



FCC PART 15.247 TEST REPORT

For

SZ DJI TECHNOLOGY CO., LTD

14th floor, West Wing, Skyworth Semiconductor Design Building NO.18 Gaoxin South 4th Ave,
Nanshan, Shenzhen, Guangdong, China

FCC ID: SS3-CS5501702

Report Type: Original Report	Product Name: CrystalSky(5.5 inch)
Test Engineer: <u>Kevin Hu</u>	<i>Kevin Hu</i>
Report Number: <u>RDG170212007B</u>	
Report Date: <u>2017-03-27</u>	
Reviewed By: <u>Henry Ding</u>	<i>Henry Ding</i>
Test Laboratory:	EMC Leader
Bay Area Compliance Laboratories Corp. (Chengdu) 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com	

Note: This test report was prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Chengdu). Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. This report was valid only with a valid digital signature.

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
MEASUREMENT UNCERTAINTY	4
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT EXERCISE SOFTWARE	6
EQUIPMENT MODIFICATIONS	8
BLOCK DIAGRAM OF TEST SETUP	9
SUMMARY OF TEST RESULTS	10
FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE	11
APPLICABLE STANDARD	11
TEST RESULT	11
FCC §15.203 - ANTENNA REQUIREMENT	12
APPLICABLE STANDARD	12
ANTENNA CONNECTOR CONSTRUCTION	12
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS	13
APPLICABLE STANDARD	13
MEASUREMENT UNCERTAINTY	13
EUT SETUP	14
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	14
TEST PROCEDURE	15
CORRECTED AMPLITUDE & MARGIN CALCULATION	15
TEST EQUIPMENT LIST AND DETAILS	16
TEST DATA	16
FCC §15.247(a) (2) – 6dB BANDWIDTH	23
APPLICABLE STANDARD	23
TEST PROCEDURE	23
TEST EQUIPMENT LIST AND DETAILS	23
TEST DATA	23
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER	30
APPLICABLE STANDARD	30
TEST PROCEDURE	30
TEST EQUIPMENT LIST AND DETAILS	30
TEST DATA	30
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	32
APPLICABLE STANDARD	32
TEST PROCEDURE	32
TEST EQUIPMENT LIST AND DETAILS	32
TEST DATA	33
FCC §15.247(e) - POWER SPECTRAL DENSITY	40

APPLICABLE STANDARD.....40

TEST PROCEDURE40

TEST EQUIPMENT LIST AND DETAILS40

TEST DATA40

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **SZ DJI TECHNOLOGY CO., LTD**'s product, model number: **CS550 (FCC ID: SS3-CS5501702)** (the "EUT") in this report was a **CrystalSky(5.5 inch)**, which was measured approximately: 15.4 cm (L) x 8.5 cm (W) x 4 cm(H), rated input voltage: DC7.6V from battery. The battery can remove from the EUT and charged by charger base.

**All measurement and test data in this report was gathered from final production sample, serial number: 170212007 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-02-12, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of **SZ DJI TECHNOLOGY CO., LTD** in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules

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

Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: SS3-CS5501702.

FCC Part 15E NII submissions with FCC ID: SS3-CS5501702.

Test Methodology

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

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

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.62dB
Power Spectral Density, conducted	±0.62 dB
Unwanted Emissions, radiated	30M~200MHz: 4.7 dB for Horizontal, 4.7 dB for Vertical 200M~1GHz: 6.0 dB for Horizontal, 6.0 for Vertical 1G~6GHz: 5.13 dB, 6G~18GHz: 5.47 dB
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.17 dB (150 kHz to 30 MHz)

Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, 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 Engineering Mode, which was provided by the manufacturer.

For 2.4GHz band, the device employed 802.11b/g/n ht20 modes.

For 802.11b, 802.11g, and 802.11n20 modes, 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	/	/

EUT Exercise Software

The software "DJI-RF Certification" 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.

For 802.11b/g/n mode, the maximum power was as below setting, the power setting was provided by the manufacturer:

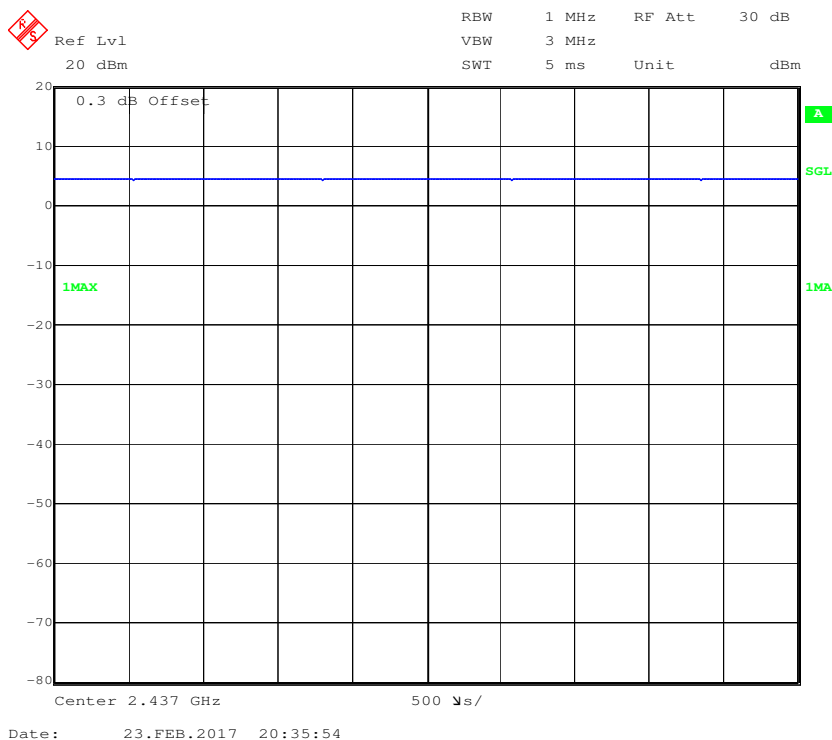
Antenna 0&1				
Test Mode	Test Software Version	DJI-RF Certification		
802.11b	Frequency (MHz)	2412	2417~2457	2462
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	7	10	7
802.11g	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	7	10	7
802.11n ht20	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	7	10	7

All test items performed at Low, Middle and High Channel, and according to the power test, the high channels for 802.11b/g/n was lower than other channels, 2457MHz was added for testing with output power and radiation bandedge test.

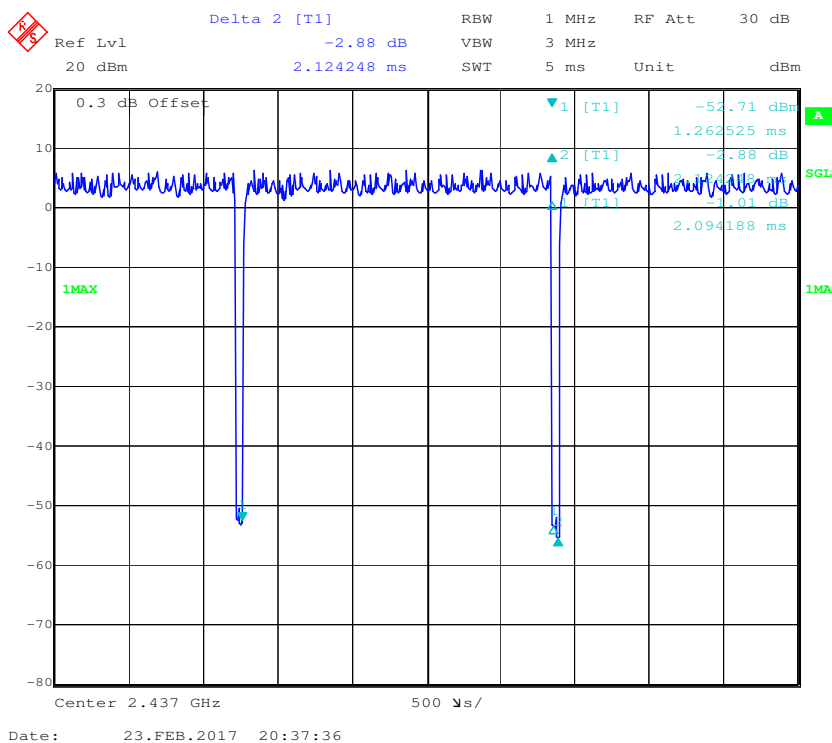
The software configured maximum duty cycle as below:

Mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
802.11b	5	5	100%
802.11g	2.09	2.12	99%
802.11n ht20	1.94	1.98	98%

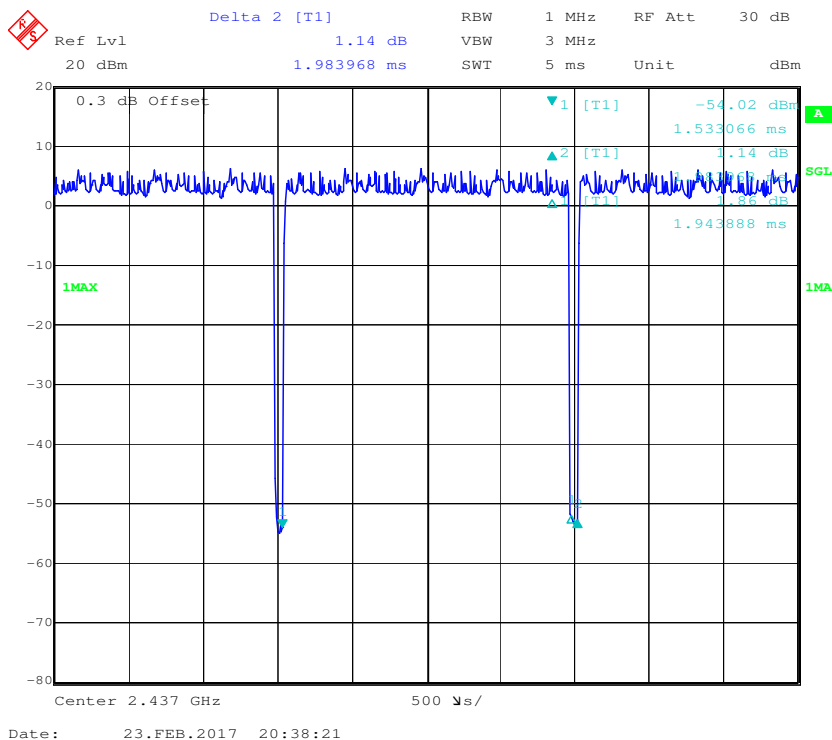
802.11b mode



802.11g mode



802.11n ht20 mode

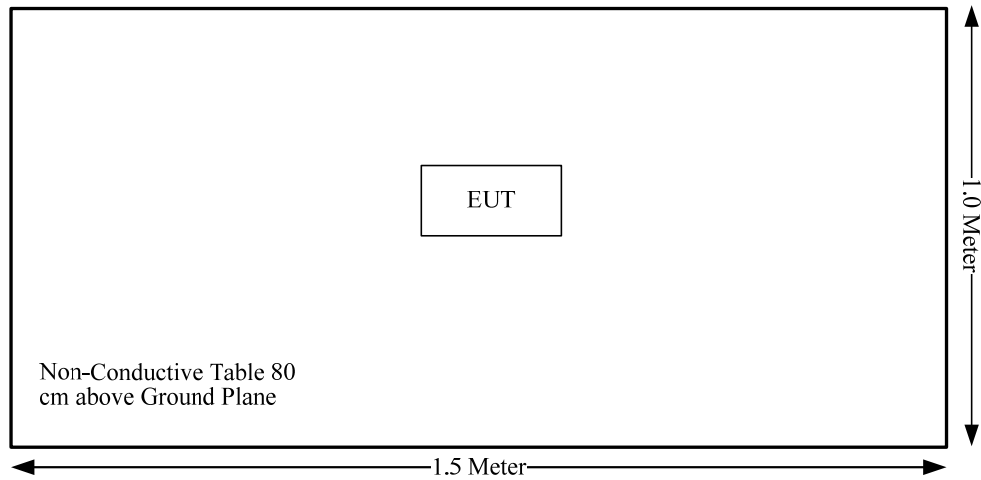


Equipment Modifications

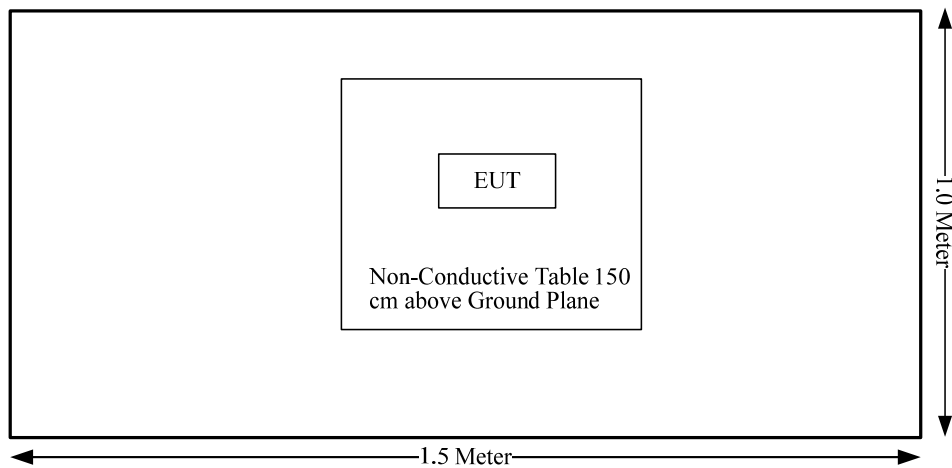
No modification was made to the EUT.

Block Diagram of Test Setup

Radiation test below 1GHz:



Radiation test above 1GHz:



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	Not Applicable
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

Not Applicable: the EUT was powered by battery.

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

Applicable Standard

According to §15.247(i), §1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG170212007-20A.

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.
- c. 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 2 internal antennas, the antenna gain of chain 0 are 2.2 dBi in 2.4GHz band, 2.5dBi in the 5150-5250MHz Band, 5.6 dBi in 5725-5850MHz band, the antenna gain of chain 1 are 2.0 dBi in 2.4GHz band, 4.3dBi in the 5150-5250MHz Band, 5.3 dBi in 5725-5850MHz band, that fulfill the requirement of the item. Please refer to the internal photos.

Result: Compliance.

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:

30M~200MHz: ±4.7 dB;

200M~1GHz: ±6.0 dB;

1G~6GHz: ±5.13dB;

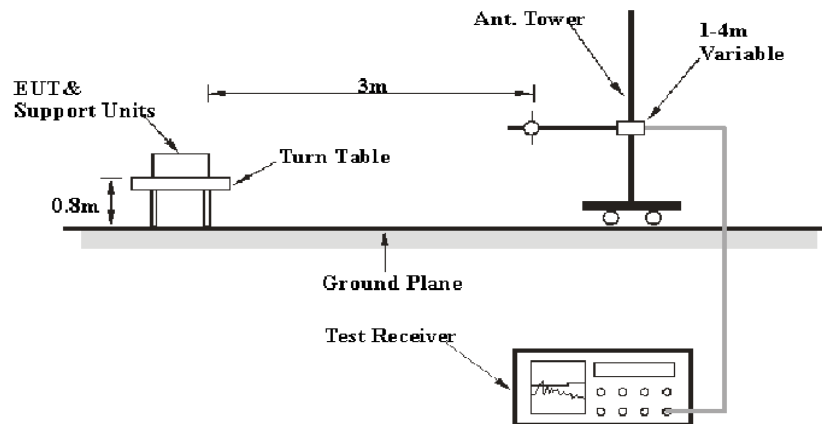
6G~25GHz: ±5.47 dB;

Table 2 – Values of U_{cisp}

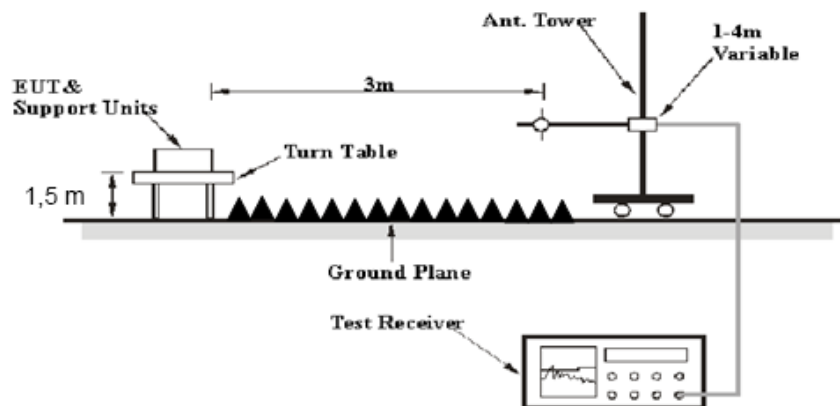
Measurement	U_{cisp}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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 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:

30MHz-1000MHz:

Detector	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

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

Note: T is minimum transmission duration

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:

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

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	A101808	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	1007726-0113028	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09

* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23.1 °C
Relative Humidity:	51 %
ATM Pressure:	97.2 kPa

The testing was performed by Kevin Hu on 2017-03-26.

Test Result: Compliance, please Refer to the following data

Test Mode: Transmitting

30MHz-25GHz:

802.11b Mode(2TX mode was the worst)

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	71.88	PK	H	23.50	3.00	0.00	98.38	N/A	N/A
2412	68.62	AV	H	23.50	3.00	0.00	95.12	N/A	N/A
2412	70.66	PK	V	23.50	3.00	0.00	97.16	N/A	N/A
2412	66.99	AV	V	23.50	3.00	0.00	93.49	N/A	N/A
2390	30.67	PK	H	23.57	3.00	0.00	57.24	74.00	16.76
2390	17.45	AV	H	23.57	3.00	0.00	44.02	54.00	9.98
4824	31.35	PK	H	30.84	5.11	26.87	40.43	74.00	33.57
4824	22.47	AV	H	30.84	5.11	26.87	31.55	54.00	22.45
7236	24	PK	H	34.77	6.18	26.36	38.59	74.00	35.41
7236	15.32	AV	H	34.77	6.18	26.36	29.91	54.00	24.09
2018	37.89	PK	H	24.84	3.05	26.82	38.96	74.00	35.04
2018	26.73	AV	H	24.84	3.05	26.82	27.80	54.00	26.20
76.56	45.5	QP	H	7.83	0.46	28.41	25.38	40.00	14.62
516.94	35.4	QP	H	18.27	1.65	28.82	26.50	46.00	19.50
Middle Channel: 2437 MHz									
2437	72.3	PK	H	23.41	3.00	0.00	98.71	N/A	N/A
2437	69.21	AV	H	23.41	3.00	0.00	95.62	N/A	N/A
2437	71.15	PK	V	23.41	3.00	0.00	97.56	N/A	N/A
2437	67.04	AV	V	23.41	3.00	0.00	93.45	N/A	N/A
4874	30.96	PK	H	31.00	5.09	26.87	40.18	74.00	33.82
4874	22.2	AV	H	31.00	5.09	26.87	31.42	54.00	22.58
7311	23.92	PK	H	34.92	6.21	26.40	38.65	74.00	35.35
7311	15.19	AV	H	34.92	6.21	26.40	29.92	54.00	24.08
2054	37.88	PK	H	24.72	3.04	26.83	38.81	74.00	35.19
2054	26.82	AV	H	24.72	3.04	26.83	27.75	54.00	26.25
3167	31.85	PK	H	25.14	3.68	26.47	34.20	74.00	39.80
3167	20.77	AV	H	25.14	3.68	26.47	23.12	54.00	30.88
76.56	45.5	QP	H	7.83	0.46	28.41	25.38	40.00	14.62
516.94	35.2	QP	H	18.27	1.65	28.82	26.30	46.00	19.70
High Channel: 2462 MHz									
2462	71.83	PK	H	23.33	2.99	0.00	98.15	N/A	N/A
2462	68.41	AV	H	23.33	2.99	0.00	94.73	N/A	N/A
2462	70.62	PK	V	23.33	2.99	0.00	96.94	N/A	N/A
2462	67.53	AV	V	23.33	2.99	0.00	93.85	N/A	N/A
2483.5	30.87	PK	H	23.26	2.99	0.00	57.12	74.00	16.88
2483.5	17.98	AV	H	23.26	2.99	0.00	44.23	54.00	9.77
4924	31.33	PK	H	31.16	5.07	26.88	40.68	74.00	33.32
4924	22.21	AV	H	31.16	5.07	26.88	31.56	54.00	22.44
7386	22.87	PK	H	35.07	6.25	26.43	37.76	74.00	36.24
7386	14.15	AV	H	35.07	6.25	26.43	29.04	54.00	24.96
2098	38.89	PK	H	24.57	3.04	26.83	39.67	74.00	34.33
2098	27.45	AV	H	24.57	3.04	26.83	28.23	54.00	25.77
76.56	45.3	QP	H	7.83	0.46	28.41	25.18	40.00	14.82
516.94	35	QP	H	18.27	1.65	28.82	26.10	46.00	19.90
2462	71.83	PK	H	23.33	2.99	0.00	98.15	N/A	N/A
2462	68.41	AV	H	23.33	2.99	0.00	94.73	N/A	N/A

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)					
Additional Channel: 2457MHz									
2457	72.02	PK	H	23.35	3.00	0.00	98.37	N/A	N/A
2457	68.31	AV	H	23.35	3.00	0.00	94.66	N/A	N/A
2483.5	30.64	PK	H	23.26	2.99	0.00	56.89	74.00	17.11
2483.5	17.71	AV	H	23.26	2.99	0.00	43.96	54.00	10.04

802.11g Mode(2TX mode was the worst)

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	74.92	PK	H	23.50	3.00	0.00	101.42	N/A	N/A
2412	64	AV	H	23.50	3.00	0.00	90.50	N/A	N/A
2412	73.18	PK	V	23.50	3.00	0.00	99.68	N/A	N/A
2412	62.43	AV	V	23.50	3.00	0.00	88.93	N/A	N/A
2390	32.32	PK	H	23.57	3.00	0.00	58.89	74.00	15.11
2390	18.83	AV	H	23.57	3.00	0.00	45.40	54.00	8.60
4824	28.29	PK	H	30.84	5.11	26.87	37.37	74.00	36.63
4824	17.66	AV	H	30.84	5.11	26.87	26.74	54.00	27.26
7236	23.44	PK	H	34.77	6.18	26.36	38.03	74.00	35.97
7236	12.56	AV	H	34.77	6.18	26.36	27.15	54.00	26.85
2018	37.63	PK	H	24.84	3.05	26.82	38.70	74.00	35.30
2018	27.05	AV	H	24.84	3.05	26.82	28.12	54.00	25.88
76.56	45.7	QP	H	7.83	0.46	28.41	25.58	40.00	14.42
516.94	35.1	QP	H	18.27	1.65	28.82	26.20	46.00	19.80
Middle Channel: 2437 MHz									
2437	74.71	PK	H	23.41	3.00	0.00	101.12	N/A	N/A
2437	63.85	AV	H	23.41	3.00	0.00	90.26	N/A	N/A
2437	73.33	PK	V	23.41	3.00	0.00	99.74	N/A	N/A
2437	62.5	AV	V	23.41	3.00	0.00	88.91	N/A	N/A
4874	27.8	PK	H	31.00	5.09	26.87	37.02	74.00	36.98
4874	17.41	AV	H	31.00	5.09	26.87	26.63	54.00	27.37
7311	23.1	PK	H	34.92	6.21	26.40	37.83	74.00	36.17
7311	12.32	AV	H	34.92	6.21	26.40	27.05	54.00	26.95
2054	37.66	PK	H	24.72	3.04	26.83	38.59	74.00	35.41
2054	27.07	AV	H	24.72	3.04	26.83	28.00	54.00	26.00
3167	32.08	PK	H	25.14	3.68	26.47	34.43	74.00	39.57
3167	20.64	AV	H	25.14	3.68	26.47	22.99	54.00	31.01
76.56	45.6	QP	H	7.83	0.46	28.41	25.48	40.00	14.52
516.94	35	QP	H	18.27	1.65	28.82	26.10	46.00	19.90
High Channel: 2462 MHz									
2462	75.44	PK	H	23.33	2.99	0.00	101.76	N/A	N/A
2462	64.21	AV	H	23.33	2.99	0.00	90.53	N/A	N/A
2462	73.03	PK	V	23.33	2.99	0.00	99.35	N/A	N/A
2462	62.45	AV	V	23.33	2.99	0.00	88.77	N/A	N/A
2483.5	32.4	PK	H	23.26	2.99	0.00	58.65	74.00	15.35
2483.5	19.64	AV	H	23.26	2.99	0.00	45.89	54.00	8.11
4924	28.05	PK	H	31.16	5.07	26.88	37.40	74.00	36.60
4924	16.73	AV	H	31.16	5.07	26.88	26.08	54.00	27.92
7386	23.64	PK	H	35.07	6.25	26.43	38.53	74.00	35.47
7386	12.95	AV	H	35.07	6.25	26.43	27.84	54.00	26.16
2098	38.61	PK	H	24.57	3.04	26.83	39.39	74.00	34.61
2098	28.45	AV	H	24.57	3.04	26.83	29.23	54.00	24.77
76.56	45.3	QP	H	7.83	0.46	28.41	25.18	40.00	14.82
516.94	35.1	QP	H	18.27	1.65	28.82	26.20	46.00	19.80
2462	75.44	PK	H	23.33	2.99	0.00	101.76	N/A	N/A
2462	64.21	AV	H	23.33	2.99	0.00	90.53	N/A	N/A

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)					
Additional Channel: 2457 MHz									
2457	75.49	PK	H	23.35	3.00	0.00	101.84	N/A	N/A
2457	64.12	AV	H	23.35	3.00	0.00	90.47	N/A	N/A
2483.5	32.5	PK	H	23.26	2.99	0.00	58.75	74.00	15.25
2483.5	19.06	AV	H	23.26	2.99	0.00	45.31	54.00	8.69

802.11 n ht20 Mode(2TX mode was the worst)

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	75.58	PK	H	23.50	3.00	0.00	102.08	N/A	N/A
2412	63.77	AV	H	23.50	3.00	0.00	90.27	N/A	N/A
2412	73.5	PK	V	23.50	3.00	0.00	100.00	N/A	N/A
2412	62.96	AV	V	23.50	3.00	0.00	89.46	N/A	N/A
2390	36.42	PK	H	23.57	3.00	0.00	62.99	74.00	11.01
2390	22.54	AV	H	23.57	3.00	0.00	49.11	54.00	4.89
4824	27.99	PK	H	30.84	5.11	26.87	37.07	74.00	36.93
4824	17.11	AV	H	30.84	5.11	26.87	26.19	54.00	27.81
7236	23.52	PK	H	34.77	6.18	26.36	38.11	74.00	35.89
7236	12.27	AV	H	34.77	6.18	26.36	26.86	54.00	27.14
2018	37.31	PK	H	24.84	3.05	26.82	38.38	74.00	35.62
2018	27.57	AV	H	24.84	3.05	26.82	28.64	54.00	25.36
76.56	45.6	QP	H	7.83	0.46	28.41	25.48	40.00	14.52
516.94	35.1	QP	H	18.27	1.65	28.82	26.20	46.00	19.80
Middle Channel: 2437 MHz									
2437	75.12	PK	H	23.41	3.00	0.00	101.53	N/A	N/A
2437	64.28	AV	H	23.41	3.00	0.00	90.69	N/A	N/A
2437	73.49	PK	V	23.41	3.00	0.00	99.90	N/A	N/A
2437	62.31	AV	V	23.41	3.00	0.00	88.72	N/A	N/A
4874	27.54	PK	H	31.00	5.09	26.87	36.76	74.00	37.24
4874	8.47	AV	H	31.00	5.09	26.87	17.69	54.00	36.31
7311	23.07	PK	H	34.92	6.21	26.40	37.80	74.00	36.20
7311	12.29	AV	H	34.92	6.21	26.40	27.02	54.00	26.98
2054	38.07	PK	H	24.72	3.04	26.83	39.00	74.00	35.00
2054	26.96	AV	H	24.72	3.04	26.83	27.89	54.00	26.11
3167	32.2	PK	H	25.14	3.68	26.47	34.55	74.00	39.45
3167	21.38	AV	H	25.14	3.68	26.47	23.73	54.00	30.27
76.56	45.7	QP	H	7.83	0.46	28.41	25.58	40.00	14.42
516.94	34.9	QP	H	18.27	1.65	28.82	26.00	46.00	20.00
High Channel: 2462 MHz									
2462	75.45	PK	H	23.33	2.99	0.00	101.77	N/A	N/A
2462	64.03	AV	H	23.33	2.99	0.00	90.35	N/A	N/A
2462	73.26	PK	V	23.33	2.99	0.00	99.58	N/A	N/A
2462	62.51	AV	V	23.33	2.99	0.00	88.83	N/A	N/A
2483.5	33.44	PK	H	23.26	2.99	0.00	59.69	74.00	14.31
2483.5	21.13	AV	H	23.26	2.99	0.00	47.38	54.00	6.62
4924	26.37	PK	H	31.16	5.07	26.88	35.72	74.00	38.28
4924	15.18	AV	H	31.16	5.07	26.88	24.53	54.00	29.47
7386	23.88	PK	H	35.07	6.25	26.43	38.77	74.00	35.23
7386	13.34	AV	H	35.07	6.25	26.43	28.23	54.00	25.77
2098	38.14	PK	H	24.57	3.04	26.83	38.92	74.00	35.08
2098	26.63	AV	H	24.57	3.04	26.83	27.41	54.00	26.59
76.56	45.8	QP	H	7.83	0.46	28.41	25.68	40.00	14.32
516.94	35.1	QP	H	18.27	1.65	28.82	26.20	46.00	19.80
2462	75.45	PK	H	23.33	2.99	0.00	101.77	N/A	N/A
2462	64.03	AV	H	23.33	2.99	0.00	90.35	N/A	N/A

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)					
Additional Channel: 2457 MHz									
2457	75.87	PK	H	23.35	3.00	0.00	102.22	N/A	N/A
2457	63.94	AV	H	23.35	3.00	0.00	90.29	N/A	N/A
2483.5	33.6	PK	H	23.26	2.99	0.00	59.85	74.00	14.15
2483.5	21.22	AV	H	23.26	2.99	0.00	47.47	54.00	6.53

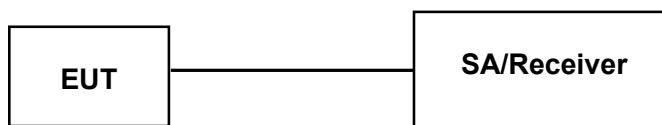
FCC §15.247(a) (2) – 6dB BANDWIDTH

Applicable Standard

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

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test 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
N/A	RF Cable	N/A	N/A	Each Time	/

* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26.4 °C
Relative Humidity:	38 %
ATM Pressure:	95.6kPa

The testing was performed by Kevin Hu on 2017-02-22.

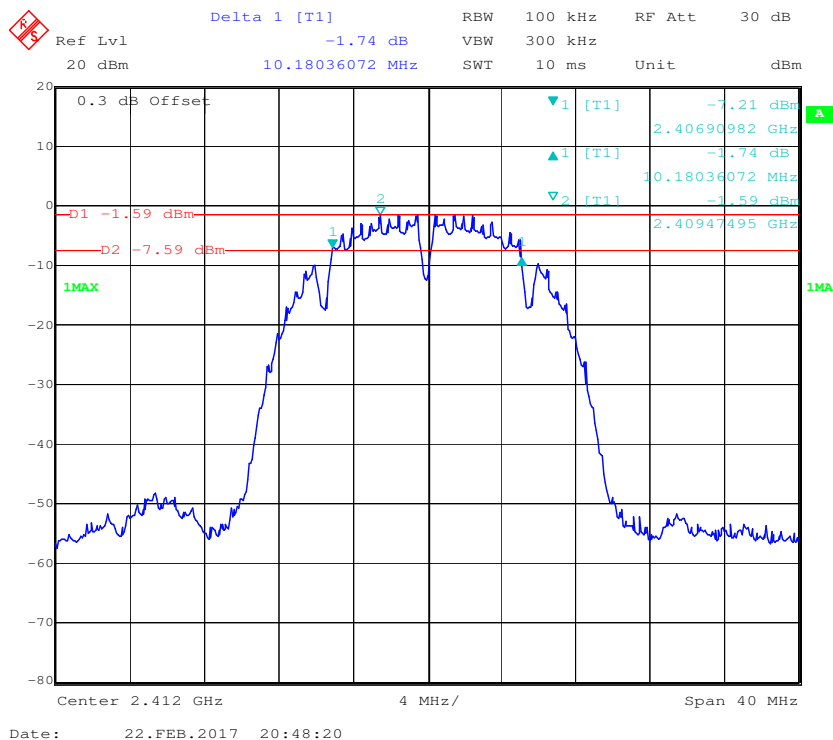
Test Result: Compliance.

Please refer to the following tables and plots.

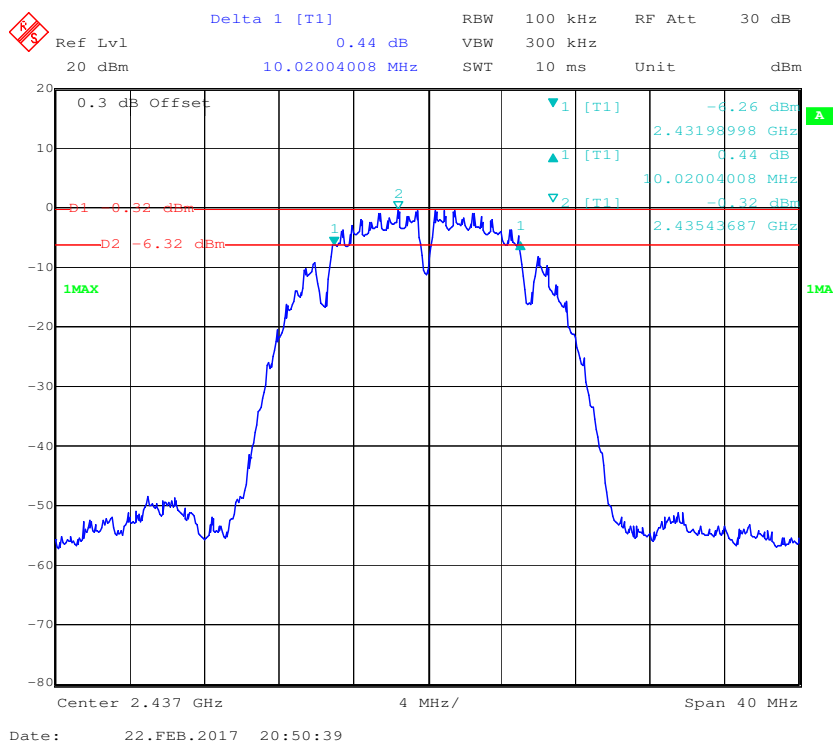
Test Mode: Transmitting (Test performed at Chain 0)

Test mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.18	≥0.5
	Middle	2437	10.02	≥0.5
	High	2462	10.1	≥0.5
802.11g	Low	2412	16.43	≥0.5
	Middle	2437	16.43	≥0.5
	High	2462	16.43	≥0.5
802.11n20	Low	2412	17.47	≥0.5
	Middle	2437	17.64	≥0.5
	High	2462	17.64	≥0.5

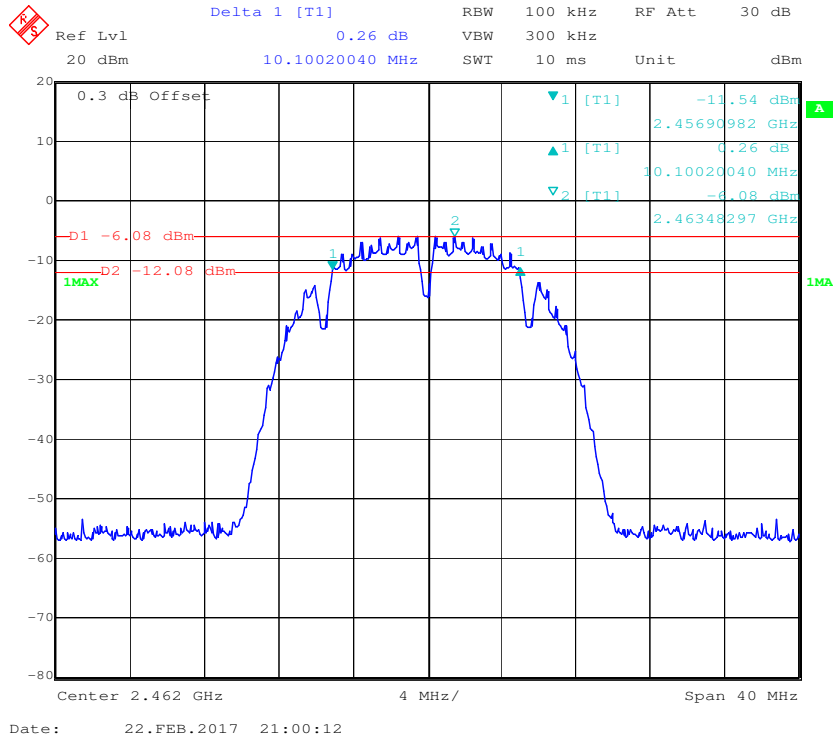
802.11b Low Channel



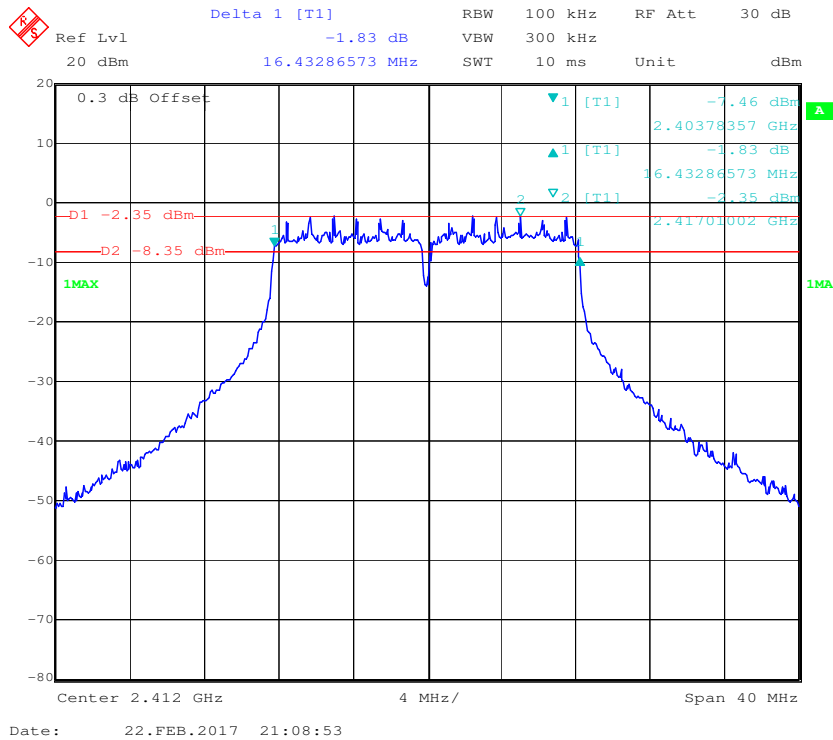
802.11b Middle Channel



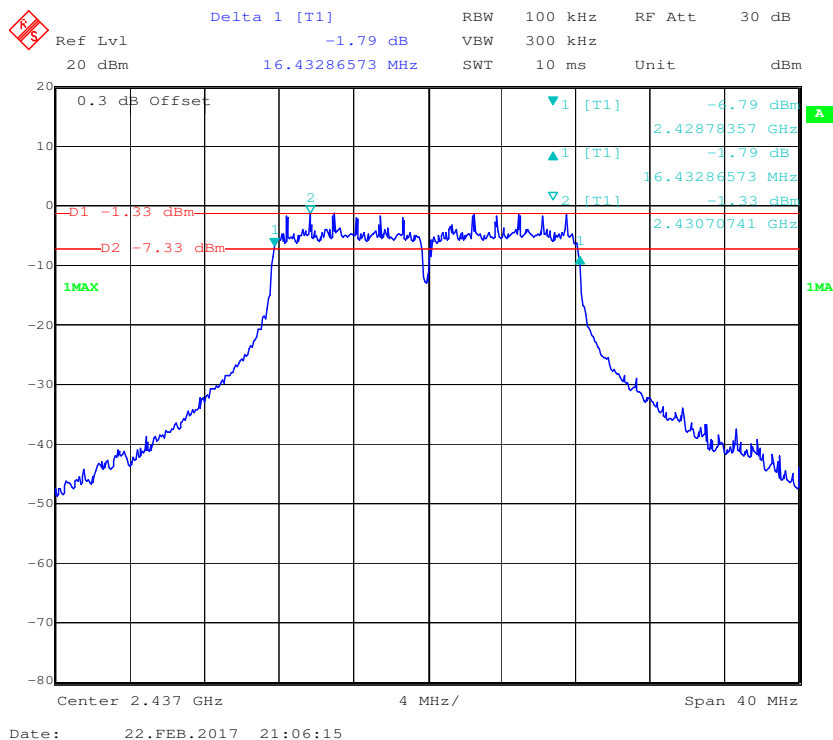
802.11b High Channel



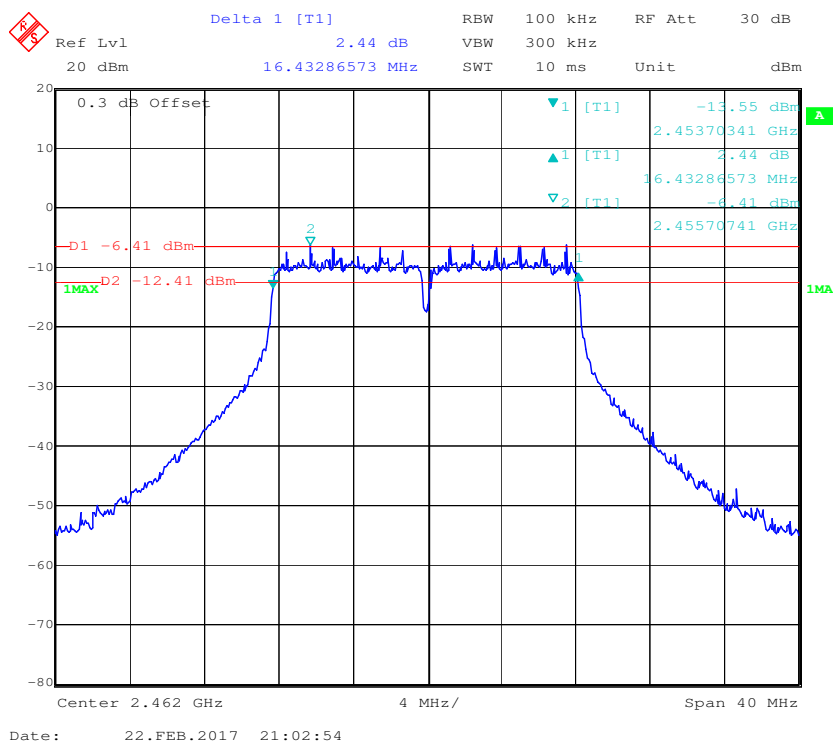
802.11g Low Channel



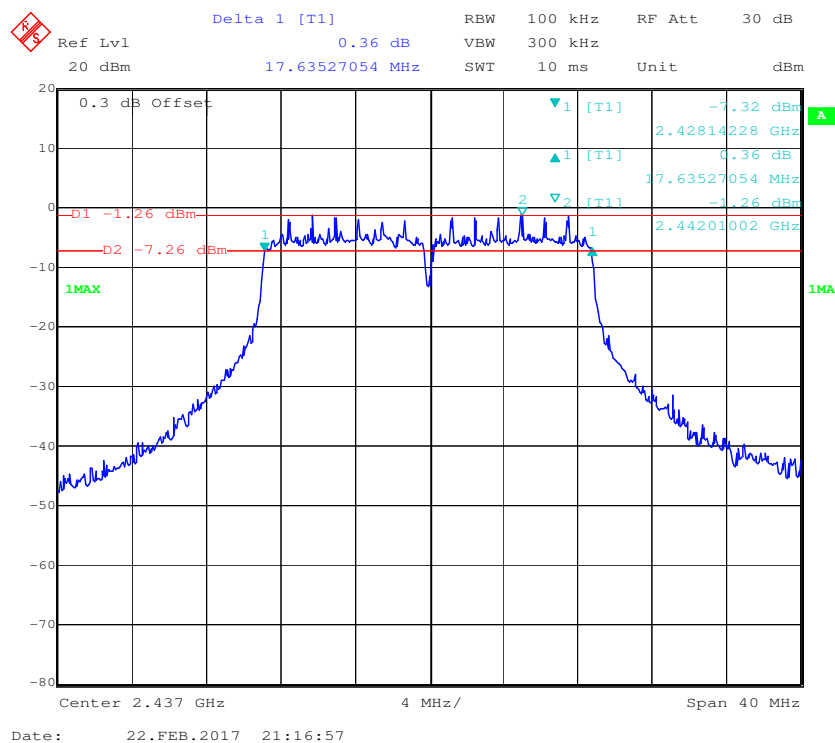
802.11g Middle Channel



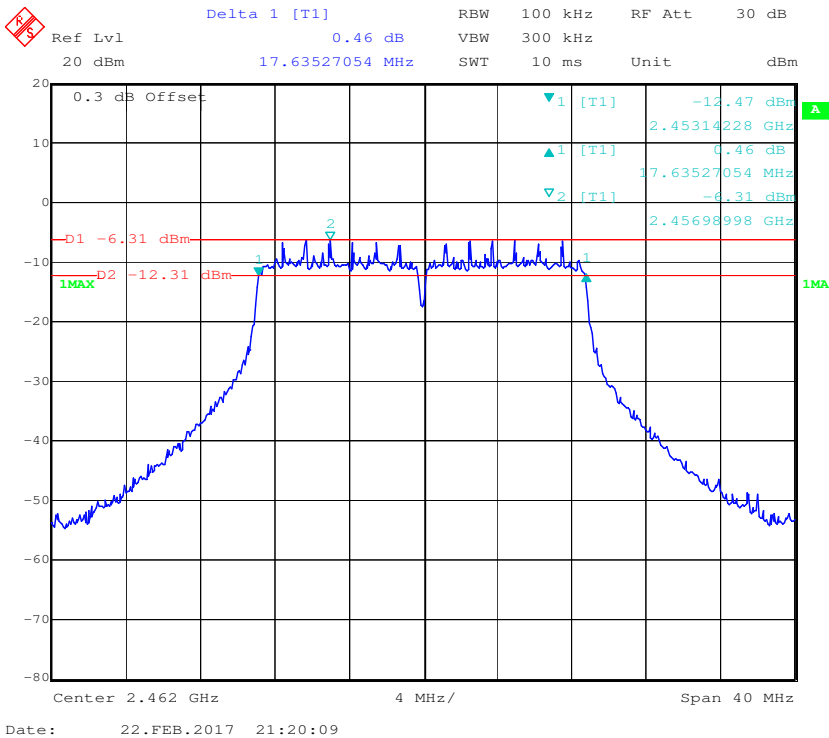
802.11g High Channel



Page 28 of 50



802.11n ht20 High Channel



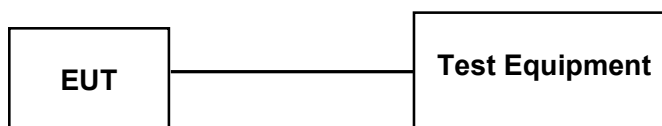
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER

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 a Test Equipment.



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
N/A	RF Cable	N/A	N/A	Each Time	/

* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23.1 °C
Relative Humidity:	51 %
ATM Pressure:	97.2 kPa

The testing was performed by Kevin Hu on 2017-02-16

Test Mode: Transmitting

Test Mode	Frequency (MHz)	Conducted Peak Output Power (dBm)		Total (dBm)	Limits (dBm)
		Chain 0	Chain 1		
802.11b	2412	11.07	11.24	14.17	30
	2437	12.1	12.44	15.28	30
	2457	11.48	11.24	14.37	30
	2462	7.39	8.96	11.26	30
802.11g	2412	18.69	18.76	21.74	30
	2437	19.2	19.54	22.38	30
	2457	18.94	18.5	21.74	30
	2462	15.3	16.2	18.78	30
802.11n 20	2412	18.52	18.71	21.63	30
	2437	18.91	19.39	22.17	30
	2457	18.59	18.64	21.63	30
	2462	14.67	16.01	18.40	30

Test Mode	Frequency (MHz)	Conducted Average Output Power (dBm)		Total (dBm)	Limits (dBm)
		Chain 0	Chain 1		
802.11b	2412	9.08	9.79	12.46	30
	2437	9.45	10.34	12.93	30
	2457	9.01	9.83	12.45	30
	2462	5.04	6.65	8.93	30
802.11g	2412	9.01	9.65	12.35	30
	2437	9.14	10.24	12.74	30
	2457	9.36	9.64	12.51	30
	2462	5.42	6.54	9.03	30
802.11n 20	2412	8.91	9.61	12.28	30
	2437	9.07	10.26	12.72	30
	2457	8.75	9.39	12.09	30
	2462	5.33	6.53	8.98	30

Note: For 802.11b/g/n the device employed Cyclic Delay Diversity (CDD) for MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

So:

Directional gain = GANT + Array Gain = 2.2dBi < 6dBi

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

Applicable Standard

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

Test Procedure

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

Test 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
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

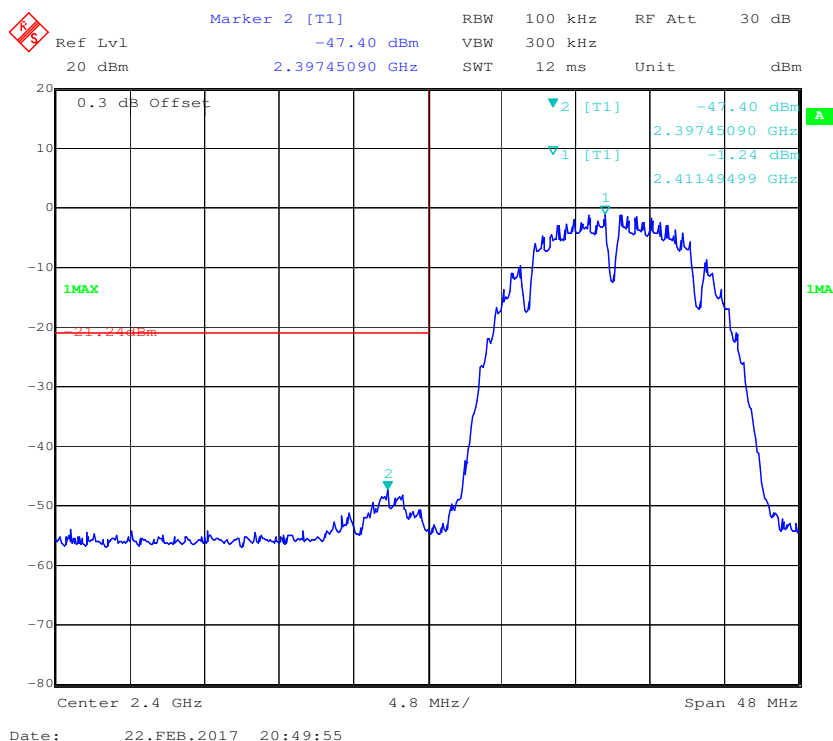
Temperature:	25.8 °C
Relative Humidity:	42 %
ATM Pressure:	96.4 kPa

The testing was performed by Kevin Hu from 2017-02-22.

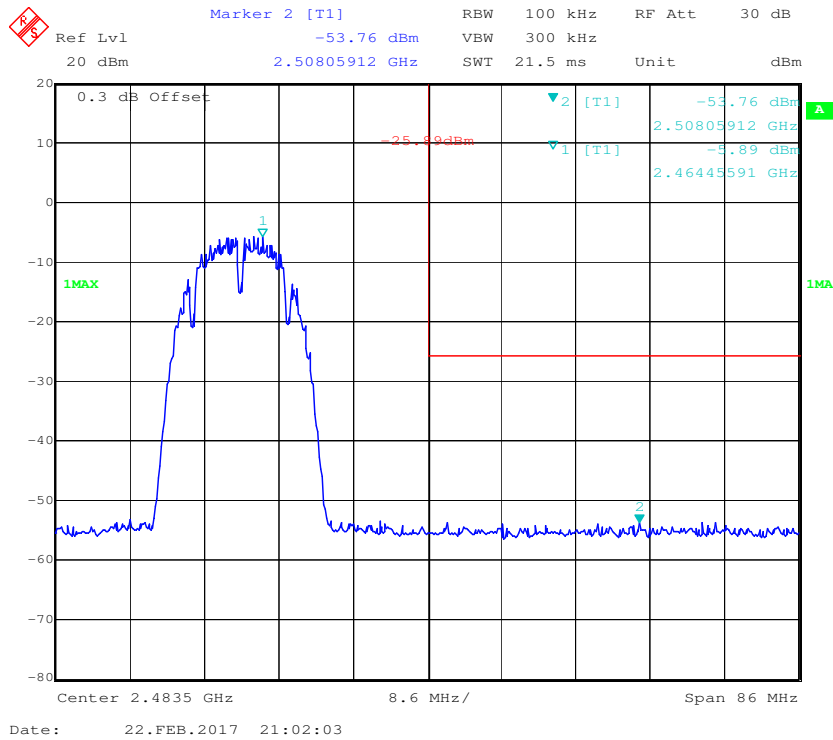
Test mode: Transmitting

Test Result: Compliant. Please refer to following plots.

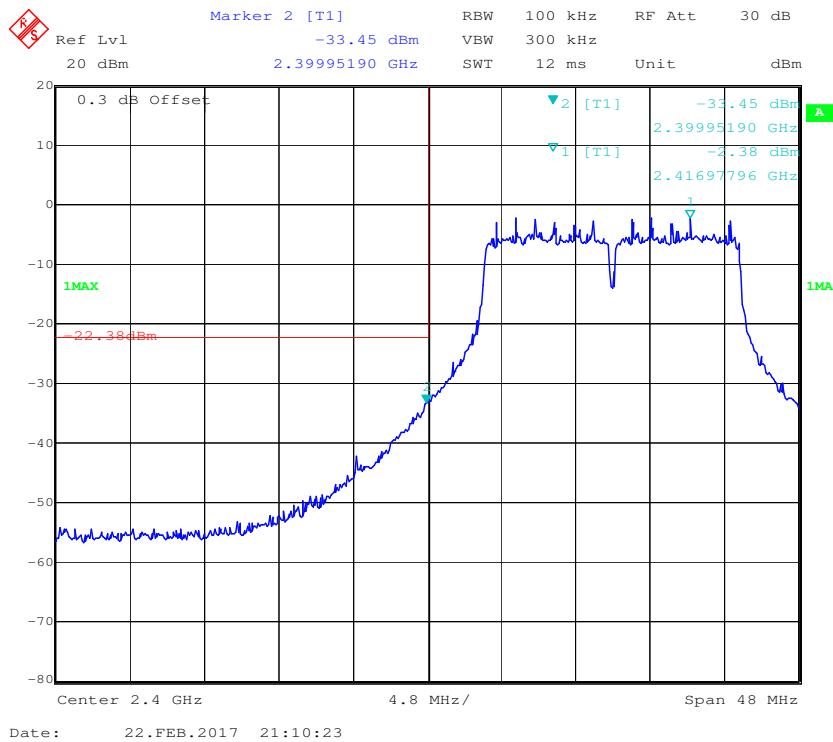
Chain 0-802.11b Band Edge, Left Side



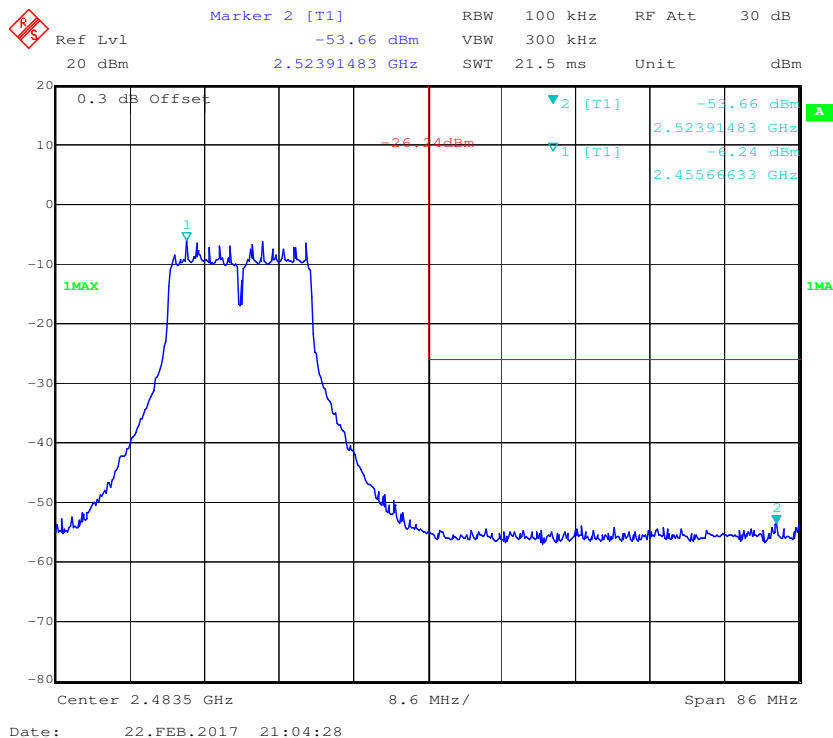
Chain 0-802.11b Band Edge, Right Side



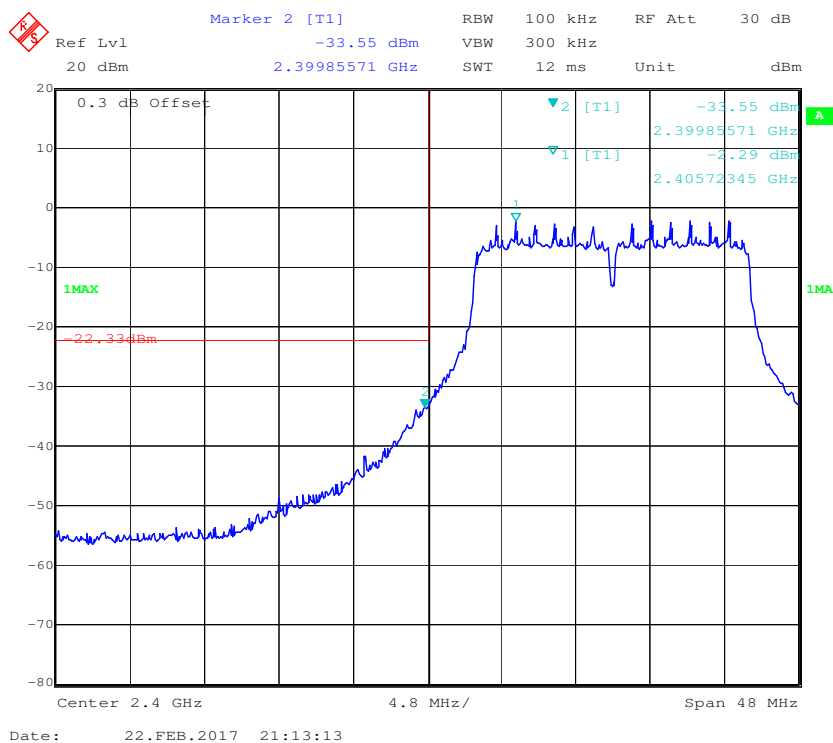
Chain 0-802.11g Band Edge, Left Side



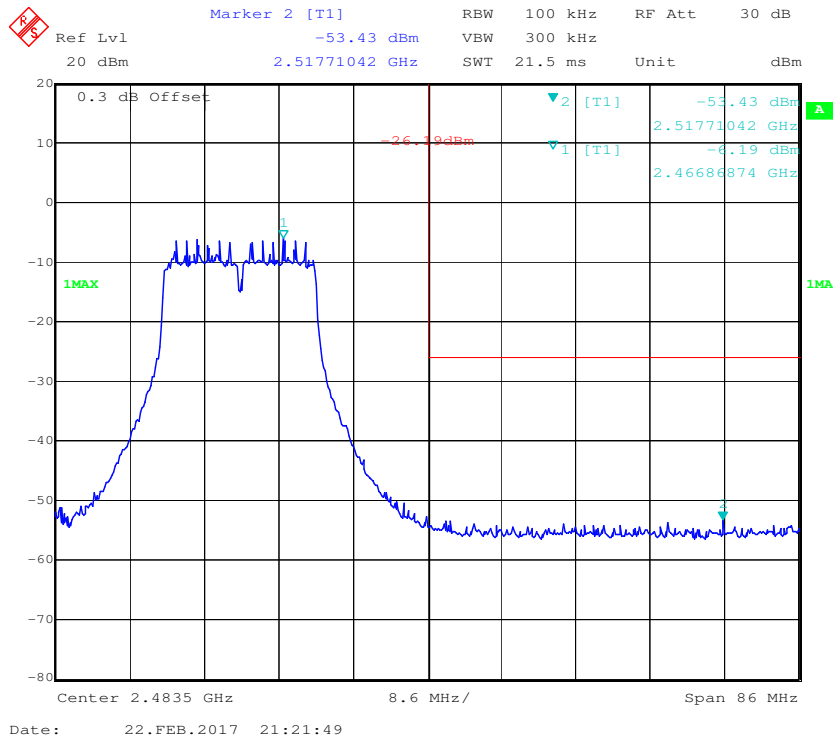
Chain 0-802.11g Band Edge, Right Side



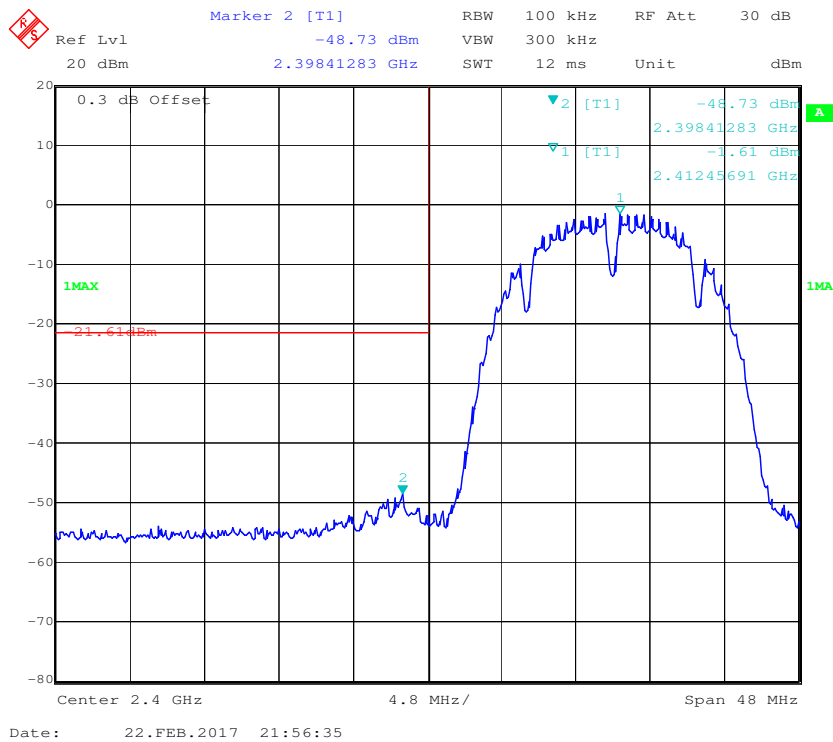
Chain 0-802.11n ht20 Band Edge, Left Side



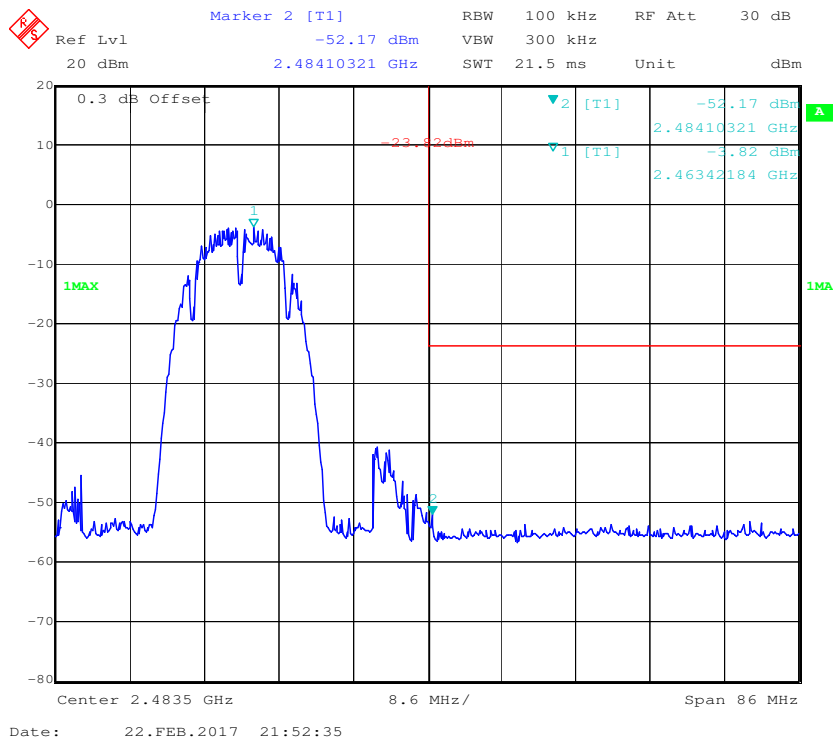
Chain 0-802.11n ht20 Band Edge, Right Side



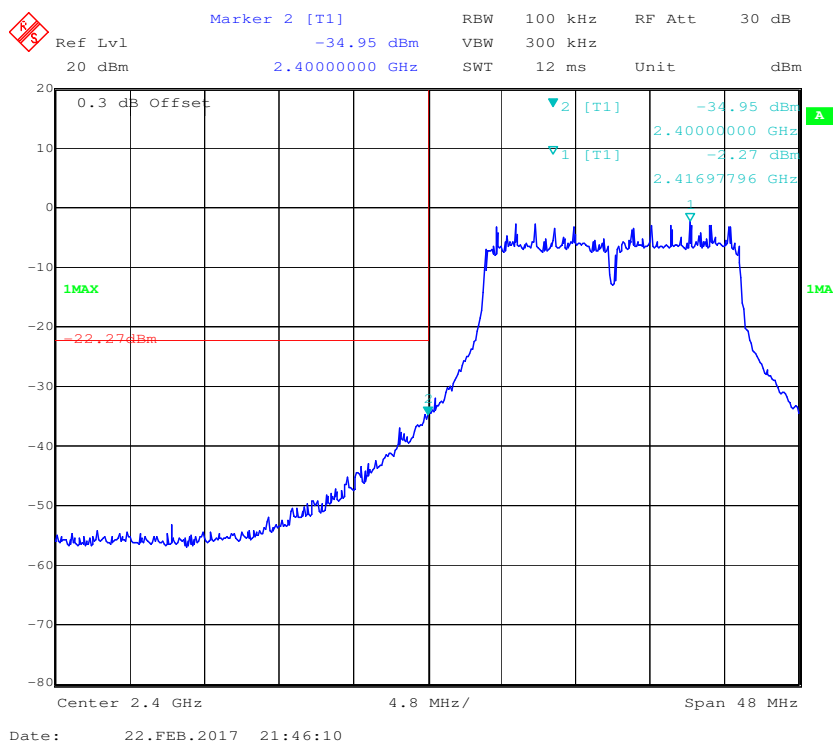
Chain 1-802.11b Band Edge, Left Side



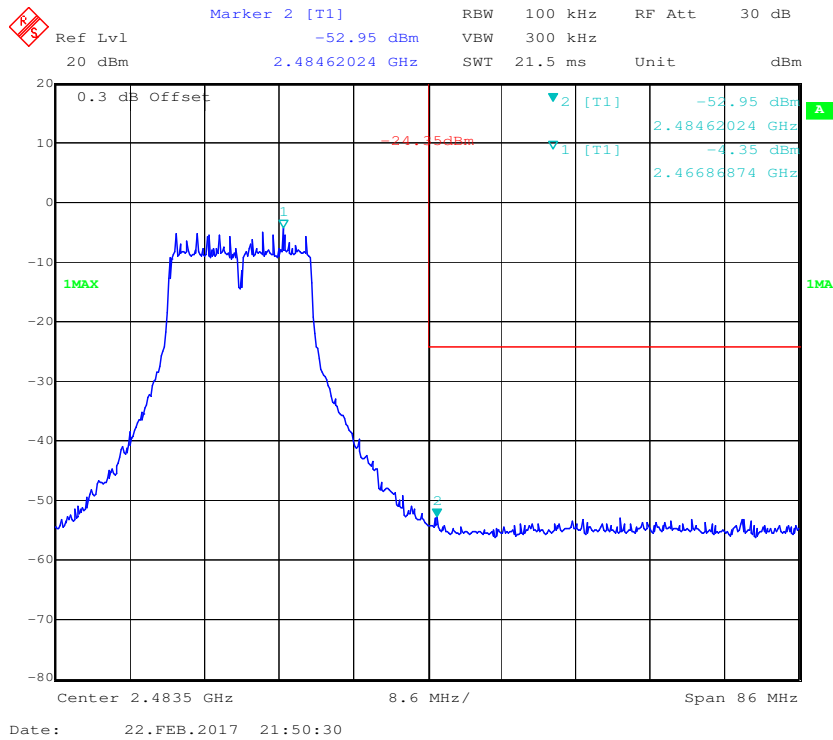
Chain 1-802.11b Band Edge, Right Side



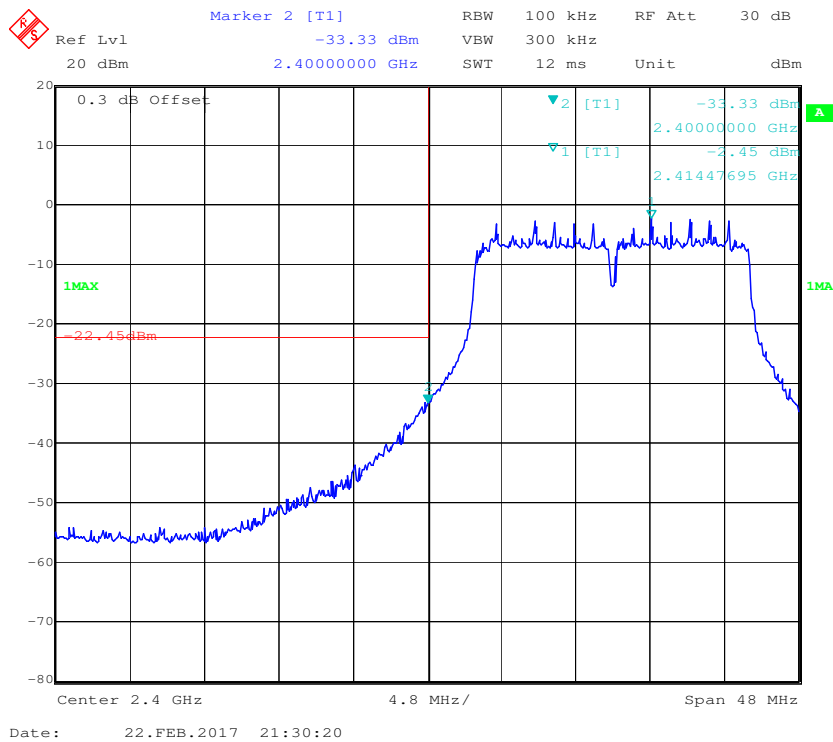
Chain 1-802.11g Band Edge, Left Side



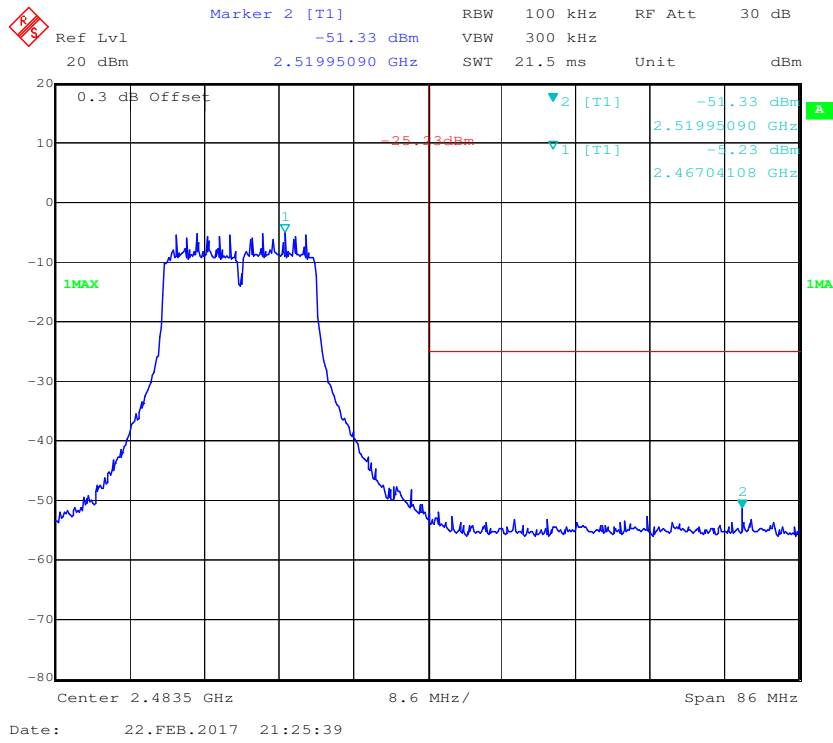
Chain 1-802.11g Band Edge, Right Side



Chain 1-802.11n ht20 Band Edge, Left Side



Chain 1-802.11n ht20 Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set 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 the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

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
N/A	RF Cable	N/A	N/A	Each Time	/

* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25.8 °C
Relative Humidity:	42 %
ATM Pressure:	96.4 kPa

The testing was performed by Kevin Hu from 2017-02-22

Test Result: Compliance

Test Mode: Transmitting

Test mode	Channel	Frequency MHz	Power Spectral Density (dBm/3kHz)		Total (dBm/3kHz)	Limits (dBm/3kHz)	Result
			Chain 0	Chain 1			
802.11b	Low	2412	-17.1	-17.15	-14.11	8	Compliance
	Middle	2437	-16.82	-15.77	-13.25	8	Compliance
	High	2462	-21.31	-20.18	-17.7	8	Compliance
802.11g	Low	2412	-17.1	-17.12	-14.1	8	Compliance
	Middle	2437	-17.71	-16.77	-14.2	8	Compliance
	High	2462	-22.29	-20.79	-18.47	8	Compliance
802.11n20	Low	2412	-17.68	-17.49	-14.57	8	Compliance
	Middle	2437	-16.14	-17.02	-13.55	8	Compliance
	High	2462	-21.55	-20.12	-17.77	8	Compliance

Note: the device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

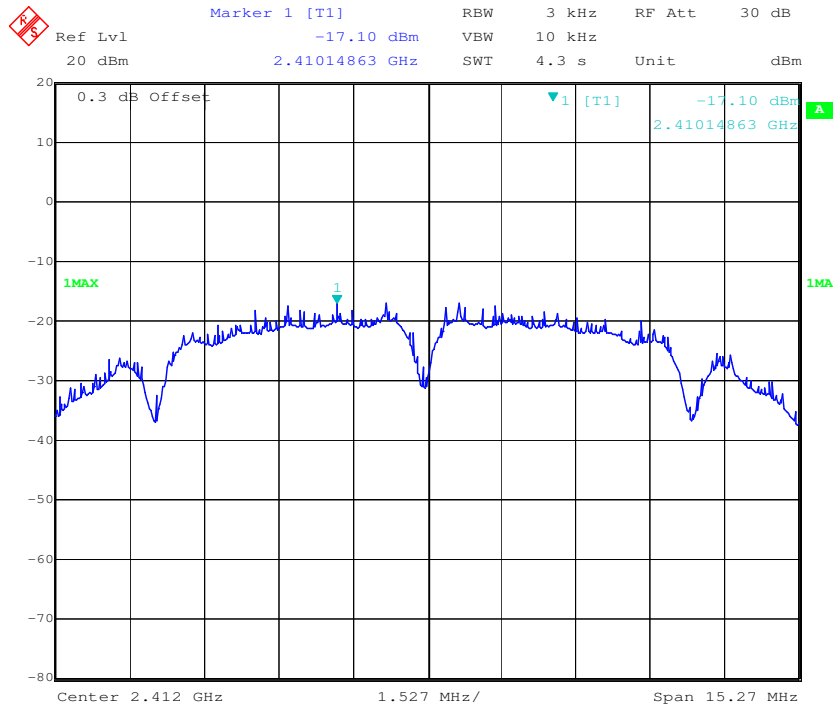
$$\text{Array Gain} = 10 \log(\text{NANT}/\text{NSS}) \text{ dB.}$$

So:

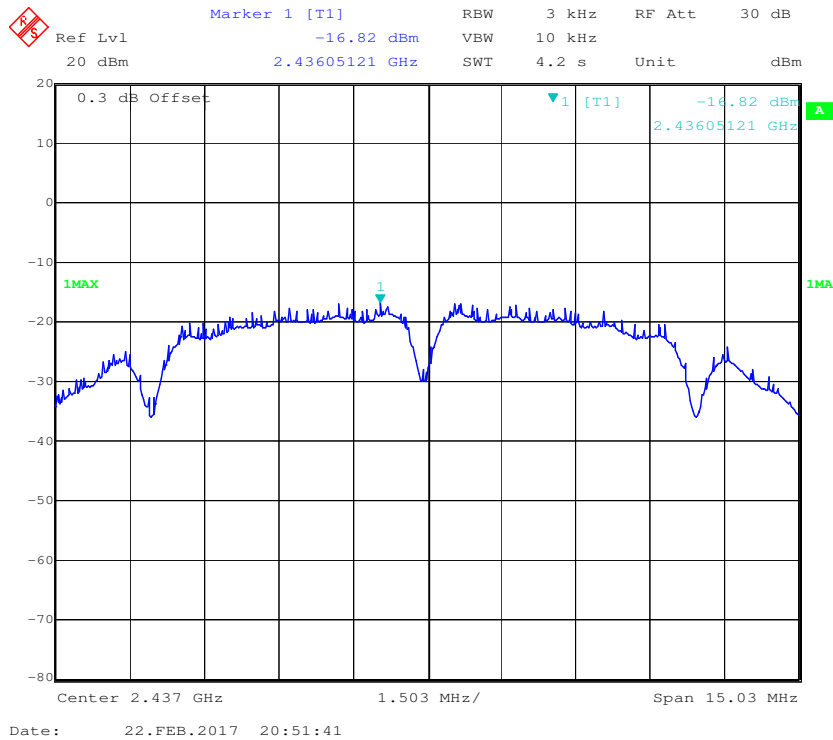
$$\text{Directional gain} = \text{GANT} + \text{Array Gain} = 2.2 + 10 \cdot \log(2) = 5.2 \text{ dBi} < 6 \text{ dBi}$$

Please refer to the following plots

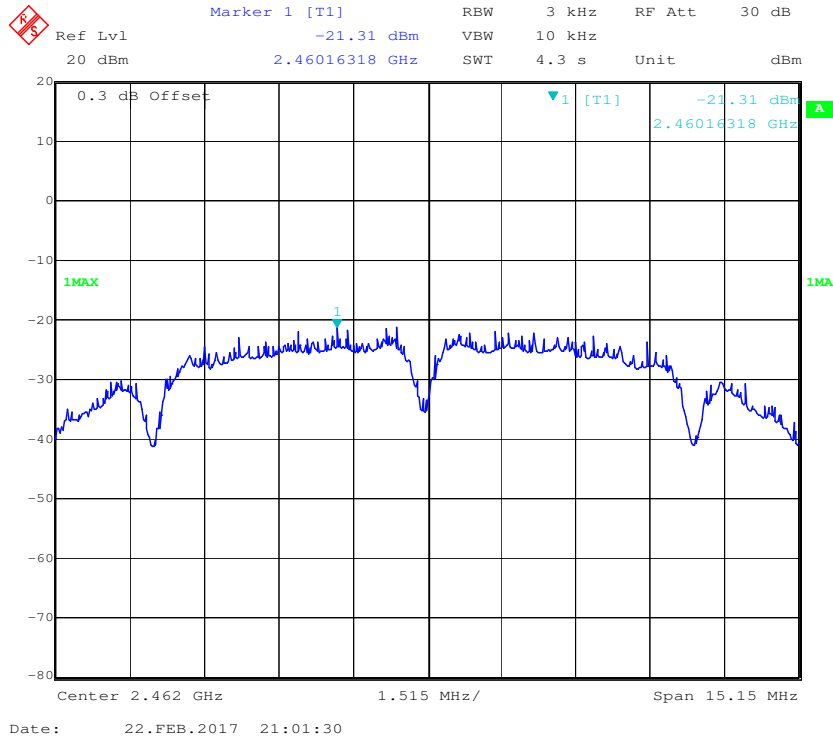
Chain 0-Power Spectral Density, 802.11b Low Channel



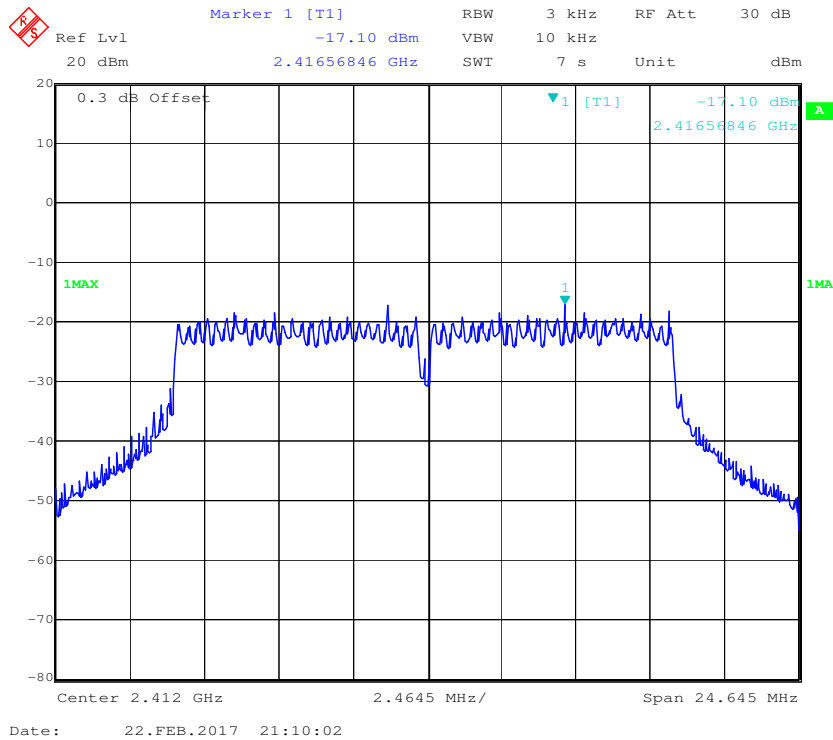
Chain 0-Power Spectral Density, 802.11b Middle Channel



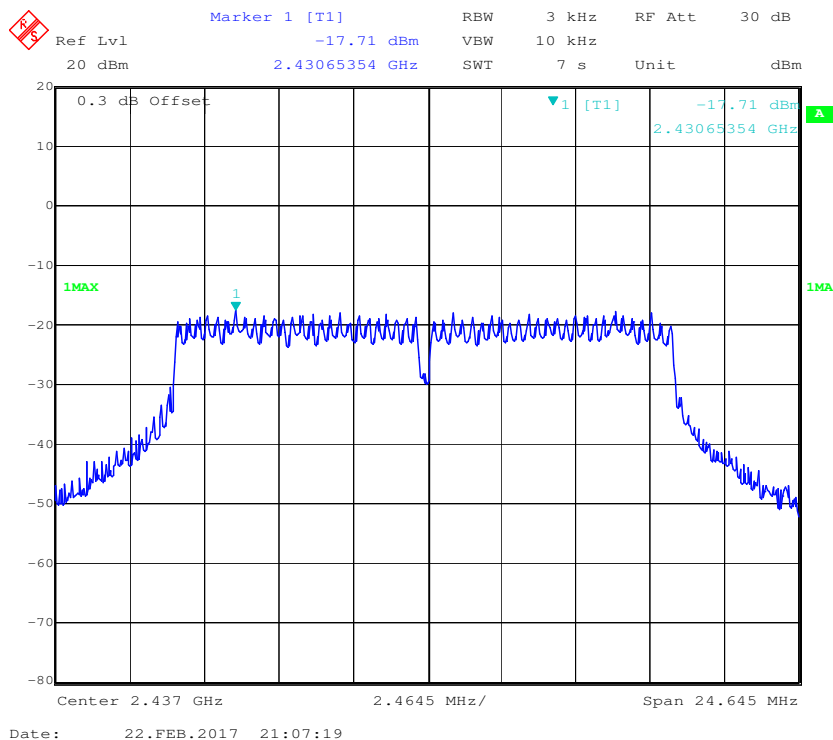
Chain 0-Power Spectral Density, 802.11b High Channel



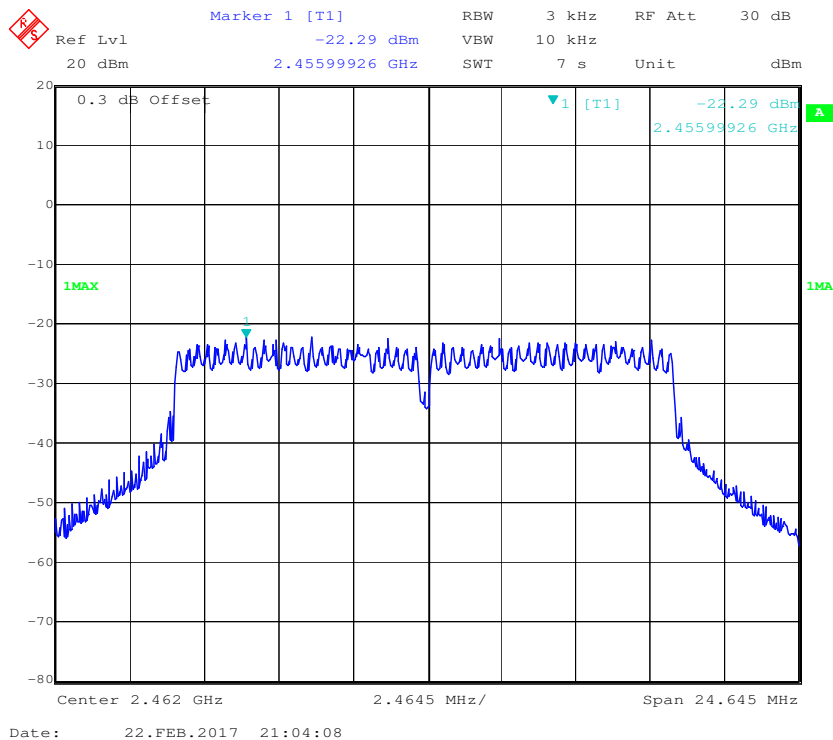
Chain 0-Power Spectral Density, 802.11g Low Channel



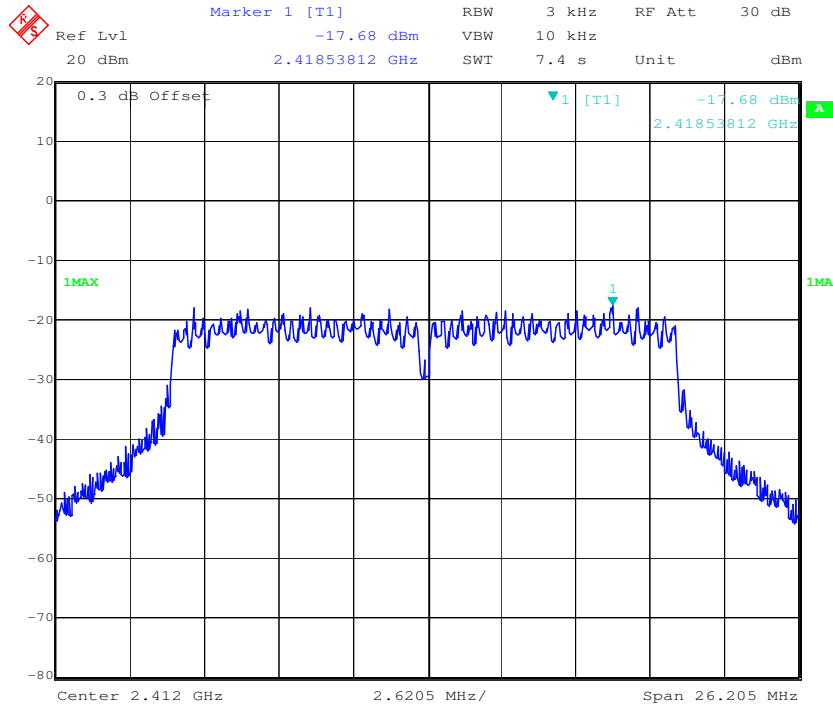
Chain 0-Power Spectral Density, 802.11g Middle Channel



Chain 0-Power Spectral Density, 802.11g High Channel

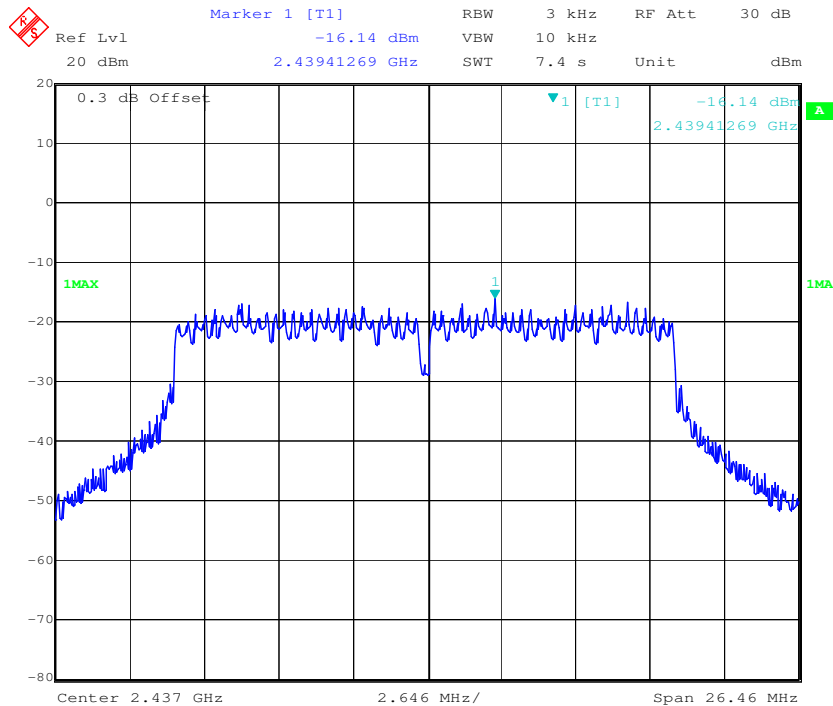


Chain 0-Power Spectral Density, 802.11n ht20 Low Channel



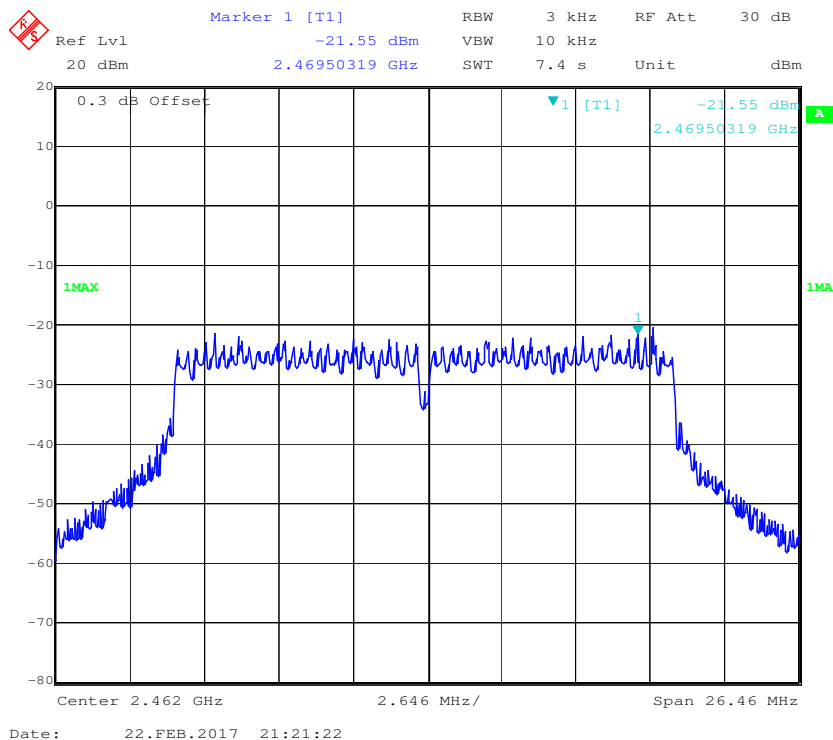
Date: 22.FEB.2017 21:12:45

Chain 0-Power Spectral Density, 802.11n ht20 Middle Channel

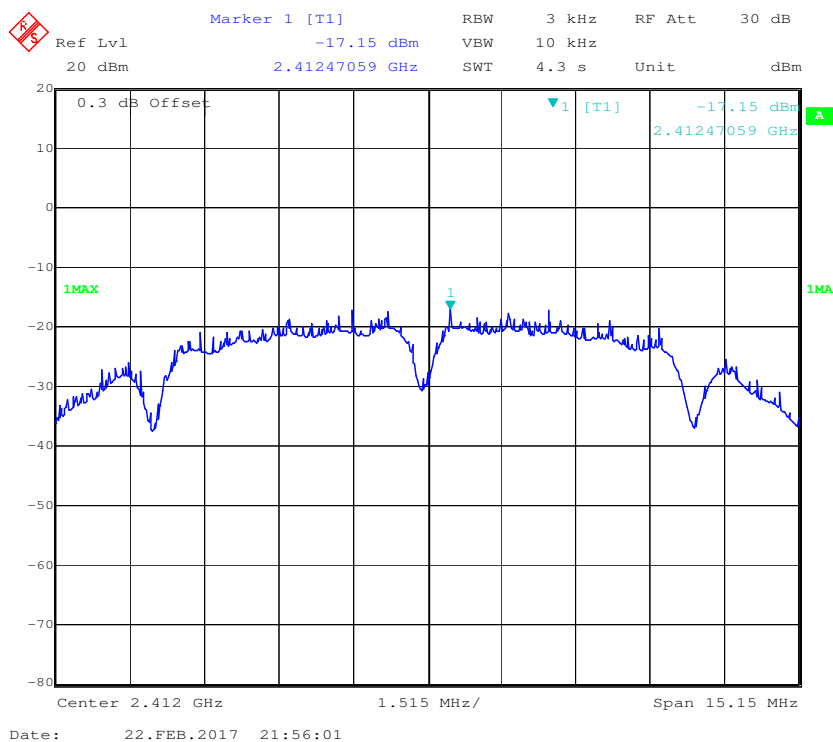


Date: 22.FEB.2017 21:18:46

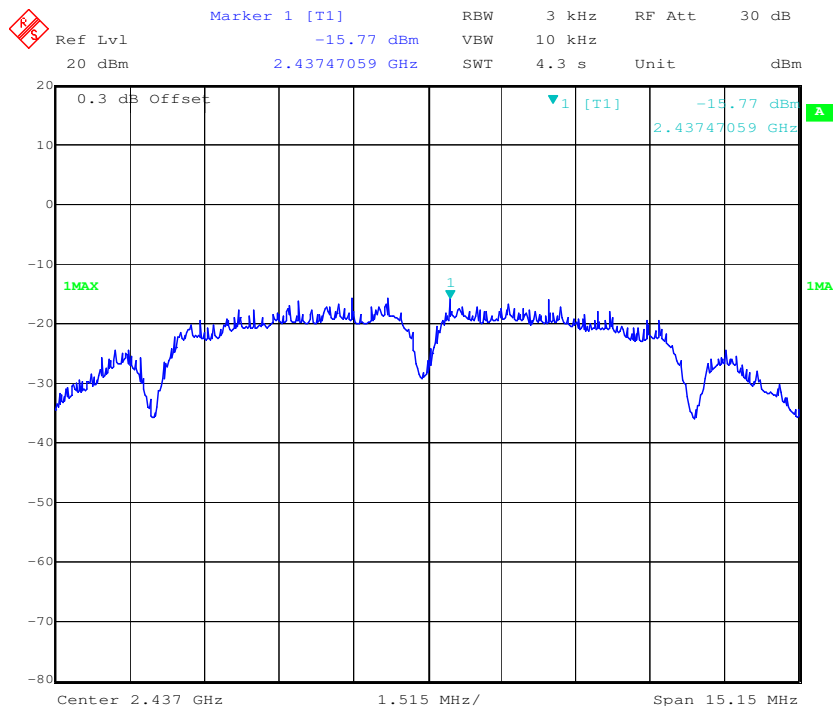
Chain 0-Power Spectral Density, 802.11n ht20 High Channel



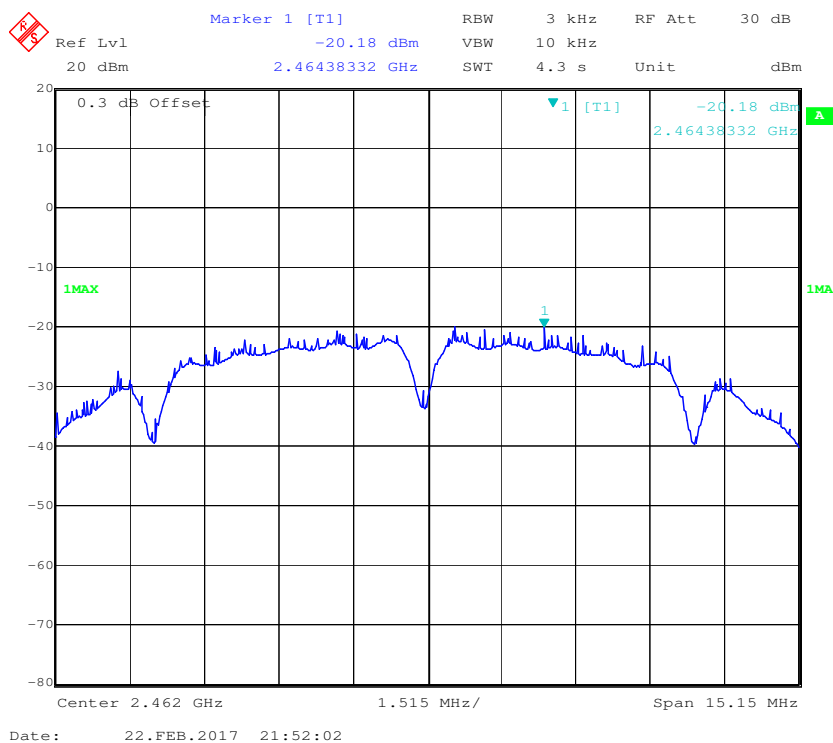
Chain 1-Power Spectral Density, 802.11b Low Channel



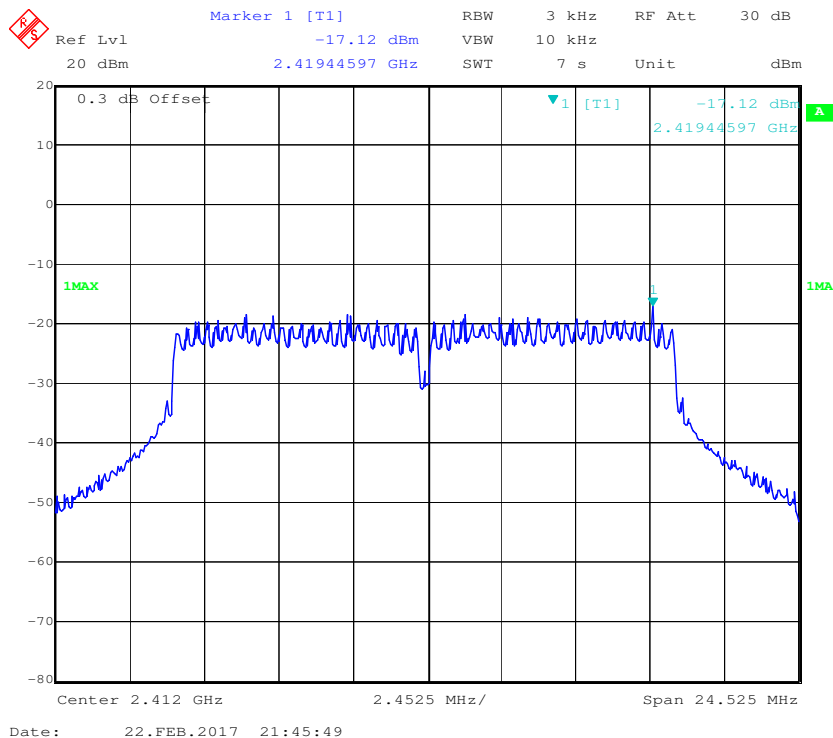
Chain 1-Power Spectral Density, 802.11b Middle Channel



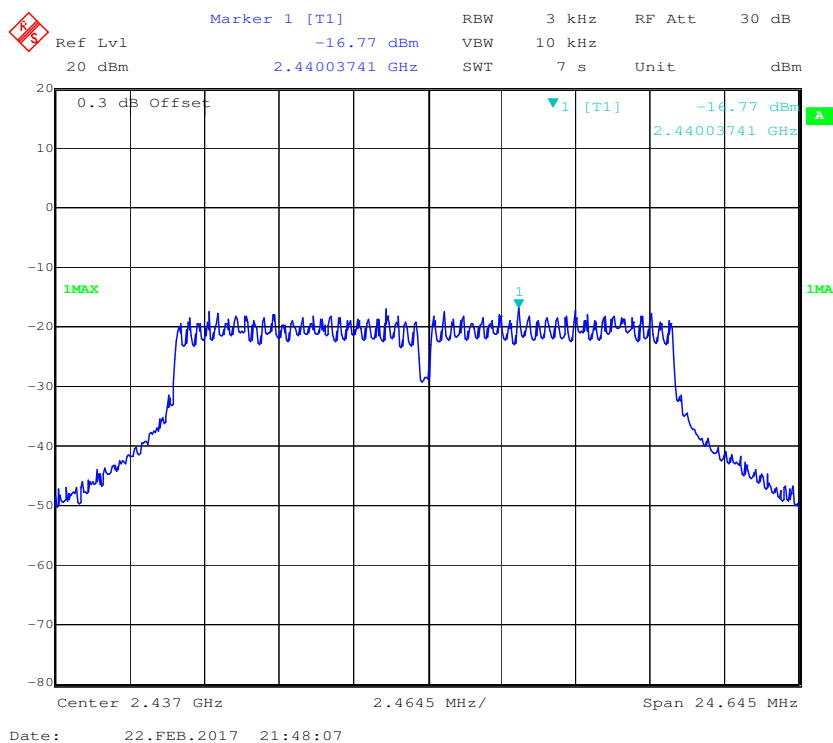
Chain 1-Power Spectral Density, 802.11b High Channel



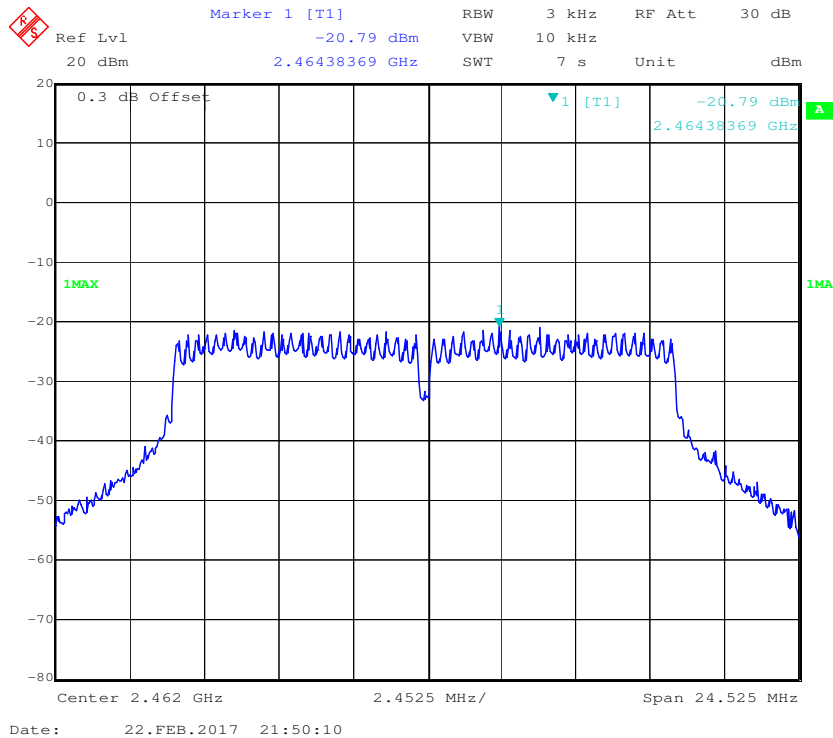
Chain 1-Power Spectral Density, 802.11g Low Channel



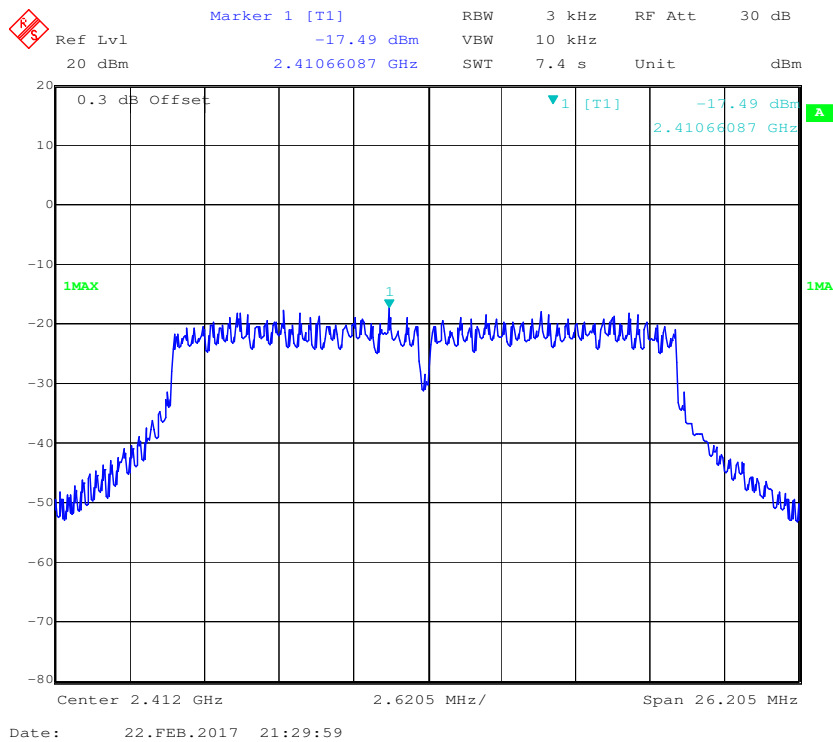
Chain 1-Power Spectral Density, 802.11g Middle Channel



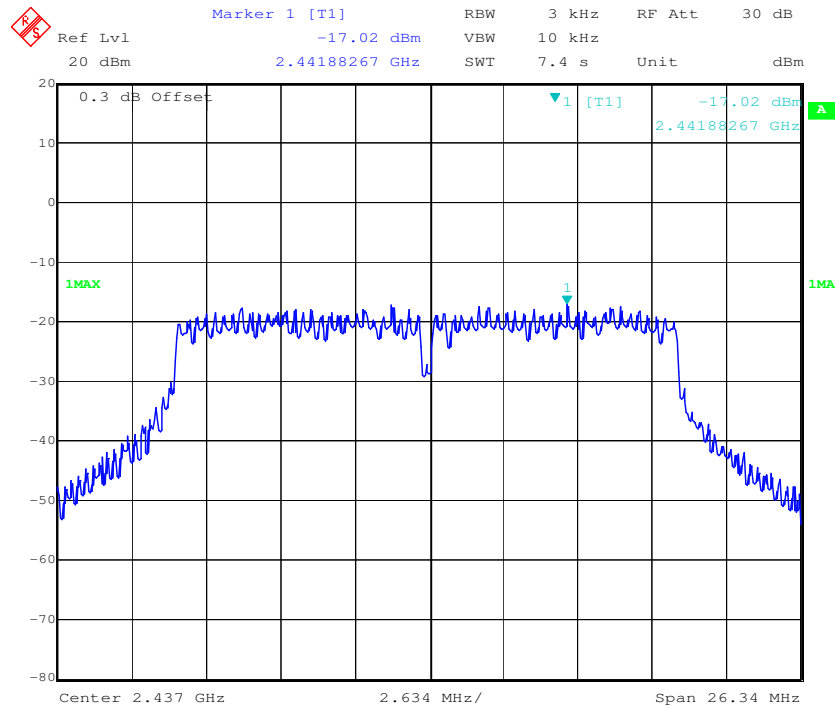
Chain 1-Power Spectral Density, 802.11g High Channel



Chain 1-Power Spectral Density, 802.11n ht20 Low Channel

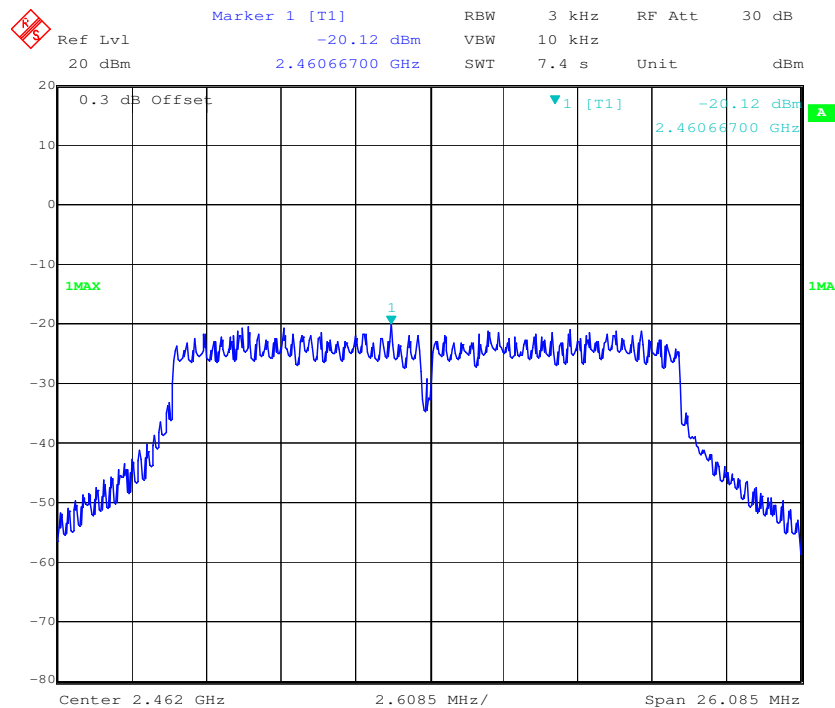


Chain 1-Power Spectral Density, 802.11n ht20 Middle Channel



Date: 22.FEB.2017 21:27:33

Chain 1-Power Spectral Density, 802.11n ht20 High Channel



Date: 22.FEB.2017 21:25:18

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