

FCC PART 15.247

TEST REPORT

For

LUCIS TECHNOLOGIES (SHANG HAI) CO., LTD

No.57.East Caohejing.Building Lucis XuHui District, Shanghai.200235.China

FCC ID: 2AEONGATEWAY

Report Type: Original Report	Product Type: Gateway
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The LUCIS TECHNOLOGIES (SHANG HAI) CO., LTD's product, model number: Gateway (FCC ID: 2AEONGATEWAY) or the "EUT" in this report was a Gateway, which was measured approximately: 84.91 mm (L) x 59.91 mm (W) x 50.5mm (H), rated input voltage: AC120V.

** All measurement and test data in this report was gathered from production sample serial number: 20160624003. (Assigned by BACL, Kunshan). The EUT was received on 2016-06-24.*

Objective

This report is prepared on behalf of LUCIS TECHNOLOGIES (SHANG HAI) CO., LTD in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15 DTS submissions with FCC ID: AZY-HF-LPT200.

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 and FCC KDB558074 D01 DTS Meas Guidance v03r05.

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

Measurement uncertainty with RF radiated emission is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Lake Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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 November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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

Low Channel: 2405MHz, Middle Channel: 2445MHz, High Channel: 2480 MHz

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

RF Test

The worst case was performed under:
Power level 4.5

Support Equipment List and Details

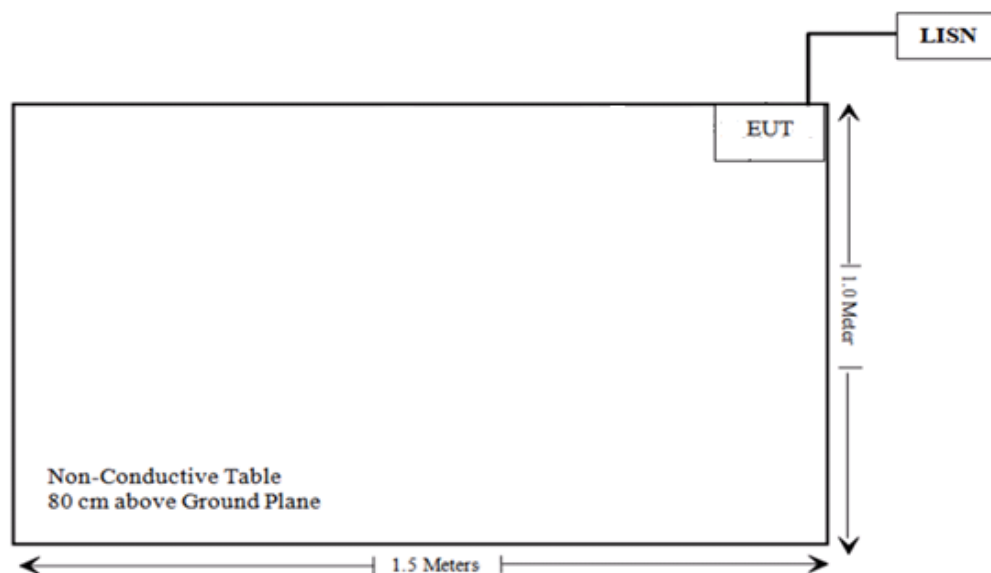
Manufacturer	Description	Model	Serial Number
DELL	PC	GX620	D65874152

External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliance*
§15.203	Antenna Requirement	Compliance*
§15.207 (a)	AC Line Conducted Emissions	Compliance*
§15.247(d)	Spurious Emissions at Antenna Port	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*

Compliance*: The EUT has WIFI module and Zigbee module. The WIFI module had been certified which the model number is HF-LPT200, FCC ID: AZY-HF-LPT200. The difference between the WIFI module and the original WIFI module is changed the matched resistances and antenna, so we added the test for the spurious emission and pre-scan the output power. The output power is similar as the power in the original report. The other data are refer to the report 201403892F which the model: HF-LPT200 (FCC ID: AZY-HF-LPT200).

FCC§15.247 (i), §1.1310& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/		f/1500	30
1500-100,000	/		1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

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

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
WIFI:802.11b	2412	0	1	22	158.49	20	0.032	1.0
Zigbee	2405	-2.0	0.63	4.5	2.82	20	0.0004	1.0

Note:

- (1) The target power : WIFI: 21 ± 1 dBm,
Zigbee: 3 ± 1.5 dBm,
which declared by the Manufacturer.

(2) According to KDB 447498 D01 General RF Exposure Guidance v06, The EUT has WIFI and Zigbee module can transmit simultaneously. So the sum of MPE ratio is 0.0324 which is less than 1.0, so the collocation exposure exclusion applies.

Result: The device meet FCC MPE at 20 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two internal antennas: one is WIFI module antenna which the antenna gain is 0dBi, the other is Zigbee module antenna which the antenna gain is -2dBi, 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

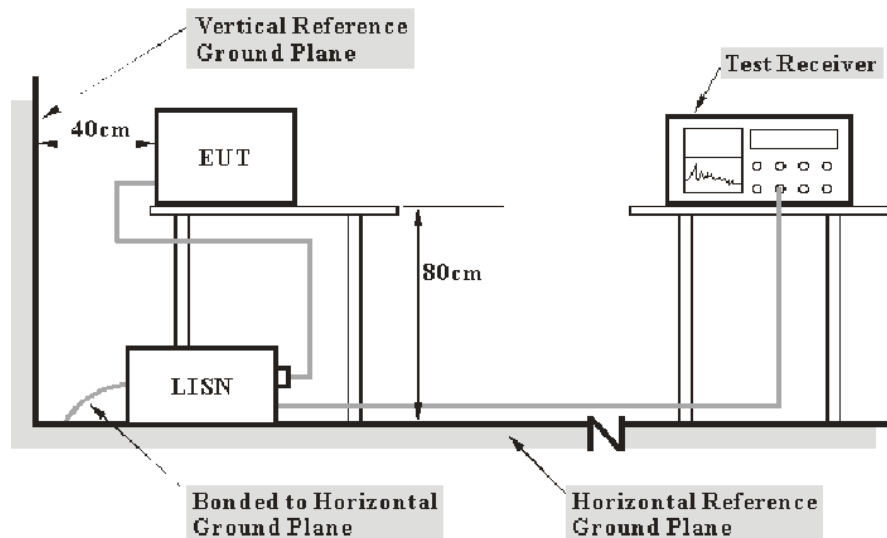
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

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 EUT 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

Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	934115/007	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	892239/018	2016-06-23	2017-06-22
FCC	ISN	FCC-TLISN-T8-02	20376	2016-06-23	2017-06-22
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2015-10-01	2016-10-01
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	--	--

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

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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

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

Test Results Summary

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

3.08 dB at 1.025000 MHz in the Line conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

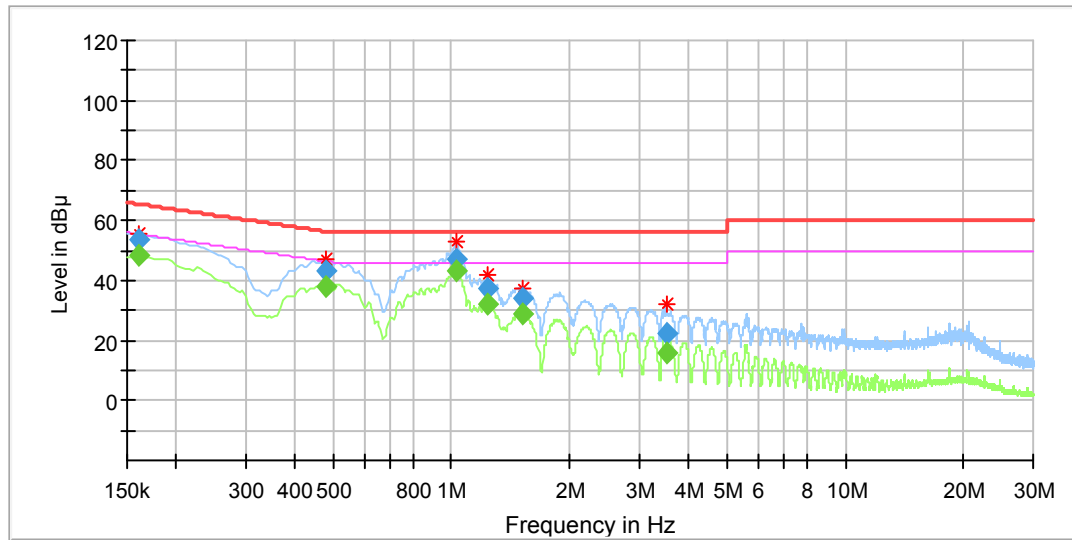
Test Data

Environmental Conditions

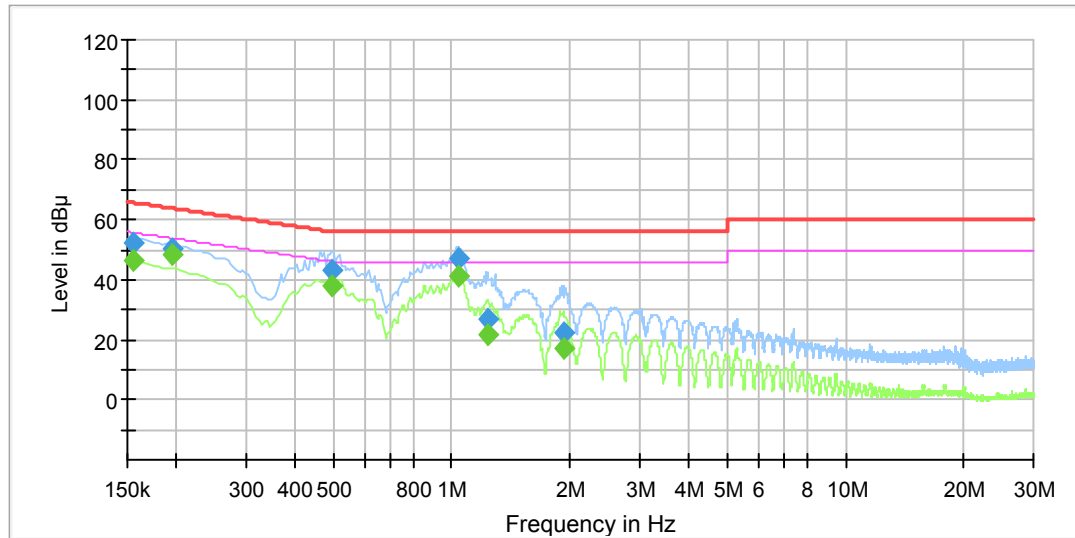
Temperature:	23 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-07-01.

Test Mode: Transmitting (WIFI and Zigbee transmit simultaneously)

AC 120V/60 Hz, Line

Frequency (MHz)	QuasiPeak (dBμV)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.160000	---	48.42	9.000	L1	11.0	7.04	55.46	Compliance
0.160000	53.79	---	9.000	L1	11.0	11.67	65.46	Compliance
0.480000	---	37.90	9.000	L1	11.0	8.44	46.34	Compliance
0.480000	43.16	---	9.000	L1	11.0	13.18	56.34	Compliance
1.025000	---	42.92	9.000	L1	11.1	3.08	46.00	Compliance
1.025000	47.08	---	9.000	L1	11.1	8.92	56.00	Compliance
1.235000	---	31.79	9.000	L1	11.1	14.21	46.00	Compliance
1.235000	37.23	---	9.000	L1	11.1	18.77	56.00	Compliance
1.515000	---	29.05	9.000	L1	11.1	16.95	46.00	Compliance
1.515000	34.14	---	9.000	L1	11.1	21.86	56.00	Compliance
3.505000	---	15.66	9.000	L1	11.3	30.34	46.00	Compliance
3.505000	22.44	---	9.000	L1	11.3	33.56	56.00	Compliance

AC 120V/60 Hz, Neutral

Frequency (MHz)	QuasiPeak (dBμV)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.155000	---	46.60	9.000	N	11.0	9.13	55.73	Compliance
0.155000	51.99	---	9.000	N	11.0	13.74	65.73	Compliance
0.195000	---	48.33	9.000	N	11.0	5.49	53.82	Compliance
0.195000	50.19	---	9.000	N	11.0	13.63	63.82	Compliance
0.495000	---	37.63	9.000	N	11.0	8.45	46.08	Compliance
0.495000	43.28	---	9.000	N	11.0	12.80	56.08	Compliance
1.040000	---	41.31	9.000	N	11.1	4.69	46.00	Compliance
1.040000	46.78	---	9.000	N	11.1	9.22	56.00	Compliance
1.230000	---	21.99	9.000	N	11.1	24.01	46.00	Compliance
1.230000	27.12	---	9.000	N	11.1	28.88	56.00	Compliance
1.930000	---	17.38	9.000	N	11.2	28.62	46.00	Compliance
1.930000	22.43	---	9.000	N	11.2	33.57	56.00	Compliance

Note:

- 1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
- 2) Corrected Amplitude = Reading + Corr.
- 3) Margin = Limit –Corrected Amplitude

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

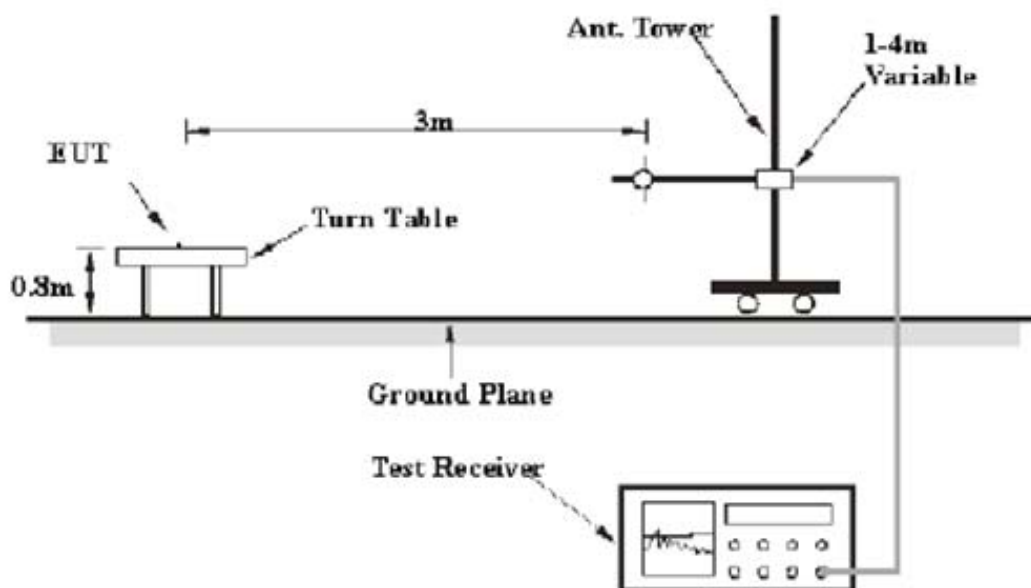
Measurement Uncertainty

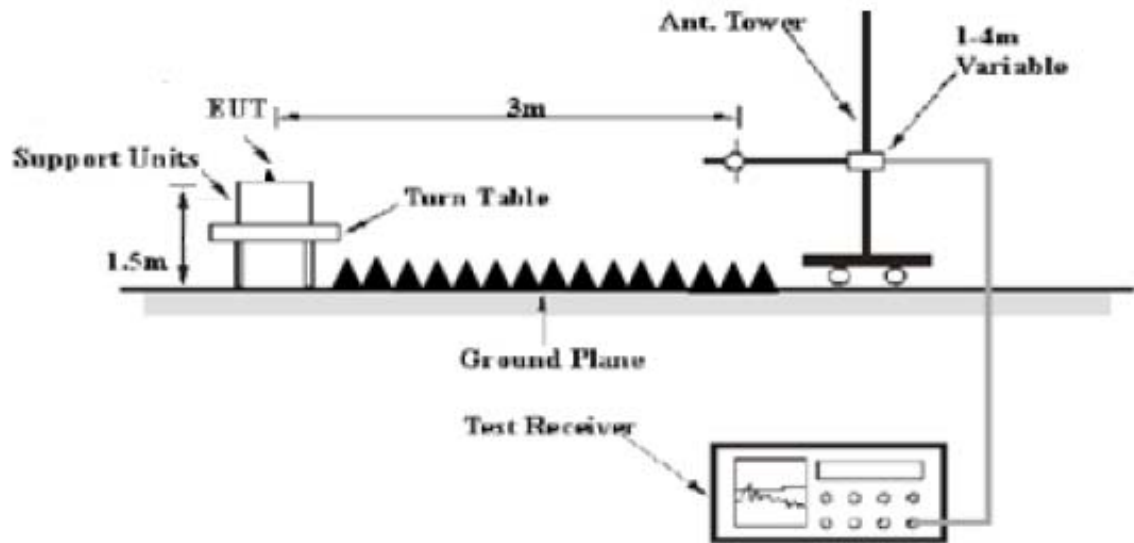
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

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

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:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrunent	Amplifier	330	171377	2015-09-16	2016-09-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
EMCO	Horn Antenna	3116	9510-2384	2015-11-07	2016-11-06
Rohde & Schwarz	SIGNAL ANALYZER	FSV40	101116	2015-09-02	2016-09-02
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Mini	Pre-amplifier	ZVA-183-S+	857001418	2015-09-16	2016-09-16
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2015-09-16	2016-09-16
champrotek	Chamber	Chamber A	1#	2015-09-17	2016-09-17
R&S	Auto test Software	EMC32	V 09.10.0	-	-
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-12-16	2016-12-15

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

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

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

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

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

Test 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 15.247.

Zigbee: 1.34dB at 2483.5 MHz in the Vertical polarization

WIFI: 3.37 dB at 220MHz in the Horizontal polarization for 802.11b Mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

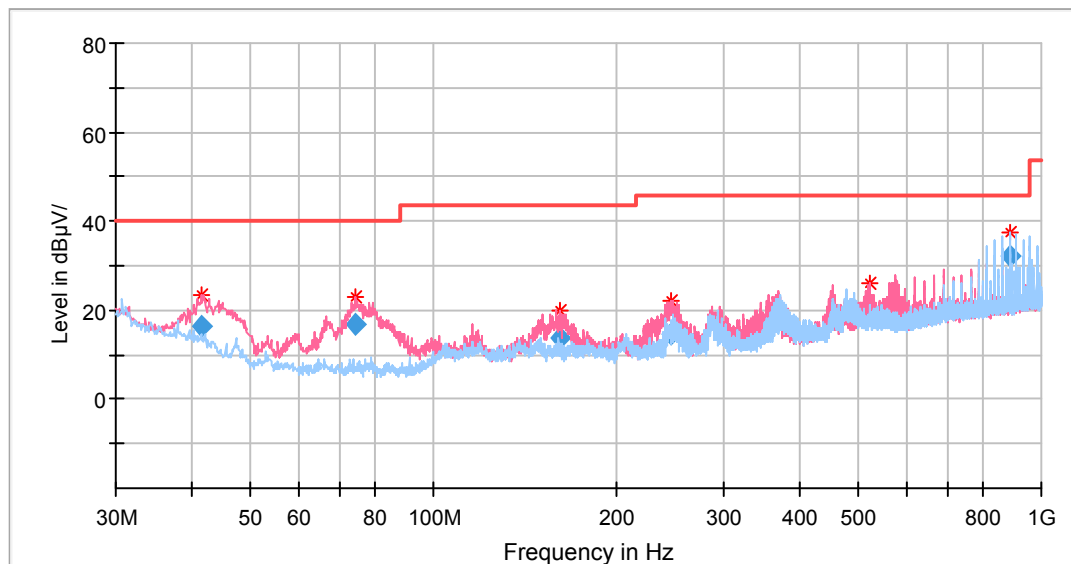
Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-06-28&2016-07-04&2016-07-05.

30 MHz-1 GHz:



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
41.518750	20.35	QP	210.0	100.0	V	-11.3	16.38	40.00	23.62
74.498750	22.06	QP	102.0	100.0	V	-17.1	16.98	40.00	23.02
160.950000	22.1	QP	309.0	100.0	V	-12.4	13.98	43.50	29.52
246.067500	20.54	QP	146.0	100.0	V	-12.0	14.53	46.00	31.47
523.851250	39.75	QP	338.0	100.0	V	-5.5	18.84	46.00	27.16
886.146250	29.14	QP	118.0	100.0	H	-1.1	32.16	46.00	13.84

1GHz-25 GHz*EUT operation mode: Transmitting***Zigbee Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Low Channel (2405MHz)									
2405.0	90.76	PK	284.0	150.0	V	4.9	95.66	/	/
2405.0	84.91	Ave	284.0	150.0	V	4.9	89.81	/	/
2405.0	89.85	PK	110.0	150.0	H	4.9	94.75	/	/
2405.0	83.82	Ave	110.0	150.0	H	4.9	88.72	/	/
1589.0	39.81	PK	95.0	150.0	V	2.8	42.61	74.0	31.39
1589.0	23.09	Ave	95.0	150.0	V	2.8	25.89	54.0	28.11
2379.0	23.65	Ave	271.0	150.0	H	4.9	28.55	54.0	25.45
2379.0	34.23	PK	271.0	150.0	H	4.9	39.13	74.0	34.87
2390.0	22.01	Ave	221.0	150.0	V	4.9	26.91	54.0	27.09
2390.0	36.19	PK	221.0	150.0	V	4.9	41.09	74.0	32.91
4810.0	32.27	PK	242.0	150.0	V	13.3	45.57	74.0	28.43
4810.0	18.51	Ave	242.0	150.0	V	13.3	31.81	54.0	22.19
7215.0	20.43	Ave	132.0	250.0	H	19.7	40.13	54.0	13.87
7215.0	32.54	PK	132.0	250.0	H	19.7	52.24	74.0	21.76
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Middle Channel (2445MHz)									
2445.0	89.33	PK	330.0	150.0	V	4.9	94.23	/	/
2445.0	83.71	Ave	330.0	150.0	V	4.9	88.61	/	/
2445.0	88.34	PK	125.0	150.0	H	4.9	93.24	/	/
2445.0	83.82	Ave	125.0	150.0	H	4.9	88.72	/	/
1603.0	34.72	PK	193.0	250.0	V	2.9	37.62	74.0	36.38
1603.0	20.43	Ave	193.0	250.0	V	2.9	23.33	54.0	30.67
1786.0	33.26	Ave	283.0	150.0	H	3.6	36.86	54.0	17.14
1786.0	40.21	PK	283.0	150.0	H	3.6	43.81	74.0	30.19
4890.0	31.68	PK	307.0	150.0	V	13.6	45.28	74.0	28.72
4890.0	18.52	Ave	307.0	150.0	V	13.6	32.12	54.0	21.88
6639.0	22.09	Ave	177.0	150.0	H	17.7	39.79	54.0	14.21
6639.0	34.82	PK	177.0	150.0	H	17.7	52.52	74.0	21.48
7335.0	30.11	PK	272.0	150.0	V	20.1	50.21	74.0	23.79
7335.0	16.69	Ave	272.0	150.0	V	20.1	36.79	54.0	17.21

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
High Channel (2480 MHz)									
2480.0	90.75	PK	209.0	150.0	V	5.0	95.75	/	/
2480.0	84.91	Ave	209.0	150.0	V	5.0	89.91	/	/
2480.0	89.81	PK	345.0	150.0	H	5.0	94.81	/	/
2480.0	83.79	Ave	345.0	150.0	H	5.0	88.79	/	/
2483.5	47.66	Ave	215.0	150.0	V	5.0	52.66	54.0	1.34
2483.5	60.95	PK	215.0	150.0	V	5.0	65.95	74.0	8.05
2488.0	26.25	Ave	215.0	150.0	V	5.0	31.25	54.0	22.75
2488.0	42.89	PK	215.0	150.0	V	5.0	47.89	74.0	26.11
1800.0	29.84	Ave	277.0	150.0	H	3.7	33.54	54.0	20.46
1800.0	39.31	PK	277.0	150.0	H	3.7	43.01	74.0	30.99
4960.0	18.48	Ave	227.0	150.0	V	13.9	32.38	54.0	21.62
4960.0	31.92	PK	227.0	150.0	V	13.9	45.82	74.0	28.18
7440.0	26.01	Ave	324.0	200.0	V	20.4	46.41	54.0	7.59
7440.0	37.54	PK	324.0	200.0	V	20.4	57.94	74.0	16.06

WIFI Mode:**802.11b Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	94.71	PK	246.00	150.00	V	3.00	97.71	/	/
2412	87.35	Ave	246.00	150.00	V	3.00	90.35	/	/
2412	93.99	PK	167.00	150.00	H	3.00	96.99	/	/
2412	86.34	Ave	167.00	150.00	H	3.00	89.34	/	/
2367	33.06	PK	173.00	200.00	V	2.50	35.56	74.00	38.44
2367	21.72	Ave	173.00	200.00	V	2.50	24.22	54.00	29.78
2390	37.59	PK	219.00	200.00	V	2.90	40.49	74.00	33.51
2390	21.86	Ave	219.00	200.00	V	2.90	24.76	54.00	29.24
4824	36.93	PK	14.00	150.00	H	13.80	50.73	74.00	23.27
4824	26.27	Ave	14.00	150.00	H	13.80	40.07	54.00	13.93
6608	29.42	PK	89.00	150.00	V	18.80	48.22	74.00	25.78
6608	21.05	Ave	89.00	150.00	V	18.80	39.85	54.00	14.15
7236	33.56	PK	160.00	200.00	H	18.80	52.36	74.00	21.64
7236	21.33	Ave	160.00	200.00	H	18.80	40.13	54.00	13.87
220	45.33	QP	200	100	H	-5.2	40.13	46.00	5.87

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437MHz)									
2437	93.18	PK	221.00	150.00	V	3.00	96.18	/	/
2437	87.28	Ave	221.00	150.00	V	3.00	90.28	/	/
2437	93.21	PK	193.00	200.00	H	3.00	96.21	/	/
2437	86.36	Ave	193.00	200.00	H	3.00	89.36	/	/
1495	37.85	PK	135.00	200.00	V	0.00	37.85	74.00	36.15
1495	24.46	Ave	135.00	200.00	V	0.00	24.46	54.00	29.54
1698	42.33	PK	174.00	200.00	H	0.70	43.03	74.00	30.97
1698	24.22	Ave	174.00	200.00	H	0.70	24.92	54.00	29.08
4874	40.41	PK	12.00	150.00	V	13.90	54.31	74.00	19.69
4874	28.94	Ave	12.00	150.00	V	13.90	42.84	54.00	11.16
6627	32.46	PK	346.00	150.00	H	18.80	51.26	74.00	22.74
6627	19.46	Ave	346.00	150.00	H	18.80	38.26	54.00	15.74
7311	25.72	PK	233.00	150.00	H	18.90	44.62	74.00	29.38
7311	18.37	Ave	233.00	150.00	H	18.90	37.27	54.00	16.73
220	44.95	QP	200	100	H	-5.2	39.75	46.00	6.25

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	93.87	PK	172.00	200.00	V	3.00	96.87	/	/
2462	85.23	Ave	172.00	200.00	V	3.00	88.23	/	/
2462	93.76	PK	129.00	150.00	H	3.00	96.76	/	/
2462	85.78	Ave	129.00	150.00	H	3.00	88.78	/	/
2483.5	51.48	PK	165.00	200.00	V	3.20	54.68	74.00	19.32
2483.5	38.43	Ave	165.00	200.00	V	3.20	41.63	54.00	12.37
2674	39.58	PK	320.00	200.00	V	4.20	43.78	74.00	30.22
2674	28.07	Ave	320.00	200.00	V	4.20	32.27	54.00	21.73
4924	44.41	PK	69.00	200.00	H	14.00	58.41	74.00	15.59
4924	35.88	Ave	69.00	200.00	H	14.00	49.88	54.00	4.12
6686	34.77	PK	129.00	150.00	H	18.80	53.57	74.00	20.43
6686	16.68	Ave	129.00	150.00	H	18.80	35.48	54.00	18.52
7386	29.67	PK	282.00	200.00	H	19.80	49.47	74.00	24.53
7386	13.54	Ave	282.00	200.00	H	19.80	33.34	54.00	20.66
192	43.43	QP	200	100	H	-5.2	38.23	43.5	5.27

802.11g Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	92.98	PK	170.0	200.00	V	3.00	95.98	/	/
2412	85.02	Ave	170.0	200.00	V	3.00	88.02	/	/
2412	92.85	PK	72.0	150.00	H	3.00	95.85	/	/
2412	85.13	Ave	72.0	150.00	H	3.00	88.13	/	/
2145	33.86	PK	167.0	200.00	V	2.50	36.36	74.00	37.64
2145	19.85	Ave	167.0	200.00	V	2.50	22.35	54.00	31.65
2390	37.45	PK	69.0	200.00	H	2.90	40.35	74.00	33.65
2390	18.66	Ave	69.0	200.00	H	2.90	21.56	54.00	32.44
4824	35.98	PK	98.0	200.00	H	13.80	49.78	74.00	24.22
4824	22.02	Ave	98.0	200.00	H	13.80	35.82	54.00	18.18
6786	31.47	PK	231.0	150.00	V	18.80	50.27	74.00	23.73
6786	17.34	Ave	231.0	150.00	V	18.80	36.14	54.00	17.86
7236	32.63	PK	177.0	150.00	H	18.80	51.43	74.00	22.57
7236	21.31	Ave	177.0	150.00	H	18.80	40.11	54.00	13.89
220	43.75	QP	200	100	H	-5.2	38.55	46.00	7.45

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	92.37	PK	121.0	150.00	V	3.00	95.37	/	/
2437	84.39	Ave	121.0	150.00	V	3.00	87.39	/	/
2437	92.29	PK	63.0	150.00	H	3.00	95.29	/	/
2437	84.18	Ave	63.0	150.00	H	3.00	87.18	/	/
1373	39.67	PK	191.0	200.00	V	0.00	39.67	74.00	34.33
1373	21.38	Ave	191.0	200.00	V	0.00	21.38	54.00	32.62
1534	41.28	PK	83.0	200.00	H	0.70	41.98	74.00	32.02
1534	26.46	Ave	83.0	200.00	H	0.70	27.16	54.00	26.84
4874	40.38	PK	7.0	200.00	V	13.90	54.28	74.00	19.72
4874	28.97	Ave	7.0	200.00	V	13.90	42.87	54.00	11.13
6639	32.07	PK	319.0	150.00	H	18.80	50.87	74.00	23.13
6639	18.99	Ave	319.0	150.00	H	18.80	37.79	54.00	16.21
7311	28.38	PK	198.0	200.00	H	18.90	47.28	74.00	26.72
7311	19.31	Ave	198.0	200.00	H	18.90	38.21	54.00	15.79
220	43.76	QP	200	100	H	-5.2	38.56	46.00	7.44

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	92.79	PK	160.0	200.0	V	3.00	95.79	/	/
2462	84.18	Ave	160.0	200.0	V	3.00	87.18	/	/
2462	92.21	PK	220.0	150.0	H	3.00	95.21	/	/
2462	84.27	Ave	220.0	150.0	H	3.00	87.27	/	/
2483.5	50.99	PK	163.0	150.0	V	3.20	54.19	74.00	19.81
2483.5	41.47	Ave	163.0	150.0	V	3.20	44.67	54.00	9.33
2627	38.67	PK	64.0	200.0	H	4.20	42.87	74.00	31.13
2627	27.61	Ave	64.0	200.0	H	4.20	31.81	54.00	22.19
4924	41.28	PK	21.0	200.0	V	14.00	55.28	74.00	18.72
4924	30.28	Ave	21.0	200.0	V	14.00	44.28	54.00	9.72
6629	31.97	PK	289.0	150.0	H	18.70	50.67	74.00	23.33
6629	19.08	Ave	289.0	150.0	H	18.70	37.78	54.00	16.22
7386	27.76	PK	172.0	200.0	V	19.80	47.56	74.00	26.44
7386	16.98	Ave	172.0	200.0	V	19.80	36.78	54.00	17.22
220	43.33	QP	200	100	H	-5.2	38.13	46.00	7.87

802.11n-HT20 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	91.63	PK	160.0	150.00	V	3.00	94.63	/	/
2412	84.43	Ave	160.0	150.00	V	3.00	87.43	/	/
2412	91.98	PK	89.0	200.00	H	3.00	94.98	/	/
2412	83.30	Ave	89.0	200.00	H	3.00	86.30	/	/
2364	30.88	PK	290.0	200.00	H	2.90	33.78	74.00	40.22
2364	21.39	Ave	290.0	200.00	H	2.90	24.29	54.00	29.71
2390	40.32	PK	119.0	150.00	V	2.90	43.22	74.00	30.78
2390	20.92	Ave	119.0	150.00	V	2.90	23.82	54.00	30.18
4824	28.10	PK	61.0	200.00	H	13.80	41.90	74.00	32.10
4824	22.98	Ave	61.0	200.00	H	13.80	36.78	54.00	17.22
6676	29.49	PK	322.0	150.00	V	18.80	48.29	74.00	25.71
6676	16.52	Ave	322.0	150.00	V	18.80	35.32	54.00	18.68
7236	32.94	PK	188.0	200.00	H	18.80	51.74	74.00	22.26
7236	25.41	Ave	188.0	200.00	H	18.80	44.21	54.00	9.79
220	44.06	QP	200	100	H	-5.2	38.86	46.00	7.14

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	91.89	PK	170.0	200.00	V	3.00	94.89	/	/
2437	84.54	Ave	170.0	200.00	V	3.00	87.54	/	/
2437	91.19	PK	110.0	200.00	H	3.00	94.19	/	/
2437	83.76	Ave	110.0	200.00	H	3.00	86.76	/	/
1569	35.78	PK	220.0	150.00	V	0.00	35.78	74.00	38.22
1569	25.56	Ave	220.0	150.00	V	0.00	25.56	54.00	28.44
2269	37.75	PK	130.0	200.00	H	0.70	38.45	74.00	35.55
2269	25.76	Ave	130.0	200.00	H	0.70	26.46	54.00	27.54
4874	37.42	PK	80.0	200.00	V	13.90	51.32	74.00	22.68
4874	30.53	Ave	80.0	200.00	V	13.90	44.43	54.00	9.57
6723	31.41	PK	320.0	150.00	H	18.80	50.21	74.00	23.79
6723	16.48	Ave	320.0	150.00	H	18.80	35.28	54.00	18.72
7311	26.64	PK	214.0	150.00	H	18.90	45.54	74.00	28.46
7311	22.88	Ave	214.0	150.00	H	18.90	41.78	54.00	12.22
220	44.41	QP	200	100	H	-5.2	39.21	46.00	6.79

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	91.47	PK	160.0	200.0	V	3.00	94.47	/	/
2462	83.23	Ave	160.0	200.0	V	3.00	86.23	/	/
2462	91.98	PK	100.0	150.0	H	3.00	94.98	/	/
2462	83.65	Ave	100.0	150.0	H	3.00	86.65	/	/
2483.5	51.69	PK	180.0	200.0	V	3.20	54.89	74.00	19.11
2483.5	38.97	Ave	180.0	200.0	V	3.20	42.17	54.00	11.83
2498	37.47	PK	90.0	150.0	H	4.20	41.67	74.00	32.33
2498	21.23	Ave	90.0	150.0	H	4.20	25.43	54.00	28.57
4924	41.78	PK	231.0	200.0	V	14.00	55.78	74.00	18.22
4924	30.78	Ave	231.0	200.0	V	14.00	44.78	54.00	9.22
6678	29.64	PK	289.0	150.0	H	18.70	48.34	74.00	25.66
6678	16.99	Ave	289.0	150.0	H	18.70	35.69	54.00	18.31
7386	25.66	PK	188.0	200.0	V	19.80	45.46	74.00	28.54
7386	23.19	Ave	188.0	200.0	V	19.80	42.99	54.00	11.01
220	4.54	QP	200	100	H	-5.2	38.96	46.00	7.04

802.11n-HT40 Mode:

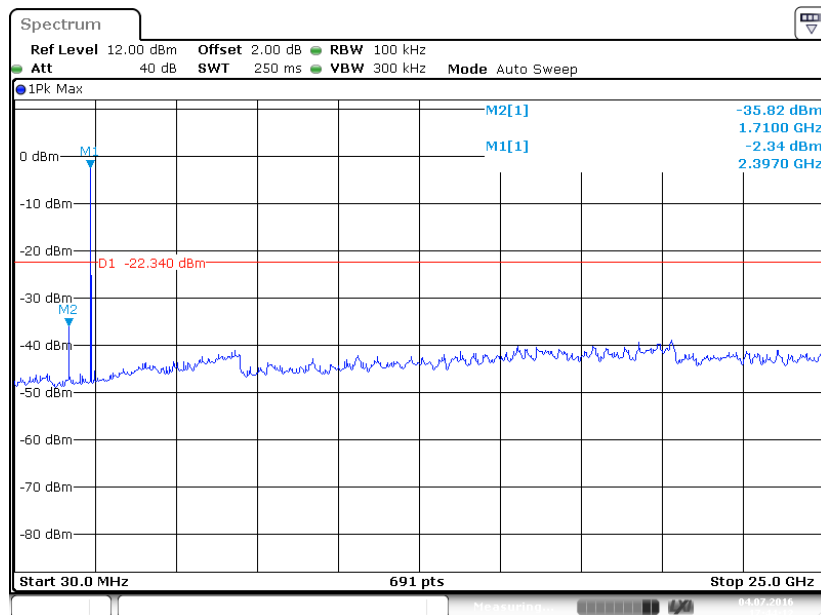
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2422 MHz)									
2422	91.48	PK	132.0	200.00	V	3.00	94.48	/	/
2422	83.41	Ave	132.0	200.00	V	3.00	86.41	/	/
2422	91.06	PK	80.0	200.00	H	3.00	94.06	/	/
2422	83.90	Ave	80.0	200.00	H	3.00	86.90	/	/
2343	29.62	PK	250.0	150.00	H	2.90	32.52	74.00	41.48
2343	22.49	Ave	250.0	150.00	H	2.90	25.39	54.00	28.61
2390	38.75	PK	168.0	150.00	V	2.90	41.65	74.00	32.35
2390	20.97	Ave	168.0	150.00	V	2.90	23.87	54.00	30.13
4844	26.52	PK	330.0	200.00	H	13.80	40.32	74.00	33.68
4844	21.56	Ave	330.0	200.00	H	13.80	35.36	54.00	18.64
6643	26.31	PK	123.0	150.00	V	18.80	45.11	74.00	28.89
6643	15.98	Ave	123.0	150.00	V	18.80	34.78	54.00	19.22
7266	32.13	PK	215.0	200.00	H	18.80	50.93	74.00	23.07
7266	22.98	Ave	215.0	200.00	H	18.80	41.78	54.00	12.22
220	43.84	QP	200	100	H	-5.2	38.64	46.00	7.36

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	91.16	PK	128.0	200.00	V	3.00	94.16	/	/
2437	83.54	Ave	128.0	200.00	V	3.00	86.54	/	/
2437	90.32	PK	69.0	150.00	H	3.00	93.32	/	/
2437	83.39	Ave	69.0	150.00	H	3.00	86.39	/	/
1538	34.78	PK	159.0	150.00	V	0.00	34.78	74.00	39.22
1538	23.02	Ave	159.0	150.00	V	0.00	23.02	54.00	30.98
2289	36.72	PK	120.0	150.00	H	0.70	37.42	74.00	36.58
2289	28.21	Ave	120.0	150.00	H	0.70	28.91	54.00	25.09
4874	36.89	PK	49.0	200.00	V	13.90	50.79	74.00	23.21
4874	29.73	Ave	49.0	200.00	V	13.90	43.63	54.00	10.37
6643	30.07	PK	356.0	200.00	H	18.80	48.87	74.00	25.13
6643	14.92	Ave	356.0	200.00	H	18.80	33.72	54.00	20.28
7311	27.79	PK	254.0	150.00	H	18.90	46.69	74.00	27.31
7311	22.05	Ave	254.0	150.00	H	18.90	40.95	54.00	13.05
220	43.06	QP	200	100	H	-5.2	37.86	46.00	8.14

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2452 MHz)									
2452	91.78	PK	118.0	200.0	V	3.00	94.78	/	/
2452	83.54	Ave	118.0	200.0	V	3.00	86.54	/	/
2452	90.42	PK	88.0	150.0	H	3.00	93.42	/	/
2452	83.43	Ave	88.0	150.0	H	3.00	86.43	/	/
2483.5	50.69	PK	180.0	150.0	V	3.20	53.89	74.00	20.11
2483.5	38.39	Ave	180.0	150.0	V	3.20	41.59	54.00	12.41
2495	34.74	PK	164.0	150.0	H	4.20	38.94	74.00	35.06
2495	21.32	Ave	164.0	150.0	H	4.20	25.52	54.00	28.48
4904	38.87	PK	257.0	200.0	V	14.00	52.87	74.00	21.13
4904	28.33	Ave	257.0	200.0	V	14.00	42.33	54.00	11.67
6656	27.27	PK	289.0	150.0	H	18.70	45.97	74.00	28.03
6656	15.66	Ave	289.0	150.0	H	18.70	34.36	54.00	19.64
7356	24.73	PK	188.0	200.0	V	19.80	44.53	74.00	29.47
7356	19.92	Ave	188.0	200.0	V	19.80	39.72	54.00	14.28
220	43.97	QP	200	100	H	-5.2	38.77	46.00	7.23

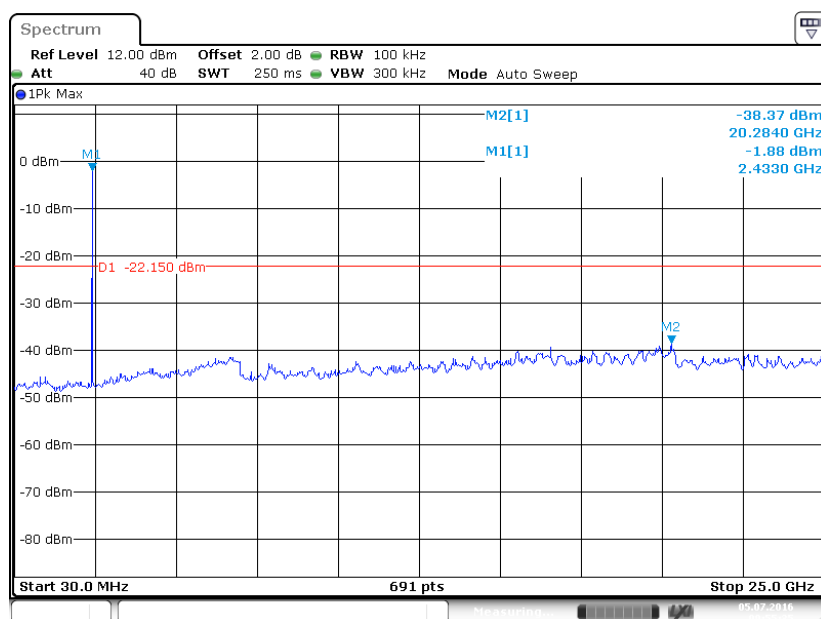
Zigbee Spurious Emissions at Antenna Port:

Low Channel



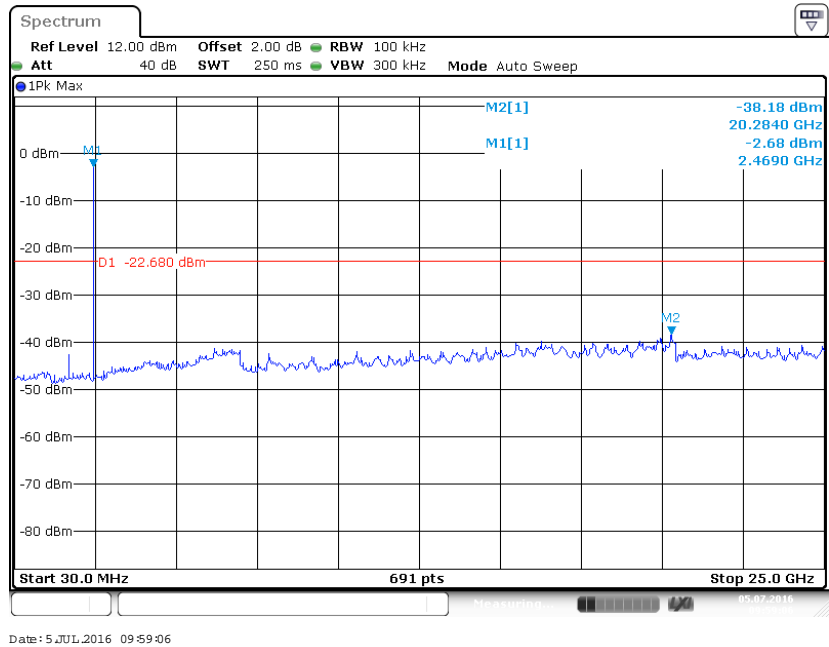
Date: 4 JUL 2016 17:44:13

Middle Channel



Date: 5 JUL 2016 09:55:36

High Channel

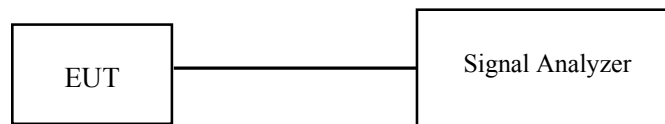


FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH**Applicable Standard**

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

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	FSV40	101116	2015-09-02	2016-09-02
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data**Environmental Conditions**

Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-07-04.

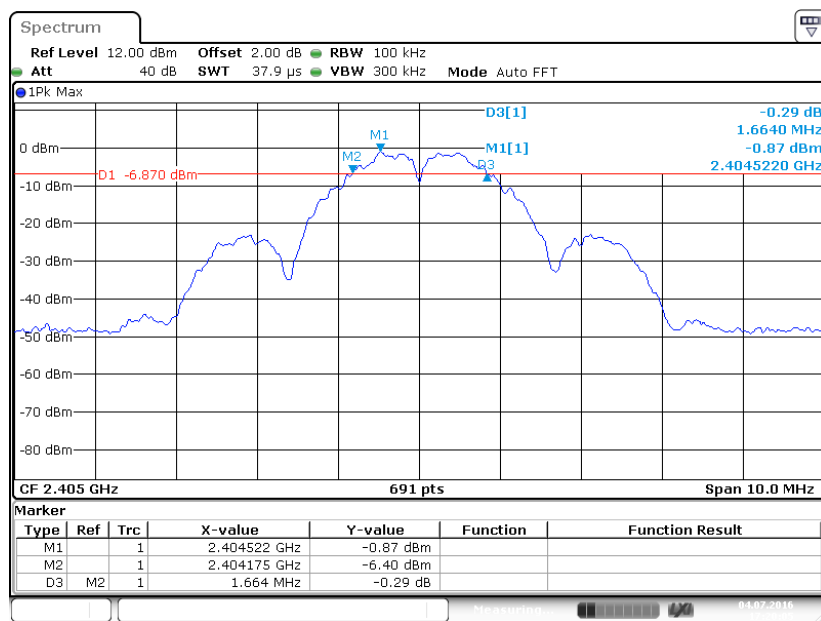
Test Result: Pass.

Please refer to the following tables and plots.

EUT operation mode: Transmitting

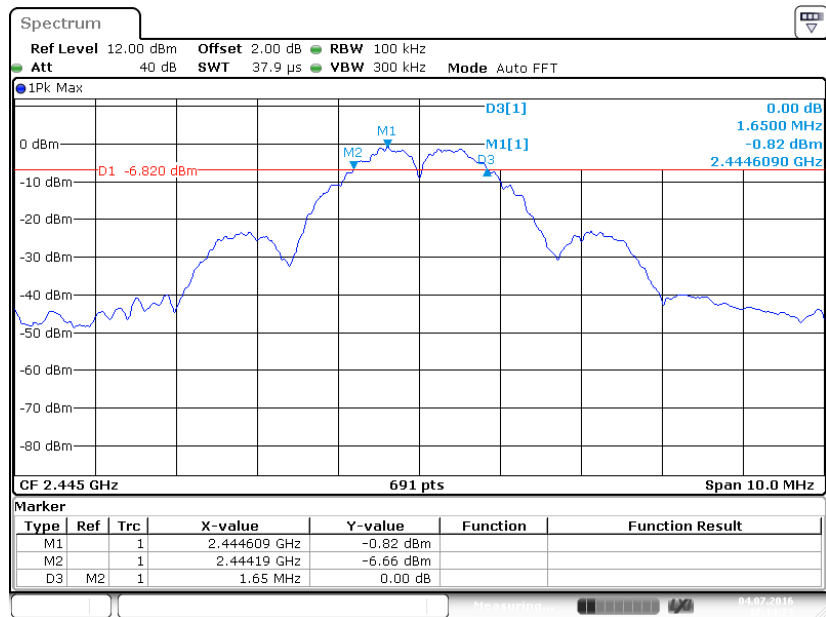
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
Low	2405	1.664	≥ 500
Middle	2445	1.650	≥ 500
High	2480	1.679	≥ 500

Low Channel



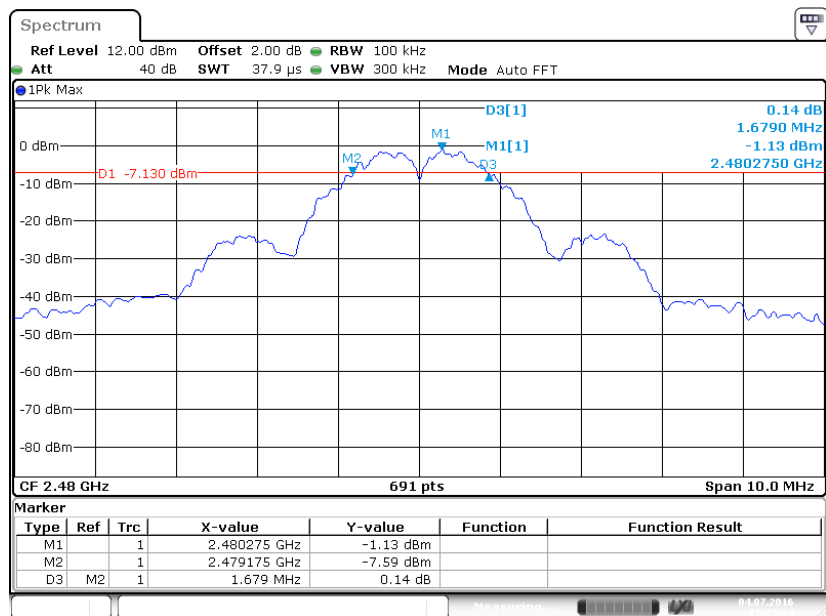
Date: 4 JUL 2016 17:20:06

Middle Channel



Date: 4 JUL 2016 17:14:23

High Channel



Date: 4 JUL 2016 17:27:54

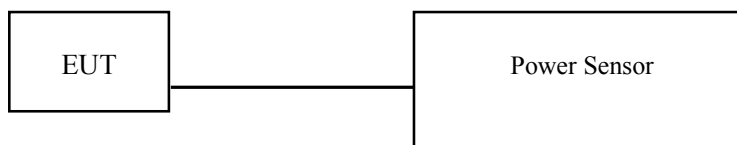
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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 one 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
Rohde & Schwarz	OSP120 BASE UNIT (WITHOUT DISPLAY)	OSP120	101247	2016-05-27	2017-05-27
Rohde & Schwarz	Power Sensor	NRP-Z91	200014	2015-08-1	2017-07-31
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data**Environmental Conditions**

Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-07-05.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)	Result
Zigbee					
Low	2405	3.95	3.24	30	Pass
Middle	2445	3.58	2.89	30	Pass
High	2480	3.20	2.78	30	Pass
802.11b					
Low	2412	21.53	20.42	30	Pass
Middle	2437	21.10	20.11	30	Pass
High	2462	20.55	20.36	30	Pass
802.11g					
Low	2412	21.22	20.45	30	Pass
Middle	2437	20.74	19.73	30	Pass
High	2462	20.12	19.65	30	Pass
802.11n Ht20					
Low	2412	21.05	20.67	30	Pass
Middle	2437	20.54	19.69	30	Pass
High	2462	20.13	19.54	30	Pass
802.11n Ht40					
Low	2422	20.89	19.76	30	Pass
Middle	2437	20.26	19.23	30	Pass
High	2452	20.03	19.37	30	Pass

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	FSV40	101116	2015-09-02	2016-09-02
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data

Environmental Conditions

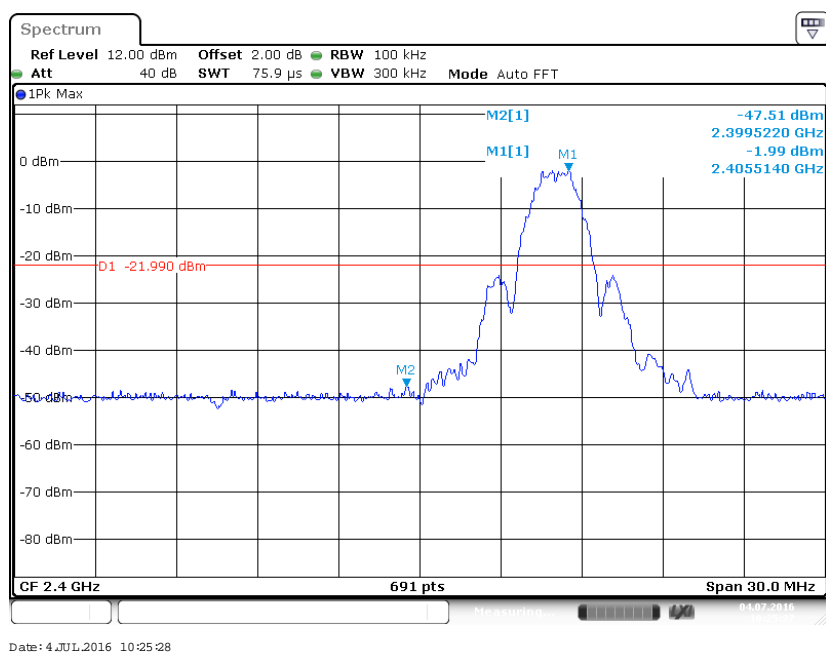
Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-07-04.

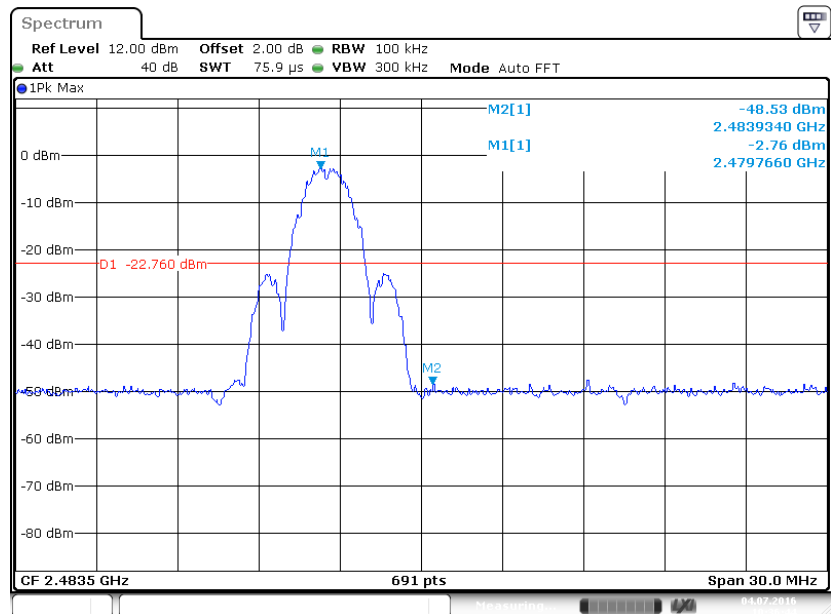
Test Result: *Compliance*

Please refer to the following table and plots.

Band Edge, Left Side



Band Edge, Right Side



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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

According to KDB558074 D01 DTS Meas Guidance v03r05 sub-clause 10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
3. Set the VBW $\geq 3 \times \text{RBW}$.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	SIGNAL ANALYZER	FSV40	101116	2015-09-02	2016-09-02
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data

Environmental Conditions

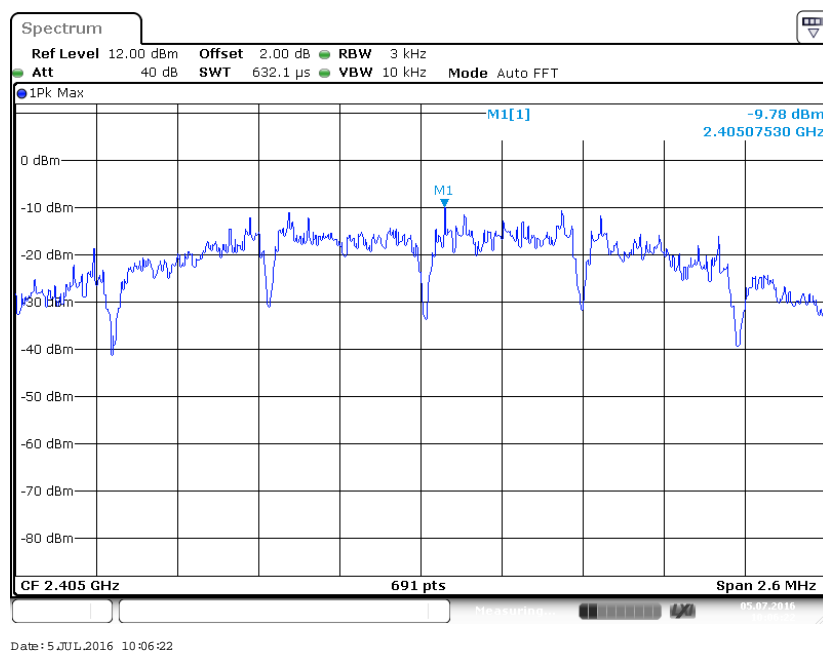
Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-07-05.

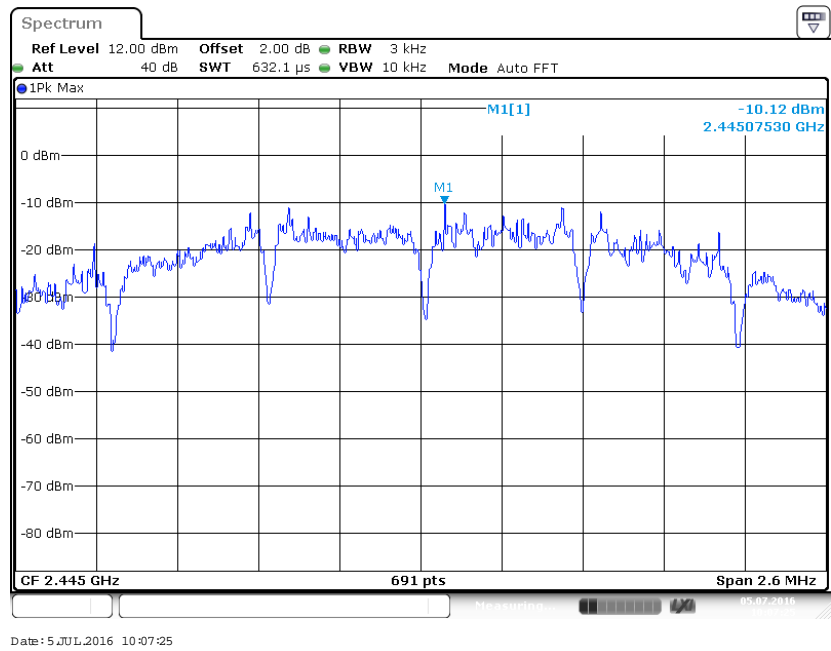
EUT operation mode: Transmitting

Test Result: Pass

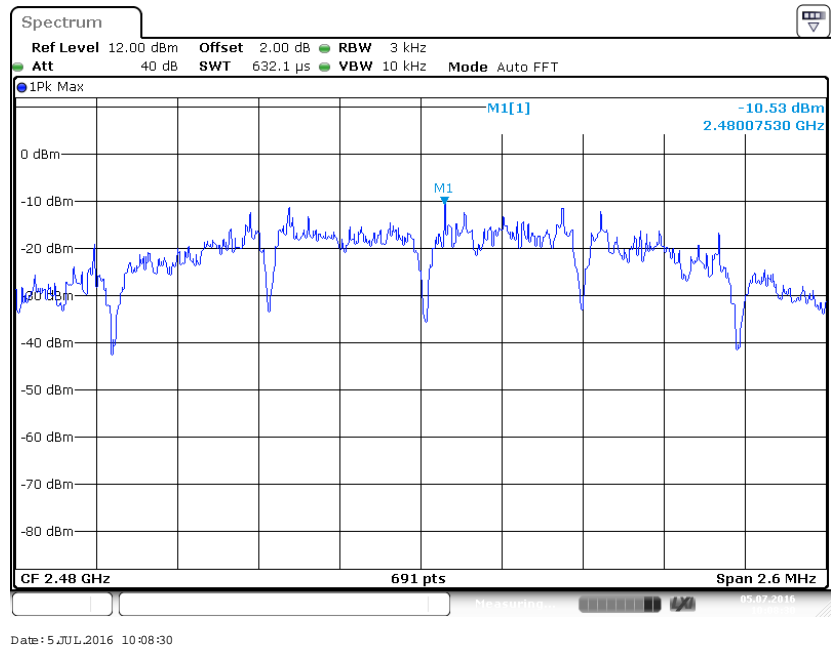
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Low	2405	-9.78	≤ 8
Middle	2445	-10.12	≤ 8
High	2480	-10.53	≤ 8

Power Spectral Density, Low Channel

Power Spectral Density, Middle Channel



Power Spectral Density, High Channel



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