FCC TEST REPORT

FCC PART 15 SUBPART C 15.236

Test report

On Behalf of

Innovative Concepts and Design LLC

For

Body-worn Wireless Microphone

Model No.: UHF-6000BP

FCC ID: 2AE6GUHF-6000BP-R2

Prepared for :	**Innovative Concepts and Design LLC** **107 Trumbull Street, Bldg F8, Elizabeth, New Jersey, 07206-2165 United States**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**

Date of Test:	**Dec. 10, 2018 ~ Dec. 17, 2018**
Date of Report:	**Dec. 17, 2018**
Report Number:	**HK1811141564E**

TEST RESULT CERTIFICATION

Applicant's name	Innovative Concepts and Design LLC
Address	107 Trumbull Street, Bldg F8, Elizabeth, New Jersey, 07206-2165 United States
Manufacture's Name	Innovative Concepts and Design LLC
Address	107 Trumbull Street, Bldg F8, Elizabeth, New Jersey, 07206-2165 United States

Product description

Trade Mark:	Gemini
Product name	Body-worn Wireless Microphone
Model and/or type reference	UHF-6000BP
Standards	FCC Rules and Regulations Part 15 Subpart C Section 15.236 ANSI C63.10: 2013

Date of Test	:	
Date (s) of performance of tests	:	Dec. 10, 2018 ~ Dec. 17, 2018
Date of Issue	:	Dec. 17, 2018
Test Result	:	**Pass**

Testing Engineer : 

(Gary Qian)

Technical Manager : 

(Eden Hu)

Authorized Signatory : 

(Jason Zhou)

Table of Contents **Page**

1. TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.236(d)	Maximum radiated power	Compliant
§15.236(f)(2)	Occupied bandwidth	Compliant
§15.236(f)(3)	Frequency stability	Compliant
§15.236(g)	Emissions within the band and outside this band	Compliant
§15.207(a)	Conducted Emission	N/A

Note: N/A means it's not applicable to this item.

1.2 TEST FACILITY

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

Address : 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, 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	512MHz ~ 537.5MHz
Maximum Radiated Power	9.89dBm
Modulation	FM
Number of channels	256(Channel Spacing is 100kHz)
Antenna Gain	0dBi
Antenna Designation	Integrated Antenna (Met 15.203 Antenna requirement)
Hardware Version	UHF-6000BP REV-C2
Software Version	UHF-6000BP REV-C2
Power Supply	DC 3V by Battery

2.2 OPERATION OF EUT DURING TESTING

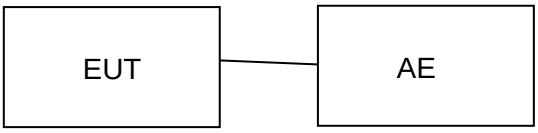
NO.	TEST MODE DESCRIPTION
1	Transmitting mode(Low channel)
2	Transmitting mode(Middle channel)
3	Transmitting mode(High channel)

Note:

1. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
2. All the requirements have been tested by modulating the transmitter with a 2.5 kHz tone at a fixed level which set to the manufacturer's maximum rated input to the modulator.

2.3 DESCRIPTION OF TEST SETUP

Operation of EUT during Radiation and Above1GHz Radiation testing:



Item	Equipment	Model No.	ID or Specification	Remark
1	Headset	N/A	N/A	accessories
2	Microphone	N/A	N/A	accessories

2.4 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.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2017	3 Year

3. MAXIMUM RADIATED POWER

3.1TEST LIMIT

Standard FCC 15.236

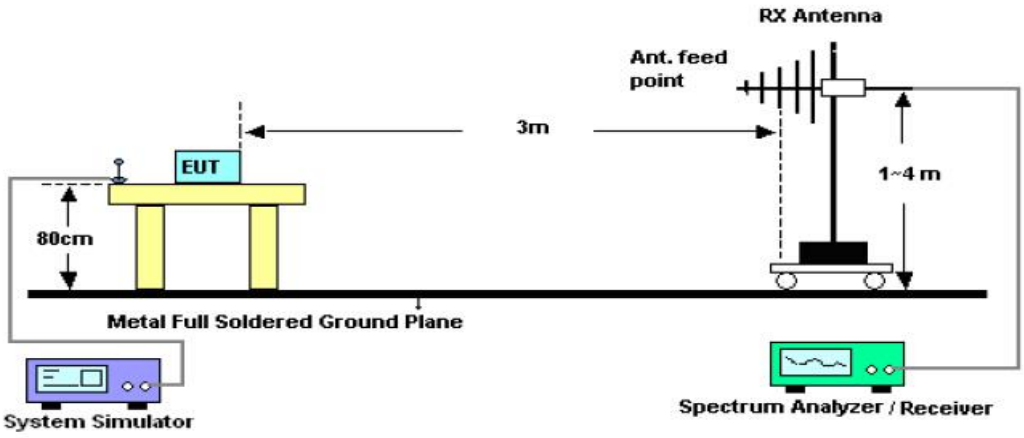
In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP； In the 600 MHz guard bands including the duplex gap: 20 mW EIRP

3.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. EIRP[dBm] = E[dB(μV)/m]− 95.2

3.3. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



3.4. TEST RESULT

Frequency MHz	Polarization	Reading dBm	Factor dB	Level dBm Peak	Limit dBm Average	Margin dB	Pass/Fail
512.0	Horizontal	-4.00	10.52	6.52	17.00	10.48	Pass
512.0	Vertical	-0.63	10.52	9.89	17.00	7.11	Pass
524.8	Horizontal	-4.07	10.52	6.45	17.00	10.55	Pass
524.8	Vertical	-0.83	10.52	9.69	17.00	7.31	Pass
537.5	Horizontal	-3.75	10.52	6.77	17.00	10.23	Pass
537.5	Vertical	-0.69	10.52	9.83	17.00	7.17	Pass

4. OCCUPIED BANDWIDTH

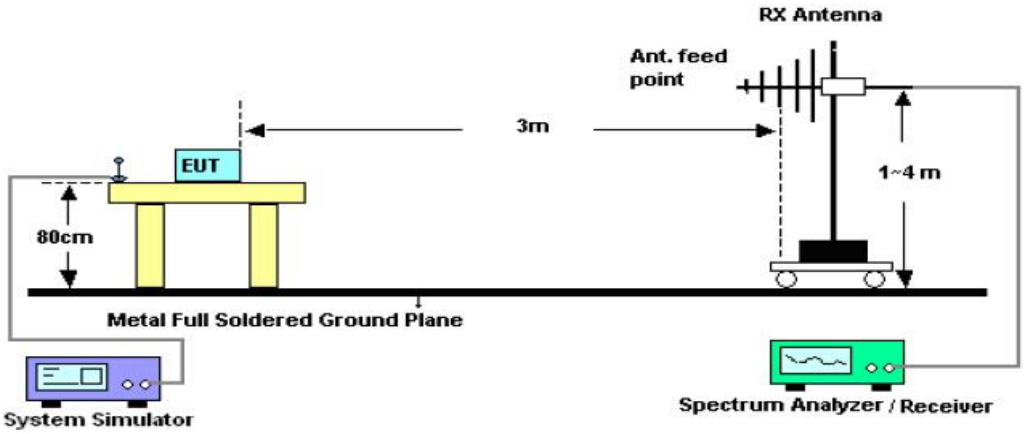
4.1TEST LIMIT

One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200 kHz.

4.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2, Set the EUT Work on operation frequency.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a channel
   The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

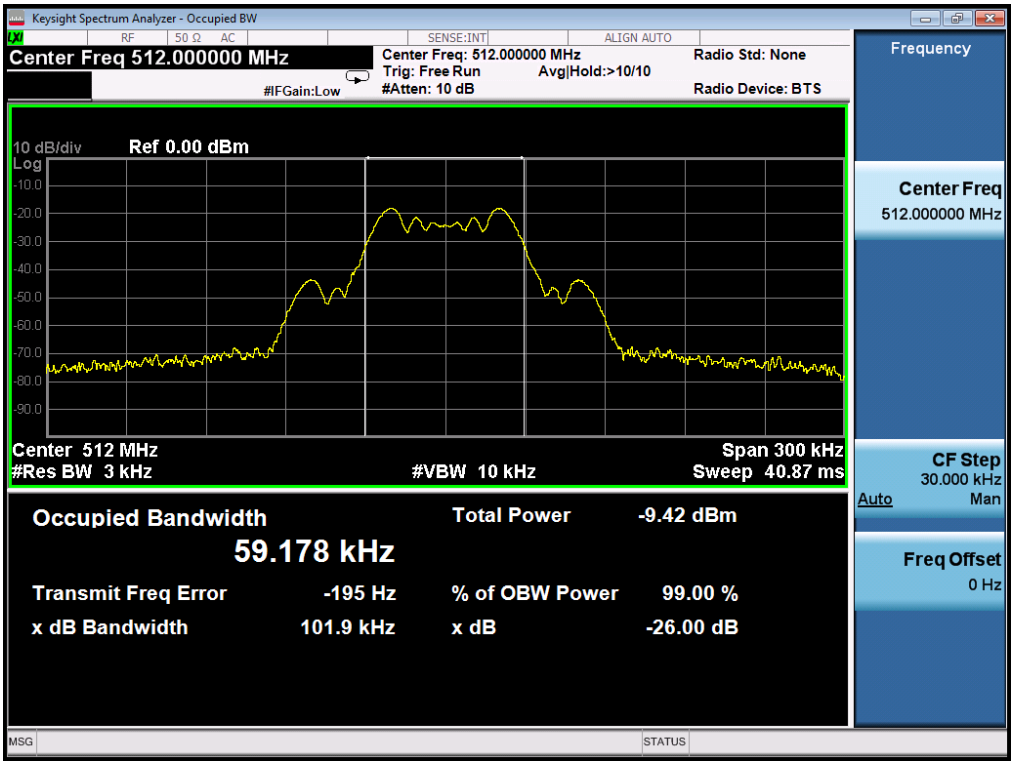
4.3. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



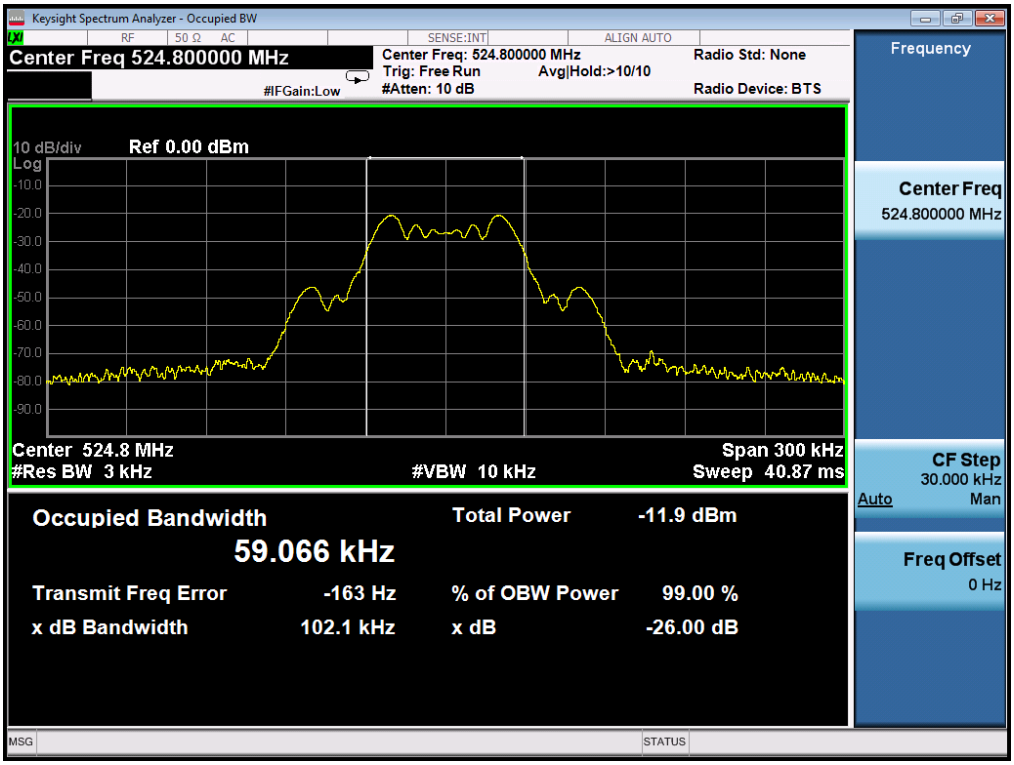
4.4. MEASUREMENT RESULTS

Test Channel	-26dBc EBW (kHz)	99% OBW (kHz)	Limit (kHz)
512.0MHz	101.9	59.178	200
524.8MHz	102.1	59.066	200
537.5MHz	101.8	59.190	200

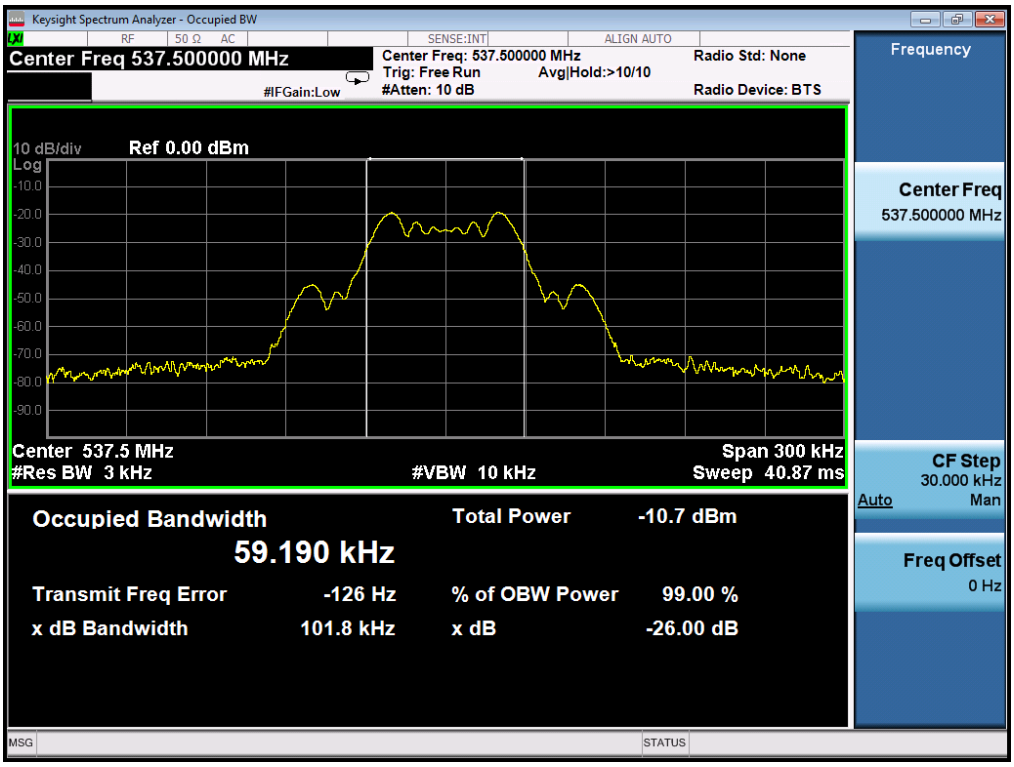
TEST PLOT OF BANDWIDTH-Low Channel



TEST PLOT OF BANDWIDTH-Middle Channel



TEST PLOT OF BANDWIDTH-High Channel



5. EMISSIONS WITHIN THE BAND AND OUTSIDE THIS BAND

5.1TEST LIMIT

Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in §8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08).

Emissions outside of this band shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 V1.4.2 (2011-08).

5.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. EIRP[dBm] = E[dB(μV)/m]− 95.2

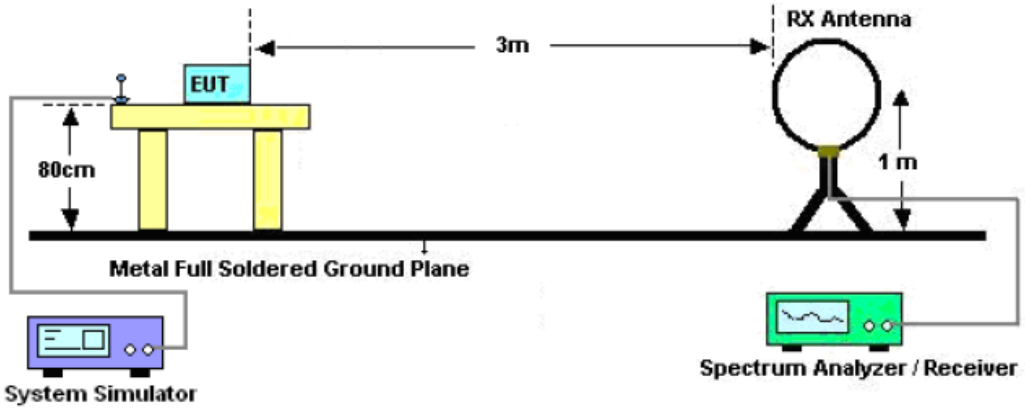
The following table is the setting of spectrum analyzer and receiver.

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	1000MHz~6000MHz/RB 1MHz for QP

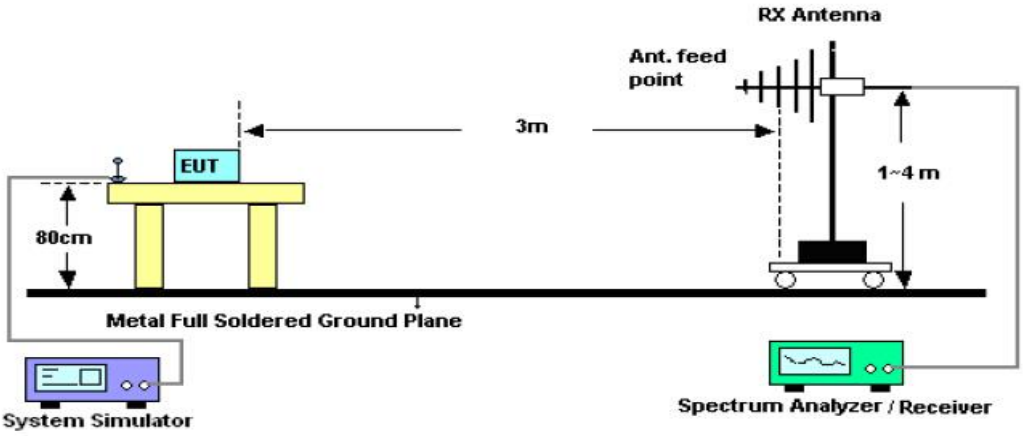
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1000MHz~6000MHz/RB 1MHz for QP

5.3. TEST SETUP

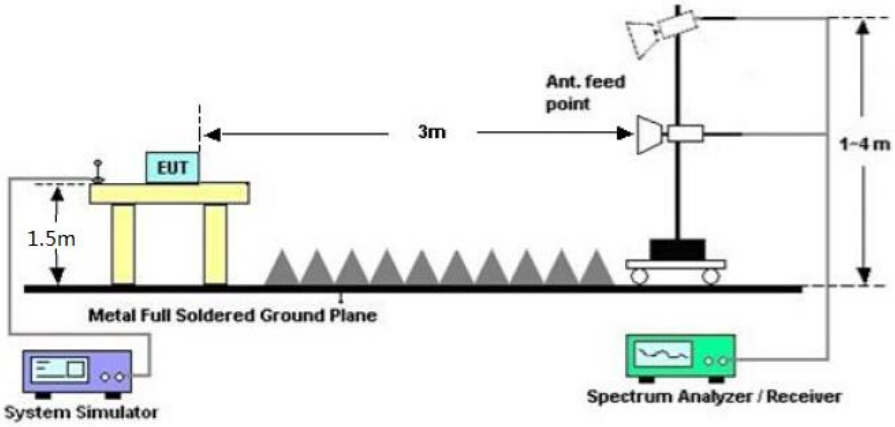
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz

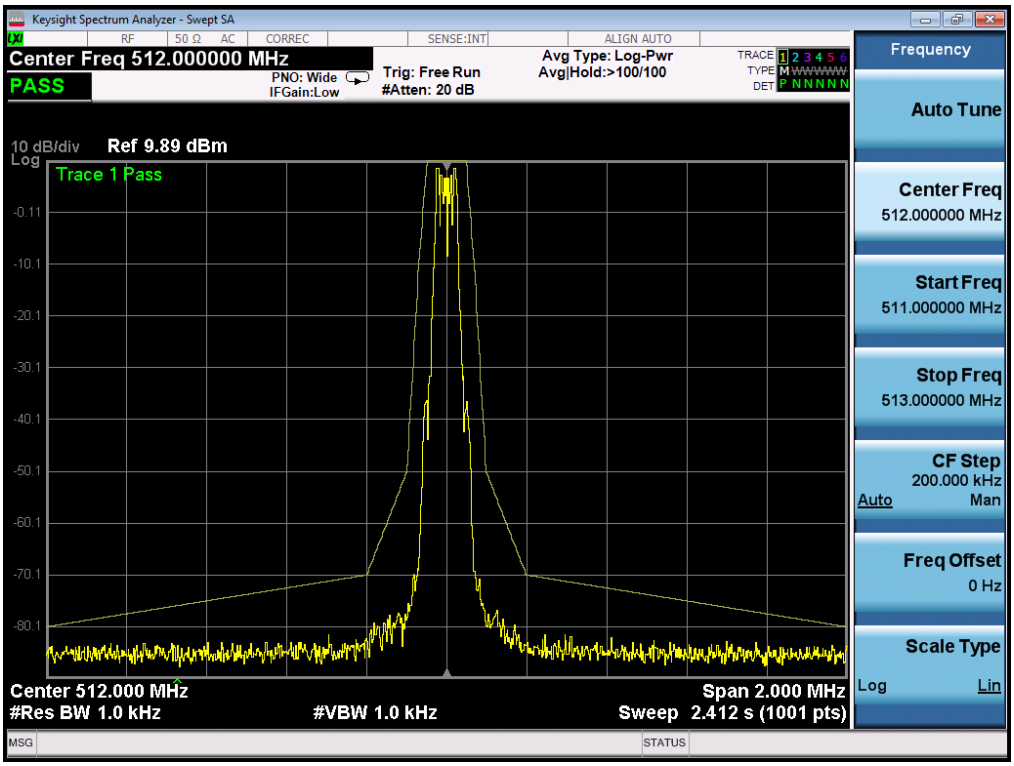


RADIATED EMISSION TEST SETUP ABOVE 1000MHz

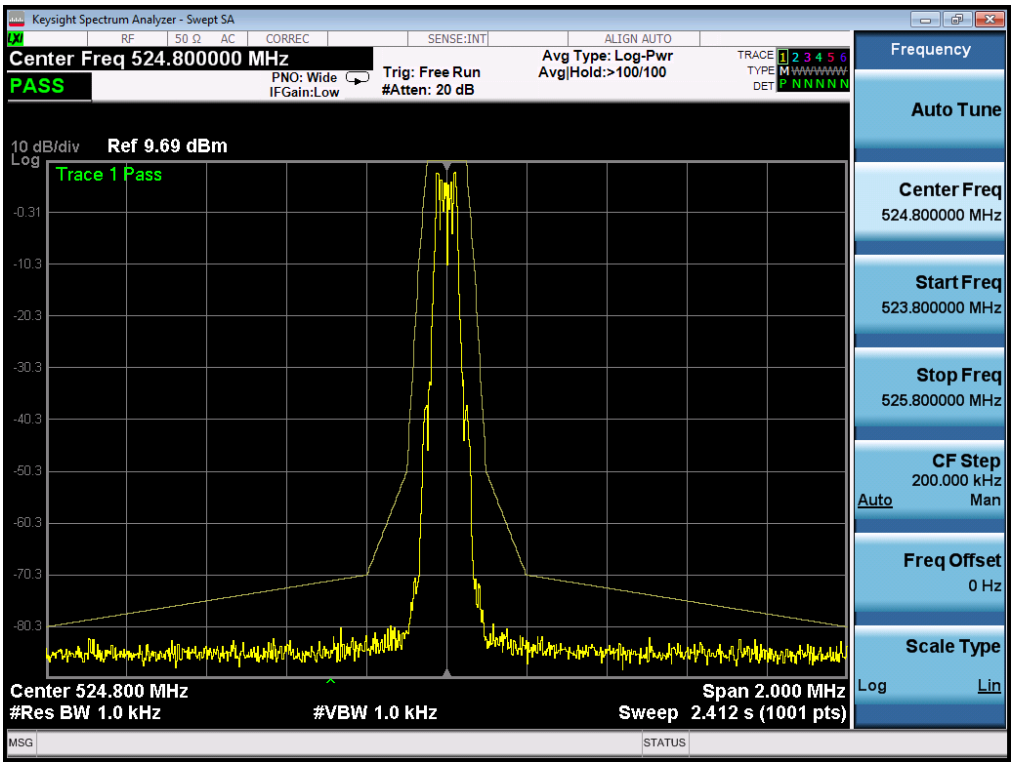


5.4. TEST RESULT

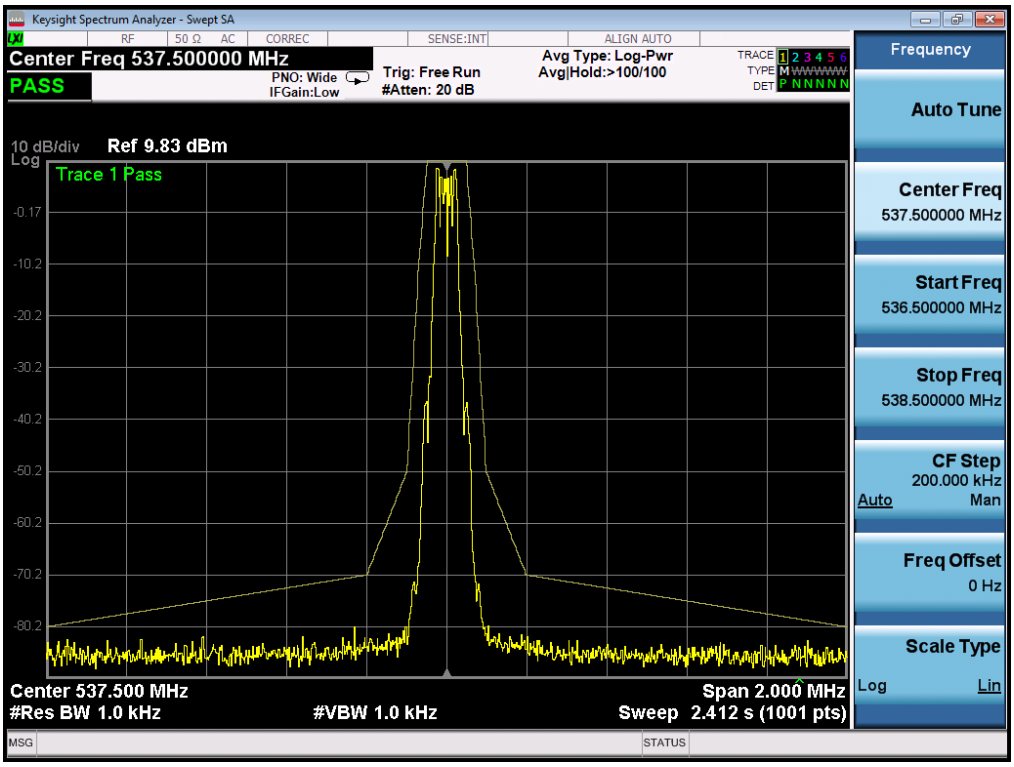
EMISSION MASK(Emissions within the band)-Low Channel



EMISSION MASK(Emissions within the band)-Middle Channel



EMISSION MASK(Emissions within the band)-High Channel



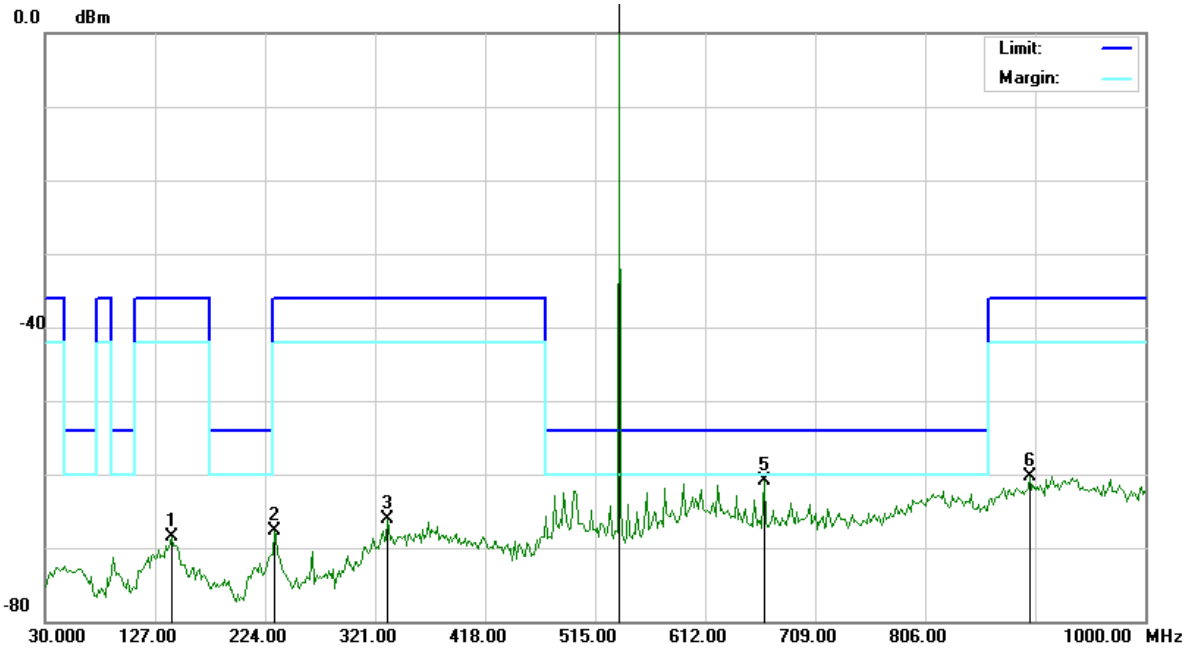
Note: The carrier power is the ref level, and The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

RADIATED EMISSION BELOW 30MHZ

Note: No other emissions found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION 30MHz- 1GHZ

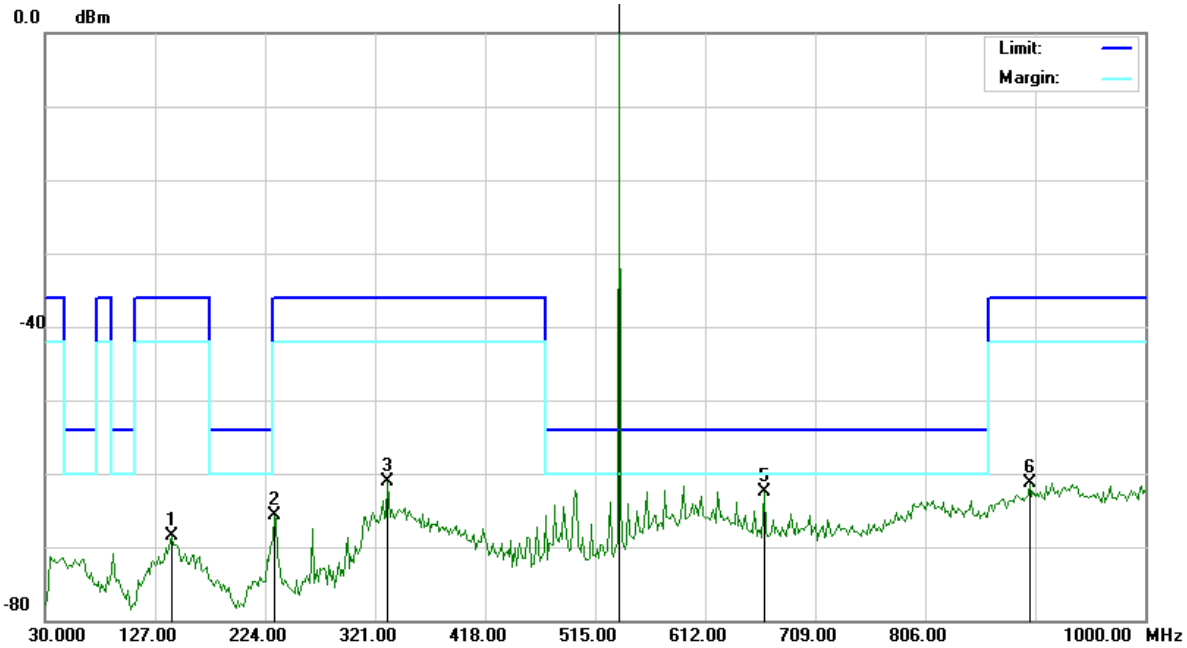
EUT：	Body-worn Wireless Microphone	Model Name. ：	UHF-6000BP
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	Normal
Test Mode ：	Transmitting at 537.5MHz	Polarization :	Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBm	dBm	dBm	dBm	dB		cm	degree	
1		141.5500	-95.72	27.20	-68.52	-36.00	-32.52	peak			
2		232.0832	-91.84	24.14	-67.70	-36.00	-31.70	peak			
3		332.3167	-95.70	29.57	-66.13	-36.00	-30.13	peak			
4	*	537.5007	-27.63	33.39	5.76			peak			
5		663.7332	-97.16	36.22	-60.94	-54.00	-6.94	peak			
6		898.1499	-100.80	40.49	-60.31	-36.00	-24.31	peak			

RESULT: PASS

EUT：	Body-worn Wireless Microphone	Model Name. ：	UHF-6000BP
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	Normal
Test Mode ：	Transmitting at 537.5MHz	Polarization：	Vertical



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBm	dBm	dBm	dBm	dB		cm	degree	
1		141.5500	-95.72	27.20	-68.52	-36.00	-32.52	peak			
2		232.0832	-89.84	24.14	-65.70	-36.00	-29.70	peak			
3		332.3167	-90.70	29.57	-61.13	-36.00	-25.13	peak			
4	*	537.5007	-25.13	33.39	8.26			peak			
5		663.7332	-98.66	36.22	-62.44	-54.00	-8.44	peak			
6		898.1499	-101.80	40.49	-61.31	-36.00	-25.31	peak			

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

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

The high channel TX was the worst case, and only the data of the worst case record in the report.

The emission signal above the limit is the fundamental wave.

RADIATED EMISSION ABOVE 1GHZ

EUT	Body-worn Wireless Microphone	**Model Name.**	UHF-6000BP
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Transmitting at 512.0MHz	**Antenna**	Horizontal/ Vertical

Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Value Type
1024.008	-40.25	2.54	-37.71	-30	-7.71	Horzontal
1024.008	-38.52	2.54	-35.98	-30	-5.98	Vertical
1536.012	-42.33	3.18	-39.15	-30	-9.15	Horzontal
1536.012	-39.51	3.18	-36.33	-30	-6.33	Vertical
Remark:						

EUT	Body-worn Wireless Microphone	**Model Name.**	UHF-6000BP
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Transmitting at 524.8MHz	**Antenna**	Horizontal/ Vertical

Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Value Type
1049.611	-44.55	2.54	-42.01	-30	-12.01	Horzontal
1049.611	-40.36	2.54	-37.82	-30	-7.82	Vertical
1574.422	-39.58	3.18	-36.4	-30	-6.4	Horzontal
1574.422	-36.27	3.18	-33.09	-30	-3.09	Vertical
Remark:						

EUT	Body-worn Wireless Microphone	**Model Name.**	UHF-6000BP
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Transmitting at 537.5MHz	**Antenna**	Horizontal/ Vertical

Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Value Type
1075.012	-44.78	2.54	-42.24	-30	-12.24	Horzontal
1075.012	-41.28	2.54	-38.74	-30	-8.74	Vertical
1612.018	-42.56	3.18	-39.38	-30	-9.38	Horzontal
1612.018	41.24	3.18	44.42	-30	74.42	Vertical
Remark:						

RESULT: PASS

Note:

Other emissions from 1G to 6 GHz are considered as ambient noise. No recording in the test report.

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

6. FREQUENCY STABILITY

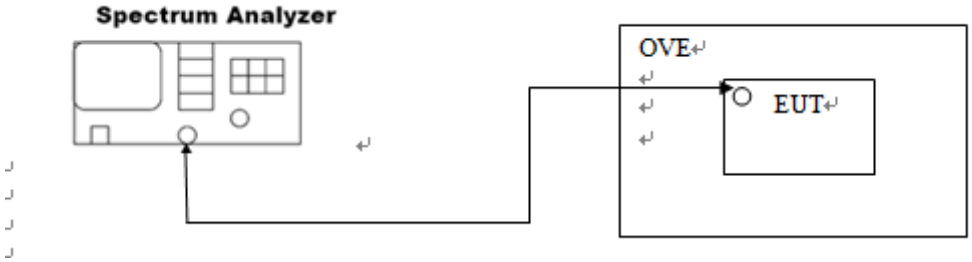
6.1. TEST LIMIT

The frequency tolerance of the carrier signal shall be maintained within ±0.005% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

6.2. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the operation frequency.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 1 KHz, VBW≥3×RBW.
4. Set SPA Trace 1 Max hold, then View.
5. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
6. Extreme temperature rule is -30°C~50°C.

6.3. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



6.4. MEASUREMENT RESULTS

Test frequency: 512.0MHz

Voltage vs. Frequency Stability (Test Temperature: 20℃)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
2.55	512.0079	0.0080	0.0256	PASS
3.00	512.0080			
3.45	512.0080			

Temperature vs. Frequency Stability (Test Voltage: 3.00V)

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 30℃	512.0080	0.0081	0.0256	PASS
- 20℃	512.0080			
-10℃	512.0079			
0℃	512.0078			
10℃	512.0080			
20℃	512.0081			
30℃	512.0081			
40℃	512.0081			
50℃	512.0080			

Test frequency: 524.8MHz

Voltage vs. Frequency Stability (Test Temperature: 20℃)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
2.55	524.8082	0.0089	0.02624	PASS
3.00	524.8082			
3.45	524.8081			

Temperature vs. Frequency Stability (Test Voltage: 3.00V)

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 30℃	524.8080	0.0083	0.02624	PASS
- 20℃	524.8080			
-10℃	524.8082			
0℃	524.8081			
10℃	524.8082			
20℃	524.8083			
30℃	524.8080			
40℃	524.8082			
50℃	524.8082			

Test frequency: 537.5MHz

Voltage vs. Frequency Stability (Test Temperature: 20℃)

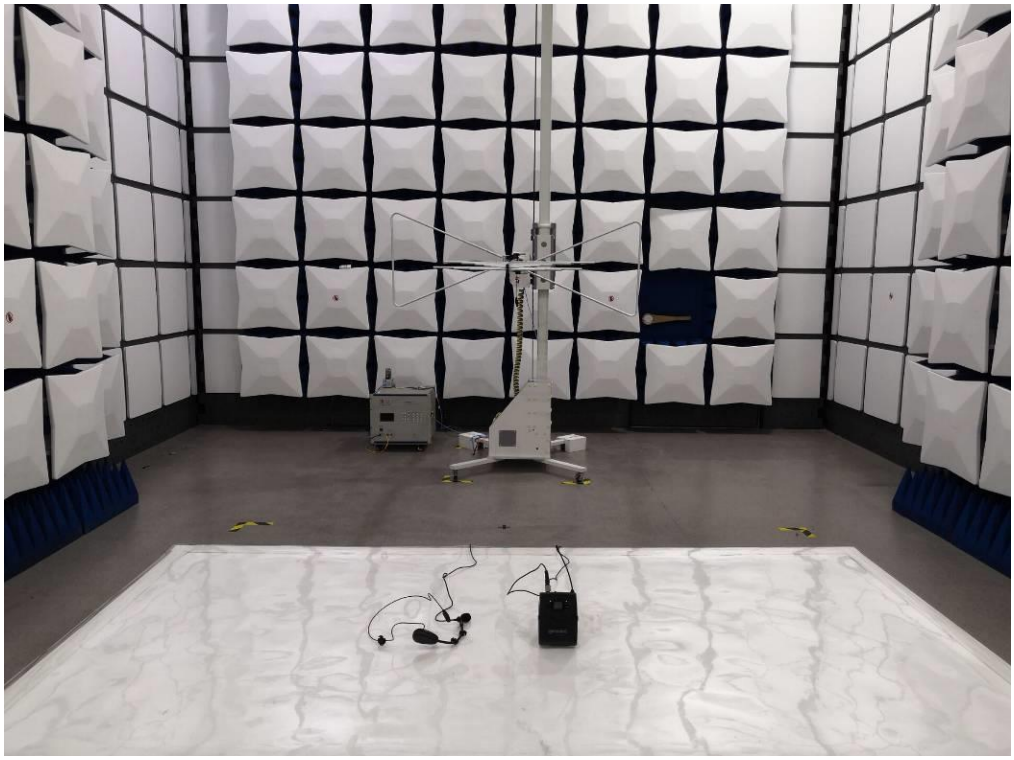
Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
2.55	537.5082	0.0085	0.026875	PASS
3.00	537.5084			
3.45	537.5084			

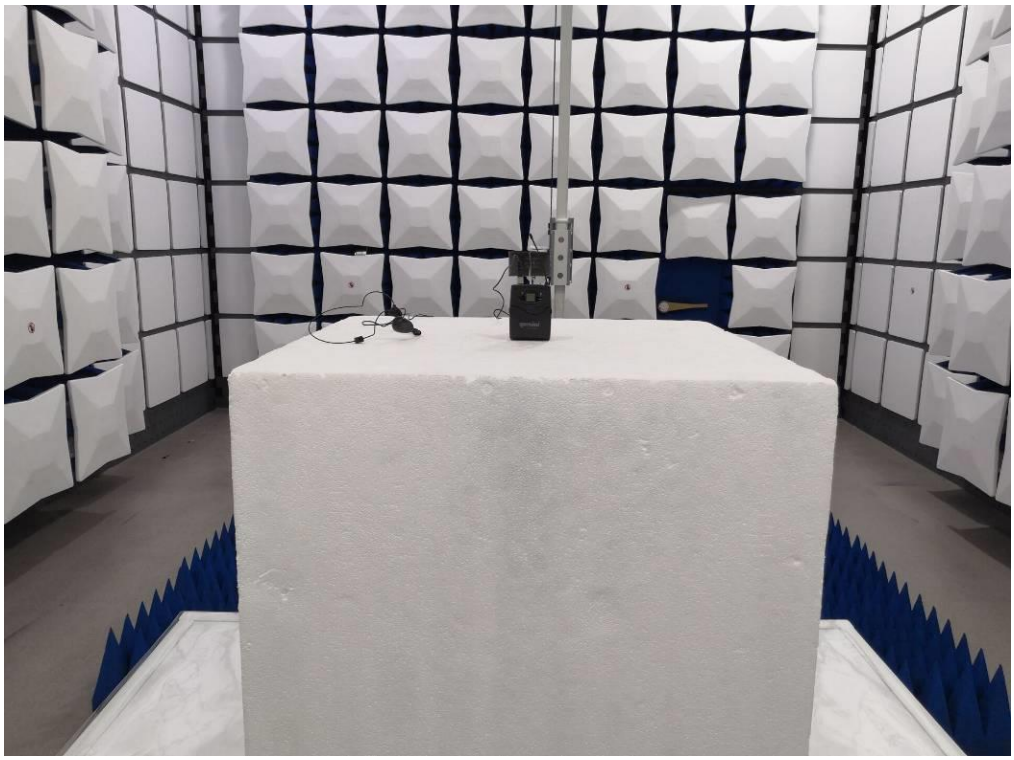
Temperature vs. Frequency Stability (Test Voltage: 3.00V)

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 30℃	537.5084	0.0084	0.026875	PASS
- 20℃	537.5084			
-10℃	537.5082			
0℃	537.5082			
10℃	537.5084			
20℃	537.5082			
30℃	537.5083			
40℃	537.5083			
50℃	537.5084			

7. PHOTOGRAPH OF TEST

Radiated Emission



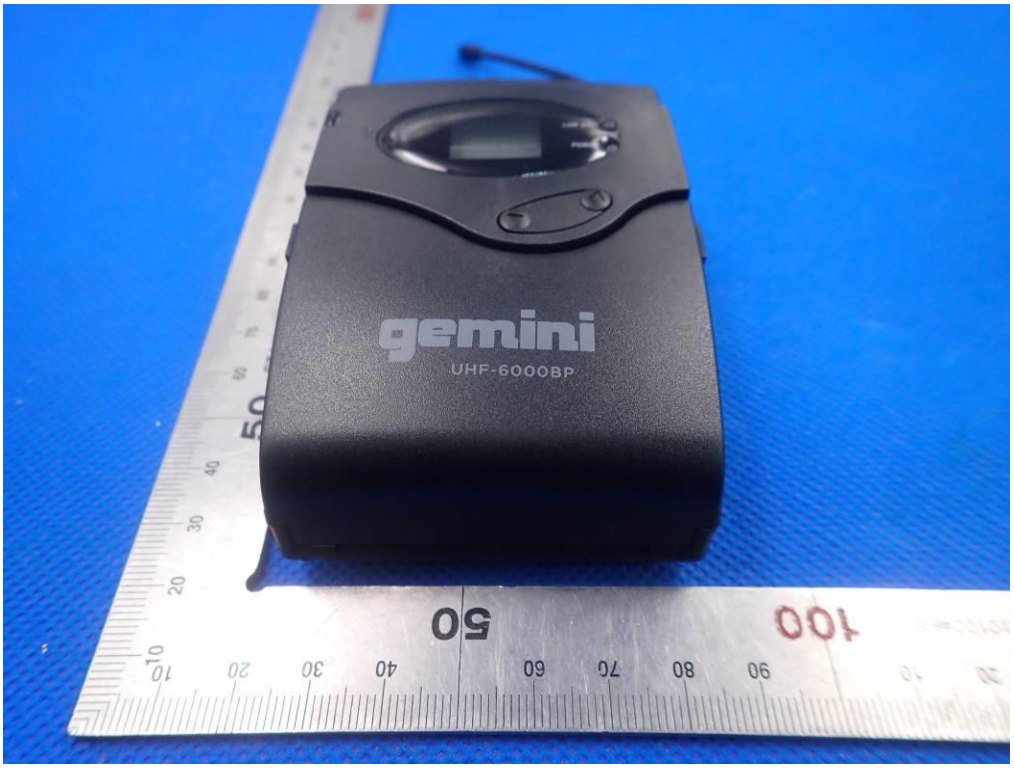


8. PHOTOGRAPHS OF EUT

ALL VIEW OF EUT

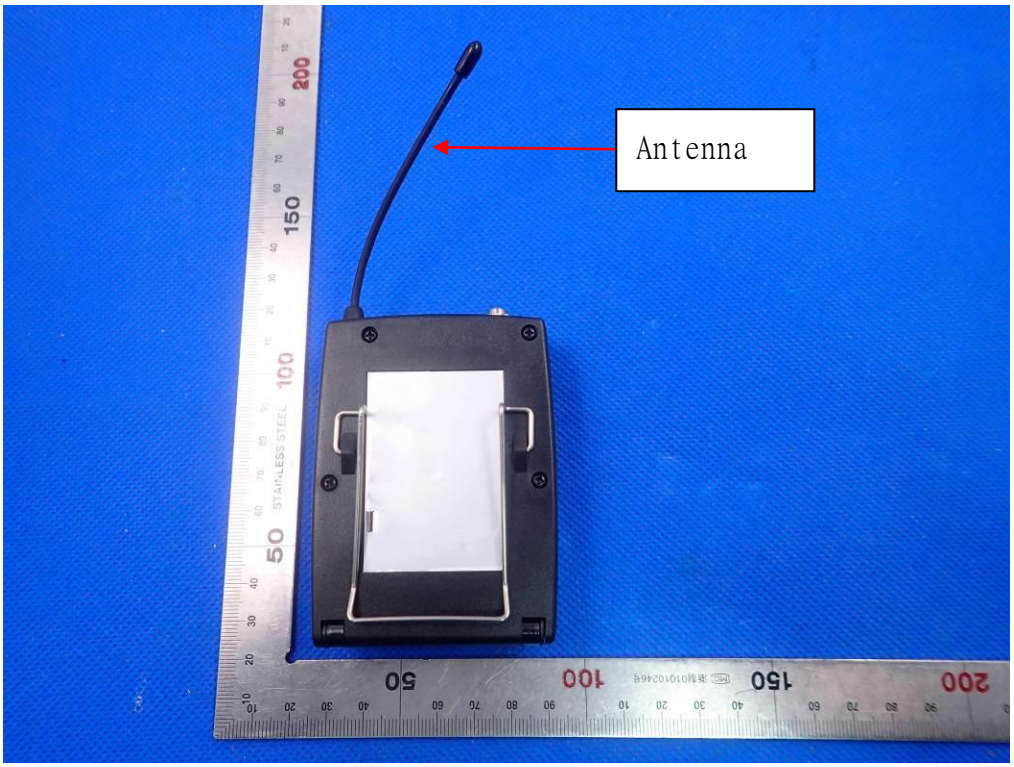
TOP VIEW OF EUT

BOTTOM VIEW OF EUT



FRONT VIEW OF EUT

BACK VIEW OF EUT

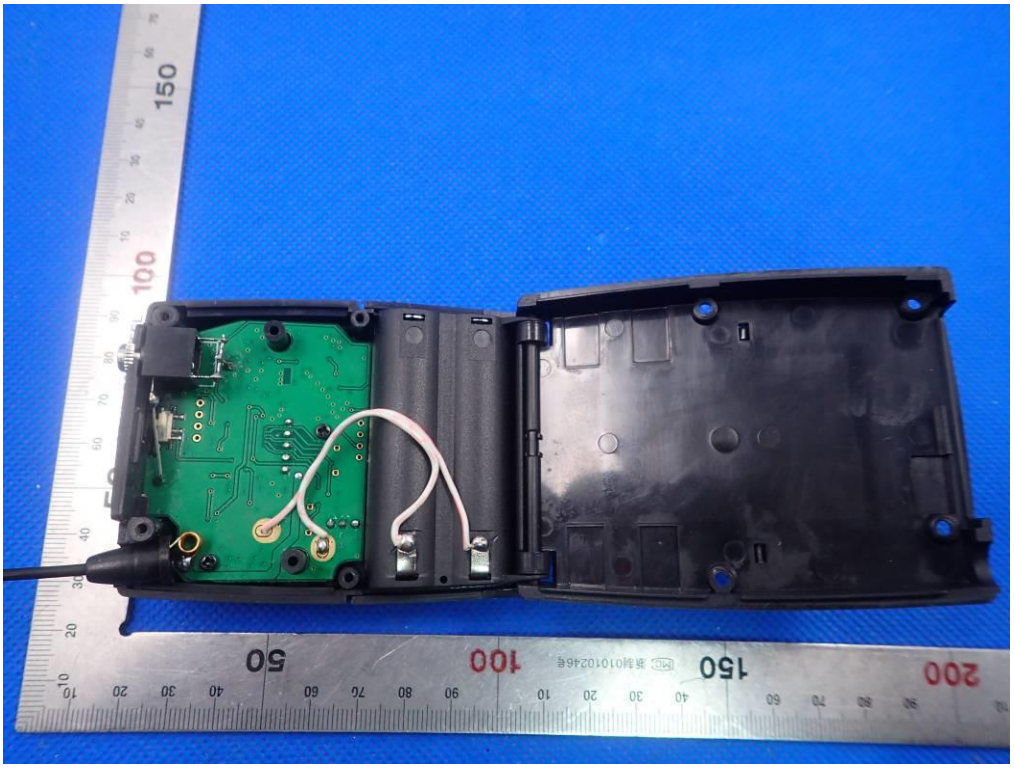


LEFT VIEW OF EUT

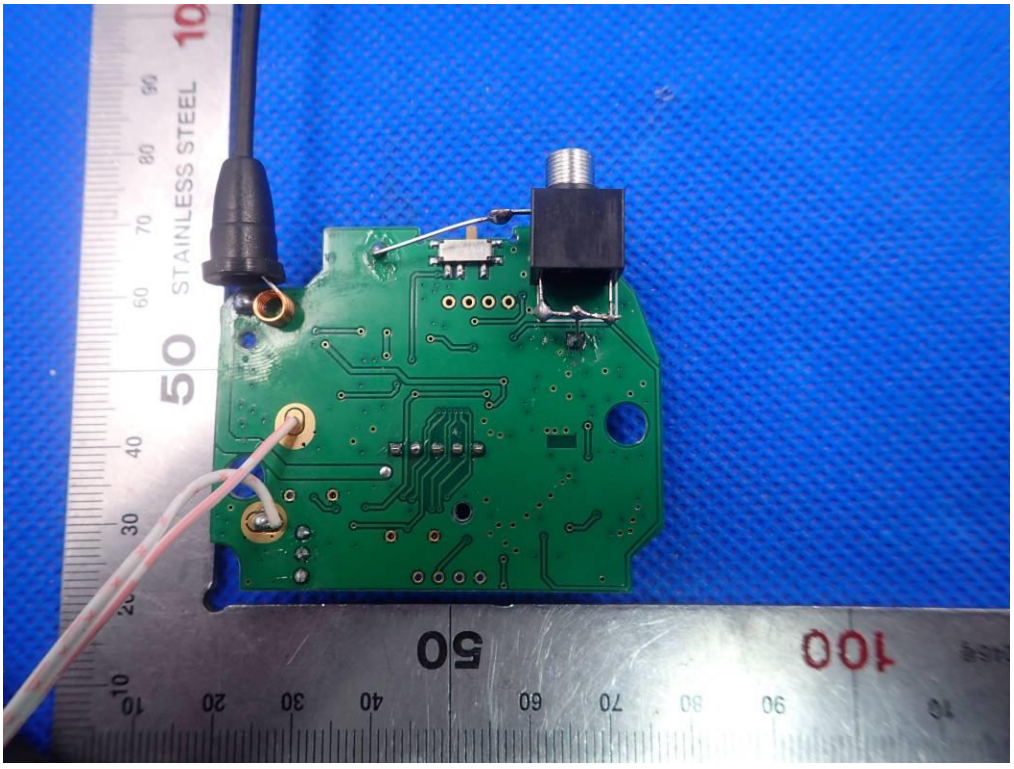
RIGHT VIEW OF EUT

OPEN VIEW 1 OF EUT

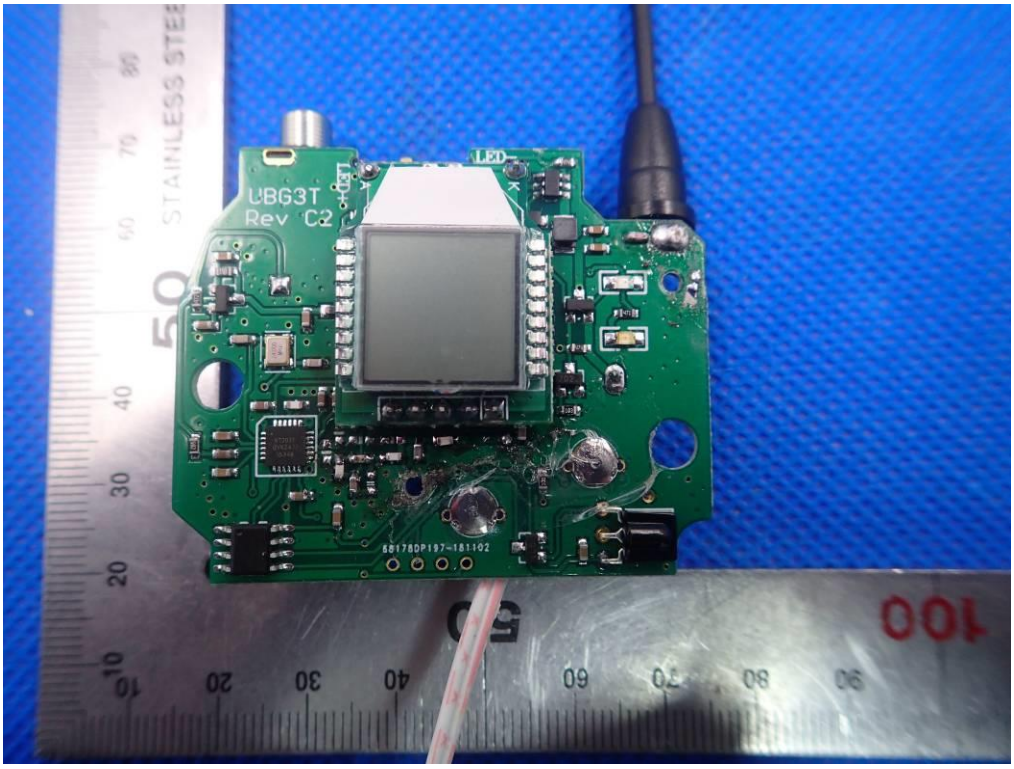
OPEN VIEW 2 OF EUT



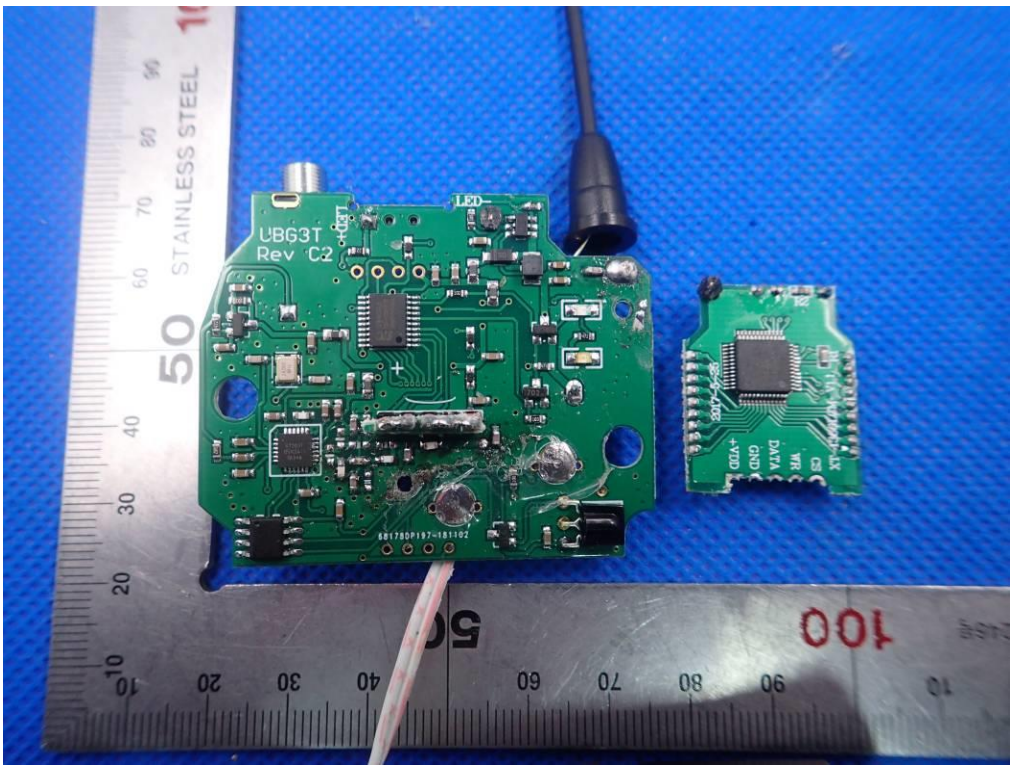
INTERNAL VIEW OF EUT 1



INTERNAL VIEW OF EUT 2



INTERNAL VIEW OF EUT 3



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