FCC TEST REPORT

Test report
On Behalf of
HONGLIANG PROMOTION CO.,LTD.
For
Wireless Speaker Bottle
Model No.: HL8478

FCC ID: 2AQPT-HL8478

Prepared for :	**HONGLIANG PROMOTION CO.,LTD.** **Room 601--603, 6/F., No.700 Yangming Road(W), Yuyao, Zhejiang, P.R.China. 315400**
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:	**Jul. 23, 2018 ~ Aug. 03, 2018**
Date of Report:	**Aug. 06, 2018**
Report Number:	**HUAK180803680E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	HONGLIANG PROMOTION CO.,LTD.
Address ..... :	Room 601--603, 6/F., No.700 Yangming Road(W), Yuyao, Zhejiang, P.R.China. 315400
Manufacture's Name ..... :	HONGLIANG PROMOTION CO.,LTD.
Address ..... :	Room 601--603, 6/F., No.700 Yangming Road(W), Yuyao, Zhejiang, P.R.China. 315400

Product description

Trade Mark:	N/A
Product Name ..... :	Wireless Speaker Bottle
Model and/or type reference :	HL8478
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013

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Date of Test ..... :

Date (s) of performance of tests ..... :	Jul. 23, 2018 ~ Aug. 03, 2018
Date of Issue ..... :	Aug. 06, 2018
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

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

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

Designation Number: : CN1229

Test Firm Registration Number : 616276

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

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Operation Frequency	2.402 GHz to 2.480GHz
Bluetooth Version	V4.2
Modulation	BR ☒GFSK, EDR ☒π /4-DQPSK, ☒8DPSK BLE ☐GFSK
Number of channels	79 for BR/EDR
Hardware Version	JH2019-R5856_V3.1
Software Version	JH2019-R5856_V3.1
Antenna Designation	PCB Antenna
Antenna Gain	0.9dBi
Power Supply	DC 3.7V by battery
Note: The USB port only used for charging and can’t be used to transfer data with PC.	

2.2 CARRIER FREQUENCY OF CHANNELS

Channel List							
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
01	2402	11	2422	21	2442	31	2462
02	2404	12	2424	22	2444	32	2464
03	2406	13	2426	23	2446	33	2466
04	2408	14	2428	24	2448	34	2468
05	2410	15	2430	25	2450	35	2470
06	2412	16	2432	26	2452	36	2472
07	2414	17	2434	27	2454	37	2474
08	2416	18	2436	28	2456	38	2476
09	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

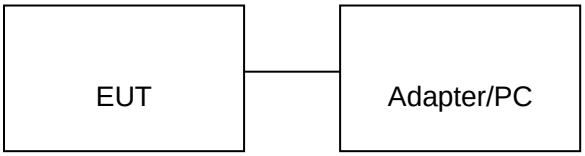
2.3 OPERATION OF EUT DURING TESTING

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π /4-DQPSK
5	Middle channel π /4-DQPSK
6	High channel π /4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	BT Link with charging
11	BT Link(Hopping mode)

Note:
1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. The EUT used fully-charged battery when tested.

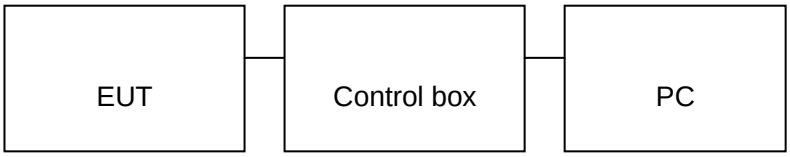
2.4 DESCRIPTION OF TEST SETUP

Configure 1: (Normal hopping)



Note: Owing to the EUT has own battery, and testing may be performed while adapter or PC removed.

Configure 2: (Control continuous TX)



2.5 EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Wireless Speaker Bottle	HONGLIANG	HL8478	EUT
2	Battery	Zhengqida	602035	Accessory
3	PC	APPLE	A1465	A.E
4	Control box	SERIAL	N/A	A.E
5	Adapter	HUAWEI	HW-059200CHQ	A.E
6	USB Cable	N/A	1m unshielded	A.E
7	TF Card	Kingston	SDA10/16GB	A.E
8	IPOD	APPLE	A1367	A.E

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. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2017	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 28, 2017	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Dec. 28, 2017	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2017	N/A
14.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year

3. CONDUCTED EMISSIONS TEST

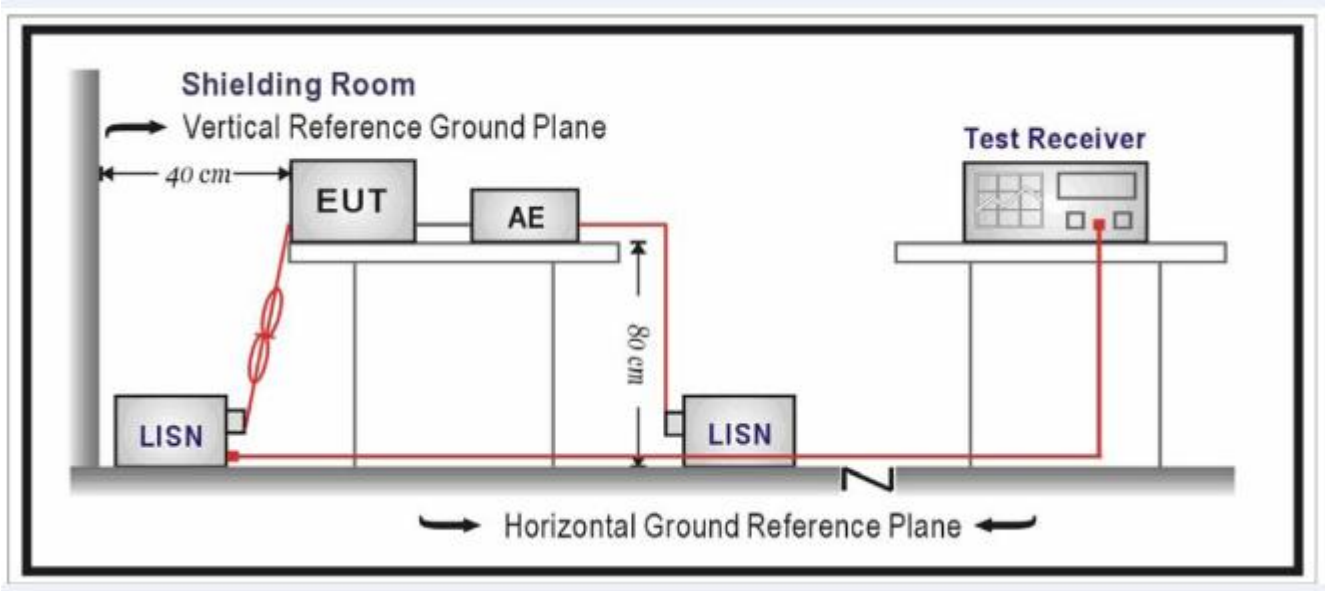
3.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

3.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



3.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When 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 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
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. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter or PC which received 120V/60Hzpower by a LISN.
6. The 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.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

3.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

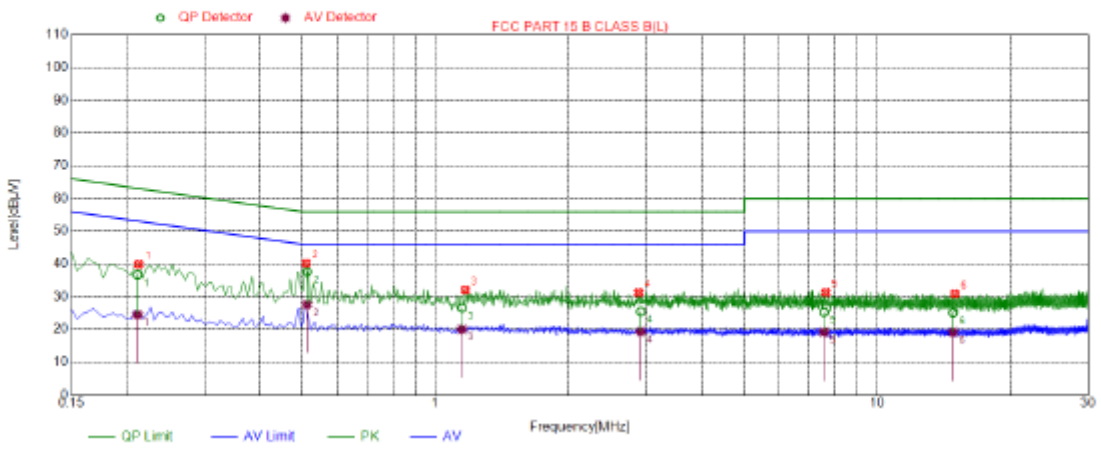
1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

3.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

By adapter(worst case)

Line Conducted Emission Test Line 1-L

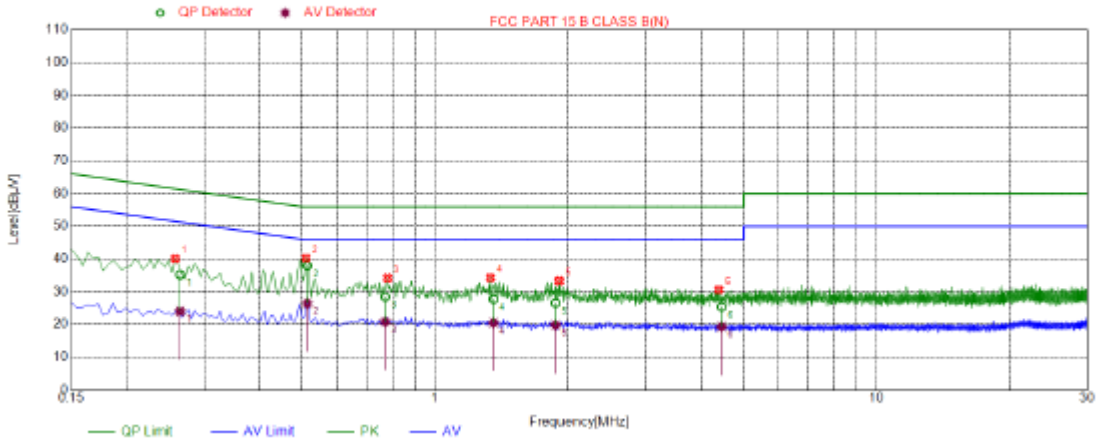
Test Graph



NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.2116	10.04	36.67	63.14	26.47	24.50	53.14	28.64
2	0.5117	10.04	37.58	56.00	18.42	27.62	46.00	18.38
3	1.1480	10.09	26.63	56.00	29.37	20.05	46.00	25.95
4	2.9128	10.21	25.47	56.00	30.53	19.30	46.00	26.70
5	7.5701	10.17	25.30	60.00	34.70	19.14	50.00	30.86
6	14.8331	9.95	25.11	60.00	34.89	19.12	50.00	30.88

Line Conducted Emission Test Line 2-N

Test Graph



NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.2644	10.03	35.16	61.29	26.13	24.00	51.29	27.29
2	0.5131	10.04	37.91	56.00	18.09	26.43	46.00	19.57
3	0.7705	10.05	28.45	56.00	27.55	20.81	46.00	25.19
4	1.3552	10.10	27.77	56.00	28.23	20.48	46.00	25.52
5	1.8734	10.14	26.56	56.00	29.44	19.79	46.00	26.21
6	4.4563	10.25	25.39	56.00	30.61	19.30	46.00	26.70

4. RADIATED EMISSION TEST

4.1TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark: (1) Emission level dBμ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4.2. MEASUREMENT PROCEDURE

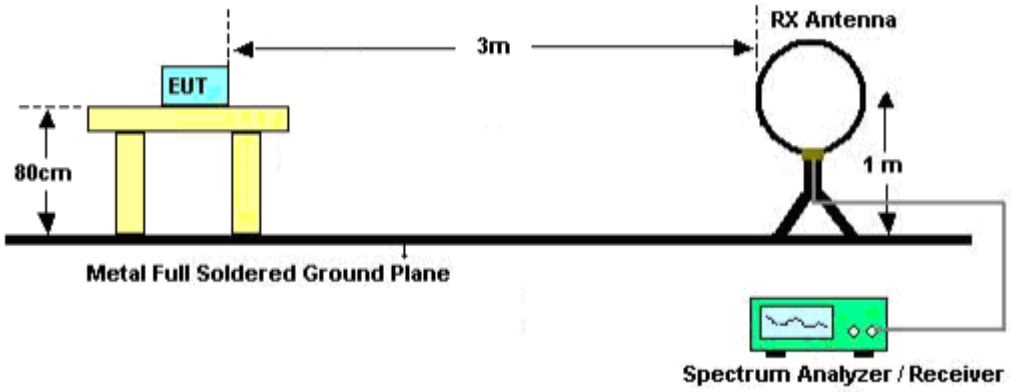
1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn’t perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn’t perform.(Above 1GHz)

The following table is the setting of spectrum analyzer and receiver.

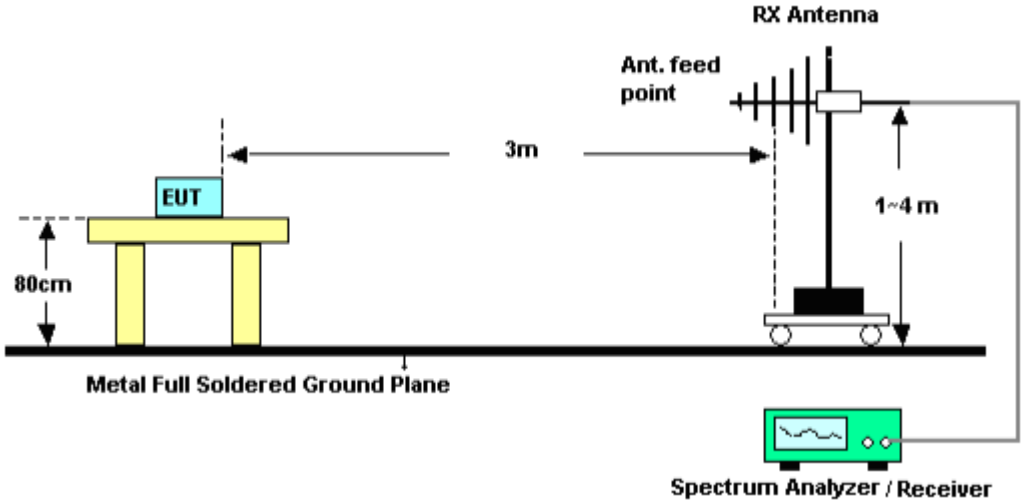
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	Fundamental: 2.4~2.483GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 2MHz/ VBW 10Hz for Average Harmonics: 1GHz~25GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 10Hz for Average
Receiver Parameter	**Setting**
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

4.3. TEST SETUP

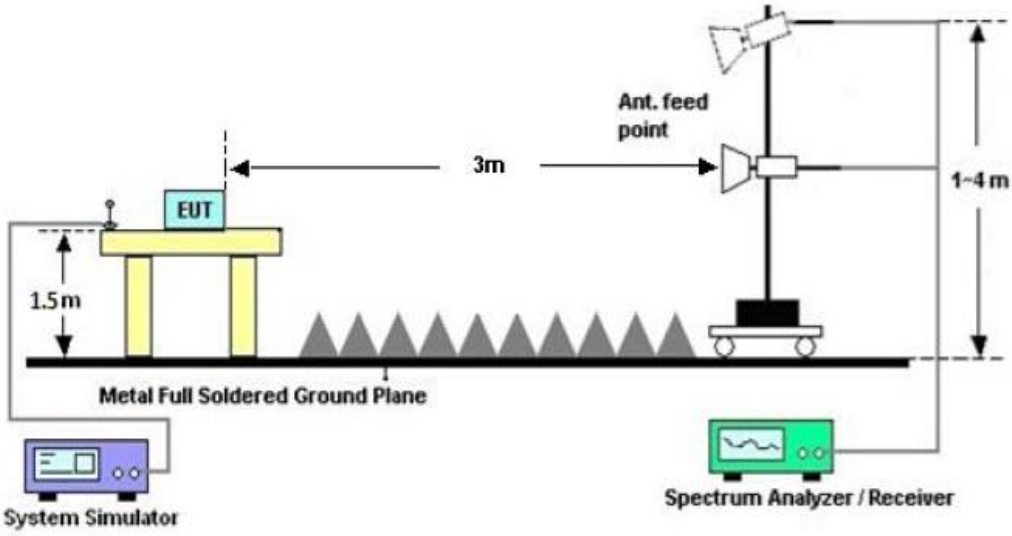
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



4.4. TEST RESULT

FOR BR/EDR

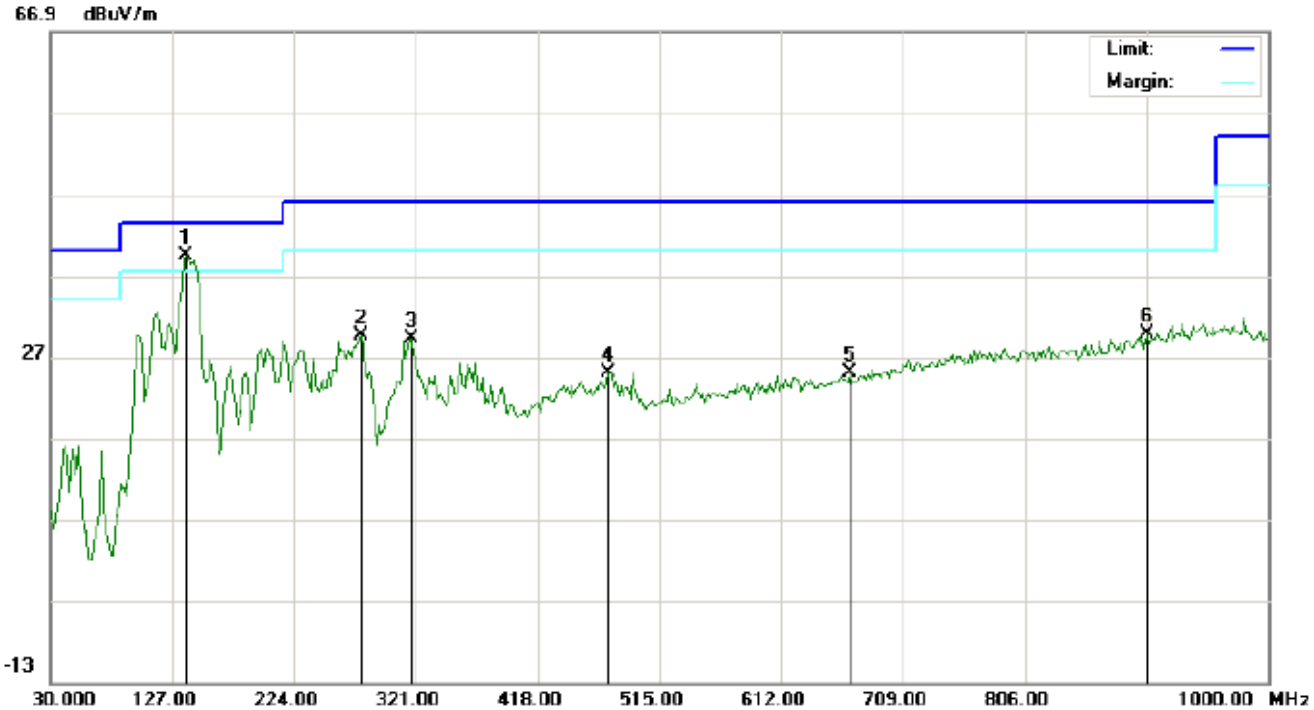
(Worst modulation: GFSK)

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHz

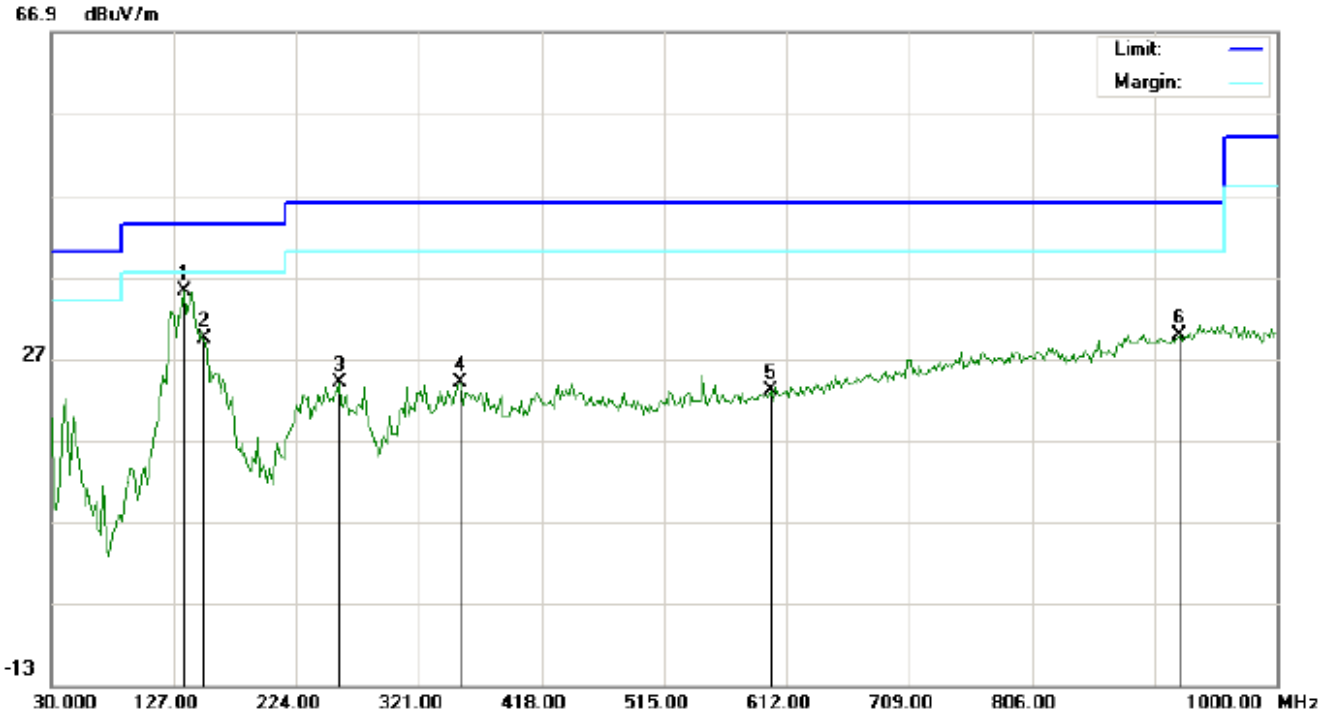
RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	138.3167	25.07	14.41	39.48	43.50	-4.02	peak			
2		277.3500	17.97	11.55	29.52	46.00	-16.48	peak			
3		317.7667	12.63	16.59	29.22	46.00	-16.78	peak			
4		474.5833	4.15	20.86	25.01	46.00	-20.99	peak			
5		666.9667	0.74	24.31	25.05	46.00	-20.95	peak			
6		903.0000	1.21	28.69	29.90	46.00	-16.10	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	135.0833	21.99	13.15	35.14	43.50	-8.36	peak			
2		151.2500	14.09	15.27	29.36	43.50	-14.14	peak			
3		257.9500	9.79	14.14	23.93	46.00	-22.07	peak			
4		353.3333	5.30	18.76	24.06	46.00	-21.94	peak			
5		599.0667	0.37	22.73	23.10	46.00	-22.90	peak			
6		922.4000	0.53	29.23	29.76	46.00	-16.24	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

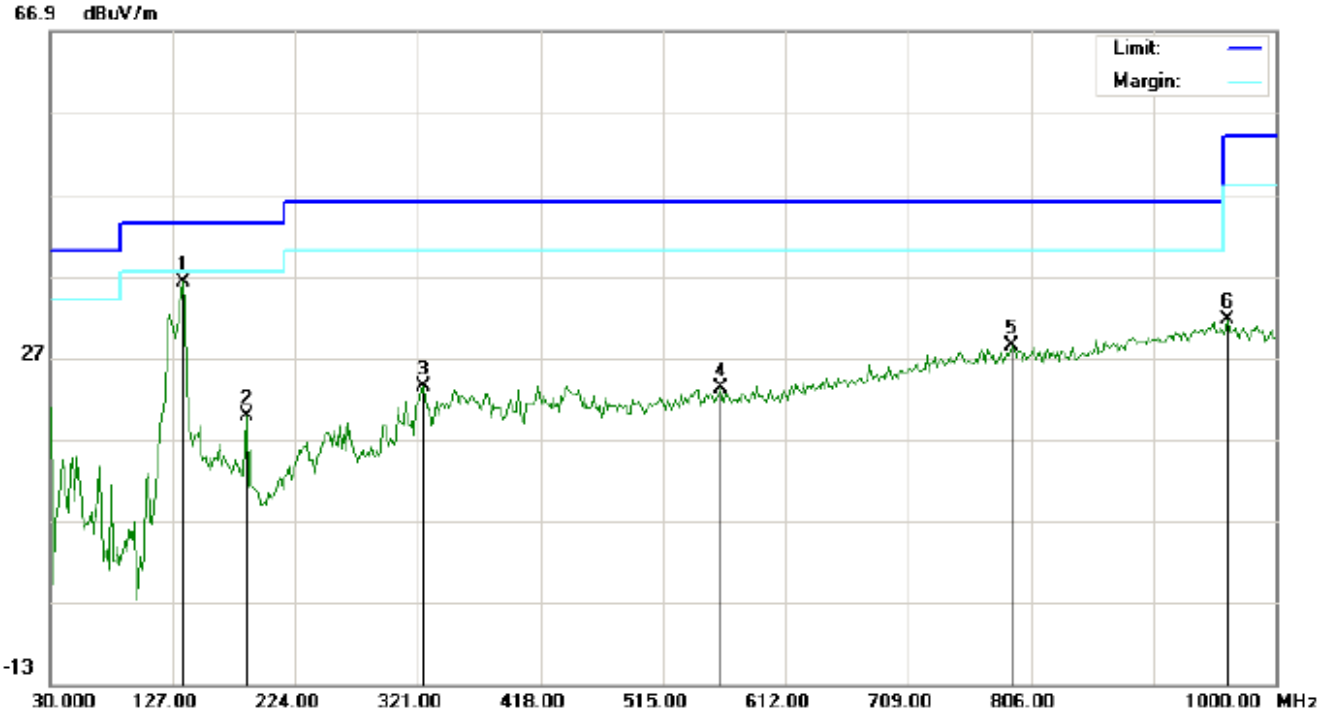
2. The “Factor” value can be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		125.3833	16.38	8.37	24.75	43.50	-18.75	peak			
2		201.3667	8.10	11.86	19.96	43.50	-23.54	peak			
3		303.2167	7.12	15.62	22.74	46.00	-23.26	peak			
4		385.6667	7.29	18.98	26.27	46.00	-19.73	peak			
5		594.2167	0.05	23.59	23.64	46.00	-22.36	peak			
6	*	806.0000	1.06	27.32	28.38	46.00	-17.62	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)- MIDDLE CHANNEL -VERTICAL



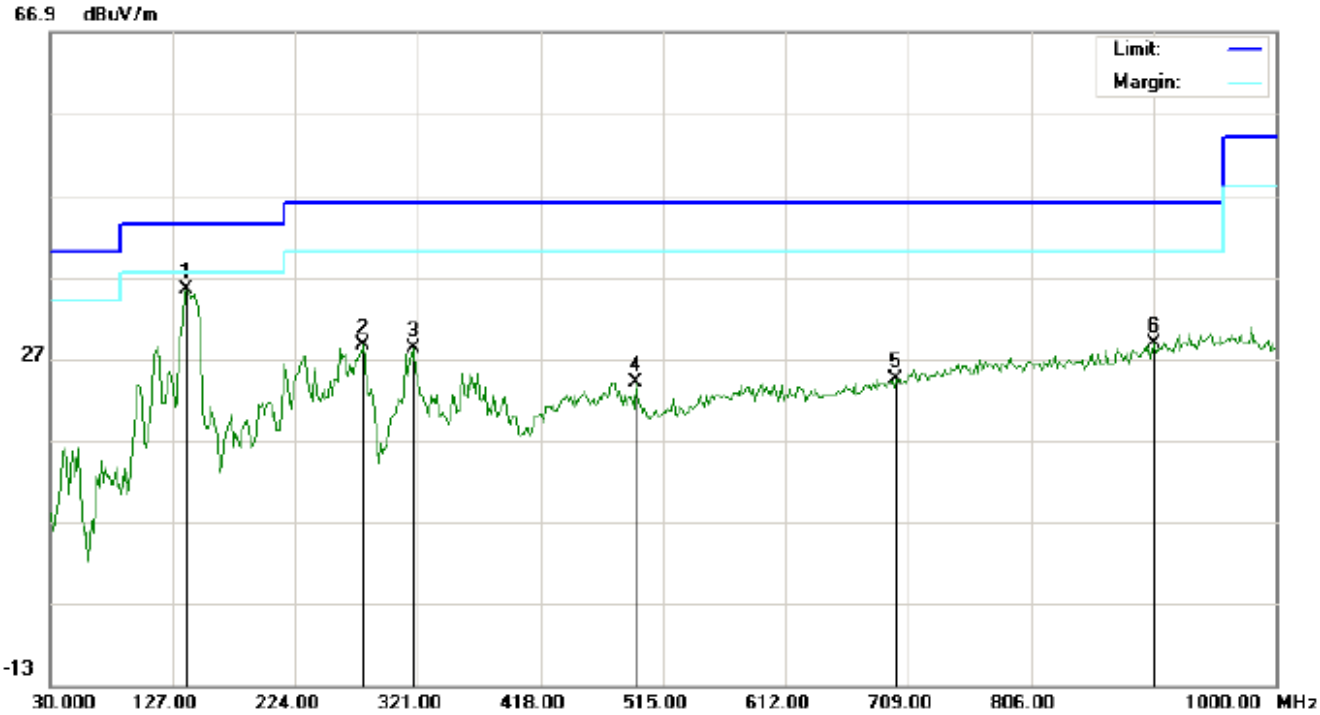
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	135.0833	23.08	13.15	36.23	43.50	-7.27	peak			
2		185.2000	7.04	12.75	19.79	43.50	-23.71	peak			
3		325.8500	6.34	17.13	23.47	46.00	-22.53	peak			
4		560.2667	0.74	22.53	23.27	46.00	-22.73	peak			
5		791.4500	1.21	27.20	28.41	46.00	-17.59	peak			
6		961.2000	1.68	29.89	31.57	54.00	-22.43	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

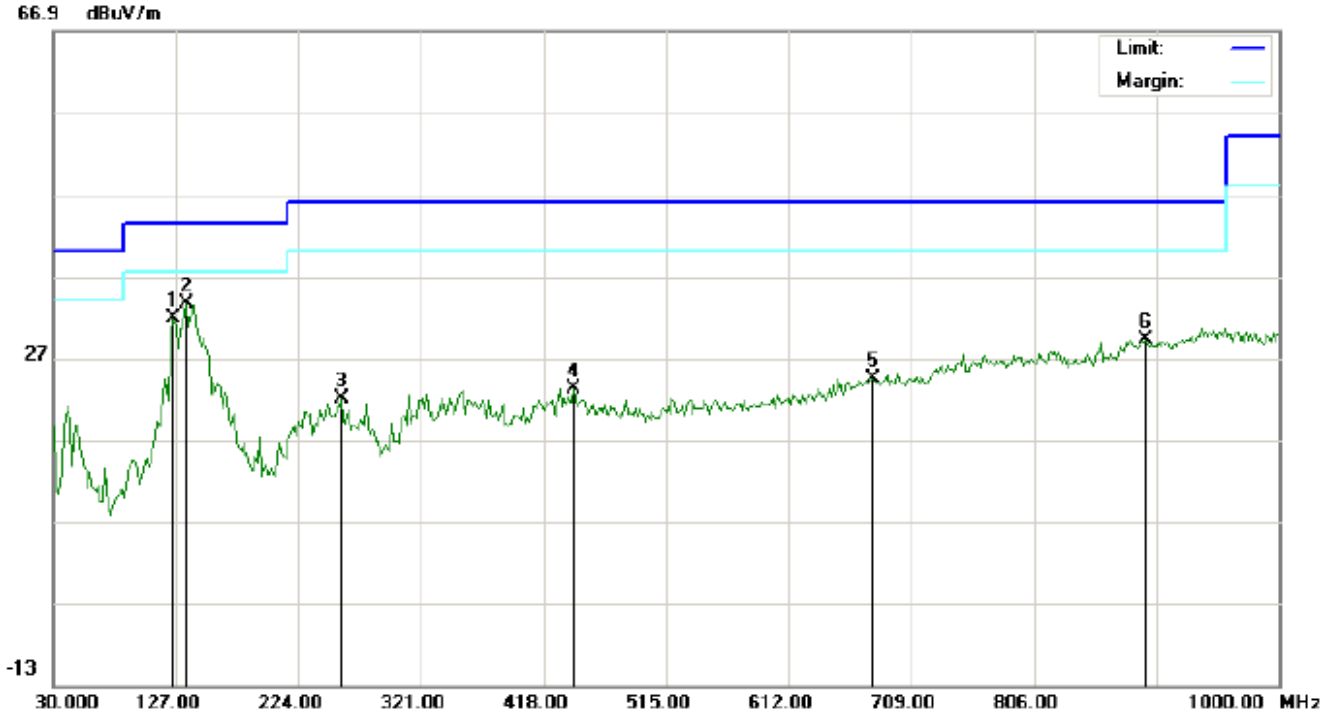
RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	138.3167	21.07	14.41	35.48	43.50	-8.02	peak			
2		277.3500	16.97	11.55	28.52	46.00	-17.48	peak			
3		317.7667	11.63	16.59	28.22	46.00	-17.78	peak			
4		493.9833	2.95	21.06	24.01	46.00	-21.99	peak			
5		699.3000	-0.72	25.20	24.48	46.00	-21.52	peak			
6		903.0000	0.20	28.69	28.89	46.00	-17.11	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		125.3833	22.70	9.10	31.80	43.50	-11.70	peak			
2	*	135.0833	20.49	13.15	33.64	43.50	-9.86	peak			
3		257.9500	7.79	14.14	21.93	46.00	-24.07	peak			
4		442.2500	2.91	20.35	23.26	46.00	-22.74	peak			
5		678.2833	-0.16	24.61	24.45	46.00	-21.55	peak			
6		894.9167	0.74	28.48	29.22	46.00	-16.78	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

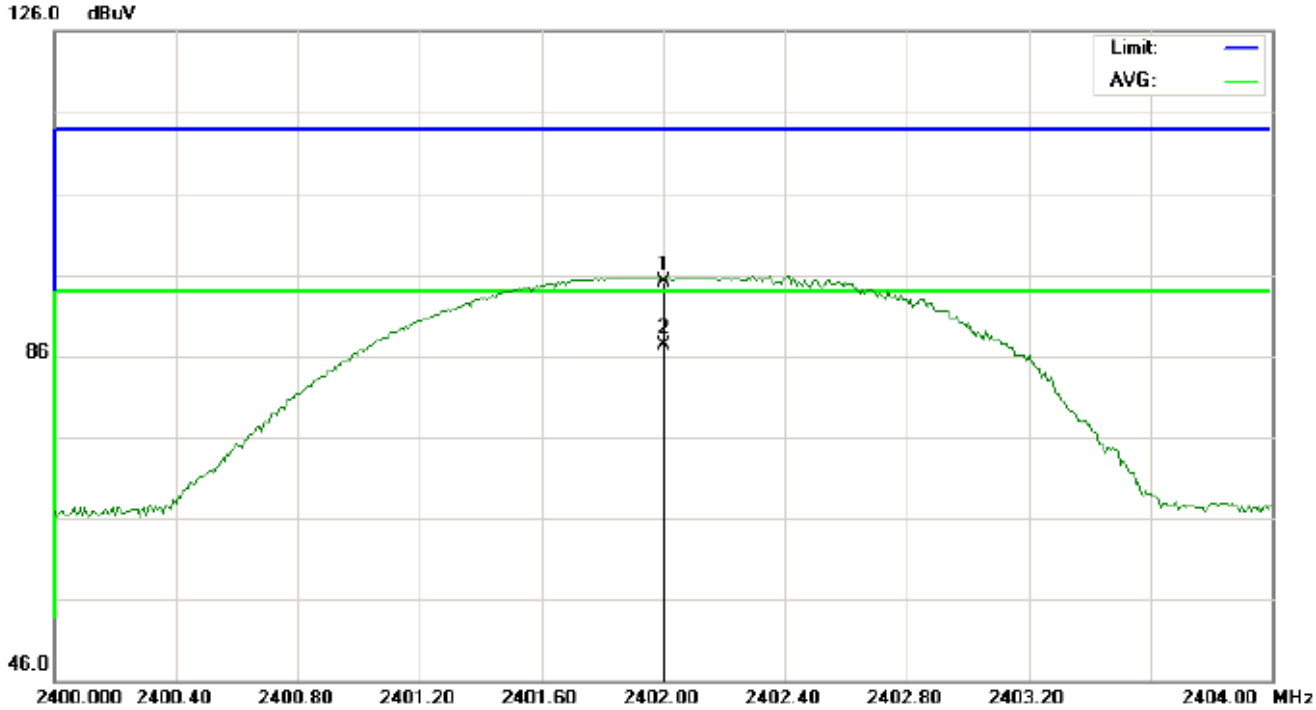
RADIATED EMISSION ABOVE 1GHz

FOR BR/EDR

(Worst modulation: GFSK)

For Fundamental

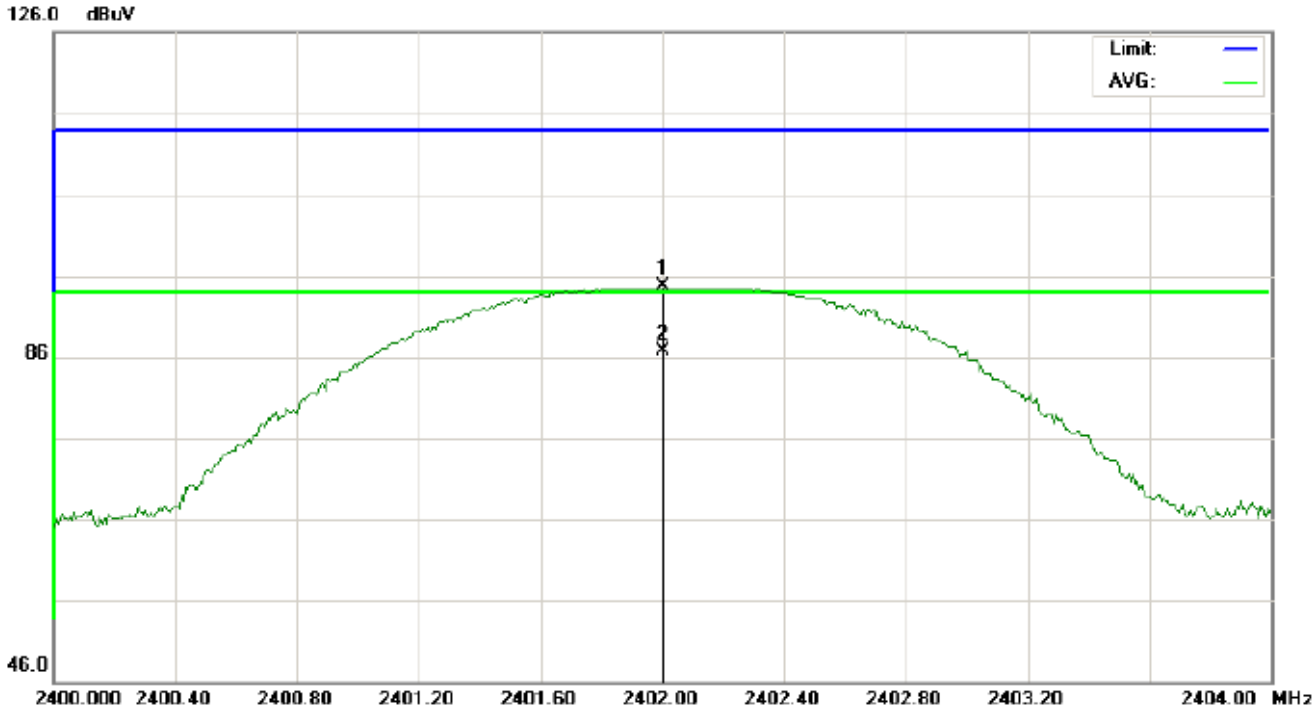
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2402.000	81.72	13.46	95.18	114.00	-18.82	peak			
2	*	2402.000	73.80	13.46	87.26	94.00	-6.74	AVG	100	168	

RESULT: PASS

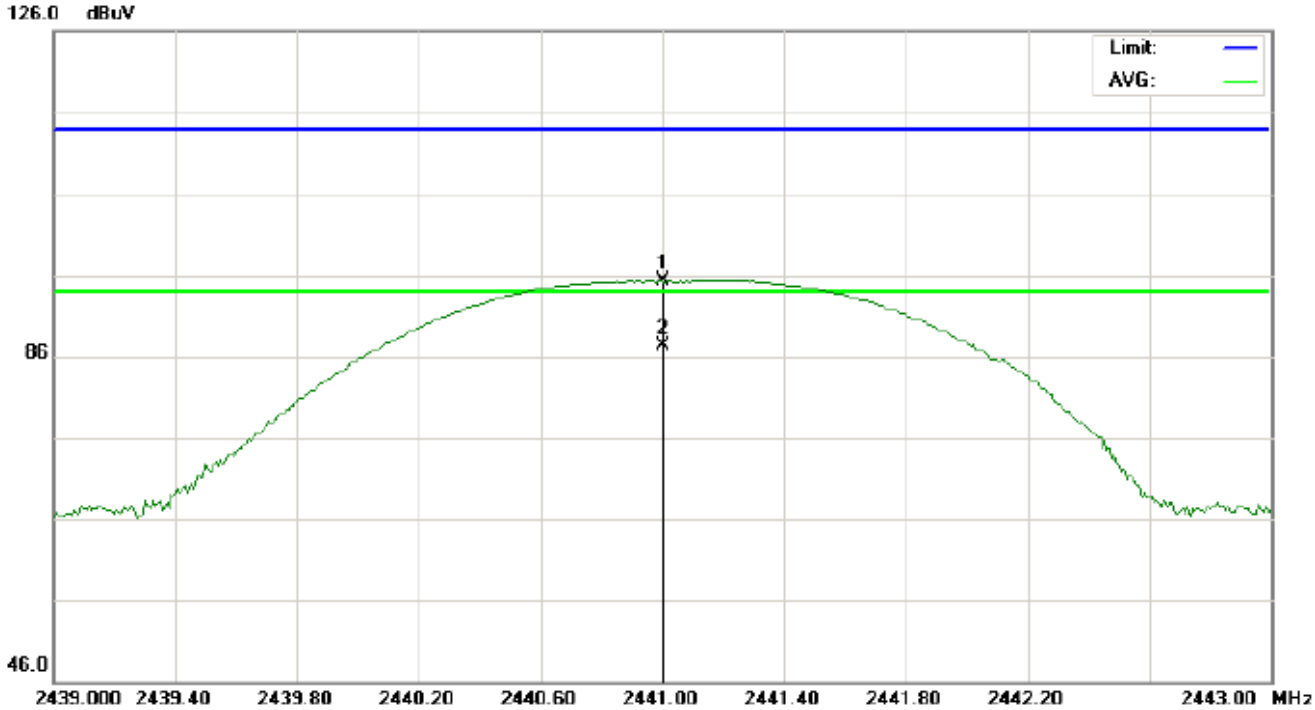
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2402.000	81.26	13.46	94.72	114.00	-19.28	peak			
2	*	2402.000	73.31	13.46	86.77	94.00	-7.23	AVG	100	327	

RESULT: PASS

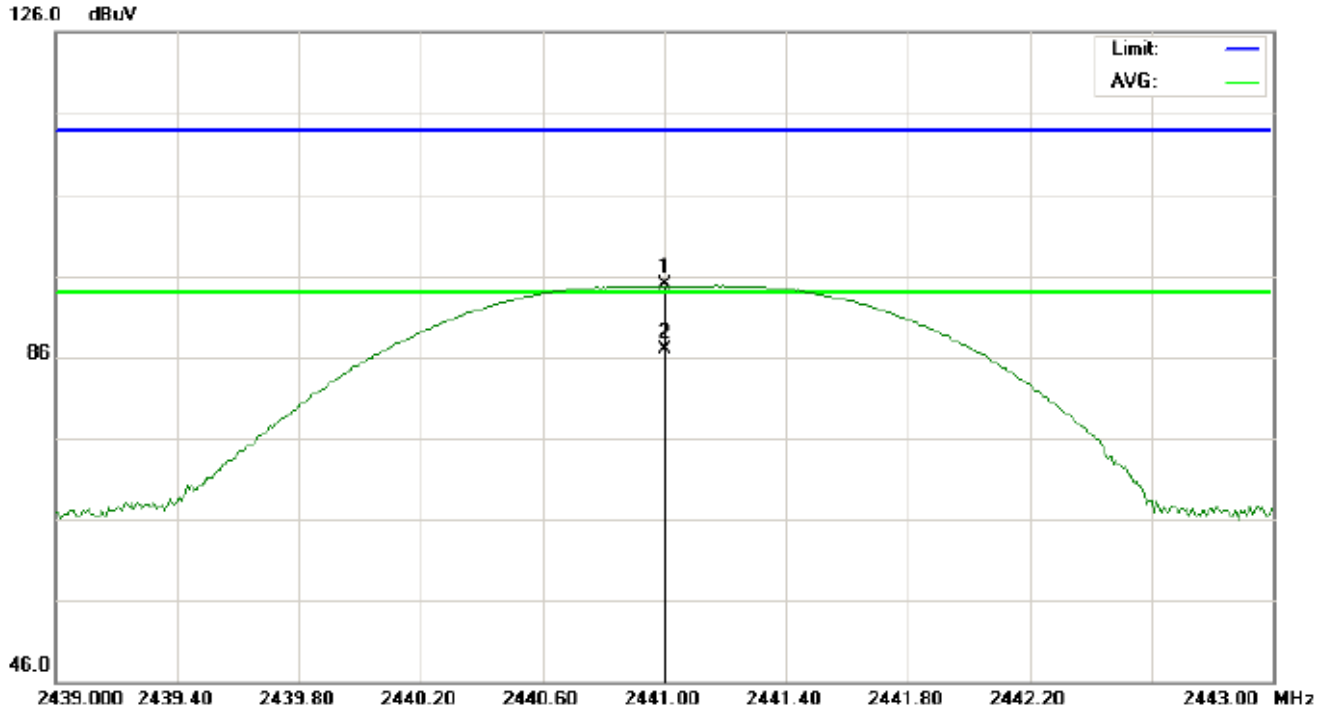
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2441.000	81.43	13.88	95.31	114.00	-18.69	peak			
2	*	2441.000	73.46	13.88	87.34	94.00	-6.66	AVG	100	161	

RESULT: PASS

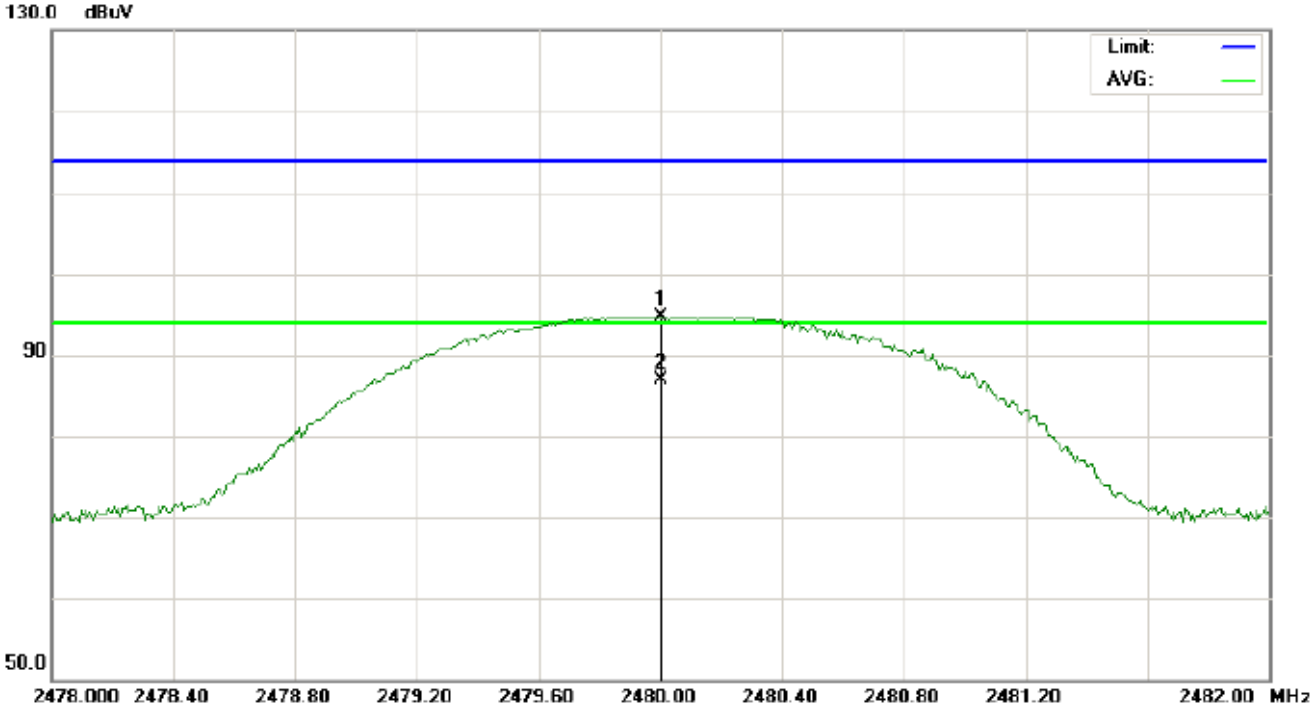
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2441.000	81.00	13.88	94.88	114.00	-19.12	peak			
2	*	2441.000	72.98	13.88	86.86	94.00	-7.14	AVG	100	329	

RESULT: PASS

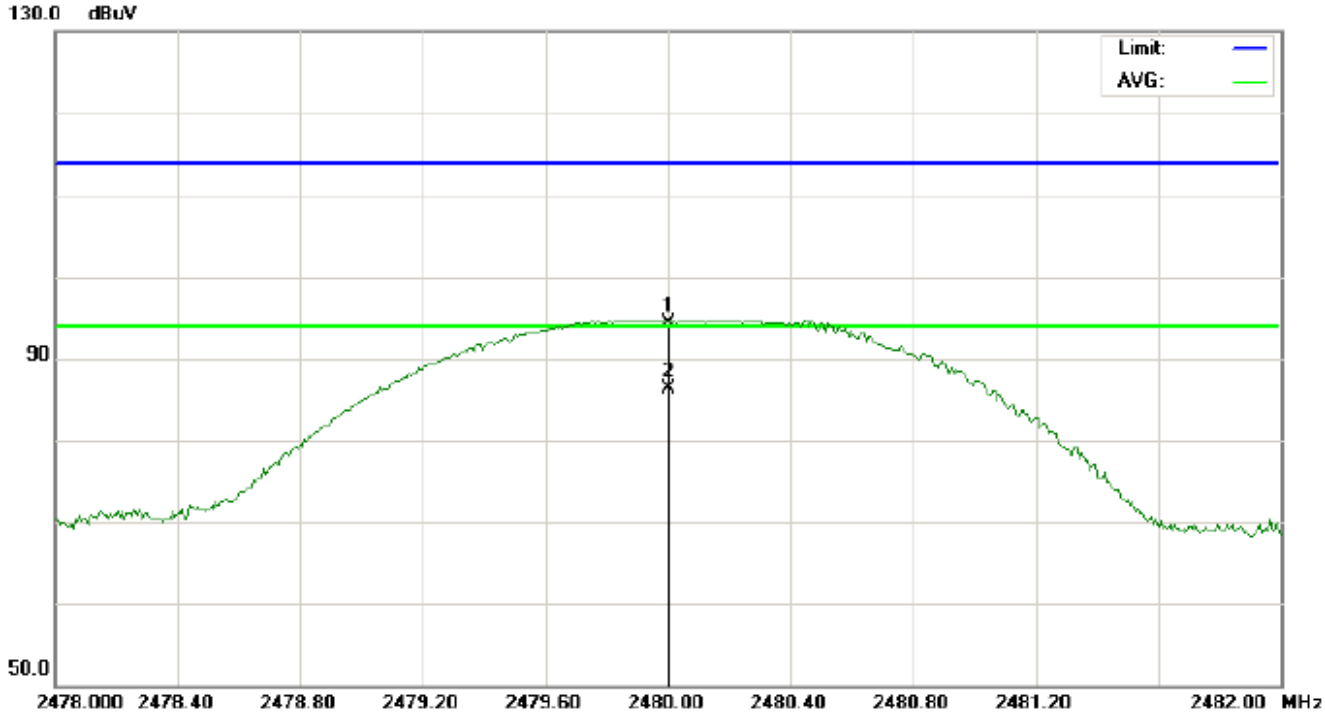
RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2480.000	80.68	14.11	94.79	114.00	-19.21	peak			
2	*	2480.000	72.73	14.11	86.84	94.00	-7.16	AVG	100	166	

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		cm	degree	
1		2480.000	80.21	14.11	94.32	114.00	-19.68	peak			
2	*	2480.000	72.28	14.11	86.39	94.00	-7.61	AVG	100	318	

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

Field strength of the fundamental signal

1Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	81.72	13.46	95.18	114	-18.82	Horizontal
2402	81.26	13.46	94.72	114	-19.28	Vertical
2441	81.43	13.88	95.31	114	-18.69	Horizontal
2441	81.00	13.88	94.88	114	-19.12	Vertical
2480	80.68	14.11	94.79	114	-19.21	Horizontal
2480	80.21	14.11	94.32	114	-19.68	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	73.80	13.46	87.26	94	-6.74	Horizontal
2402	73.31	13.46	86.77	94	-7.23	Vertical
2441	73.46	13.88	87.34	94	-6.66	Horizontal
2441	72.98	13.88	86.86	94	-7.14	Vertical
2480	72.73	14.11	86.84	94	-7.16	Horizontal
2480	72.28	14.11	86.39	94	-7.61	Vertical

2Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	81.29	13.46	94.75	114	-19.25	Horizontal
2402	80.82	13.46	94.28	114	-19.72	Vertical
2441	81.02	13.88	94.90	114	-19.10	Horizontal
2441	80.53	13.88	94.41	114	-19.59	Vertical
2480	80.23	14.11	94.34	114	-19.66	Horizontal
2480	79.79	14.11	93.90	114	-20.10	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	73.34	13.46	86.80	94	-7.20	Horizontal
2402	72.82	13.46	86.28	94	-7.72	Vertical
2441	73.03	13.88	86.91	94	-7.09	Horizontal
2441	72.57	13.88	86.45	94	-7.55	Vertical
2480	72.30	14.11	86.41	94	-7.59	Horizontal
2480	71.82	14.11	85.93	94	-8.07	Vertical

3Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	80.79	13.46	94.25	114	-19.75	Horizontal
2402	80.41	13.46	93.87	114	-20.13	Vertical
2441	80.62	13.88	94.50	114	-19.50	Horizontal
2441	80.07	13.88	93.95	114	-20.05	Vertical
2480	79.82	14.11	93.93	114	-20.07	Horizontal
2480	79.31	14.11	93.42	114	-20.58	Vertical

Average value

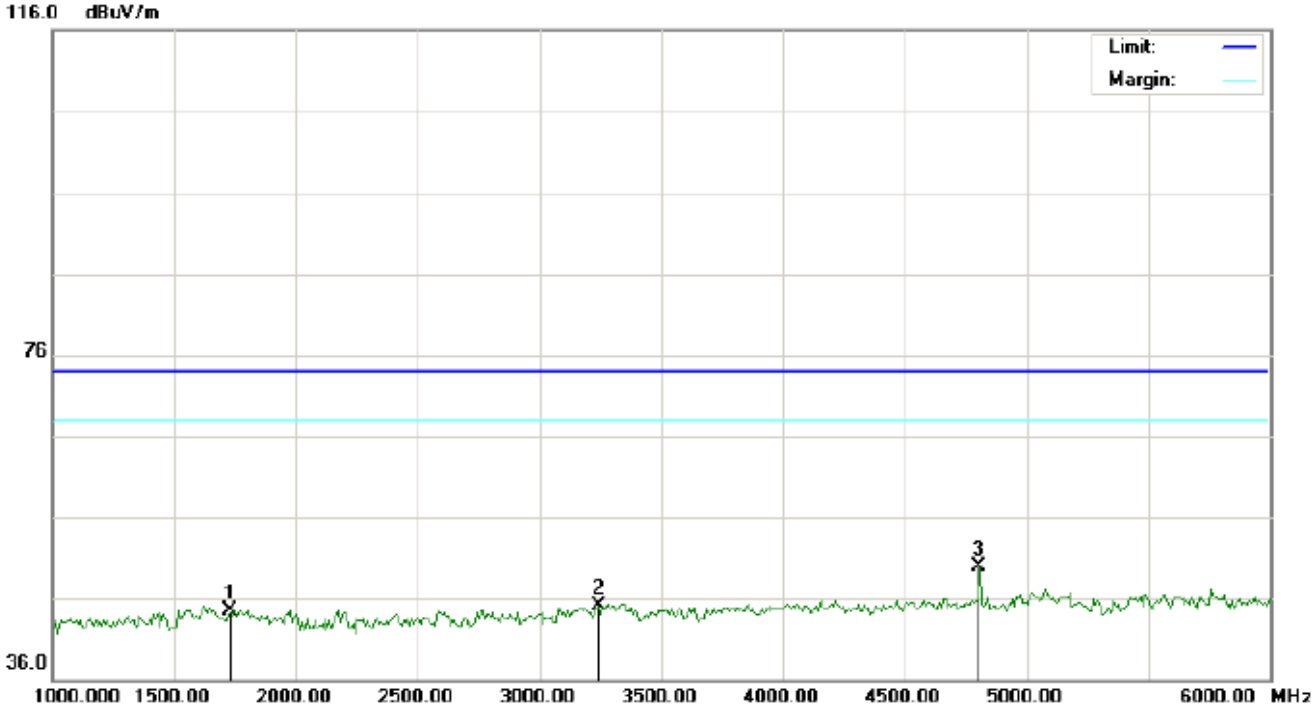
Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	72.88	13.46	86.34	94	-7.66	Horizontal
2402	72.33	13.46	85.79	94	-8.21	Vertical
2441	72.63	13.88	86.51	94	-7.49	Horizontal
2441	72.10	13.88	85.98	94	-8.02	Vertical
2480	71.81	14.11	85.92	94	-8.08	Horizontal
2480	71.40	14.11	85.51	94	-8.49	Vertical

FOR BR/EDR

(Worst modulation: GFSK)

For Harmonics

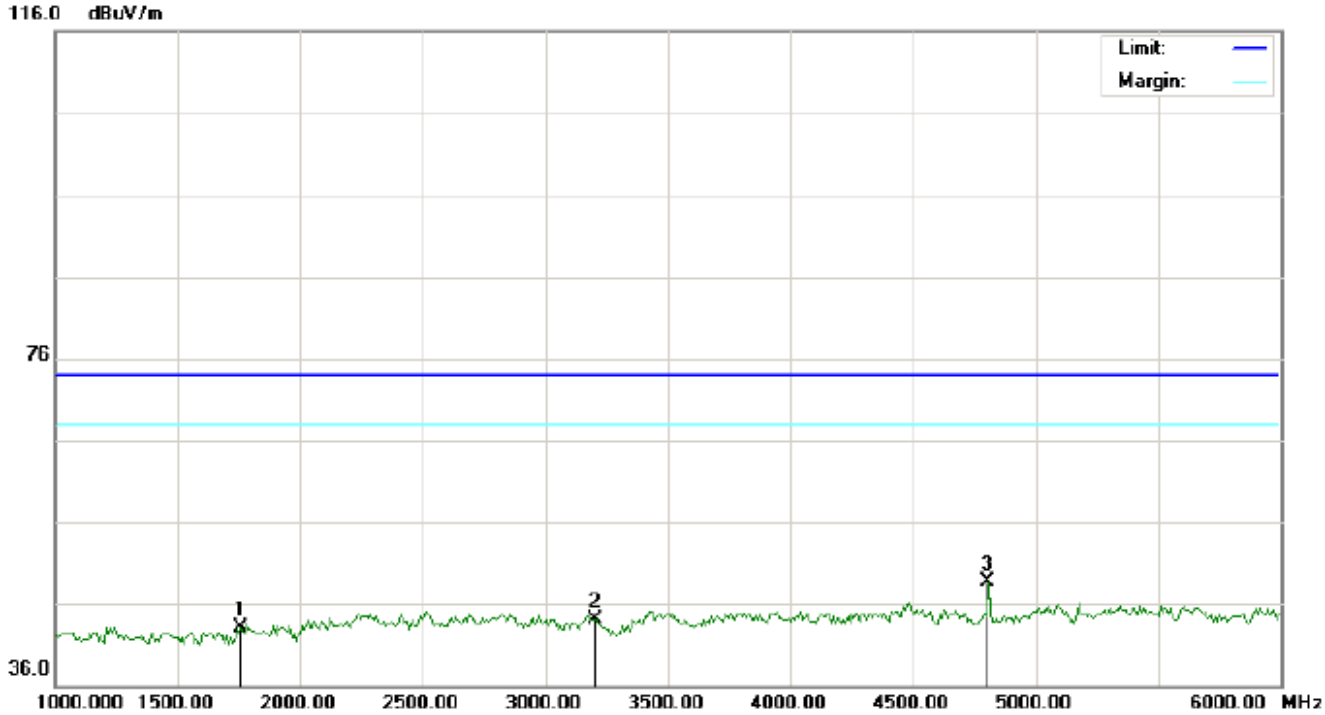
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1733.333	37.47	7.07	44.54	74.00	-29.46	peak			
2		3241.667	33.30	11.87	45.17	74.00	-28.83	peak			
3	*	4804.000	42.21	7.69	49.90	74.00	-24.10	peak			

RESULT: PASS

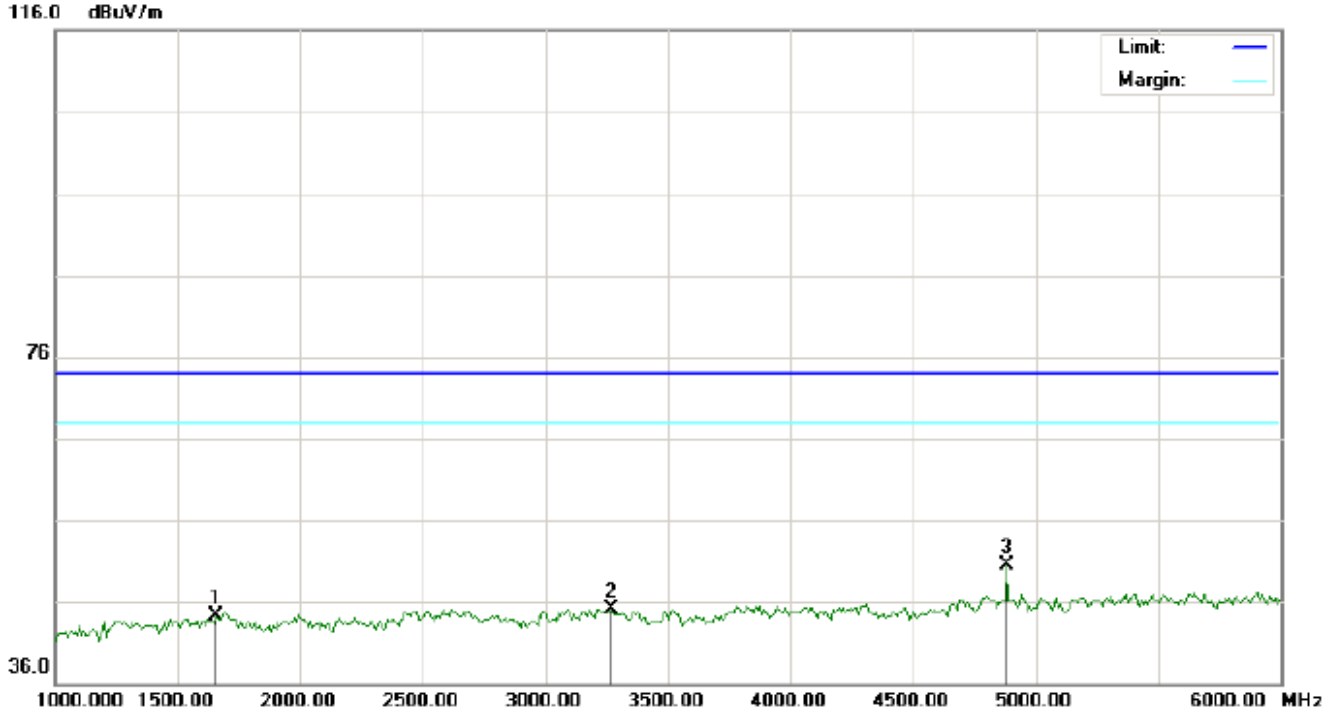
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1758.333	35.82	7.34	43.16	74.00	-30.84	peak			
2		3200.000	32.33	11.83	44.16	74.00	-29.84	peak			
3	*	4804.000	41.05	7.69	48.74	74.00	-25.26	peak			

RESULT: PASS

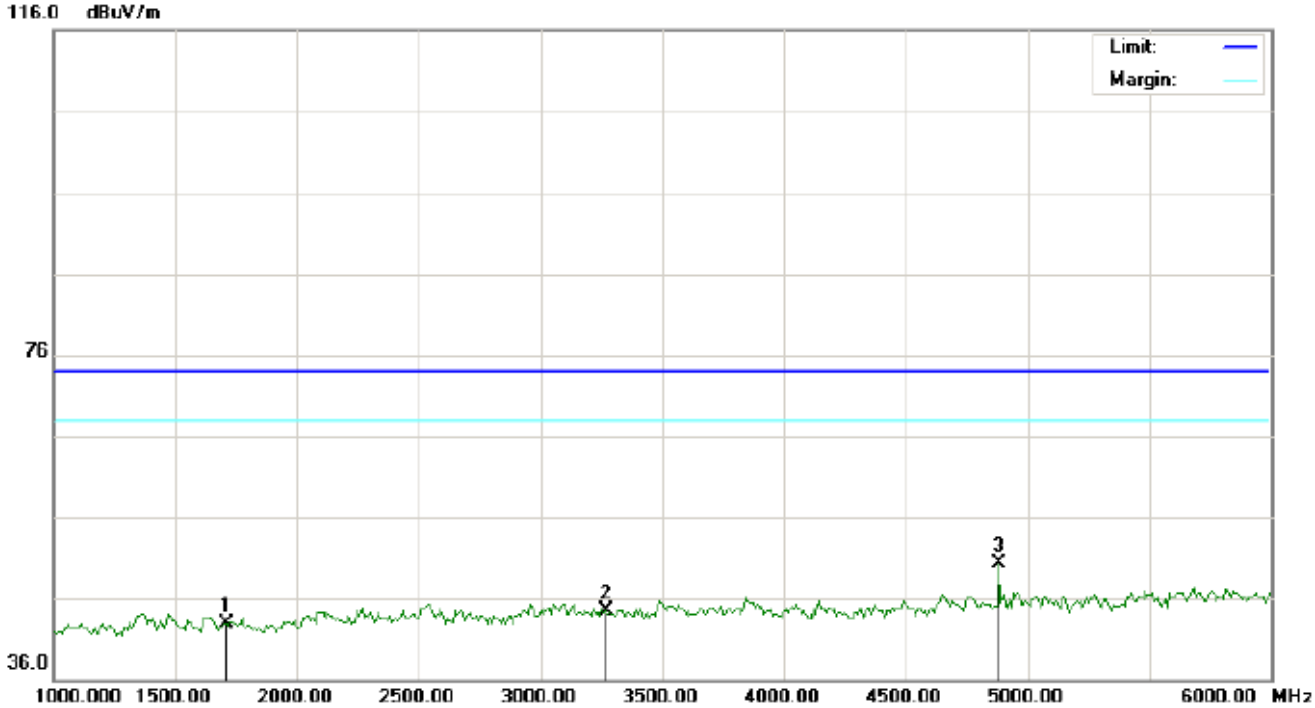
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1658.333	38.10	6.29	44.39	74.00	-29.61	peak			
2		3266.667	33.19	11.89	45.08	74.00	-28.92	peak			
3	*	4882.000	42.66	7.89	50.55	74.00	-23.45	peak			

RESULT: PASS

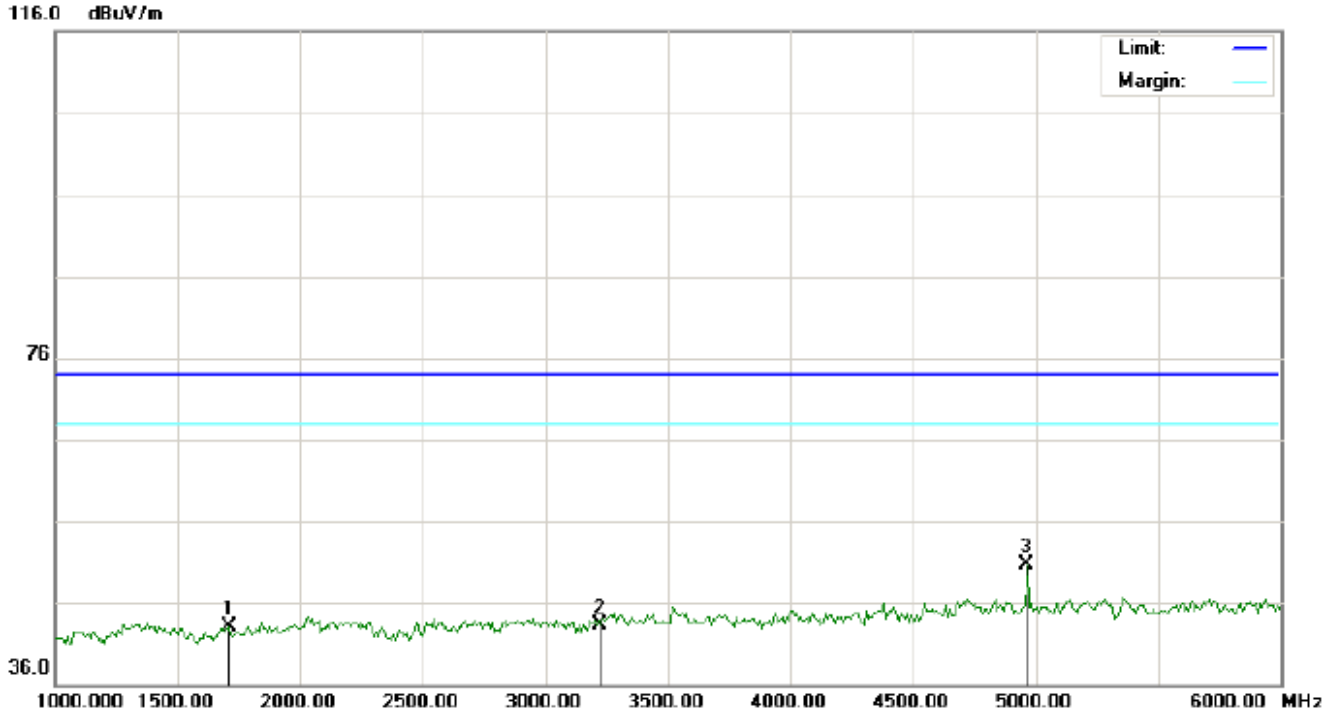
RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1708.333	36.11	6.81	42.92	74.00	-31.08	peak			
2		3266.667	32.63	11.89	44.52	74.00	-29.48	peak			
3	*	4882.000	42.39	7.89	50.28	74.00	-23.72	peak			

RESULT: PASS

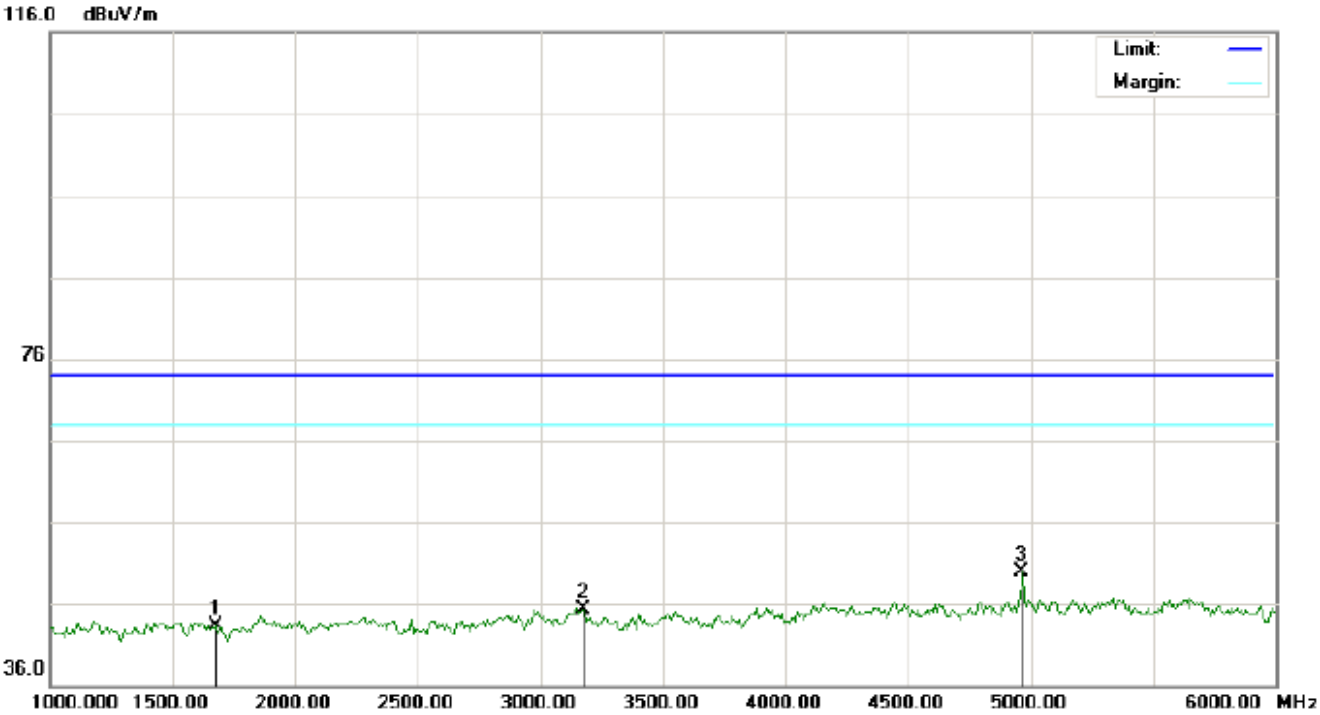
RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1708.333	36.33	6.81	43.14	74.00	-30.86	peak			
2		3225.000	31.51	11.85	43.36	74.00	-30.64	peak			
3	*	4960.000	42.60	8.09	50.69	74.00	-23.31	peak			

RESULT: PASS

RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1675.000	36.77	6.46	43.23	74.00	-30.77	peak			
2		3175.000	33.40	11.80	45.20	74.00	-28.80	peak			
3	*	4960.000	41.91	8.09	50.00	74.00	-24.00	peak			

RESULT: PASS

Note: 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

5. BAND EDGE

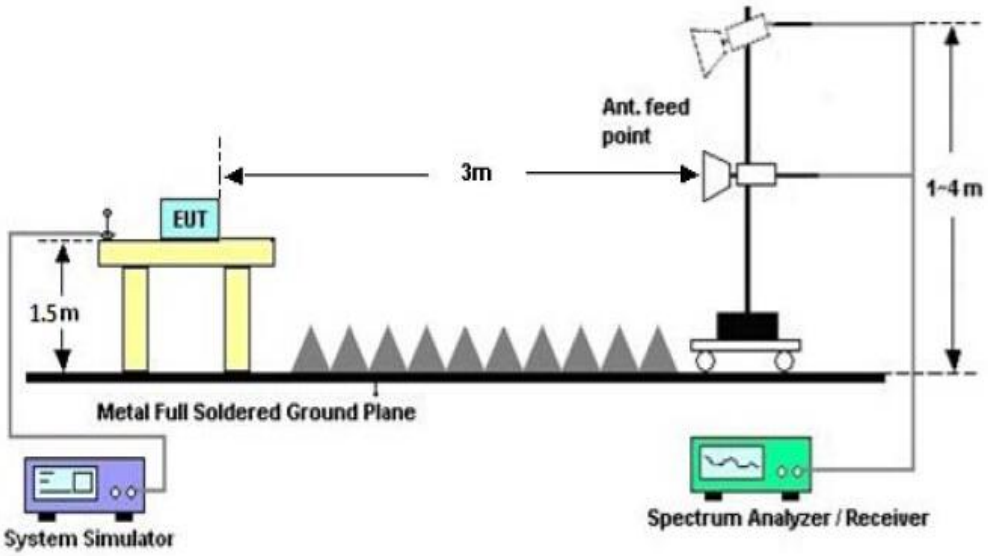
5.1. MEASUREMENT PROCEDURE

1. The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

Start frequency(MHz)	Stop frequency(MHz)
2200	2405
2478	2500

5.2 TEST SETUP

RADIATED EMISSION TEST SETUP

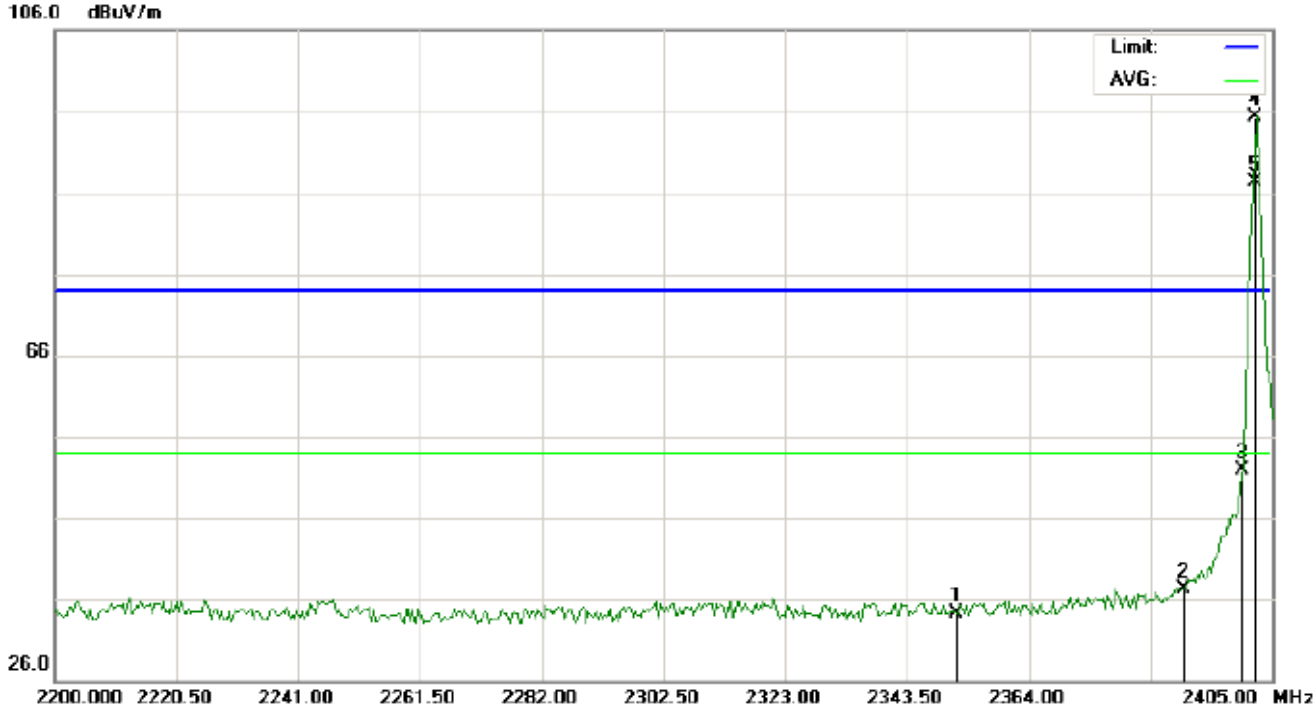


5.3 RADIATED TEST RESULT

FOR BR/EDR

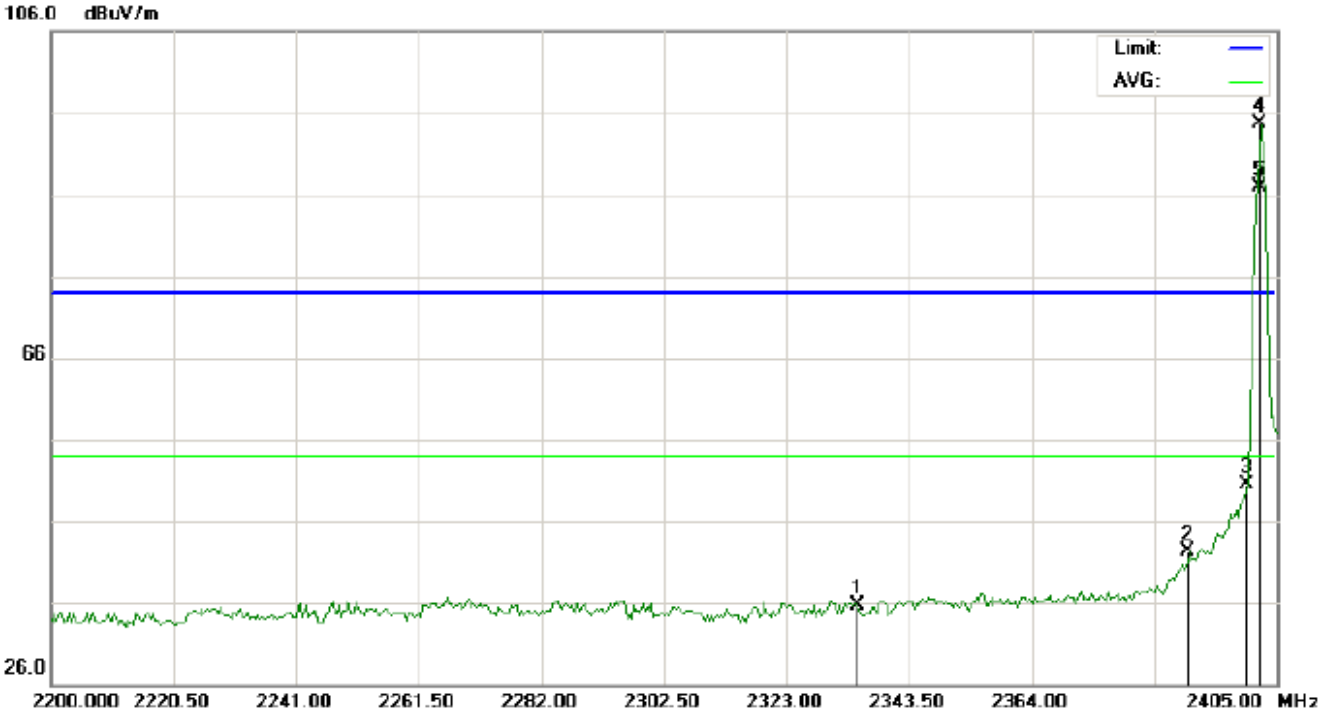
(Worst modulation: GFSK)

TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



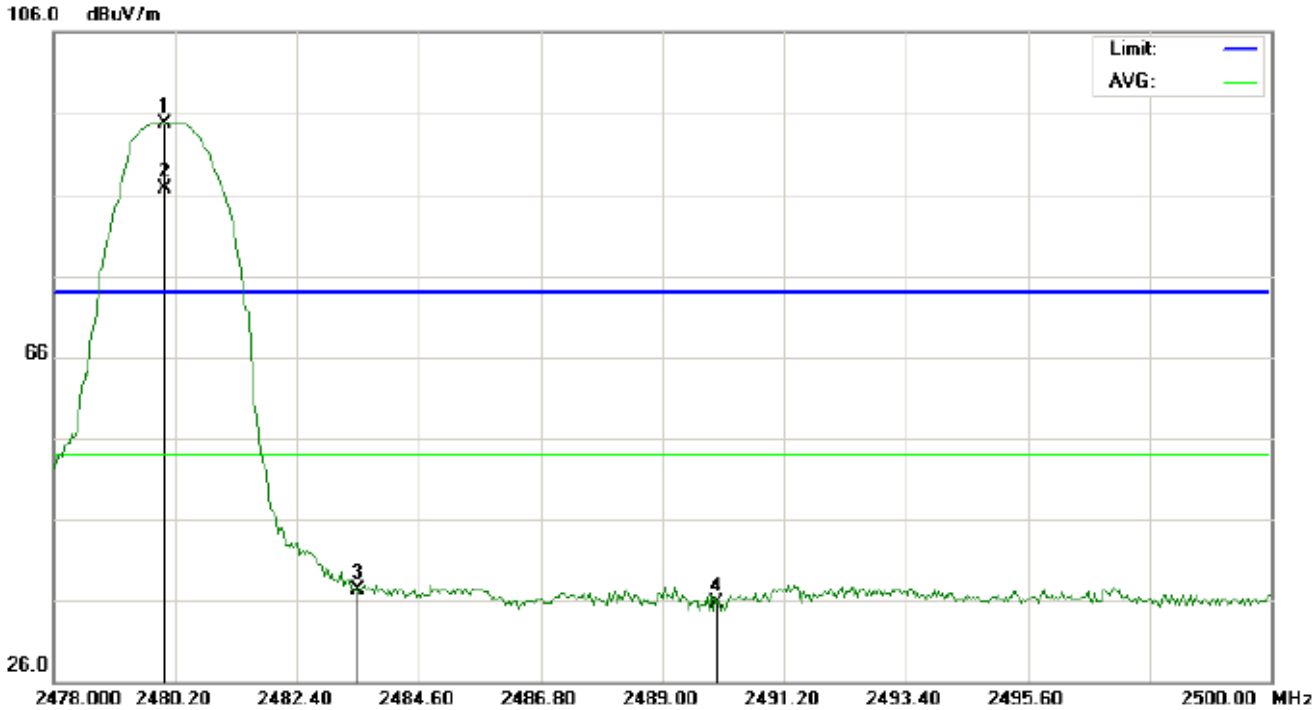
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2351.700	20.86	13.44	34.30	74.00	-39.70	peak			
2		2390.000	23.80	13.45	37.25	74.00	-36.75	peak			
3		2400.000	38.54	13.45	51.99	74.00	-22.01	peak			
4	X	2402.000	81.79	13.46	95.25	74.00	21.25	peak			
5	*	2402.000	73.87	13.46	87.33	54.00	33.33	AVG	100	159	

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



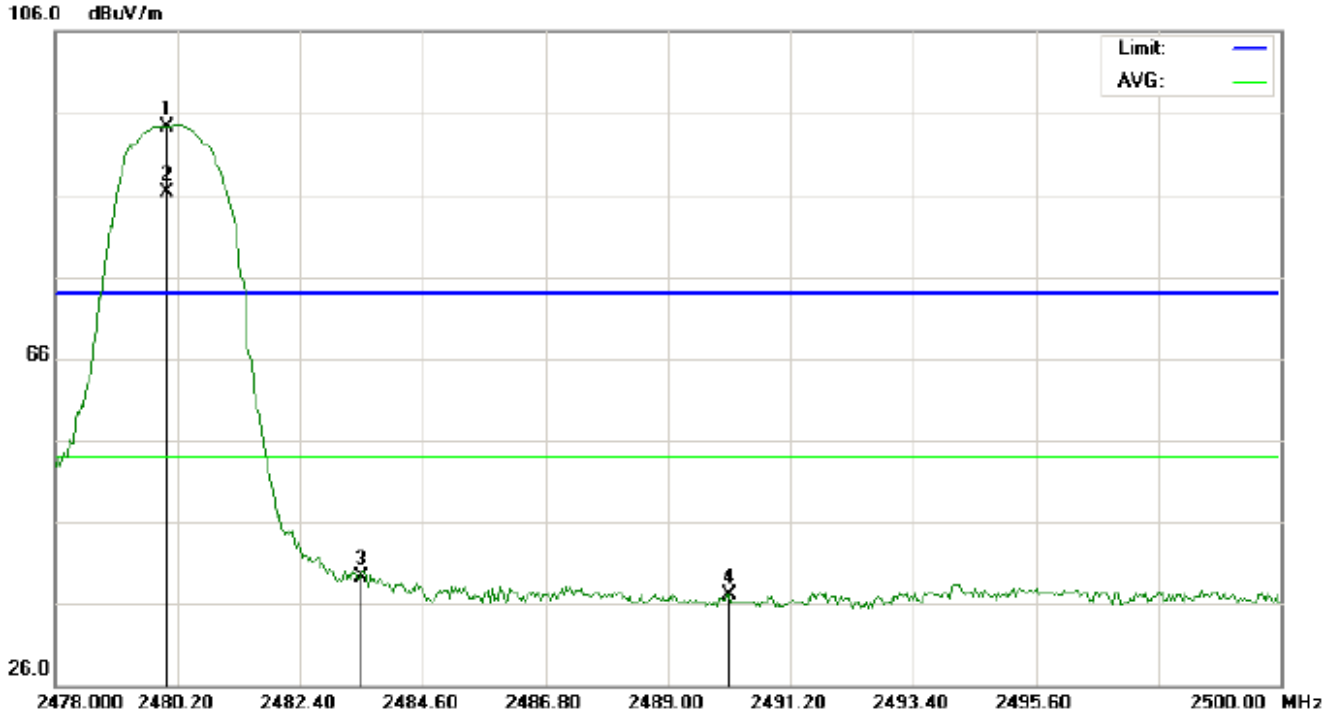
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2334.958	22.22	13.40	35.62	74.00	-38.38	peak			
2		2390.000	28.75	13.45	42.20	74.00	-31.80	peak			
3		2400.000	37.04	13.45	50.49	74.00	-23.51	peak			
4	X	2402.000	81.32	13.46	94.78	74.00	20.78	peak			
5	*	2402.000	73.35	13.46	86.81	54.00	32.81	AVG	100	321	

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2480.000	80.63	14.11	94.74	74.00	20.74	peak			
2	*	2480.000	72.68	14.11	86.79	54.00	32.79	AVG	100	164	
3		2483.500	23.16	14.13	37.29	74.00	-36.71	peak			
4		2489.990	21.57	14.17	35.74	74.00	-38.26	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2480.000	80.26	14.11	94.37	74.00	20.37	peak			
2	*	2480.000	72.23	14.11	86.34	54.00	32.34	AVG	100	325	
3		2483.500	25.22	14.13	39.35	74.00	-34.65	peak			
4		2490.100	22.88	14.17	37.05	74.00	-36.95	peak			

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

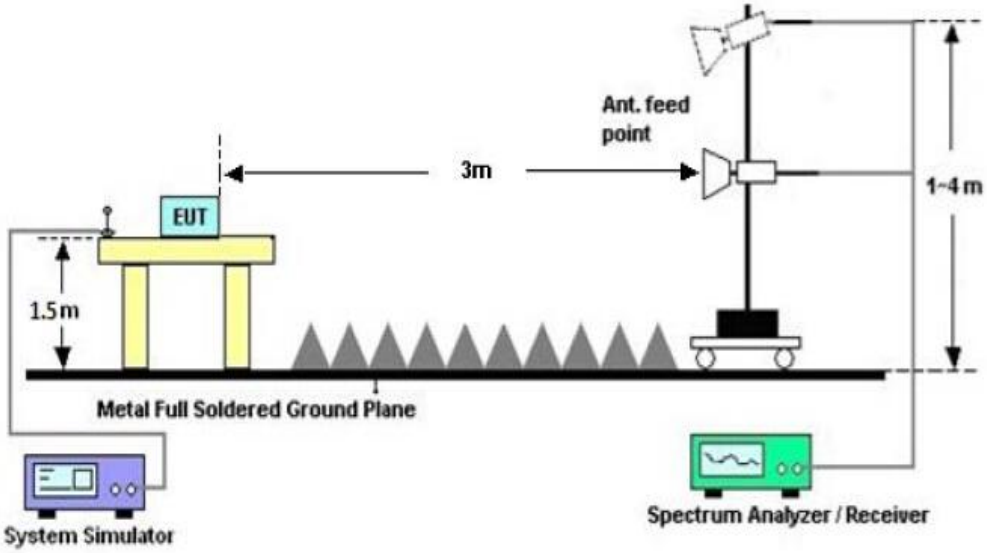
Hopping on mode and Hopping off mode have been tested, but only worst case reported.

6. OCCUPIED BANDWIDTH MEASUREMENT

6.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ 3RBW; Sweep = auto; Detector function = peak
3. Set SPA Trace 1 Max hold, then View.

6.2. TEST SET-UP

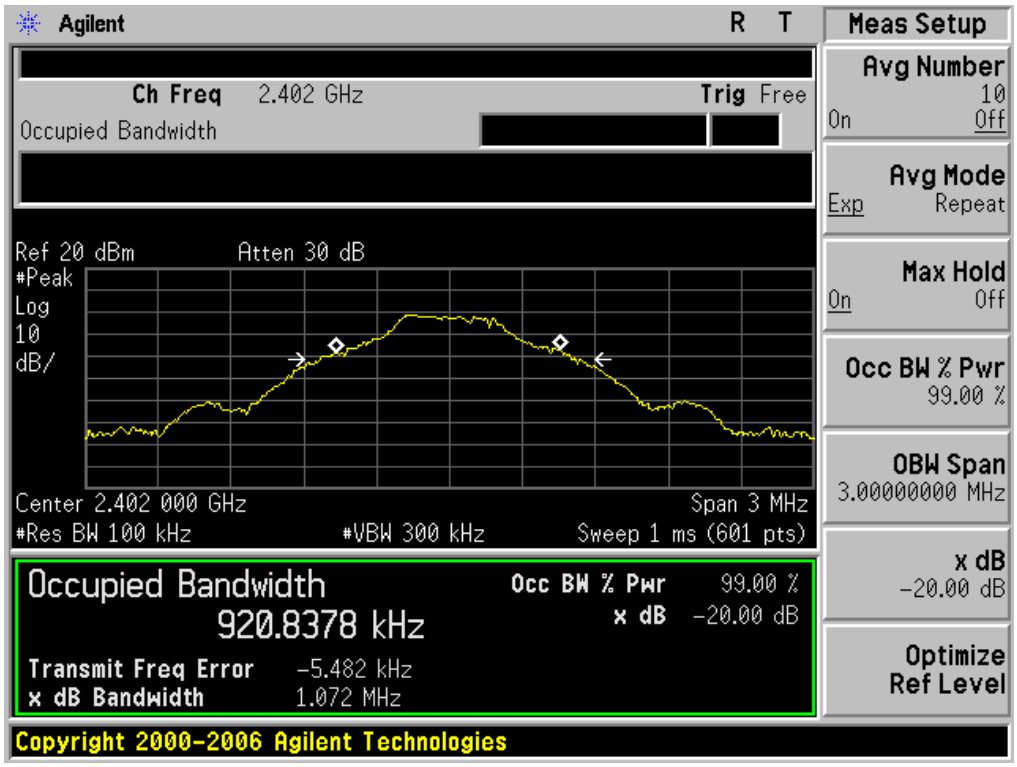


6.3. LIMITS AND MEASUREMENT RESULTS

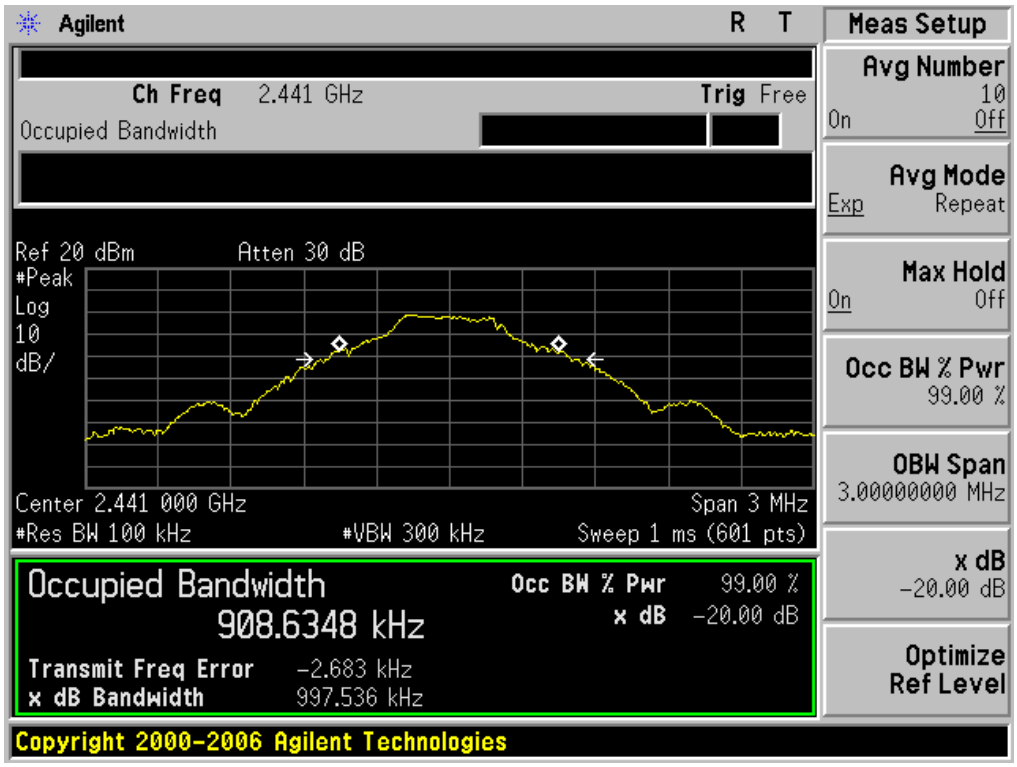
FOR BR/EDR

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	0.921	1.072	PASS
	Middle Channel	0.909	0.998	PASS
	High Channel	0.893	1.035	PASS

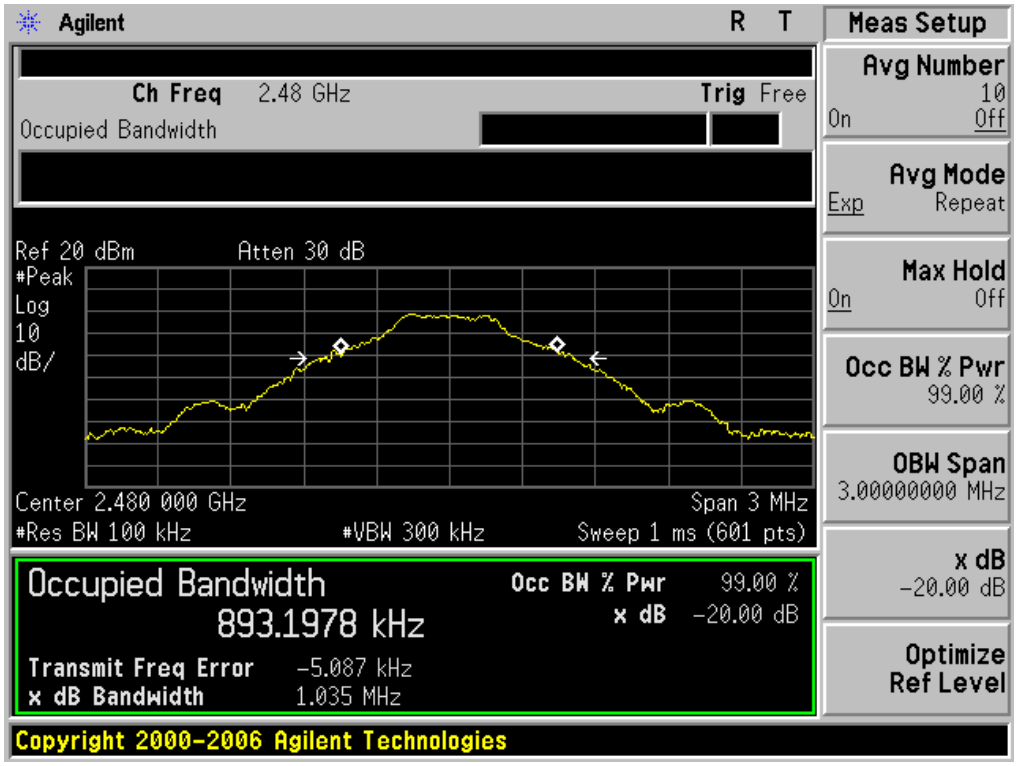
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

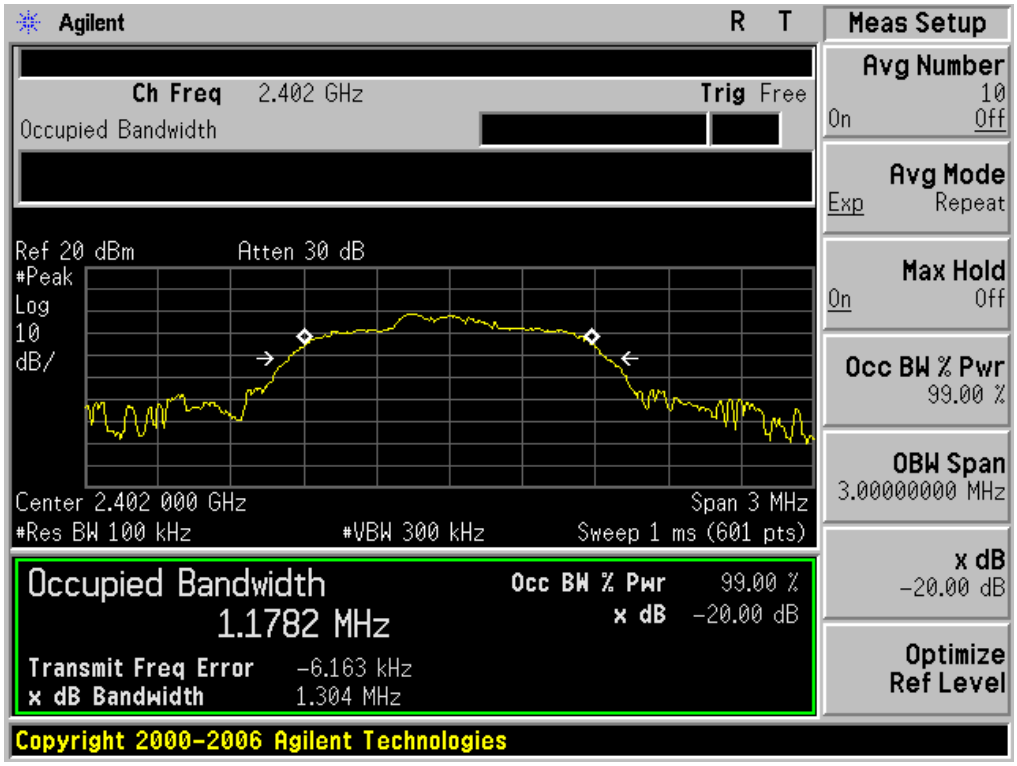


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

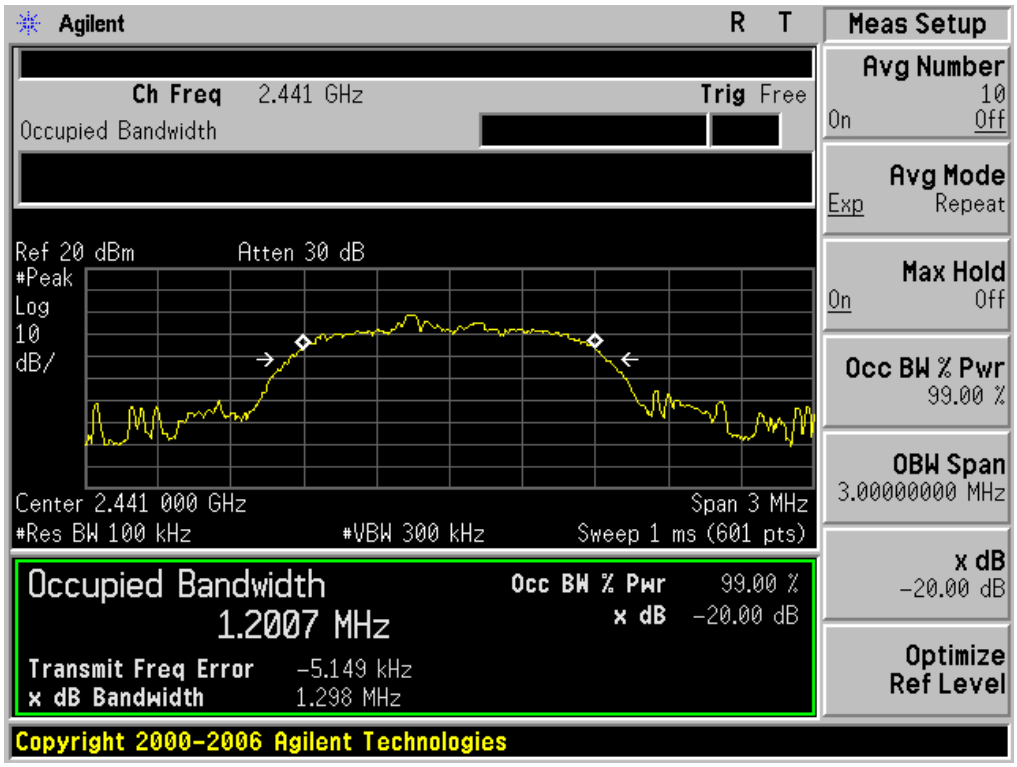


BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.178	1.304	PASS
	Middle Channel	1.201	1.298	PASS
	High Channel	1.175	1.301	PASS

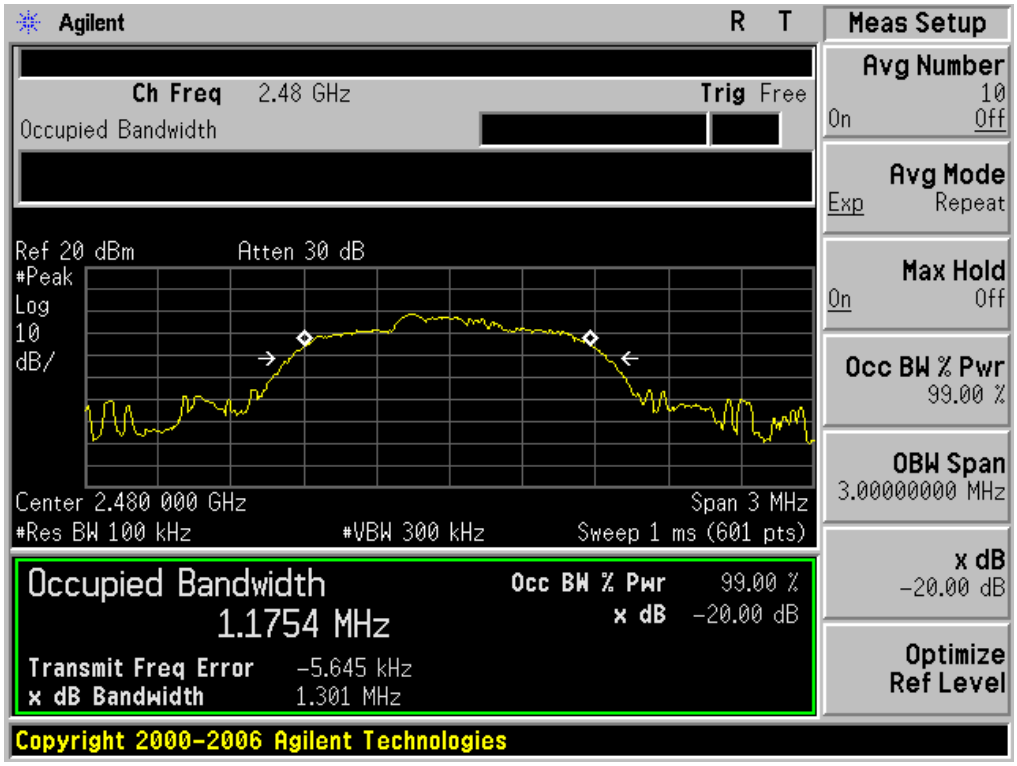
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

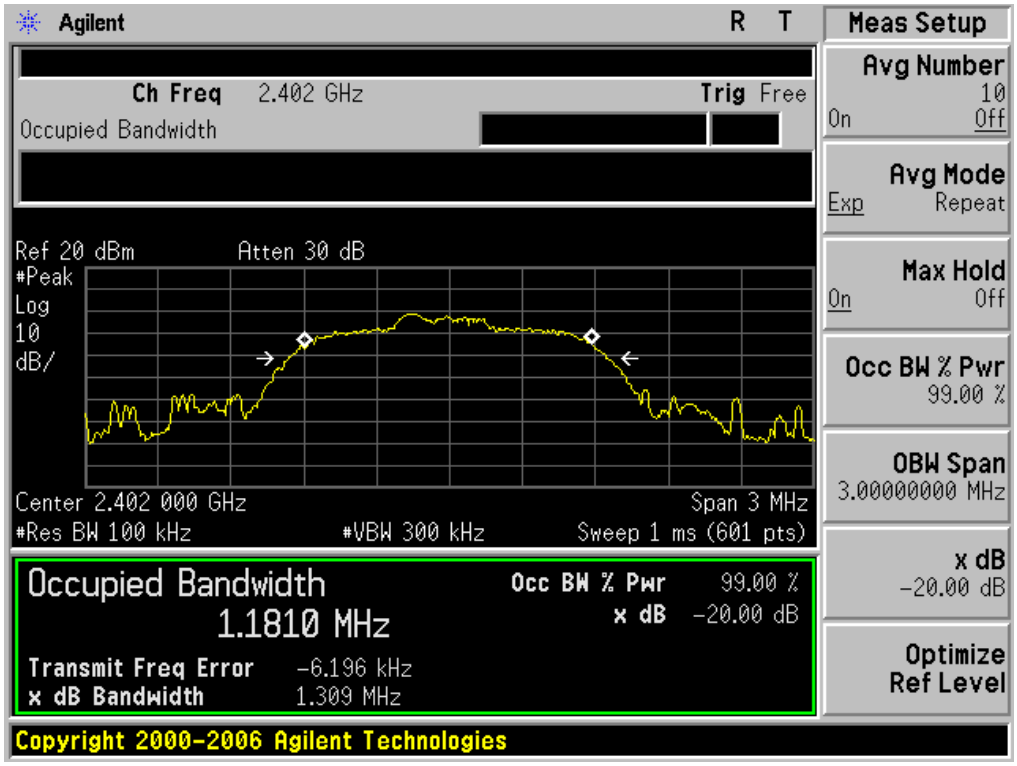


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

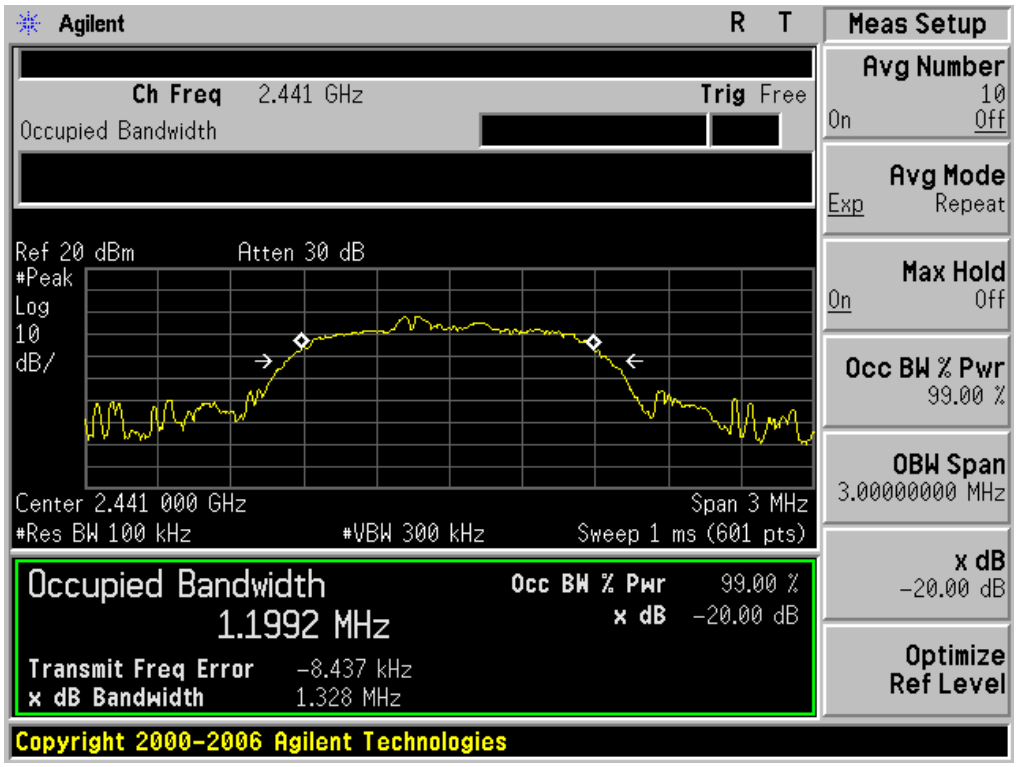


BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.181	1.309	PASS
	Middle Channel	1.199	1.328	PASS
	High Channel	1.194	1.325	PASS

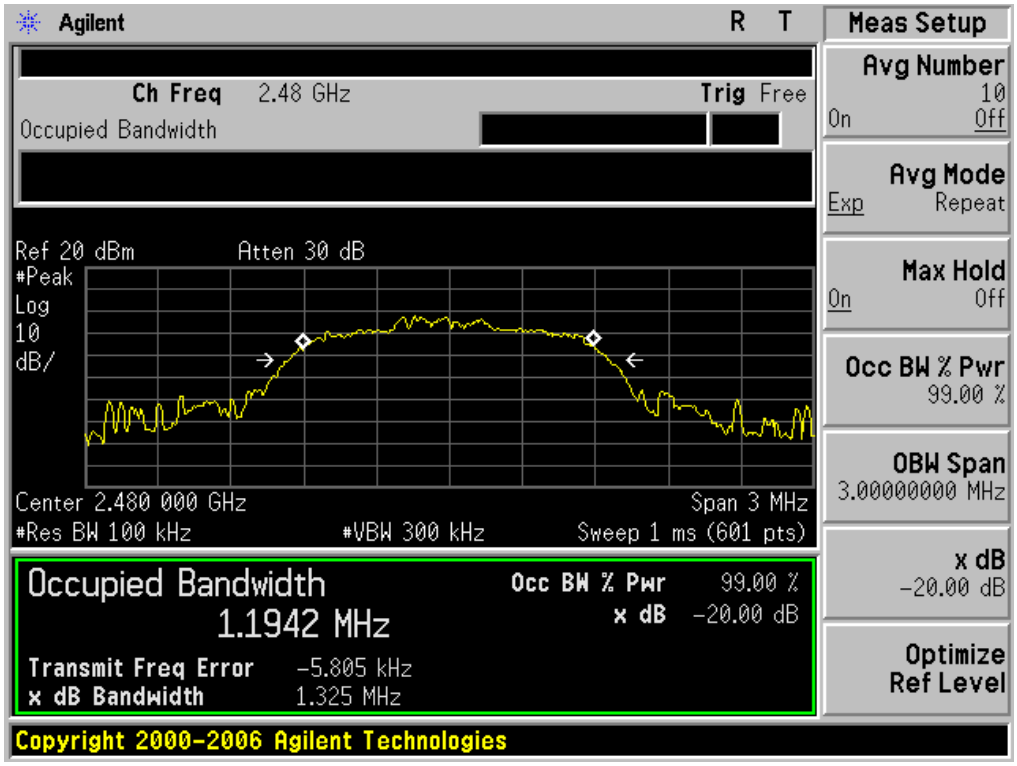
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



7. ANTENNA REQUIREMENT

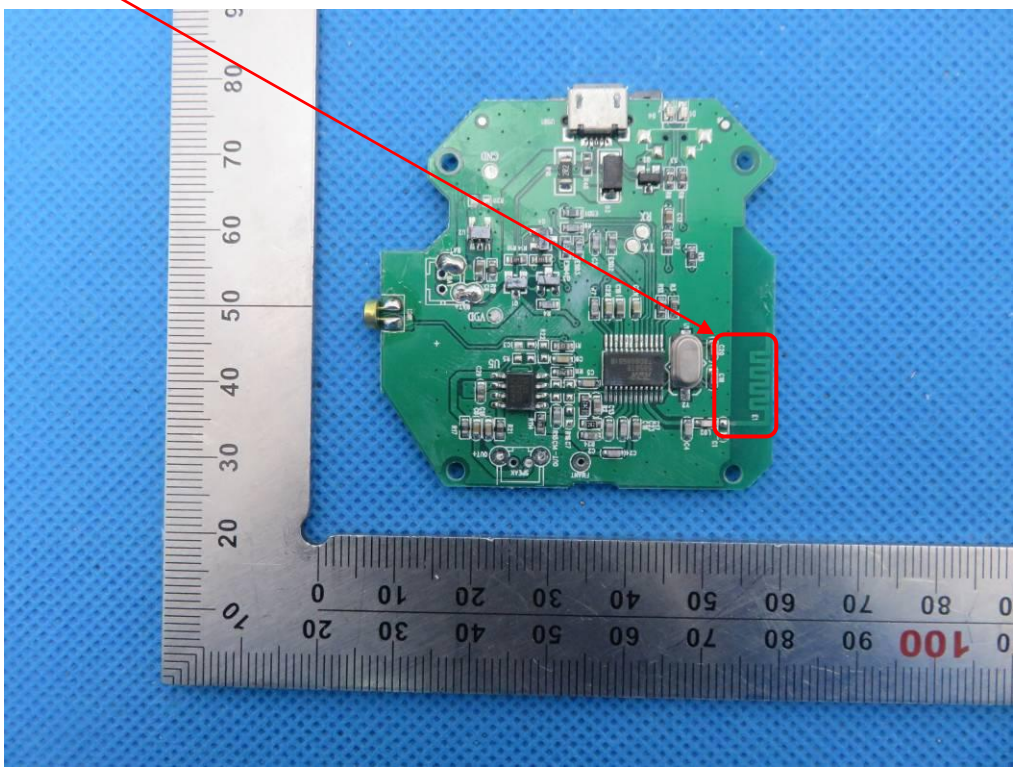
Standard Applicable

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.

Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

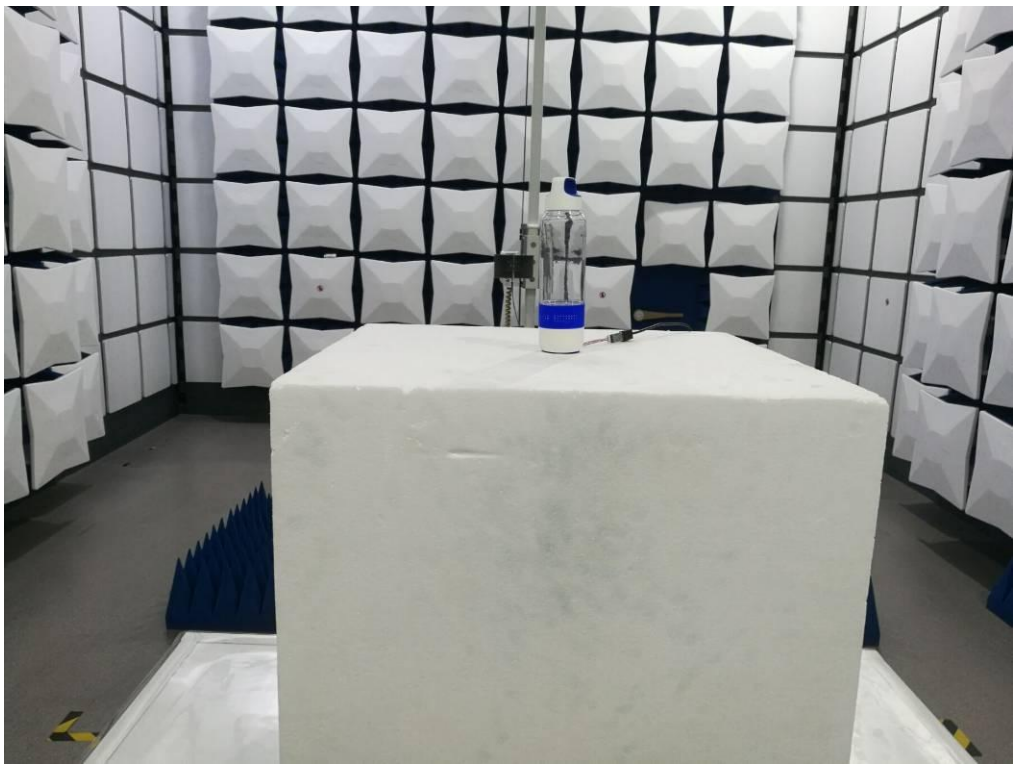
ANTENNA



8. PHOTOGRAPH OF TEST

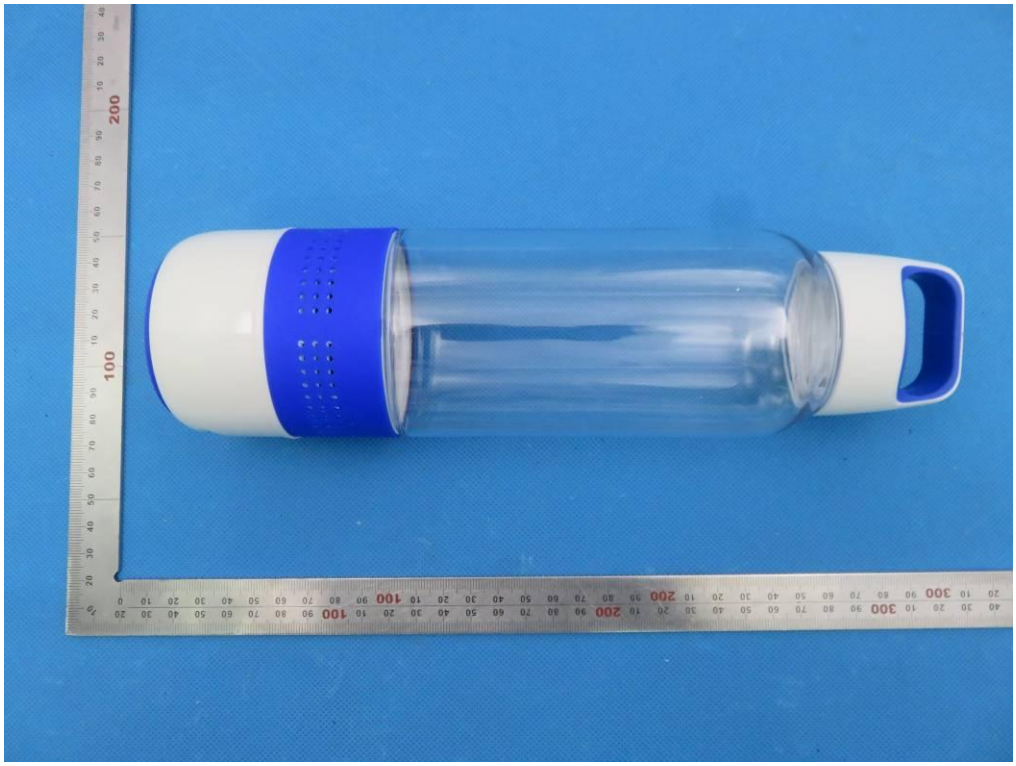
FCC LINE CONDUCTED EMISSION TEST SETUP

FCC RADIATED EMISSION TEST SETUP

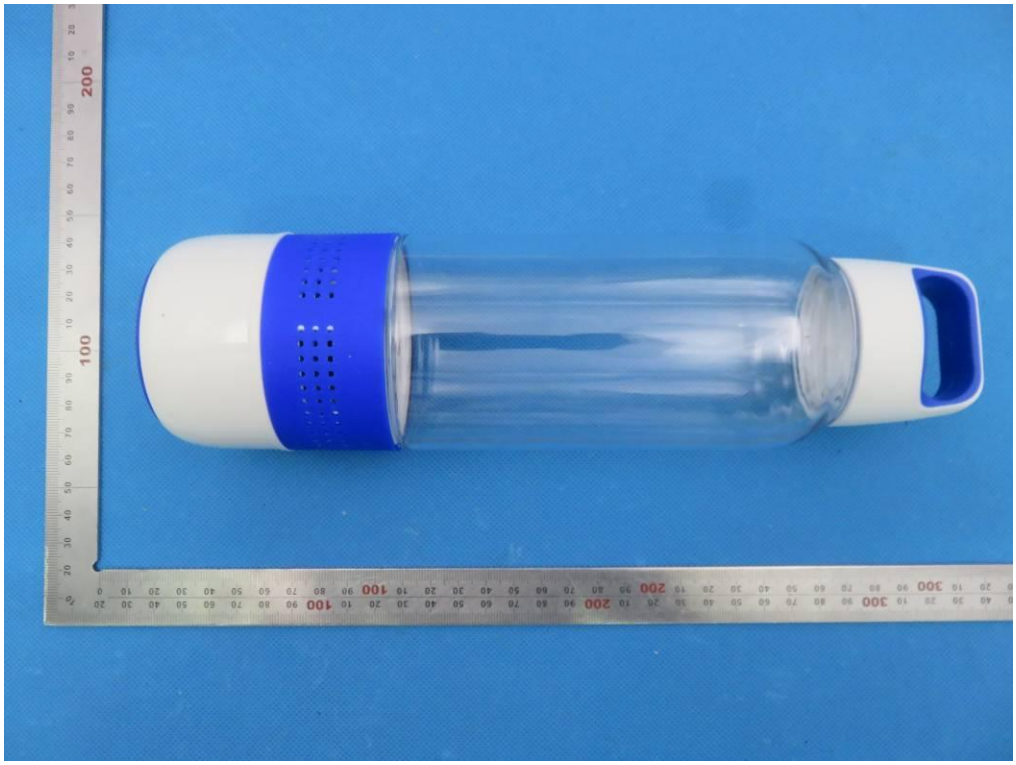


9. PHOTOGRAPHS OF EUT

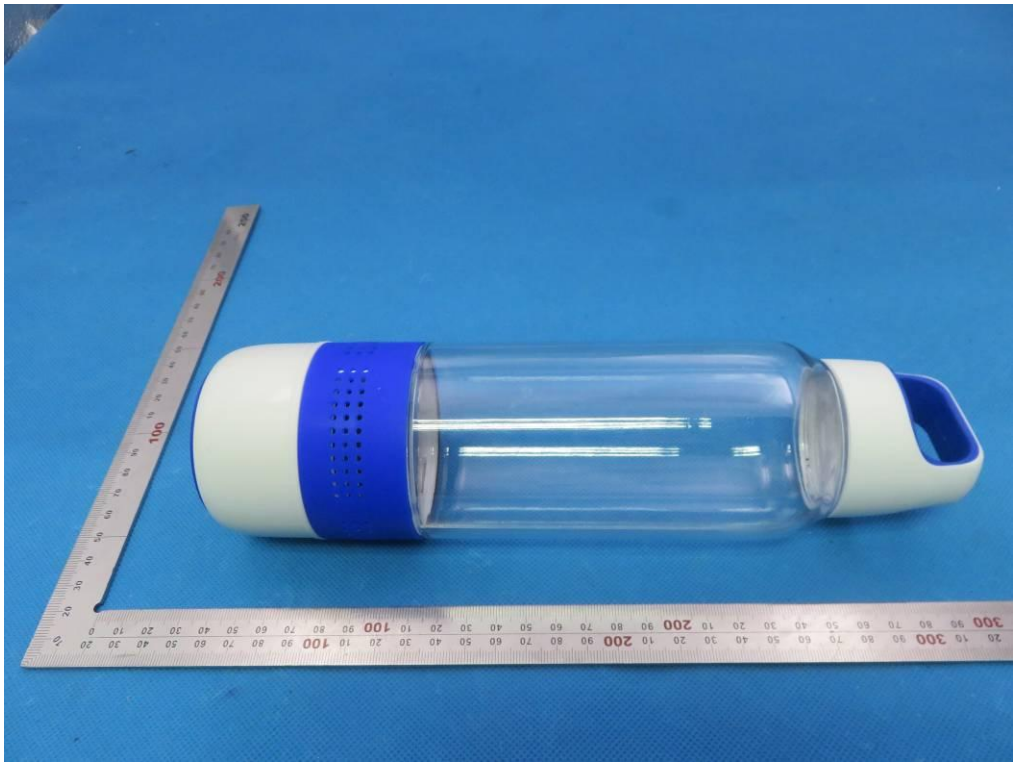
TOP VIEW OF EUT



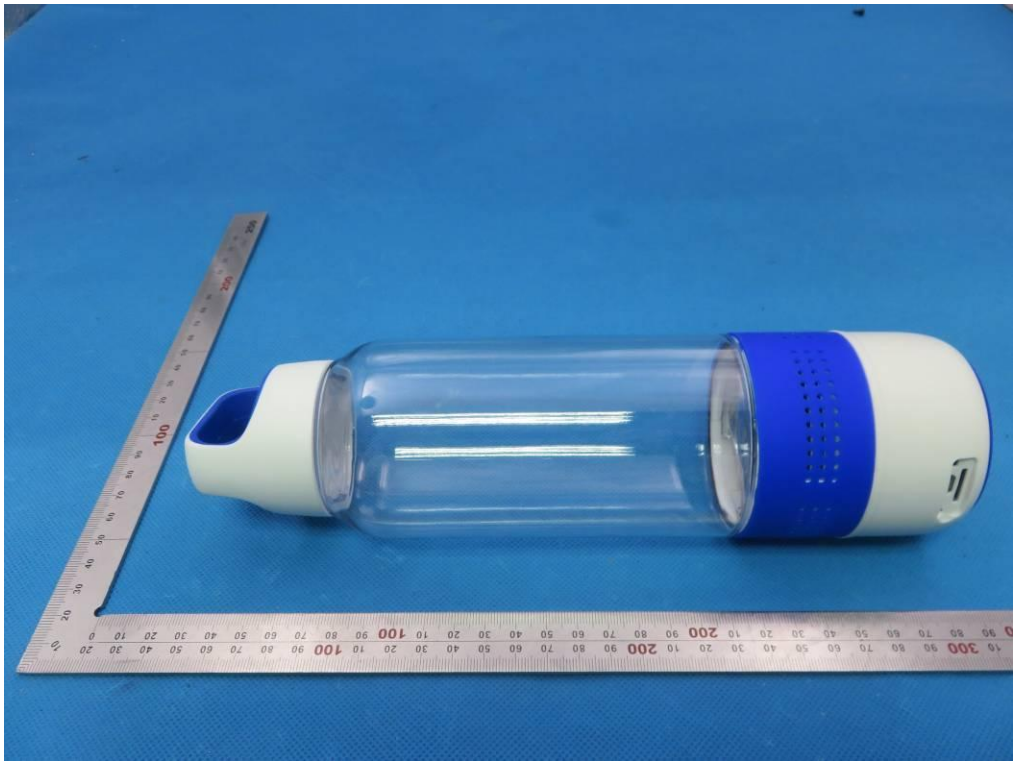
BOTTOM VIEW OF EUT



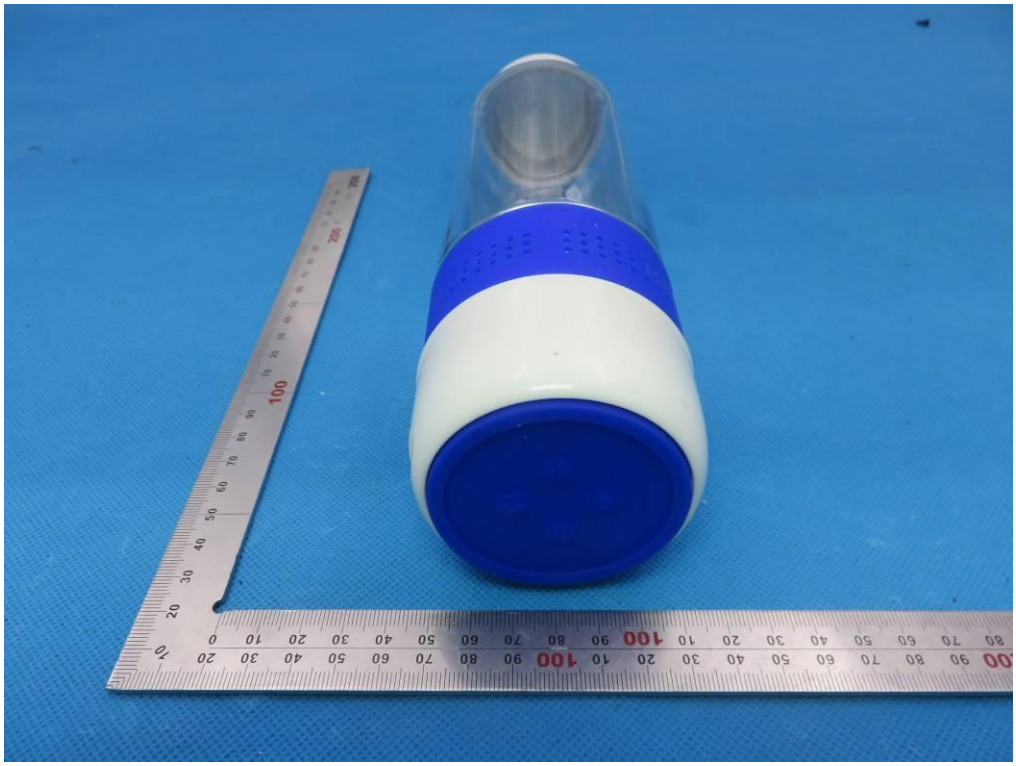
FRONT VIEW OF EUT



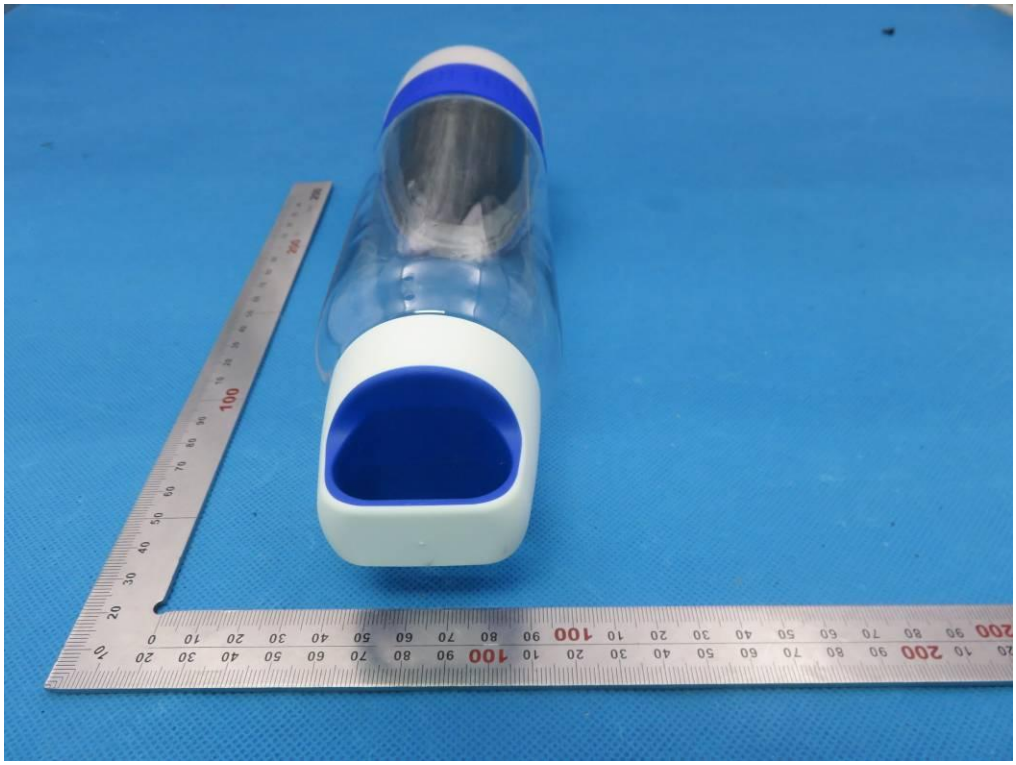
BACK VIEW OF EUT



LEFT VIEW OF EUT

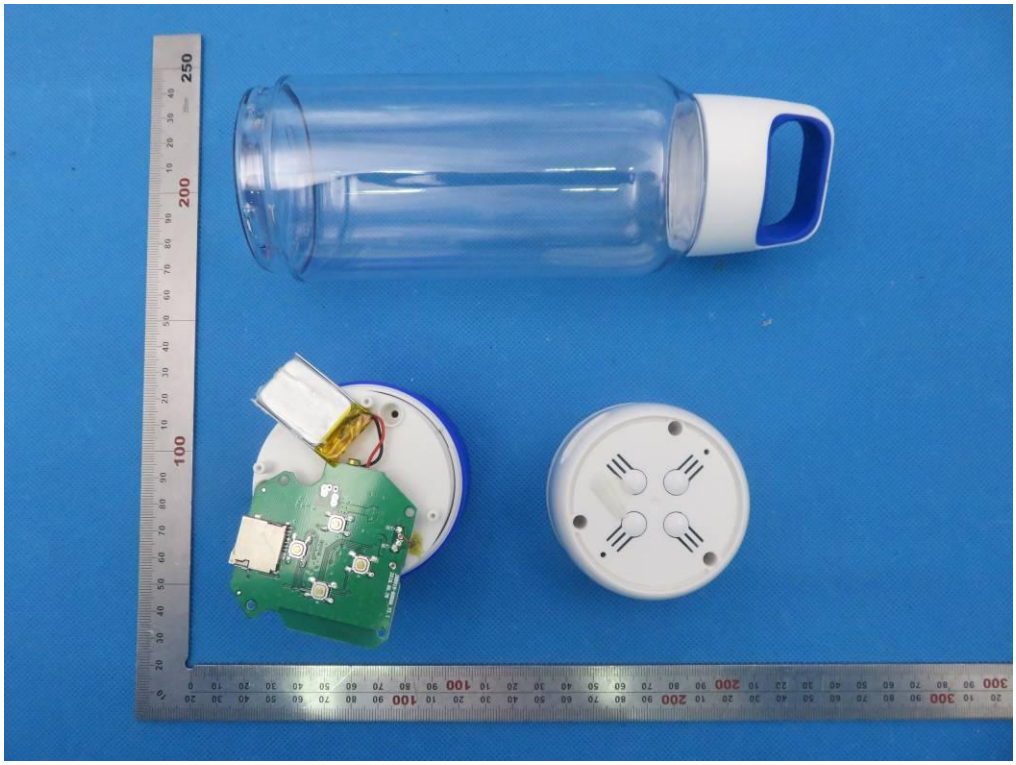


RIGHT VIEW OF EUT



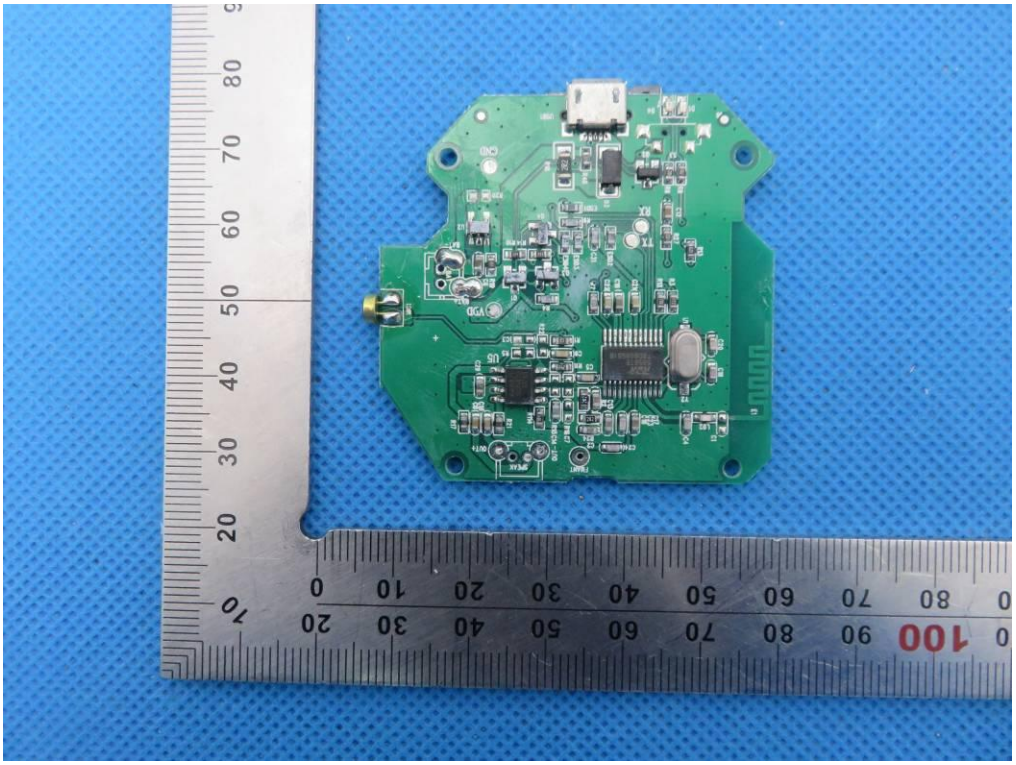
VIEW OF EUT (PORT)

OPEN VIEW OF EUT

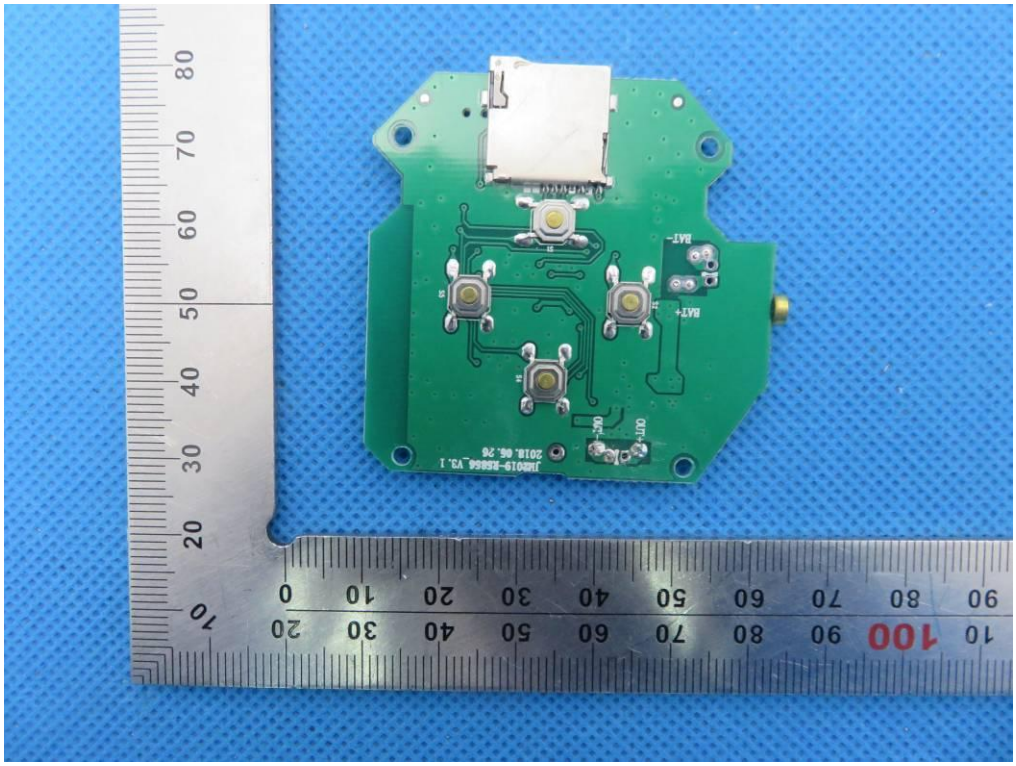


VIEW OF BATTERY

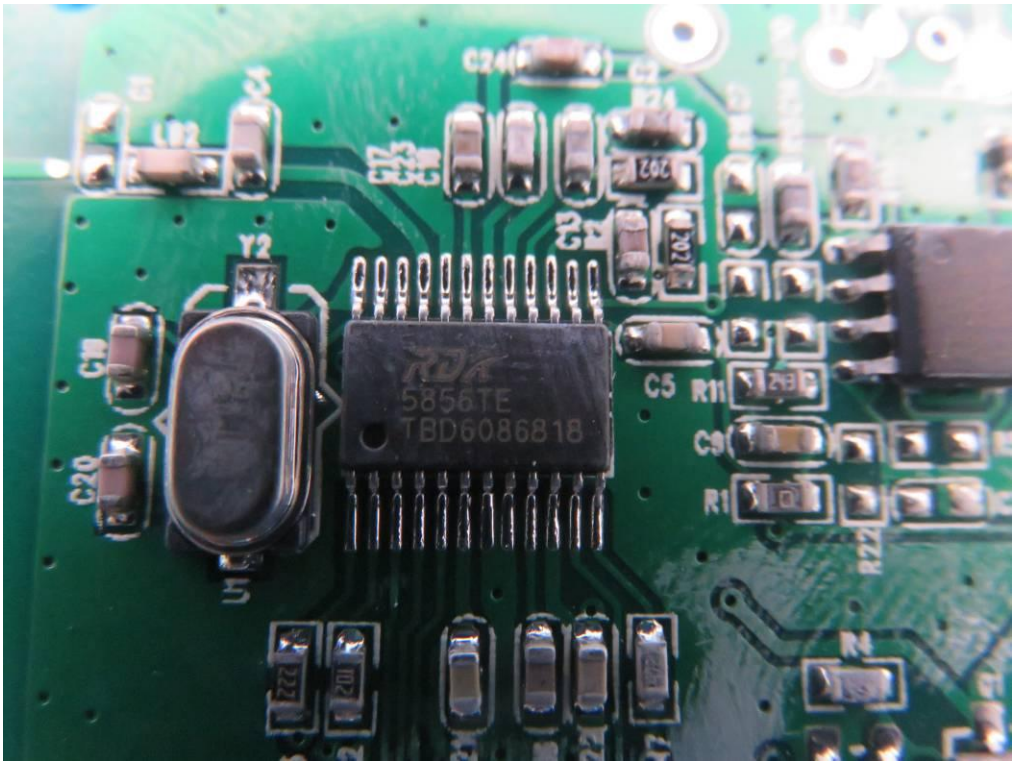
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2

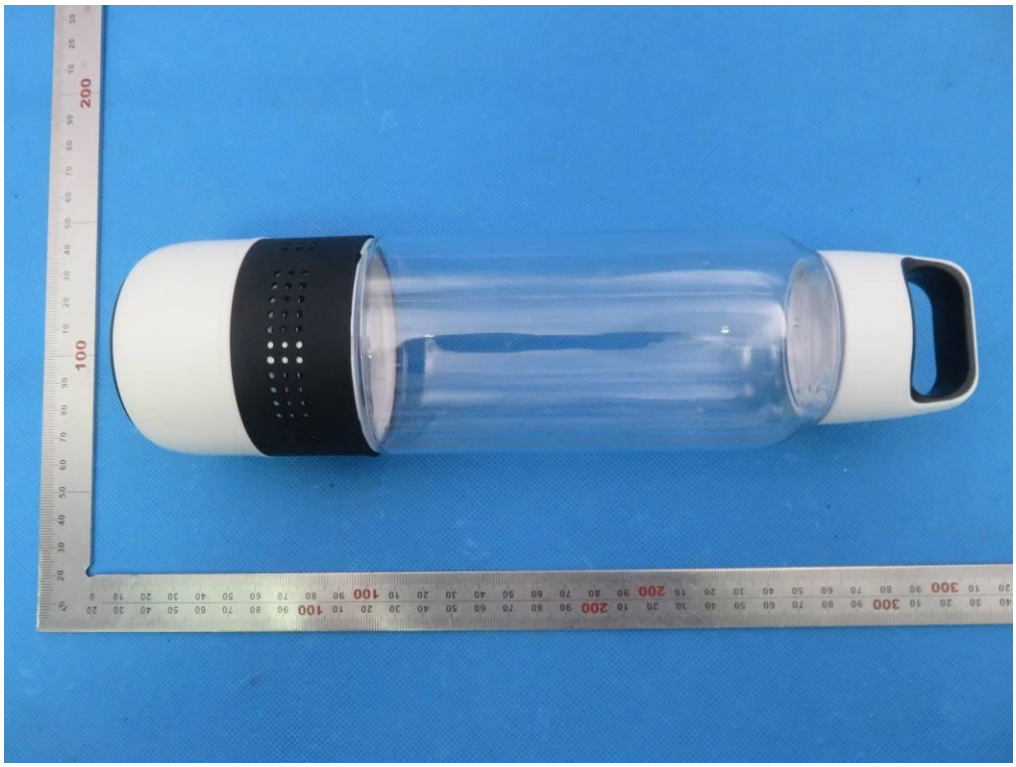


INTERNAL VIEW OF EUT-3

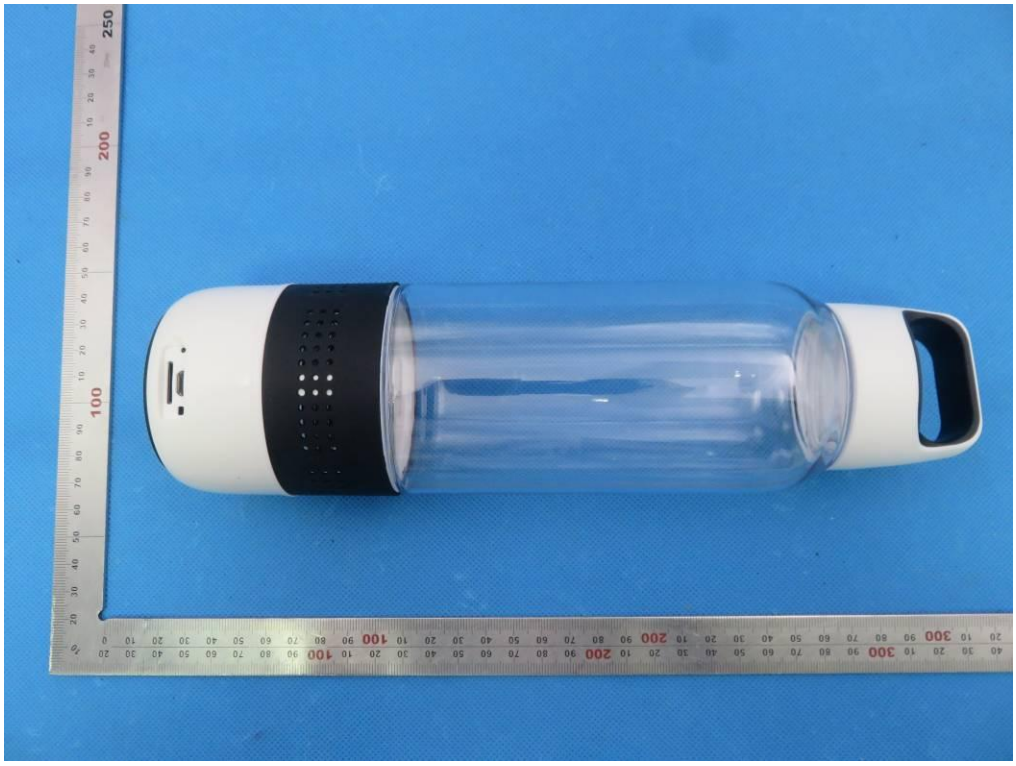


SERIES COLOR SAMPLE

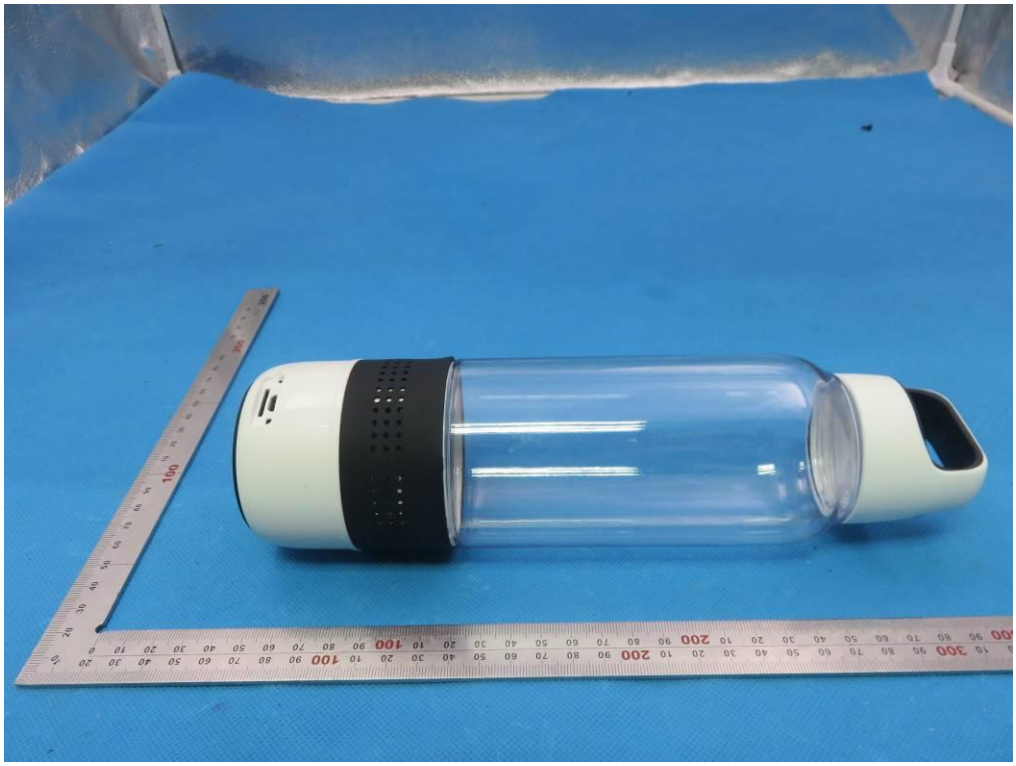
TOP VIEW OF EUT



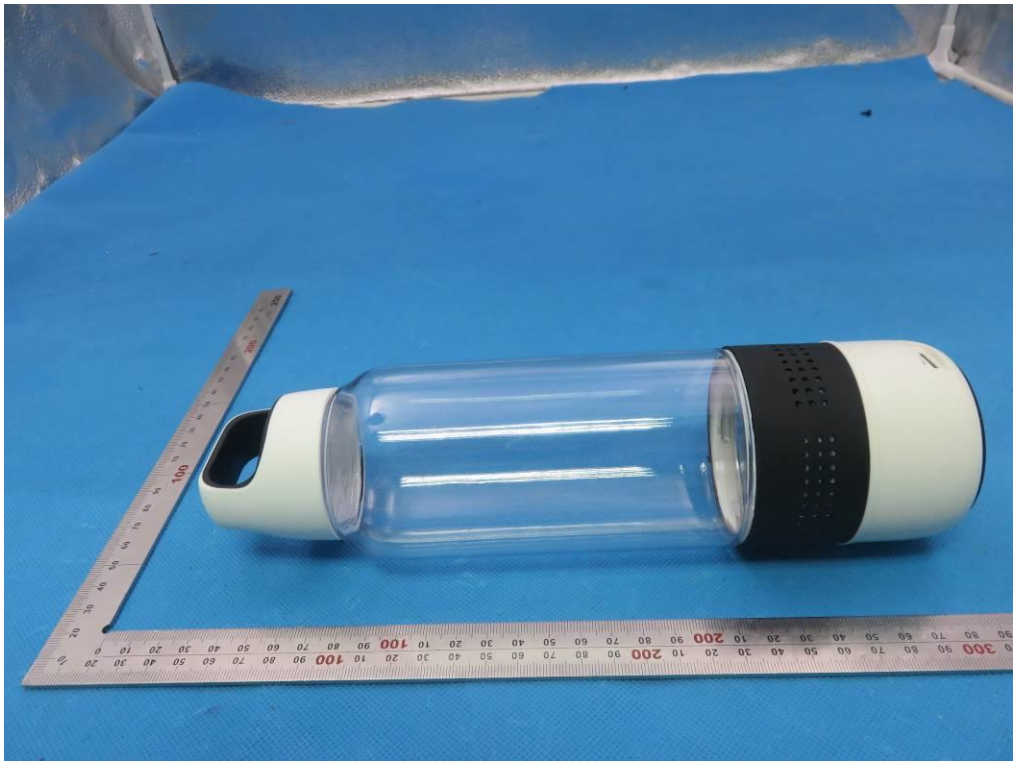
BOTTOM VIEW OF EUT



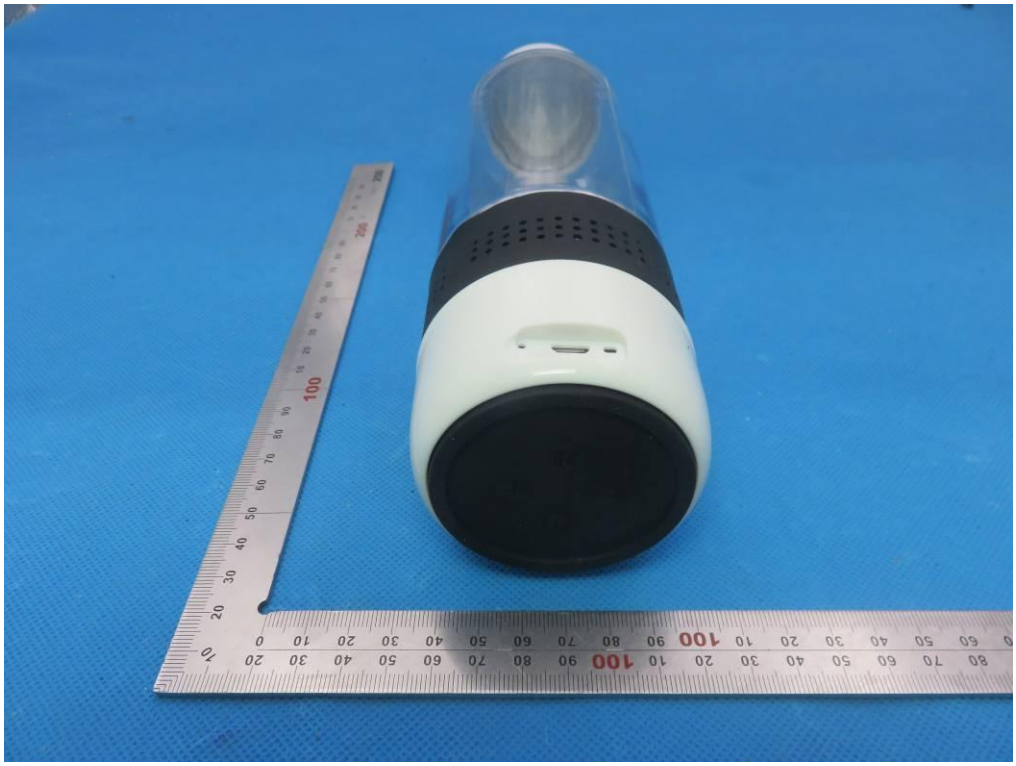
FRONT VIEW OF EUT



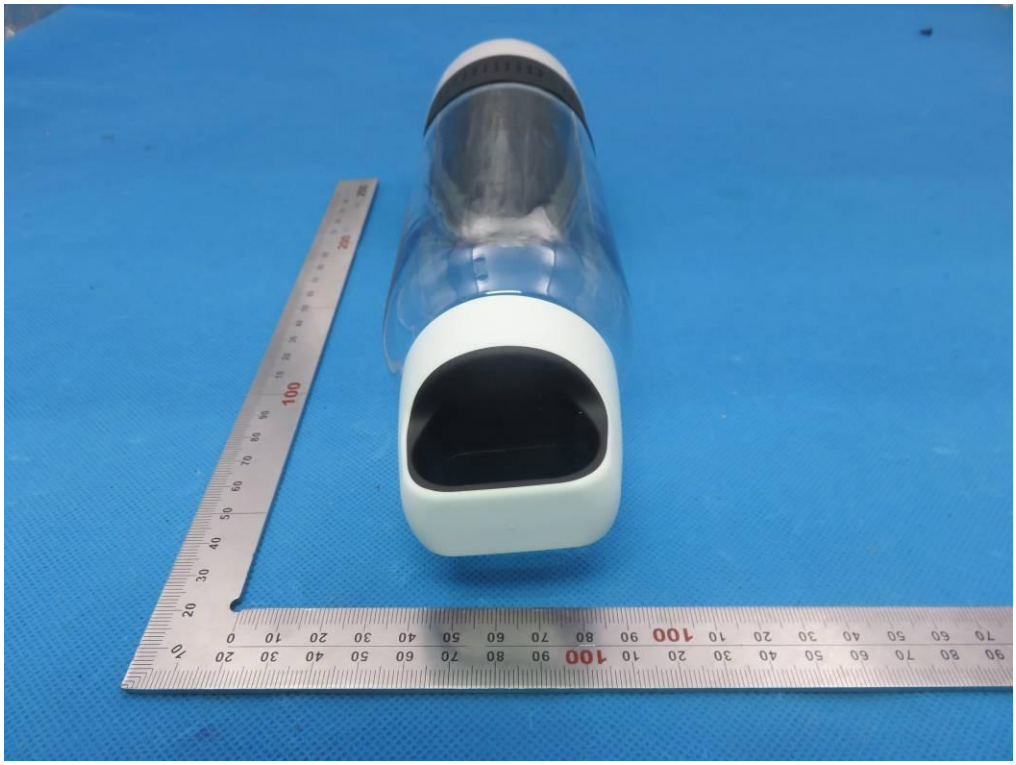
BACK VIEW OF EUT



LEFT VIEW OF EUT

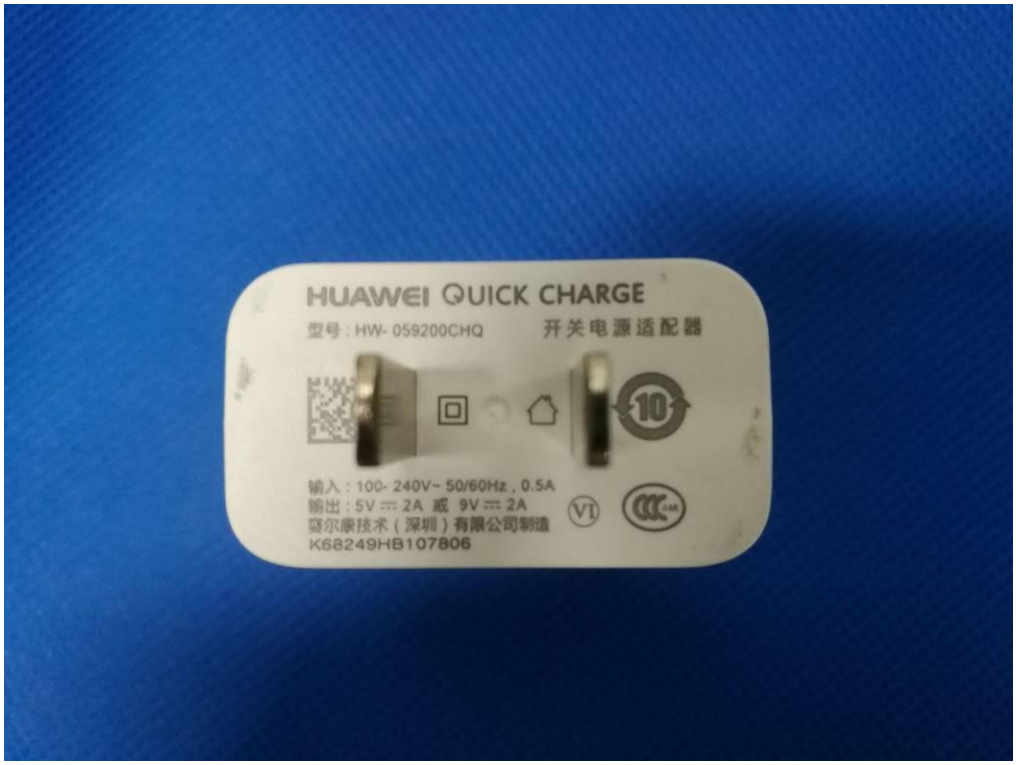


RIGHT VIEW OF EUT



VIEW OF EUT (PORT)

VIEW OF ADAPTER (AE)



The adapter was supplied by HUAK

----END OF REPORT----