

FCC PART 15.247 TEST REPORT

For

Sensoro Co.,Ltd.

Room 2807, Building 1B, Wangjing SOHO, No10 Wangjing Street, Chaoyang District, Beijing, China

FCC ID: 2ADYO-S0002A

Report Type: **Product Name:** Original Report SmartBeacon **Report Number:** RBJ170728052-00 **Report Date:** 2017-08-18 Jerry Zhang Jerry Zhang **EMC Manager Reviewed By:** Bay Area Compliance Laboratories Corp. (Dongguan) **Test Laboratory:** No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

TABLE OF CONTENTS

Report No.: RBJ170728052-00

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
Objective	
RELATED SUBMITTAL(S)/GRANT(S)	
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY TEST FACILITY	
SYSTEM TEST CONFIGURATION	
DESCRIPTION OF TEST CONFIGURATION	
EUT Exercise Software	
BLOCK DIAGRAM OF TEST SETUP	
SUMMARY OF TEST RESULTS	
FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)	9
APPLICABLE STANDARD	
FCC §15.203 - ANTENNA REQUIREMENT	10
APPLICABLE STANDARD	
ANTENNA CONNECTOR CONSTRUCTION	
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS	
APPLICABLE STANDARD	
EUT SETUP	11
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	
TEST PROCEDURE	
CORRECTED AMPLITUDE & MARGIN CALCULATION	
TEST DATA	
FCC §15.247(a) (2)–6 dB EMISSION BANDWIDTH	
APPLICABLE STANDARD	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS.	
Test Data	17
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER	20
APPLICABLE STANDARD	20
Test Procedure	
TEST EQUIPMENT LIST AND DETAILS.	
TEST DATA	
FCC §15.247(d)– 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	
APPLICABLE STANDARD	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	
FCC §15.247(e) - POWER SPECTRAL DENSITY	26

Bay Area Compliance Laboratories Corp. (Dongguan)

Applicable Standard	26
Test Procedure	
TEST EQUIPMENT LIST AND DETAILS	26
TEST DATA	

Report No.: RBJ170728052-00

FCC Part 15.247 Page 3 of 28

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Sensoro Co.,Ltd.*'s product, model number: *4AA (FCC ID: 2ADYO-S0002A)* (the "EUT") in this report was a *SmartBeacon*, which was measured approximately: 6.4 cm (L) x 6.4 cm (W) x 2.35cm (H), rated input voltage: DC 3.0 V from battery.

Report No.: RBJ170728052-00

*All measurement and test data in this report was gathered from final production sample, serial number: 170728052 (assigned by the BACL, Dongguan). The EUT was received on 2017-07-28.

Objective

This report is prepared on behalf of *Sensoro Co.,Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

Test Methodology

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

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

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical
Unwanted Emissions, radiated	200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical
	1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB
Unwanted Emissions	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

FCC Part 15.247 Page 4 of 28

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 Industry Area, Tangxia, Dongguan, Guangdong, China

Report No.: RBJ170728052-00

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO 17025 by CNAS(Lab code: L5662). And accredited to ISO 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

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.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

FCC Part 15.247 Page 5 of 28

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

Report No.: RBJ170728052-00

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.

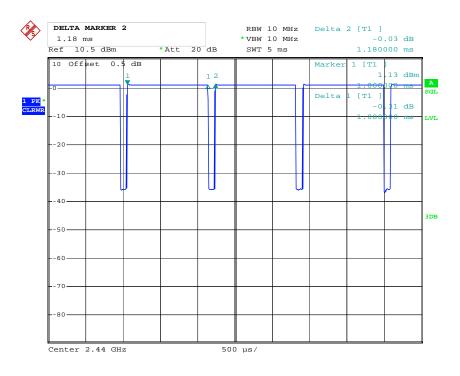
EUT Exercise Software

The software "IPOP" was used for testing, which was provided by manufacturer. The system configured maximum power by default setting, and the software used for changing channels.

The duty cycle as below:

Mode	Ton (ms)	T _{on+off} (ms)	Duty Cycle (%)	Minimum Transmission Duration (T) (ms)
BLE	1.000	1.180	84.75	1.000

FCC Part 15.247 Page 6 of 28

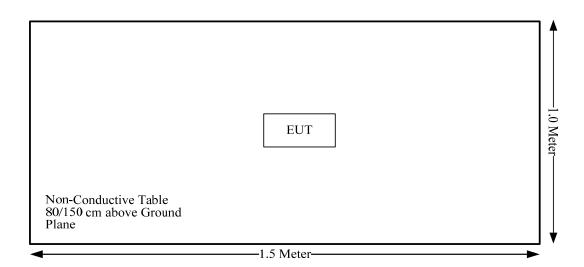


Date: 18.AUG.2017 09:19:36

Equipment Modifications

No modification was made to the EUT.

Block Diagram of Test Setup



FCC Part 15.247 Page 7 of 28

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissable Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions Not App	
§15.205, §15.209, §15.247(d)	Spurious Emissions Compli	
§15.247 (a)(2)	6 dB Bandwidth Complian	
§15.247(b)(3)	Maximum Conducted Output Power Compli	
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge Complia	
§15.247(e)	Power Spectral Density Complian	

Report No.: RBJ170728052-00

Not Applicable: the device was powered by batteries.

FCC Part 15.247 Page 8 of 28

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.

Report No.: RBJ170728052-00

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

(B) Limits for General Population/Uncontrolled Exposure					
		Averaging Time (minutes)			
0.3-1.34	614	1.63	*(100)	30	
1.34–30	824/f	2.19/f	*(180/f²)	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.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

 $S = PG/4\pi R^2$ = 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)	Ante	nna Gain	output includir	lucted power ng Tune- lerance	Evaluation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)
	(dBi)	(numeric)	(dBm)	(mW)			
2402-2480	0.9	1.23	4	2.51	20.00	0.0006	1.0

Result: The device meet FCC MPE at 20 cm distance

FCC Part 15.247 Page 9 of 28

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:

Report No.: RBJ170728052-00

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has a internal PCB antenna permanently attached to the EUT, and the antenna gain is 0.9 dBi. Please refer to the EUT photos.

Result: Compliance.

FCC Part 15.247 Page 10 of 28

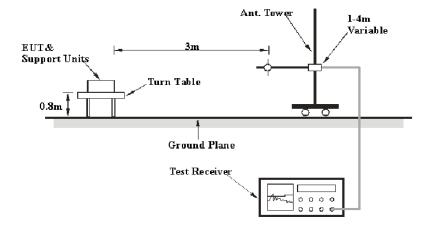
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

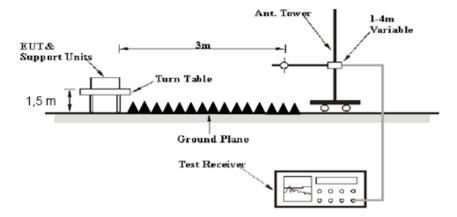
EUT Setup

Below 1GHz:



Report No.: RBJ170728052-00

Above 1GHz:



The radiated emission tests were performed in the 10 meters chamber test site for the range 30MHz to 1GHz and the 3 meters chamber test site for above 1GHz, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The spacing between the peripherals was 10 cm.

FCC Part 15.247 Page 11 of 28

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

30MHz-1000MHz:

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

Report No.: RBJ170728052-00

1GHz-25GHz:

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

Note: T is minimum transmission duration

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – Corrected Amplitude

FCC Part 15.247 Page 12 of 28

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2016-09-01	2017-08-31
Sunol Sciences	Antenna	JB3	A060611-1	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2016-09-01	2017-09-01
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Mini-Circuit	Amplifier	ZVA-213-S+	SN054201245	2017-02-19	2018-02-19
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2016-09-06	2017-09-06
Unknown	Coaxial Cable	Chamber A-1	4m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber B-1	0.75m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber A-2	10m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber B-2	8m	2016-09-01	2017-09-01
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

Report No.: RBJ170728052-00

Test Data

Environmental Conditions

Temperature:	26.1 °C
Relative Humidity:	63 %
ATM Pressure:	101 kPa

The testing was performed by Robin Zheng on 2017-08-04.

Test Result: Compliance, please Refer to the following data

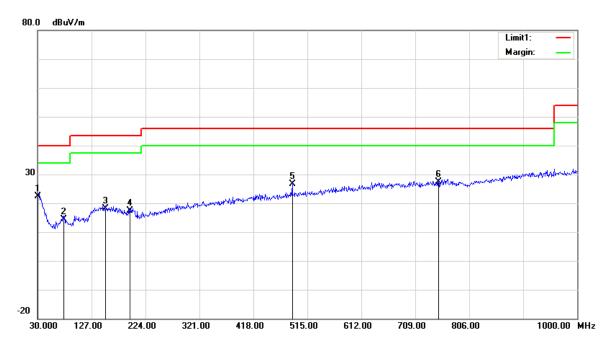
Test Mode: Transmitting

FCC Part 15.247 Page 13 of 28

^{*} **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).

1) 30MHz-1GHz(Middle channel was the worst)

Horizontal:

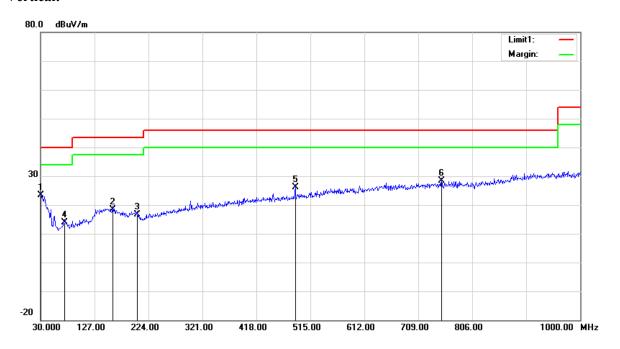


Report No.: RBJ170728052-00

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	17.04	QP	5.36	22.40	40.00	17.60
76.5600	20.34	QP	-5.84	14.50	40.00	25.50
152.2200	17.68	QP	0.42	18.10	43.50	25.40
195.8700	17.39	QP	-0.09	17.30	43.50	26.20
487.8400	21.57	QP	5.13	26.70	46.00	19.30
750.7100	18.83	QP	8.47	27.30	46.00	18.70

FCC Part 15.247 Page 14 of 28

Vertical:



Report No.: RBJ170728052-00

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	18.00	QP	5.36	23.36	40.00	16.64
159.9800	18.04	QP	0.46	18.50	43.50	25.00
203.6300	17.23	QP	-0.53	16.70	43.50	26.80
73.6500	19.85	QP	-5.95	13.90	40.00	26.10
487.8400	21.07	QP	5.13	26.20	46.00	19.80
750.7100	19.83	QP	8.47	28.30	46.00	17.70

FCC Part 15.247 Page 15 of 28

2) 1-25GHz:

	Re	eceiver	Rx A	ntenna	Cable	Amplifier	Corrected		
Frequency (MHz)	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)	loss (dB)	Gain (dB)	Amplitude (dBµV/m)	Limit (dBμV/m)	Margin (dB)
			Lo	w Channe	1: 2402 M	Ήz			
2402	62.56	PK	Н	28.10	3.11	0.00	93.77	N/A	N/A
2402	60.25	AV	Н	28.10	3.11	0.00	91.46	N/A	N/A
2402	60.17	PK	V	28.10	3.11	0.00	91.38	N/A	N/A
2402	58.63	AV	V	28.10	3.11	0.00	89.84	N/A	N/A
2390	26.15	PK	Н	28.08	3.10	0.00	57.33	74.00	16.67
2390	13.41	AV	Н	28.08	3.10	0.00	44.59	54.00	9.41
4804	52.47	PK	Н	32.91	4.30	35.48	54.20	74.00	19.80
4804	36.43	AV	Н	32.91	4.30	35.48	38.16	54.00	15.84
7206	46.96	PK	Н	35.74	5.45	35.97	52.18	74.00	21.82
7206	34.23	AV	Н	35.74	5.45	35.97	39.45	54.00	14.55
5436	46.53	PK	Н	34.00	4.52	35.82	49.23	74.00	24.77
5436	33.87	AV	Н	34.00	4.52	35.82	36.57	54.00	17.43
			Mid	ldle Chann	el: 2440]	MHz			
2440	64.87	PK	Н	28.18	3.11	0.00	96.16	N/A	N/A
2440	62.91	AV	Н	28.18	3.11	0.00	94.20	N/A	N/A
2440	60.17	PK	V	28.18	3.11	0.00	91.46	N/A	N/A
2440	58.74	AV	V	28.18	3.11	0.00	90.03	N/A	N/A
4880	53.59	PK	Н	33.06	4.40	35.54	55.51	74.00	18.49
4880	36.95	AV	Н	33.06	4.40	35.54	38.87	54.00	15.13
7320	46.89	PK	Н	36.03	5.52	35.98	52.46	74.00	21.54
7320	35.51	AV	Н	36.03	5.52	35.98	41.08	54.00	12.92
5214	46.39	PK	Н	33.64	4.80	35.72	49.11	74.00	24.89
5214	34.16	AV	Н	33.64	4.80	35.72	36.88	54.00	17.12
3895	46.13	PK	Н	32.17	3.81	35.29	46.82	74.00	27.18
3895	33.58	AV	Н	32.17	3.81	35.29	34.27	54.00	19.73
			Hi	gh Channe					
2480	65.69	PK	Н	28.26	3.10	0.00	97.05	N/A	N/A
2480	64.33	AV	Н	28.26	3.10	0.00	95.69	N/A	N/A
2480	60.97	PK	V	28.26	3.10	0.00	92.33	N/A	N/A
2480	58.46	AV	V	28.26	3.10	0.00	89.82	N/A	N/A
2483.5	26.17	PK	Н	28.27	3.10	0.00	57.54	74.00	16.46
2483.5	14.07	AV	Н	28.27	3.10	0.00	45.44	54.00	8.56
4960	53.12	PK	Н	33.22	4.42	35.60	55.16	74.00	18.84
4960	36.58	AV	Н	33.22	4.42	35.60	38.62	54.00	15.38
7440	49.08	PK	Н	36.34	5.60	35.99	55.03	74.00	18.97
7440	35.96	AV	Н	36.34	5.60	35.99	41.91	54.00	12.09
5823	46.26	PK	Н	34.23	4.69	35.85	49.33	74.00	24.67
5823	34.52	AV	Н	34.23	4.69	35.85	37.59	54.00	16.41

Report No.: RBJ170728052-00

FCC Part 15.247 Page 16 of 28

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

Applicable Standard

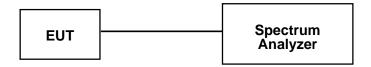
According to FCC §15.247(a) (2)

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.

Report No.: RBJ170728052-00

Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times RBW$.
- c) Detector = Peak.
- d) Trace mode = \max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2016-12-08	2017-12-08
Unknown	RF Cable	Unknown	C-4	Each Time	/

^{*} 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:	25.4 °C
Relative Humidity:	61 %
ATM Pressure:	99.9 kPa

^{*} The testing was performed by Robin Zheng on 2017-08-07.

FCC Part 15.247 Page 17 of 28

Test Mode: Transmitting

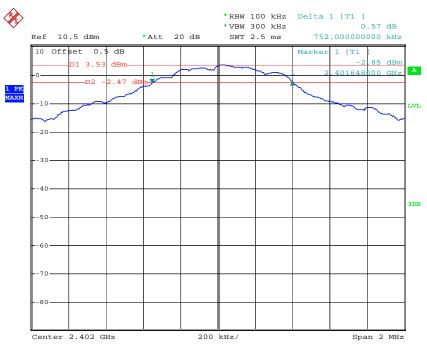
Test Result: Compliant. Please refer to the following table and plots.

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
Low	2402	0.752	≥0.5
Middle	2440	0.784	≥0.5
High	2480	0.788	≥0.5

Report No.: RBJ170728052-00

6dB Bandwidth:

Low Channel

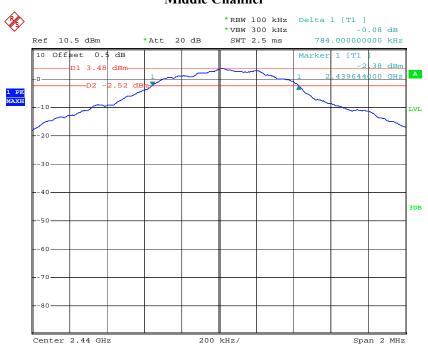


Date: 7.AUG.2017 16:49:57

FCC Part 15.247 Page 18 of 28

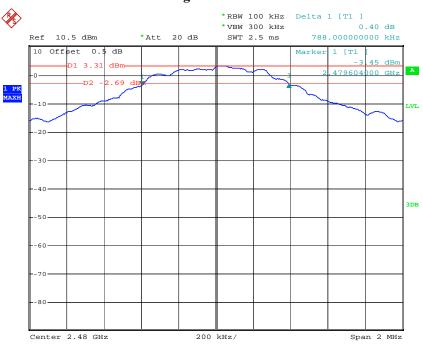
Middle Channel

Report No.: RBJ170728052-00



Date: 7.AUG.2017 16:47:22

High Channel



Date: 7.AUG.2017 16:45:49

FCC Part 15.247 Page 19 of 28

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

Report No.: RBJ170728052-00

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 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
R&S	EMI Test Receiver	ESPI	100120	2016-12-08	2017-12-08
Unknown	RF Cable	Unknown	C-4	Each Time	/

^{*} 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:	25.4 °C
Relative Humidity:	61 %
ATM Pressure:	99.9 kPa

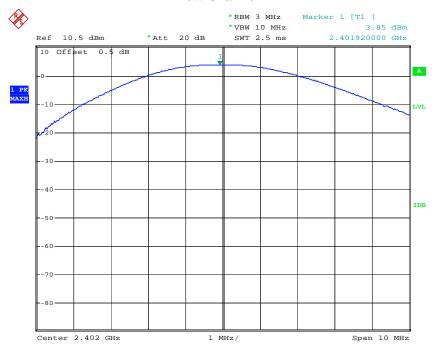
The testing was performed by Robin Zheng on 2017-08-07.

FCC Part 15.247 Page 20 of 28

Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)	Limit (dBm)
Low	2402	3.85	30
Middle	2440	3.82	30
High	2480	3.63	30

Report No.: RBJ170728052-00

Low Channel

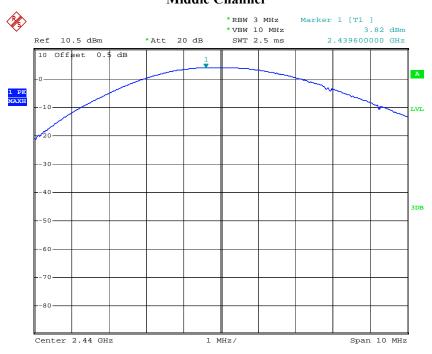


Date: 7.AUG.2017 16:23:01

FCC Part 15.247 Page 21 of 28

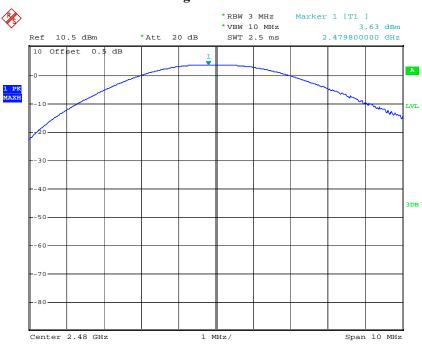
Middle Channel

Report No.: RBJ170728052-00



Date: 7.AUG.2017 16:23:44

High Channel



Date: 7.AUG.2017 16:24:08

FCC Part 15.247 Page 22 of 28

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

Report No.: RBJ170728052-00

Applicable Standard

According to FCC§15.247(d):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
R&S	EMI Test Receiver	ESPI	100120	2016-12-08	2017-12-08
Unknown	RF Cable	Unknown	C-4	Each Time	/

^{*} 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).

FCC Part 15.247 Page 23 of 28

Test Data

Environmental Conditions

Temperature:	25.4 °C
Relative Humidity:	61 %
ATM Pressure:	99.9 kPa

Report No.: RBJ170728052-00

Test mode: Transmitting

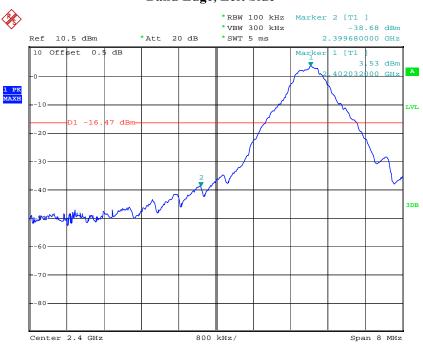
Test Result: Compliant. Please refer to following plots.

FCC Part 15.247 Page 24 of 28

^{*} The testing was performed by Robin Zheng on 2017-08-07.

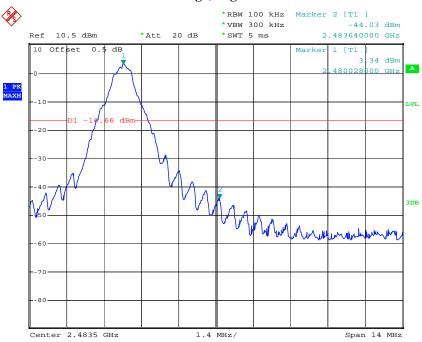
Band Edge, Left Side

Report No.: RBJ170728052-00



Date: 7.AUG.2017 17:01:00

Band Edge, Right Side



Date: 7.AUG.2017 17:03:12

FCC Part 15.247 Page 25 of 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.

Report No.: RBJ170728052-00

Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
- 4. Use the peak marker function to determine the maximum amplitude level.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2016-12-08	2017-12-08
Unknown	RF Cable	Unknown	C-4	Each Time	/

^{*} 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:	25.4 °C	
Relative Humidity:	61 %	
ATM Pressure: 99.9 kPa		

The testing was performed by Robin Zheng on 2017-08-07.

FCC Part 15.247 Page 26 of 28

Test Result: Compliance

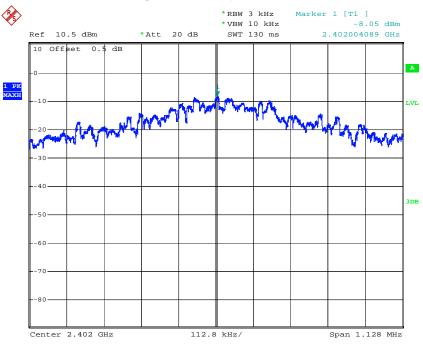
Test Mode: Transmitting

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
Low	2402	-8.05	≤8
Middle	2440	-8.93	≤8
High	2480	-9.53	≤8

Report No.: RBJ170728052-00

Please refer to the following plots

Power Spectral Density, Low Channel

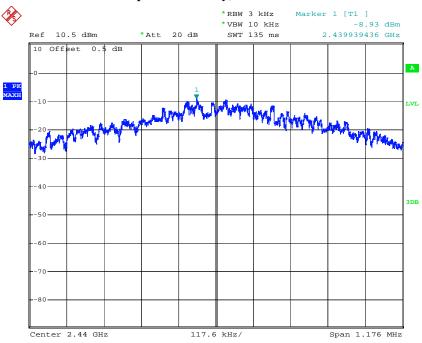


Date: 7.AUG.2017 17:12:21

FCC Part 15.247 Page 27 of 28

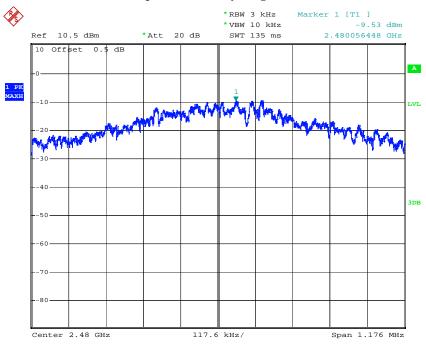
Power Spectral Density, Middle Channel

Report No.: RBJ170728052-00



Date: 7.AUG.2017 17:13:18

Power Spectral Density, High Channel



Date: 7.AUG.2017 17:14:04

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

FCC Part 15.247 Page 28 of 28