



RF TEST REPORT

Applicant Huawei Device Co.,Ltd.
FCC ID 2ATEYPPA-LX3
Product Smart Phone
Model PPA-LX3
Report No. R2101A0041-R4
Issue Date January 8, 2021

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Approved by: Kai Xu

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Summary of measurement results

Number	Test Case	Clause in FCC rules	Verdict
1	Maximum output power	15.247(b)(3)	PASS
2	99% Bandwidth and 6 dB Bandwidth	15.247(a)(2)	PASS
3	Power spectral density	15.247(e)	PASS
4	Band Edge	15.247(d)	PASS
5	Spurious RF Conducted Emissions	15.247(d)	PASS
6	Unwanted Emissions	15.247(d),15.205,15.209	PASS
7	Conducted Emissions	15.207	PASS
Date of Testing: September 7, 2020 ~ September 21, 2020			
Date of Sample Received: September 7, 2020			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

This report is only added FCC ID, there is no test in this report and the original report number is R2009H0244-R4.

1. Test Laboratory

1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3. Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City: Shanghai
Post code: 201201
Country: P. R. China
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Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com

2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Huawei Device Co.,Ltd.
Applicant address	No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China
Manufacturer	Huawei Device Co.,Ltd.
Manufacturer address	No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China

2.2. General information

EUT Description			
Model		PPA-LX3	
SN		2KTNU20811100857	
Hardware Version		HL1PPAM	
Software Version		10.1.1.100(C900E25R1P2)	
Power Supply		Battery/AC adapter	
Antenna Type		Internal Antenna	
Antenna Connector		A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)	
Antenna Gain		-1dBi	
additional beamforming gain		NA	
Test Mode		Bluetooth V5.1 LE 802.11b 802.11g, 802.11n(HT20/HT40);	
Modulation Type		BLE :GFSK 802.11b: DSSS; 802.11g/n(HT20/HT40): OFDM	
Max. Output Power		Wi-Fi 2.4G :18.38dBm BLE : 9.42dBm	
Operating Frequency Range(s)		802.11b/g/n(HT20): 2412 ~ 2462 MHz 802.11n(HT40): 2422 ~ 2452 MHz BLE: 2402 ~2480 MHz	
EUT Accessory			
Accessory	Model	Manufacture	No.
Adapter	HW-100225E00	Huawei Device Co.,Ltd. (Manufacturer: HUIZHOU BYD ELECTRONIC CO.,	1



		LTD.)	
		Huawei Device Co.,Ltd. (Manufacturer: DONGGUAN PHITEK ELECTRONICS CO.,LTD)	2
		Huawei Device Co.,Ltd. (Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD.)	3
	HW-100225U00	Huawei Device Co.,Ltd. (Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.)	4
		Huawei Device Co.,Ltd. (Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD.)	5
	HW-100225A00	Huawei Device Co.,Ltd. (Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.)	6
		Huawei Device Co.,Ltd. (Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD.)	7
	HW-100225B00	Huawei Device Co.,Ltd. (Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.)	8
		Huawei Device Co.,Ltd. (Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD.)	9
Battery	HB526488EEW	Huawei Device Co.,Ltd. (Manufacturer: Dongguan NVT Technology Co., Ltd)	1
		Huawei Device Co.,Ltd. (Manufacturer: Huizhou Desay Battery Co., Ltd.)	2
		Huawei Device Co.,Ltd. (Manufacturer: Sunwoda Electronic Co., Ltd.)	3
USB Cable	WA0020	NingBo Broad Telecommunication Co.,Ltd.	1
	L99UC131-CS-H	LUXSHARE Precision Industry Co., Ltd.	2
	CUDU01B-HC295-EH	FOXCONN INTERCONNECT TECHNOLOGY LIMITED	3
	18-93C2CHO-001HF	Freeport Resources Enterprises (Jiangxi) Co.,Ltd	4
	203-1572-0	Dongguan Mingji Electronics Technology Group Co.,Ltd	5
Earphone	MEND1532B528A11	Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD	1
	1293-3283-3.5MM-339	Boluo County Quancheng Electronic Co.,ltd	2
	EPAB542-2WH05-DH	FOXCONN INTERCONNECT TECHNOLOGY LIMITED	3
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the			



applicant.

2. There are more than one Adapter, Battery, Earphone and USB Cable, each one should be applied throughout the compliance test respectively, however, only the worst case (Adapter1, Battery2, Earphone2 and USB Cable1) will be recorded in this report.



3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 15C (2019) Radio Frequency Devices

ANSI C63.10 (2013)

Reference standard:

KDB 558074 D01 15.247 Meas Guidance v05r02

4. Test Configuration

Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the loop antenna is vertical, the others are vertical and horizontal. and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Preliminary tests have been done on all the configuration for confirming worst case. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

Band	Data Rate
Bluetooth(Low Energy)	1Mbps, 2Mbps
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

5. Test Case Results

5.1. Maximum output power

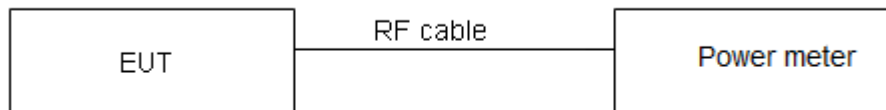
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT was connected to Power meter with a known loss. The EUT is max power transmission with proper modulation.

Test Setup



Limits

Rule Part 15.247 (b) (3) specifies that " For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz: 1 Watt."

Average Output Power	$\leq 1W$ (30dBm)
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.44$ dB.

Test Results

Band	T _{on} (ms)	T _(on+off) (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11b	12.40	12.46	1.00	NA
802.11g	2.06	2.11	0.98	NA
802.11n HT20	1.92	1.96	0.98	NA
802.11n HT40	0.94	0.98	0.96	0.19
BLE (1Mbps)	2.13	2.50	0.85	0.70
BLE (2Mbps)	1.07	1.88	0.57	2.45
Note: when Duty cycle ≥ 0.98 , Duty cycle correction Factor not required.				

Network Standards	Carrier frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412	17.12	17.12	30	PASS
	2437	17.83	17.83	30	PASS
	2462	16.98	16.98	30	PASS
802.11g	2412	9.95	9.95	30	PASS
	2417	13.03	13.03	30	PASS
	2422	13.25	13.25	30	PASS
	2427	16.27	16.27	30	PASS
	2432	18.38	18.38	30	PASS
	2437	18.20	18.20	30	PASS
	2447	17.89	17.89	30	PASS
	2452	15.61	15.61	30	PASS
	2457	13.74	13.74	30	PASS
	2462	10.77	10.77	30	PASS
802.11n HT20	2412	10.03	10.03	30	PASS
	2417	13.05	13.05	30	PASS
	2422	13.22	13.22	30	PASS
	2427	16.38	16.38	30	PASS
	2437	16.41	16.41	30	PASS
	2452	15.62	15.62	30	PASS
	2457	13.76	13.76	30	PASS
	2462	10.90	10.90	30	PASS



802.11n HT40	2422	7.18	7.37	30	PASS
	2427	9.17	9.36	30	PASS
	2432	9.23	9.42	30	PASS
	2437	12.09	12.28	30	PASS
	2442	12.12	12.31	30	PASS
	2447	11.04	11.23	30	PASS
	2452	8.92	9.11	30	PASS
BLE (1Mbps)	2402	8.72	9.42	30	PASS
	2440	7.83	8.53	30	PASS
	2480	8.01	8.71	30	PASS
BLE (2Mbps)	2402	6.87	9.32	30	PASS
	2440	6.03	8.48	30	PASS
	2480	6.31	8.76	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient condition

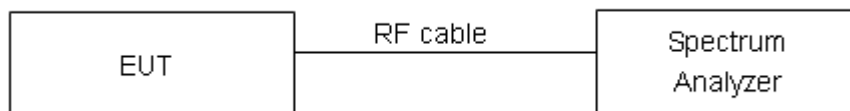
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 100 kHz; VBW is set to 300 kHz on spectrum analyzer. Dector=Peak, Trace mode=max hold.

The EUT was connected to the spectrum analyzer through a known loss cable. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value.

Test Setup



Limits

Rule Part 15.247 (a) (2) specifies that “Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.”

minimum 6 dB bandwidth	≥ 500 kHz
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

Test Results:

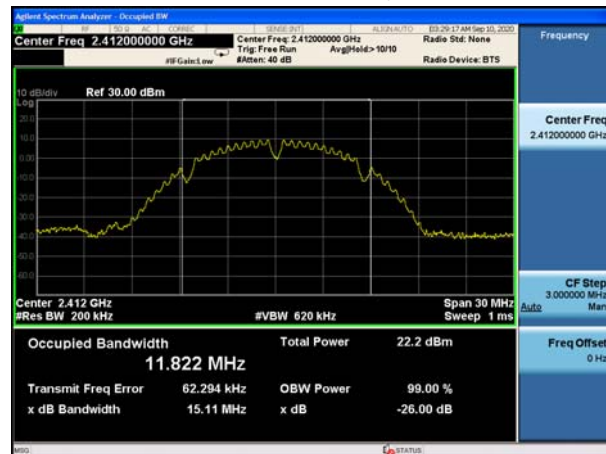
Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (MHz)	Conclusion
802.11b	2412	11.822	8.05	0.5	PASS
	2437	11.436	7.58	0.5	PASS
	2462	11.796	8.08	0.5	PASS
802.11g	2412	16.576	16.39	0.5	PASS
	2417	16.553	16.39	0.5	PASS
	2422	16.566	16.44	0.5	PASS
	2427	16.519	16.12	0.5	PASS
	2432	16.517	16.36	0.5	PASS
	2437	16.514	16.36	0.5	PASS
	2447	16.542	16.39	0.5	PASS
	2452	16.548	16.41	0.5	PASS
	2457	16.540	16.40	0.5	PASS
	2462	16.571	16.42	0.5	PASS
802.11n HT20	2412	17.648	17.65	0.5	PASS
	2417	17.641	17.62	0.5	PASS
	2422	17.639	17.62	0.5	PASS
	2427	17.627	17.33	0.5	PASS
	2437	17.574	17.33	0.5	PASS
	2452	17.616	17.62	0.5	PASS
	2457	17.628	17.62	0.5	PASS
	2462	17.665	17.63	0.5	PASS
802.11n HT40	2422	36.014	35.51	0.5	PASS
	2427	35.900	35.33	0.5	PASS
	2432	35.818	35.30	0.5	PASS
	2437	35.761	35.16	0.5	PASS
	2442	35.712	35.16	0.5	PASS



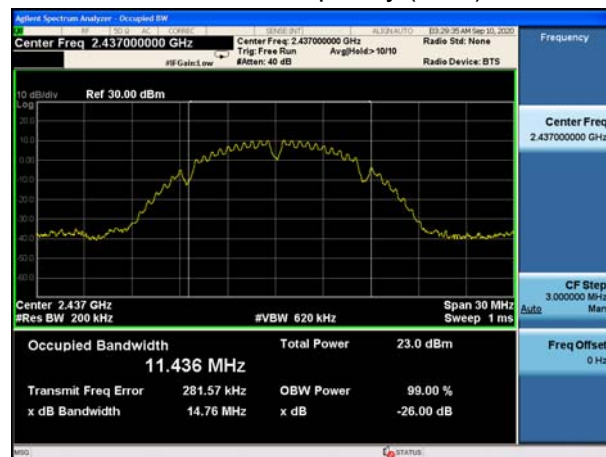
	2447	35.832	35.20	0.5	PASS
	2452	35.960	35.60	0.5	PASS
BLE (1Mbps)	2402	1.041	0.67	0.5	PASS
	2440	1.043	0.67	0.5	PASS
	2480	1.042	0.67	0.5	PASS
BLE (2Mbps)	2402	2.073	1.17	0.5	PASS
	2440	2.072	1.16	0.5	PASS
	2480	2.071	1.17	0.5	PASS

99%bandwidth

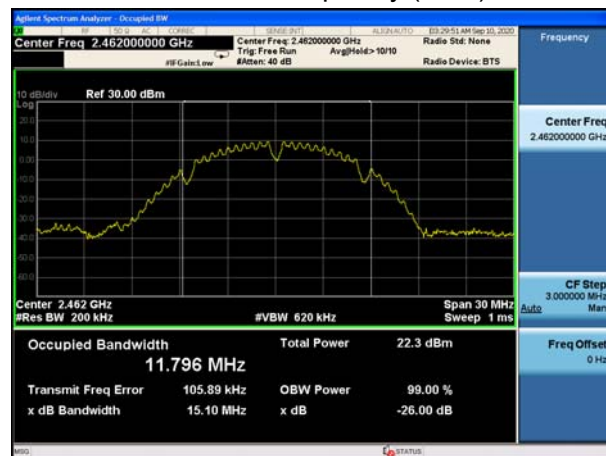
802.11b, Carrier frequency (MHz): 2412



802.11b, Carrier frequency (MHz): 2437

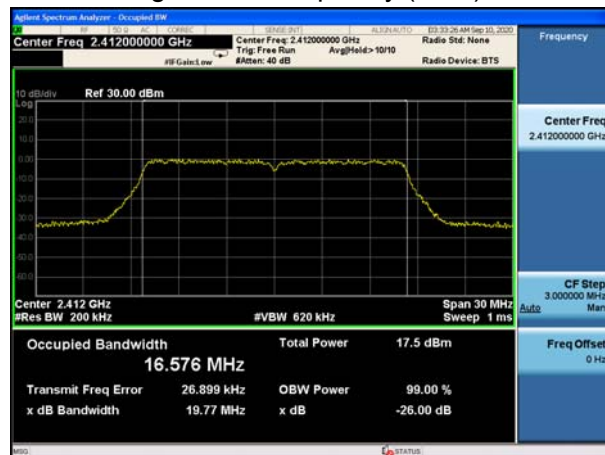


802.11b, Carrier frequency (MHz):2462

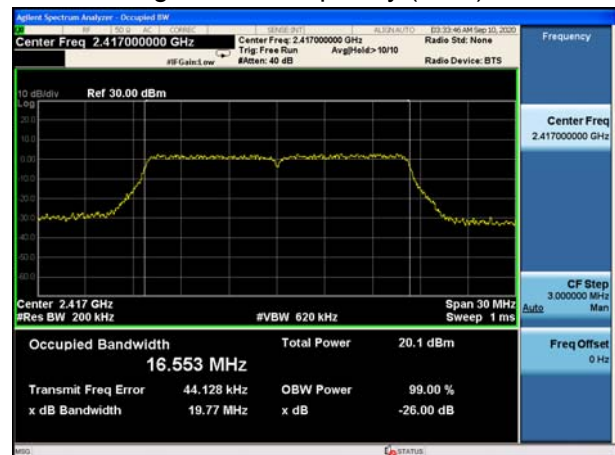




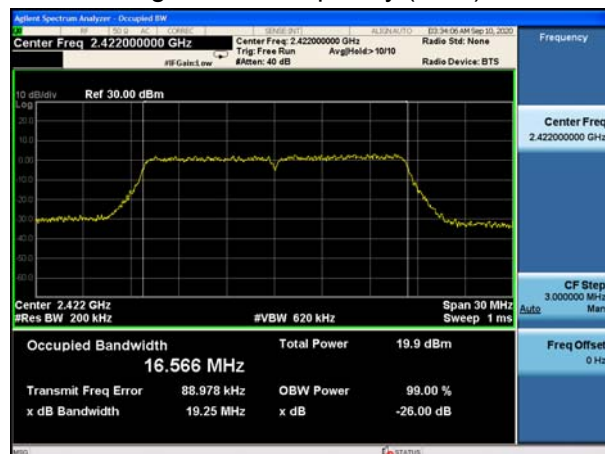
802.11g, Carrier frequency (MHz): 2412



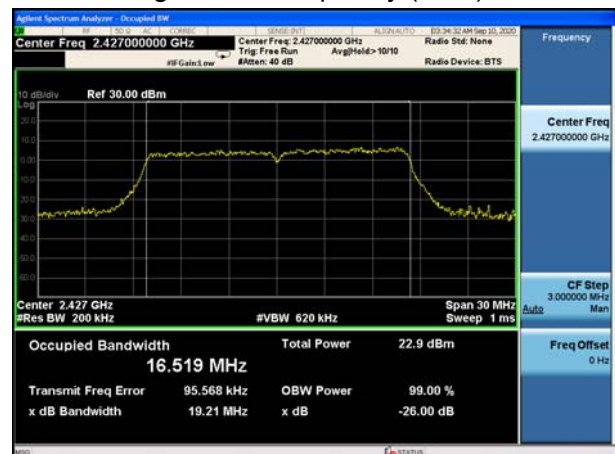
802.11g, Carrier frequency (MHz): 2417



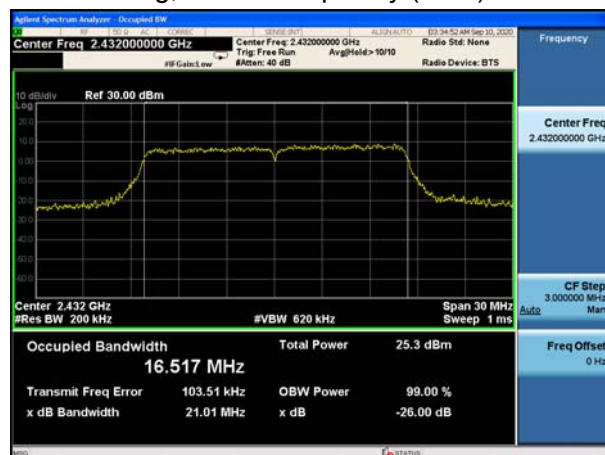
802.11g, Carrier frequency (MHz): 2422



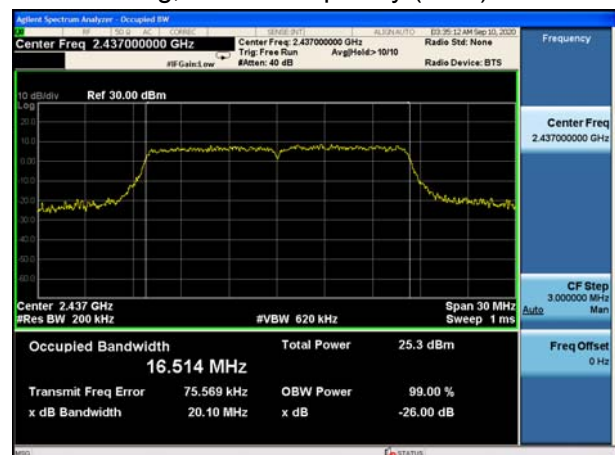
802.11g, Carrier frequency (MHz): 2427



802.11g, Carrier frequency (MHz): 2432

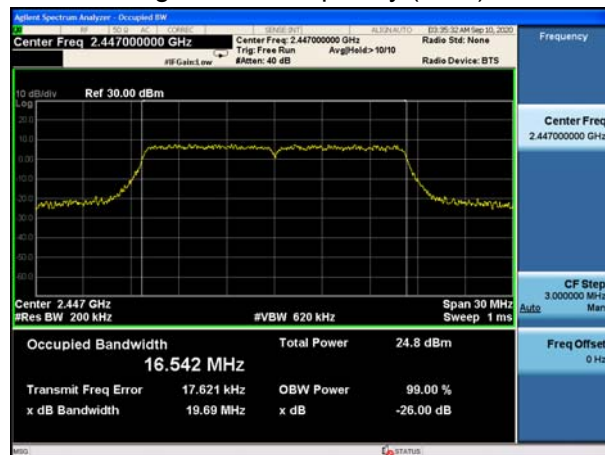


802.11g, Carrier frequency (MHz): 2437

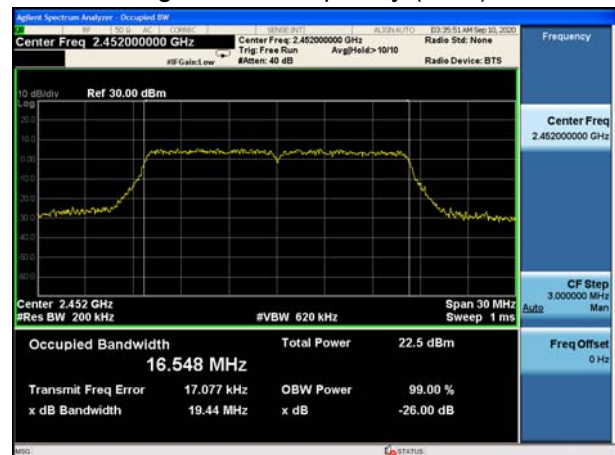




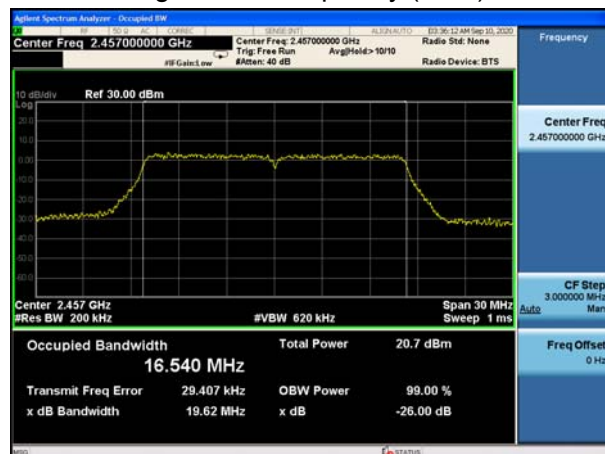
802.11g, Carrier frequency (MHz):2447



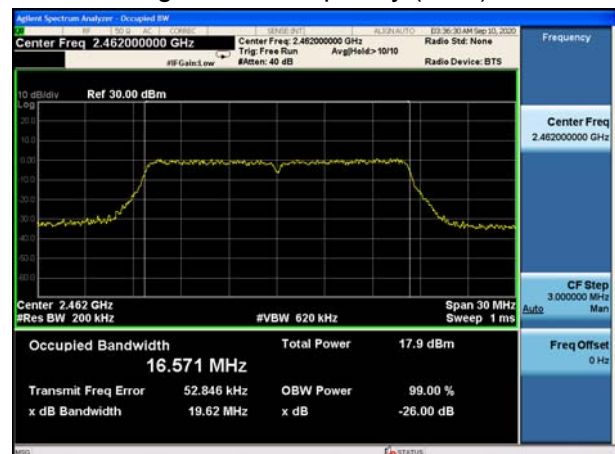
802.11g, Carrier frequency (MHz):2452



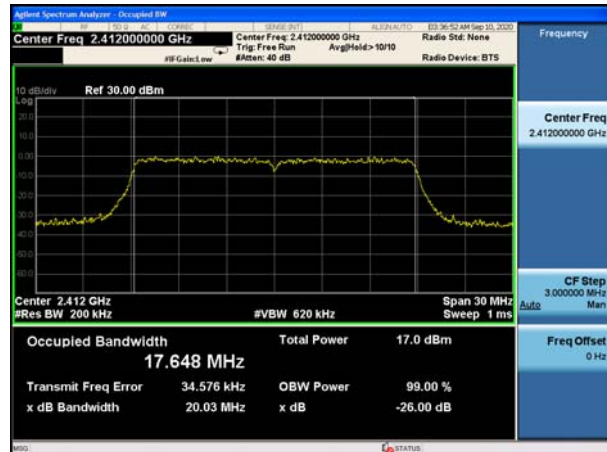
802.11g, Carrier frequency (MHz):2457



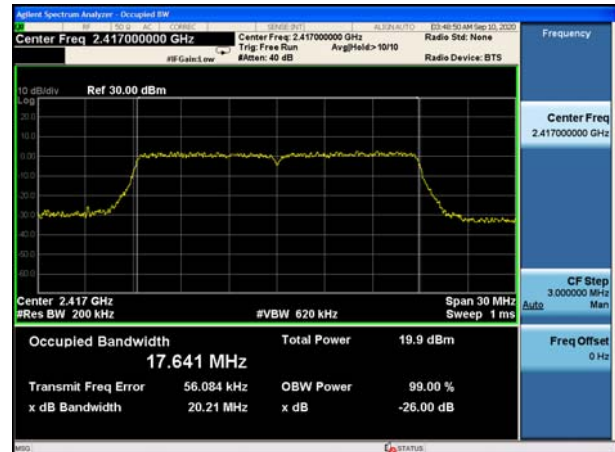
802.11g, Carrier frequency (MHz):2462



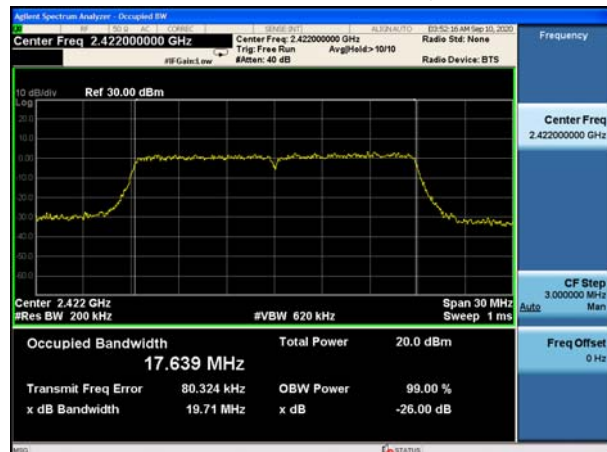
802.11n(HT20), Carrier frequency (MHz): 2412



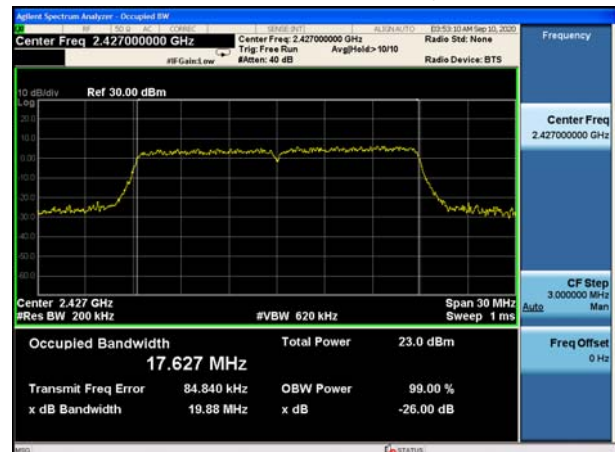
802.11n(HT20), Carrier frequency (MHz): 2417



802.11n(HT20), Carrier frequency (MHz): 2422



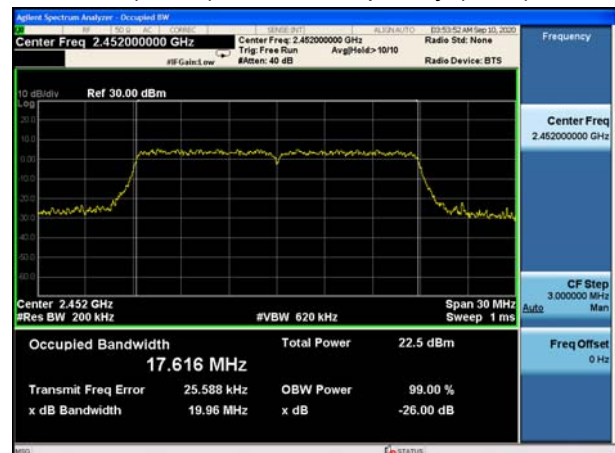
802.11n(HT20), Carrier frequency (MHz): 2427



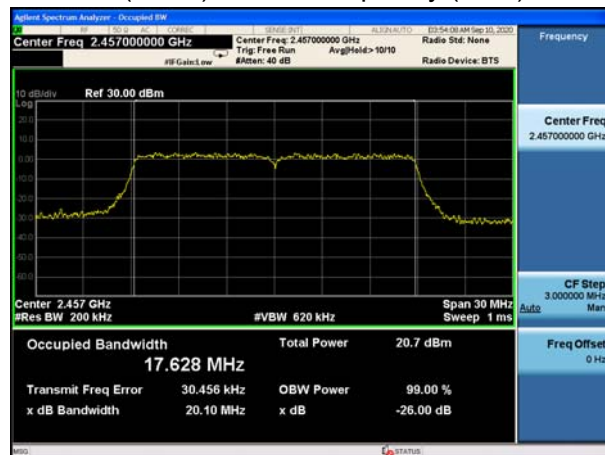
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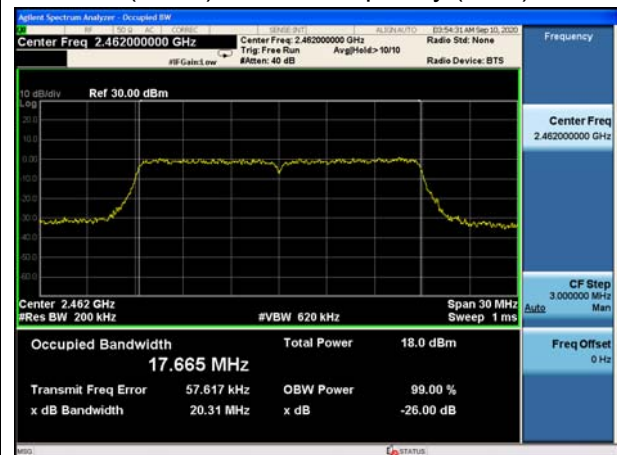
802.11n(HT20), Carrier frequency (MHz): 2452



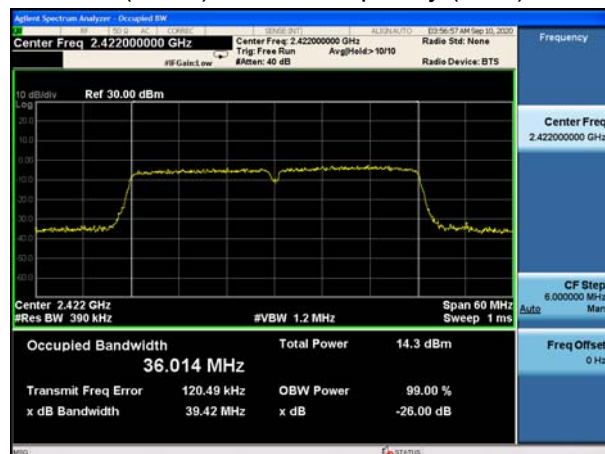
802.11n(HT20), Carrier frequency (MHz): 2457



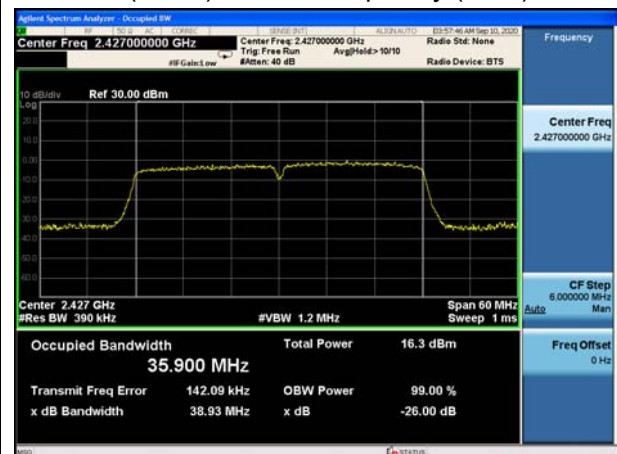
802.11n(HT20), Carrier frequency (MHz): 2462



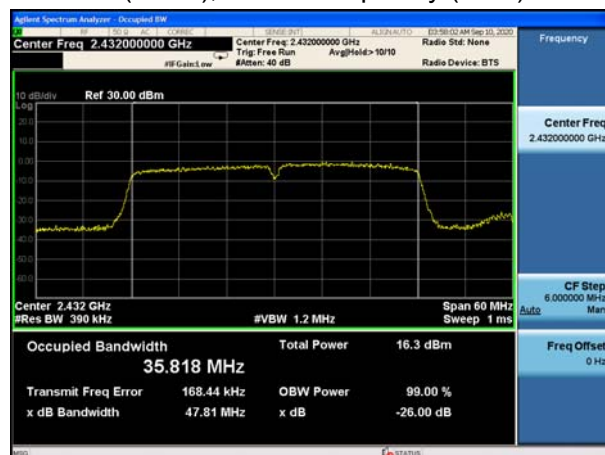
802.11n(HT40), Carrier frequency (MHz): 2422



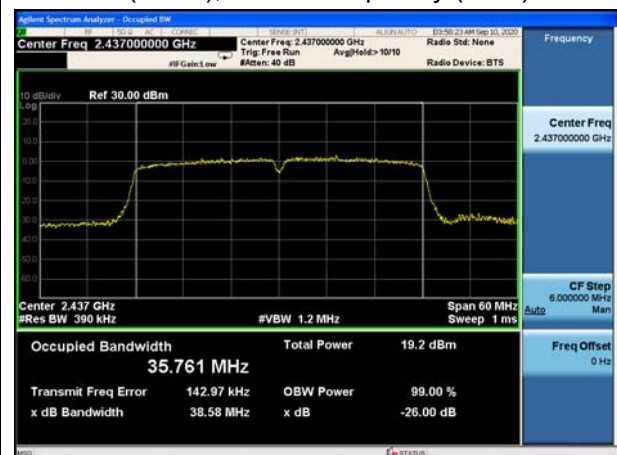
802.11n(HT40), Carrier frequency (MHz): 2427



802.11n(HT40), Carrier frequency (MHz): 2432

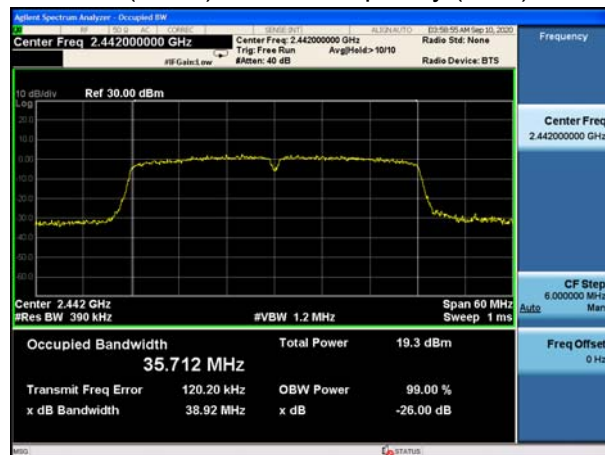


802.11n(HT40), Carrier frequency (MHz): 2437

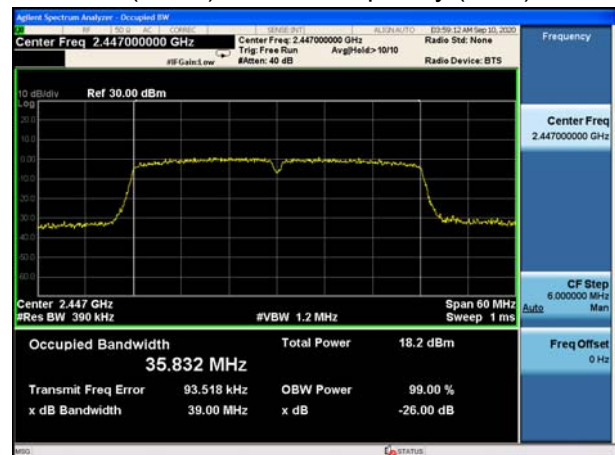




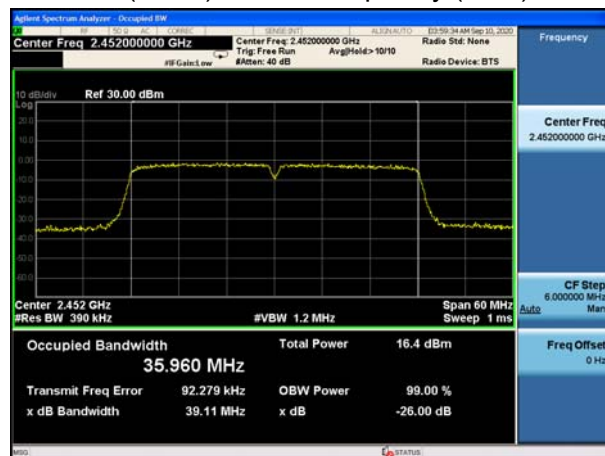
802.11n(HT40), Carrier frequency (MHz):2442



802.11n(HT40), Carrier frequency (MHz):2447



802.11n(HT40), Carrier frequency (MHz):2452



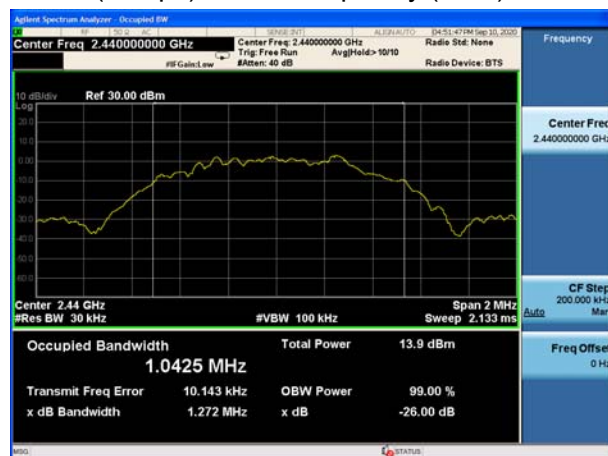
BLE(1Mbps) Carrier frequency (MHz): 2402



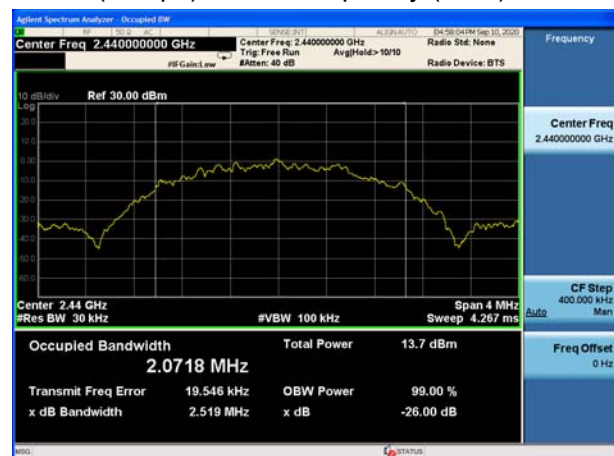
BLE(2Mbps) Carrier frequency (MHz): 2402



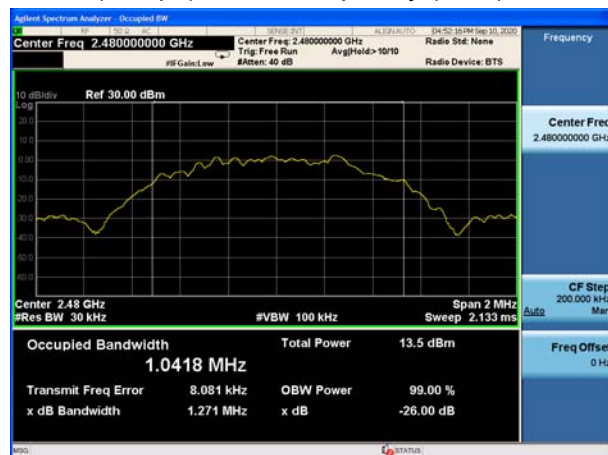
BLE(1Mbps) Carrier frequency (MHz): 2440



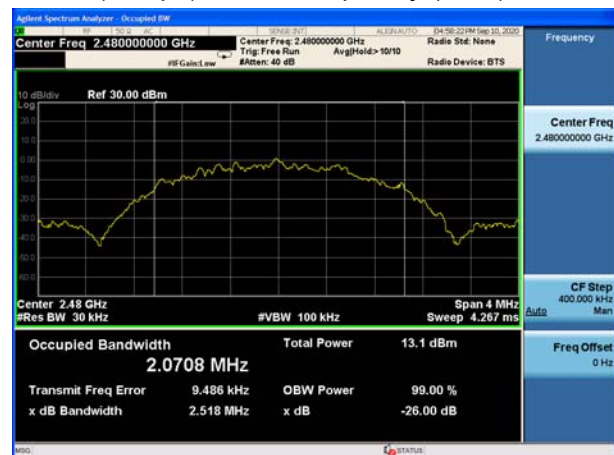
BLE(2Mbps) Carrier frequency (MHz): 2440



BLE(1Mbps) Carrier frequency (MHz): 2480



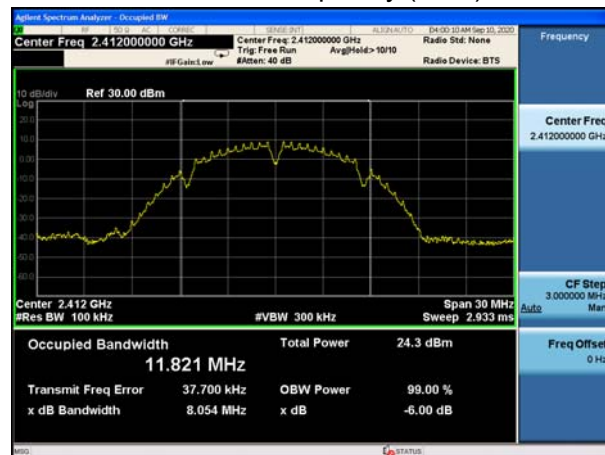
BLE(2Mbps) Carrier frequency (MHz): 2480



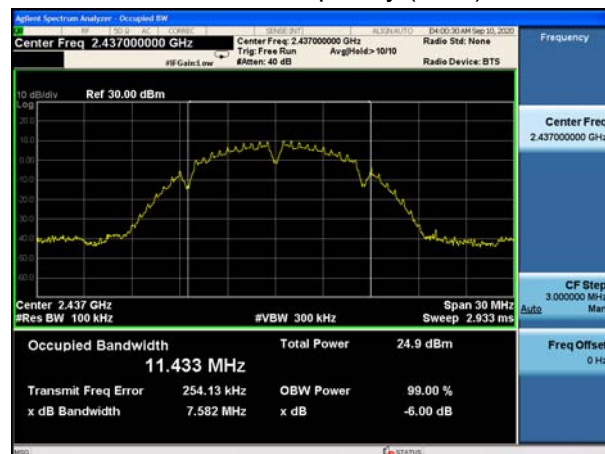


6 dB bandwidth

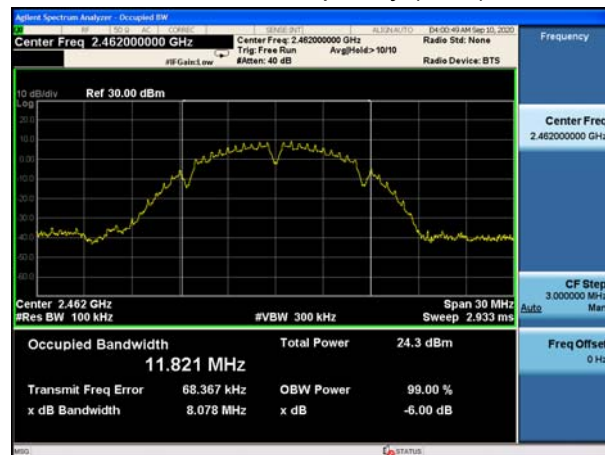
802.11b, Carrier frequency (MHz): 2412



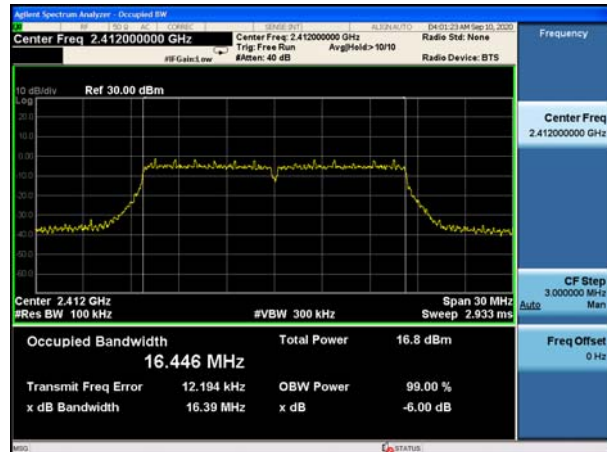
802.11b, Carrier frequency (MHz): 2437



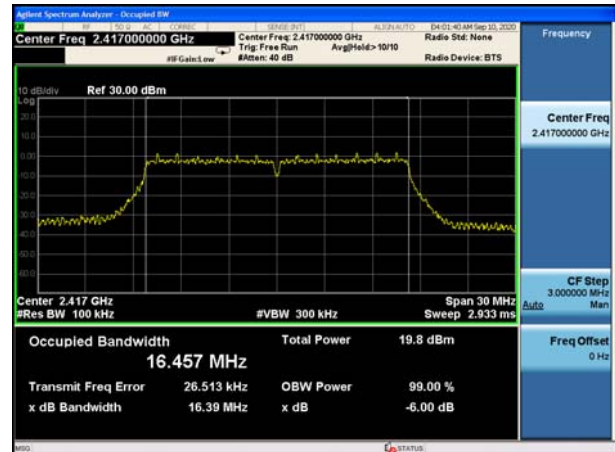
802.11b, Carrier frequency (MHz): 2462



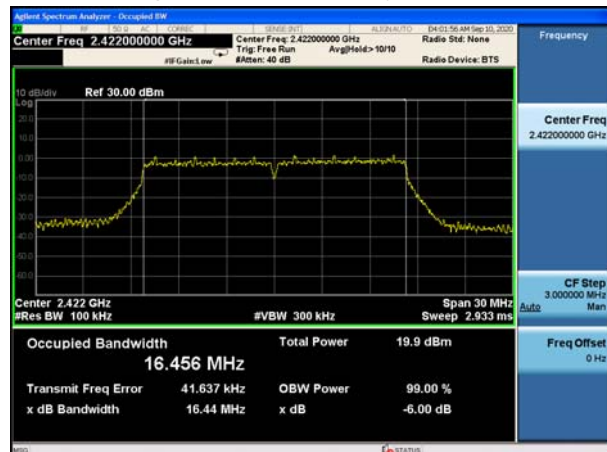
802.11g, Carrier frequency (MHz): 2412



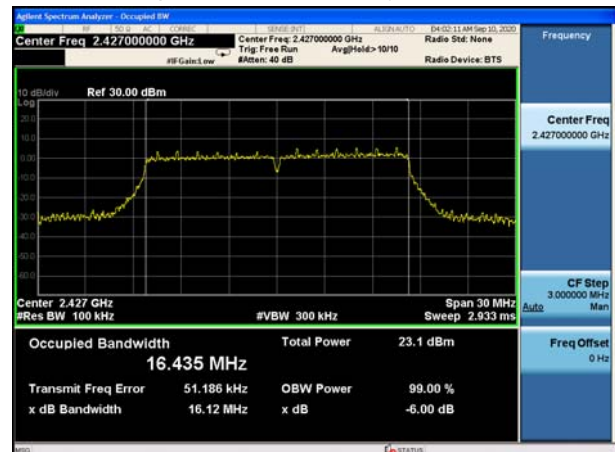
802.11g, Carrier frequency (MHz): 2417



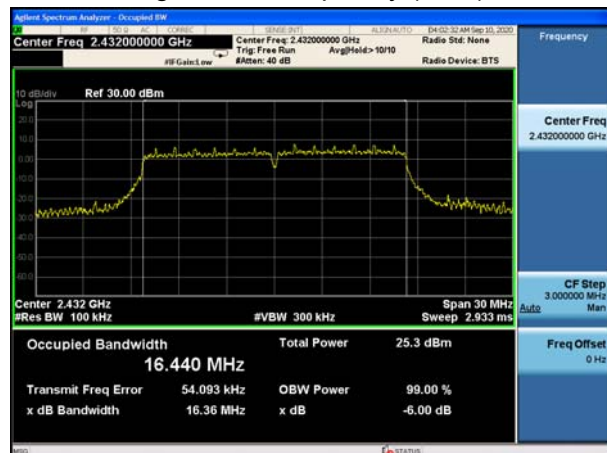
802.11g, Carrier frequency (MHz): 2422



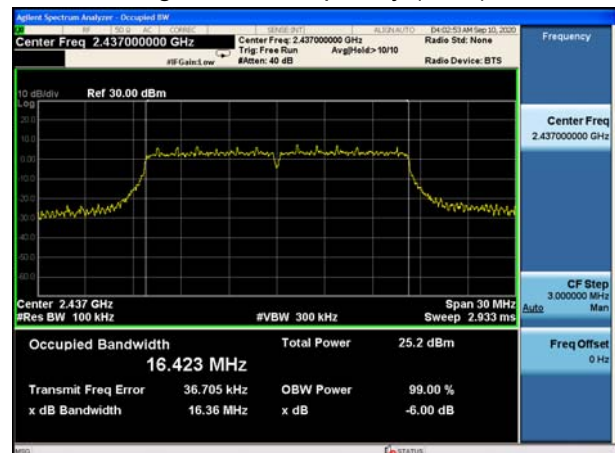
802.11g, Carrier frequency (MHz): 2427



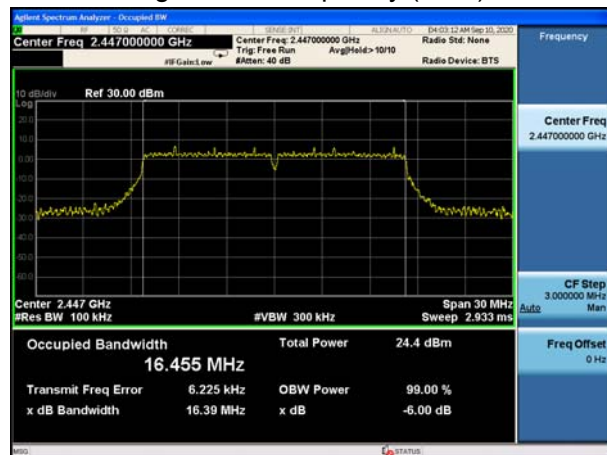
802.11g, Carrier frequency (MHz): 2432



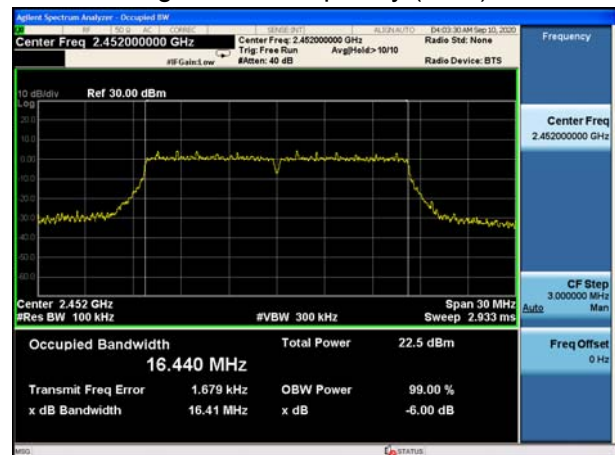
802.11g, Carrier frequency (MHz): 2437



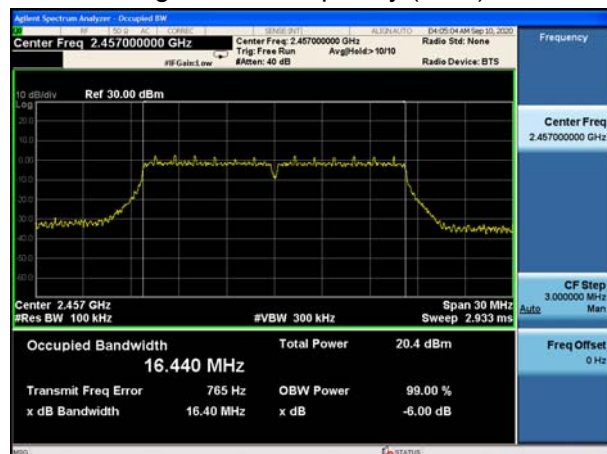
802.11g, Carrier frequency (MHz):2447



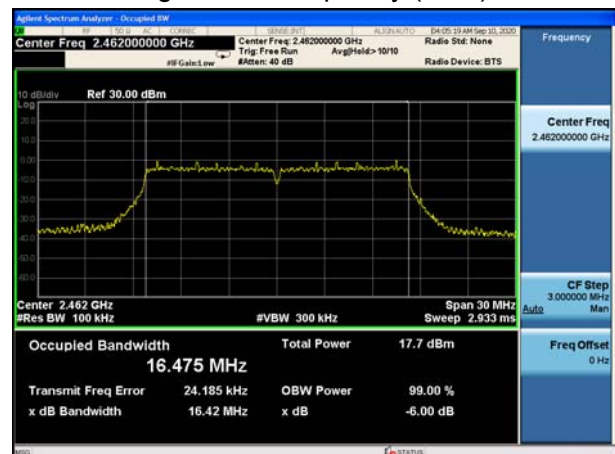
802.11g, Carrier frequency (MHz):2452



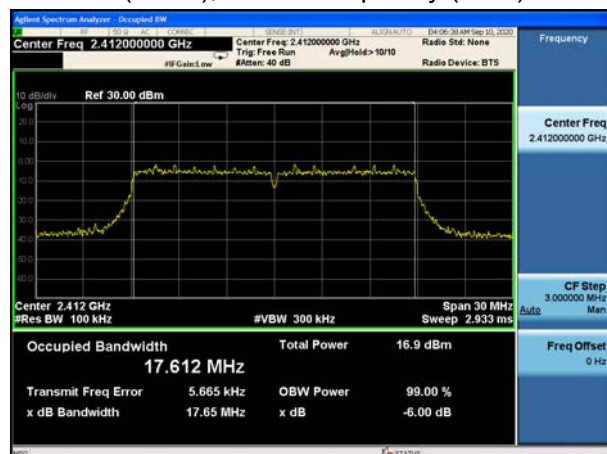
802.11g, Carrier frequency (MHz):2457



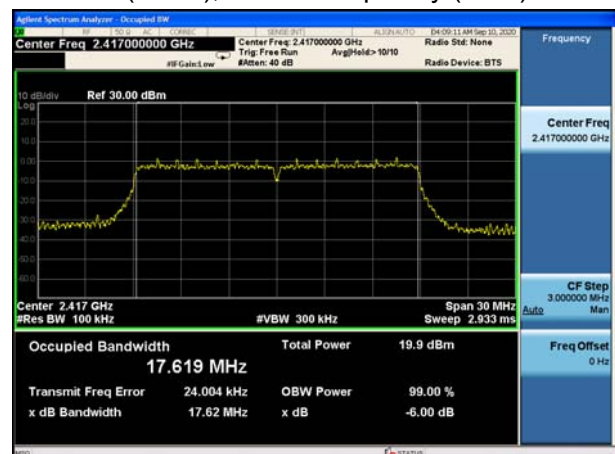
802.11g, Carrier frequency (MHz):2462



802.11n(HT20), Carrier frequency (MHz): 2412

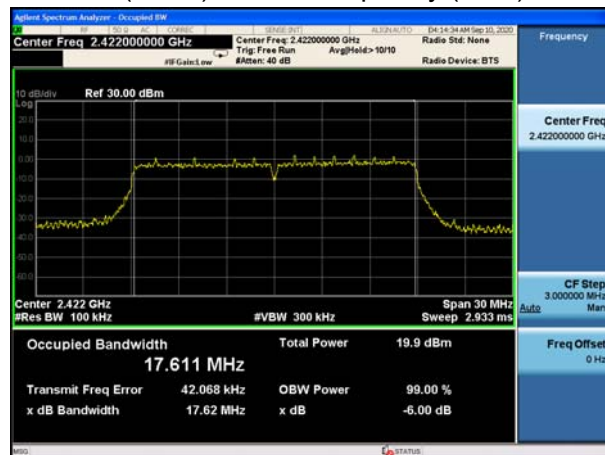


802.11n(HT20), Carrier frequency (MHz): 2417

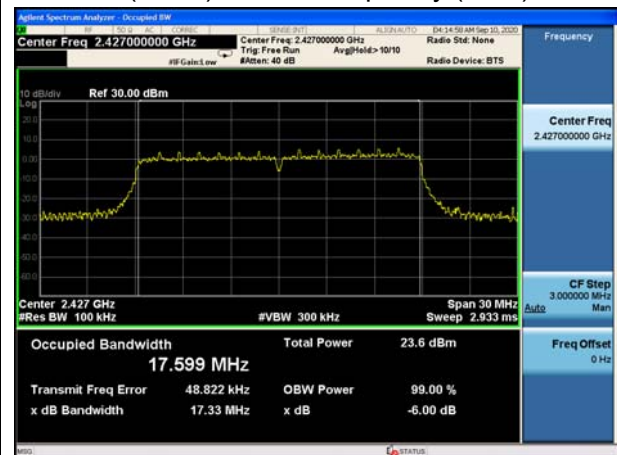




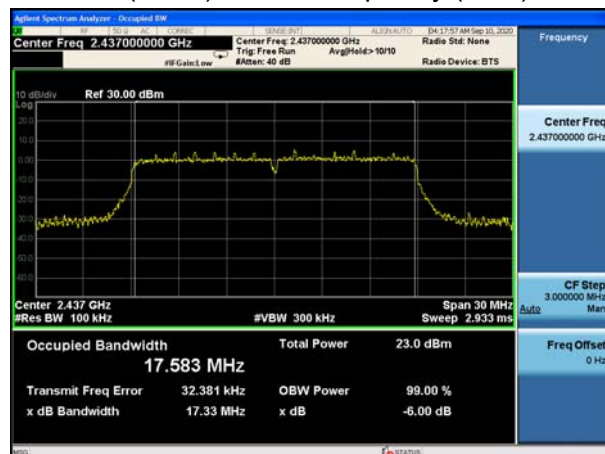
802.11n(HT20), Carrier frequency (MHz): 2422



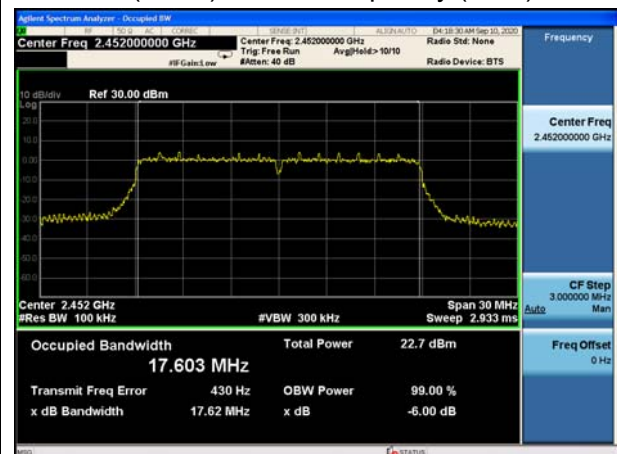
802.11n(HT20), Carrier frequency (MHz): 2427



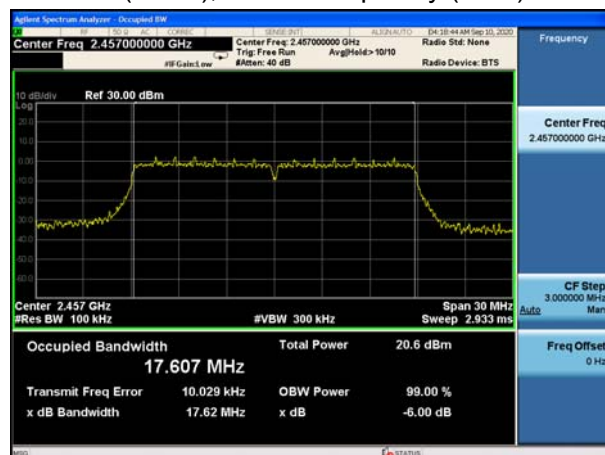
802.11n(HT20), Carrier frequency (MHz): 2437



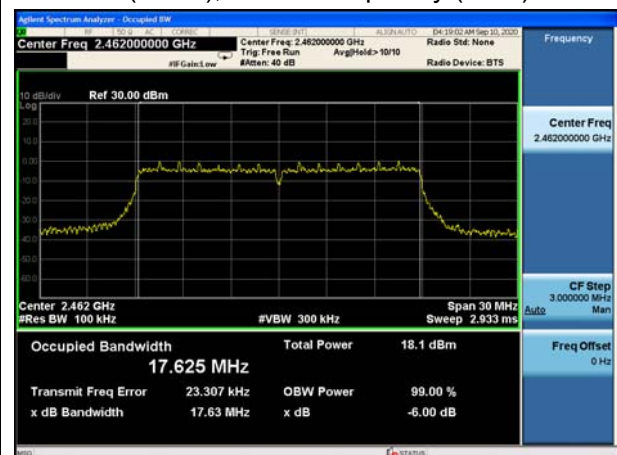
802.11n(HT20), Carrier frequency (MHz): 2452



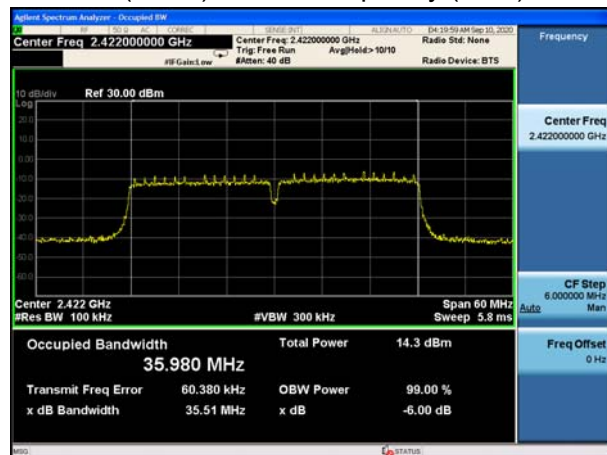
802.11n(HT20), Carrier frequency (MHz): 2457



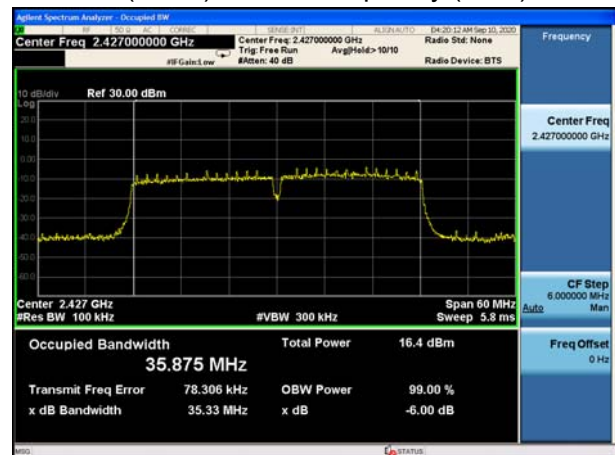
802.11n(HT20), Carrier frequency (MHz): 2462



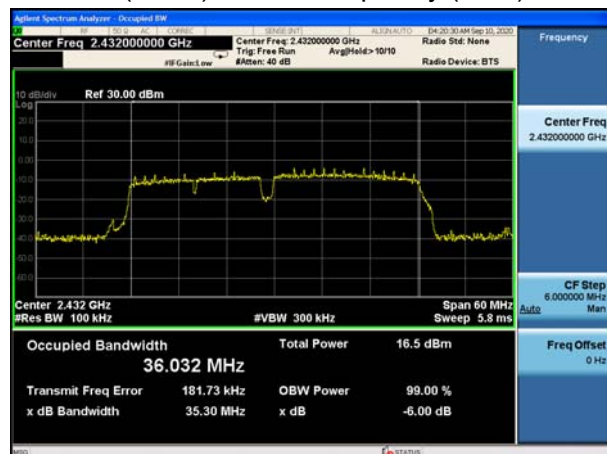
802.11n(HT40), Carrier frequency (MHz): 2422



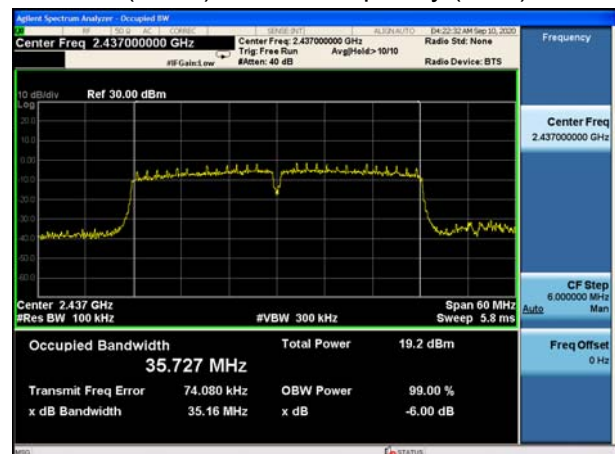
802.11n(HT40), Carrier frequency (MHz): 2427



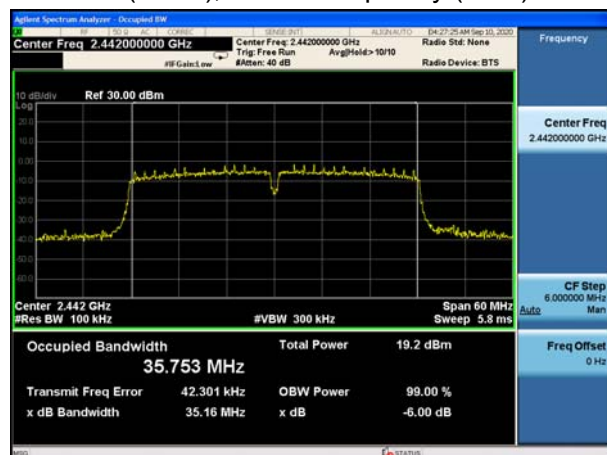
802.11n(HT40), Carrier frequency (MHz): 2432



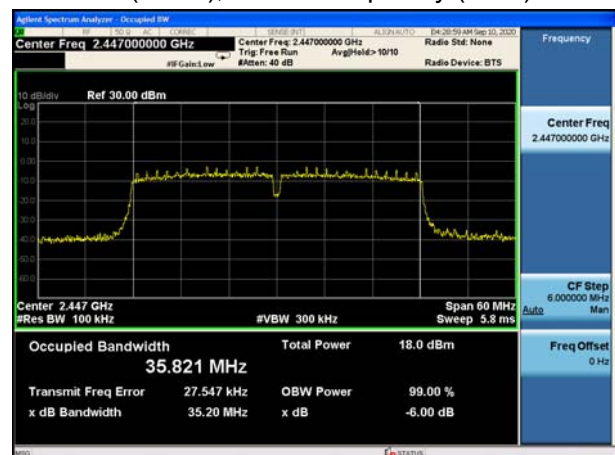
802.11n(HT40), Carrier frequency (MHz): 2437



802.11n(HT40), Carrier frequency (MHz): 2442

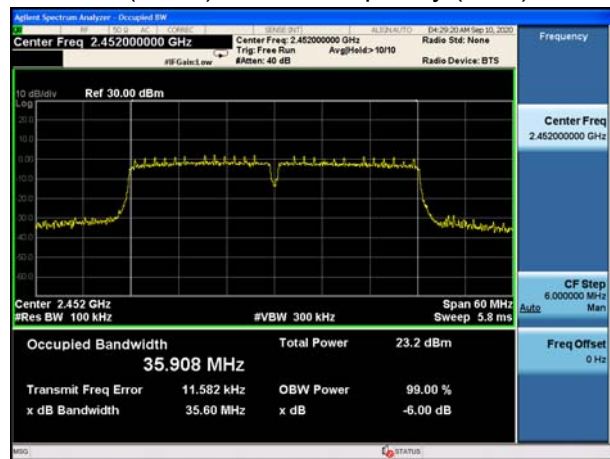


802.11n(HT40), Carrier frequency (MHz): 2447





802.11n(HT40), Carrier frequency (MHz):2452





BLE(1Mbps) Carrier frequency (MHz): 2402



BLE(2Mbps) Carrier frequency (MHz): 2402



BLE(1Mbps) Carrier frequency (MHz): 2440



BLE(2Mbps) Carrier frequency (MHz): 2440



BLE(1Mbps) Carrier frequency (MHz): 2480



BLE(2Mbps) Carrier frequency (MHz): 2480



5.3. Band Edge

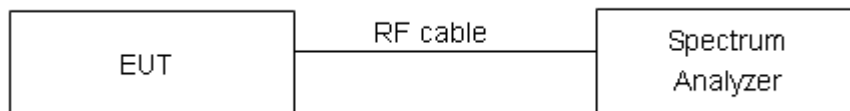
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable the band edge of the lowest and highest channels were measured. The peak detector is used and RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 15.247(d) specifies that “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.”

Measurement Uncertainty

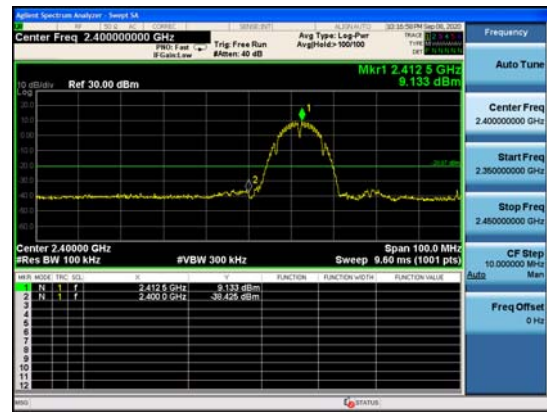
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
2GHz-3GHz	1.407 dB

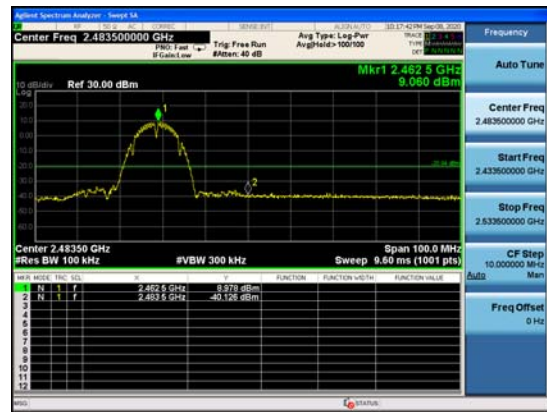


Test Results: PASS

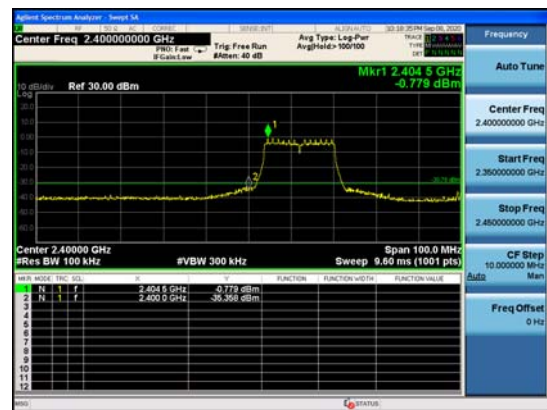
802.11b, Channel No.: 1



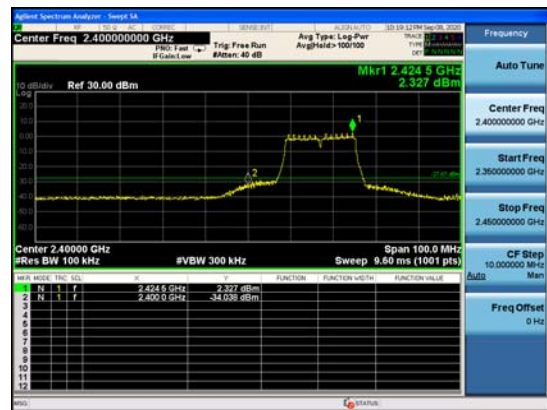
802.11b, Channel No.: 11



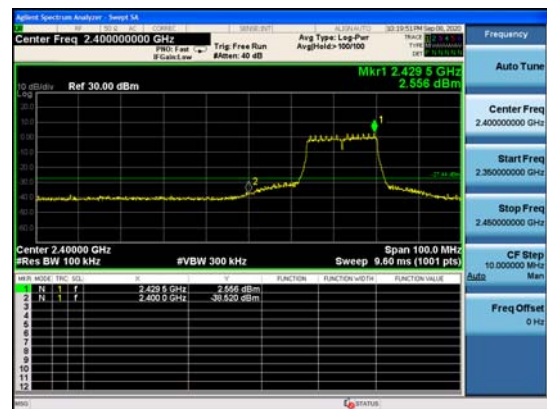
802.11g, Channel No.: 1



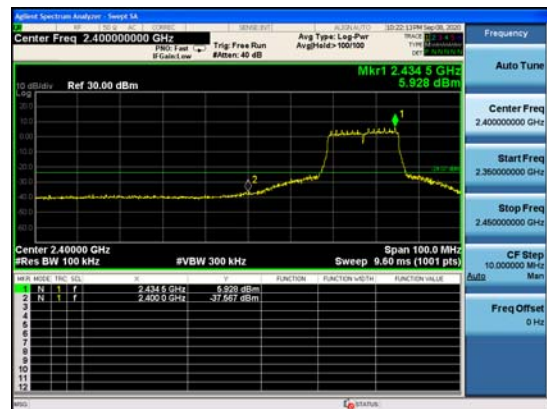
802.11g, Channel No.: 2



802.11g, Channel No.: 3



802.11g, Channel No.: 4



802.11g, Channel No.: 5



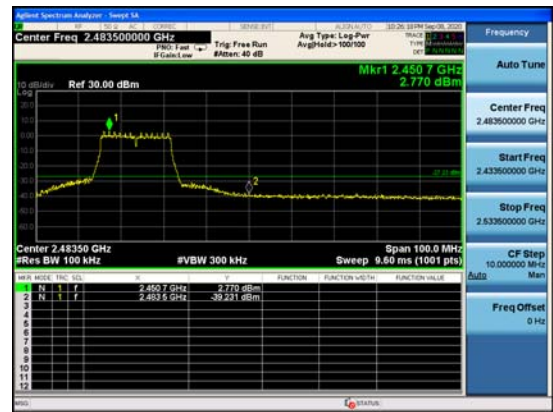
802.11g, Channel No.: 8



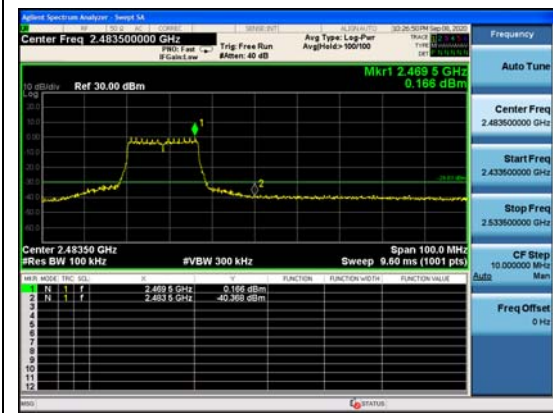
802.11g, Channel No.: 9



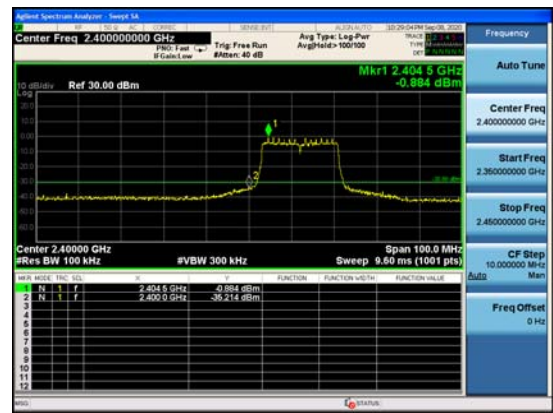
802.11g, Channel No.: 10



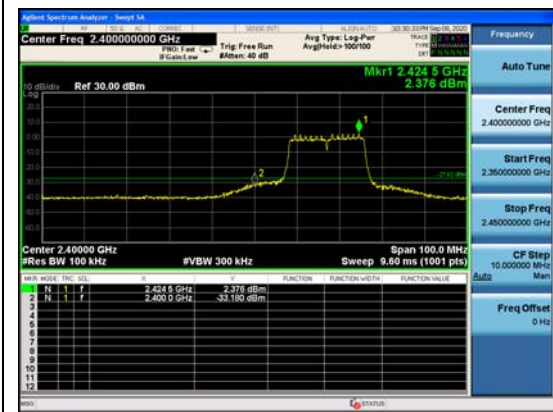
802.11g, Channel No.: 11



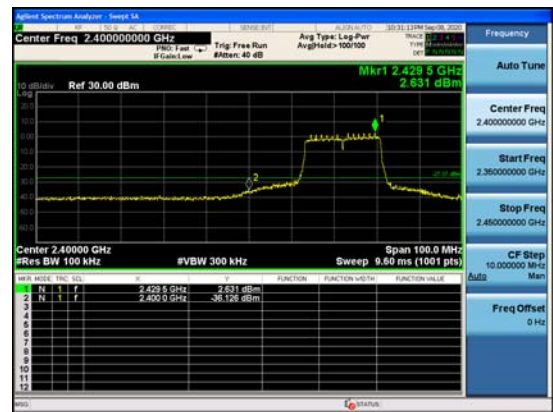
802.11n(HT20), Channel No.: 1



802.11n(HT20), Channel No.: 2



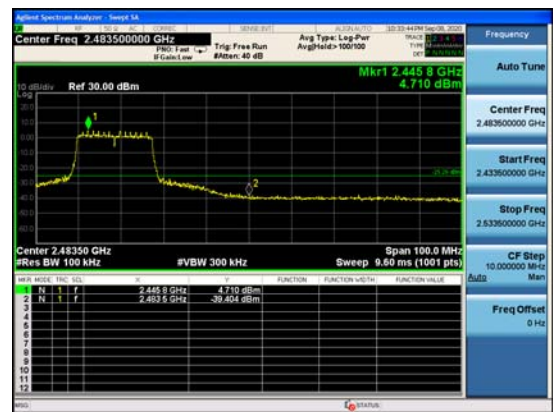
802.11n(HT20), Channel No.: 3



802.11n(HT20), Channel No.: 4



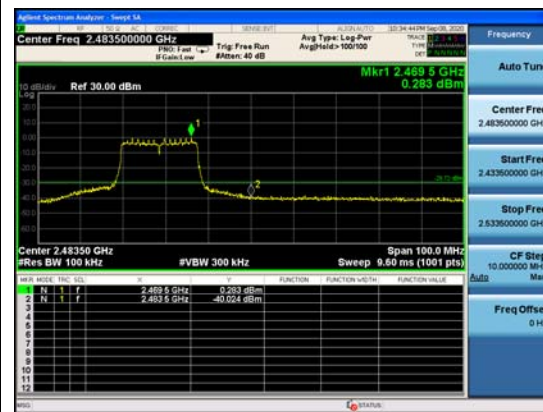
802.11n(HT20), Channel No.: 9



802.11n(HT20), Channel No.: 10



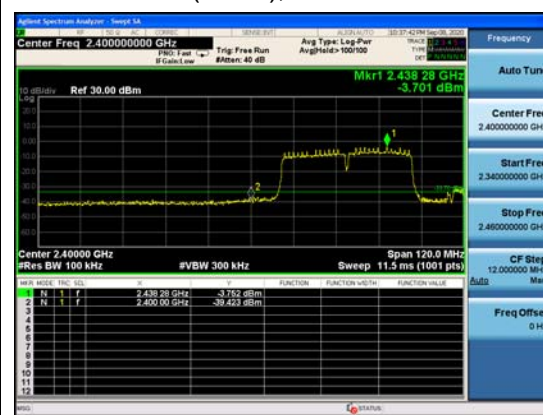
802.11n(HT20), Channel No.: 11



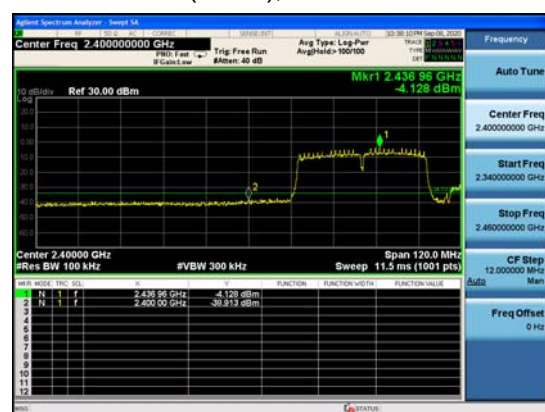
802.11n(HT40), Channel No.: 3



802.11n(HT40), Channel No.: 4



802.11n(HT40), Channel No.: 5



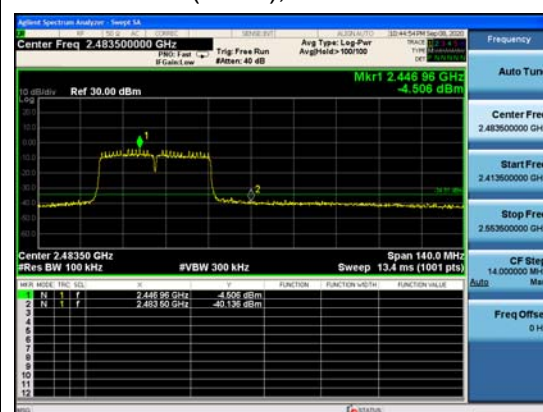
802.11n(HT40), Channel No.: 7

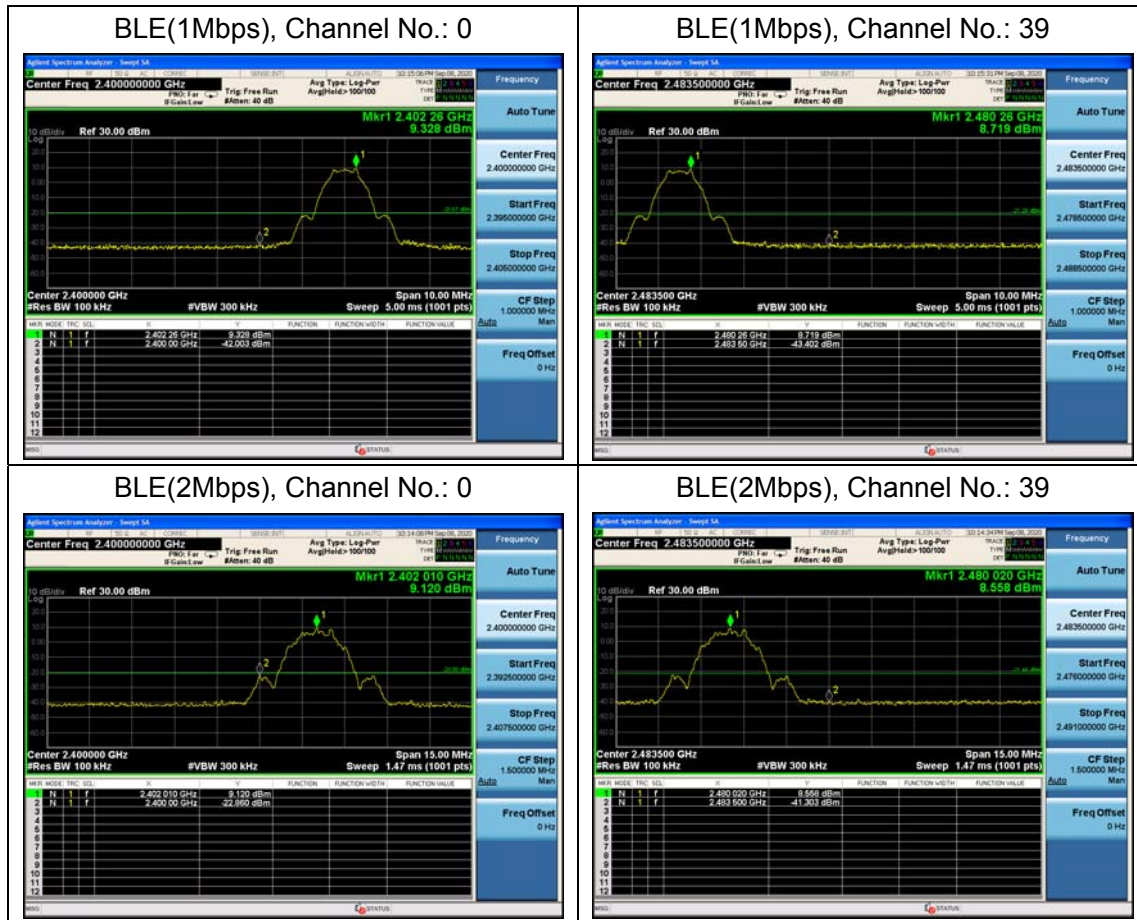


802.11n(HT40), Channel No.: 8



802.11n(HT40), Channel No.: 9





5.4. Power Spectral Density

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

During the process of the testing, The EUT was connected to Spectrum Analyzer with a known loss.

The EUT is max power transmission with proper modulation.

Method AVGPSD-1 was used for this test.

- Set instrument center frequency to DTS channel center frequency
- Set span to at least 1.5 times the OBW
- Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$
- Set VBW $\geq [3 \times \text{RBW}]$
- Detector=power averaging(rms) or sample detector(when rms not available)
- Ensure that the number of measurement points in the sweep $2[2 \times \text{span}/\text{RBW}]$
- Sweep time auto couple
- Employ trace averaging(rms) mode over a minimum of 100 traces
- Use the peak marker function to determine the maximum amplitude level.
- If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat(note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)

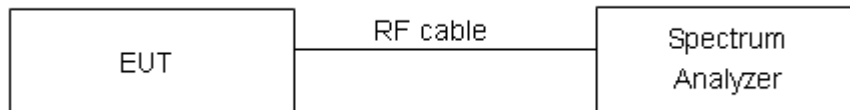
Method AVGPSD-2 was used for this test.

- Measure the duty cycle(D)of the transmitter output signal as described in 11.6
- Set instrument center frequency to DTS channel center frequency
- Set span to at least 1.5 times the OBW
- Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{Kh}$
- Set VBW $\geq [3 \times \text{RBW}]$
- Detector= power averaging(rms) or sample detector (when rms not available)
- Ensure that the number of measurement points in the sweep $2[2 \times \text{span}/\text{RBW}]$
- Sweep time =auto couple
- Do not use sweep triggering; allow sweep to "free run"
- Employ trace averaging(rms) mode over a minimum of 100 traces
- Use the peak marker function to determine the maximum amplitude level
- Add $[10 \log(1/ D)]$, where D is the duty cycle measured in step a), to the measured PSD to

compute the average PSD during the actual transmission time

m) If measured value exceeds requirement specified by regulatory agency then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)

Test setup



Limits

Rule Part 15.247(e) specifies that "For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. "

Limits	$\leq 8 \text{ dBm} / 3\text{kHz}$
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.75\text{dB}$.

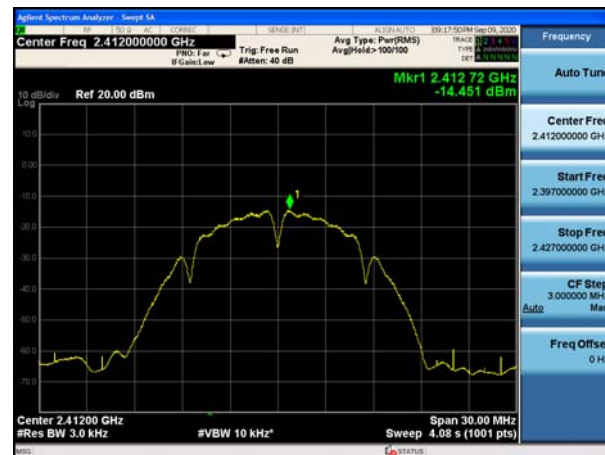
Test Results:

Network Standards	Channel Number	Read Value (dBm / 3kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	1	-14.45	-14.45	8	PASS
	6	-13.59	-13.59	8	PASS
	11	-14.34	-14.34	8	PASS
802.11g	1	-24.79	-24.79	8	PASS
	2	-21.66	-21.66	8	PASS
	3	-21.29	-21.29	8	PASS
	4	-18.14	-18.14	8	PASS
	5	-15.89	-15.89	8	PASS
	6	-16.91	-16.91	8	PASS
	8	-17.36	-17.36	8	PASS
	9	-17.68	-17.68	8	PASS
	10	-21.62	-21.62	8	PASS
	11	-23.67	-23.67	8	PASS
802.11n HT20	1	-25.30	-25.30	8	PASS
	2	-21.95	-21.95	8	PASS
	3	-21.53	-21.53	8	PASS
	4	-18.18	-18.18	8	PASS
	6	-18.84	-18.84	8	PASS
	9	-19.75	-19.75	8	PASS
	10	-21.83	-21.83	8	PASS
	11	-24.04	-24.04	8	PASS
802.11n HT40	3	-30.49	-30.30	8	PASS
	4	-28.27	-28.08	8	PASS
	5	-28.31	-28.12	8	PASS
	6	-25.52	-25.33	8	PASS
	7	-25.36	-25.17	8	PASS
	8	-26.89	-26.70	8	PASS

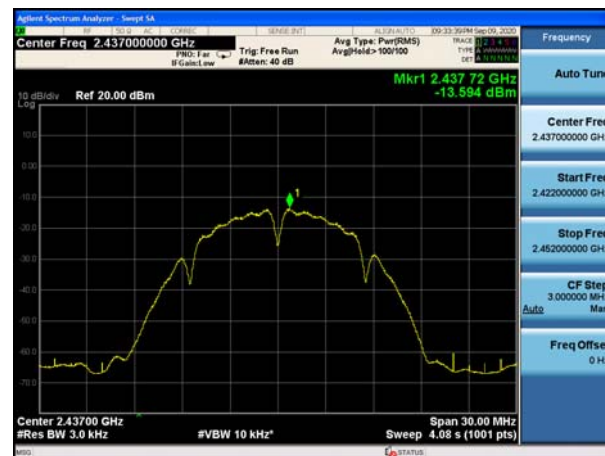


	9	-29.02	-28.83	8	PASS
BLE (1Mbps)	0	-14.50	-13.80	8	PASS
	19	-15.12	-14.43	8	PASS
	39	-15.92	-15.22	8	PASS
BLE (2Mbps)	0	-18.47	-16.02	8	PASS
	19	-19.11	-16.67	8	PASS
	39	-19.85	-17.40	8	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

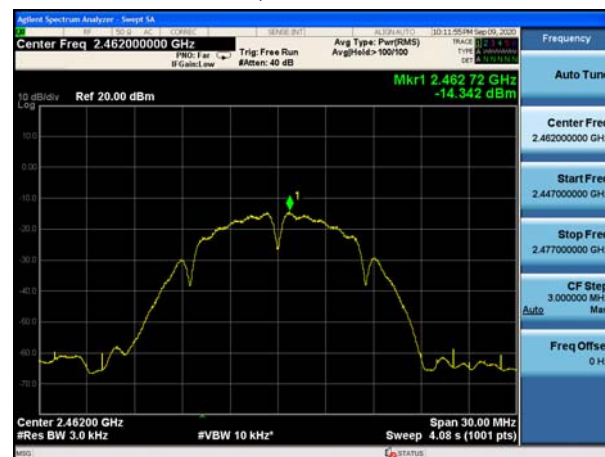
802.11b, Channel No.: 1



802.11b, Channel No.: 6

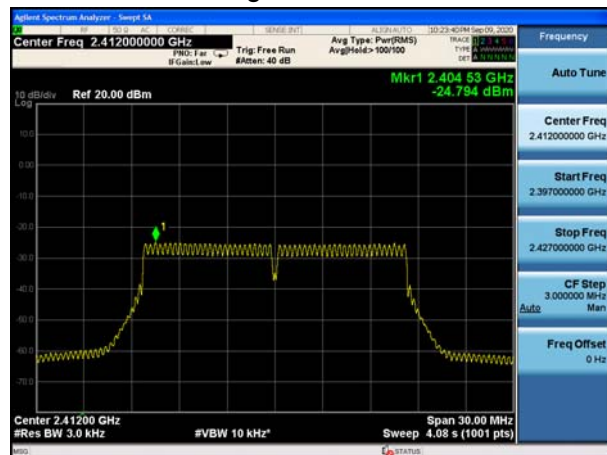


802.11b, Channel No.: 11

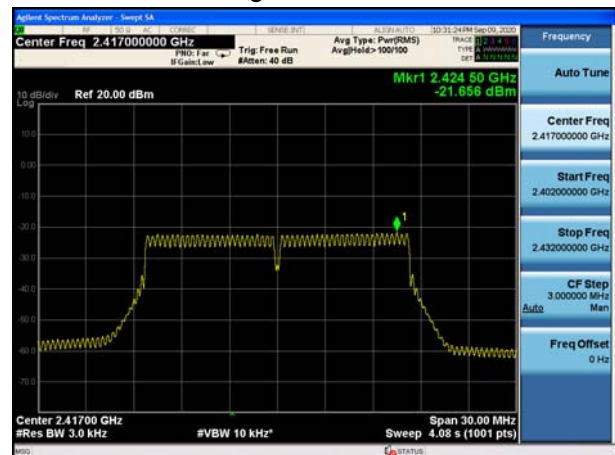




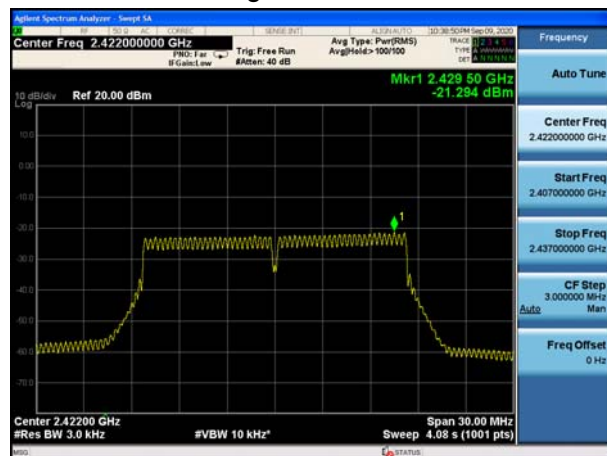
802.11g, Channel No.: 1



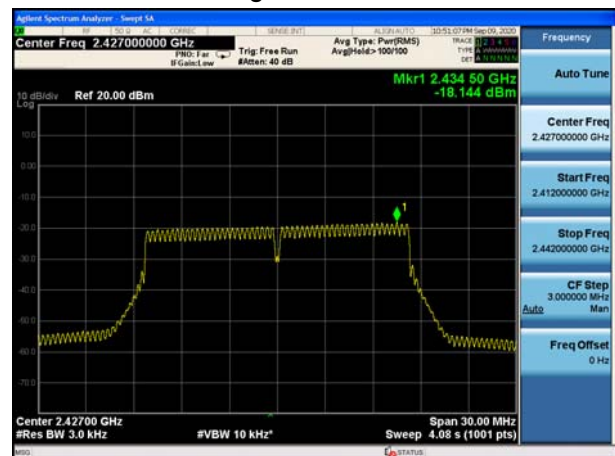
802.11g, Channel No.: 2



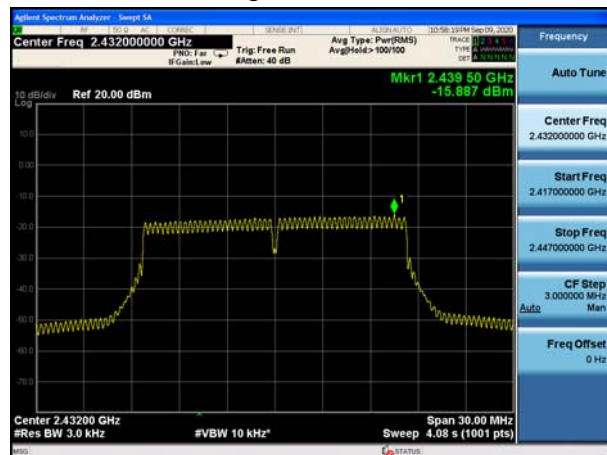
802.11g, Channel No.: 3



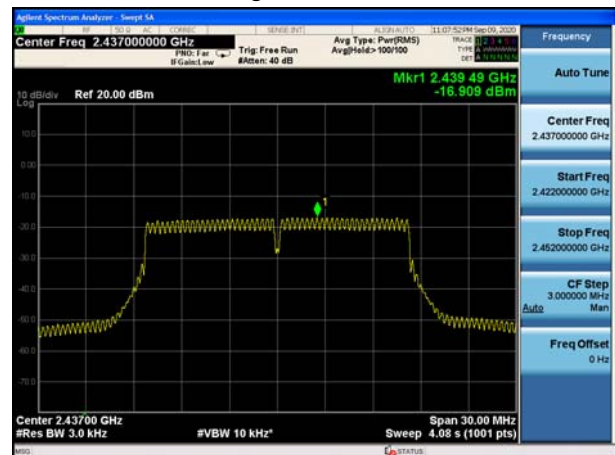
802.11g, Channel No.: 4



802.11g, Channel No.: 5

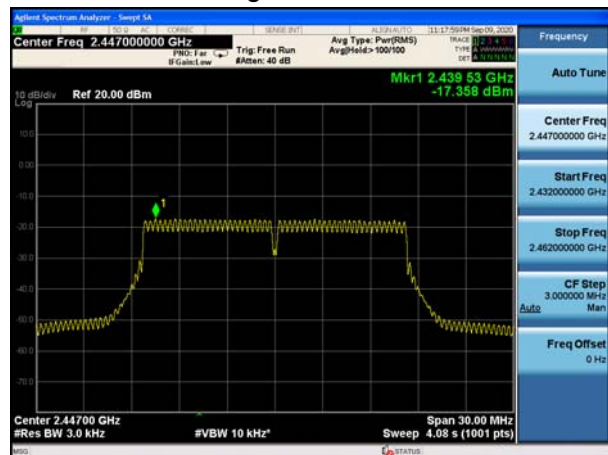


802.11g, Channel No.: 6

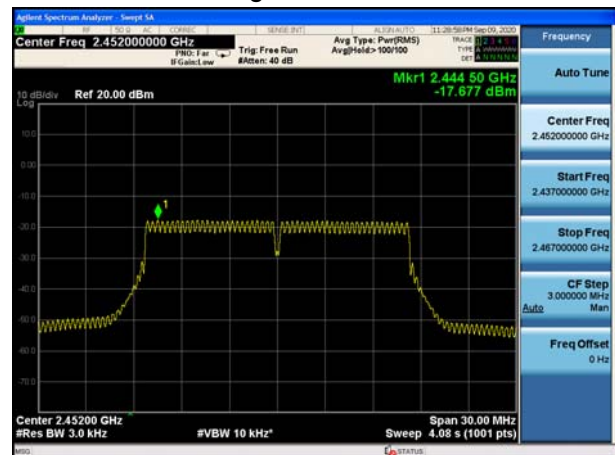




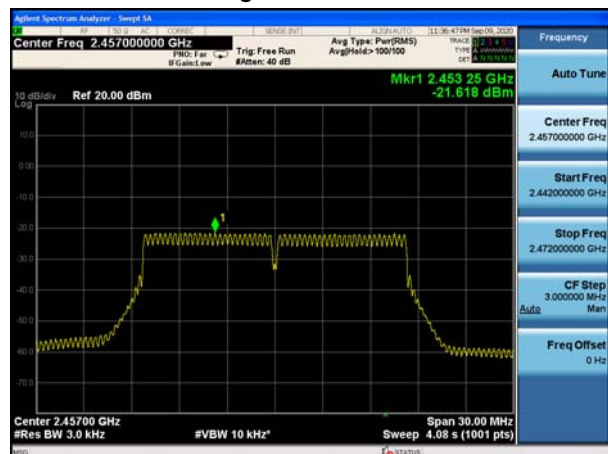
802.11g, Channel No.: 8



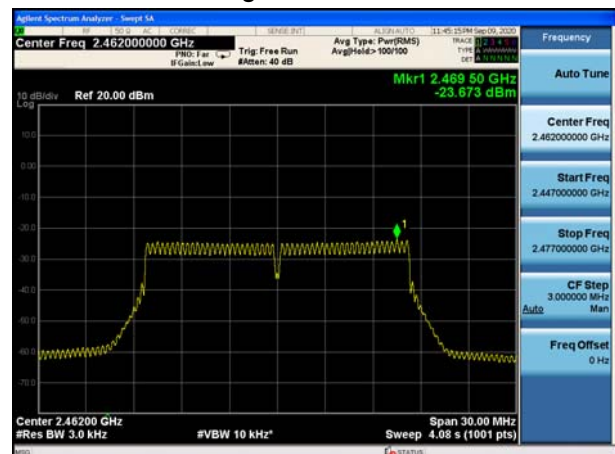
802.11g, Channel No.: 9



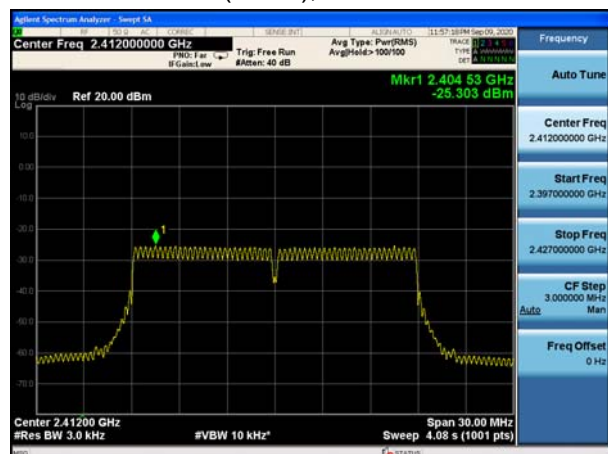
802.11g, Channel No.: 10



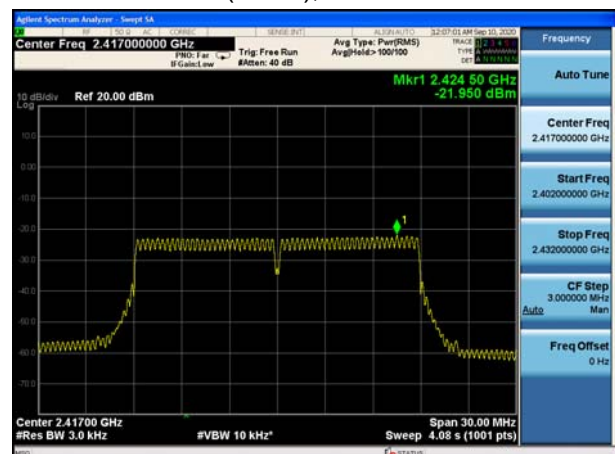
802.11g, Channel No.: 11



802.11n(HT20), Channel No. 1

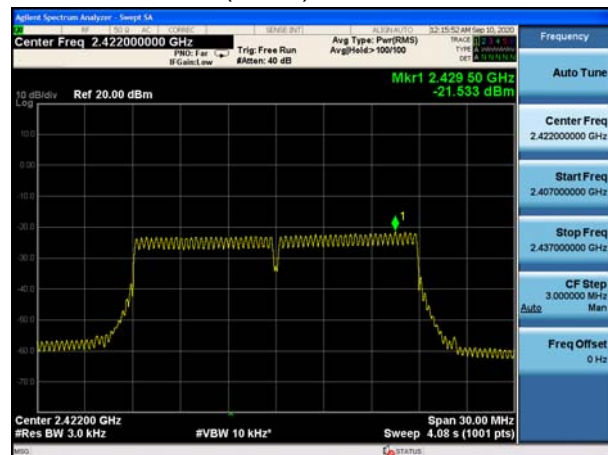


802.11n(HT20), Channel No. 2

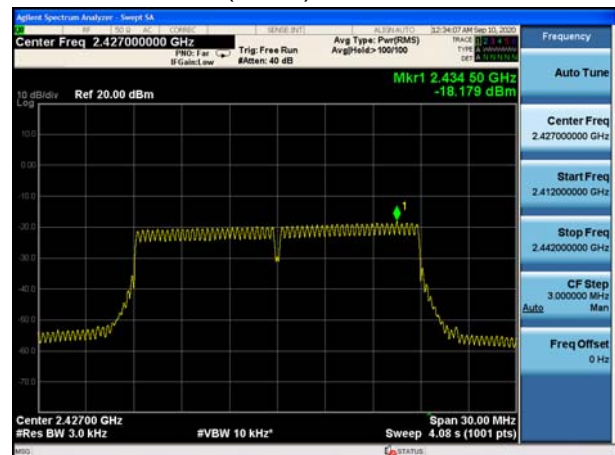




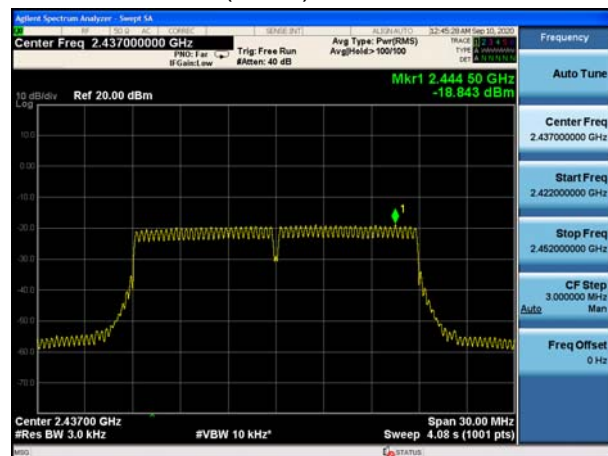
802.11n(HT20), Channel No. 3



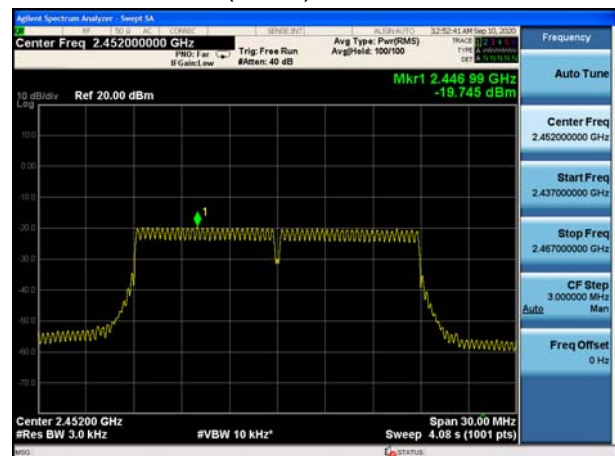
802.11n(HT20), Channel No. 4



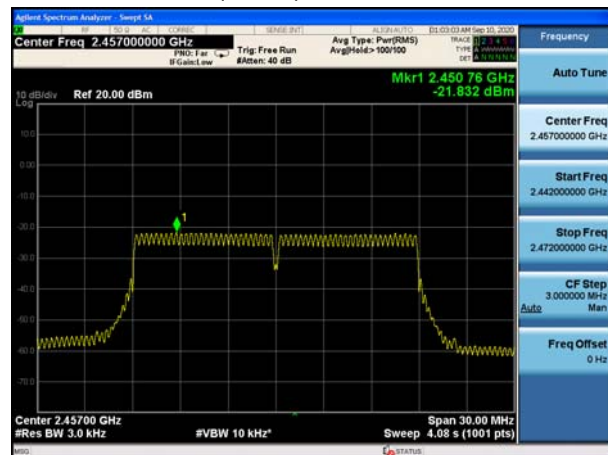
802.11n(HT20), Channel No. 6



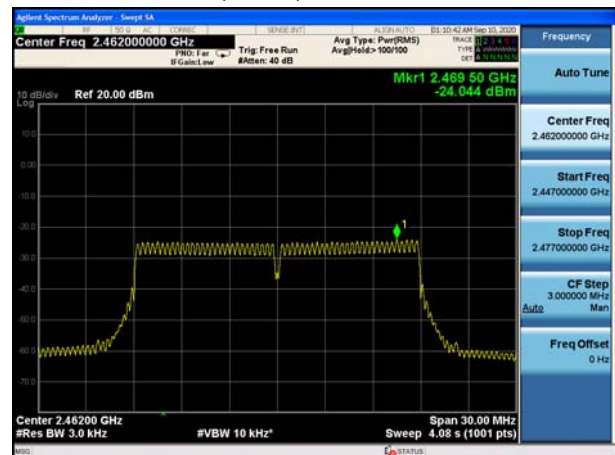
802.11n(HT20), Channel No. 9



802.11n(HT20), Channel No. 10

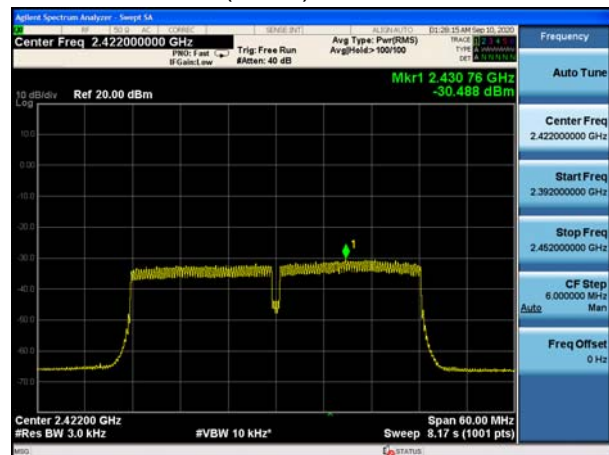


802.11n(HT20), Channel No. 11

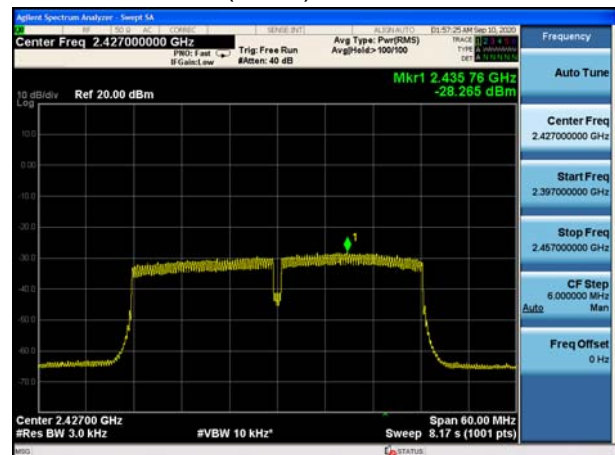




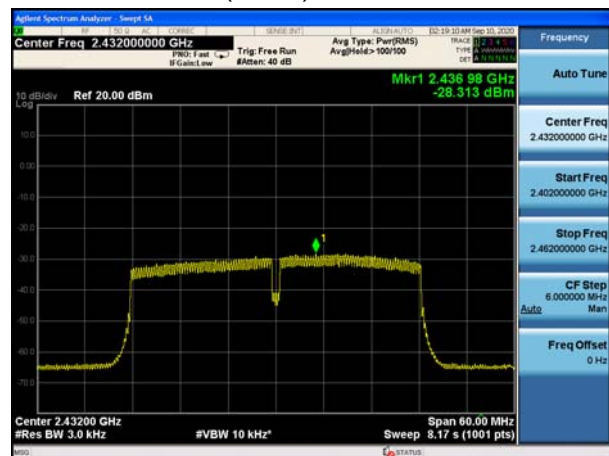
802.11n(HT40), Channel No. 3



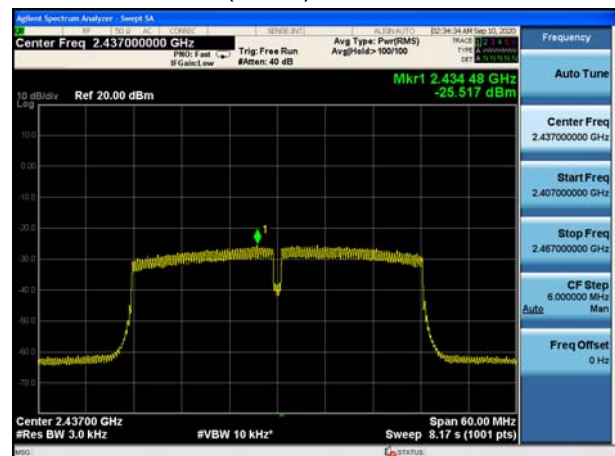
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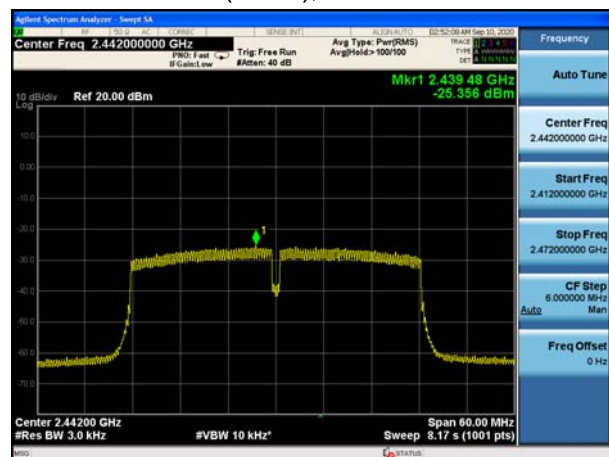
802.11n(HT40), Channel No. 5



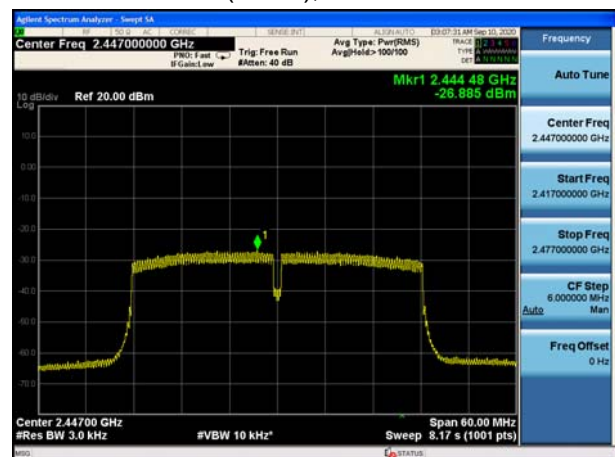
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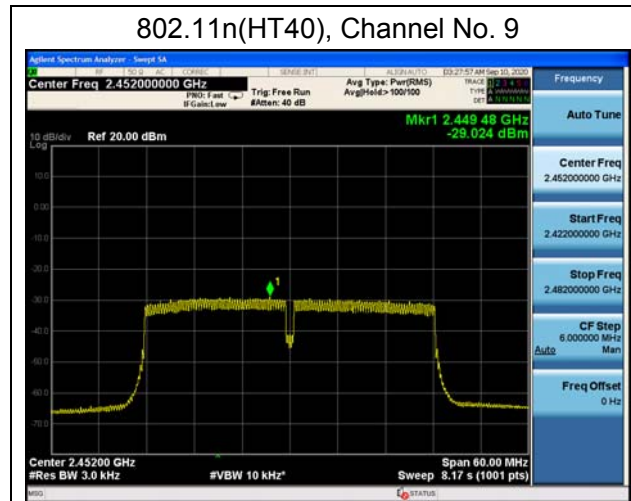


802.11n(HT40), Channel No. 7

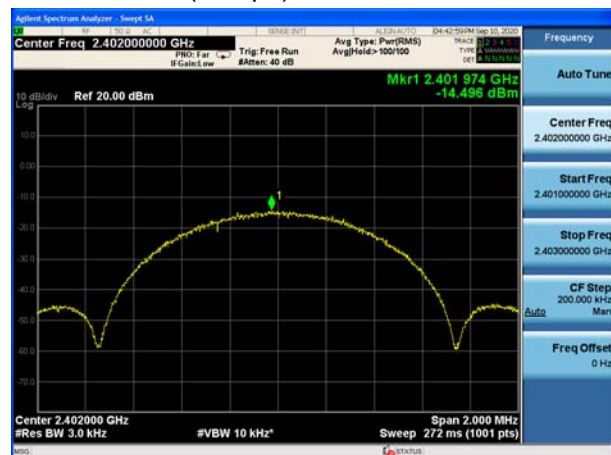


802.11n(HT40), Channel No. 8

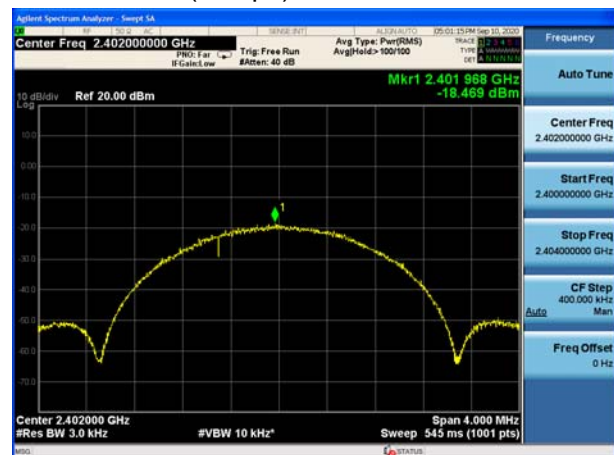




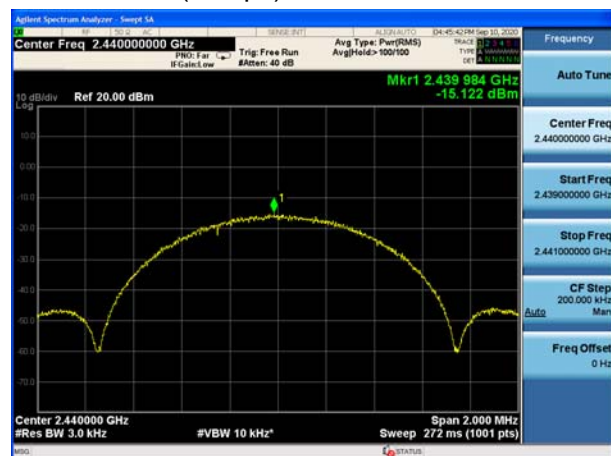
BLE(1Mbps), Channel No.: 0



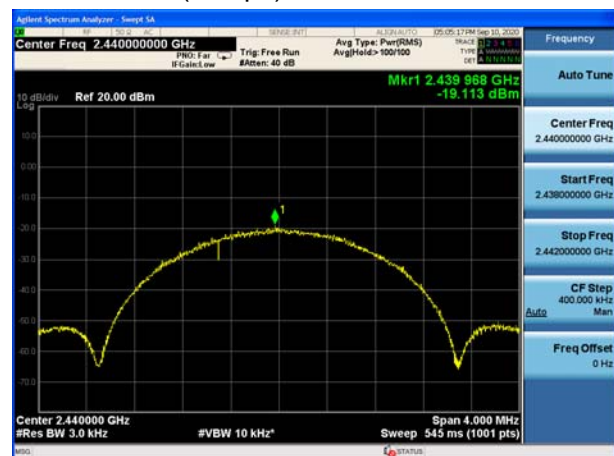
BLE(2Mbps), Channel No.: 0



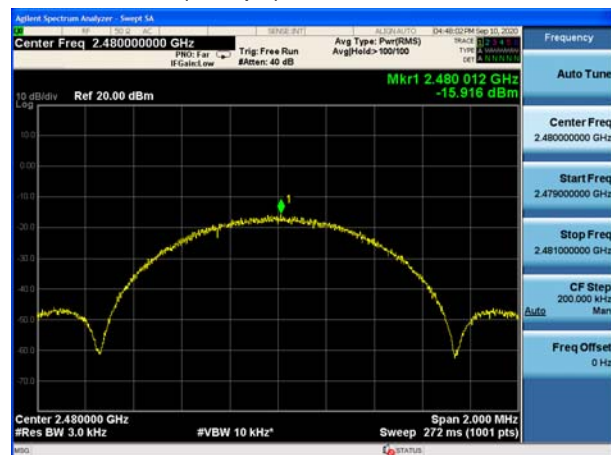
BLE(1Mbps), Channel No.: 19



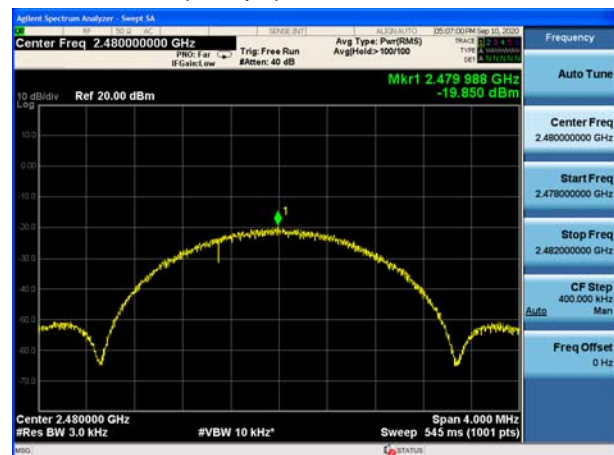
BLE(2Mbps), Channel No.: 19



BLE(1Mbps), Channel No.: 39



BLE(2Mbps), Channel No.: 39



5.5. Spurious RF Conducted Emissions

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. Set RBW to 100 kHz and VBW to 300 kHz, Sweep is set to ATUO.

The test is in transmitting mode.

Test setup



Limits

Rule Part 15.247(d) pacifies that “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. ”

Network Standards	Carrier frequency (MHz)	Reference value (dBm)	Limit
802.11b	2412	8.29	-21.71
	2437	9.70	-20.30
	2462	8.74	-21.26
802.11g	2412	-1.30	-31.30
	2417	2.02	-27.98
	2422	5.87	-24.13
	2427	6.77	-23.23
	2432	7.02	-22.98
	2437	6.73	-23.27
	2447	5.96	-24.04
	2452	3.96	-26.04



	2457	2.12	-27.88
	2462	-0.54	-30.54
802.11n HT20	2412	-1.59	-31.59
	2417	1.72	-28.28
	2422	2.44	-27.56
	2427	5.40	-24.60
	2437	3.81	-26.19
	2452	3.86	-26.14
	2457	1.72	-28.28
	2462	2.12	-27.88
802.11n HT40	2422	-6.65	-36.65
	2427	-5.32	-35.32
	2432	-4.48	-34.48
	2437	-1.35	-31.35
	2442	-1.67	-31.67
	2447	-2.94	-32.94
	2452	-5.05	-35.05
BLE (1Mbps)	2402	9.02	-20.98
	2440	7.09	-22.91
	2480	7.98	-22.02
BLE (2Mbps)	2402	6.97	-23.03
	2440	5.82	-24.18
	2480	5.71	-24.29

Measurement Uncertainty

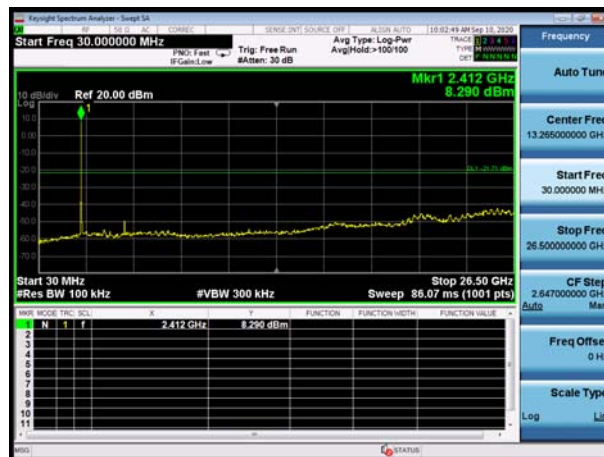
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

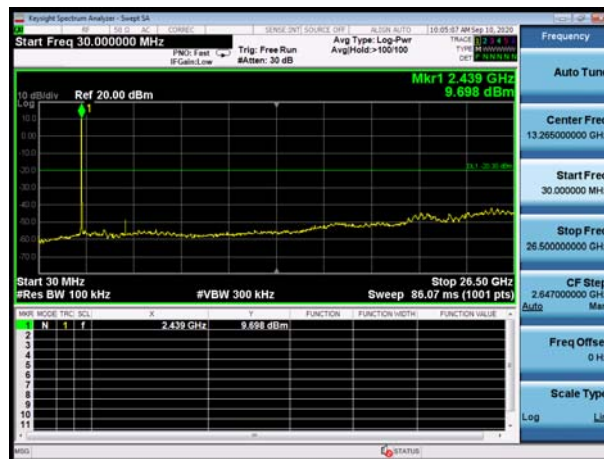


Test Results:

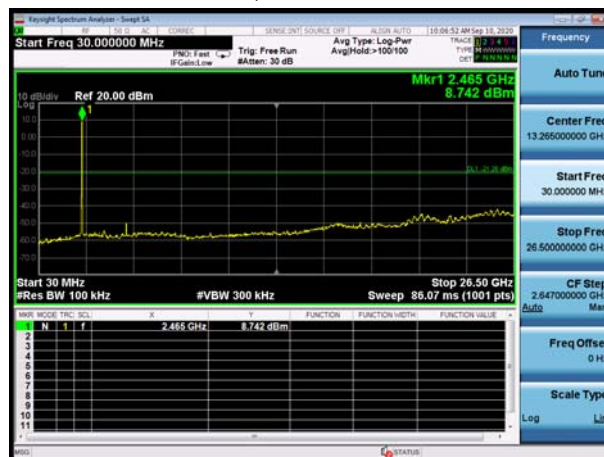
802.11b, Channel No.: 1



802.11b, Channel No.: 6

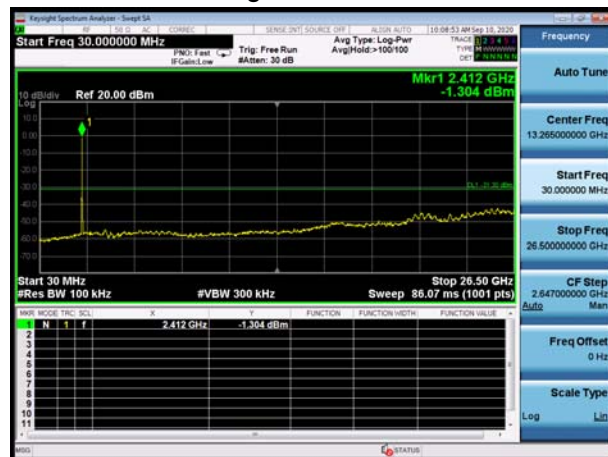


802.11b, Channel No.: 11

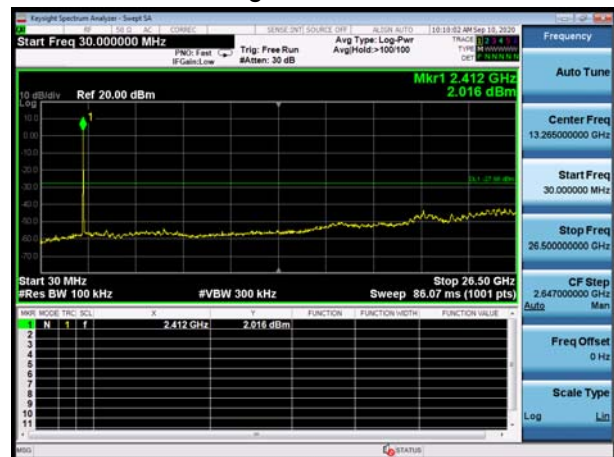




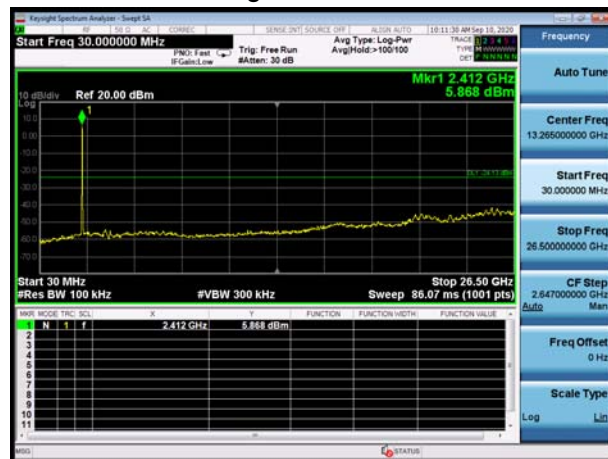
802.11g, Channel No.: 1



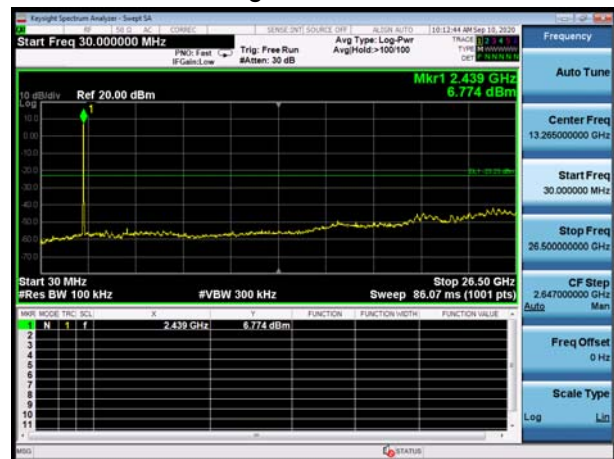
802.11g, Channel No.: 2



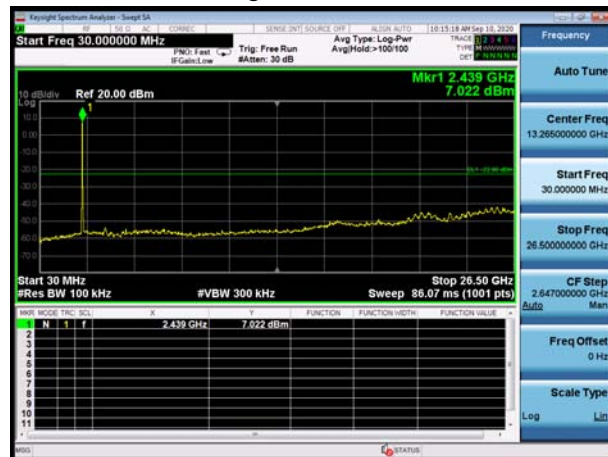
802.11g, Channel No.: 3



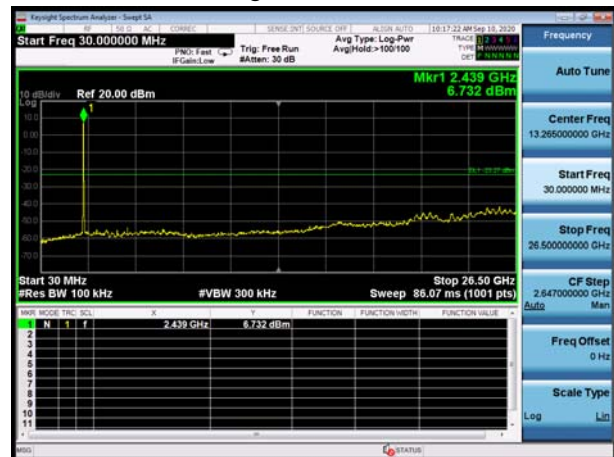
802.11g, Channel No.: 4



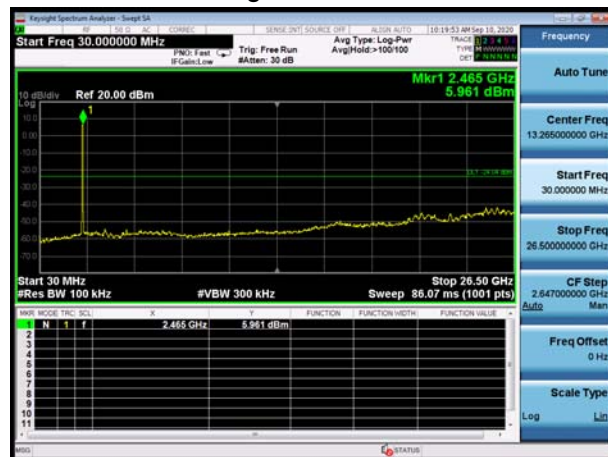
802.11g, Channel No.: 5



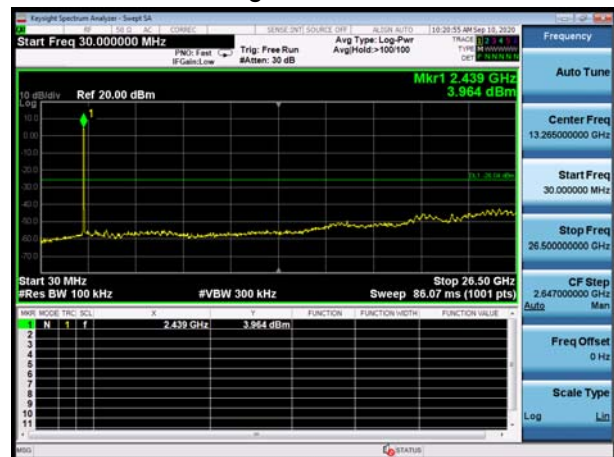
802.11g, Channel No.: 6



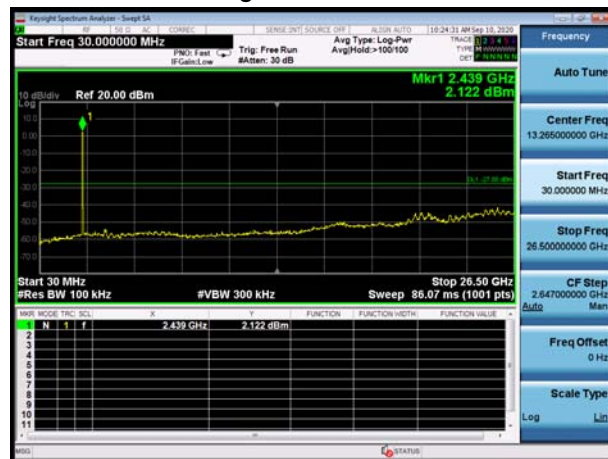
802.11g, Channel No.: 8



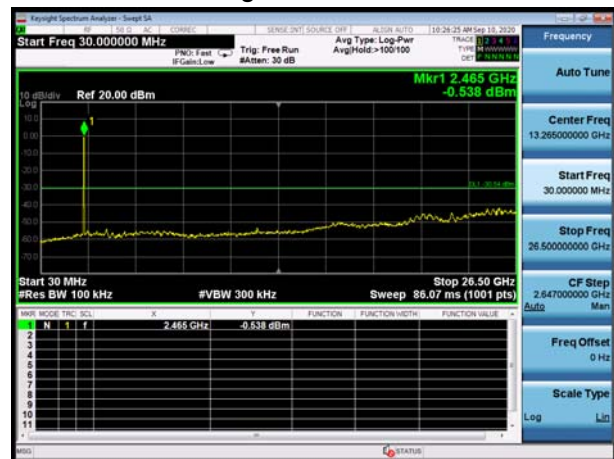
802.11g, Channel No.: 9



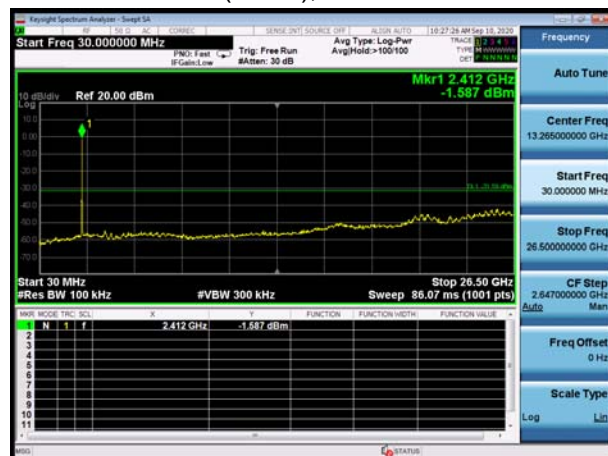
802.11g, Channel No.: 10



802.11g, Channel No.: 11



802.11n(HT20), Channel No. 1



802.11n(HT20), Channel No. 2

