

FCC DTS REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Date of Issue:
February 27, 2023

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Report No.: HCT-RF-2302-FC025

FCC ID:	A3LSMA546JPN
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APPLICANT:	SAMSUNG Electronics Co., Ltd.
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Model: SC-53D

Additional Model: SCG21

EUT Type: Mobile Phone

Average Output Power: Ant.1 - 802.11b : 18.04 dBm, 802.11g : 16.56 dBm, 802.11n(HT20) : 16.63 dBm
Ant.1&2 - 802.11b : 21.21 dBm, 802.11g : 19.77 dBm, 802.11n(HT20) : 19.82 dBm

Frequency Range: 2 412 MHz ~ 2 472 MHz

Modulation type: CCK/DSSS/OFDM

FCC Classification: Digital Transmission System(DTS)

FCC Rule Part(s): Part 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

Report No.: HCT-RF-2302-FC025

REVIEWED BY



Report prepared by : Jin Gwan Lee
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2302-FC025	February 27, 2023	- First Approval Report

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1. EUT DESCRIPTION

Model	SC-53D		
Additional Model	SCG21		
EUT Type	Mobile Phone		
Power Supply	DC 3.85 V		
Frequency Range	2 412 MHz ~ 2 472 MHz		
Max. RF Output Power	<u>Average Power</u>	Ant. 1 (SISO)	802.11b : 18.04 dBm 802.11g : 16.56 dBm 802.11n(HT20) : 16.63 dBm
		Ant.1&2 (MIMO)	802.11b : 21.21 dBm 802.11g : 19.77 dBm 802.11n(HT20) : 19.82 dBm
	<u>Peak Power</u>	Ant. 1 (SISO)	802.11b : 23.71 dBm 802.11g : 24.76 dBm 802.11n(HT20) : 24.79 dBm
		Ant.1&2 (MIMO)	802.11b : 26.85 dBm 802.11g : 27.99 dBm 802.11n(HT20) : 28.02 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n		
Number of Channels	13 Channels		
Date(s) of Tests	February 01, 2023 ~ February 27, 2023		
Serial number	Radiated: R3CTC0EE7KJ Conducted: R3CTC0EE5RY		

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant1	Ant2	CDD	SDM
802.11b	O	X	O	X
802.11g	O	X	O	X
802.11n(HT20)	O	X	O	O

Note:

- (1) O = Support, X = Not Support
- (2) SISO = Single Input Single Output
- (3) SDM = Spatial Diversity Multiplexing
- (4) CDD = Cyclic Delay Diversity

2. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) e) (iii), f) ii)

$$\text{Directional gain(SDM)} = G_{\max} + 10 \cdot \log(N_{\text{ANT}}/ N_{\text{SS}}),$$

$$\text{Directional Gain(CDD)} = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{\text{SS}}} (\sum_{k=1}^{N_{\text{ANT}}} g_{j,k})^2}{N_{\text{ANT}}} \right]$$

Ant Gain (dBi)		N _{ANT} / N _{SS}	Directional Gain (dBi)	
			SDM	CDD
ANT1	-4.93	2 / 2	-4.93	-4.03
ANT2	-9.84			

Note

According to Ansi C63.10-2013 section 14.4.3, the directional gain is calculated using the formula, where G_N is the gain of the nth antenna and N_{ANT} is the total number of antennas used.

$$\text{Directional gain(SDM)} = G_{\max} + 10 \cdot \log(N_{\text{ANT}}/ N_{\text{SS}}),$$

$$\text{Directional Gain(CDD)} = 10 \cdot \log(((10^{(\text{ANT1 Gain}/20)} + 10^{(\text{ANT2 Gain}/20)})^2 / 2) \text{ dBi})$$

Sample MIMO Calculation:

Ex) Ant 1 : 11.58 dBm Ant 2 : 12.08 dBm

$$\text{Ant1} + \text{Ant 2} = \text{MIMO}$$

$$(11.58 \text{ dBm} + 12.08 \text{ dBm}) = (14.387 \text{ mW} + 16.143 \text{ mW}) = 30.53 \text{ mW} = 14.88 \text{ dBm}$$

2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of §15.203

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

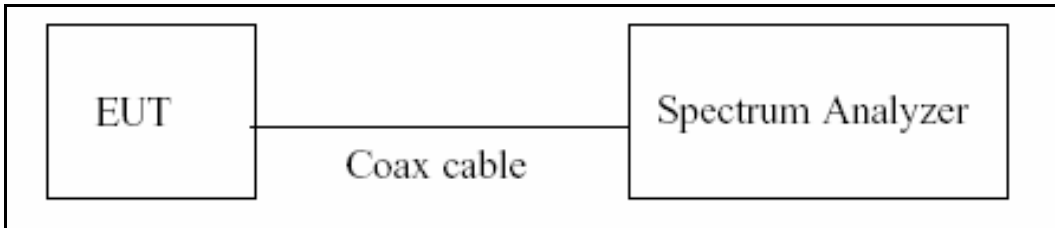
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.90 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, $k=2$)

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method.

The largest available value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

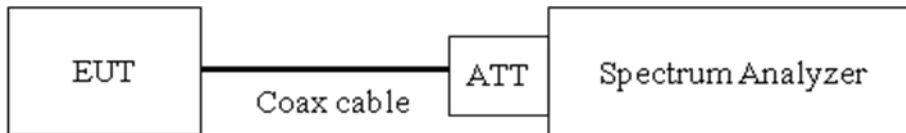
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10\log(1/\text{Duty Cycle})$

7.2. 6 dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW $\geq 3 \times$ RBW
- 3) Detector = Peak
- 4) Trace mode = max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

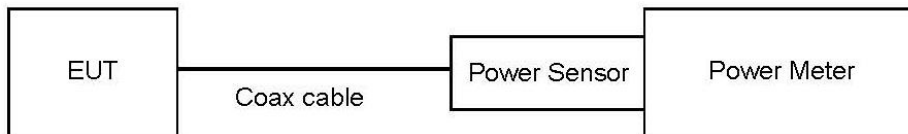
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
: Measure the peak power of the transmitter.

- Average Power (Procedure 11.9.2.3 in ANSI 63.10-2013)
 - 1) Measure the duty cycle.
 - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 - 3) Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

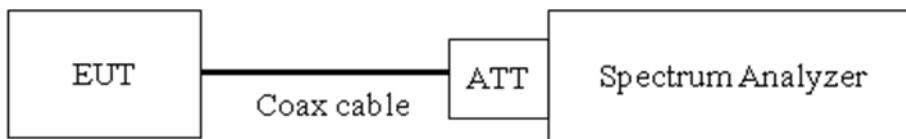
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm in any 3 kHz BW.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set span to at least 1.5 times the OBW.
- 3) $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$.
- 4) $VBW \geq 3 \times RBW$.
- 5) Sweep = auto couple
- 6) Detector = power averaging (rms) or sample detector (when rms not available).
- 7) Ensure that the number of measurement points in the sweep $\geq [2 \times \text{span} / RBW]$.
- 8) Employ trace averaging (rms) mode over a minimum of 100 traces
- 9) Use the peak marker function to determine the maximum amplitude level.
- 10) Use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 11) if then duty factor shall be added to adjust the result if the duty cycle is less than 98 %

Sample Calculation

- Power Spectral Density = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

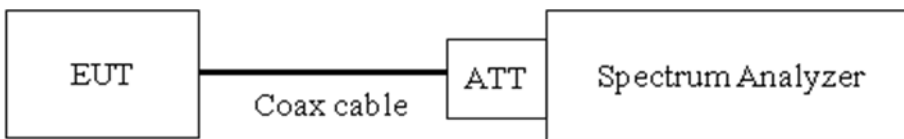
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (Average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW $\geq 3 \times$ RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points $\geq 2 \times$ Span/RBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

Factors for frequency

Freq(MHz)	Factor(dB)
30	20.04
100	20.09
200	20.13
300	20.19
400	20.22
500	20.23
600	20.23
700	20.25
800	20.27
900	20.29
1000	20.31
2000	20.46
2400	20.52
2480	20.52
2500	20.52
3000	20.57
4000	20.67
5000	20.75
5150	20.77
5850	20.82
6000	20.82
7000	20.91
8000	20.98
9000	21.05
10000	21.12
11000	21.16
12000	21.24
13000	21.32
14000	21.30
15000	21.32
16000	21.37
17000	21.41
18000	21.47
19000	21.50
20000	21.56
21000	21.77
22000	21.74
23000	21.94

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss(1ea)

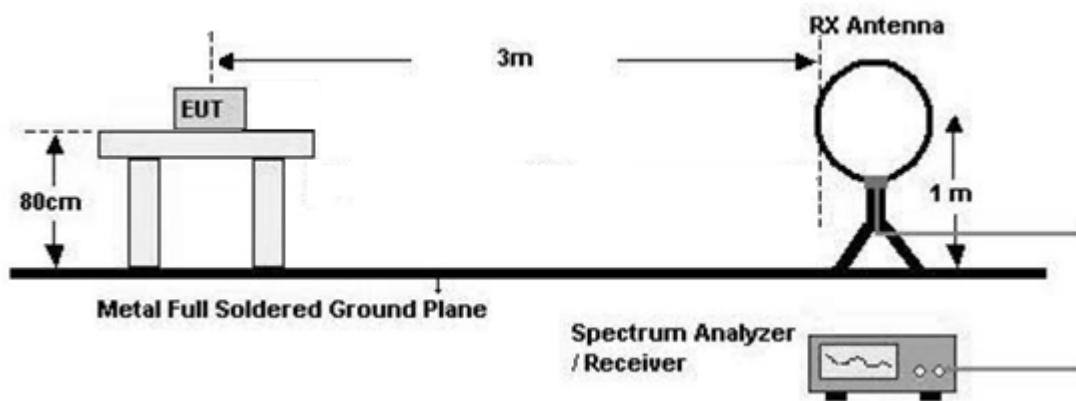
7.6. Radiated Test

Limit

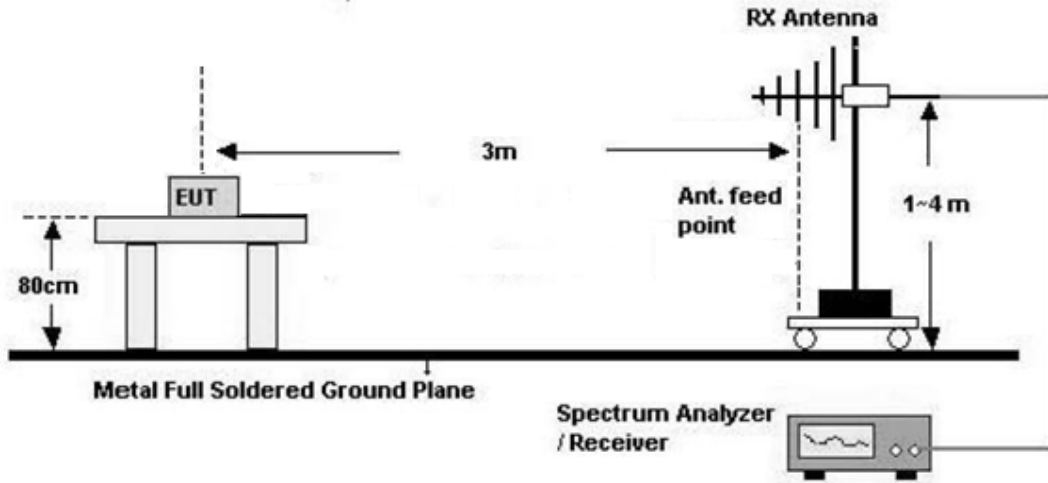
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

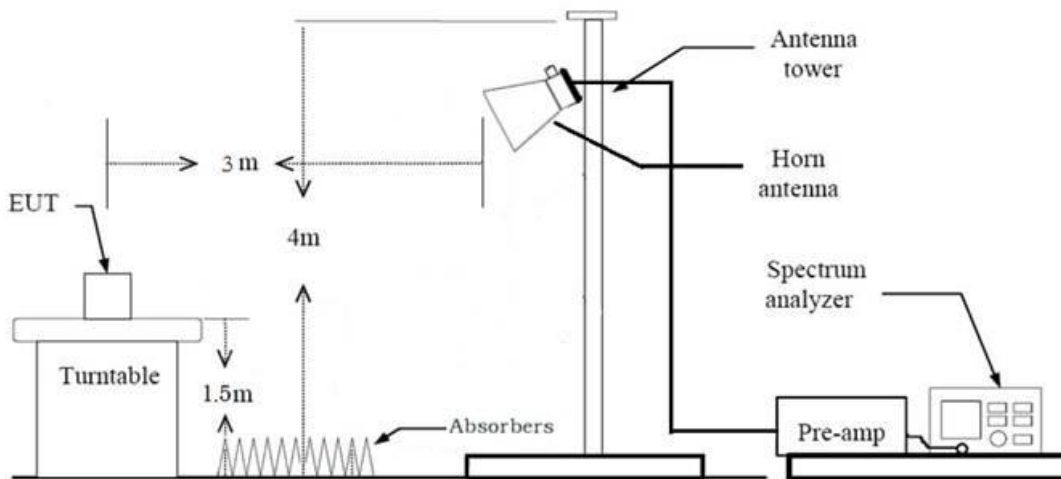
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions (Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = $40\log(3\text{ m}/300\text{ m}) = - 80\text{ dB}$
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40\log(3\text{ m}/30\text{ m}) = - 40\text{ dB}$
Measurement Distance : 3 m
8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions (Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- In general, (1) is used mainly
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 1 GHz – 25 GHz
 - Detector = Peak

- Trace = Maxhold
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW

(2) Measurement Type(Average): Duty cycle $\geq 98 \%$

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle $< 98 \%$, duty cycle variations are less than $\pm 2 \%$

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 % duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

10. Distance extrapolation factor = $20\log$ (test distance / specific distance) (dB)

11. Total(Measurement Type : Peak)

$$= \text{Measured value} + \text{Antenna Factor(A.F)} + \text{Cable Loss(C.L)} - \text{Amp Gain(A.G)} + \text{Distance Factor(D.F)}$$

Total(Measurement Type : Average, Duty cycle $\geq 98 \%$)

$$= \text{Measured value} + \text{Antenna Factor(A.F)} + \text{Cable Loss(C.L)} - \text{Amp Gain(A.G)} + \text{Distance Factor(D.F)}$$

Total(Measurement Type : Average, Duty cycle $< 98 \%$)

$$= \text{Measured value} + \text{Antenna Factor(A.F)} + \text{Cable Loss(C.L)} - \text{Amp Gain(A.G)} + \text{Distance Factor(D.F)} \\ + \text{Duty Cycle Factor}$$

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW

(2) Measurement Type(Average): Duty cycle $\geq 98 \%$,

- Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle $< 98 \%$, duty cycle variations are less than $\pm 2 \%$

- Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 % duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
10. Distance extrapolation factor = $20\log(\text{test distance} / \text{specific distance})$ (dB)
11. Total(Measurement Type : Peak)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
- Total(Measurement Type : Average, Duty cycle $\geq 98\%$)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
- Total(Measurement Type : Average, Duty cycle < 98 %)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) + Duty Cycle Factor

7.7. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 ^(a)	56 to 46 ^(a)
0.50 to 5	56	46
5 to 30	60	50

^(a)Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
 - Worstcase : Stand alone
2. EUT Axis
 - Radiated Spurious Emissions : Z
 - Radiated Restricted Band Edge : X
3. Duty cycle factor applies only 802.11g/n (Duty cycle < 98 %).
4. All data rate of operation were investigated and the test results are worst case in lowest Data Rate of each mode.
 - 802.11b : 1 Mbps
 - 802.11g : 6 Mbps
 - 802.11n(HT20): MCS0
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
 - Position : Horizontal, Vertical, Parallel to the ground plane
6. SC-53D, SCG21 were tested and the worst case results are reported.
(Worst case : SC-53D)
7. All Antenna of operation were investigated and the worst case results are reported
 - Mode : Ant1(SISO), MIMO(SDM), MIMO(CDD)
 - Radiated Bandedge Worst case : MIMO(CDD)
 - Radiated spurious emissions Worst case : MIMO(CDD)

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone + External accessories(Earphone, etc) + Travel Adapter,
Stand alone + Travel Adapter
 - Worstcase : Stand alone + Travel Adapter
2. SC-53D, SCG21 were tested and the worst case results are reported.
(Worst case : SC-53D)

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. SC-53D, SCG21 were tested and the worst case results are reported.
(Worst case : SC-53D)
3. Duty cycle factor applies only 802.11g/n (Duty cycle < 98 %).

8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§15.247(d)	Conducted > 30 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

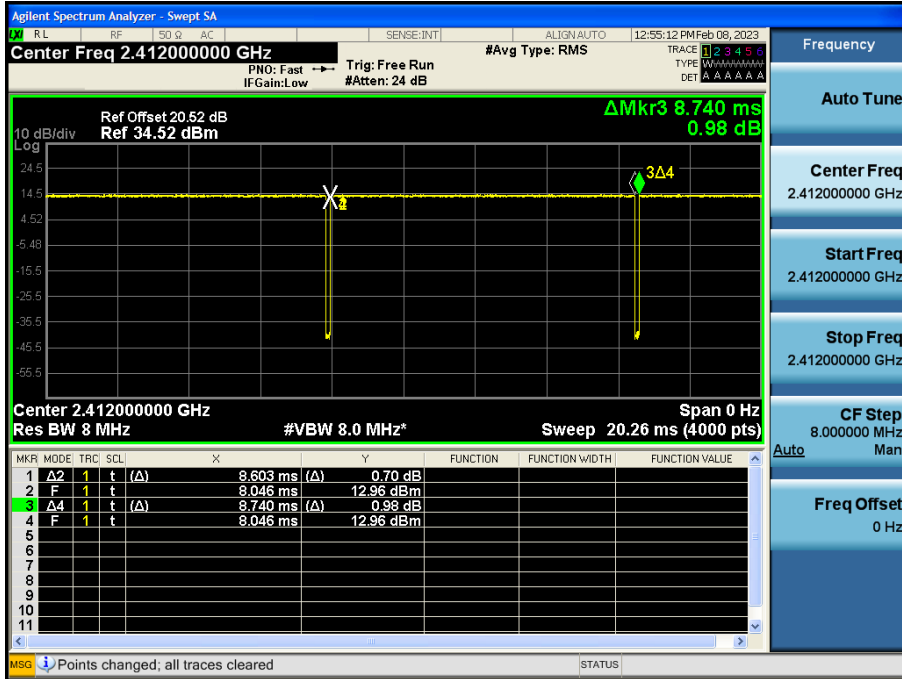
9. TEST RESULT

9.1 DUTY CYCLE

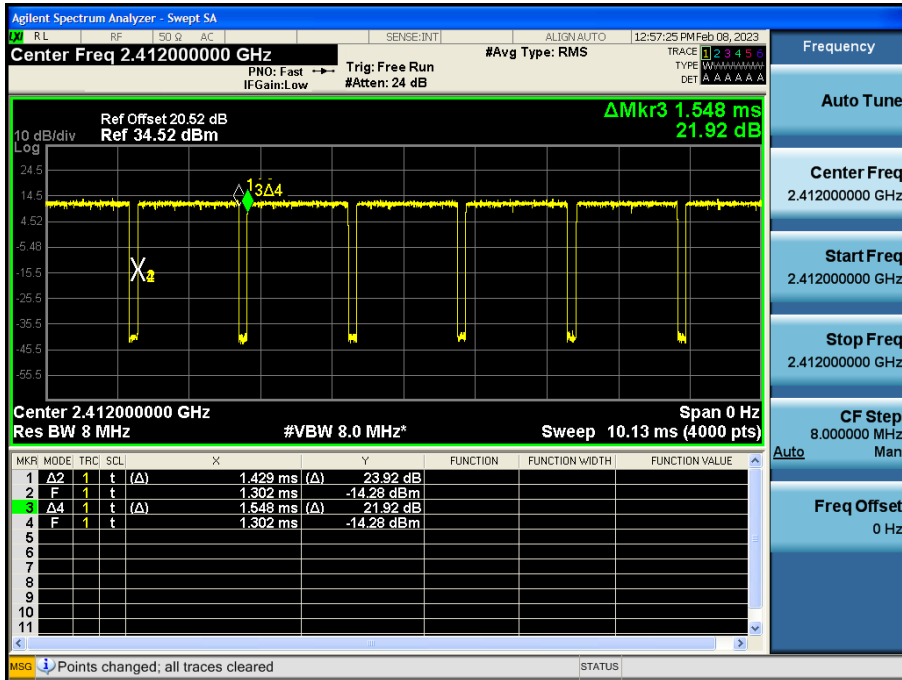
Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.603	8.740	0.984	0.069
	2	4.305	4.419	0.974	0.113
	5.5	1.626	1.740	0.934	0.294
	11	0.861	0.993	0.867	0.618
802.11g	6	1.429	1.548	0.923	0.348
	9	0.960	1.079	0.890	0.508
	12	0.722	0.839	0.861	0.650
	18	0.491	0.611	0.805	0.942
	24	0.372	0.489	0.762	1.182
	36	0.256	0.372	0.687	1.630
	48	0.198	0.314	0.629	2.013
	54	0.180	0.299	0.602	2.206
802.11n (HT20)	6.5 (MCS0)	1.335	1.454	0.918	0.371
	13 (MCS1)	0.687	0.803	0.855	0.681
	19.5 (MCS2)	0.471	0.588	0.802	0.960
	26 (MCS3)	0.365	0.481	0.758	1.204
	39 (MCS4)	0.256	0.375	0.682	1.659
	52 (MCS5)	0.200	0.319	0.627	2.027
	58.5 (MCS6)	0.185	0.301	0.613	2.122
	65 (MCS7)	0.167	0.284	0.589	2.297

Test Plots

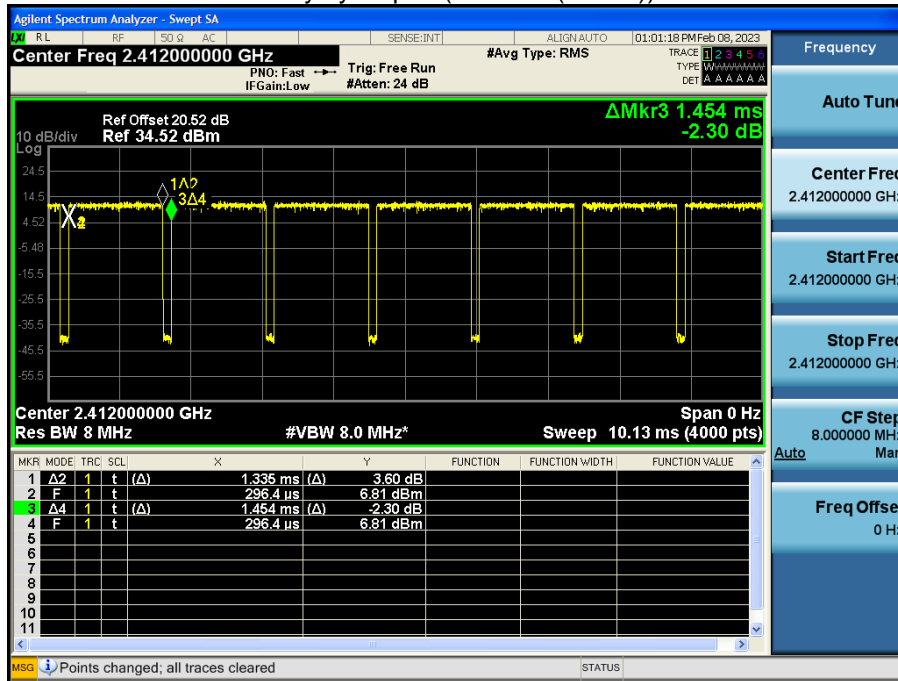
Duty cycle plot (802.11b(1 Mbps))



Duty cycle plot (802.11g(6 Mbps))



Duty cycle plot (802. 11n(MCS0))



Note:

In order to simplify the report, attached plots were only the lowest data rate.

9.2 6 dB BANDWIDTH**[Ant.1]**

Mode	Frequency [MHz]	Channel No.	6dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
802.11b	2412	1	8.103	0.50
	2437	6	8.106	0.50
	2462	11	8.074	0.50
	2467	12	8.070	0.50
	2472	13	8.101	0.50
802.11g	2412	1	15.13	0.50
	2437	6	16.40	0.50
	2462	11	16.42	0.50
	2467	12	16.39	0.50
	2472	13	15.16	0.50
802.11n(HT20)	2412	1	15.48	0.50
	2437	6	17.65	0.50
	2462	11	17.36	0.50
	2467	12	17.63	0.50
	2472	13	15.16	0.50

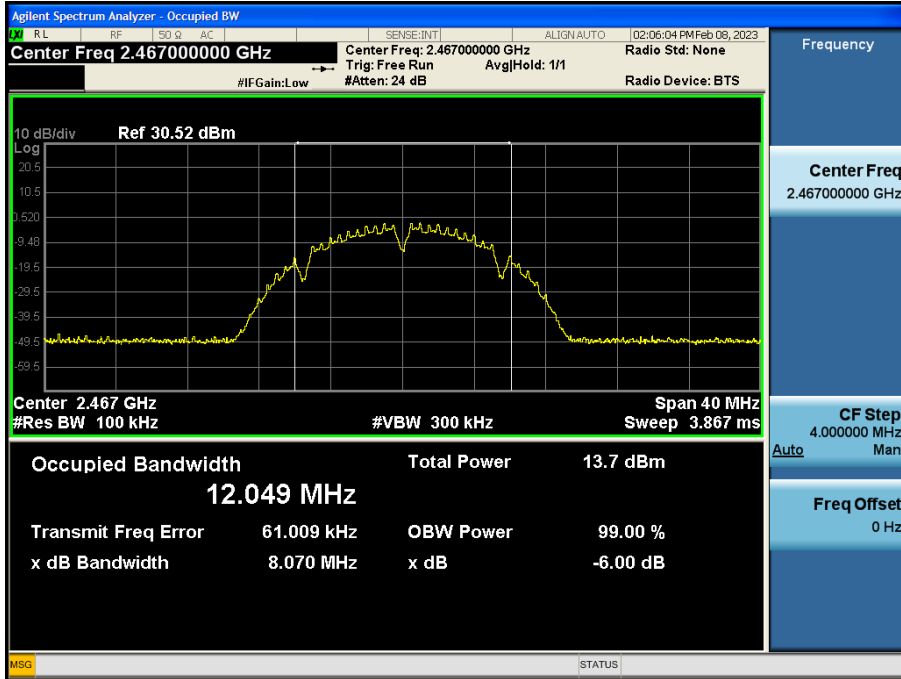
[Ant.2]

Mode	Frequency [MHz]	Channel No.	6dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
802.11b	2412	1	8.106	0.50
	2437	6	8.107	0.50
	2462	11	8.106	0.50
	2467	12	8.087	0.50
	2472	13	8.112	0.50
802.11g	2412	1	15.12	0.50
	2437	6	16.16	0.50
	2462	11	16.40	0.50
	2467	12	16.41	0.50
	2472	13	15.37	0.50
802.11n(HT20)	2412	1	15.15	0.50
	2437	6	17.28	0.50
	2462	11	17.66	0.50
	2467	12	17.66	0.50
	2472	13	15.77	0.50

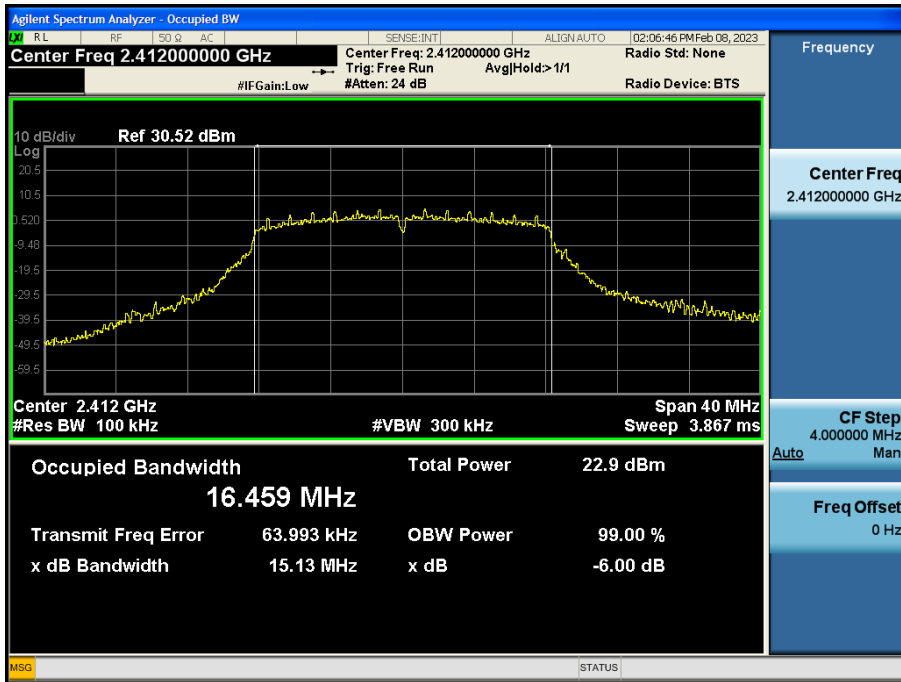
[Ant.1]

▣ Test Plots

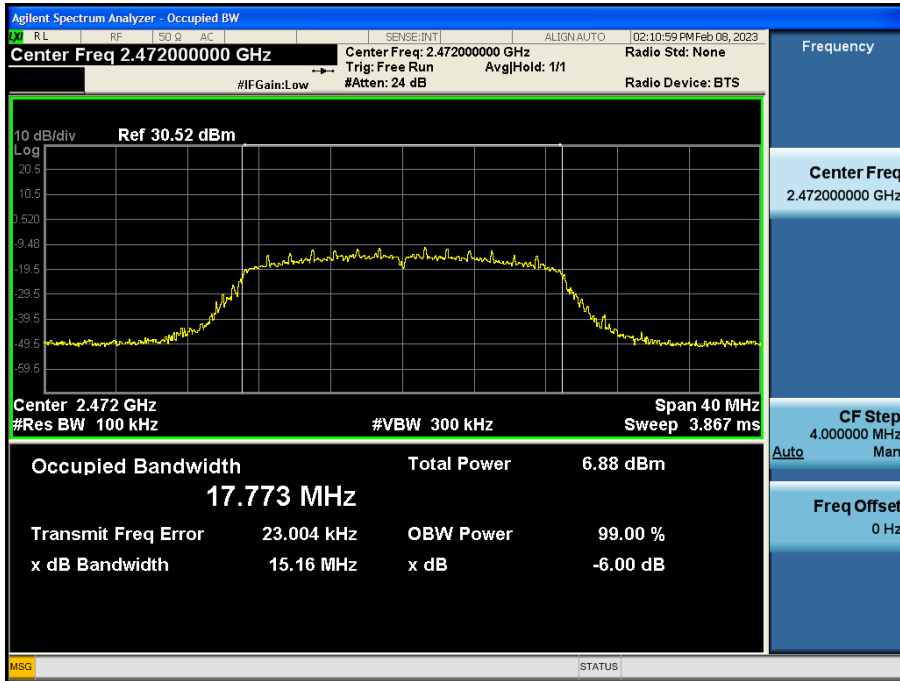
6 dB Bandwidth plot (802.11b-CH 12)



6 dB Bandwidth plot (802.11g-CH 1)



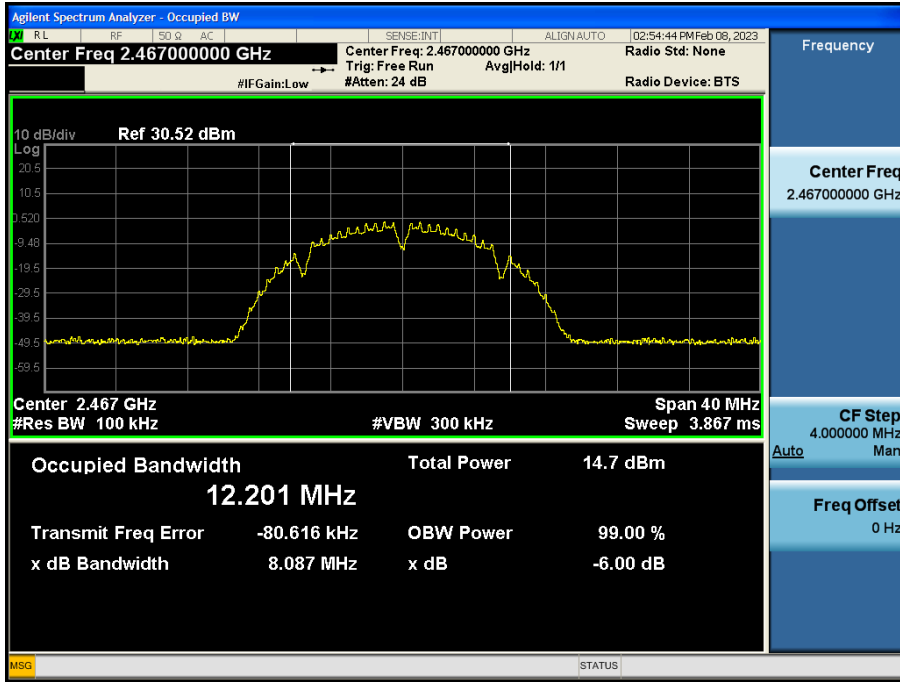
6 dB Bandwidth plot (802.11n_HT20-CH 13)



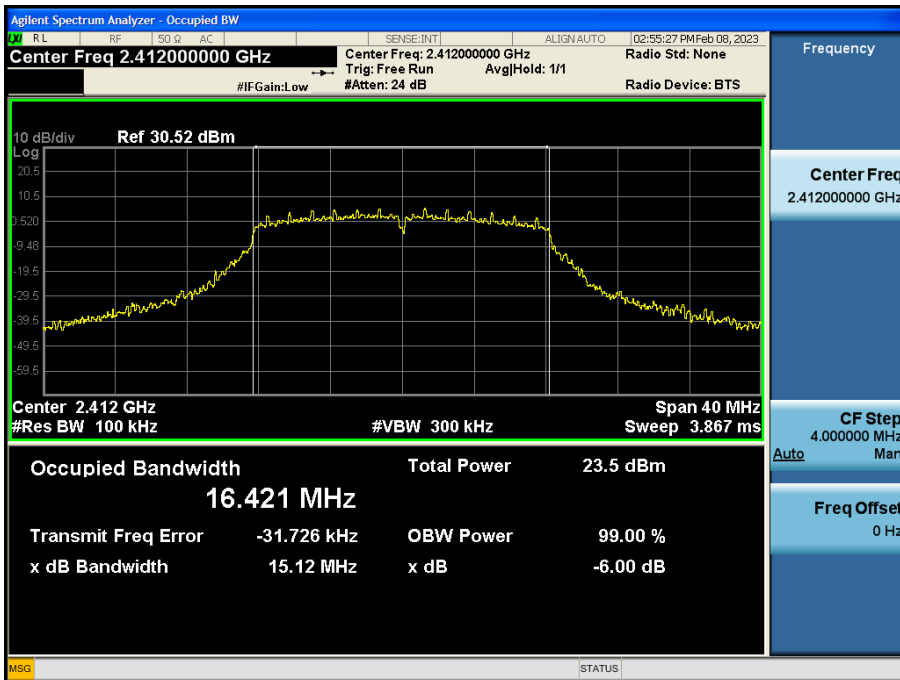
[Ant.2]

▣ Test Plots

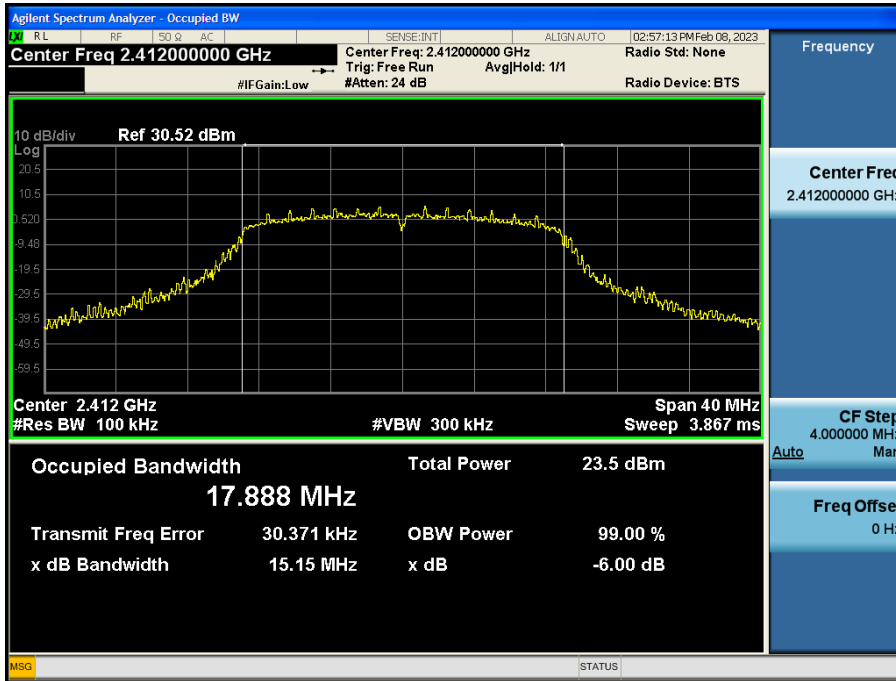
6 dB Bandwidth plot (802.11b-CH 12)



6 dB Bandwidth plot (802.11g-CH 1)



6 dB Bandwidth plot (802.11n_HT20-CH 1)



Note:

In order to simplify the report, attached plots were only the narrowest 6 dB BW channel.

9.3 OUTPUT POWER

Power Level Setting

Peak Power

Power Meter offset

Attenuator loss(20 dB) + Cable loss

[Ant.1]

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1	19.90	30
		2	20.14	30
		5.5	21.67	30
		11	23.14	30
2437	6	1	20.44	30
		2	20.72	30
		5.5	22.21	30
		11	23.71	30
2462	11	1	19.35	30
		2	19.60	30
		5.5	21.15	30
		11	22.64	30
2467	12	1	8.93	30
		2	9.20	30
		5.5	10.70	30
		11	12.18	30
2472	13	1	2.50	30
		2	2.73	30
		5.5	4.20	30
		11	5.64	30

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6	23.47	30
		9	23.43	30
		12	23.01	30
		18	23.17	30
		24	23.80	30
		36	23.60	30
		48	22.73	30
		54	22.95	30
2437	6	6	24.40	30
		9	24.35	30
		12	24.01	30
		18	24.06	30
		24	24.76	30
		36	24.54	30
		48	23.51	30
		54	23.73	30
2462	11	6	23.61	30
		9	23.56	30
		12	23.26	30
		18	23.33	30
		24	24.03	30
		36	23.80	30
		48	22.85	30
		54	23.09	30
2467	12	6	14.22	30
		9	14.18	30
		12	13.79	30
		18	13.85	30
		24	14.61	30
		36	14.33	30
		48	14.29	30
		54	14.53	30
2472	13	6	7.39	30
		9	7.33	30
		12	6.92	30
		18	7.07	30
		24	7.72	30
		36	7.46	30
		48	7.49	30
		54	7.67	30

802.11n(HT20) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	0	23.31	30
		1	23.08	30
		2	23.19	30
		3	23.56	30
		4	23.53	30
		5	22.64	30
		6	22.82	30
		7	22.76	30
2437	6	0	24.46	30
		1	24.21	30
		2	24.29	30
		3	24.79	30
		4	24.74	30
		5	23.67	30
		6	23.88	30
		7	23.79	30
2462	11	0	23.67	30
		1	23.40	30
		2	23.58	30
		3	23.97	30
		4	23.97	30
		5	22.92	30
		6	23.15	30
		7	23.07	30
2467	12	0	12.07	30
		1	11.81	30
		2	11.95	30
		3	12.35	30
		4	12.32	30
		5	12.23	30
		6	12.48	30
		7	12.37	30
2472	13	0	7.11	30
		1	6.81	30
		2	6.99	30
		3	7.37	30
		4	7.36	30
		5	7.28	30
		6	7.44	30
		7	7.37	30

[Ant.2]

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1	20.57	30
		2	20.86	30
		5.5	22.26	30
		11	23.82	30
2437	6	1	20.73	30
		2	20.99	30
		5.5	22.51	30
		11	23.97	30
2462	11	1	20.74	30
		2	20.99	30
		5.5	22.44	30
		11	23.90	30
2467	12	1	9.68	30
		2	9.95	30
		5.5	11.41	30
		11	12.93	30
2472	13	1	3.18	30
		2	3.42	30
		5.5	4.86	30
		11	6.32	30

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6	23.89	30
		9	23.84	30
		12	23.45	30
		18	23.59	30
		24	24.25	30
		36	24.02	30
		48	22.35	30
		54	22.66	30
2437	6	6	24.86	30
		9	24.79	30
		12	24.47	30
		18	24.52	30
		24	25.20	30
		36	24.93	30
		48	22.94	30
		54	23.19	30
2462	11	6	24.71	30
		9	24.70	30
		12	24.37	30
		18	24.49	30
		24	25.13	30
		36	24.91	30
		48	23.22	30
		54	23.48	30
2467	12	6	15.46	30
		9	15.45	30
		12	15.04	30
		18	15.12	30
		24	15.84	30
		36	15.54	30
		48	14.75	30
		54	15.07	30
2472	13	6	8.78	30
		9	8.73	30
		12	8.30	30
		18	8.43	30
		24	9.13	30
		36	8.86	30
		48	8.06	30
		54	8.27	30

802.11n(HT20) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	0	23.66	30
		1	23.43	30
		2	23.56	30
		3	23.94	30
		4	23.88	30
		5	22.21	30
		6	22.41	30
		7	22.32	30
2437	6	0	24.88	30
		1	24.63	30
		2	24.80	30
		3	25.22	30
		4	25.16	30
		5	23.04	30
		6	23.29	30
		7	23.20	30
2462	11	0	24.77	30
		1	24.48	30
		2	24.64	30
		3	25.13	30
		4	25.07	30
		5	23.36	30
		6	23.57	30
		7	23.49	30
2467	12	0	13.30	30
		1	13.05	30
		2	13.13	30
		3	13.60	30
		4	13.55	30
		5	12.84	30
		6	13.04	30
		7	12.95	30
2472	13	0	8.55	30
		1	8.32	30
		2	8.43	30
		3	8.80	30
		4	8.82	30
		5	7.95	30
		6	8.13	30
		7	8.04	30

[MIMO]

802.11b Mode		Rate (Mbps)	Ant.1 Measured Power(dBm)	Ant.2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.					
2412	1	1	19.90	20.57	23.26	30
		2	20.14	20.86	23.53	30
		5.5	21.67	22.26	24.99	30
		11	23.14	23.82	26.50	30
2437	6	1	20.44	20.73	23.60	30
		2	20.72	20.99	23.87	30
		5.5	22.21	22.51	25.37	30
		11	23.71	23.97	26.85	30
2462	11	1	19.35	20.74	23.11	30
		2	19.60	20.99	23.36	30
		5.5	21.15	22.44	24.85	30
		11	22.64	23.90	26.33	30
2467	12	1	8.93	9.68	12.33	30
		2	9.20	9.95	12.60	30
		5.5	10.70	11.41	14.08	30
		11	12.18	12.93	15.58	30
2472	13	1	2.50	3.18	5.87	30
		2	2.73	3.42	6.10	30
		5.5	4.20	4.86	7.55	30
		11	5.64	6.32	9.01	30

802.11g Mode		Rate (Mbps)	Ant.1 Measured Power(dBm)	Ant.2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.					
2412	1	6	23.47	23.89	26.70	30
		9	23.43	23.84	26.65	30
		12	23.01	23.45	26.24	30
		18	23.17	23.59	26.39	30
		24	23.80	24.25	27.04	30
		36	23.60	24.02	26.82	30
		48	22.73	22.35	25.55	30
		54	22.95	22.66	25.82	30
2437	6	6	24.40	24.86	27.65	30
		9	24.35	24.79	27.59	30
		12	24.01	24.47	27.26	30
		18	24.06	24.52	27.31	30
		24	24.76	25.20	27.99	30
		36	24.54	24.93	27.75	30
		48	23.51	22.94	26.24	30
		54	23.73	23.19	26.48	30
2462	11	6	23.61	24.71	27.20	30
		9	23.56	24.70	27.18	30
		12	23.26	24.37	26.86	30
		18	23.33	24.49	26.96	30
		24	24.03	25.13	27.63	30
		36	23.80	24.91	27.40	30
		48	22.85	23.22	26.05	30
		54	23.09	23.48	26.30	30
2467	12	6	14.22	15.46	17.89	30
		9	14.18	15.45	17.87	30
		12	13.79	15.04	17.47	30
		18	13.85	15.12	17.54	30
		24	14.61	15.84	18.28	30
		36	14.33	15.54	17.99	30
		48	14.29	14.75	17.54	30
		54	14.53	15.07	17.82	30
2472	13	6	7.39	8.78	11.15	30
		9	7.33	8.73	11.09	30
		12	6.92	8.30	10.67	30
		18	7.07	8.43	10.81	30
		24	7.72	9.13	11.50	30
		36	7.46	8.86	11.22	30
		48	7.49	8.06	10.80	30
		54	7.67	8.27	10.99	30

802.11n(HT20) Mode		MCS Index	Ant.1 Measured Power(dBm)	Ant.2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.					
2412	1	0	23.31	23.66	26.50	30
		1	23.08	23.43	26.27	30
		2	23.19	23.56	26.39	30
		3	23.56	23.94	26.76	30
		4	23.53	23.88	26.72	30
		5	22.64	22.21	25.44	30
		6	22.82	22.41	25.63	30
		7	22.76	22.32	25.56	30
2437	6	0	24.46	24.88	27.69	30
		1	24.21	24.63	27.43	30
		2	24.29	24.80	27.56	30
		3	24.79	25.22	28.02	30
		4	24.74	25.16	27.97	30
		5	23.67	23.04	26.37	30
		6	23.88	23.29	26.61	30
		7	23.79	23.20	26.51	30
2462	11	0	23.67	24.77	27.27	30
		1	23.40	24.48	26.98	30
		2	23.58	24.64	27.15	30
		3	23.97	25.13	27.60	30
		4	23.97	25.07	27.57	30
		5	22.92	23.36	26.16	30
		6	23.15	23.57	26.37	30
		7	23.07	23.49	26.30	30
2467	12	0	12.07	13.30	15.74	30
		1	11.81	13.05	15.49	30
		2	11.95	13.13	15.59	30
		3	12.35	13.60	16.03	30
		4	12.32	13.55	15.99	30
		5	12.23	12.84	15.55	30
		6	12.48	13.04	15.78	30
		7	12.37	12.95	15.68	30
2472	13	0	7.11	8.55	10.90	30
		1	6.81	8.32	10.64	30
		2	6.99	8.43	10.78	30
		3	7.37	8.80	11.15	30
		4	7.36	8.82	11.16	30
		5	7.28	7.95	10.64	30
		6	7.44	8.13	10.81	30
		7	7.37	8.04	10.73	30

Average Power

Power Meter offset Loss = Attenuator loss(20 dB) + Cable loss

[Ant.1]

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1	17.13	0.07	17.20	30
		2	17.07	0.11	17.18	30
		5.5	16.80	0.29	17.09	30
		11	16.62	0.62	17.24	30
2437	6	1	17.90	0.07	17.97	30
		2	17.86	0.11	17.97	30
		5.5	17.67	0.29	17.96	30
		11	17.42	0.62	18.04	30
2462	11	1	17.04	0.07	17.11	30
		2	16.97	0.11	17.08	30
		5.5	16.83	0.29	17.12	30
		11	16.55	0.62	17.17	30
2467	12	1	6.34	0.07	6.41	30
		2	6.31	0.11	6.43	30
		5.5	6.12	0.29	6.42	30
		11	5.87	0.62	6.49	30
2472	13	1	-0.17	0.07	-0.10	30
		2	-0.24	0.11	-0.12	30
		5.5	-0.44	0.29	-0.14	30
		11	-0.66	0.62	-0.04	30

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6	15.33	0.35	15.68	30
		9	15.14	0.51	15.65	30
		12	15.04	0.65	15.69	30
		18	14.82	0.94	15.76	30
		24	14.44	1.18	15.62	30
		36	13.98	1.63	15.61	30
		48	12.76	2.01	14.78	30
		54	12.59	2.21	14.79	30
2437	6	6	16.20	0.35	16.55	30
		9	16.02	0.51	16.53	30
		12	15.88	0.65	16.53	30
		18	15.61	0.94	16.56	30
		24	15.28	1.18	16.47	30
		36	14.82	1.63	16.45	30
		48	13.40	2.01	15.42	30
		54	13.30	2.21	15.51	30
2462	11	6	15.39	0.35	15.74	30
		9	15.22	0.51	15.73	30
		12	15.14	0.65	15.79	30
		18	14.89	0.94	15.83	30
		24	14.61	1.18	15.80	30
		36	14.14	1.63	15.77	30
		48	12.82	2.01	14.83	30
		54	12.64	2.21	14.85	30
2467	12	6	5.87	0.35	6.22	30
		9	5.74	0.51	6.25	30
		12	5.55	0.65	6.20	30
		18	5.32	0.94	6.26	30
		24	4.97	1.18	6.15	30
		36	4.50	1.63	6.13	30
		48	4.11	2.01	6.12	30
		54	3.95	2.21	6.16	30
2472	13	6	-0.85	0.35	-0.50	30
		9	-0.98	0.51	-0.48	30
		12	-1.14	0.65	-0.49	30
		18	-1.38	0.94	-0.44	30
		24	-1.69	1.18	-0.51	30
		36	-2.16	1.63	-0.53	30
		48	-2.54	2.01	-0.53	30
		54	-2.68	2.21	-0.48	30

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	0	15.24	0.37	15.61	30
		1	14.91	0.68	15.59	30
		2	14.64	0.96	15.60	30
		3	14.41	1.20	15.61	30
		4	14.00	1.66	15.66	30
		5	12.73	2.03	14.76	30
		6	12.62	2.12	14.74	30
		7	12.44	2.30	14.74	30
2437	6	0	16.24	0.37	16.61	30
		1	15.89	0.68	16.57	30
		2	15.66	0.96	16.62	30
		3	15.40	1.20	16.60	30
		4	14.97	1.66	16.63	30
		5	13.59	2.03	15.61	30
		6	13.49	2.12	15.61	30
		7	13.29	2.30	15.58	30
2462	11	0	15.47	0.37	15.84	30
		1	15.12	0.68	15.80	30
		2	14.91	0.96	15.87	30
		3	14.60	1.20	15.80	30
		4	14.24	1.66	15.90	30
		5	12.89	2.03	14.92	30
		6	12.76	2.12	14.88	30
		7	12.56	2.30	14.86	30
2467	12	0	3.77	0.37	4.14	30
		1	3.44	0.68	4.12	30
		2	3.15	0.96	4.11	30
		3	2.90	1.20	4.10	30
		4	2.49	1.66	4.15	30
		5	2.05	2.03	4.08	30
		6	1.90	2.12	4.02	30
		7	1.78	2.30	4.07	30
2472	13	0	-0.97	0.37	-0.60	30
		1	-1.34	0.68	-0.66	30
		2	-1.58	0.96	-0.62	30
		3	-1.84	1.20	-0.64	30
		4	-2.25	1.66	-0.59	30
		5	-2.63	2.03	-0.60	30
		6	-2.77	2.12	-0.65	30
		7	-2.96	2.30	-0.67	30

[Ant.2]

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1	17.97	0.07	18.04	30
		2	17.92	0.11	18.03	30
		5.5	17.66	0.29	17.95	30
		11	17.49	0.62	18.11	30
2437	6	1	18.25	0.07	18.32	30
		2	18.14	0.11	18.25	30
		5.5	17.86	0.29	18.15	30
		11	17.73	0.62	18.35	30
2462	11	1	18.10	0.07	18.17	30
		2	18.04	0.11	18.15	30
		5.5	17.82	0.29	18.11	30
		11	17.58	0.62	18.20	30
2467	12	1	7.13	0.07	7.20	30
		2	7.04	0.11	7.16	30
		5.5	6.86	0.29	7.16	30
		11	6.63	0.62	7.25	30
2472	13	1	0.56	0.07	0.63	30
		2	0.51	0.11	0.63	30
		5.5	0.28	0.29	0.58	30
		11	0.07	0.62	0.69	30

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6	15.74	0.35	16.09	30
		9	15.54	0.51	16.05	30
		12	15.40	0.65	16.05	30
		18	15.16	0.94	16.10	30
		24	14.84	1.18	16.03	30
		36	14.36	1.63	15.99	30
		48	12.58	2.01	14.59	30
		54	12.47	2.21	14.67	30
2437	6	6	16.60	0.35	16.94	30
		9	16.42	0.51	16.93	30
		12	16.29	0.65	16.94	30
		18	16.02	0.94	16.96	30
		24	15.66	1.18	16.84	30
		36	15.25	1.63	16.88	30
		48	12.83	2.01	14.85	30
		54	12.72	2.21	14.93	30
2462	11	6	16.52	0.35	16.86	30
		9	16.43	0.51	16.94	30
		12	16.27	0.65	16.92	30
		18	16.01	0.94	16.96	30
		24	15.70	1.18	16.88	30
		36	15.25	1.63	16.88	30
		48	13.23	2.01	15.24	30
		54	13.02	2.21	15.23	30
2467	12	6	7.11	0.35	7.46	30
		9	6.95	0.51	7.46	30
		12	6.79	0.65	7.44	30
		18	6.55	0.94	7.49	30
		24	6.23	1.18	7.41	30
		36	5.72	1.63	7.35	30
		48	4.64	2.01	6.65	30
		54	4.51	2.21	6.72	30
2472	13	6	0.58	0.35	0.92	30
		9	0.41	0.51	0.91	30
		12	0.28	0.65	0.93	30
		18	0.03	0.94	0.97	30
		24	-0.31	1.18	0.87	30
		36	-0.74	1.63	0.89	30
		48	-1.94	2.01	0.08	30
		54	-2.09	2.21	0.11	30

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	0	15.61	0.37	15.98	30
		1	15.27	0.68	15.95	30
		2	15.07	0.96	16.03	30
		3	14.77	1.20	15.97	30
		4	14.38	1.66	16.04	30
		5	12.48	2.03	14.51	30
		6	12.40	2.12	14.52	30
		7	12.22	2.30	14.51	30
2437	6	0	16.59	0.37	16.96	30
		1	16.25	0.68	16.93	30
		2	15.97	0.96	16.93	30
		3	15.71	1.20	16.91	30
		4	15.32	1.66	16.98	30
		5	12.87	2.03	14.90	30
		6	12.81	2.12	14.93	30
		7	12.57	2.30	14.87	30
2462	11	0	16.54	0.37	16.91	30
		1	16.19	0.68	16.87	30
		2	15.98	0.96	16.94	30
		3	15.70	1.20	16.91	30
		4	15.29	1.66	16.95	30
		5	13.23	2.03	15.26	30
		6	13.10	2.12	15.23	30
		7	12.94	2.30	15.23	30
2467	12	0	5.06	0.37	5.43	30
		1	4.69	0.68	5.37	30
		2	4.45	0.96	5.40	30
		3	4.17	1.20	5.37	30
		4	3.78	1.66	5.44	30
		5	2.71	2.03	4.74	30
		6	2.62	2.12	4.74	30
		7	2.44	2.30	4.74	30
2472	13	0	0.48	0.37	0.85	30
		1	0.11	0.68	0.79	30
		2	-0.11	0.96	0.85	30
		3	-0.35	1.20	0.85	30
		4	-0.78	1.66	0.88	30
		5	-1.95	2.03	0.07	30
		6	-2.06	2.12	0.06	30
		7	-2.24	2.30	0.06	30

[MIMO]

802.11b Mode		Rate (Mbps)	Ant.1 Measured Power(dBm)	Ant.2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.					
2412	1	1	17.20	18.04	20.65	30
		2	17.18	18.03	20.64	30
		5.5	17.09	17.95	20.56	30
		11	17.24	18.11	20.71	30
2437	6	1	17.97	18.32	21.16	30
		2	17.97	18.25	21.13	30
		5.5	17.96	18.15	21.07	30
		11	18.04	18.35	21.21	30
2462	11	1	17.11	18.17	20.68	30
		2	17.08	18.15	20.66	30
		5.5	17.12	18.11	20.66	30
		11	17.17	18.20	20.72	30
2467	12	1	6.41	7.20	9.83	30
		2	6.43	7.16	9.82	30
		5.5	6.42	7.16	9.81	30
		11	6.49	7.25	9.90	30
2472	13	1	-0.10	0.63	3.29	30
		2	-0.12	0.63	3.28	30
		5.5	-0.14	0.58	3.24	30
		11	-0.04	0.69	3.35	30

802.11g Mode		Rate (Mbps)	Ant.1 Measured Power(dBm)	Ant.2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.					
2412	1	6	15.68	16.09	18.90	30
		9	15.65	16.05	18.87	30
		12	15.69	16.05	18.88	30
		18	15.76	16.10	18.94	30
		24	15.62	16.03	18.84	30
		36	15.61	15.99	18.82	30
		48	14.78	14.59	17.70	30
		54	14.79	14.67	17.74	30
2437	6	6	16.55	16.94	19.76	30
		9	16.53	16.93	19.75	30
		12	16.53	16.94	19.75	30
		18	16.56	16.96	19.77	30
		24	16.47	16.84	19.67	30
		36	16.45	16.88	19.68	30
		48	15.42	14.85	18.15	30
		54	15.51	14.93	18.24	30
2462	11	6	15.74	16.86	19.35	30
		9	15.73	16.94	19.39	30
		12	15.79	16.92	19.40	30
		18	15.83	16.96	19.44	30
		24	15.80	16.88	19.38	30
		36	15.77	16.88	19.37	30
		48	14.83	15.24	18.05	30
		54	14.85	15.23	18.05	30
2467	12	6	6.22	7.46	9.89	30
		9	6.25	7.46	9.90	30
		12	6.20	7.44	9.88	30
		18	6.26	7.49	9.93	30
		24	6.15	7.41	9.84	30
		36	6.13	7.35	9.79	30
		48	6.12	6.65	9.40	30
		54	6.16	6.72	9.46	30
2472	13	6	-0.50	0.92	3.28	30
		9	-0.48	0.91	3.28	30
		12	-0.49	0.93	3.29	30
		18	-0.44	0.97	3.33	30
		24	-0.51	0.87	3.25	30
		36	-0.53	0.89	3.25	30
		48	-0.53	0.08	2.80	30
		54	-0.48	0.11	2.84	30

802.11n(HT20) Mode		MCS Index	Ant.1 Measured Power(dBm)	Ant.2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.					
2412	1	0	15.61	15.98	18.81	30
		1	15.59	15.95	18.79	30
		2	15.60	16.03	18.83	30
		3	15.61	15.97	18.81	30
		4	15.66	16.04	18.86	30
		5	14.76	14.51	17.65	30
		6	14.74	14.52	17.64	30
		7	14.74	14.51	17.64	30
2437	6	0	16.61	16.96	19.80	30
		1	16.57	16.93	19.76	30
		2	16.62	16.93	19.79	30
		3	16.60	16.91	19.77	30
		4	16.63	16.98	19.82	30
		5	15.61	14.90	18.28	30
		6	15.61	14.93	18.29	30
		7	15.58	14.87	18.25	30
2462	11	0	15.84	16.91	19.42	30
		1	15.80	16.87	19.38	30
		2	15.87	16.94	19.45	30
		3	15.80	16.91	19.40	30
		4	15.90	16.95	19.47	30
		5	14.92	15.26	18.10	30
		6	14.88	15.23	18.07	30
		7	14.86	15.23	18.06	30
2467	12	0	4.14	5.43	7.85	30
		1	4.12	5.37	7.80	30
		2	4.11	5.40	7.82	30
		3	4.10	5.37	7.79	30
		4	4.15	5.44	7.85	30
		5	4.08	4.74	7.43	30
		6	4.02	4.74	7.40	30
		7	4.07	4.74	7.43	30
2472	13	0	-0.60	0.85	3.20	30
		1	-0.66	0.79	3.14	30
		2	-0.62	0.85	3.19	30
		3	-0.64	0.85	3.18	30
		4	-0.59	0.88	3.22	30
		5	-0.60	0.07	2.76	30
		6	-0.65	0.06	2.73	30
		7	-0.67	0.06	2.72	30

9.4 POWER SPECTRAL DENSITY

[Ant.1]

Mode	Frequency (MHz)	Channel No.	Test Result			Limit (dBm)
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	
802.11b	2412	1	-2.842	0.618	-2.224	8 dBm / 3 kHz
	2437	6	-2.982	0.618	-2.364	
	2462	11	-3.411	0.618	-2.793	
	2467	12	-14.340	0.618	-13.722	
	2472	13	-21.021	0.618	-20.403	
802.11g	2412	1	-9.237	0.942	-8.295	
	2437	6	-8.570	0.942	-7.628	
	2462	11	-8.760	0.942	-7.818	
	2467	12	-18.661	0.942	-17.719	
	2472	13	-24.778	0.942	-23.836	
802.11n(HT20)	2412	1	-8.457	1.659	-6.798	
	2437	6	-8.397	1.659	-6.738	
	2462	11	-8.964	1.659	-7.305	
	2467	12	-20.808	1.659	-19.149	
	2472	13	-24.286	1.659	-22.627	

[Ant.2]

Mode	Frequency (MHz)	Channel No.	Test Result			Limit (dBm)
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	
802.11b	2412	1	-2.541	0.618	-1.923	8 dBm / 3 kHz
	2437	6	-2.378	0.618	-1.760	
	2462	11	-2.431	0.618	-1.813	
	2467	12	-13.231	0.618	-12.613	
	2472	13	-19.715	0.618	-19.097	
802.11g	2412	1	-8.090	0.942	-7.148	
	2437	6	-7.518	0.942	-6.576	
	2462	11	-7.979	0.942	-7.037	
	2467	12	-17.296	0.942	-16.354	
	2472	13	-23.578	0.942	-22.636	
802.11n(HT20)	2412	1	-8.140	1.659	-6.481	
	2437	6	-6.856	1.659	-5.197	
	2462	11	-8.038	1.659	-6.379	
	2467	12	-19.080	1.659	-17.421	
	2472	13	-23.977	1.659	-22.318	

[MIMO]

Mode	Frequency (MHz)	Channel No.	Test Result			
			Ant.1 Measured Power(dBm) + Duty Cycle Factor	Ant.2 Measured Power(dBm) + Duty Cycle Factor	MIMO Measured Power(dBm)	Limit (dBm)
802.11b	2412	1	-2.224	-1.923	0.939	8 dBm / 3 kHz
	2437	6	-2.364	-1.760	0.959	
	2462	11	-2.793	-1.813	0.735	
	2467	12	-13.722	-12.613	-10.122	
	2472	13	-20.403	-19.097	-16.691	
802.11g	2412	1	-8.295	-7.148	-4.673	
	2437	6	-7.628	-6.576	-4.060	
	2462	11	-7.818	-7.037	-4.400	
	2467	12	-17.719	-16.354	-13.973	
	2472	13	-23.836	-22.636	-20.184	
802.11n(HT20)	2412	1	-6.798	-6.481	-3.626	
	2437	6	-6.738	-5.197	-2.889	
	2462	11	-7.305	-6.379	-3.807	
	2467	12	-19.149	-17.421	-15.189	
	2472	13	-22.627	-22.318	-19.459	

Note :

1. Spectrum Measured Levels are not plot data.

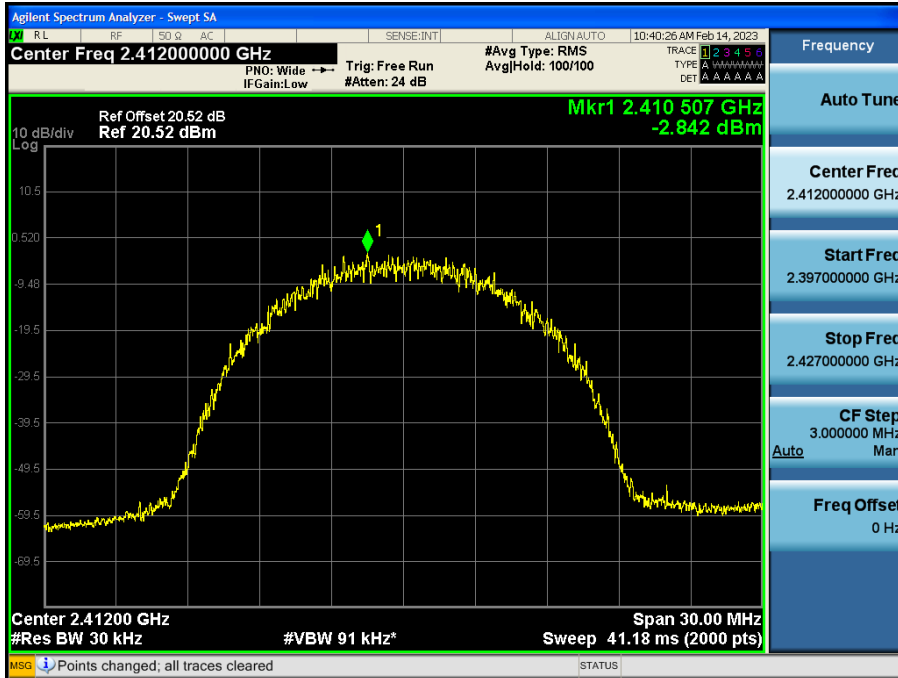
The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset Loss = Attenuator loss(20 dB) + Cable loss

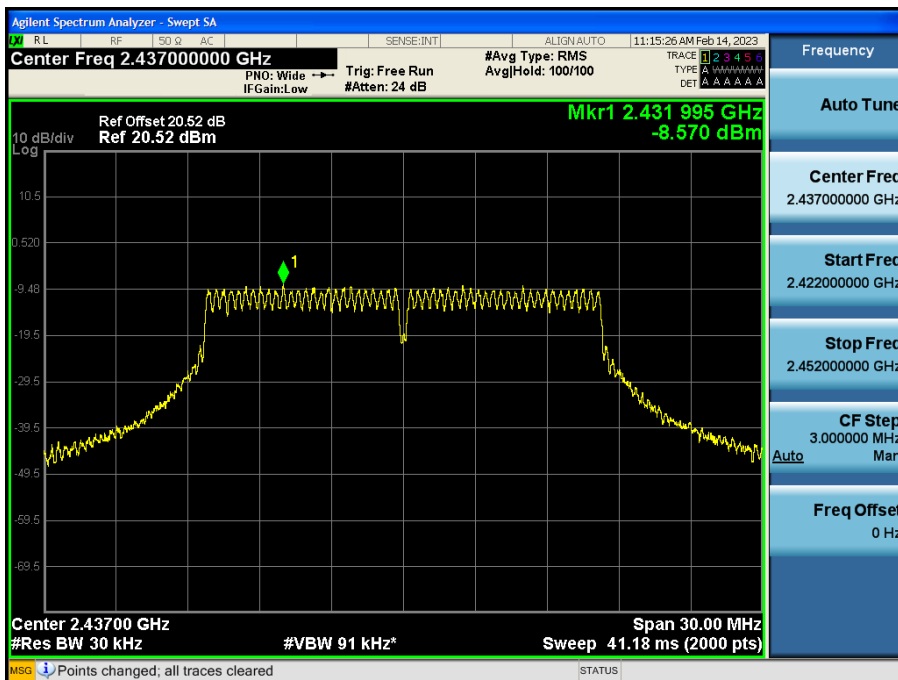
[Ant.1]

Test Plots

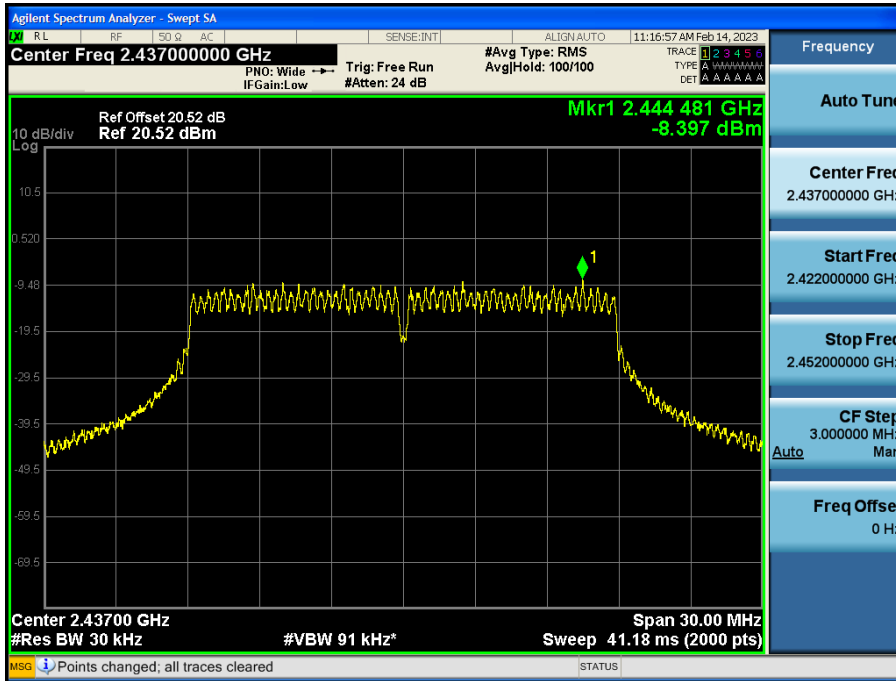
Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11g-CH 6)



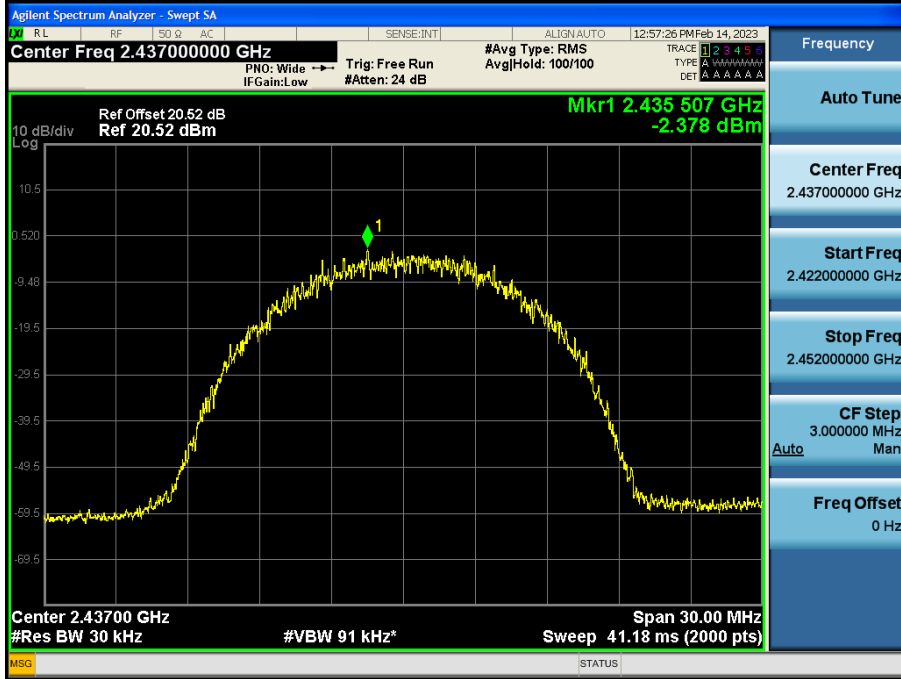
Power Spectral Density (802.11n_HT20-CH 6)



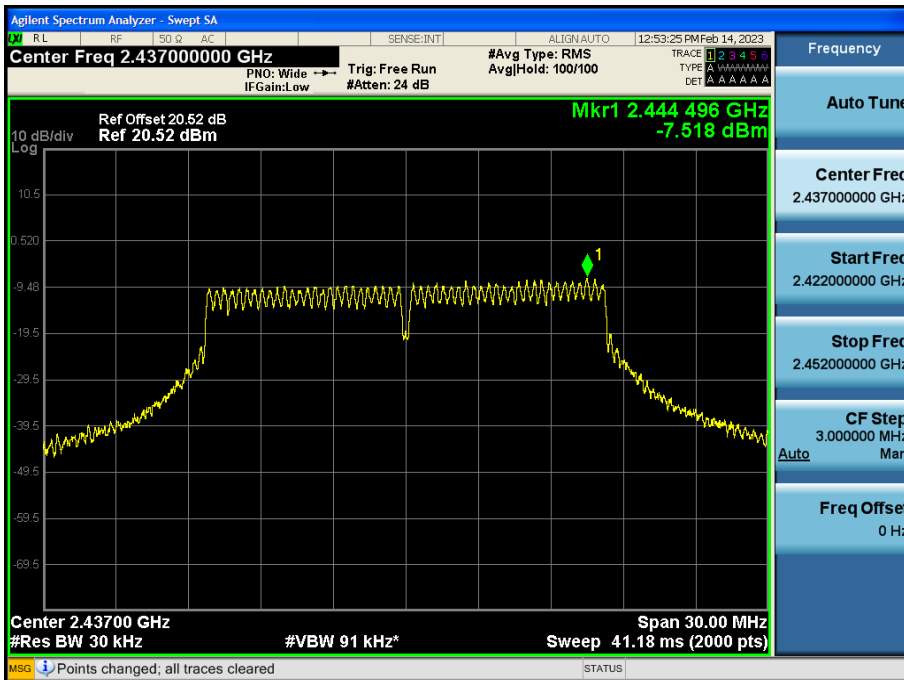
[Ant.2]

☑ Test Plots

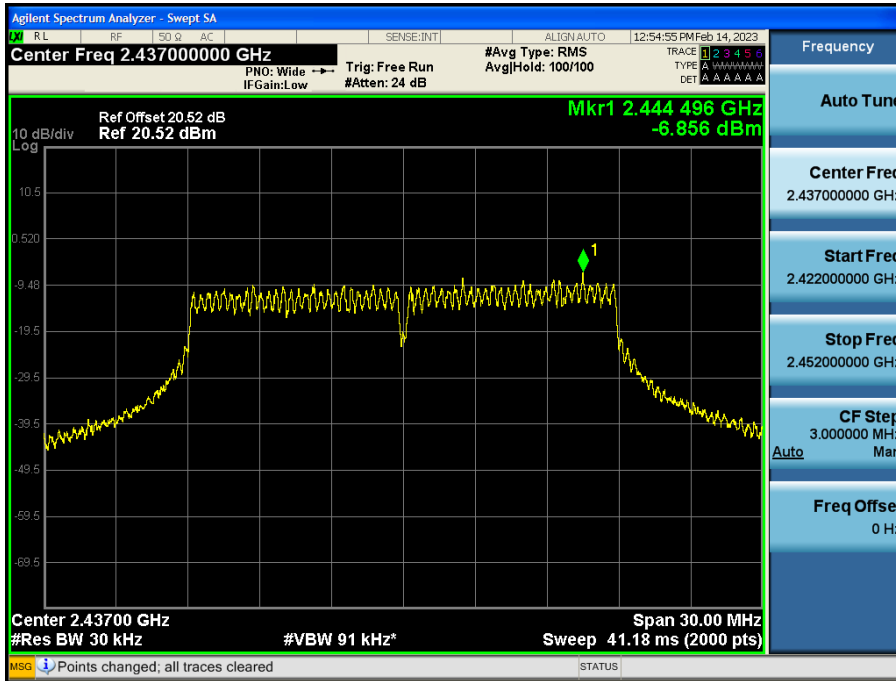
Power Spectral Density (802.11b-CH 6)



Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20-CH 6)



Note :

In order to simplify the report, attached plots were only the worst case PSD channel.

9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

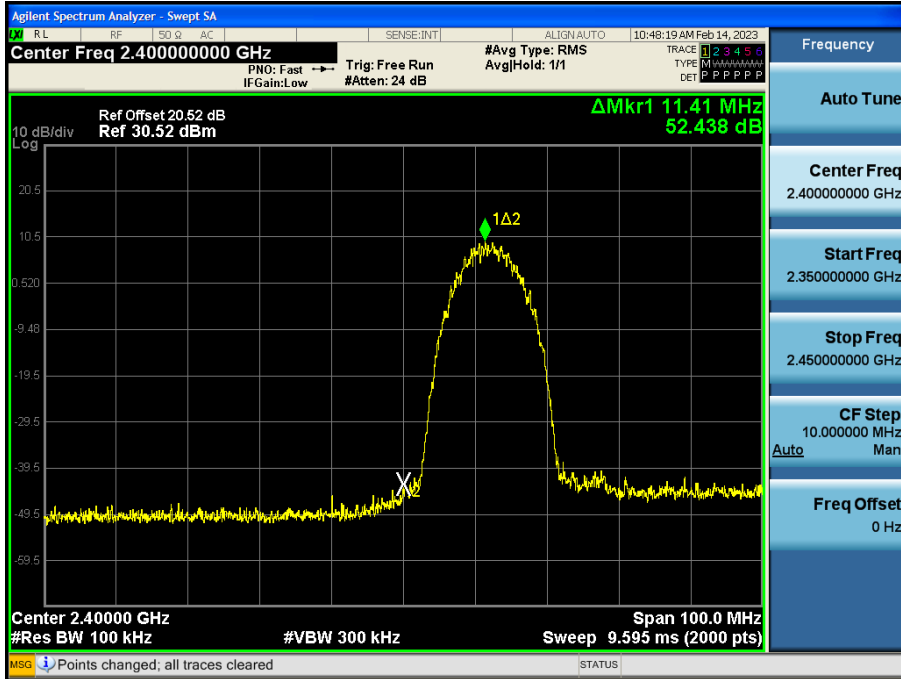
Test Result : please refer to the plot below.

In order to simplify the report, attached plots were only the worst case channel and data rate.

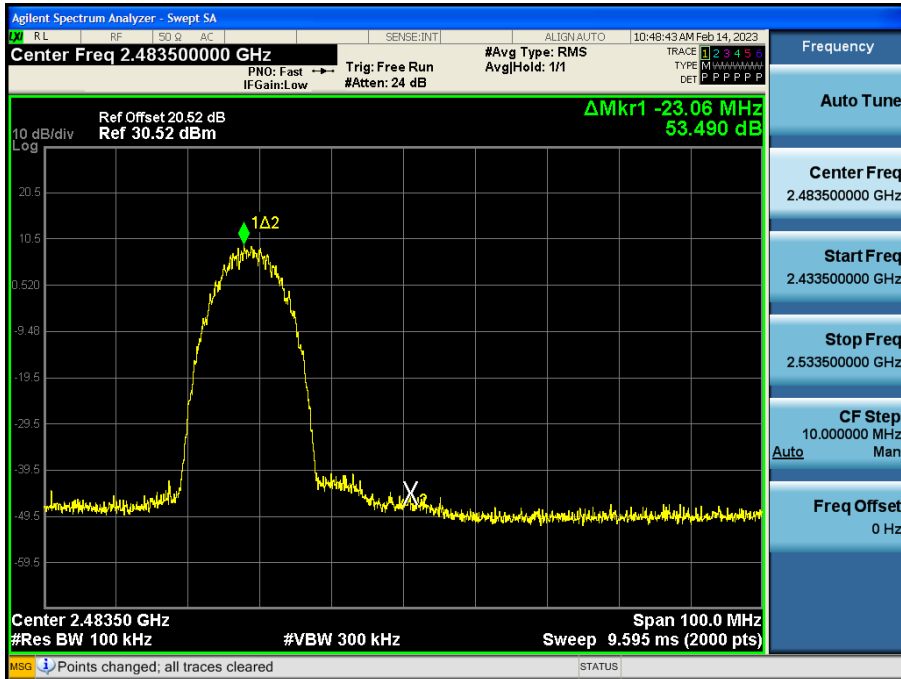
[Ant.1]

▣ Test Plots(Band Edge)

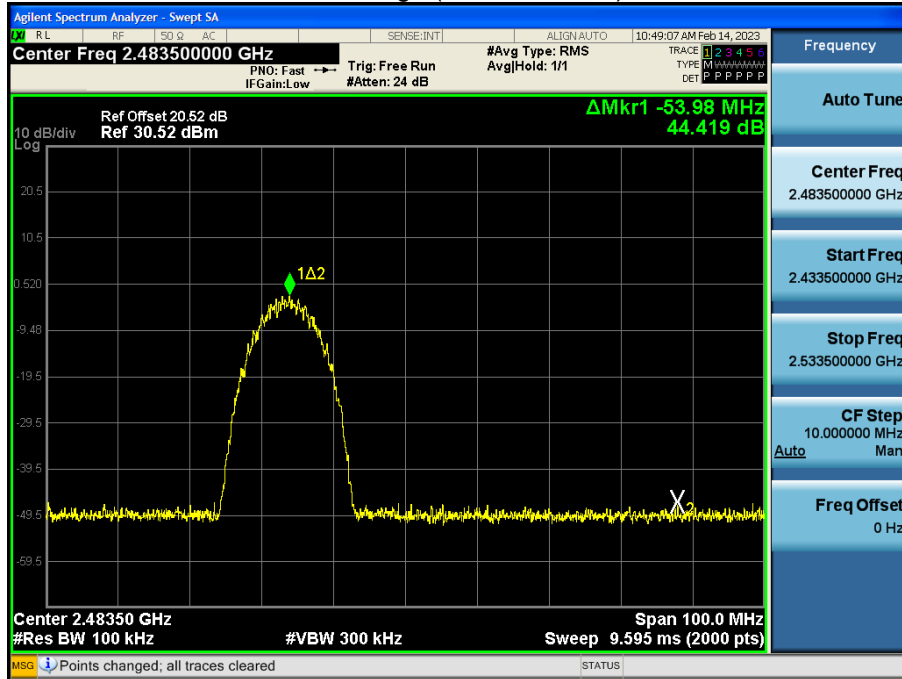
Band Edge (802.11b-CH1)



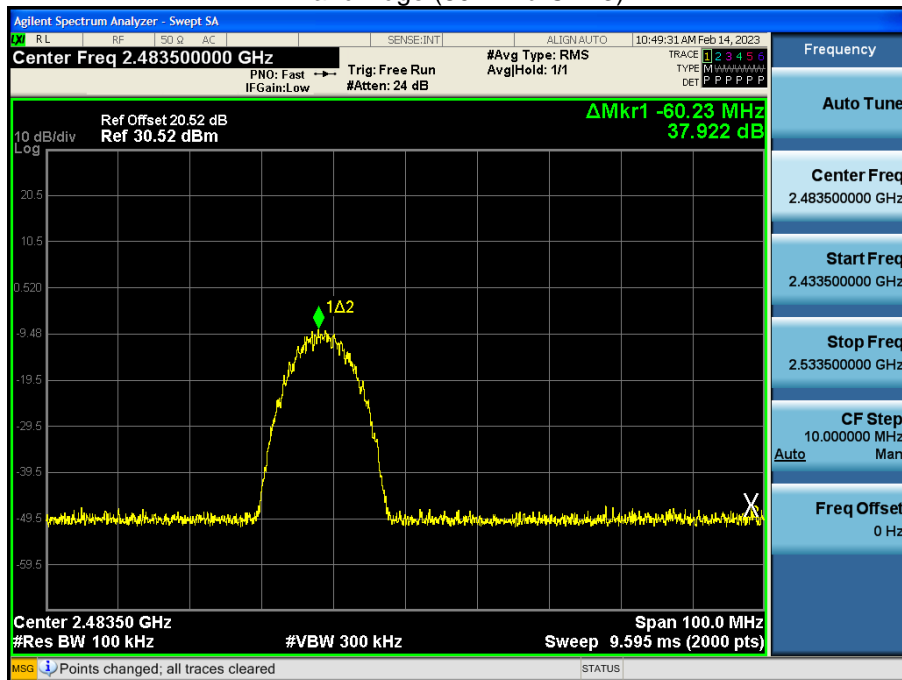
Band Edge (802.11b-CH11)



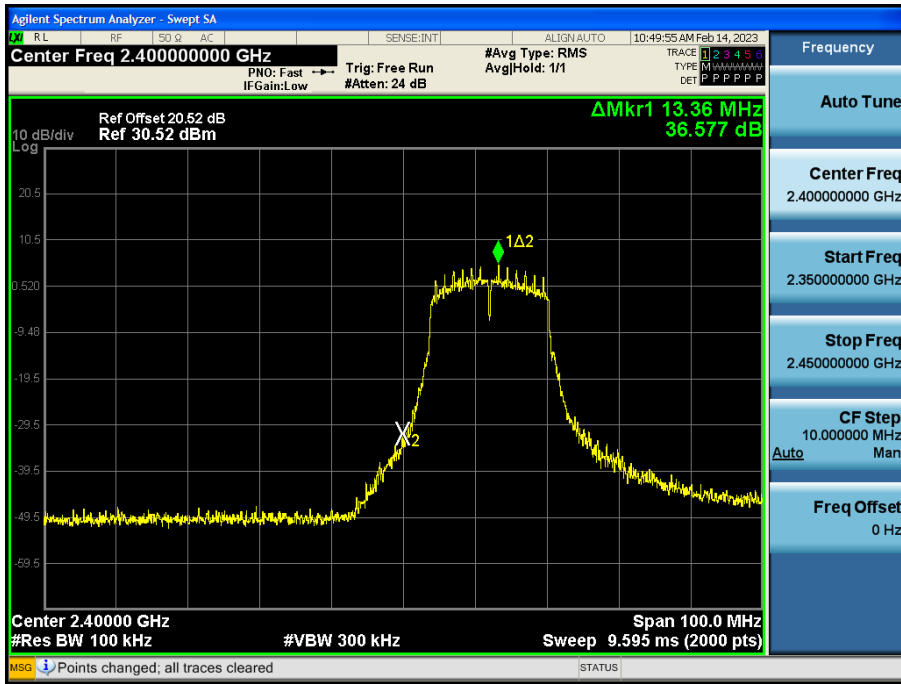
Band Edge (802.11b-CH12)



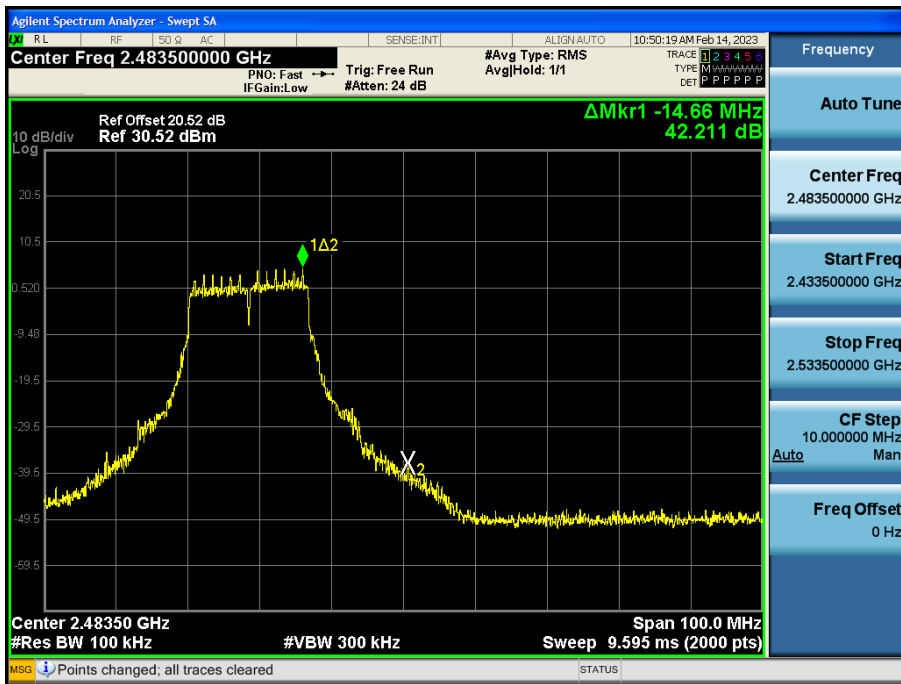
Band Edge (802.11b-CH13)



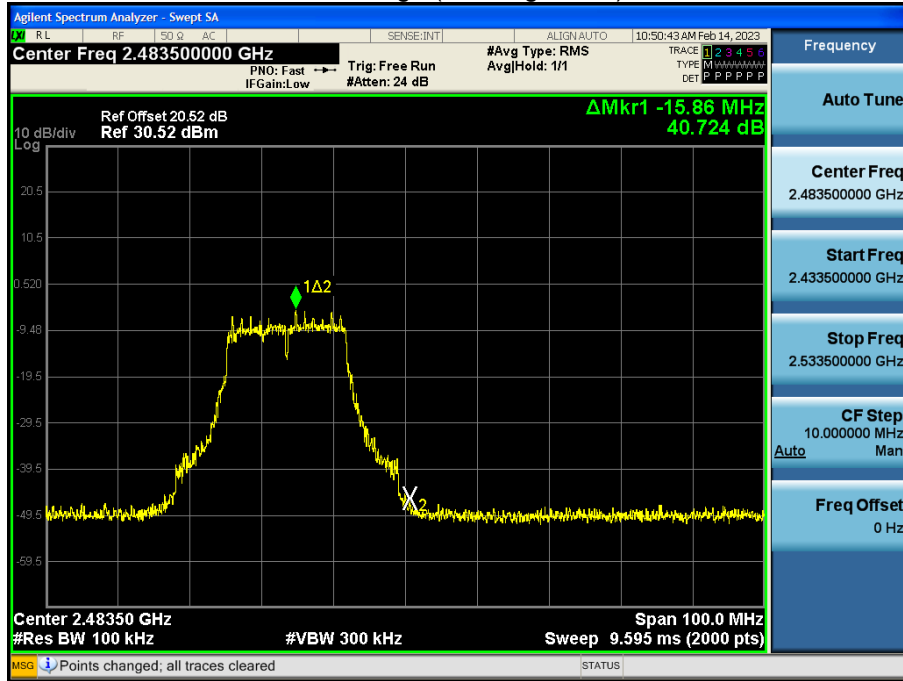
Band Edge (802.11g-CH1)



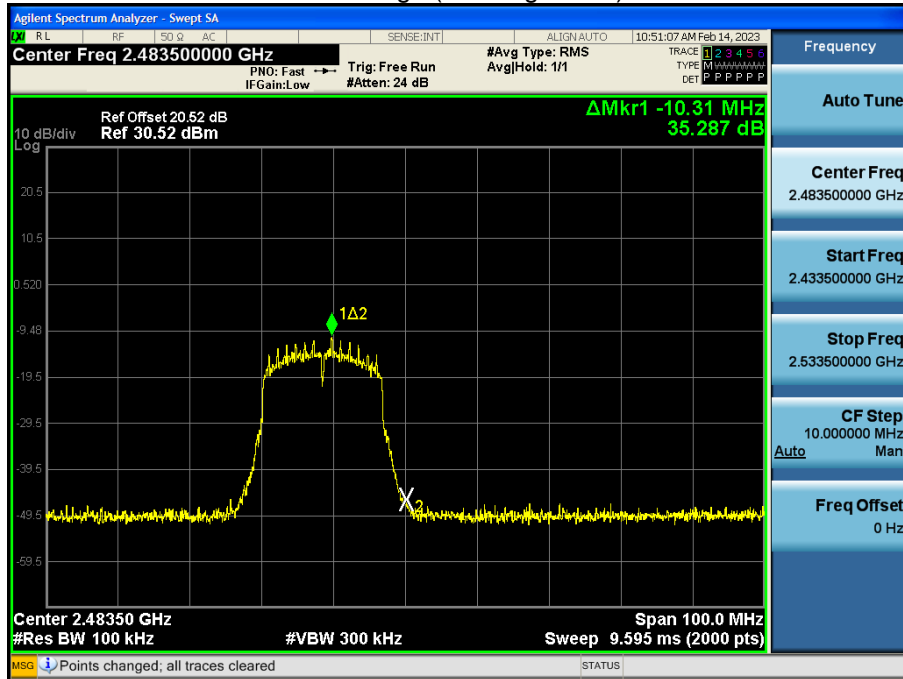
Band Edge (802.11g-CH11)



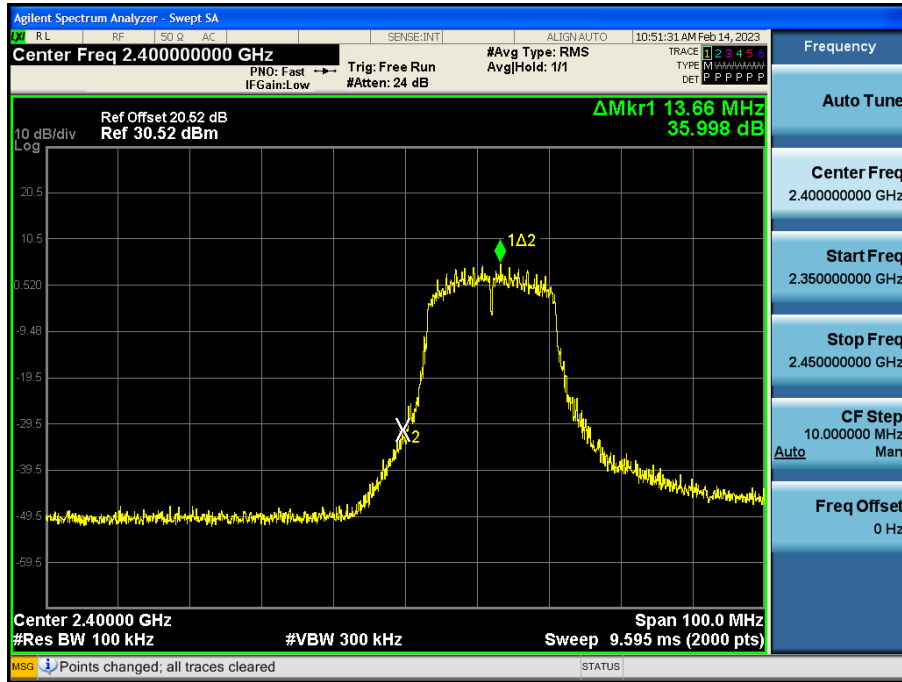
Band Edge (802.11g-CH12)



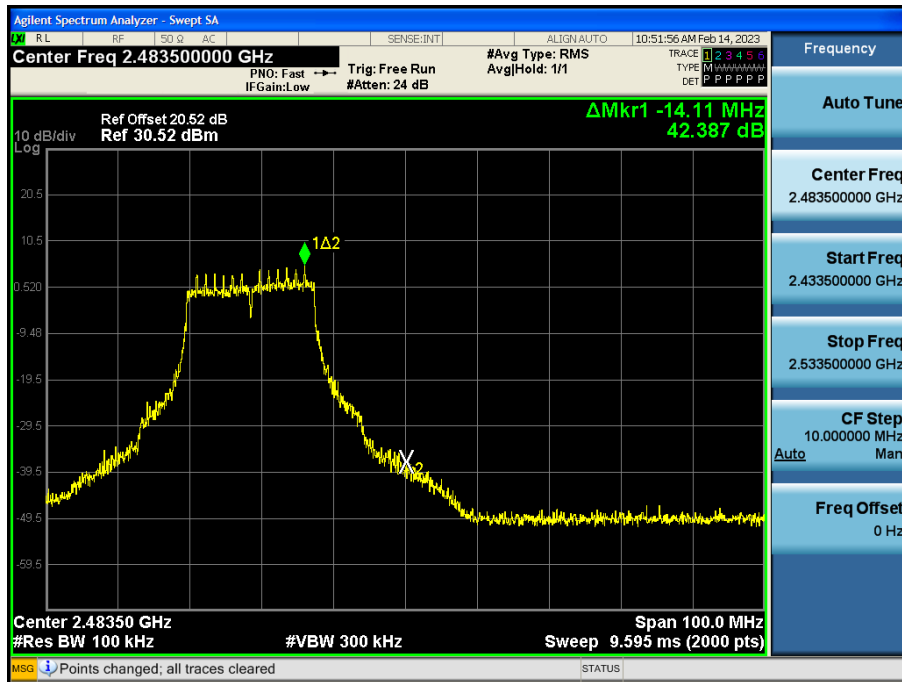
Band Edge (802.11g-CH13)



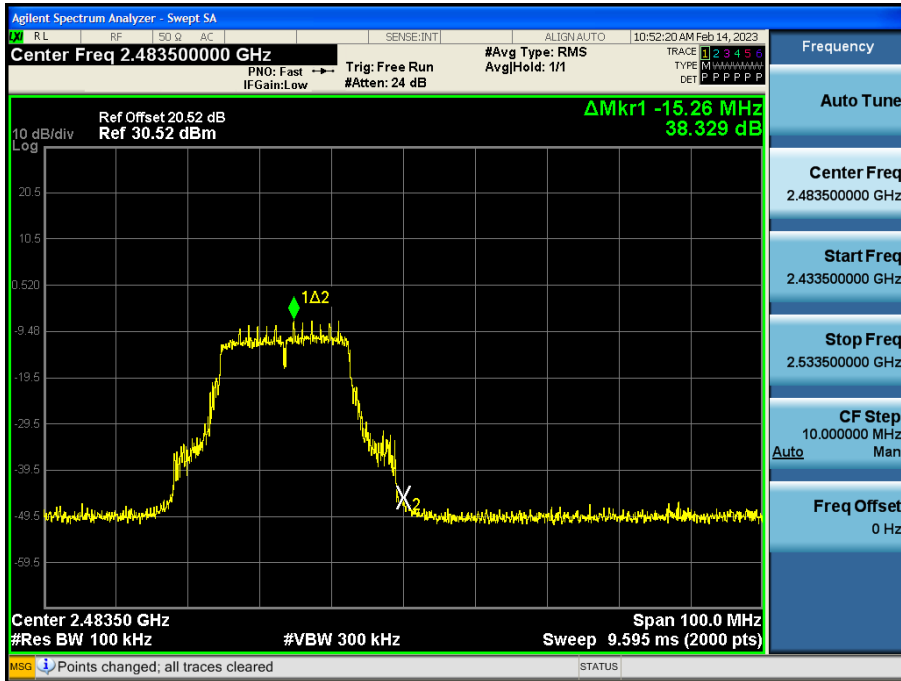
Band Edge (802.11n_HT20-CH1)



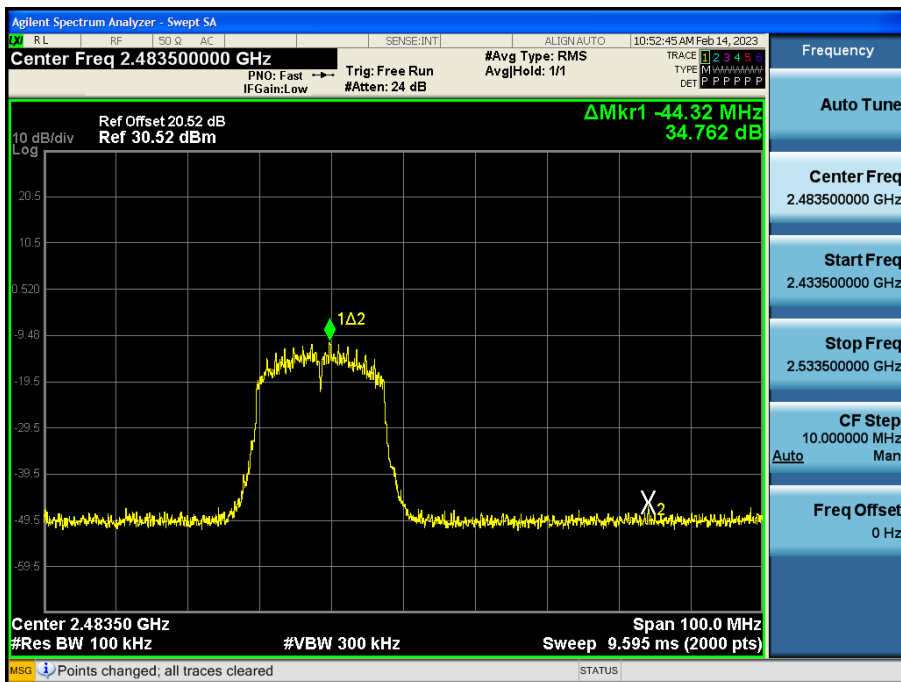
Band Edge (802.11n_HT20-CH11)



Band Edge (802.11n_HT20-CH12)



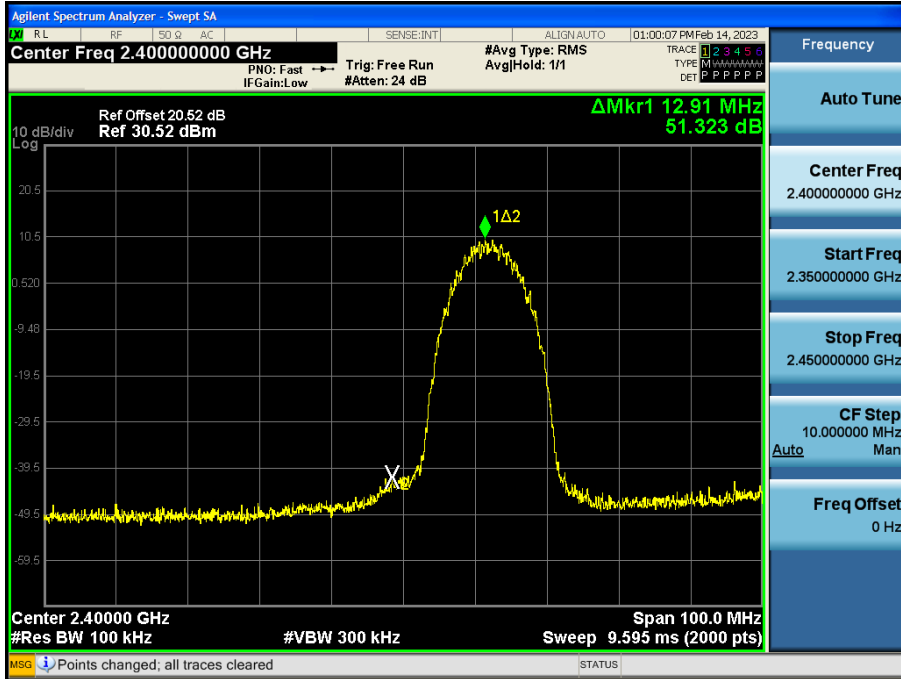
Band Edge (802.11n_HT20-CH13)



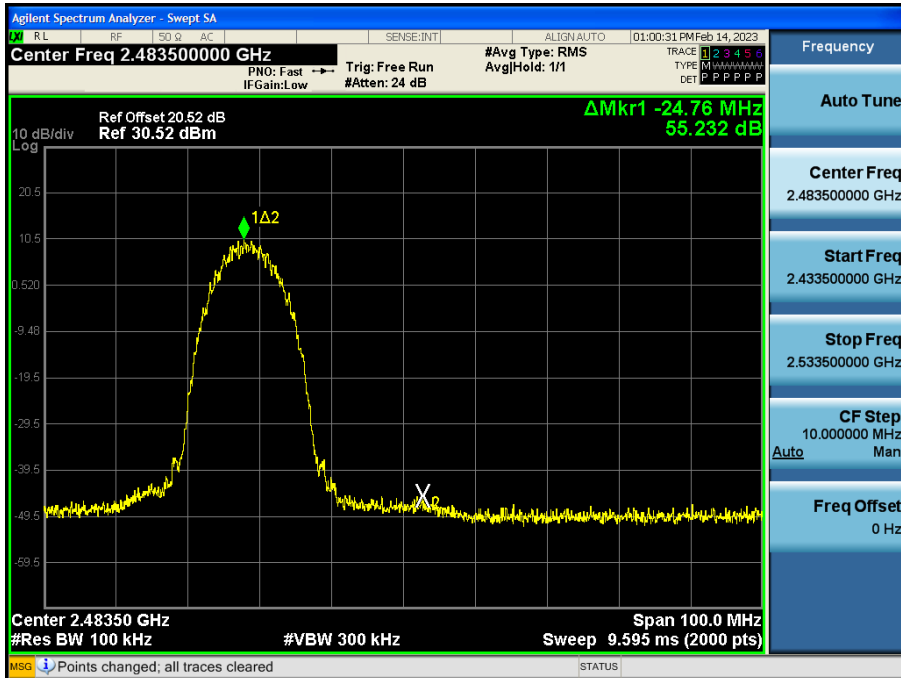
[Ant.2]

☑ Test Plots(Band Edge)

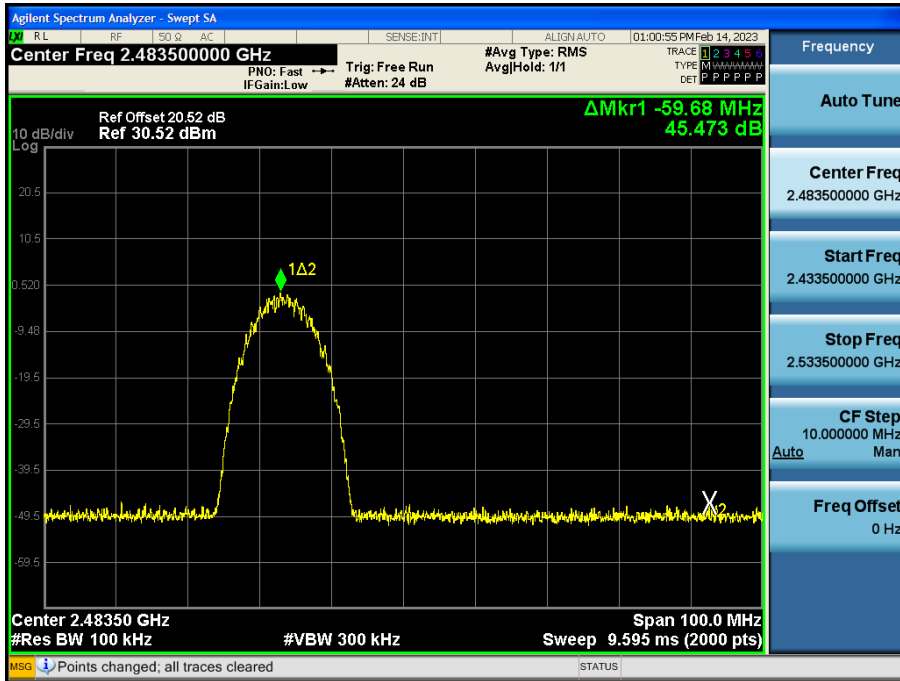
Band Edge (802.11b-CH1)



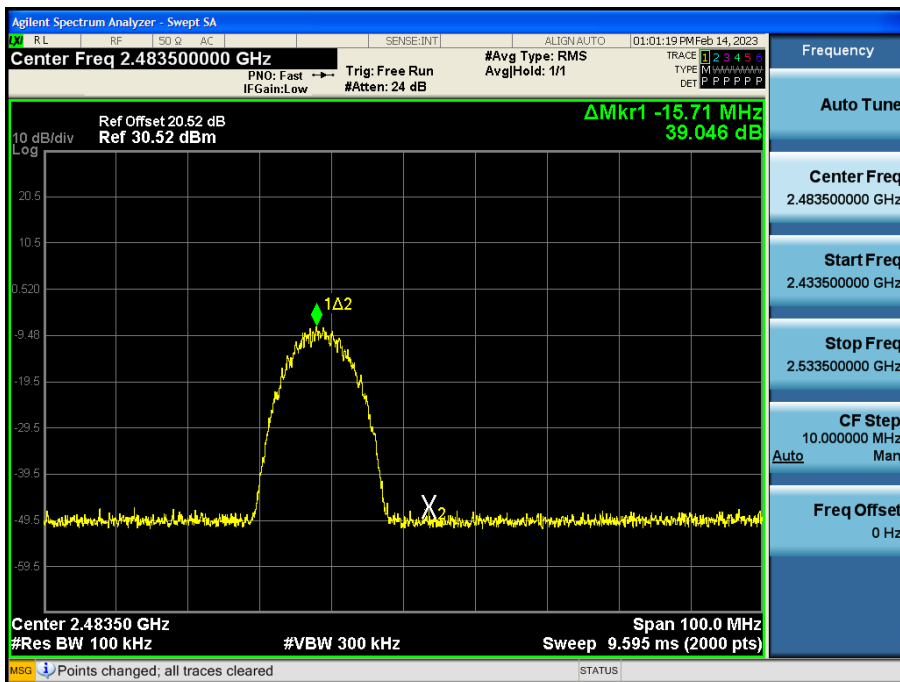
Band Edge (802.11b-CH11)



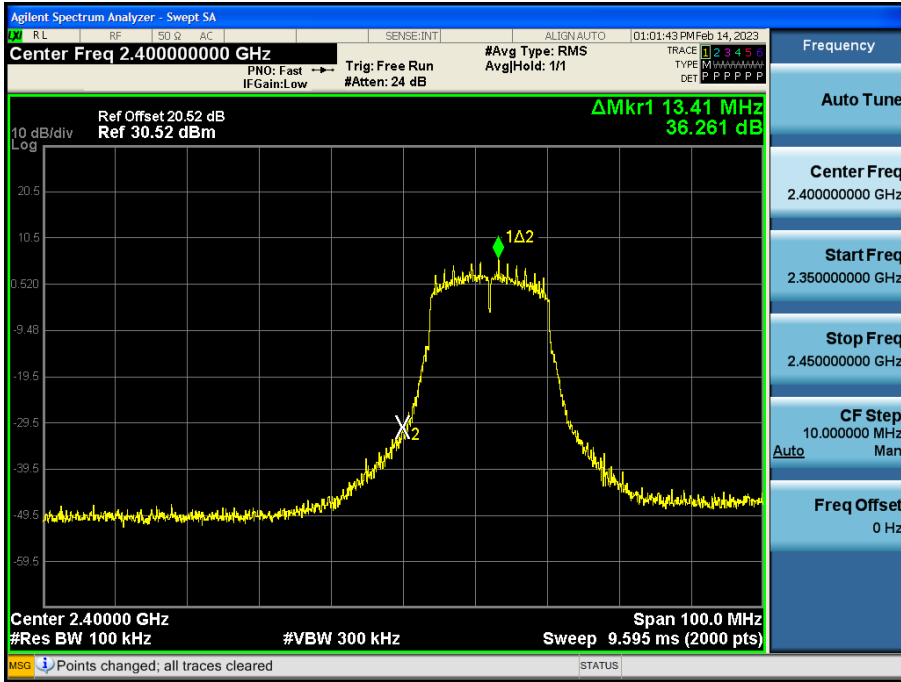
Band Edge (802.11b-CH12)



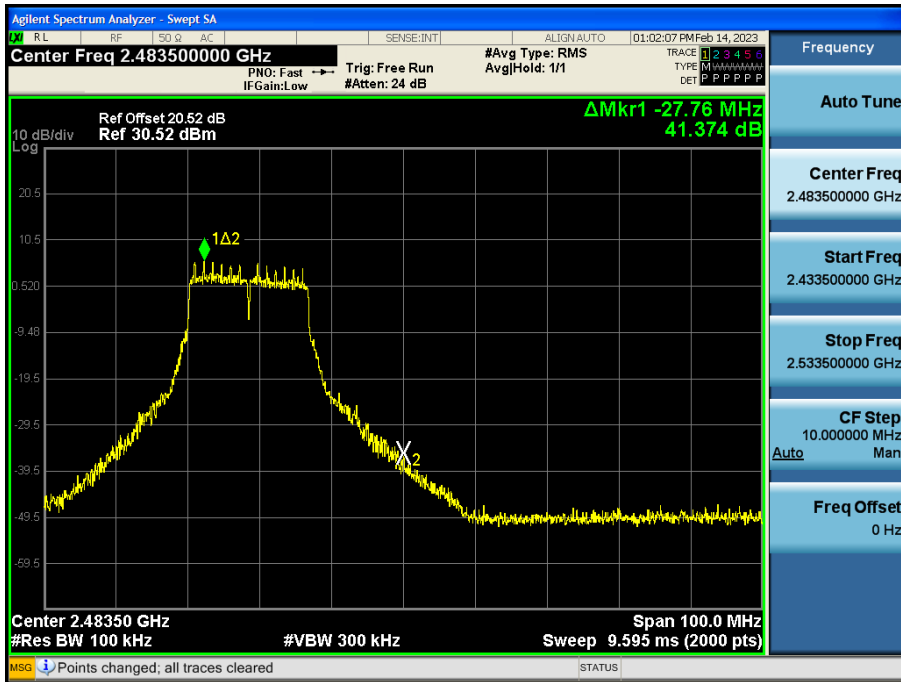
Band Edge (802.11b-CH13)



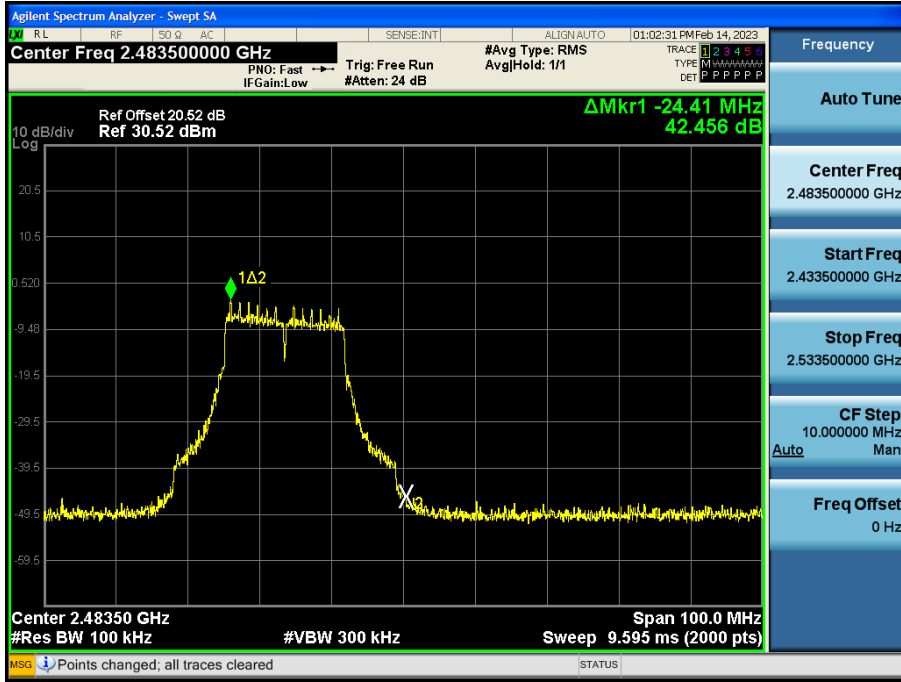
Band Edge (802.11g-CH1)



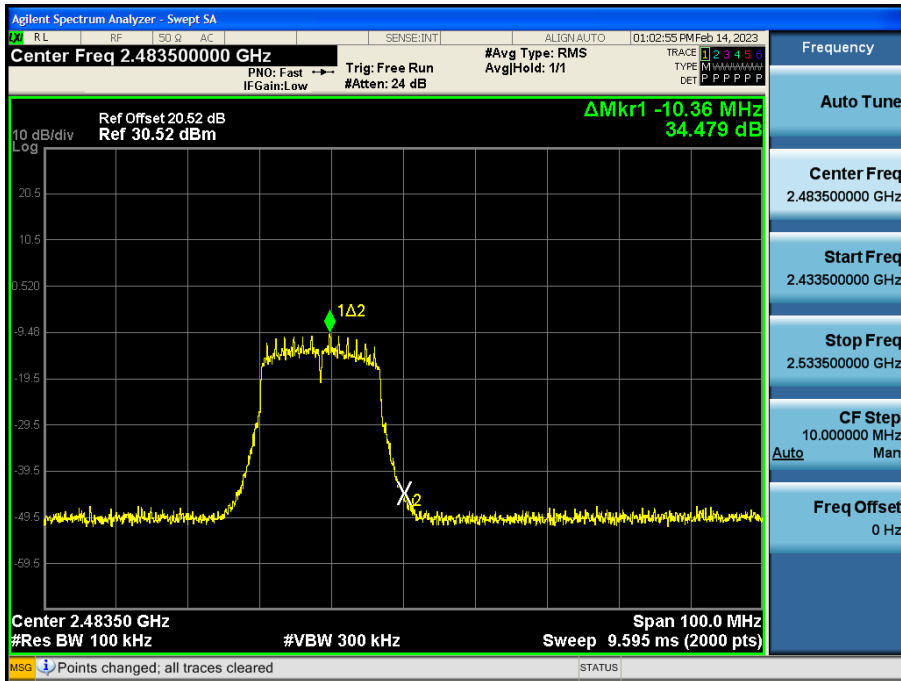
Band Edge (802.11g-CH11)



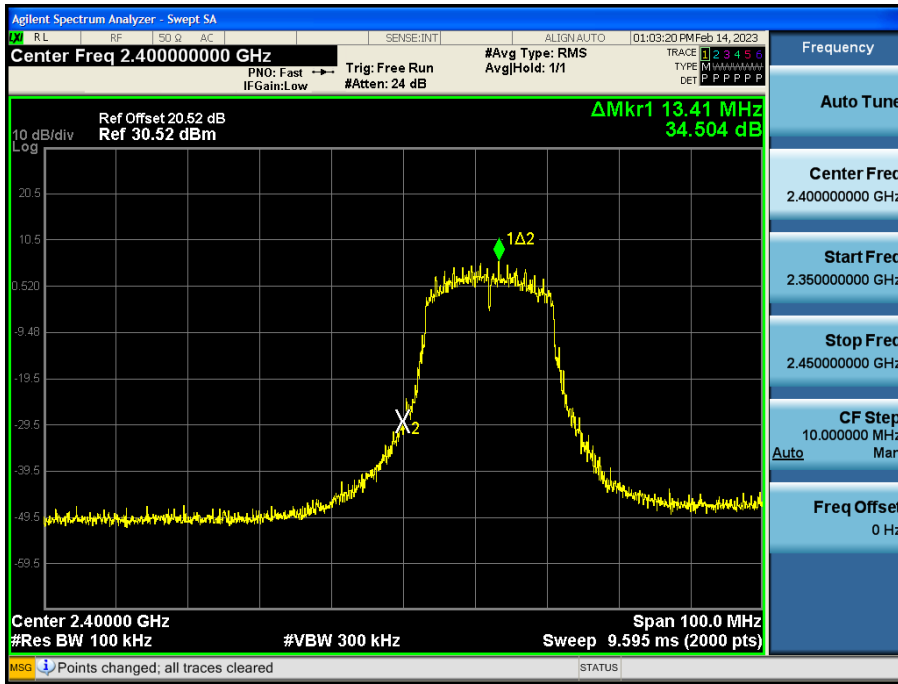
Band Edge (802.11g_CH12)



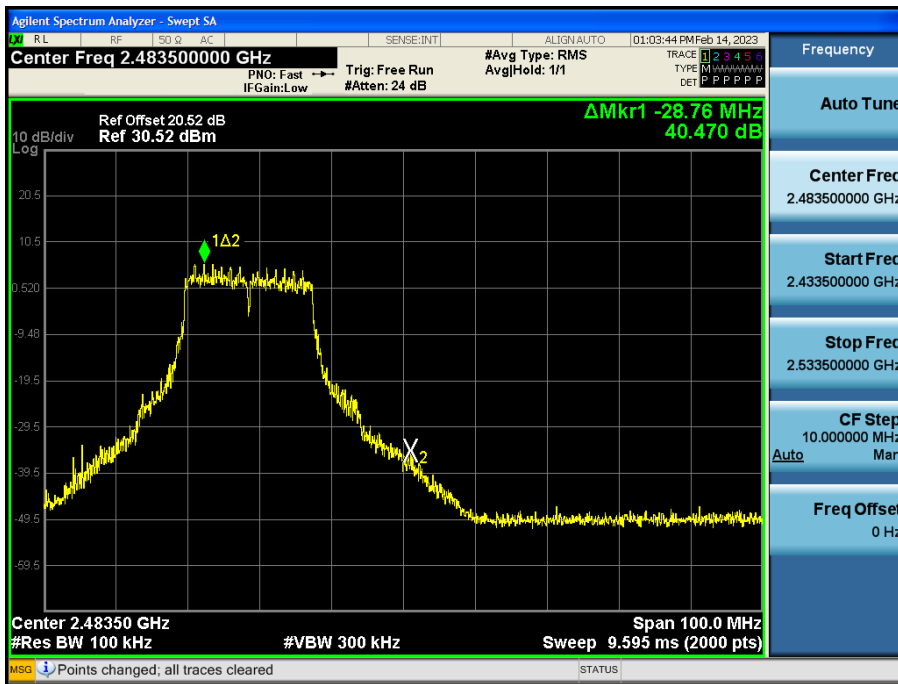
Band Edge (802.11g-CH13)



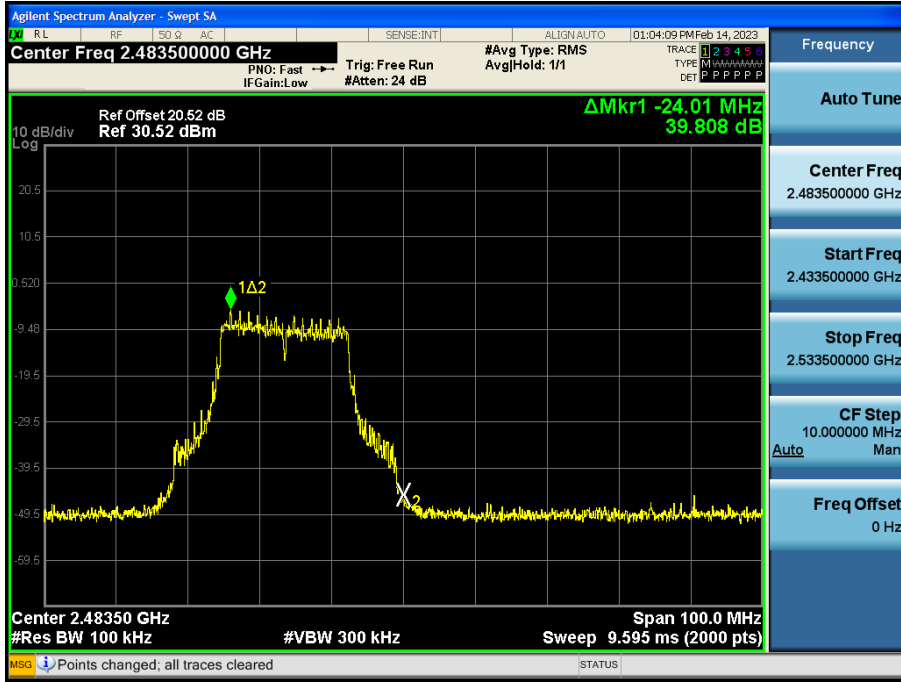
Band Edge (802.11n_HT20-CH1)



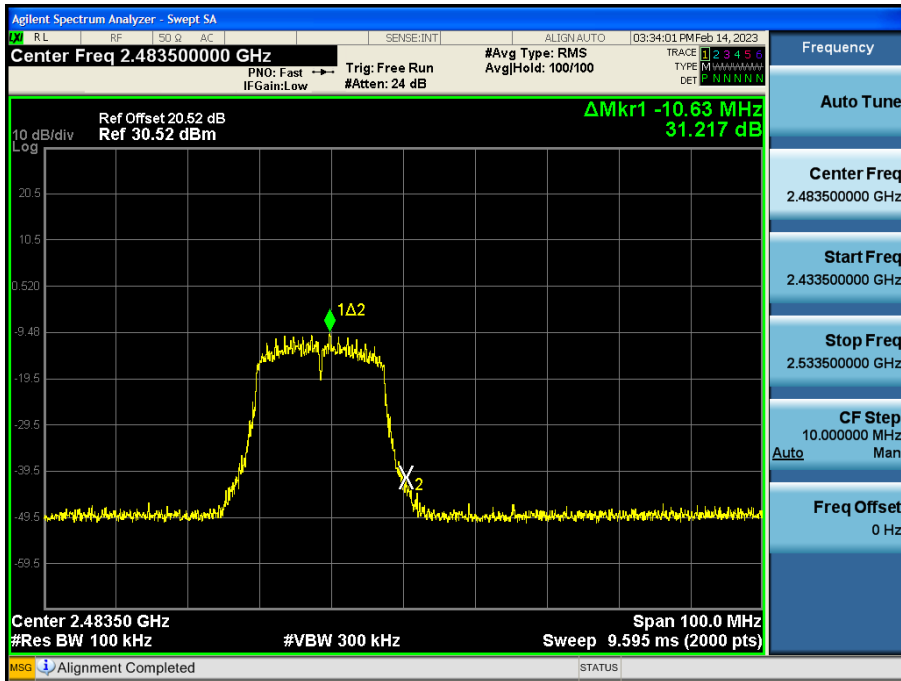
Band Edge (802.11n_HT20-CH11)



Band Edge (802.11n_HT20-CH12)



Band Edge (802.11n_HT20-CH13)

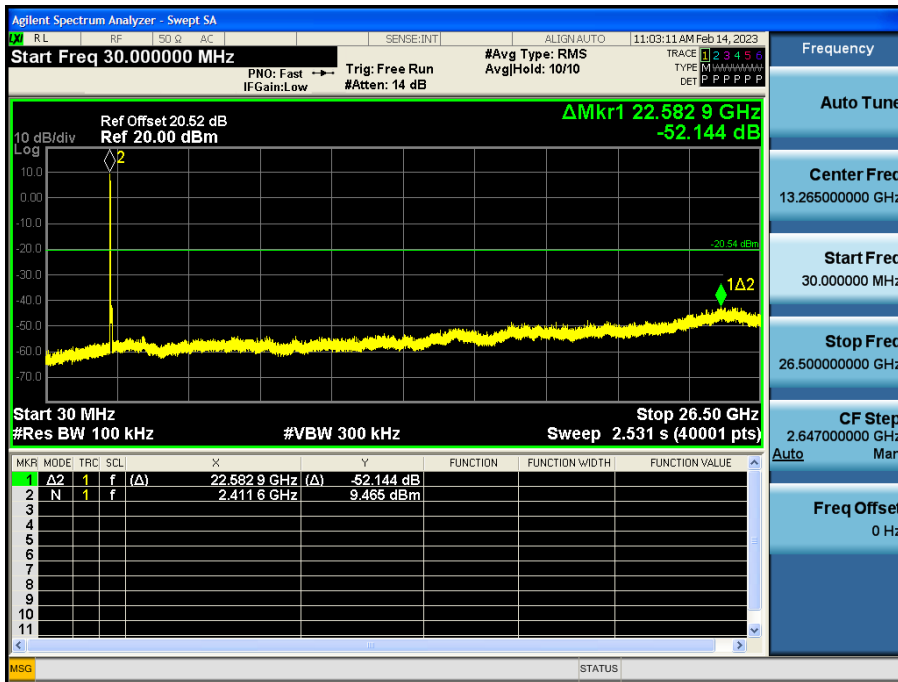


☑ Test Plots(Conducted Spurious Emission)

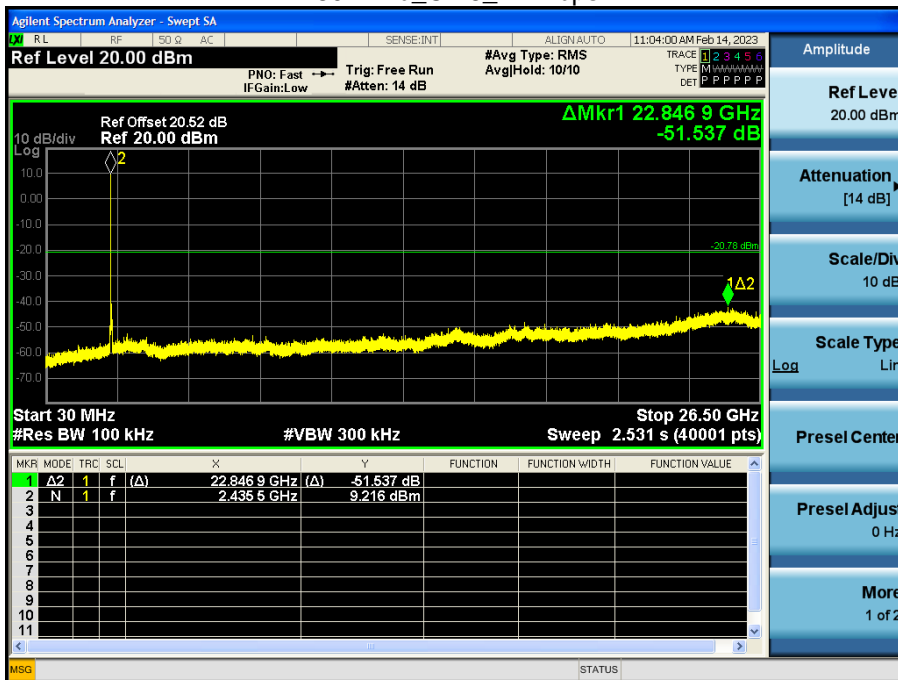
[Ant.1]

30 MHz ~ 26.5 GHz

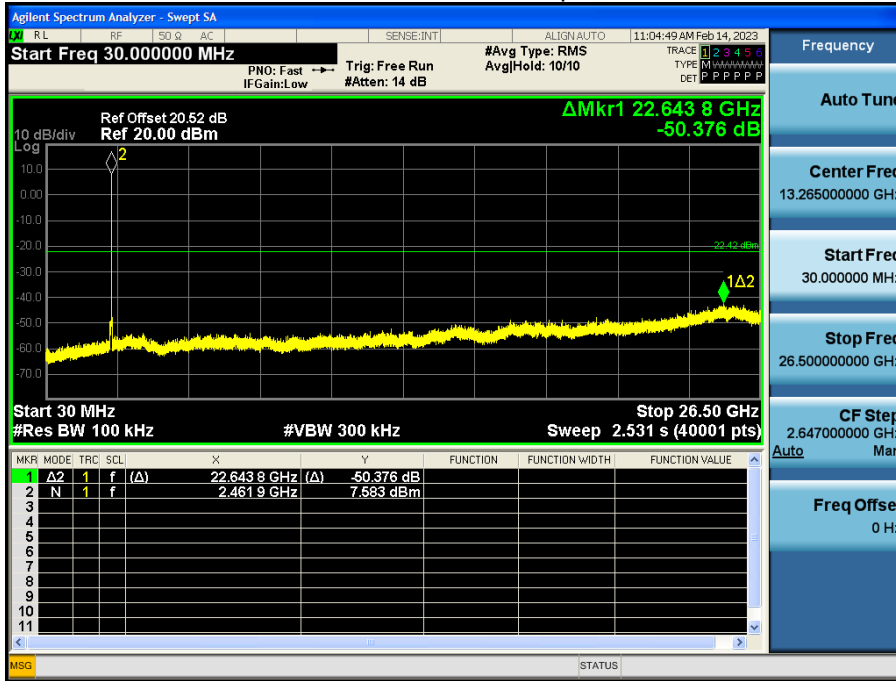
802.11b_Ch.1_11 Mbps



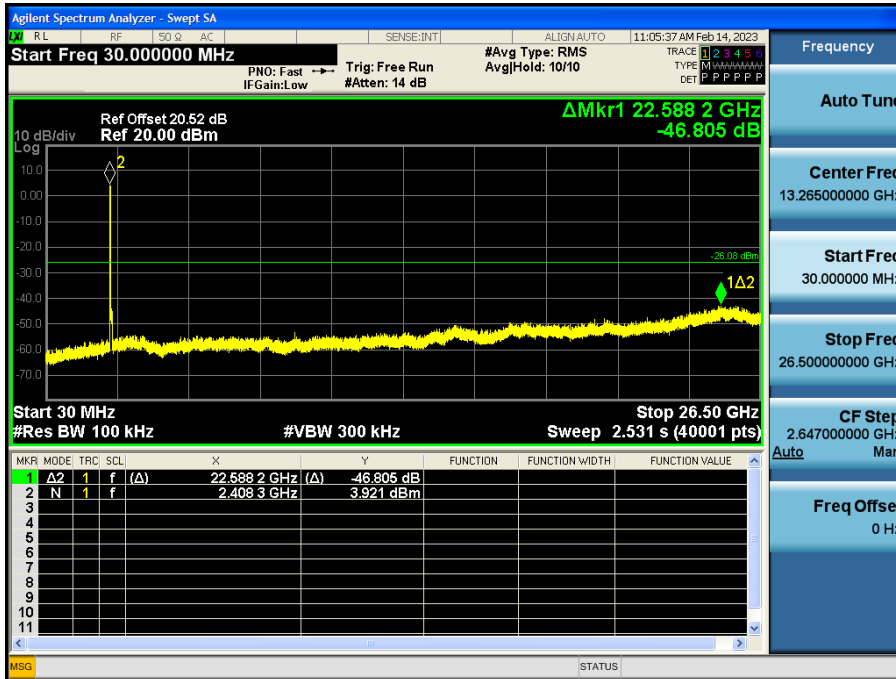
802.11b_Ch.6_11 Mbps



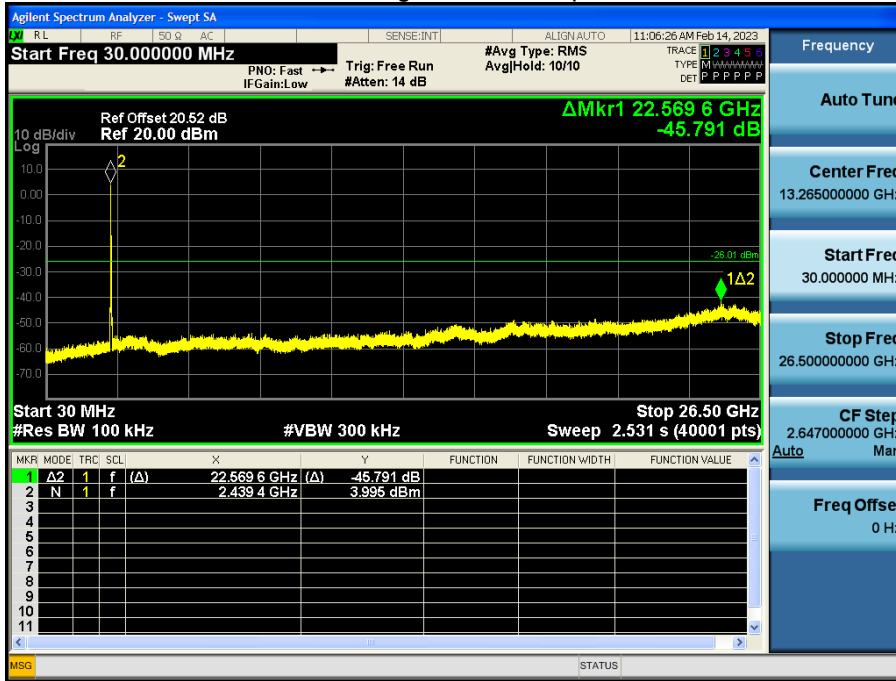
802.11b_Ch.11_11 Mbps



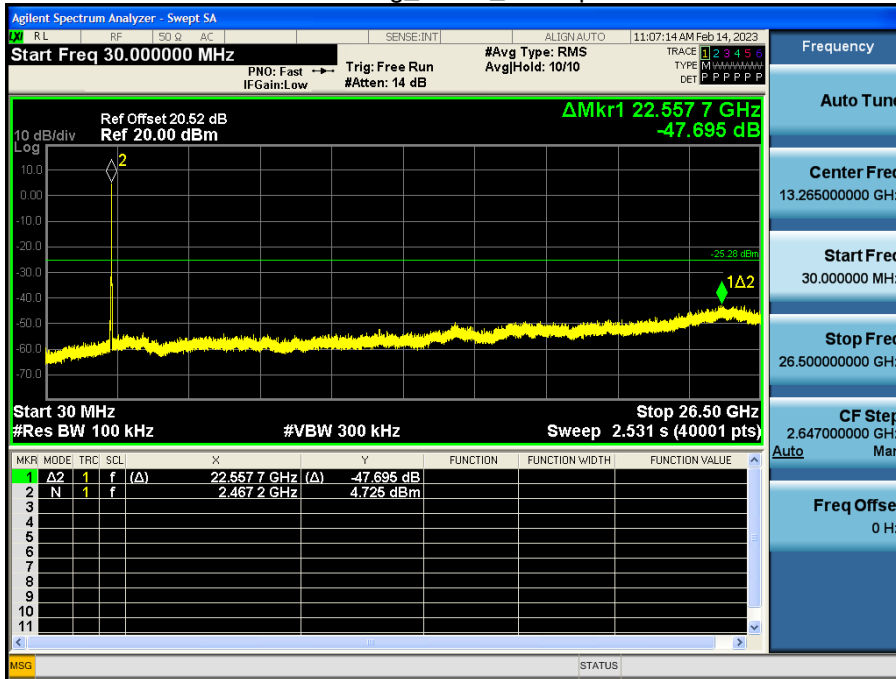
802.11g_Ch.1_18 Mbps



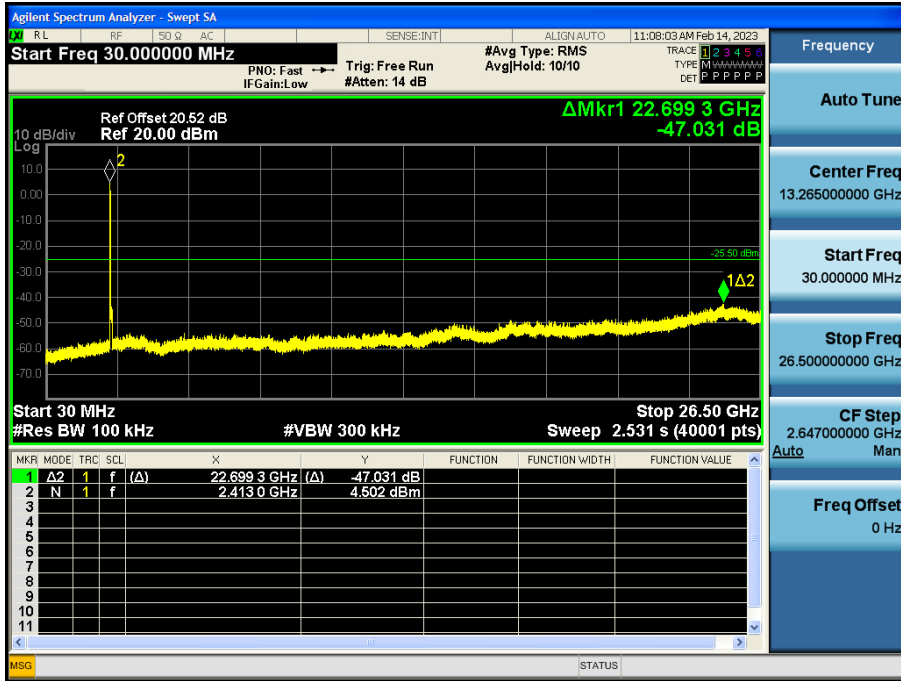
802.11g_Ch.6_18 Mbps



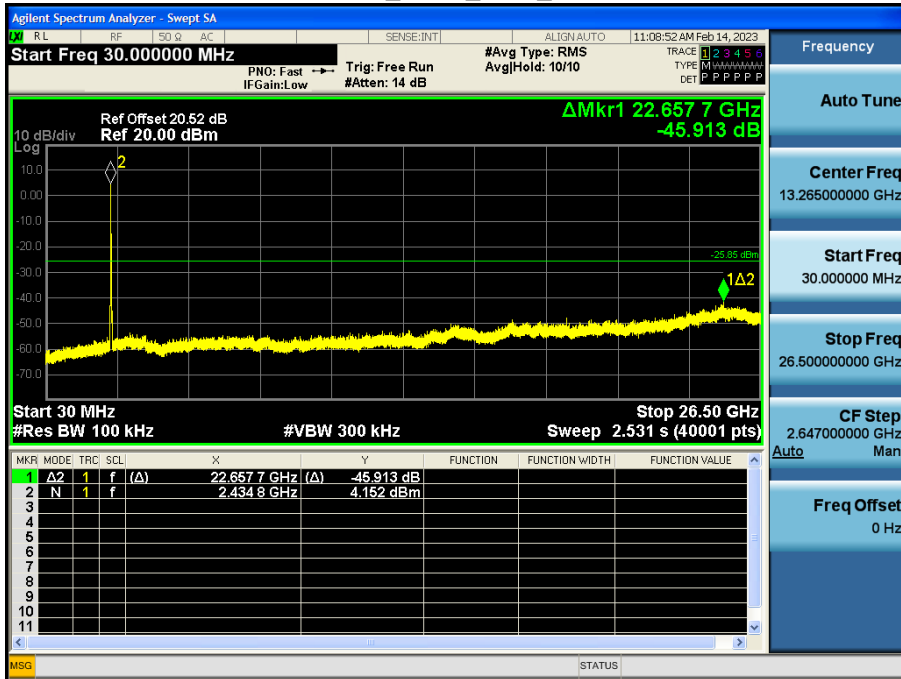
802.11g_Ch.11_18 Mbps



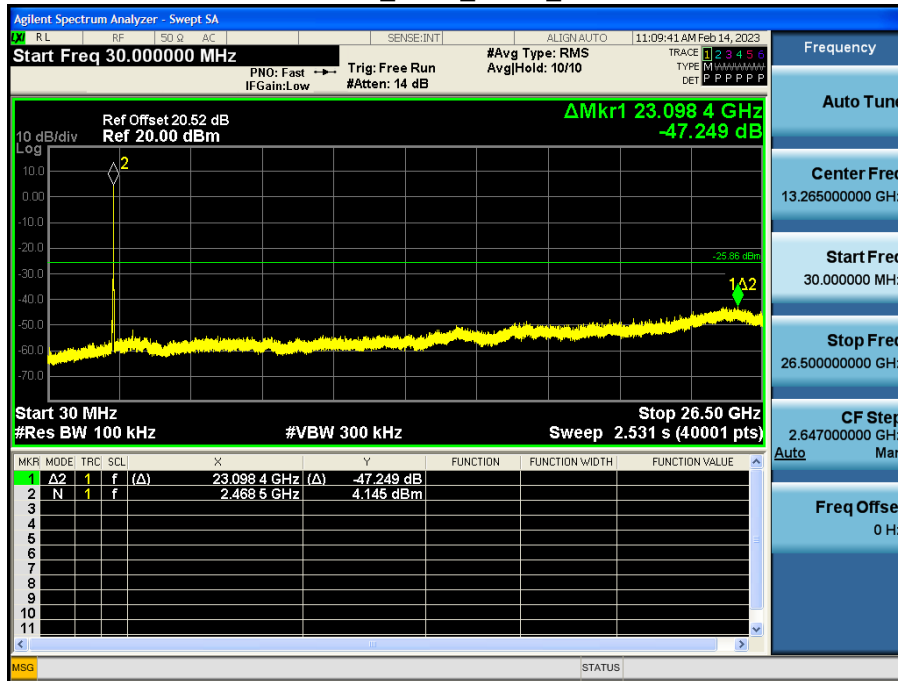
802.11n_HT20_Ch.1_MCS4



802.11n_HT20_Ch.6_MCS4



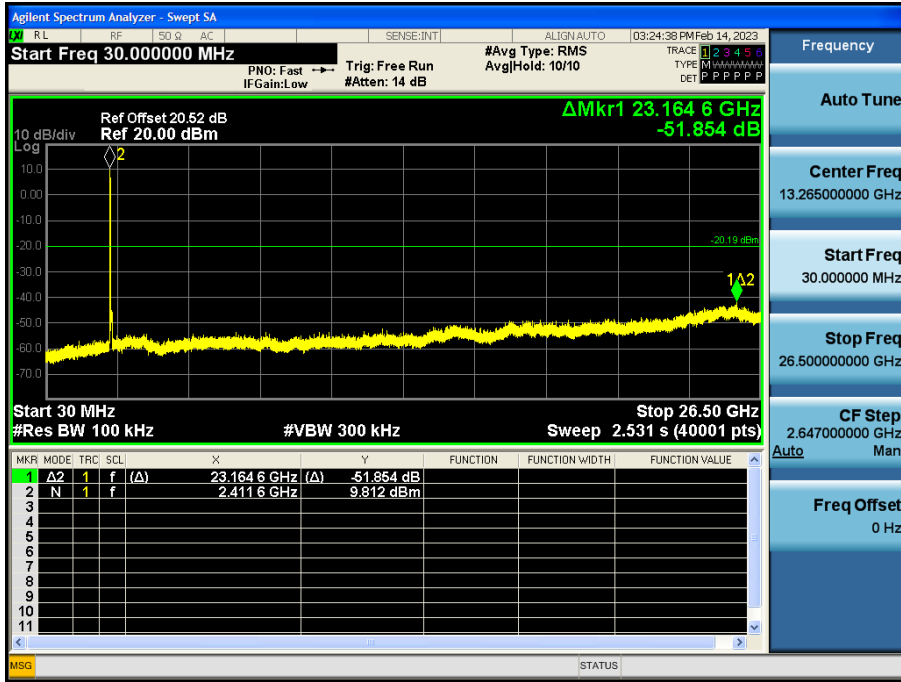
802.11n_HT20_Ch.11_MCS4



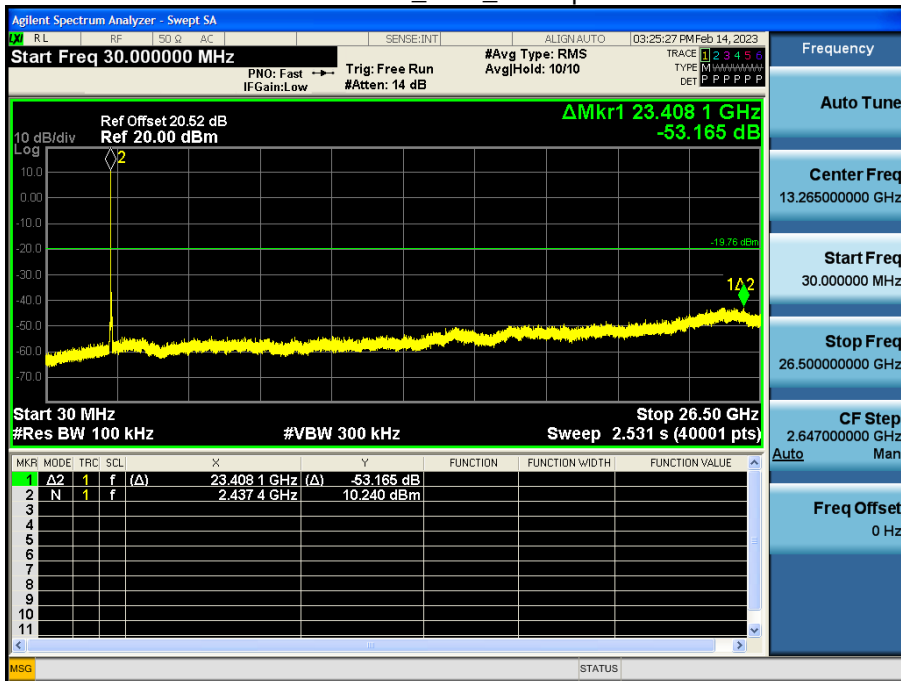
[Ant.2]

30 MHz ~ 26.5 GHz

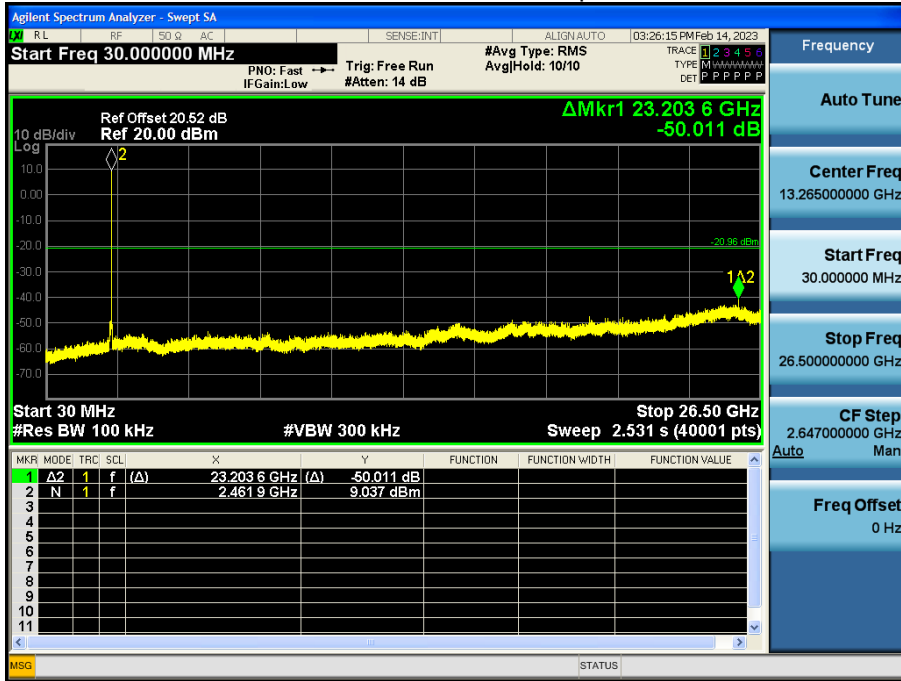
802.11b_Ch.1_11 Mbps



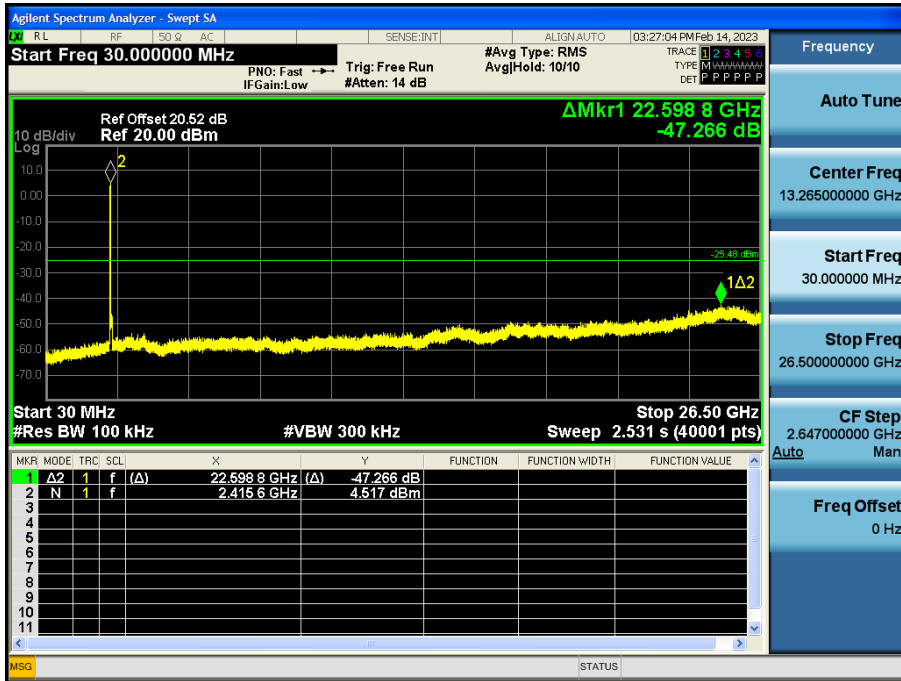
802.11b_Ch.6_11 Mbps



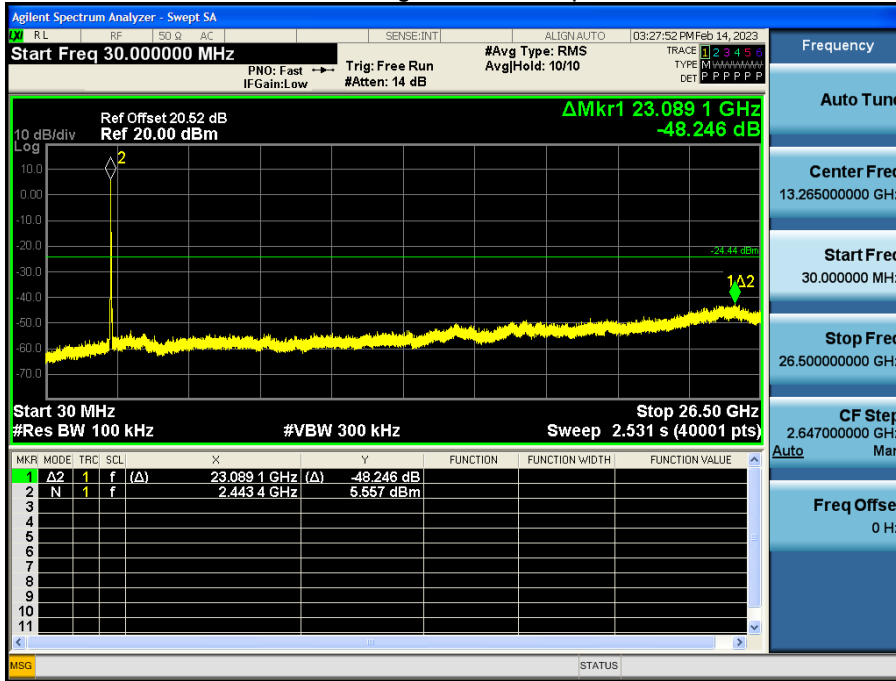
802.11b_Ch.11_11 Mbps



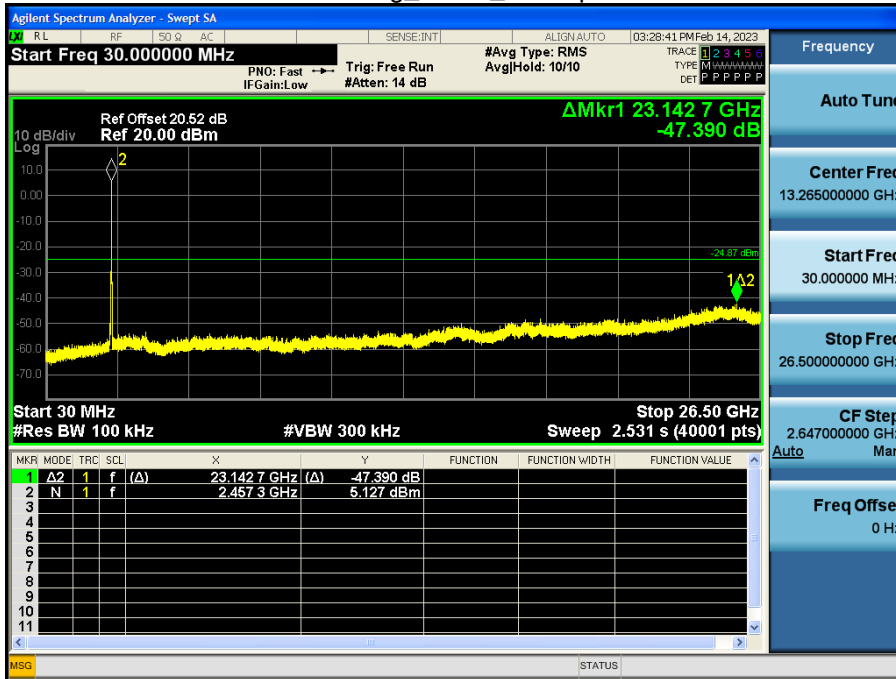
802.11g_Ch.1_18 Mbps



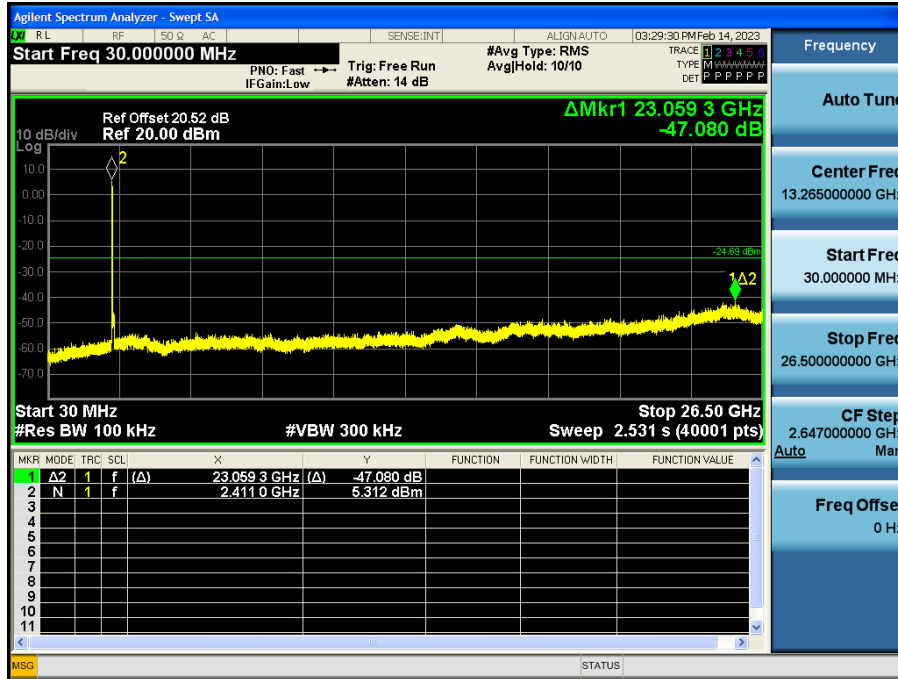
802.11g_Ch.6_18 Mbps



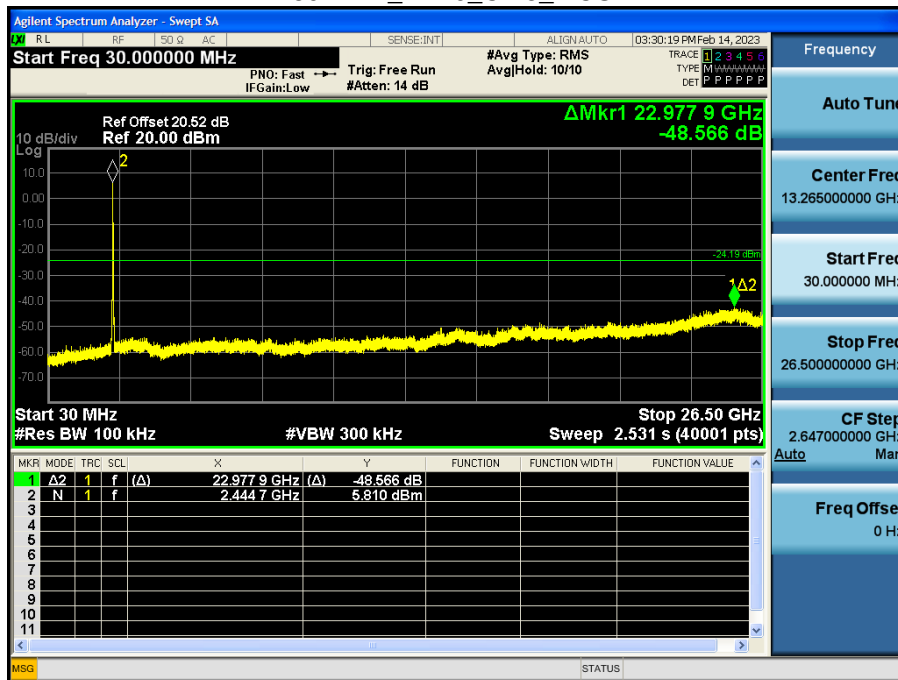
802.11g_Ch.11_18 Mbps



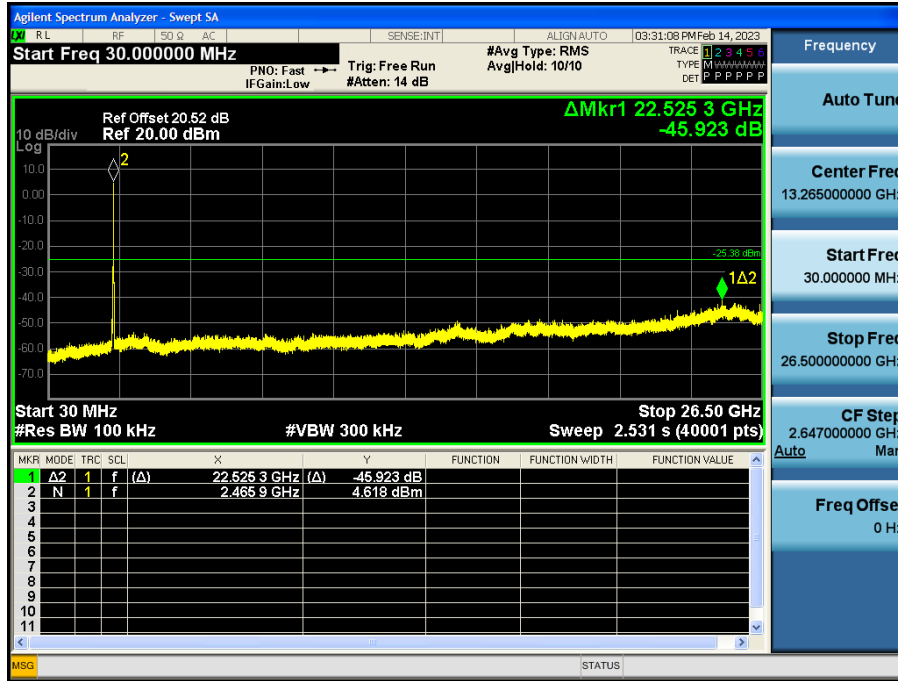
802.11n_HT20_Ch.1_MCS4



802.11n_HT20_Ch.6_MCS4



802.11n_HT20_Ch.11_MCS4



9.6 RADIATED SPURIOUS EMISSIONS**Frequency Range : 9 kHz – 30 MHz**

Frequency	Measured Value	A.F+C.L+D.F	Ant. POL	Total	Limit	Margin
[MHz]	[dB μ V]	[dB/m]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]
No Critical peaks found						

Note:

1. The Measured value of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = $40\log(\text{specific distance} / \text{test distance})$ (dB)
3. Limit line = specific Limits (dB μ V) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	Ant. POL	Total	Limit	Margin
[MHz]	[dB μ V]	[dB/m]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]
No Critical peaks found						

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz**[MIMO]**

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz
Channel No.	01 Ch

Frequency [MHz]	Measured Value [dB μ V]	A.F+C.L-A.G+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4824	44.22	4.02	V	48.24	73.98	25.74	PK
4824	36.77	4.02	V	40.79	53.98	13.19	AV
7236	40.32	11.57	V	51.89	73.98	22.09	PK
7236	30.42	11.57	V	41.99	53.98	11.99	AV
4824	43.85	4.02	H	47.87	73.98	26.11	PK
4824	36.12	4.02	H	40.14	53.98	13.84	AV
7236	40.59	11.57	H	52.16	73.98	21.82	PK
7236	30.91	11.57	H	42.48	53.98	11.50	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2437 MHz
Channel No.	06 Ch

Frequency [MHz]	Measured Value [dB μ V]	A.F+C.L-A.G+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4874	43.41	4.25	V	47.66	73.98	26.32	PK
4874	35.13	4.25	V	39.38	53.98	14.60	AV
7311	45.22	12.01	V	57.23	73.98	16.75	PK
7311	38.55	12.01	V	50.56	53.98	3.42	AV
4874	42.95	4.25	H	47.20	73.98	26.78	PK
4874	34.89	4.25	H	39.14	53.98	14.84	AV
7311	45.47	12.01	H	57.48	73.98	16.50	PK
7311	38.88	12.01	H	50.89	53.98	3.09	AV

Operation Mode: 802.11b
Transfer Rate: 1 Mbps
Operating Frequency: 2462 MHz
Channel No.: 11 Ch

Frequency [MHz]	Measured Value [dB μ V]	A.F+C.L-A.G+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4924	45.07	4.41	V	49.48	73.98	24.50	PK
4924	37.99	4.41	V	42.40	53.98	11.58	AV
7386	44.12	11.96	V	56.08	73.98	17.90	PK
7386	36.85	11.96	V	48.81	53.98	5.17	AV
4924	44.68	4.41	H	49.09	73.98	24.89	PK
4924	37.59	4.41	H	42.00	53.98	11.98	AV
7386	44.57	11.96	H	56.53	73.98	17.45	PK
7386	37.02	11.96	H	48.98	53.98	5.00	AV

Note:

Channel 12 and 13 are less powerful than channel 11. So, The test for high channel was performed at channel 11.

Operation Mode: 802.11g
 Transfer Rate: 6 Mbps
 Operating Frequency: 2412 MHz
 Channel No.: 01 Ch

Frequency	Measured Value	Duty Cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
4824	42.39	0.000	4.02	V	46.41	73.98	27.57	PK
4824	30.35	0.348	4.02	V	34.72	53.98	19.26	AV
7236	41.02	0.000	11.57	V	52.59	73.98	21.39	PK
7236	27.85	0.348	11.57	V	39.77	53.98	14.21	AV
4824	42.08	0.000	4.02	H	46.10	73.98	27.88	PK
4824	30.01	0.348	4.02	H	34.38	53.98	19.60	AV
7236	41.38	0.000	11.57	H	52.95	73.98	21.03	PK
7236	28.12	0.348	11.57	H	40.04	53.98	13.94	AV

Operation Mode: 802.11g
 Transfer Rate: 6 Mbps
 Operating Frequency: 2437 MHz
 Channel No.: 06 Ch

Frequency	Measured Value	Duty Cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
4874	42.57	0.000	4.25	V	46.82	73.98	27.16	PK
4874	29.88	0.348	4.25	V	34.48	53.98	19.50	AV
7311	45.89	0.000	12.01	V	57.90	73.98	16.08	PK
7311	31.22	0.348	12.01	V	43.58	53.98	10.40	AV
4874	42.44	0.000	4.25	H	46.69	73.98	27.29	PK
4874	29.78	0.348	4.25	H	34.38	53.98	19.60	AV
7311	46.06	0.000	12.01	H	58.07	73.98	15.91	PK
7311	31.55	0.348	12.01	H	43.91	53.98	10.07	AV

Operation Mode: 802.11g
Transfer Rate: 6 Mbps
Operating Frequency: 2462 MHz
Channel No.: 11 Ch

Frequency [MHz]	Measured Value [dB μ V]	Duty Cycle Factor [dB]	A.F+C.L-A.G+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4924	42.13	0.000	4.41	V	46.54	73.98	27.44	PK
4924	30.85	0.348	4.41	V	35.61	53.98	18.37	AV
7386	43.69	0.000	11.96	V	55.65	73.98	18.33	PK
7386	29.85	0.348	11.96	V	42.16	53.98	11.82	AV
4924	41.91	0.000	4.41	H	46.32	73.98	27.66	PK
4924	30.69	0.348	4.41	H	35.45	53.98	18.53	AV
7386	43.99	0.000	11.96	H	55.95	73.98	18.03	PK
7386	30.22	0.348	11.96	H	42.53	53.98	11.45	AV

Note:

Channel 12 and 13 are less powerful than channel 11. So, The test for high channel was performed at channel 11.

Operation Mode: 802.11n_HT20
 Transfer Rate: MCS0
 Operating Frequency: 2412 MHz
 Channel No.: 01 Ch

Frequency	Measured Value	Duty Cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
4824	41.82	0.000	4.02	V	45.84	73.98	28.14	PK
4824	30.22	0.371	4.02	V	34.61	53.98	19.37	AV
7236	42.78	0.000	11.57	V	54.35	73.98	19.63	PK
7236	29.89	0.371	11.57	V	41.83	53.98	12.15	AV
4824	41.65	0.000	4.02	H	45.67	73.98	28.31	PK
4824	30.02	0.371	4.02	H	34.41	53.98	19.57	AV
7236	42.98	0.000	11.57	H	54.55	73.98	19.43	PK
7236	30.01	0.371	11.57	H	41.95	53.98	12.03	AV

Operation Mode: 802.11n_HT20
 Transfer Rate: MCS0
 Operating Frequency: 2437 MHz
 Channel No.: 06 Ch

Frequency	Measured Value	Duty Cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
4874	42.45	0.000	4.25	V	46.70	73.98	27.28	PK
4874	29.77	0.371	4.25	V	34.39	53.98	19.59	AV
7311	46.02	0.000	12.01	V	58.03	73.98	15.95	PK
7311	31.12	0.371	12.01	V	43.50	53.98	10.48	AV
4874	42.32	0.000	4.25	H	46.57	73.98	27.41	PK
4874	29.62	0.371	4.25	H	34.24	53.98	19.74	AV
7311	46.28	0.000	12.01	H	58.29	73.98	15.69	PK
7311	31.49	0.371	12.01	H	43.87	53.98	10.11	AV

Operation Mode: 802.11n_HT20
Transfer Rate: MCS0
Operating Frequency: 2462 MHz
Channel No.: 11 Ch

Frequency [MHz]	Measured Value [dB μ V]	Duty Cycle Factor [dB]	A.F+C.L-A.G+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4924	42.53	0.000	4.41	V	46.94	73.98	27.04	PK
4924	30.68	0.371	4.41	V	35.46	53.98	18.52	AV
7386	44.29	0.000	11.96	V	56.25	73.98	17.73	PK
7386	29.89	0.371	11.96	V	42.22	53.98	11.76	AV
4924	42.32	0.000	4.41	H	46.73	73.98	27.25	PK
4924	30.48	0.371	4.41	H	35.26	53.98	18.72	AV
7386	44.61	0.000	11.96	H	56.57	73.98	17.41	PK
7386	30.18	0.371	11.96	H	42.51	53.98	11.47	AV

Note:

Channel 12 and 13 are less powerful than channel 11. So, The test for high channel was performed at channel 11.

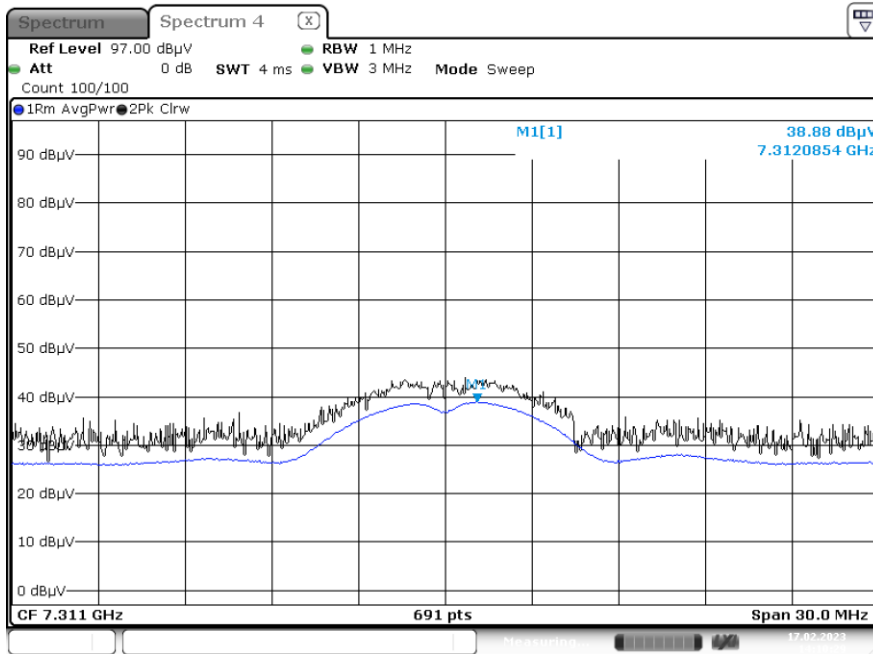
Test Plots

Note:

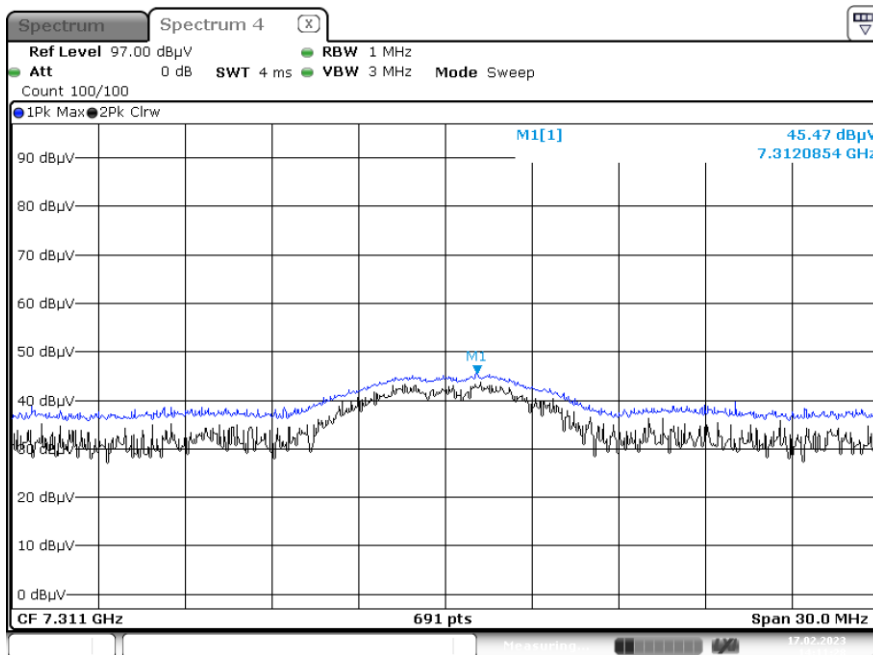
In order to simplify the report, Plot of worst case are only reported.

[MIMO]

Radiated Spurious Emissions plot – Average Result (802.11b_1 Mbps, Ch.6 3rd Harmonic, Z-H)



Radiated Spurious Emissions plot – Peak Result (802.11b_1 Mbps, Ch.6 3rd Harmonic, Z-H)



9.7 RADIATED RESTRICTED BAND EDGES**[MIMO]**

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Measured Value [dB μ V]	A.F+C.L-A.G +ATT+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
2390.0	19.252	37.05	H	56.30	73.98	17.68	PK
2390.0	7.333	37.05	H	44.38	53.98	9.60	AV
2390.0	19.025	37.05	V	56.08	73.98	17.91	PK
2390.0	7.125	37.05	V	44.18	53.98	9.81	AV
2483.5	26.379	37.03	H	63.41	73.98	10.57	PK
2483.5	8.936	37.03	H	45.97	53.98	8.01	AV
2483.5	26.125	37.03	V	63.16	73.98	10.83	PK
2483.5	8.659	37.03	V	45.69	53.98	8.29	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2467 MHz, 2472 MHz
Channel No.	12 Ch, 13 Ch

Frequency [MHz]	Measured Value [dB μ V]	A.F+C.L-A.G +ATT+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
2483.5	18.716	37.03	H	55.75	73.98	18.23	PK
2483.5	7.291	37.03	H	44.32	53.98	9.66	AV
2483.5	18.521	37.03	V	55.55	73.98	18.43	PK
2483.5	7.125	37.03	V	44.16	53.98	9.83	AV
2483.5	16.794	37.03	H	53.82	73.98	20.16	PK
2483.5	4.950	37.03	H	41.98	53.98	12.00	AV
2483.5	16.595	37.03	V	53.63	73.98	20.36	PK
2483.5	4.812	37.03	V	41.84	53.98	12.14	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Measured Value [dB μ V]	Duty Cycle Factor [dB]	A.F+C.L-A.G +ATT+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
2390.0	18.981	0.000	37.05	H	56.03	73.98	17.95	PK
2390.0	8.513	0.348	37.05	H	45.91	53.98	8.07	AV
2390.0	18.459	0.000	37.05	V	55.51	73.98	18.47	PK
2390.0	8.222	0.348	37.05	V	45.62	53.98	8.36	AV
2483.5	31.250	0.000	37.03	H	68.28	73.98	5.70	PK
# 2484.0	13.900	0.348	37.03	H	51.28	53.98	2.70	AV
# 2485.0	11.930	0.348	37.03	H	49.31	53.98	4.67	AV
2485.5	11.917	0.348	37.03	H	49.30	53.98	4.69	AV
2483.5	30.521	0.000	37.03	V	67.55	73.98	6.43	PK
# 2484.0	13.512	0.348	37.03	V	50.89	53.98	3.09	AV
# 2485.0	11.652	0.348	37.03	V	49.03	53.98	4.95	AV
2485.5	11.598	0.348	37.03	V	48.98	53.98	5.00	AV

Note : Integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode: 802.11g
 Transfer Rate: 6 Mbps
 Operating Frequency: 2467 MHz, 2472 MHz
 Channel No. 12 Ch, 13 Ch

Frequency [MHz]	Measured Value [dBμV]	Duty Cycle Factor [dB]	A.F+C.L-A.G +ATT+D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2483.5	23.498	0.000	37.03	H	60.53	73.98	13.45	PK
2483.5	9.173	0.348	37.03	H	46.55	53.98	7.43	AV
2483.5	23.025	0.000	37.03	V	60.06	73.98	13.93	PK
2483.5	9.001	0.348	37.03	V	46.38	53.98	7.60	AV
2483.5	30.225	0.000	37.03	H	67.26	73.98	6.73	PK
# 2484.0	12.120	0.348	37.03	H	49.50	53.98	4.48	AV
# 2485.0	9.950	0.348	37.03	H	47.33	53.98	6.65	AV
2485.5	9.588	0.348	37.03	H	46.97	53.98	7.01	AV
2483.5	30.021	0.000	37.03	V	67.05	73.98	6.93	PK
# 2484.0	11.890	0.348	37.03	V	49.27	53.98	4.71	AV
# 2485.0	9.750	0.348	37.03	V	47.13	53.98	6.85	AV
2485.5	9.325	0.348	37.03	V	46.70	53.98	7.28	AV

Note : Integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode: 802.11n (HT20)
Transfer Rate: 0
Operating Frequency: 2412 MHz, 2462 MHz
Channel No. 01 Ch, 11 Ch

Frequency [MHz]	Measured Value [dB μ V]	Duty Cycle Factor [dB]	A.F+C.L-A.G +ATT+D.F [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
2390.0	22.426	0.000	37.05	H	59.48	73.98	14.50	PK
2390.0	9.544	0.371	37.05	H	46.97	53.98	7.02	AV
2390.0	22.025	0.000	37.05	V	59.08	73.98	14.91	PK
2390.0	9.325	0.371	37.05	V	46.75	53.98	7.23	AV
2483.5	32.681	0.000	37.03	H	69.71	73.98	4.27	PK
# 2484.0	11.440	0.371	37.03	H	48.84	53.98	5.14	AV
# 2485.0	11.060	0.371	37.03	H	48.46	53.98	5.52	AV
2485.5	11.672	0.371	37.03	H	49.07	53.98	4.91	AV
2483.5	32.159	0.000	37.03	V	69.19	73.98	4.79	PK
2484.0	10.956	0.371	37.03	V	48.36	53.98	5.62	AV
2485.0	10.850	0.371	37.03	V	48.25	53.98	5.73	AV
2485.5	11.320	0.371	37.03	V	48.72	53.98	5.26	AV

Note : Integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode: 802.11n (HT20)
 Transfer MCS Index: 0
 Operating Frequency: 2467 MHz, 2472 MHz
 Channel No. 12 Ch, 13 Ch

Frequency [MHz]	Measured Value [dBμV]	Duty Cycle Factor [dB]	A.F+C.L-A.G +ATT+D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2483.5	24.278	0.000	37.03	H	61.31	73.98	12.67	PK
2483.5	9.010	0.371	37.03	H	46.41	53.98	7.57	AV
2483.5	24.025	0.000	37.03	V	61.06	73.98	12.93	PK
2483.5	8.889	0.371	37.03	V	46.29	53.98	7.69	AV
# 2484.0	27.030	0.000	37.03	H	64.06	73.98	9.92	PK
# 2485.0	27.940	0.000	37.03	H	64.97	73.98	9.01	PK
2485.5	32.742	0.000	37.03	H	69.77	73.98	4.21	PK
# 2484.0	14.160	0.371	37.03	H	51.56	53.98	2.42	AV
# 2485.0	11.920	0.371	37.03	H	49.32	53.98	4.66	AV
2485.5	11.486	0.371	37.03	H	48.89	53.98	5.09	AV
# 2484.0	26.890	0.000	37.03	V	63.92	73.98	10.06	PK
# 2485.0	27.770	0.000	37.03	V	64.80	73.98	9.18	PK
2485.5	32.555	0.000	37.03	V	69.59	73.98	4.40	PK
# 2484.0	13.950	0.371	37.03	V	51.35	53.98	2.63	AV
# 2485.0	11.710	0.371	37.03	V	49.11	53.98	4.87	AV
2485.5	11.222	0.371	37.03	V	48.62	53.98	5.36	AV

Note : Integration method Used (ANSI C63.10 Section11.13.3)

■ Test Plots

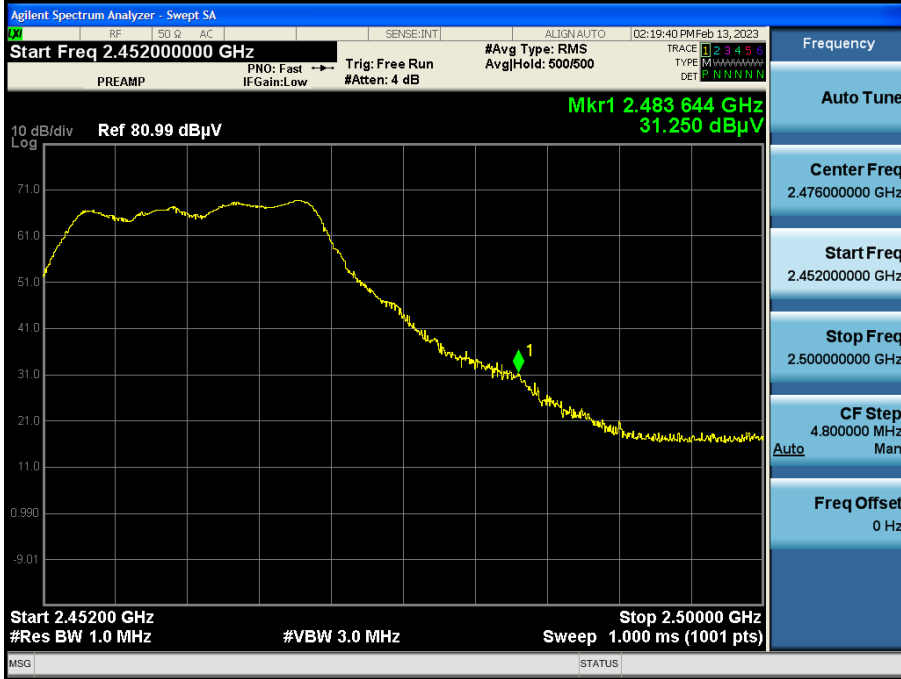
Note:

In order to simplify the report, Plots of worst case are only reported.

[MIMO]

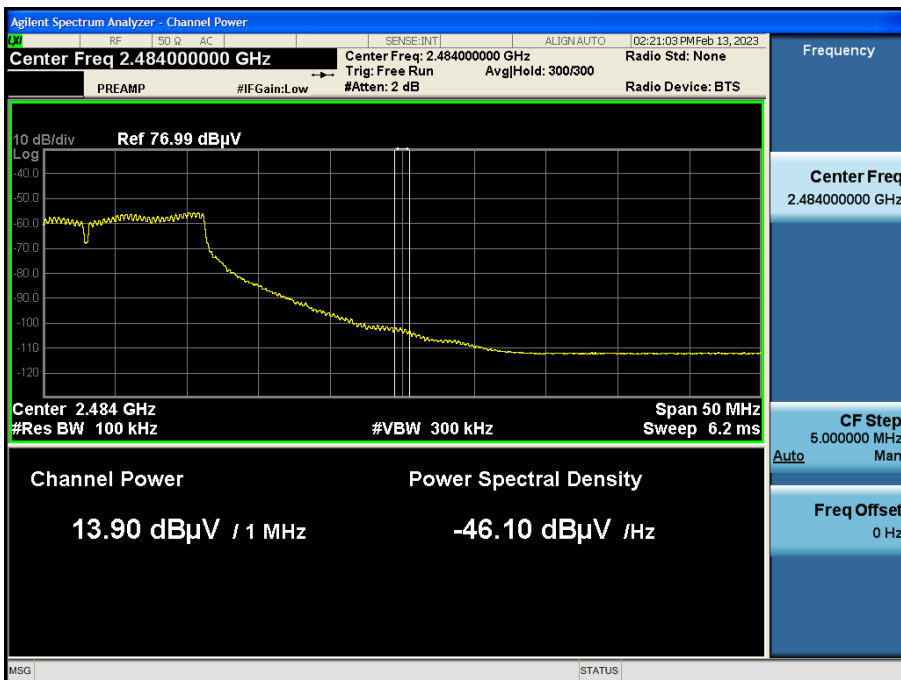
Radiated Restricted Band Edges plot – Peak Result (802.11g_ 6 Mbps, Ch.11, X-H)

Standard method Used 2483.5 ~ 2500



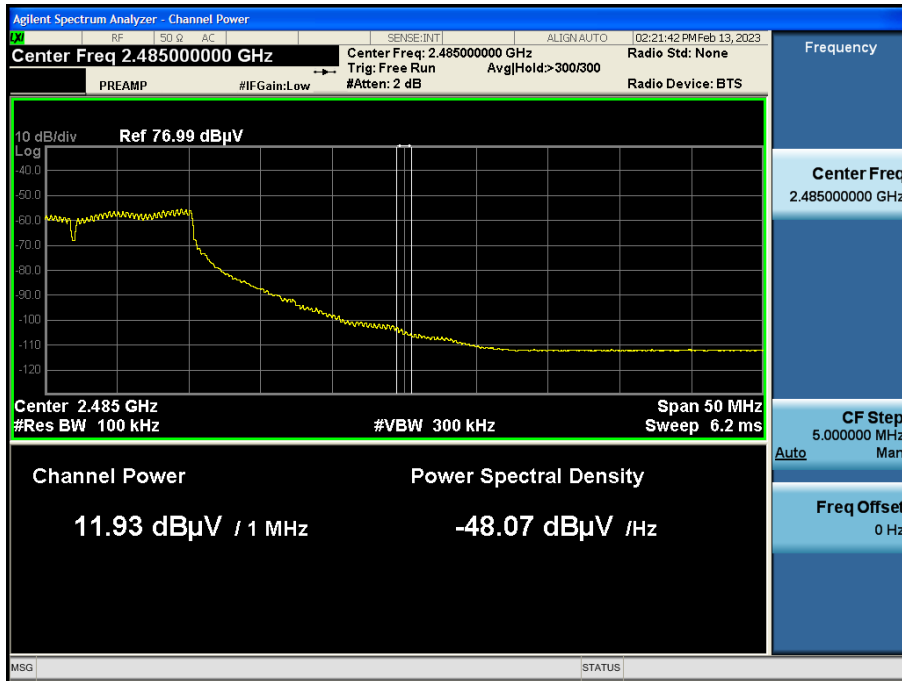
Radiated Restricted Band Edges plot – Average Result (802.11g_ 6 Mbps, Ch.11, X-H)

Integration method Used_2 484 MHz



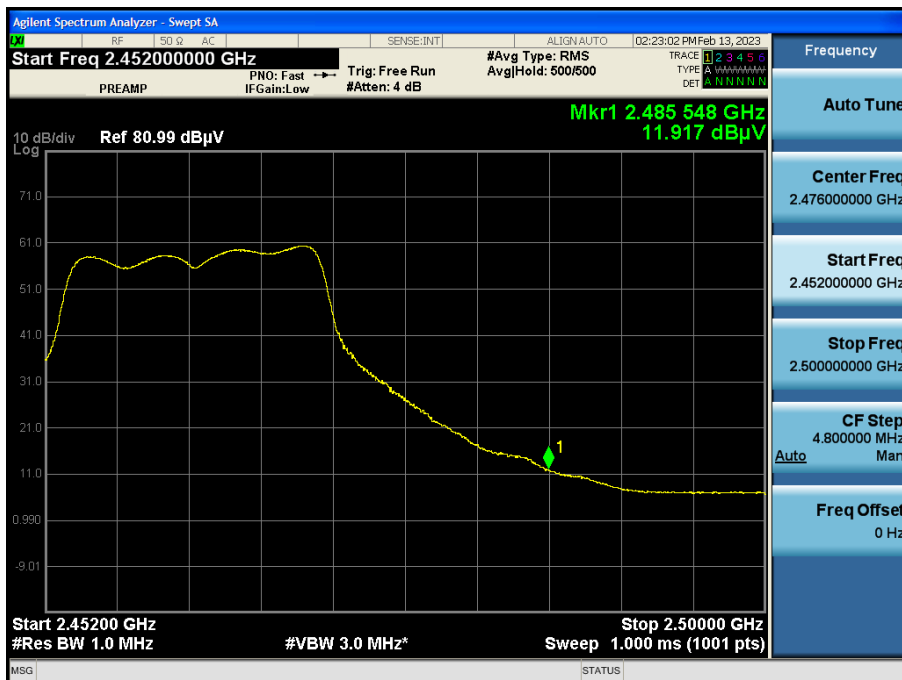
Radiated Restricted Band Edges plot – Average Result (802.11g_ 6 Mbps, Ch.11, X-H)

Integration method Used_2 485 MHz



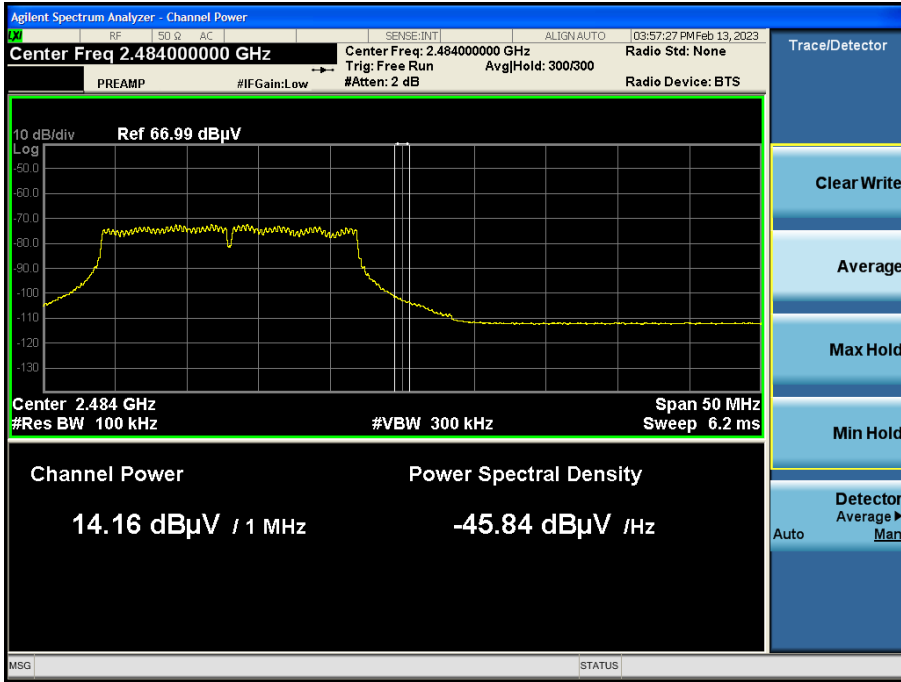
Radiated Restricted Band Edges plot – Average Result (802.11g_ 6 Mbps, Ch.11, X-H)

Standard method Used 2485.5 ~ 2500



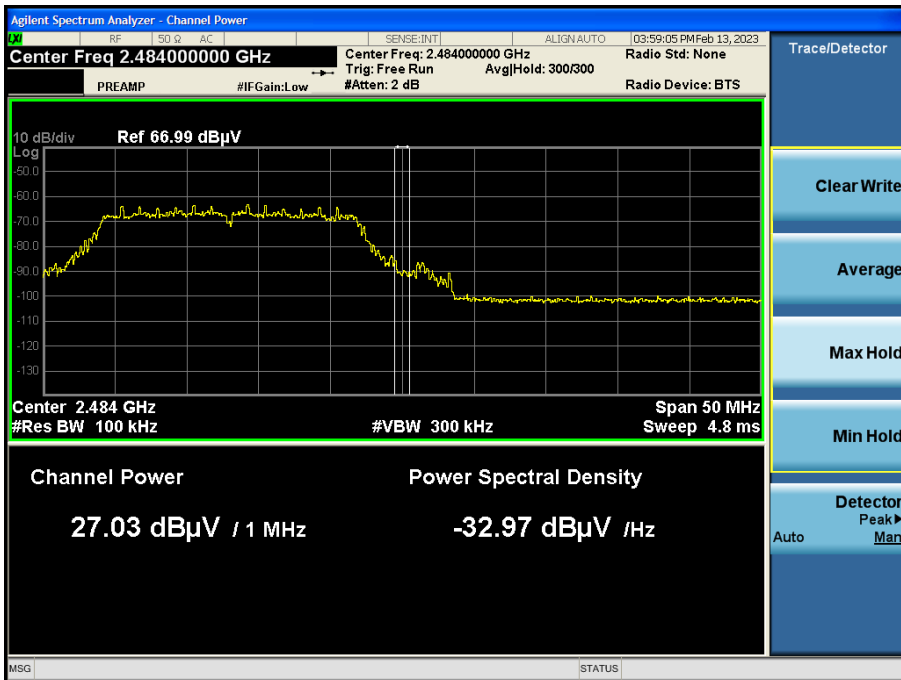
Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_ MCS0, Ch.13, X-H)

Integration method Used_2 484 MHz



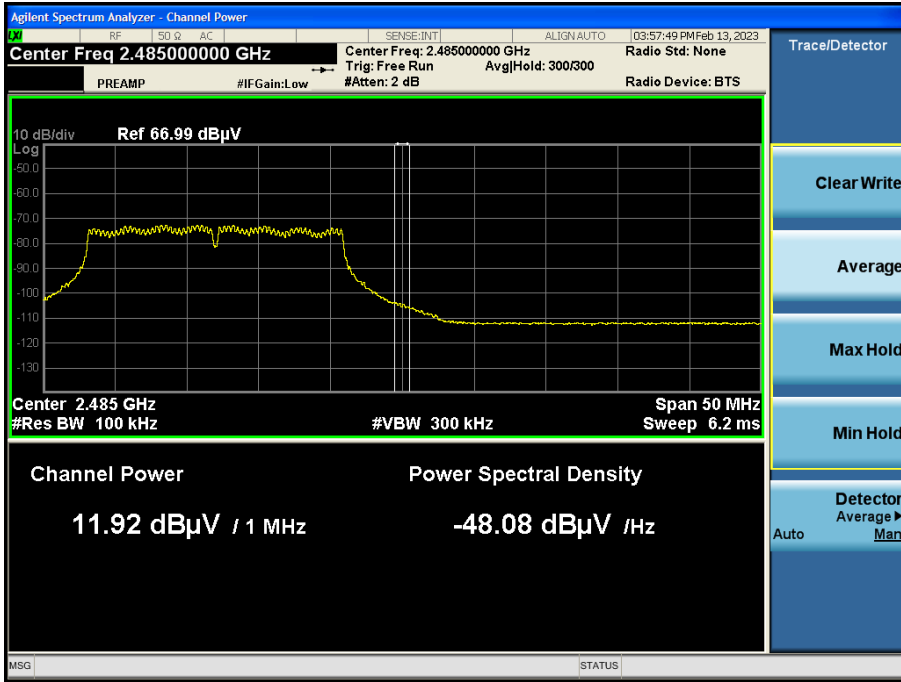
Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_ MCS0, Ch.13, X-H)

Integration method Used_2 484 MHz



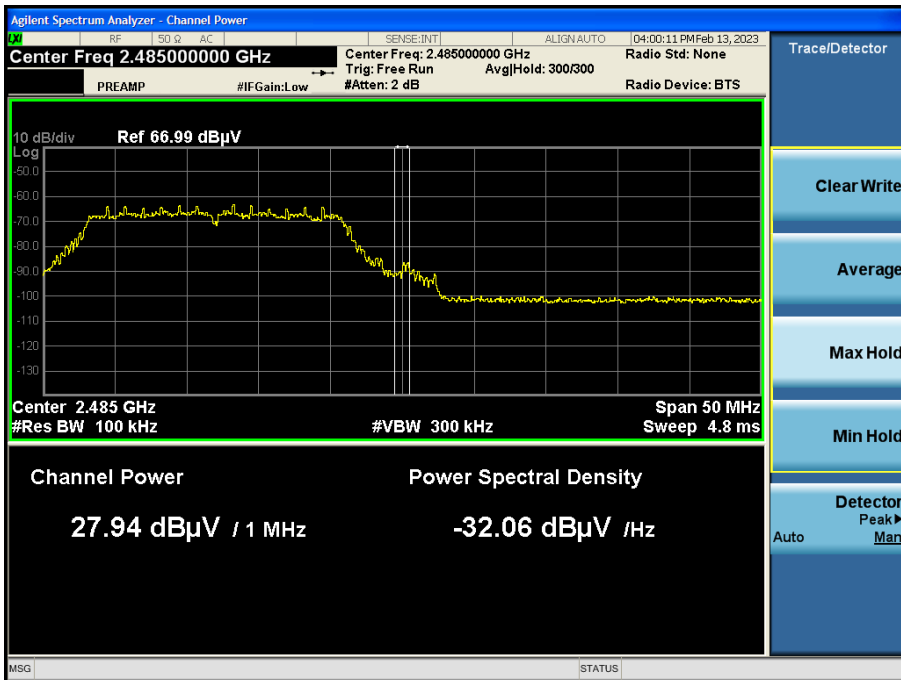
Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_ MCS0, Ch.13, X-H)

Integration method Used_2 485 MHz



Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_ MCS0, Ch.13, X-H)

Integration method Used_2 485 MHz



Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_ MCS0, Ch.13, X-H)

Standard method Used 2485.5 ~ 2500



Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_ MCS0, Ch.13, X-H)

Standard method Used 2485.5 ~ 2500



9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions

Test

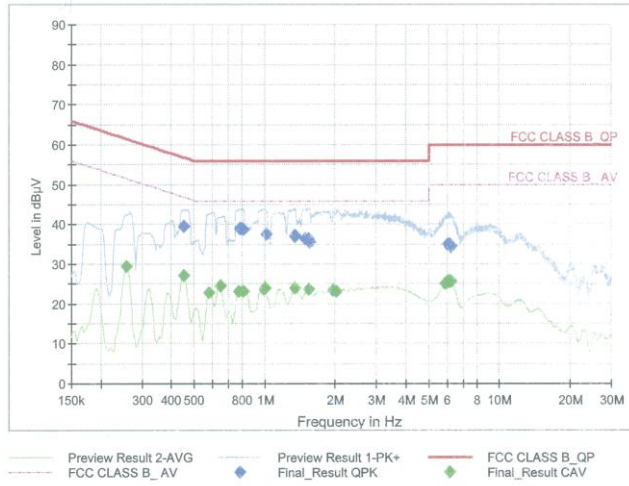
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Test Report

Common Information

EUT : SC-53D
 Operating Conditions : 2.4G WLAN Mode
 Comment :

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.4538	39.45	56.81	17.35	1000.0	9.000	L1	OFF	9.7
0.7880	39.02	56.00	16.99	1000.0	9.000	L1	OFF	9.7
0.7970	38.88	56.00	17.12	1000.0	9.000	L1	OFF	9.7
0.8015	39.06	56.00	16.94	1000.0	9.000	L1	OFF	9.7
0.8060	39.06	56.00	16.94	1000.0	9.000	L1	OFF	9.7
0.8105	38.77	56.00	17.23	1000.0	9.000	L1	OFF	9.7
1.0130	37.58	56.00	18.42	1000.0	9.000	L1	OFF	9.7
1.3438	37.08	56.00	18.92	1000.0	9.000	L1	OFF	9.7
1.3505	36.97	56.00	19.03	1000.0	9.000	L1	OFF	9.7
1.4923	36.40	56.00	19.60	1000.0	9.000	L1	OFF	9.7
1.5463	36.34	56.00	19.66	1000.0	9.000	L1	OFF	9.7
1.5530	35.47	56.00	20.53	1000.0	9.000	L1	OFF	9.7
5.9968	35.02	60.00	24.98	1000.0	9.000	L1	OFF	9.9
6.0823	34.85	60.00	25.15	1000.0	9.000	L1	OFF	9.9
6.1138	34.84	60.00	25.16	1000.0	9.000	L1	OFF	9.9
6.1340	34.93	60.00	25.07	1000.0	9.000	L1	OFF	9.9
6.2150	34.74	60.00	25.26	1000.0	9.000	L1	OFF	9.9
6.2420	34.46	60.00	25.54	1000.0	9.000	L1	OFF	9.9

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Test

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Final Result CAV

Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.2580	29.47	51.50	22.02	1000.0	9.000	L1	OFF	9.7
0.4515	27.13	46.85	19.71	1000.0	9.000	L1	OFF	9.7
0.5810	22.88	46.00	23.12	1000.0	9.000	L1	OFF	9.7
0.6440	24.57	46.00	21.43	1000.0	9.000	L1	OFF	9.7
0.7723	23.04	46.00	22.96	1000.0	9.000	L1	OFF	9.7
0.8083	23.10	46.00	22.90	1000.0	9.000	L1	OFF	9.7
0.9905	23.79	46.00	22.21	1000.0	9.000	L1	OFF	9.7
0.9995	23.85	46.00	22.15	1000.0	9.000	L1	OFF	9.7
1.3483	23.98	46.00	22.02	1000.0	9.000	L1	OFF	9.7
1.5373	23.69	46.00	22.31	1000.0	9.000	L1	OFF	9.7
1.9558	23.39	46.00	22.61	1000.0	9.000	L1	OFF	9.7
2.0188	23.22	46.00	22.78	1000.0	9.000	L1	OFF	9.7
5.8843	25.13	50.00	24.87	1000.0	9.000	L1	OFF	9.9
5.9968	25.63	50.00	24.37	1000.0	9.000	L1	OFF	9.9
6.0800	25.79	50.00	24.21	1000.0	9.000	L1	OFF	9.9
6.1295	25.78	50.00	24.22	1000.0	9.000	L1	OFF	9.9
6.1700	25.73	50.00	24.27	1000.0	9.000	L1	OFF	9.9
6.1880	25.72	50.00	24.28	1000.0	9.000	L1	OFF	9.9

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10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/22/2023	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Agilent	MY49432108	03/08/2023	Annual
Power Measurement Set	OSP 120	Rohde & Schwarz	101231	06/14/2023	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Agilent	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2023	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/06/2024	Annual
DC Power Supply	E3632A	HP	KR75303243	04/25/2023	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C	HP	08285	06/21/2023	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	03/07/2023	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A
Bluetooth Tester	CBT	Rohde & Schwarz	100808	02/16/2024	Annual

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
EM1000 / Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Amp &Filter Bank Switch Controller	FBSM-01B	TNM system	TM19050002	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/16/2024	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1300	01/18/2024	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Spectrum Analyzer	FSV(10 Hz ~ 40 GHz)	Rohde & Schwarz	101055	05/16/2023	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/05/2024	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/13/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/13/2023	Annual
High Pass Filter(7 GHz ~ 18 GHz)	WHKX10-7150-8000-18000-50SS	Wainwright Instruments	1	03/11/2023	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000175	04/05/2023	Annual
HPF(3~18GHz)+LNA1(1~18GHz)	FMSR-05B	TNM system	F6	01/17/2024	Annual
ATT(10dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/17/2024	Annual
ATT(3dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/17/2024	Annual
LNA1(1~18GHz)	FMSR -05B	TNM system	25540	01/17/2024	Annual
HPF(7~18GHz)+LNA2(6~18GHz)	FMSR -05B	TNM system	28550	01/17/2024	Annual
Thru(30MHz ~ 18GHz)	FMSR -05B	TNM system	None	01/17/2024	Annual

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

11. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2302-FC025-P