



FCC TEST REPORT

**Test report
On Behalf of
Shenzhen Jiayz photo industrial ., Ltd
For
Dual-Channel Digital Wireless Microphone
Model No.: BY-WM4 pro, BY-WM4 pro K 1, BY-WM4 pro K2
FCC ID: 2ARN3-BY-WM4**

Prepared for : Shenzhen Jiayz photo industrial ., Ltd
A16 Building, Intelligent Terminal Industrial Park of Silicon Valley Power, Guanlan,
Longhua District, Shenzhen, China

Prepared By : Shenzhen HUAKE Testing Technology Co., Ltd.
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Bao'an District, Shenzhen City, China



TEST REPORT

Applicant's name: **Shenzhen Jiayz photo industrial ., Ltd**

Address: A16 Building, Intelligent Terminal Industrial Park of Silicon Valley Power,
Guanlan, Longhua District, Shenzhen, China

Manufacture's Name: **Shenzhen Jiayz photo industrial ., Ltd**

Address: A16 Building, Intelligent Terminal Industrial Park of Silicon Valley Power,
Guanlan, Longhua District, Shenzhen, China

Product description

Trade Mark: BOYA

Product name: Dual-Channel Digital Wireless Microphone

Model and/or type
reference: BY-WM4 pro, BY-WM4 pro K 1, BY-WM4 pro K2

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

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Date of Test

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:

Date (s) of performance of tests Sep.20, 2019 ~. Nov.08, 2019

.....
:

Date of Issue Nov.08, 2019

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:

Test **Result Pass**

.....
:

Testing Engineer :

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1. TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
POWER SPECTRAL DENSITY	COMPLIANT
PEAK OUTPUT POWER _{Peak}	COMPLIANT
OUT OF BAND EMISSIONS	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

1.2 TEST FACILITY

Test Firm : Shenzhen HUAKE 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

Measurement Uncertainty	
Conducted Emission Expanded Uncertainty	= 2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	= 3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	= 4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	= 4.06dB, k=2



1.4 Test Description

Test Specification clause	Test case	Test Channel	Test mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(e)	Power spectral density	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(1)	Maximum output power	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	Band edge compliance conducted	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.205	Band edge compliance radiated	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX spurious emissions conducted	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX spurious emissions radiated	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109	RX spurious emissions radiated	-/-	-/-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a)	TX spurious Emissions Radiated < 30 MHz	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a) §15.207	Conducted Emissions 9KHz-30 MHz	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	GFSK	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	/

Remark:

The measurement uncertainty is not included in the test result.

NA = Not Applicable; NP = Not Performed



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Dual-Channel Digital Wireless Microphone
Trade Mark:	BOYA
Model Name	BY-WM4 pro
Serial Model	/
FCC ID	2ARN3-BY-MW4
Antenna Type	PCB antenna
Antenna Gain	0.0 dBi
Operation frequency	2406~2478 MHz
Number of Channels	73
Modulation Type	GFSK
Power Rating	DC 3.0V From Battery



2.1.1 Carrier Frequency of Channels

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 73 channels provided to the EUT. Channel 00/36/72 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	2406	36	2442
1	2407	37	2443
2	2408	38	2444
3	2409	39	2445
4	2410	40	2446
5	2411	41	2447
6	2412	42	2448
7	2413	43	2449
8	2414	44	2450
9	2415	45	2451
10	2416	46	2452
11	2417	47	2453
12	2418	48	2454
13	2419	49	2455
14	2420	50	2456
15	2421	51	2457
16	2422	52	2458
17	2423	53	2459
18	2424	54	2460
19	2425	55	2461
20	2426	56	2462
21	2427	57	2463
22	2428	58	2464
23	2429	59	2465
24	2430	60	2466
25	2431	61	2467
26	2432	62	2468
27	2433	63	2469
28	2434	64	2470
29	2435	65	2471
30	2436	66	2472
31	2437	67	2473
32	2438	68	2474
33	2439	69	2475
34	2440	70	2476
35	2441	71	2477



		72	2478
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Operation of EUT during testing

Operating Mode

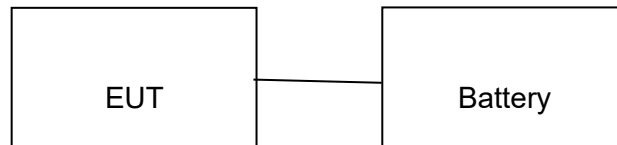
The mode is used: **Transmitting mode for GFSK**

Low Channel: 2406MHz

Middle Channel: 2442MHz

High Channel: 2478MHz

2.2 DESCRIPTION OF TEST SETUP





2.3 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. 28, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2018	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 28, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018	1 Year
6.	High gain antenna	Schwarzbeck	LB- 180400KF	HKE-054	Dec. 28, 2018	1 Year
7.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2018	1 Year
8.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2018	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2018	1 Year
10.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2018	1 Year
11.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Dec. 28, 2018	1 Year
12.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2018	1 Year
13.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2018	1 Year
14.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2018	N/A
15.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 28, 2018	1 Year
16.	Power Sensor	R&S	NRP-Z4	HKE-091	Dec. 28, 2018	1 Year
17.	Power Meter	R&S	NRVS	HKE-092	Dec. 28, 2018	1 Year
18.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018	1 Year
19.	Signal generator	Agilent	N5182A	HKE-029	Dec. 28, 2018	1 Year
20.	Signal Generator	Agilent	83630A	HKE-028	Dec. 28, 2018	1 Year
21.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2018	3 Year



3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

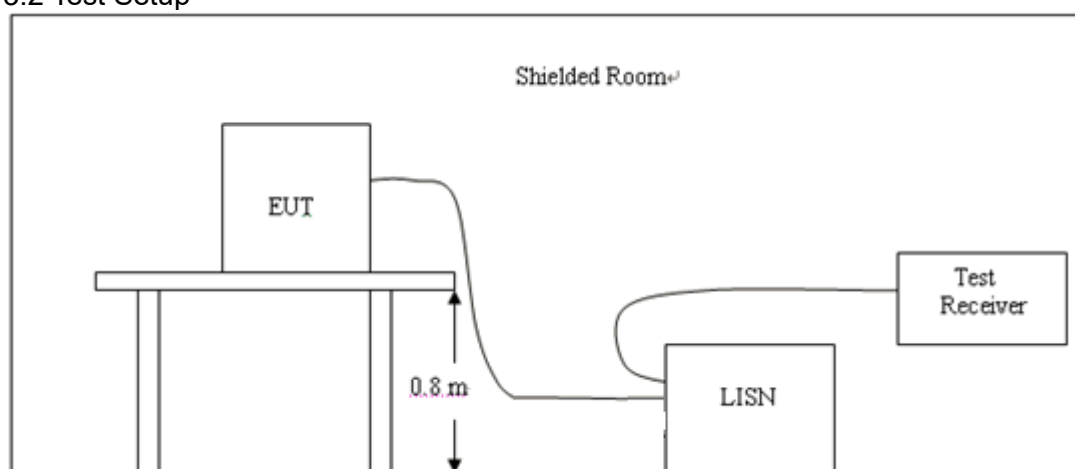
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 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.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's 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.

3.4 Test Result

Note: The EUT is Powered by Battery, So this test item is not applicable for the EUT

4 RADIATED EMISSION TEST

4.1 Radiation Limit

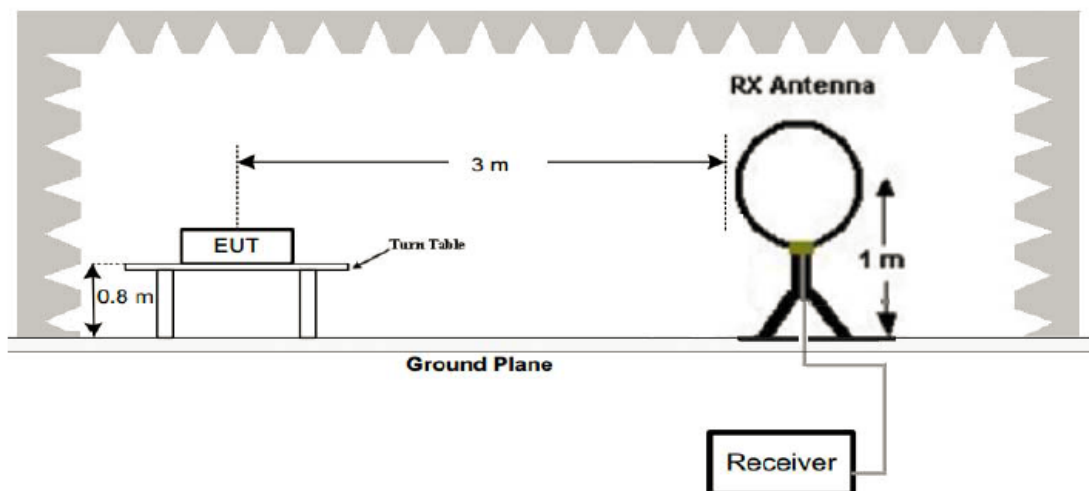
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	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

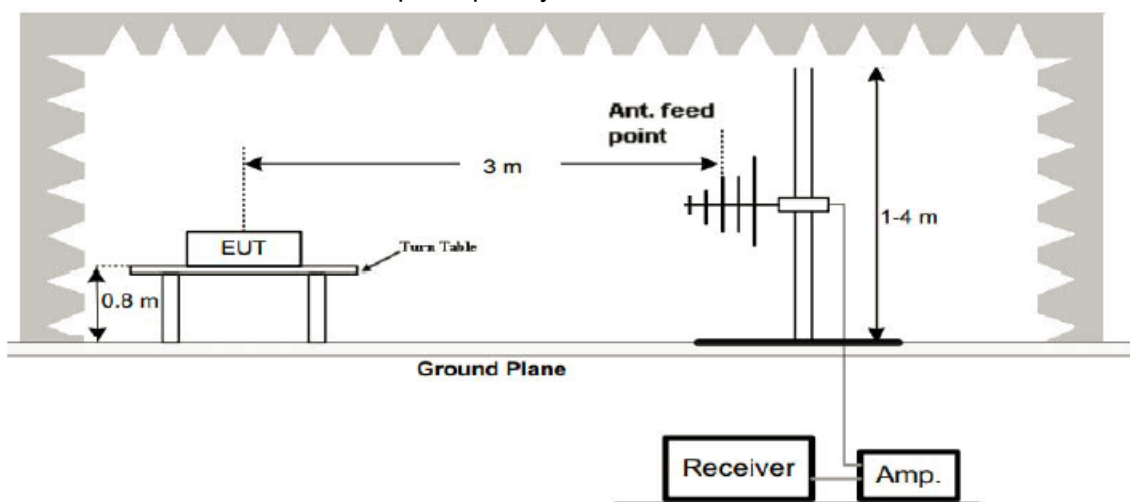
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

(1) Radiated Emission Test-Up Frequency Below 30MHz

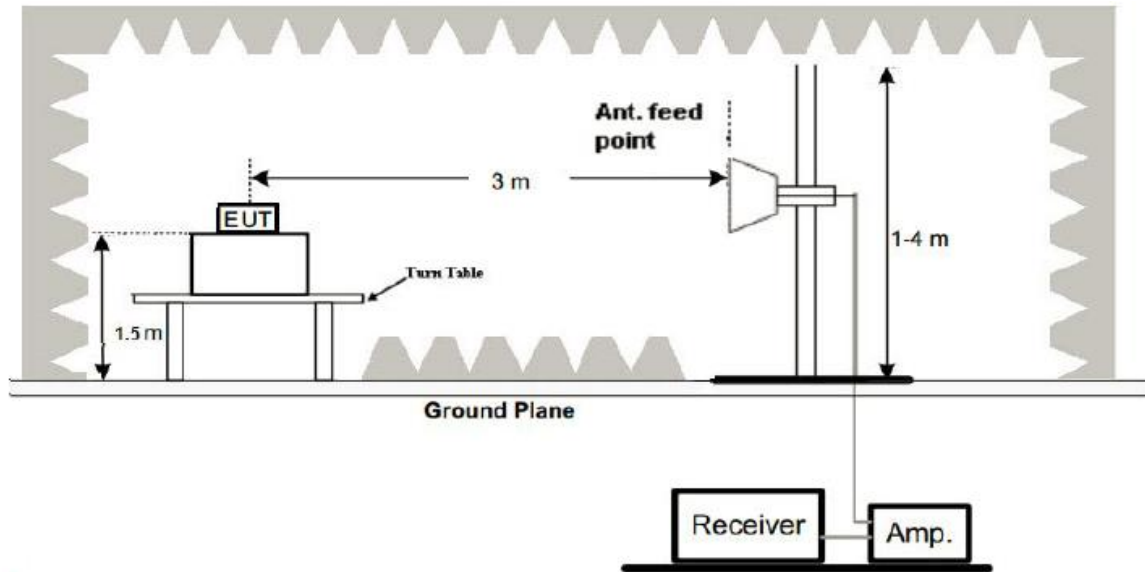


(2) Radiated Emission Test-Up Frequency 30MHz~1GHz





(3) Radiated Emission Test-Up Frequency Above 1GHz



4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:

For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

PASS

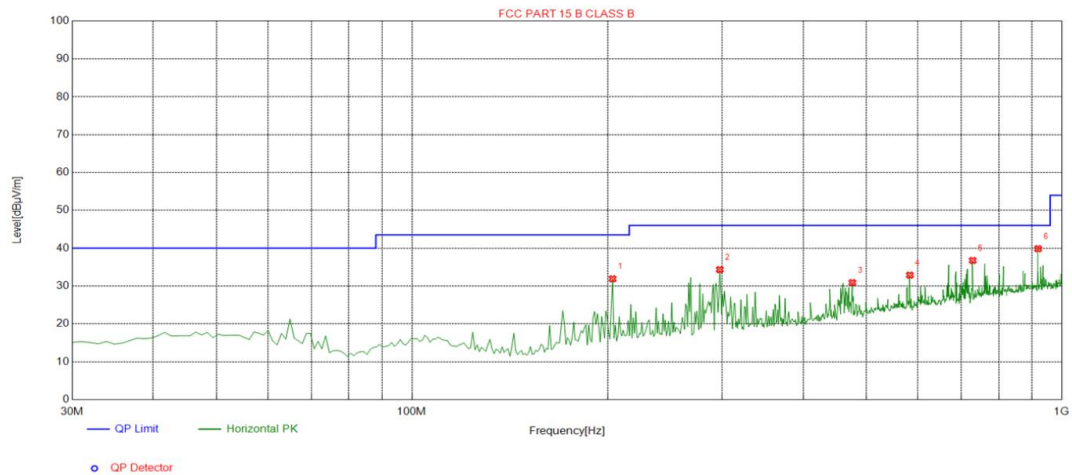
For 9 KHz-30MHz

All the test modes completed for test. The worst case of Radiated Emission (GFSK Transmitting Low Channel-2406MHz (worst case)); the test data of this mode was reported.

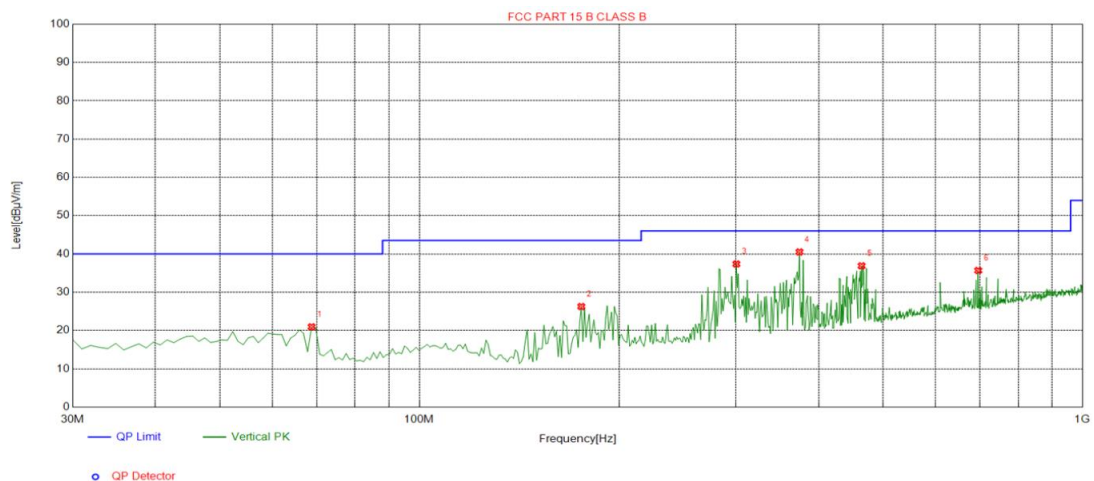
Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m)@3m	Margin(dB)	Detector	Result
0.27	51.68	98.98	47.30	QP	PASS
0.65	45.76	71.35	25.59	QP	PASS
18.26	45.42	69.54	24.12	QP	PASS
23.42	46.18	69.54	23.36	QP	PASS

**For 30MHz-1GHz**

All the test modes completed for test. The worst case of Radiated Emission (GFSK Transmitting Low Channel-2406MHz (worst case)); the test data of this mode was reported.

Horizontal**Suspected List**

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	203.630	31.90	-14.97	43.50	11.60	100	0	Horizontal
2	297.720	34.34	-12.76	46.00	11.66	100	246	Horizontal
3	476.200	30.89	-8.41	46.00	15.11	100	236	Horizontal
4	583.870	32.87	-6.66	46.00	13.13	100	209	Horizontal
5	729.370	36.76	-4.55	46.00	9.24	100	238	Horizontal
6	919.490	39.86	-1.79	46.00	6.14	100	1	Horizontal

Vertical**Suspected List**

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	68.8000	20.97	-17.37	40.00	19.03	100	334	Vertical
2	175.500	26.27	-17.06	43.50	17.23	100	350	Vertical
3	300.630	37.38	-12.73	46.00	8.62	100	14	Vertical
4	374.350	40.52	-10.92	46.00	5.48	100	339	Vertical
5	464.560	36.89	-8.52	46.00	9.11	100	347	Vertical
6	696.390	35.68	-5.11	46.00	10.32	100	17	Vertical



Above 1 GHz Test Results:

LOW CH0: 2406MHz
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4812	62.02	-3.72	58.3	74	-15.7	peak
4812	47.79	-3.72	44.07	54	-9.93	AVG
7218	57.35	-1.02	56.33	74	-17.67	peak
7218	42.38	-1.02	41.36	54	-12.64	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)	
4812	61.58	-3.72	57.86	74	-16.14	peak
4812	47.26	-3.72	43.54	54	-10.46	AVG
7218	57.16	-1.02	56.14	74	-17.86	peak
7218	43.27	-1.02	42.25	54	-11.75	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH36:2442MHz

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4884	57.16	-3.42	53.74	74	-20.26	peak
4884	46.05	-3.42	42.63	54	-11.37	AVG
7326	57.16	-0.79	56.37	74	-17.63	peak
7326	43.65	-0.79	42.86	54	-11.14	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)	
4884	58.35	-3.42	54.93	74	-19.07	peak
4884	47.16	-3.42	43.74	54	-10.26	AVG
7326	57.85	-0.79	57.06	74	-16.94	peak
7326	43.91	-0.79	43.12	54	-10.88	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH72: 2478MHz

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4956	60.25	-3.48	56.77	74	-17.23	peak
4956	46.52	-3.48	43.04	54	-10.96	AVG
7434	55.17	-0.77	54.4	74	-19.6	peak
7434	43.08	-0.77	42.31	54	-11.69	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)	
4956	60.68	-3.48	57.2	74	-16.8	peak
4956	46.96	-3.48	43.48	54	-10.52	AVG
7434	56.25	-0.77	55.48	74	-18.52	peak
7434	43.17	-0.77	42.4	54	-11.6	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.
- (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.



5 BAND EDGE

5.1 Limits

Please refer section 15.247

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

5.2 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 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

5.3 Test Result

PASS

For Radiated Bandedge Measurement

Operation Mode: LOW CH0: 2406MHz

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2390	56.72	-5.81	50.91	74	-23.09	peak
2390	47.35	-5.81	41.54	54	-12.46	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)	
2390	58.23	-5.81	52.42	74	-21.58	peak
2390	49.36	-5.81	43.55	54	-10.45	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Operation Mode: High CH72: 2478MHz
Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	56.27	-5.65	50.62	74	-23.38	peak
2483.5	46.19	-5.65	40.54	54	-13.46	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

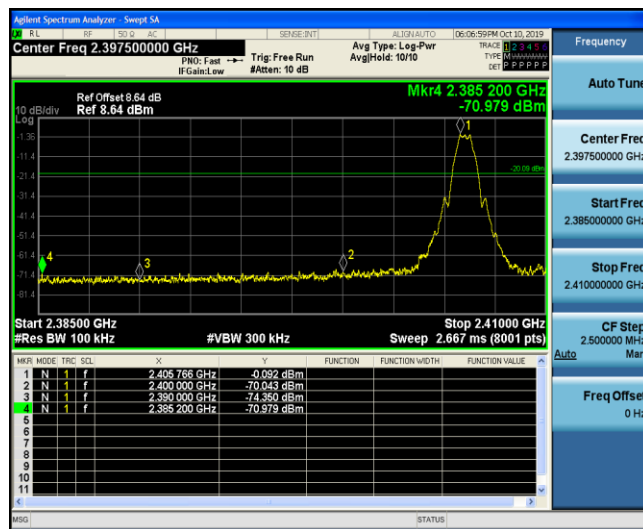
Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	58.87	-5.65	53.22	74	-20.78	peak
2483.5	49.31	-5.65	43.66	54	-10.34	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						
Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.						

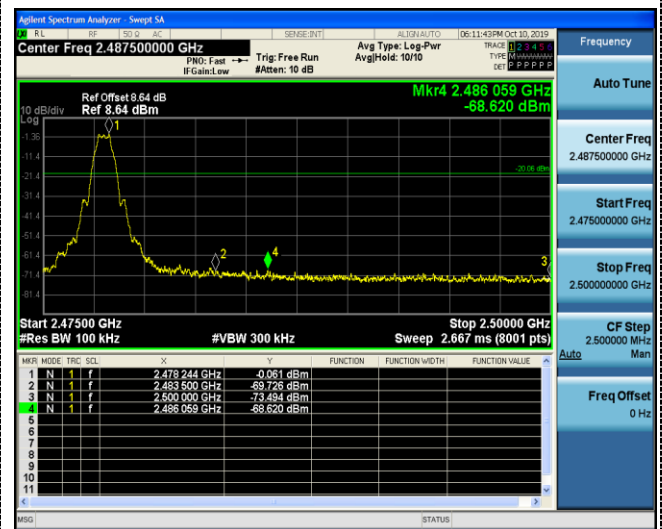


For Conducted Bandedge Measurement

BLE GFSK



Left bandedge



Right bandedge



6 6dB Bandwidth

6.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

6.2 Test Procedure

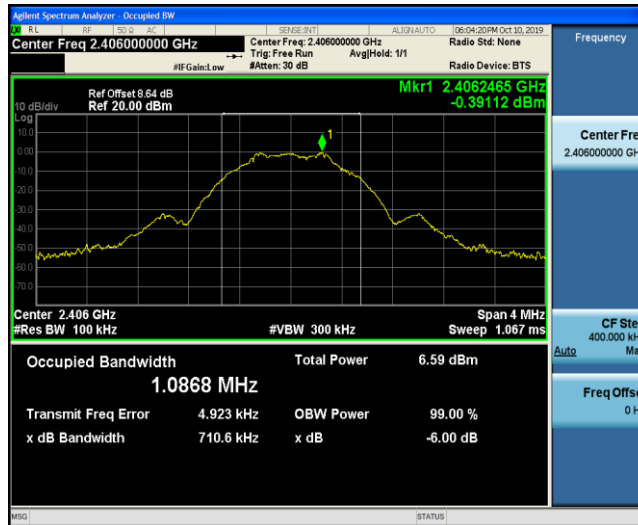
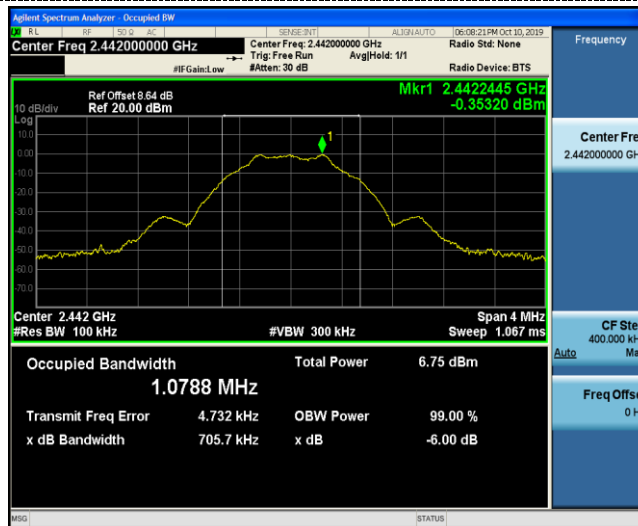
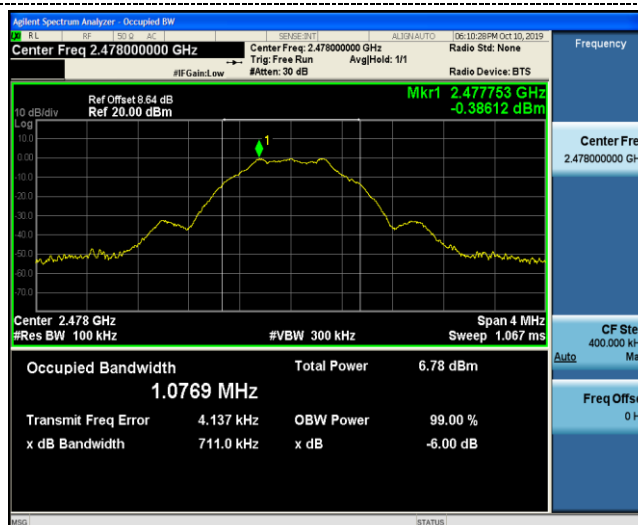
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. According to KDB558074 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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.

6.3 Test Result

PASS

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
GFSK	00	0.7106	≥ 500	Pass
	36	0.7057		
	72	0.7110		

*BLE GFSK**CH00**CH36**CH72*



7 POWER SPECTRAL DENSITY TEST

7.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

7.2 Test Procedure

According to KDB 558074 D01 Method PKPSD (peak PSD) This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

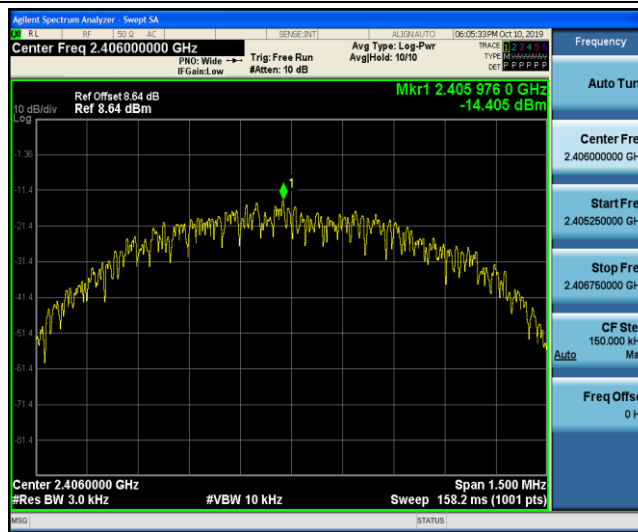
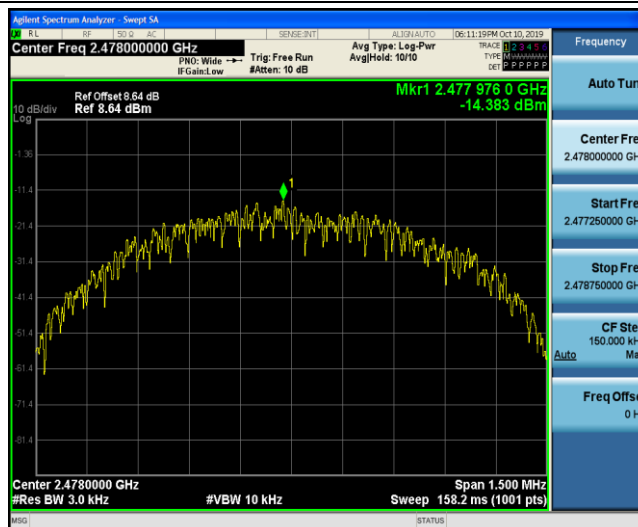
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \text{ RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. 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

7.3 Test Result

PASS

All the test modes completed for test.

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
GFSK	00	-14.41	8.00	Pass
	36	-14.46		
	72	-14.38		

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8 PEAK OUTPUT POWER TEST

8.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 Test Procedure

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power, 9.1.2. and Average conducted output power, 9.2.3.1.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple detector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

8.3 Test Result

PASS



Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
GFSK	00	0.772	30.00	Pass
	36	0.783		
	72	0.740		

Note: 1.The test results including the cable lose.

Duty cycle used in all test items: 100%



9 OUT OF BAND EMISSIONS TEST

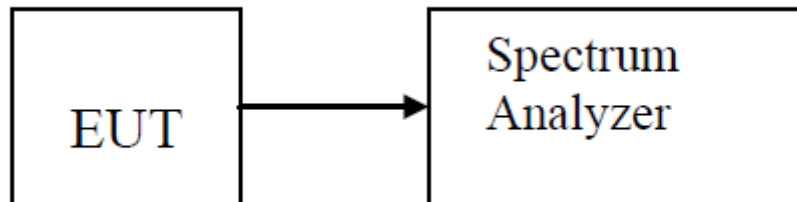
9.1 Test Limit

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

9.2 Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013, For 30MHz-25GHz ,Set RBW=100kHz and VBW= 300KHz in order to measure the peak field strength, and measure frequency range from 30MHz to 25GHz.

9.3 Test Setup



7.4 Test Result

PASS

All the test modes completed for test.



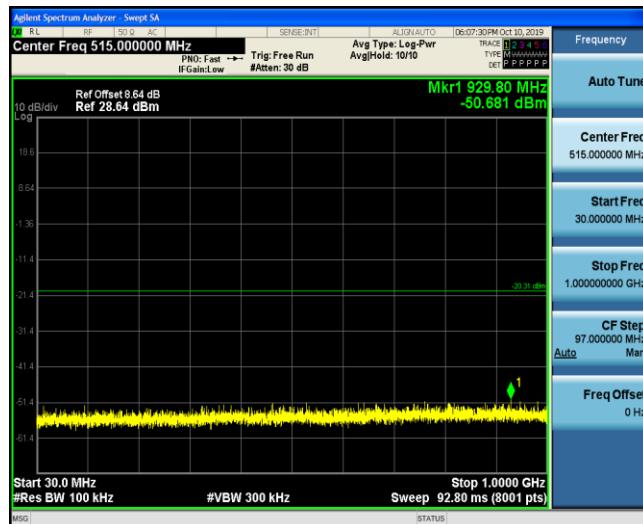
CH00



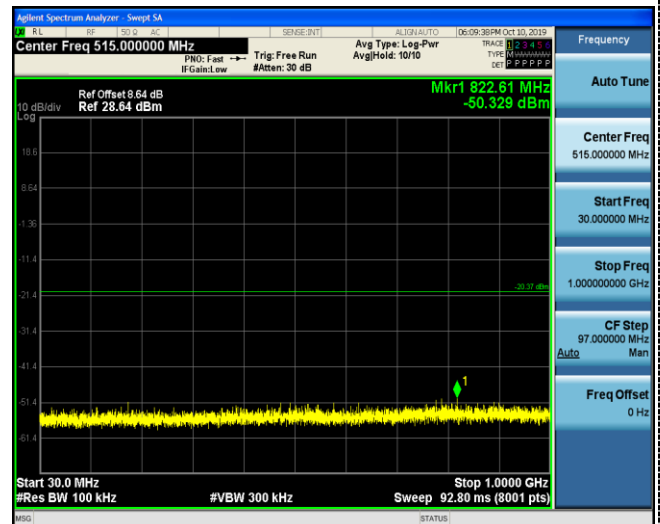
CH36



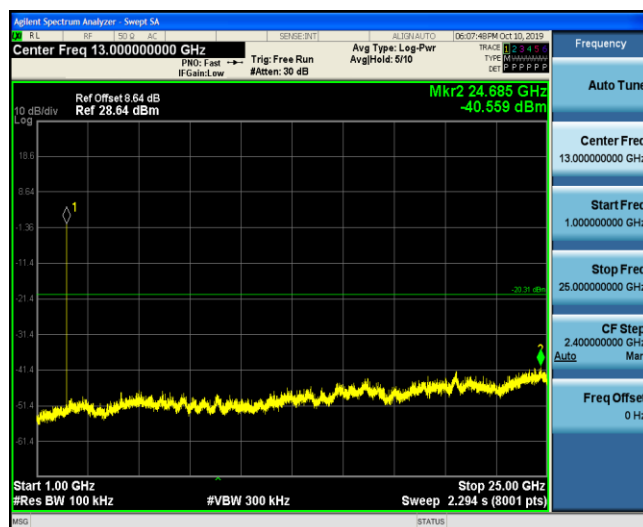
Reference



Reference



30MHz - 1GHz



30MHz - 1GHz

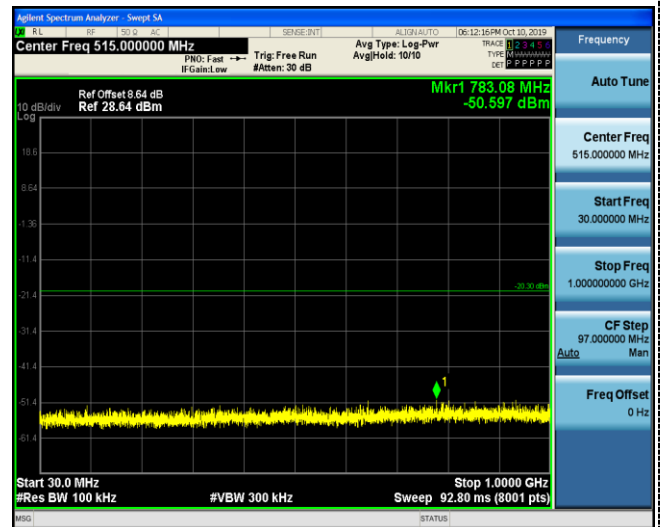


1GHz - 25GHz

1GHz - 25GHz



CH72



Reference

30MHz - 1GHz



1GHz - 25GHz



10 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.

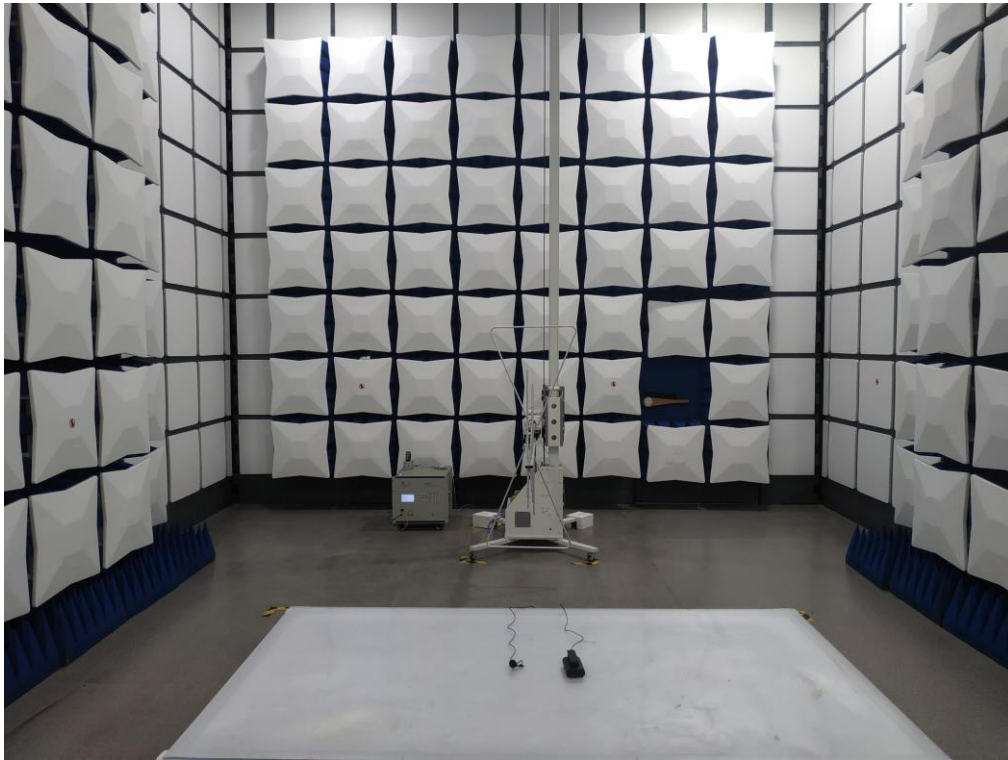
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Information

The antenna is PCB antenna ,The directional gains of antenna used for transmitting is 0.00 dBi.



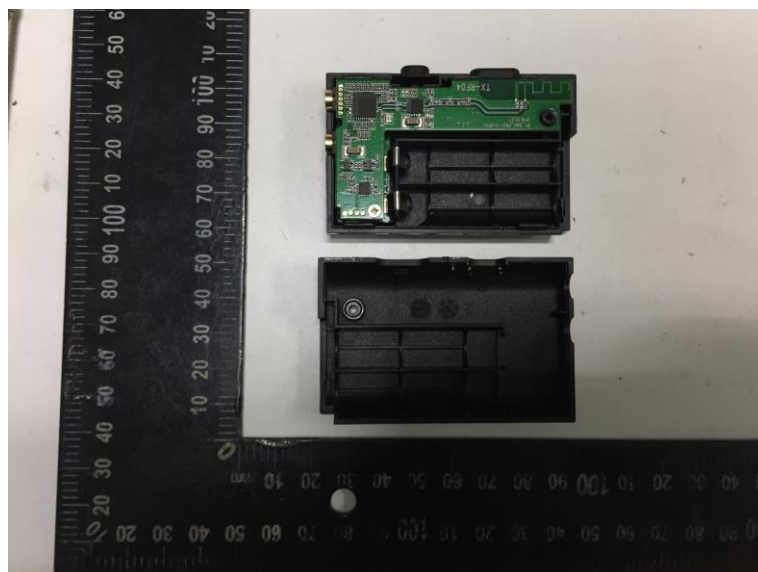
11 Test Setup Photos of the EUT

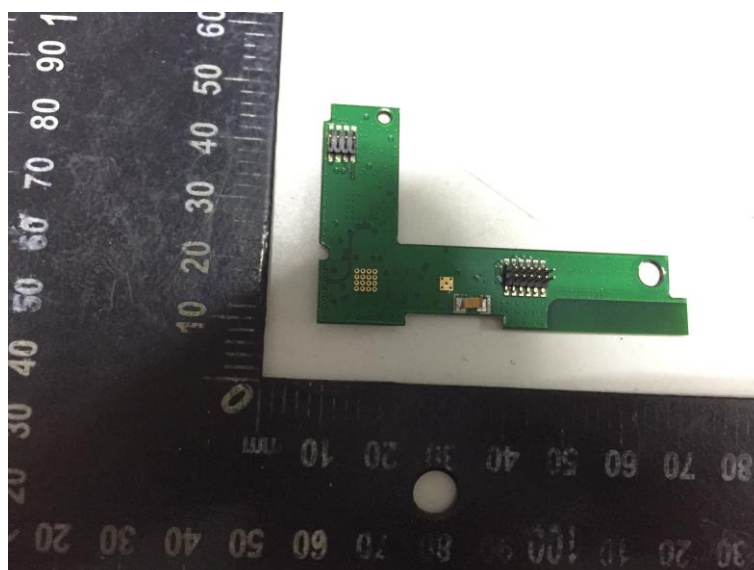
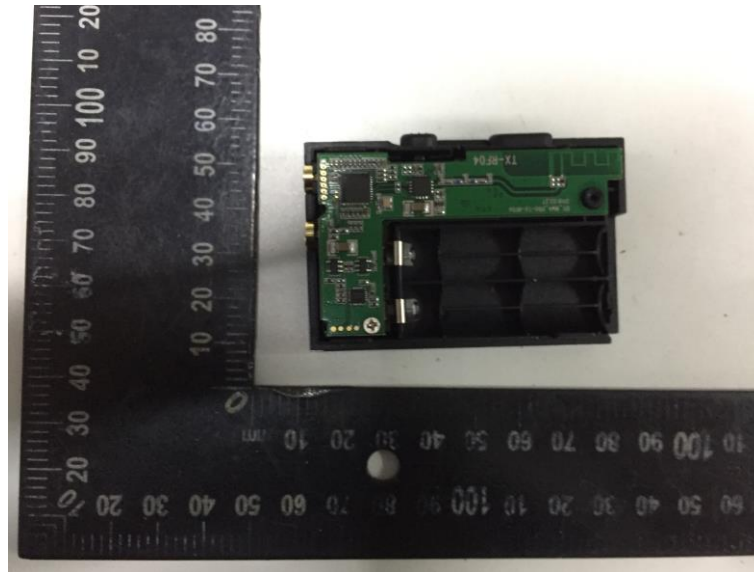


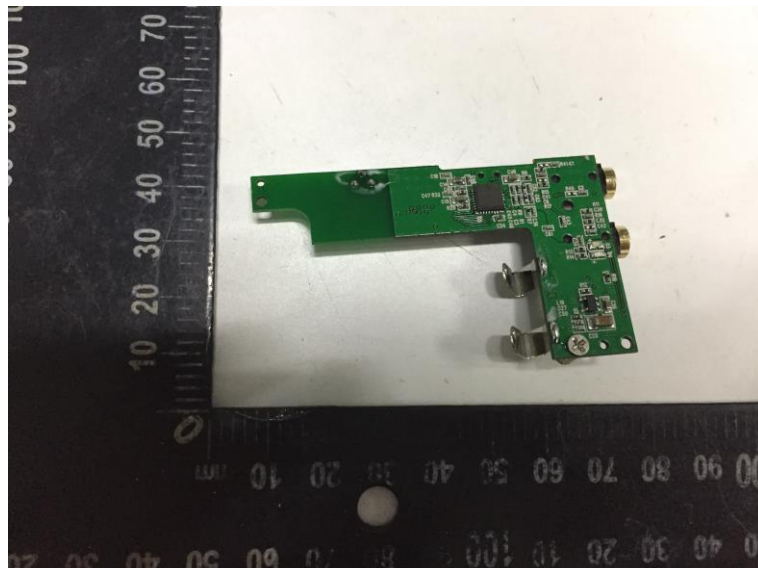
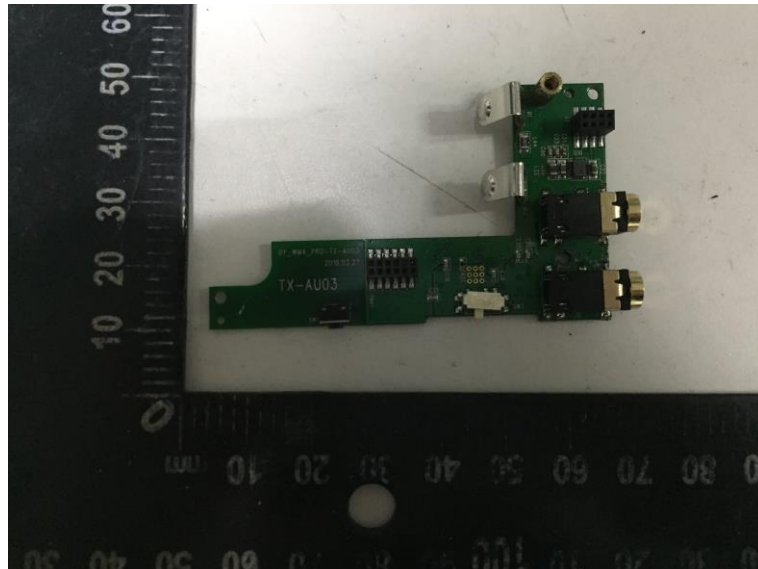
12. The Photos of the EUT











.....End of Report.....