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TEL: +82-31-645-6300 **FAX: +82-31-645-6401**

FCC DTS REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
January 02, 2023

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2212-FC018

FCC ID:	**A3LSMM146B**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**
Model:	SM-M146B/DSN
Additional Model:	-
EUT Type:	Mobile Phone
Average. RF Output Power:	802.11b : 17.59 dBm, 802.11g : 16.13 dBm, 802.11n(HT20) : 15.18 dBm
Frequency Range:	2412 MHz ~ 2472 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.

REVIEWED BY

Report prepared by : Woong Jin Kim
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)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2212-FC018	January 02, 2023	- First Approval Report

Table of Contents

1. EUT DESCRIPTION

Model	SM-M146B/DSN	
Additional Model	-	
EUT Type	Mobile Phone	
Power Supply	DC 4.2 V	
Frequency Range	2412 MHz ~ 2472 MHz	
Max. RF Output Power	Average Power	802.11b : 17.59 dBm 802.11g : 16.13 dBm 802.11n(HT20) : 15.18 dBm
	Peak Power (For information only)	802.11b : 23.34 dBm 802.11g : 24.37 dBm 802.11n(HT20) : 23.25 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n	
Number of Channels	13 Channels	
Date(s) of Tests	November 17, 2022 ~ January 02, 2023	
Serial number	Radiated : R3CTA0Z2XBJ Conducted : R3CTA0GVDBB	

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.

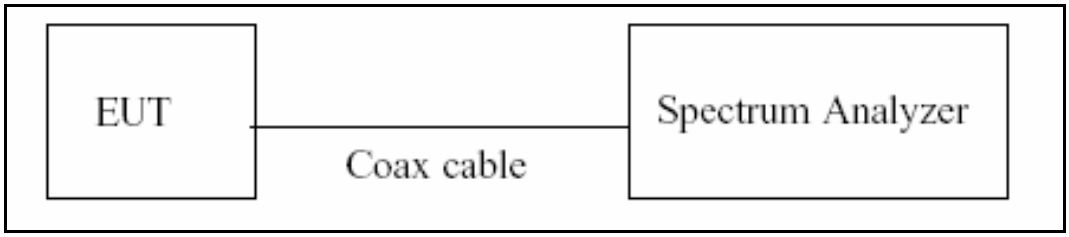
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.48 (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 ≤ 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*.

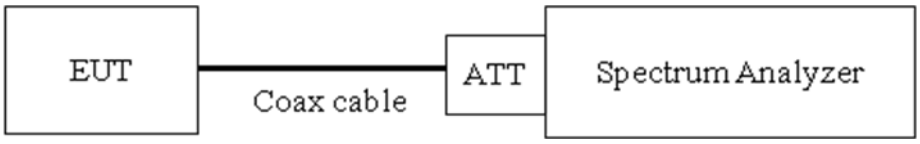
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

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 ≥ 3 x 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.

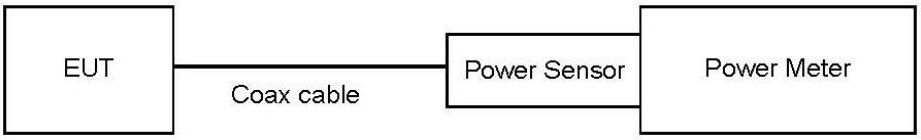
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

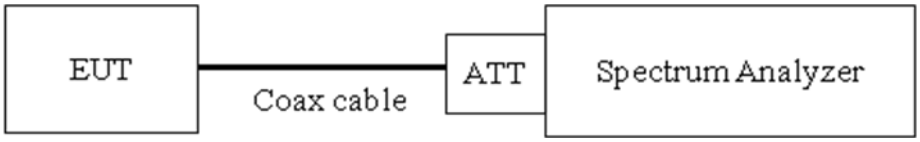
▪ Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

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 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x 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 ≥ [2 × 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

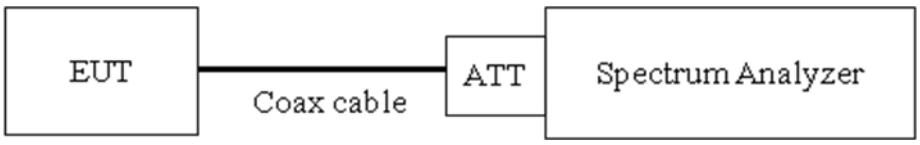
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

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 ≥ 3 x 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 ≥ 2 x 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
24000	21.77
25000	21.80
26000	21.80

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

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

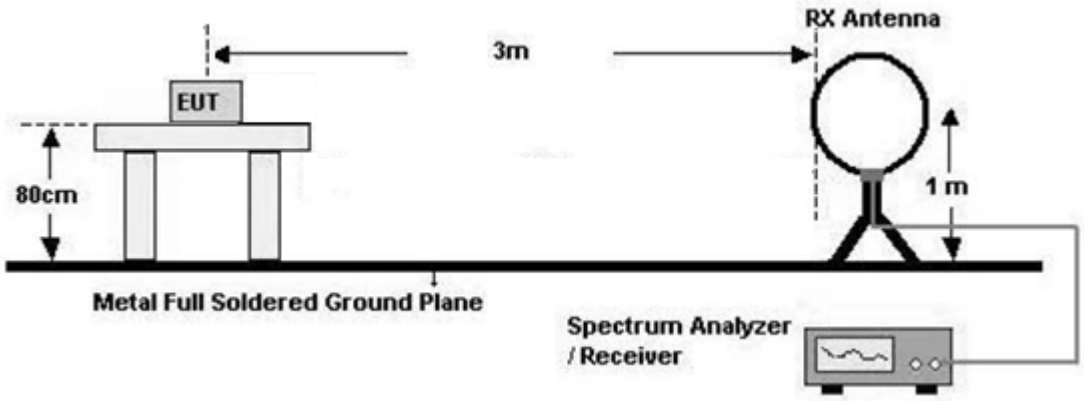
7.6. Radiated Test

Limit

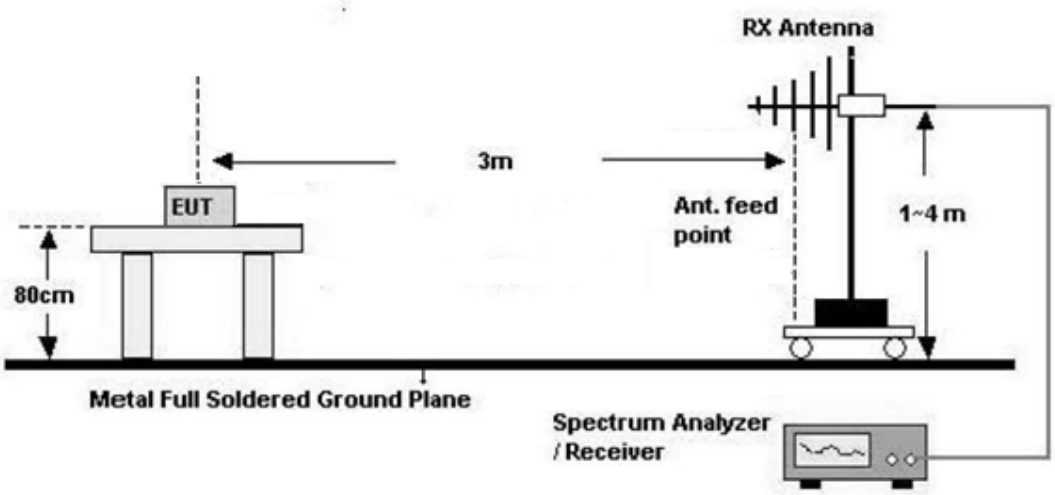
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

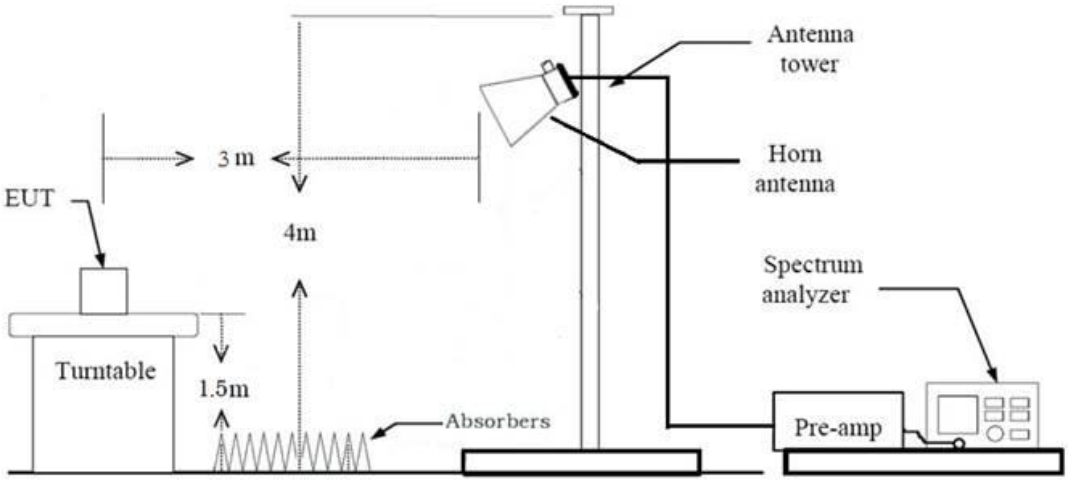
Below 30 MHz



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) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x 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 ≥ 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 ≥ 3 x RBW

(2) Measurement Type(Average): Duty cycle ≥ 98 %

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

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

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3 x 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 = 20log (test distance / specific distance) (dB)
11. Total(Measurement Type : Peak)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

    Total(Measurement Type : Average, Duty cycle ≥ 98 %)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

    Total(Measurement Type : Average, Duty cycle < 98 %)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)
    + 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 ≥ 3 x RBW

   (2) Measurement Type(Average): Duty cycle ≥ 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 ≥ 3 x RBW
   - Sweep time = auto.
   - Trace mode = average (at least 100 traces).

   (3) Measurement Type(Average): Duty cycle < 98 %, duty cycle variations are less than ± 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 ≥ 3 x 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 = 20log (test distance / 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 ≥ 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 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	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 : X
   - 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

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

Conducted test

1. The EUT was configured with data rate of the highest power.

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

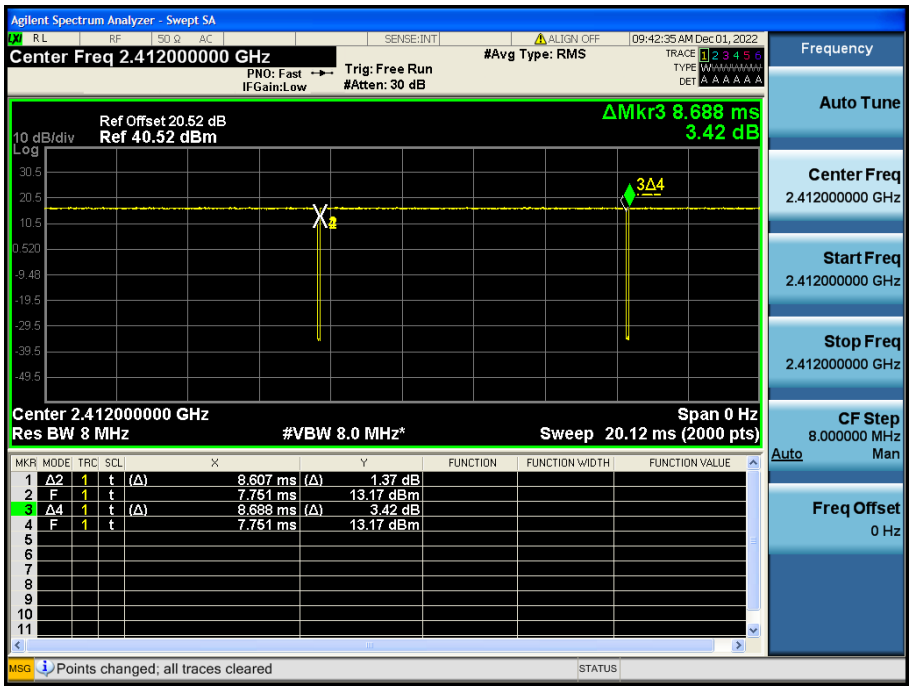
9. TEST RESULT

9.1 DUTY CYCLE

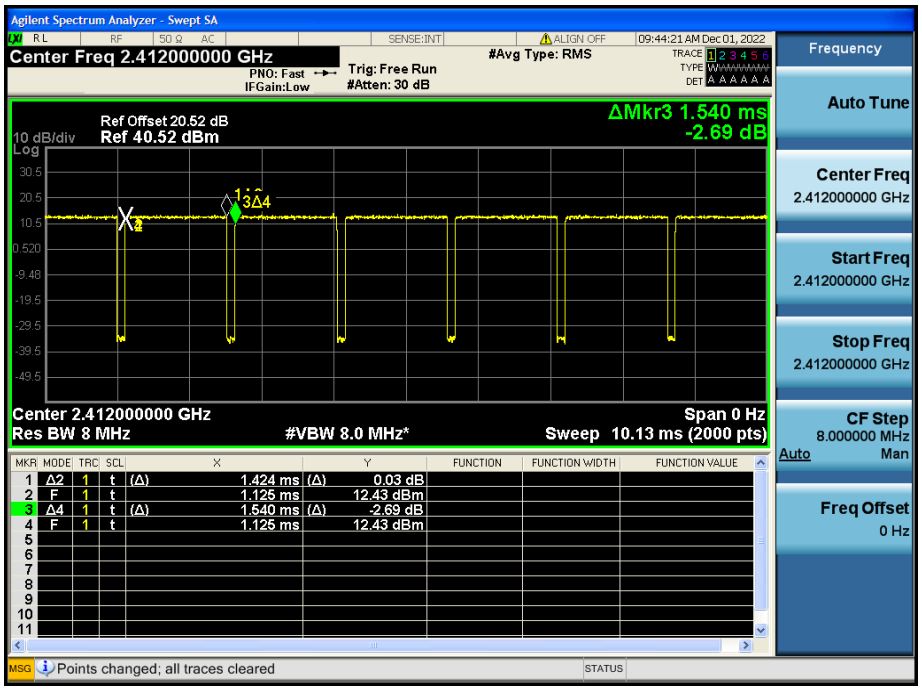
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.607	8.688	0.991	0.040
	2	4.399	4.512	0.975	0.110
	5.5	1.723	1.814	0.950	0.224
	11	0.953	1.069	0.891	0.501
802.11g	6	1.424	1.540	0.924	0.342
	9	0.958	1.074	0.892	0.499
	12	0.725	0.841	0.861	0.648
	18	0.491	0.608	0.808	0.924
	24	0.370	0.486	0.760	1.189
	36	0.253	0.370	0.685	1.644
	48	0.198	0.309	0.639	1.943
	54	0.177	0.294	0.603	2.194
802.11n (HT20)	6.5 (MCS0)	1.338	1.434	0.933	0.302
	13 (MCS1)	0.689	0.785	0.877	0.568
	19.5 (MCS2)	0.471	0.588	0.802	0.960
	26 (MCS3)	0.365	0.481	0.758	1.204
	39 (MCS4)	0.258	0.375	0.689	1.617
	52 (MCS5)	0.203	0.314	0.645	1.903
	58.5 (MCS6)	0.182	0.304	0.600	2.218
	65 (MCS7)	0.167	0.283	0.592	2.280

▣ Test Plots

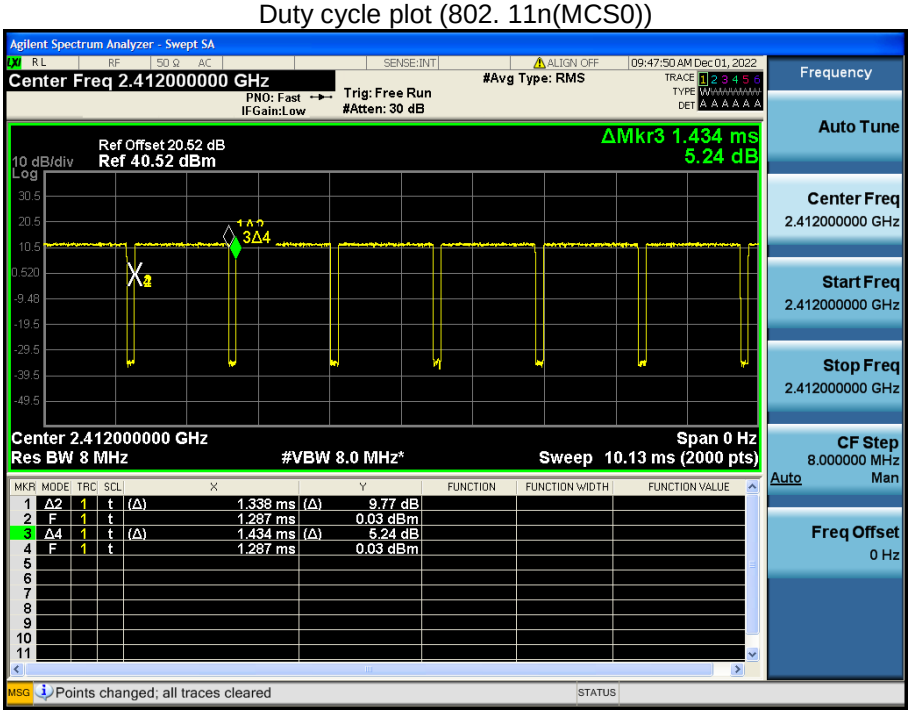
Duty cycle plot (802.11b(1 Mbps))



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

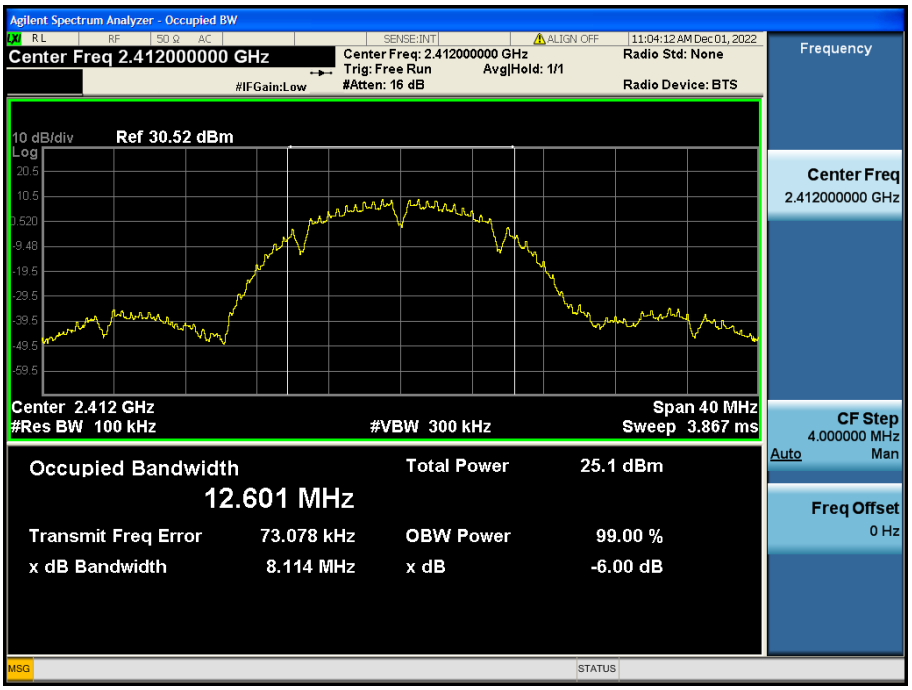
802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.114	0.5
2437	6	8.121	0.5
2462	11	8.142	0.5
2467	12	8.587	0.5
2472	13	8.114	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.14	0.5
2437	6	15.15	0.5
2462	11	15.16	0.5
2467	12	15.14	0.5
2472	13	15.12	0.5

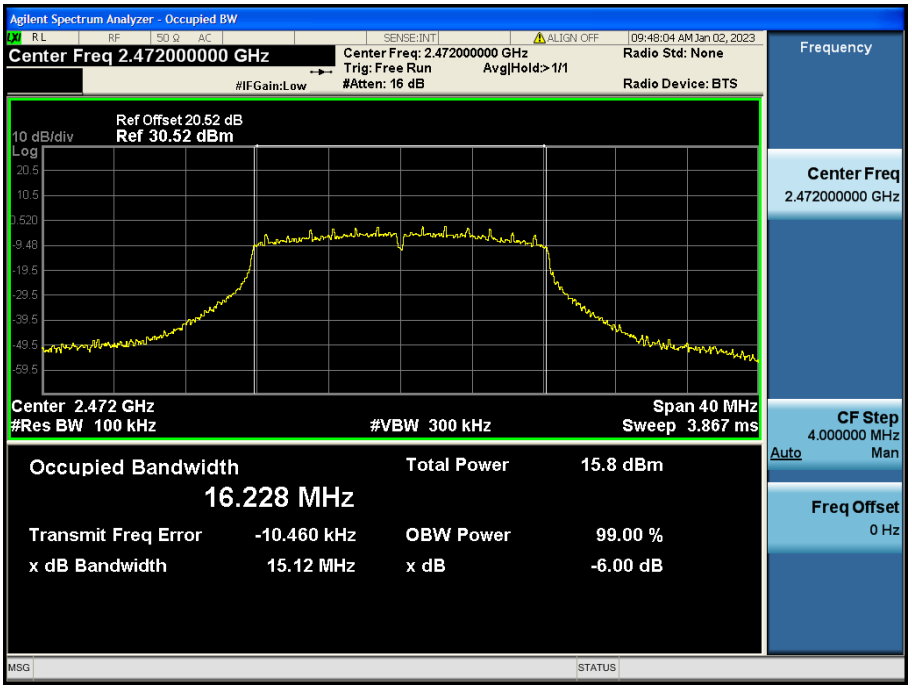
802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.12	0.5
2437	6	15.35	0.5
2462	11	15.48	0.5
2467	12	15.16	0.5
2472	13	15.13	0.5

▣ Test Plots

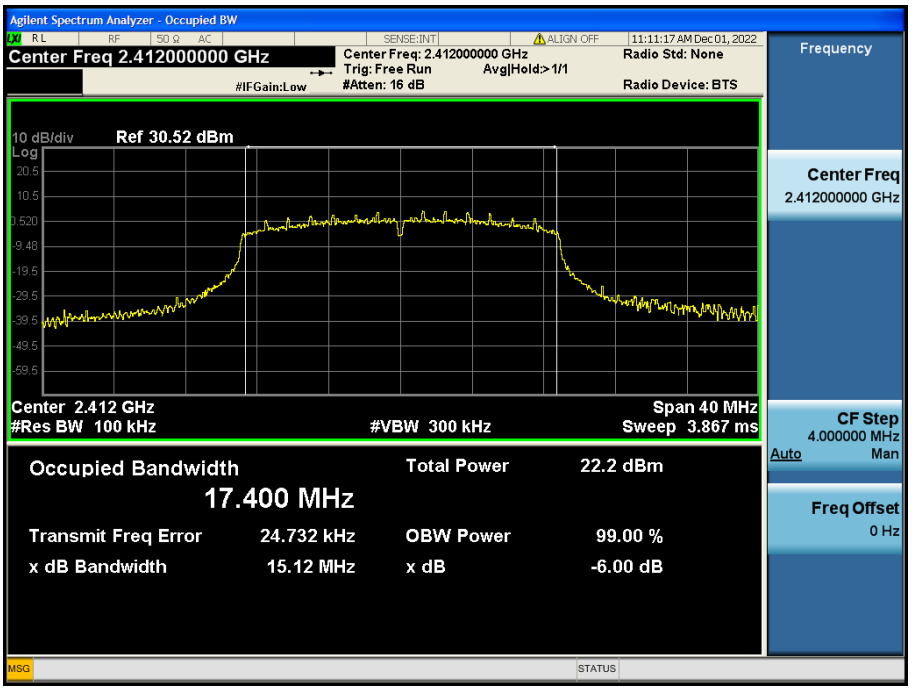
6 dB Bandwidth plot (802.11b-CH 1)



6 dB Bandwidth plot (802.11g-CH 13)



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

Peak Output Power

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1	20.15	30
		2	20.33	30
		5.5	21.85	30
		11	23.34	30
2437	6	1	19.66	30
		2	19.91	30
		5.5	21.49	30
		11	22.95	30
2462	11	1	19.31	30
		2	19.57	30
		5.5	21.15	30
		11	22.61	30
2412	12	1	15.70	30
		2	15.91	30
		5.5	17.48	30
		11	18.97	30
2472	13	1	12.15	30
		2	12.32	30
		5.5	13.89	30
		11	15.35	30

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6	23.99	30
		9	23.88	30
		12	23.49	30
		18	23.74	30
		24	24.37	30
		36	24.18	30
		48	22.44	30
		54	22.67	30
2437	6	6	23.86	30
		9	23.76	30
		12	23.38	30
		18	23.57	30
		24	24.27	30
		36	24.07	30
		48	22.15	30
		54	22.40	30
2462	11	6	23.59	30
		9	23.52	30
		12	23.11	30
		18	23.33	30
		24	24.04	30
		36	23.80	30
		48	21.85	30
		54	22.13	30
2467	12	6	20.72	30
		9	20.59	30
		12	20.21	30
		18	20.39	30
		24	21.06	30
		36	20.86	30
		48	20.93	30
		54	21.19	30
2472	13	6	16.96	30
		9	16.76	30
		12	16.38	30
		18	16.61	30
		24	17.25	30
		36	17.01	30
		48	17.16	30
		54	17.37	30

802.11n(HT20) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	0	22.86	30
		1	22.70	30
		2	22.82	30
		3	23.23	30
		4	23.25	30
		5	21.04	30
		6	21.27	30
		7	21.20	30
2437	6	0	22.61	30
		1	22.42	30
		2	22.64	30
		3	22.96	30
		4	22.99	30
		5	20.88	30
		6	21.15	30
		7	21.04	30
2462	11	0	22.41	30
		1	22.12	30
		2	22.32	30
		3	22.66	30
		4	22.77	30
		5	20.65	30
		6	20.94	30
		7	20.79	30
2467	12	0	20.51	30
		1	20.36	30
		2	20.43	30
		3	20.76	30
		4	20.87	30
		5	19.73	30
		6	20.02	30
		7	19.86	30
2472	13	0	14.64	30
		1	14.43	30
		2	14.57	30
		3	14.92	30
		4	14.96	30
		5	13.69	30
		6	13.89	30
		7	13.81	30

Average Output Power

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	17.55	0.040	17.59	30
		2	17.47	0.110	17.58	30
		5.5	17.33	0.224	17.55	30
		11	17.09	0.501	17.59	30
2437	6	1	17.14	0.040	17.18	30
		2	17.07	0.110	17.18	30
		5.5	16.95	0.224	17.18	30
		11	16.75	0.501	17.25	30
2462	11	1	16.83	0.040	16.87	30
		2	16.75	0.110	16.86	30
		5.5	16.64	0.224	16.87	30
		11	16.44	0.501	16.94	30
2467	12	1	13.06	0.040	13.10	30
		2	13.00	0.110	13.11	30
		5.5	12.82	0.224	13.05	30
		11	12.64	0.501	13.14	30
2472	13	1	9.65	0.040	9.69	30
		2	9.56	0.110	9.67	30
		5.5	9.48	0.224	9.70	30
		11	9.26	0.501	9.76	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	15.63	0.342	15.97	30
		9	15.47	0.499	15.97	30
		12	15.34	0.648	15.98	30
		18	15.13	0.924	16.05	30
		24	14.85	1.189	16.04	30
		36	14.49	1.644	16.13	30
		48	12.33	1.943	14.27	30
		54	12.25	2.194	14.44	30
2437	6	6	15.49	0.342	15.83	30
		9	15.36	0.499	15.86	30
		12	15.22	0.648	15.86	30
		18	15.03	0.924	15.95	30
		24	14.76	1.189	15.95	30
		36	14.39	1.644	16.04	30
		48	12.03	1.943	13.97	30
		54	11.94	2.194	14.14	30
2462	11	6	15.24	0.342	15.59	30
		9	15.11	0.499	15.61	30
		12	14.97	0.648	15.62	30
		18	14.77	0.924	15.70	30
		24	14.48	1.189	15.67	30
		36	14.14	1.644	15.78	30
		48	11.74	1.943	13.69	30
		54	11.67	2.194	13.86	30
2467	12	6	12.38	0.342	12.72	30
		9	12.20	0.499	12.70	30
		12	12.02	0.648	12.66	30
		18	11.82	0.924	12.74	30
		24	11.51	1.189	12.70	30
		36	11.14	1.644	12.79	30
		48	10.80	1.943	12.75	30
		54	10.73	2.194	12.92	30
2472	13	6	8.53	0.342	8.87	30
		9	8.34	0.499	8.84	30
		12	8.20	0.648	8.84	30
		18	7.98	0.924	8.91	30
		24	7.67	1.189	8.86	30
		36	7.30	1.644	8.94	30
		48	6.99	1.943	8.94	30
		54	6.89	2.194	9.09	30

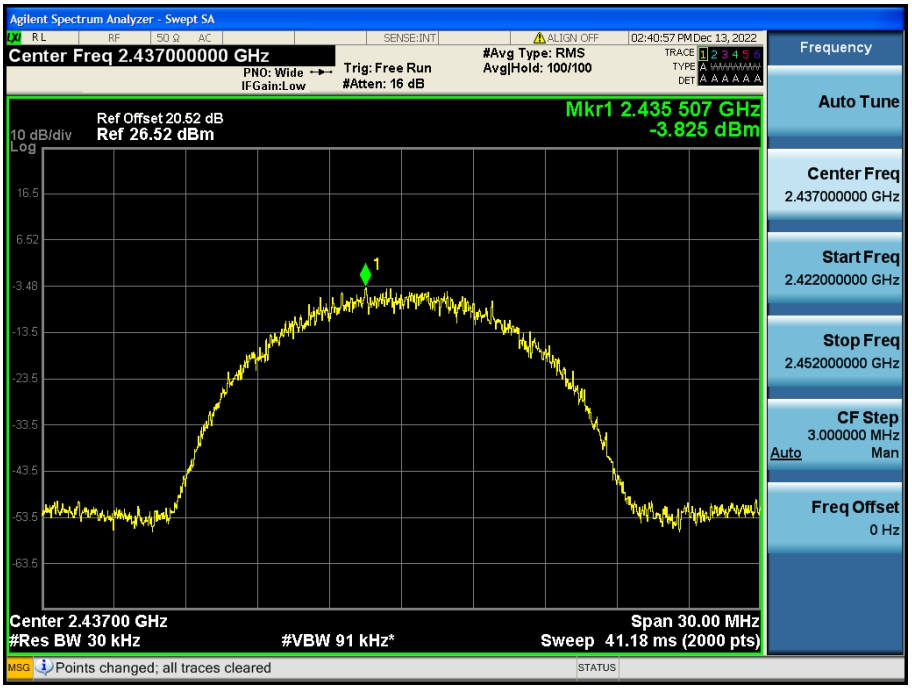
802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	0	14.62	0.302	14.92	30
		1	14.33	0.568	14.90	30
		2	14.14	0.960	15.10	30
		3	13.91	1.204	15.12	30
		4	13.56	1.617	15.18	30
		5	11.07	1.903	12.98	30
		6	10.98	2.218	13.20	30
		7	10.84	2.280	13.12	30
2437	6	0	14.38	0.302	14.68	30
		1	14.06	0.568	14.63	30
		2	13.88	0.960	14.84	30
		3	13.66	1.204	14.86	30
		4	13.33	1.617	14.94	30
		5	10.91	1.903	12.81	30
		6	10.83	2.218	13.05	30
		7	10.67	2.280	12.95	30
2462	11	0	14.10	0.302	14.41	30
		1	13.79	0.568	14.36	30
		2	13.59	0.960	14.55	30
		3	13.38	1.204	14.58	30
		4	13.03	1.617	14.64	30
		5	10.64	1.903	12.55	30
		6	10.56	2.218	12.78	30
		7	10.40	2.280	12.68	30
2467	12	0	12.30	0.302	12.60	30
		1	11.96	0.568	12.53	30
		2	11.75	0.960	12.71	30
		3	11.52	1.204	12.73	30
		4	11.16	1.617	12.77	30
		5	9.75	1.903	11.65	30
		6	9.67	2.218	11.89	30
		7	9.50	2.280	11.78	30
2472	13	0	6.37	0.302	6.68	30
		1	6.05	0.568	6.62	30
		2	5.82	0.960	6.78	30
		3	5.61	1.204	6.82	30
		4	5.22	1.617	6.84	30
		5	3.70	1.903	5.60	30
		6	3.58	2.218	5.80	30
		7	3.40	2.280	5.68	30

9.4 POWER SPECTRAL DENSITY

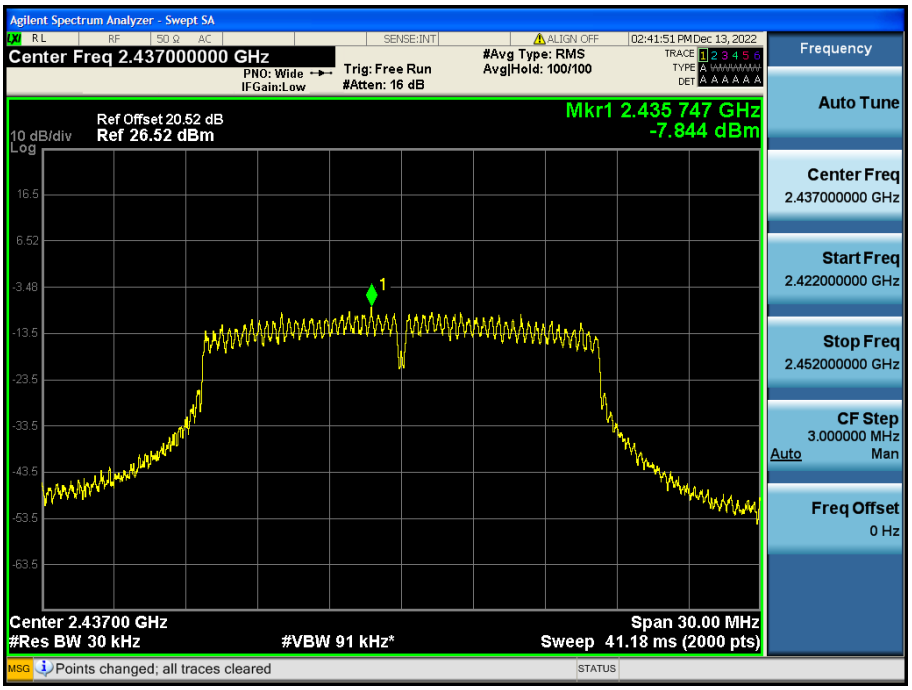
Mode	Frequency (MHz)	Channel No.	Test Result			
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11b	2412	1	-4.385	0.040	-4.345	8 dBm / 3 kHz
	2437	6	-3.825	0.501	-3.324	
	2462	11	-4.129	0.501	-3.628	
	2467	12	-8.297	0.501	-7.796	
	2472	13	-11.602	0.501	-11.101	
802.11g	2412	1	-8.265	1.644	-6.621	
	2437	6	-7.844	1.644	-6.200	
	2462	11	-8.554	1.644	-6.910	
	2467	12	-11.724	2.194	-9.530	
	2472	13	-15.569	2.194	-13.375	
802.11n(HT20)	2412	1	-8.660	1.617	-7.043	
	2437	6	-9.512	1.617	-7.895	
	2462	11	-9.730	1.617	-8.113	
	2467	12	-11.448	1.617	-9.831	
	2472	13	-17.005	1.617	-15.388	

▣ Test Plots

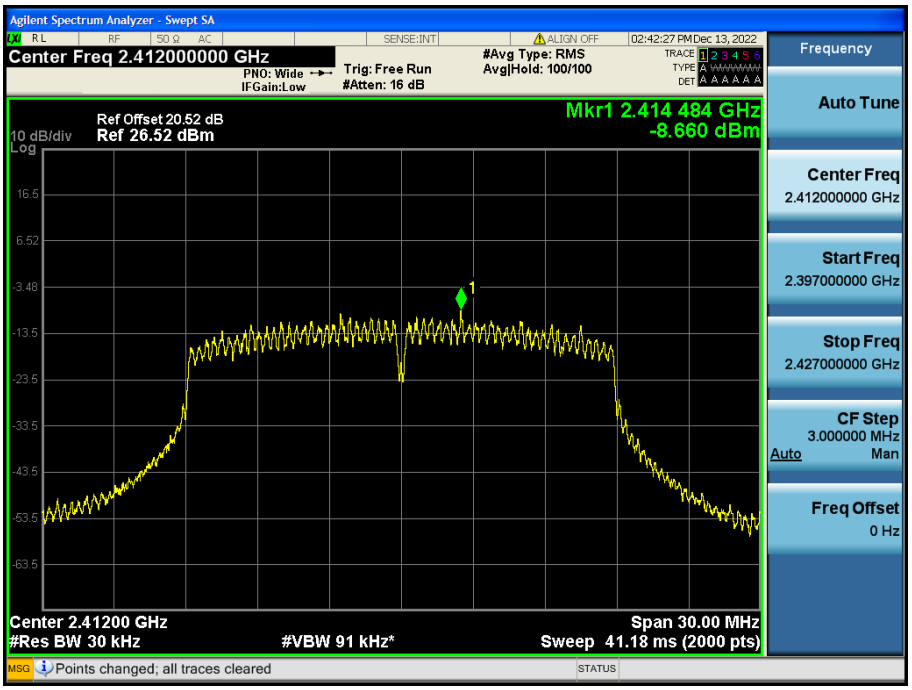
Power Spectral Density (802.11b-CH 6)



Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20-CH 1)



Note :

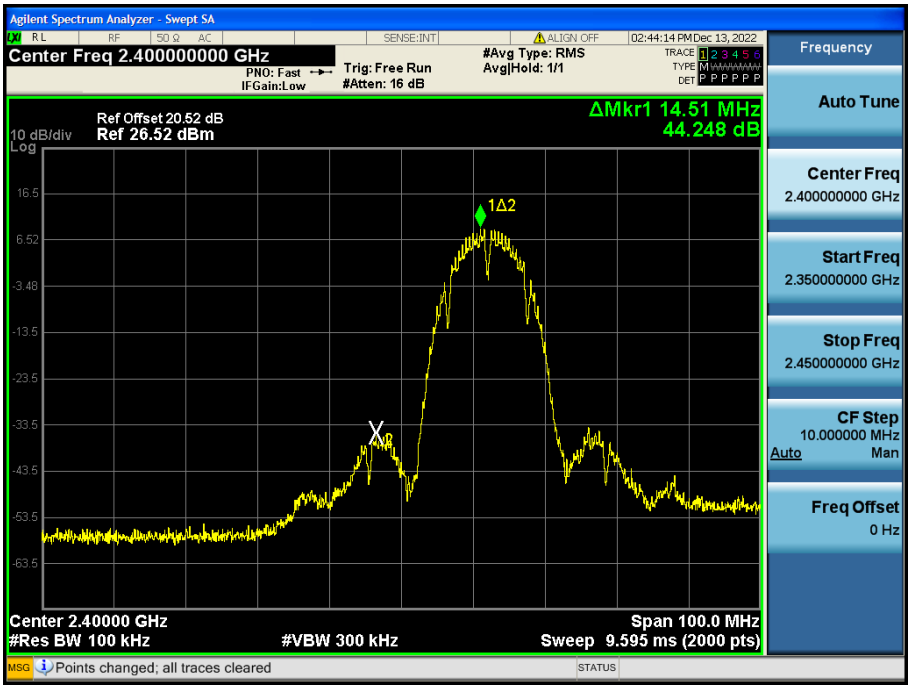
In order to simplify the report, attached plots were only the worst case PSD channel.

9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

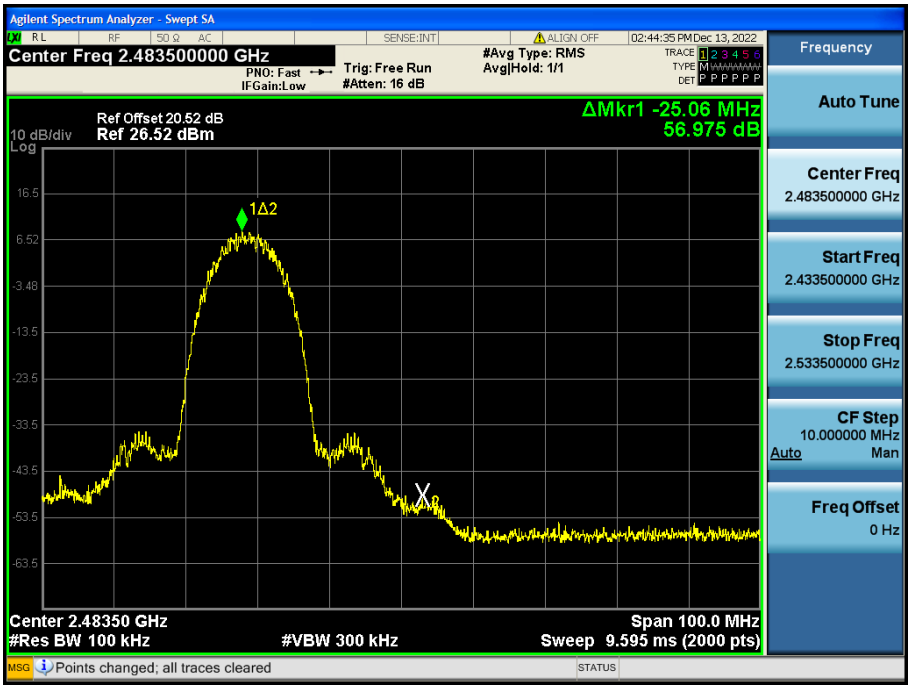
Test Result : please refer to the plot below.
In order to simplify the report, attached plots were only the worst case channel and data rate.

▣ Test Plots(Band Edge)

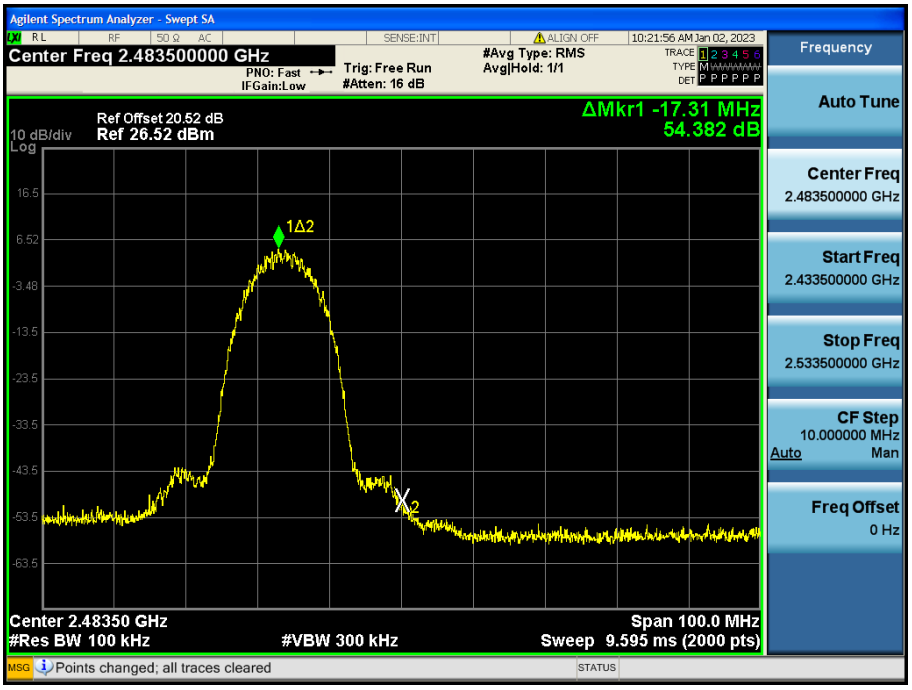
Band Edge (802.11b -CH1)



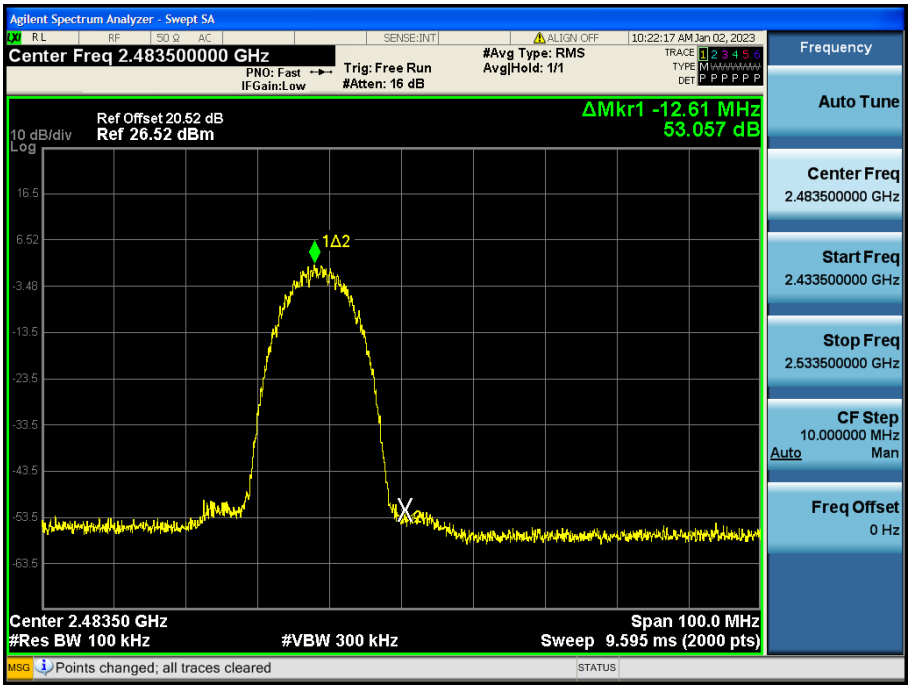
Band Edge (802.11b -CH11)



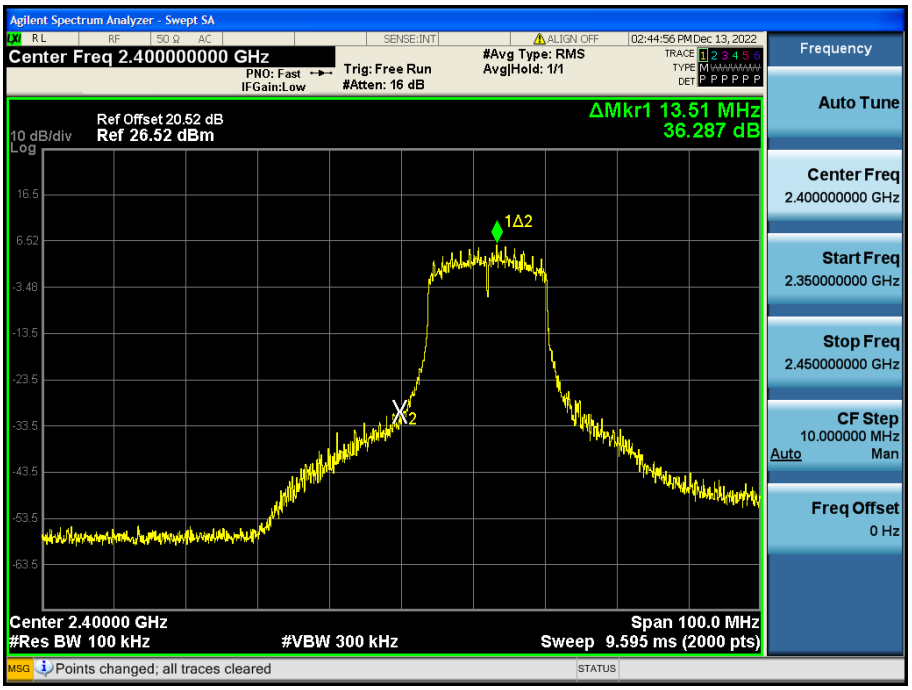
Band Edge (802.11b –CH12)



Band Edge (802.11b -CH13)



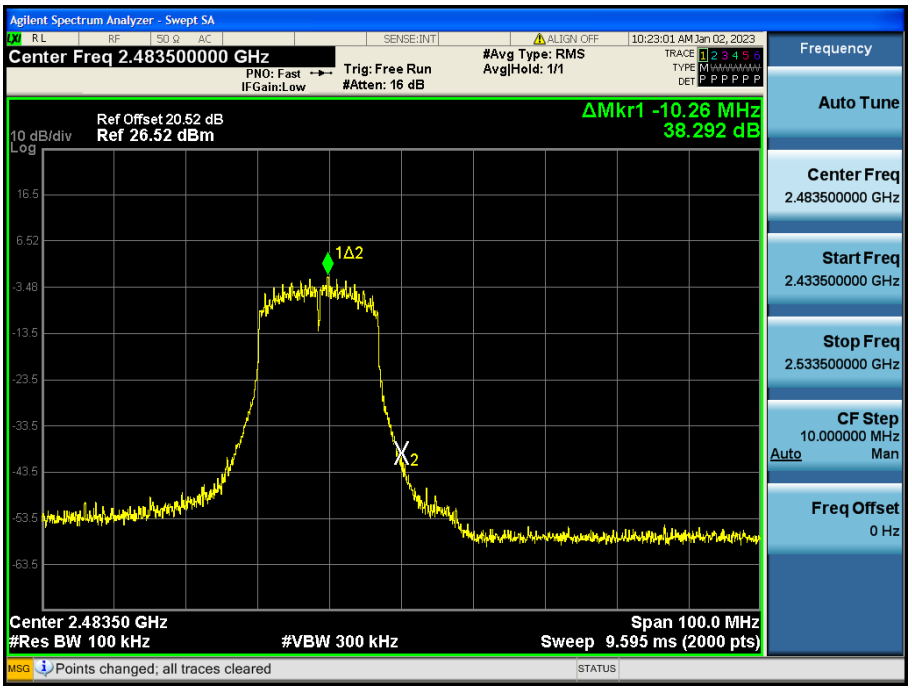
Band Edge (802.11g -CH1)



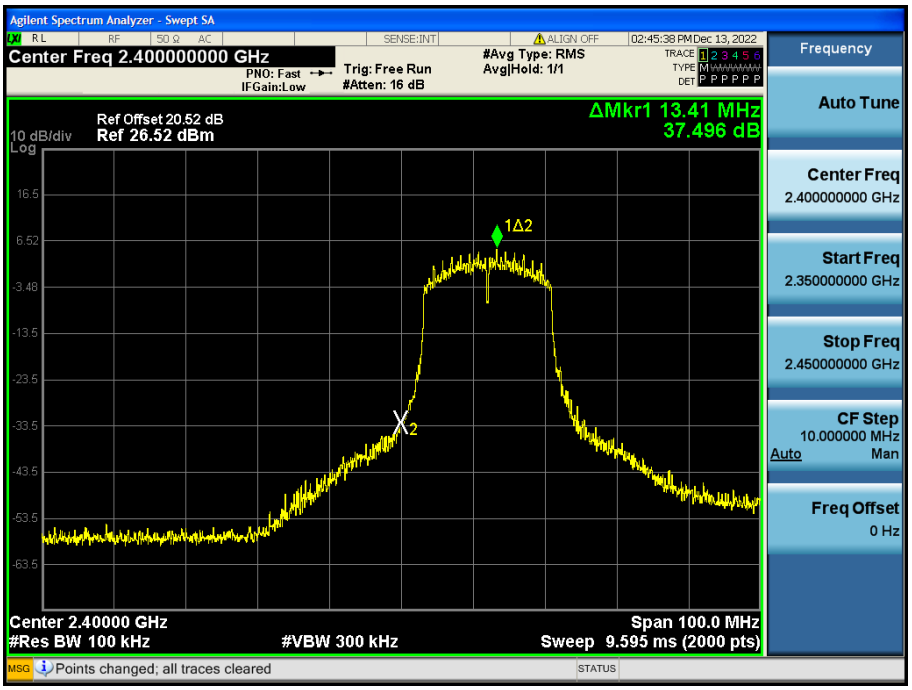
Band Edge (802.11g -CH11)

Band Edge (802.11g -CH12)

Band Edge (802.11g -CH13)

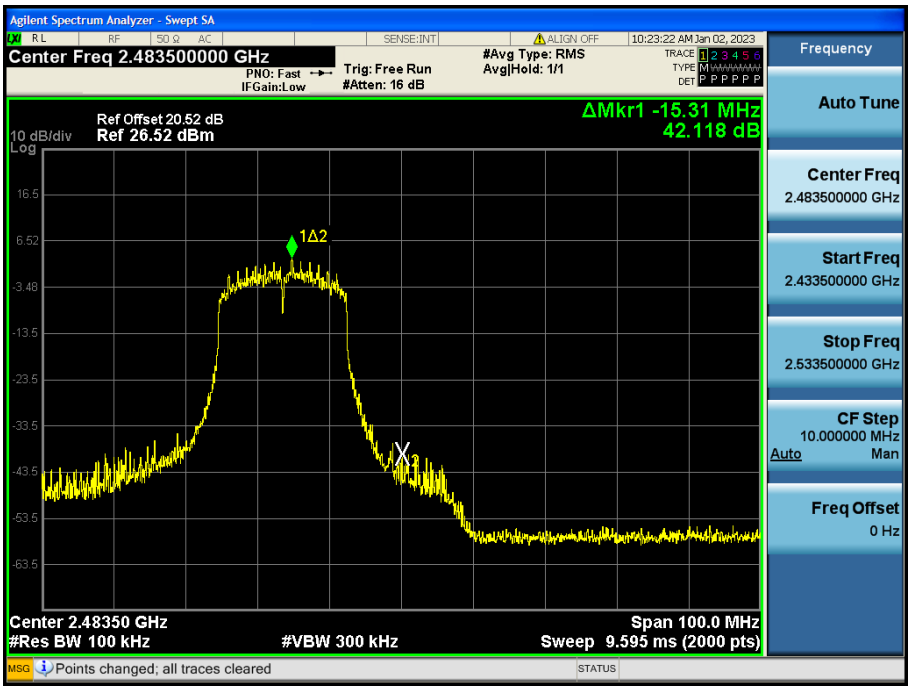


Band Edge (802.11n_HT20-CH1)

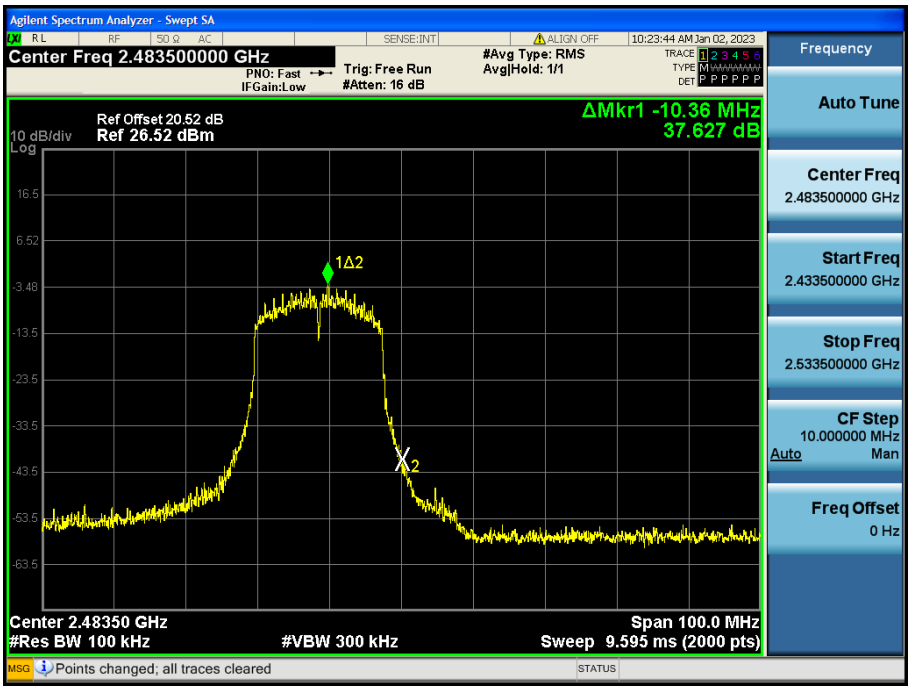


Band Edge (802.11n_HT20-CH11)

Band Edge (802.11n_HT20-CH12)



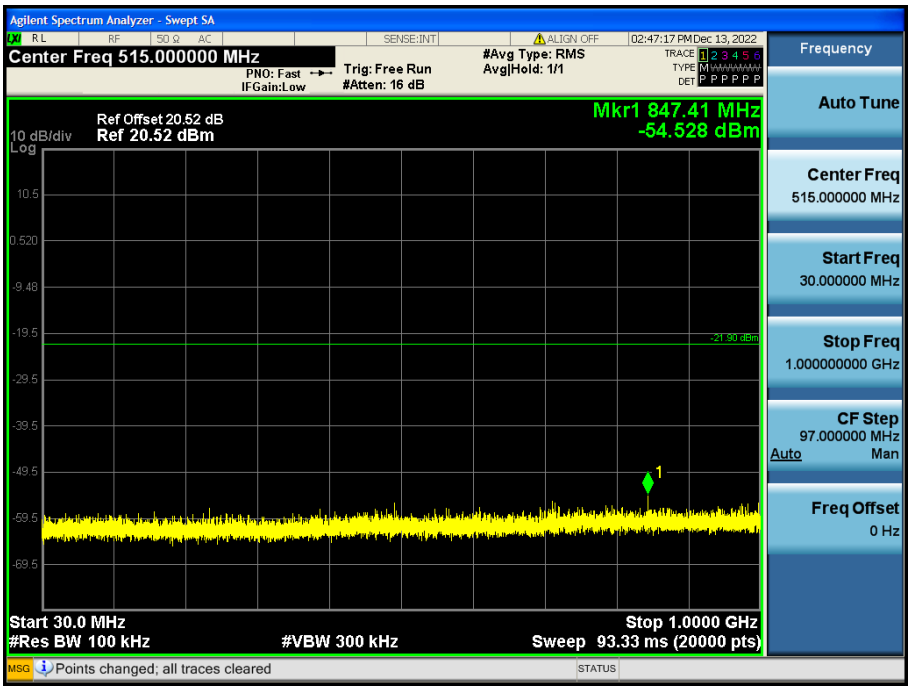
Band Edge (802.11n_HT20-CH13)



▣ Test Plots(Conducted Spurious Emission)

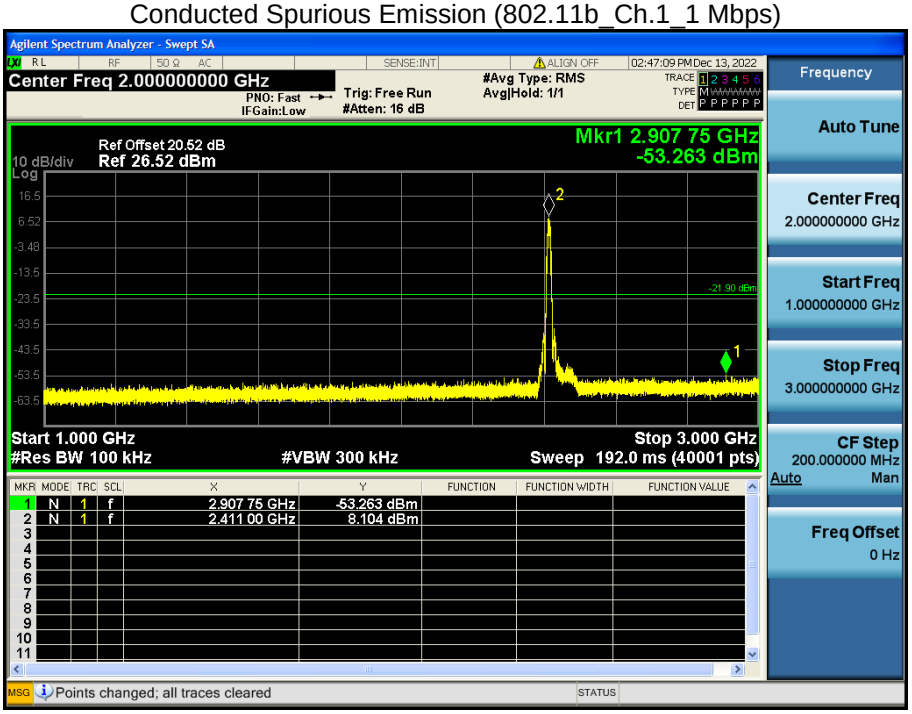
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



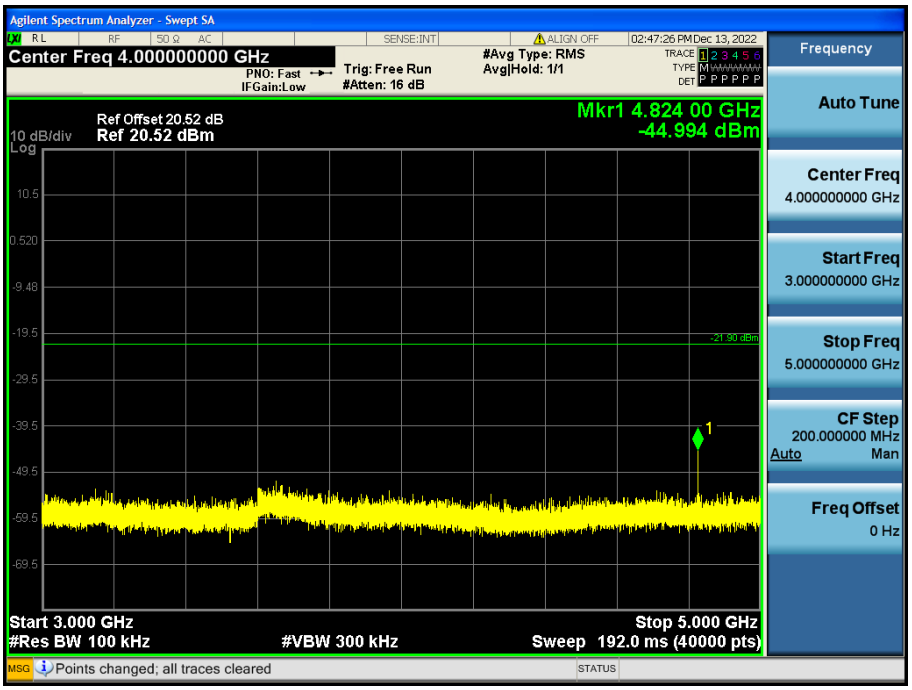
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



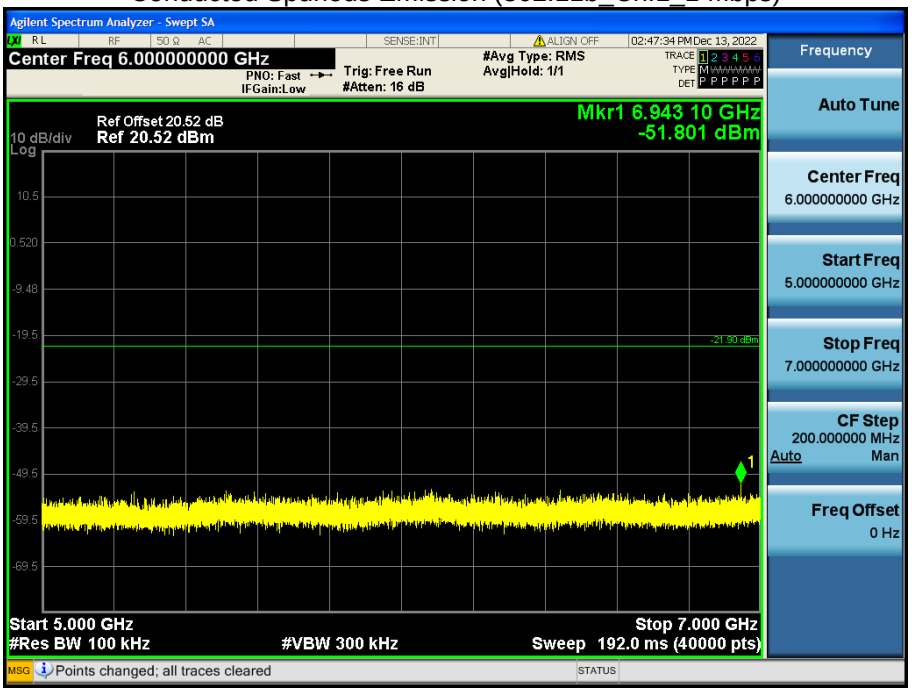
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



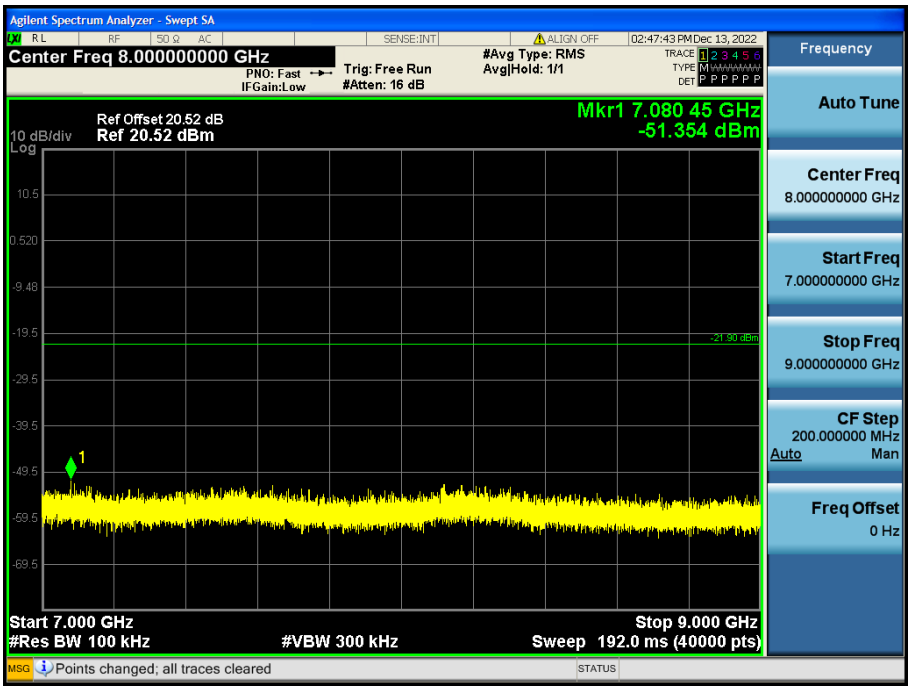
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



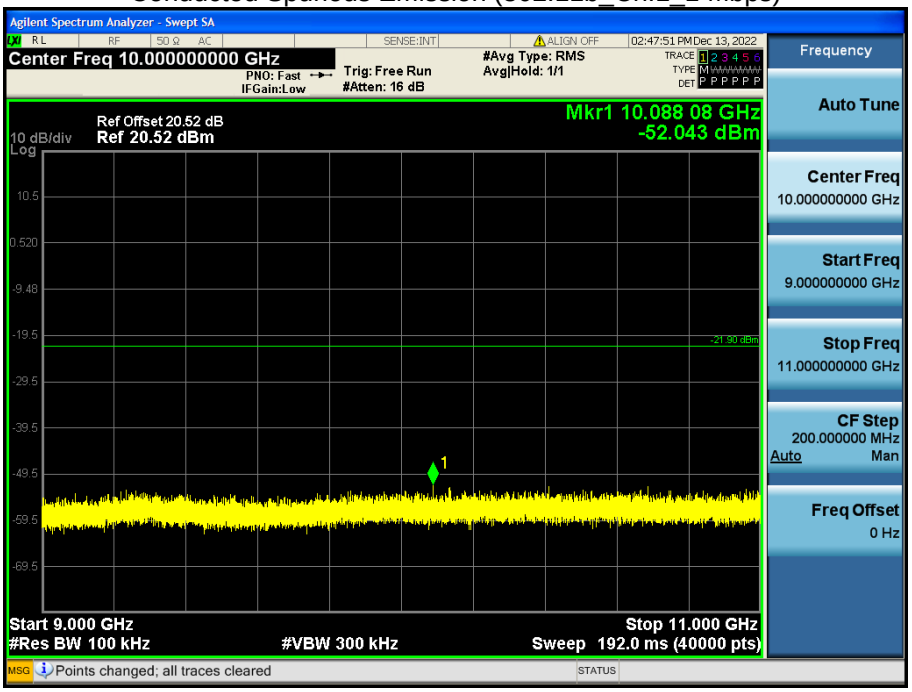
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



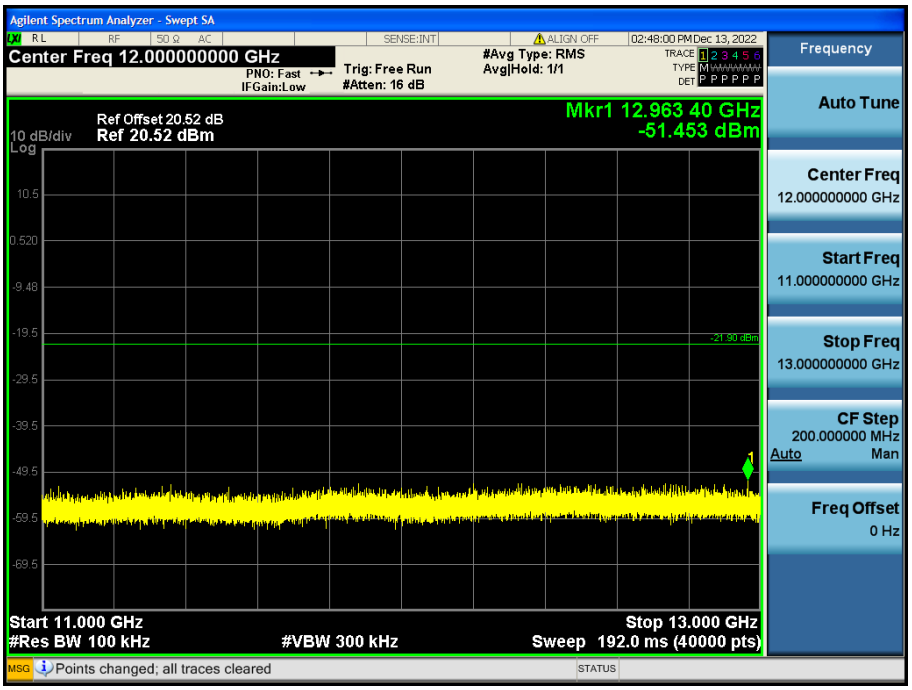
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



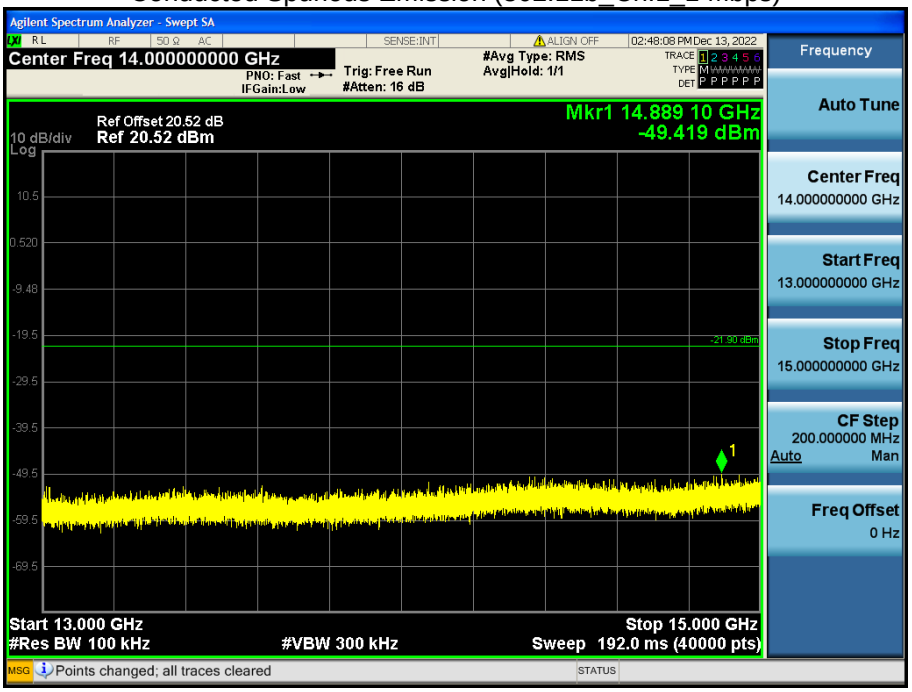
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



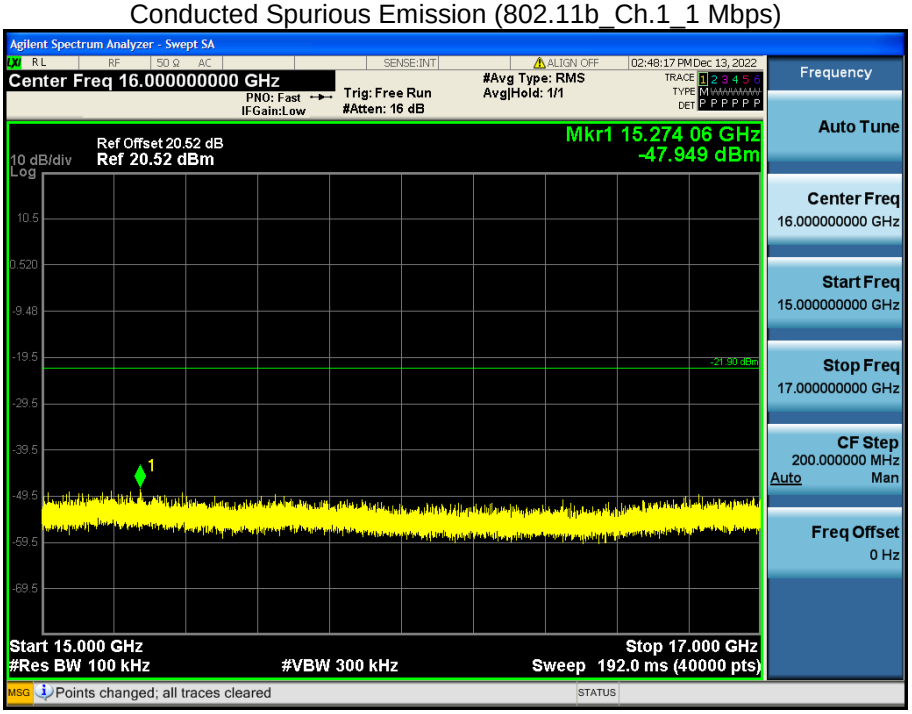
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



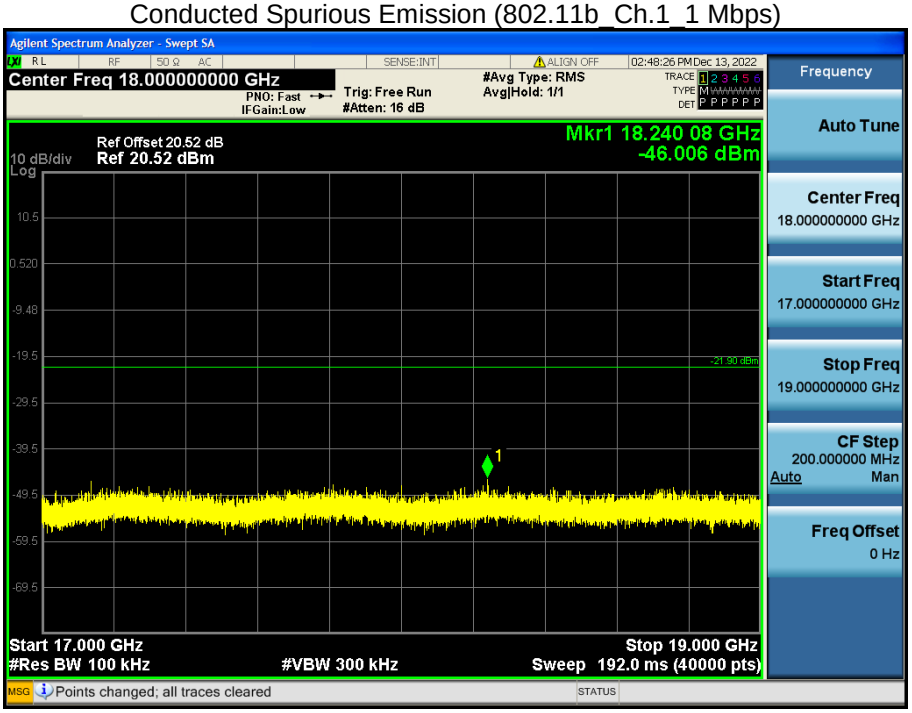
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



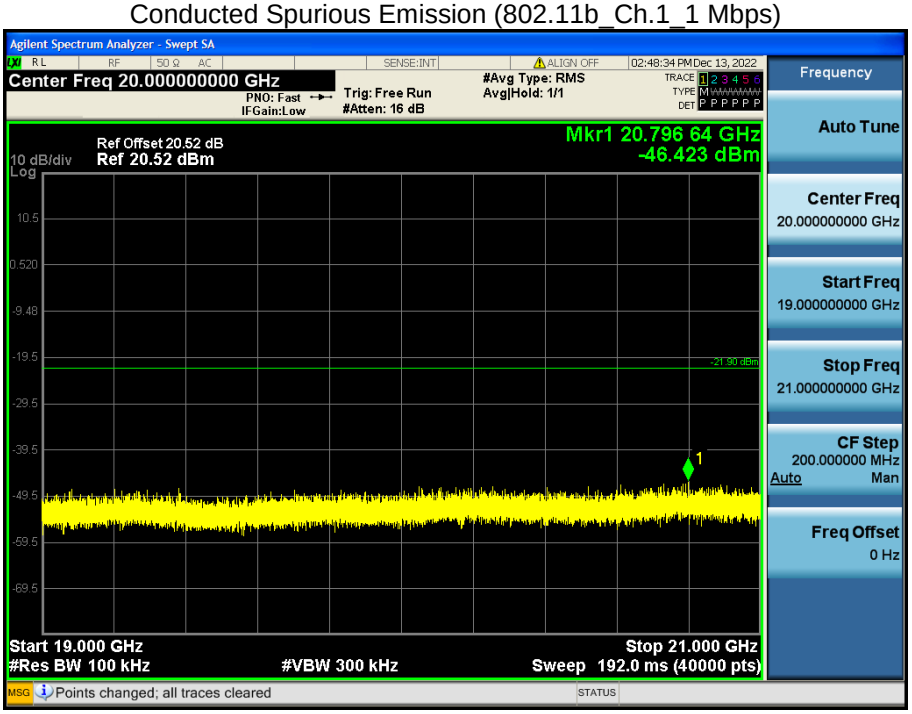
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



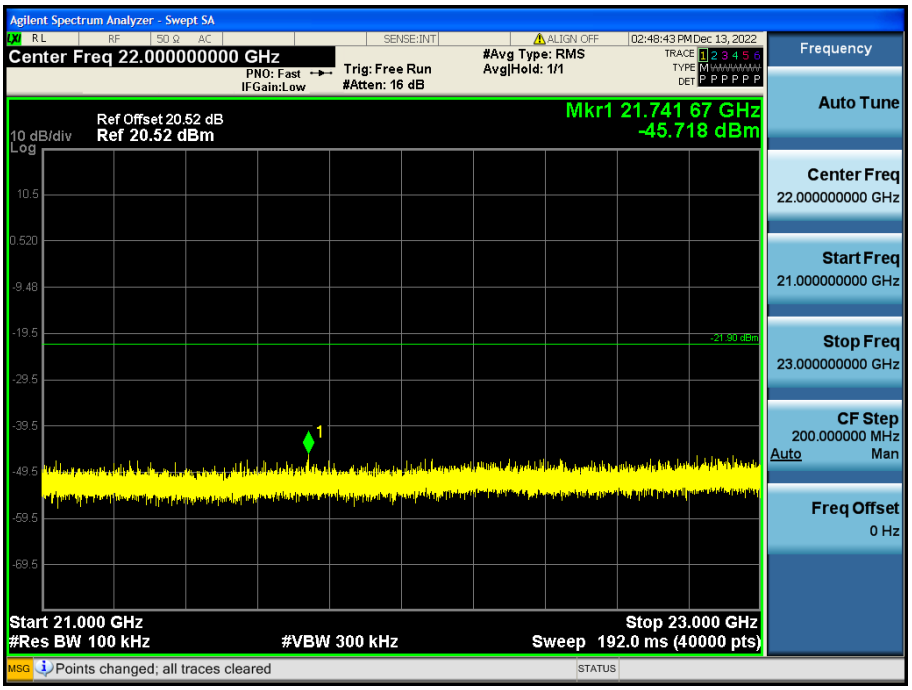
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



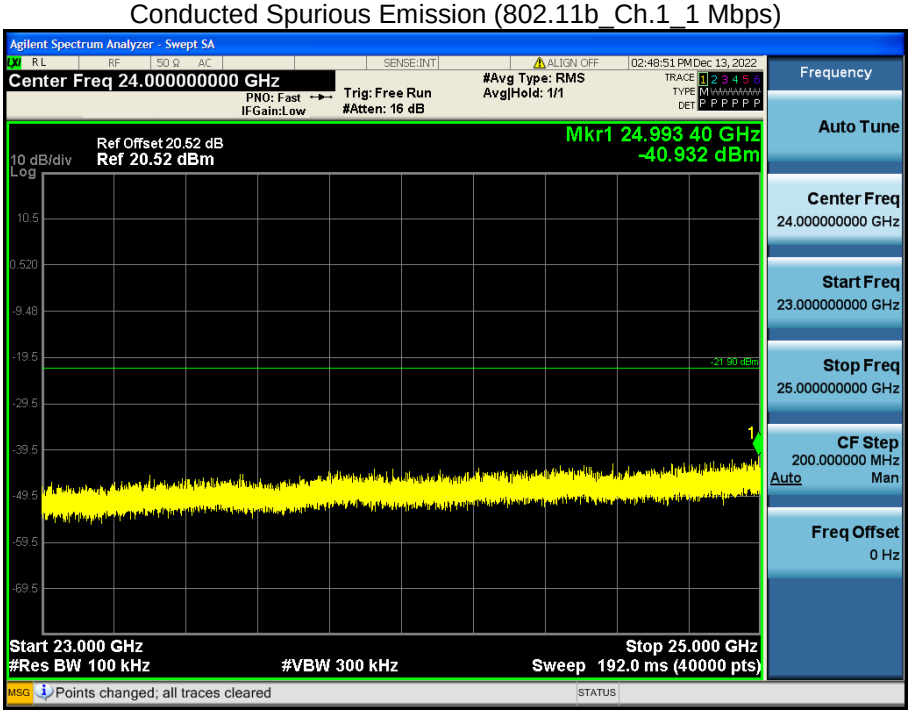
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



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]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/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 = 40log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBμV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	Ant. POL	Total	Limit	Margin
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/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

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

Frequency [MHz]	Measured Value [dBµV]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4824	45.62	4.02	V	49.64	73.98	24.34	PK
4824	42.23	4.02	V	46.25	53.98	7.73	AV
7236	39.06	11.57	V	50.63	73.98	23.35	PK
7236	26.81	11.57	V	38.38	53.98	15.60	AV
4824	48.43	4.02	H	52.45	73.98	21.53	PK
4824	44.06	4.02	H	48.08	53.98	5.90	AV
7236	38.74	11.57	H	50.31	73.98	23.67	PK
7236	26.56	11.57	H	38.13	53.98	15.85	AV

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

Frequency [MHz]	Measured Value [dBµV]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4874	45.72	4.25	V	49.97	73.98	24.01	PK
4874	42.13	4.25	V	46.38	53.98	7.60	AV
7311	39.37	12.01	V	51.38	73.98	22.60	PK
7311	26.55	12.01	V	38.56	53.98	15.42	AV
4874	47.61	4.25	H	51.86	73.98	22.12	PK
4874	43.30	4.25	H	47.55	53.98	6.43	AV
7311	39.05	12.01	H	51.06	73.98	22.92	PK
7311	26.21	12.01	H	38.22	53.98	15.76	AV

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

Frequency [MHz]	Measured Value [dBμV]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
4924	46.77	4.41	V	51.18	73.98	22.80	PK
4924	43.20	4.41	V	47.61	53.98	6.37	AV
7386	39.24	11.96	V	51.20	73.98	22.78	PK
7386	27.41	11.96	V	39.37	53.98	14.61	AV
4924	48.62	4.41	H	53.03	73.98	20.95	PK
4924	44.09	4.41	H	48.50	53.98	5.48	AV
7386	38.85	11.96	H	50.81	73.98	23.17	PK
7386	27.23	11.96	H	39.19	53.98	14.79	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 [MHz]	Measured Value [dBμV]	Duty Cycle Factor [dB]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
4824	43.87	0.000	4.02	V	47.89	73.98	26.09	PK
4824	32.04	0.342	4.02	V	36.40	53.98	17.58	AV
7236	38.53	0.000	11.57	V	50.10	73.98	23.88	PK
7236	26.39	0.342	11.57	V	38.30	53.98	15.68	AV
4824	45.12	0.000	4.02	H	49.14	73.98	24.84	PK
4824	33.12	0.342	4.02	H	37.48	53.98	16.50	AV
7236	38.18	0.000	11.57	H	49.75	73.98	24.23	PK
7236	25.91	0.342	11.57	H	37.82	53.98	16.16	AV

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

Frequency [MHz]	Measured Value [dBμV]	Duty Cycle Factor [dB]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
4874	43.24	0.000	4.25	V	47.49	73.98	26.49	PK
4874	31.69	0.342	4.25	V	36.28	53.98	17.70	AV
7311	39.41	0.000	12.01	V	51.42	73.98	22.56	PK
7311	26.53	0.342	12.01	V	38.88	53.98	15.10	AV
4874	44.88	0.000	4.25	H	49.13	73.98	24.85	PK
4874	32.84	0.342	4.25	H	37.43	53.98	16.55	AV
7311	39.11	0.000	12.01	H	51.12	73.98	22.86	PK
7311	26.29	0.342	12.01	H	38.64	53.98	15.34	AV

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

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4924	43.68	0.000	4.41	V	48.09	73.98	25.89	PK
4924	32.25	0.342	4.41	V	37.00	53.98	16.98	AV
7386	38.96	0.000	11.96	V	50.92	73.98	23.06	PK
7386	26.84	0.342	11.96	V	39.14	53.98	14.84	AV
4924	45.49	0.000	4.41	H	49.90	73.98	24.08	PK
4924	33.16	0.342	4.41	H	37.91	53.98	16.07	AV
7386	38.45	0.000	11.96	H	50.41	73.98	23.57	PK
7386	26.67	0.342	11.96	H	38.97	53.98	15.01	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
MCS Index:	0
Operating Frequency	2412 MHz
Channel No.	01 Ch

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4824	44.52	0.000	4.02	V	48.54	73.98	25.44	PK
4824	31.88	0.302	4.02	V	36.20	53.98	17.78	AV
7236	38.63	0.000	11.57	V	50.20	73.98	23.78	PK
7236	26.35	0.302	11.57	V	38.22	53.98	15.76	AV
4824	45.09	0.000	4.02	H	49.11	73.98	24.87	PK
4824	32.43	0.302	4.02	H	36.75	53.98	17.23	AV
7236	38.24	0.000	11.57	H	49.81	73.98	24.17	PK
7236	26.07	0.302	11.57	H	37.94	53.98	16.04	AV

Operation Mode:	802.11n_HT20
MCS Index:	0
Operating Frequency	2437 MHz
Channel No.	06 Ch

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4874	43.76	0.000	4.25	V	48.01	73.98	25.97	PK
4874	30.84	0.302	4.25	V	35.39	53.98	18.59	AV
7311	39.27	0.000	12.01	V	51.28	73.98	22.70	PK
7311	26.51	0.302	12.01	V	38.82	53.98	15.16	AV
4874	45.29	0.000	4.25	H	49.54	73.98	24.44	PK
4874	32.01	0.302	4.25	H	36.56	53.98	17.42	AV
7311	38.92	0.000	12.01	H	50.93	73.98	23.05	PK
7311	26.07	0.302	12.01	H	38.38	53.98	15.60	AV

Operation Mode:	802.11n_HT20
MCS Index:	0
Operating Frequency	2462 MHz
Channel No.	11 Ch

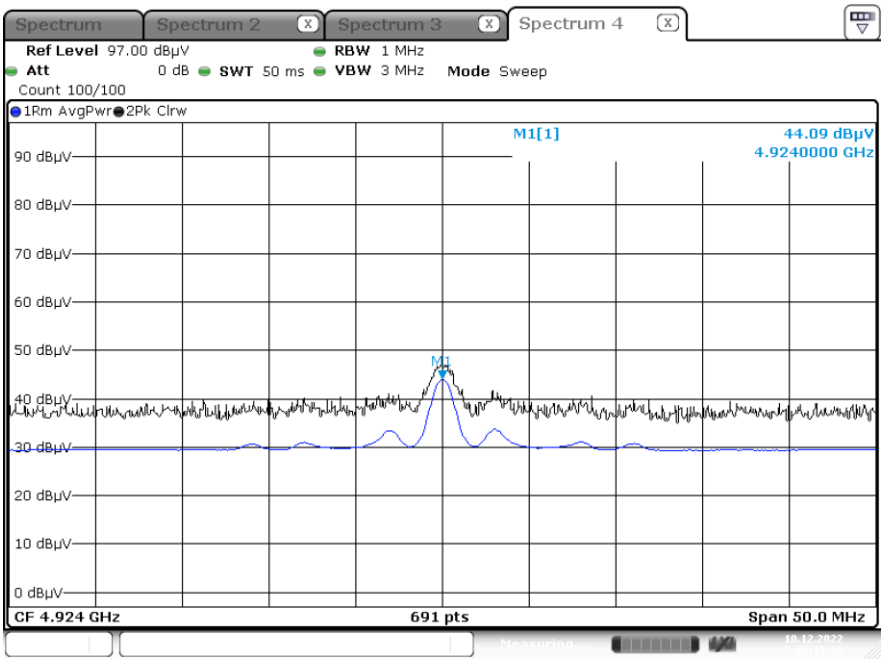
Frequency [MHz]	Measured Value [dBμV]	Duty Cycle Factor [dB]	A.F+C.L+D.F-A.G [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
4924	43.23	0.000	4.41	V	47.64	73.98	26.34	PK
4924	31.05	0.302	4.41	V	35.76	53.98	18.22	AV
7386	39.29	0.000	11.96	V	51.25	73.98	22.73	PK
7386	26.78	0.302	11.96	V	39.04	53.98	14.94	AV
4924	44.85	0.000	4.41	H	49.26	73.98	24.72	PK
4924	32.32	0.302	4.41	H	37.03	53.98	16.95	AV
7386	38.96	0.000	11.96	H	50.92	73.98	23.06	PK
7386	26.42	0.302	11.96	H	38.68	53.98	15.30	AV

Note:

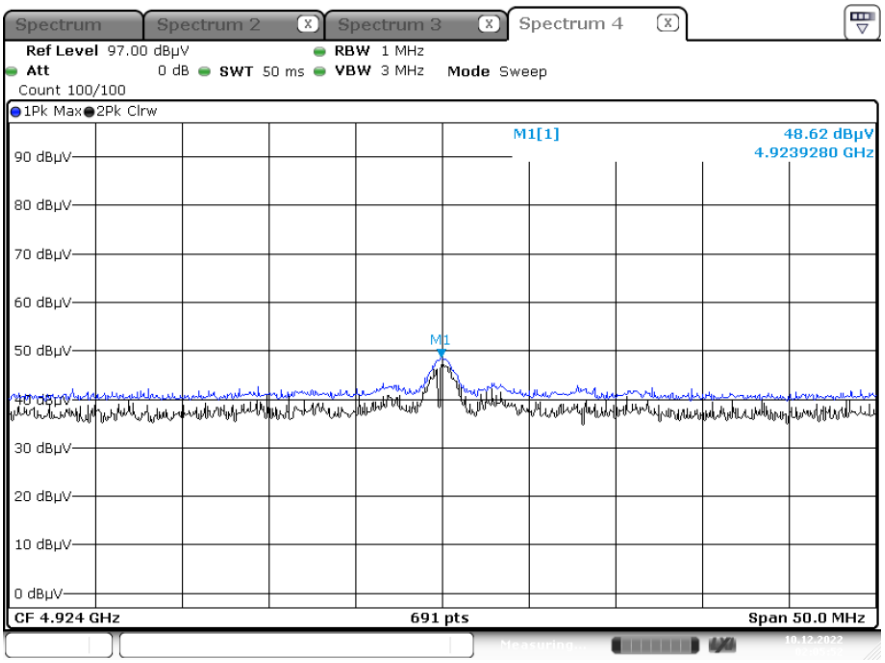
Channel 12 and 13 are less powerful than channel 11 so the test for high channel was performed at channel 11.

▣ Test Plots (Worst case : X-H)

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



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



9.7 RADIATED RESTRICTED BAND EDGES

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]	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
2390.0	21.913	37.05	H	58.96	73.98	15.02	PK
2390.0	12.222	37.05	H	49.27	53.98	4.71	AV
2390.0	21.738	37.05	V	58.79	73.98	15.19	PK
2390.0	12.161	37.05	V	49.21	53.98	4.77	AV
2483.5	21.601	37.03	H	58.63	73.98	15.35	PK
2483.5	11.335	37.03	H	48.37	53.98	5.61	AV
2483.5	21.513	37.03	V	58.54	73.98	15.44	PK
2483.5	11.120	37.03	V	48.15	53.98	5.83	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]	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	21.080	37.03	H	58.11	73.98	15.87	PK
2483.5	10.525	37.03	H	47.56	53.98	6.43	AV
2483.5	20.852	37.03	V	57.88	73.98	16.10	PK
2483.5	10.325	37.03	V	47.36	53.98	6.62	AV
2483.5	19.283	37.03	H	56.31	73.98	17.67	PK
2483.5	8.163	37.03	H	45.19	53.98	8.79	AV
2483.5	19.001	37.03	V	56.03	73.98	17.95	PK
2483.5	7.896	37.03	V	44.93	53.98	9.05	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]	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
2390.0	27.532	0.000	37.05	H	64.58	73.98	9.40	PK
# 2389.5	13.150	0.342	37.05	H	50.54	53.98	3.44	AV
2389.0	13.428	0.342	37.05	H	50.82	53.98	3.16	AV
2390.0	27.112	0.000	37.05	V	64.16	73.98	9.82	PK
# 2389.5	12.530	0.342	37.05	V	49.92	53.98	4.06	AV
2389.0	12.874	0.342	37.05	V	50.27	53.98	3.71	AV
2483.5	29.121	0.000	37.03	H	66.15	73.98	7.83	PK
# 2484.0	13.130	0.342	37.03	H	50.50	53.98	3.48	AV
2484.5	13.293	0.342	37.03	H	50.67	53.98	3.32	AV
2483.5	28.973	0.000	37.03	V	66.00	73.98	7.98	PK
# 2484.0	12.896	0.342	37.03	V	50.27	53.98	3.71	AV
2484.5	12.981	0.342	37.03	V	50.35	53.98	3.63	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	30.025	0.000	37.03	H	67.06	73.98	6.93	PK
# 2484	12.660	0.342	37.03	H	50.03	53.98	3.95	AV
2484.5	12.952	0.342	37.03	H	50.32	53.98	3.66	AV
2483.5	29.952	0.000	37.03	V	66.98	73.98	7.00	PK
# 2484	12.495	0.342	37.03	V	49.87	53.98	4.11	AV
2484.5	12.718	0.342	37.03	V	50.09	53.98	3.89	AV
# 2484	25.450	0.000	37.03	H	62.48	73.98	11.50	PK
# 2484	14.450	0.342	37.03	H	51.82	53.98	2.16	AV
2484.5	29.646	0.000	37.03	H	66.68	73.98	7.30	PK
2484.5	13.349	0.342	37.03	H	50.72	53.98	3.26	AV
# 2484	25.125	0.000	37.03	V	62.16	73.98	11.83	PK
# 2484	14.156	0.342	37.03	V	51.53	53.98	2.45	AV
2484.5	29.239	0.000	37.03	V	66.27	73.98	7.71	PK
2484.5	13.025	0.342	37.03	V	50.40	53.98	3.58	AV

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

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 [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
2390.0	28.217	0.000	37.05	H	65.27	73.98	8.71	PK
# 2389.5	12.560	0.302	37.05	H	49.91	53.98	4.07	AV
2389.0	13.048	0.302	37.05	H	50.40	53.98	3.58	AV
2390.0	28.006	0.000	37.05	V	65.06	73.98	8.92	PK
# 2389.5	12.283	0.302	37.05	V	49.64	53.98	4.35	AV
2389.0	12.876	0.302	37.05	V	50.23	53.98	3.75	AV
2483.5	31.686	0.000	37.03	H	68.72	73.98	5.26	PK
# 2484	12.520	0.302	37.03	H	49.85	53.98	4.13	AV
2484.5	12.953	0.302	37.03	H	50.29	53.98	3.70	AV
2483.5	31.217	0.000	37.03	V	68.25	73.98	5.73	PK
# 2484	12.189	0.302	37.03	V	49.52	53.98	4.46	AV
2484.5	12.623	0.302	37.03	V	49.96	53.98	4.03	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	31.083	0.000	37.03	H	68.11	73.98	5.87	PK
# 2484	13.810	0.302	37.03	H	51.14	53.98	2.84	AV
2484.5	13.708	0.302	37.03	H	51.04	53.98	2.94	AV
2483.5	30.125	0.000	37.03	V	67.16	73.98	6.83	PK
# 2484	13.985	0.302	37.03	V	51.32	53.98	2.66	AV
2484.5	13.512	0.302	37.03	V	50.84	53.98	3.14	AV
# 2484	24.950	0.000	37.03	H	61.98	73.98	12.00	PK
# 2484	14.290	0.302	37.03	H	51.62	53.98	2.36	AV
2484.5	28.837	0.000	37.03	H	65.87	73.98	8.11	PK
2484.5	12.726	0.302	37.03	H	50.06	53.98	3.92	AV
# 2484	24.712	0.000	37.03	V	61.74	73.98	12.24	PK
# 2484	14.026	0.302	37.03	V	51.36	53.98	2.62	AV
2484.5	28.652	0.000	37.03	V	65.68	73.98	8.30	PK
2484.5	12.512	0.302	37.03	V	49.84	53.98	4.14	AV

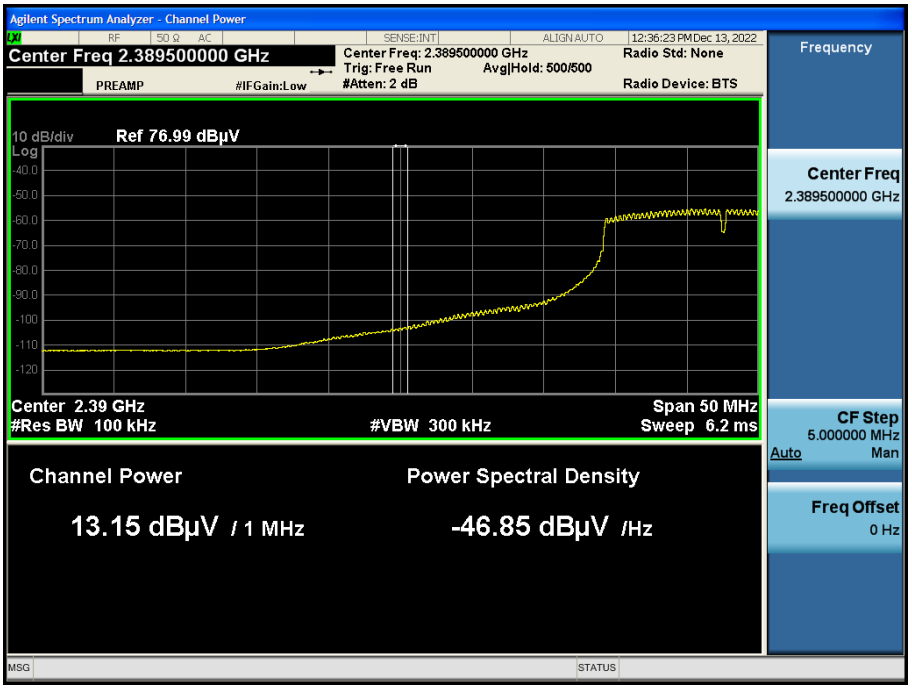
Note : integration method Used (ANSI C63.10 Section11.13.3)

▣ Test Plots

(Worst case : X-H)

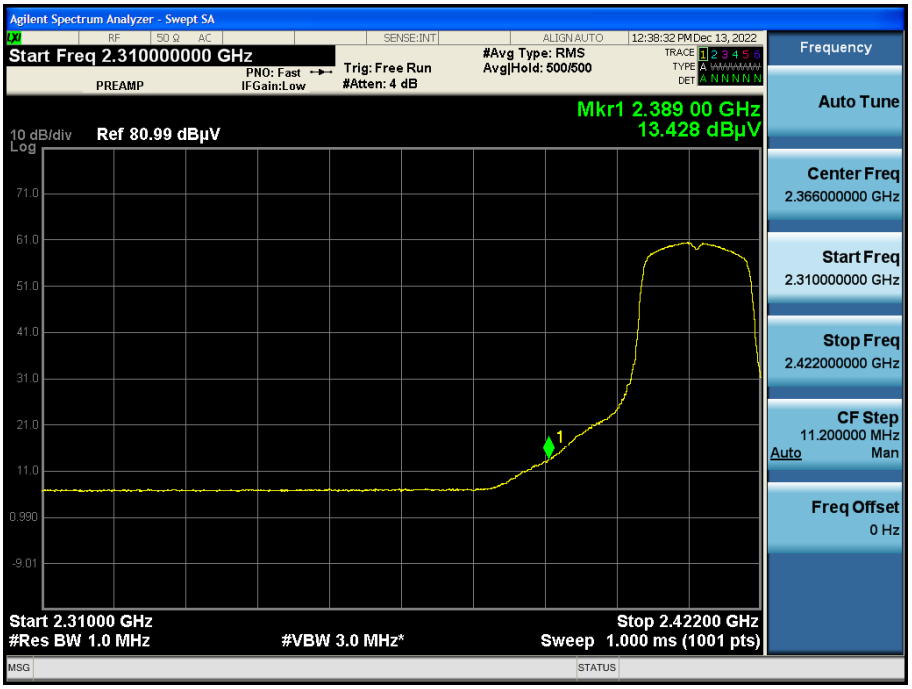
Radiated Restricted Band Edges plot – Average Result (802.11g 6 Mbps, Ch.1)

Integration method Used_2389.5 MHz



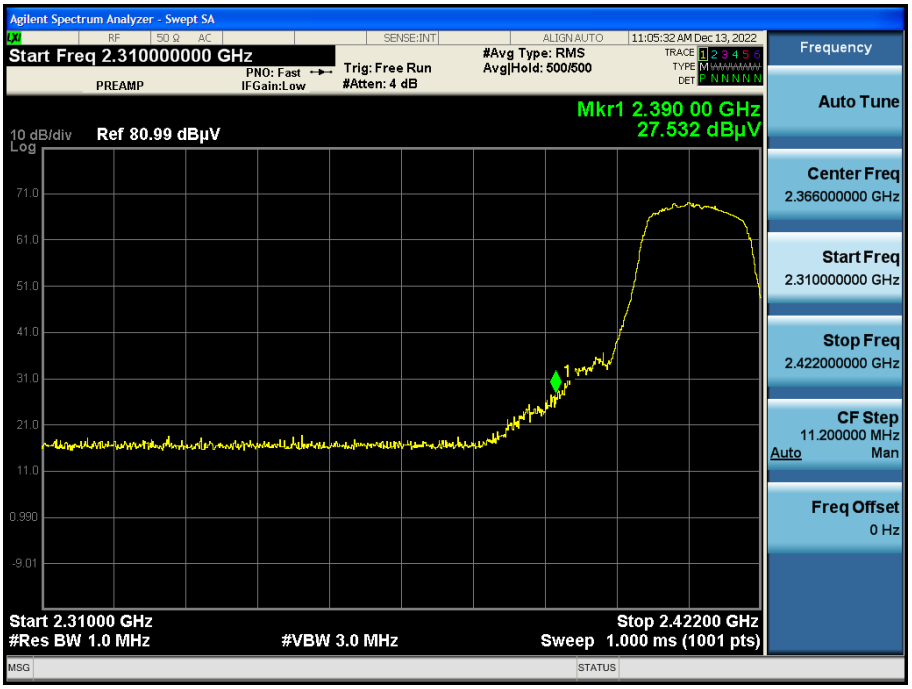
Radiated Restricted Band Edges plot – Average Result (802.11g 6 Mbps, Ch.1)

Standard method Used_2389 MHz



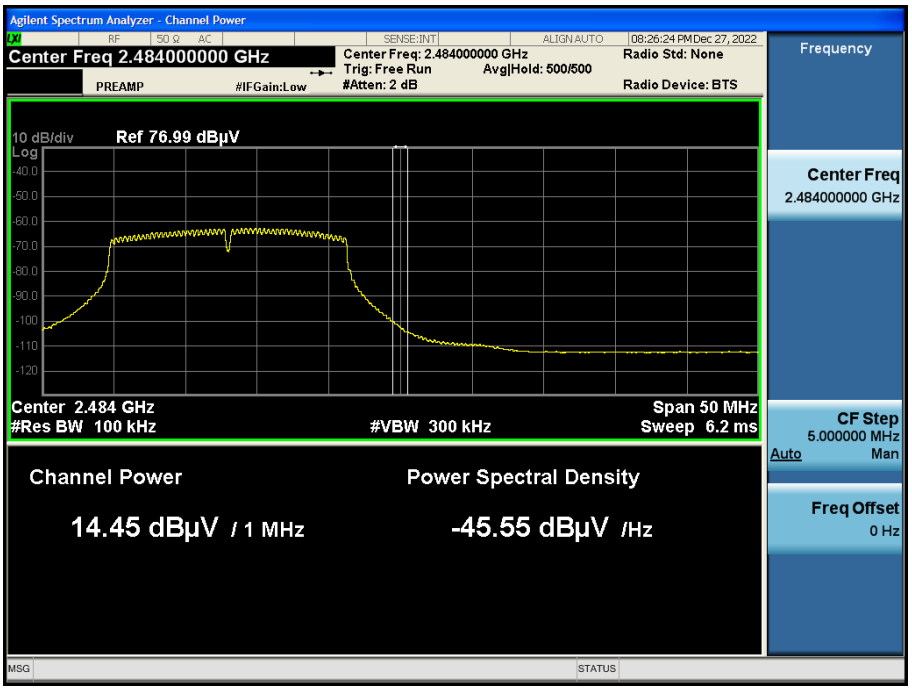
Radiated Restricted Band Edges plot – Peak Result (802.11g 6 Mbps, Ch.1)

Standard method Used _2390 MHz



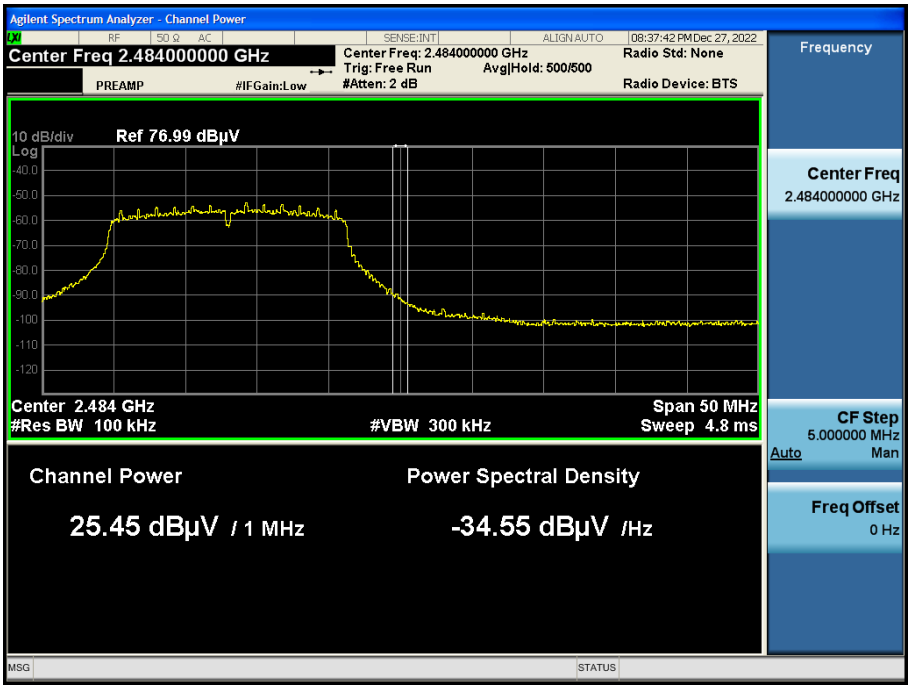
Radiated Restricted Band Edges plot – Average Result (802.11g 6 Mbps, Ch.13)

Integration method Used_ 2484 MHz



Radiated Restricted Band Edges plot – Peak Result (802.11g 6 Mbps, Ch.13)

Integration method Used_ 2484 MHz

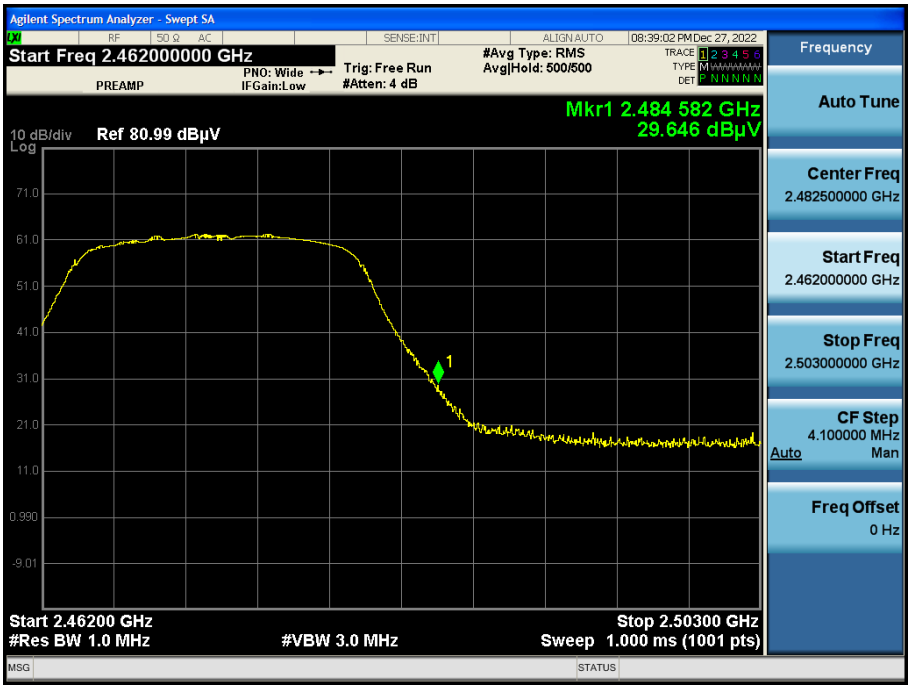


Radiated Restricted Band Edges plot – Average Result (802.11g 6 Mbps, Ch.13)

Standard method Used _2484.5 MHz

Radiated Restricted Band Edges plot – Peak Result (802.11g 6 Mbps, Ch.13)

Standard method Used _2484.5 MHz



Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

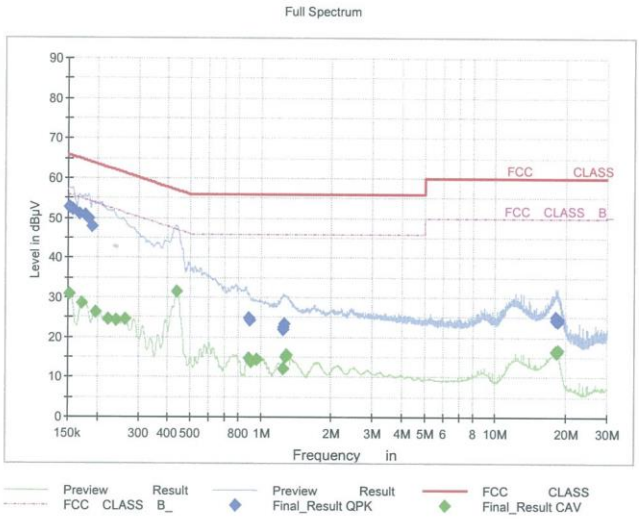
Conducted Emissions

SM-M146BDSN_WLAN 2.4G MODE 1 / 2

Test Report

Common Information

EUT : SM-M146B/DSN
Operating Conditions : WLAN 2.4G MODE



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	52.79	65.88	13.09	1000.0	9.000	L1	OFF	9.7
0.1568	52.14	65.63	13.49	1000.0	9.000	N	OFF	9.6
0.1680	51.14	65.06	13.92	1000.0	9.000	N	OFF	9.6
0.1770	50.74	64.63	13.89	1000.0	9.000	L1	OFF	9.7
0.1838	49.80	64.31	14.51	1000.0	9.000	N	OFF	9.6
0.1905	48.02	64.02	15.99	1000.0	9.000	N	OFF	9.6
0.8893	24.74	56.00	31.26	1000.0	9.000	N	OFF	9.7
0.8938	24.17	56.00	31.83	1000.0	9.000	N	OFF	9.7
0.8983	24.18	56.00	31.82	1000.0	9.000	N	OFF	9.7
1.2425	22.01	56.00	33.99	1000.0	9.000	L1	OFF	9.7
1.2493	22.39	56.00	33.61	1000.0	9.000	L1	OFF	9.7
1.2560	23.29	56.00	32.71	1000.0	9.000	L1	OFF	9.7
18.1670	25.12	60.00	34.88	1000.0	9.000	L1	OFF	10.3
18.1850	24.24	60.00	35.76	1000.0	9.000	L1	OFF	10.3
18.1963	24.37	60.00	35.63	1000.0	9.000	L1	OFF	10.3
18.4123	24.06	60.00	35.94	1000.0	9.000	L1	OFF	10.3
18.4213	24.65	60.00	35.35	1000.0	9.000	L1	OFF	10.3
18.4258	24.42	60.00	35.58	1000.0	9.000	L1	OFF	10.3

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SM-M146BDSN_WLAN 2.4G MODE 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	30.82	55.88	25.06	1000.0	9.000	N	OFF	9.6
0.1725	28.68	54.84	26.16	1000.0	9.000	N	OFF	9.6
0.1973	26.27	53.73	27.46	1000.0	9.000	N	OFF	9.6
0.2220	24.57	52.74	28.18	1000.0	9.000	N	OFF	9.6
0.2400	24.16	52.10	27.94	1000.0	9.000	N	OFF	9.6
0.2625	24.54	51.35	26.82	1000.0	9.000	N	OFF	9.6
0.4380	31.47	47.10	15.63	1000.0	9.000	N	OFF	9.6
0.8893	14.65	46.00	31.35	1000.0	9.000	N	OFF	9.7
0.9095	13.84	46.00	32.16	1000.0	9.000	N	OFF	9.7
0.9545	14.40	46.00	31.60	1000.0	9.000	N	OFF	9.7
1.2448	12.18	46.00	33.82	1000.0	9.000	L1	OFF	9.7
1.2695	15.00	46.00	31.00	1000.0	9.000	L1	OFF	9.7
1.2920	15.55	46.00	30.45	1000.0	9.000	N	OFF	9.7
18.1693	16.54	50.00	33.46	1000.0	9.000	L1	OFF	10.3
18.1828	16.37	50.00	33.63	1000.0	9.000	L1	OFF	10.3
18.1940	16.28	50.00	33.72	1000.0	9.000	L1	OFF	10.3
18.2953	16.03	50.00	33.97	1000.0	9.000	L1	OFF	10.3
18.4190	16.60	50.00	33.40	1000.0	9.000	L1	OFF	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	08/22/2023	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	02/03/2023	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

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	01/06/2023	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
HPF(3~18GHz)+LNA1(1~18GHz)	FMSR-05B	TNM system	F6	01/19/2023	Annual
ATT(10dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/19/2023	Annual
ATT(3dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/19/2023	Annual
LNA1(1~18GHz)	FMSR -05B	TNM system	25540	01/19/2023	Annual
HPF(7~18GHz)+LNA2(6~18GHz)	FMSR -05B	TNM system	28550	01/19/2023	Annual
Thru(30MHz ~ 18GHz)	FMSR -05B	TNM system	None	01/19/2023	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-2212-FC018-P