

FCC DTS REPORT

Certification

| | |
|---|---|
| Applicant Name: SAMSUNG Electronics Co., Ltd. | Date of Issue: October 17, 2023 |
| Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea | Test Site/Location: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA |
| | Report No.: HCT-RF-2310-FC060 |

| | |
|-------------------|--------------------------------------|
| FCC ID: | A3LSMS926B |
| APPLICANT: | SAMSUNG Electronics Co., Ltd. |

| | |
|------------------------------|--|
| Model: | SM-S926B/DS |
| Additional Model: | SM-S926B |
| EUT Type: | Mobile phone |
| Average Output Power: | 802.11b : 17.85 dBm 802.11g : 16.73 dBm |
| Ant.1 : | 802.11n(HT20) : 16.68 dBm 802.11ac(VHT20) : 16.67 dBm |
| Ant.2 | 802.11b : 17.90 dBm 802.11g : 16.86 dBm 802.11n(HT20) : 16.86 dBm 802.11ac(VHT20) : 16.41 dBm |
| MIMO_CDD(Ant1+Ant2): | 802.11b : 20.89 dBm 802.11g : 19.80 dBm 802.11n(HT20) : 19.79 dBm 802.11ac(VHT20) : 19.68 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-2310-FC060

REVIEWED BY



Report prepared by : Kyung Jun Woo
Engineer of Telecommunication Testing Center

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

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

Test Report Statement:

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.

The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

| TEST REPORT NO. | DATE | DESCRIPTION |
|-------------------|------------------|-------------------------|
| HCT-RF-2310-FC060 | October 17, 2023 | - First Approval Report |

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1. EUT DESCRIPTION

| | | | |
|-----------------------------|---|----------------------|--|
| Model | SM-S926B/DS | | |
| Additional Model | SM-S926B | | |
| EUT Type | Mobile phone | | |
| Power Supply | DC 3.88 V | | |
| Frequency Range | 2 412 MHz ~ 2 472 MHz | | |
| Max. RF Output Power | <u>Average Power</u> | Ant.1 | 802.11b : 17.85 dBm 802.11g : 16.73 dBm 802.11n(HT20) : 16.68 dBm 802.11ac(VHT20) : 16.67 dBm |
| | | Ant.2 | 802.11b : 17.90 dBm 802.11g : 16.86 dBm 802.11n(HT20) : 16.86 dBm 802.11ac(VHT20) : 16.41 dBm |
| | | MIMO_CDD (Ant1+Ant2) | 802.11b : 20.89 dBm 802.11g : 19.80 dBm 802.11n(HT20) : 19.79 dBm 802.11ac(VHT20) : 19.68 dBm |
| | <u>Peak Power</u> | Ant.1 | 802.11b : 23.81 dBm 802.11g : 23.96 dBm 802.11n(HT20) : 23.85 dBm 802.11ac(VHT20) : 23.80 dBm |
| | | Ant.2 | 802.11b : 23.65 dBm 802.11g : 24.62 dBm 802.11n(HT20) : 24.75 dBm 802.11ac(VHT20) : 24.42 dBm |
| | | MIMO_CDD (Ant1+Ant2) | 802.11b : 26.74 dBm 802.11g : 27.31 dBm 802.11n(HT20) : 27.34 dBm 802.11ac(VHT20) : 27.17 dBm |
| Modulation Type | DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n, 802.11ac | | |
| Number of Channels | 13 Channels | | |
| Date(s) of Tests | August 30, 2023 ~ October 13, 2023 | | |
| Serial number | Radiated: R3CW70NE10P Conducted : 7414f9c84c0f7ece | | |

ANTENNA CONFIGURATIONS

1. Antenna configuration

| Configurations | SISO | | MIMO | |
|-----------------|------|------|------|-----|
| | Ant1 | Ant2 | CDD | SDM |
| 802.11b | O | O | O | X |
| 802.11g | O | O | O | X |
| 802.11n(HT20) | O | O | O | O |
| 802.11ac(VHT20) | O | O | 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. This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the 2.4 GHz and 5 GHz or 6 GHz Bands simultaneously on each antenna.

| RSDB Scenario | 2.4 GHz | 2.4 GHz | 5 GHz | 5 GHz | 6 GHz | 6 GHz | Bluetooth Ant.1 | Bluetooth Ant.2 | Test Case |
|--|---------------|---------------|---------------|---------------|---------------|---------------|--------------------|--------------------|-----------|
| | WiFi Ant.1 | WiFi Ant.2 | WiFi Ant.1 | WiFi Ant.2 | WiFi Ant.1 | WiFi Ant.2 | | | |
| 2.4 GHz WiFi MIMO + 5 GHz WiFi MIMO | on | on | on | on | | | | | Scenario1 |
| 2.4 GHz WiFi MIMO + 6 GHz WiFi MIMO | on | on | | | on | on | | | |
| Bluetooth ANT.1 + 2.4 GHz WiFi ANT.2 + 5 GHz WiFi MIMO | | on | on | on | | | on | | Scenario2 |
| Bluetooth ANT.1 + 2.4 GHz WiFi ANT.2 + 6 GHz WiFi MIMO | | on | | | on | on | on | | |
| Dual Bluetooth + 5 GHz WiFi MIMO | | | on | on | | | on | on | Scenario3 |
| Dual Bluetooth + 6 GHz WiFi MIMO | | | | | on | on | on | on | |

3. Directional Gain Calculation

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

Directional gain(CDD) =

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

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

| Ant Gain (dBi) | | N _{ANT} / N _{ss} | Directional Gain (dBi) | |
|----------------|-------|------------------------------------|------------------------|-------|
| | | | CDD | SDM |
| ANT1 | -2.53 | CDD 2 / 1 SDM 2 / 2 | -0.34 | -2.53 |
| ANT2 | -4.25 | | | |

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.

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

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

Sample MIMO Calculation:

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

$$Ant1 + Ant 2 = MIMO$$

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

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 March 31, 2022 (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.

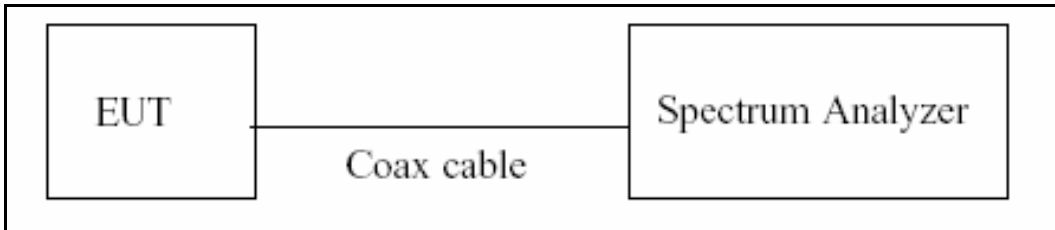
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| 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 $> 50/T$.

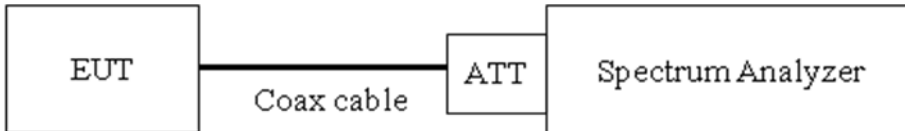
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Average
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10\log(1/\text{Duty Cycle})$

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.

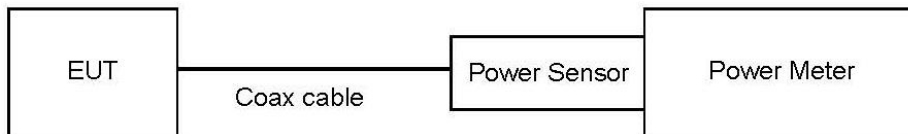
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

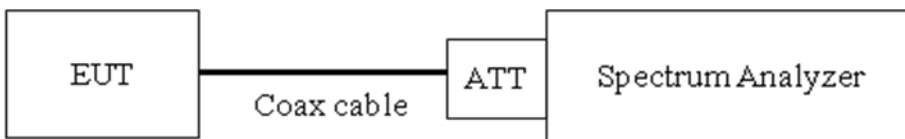
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

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

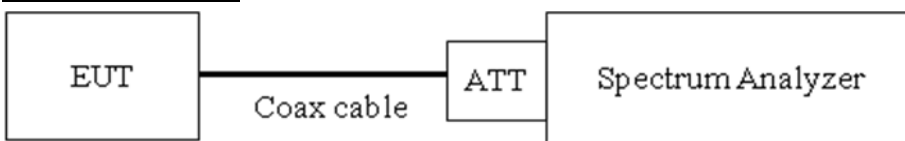
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

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 | 10.33 |
| 100 | 10.45 |
| 200 | 10.55 |
| 300 | 10.61 |
| 400 | 10.64 |
| 500 | 10.66 |
| 600 | 10.68 |
| 700 | 10.70 |
| 800 | 10.77 |
| 900 | 10.85 |
| 1 000 | 10.91 |
| 2 000 | 11.00 |
| 2 400 | 11.10 |
| 2 500 | 11.10 |
| 3 000 | 11.42 |
| 4 000 | 11.68 |
| 5 000 | 12.62 |
| 5 150 | 12.62 |
| 6 000 | 12.62 |
| 7 000 | 12.93 |
| 8 000 | 13.12 |
| 9 000 | 13.19 |
| 10 000 | 13.24 |
| 11 000 | 13.38 |
| 12 000 | 13.43 |
| 13 000 | 13.49 |
| 14 000 | 13.66 |
| 15 000 | 13.96 |
| 16 000 | 14.12 |
| 17 000 | 14.15 |
| 18 000 | 14.05 |
| 19 000 | 14.08 |
| 20 000 | 13.97 |
| 21 000 | 14.23 |
| 22 000 | 14.67 |
| 23 000 | 14.49 |
| 24 000 | 14.62 |
| 25 000 | 14.60 |

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

2. Factor = Attenuator loss + Cable loss

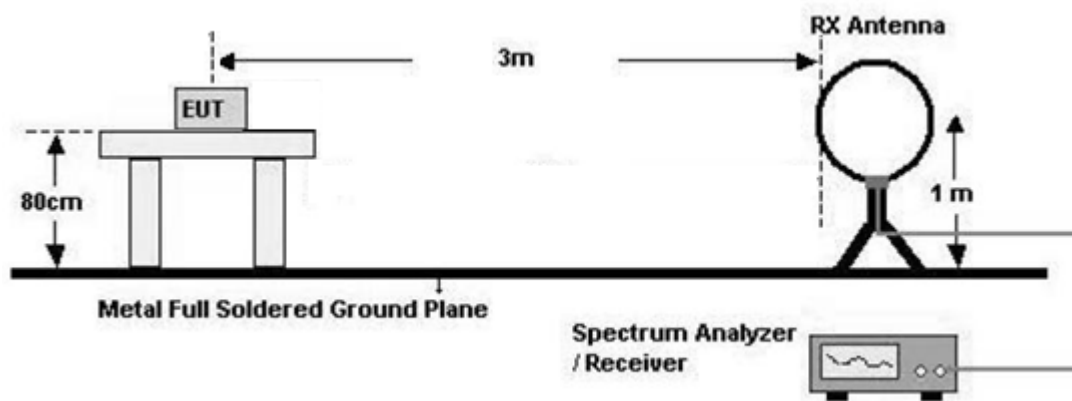
7.6. Radiated Test

Limit

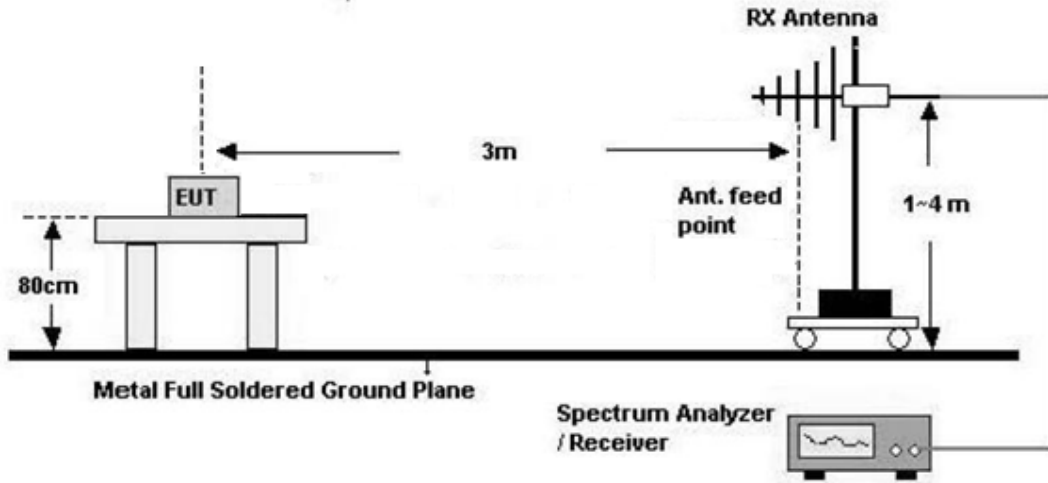
| Frequency (MHz) | Field Strength ($\mu\text{V/m}$) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150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

Test Configuration

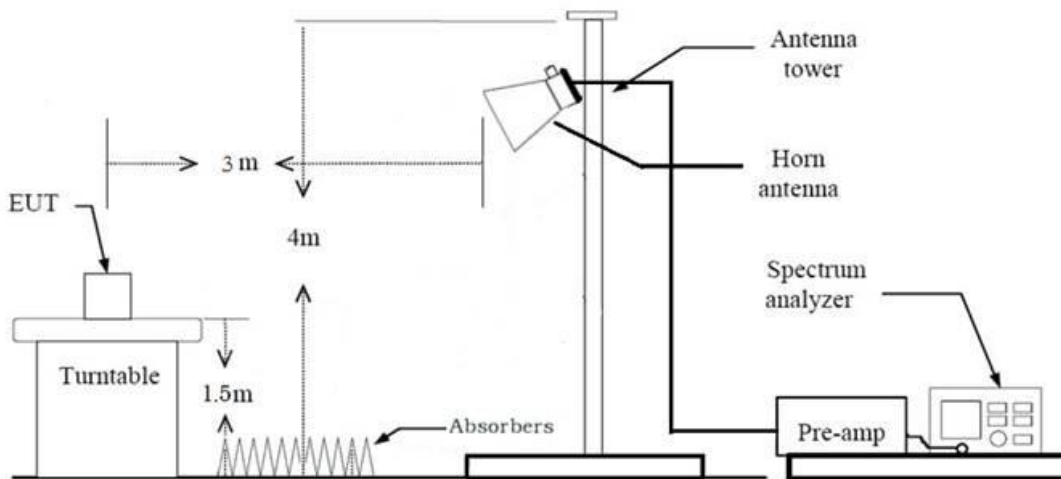
Below 30 MHz



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)

= Peak Measured Value

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

= Average Measured Value

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

= Average Measured Value + Duty Cycle Factor

- We apply to the offset in range 1 GHz - 18 GHz

- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) - Amp.Gain(A.G)

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)
= Peak Measured Value
- Total(Measurement Type : Average, Duty cycle \geq 98 %)
= Average Measured Value
- Total(Measurement Type : Average, Duty cycle < 98 %)
= Average Measured Value + Duty Cycle Factor
- We apply to the offset in range 1 GHz - 18 GHz
 - The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

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. All Antenna of operation were investigated and the worst case results are reported
 - Mode : SISO, Ant.1+Ant.2(SDM), Ant.1+Ant.2(CDD)
 - Worst case : Ant.1+Ant.2(CDD)
3. EUT Axis
 - Radiated Spurious Emissions : Y
 - Radiated Restricted Band Edge : Y
4. Duty cycle factor applies only 802.11g/n/ac (Duty cycle < 98 %).
5. 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
 - 802.11ac(VHT20): MCS0
6. 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
7. Radiated Spurious Emission
 - All mode of operation were investigated and the worst case results are reported.
 - Mode: 802.11b, 802.11g, 802.11n(HT20), 802.11ac(VHT20)
 - Worstcase: 802.11b
8. SM-S926B/DS, SM-S926B were tested and the worst case results are reported.
(Worst case : SM-S926B/DS)

Radiated test(RSDB)

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone, Stand alone + External accessories(Earphone, Keyboard, etc)
- Worstcase : Stand alone

2. EUT Axis

- Radiated Spurious Emissions : X, Y

3. All of RSDB Scenario were investigated and the worst case configuration results are reported.

| RSDB Scenario | 2.4 GHz WiFi Ant.1 | 2.4 GHz WiFi Ant.2 | 5 GHz WiFi Ant.1 | 5 GHz WiFi Ant.2 | 6 GHz WiFi Ant.1 | 6 GHz WiFi Ant.2 | Bluetooth Ant.1 | Bluetooth Ant.2 | Test Case |
|--|--------------------|--------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------|
| 2.4 GHz WiFi MIMO + 5 GHz WiFi MIMO | on | on | on | on | | | | | Scenario1 |
| 2.4 GHz WiFi MIMO + 6 GHz WiFi MIMO | on | on | | | on | on | | | |
| Bluetooth ANT.1 + 2.4 GHz WiFi ANT.2 + 5 GHz WiFi MIMO | | on | on | on | | | on | | Scenario2 |
| Bluetooth ANT.1 + 2.4 GHz WiFi ANT.2 + 6 GHz WiFi MIMO | | on | | | on | on | on | | |
| Dual Bluetooth + 5 GHz WiFi MIMO | | | on | on | | | on | on | Scenario3 |
| Dual Bluetooth + 6 GHz WiFi MIMO | | | | | on | on | on | on | |

4. The RSDB mode test investigated both intermodulation and radiated spurious emissions.

And the worst results were reported.

- Worst result: Radiated spurious emissions
- Intermodulation: No signals are generated.
- Radiated spurious emissions: cf. Section 9.6.

5. The following tables show the worst case configurations determined during testing.

(Worst case: The lowest margin condition the channels and modes were selected for test.)

| RSDB Scenario 1 | Description | 2.4GHz Emission | 5 GHz Emission |
|--|-------------|-----------------|----------------|
| 2.4 GHz WiFi MIMO + 5 GHz WiFi MIMO | Antenna | Ant All | Ant All |
| | Channel | 11 | 100 |
| | Data Rate | 1 Mbps | 6 Mbps |
| | Mode | 802.11b | 802.11a |

Note : DTS, UNII RSDB Data refer to [DTS], [UNII] Test Report

| RSDB Scenario 2 | Description | Bluetooth Emission | 2.4GHz Emission | 5 GHz Emission |
|----------------------|-------------|--------------------|-----------------|----------------|
| Bluetooth ANT.1 + | Antenna | ANT1 | ANT2 | Ant All |
| | Channel | 39 | 11 | 100 |
| 2.4 GHz WiFi ANT.2 + | Data Rate | 1 Mbps | 1 Mbps | 6 Mbps |
| 5 GHz WiFi MIMO | Mode | GFSK | 802.11b | 802.11a |

Note : DTS, UNII RSDB Data refer to [DTS], [UNII] Test Report

| RSDB Scenario 3 | Description | Bluetooth Emission | 5 GHz Emission |
|-------------------------------------|-------------|--------------------|----------------|
| Dual Bluetooth + 5 GHz WiFi MIMO | Antenna | Dual | Ant All |
| | Channel | 0 | 100 |
| | Data Rate | 1 Mbps | 6 Mbps |
| | Mode | GFSK | 802.11a |

Note : BT, UNII RSDB Data refer to [BT], [UNII] Test Report

6. SM-S926B/DS, SM-S926B were tested and the worst case results are reported.

(Worst case : SM-S926B/DS)

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. SM-S926B/DS, SM-S926B were tested and the worst case results are reported.
(Worst case : SM-S926B/DS)

Conducted test

1. The EUT was configured with data rate of highest power.
2. SM-S926B/DS, SM-S926B were tested and the worst case results are reported.
(Worst case : SM-S926B/DS)

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 |

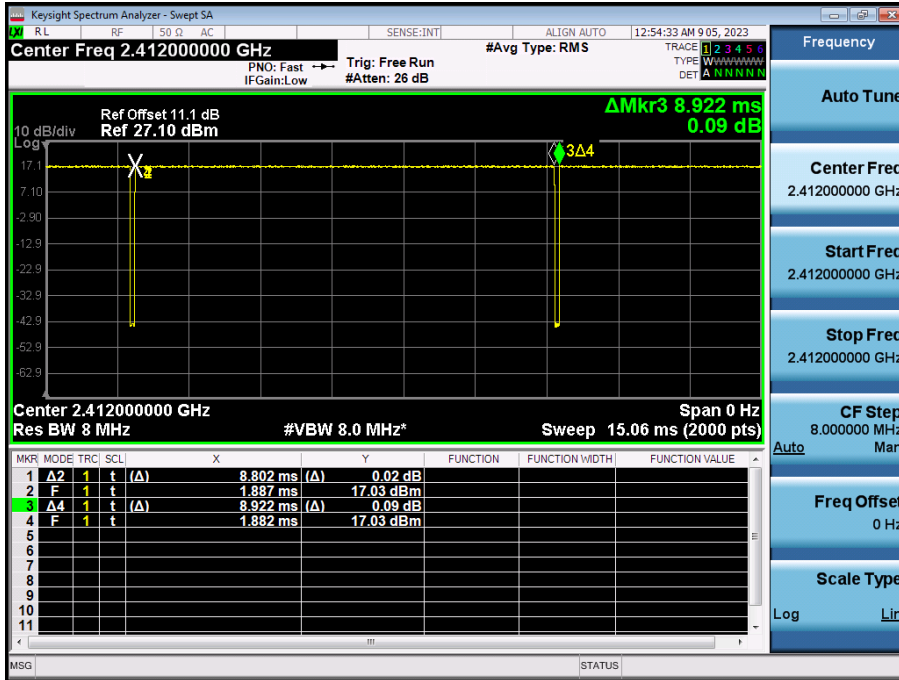
9. TEST RESULT

9.1 DUTY CYCLE

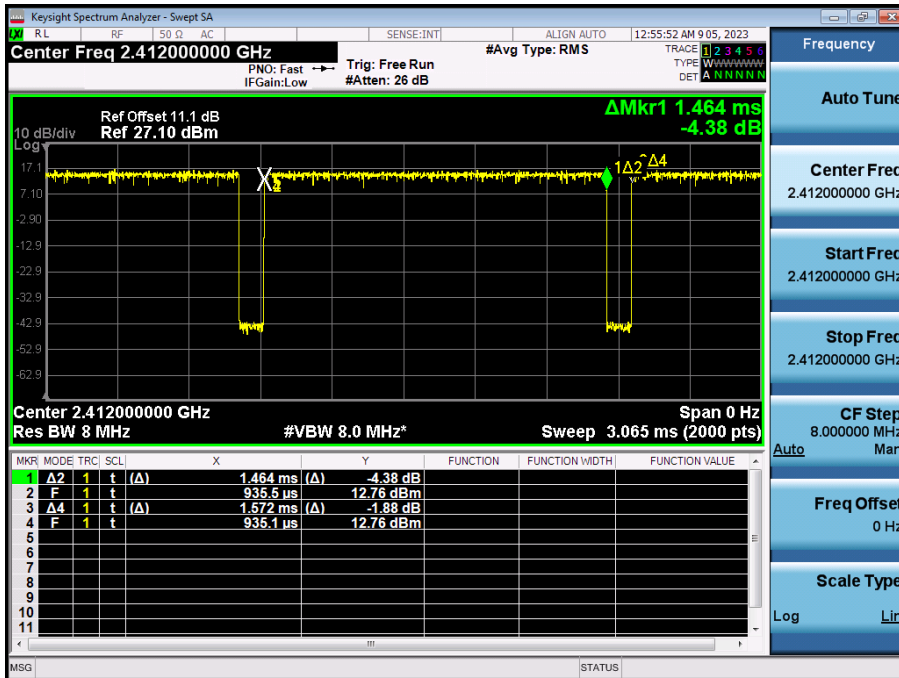
| Mode | Data Rate | T _{on} (ms) | T _{total} (ms) | Duty Cycle | Duty Cycle Factor (dB) |
|---------------------|-----------|-------------------------|----------------------------|------------|---------------------------|
| 802.11b | 1 Mbps | 8.802 | 8.922 | 0.987 | 0.059 |
| | 2 Mbps | 4.410 | 4.511 | 0.978 | 0.099 |
| | 5.5 Mbps | 1.664 | 1.766 | 0.943 | 0.257 |
| | 11 Mbps | 0.882 | 0.983 | 0.897 | 0.473 |
| 802.11g | 6 Mbps | 1.464 | 1.572 | 0.931 | 0.309 |
| | 9 Mbps | 0.985 | 1.094 | 0.900 | 0.455 |
| | 12 Mbps | 0.747 | 0.854 | 0.875 | 0.578 |
| | 18 Mbps | 0.507 | 0.613 | 0.826 | 0.828 |
| | 24 Mbps | 0.388 | 0.494 | 0.785 | 1.053 |
| | 36 Mbps | 0.266 | 0.372 | 0.714 | 1.461 |
| | 48 Mbps | 0.205 | 0.357 | 0.574 | 2.407 |
| | 54 Mbps | 0.187 | 0.347 | 0.540 | 2.675 |
| 802.11n (HT20) | MCS0 | 1.246 | 1.355 | 0.920 | 0.364 |
| | MCS1 | 0.646 | 0.752 | 0.859 | 0.662 |
| | MCS2 | 0.441 | 0.550 | 0.802 | 0.959 |
| | MCS3 | 0.342 | 0.448 | 0.763 | 1.176 |
| | MCS4 | 0.241 | 0.393 | 0.613 | 2.126 |
| | MCS5 | 0.190 | 0.360 | 0.528 | 2.772 |
| | MCS6 | 0.175 | 0.360 | 0.486 | 3.138 |
| | MCS7 | 0.162 | 0.360 | 0.451 | 3.461 |
| 802.11ac (VHT20) | MCS0 | 1.251 | 1.360 | 0.920 | 0.363 |
| | MCS1 | 0.651 | 0.757 | 0.860 | 0.657 |
| | MCS2 | 0.443 | 0.552 | 0.803 | 0.954 |
| | MCS3 | 0.345 | 0.453 | 0.760 | 1.193 |
| | MCS4 | 0.246 | 0.380 | 0.647 | 1.893 |
| | MCS5 | 0.193 | 0.390 | 0.494 | 3.067 |
| | MCS6 | 0.177 | 0.357 | 0.496 | 3.041 |
| | MCS7 | 0.167 | 0.355 | 0.471 | 3.266 |
| | MCS8 | 0.147 | 0.352 | 0.417 | 3.796 |

Test Plots

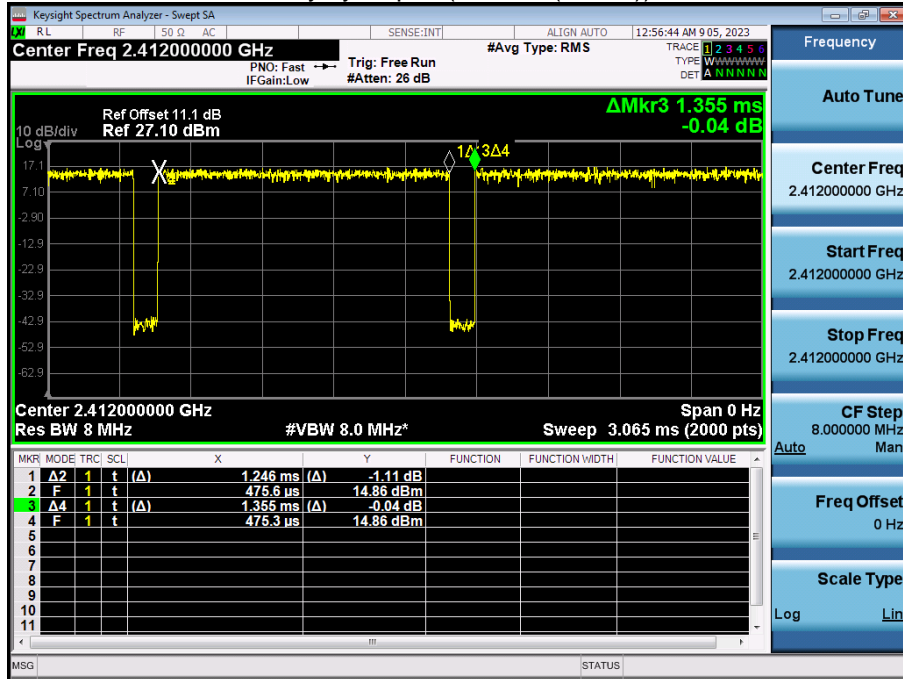
Duty cycle plot (802.11b(1 Mbps))



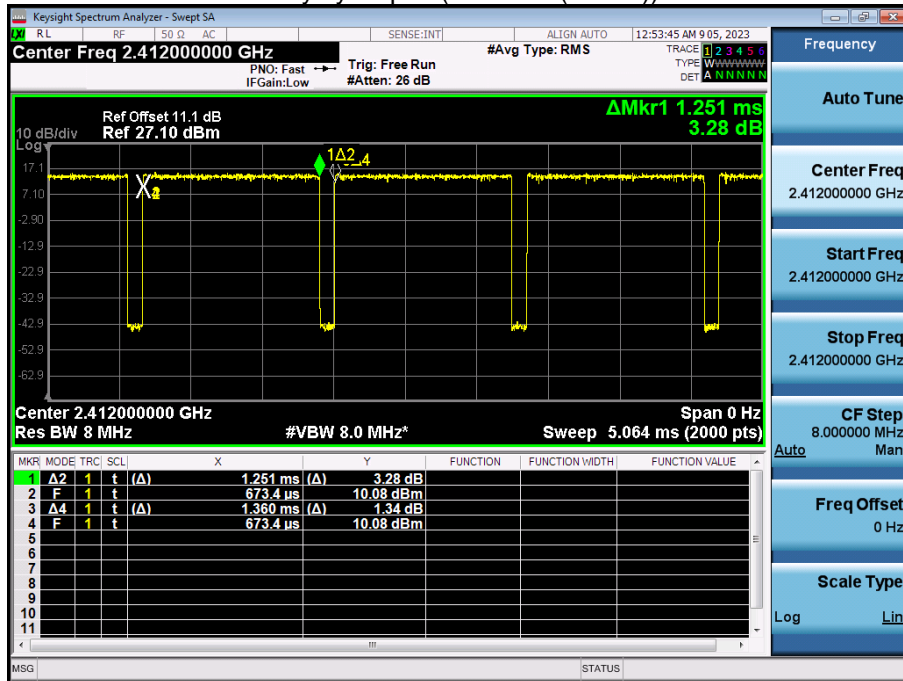
Duty cycle plot (802.11g(6 Mbps))



Duty cycle plot (802.11n(MCS0))



Duty cycle plot (802.11ac(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. | 6 dB Bandwidth [MHz] | Minimum Bandwidth [MHz] |
|-----------------|----------------------------|------------------------|---------------------------------|------------------------------------|
| 802.11b | 2412 | 1 | 9.112 | 0.50 |
| | 2437 | 6 | 9.130 | 0.50 |
| | 2462 | 11 | 9.129 | 0.50 |
| | 2467 | 12 | 9.130 | 0.50 |
| | 2472 | 13 | 9.131 | 0.50 |
| 802.11g | 2412 | 1 | 16.10 | 0.50 |
| | 2437 | 6 | 16.40 | 0.50 |
| | 2462 | 11 | 16.38 | 0.50 |
| | 2467 | 12 | 16.39 | 0.50 |
| | 2472 | 13 | 16.37 | 0.50 |
| 802.11n(HT20) | 2412 | 1 | 17.23 | 0.50 |
| | 2437 | 6 | 17.62 | 0.50 |
| | 2462 | 11 | 17.59 | 0.50 |
| | 2467 | 12 | 17.62 | 0.50 |
| | 2472 | 13 | 17.60 | 0.50 |
| 802.11ac(VHT20) | 2412 | 1 | 17.23 | 0.50 |
| | 2437 | 6 | 17.62 | 0.50 |
| | 2462 | 11 | 17.60 | 0.50 |
| | 2467 | 12 | 17.62 | 0.50 |
| | 2472 | 13 | 17.59 | 0.50 |

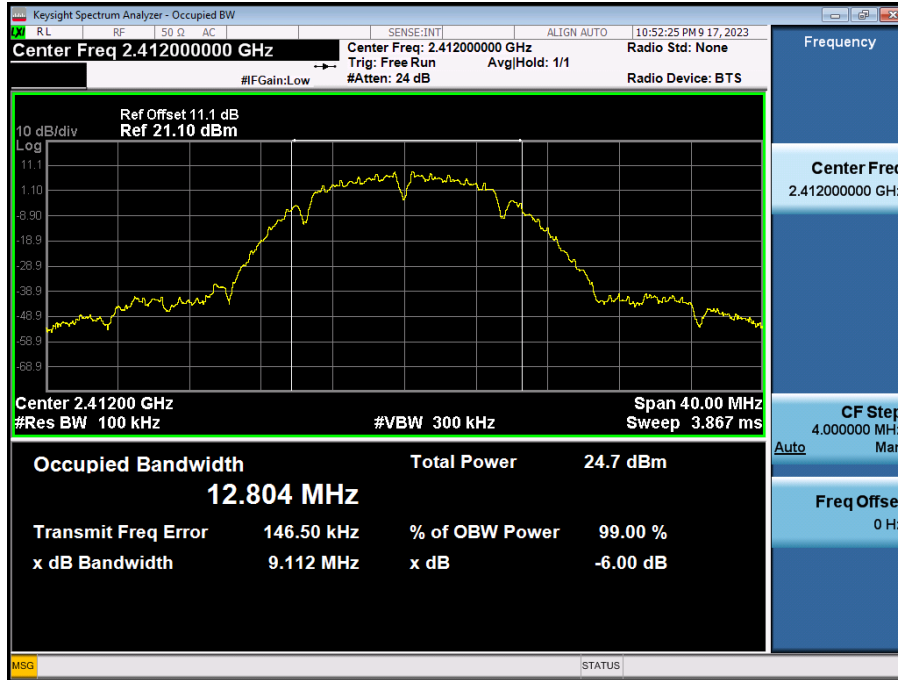
[ANT. 2]

| Mode | Frequency [MHz] | Channel No. | 6 dB Bandwidth [MHz] | Minimum Bandwidth [MHz] |
|-----------------|----------------------------|------------------------|---------------------------------|------------------------------------|
| 802.11b | 2412 | 1 | 9.118 | 0.50 |
| | 2437 | 6 | 9.138 | 0.50 |
| | 2462 | 11 | 9.111 | 0.50 |
| | 2467 | 12 | 9.571 | 0.50 |
| | 2472 | 13 | 8.649 | 0.50 |
| 802.11g | 2412 | 1 | 16.00 | 0.50 |
| | 2437 | 6 | 16.38 | 0.50 |
| | 2462 | 11 | 16.36 | 0.50 |
| | 2467 | 12 | 16.38 | 0.50 |
| | 2472 | 13 | 16.11 | 0.50 |
| 802.11n(HT20) | 2412 | 1 | 17.23 | 0.50 |
| | 2437 | 6 | 17.61 | 0.50 |
| | 2462 | 11 | 17.34 | 0.50 |
| | 2467 | 12 | 17.59 | 0.50 |
| | 2472 | 13 | 17.23 | 0.50 |
| 802.11ac(VHT20) | 2412 | 1 | 17.21 | 0.50 |
| | 2437 | 6 | 17.60 | 0.50 |
| | 2462 | 11 | 17.57 | 0.50 |
| | 2467 | 12 | 17.61 | 0.50 |
| | 2472 | 13 | 17.24 | 0.50 |

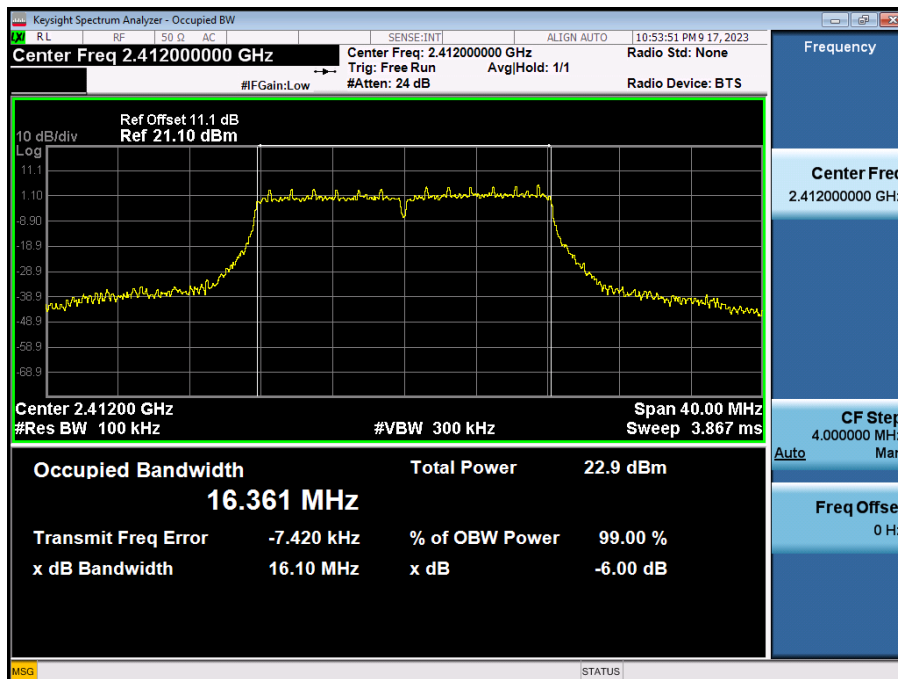
☑ Test Plots

[ANT. 1]

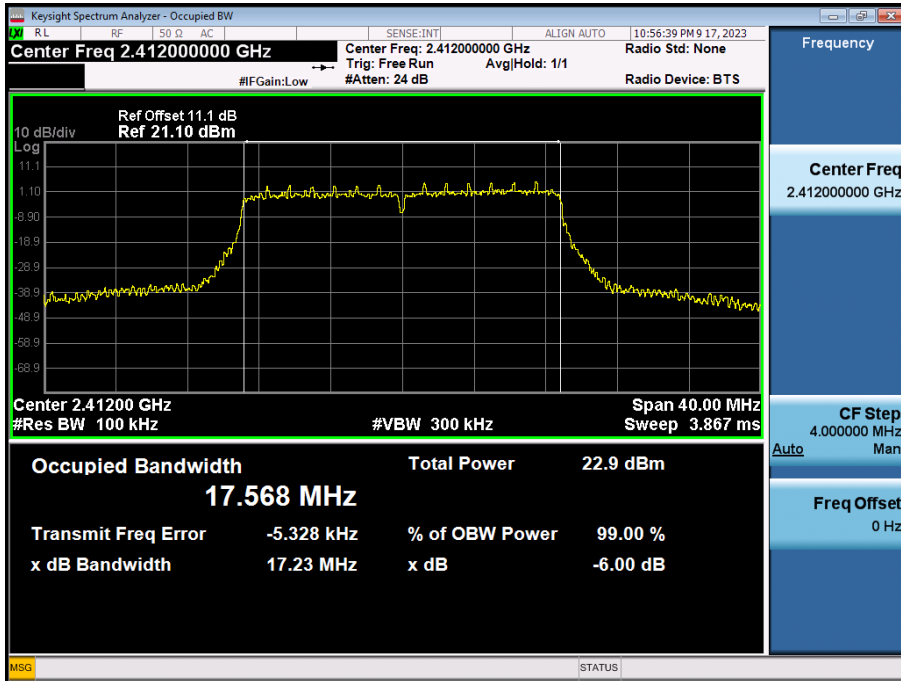
6 dB Bandwidth plot (802.11b-CH 1)



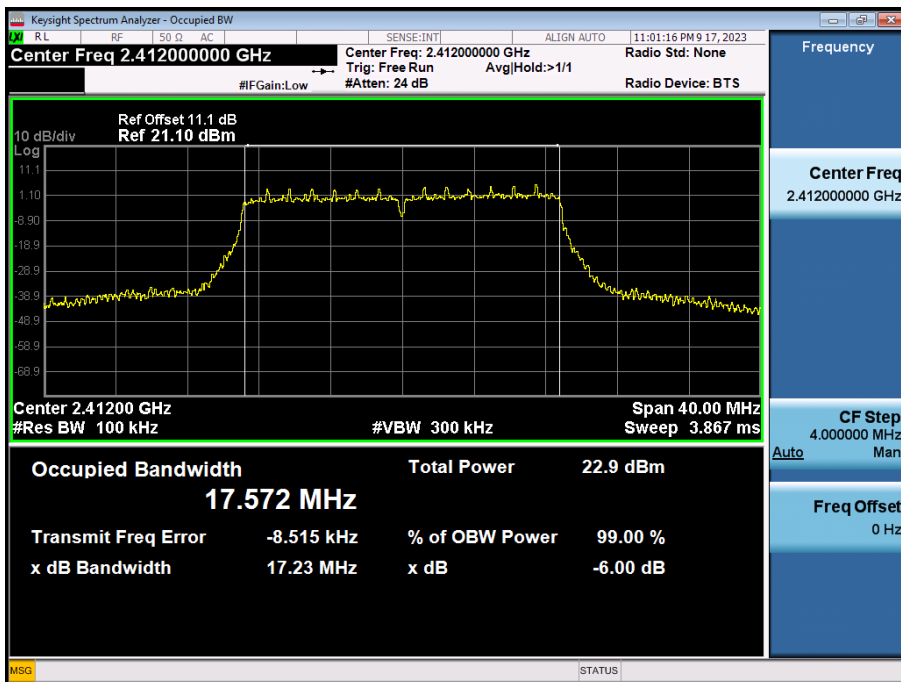
6 dB Bandwidth plot (802.11g-CH 1)



6 dB Bandwidth plot (802.11n_HT20-CH 1)

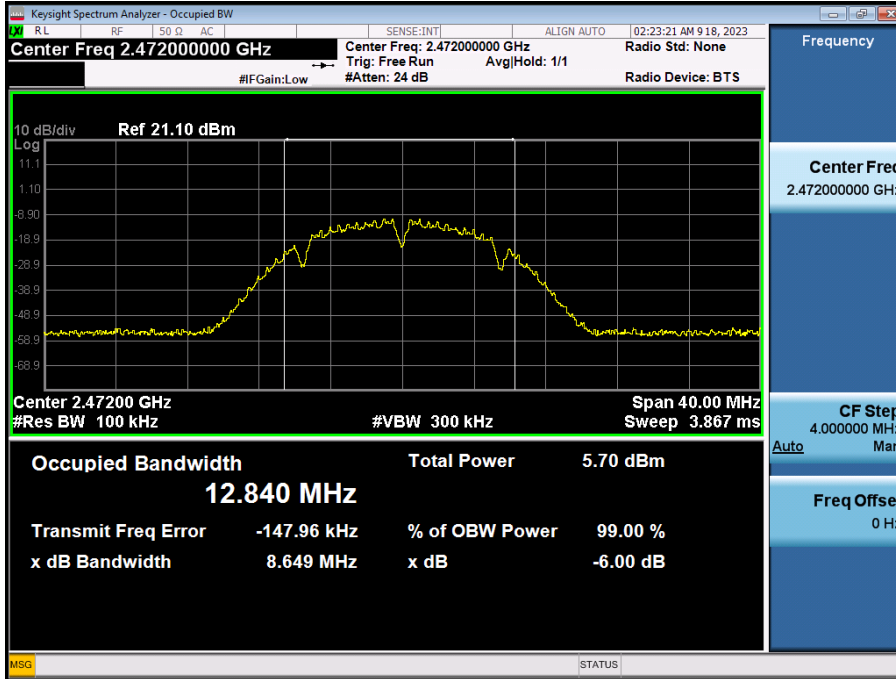


6 dB Bandwidth plot (802.11ac_VHT20-CH 1)



[ANT. 2]

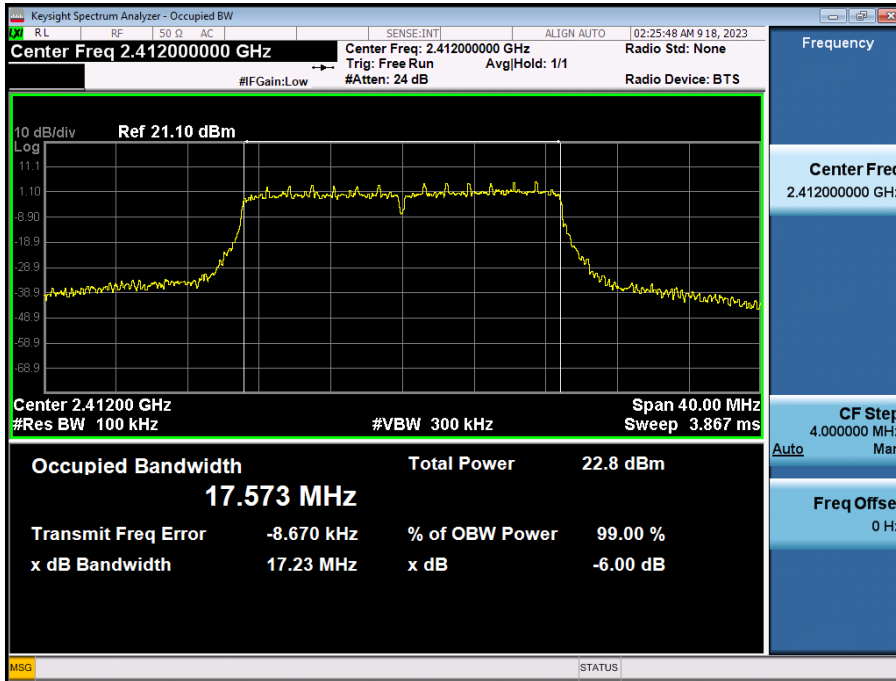
6 dB Bandwidth plot (802.11b-CH 13)



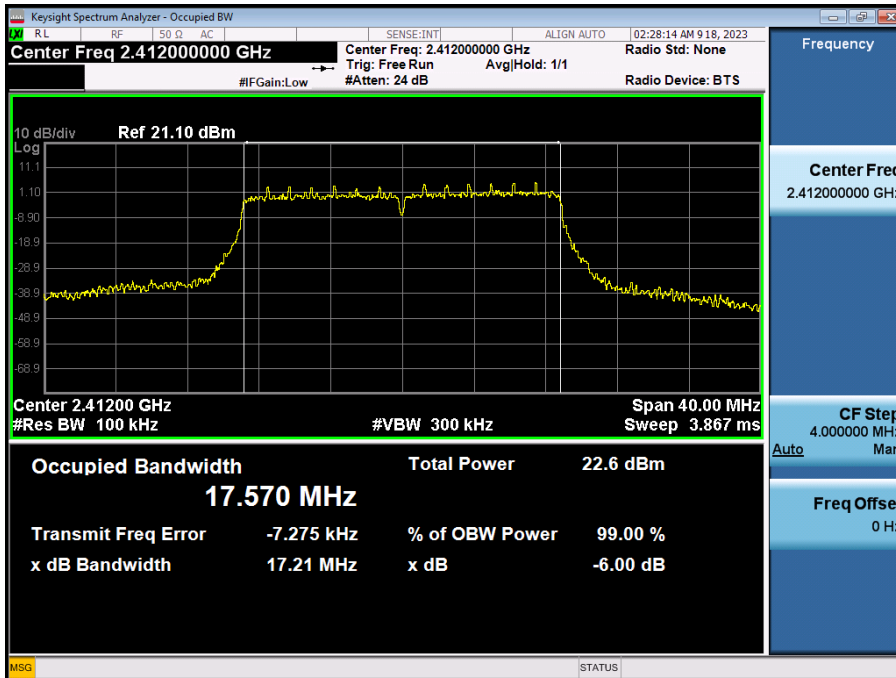
6 dB Bandwidth plot (802.11g-CH 1)



6 dB Bandwidth plot (802.11n_HT20-CH 1)



6 dB Bandwidth plot (802.11ac_VHT20-CH 1)



Note:

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

9.3 OUTPUT POWER

Note :

1. MIMO_CDD(Ant1+Ant2) Power = $10 \cdot \log((10^{(\text{Ant. 1 power} / 10)}) + (10^{(\text{Ant. 2 power} / 10)}))$

Peak Power

[MIMO_CDD(Ant1+Ant2)]

| Mode | Frequency [MHz] | Channel No. | Data Rate | Conducted Peak Power | | | Limit [dBm] |
|----------|--------------------|----------------|--------------|----------------------|-------|-------|----------------|
| | | | | [dBm] | | | |
| | | | | ANT1 | ANT2 | MIMO | |
| 802.11b | 2412 | 1 | 11M | 23.21 | 23.32 | 26.28 | 30 |
| | 2437 | 6 | 11M | 23.26 | 23.29 | 26.29 | 30 |
| | 2462 | 11 | 11M | 23.81 | 23.65 | 26.74 | 30 |
| | 2467 | 12 | 11M | 12.05 | 12.09 | 15.08 | 30 |
| | 2472 | 13 | 11M | 5.43 | 5.10 | 8.28 | 30 |
| 802.11g | 2412 | 1 | 6M | 22.59 | 23.16 | 25.89 | 30 |
| | 2437 | 6 | 6M | 23.57 | 24.25 | 26.93 | 30 |
| | 2462 | 11 | 6M | 23.96 | 24.62 | 27.31 | 30 |
| | 2467 | 12 | 6M | 12.78 | 14.02 | 16.46 | 30 |
| | 2472 | 13 | 6M | 5.83 | 5.91 | 8.88 | 30 |
| 802.11n | 2412 | 1 | MCS0 | 22.69 | 23.27 | 26.00 | 30 |
| | 2437 | 6 | MCS0 | 23.65 | 24.35 | 27.02 | 30 |
| | 2462 | 11 | MCS0 | 23.85 | 24.75 | 27.34 | 30 |
| | 2467 | 12 | MCS0 | 12.84 | 13.95 | 16.44 | 30 |
| | 2472 | 13 | MCS0 | 5.84 | 5.78 | 8.82 | 30 |
| 802.11ac | 2412 | 1 | MCS0 | 22.73 | 23.36 | 25.84 | 30 |
| | 2437 | 6 | MCS0 | 23.75 | 24.42 | 26.64 | 30 |
| | 2462 | 11 | MCS0 | 23.80 | 23.82 | 27.17 | 30 |
| | 2467 | 12 | MCS0 | 12.85 | 13.95 | 16.24 | 30 |
| | 2472 | 13 | MCS0 | 5.87 | 5.72 | 8.76 | 30 |

Average Power

Note :

1. Total Power [dBm] = Measured Power [dBm] + Duty Cycle Factor [dB]

[MIMO_CDD(Ant1+Ant2)]

| Mode | Frequency [MHz] | Channel No. | Data Rate | Conducted Average Power | | | Limit [dBm] |
|----------|--------------------|----------------|--------------|-------------------------|-------|-------|----------------|
| | | | | [dBm] | | | |
| | | | | ANT1 | ANT2 | MIMO | |
| 802.11b | 2412 | 1 | 1M | 17.45 | 17.35 | 20.41 | 30 |
| | 2437 | 6 | 1M | 17.44 | 17.71 | 20.59 | 30 |
| | 2462 | 11 | 1M | 17.85 | 17.90 | 20.89 | 30 |
| | 2467 | 12 | 1M | 5.76 | 5.93 | 8.86 | 30 |
| | 2472 | 13 | 1M | -1.02 | -0.90 | 2.05 | 30 |
| 802.11g | 2412 | 1 | 6M | 15.17 | 15.50 | 18.35 | 30 |
| | 2437 | 6 | 6M | 16.23 | 16.38 | 19.32 | 30 |
| | 2462 | 11 | 6M | 16.73 | 16.86 | 19.80 | 30 |
| | 2467 | 12 | 6M | 5.58 | 5.89 | 8.75 | 30 |
| | 2472 | 13 | 6M | -1.44 | -1.37 | 1.60 | 30 |
| 802.11n | 2412 | 1 | MCS0 | 15.12 | 15.37 | 18.26 | 30 |
| | 2437 | 6 | MCS0 | 16.16 | 16.44 | 19.32 | 30 |
| | 2462 | 11 | MCS0 | 16.68 | 16.86 | 19.79 | 30 |
| | 2467 | 12 | MCS0 | 5.47 | 5.88 | 8.69 | 30 |
| | 2472 | 13 | MCS0 | -1.53 | -1.49 | 1.50 | 30 |
| 802.11ac | 2412 | 1 | MCS0 | 15.08 | 15.39 | 18.12 | 30 |
| | 2437 | 6 | MCS0 | 16.15 | 16.17 | 19.25 | 30 |
| | 2462 | 11 | MCS0 | 16.67 | 16.41 | 19.68 | 30 |
| | 2467 | 12 | MCS0 | 5.47 | 5.87 | 8.54 | 30 |
| | 2472 | 13 | MCS0 | -1.55 | -1.38 | 1.36 | 30 |

9.4 POWER SPECTRAL DENSITY

Note :

1. MIMO_CDD(Ant1+Ant2) PSD = $10 \cdot \log((10^{(Ant. 1 \text{ PSD} / 10)}) + (10^{(Ant. 2 \text{ PSD} / 10)}))$
2. Total PSD = Measured Value + Duty Cycle Factor

[MIMO_CDD(Ant1+Ant2)]

| BW | Frequency [MHz] | Channel No. | Data Rate | Power Spectral Density | | | Limit |
|----------|--------------------|----------------|--------------|------------------------|---------|---------|------------------|
| | | | | [dBm] | | | |
| | | | | ANT1 | ANT2 | MIMO | |
| 802.11b | 2412 | 1 | 1M | -4.325 | -3.452 | -0.856 | 8 dBm / 3 kHz |
| | 2437 | 6 | 1M | -4.215 | -3.563 | -0.866 | |
| | 2462 | 11 | 1M | -4.012 | -3.083 | -0.512 | |
| | 2467 | 12 | 1M | -16.122 | -14.835 | -12.421 | |
| | 2472 | 13 | 1M | -22.824 | -22.824 | -19.814 | |
| 802.11g | 2412 | 1 | 6M | -8.614 | -8.219 | -5.402 | |
| | 2437 | 6 | 6M | -8.459 | -7.172 | -4.758 | |
| | 2462 | 11 | 6M | -7.861 | -7.231 | -4.524 | |
| | 2467 | 12 | 6M | -19.338 | -18.284 | -15.769 | |
| | 2472 | 13 | 6M | -26.233 | -26.044 | -23.127 | |
| 802.11n | 2412 | 1 | MCS0 | -9.117 | -8.739 | -5.913 | |
| | 2437 | 6 | MCS0 | -8.774 | -7.823 | -5.262 | |
| | 2462 | 11 | MCS0 | -8.147 | -7.618 | -4.864 | |
| | 2467 | 12 | MCS0 | -19.063 | -18.630 | -15.831 | |
| | 2472 | 13 | MCS0 | -26.427 | -26.332 | -23.369 | |
| 802.11ac | 2412 | 1 | MCS0 | -9.224 | -8.738 | -5.964 | |
| | 2437 | 6 | MCS0 | -8.879 | -7.811 | -5.302 | |
| | 2462 | 11 | MCS0 | -8.088 | -7.532 | -4.791 | |
| | 2467 | 12 | MCS0 | -19.535 | -18.585 | -16.024 | |
| | 2472 | 13 | MCS0 | -26.568 | -26.376 | -23.461 | |

Test Plots

Note :

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

[MIMO_CDD(Ant1+Ant2)]

Power Spectral Density (802.11b-CH 11)

ANT. 1

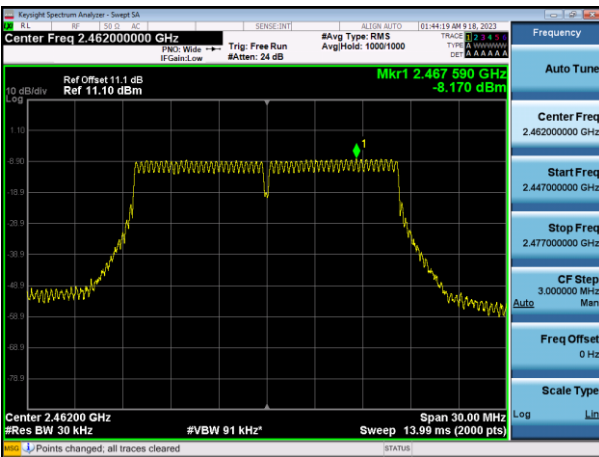


ANT. 2

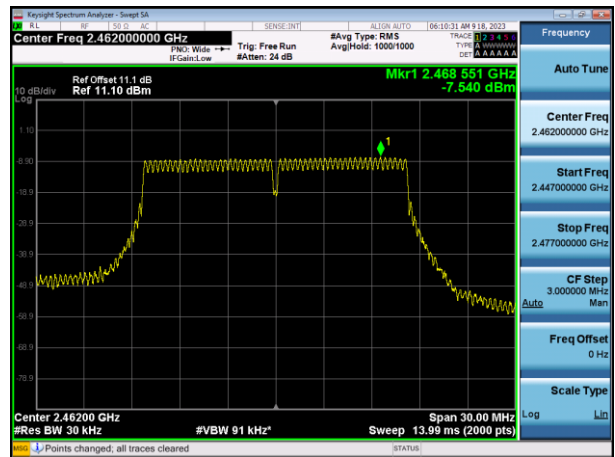


Power Spectral Density (802.11g-CH 11)

ANT. 1

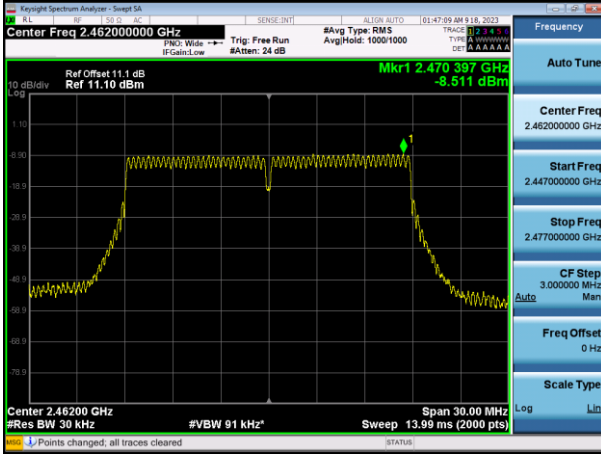


ANT. 2

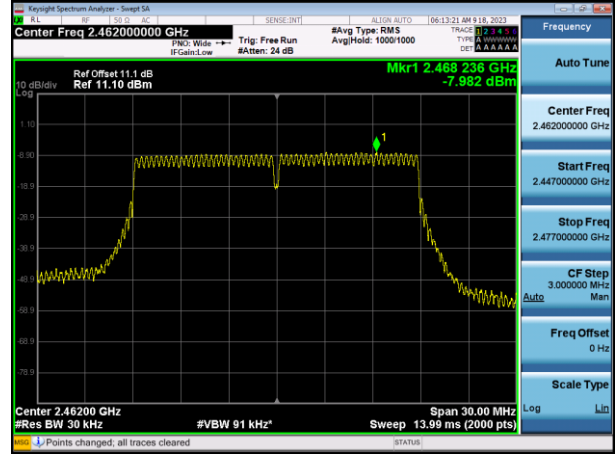


Power Spectral Density (802.11n-CH 11)

ANT. 1

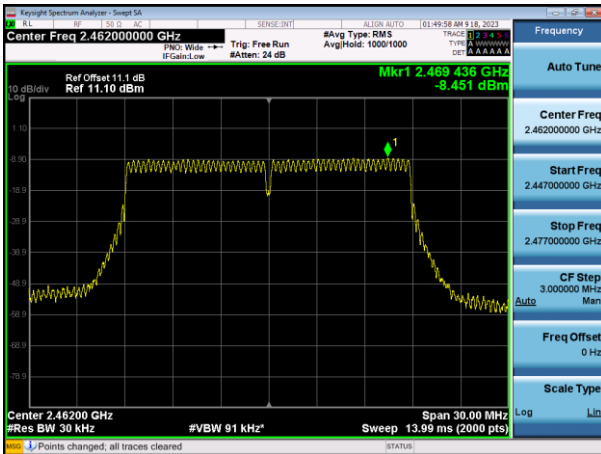


ANT. 2

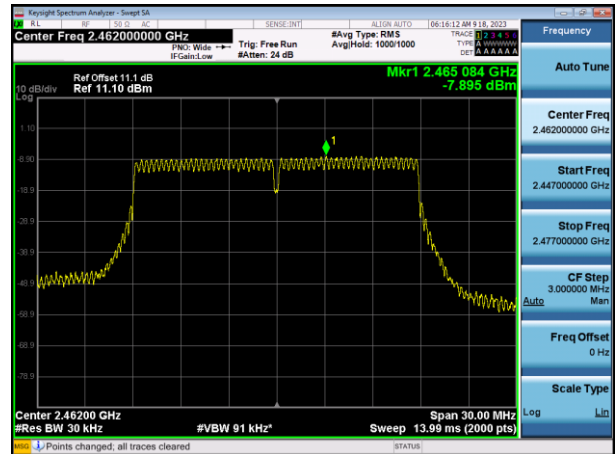


Power Spectral Density (802.11ac-CH 11)

ANT. 1



ANT. 2



9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS**Band Edge**

Limit : 30 dBc

[ANT. 1]

| Mode | Freq. [MHz] | CH. | Measured Position | Band edge[dB] |
|----------|----------------|-----|-------------------|---------------|
| 802.11b | 2 412 | 1 | Lowest Bandedge | 50.021 |
| | 2 462 | 11 | Highest Bandedge | 61.454 |
| | 2 467 | 12 | Highest Bandedge | 50.453 |
| | 2 472 | 13 | Highest Bandedge | 43.530 |
| 802.11g | 2 412 | 1 | Lowest Bandedge | 40.793 |
| | 2 462 | 11 | Highest Bandedge | 53.735 |
| | 2 467 | 12 | Highest Bandedge | 48.230 |
| | 2 472 | 13 | Highest Bandedge | 41.510 |
| 802.11n | 2 412 | 1 | Lowest Bandedge | 41.589 |
| | 2 462 | 11 | Highest Bandedge | 52.645 |
| | 2 467 | 12 | Highest Bandedge | 48.254 |
| | 2 472 | 13 | Highest Bandedge | 41.233 |
| 802.11ac | 2 412 | 1 | Lowest Bandedge | 40.953 |
| | 2 462 | 11 | Highest Bandedge | 52.120 |
| | 2 467 | 12 | Highest Bandedge | 48.114 |
| | 2 472 | 13 | Highest Bandedge | 41.260 |

[ANT. 2]

| Mode | Freq. [MHz] | CH. | Measured Position | Band edge[dB] |
|-------------|------------------------|------------|--------------------------|----------------------|
| 802.11b | 2 412 | 1 | Lowest Bandedge | 47.662 |
| | 2 462 | 11 | Highest Bandedge | 61.705 |
| | 2 467 | 12 | Highest Bandedge | 51.231 |
| | 2 472 | 13 | Highest Bandedge | 42.813 |
| 802.11g | 2 412 | 1 | Lowest Bandedge | 38.108 |
| | 2 462 | 11 | Highest Bandedge | 52.433 |
| | 2 467 | 12 | Highest Bandedge | 48.845 |
| | 2 472 | 13 | Highest Bandedge | 41.957 |
| 802.11n | 2 412 | 1 | Lowest Bandedge | 38.651 |
| | 2 462 | 11 | Highest Bandedge | 51.458 |
| | 2 467 | 12 | Highest Bandedge | 48.804 |
| | 2 472 | 13 | Highest Bandedge | 41.142 |
| 802.11ac | 2 412 | 1 | Lowest Bandedge | 38.524 |
| | 2 462 | 11 | Highest Bandedge | 51.994 |
| | 2 467 | 12 | Highest Bandedge | 49.085 |
| | 2 472 | 13 | Highest Bandedge | 41.364 |

▣ Test Plots

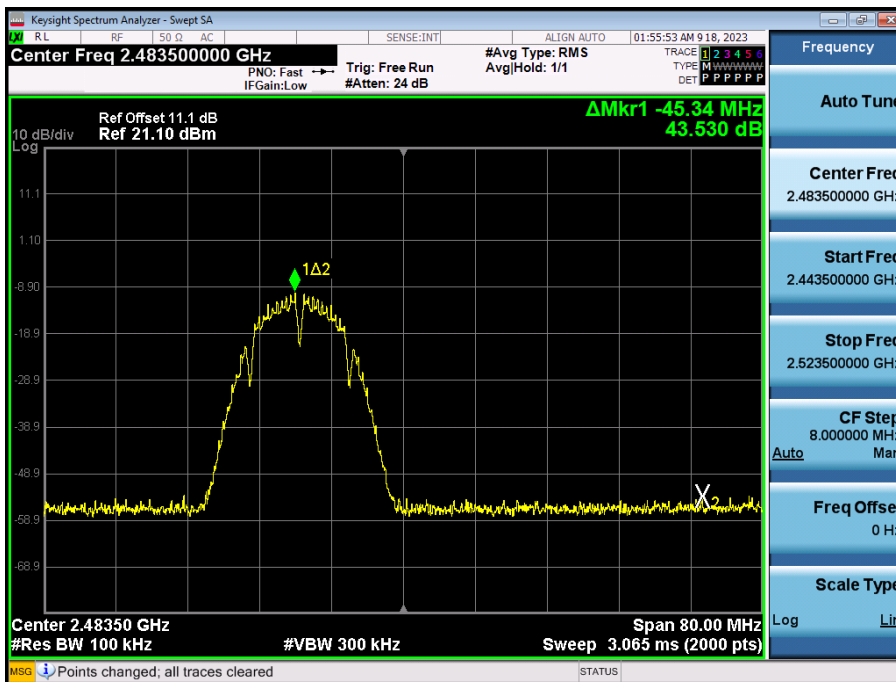
Note: In order to simplify the report, attached plots were only the worst case.

[ANT. 1]

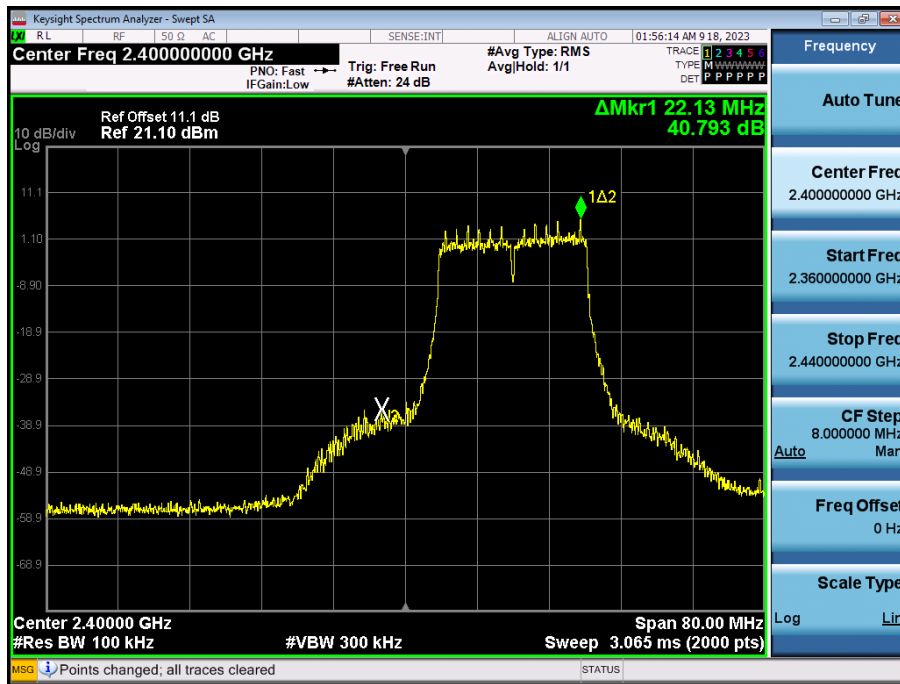
Band Edge (802.11b-CH1)



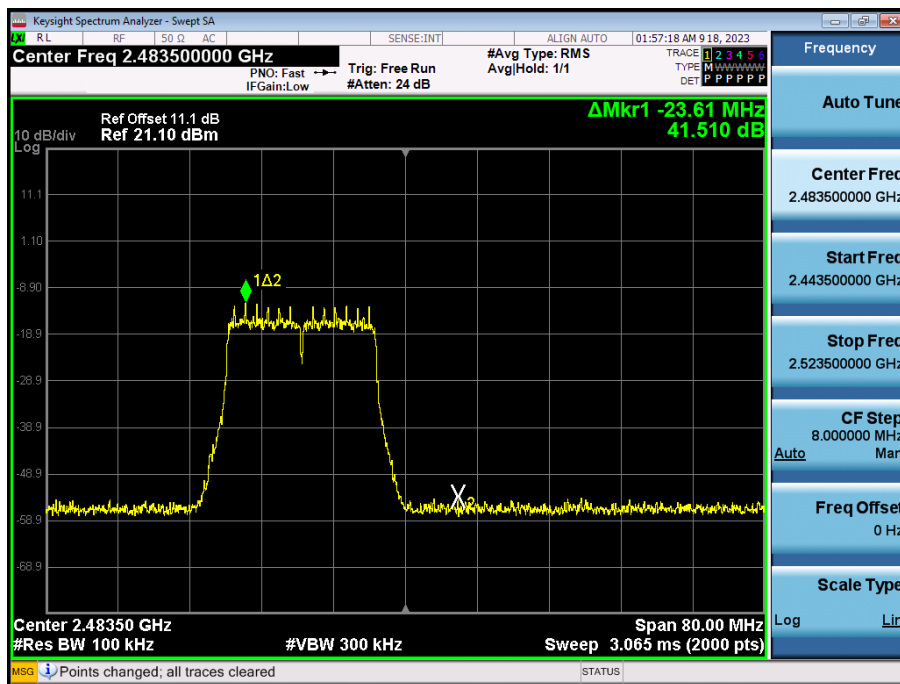
Band Edge (802.11b-CH13)



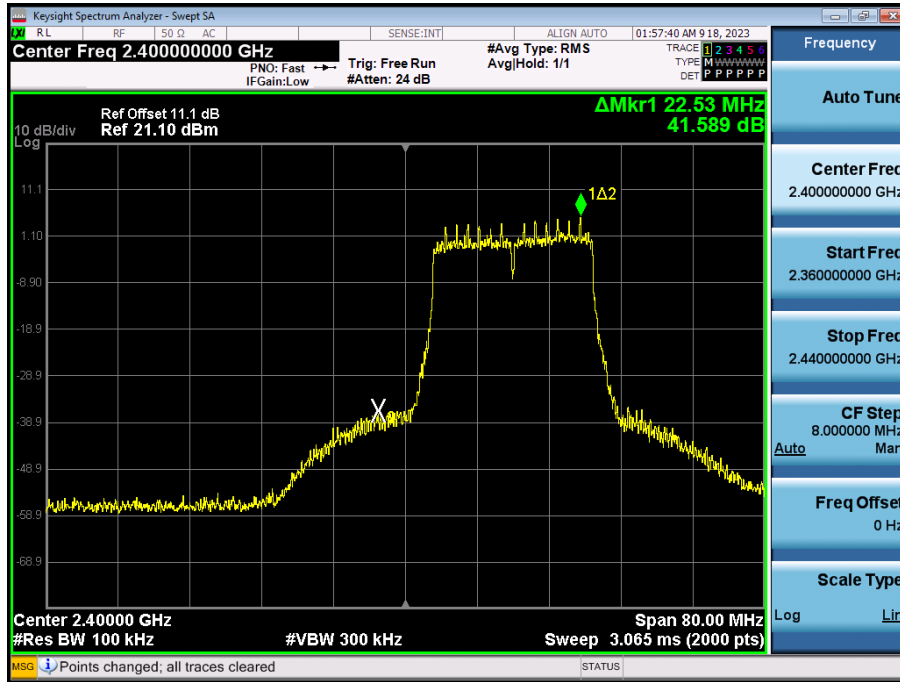
Band Edge (802.11g-CH1)



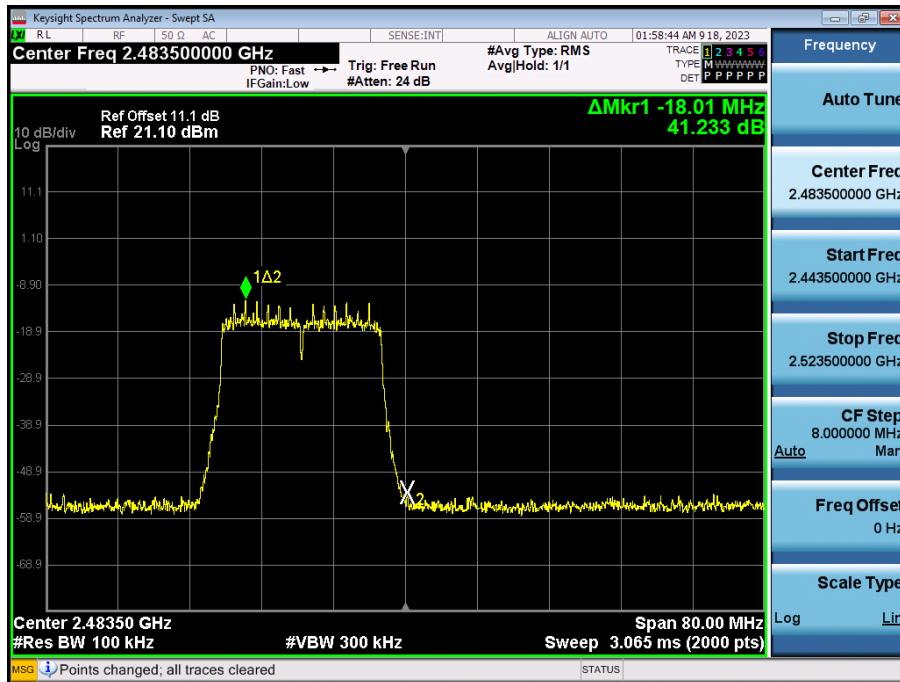
Band Edge (802.11g-CH13)



Band Edge (802.11n_HT20-CH1)



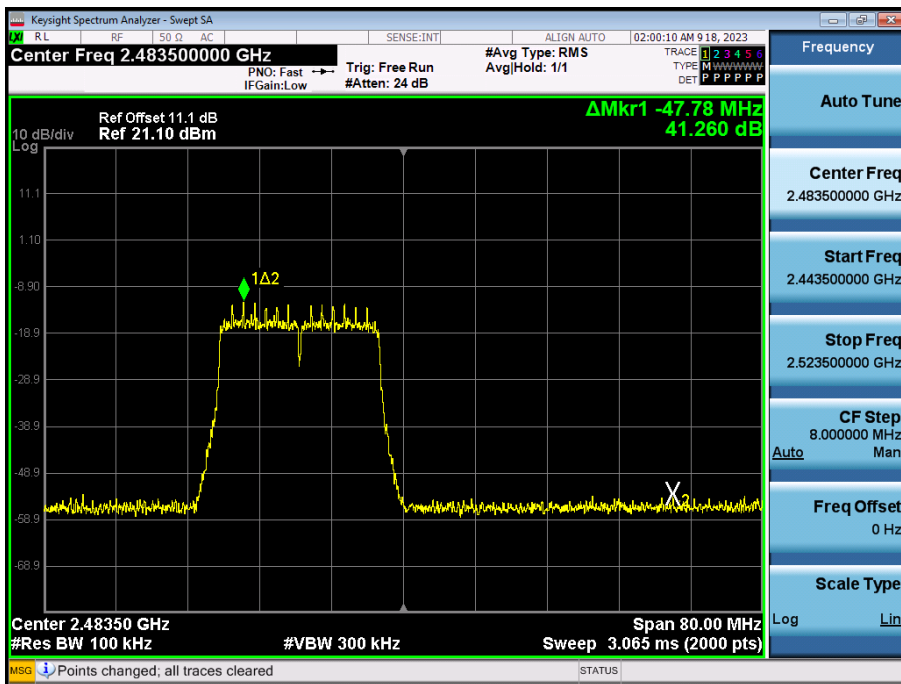
Band Edge (802.11n_HT20-CH13)



Band Edge (802.11ac_VHT20-CH1)

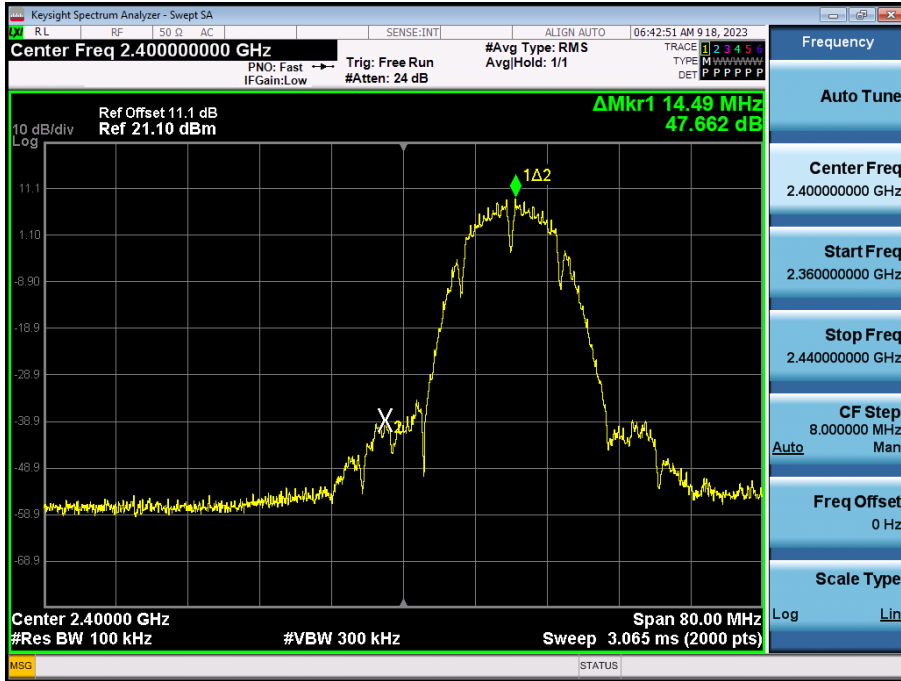


Band Edge (802.11ac_VHT20-CH13)

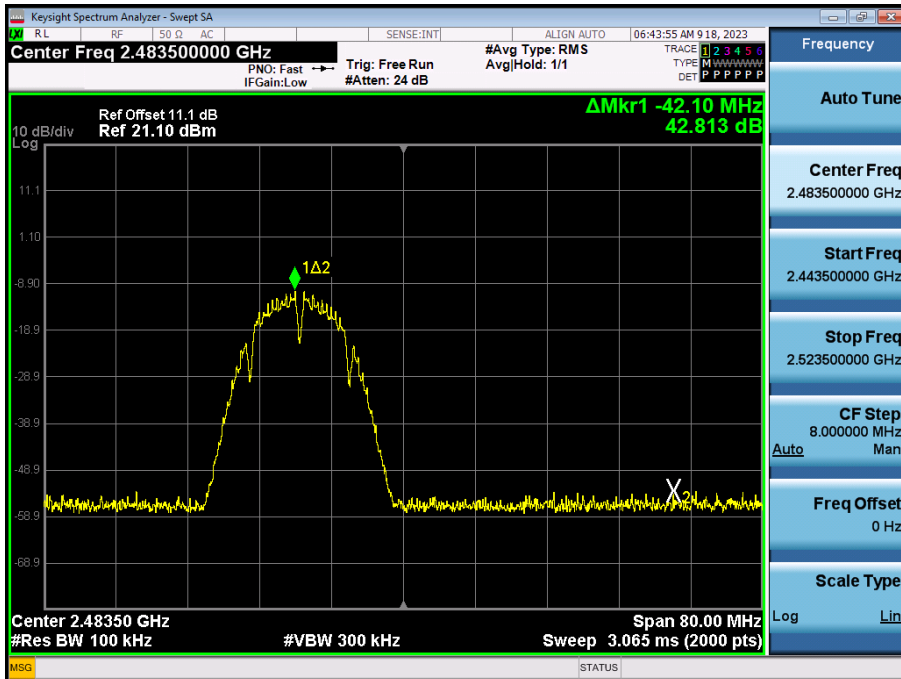


[ANT. 2]

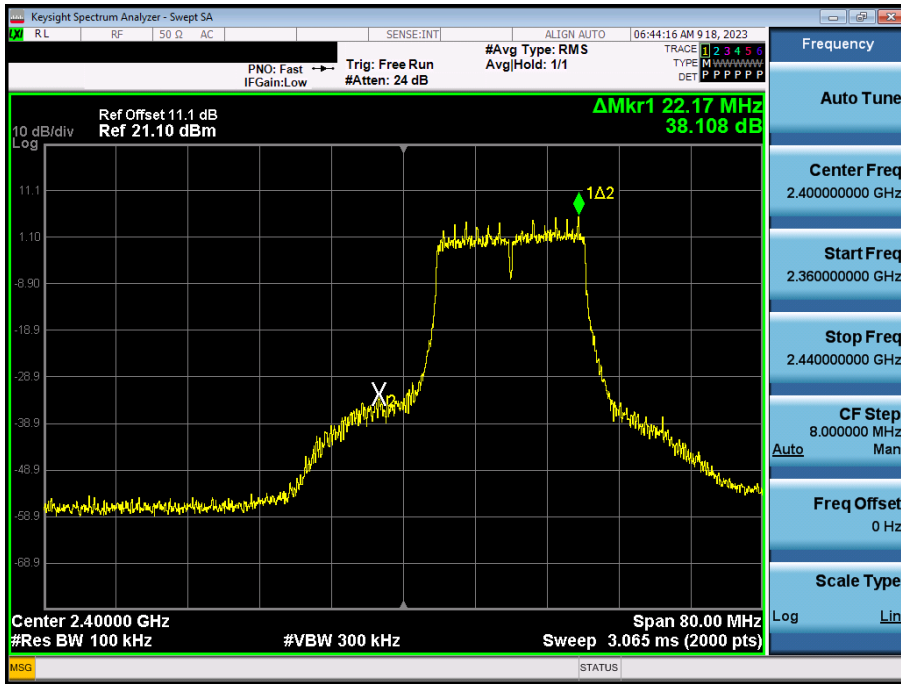
Band Edge (802.11b-CH1)



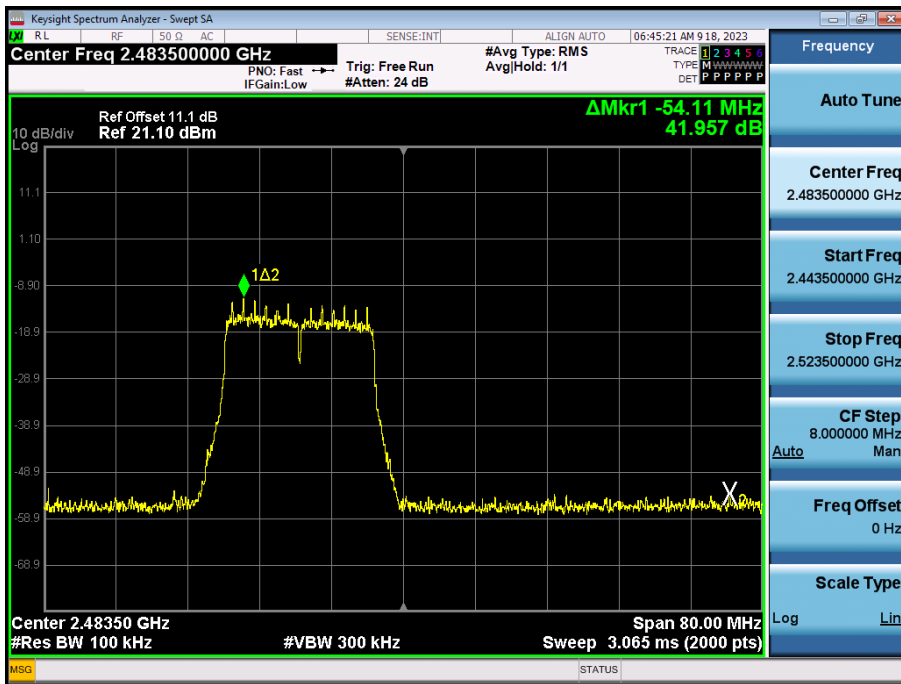
Band Edge (802.11b-CH13)



Band Edge (802.11g-CH1)



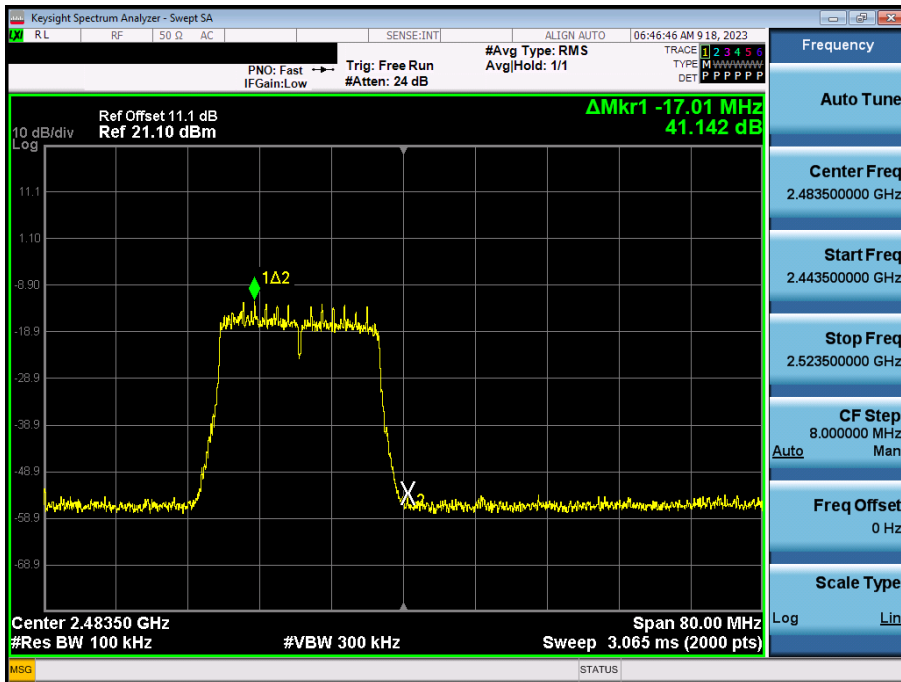
Band Edge (802.11g-CH13)



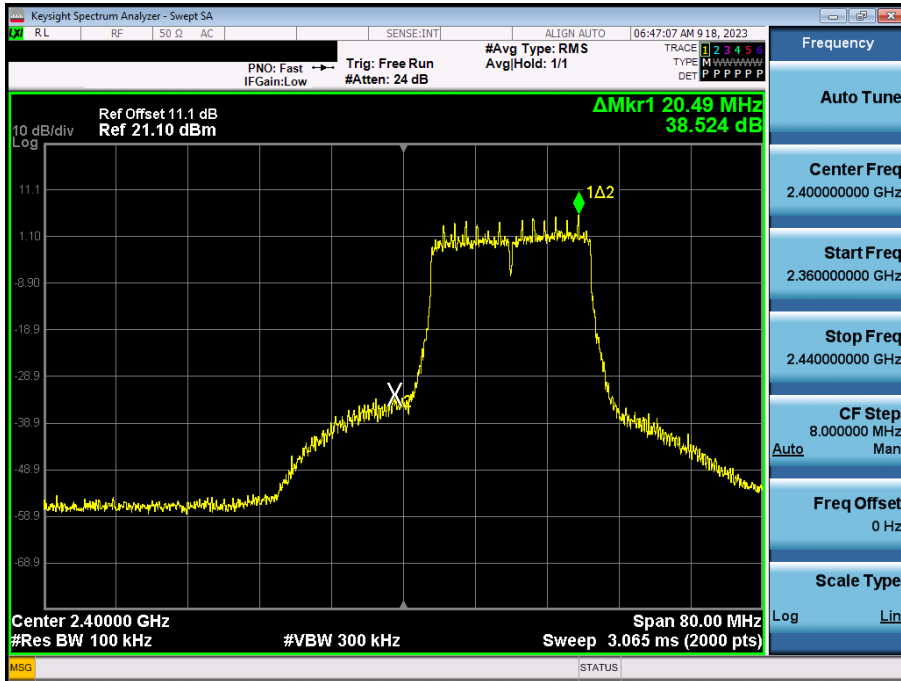
Band Edge (802.11n_HT20-CH1)



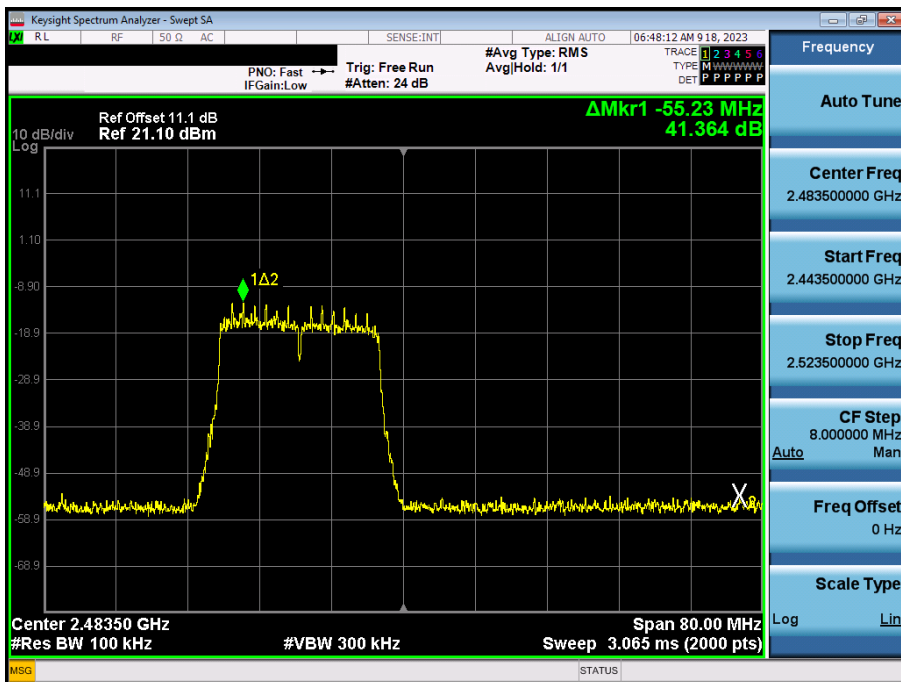
Band Edge (802.11n_HT20-CH13)



Band Edge (802.11ac_VHT20-CH1)



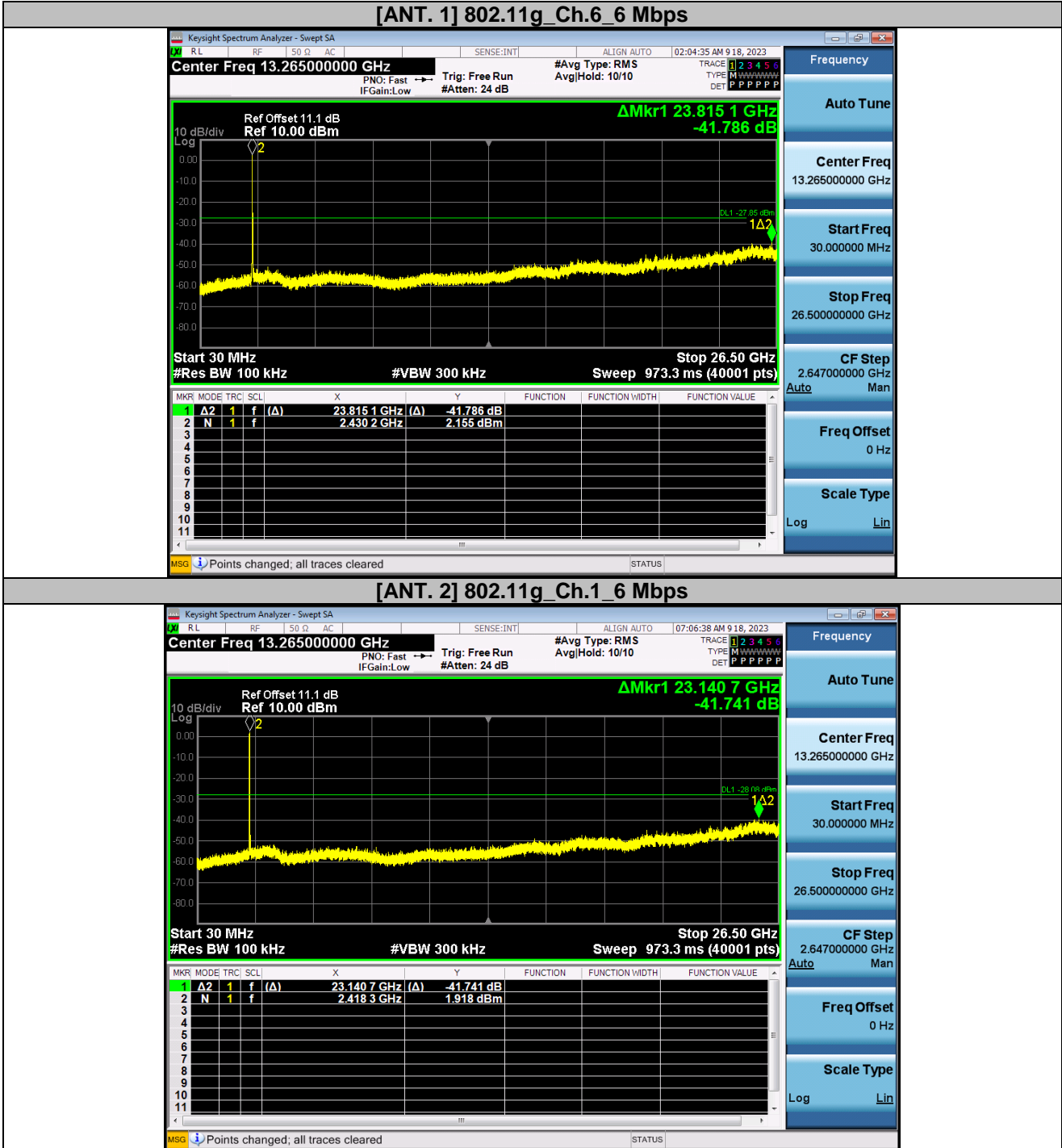
Band Edge (802.11ac_VHT20-CH13)



Test Plots(Conducted Spurious Emission)

Note:

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



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**Note:**

1. The offset was included in the Sigant Analyzer.

- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – Amp. Gain(A.G)

[MIMO_CDD(Ant1+Ant2)]

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

| Frequency [MHz] | Measured Value [dB μ V] | ANT. POL [H/V] | Total [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Measurement Type |
|--------------------|-----------------------------------|-------------------|-------------------------|-------------------------|----------------|---------------------|
| 4824 | 48.09 | V | 48.09 | 73.98 | 25.89 | PK |
| 4824 | 37.82 | V | 37.82 | 53.98 | 16.16 | AV |
| 7236 | 51.34 | V | 51.34 | 73.98 | 22.64 | PK |
| 7236 | 39.54 | V | 39.54 | 53.98 | 14.44 | AV |
| 4824 | 48.79 | H | 48.79 | 73.98 | 25.19 | PK |
| 4824 | 39.05 | H | 39.05 | 53.98 | 14.93 | AV |
| 7236 | 51.56 | H | 51.56 | 73.98 | 22.42 | PK |
| 7236 | 39.45 | H | 39.45 | 53.98 | 14.53 | AV |

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

| Frequency [MHz] | Measured Value [dB μ V] | ANT. POL [H/V] | Total [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------------|-------------------|-------------------------|-------------------------|----------------|------------------|
| 4874 | 47.59 | V | 47.59 | 73.98 | 26.39 | PK |
| 4874 | 37.80 | V | 37.80 | 53.98 | 16.18 | AV |
| 7311 | 51.49 | V | 51.49 | 73.98 | 22.49 | PK |
| 7311 | 40.11 | V | 40.11 | 53.98 | 13.87 | AV |
| 4874 | 47.63 | H | 47.63 | 73.98 | 26.35 | PK |
| 4874 | 37.49 | H | 37.49 | 53.98 | 16.49 | AV |
| 7311 | 51.69 | H | 51.69 | 73.98 | 22.29 | PK |
| 7311 | 40.27 | H | 40.27 | 53.98 | 13.71 | AV |

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

| Frequency [MHz] | Measured Value [dB μ V] | ANT. POL [H/V] | Total [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------------|-------------------|-------------------------|-------------------------|----------------|------------------|
| 4924 | 47.73 | V | 47.73 | 73.98 | 26.25 | PK |
| 4924 | 37.09 | V | 37.09 | 53.98 | 16.89 | AV |
| 7386 | 52.11 | V | 52.11 | 73.98 | 21.87 | PK |
| 7386 | 40.42 | V | 40.42 | 53.98 | 13.56 | AV |
| 4924 | 48.14 | H | 48.14 | 73.98 | 25.84 | PK |
| 4924 | 40.77 | H | 40.77 | 53.98 | 13.21 | AV |
| 7386 | 52.23 | H | 52.23 | 73.98 | 21.75 | PK |
| 7386 | 40.60 | H | 40.60 | 53.98 | 13.38 | AV |

[RSDB]

Scenario 1

MIMO WLAN_2.4 GHz_802.11b_Ch.11_1 Mbps + MIMO WLAN_5 GHz_802.11a_Ch.100_6 Mbps

| Frequency [MHz] | Measured Value [dBμV] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------|-------------------|-------------------|-------------------|----------------|------------------|
| 4924 | 48.67 | V | 48.67 | 73.98 | 25.31 | PK |
| 4924 | 41.65 | V | 41.65 | 53.98 | 12.33 | AV |
| 7386 | 51.86 | V | 51.86 | 73.98 | 22.12 | PK |
| 7386 | 40.66 | V | 40.66 | 53.98 | 13.32 | AV |
| 4924 | 50.80 | H | 50.80 | 73.98 | 23.18 | PK |
| 4924 | 45.12 | H | 45.12 | 53.98 | 8.86 | AV |
| 7386 | 52.10 | H | 52.10 | 73.98 | 21.88 | PK |
| 7386 | 41.07 | H | 41.07 | 53.98 | 12.91 | AV |

Note : UNII RSDB Data refer to [UNII] Test Report

Scenario 2

Ant.1 Bluetooth_Ch.39_GFSK + Ant.2 WLAN_2.4 GHz_802.11b_Ch.11_1 Mbps

+ MIMO WLAN_5 GHz_802.11a_Ch.100_6 Mbps

| Frequency [MHz] | Measured Value [dBμV] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------|-------------------|-------------------|-------------------|----------------|------------------|
| 4924 | 47.44 | V | 47.44 | 73.98 | 26.54 | PK |
| 4924 | 37.52 | V | 37.52 | 53.98 | 16.46 | AV |
| 7386 | 52.01 | V | 52.01 | 73.98 | 21.97 | PK |
| 7386 | 40.30 | V | 40.30 | 53.98 | 13.68 | AV |
| 4924 | 49.32 | H | 49.32 | 73.98 | 24.66 | PK |
| 4924 | 42.07 | H | 42.07 | 53.98 | 11.91 | AV |
| 7386 | 51.79 | H | 51.79 | 73.98 | 22.19 | PK |
| 7386 | 40.25 | H | 40.25 | 53.98 | 13.73 | AV |

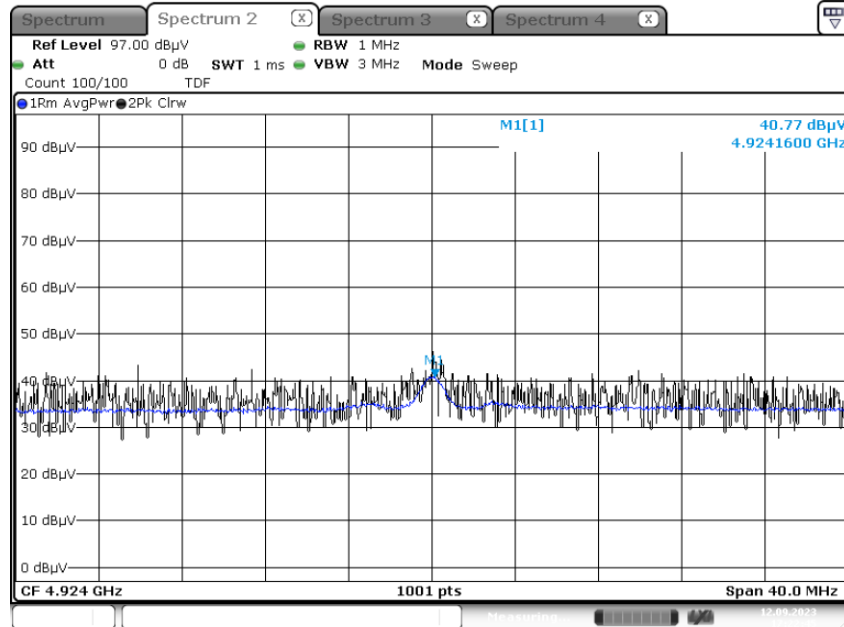
Note : BT, UNII RSDB Data refer to [BT], [UNII] Test Report

Test Plots

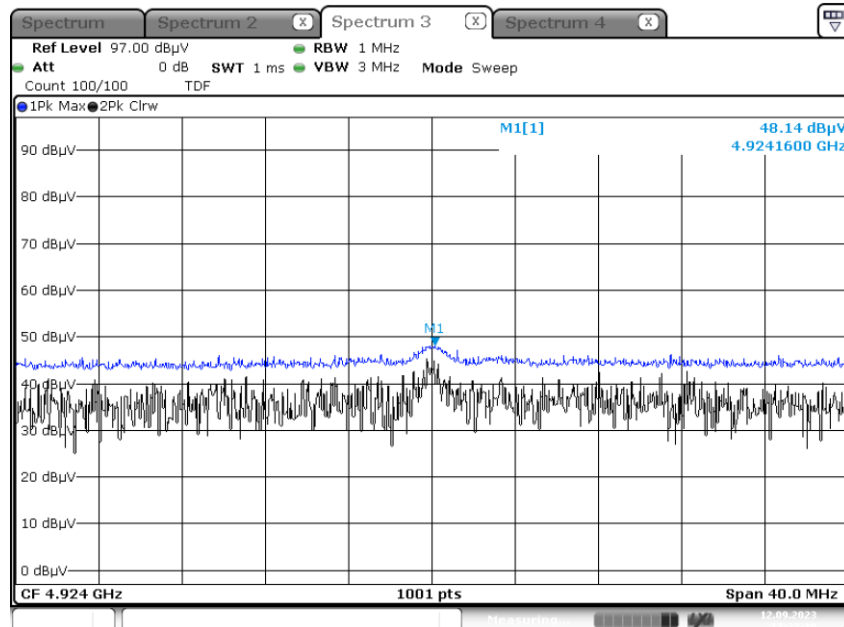
Note: In order to simplify the report, Plot of worst case are only reported.

[MIMO_CDD(Ant1+Ant2)]

Radiated Spurious Emissions plot – Average Result (802.11b_1 Mbps, Ch.11 2nd Harmonic, Y-H)



Radiated Spurious Emissions plot – Peak Result (802.11b_1 Mbps, Ch.11 2nd Harmonic, Y-H)

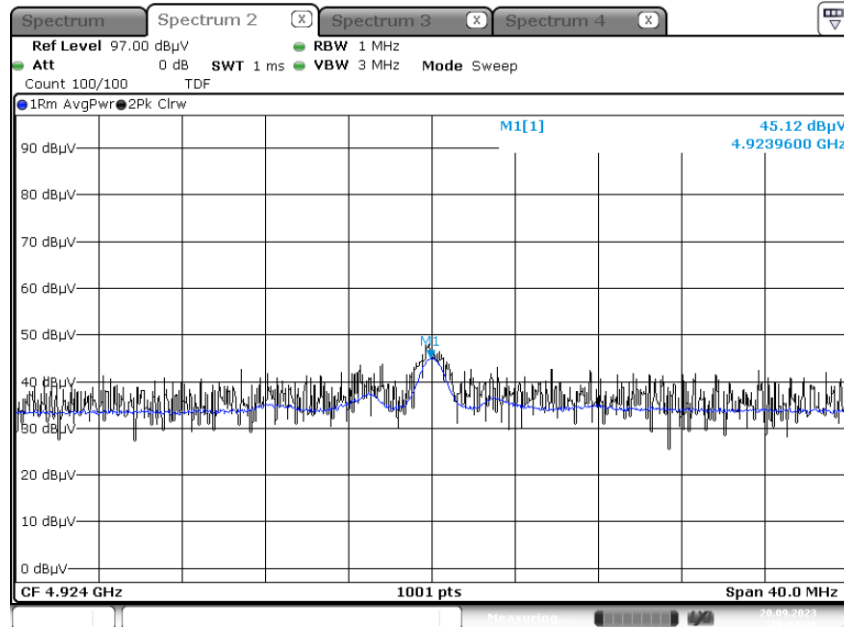


[RSDB]

Scenario 1

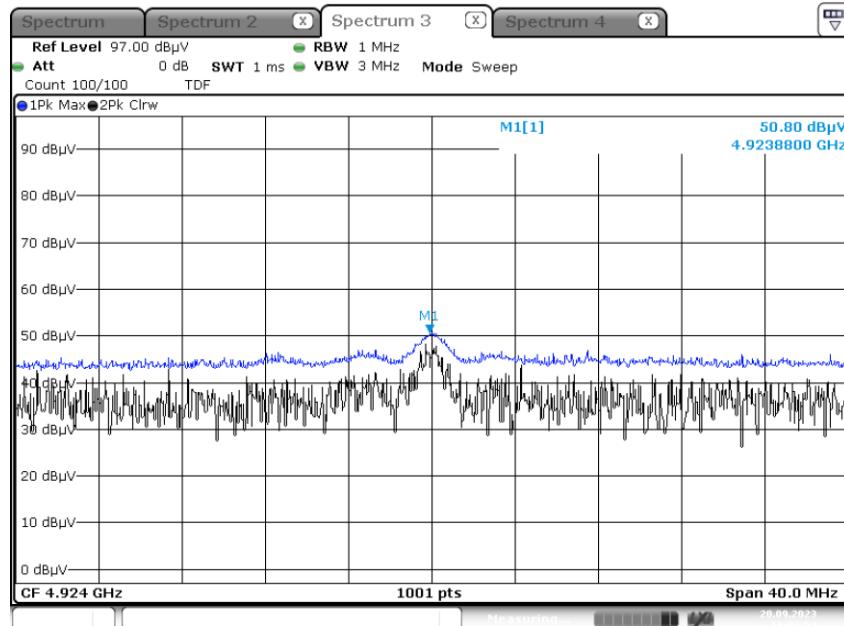
MIMO WLAN_2.4 GHz_802.11b_Ch.11_1 Mbps + MIMO WLAN_5 GHz_802.11a_Ch.100_6 Mbps

Radiated Spurious Emissions plot – Average Result (2nd Harmonic, Y-H)



Date: 20.SEP.2023 18:03:29

Radiated Spurious Emissions plot – Peak Result (2nd Harmonic, Y-H)

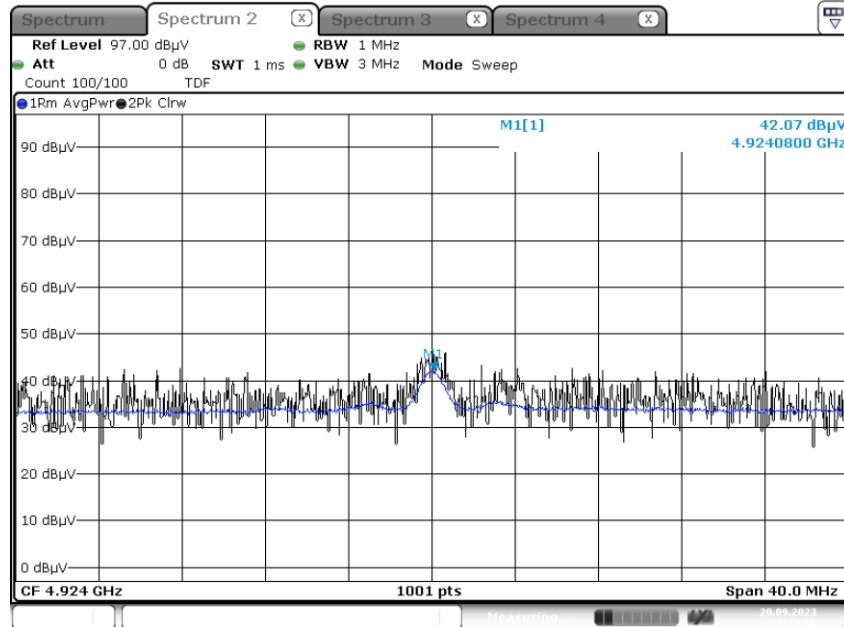


Date: 20.SEP.2023 18:03:54

Scenario 2

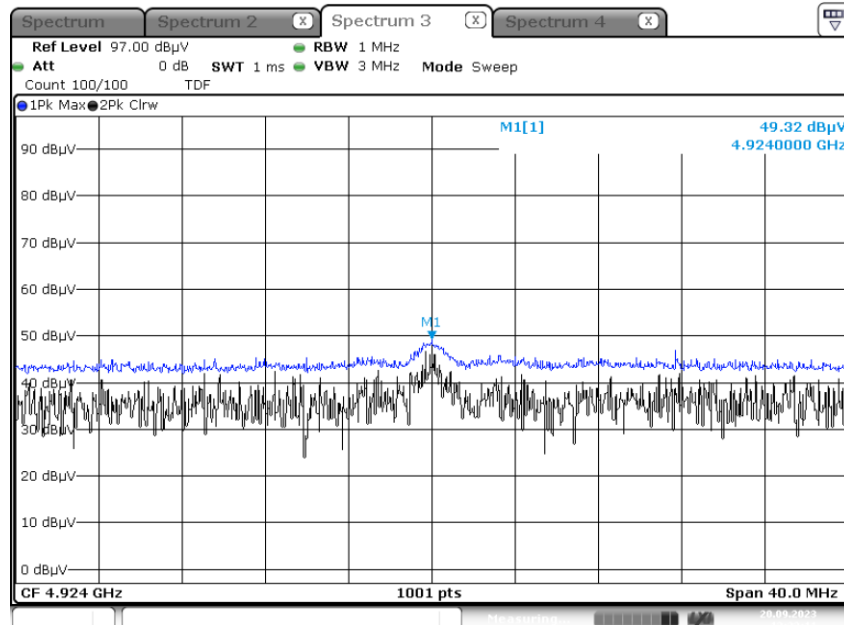
Ant.1 Bluetooth_Ch.39_GFSK + Ant.2 WLAN_2.4 GHz_802.11b_Ch.11_1 Mbps
+ MIMO WLAN_5 GHz_802.11a_Ch.100_6 Mbps

Radiated Spurious Emissions plot – Average Result (2nd Harmonic, Y-H)



Date: 20.SEP.2023 12:22:56

Radiated Spurious Emissions plot – Peak Result (2nd Harmonic, Y-H)



Date: 20.SEP.2023 12:23:12

9.7 RADIATED RESTRICTED BAND EDGES

Note:

1. The offset was included in the Sigantl Analyzer.
 - The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

[MIMO_CDD(Ant1+Ant2)]

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

| Frequency [MHz] | Measured Value [dBμV] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------|-------------------|-------------------|-------------------|----------------|------------------|
| 2310.0~2390.0 | 54.52 | H | 54.52 | 73.98 | 19.46 | PK |
| 2310.0~2390.0 | 43.02 | H | 43.02 | 53.98 | 10.96 | AV |
| 2310.0~2390.0 | 54.22 | V | 54.22 | 73.98 | 19.76 | PK |
| 2310.0~2390.0 | 42.69 | V | 42.69 | 53.98 | 11.29 | AV |
| 2483.5~2500.0 | 58.99 | H | 58.99 | 73.98 | 14.99 | PK |
| 2483.5~2500.0 | 43.02 | H | 43.02 | 53.98 | 10.96 | AV |
| 2483.5~2500.0 | 58.37 | V | 58.37 | 73.98 | 15.61 | PK |
| 2483.5~2500.0 | 42.84 | V | 42.84 | 53.98 | 11.14 | 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 [dBμV] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------|-------------------|-------------------|-------------------|----------------|------------------|
| 2483.5~2500.0 | 54.85 | H | 54.85 | 73.98 | 19.13 | PK |
| 2483.5~2500.0 | 42.21 | H | 42.21 | 53.98 | 11.77 | AV |
| 2483.5~2500.0 | 54.72 | V | 54.72 | 73.98 | 19.26 | PK |
| 2483.5~2500.0 | 42.07 | V | 42.07 | 53.98 | 11.91 | AV |
| 2483.5~2500.0 | 54.58 | H | 54.58 | 73.98 | 19.40 | PK |
| 2483.5~2500.0 | 42.19 | H | 42.19 | 53.98 | 11.79 | AV |
| 2483.5~2500.0 | 54.39 | V | 54.39 | 73.98 | 19.59 | PK |
| 2483.5~2500.0 | 42.01 | V | 42.01 | 53.98 | 11.97 | 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 [dBμV] | Duty Cycle Factor [dB] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|-----------------|-----------------------|------------------------|----------------|----------------|----------------|-------------|------------------|
| 2310.0~2390.0 | 65.42 | 0.00 | H | 65.42 | 73.98 | 8.56 | PK |
| 2310.0~2390.0 | 50.66 | 0.31 | H | 50.97 | 53.98 | 3.01 | AV |
| 2310.0~2390.0 | 64.99 | 0.00 | V | 64.99 | 73.98 | 8.99 | PK |
| 2310.0~2390.0 | 50.48 | 0.31 | V | 50.79 | 53.98 | 3.19 | AV |
| #2483.5~2500.0 | 61.36 | 0.00 | H | 61.36 | 73.98 | 12.62 | PK |
| #2483.5~2500.0 | 50.36 | 0.31 | H | 50.67 | 53.98 | 3.31 | AV |
| #2483.5~2500.0 | 60.21 | 0.00 | V | 60.21 | 73.98 | 13.77 | PK |
| #2483.5~2500.0 | 50.19 | 0.31 | V | 50.50 | 53.98 | 3.48 | 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] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|-----------------|-----------------------|------------------------|----------------|----------------|----------------|-------------|------------------|
| 2483.5~2500.0 | 54.78 | 0.00 | H | 54.78 | 73.98 | 19.20 | PK |
| 2483.5~2500.0 | 42.18 | 0.31 | H | 42.49 | 53.98 | 11.49 | AV |
| 2483.5~2500.0 | 54.39 | 0.00 | V | 54.39 | 73.98 | 19.59 | PK |
| 2483.5~2500.0 | 42.00 | 0.31 | V | 42.31 | 53.98 | 11.67 | AV |
| 2483.5~2500.0 | 54.98 | 0.00 | H | 54.98 | 73.98 | 19.00 | PK |
| 2483.5~2500.0 | 42.35 | 0.31 | H | 42.66 | 53.98 | 11.32 | AV |
| 2483.5~2500.0 | 54.72 | 0.00 | V | 54.72 | 73.98 | 19.26 | PK |
| 2483.5~2500.0 | 42.05 | 0.31 | V | 42.36 | 53.98 | 11.62 | AV |

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

| Frequency [MHz] | Measured Value [dB μ V] | Duty Cycle Factor [dB] | ANT. POL [H/V] | Total [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------------|---------------------------|-------------------|-------------------------|-------------------------|----------------|------------------|
| 2310.0~2390.0 | 68.58 | 0.00 | H | 68.58 | 73.98 | 5.40 | PK |
| #2310.0~2390.0 | 51.01 | 0.36 | H | 51.37 | 53.98 | 2.61 | AV |
| 2310.0~2390.0 | 68.17 | 0.00 | V | 68.17 | 73.98 | 5.81 | PK |
| #2310.0~2390.0 | 50.67 | 0.36 | V | 51.03 | 53.98 | 2.95 | AV |
| #2483.5~2500.0 | 62.58 | 0.00 | H | 62.58 | 73.98 | 11.40 | PK |
| #2483.5~2500.0 | 51.54 | 0.36 | H | 51.90 | 53.98 | 2.08 | AV |
| #2483.5~2500.0 | 62.13 | 0.00 | V | 62.13 | 73.98 | 11.85 | PK |
| #2483.5~2500.0 | 51.08 | 0.36 | V | 51.44 | 53.98 | 2.54 | 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 [dB μ V] | Duty Cycle Factor [dB] | ANT. POL [H/V] | Total [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Measurement Type |
|--------------------|--------------------------------|---------------------------|-------------------|-------------------------|-------------------------|----------------|------------------|
| 2483.5~2500.0 | 54.75 | 0.00 | H | 54.75 | 73.98 | 19.23 | PK |
| 2483.5~2500.0 | 42.21 | 0.36 | H | 42.57 | 53.98 | 11.41 | AV |
| 2483.5~2500.0 | 54.36 | 0.00 | V | 54.36 | 73.98 | 19.62 | PK |
| 2483.5~2500.0 | 42.07 | 0.36 | V | 42.43 | 53.98 | 11.55 | AV |
| 2483.5~2500.0 | 56.15 | 0.00 | H | 56.15 | 73.98 | 17.83 | PK |
| 2483.5~2500.0 | 42.73 | 0.36 | H | 43.09 | 53.98 | 10.89 | AV |
| 2483.5~2500.0 | 55.91 | 0.00 | V | 55.91 | 73.98 | 18.07 | PK |
| 2483.5~2500.0 | 42.61 | 0.36 | V | 42.97 | 53.98 | 11.01 | AV |

Operation Mode: 802.11ac (VHT20)
 Transfer MCS Index: 0
 Operating Frequency: 2412 MHz, 2462 MHz
 Channel No. 01 Ch, 11 Ch

| Frequency [MHz] | Measured Value [dBμV] | Duty Cycle Factor [dB] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|-----------------|-----------------------|------------------------|----------------|----------------|----------------|-------------|------------------|
| 2310.0~2390.0 | 68.57 | 0.00 | H | 68.57 | 73.98 | 5.41 | PK |
| #2310.0~2390.0 | 50.92 | 0.36 | H | 51.28 | 53.98 | 2.70 | AV |
| 2310.0~2390.0 | 67.91 | 0.00 | V | 67.91 | 73.98 | 6.07 | PK |
| #2310.0~2390.0 | 50.27 | 0.36 | V | 50.63 | 53.98 | 3.35 | AV |
| #2483.5~2500.0 | 62.78 | 0.00 | H | 62.78 | 73.98 | 11.20 | PK |
| #2483.5~2500.0 | 51.57 | 0.36 | H | 51.93 | 53.98 | 2.05 | AV |
| #2483.5~2500.0 | 61.68 | 0.00 | V | 61.68 | 73.98 | 12.30 | PK |
| #2483.5~2500.0 | 51.31 | 0.36 | V | 51.67 | 53.98 | 2.31 | AV |

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

Operation Mode: 802.11ac (VHT20)
 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] | ANT. POL [H/V] | Total [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Measurement Type |
|-----------------|-----------------------|------------------------|----------------|----------------|----------------|-------------|------------------|
| 2483.5~2500.0 | 55.45 | 0.00 | H | 55.45 | 73.98 | 18.53 | PK |
| 2483.5~2500.0 | 42.21 | 0.36 | H | 42.57 | 53.98 | 11.41 | AV |
| 2483.5~2500.0 | 54.69 | 0.00 | V | 54.69 | 73.98 | 19.29 | PK |
| 2483.5~2500.0 | 42.08 | 0.36 | V | 42.44 | 53.98 | 11.54 | AV |
| 2483.5~2500.0 | 54.97 | 0.00 | H | 54.97 | 73.98 | 19.01 | PK |
| 2483.5~2500.0 | 42.83 | 0.36 | H | 43.19 | 53.98 | 10.79 | AV |
| 2483.5~2500.0 | 54.61 | 0.00 | V | 54.61 | 73.98 | 19.37 | PK |
| 2483.5~2500.0 | 42.30 | 0.36 | V | 42.66 | 53.98 | 11.32 | AV |

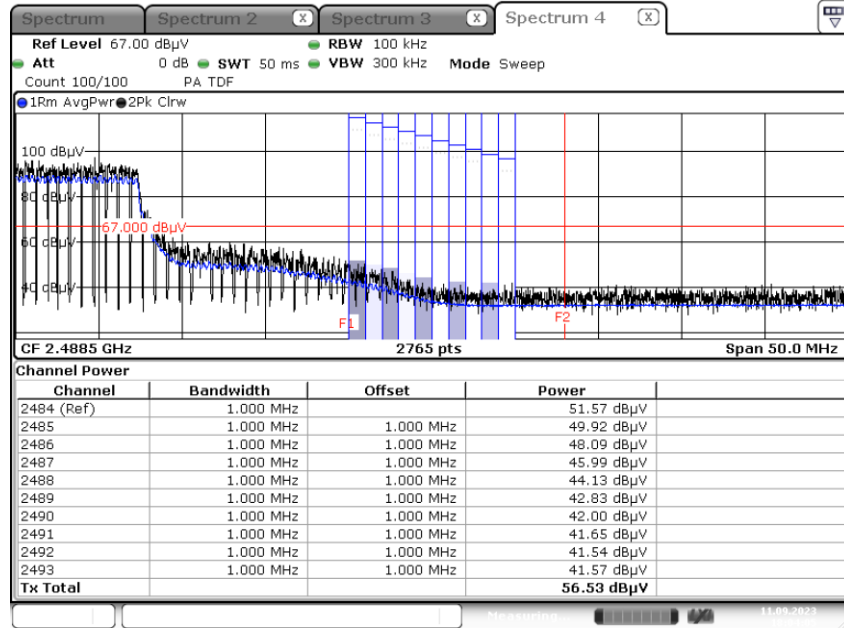
■ Test Plots

Note:

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

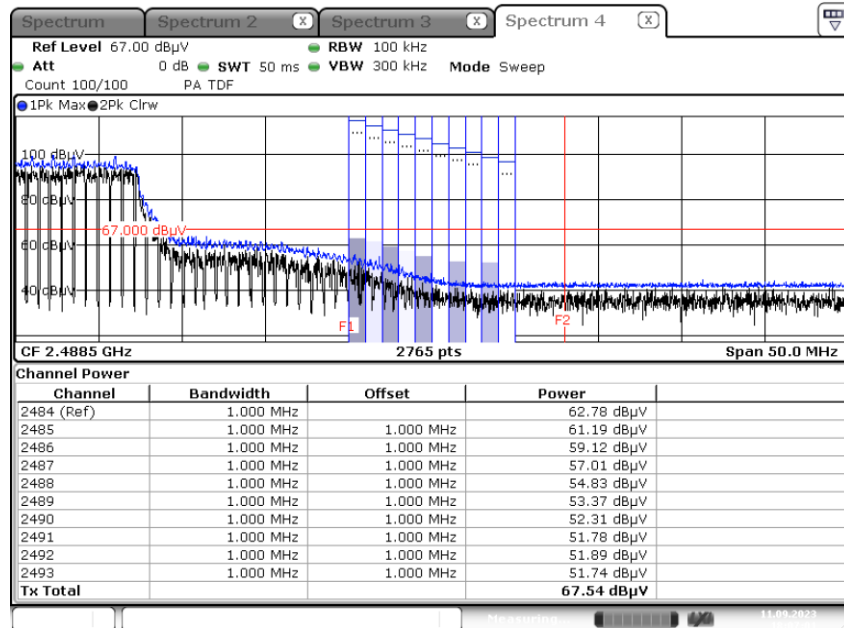
[MIMO_CDD(Ant1+Ant2)]

Radiated Restricted Band Edges plot – Average Result (802.11ac (VHT20)_ MCS0, Ch.11, H)



Date: 11.SEP.2023 18:04:05

Radiated Restricted Band Edges plot – Peak Result (802.11ac (VHT20)_ MCS0, Ch.11, H)



Date: 11.SEP.2023 18:07:01

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions

Test

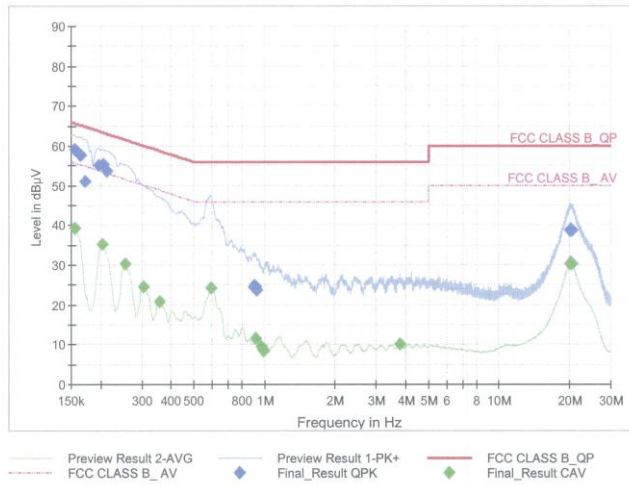
1 / 2

Test Report

Common Information

EUT : SM-S926B/DS
 Operating Conditions : 2.4G WLAN Mode
 Comment :

Full Spectrum



Final Result QPK

| Frequency (MHz) | QuasiPeak (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|--------------|-------------|-----------------|------|------------|
| 0.1545 | 59.21 | 65.75 | 6.54 | 9.000 | N | 9.6 |
| 0.1635 | 57.58 | 65.28 | 7.71 | 9.000 | L1 | 9.6 |
| 0.1725 | 51.11 | 64.84 | 13.73 | 9.000 | L1 | 9.6 |
| 0.1973 | 55.03 | 63.73 | 8.69 | 9.000 | N | 9.6 |
| 0.2063 | 55.35 | 63.36 | 8.00 | 9.000 | N | 9.6 |
| 0.2130 | 53.60 | 63.09 | 9.48 | 9.000 | N | 9.6 |
| 0.8960 | 24.65 | 56.00 | 31.35 | 9.000 | N | 9.7 |
| 0.9005 | 24.46 | 56.00 | 31.54 | 9.000 | N | 9.7 |
| 0.9095 | 24.69 | 56.00 | 31.31 | 9.000 | N | 9.7 |
| 0.9163 | 24.45 | 56.00 | 31.55 | 9.000 | N | 9.7 |
| 0.9208 | 24.64 | 56.00 | 31.36 | 9.000 | N | 9.7 |
| 0.9298 | 23.53 | 56.00 | 32.47 | 9.000 | N | 9.7 |
| 20.0233 | 38.62 | 60.00 | 21.38 | 9.000 | L1 | 10.3 |
| 20.1358 | 38.92 | 60.00 | 21.08 | 9.000 | L1 | 10.3 |
| 20.1875 | 38.65 | 60.00 | 21.35 | 9.000 | L1 | 10.3 |
| 20.2775 | 38.93 | 60.00 | 21.07 | 9.000 | L1 | 10.3 |
| 20.2888 | 38.85 | 60.00 | 21.15 | 9.000 | L1 | 10.3 |
| 20.4418 | 38.79 | 60.00 | 21.21 | 9.000 | L1 | 10.3 |

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Final Result CAV

| Frequency (MHz) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|-----------------|--------------|-------------|-----------------|------|------------|
| 0.1545 | 39.23 | 55.75 | 16.52 | 9.000 | N | 9.6 |
| 0.2040 | 35.14 | 53.45 | 18.31 | 9.000 | N | 9.6 |
| 0.2535 | 30.35 | 51.64 | 21.29 | 9.000 | N | 9.6 |
| 0.3053 | 24.60 | 50.10 | 25.50 | 9.000 | N | 9.6 |
| 0.3548 | 20.81 | 48.85 | 28.04 | 9.000 | N | 9.6 |
| 0.5923 | 24.29 | 46.00 | 21.71 | 9.000 | L1 | 9.6 |
| 0.9185 | 11.66 | 46.00 | 34.34 | 9.000 | L1 | 9.6 |
| 0.9658 | 9.48 | 46.00 | 36.52 | 9.000 | L1 | 9.6 |
| 0.9748 | 9.39 | 46.00 | 36.61 | 9.000 | L1 | 9.6 |
| 0.9815 | 9.02 | 46.00 | 36.98 | 9.000 | L1 | 9.6 |
| 0.9973 | 8.51 | 46.00 | 37.49 | 9.000 | L1 | 9.6 |
| 3.7873 | 10.07 | 46.00 | 35.93 | 9.000 | L1 | 9.8 |
| 20.1155 | 30.29 | 50.00 | 19.71 | 9.000 | L1 | 10.3 |
| 20.1358 | 30.40 | 50.00 | 19.60 | 9.000 | L1 | 10.3 |
| 20.1605 | 30.28 | 50.00 | 19.73 | 9.000 | L1 | 10.3 |
| 20.2123 | 30.43 | 50.00 | 19.57 | 9.000 | L1 | 10.3 |
| 20.2775 | 30.44 | 50.00 | 19.56 | 9.000 | L1 | 10.3 |
| 20.3833 | 30.29 | 50.00 | 19.71 | 9.000 | L1 | 10.3 |

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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 | 08/02/2024 | Annual |
| EMI Test Receiver | ESR | Rohde & Schwarz | 101910 | 05/26/2024 | Annual |
| Temperature Chamber | SU-642 | ESPEC | 93008124 | 02/22/2024 | Annual |
| Signal Analyzer | N9030A | Keysight | MY55410508 | 09/04/2024 | Annual |
| Power Meter | N1911A | Agilent | MY45100523 | 03/06/2024 | Annual |
| Power Sensor | N1921A | Agilent | MY57820067 | 03/06/2024 | Annual |
| Directional Coupler | 87300B | Agilent | 3116A03621 | 11/02/2023 | Annual |
| Power Splitter | 11667B | Hewlett Packard | 10545 | 02/06/2024 | Annual |
| DC Power Supply | E3632A | Agilent | KR75305528 | 01/03/2024 | Annual |
| Attenuator(10 dB)(DC-26.5 GHz) | 8493C-010 | Agilent | 08285 | 06/02/2024 | Annual |
| Attenuator(20 dB) | 18N-20dB | Rohde & Schwarz | 8 | 03/08/2024 | 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 | S3AM | 08/03/2025 | Biennial |
| Controller | EM2090 | Emco | 060520 | N/A | N/A |
| Turn Table | N/A | Ets | N/A | 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-1191 | 11/18/2023 | Biennial |
| Horn Antenna(15 GHz ~ 40 GHz) | BBHA9170 | Schwarzbeck | BBHA9170124 | 03/28/2025 | Biennial |
| Amp & Filter Bank Switch Controller | FBSM-01A | TNM system | 0 | N/A | N/A |
| 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 | 06/12/2024 | Annual |
| Band Reject Filter | WRCJV12-4900-5100-5900-6100-50SS | Wainwright Instruments | 6 | 06/12/2024 | Annual |
| Band Reject Filter | WRCJV5100/5850-40/50-8EEK | Wainwright Instruments | 1 | 02/09/2024 | Annual |
| RF Switching System | FBSR-03A (3G HPF+LNA) | T&M SYSTEM | S3L1 | 12/05/2023 | Annual |
| RF Switching System | FBSR-03A (10dB ATT+LNA) | T&M SYSTEM | S3L2 | 12/05/2023 | Annual |
| RF Switching System | FBSR-03A (7G HPF+LNA) | T&M SYSTEM | S3L3 | 12/05/2023 | Annual |
| RF Switching System | FBSR-03A (3dB ATT+LNA) | T&M SYSTEM | S3L4 | 12/05/2023 | Annual |
| Power Amplifier | CBL18265035 | CERNEX | 22966 | 12/01/2023 | Annual |
| Power Amplifier | CBL26405040 | CERNEX | 25956 | 03/02/2024 | Annual |
| Bluetooth Tester | TC-3000C | TESCOM | 3000C000175 | 03/28/2024 | Annual |
| Spectrum Analyzer | FSVA40 (10 Hz ~ 40 GHz) | Rohde & Schwarz | 101502 | 03/17/2024 | 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-2310-FC060-P |