



FCC PART 15.247

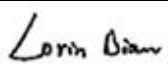
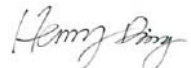
TEST REPORT

For

Shenzhen Genvict Technologies Co.,Ltd

12th Floor, Block A, Tsinghua Hi-tech Park, Nanshan District, Shenzhen,
Guangdong, China

FCC ID: 2AL59WB-R30B

Report Type: Original Report	Product Name: DSRC
	
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Report Number:	<u>RDG170516802A</u>
Report Date:	<u>2017-08-11</u>
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TABLE OF CONTENTS

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S)	4
TEST METHODOLOGY	4
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT EXERCISE SOFTWARE	6
EXTERNAL CABLE	10
BLOCK DIAGRAM OF TEST SETUP	10
SUMMARY OF TEST RESULTS	11
FCC §15.247 (i) , §1.1310 , §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	12
APPLICABLE STANDARD	12
FCC §15.203 - ANTENNA REQUIREMENT	14
APPLICABLE STANDARD	14
ANTENNA CONNECTOR CONSTRUCTION	14
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS.....	15
APPLICABLE STANDARD	15
EUT SETUP	15
EMI TEST RECEIVER SETUP	15
TEST PROCEDURE	16
CORRECTED AMPLITUDE & MARGIN CALCULATION	16
TEST EQUIPMENT LIST AND DETAILS	16
TEST DATA	17
FCC §15.209, §15.205 , §15.247(d) - SPURIOUS EMISSIONS.....	19
APPLICABLE STANDARD	19
EUT SETUP	19
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	20
TEST PROCEDURE	20
CORRECTED AMPLITUDE & MARGIN CALCULATION	20
TEST EQUIPMENT LIST AND DETAILS	21
TEST DATA	21
FCC §15.247(a) (2)& RSS-247 §5.2 a)–6 dB EMISSION BANDWIDTH	26
APPLICABLE STANDARD	26
TEST PROCEDURE	26
TEST EQUIPMENT LIST AND DETAILS	26
TEST DATA	27
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER	34
APPLICABLE STANDARD	34
TEST PROCEDURE	34
TEST EQUIPMENT LIST AND DETAILS	34
TEST DATA	35
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	36
APPLICABLE STANDARD	36

TEST PROCEDURE	36
TEST EQUIPMENT LIST AND DETAILS	36
TEST DATA	37
FCC §15.247(e) - POWER SPECTRAL DENSITY	42
APPLICABLE STANDARD	42
TEST PROCEDURE	42
TEST EQUIPMENT LIST AND DETAILS	42
TEST DATA	42

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Shenzhen Genvict Technologies Co.,Ltd**'s product, model number: **WB-R30B (FCC ID: 2AL59WB-R30B)** (the "EUT") in this report was a **DSRC**, which was measured approximately: 28 cm (L) x 24.5 cm (W) x 9 cm (H), rated input voltage: DC 48V from RSS232&DC 48V port or from POE.

**All measurement and test data in this report was gathered from final production sample, serial number: 170516802 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-05-17, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of **Shenzhen Genvict Technologies Co.,Ltd** 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 PART90 TNB submissions with FCC ID: 2AL59WB-R30B.
FCC PART15C DSS submissions with FCC ID: 2AL59WB-R30B.

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 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. When test, the DSRC antennas were terminated.

The device employed 802.11b/g/n20/n40 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	/	/

802.11b, 802.11g, 802.11n20 modes were test with channel 1,6,11; 802.11n40 mode was test with 3,6,9.

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.

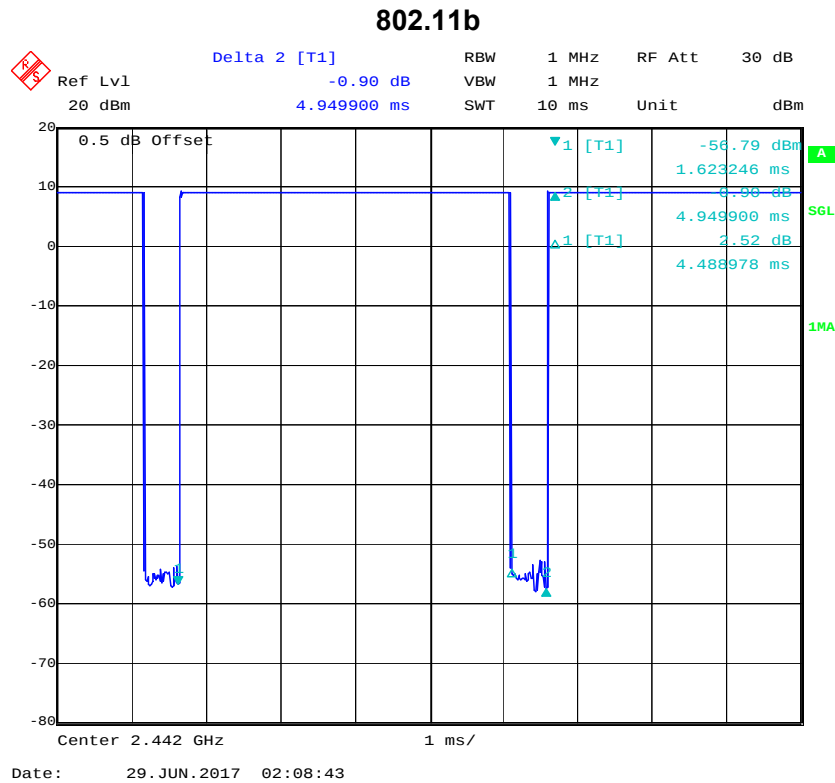
EUT Exercise Software

The software "SecureCRT" was used for testing, and the commands were provided by manufacturer. The maximum power and duty cycle was set by commands as following table:

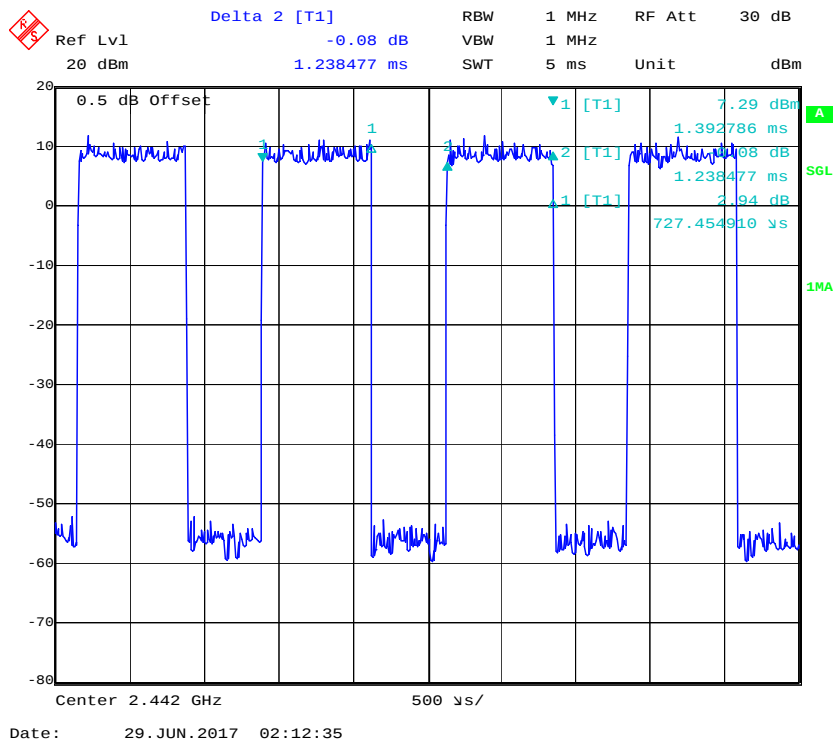
Test Mode	Test Software Version	SecureCRT		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	0C	0C	0C
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	04	03	03
802.11n20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	0C	0C	0C
802.11n40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	04	03	03

The duty cycle as below:

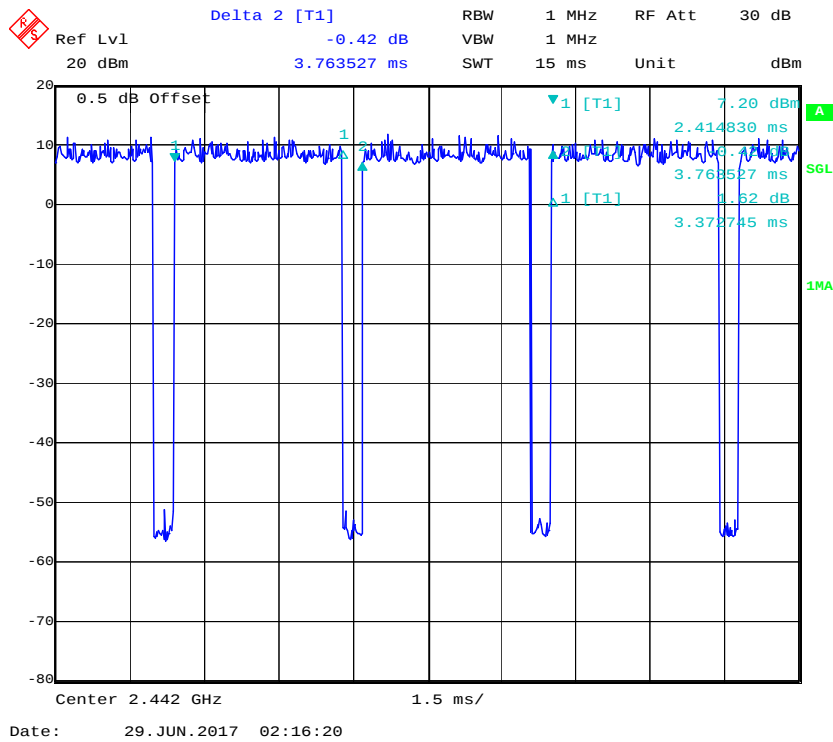
Mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
802.11b	4.49	4.95	90.7
802.11g	0.727	1.238	58.72
802.11n20	3.373	3.764	89.61
802.11n40	2.19	2.5	87.6



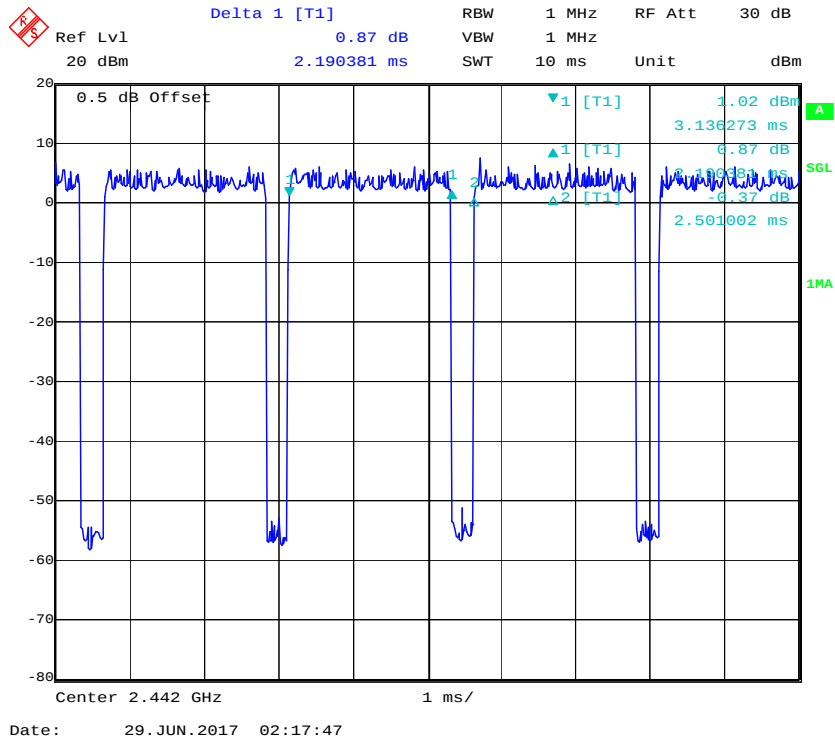
802.11g



802.11n20



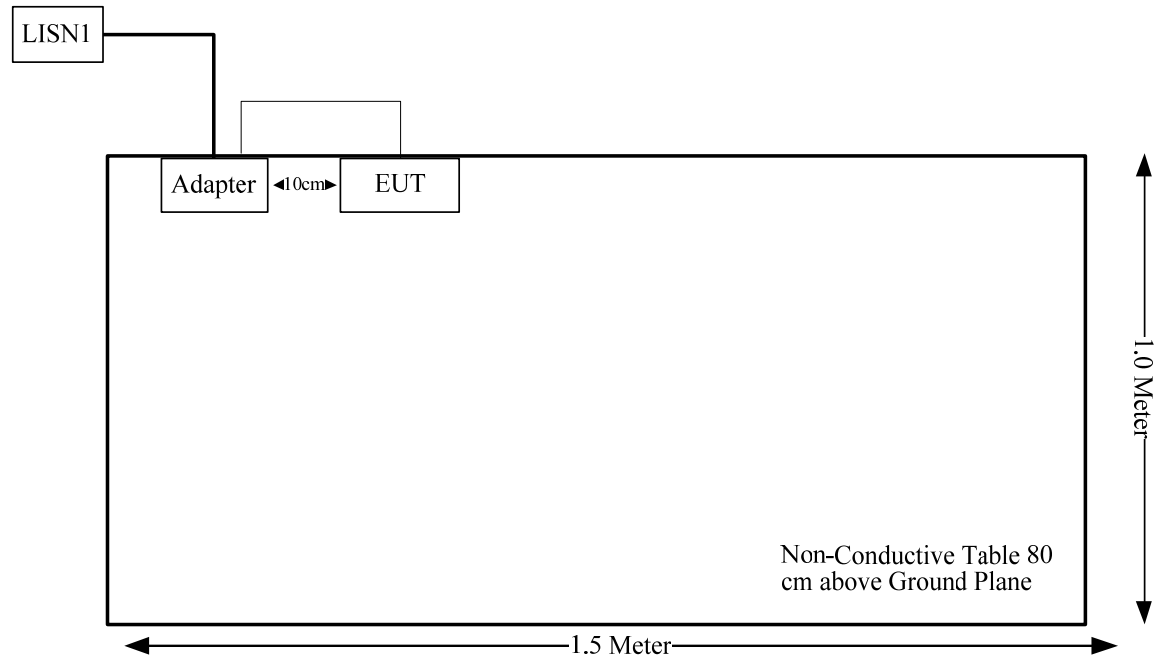
802.11n40



External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	Yes	No	1.5	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
FCC§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 , §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, 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.

Calculation Formula:

Prediction of power density at the distance of the applicable MPE limit:

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

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);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Module	Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G	2402-2480	3	2.00	11	12.59	20.00	0.0050	1.0
	2412-2462	3	2.00	24	251.19	20.00	0.10	1.0
DSRC	5860-5920	7	5.01	20	100.00	20.00	0.10	1.0

Note: The maximum tune-up power including tolerance was declared by manufacturer.

The WLAN or Bluetooth can transmit simultaneously with DSRC:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$\begin{aligned}
 &= S_{2.4}/S_{limit-2.4} + S_{DSRC}/S_{limit-DSRC} \\
 &= 0.1/1 + 0.1/1 \\
 &= 0.2 \\
 &< 1.0
 \end{aligned}$$

Result: The device meet FCC MPE at 20 cm distance

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 has one external antenna with a standard connector coupling to the EUT, and the antenna gain is 3.0 dBi, the EUT must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. That fulfill the requirement of this section. Please refer to the EUT photos.

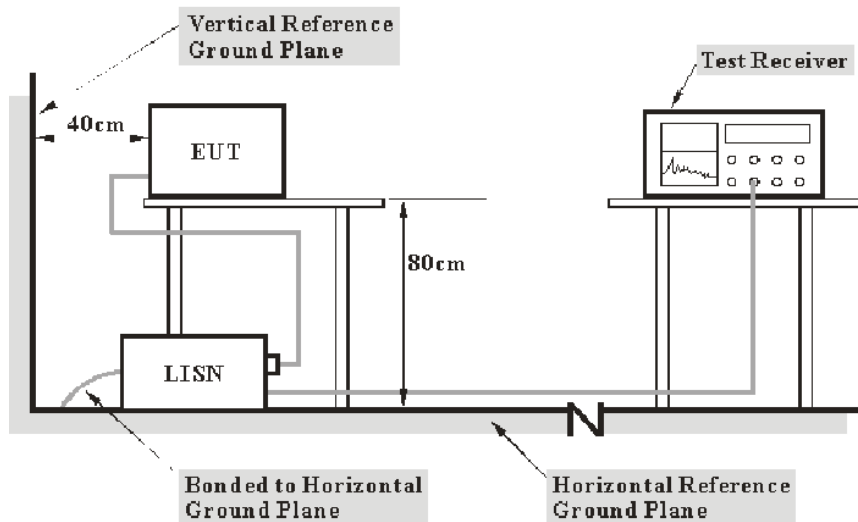
Result: Compliance.

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.

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

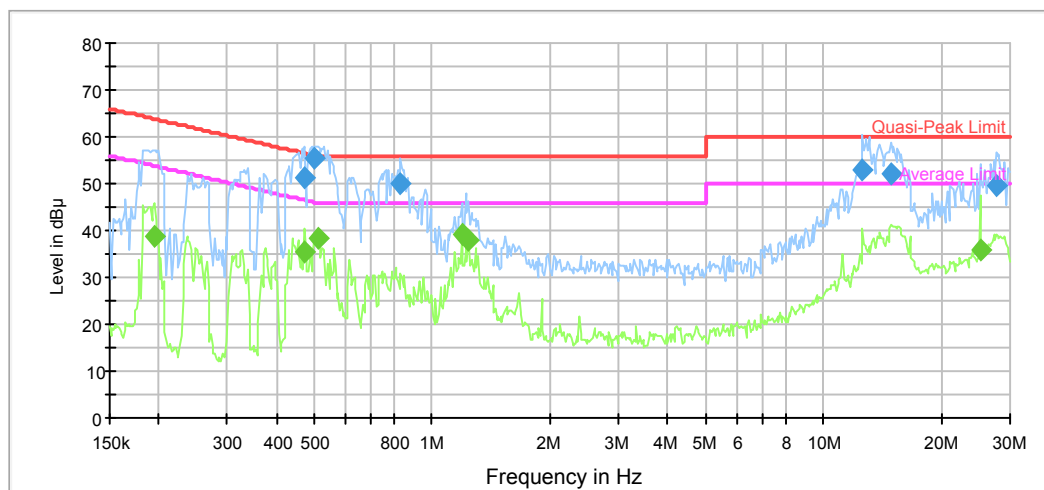
Environmental Conditions

Temperature:	26.2 °C
Relative Humidity:	61 %
ATM Pressure:	100 kPa

The testing was performed by Lorin Bian on 2017-07-10.

Test Mode: Transmitting

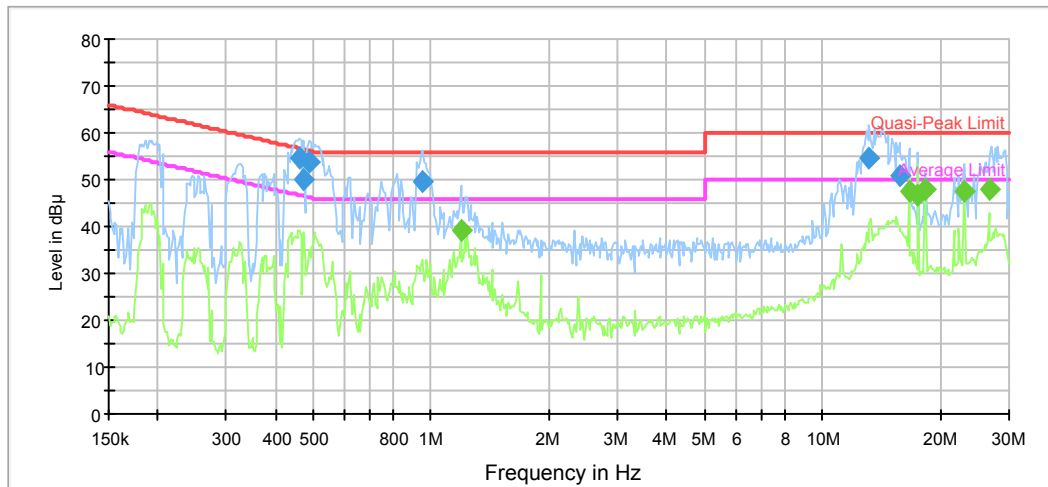
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.472507	51.1	9.000	L1	19.7	5.4	56.5	Compliance
0.499611	55.4	9.000	L1	19.7	0.6	56.0	Compliance
0.831967	50.0	9.000	L1	19.7	6.0	56.0	Compliance
12.593528	53.1	9.000	L1	20.0	6.9	60.0	Compliance
14.887390	52.0	9.000	L1	20.1	8.0	60.0	Compliance
27.716608	49.8	9.000	L1	20.3	10.2	60.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.195114	38.7	9.000	L1	19.7	15.1	53.8	Compliance
0.472507	35.6	9.000	L1	19.7	10.9	46.5	Compliance
0.511698	38.3	9.000	L1	19.7	7.7	46.0	Compliance
1.190776	39.2	9.000	L1	19.7	6.8	46.0	Compliance
1.239175	37.8	9.000	L1	19.7	8.2	46.0	Compliance
25.189161	35.8	9.000	L1	20.2	14.2	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.461346	54.8	9.000	N	19.6	1.9	56.7	Compliance
0.472507	50.0	9.000	N	19.6	6.5	56.5	Compliance
0.487810	53.9	9.000	N	19.6	2.3	56.2	Compliance
0.952654	49.7	9.000	N	19.7	6.3	56.0	Compliance
13.210237	54.7	9.000	N	19.9	5.3	60.0	Compliance
15.741362	50.9	9.000	N	19.9	9.1	60.0	Compliance

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
1.190776	39.0	9.000	N	19.6	7.0	46.0	Compliance
16.644319	47.6	9.000	N	19.9	2.4	50.0	Compliance
17.599071	46.6	9.000	N	19.9	3.4	50.0	Compliance
18.314388	47.9	9.000	N	19.9	2.1	50.0	Compliance
23.075326	47.4	9.000	N	20.0	2.6	50.0	Compliance
26.634063	47.8	9.000	N	20.1	2.2	50.0	Compliance

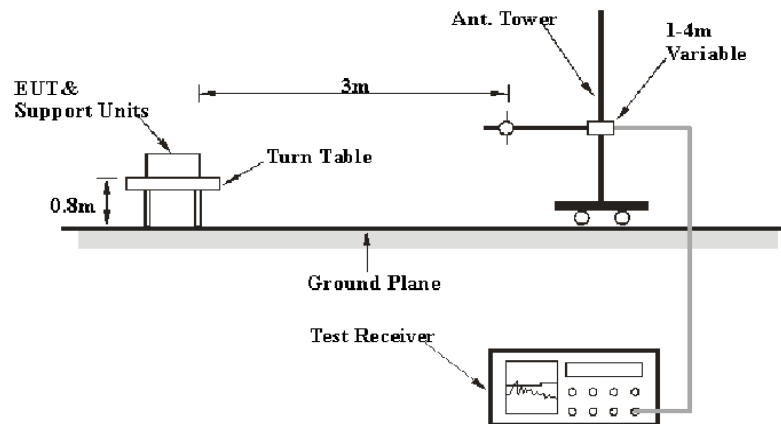
FCC §15.209, §15.205 , §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

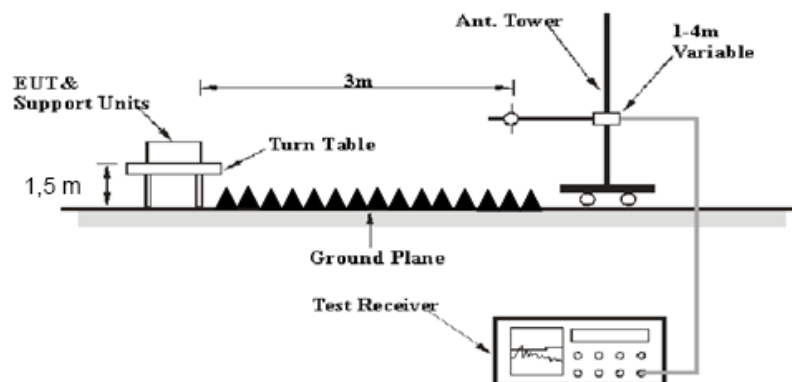
FCC §15.247 (d); §15.209; §15.205

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber 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:

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 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 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	2017-06-16	2020-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
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

*** 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:	27.6 °C
Relative Humidity:	56 %
ATM Pressure:	100 kPa

* The testing was performed by Lorin Bian on 2017-07-11.

Test Mode: Transmitting

30MHz-25GHz:802.11b

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)					
Frequency: 2412 MHz									
2412	64.94	PK	H	24.84	5.68	0.00	95.46	N/A	N/A
2412	59.71	AV	H	24.84	5.68	0.00	90.23	N/A	N/A
2412	78.19	PK	V	24.84	5.68	0.00	108.71	N/A	N/A
2412	72.04	AV	V	24.84	5.68	0.00	102.56	N/A	N/A
2390	29.31	PK	V	24.80	5.67	0.00	59.78	74.00	14.22
2390	15.94	AV	V	24.80	5.67	0.00	46.41	54.00	7.59
4824	43.46	PK	V	29.75	7.99	28.39	52.81	74.00	21.19
4824	35.26	AV	V	29.75	7.99	28.39	44.61	54.00	9.39
4844	42.58	PK	V	29.79	8.00	28.44	51.93	74.00	22.07
4844	33.43	AV	V	29.79	8.00	28.44	42.78	54.00	11.22
2773	44.38	PK	V	25.38	6.02	27.89	47.89	74.00	26.11
2773	34.28	AV	V	25.38	6.02	27.89	37.79	54.00	16.21
240.87	48.25	QP	H	12.30	1.08	27.55	34.08	46.00	11.92
481.09	46.25	QP	H	18.19	1.65	28.70	37.39	46.00	8.61
Frequency: 2437 MHz									
2437	65.72	PK	H	24.89	5.68	0.00	96.29	N/A	N/A
2437	60.35	AV	H	24.89	5.68	0.00	90.92	N/A	N/A
2437	78.49	PK	V	24.89	5.68	0.00	109.06	N/A	N/A
2437	73.1	AV	V	24.89	5.68	0.00	103.67	N/A	N/A
4874	40.5	PK	V	29.85	8.03	28.51	49.87	74.00	24.13
4874	33.58	AV	V	29.85	8.03	28.51	42.95	54.00	11.05
2164	41.15	PK	V	24.40	5.63	27.87	43.31	74.00	30.69
2164	32.99	AV	V	24.40	5.63	27.87	35.15	54.00	18.85
3488	44.54	PK	V	27.16	6.96	26.73	51.93	74.00	22.07
3488	33.86	AV	V	27.16	6.96	26.73	41.25	54.00	12.75
240.87	48.52	QP	H	12.30	1.08	27.55	34.35	46.00	11.65
481.09	46.39	QP	H	18.19	1.65	28.70	37.53	46.00	8.47
Frequency: 2462 MHz									
2462	63.72	PK	H	24.93	5.69	0.00	94.34	N/A	N/A
2462	58.15	AV	H	24.93	5.69	0.00	88.77	N/A	N/A
2462	77.62	PK	V	24.93	5.69	0.00	108.24	N/A	N/A
2462	72.51	AV	V	24.93	5.69	0.00	103.13	N/A	N/A
2483.5	29.77	PK	V	24.97	5.69	0.00	60.43	74.00	13.57
2483.5	18.28	AV	V	24.97	5.69	0.00	48.94	54.00	5.06
4924	44.64	PK	V	29.95	8.07	28.63	54.03	74.00	19.97
4924	35.84	AV	V	29.95	8.07	28.63	45.23	54.00	8.77
7386	41.09	PK	V	34.22	9.91	34.54	50.68	74.00	23.32
7386	33.17	AV	V	34.22	9.91	34.54	42.76	54.00	11.24
2348	45.98	PK	V	24.73	5.66	27.91	48.46	74.00	25.54
2348	34.41	AV	V	24.73	5.66	27.91	36.89	54.00	17.11
240.87	49.36	QP	H	12.30	1.08	27.55	35.19	46.00	10.81
481.09	46.81	QP	H	18.19	1.65	28.70	37.95	46.00	8.05

802.11g

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)					
Frequency: 2412 MHz									
2412	65.57	PK	H	24.84	5.68	0.00	96.09	N/A	N/A
2412	59.35	AV	H	24.84	5.68	0.00	89.87	N/A	N/A
2412	78.25	PK	V	24.84	5.68	0.00	108.77	N/A	N/A
2412	71.58	AV	V	24.84	5.68	0.00	102.10	N/A	N/A
2390	29.86	PK	V	24.80	5.67	0.00	60.33	74.00	13.67
2390	16.07	AV	V	24.80	5.67	0.00	46.54	54.00	7.46
4824	43.28	PK	V	29.75	7.99	28.39	52.63	74.00	21.37
4824	35.01	AV	V	29.75	7.99	28.39	44.36	54.00	9.64
7236	41.85	PK	V	33.98	9.79	34.18	51.44	74.00	22.56
7236	33.44	AV	V	33.98	9.79	34.18	43.03	54.00	10.97
3145	44.06	PK	V	26.14	6.48	27.29	49.39	74.00	24.61
3145	34.37	AV	V	26.14	6.48	27.29	39.70	54.00	14.30
240.87	48.89	QP	H	12.30	1.08	27.55	34.72	46.00	11.28
481.09	47.25	QP	H	18.19	1.65	28.70	38.39	46.00	7.61
Frequency: 2437 MHz									
2437	65.91	PK	H	24.89	5.68	0.00	96.48	N/A	N/A
2437	60.37	AV	H	24.89	5.68	0.00	90.94	N/A	N/A
2437	78.03	PK	V	24.89	5.68	0.00	108.60	N/A	N/A
2437	73.21	AV	V	24.89	5.68	0.00	103.78	N/A	N/A
4874	41.19	PK	V	29.85	8.03	28.51	50.56	74.00	23.44
4874	34.21	AV	V	29.85	8.03	28.51	43.58	54.00	10.42
2376	41.82	PK	V	24.78	5.67	27.86	44.41	74.00	29.59
2376	33.81	AV	V	24.78	5.67	27.86	36.40	54.00	17.60
2436	43.2	PK	V	24.88	5.68	27.88	45.88	74.00	28.12
2436	34.26	AV	V	24.88	5.68	27.88	36.94	54.00	17.06
240.87	48.42	QP	H	12.30	1.08	27.55	34.25	46.00	11.75
481.09	47.69	QP	H	18.19	1.65	28.70	38.83	46.00	7.17
Frequency: 2462 MHz									
2462	64.32	PK	H	24.93	5.69	0.00	94.94	N/A	N/A
2462	58.51	AV	H	24.93	5.69	0.00	89.13	N/A	N/A
2462	77.97	PK	V	24.93	5.69	0.00	108.59	N/A	N/A
2462	72.3	AV	V	24.93	5.69	0.00	102.92	N/A	N/A
2483.5	29.67	PK	V	24.97	5.69	0.00	60.33	74.00	13.67
2483.5	18	AV	V	24.97	5.69	0.00	48.66	54.00	5.34
4924	43.76	PK	V	29.95	8.07	28.63	53.15	74.00	20.85
4924	34.92	AV	V	29.95	8.07	28.63	44.31	54.00	9.69
7386	42.02	PK	V	34.22	9.91	34.54	51.61	74.00	22.39
7386	33.82	AV	V	34.22	9.91	34.54	43.41	54.00	10.59
2288	43.95	PK	V	24.62	5.65	27.99	46.23	74.00	27.77
2288	34.82	AV	V	24.62	5.65	27.99	37.10	54.00	16.90
240.87	47.15	QP	H	12.30	1.08	27.55	32.98	46.00	13.02
481.09	45.69	QP	H	18.19	1.65	28.70	36.83	46.00	9.17

802.11n20

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)					
Frequency: 2412 MHz									
2412	65.26	PK	H	24.84	5.68	0.00	95.78	N/A	N/A
2412	59.44	AV	H	24.84	5.68	0.00	89.96	N/A	N/A
2412	77.71	PK	V	24.84	5.68	0.00	108.23	N/A	N/A
2412	72.55	AV	V	24.84	5.68	0.00	103.07	N/A	N/A
2390	29.3	PK	V	24.80	5.67	0.00	59.77	74.00	14.23
2390	15.58	AV	V	24.80	5.67	0.00	46.05	54.00	7.95
4824	44	PK	V	29.75	7.99	28.39	53.35	74.00	20.65
4824	35.19	AV	V	29.75	7.99	28.39	44.54	54.00	9.46
7236	42.09	PK	V	33.98	9.79	34.18	51.68	74.00	22.32
7236	33.07	AV	V	33.98	9.79	34.18	42.66	54.00	11.34
3436	44.75	PK	V	27.01	6.89	26.82	51.83	74.00	22.17
3436	34.02	AV	V	27.01	6.89	26.82	41.10	54.00	12.90
240.87	47.42	QP	H	12.30	1.08	27.55	33.25	46.00	12.75
481.09	45.83	QP	H	18.19	1.65	28.70	36.97	46.00	9.03
Frequency: 2437 MHz									
2437	65.49	PK	H	24.89	5.68	0.00	96.06	N/A	N/A
2437	60.88	AV	H	24.89	5.68	0.00	91.45	N/A	N/A
2437	78.77	PK	V	24.89	5.68	0.00	109.34	N/A	N/A
2437	72.61	AV	V	24.89	5.68	0.00	103.18	N/A	N/A
4874	40.16	PK	V	29.85	8.03	28.51	49.53	74.00	24.47
4874	33.48	AV	V	29.85	8.03	28.51	42.85	54.00	11.15
2866	41.8	PK	V	25.51	6.13	27.84	45.60	74.00	28.40
2866	33.12	AV	V	25.51	6.13	27.84	36.92	54.00	17.08
2437	45.23	PK	V	24.89	5.68	27.88	47.92	74.00	26.08
2437	34.22	AV	V	24.89	5.68	27.88	36.91	54.00	17.09
240.87	48.26	QP	H	12.30	1.08	27.55	34.09	46.00	11.91
481.09	46.25	QP	H	18.19	1.65	28.70	37.39	46.00	8.61
Frequency: 2462 MHz									
2462	63.29	PK	H	24.93	5.69	0.00	93.91	N/A	N/A
2462	58.26	AV	H	24.93	5.69	0.00	88.88	N/A	N/A
2462	78.23	PK	V	24.93	5.69	0.00	108.85	N/A	N/A
2462	72.3	AV	V	24.93	5.69	0.00	102.92	N/A	N/A
2483.5	29.94	PK	V	24.97	5.69	0.00	60.60	74.00	13.40
2483.5	18.4	AV	V	24.97	5.69	0.00	49.06	54.00	4.94
4924	43.19	PK	V	29.95	8.07	28.63	52.58	74.00	21.42
4924	35.68	AV	V	29.95	8.07	28.63	45.07	54.00	8.93
7386	41.34	PK	V	34.22	9.91	34.54	50.93	74.00	23.07
7386	32.95	AV	V	34.22	9.91	34.54	42.54	54.00	11.46
2285	43.02	PK	V	24.61	5.65	27.98	45.30	74.00	28.70
2285	33.88	AV	V	24.61	5.65	27.98	36.16	54.00	17.84
240.87	47.79	QP	H	12.30	1.08	27.55	33.62	46.00	12.38
481.09	46.69	QP	H	18.19	1.65	28.70	37.83	46.00	8.17

802.11n40

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)					
Frequency: 2422 MHz									
2422	65.62	PK	H	24.86	5.68	0.00	96.16	N/A	N/A
2422	59.67	AV	H	24.86	5.68	0.00	90.21	N/A	N/A
2422	77.75	PK	V	24.86	5.68	0.00	108.29	N/A	N/A
2422	72.18	AV	V	24.86	5.68	0.00	102.72	N/A	N/A
2390	29.18	PK	V	24.80	5.67	0.00	59.65	74.00	14.35
2390	16.15	AV	V	24.80	5.67	0.00	46.62	54.00	7.38
4824	43.65	PK	V	29.75	7.99	28.39	53.00	74.00	21.00
4824	34.92	AV	V	29.75	7.99	28.39	44.27	54.00	9.73
7266	41.65	PK	V	34.03	9.82	34.25	51.25	74.00	22.75
7266	33.86	AV	V	34.03	9.82	34.25	43.46	54.00	10.54
3455	44.45	PK	V	27.07	6.92	26.79	51.65	74.00	22.35
3455	34.98	AV	V	27.07	6.92	26.79	42.18	54.00	11.82
240.87	47.32	QP	H	12.30	1.08	27.55	33.15	46.00	12.85
481.09	47.13	QP	H	18.19	1.65	28.70	38.27	46.00	7.73
Frequency: 2437 MHz									
2437	65.57	PK	H	24.89	5.68	0.00	96.14	N/A	N/A
2437	60.61	AV	H	24.89	5.68	0.00	91.18	N/A	N/A
2437	79.09	PK	V	24.89	5.68	0.00	109.66	N/A	N/A
2437	73.35	AV	V	24.89	5.68	0.00	103.92	N/A	N/A
4874	40.18	PK	V	29.85	8.03	28.51	49.55	74.00	24.45
4874	33.25	AV	V	29.85	8.03	28.51	42.62	54.00	11.38
1863	40.56	PK	V	24.10	5.29	27.83	42.12	74.00	31.88
1863	32.9	AV	V	24.10	5.29	27.83	34.46	54.00	19.54
3145	45.47	PK	V	26.14	6.48	27.29	50.80	74.00	23.20
3145	35.31	AV	V	26.14	6.48	27.29	40.64	54.00	13.36
240.87	48.01	QP	H	12.30	1.08	27.55	33.84	46.00	12.16
481.09	46.25	QP	H	18.19	1.65	28.70	37.39	46.00	8.61
Frequency: 2452 MHz									
2452	64.21	PK	H	24.91	5.69	0.00	94.81	N/A	N/A
2452	58.05	AV	H	24.91	5.69	0.00	88.65	N/A	N/A
2452	77.35	PK	V	24.91	5.69	0.00	107.95	N/A	N/A
2452	73.2	AV	V	24.91	5.69	0.00	103.80	N/A	N/A
2483.5	30.05	PK	V	24.97	5.69	0.00	60.71	74.00	13.29
2483.5	18.42	AV	V	24.97	5.69	0.00	49.08	54.00	4.92
4904	43.77	PK	V	29.91	8.05	28.58	53.15	74.00	20.85
4904	35.65	AV	V	29.91	8.05	28.58	45.03	54.00	8.97
7356	41.43	PK	V	34.17	9.89	34.46	51.03	74.00	22.97
7356	32.99	AV	V	34.17	9.89	34.46	42.59	54.00	11.41
2423	42.29	PK	V	24.86	5.68	27.86	44.97	74.00	29.03
2423	34.32	AV	V	24.86	5.68	27.86	37.00	54.00	17.00
240.87	48.28	QP	H	12.30	1.08	27.55	34.11	46.00	11.89
481.09	46.39	QP	H	18.19	1.65	28.70	37.53	46.00	8.47

FCC §15.247(a) (2)& RSS-247 §5.2 a)–6 dB EMISSION BANDWIDTH

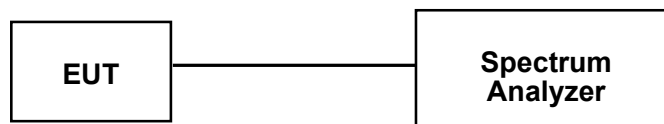
Applicable Standard

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-2	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:	27.6 °C
Relative Humidity:	58 %
ATM Pressure:	100.1 kPa

* The testing was performed by Lorin Bian on 2017-06-29.

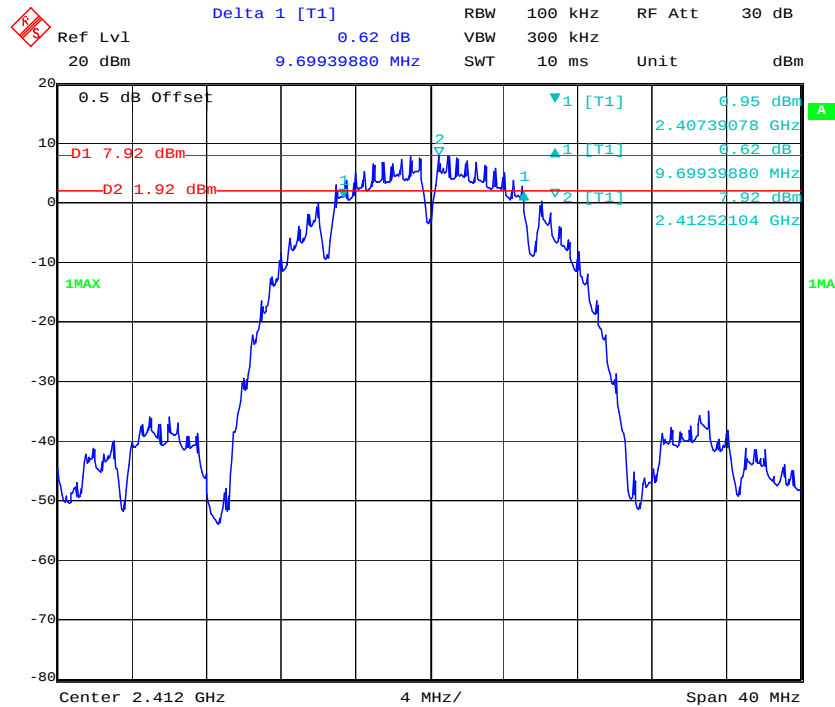
Test Mode: Transmitting

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

Test mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	9.70	≥0.5
	Middle	2437	10.1	≥0.5
	High	2462	10.02	≥0.5
802.11g	Low	2412	15.23	≥0.5
	Middle	2437	15.15	≥0.5
	High	2462	15.15	≥0.5
802.11n20	Low	2412	15.15	≥0.5
	Middle	2437	15.23	≥0.5
	High	2462	15.15	≥0.5
802.11n40	Low	2422	33.83	≥0.5
	Middle	2437	33.83	≥0.5
	High	2452	33.83	≥0.5

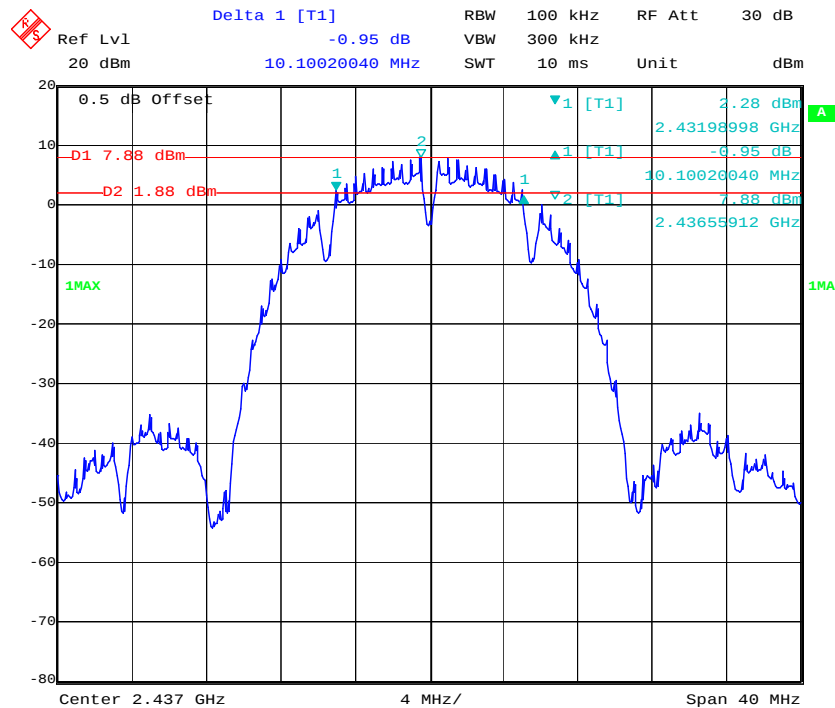
6dB Bandwidth:

802.11b Low Channel



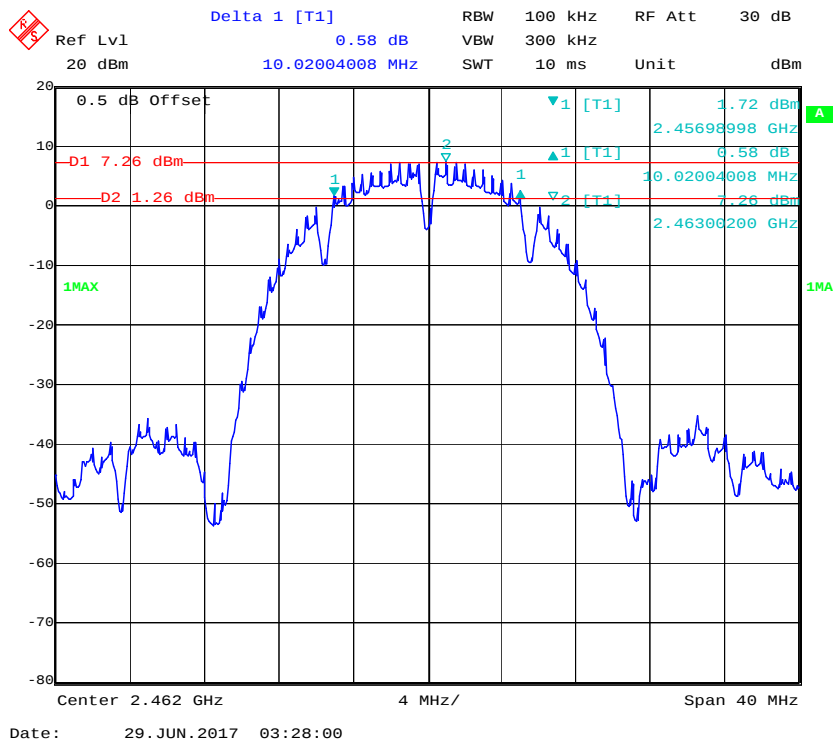
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802.11b Middle Channel

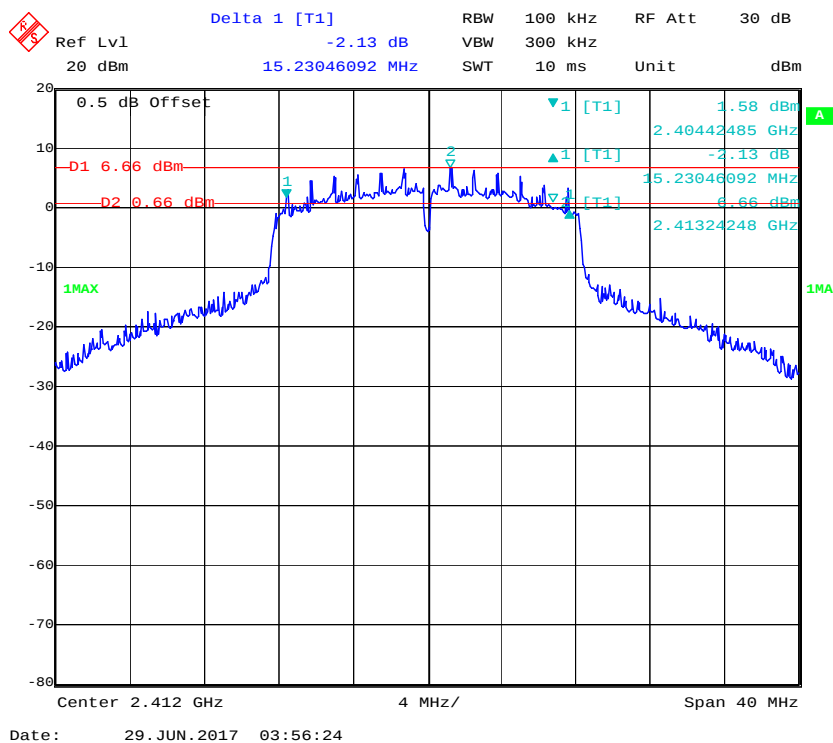


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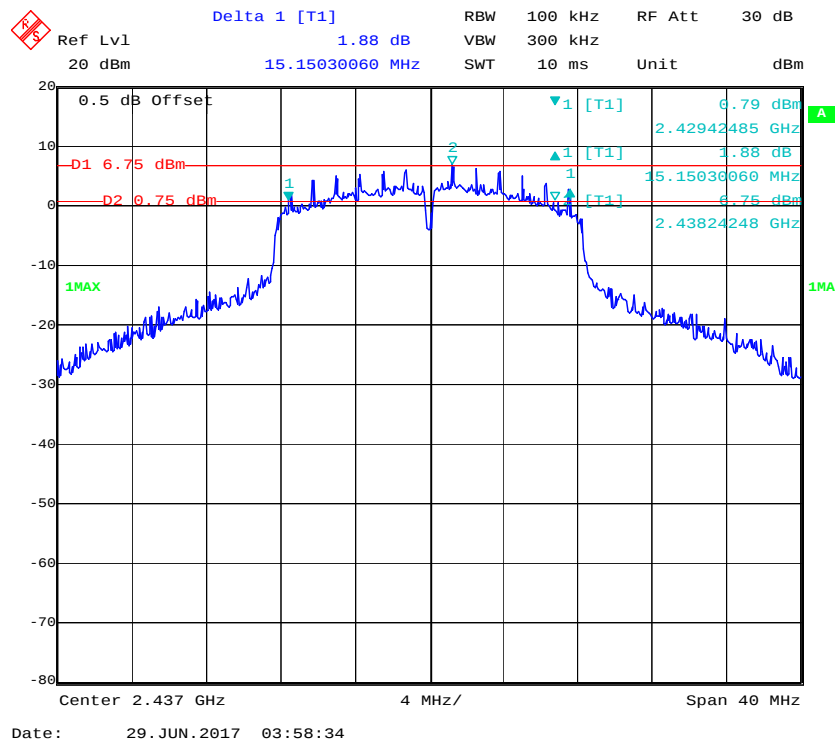
802.11b High Channel



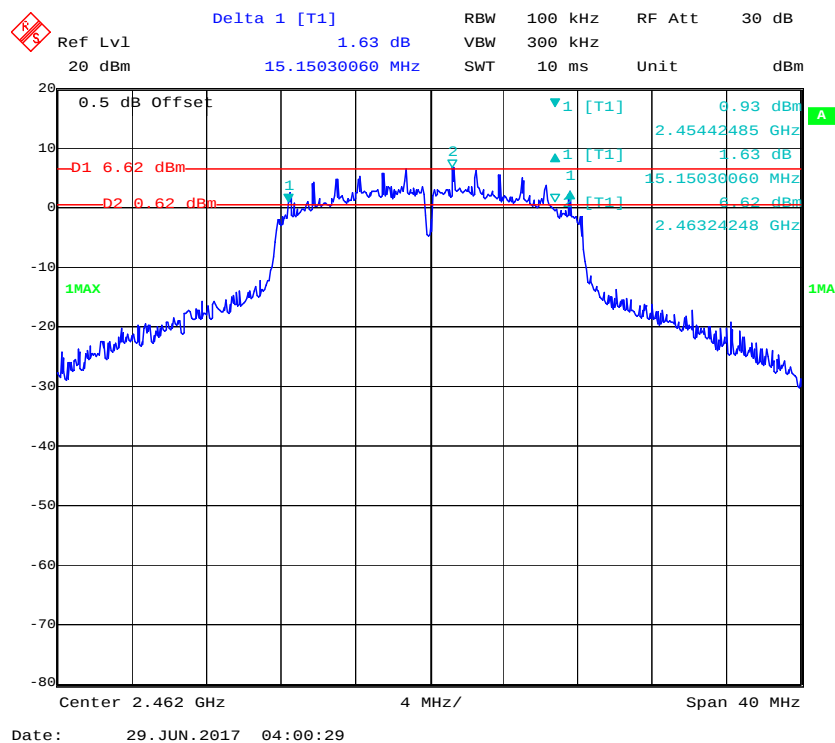
802.11g Low Channel



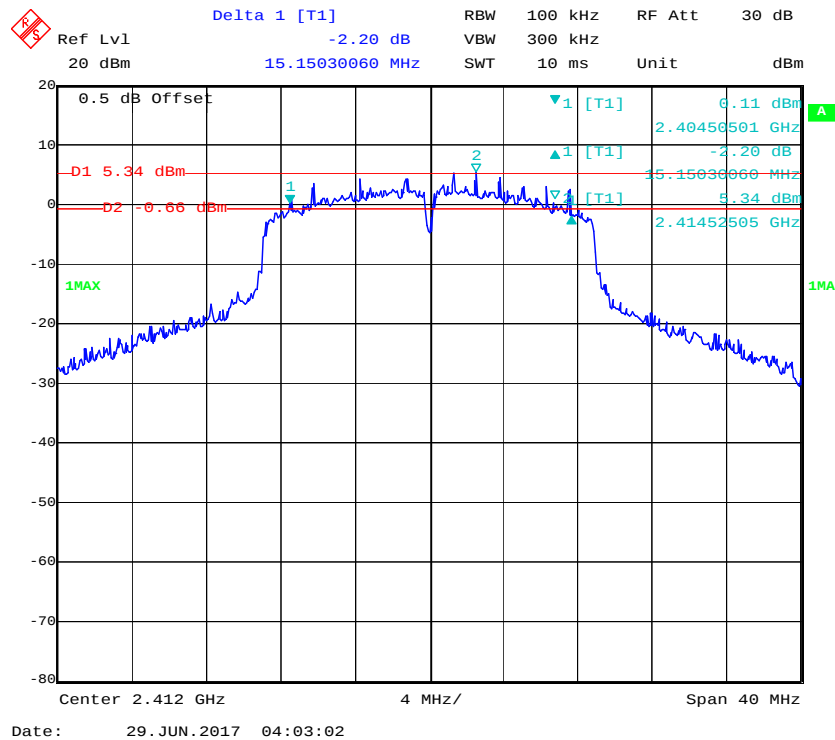
802.11g Middle Channel



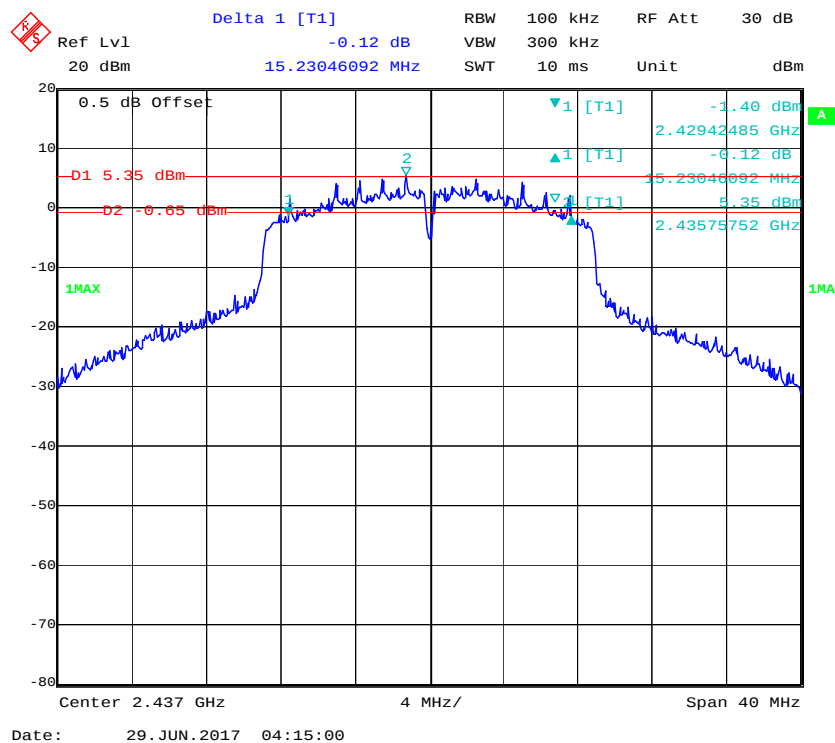
802.11g High Channel



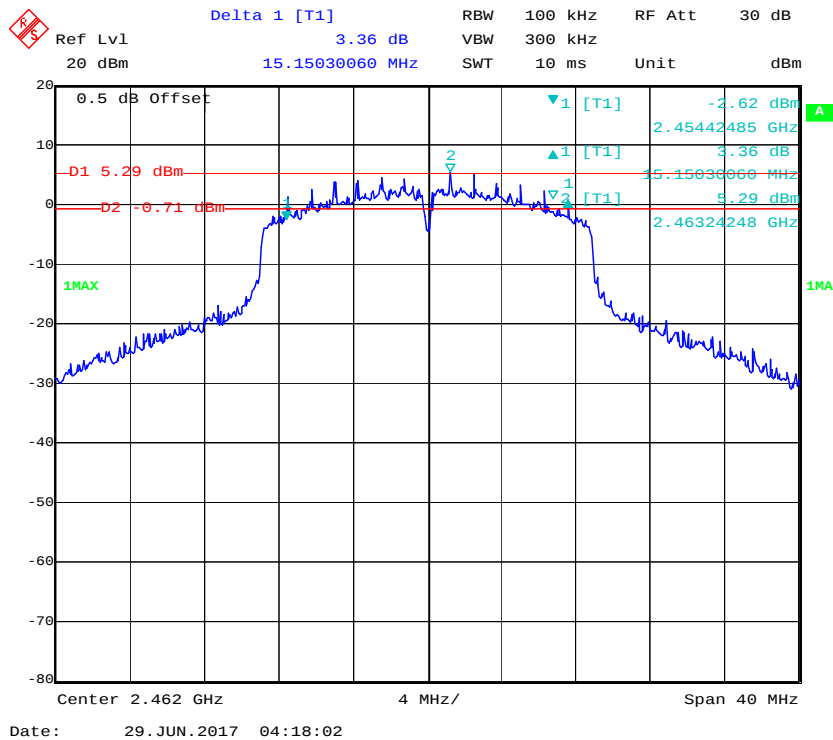
802.11n20 Low Channel



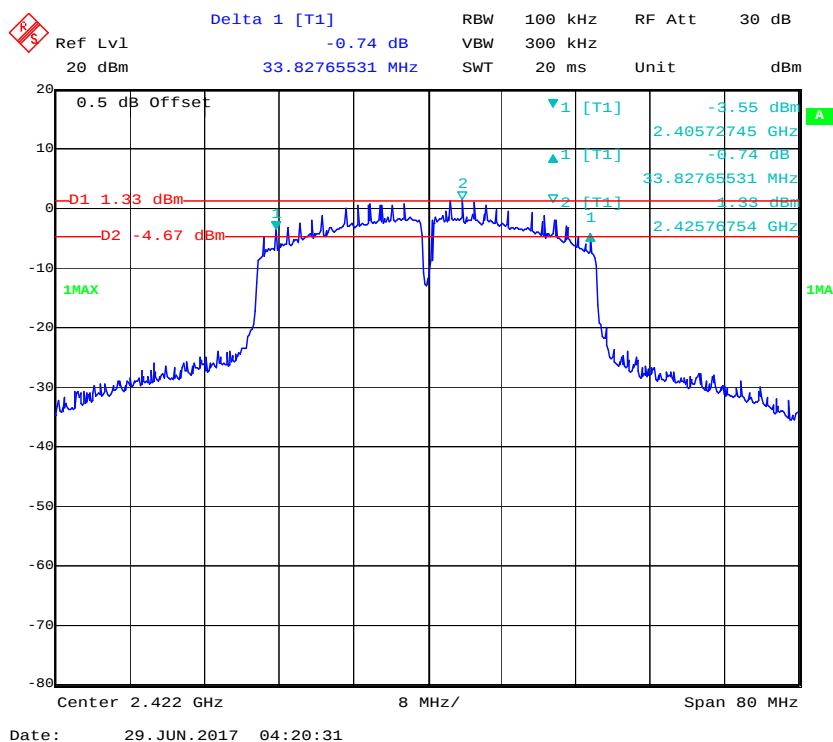
802.11n20 Middle Channel



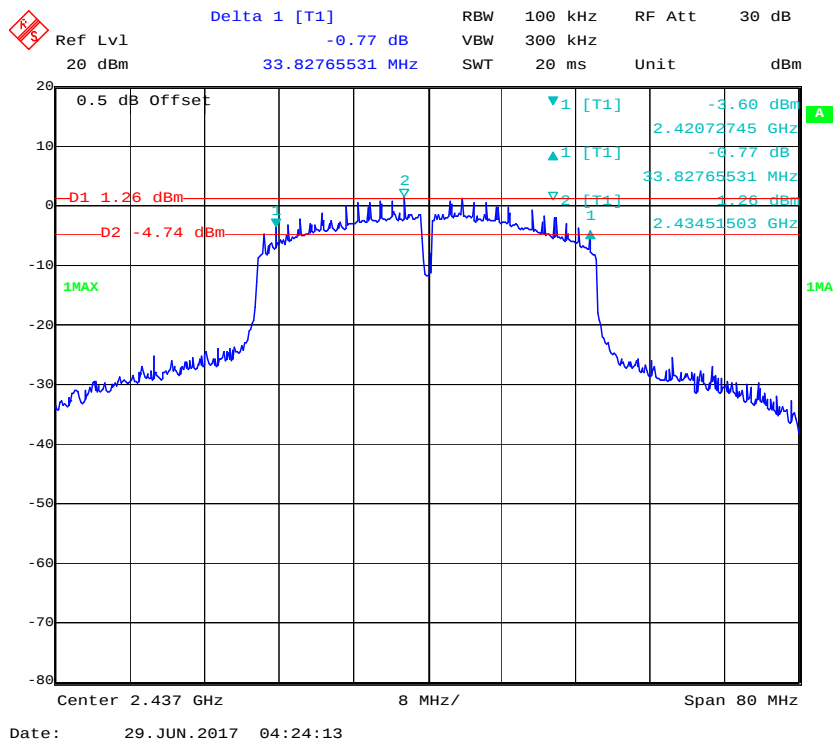
802.11n20 High Channel



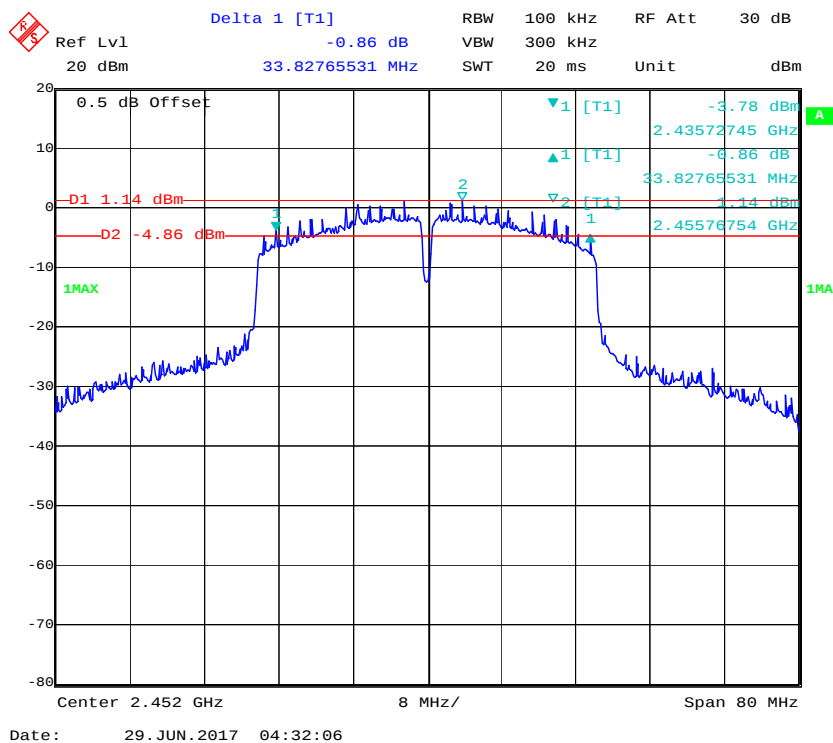
802.11n40 Low Channel



802.11n40 Middle Channel



802.11n40 High Channel



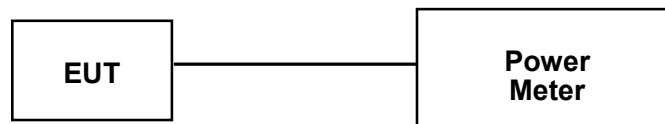
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54170074	2017-01-03	2018-01-02
Agilent	P-Series Power Meter	N1912A	MY5000798	2017-01-03	2018-01-02
Unknown	RF Cable	Unknown	C-2	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:	27.6 °C
Relative Humidity:	58 %
ATM Pressure:	100.1 kPa

* The testing was performed by Lorin Bian on 2017-06-29.

Test Mode: Transmitting

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

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Limit (dBm)
802.11b	Low	2412	18.81	30
	Middle	2437	18.87	30
	High	2462	18.71	30
802.11g	Low	2412	23.88	30
	Middle	2437	23.86	30
	High	2462	23.72	30
802.11n20	Low	2412	23.25	30
	Middle	2437	23.25	30
	High	2462	22.93	30
802.11n40	Low	2422	22.23	30
	Middle	2437	22.15	30
	High	2452	22.13	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 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 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-2	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

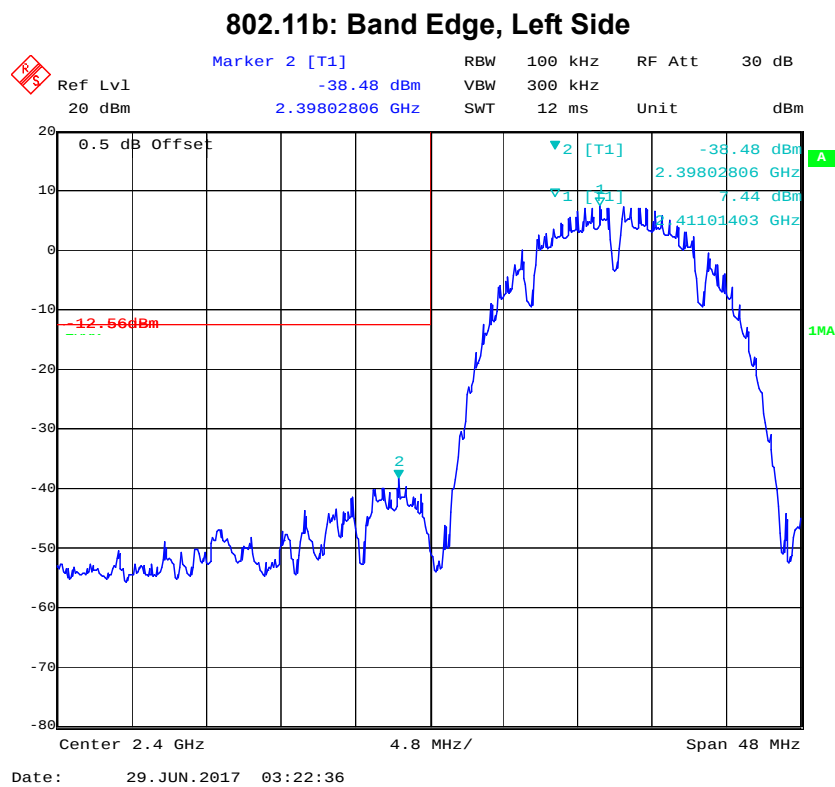
Environmental Conditions

Temperature:	27.6 °C
Relative Humidity:	58 %
ATM Pressure:	100.1 kPa

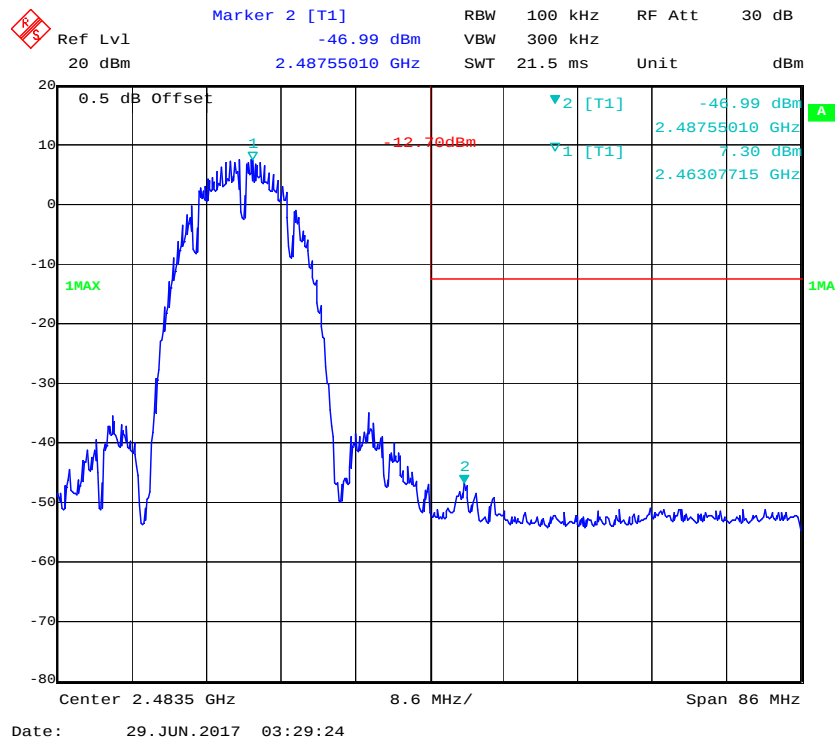
* The testing was performed by Lorin Bian on 2017-06-29.

Test mode: Transmitting

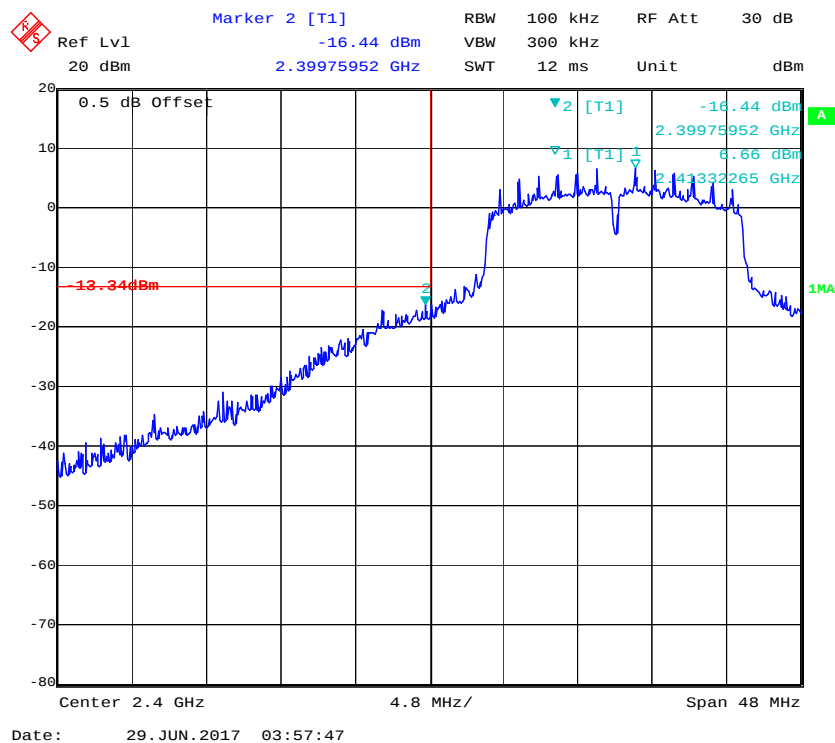
Test Result: Compliant. Please refer to following plots.



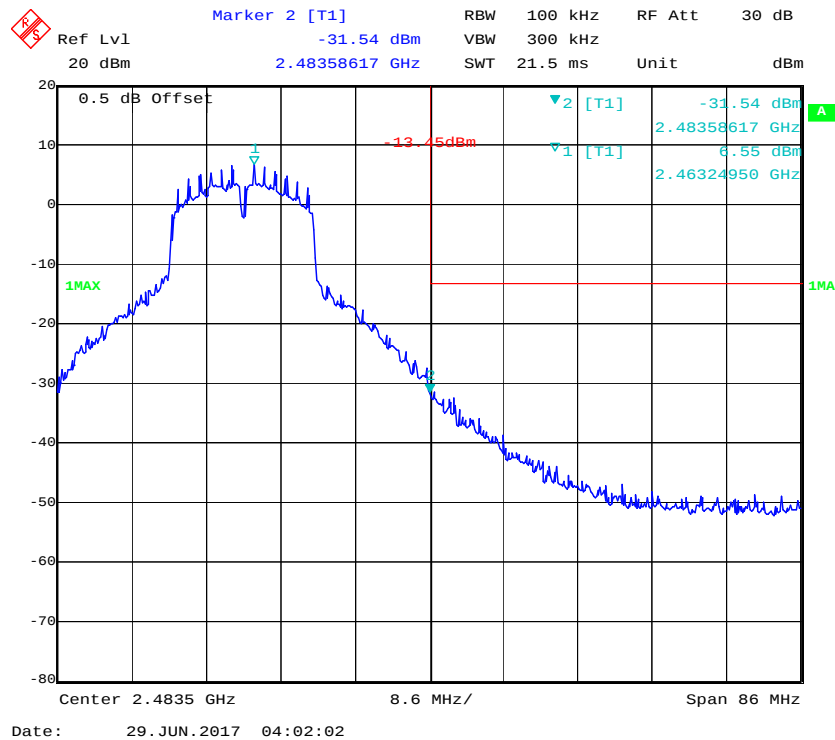
802.11b: Band Edge, Right Side



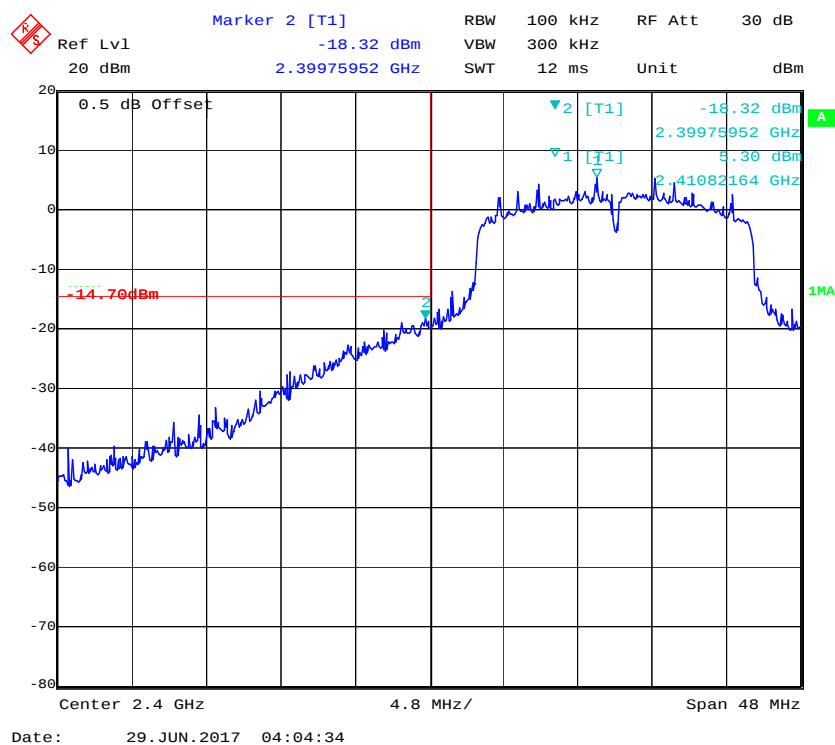
802.11g: Band Edge, Left Side



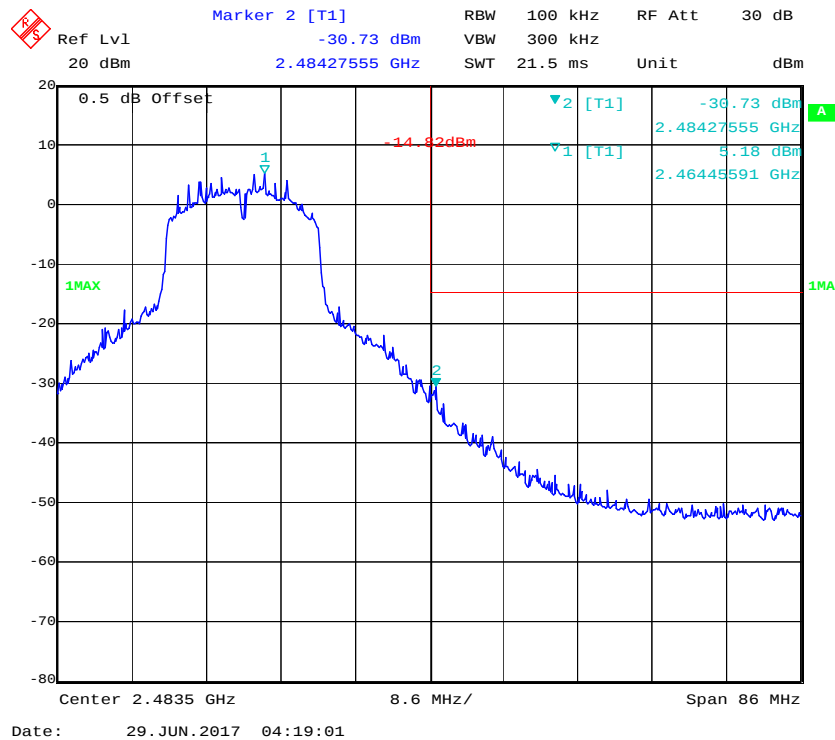
802.11g: Band Edge, Right Side



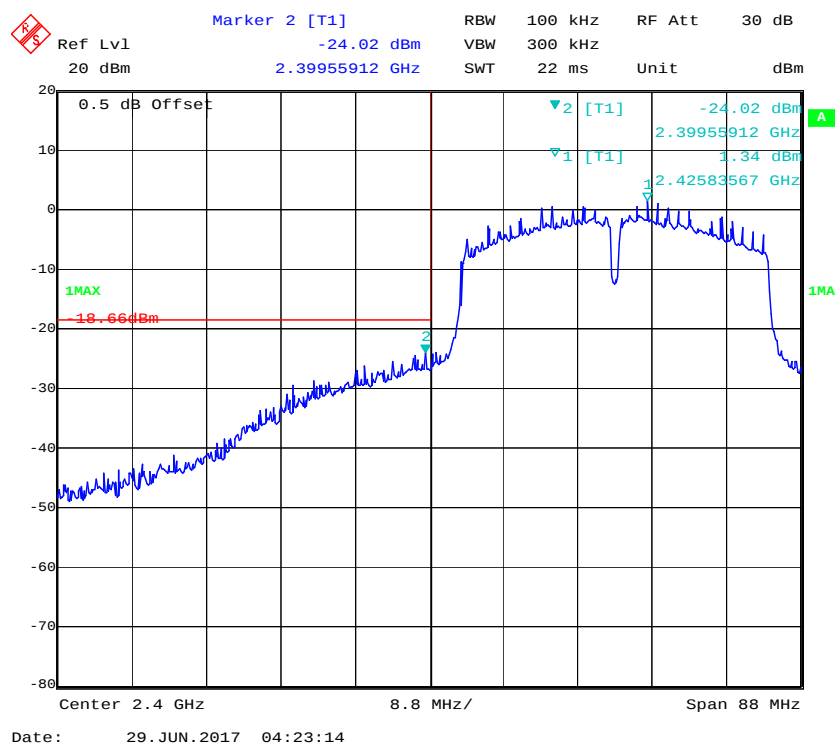
802.11n20: Band Edge, Left Side



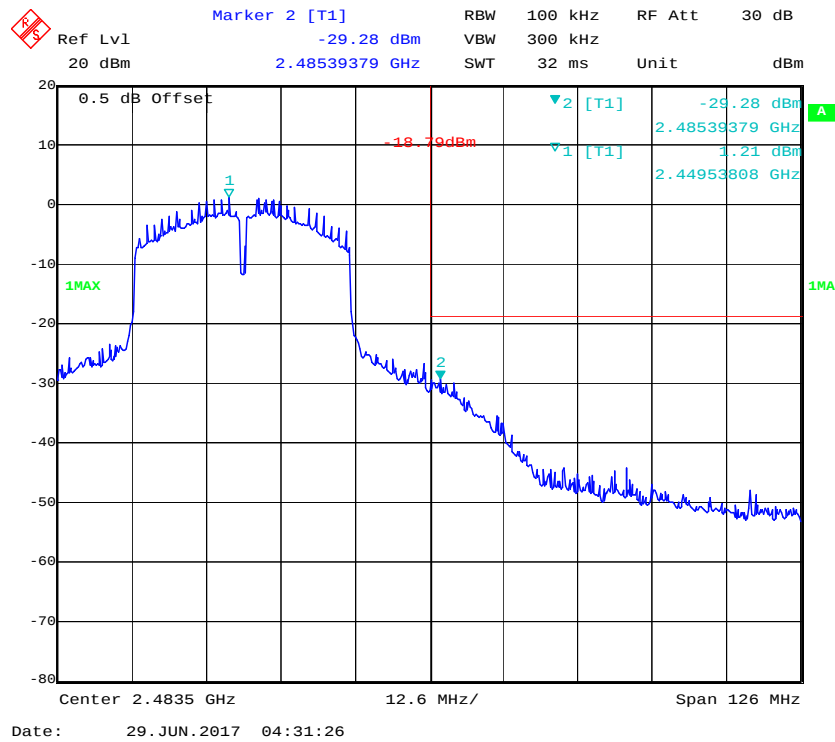
802.11n20: Band Edge, Right Side



802.11n40: Band Edge, Left Side



802.11n40: 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-2	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:	27.6 °C
Relative Humidity:	58 %
ATM Pressure:	100.1 kPa

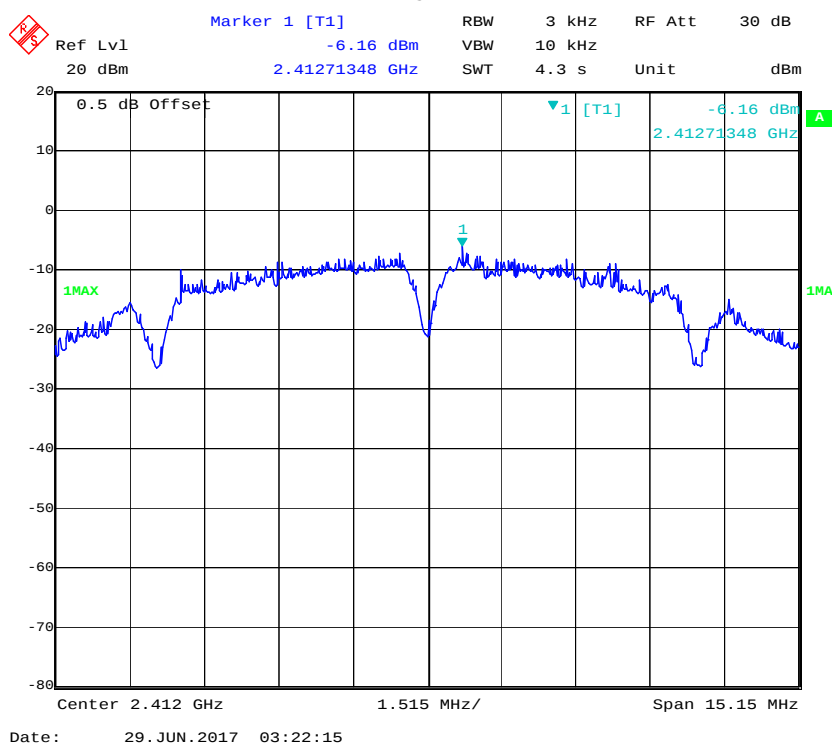
* The testing was performed by Lorin Bian on 2017-06-29.

Test Mode: Transmitting

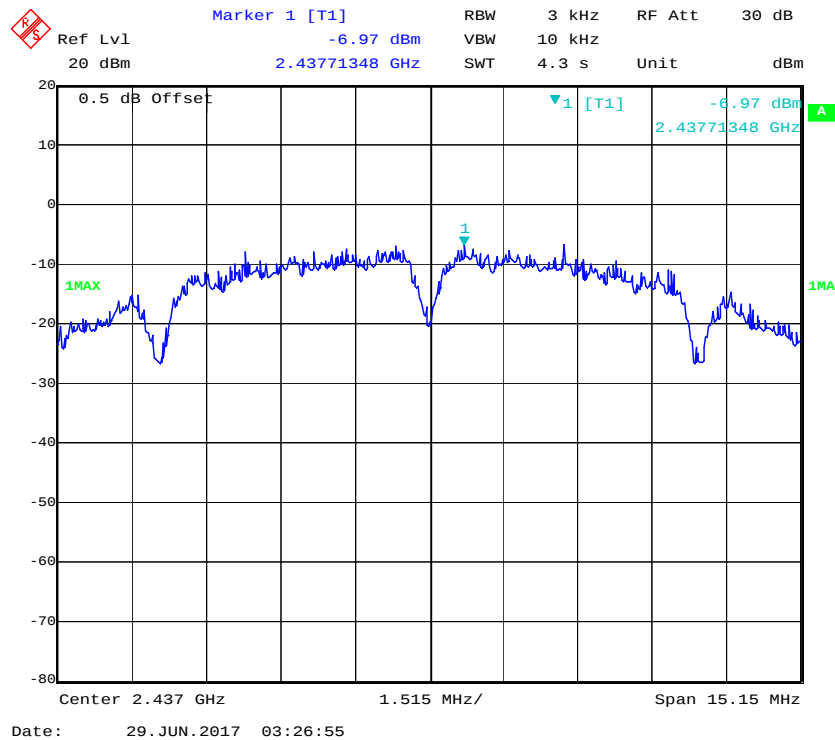
Test Result: Compliant. Please refer to the following table and plots

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-6.16	≤8
	Middle	2437	-6.97	≤8
	High	2462	-6.90	≤8
802.11g	Low	2412	-8.84	≤8
	Middle	2437	-9.06	≤8
	High	2462	-8.27	≤8
802.11n20	Low	2412	-8.72	≤8
	Middle	2437	-7.73	≤8
	High	2462	-9.80	≤8
802.11n40	Low	2422	-13.19	≤8
	Middle	2437	-13.53	≤8
	High	2452	-13.81	≤8

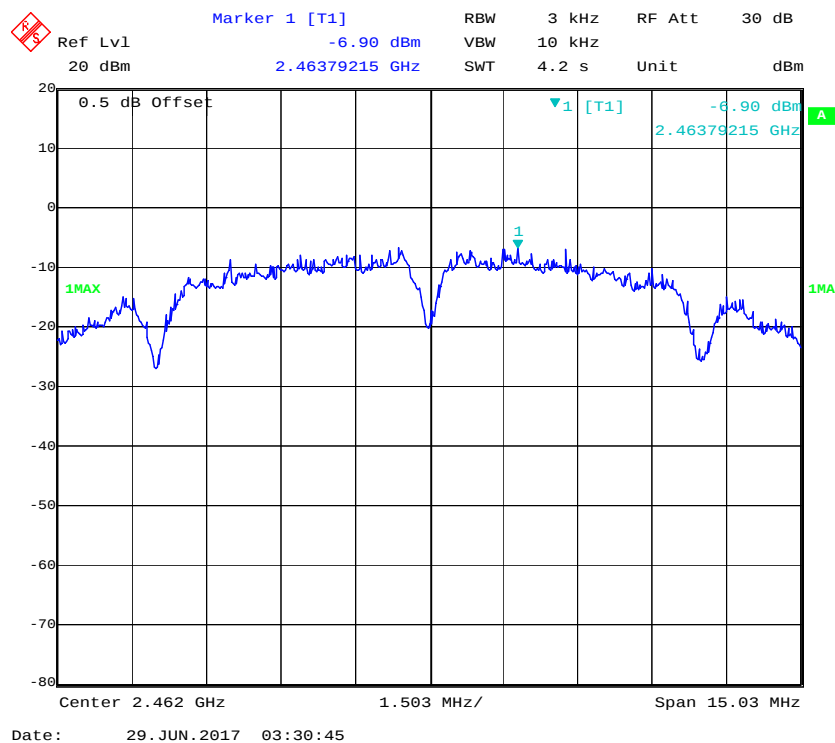
Power Spectral Density, 802.11b Low Channel



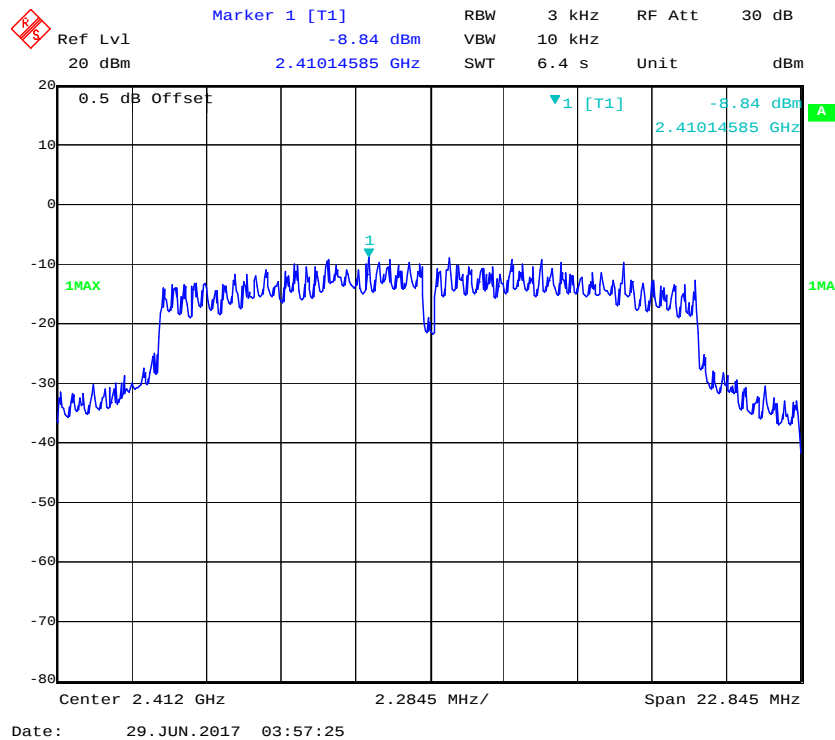
Power Spectral Density, 802.11b Middle Channel



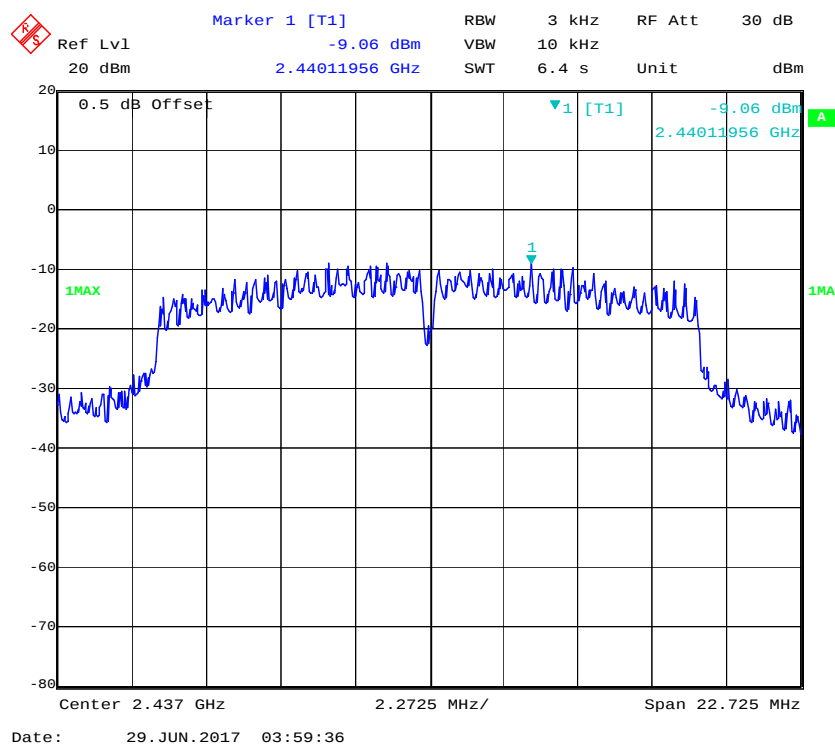
Power Spectral Density, 802.11b High Channel



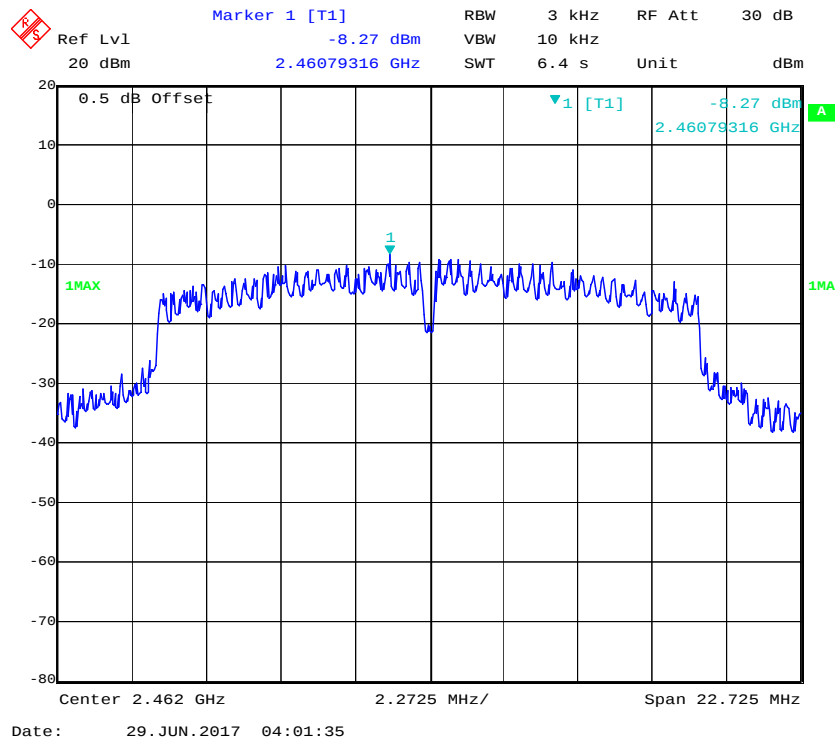
Power Spectral Density, 802.11g Low Channel



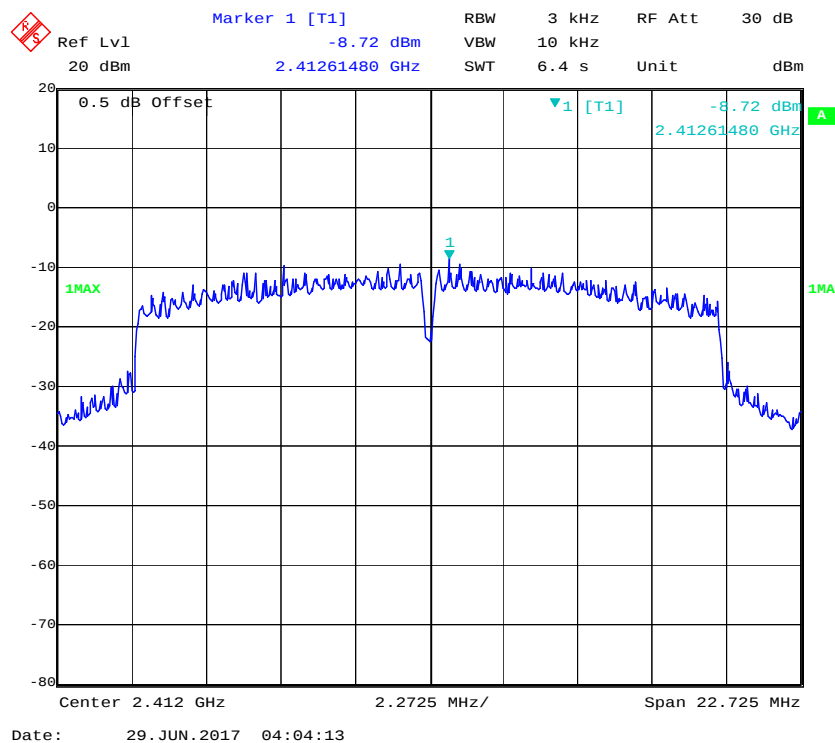
Power Spectral Density, 802.11g Middle Channel



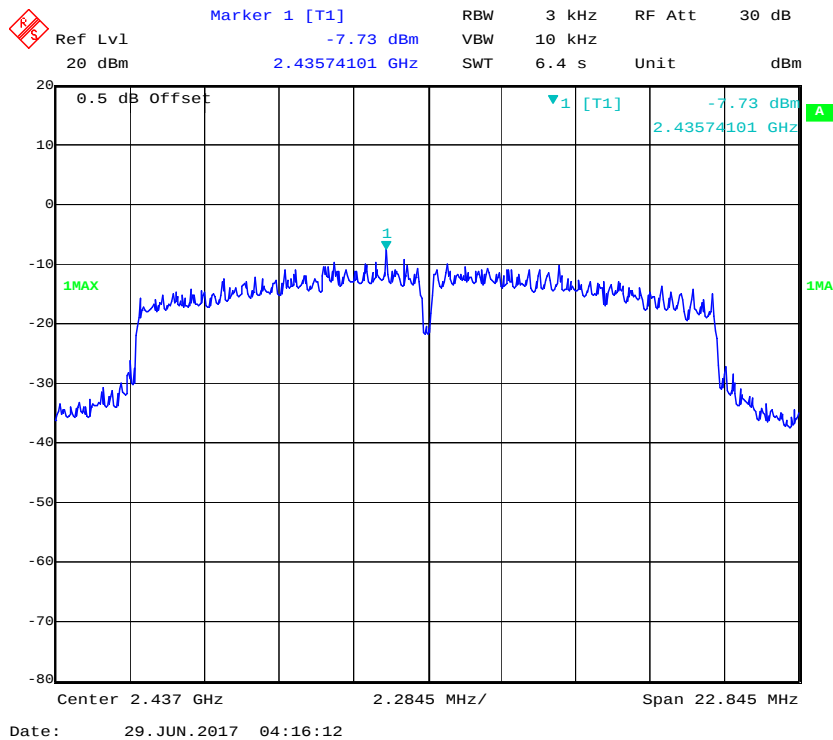
Power Spectral Density, 802.11g High Channel



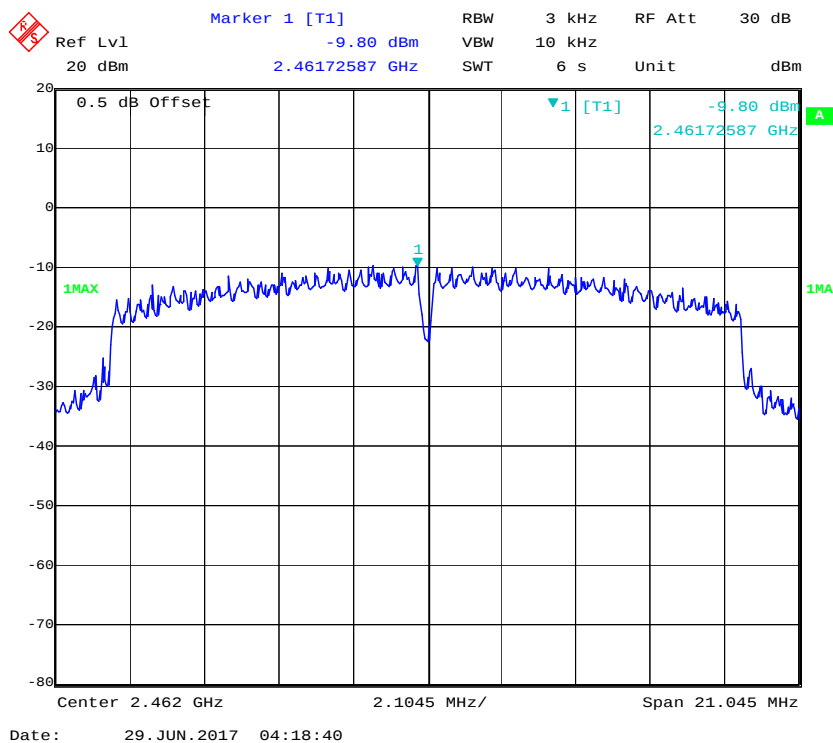
Power Spectral Density, 802.11n20 Low Channel



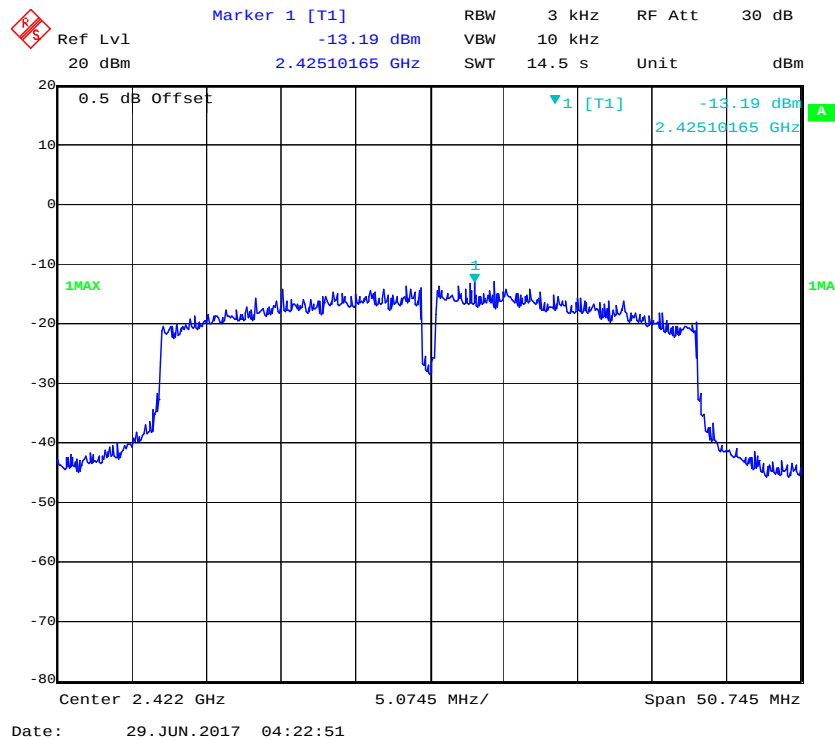
Power Spectral Density, 802.11n20 Middle Channel



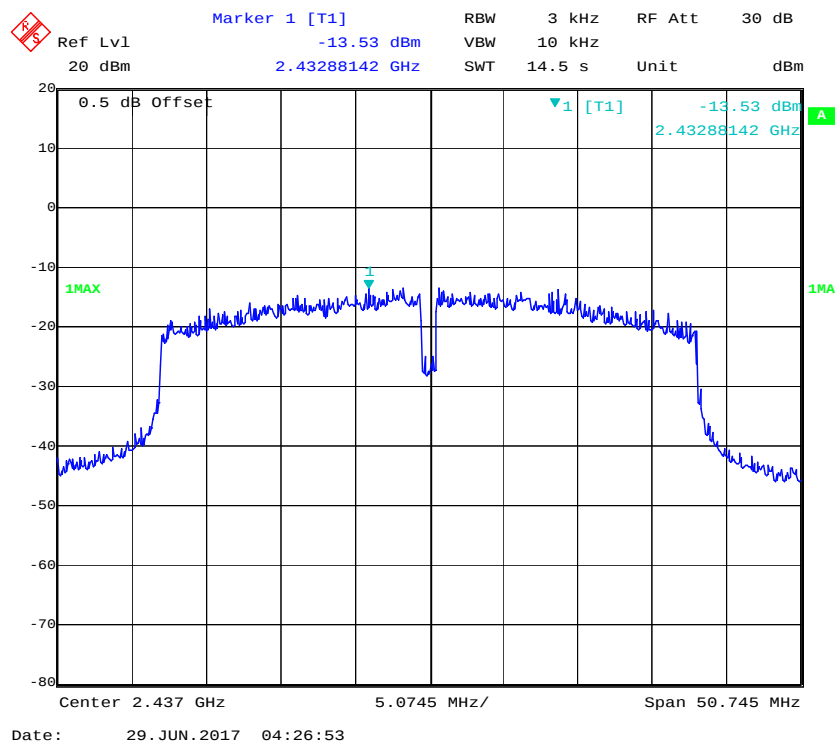
Power Spectral Density, 802.11n20 High Channel

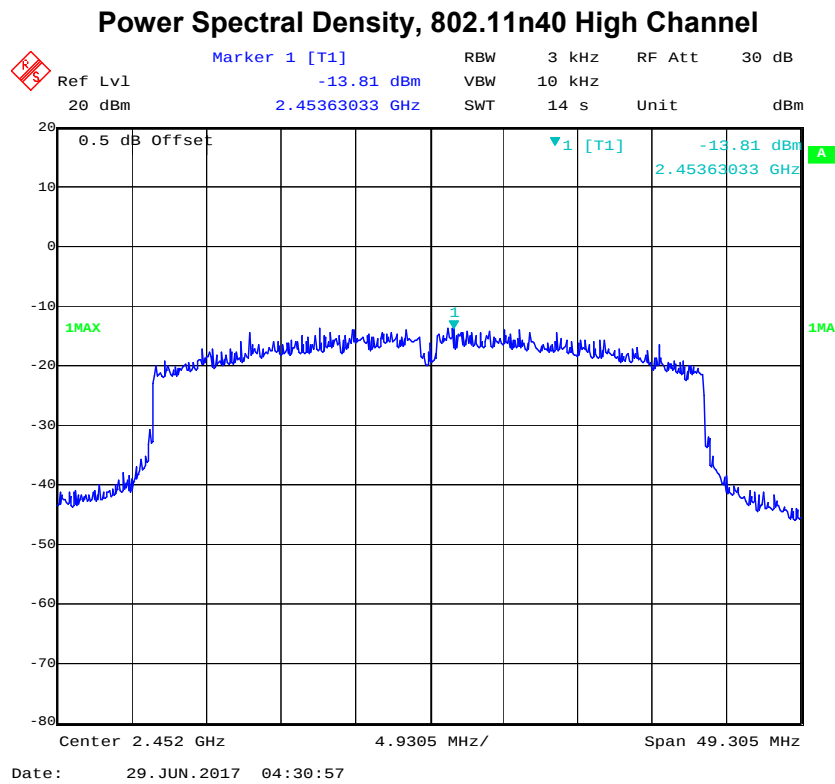


Power Spectral Density, 802.11n40 Low Channel



Power Spectral Density, 802.11n40 Middle Channel





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