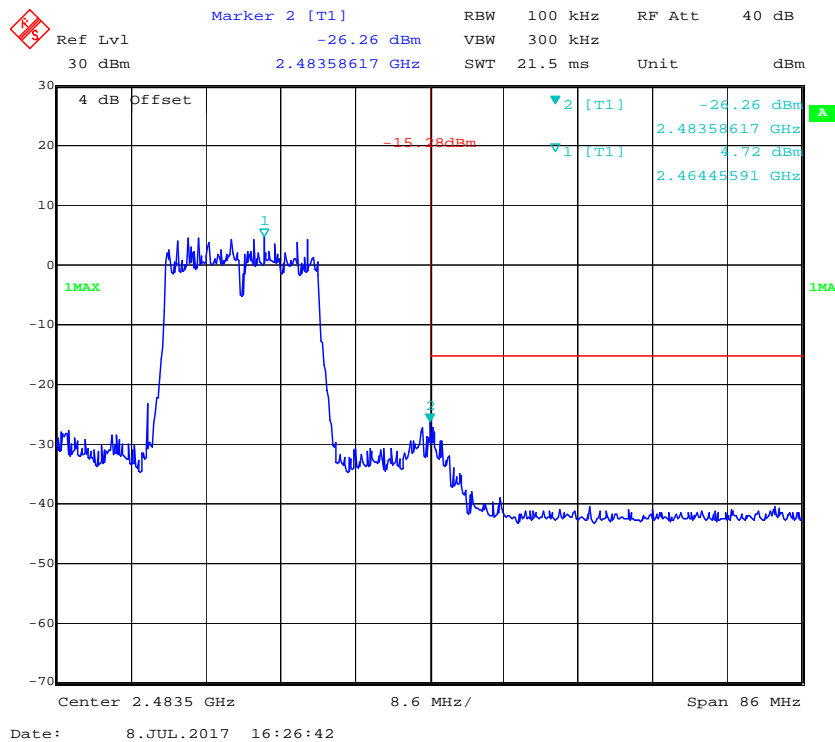




### 802.11n-HT20: Band Edge, Left Side



### 802.11n-HT20: Band Edge, Right Side



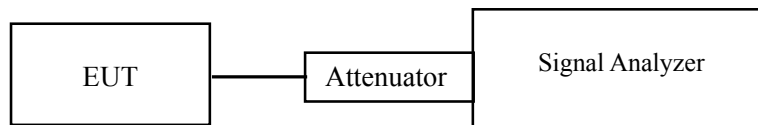
## FCC §15.247(e) - POWER SPECTRAL DENSITY

### 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:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .
3. Set the VBW  $\geq 3 \times \text{RBW}$ .
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:	24 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

*The testing was performed by Ada Yu on 2017-07-08.*

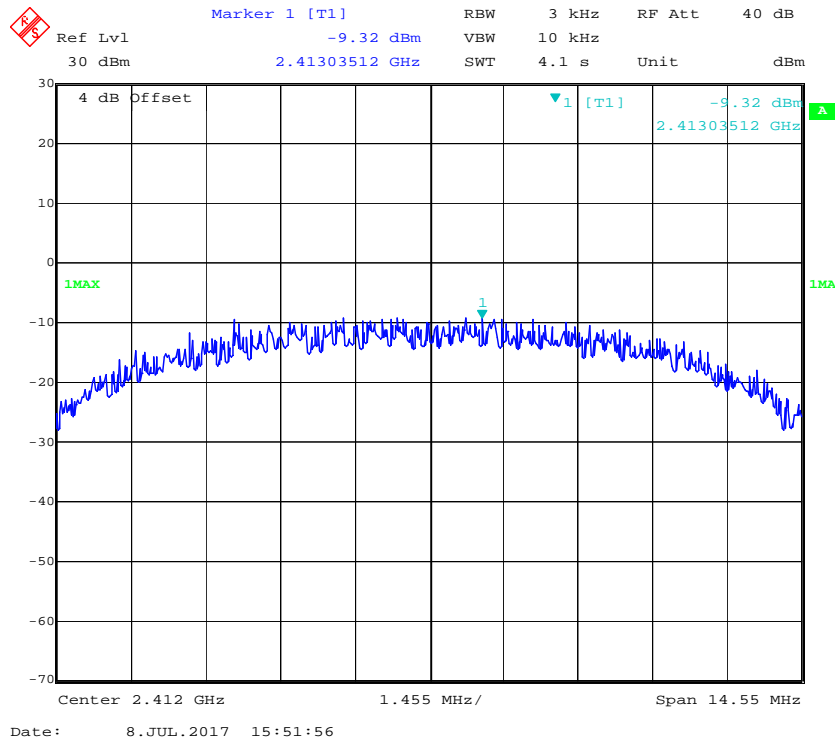
*Test Result: Compliance.*

*EUT operation mode: Transmitting*

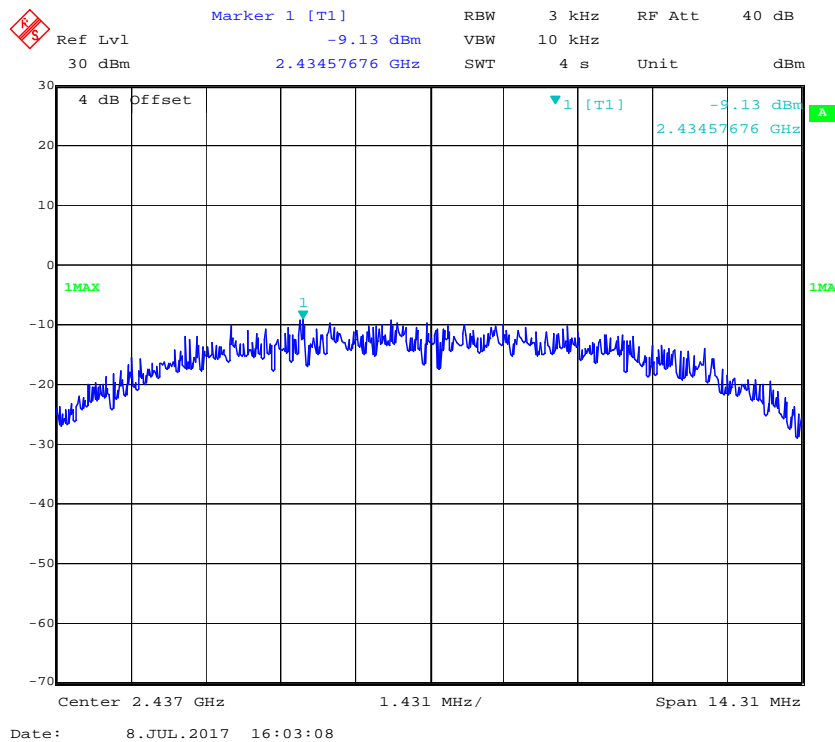
Please refer to following table and plots.

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-9.32	$\leq 8$
Middle	2437	-9.13	$\leq 8$
High	2462	-8.64	$\leq 8$
802.11g mode			
Low	2412	-10.24	$\leq 8$
Middle	2437	-9.91	$\leq 8$
High	2462	-10.83	$\leq 8$
802.11n-HT20 mode			
Low	2412	-10.32	$\leq 8$
Middle	2437	-10.94	$\leq 8$
High	2462	-11.28	$\leq 8$

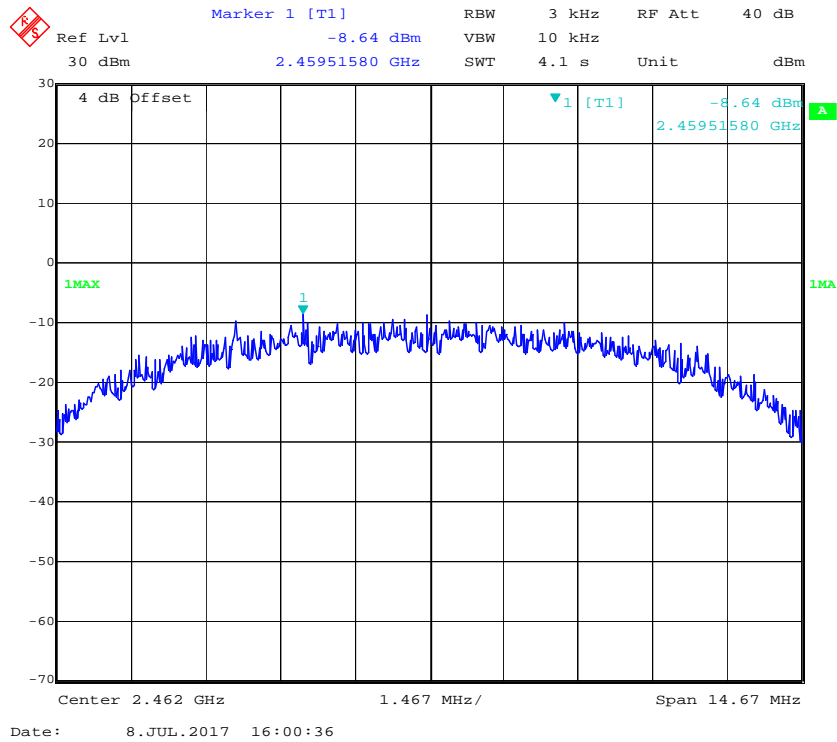
### Power Spectral Density, 802.11b Low Channel



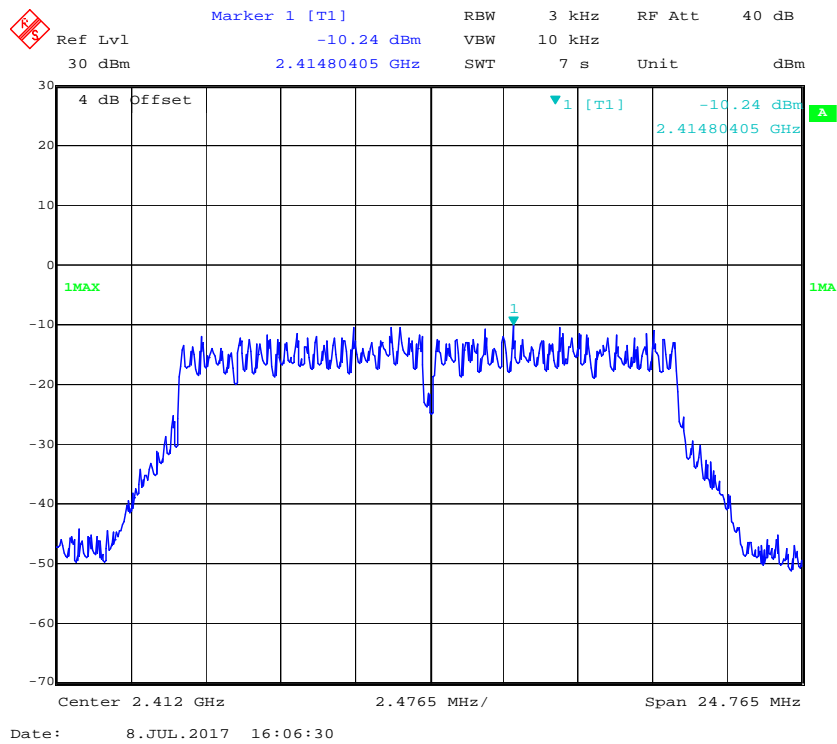
### Power Spectral Density, 802.11b Middle Channel



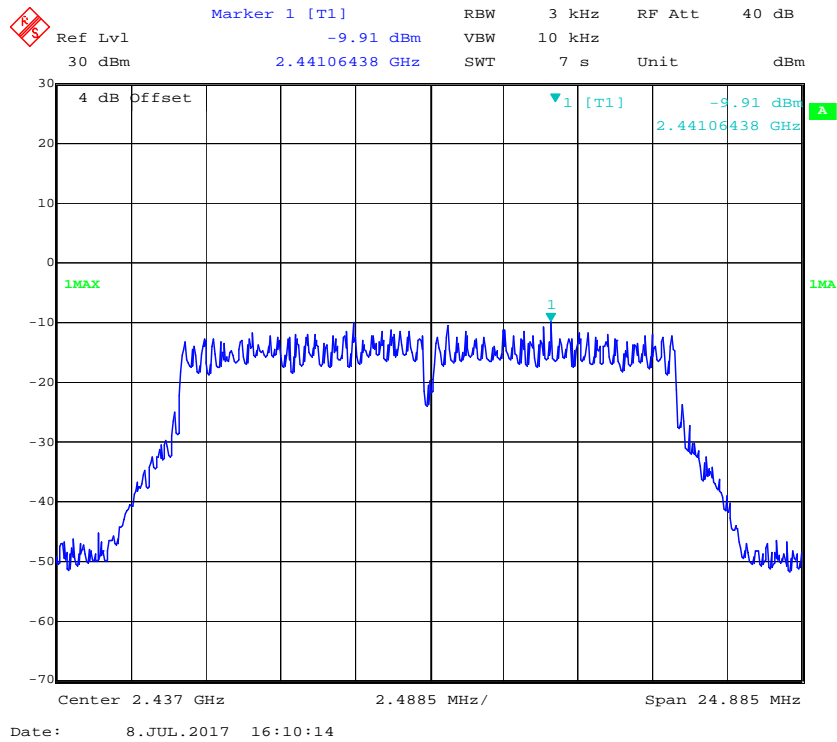
### Power Spectral Density, 802.11b High Channel



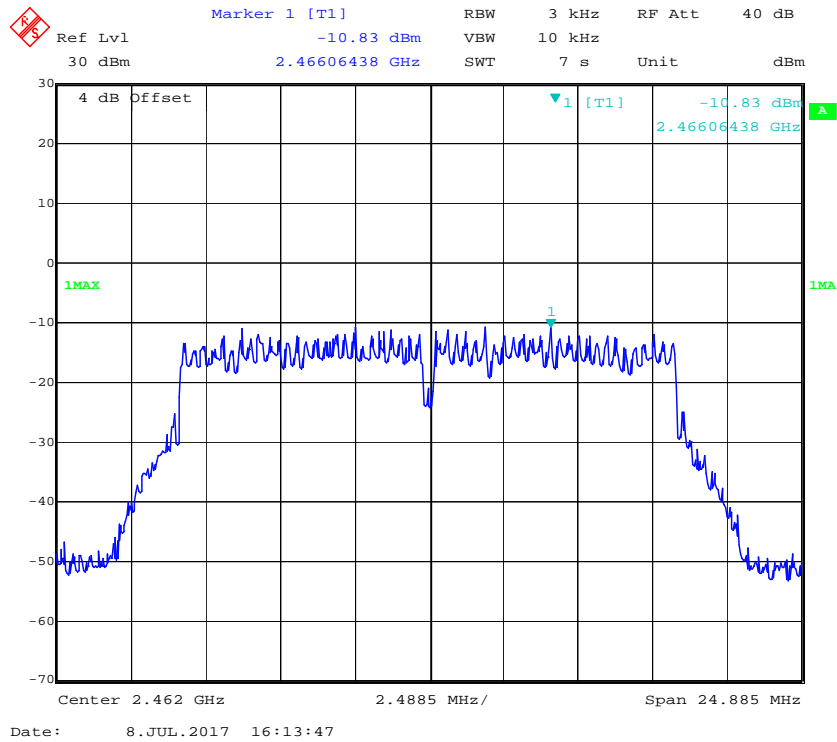
### Power Spectral Density, 802.11g Low Channel



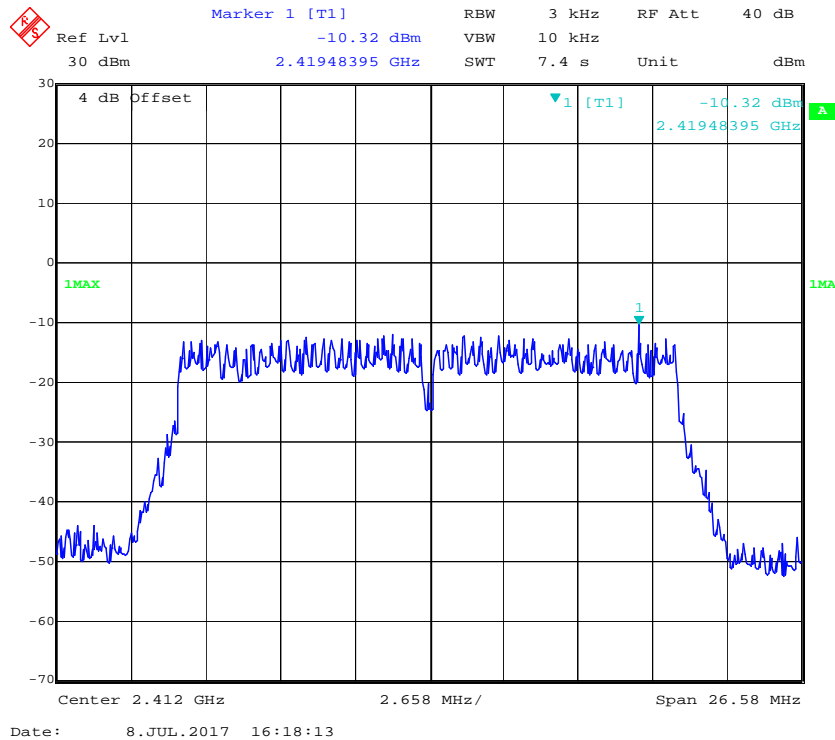
### Power Spectral Density, 802.11g Middle Channel



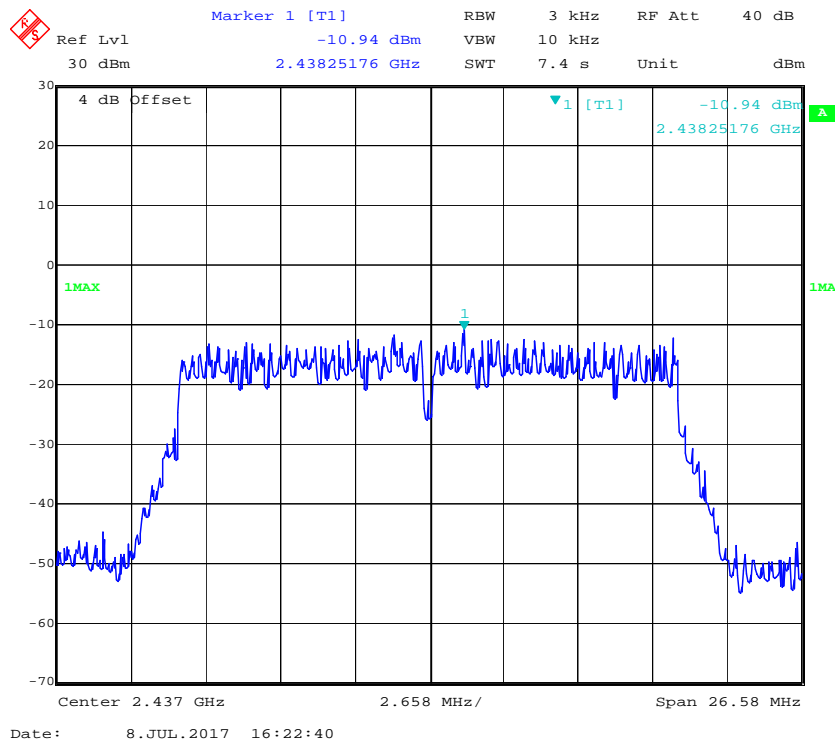
### Power Spectral Density, 802.11g High Channel



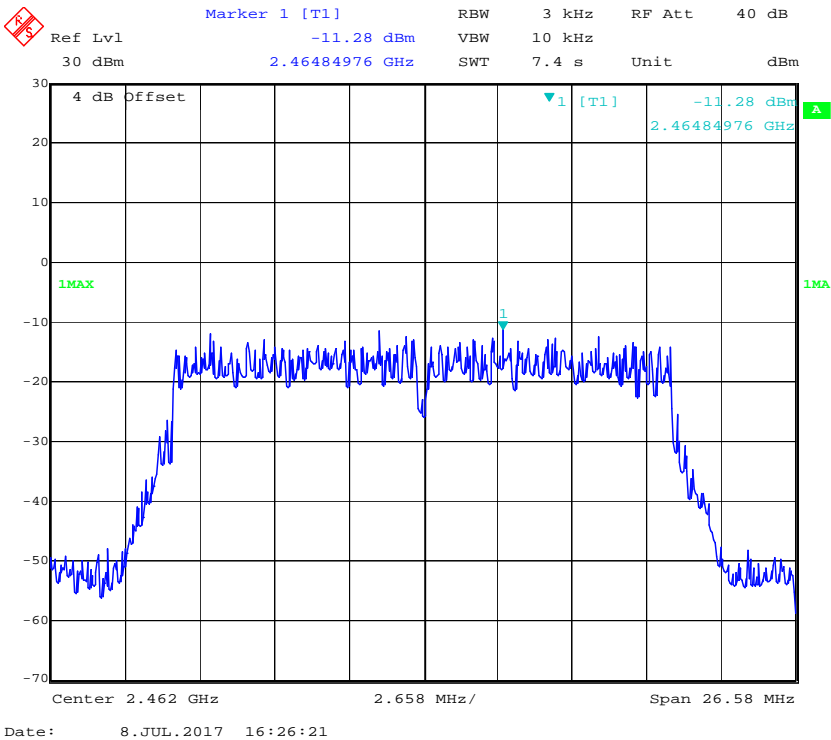
### Power Spectral Density, 802.11n-HT20 Low Channel



### Power Spectral Density, 802.11n-HT20 Middle Channel



Power Spectral Density, 802.11n-HT20 High Channel



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