FCC TEST REPORT

Test report
On Behalf of
PEEQ Technologies Inc
For
PEEQ Ball

Model No.: Qball 2.0

FCC ID: 2AOFK-QBALL

Prepared for : **PEEQ Technologies Inc**
225 James Jackson Ave, Cary NC27513, USA

Prepared By : **Shenzhen HUAK Testing Technology Co., Ltd.**
1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

Date of Test: **Oct. 31, 2019 ~ Nov. 06, 2019**
Date of Report: **Nov. 06, 2019**
Report Number: **HK1911042776-E**

TEST RESULT CERTIFICATION

Applicant's name .....: **PEEQ Technologies Inc**

Address.....: **225 James Jackson Ave, Cary NC27513, USA**

Manufacture's Name.....: **Dongguan ShengLong Electronics Technology Co.,Ltd**

Address.....: **No.43, Changtang Third Industrail Zone, Dalang Town, Dongguan City, Guangdong, China**

Product description

Trade Mark.....: Qball

Product name .....: PEEQ Ball

Model and/or type reference : Qball 2.0

Standards.....: FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

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Date of Test.....:

Date (s) of performance of tests.....: Oct. 31, 2019 ~ Nov. 06, 2019

Date of Issue.....: Nov. 06, 2019

Test Result.....: **Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)	PASS
6dB Emission Bandwidth	§15.247 (a)(2)	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	§15.247(d)	PASS
Spurious Emission	§15.205/§15.209	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

1.2 TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

1.3 Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	PEEQ Ball
Model Name	Qball 2.0
Serial No.	N/A
Model Difference	N/A
Trade Mark	Qball
Hardware Version:	MTX_PEEQ_1.0_V0.3
Software Version:	T0070_THYSM_TX_0x26_1to1_20181023_V001
Operation frequency	2403MHz -- 2478MHz
Number of Channels	26
Antenna Type	PCB antenna
Antenna Gain	0dBi
Modulation Type	GFSK
Power Source	DC 3.7V from battery

2.2 Carrier Frequency of Channels

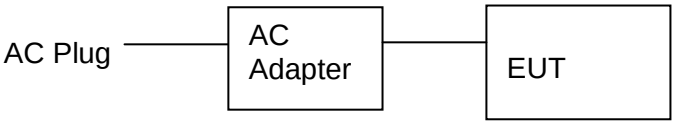
Operation Frequency each of channel			
Channel	Frequency	Channel	Frequency
0	2403MHz	13	2442MHz
1	2406MHz	14	2445MHz
2	2409MHz	15	2448MHz
3	2412MHz	16	2451MHz
4	2415MHz	17	2454MHz
5	2418MHz	18	2457MHz
6	2421MHz	19	2460MHz
7	2424MHz	20	2463MHz
8	2427MHz	21	2466MHz
9	2430MHz	22	2469MHz
10	2433MHz	23	2472MHz
11	2436MHz	24	2475MHz
12	2439MHz	25	2478MHz

2.3 Operation of EUT during testing

Operating Mode
The mode is used: **Transmitting mode**
Low Channel: 2403MHz
Middle Channel: 2439MHz
High Channel: 2478MHz

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and Radiation testing:



Operation of EUT Above1GHz Radiation testing:

2.5 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Description	Model No.	Manufacturer	Remark	Certificate
Adapter	Model: KA3A0502000 Input: 100-240V~ 0.8, 50/60Hz Output: 5Vdc 2A	/	Provided by Applicant	SDOC
USB cable	/	/	Provided by Applicant	SDOC
AUX cable	/	/	Provided by Applicant	SDOC

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

2.6 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 27, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 27, 2018	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 27, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 27, 2018	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 27, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519B	HKE-014	Dec. 27, 2018	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 27, 2018	1 Year
11.	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Dec. 27, 2018	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 27, 2018	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 27, 2018	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 27, 2018	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 27, 2018	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 27, 2018	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 27, 2017	3 Year
19.	Power Meter	R&S	NRVD	SEL0069	Dec. 27, 2018	1 Year
20	High Gain Antenna	Schewarzbeck	LB-180400KF	HKE-054	Dec. 27, 2018	1 Year

3 TEST RESULTS AND MEASUREMENT DATA

3.1 CONDUCTED EMISSIONS TEST

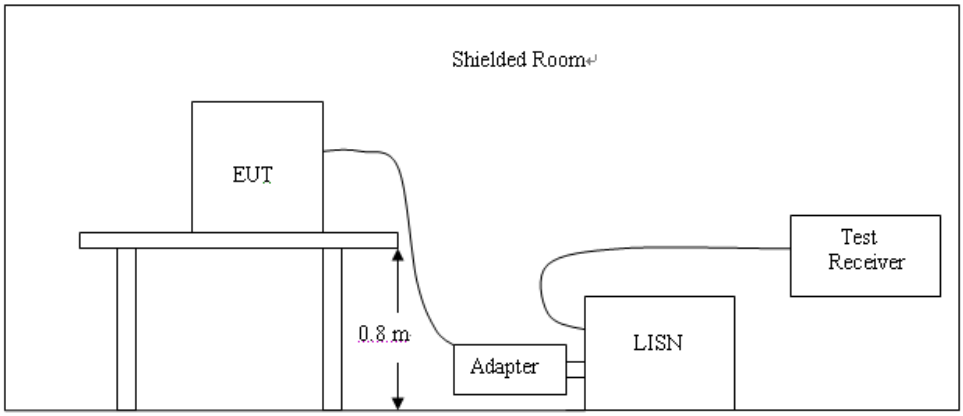
LIMIT

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207 and RSS Gen 8.8, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

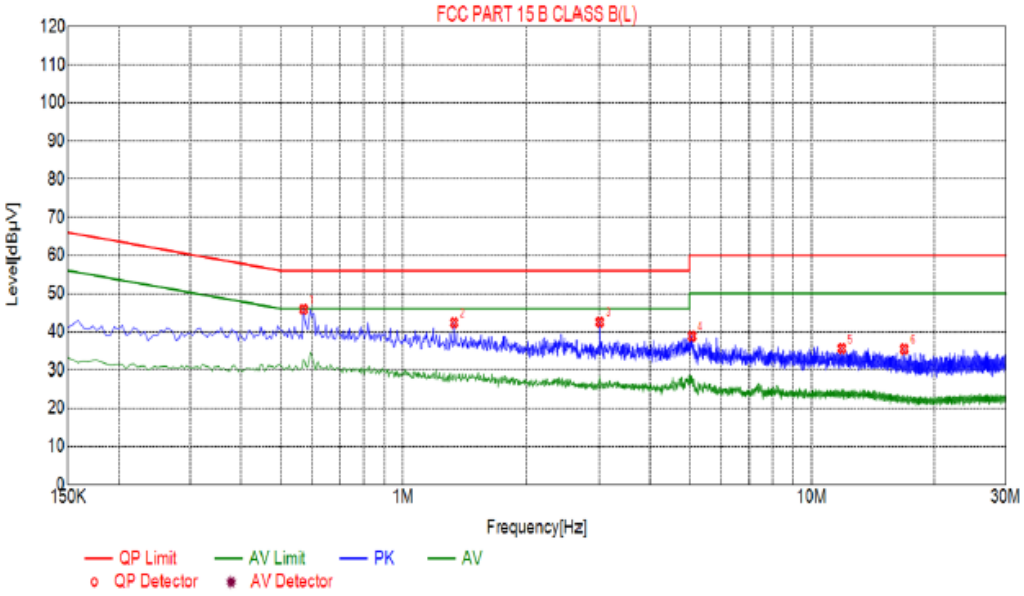
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Note：When Charging, EUT can not transmit

Test Specification: Line

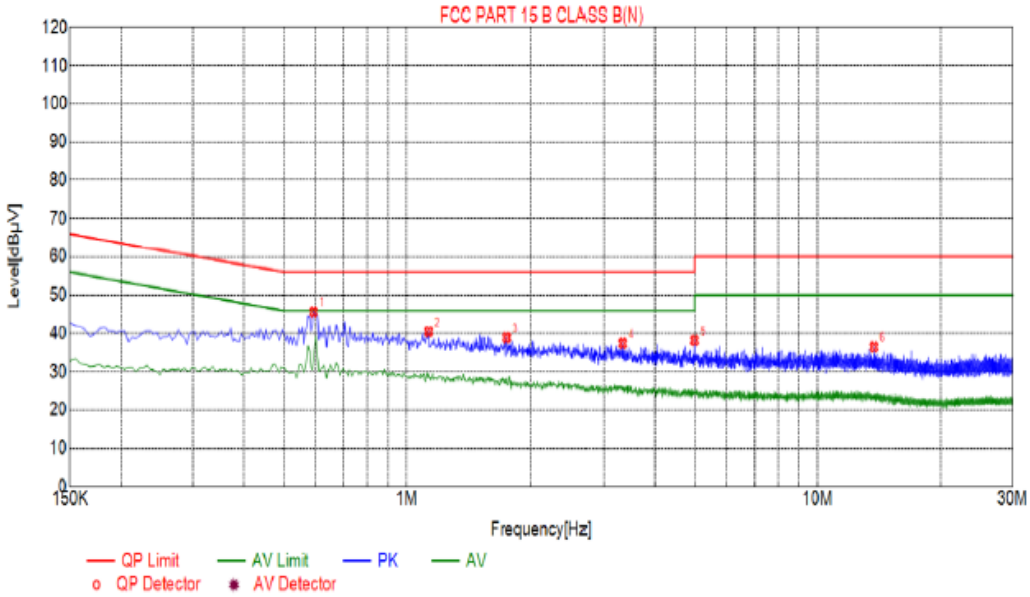


Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.5685	45.83	10.05	56.00	10.17	PK
2	1.3335	42.35	10.10	56.00	13.65	PK
3	3.0165	42.51	10.22	56.00	13.49	PK
4	5.0730	38.80	10.26	60.00	21.20	PK
5	11.8590	35.59	9.99	60.00	24.41	PK
6	16.8810	35.42	9.99	60.00	24.58	PK

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

Test Specification: Neutral



Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.5910	45.70	10.05	56.00	10.30	PK
2	1.1310	40.47	10.08	56.00	15.53	PK
3	1.7520	38.88	10.14	56.00	17.12	PK
4	3.3405	37.40	10.24	56.00	18.60	PK
5	5.0055	38.16	10.26	60.00	21.84	PK
6	13.7355	36.43	9.96	60.00	23.57	PK

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

3.2 RADIATED EMISSION TEST

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

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)

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission

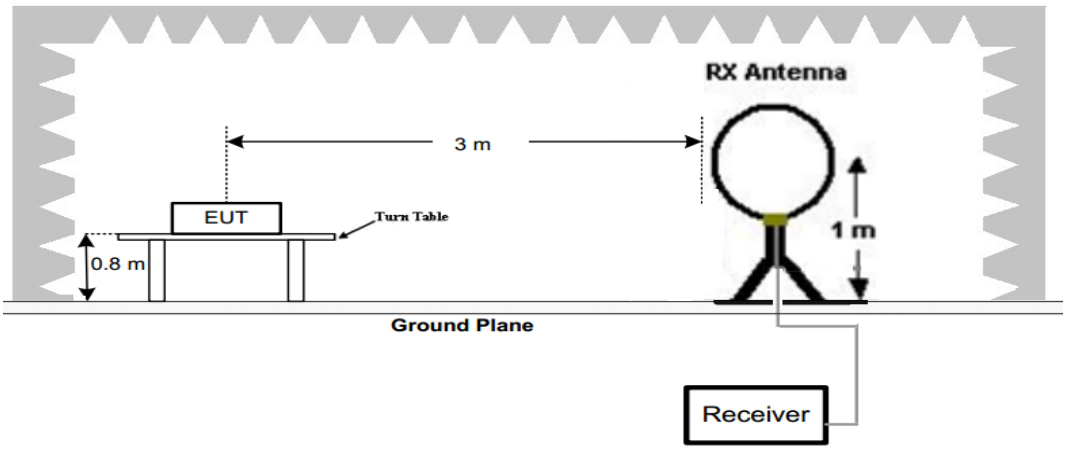
Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Radiated emission limits

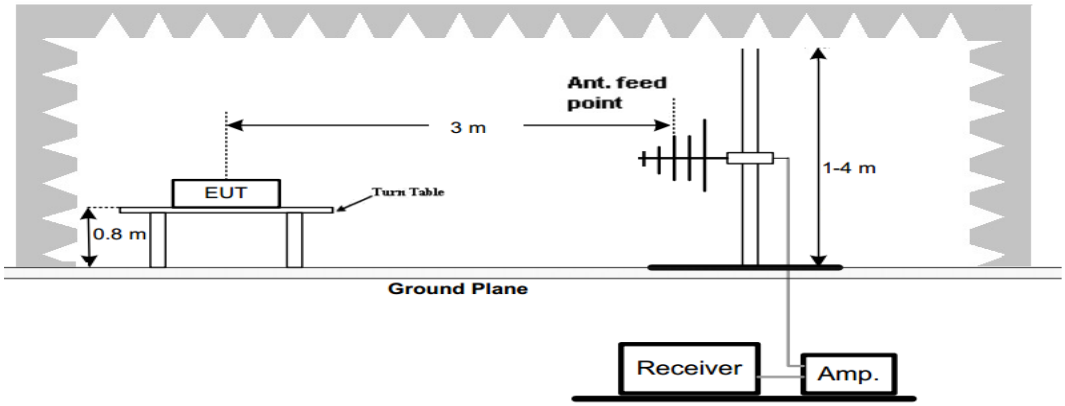
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

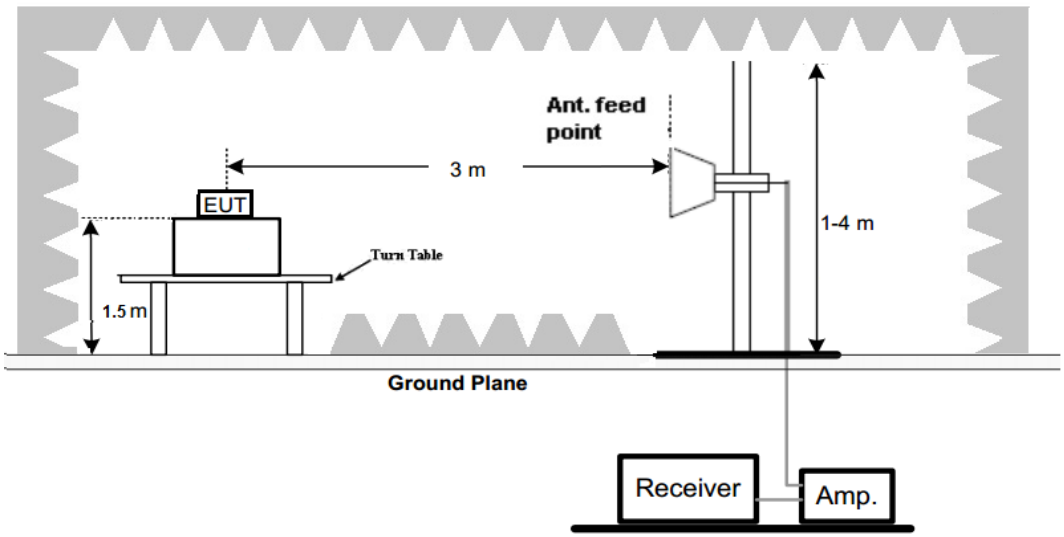
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

Note: For the radiated emission test above 1GHz:Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions.

The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test the EUT in the lowest channel,the middle channel,the Highest channel
The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.Repeat above procedures until all frequencies measured was complete.

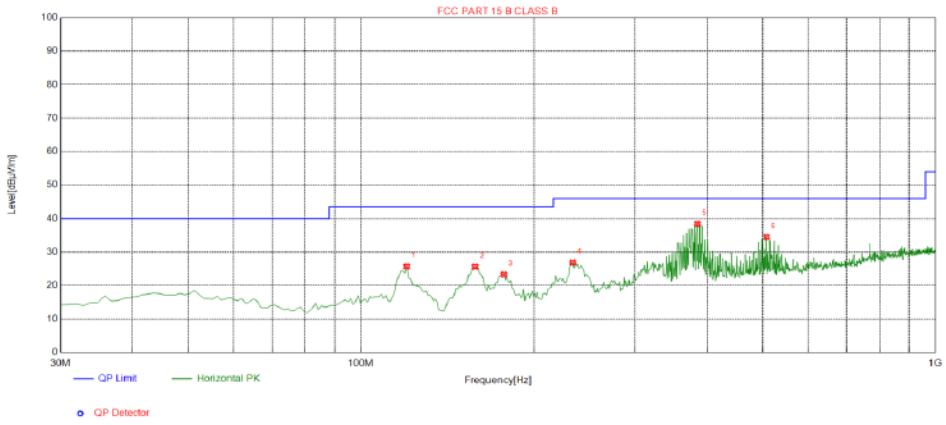
TEST RESULTS

Remark:
1. Radiated Emission measured at low middle and high mode from 9 KHz to 10th harmonic of fundamental and recorded worst case .
2. There is no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

Below 1GHz Test Results:

Antenna polarity: H

Test Graph



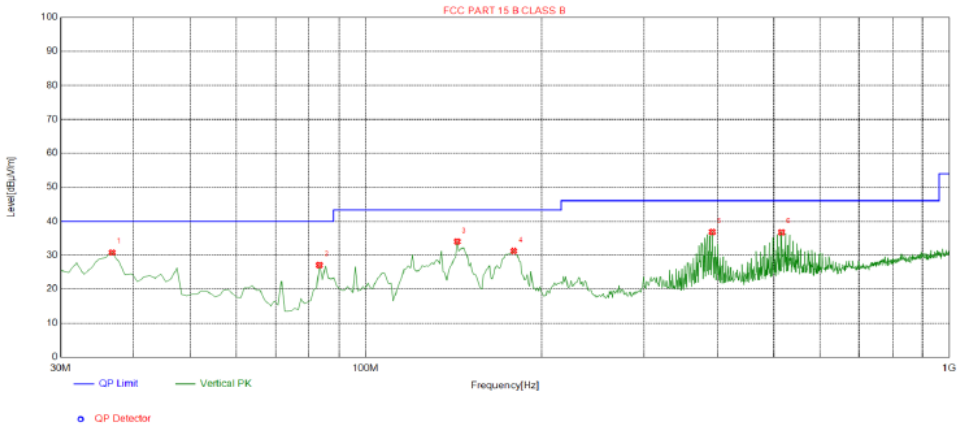
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	120.210	25.69	-17.13	43.50	17.81	100	22	Horizontal
2	158.040	25.62	-18.36	43.50	17.88	100	179	Horizontal
3	177.440	23.29	-16.97	43.50	20.21	100	242	Horizontal
4	233.700	26.86	-14.15	46.00	19.14	100	235	Horizontal
5	385.020	38.40	-10.74	46.00	7.60	100	56	Horizontal
6	508.210	34.52	-8.06	46.00	11.48	100	329	Horizontal

Remark:
Margin = Limit – Level
Level=Test receiver reading + factor
Factor= Antenna factor + cable loss- Amp factor

Antenna polarity: V

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7900	30.80	-15.57	40.00	9.20	100	135	Vertical
2	83.3500	27.02	-18.67	40.00	12.98	100	47	Vertical
3	143.490	34.03	-19.10	43.50	9.47	100	316	Vertical
4	179.380	31.23	-16.88	43.50	12.27	100	274	Vertical
5	392.780	36.89	-10.58	46.00	9.11	100	192	Vertical
6	515.970	36.78	-7.84	46.00	9.22	100	176	Vertical

Remark:
Margin = Limit – Level
Level=Test receiver reading + factor
Factor= Antenna factor + cable loss- Amp factor
(1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Above 1 GHz Test Results:

CH Low (2403MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
4806	58.85	-3.65	55.20	74	-18.80	Peak
4806	45.19	-3.65	41.54	54	-12.46	AVG
7209	57.43	-0.95	56.48	74	-17.52	Peak
7209	45.26	-0.95	44.31	54	-9.69	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
4806	57.85	-3.65	54.20	74	-19.80	Peak
4806	46.60	-3.65	42.95	54	-11.05	AVG
7209	57.31	-0.95	56.36	74	-17.64	Peak
7209	46.35	-0.95	45.40	54	-8.60	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

CH Middle (2439MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
4878	59.01	-3.54	55.47	74	-18.53	Peak
4878	46.64	-3.54	43.10	54	-10.90	AVG
7317	58.19	-0.81	57.38	74	-16.62	Peak
7317	46.70	-0.81	45.89	54	-8.11	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
4878	57.36	-3.54	53.82	74	-20.18	Peak
4878	45.07	-3.54	41.53	54	-12.47	AVG
7317	57.44	-0.81	56.63	74	-17.37	Peak
7317	46.03	-0.81	45.22	54	-8.78	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

CH High (2478MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4956	56.53	-3.43	53.10	74	-20.90	Peak
4956	45.83	-3.43	42.40	54	-11.60	AVG
7434	57.32	-0.77	56.55	74	-17.45	Peak
7434	47.29	-0.77	46.52	54	-7.48	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4956	56.64	-3.43	53.21	74	-20.79	Peak
4956	45.09	-3.43	41.66	54	-12.34	AVG
7434	57.14	-0.77	56.37	74	-17.63	Peak
7434	45.46	-0.77	44.69	54	-9.31	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Remark：
(1) Measuring frequencies from 1 GHz to the 25 GHz。
(2) “F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency.
(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(4) Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.
(7)All modes of operation were investigated and the worst-case emissions are reported.

3.3 BAND EDGE

Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 1MHz and VBM to 3MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength With peak detection.

Test Result

Radiated Band Edge Test:

Operation Mode: TX CH Low (2403MHz)

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
2310	56.92	-5.81	51.11	74	-22.89	Peak
2310	49.57	-5.81	43.76	54	-10.24	AVG
2390	56.29	-5.84	50.45	74	-23.55	Peak
2390	47.10	-5.84	41.26	54	-12.74	AVG
2400	57.88	-5.84	52.04	74	-21.96	Peak
2400	48.35	-5.84	42.51	54	-11.49	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
2310	54.75	-5.81	48.94	74	-25.06	Peak
2310	47.99	-5.81	42.18	54	-11.82	AVG
2390	56.94	-5.84	51.10	74	-22.90	Peak
2390	48.17	-5.84	42.33	54	-11.67	AVG
2400	56.50	-5.84	50.66	74	-23.34	Peak
2400	49.69	-5.84	43.85	54	-10.15	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Operation Mode: TX CH High (2478MHz)

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	55.54	-6.04	49.50	74	-24.50	Peak
2483.5	50.83	-6.04	44.79	54	-9.21	AVG
2500	56.03	-6.06	49.97	74	-24.03	Peak
2500	47.06	-6.06	41.00	54	-13.00	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

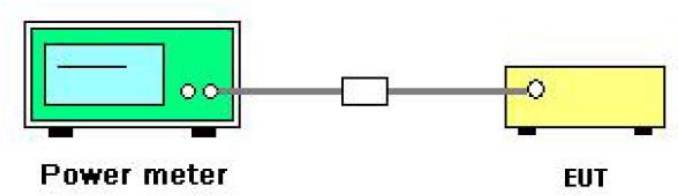
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	54.22	-6.04	48.18	74	-25.82	Peak
2483.5	48.56	-6.04	42.52	54	-11.48	AVG
2500	57.03	-6.06	50.97	74	-23.03	Peak
2500	47.90	-6.06	41.84	54	-12.16	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

3.4 Conducted Output Power

Limit

30dBm

TEST CONFIGURATION



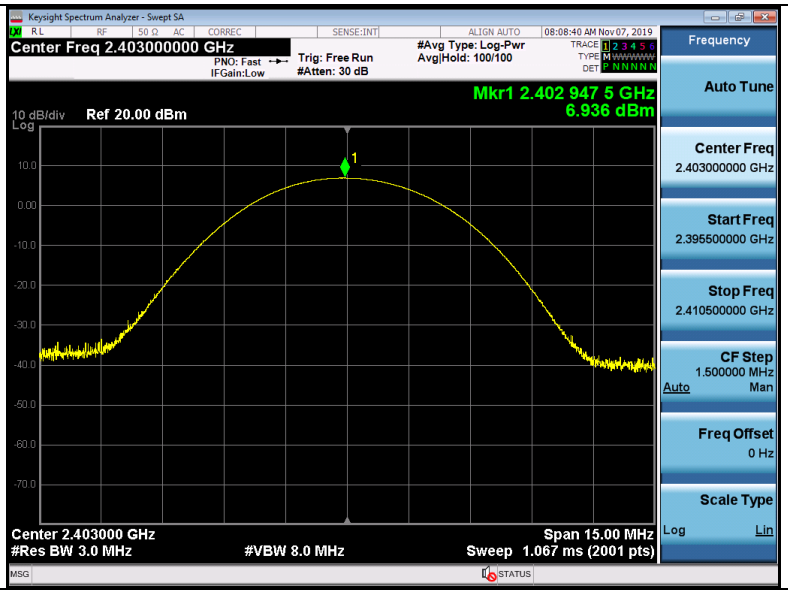
Test Procedure:

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v05.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the Peak output power and record the results in the test report.

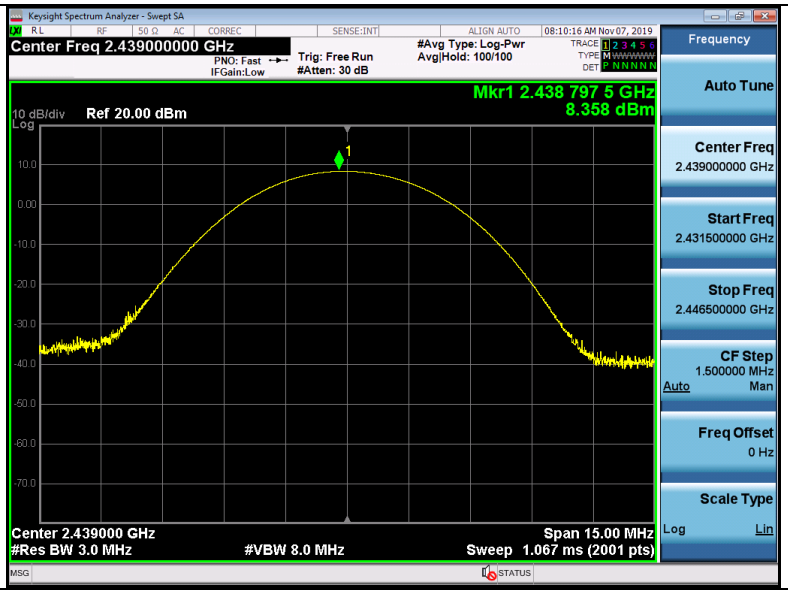
Test Results:

Test Channel (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Result
2403	6.936	30	PASS
2439	8.358	30	PASS
2478	10.841	30	PASS

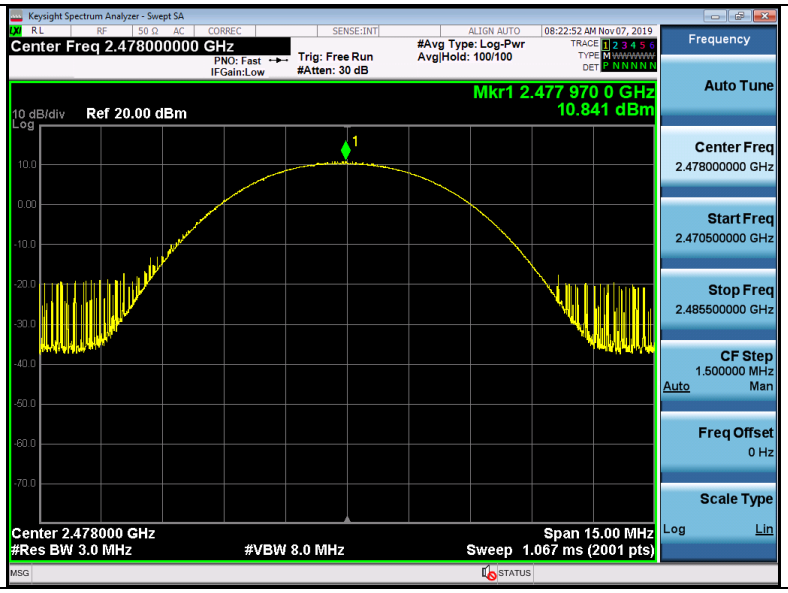
CH00



CH12



CH25

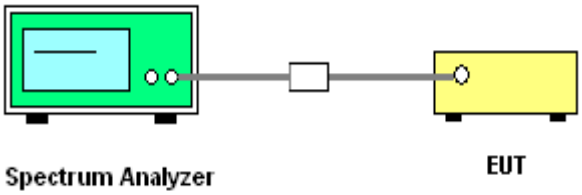


3.5 OCCUPIED BANDWIDTH MEASUREMENT

Limit

⩾500KHz

TEST CONFIGURATION



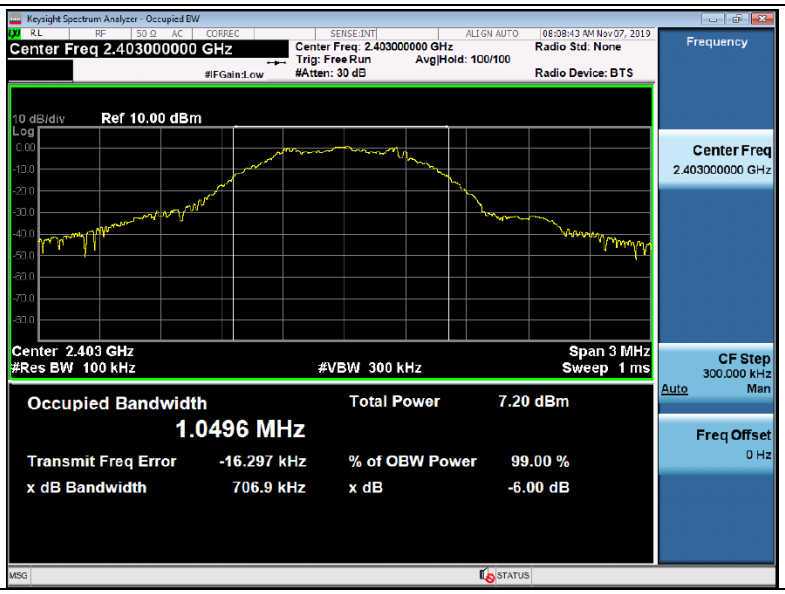
Test Procedure:

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v05.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.
4. Measure and record the results in the test report.

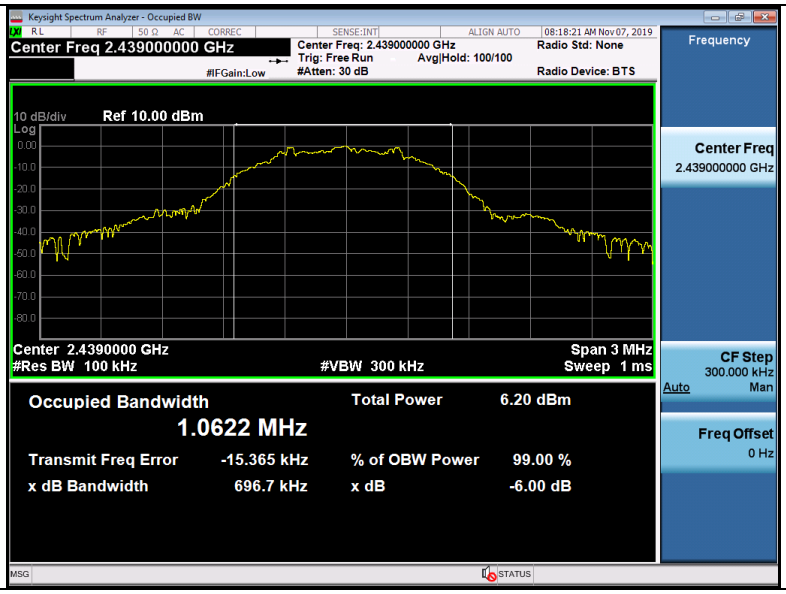
Test Results:

Test Channel (MHz)	6dB Emission Bandwidth (MHz)	Limit (MHz)	Result
2403	0.7069	0.5	PASS
2439	0.6967		PASS
2478	0.7370		PASS

CH00



CH12



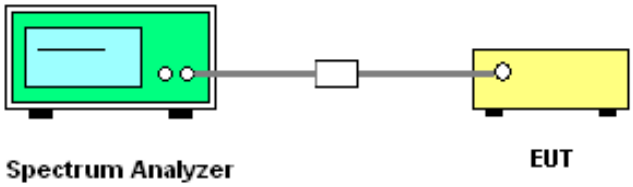
CH25

3.5 Power Spectral Density

Limit

Max 8dBm/3kHz

TEST CONFIGURATION



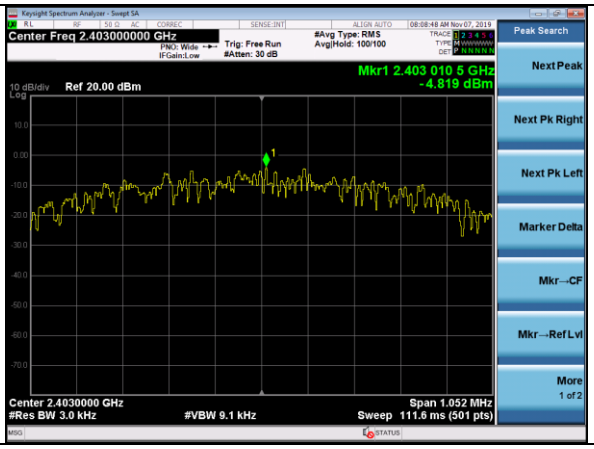
Test Procedure:

1. The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication No.558074 D01 DTS Meas. Guidance v05
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW.
5. Detector = Peak, Sweep time = auto couple.
6. Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

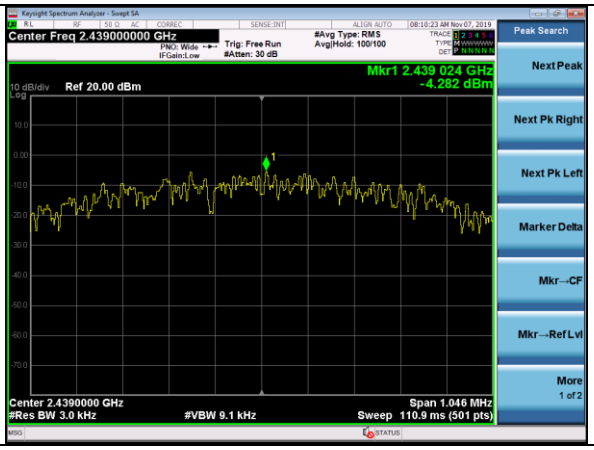
Test Result

Test Channel (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2403	-4.819	⩽8.00	PASS
2439	-4.282	⩽8.00	PASS
2478	-6.195	⩽8.00	PASS

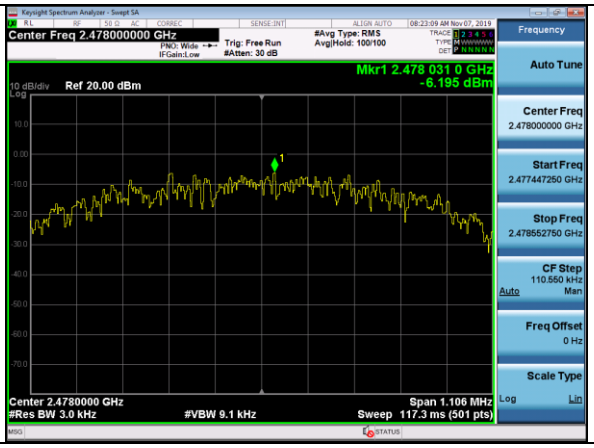
CH00



CH12



CH25

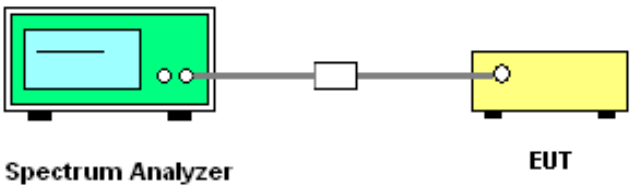


3.6 Conducted Band Edge and Spurious Emission Measurement

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

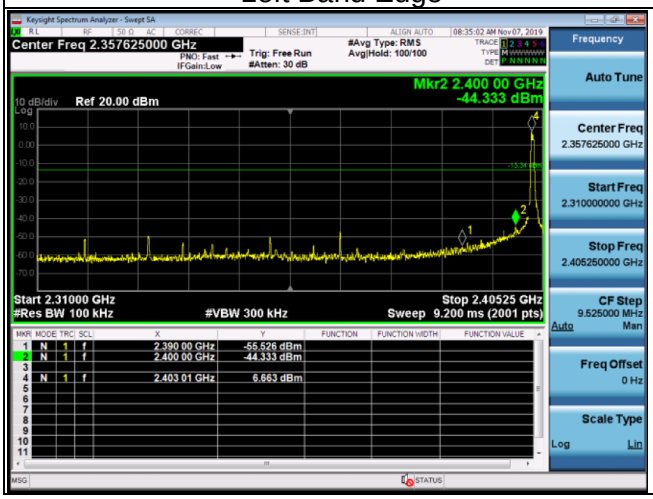
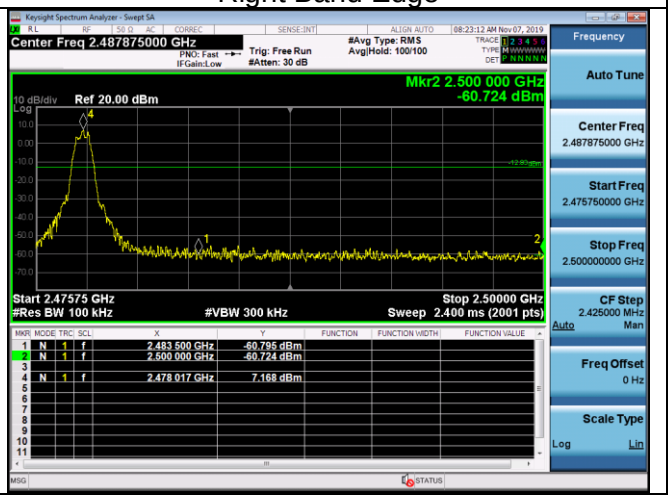
TEST CONFIGURATION



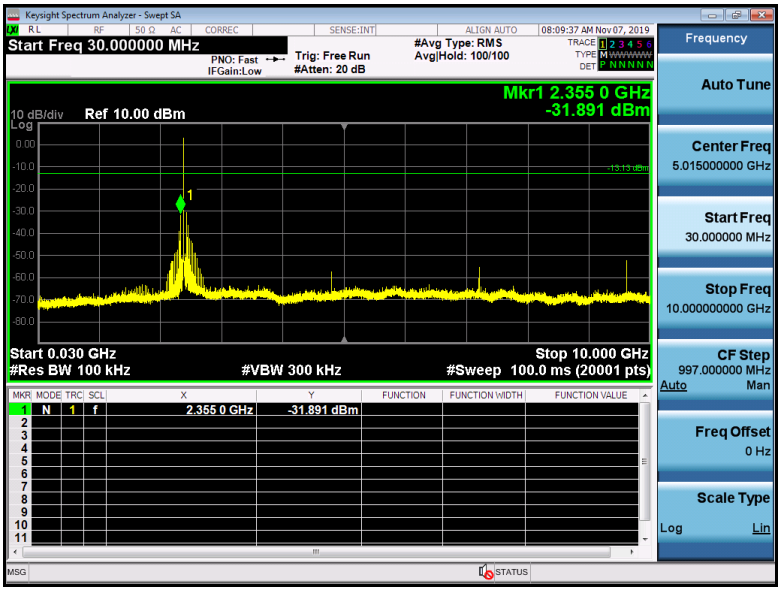
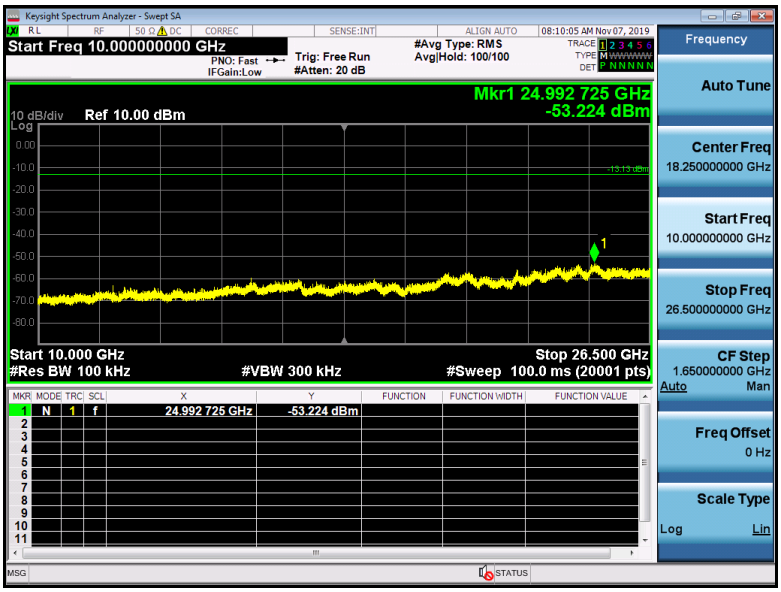
Test Procedure:

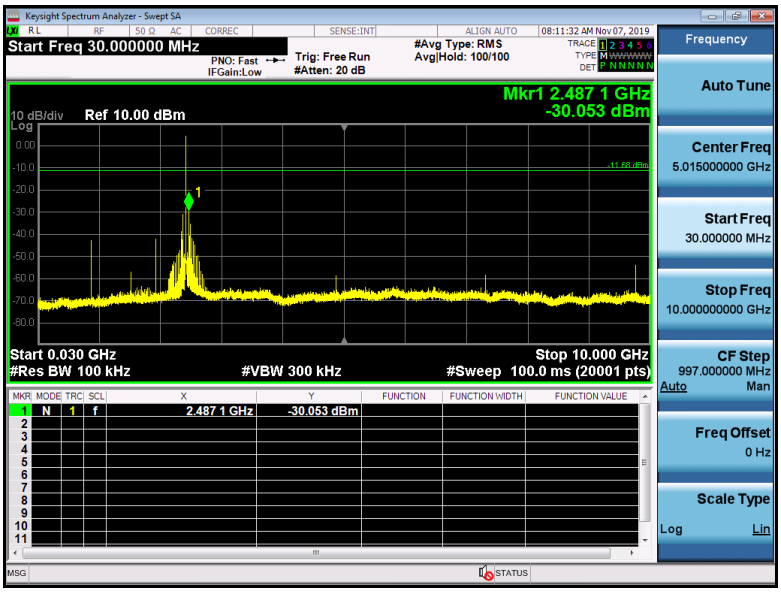
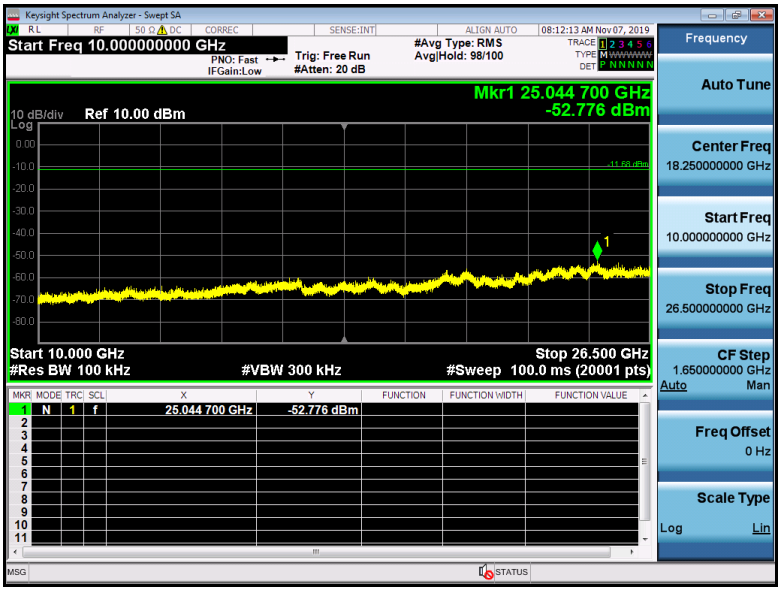
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

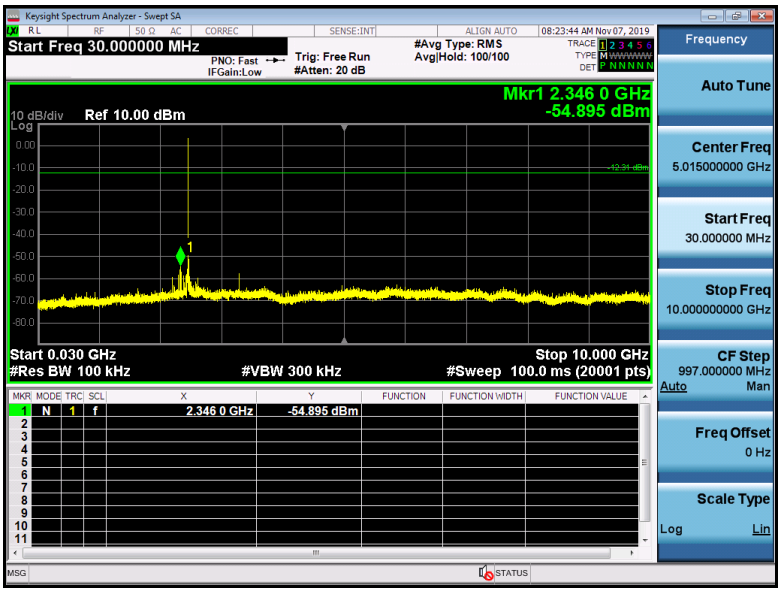
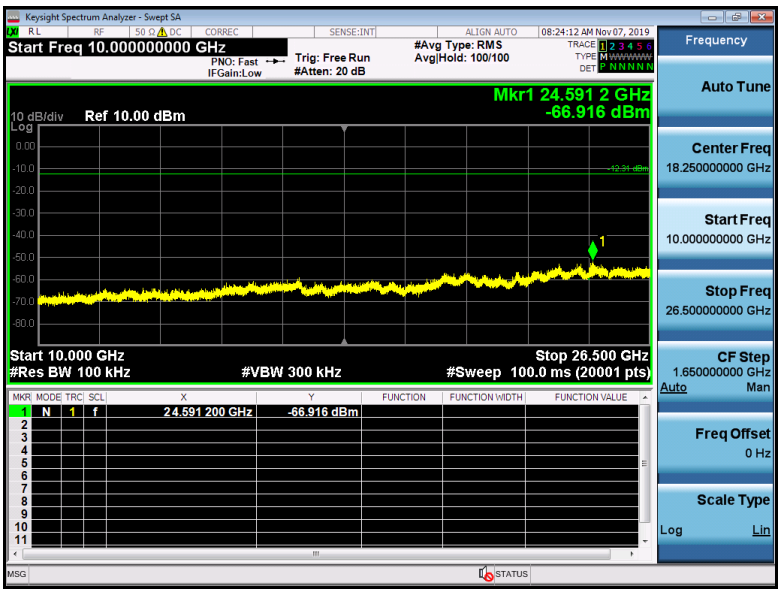
Test Result

Left Band Edge	Right Band Edge
	

Spurious emission

Low Channel	30MHz – 10GHz
	
	10GHz – 26.5GHz
	

Middle Channel	30MHz – 10GHz
	
	10GHz – 26.5GHz
	

High Channel	30MHz – 10GHz
	
	10GHz – 26.5GHz
	

3.7 ANTENNA REQUIREMENT

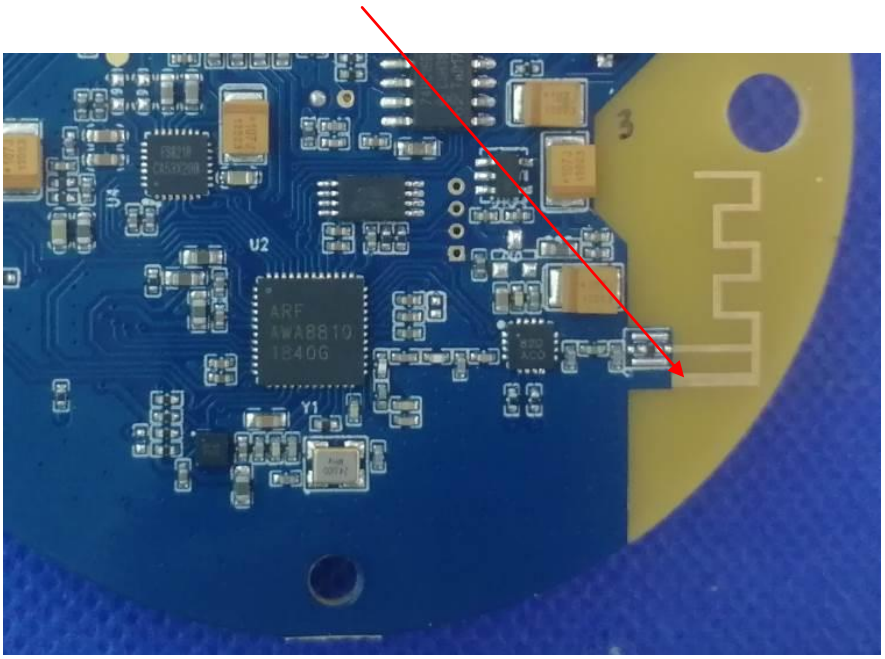
Standard Applicable

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.249, if 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 6dBi.

Antenna Connected Construction

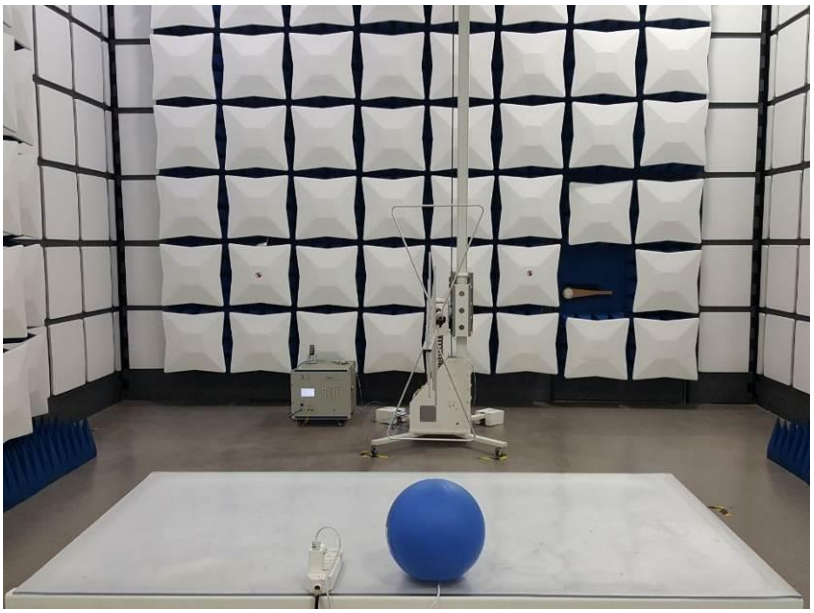
The antenna used in this product is a PCB antenna , The directional gains of antenna used for transmitting is 0dBi.

PCB ANTENNA

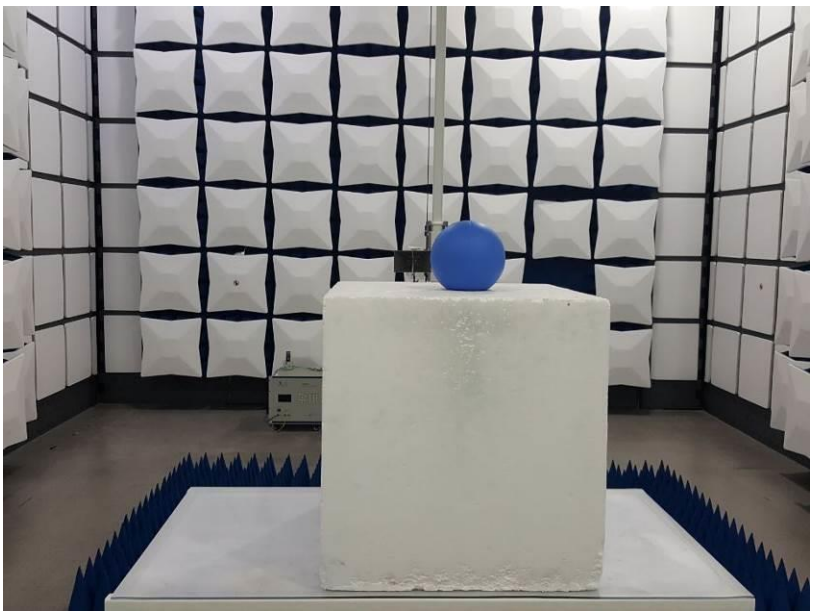


4 PHOTOGRAPH OF TEST

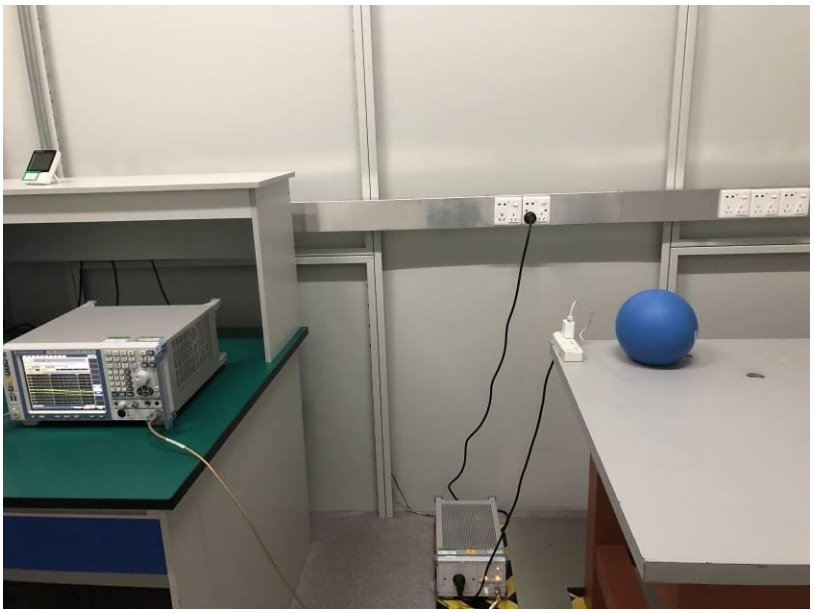
30MHz-1000MHz



Above 1000MHz

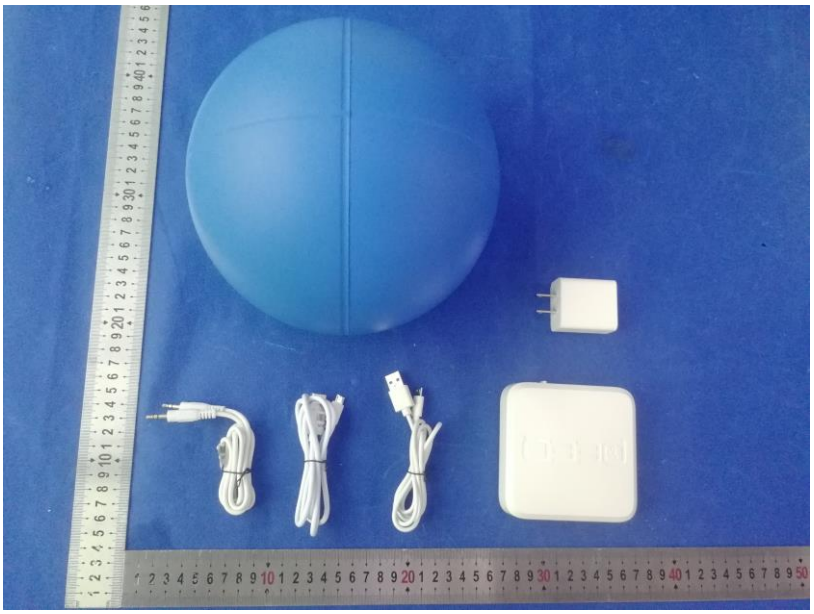


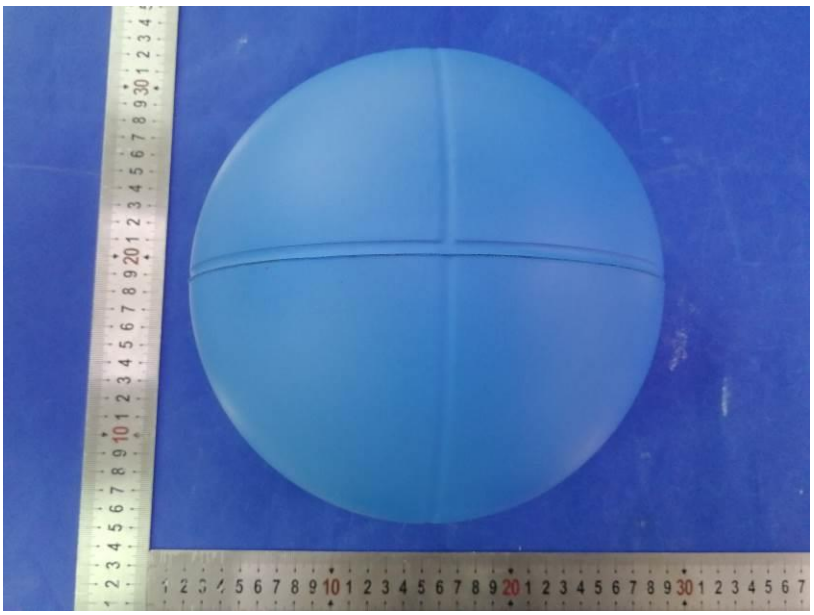
Conducted Emission

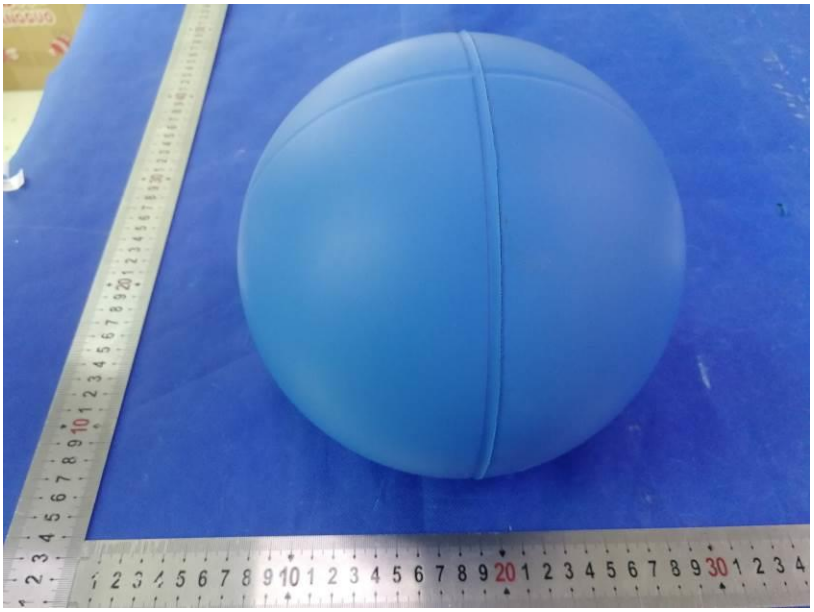


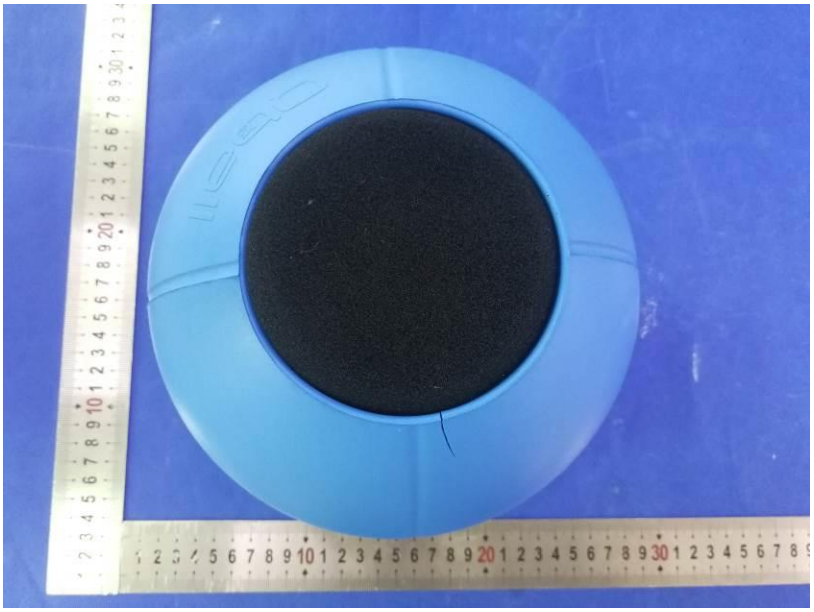
5 PHOTOGRAPH OF EUT

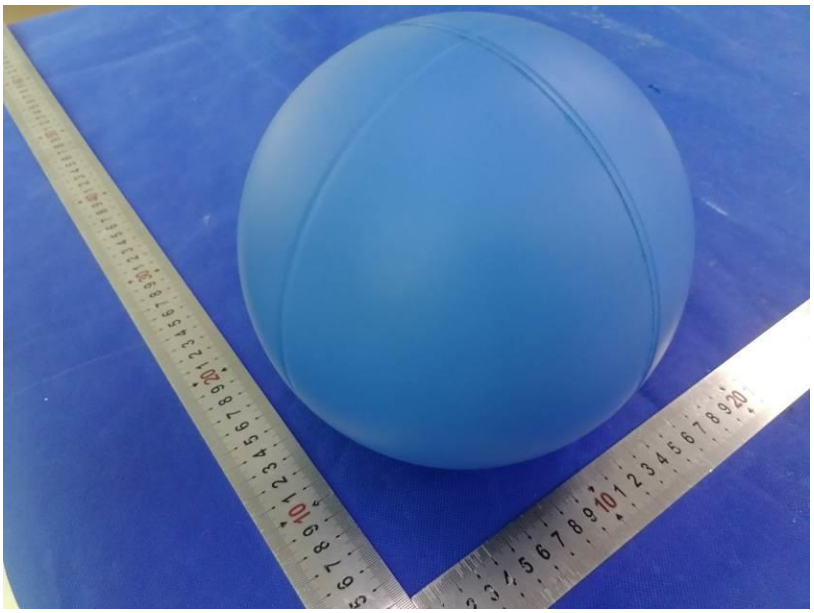
External photos

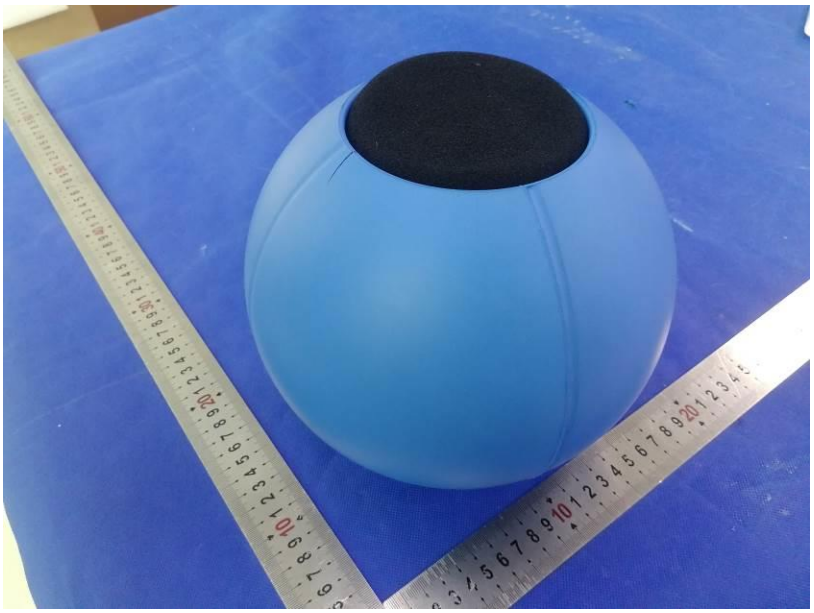




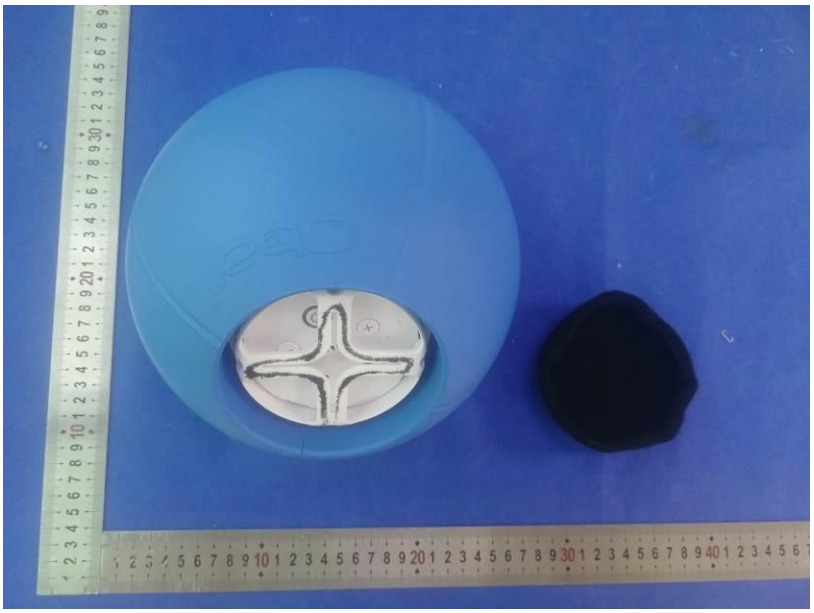


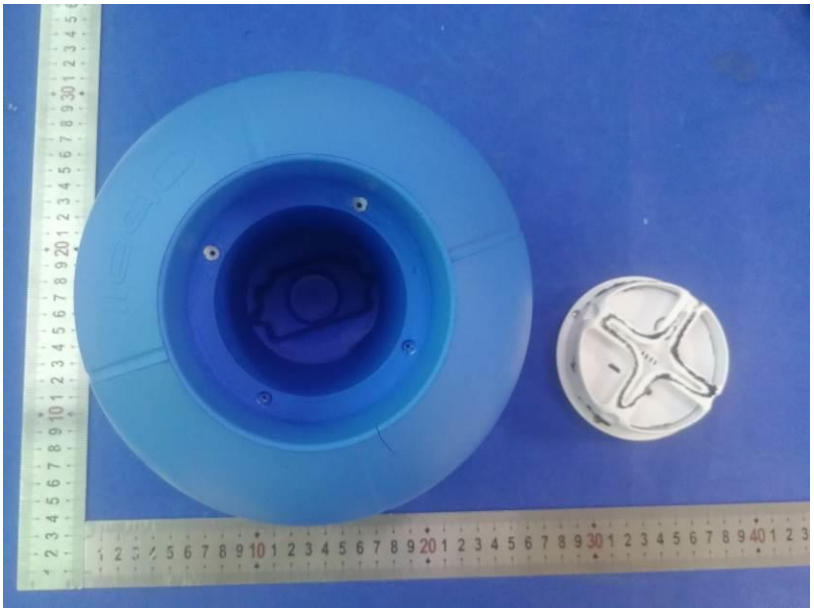


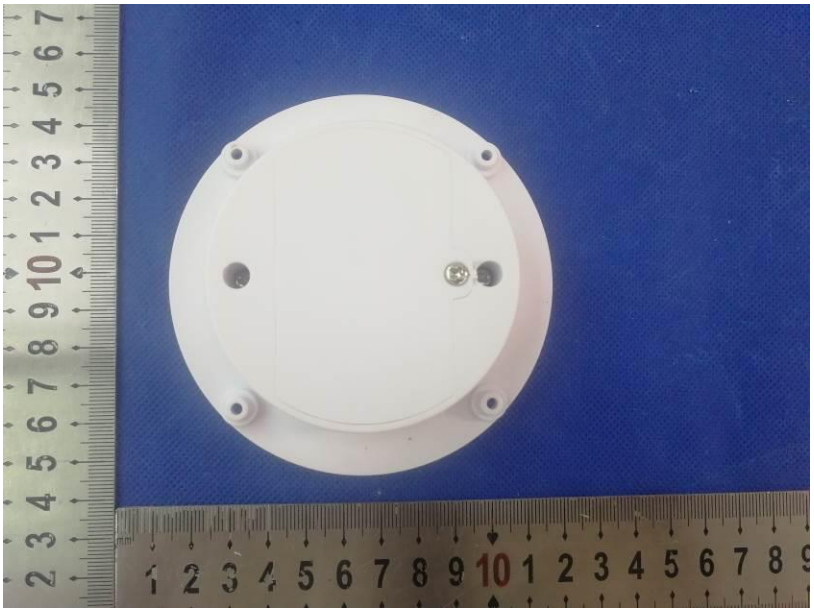


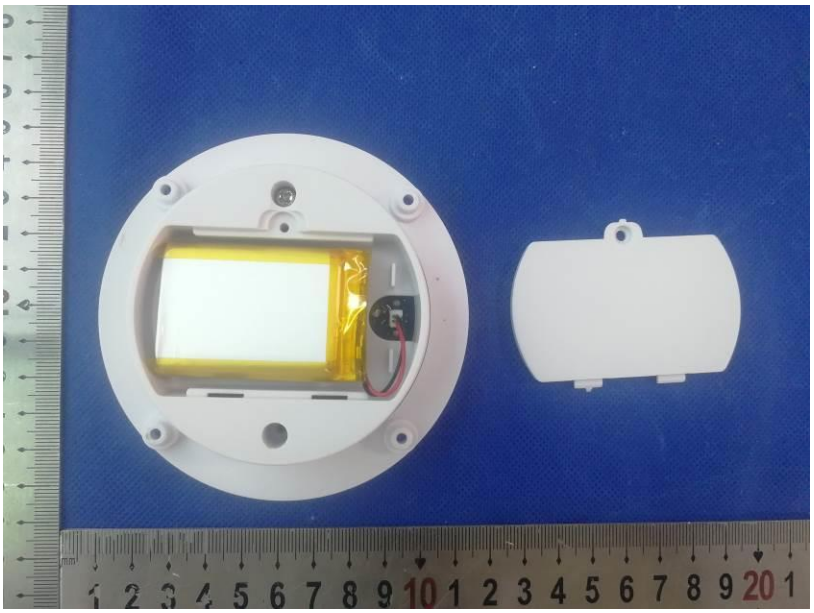


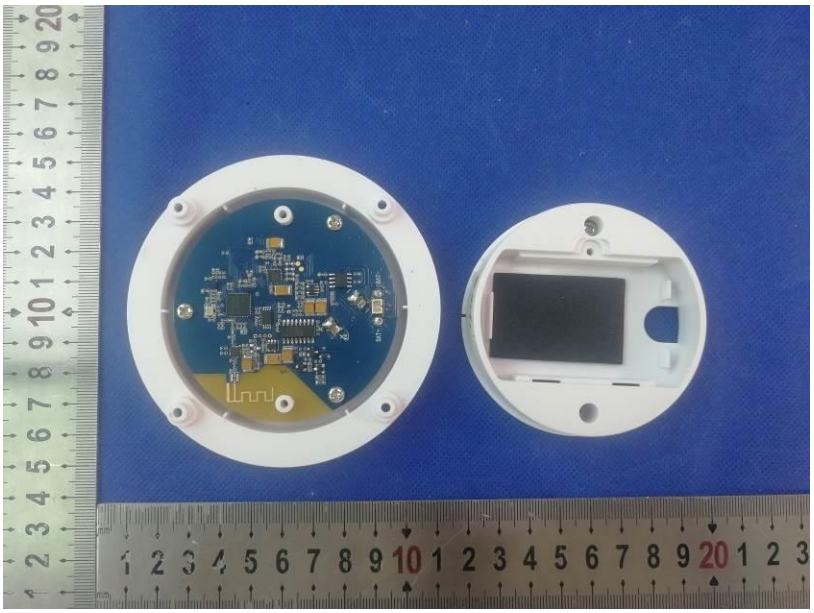
Internal photos

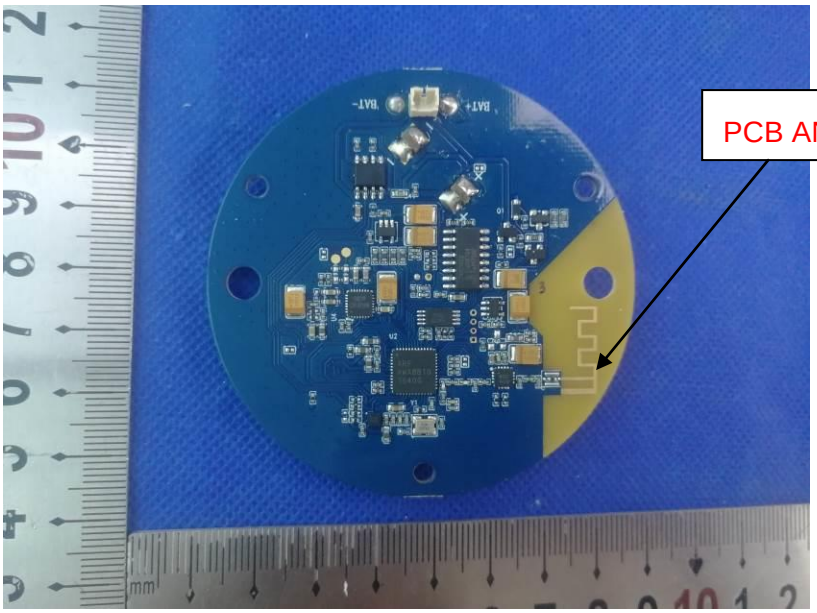


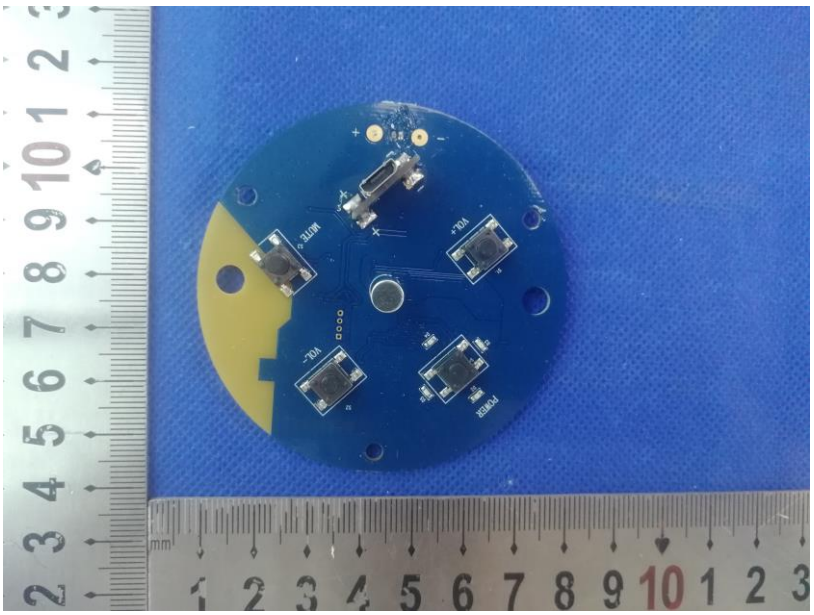


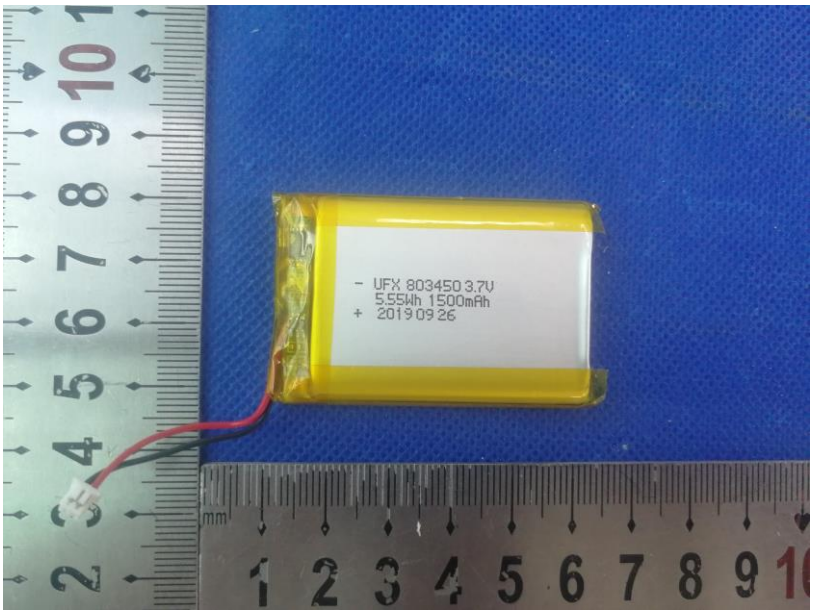







PCB ANTENNA





END