FCC TEST REPORT

FCC ID:2BG9S-YR108T

Product	:	android tablet
Model Name	:	YR108T
Serial model	:	XR808T, YR156T, YR215T, ZR238T, ZR270T, ZR320T, R37T, R430T, R490T, R550T, HP101T, HP133T
Brand	:	N/A
Report No.	:	PTC24060500701E-FC03

Prepared for

The Looma Project

5540 Centerview Dr Ste 204 PMB 68853 Raleigh,NC 27606-8012 United States

Prepared by

Precise Testing & Certification Co., Ltd

Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China

1 TEST RESULT CERTIFICATION

Applicant's name	:	The Looma Project
Address	:	5540 Centerview Dr Ste 204 PMB 68853 Raleigh,NC 27606-8012 United States
Manufacture's name	:	E-BUSINESS INTERNATIONAL
Address	:	15244 NW GREENBRIER PKWY BEAVERTON, OR 97006
Product name	:	android tablet
Model name	:	YR108T
Serial model	:	XR808T, YR156T, YR215T, ZR238T, ZR270T, ZR320T, R37T, R430T, R490T, R550T, HP101T, HP133T
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013
Test Date	:	Jun. 27, 2024 to Jul. 9, 2024
Date of Issue	:	Jul. 25, 2024
Test Result	:	Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
This report shall not be reproduced except in full, without the written approval of PTC, this document may be altered or revised by PTC, personal only, and shall be noted in the revision of the document.

Test Engineer:

Jack zhou / Engineer

Technical Manager:

Simon Pu / Manager

Contents

Page

1 TEST RESULT CERTIFICATION **2**

2 TEST SUMMARY **5**

3 GENERAL INFORMATION **6**

3.1 GENERAL DESCRIPTION OF E.U.T. 6

3.2 CHANNEL LIST 7

3.3 TEST SITE 8

4 EQUIPMENT DURING TEST **9**

4.1 EQUIPMENTS LIST 9

4.2 MEASUREMENT UNCERTAINTY 11

4.3 DESCRIPTION OF SUPPORT UNITS 12

5 CONDUCTED EMISSION **13**

5.1 E.U.T. OPERATION 13

5.2 EUT SETUP 13

5.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 14

5.4 MEASUREMENT PROCEDURE 14

5.5 CONDUCTED EMISSION LIMIT 14

5.6 MEASUREMENT DESCRIPTION 14

5.7 CONDUCTED EMISSION TEST RESULT 14

6 RADIATED SPURIOUS EMISSIONS **17**

6.1 EUT OPERATION 17

6.2 TEST SETUP 18

6.3 SPECTRUM ANALYZER SETUP 19

6.4 TEST PROCEDURE 20

6.5 SUMMARY OF TEST RESULTS 21

7 CONDUCTED SPURIOUS EMISSION **28**

7.1 TEST PROCEDURE 28

7.2 TEST SETUP 28

7.3 TEST RESULT 28

8 BAND EDGE MEASUREMENT **48**

8.1 TEST PROCEDURE 48

8.2 TEST SETUP 48

8.3 TEST RESULT 48

9 6DB BANDWIDTH MEASUREMENT **54**

9.1 TEST PROCEDURE 54

9.2 TEST SETUP 54

9.3 TEST RESULT 54

10 MAXIMUM CONDUCTED OUTPUT POWER **61**

10.1 TEST PROCEDURE 61

10.2 TEST SETUP 61

10.3 TEST RESULT 61

11 POWER SPECTRAL DENSITY **62**

11.1 TEST PROCEDURE 62

11.2 TEST SETUP 62

11.3 TEST RESULT 62

12 ANTENNA APPLICATION **69**

12.1 ANTENNA REQUIREMENT 69

12.2 RESULT 69

13 TEST SETUP **70**

14 EUT PHOTOS **72**

2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Conducted Spurious Emission	15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS
Remark: N/A: Not Applicable		

3 General Information

3.1General Description of E.U.T.

Product Name	:	android tablet
Model Name	:	YR108T
Additional model	:	XR808T, YR156T, YR215T, ZR238T, ZR270T, ZR320T, R37T, R430T, R490T, R550T, HP101T, HP133T
Differences Description	:	The only difference is the model names.
Specification	:	802.11b/g/n HT20/HT40
Operating frequency	:	2412-2462MHz for 802.11b/g/ n(HT20) 2422-2452MHz for 802.11 n(HT40)
Numbers of Channel	:	11 channels for 802.11b/g/ n(HT20) 7 channels for 802.11n(HT40)
Antenna Type	:	PCB Antenna
Antenna Gain	:	1.82 dBi
Type of Modulation	:	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Rated Power Supply	:	Adapter:JML-1202000-LW Input: 100-240V~50/60Hz 0.8A Output: 12.0V⎓2.0A
Hardware Version	:	RK3568
Software Version	:	XB-RK3568DF-SU-EN-05Y108-HNH9365-EDITION11-20240622
Test sample No.	:	PTC24060500701E-1/2, PTC24060500701E-2/2

3.2 Channel List

The EUT has been tested under its typical operating condition.

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

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

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20): MCS0;) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n (HT20/HT40)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

The maximum duty cycle as following table:

Test Mode	Duty Cycle(%)
802.11b	100%
802.11g	100%
802.11n(HT20)	100%
802.11n(HT40)	100%

3.3Test Site

Precise Testing & Certification Co., Ltd

Address: Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A

FCC Designation Number: CN1219

4 Equipment During Test

4.1Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Last Calibration	Calibration Interval
MXG Signal Analyzer	Agilent	N9020A	SER MY5111038	10Hz-26.5GHz	Aug.17, 2023	1 Year
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Aug.17, 2023	1 Year
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Aug.17, 2023	1 Year
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Aug.17, 2023	1 Year
Test S/W	Tonscend	JS1120-3	/	/	/	/

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Last Calibration	Calibration Interval
EMI Test Receiver	Rohde&Schwarz	ESPI7	101671	9KHz-7GHz	Aug. 17,2023	1 Year
Loop Antenna	Schwarzbeck	FMZB 1519	192	9 KHz -30MHz	Aug. 17,2023	1 Year
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Aug. 17,2023	1 Year
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Aug. 17,2023	1 Year
Cable	IMRO	AK-9515E(9m)	Cable-L	9KHz-3GHz	Aug. 17,2023	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV40	6625-01-588-5515	9KHz-40GHz	Aug. 17,2023	1 Year
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Aug. 17,2023	1 Year
Power Amplifier	ZHINAN	ZN3380C	15002	1GHz-26.5GHz	Aug. 17,2023	1 Year

Horn Antenna	SCHWARZBECK	BBHA 9170	9170-1066	15GHz-40GHz	Jul. 19, 2023	1 Year
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Jul. 19, 2023	1 Year
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Aug. 17,2023	1 Year
RF Cable	R&S	R204	R21X	1GHz-40GHz	Aug. 17,2023	1 Year
Test S/W	Tonscend	TS+	/	/	/	/

Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Date	Calibration Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Aug. 17, 2023	1 Year
Artificial Mains Network	Rohde&Schwarz	ENV216	102453	9KHz-300MHz	Aug. 17, 2023	1 Year
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Aug. 17, 2023	1 Year
Limiter	R&S	ESH3-Z2	0357.8810.54-102808-NB	0Hz-30MHz	Aug. 16,2023	1 Year
RF Switch	DIAMOND ANTENNA	CX-210	/	9kHz-6GHz	Mar. 22,2024	1 Year
Test S/W	Tonscend	JS32-CE	/	/	/	/

4.2Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(9kHz~30MHz)	±3.15dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

4.3Description of Support Units

Equipment	Model No.	Series No.	Parameters
Mouse	OP-300	SA8177323	N/A
Keyboard	G2	SA8173709103	N/A

5 Conducted Emission

Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207
Test Method	:	ANSI C63.10: 2013
Test Result	:	PASS
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B

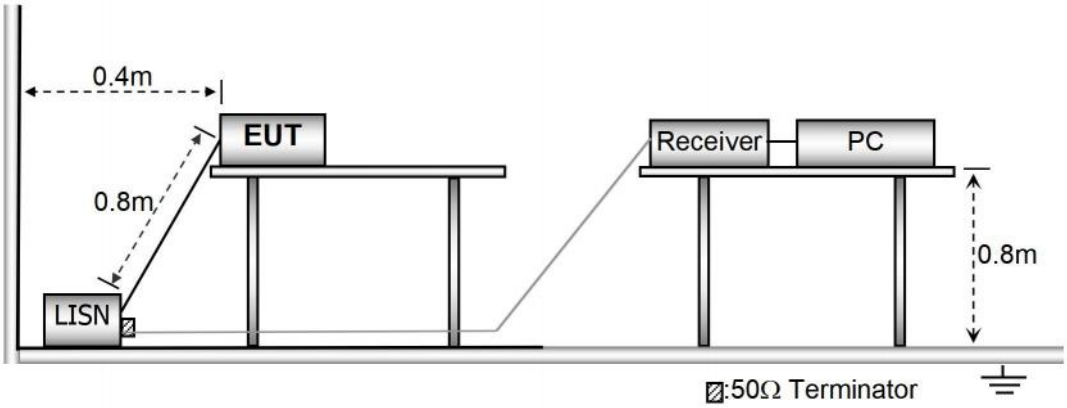
5.1E.U.T. Operation

Operating Environment :

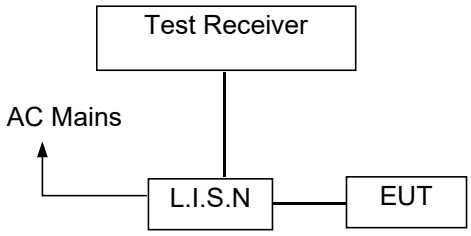
Temperature	:	23.9 °C
Humidity	:	51.4 % RH
Atmospheric Pressure	:	101.21kPa

5.2EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



5.3Test SET-UP (Block Diagram of Configuration)



5.4Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

5.5Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:
1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.6Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

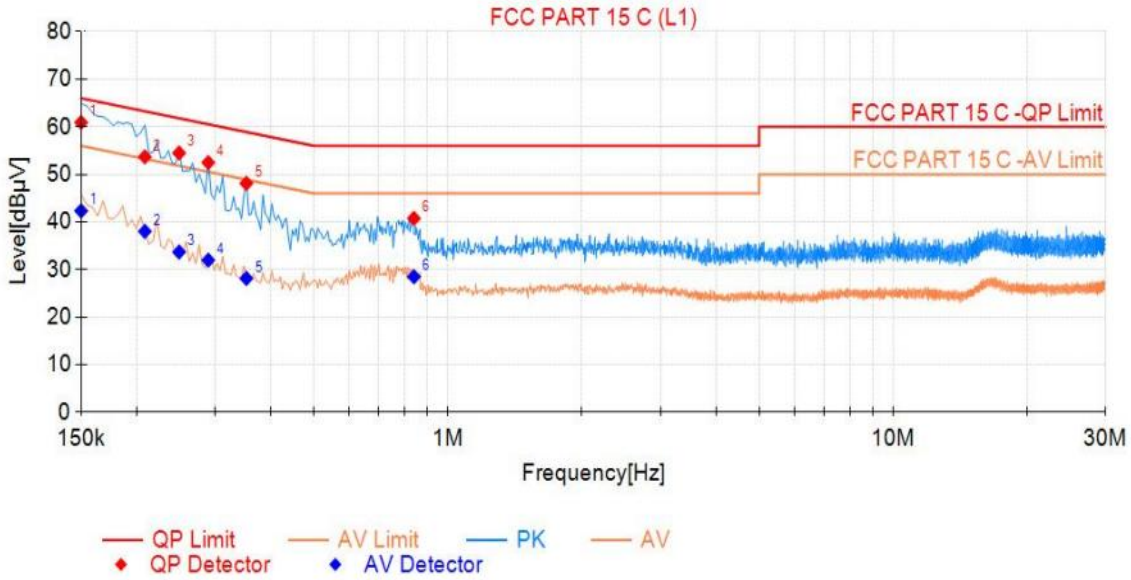
5.7Conducted Emission Test Result

PASS.

During the test, the 120Vac/60Hz and 240Vac/60Hz power supplies were scanned in advance, and it was found that (120Vac/60Hz, TX 802.11b Low Channel) was a poor mode, and the report only reflected the poor mode.

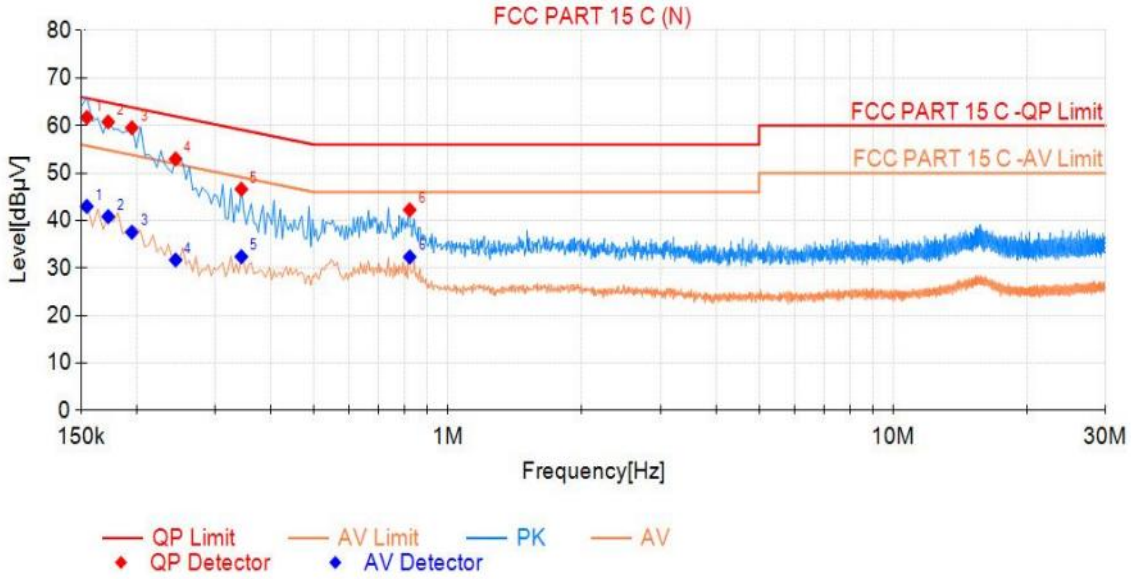
Please refer to the following pages.

Line-AC 120V/60Hz



Final Data List											
NO.	Freq. [MHz]	QP Reading [dBµV]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.150	41.71	19.22	60.93	66.00	5.07	23.12	42.34	56.00	13.66	PASS
2	0.209	34.53	19.15	53.68	63.26	9.58	18.88	38.03	53.26	15.23	PASS
3	0.249	35.37	19.12	54.49	61.79	7.30	14.58	33.70	51.79	18.09	PASS
4	0.290	33.26	19.23	52.49	60.54	8.05	12.76	31.99	50.54	18.55	PASS
5	0.353	28.92	19.20	48.12	58.90	10.78	8.94	28.14	48.90	20.76	PASS
6	0.839	21.48	19.27	40.75	56.00	15.25	9.23	28.50	46.00	17.50	PASS

Neutral-AC 120V/60Hz



Final Data List											
NO.	Freq. [MHz]	QP Reading [dBµV]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.155	42.70	19.01	61.71	65.75	4.04	23.98	42.99	55.75	12.76	PASS
2	0.173	41.69	19.08	60.77	64.84	4.07	21.76	40.84	54.84	14.00	PASS
3	0.195	40.46	19.08	59.54	63.82	4.28	18.47	37.55	53.82	16.27	PASS
4	0.245	33.92	19.05	52.97	61.94	8.97	12.67	31.72	51.94	20.22	PASS
5	0.344	27.41	19.20	46.61	59.12	12.51	13.21	32.41	49.12	16.71	PASS
6	0.821	23.02	19.25	42.27	56.00	13.73	13.09	32.34	46.00	13.66	PASS

Note:QP Margin[dB]= QP Limit[dBµV]- QP Value[dBµV], AV Margin[dB]= AV Limit[dBµV]- AV Value[dBµV].

6 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method : ANSI C63.10:2013

Test Result : PASS

Measurement Distance : 3m

Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

6.1EUT Operation

Operating Environment :

Temperature: : 24.5 °C

Humidity: : 52 % RH

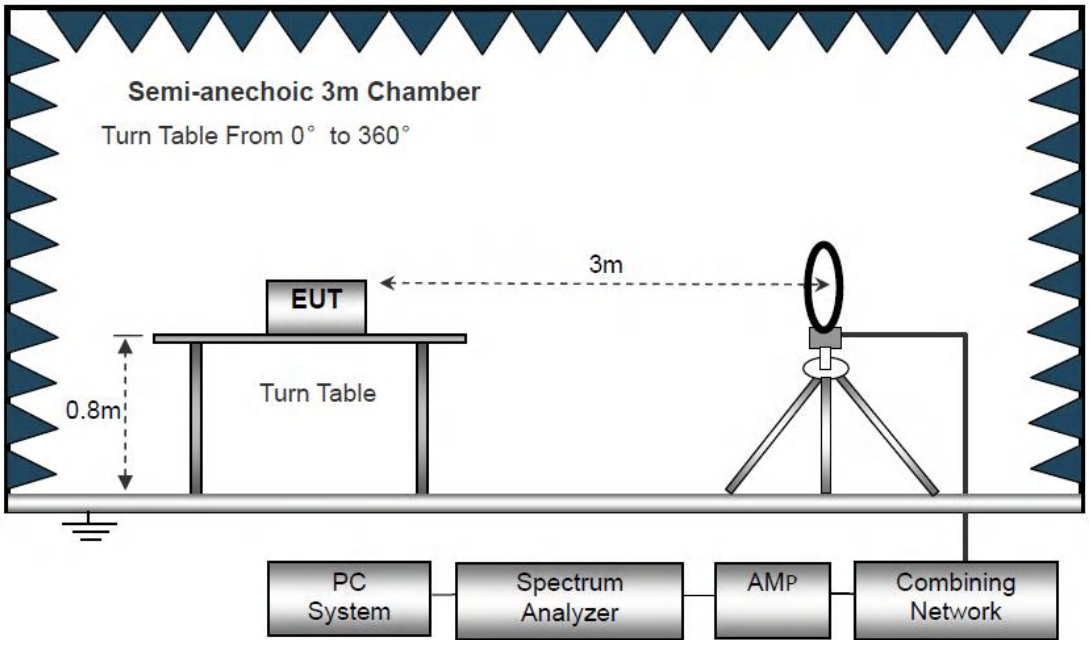
Atmospheric Pressure: : 101.3kPa

Test Voltage : AC 120V 60Hz

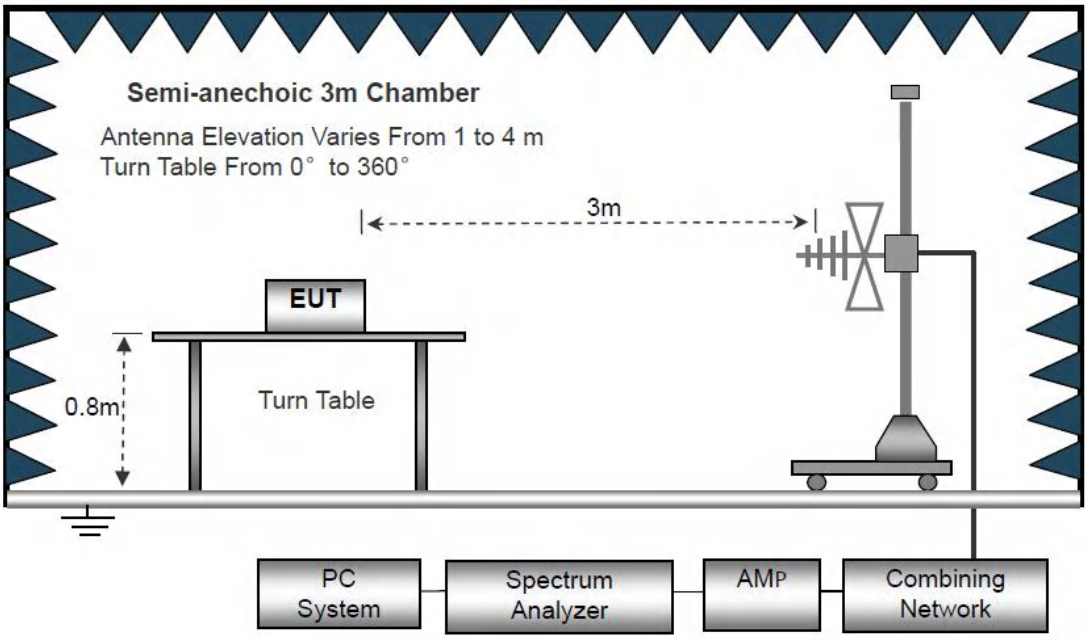
6.2Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

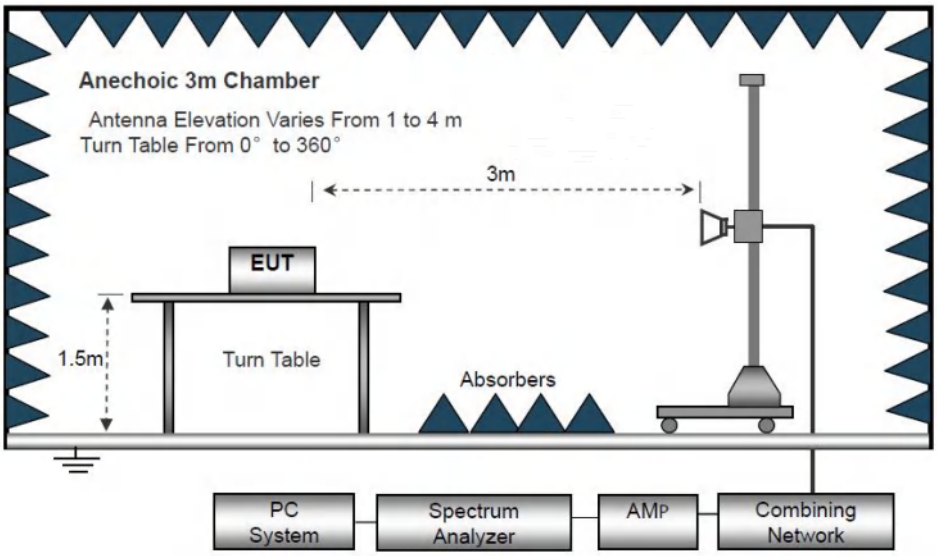
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



6.3Spectrum Analyzer Setup

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value

6.4Test Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane, And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6. Repeat above procedures until the measurements for all frequencies are complete.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room

6.5Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

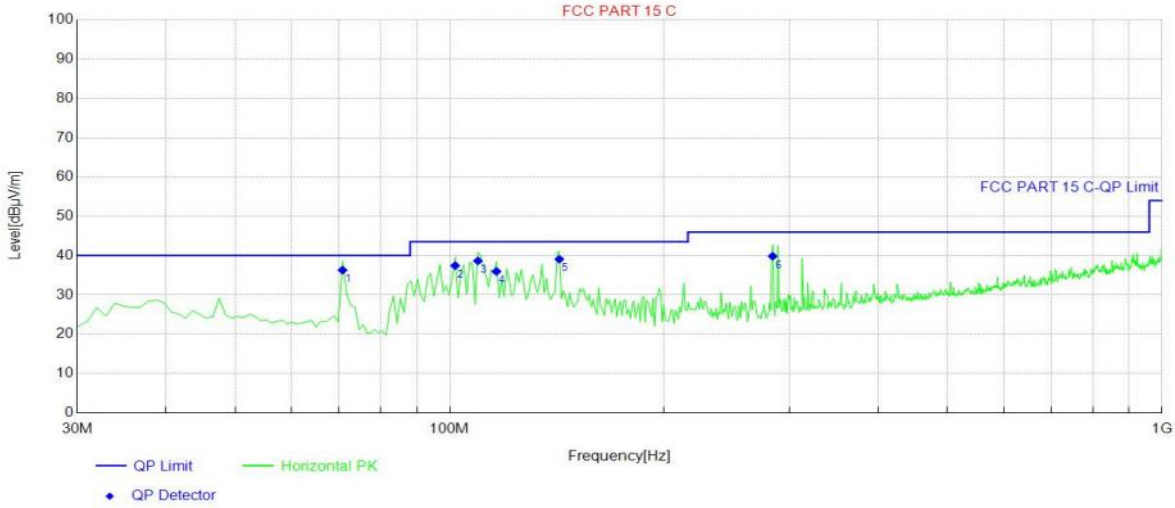
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

All the modulation modes were tested the data of the worst mode (TX 802.11b Low Channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following test plots:

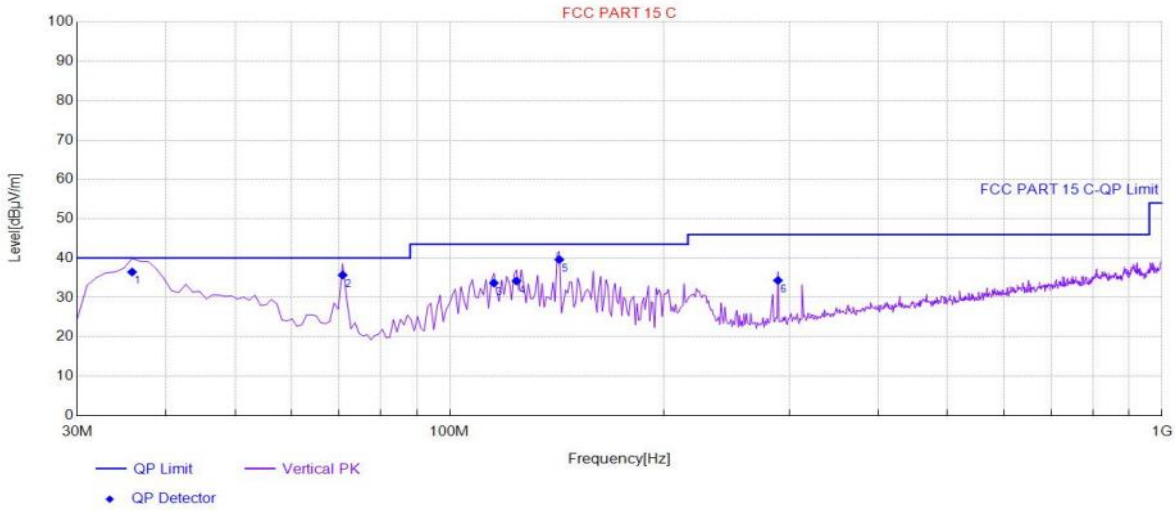
Antenna Polarization: Horizontal



Final Data List[QP]								
NO.	Freq. [MHz]	QP Reading [dBμV]	Factor [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity	Verdict
1	70.74	55.55	-19.25	36.30	40.00	3.70	Horizontal	PASS
2	101.78	57.56	-20.13	37.43	43.50	6.07	Horizontal	PASS
3	109.54	57.79	-19.14	38.65	43.50	4.85	Horizontal	PASS
4	116.33	53.87	-17.90	35.97	43.50	7.53	Horizontal	PASS
5	142.52	55.22	-16.15	39.07	43.50	4.43	Horizontal	PASS
6	284.14	56.12	-16.28	39.84	46.00	6.16	Horizontal	PASS

Remark:1. QP Value= QP Reading+ Factor;
2.QP Margin= QP Limit- QP Value；
3.Factor= ANT Factor+ Cable Loss -AMP Factor.

Antenna Polarization: Vertical



Final Data List[QP]								
NO.	Freq. [MHz]	QP Reading [dBμV]	Factor [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity	Verdict
1	35.82	53.92	-17.47	36.45	40.00	3.55	Vertical	PASS
2	70.74	55.61	-19.93	35.68	40.00	4.32	Vertical	PASS
3	115.36	52.30	-18.64	33.66	43.50	9.84	Vertical	PASS
4	124.09	52.01	-17.84	34.17	43.50	9.33	Vertical	PASS
5	142.52	56.26	-16.63	39.63	43.50	3.87	Vertical	PASS
6	288.99	50.97	-16.65	34.32	46.00	11.68	Vertical	PASS

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Test Frequency: From 1GHz to 18GHz

Worst case 802.11b

Test Mode: 2412					Test channel: Lowest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4824	45.98	32.35	4.12	28.44	54.01	74	-19.99	V
7236	38.13	36.08	6.3	27.74	52.77	74	-21.23	V
9648	35.41	38.25	7.91	24.65	56.92	74	-17.08	V
4824	43.63	32.35	4.12	28.44	51.66	74	-22.34	H
7236	37.49	36.08	6.3	27.74	52.13	74	-21.87	H
9648	35.28	38.25	7.91	24.65	56.79	74	-17.21	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4824	30.33	32.35	4.12	28.44	38.36	54	-15.64	V
7236	24.38	36.08	6.3	27.74	39.02	54	-14.98	V
9648	21.28	38.25	7.91	24.65	42.79	54	-11.21	V
4824	30.28	32.35	4.12	28.44	38.31	54	-15.69	H
7236	25.30	36.08	6.3	27.74	39.94	54	-14.06	H
9648	20.85	38.25	7.91	24.65	42.36	54	-11.64	H

Worst case 802.11b

Test Mode: 2437					Test channel: Middle			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4874	46.20	32.35	4.12	28.44	54.23	74	-19.77	V
7311	38.64	36.08	6.3	27.74	53.28	74	-20.72	V
9748	35.91	38.25	7.91	24.65	57.42	74	-16.58	V
4874	43.76	32.35	4.12	28.44	51.79	74	-22.21	H
7311	37.88	36.08	6.3	27.74	52.52	74	-21.48	H
9748	34.43	38.25	7.91	24.65	55.94	74	-18.06	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4874	30.85	32.35	4.12	28.44	38.88	54	-15.12	V
7311	24.22	36.08	6.3	27.74	38.86	54	-15.14	V
9748	21.05	38.25	7.91	24.65	42.56	54	-11.44	V
4874	30.63	32.35	4.12	28.44	38.66	54	-15.34	H
7311	24.60	36.08	6.3	27.74	39.24	54	-14.76	H
9748	21.29	38.25	7.91	24.65	42.80	54	-11.20	H

Worst case 802.11b

Test Mode: 2462					Test channel: High			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4924	46.07	32.35	4.12	28.44	54.10	74	-19.90	V
7386	38.02	36.08	6.3	27.74	52.66	74	-21.34	V
9848	35.73	38.25	7.91	24.65	57.24	74	-16.76	V
4924	42.96	32.35	4.12	28.44	50.99	74	-23.01	H
7386	37.84	36.08	6.3	27.74	52.48	74	-21.52	H
9848	34.51	38.25	7.91	24.65	56.02	74	-17.98	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4924	31.75	32.35	4.12	28.44	39.78	54	-14.22	V
7386	25.01	36.08	6.3	27.74	39.65	54	-14.35	V
9848	21.26	38.25	7.91	24.65	42.77	54	-11.23	V
4924	30.11	32.35	4.12	28.44	38.14	54	-15.86	H
7386	25.17	36.08	6.3	27.74	39.81	54	-14.19	H
9848	20.42	38.25	7.91	24.65	41.93	54	-12.07	H

Note:

1. The testing has been conformed to 10*2462MHz=24620MHz.
2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
   Margin=Emission Level-Limit
4. X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz
2.4G WiFi (802.11b/g/n)mode have been tested, and the worst result(802.11g) was report as below
Test Mode: Worst case 802.11g Low Channel 2412MHz

Test Mode: 802.11g Low Channel 2412MHz									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2390	47.66	27.39	2.77	34.01	43.81	74	-30.19	H	Peak
2400	59.24	27.42	2.78	34.01	55.43	74	-18.57	H	
2390	47.79	27.39	2.77	34.01	43.94	74	-30.06	V	
2400	55.16	27.42	2.78	34.01	51.35	74	-22.65	V	
2390	40.76	27.39	2.77	34.01	36.91	54	-17.09	H	Average
2400	43.47	27.42	2.78	34.01	39.66	54	-14.34	H	
2390	39.37	27.39	2.77	34.01	35.52	54	-18.48	V	
2400	44.30	27.42	2.78	34.01	40.49	54	-13.51	V	

Test Mode: Worst case 802.11g High Channel 2462MHz

Test Mode: 802.11g High Channel 2462MHz									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2483.5	59.21	27.39	2.77	34.01	55.36	74	-18.64	H	Peak
2500	49.59	27.42	2.78	34.01	45.78	74	-28.22	H	
2483.5	59.50	27.39	2.77	34.01	55.65	74	-18.35	V	
2500	49.57	27.42	2.78	34.01	45.76	74	-28.24	V	
2483.5	41.88	27.39	2.77	34.01	38.03	54	-15.97	H	Average
2500	39.04	27.42	2.78	34.01	35.23	54	-18.77	H	
2483.5	43.93	27.39	2.77	34.01	40.08	54	-13.92	V	
2500	39.85	27.42	2.78	34.01	36.04	54	-17.96	V	

Test Frequency: From 18GHz to 25GHz

The measurements were more than 20dB below the limit and not reported.

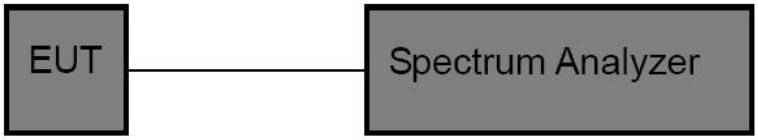
7 Conducted Spurious Emission

Test Requirement : FCC CFR47 Part 15 Section 15.247
Test Method : ANSI C63.10:2013
Test Limit : Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.1Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

7.2Test Setup



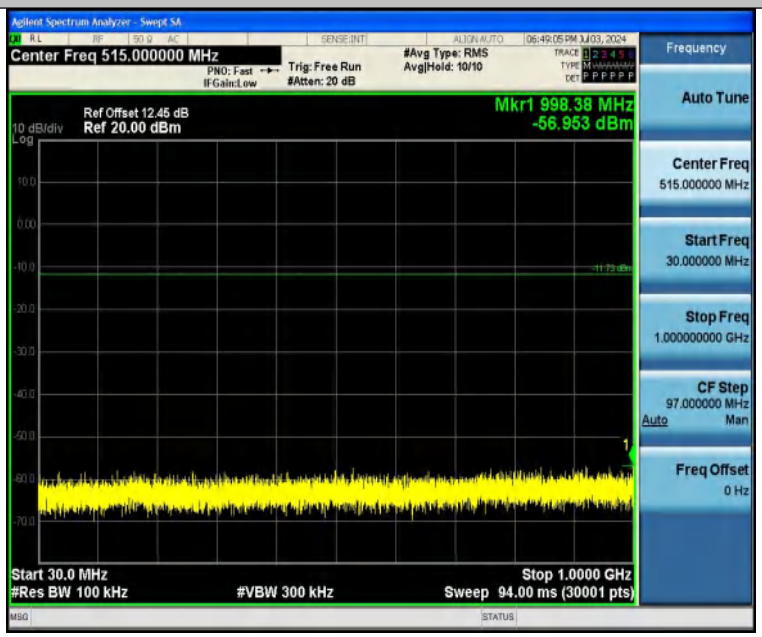
7.3Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	0~Reference	8.27	8.27	---	PASS
11B	Ant1	2412	30~1000	8.27	-56.95	≤-11.73	PASS
11B	Ant1	2412	1000~26500	8.27	-41.17	≤-11.73	PASS
11B	Ant1	2437	0~Reference	9.44	9.44	---	PASS
11B	Ant1	2437	30~1000	9.44	-56.71	≤-10.56	PASS
11B	Ant1	2437	1000~26500	9.44	-40.43	≤-10.56	PASS
11B	Ant1	2462	0~Reference	7.82	7.82	---	PASS
11B	Ant1	2462	30~1000	7.82	-56.77	≤-12.18	PASS

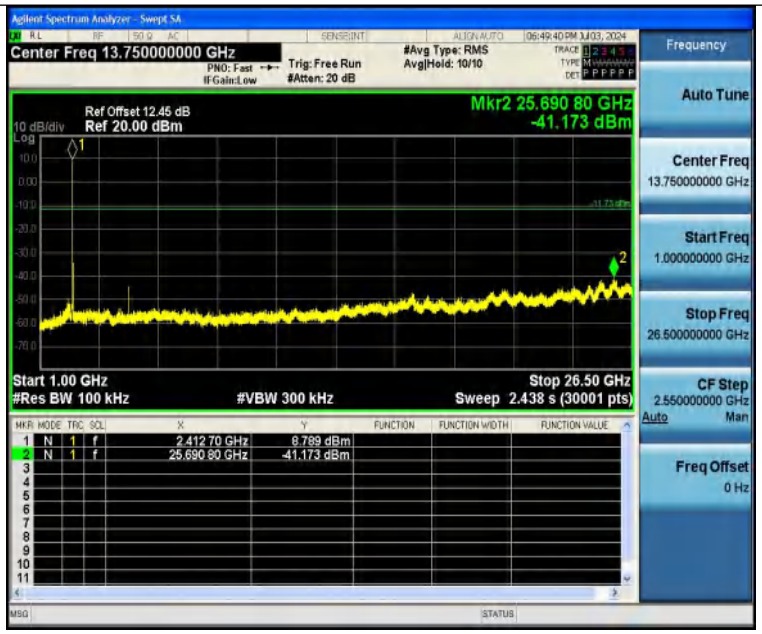
11B	Ant1	2462	1000~26500	7.82	-41.46	≤-12.18	PASS
11G	Ant1	2412	0~Reference	3.44	3.44	---	PASS
11G	Ant1	2412	30~1000	3.44	-57.02	≤-16.56	PASS
11G	Ant1	2412	1000~26500	3.44	-40.79	≤-16.56	PASS
11G	Ant1	2437	0~Reference	3.23	3.23	---	PASS
11G	Ant1	2437	30~1000	3.23	-57.16	≤-16.77	PASS
11G	Ant1	2437	1000~26500	3.23	-40.95	≤-16.77	PASS
11G	Ant1	2462	0~Reference	-2.44	-2.44	---	PASS
11G	Ant1	2462	30~1000	-2.44	-56.95	≤-22.44	PASS
11G	Ant1	2462	1000~26500	-2.44	-41.38	≤-22.44	PASS
11N20SISO	Ant1	2412	0~Reference	1.01	1.01	---	PASS
11N20SISO	Ant1	2412	30~1000	1.01	-57.36	≤-18.99	PASS
11N20SISO	Ant1	2412	1000~26500	1.01	-40.71	≤-18.99	PASS
11N20SISO	Ant1	2437	0~Reference	4.74	4.74	---	PASS
11N20SISO	Ant1	2437	30~1000	4.74	-56.3	≤-15.26	PASS
11N20SISO	Ant1	2437	1000~26500	4.74	-38.93	≤-15.26	PASS
11N20SISO	Ant1	2462	0~Reference	0.18	0.18	---	PASS
11N20SISO	Ant1	2462	30~1000	0.18	-56.51	≤-19.82	PASS
11N20SISO	Ant1	2462	1000~26500	0.18	-41.48	≤-19.82	PASS
11N40SISO	Ant1	2422	0~Reference	0.22	0.22	---	PASS
11N40SISO	Ant1	2422	30~1000	0.22	-57.12	≤-19.78	PASS
11N40SISO	Ant1	2422	1000~26500	0.22	-41.31	≤-19.78	PASS
11N40SISO	Ant1	2437	0~Reference	0.36	0.36	---	PASS
11N40SISO	Ant1	2437	30~1000	0.36	-56.38	≤-19.64	PASS
11N40SISO	Ant1	2437	1000~26500	0.36	-41.43	≤-19.64	PASS
11N40SISO	Ant1	2452	0~Reference	0.64	0.64	---	PASS
11N40SISO	Ant1	2452	30~1000	0.64	-56.17	≤-19.36	PASS
11N40SISO	Ant1	2452	1000~26500	0.64	-40.46	≤-19.36	PASS

Test Graphs:

11B-Ant1-2412-0~Reference-PASS

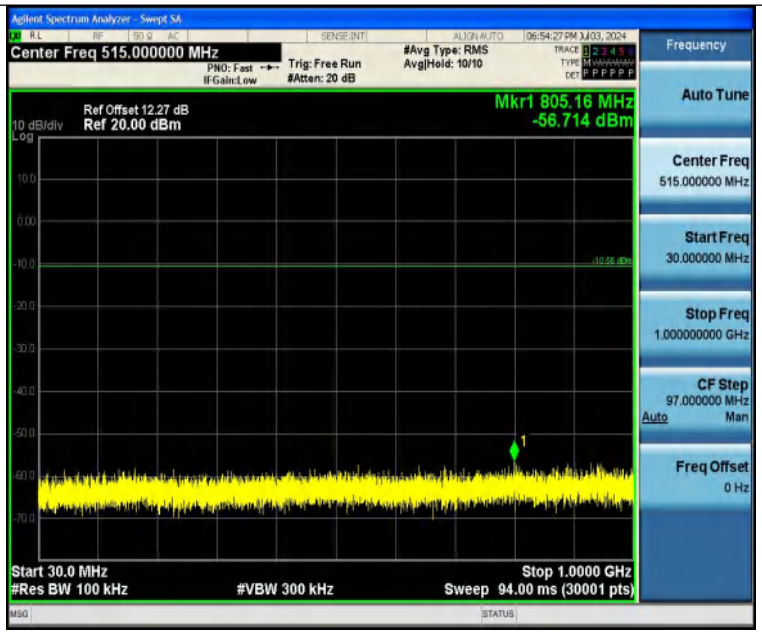


11B-Ant1-2412-30~1000-PASS

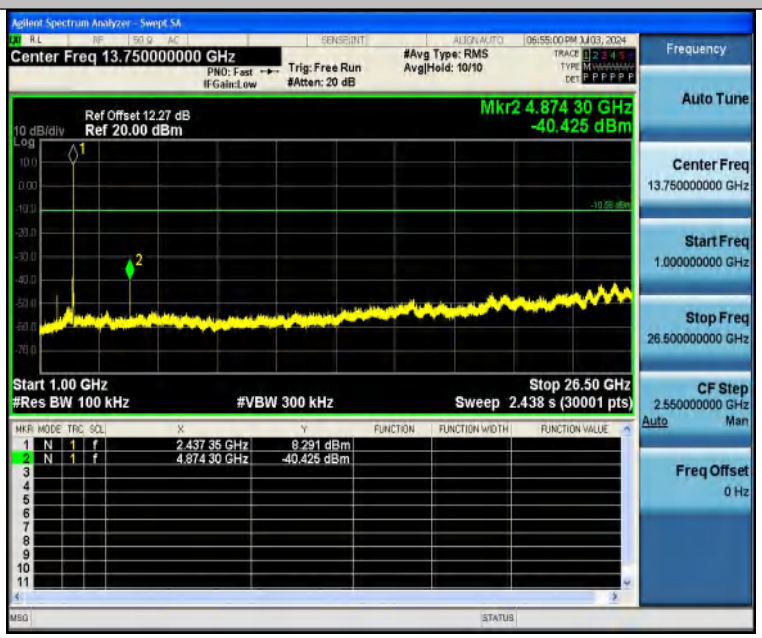


11B-Ant1-2412-1000~26500-PASS

11B-Ant1-2437-0~Reference-PASS

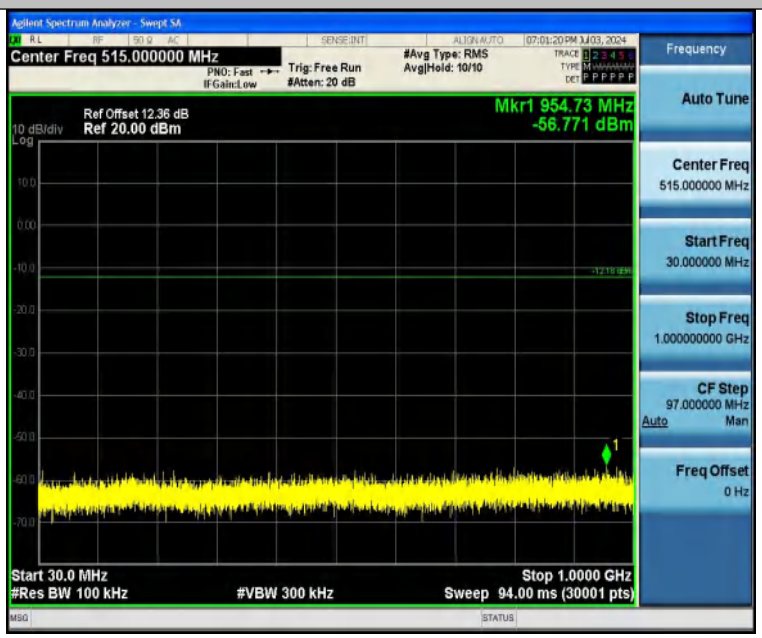


11B-Ant1-2437-30~1000-PASS

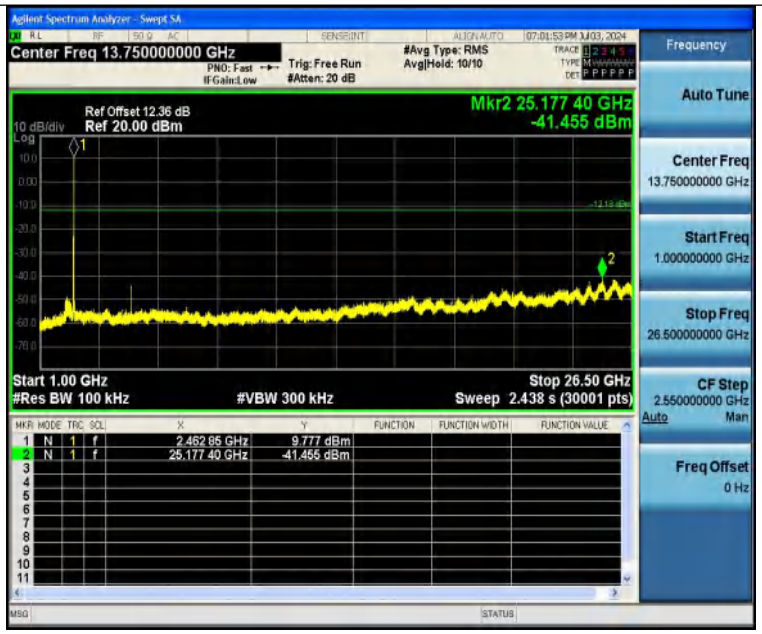


11B-Ant1-2437-1000~26500-PASS

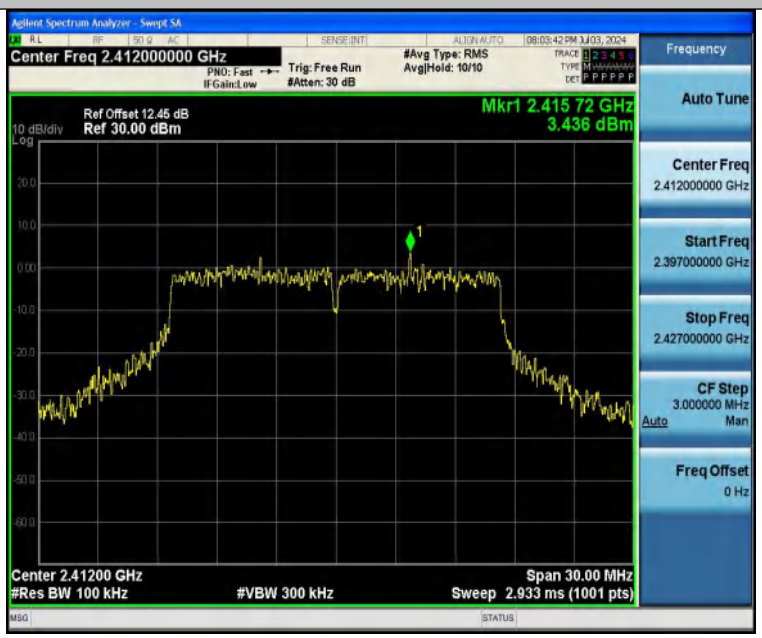
11B-Ant1-2462-0~Reference-PASS



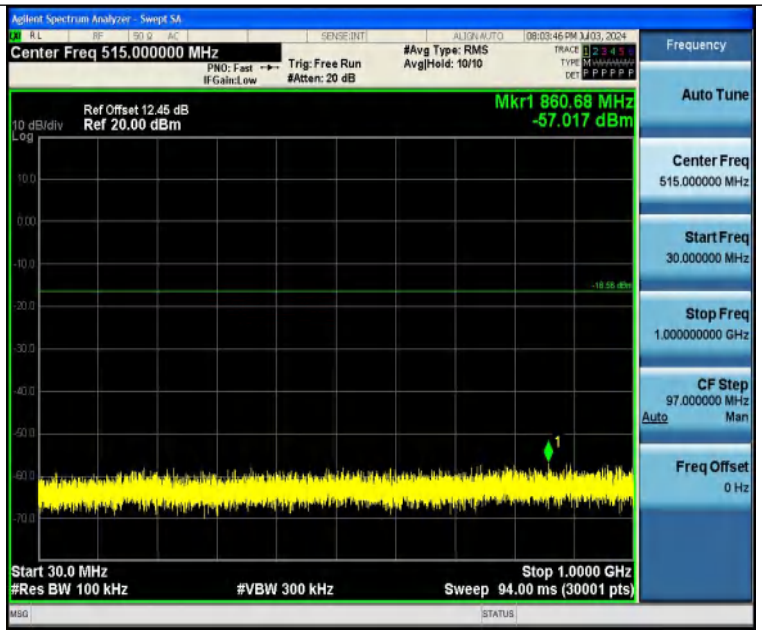
11B-Ant1-2462-30~1000-PASS



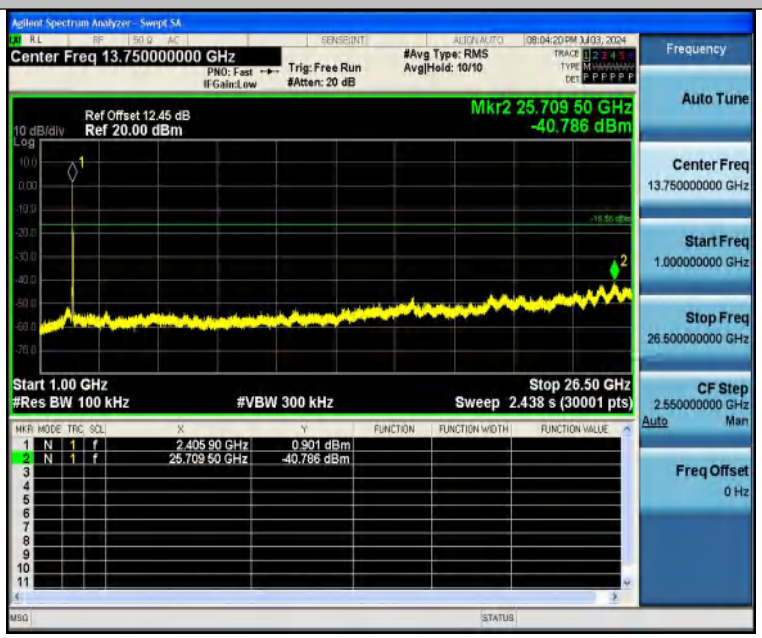
11B-Ant1-2462-1000~26500-PASS



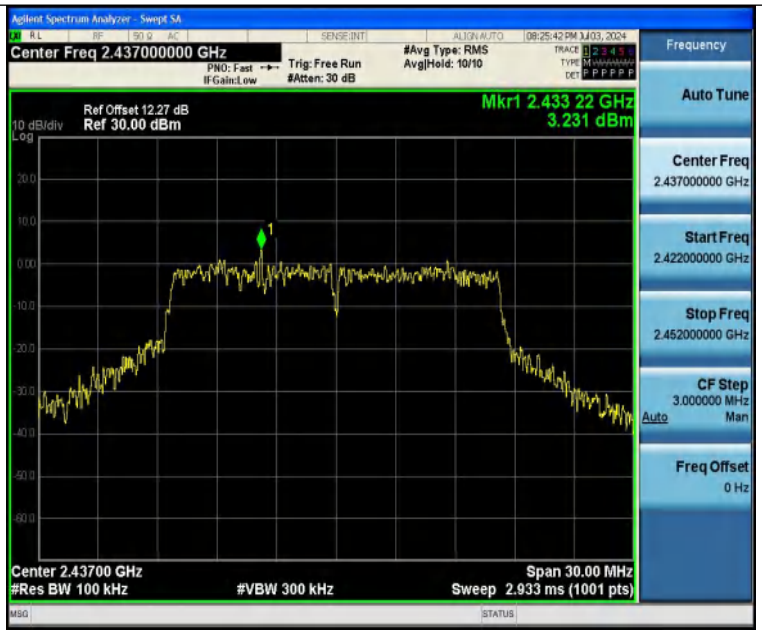
11G-Ant1-2412-0~Reference-PASS



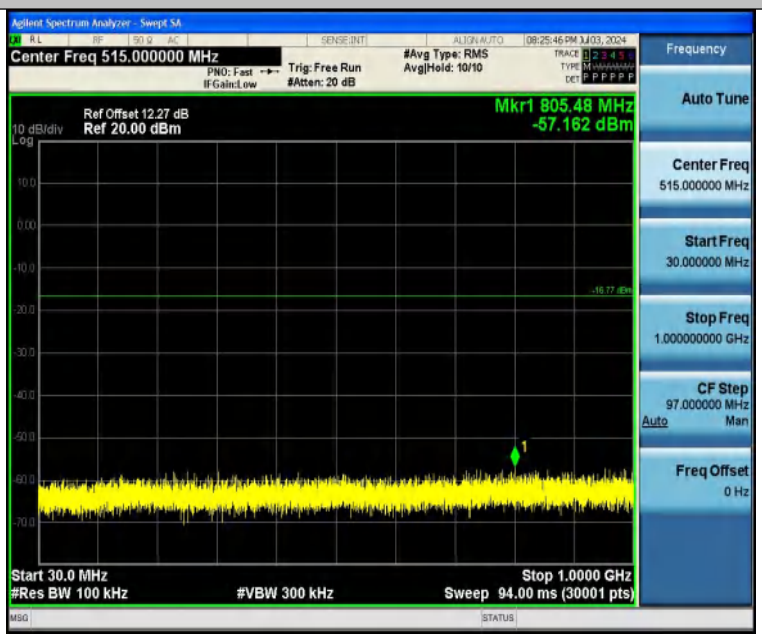
11G-Ant1-2412-30~1000-PASS



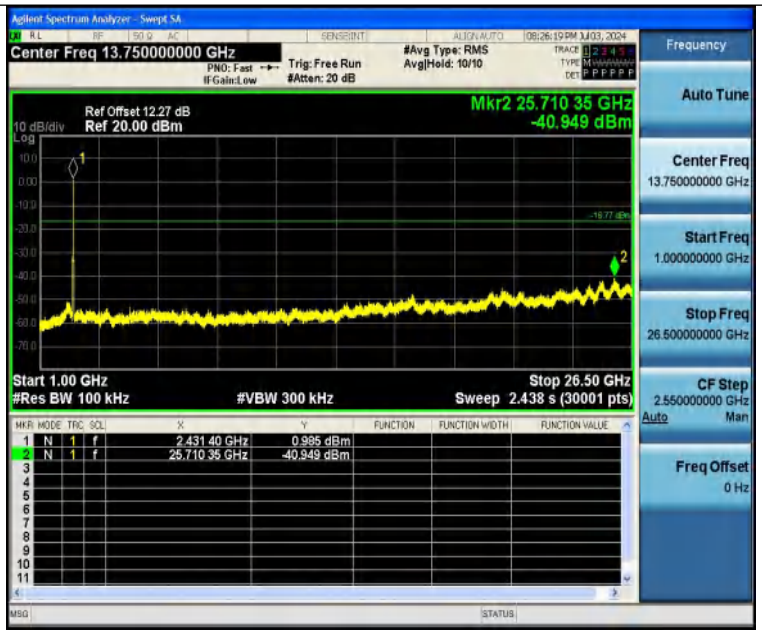
11G-Ant1-2412-1000~26500-PASS



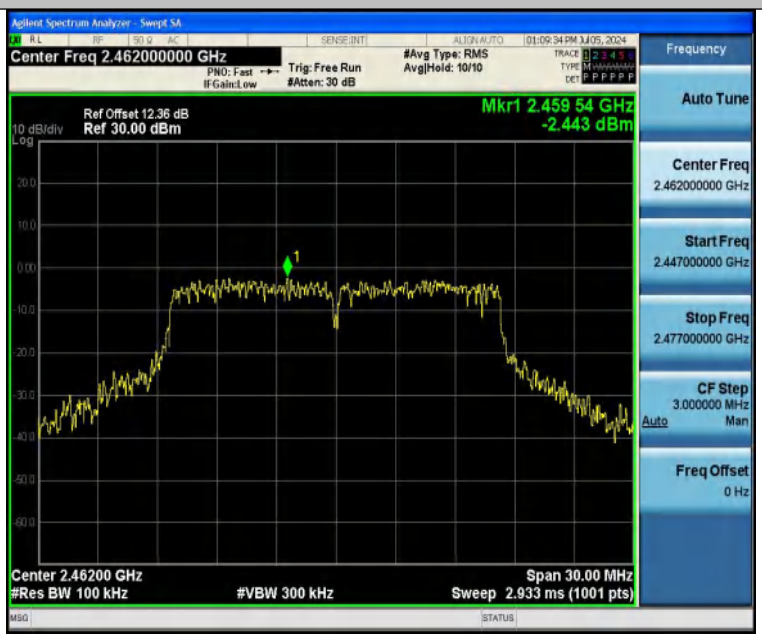
11G-Ant1-2437-0~Reference-PASS



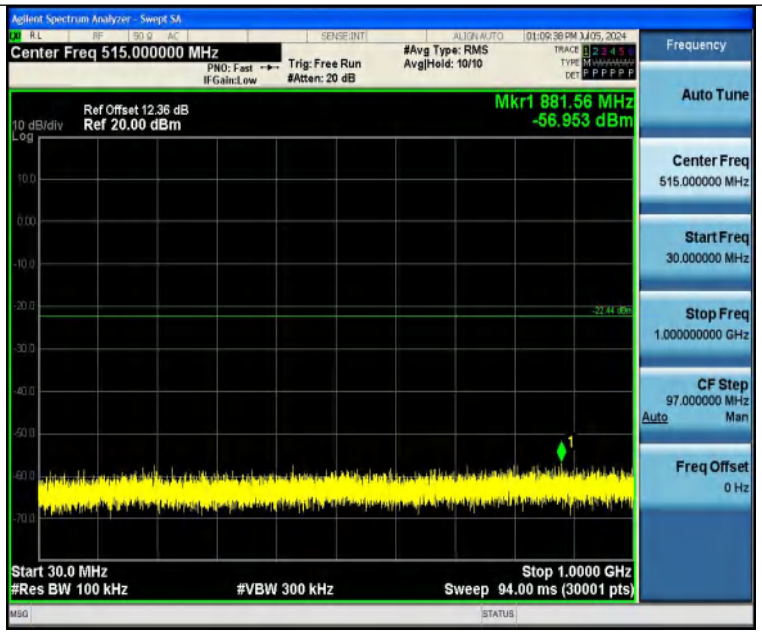
11G-Ant1-2437-30~1000-PASS



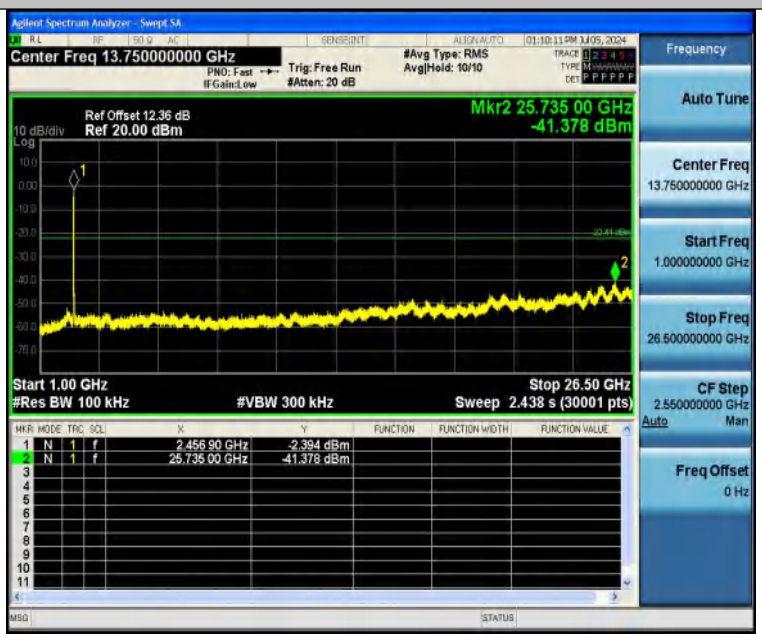
11G-Ant1-2437-1000~26500-PASS



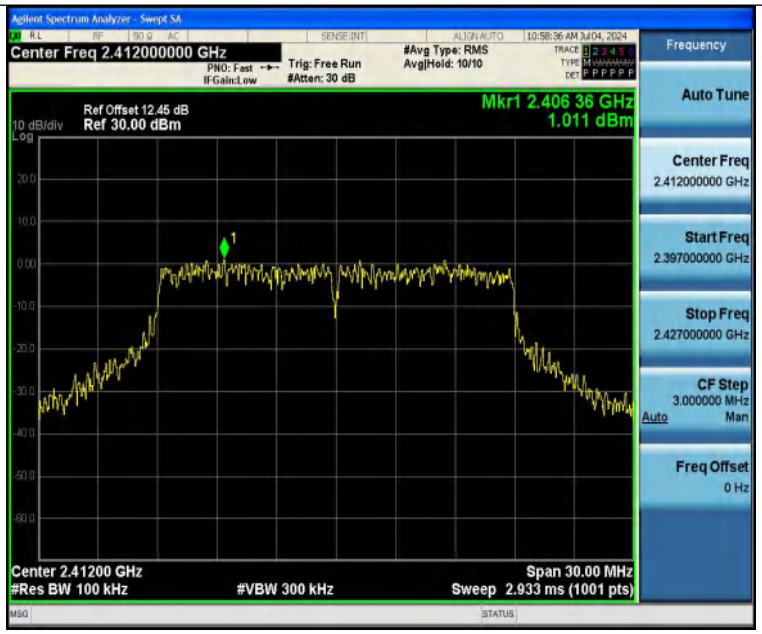
11G-Ant1-2462-0~Reference-PASS



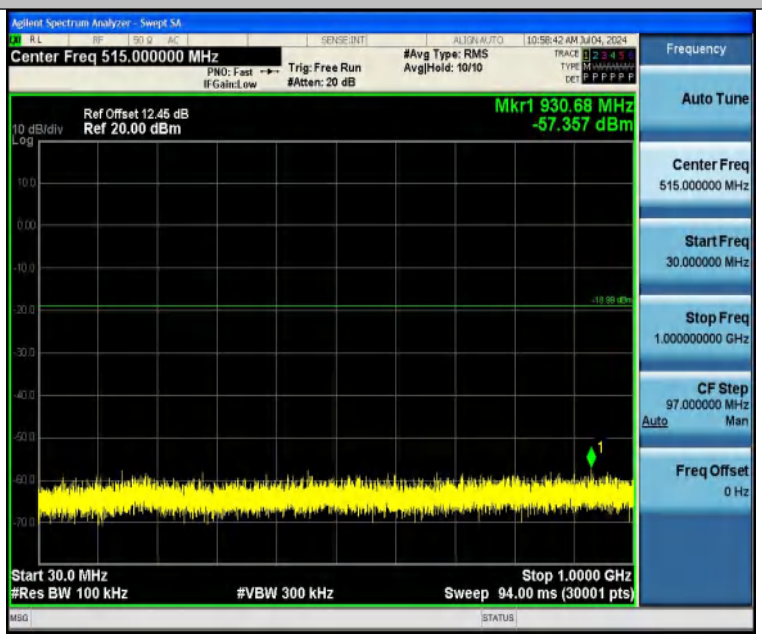
11G-Ant1-2462-30~1000-PASS



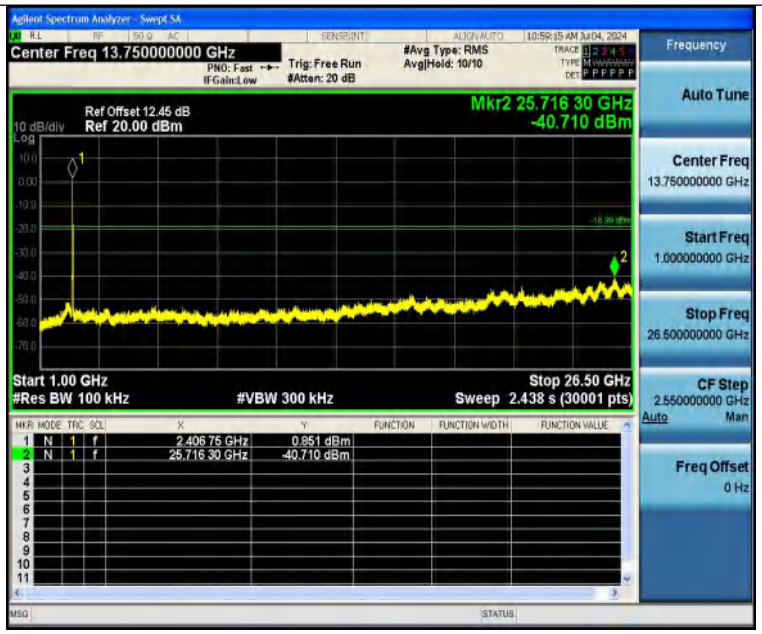
11G-Ant1-2462-1000~26500-PASS



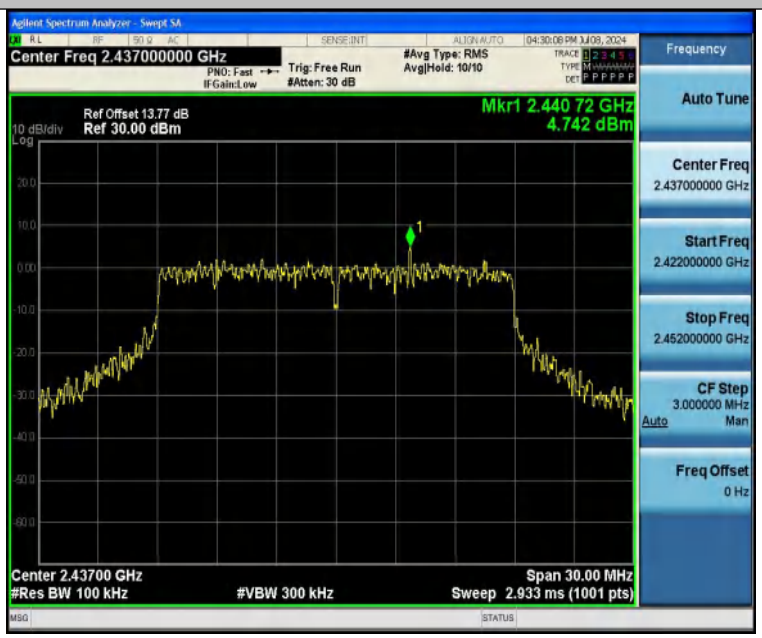
11N20SISO-Ant1-2412-0~Reference-PASS



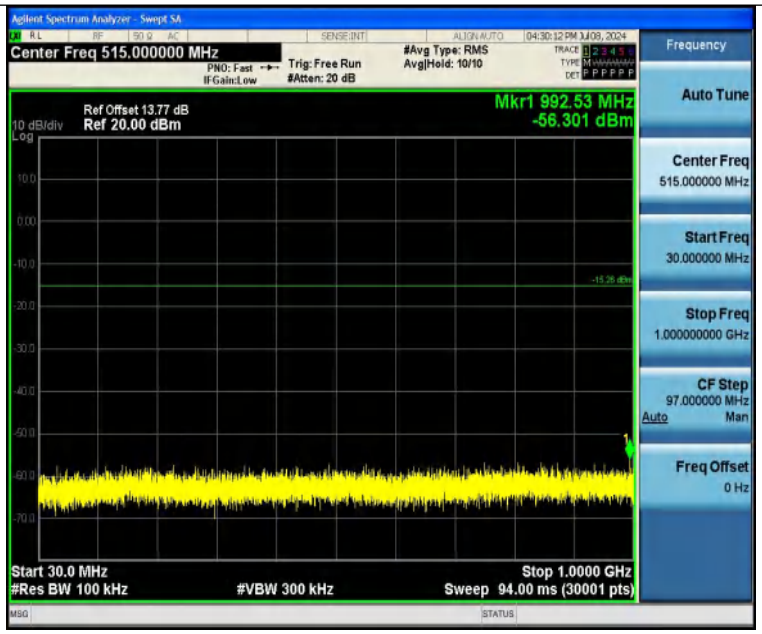
11N20SISO-Ant1-2412-30~1000-PASS



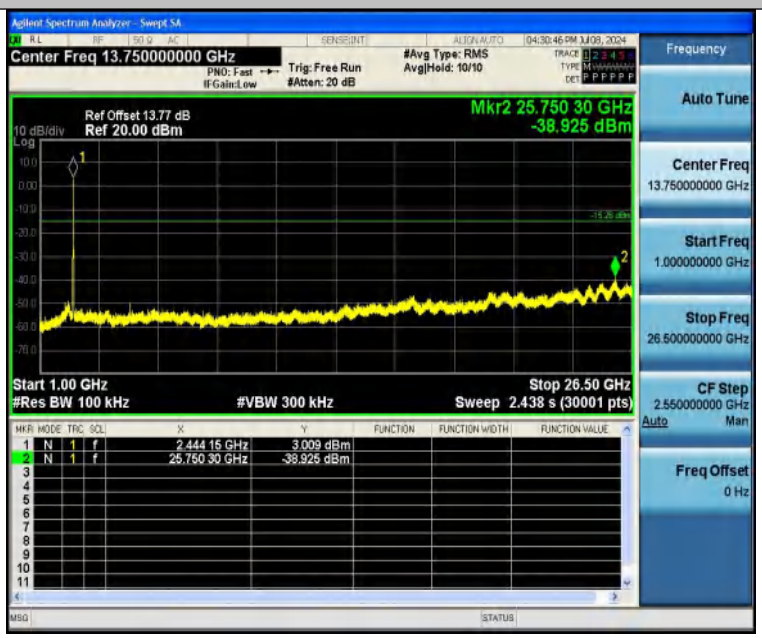
11N20SISO-Ant1-2412-1000~26500-PASS



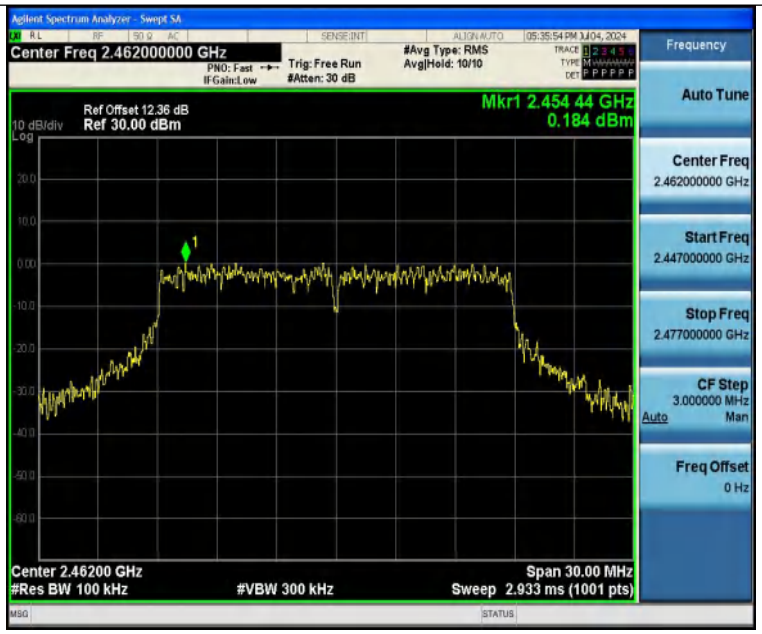
11N20SISO-Ant1-2437-0~Reference-PASS



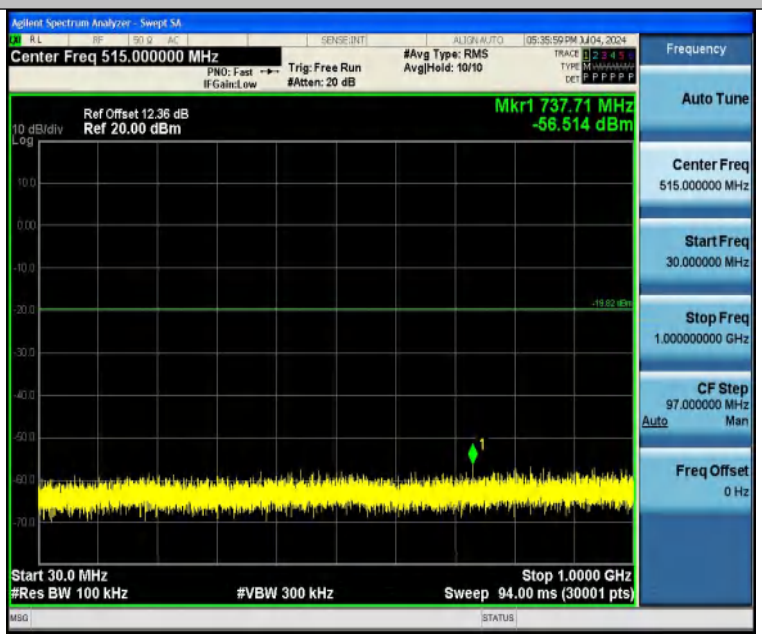
11N20SISO-Ant1-2437-30~1000-PASS



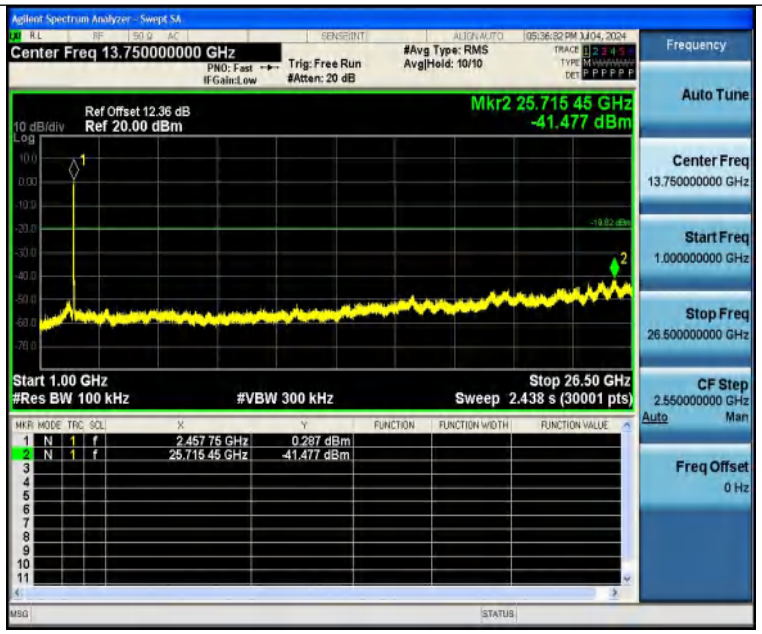
11N20SISO-Ant1-2437-1000~26500-PASS



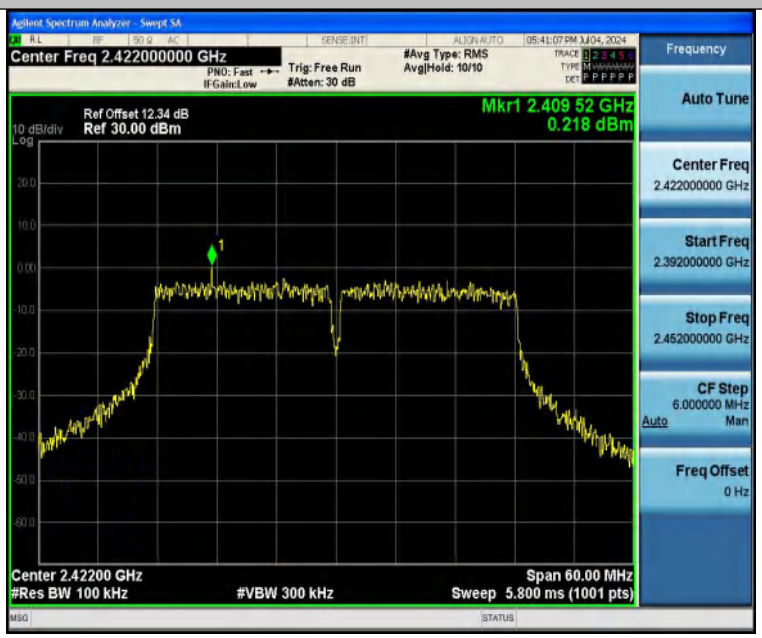
11N20SISO-Ant1-2462-0~Reference-PASS



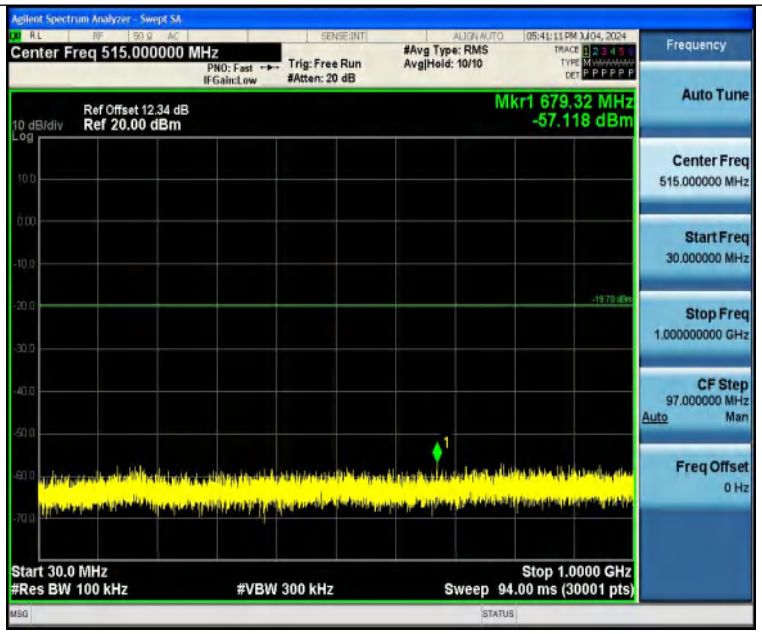
11N20SISO-Ant1-2462-30~1000-PASS



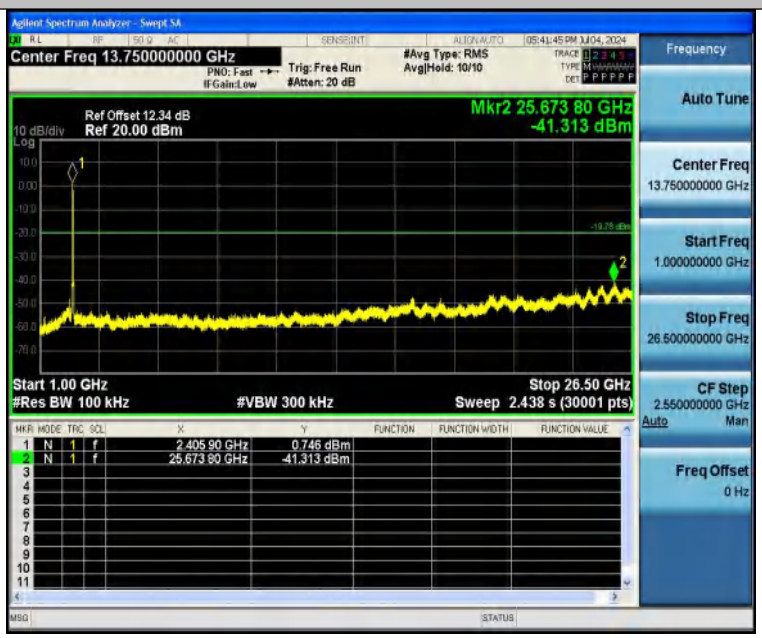
11N20SISO-Ant1-2462-1000~26500-PASS



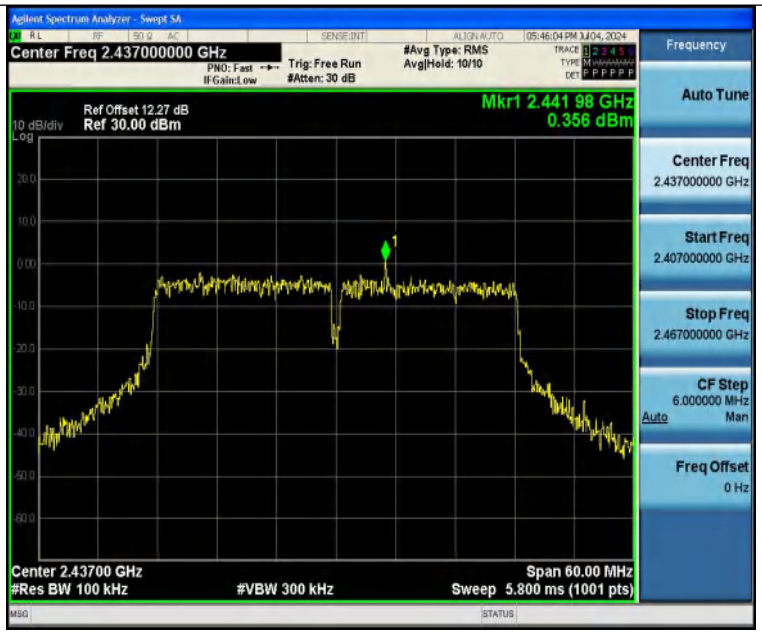
11N40SISO-Ant1-2422-0~Reference-PASS



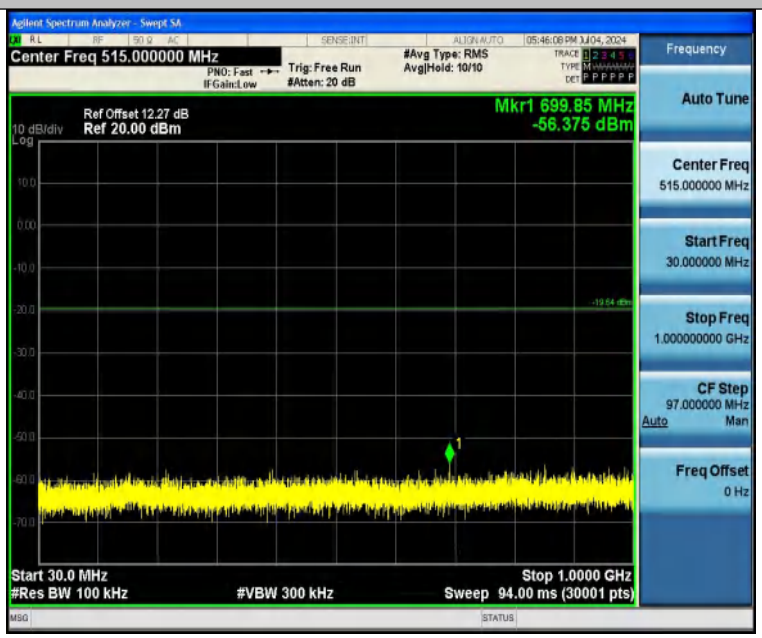
11N40SISO-Ant1-2422-30~1000-PASS



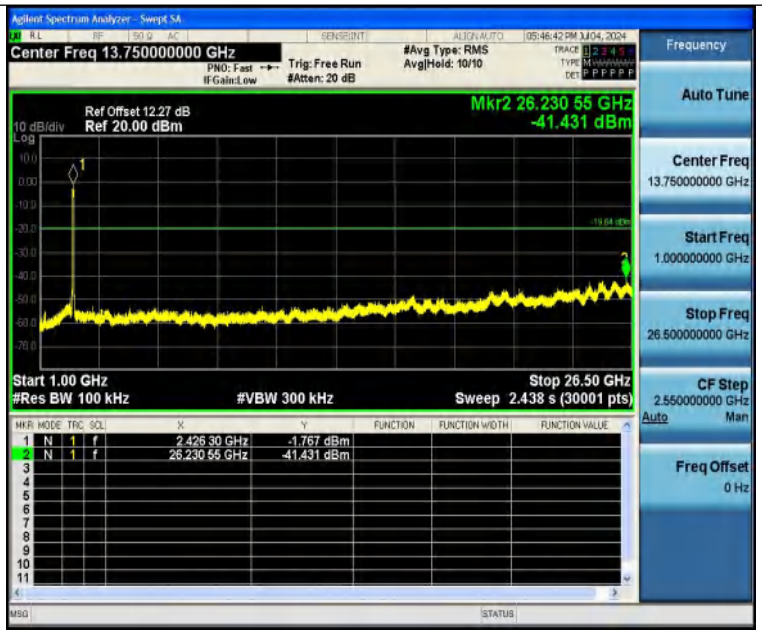
11N40SISO-Ant1-2422-1000~26500-PASS



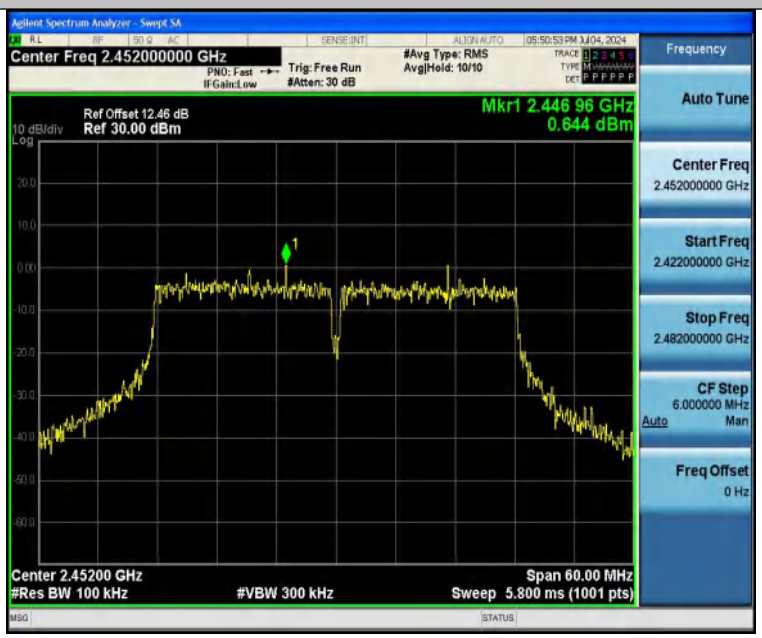
11N40SISO-Ant1-2437-0~Reference-PASS



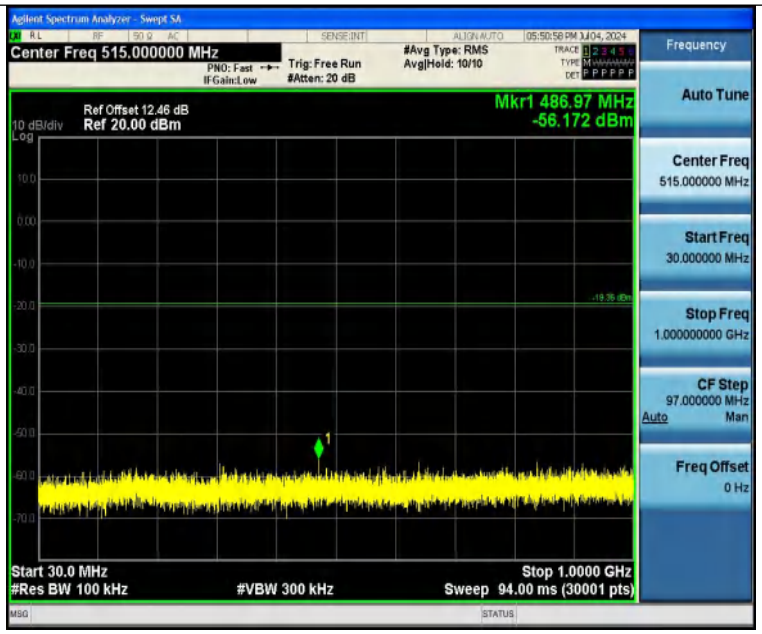
11N40SISO-Ant1-2437-30~1000-PASS



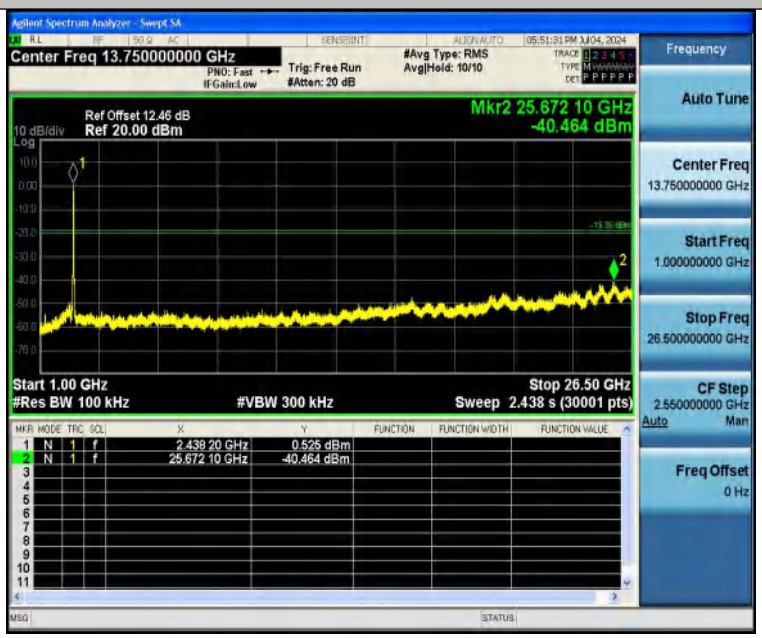
11N40SISO-Ant1-2437-1000~26500-PASS



11N40SISO-Ant1-2452-0~Reference-PASS



11N40SISO-Ant1-2452-30~1000-PASS



11N40SISO-Ant1-2452-1000~26500-PASS

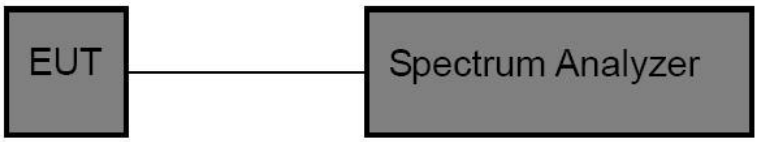
8 Band Edge Measurement

Test Requirement	:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

8.1Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

8.2Test Setup

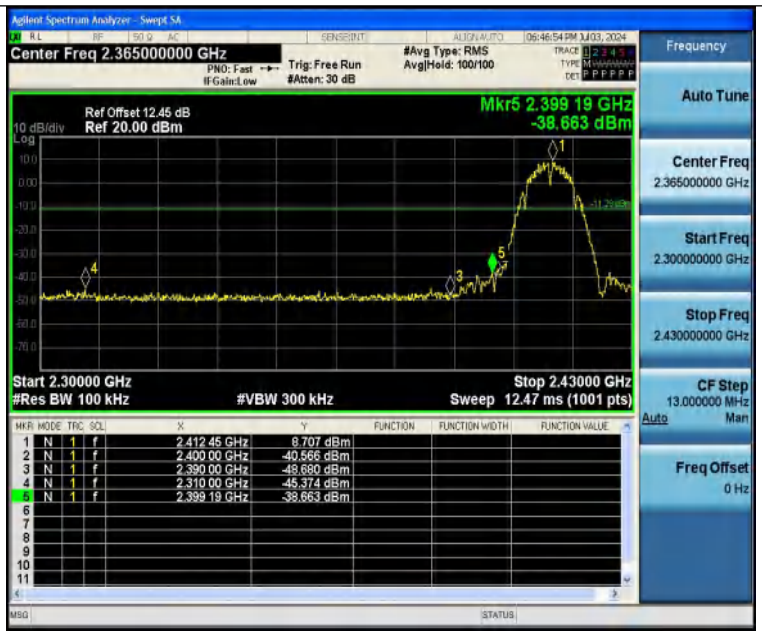


8.3Test Result

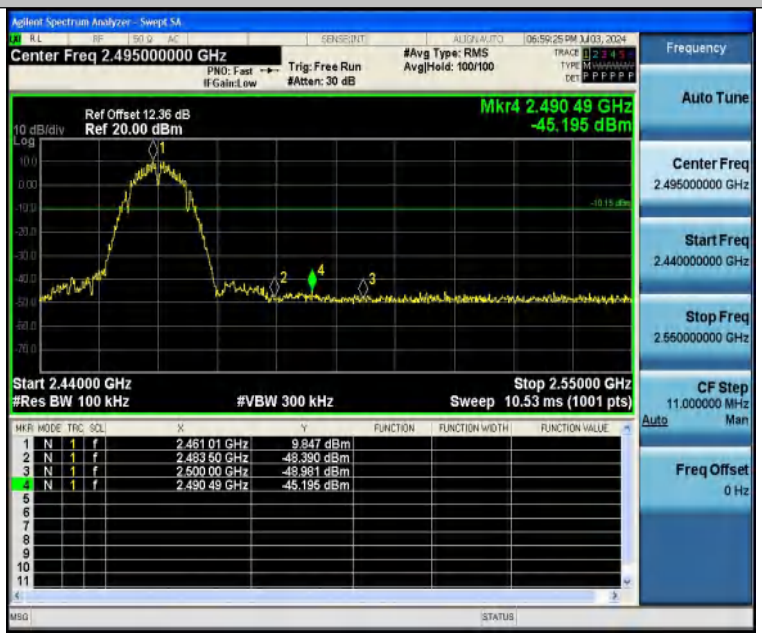
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	8.71	-38.66	≤-11.29	PASS
11B	Ant1	High	2462	9.85	-45.2	≤-10.15	PASS
11G	Ant1	Low	2412	3.63	-25.44	≤-16.38	PASS
11G	Ant1	High	2462	1.17	-42.64	≤-18.83	PASS
11N20SISO	Ant1	Low	2412	4.06	-22.72	≤-15.94	PASS
11N20SISO	Ant1	High	2462	3.81	-37.71	≤-16.19	PASS

11N40SISO	Ant1	Low	2422	0.84	-28.72	≤-19.16	PASS
11N40SISO	Ant1	High	2452	0.71	-37.61	≤-19.29	PASS

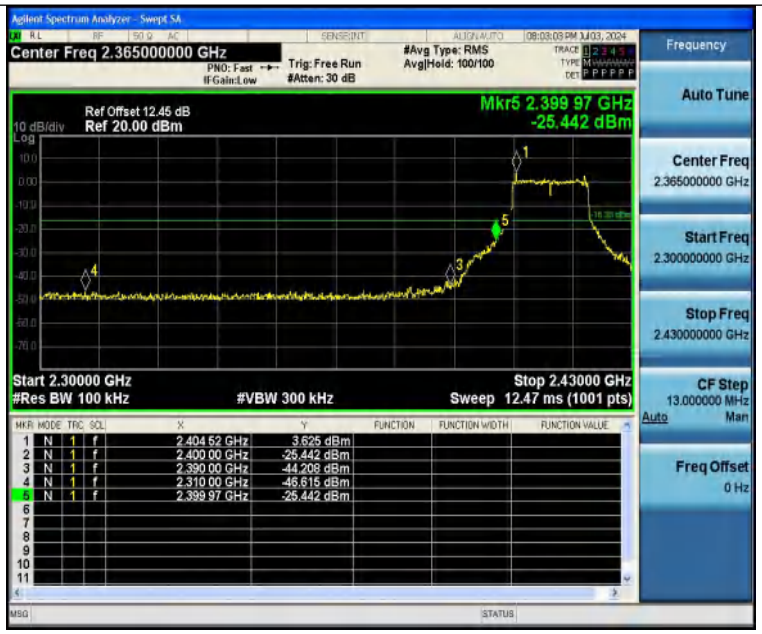
Test Graphs:



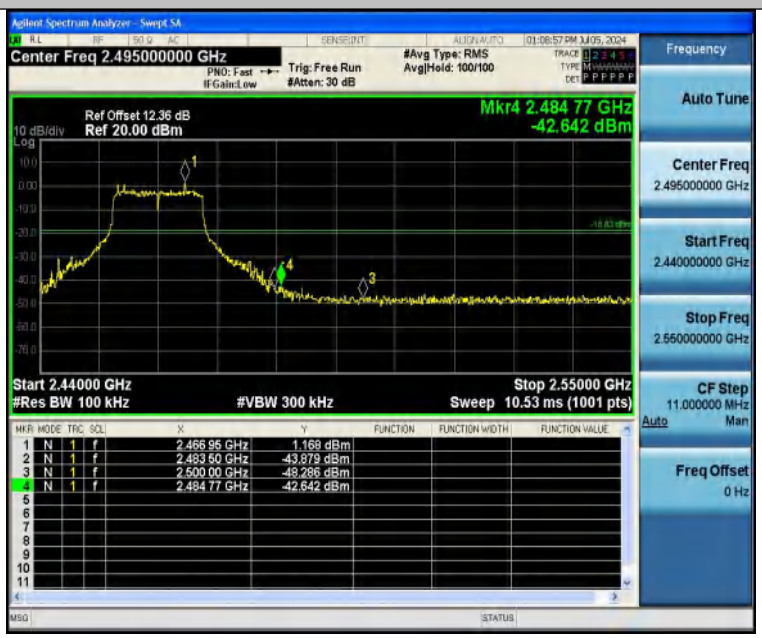
11B-Ant1-2412-PASS



11B-Ant1-2462-PASS

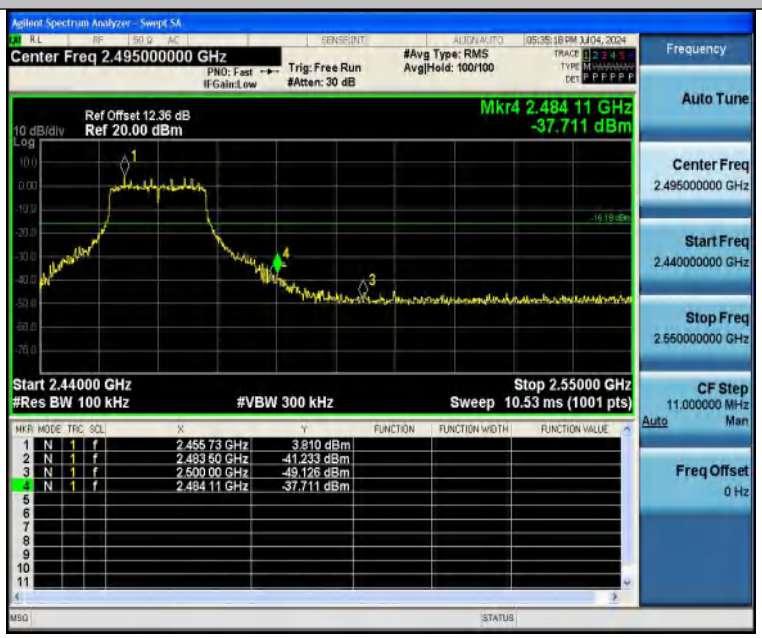


11G-Ant1-2412-PASS



11G-Ant1-2462-PASS

11N20SISO-Ant1-2412-PASS



11N20SISO-Ant1-2462-PASS

11N40SISO-Ant1-2422-PASS

11N40SISO-Ant1-2452-PASS

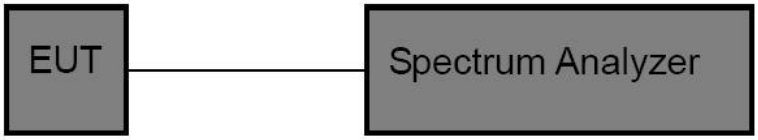
9 6dB Bandwidth Measurement

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit		Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.1Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

9.2Test Setup



9.3Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.040	2408.000	2416.040	0.5	PASS
11B	Ant1	2437	8.520	2432.480	2441.000	0.5	PASS
11B	Ant1	2462	8.080	2457.920	2466.000	0.5	PASS
11G	Ant1	2412	16.400	2403.760	2420.160	0.5	PASS
11G	Ant1	2437	16.360	2428.800	2445.160	0.5	PASS
11G	Ant1	2462	16.320	2453.840	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.560	2403.200	2420.760	0.5	PASS
11N20SISO	Ant1	2437	17.680	2428.120	2445.800	0.5	PASS
11N20SISO	Ant1	2462	17.560	2453.200	2470.760	0.5	PASS
11N40SISO	Ant1	2422	36.320	2403.840	2440.160	0.5	PASS
11N40SISO	Ant1	2437	35.840	2418.840	2454.680	0.5	PASS
11N40SISO	Ant1	2452	36.320	2433.840	2470.160	0.5	PASS

Test Graphs:

11B-Ant1-2412-PASS

11B-Ant1-2437-PASS

11B-Ant1-2462-PASS

11G-Ant1-2412-PASS

11G-Ant1-2437-PASS

11G-Ant1-2462-PASS

11N20SISO-Ant1-2412-PASS

11N20SISO-Ant1-2437-PASS

11N20SISO-Ant1-2462-PASS

11N40SISO-Ant1-2422-PASS

11N40SISO-Ant1-2437-PASS

11N40SISO-Ant1-2452-PASS

10 Maximum conducted output power

Test Requirement : FCC CFR47 Part 15 Section 15.247

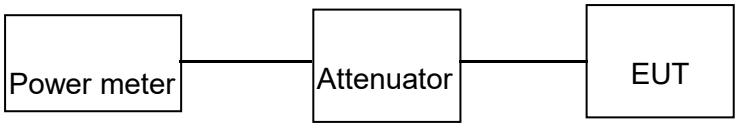
Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

10.1Test Procedure

1. According to ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter method. The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

10.2Test Setup



10.3Test Result

TestMode	Antenna	Frequency[MHz]	Set Power	Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
11B	Ant1	2412	---	21.56	≤30.00	PASS
11B	Ant1	2437	---	20.90	≤30.00	PASS
11B	Ant1	2462	---	20.91	≤30.00	PASS
11G	Ant1	2412	---	18.68	≤30.00	PASS
11G	Ant1	2437	---	17.86	≤30.00	PASS
11G	Ant1	2462	---	17.90	≤30.00	PASS
11N20SISO	Ant1	2412	---	18.54	≤30.00	PASS
11N20SISO	Ant1	2437	---	17.82	≤30.00	PASS
11N20SISO	Ant1	2462	---	17.85	≤30.00	PASS
11N40SISO	Ant1	2422	---	18.14	≤30.00	PASS
11N40SISO	Ant1	2437	---	17.73	≤30.00	PASS
11N40SISO	Ant1	2452	---	18.14	≤30.00	PASS

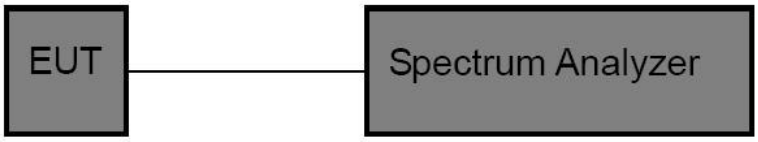
11 Power Spectral density

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

11.1Test Procedure

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below:
   Center frequency=DTS channel center frequency
   Span = 1.5 times the DTS bandwidth
   RBW = 3KHz, VBW = 10KHz
   Sweep time = auto couple
   Detector = peak
   Trace mode =max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW(no less than 3KHz) and repeat.

11.2Test Setup

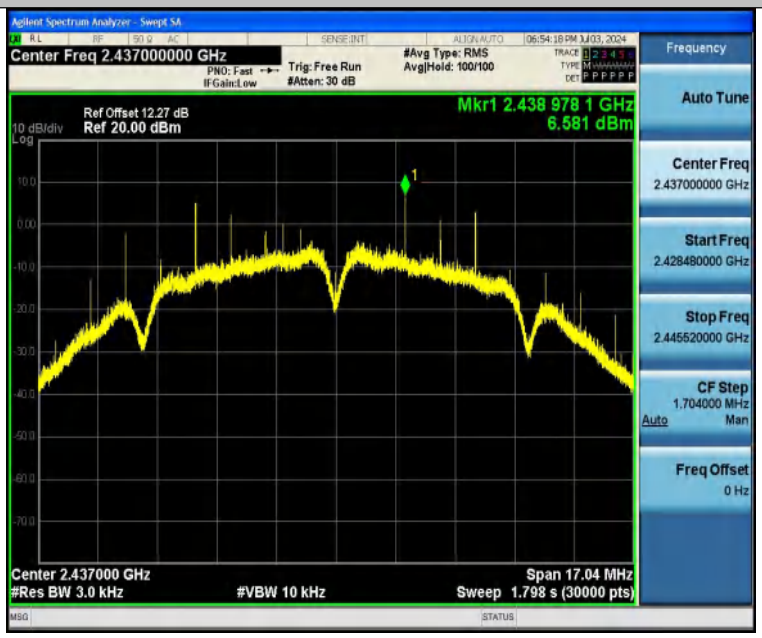


11.3Test Result

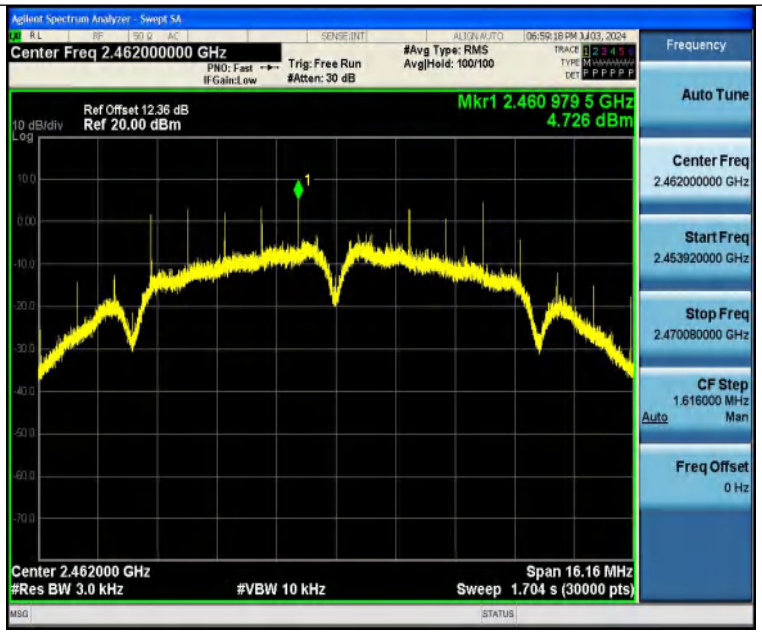
TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	4.75	≤8.00	PASS
11B	Ant1	2437	6.58	≤8.00	PASS
11B	Ant1	2462	4.73	≤8.00	PASS
11G	Ant1	2412	-9.34	≤8.00	PASS
11G	Ant1	2437	-9.08	≤8.00	PASS
11G	Ant1	2462	-11.87	≤8.00	PASS
11N20SISO	Ant1	2412	-9.02	≤8.00	PASS
11N20SISO	Ant1	2437	-9.41	≤8.00	PASS
11N20SISO	Ant1	2462	-8.95	≤8.00	PASS
11N40SISO	Ant1	2422	-12.73	≤8.00	PASS
11N40SISO	Ant1	2437	-11.32	≤8.00	PASS
11N40SISO	Ant1	2452	-12.38	≤8.00	PASS

Test Graphs:

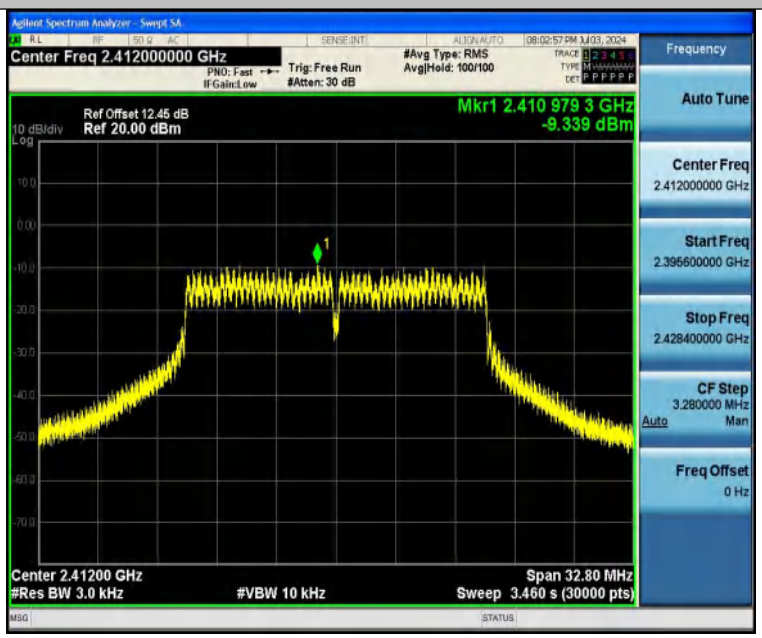
11B-Ant1-2412-PASS



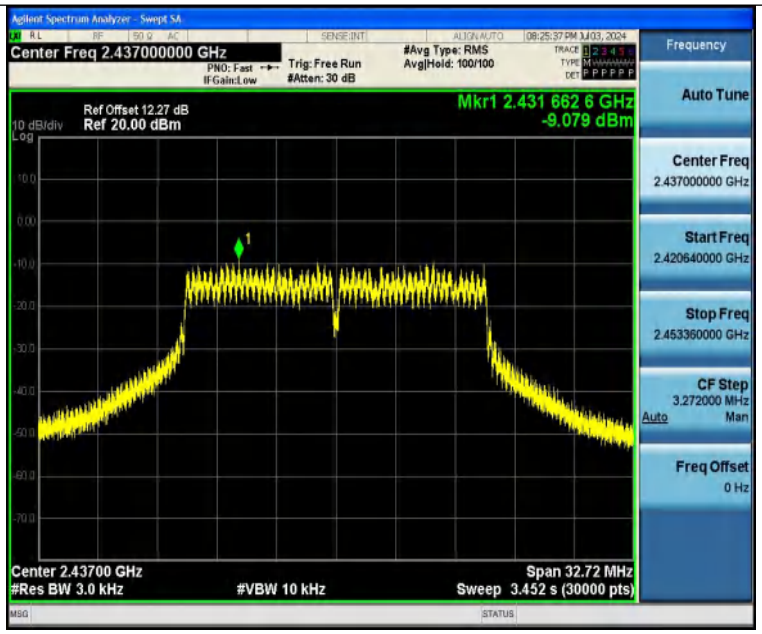
11B-Ant1-2437-PASS



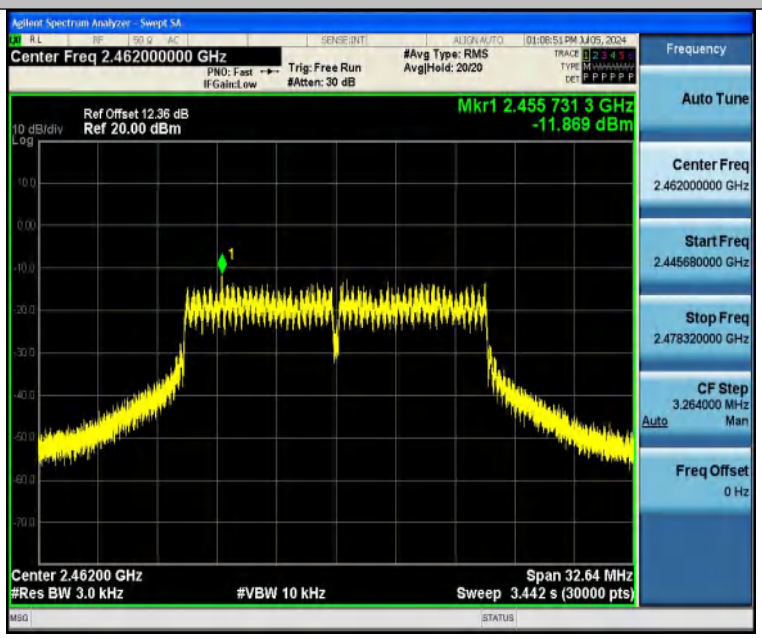
11B-Ant1-2462-PASS



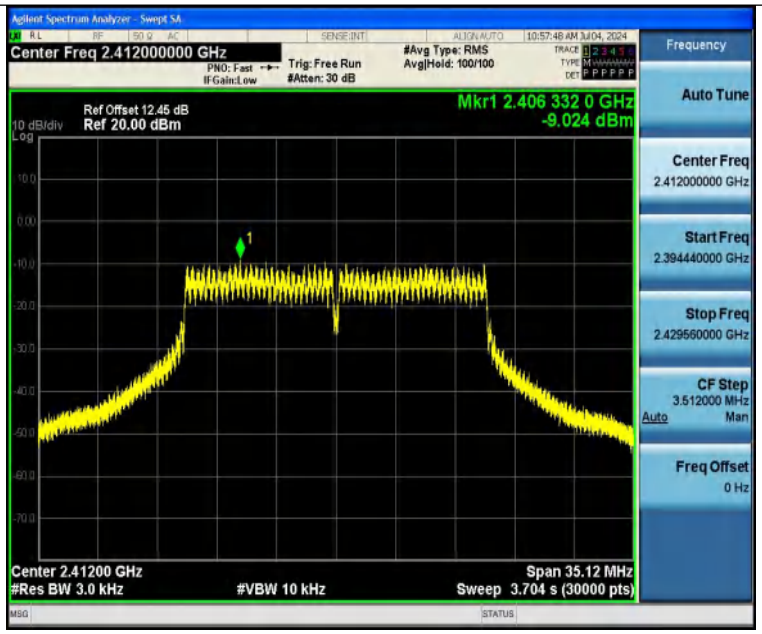
11G-Ant1-2412-PASS



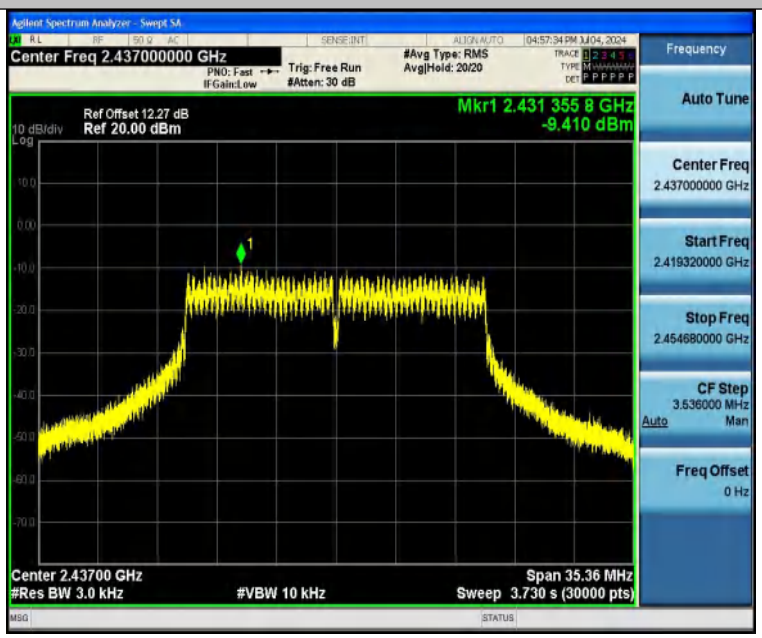
11G-Ant1-2437-PASS



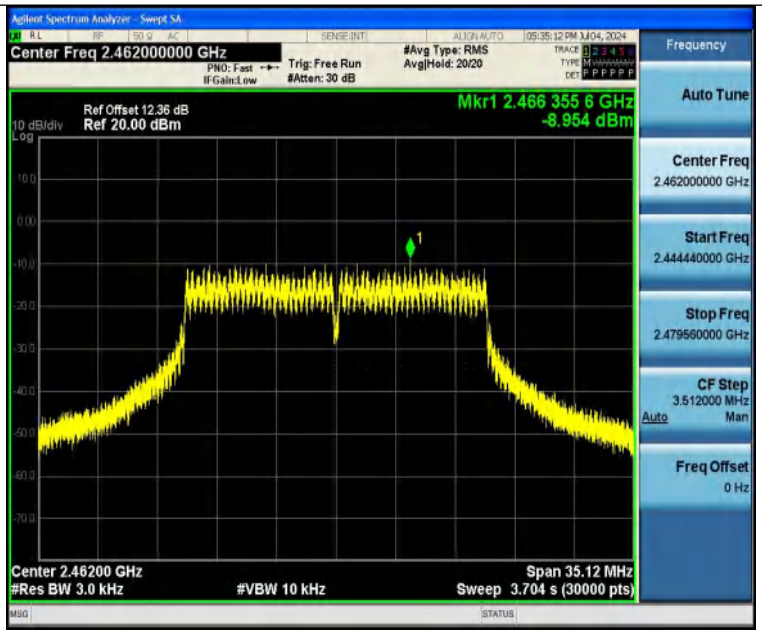
11G-Ant1-2462-PASS



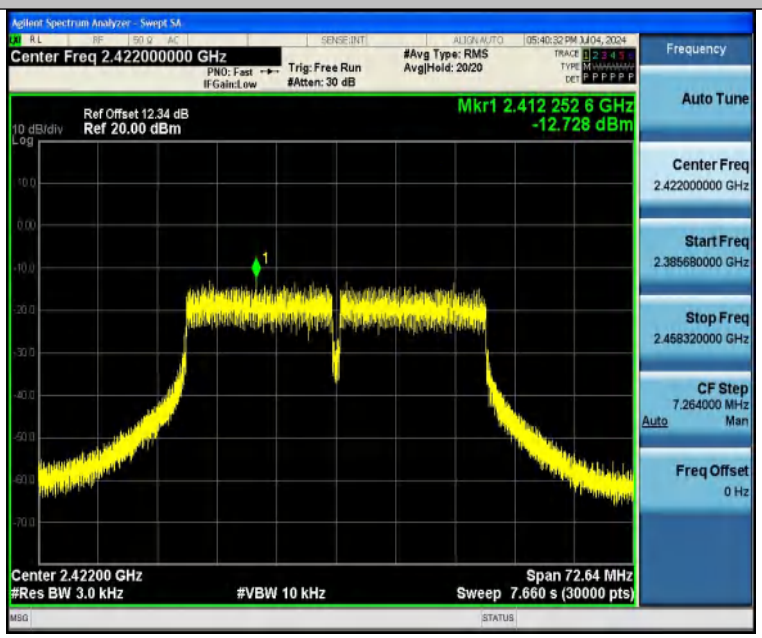
11N20SISO-Ant1-2412-PASS



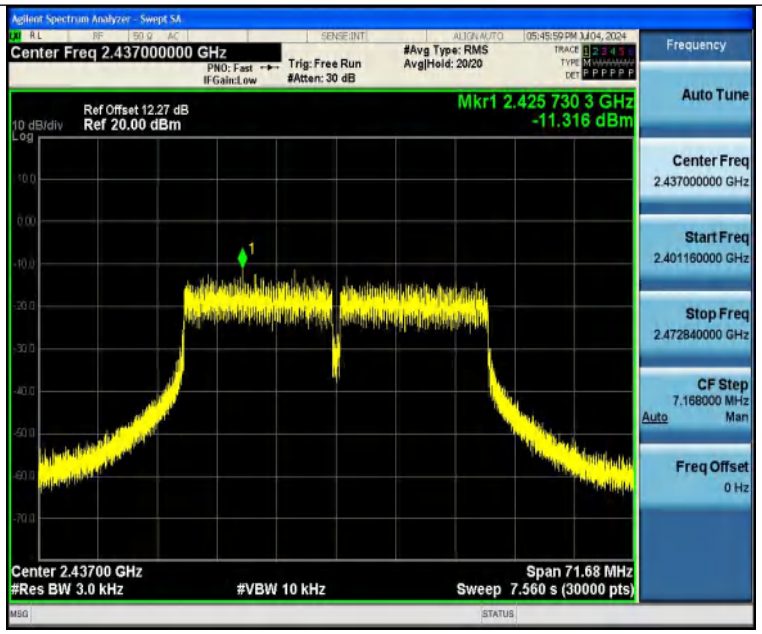
11N20SISO-Ant1-2437-PASS



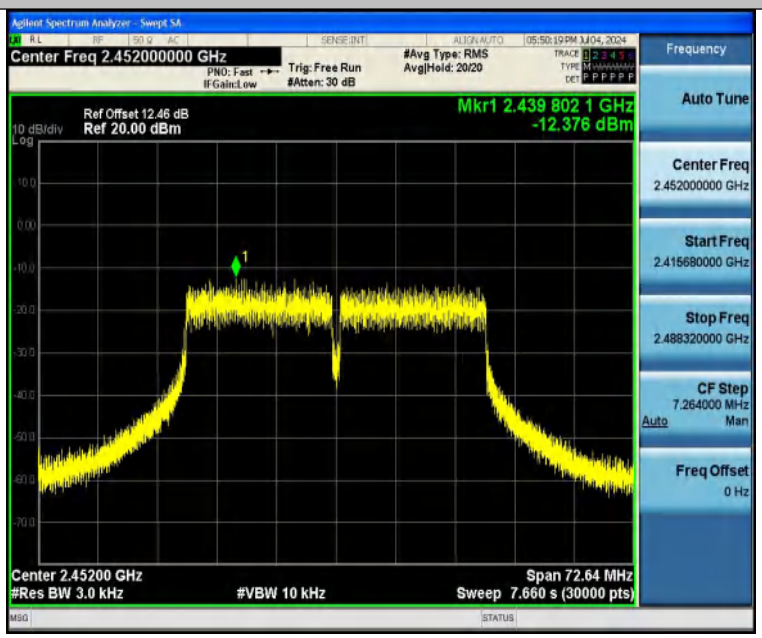
11N20SISO-Ant1-2462-PASS



11N40SISO-Ant1-2422-PASS



11N40SISO-Ant1-2437-PASS



11N40SISO-Ant1-2452-PASS

12 Antenna Application

12.1 Antenna Requirement

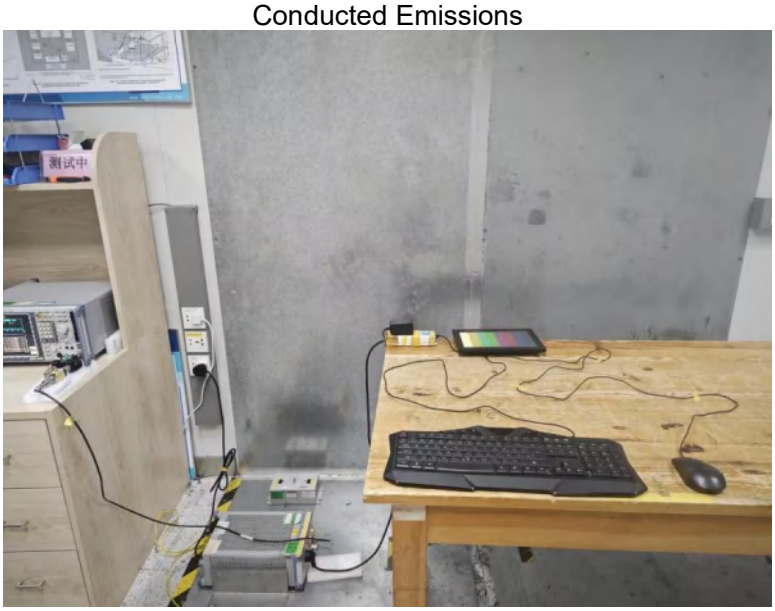
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

12.2 Result

The EUT'S antenna, permanent attached antenna,is PCB Antenna. The antenna's gain is 1.82 dBi and meets the requirement.

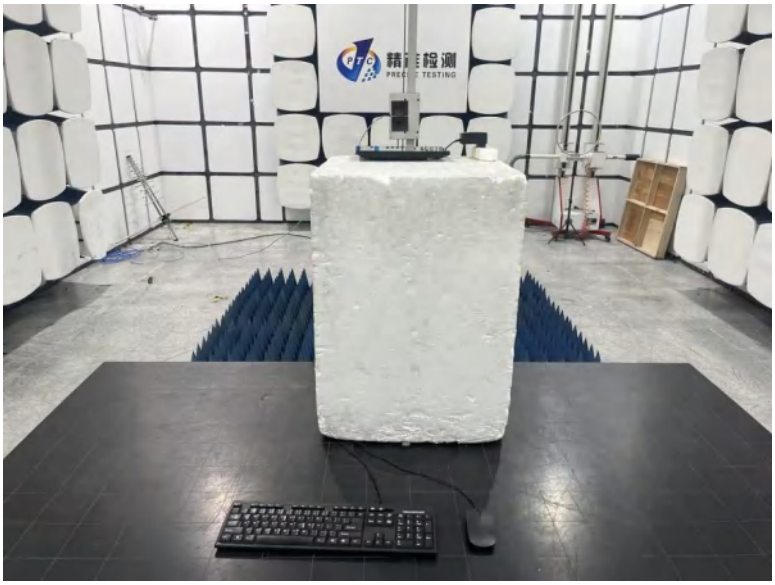
13 Test Setup

Conducted Emissions

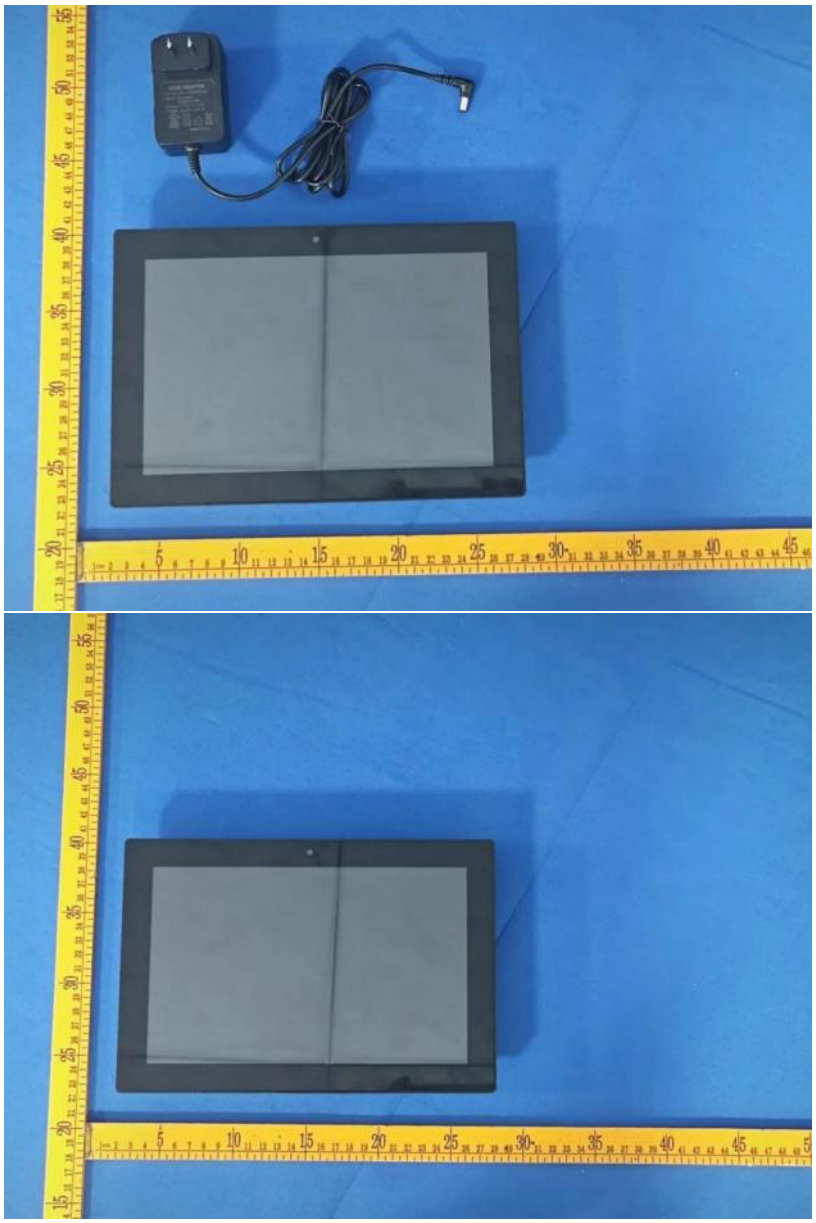


Radiated Spurious Emissions
From 30MHz-1000MHz

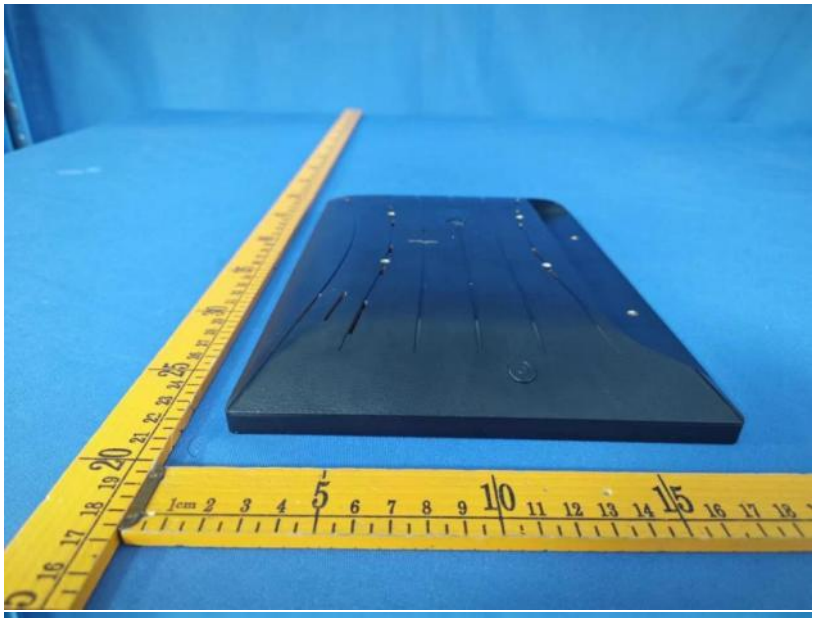
Test frequency from Above 1GHz

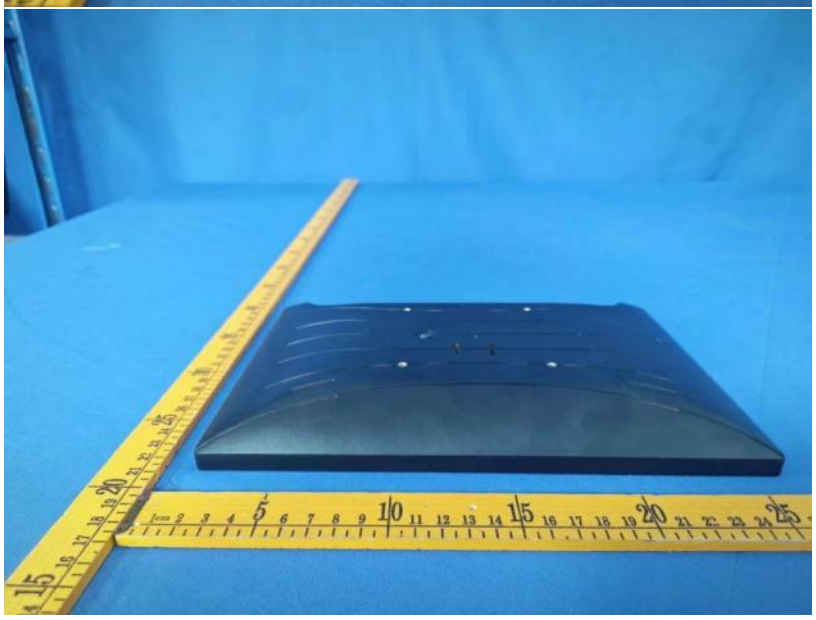


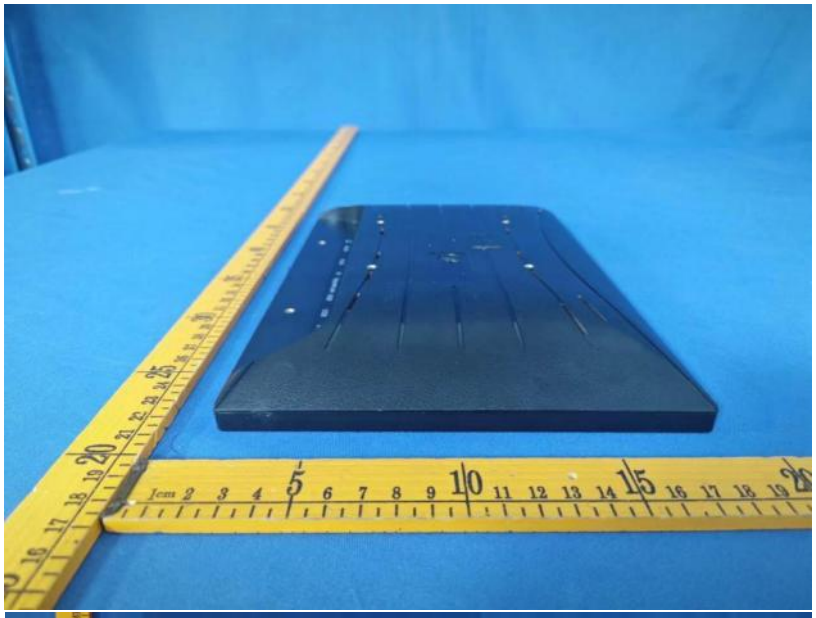
14 EUT PHOTOS

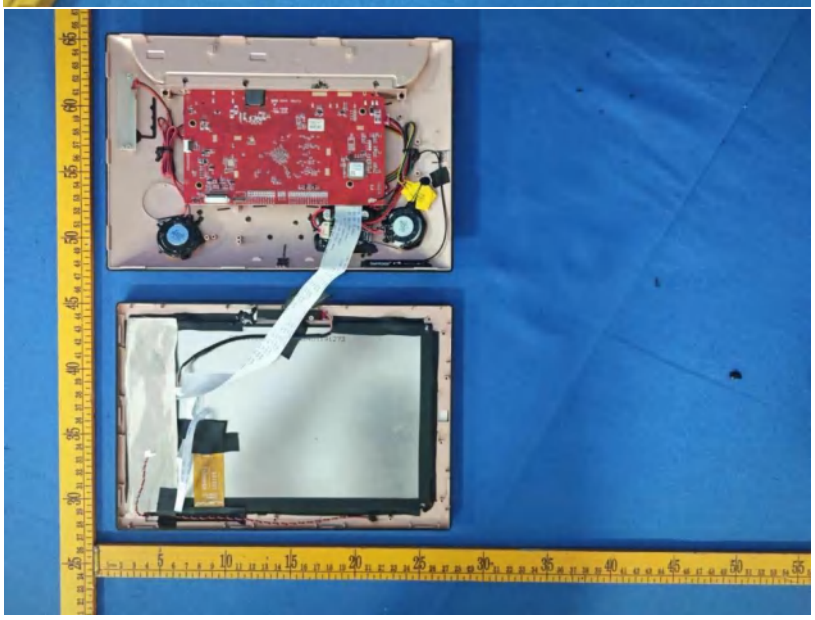


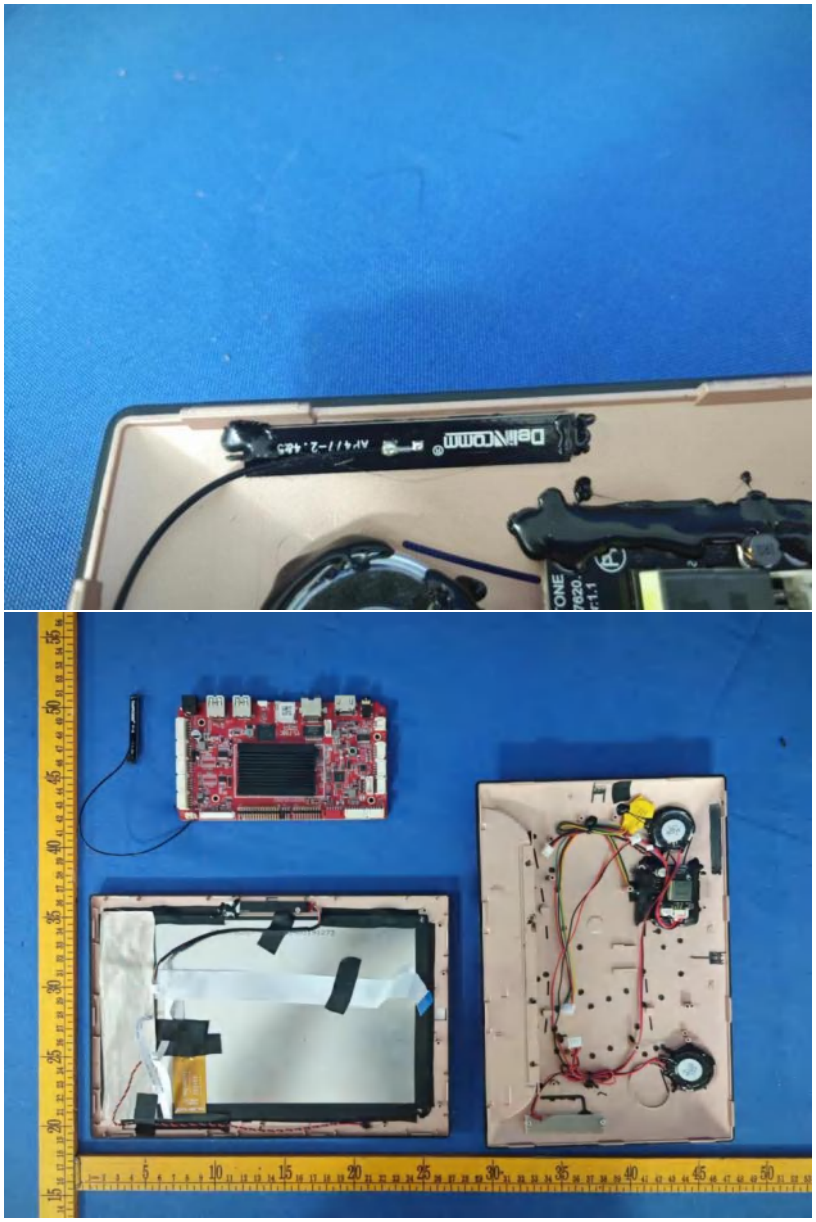
HDMI
RJ45
TF
Upgrade jack
USB
USB
DC IN

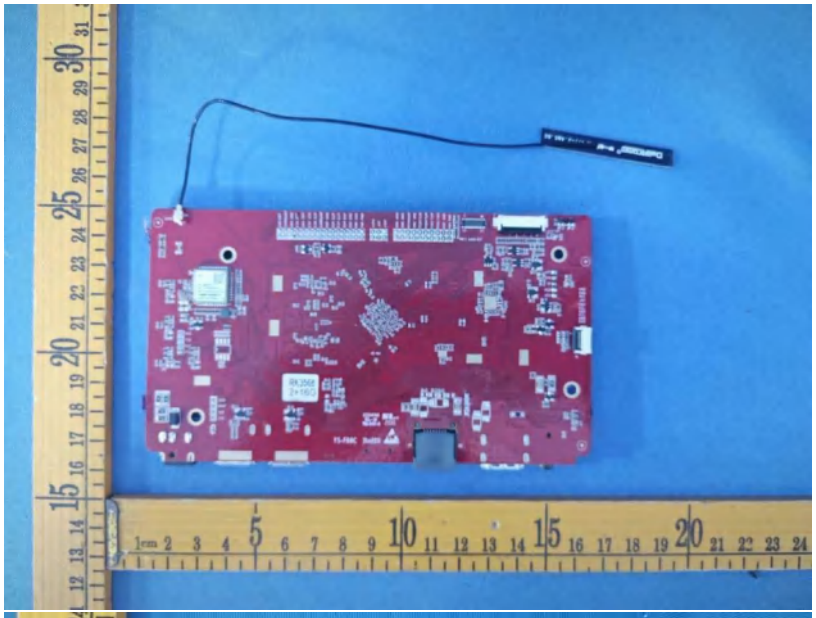


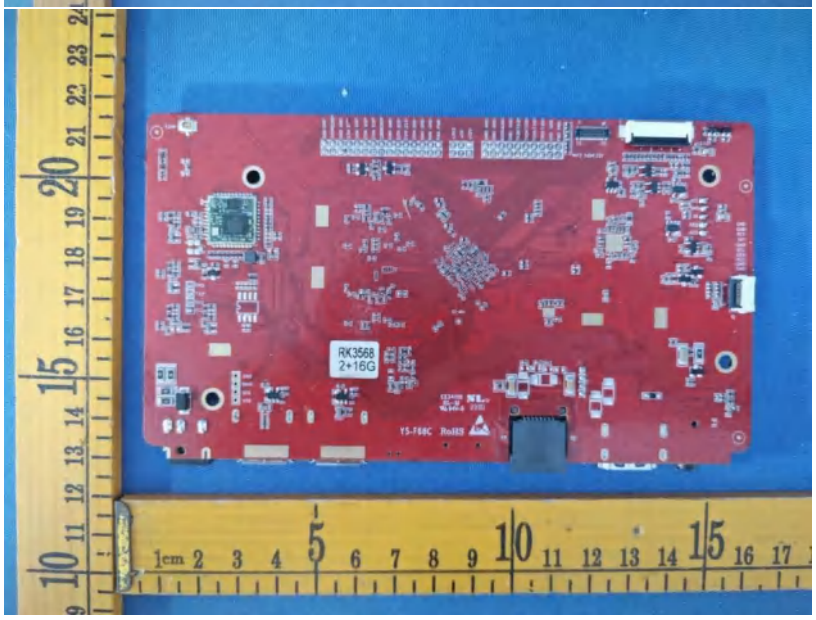


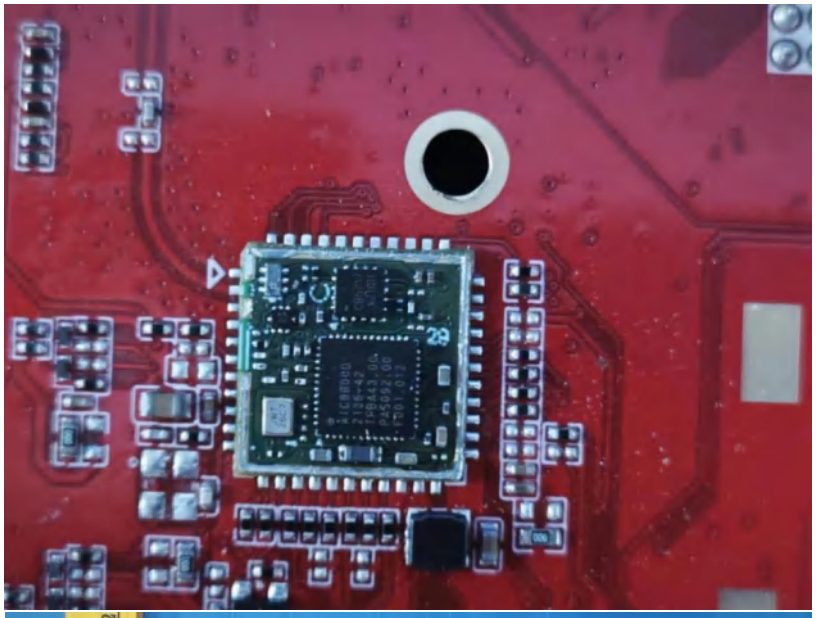


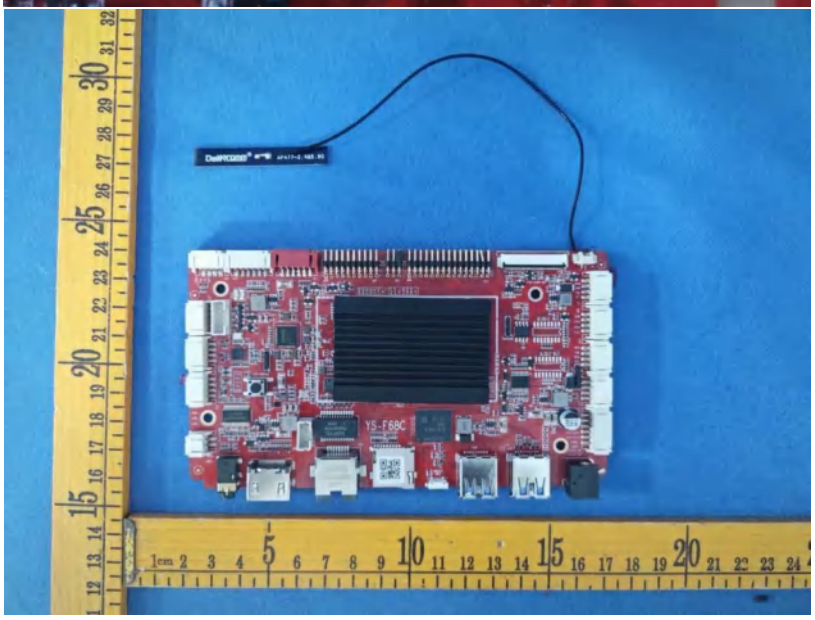


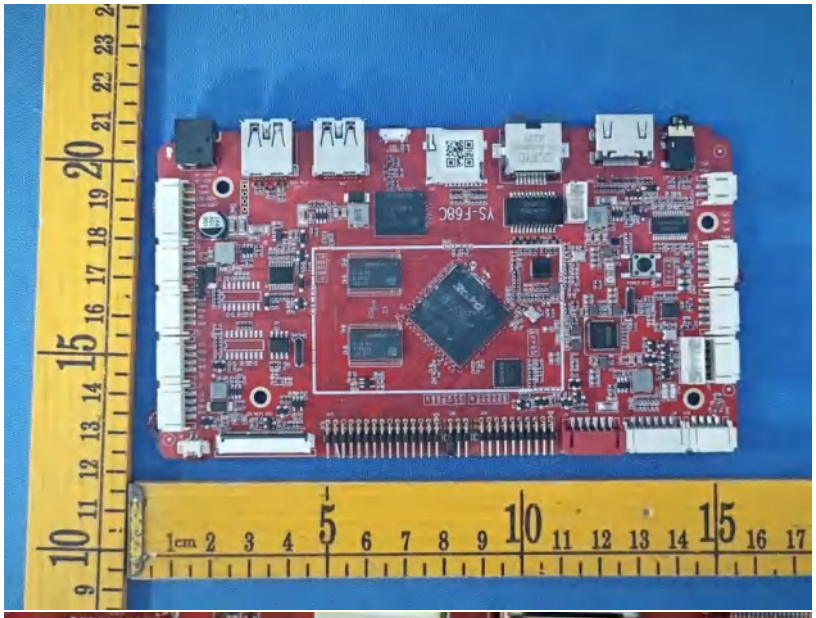




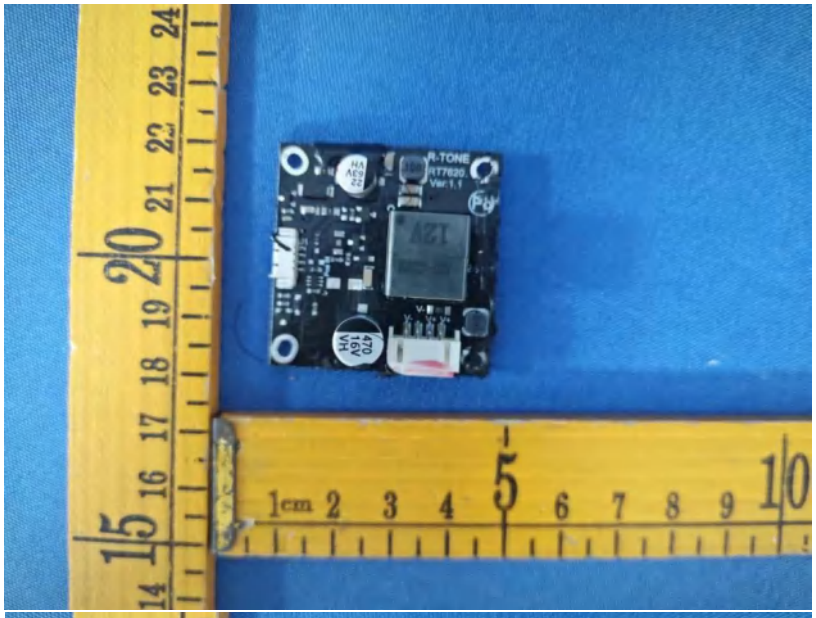

RK3568
2+16G

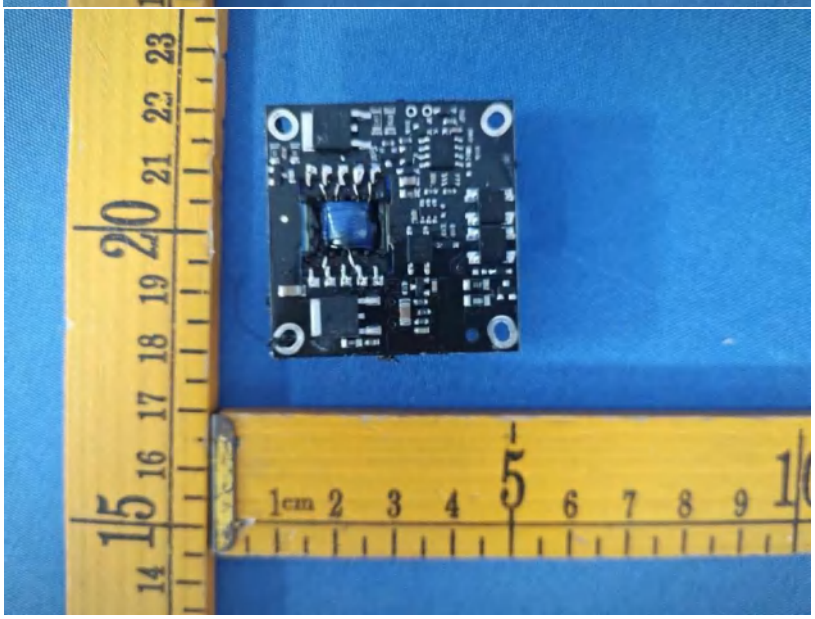


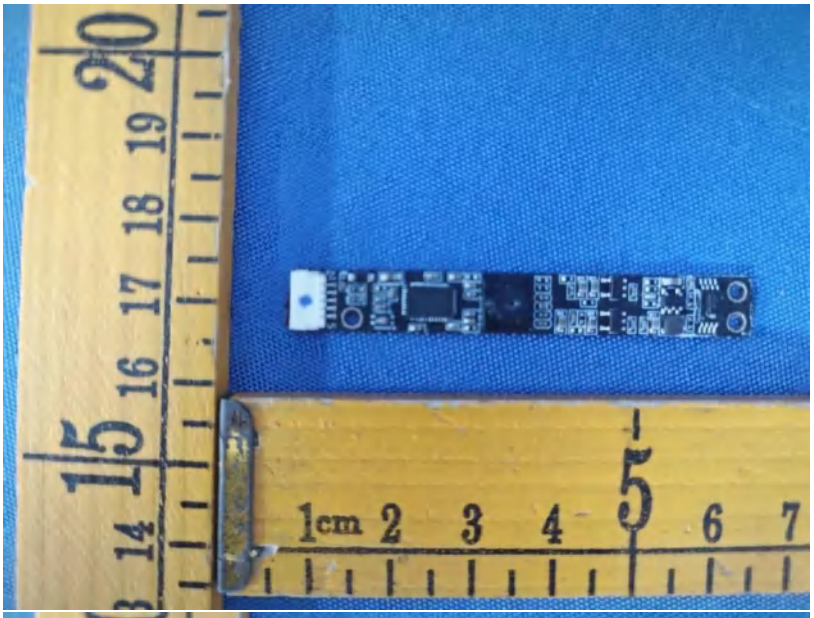

YS-F68C

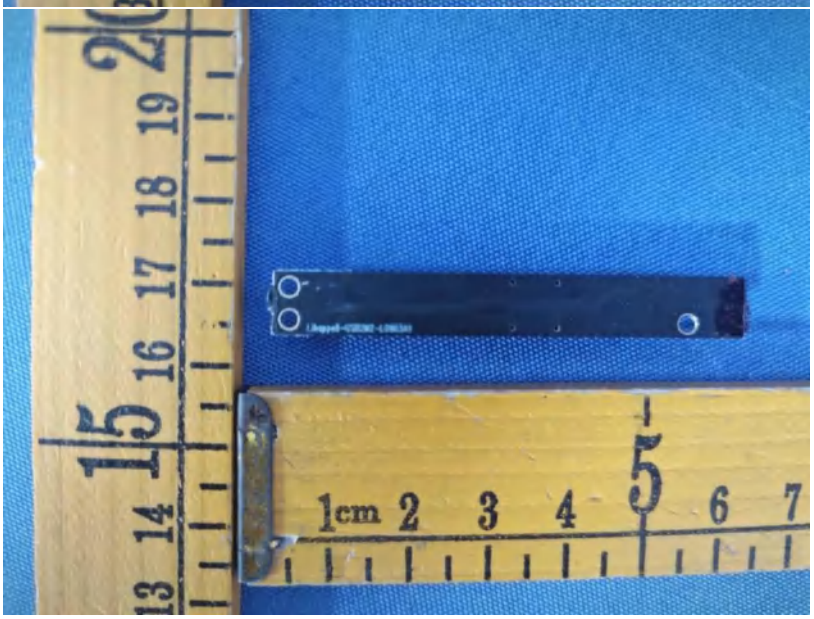

YS-F68C

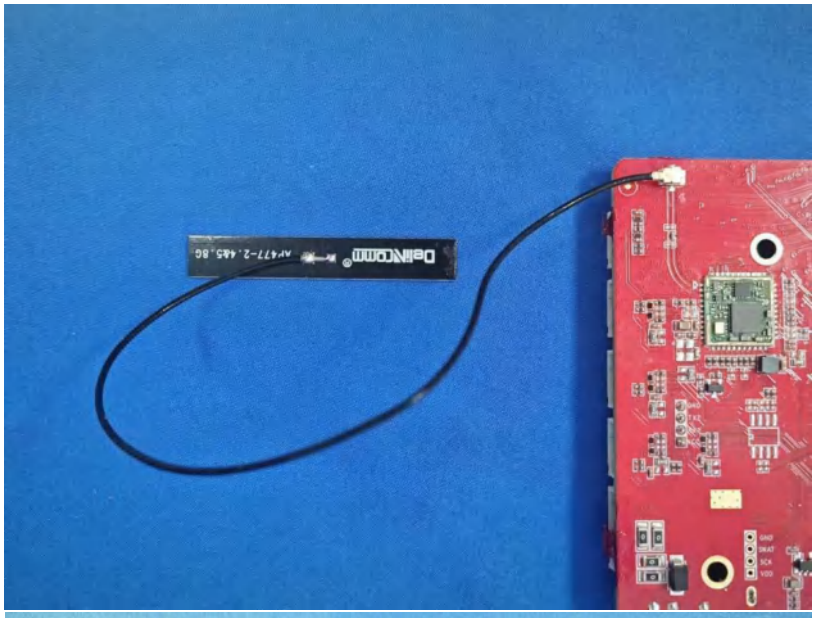
YS-F68C


R-TONE
RT7620
Ver:1.1
470
16V
1cm


1cm


1cm 2 3 4 5 6 7


1cm 2 3 4 5 6 7



********THE END REPORT********