TEST REPORT
On behalf of

Savant Technologies LLC, dba GE Lighting, a Savant company

Product Name: Dual mode Tunable White A19

Model No.: CLEDA199SD1

FCC ID: PUU-A19-DMTWIII

Prepared For: Savant Technologies LLC, dba GE Lighting, a Savant company
1975 Noble Road, Cleveland, OH 44112

Prepared By: Audix Technology (Shanghai) Co., Ltd.
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TESTING
NVLAP LAB CODE 200371-0

File No. : C1D2013086
Report No. : ACI-F21078
Date of Test : 2021.04.06 – 18
Date of Report : 2021.04.20

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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TEST REPORT

Applicant	:	Savant Technologies LLC, dba GE Lighting, a Savant company
EUT Description	:	Dual mode Tunable White A19
	(A) Model No.	: Refer to Sec.2.1
	(B) Power Supply	: 120V AC 60Hz
	(C) Test Voltage	: 120V/60Hz

Test Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C
AND ANSI C63.10-2013

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.

This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

The test results for EUT's BLE function are contained in No.ACI-F21078 report.

Date of Test : 2021.04.06 – 18 Date of Report : 2021.04.20

Producer : _____
JAREY LU / Supervisor

Reviewer : _____
BYRON WU / Deputy Assistant Manager

AUDIX® For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

Signatory : _____
Authorized Signature(s) BYRON KWO/Assistant General Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(e)
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description	:	Dual mode Tunable White A19
Type of EUT	:	☑ Production ☐ Pre-product ☐ Pro-type
Model Number	:	CLEDA199SD1
Radio Tech	:	BLE 4.2; IEEE 802.11 b/g/n.
Note:	:	802.11n-HT20 only.
Channel Freq.	:	BLE: 2402MHz-2480MHz; 802.11b/g/n: 2412MHz-2462MHz.
Modulation	:	BLE: GFSK; 802.11b: DSSS (CCK, DQPSK, DBPSK); 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK).
Antenna Info.	:	Antenna Type: Metal Monopole Antenna Antenna Gain: 1.22 dBi The Antenna was a permanently attached antenna that is comply with 15.203 requirement.
Test Mode	:	The EUT was set at continuous TX during all the test in the report.
Applicant	:	Savant Technologies LLC, dba GE Lighting, a Savant company 1975 Noble Road, Cleveland, OH 44112
Manufacturer	:	same as Applicant
Factory	:	LEEDARSON LIGHTING CO., LTD. Xingtai Industrial Zone, Economic Development Zone, Changtai County, Zhangzhou city, Fujian Province, P.R. China

2.2 EUT Specifications Assessed in Current Report

Mode	Modulation	Data Rate(Mbps)
802.11b	DS (DQPSK, DBPSK, CCK)	Up to 11
802.11g	OFDM (64-QAM, 16-QAM, QPSK, BPSK)	Up to 54
802.11n-HT 20	OFDM (64-QAM, 16-QAM, QPSK, BPSK)	Up to 72.2

Channel List			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

2.3 Test Information

The test software " UI_mptool.exe" was used to control EUT work in TX mode, Power Index and select test channel.

Modulation	data rate (Mbps)	Power Index	Test Channel		Frequency (MHz)
802.11b	1	84	Low:	1	2412
		84	Middle:	6	2437
		84	High:	11	2462
802.11g	6	96	Low:	1	2412
		96	Middle:	6	2437
		96	High:	11	2462
802.11n20	MCS0	96	Low:	1	2412
		96	Middle:	6	2437
		96	High:	11	2462

2.4 Sample Description

Test Item	Model Number	Sample Number	Date of receipted
Conducted Emission	CLEDA199SD1	E2103444-01/02	2021.03.29
Radiated Emission	CLEDA199SD1	E2103444-01/02	2021.03.29
Conducted RF Test	CLEDA199SD1	E2103444-02/02	2021.03.29

2.5 Supported equipment

Brand	:	Acer
Product Name:	:	Notebook PC
Model Name	:	TravelMate P238 series
Model Number	:	N15W8

2.6 Description of Test Facility

Name of Firm	:	Audix Technology (Shanghai) Co., Ltd.
Site Location	:	3F and 4F, 34Bldg, 680 Guiping Rd., Caohejing Hi-Tech Park, Shanghai 200233, China.
Accredited by NVLAP, Lab Code	:	200371-0
FCC Designation Number	:	CN5027
Test Firm Registration Number	:	954668

3 CONDUCTED EMISSION TEST

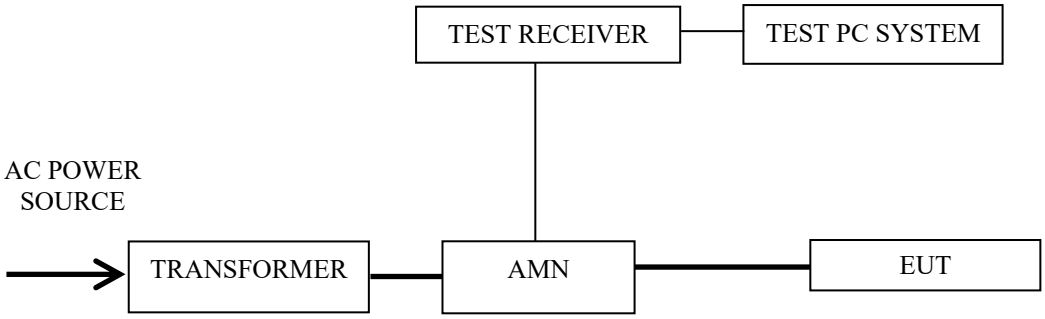
3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	100841	2021.02.11	1 Year
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	2021.01.06	1 Year
3.	Software	Audix	e3	6.2009-1-15	--	--

3.2 Block Diagram of Test Setup

3.2.1 Conducted Disturbance Test Setup



—— : Signal Line
▬ : Power Line

3.3 Conducted Emission Limits (§15.207)

Frequency Range (MHz)	Limits dB(V)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE 1 – The lower limit shall apply at the transition frequencies. NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz		

3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipment.

3.5.3 Turn the EUT on the test mode, and then test.

3.6 Test Procedures

The EUT was placed upon a non-metallic table, which is 0.8 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50 Ω coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15 Subpart C and ANSI C63.10: 2013 requirements during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

Test with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. (According to KDB 174176 D01 Line Conducted FAQ)

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Worst case emission:

No.	Operation	Modulation	Channel	Frequency (MHz)	Data Page
1.	Lighting	--	--	--	P12

NOTE 1 – Level = Read Level + AMN Factor + Cable Loss
NOTE 2 – "QP" means "Quasi-Peak" values
NOTE 3 – The emission levels which not reported are too low against the official limit.

Worst case emission

EUT	:	Dual mode Tunable White A19	Temperature :	22℃
Model No.	:	CLEDA199SD1	Humidity :	51%RH
Test Mode	:	Lighting	Date of Test :	2021.04.10

Polarization	Frequency (MHz)	Meter Reading dB (V)	AMN Factor (dB/m)	Cable Loss (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Line	0.15	57.46	0.2	0.03	57.69	66	8.31	QP
	0.15	39.89	0.2	0.03	40.12	56	15.88	Average
	0.3133	51.44	0.2	0.03	51.67	59.88	8.21	QP
	0.3133	32.86	0.2	0.03	33.09	49.88	16.79	Average
	0.5523	**48**	**0.2**	**0.05**	**48.25**	**56**	**7.75**	**QP**
	0.5523	30.72	0.2	0.05	30.97	46	15.03	Average
	1.094	42.21	0.2	0.06	42.47	56	13.53	QP
	1.094	28.33	0.2	0.06	28.59	46	17.41	Average
	3.074	30.5	0.3	0.11	30.91	56	25.09	QP
	3.074	20.9	0.3	0.11	21.31	46	24.69	Average
	15.718	12.35	0.67	0.25	13.27	60	46.73	QP
	15.718	3.68	0.67	0.25	4.6	50	45.4	Average
Neutral	0.1516	55.52	0.2	0.03	55.75	65.91	10.16	QP
	0.1516	37.06	0.2	0.03	37.29	55.91	18.62	Average
	0.4062	49.43	0.2	0.04	49.67	57.73	8.06	QP
	0.4062	28.9	0.2	0.04	29.14	47.73	18.59	Average
	0.5581	47.4	0.2	0.05	47.65	56	8.35	QP
	0.5581	29.43	0.2	0.05	29.68	46	16.32	Average
	1.054	43.44	0.2	0.06	43.7	56	12.3	QP
	1.054	27.17	0.2	0.06	27.43	46	18.57	Average
	2.554	27.42	0.21	0.1	27.73	56	28.27	QP
	2.554	9	0.21	0.1	9.31	46	36.69	Average
	6.488	26.9	0.3	0.16	27.36	60	32.64	QP
	6.488	17.4	0.3	0.16	17.86	50	32.14	Average

TEST ENGINEER: Jarey

4 RADIATED EMISSION TEST

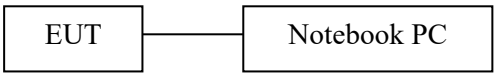
4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

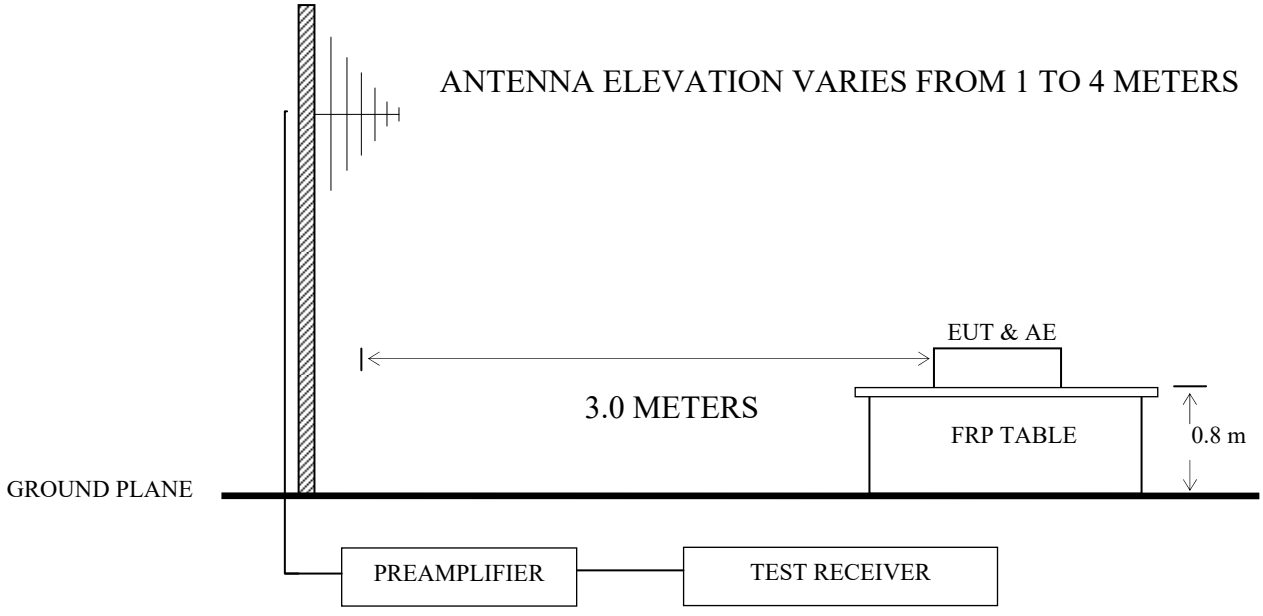
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Preamplifier	Agilent	8447D	2944A10548	2020.04.26	1 Year
2.	Preamplifier	HP	8449B	3008A00864	2021.01.05	1 Year
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2020.09.16	1 Year
4.	Test Receiver	R&S	ESCI	101303	2020.04.26	1 Year
5.	Bilog Antenna+6dB Attenuator	Schwarz beck	VULB 9168+EMCI-N-6-06	708+AT-N0638	2020.07.06	1 Year
6.	Horn Antenna	EMCO	3115	9607-4878	2020.07.13	1 Year
7.	Horn Antenna	EMCO	3116	00062643	2020.09.08	1 Year
8.	Cavity Band Rejection Filter	Microwave	WT-A3882-R10	WT200312-1-1	2020.07.07	1 Year
9.	Software	Audix	e3	SET00200 9912M295-2	--	--

4.2 Block Diagram of Test Setup

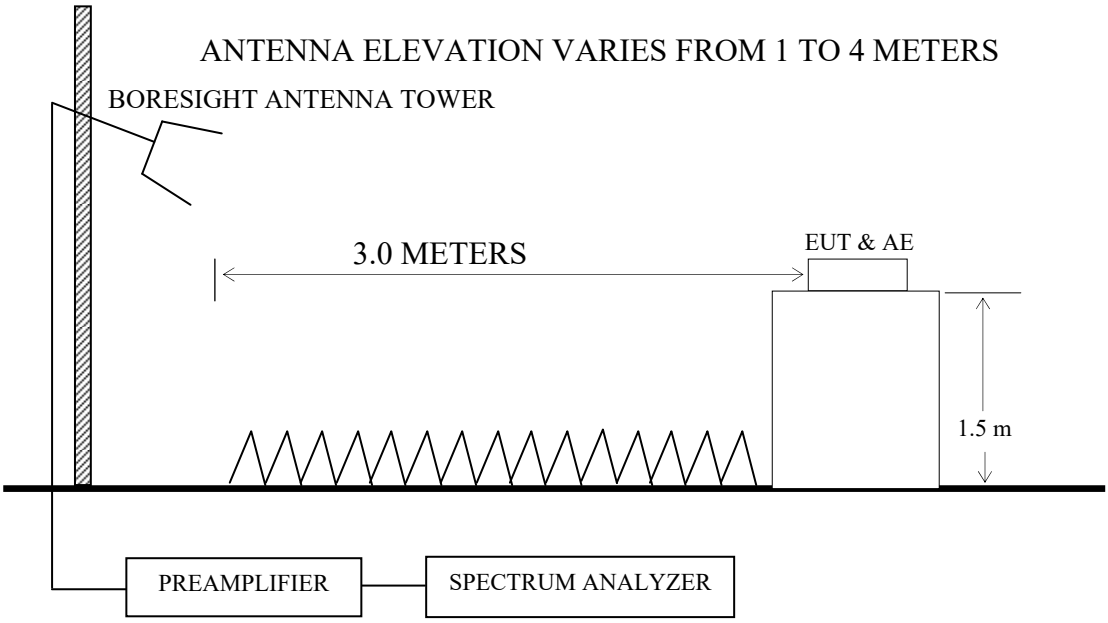
4.2.1 EUT & Peripherals



4.2.2 Below 1GHz



4.2.3 Above 1GHz



4.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (V/m)	
		(V/m)	dB(V/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB (V/m) = 20 log Emission Level (V/m)
NOTE 2 - The tighter limit applies at the band edges.
NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.
NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 4.2.

4.5.2 Turn on the power of all equipment.

4.5.3 Turn the EUT on the test mode, and then test.

4.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of Agilent N9010A was set at 1MHz for above 1GHz.

The frequency range from 30 MHz to 25 GHz (Up to 10^{th} harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Frequency range: below 1GHz (Worst case emission)

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P17

Frequency range: above 1GHz

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	802.11b	1	2412 MHz	P18
2.			6	2437 MHz	P18
3.			11	2462 MHz	P19
4.	Transmitting	802.11g	11	2462 MHz	P19
5.	Transmitting	802.11n20	11	2462 MHz	P20

Restricted bands:

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	802.11b	Cabinet Emission		P21
2.		802.11g	Cabinet Emission		P22
3.		802.11n20	Cabinet Emission		P23

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
NOTE 2 – "QP" means "Quasi-Peak" values
NOTE 3 – 0°was the table front facing the antenna. Degree is calculated from 0°clockwise facing the antenna.
NOTE 4 – The emission levels which not reported are too low against the official limit.
NOTE 5 – The emission levels recorded below is data of EUT configured in Standing direction, for Standing direction was the maximum emission direction during the test. The data of Side & Lying direction are too low against the official limit to be reported.
NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.
For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
NOTE 7 – The frequency range 2310-2390MHz & 2483.5-2500MHz were tested for Restricted bands.

Worst case emission < 1GHz

EUT	:	Dual mode Tunable White A19	Temperature :	22℃	
Model No.	:	CLEDA199SD1	Humidity :	51%RH	
Test Mode	:	Transmitting	Date of Test :	2021.04.07 - 18	

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	52.391	22.03	19.44	0.78	28.35	13.9	40	26.1	QP
	66.967	21.54	18.63	0.88	28.25	12.8	40	27.2	QP
	199.99	36.92	15.8	1.57	27.5	26.79	43.5	16.71	QP
	263.82	31.27	18.04	1.74	27.39	23.66	46	22.34	QP
	480.53	21.87	23.09	2.4	27.17	20.19	46	25.81	QP
	804.6	21.78	28.02	3.09	27.48	25.41	46	20.59	QP
Vertical	44.587	22.21	18.51	0.71	28.37	13.06	40	26.94	QP
	63.536	21.8	19.14	0.86	28.27	13.53	40	26.47	QP
	136.94	21.74	18.05	1.26	27.82	13.23	43.5	30.27	QP
	187.1	24.92	17.05	1.48	27.56	15.89	43.5	27.61	QP
	428.02	21.45	22.1	2.23	27.22	18.56	46	27.44	QP
	782.35	20.41	27.87	3.02	27.46	23.84	46	22.16	QP

TEST ENGINEER: Jarey

Radiated Emission > 1GHz

EUT	:	Dual mode Tunable White A19	Temperature :	22℃
Model No.	:	CLEDA199SD1	Humidity :	51%RH
Test Mode	:	Transmitting	Date of Test :	2021.04.07 - 18

802.11b CH2412MHz

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	3184	43.69	30.54	6.09	35.24	45.08	74	28.92	Peak
	4822	40.75	32.98	7.55	34.75	46.53	74	27.47	Peak
	7062	37.5	35.59	9.37	34.8	47.66	74	26.34	Peak
	8756	37.58	38.39	10.58	34.72	51.83	74	22.17	Peak
	10408	36.79	38.48	11.46	34.52	52.21	74	21.79	Peak
	12662	35.15	38.92	12.8	34	52.87	74	21.13	Peak
Vertical	3324	41.61	30.85	6.23	35.19	43.5	74	30.5	Peak
	4822	43.73	32.98	7.55	34.75	49.51	74	24.49	Peak
	4822	41.59	32.98	7.55	34.75	47.37	54	6.63	Average
	6362	37.66	34.41	8.68	34.74	46.01	74	27.99	Peak
	8098	36.7	37.74	10.28	34.79	49.93	74	24.07	Peak
	10100	36.45	38.42	11.37	34.58	51.66	74	22.34	Peak
	12228	35.67	38.93	12.45	34.13	52.92	74	21.08	Peak

802.11b CH2437MHz

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	3184	42.23	30.54	6.09	35.24	43.62	74	30.38	Peak
	4864	41.45	33.06	7.61	34.74	47.38	74	26.62	Peak
	6894	36.92	35.22	9.18	34.79	46.53	74	27.47	Peak
	9330	36.75	38.37	10.97	34.67	51.42	74	22.58	Peak
	11066	36.06	38.63	11.64	34.38	51.95	74	22.05	Peak
	12522	35.89	38.7	12.68	34.04	53.23	74	20.77	Peak
Vertical	3184	44.44	30.54	6.09	35.24	45.83	74	28.17	Peak
	4864	42.39	33.06	7.61	34.74	48.32	74	25.68	Peak
	4864	40.71	33.06	7.61	34.74	46.64	54	7.36	Average
	6908	38.08	35.26	9.18	34.79	47.73	74	26.27	Peak
	9106	36.2	38.32	10.79	34.69	50.62	74	23.38	Peak

	10688	36.33	38.54	11.55	34.46	51.96	74	22.04	Peak
	13138	34.08	39.83	13.03	33.85	53.09	74	20.91	Peak

802.11b CH2462MHz

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	3520	41.01	31.26	6.4	35.13	43.54	74	30.46	Peak
	5844	37.28	34.2	8.25	34.7	45.03	74	28.97	Peak
	7762	36.96	37.23	10.01	34.8	49.4	74	24.6	Peak
	9918	36.75	38.4	11.33	34.61	51.87	74	22.13	Peak
	11388	35.34	38.76	11.87	34.32	51.65	74	22.35	Peak
	13082	33.86	39.72	13.03	33.86	52.75	74	21.25	Peak
Vertical	3184	44.46	30.54	6.09	35.24	45.85	74	28.15	Peak
	4920	44.8	33.15	7.67	34.72	50.9	74	23.1	Peak
	4920	**42.88**	**33.15**	**7.67**	**34.72**	**48.98**	**54**	**5.02**	**Average**
	7062	37.09	35.59	9.37	34.8	47.25	74	26.75	Peak
	8784	37	38.38	10.64	34.72	51.3	74	22.7	Peak
	10758	36.34	38.55	11.6	34.45	52.04	74	21.96	Peak
	12648	35.44	38.92	12.8	34.01	53.15	74	20.85	Peak

802.11g CH2462MHz

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	3520	41.37	31.26	6.4	35.13	43.9	74	30.1	Peak
	4920	40.78	33.15	7.67	34.72	46.88	74	27.12	Peak
	6950	36.49	35.33	9.18	34.8	46.2	74	27.8	Peak
	8546	37.29	38.48	10.52	34.74	51.55	74	22.45	Peak
	10688	36.53	38.54	11.55	34.46	52.16	74	21.84	Peak
	12256	36.03	38.9	12.56	34.12	53.37	74	20.63	Peak
Vertical	3198	43.37	30.56	6.09	35.23	44.79	74	29.21	Peak
	4920	41.03	33.15	7.67	34.72	47.13	74	26.87	Peak
	6292	37.95	34.37	8.68	34.73	46.27	74	27.73	Peak
	7790	37.68	37.25	10.01	34.8	50.14	74	23.86	Peak
	10408	36.77	38.48	11.46	34.52	52.19	74	21.81	Peak
	11836	35.49	39	12.22	34.23	52.48	74	21.52	Peak

802.11n20 CH2462MHz

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	3366	42.13	30.93	6.23	35.18	44.11	74	29.89	Peak
	4906	39.4	33.13	7.61	34.73	45.41	74	28.59	Peak
	7258	36.86	36.21	9.47	34.8	47.74	74	26.26	Peak
	9344	37.11	38.37	10.97	34.66	51.79	74	22.21	Peak
	11094	35.88	38.64	11.76	34.38	51.9	74	22.1	Peak
	13040	34.25	39.51	13.03	33.88	52.91	74	21.09	Peak
Vertical	3450	42.33	31.1	6.31	35.15	44.59	74	29.41	Peak
	4920	40.95	33.15	7.67	34.72	47.05	74	26.95	Peak
	7398	37.69	36.59	9.69	34.8	49.17	74	24.83	Peak
	9960	36.73	38.4	11.33	34.61	51.85	74	22.15	Peak
	12228	35.64	38.93	12.45	34.13	52.89	74	21.11	Peak
	13138	33.99	39.83	13.03	33.85	53	74	21	Peak

TEST ENGINEER: Jarey

Emissions in restricted frequency bands:

EUT	:	Dual mode Tunable White A19	Temperature :	22℃	
Model No.	:	CLEDA199SD1	Humidity :	51%RH	
Test Mode	:	Transmitting	Date of Test :	2021.04.07 - 18	

802.11b

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	2330.7	45.74	28.16	5.29	37.11	42.08	74	31.92	Peak
	2330.7	38.23	28.16	5.29	37.11	34.57	54	19.43	Average
	2363.8	46.25	28.23	5.32	37.11	42.69	74	31.31	Peak
	2363.8	39.46	28.23	5.32	37.11	35.9	54	18.1	Average
	2390	56.77	28.27	5.36	37.11	53.29	74	20.71	Peak
	2390	41.14	28.27	5.36	37.11	37.66	54	16.34	Average
	2485.6	46.88	28.47	5.47	37.11	43.71	74	30.29	Peak
	2485.6	39.23	28.47	5.47	37.11	36.06	54	17.94	Average
	2489.8	47.77	28.49	5.47	37.11	44.62	74	29.38	Peak
	2489.8	38.53	28.49	5.47	37.11	35.38	54	18.62	Average
	2495.4	47.72	28.49	5.47	37.11	44.57	74	29.43	Peak
	2495.4	38.23	28.49	5.47	37.11	35.08	54	18.92	Average
Vertical	2327.7	50.54	28.14	5.29	37.11	46.86	74	27.14	Peak
	2327.7	39.26	28.14	5.29	37.11	35.58	54	18.42	Average
	2349.6	48.12	28.2	5.32	37.11	44.53	74	29.47	Peak
	2349.6	36.22	28.2	5.32	37.11	32.63	54	21.37	Average
	2389	59.78	28.27	5.36	37.11	56.3	74	17.7	Peak
	2389	41.45	28.27	5.36	37.11	37.97	54	16.03	Average
	2485.7	50.94	28.47	5.47	37.11	47.77	74	26.23	Peak
	2485.7	39.13	28.47	5.47	37.11	35.96	54	18.04	Average
	2491	50.86	28.49	5.47	37.11	47.71	74	26.29	Peak
	2491	40.21	28.49	5.47	37.11	37.06	54	16.94	Average
	2498.2	51.17	28.5	5.47	37.11	48.03	74	25.97	Peak
	2498.2	38.12	28.5	5.47	37.11	34.98	54	19.02	Average

802.11g

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	2316.9	49.04	28.13	5.29	37.11	45.35	74	28.65	Peak
	2316.9	40.42	28.13	5.29	37.11	36.73	54	17.27	Average
	2345.4	49.64	28.19	5.32	37.11	46.04	74	27.96	Peak
	2345.4	39.34	28.19	5.32	37.11	35.74	54	18.26	Average
	2390.1	52.99	28.27	5.36	37.11	49.51	74	24.49	Peak
	2390.1	41.27	28.27	5.36	37.11	37.79	54	16.21	Average
	2483.6	54.64	28.47	5.43	37.11	51.43	74	22.57	Peak
	2483.6	40.27	28.47	5.43	37.11	37.06	54	16.94	Average
	2490	51.08	28.49	5.47	37.11	47.93	74	26.07	Peak
	2490	39.6	28.49	5.47	37.11	36.45	54	17.55	Average
	2495.8	50.58	28.49	5.47	37.11	47.43	74	26.57	Peak
	2495.8	39.23	28.49	5.47	37.11	36.08	54	17.92	Average
Vertical	2333.3	53	28.16	5.29	37.11	49.34	74	24.66	Peak
	2333.3	39.53	28.16	5.29	37.11	35.87	54	18.13	Average
	2364.2	53.49	28.23	5.32	37.11	49.93	74	24.07	Peak
	2364.2	38.13	28.23	5.32	37.11	34.57	54	19.43	Average
	2390	59.54	28.27	5.36	37.11	56.06	74	17.94	Peak
	2390	46.48	28.27	5.36	37.11	43	54	11	Average
	2483.5	59.25	28.47	5.43	37.11	56.04	74	17.96	Peak
	2483.5	45.24	28.47	5.43	37.11	42.03	54	11.97	Average
	2488	57.77	28.47	5.47	37.11	54.6	74	19.4	Peak
	2488	40.13	28.47	5.47	37.11	36.96	54	17.04	Average
	2494.7	56.16	28.49	5.47	37.11	53.01	74	20.99	Peak
	2494.7	41.42	28.49	5.47	37.11	38.27	54	15.73	Average

802.11n20

Polarization	Frequency (MHz)	Meter Reading dB (V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (V/m)	Limits dB (V/m)	Margin (dB)	Remark
Horizontal	2326.8	49.82	28.14	5.29	37.11	46.14	74	27.86	Peak
	2326.8	39.45	28.14	5.29	37.11	35.77	54	18.23	Average
	2353.3	49.57	28.2	5.32	37.11	45.98	74	28.02	Peak
	2353.3	39.34	28.2	5.32	37.11	35.75	54	18.25	Average
	2390	53.19	28.27	5.36	37.11	49.71	74	24.29	Peak
	2390	40.62	28.27	5.36	37.11	37.14	54	16.86	Average
	2483.7	55.93	28.47	5.43	37.11	52.72	74	21.28	Peak
	2483.7	40.3	28.47	5.43	37.11	37.09	54	16.91	Average
	2485.8	57.51	28.47	5.47	37.11	54.34	74	19.66	Peak
	2485.8	41.65	28.47	5.47	37.11	38.48	54	15.52	Average
	2495.2	53.62	28.49	5.47	37.11	50.47	74	23.53	Peak
	2495.2	39.46	28.49	5.47	37.11	36.31	54	17.69	Average
Vertical	2336.1	52.54	28.17	5.29	37.11	48.89	74	25.11	Peak
	2336.1	39.13	28.17	5.29	37.11	35.48	54	18.52	Average
	2363.8	52.81	28.23	5.32	37.11	49.25	74	24.75	Peak
	2363.8	39.19	28.23	5.32	37.11	35.63	54	18.37	Average
	2383.5	57.46	28.26	5.36	37.11	53.97	74	20.03	Peak
	2383.5	41.24	28.26	5.36	37.11	37.75	54	16.25	Average
	2483.5	61.72	28.47	5.43	37.11	58.51	74	15.49	Peak
	2483.5	46.21	28.47	5.43	37.11	43	54	11	Average
	2486.4	62.28	28.47	5.47	37.11	59.11	74	14.89	Peak
	2486.4	42.23	28.47	5.47	37.11	39.06	54	14.94	Average
	2494.4	57.41	28.49	5.47	37.11	54.26	74	19.74	Peak
	2494.4	40.54	28.49	5.47	37.11	37.39	54	16.61	Average

TEST ENGINEER: Jarey

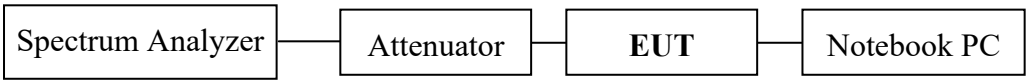
5 6 dB BANDWIDTH MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
4.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2020.09.16	1 Year
5.	Coaxial Cable	WOKEN	SFL402-105F LEX	F02-150819-045	2021.03.08	1 Year
6.	20 dB Attenuator	Mini-Circuits	VAT-20+	001	2020.08.06	1 Year

5.2 Block Diagram of Test Setup



5.3 Specification Limits (§15.247(a)(2))

The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 100kHz, VBW ≥ 3 × RBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 6 dB .

The test procedure is defined in ANSI C63.10-2013 (the 11.8.2 Measurement Procedure “Option 2” was used).

5.6 Test Results

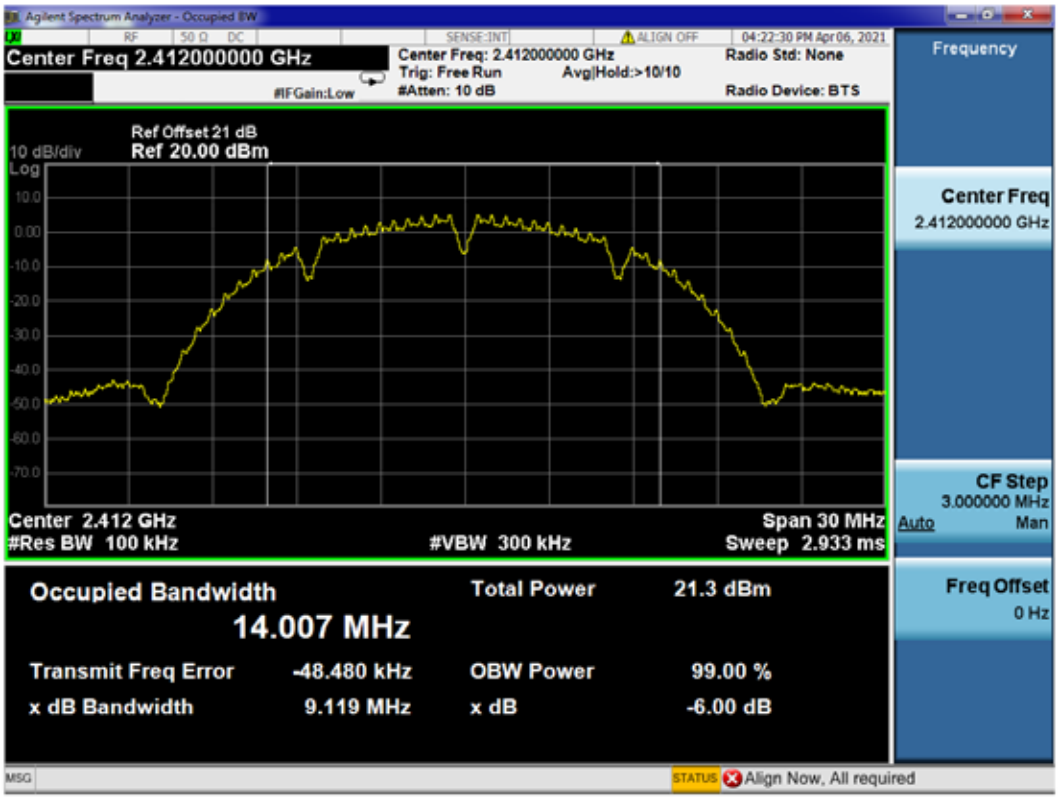
PASSED.

All the test results are attached in next pages.

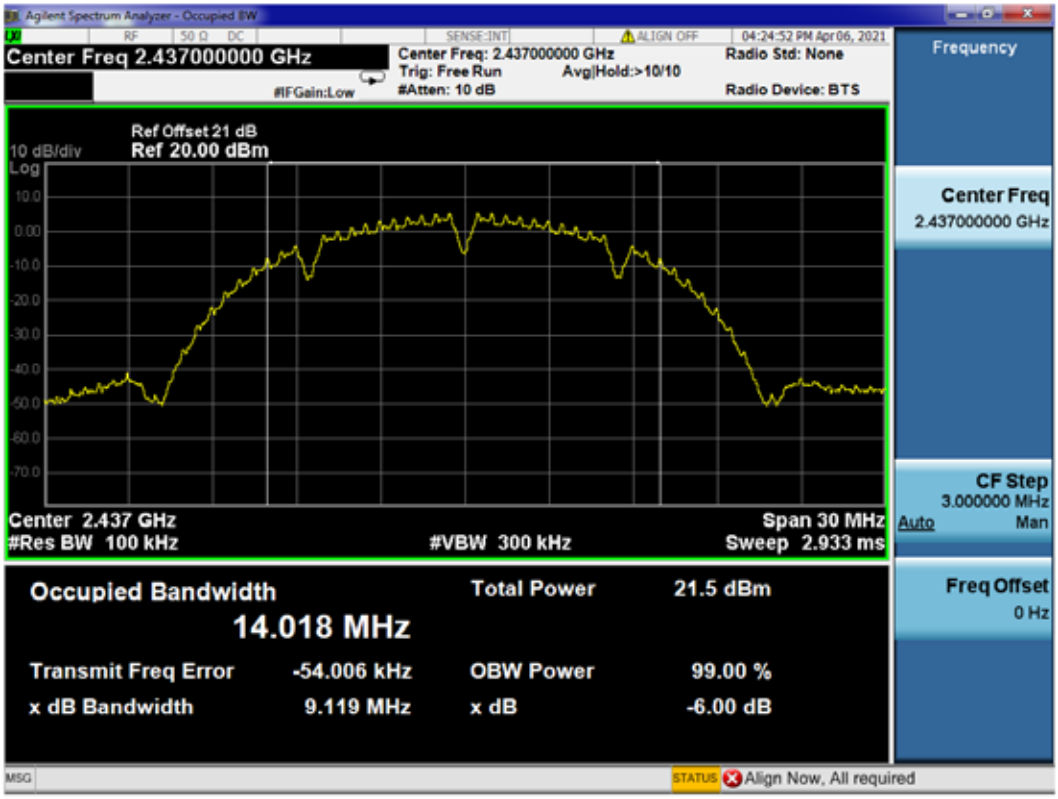
(Test Date: 2021.04.06 Temperature: 23℃ Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	**6dB Bandwidth (MHz)**	Limit
802.11b	1	2412	**9.119**	500 kHz
	6	2437	**9.119**	500 kHz
	11	2462	**9.119**	500 kHz
802.11g	1	2412	**16.57**	500 kHz
	6	2437	**16.56**	500 kHz
	11	2462	**16.57**	500 kHz
802.11n20	1	2412	**17.75**	500 kHz
	6	2437	**17.75**	500 kHz
	11	2462	**17.76**	500 kHz

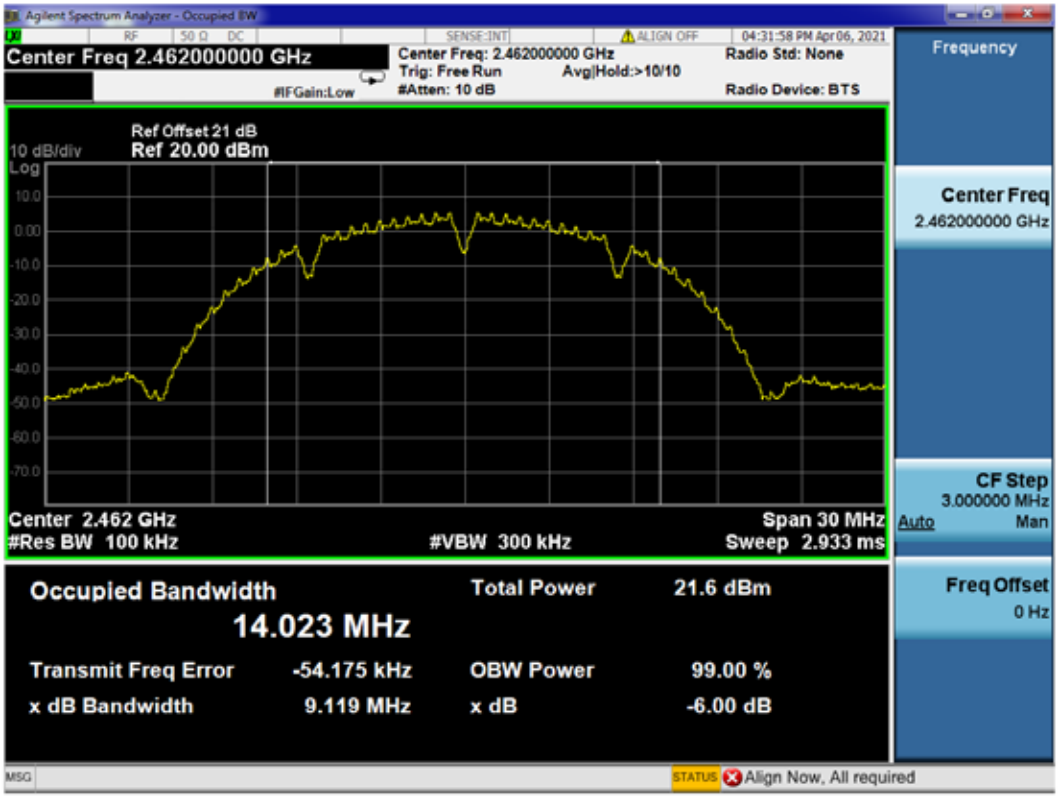
802.11b CH2412MHz



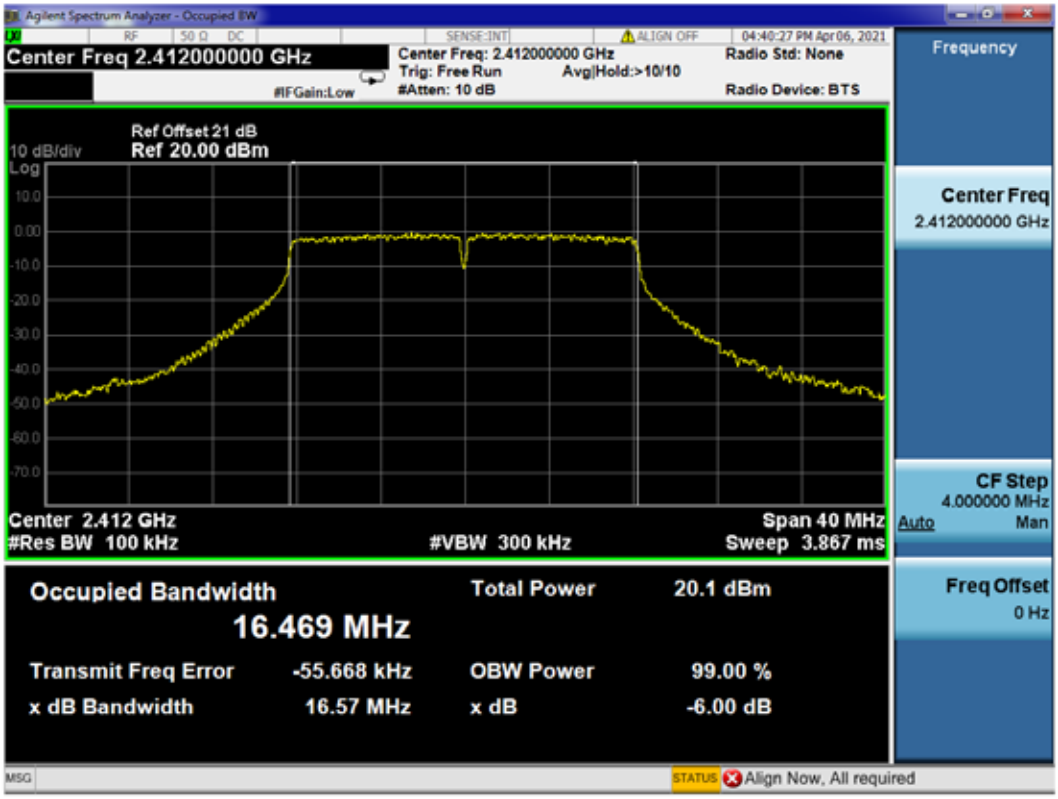
802.11b CH2437MHz



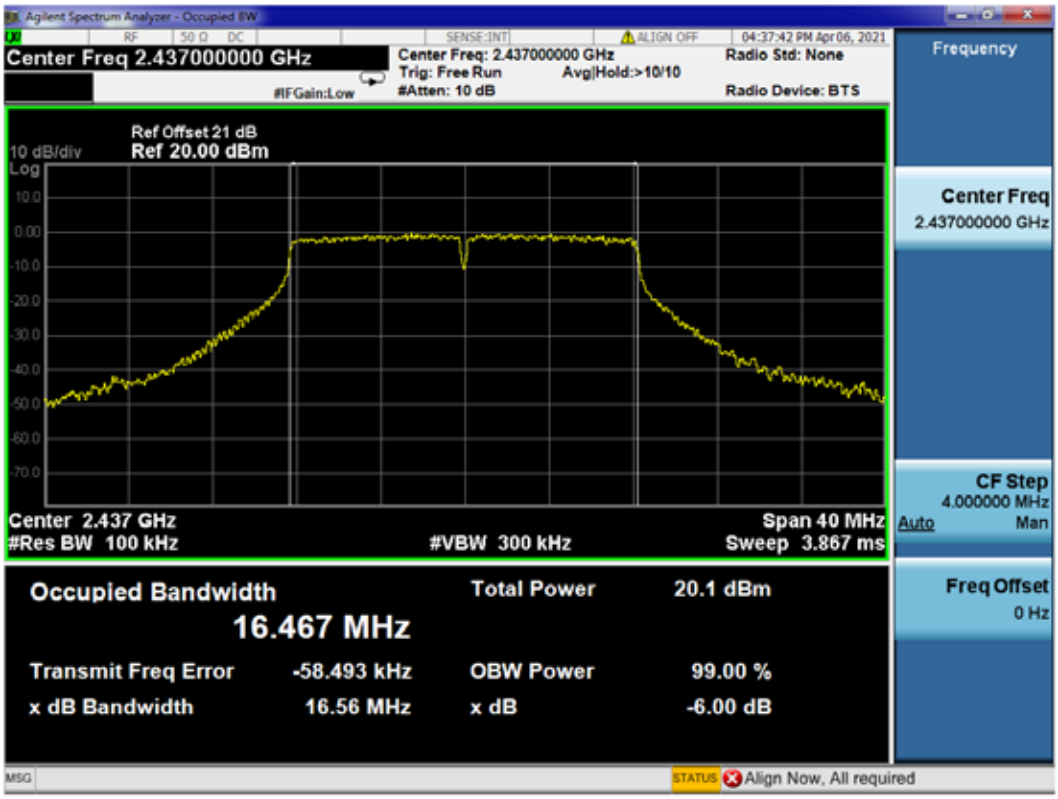
802.11b CH2462MHz



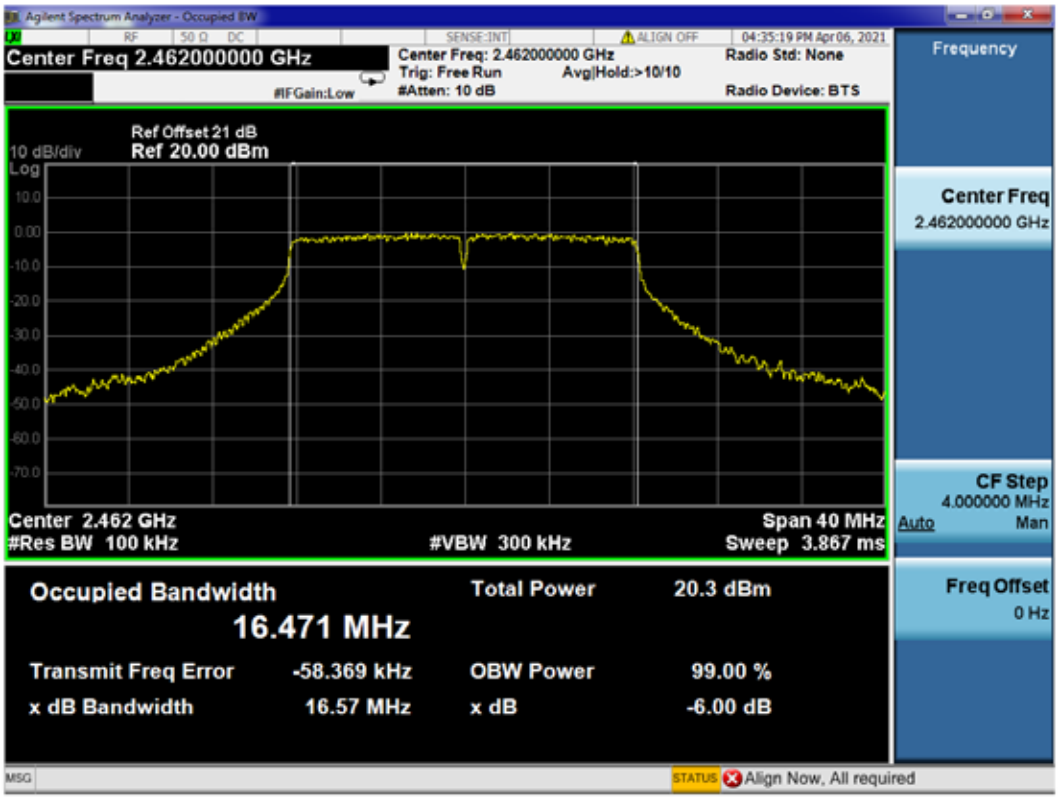
802.11g CH2412MHz



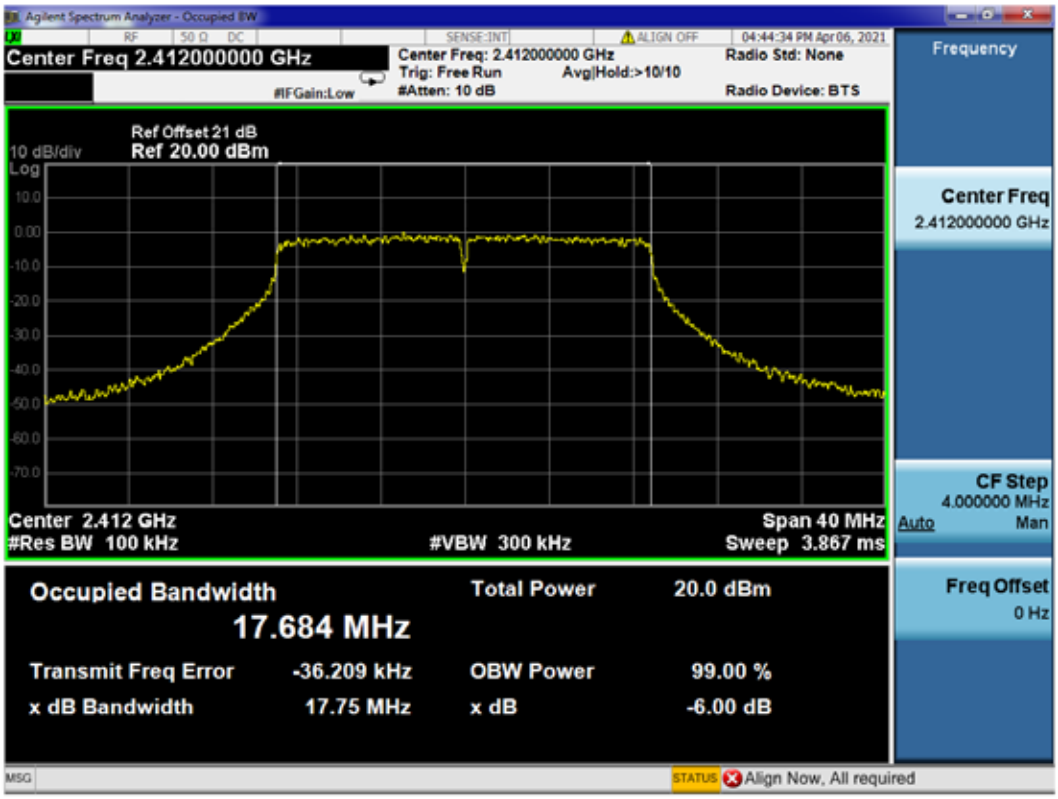
802.11g CH2437MHz



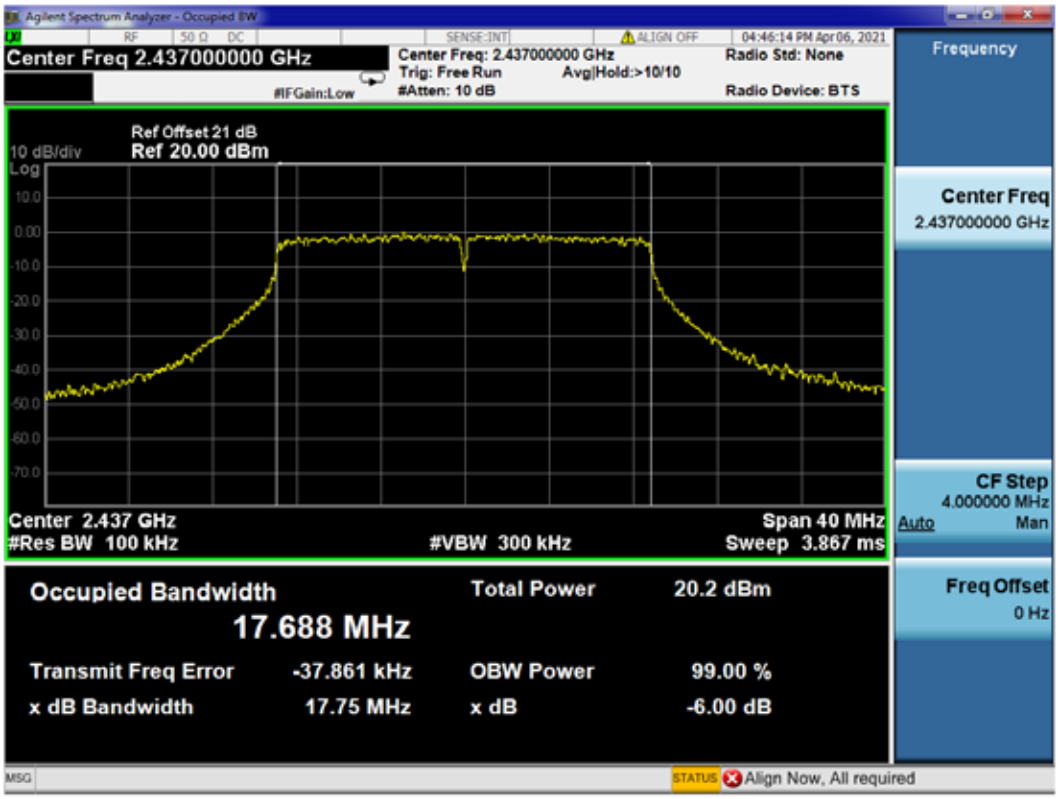
802.11g CH2462MHz



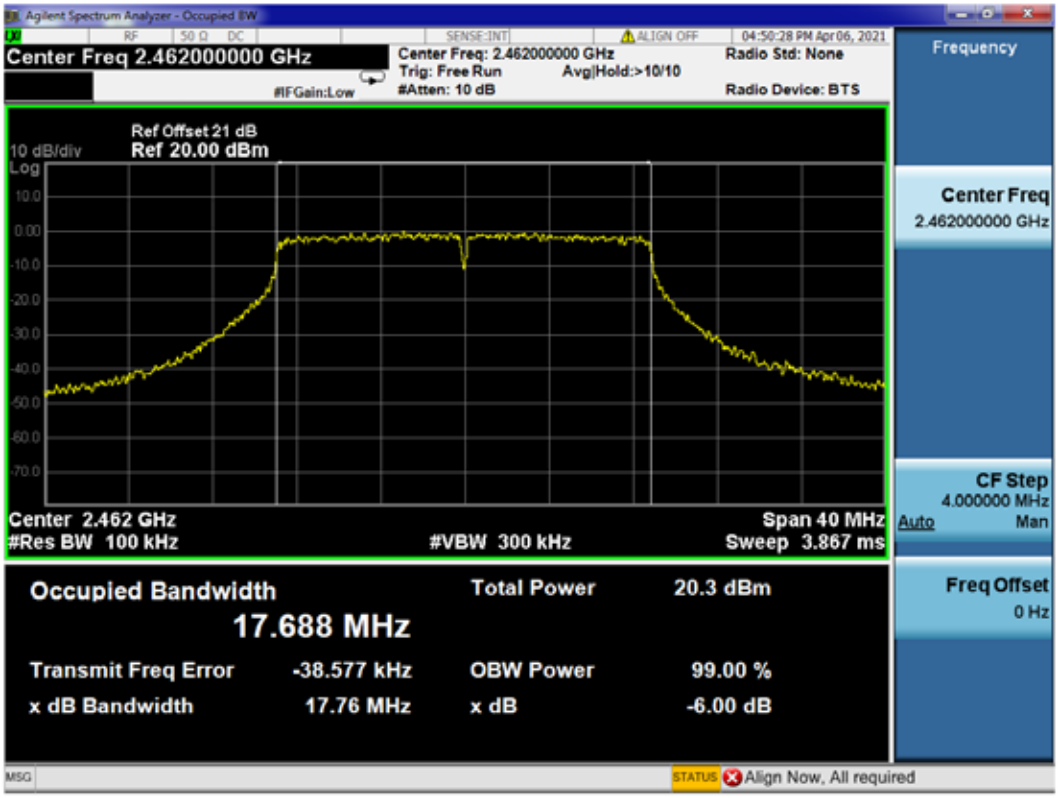
802.11n20 CH2412MHz



802.11n20 CH2437MHz



802.11n20 CH2462MHz



6 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

6.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2020.09.16	1 Year
2.	Coaxial Cable	WOKEN	SFL402-105F LEX	F02-150819-045	2021.03.08	1 Year
3.	20 dB Attenuator	Mini-Circuits	VAT-20+	001	2020.08.06	1 Year

6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

6.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

6.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

6.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

The following procedure can be used when the maximum available RBW of the instrument is less than the DTS bandwidth:
a) Set the RBW = 1 MHz.
b) Set the VBW ≥ [3 RBW].
c) Set the span ≥ [1.5 DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth

The test procedure is defined in ANSI C63.10-2013 (11.9.1.2 Measurement Procedure " Integrated band power method" was used).

6.6 Test Results

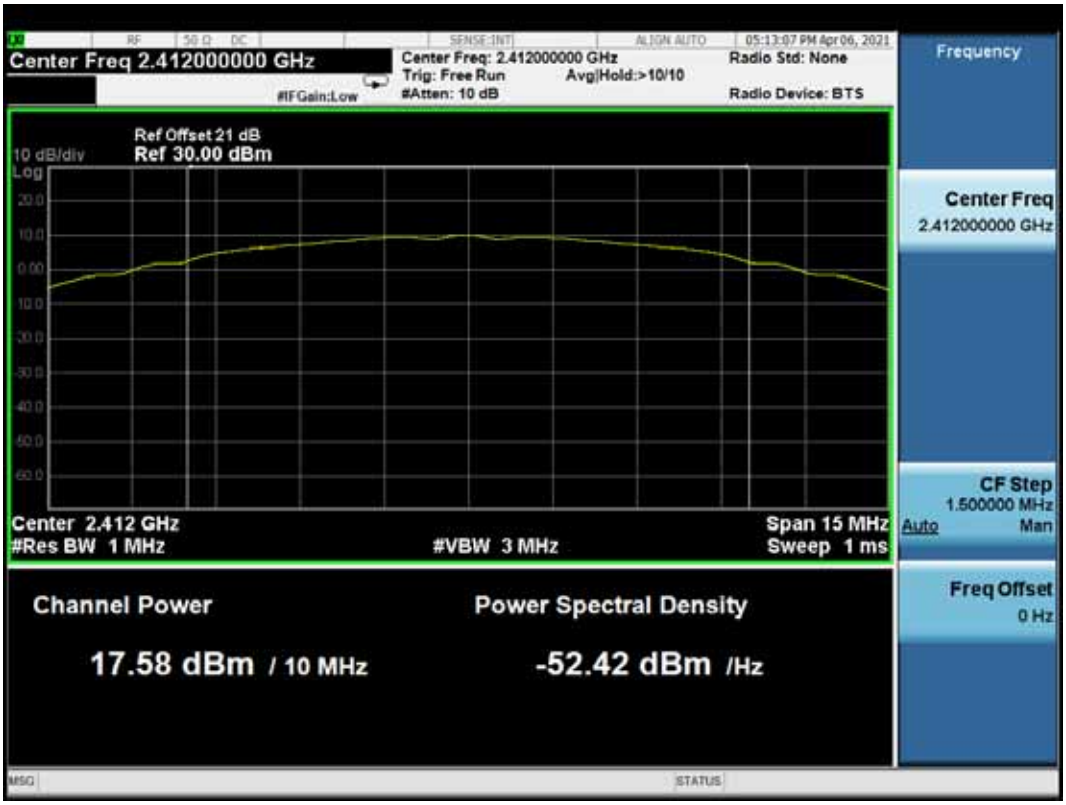
PASSED.

All the test results are listed below.

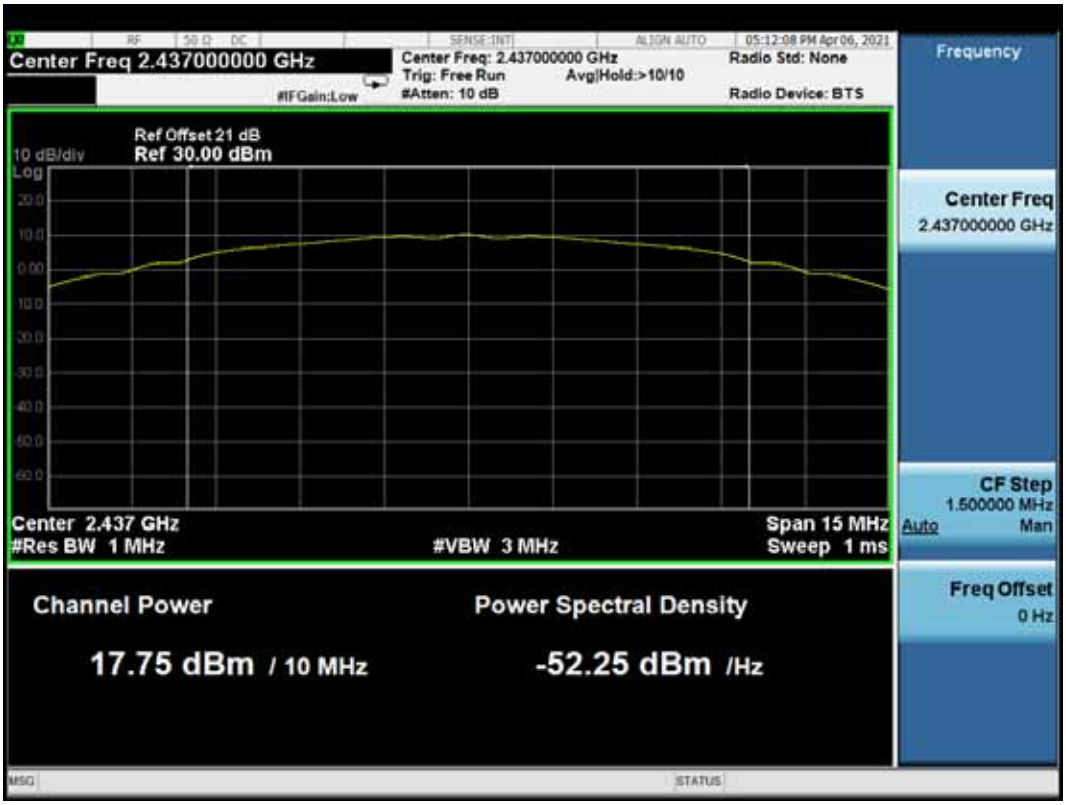
(Test Date: 2021.04.06 Temperature: 23℃ Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	**Peak Output Power (dBm)**	Limit
802.11b	1	2412	**17.58**	30 dBm
	6	2437	**17.75**	30 dBm
	11	2462	**17.77**	30 dBm
802.11g	1	2412	**21.57**	30 dBm
	6	2437	**21.85**	30 dBm
	11	2462	**21.89**	30 dBm
802.11n20	1	2412	**21.6**	30 dBm
	6	2437	**21.68**	30 dBm
	11	2462	**21.58**	30 dBm

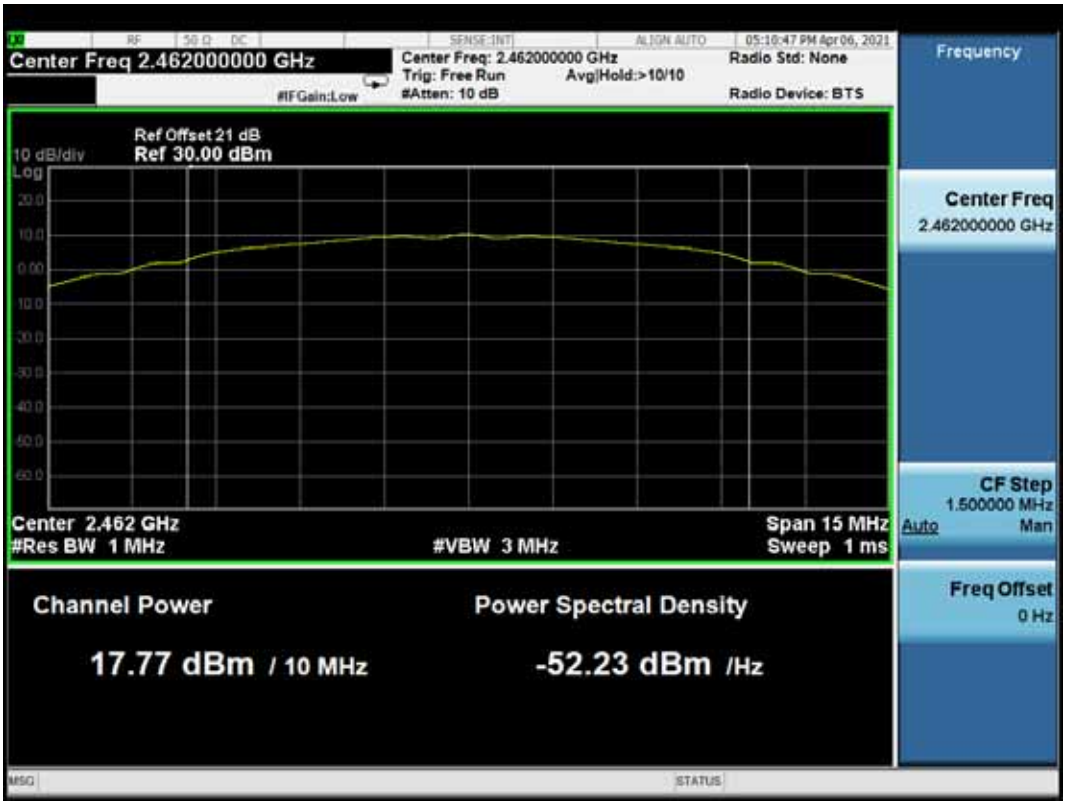
802.11b CH2412MHz



802.11b CH2437MHz

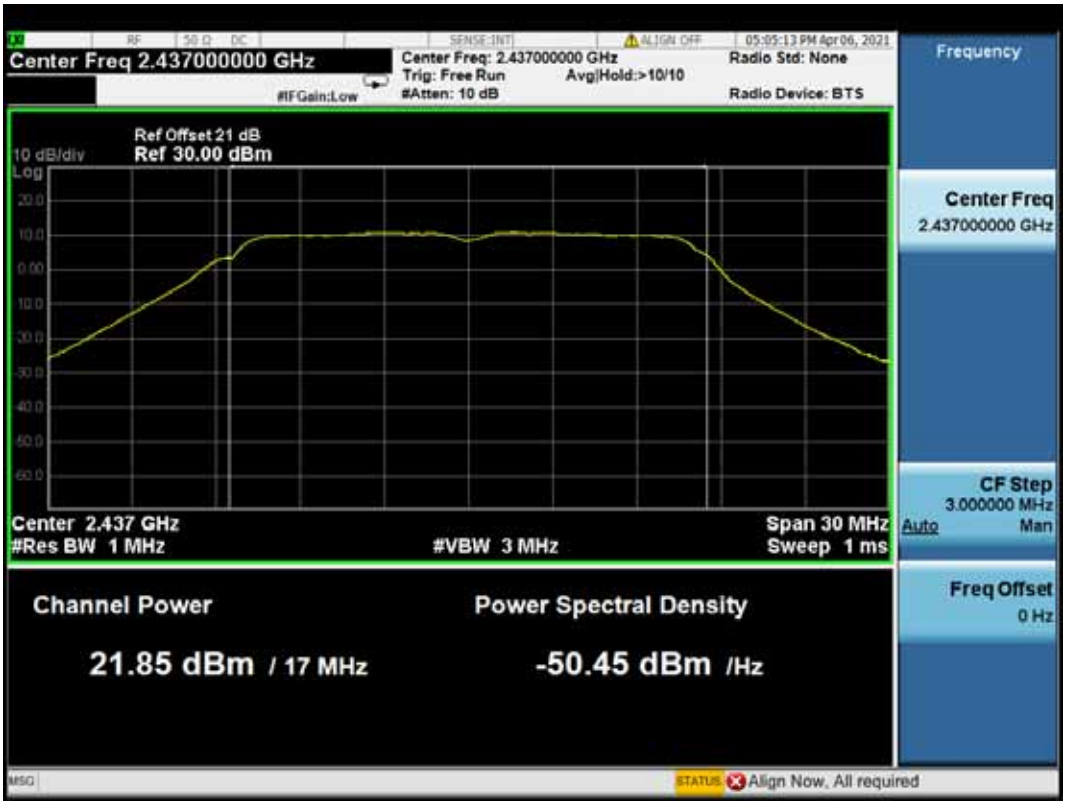


802.11b CH2462MHz

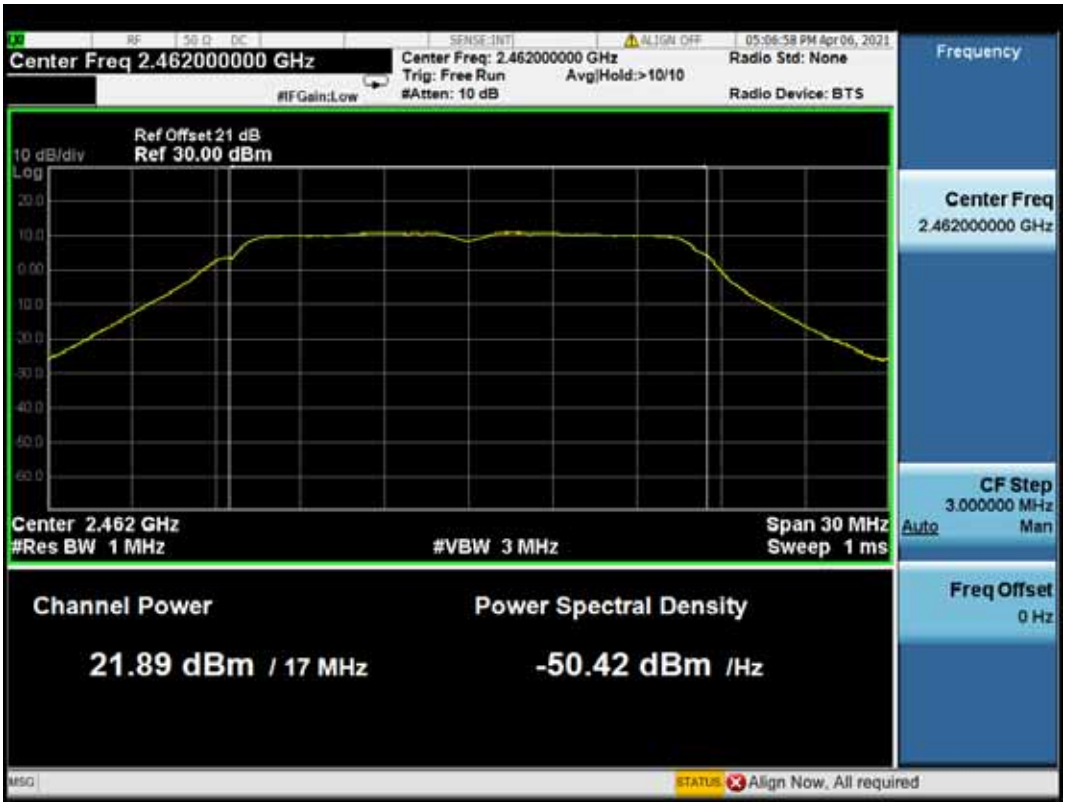


802.11g CH2412MHz

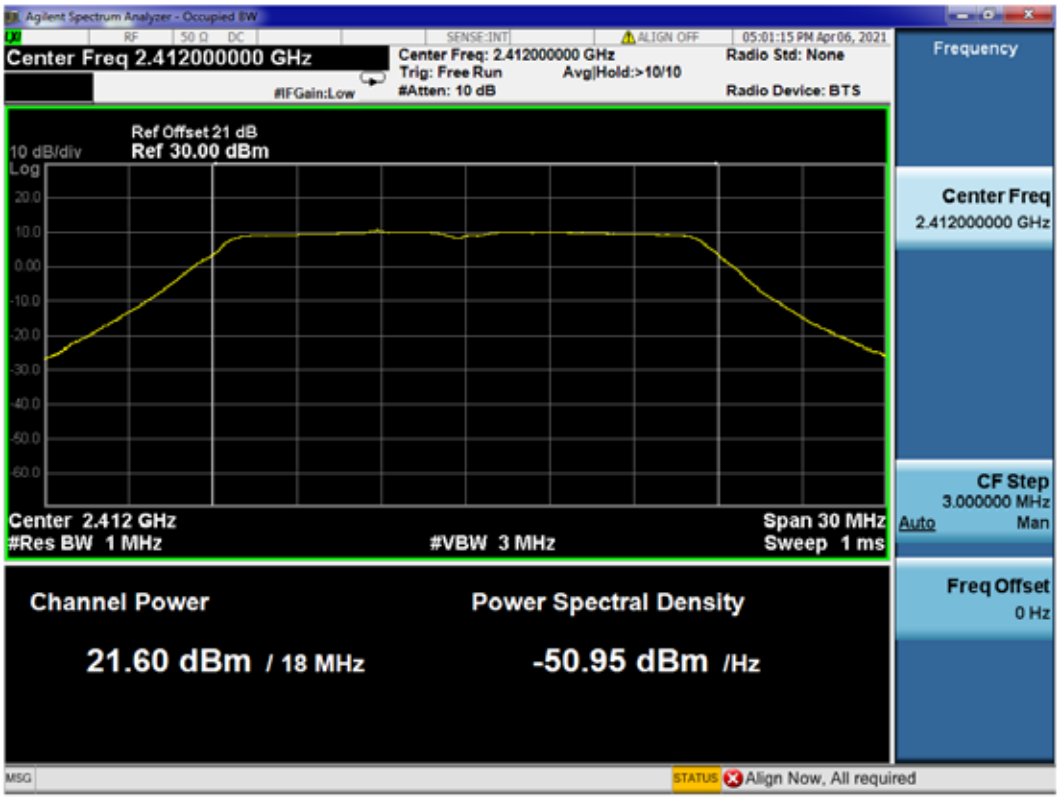
802.11g CH2437MHz



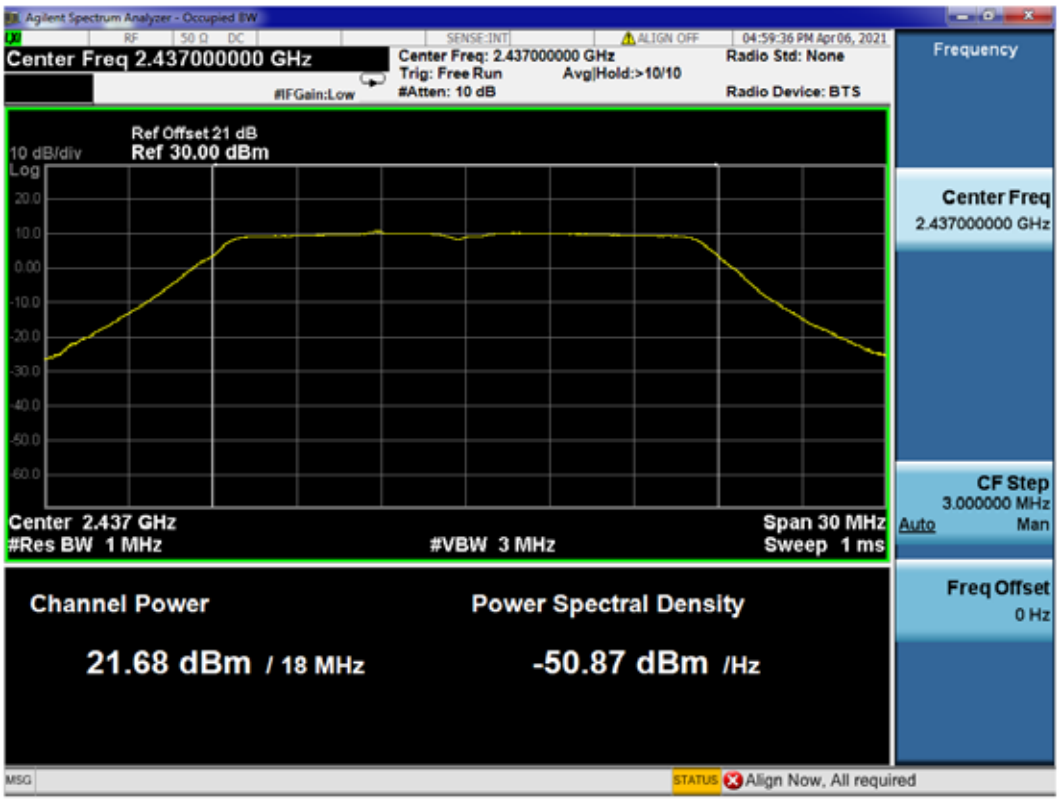
802.11g CH2462MHz



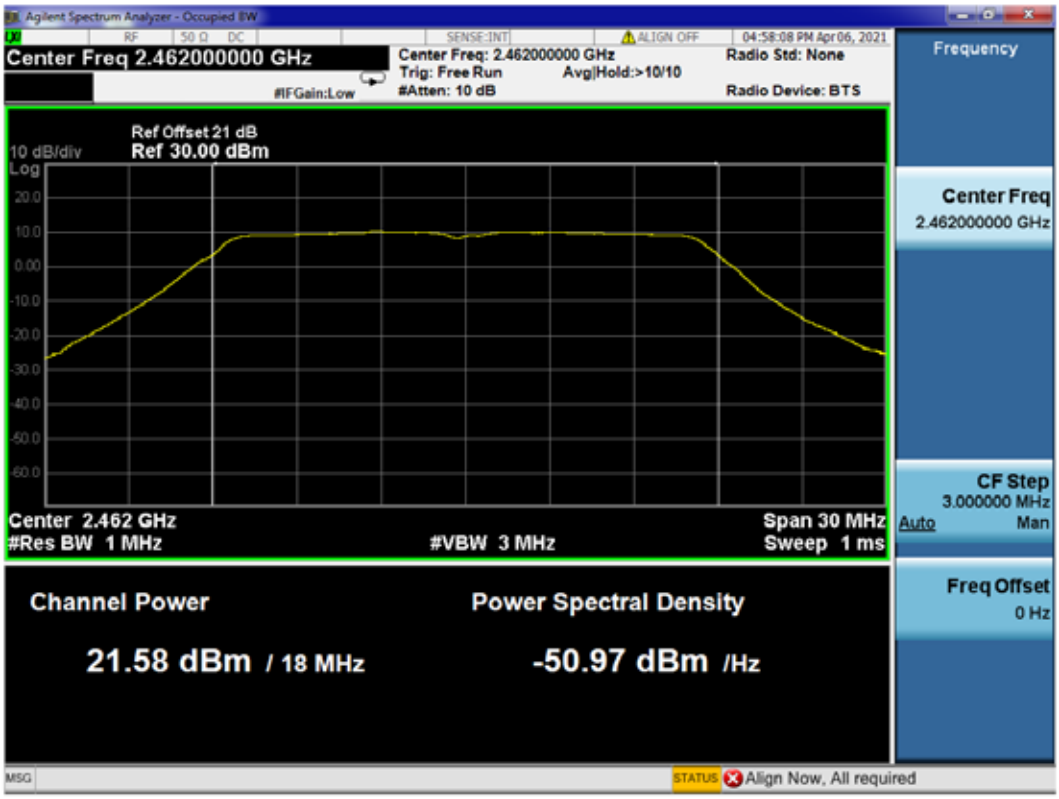
802.11n20 CH2412MHz



802.11n20 CH2437MHz



802.11n20 CH2462MHz



7 EMISSION LIMITATIONS MEASUREMENT

7.1 Test Equipment

The following test equipment was used during the emission limitations test:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2020.09.16	1 Year
2.	Coaxial Cable	WOKEN	SFL402-105F LEX	F02-150819-045	2021.03.08	1 Year
3.	20 dB Attenuator	Mini-Circuits	VAT-20+	001	2020.08.06	1 Year

7.2 Block Diagram of Test Setup

The Same as Section. 5.2.

7.3 Specification Limits (§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)). (※This test result attaching to Section. 3.7)

7.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to

establish the reference level.

Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Scan up through 10^{th} harmonic.

The test procedure is defined in ANSI C63.10-2013 (11.11.2 Reference level measurement and 11.11.3 Emission level measurement was used).

7.6 Test Results

PASSED.

The test data was attached in the next pages.

(Test Date: 2021.04.06 Temperature: 23℃ Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	Data Page
802.11b	1	2412 MHz	P42-43
	6	2437 MHz	P44-45
	11	2462 MHz	P46-47
802.11g	1	2412 MHz	P48-49
	6	2437 MHz	P50-51
	11	2462 MHz	P52-53
802.11n20	1	2412 MHz	P54-55
	6	2437 MHz	P56-57
	11	2462 MHz	P58-59

802.11b CH2412MHz

Reference level

Emission level

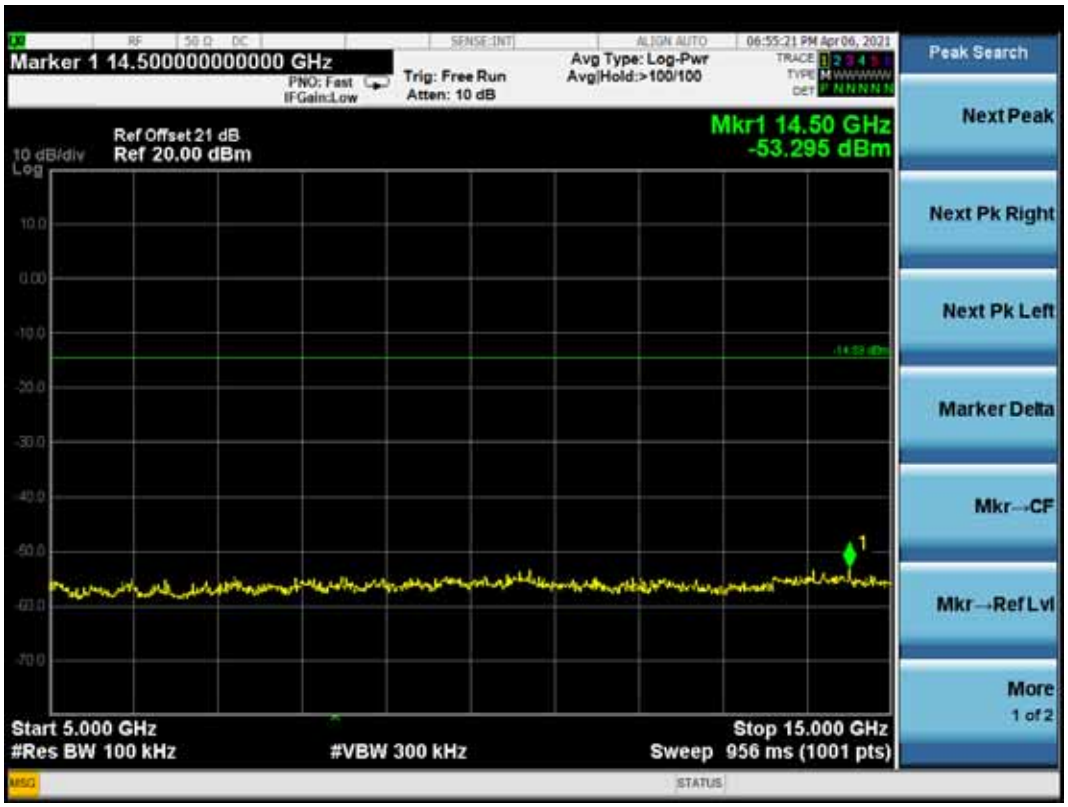

Marker 1 10.040000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:02:31 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 10.04 GHz
-53.451 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Marker 1 23.700000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:04:50 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.70 GHz
-49.241 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

802.11b CH2437MHz

Reference level

Emission level

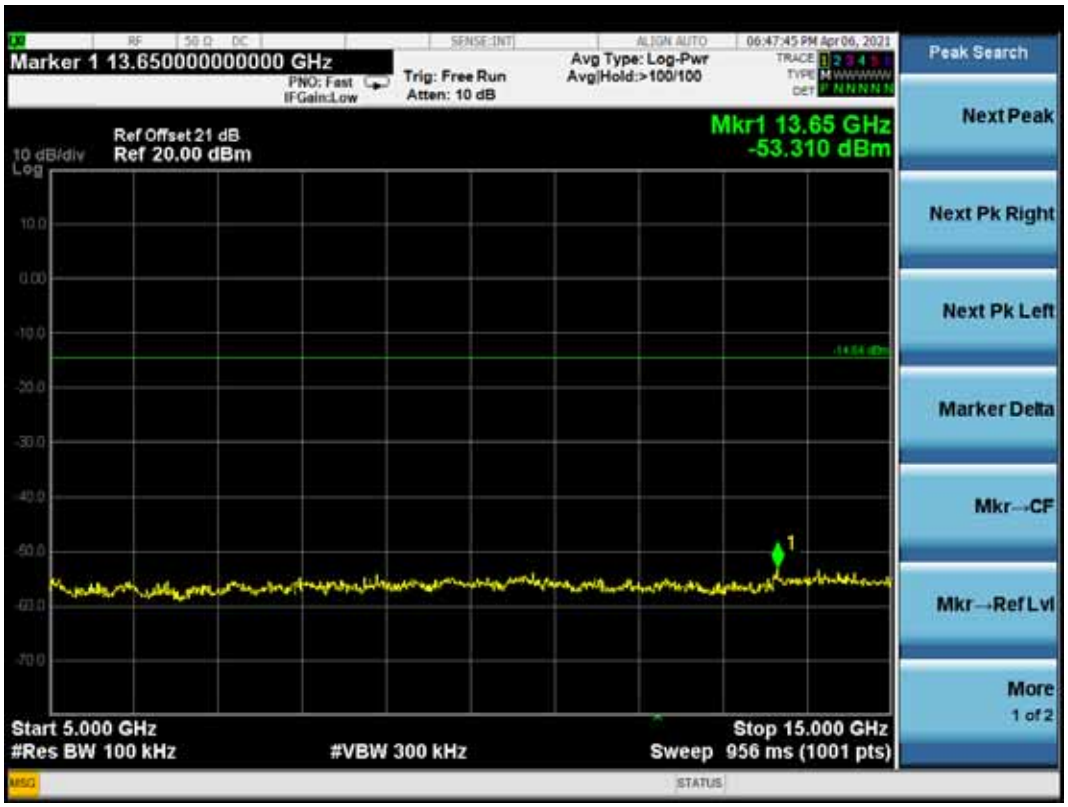

Marker 1 14.500000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:55:21 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 14.50 GHz
-53.295 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)


Marker 1 23.570000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:57:38 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.57 GHz
-49.417 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)

802.11b CH2462MHz

Reference level

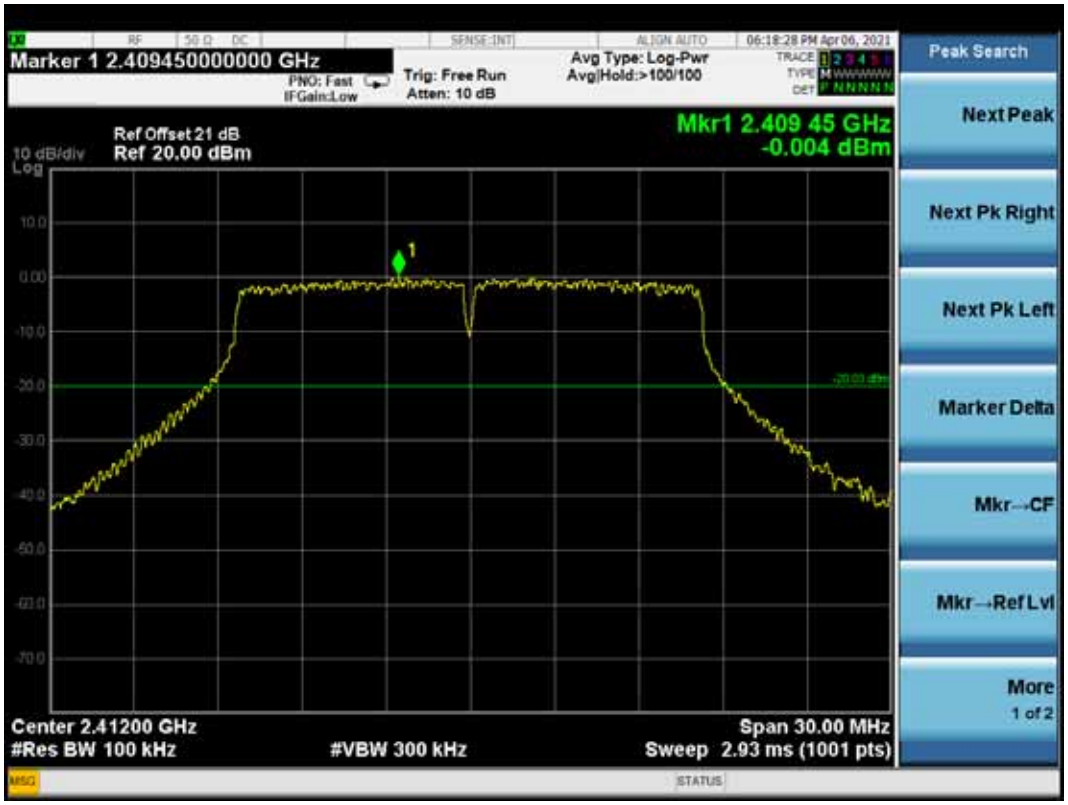
Emission level


Marker 1 13.650000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:47:45 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 13.65 GHz
-53.310 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

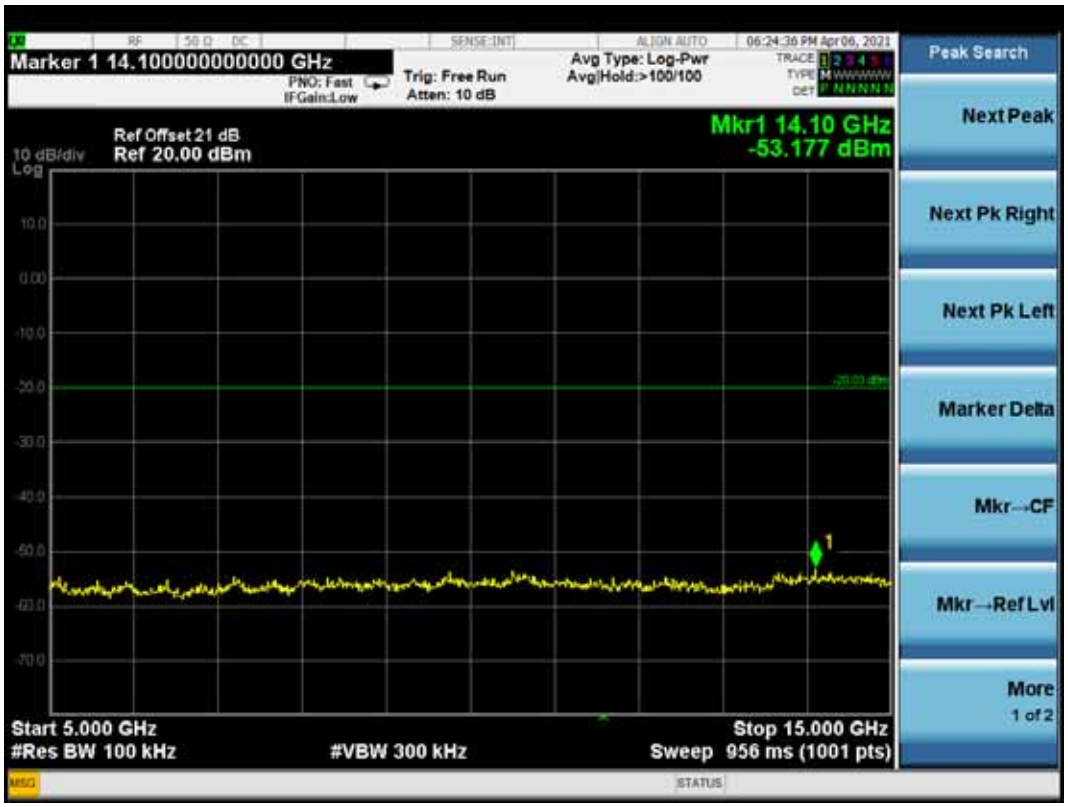

Marker 1 23.630000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:50:39 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.63 GHz
-49.758 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

802.11g CH2412MHz

Reference level



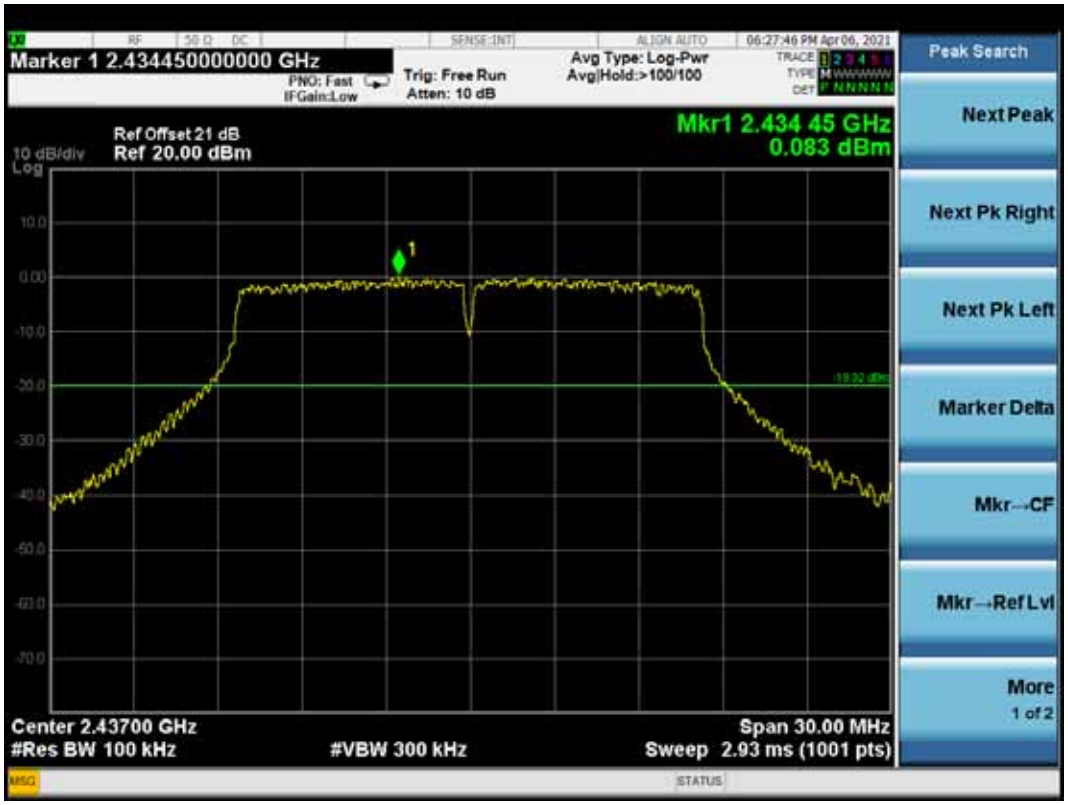
Emission level


Marker 1 14.100000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:24:36 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 14.10 GHz
-53.177 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

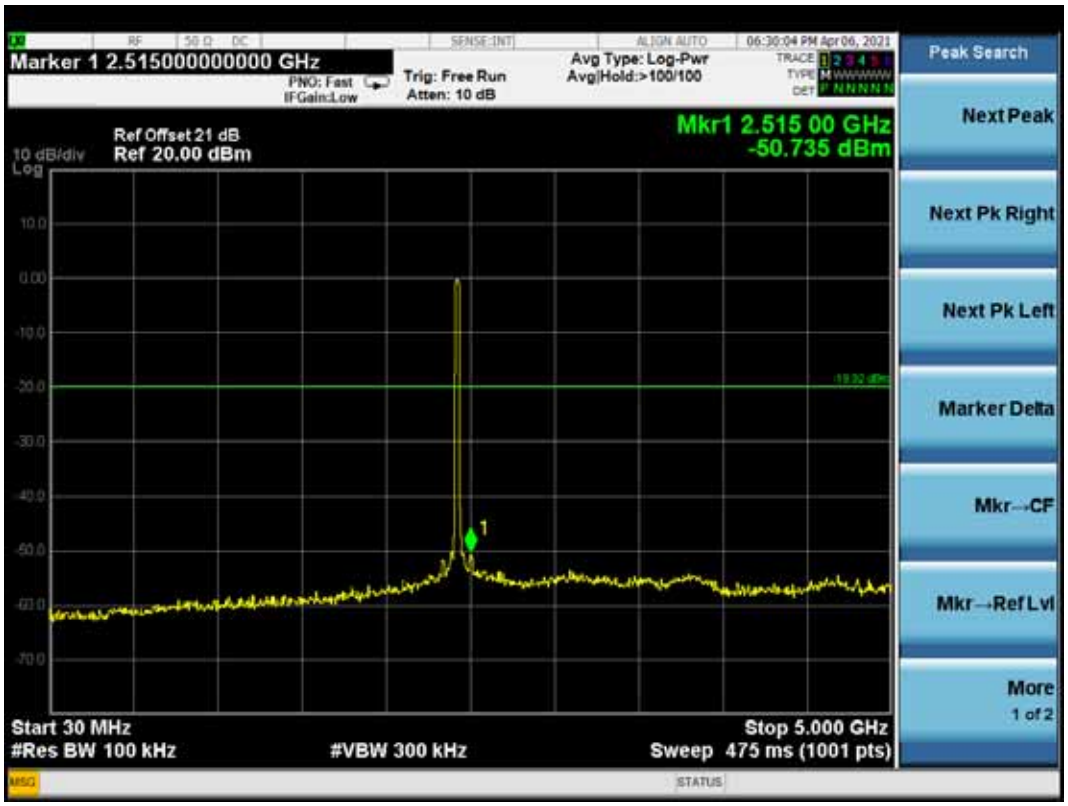

Marker 1 23.640000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:26:59 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.64 GHz
-49.916 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

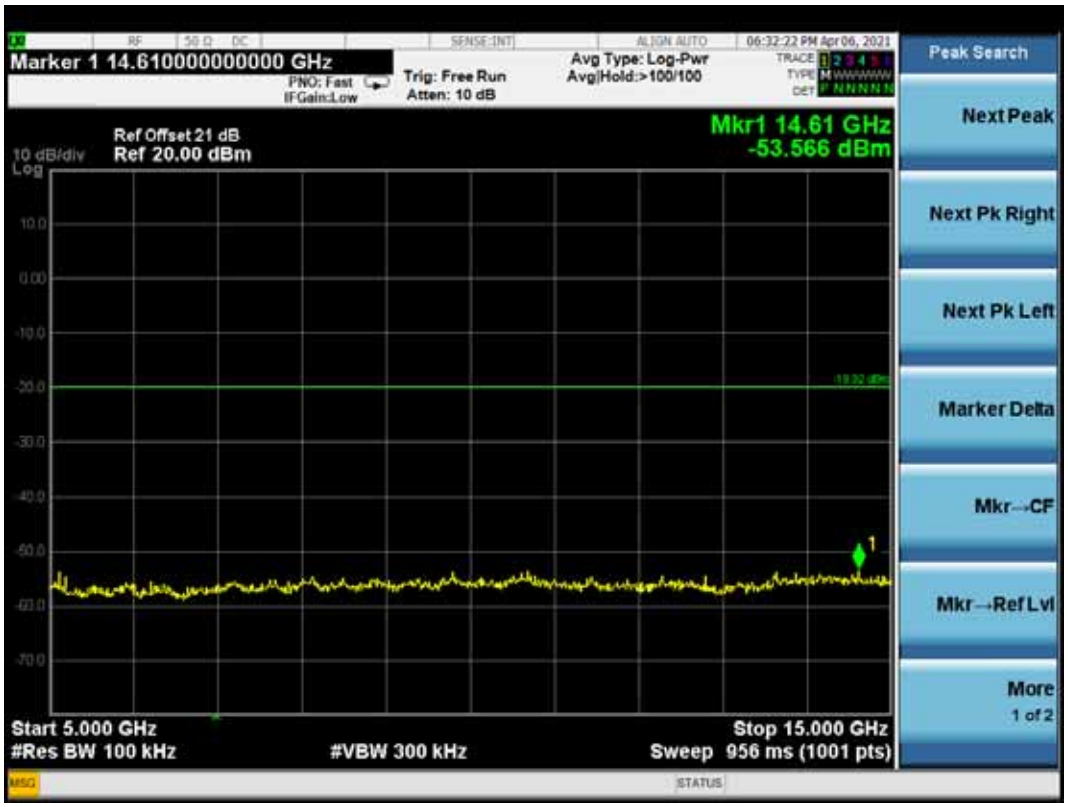
802.11g CH2437MHz

Reference level



Emission level

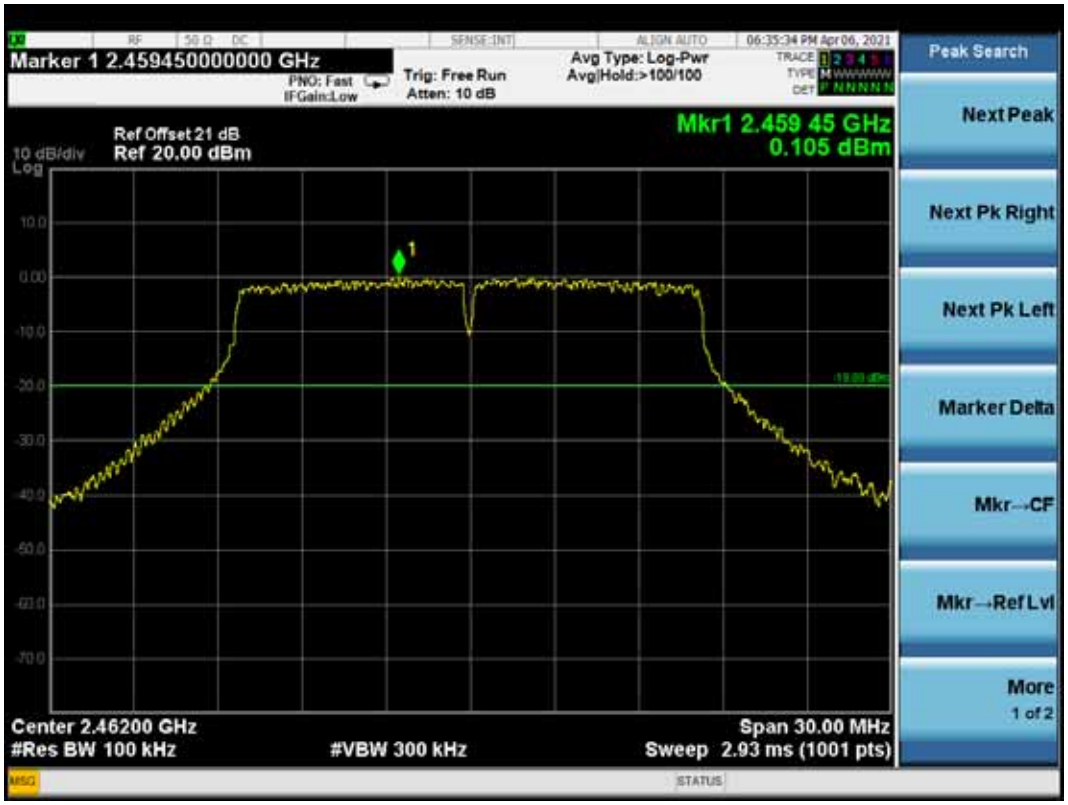



Marker 1 14.610000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:32:22 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 14.61 GHz
-53.566 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)

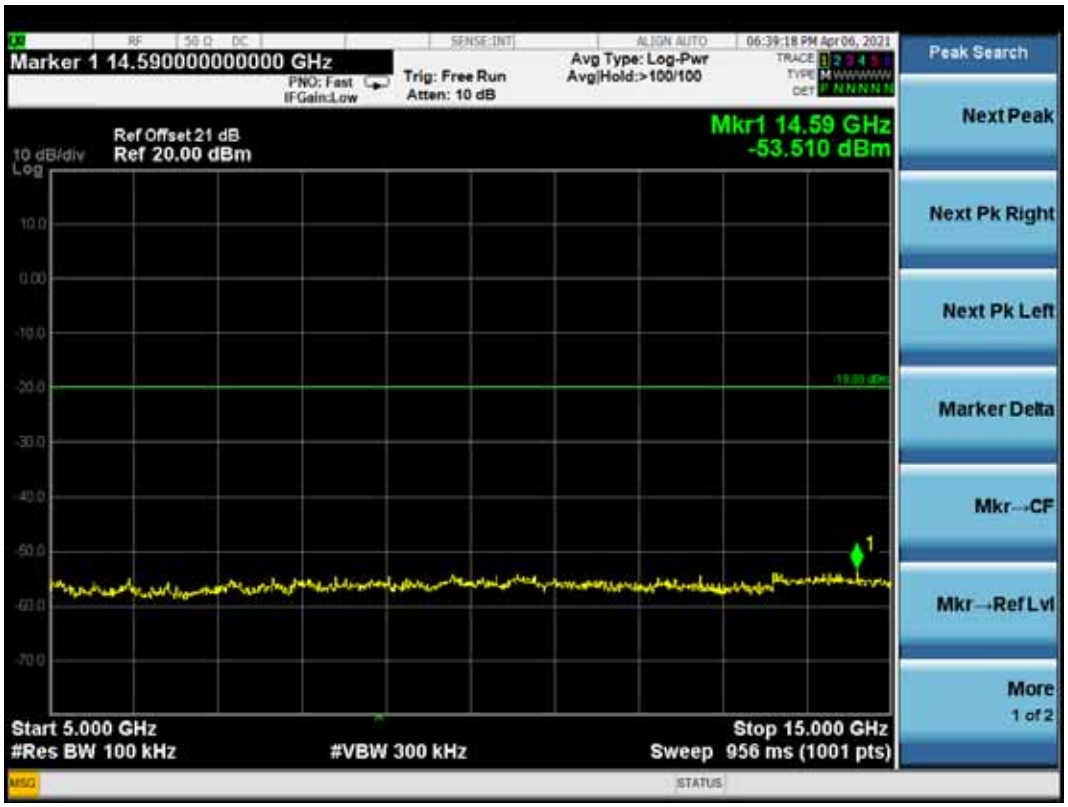

Marker 1 23.660000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:34:48 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.66 GHz
-49.512 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)

802.11g CH2462MHz

Reference level



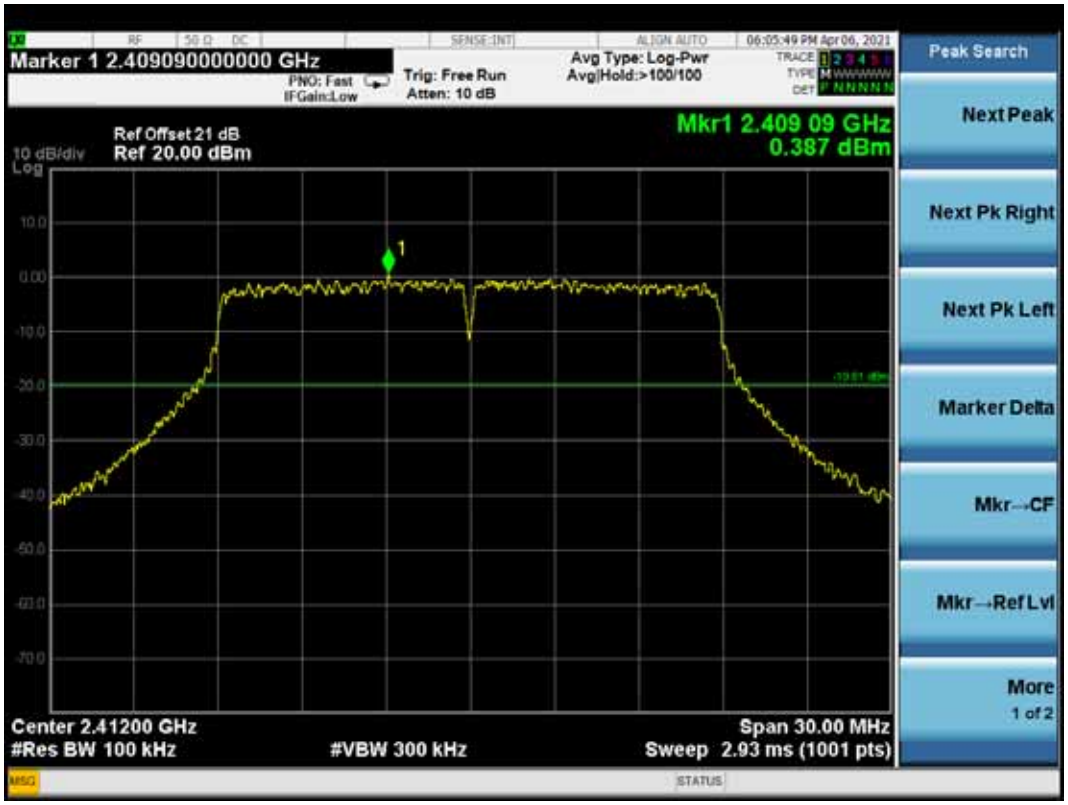
Emission level


Marker 1 14.590000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:39:18 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 14.59 GHz
-53.510 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)

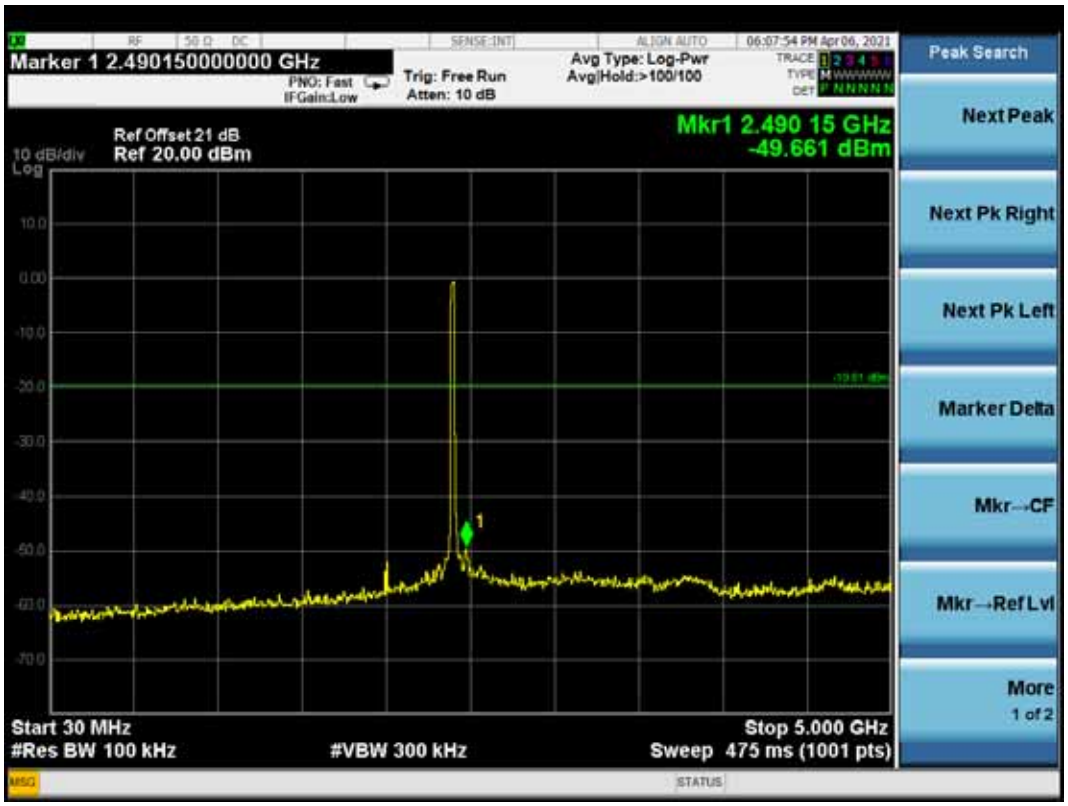

Marker 1 23.630000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:42:05 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.63 GHz
-49.589 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)

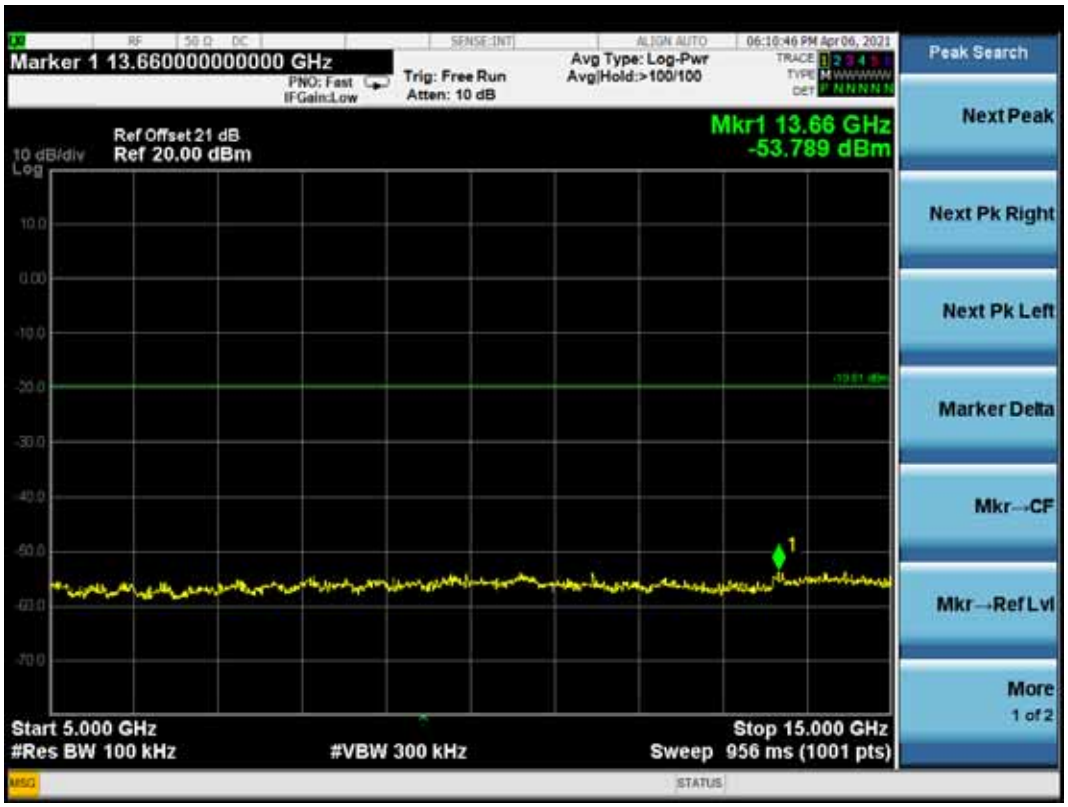
802.11n20 CH2412MHz

Reference level



Emission level

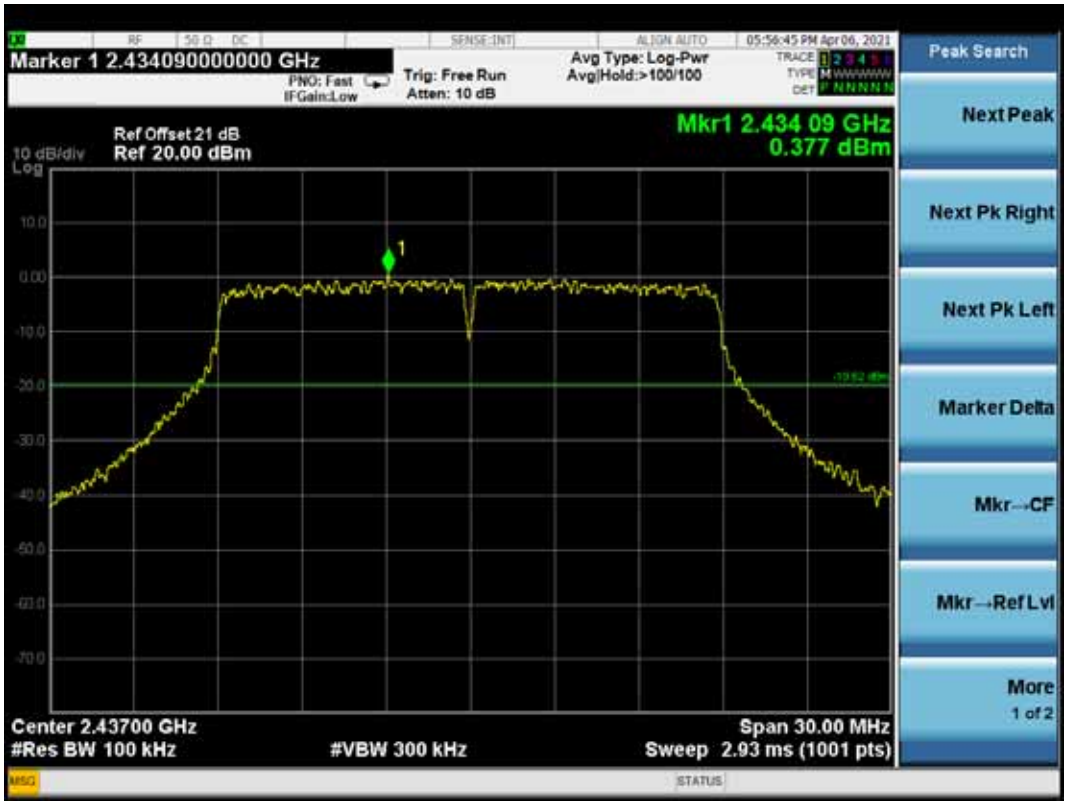



Marker 1 13.660000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:16:46 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 13.66 GHz
-53.789 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)

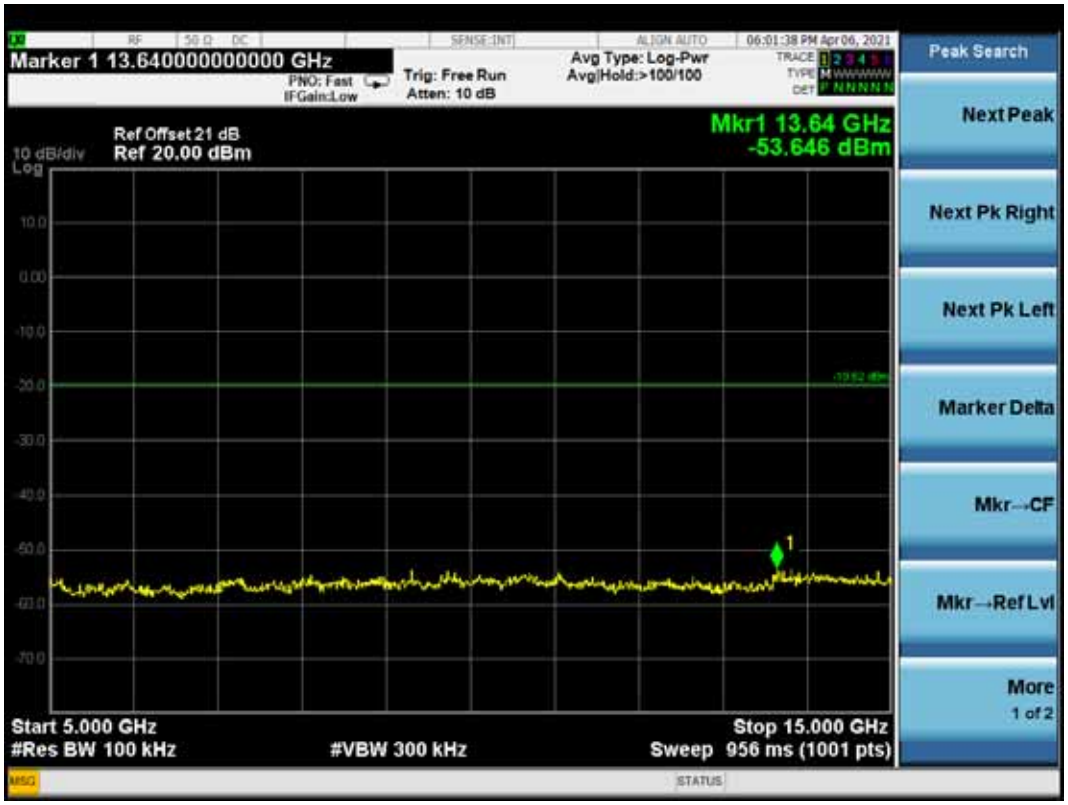

Marker 1 23.710000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:17:34 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.71 GHz
-50.022 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)

802.11n20 CH2437MHz

Reference level



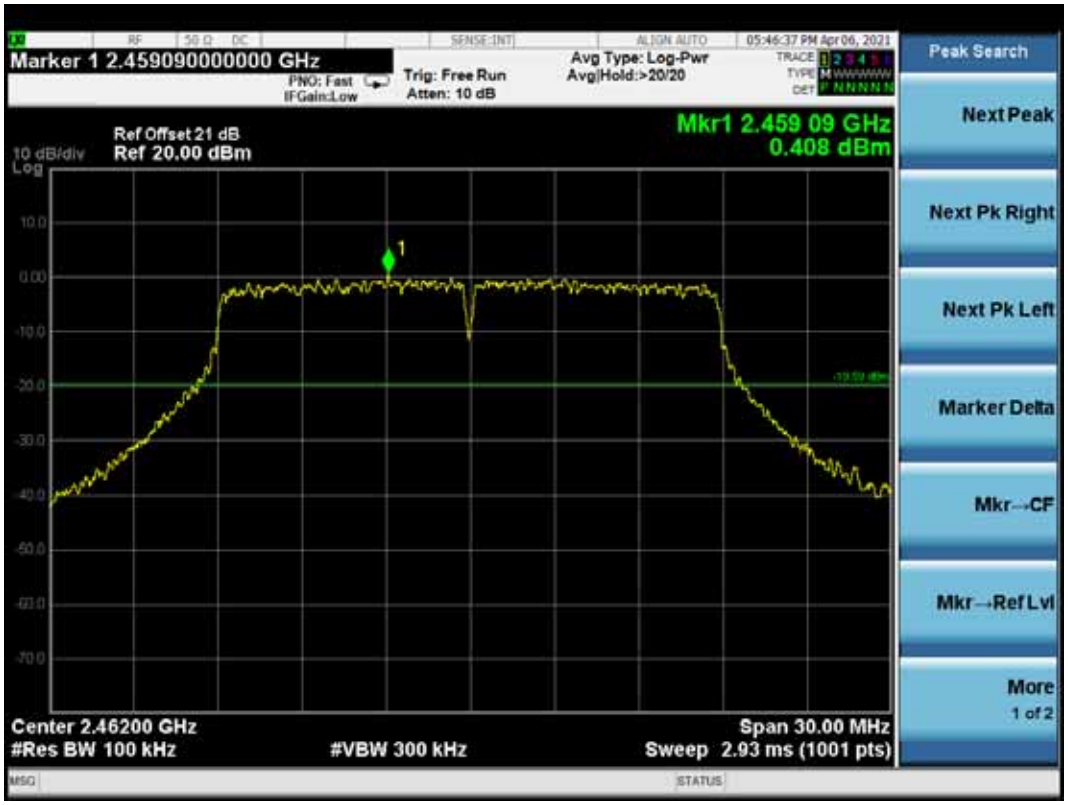
Emission level


Marker 1 13.640000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:01:38 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 13.64 GHz
-53.646 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

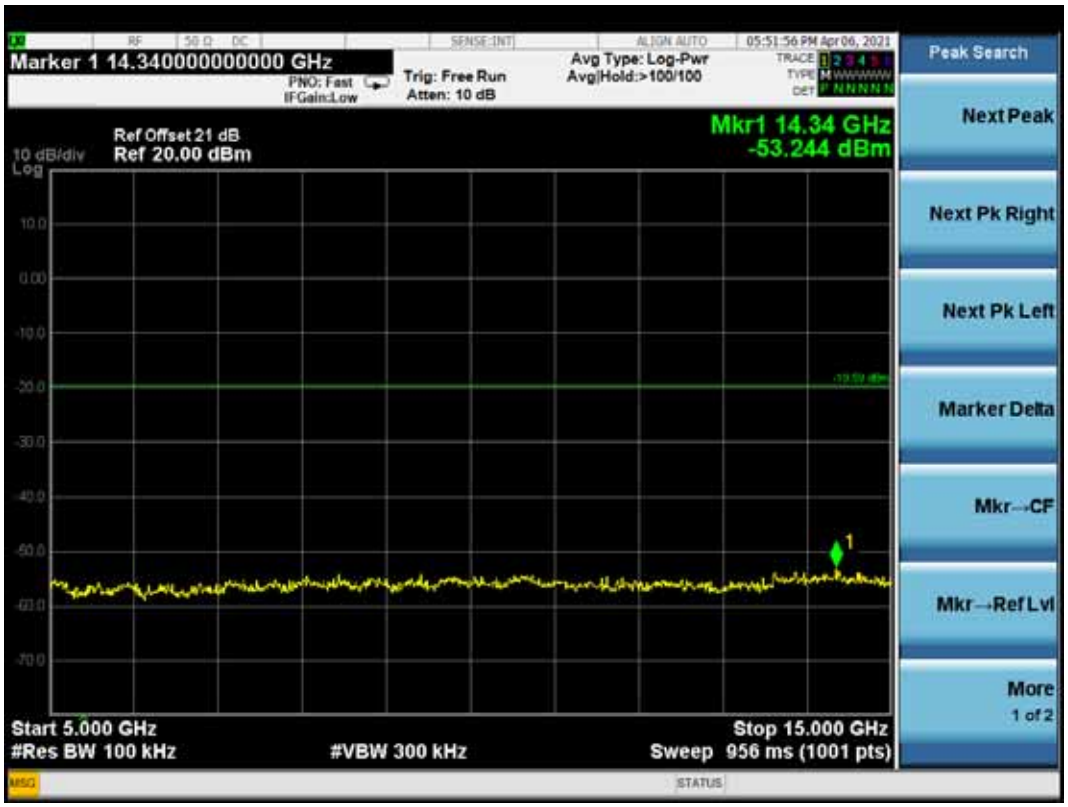

Marker 1 23.650000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
06:04:33 PM Apr 06, 2021
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.65 GHz
-47.764 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

802.11n20 CH2462MHz

Reference level



Emission level


Marker 1 14.340000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
05:51:56 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 14.34 GHz
-53.244 dBm
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 956 ms (1001 pts)


Marker 1 23.720000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
05:54:38 PM Apr 06, 2021
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 21 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 23.72 GHz
-49.900 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 956 ms (1001 pts)

8 BAND EDGES MEASUREMENT

8.1 Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2020.09.16	1 Year
2.	Coaxial Cable	WOKEN	SFL402-105F LEX	F02-150819-045	2021.03.08	1 Year
3.	20 dB Attenuator	Mini-Circuits	VAT-20+	001	2020.08.06	1 Year

8.2 Block Diagram of Test Setup

The Same as section. 5.2.

8.3 Specification Limits (§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.

8.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

8.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. Set RBW of Test Receiver to 100kHz and VBW to 300kHz with suitable frequency span including 100kHz bandwidth from band edge.
The test procedure is defined in ANSI C63.10-2013 (11.11.3 Emission level measurement was used).

8.6 Test Results

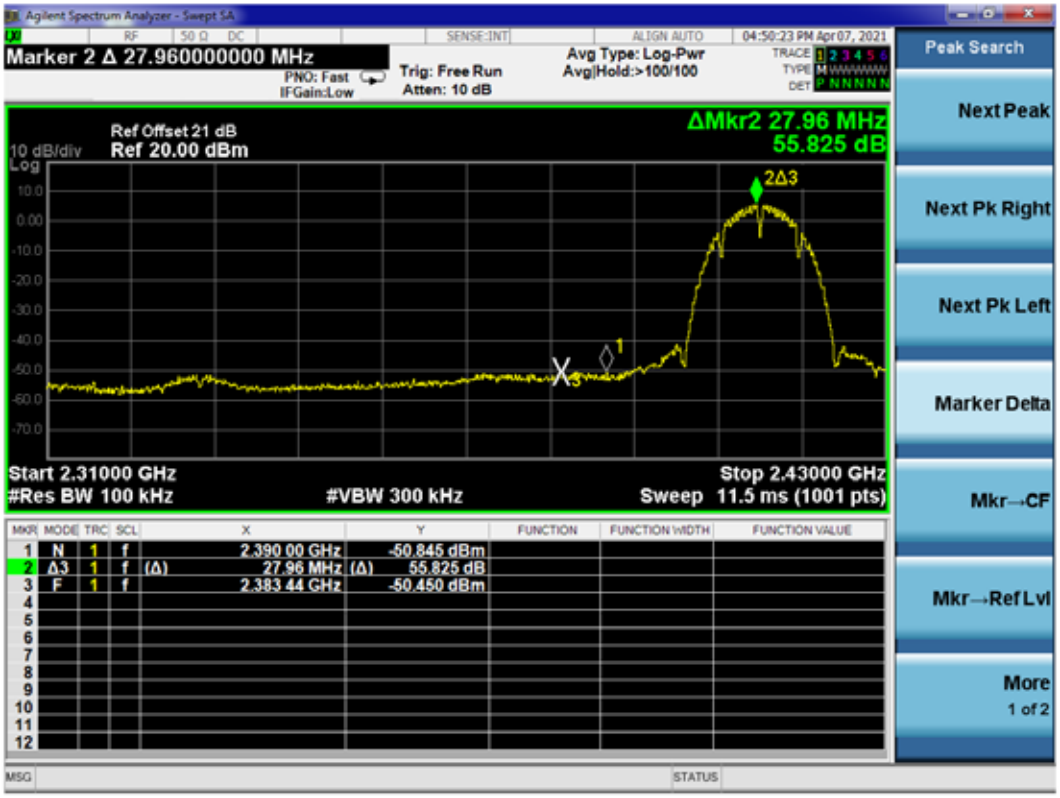
PASSED.

All the test results are attached in next pages.

(Test Date: 2021.04.06 Temperature: 23℃ Humidity: 51 %)

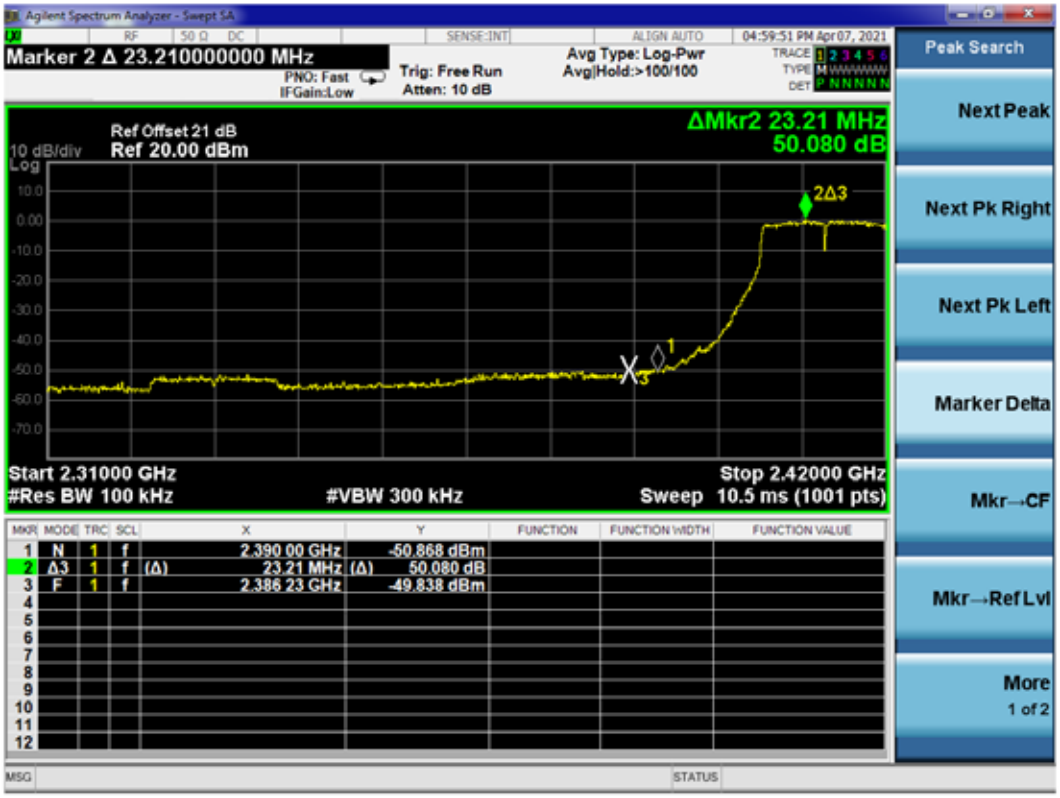
Modulation	Location	Channel	Frequency (MHz)	**Delta Marker (dB)**	Result
802.11b	Below Band Edge	1	2412	**55.825**	More than **20 dB** below the highest level of the desired power
	Upper Band Edge	11	2462	**54.494**	
802.11g	Below Band Edge	1	2412	**50.08**	More than **20 dB** below the highest level of the desired power
	Upper Band Edge	11	2462	**47.33**	
802.11n20	Below Band Edge	1	2412	**50.495**	More than **20 dB** below the highest level of the desired power
	Upper Band Edge	11	2462	**46.915**	

802.11b CH2412MHz (Below Edge 2390 MHz)



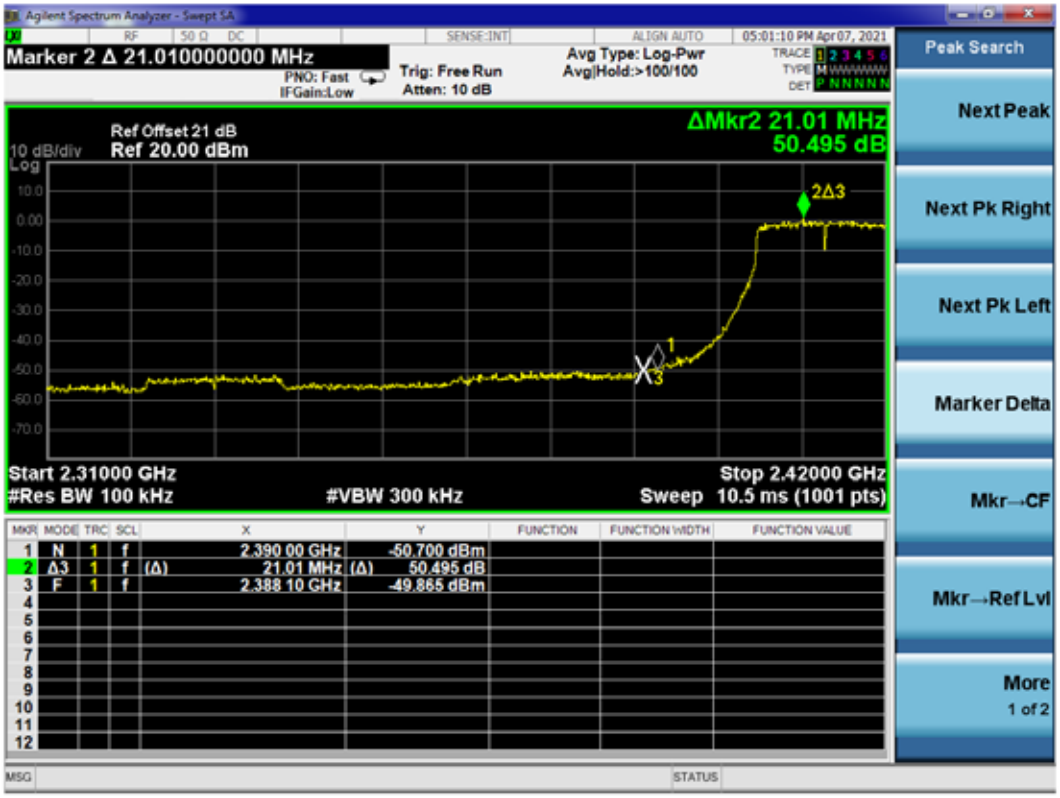
802.11b CH2462MHz (Upper Edge 2483.5 MHz)

802.11g CH2412MHz (Below Edge 2390 MHz)



802.11g CH2462MHz (Upper Edge 2483.5 MHz)

802.11n20 CH2412MHz (Below Edge 2390 MHz)



802.11n20 CH2462MHz (Upper Edge 2483.5 MHz)

9 POWER SPECTRAL DENSITY MEASUREMENT

9.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2020.09.16	1 Year
2.	Coaxial Cable	WOKEN	SFL402-105F LEX	F02-150819-045	2021.03.08	1 Year
3.	20 dB Attenuator	Mini-Circuits	VAT-20+	001	2020.08.06	1 Year

9.2 Block Diagram of Test Setup

The Same as section 5.2.

9.3 Specification Limits (§15.247(e))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

9.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

9.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

The test procedure is defined in ANSI C63.10-2013 (11.10.2 Measurement Procedure “Method PKPSD (peak PSD)” was used).

9.6 Test Results

PASSED.

All the test results are attached in next pages.

(Test Date: 2021.04.06 Temperature: 23℃ Humidity: 51 %)

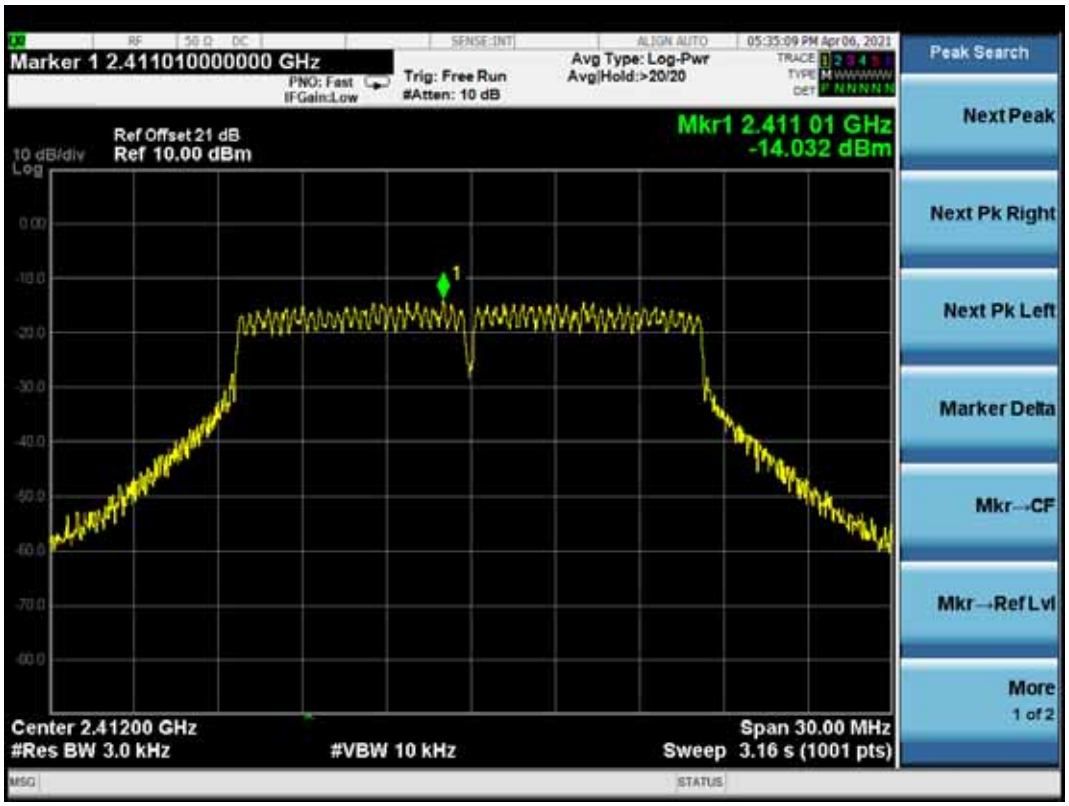
Modulation	Channel	Frequency (MHz)	**Power Spectral Density (dBm)**	Limit
802.11b	1	2412	**-14.74**	8 dBm
	6	2437	**-14.71**	8 dBm
	11	2462	**-14.42**	8 dBm
802.11g	1	2412	**-14.032**	8 dBm
	6	2437	**-13.878**	8 dBm
	11	2462	**-13.747**	8 dBm
802.11n20	1	2412	**-14.032**	8 dBm
	6	2437	**-14.017**	8 dBm
	11	2462	**-13.58**	8 dBm

802.11b CH2412 MHz

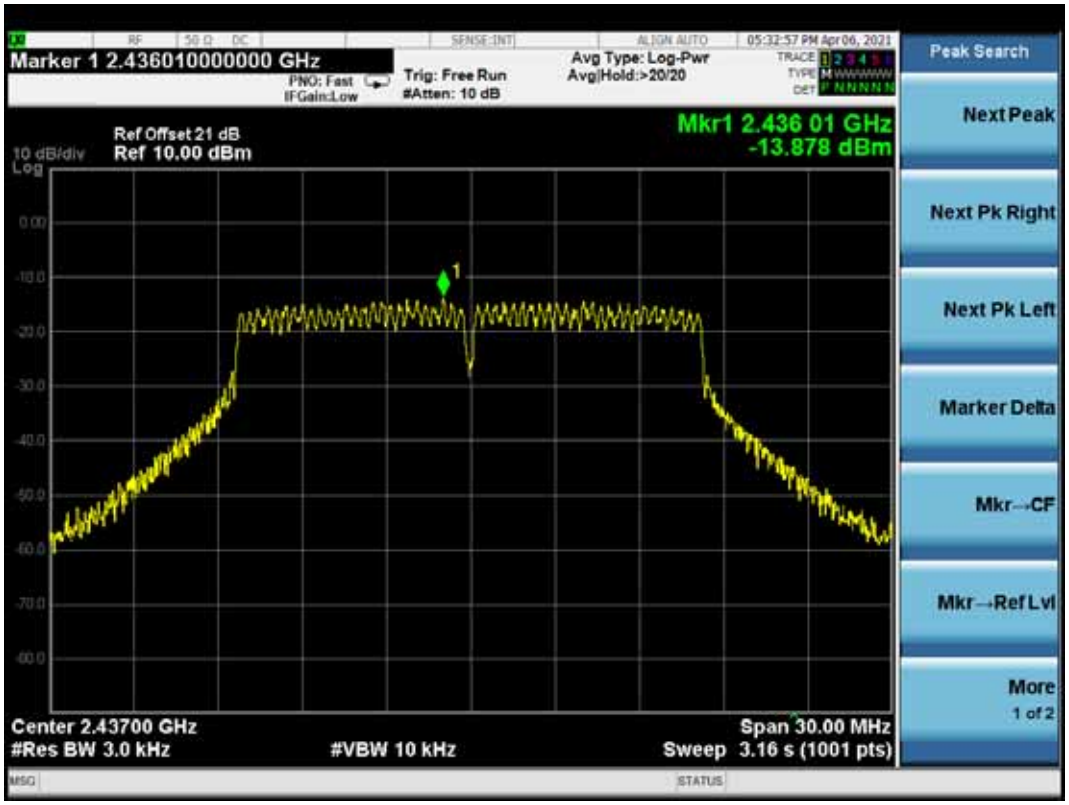
802.11b CH2437 MHz

802.11b CH2462 MHz

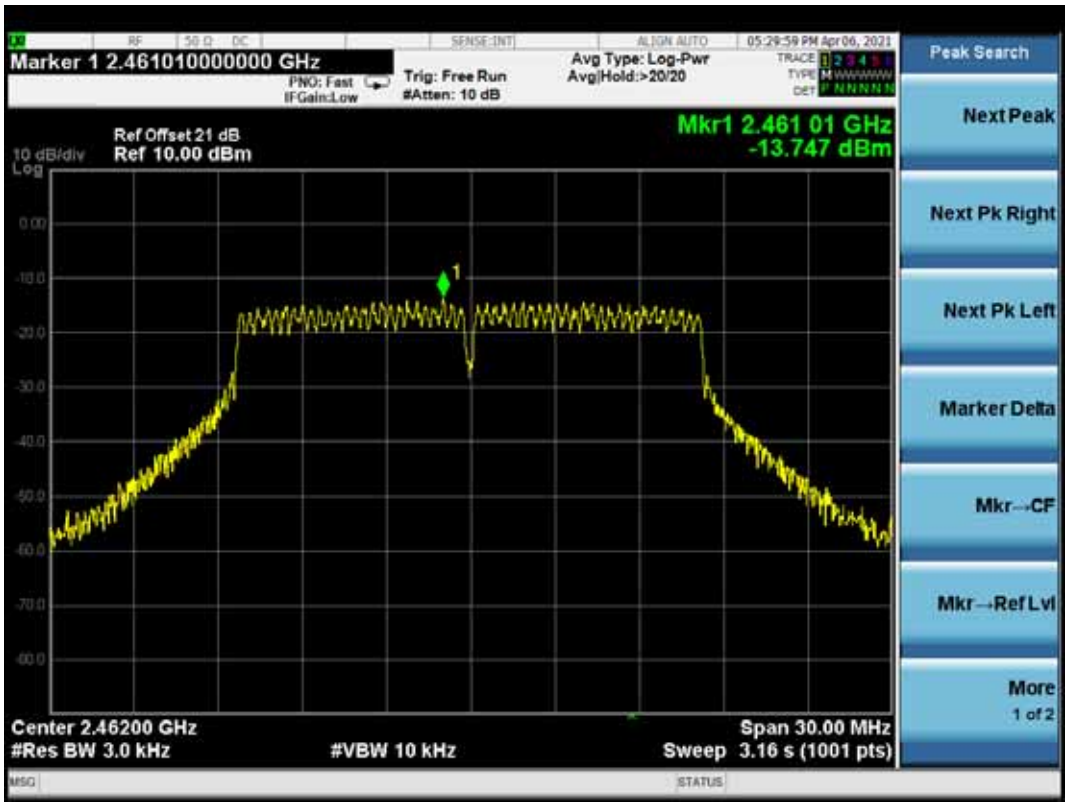
802.11g CH2412 MHz



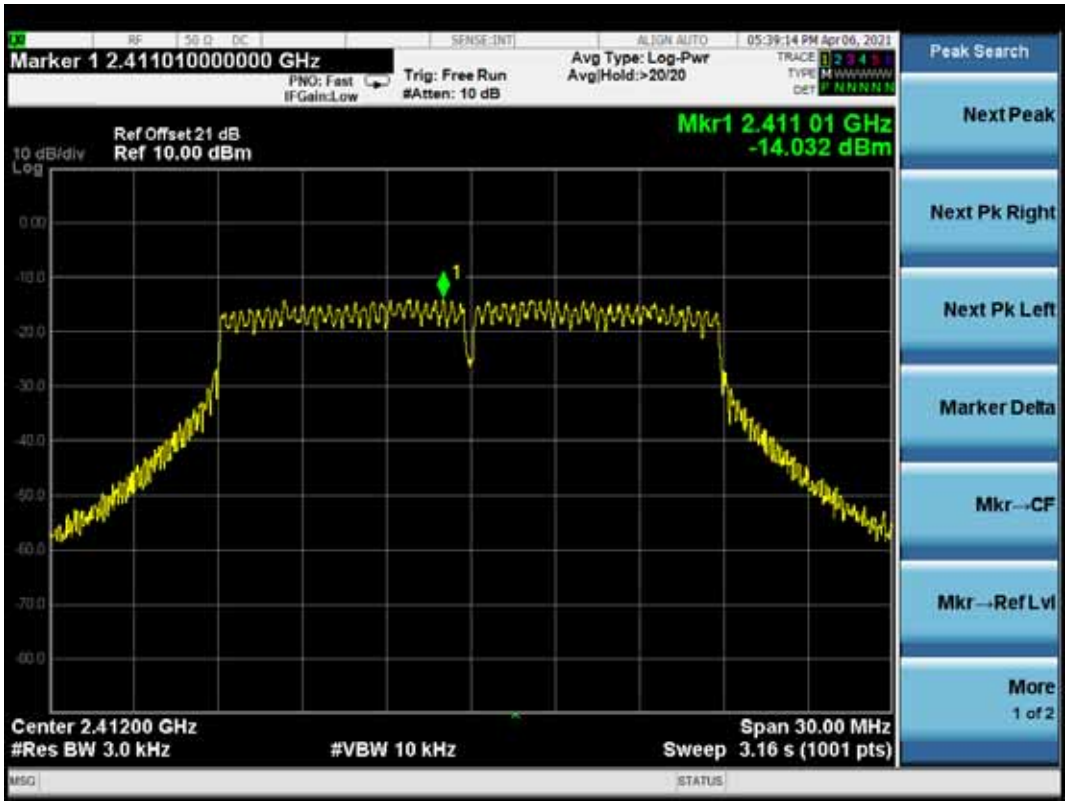
802.11g CH2437 MHz



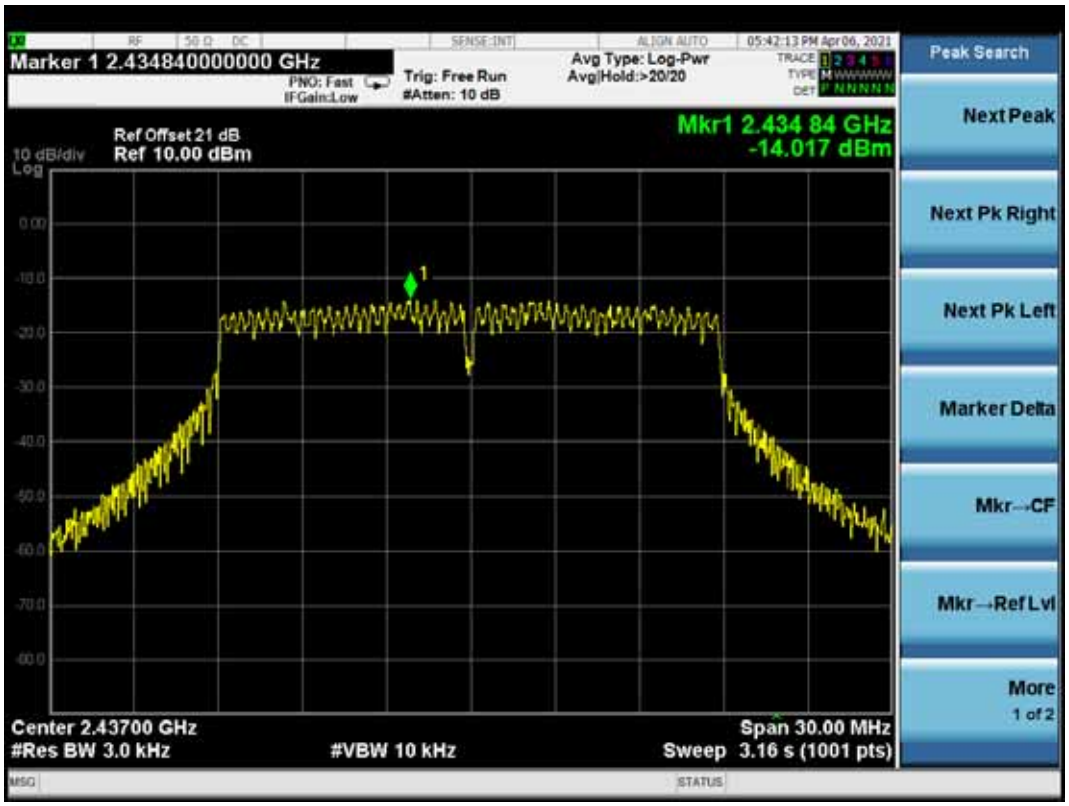
802.11g CH2462 MHz



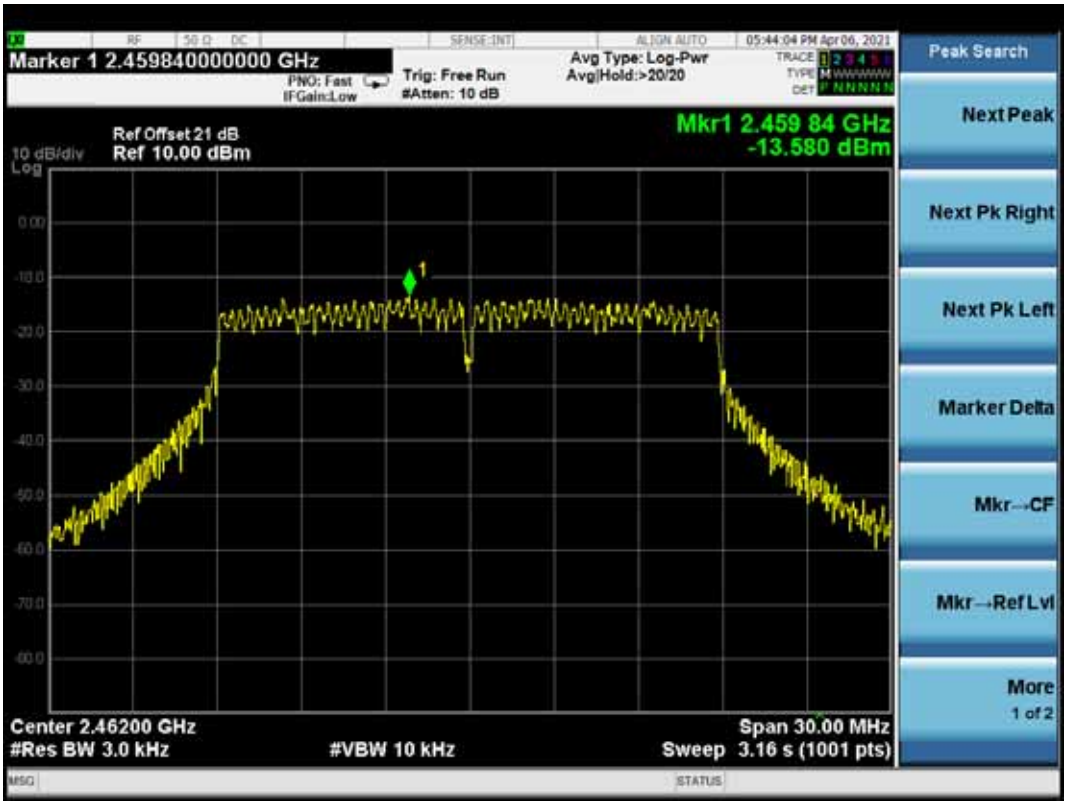
802.11n20 CH2412 MHz



802.11n20 CH2437 MHz



802.11n20 CH2462 MHz



10 DEVIATION TO TEST SPECIFICATIONS

None.

11 MEASUREMENT UNCERTAINTY LIST

The measurement uncertainty was estimated for test on the EUT according to CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage of K=2.
The uncertainties value is not used in determining the PASS/FAIL results.

Test Items/Facilities	Frequency/Equipment/Unit	Uncertainty
Conducted Emission No.1 Shielded Room	9kHz~150kHz	±3.2 dB
	150kHz~30MHz	±3.1 dB
Conducted Emission No.3 Shielded Room	150kHz~30MHz	±3.1 dB
Radiated Emission	30MHz~200MHz, Horizontal	±3.4 dB
	30MHz~200MHz, Vertical	±4.0 dB
	200MHz~1000MHz, Horizontal	±3.7 dB
	200MHz~1000MHz, Vertical	±5.1 dB
	1GHz~6GHz	±5.7 dB
	6GHz~18GHz	±4.7 dB
Output Power Test	50MHz~18GHz	0.77 dB
Power Density Test	9kHz~6GHz	1.08 dB
RF Frequency Test	9kHz~40GHz	$6*10^{-4}$
Bandwidth Test	9kHz~6GHz	$1.5*10^{-3}$
RF Radiated Power Test	30MHz~1000MHz	3.06 dB
Conducted Output Power Test	50MHz~18GHz	0.83 dB
AC Voltage(<10kHz) Test	120V~230V	0.04 %
DC Power Test	0V~30V	0.4 %
Temperature	-40℃~+100℃	0.52 ℃
Humidity	30%~95%	2.6 %