FCC PART 15.247

TEST REPORT

For

Light & Effects Technology Co., Ltd

No2 Xinda Road, Hi-Tech West Zone, Chengdu, China

FCC ID: 2AG6C-LEA01

Report Type:	**Product Name:**
Original Report	Lettin Chroma Bulb

Report Number:	RSC180322002-0C
Report Date:	2018-03-30
Reviewed By:	Sula Huang Engineering Director
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65525123 Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Light & Effects Technology Co., Ltd**'s product, model number: **LE-LB09A19 (FCC ID: 2AG6C-LEA01)** or the "EUT" as referred to in this report was the **Lettin Chroma Bulb**.

Mechanical Description of EUT

The EUT was measured approximately: φ60 mm x 110 mm.

Rated input voltage: 100-240V~50/60Hz.

**All measurement and test data in this report were gathered from final production sample, serial number: 180322002/01 (assigned by BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2018-03-21, and EUT complied with test requirement.*

Objective

This report is prepared on behalf of ***Light & Effects Technology 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 Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

None.

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.71 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.57 dB
		V	4.81 dB
	200MHz-1GHz	H	5.69 dB
		V	6.07 dB
	1GHz-6GHz		5.49 dB
	6GHz-18GHz		5.57 dB
	18GHz-40GHz		5.48 dB
Conducted RF Power			±0.61dB
Power Spectrum Density			±0.61dB
Occupied Bandwidth			±5%
Conducted Emission			±1.5dB
Humidity			±5%
Temperature			±1℃

Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. KDB558074 D01 DTS Meas Guidance v04.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 910975, the FCC Designation No. : CN1186.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062C-1.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer.

For Zigbee mode, 4 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	20	2450
15	2425	25	2475

EUT was tested with channel 11, 15, 20 and 25.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

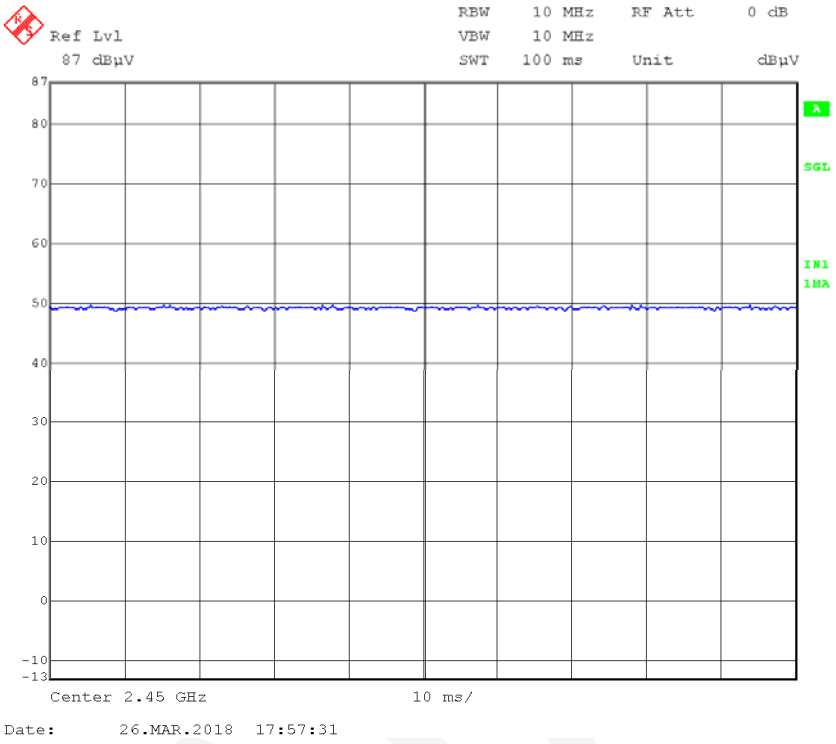
For Zigbee mode, the maximum power setting provided by the manufacturer is below:

Test Software Version	Lettin			
Test Frequency	2405 MHz	2425 MHz	2450 MHz	2475 MHz
Data Rate	Default	Default	Default	Default
Power Level	Default	Default	Default	Default

The software configured maximum duty cycle as below:

Test Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
Zigbee	100	100	100

Duty Cycle

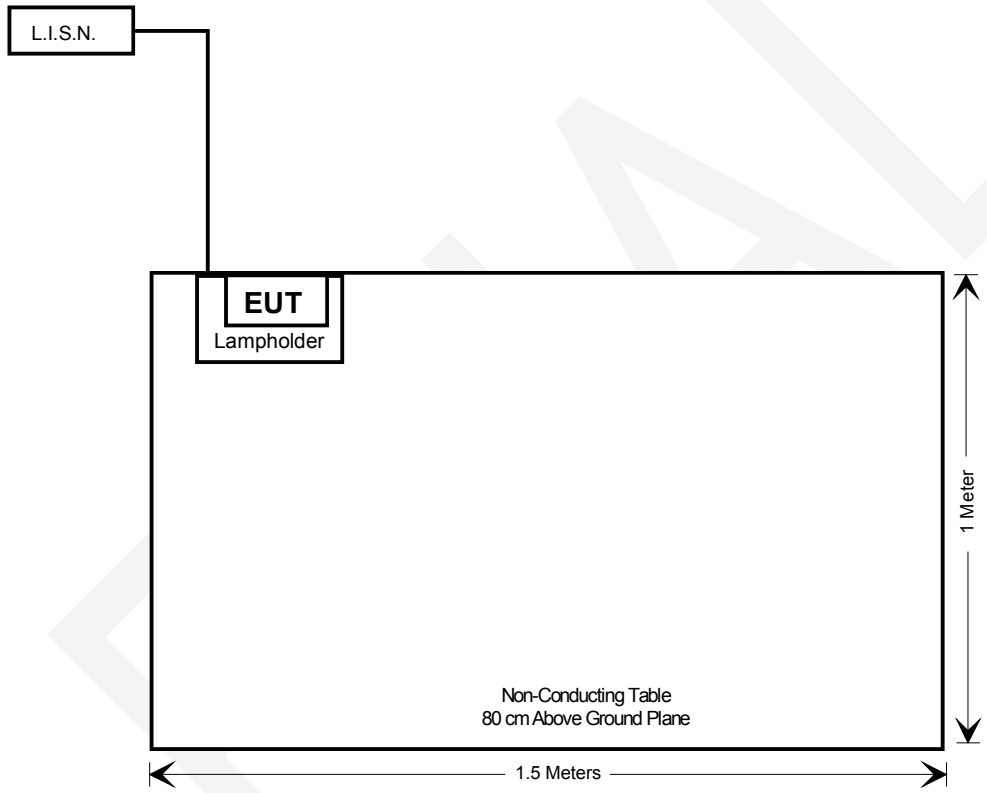

RBW 10 MHz
RF Att 0 dB
VBW 10 MHz
Ref Lvl
87 dBµV
SWT 100 ms
Unit dBµV
87
80
70
60
50
40
30
20
10
0
-10
-13
A
SGL
IN1
1MA
Center 2.45 GHz
10 ms/
Date: 26.MAR.2018 17:57:31

External I/O Cable

Cable Description	Length (m)	From	To
AC Power Cable	1.0	L.I.S.N.	Lampholder

Block Diagram of Test Setup

AC power line conducted emissions test：



Test Equipments List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2017-12-02	2018-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2017-05-20	2018-05-19
EMCO	L.I.S.N.	3810/2BR	9509-1102	2017-12-02	2018-12-01
Rohde & Schwarz	RF Limiter	ESH3Z2	DE14781	2017-11-10	2018-11-09
N/A	Conducted Cable	L-E003	N/A	2017-11-10	2018-11-09
Rohde & Schwarz	EMC32	N/A	V 8.52.0	N/A	N/A
Radiated Emissions Test					
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2017-05-20	2018-05-19
Sunol Sciences	Broadband Antenna	JB3	A121808	2017-05-18	2020-05-17
Sonoma	Pre-Amplifier	310N	186684	2017-08-18	2018-08-17
INMET	Attenuator	18N-6dB	64671	2017-11-10	2018-11-09
Rohde & Schwarz	EMI Test Receiver	ESIB 40	100215	2017-09-12	2018-09-11
ETS	Horn Antenna	3115	003-6076	2017-05-19	2020-05-18
A.H.Systems,inc	Horn Antenna	SAS-574	505	2017-12-02	2018-12-01
A.H.Systems,inc	Pre-Amplifier	PAM-0118P	467	2017-08-10	2018-08-10
EM Electronics Corporation	Pre-Amplifier	EM18G40	060725	2018-03-01	2019-02-28
Sinoscite.,Co Ltd	Reject Band Filter	BSF 2402-2480MN	0898-005	2017-11-10	2018-11-09
N/A	RF Cable (below 1GHz)	L-E005	N/A	2017-11-10	2018-11-09
N/A	RF Cable (below 1GHz)	T-E128	N/A	2017-11-10	2018-11-09
N/A	RF Cable (below 1GHz)	T-E129	N/A	2017-11-10	2018-11-09
N/A	RF Cable (above 1GHz)	T-E069	N/A	2017-11-10	2018-11-09
ORIDA RF LABS	RF Cable (18-40GHz)	KMS-160A-72.0-KMS	1042	2017-11-10	2018-11-09
Micro-coax	RF Cable (18-40GHz)	UFA147A-1-2362-100100	MFR 64639 2310	2017-11-10	2018-11-09
Rohde & Schwarz	EMC32	N/A	V 8.52.0	N/A	N/A

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247(i),§2.1091 & §1.1307(b)(1)	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), §2.1091 & §1.1307(B)(1) - 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

$$S = PG/4\pi R^2$$

Where:
S = 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);

Mode	Frequency	Antenna Gain		Max Target Conducted Power		Evaluation Distance	Power Density	Limit
	MHz	dBi	numeric	dBm	mW	cm	mW/cm^2	mW/cm^2
Zigbee	2475	3	2.0	-10.0	0.10	20	0.00004	1.0

Note: 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.

Antenna Connector Construction

The EUT have one PCB antenna, which was permanently attached and the antenna gain is 3 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

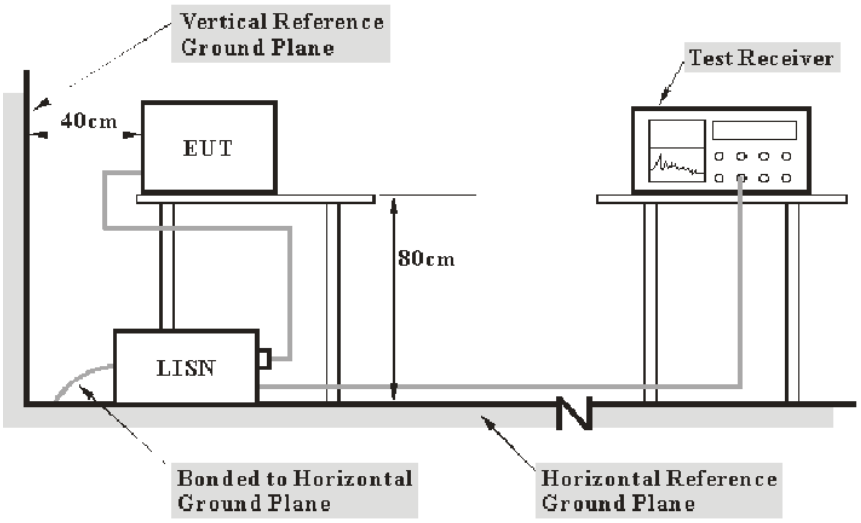
Result: Compliant.

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.

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

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the EUT was connected to the first 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 Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

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

Margin = Limit – Corrected Amplitude

Test Data

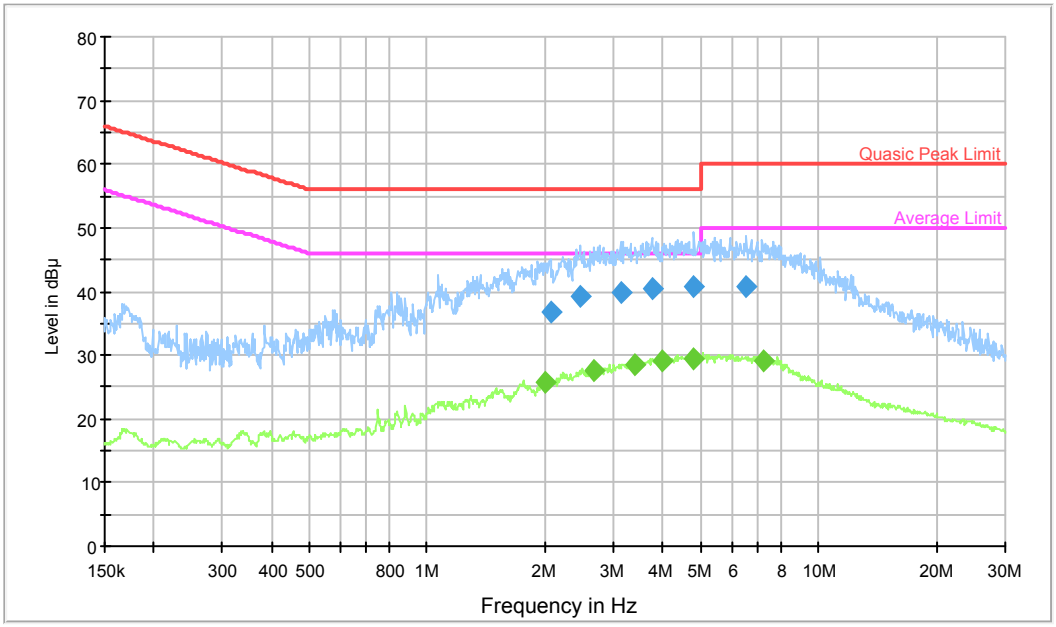
Environmental Conditions

Temperature:	20 °C
Relative Humidity:	55 %
ATM Pressure:	96.1 kPa

The testing was performed by Johnny Ji on 2018-03-22.

Test Mode: Transmitting (Low Channel-worst case)

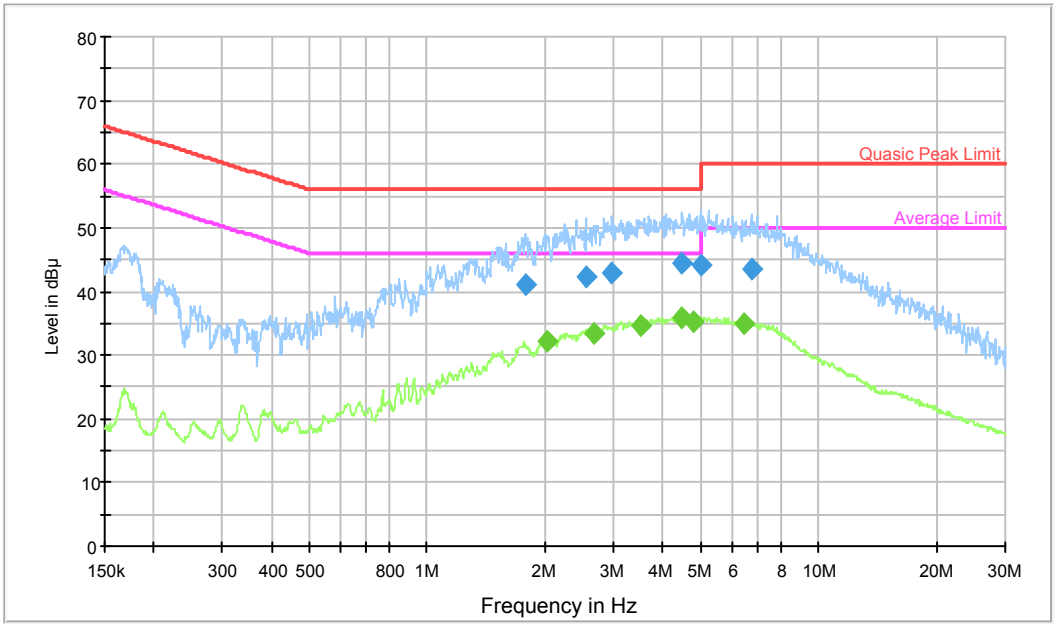
AC120V/60Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
2.066050	36.8	9.000	L1	19.8	19.2	56.0
2.462772	39.3	9.000	L1	19.8	16.7	56.0
3.116831	40.0	9.000	L1	19.9	16.0	56.0
3.745106	40.4	9.000	L1	19.9	15.6	56.0
4.816017	40.9	9.000	L1	20.0	15.1	56.0
6.549134	40.8	9.000	L1	20.0	19.2	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
2.001111	25.6	9.000	L1	19.8	20.4	46.0
2.667463	27.5	9.000	L1	19.9	18.5	46.0
3.402945	28.6	9.000	L1	19.9	17.4	46.0
3.976214	29.1	9.000	L1	19.9	16.9	46.0
4.796829	29.6	9.000	L1	20.0	16.4	46.0
7.207638	29.2	9.000	L1	20.0	20.8	50.0

AC120V/60Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
1.782352	41.1	9.000	N	19.5	14.9	56.0
2.552864	42.2	9.000	N	19.6	13.8	56.0
2.971042	43.0	9.000	N	19.6	13.0	56.0
4.482096	44.3	9.000	N	19.7	11.7	56.0
4.992193	44.3	9.000	N	19.7	11.7	56.0
6.734725	43.6	9.000	N	19.7	16.4	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
2.025220	32.3	9.000	N	19.5	13.7	46.0
2.667463	33.5	9.000	N	19.6	12.5	46.0
3.513376	34.7	9.000	N	19.6	11.3	46.0
4.464239	35.7	9.000	N	19.7	10.3	46.0
4.777718	35.3	9.000	N	19.7	10.7	46.0
6.471169	34.9	9.000	N	19.7	15.1	50.0

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

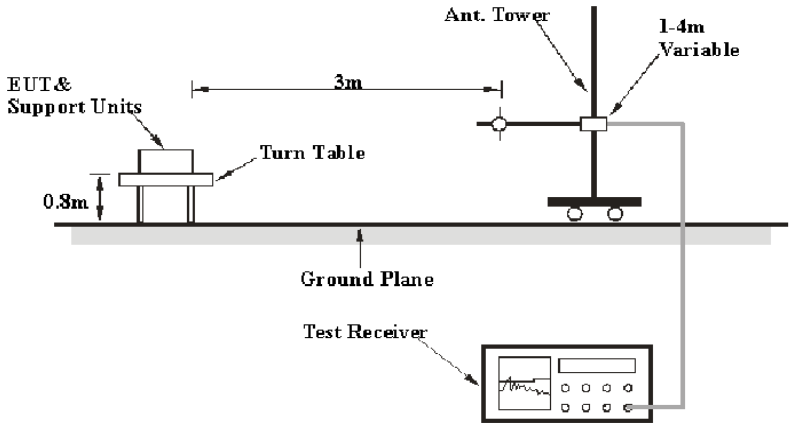
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

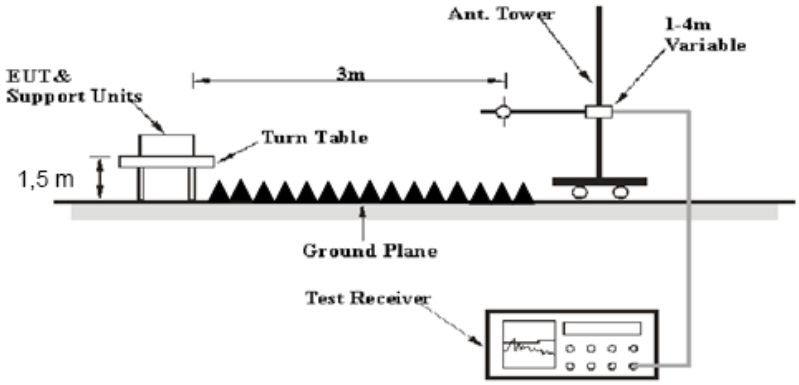
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber 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 external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

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

EMI Test Receiver

The system was investigated from 30 MHz to 26 GHz.

During the radiated emission test, the EMI Test Receiver setup was 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	Measurement
Above 1 GHz	1MHz	3 MHz	Any	PK
	1MHz	10Hz	>98%	AV
	1MHz	1/T	<98%	AV

Note: T is 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 Loss 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 Data

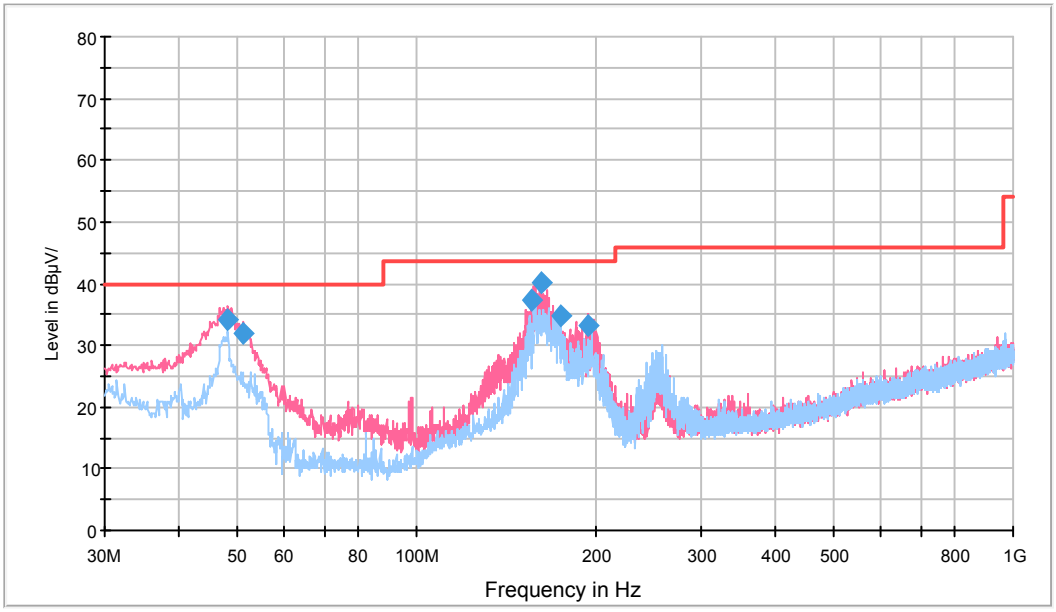
Environmental Conditions

Temperature:	22 °C
Relative Humidity:	56 %
ATM Pressure:	96.4 kPa

** The testing was performed by Johnny Ji on 2018-03-26.*

Test Mode: Transmitting

30 MHz to 1 GHz: *(Low Channel-worst case)*



Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
48.308750	34.2	100.0	V	336.0	-16.0	5.8	40.0
51.340000	32.0	100.0	V	198.0	-17.1	8.0	40.0
155.857500	37.3	100.0	V	228.0	-11.8	6.2	43.5
161.313750	40.0	100.0	V	213.0	-12.1	*3.5	43.5
173.923750	34.8	100.0	V	206.0	-12.5	8.7	43.5
194.051250	33.2	100.0	V	206.0	-12.8	10.3	43.5

**Within measurement uncertainty!*

1GHz-26GHz:

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
2405 MHz									
2405	48.89	PK	H	28.72	3.00	0.00	80.61	N/A	N/A
2405	45.87	AV	H	28.72	3.00	0.00	77.59	N/A	N/A
2405	55.65	PK	V	28.72	3.00	0.00	87.37	N/A	N/A
2405	53.13	AV	V	28.72	3.00	0.00	84.85	N/A	N/A
2390	29.47	PK	V	28.67	3.00	0.00	61.14	74.00	12.86
2390	16.04	AV	V	28.67	3.00	0.00	47.71	54.00	6.29
4810	59.61	PK	V	33.87	5.12	44.73	53.87	74.00	20.13
4810	52.24	AV	V	33.87	5.12	44.73	46.50	54.00	7.50
7215	51.84	PK	V	36.40	6.17	43.94	50.47	74.00	23.53
7215	43.56	AV	V	36.40	6.17	43.94	42.19	54.00	11.81
2425 MHz									
2425	49.31	PK	H	28.78	3.00	0.00	81.09	N/A	N/A
2425	46.72	AV	H	28.78	3.00	0.00	78.50	N/A	N/A
2425	56.23	PK	V	28.78	3.00	0.00	88.01	N/A	N/A
2425	53.93	AV	V	28.78	3.00	0.00	85.71	N/A	N/A
4850	60.03	PK	V	33.98	5.10	44.72	54.39	74.00	19.61
4850	52.44	AV	V	33.98	5.10	44.72	46.80	54.00	7.20
7275	50.87	PK	V	36.49	6.20	44.10	49.46	74.00	24.54
7275	44.30	AV	V	36.49	6.20	44.10	42.89	54.00	11.11

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	dB(1/m)	dB	dB	dBμV/m	dBμV/m	dB
2450 MHz									
2450	49.11	PK	H	28.85	3.00	0.00	80.96	N/A	N/A
2450	46.29	AV	H	28.85	3.00	0.00	78.14	N/A	N/A
2450	55.78	PK	V	28.85	3.00	0.00	87.63	N/A	N/A
2450	53.23	AV	V	28.85	3.00	0.00	85.08	N/A	N/A
4900	59.99	PK	V	34.12	5.08	44.71	54.48	74.00	19.52
4900	51.81	AV	V	34.12	5.08	44.71	46.30	54.00	7.70
7350	51.03	PK	V	36.59	6.23	44.30	49.55	74.00	24.45
7350	44.02	AV	V	36.59	6.23	44.30	42.54	54.00	11.46
2475 MHz									
2475	47.72	PK	H	28.93	2.99	0.00	79.64	N/A	N/A
2475	44.39	AV	H	28.93	2.99	0.00	76.31	N/A	N/A
2475	54.79	PK	V	28.93	2.99	0.00	86.71	N/A	N/A
2475	52.42	AV	V	28.93	2.99	0.00	84.34	N/A	N/A
2483.5	28.46	PK	V	28.95	2.99	0.00	60.40	74.00	13.60
2483.5	15.52	AV	V	28.95	2.99	0.00	47.46	54.00	6.54
4950	58.26	PK	V	34.26	5.05	44.71	52.86	74.00	21.14
4950	46.77	AV	V	34.26	5.05	44.71	41.37	54.00	12.63
7425	51.94	PK	V	36.70	6.27	44.50	50.41	74.00	23.59
7425	42.05	AV	V	36.70	6.27	44.50	40.52	54.00	13.48

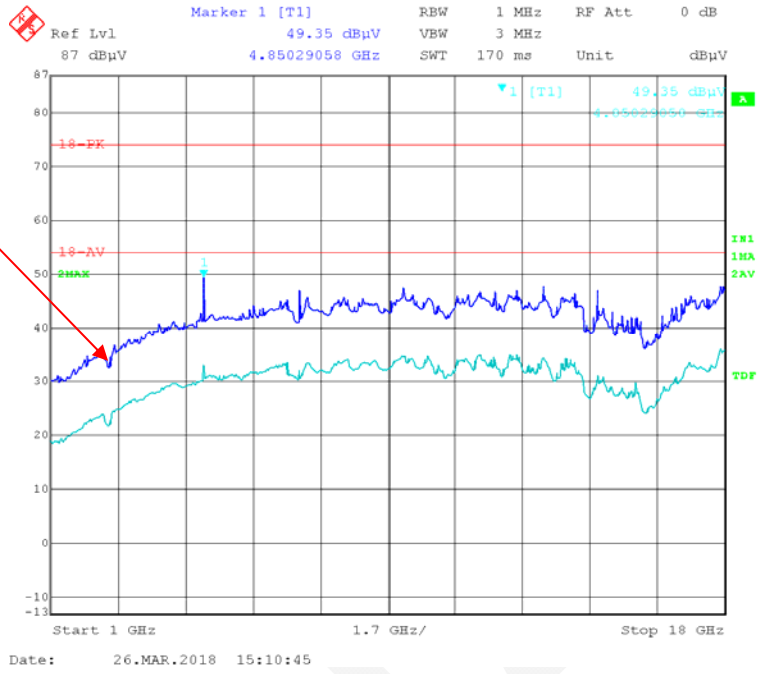
Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude

Spurious emissions more than 20 dB below the limit were not reported.

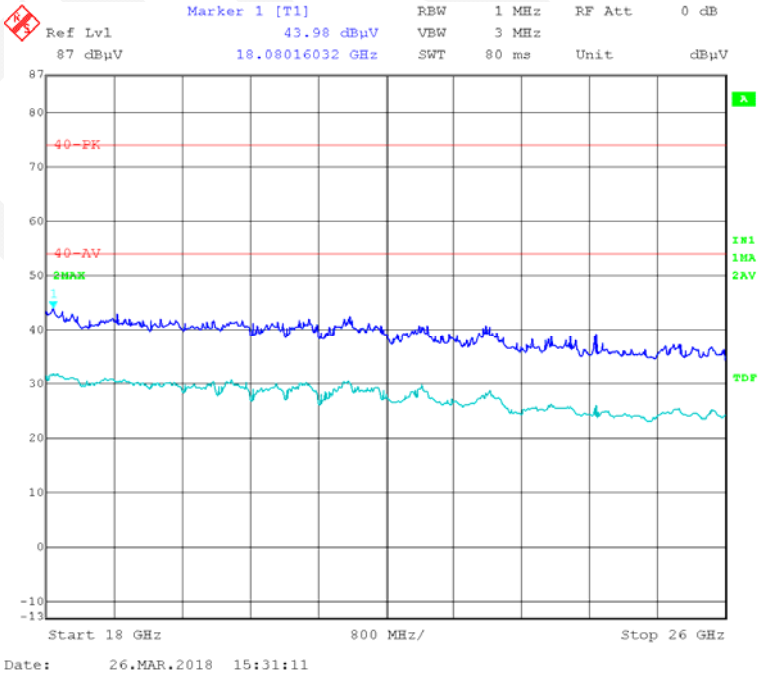
Please refer to the below pre-scan plot of worst case:

Low Channel_Horizontal_1GHz-18GHz

Fundamental with Reject Band Filter

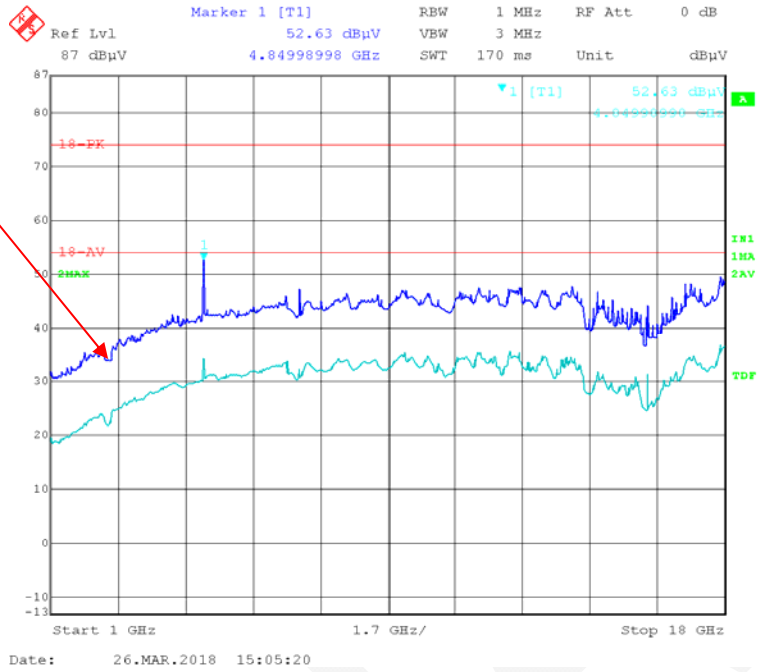


Low Channel _Horizontal_18GHz-26GHz

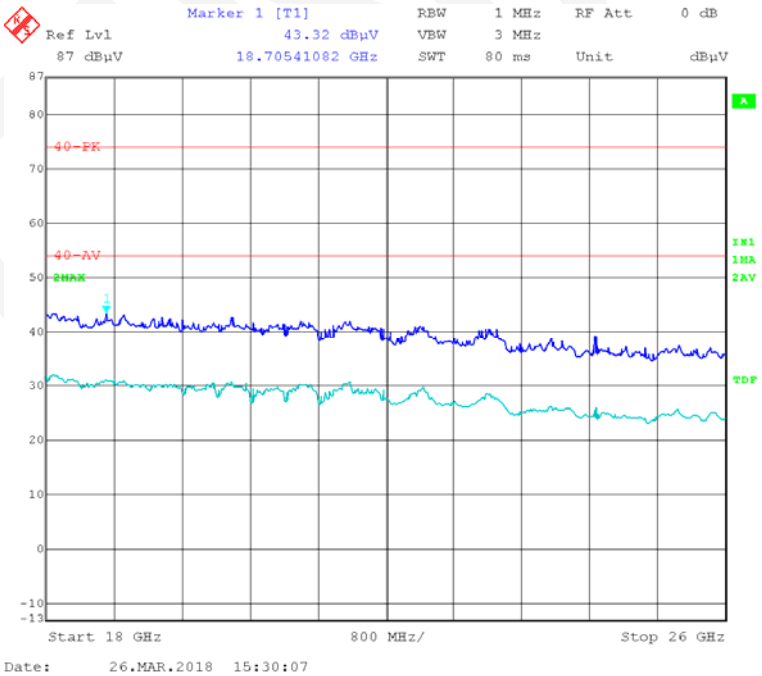


Low Channel _Vertical_1GHz-18GHz

Fundamental with Reject Band Filter



Low Channel _Vertical_18GHz-26GHz



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 (Radiated Test)

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×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 Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	56 %
ATM Pressure:	95.8 kPa

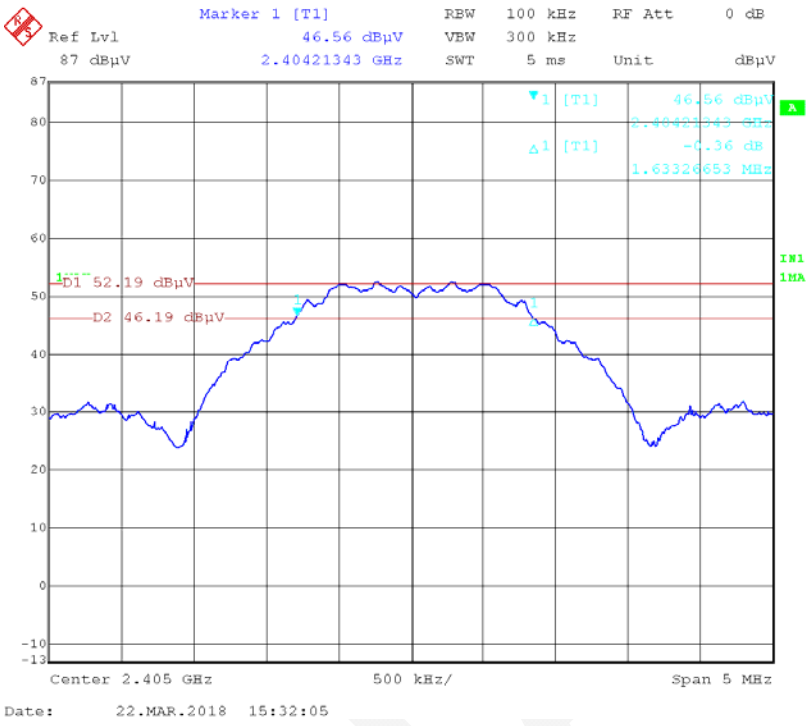
** The testing was performed by Johnny Ji on 2018-03-22.*

Test Mode: Transmitting

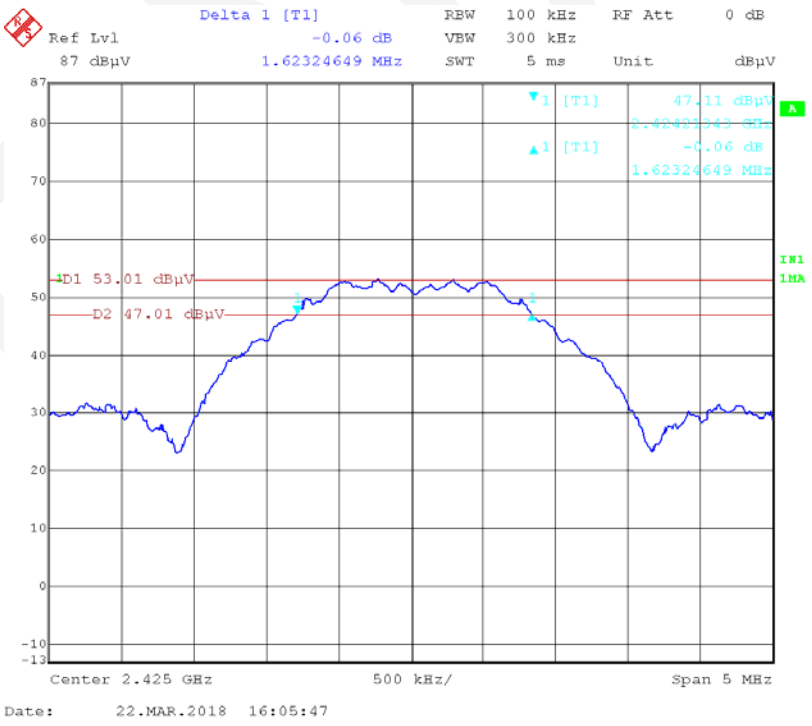
Test Result: Compliant. Please refer to the following table and plots.

Test Mode	Frequency (MHz)	6dB Bandwidth （MHz）	Limit （MHz）
Zigbee	2405	1.63	≥0.5
	2425	1.62	≥0.5
	2450	1.61	≥0.5
	2475	1.63	≥0.5

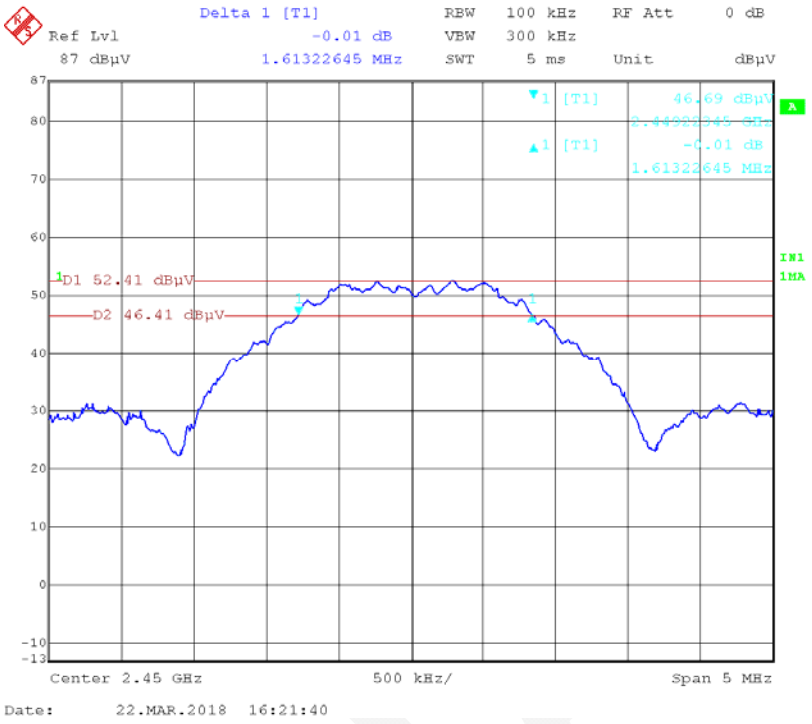
6dB Bandwidth - 2405 MHz



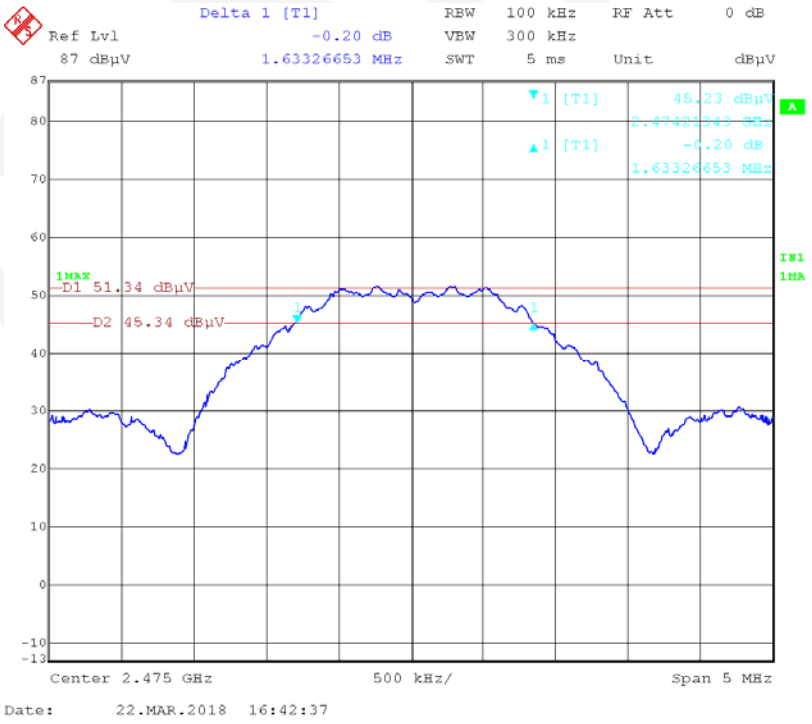
6dB Bandwidth - 2425 MHz



6dB Bandwidth - 2450 MHz



6dB Bandwidth - 2475 MHz



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 (Radiated Test)

According to ANSI C63.10-2013.

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	56 %
ATM Pressure:	95.8 kPa

** The testing was performed by Johnny Ji on 2018-03-22.*

Test Mode: Transmitting

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

Test Mode	Frequency (MHz)	Field Strength (dBμV/m)	EIRP (dBm)	Antenna Gain (dBi)	Conducted Output Power (dBm)	Limit (dBm)
Zigbee	2405	87.37	-7.83	3	-10.83	30
	2425	88.01	-7.19	3	-10.19	30
	2450	87.63	-7.57	3	-10.57	30
	2475	86.71	-8.49	3	-11.49	30

Note: EIRP[dBm] = E[dBμV/m]-95.2 when distance is 3 meter
EIRP[dBm] = Conducted Output Power[dBm] + Antenna Gain

Where: E is the field strength in dBμV/m
EIRP is the equivalent isotropic radiated power in dBm

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 (Radiated Test)

1. 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.
2. 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.
3. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

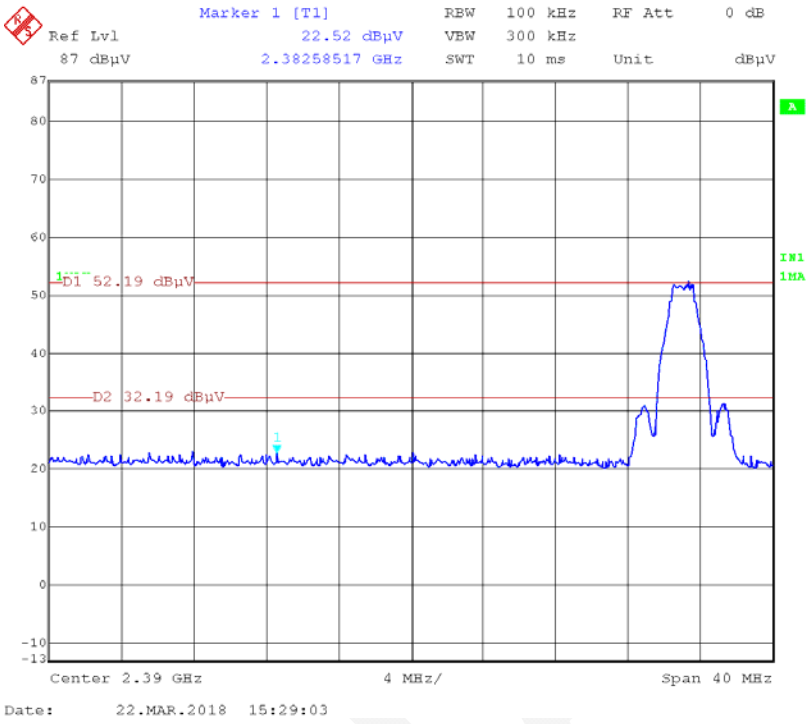
Temperature:	22 °C
Relative Humidity:	56 %
ATM Pressure:	95.8 kPa

** The testing was performed by Johnny Ji on 2018-03-22.*

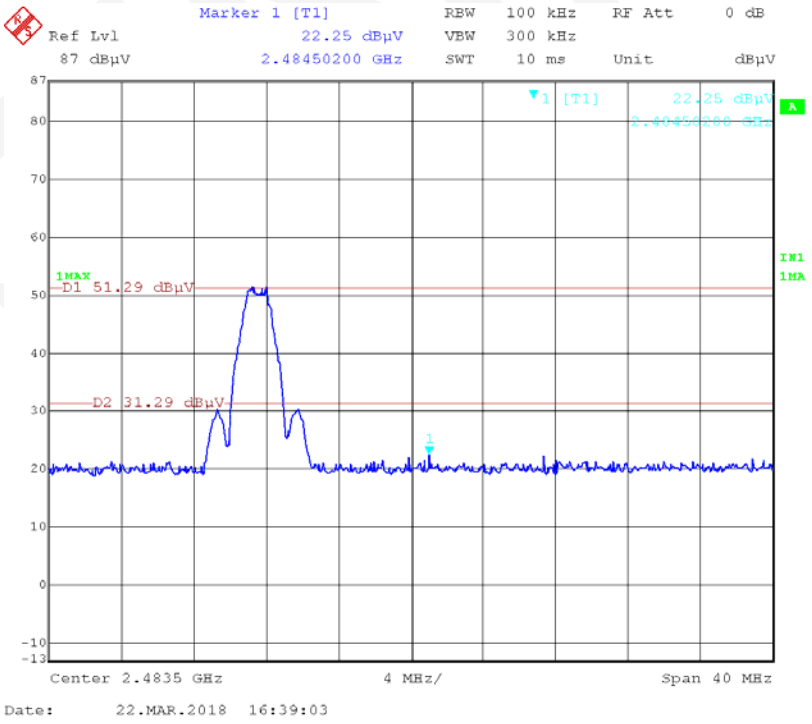
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following 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 (Radiated Test)

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	56 %
ATM Pressure:	95.8 kPa

** The testing was performed by Johnny Ji on 2018-03-22.*

Test Mode: Transmitting

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

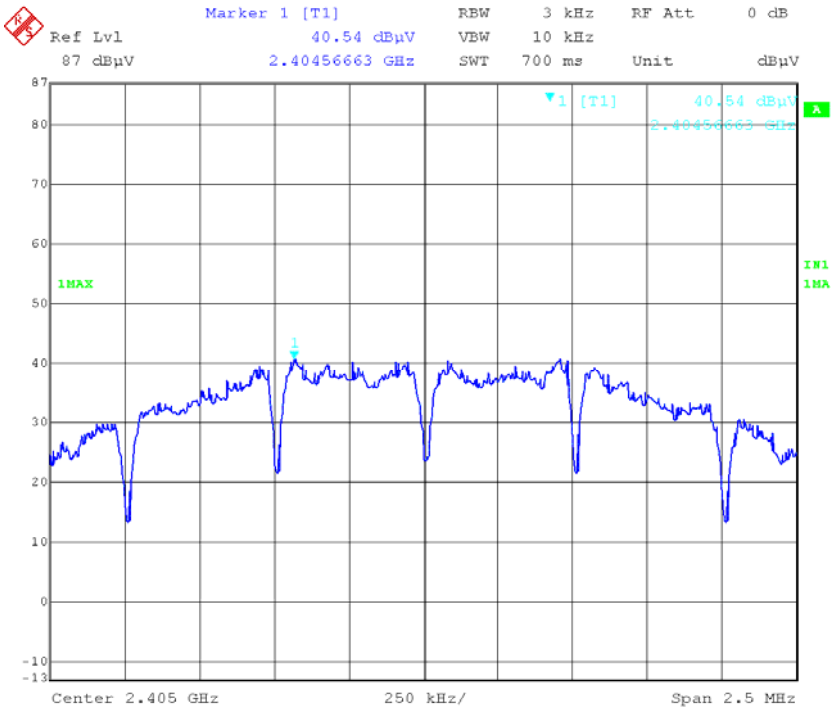
Frequency (MHz)	Reading (dBµV)	Polarity (H/V)	Factor (dB/m)	Cable Loss (dB)	Pre-Amp (dB)	Corrected Amplitude (dBµV/m)	Detector
2405	40.54	V	28.72	3.00	0.00	72.26	Peak
2425	40.83	V	28.78	3.00	0.00	72.61	Peak
2450	40.27	V	28.85	3.00	0.00	72.12	Peak
2475	39.33	V	28.93	3.00	0.00	71.26	Peak

Tset Mode	Frequency (MHz)	Field Strength (dBµV/m)	EIRP (dBm)	Antenna Gain (dBi)	PSD (dBm/3kHz)	Limit （dBm）
Zigbee	2405	72.26	-22.94	3	-25.94	≤8
	2425	72.61	-22.59	3	-25.59	≤8
	2450	72.12	-23.08	3	-26.08	≤8
	2475	71.26	-23.94	3	-26.94	≤8

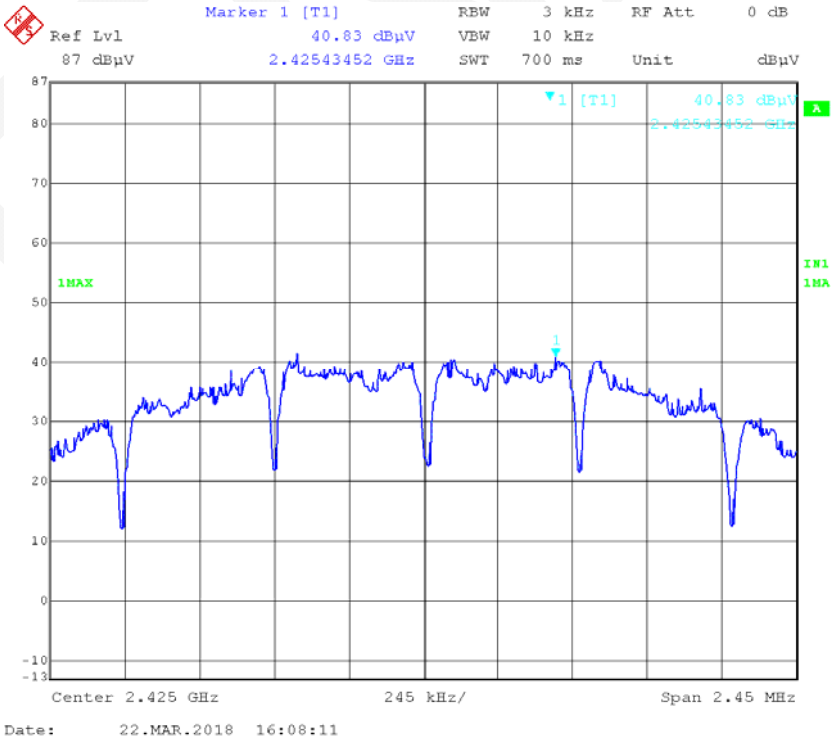
Note: EIRP[dBm] = E[dBµV/m]-95.2 when distance is 3 meter
EIRP[dBm] = Conducted Output Power[dBm] + Antenna Gain

Where: E is the field strength in dBµV/m
EIRP is the equivalent isotropic radiated power in dBm

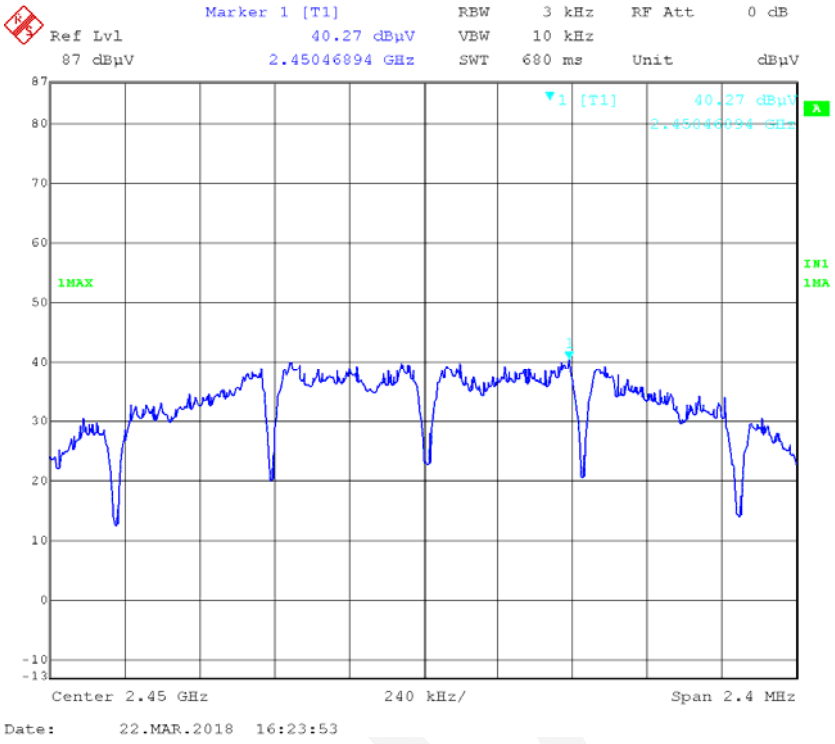
Power Spectral Density, 2405 MHz



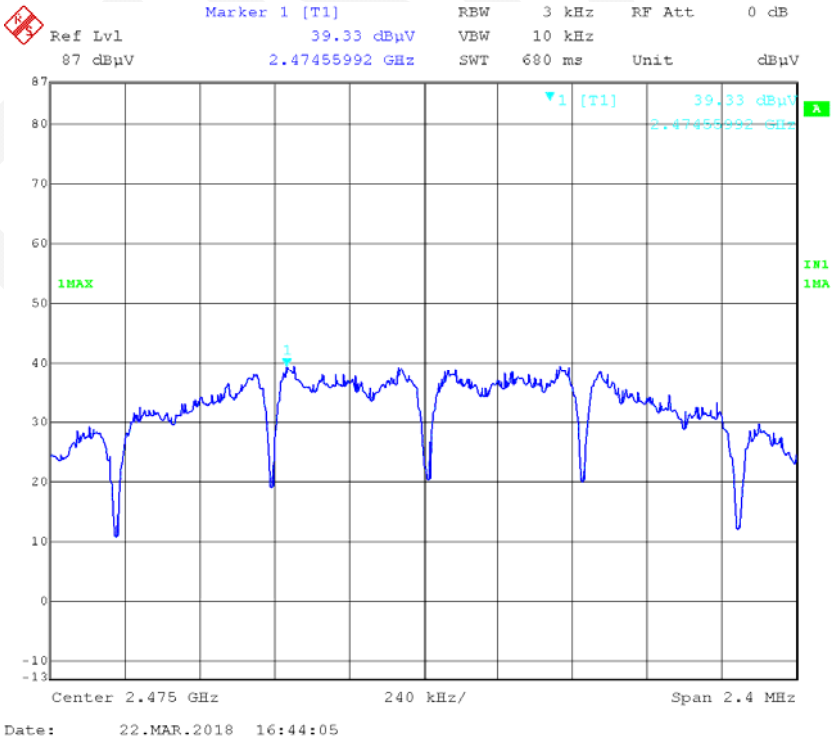
Power Spectral Density, 2425 MHz



Power Spectral Density, 2450 MHz



Power Spectral Density, 2450 MHz



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