Shenzhen Huaxia Testing Technology Co., Ltd.

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

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Report Template Version: V05
Report Template Revision Date: 2021-11-03

TEST REPORT

Report No.:	CQASZ20250300703E-01
Applicant:	Shenzhen PioCreat 3d Technology Co., Ltd.
Address of Applicant:	3rd Floor, Building 1, No. 156 Huawang Road, Langkou Community, Dalang Street, Longhua District, Shenzhen, China
Equipment Under Test (EUT):	
Product:	3D Printer
Model No.:	HALOT-X1,HALOT-X1 Combo
Test Model No.:	HALOT-X1
Brand Name:	N/A
FCC ID:	2A2DOHALOT-X1
Standards:	47 CFR Part 15, Subpart C KDB558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10:2013
Date of Receipt:	2025-03-31
Date of Test:	2025-03-31 to 2025-05-15
Date of Issue:	2025-05-30
Test Result :	**PASS***

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

Tested By: lewis zhou

(Lewis Zhou)

Reviewed By: Timo Lei

(Timo Lei)

Approved By:

(Jack Ai)

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1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20250300703E-01	Rev.01	Initial report	2025-05-30

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15.203	N/A	PASS
AC Power Line Conducted Emission	47 CFR Part 15.207	ANSI C63.10-2013	PASS
Conducted Peak & Average Output Power	47 CFR Part 15.247	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15.247	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15.247	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15.247	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15.247	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15.205/15.209	ANSI C63.10-2013	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application

3 Contents

Page

4 General Information

4.1 Client Information

Applicant:	Shenzhen PioCreat 3d Technology Co., Ltd.
Address of Applicant:	3rd Floor, Building 1, No. 156 Huawang Road, Langkou Community, Dalang Street, Longhua District, Shenzhen, China
Manufacturer:	Shenzhen PioCreat 3d Technology Co., Ltd.
Address of Manufacturer:	3rd Floor, Building 1, No. 156 Huawang Road, Langkou Community, Dalang Street, Longhua District, Shenzhen, China
Factory:	Shenzhen PioCreat 3d Technology Co., Ltd.
Address of Factory:	3rd Floor, Building 1, No. 156 Huawang Road, Langkou Community, Dalang Street, Longhua District, Shenzhen, China

4.2 General Description of EUT

Product Name:	3D Printer
Model No.:	HALOT-X1,HALOT-X1 Combo
Test Model No.:	HALOT-X1
Trade Mark:	N/A
Software Version:	V1.0
Hardware Version:	V1.2
Power Supply:	AC100-120V~,200-240V.50-60Hz, 350W
EUT Supports Radios application:	2.4GHz: Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462MHz;
Simultaneous Transmission	☐ Simultaneous TX is supported and evaluated in this report. ☒ Simultaneous TX is not supported.

4.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps
Product Type:	☒ Mobile ☐ Portable
Test Software of EUT:	adb
Antenna Type:	FPC antenna

Antenna Gain:	2.54dBi

Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11b/g/n (HT20):

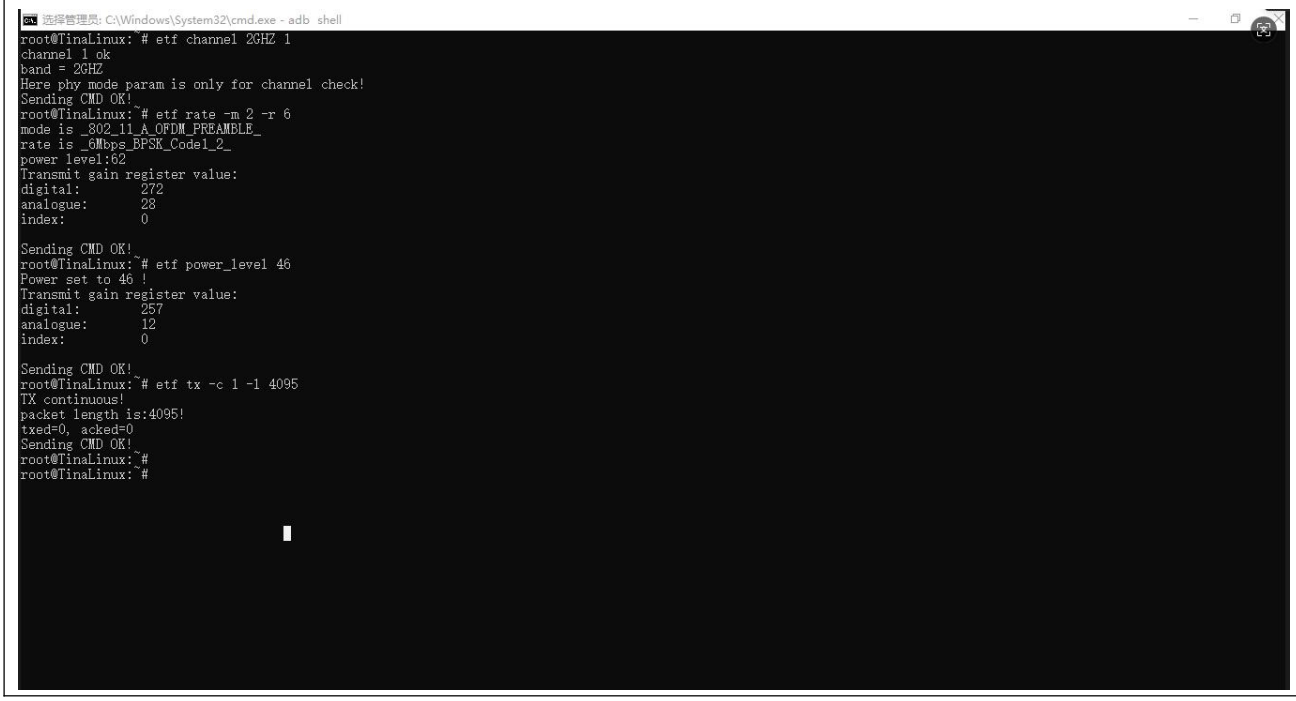
Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

Note:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.4 Test Environment and Mode

Operating Environment:	
Radiated Emissions:	
Temperature:	25.3 °C
Humidity:	55 % RH
Atmospheric Pressure:	1009 mbar
Conducted Emissions:	
Temperature:	25.6 °C
Humidity:	60 % RH
Atmospheric Pressure:	1009 mbar
Radio conducted item test (RF Conducted test room):	
Temperature:	25.5 °C
Humidity:	52 % RH
Atmospheric Pressure:	1009 mbar
Test mode:	
Transmitting mode:	EUT is set in RF test mode in all supported modulation types, bandwidth and data rate, etc.
EUT Power level:	Class0
Run Software:	



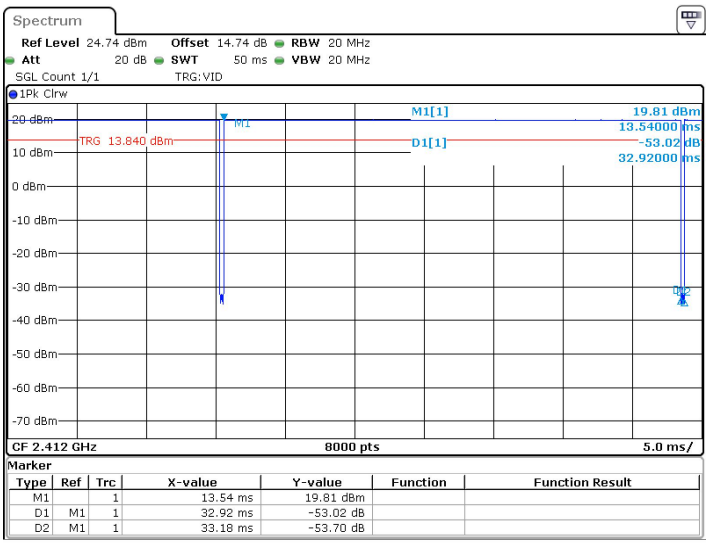
Operated Mode for Worst Duty Cycle:				
Test Mode	On time [Ton] (ms)	Period [Ttotal] ms)	Duty Cycle(%)	Average correction factor(dB)
IEEE802.11b	32.92	33.18	99.22	/
IEEE802.11g	5.45	5.72	95.28	0.21
IEEE802.11n (HT20)	5.04	5.31	94.92	0.23

Remark:

1) Duty cycle= On Time/ Period;

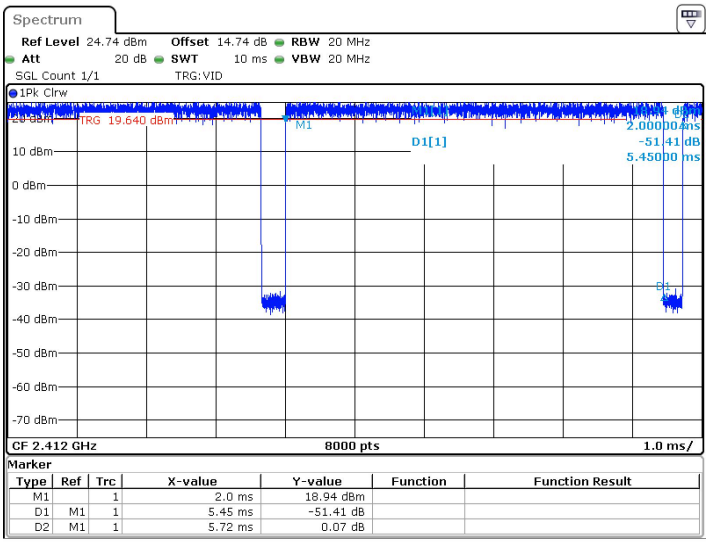
2) Duty Cycle factor = 10 * log(1/ Duty cycle);

Test Graph_IEEE802.11b Duty Cycle:



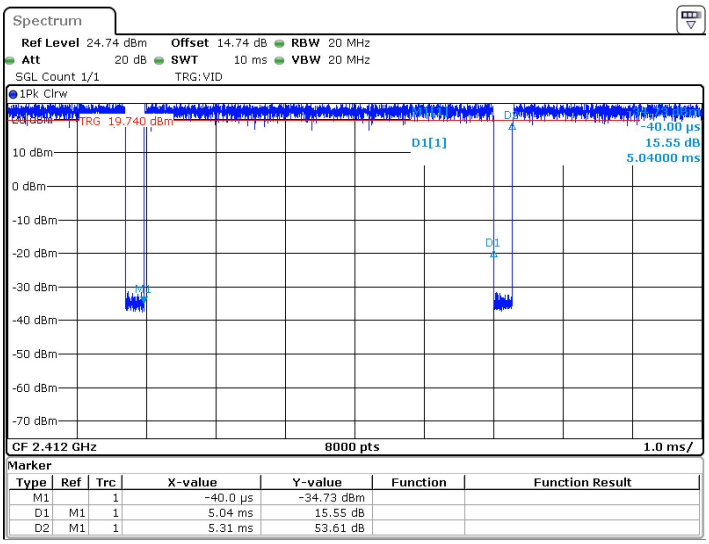
Date: 17.APR.2025 18:48:27

Test Graph_IEEE802.11g Duty Cycle:



Date: 17.APR.2025 18:55:09

Test Graph_IEEE802.11 n (HT20) Duty Cycle:



4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
/	/	/	/	/

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	/	/	/	/

4.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

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

4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

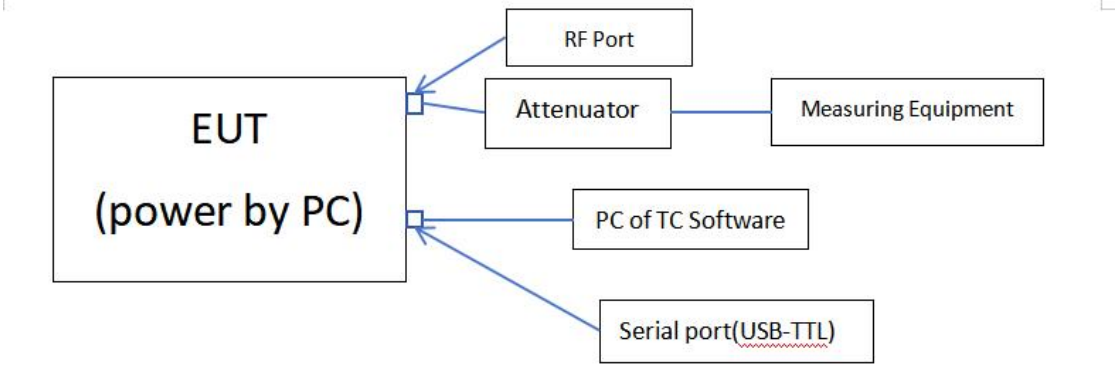
• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.8 Test configuration



4.9 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.10 Deviation from Standards

None.

4.11 Abnormalities from Standard Conditions

None.

4.12 Other Information Requested by the Customer

None.

4.13 Equipment List

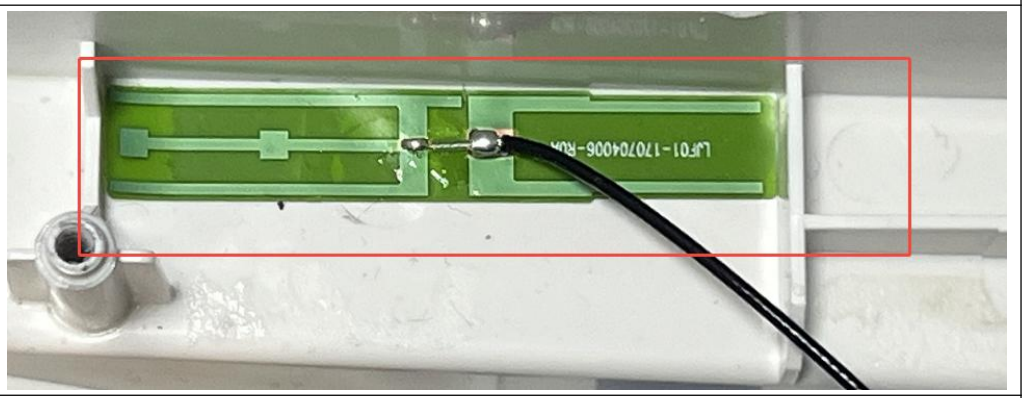
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2024/9/2	2025/9/1
Spectrum analyzer	R&S	FSU26	CQA-038	2024/9/2	2025/9/1
Spectrum analyzer	R&S	FSU40	CQA-075	2024/9/2	2025/9/1
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2024/9/2	2025/9/1
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2024/9/2	2025/9/1
Preamplifier	EMCI	EMC184055SE	CQA-089	2024/9/2	2025/9/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2023/9/8	2026/9/7
Bilog Antenna	R&S	HL562	CQA-011	2023/11/01	2026/10/31
Horn Antenna	R&S	HF906	CQA-012	2023/11/01	2026/10/31
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2023/9/7	2026/9/6
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2024/9/2	2025/9/1
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2024/9/2	2025/9/1
Antenna Connector	CQA	RFC-01	CQA-080	2024/9/2	2025/9/1
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2024/9/2	2025/9/1
Power meter	R&S	NRVD	CQA-029	2024/9/2	2025/9/1
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2024/9/2	2025/9/1
EMI Test Receiver	R&S	ESR7	CQA-005	2024/9/2	2025/9/1
LISN	R&S	ENV216	CQA-003	2024/9/2	2025/9/1
Coaxial cable	CQA	N/A	CQA-C009	2024/9/2	2025/9/1
DC power	KEYSIGHT	E3631A	CQA-028	2024/9/2	2025/9/1

Test software:

	Manufacturer	Software brand	Software version
Radiated Emissions test software	Tonscend	JS1120-3	Version:8
Conducted Emissions test software	Audix	e3	Version:9
RF Conducted test software	Audix	e3	V3.5.39

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
15.203 requirement: 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	
The antenna is FPC antenna. The connection/connection type between the antenna to the EUT's antenna port is: unique coupling This is either permanently attachment or a unique coupling that satisfies the requirement.	

5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	150kHz to 30MHz
Limit:	

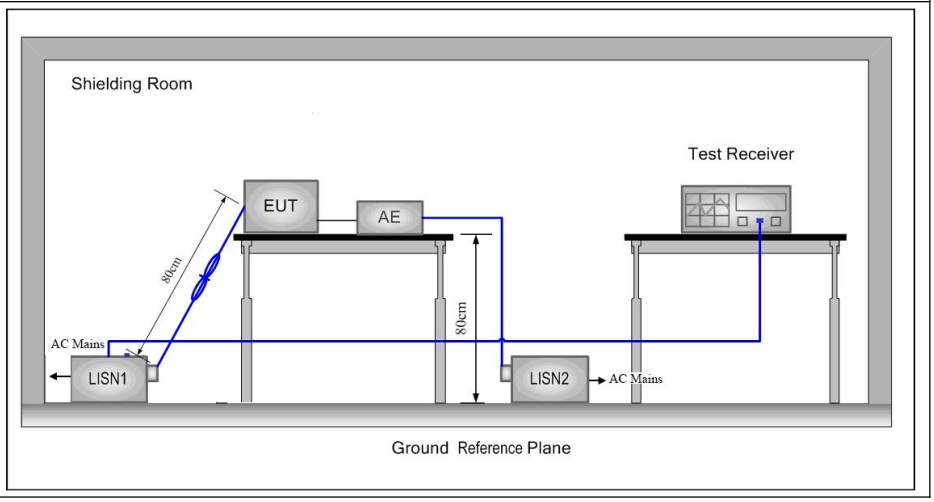
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Procedure:

1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

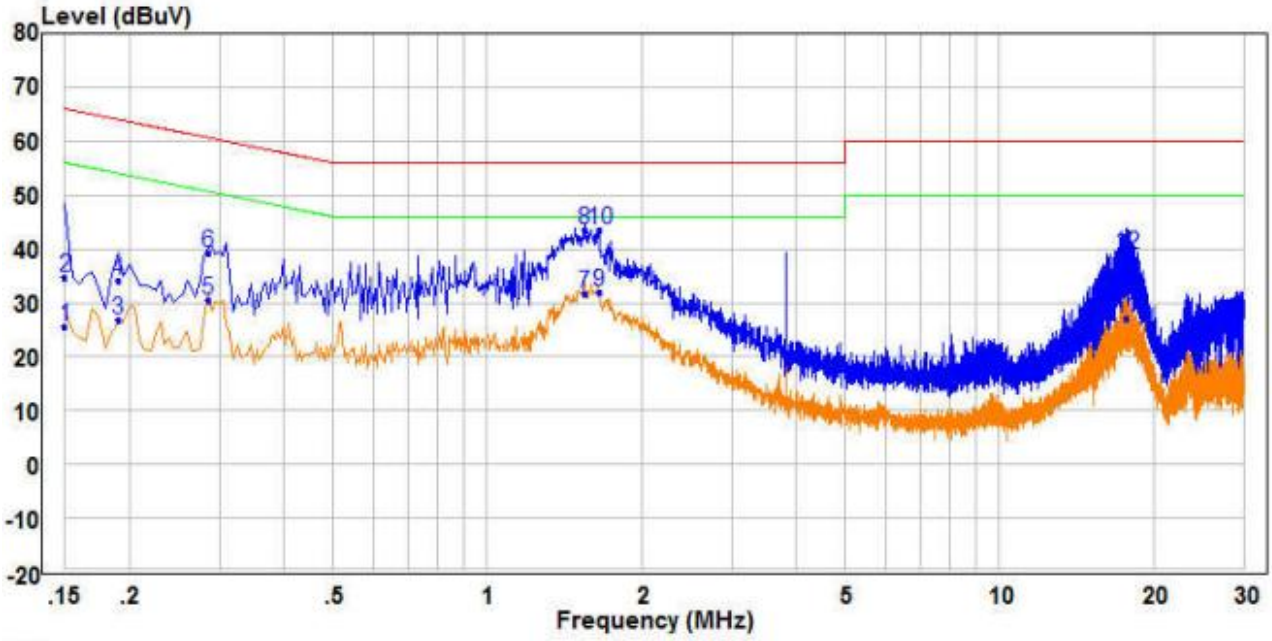
Test Setup:



Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11b at middle channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

Live Line:

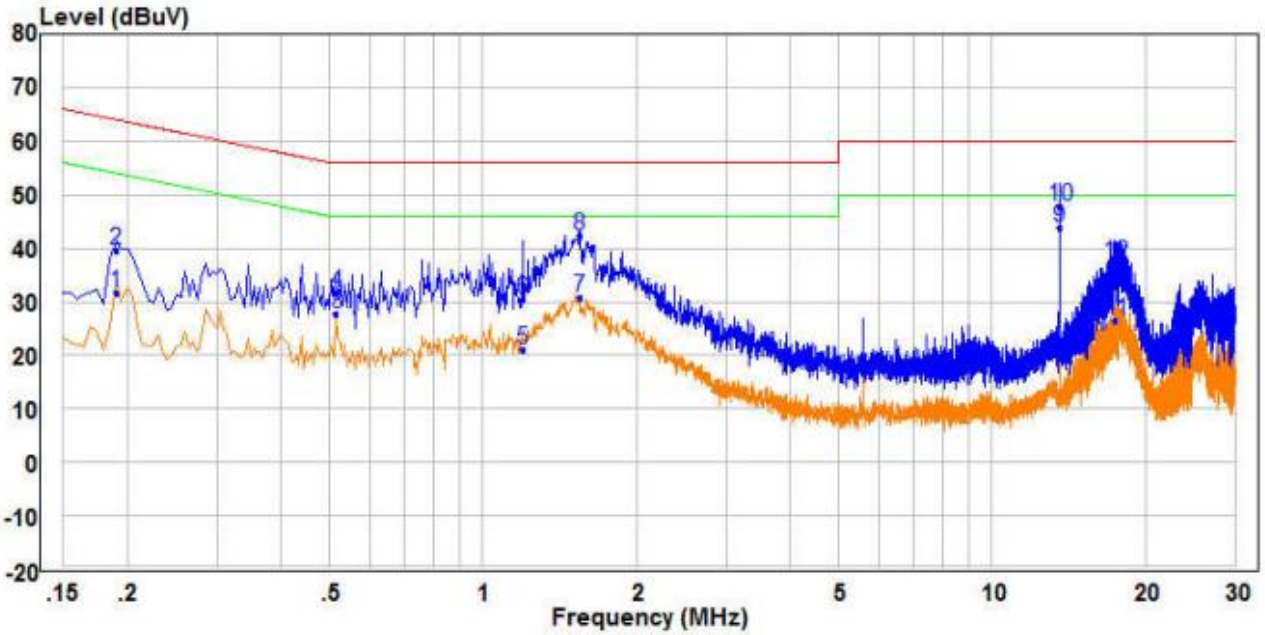


		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.150	15.87	9.70	25.57	56.00	-30.43	Average	Line
2		0.150	25.10	9.70	34.80	66.00	-31.20	QP	Line
3		0.190	17.10	9.63	26.73	54.04	-27.31	Average	Line
4		0.190	24.38	9.63	34.01	64.04	-30.03	QP	Line
5		0.285	20.87	9.51	30.38	50.67	-20.29	Average	Line
6		0.285	29.63	9.51	39.14	60.67	-21.53	QP	Line
7		1.550	20.87	10.93	31.80	46.00	-14.20	Average	Line
8	PP	1.550	32.76	10.93	43.69	56.00	-12.31	QP	Line
9	AV	1.655	21.00	11.11	32.11	46.00	-13.89	Average	Line
10		1.655	32.41	11.11	43.52	56.00	-12.48	QP	Line
11		17.660	17.37	9.79	27.16	50.00	-22.84	Average	Line
12		17.660	29.22	9.79	39.01	60.00	-20.99	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.190	21.98	9.62	31.60	54.04	-22.44	Average	Neutral
2		0.190	30.08	9.62	39.70	64.04	-24.34	QP	Neutral
3		0.515	18.15	9.72	27.87	46.00	-18.13	Average	Neutral
4		0.515	21.96	9.72	31.68	56.00	-24.32	QP	Neutral
5		1.195	11.19	9.71	20.90	46.00	-25.10	Average	Neutral
6		1.195	20.62	9.71	30.33	56.00	-25.67	QP	Neutral
7		1.550	21.09	9.73	30.82	46.00	-15.18	Average	Neutral
8		1.550	32.66	9.73	42.39	56.00	-13.61	QP	Neutral
9	PP	13.560	33.97	9.77	43.74	50.00	-6.26	Average	Neutral
10	QP	13.560	38.14	9.77	47.91	60.00	-12.09	QP	Neutral
11		17.490	16.84	9.78	26.62	50.00	-23.38	Average	Neutral
12		17.490	27.46	9.78	37.24	60.00	-22.76	QP	Neutral

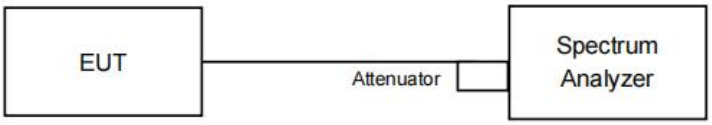
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3. If the Peak value under Average limit, the Average value is not recorded in the report.

5.3 Conducted Peak & Average Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10: 2013
Test Setup:	*Setup for Power meter measurement method*  *Setup for Spectrum analyser measurement method* 
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Only the worst case is recorded in the report.
Limit:	30dBm
Test Results:	Pass

Test Result

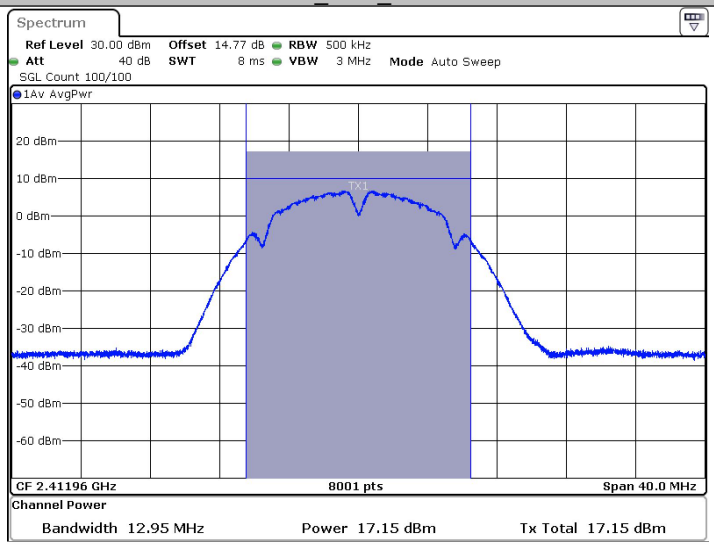
Test Mode	Frequency[MHz]	Result [dBm]	Limit [dBm]	Verdict
11B	2412	17.15	≤30.00	PASS
	2437	18.42	≤30.00	PASS
	2462	16.95	≤30.00	PASS
11G	2412	16.96	≤30.00	PASS
	2437	18.03	≤30.00	PASS
	2462	16.79	≤30.00	PASS
11N20SISO	2412	17.05	≤30.00	PASS
	2437	18.01	≤30.00	PASS
	2462	16.84	≤30.00	PASS

Note: Duty cycle correction factor details please see section 4.4.

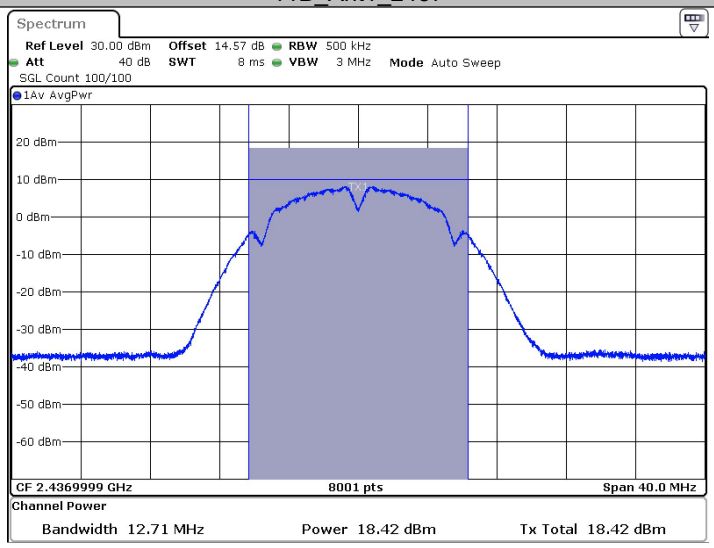
When Duty cycle >98%, D.C.F is not required.

Test Graphs

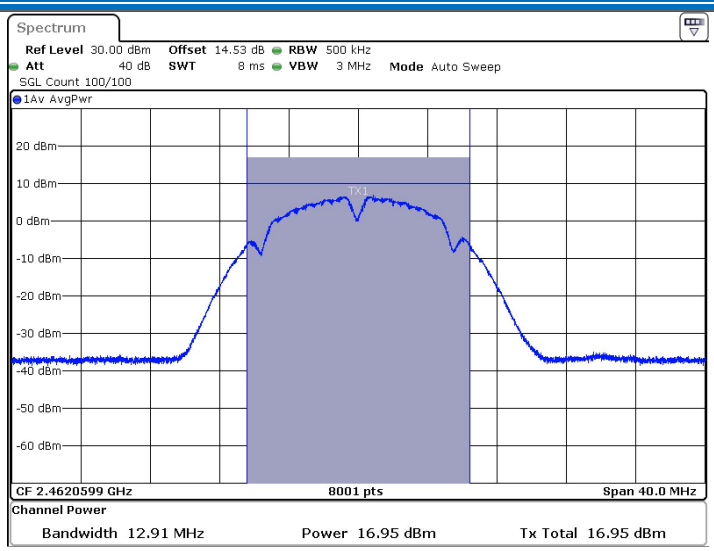
11B_Ant1_2412



11B_Ant1_2437

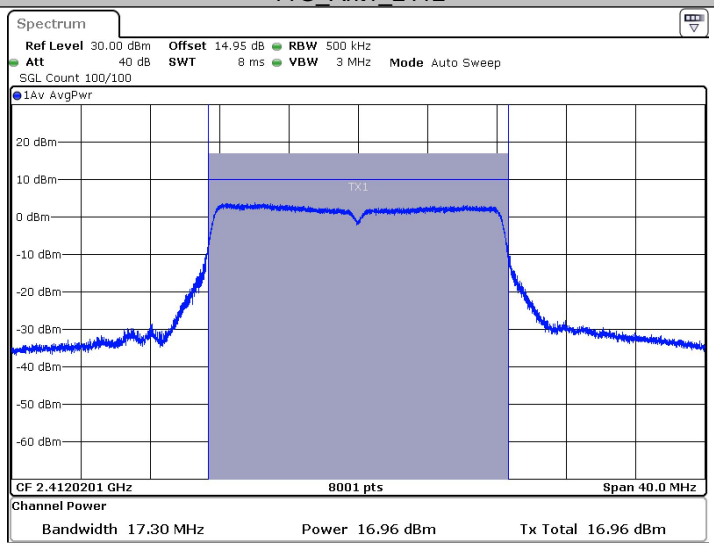


11B_Ant1_2462



Date: 17.APR.2025 18:53:41

11G_Ant1_2412



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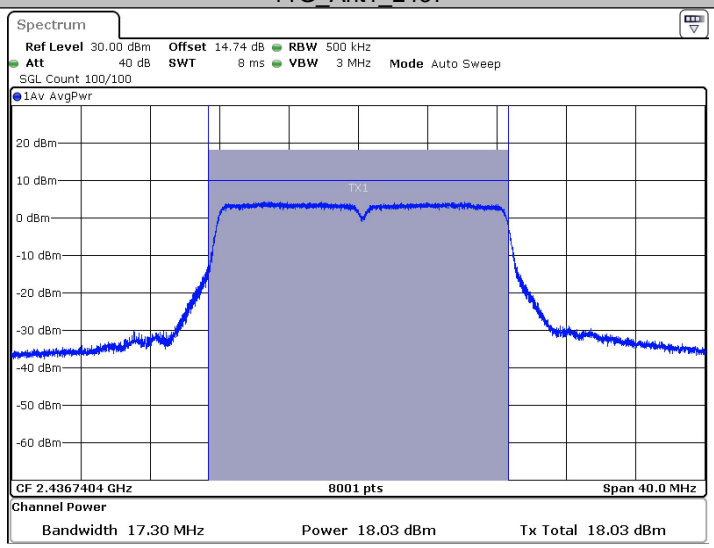
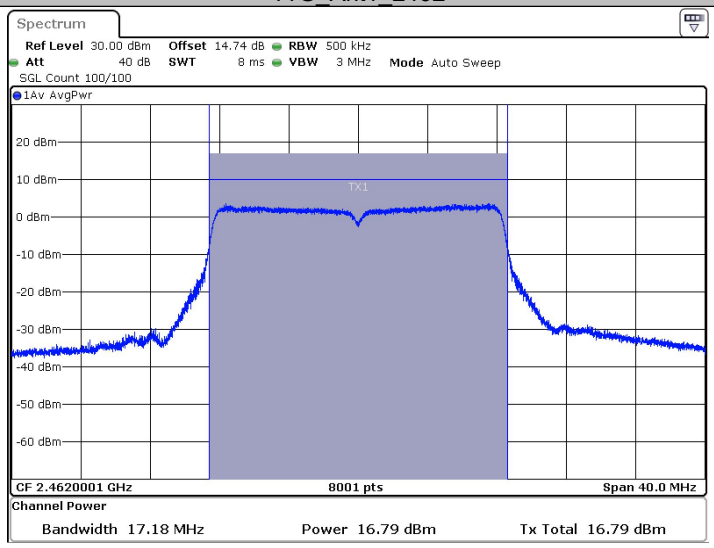
11G_Ant1_2437

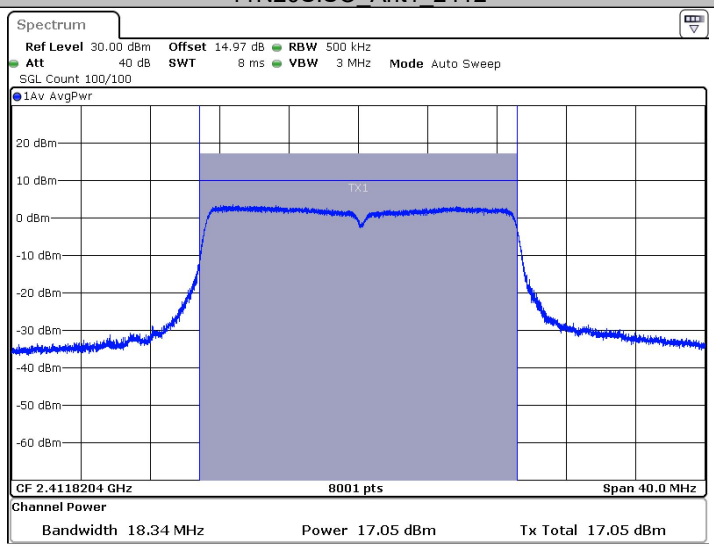


Date: 17.APR.2025 18:56:43

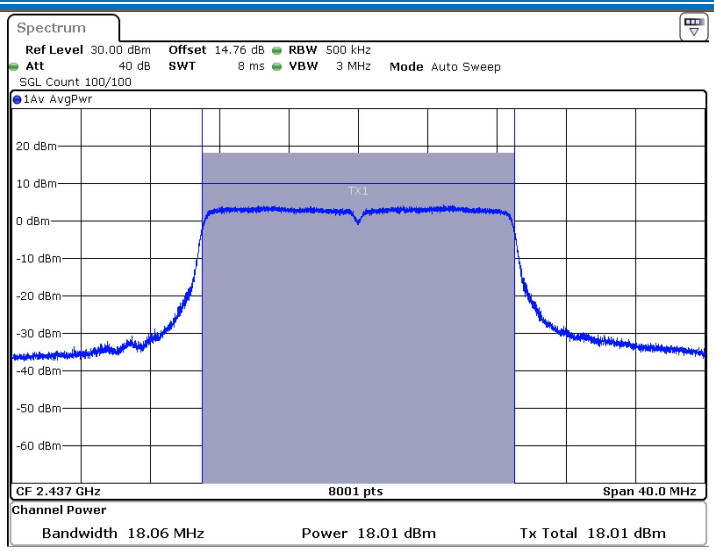
11G_Ant1_2462



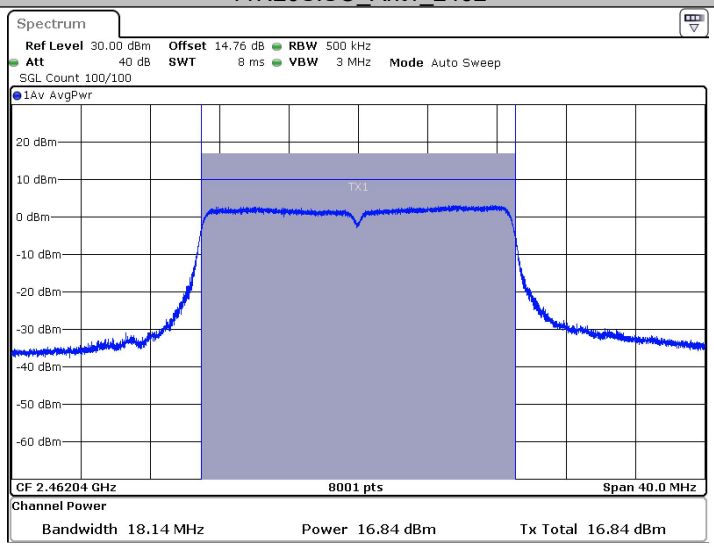
11N20SISO_Ant1_2412



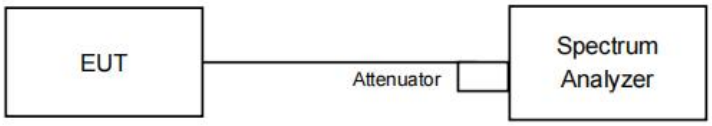
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



5.4 99% Occupied Bandwidth

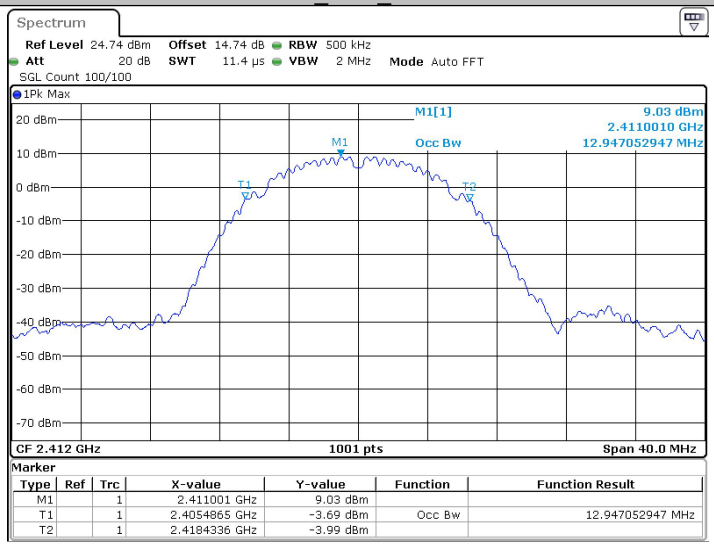
Test Requirement:	47 CFR Part 15C
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Only the worst case is recorded in the report.
Test Results:	Pass

Test Result

TestMode	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]
11B	2412	12.947	2405.4865	2418.4336
	2437	12.707	2430.6464	2443.3536
	2462	12.907	2455.6064	2468.5135
11G	2412	17.303	2403.3686	2420.6713
	2437	17.303	2428.0889	2445.3916
	2462	17.183	2453.4086	2470.5914
11N20SISO	2412	18.342	2402.6494	2420.9910
	2437	18.062	2427.9690	2446.0310
	2462	18.142	2452.9690	2471.1109

Test Graphs

11B_Ant1_2412



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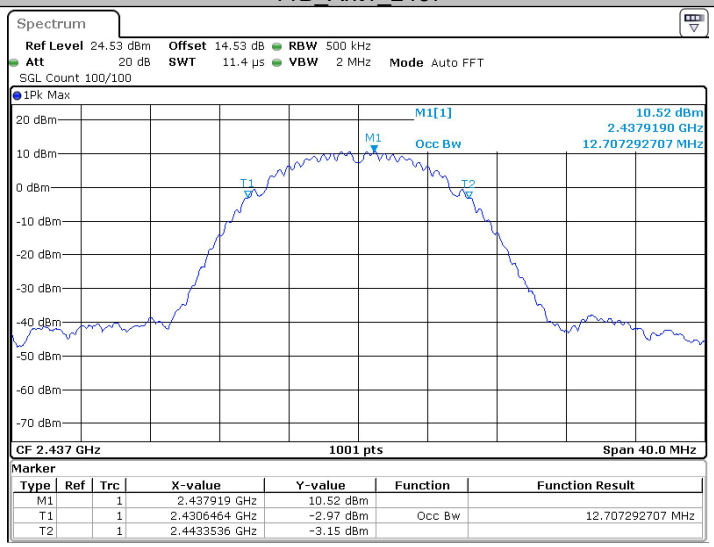
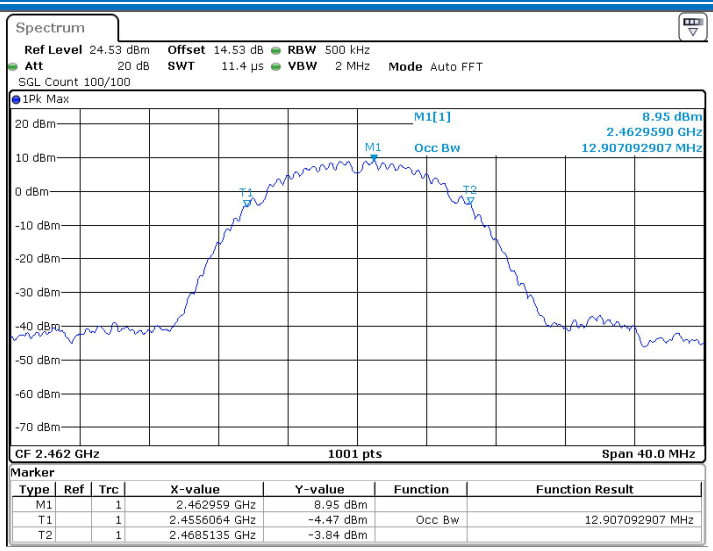
11B_Ant1_2437



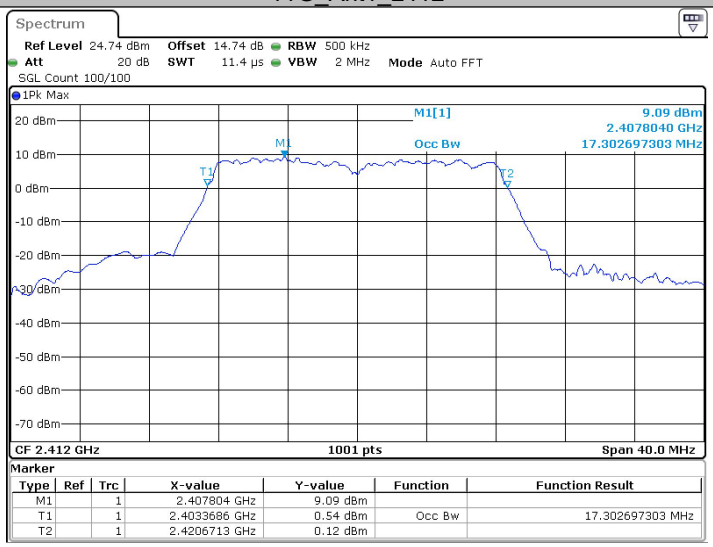
Date: 17.APR.2025 18:52:11

11B_Ant1_2462



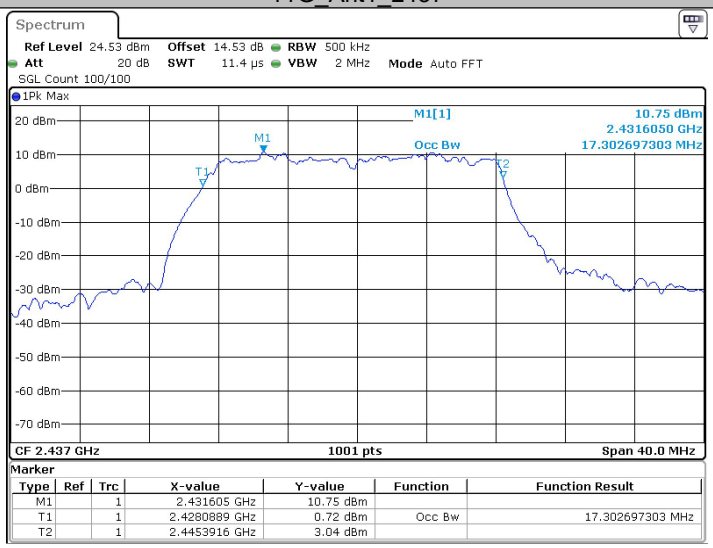
Date: 17.APR.2025 18:53:36

11G_Ant1_2412



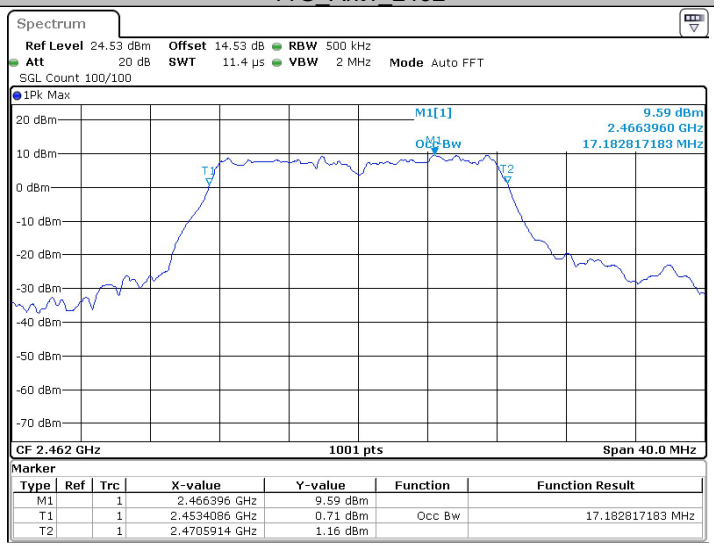
Date: 17.APR.2025 18:55:19

11G_Ant1_2437

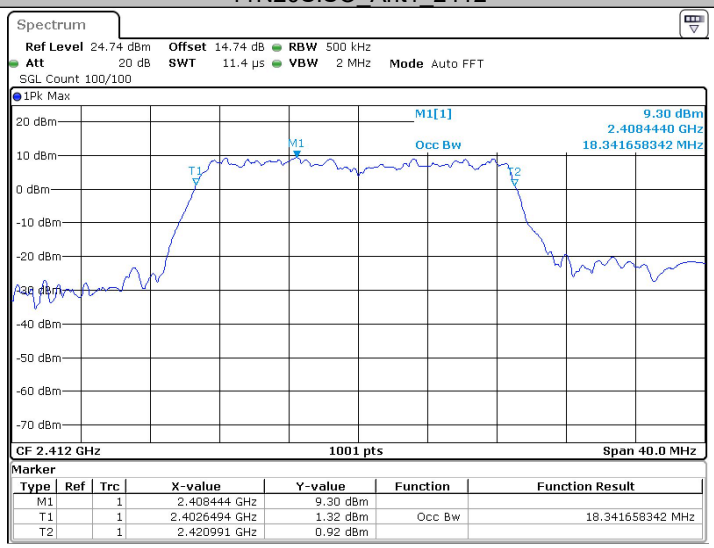


Date: 17.APR.2025 18:56:37

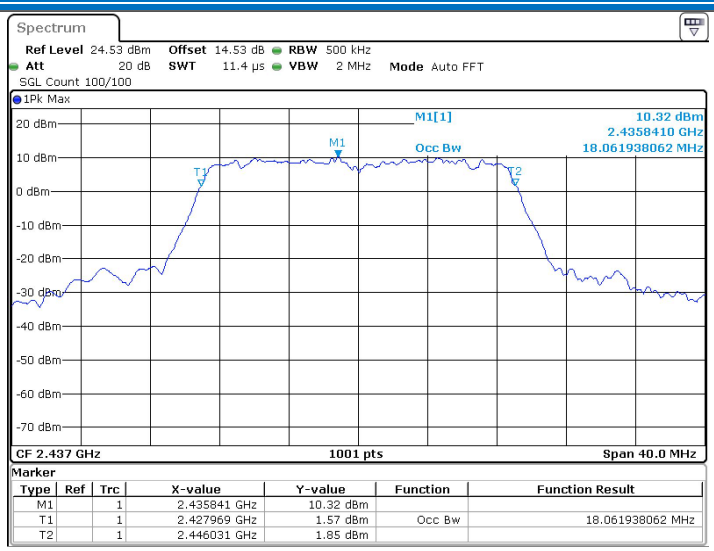
11G_Ant1_2462



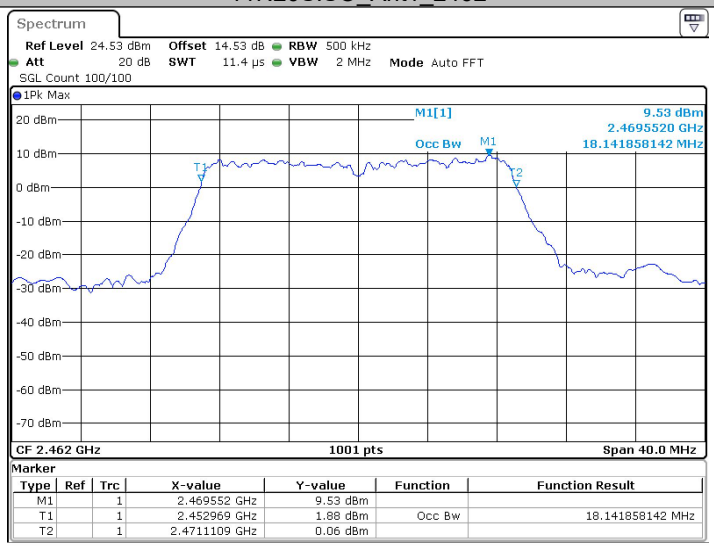
11N20SISO_Ant1_2412



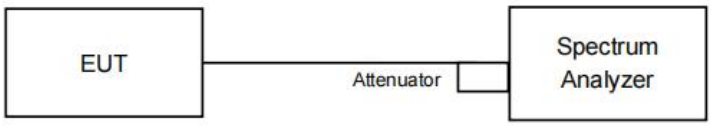
11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



5.5 6dB Occupied Bandwidth

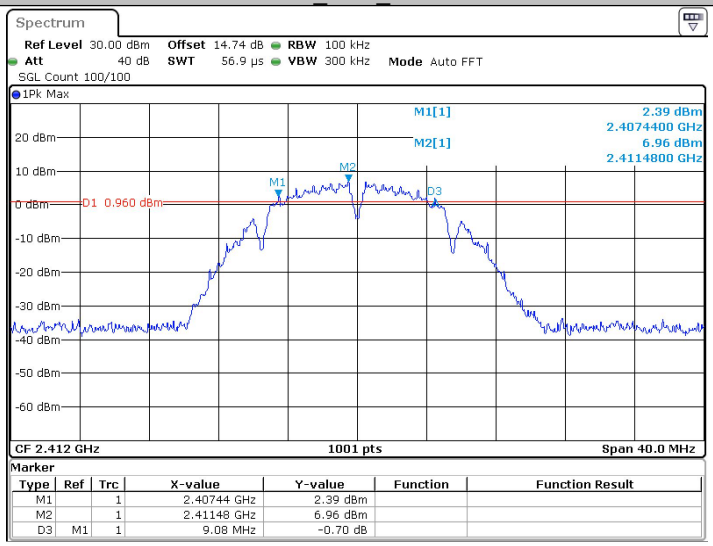
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Only the worst case is recorded in the report.
Limit:	≥ 500 kHz
Test Results:	Pass

Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.08	0.5	PASS
		2437	9.08	0.5	PASS
		2462	8.12	0.5	PASS
11G	Ant1	2412	16.60	0.5	PASS
		2437	16.36	0.5	PASS
		2462	16.56	0.5	PASS
11N20SISO	Ant1	2412	17.80	0.5	PASS
		2437	17.76	0.5	PASS
		2462	17.64	0.5	PASS

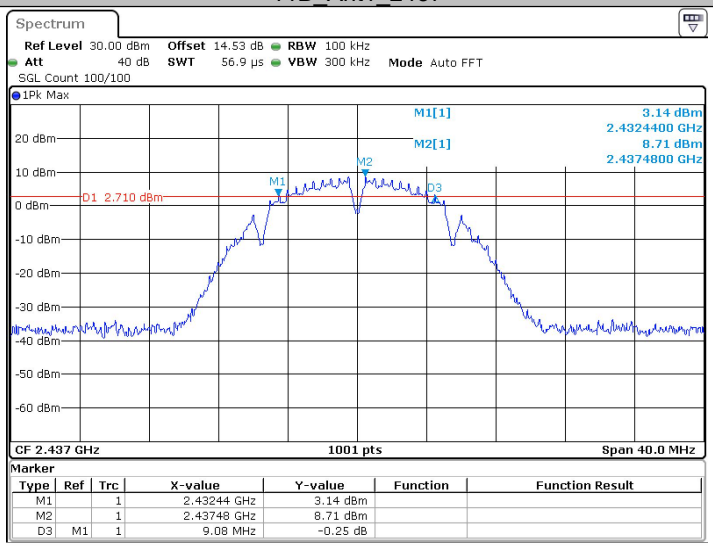
Test Graphs

11B_Ant1_2412



Date: 17.APR.2025 18:48:34

11B_Ant1_2437



Date: 17.APR.2025 18:52:07

11B_Ant1_2462