RF TEST REPORT

Applicant	XCHENG TECH CO., LIMITED
FCC ID	2AZ4F-T0511-T5
Product	PDA
Brand	Kobile
Model	T0511; T5; T05; T05_ROW
Report No.	R2111A1062-R5V1
Issue Date	April 28, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2021)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Peng Tao

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

Version	Revision description	Issue Date
Rev.0	Initial issue of report.	April 2, 2022
Rev.1	Update Applicant.	April 28, 2022
Note: This revised report (Report No. R2111A1062-R5V1) supersedes and replaces the previously issued report (Report No. R2111A1062-R5). Please discard or destroy the previously issued report and dispose of it accordingly.		

Summary of measurement results

Number	Test Case	Clause in FCC rules	Verdict
1	Maximum output power	15.247(b)(3)	PASS
2	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: January 4, 2022 ~ February 14, 2022 Date of Sample Received: November 25, 2021			
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.			

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 measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform 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
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
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	XCHENG TECH CO., LIMITED
Applicant address	ROOM 401F, Building 5, No.3000 LONG DONG Avenue, Pudong New District, Shanghai, China
Manufacturer	XCHENG TECH CO., LIMITED
Manufacturer Factory	ROOM 401F, Building 5, No.3000 LONG DONG Avenue, Pudong New District, Shanghai, China

2.2. General information

EUT Description	
Model	T0511; T5; T05; T05_ROW
IMEI	IMEI1:354721087287473 IMEI2:354721087288026
Hardware Version	MT6761
Software Version	V01
Power Supply	Battery / AC adapter
Antenna Type	PIFA Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)
Antenna Gain	2dBi
additional beamforming gain	NA
Operating Frequency Range(s)	802.11b/g/n(HT20): 2412 ~ 2462 MHz 802.11n(HT40): 2422 ~ 2452 MHz Bluetooth LE V5.0: 2402 ~2480 MHz
Modulation Type	802.11b: DSSS 802.11g/n(HT20/HT40): OFDM Bluetooth LE: GFSK
Max. Conducted Power	Wi-Fi 2.4G: 18.40dBm Bluetooth LE: -2.54dBm
EUT Accessory	
Adapter 1	Manufacturer: SHENZHENG EAST SUN ELECTRONIC CO.,LTD Model: WI-RD-191105-001
Adapter 2	Manufacturer: SHENZHENG EAST SUN ELECTRONIC CO.,LTD Model: TPA-59050200BU01-C

Adapter 3	Manufacturer: SHENZHENG EAST SUN ELECTRONIC CO.,LTD Model: TPA-23A050200UU02-C
Battery	Manufacturer: Zhongshan Tianmao BatteryCo.,Ltd Model: BP1826-3
USB Cable	Manufacturer: Shenzhen HuaJiaShengMing Technology Co.,Ltd Model: 262202110B0011
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. 2. There is more than one Adapter, each one should be applied throughout the compliance test respectively, and however, only the worst case (Adapter 2) will be recorded in this report. 3. Customer declaration, The four products are the same, except for model. Only T0511 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 (2021) 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.

Test Mode	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

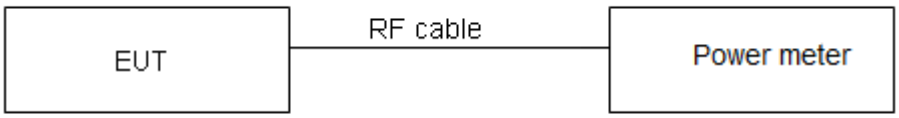
Ambient condition

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	≤ 1W (30dBm)

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

Power Index					
Channel	**802.11b**	**802.11g**	**802.11n HT20**	**Channel**	**802.11n HT40**
CH1	19.5	17.5	12.0	**CH3**	11.5
CH2	/	/	17.5	**CH4**	14.5
CH6	19.5	17.5	17.5	**CH5**	15.5
CH10	/	17.5	17.5	**CH6**	16.5
CH11	19.5	14.0	13.5	**CH7**	11.5
/	/	**/**	/	**CH8**	11.5
/	/	**/**	/	**CH9**	11.5

Test Mode	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11b	8.38	8.42	1.00	0.00
802.11g	1.39	1.44	0.97	0.15
802.11n HT20	1.30	1.35	0.96	0.16
802.11n HT40	0.65	0.69	0.94	0.26
Bluetooth LE (1M)	2.13	2.5	0.85	0.70
Bluetooth LE (2M)	1.07	1.87	0.57	2.43
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.				

Test Mode	Carrier frequency (MHz))/ Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412/CH 1	18.40	18.40	30	PASS
	2437/CH 6	18.16	18.16	30	PASS
	2462/CH11	18.18	18.18	30	PASS
802.11g	2412/CH 1	15.96	16.11	30	PASS
	2437/CH 6	16.45	16.60	30	PASS
	2437/CH 10	16.69	16.84	30	PASS
	2462/CH11	13.01	13.16	30	PASS
802.11n HT20	2412/CH 1	11.15	11.31	30	PASS
	2412/CH 2	16.75	16.91	30	PASS
	2437/CH 6	16.25	16.41	30	PASS
	2412/CH 10	16.57	16.73	30	PASS
	2462/CH11	12.71	12.87	30	PASS
802.11n HT40	2422/CH3	10.91	11.17	30	PASS
	2422/CH4	14.03	14.29	30	PASS
	2422/CH5	14.76	15.02	30	PASS
	2437/CH6	15.65	15.91	30	PASS
	2422/CH7	10.64	10.90	30	PASS
	2422/CH8	10.65	10.91	30	PASS
	2452/CH9	10.78	11.04	30	PASS
Bluetooth (Low Energy) (1M)	2402/CH0	-3.55	-2.85	30	PASS
	2440/CH19	-3.31	-2.61	30	PASS
	2480/CH39	-3.50	-2.80	30	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-5.19	-2.77	30	PASS
	2440/CH19	-4.96	-2.54	30	PASS
	2480/CH39	-5.21	-2.79	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient condition

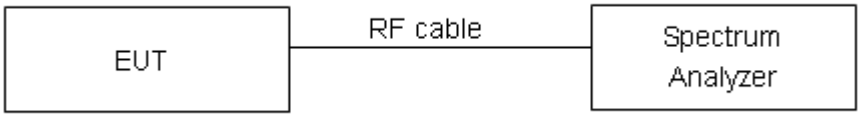
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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

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:

Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412	13.442	8.520	500	PASS
	2437	13.469	8.040	500	PASS
	2462	13.537	8.560	500	PASS
802.11g	2412	17.057	15.400	500	PASS
	2437	17.096	14.960	500	PASS
	2457	17.065	15.280	500	PASS
	2462	16.963	15.400	500	PASS
802.11n HT20	2412	17.902	15.960	500	PASS
	2417	18.059	15.040	500	PASS
	2437	18.059	13.960	500	PASS
	2457	18.059	15.000	500	PASS
	2462	17.908	14.200	500	PASS
802.11n HT40	2422	36.153	35.120	500	PASS
	2427	36.116	35.040	500	PASS
	2432	36.163	35.040	500	PASS
	2437	36.241	32.560	500	PASS
	2442	36.120	35.040	500	PASS
	2447	36.074	35.120	500	PASS
	2452	36.154	33.760	500	PASS
Bluetooth (Low Energy) (1M)	2402	1.0334	0.688	500	PASS
	2440	1.0425	0.704	500	PASS
	2480	1.0507	0.668	500	PASS
Bluetooth (Low Energy) (2M)	2402	2.0894	1.236	500	PASS
	2440	2.0853	1.160	500	PASS
	2480	2.0878	1.376	500	PASS

99%bandwidth

802.11b, Carrier frequency (MHz): 2412

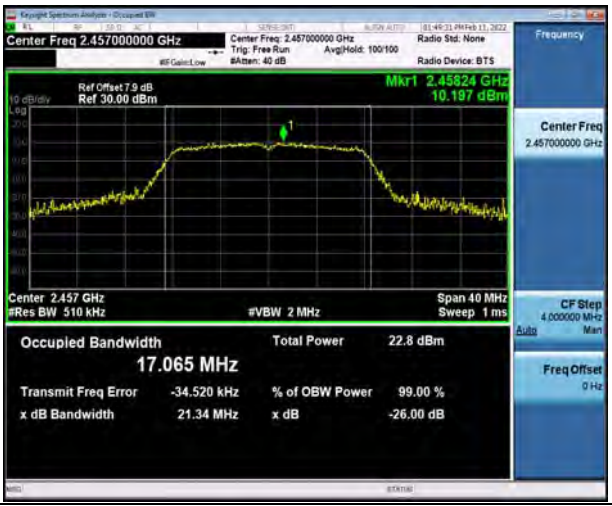
802.11g, Carrier frequency (MHz): 2412

802.11b, Carrier frequency (MHz): 2437

802.11g, Carrier frequency (MHz): 2437

802.11b, Carrier frequency (MHz):2462

802.11g, Carrier frequency (MHz): 2457



/	802.11g, Carrier frequency (MHz): 2462 
802.11n(HT20), Carrier frequency (MHz): 2412 	802.11n(HT40), Carrier frequency (MHz): 2422 
802.11n(HT20), Carrier frequency (MHz): 2417 	802.11n(HT40), Carrier frequency (MHz): 2427 

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

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

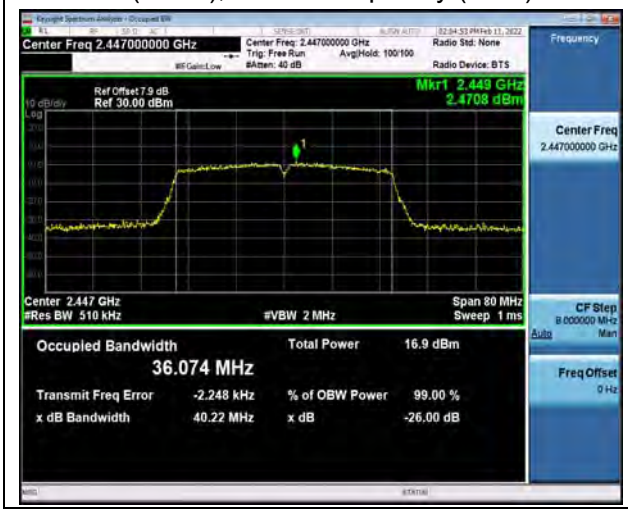
802.11n(HT20), Carrier frequency (MHz): 2457

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

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

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

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

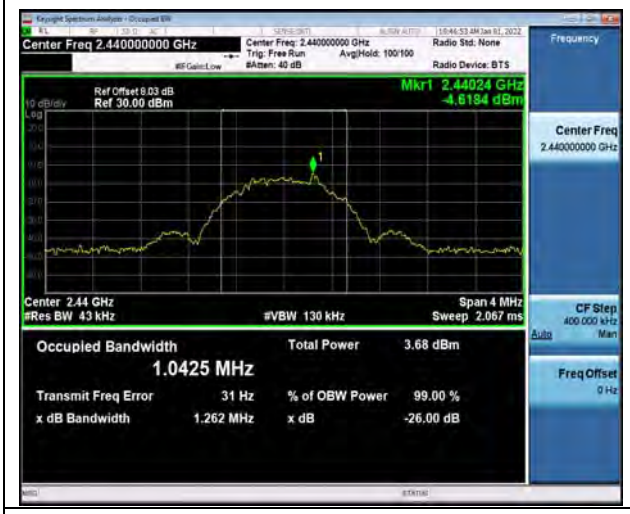


802.11n(HT40), Carrier frequency (MHz): 2452

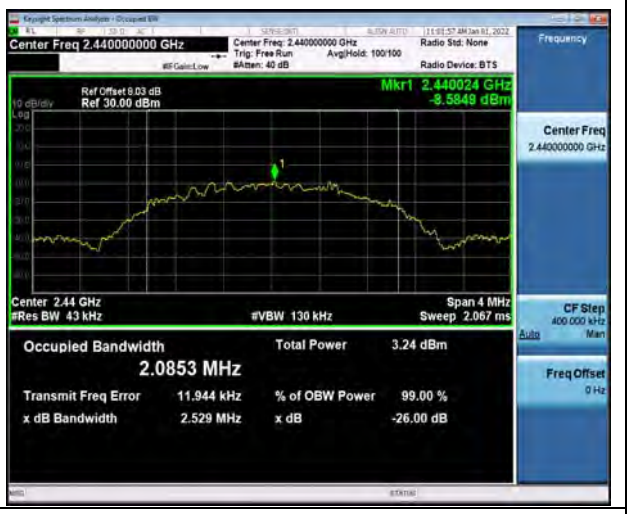
Bluetooth LE (1M) Carrier frequency (MHz): 2402

Bluetooth LE (2M) Carrier frequency (MHz): 2402

Bluetooth LE (1M) Carrier frequency (MHz): 2440



Bluetooth LE (2M) Carrier frequency (MHz): 2440

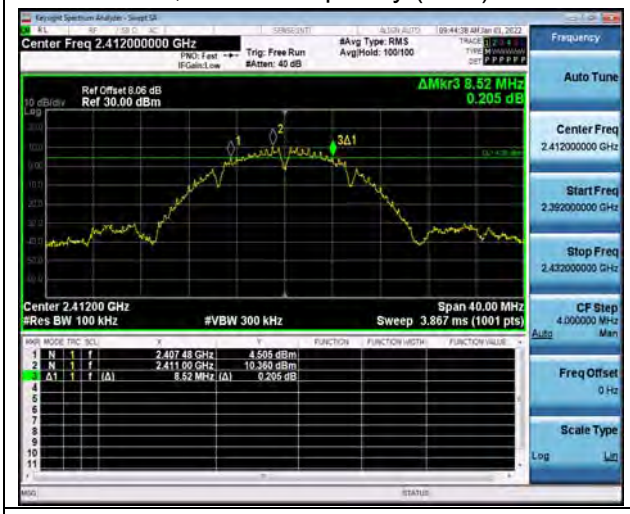


Bluetooth LE (1M) Carrier frequency (MHz): 2480

Bluetooth LE (2M) Carrier frequency (MHz): 2480

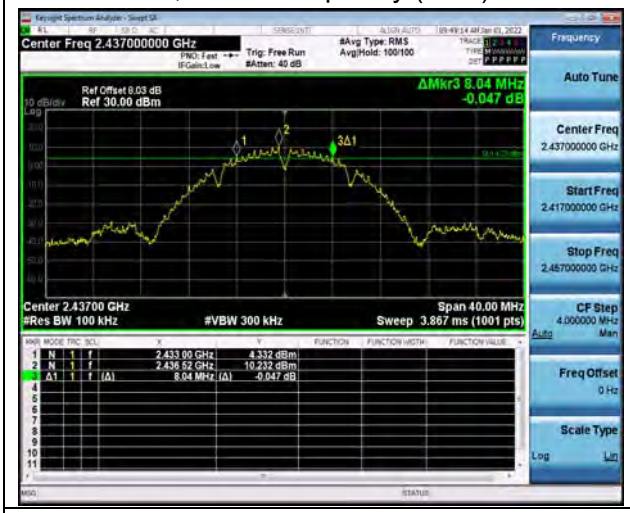
6 dB bandwidth

802.11b, Carrier frequency (MHz): 2412



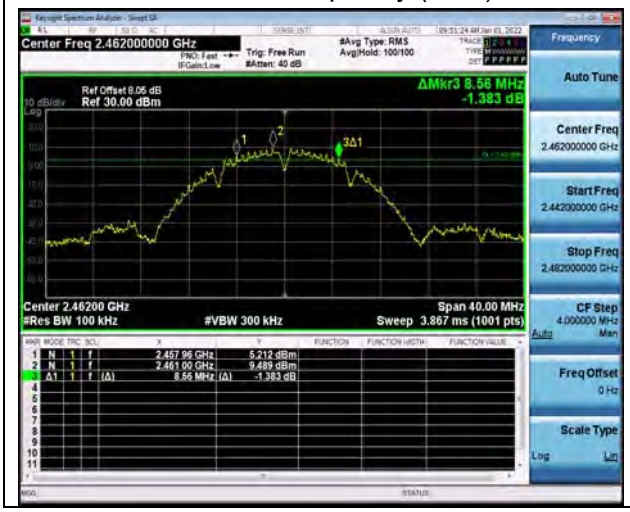
802.11g, Carrier frequency (MHz): 2412

802.11b, Carrier frequency (MHz): 2437



802.11g, Carrier frequency (MHz): 2437

802.11b, Carrier frequency (MHz):2462

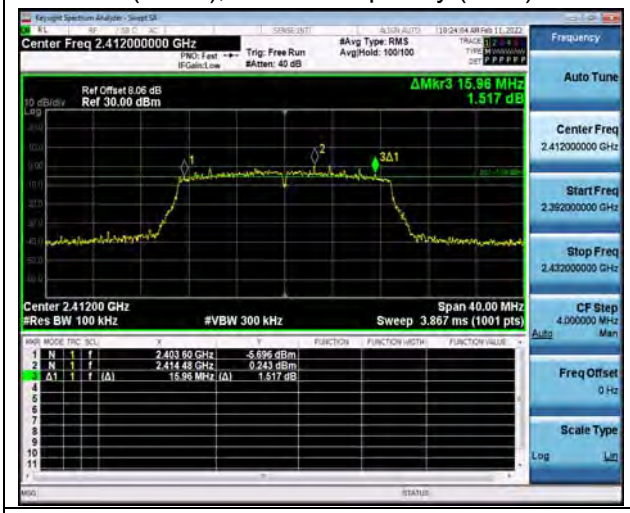


802.11g, Carrier frequency (MHz): 2457

/

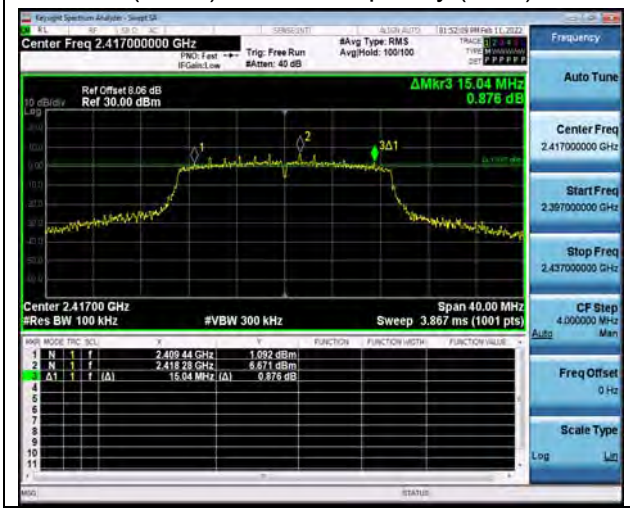
802.11g, Carrier frequency (MHz): 2462

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

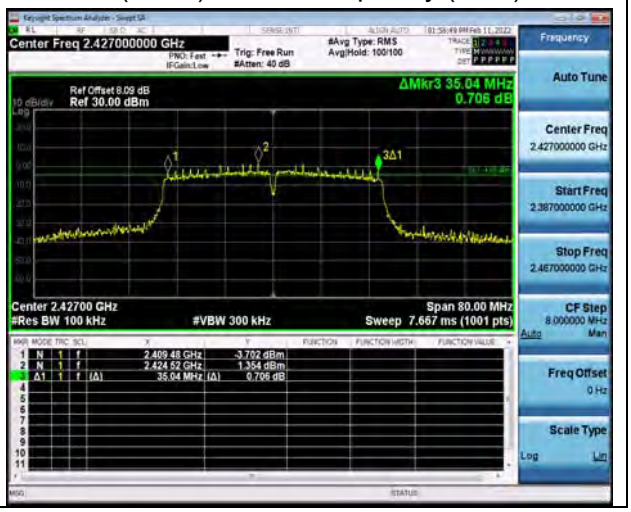


802.11n(HT40), Carrier frequency (MHz): 2422

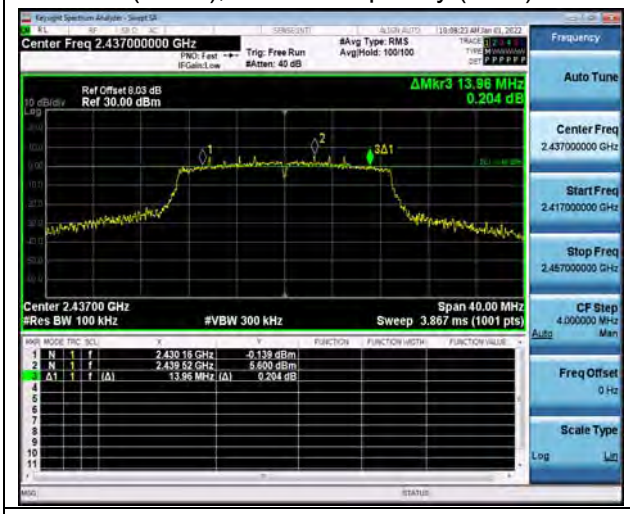
802.11n(HT20), Carrier frequency (MHz): 2417



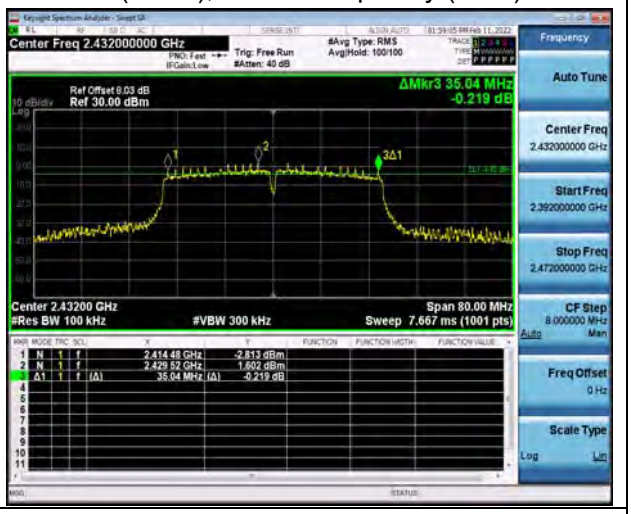
802.11n(HT40), Carrier frequency (MHz): 2427



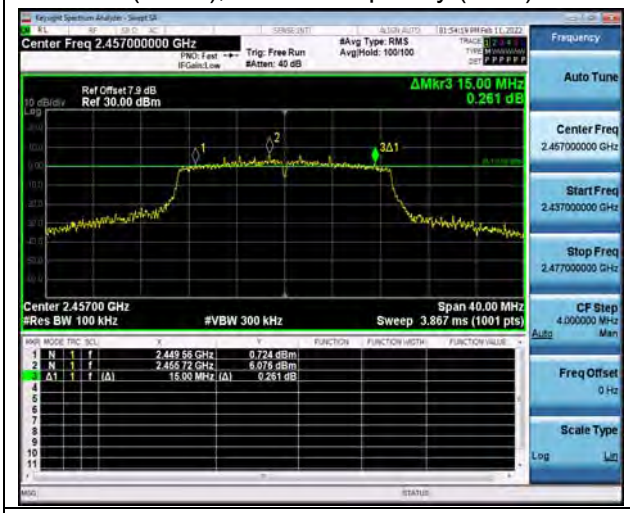
802.11n(HT20), Carrier frequency (MHz): 2437



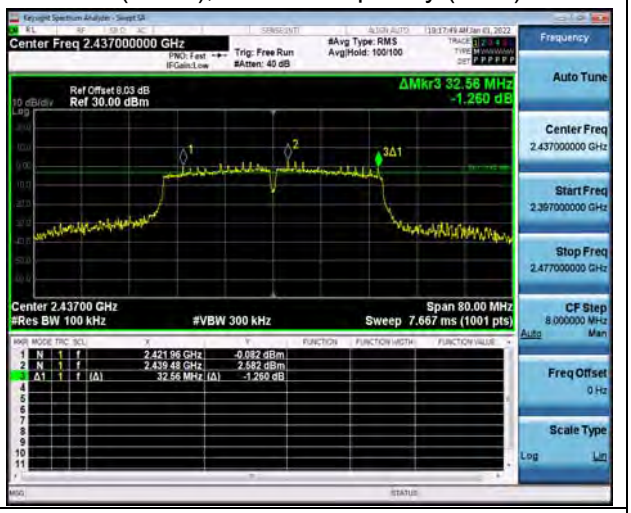
802.11n(HT40), Carrier frequency (MHz): 2432



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

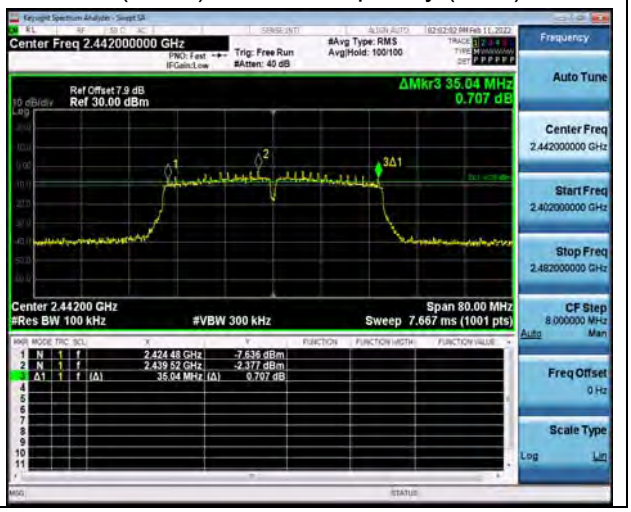


802.11n(HT40), Carrier frequency (MHz): 2437

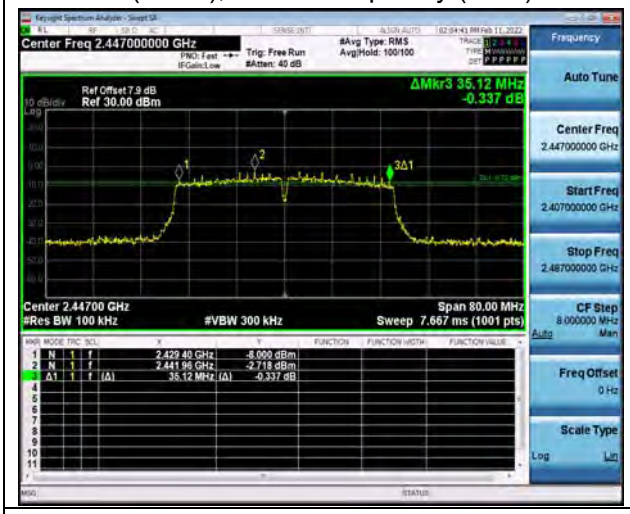


802.11n(HT20), Carrier frequency (MHz): 2462

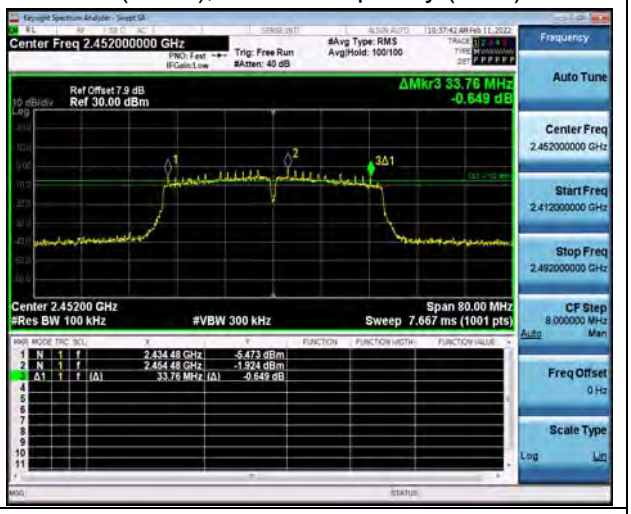
802.11n(HT40), Carrier frequency (MHz): 2442



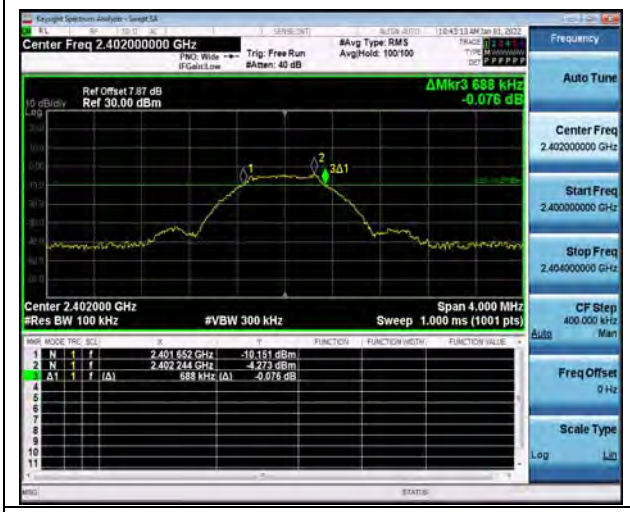
802.11n(HT40), Carrier frequency (MHz): 2447



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

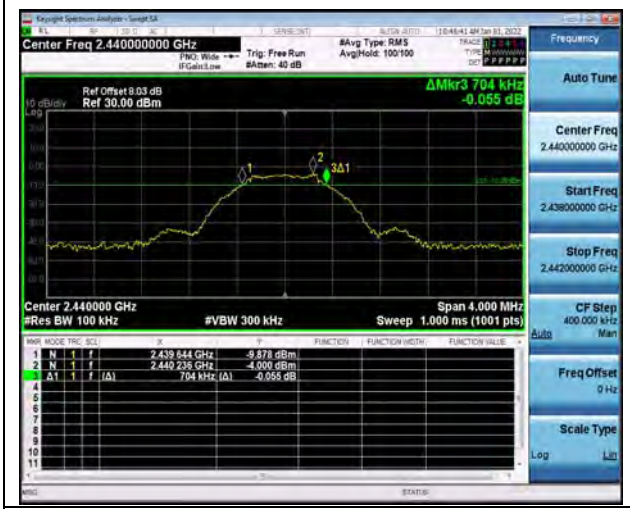


Bluetooth LE (1M) Carrier frequency (MHz): 2402

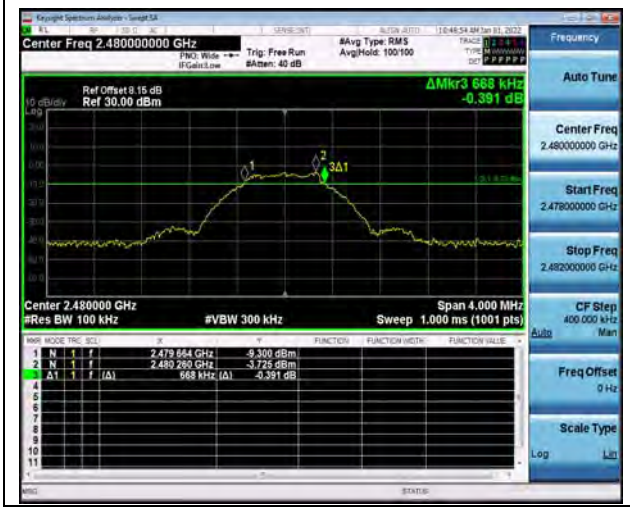


Bluetooth LE (2M) Carrier frequency (MHz): 2402

Bluetooth LE (1M) Carrier frequency (MHz): 2440



Bluetooth LE (2M) Carrier frequency (MHz): 2440

Bluetooth LE (1M) Carrier frequency (MHz): 2480	Bluetooth LE (2M) Carrier frequency (MHz): 2480
	

5.3. Band Edge

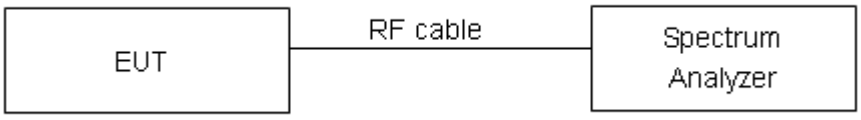
Ambient condition

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

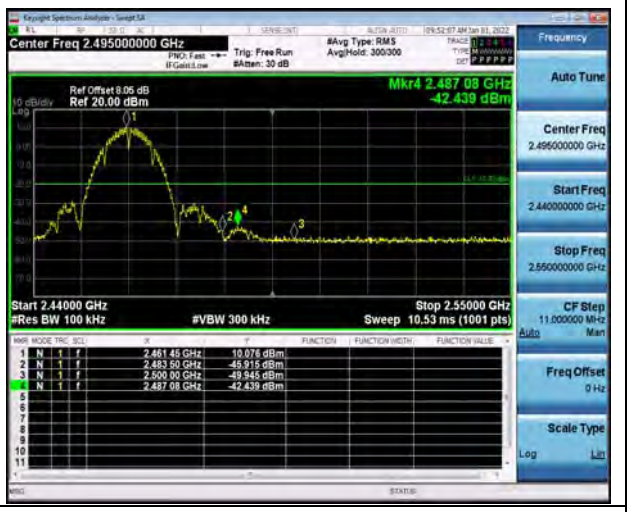
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

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

802.11n(HT20), Channel No. 1

802.11g, Channel No.: 10

802.11n(HT20), Channel No. 2

802.11g, Channel No.: 11

802.11n(HT20), Channel No. 10

802.11n(HT40), Channel No. 3

802.11n(HT20), Channel No. 11

802.11n(HT40), Channel No. 4

802.11n(HT40), Channel No. 5

802.11n(HT40), Channel No. 7

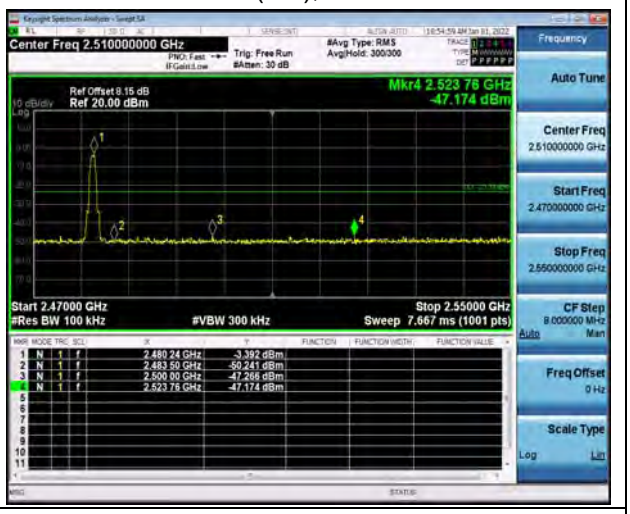
802.11n(HT40), Channel No. 8

802.11n(HT40), Channel No. 9

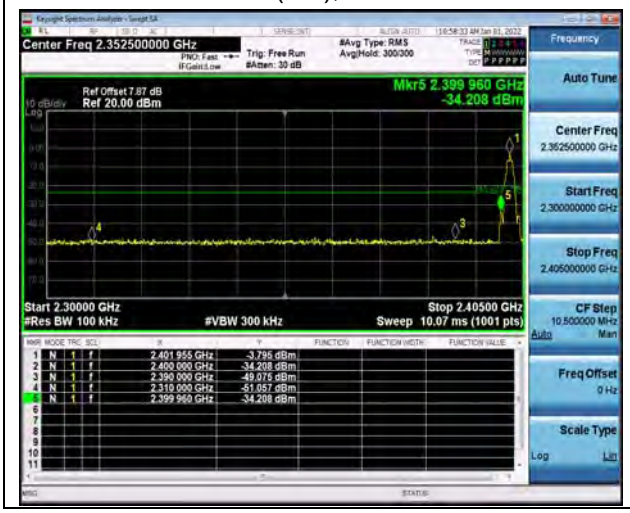
/

Bluetooth LE (1M), Channel No.: 0

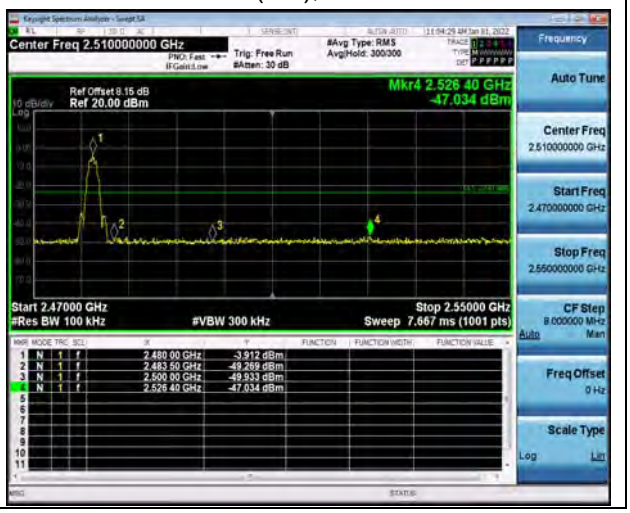
Bluetooth LE (1M), Channel No.: 39



Bluetooth LE (2M), Channel No.: 0



Bluetooth LE (2M), Channel No.: 39



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.

a) Set instrument center frequency to DTS channel center frequency

b) Set span to at least 1.5 times the OBW

c) Set RBW to:3kHz≤RBW≤100kHz

d) Set VBW≥[3x RBW]

e) Detector=power averaging (rms) or sample detector (when rms not available)

f) Ensure that the number of measurement points in the sweep 2[2 X span/RBWT]

g) Sweep time auto couple

h) Employ trace averaging (rms) mode over a minimum of 100 traces

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

j) 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.

a) Measure the duty cycle (D)of the transmitter output signal as described in 11.6

b) Set instrument center frequency to DTS channel center frequency

c) Set span to at least 1.5 times the OBW

d) Set RBW to:3kHz≤RBW≤100Kh

e) Set VBW≥[3x RBW]

f) Detector= power averaging (rms) or sample detector (when rms not available)

g) Ensure that the number of measurement points in the sweep 2[2 X span/RBW]

h) Sweep time =auto couple

i) Do not use sweep triggering; allow sweep to "free run”

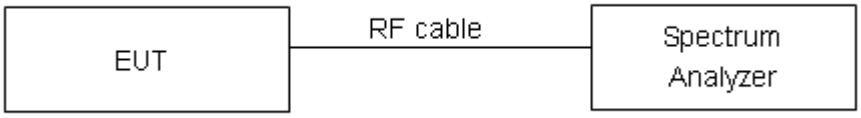
j) Employ trace averaging (rms) mode over a minimum of 100 traces

k) Use the peak marker function to determine the maximum amplitude level

l) 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	≤ 8 dBm / 3kHz

Measurement Uncertainty

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

Test Results:

Test Mode	Channel Number	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	2412/CH 1	-2.53	-12.53	8	PASS
	2437/CH 6	-2.86	-12.86	8	PASS
	2462/CH11	-3.02	-13.02	8	PASS
802.11g	2412/CH 1	-7.51	-17.51	8	PASS
	2437/CH 6	-6.95	-16.95	8	PASS
	2437/CH 10	-6.49	-16.49	8	PASS
	2462/CH11	-9.93	-19.93	8	PASS
802.11n HT20	2412/CH 1	-12.17	-22.17	8	PASS
	2412/CH 2	-6.82	-16.82	8	PASS
	2437/CH 6	-7.33	-17.33	8	PASS
	2412/CH 10	-6.49	-16.49	8	PASS
	2462/CH11	-9.87	-19.87	8	PASS
802.11n HT40	2422/CH3	-15.27	-25.27	8	PASS
	2422/CH4	-12.30	-22.30	8	PASS
	2422/CH5	-10.90	-20.90	8	PASS
	2437/CH6	-10.79	-20.79	8	PASS
	2422/CH7	-15.67	-25.67	8	PASS
	2422/CH8	-15.30	-25.30	8	PASS
	2452/CH9	-14.39	-24.39	8	PASS

Note: 1. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the power spectrum density.
2. PSD(dBm/3kHz)=RSD(dBm/30kHz)+10*log10(3/30)
10*log10(3/30)=-10

Test Mode	Channel Number	Read Value (dBm / 10kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
Bluetooth (Low Energy) (1M)	2402/CH0	-20.55	-25.77	8	PASS
	2440/CH19	-20.59	-25.81	8	PASS
	2480/CH39	-20.28	-25.50	8	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-24.43	-29.65	8	PASS
	2440/CH19	-23.74	-28.96	8	PASS
	2480/CH39	-23.90	-29.12	8	PASS

Note: 1. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the power spectrum density.
2. PSD(dBm/3kHz)= RSD(dBm/10kHz) +10*LOG10(3/10)
10*LOG10(3/10)=-5.22

802.11b, Channel No.: 1

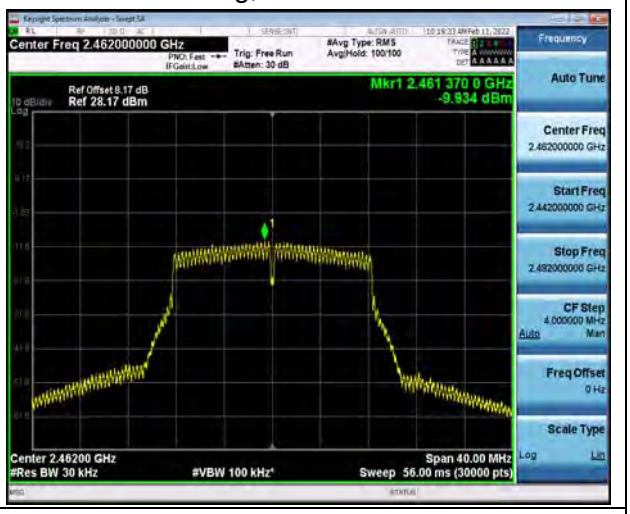
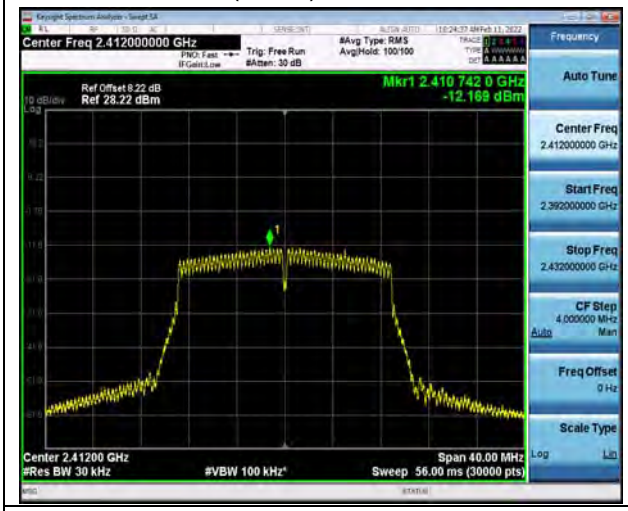
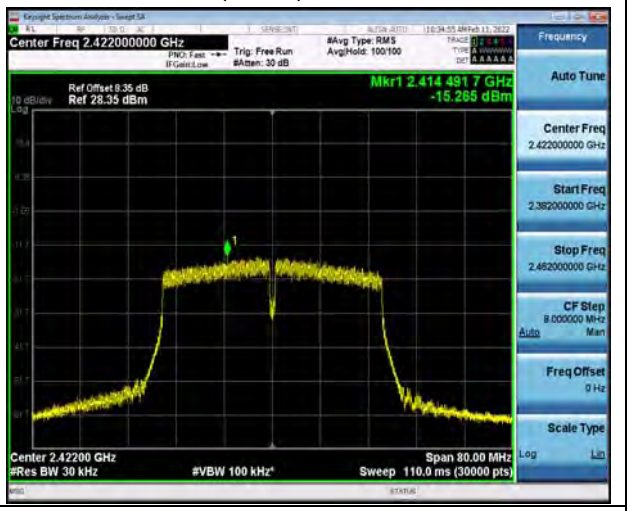
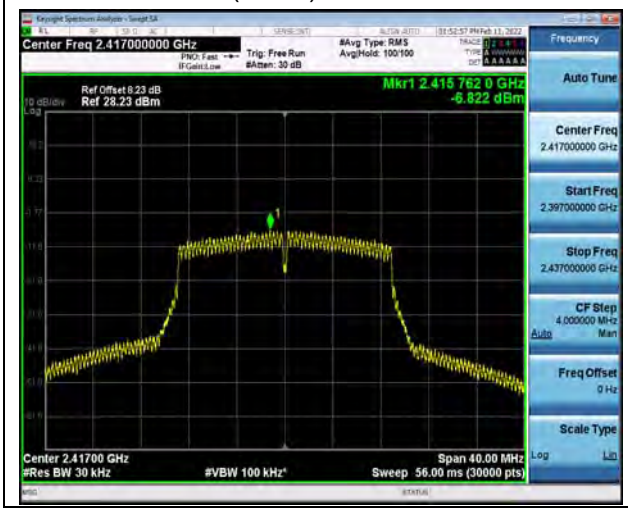
802.11g, Channel No.: 1

802.11b, Channel No.: 6

802.11g, Channel No.: 6

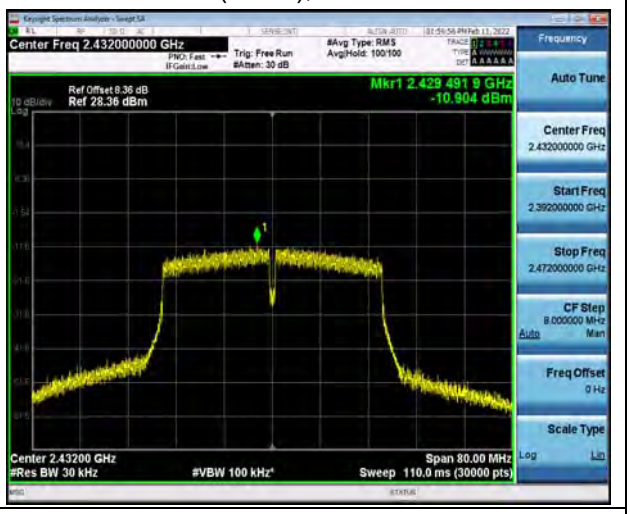
802.11b, Channel No.: 11

802.11g, Channel No.: 10

/	802.11g, Channel No.: 11 
802.11n(HT20), Channel No. 1 	802.11n(HT40), Channel No. 3 
802.11n(HT20), Channel No. 2 	802.11n(HT40), Channel No. 4 

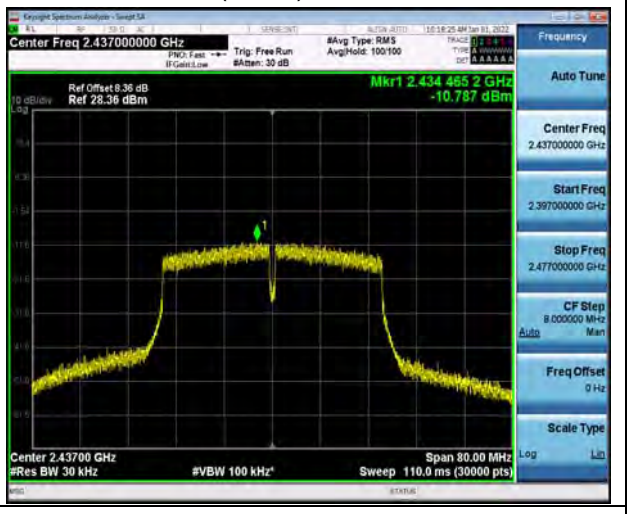
802.11n(HT20), Channel No. 6

802.11n(HT40), Channel No. 5



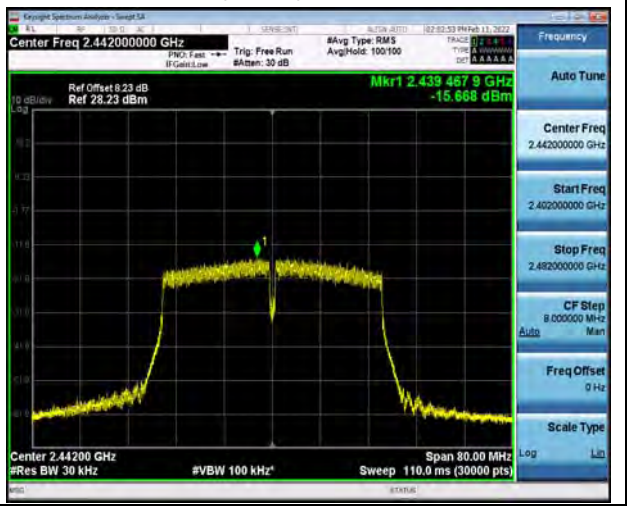
802.11n(HT20), Channel No. 10

802.11n(HT40), Channel No. 6

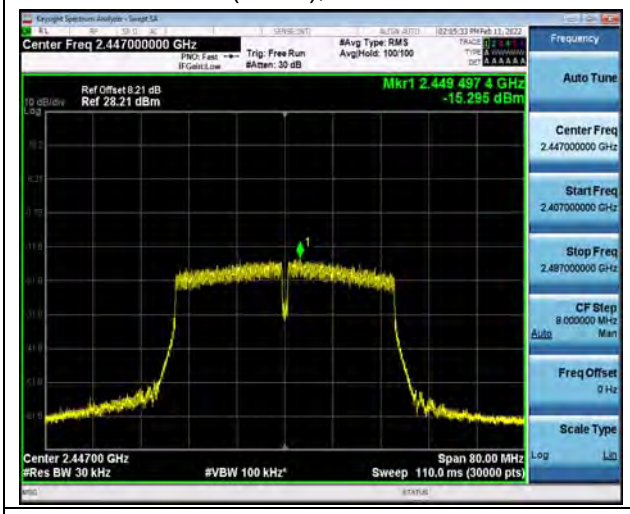


802.11n(HT20), Channel No. 11

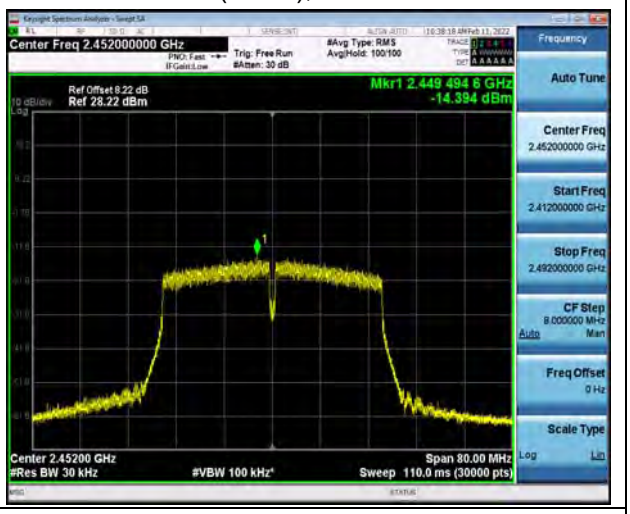
802.11n(HT40), Channel No. 7



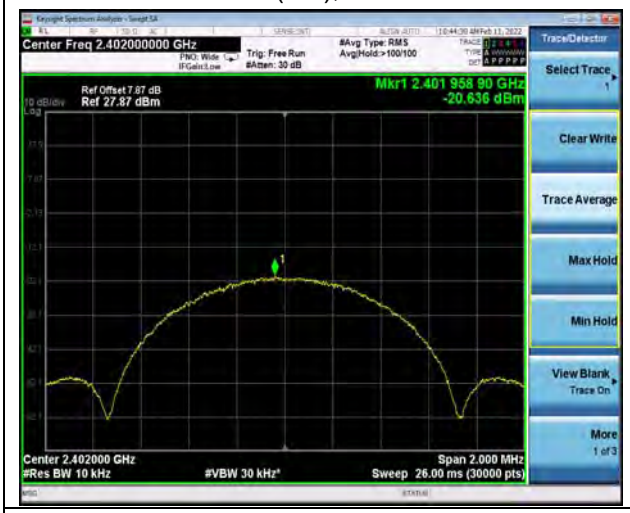
802.11n(HT40), Channel No. 8



802.11n(HT40), Channel No. 9

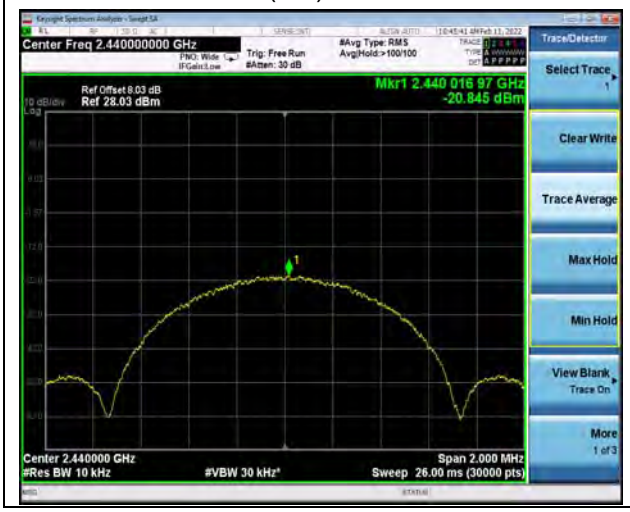


Bluetooth LE (1M), Channel No.: 0

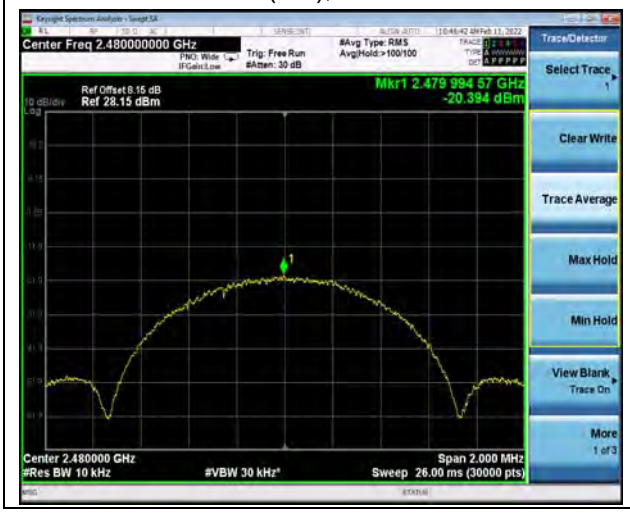


Bluetooth LE (2M), Channel No.: 0

Bluetooth LE (1M), Channel No.: 19



Bluetooth LE (2M), Channel No.: 19

Bluetooth LE (1M), Channel No.: 39	Bluetooth LE (2M), 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. ”

Test Mode	Carrier frequency (MHz)	Reference value (dBm)	Limit
802.11b	2412	9.19	-20.81
	2437	8.26	-21.74
	2462	10.11	-19.89
802.11g	2412	3.62	-26.38
	2437	5.70	-24.30
	2457	3.07	-26.93
	2462	-0.71	-30.71
802.11n HT20	2412	-0.99	-30.99
	2417	5.17	-24.83
	2437	3.34	-26.66
	2457	4.60	-25.40
	2462	-1.52	-31.52

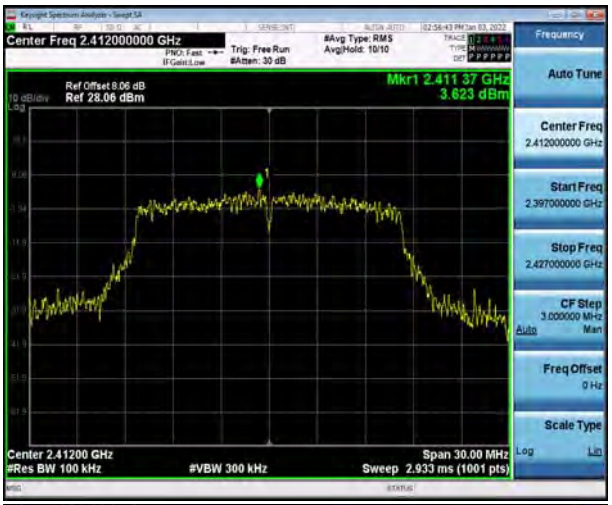
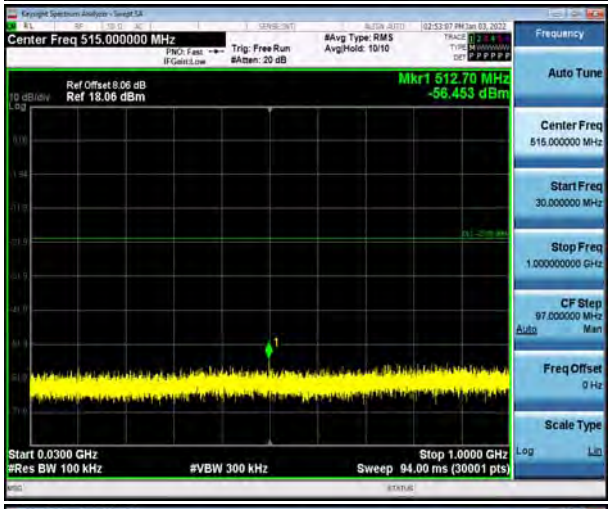
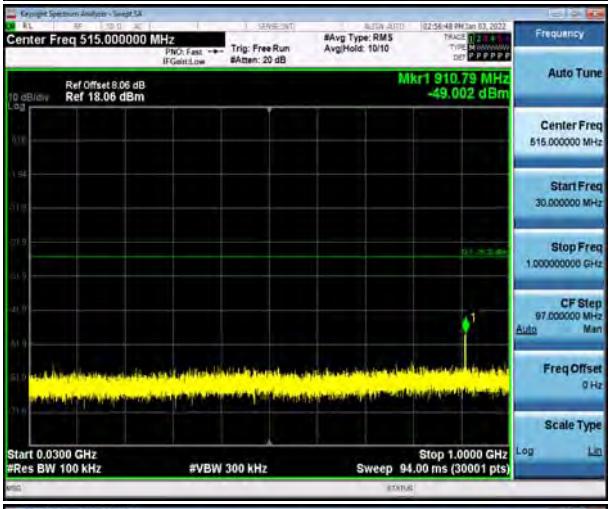
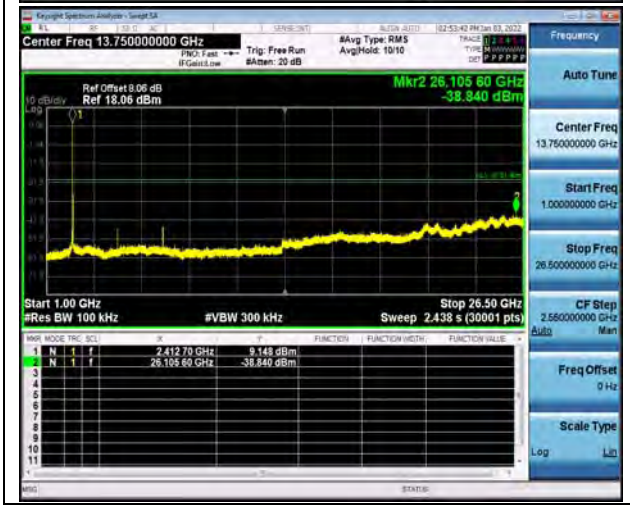
802.11n HT40	2422	-3.49	-33.49
	2427	-0.64	-30.64
	2432	0.85	-29.15
	2437	0.36	-29.64
	2442	-2.93	-32.93
	2447	-2.28	-32.28
	2452	-3.45	-33.45
Bluetooth (Low Energy) (1M)	2402	-4.41	-34.41
	2440	-4.52	-34.52
	2480	-4.87	-34.87
Bluetooth (Low Energy) (2M)	2402	-4.95	-34.95
	2440	-6.43	-36.43
	2480	-5.47	-35.47

Measurement Uncertainty

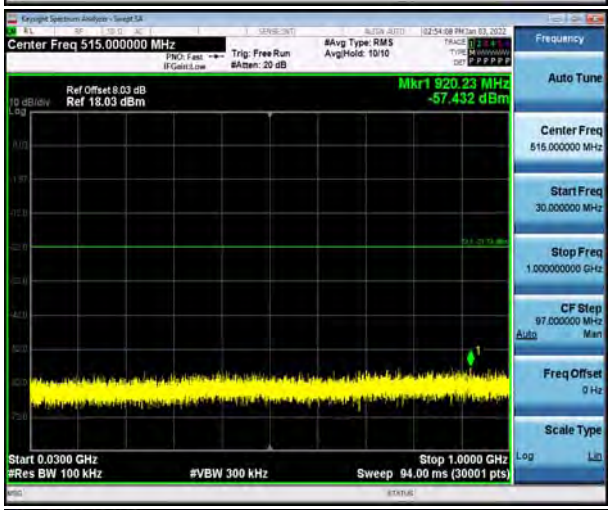
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

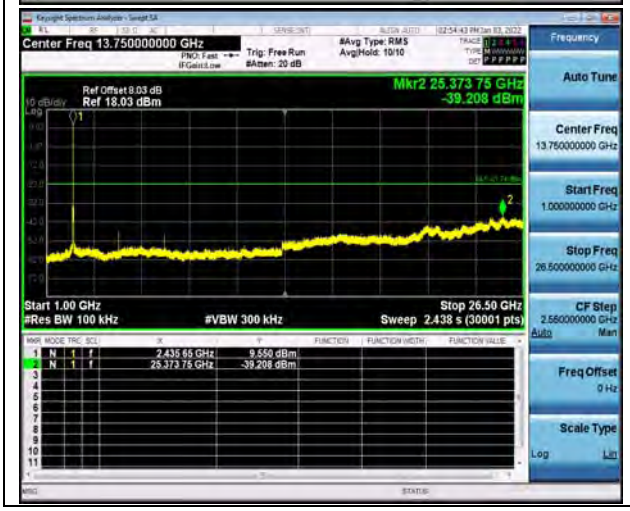
Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

Test Results:

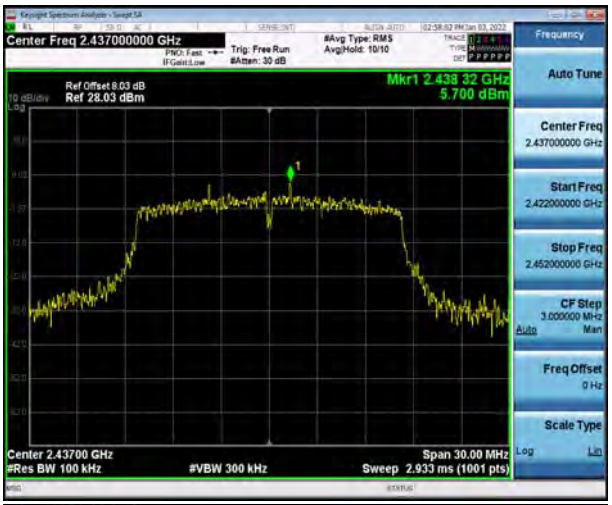
802.11b, Channel No.: 1	802.11g, Channel No.: 1
	
	
	

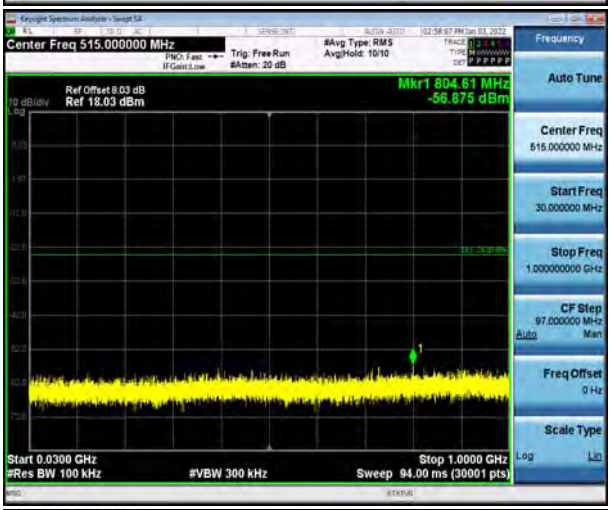
802.11b, Channel No.: 6

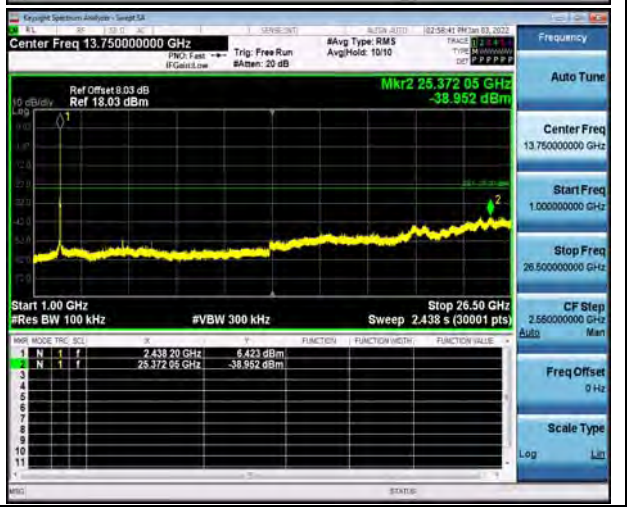




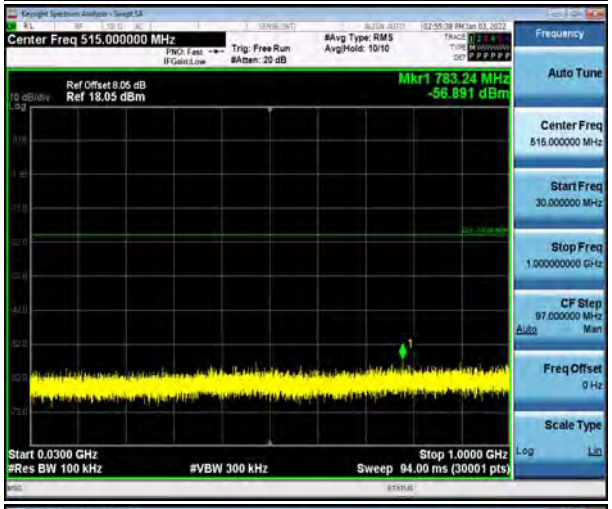
802.11g, Channel No.: 6

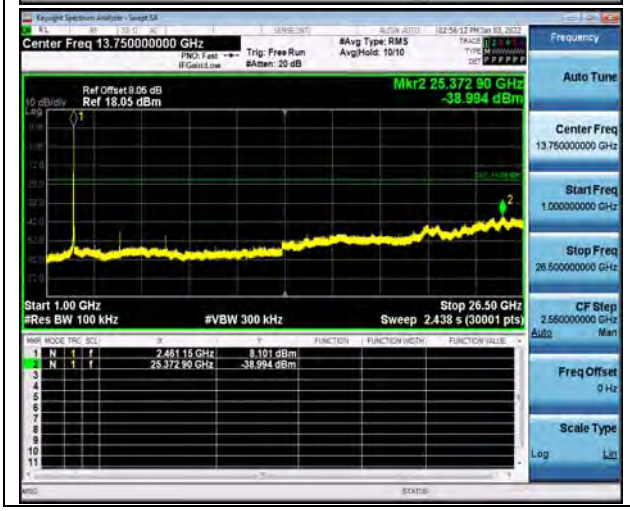




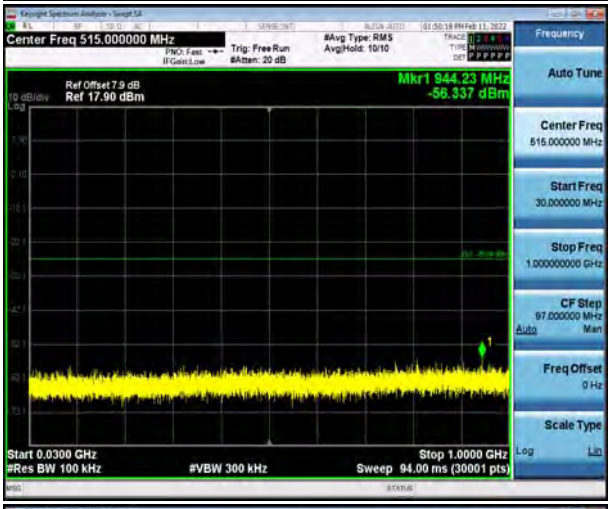


802.11b, Channel No.: 11

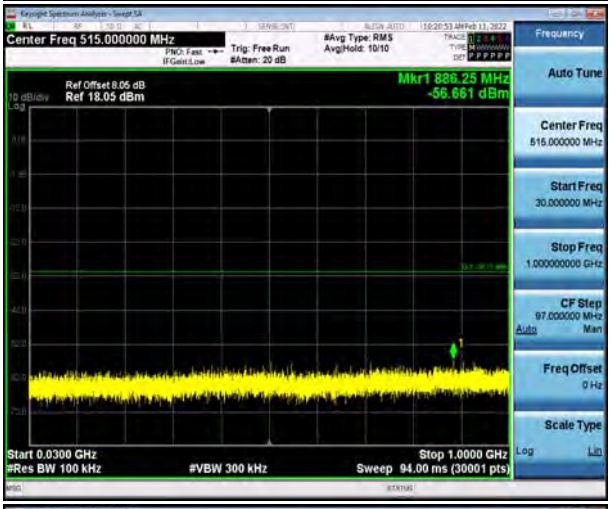




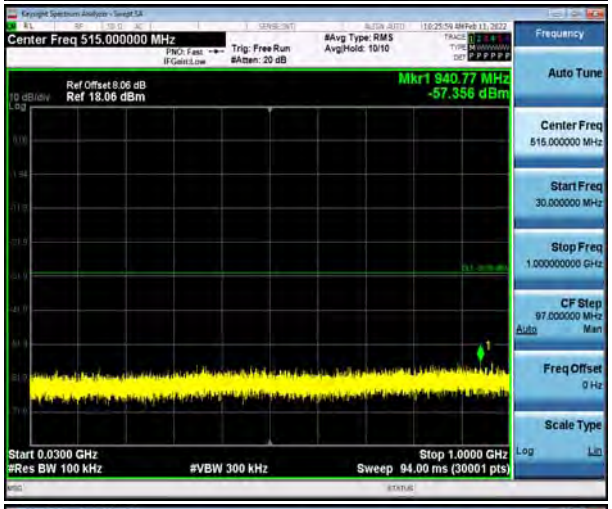
802.11g, Channel No.: 10



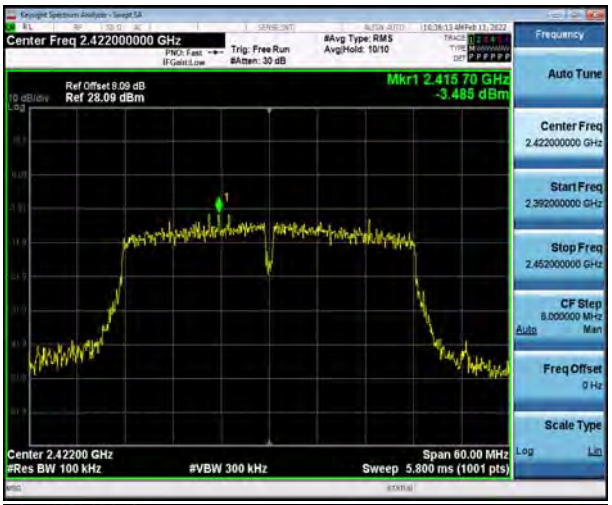
802.11g, Channel No.: 11

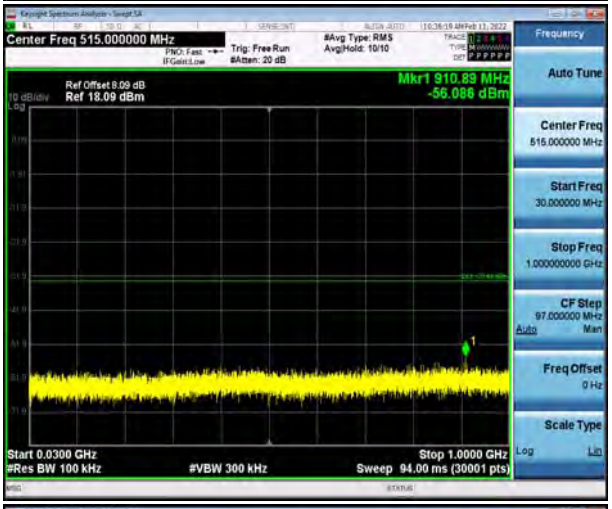


802.11n(HT20), Channel No. 1

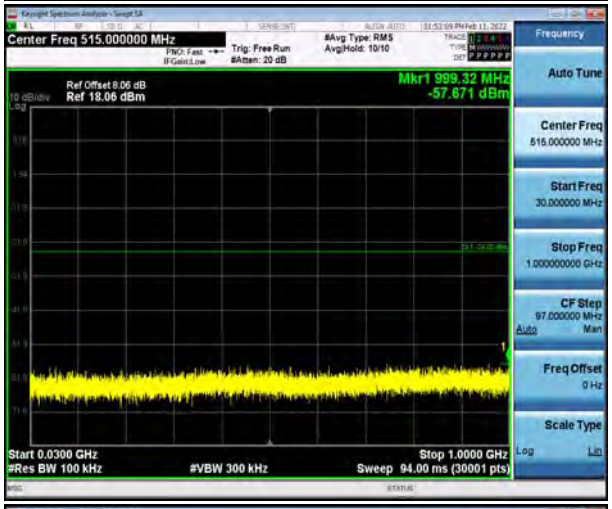


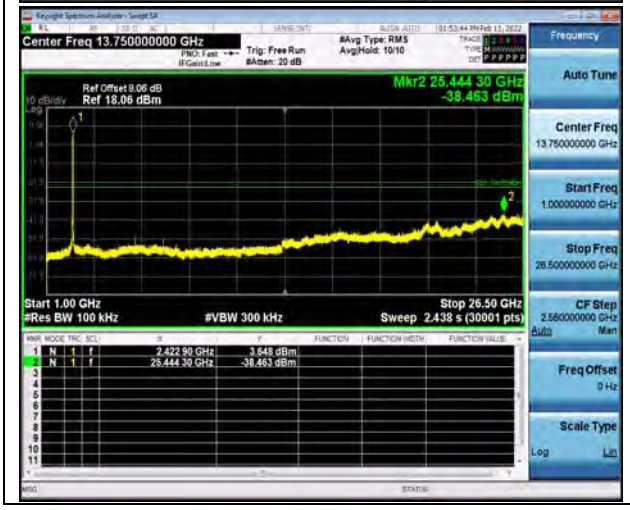
802.11n(HT40), Channel No. 3



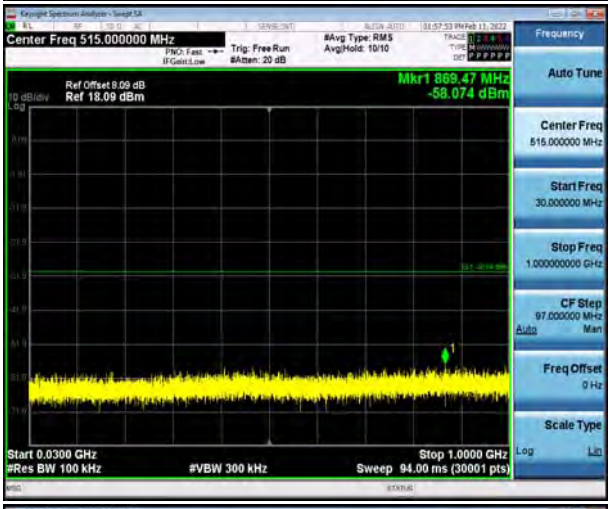


802.11n(HT20), Channel No. 2

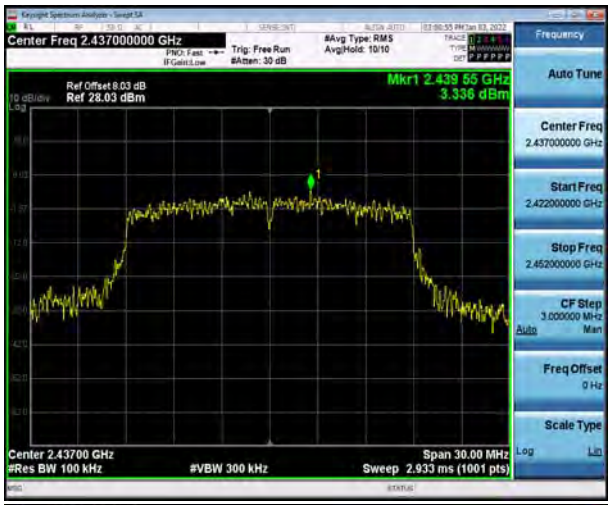


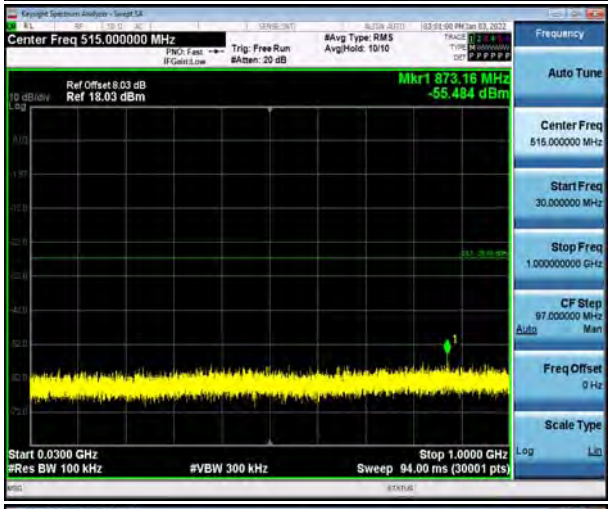


802.11n(HT40), Channel No. 4

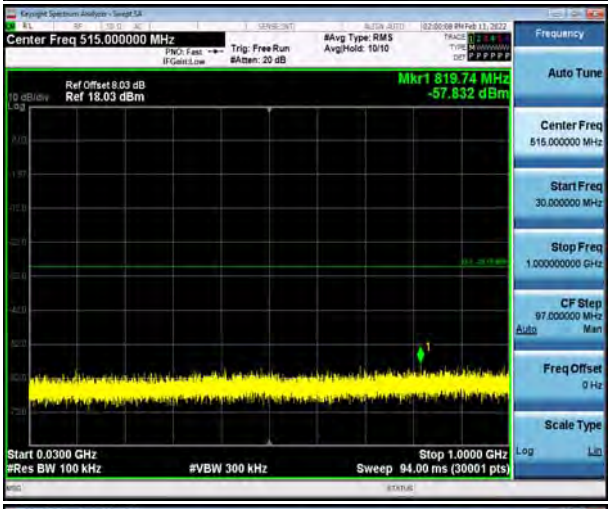


802.11n(HT20), Channel No. 6

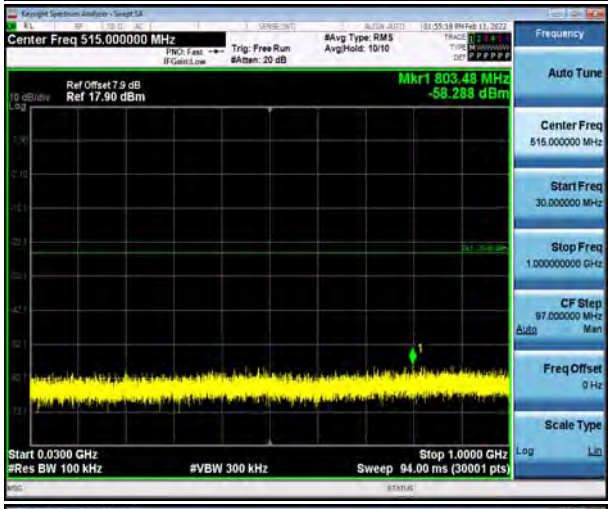


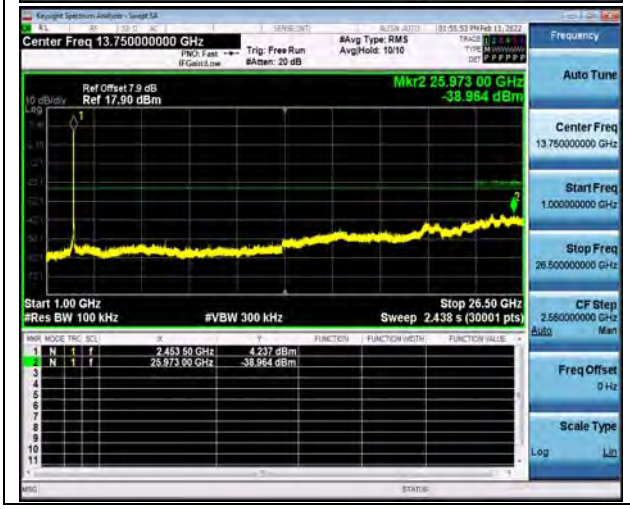


802.11n(HT40), Channel No. 5

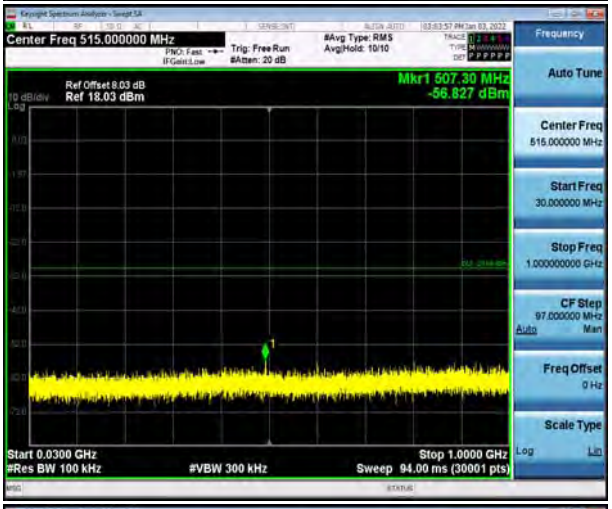


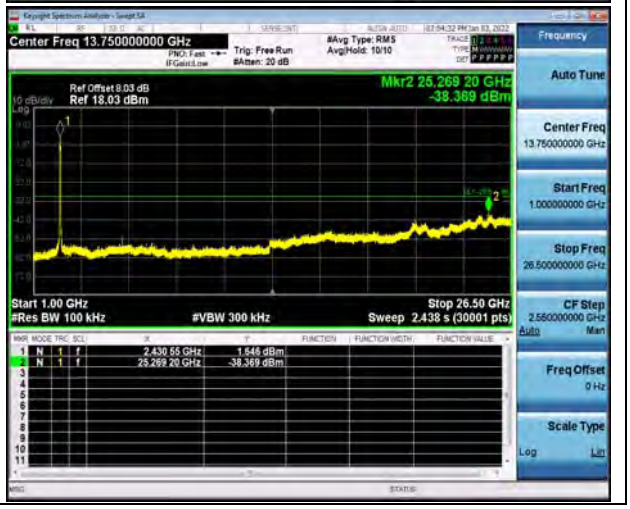
802.11n(HT20), Channel No. 10



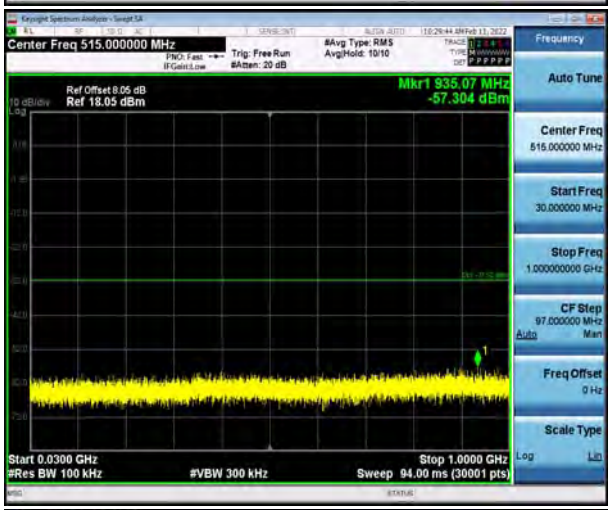


802.11n(HT40), Channel No. 6

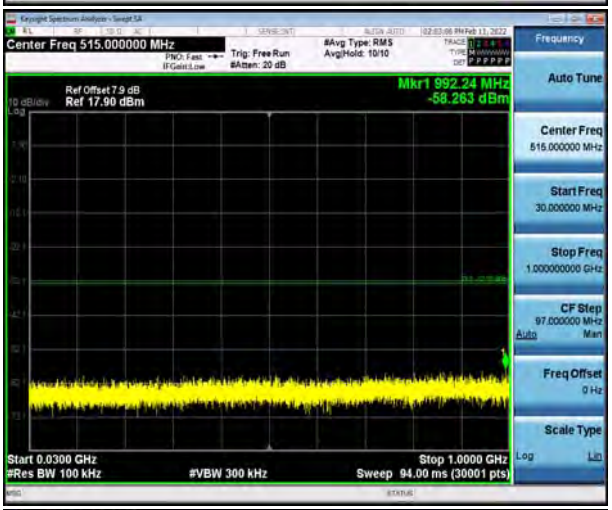




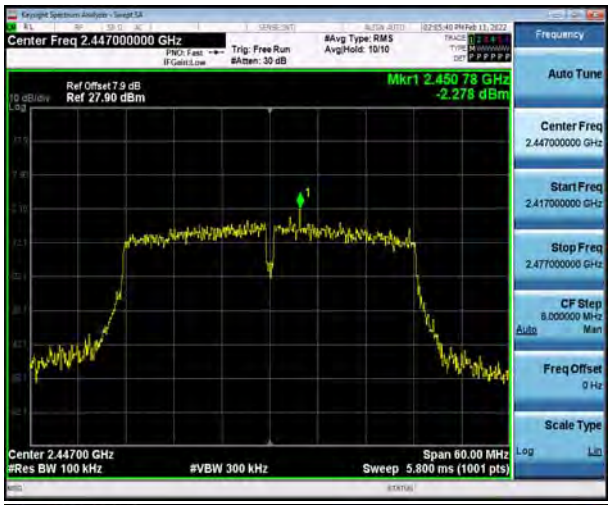
802.11n(HT20), Channel No. 11

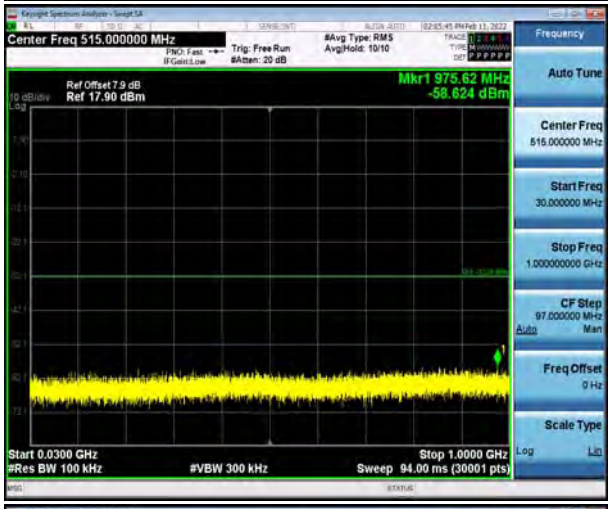


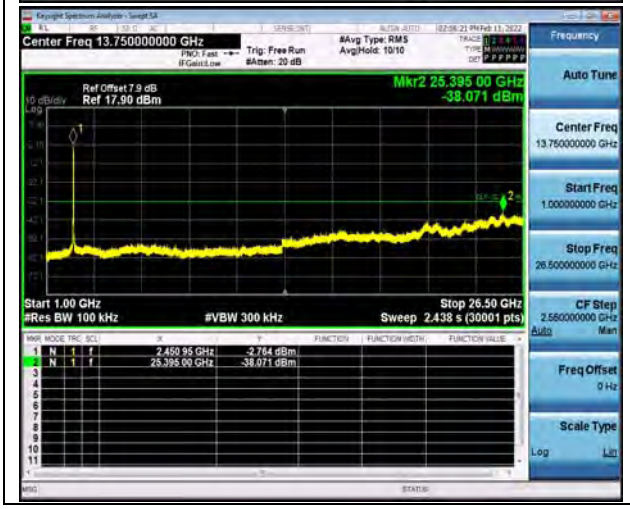
802.11n(HT40), Channel No. 7



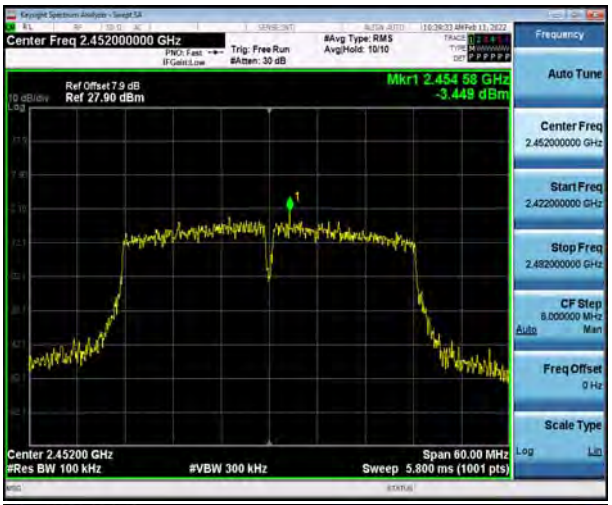
802.11n(HT40), Channel No. 8

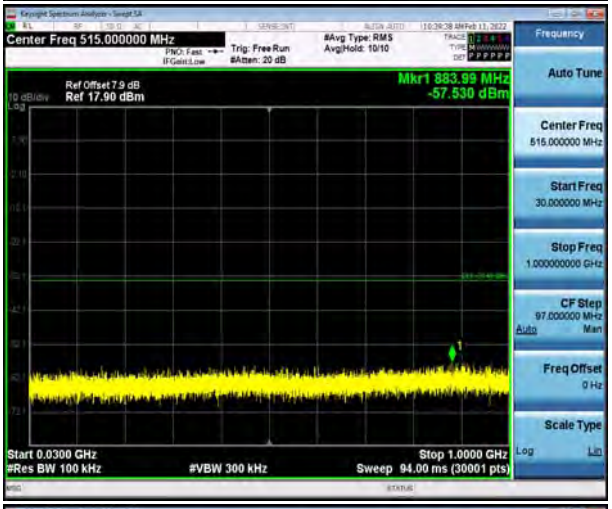


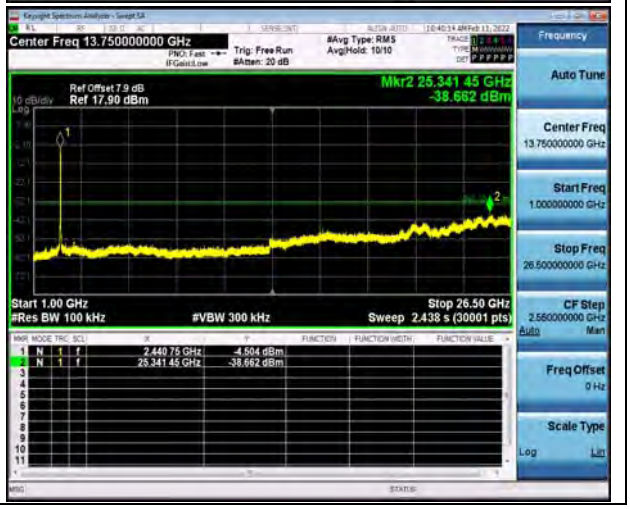


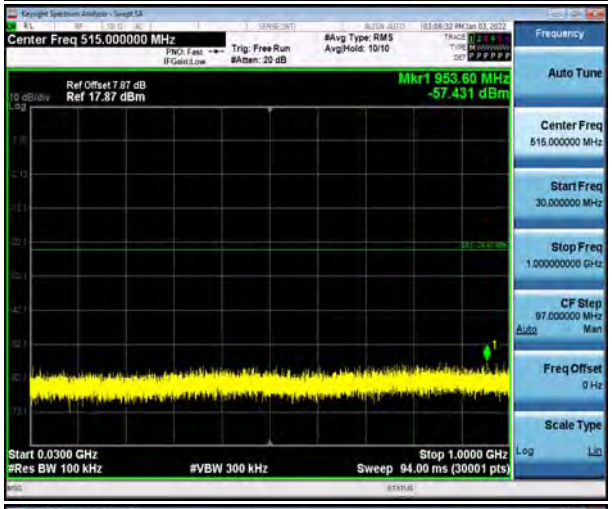
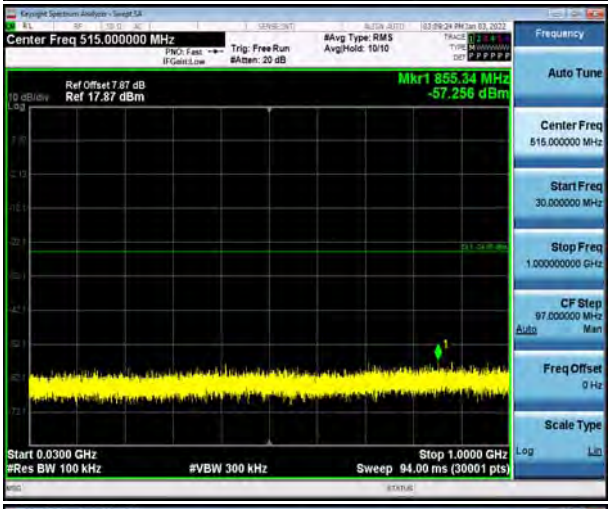


802.11n(HT40), Channel No. 9

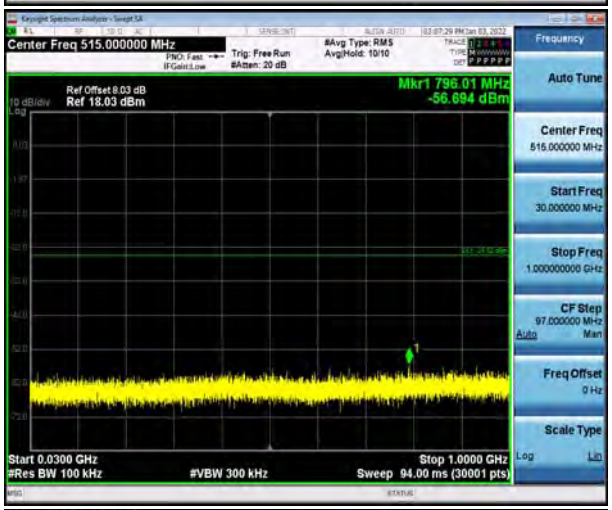


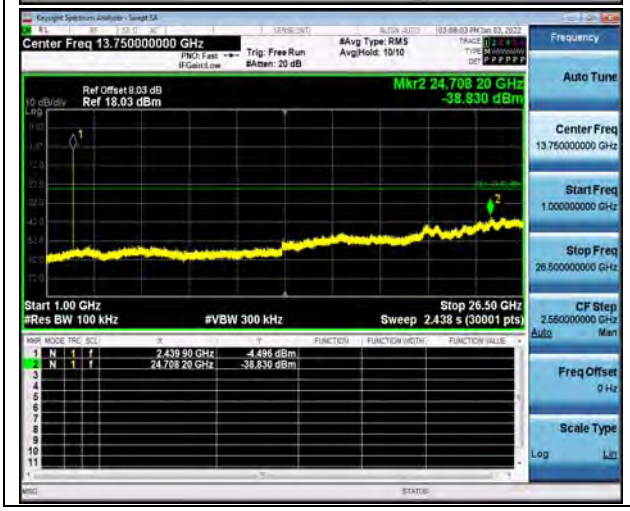




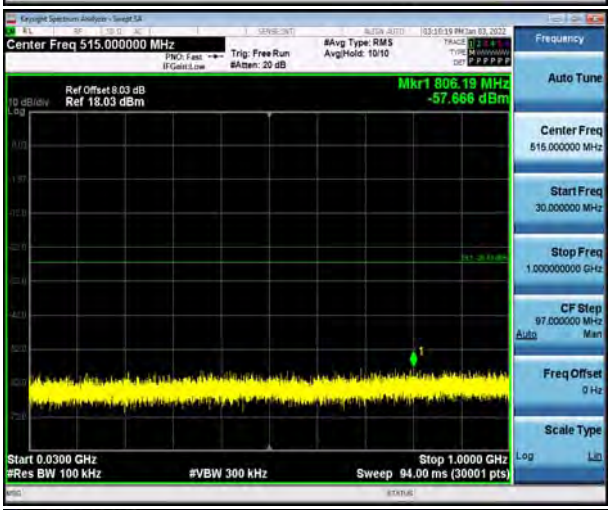
Bluetooth LE (1M), Channel No.: 0	Bluetooth LE (2M), Channel No.: 0
	
	
	

Bluetooth LE (1M), Channel No.: 19

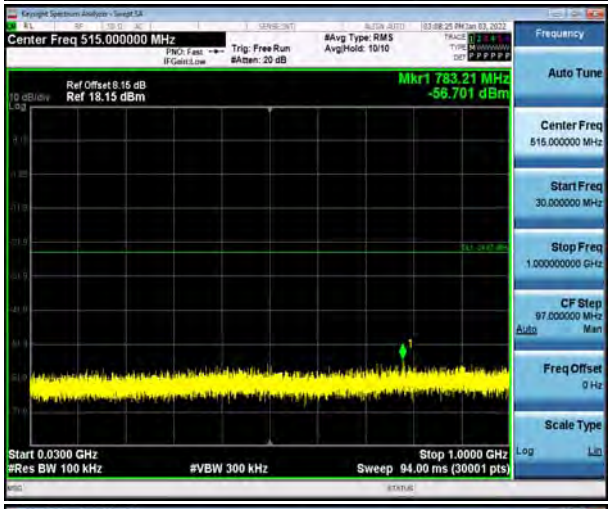




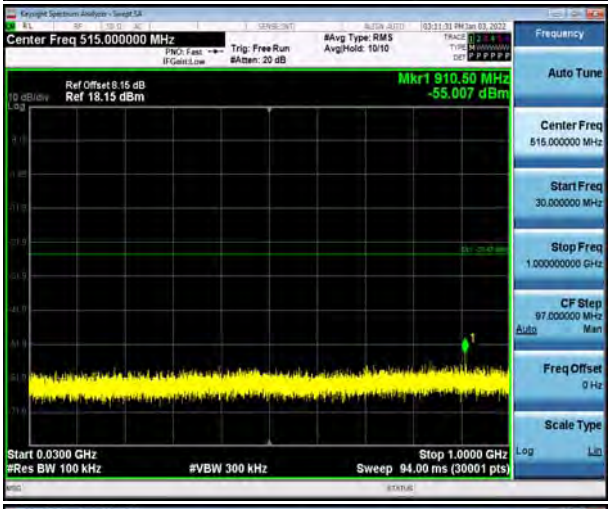
Bluetooth LE (2M), Channel No.: 19



Bluetooth LE (1M), Channel No.: 39



Bluetooth LE (2M), Channel No.: 39



5.6. Unwanted Emission

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.10.
The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna.The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. Sweep the Restricted Band and the emissions less than 20 dB below the permissible value are reported.
The radiated emissions measurements were made in a typical installation configuration.
Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

This method refer to ANSI C63.10.
The procedure for peak unwanted emissions measurements above 1000 MHz is as follows:
Set the spectrum analyzer in the following:
9kHz~150 kHz
RBW=200Hz, VBW=1kHz/ Sweep=AUTO
150 kHz~30MHz
RBW=9KHz, VBW=30KHz,/ Sweep=AUTO
Below 1GHz
RBW=100kHz / VBW=300kHz / Sweep=AUTO
a) Peak emission levels are measured by setting the instrument as follows:
Above 1GHz
PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO
b) Average emission levels are measured by setting the instrument as follows:
Above 1GHz
AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO
c) Detector: The measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage

averaging. Log or dB averaging shall not be used.)

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

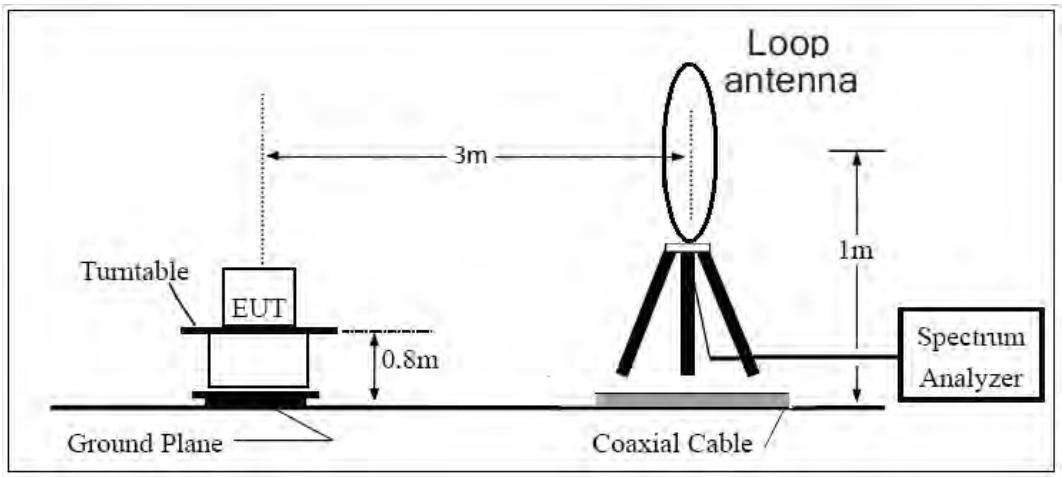
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.

3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

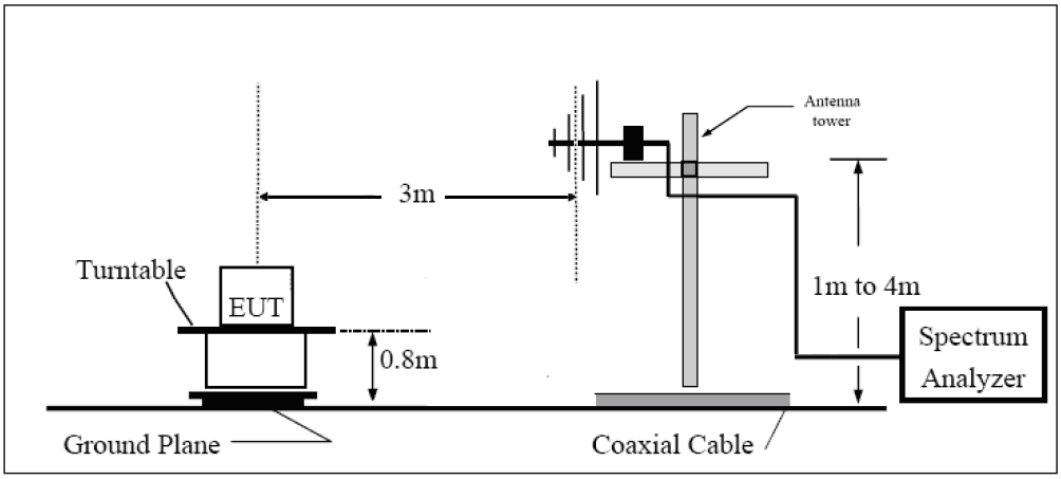
The test is in transmitting mode.

Test setup

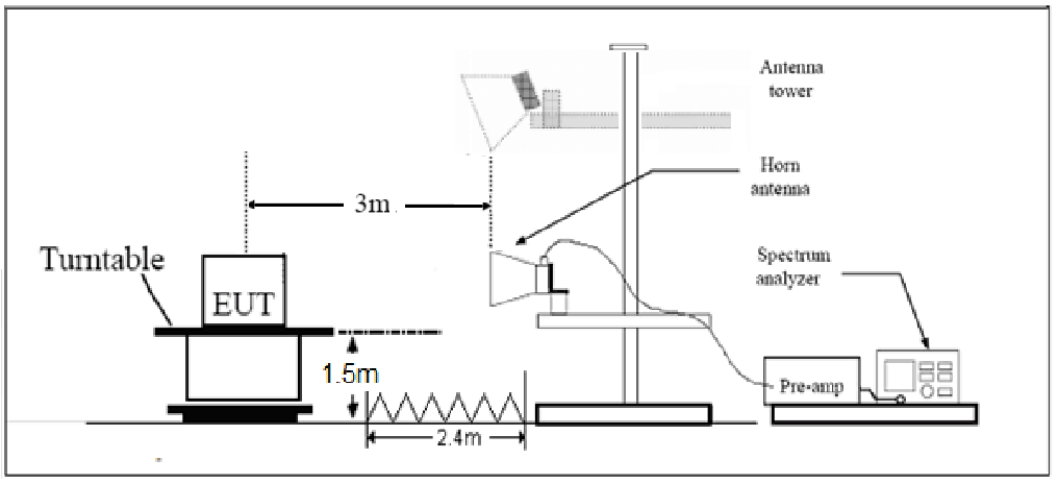
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

Rule Part 15.247(d) specifies that “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)).”

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
0.009–0.490	2400/F(kHz)	/
0.490–1.705	24000/F(kHz)	/
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Peak Limit=74 dBuV/m

Average Limit=54 dBuV/m

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1] 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Measurement Uncertainty

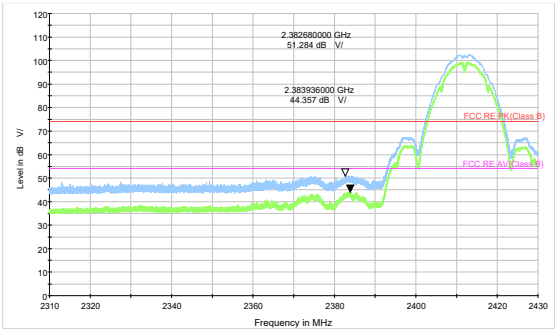
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.17 dB
200MHz-1GHz	4.84 dB
1-18GHz	4.35 dB
18-26.5GHz	5.90 dB
26.5GHz~40GHz	5.92 dB

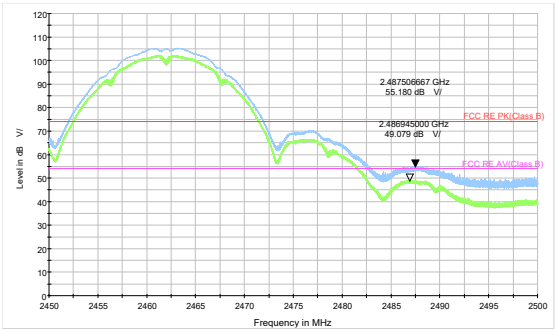
Test Results:

A font (dB礦/m)in the test plot =(dB μ V/m)

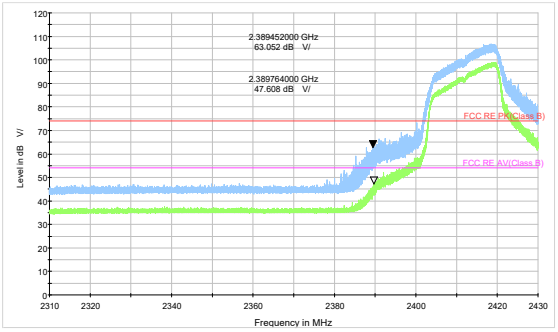
A font (dB V/)in the test plot =(dB μ V/m)



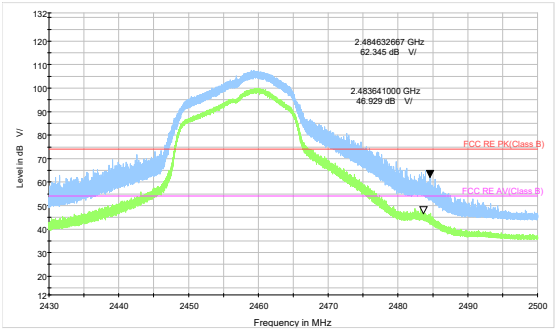
802.11b-Channel 1 Peak+ Average



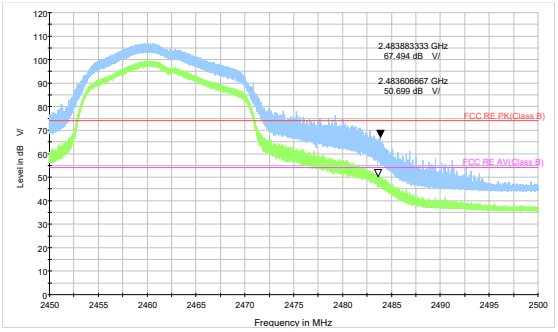
802.11b-Channel 11 Peak+ Average



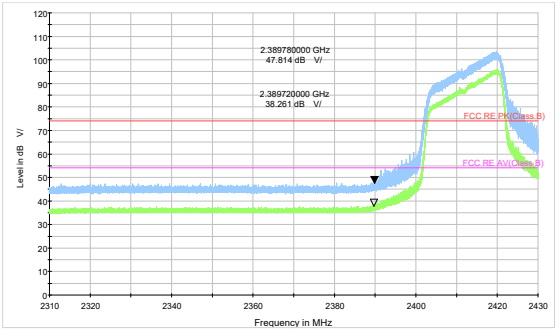
802.11g-Channel 1 Peak+ Average



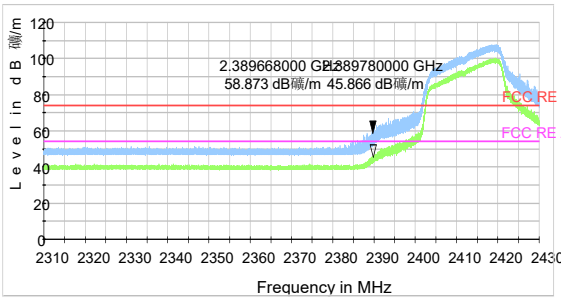
802.11g-Channel 10 Peak+ Average



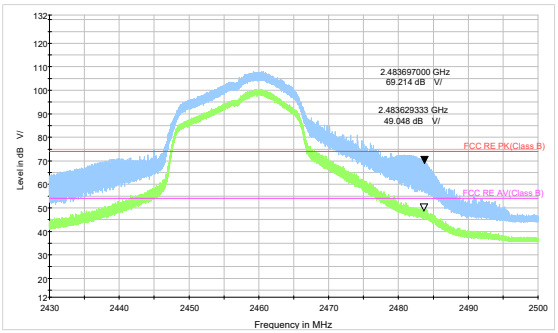
802.11g-Channel 11 Peak+ Average



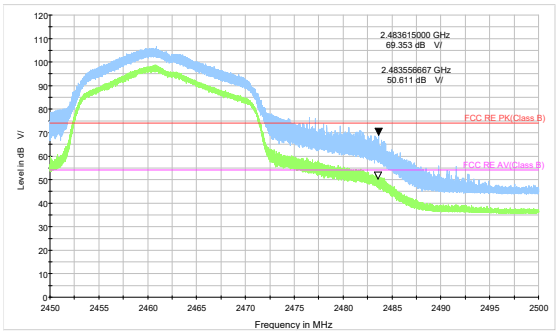
802.11n HT20 -Channel 1 Peak+ Average



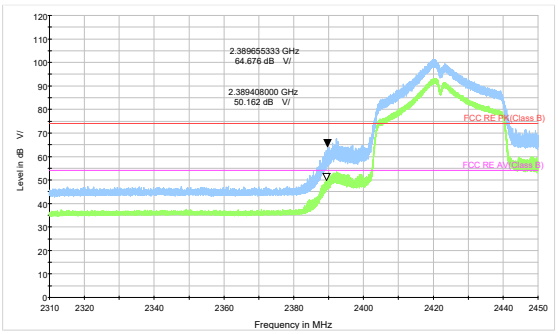
802.11n HT20 -Channel 2 Peak+ Average



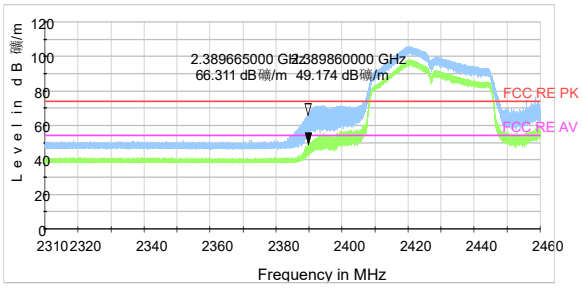
802.11n HT20 -Channel 10 Peak+ Average



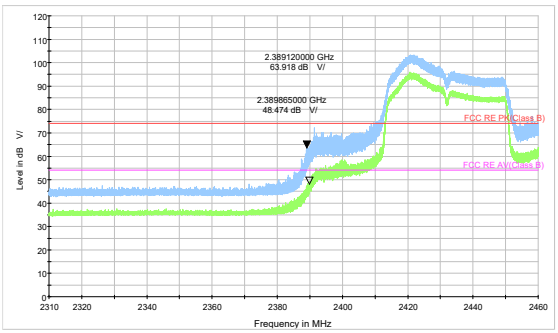
802.11n HT20 -Channel 11 Peak+ Average



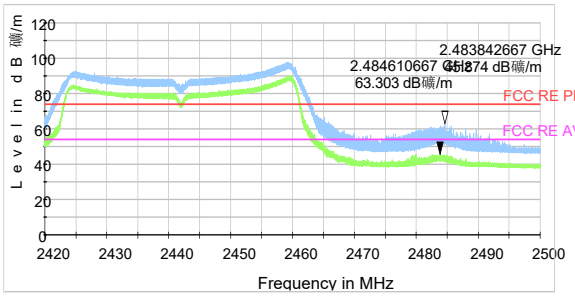
802.11n HT40 –Channel 3 Peak+ Average



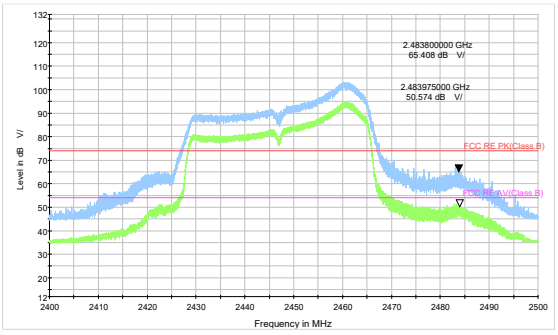
802.11n HT40 –Channel 4 Peak+ Average



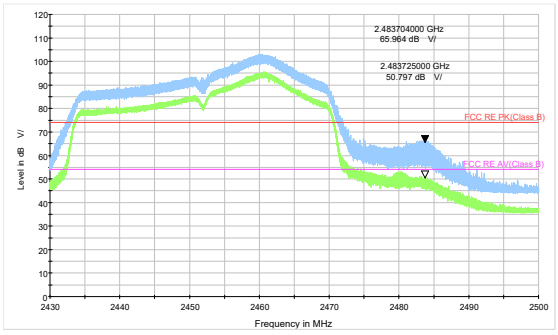
802.11n HT40 –Channel 5 Peak+ Average



802.11n HT40 –Channel 7 Peak+ Average

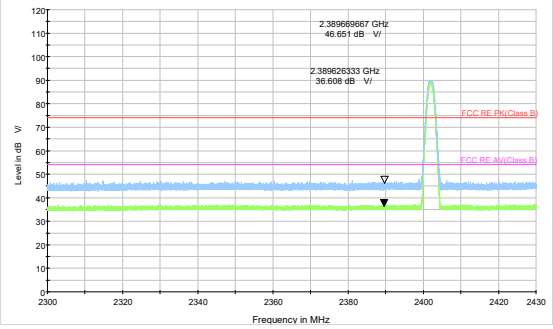
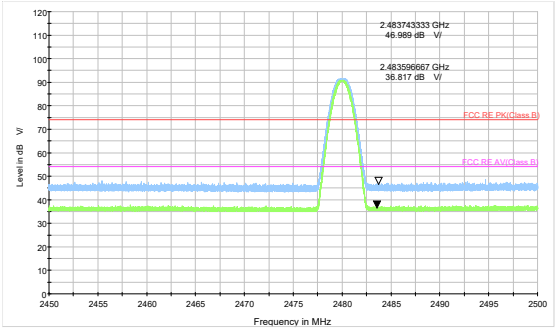


802.11n HT40 –Channel 8 Peak+ Average



802.11n HT40 –Channel 9 Peak+ Average

After the pretest, Bluetooth LE (1M) was selected as the worst Mode for Bluetooth LE.

	
Bluetooth LE (1M) Channel 0 Peak+ Average	Bluetooth LE (1M) Channel 39 Peak+Average