



## FCC PART 15.247

### TEST REPORT

For

## MAXWEST INTERNATIONAL LIMITED.

No.1,Longgang Road,Buji,Longgang,ShenzhenCity,Guangdong Province, P.R. China

**FCC ID: 2AEN3NITRO4S**

<b>Report Type:</b> Original Report	<b>Product Name:</b> Mobile Phone
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<b>Report Number:</b> <u>RDG170310002C</u>	
<b>Report Date:</b> <u>2017-04-10</u>	
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## GENERAL INFORMATION

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

The **MAXWEST INTERNATIONAL LIMITED.**'s product, model number: **Nitro 4s (FCC ID: 2AEN3NITRO4S)** (the "EUT") in this report was a **Mobile Phone**, which was measured approximately: 12.5 cm (L) × 6.4 cm (W) × 0.9 cm (H), rated input voltage: DC3.8V battery or DC5V from adapter.

Adapter information:

INPUT: AC100-240V 50/60Hz

OUTPU: DC5V+5% 500mA

*\*All measurement and test data in this report was gathered from final production sample, serial number: 170310002 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-03-10, and EUT conformed to test requirement.*

### Objective

This report is prepared on behalf of **MAXWEST INTERNATIONAL LIMITED.** 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, 15.207, 15.209 and 15.247 rules.

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

FCC Part 15B JBP submissions with FCC ID: 2AEN3NITRO4S.

FCC Part 15C DSS submissions with FCC ID: 2AEN3NITRO4S.

FCC Part 22H, 24E PCE submissions with FCC ID: 2AEN3NITRO4S.

## 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.

The uncertainty of any RF tests which use conducted method measurement is  $\pm 3.17$  dB, the uncertainty of any radiation on emissions measurement is:

30M~200MHz:  $\pm 4.7$  dB;

200M~1GHz:  $\pm 6.0$  dB;

1G~6GHz:  $\pm 5.13$  dB;

6G~25GHz:  $\pm 5.47$  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, 11 channels are provided to testing:

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 802.11n ht20 modes were tested with channel 1, 6 and 11.

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.

### Equipment Modifications

No modification was made to the EUT tested.

### EUT Exercise Software

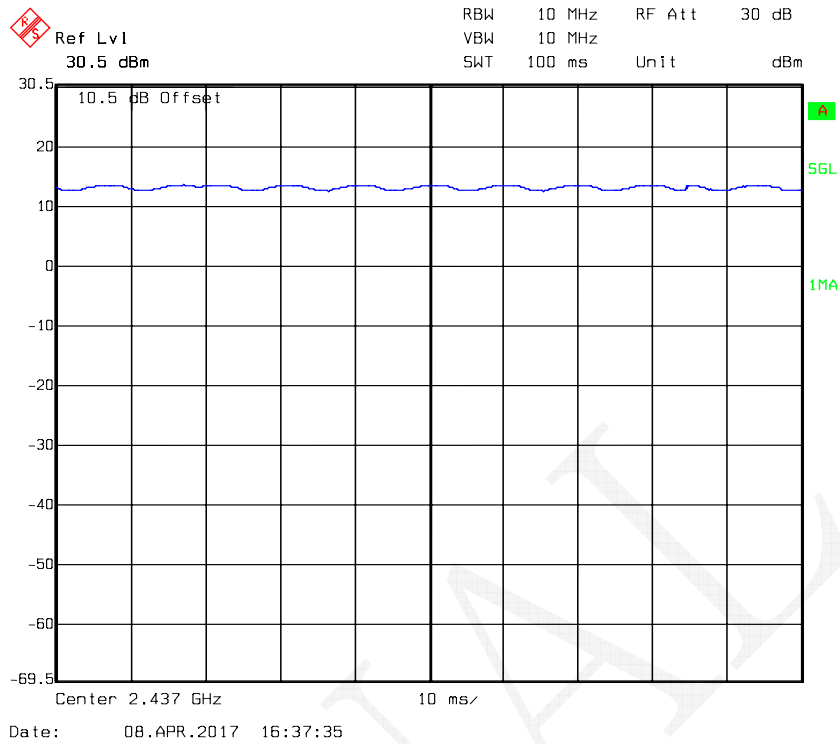
The worst condition (maximum power) was setting by the Engineer Mode as following table:

Test Mode	Test Software Version	EngineerMode		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	56	56	56
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	94	94	94
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6.5	6.5	6.5
	Power Level Setting	100	100	100

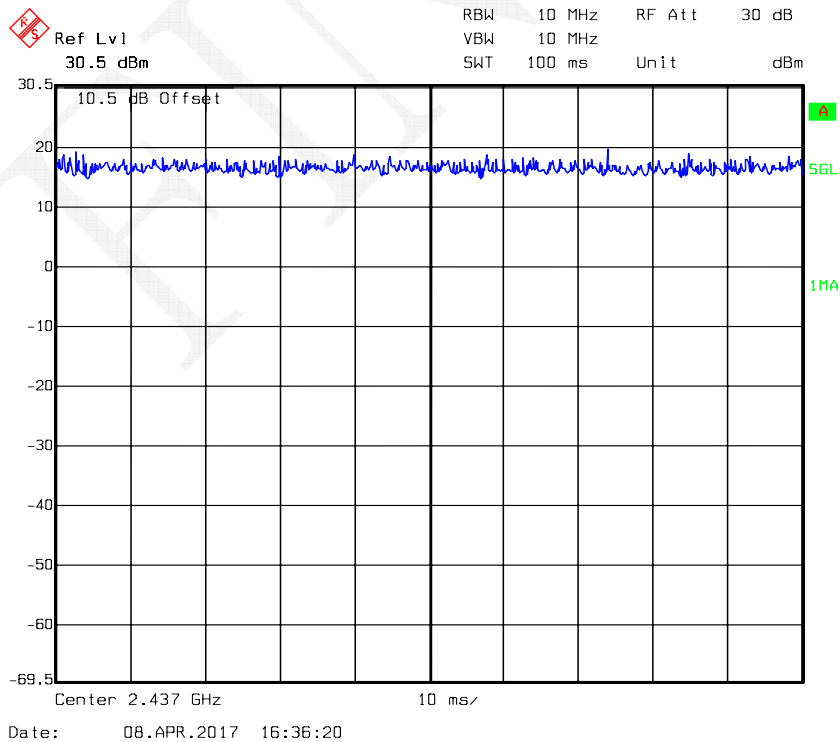
The maximum duty cycle as following table:

Test mode	T <sub>on</sub> (ms)	T <sub>on+off</sub> (ms)	Duty Cycle (%)
802.11b	100	100	100%
802.11g	100	100	100%
802.11n ht20	100	100	100%

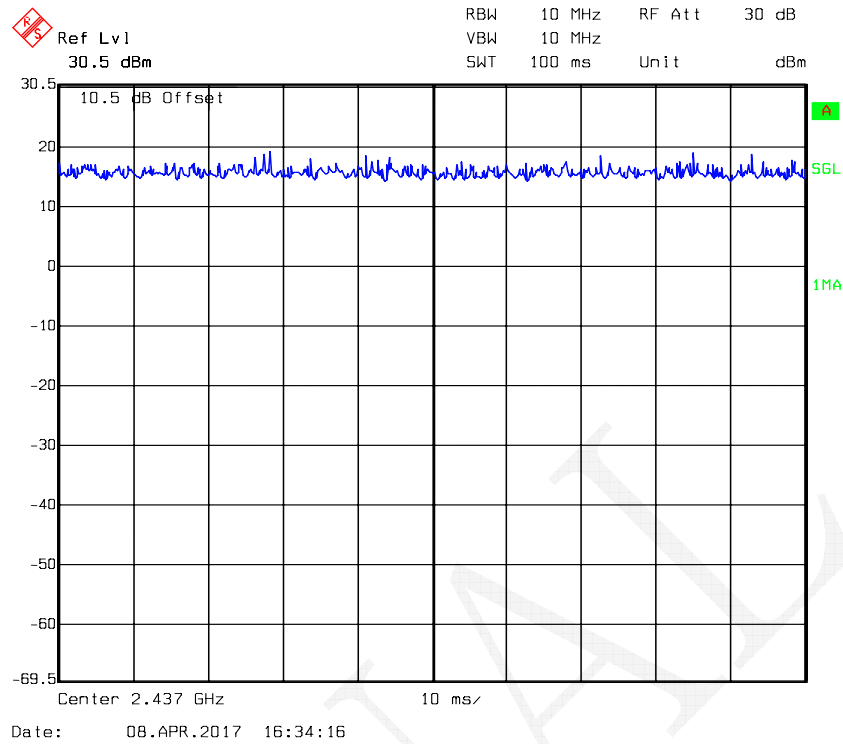
### 802.11b



### 802.11g



### 802.11n ht20

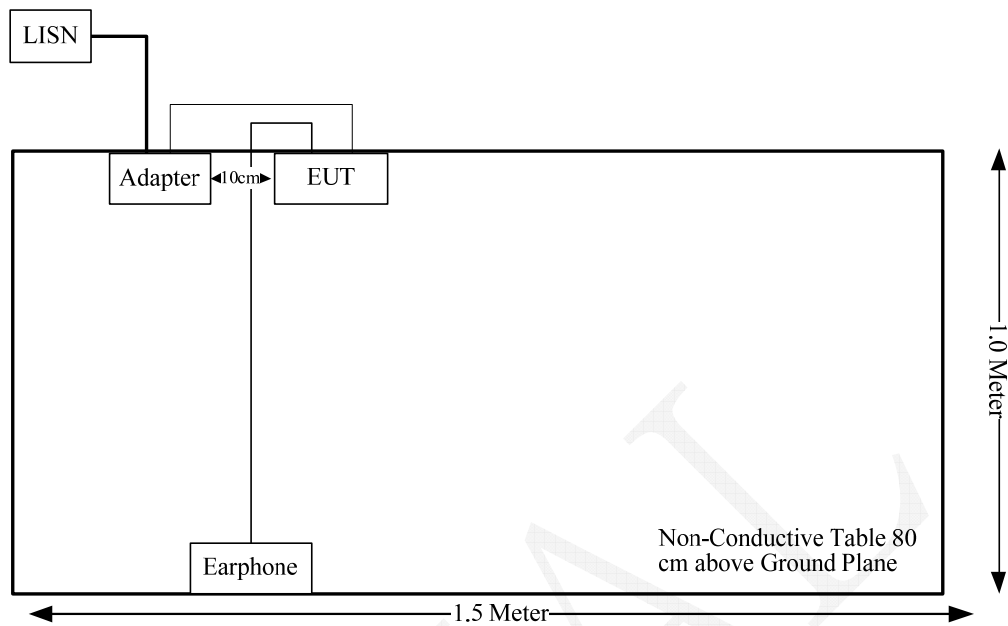


### External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	No	No	0.93	Adapter	EUT
Earphone Cable	No	No	1.15	EUT	Earphone



## Block Diagram of Test Setup



## **SUMMARY OF TEST RESULTS**

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<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
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**

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### **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.

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

### **Measurement Result**

The max tune-up conducted power is 9.4 dBm (8.71 mW).

$[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})][\sqrt{f(\text{GHz})}]$   
 $= 8.71/5 \cdot (\sqrt{2.462}) = 2.7 \leq 3.0$

**So the stand-alone SAR evaluation is not necessary.**

## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **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 internal antenna arrangement, and the antenna gain is 1.2 dBi, 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

### 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  $U_{cispr}$  of Table 1, 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  $U_{cispr}$  of Table 1, then:

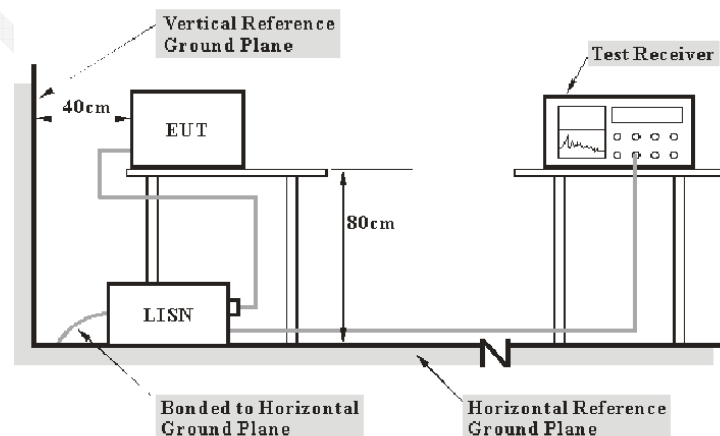
–compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;  
 –non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2:2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Chengdu) is  $\pm 3.17$  dB (150 kHz to 30 MHz).

Table 1 – Values of  $U_{cispr}$

Measurement	$U_{cispr}$
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

### 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 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	3560.6550.06	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	357.8810.52	2016-10-31	2017-10-30
N/A	Conducted Cable	NO.5	N/A	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

\* **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

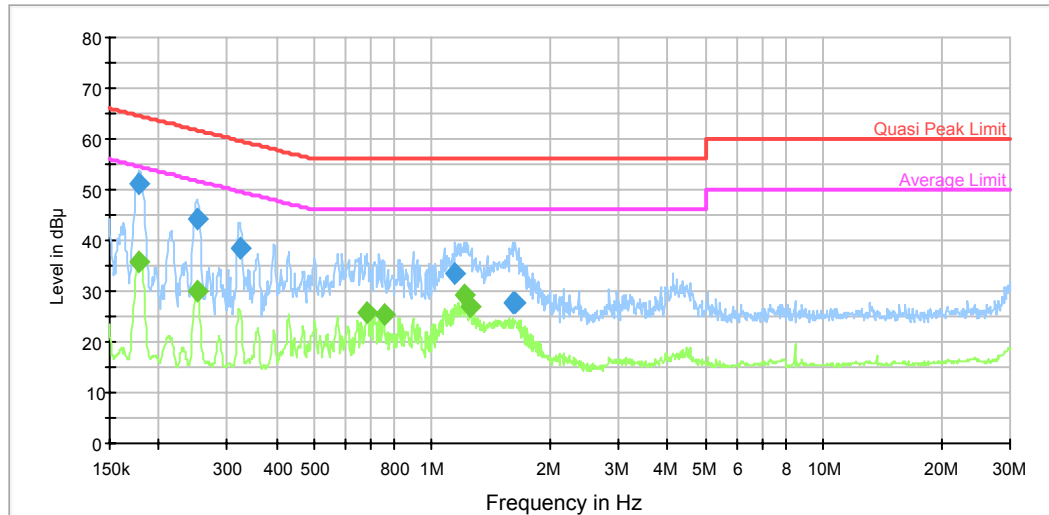
### Environmental Conditions

Temperature:	19 °C
Relative Humidity:	58 %
ATM Pressure:	95.2kPa

*The testing was performed by Tom Tang on 2017-03-22.*

Test Mode: Transmitting (Wi-Fi)

AC120 V, 60 Hz, Line:

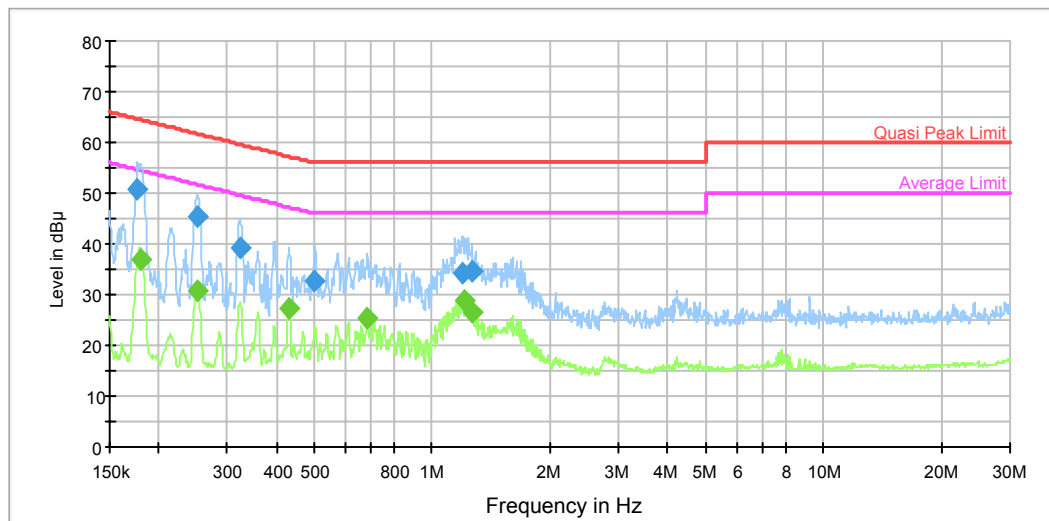


Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178803	51.0	9.000	L1	19.7	13.5	64.5	Compliance
0.250038	44.4	9.000	L1	19.6	17.4	61.8	Compliance
0.322823	38.5	9.000	L1	19.6	21.1	59.6	Compliance
1.144330	33.6	9.000	L1	19.6	22.4	56.0	Compliance
1.606634	27.6	9.000	L1	19.7	28.4	56.0	Compliance
1.632495	27.6	9.000	L1	19.7	28.4	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178803	36.0	9.000	L1	19.7	18.5	54.5	Compliance
0.250038	30.0	9.000	L1	19.6	21.8	51.8	Compliance
0.683758	25.9	9.000	L1	19.6	20.1	46.0	Compliance
0.752509	25.5	9.000	L1	19.6	20.5	46.0	Compliance
1.214946	29.3	9.000	L1	19.6	16.7	46.0	Compliance
1.249376	26.9	9.000	L1	19.6	19.1	46.0	Compliance



**AC120 V, 60 Hz, Neutral:**



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.176674	50.7	9.000	N	19.7	13.9	64.6	Compliance
0.251039	45.4	9.000	N	19.7	16.3	61.7	Compliance
0.322823	39.4	9.000	N	19.7	20.2	59.6	Compliance
0.502813	32.7	9.000	N	19.7	23.3	56.0	Compliance
1.190936	34.0	9.000	N	19.7	22.0	56.0	Compliance
1.264428	34.8	9.000	N	19.7	21.2	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.180236	36.9	9.000	N	19.7	17.6	54.5	Compliance
0.250038	30.7	9.000	N	19.7	21.1	51.8	Compliance
0.430320	27.2	9.000	N	19.7	20.0	47.2	Compliance
0.683758	25.4	9.000	N	19.7	20.6	46.0	Compliance
1.214946	29.0	9.000	N	19.7	17.0	46.0	Compliance
1.264428	26.4	9.000	N	19.7	19.6	46.0	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:  $\pm 4.7$  dB;

200M~1GHz:  $\pm 6.0$  dB;

1G~6GHz:  $\pm 5.13$  dB;

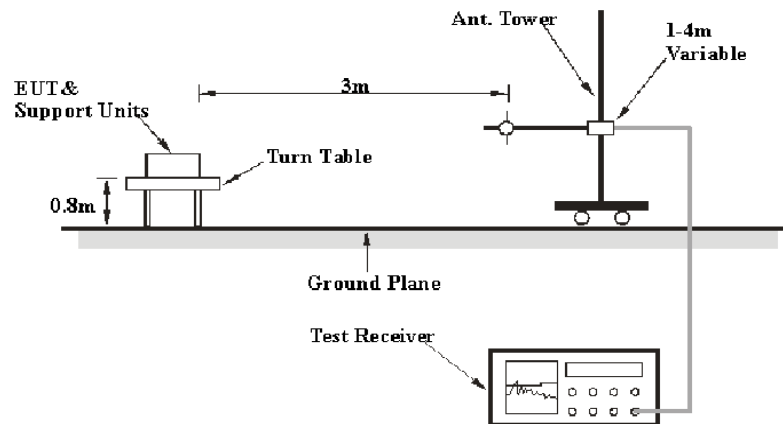
6G~25GHz:  $\pm 5.47$  dB;

Table 2 – Values of  $U_{cisp}$

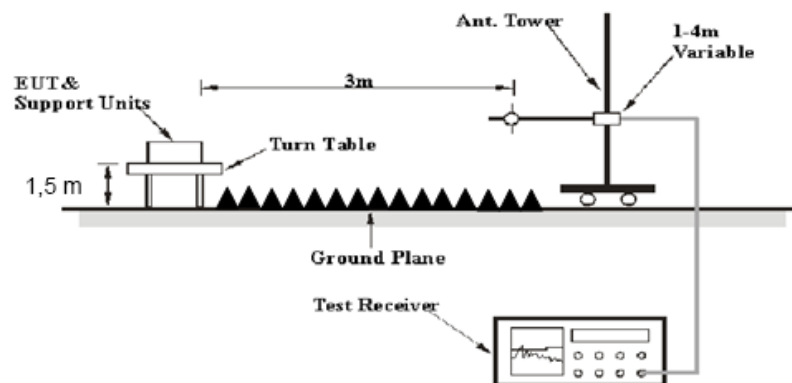
Measurement	$U_{cisp}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

## 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 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:

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	1007726-0113024	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:	20 °C
Relative Humidity:	60 %
ATM Pressure:	96 kPa

\* The testing was performed by Tom Tang on 2017-03-31.

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	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	65.47	PK	H	23.50	3.00	0.00	91.97	N/A	N/A
2412	61.09	AV	H	23.50	3.00	0.00	87.59	N/A	N/A
2412	60.2	PK	V	23.50	3.00	0.00	86.70	N/A	N/A
2412	55.45	AV	V	23.50	3.00	0.00	81.95	N/A	N/A
2390	30.22	PK	H	23.57	3.00	0.00	56.79	74.00	17.21
2390	15.41	AV	H	23.57	3.00	0.00	41.98	54.00	12.02
4824	53.34	PK	H	30.84	5.11	26.87	62.42	74.00	11.58
4824	41.46	AV	H	30.84	5.11	26.87	50.54	54.00	3.46
7236	36.32	PK	H	34.77	6.18	26.36	50.91	74.00	23.09
7236	24.77	AV	H	34.77	6.18	26.36	39.36	54.00	14.64
32.3	41.05	QP	H	21.26	0.34	28.56	34.09	40.00	5.91
35.94	40.36	QP	H	18.60	0.38	28.54	30.80	40.00	9.20
Middle Channel: 2437 MHz									
2437	64.35	PK	H	23.41	3.00	0.00	90.76	N/A	N/A
2437	59.78	AV	H	23.41	3.00	0.00	86.19	N/A	N/A
2437	58.79	PK	V	23.41	3.00	0.00	85.20	N/A	N/A
2437	54.17	AV	V	23.41	3.00	0.00	80.58	N/A	N/A
4874	54.09	PK	H	31.00	5.09	26.87	63.31	74.00	10.69
4874	42.47	AV	H	31.00	5.09	26.87	51.69	54.00	2.31
7311	34.41	PK	H	34.92	6.21	26.40	49.14	74.00	24.86
7311	18.76	AV	H	34.92	6.21	26.40	33.49	54.00	20.51
32.3	41.32	QP	H	21.26	0.34	28.56	34.36	40.00	5.64
35.94	40.5	QP	H	18.60	0.38	28.54	30.94	40.00	9.06
High Channel: 2462 MHz									
2462	62.96	PK	H	23.33	2.99	0.00	89.28	N/A	N/A
2462	58.58	AV	H	23.33	2.99	0.00	84.90	N/A	N/A
2462	57.59	PK	V	23.33	2.99	0.00	83.91	N/A	N/A
2462	53.01	AV	V	23.33	2.99	0.00	79.33	N/A	N/A
2483.5	29.83	PK	H	23.26	2.99	0.00	56.08	74.00	17.92
2483.5	15.76	AV	H	23.26	2.99	0.00	42.01	54.00	11.99
4924	55.19	PK	H	31.16	5.07	26.88	64.54	74.00	9.46
4924	40.89	AV	H	31.16	5.07	26.88	50.24	54.00	3.76
7386	32.36	PK	H	35.07	6.25	26.43	47.25	74.00	26.75
7386	17.42	AV	H	35.07	6.25	26.43	32.31	54.00	21.69
32.3	42.16	QP	H	21.26	0.34	28.56	35.20	40.00	4.80
35.94	40.92	QP	H	18.60	0.38	28.54	31.36	40.00	8.64

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	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	67.59	PK	H	23.50	3.00	0.00	94.09	N/A	N/A
2412	57.59	AV	H	23.50	3.00	0.00	84.09	N/A	N/A
2412	62.01	PK	V	23.50	3.00	0.00	88.51	N/A	N/A
2412	52.11	AV	V	23.50	3.00	0.00	78.61	N/A	N/A
2390	30.44	PK	V	23.57	3.00	0.00	57.01	74.00	16.99
2390	15.41	AV	H	23.57	3.00	0.00	41.98	54.00	12.02
4824	53.28	PK	H	30.84	5.11	26.87	62.36	74.00	11.64
4824	37.96	AV	H	30.84	5.11	26.87	47.04	54.00	6.96
7236	39.66	PK	H	34.77	6.18	26.36	54.25	74.00	19.75
7236	20.52	AV	H	34.77	6.18	26.36	35.11	54.00	18.89
32.3	41.69	QP	H	21.26	0.34	28.56	34.73	40.00	5.27
35.94	41.36	QP	H	18.60	0.38	28.54	31.80	40.00	8.20
Middle Channel: 2437 MHz									
2437	66.13	PK	H	23.41	3.00	0.00	92.54	N/A	N/A
2437	56.17	AV	H	23.41	3.00	0.00	82.58	N/A	N/A
2437	61.11	PK	V	23.41	3.00	0.00	87.52	N/A	N/A
2437	50.59	AV	V	23.41	3.00	0.00	77.00	N/A	N/A
4874	53.65	PK	H	31.00	5.09	26.87	62.87	74.00	11.13
4874	37.97	AV	H	31.00	5.09	26.87	47.19	54.00	6.81
7311	36.15	PK	H	34.92	6.21	26.40	50.88	74.00	23.12
7311	18.47	AV	H	34.92	6.21	26.40	33.20	54.00	20.80
32.3	41.22	QP	H	21.26	0.34	28.56	34.26	40.00	5.74
35.94	41.8	QP	H	18.60	0.38	28.54	32.24	40.00	7.76
High Channel: 2462 MHz									
2462	65.49	PK	H	23.33	2.99	0.00	91.81	N/A	N/A
2462	55.19	AV	H	23.33	2.99	0.00	81.51	N/A	N/A
2462	59.23	PK	V	23.33	2.99	0.00	85.55	N/A	N/A
2462	49.25	AV	V	23.33	2.99	0.00	75.57	N/A	N/A
2483.5	29.33	PK	H	23.26	2.99	0.00	55.58	74.00	18.42
2483.5	15.48	AV	H	23.26	2.99	0.00	41.73	54.00	12.27
4924	54.8	PK	H	31.16	5.07	26.88	64.15	74.00	9.85
4924	38.58	AV	H	31.16	5.07	26.88	47.93	54.00	6.07
7386	32.46	PK	H	35.07	6.25	26.43	47.35	74.00	26.65
7386	17.19	AV	H	35.07	6.25	26.43	32.08	54.00	21.92
32.3	41.95	QP	H	21.26	0.34	28.56	34.99	40.00	5.01
35.94	40.37	QP	H	18.60	0.38	28.54	30.81	40.00	9.19

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	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	67.43	PK	H	23.50	3.00	0.00	93.93	N/A	N/A
2412	56.96	AV	H	23.50	3.00	0.00	83.46	N/A	N/A
2412	61.94	PK	V	23.50	3.00	0.00	88.44	N/A	N/A
2412	51.16	AV	V	23.50	3.00	0.00	77.66	N/A	N/A
2390	31.12	PK	H	23.57	3.00	0.00	57.69	74.00	16.31
2390	15.63	AV	H	23.57	3.00	0.00	42.20	54.00	11.80
4824	53.73	PK	H	30.84	5.11	26.87	62.81	74.00	11.19
4824	37.42	AV	H	30.84	5.11	26.87	46.50	54.00	7.50
7236	38.57	PK	H	34.77	6.18	26.36	53.16	74.00	20.84
7236	19.5	AV	H	34.77	6.18	26.36	34.09	54.00	19.91
32.3	42.22	QP	H	21.26	0.34	28.56	35.26	40.00	4.74
35.94	40.51	QP	H	18.60	0.38	28.54	30.95	40.00	9.05
Middle Channel: 2437 MHz									
2437	65.98	PK	H	23.41	3.00	0.00	92.39	N/A	N/A
2437	55.74	AV	H	23.41	3.00	0.00	82.15	N/A	N/A
2437	61.07	PK	V	23.41	3.00	0.00	87.48	N/A	N/A
2437	50.23	AV	V	23.41	3.00	0.00	76.64	N/A	N/A
4874	53.87	PK	H	31.00	5.09	26.87	63.09	74.00	10.91
4874	37.77	AV	H	31.00	5.09	26.87	46.99	54.00	7.01
7311	35.61	PK	H	34.92	6.21	26.40	50.34	74.00	23.66
7311	18.47	AV	H	34.92	6.21	26.40	33.20	54.00	20.80
32.3	43.06	QP	H	21.26	0.34	28.56	36.10	40.00	3.90
35.94	40.93	QP	H	18.60	0.38	28.54	31.37	40.00	8.63
High Channel: 2462 MHz									
2462	64.87	PK	H	23.33	2.99	0.00	91.19	N/A	N/A
2462	54.73	AV	H	23.33	2.99	0.00	81.05	N/A	N/A
2462	60.12	PK	V	23.33	2.99	0.00	86.44	N/A	N/A
2462	48.99	AV	V	23.33	2.99	0.00	75.31	N/A	N/A
2483.5	29.4	PK	H	23.26	2.99	0.00	55.65	74.00	18.35
2483.5	15.41	AV	H	23.26	2.99	0.00	41.66	54.00	12.34
4924	53.99	PK	H	31.16	5.07	26.88	63.34	74.00	10.66
4924	37.96	AV	H	31.16	5.07	26.88	47.31	54.00	6.69
7386	32.65	PK	H	35.07	6.25	26.43	47.54	74.00	26.46
7386	17.31	AV	H	35.07	6.25	26.43	32.20	54.00	21.80
32.3	42.59	QP	H	21.26	0.34	28.56	35.63	40.00	4.37
35.94	41.37	QP	H	18.60	0.38	28.54	31.81	40.00	8.19



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

### Applicable Standard

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

### Test Procedure

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	Attenuator	10dB	N/A	Each Time	/
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

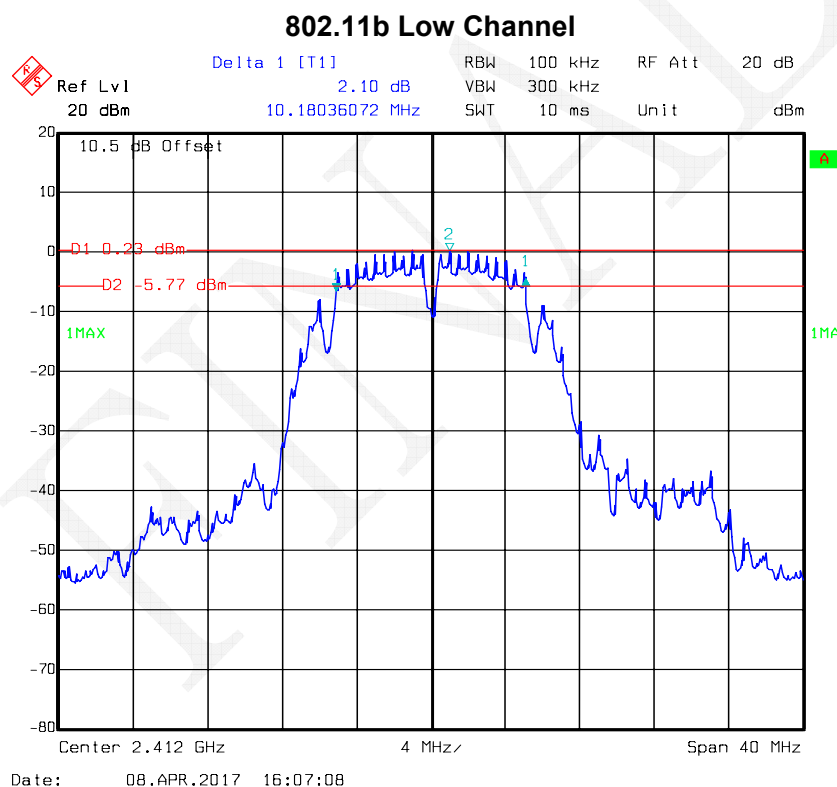
Temperature:	21 °C
Relative Humidity:	56 %
ATM Pressure:	96 kPa

\* The testing was performed by Tom Tang on 2017-04-08.

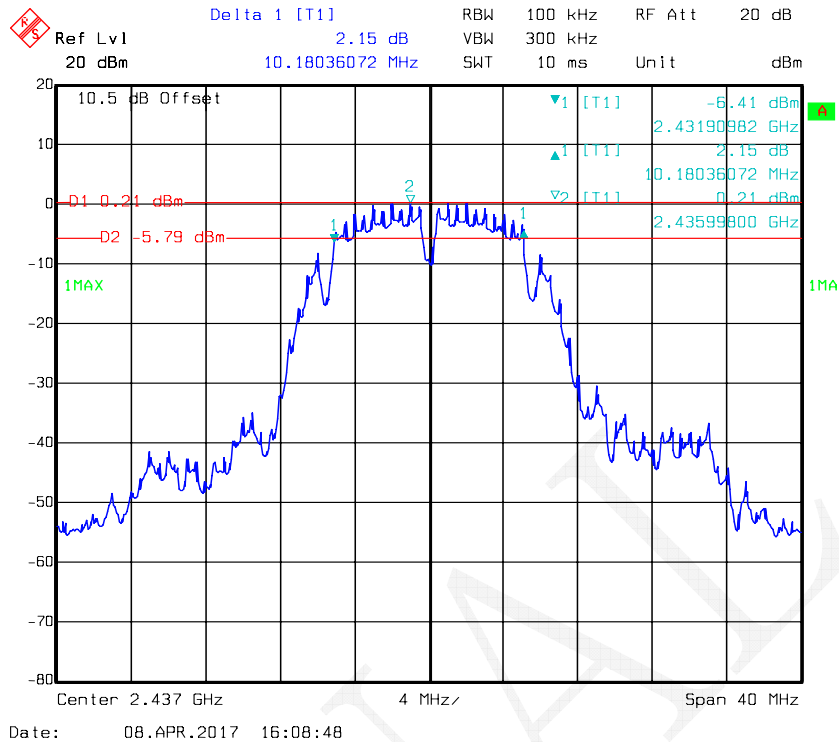
Test Mode: Transmitting

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

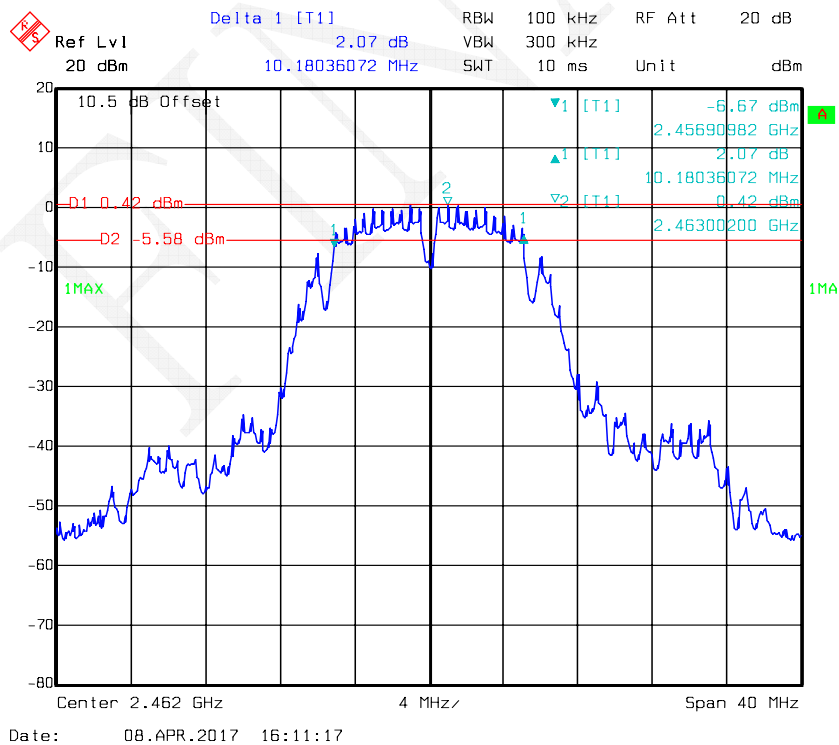
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.18	≥0.5
	Middle	2437	10.18	≥0.5
	High	2462	10.18	≥0.5
802.11g	Low	2412	15.95	≥0.5
	Middle	2437	16.43	≥0.5
	High	2462	16.35	≥0.5
802.11n20	Low	2412	17.31	≥0.5
	Middle	2437	17.47	≥0.5
	High	2462	17.23	≥0.5



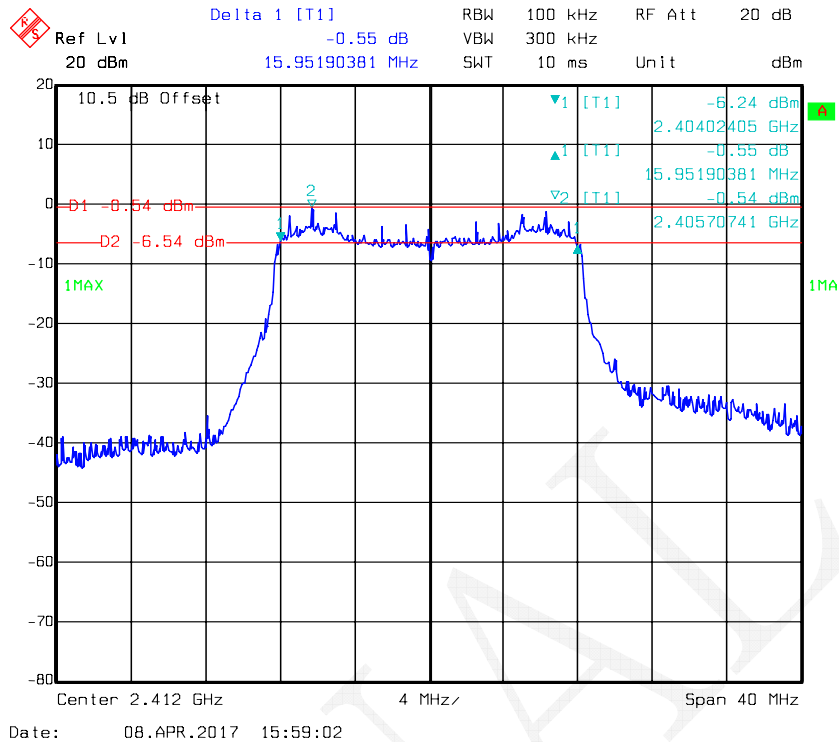
### 802.11b Middle Channel



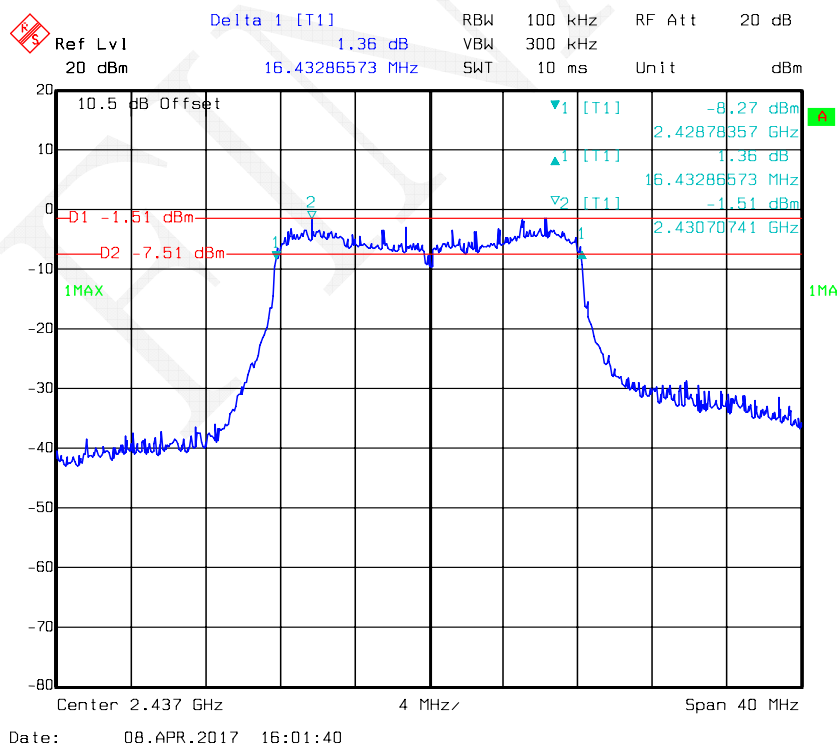
### 802.11b High Channel



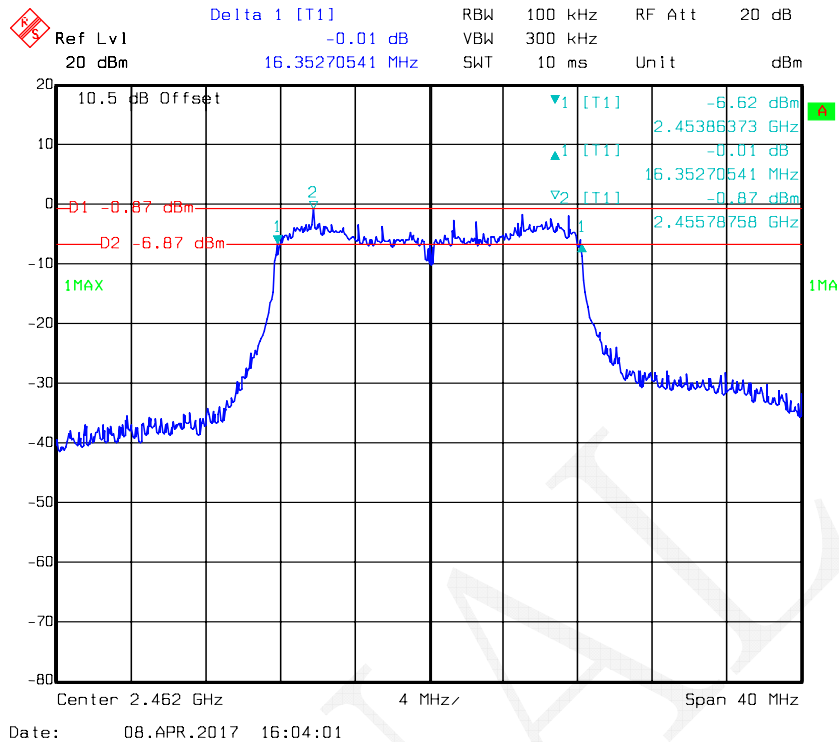
### 802.11g Low Channel



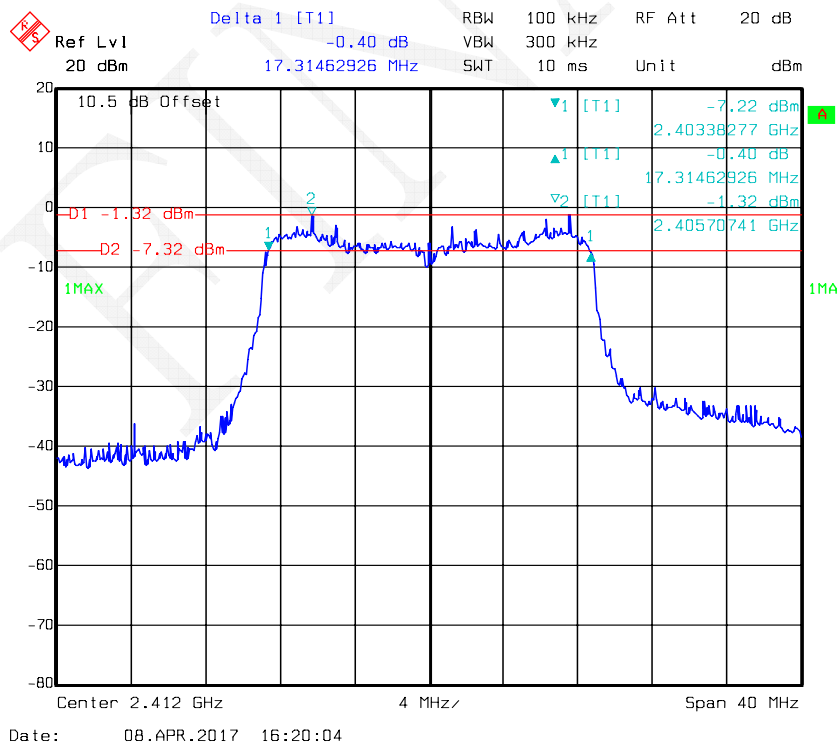
### 802.11g Middle Channel



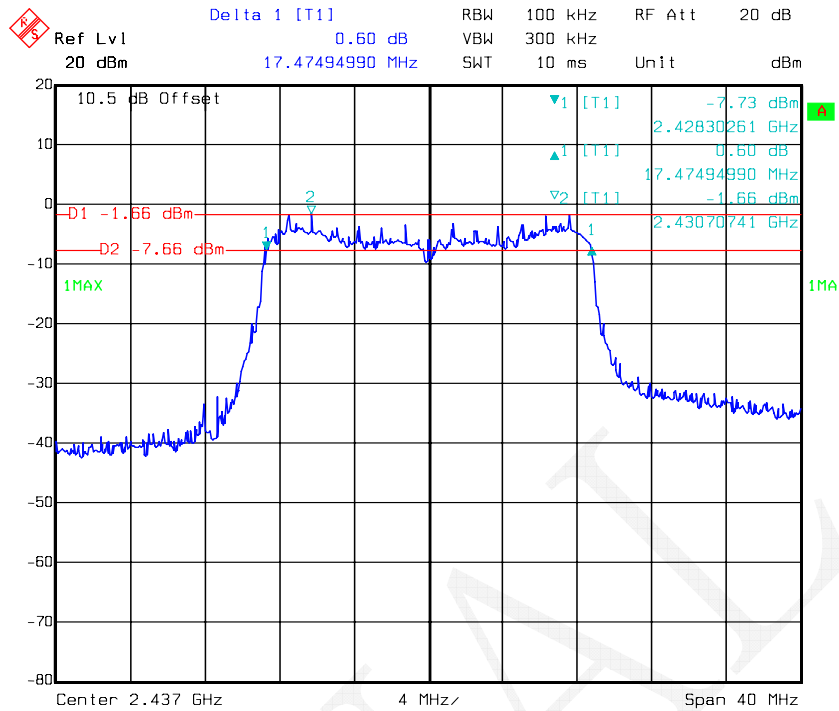
### 802.11g High Channel



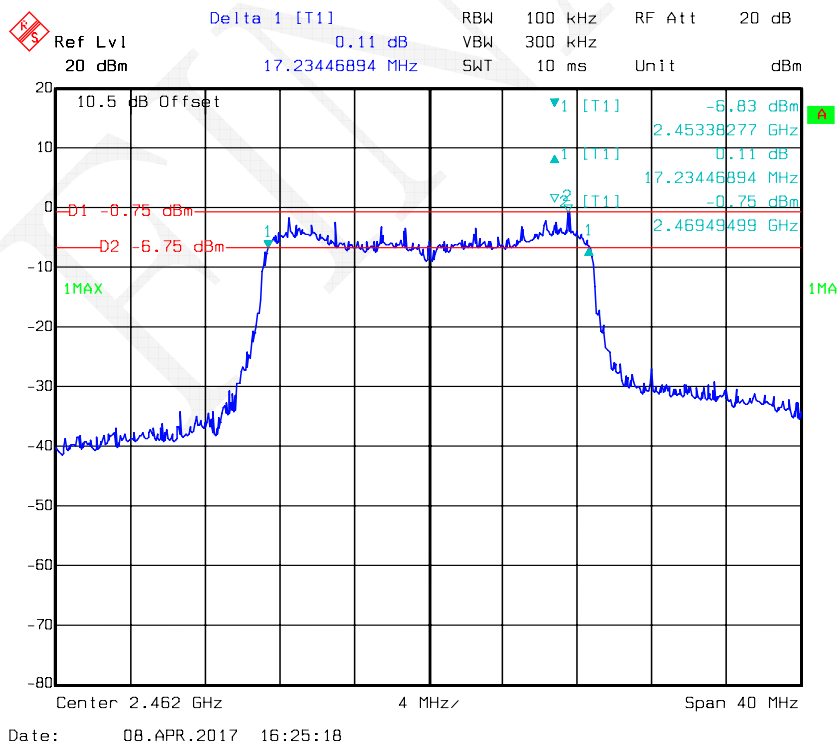
### 802.11n ht20 Low Channel



### 802.11n ht20 Middle Channel



### 802.11n ht20 High Channel



## 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
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

<b>Temperature:</b>	21 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	96 kPa

\* The testing was performed by Tom Tang on 2017-04-08.

Test Mode: Transmitting

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

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)
802.11b	Low	2412	11	9	30
	Middle	2437	10.9	9.04	30
	High	2462	10.6	9.24	30
802.11g	Low	2412	13.94	8.72	30
	Middle	2437	14.02	8.92	30
	High	2462	14.16	9.07	30
802.11n20	Low	2412	14.17	8.15	30
	Middle	2437	14.24	8.31	30
	High	2462	14.33	8.4	30



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

### **Applicable Standard**

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

### **Test Procedure**

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

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
N/A	Attenuator	10dB	N/A	Each Time	/
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
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

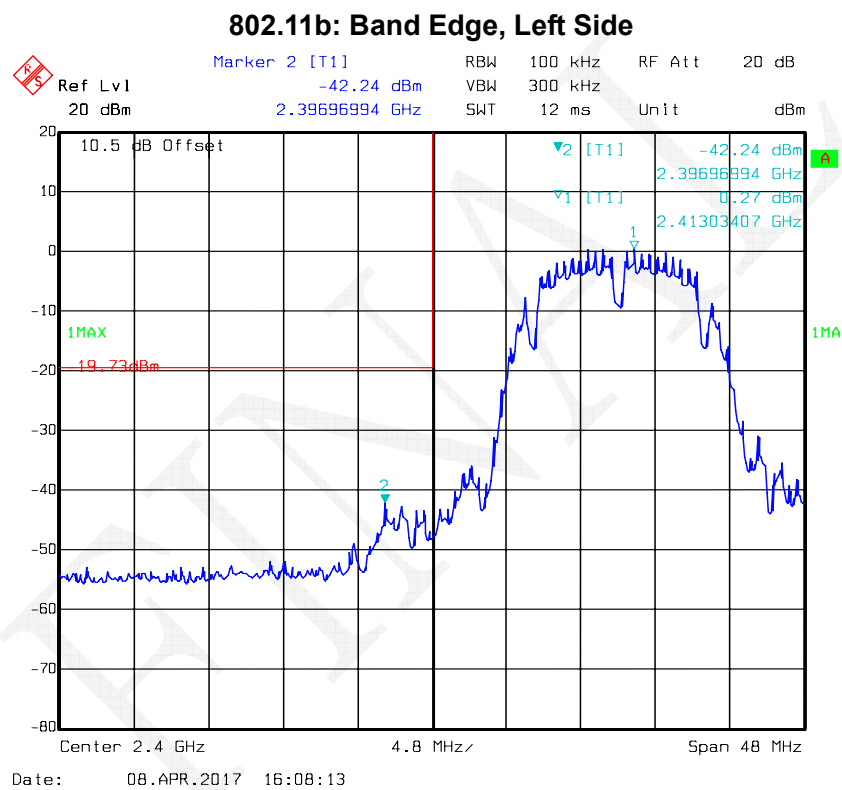
### Environmental Conditions

Temperature:	21 °C
Relative Humidity:	56 %
ATM Pressure:	96 kPa

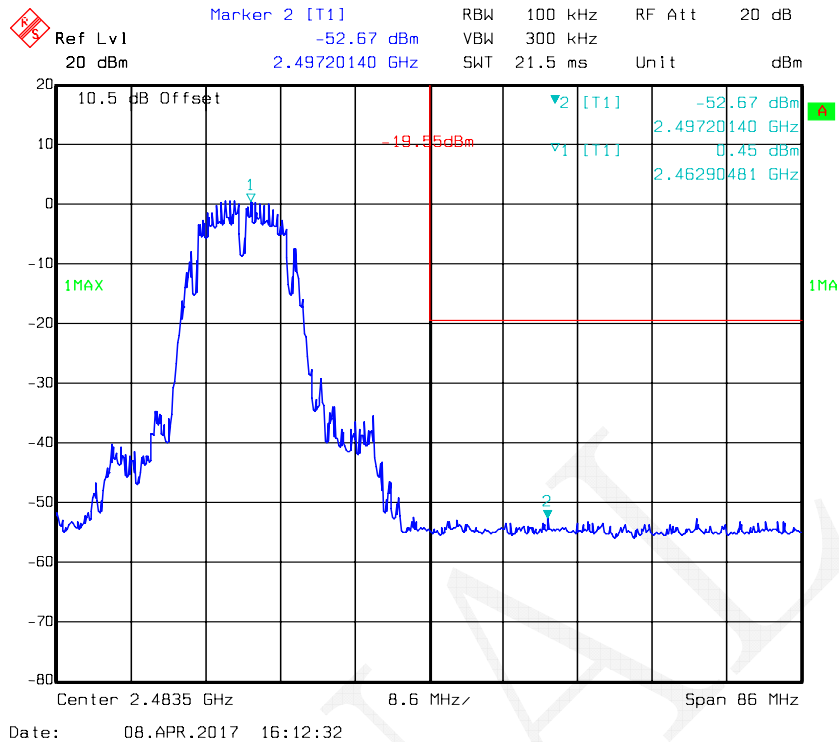
\* The testing was performed by Tom Tang on 2017-04-08.

Test mode: Transmitting

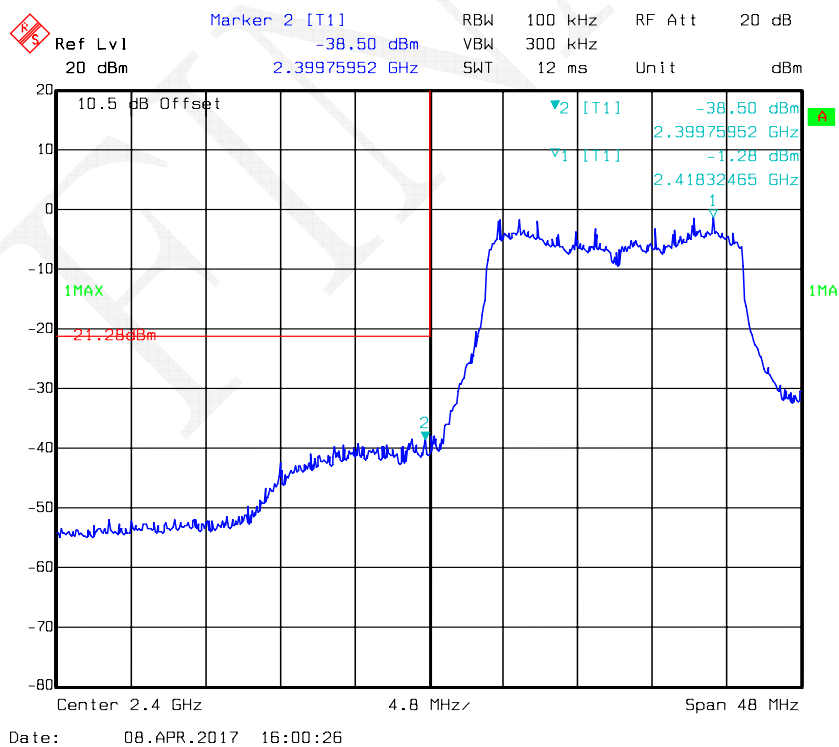
Test Result: Compliant. Please refer to following plots.



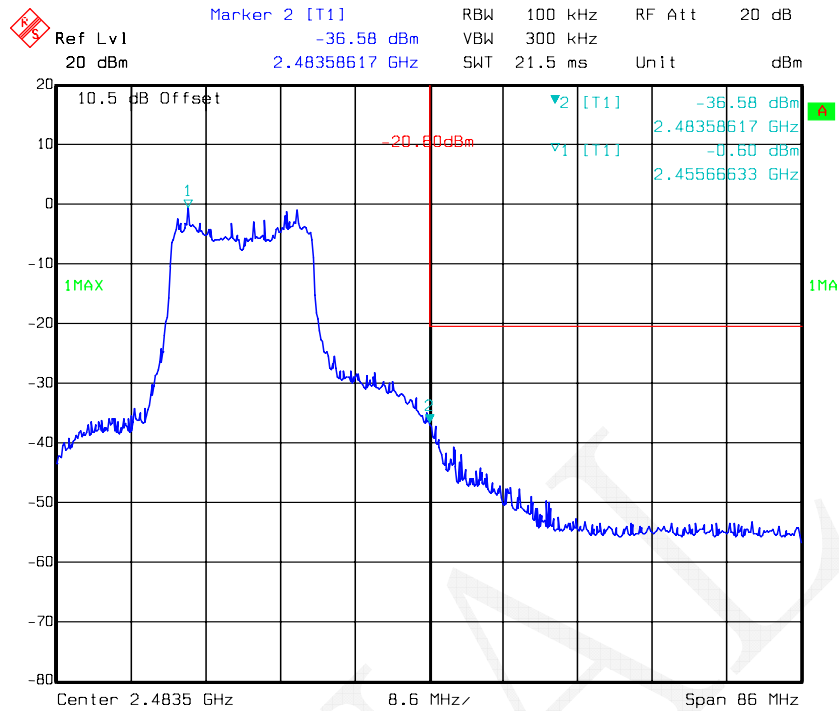
### 802.11b: Band Edge, Right Side



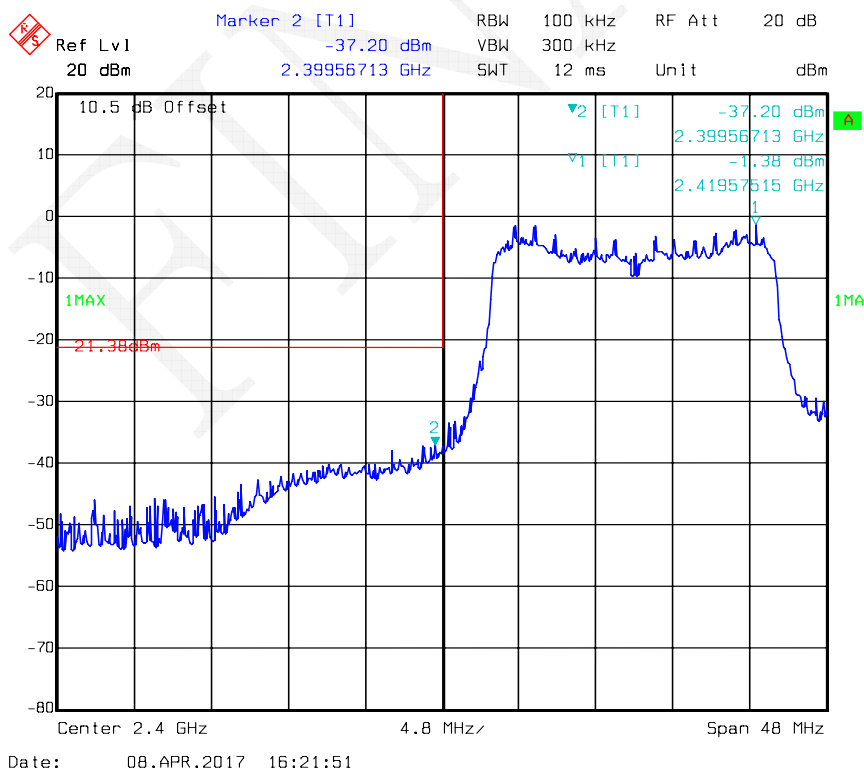
### 802.11g: Band Edge, Left Side



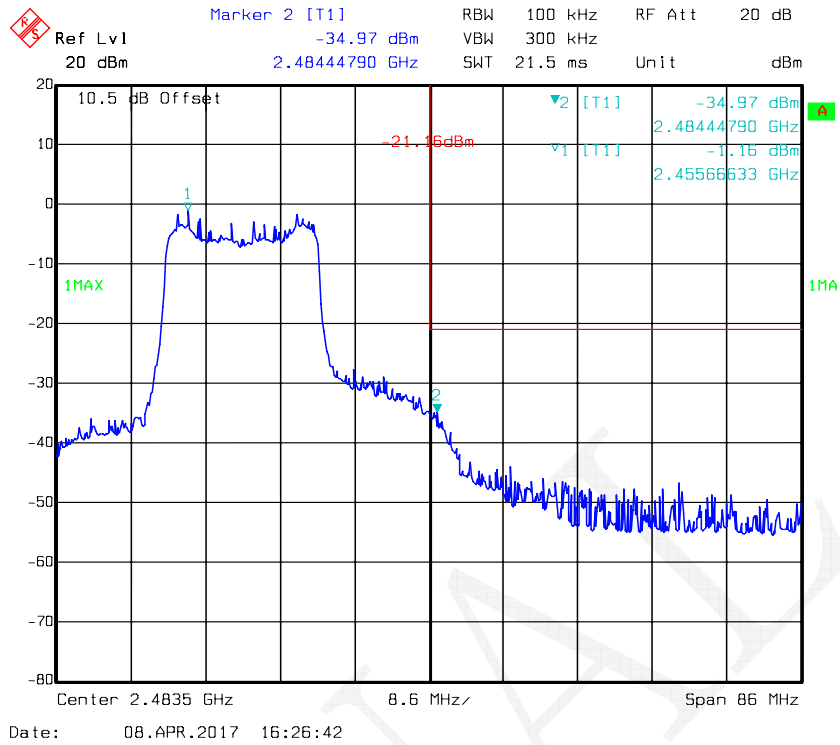
### 802.11g: Band Edge, Right Side



### 802.11n ht20 Band Edge, Left Side



### 802.11n ht20 Band Edge, Right Side



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

### Applicable Standard

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

### Test Procedure

- 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	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	Attenuator	10dB	N/A	Each Time	/
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

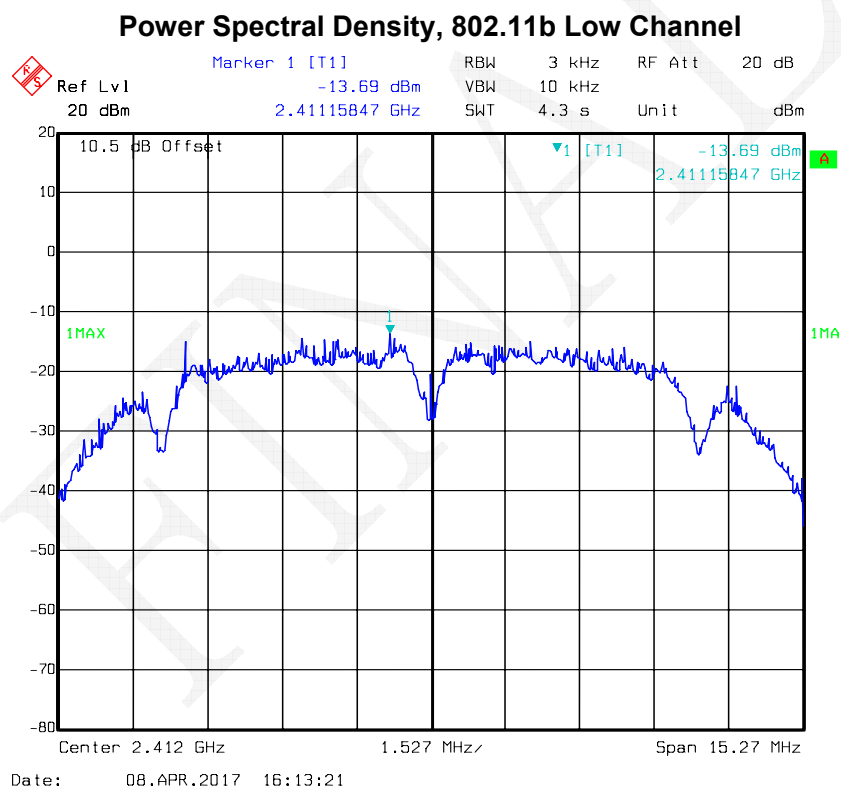
Temperature:	21 °C
Relative Humidity:	56 %
ATM Pressure:	96 kPa

\* The testing was performed by Tom Tang on 2017-04-08.

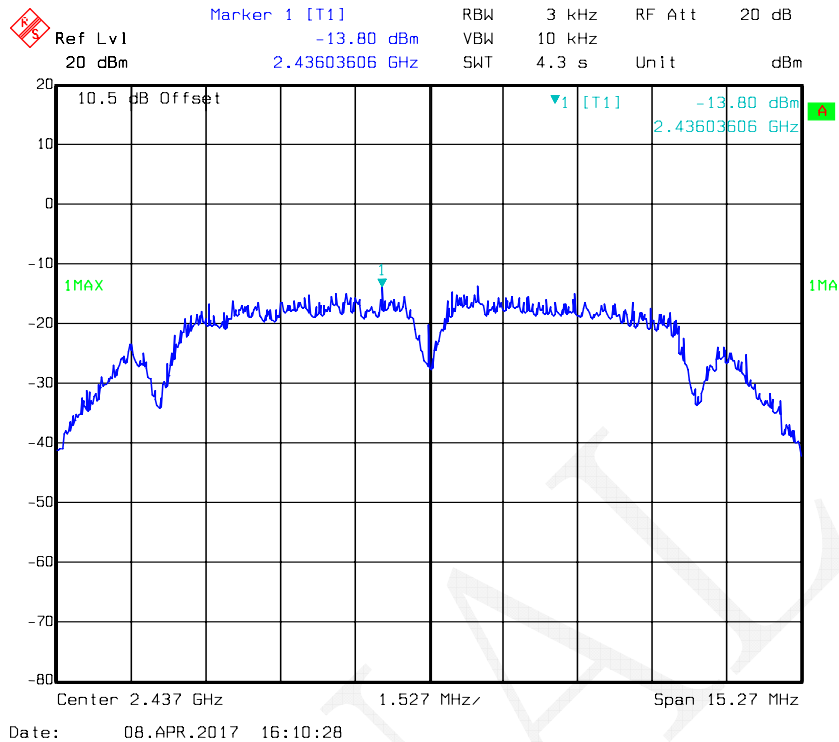
Test Mode: Transmitting

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

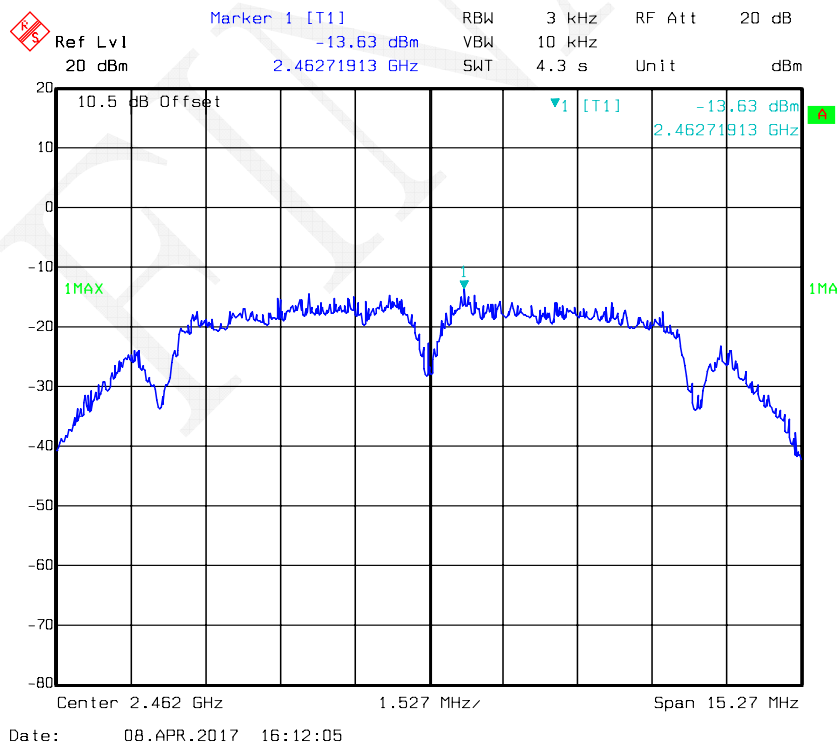
Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-13.69	≤8
	Middle	2437	-13.8	≤8
	High	2462	-13.63	≤8
802.11g	Low	2412	-12.9	≤8
	Middle	2437	-12.78	≤8
	High	2462	-12.2	≤8
802.11n20	Low	2412	-9.52	≤8
	Middle	2437	-9.92	≤8
	High	2462	-9.48	≤8



### Power Spectral Density, 802.11b Middle Channel

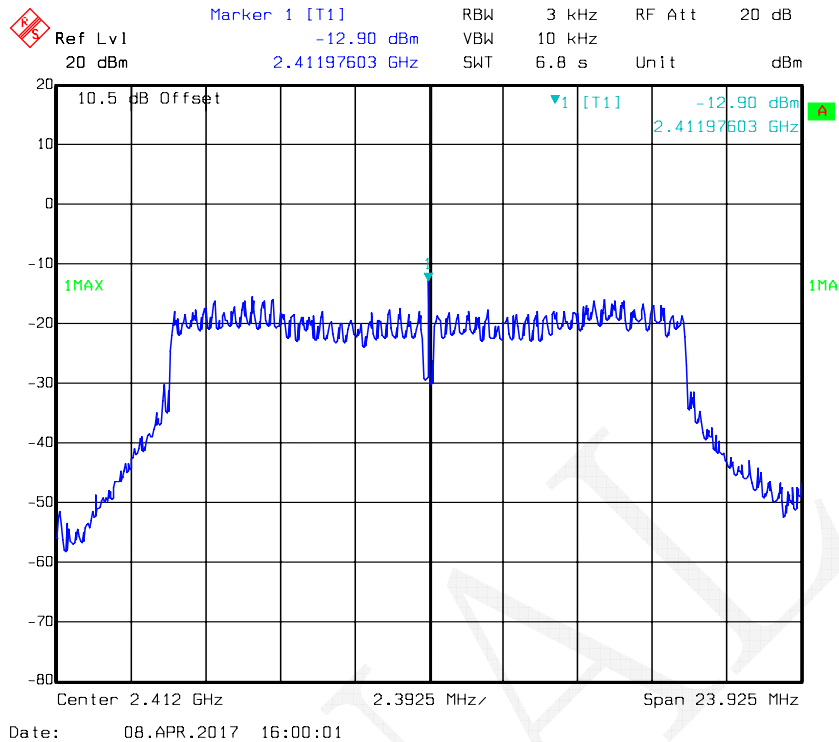


### Power Spectral Density, 802.11b High Channel

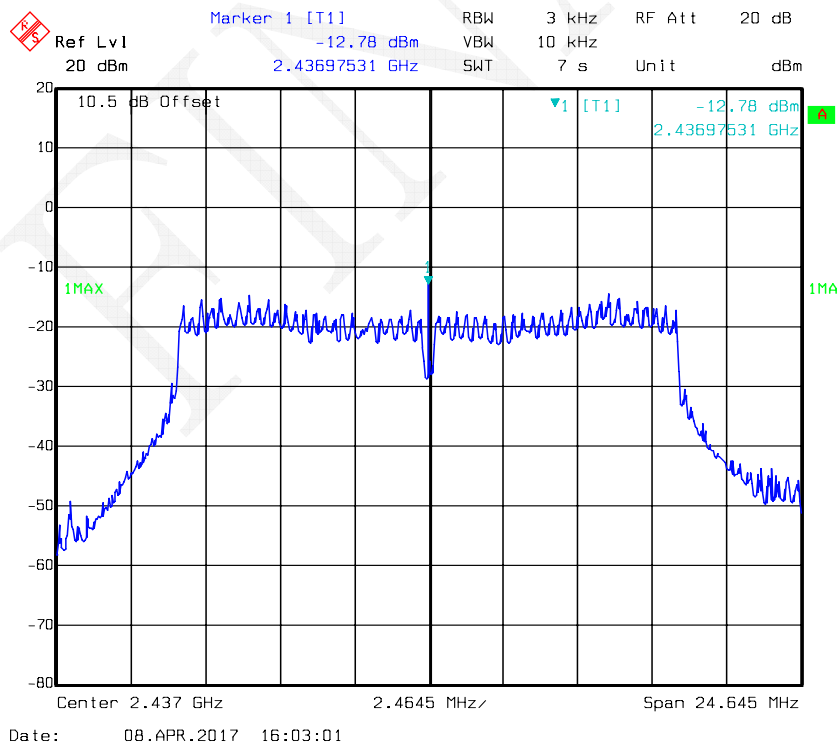




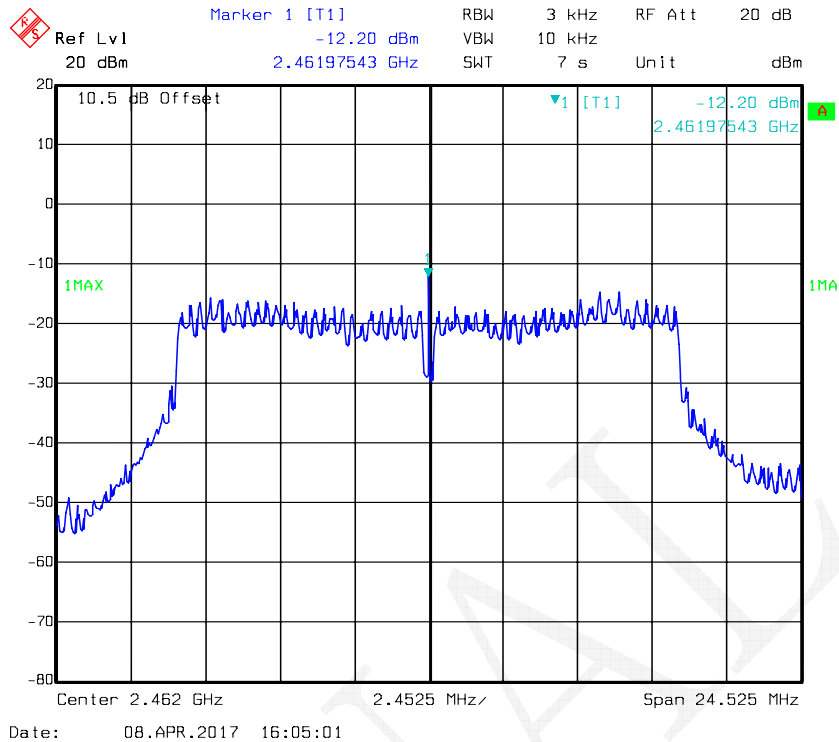
### Power Spectral Density, 802.11g Low Channel



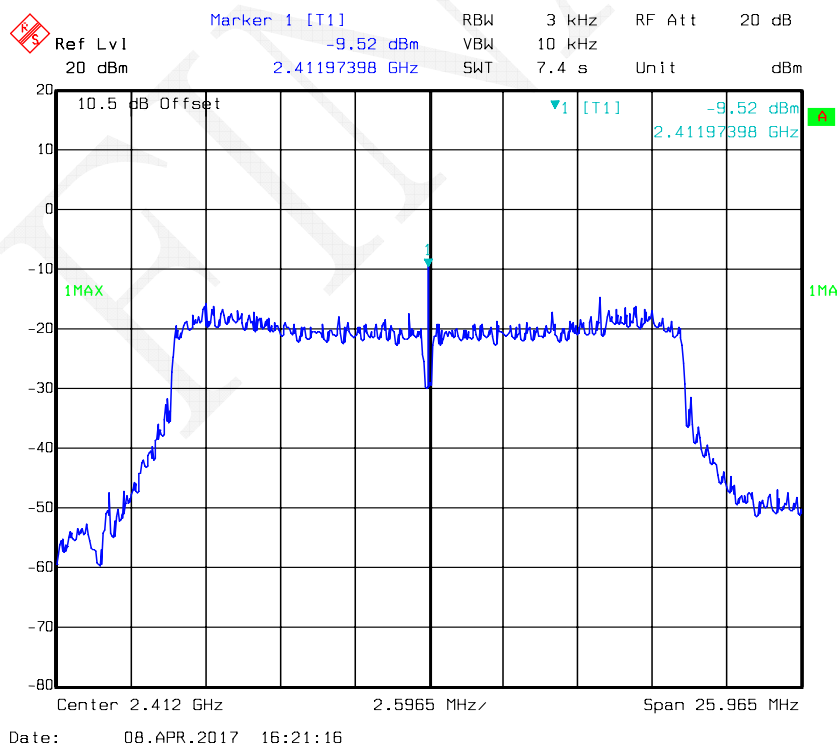
### Power Spectral Density, 802.11g Middle Channel



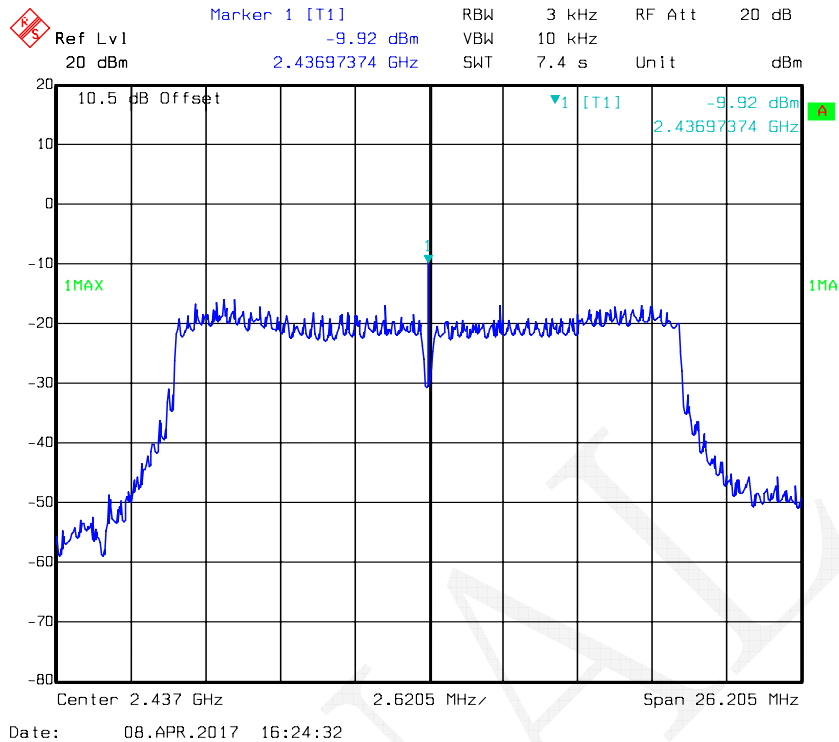
### Power Spectral Density, 802.11g High Channel



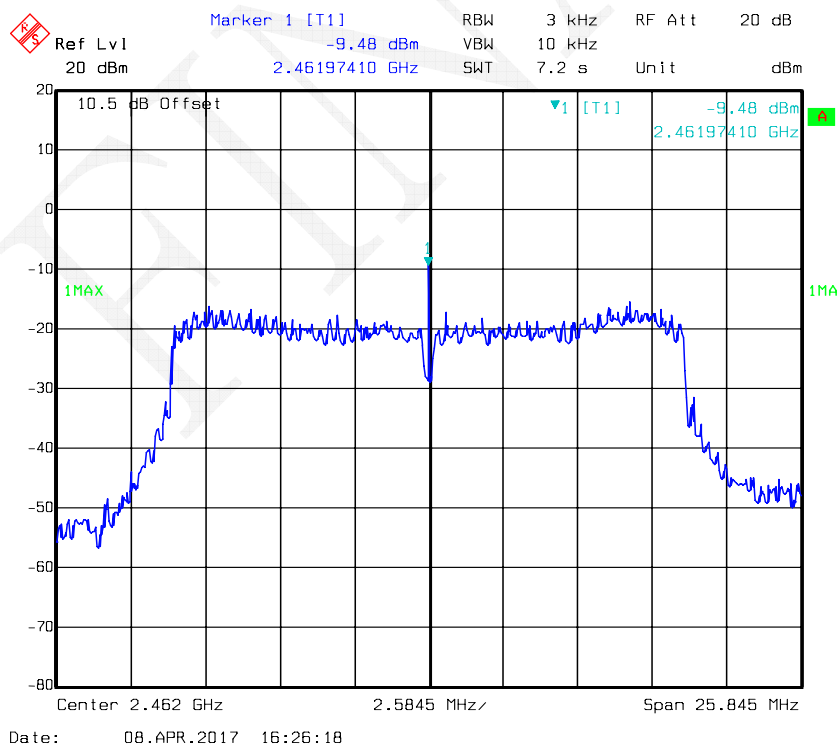
### Power Spectral Density, 802.11n ht20 Low Channel



### Power Spectral Density, 802.11n ht20 Middle Channel



### Power Spectral Density, 802.11n ht20 High Channel



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