FCC TEST REPORT

FCC ID: 2BFH2-SIN-M01

Product	:	industrial pc, panel pc, industrial all in one pc, touch screen monitor
Model Name	:	SIN-M01
Series model	:	SIN-M02, SIN-M03, SIN-M04, SIN-M05, SIN-M06, SINM07, SIN-M08, SIN-M09, SIN-M10, SIN-M1X, SIN-M2X, SIN-M3X, SINM4X, SIN-M5X, SIN-M6X, SIN-M7X, SIN-M8X, SIN-M9X
Brand	:	N/A
Report No.	:	PTC24010802601E-FC03

Prepared for

Guangdong Sinmar Electronic Science and Technology Co.,Ltd

302, No.8, Changsha Road, Dalong Street, Panyu District, Guangzhou

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	:	Guangdong Sinmar Electronic Science and Technology Co.,Ltd
Address	:	302, No.8, Changsha Road, Dalong Street, Panyu District, Guangzhou
Manufacture's name	:	Guangdong Sinmar Electronic Science and Technology Co.,Ltd
Address	:	302, No.8, Changsha Road, Dalong Street, Panyu District, Guangzhou
Product name	:	industrial pc, panel pc, industrial all in one pc, touch screen monitor
Model name	:	SIN-M01
Series model	:	SIN-M02, SIN-M03, SIN-M04, SIN-M05, SIN-M06, SINM07, SIN-M08, SIN-M09, SIN-M10, SIN-M1X, SIN-M2X, SIN-M3X, SINM4X, SIN-M5X, SIN-M6X, SIN-M7X, SIN-M8X, SIN-M9X
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013
Test Date	:	Jan. 26, 2024 to Mar. 15, 2024
Date of Issue	:	Apr. 23, 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.
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Test Engineer:

Jack zhou / Engineer

Technical Manager:

Simon Pu / Manager

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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	:	industrial pc, panel pc, industrial all in one pc , touch screen monitor
Model Name	:	SIN-M01
Additional model	:	SIN-M02, SIN-M03, SIN-M04, SIN-M05, SIN-M06, SINM07, SIN-M08, SIN-M09, SIN-M10, SIN-M1X, SIN-M2X, SIN-M3X, SINM4X, SIN-M5X, SIN-M6X, SIN-M7X, SIN-M8X, SIN-M9X
Model difference	:	Different 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	:	FPC Antenna
Antenna Gain	:	5.58 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	:	Input: DC 12V-3A
Test Power Supply	:	Adapter:DJ-120300-SA Input: AC100-240V 50/60Hz 0.8A Max. Output: DC 12V 3A
Hardware Version	:	V1.1
Software Version	:	V11.2.20240109.123418-wxl.userdebug
Test sample No.	:	PTC24010802601E-1/2, PTC24010802601E-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	Last Calibration	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
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.
N/A	N/A	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

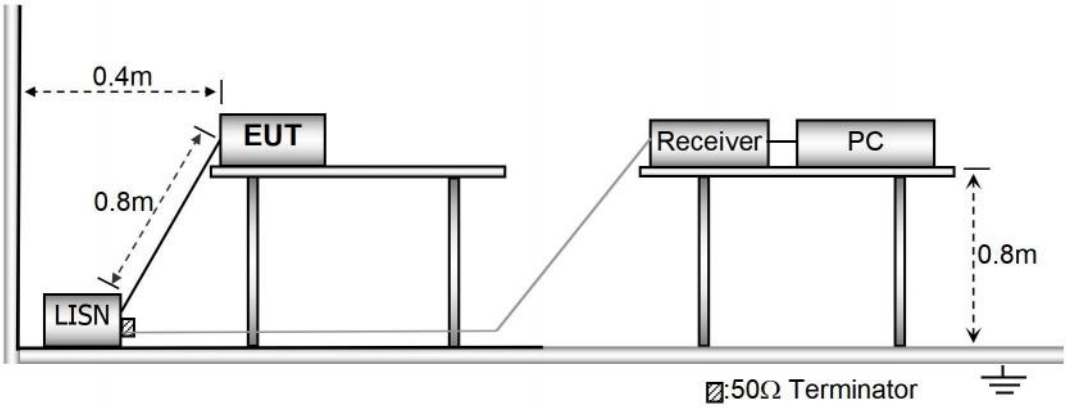
5.1E.U.T. Operation

Operating Environment :

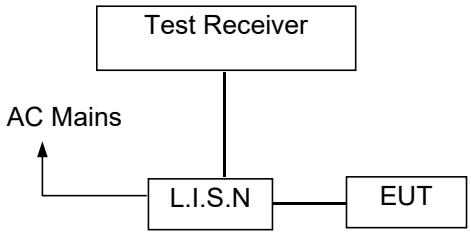
Temperature	:	23.9 °C
Humidity	:	51.4 % RH
Atmospheric Pressure	:	101.21kPa

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.

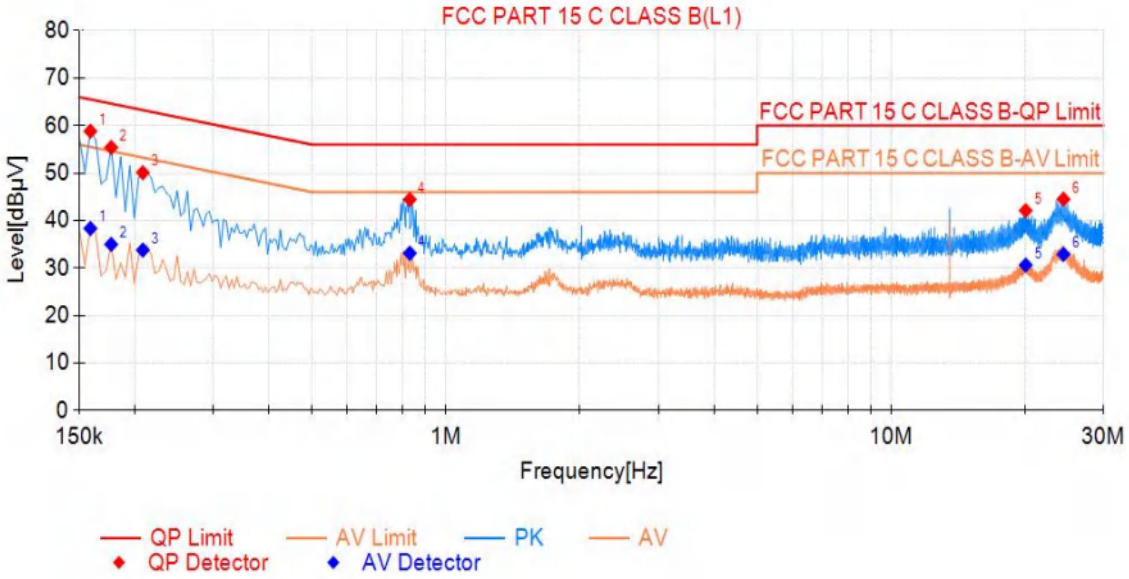
5.7Conducted Emission Test Result

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.

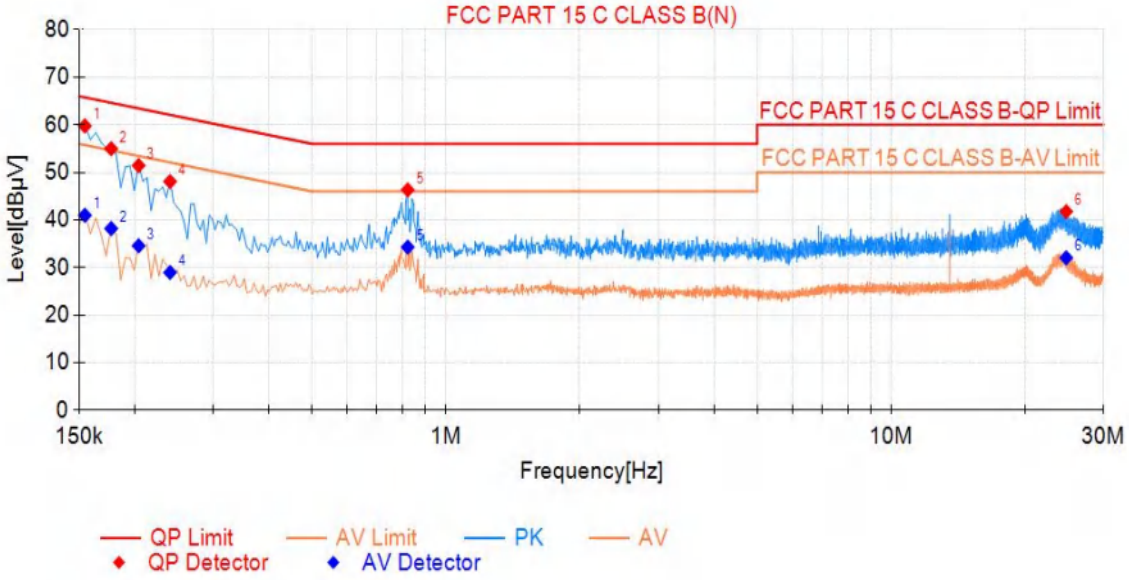
Please refer to the following pages.

Line- AC 120V/60Hz



Final Data List								
NO.	Freq. [MHz]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.159	58.82	65.52	6.70	38.35	55.52	17.17	PASS
2	0.177	55.40	64.63	9.23	35.01	54.63	19.62	PASS
3	0.209	50.10	63.26	13.16	33.79	53.26	19.47	PASS
4	0.830	44.46	56.00	11.54	33.13	46.00	12.87	PASS
5	20.058	42.11	60.00	17.89	30.64	50.00	19.36	PASS
6	24.378	44.51	60.00	15.49	32.91	50.00	17.09	PASS

Neutral-AC 120V/60Hz



Final Data List								
NO.	Freq. [MHz]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.155	59.77	65.75	5.98	40.99	55.75	14.76	PASS
2	0.177	54.99	64.63	9.64	38.20	54.63	16.43	PASS
3	0.204	51.44	63.45	12.01	34.59	53.45	18.86	PASS
4	0.240	48.08	62.10	14.02	28.97	52.10	23.13	PASS
5	0.821	46.34	56.00	9.66	34.30	46.00	11.70	PASS
6	24.729	41.76	60.00	18.24	32.06	50.00	17.94	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

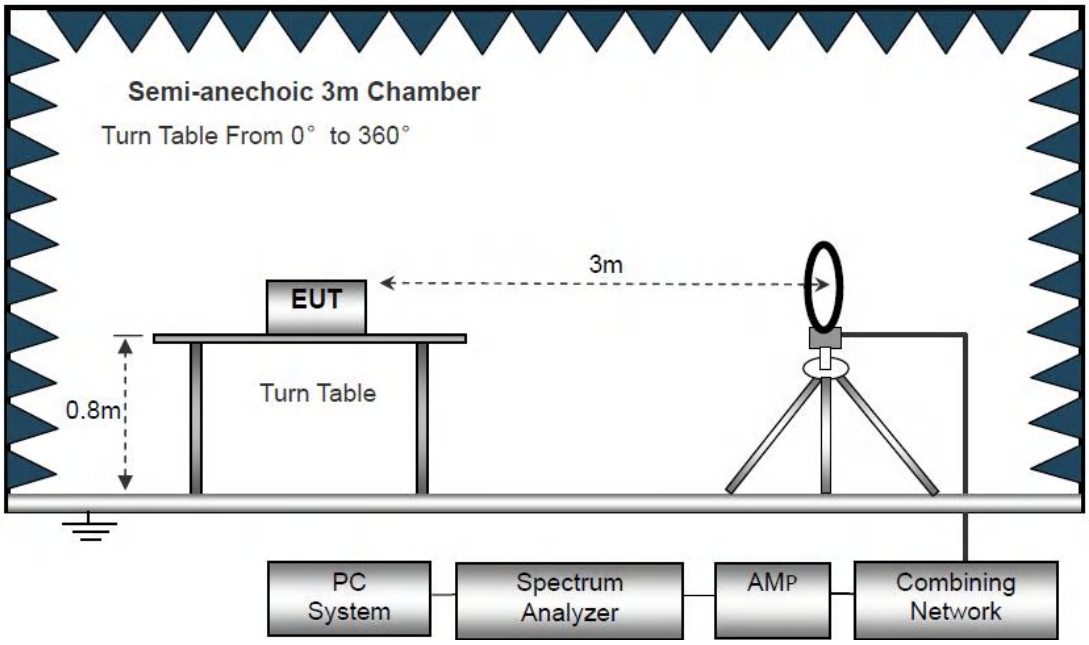
Atmospheric Pressure: : 101.3kPa

Test Voltage : AC 120V 60Hz

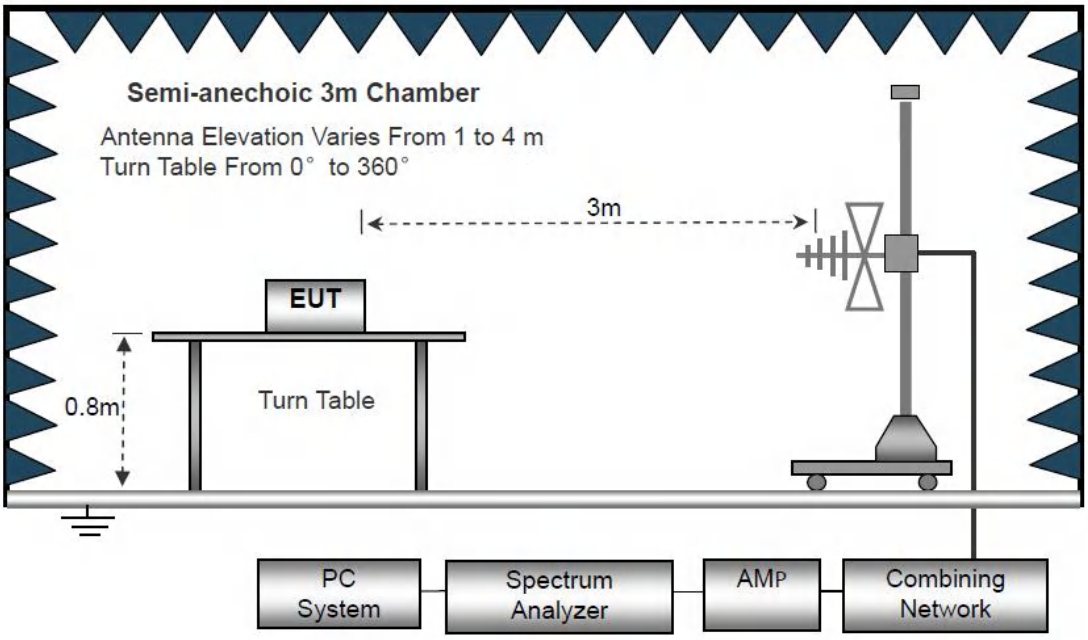
6.2Test Setup

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

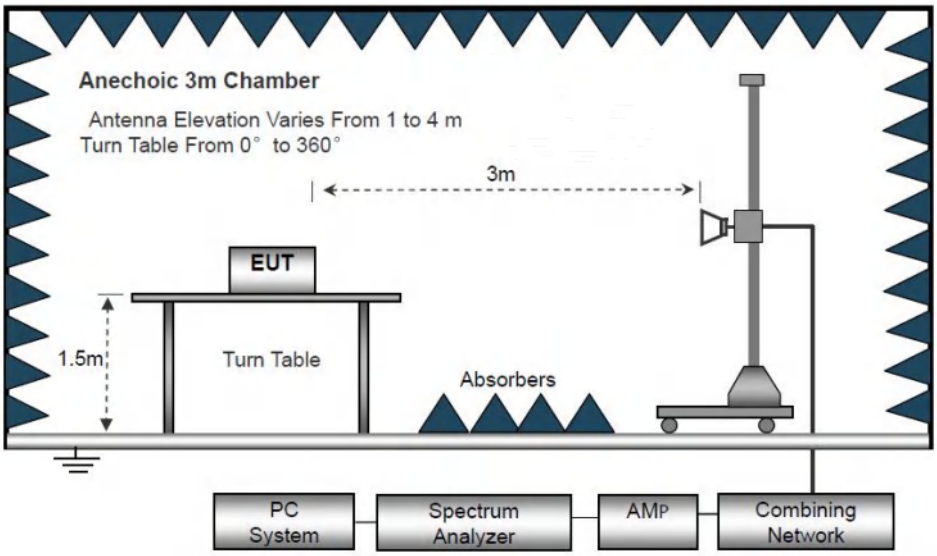
The test setup for emission measurement below 30MHz



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.

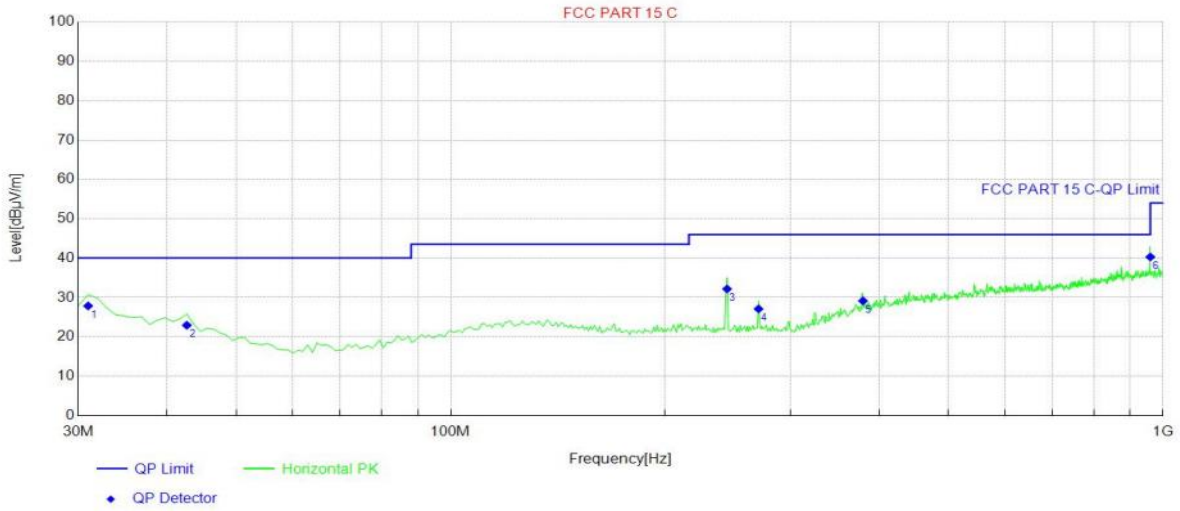
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

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:

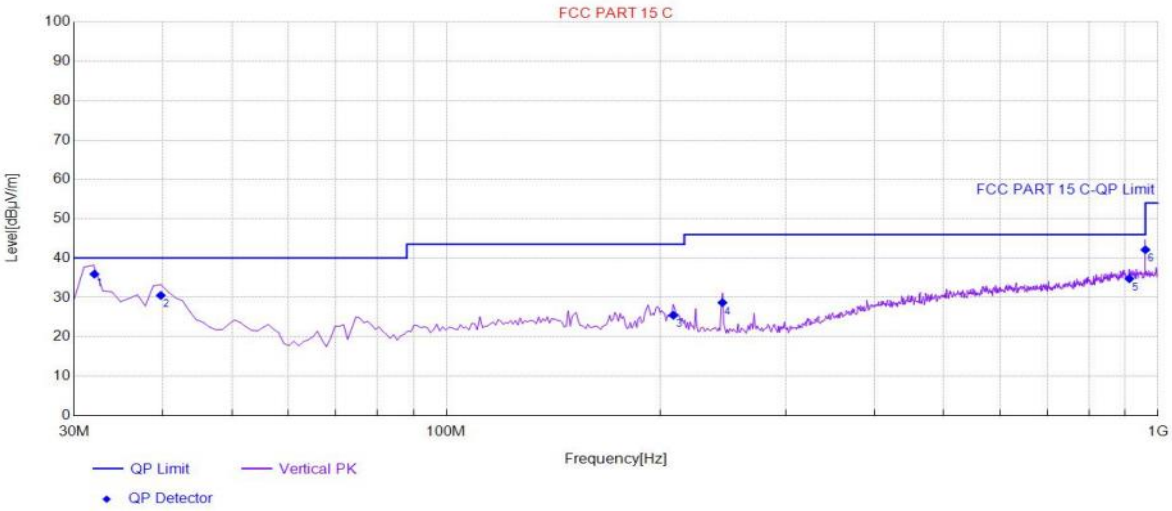
Antenna Polarization: Horizontal



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	30.97	41.46	-13.61	27.85	40.00	12.15	Horizontal	PASS
2	42.61	42.02	-19.09	22.93	40.00	17.07	Horizontal	PASS
3	244.37	51.30	-19.14	32.16	46.00	13.84	Horizontal	PASS
4	270.56	46.03	-18.94	27.09	46.00	18.91	Horizontal	PASS
5	379.20	43.30	-14.18	29.12	46.00	16.88	Horizontal	PASS
6	960.23	45.56	-5.27	40.29	54.00	13.71	Horizontal	PASS

Remark:Emission Level=Reading+Cable Loss+ANT Factor-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	32.03	49.99	-14.07	35.92	40.00	4.08	Vertical	PASS
2	39.70	48.35	-17.84	30.51	40.00	9.49	Vertical	PASS
3	208.48	44.72	-19.26	25.46	43.50	18.04	Vertical	PASS
4	244.37	47.81	-19.14	28.67	46.00	17.33	Vertical	PASS
5	911.73	40.29	-5.54	34.75	46.00	11.25	Vertical	PASS
6	960.23	47.39	-5.27	42.12	54.00	11.88	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	46.97	32.35	4.12	28.44	55.00	74	-19.00	V
7236	38.07	36.08	6.3	27.74	52.71	74	-21.29	V
9648	35.25	38.25	7.91	24.65	56.76	74	-17.24	V
4824	43.19	32.35	4.12	28.44	51.22	74	-22.78	H
7236	38.40	36.08	6.3	27.74	53.04	74	-20.96	H
9648	34.73	38.25	7.91	24.65	56.24	74	-17.76	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	31.53	32.35	4.12	28.44	39.56	54	-14.44	V
7236	23.27	36.08	6.3	27.74	37.91	54	-16.09	V
9648	21.24	38.25	7.91	24.65	42.75	54	-11.25	V
4824	31.20	32.35	4.12	28.44	39.23	54	-14.77	H
7236	25.42	36.08	6.3	27.74	40.06	54	-13.94	H
9648	21.50	38.25	7.91	24.65	43.01	54	-10.99	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	45.54	32.35	4.12	28.44	53.57	74	-20.43	V
7311	38.23	36.08	6.3	27.74	52.87	74	-21.13	V
9748	35.19	38.25	7.91	24.65	56.70	74	-17.30	V
4874	43.56	32.35	4.12	28.44	51.59	74	-22.41	H
7311	37.87	36.08	6.3	27.74	52.51	74	-21.49	H
9748	33.69	38.25	7.91	24.65	55.20	74	-18.80	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	30.48	32.35	4.12	28.44	38.51	54	-15.49	V
7311	23.54	36.08	6.3	27.74	38.18	54	-15.82	V
9748	20.33	38.25	7.91	24.65	41.84	54	-12.16	V
4874	31.15	32.35	4.12	28.44	39.18	54	-14.82	H
7311	24.72	36.08	6.3	27.74	39.36	54	-14.64	H
9748	20.85	38.25	7.91	24.65	42.36	54	-11.64	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	45.91	32.41	4.14	28.42	54.04	74	-19.96	V
7386	38.73	36.15	6.36	27.68	53.56	74	-20.44	V
9848	35.36	38.35	7.97	24.33	57.35	74	-16.65	V
4924	43.37	32.41	4.14	28.42	51.50	74	-22.50	H
7386	38.21	36.15	6.36	27.68	53.04	74	-20.96	H
9848	35.19	38.35	7.97	24.33	57.18	74	-16.82	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	31.29	32.41	4.14	28.42	39.42	54	-14.58	V
7386	23.59	36.15	6.36	27.68	38.42	54	-15.58	V
9848	20.54	38.35	7.97	24.33	42.53	54	-11.47	V
4924	30.79	32.41	4.14	28.42	38.92	54	-15.08	H
7386	24.76	36.15	6.36	27.68	39.59	54	-14.41	H
9848	21.84	38.35	7.97	24.33	43.83	54	-10.17	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	47.96	27.39	2.77	34.01	44.11	74	-29.89	H	Peak
2400	60.26	27.42	2.78	34.01	56.45	74	-17.55	H	
2390	47.66	27.39	2.77	34.01	43.81	74	-30.19	V	
2400	55.06	27.42	2.78	34.01	51.25	74	-22.75	V	
2390	40.99	27.39	2.77	34.01	37.14	54	-16.86	H	Average
2400	43.82	27.42	2.78	34.01	40.01	54	-13.99	H	
2390	39.22	27.39	2.77	34.01	35.37	54	-18.63	V	
2400	44.06	27.42	2.78	34.01	40.25	54	-13.75	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	60.26	27.39	2.77	34.01	56.41	74	-17.59	H	Peak
2500	49.53	27.42	2.78	34.01	45.72	74	-28.28	H	
2483.5	59.31	27.39	2.77	34.01	55.46	74	-18.54	V	
2500	49.14	27.42	2.78	34.01	45.33	74	-28.67	V	
2483.5	41.19	27.39	2.77	34.01	37.34	54	-16.66	H	Average
2500	39.98	27.42	2.78	34.01	36.17	54	-17.83	H	
2483.5	43.47	27.39	2.77	34.01	39.62	54	-14.38	V	
2500	40.49	27.42	2.78	34.01	36.68	54	-17.32	V	

Test Frequency: From 18GHz to 25GHz

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

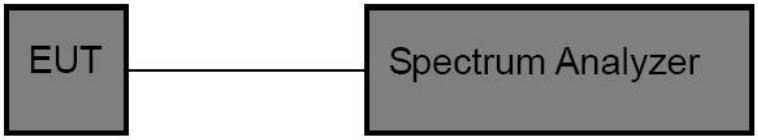
7 Conducted Spurious Emission

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



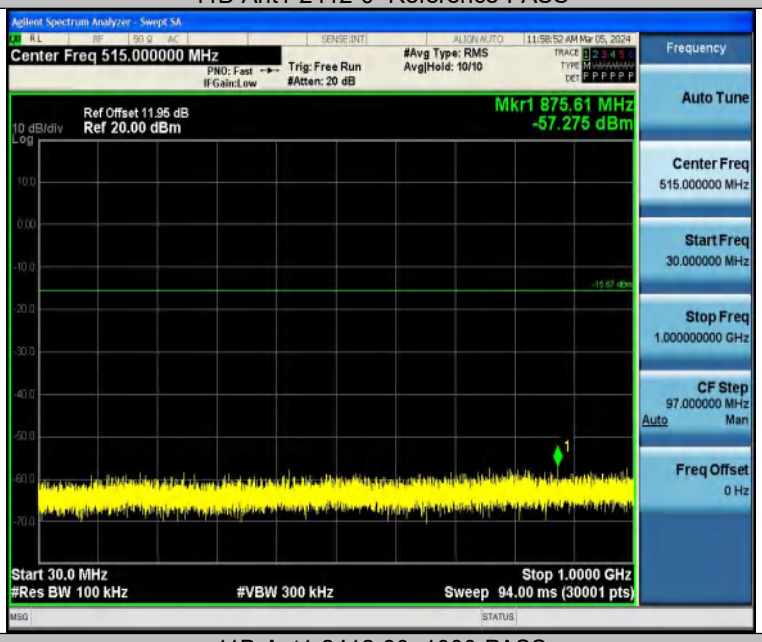
7.3Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	0~Reference	4.33	4.33	---	PASS
11B	Ant1	2412	30~1000	4.33	-57.28	≤-15.67	PASS
11B	Ant1	2412	1000~26500	4.33	-42.18	≤-15.67	PASS
11B	Ant1	2437	0~Reference	4.96	4.96	---	PASS
11B	Ant1	2437	30~1000	4.96	-57.02	≤-15.04	PASS
11B	Ant1	2437	1000~26500	4.96	-42.14	≤-15.04	PASS
11B	Ant1	2462	0~Reference	6.01	6.01	---	PASS
11B	Ant1	2462	30~1000	6.01	-57.51	≤-13.99	PASS
11B	Ant1	2462	1000~26500	6.01	-41.83	≤-13.99	PASS
11G	Ant1	2412	0~Reference	0.11	0.11	---	PASS
11G	Ant1	2412	30~1000	0.11	-57.38	≤-19.89	PASS
11G	Ant1	2412	1000~26500	0.11	-41.86	≤-19.89	PASS
11G	Ant1	2437	0~Reference	-0.10	-0.10	---	PASS
11G	Ant1	2437	30~1000	-0.10	-58.6	≤-20.1	PASS
11G	Ant1	2437	1000~26500	-0.10	-41.76	≤-20.1	PASS
11G	Ant1	2462	0~Reference	0.23	0.23	---	PASS
11G	Ant1	2462	30~1000	0.23	-58.5	≤-19.77	PASS

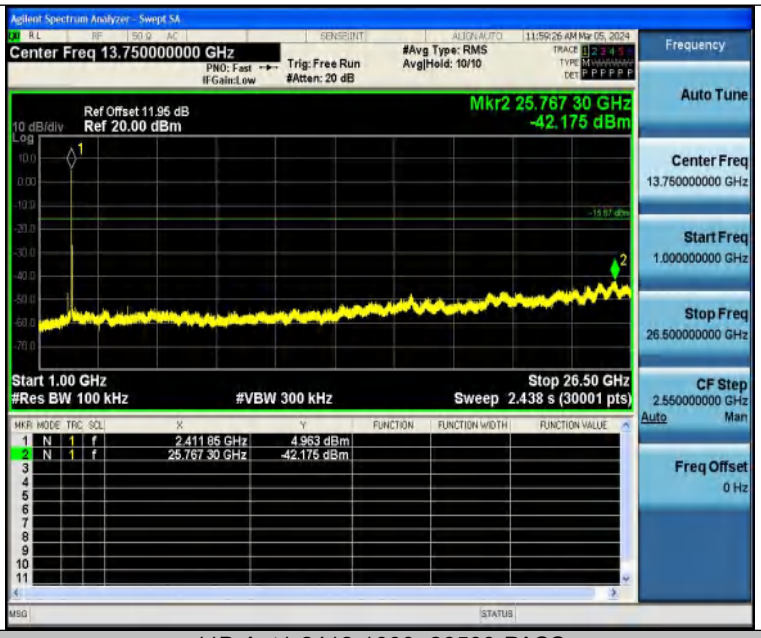
11G	Ant1	2462	1000~26500	0.23	-41.41	≤-19.77	PASS
11N20SISO	Ant1	2412	0~Reference	1.44	1.44	---	PASS
11N20SISO	Ant1	2412	30~1000	1.44	-57.11	≤-18.56	PASS
11N20SISO	Ant1	2412	1000~26500	1.44	-41.43	≤-18.56	PASS
11N20SISO	Ant1	2437	0~Reference	1.03	1.03	---	PASS
11N20SISO	Ant1	2437	30~1000	1.03	-57.89	≤-18.97	PASS
11N20SISO	Ant1	2437	1000~26500	1.03	-41.8	≤-18.97	PASS
11N20SISO	Ant1	2462	0~Reference	-2.16	-2.16	---	PASS
11N20SISO	Ant1	2462	30~1000	-2.16	-58.06	≤-22.16	PASS
11N20SISO	Ant1	2462	1000~26500	-2.16	-39.63	≤-22.16	PASS
11N40SISO	Ant1	2422	0~Reference	-4.84	-4.84	---	PASS
11N40SISO	Ant1	2422	30~1000	-4.84	-52.49	≤-24.84	PASS
11N40SISO	Ant1	2422	1000~26500	-4.84	-41.73	≤-24.84	PASS
11N40SISO	Ant1	2437	0~Reference	-4.37	-4.37	---	PASS
11N40SISO	Ant1	2437	30~1000	-4.37	-58.27	≤-24.37	PASS
11N40SISO	Ant1	2437	1000~26500	-4.37	-41.19	≤-24.37	PASS
11N40SISO	Ant1	2452	0~Reference	-4.12	-4.12	---	PASS
11N40SISO	Ant1	2452	30~1000	-4.12	-58.29	≤-24.12	PASS
11N40SISO	Ant1	2452	1000~26500	-4.12	-41.51	≤-24.12	PASS

Test Graphs:

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

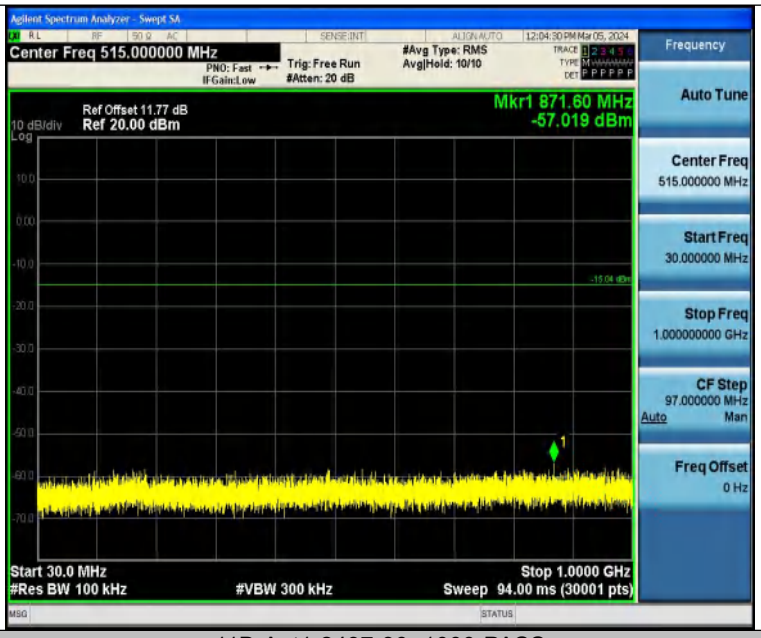


11B-Ant1-2412-30~1000-PASS

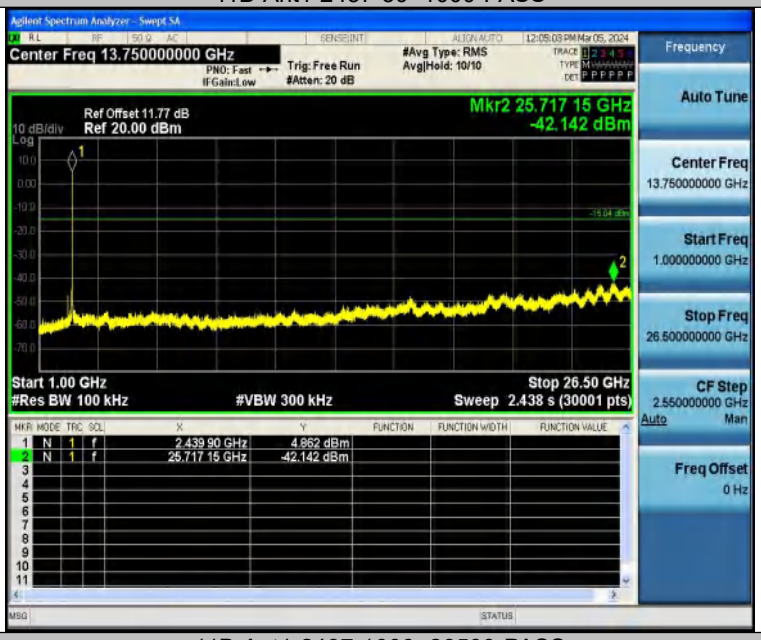


11B-Ant1-2412-1000~26500-PASS

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

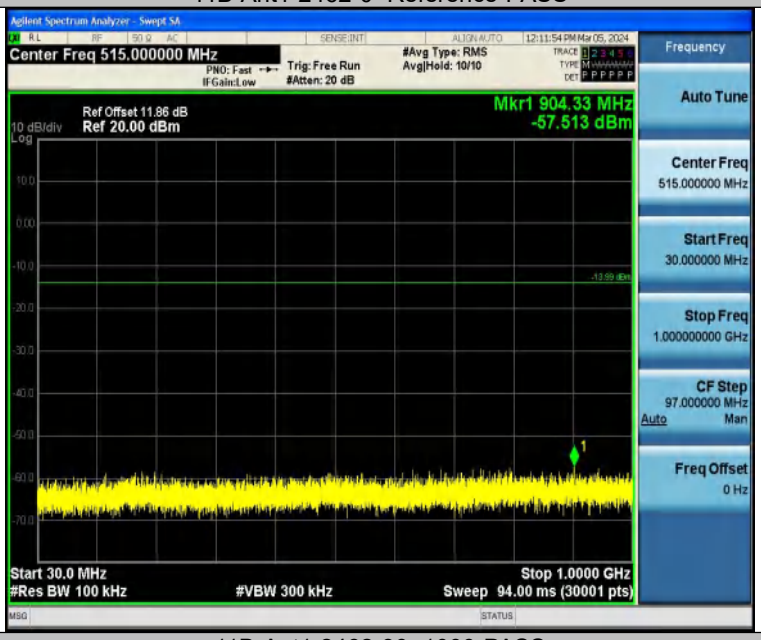


11B-Ant1-2437-30~1000-PASS

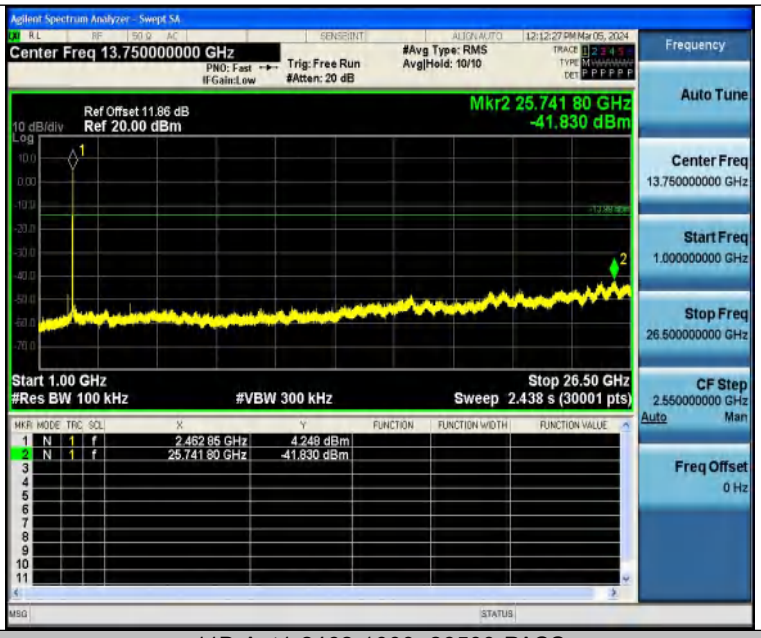


11B-Ant1-2437-1000~26500-PASS

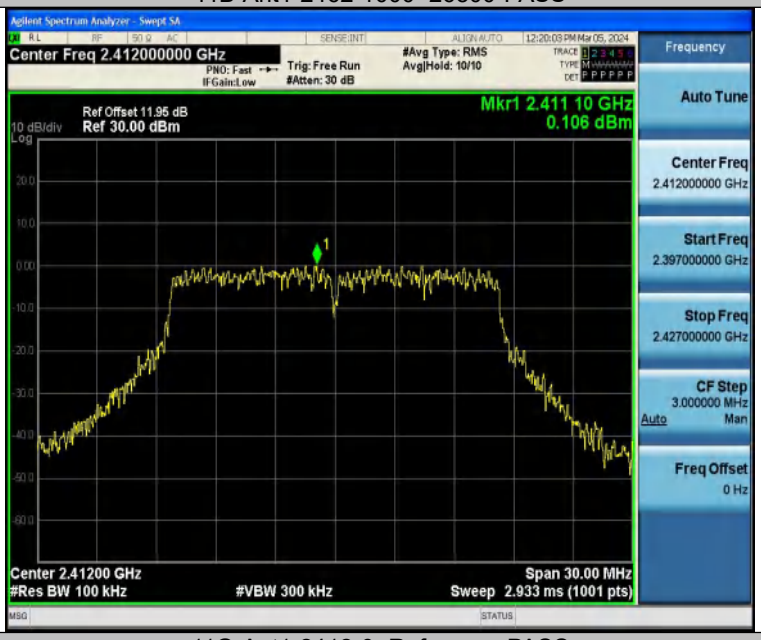
11B-Ant1-2462-0~Reference-PASS



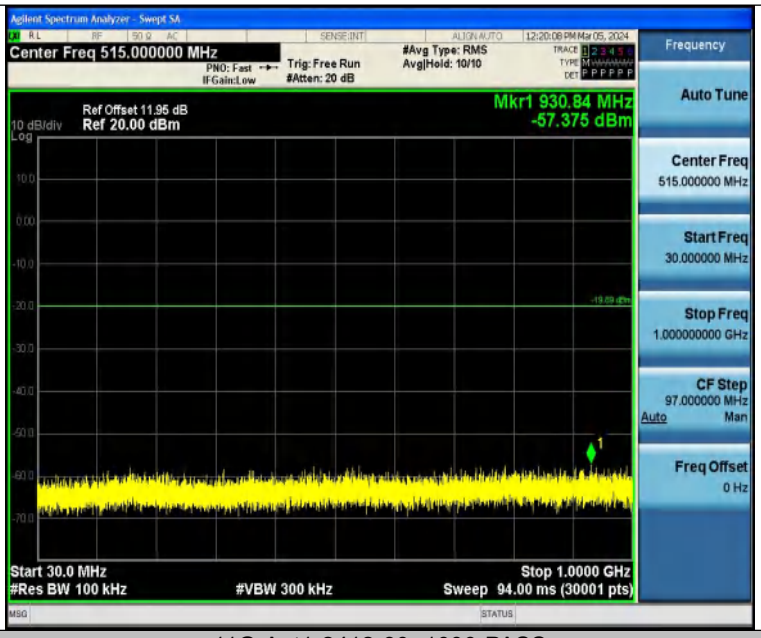
11B-Ant1-2462-30~1000-PASS



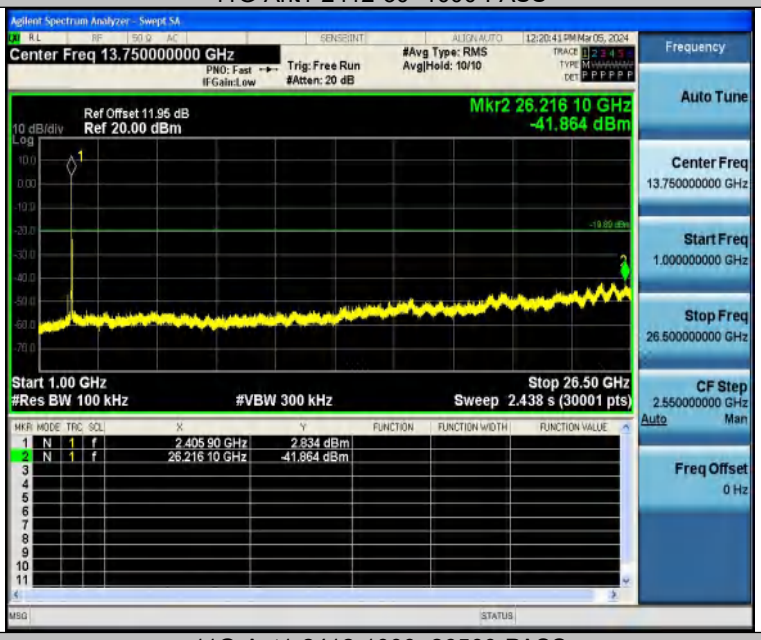
11B-Ant1-2462-1000~26500-PASS



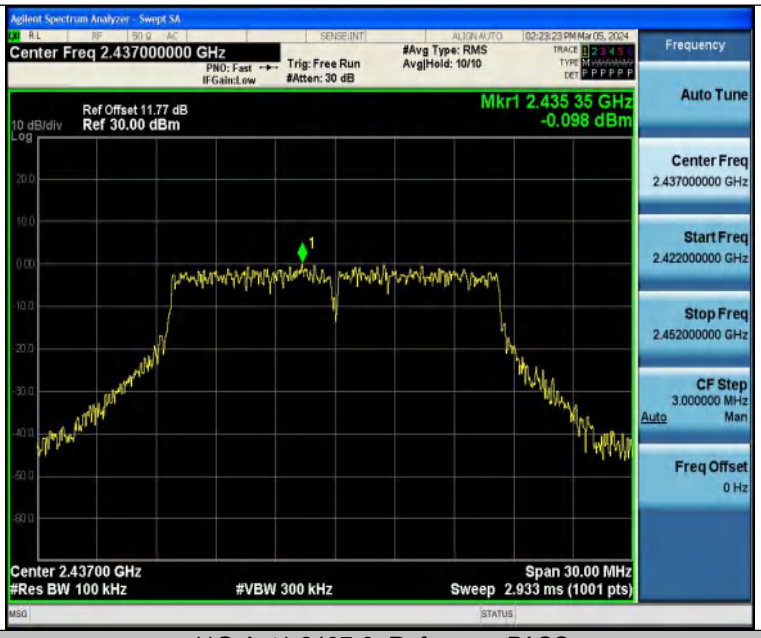
11G-Ant1-2412-0~Reference-PASS



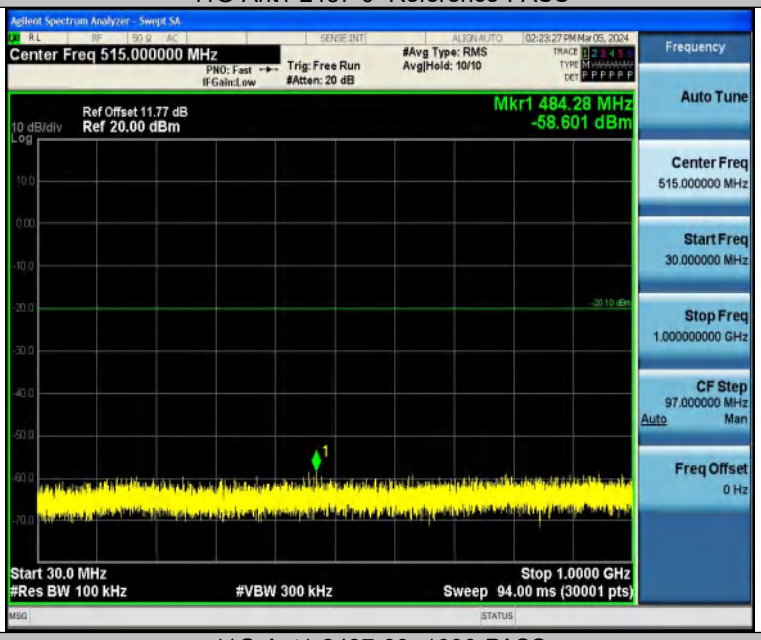
11G-Ant1-2412-30~1000-PASS



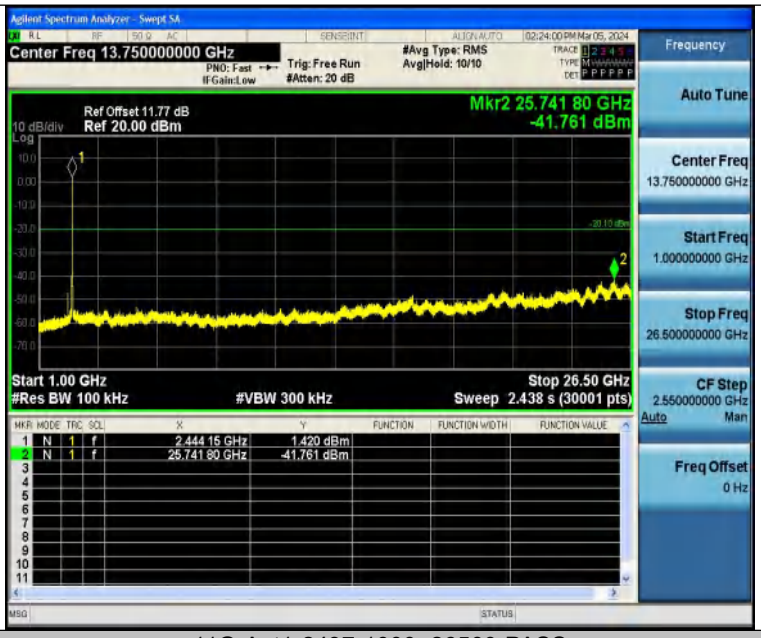
11G-Ant1-2412-1000~26500-PASS



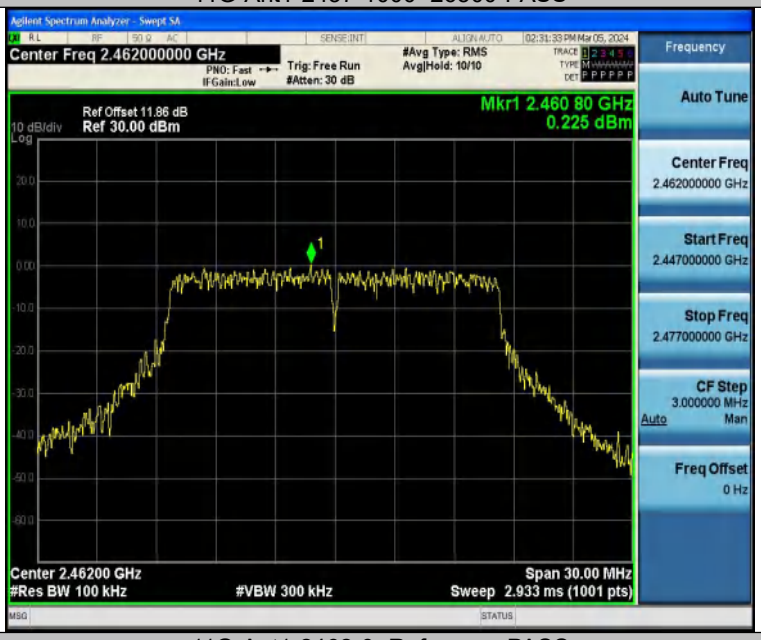
11G-Ant1-2437-0~Reference-PASS



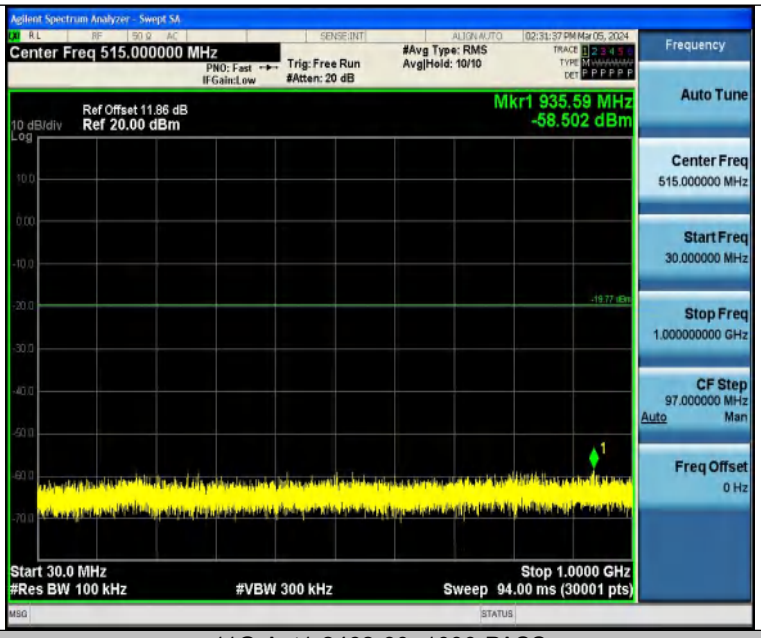
11G-Ant1-2437-30~1000-PASS



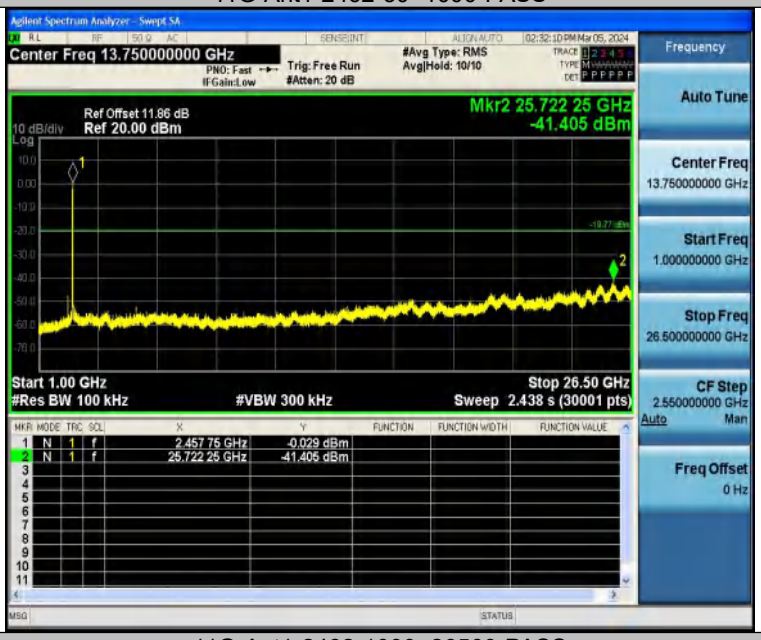
11G-Ant1-2437-1000~26500-PASS



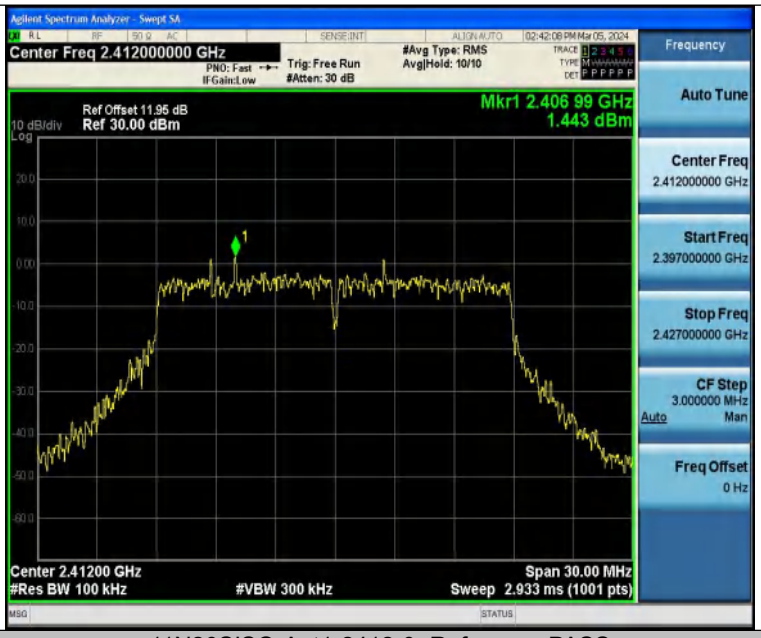
11G-Ant1-2462-0~Reference-PASS



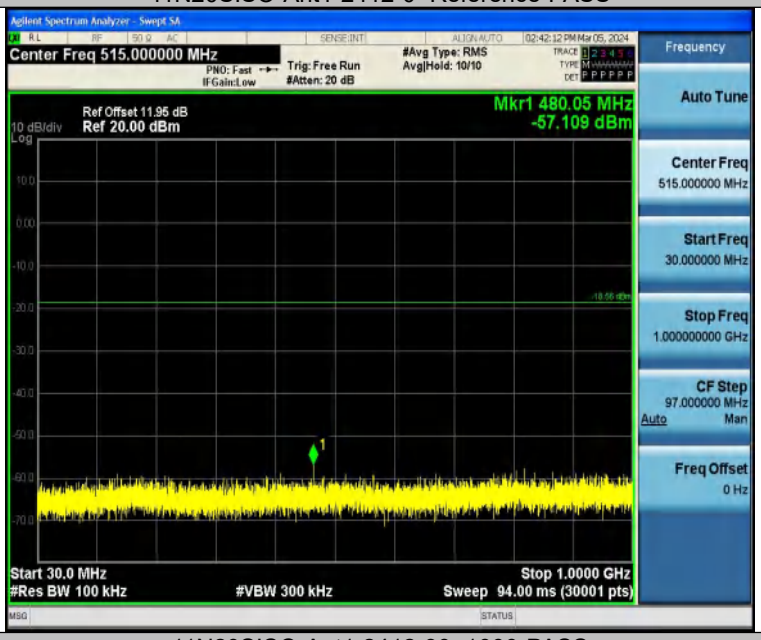
11G-Ant1-2462-30~1000-PASS



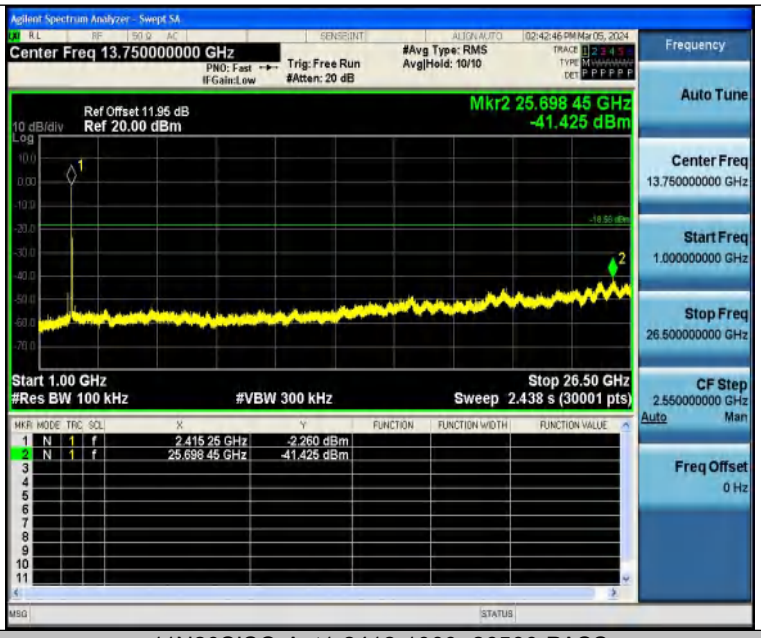
11G-Ant1-2462-1000~26500-PASS



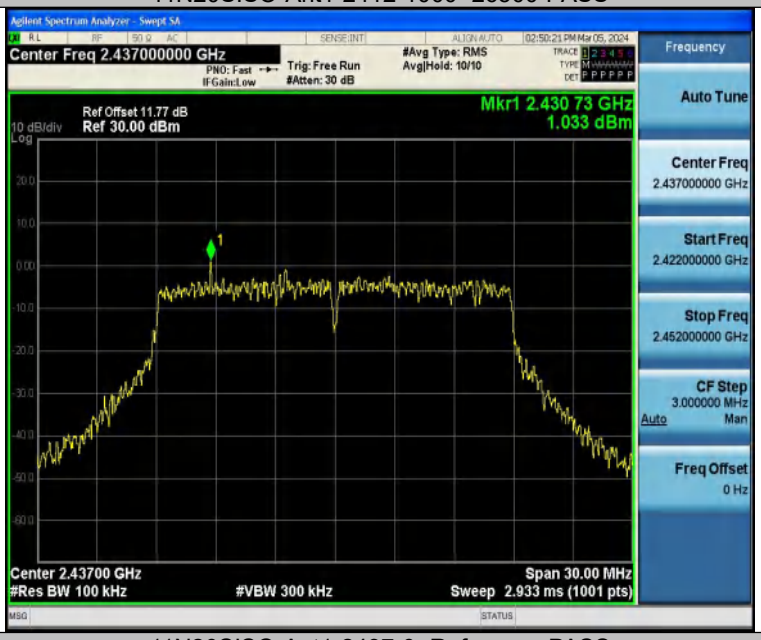
11N20SISO-Ant1-2412-0~Reference-PASS



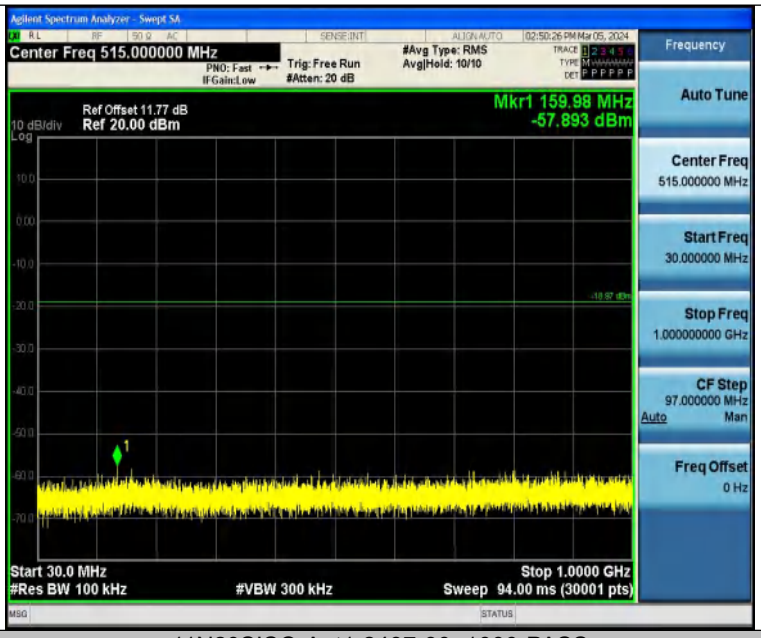
11N20SISO-Ant1-2412-30~1000-PASS



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



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



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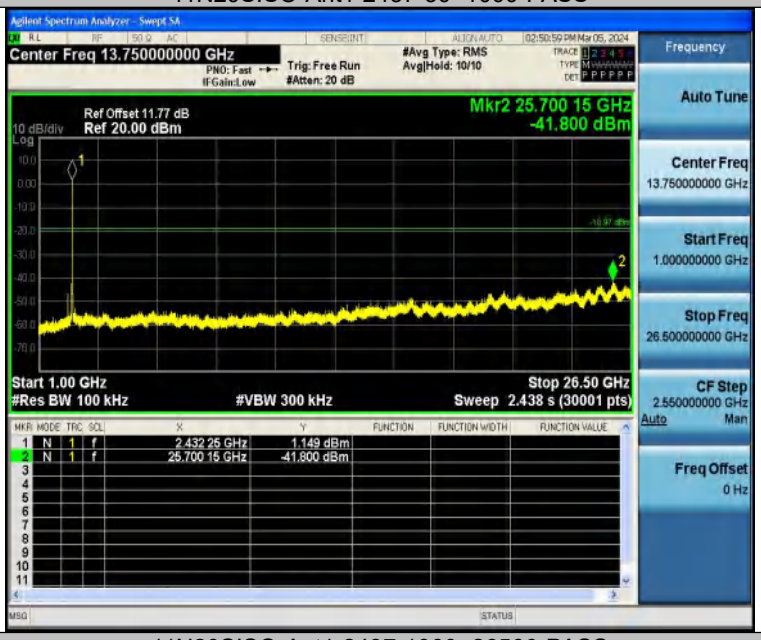

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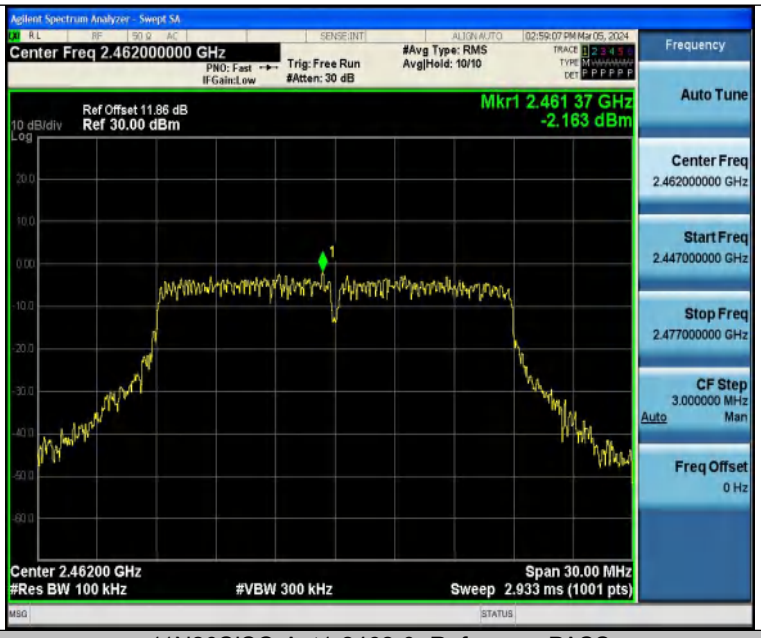
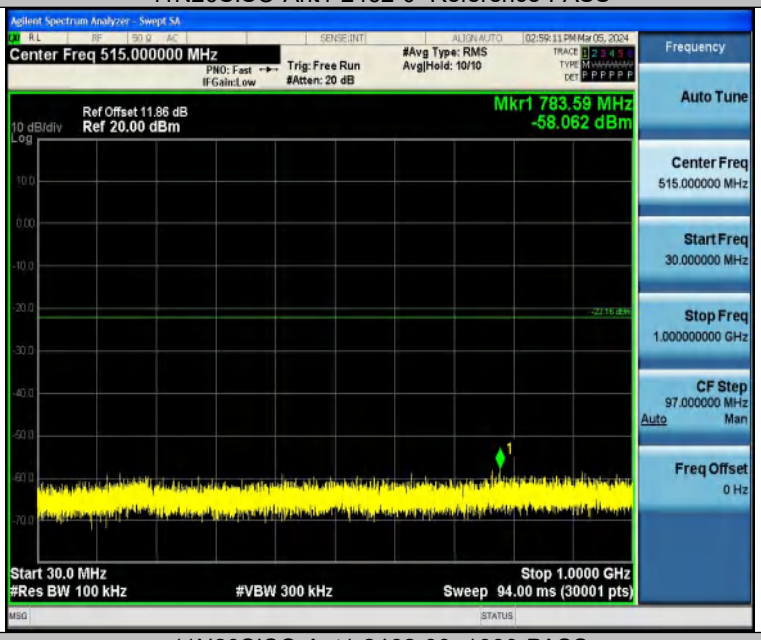
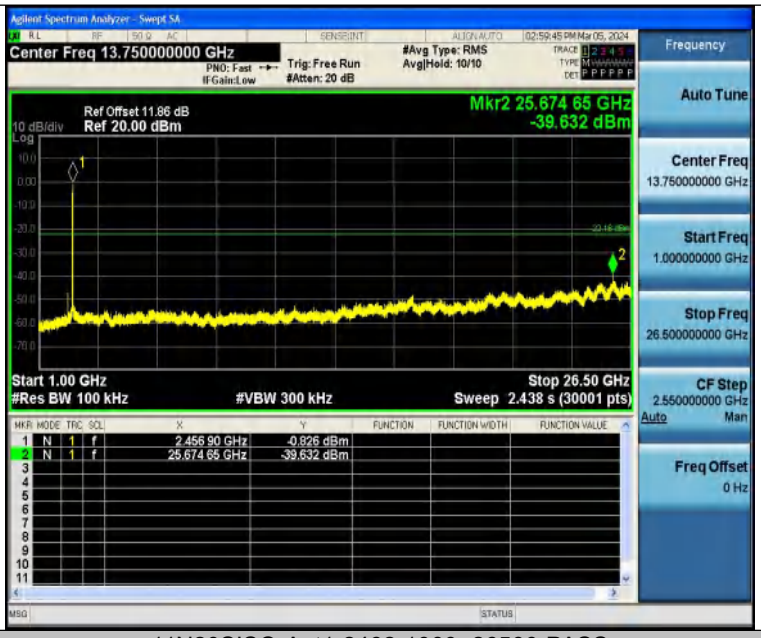


11N20SISO-Ant1-2462-0~Reference-PASS



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



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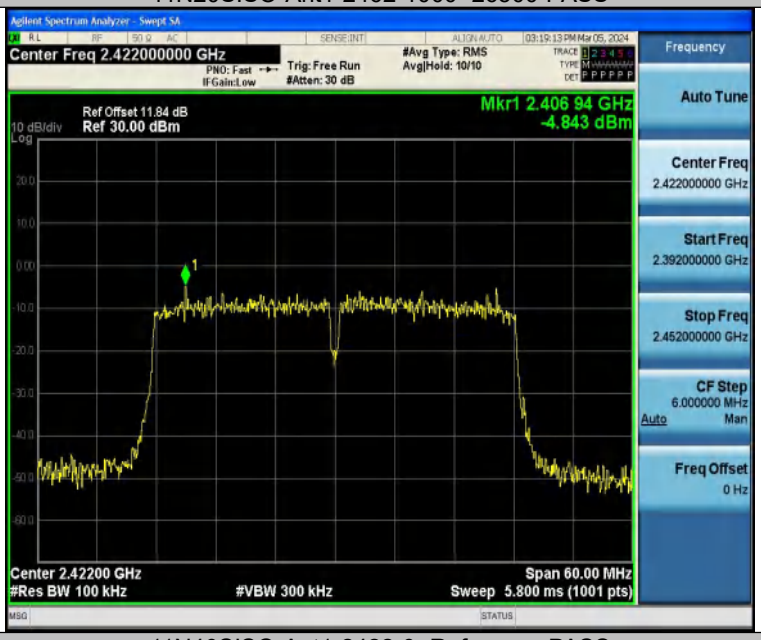
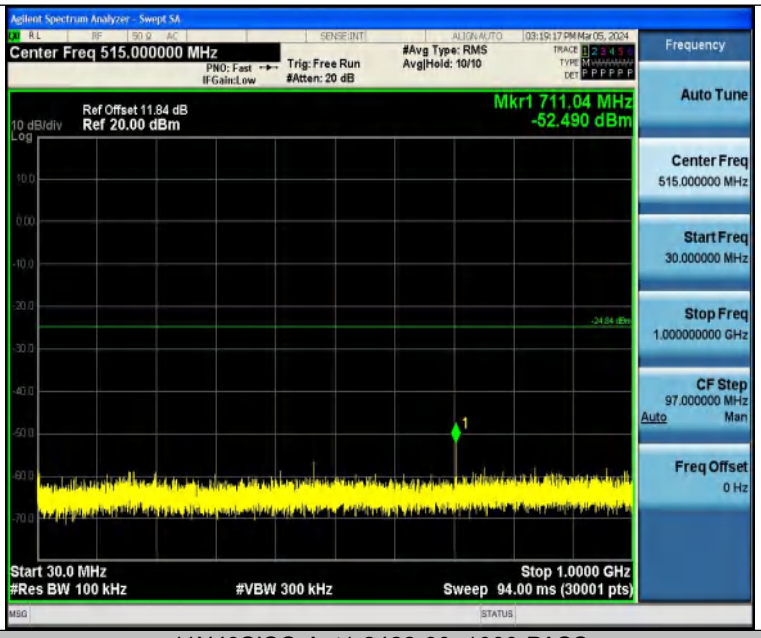
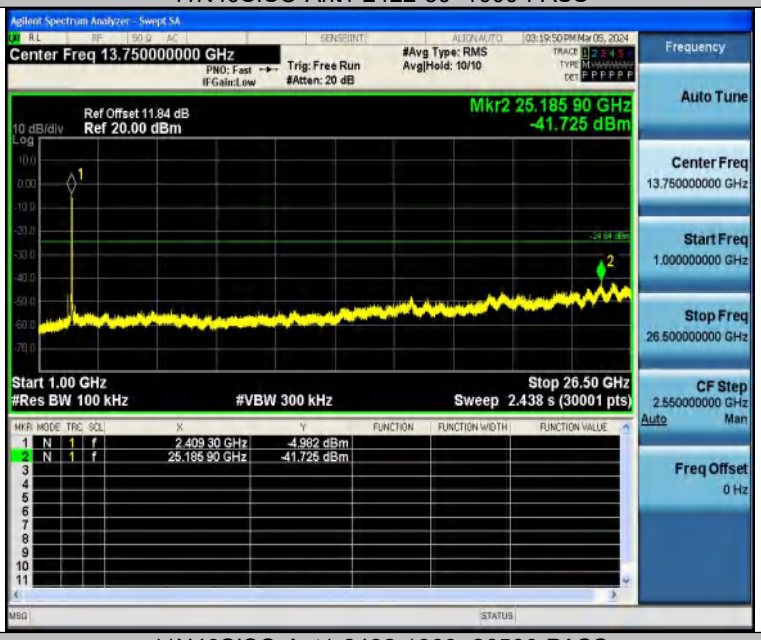


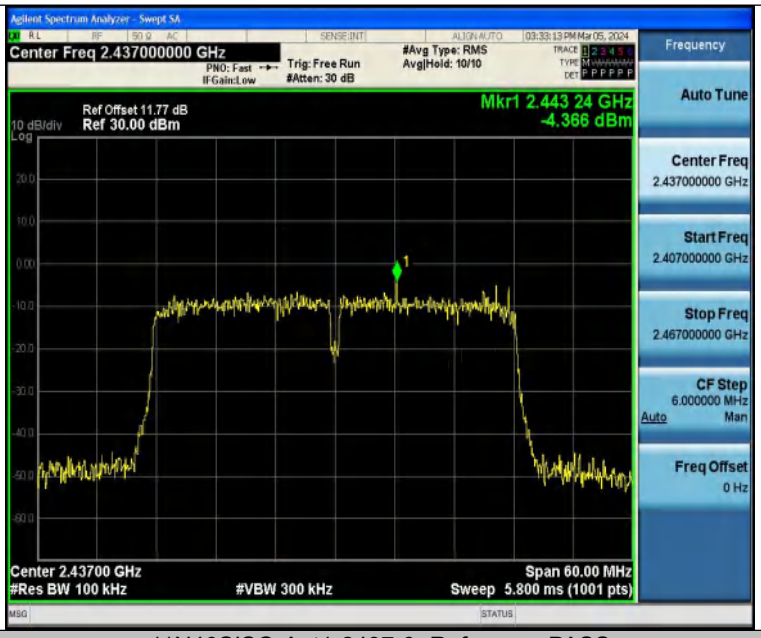
11N40SISO-Ant1-2422-0~Reference-PASS



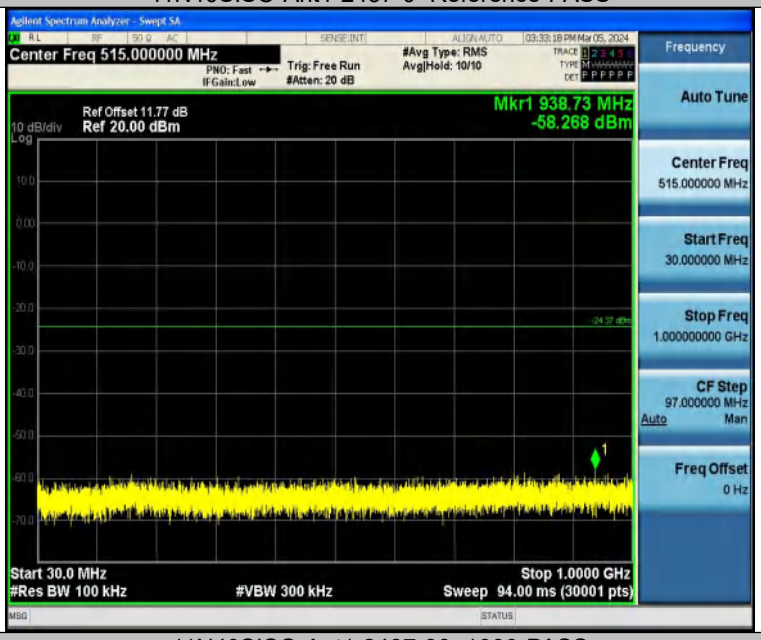
11N40SISO-Ant1-2422-30~1000-PASS



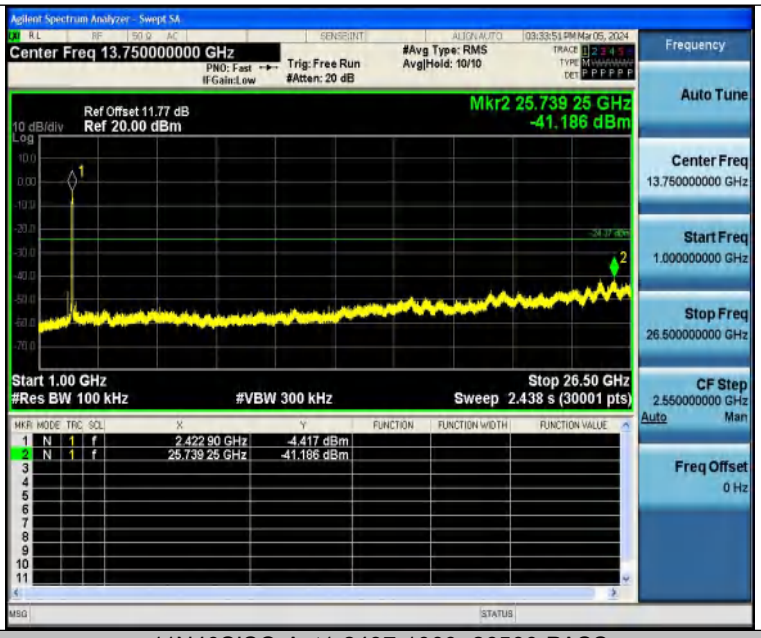
11N40SISO-Ant1-2422-1000~26500-PASS



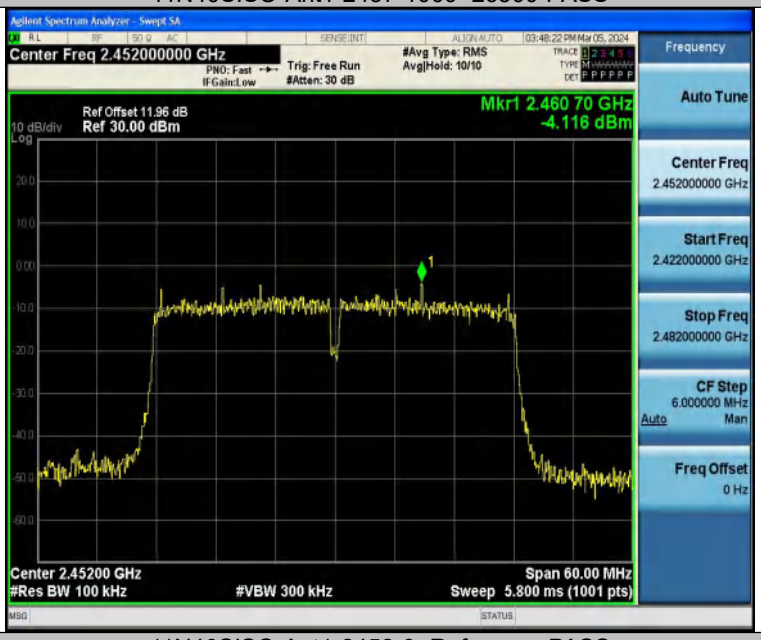
11N40SISO-Ant1-2437-0~Reference-PASS



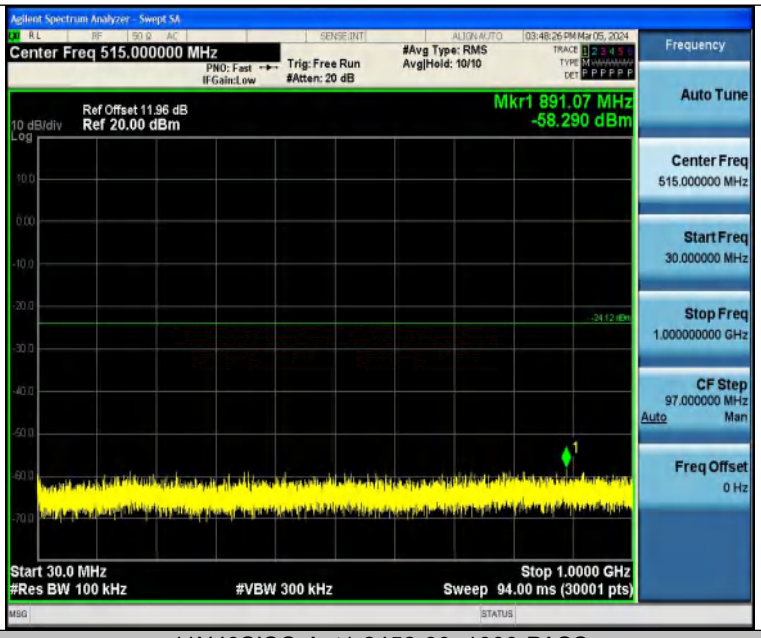
11N40SISO-Ant1-2437-30~1000-PASS



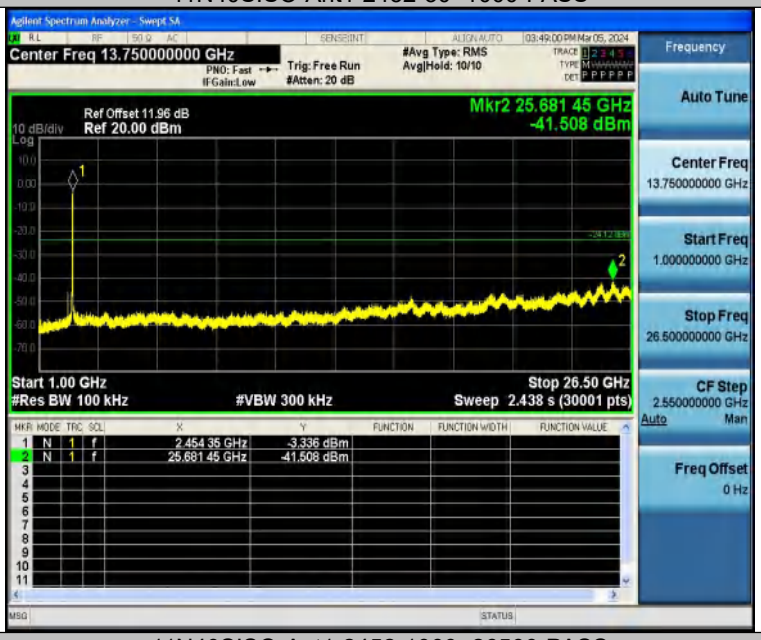
11N40SISO-Ant1-2437-1000~26500-PASS



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



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



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

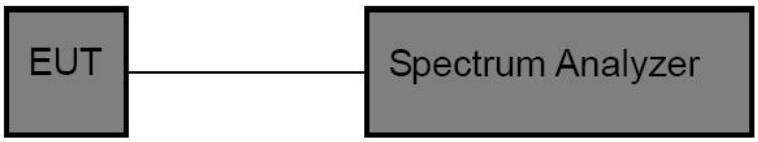
8 Band Edge Measurement

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

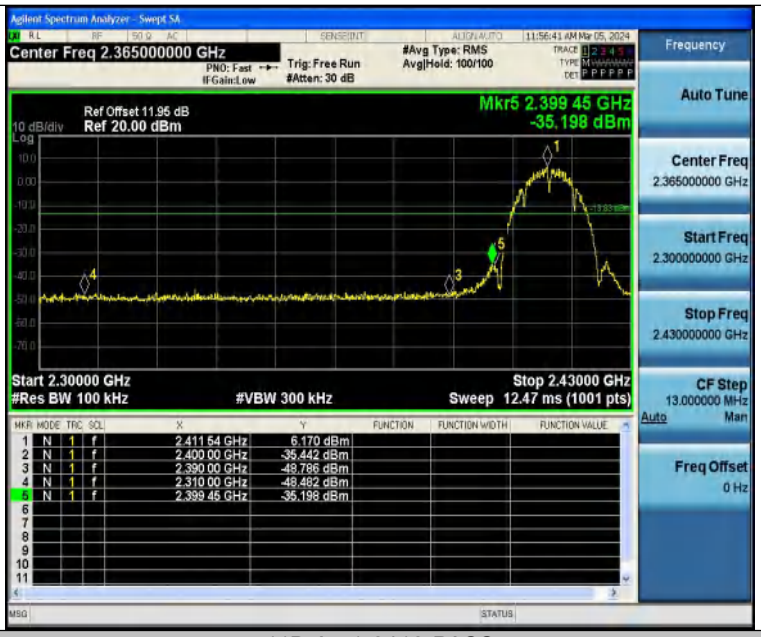
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

8.2Test Setup

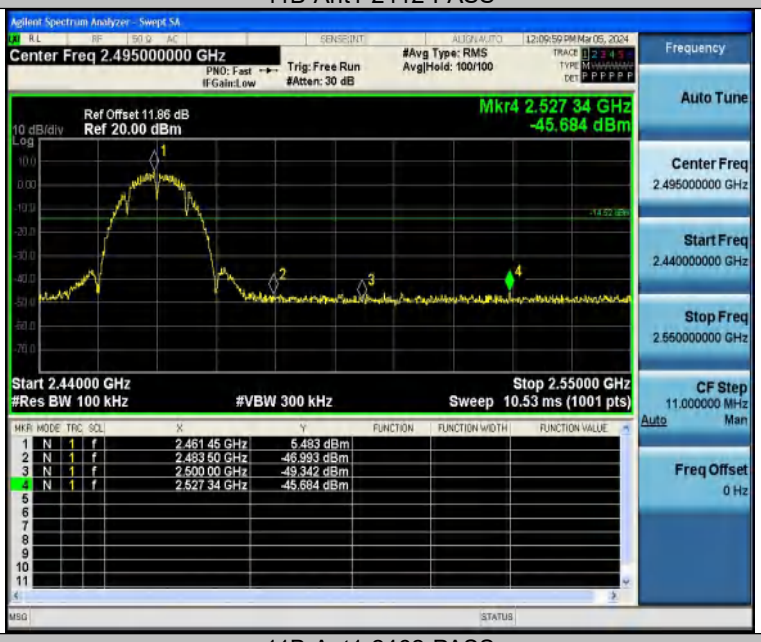


8.3Test Result

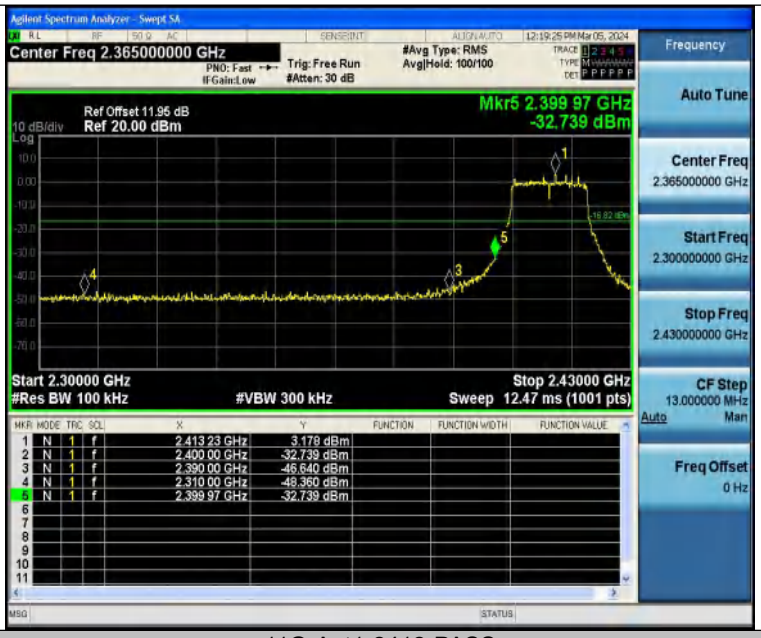
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	6.17	-35.2	≤-13.83	PASS
11B	Ant1	High	2462	5.48	-45.68	≤-14.52	PASS
11G	Ant1	Low	2412	3.18	-32.74	≤-16.82	PASS
11G	Ant1	High	2462	2.67	-45.19	≤-17.33	PASS
11N20SISO	Ant1	Low	2412	3.58	-30.88	≤-16.43	PASS
11N20SISO	Ant1	High	2462	1.05	-45.48	≤-18.95	PASS
11N40SISO	Ant1	Low	2422	-1.25	-39.19	≤-21.25	PASS
11N40SISO	Ant1	High	2452	-3.63	-45.23	≤-23.63	PASS



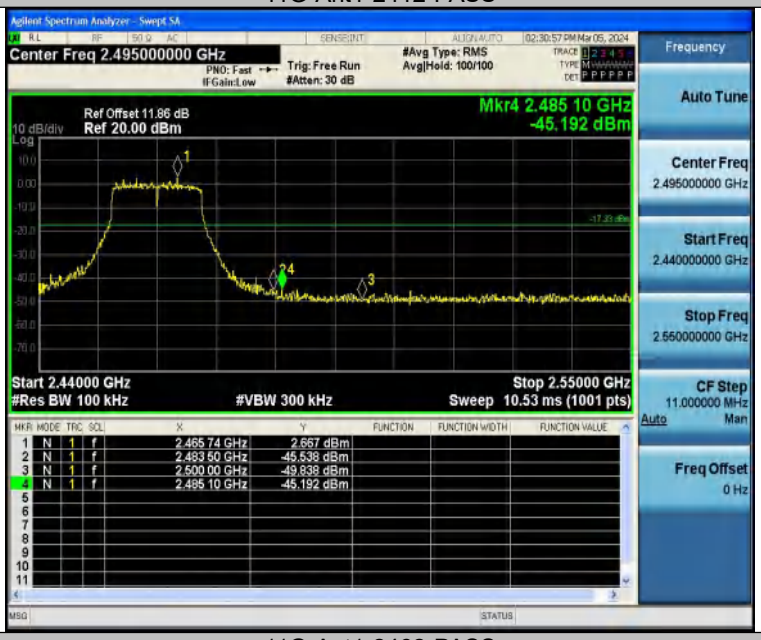
11B-Ant1-2412-PASS



11B-Ant1-2462-PASS

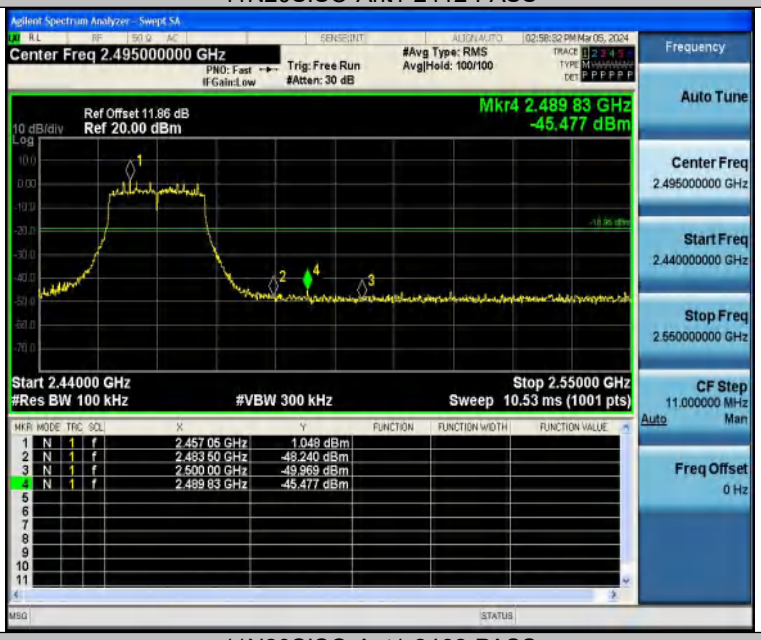


11G-Ant1-2412-PASS



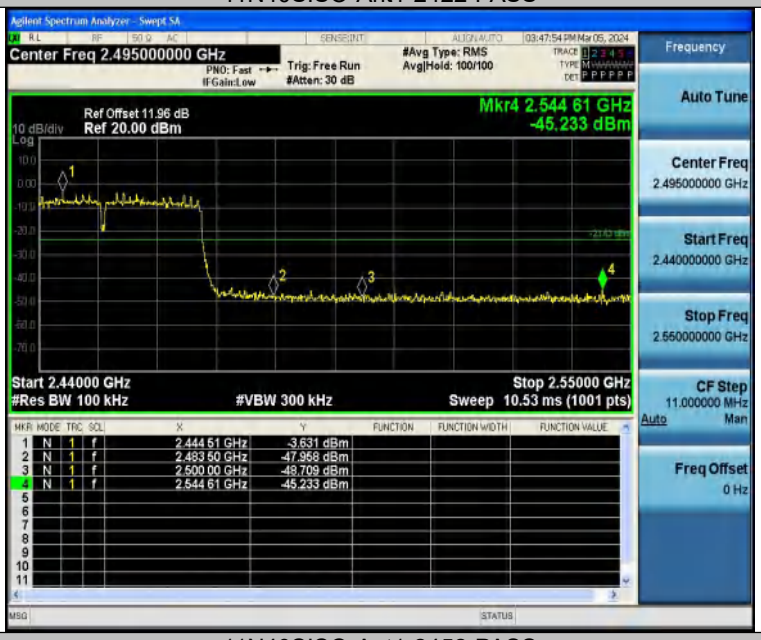
11G-Ant1-2462-PASS

11N20SISO-Ant1-2412-PASS



11N20SISO-Ant1-2462-PASS

11N40SISO-Ant1-2422-PASS



11N40SISO-Ant1-2452-PASS

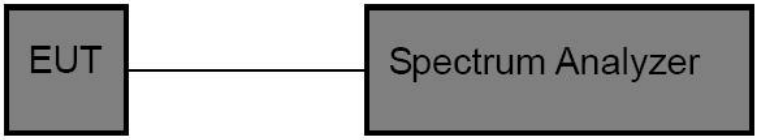
9 6dB Bandwidth Measurement

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

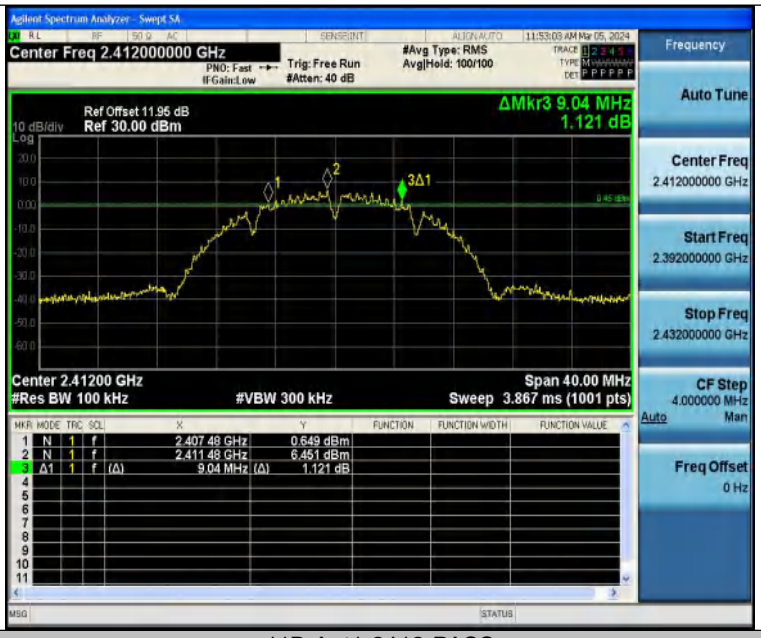
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

9.2Test Setup



9.3Test Result

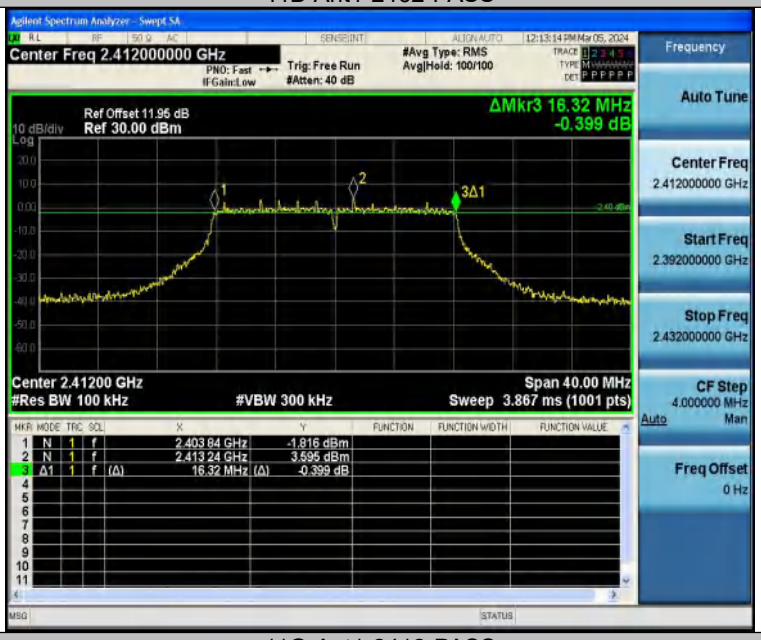
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.040	2407.480	2416.520	0.5	PASS
11B	Ant1	2437	9.520	2432.000	2441.520	0.5	PASS
11B	Ant1	2462	9.560	2457.480	2467.040	0.5	PASS
11G	Ant1	2412	16.320	2403.840	2420.160	0.5	PASS
11G	Ant1	2437	16.320	2428.840	2445.160	0.5	PASS
11G	Ant1	2462	16.360	2453.800	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.520	2403.240	2420.760	0.5	PASS
11N20SISO	Ant1	2437	17.520	2428.240	2445.760	0.5	PASS
11N20SISO	Ant1	2462	17.560	2453.200	2470.760	0.5	PASS
11N40SISO	Ant1	2422	35.200	2404.240	2439.440	0.5	PASS
11N40SISO	Ant1	2437	35.120	2419.480	2454.600	0.5	PASS
11N40SISO	Ant1	2452	35.040	2434.480	2469.520	0.5	PASS



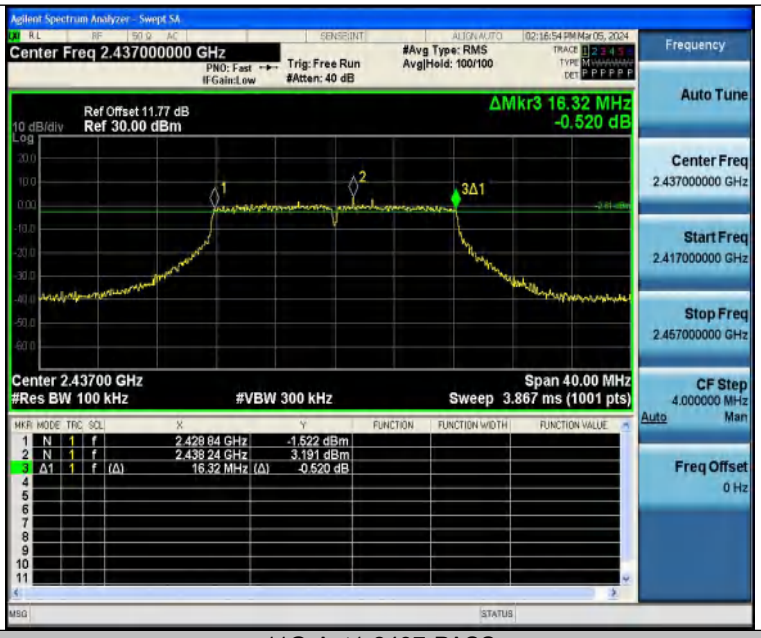
11B-Ant1-2412-PASS

11B-Ant1-2437-PASS

11B-Ant1-2462-PASS

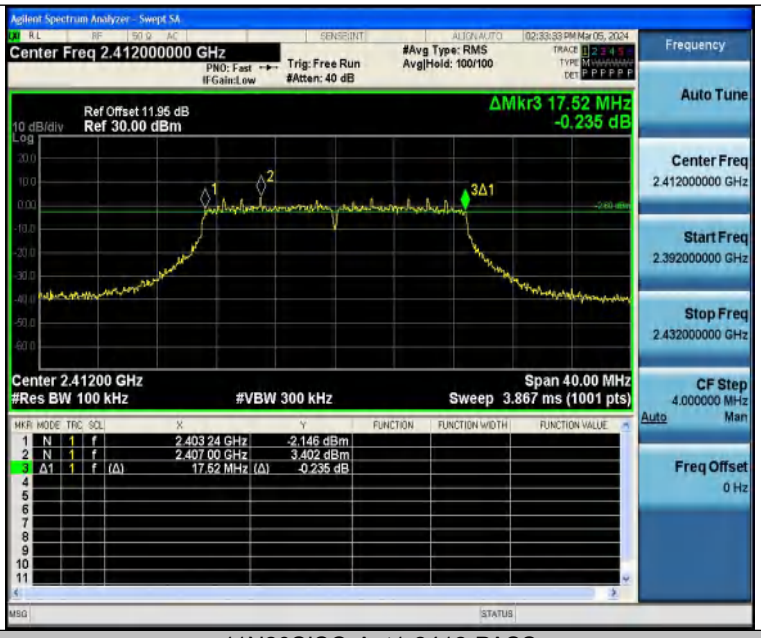


11G-Ant1-2412-PASS

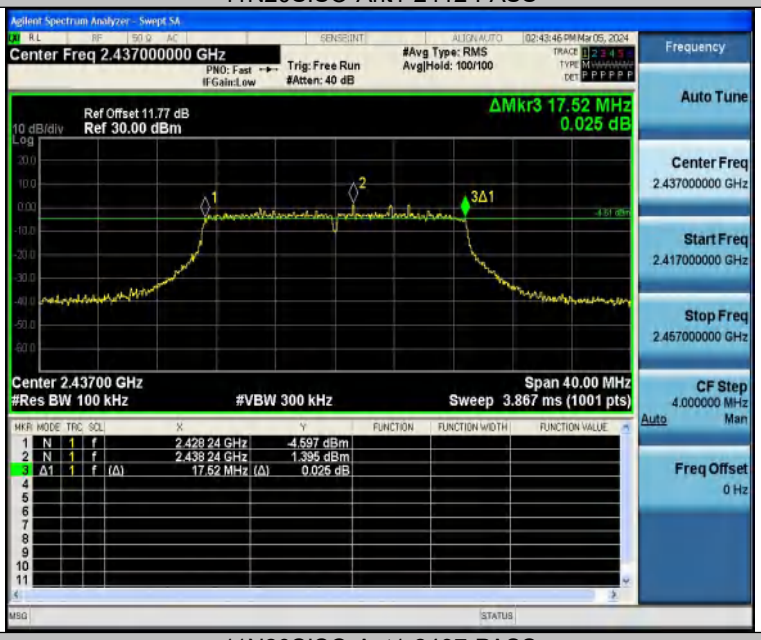


11G-Ant1-2437-PASS

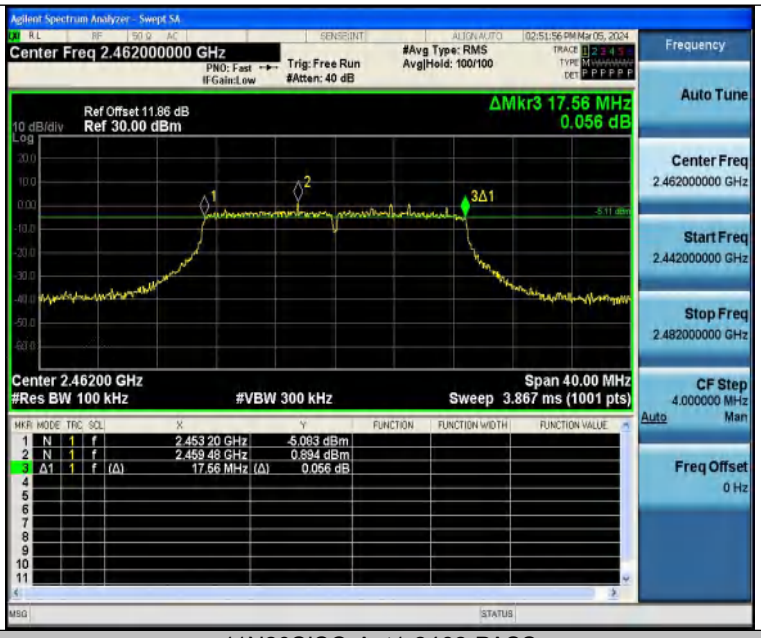
11G-Ant1-2462-PASS



11N20SISO-Ant1-2412-PASS



11N20SISO-Ant1-2437-PASS



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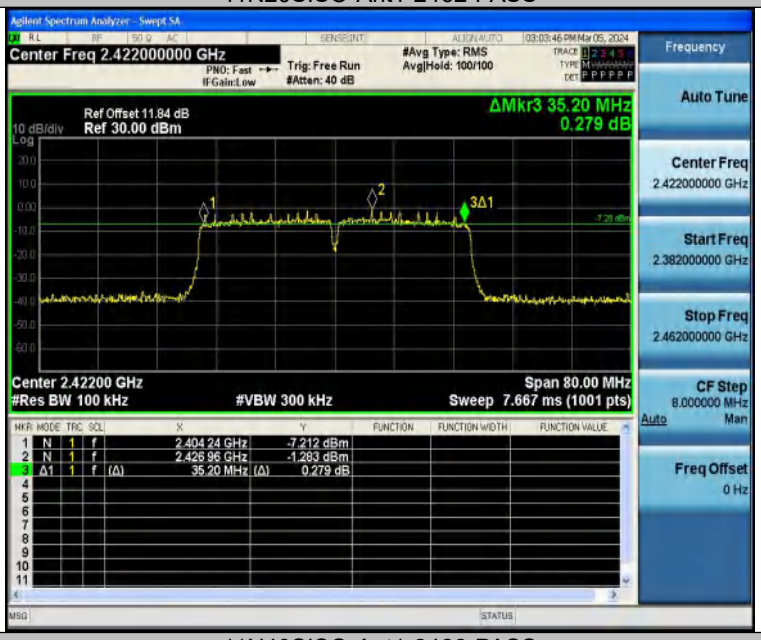
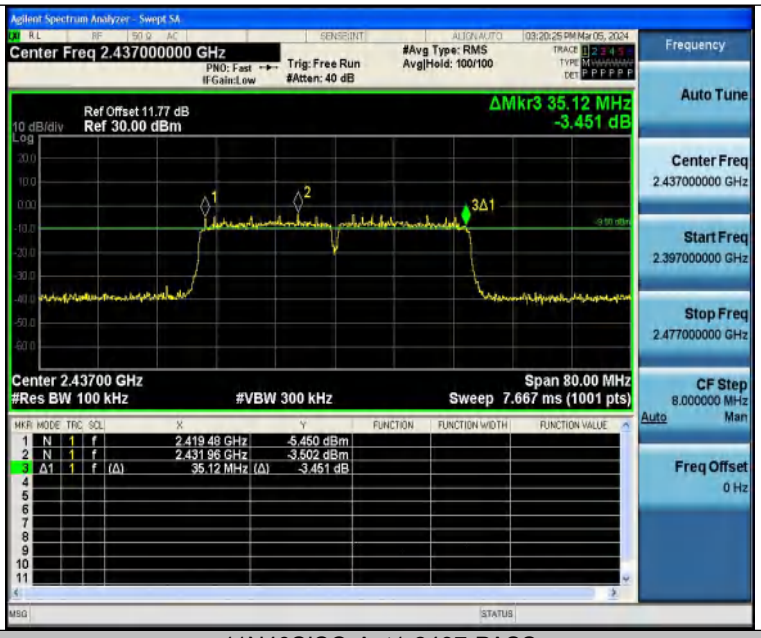
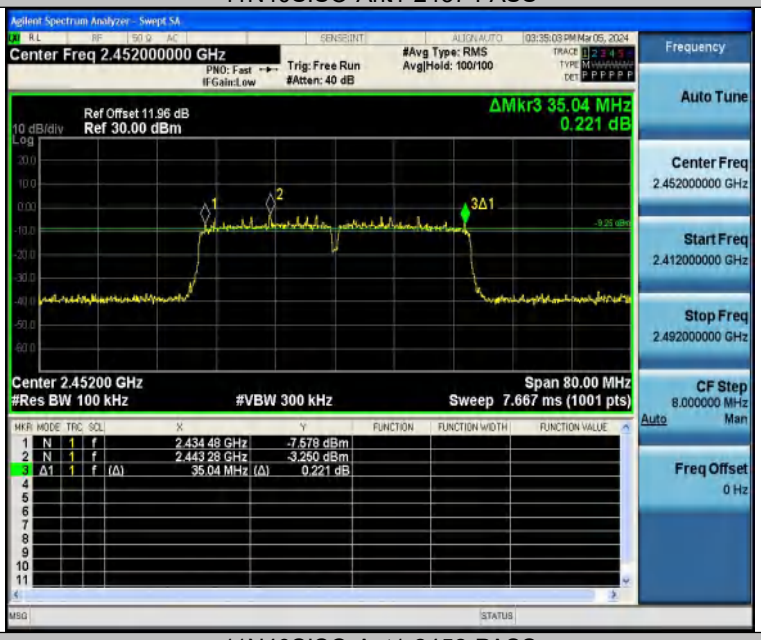


11N40SISO-Ant1-2422-PASS



11N40SISO-Ant1-2437-PASS



11N40SISO-Ant1-2452-PASS

10 Maximum conducted output power

Test Requirement : FCC CFR47 Part 15 Section 15.247

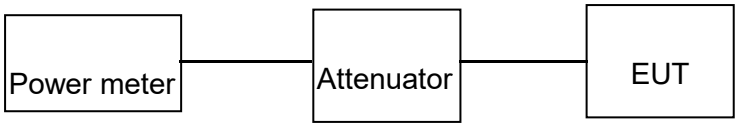
Test Method : ANSI C63.10:2013

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	---	17.77	≤30.00	PASS
11B	Ant1	2437	---	17.46	≤30.00	PASS
11B	Ant1	2462	---	17.30	≤30.00	PASS
11G	Ant1	2412	---	21.68	≤30.00	PASS
11G	Ant1	2437	---	21.81	≤30.00	PASS
11G	Ant1	2462	---	21.41	≤30.00	PASS
11N20SISO	Ant1	2412	---	21.93	≤30.00	PASS
11N20SISO	Ant1	2437	---	19.64	≤30.00	PASS
11N20SISO	Ant1	2462	---	19.37	≤30.00	PASS
11N40SISO	Ant1	2422	---	19.81	≤30.00	PASS
11N40SISO	Ant1	2437	---	17.81	≤30.00	PASS
11N40SISO	Ant1	2452	---	17.74	≤30.00	PASS

11 Power Spectral density

Test Requirement : FCC CFR47 Part 15 Section 15.247

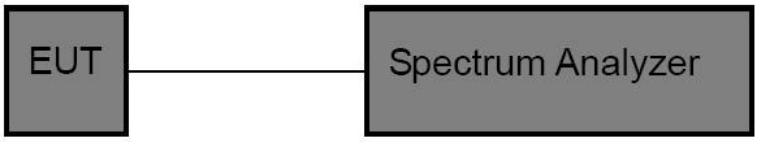
Test Method : ANSI C63.10:2013

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



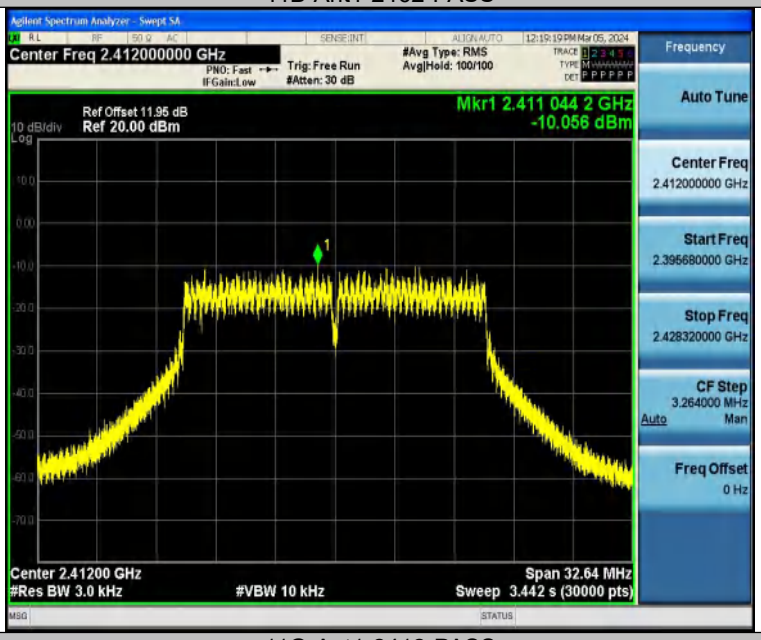
11.3Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-6.24	≤8.00	PASS
11B	Ant1	2437	-6.77	≤8.00	PASS
11B	Ant1	2462	-7.2	≤8.00	PASS
11G	Ant1	2412	-10.06	≤8.00	PASS
11G	Ant1	2437	-10.41	≤8.00	PASS
11G	Ant1	2462	-11.05	≤8.00	PASS
11N20SISO	Ant1	2412	-10.14	≤8.00	PASS
11N20SISO	Ant1	2437	-10.25	≤8.00	PASS
11N20SISO	Ant1	2462	-12.11	≤8.00	PASS
11N40SISO	Ant1	2422	-14.98	≤8.00	PASS
11N40SISO	Ant1	2437	-17.33	≤8.00	PASS
11N40SISO	Ant1	2452	-17.47	≤8.00	PASS

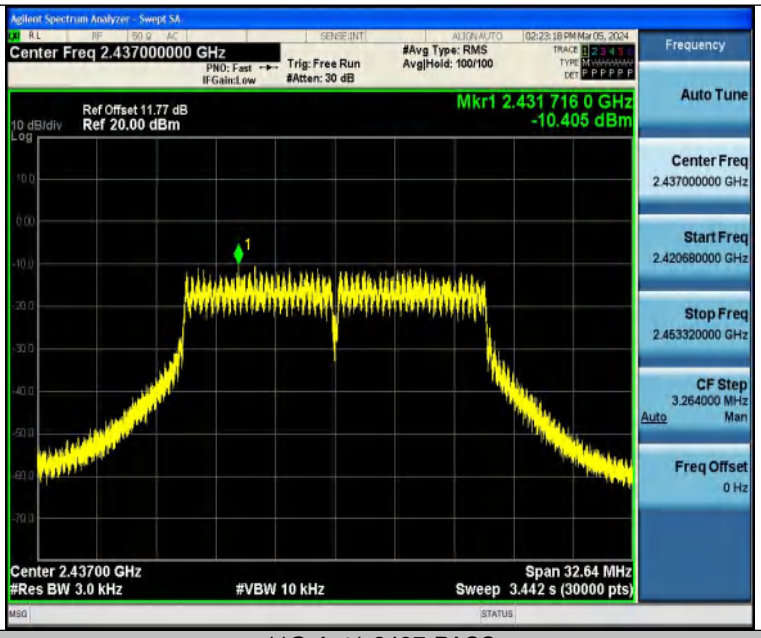
11B-Ant1-2412-PASS

11B-Ant1-2437-PASS

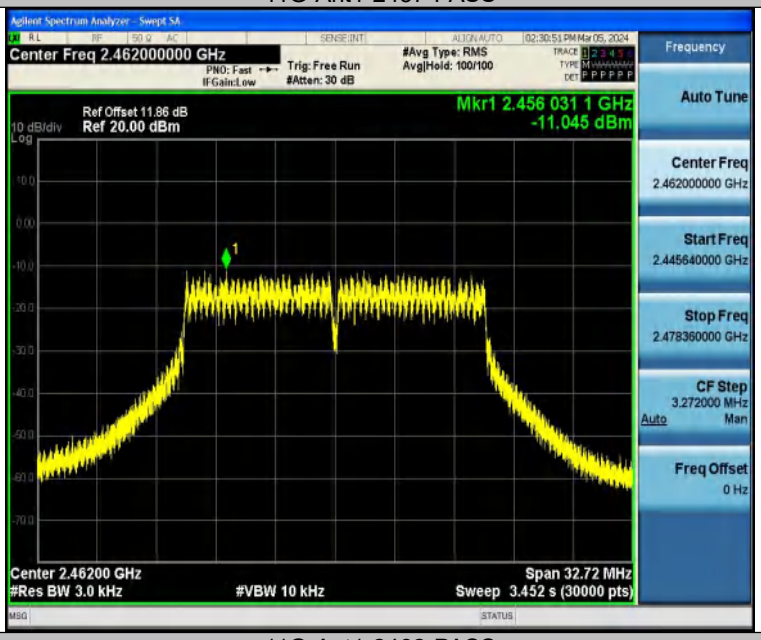
11B-Ant1-2462-PASS



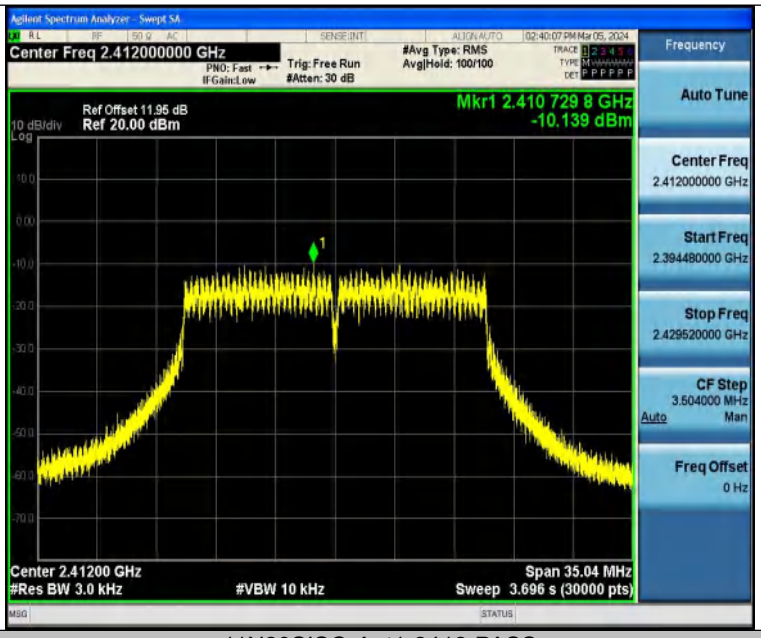
11G-Ant1-2412-PASS



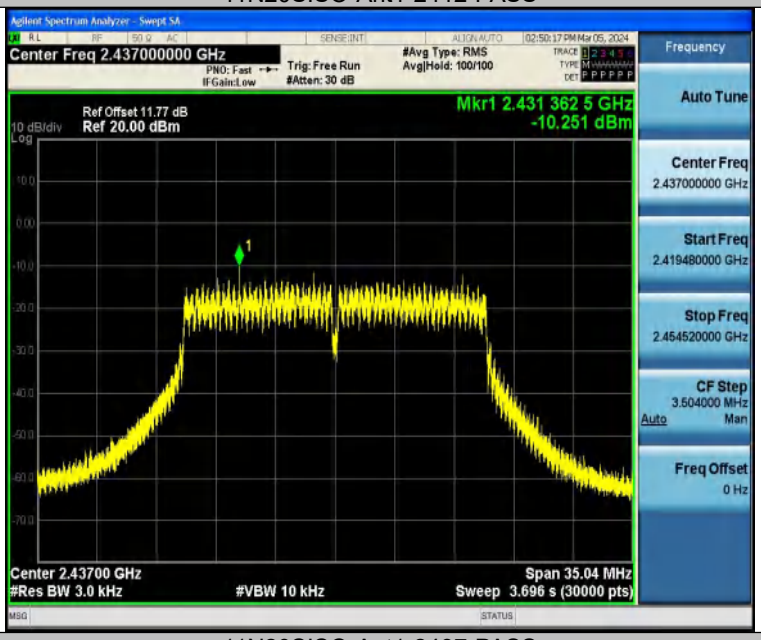
11G-Ant1-2437-PASS



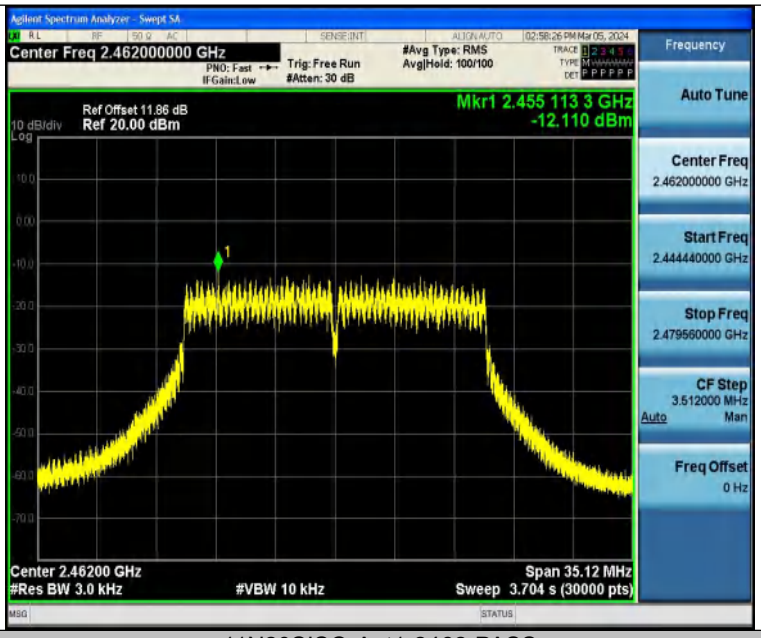
11G-Ant1-2462-PASS



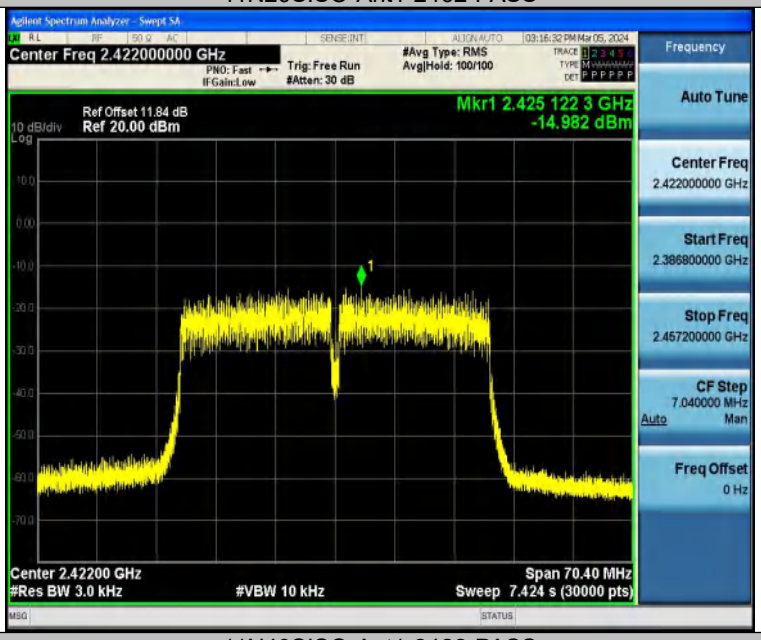
11N20SISO-Ant1-2412-PASS



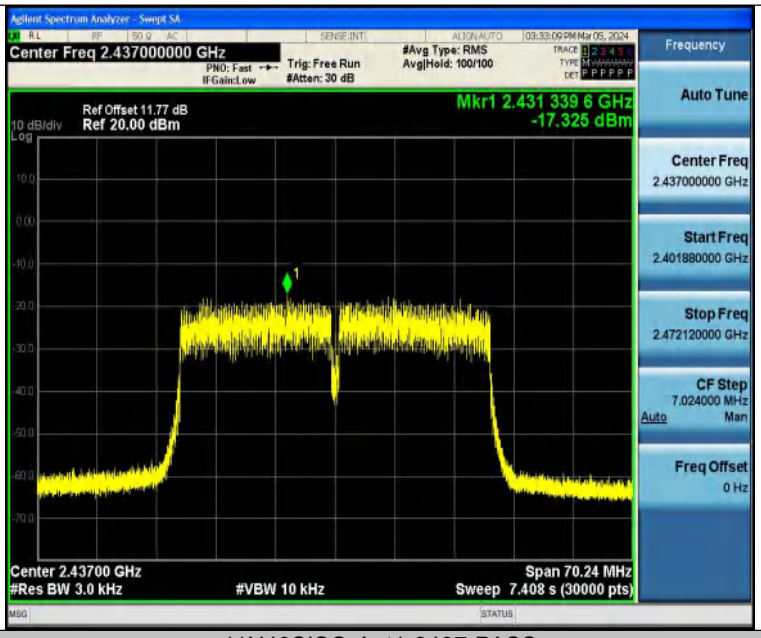
11N20SISO-Ant1-2437-PASS



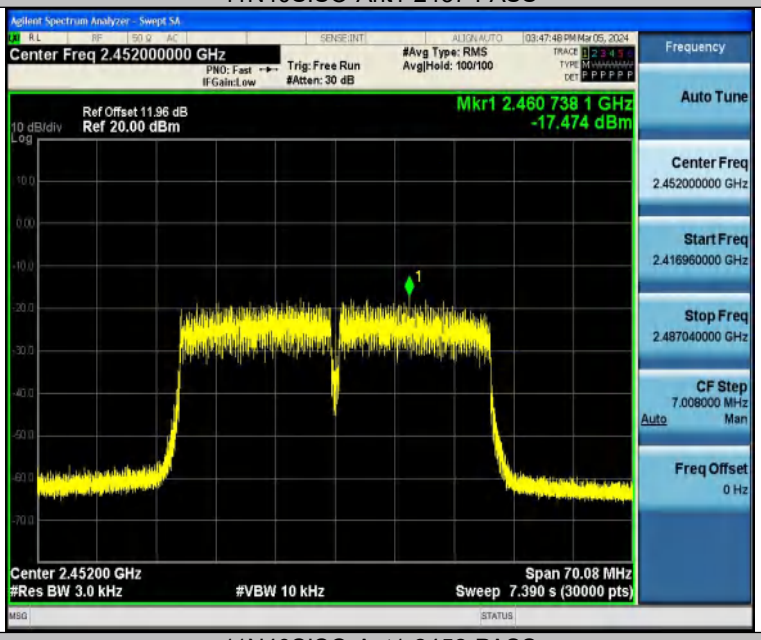
11N20SISO-Ant1-2462-PASS



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.

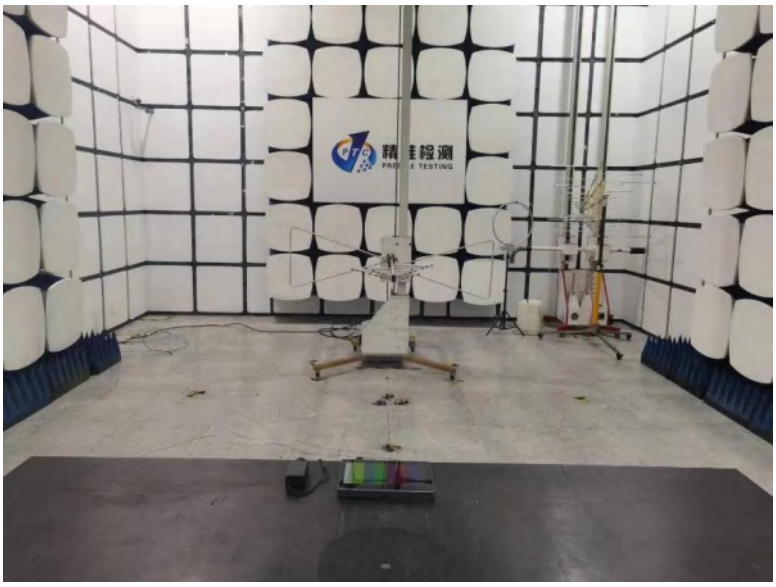
12.2 Result

The EUT'S antenna, permanent attached antenna,is FPC antenna. The antenna's gain is 5.58 dBi and meets the requirement.

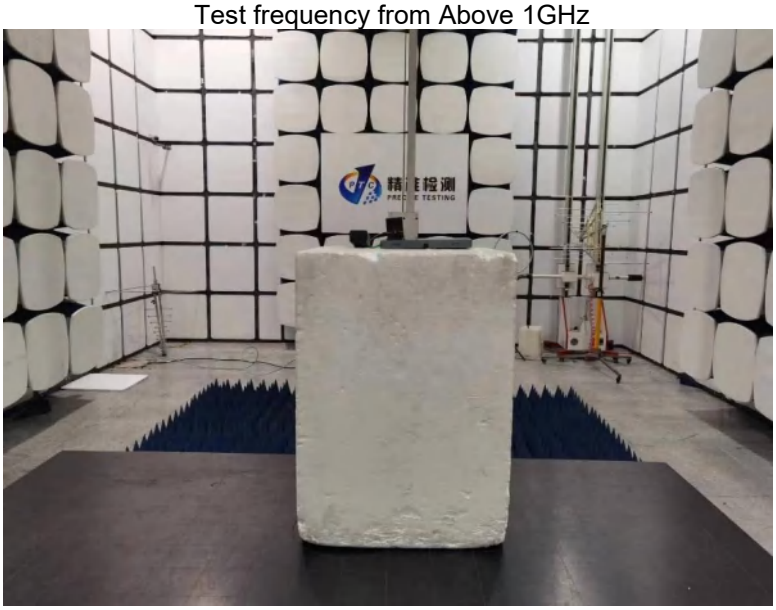
13 Test Setup

Conducted Emissions

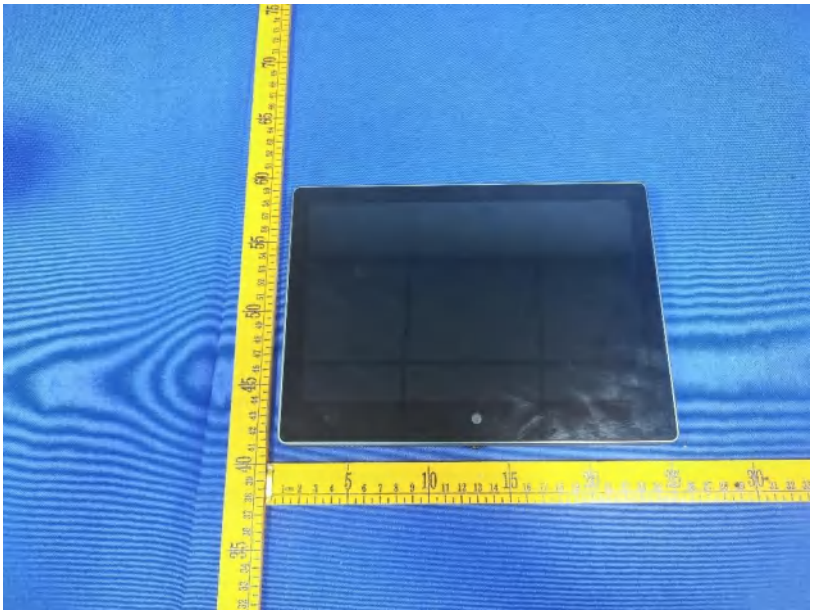
Radiated Spurious Emissions
From 30MHz-1000MHz

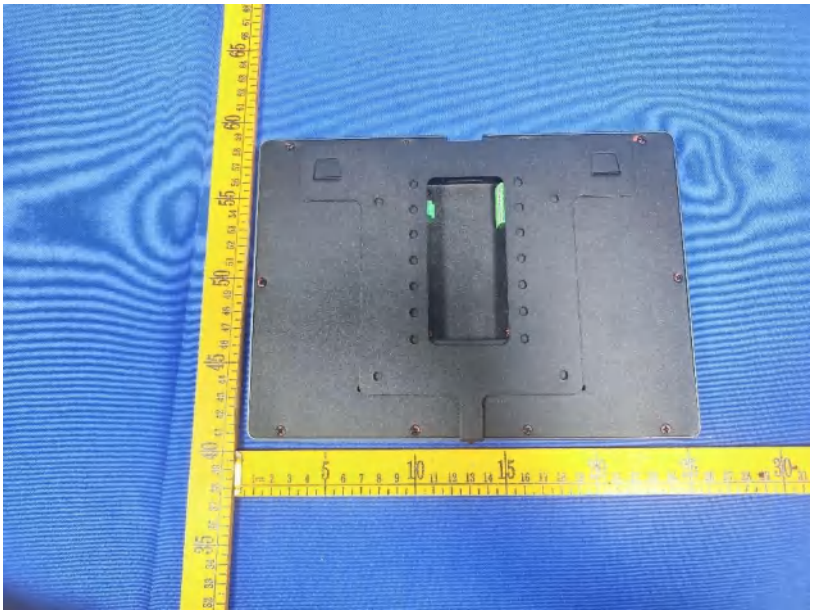


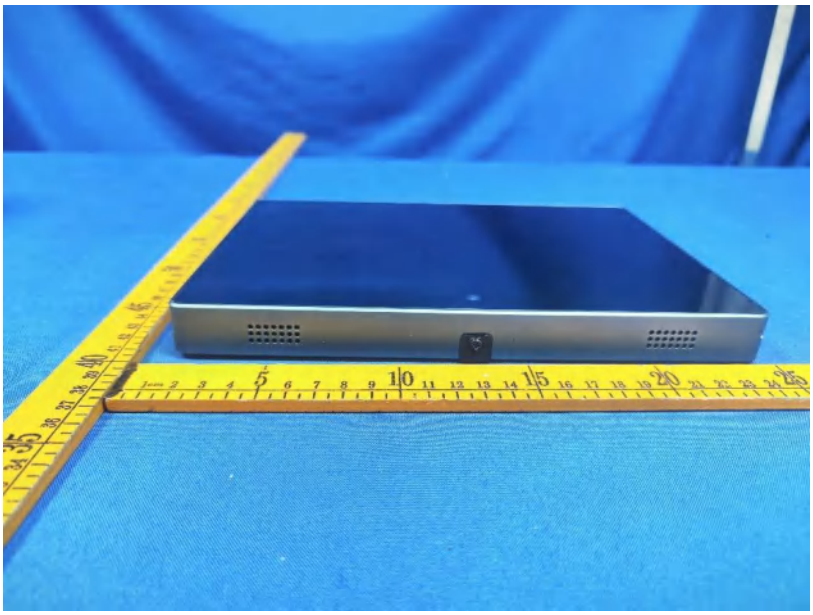
Test frequency from Above 1GHz

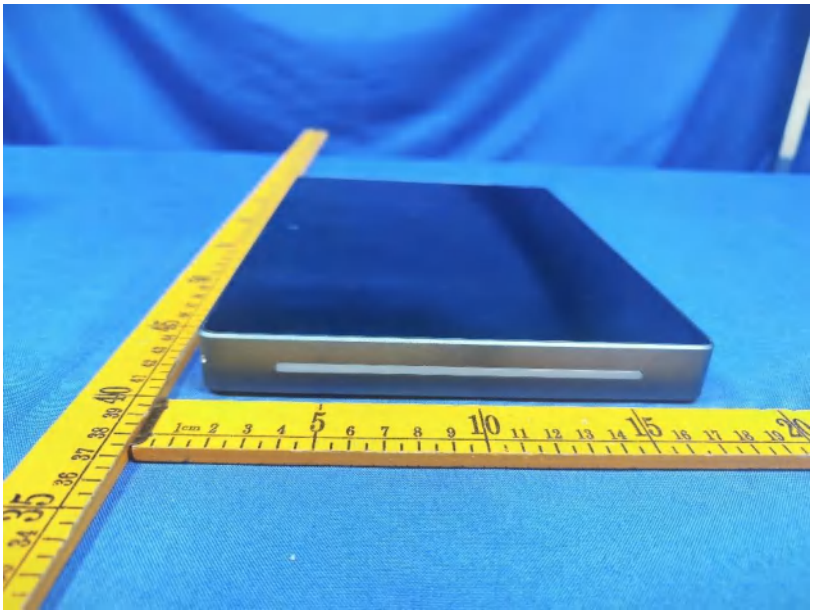


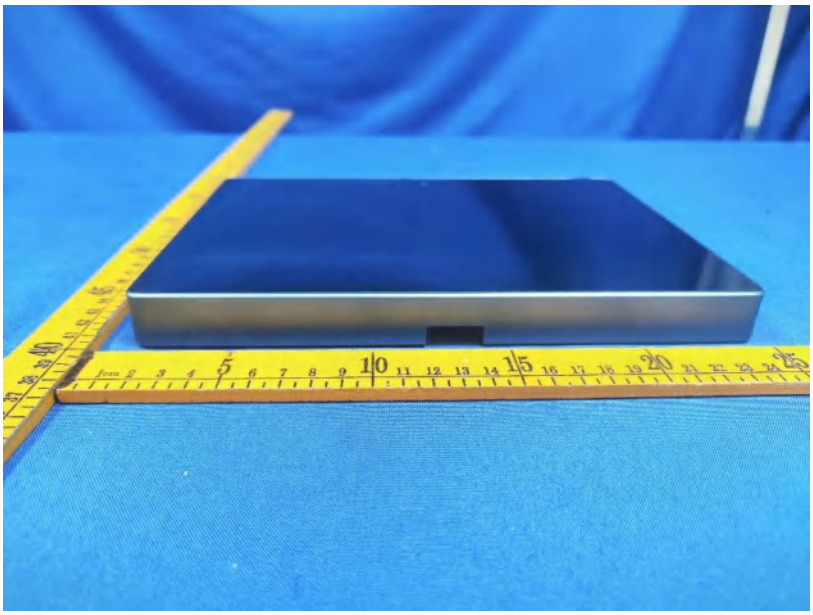
14 EUT PHOTOS

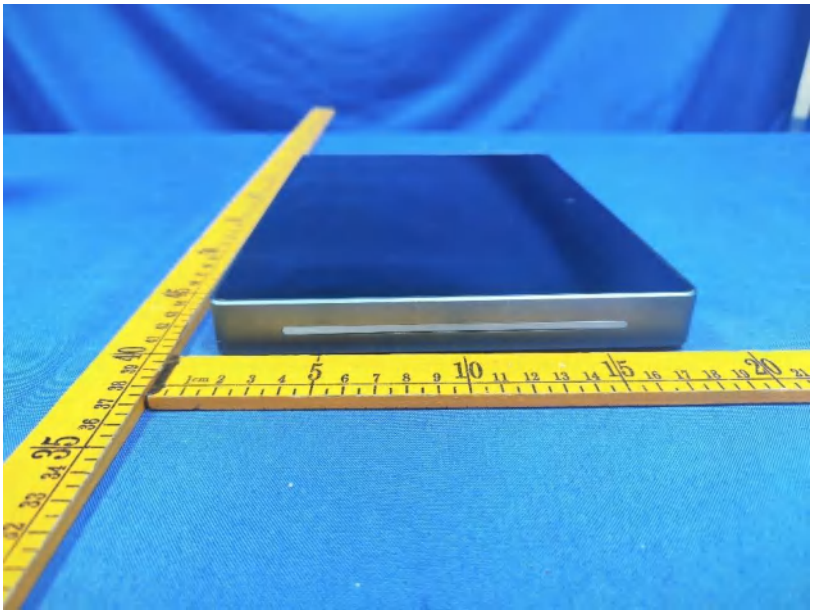


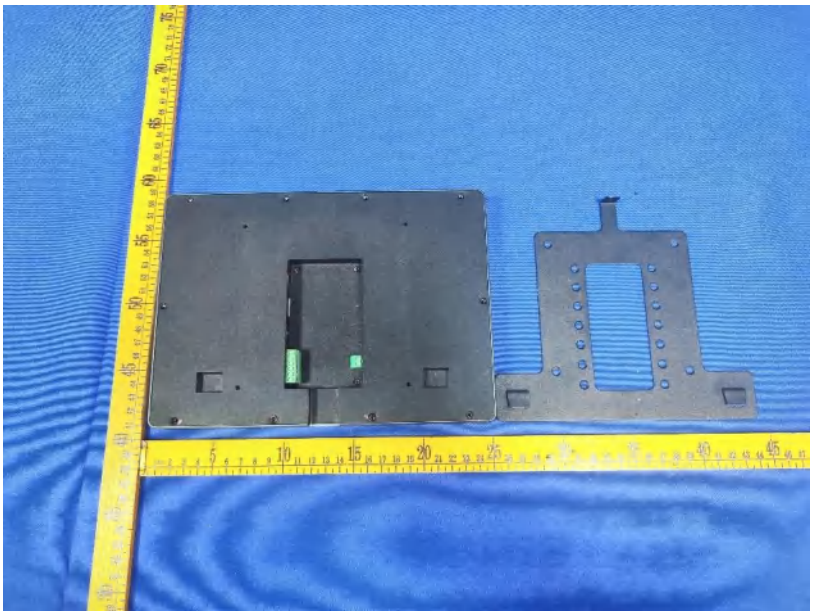


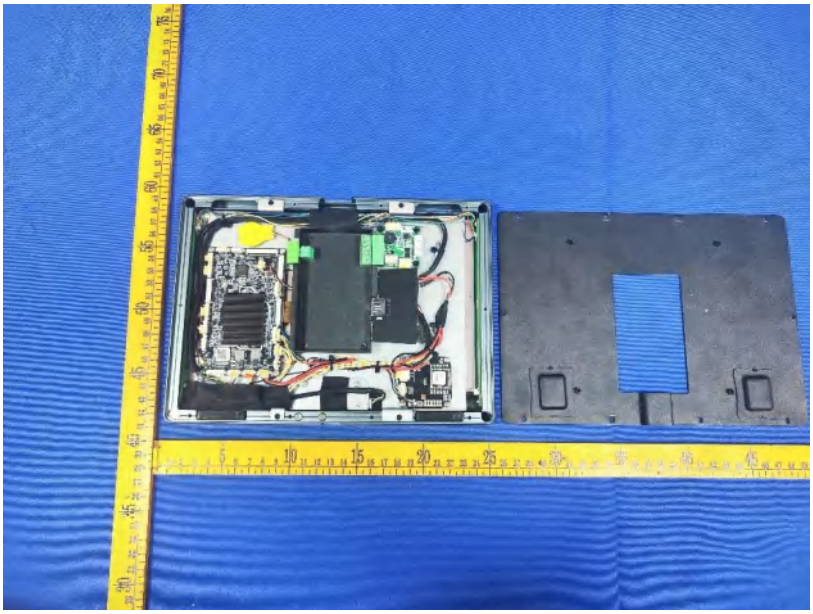


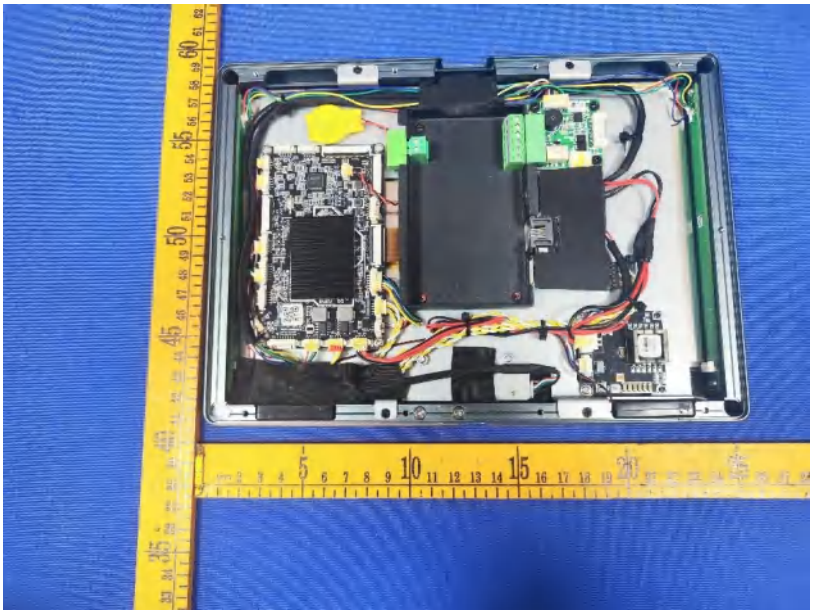


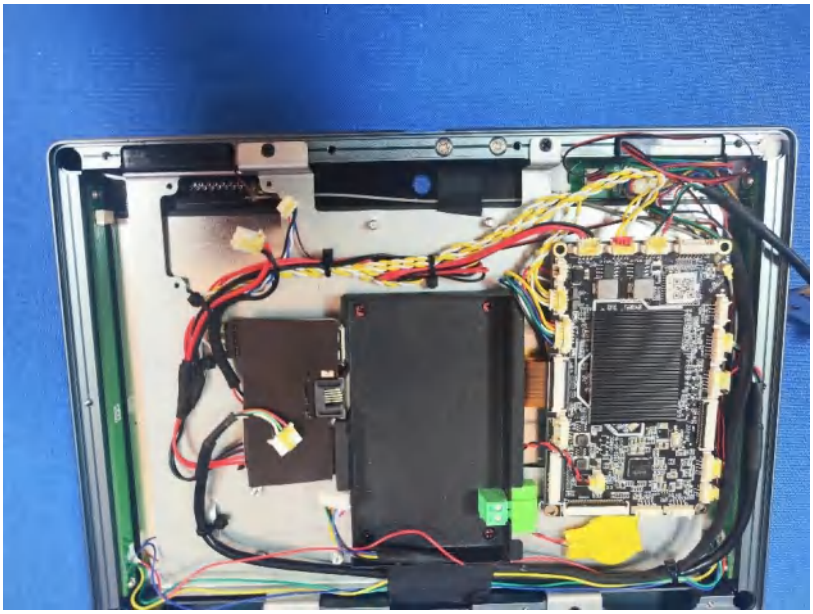


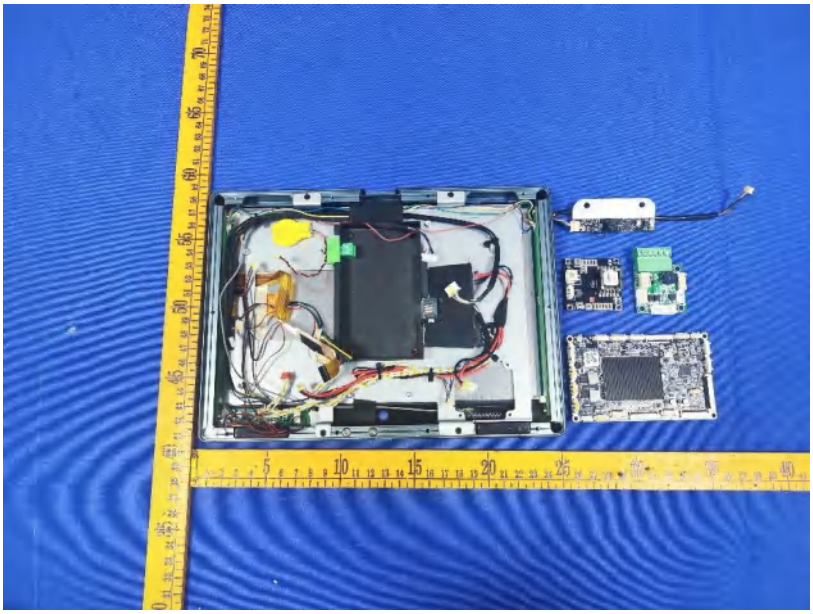


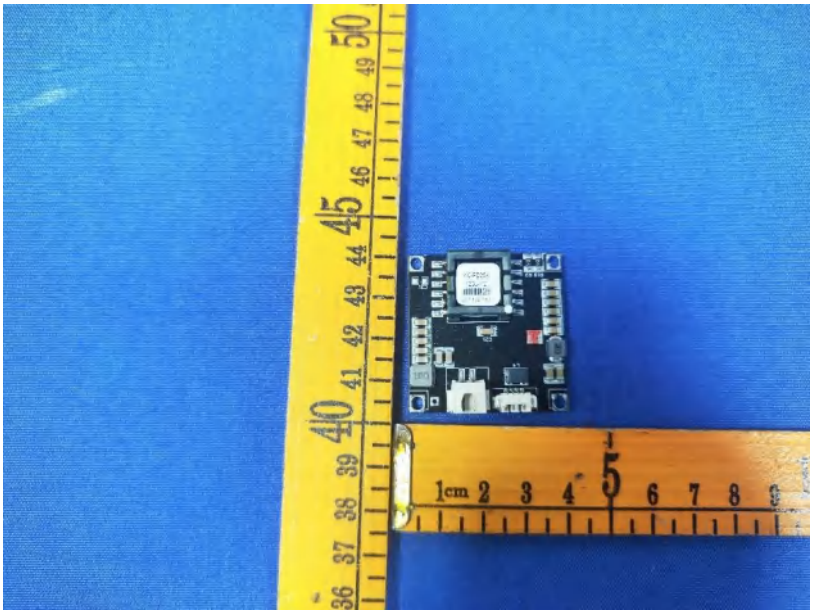


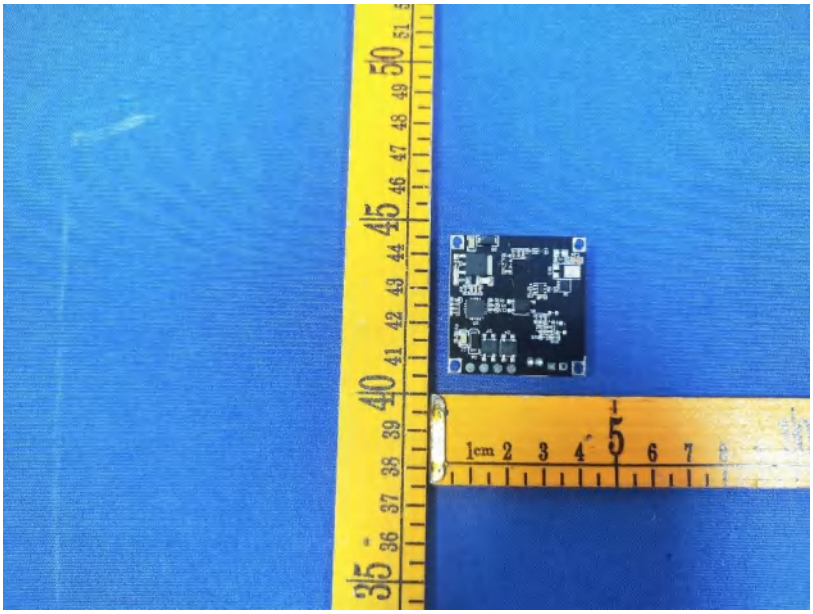


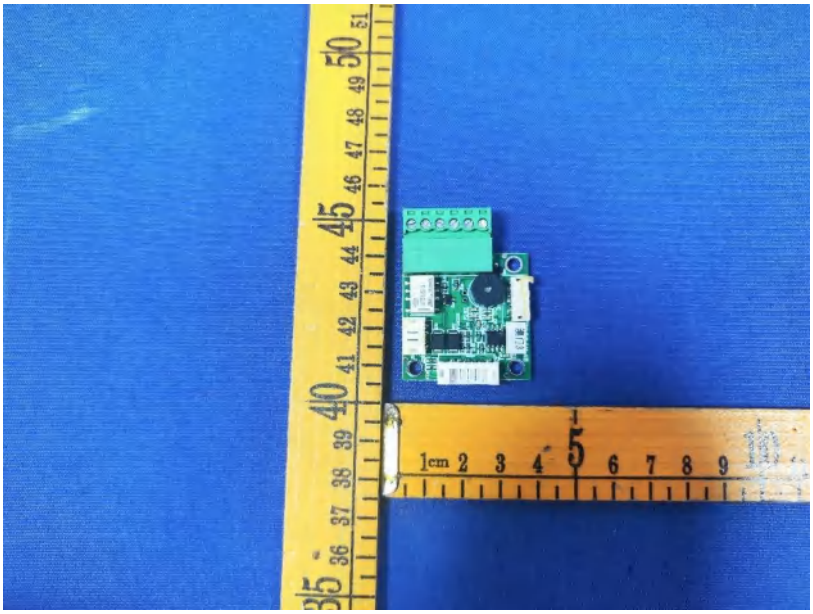


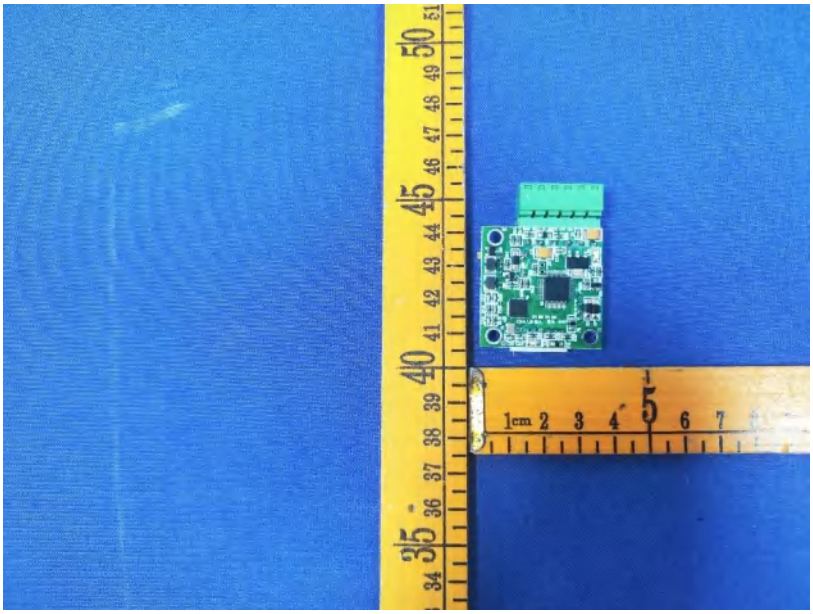


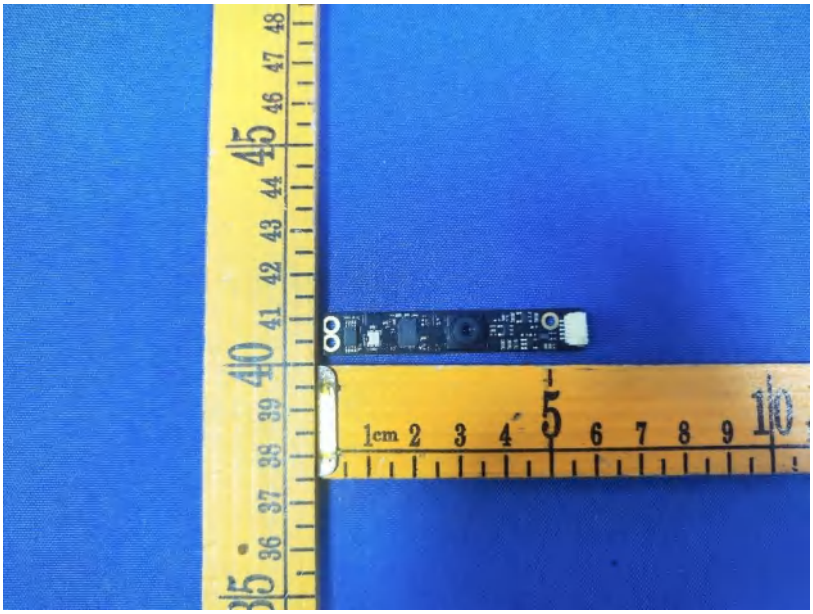


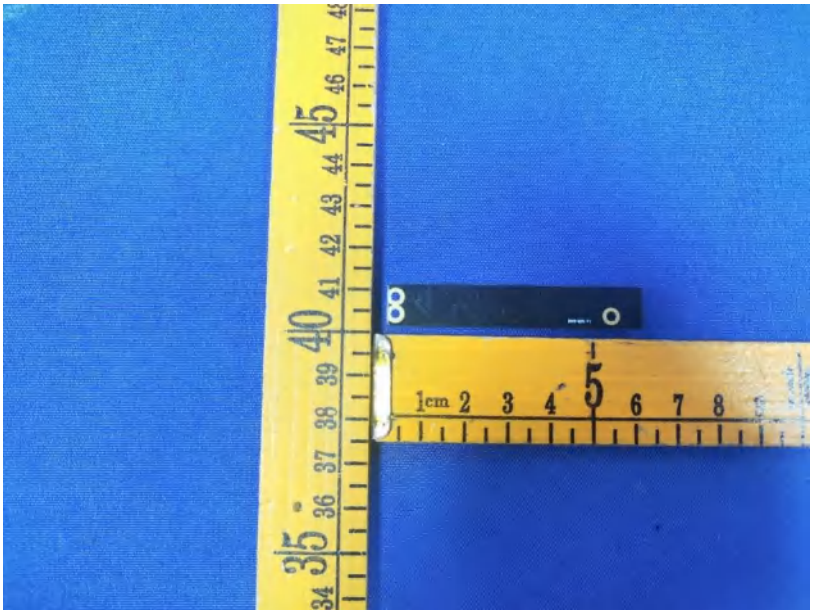


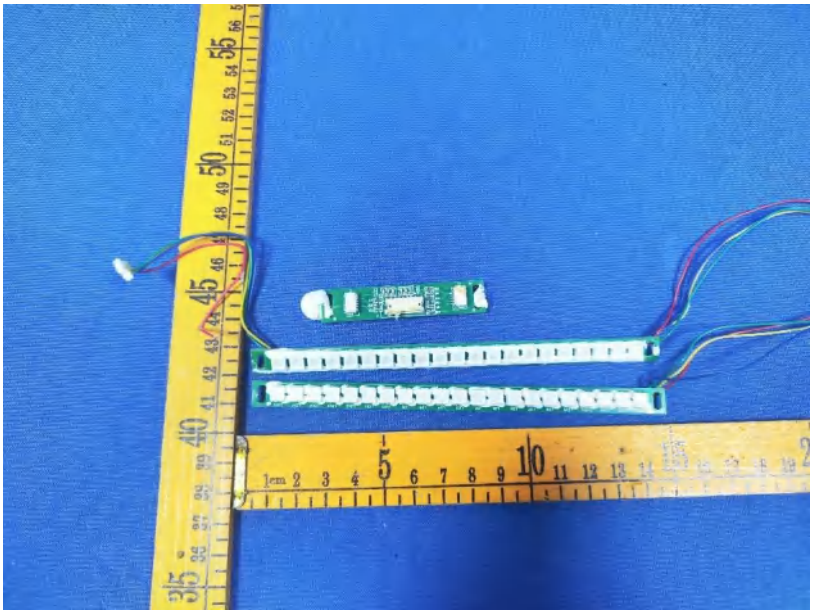


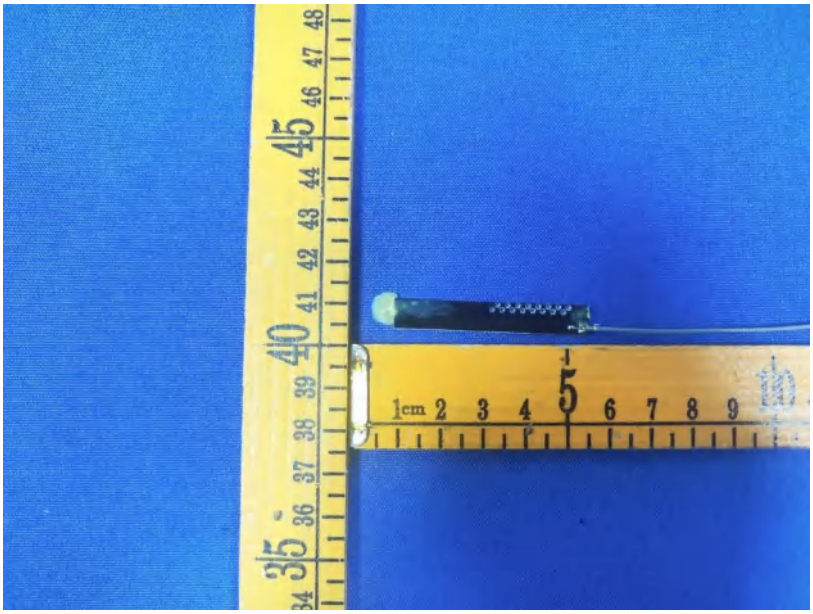








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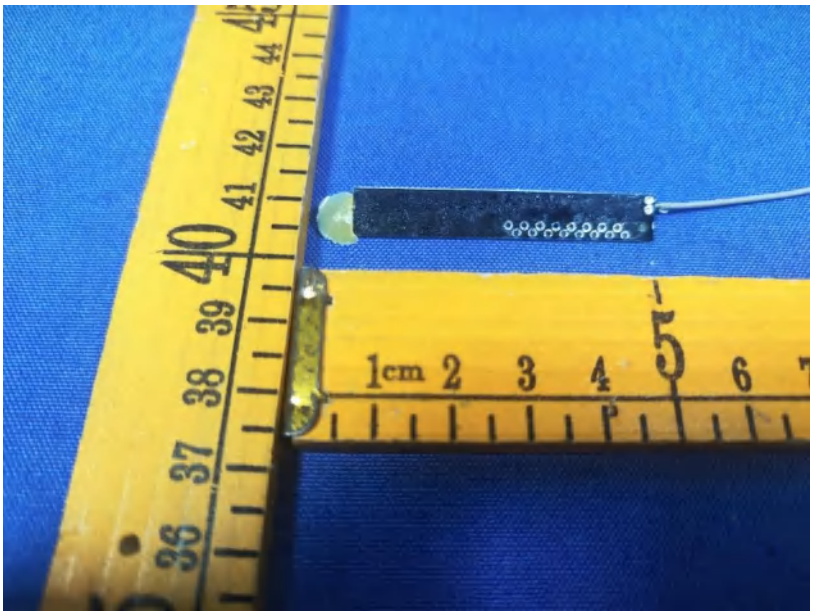
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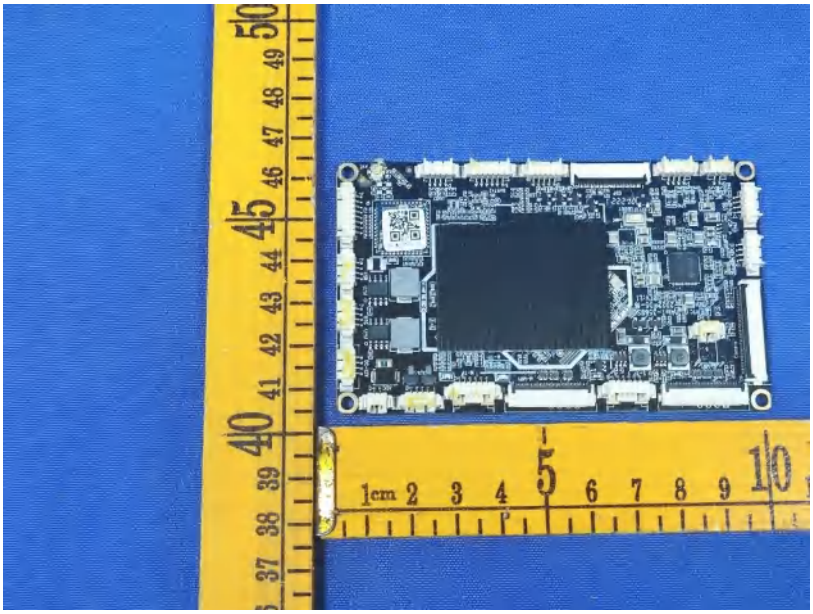

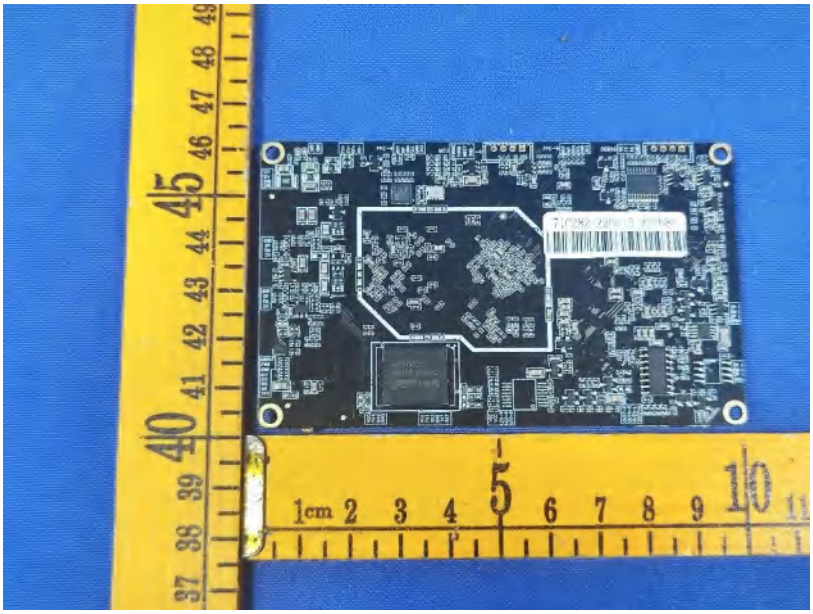

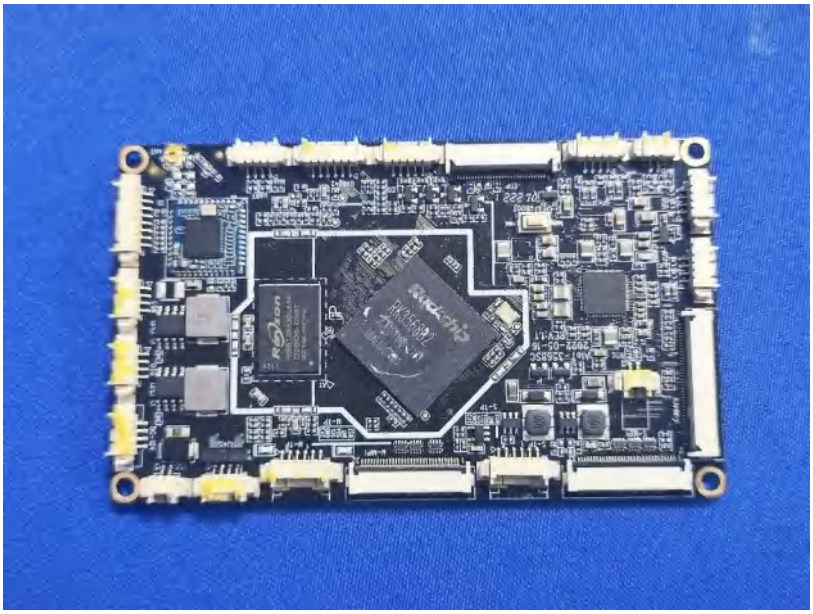

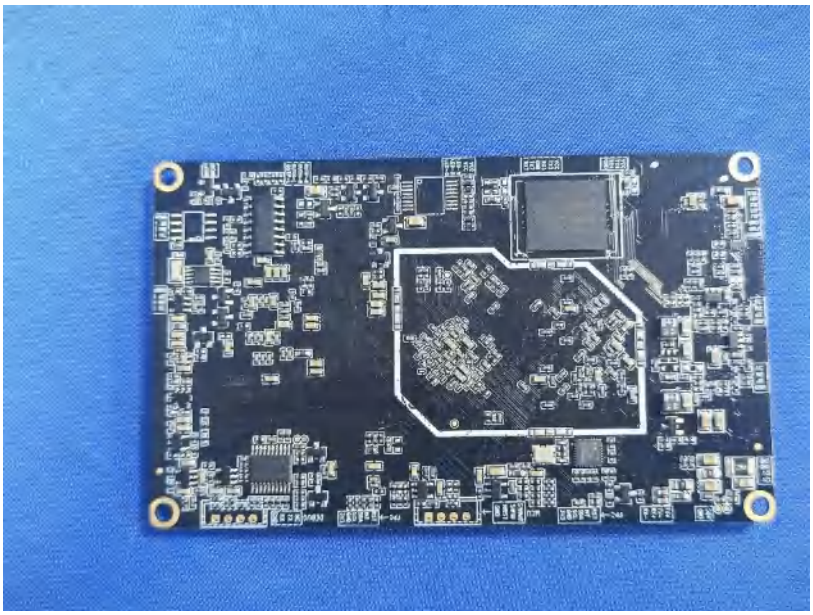

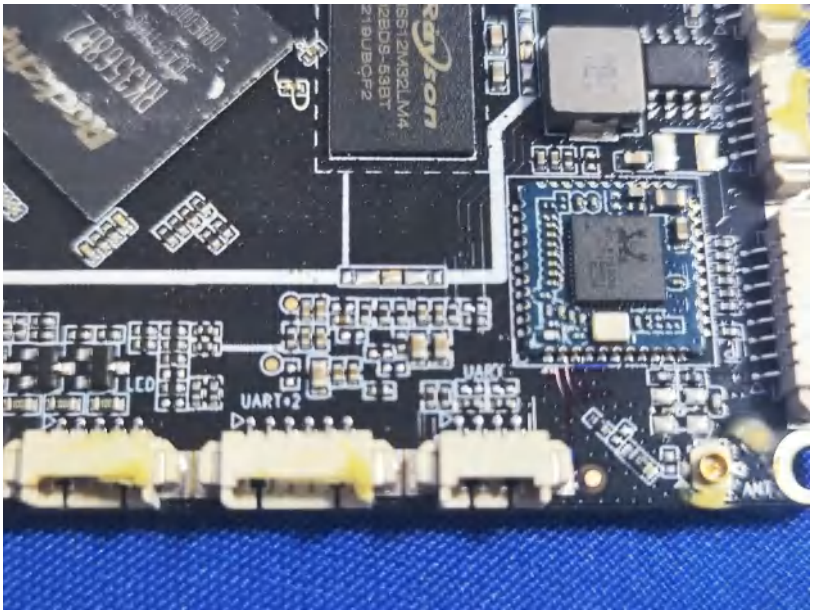

********THE END REPORT********