



## FCC PART 15.407

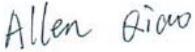
### TEST REPORT

For

### Shenzhen TongFang Information Technologies CO., LTD

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NanShan District, ShenZhen, P.R.China 518058

**FCC ID: 2ABKZ-UA791909**

<b>Report Type:</b> Original Report	<b>Product Type:</b> MID
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<b>Report Number:</b> <u>RDG150209002-00C</u>	
<b>Report Date:</b> <u>2015-02-15</u>	
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## GENERAL INFORMATION

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

The *Shenzhen TongFang Information Technologies CO., LTD*'s product, model number: *B9SS (FCC ID: 2ABKZ-UA791909)* or ("EUT") in this report is a *MID*, which was measured approximately: 24.7 cm (L) x 19.4 cm (W) x 1.2 cm (H), rated input voltage: DC 3.7V rechargeable Li-ion battery or DC5V charging from USB port.

Adapter information:

Model: FEF0500200A1BU  
Input: 100-240V~50/80Hz, 0.3A  
Output: 5V, 2.0A

*All measurement and test data in this report was gathered from production sample serial number: 150209002 (Assigned by BACL, Dongguan). The EUT was received on 2015-02-10*

### Objective

This type approval report is prepared on behalf of *Shenzhen TongFang Information Technologies CO., LTD* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

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

FCC Part 15B JBP submissions with FCC ID: 2ABKZ-UA791909.  
FCC Part 15C DSS submissions with FCC ID: 2ABKZ-UA791909.  
FCC Part 15C DTS submissions with FCC ID: 2ABKZ-UA791909.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications 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 February 06, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. 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 EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5G band, the EUT only support 5150~5250 MHz, and 802.11a mode, 6 channels are provided to test:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 802.11a mode, the channel 36, 40 and 48 were tested.

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 “AmpakRFTestTool V5.0” was used for testing. The worst condition (maximum power with 100% duty cycle) was configured by default value and the data rate of wifi was set by the software as following table:

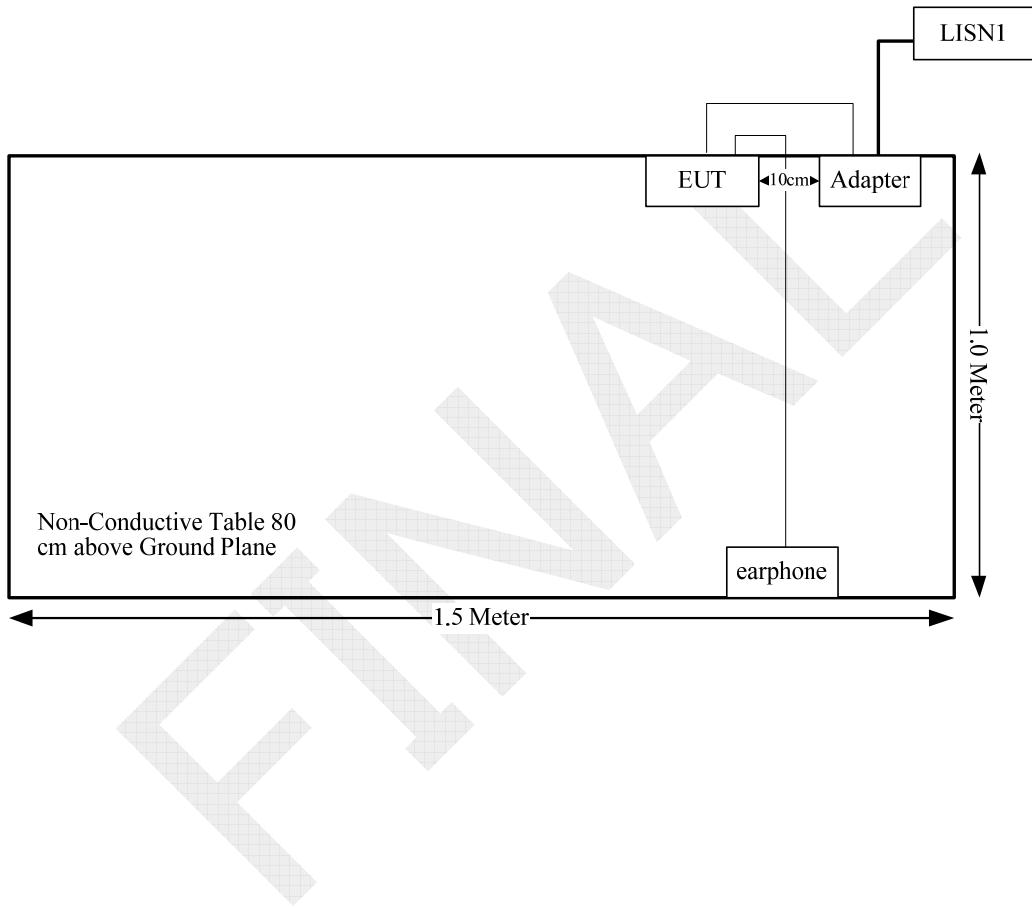
Test Mode	Test Software Version	AmpakRFTestTool V5.0		
		5180MHz	5200MHz	5240MHz
802.11a	Test Frequency	5180MHz	5200MHz	5240MHz
	Data Rate	6Mbps	6Mbps	6Mbps

### Equipment Modifications

No modification was made to the EUT.

**External Cable**

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

**Block Diagram of Test Setup**

## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f)	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1),(6),(7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(b) (1),(2),(3),(4)	Out Of Band Emissions	Compliance
§15.407(a) (1)	26 dB Bandwidth	Compliance
§15.407(a)(1),	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(5)	Power Spectral Density	Compliance

## FCC §15.407 (f) - RF EXPOSURE

### Applicable Standard

According to §15.407(f) U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

According to KDB447498 D01 General RF Exposure Guidance v05r02:

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:

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

- $f(\text{GHz})$  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 maximum conducted output power = 8.02dBm (6.34mW) at 5200 MHz  
 $[(\text{max. power of channel, mW}) / (\text{min. test separation distance, mm})] [\sqrt{f(\text{GHz})}]$   
 $= 6.34 / 5 * (\sqrt{5.200}) = 2.89 < 3.0$

So the stand-alone SAR evaluation is not necessary.

## **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 use of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.407 (a)(1), if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **Antenna Connector Construction**

The EUT has one internal antenna arrangement, which was permanently attached and the antenna gain is 0 dBi at 5.2GHz band, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207, §15.407(b) (6)

### Measurement Uncertainty

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

If  $U_{\text{lab}}$  is less than or equal to  $U_{\text{cisp}}$  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  $U_{\text{lab}}$  is greater than  $U_{\text{cisp}}$  of Table 1, then:

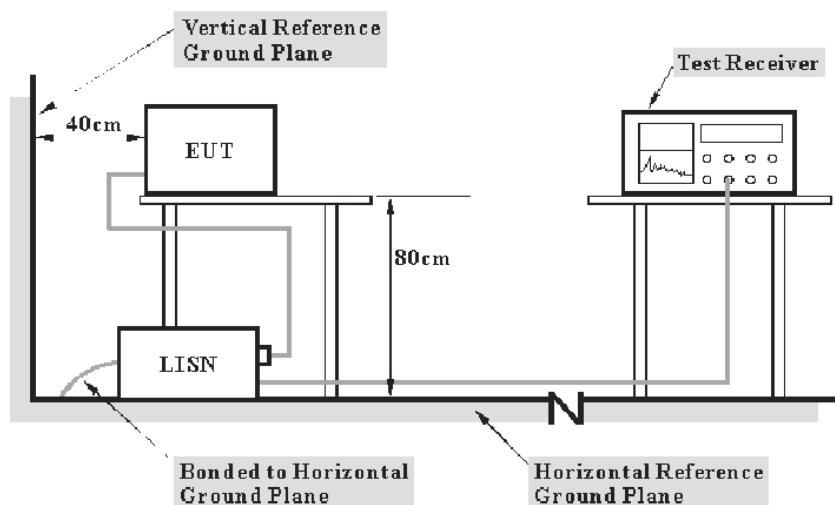
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cisp}})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of  $U_{\text{cisp}}$

Measurement	$U_{\text{cisp}}$
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 C63.4-2009 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 VAC/60 Hz 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

### 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
R&S	EMI Test Receiver	ESCS 30	830245/006	2014-10-16	2015-10-16
R&S	L.I.S.N	ESH3-Z5	843331/015	N/A	N/A
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-12-11	2015-12-11
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

During the conducted emission test, the adapter of laptop was connected to the first LISN and the other support equipments were connected to the outlet of the second 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.

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

**12.0 dB at 0.744147 MHz** in the **Neutral** conducted mode

## Test Data

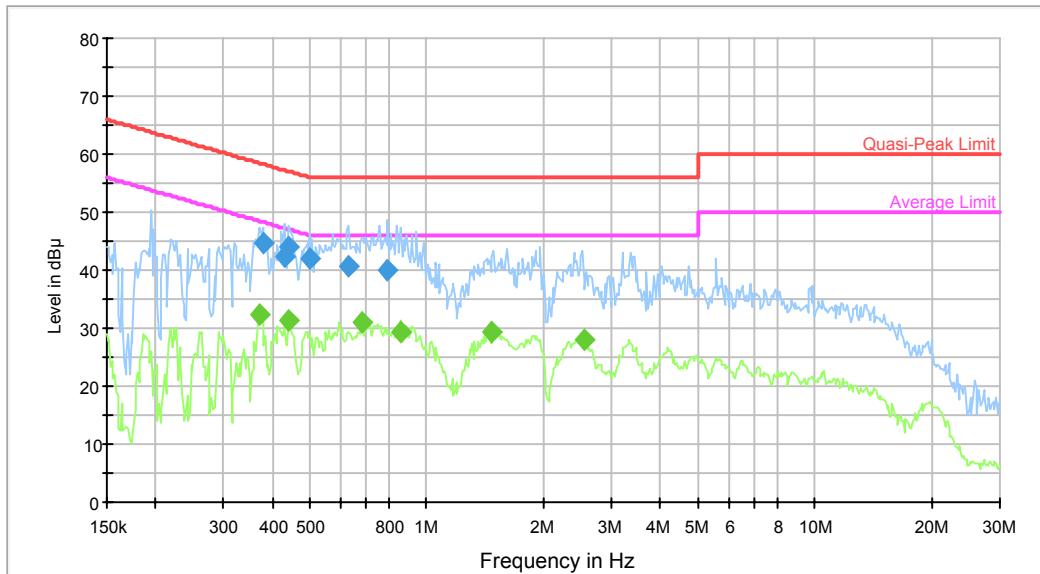
### Environmental Conditions

<b>Temperature:</b>	20.3 °C
<b>Relative Humidity:</b>	32 %
<b>ATM Pressure:</b>	101.4 kPa

*The testing was performed by Allen Qiao on 2015-02-13.*

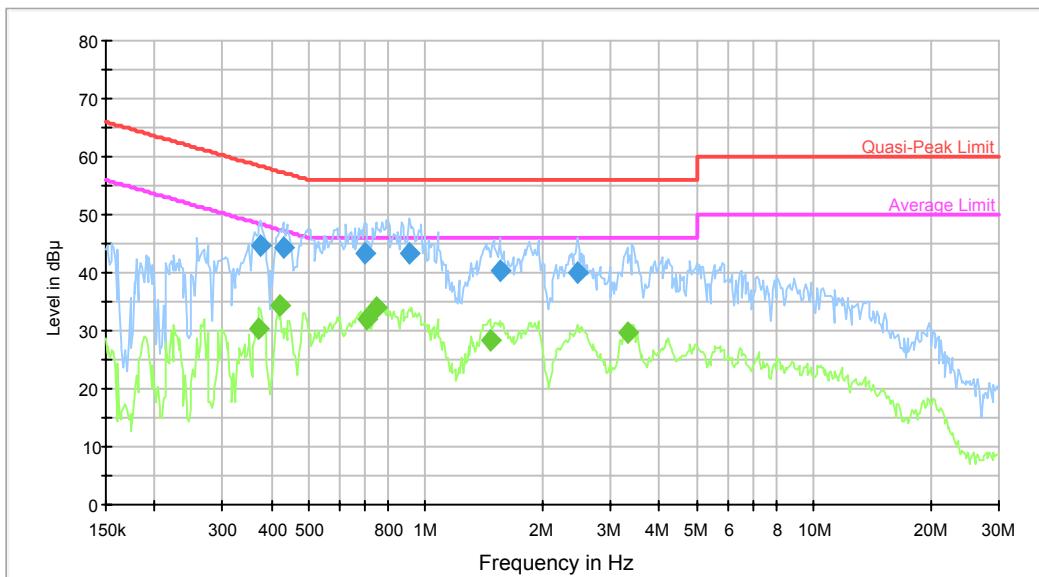
*Test Mode: Transmitting*

**AC120 V, 60 Hz, Line:**



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.378019	44.8	9.000	L1	10.6	13.5	58.3	Compliance
0.429420	42.5	9.000	L1	10.5	14.8	57.3	Compliance
0.443327	44.0	9.000	L1	10.5	13.0	57.0	Compliance
0.499611	41.9	9.000	L1	10.4	14.2	56.0	Compliance
0.629488	40.6	9.000	L1	10.5	15.4	56.0	Compliance
0.793127	40.1	9.000	L1	10.5	15.9	56.0	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.369089	32.4	9.000	L1	10.7	16.2	48.5	Compliance
0.443327	31.4	9.000	L1	10.5	15.6	47.0	Compliance
0.681699	30.9	9.000	L1	10.6	15.1	46.0	Compliance
0.858911	29.5	9.000	L1	10.5	16.5	46.0	Compliance
1.476605	29.4	9.000	L1	10.4	16.6	46.0	Compliance
2.538519	28.0	9.000	L1	10.5	18.0	46.0	Compliance

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

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.375019	44.8	9.000	N	10.9	13.6	58.4	Compliance
0.429420	44.3	9.000	N	10.6	12.9	57.3	Compliance
0.698191	43.3	9.000	N	10.6	12.7	56.0	Compliance
0.908180	43.2	9.000	N	10.6	12.8	56.0	Compliance
1.548915	40.5	9.000	N	10.5	15.5	56.0	Compliance
2.458886	39.9	9.000	N	10.5	16.1	56.0	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.372042	30.3	9.000	N	10.9	18.2	48.5	Compliance
0.422630	34.4	9.000	N	10.7	13.0	47.4	Compliance
0.703777	32.0	9.000	N	10.6	14.0	46.0	Compliance
0.744147	34.0	9.000	N	10.6	12.0	46.0	Compliance
1.464886	28.2	9.000	N	10.5	17.8	46.0	Compliance
3.328423	29.6	9.000	N	10.7	16.4	46.0	Compliance

## FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) –UNWANTED EMISSION

### Applicable Standard

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

### 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 radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

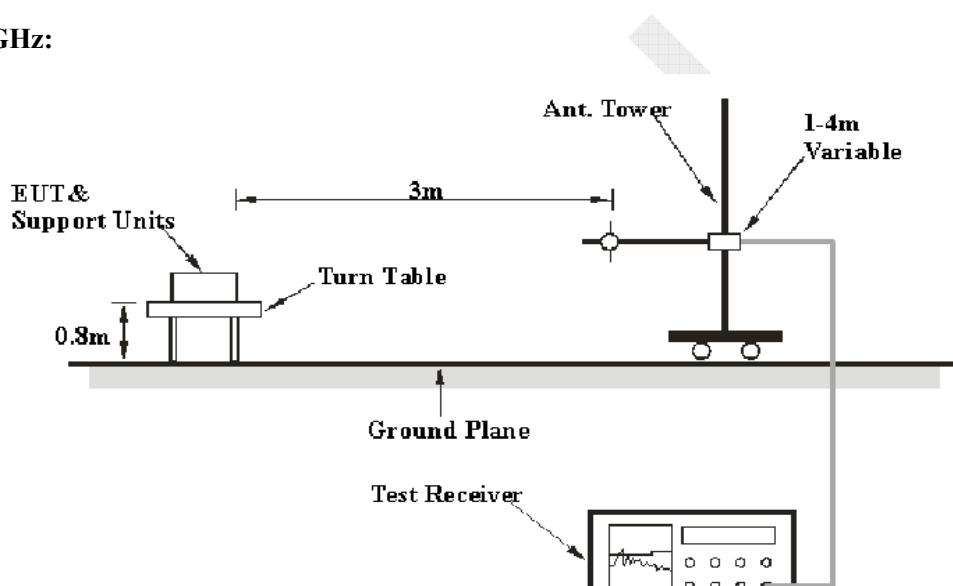
6G~18GHz: 5.23 dB

Table 1 – Values of  $U_{\text{cisp}}^{\text{r}}$

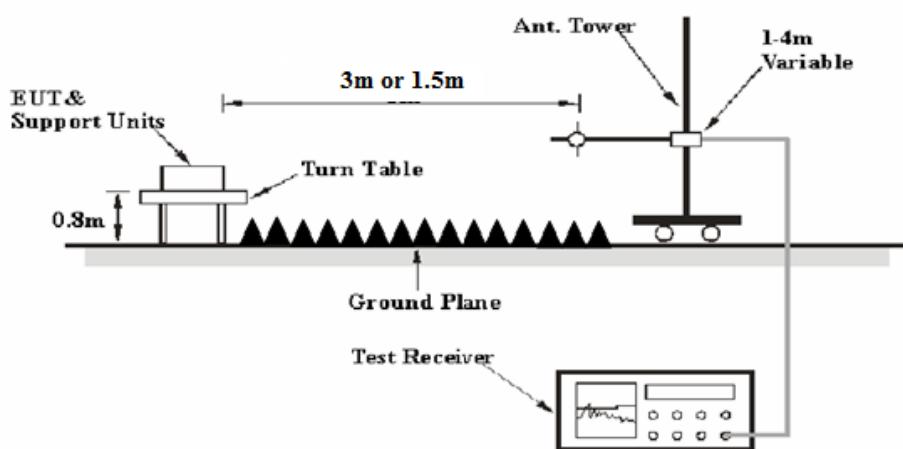
Measurement	$U_{\text{cisp}}^{\text{r}}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

## EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.407 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.

The adapter was connected to a 120 VAC/60 Hz power source

### EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

### Test Procedure

During the radiated emission test, the adapter of laptop was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v01, emission shall be computed as:  $E [dB\mu V/m] = EIRP[dBm] + 95.2$ , for  $d = 3$  meters.

According to C63.4, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]}/\text{test distance [1.5m]})$  dB

Extrapolation result = Corrected Amplitude ( $dB\mu V/m$ ) - distance extrapolation factor (6dB)

### 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:

$$\text{Margin} = \text{Limit} - \text{Extrapolation result}$$

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, Section 15.205, 15.209 and 15.407, with the worst margin reading of:

**7.08 dB at 5150 MHz in the Horizontal polarization mode**

## Test Data

### Environmental Conditions

Temperature:	21.2°C
Relative Humidity:	42%
ATM Pressure:	101.4 kPa

The testing was performed by Allen Qiao on 2015-02-13.

Mode: Transmitting

Note: For above 1GHz, the test distance is 1.5m.

5180MHz-5240MHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB $\mu$ V/m)	Extrapolation result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
(MHz)	Reading (dB $\mu$ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Low Channel: 5180 MHz										
5180	61.65	PK	H	31.46	5.40	0.00	98.51	92.51	N/A	N/A
5180	51.82	AV	H	31.46	5.40	0.00	88.68	82.68	N/A	N/A
5180	58.65	PK	V	31.46	5.40	0.00	95.51	89.51	N/A	N/A
5180	47.71	AV	V	31.46	5.40	0.00	84.57	78.57	N/A	N/A
5150	27.76	PK	H	31.40	5.26	0.00	64.42	58.42	74.00	15.58
5150	16.26	AV	H	31.40	5.26	0.00	52.92	46.92	54.00	<b>7.08</b>
10360	32.24	PK	H	36.97	8.36	25.52	52.05	46.05	74.00	27.95
10360	20.38	AV	H	36.97	8.36	25.52	40.19	34.19	54.00	19.81
15540	31.56	PK	H	37.43	14.94	24.98	58.95	52.95	74.00	21.05
15540	19.13	AV	H	37.43	14.94	24.98	46.52	40.52	54.00	13.48
1591	43.24	PK	H	23.78	2.56	27.77	41.81	35.81	74.00	38.19
1591	29.67	AV	H	23.78	2.56	27.77	28.24	22.24	54.00	31.76
2933	40.64	PK	H	27.03	6.37	27.54	46.50	40.50	74.00	33.50
2933	28.35	AV	H	27.03	6.37	27.54	34.21	28.21	54.00	25.79
432.7	35.74	QP	H	16.82	2.49	21.85	33.20	33.20	46.00	12.80
Middle Channel: 5200 MHz										
5200	61.33	PK	H	31.50	5.49	0.00	98.32	92.32	N/A	N/A
5200	51.24	AV	H	31.50	5.49	0.00	88.23	82.23	N/A	N/A
5200	58.32	PK	V	31.50	5.49	0.00	95.31	89.31	N/A	N/A
5200	47.81	AV	V	31.50	5.49	0.00	84.80	78.80	N/A	N/A
10400	32.31	PK	H	36.98	8.32	25.50	52.11	46.11	74.00	27.89
10400	20.35	AV	H	36.98	8.32	25.50	40.15	34.15	54.00	19.85
15600	31.47	PK	H	37.32	14.69	24.69	58.79	52.79	74.00	21.21
15600	19.12	AV	H	37.32	14.69	24.69	46.44	40.44	54.00	13.56
1591	43.29	PK	H	23.78	2.56	27.77	41.86	35.86	74.00	38.14
1591	30.65	AV	H	23.78	2.56	27.77	29.22	23.22	54.00	30.78
2933	41.57	PK	H	27.03	6.37	27.54	47.43	41.43	74.00	32.57
2933	29.36	AV	H	27.03	6.37	27.54	35.22	29.22	54.00	24.78
432.7	35.92	QP	H	16.82	2.49	21.85	33.38	33.38	46.00	12.62
High Channel: 5240 MHz										
5240	61.12	PK	H	31.58	5.28	0.00	97.98	91.98	N/A	N/A
5240	51.04	AV	H	31.58	5.28	0.00	87.90	81.90	N/A	N/A
5240	58.69	PK	V	31.58	5.28	0.00	95.55	89.55	N/A	N/A
5240	48.34	AV	V	31.58	5.28	0.00	85.20	79.20	N/A	N/A
5350	25.93	PK	H	31.80	5.61	0.00	63.34	57.34	74.00	16.66
5350	14.77	AV	H	31.80	5.61	0.00	52.18	46.18	54.00	7.82
10480	32.28	PK	H	37.00	8.23	26.01	51.50	45.50	74.00	28.50
10480	20.45	AV	H	37.00	8.23	26.01	39.67	33.67	54.00	20.33
15720	31.52	PK	H	37.10	14.20	24.92	57.90	51.90	74.00	22.10
15720	18.97	AV	H	37.10	14.20	24.92	45.35	39.35	54.00	14.65
2933	42.15	PK	H	27.03	6.37	27.54	48.01	42.01	74.00	31.99
2933	30.63	AV	H	27.03	6.37	27.54	36.49	30.49	54.00	23.51
1591	44.59	PK	H	23.78	2.56	27.77	43.16	37.16	74.00	36.84
1591	30.45	AV	H	23.78	2.56	27.77	29.02	23.02	54.00	30.98
432.7	35.07	QP	H	16.82	2.49	21.85	32.53	32.53	46.00	13.47

## FCC§15.407(b) –CONDUCTED SPURIOUS EMISSION AT ANTENNA PORT

### Applicable Standard

FCC §15.407;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

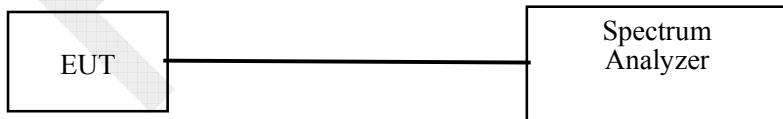
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The Resolution bandwidth is set to 1MHz, The Video bandwidth is set to  $\geq$  1MHz, report the peak value out of the operating band. Offset the antenna gain and cable loss.
3. Repeat above procedures until all frequencies measured were complete.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

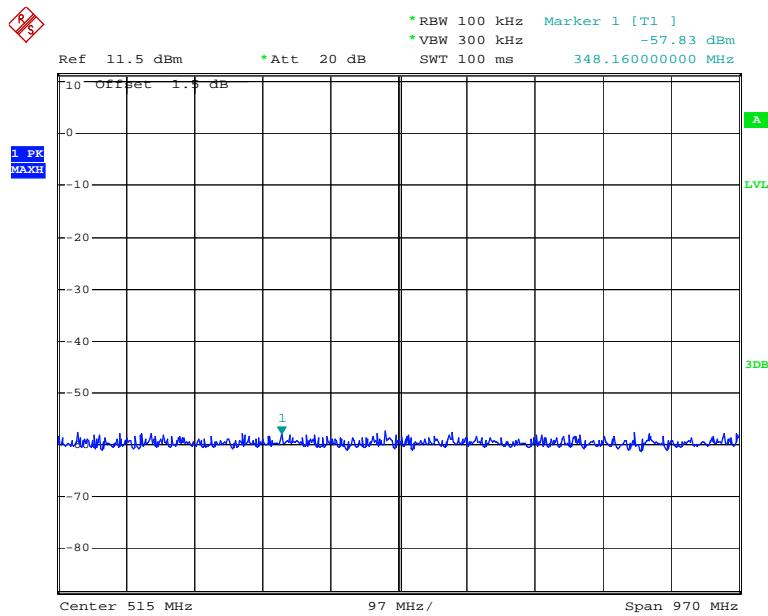
### Environmental Conditions

Temperature:	21.2°C
Relative Humidity:	42%
ATM Pressure:	101.4 kPa

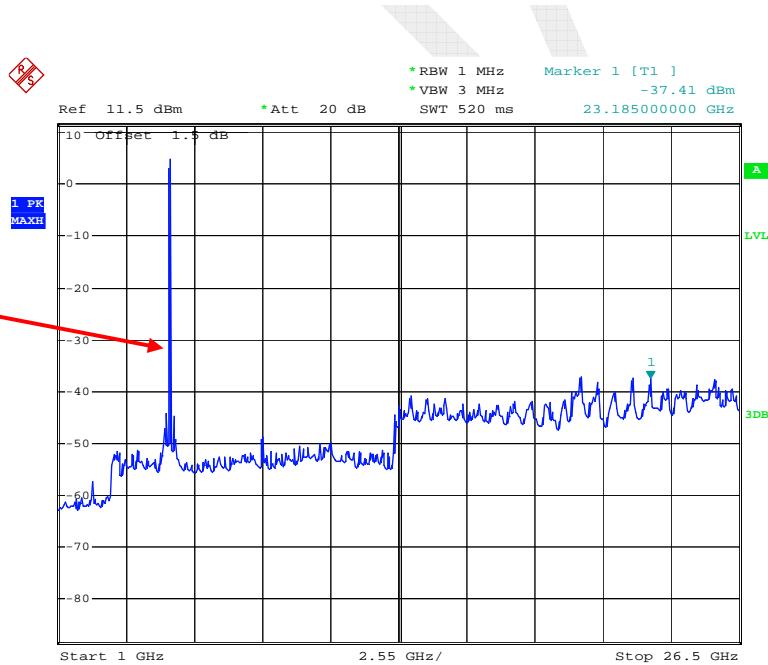
*The testing was performed by Allen Qiao on 205-02-13.*

**Test Result:** Compliance, please refer to the following plots.

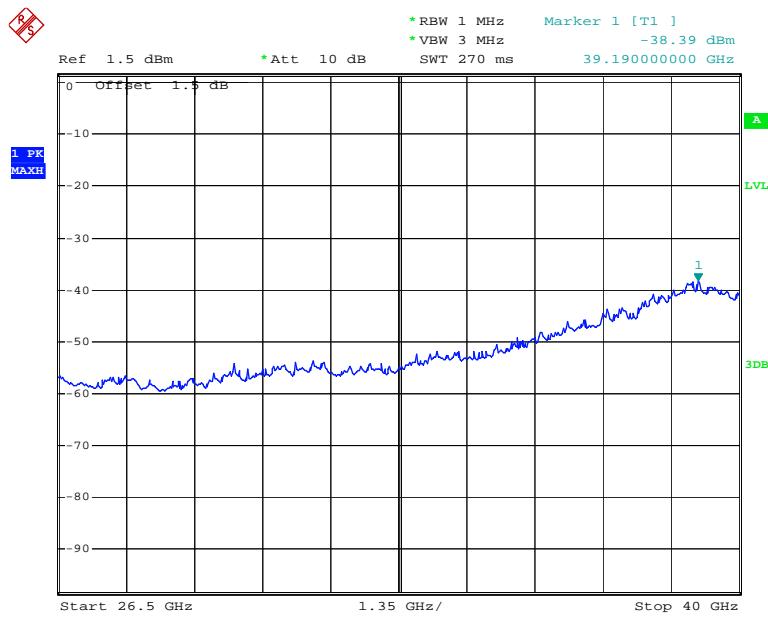
## 802.11a Low Channel



Date: 13.FEB.2015 15:09:32

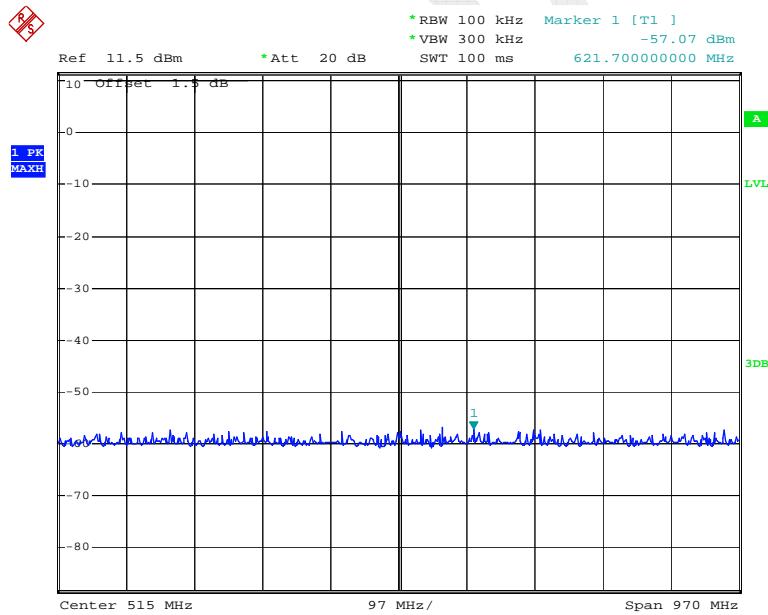


Date: 13.FEB.2015 15:07:17



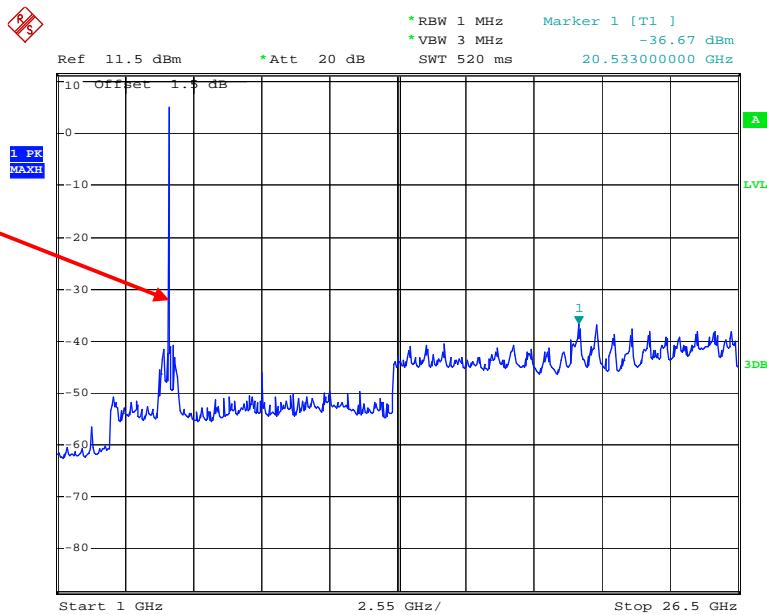
Date: 13.FEB.2015 15:05:25

### 802.11a Middle Channel

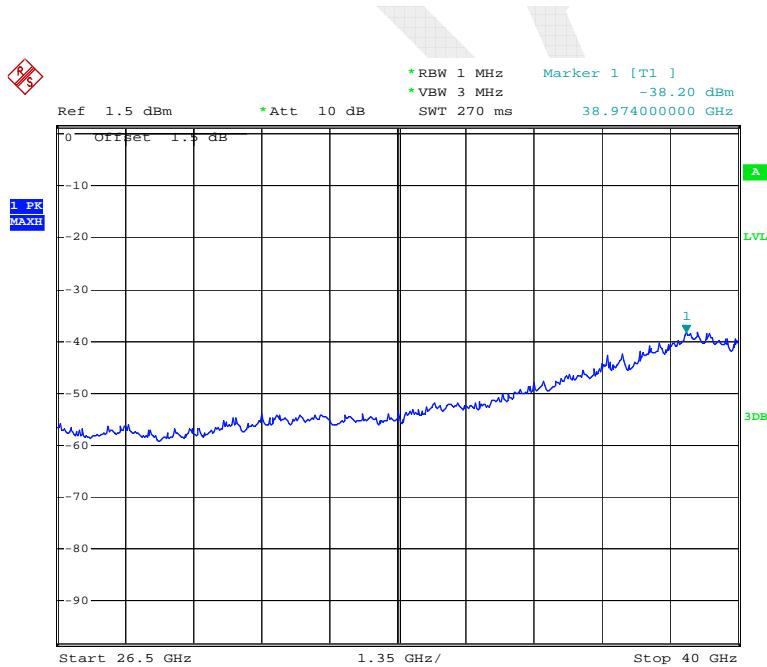


Date: 13.FEB.2015 15:10:39

Fundamental

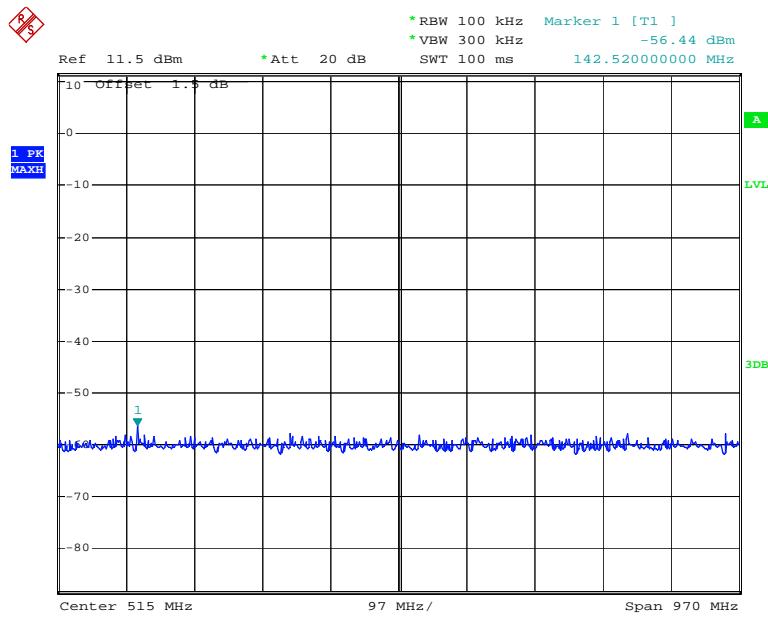


Date: 13.FEB.2015 15:52:17

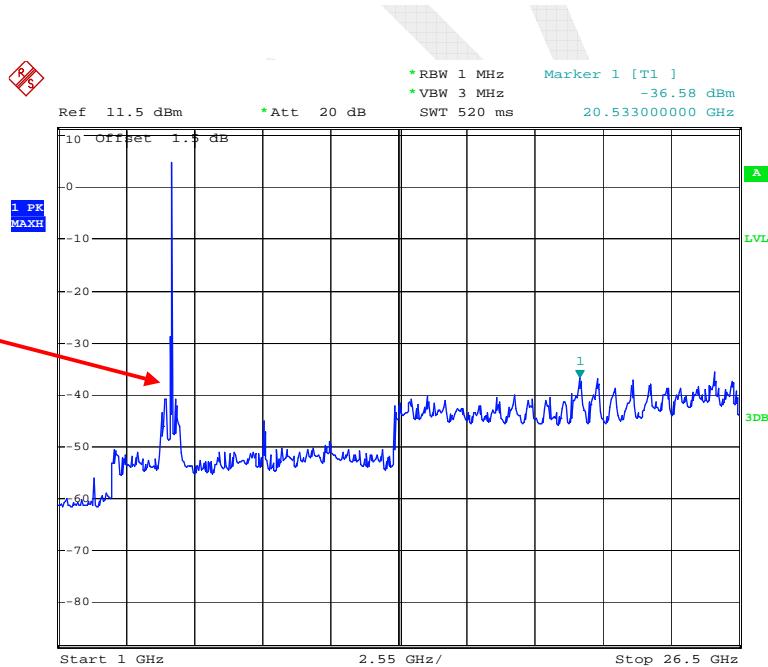


Date: 13.FEB.2015 15:05:09

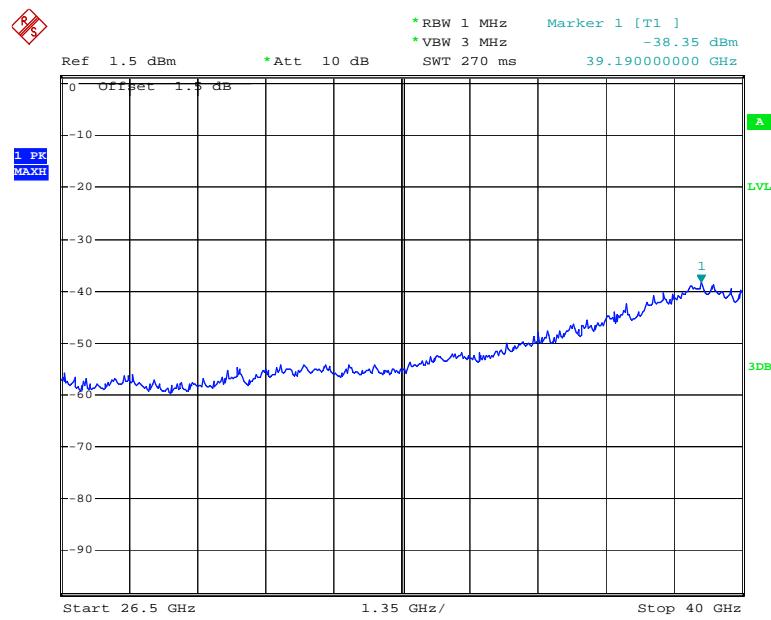
## 802.11a High Channel



Date: 13.FEB.2015 15:10:46



Date: 13.FEB.2015 15:51:56



Date: 13.FEB.2015 15:01:52

FIN

## FCC §15.407(b) (1) –BAND EDGE

### Applicable Standard

FCC §15.407 (b) (1), (2), (3), (4);

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

### Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Data

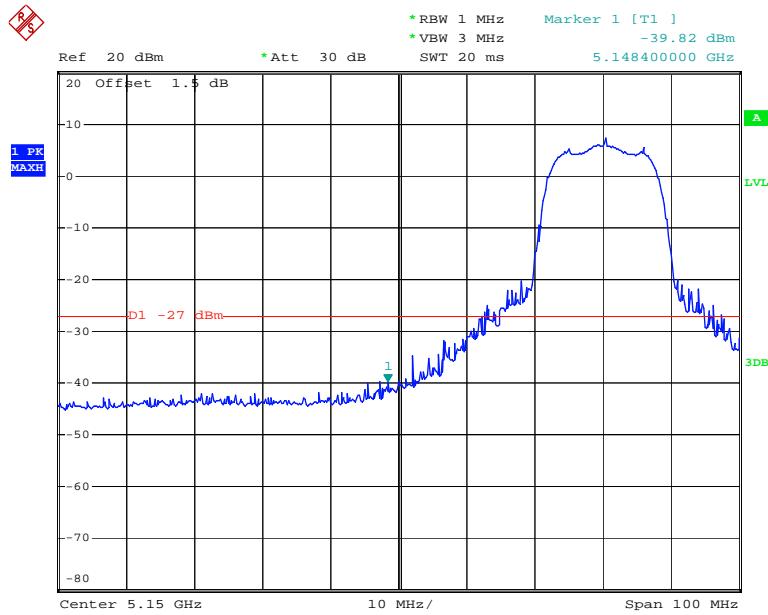
#### Environmental Conditions

Temperature:	21.2°C
Relative Humidity:	42 %
ATM Pressure:	101.4 kPa

The testing was performed by Allen Qiao on 2015-02-13.  
Please refer to the following plots:

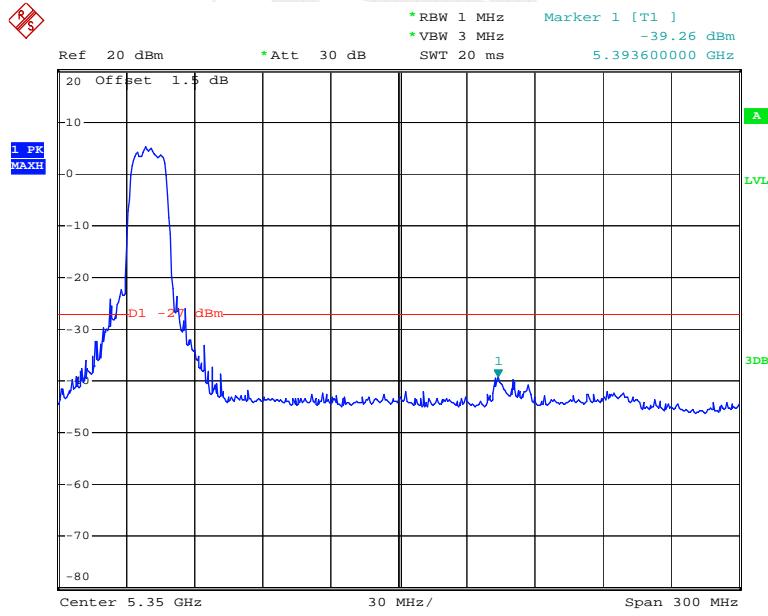
5180MHz-5240MHz:

## Band Edge, Left Side



Date: 13.FEB.2015 14:45:26

## Band Edge, Right Side



Date: 13.FEB.2015 14:46:05

## FCC §15.407(a) –EMISSION BANDWIDTH

### Applicable Standard

15.407(a) (e)

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

1. According to KDB 789033 D02 General UNII Test Procedures New Rules v01

### Test Data

#### Environmental Conditions

Temperature:	21.2°C
Relative Humidity:	42 %
ATM Pressure:	101.4 kPa

*The testing was performed by Allen Qiao on 2015-02-13.*

**Test Result:** Pass.

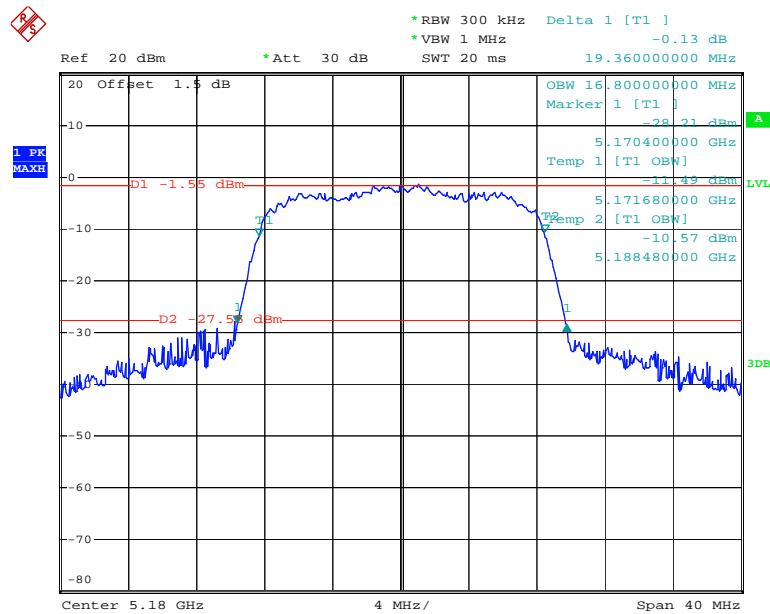
Please refer to the following tables and plots.

*Test mode: Transmitting*

Mode	Channel	Frequency MHz	26 dB Bandwidth MHz	99% occupied bandwidth MHz	Result
802.11a	Low	5180	19.36	16.8	PASS
	Middle	5200	19.28	16.72	PASS
	High	5240	19.28	16.72	PASS

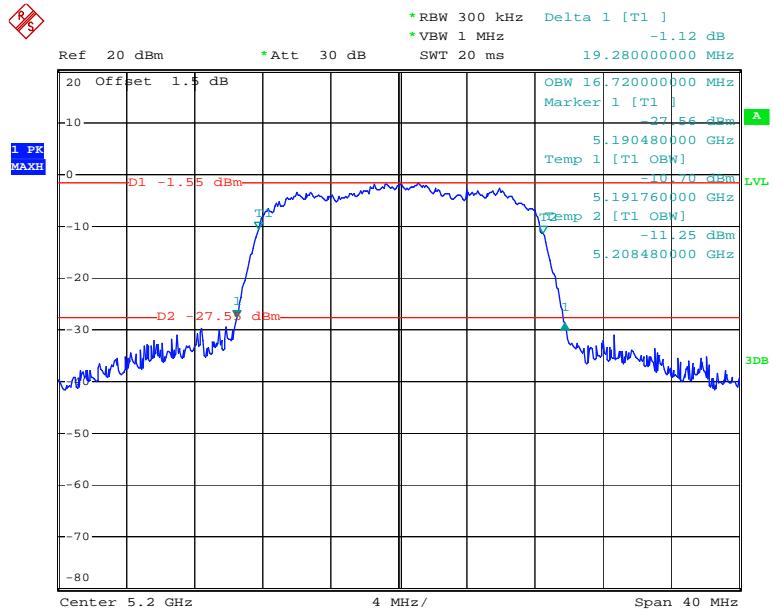
5150MHz-5250MHz:

### 802.11a Low Channel



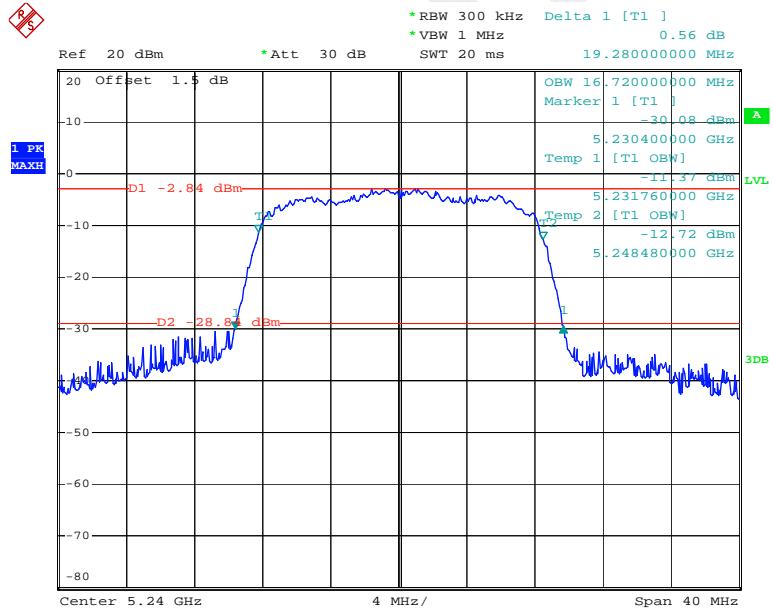
Date: 13.FEB.2015 13:49:30

### 802.11a Middle Channel



Date: 13.FEB.2015 13:51:38

### 802.11a High Channel



Date: 13.FEB.2015 13:52:50

**FCC §15.407(a) (1) (ii) (4) –MAXIMUM CONDUCTED OUTPUT POWER****Applicable Standard**

## (a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54210016	2014-11-03	2015-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2014-11-03	2015-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2014-11-03	2015-11-03

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01.

## Test Data

### Environmental Conditions

Temperature:	21.1°C
Relative Humidity:	42 %
ATM Pressure:	101.4 kPa

*The testing was performed by Allen Qiao on 2015-02-13.*

*Test Mode: Transmitting*

Mode	Channel	Frequency MHz	Conducted Output Power dBm	Limit dBm	Result
802.11a	Low	5180	7.99	30	PASS
	Middle	5200	8.02	30	PASS
	High	5240	7.46	30	PASS

FINAL

## FCC §15.407(a) - POWER SPECTRAL DENSITY

### Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

## Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

Temperature:	21.2 °C
Relative Humidity:	42 %
ATM Pressure:	101.4 kPa

*The testing was performed by Allen Qiao on 2015-02-13.*

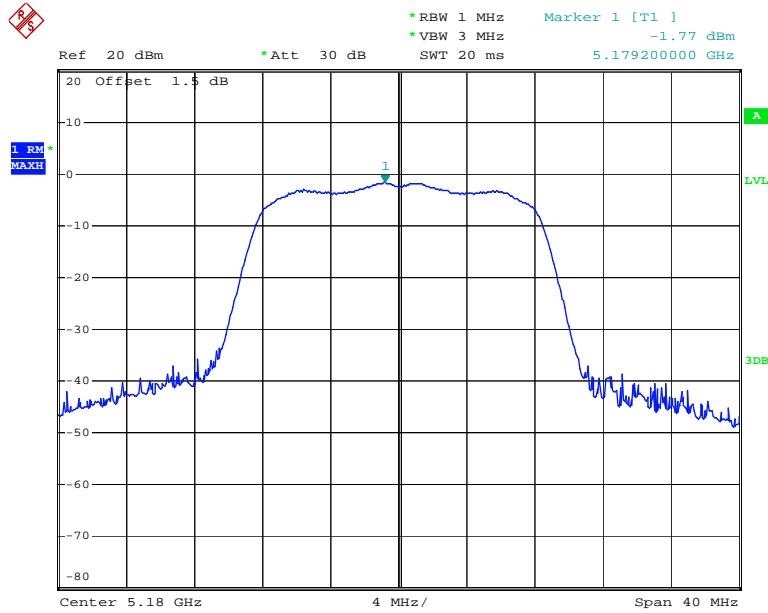
*Test Mode: Transmitting*

*Test Result: Compliance. Please refer to the following table and plot.*

Mode	Channel	Frequency MHz	PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	Low	5180	-1.77	17	PASS
	Middle	5200	-1.83	17	PASS
	High	5240	-2.65	17	PASS

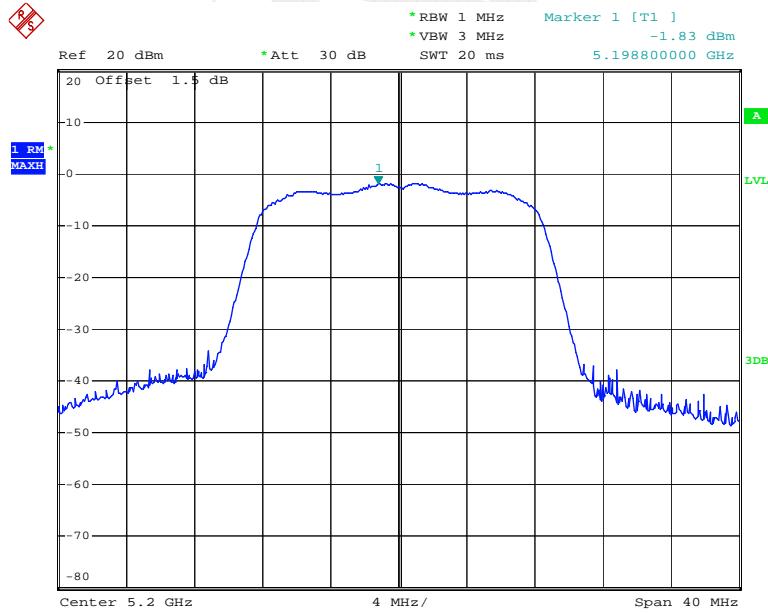
5150MHz-5250MHz:

## 802.11a Low Channel

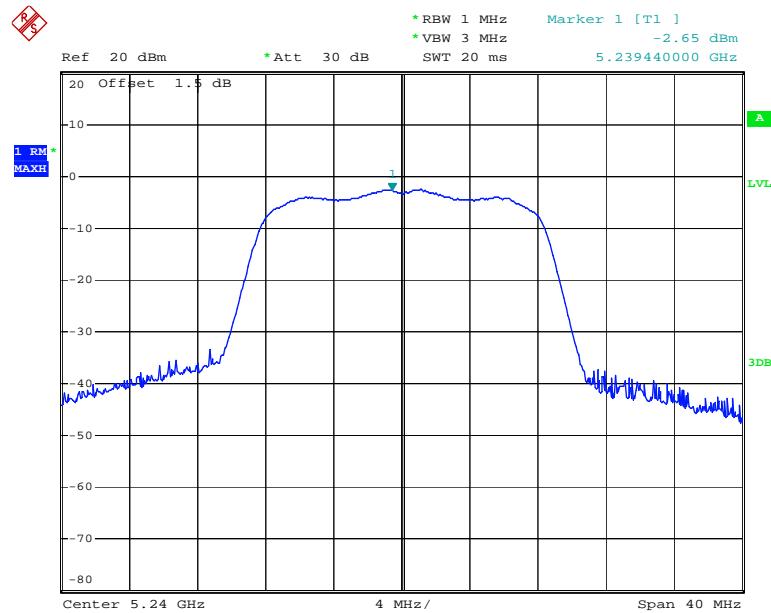


Date: 13.FEB.2015 14:40:43

## 802.11a Middle Channel



Date: 13.FEB.2015 14:40:55

**802.11a High Channel**

Date: 13.FEB.2015 14:41:19

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