
FCC Test Report

Report No.: AGC02931191002FE08A

FCC ID : POD-ADB5
PRODUCT DESIGNATION : Analog Transceiver
BRAND NAME : TYT, Explorer
MODEL NAME : TH-UV88, TH-UV98, TH-UV87, TH-UV66, QRZ-1
APPLICANT : TYT Electronics Co., Ltd.
DATE OF ISSUE : Nov. 19, 2021
STANDARD(S) : FCC Part 15 Rules
REPORT VERSION : V 1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Nov. 19, 2021	Valid	Class II Permissive Change

Note: The original test report Ref. No. (AGC02931191002FE08) (dated 2019-12-30), was modified on 2021-11-19 to include the following changes and additions for:

- Updated series model.
- Increase the brand name Explorer.
- Updated the hardware version.

For the above described change(s), updated FCC Radiated emission test and FCC CONDUCTED EMISSION TEST.

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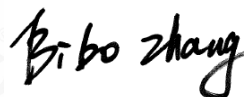


1. VERIFICATION OF COMPLIANCE

Applicant:	TYT Electronics Co., Ltd.
Address:	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Manufacturer:	TYT Electronics Co., Ltd.
Address:	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Factory:	TYT Electronics Co., Ltd.
Address:	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Product Designation:	Analog Transceiver
Brand Name:	TYT, Explorer
Test Model:	TH-UV88
Series Model(s)	TH-UV98, TH-UV87, TH-UV66, QRZ-1
Difference Description	a) The same PCB and specifications, only the model number, trademark and appearance line design are different, the corresponding relationship are as follow: b) Explorer is corresponding QRZ-1 ; TYT is corresponding TH-UV88,TH-UV98,TH-UV87,TH-UV66
Measurement Procedure:	ANSI C63.4: 2014
Deviation:	No any deviation from the test method.
Date of Test:	Nov. 08, 2021~Nov. 19, 2021
Condition of Test Sample:	Normal
Test Result:	Pass
Report Template:	AGCRT-US-PTT/EMC

The above equipment was tested by Attestation Of Global Compliance (Shenzhen) Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2014. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements. The test results of this report relate only to the tested sample identified in this report.

Prepared By



Bibo Zhang
(Project Engineer)

Nov. 19, 2021

Reviewed By



Calvin Liu
(Reviewer)

Nov. 19, 2021

Approved By



Max Zhang
Authorized Officer

Nov. 19, 2021

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2. PRODUCT INFORMATION

The EUT is a **Analog Transceiver** designed 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
RX Frequency Range	136-174MHz, 400-480 MHz (Scanning Receiver)
Emission Type	F3E
Antenna Designation	Detachable Antenna
Antenna Gain	1.5dBi
Hardware Version	VER 2.1B
Software Version	V1.00
Power Supply	DC 7.4V,1400mAh by battery, charging for DC8.4V

I/O Port Information (☒Applicable ☐Not Applicable)

I/O Port of EUT			
I/O Port Type	Q'TY	Cable	Tested with
Antenna Port	1	-	1
Earphone Port	1	-	1

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3. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

List of Test Equipment:

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 11, 2021	May 10, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
TEST SOFTWARE	FARA	EZ-EMC (Ver.AGC-C ON03A1)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 11, 2021	May 10, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2021	Jan. 07, 2023
ANTENNA	SCHWARZBECK	VULB9168	D69250	Apr. 28, 2021	Apr. 27, 2023
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
POSITIONING CONTROLLER	MF	MF-7802	MF780208285	--	--
HORN ANTENNA	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2023
RF Communication Test Set	HP	8920B	US35010161	Sep. 01, 2021	Aug. 31, 2022
EXA Signal Analyzer	Agilent	N9020A	MY53300860	Jun. 09, 2021	Jun. 08, 2022
Attenuator	Schaffner	58-30-33	ML030	Oct. 24, 2021	Oct. 23, 2022
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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4. SUPPORT EQUIPMENT LIST

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
Charger	-	AD-UV88	-	-	1.2m Unshielded
Battery	-	TH-UV88	-	-	-
Back clip	-	N/A	-	-	-

5. SYSTEM DESCRIPTION

EUT TEST PROCEDURE:

1. Connect EUT and peripheral devices.
2. Power on the EUT, the EUT begins to work.
3. Make sure the EUT normal working.

EMC TEST MODE:

No.	TEST MODES
1	Scanning mode
2	Scanning stopped/Receiving at low channel of 136 MHz to 174 MHz
3	Scanning stopped/Receiving at middle channel of 136 MHz to 174 MHz
4	Scanning stopped/Receiving at high channel of 136 MHz to 174 MHz
5	Scanning stopped/Receiving at low channel of 400 MHz to 480 MHz
6	Scanning stopped/Receiving at middle channel of 400 MHz to 480 MHz
7	Scanning stopped/Receiving at high channel of 400 MHz to 480 MHz

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

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6. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.1$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 4.0$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ Db

7. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.107	Conduction Emission	Compliant
§15.109	Radiated Emission	Compliant

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8. FCC RADIATED EMISSION TEST

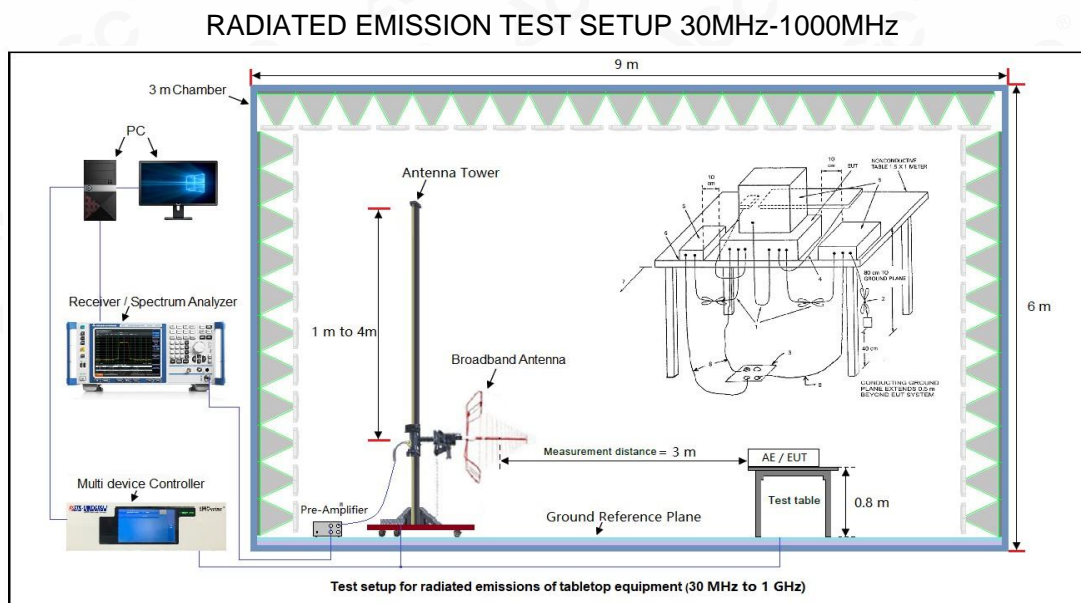
8.1 PROVISIONS APPLICABLE

FCC CFR Title 47 Part 15 Subpart B Section 15.109:

Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

Note: The lower limit shall apply at the transition frequency. Because the EUT RX frequency range up to 480 MHz, so the upper the frequency range up to 2 GHz.

8.2 TEST SETUP BLOCK DIAGRAM

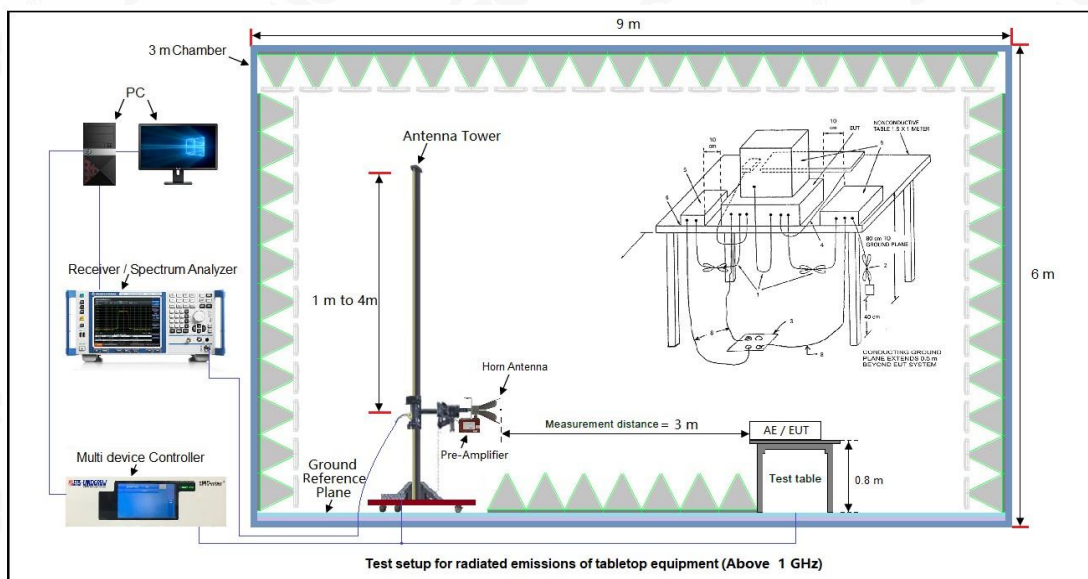


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RADIATED EMISSION TEST SETUP ABOVE 1000MHz



EMI TEST RECEIVER SETUP:

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

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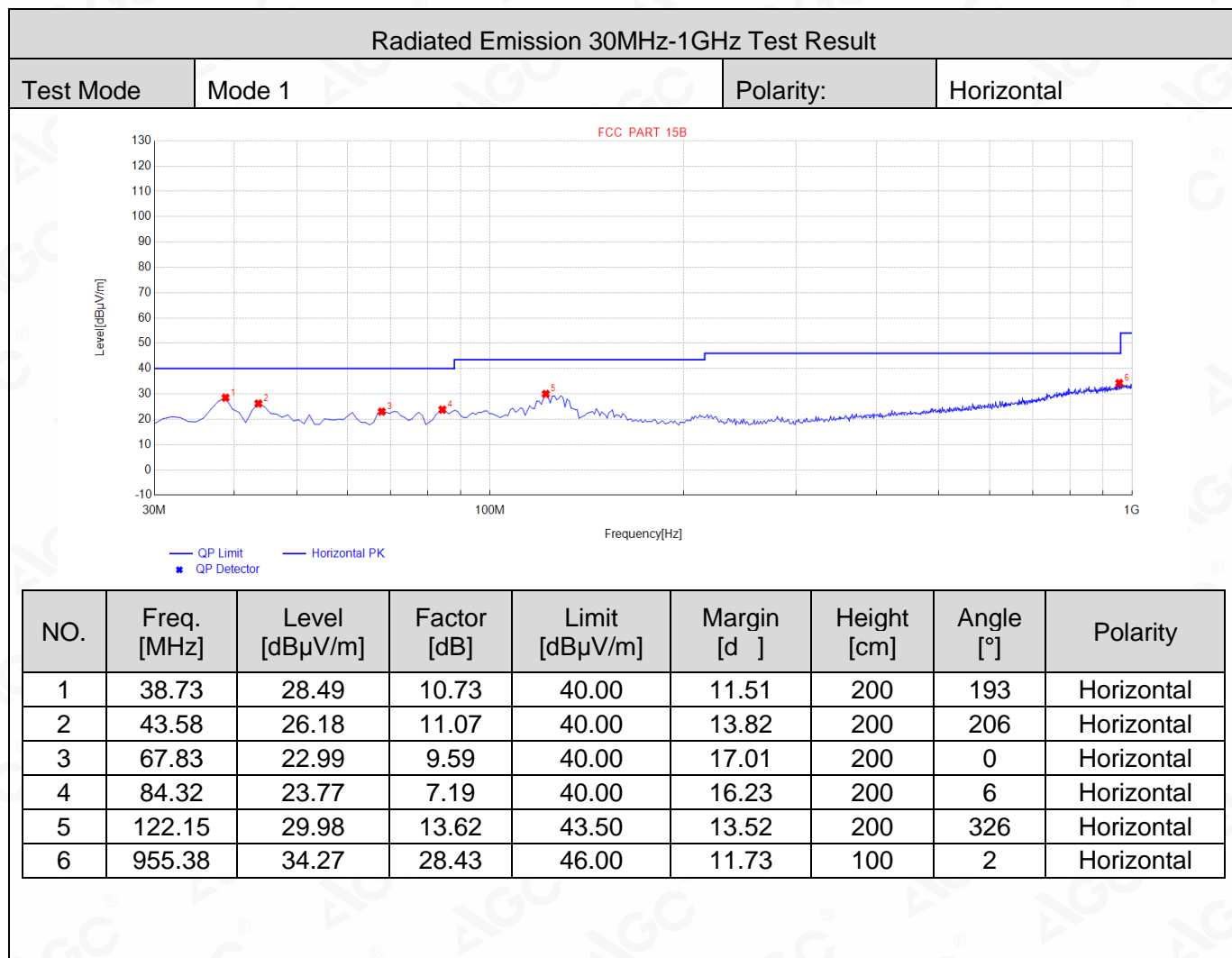
8.3 TEST PROCEDURE

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 turntable with a height of 0.8 meters is used which 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 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 by AC 120V/60Hz.
5. The antenna was placed at 3 meter away from the EUT as stated in FCC Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
6. The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
7. The test mode(s) were scanned during the test:
8. Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented. For emissions below 1GHz, use 120KHz RBW and VBW \geq 3RBW for QP reading.
9. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
11. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
12. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
13. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
14. The test data of the worst case condition (mode 1) was reported on the following Data page.

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8.4 TEST RESULT



RESULT: PASS

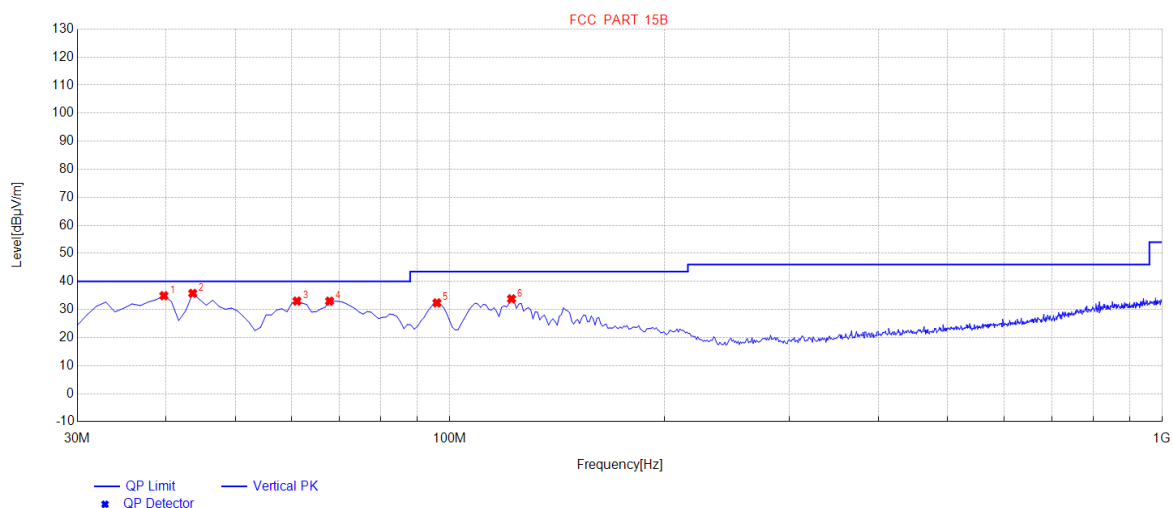
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Radiated Emission 30MHz-1GHz Test Result

Test Mode	Mode 1	Polarity:	Vertical
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NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	39.7	34.91	10.73	40.00	5.09	100	182	Vertical
2	43.58	35.75	11.07	40.00	4.25	100	217	Vertical
3	61.04	33.00	10.74	40.00	7.00	100	50	Vertical
4	67.83	32.97	9.59	40.00	7.03	100	87	Vertical
5	95.96	32.35	9.71	43.50	11.15	100	323	Vertical
6	122.15	33.79	13.62	43.50	9.71	100	6	Vertical

RESULT: PASS

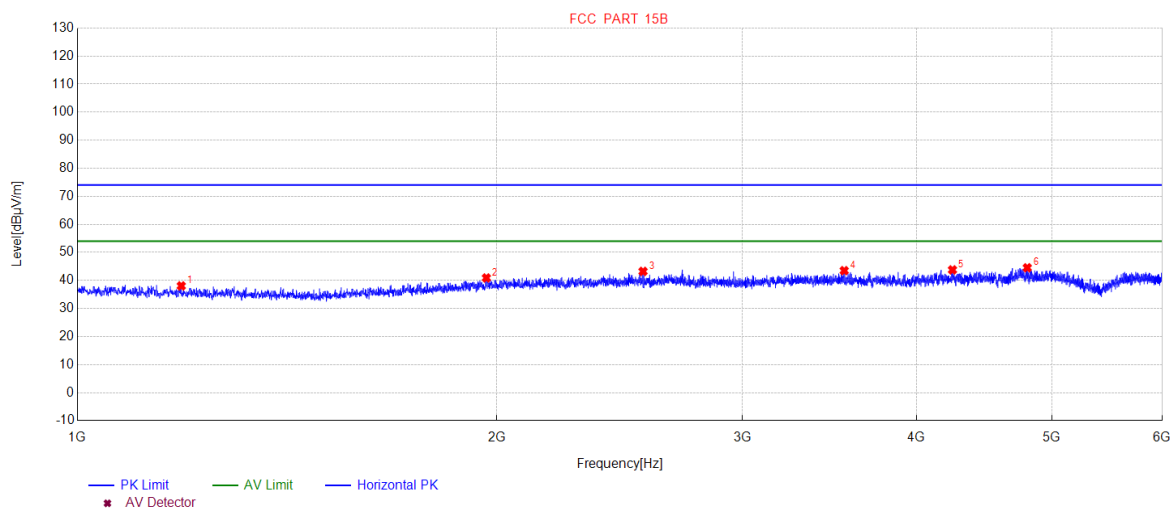
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Radiated Emission Above 1GHz Test Result

Test Mode	Mode 1	Polarity:	Horizontal
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NO.	Freq. [MHz]	Level [dBμV/m]	Factor dB	Limit [dBμV/m]	[dB]	Height [m]	Angle [°]	Polarity
1	1187.5188	38.05	-16.82	74.00	35.95	100	180	Horizontal
2	1965.5966	40.89	-12.19	74.00	33.11	100	140	Horizontal
3	2546.1546	43.22	-9.68	74.00	30.78	100	40	Horizontal
4	3549.755	43.49	-7.49	74.00	30.51	100	130	Horizontal
5	4244.8245	43.76	-5.86	74.00	30.24	100	130	Horizontal
6	4802.8803	44.52	-4.91	74.00	29.48	100	300	Horizontal

RESULT: PASS

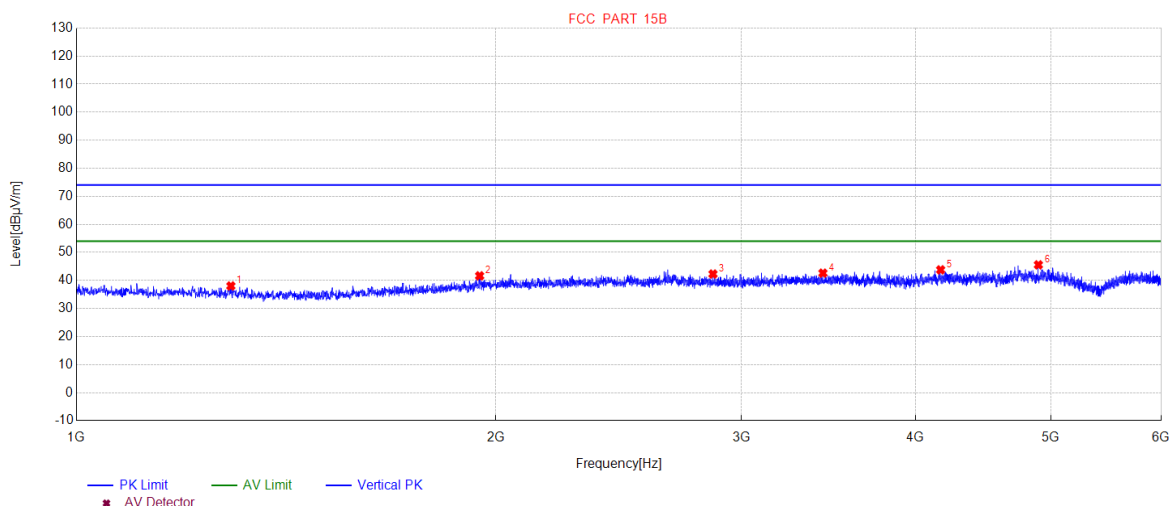
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Radiated Emission Above 1GHz Test Result

Test Mode	Mode 1	Polarity:	Vertical
-----------	--------	-----------	----------



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1291.0291	38.03	-16.93	74.00	35.97	100	50	Vertical
2	1947.0947	41.63	-12.38	74.00	32.37	100	300	Vertical
3	2862.6863	42.28	-9.44	74.00	31.72	100	220	Vertical
4	3432.7433	42.60	-7.83	74.00	31.40	100	90	Vertical
5	4169.3169	43.78	-6.06	74.00	30.22	100	250	Vertical
6	4900.39	45.56	-4.82	74.00	28.44	100	220	Vertical

RESULT: PASS

- Note:** 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Measurement.
2. The "Factor" value can be calculated automatically by software of measurement system.

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9. FCC CONDUCTED EMISSION TEST

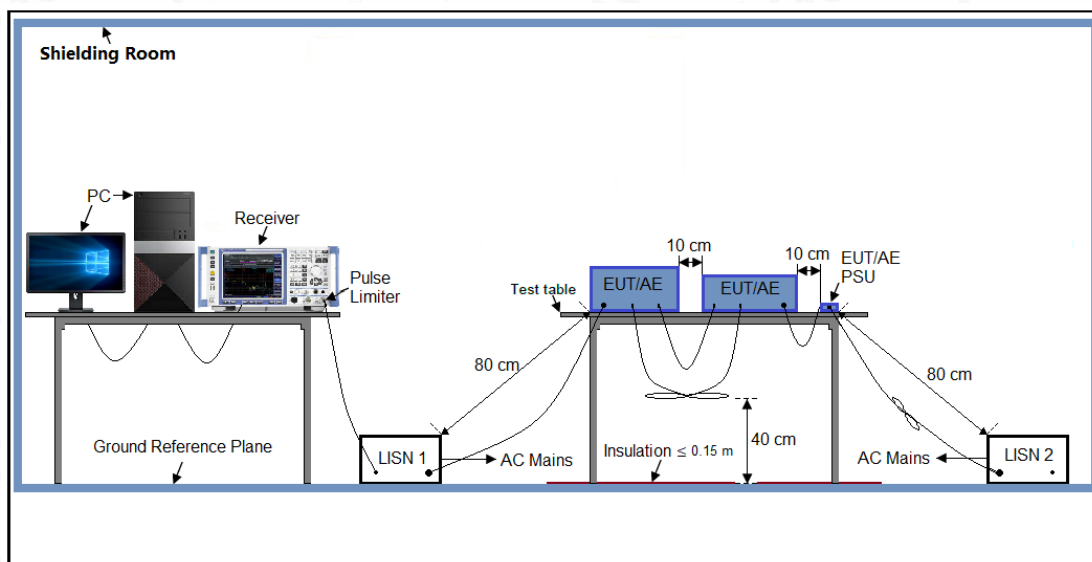
9.1 PROVISIONS APPLICABLE

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.

9.2 TEST SETUP BLOCK DIAGRAM



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9.3 TEST 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 AC 120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test data of the worst case condition (mode 2) was reported on the following Data page.

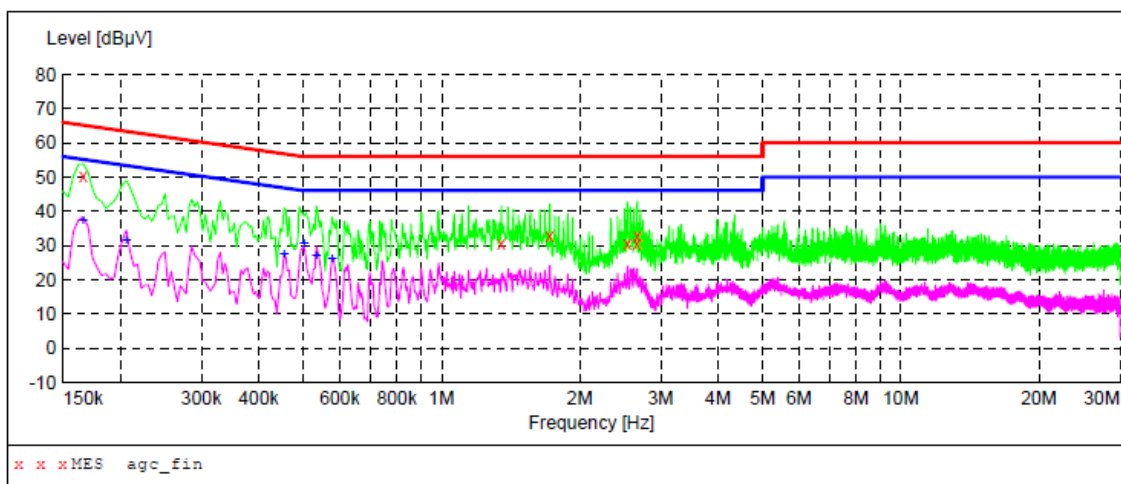
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9.4 TEST RESULT

LINE CONDUCTED EMISSION TEST

Test Mode	Mode 2	LISN line	Hot Side
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**MEASUREMENT RESULT: "agc_fin"**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.166000	50.40	6.8	65	14.8	QP	L1
1.350000	30.30	5.9	56	25.7	QP	L1
1.722000	32.70	6.3	56	23.3	QP	L1
2.538000	30.50	6.5	56	25.5	QP	L1
2.662000	30.30	6.5	56	25.7	QP	L1
2.670000	32.80	6.5	56	23.2	QP	L1

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.166000	37.30	6.8	55	17.9	AV	L1
0.206000	31.30	6.5	53	22.1	AV	L1
0.454000	27.20	5.5	47	19.6	AV	L1
0.502000	30.40	5.4	46	15.6	AV	L1
0.534000	27.10	5.4	46	18.9	AV	L1
0.578000	25.90	5.4	46	20.1	AV	L1

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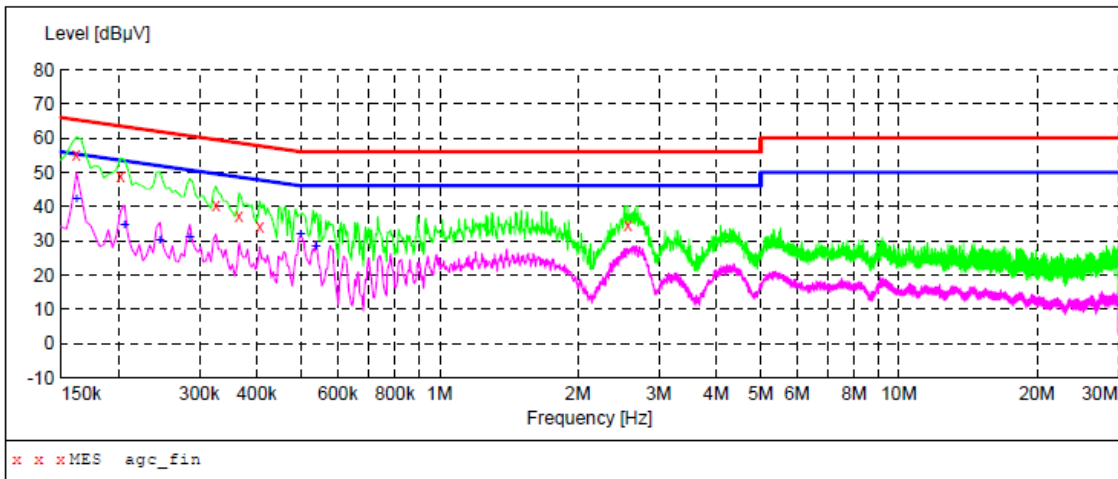
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LINE CONDUCTED EMISSION TEST

Test Mode	Mode 2	LISN line	Neutral Side
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MEASUREMENT RESULT: "agc_fin"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.162000	55.30	6.8	65	10.1	QP	N
0.202000	48.90	6.5	64	14.6	QP	N
0.326000	40.50	5.9	60	19.1	QP	N
0.366000	37.40	5.8	59	21.2	QP	N
0.406000	34.00	5.7	58	23.7	QP	N
2.570000	34.40	6.5	56	21.6	QP	N

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.162000	42.30	6.8	55	13.1	AV	N
0.206000	34.80	6.5	53	18.6	AV	N
0.246000	30.10	6.3	52	21.8	AV	N
0.286000	30.80	6.1	51	19.8	AV	N
0.498000	31.70	5.4	46	14.3	AV	N
0.538000	28.50	5.4	46	17.5	AV	N

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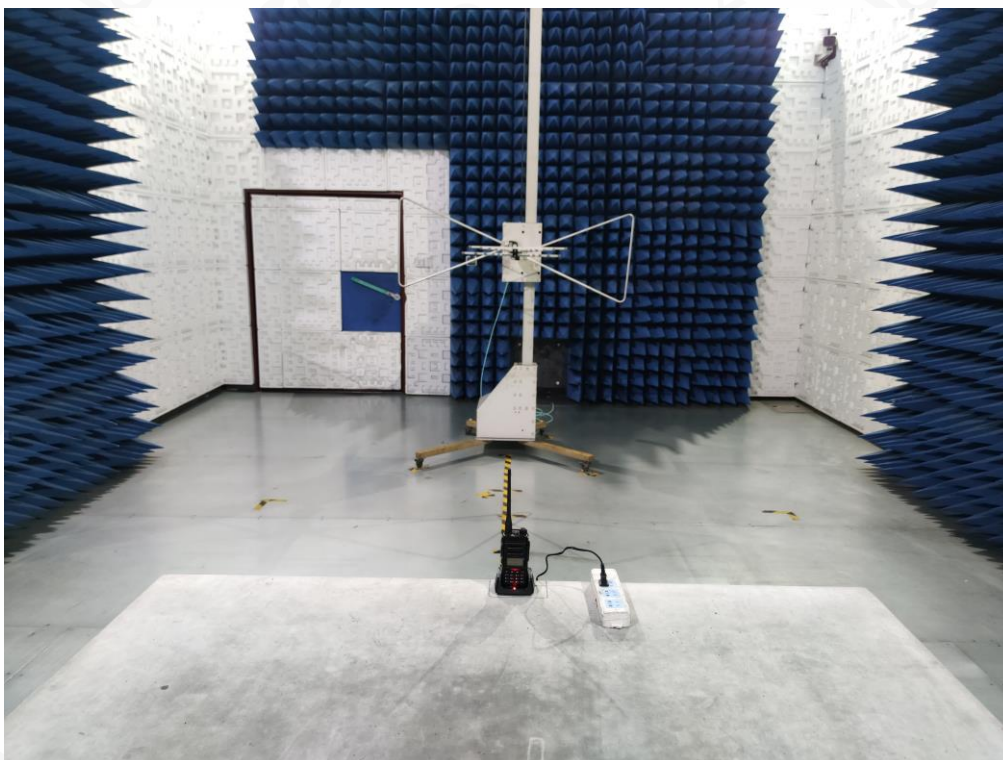


APPENDIX I PHOTOGRAPHS OF TEST SETUP

CONDUCTED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP-BELOW 1GHZ

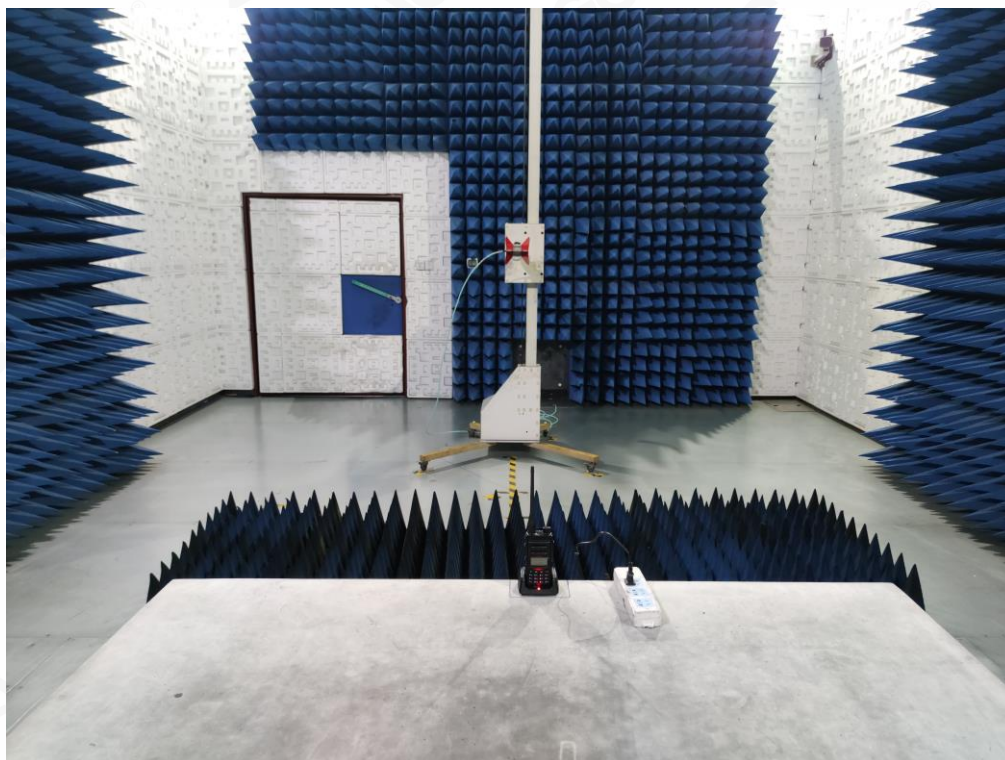


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RADIATED EMISSION TEST SETUP-ABOVE 1GHZ



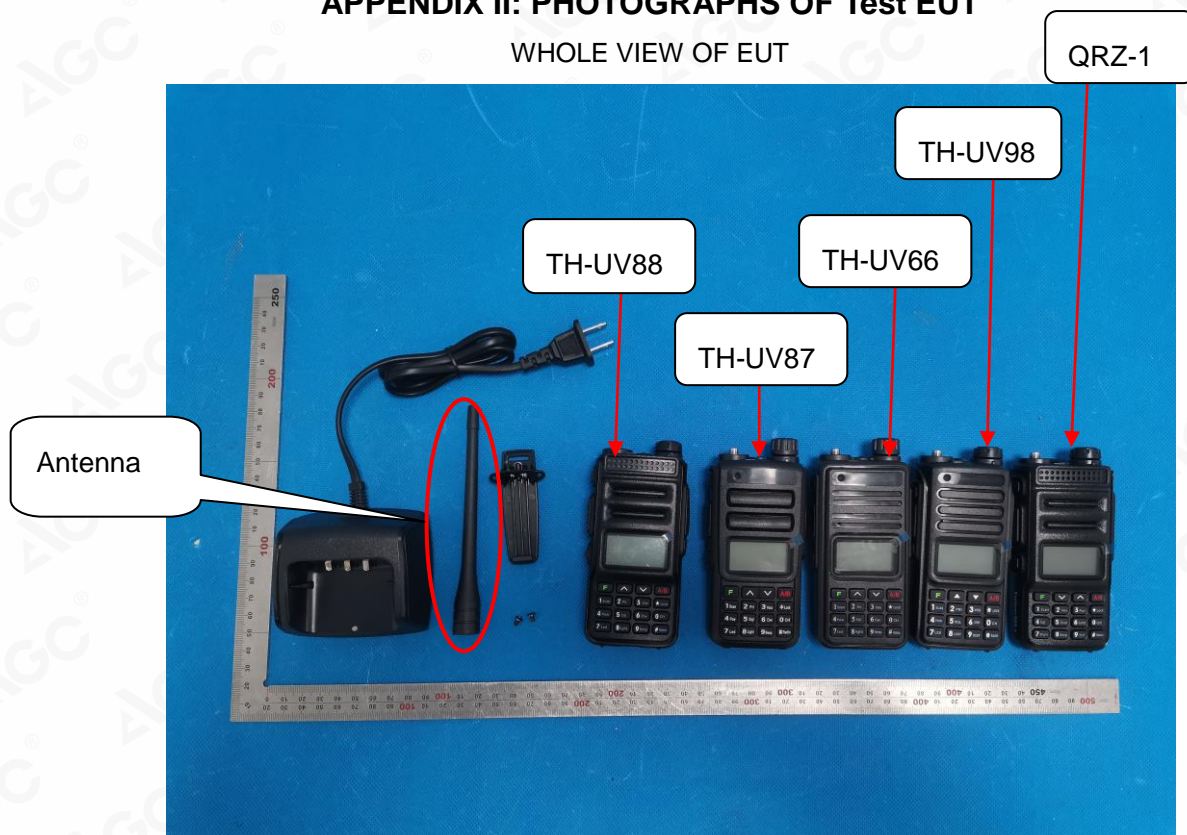
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APPENDIX II: PHOTOGRAPHS OF Test EUT

WHOLE VIEW OF EUT



TOP VIEW OF EUT



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BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



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BACK VIEW OF EUT



LEFT VIEW OF EUT



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RIGHT VIEW OF EUT



OPEN VIEW-1 OF EUT



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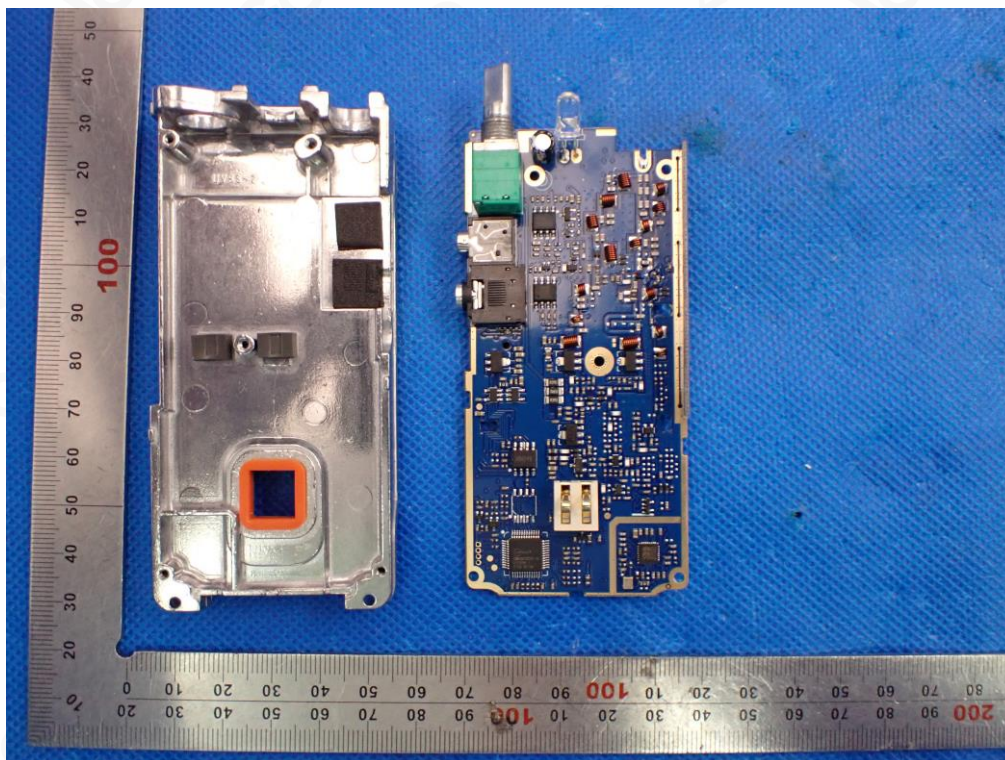
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OPEN VIEW-2 OF EUT



OPEN VIEW-3 OF EUT



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