



FCC TEST REPORT

FCC PART 15 SUBPART C 15.236

Test report
On Behalf of
Innovative Concepts and Design LLC
For
Wireless Microphone

Model No.: UHF-6000HHM

FCC ID: 2AE6GUHF-6000HHM-R2

Prepared for : **Innovative Concepts and Design LLC**
107 Trumbull Street, Bldg F8, Elizabeth, New Jersey, 07206-2165 United States

Prepared By : **Shenzhen HUAKE 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: **HK1811141563E**



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 Wireless Microphone

Model and/or type reference UHF-6000HHM

Standards FCC Rules and Regulations Part 15 Subpart C Section 15.236
ANSI C63.10: 2013


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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)



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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 HUAKE 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	9.42dBm
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-6000HHM REV-D1
Software Version	UHF-6000HHM REV-D1
Power Supply	DC 3.0V 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:

EUT

**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	Schwarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC05184 5SE	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

3.1 TEST LIMIT

Standard FCC 15.236

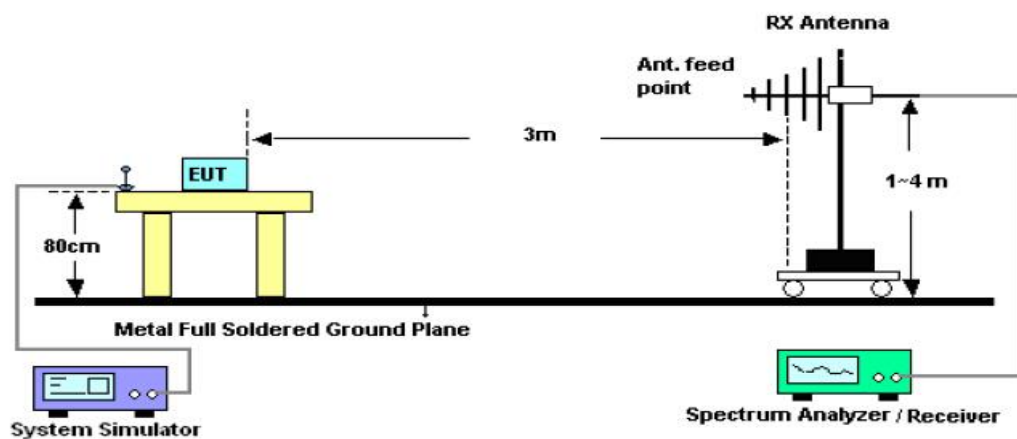
In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP; In the 600 MHz guard bands including the duplex gap: 20 mW EIRP

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. $EIRP[dBm] = E[dB(\mu V)/m] - 95.2$

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	-3.08	10.52	7.44	17.00	9.56	Pass
512.0	Vertical	-1.10	10.52	9.42	17.00	7.58	Pass
524.8	Horizontal	-3.16	10.52	7.36	17.00	9.64	Pass
524.8	Vertical	-1.29	10.52	9.23	17.00	7.77	Pass
537.5	Horizontal	-3.34	10.52	7.18	17.00	9.82	Pass
537.5	Vertical	-1.31	10.52	9.21	17.00	7.79	Pass

4. OCCUPIED BANDWIDTH

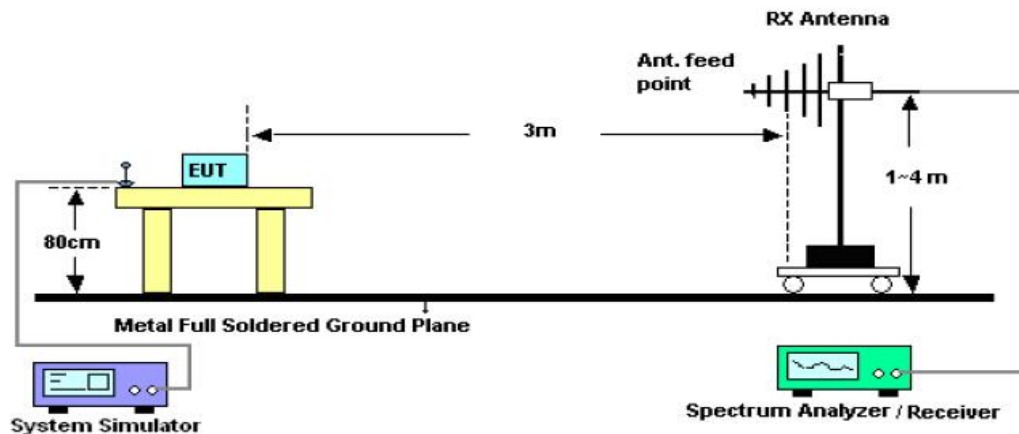
4.1 TEST LIMIT

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)

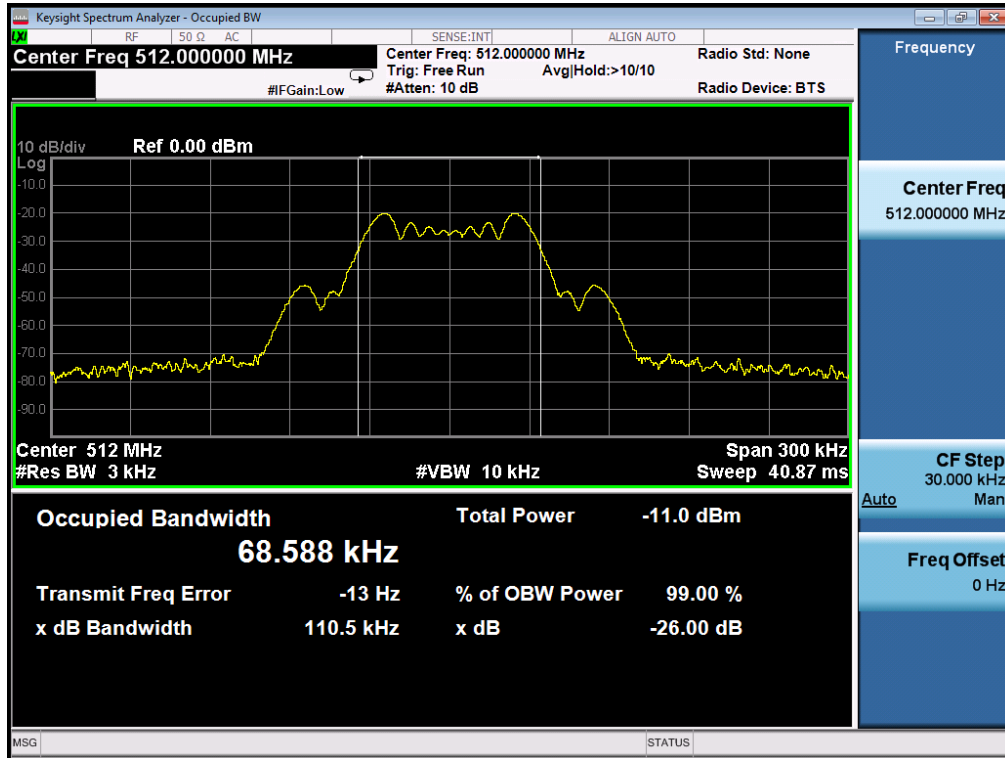




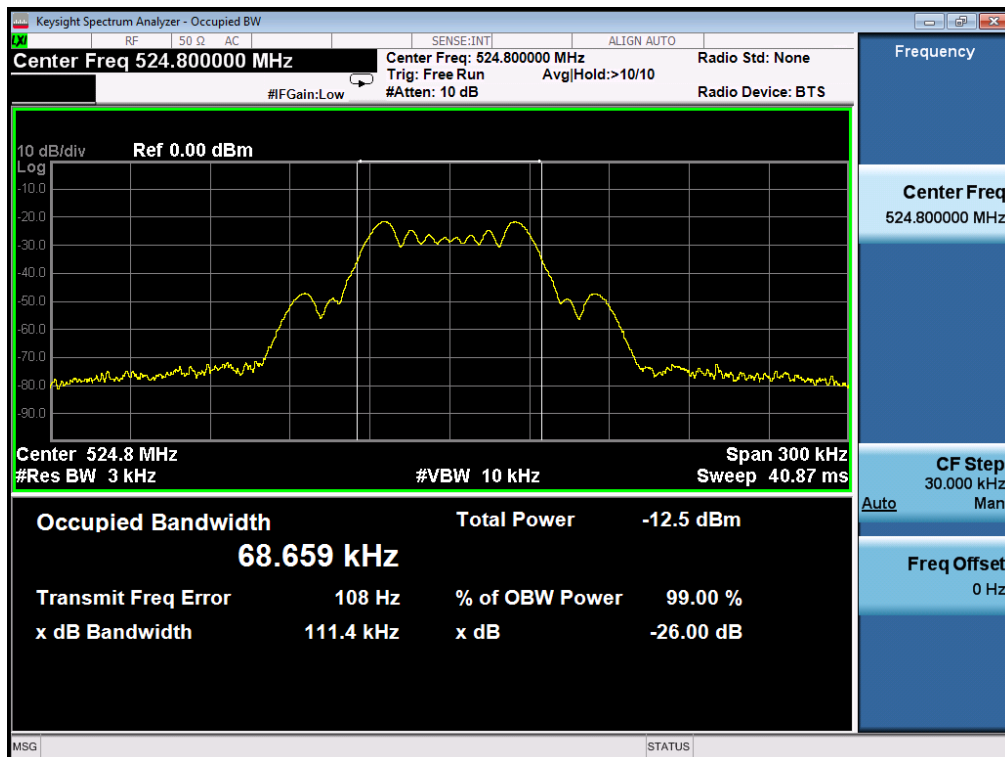
4.4. MEASUREMENT RESULTS

Test Channel	-26dBc EBW (kHz)	99% OBW (kHz)	Limit (kHz)
512.0MHz	110.5	68.588	200
524.8MHz	111.4	68.659	200
537.5MHz	110.8	68.543	200

TEST PLOT OF BANDWIDTH-Low Channel

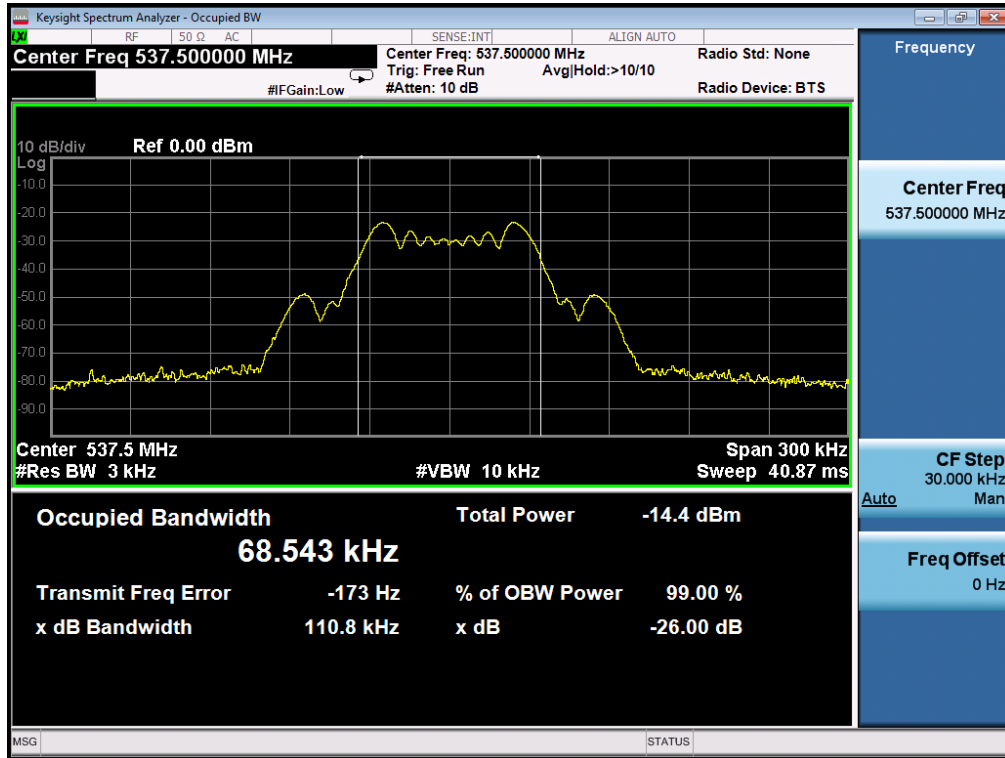


TEST PLOT OF BANDWIDTH-Middle Channel





TEST PLOT OF BANDWIDTH-High Channel





5. EMISSIONS WITHIN THE BAND AND OUTSIDE THIS BAND

5.1 TEST 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. $EIRP[dBm] = E[dB(\mu V)/m] - 95.2$

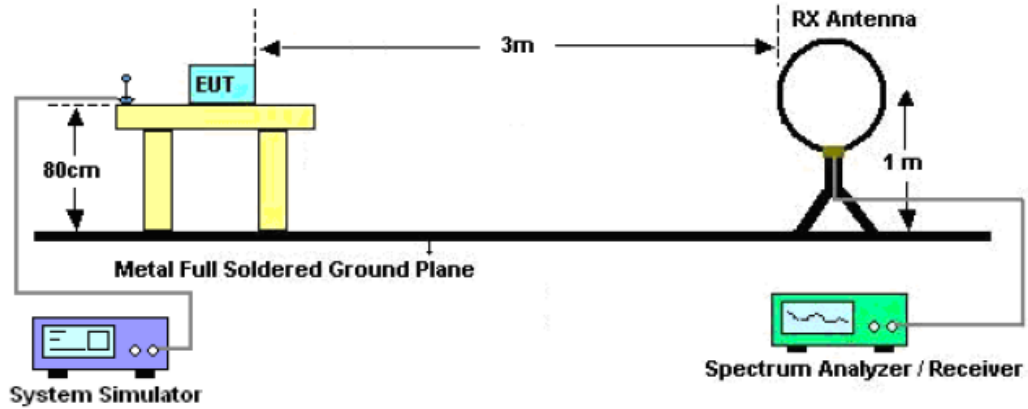
The following table is the setting of spectrum analyzer and receiver.

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

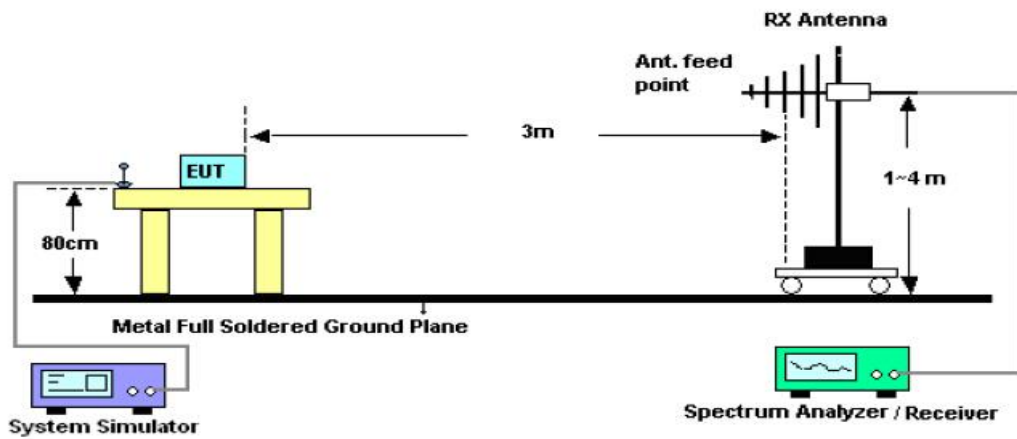
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1000MHz~6000MHz/RB 1MHz for QP

5.3. TEST SETUP

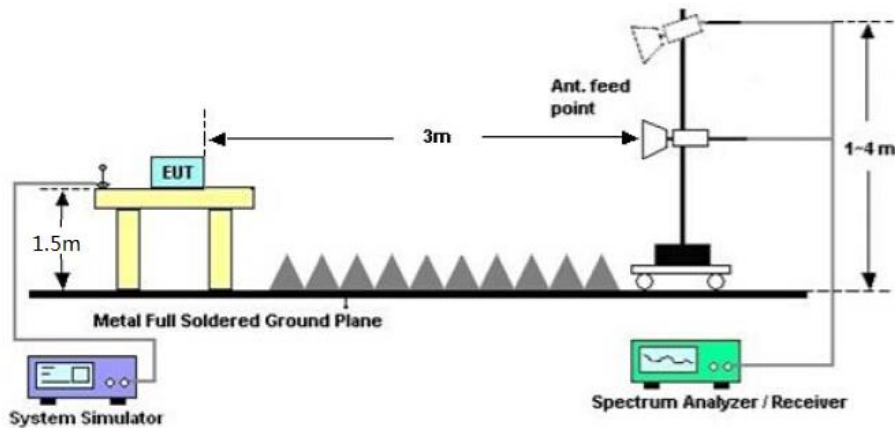
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



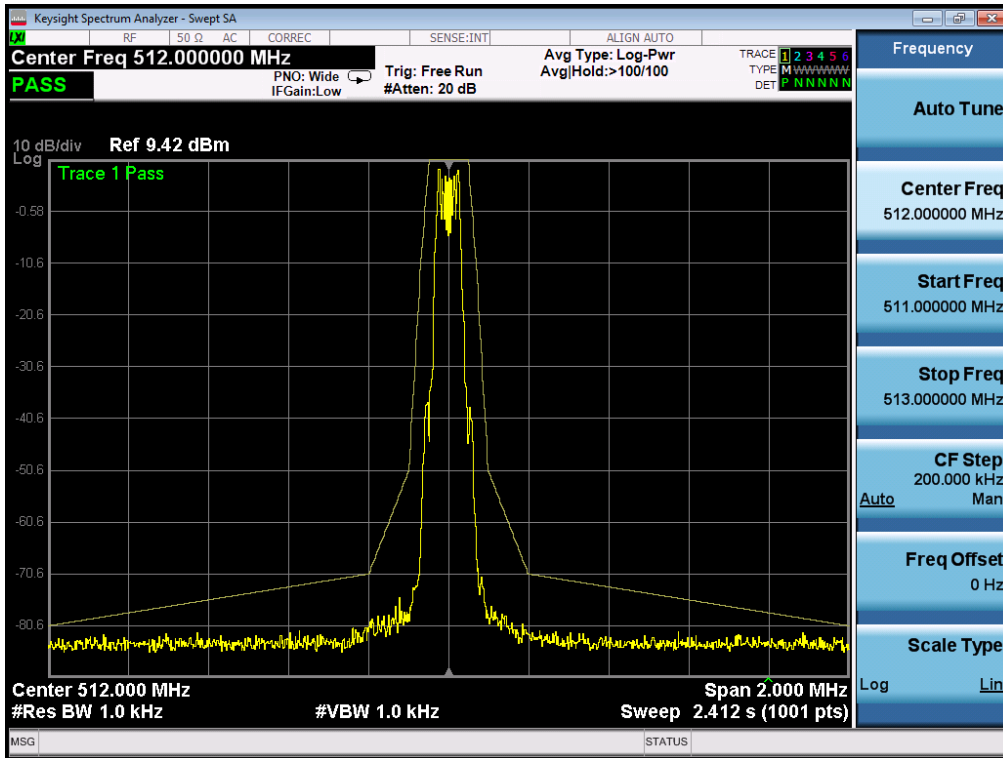
RADIATED EMISSION TEST SETUP ABOVE 1000MHz



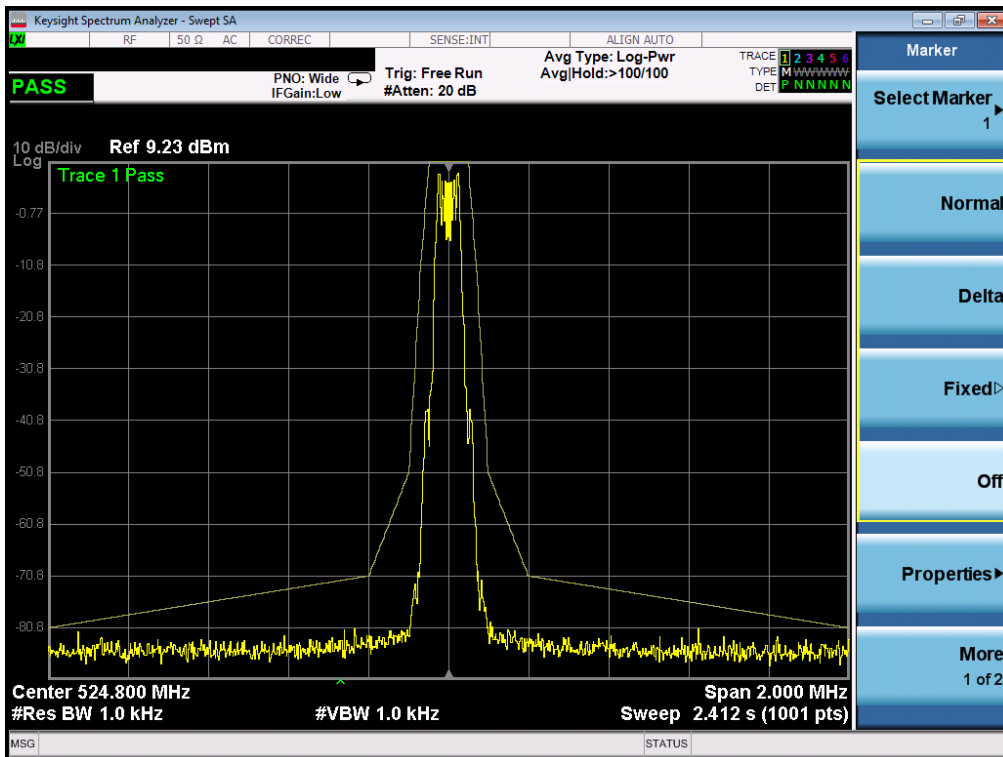


5.4. TEST RESULT

EMISSION MASK(Emissions within the band)-Low Channel

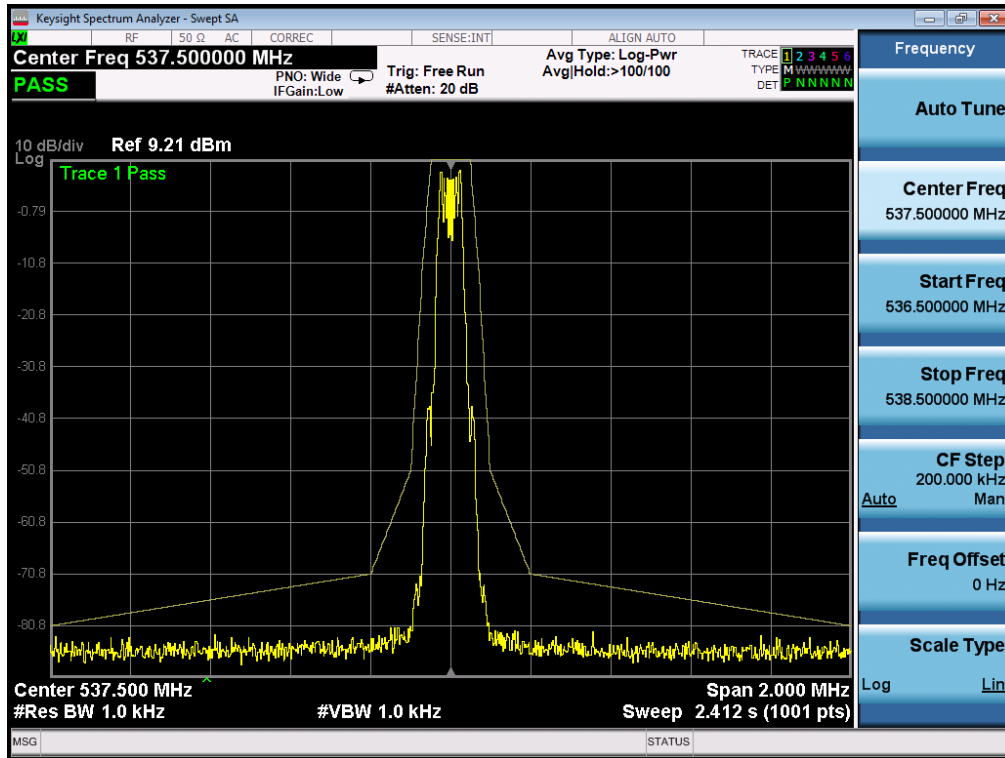


EMISSION MASK(Emissions within the band)-Middle Channel





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.

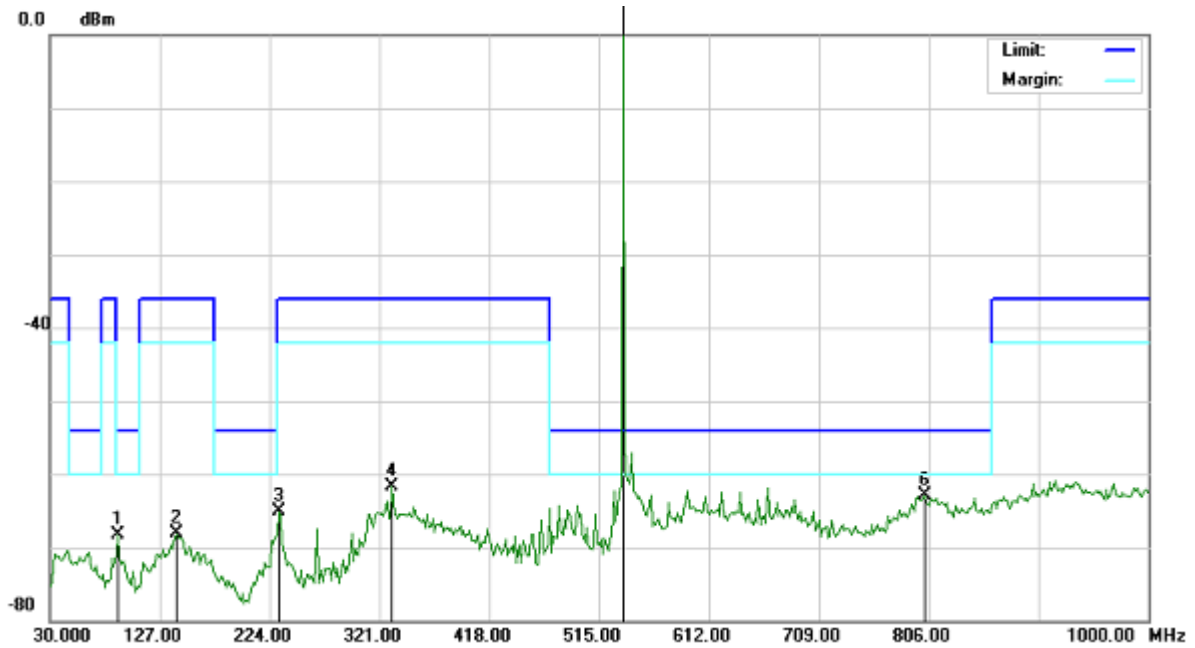


RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION 30MHz- 1GHZ

EUT :	Wireless Microphone	Model Name. :	UHF-6000HHM
Temperature :	20 °C	Relative Humidity:	48%
Pressure :	1010 hPa	Test Voltage :	Normal
Test Mode :	Transmitting at 537.5MHz	Polarization :	Horizontal

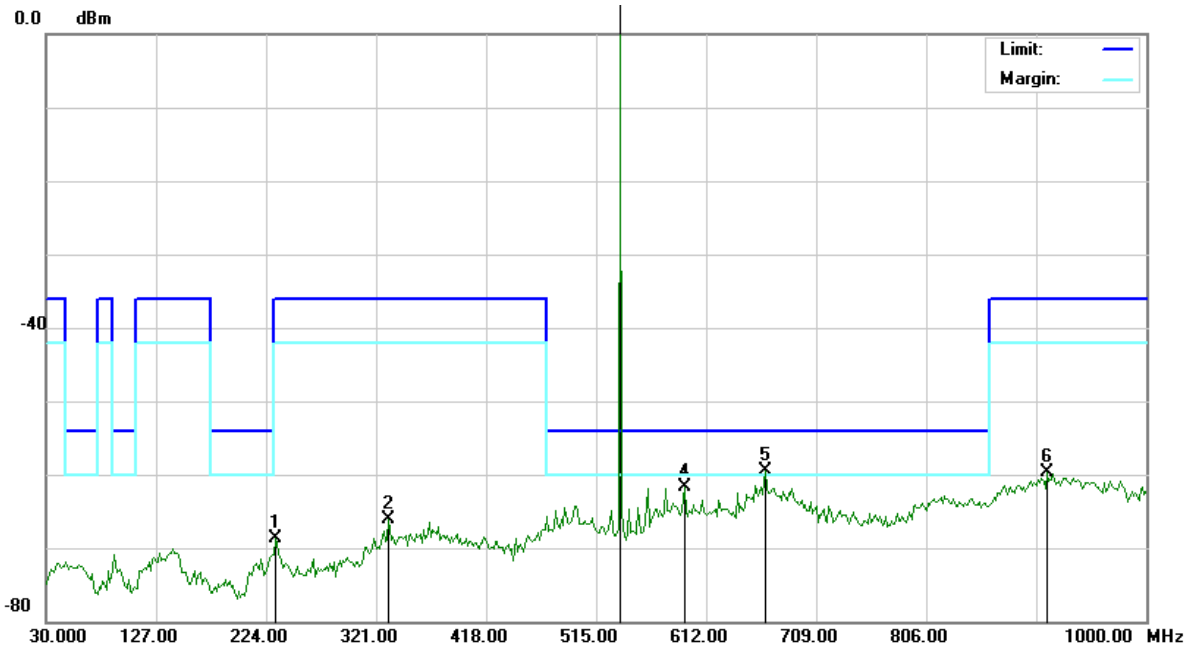


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBm	dBm	dBm	dBm	dB		cm	degree	
1		89.8162	-85.65	17.31	-68.34	-54.00	-14.34	peak			
2		141.5500	-95.22	27.20	-68.02	-36.00	-32.02	peak			
3		232.0832	-89.34	24.14	-65.20	-36.00	-29.20	peak			
4		332.3167	-91.20	29.57	-61.63	-36.00	-25.63	peak			
5	*	537.5007	-29.13	33.39	4.26			peak			
6		802.7667	-102.20	39.21	-62.99	-54.00	-8.99	peak			

RESULT: PASS



EUT :	Wireless Microphone	Model Name. :	UHF-6000HHM
Temperature :	20 °C	Relative Humidity :	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		232.0832	-92.84	24.14	-68.70	-36.00	-32.70	peak			
2		332.3167	-95.70	29.57	-66.13	-36.00	-30.13	peak			
3	*	537.5007	-27.13	33.39	6.26			peak			
4		592.5999	-96.26	34.54	-61.72	-54.00	-7.72	peak			
5	!	663.7332	-95.66	36.22	-59.44	-54.00	-5.44	peak			
6		912.7000	-100.65	40.96	-59.69	-36.00	-23.69	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	Wireless Microphone	Model Name.	UHF-6000HHM
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	-44.47	2.54	-41.93	-30	-11.93	Horizontal
1024.008	-40.52	2.54	-37.98	-30	-7.98	Vertical
1536.112	-43.71	3.18	-40.53	-30	-10.53	Horizontal
1536.113	-41.24	3.18	-38.06	-30	-8.06	Vertical

Remark:

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

EUT	Wireless Microphone	Model Name.	UHF-6000HHM
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
1049.608	-43.25	2.54	-40.71	-30	-10.71	Horizontal
1049.608	-41.33	2.54	-38.79	-30	-8.79	Vertical
1574.412	-45.25	3.18	-42.07	-30	-12.07	Horizontal
1574.412	-40.36	3.18	-37.18	-30	-7.18	Vertical

Remark:

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

EUT	Wireless Microphone	Model Name.	UHF-6000HHM
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
1075.004	-44.27	2.54	-41.73	-30	-11.73	Horizontal
1075.004	-40.28	2.54	-37.74	-30	-7.74	Vertical
1612.009	-43.15	3.18	-39.97	-30	-9.97	Horizontal
1612.009	-39.68	3.18	-36.5	-30	-6.5	Vertical

Remark:

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

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

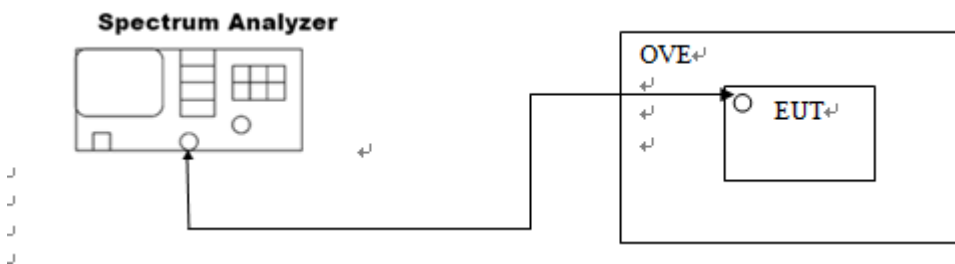
6.1. TEST LIMIT

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.005\%$ 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, $VBW \geq 3 \times RBW$.
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 $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$.

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





6.4. MEASUREMENT RESULTS

Test frequency: 512.0MHz

Voltage vs. Frequency Stability (Test Temperature: 20°C)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
2.55	512.0086	0.0086	0.0256	PASS
3.00	512.0085			
3.45	512.0085			

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

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 30°C	512.0084	0.0087	0.0256	PASS
- 20°C	512.0084			
-10°C	512.0085			
0°C	512.0084			
10°C	512.0085			
20°C	512.0087			
30°C	512.0085			
40°C	512.0087			
50°C	512.0087			

Test frequency: 524.8MHz

Voltage vs. Frequency Stability (Test Temperature: 20°C)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
2.55	524.8089	0.0089	0.02624	PASS
3.00	524.8088			
3.45	524.8089			



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

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 30°C	524.8089	0.0089	0.02624	PASS
- 20°C	524.8089			
-10°C	524.8087			
0°C	524.8088			
10°C	524.8087			
20°C	524.8087			
30°C	524.8088			
40°C	524.8088			
50°C	524.8086			

Test frequency: 537.5MHz

Voltage vs. Frequency Stability (Test Temperature: 20°C)

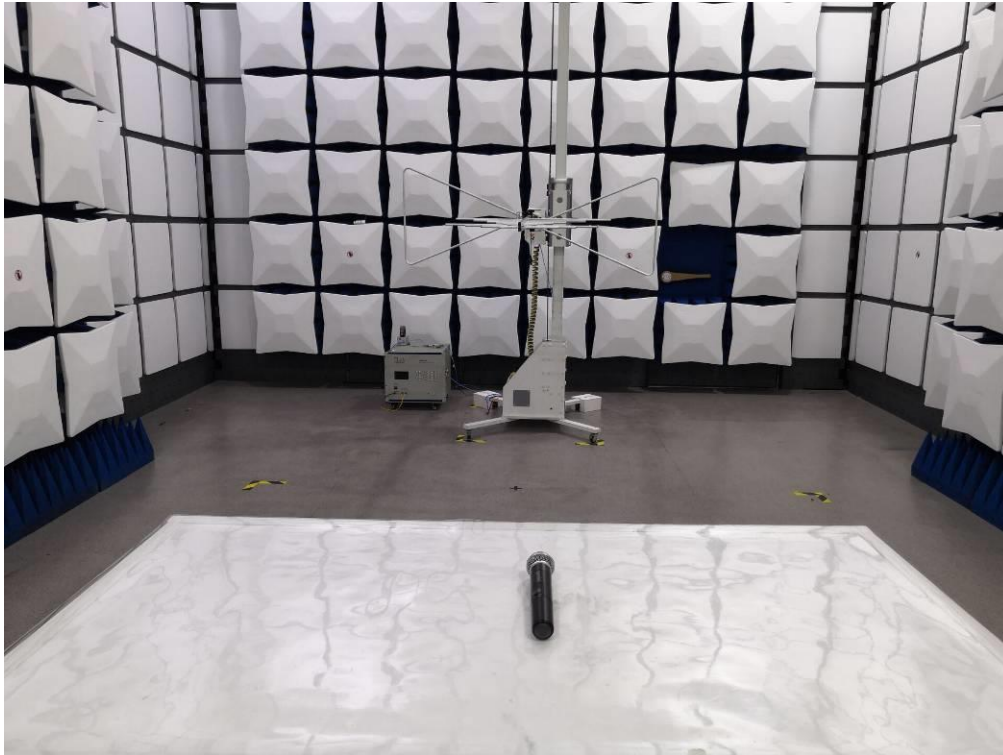
Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
2.55	537.5084	0.0085	0.026875	PASS
3.00	537.5085			
3.45	537.5084			

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

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 30°C	537.5083	0.0083	0.026875	PASS
- 20°C	537.5083			
-10°C	537.5082			
0°C	537.5083			
10°C	537.5082			
20°C	537.5081			
30°C	537.5082			
40°C	537.5082			
50°C	537.5083			

7. PHOTOGRAPH OF TEST

Radiated Emission



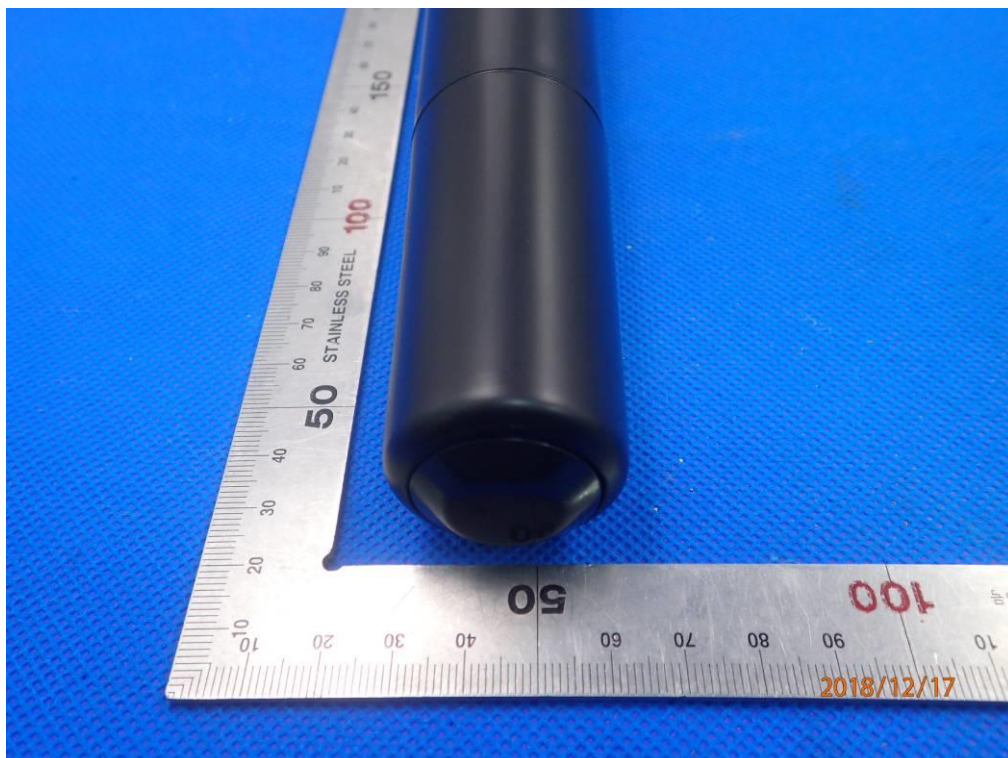


8. PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT





FRONT VIEW OF EUT



BACK VIEW OF EUT





LEFT VIEW OF EUT



RIGHT VIEW OF EUT



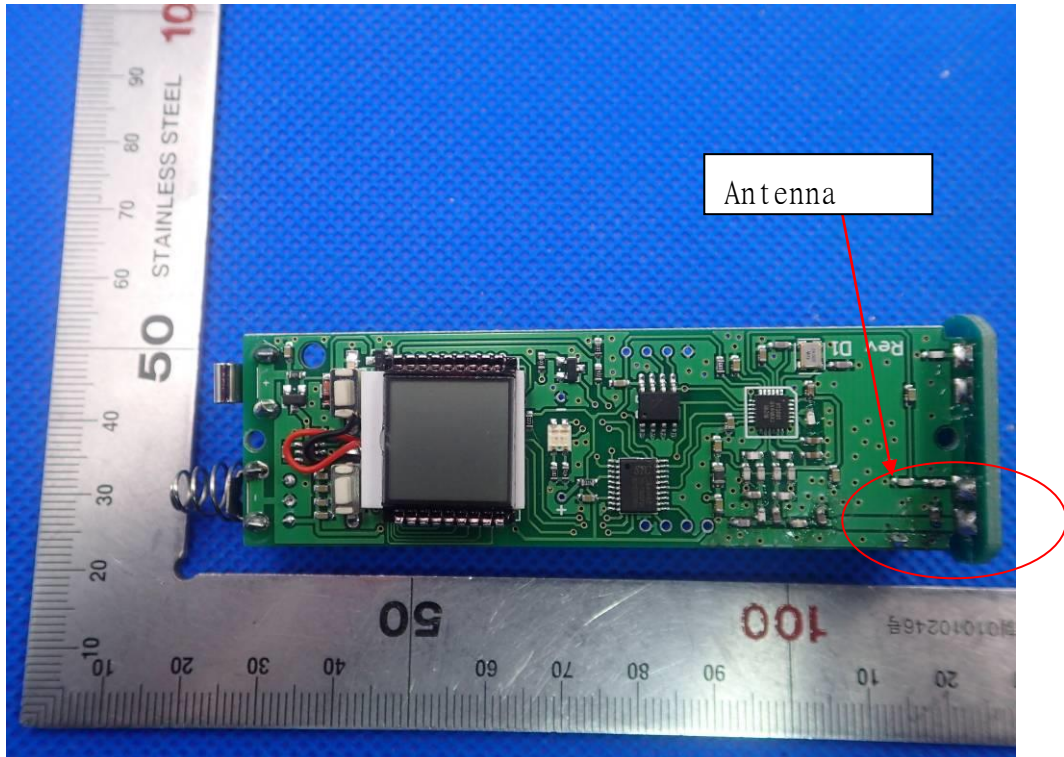
OPEN VIEW 1 OF EUT



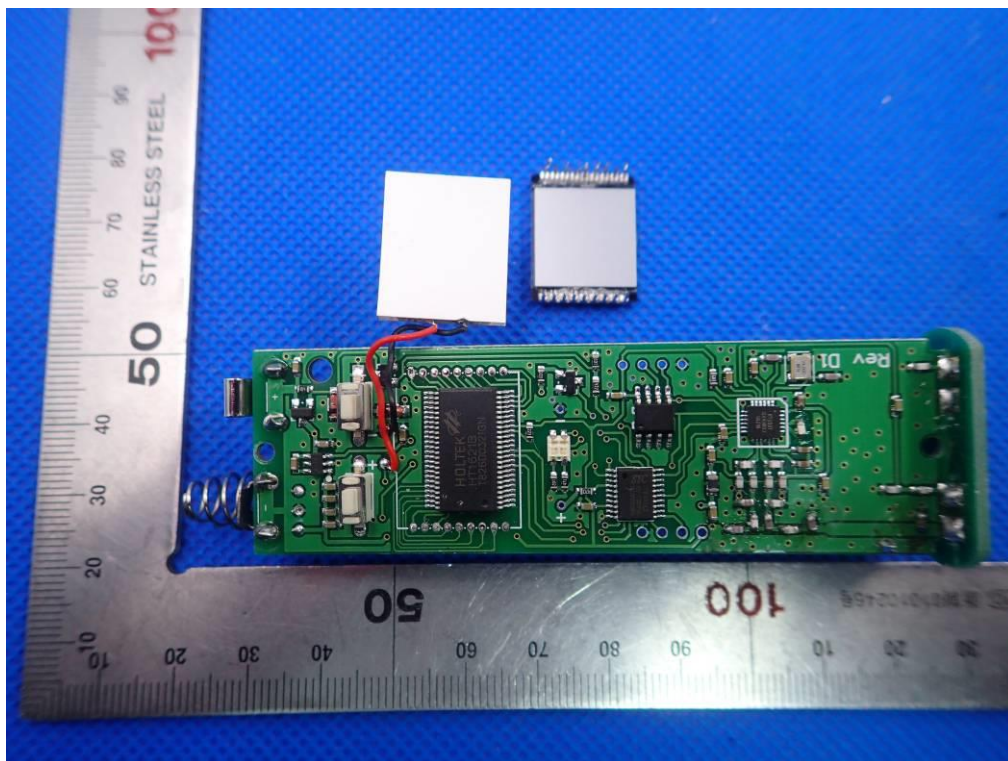
OPEN VIEW 2 OF EUT



INTERNAL VIEW OF EUT 1

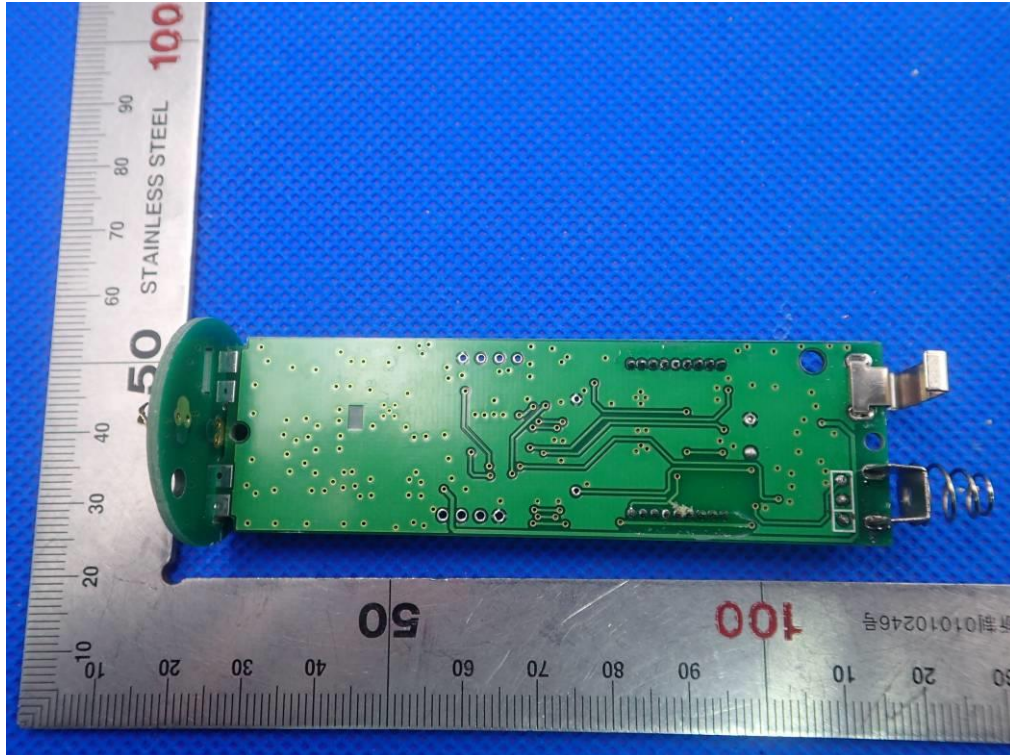


INTERNAL VIEW OF EUT 2

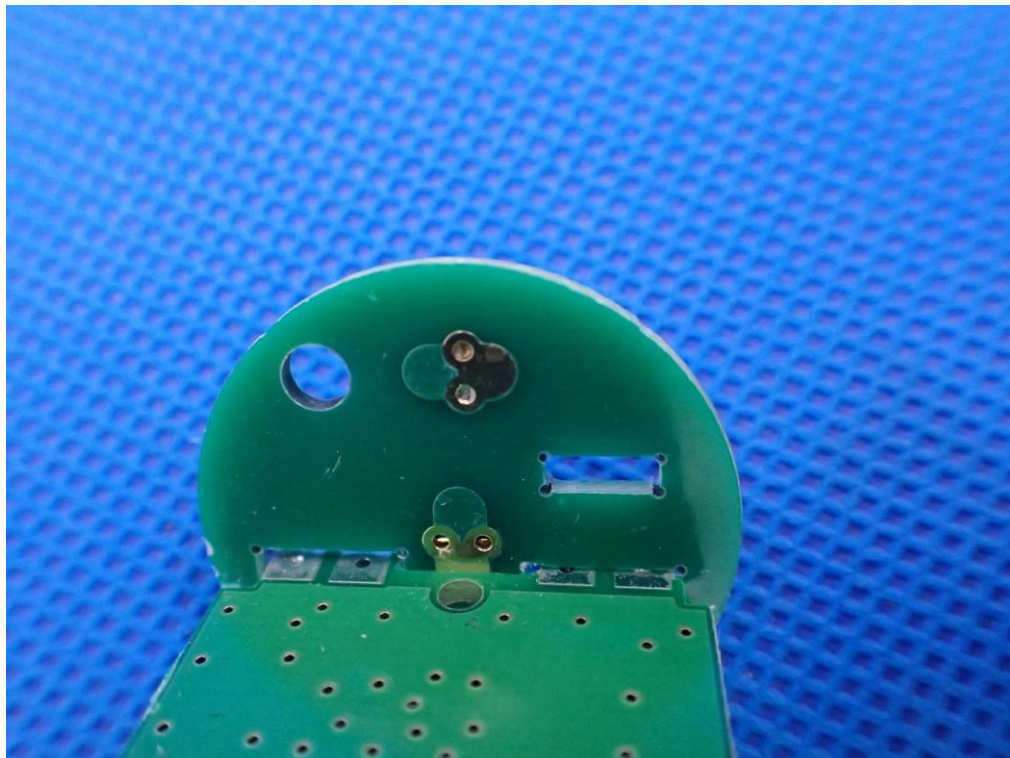




INTERNAL VIEW OF EUT 3

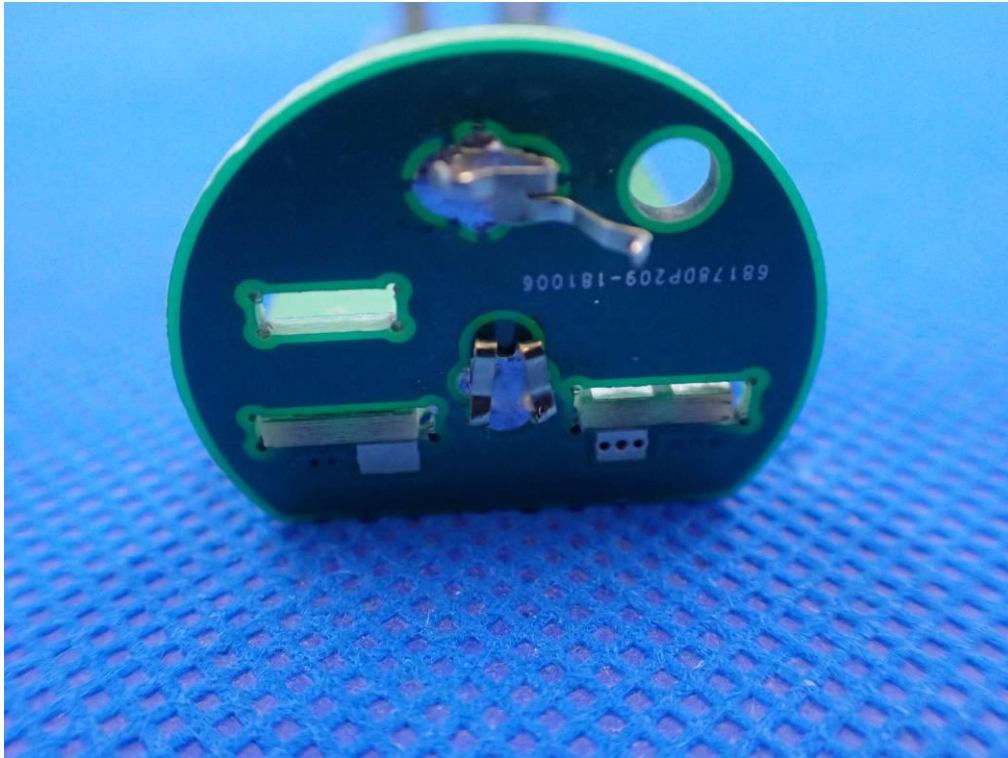


INTERNAL VIEW OF EUT 4





INTERNAL VIEW OF EUT 5



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