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Report Template Version: V04

Report Template Revision Date: 2018-07-06

TEST REPORT

Report No. : CQASZ20190700605E

Applicant: Alinco, Inc. Electronics Division

Address of Applicant: Yodoyabashi Dai-Bldg 13F, 4-4-9 Koraibashi, Chuo-Ku, Osaka 541-0043, Japan

Equipment Under Test (EUT):

EUT Name: VHF/UHF DUAL BAND FM TRANSCEIVER

Model No.: DJ-VX50HT

Trade Mark: ALINCO

FCC ID: PH3DJ-VX50HT

Standards: 47 CFR Part 15, Subpart B, ClassB

Date of Receipt: 2019-07-18

Date of Test: 2019-07-18 to 2019-07-26

Date of Issue: 2019-07-26

Test Result : **PASS***

* In the configuration tested, the EUT complied with the standards specified above

Tested By: Timy You
(Timy You)

Reviewed By: Sheek Luo
(Sheek Luo)

Approved By: Jack Ai
(Jack Ai)



1 Version

Revision History of Report

Report No.	Version	Description	Issue Date
CQASZ20190700605E	Rev.01	Initial report	2019-07-26

2 Test Summary

Test Item	Test Requirement	Test method	Result
Radiated Emission	47 CFR Part 15B	ANSI C63.4-2014	PASS
Conducted Emission (150KHz to 30MHz)	47 CFR Part 15B	ANSI C63.4-2014	PASS
Conducted Spurious Emissions	47 CFR Part 15B	ANSI C63.4-2014	PASS

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement Range (MHz)
Below 1.705	30
1.705 to 108	1000
108 to 500	2000
500 to 1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

Remark:

The highest frequency of the internal sources of the EUT is 450MHz.

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4 General Information

4.1 Client Information

Applicant:	Alinco, Inc. Electronics Division
Address of Applicant:	Yodoyabashi Dai-Bldg 13F, 4-4-9 Koraibashi, Chuo-Ku, Osaka 541-0043, Japan
Manufacturer:	Alinco, Inc. Electronics Division
Address of Manufacturer:	Yodoyabashi Dai-Bldg 13F, 4-4-9 Koraibashi, Chuo-Ku, Osaka 541-0043, Japan

4.2 General Description of EUT

Product Name:	VHF/UHF DUAL BAND FM TRANSCEIVER
Model No.:	DJ-VX50HT
Trade Mark:	ALINCO
Hardware Version:	DJ-WX8 V2.1
Software Version:	DJ-VX50HUVD-190509001
Operation Frequency:	VHF:144-148MHz(Rx only) UHF:420-450MHz(Rx only) FM: 76-108MHz(Rx only) AM:118-135.995MHz(Rx only)
Product Type:	<input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Antenna Type:	External antenna
Power Supply:	lithium battery:DC7.4V, Charge by adapter Adapter: Model: NLA050090W1A6 Input: 100-240V 50/60Hz 0.2A Max Output: 9V 500mA

4.3 Test Environment and Mode

Operating Environment:	
Radiated Emission	
Temperature:	25.4 °C
Humidity:	53 % RH
Atmospheric Pressure:	1001mbar
Conducted Emission	
Temperature:	25 °C
Humidity:	52 % RH
Atmospheric Pressure:	1001mbar
Test mode	
Mode a:	Charging+ VHF Rx
Mode b:	Charging+ UHF Rx
Mode c:	Charging+ FM Rx
Mode d:	Charging+ AM Rx

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

1) support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Adapter	Alinco	NLA050090W1A6	FCC	Client

4.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

No tests were sub-contracted:

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Other Information Requested by the Customer

None.

4.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Conduction emission	3.74dB (9kHz to 150kHz)
		3.34dB (150kHz to 30MHz)
2	Radiated emission	5.12dB (Below 1GHz)
		4.60dB (Above 1GHz)
3	Temperature	0.8°C
4	Humidity	2.0%

5 Equipment List

Conducted Emissions (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/10/28	2019/10/27
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable (9KHz~300MHz)	CQA	N/A	C009	2018/9/26	2019/9/25

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2019/9/25
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2019/9/25
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2018/10/28	2020/10/27
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2018/10/28	2019/10/27
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4- 00010300- 18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D- 02001800- 29-20P	CQA-036	2018/11/2	2019/11/1
Coaxial cable (1GHz~40GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial cable (9KHz~1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25

6 Test results and Measurement Data

6.1 Conducted Emissions

Test Requirement: 47 CFR Part 15B

Test Method: ANSI C63.4

Test frequency range: 150kHz to 30MHz

Limit:

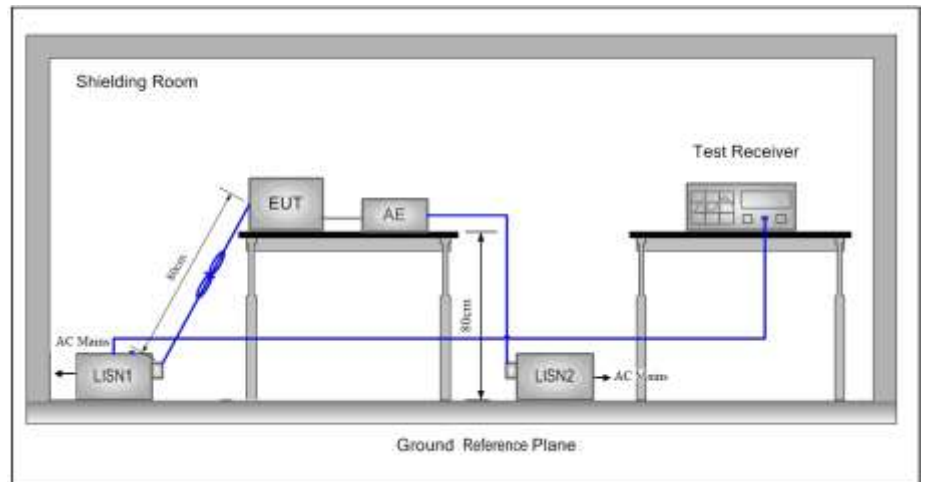
Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Procedure:

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.

Test Setup:



Instruments Used:

Refer to section 5 for details

Test Mode:

Mode a: Charging+ VHF Rx

Mode b: Charging+ UHF Rx

Mode c: Charging+ FM Rx

Mode d: Charging+ AM Rx

Final Test Mode:

Pretest the EUT at different test mode and found the mode a which is worst case, the test worst case mode is recorded in the report.

Test Results:

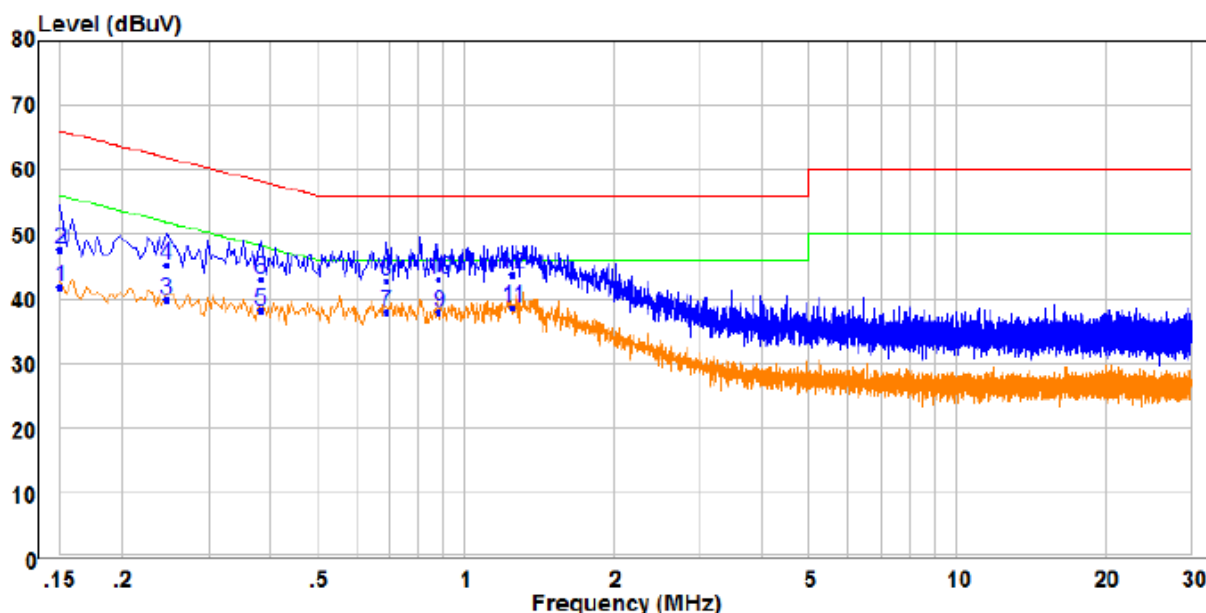
Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

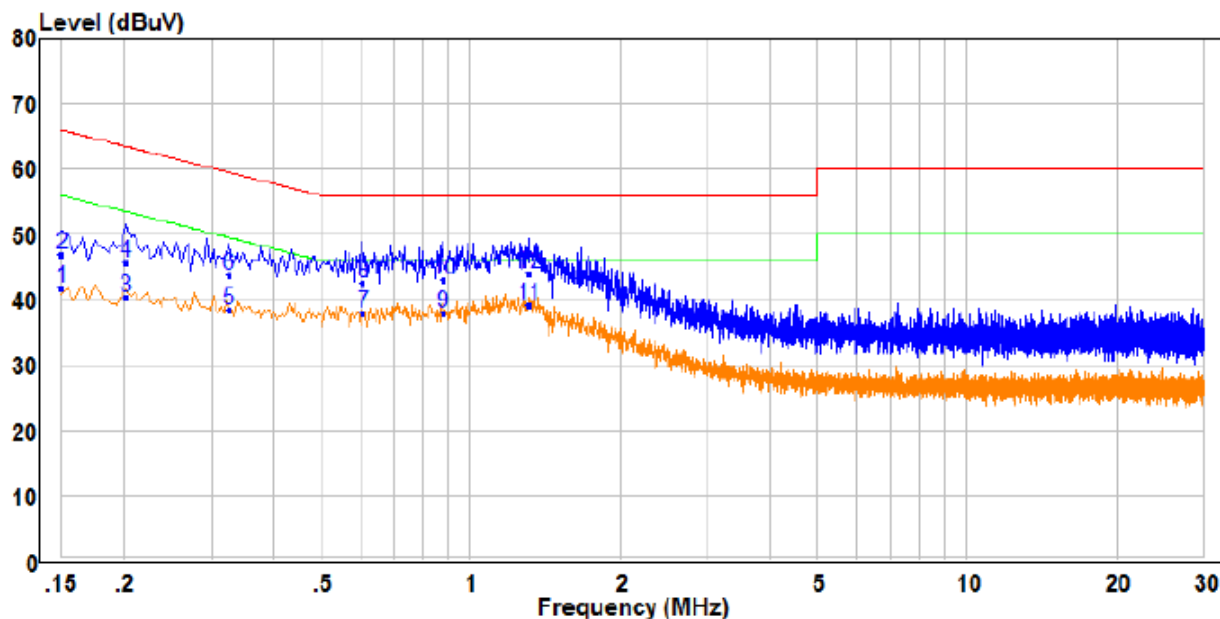
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	32.26	9.49	41.75	56.00	-14.25	Average
2	0.150	38.17	9.49	47.66	66.00	-18.34	QP
3	0.246	30.48	9.49	39.97	51.89	-11.92	Average
4	0.246	35.65	9.49	45.14	61.89	-16.75	QP
5	0.382	28.61	9.50	38.11	48.24	-10.13	Average
6	0.382	33.57	9.50	43.07	58.24	-15.17	QP
7	0.690	27.98	9.85	37.83	46.00	-8.17	Average
8	0.690	33.02	9.85	42.87	56.00	-13.13	QP
9	0.882	28.38	9.66	38.04	46.00	-7.96	Average
10	0.882	33.33	9.66	42.99	56.00	-13.01	QP
11 PP	1.246	29.13	9.52	38.65	46.00	-7.35	Average
12 QP	1.246	34.27	9.52	43.79	56.00	-12.21	QP

Neutral Line:



	Read Freq	Read Level	Factor	Limit Level	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dB	
1	0.150	32.35	9.48	41.83	56.00	-14.17 Average
2	0.150	37.55	9.48	47.03	66.00	-18.97 QP
3	0.202	30.94	9.48	40.42	53.53	-13.11 Average
4	0.202	36.16	9.48	45.64	63.53	-17.89 QP
5	0.326	28.99	9.50	38.49	49.55	-11.06 Average
6	0.326	34.31	9.50	43.81	59.55	-15.74 QP
7	0.606	28.16	9.72	37.88	46.00	-8.12 Average
8	0.606	32.92	9.72	42.64	56.00	-13.36 QP
9	0.878	28.17	9.77	37.94	46.00	-8.06 Average
10	0.878	33.34	9.77	43.11	56.00	-12.89 QP
11 PP	1.306	29.44	9.72	39.16	46.00	-6.84 Average
12 QP	1.306	34.34	9.72	44.06	56.00	-11.94 QP

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

6.2 Radiated Emission

Test Requirement: 47 CFR Part 15B

Test Method: ANSI C63.4

Test site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value

Limit:

Frequency	Limit (dB μ V/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Procedure:

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different from above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber (Above 18GHz the distance is 1 meter).
- Repeat above procedures until all frequencies measured was complete.

Test Setup:

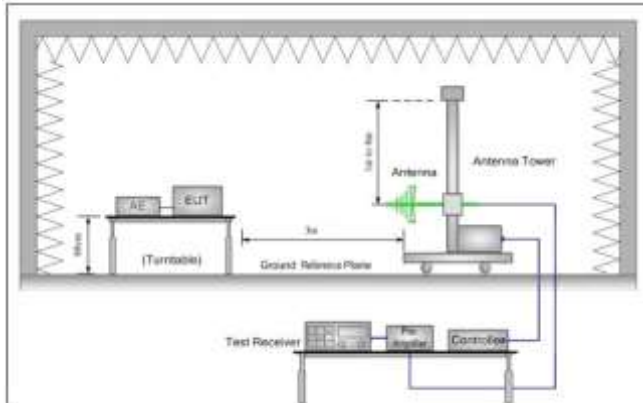


Figure 1. 30MHz to 1GHz

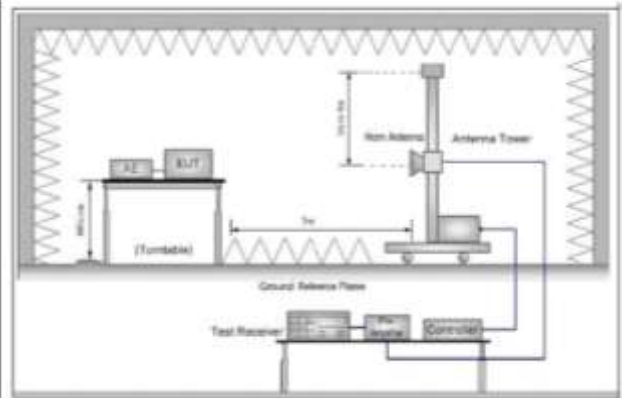


Figure 2. Above 1 GHz

Instruments Used:

Refer to section 5 for details

Test Mode:

- Mode a: Charging+ VHF Rx
- Mode b: Charging+ UHF Rx
- Mode c: Charging+ FM Rx
- Mode d: Charging+ AM Rx

Final Test Mode:

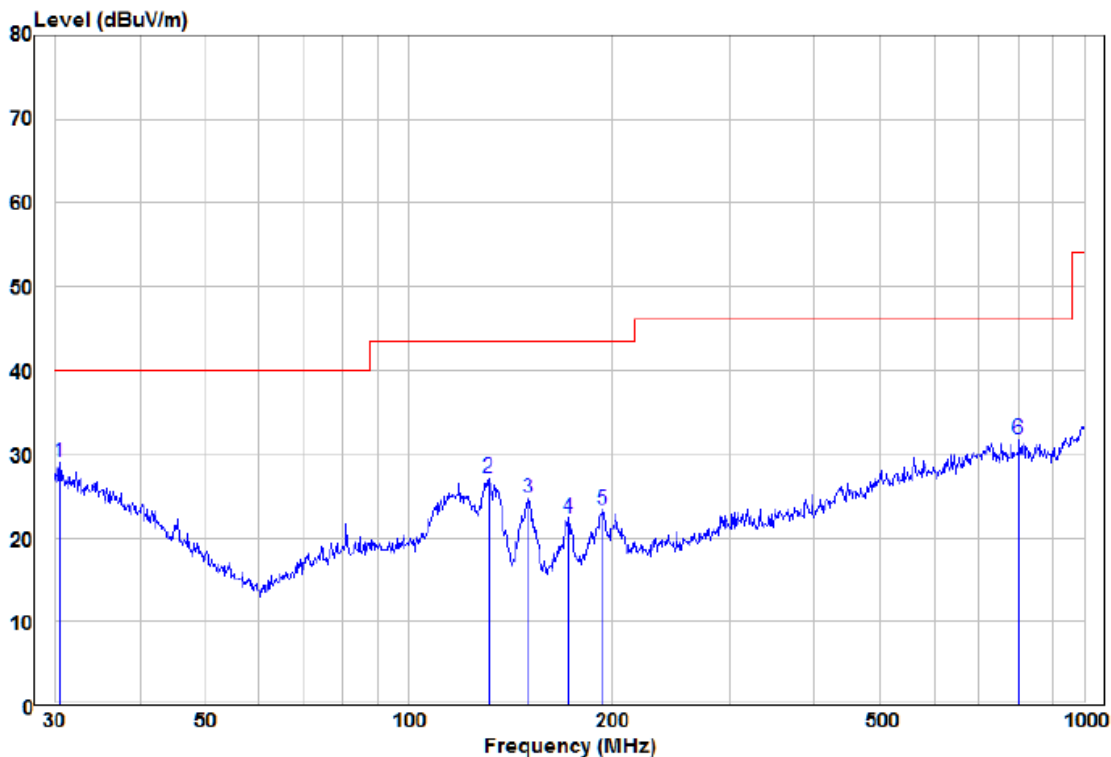
Pretest the EUT at different test mode and found the mode a which is worst case, the test worst case mode is recorded in the report.

Test Results:

Pass

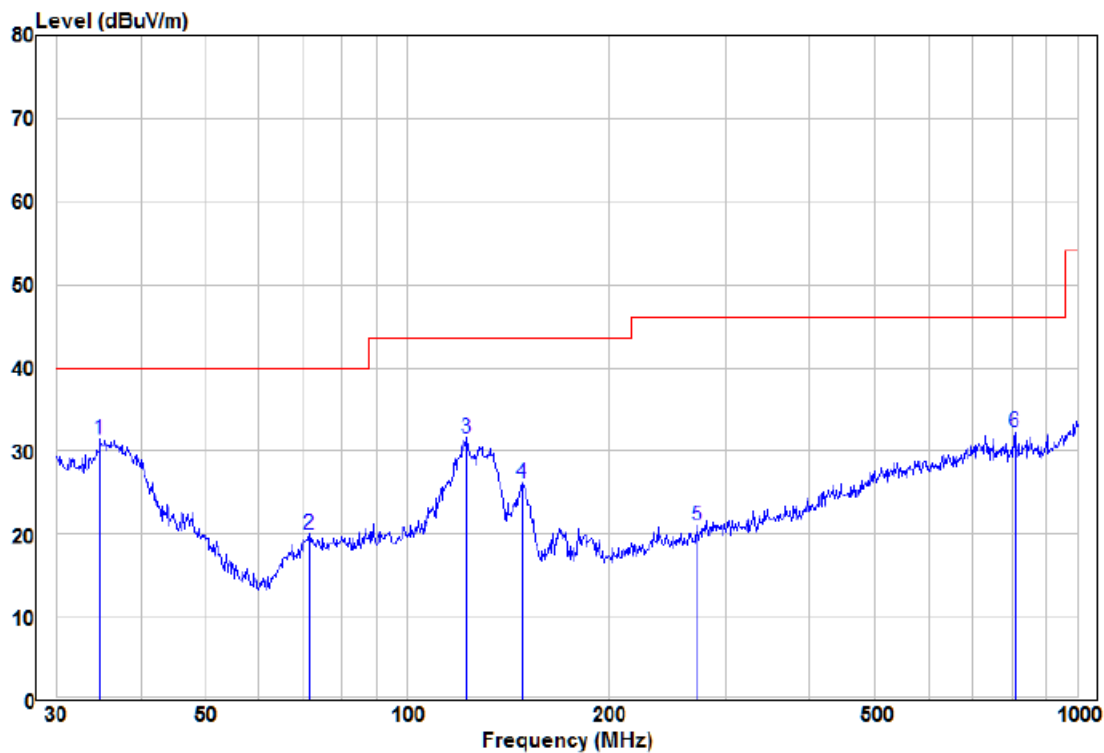
Below 1GHz

Horizontal



	Read			Limit	Over		
Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	30.53	10.82	18.22	29.04	40.00	-10.96 Peak	HORIZONTAL
2	131.76	17.13	9.93	27.06	43.50	-16.44 Peak	HORIZONTAL
3	150.54	16.35	8.43	24.78	43.50	-18.72 Peak	HORIZONTAL
4	172.60	14.52	7.80	22.32	43.50	-21.18 Peak	HORIZONTAL
5	194.45	15.26	8.20	23.46	43.50	-20.04 Peak	HORIZONTAL
6	801.79	10.89	20.81	31.70	46.00	-14.30 Peak	HORIZONTAL

Vertical



	Read Freq	Read Level	Factor	Limit Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	pp	34.88	14.66	16.65	31.31	40.00	-8.69 Peak	VERTICAL
2		71.58	11.49	8.41	19.90	40.00	-20.10 Peak	VERTICAL
3		122.83	20.95	10.59	31.54	43.50	-11.96 Peak	VERTICAL
4		148.44	17.71	8.41	26.12	43.50	-17.38 Peak	VERTICAL
5		271.32	10.12	10.78	20.90	46.00	-25.10 Peak	VERTICAL
6		807.43	11.51	20.78	32.29	46.00	-13.71 Peak	VERTICAL

Above 1GHz

Peak value:

Frequency (MHz)	Height (cm)	Azimuth (deg)	Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Antenna Polaxis
1222.16	162	295	51.30	74	Pass	H
2522.66	170	52	51.18	74	Pass	H
4548.29	137	96	59.94	74	Pass	H
1743.21	181	48	52.31	74	Pass	V
2361.31	193	358	53.83	74	Pass	V
4520.76	109	284	57.73	74	Pass	V

Average value:

Frequency (MHz)	Height (cm)	Azimuth (deg)	Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Antenna Polaxis
1222.16	162	295	37.58	54	Pass	H
2522.66	170	52	35.07	54	Pass	H
4548.29	137	96	39.52	54	Pass	H
1743.21	181	48	37.14	54	Pass	V
2361.31	193	358	35.70	54	Pass	V
4520.76	109	284	39.66	54	Pass	V

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 $Final\ Test\ Level = Receiver\ Reading - Correct\ Factor$
 $Correct\ Factor = Preamplifier\ Factor - Antenna\ Factor - Cable\ Factor$
- 2) Scan from 9kHz to 6GHz, the disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

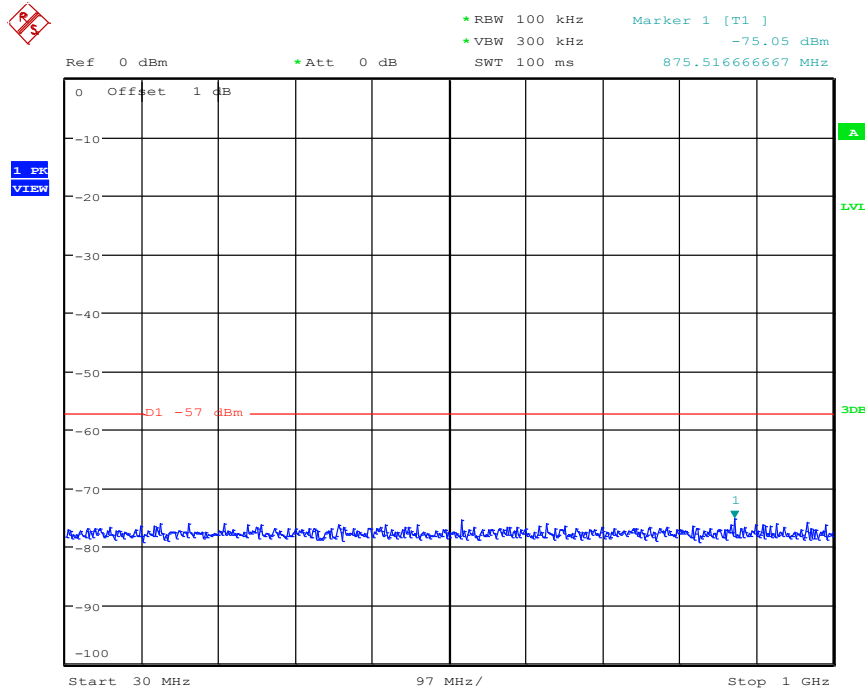
3. Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15B
Test Method:	ANSI C63.4
Limit:	All signals measured at the receiver antenna port were below 2 nanowatts (-57 dBm) for upto 1 GHz and 5 nanowatts (-54 dBm) for above 1 GHz.
Test Procedure:	Per FCC section 15.109(f), For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in §15.111(a).

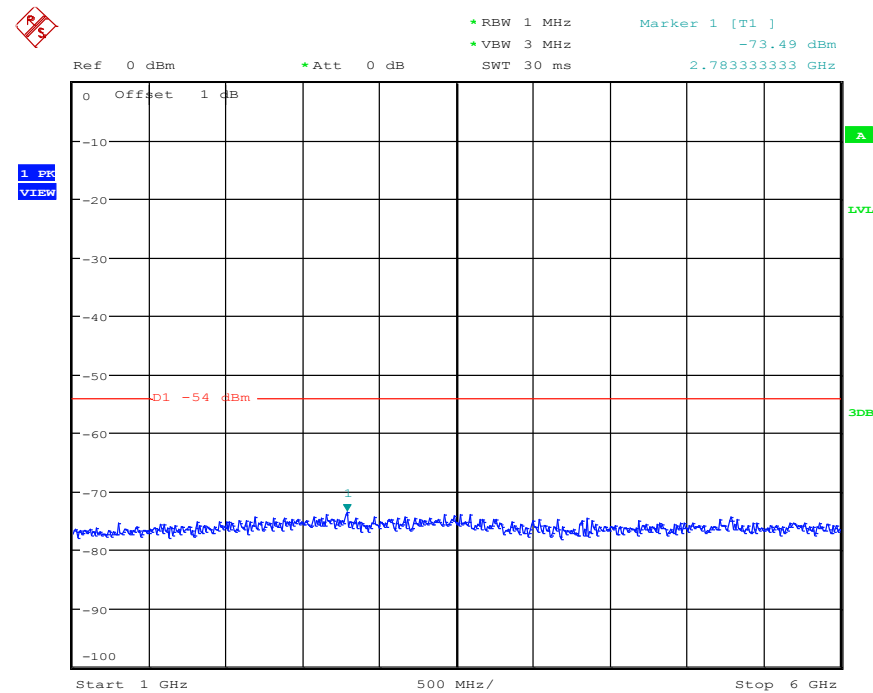
FCC section 15.111(a) states: In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of §15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nanowatts.

Instruments Used:	Refer to section 5 for details
Test Mode:	VHF Rx mode UHF Rx mode FM Rx mode AM Rx mode
Test Results:	Pass

Measurement Data
VHF Rx mode:
30 MHz-1GHz



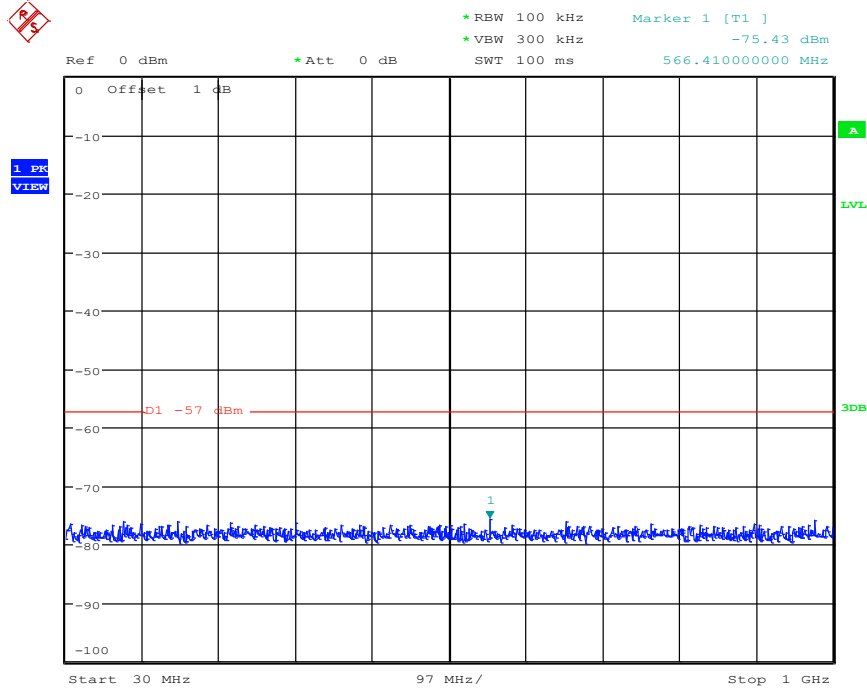
1-6 GHz EP.2019 16:19:24



Date: 10.SEP.2019 16:25:19

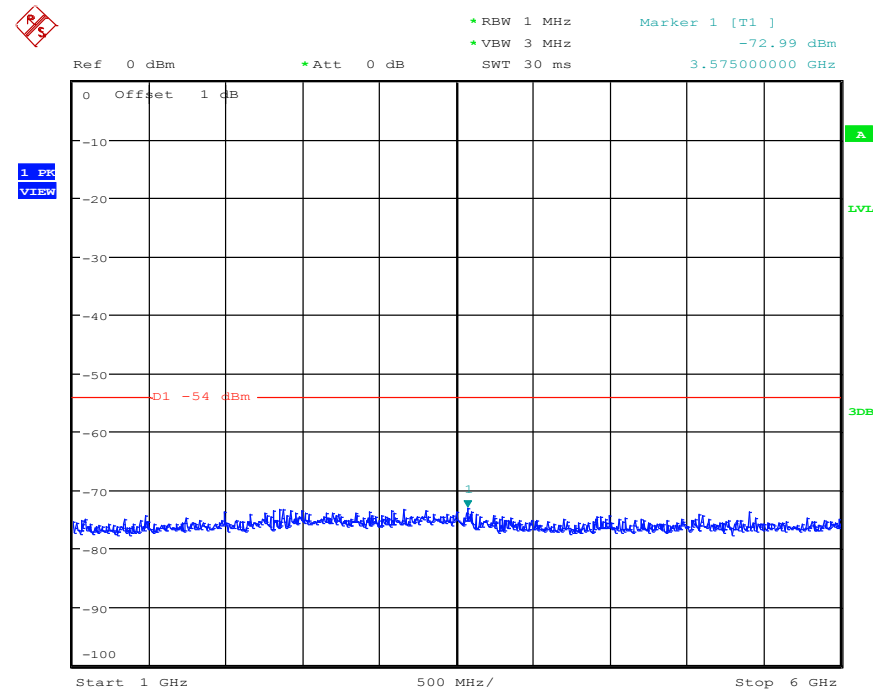
UHF Rx mode:

30 MHz-1GHz



Date: 16.SEP.2019 17:39:52

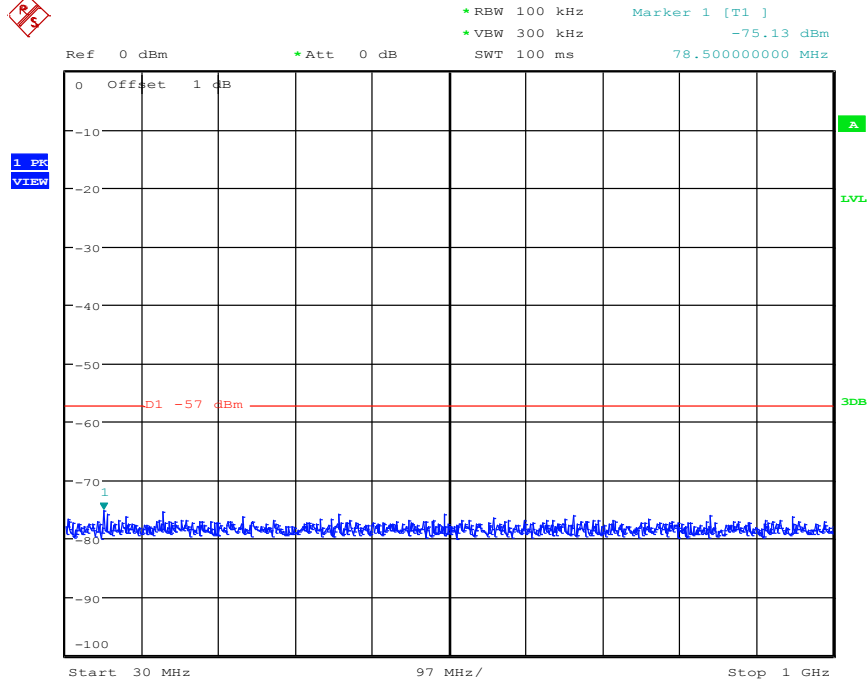
1-6 GHz



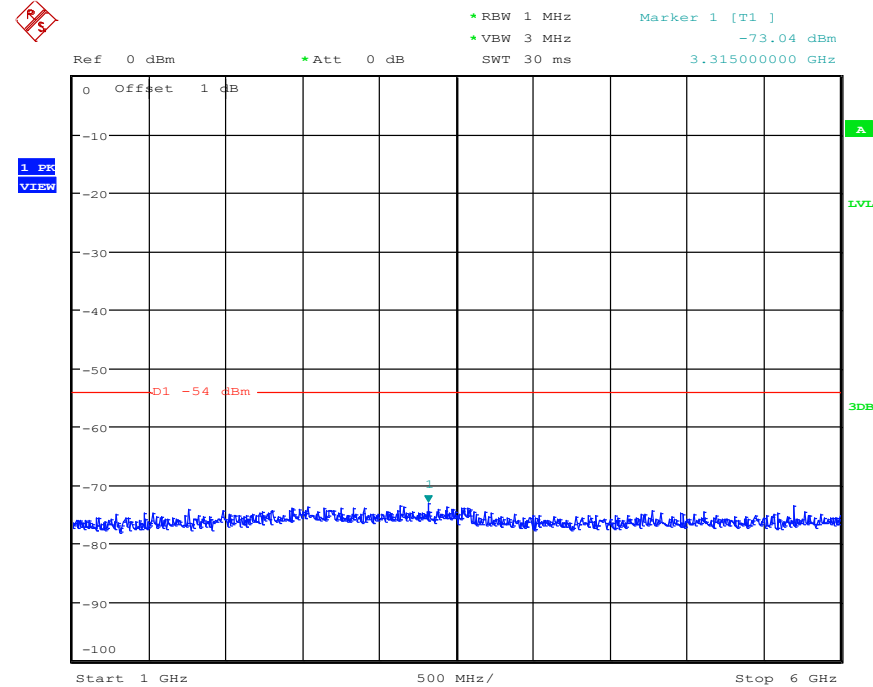
Date: 16.SEP.2019 17:42:11

FM Rx mode:

30 MHz-1GHz



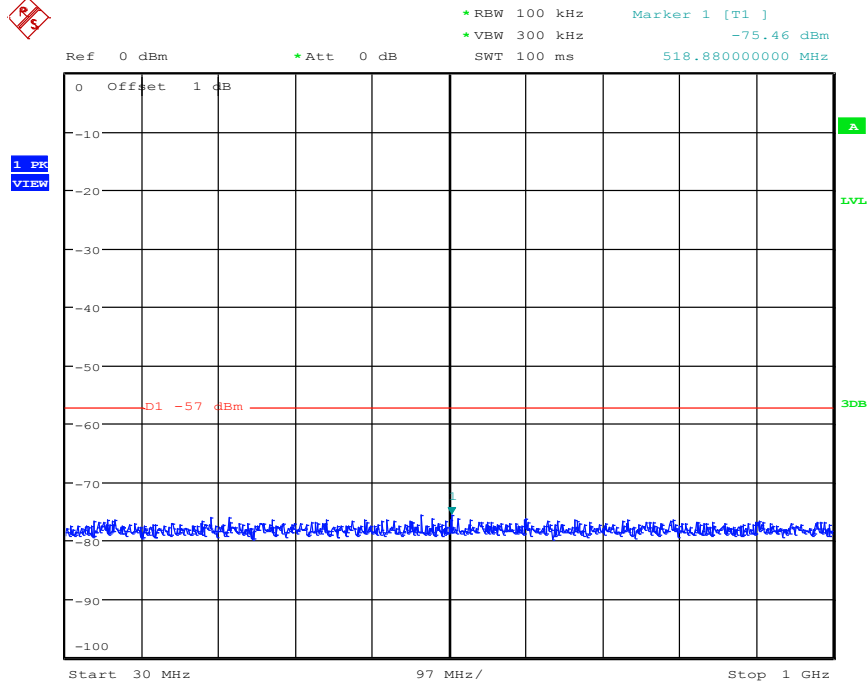
16 GHz 16.SEP.2019 17:40:32



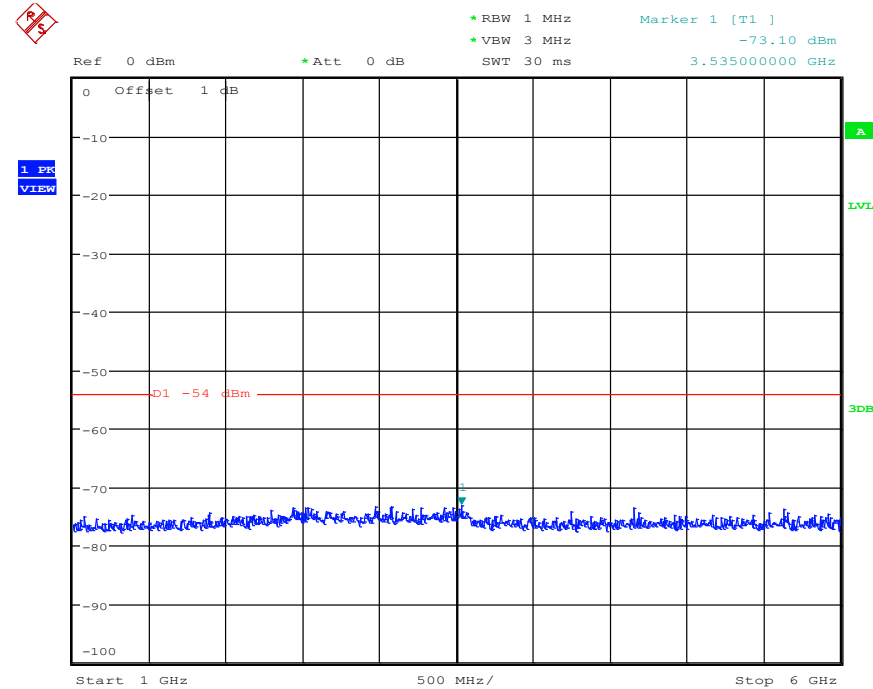
Date: 16.SEP.2019 17:42:34

AM Rx mode:

30 MHz-1GHz



16 GHz 16.SEP.2019 17:40:57

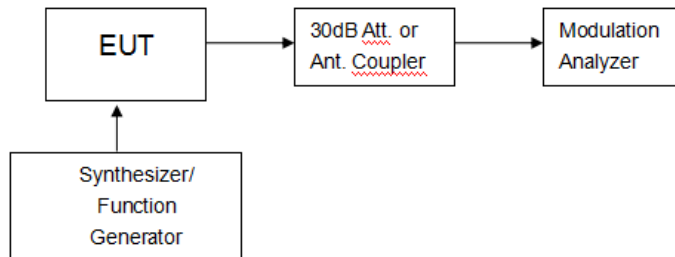


Date: 16.SEP.2019 17:42:54

4. SANNING RECEIVERS AND FREQUENCY CONVERTERS USED WITH SANNING RECEIVERS.

Test Requirement: 47 CFR Part 15B
Test Method: ANSI C63.4
Limit: Except as provided in paragraph (c) of this section, scanning receivers shall reject any signals from the Cellular Radiotelephone Service frequency bands that are 38 dB or lower based upon a 12 dB SINAD measurement, which is considered the threshold where a signal can be clearly discerned from any interference that may be present.

TEST CONFIGURATION:



TEST CONFIGURATION: Please review the FCC Part 15.121 b section requirements to meet the testing process.

Test Results:

VHF:				
Frequency Range (MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
144-148	Bottom	49	>38	Pass
144-148	Middle	52	>38	Pass
144-148	Top	46	>38	Pass

UHF:				
Frequency Range (MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
420-450	Bottom	45	>38	Pass
420-450	Middle	56	>38	Pass
420-450	Top	48	>38	Pass

FM:				
Frequency Range (MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
76-108	Bottom	47	>38	Pass
76-108	Middle	53	>38	Pass
76-108	Top	49	>38	Pass

AM:				
Frequency Range (MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
118-135.995	Bottom	44	>38	Pass
118-135.995	Middle	54	>38	Pass
118-135.995	Top	47	>38	Pass

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Model No.: DJ-VX50HT

Radiated emission Test Setup (30MHz~1GHz)



Conducted Emissions



APPENDIX 2 PHOTOGRAPHS OF EUT

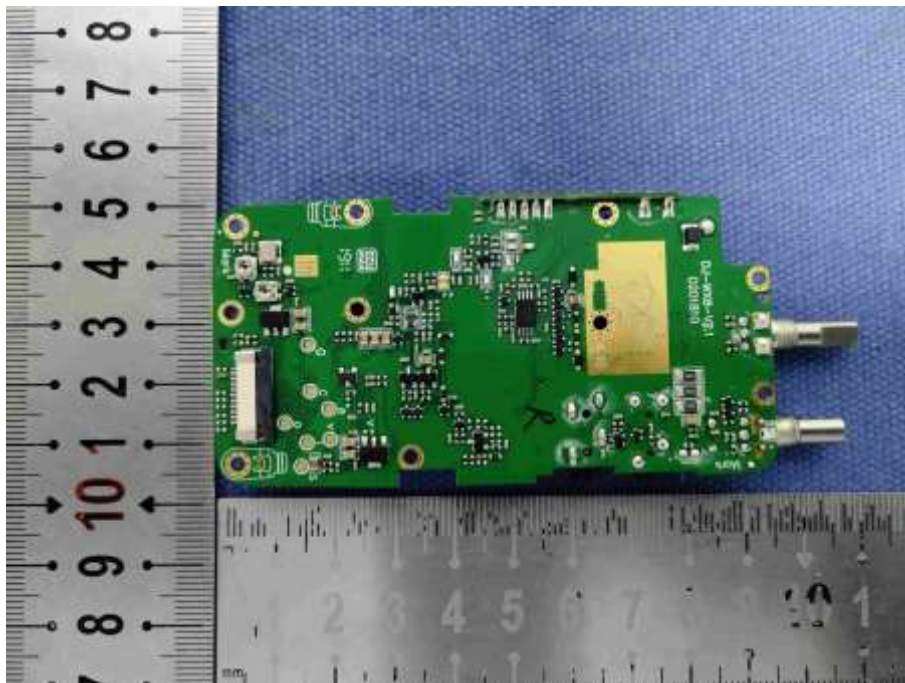
Mode No.: DJ-VX50HT

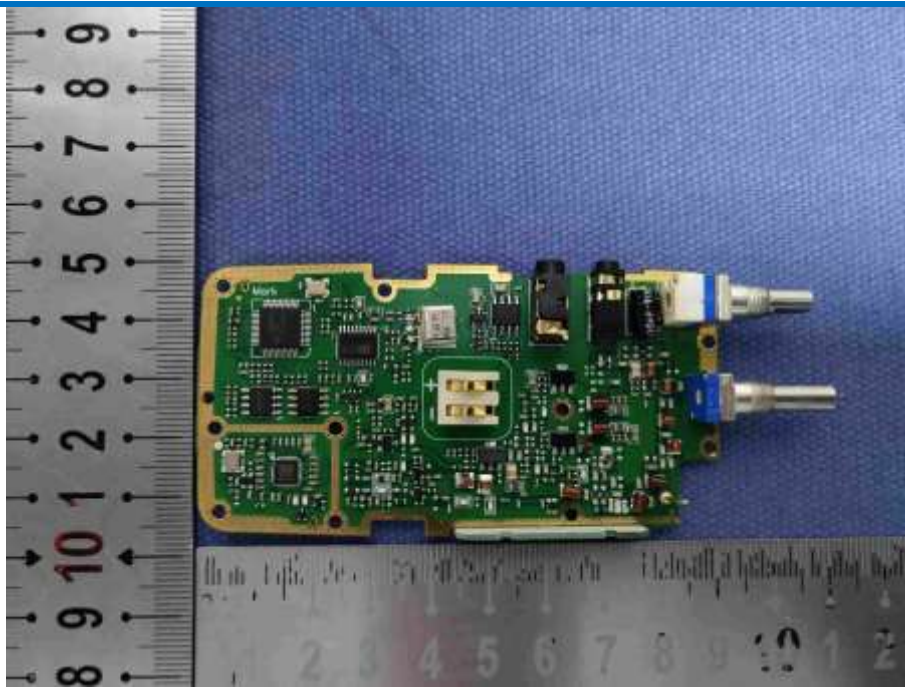




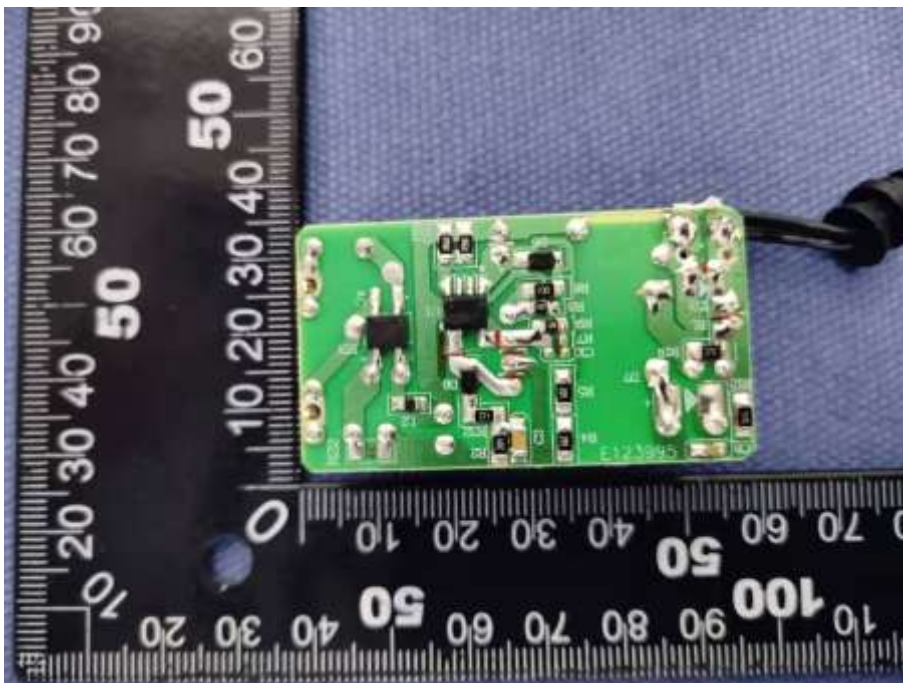
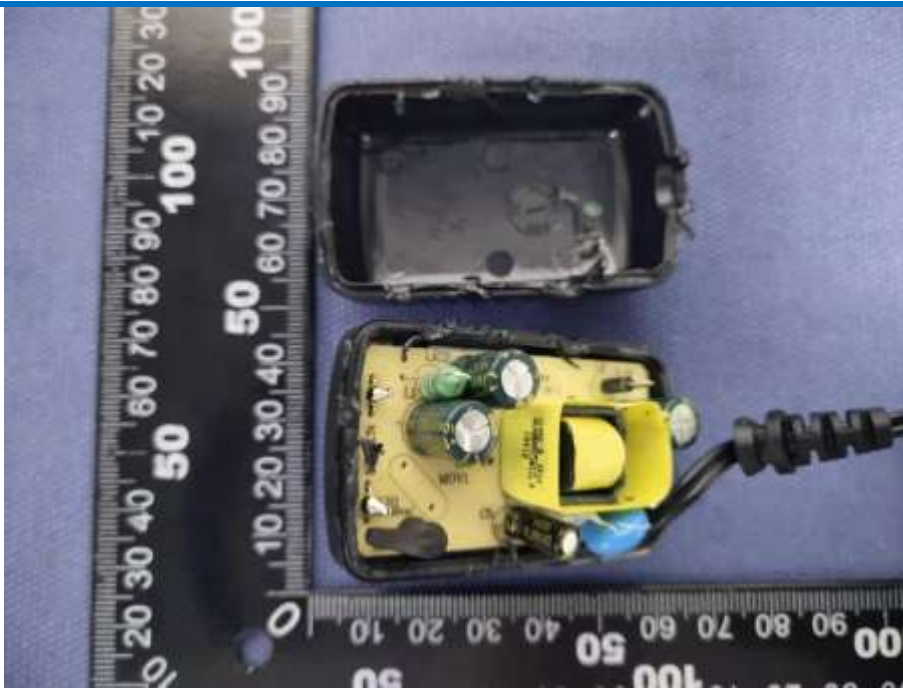


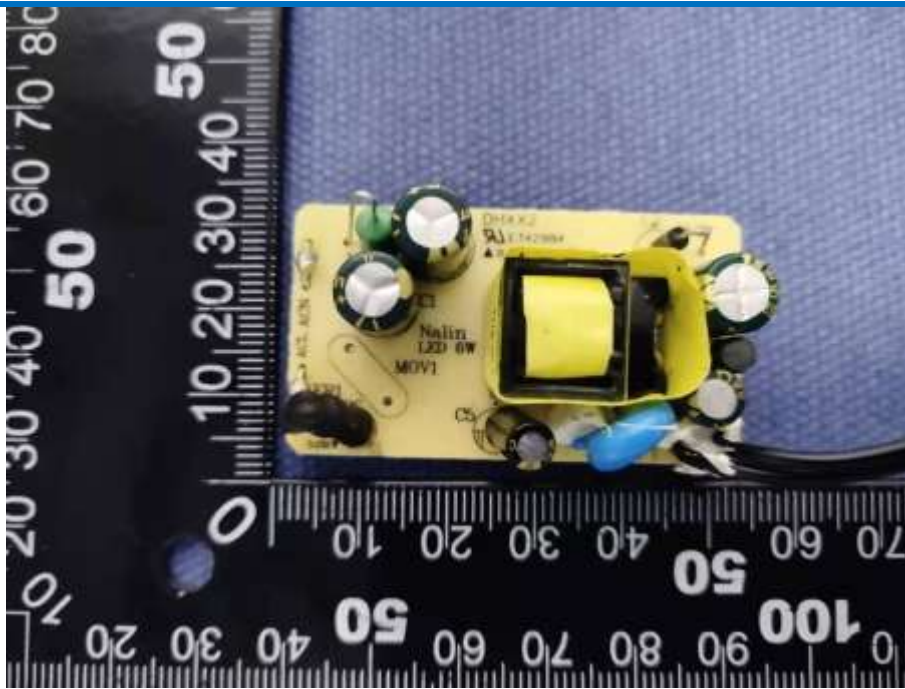












*** End of Report ***