FCC PART 15.247

TEST REPORT

For

Ningbo Lumiaudio Electronic Technology LTD

22/F., Building 1,Lisi Plaza, Huifeng East Road ,Ningbo, China

FCC ID: 2AKKHBLS

Report Type:	Product Type:
Original Report	LED COLOR LIGHTBULB BLUETOOTH SPEAKER

Test Engineer:	Belle Cheng
Report Number:	RKS170316021-00B
Report Date:	2017-05-08
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Ningbo Lumiaudio Electronic Technology LTD
Tested Model	BLS-01
Product Type	LED COLOR LIGHTBULB BLUETOOTH SPEAKER
Dimension	150 mm(L)×150 mm(W)×98.5 mm(H)
Power Supply	AC 100-240V

**All measurement and test data in this report was gathered from production sample serial number: 20170317002 (Assigned by the BACL. The EUT supplied by the applicant was received on 2017-03-17)*

Objective

This report is prepared on behalf of Ningbo Lumiaudio Electronic Technology LTD in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's 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 Part15.247 DSS submissions with FCC ID: 2AKKHBLS.

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

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,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 C63.4-2014.

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 BLE mode, 40 channels are provided to 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

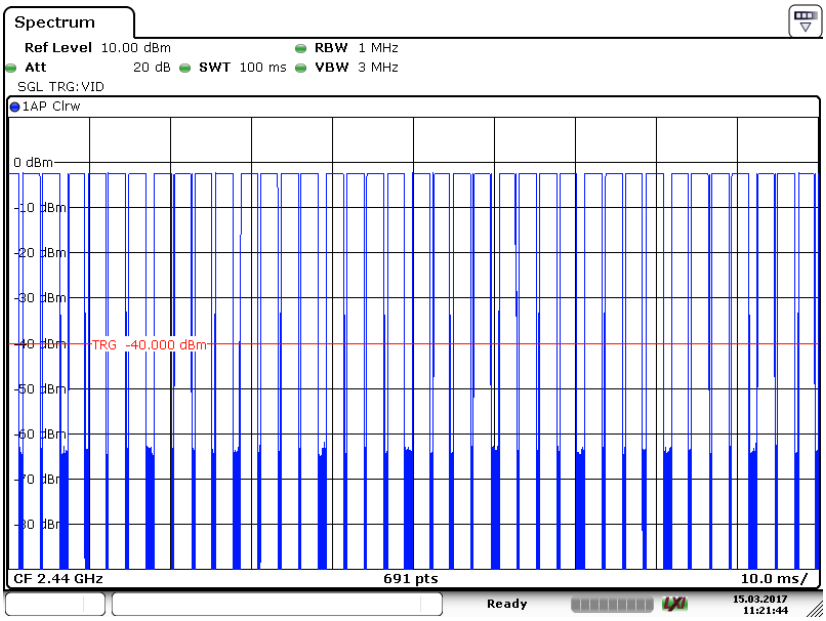
No modification was made to the EUT tested.

EUT Exercise Software

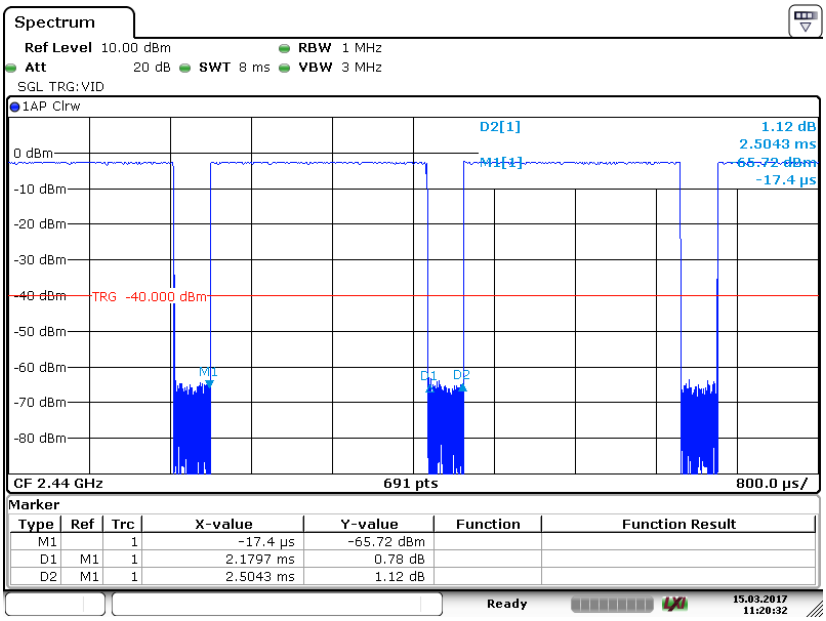
RTLBTAPP

The device was tested with 87.04% duty cycle and the worst case was performed as below:
BLE : Power level: 0

Middle Channel Duty Cycle



Date: 15.MAR.2017 11:21:45



Date: 15.MAR.2017 11:20:32

Band	Duty Cycle	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
BLE	87.04%	2179.70	0.46	1kHz	0.60

Support Equipment List and Details

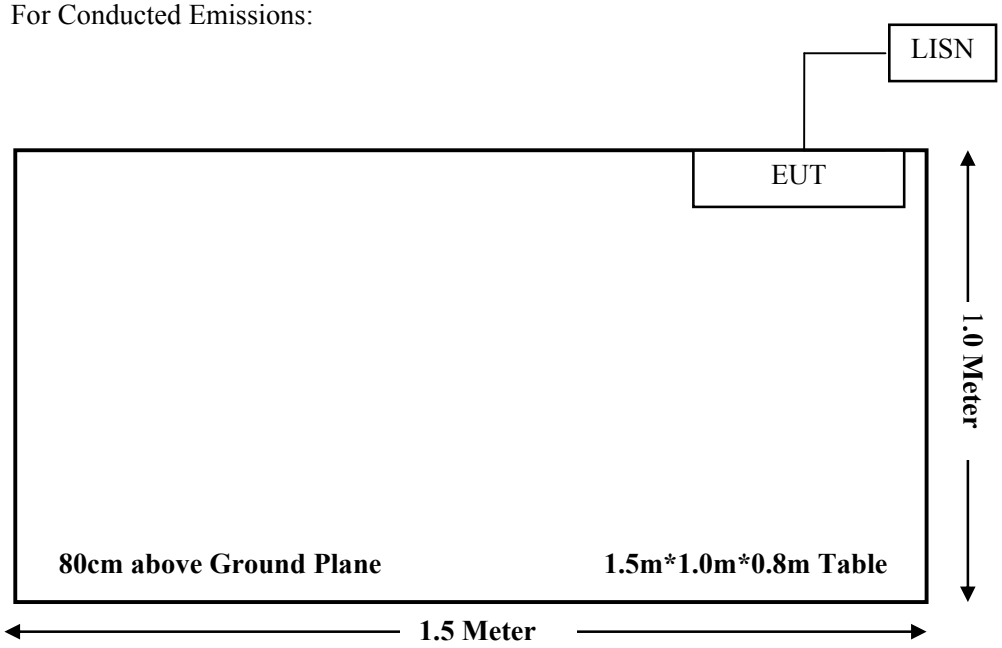
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

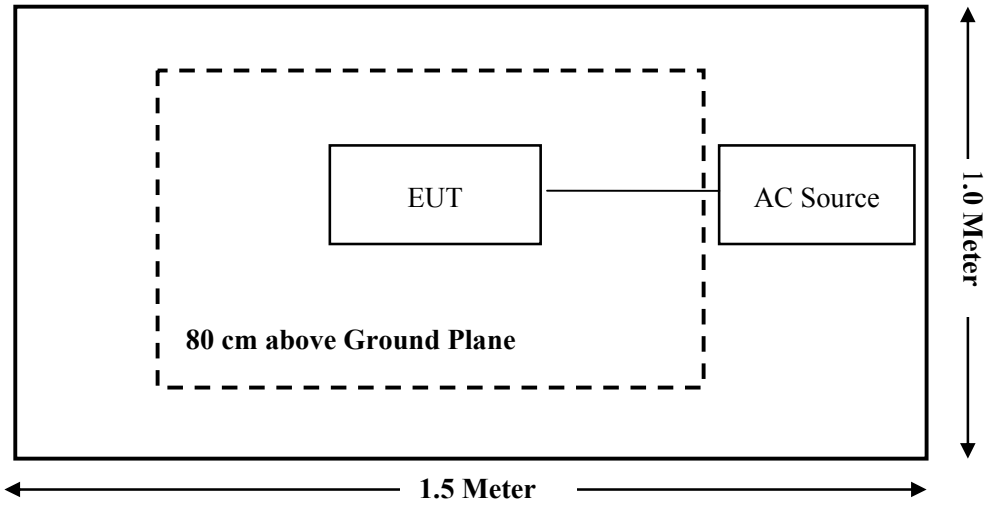
Cable Description	Shielding Type	Length (m)	From Port	To
Power Cable	Unshielding	1.2	EUT	AC Power Source

Block Diagram of Test Setup

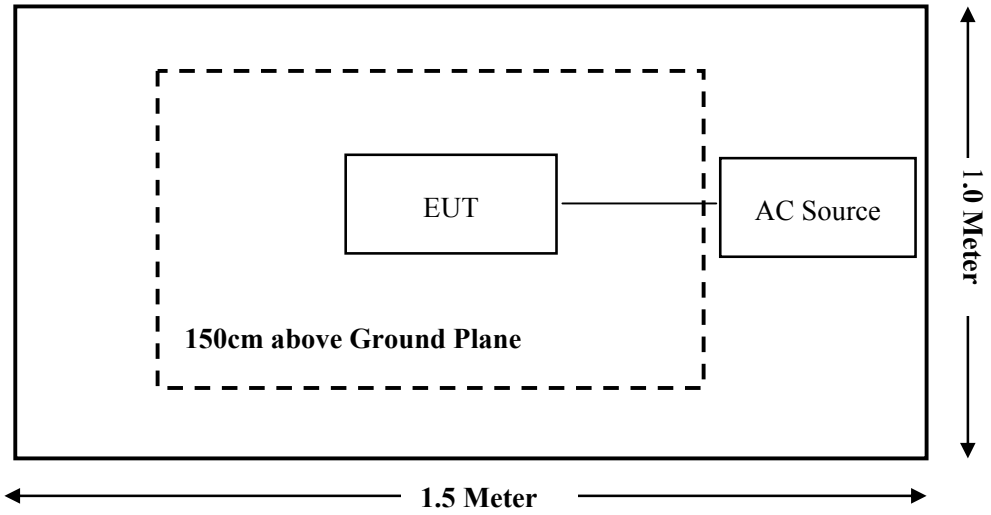
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



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

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
R&S	Auto test Software	EMC32	100361	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
Rohde & Schwarz	FSV40 Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Agilent	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
Ningbo Lumiaudio	RF Cable	N/A	N/A	2017-03-22	2018-03-21
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
Rohde & Schwarz	LISN	ENV216	3560655016	2016-11-25	2017-11-24
Rohde & Schwarz	CE Test software	EMC32	100357	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2016-09-08	2017-09-07

*** 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).

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/cm^2);
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);

Measurement Result

Mode	**Frequency Range**	**Antenna Gain**		**Output Power**		**Evaluation Distance**	**Power Density**	**MPE Limit**
	(MHz)	**(dBi)**	**(numeric)**	**(dBm)**	**(mW)**	**(cm)**	**(mW/cm^2)**	**(mW/cm^2)**
BLE	2402-2480	-0.48	0.90	6.33	4.30	20	0.0008	1.0
BT	2402-2480	-0.48	0.90	4.18	2.62	20	0.0005	1.0

Note: The target output power:
BLE：6.33dBm, which declared by the Manufacturer.
BT：4.18dBm, which declared by the Manufacturer.

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, which the antenna gain is -0.48 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

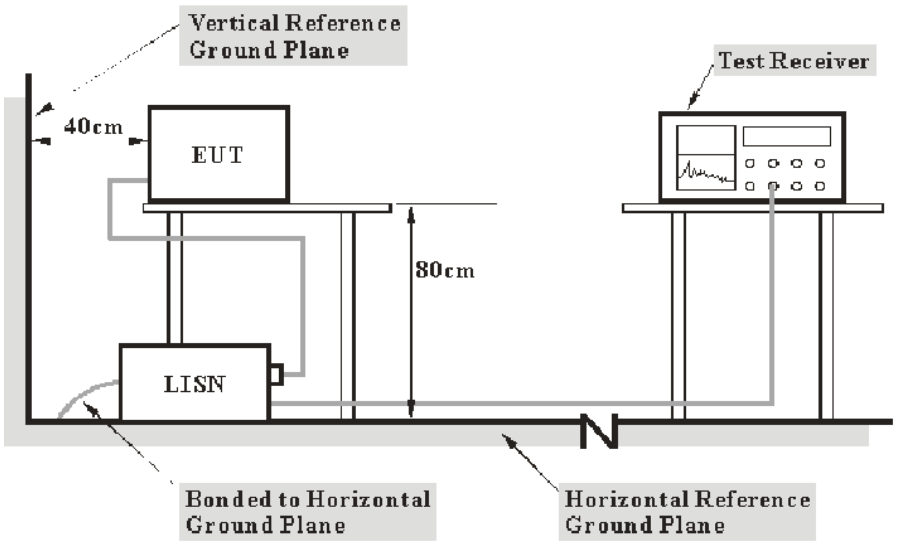
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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.

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.

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:

Correction Factor = LISN VDF + 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

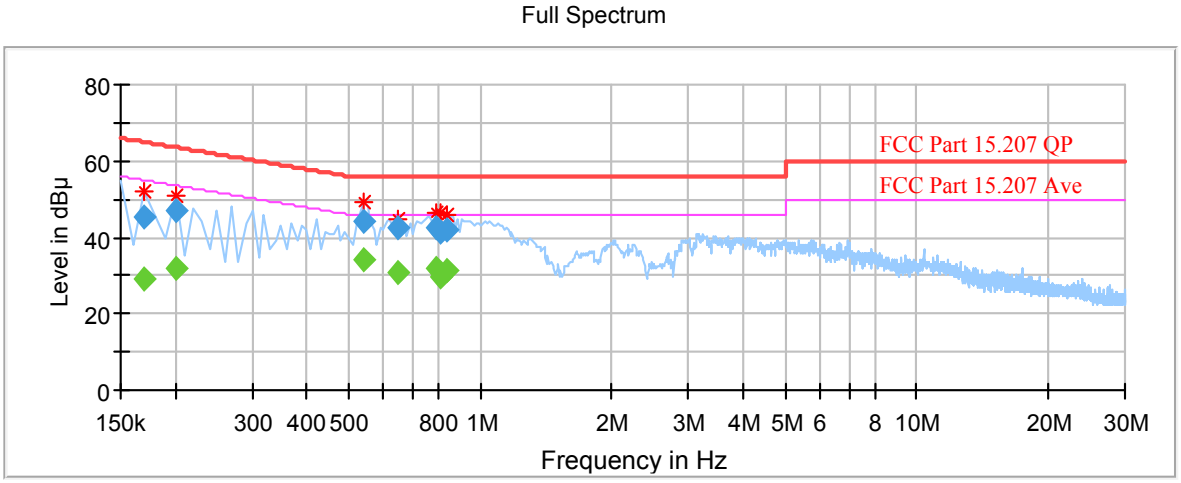
Environmental Conditions

Temperature:	20.3 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

The testing was performed by Belle Cheng on 2017-03-28.

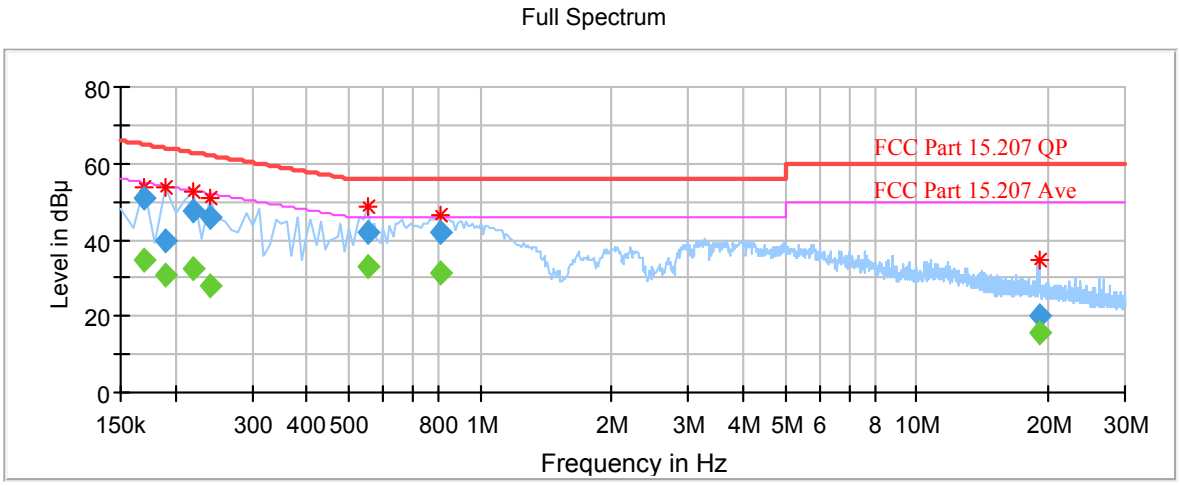
EUT operation mode: Transmitting in high channel

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.170000	---	29.31	9.000	L1	10.0	25.65	54.96	Compliance
0.170000	45.50	---	9.000	L1	10.0	19.46	64.96	Compliance
0.200000	---	31.78	9.000	L1	9.9	21.83	53.61	Compliance
0.200000	46.90	---	9.000	L1	9.9	16.71	63.61	Compliance
0.540000	---	34.14	9.000	L1	9.9	11.86	46.00	Compliance
0.540000	44.20	---	9.000	L1	9.9	11.80	56.00	Compliance
0.650000	---	30.79	9.000	L1	9.8	15.21	46.00	Compliance
0.650000	42.37	---	9.000	L1	9.8	13.63	56.00	Compliance
0.790000	---	31.64	9.000	L1	9.8	14.36	46.00	Compliance
0.790000	42.37	---	9.000	L1	9.8	13.63	56.00	Compliance
0.810000	---	29.88	9.000	L1	9.8	16.12	46.00	Compliance
0.810000	41.17	---	9.000	L1	9.8	14.83	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
0.170000	---	34.81	9.000	N	10.0	20.15	54.96	Compliance
0.170000	50.88	---	9.000	N	10.0	14.08	64.96	Compliance
0.190000	---	30.97	9.000	N	10.0	23.07	54.04	Compliance
0.190000	39.77	---	9.000	N	10.0	24.27	64.04	Compliance
0.220000	---	32.70	9.000	N	10.0	20.12	52.82	Compliance
0.220000	47.72	---	9.000	N	10.0	15.10	62.82	Compliance
0.240000	---	28.05	9.000	N	10.0	24.05	52.10	Compliance
0.240000	45.83	---	9.000	N	10.0	16.27	62.10	Compliance
0.550000	---	32.73	9.000	N	9.9	13.27	46.00	Compliance
0.550000	42.08	---	9.000	N	9.9	13.92	56.00	Compliance
0.810000	---	31.46	9.000	N	9.8	14.54	46.00	Compliance
0.810000	41.82	---	9.000	N	9.8	14.18	56.00	Compliance

Note:

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

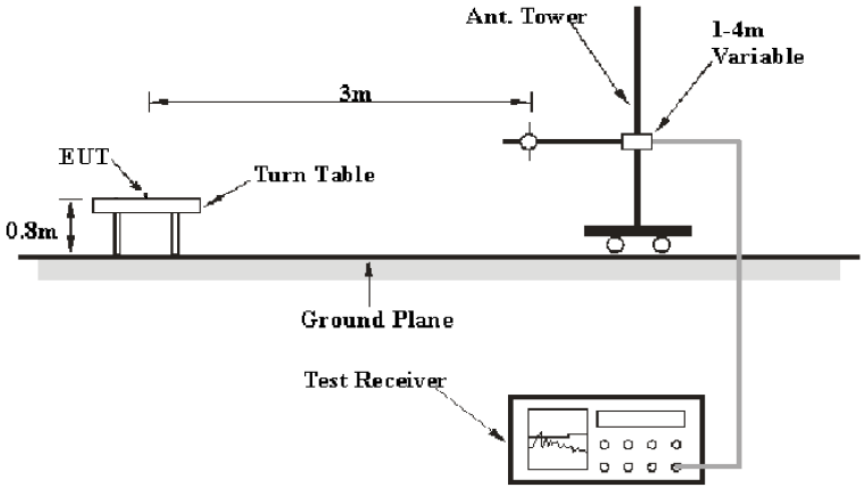
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

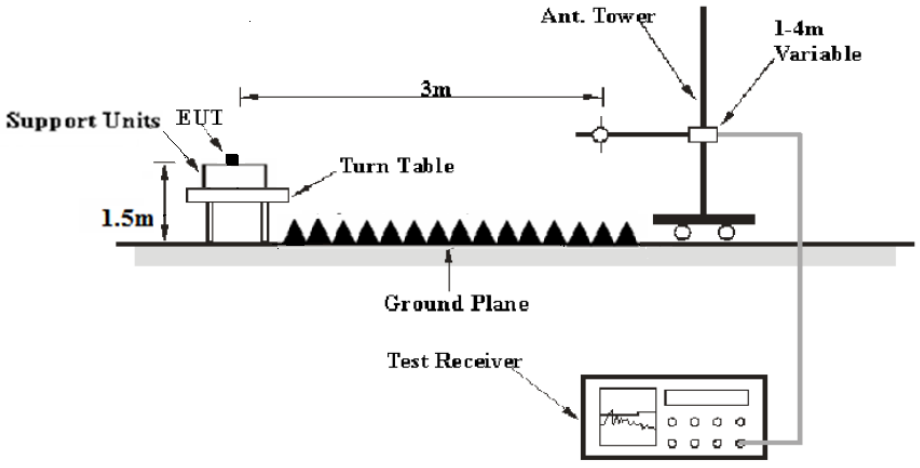
FCC §15.247 (d); §15.209; §15.205;

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.

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	120 kHz	300 kHz	120 kHz	QP

Frequency Range	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	1MHz	3 MHz	Any	PK
	1MHz	10 Hz	>98%	Ave.
	1MHz	1/T	<98%	

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

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.

Test Data

Environmental Conditions

Temperature:	20.3 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

The testing was performed by Belle Cheng on 2017-03-28.

EUT operation mode: Transmitting

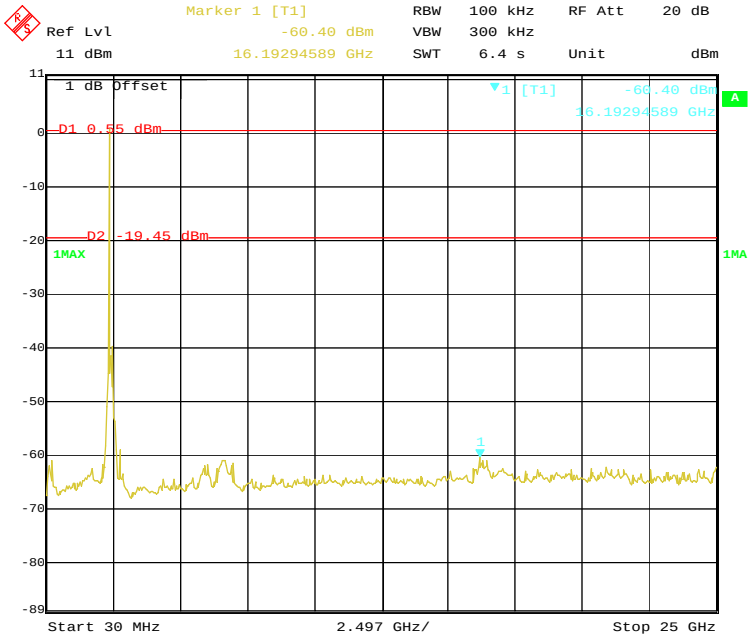
30MHz-25GHz

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel (2402 MHz)									
72.00	45.06	QP	183	165	V	-11.30	33.76	40.00	6.24
2402.00	102.34	PK	273	120	V	-6.19	96.15	/	/
2402.00	94.05	Ave	273	120	V	-6.19	87.86	/	/
2402.00	101.62	PK	54	110	H	-6.19	95.43	/	/
2402.00	93.10	Ave	54	110	H	-6.19	86.91	/	/
2360.00	49.41	PK	25	105	H	-6.28	43.13	74.00	30.87
2360.00	42.12	Ave	25	105	H	-6.28	35.84	54.00	18.16
2400.00	48.14	PK	25	106	H	-6.19	41.95	74.00	32.05
2400.00	40.58	Ave	25	106	H	-6.19	34.39	54.00	19.61
1200.00	49.12	PK	227	145	V	-11.25	37.87	74.00	36.13
1200.00	41.26	Ave	227	145	V	-11.25	30.01	54.00	23.99
4804.00	52.48	PK	265	147	H	1.61	54.09	74.00	19.91
4804.00	45.21	Ave	265	147	H	1.61	46.82	54.00	7.18
7206.00	41.12	PK	250	215	H	7.55	48.67	74.00	25.33
7206.00	34.07	Ave	250	215	H	7.55	41.62	54.00	12.38

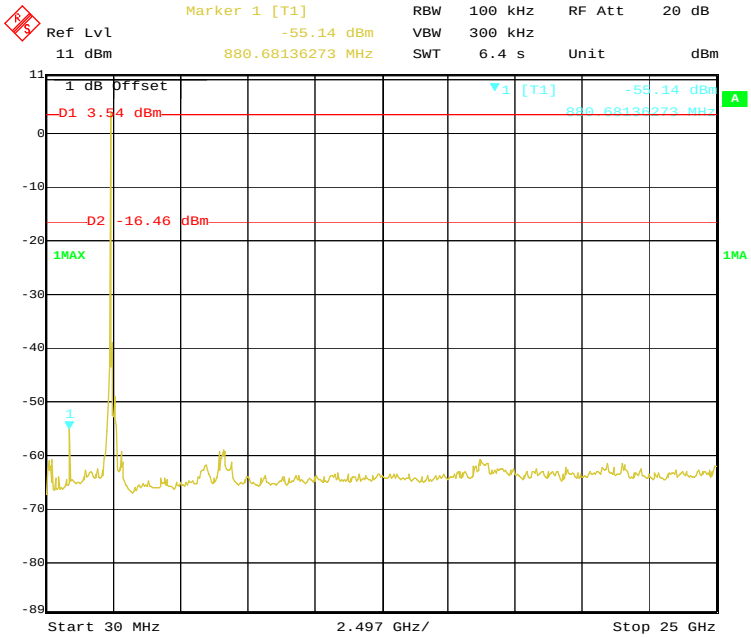
Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Middle Channel (2440 MHz)									
72.00	45.08	QP	212	164	V	-11.30	33.78	40.00	6.22
2440.00	104.37	PK	251	155	V	-6.10	98.27	/	/
2440.00	96.55	Ave	251	155	V	-6.10	90.45	/	/
2440.00	103.72	PK	35	120	H	-6.10	97.62	/	/
2440.00	95.14	Ave	35	120	H	-6.10	89.04	/	/
1200.00	49.12	PK	358	205	V	-11.25	37.87	74.00	36.13
1200.00	42.17	Ave	358	205	V	-11.25	30.92	54.00	23.08
3060.00	45.62	PK	292	231	H	-3.08	42.54	74.00	31.46
3060.00	38.08	Ave	292	231	H	-3.08	35.00	54.00	19.00
4880.00	52.12	PK	290	138	H	1.79	53.91	74.00	20.09
4880.00	46.30	Ave	290	138	H	1.79	48.09	54.00	5.91
6469.00	40.79	PK	71	105	H	5.80	46.59	74.00	27.41
6469.00	32.87	Ave	71	105	H	5.80	38.67	54.00	15.33
7320.00	38.19	PK	358	138	H	7.67	45.86	74.00	28.14
7320.00	29.68	Ave	358	138	H	7.67	37.35	54.00	16.65
High Channel (2480MHz)									
72.00	46.01	QP	133	151	V	-11.30	34.71	40.00	5.29
2480.00	106.38	PK	286	137	V	-6.01	100.37	/	/
2480.00	97.86	Ave	286	137	V	-6.01	91.85	/	/
2480.00	105.13	PK	315	153	H	-6.01	99.12	/	/
2480.00	96.70	Ave	315	153	H	-6.01	90.69	/	/
2483.50	37.59	PK	160	128	H	-6.01	31.58	74.00	42.42
2483.50	31.94	Ave	160	128	H	-6.01	25.93	54.00	28.07
2580.00	54.15	PK	335	216	V	-5.53	48.62	74.00	25.38
2580.00	49.25	Ave	335	216	V	-5.53	43.72	54.00	10.28
4960.00	56.28	PK	192	203	H	1.97	58.25	74.00	15.75
4960.00	48.98	Ave	192	203	H	1.97	50.95	54.00	3.05
6633.00	46.17	PK	151	196	V	6.29	52.46	74.00	21.54
6633.00	40.27	Ave	151	196	V	6.29	46.56	54.00	7.44
7440.00	44.85	PK	359	139	H	7.79	52.64	74.00	21.36
7440.00	36.65	Ave	359	139	H	7.79	44.44	54.00	9.56

Conducted Spurious Emissions at Antenna Port

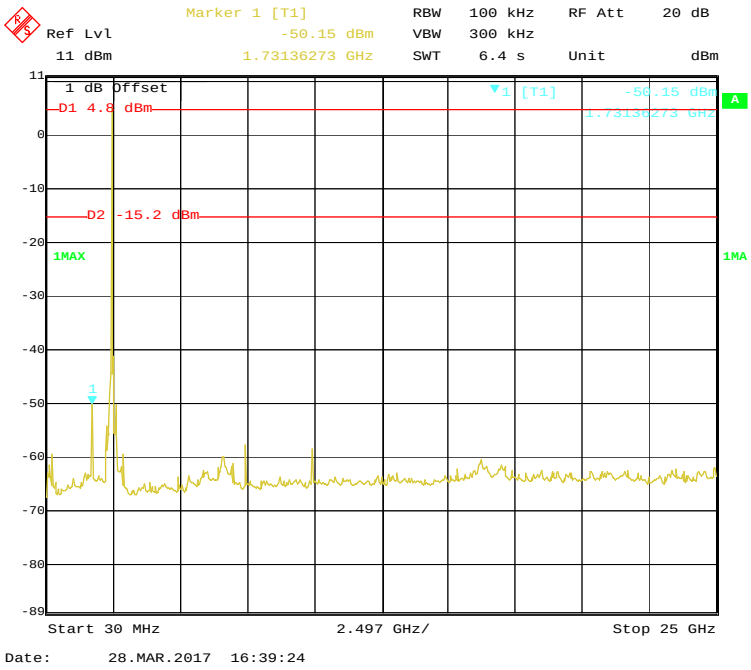
Low Channel



Middle Channel



High Channel



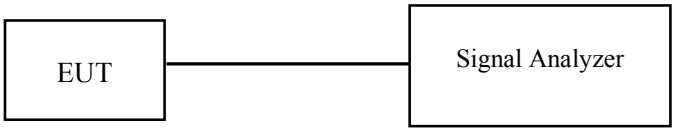
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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 Data

Environmental Conditions

Temperature:	20.2 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

The testing was performed by Belle Cheng on 2017-03-28.

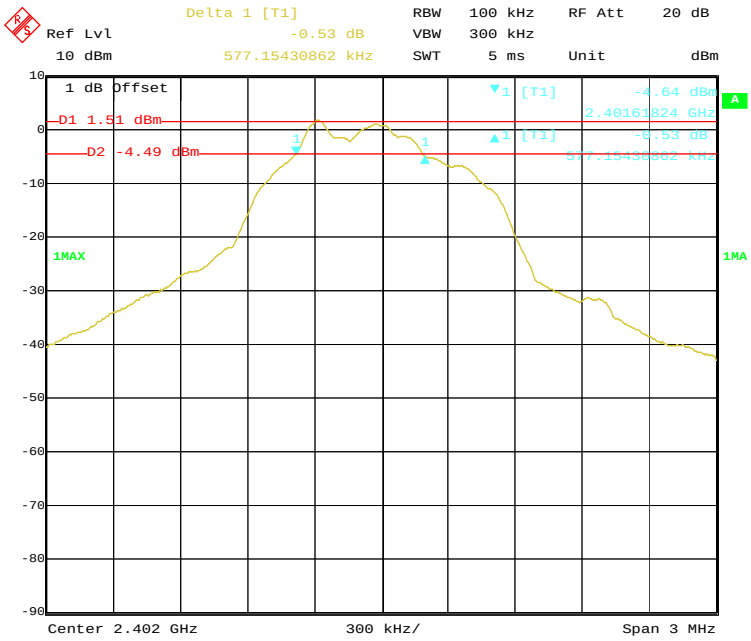
Test Result: Pass.

Please refer to the following tables and plots.

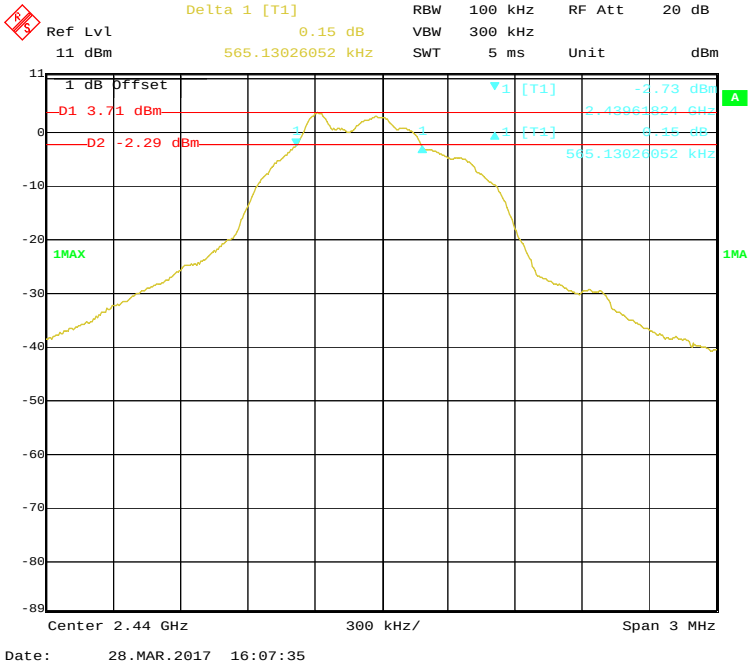
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
Low	2402	0.577	≥0.5
Middle	2440	0.565	≥0.5
High	2480	0.577	≥0.5

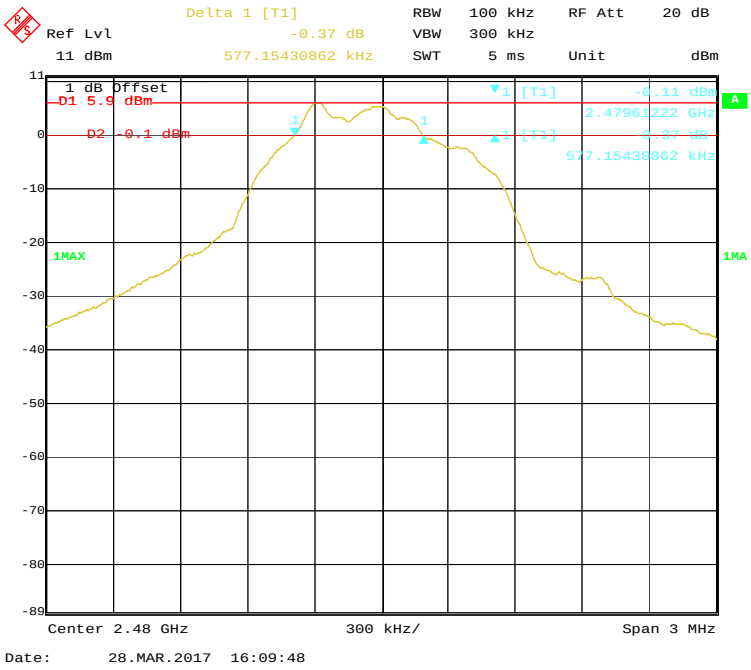
Low Channel



Middle Channel



High Channel



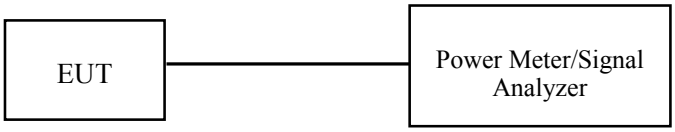
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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 Data

Environmental Conditions

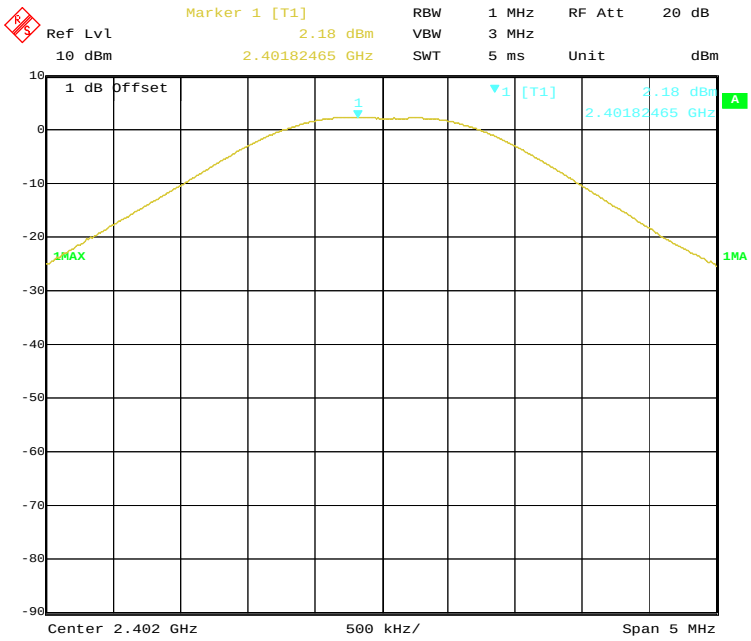
Temperature:	20.2 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

The testing was performed by Belle Cheng on 2017-03-29.

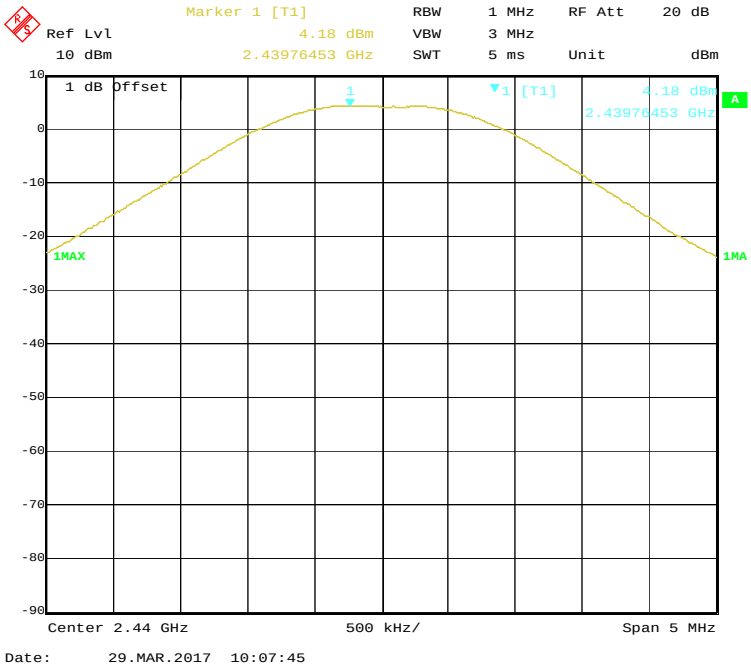
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low	2402	2.18	30	Pass
Middle	2440	4.18	30	Pass
High	2480	6.33	30	Pass

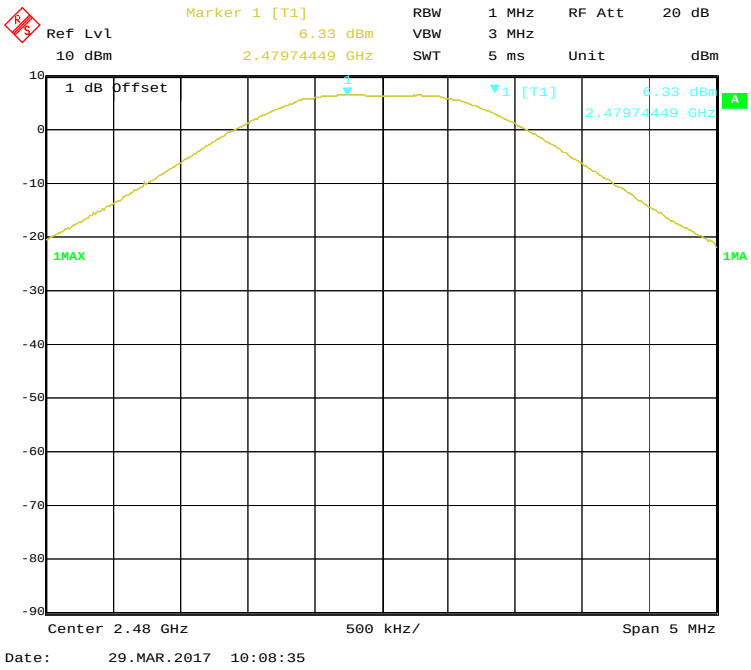
Low Channel power



Middle Channel power



High Channel power



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 Data

Environmental Conditions

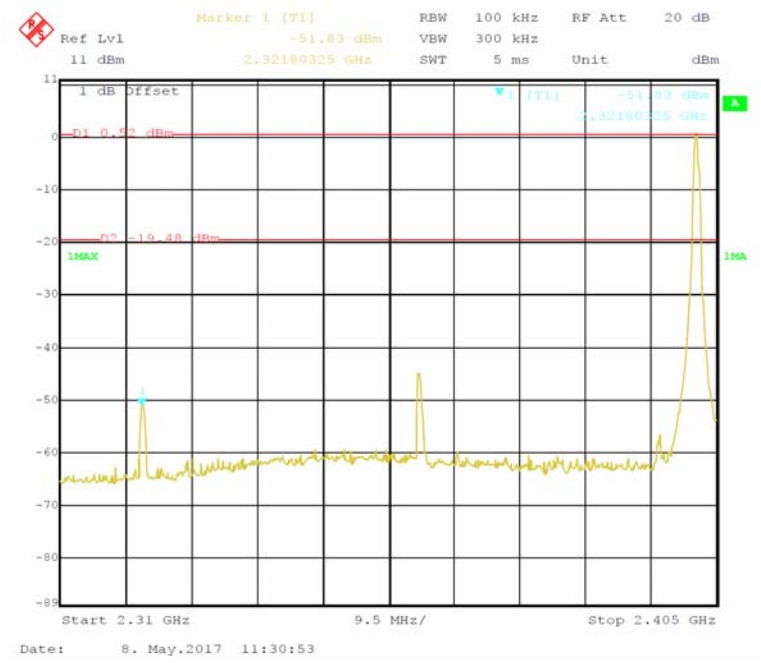
Temperature:	20.2 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

The testing was performed by Belle Cheng on 2017-05-08.

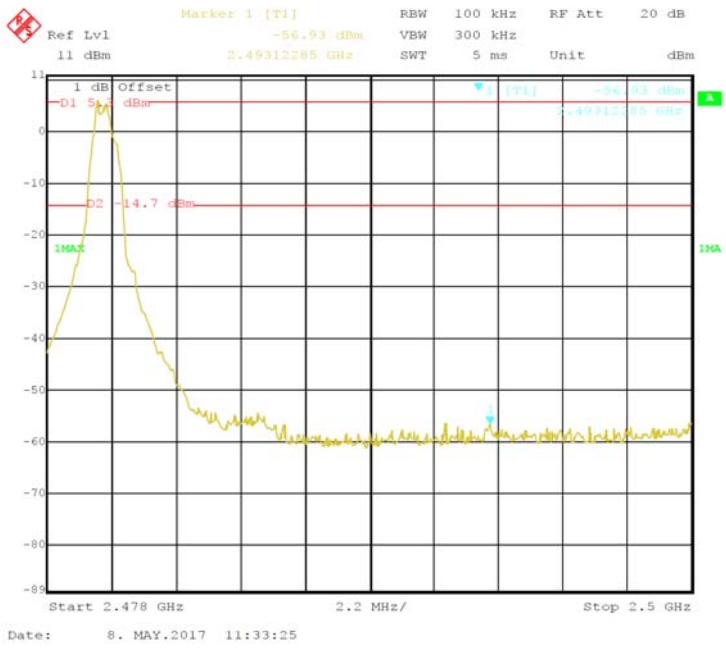
Test Result: *Compliance*

Please refer to the following table and plots.

Band Edge, Left Side



Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v03r05.

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: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×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 Data

Environmental Conditions

Temperature:	20.2 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

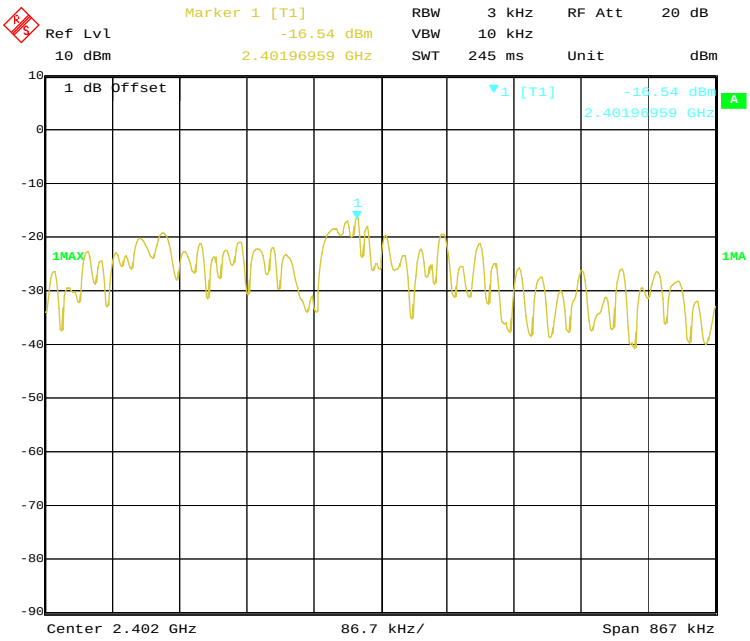
The testing was performed by Belle Cheng on 2017-03-28.

EUT operation mode: Transmitting

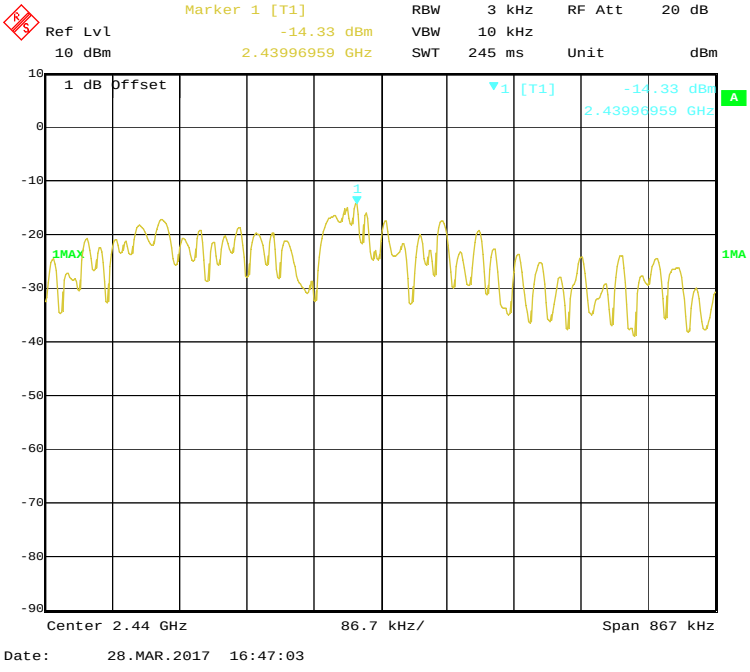
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Low	2402	-16.54	≤8
Middle	2440	-14.33	≤8
High	2480	-11.71	≤8

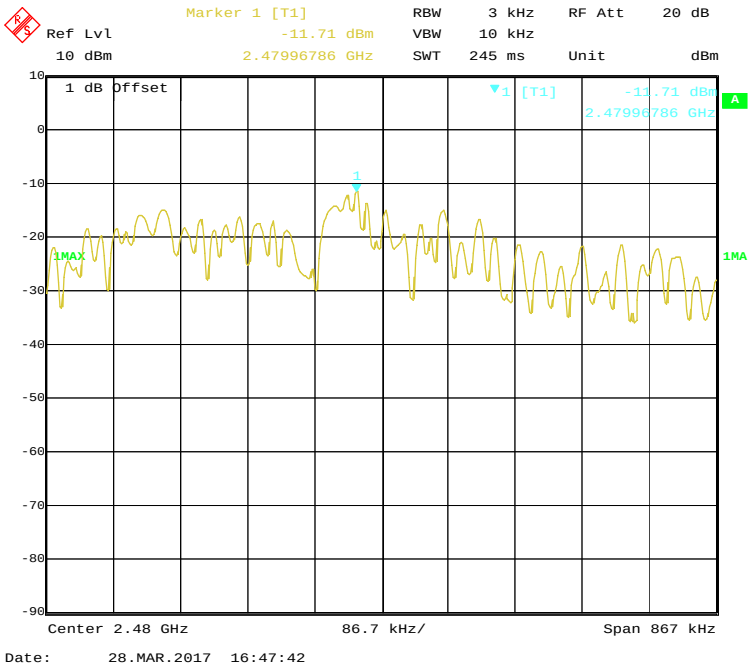
Power Spectral Density , Low Channel



Power Spectral Density , Middle Channel



Power Spectral Density , High Channel



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