

FCC PART 15.247

TEST REPORT

For

Smartx Network Technology(Shanghai) Co., Ltd.

Room 502-5, Building No. 23, No. 518, Xinzhuan Rd. Songjiang District, Shanghai

FCC ID: 2AGE5-ZEGA0003

Report Type: Original Report	Product Type: Intelligent Toys
Test Engineer: Ada Yu	<i>Ada Yu</i>
Report Number: RKS161011002-00E	
Report Date: 2016-10-17	
Reviewed By: EMC Manager	<i>Jesse Huang</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) Chenghu Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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.

TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
TEST FACILITY	5
SYSTEM TEST CONFIGURATION.....	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	6
SUPPORT EQUIPMENT LIST AND DETAILS	7
EXTERNAL I/O CABLE.....	7
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS	8
FCC§15.247 (i), §1.1310& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	9
APPLICABLE STANDARD	9
FCC §15.203 - ANTENNA REQUIREMENT.....	10
APPLICABLE STANDARD	10
ANTENNA CONNECTOR CONSTRUCTION	10
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	11
APPLICABLE STANDARD	11
MEASUREMENT UNCERTAINTY.....	11
EUT SETUP.....	11
EMI TEST RECEIVER SETUP.....	12
TEST PROCEDURE	12
TEST EQUIPMENT LIST AND DETAILS.....	12
CORRECTED FACTOR & MARGIN CALCULATION	12
TEST RESULTS SUMMARY	13
TEST DATA	13
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	16
APPLICABLE STANDARD	16
MEASUREMENT UNCERTAINTY.....	16
EUT SETUP	16
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	17
TEST PROCEDURE	17
TEST EQUIPMENT LIST AND DETAILS.....	18
CORRECTED AMPLITUDE & MARGIN CALCULATION	18
TEST RESULTS SUMMARY	18
TEST DATA	19
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....	23
APPLICABLE STANDARD	23
TEST PROCEDURE	23
TEST EQUIPMENT LIST AND DETAILS.....	23
TEST DATA	23
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER.....	26

APPLICABLE STANDARD	26
TEST PROCEDURE	26
TEST EQUIPMENT LIST AND DETAILS.....	26
TEST DATA	26
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....	28
APPLICABLE STANDARD	28
TEST PROCEDURE	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST DATA	28
FCC §15.247(e) - POWER SPECTRAL DENSITY	30
APPLICABLE STANDARD	30
TEST PROCEDURE	30
TEST EQUIPMENT LIST AND DETAILS.....	30
TEST DATA	30

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Smartx Network Technology(Shanghai) Co., Ltd.'s product, model number: Z-1302 (FCC ID: 2AGE5-ZEGA0003) or the "EUT" in this report was a Galaxy ZEGA, which was measured approximately: 150mm (L) x150mm (W) x9.8mm (H). The rated voltage: 3.7V From Rechargeable lithium battery.

EUT adapter information:

MODEL: A122-05020001U

INPUT: AC100-240V~50-60Hz 0.4A

OUTPUT: 5V~2000mA

Frequency Range:

Bluetooth: 2402MHz-2480MHz

**All measurement and test data in this report was gathered from production sample serial number: 20160929007*

(Assigned by the BACL. The EUT supplied by the applicant was received on 2016-09-29.

Objective

This report is prepared on behalf of Smartx Network Technology(Shanghai) 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 15.225 DXX Submittal with FCC ID: 2AGE5-ZEGA0003.

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

For Bluetooth LE mode, 40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	...	...
...	...	...	...
...	...	...	...
...	...	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Bluetool

Support Equipment List and Details

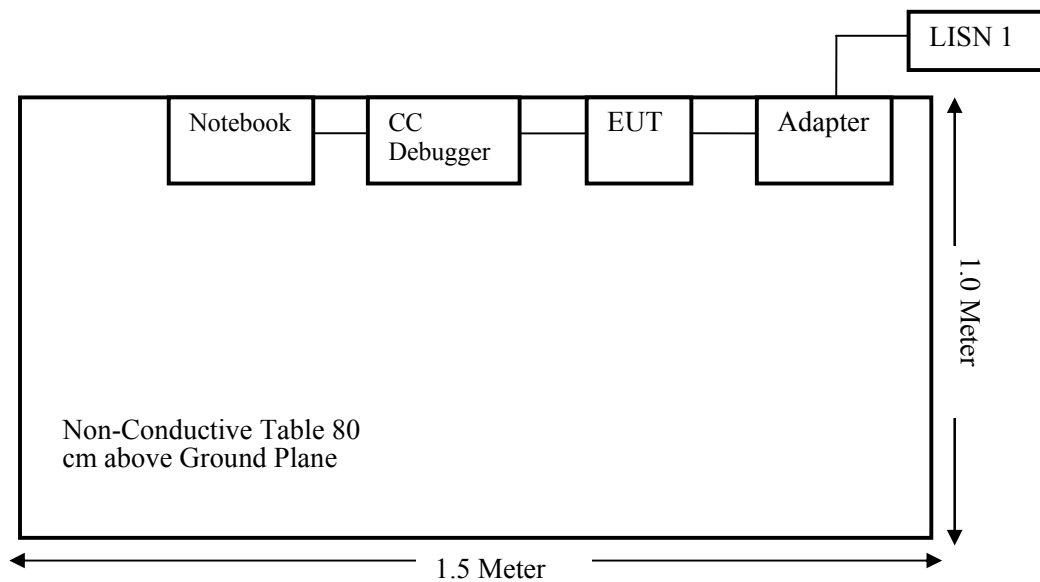
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152

External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.9	Notebook	CC Debugger
Power Cable	Un-shielding	0.1	CC Debugger	EUT

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1310 & §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

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:

Frequency (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2402	0	1.00	1	1.26	20	0.0003	1.0

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 a PCB antenna arrangement for Bluetooth and the antenna gain is 0 dBi, which was permanently attached, 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

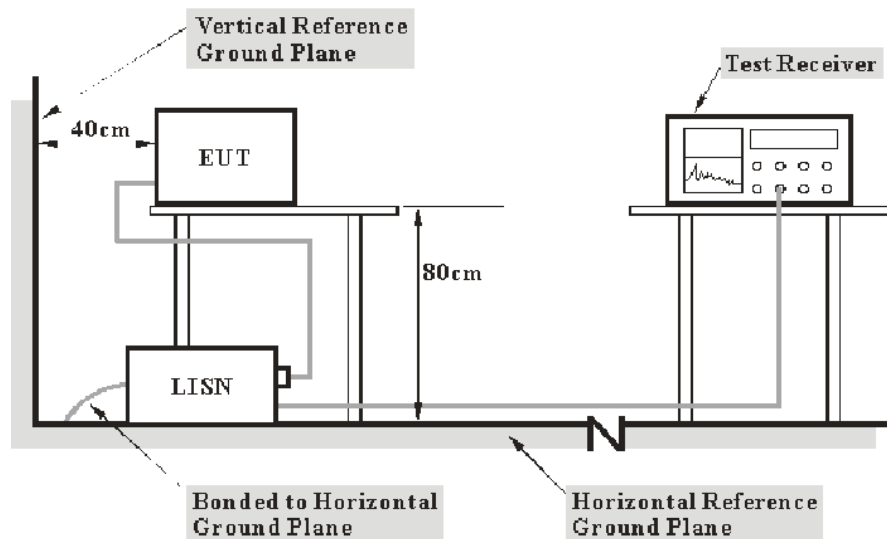
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements may be 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, 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 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

Test Procedure

During the conducted emission test, the adapter 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
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2016-06-19	2017-06-18
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2016-10-01	2017-10-01
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:

11.35dB at 0.160000MHz in the **Line** conducted mode

Refer to CISPR16-4-2 and CISPR 16-4-1, 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.

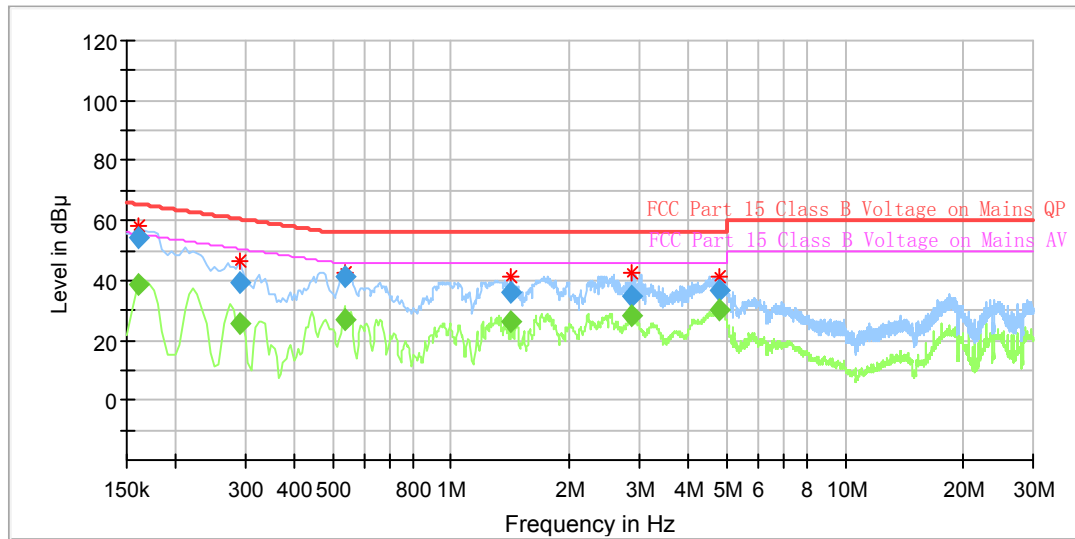
Test Data

Environmental Conditions

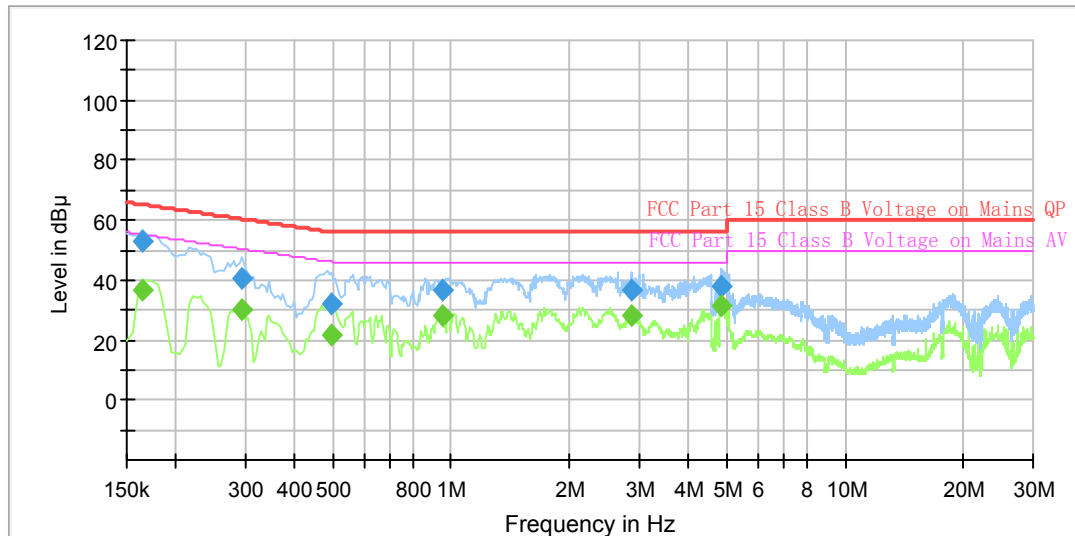
Temperature:	23 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-10-13.

EUT operation mode: Charging and transmitting in low channel (worst case)

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	---	38.49	9.000	L1	10.3	16.97	55.46	Compliance
0.160000	54.11	---	9.000	L1	10.3	11.35	65.46	Compliance
0.290000	---	25.41	9.000	L1	10.3	25.11	50.52	Compliance
0.290000	39.57	---	9.000	L1	10.3	20.95	60.52	Compliance
0.540000	---	26.95	9.000	L1	10.3	19.05	46.00	Compliance
0.540000	41.12	---	9.000	L1	10.3	14.88	56.00	Compliance
1.420000	---	26.21	9.000	L1	10.3	19.79	46.00	Compliance
1.420000	36.30	---	9.000	L1	10.3	19.70	56.00	Compliance
2.865000	---	28.26	9.000	L1	10.4	17.74	46.00	Compliance
2.865000	34.85	---	9.000	L1	10.4	21.15	56.00	Compliance
4.805000	---	30.31	9.000	L1	10.5	15.69	46.00	Compliance
4.805000	36.41	---	9.000	L1	10.5	19.59	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
0.165000	---	36.48	9.000	N	10.3	18.73	55.21	Compliance
0.165000	52.91	---	9.000	N	10.3	12.30	65.21	Compliance
0.295000	---	30.07	9.000	N	10.3	20.31	50.38	Compliance
0.295000	40.53	---	9.000	N	10.3	19.85	60.38	Compliance
0.495000	---	21.97	9.000	N	10.3	24.11	46.08	Compliance
0.495000	31.93	---	9.000	N	10.3	24.15	56.08	Compliance
0.950000	---	28.18	9.000	N	10.3	17.82	46.00	Compliance
0.950000	36.79	---	9.000	N	10.3	19.21	56.00	Compliance
2.860000	---	28.34	9.000	N	10.5	17.66	46.00	Compliance
2.860000	36.58	---	9.000	N	10.5	19.42	56.00	Compliance
4.845000	---	31.41	9.000	N	10.6	14.59	46.00	Compliance
4.845000	37.97	---	9.000	N	10.6	18.03	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;

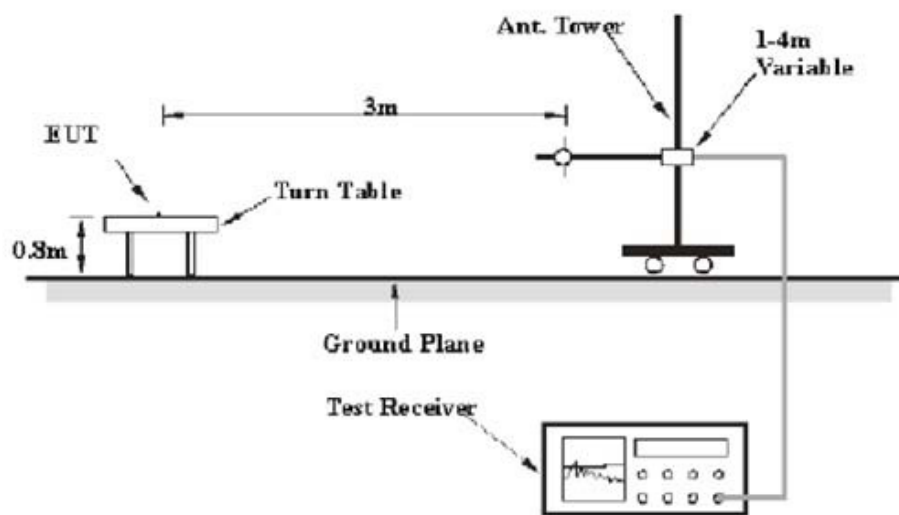
Measurement Uncertainty

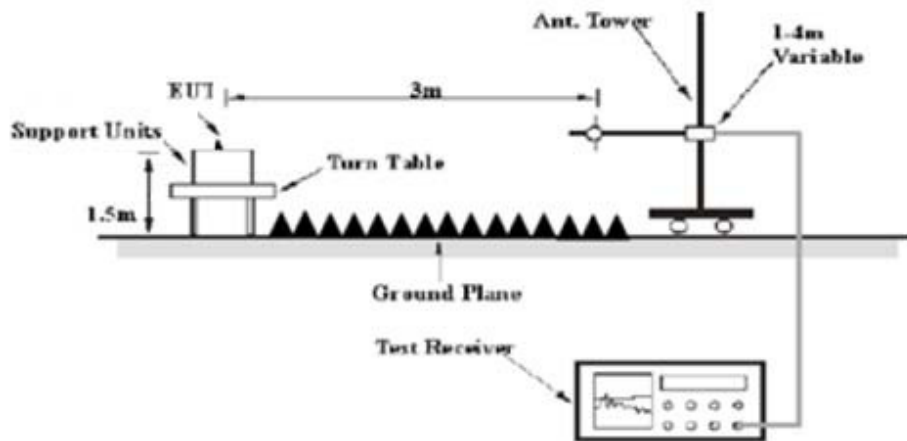
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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 1GHz:



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 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 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	2016-09-16	2017-09-16
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	FSIQ26	100048	2015-11-12	2016-11-11
Rohde & Schwarz	SIGNAL ANALYZER	FSV40	101116	2016-07-04	2017-07-03
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-16
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2016-09-16	2017-09-16
champrotek	Chamber	Chamber A	1#	2016-09-16	2017-09-16
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.

10.21 dB at 86.623750 MHz in the Vertical polarization

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

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

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

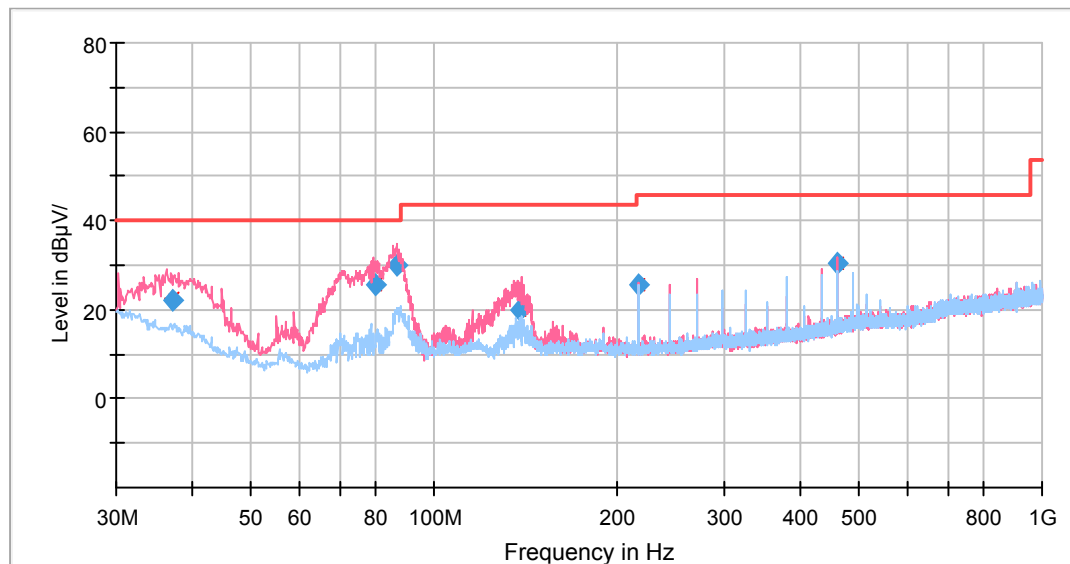
Test Data**Environmental Conditions**

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

The testing was performed by Ada Yu on 2016-10-11.

30 MHz-1 GHz:

EUT operation mode: Charging and transmitting in middle channel (worst case)



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)
37.065000	30.69	QP	0.0	101.0	V	-8.8	21.89	40.00	18.11
80.267500	42.70	QP	159.0	101.0	V	-17.0	25.70	40.00	14.30
86.623750	46.79	QP	106.0	101.0	V	-17.0	29.79	40.00	10.21
138.167500	31.92	QP	159.0	101.0	H	-12.2	19.72	43.50	23.78
216.967500	37.86	QP	144.0	101.0	H	-12.4	25.46	46.00	20.54
461.043750	36.95	QP	182.0	101.0	V	-6.7	30.25	46.00	15.75

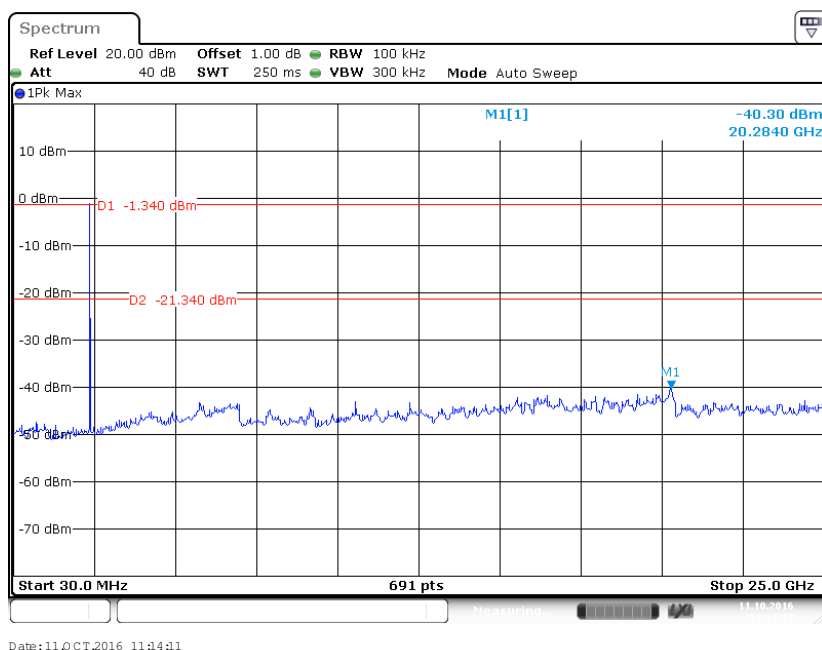
1GHz-25GHz*EUT operation mode: Charging and transmitting*

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 (2402 MHz)									
2402	94.44	PK	165.0	150.0	V	3.00	97.44	/	/
2402	83.95	Ave	165.0	150.0	V	3.00	86.95	/	/
2402	93.67	PK	250.0	150.0	H	3.00	96.67	/	/
2402	82.85	Ave	250.0	150.0	H	3.00	85.85	/	/
2390	33.10	PK	197.0	150.0	V	4.90	38.00	74	36.00
2390	19.98	Ave	197.0	150.0	V	4.90	24.88	54	29.12
2400	33.12	PK	110.0	150.0	H	4.90	38.02	74	35.98
2400	19.99	Ave	110.0	150.0	H	4.90	24.89	54	29.11
4804	31.30	PK	110.0	150.0	H	13.70	45.00	74	29.00
4804	17.54	Ave	110.0	150.0	H	13.70	31.24	54	22.76
6653	35.34	PK	137.0	250.0	H	17.8	53.14	74	20.86
6653	21.67	Ave	137.0	250.0	H	17.8	39.47	54	14.53
7206	15.89	Ave	50.0	150.0	H	20.50	36.39	54	17.61
7206	29.14	PK	50.0	150.0	H	20.50	49.64	74	24.36
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 (dB μ V/m)	Margin (dB)
Middle Channel (2440MHz)									
2440	95.45	PK	165.0	150.0	V	2.60	98.05	/	/
2440	84.72	Ave	165.0	150.0	V	2.60	87.32	/	/
2440	95.17	PK	155.0	150.0	H	2.60	97.77	/	/
2440	84.09	Ave	155.0	150.0	H	2.60	86.69	/	/
1743	29.06	Ave	33.0	250.0	V	3.50	32.56	54	21.44
1743	41.83	PK	33.0	250.0	V	3.50	45.33	74	28.67
2262	31.13	Ave	80.0	150.0	V	0.70	31.83	54	22.17
2262	41.88	PK	80.0	150.0	V	0.70	42.58	74	31.42
4880	17.66	Ave	80.0	150.0	H	13.90	31.56	54	22.44
4880	31.64	PK	80.0	150.0	H	13.90	45.54	74	28.46
6625	34.87	PK	142.0	150.0	V	17.70	52.57	74	21.43
6625	21.67	Ave	142.0	150.0	V	17.70	39.37	54	14.63
7320	29.33	PK	325.0	150.0	H	20.80	50.13	74	23.87
7320	16.54	Ave.	325.0	150.0	H	20.80	37.34	54	16.66

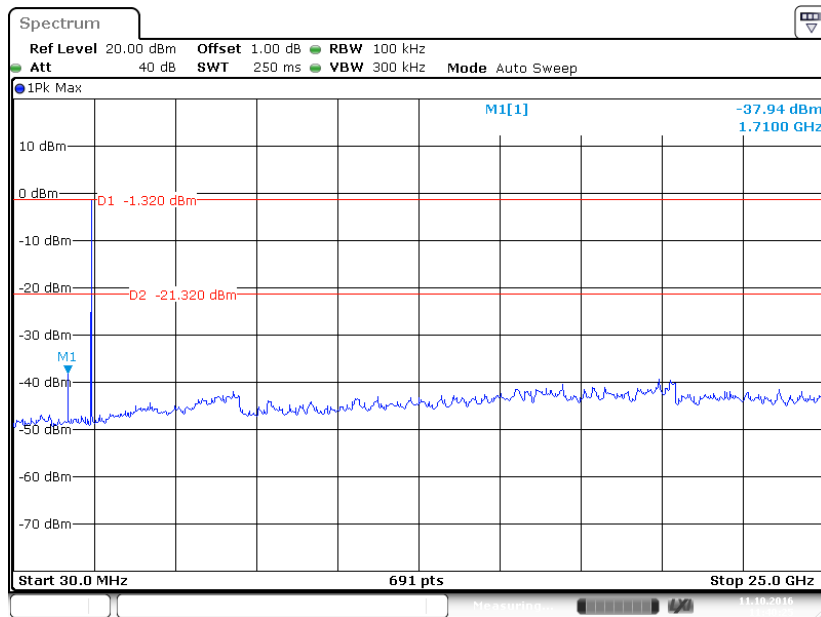
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
High Channel (2480 MHz)									
2480	94.43	PK	155.0	150.0	V	3.20	97.63	/	/
2480	83.22	Ave	155.0	150.0	V	3.20	86.42	/	/
2480	93.52	PK	116.0	150.0	H	3.20	96.72	/	/
2480	82.69	Ave	116.0	150.0	H	3.20	85.89	/	/
2483.5	43.24	PK	163.0	150.0	V	4.20	47.44	74	26.56
2483.5	28.48	Ave	163.0	150.0	V	4.20	32.68	54	21.32
2487	36.33	PK	155.0	150.0	V	5.00	41.33	74	32.67
2487	21.66	Ave	155.0	150.0	V	5.00	26.66	54	27.34
4960	17.72	Ave	84.0	150.0	H	14.10	31.82	54	22.18
4960	31.88	PK	84.0	150.0	H	14.10	45.98	74	28.02
6639	21.72	Ave	105.0	200.0	H	17.70	39.42	54	14.58
6639	35.22	PK	105.0	200.0	H	17.70	52.92	74	21.08
7440	14.44	Ave	316.0	150.0	H	21.20	35.64	54	18.36
7440	28.49	PK	316.0	150.0	H	21.20	49.69	74	24.31

Spurious Emissions at Antenna Port:

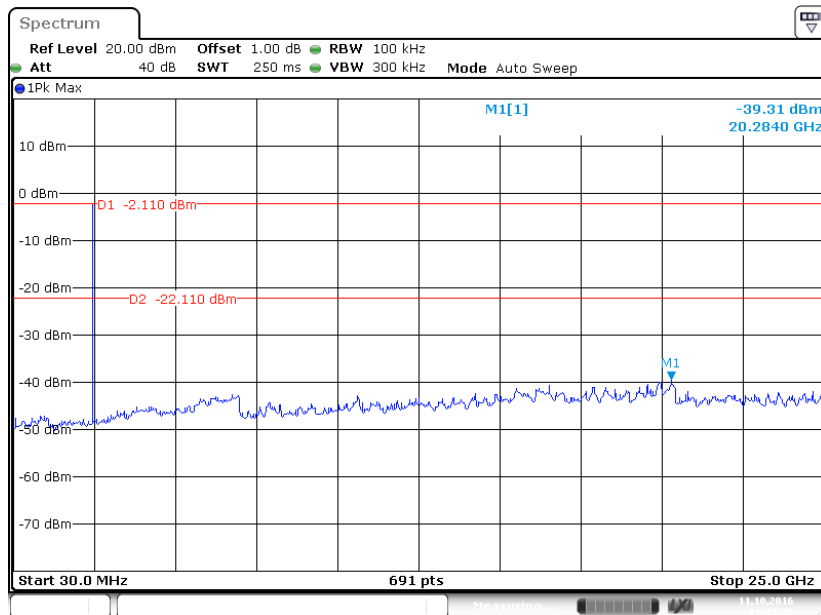
Low Channel



Middle Channel



High Channel



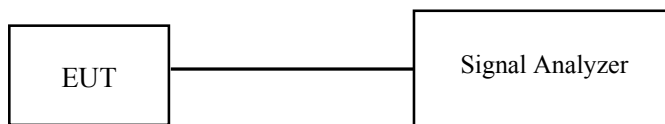
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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	FSIQ26	100048	2015-11-12	2016-11-11
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 Ada Yu on 2016-10-11.

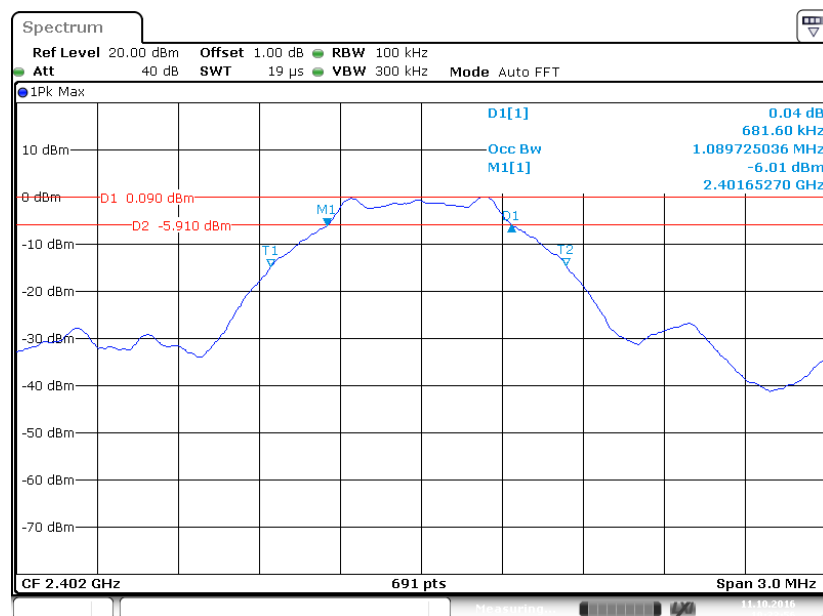
Test Result: Pass.

Please refer to the following tables and plots.

EUT operation mode: Transmitting

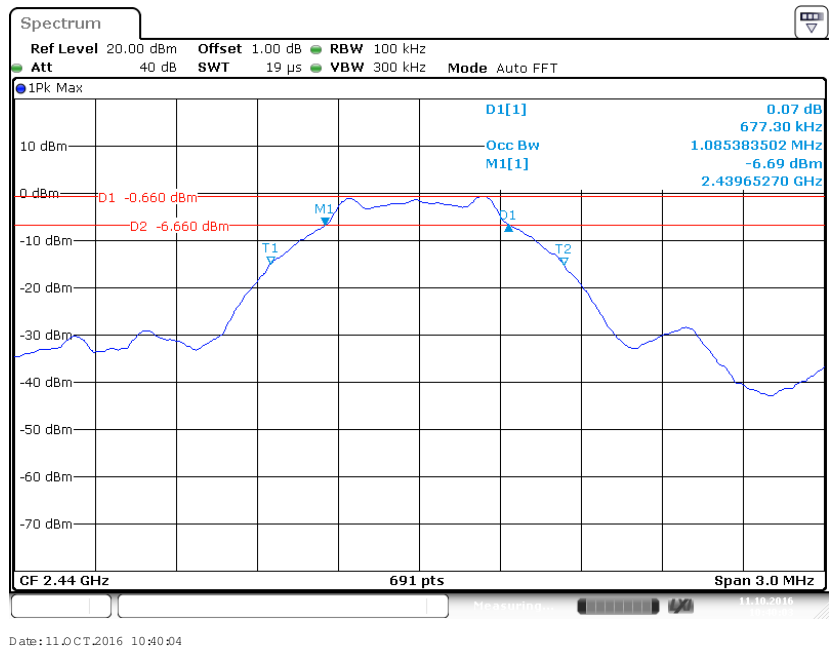
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
Low	2402	0.68	≥ 500
Middle	2440	0.68	≥ 500
High	2480	0.68	≥ 500

Low Channel

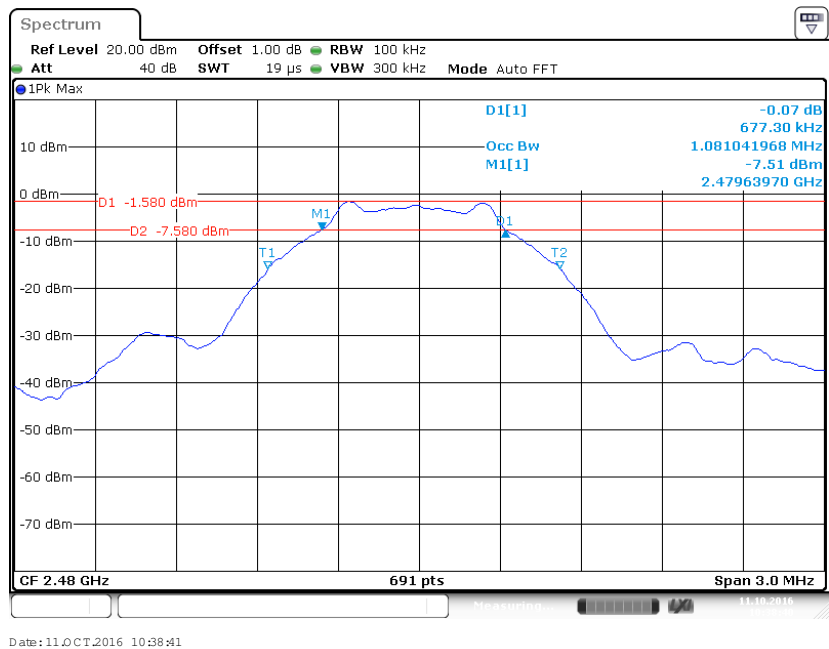


Date: 11 OCT 2016 10:33:56

Middle Channel



High Channel



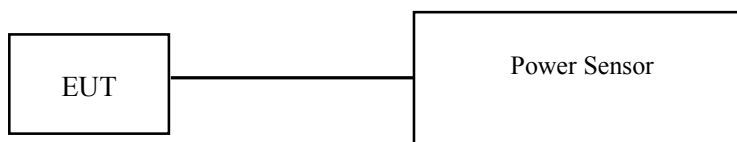
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to 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	BASE UNIT (WITHOUT DISPLAY)	OSP120	101247	2015-05-27	2017-05-27
Rohde & Schwarz	Power Sensor	NRP-Z91	200014	2015-08-01	2017-07-31
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
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

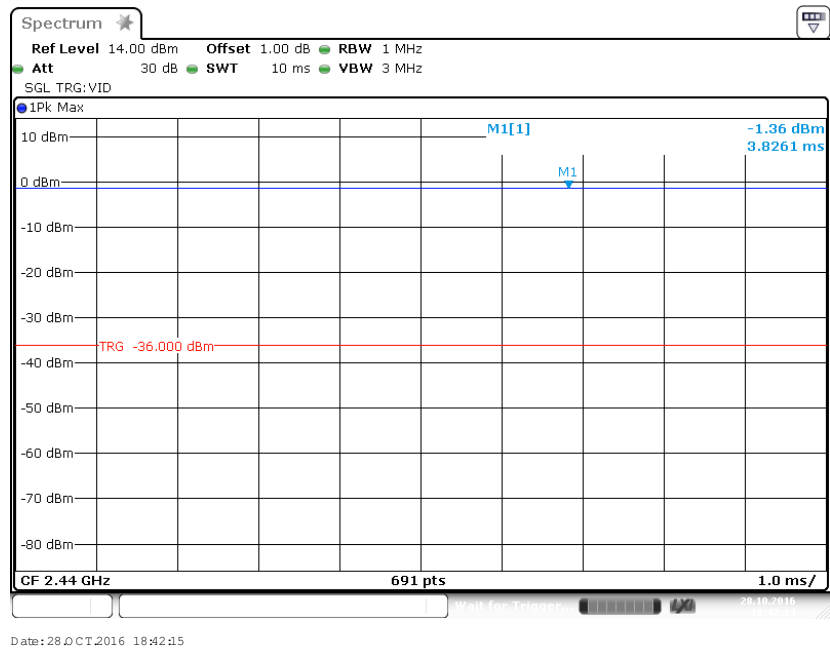
The testing was performed by Ada Yu on 2016-10-11&2016-10-28.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Conducted Average Output Power Reading (dBm)	Corrected Factor $10\log(1/x)$ (dB)	Conducted Average Output Power (dBm)	Limit (dBm)	Result
Low	2402	0.19	-0.67	0	-0.67	30	Pass
Middle	2440	-0.55	-1.01	0	-1.01	30	Pass
High	2480	-1.48	-2.51	0	-2.51	30	Pass

Note: x is the duty cycle. As the follow plot: x=1
 Conducted Average Output Power= Reading+ Corrected Factor
 The reading value is reading from the test software.

Duty Cycle in Middle Channel



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

Applicable Standard

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

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
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

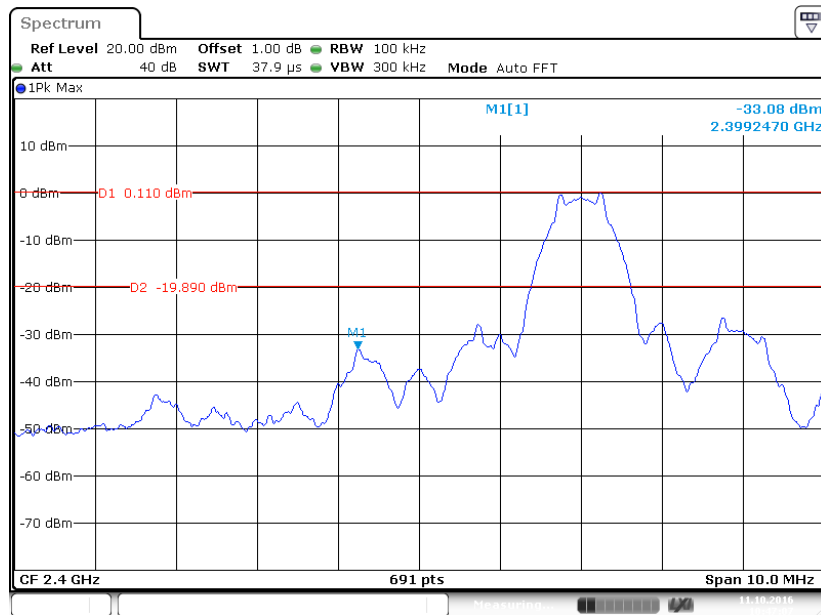
Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-10-11.

Test Result: *Compliance*

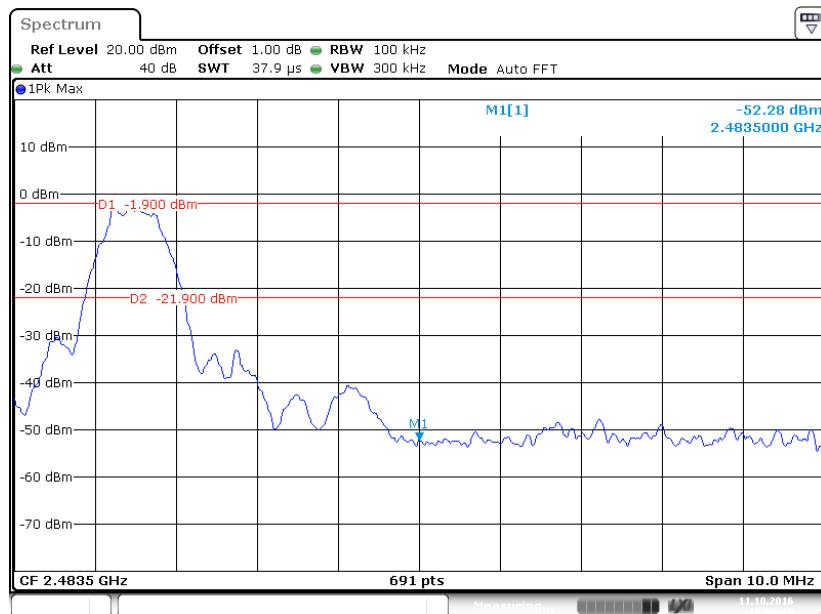
Please refer to the following table and plots.

Band Edge, Left Side



Date: 11 OCT 2016 10:47:08

Band Edge, Right Side



Date: 11 OCT 2016 10:50:28

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	FSIQ26	100048	2015-11-12	2016-11-11
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

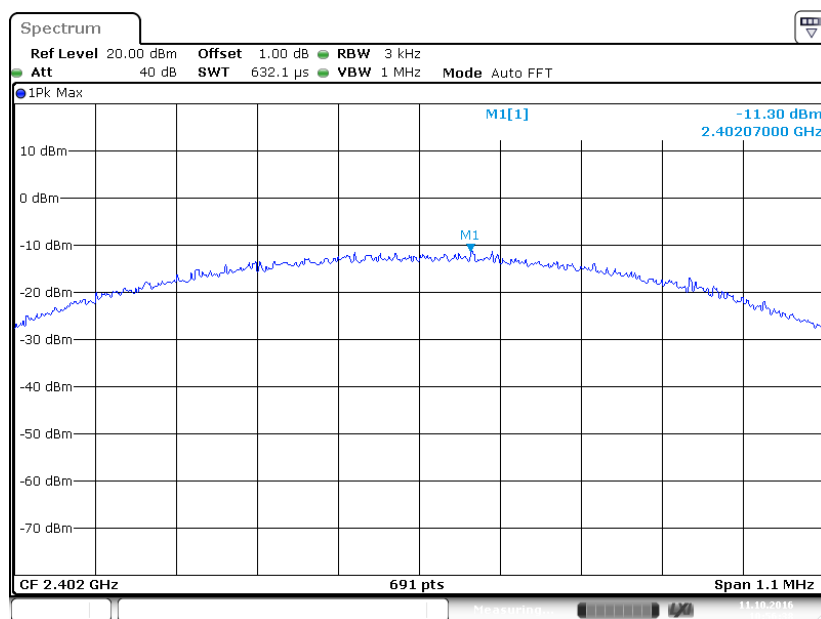
Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-10-11.

EUT operation mode: Transmitting

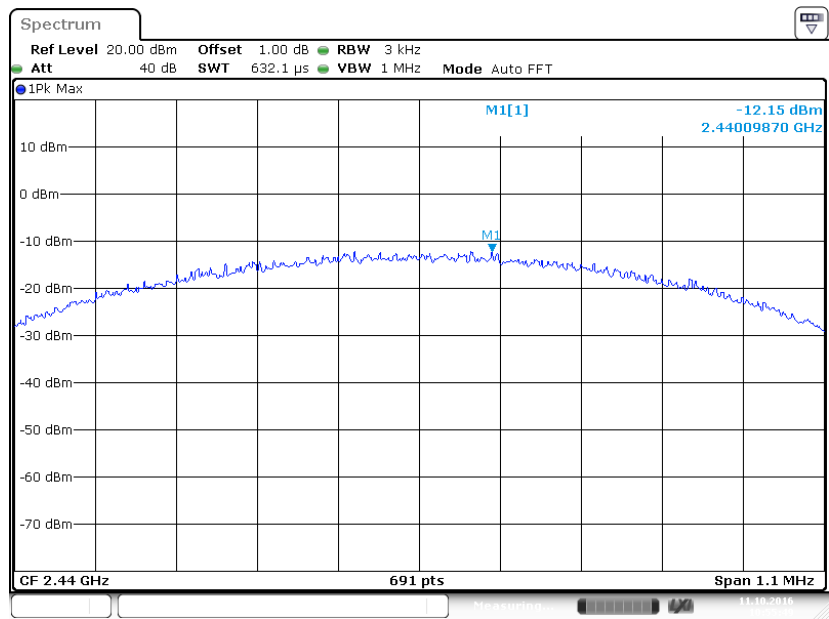
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Low	2402	-11.30	≤ 8
Middle	2440	-12.15	≤ 8
High	2480	-13.33	≤ 8

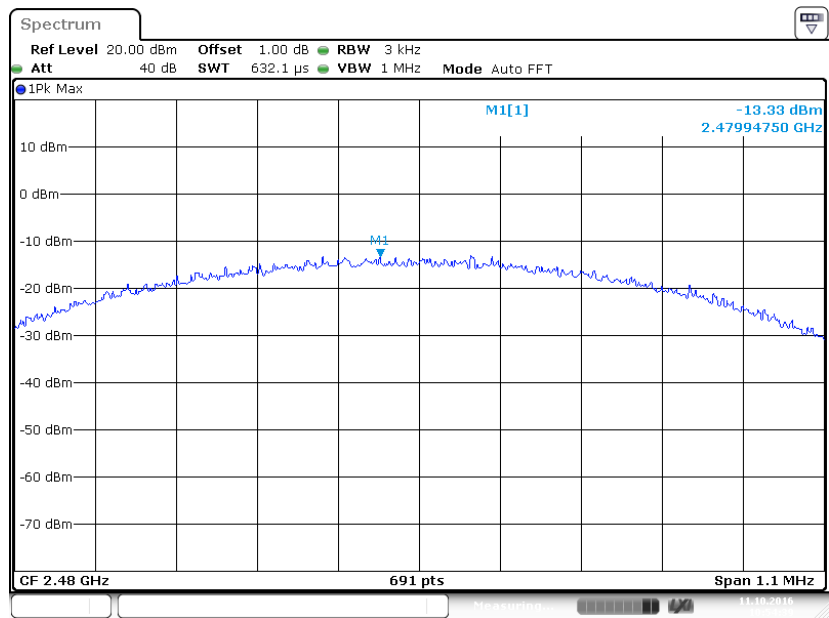
Power Spectral Density, Low Channel

Date: 11 OCT 2016 10:56:38

Power Spectral Density, Middle Channel



Power Spectral Density, High Channel



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