FCC CERTIFICATION TEST REPORT

Applicant:	SOUND AROUND INC.
Address:	1600 63 RD STREET BROOKLYN,NEW YORK,USA
Manufacturer:	Guangzhou Yuandong Smart Sports Technology Co, Ltd.
Address:	No.192, Kezhu Road, Huangpu District, Guangzhou,China
Product Description:	Travel Apollo Fitness Board
Brand Name:	SQUATZ
Tested Model:	SQUAPLLO-TRVOR
FCC ID:	2A5X5-APTRVL22
Report No.:	JCF230725201-003
Received Date:	Jul. 25, 2023
Tested Date:	Jul. 25, 2023 - Aug. 30, 2023
Issued Date:	Aug. 31, 2023
Test Standards:	FCC Rules and Regulations Part 15 Subpart C
Test Procedure：	ANSI C63.10:2013
Test Result:	Pass

Prepared By:

Roger Li

Roger Li/Engineer **Date:** Aug. 31, 2023

Reviewed By:

Kennys Zhang

Kennys Zhang/Engineer **Date:** Aug. 31, 2023

Approved By:

Talent Zhang

Talent Zhang/Engineer **Date:** Aug. 31, 2023

Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of Guangzhou Jingce Testing Technology Co., Ltd. the test report shall not be reproduced except in full.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 31, 2023	Original Report	/

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1. Test Report Declare

Applicant:	SOUND AROUND INC.
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Manufacturer:	Guangzhou Yuandong Smart Sports Technology Co, Ltd.
Address:	No.192, Kezhu Road, Huangpu District, Guangzhou,China
Product Name:	Travel Apollo Fitness Board
Brand Name:	SQUATZ
Model Name:	SQUAPLLO-TRVOR, SQUAPLLO-TRVBL, SQUAPLLO********(* : 0~9, A~Z, "-", Blank)
Difference Description:	All models are identical to each other except for model designation and market which does not affect the product RF function.

We Declare:

The equipment described above is tested by Guangzhou Jingce Testing Technology Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangzhou Jingce Testing Technology Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

2. Summary of Test Results

Summary of Test Results			
Clause	**Test Items**	**FCC/ISED Rules**	**Test Results**
1	6dB Bandwidth	FCC Part 15.247 (a) (2)	Pass
2	Peak Conducted Output Power	FCC Part 15.247 (b) (3)	Pass
3	Power Spectral Density	FCC Part 15.247 (e)	Pass
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d)	Pass
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Pass
6	Conducted Emission Test For AC Power Port	FCC Part 15.207	Pass
7	Antenna Requirement	FCC Part 15.203	Pass

3. Test Laboratory

Guangzhou Jingce Testing Technology Co., Ltd.

Add.: No.192, Kezhu Road, Huangpu District, Guangzhou, Guangdong, China

Association for Laboratory Accreditation(A2LA). Certificate Number: 6594.01

FCC Designation Number: CN1331. Test Firm Registration Number: 360543

IC Test Firm Registration Number: 28796

Conformity Assessment Body identifier: CN0138

4. Equipment Under Test

4.1. Description of EUT

EUT Name:	Travel Apollo Fitness Board
Model Number:	SQUAPLLO-TRVOR
EUT Function Description:	Please reference user's manual
Power Supply:	100-240V~ 50/60Hz 750W
Hardware Version:	YD.ESP32.mix
Software Version:	ESP32_RFTest_184_2021092
Radio Specification:	IEEE802.11b/g/n
Operation Frequency:	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20, HT40: 2412MHz—2462MHz
Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n (HT20/40): OFDM (64QAM, 16QAM, QPSK, BPSK)
Data Rate:	IEEE 802.11b: 1, 2, 5.5, 11 Mbps IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n HT20: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65.5 Mbps IEEE 802.11n HT40: 13.5, 27, 40.5, 54, 81, 108, 121.5, 135 Mbps
Antenna Type:	FPC Antenna, MAX. Gain: 2.71 dBi

Note 1: EUT is the ab. of equipment under test.

Note 2: The antenna gain is declared by the customer and the laboratory is not responsible for the accuracy of the antenna gain.

4.2. Channel List

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	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	/	/	/	/

Channel List for 802.11n (40 MHz)					
Channel	Frequency (MHz)	Channel	Frequency(MHz)	Channel	Frequency (MHz)
3	2422	7	2442	/	/
4	2427	8	2447	/	/
5	2432	9	2452	/	/
6	2437	/	/	/	/

4.3. Test Channel Configuration

Tested mode, channel and rand data rate information			
Mode	Data rate (Mbps) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1MHz	Low: CH1	2412
	1MHz	Middle: CH7	2442
	1MHz	High: CH13	2472
IEEE 802.11g	6 MHz	Low: CH1	2412
	6 MHz	Middle: CH7	2442
	6 MHz	High: CH13	2472
IEEE 802.11n HT20	MCS0	Low: CH1	2412
	MCS0	Middle: CH7	2442
	MCS0	High: CH13	2472
IEEE 802.11n HT40	MCS0	Low: CH3	2422
	MCS0	Middle: CH7	2442
	MCS0	High: CH11	2462
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			

4.4. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 ℃
Humidity range:	40-75%
Pressure range:	86-106 kPa

4.5. Description of Available Antennas

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band			
Test Software		EspRFTestTool_v2.8_Manual	
Modulation Mode	Transmit Antenna Number	Test Software Setting Value	
		ANT1	Channel
802.11b	1	40	CH1
		40	CH6
		50	CH11
802.11g	1	40	CH1
		40	CH6
		60	CH11
802.11HT20	1	40	CH1
		40	CH6
		60	CH11
802.11n HT40	1	40	CH3
		40	CH6
		60	CH9

4.6. Description of Available Antennas

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11g	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT40	☒ 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
Note: Only 802.11n HT20/HT40 support MIMO mode		

5. Description of Test Setup

5.1. Accessory

Description of Accessories	Manufacturer	Model Number	Description	Remark
/	/	/	/	/

5.2. Support Equipment

Equipment	Brand Name	Model Name	P/N
PC	Lenovo	T480	/

5.3. Test Setup

The EUT can work in engineering mode.

5.4. Setup Diagram for Tests

6. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
AC Power Conduction emission	1.37 dB
All Radiated emissions	5.4dB
Conducted emissions	3.09 dB
Occupied Channel Bandwidth	1.1%
Conducted Output power	0.82dB
Power Spectral Density	0.82dB
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k = 2.	

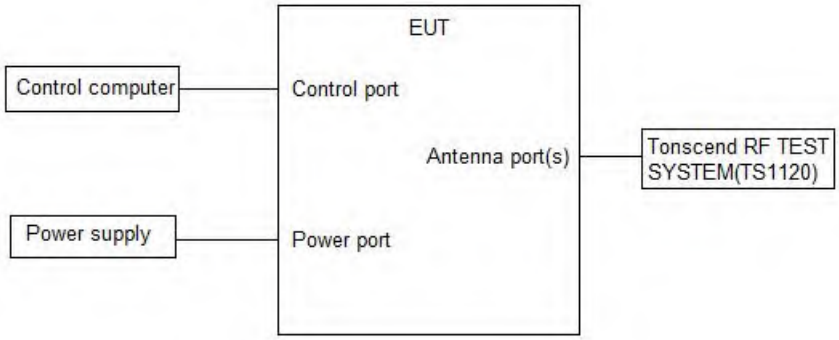
7. Measuring Instrument and Software Used

TS Test System						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☑	Spectrum Analyzer	Keysight	N9030B	MY56320512	Jul. 10, 2023	Jul. 09, 2024
☑	Vector Signal Generator	Keysight	N5182B	MY57300334	Nov. 24, 2022	Nov. 23, 2023
☑	Signal Generator	Keysight	N5171B	MY57280639	Nov. 24, 2022	Nov. 23, 2023
☑	DC POWER	Keysight	E342A	MY59020356	Jul. 14, 2023	Jul. 13, 2024
☑	Incubator thermometer	GWS	EL-02JA	21107288	Nov. 03, 2022	Nov. 02, 2023
☑	Control unit(Power sensor)	Tonscend	JS0806-2	/	Jul. 10, 2023	Jul. 09, 2024
☑	Wideband radio communication tester	R&S	CMW500	163478	Jul. 11, 2023	Jul. 10, 2024
☑	Spectrum Analyzer	Keysight	N9020B	MY60112206	Nov. 24, 2022	Nov. 23, 2023
☑	Control unit(Power sensor)	Tonscend	JS0806-2	21H8060465	Nov. 25, 2022	Nov. 24, 2023
Software						
Used	Description	Manufacturer	Name		Version	
☑	Test software	TS+	JS1120-3		V3.3.10	

RSE Test System						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☑	EMI Receiver	R&S	ESW	101685	Jul. 12, 2023	Jul. 11, 2024
☑	Bilog Antenna	Schwarzbeck	VULB 9163	01416	Mar. 21, 2023	Mar. 20, 2024
☑	Horn Antenna 1	Schwarzbeck	BBHA 9120 D	01673	Nov. 23, 2022	Nov. 22, 2023
☑	Horn Antenna 2	ETS	3116C	00217677	Sep. 19, 2022	Sep. 18, 2023
☑	Signal Pre-Amplifier	Tonscend	TAP01018050	AP21C806122	Jul. 10, 2023	Jul. 09, 2024
☑	Signal Pre-Amplifier	Tonscend	TAP9K3G32	AP20K806104	Jul. 10, 2023	Jul. 09, 2024
☑	Signal Pre-Amplifier	ETS	3116C-PA	00217677	Sep. 02, 2022	Sep. 01, 2023
☑	3m Fully-anechoic Chamber	ETS	RFD-100	/	Apr. 24, 2021	Apr. 23, 2024
Software						
Used	Description	Manufacturer	Name		Version	
☑	Test software	TS+	TS+		V3.0.0.4	
Conducted Emission Test For AC Power Port						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☑	LISN	R&S	ENV216	102154	Jul. 10, 2023	Jul. 09, 2024
☑	EMI Receiver	R&S	ESR3	102509	Jul. 12, 2023	Jul. 11, 2024
Software						
Used	Description	Manufacturer	Name		Version	
☑	Test software	EZ	EZ-EMC		EMEC-3A1	
Other Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☑	Temperature & Humidity	Temperature	HTC-1	/	Nov. 25, 2022	Nov. 24, 2023

8. On Time and Duty Cycle

8.1. Block diagram of test setup



8.2. Limits

None; for reporting purposes only

8.3. Procedure

KDB 558074 Zero-Span Spectrum Analyzer Method

8.4. Results

Test Mode	Ant.	Freq. [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	20.00	20.00	100.00
		2437	20.00	20.00	100.00
		2462	20.00	20.00	100.00
11G	Ant1	2412	20.00	20.00	100.00
		2437	20.00	20.00	100.00
		2462	20.00	20.00	100.00
11N20SISO	Ant1	2412	20.00	20.00	100.00
		2437	20.00	20.00	100.00
		2462	20.00	20.00	100.00
11N40SISO	Ant1	2422	20.00	20.00	100.00
		2437	20.00	20.00	100.00
		2452	20.00	20.00	100.00

Note: Duty Cycle Correction Factor = 10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer, then the next higher value should be used.
For mode 11b, the duty cycle is greater than 98 %, so it can set VBW to 10 Hz.

8.5. Original test data

11B_Ant1_2412

11B_Ant1_2437

11B_Ant1_2462

11G_Ant1_2412

11G_Ant1_2437

11G_Ant1_2462

11N20SISO_Ant1_2412

11N20SISO_Ant1_2437

11N20SISO_Ant1_2462

11N40SISO_Ant1_2422

11N40SISO_Ant1_2437

11N40SISO_Ant1_2452

9. 6 dB DTS Bandwidth

9.1. Block diagram of test setup

Same as section 8.1

9.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5

9.3. Test Procedure

Connect the UUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100 kHz
VBW	For 6 dB Bandwidth: ≥ 3 × RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB.

9.4. Results

Test Mode	Ant.	Freq. [MHz]	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	9.280	2407.360	2416.640	0.5	PASS
		2437	8.920	2432.200	2441.120	0.5	PASS
		2462	8.080	2457.920	2466.000	0.5	PASS
11G	Ant1	2412	16.440	2403.720	2420.160	0.5	PASS
		2437	16.440	2428.720	2445.160	0.5	PASS
		2462	16.400	2453.760	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.280	2403.200	2420.480	0.5	PASS
		2437	17.600	2428.160	2445.760	0.5	PASS
		2462	17.360	2453.400	2470.760	0.5	PASS
11N40SISO	Ant1	2422	32.400	2405.440	2437.840	0.5	PASS
		2437	33.440	2420.040	2453.480	0.5	PASS
		2452	32.640	2435.920	2468.560	0.5	PASS

9.5. Original test data

6dB bandwidth:

11B_Ant1_2412

11B_Ant1_2437

11B_Ant1_2462

11G_Ant1_2412

11G_Ant1_2437

11G_Ant1_2462

11N20SISO_Ant1_2412

11N20SISO_Ant1_2437

11N20SISO_Ant1_2462

11N40SISO_Ant1_2422

11N40SISO_Ant1_2437

11N40SISO_Ant1_2452

10. Conducted Output Power

10.1. Block diagram of test setup

Same as section 8.1

10.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	Peak Output Power	1 watt or 30 dBm	2400-2483.5

10.3. Test Procedure

Place the EUT on the table and set it in the transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.

Measure peak power each channel.

Peak Detector use for Peak result.

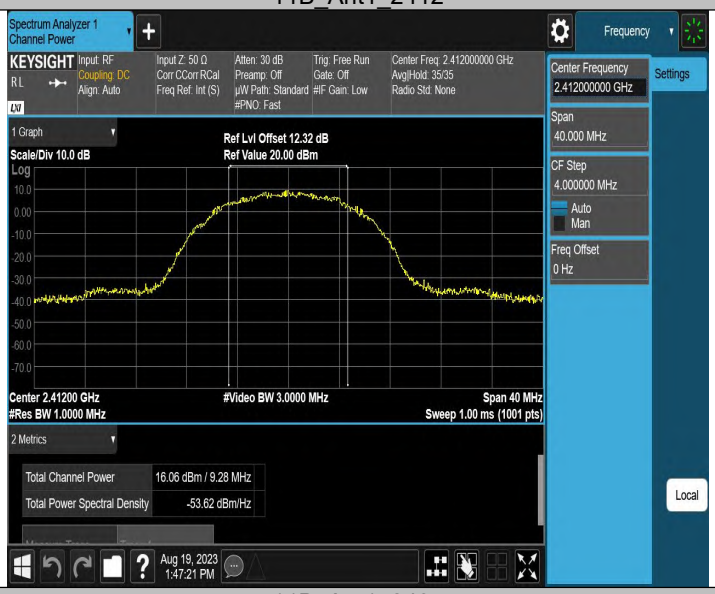
AVG Detector use for AVG result.

10.4. Results

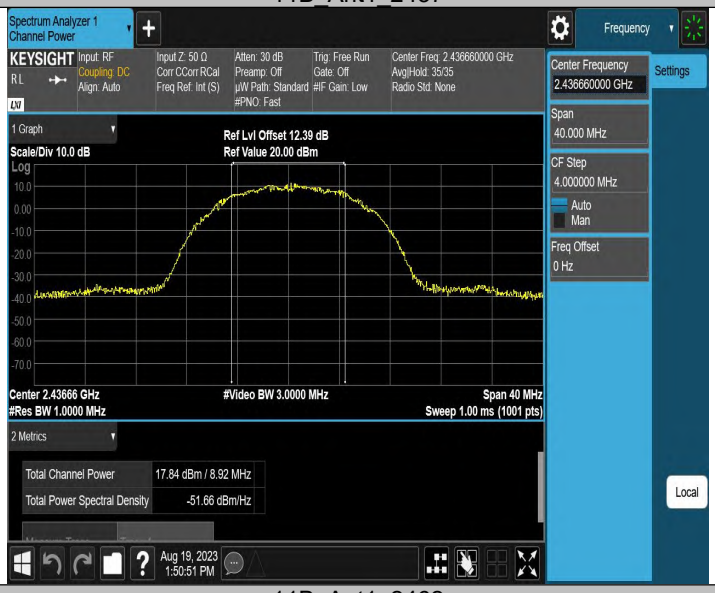
Test Mode	Ant.	Freq. [MHz]	Peak Power [dBm]	Conducted Limit [dBm]	Verdict
11B	Ant1	2412	16.06	≤30.00	PASS
		2437	17.84	≤30.00	PASS
		2462	16.90	≤30.00	PASS
11G	Ant1	2412	14.63	≤30.00	PASS
		2437	16.62	≤30.00	PASS
		2462	13.62	≤30.00	PASS
11N20SISO	Ant1	2412	14.62	≤30.00	PASS
		2437	16.56	≤30.00	PASS
		2462	13.57	≤30.00	PASS
11N40SISO	Ant1	2422	14.84	≤30.00	PASS
		2437	16.15	≤30.00	PASS
		2452	12.16	≤30.00	PASS

10.5. Original test data

11B_Ant1_2412

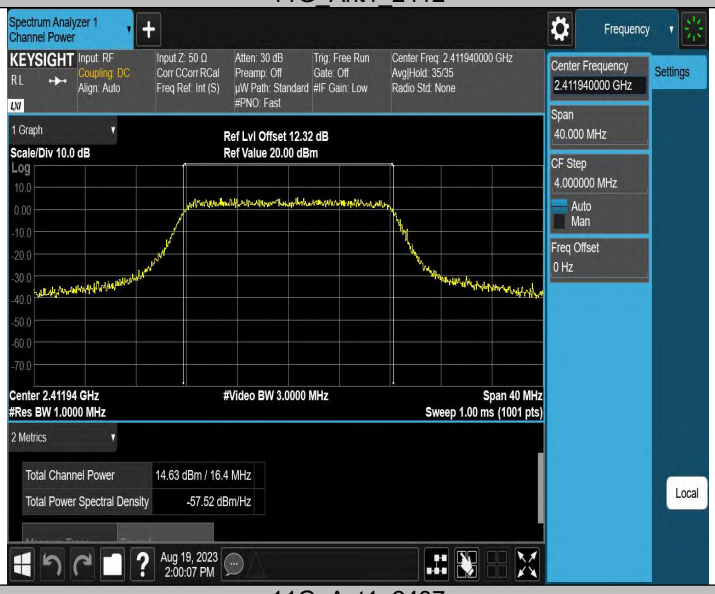


11B_Ant1_2437

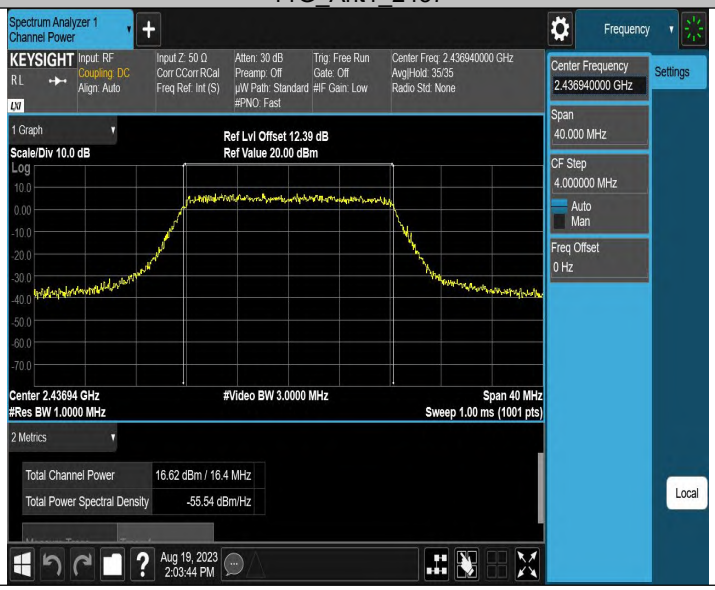


11B_Ant1_2462

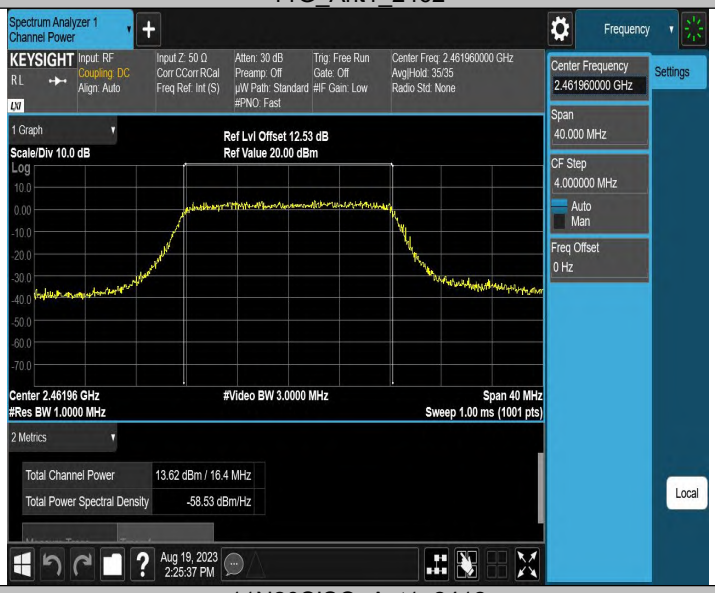
11G_Ant1_2412



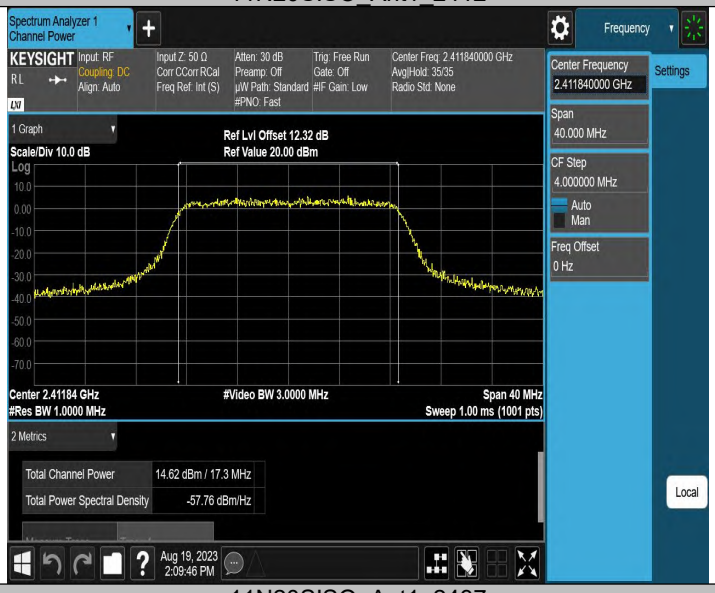
11G_Ant1_2437



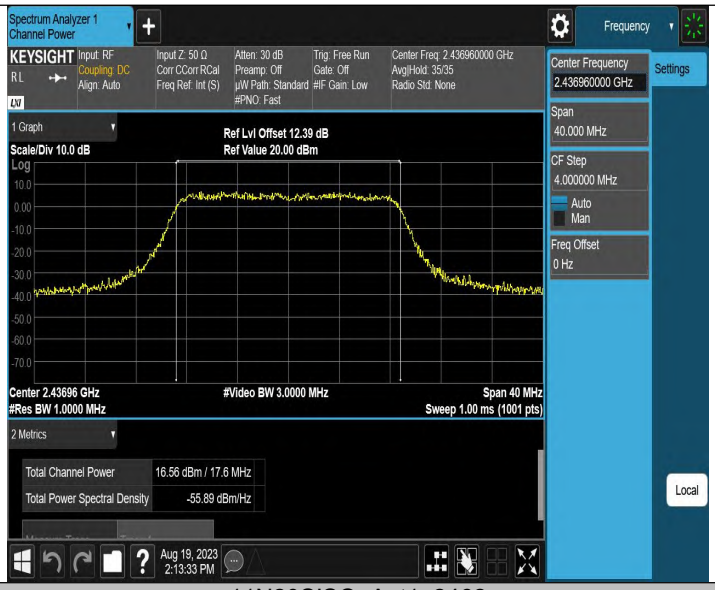
11G_Ant1_2462



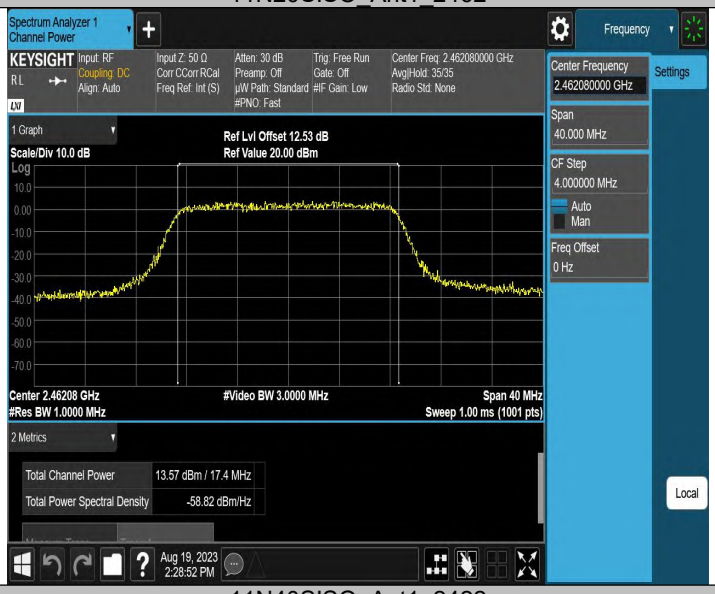
11N20SISO_Ant1_2412



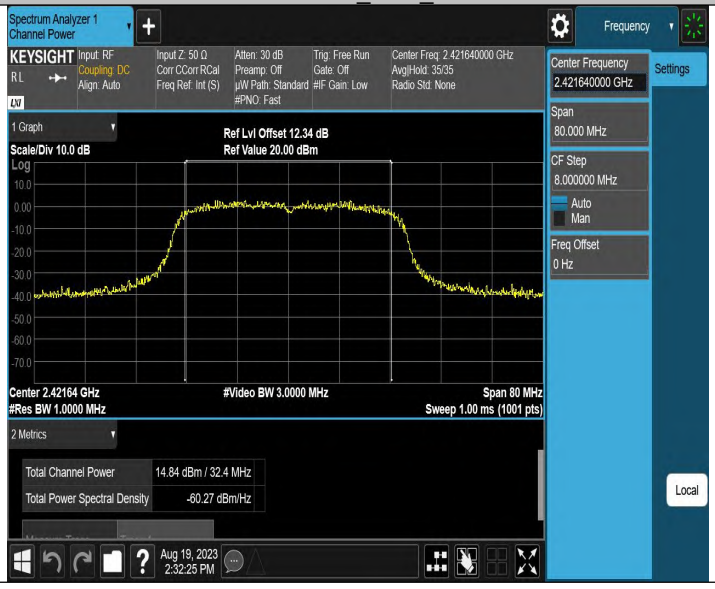
11N20SISO_Ant1_2437



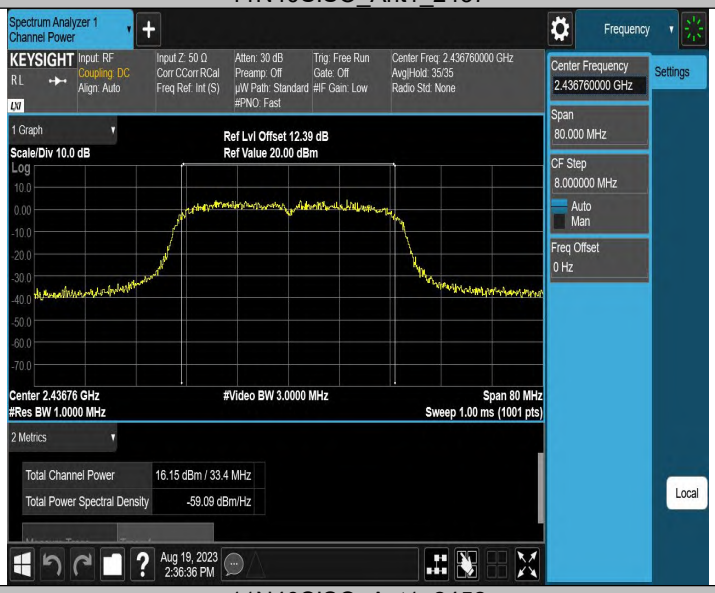
11N20SISO_Ant1_2462



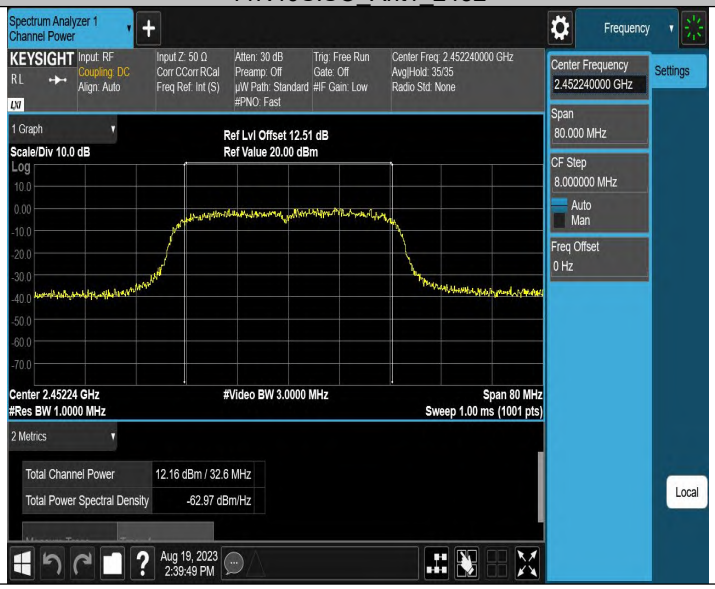
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



11. Power Spectral Density

11.1. Block diagram of test setup

Same as section 8.1

11.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm/3 kHz	2400-2483.5

11.3. Test Procedure

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

11.4. Results

Test Mode	Ant.	Freq. [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-13.12	≤8.00	PASS
		2437	-11.29	≤8.00	PASS
		2462	-12.07	≤8.00	PASS
11G	Ant1	2412	-15.42	≤8.00	PASS
		2437	-17.32	≤8.00	PASS
		2462	-14.54	≤8.00	PASS
11N20SISO	Ant1	2412	-15.71	≤8.00	PASS
		2437	-16.33	≤8.00	PASS
		2462	-14.24	≤8.00	PASS
11N40SISO	Ant1	2422	-14.4	≤8.00	PASS
		2437	-14.73	≤8.00	PASS
		2452	-15.38	≤8.00	PASS

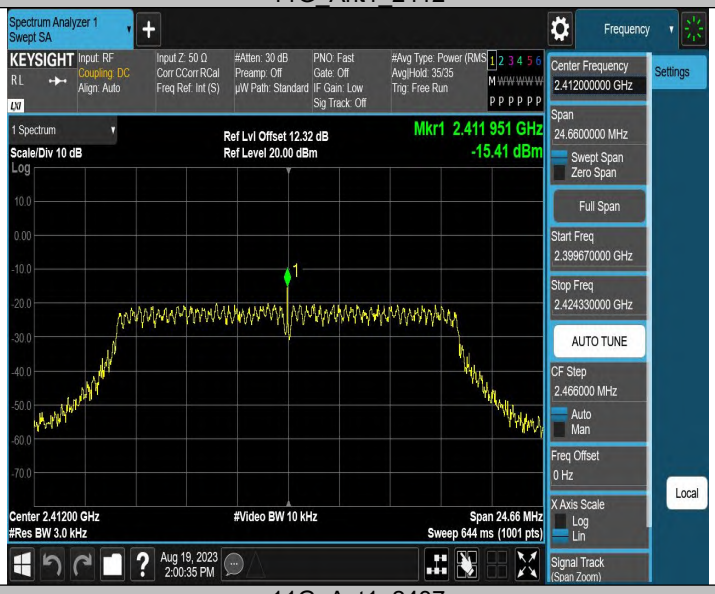
11.5. Original test data

11B_Ant1_2412

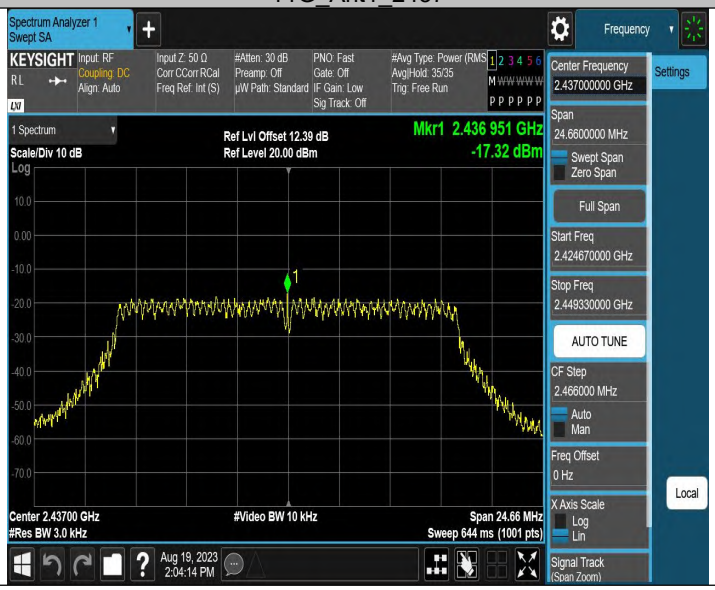
11B_Ant1_2437

11B_Ant1_2462

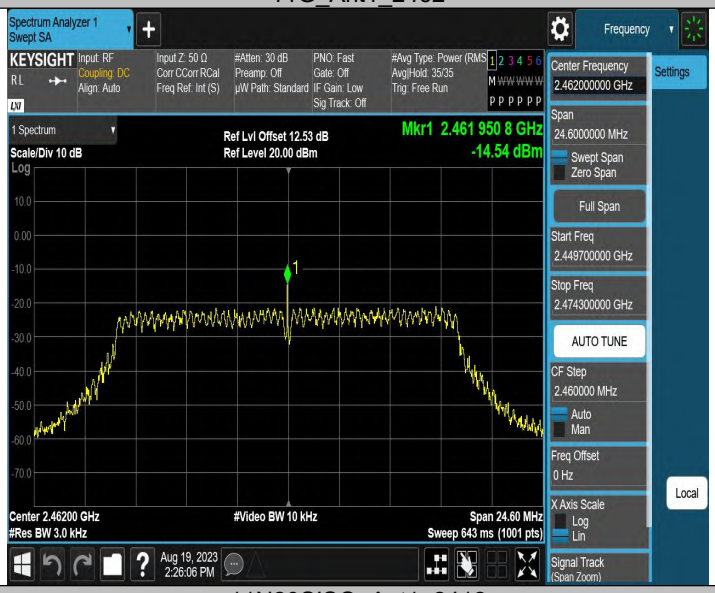
11G_Ant1_2412



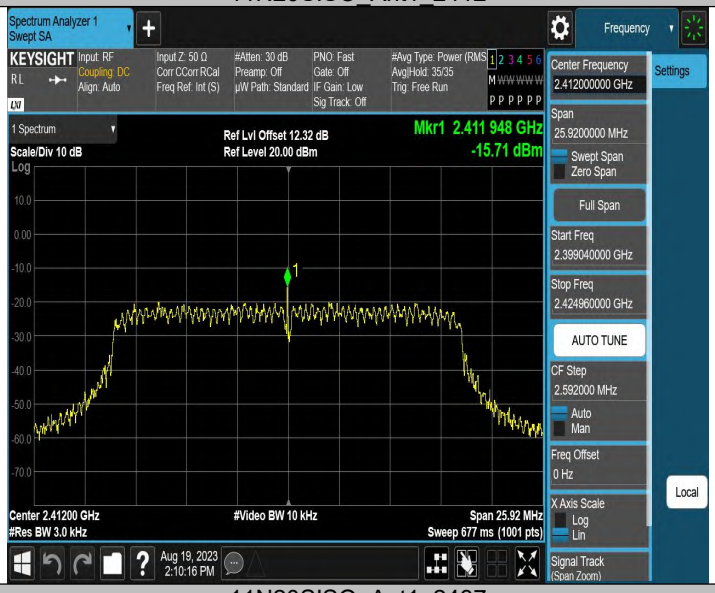
11G_Ant1_2437



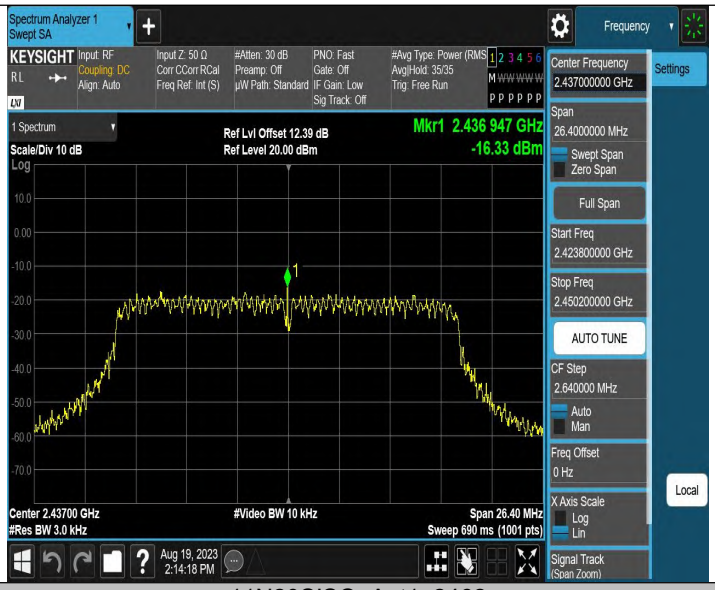
11G_Ant1_2462



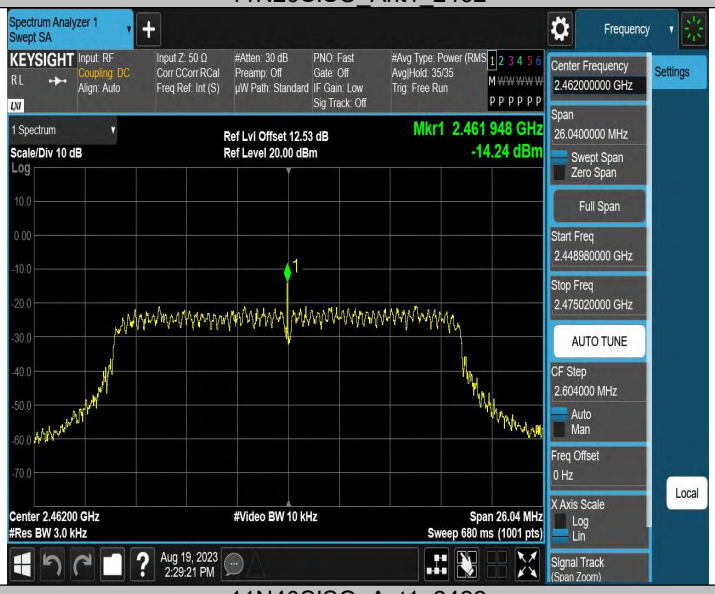
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



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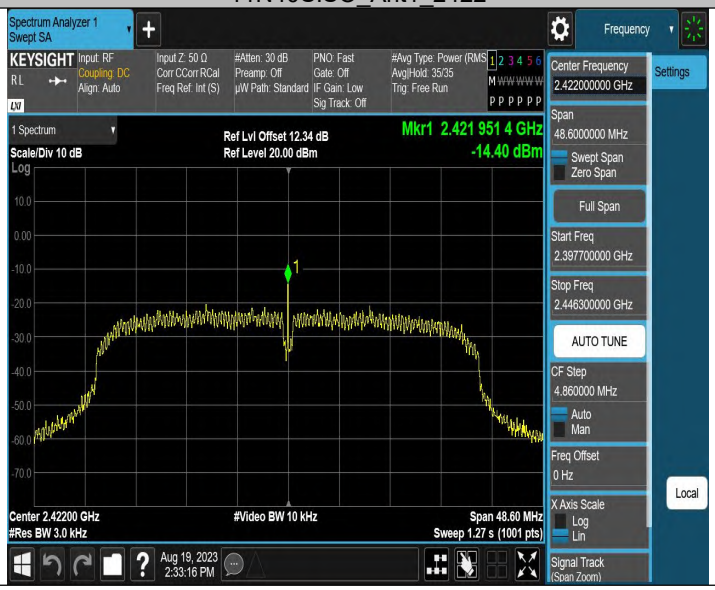

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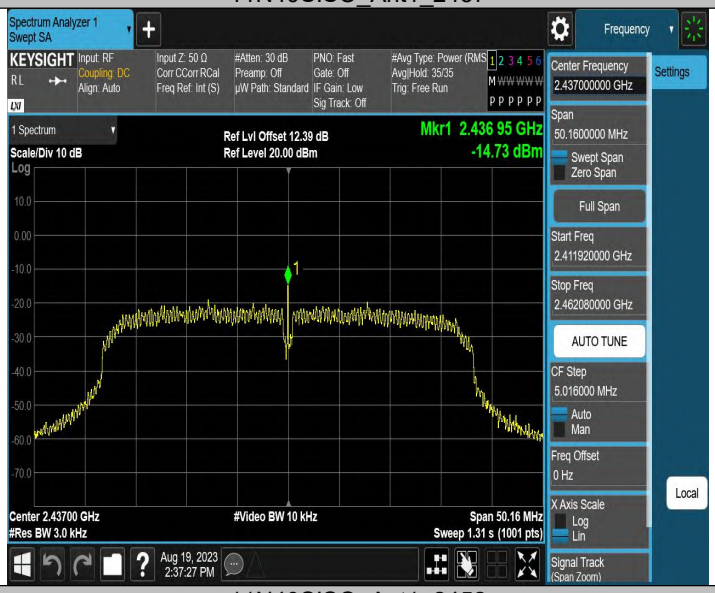
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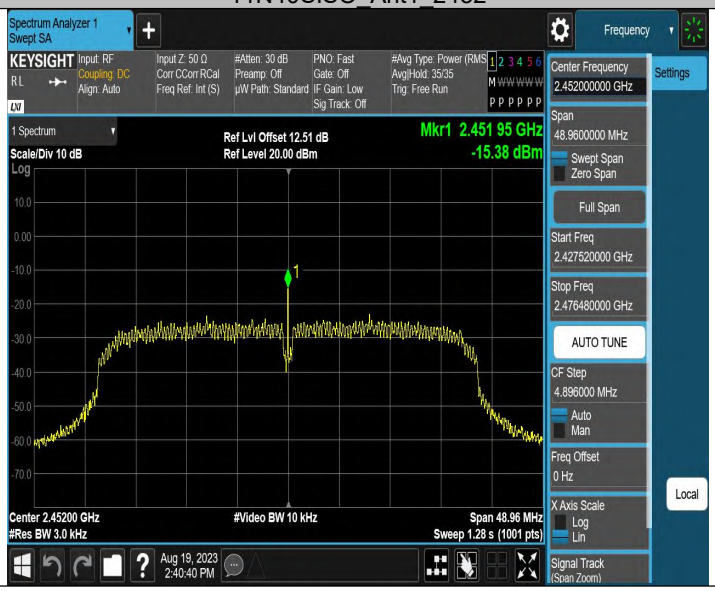


12. Conducted Band edge and Spurious Emissions

12.1. Block diagram of test setup

Same as section 8.1

12.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

12.3. Test Procedure

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Connect the UUT to the spectrum analyser and use the following settings:
Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	≥ 3 × RBW
measurement points	≥ span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

12.4. Test result

Test Mode	Ant.	Ch Name	Freq. [MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	Low	2412	2.00	-42.59	≤-18	PASS
		High	2462	2.59	-45.23	≤-17.41	PASS
11G	Ant1	Low	2412	-5.62	-38.97	≤-25.62	PASS
		High	2462	-6.36	-45.79	≤-26.36	PASS
11N20SISO	Ant1	Low	2412	-5.77	-41.24	≤-25.77	PASS
		High	2462	-6.63	-45.01	≤-26.63	PASS
11N40SISO	Ant1	Low	2422	-7.91	-40.96	≤-27.91	PASS
		High	2452	-11.09	-45.03	≤-31.09	PASS

Test Mode	Ant.	Freq. [MHz]	Freq Range [Mhz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	30~1000	2.00	-59.38	≤-18	PASS
			1000~26500	2.00	-33.04	≤-18	PASS
		2437	30~1000	2.57	-58.63	≤-17.43	PASS
			1000~26500	2.57	-33.12	≤-17.43	PASS
		2462	30~1000	2.59	-57.77	≤-17.41	PASS
			1000~26500	2.59	-32.96	≤-17.41	PASS
11G	Ant1	2412	30~1000	-5.62	-58.83	≤-25.62	PASS
			1000~26500	-5.62	-33.17	≤-25.62	PASS
		2437	30~1000	-3.65	-58.15	≤-23.65	PASS
			1000~26500	-3.65	-33.11	≤-23.65	PASS
		2462	30~1000	-6.36	-58.7	≤-26.36	PASS
			1000~26500	-6.36	-33.07	≤-26.36	PASS
11N20SISO	Ant1	2412	30~1000	-5.77	-59.43	≤-25.77	PASS
			1000~26500	-5.77	-33.13	≤-25.77	PASS
		2437	30~1000	-3.81	-59.24	≤-23.81	PASS
			1000~26500	-3.81	-33.15	≤-23.81	PASS
		2462	30~1000	-6.63	-59.02	≤-26.63	PASS
			1000~26500	-6.63	-33.1	≤-26.63	PASS
11N40SISO	Ant1	2422	30~1000	-7.91	-58.1	≤-27.91	PASS
			1000~26500	-7.91	-33.4	≤-27.91	PASS
		2437	30~1000	-6.84	-58.93	≤-26.84	PASS
			1000~26500	-6.84	-33.16	≤-26.84	PASS
		2452	30~1000	-11.09	-59.26	≤-31.09	PASS
			1000~26500	-11.09	-32.92	≤-31.09	PASS

12.5. Original test data

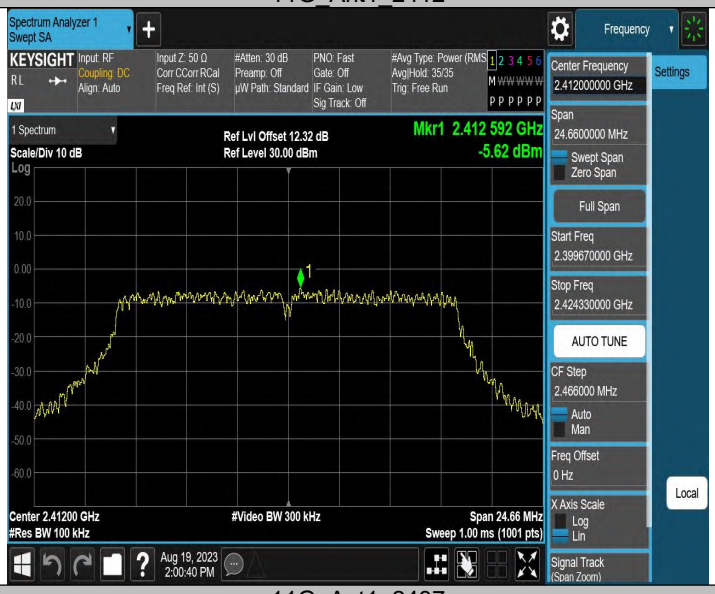
Reference level

11B_Ant1_2412

11B_Ant1_2437

11B_Ant1_2462

11G_Ant1_2412



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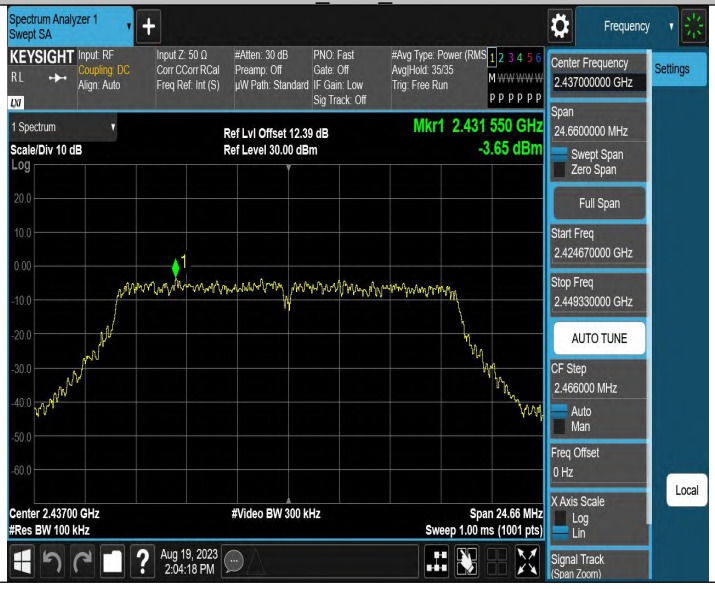

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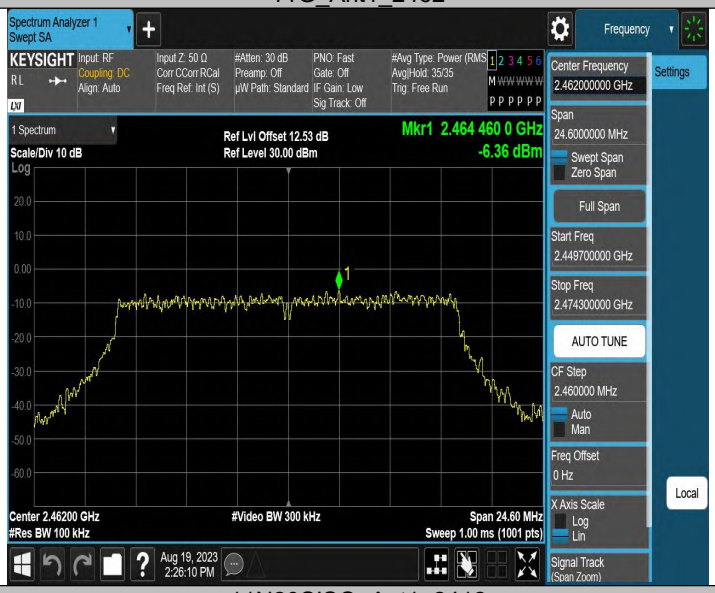

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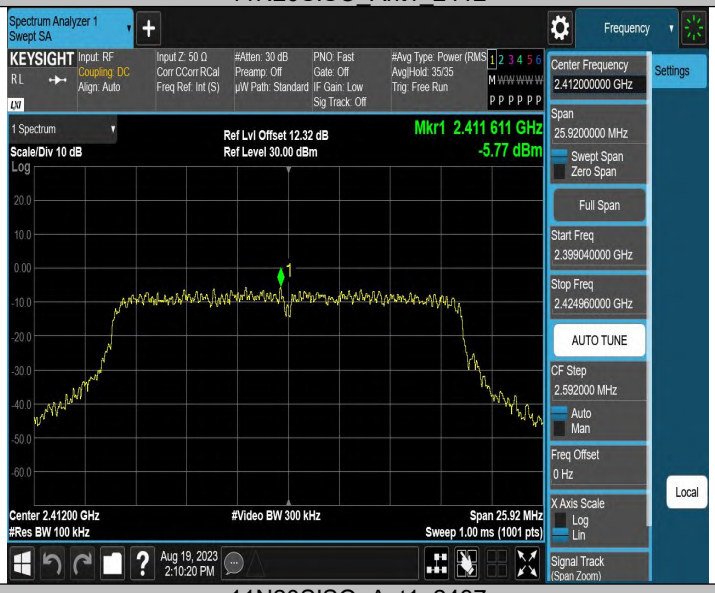

11N20SISO_Ant1_2437