



FCC PART 15.247

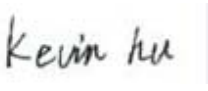

TEST REPORT

For

HUNG WAI PRODUCTS LIMITED

Unit 11, 12/F., New Commerce Centre, 19 On Sum Street, Shatin, Hong Kong

FCC ID: 2AB6Z-BZT-T102

Report Type: Original Report	Product Name: Buzztime 7 inch Tablet - T102
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Report Number: <u>RDG170503801A</u>	
Report Date: <u>2017-06-08</u>	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **HUNG WAI PRODUCTS LIMITED**'s product, model number: **BZT-T102 (FCC ID: 2AB6Z-BZT-T102)** (the "EUT") in this report was a **Buzztime 7 inch Tablet - T102**, which was measured approximately: 18.8 cm (L) x 11.1 cm (W) x 1 cm (H), rated input voltage: DC5V from USB port or DC3.7V from battery.

**All measurement and test data in this report was gathered from final production sample, serial number: 170503801 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-05-05, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of **HUNG WAI PRODUCTS LIMITED Inc.** in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules

The tests were performed in order to determine the compliance of the EUT with FCC Rules Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209, 15.247 rules

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: 2AB6Z-BZT-T102.

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"

All of the measurements detailed in this Test Report were performed by Bay Area Compliance Laboratories Corp. (Chengdu).

The Bay Area Compliance Laboratories Corp. Chengdu's measurement Uncertainties (calculated for a k=2 Coverage Factor corresponding to approximately 95% Coverage) were as follows:

- For all of the AC Line Conducted Emissions Tests reported herein: ± 3.17 dB.
- For of all of the Direct Antenna Conducted Emissions Tests reported herein: ± 0.56 dB.
- For of all of the direct Radiated Emissions Tests reported herein are:
 - 30 MHz to 200 MHz: ± 4.7 dB;
 - 200 MHz to 1 GHz: ± 6.0 dB;
 - 1 GHz to 6 GHz: ± 5.13 dB; and,
 - 6 GHz to 40 GHz: ± 5.47 dB.

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL 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 April 24, 2015. 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.: 560332. 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

The system was configured for testing in testing mode, which was provided by manufacturer.

For 2.4GHz band, the device employed 802.11b/g/n20 modes and 11 channels are provided:

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

For 802.11b, 802.11g, and 802.11n20 modes were tested with Channel 1, 6 and 11.

For 802.11n40 modes were tested with Channel 3, 6 and 9.

EUT Exercise Software

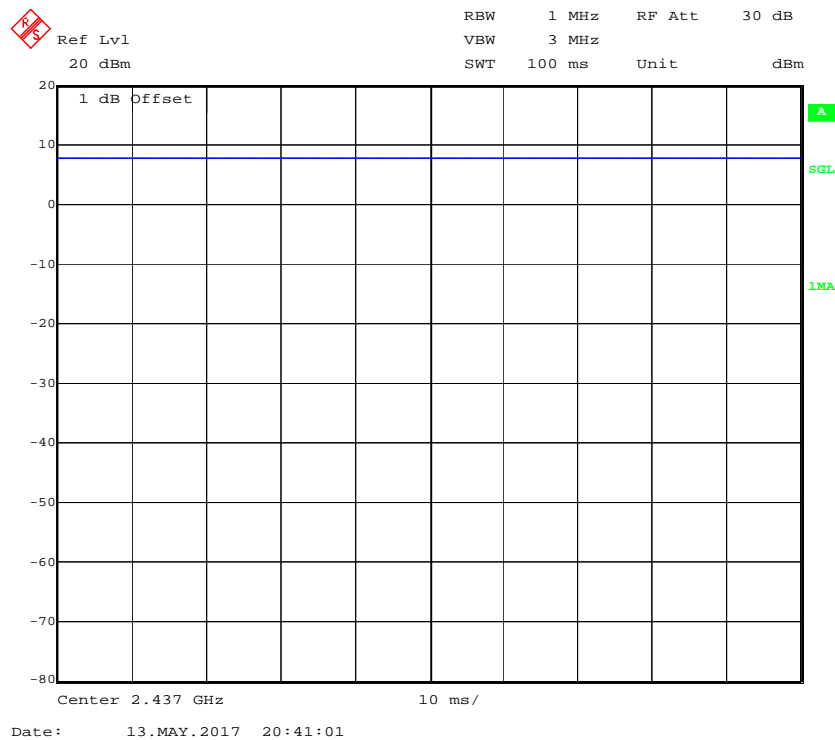
The software "WIFI Test (v1.8.3).exe" was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations. The maximum power was configured as below table, that provided by the manufacturer:

Test Mode	Test Software Version	WIFI Test (v1.8.3).exe		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	32	32	31
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	41	40	40
802.11n 20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	42	41	40
802.11n 40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	49	49	48

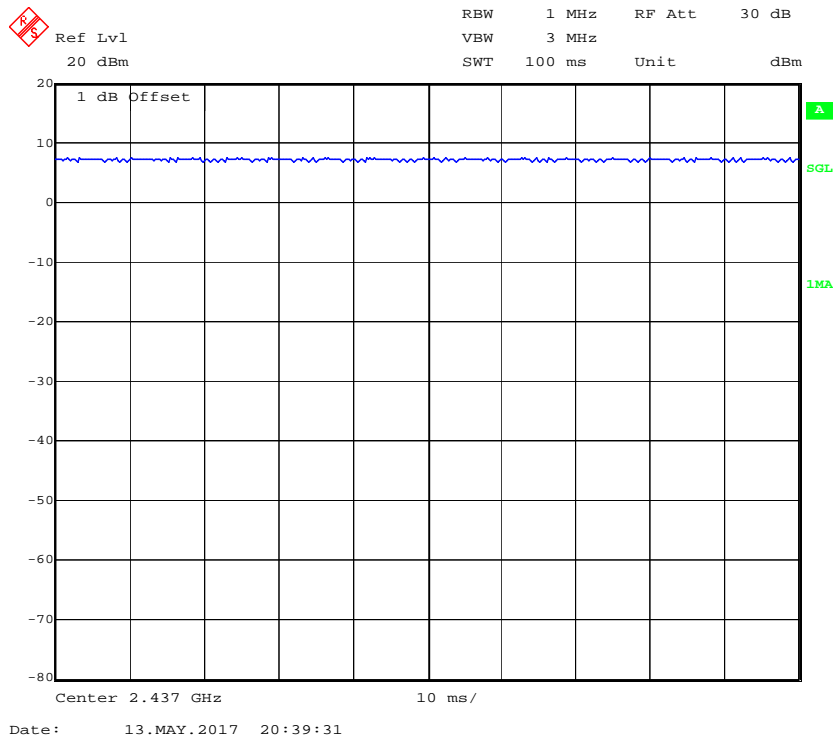
The duty cycle as below:

Mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
802.11 b	100	100	100%
802.11 g	100	100	100%
802.11n ht20	100	100	100%
802.11n ht40	100	100	100%

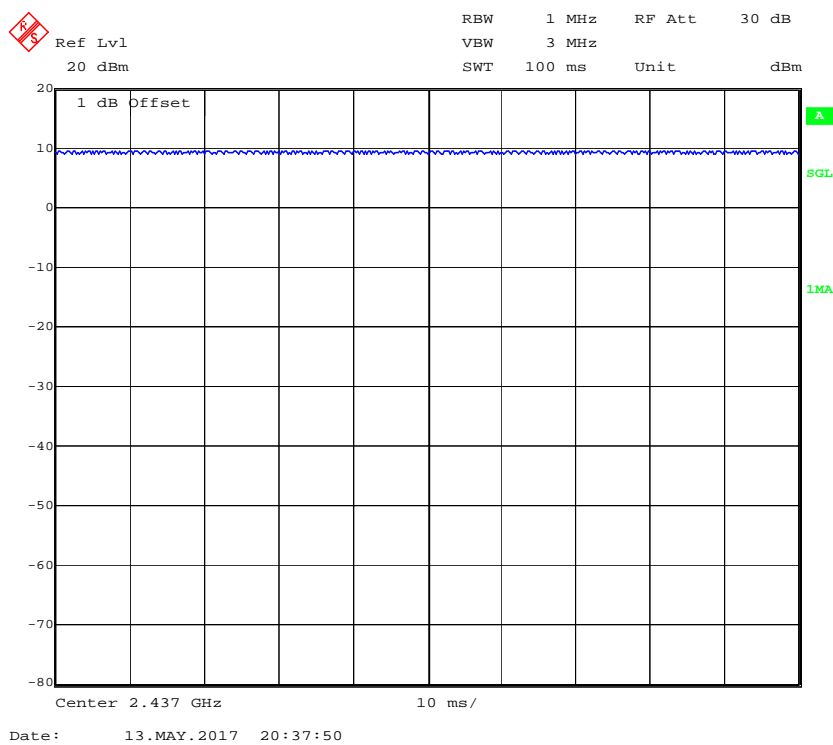
802.11b



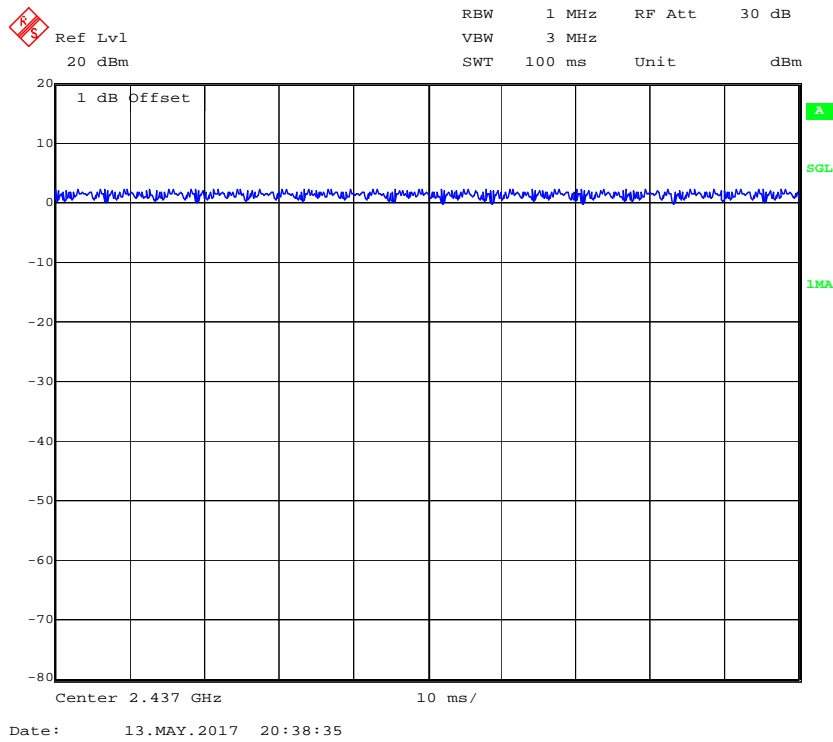
802.11g



802.11n ht20



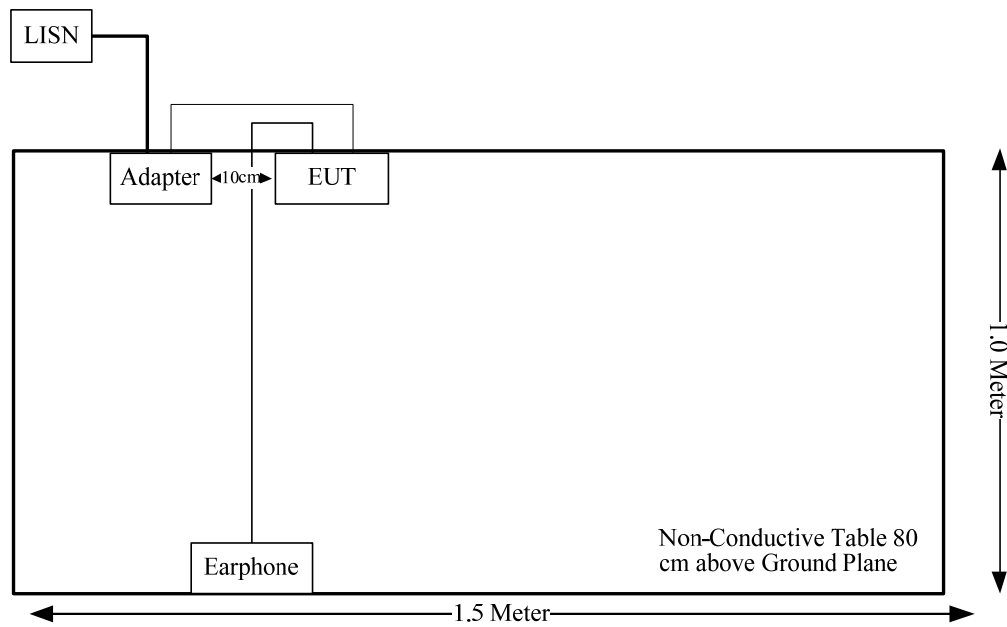
802.11n ht40



External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB cable	no	no	1.0	Adapter	EUT
Earphone	no	no	1.2	EUT	Earphone

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	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

FCC §15.247 (i) , §1.1310 , §2.1093- RF EXPOSURE

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Result

Compliance, Please refer to the SAR report: RDG170503801-20A .

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.

Antenna Connector Construction

The EUT have an internal FPC antenna permanently attached to the unit. The Maximum gain is 0 dBi, compliance the requirements, Please refer to the EUT photos.

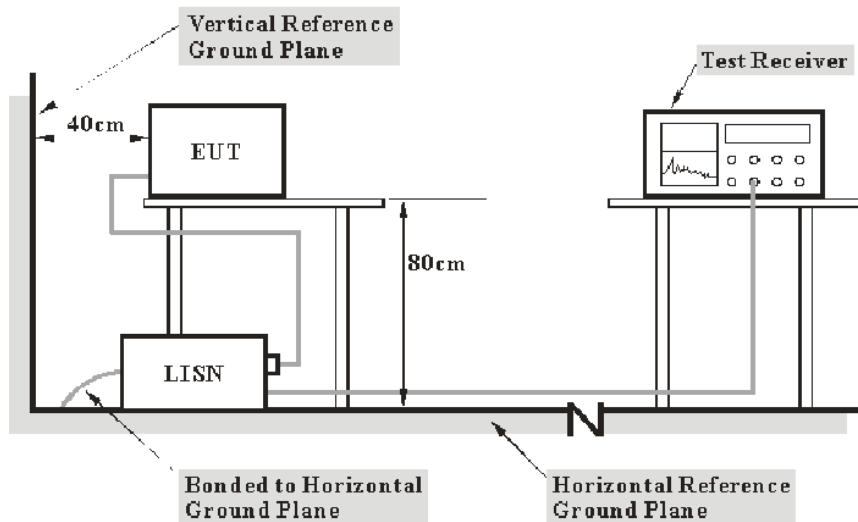
Result: Compliance.

FCC §15.207 (a)– AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main LISN with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN

C_f : Correction Factor

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-10-31	2017-10-30
Unknown	Conducted Cable	Unknown	NO.5	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

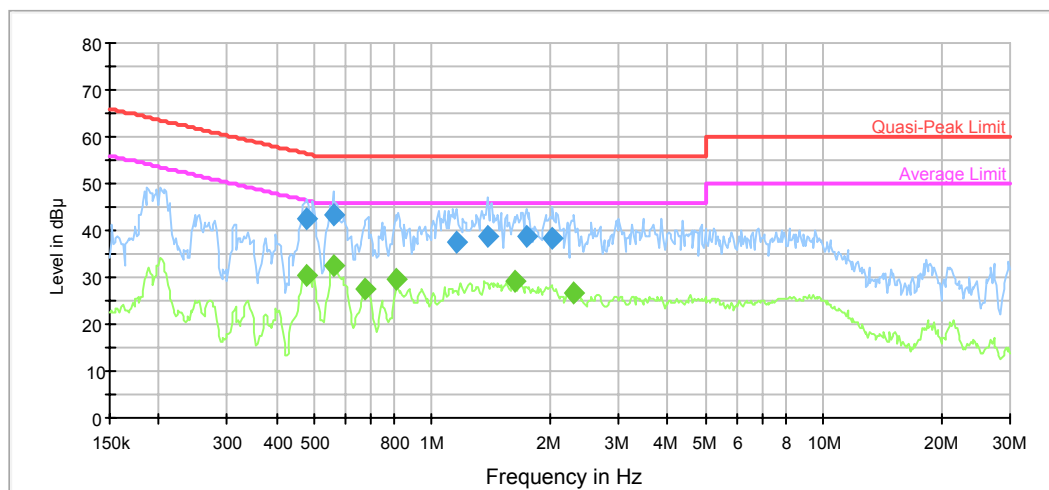
Environmental Conditions

Temperature:	27.1 °C
Relative Humidity:	40 %
ATM Pressure:	100.1 kPa

The testing was performed by Kevin Hu on 2017-06-01.

Test Mode: Transmitting

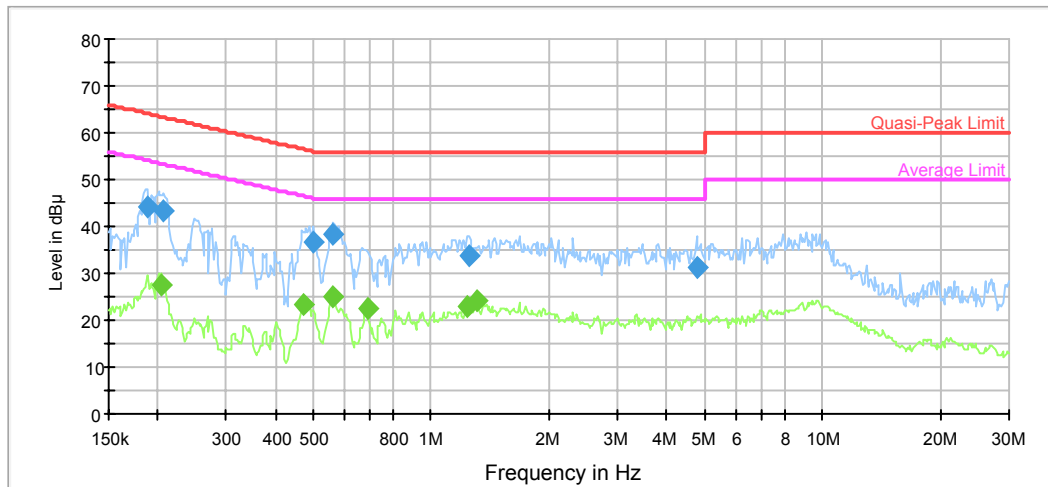
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.480097	42.7	9.000	L1	19.7	13.6	56.3	Compliance
0.558572	43.5	9.000	L1	19.7	12.5	56.0	Compliance
1.153421	37.7	9.000	L1	19.7	18.3	56.0	Compliance
1.385415	38.7	9.000	L1	19.7	17.3	56.0	Compliance
1.745563	38.9	9.000	L1	19.7	17.1	56.0	Compliance
2.030886	38.4	9.000	L1	19.8	17.6	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.480097	30.6	9.000	L1	19.7	15.7	46.3	Compliance
0.558572	32.4	9.000	L1	19.7	13.6	46.0	Compliance
0.676289	27.6	9.000	L1	19.7	18.4	46.0	Compliance
0.812315	29.6	9.000	L1	19.7	16.4	46.0	Compliance
1.624765	29.0	9.000	L1	19.7	17.0	46.0	Compliance
2.307034	26.6	9.000	L1	19.7	19.4	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.188994	44.0	9.000	N	19.6	20.1	64.1	Compliance
0.207957	43.3	9.000	N	19.6	20.0	63.3	Compliance
0.499611	36.5	9.000	N	19.6	19.5	56.0	Compliance
0.563041	38.2	9.000	N	19.6	17.8	56.0	Compliance
1.249088	33.9	9.000	N	19.6	22.1	56.0	Compliance
4.763898	31.3	9.000	N	19.7	24.7	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.204669	27.6	9.000	N	19.6	25.8	53.4	Compliance
0.472507	23.2	9.000	N	19.6	23.2	46.5	Compliance
0.563041	25.2	9.000	N	19.6	20.8	46.0	Compliance
0.687153	22.3	9.000	N	19.6	23.7	46.0	Compliance
1.239175	23.1	9.000	N	19.6	22.9	46.0	Compliance
1.310256	24.0	9.000	N	19.6	22.0	46.0	Compliance

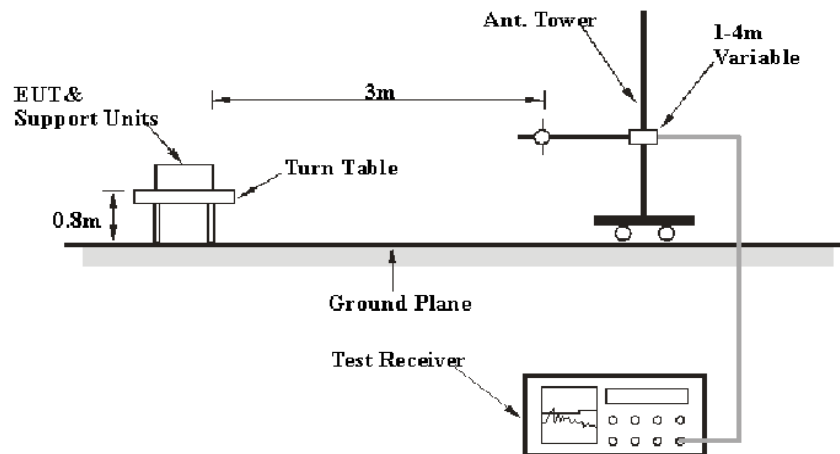
FCC §15.209, §15.205 , §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

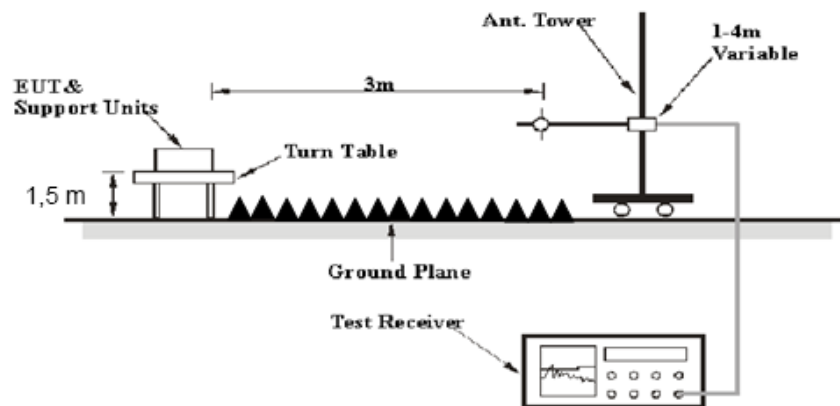
FCC §15.247 (d); §15.209; §15.205

EUT Setup

Below 1GHz:



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, 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:

30-1000MHz:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

1GHz- 25GHz:

Detector	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

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 Loss 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18
Quinstar	Amplifier	QLW-18405536-JO	15964001032	2016-08-18	2017-08-18
Agilent	Spectrum Analyzer	8564E	5943A01752	2016-08-18	2017-08-18

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Results Summary

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

Test Data

Environmental Conditions

Temperature:	27.5°C
Relative Humidity:	42 %
ATM Pressure:	100.1 kPa

* The testing was performed by Kevin Hu on 2017-06-01.

Test Mode: Transmitting

30MHz-25GHz
802.11b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	63.49	PK	H	23.50	3.00	0.00	89.99	N/A	N/A
2412	58.97	AV	H	23.50	3.00	0.00	85.47	N/A	N/A
2412	63.57	PK	V	23.50	3.00	0.00	90.07	N/A	N/A
2412	59.17	AV	V	23.50	3.00	0.00	85.67	N/A	N/A
2390	35.68	PK	V	23.57	3.00	0.00	62.25	74.00	11.75
2390	23.6	AV	V	23.57	3.00	0.00	50.17	54.00	3.83
4824	51.38	PK	V	30.84	5.11	26.87	60.46	74.00	13.54
4824	43.86	AV	V	30.84	5.11	26.87	52.94	54.00	1.06
7236	38.42	PK	V	34.77	6.18	26.36	53.01	74.00	20.99
7236	21.41	AV	V	34.77	6.18	26.36	36.00	54.00	18.00
9648	35.72	PK	V	37.09	7.79	26.20	54.40	74.00	19.60
9648	23.25	AV	V	37.09	7.79	26.20	41.93	54.00	12.07
3131	38.92	PK	V	24.93	3.63	26.46	41.02	74.00	32.98
3131	27.33	AV	V	24.93	3.63	26.46	29.43	54.00	24.57
82.38	39.2	QP	V	8.31	0.50	28.37	19.64	40.00	20.36
62.98	38.1	QP	V	7.47	0.54	28.41	17.70	40.00	22.30
Middle Channel: 2437 MHz									
2437	68.72	PK	H	23.41	3.00	0.00	95.13	N/A	N/A
2437	65.06	AV	H	23.41	3.00	0.00	91.47	N/A	N/A
2437	69.3	PK	V	23.41	3.00	0.00	95.71	N/A	N/A
2437	64.03	AV	V	23.41	3.00	0.00	90.44	N/A	N/A
4874	35.76	PK	V	31.00	5.09	26.87	44.98	74.00	29.02
4874	23.09	AV	V	31.00	5.09	26.87	32.31	54.00	21.69
7311	49.21	PK	V	34.92	6.21	26.40	63.94	74.00	10.06
7311	38.34	AV	V	34.92	6.21	26.40	53.07	54.00	0.93
9748	39.34	PK	V	37.15	7.72	26.26	57.95	74.00	16.05
9748	23.91	AV	V	37.15	7.72	26.26	42.52	54.00	11.48
3190	42.46	PK	V	25.26	3.72	26.48	44.96	74.00	29.04
3190	27	AV	V	25.26	3.72	26.48	29.50	54.00	24.50
82.38	38.8	QP	V	8.31	0.50	28.37	19.24	40.00	20.76
62.98	38.5	QP	V	7.47	0.54	28.41	18.10	40.00	21.90
High Channel: 2462 MHz									
2462	69.51	PK	H	23.33	2.99	0.00	95.83	N/A	N/A
2462	65.26	AV	H	23.33	2.99	0.00	91.58	N/A	N/A
2462	69.55	PK	V	23.33	2.99	0.00	95.87	N/A	N/A
2462	64.47	AV	V	23.33	2.99	0.00	90.79	N/A	N/A
2483.5	37.39	PK	V	23.26	2.99	0.00	63.64	74.00	10.36
2483.5	24.25	AV	V	23.26	2.99	0.00	50.50	54.00	3.50
4924	49.81	PK	V	31.16	5.07	26.88	59.16	74.00	14.84
4924	43.63	AV	V	31.16	5.07	26.88	52.98	54.00	1.02
7386	37.64	PK	V	35.07	6.25	26.43	52.53	74.00	21.47
7386	22.44	AV	V	35.07	6.25	26.43	37.33	54.00	16.67
9848	36.86	PK	V	37.21	7.65	26.33	55.39	74.00	18.61
9848	25.43	AV	V	37.21	7.65	26.33	43.96	54.00	10.04
3131	41.43	PK	V	24.93	3.63	26.46	43.53	74.00	30.47
3131	26.18	AV	V	24.93	3.63	26.46	28.28	54.00	25.72
82.38	39.1	QP	V	8.31	0.50	28.37	19.54	40.00	20.46
62.98	38.2	QP	V	7.47	0.54	28.41	17.80	40.00	22.20

802.11g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	64.43	PK	H	23.50	3.00	0.00	90.93	N/A	N/A
2412	54.31	AV	H	23.50	3.00	0.00	80.81	N/A	N/A
2412	64.46	PK	V	23.50	3.00	0.00	90.96	N/A	N/A
2412	53.9	AV	V	23.50	3.00	0.00	80.40	N/A	N/A
2390	36.4	PK	V	23.57	3.00	0.00	62.97	74.00	11.03
2390	23.82	AV	V	23.57	3.00	0.00	50.39	54.00	3.61
4824	47.36	PK	V	30.84	5.11	26.87	56.44	74.00	17.56
4824	38.05	AV	V	30.84	5.11	26.87	47.13	54.00	6.87
7236	39.79	PK	V	34.77	6.18	26.36	54.38	74.00	19.62
7236	21.72	AV	V	34.77	6.18	26.36	36.31	54.00	17.69
9648	37.55	PK	V	37.09	7.79	26.20	56.23	74.00	17.77
9648	23.33	AV	V	37.09	7.79	26.20	42.01	54.00	11.99
2950	36.31	PK	V	24.10	3.39	26.46	37.34	74.00	36.66
2950	25.27	AV	V	24.10	3.39	26.46	26.30	54.00	27.70
82.38	39	QP	V	8.31	0.50	28.37	19.44	40.00	20.56
62.98	38.5	QP	V	7.47	0.54	28.41	18.10	40.00	21.90
Middle Channel: 2437 MHz									
2437	71.29	PK	H	23.41	3.00	0.00	97.70	N/A	N/A
2437	59.86	AV	H	23.41	3.00	0.00	86.27	N/A	N/A
2437	72.4	PK	V	23.41	3.00	0.00	98.81	N/A	N/A
2437	62.93	AV	V	23.41	3.00	0.00	89.34	N/A	N/A
4874	34.39	PK	V	31.00	5.09	26.87	43.61	74.00	30.39
4874	22.86	AV	V	31.00	5.09	26.87	32.08	54.00	21.92
7311	51.55	PK	V	34.92	6.21	26.40	66.28	74.00	7.72
7311	36.98	AV	V	34.92	6.21	26.40	51.71	54.00	2.29
9748	49.74	PK	V	37.15	7.72	26.26	68.35	74.00	5.65
9748	29.51	AV	V	37.15	7.72	26.26	48.12	54.00	5.88
2950	39.84	PK	V	24.10	3.39	26.46	40.87	74.00	33.13
2950	24.33	AV	V	24.10	3.39	26.46	25.36	54.00	28.64
3610	34.28	PK	V	27.44	4.34	26.58	39.48	74.00	34.52
3610	22.77	AV	V	27.44	4.34	26.58	27.97	54.00	26.03
82.38	38.7	QP	V	8.31	0.50	28.37	19.14	40.00	20.86
62.98	38.4	QP	V	7.47	0.54	28.41	18.00	40.00	22.00
High Channel: 2462 MHz									
2462	71.03	PK	H	23.33	2.99	0.00	97.35	N/A	N/A
2462	60.01	AV	H	23.33	2.99	0.00	86.33	N/A	N/A
2462	72.52	PK	V	23.33	2.99	0.00	98.84	N/A	N/A
2462	62.69	AV	V	23.33	2.99	0.00	89.01	N/A	N/A
2483.5	36.25	PK	V	23.26	2.99	0.00	62.50	74.00	11.50
2483.5	24.86	AV	V	23.26	2.99	0.00	51.11	54.00	2.89
4924	52.04	PK	V	31.16	5.07	26.88	61.39	74.00	12.61
4924	37.43	AV	V	31.16	5.07	26.88	46.78	54.00	7.22
7386	48.22	PK	V	35.07	6.25	26.43	63.11	74.00	10.89
7386	27.93	AV	V	35.07	6.25	26.43	42.82	54.00	11.18
9848	39.4	PK	V	37.21	7.65	26.33	57.93	74.00	16.07
9848	24.19	AV	V	37.21	7.65	26.33	42.72	54.00	11.28
2950	35.82	PK	V	24.10	3.39	26.46	36.85	74.00	37.15
2950	24.93	AV	V	24.10	3.39	26.46	25.96	54.00	28.04
82.38	39.2	QP	V	8.31	0.50	28.37	19.64	40.00	20.36
62.98	38.6	QP	V	7.47	0.54	28.41	18.20	40.00	21.80

802.11 n ht20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	63.24	PK	H	23.50	3.00	0.00	89.74	N/A	N/A
2412	52.55	AV	H	23.50	3.00	0.00	79.05	N/A	N/A
2412	63.46	PK	V	23.50	3.00	0.00	89.96	N/A	N/A
2412	52.92	AV	V	23.50	3.00	0.00	79.42	N/A	N/A
2390	36.59	PK	V	23.57	3.00	0.00	63.16	74.00	10.84
2390	24.48	AV	V	23.57	3.00	0.00	51.05	54.00	2.95
4824	46.29	PK	V	30.84	5.11	26.87	55.37	74.00	18.63
4824	36.61	AV	V	30.84	5.11	26.87	45.69	54.00	8.31
7236	43.09	PK	V	34.77	6.18	26.36	57.68	74.00	16.32
7236	22.03	AV	V	34.77	6.18	26.36	36.62	54.00	17.38
9648	36.42	PK	V	37.09	7.79	26.20	55.10	74.00	18.90
9648	23.67	AV	V	37.09	7.79	26.20	42.35	54.00	11.65
2950	36.55	PK	V	24.10	3.39	26.46	37.58	74.00	36.42
2950	25.44	AV	V	24.10	3.39	26.46	26.47	54.00	27.53
82.38	38.8	QP	V	8.31	0.50	28.37	19.24	40.00	20.76
62.98	38	QP	V	7.47	0.54	28.41	17.60	40.00	22.40
Middle Channel: 2437 MHz									
2437	70.36	PK	H	23.41	3.00	0.00	96.77	N/A	N/A
2437	59.35	AV	H	23.41	3.00	0.00	85.76	N/A	N/A
2437	70.65	PK	V	23.41	3.00	0.00	97.06	N/A	N/A
2437	60.75	AV	V	23.41	3.00	0.00	87.16	N/A	N/A
4874	36.27	PK	V	31.00	5.09	26.87	45.49	74.00	28.51
4874	23.16	AV	V	31.00	5.09	26.87	32.38	54.00	21.62
7311	47.46	PK	V	34.92	6.21	26.40	62.19	74.00	11.81
7311	35.99	AV	V	34.92	6.21	26.40	50.72	54.00	3.28
9748	47.14	PK	V	37.15	7.72	26.26	65.75	74.00	8.25
9748	26.15	AV	V	37.15	7.72	26.26	44.76	54.00	9.24
3610	35.44	PK	V	27.44	4.34	26.58	40.64	74.00	33.36
3610	24.56	AV	V	27.44	4.34	26.58	29.76	54.00	24.24
82.38	39.2	QP	V	8.31	0.50	28.37	19.64	40.00	20.36
62.98	38.6	QP	V	7.47	0.54	28.41	18.20	40.00	21.80
High Channel: 2462 MHz									
2462	70.37	PK	H	23.33	2.99	0.00	96.69	N/A	N/A
2462	59.9	AV	H	23.33	2.99	0.00	86.22	N/A	N/A
2462	70.46	PK	V	23.33	2.99	0.00	96.78	N/A	N/A
2462	60.45	AV	V	23.33	2.99	0.00	86.77	N/A	N/A
2483.5	37.47	PK	V	23.26	2.99	0.00	63.72	74.00	10.28
2483.5	25.14	AV	V	23.26	2.99	0.00	51.39	54.00	2.61
4924	48.1	PK	V	31.16	5.07	26.88	57.45	74.00	16.55
4924	36.88	AV	V	31.16	5.07	26.88	46.23	54.00	7.77
7386	44.82	PK	V	35.07	6.25	26.43	59.71	74.00	14.29
7386	24.67	AV	V	35.07	6.25	26.43	39.56	54.00	14.44
9848	36.51	PK	V	37.21	7.65	26.33	55.04	74.00	18.96
9848	26.4	AV	V	37.21	7.65	26.33	44.93	54.00	9.07
2950	37.07	PK	V	24.10	3.39	26.46	38.10	74.00	35.90
2950	26.02	AV	V	24.10	3.39	26.46	27.05	54.00	26.95
82.38	38.7	QP	V	8.31	0.50	28.37	19.14	40.00	20.86
62.98	38.1	QP	V	7.47	0.54	28.41	17.70	40.00	22.30

802.11 n ht40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	63.02	PK	H	23.47	3.00	0.00	89.49	N/A	N/A
2422	52.93	AV	H	23.47	3.00	0.00	79.40	N/A	N/A
2422	63.13	PK	V	23.47	3.00	0.00	89.60	N/A	N/A
2422	52.86	AV	V	23.47	3.00	0.00	79.33	N/A	N/A
2390	36.09	PK	V	23.57	3.00	0.00	62.66	74.00	11.34
2390	24.82	AV	V	23.57	3.00	0.00	51.39	54.00	2.61
4844	47.74	PK	V	30.90	5.10	26.87	56.87	74.00	17.13
4844	24.41	AV	V	30.90	5.10	26.87	33.54	54.00	20.46
7266	41.73	PK	V	34.83	6.19	26.38	56.37	74.00	17.63
7266	22.39	AV	V	34.83	6.19	26.38	37.03	54.00	16.97
9688	36.51	PK	V	37.11	7.76	26.23	55.15	74.00	18.85
9688	23.82	AV	V	37.11	7.76	26.23	42.46	54.00	11.54
2950	36.74	PK	V	24.10	3.39	26.46	37.77	74.00	36.23
2950	25.25	AV	V	24.10	3.39	26.46	26.28	54.00	27.72
82.38	39.1	QP	V	8.31	0.50	28.37	19.54	40.00	20.46
62.98	38.1	QP	V	7.47	0.54	28.41	17.70	40.00	22.30
Middle Channel: 2437 MHz									
2437	68.59	PK	H	23.41	3.00	0.00	95.00	N/A	N/A
2437	57.68	AV	H	23.41	3.00	0.00	84.09	N/A	N/A
2437	68.01	PK	V	23.41	3.00	0.00	94.42	N/A	N/A
2437	57.46	AV	V	23.41	3.00	0.00	83.87	N/A	N/A
4874	34.12	PK	V	31.00	5.09	26.87	43.34	74.00	30.66
4874	23.94	AV	V	31.00	5.09	26.87	33.16	54.00	20.84
7311	53.95	PK	V	34.92	6.21	26.40	68.68	74.00	5.32
7311	38.35	AV	V	34.92	6.21	26.40	53.08	54.00	0.92
9748	45.89	PK	V	37.15	7.72	26.26	64.50	74.00	9.50
9748	25.59	AV	V	37.15	7.72	26.26	44.20	54.00	9.80
3610	33.88	PK	V	27.44	4.34	26.58	39.08	74.00	34.92
3610	23.16	AV	V	27.44	4.34	26.58	28.36	54.00	25.64
82.38	38.8	QP	V	8.31	0.50	28.37	19.24	40.00	20.76
62.98	38.3	QP	V	7.47	0.54	28.41	17.90	40.00	22.10
High Channel: 2452 MHz									
2452	68.9	PK	H	23.36	3.00	0.00	95.26	N/A	N/A
2452	58.04	AV	H	23.36	3.00	0.00	84.40	N/A	N/A
2452	68.24	PK	V	23.36	3.00	0.00	94.60	N/A	N/A
2452	57.78	AV	V	23.36	3.00	0.00	84.14	N/A	N/A
2483.5	35.88	PK	V	23.26	2.99	0.00	62.13	74.00	11.87
2483.5	25.4	AV	V	23.26	2.99	0.00	51.65	54.00	2.35
4904	54.91	PK	V	31.09	5.08	26.87	64.21	74.00	9.79
4904	41.2	AV	V	31.09	5.08	26.87	50.50	54.00	3.50
7356	44.37	PK	V	35.01	6.23	26.42	59.19	74.00	14.81
7356	23.66	AV	V	35.01	6.23	26.42	38.48	54.00	15.52
9808	37.22	PK	V	37.18	7.68	26.30	55.78	74.00	18.22
9808	24.22	AV	V	37.18	7.68	26.30	42.78	54.00	11.22
2950	36.43	PK	V	24.10	3.39	26.46	37.46	74.00	36.54
2950	25.65	AV	V	24.10	3.39	26.46	26.68	54.00	27.32
82.38	38.7	QP	V	8.31	0.50	28.37	19.14	40.00	20.86
62.98	38.6	QP	V	7.47	0.54	28.41	18.20	40.00	21.80

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

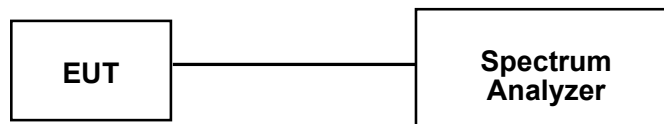
Applicable Standard

According to FCC §15.247(a) (2)

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

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
- h) Measure the 99% bandwidth use OBW test function.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-5	Each Time	/

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	52 %
ATM Pressure:	100.1 kPa

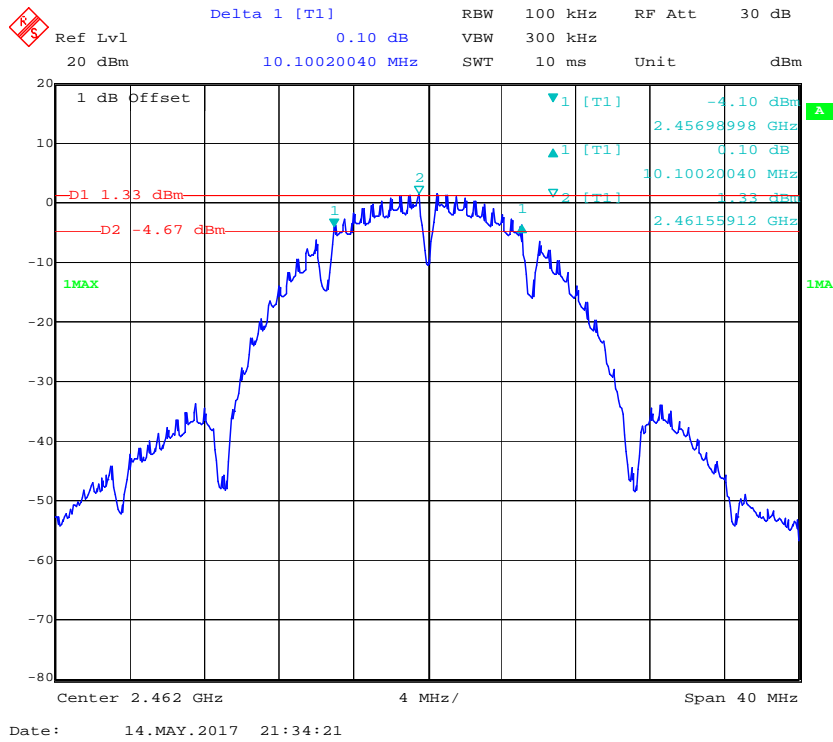
* The testing was performed by Kevin Hu on 2017-05-14.

Test Mode: Transmitting

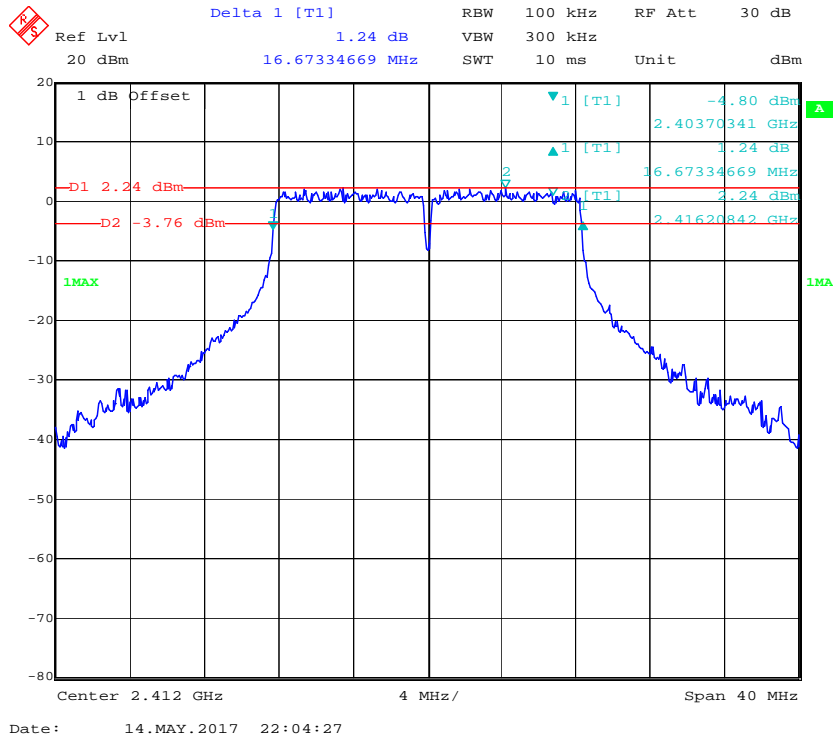
Test Result: Compliant. Please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.1	15.39	≥0.5
	Middle	2437	10.1	15.39	≥0.5
	High	2462	10.1	15.47	≥0.5
802.11g	Low	2412	16.67	17.47	≥0.5
	Middle	2437	16.67	17.39	≥0.5
	High	2462	16.67	17.39	≥0.5
802.11n ht20	Low	2412	17.88	18.52	≥0.5
	Middle	2437	17.96	18.44	≥0.5
	High	2462	17.88	18.44	≥0.5
802.11n ht40	Low	2422	36.55	36.71	≥0.5
	Middle	2437	36.55	36.87	≥0.5
	High	2452	36.55	36.87	≥0.5

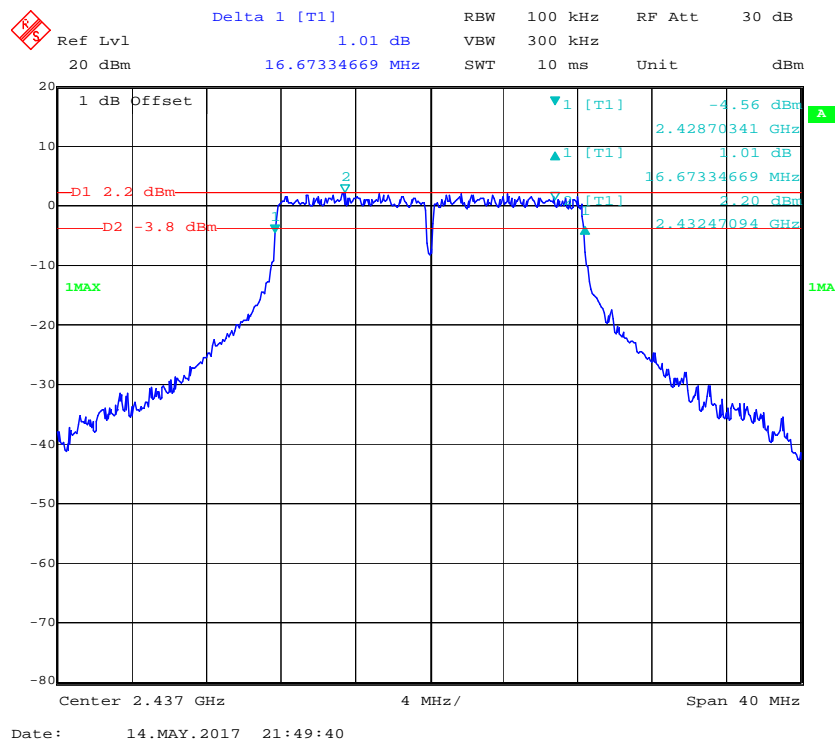
802.11b High Channel



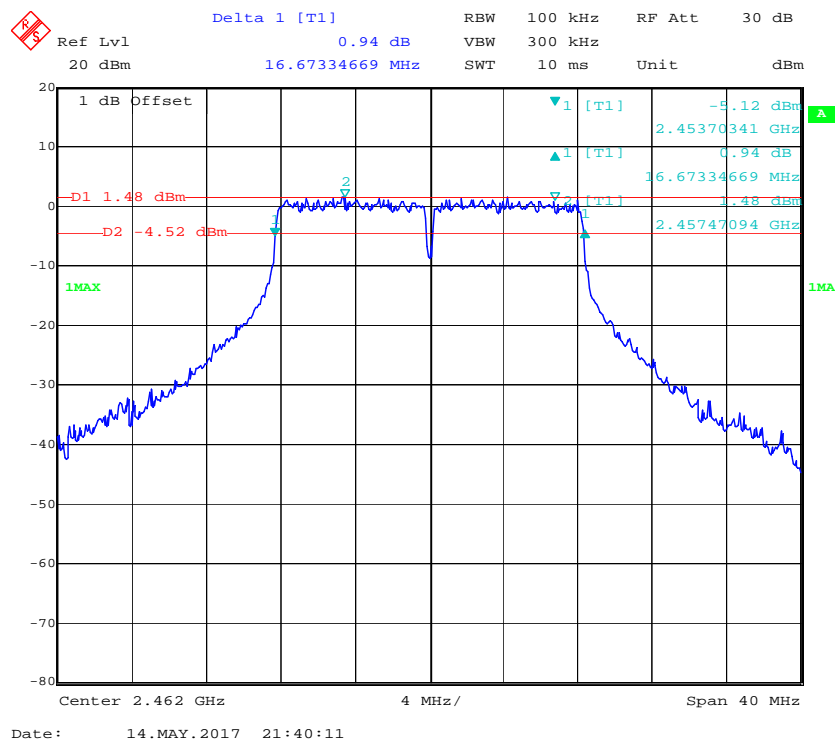
802.11g Low Channel



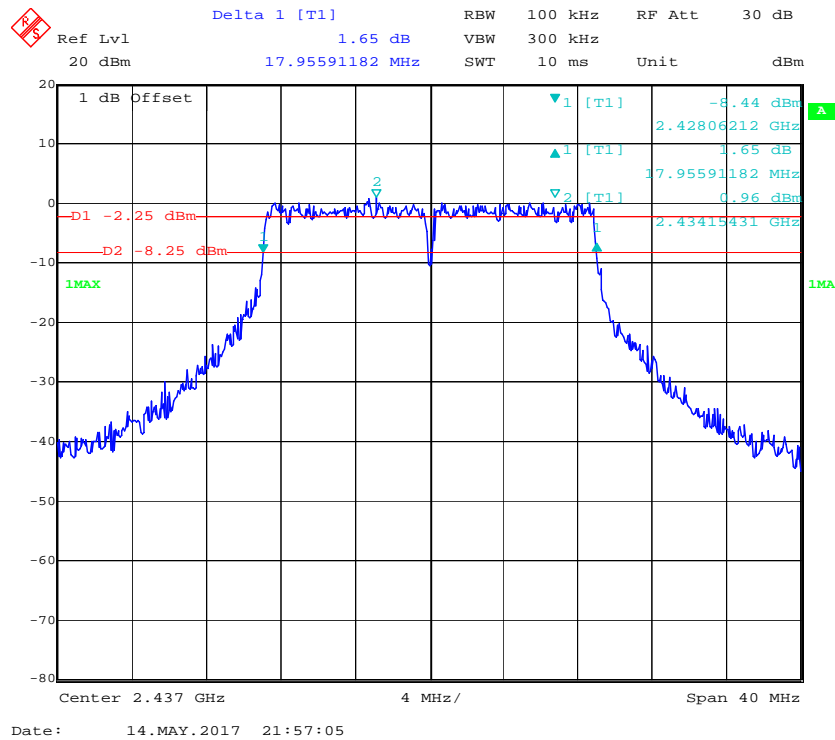
802.11g Middle Channel



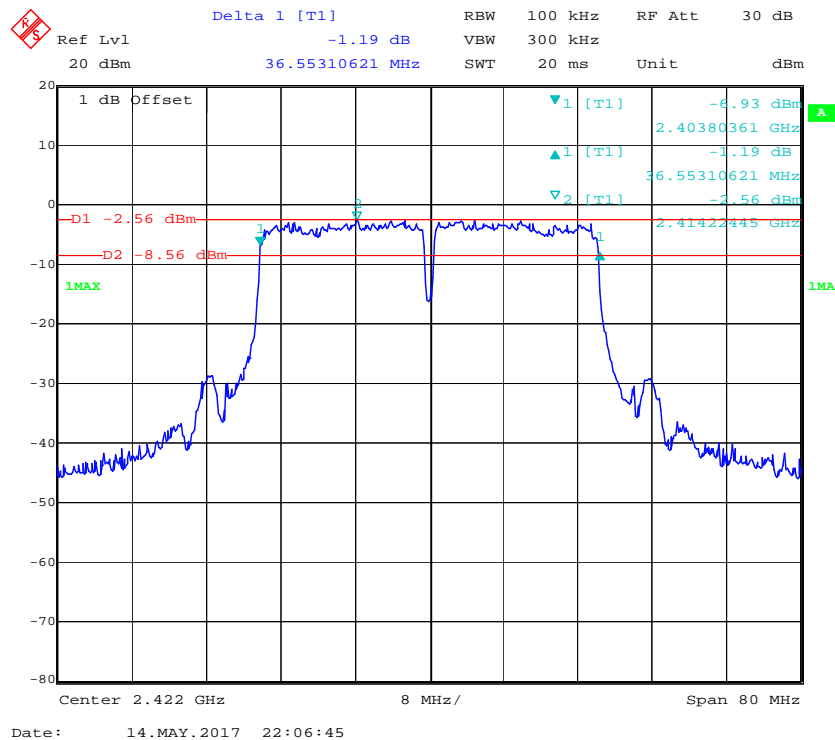
802.11g High Channel



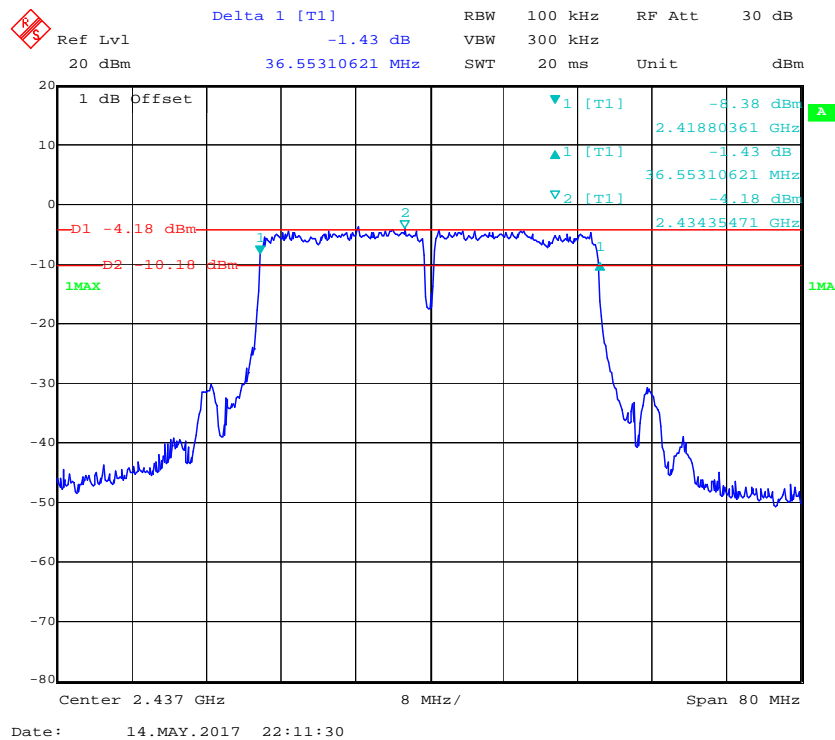
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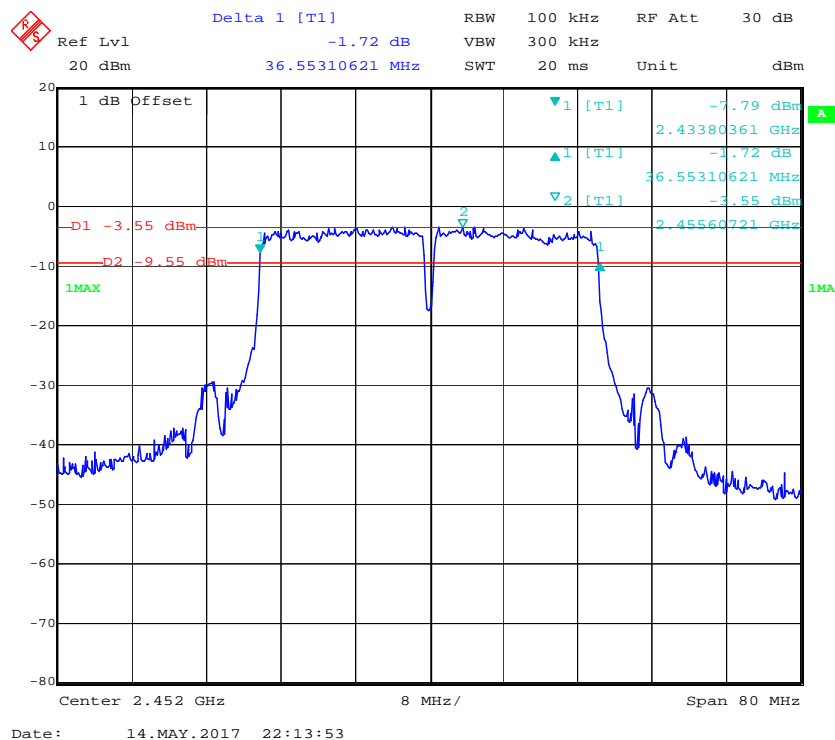
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802.11n ht40 Middle Channel

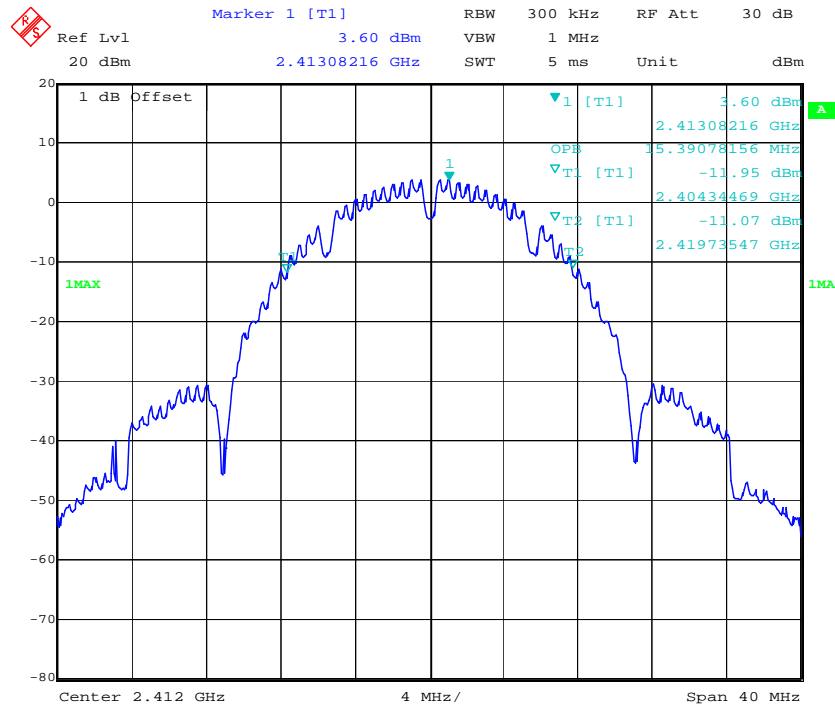


802.11n ht40 High Channel



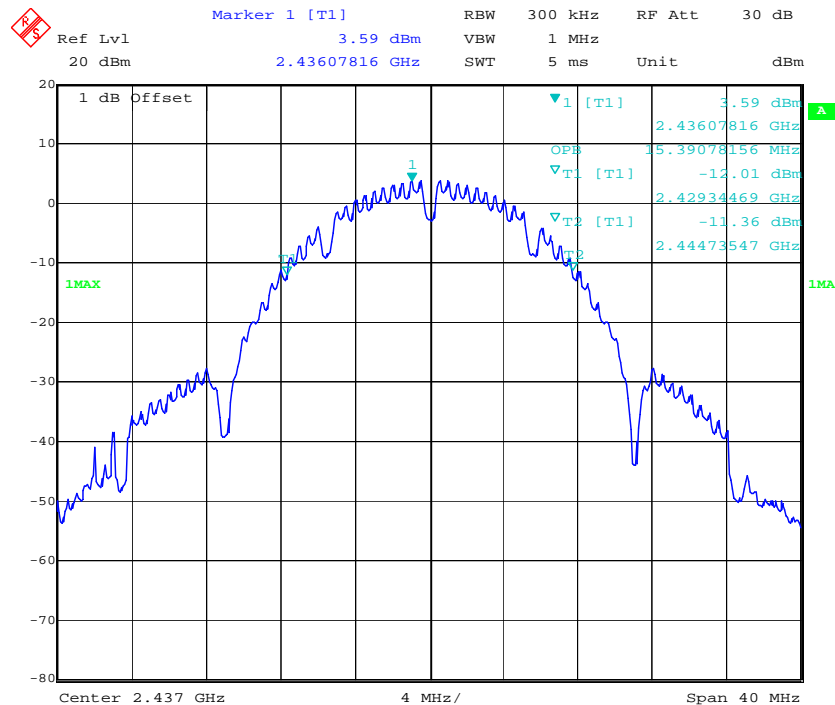
99% Occupied Bandwidth

802.11b Low Channel



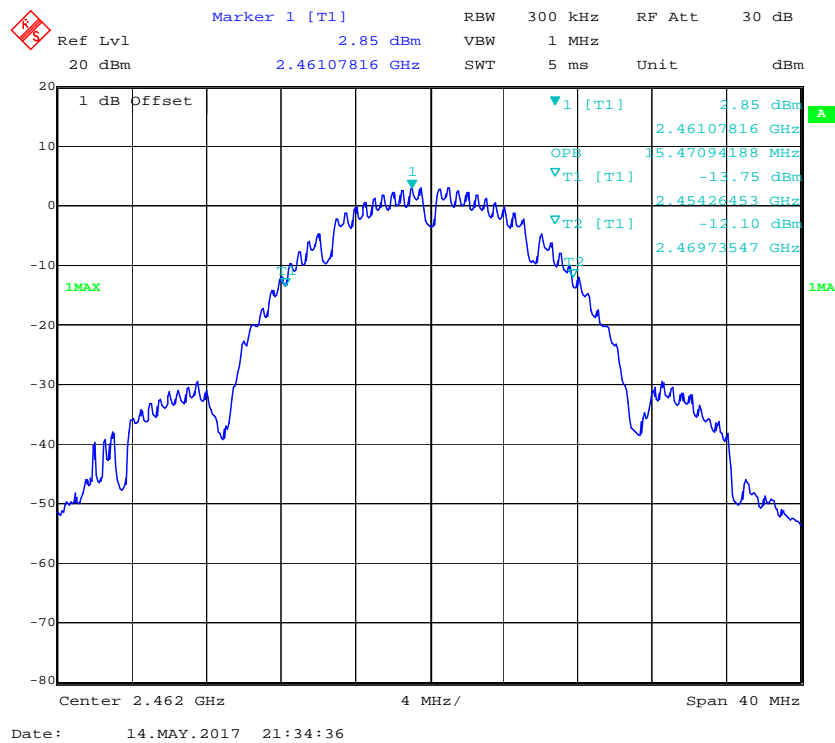
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802.11b Middle Channel

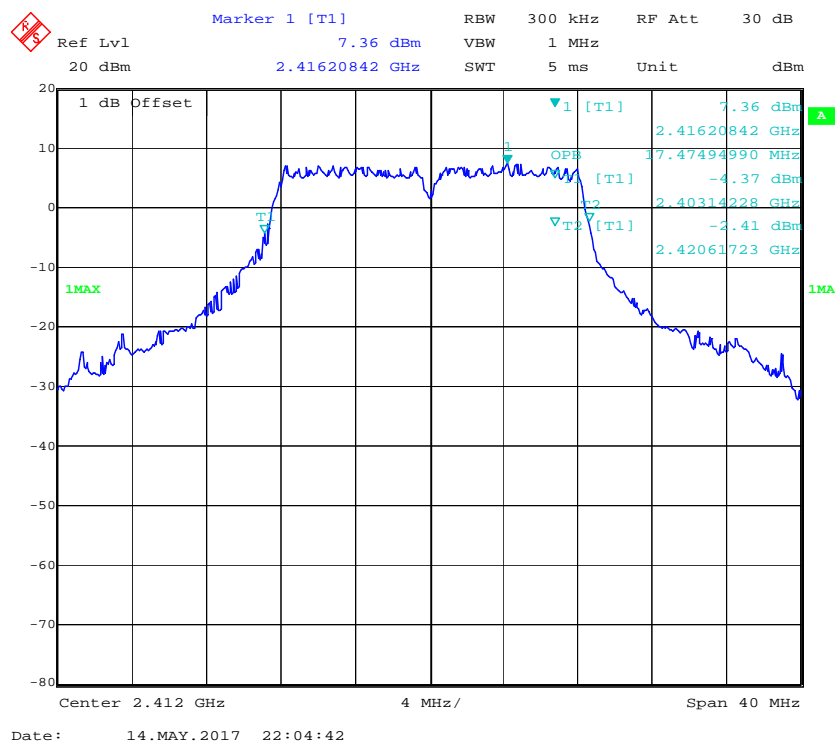


Date: 14.MAY.2017 21:31:54

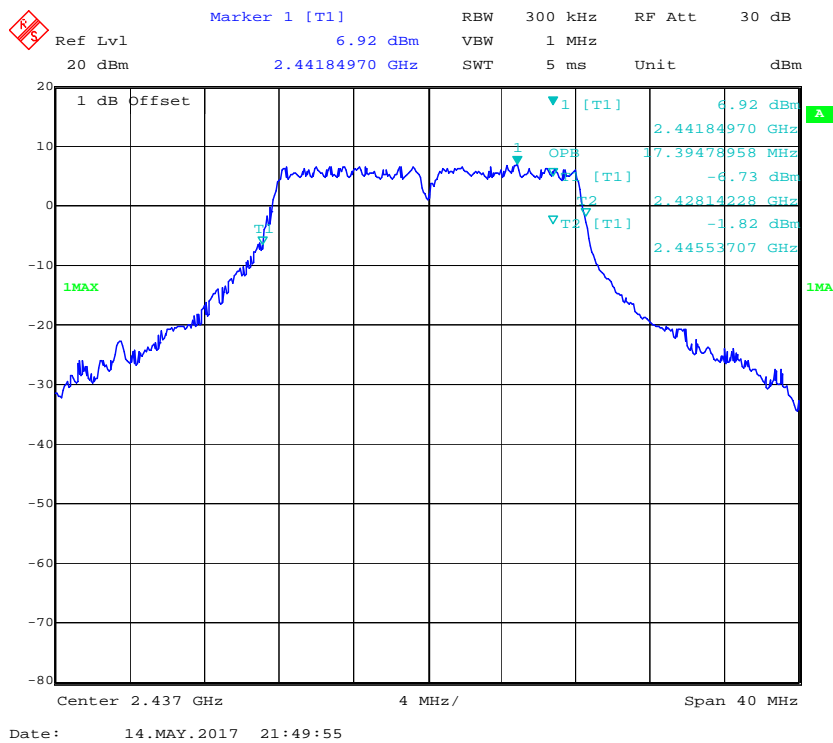
802.11b High Channel



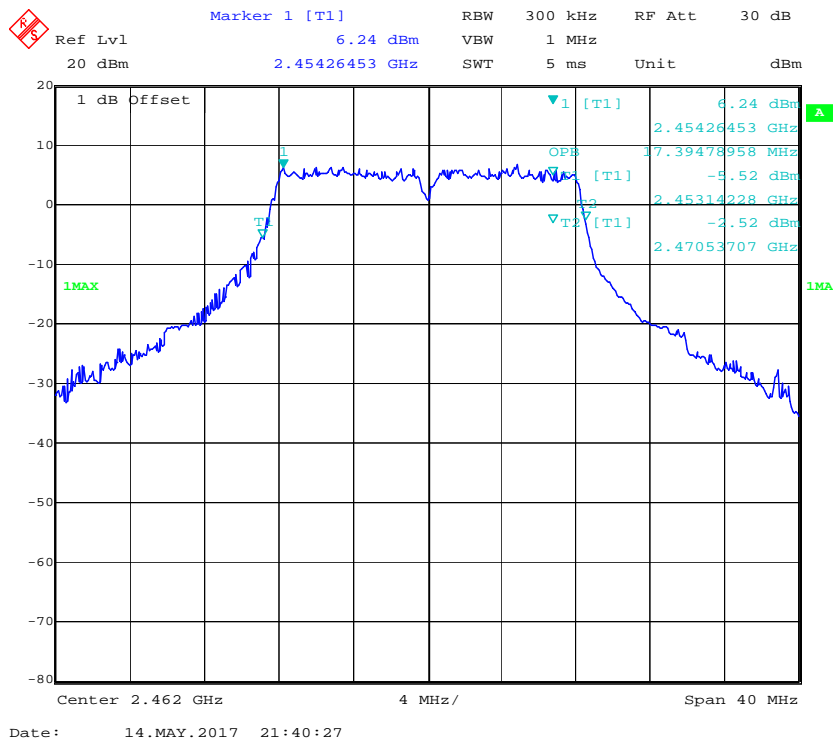
802.11g Low Channel



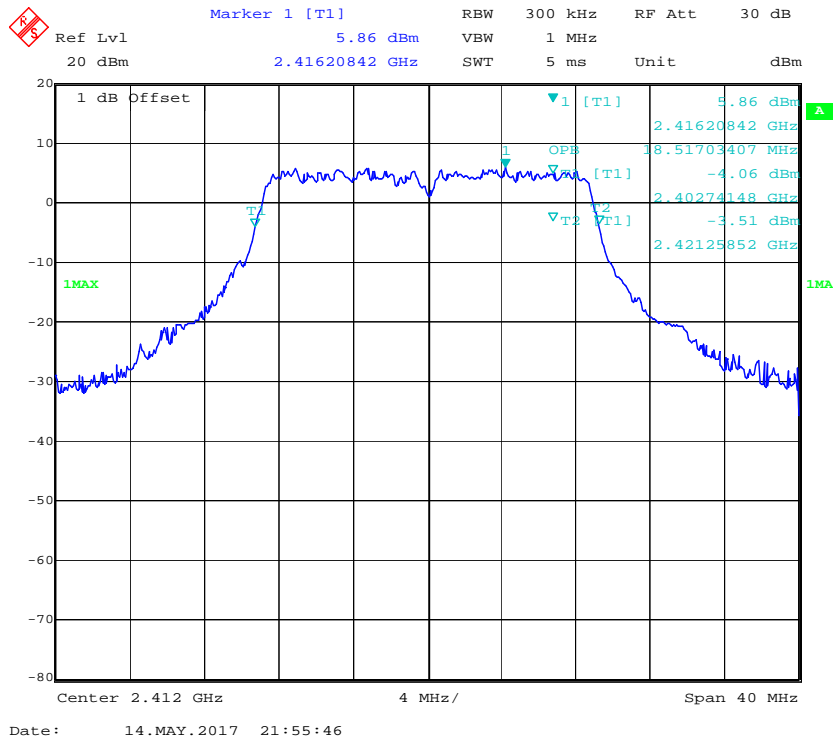
802.11g Middle Channel



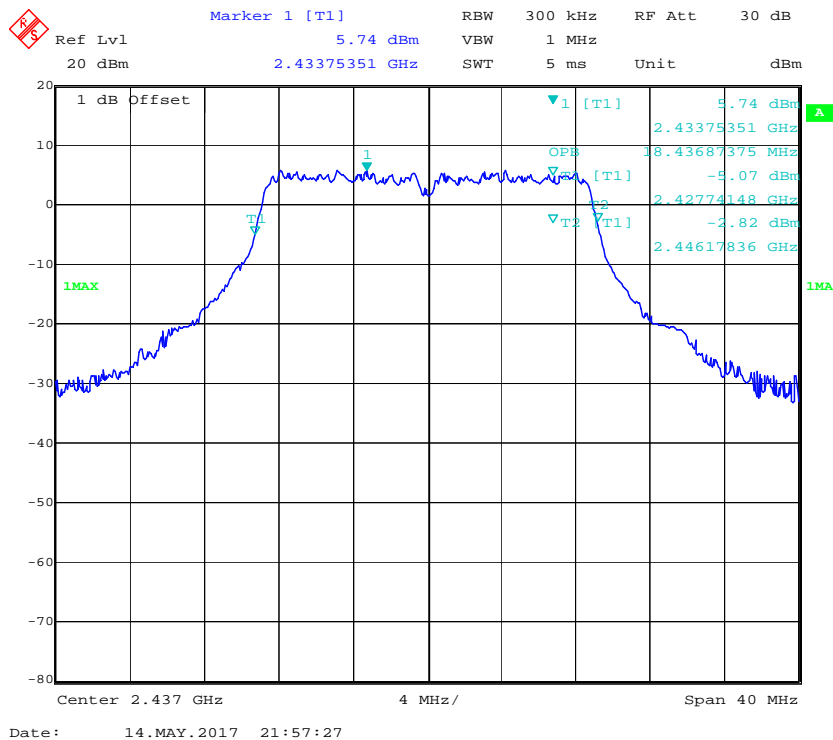
802.11g High Channel



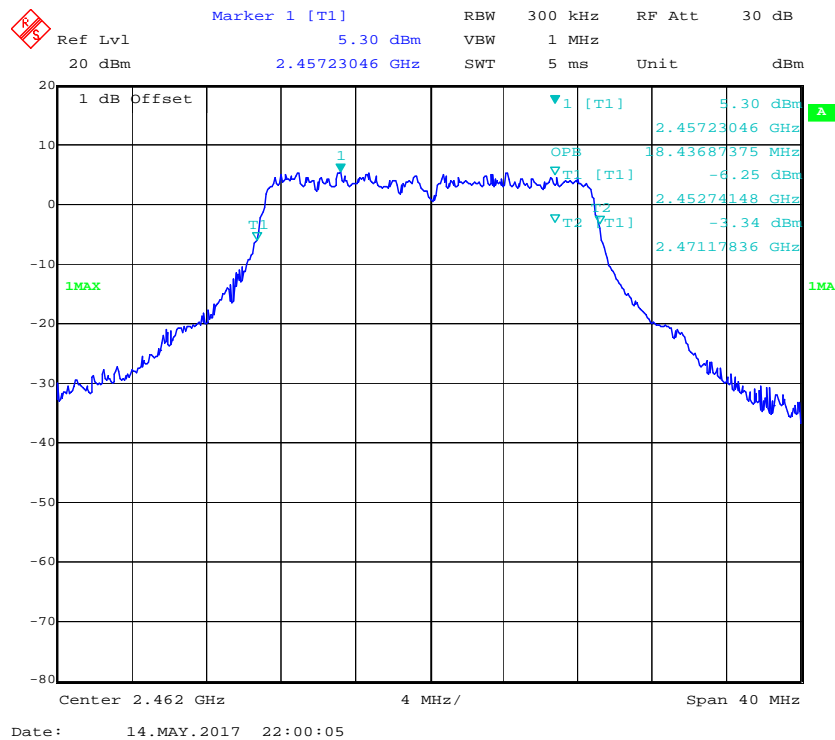
802.11n ht20 Low Channel



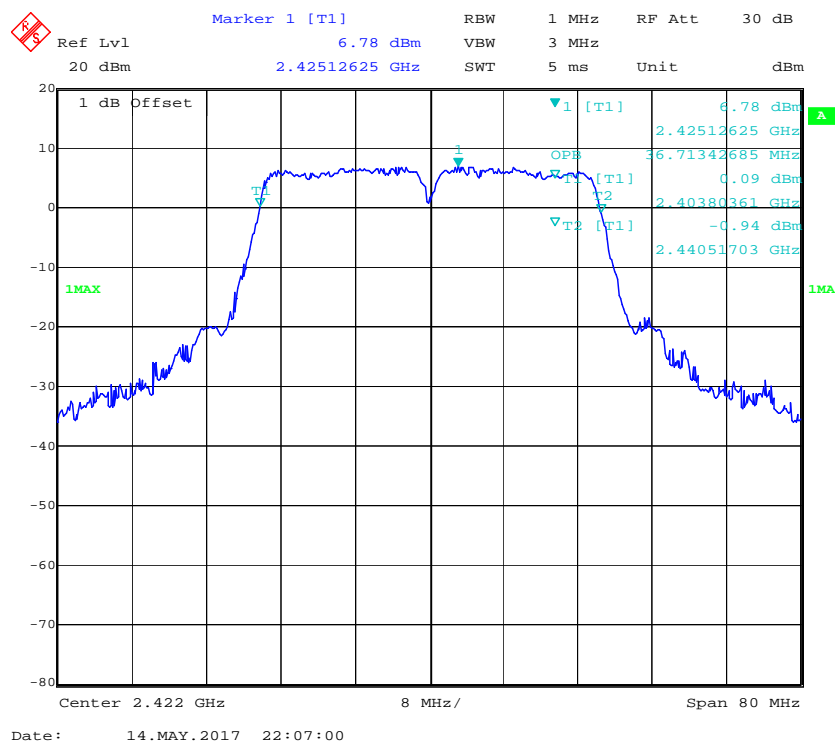
802.11n ht20 Middle Channel



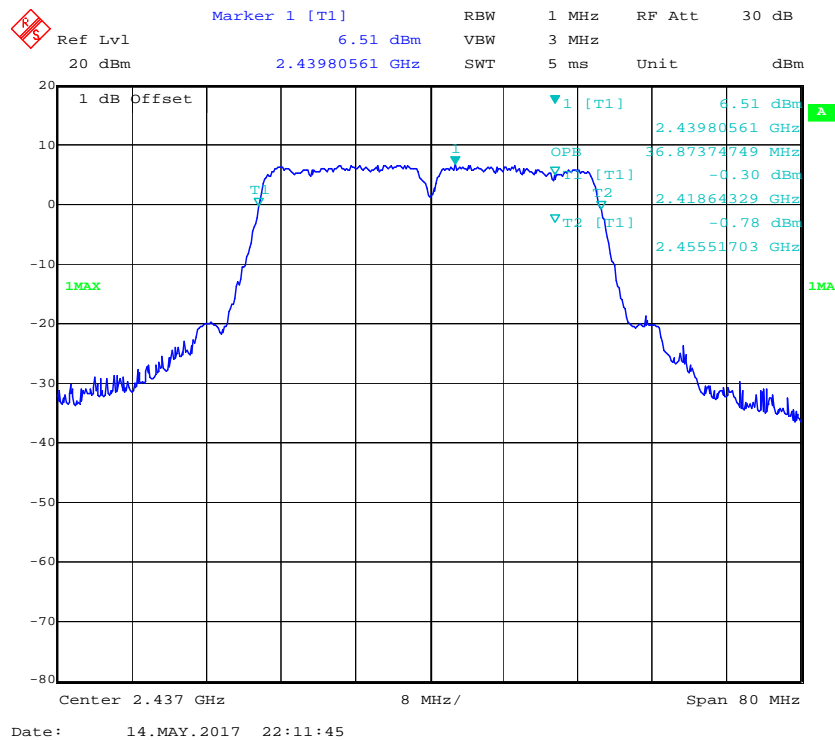
802.11n ht20 High Channel



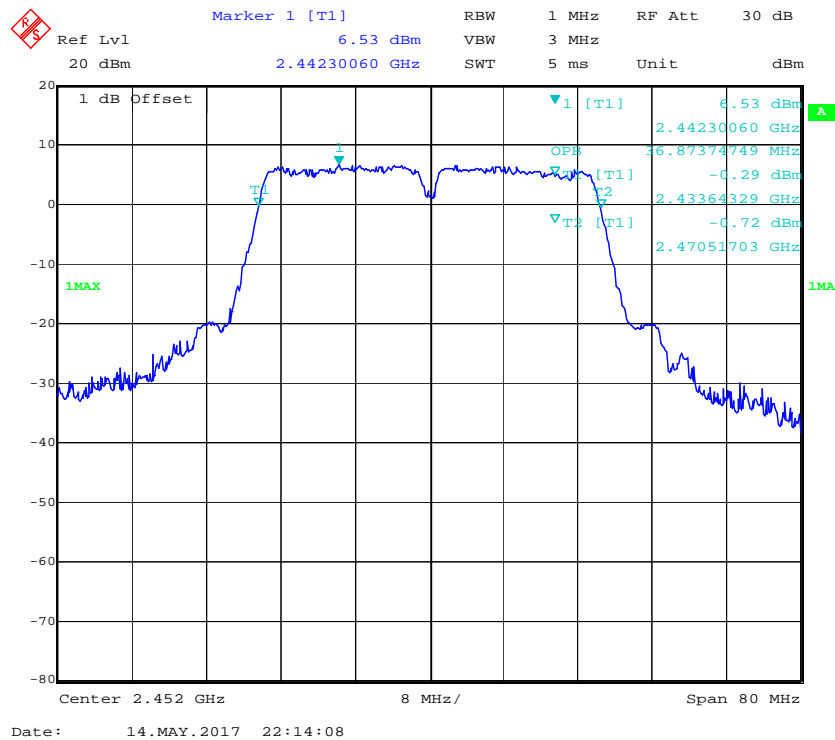
802.11n ht40 Low Channel



802.11n ht40 Middle Channel



802.11n ht40 High Channel



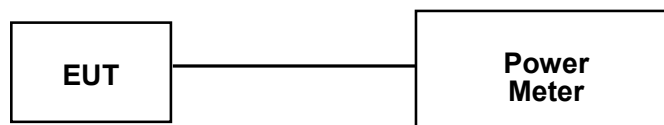
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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 test equipment.
3. Add a correction factor to the display.
4. Set the power Meter to test Peak output power, record the result as peak power.
5. Set the power Meter to test Average output power, record the result as Average power.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54170074	2017-01-03	2018-01-03
Agilent	P-Series Power Meter	N1912A	MY5000798	2017-01-03	2018-01-03
Unknown	RF Cable	Unknown	C-5	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	52 %
ATM Pressure:	100.1 kPa

** The testing was performed by Kevin Hu on 2017-05-14.*

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table.

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Max Average Conducted Output Power (dBm)	Limit (dBm)
802.11b	Low	2412	14.86	10.03	30
	Middle	2437	14.66	10.39	30
	High	2462	14.02	10.48	30
802.11g	Low	2412	17.52	10.28	30
	Middle	2437	17.28	10.33	30
	High	2462	17.75	10.69	30
802.11n ht20	Low	2412	18.75	10.58	30
	Middle	2437	18.62	10.55	30
	High	2462	18.56	10.53	30
802.11n ht40	Low	2422	18.85	10.52	30
	Middle	2437	18.73	10.44	30
	High	2452	18.66	10.22	30

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

Applicable Standard

According to FCC§15.247(d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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 to 300 kHz of spectrum analyzer 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-5	Each Time	/

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Data

Environmental Conditions

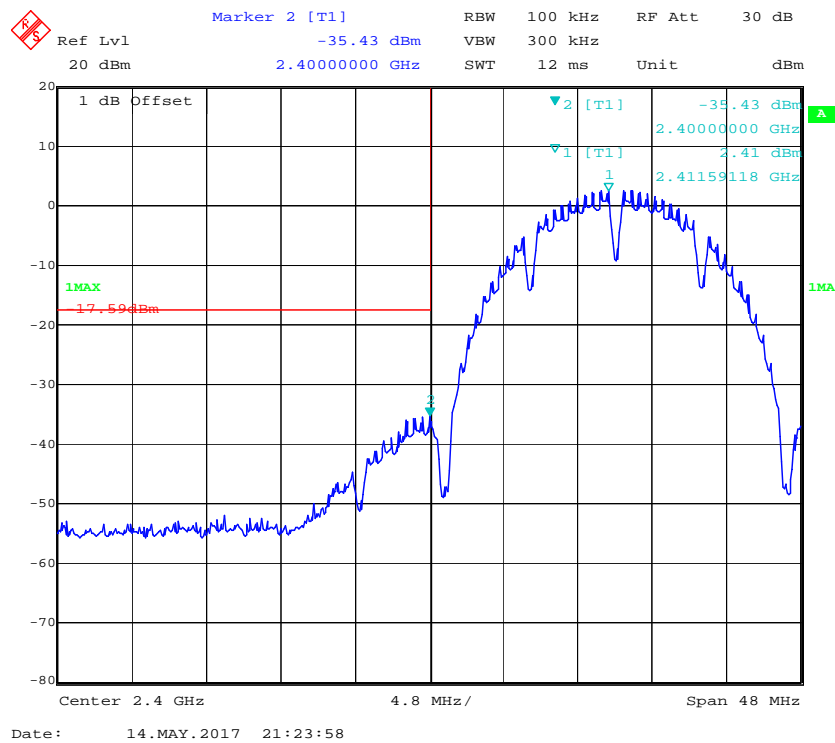
Temperature:	28 °C
Relative Humidity:	52 %
ATM Pressure:	100.1 kPa

* The testing was performed by Kevin Hu on 2017-05-14.

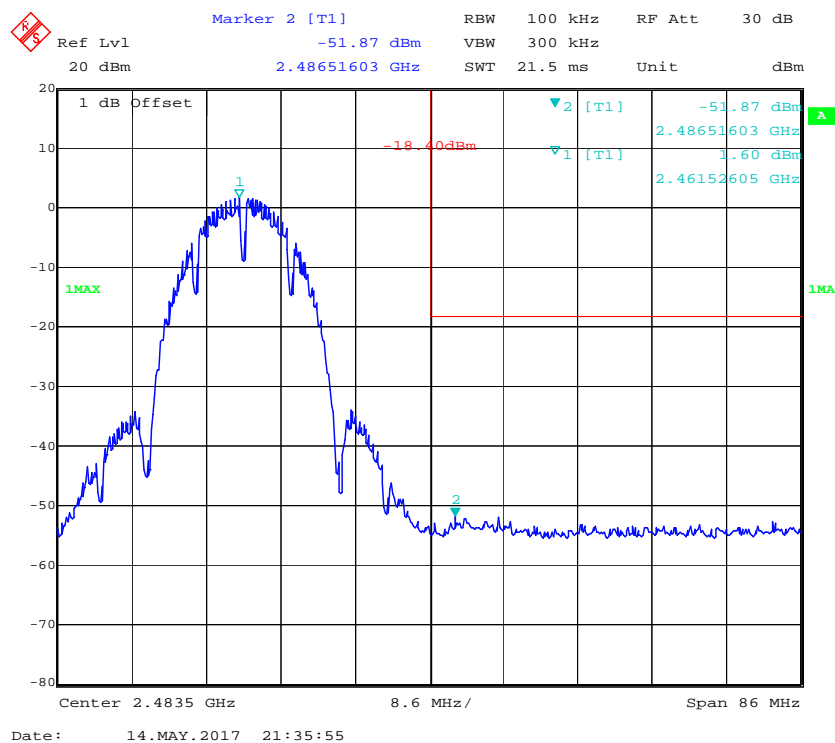
Test mode: Transmitting

Test Result: Compliant. Please refer to following plots.

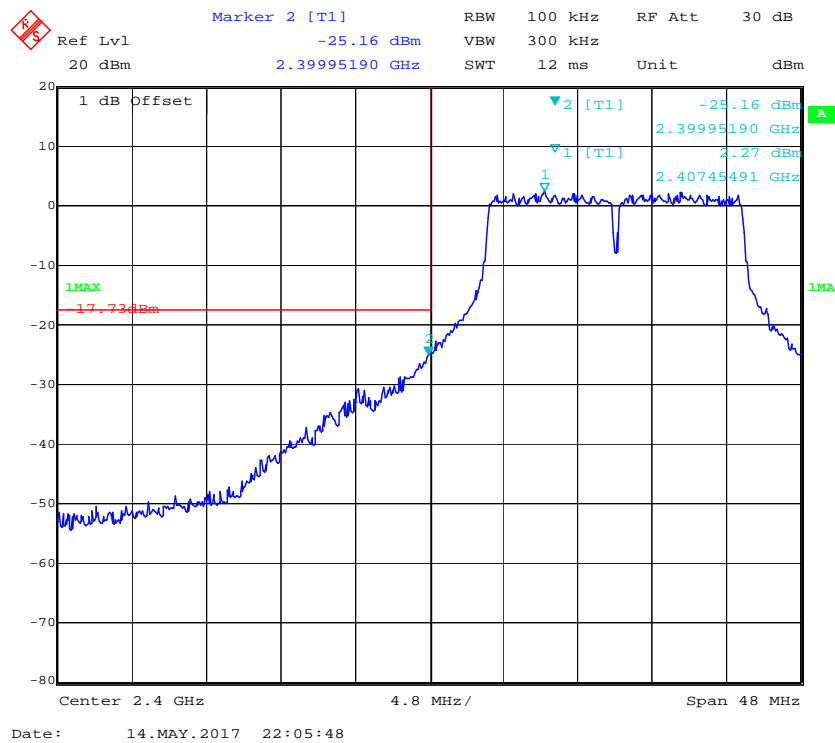
802.11b: Band Edge, Left Side



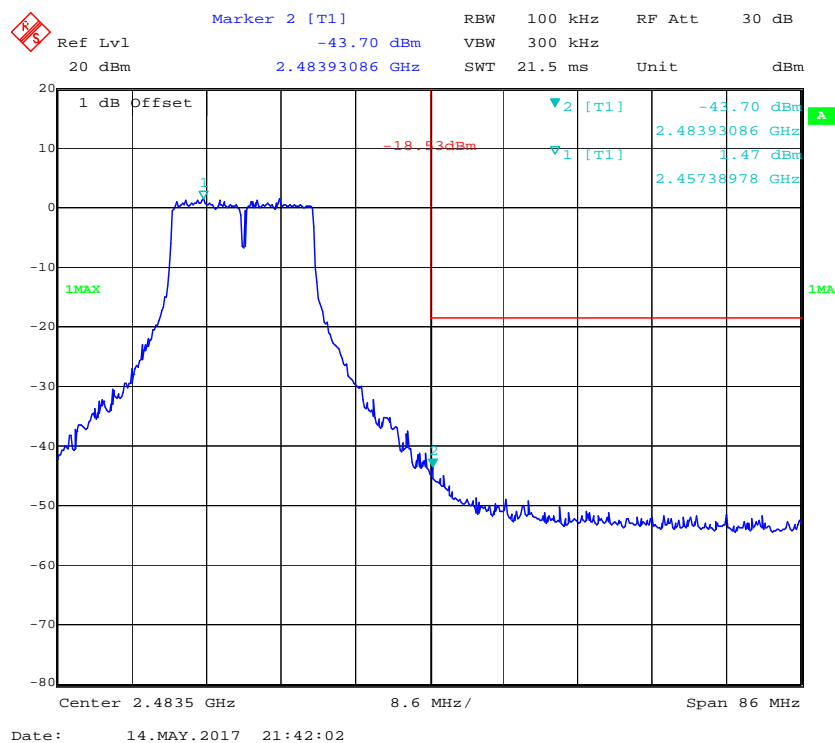
802.11b: Band Edge, Right Side



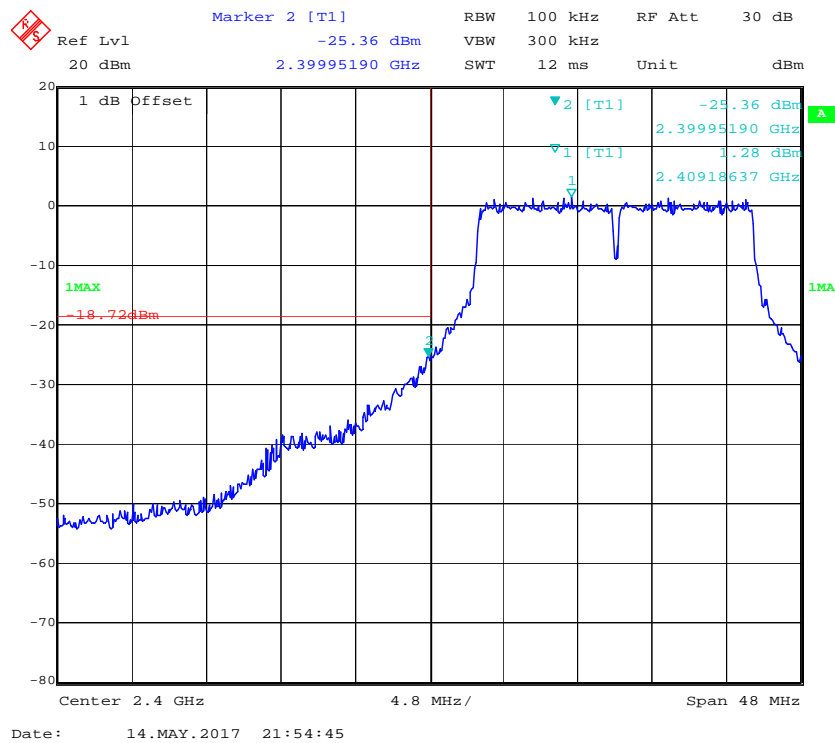
802.11g: Band Edge, Left Side



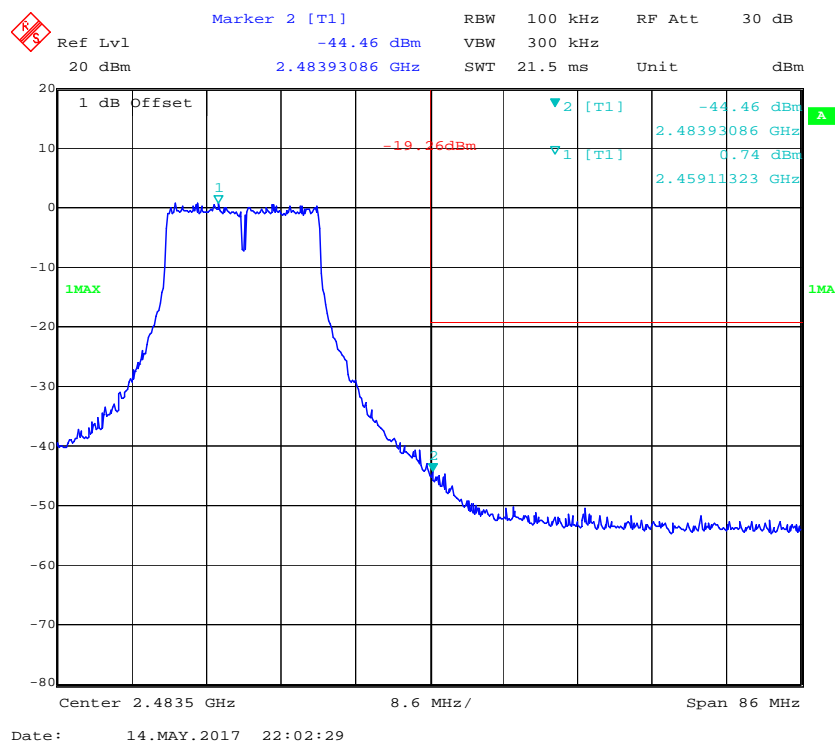
802.11g: Band Edge, Right Side



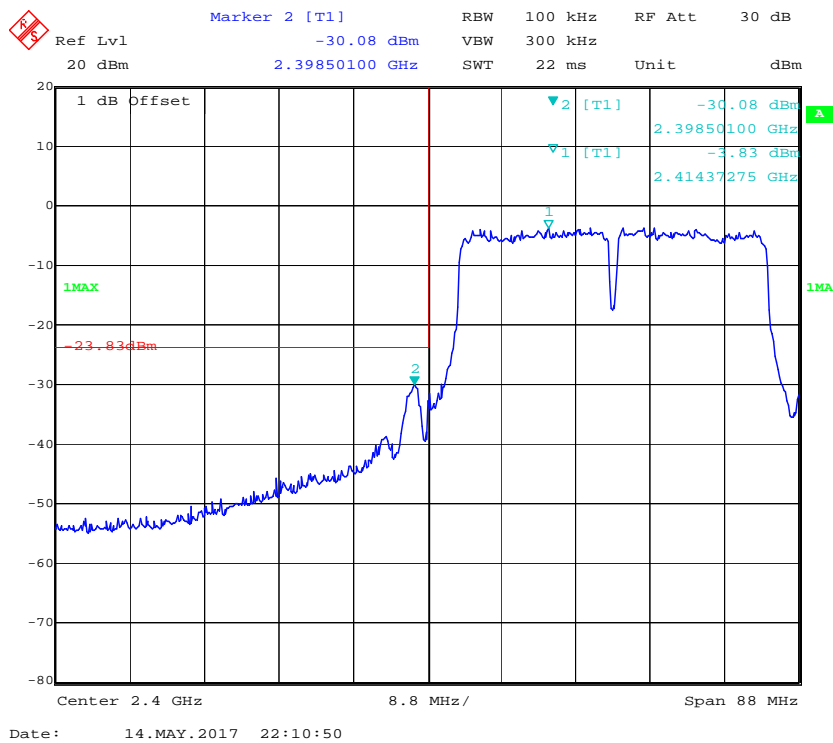
802.11n ht20 Band Edge, Left Side



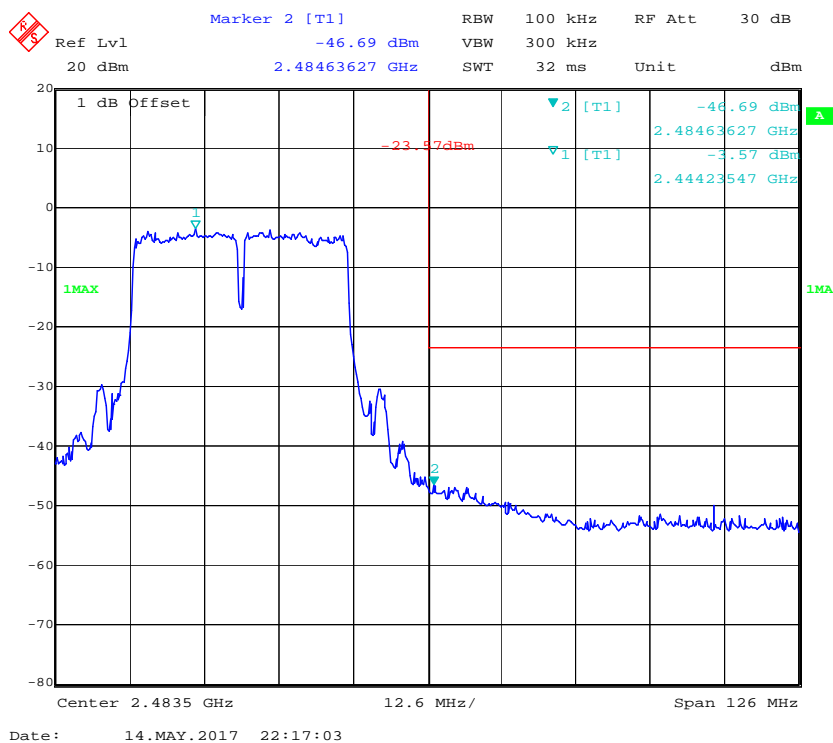
802.11n ht20 Band Edge, Right Side



802.11n ht40 Band Edge, Left Side



802.11n ht40 Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

According to FCC§15.247(e):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

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-5	Each Time	/

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	52 %
ATM Pressure:	100.1 kPa

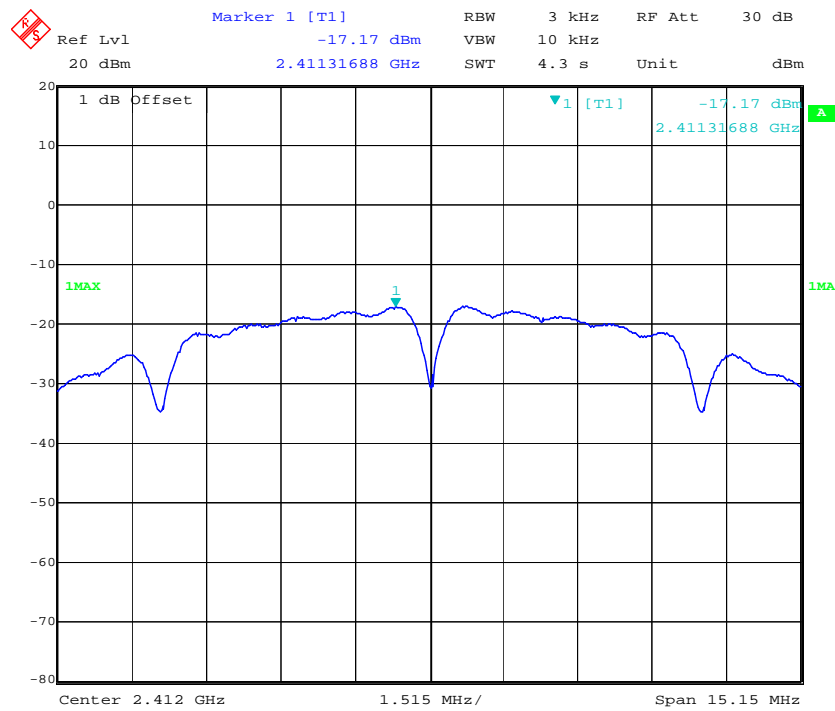
** The testing was performed by Kevin Hu on 2017-05-14.*

Test Mode: Transmitting

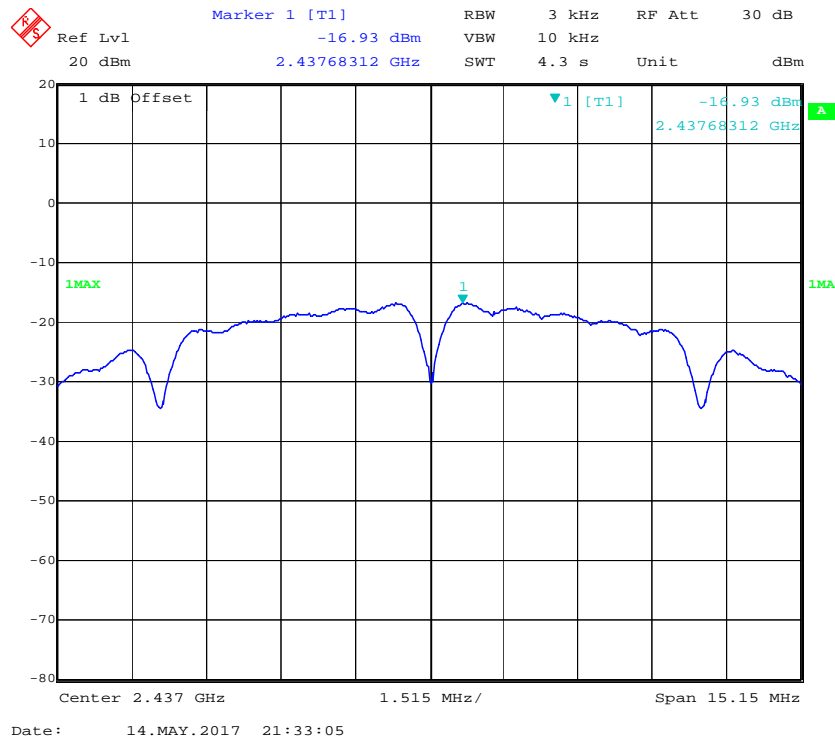
Test Result: Compliant. Please refer to the following table and plots

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-17.17	≤8.0
	Middle	2437	-16.93	≤8.0
	High	2462	-17.92	≤8.0
802.11g	Low	2412	-12.44	≤8.0
	Middle	2437	-12.73	≤8.0
	High	2462	-13.19	≤8.0
802.11n ht20	Low	2412	-13.04	≤8.0
	Middle	2437	-12.54	≤8.0
	High	2462	-13.03	≤8.0
802.11n ht40	Low	2422	-14.96	≤8.0
	Middle	2437	-16.32	≤8.0
	High	2452	-15.34	≤8.0

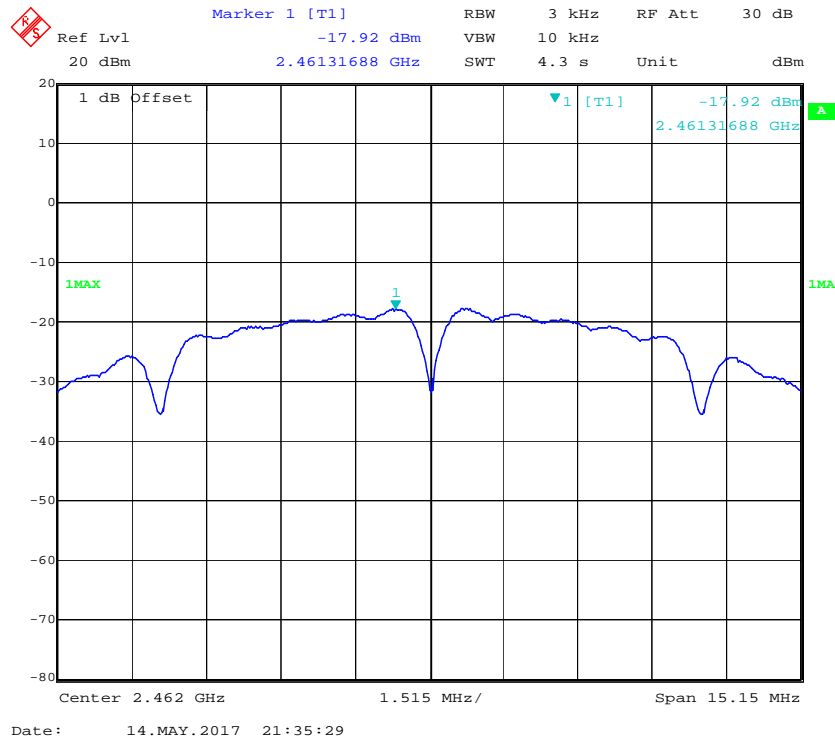
Power Spectral Density, 802.11b Low Channel



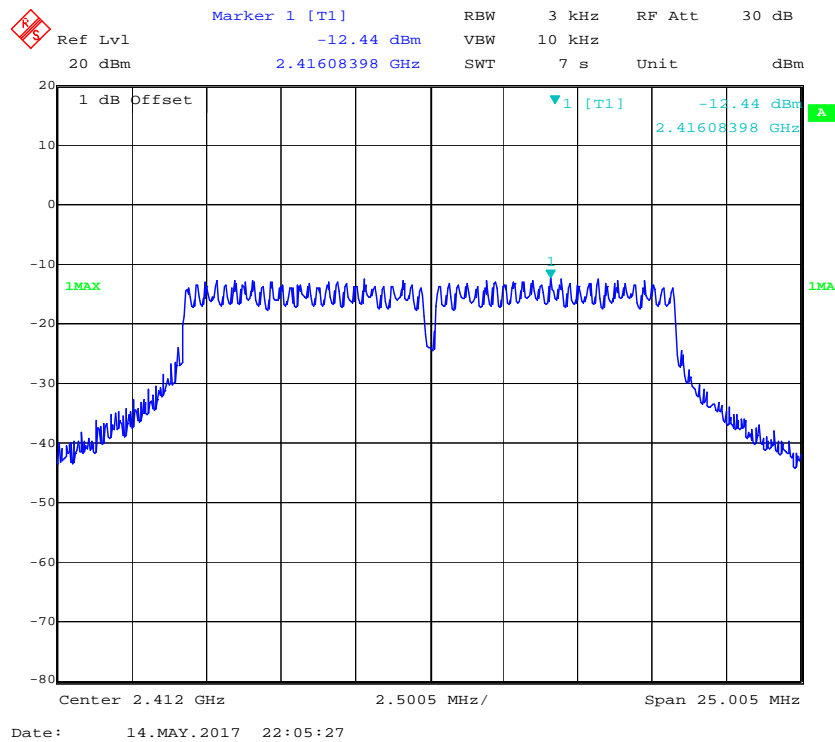
Power Spectral Density, 802.11b Middle Channel



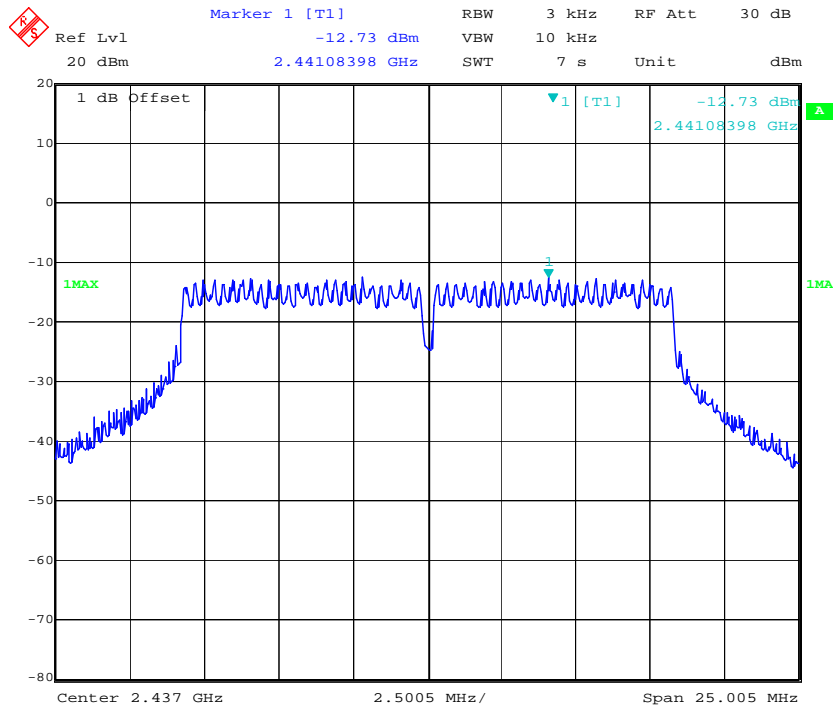
Power Spectral Density, 802.11b High Channel



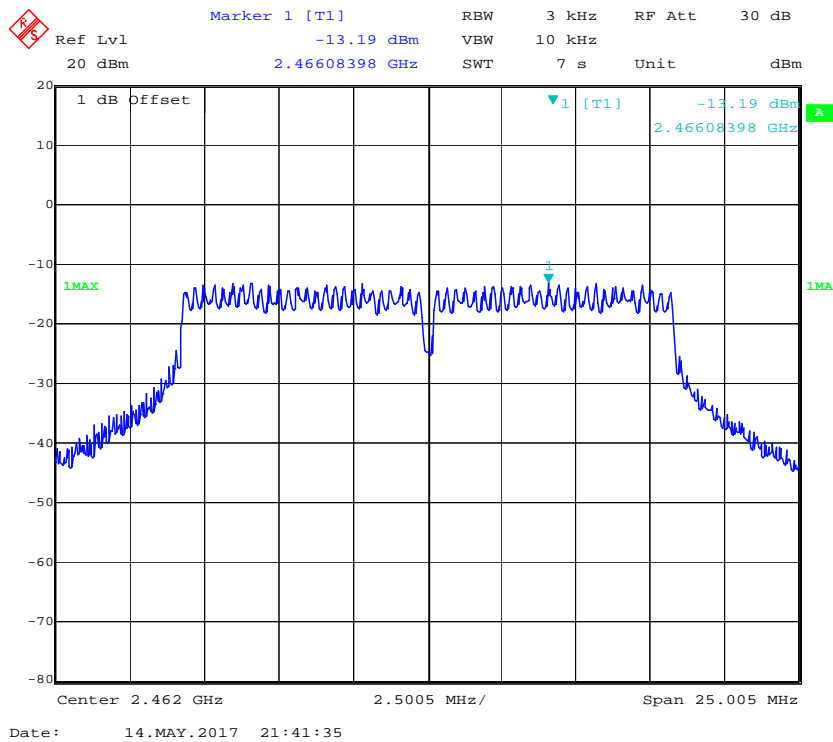
Power Spectral Density, 802.11g Low Channel



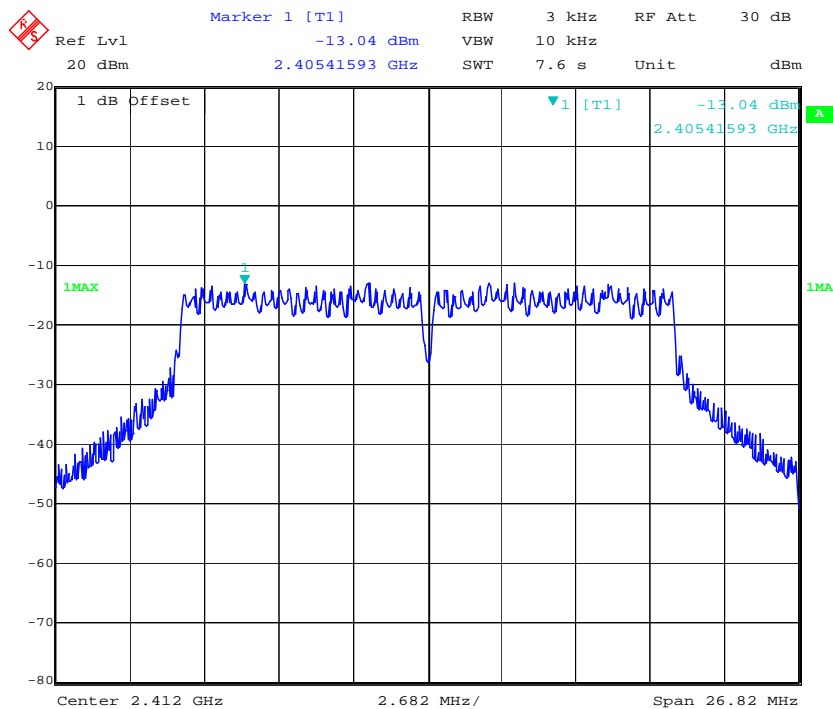
Power Spectral Density, 802.11g Middle Channel



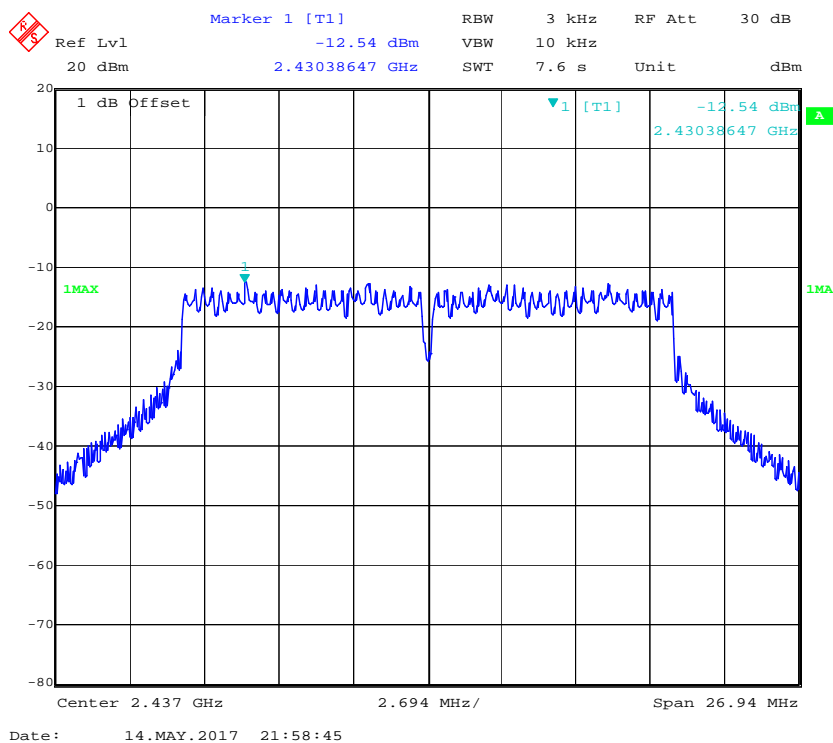
Power Spectral Density, 802.11g High Channel



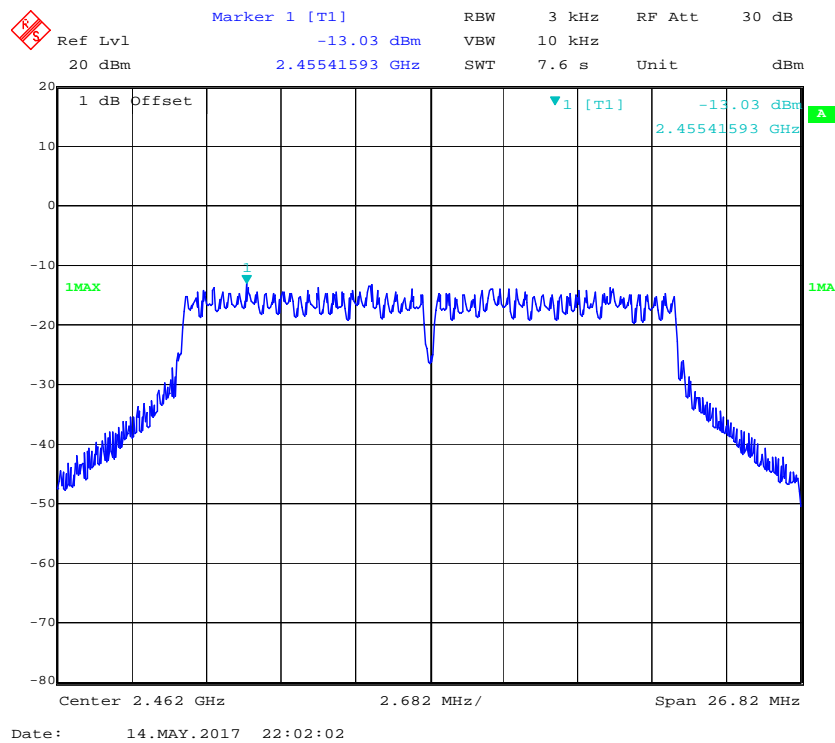
Power Spectral Density, 802.11n ht20 Low Channel



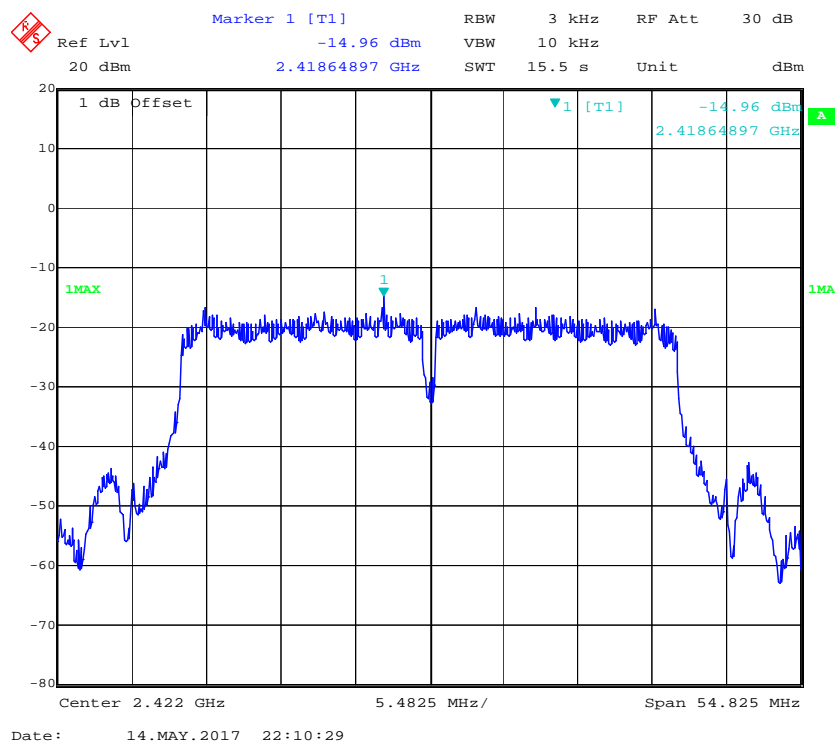
Power Spectral Density, 802.11n ht20 Middle Channel



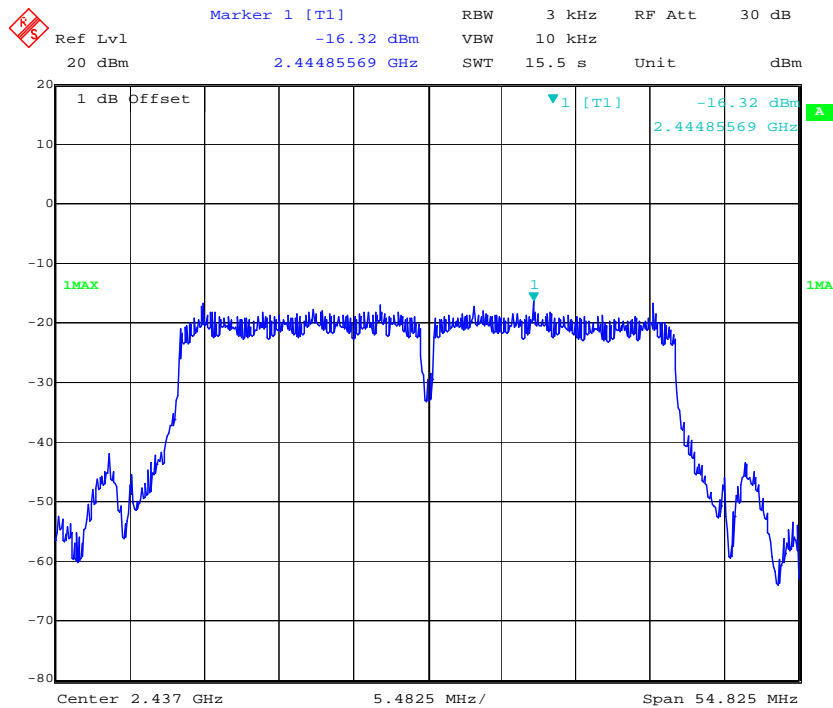
Power Spectral Density, 802.11n ht20 High Channel



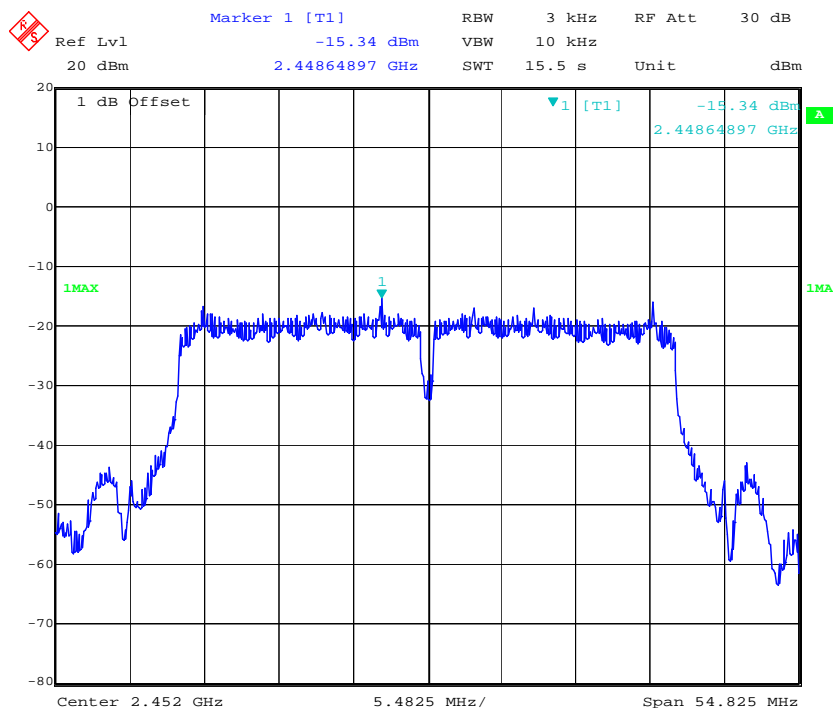
Power Spectral Density, 802.11n ht40 Low Channel



Power Spectral Density, 802.11n ht40 Middle Channel



Power Spectral Density, 802.11n ht40 High Channel



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