FCC Part 97 Test Report

Report No.: AGC02294180603FE09

PRODUCT DESIGNATION	:	Dual Band FM Transceiver
BRAND NAME	:	BAOFENG, pofung
MODEL NAME	:	UV-5R, UV-5RC, UV-5RE, UV-5RE plus, UV-5R+Plus, UV-5RA, GT-3
CLIENT	:	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
DATE OF ISSUE	:	Jun. 26, 2018
STANDARD(S)	:	FCC Part 97 Rules
REPORT VERSION	:	V 1.0

*A*ttestation of *G*lobal *C*ompliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 26, 2018	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
Address	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
Manufacturer	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
Address	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
Product Designation	Dual Band FM Transceiver
Brand name	BAOFENG, pofung
Test Model	UV-5R
Series Model	UV-5RC, UV-5RE, UV-5RE plus, UV-5R+Plus, UV-5RA, GT-3
Declaration of Difference	All the same except for the model name, brand name and front appearance. (UV-5R, UV-5RC, UV-5RE, UV-5RE plus, UV-5R+Plus, UV-5RA is BAOFENG / GT-3WP is pofung)
Measurement Procedure	ANSI C63.4: 2014
Date of test	Jun. 19, 2018 to Jun. 26, 2018
Test Result	Pass

WE HEREBY CERTIFY THAT:

The above equipment was tested by Shenzhen Attestation of Global Compliance Science & Technology Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2014 and TIA/EIA 603. The sample tested as described in this report is in compliance with the FCC Rules Part 97.

The test results of this report relate only to the tested sample identified in this report.

Tested By Steven Zhou

Steven Zhou(Zhou Pengyun) Jun. 26, 2018

Reviewed By Bart Xie

Bart Xie(Xie Xiaobin) Jun. 26, 2018

Approved By Forrest Lei

Forrest Lei(Lei Yonggang) Authorized Officer Jun. 26, 2018

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

The EUT is a Dual Band FM Transceiverdesigned for voice communication. It is designed by way of utilizing the F3E modulation achieves the system operating.

A major technical description of EUT is described as following:

Communication Type	Voice / Tone only	
Modulation	FM	
Hardware Version	5R-VER22	
Software Version	UV-5R	
Emission Type	15K23F3E	
Emission Bandwidth	VHF:10.25 KHz(5W-12.5KHz),15.23 KHz(5W-25KHz) UHF:10.18 KHz(5W-12.5KHz),15.22 KHz(5W-25KHz)	
Peak Frequency Deviation	1.91KHz	
Audio Frequency Response	10.94dB	
Maximum Transmitter Power	VHF: 36.89 dBm (5W-12.5KHz),36.88 dBm (5W-25KHz) UHF:36.89 dBm (5W-12.5KHz),36.83 dBm (5W-25KHz)	
Output power Modification	VHF/ UHF: 5W (It was fixed by the manufacturer, any individual can't arbitrarily change it)	
Antenna Designation	Detachable antenna	
Antenna Gain	2.15dBi	
Power Supply	DC 7.4V 1800mAh by battery .charging with DC 8.4V	
Adapter parameter	INPUT:AC 100-240V~ 50/60Hz ,0.4A OUTPUT:DC 10V, 0.5A	
Charger Parameter	OUTPUT:DC 10V,0.5A OUTPUT:DC 8.4V, 0.4A	
Limiting Voltage	DC 6.29 V ~8.51V	
Operation Frequency Range and Channel Separation	Frequency Range: TX(VHF:144 MHz -148 MHz UHF:420MHz-450MHz) Channel Separation:12.5 KHz /25KHz	
	144 MHz -148 MHz	420MHz-450MHz
	Bottom Channel: 144.025MHz Middle Channel: 146.025MHz Top Channel:147.975MHz	Bottom Channel: 420.025MHz Middle Channel: 435.025MHz Top Channel:449.975MHz
Frequency Tolerance	1.245ppm	

2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for filing to comply with the FCC Part 97 requirements.

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI C 63.4: 2014; TIA/EIA 603 and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

2.4 TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
NVLAP LAB CODE	600153-0
Designation Number	CN5028
FCC Test Firm Registration Number	682566
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

2.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

3.3 GENERAL TECHNICAL REQUIREMENTS

(1). Section 15.207: Conducted Limits
(2). Section 97.303: Frequency sharing requirements
(3). Section 97.305: Authorized emission types
(4). Section 97.307: Emissions standards
(5). Section 97.309: RTTY and data emission codes
(6). Section 97.313: Transmitter power standards
(7).Section 2.1047: Modulation characteristic

3.4 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

Item	Equipment	Model No.	Note
1	Dual Band FM Transceiver	UV-5R	EUT

3.5 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	Compliant
§2.1047	Modulation characteristics	Compliant
§97.303	Frequency sharing requirements	Compliant
§97.305	Authorized emission types	Compliant
§97.307	Emissions standards	Compliant

4. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2018	Jun. 11, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 18, 2017	May 17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 12, 2018	Jun. 11, 2019
HORN ANTENNA	EM	EM-AH-10180	/	Mar.01, 2018	Feb.29, 2020
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Mar.01, 2018	Feb.29, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
Small environmental tester	ESPEC	SH-242	--	Mar.02, 2018	Mar. 01, 2019
RF Communication Test Set	HP	HP8920B	--	Jun. 20, 2017	Jun. 19, 2018
Loop Antenna	A.H.Systems,Inc	SAS-562B	--	Mar.01, 2018	Feb.28, 2020

NOTE: 8920B can generate audio modulation frequency.

5. DESCRIPTION OF TEST MODES

RF TEST MODES

The EUT (Dual Band FM Transceiver) has been tested under normal operating condition. (The top channel, the middle channel and the bottom channel) are chosen for testing at each channel separation.

No.	TEST MODES	CHANNEL SEPARATION
1	Low Channel	12.5 KHz
2	Middle Channel	12.5 KHz
3	High Channel	12.5 KHz

TEST MODES

No.	TEST MODES
1	Standby Mode + (Charging)
2	TX

Note: Only the result of the worst case was recorded in the report.

6. CONDUCTED LIMITS

6.1 PROVISIONS APPLICABLE

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the, the radio frequency voltage that is conducted back onto the AC power line on any frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

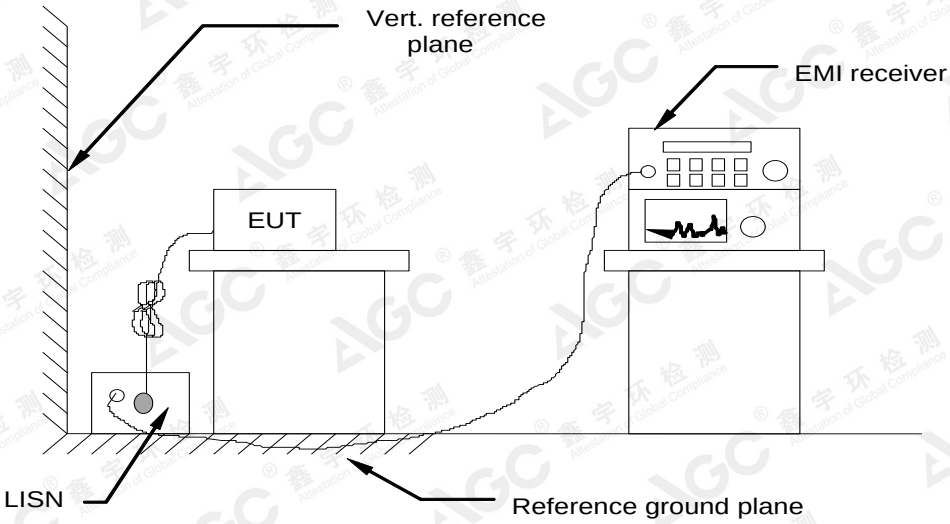
* Decreases with the logarithm of the frequency.

6.2 MEASUREMENT PROCEDURE

(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 C63.4 (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 C63.4.
(3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
(4) The EUT received 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. During the above scans, the emissions were maximized by cable manipulation.

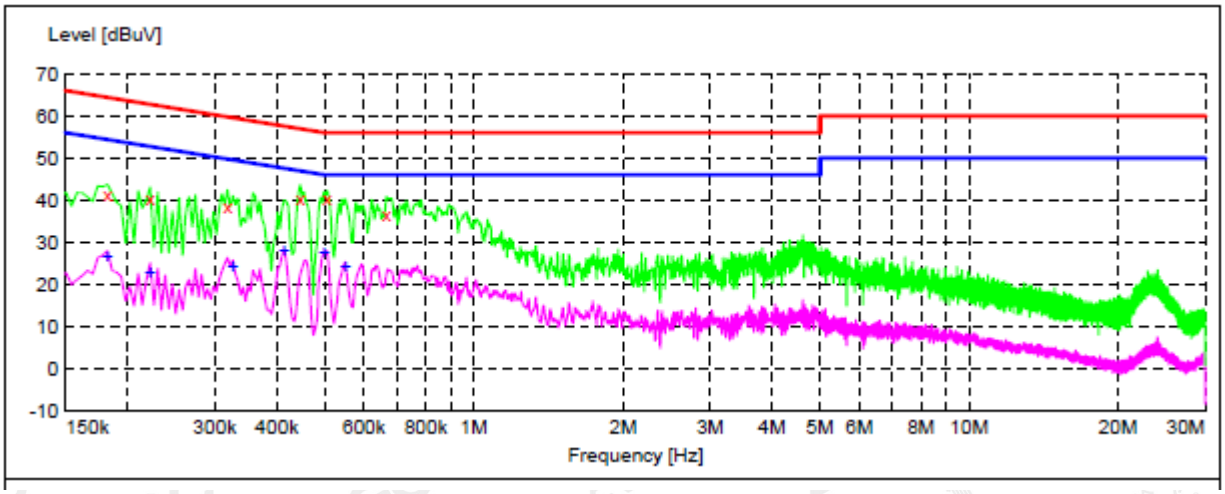
The test data of condition (mode 1) was reported on the following Data page.

6.3 TEST SETUP BLOCK DIAGRAM



6.4 TEST RESULT

LINE CONDUCTED EMISSION TEST-L1



MEASUREMENT RESULT:

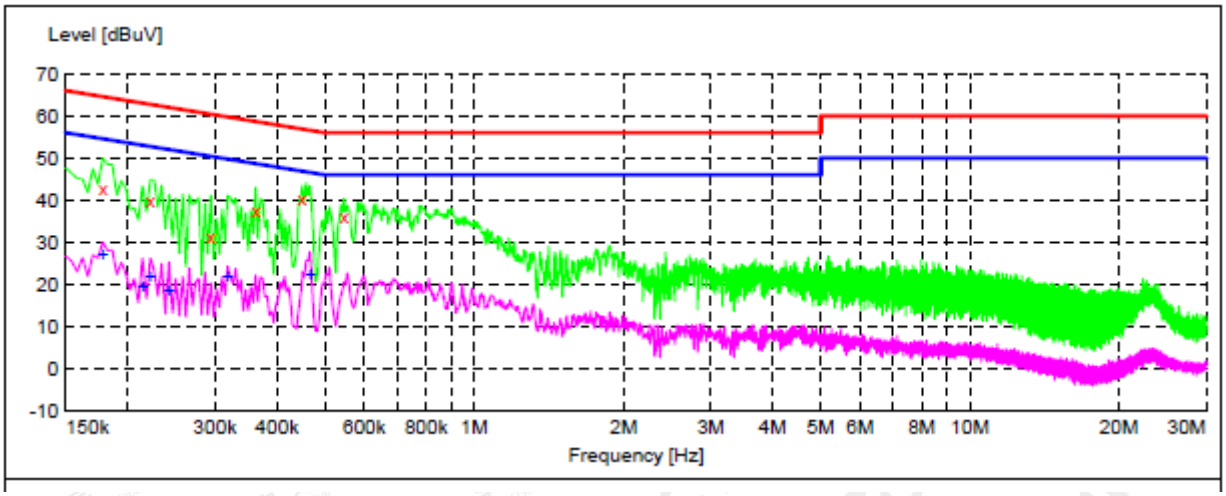
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.182000	41.20	10.0	64	23.2	QP	L1	FLO
0.222000	40.30	10.1	63	22.4	QP	L1	FLO
0.318000	38.50	10.1	60	21.3	QP	L1	FLO
0.446000	40.30	10.0	57	16.6	QP	L1	FLO
0.506000	40.60	9.9	56	15.4	QP	L1	FLO
0.666000	36.70	9.9	56	19.3	QP	L1	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.182000	26.50	10.0	54	27.9	AV	L1	FLO
0.222000	22.60	10.1	53	30.1	AV	L1	FLO
0.326000	24.40	10.1	50	25.2	AV	L1	FLO
0.414000	27.80	10.0	48	19.8	AV	L1	FLO
0.498000	27.40	10.0	46	18.6	AV	L1	FLO
0.550000	24.40	9.9	46	21.6	AV	L1	FLO

RESULT: PASS

LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.178000	42.60	10.0	65	22.0	QP	N	FLO
0.222000	40.00	10.1	63	22.7	QP	N	FLO
0.294000	31.40	10.1	60	29.0	QP	N	FLO
0.362000	37.30	10.0	59	21.4	QP	N	FLO
0.450000	40.20	10.0	57	16.7	QP	N	FLO
0.546000	36.10	9.9	56	19.9	QP	N	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.178000	27.00	10.0	55	27.6	AV	N	FLO
0.214000	19.50	10.1	53	33.5	AV	N	FLO
0.222000	22.00	10.1	53	30.7	AV	N	FLO
0.242000	18.70	10.1	52	33.3	AV	N	FLO
0.318000	21.90	10.1	50	27.9	AV	N	FLO
0.466000	22.10	10.0	47	24.5	AV	N	FLO

RESULT: PASS

7. FREQUENCY TOLERANCE

7.1 PROVISIONS APPLICABLE

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30℃ to +60℃ centigrade.
b). According to FCC Part 2 Section 2.1055(d)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacturer.

7.2 MEASUREMENT PROCEDURE

7.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

7.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 7.4 V
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

7.3 TEST SETUP BLOCK DIAGRAM

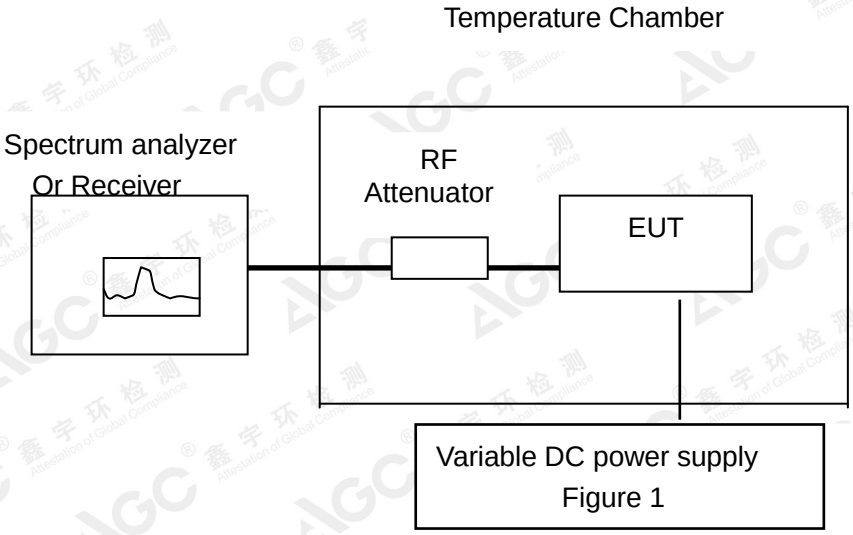


Figure 1

7.4 TEST RESULT

VHF @ 12.5 KHz Channel Separation

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		144.025MHz	146.025MHz	147.975 MHz	
50	DC 7.40 V	0.981	0.605	0.570	2.5
40	DC 7.40 V	0.863	0.598	0.966	
30	DC 7.40 V	1.064	0.564	0.696	
20	DC 7.40 V	0.996	0.595	0.620	
10	DC 7.40 V	0.591	0.933	1.051	
0	DC 7.40 V	0.568	0.846	0.634	
-10	DC 7.40 V	0.811	1.056	0.908	
-20	DC 7.40 V	1.030	1.043	1.036	
-30	DC 7.40 V	0.551	1.024	0.585	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		144.025MHz	146.025MHz	147.975 MHz	
50	DC 6.29 V	0.846	0.803	0.456	2.5
40	DC 6.29 V	0.385	0.539	0.700	
30	DC 6.29 V	0.902	0.458	0.452	
20	DC 6.29 V	0.680	0.470	0.380	
10	DC 6.29 V	0.385	0.508	0.882	
0	DC 6.29 V	0.861	0.607	0.999	
-10	DC 6.29 V	0.591	0.853	0.307	
-20	DC 6.29 V	0.948	0.837	0.343	
-30	DC 6.29 V	0.804	0.729	0.857	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		144.025MHz	146.025MHz	147.975MHz	
50	DC 8.51 V	0.446	0.423	0.732	2.5
40	DC 8.51 V	0.588	0.370	0.735	
30	DC 8.51 V	0.353	0.830	0.985	
20	DC 8.51 V	0.722	0.885	0.430	
10	DC 8.51 V	0.562	0.872	0.574	
0	DC 8.51 V	0.499	0.518	0.468	
-10	DC 8.51 V	0.609	0.858	0.412	
-20	DC 8.51 V	0.958	0.849	0.518	
-30	DC 8.51 V	0.490	0.677	0.887	
Result	Pass				

VHF @ 25 KHz Channel Separation

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		144.025MHz	146.025MHz	147.975MHz	
50	DC 7.40 V	0.812	0.905	1.086	2.5
40	DC 7.40 V	0.798	0.788	0.539	
30	DC 7.40 V	0.648	1.079	0.630	
20	DC 7.40 V	1.245	0.807	0.898	
10	DC 7.40 V	0.714	0.993	0.556	
0	DC 7.40 V	0.821	0.670	0.976	
-10	DC 7.40 V	0.699	0.607	0.899	
-20	DC 7.40 V	0.566	0.920	1.012	
-30	DC 7.40 V	0.807	1.042	0.574	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		144.025MHz	146.025MHz	147.975MHz	
50	DC 6.29 V	0.486	0.434	0.576	2.5
40	DC 6.29 V	0.768	0.599	0.600	
30	DC 6.29 V	0.533	0.779	0.771	
20	DC 6.29 V	0.900	0.947	0.565	
10	DC 6.29 V	0.884	0.419	0.900	
0	DC 6.29 V	0.631	0.527	0.570	
-10	DC 6.29 V	0.747	0.463	0.711	
-20	DC 6.29 V	0.422	0.729	0.827	
-30	DC 6.29 V	0.377	0.821	0.541	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		144.025MHz	146.025MHz	147.975 MHz	
50	DC 8.51 V	0.503	0.863	0.568	2.5
40	DC 8.51 V	0.442	0.890	0.543	
30	DC 8.51 V	0.462	0.912	0.671	
20	DC 8.51 V	0.943	0.375	0.593	
10	DC 8.51 V	0.721	0.563	0.789	
0	DC 8.51 V	0.336	0.936	0.864	
-10	DC 8.51 V	0.681	0.985	0.422	
-20	DC 8.51 V	0.652	0.972	0.324	
-30	DC 8.51 V	0.470	0.962	0.456	
Result	Pass				

UHF @ 12.5 KHz Channel Separation

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		420.025MHz	435.025MHz	449.975 MHz	
50	DC 7.40 V	0.768	0.653	0.544	2.5
40	DC 7.40 V	1.018	1.048	0.860	
30	DC 7.40 V	0.520	0.751	0.922	
20	DC 7.40 V	1.032	0.935	1.098	
10	DC 7.40 V	0.649	0.749	0.636	
0	DC 7.40 V	0.570	0.886	0.514	
-10	DC 7.40 V	0.710	0.935	0.723	
-20	DC 7.40 V	0.682	0.769	0.828	
-30	DC 7.40 V	0.610	0.579	0.903	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		420.025MHz	435.025MHz	449.975 MHz	
50	DC 6.29 V	0.818	0.377	0.902	2.5
40	DC 6.29 V	0.752	0.553	0.536	
30	DC 6.29 V	0.857	0.892	0.747	
20	DC 6.29 V	0.304	0.859	0.671	
10	DC 6.29 V	0.472	0.627	0.631	
0	DC 6.29 V	0.596	0.572	0.994	
-10	DC 6.29 V	0.637	0.485	0.744	
-20	DC 6.29 V	0.964	0.918	0.722	
-30	DC 6.29 V	0.302	0.356	0.820	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		420.025MHz	435.025MHz	449.975 MHz	
50	DC 8.51 V	0.678	0.433	0.463	2.5
40	DC 8.51 V	0.476	0.658	0.332	
30	DC 8.51 V	0.925	0.780	0.709	
20	DC 8.51 V	0.861	0.402	0.704	
10	DC 8.51 V	0.740	0.920	0.702	
0	DC 8.51 V	0.926	0.430	0.556	
-10	DC 8.51 V	0.301	0.791	0.567	
-20	DC 8.51 V	0.823	0.706	0.876	
-30	DC 8.51 V	0.614	0.754	0.379	
Result	Pass				

UHF @ 25 KHz Channel Separation

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		420.025MHz	435.025MHz	449.975 MHz	
50	DC 7.40 V	0.973	0.748	0.972	2.5
40	DC 7.40 V	1.085	1.047	1.027	
30	DC 7.40 V	0.940	0.585	0.797	
20	DC 7.40 V	1.002	0.684	1.011	
10	DC 7.40 V	0.668	0.755	0.885	
0	DC 7.40 V	0.882	0.553	0.698	
-10	DC 7.40 V	0.722	0.863	0.958	
-20	DC 7.40 V	0.760	0.558	0.810	
-30	DC 7.40 V	0.968	0.859	0.838	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		420.025MHz	435.025MHz	449.975 MHz	
50	DC 6.29 V	0.308	0.790	0.736	2.5
40	DC 6.29 V	0.818	0.389	0.918	
30	DC 6.29 V	0.563	0.982	0.971	
20	DC 6.29 V	0.496	0.519	0.895	
10	DC 6.29 V	0.942	0.407	0.656	
0	DC 6.29 V	0.703	0.469	0.569	
-10	DC 6.29 V	0.410	0.355	0.718	
-20	DC 6.29 V	0.687	0.376	0.362	
-30	DC 6.29 V	0.586	0.977	0.616	
Result	Pass				

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		420.025MHz	435.025MHz	449.975 MHz	
50	DC 8.51 V	0.420	0.322	0.908	2.5
40	DC 8.51 V	0.899	0.710	0.646	
30	DC 8.51 V	0.667	0.933	0.963	
20	DC 8.51 V	0.616	0.599	0.611	
10	DC 8.51 V	0.774	0.442	0.509	
0	DC 8.51 V	0.670	0.558	0.822	
-10	DC 8.51 V	0.428	0.429	0.907	
-20	DC 8.51 V	0.559	0.399	0.471	
-30	DC 8.51 V	0.730	0.661	0.840	
Result	Pass				

8. EMISSION BANDWIDTH

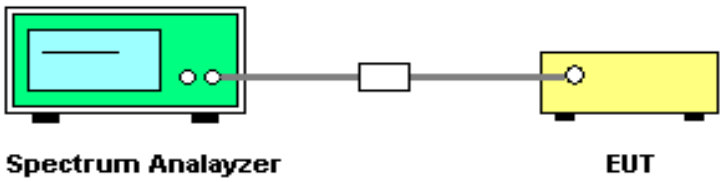
8.1 PROVISIONS APPLICABLE

According to FCC Part 97 Section 97.305: The authorized bandwidth shall be 100 KHz

8.2 MEASUREMENT PROCEDUR

1). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing).
2). Set SPA Center Frequency = fundamental frequency, RBW=100 Hz, VBW= 300 Hz, Span =50 KHz.
3). Set SPA Max hold. Mark peak, -26 dB.

8.3 TEST SETUP BLOCK DIAGRAM

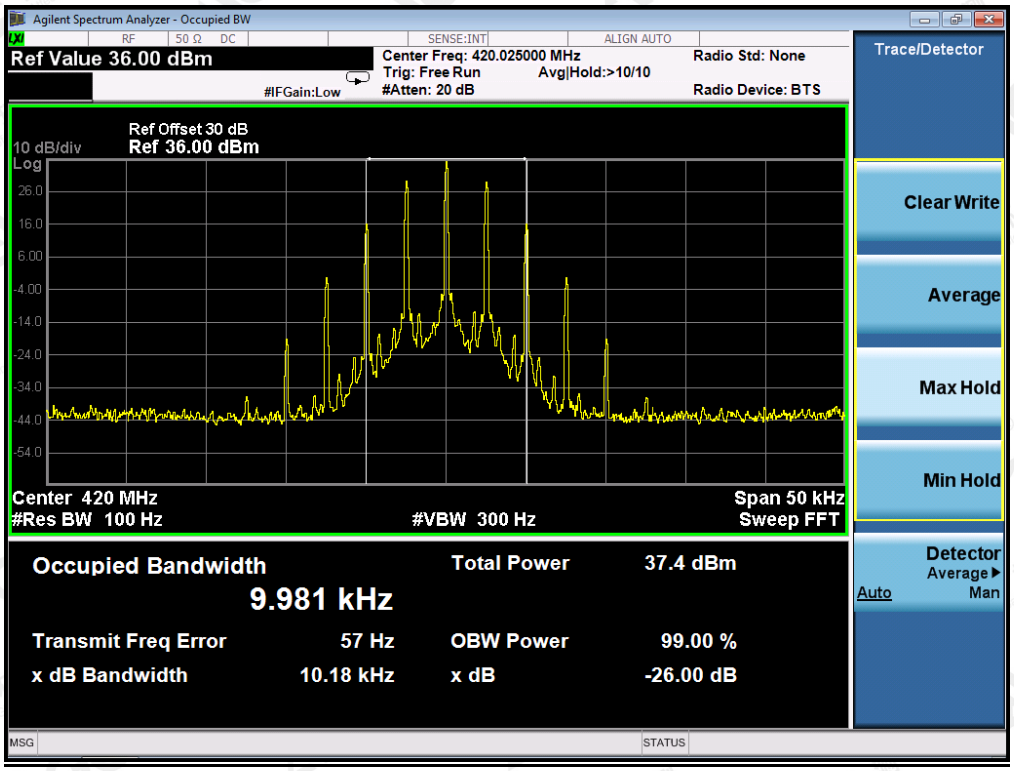


8.4 MEASUREMENT RESULT

UHF:

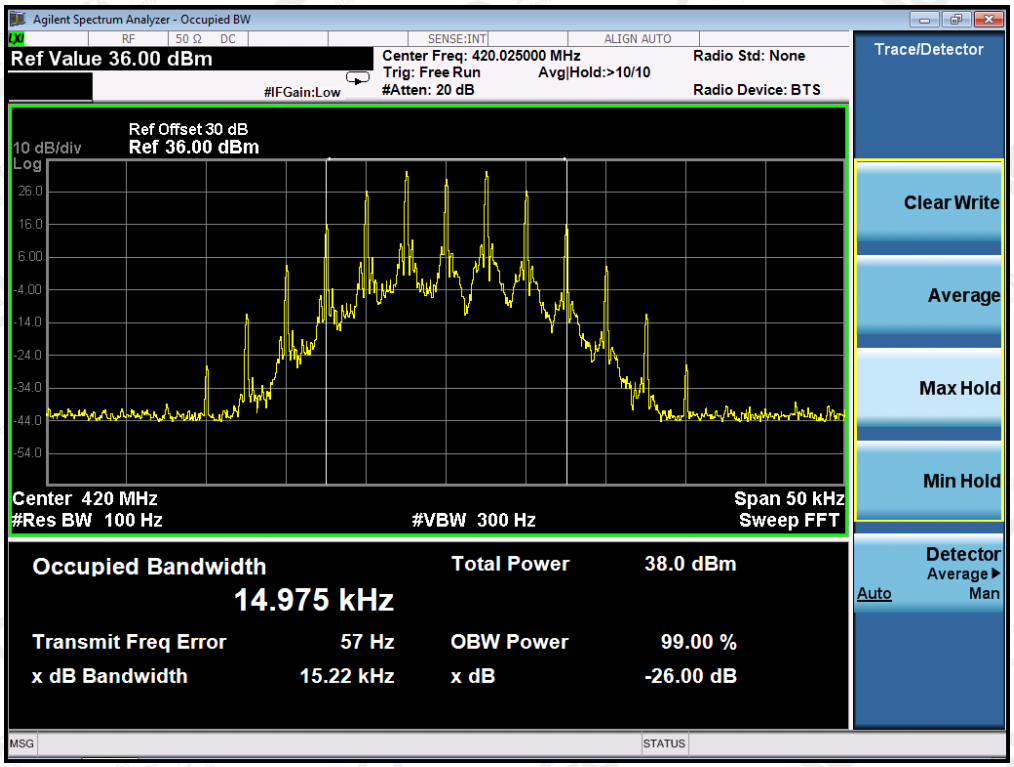
26 dB Bandwidth Measurement Result			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
420.025MHz	10.18 KHz	100 KHz	Pass

Occupied bandwidth of Top Channel (Maximum) @ 12.5 KHz Channel Separation-5W



26 dB Bandwidth Measurement Result			
Operating Frequency	25 KHz Channel Separation		
	Test Data	Limits	Result
420.025MHz	15.22 KHz	100 KHz	Pass

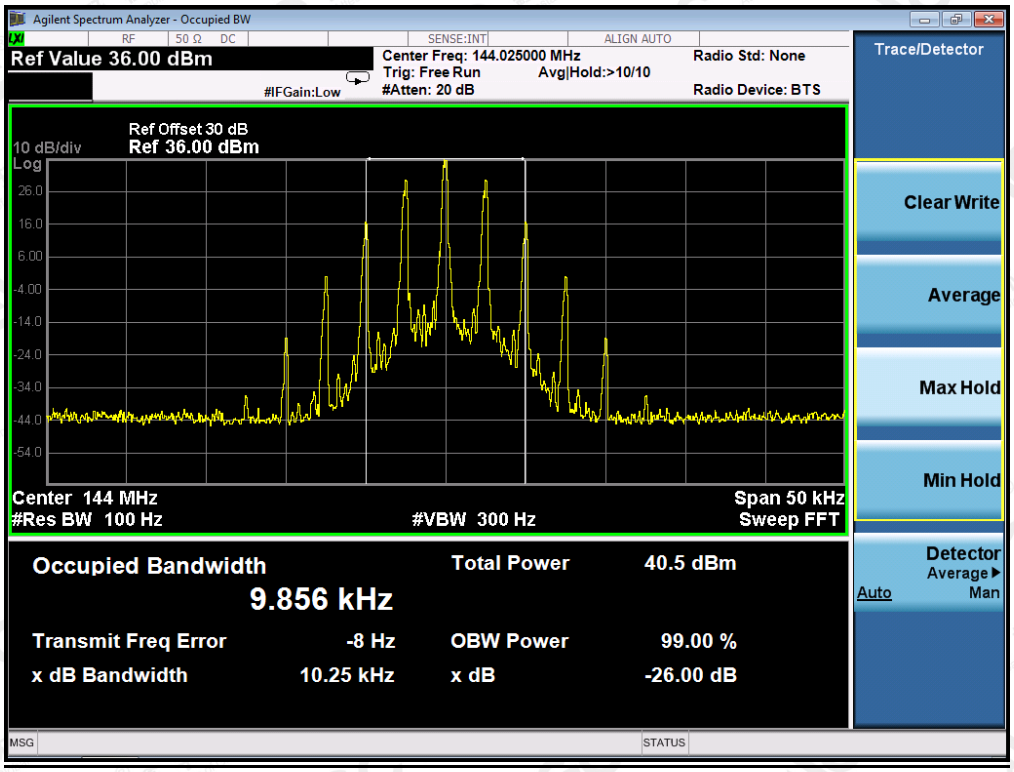
Occupied bandwidth of Top Channel (Maximum) @ 25 KHz Channel Separation-5W



VHF:

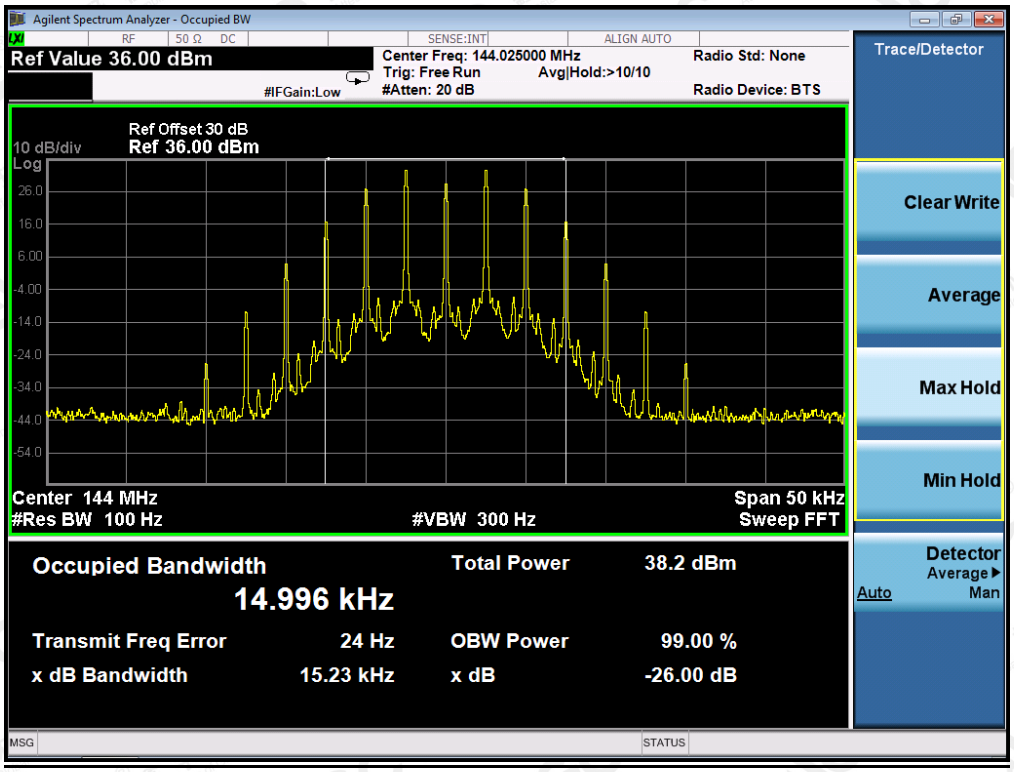
26 dB Bandwidth Measurement Result			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
144.025MHz	10.25 KHz	100 KHz	Pass

Occupied bandwidth of Top Channel (Maximum) @ 12.5 KHz Channel Separation-5W



26 dB Bandwidth Measurement Result			
Operating Frequency	25 KHz Channel Separation		
	Test Data	Limits	Result
144.025MHz	15.23 KHz	100 KHz	Pass

Occupied bandwidth of Top Channel (Maximum) @ 25 KHz Channel Separation-5W



9. UNWANTED RADIATION

9.1 PROVISIONS APPLICABLE

(1) No amateur station transmission shall occupy more bandwidth than necessary bandwidth for the information rate and emission type being transmitted, in accordance with good amateur practice.

(2) Emissions resulting from modulation must be confined to the band or segment available to the control operator. Emissions outside the necessary bandwidth must not cause splatter or key click interference to operations on adjacent frequencies.

(3) The mean power of any spurious emissions from a station transmitter or external RF power amplifier transmitting on a frequency between 30-225 MHz must be at least 60dB below the mean power of the fundamental. For a transmitter having a mean power of 25W or less, the mean power of any spurious emission supplied to the antenna transmission line must not exceed 25 uW and must be at least 40dB below the mean power of the fundamental emission, but need not be reduced below the power of 10uW.

9.2 MEASUREMENT PROCEDURE

(1)On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

(2)The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

(3)The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

(4)The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

(5)The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

(6)The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

(7)The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

(8)The maximum signal level detected by the measuring receiver shall be noted.

(9)The measurement shall be repeated with the test antenna set to horizontal polarization.

(10) Replace the antenna with a proper Antenna (substitution antenna).

(11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

(12)The substitution antenna shall be connected to a calibrated signal generator.

(13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

(14)The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

(15)The input signal to substitution antenna shall be adjusted to the level that produces a level detected by

the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

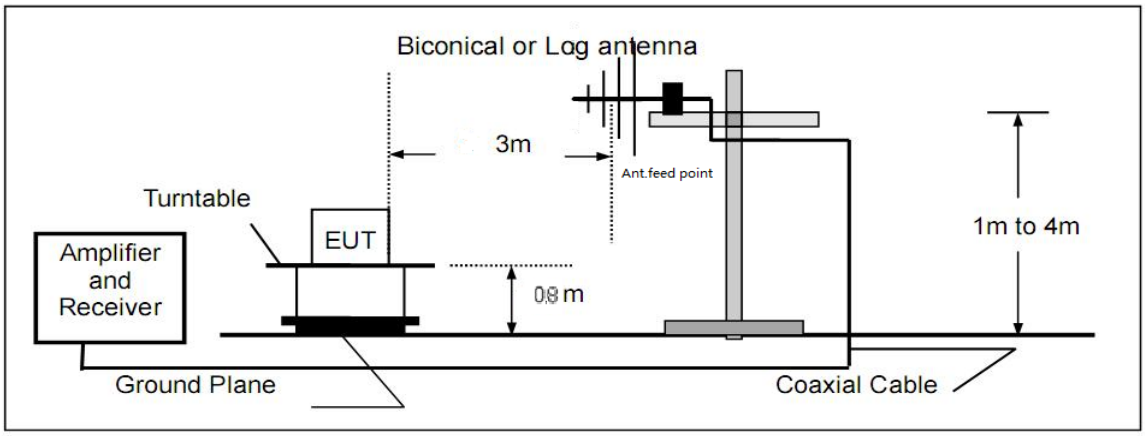
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

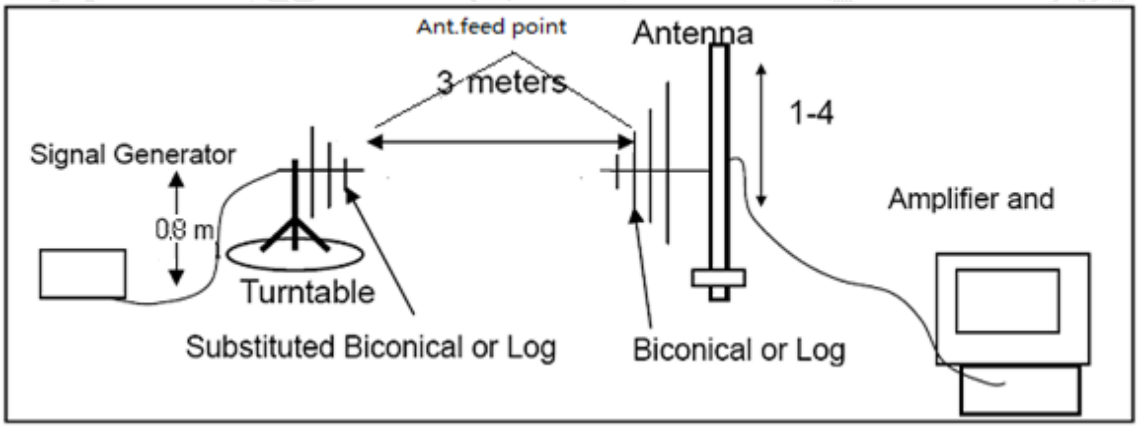
9.3 TEST SETUP BLOCK DIAGRAM

SUBSTITUTION METHOD: (Radiated Emissions)

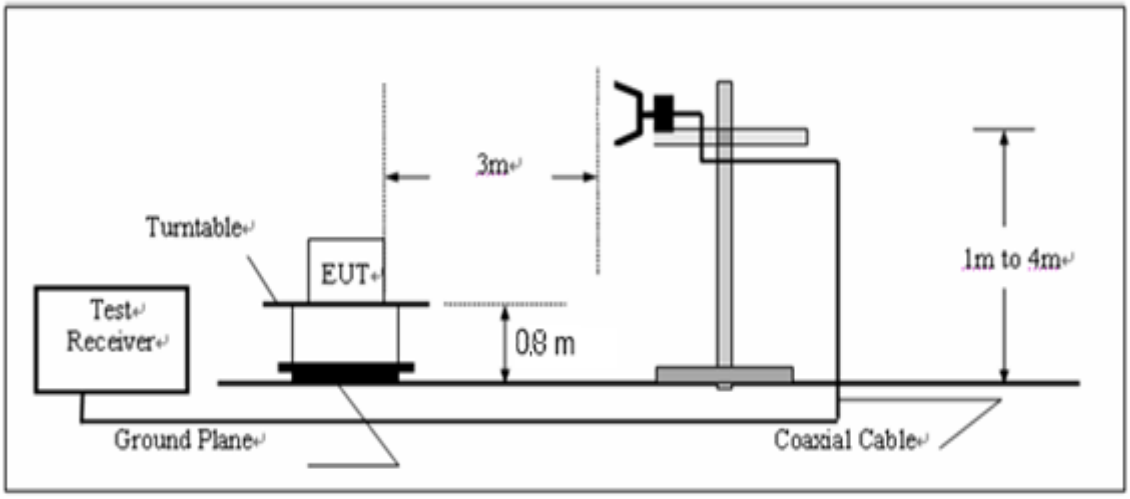
Radiated Below 1GHz

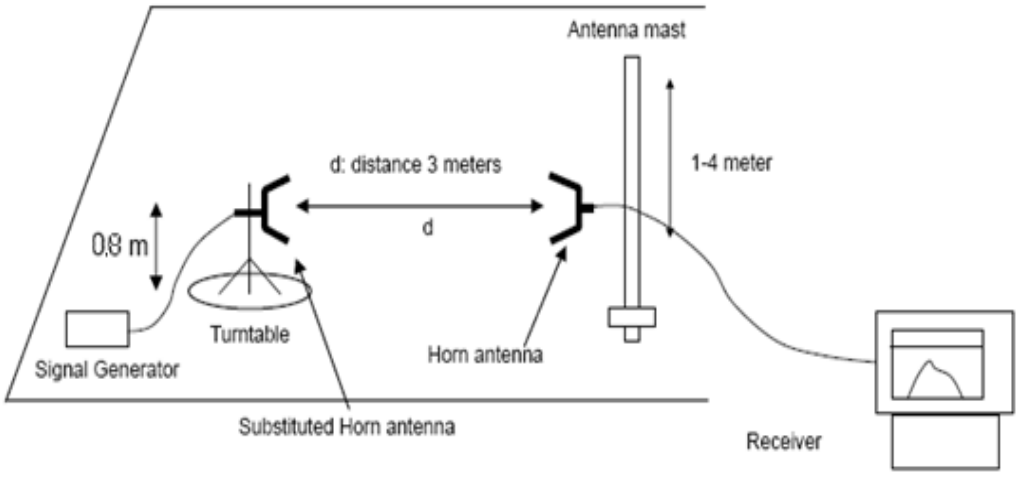
Radiated





Radiated Above 1 GHz





9.4 MEASUREMENT RESULTS:

Measurement Result for 12.5/25 KHz Channel Separation

Limit is at least 60dB below the mean power of the fundamental. For a transmitter having a mean power of 25W or less, the mean power of any spurious emissions supplied to the antenna transmission line must not exceed 25uW and must be at least 40dB below the mean power of the fundamental emission.

Bottom Channel

Frequency	Reading level	Antenna	S.G.	Cable loss	Correction	Emission level	Limit	Margin
(MHz)	(dBuV)	Polarization	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
--	--	--	--	--	--	--	-16	--

Middle Channel

Frequency	Reading level	Antenna	S.G.	Cable loss	Correction	Emission level	Limit	Margin
(MHz)	(dBuV)	Polarization	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
--	--	--	--	--	--	--	-16	--

Top Channel

Frequency	Reading level	Antenna	S.G.	Cable loss	Correction	Emission level	Limit	Margin
(MHz)	(dBuV)	Polarization	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
--	--	--	--	--	--	--	-16	--

Notes:“--“ means that the emission level is too low to be measured or at least 20 dB down than the limit.

10. MODULATION CHARACTERISTICS

10.1 PROVISIONS APPLICABLE

According to CFR 47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

10.2 MEASUREMENT METHOD

10.2.1 Modulation Limit

(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(2). Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

10.2.2 Audio Frequency Response

(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

(3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

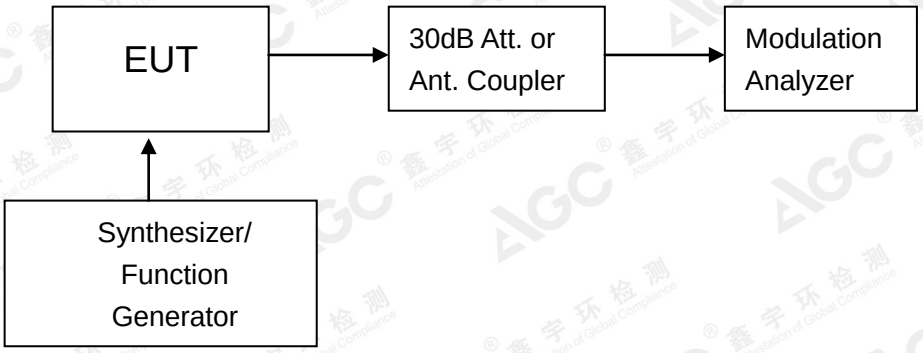


Figure 1: Modulation characteristic measurement configuration

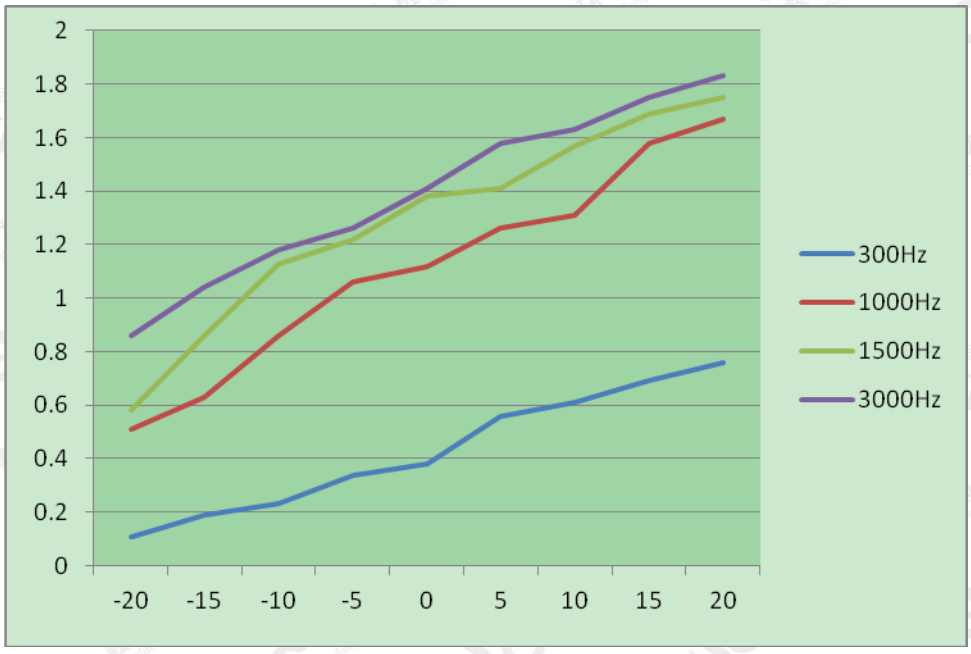
10.3 MEASUREMENT RESULT

(A). MODULATION LIMIT:

UHF:

Middle Channel @ 12.5 KHz Channel Separations-H Power

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.11	0.51	0.58	0.86
-15	0.19	0.63	0.86	1.04
-10	0.23	0.86	1.13	1.18
-5	0.34	1.06	1.22	1.26
0	0.38	1.12	1.38	1.41
+5	0.56	1.26	1.41	1.58
+10	0.61	1.31	1.57	1.63
+15	0.69	1.58	1.69	1.75
+20	0.76	1.67	1.75	1.83

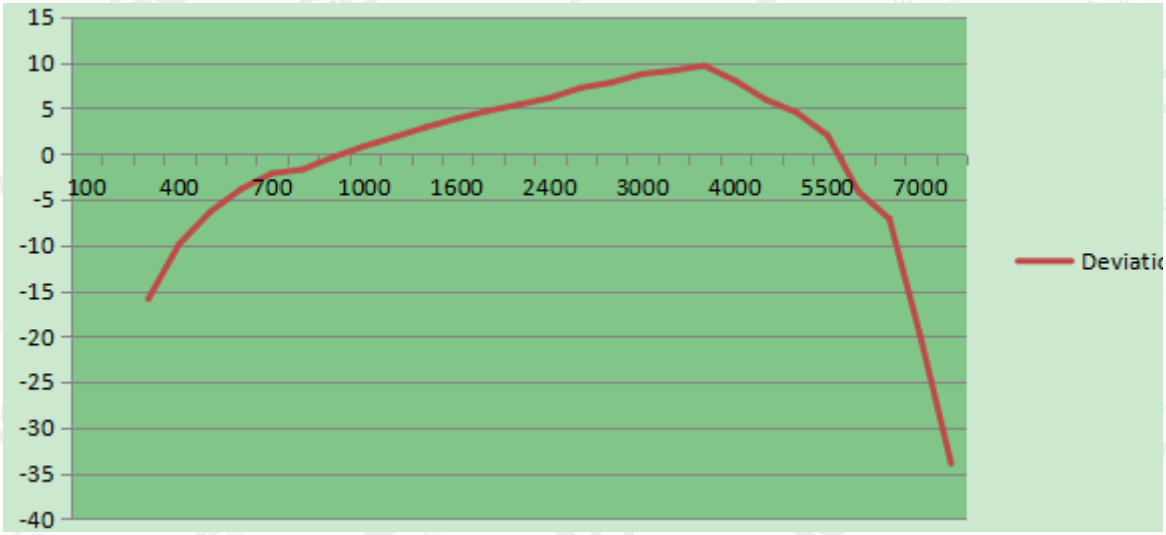


(B). AUDIO FREQUENCY RESPONSE:

Middle Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.09	-12.67
400	0.21	-10.53
500	0.38	-7.91
600	0.45	-6.78
700	0.29	-6.52
800	0.36	-3.69
900	0.56	-1.74
1000	0.59	0.88
1200	0.62	1.55
1400	0.69	2.61
1600	0.81	3.29
1800	0.99	4.47
2000	0.75	5.89
2400	1.02	7.63
2500	1.29	9.86
2800	1.34	10.53
3000	1.52	10.16
3200	1.69	9.83
3600	1.74	8.57
4000	1.81	8.63
4500	0.96	7.99
5000	0.87	-3.51
5500	0.53	-8.97
6000	0.34	-15.58
6500	0.025	-29.69
7000	0.07	-25.71
7500	0.02	-36.86
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Middle Channel

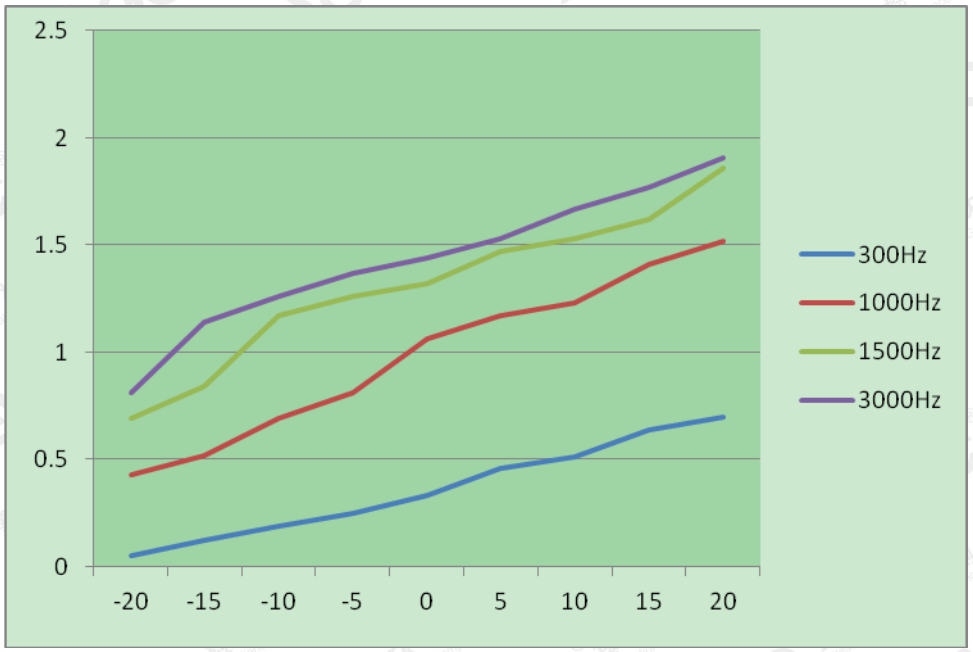


(A). MODULATION LIMIT:

VHF:

Middle Channel @ 12.5 KHz Channel Separations-H Power

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.05	0.43	0.69	0.81
-15	0.12	0.52	0.84	1.14
-10	0.19	0.69	1.17	1.26
-5	0.25	0.81	1.26	1.37
0	0.33	1.06	1.32	1.44
+5	0.46	1.17	1.47	1.53
+10	0.51	1.23	1.53	1.67
+15	0.64	1.41	1.62	1.77
+20	0.70	1.52	1.86	1.91

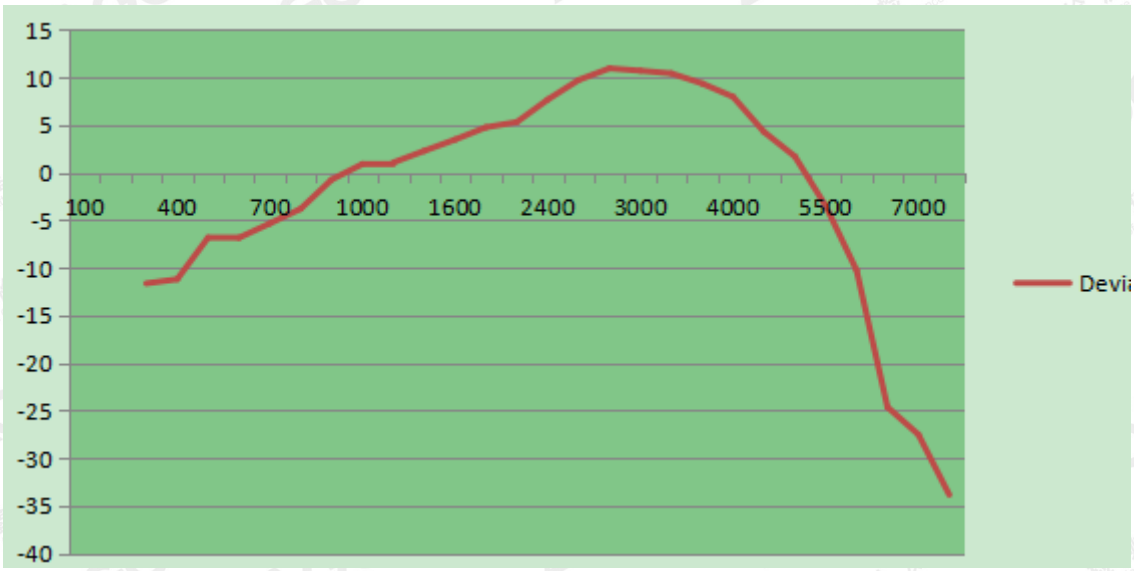


(B). AUDIO FREQUENCY RESPONSE:

Middle Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.18	-11.65
400	0.34	-11.21
500	0.51	-6.84
600	0.69	-6.86
700	0.77	-5.35
800	0.52	-3.81
900	0.69	-0.75
1000	0.85	0.89
1200	0.94	1.05
1400	0.97	2.27
1600	0.83	3.46
1800	0.64	4.75
2000	1.02	5.30
2400	1.17	7.66
2500	1.22	9.72
2800	1.35	10.94
3000	1.53	10.69
3200	1.65	10.41
3600	1.98	9.35
4000	0.71	7.95
4500	0.89	4.27
5000	0.66	1.69
5500	0.42	-3.51
6000	0.78	-10.28
6500	0.59	-24.64
7000	0.46	-27.52
7500	0.30	-33.84
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Middle Channel



11. MAXIMUMN TRANSMITTER POWER

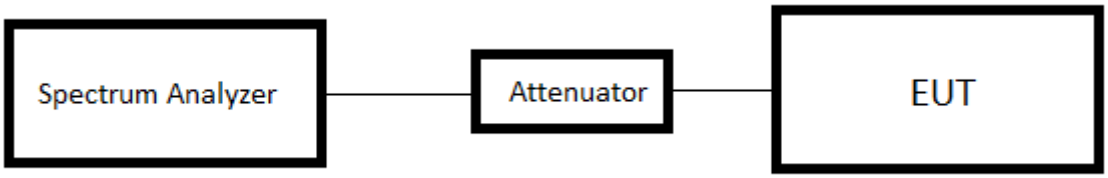
11.1 PROVISIONS APPLICABLE

Per FCC §2.1046 and §97.313: No station may transmit with a transmitter power exceeding 1.5 kW PEP.

11.2 TEST PROCEDURE

The RF output of Two-way Radio was conducted to a spectrum analyzer through an appropriate attenuator.

11.3 TEST CONFIGURATION



11.4 TEST RESULT

The maximum Conducted Power (CP) is

H; 5W for 12.5 KHz/25 KHz Channel Separation

Calculation Formula: CP = R + A + L

***** Note:

CP: The final Conducted Power

R : The reading value from spectrum analyzer

A : The attenuation value of the used attenuator

L : The loss of all connection cables

UHF：

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 36.99dBm(5W)
12.5 KHz	Bottom(420.025MHz)	36.75
	Middle(435.025MHz)	36.89
	Top (449.975MHz)	36.68
25 KHz	Bottom(420.025MHz)	36.71
	Middle(435.025MHz)	36.75
	Top (449.975MHz)	36.83

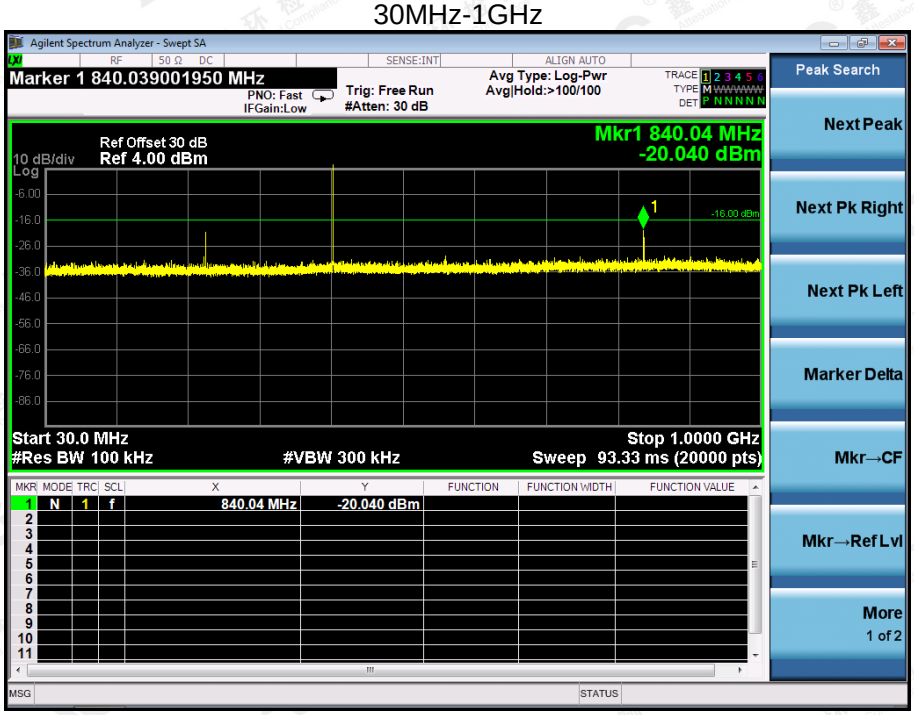
VHF:

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 36.99dBm(5W)
12.5 KHz	Bottom(144.025MHz)	36.84
	Middle(146.025MHz)	36.89
	Top (147.975MHz)	36.73
25 KHz	Bottom(144.025MHz)	36.81
	Middle(146.025MHz)	36.88
	Top (147.975MHz)	36.76

11.5 CONDUCT SPURIOUS PLOT

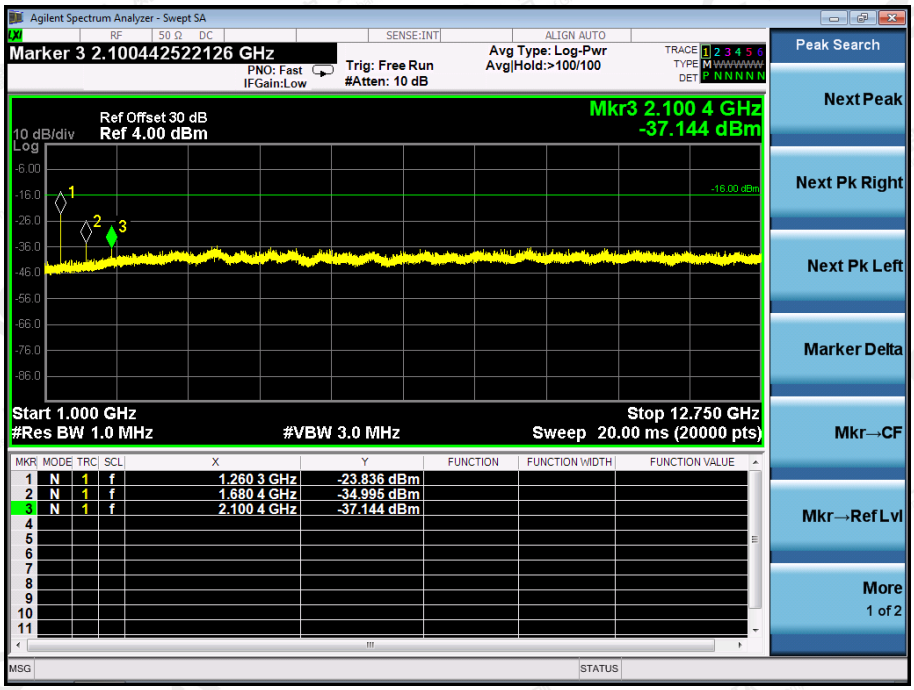
Conducted Spurious Emission (worst) @ 420.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 420.025MHz With 12.5 KHz Channel Separation-5W

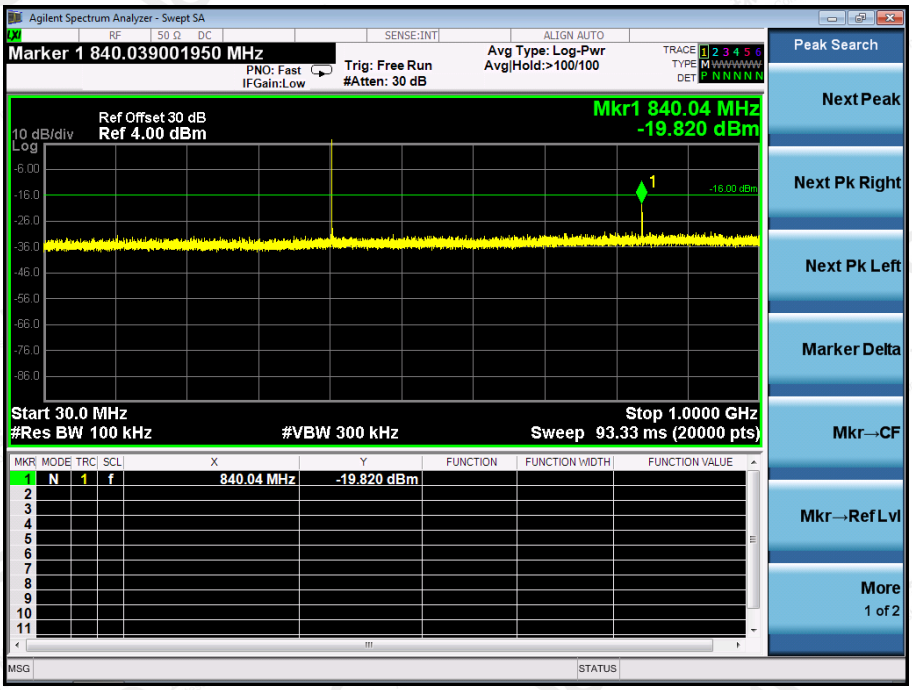
1GHz-12.75GHz



Note: All the test frequencies had been tested, but only the worst data (bottom channel) recorded in the report.

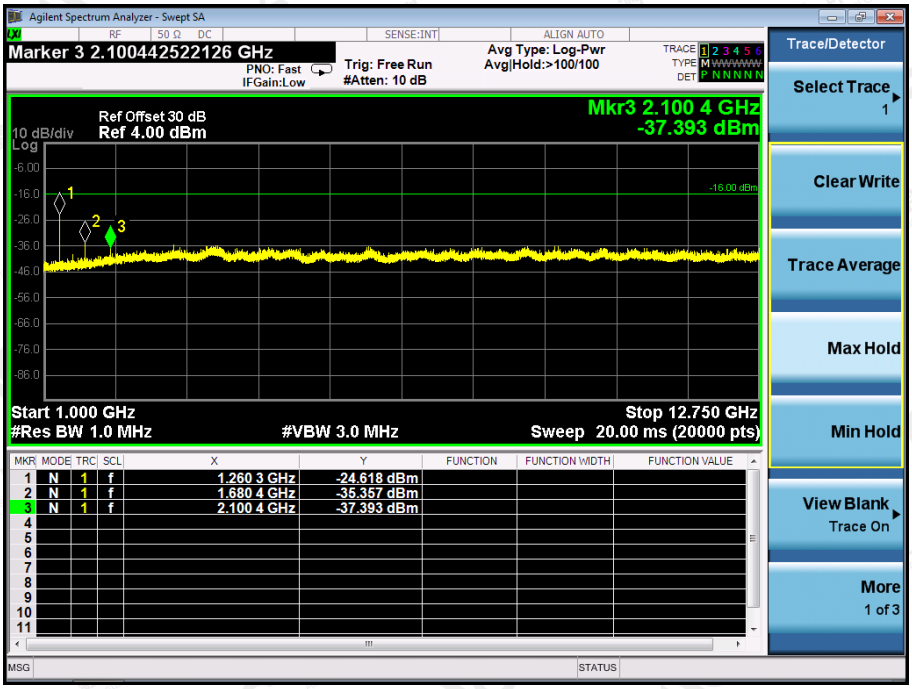
Conducted Spurious Emission (worst) @ 420.025MHz With 25 KHz Channel Separation-5W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 420.025MHz With 25 KHz Channel Separation-5W

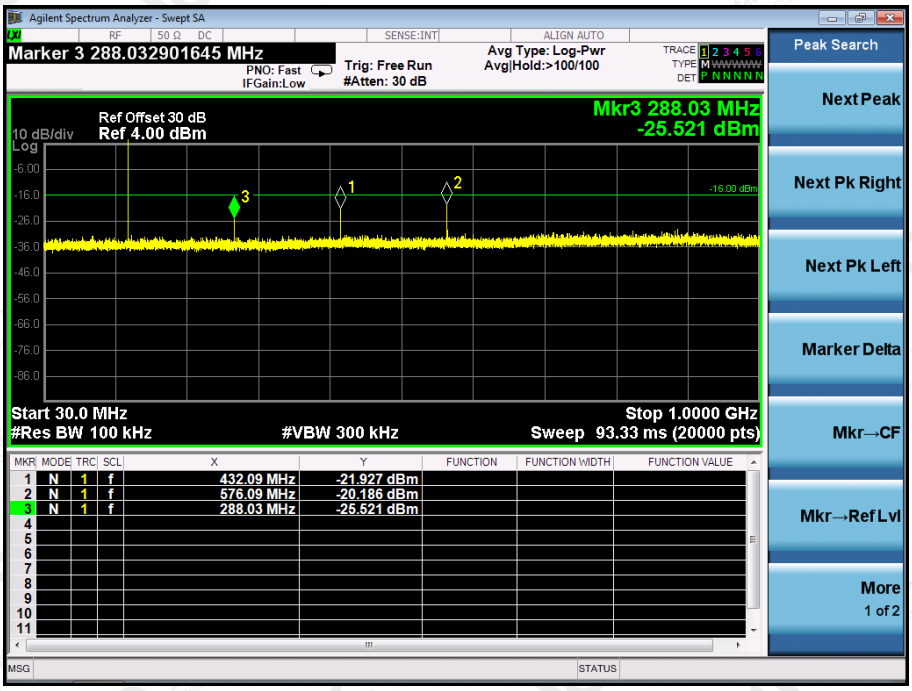
1GHz-12.75GHz



Note: All the test frequencies had been tested, but only the worst data (bottom channel) recorded in the report.

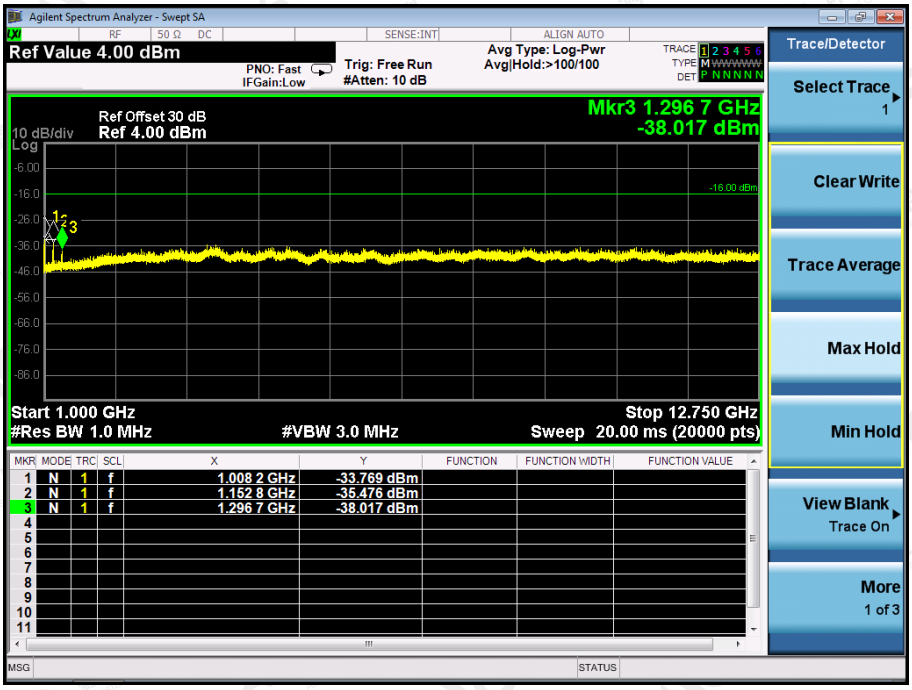
Conducted Spurious Emission (worst) @ 144.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 144.025MHz With 12.5 KHz Channel Separation-5W

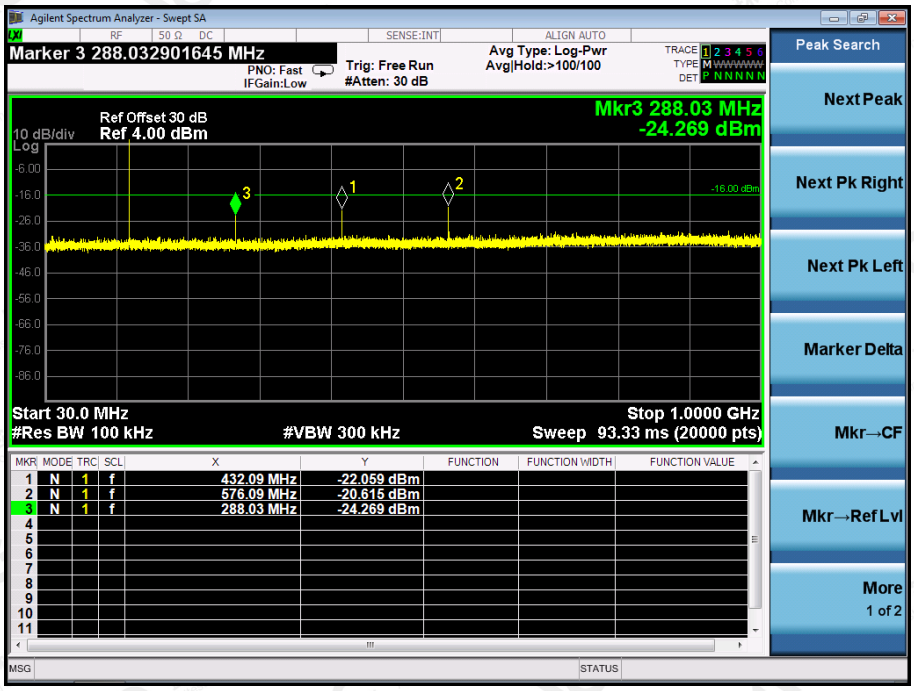
1GHz-12.75GHz



Note: All the test frequencies had been tested, but only the worst data (bottom channel) recorded in the report.

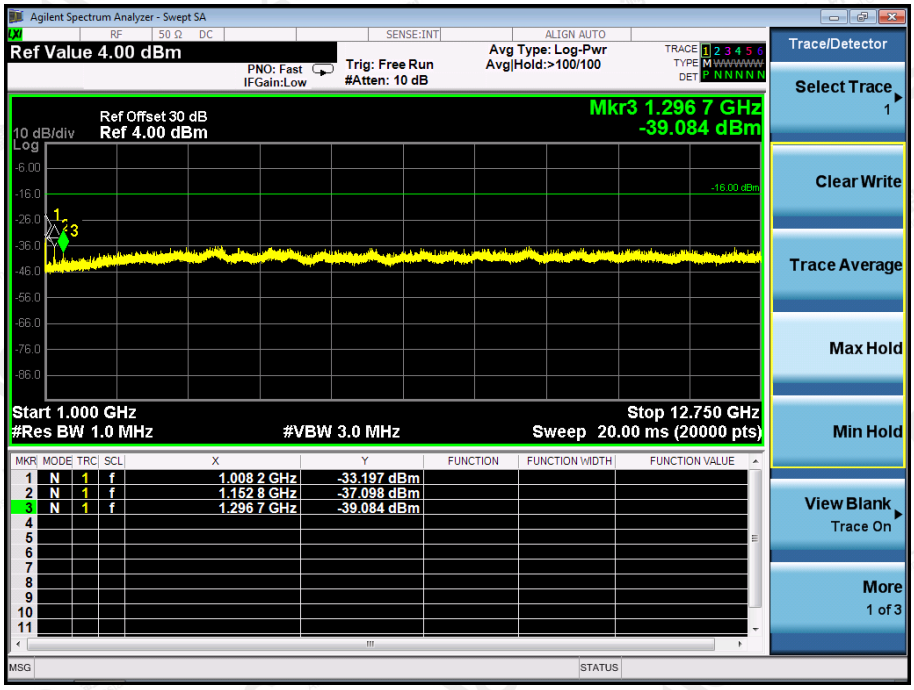
Conducted Spurious Emission (worst) @ 144.025MHz With 25 KHz Channel Separation-5W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 144.025MHz With 25 KHz Channel Separation-5W

1GHz-12.75GHz



Note: All the test frequencies had been tested, but only the worst data (bottom channel) recorded in the report.

12. RADIATED EMISSION ON RECEIVING MODE

12.1 PROVISIONS APPLICABLE

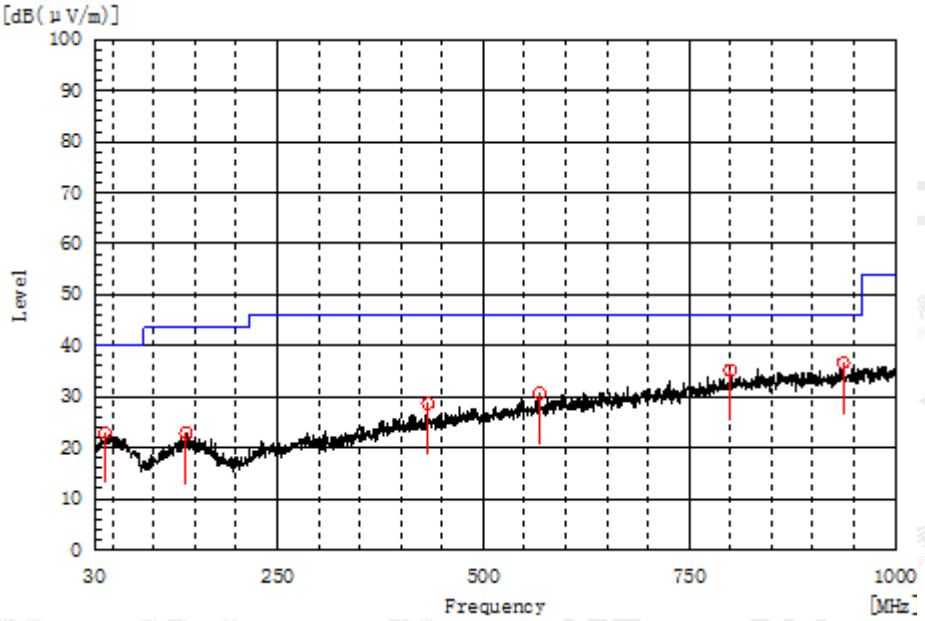
FCC Part 15 Subpart B Section 15.109

12.2 TEST METHOD

ANSI C 63.4: 2014

12.3 MEASURE RESULT (MEASURED AT 3M USING FCC PART15 B LIMITS)

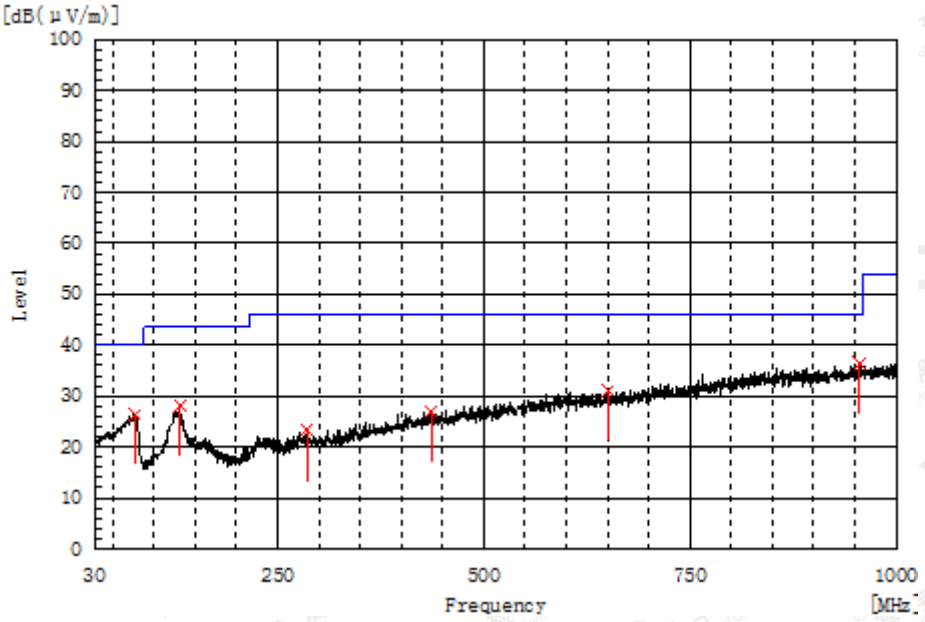
RADIATED EMISSION TEST RESULTS – HORIZONTAL



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
41.155	H	5.5	17.4	22.9	40.0	17.1	Pass	150.0	145.8
139.610	H	6.3	16.6	22.9	43.5	20.6	Pass	150.0	254.9
433.035	H	6.9	21.7	28.6	46.0	17.4	Pass	100.0	93.2
568.350	H	6.4	24.3	30.7	46.0	15.3	Pass	200.0	145.7
799.695	H	6.5	28.7	35.2	46.0	10.8	Pass	150.0	109.2
936.950	H	6.1	30.5	36.6	46.0	9.4	Pass	200.0	145.7

RESULT:PASS

RADIATED EMISSION TEST RESULTS – VERTICAL



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
78.015	V	14.0	12.4	26.4	40.0	13.6	Pass	100.0	324.2
131.365	V	11.8	16.3	28.1	43.5	15.4	Pass	200.0	305.4
285.595	V	5.6	17.7	23.3	46.0	22.7	Pass	150.0	72.2
436.915	V	5.2	21.8	27.0	46.0	19.0	Pass	150.0	216.3
650.315	V	5.6	25.6	31.2	46.0	14.8	Pass	200.0	271.1
954.895	V	5.7	30.7	36.4	46.0	9.6	Pass	150.0	289.1

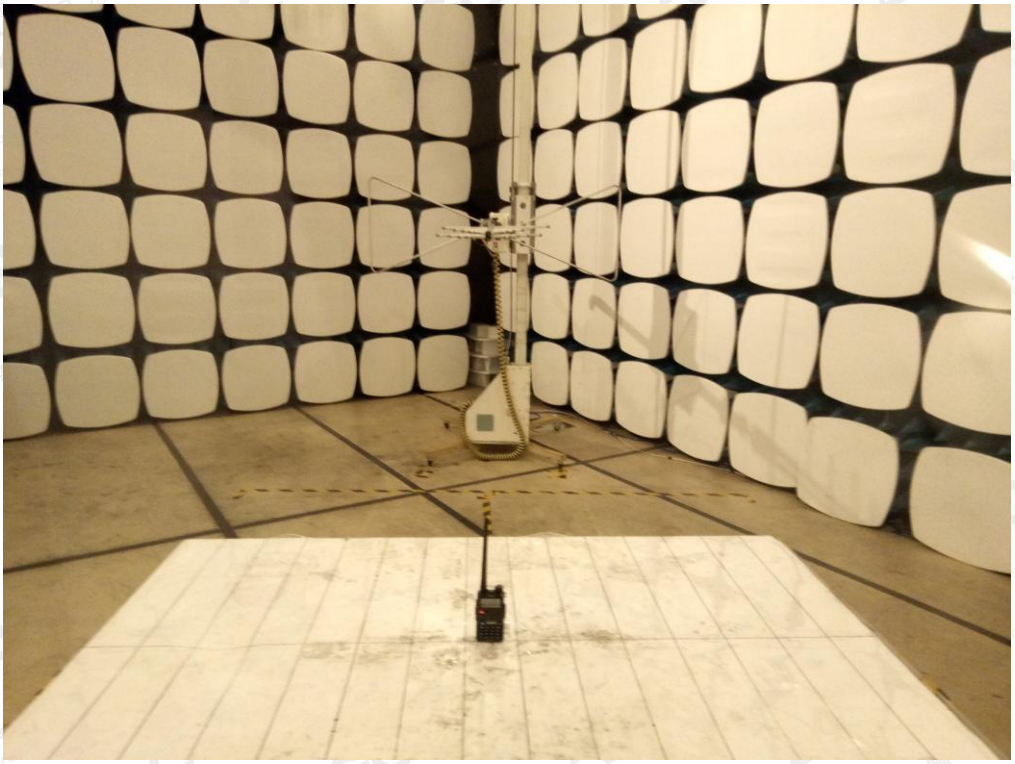
RESULT:PASS

NOTE： The test results of above 1G are all 20 dB margin below the limits.

APPENDIX 1: PHOTOGRAPHS OF SETUP

CONDUCTED EMISSION TEST SETUP

RADIATED EMISSION TEST SETUP-Below 1GHz



APPENDIX 2: EXTERNAL VIEW OF EUT

TOTAL VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

BACK VIEW OF EUT

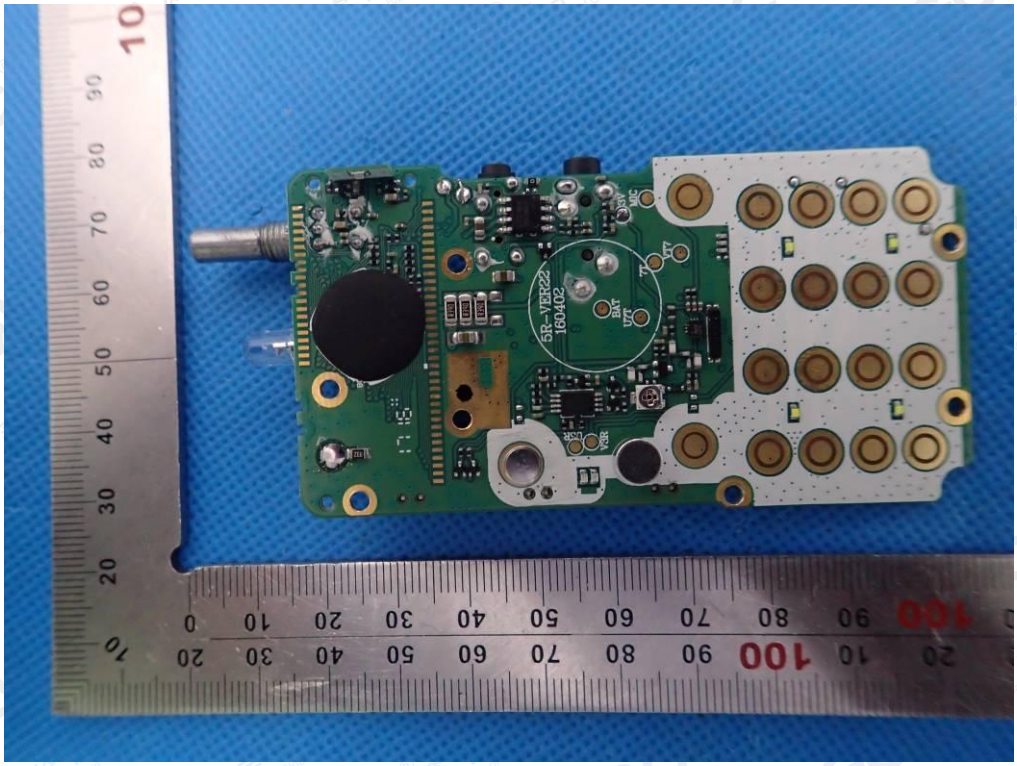
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

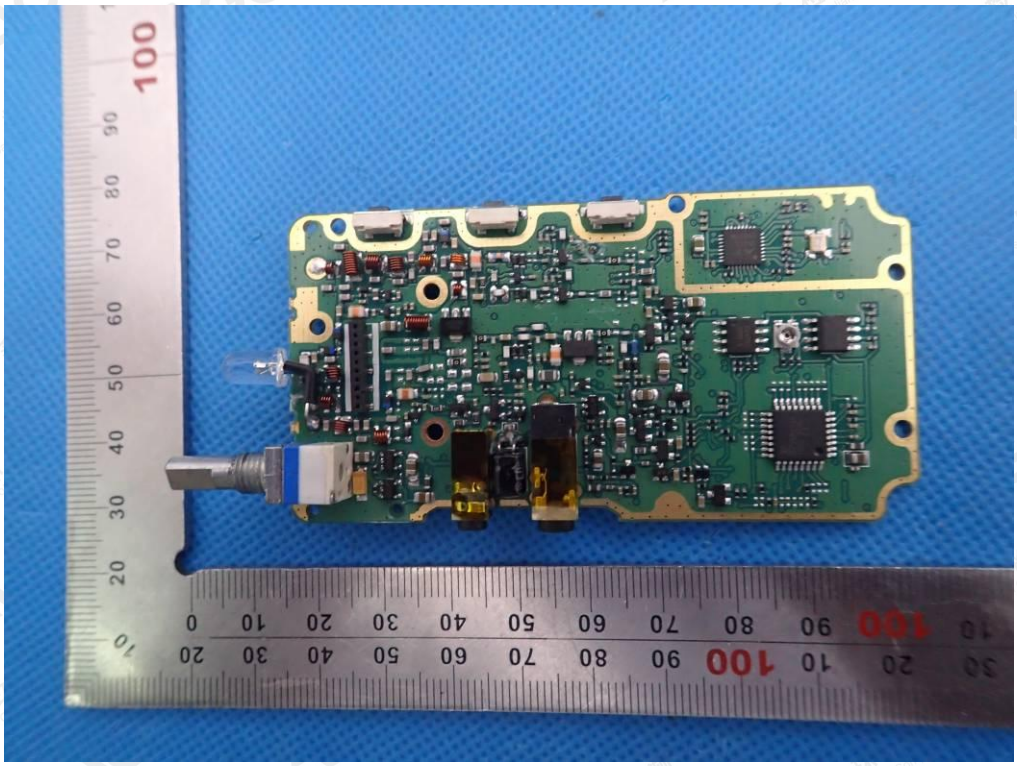
OPEN VIEW-1 OF EUT

INTERNAL VIEW-1 OF EUT

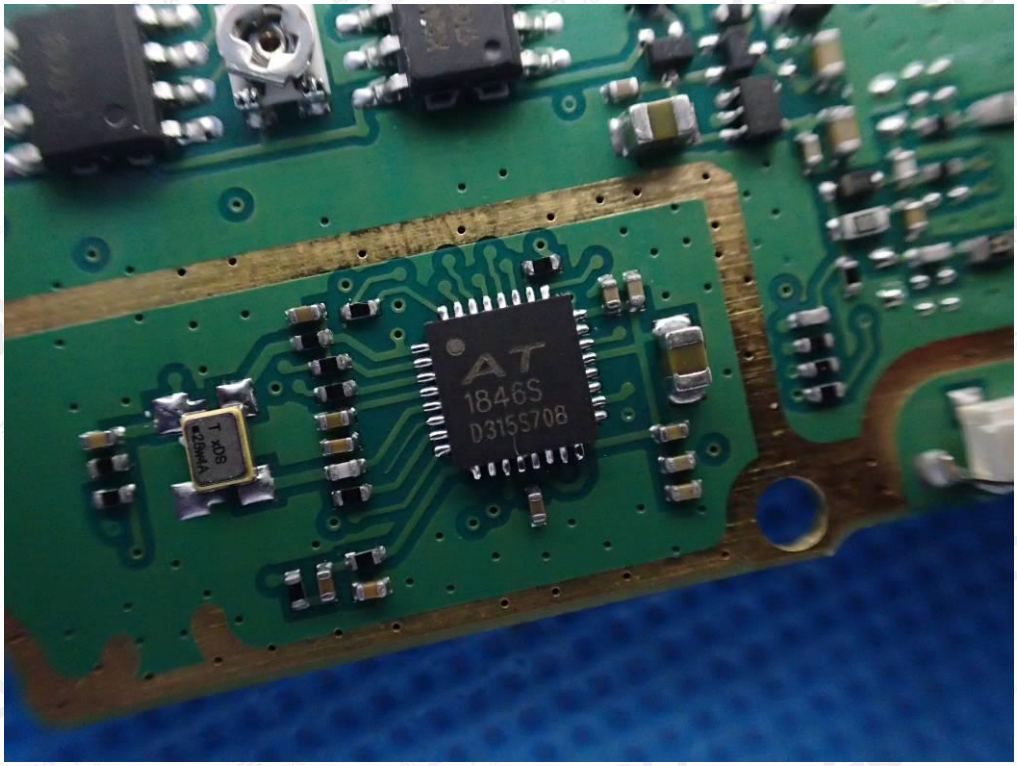
INTERNAL VIEW-2 OF EUT



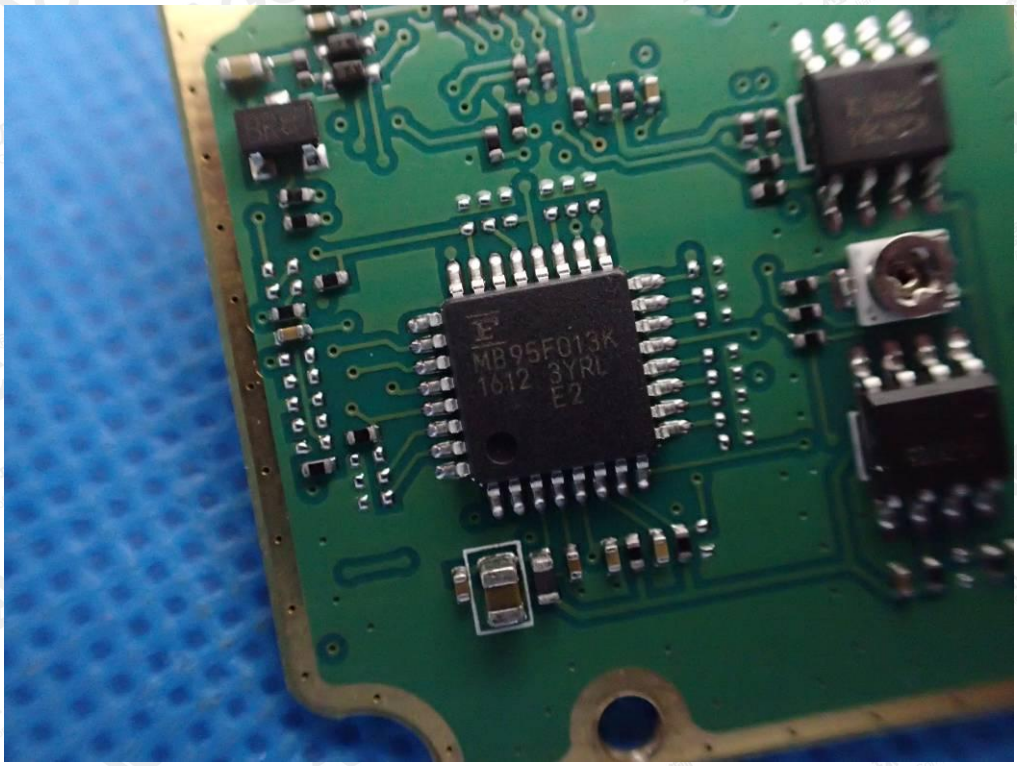
INTERNAL VIEW-3 OF EUT



INTERNAL VIEW-4 OF EUT



INTERNAL VIEW-5 OF EUT



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