

FCC DTS REPORT

Certification

Applicant Name: SAMSUNG Electronics Co., Ltd.	Date of Issue: November 22, 2022
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-2211-FC029

FCC ID:	A3LSMA146M
APPLICANT:	SAMSUNG Electronics Co., Ltd.

Model:	SM-A146M/DS
Additional Model:	SM-A146M
EUT Type:	Mobile Phone
Max. RF Output Power:	802.11b : 16.96 dBm, 802.11g : 16.05 dBm, 802.11n(HT20) : 15.84 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.

REVIEWED BY



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

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

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

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

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

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2211-FC029	November 22, 2022	- First Approval Report

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1. EUT DESCRIPTION

Model	SM-A146M/DS	
Additional Model	SM-A146M	
EUT Type	Mobile Phone	
Power Supply	DC 4.2 V	
Frequency Range	2 412 MHz ~ 2 472 MHz	
Max. RF Output Power	<u>Average Power</u>	802.11b : 16.96 dBm 802.11g : 16.05 dBm 802.11n(HT20) : 15.84 dBm
	<u>Peak Power</u> (For information only)	802.11b : 24.17 dBm 802.11g : 24.51 dBm 802.11n(HT20) : 24.22 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n	
Number of Channels	13 Channels	
Date(s) of Tests	October 04, 2022 ~ November 18, 2022	
Serial number	Radiated: R93T900CNST Conducted : R93T8000K9P	

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.

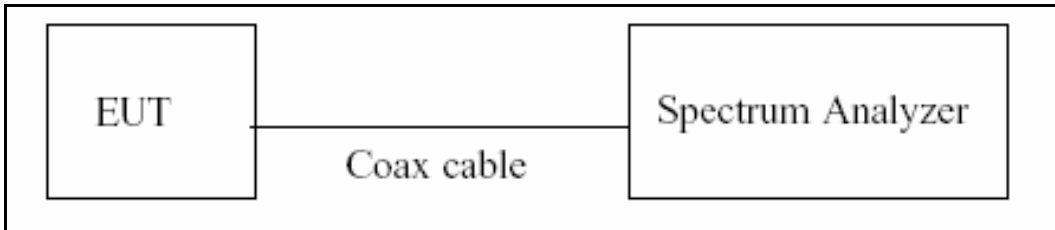
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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 $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

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

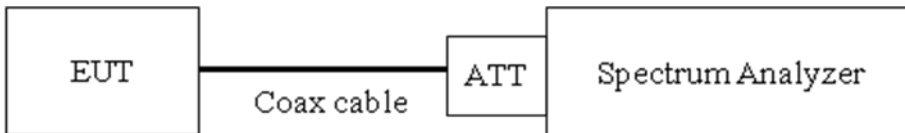
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10\log(1/\text{Duty Cycle})$

7.2. 6 dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

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

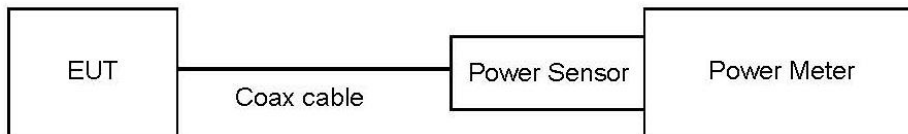
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

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

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

Sample Calculation

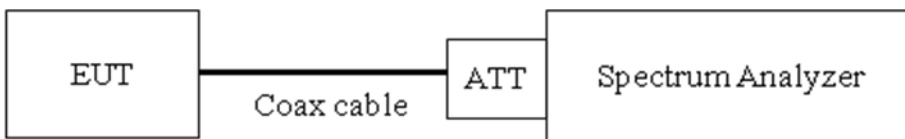
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

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

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

The spectrum analyzer is set to :

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

Sample Calculation

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

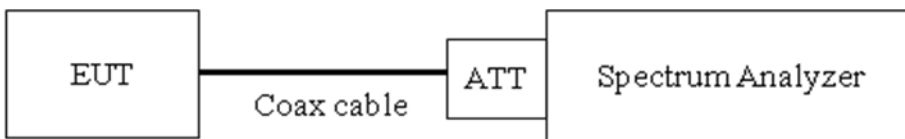
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

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

[Conducted > 30 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

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

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

Factors for frequency

Freq(MHz)	Factor(dB)
30	10.12
100	10.13
200	10.14
300	10.21
400	10.24
500	10.25
600	10.24
700	10.27
800	10.29
900	10.29
1000	10.34
2000	10.50
2400	10.55
2412	10.55
2437	10.55
2462	10.55
2500	10.63
3000	11.06
4000	11.64
5000	12.08
5500	12.07
6000	12.08
7000	12.30
8000	12.44
9000	12.83
10000	13.03
11000	13.52
12000	13.82
13000	13.96
14000	14.09
15000	14.22
16000	14.61
17000	14.63
18000	14.89
19000	15.03
20000	15.11
21000	15.62
22000	15.69
23000	15.77
24000	15.82
25000	15.96

Note : 1. 2 400 ~ 2 500 MHz is fundamental frequency range.

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

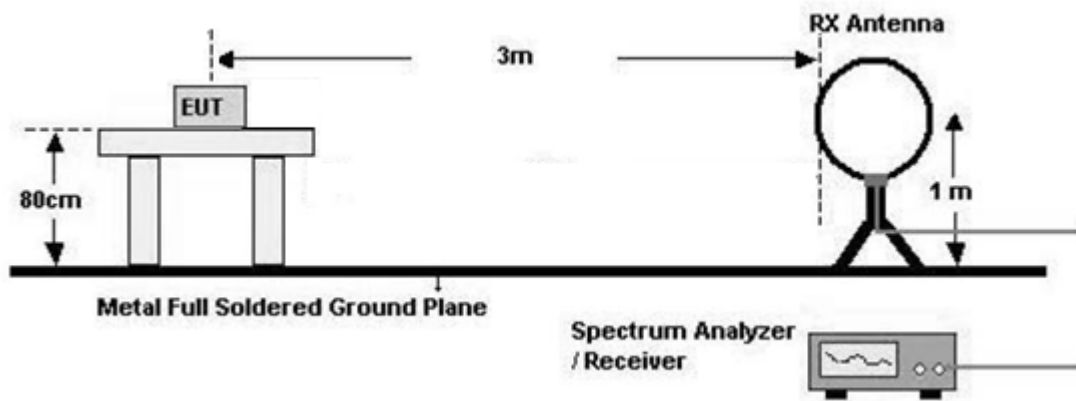
7.6. Radiated Test

Limit

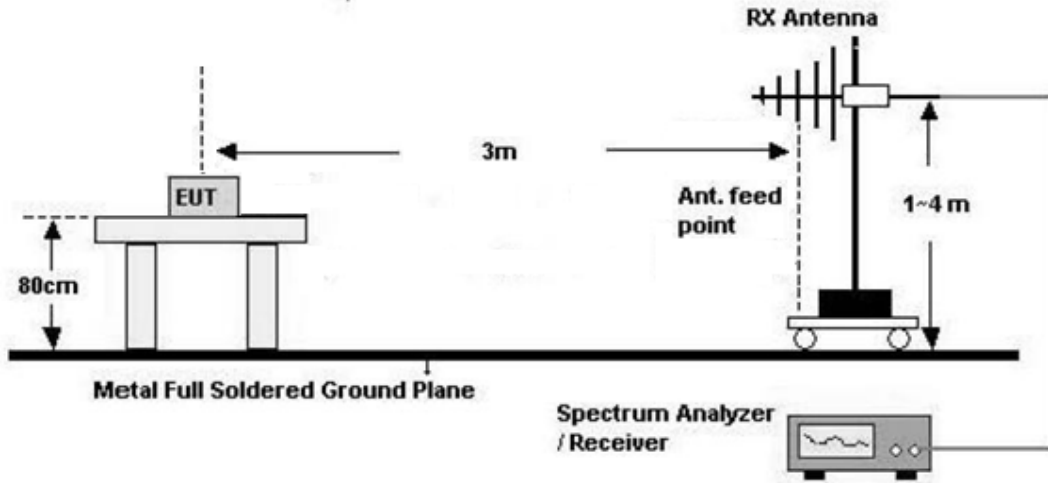
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

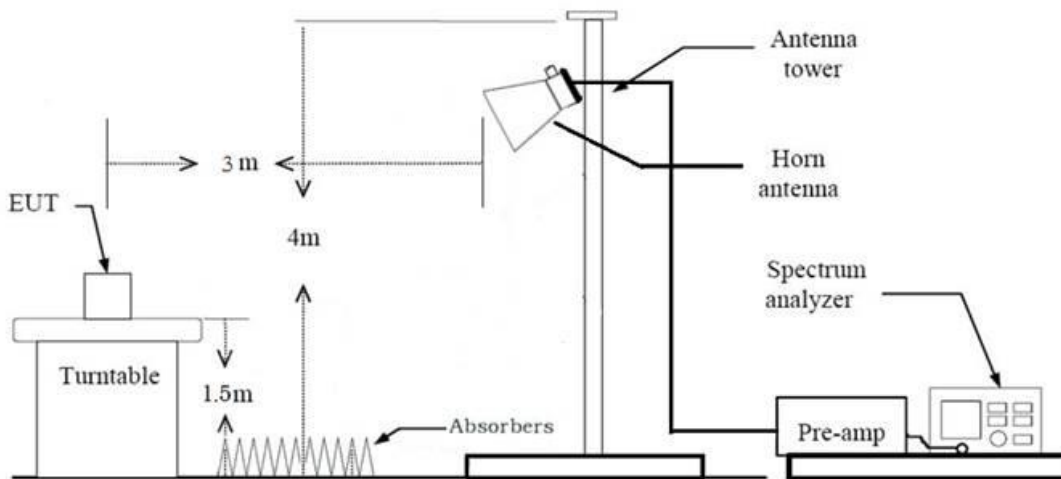
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions(Below 1 GHz)

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

Test Procedure of Radiated spurious emissions (Above 1 GHz)

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

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

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

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

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

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

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

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

11. Total(Measurement Type : Peak)

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

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

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

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

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

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 1 MHz
 - VBW \geq 3 x 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 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 \geq 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 = $20\log(\text{test distance} / \text{specific distance})$ (dB)
11. Total(Measurement Type : Peak)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
- Total(Measurement Type : Average, Duty cycle $\geq 98\%$)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
- Total(Measurement Type : Average, Duty cycle < 98 %)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) + Duty Cycle Factor

7.7. AC Power line Conducted Emissions

Limit

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

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

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

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
 - Worstcase : Stand alone
2. EUT Axis
 - Radiated Spurious Emissions : Y
 - Radiated Restricted Band Edge : X
3. Duty cycle factor applies only 802.11g/n (Duty cycle < 98 %).
4. All data rate of operation were investigated and the test results are worst case in lowest Data Rate of each mode.
 - 802.11b : 1 Mbps
 - 802.11g : 6 Mbps
 - 802.11n(HT20): MCS0
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
 - Position : Horizontal, Vertical, Parallel to the ground plane
6. SM-A146M/DS, SM-A146M were tested and the worst case results are reported.
(Worst case : SM-A146M/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-A146M/DS, SM-A146M were tested and the worst case results are reported.
(Worst case : SM-A146M/DS)

Conducted test

1. The EUT was configured with data rate of highest power.
2. SM-A146M/DS, SM-A146M were tested and the worst case results are reported.
(Worst case : SM-A146M/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

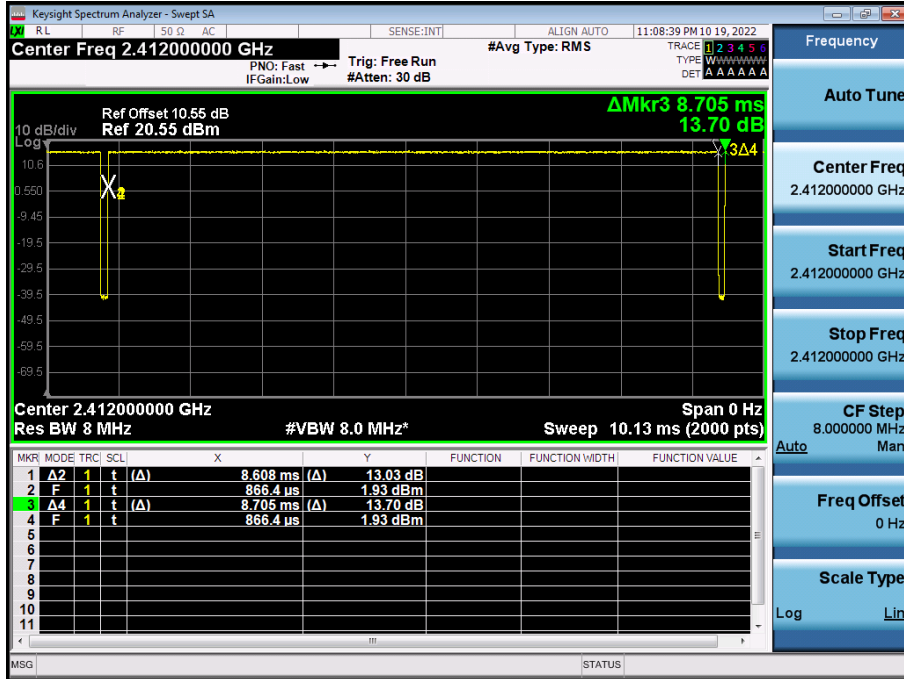
9. TEST RESULT

9.1 DUTY CYCLE

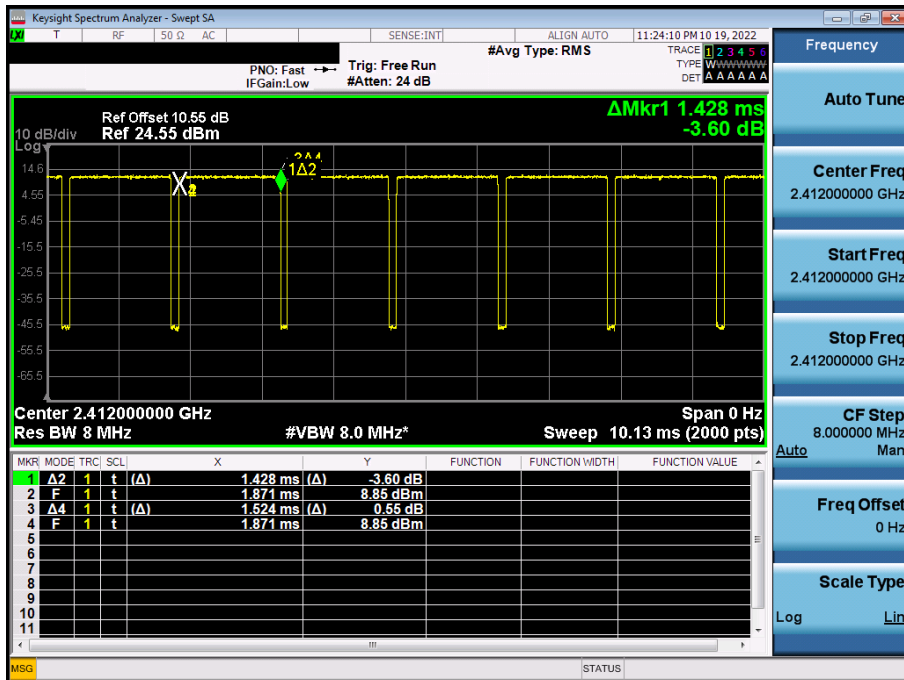
Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.608	8.705	0.989	0.048
	2	4.392	4.512	0.973	0.118
	5.5	1.723	1.834	0.939	0.272
	11	0.958	1.069	0.896	0.478
802.11g	6	1.428	1.524	0.937	0.283
	9	0.958	1.054	0.909	0.416
	12	0.719	0.841	0.856	0.676
	18	0.491	0.608	0.808	0.924
	24	0.375	0.486	0.771	1.130
	36	0.258	0.370	0.699	1.558
	48	0.198	0.274	0.722	1.413
	54	0.182	0.294	0.621	2.071
802.11n (HT20)	6.5 (MCS0)	1.338	1.452	0.921	0.355
	13 (MCS1)	0.689	0.806	0.855	0.679
	19.5 (MCS2)	0.471	0.613	0.769	1.143
	26 (MCS3)	0.365	0.481	0.758	1.204
	39 (MCS4)	0.253	0.370	0.685	1.644
	52 (MCS5)	0.198	0.314	0.629	2.013
	58.5 (MCS6)	0.182	0.299	0.610	2.145
	65 (MCS7)	0.167	0.284	0.589	2.297

Test Plots

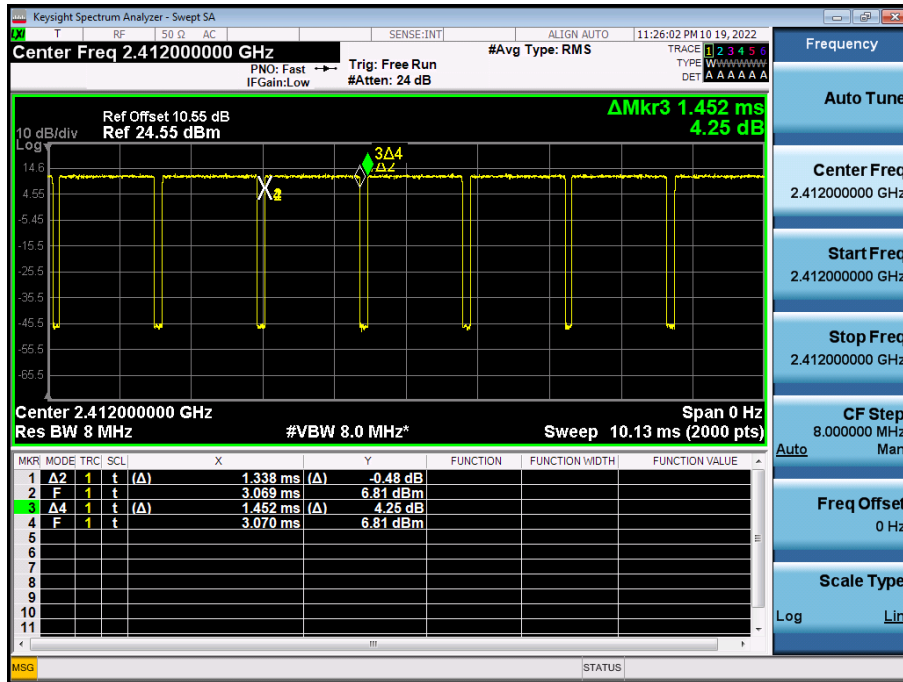
Duty cycle plot (802.11b(1 Mbps))



Duty cycle plot (802.11g(6 Mbps))



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



Note:

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

9.2 6 dB BANDWIDTH

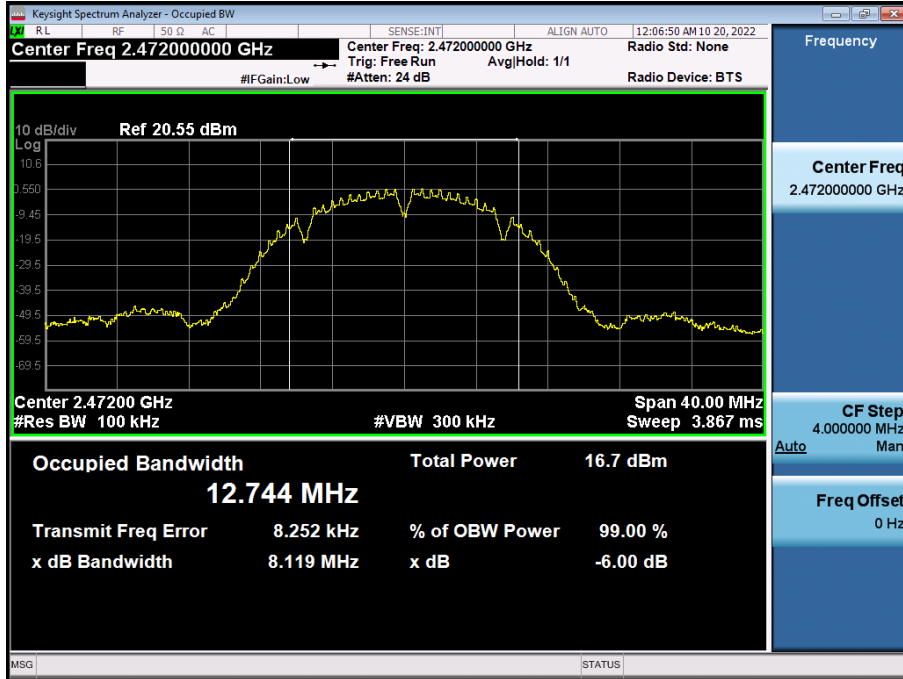
802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.571	0.5
2437	6	8.584	0.5
2462	11	8.575	0.5
2467	12	8.590	0.5
2472	13	8.119	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.13	0.5
2437	6	15.10	0.5
2462	11	15.11	0.5
2467	12	15.16	0.5
2472	13	15.05	0.5

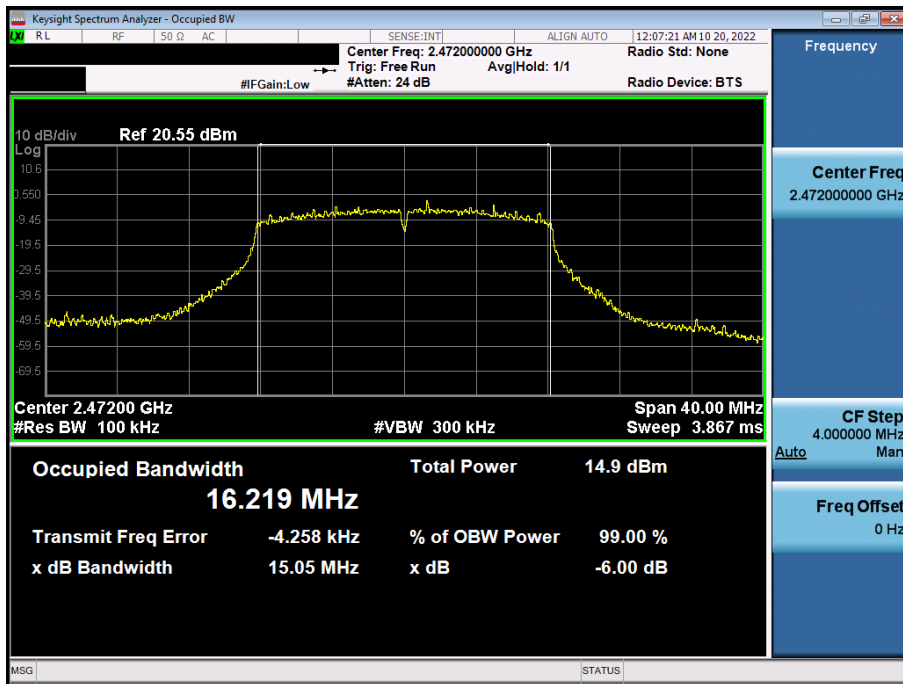
802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.14	0.5
2437	6	15.10	0.5
2462	11	15.16	0.5
2467	12	15.14	0.5
2472	13	15.13	0.5

▣ Test Plots

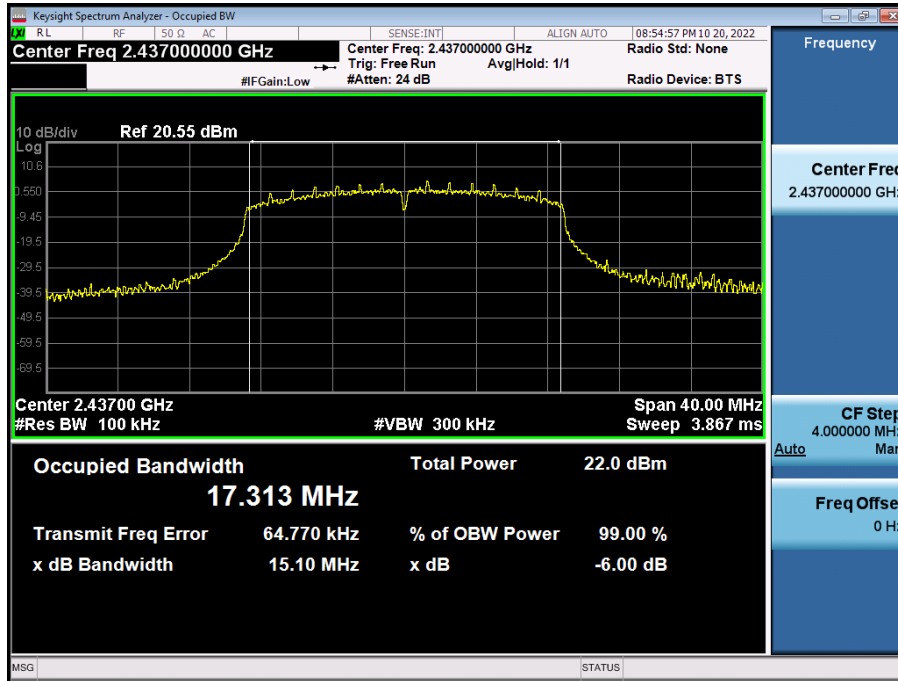
6 dB Bandwidth plot (802.11b-CH 13)



6 dB Bandwidth plot (802.11g-CH 13)



6 dB Bandwidth plot (802.11n_HT20-CH 6)



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	20.85	30
		2	21.09	30
		5.5	22.60	30
		11	24.17	30
2437	6	1	18.42	30
		2	18.69	30
		5.5	20.24	30
		11	21.82	30
2462	11	1	18.80	30
		2	19.07	30
		5.5	20.57	30
		11	22.13	30
2467	12	1	14.26	30
		2	14.53	30
		5.5	16.12	30
		11	17.62	30
2472	13	1	11.64	30
		2	11.92	30
		5.5	13.52	30
		11	15.00	30

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6	23.66	30
		9	22.99	30
		12	22.65	30
		18	22.98	30
		24	23.39	30
		36	23.24	30
		48	22.63	30
		54	22.88	30
2437	6	6	24.51	30
		9	23.96	30
		12	23.59	30
		18	23.88	30
		24	24.43	30
		36	24.24	30
		48	22.47	30
		54	22.73	30
2462	11	6	23.91	30
		9	23.24	30
		12	22.89	30
		18	23.16	30
		24	23.77	30
		36	23.62	30
		48	22.84	30
		54	23.11	30
2467	12	6	22.03	30
		9	21.35	30
		12	20.99	30
		18	21.25	30
		24	21.90	30
		36	21.71	30
		48	21.79	30
		54	22.02	30
2472	13	6	17.22	30
		9	16.31	30
		12	15.96	30
		18	16.21	30
		24	16.82	30
		36	16.60	30
		48	16.81	30
		54	17.11	30

802.11n(HT20) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	0	23.41	30
		1	22.67	30
		2	22.98	30
		3	23.28	30
		4	23.38	30
		5	22.42	30
		6	22.71	30
		7	22.60	30
2437	6	0	24.22	30
		1	23.61	30
		2	23.83	30
		3	24.12	30
		4	24.22	30
		5	22.32	30
		6	22.54	30
		7	22.39	30
2462	11	0	23.70	30
		1	22.89	30
		2	23.08	30
		3	23.43	30
		4	23.53	30
		5	22.62	30
		6	22.90	30
		7	22.76	30
2467	12	0	22.01	30
		1	21.01	30
		2	21.22	30
		3	21.50	30
		4	21.60	30
		5	21.56	30
		6	21.85	30
		7	21.71	30
2472	13	0	17.11	30
		1	15.99	30
		2	16.12	30
		3	16.47	30
		4	16.52	30
		5	16.64	30
		6	16.94	30
		7	16.79	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	16.96	0.000	16.96	30
		2	16.54	0.118	16.66	30
		5.5	16.42	0.272	16.69	30
		11	16.24	0.478	16.71	30
2437	6	1	14.74	0.000	14.74	30
		2	14.47	0.118	14.59	30
		5.5	14.37	0.272	14.64	30
		11	14.21	0.478	14.68	30
2462	11	1	14.88	0.000	14.88	30
		2	14.57	0.118	14.69	30
		5.5	14.47	0.272	14.74	30
		11	14.35	0.478	14.83	30
2467	12	1	13.10	0.000	13.10	30
		2	12.79	0.118	12.91	30
		5.5	12.76	0.272	13.04	30
		11	12.58	0.478	13.05	30
2472	13	1	9.33	0.000	9.33	30
		2	9.11	0.118	9.23	30
		5.5	8.85	0.272	9.12	30
		11	8.55	0.478	9.03	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	14.75	0.283	15.04	30
		9	14.33	0.416	14.75	30
		12	14.25	0.676	14.92	30
		18	14.06	0.924	14.98	30
		24	13.80	1.130	14.93	30
		36	13.43	1.558	14.99	30
		48	12.51	1.413	13.92	30
		54	12.14	2.071	14.22	30
2437	6	6	15.65	0.283	15.93	30
		9	15.29	0.416	15.71	30
		12	15.14	0.676	15.81	30
		18	14.95	0.924	15.87	30
		24	14.62	1.130	15.75	30
		36	14.24	1.558	15.80	30
		48	12.56	1.413	13.97	30
		54	12.20	2.071	14.28	30
2462	11	6	15.77	0.283	16.05	30
		9	15.14	0.416	15.56	30
		12	15.01	0.676	15.68	30
		18	14.64	0.924	15.57	30
		24	14.55	1.130	15.68	30
		36	14.17	1.558	15.72	30
		48	12.64	1.413	14.05	30
		54	12.57	2.071	14.64	30
2467	12	6	13.38	0.283	13.66	30
		9	12.89	0.416	13.31	30
		12	12.75	0.676	13.43	30
		18	12.57	0.924	13.50	30
		24	12.29	1.130	13.42	30
		36	11.90	1.558	13.46	30
		48	11.59	1.413	13.01	30
		54	11.50	2.071	13.57	30
2472	13	6	8.81	0.283	9.09	30
		9	8.48	0.416	8.90	30
		12	8.36	0.676	9.04	30
		18	8.16	0.924	9.08	30
		24	7.86	1.130	8.99	30
		36	7.45	1.558	9.01	30
		48	7.24	1.413	8.65	30
		54	6.95	2.071	9.02	30

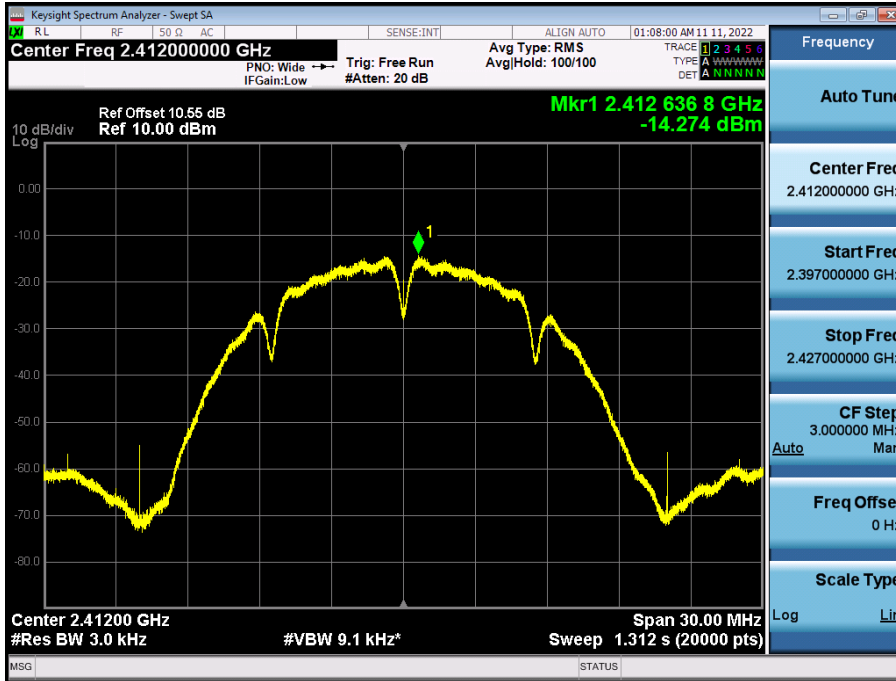
802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	0	14.55	0.355	14.91	30
		1	14.05	0.679	14.73	30
		2	13.48	1.143	14.62	30
		3	13.70	1.204	14.90	30
		4	13.25	1.644	14.89	30
		5	12.29	2.013	14.31	30
		6	12.26	2.145	14.41	30
		7	12.06	2.297	14.36	30
2437	6	0	15.48	0.355	15.84	30
		1	14.86	0.679	15.54	30
		2	14.68	1.143	15.82	30
		3	14.48	1.204	15.68	30
		4	14.14	1.644	15.79	30
		5	12.17	2.013	14.18	30
		6	12.09	2.145	14.24	30
		7	11.86	2.297	14.16	30
2462	11	0	15.21	0.355	15.57	30
		1	14.70	0.679	15.37	30
		2	14.34	1.143	15.49	30
		3	14.35	1.204	15.55	30
		4	13.90	1.644	15.54	30
		5	12.49	2.013	14.50	30
		6	12.45	2.145	14.60	30
		7	12.26	2.297	14.55	30
2467	12	0	13.27	0.355	13.63	30
		1	12.55	0.679	13.23	30
		2	12.36	1.143	13.50	30
		3	12.14	1.204	13.35	30
		4	11.80	1.644	13.44	30
		5	11.45	2.013	13.46	30
		6	11.39	2.145	13.54	30
		7	11.21	2.297	13.51	30
2472	13	0	8.67	0.355	9.03	30
		1	8.04	0.679	8.71	30
		2	7.61	1.143	8.75	30
		3	7.38	1.204	8.59	30
		4	7.02	1.644	8.67	30
		5	6.78	2.013	8.80	30
		6	6.77	2.145	8.91	30
		7	6.52	2.297	8.81	30

9.4 POWER SPECTRAL DENSITY

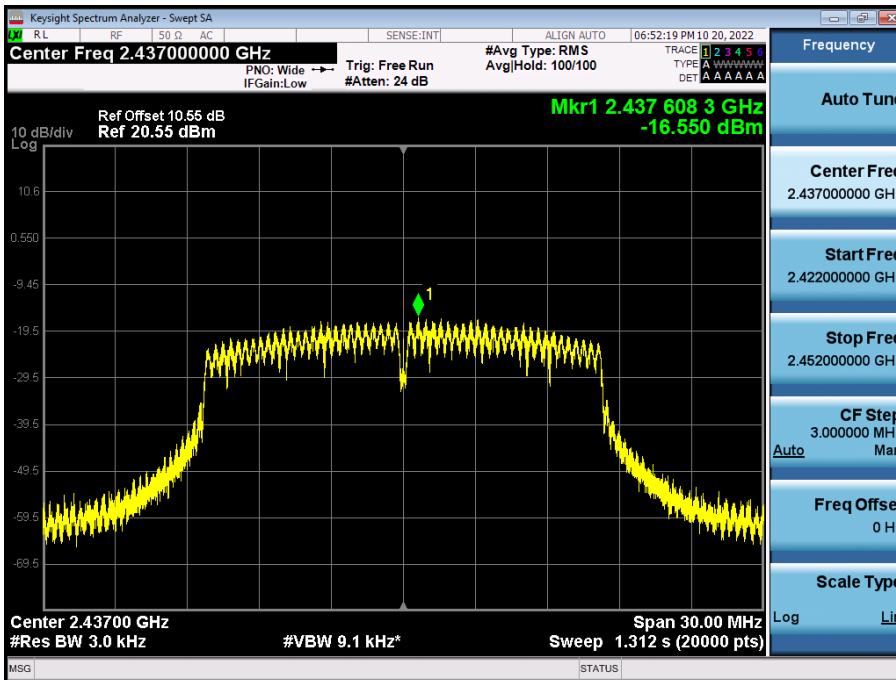
Mode	Frequency (MHz)	Channel No.	Test Result			Limit (dBm)
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	
802.11b	2412	1	-14.274	0.000	-14.274	8 dBm / 3 kHz
	2437	6	-16.003	0.000	-16.003	
	2462	11	-16.770	0.000	-16.770	
	2467	12	-18.524	0.000	-18.524	
	2472	13	-21.647	0.000	-21.647	
802.11g	2412	1	-17.434	0.283	-17.151	
	2437	6	-16.550	0.283	-16.267	
	2462	11	-17.248	0.283	-16.965	
	2467	12	-19.382	0.283	-19.099	
	2472	13	-24.412	0.283	-24.129	
802.11n(HT20)	2412	1	-18.019	0.355	-17.664	
	2437	6	-17.237	0.355	-16.882	
	2462	11	-18.162	0.355	-17.807	
	2467	12	-20.094	0.355	-19.739	
	2472	13	-24.892	0.355	-24.537	

Test Plots

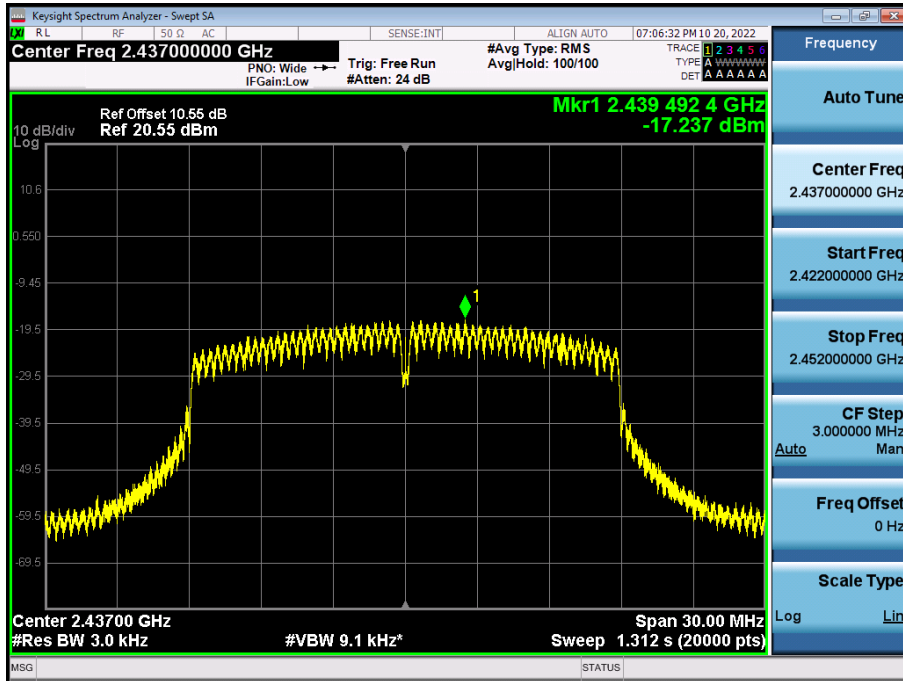
Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20-CH 6)



Note :

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

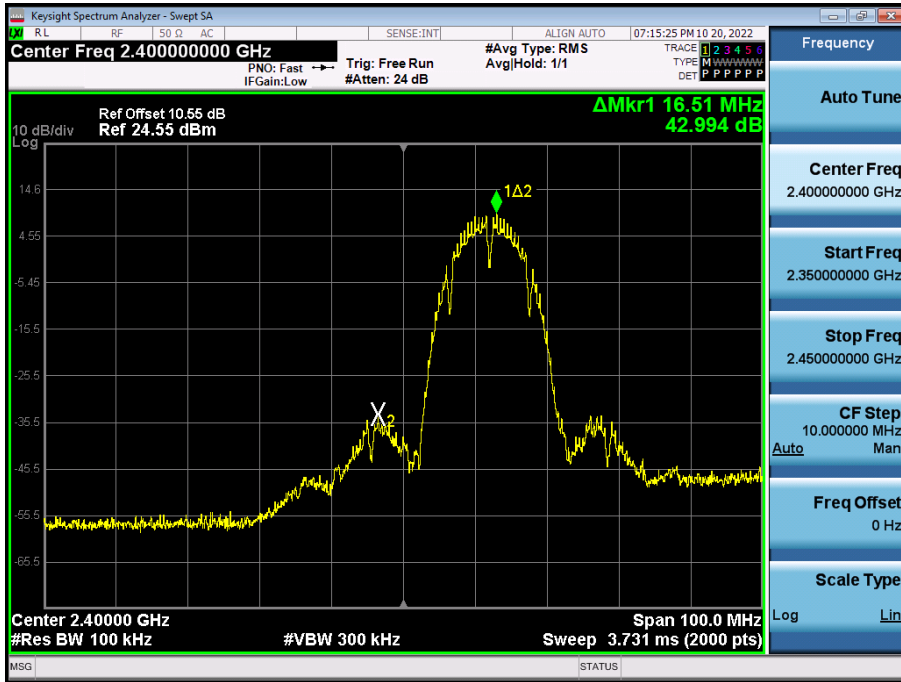
9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

Test Result : please refer to the plot below.

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

▣ Test Plots(Band Edge)

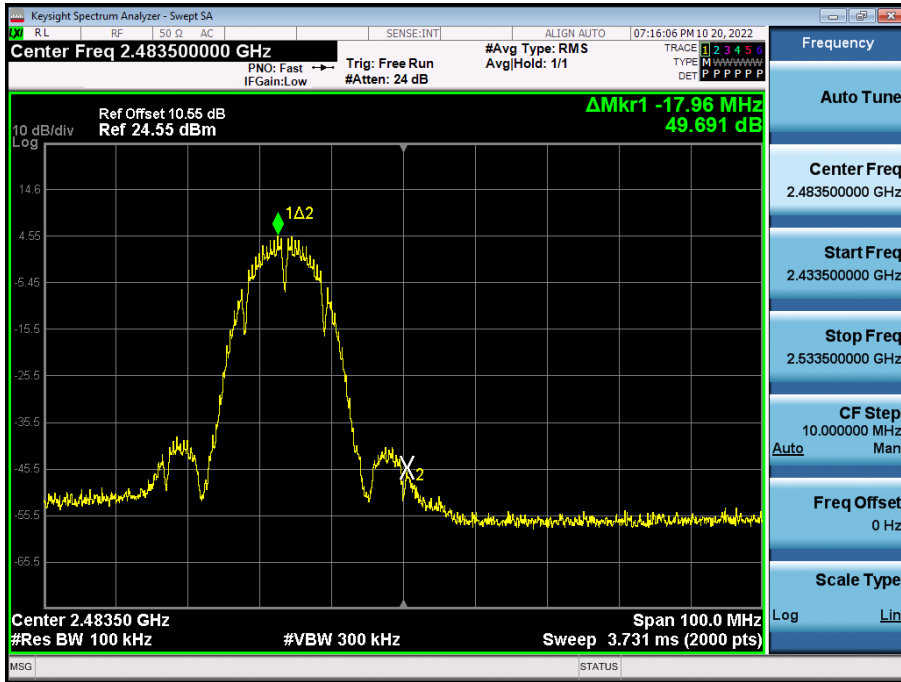
Band Edge (802.11b -CH1)



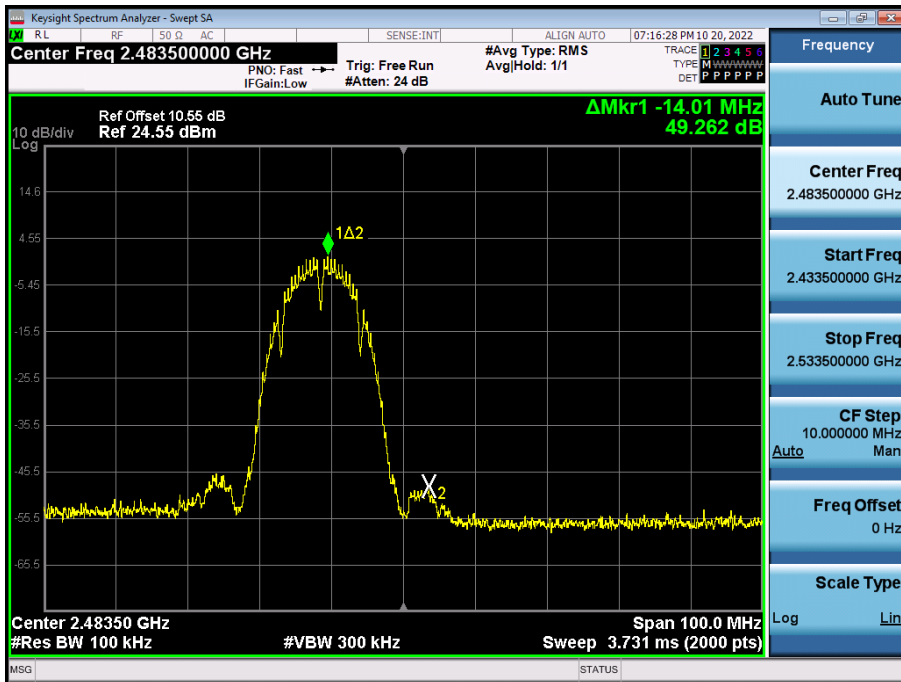
Band Edge (802.11b -CH11)



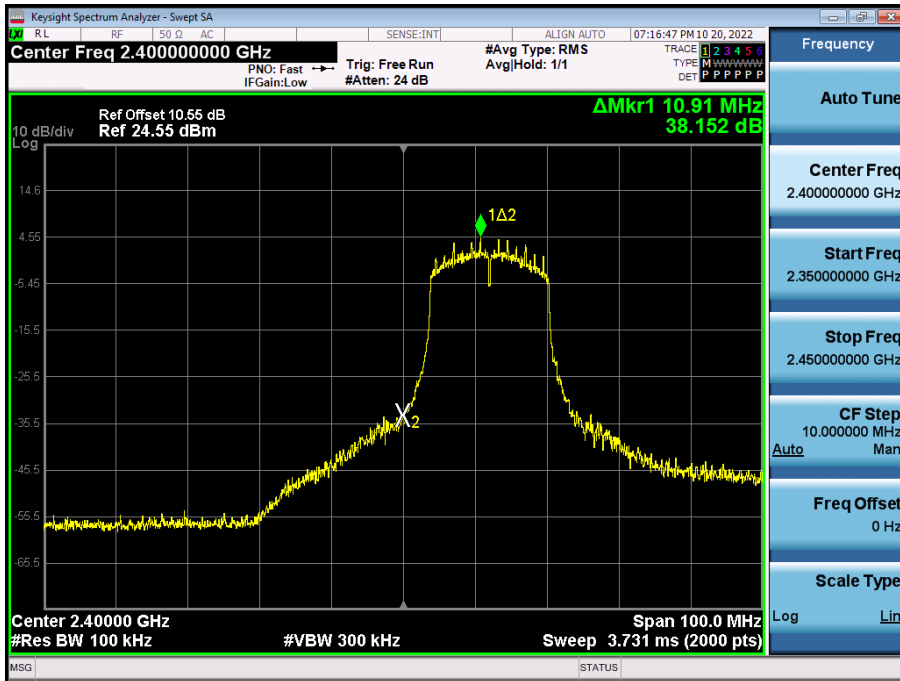
Band Edge (802.11b -CH12)



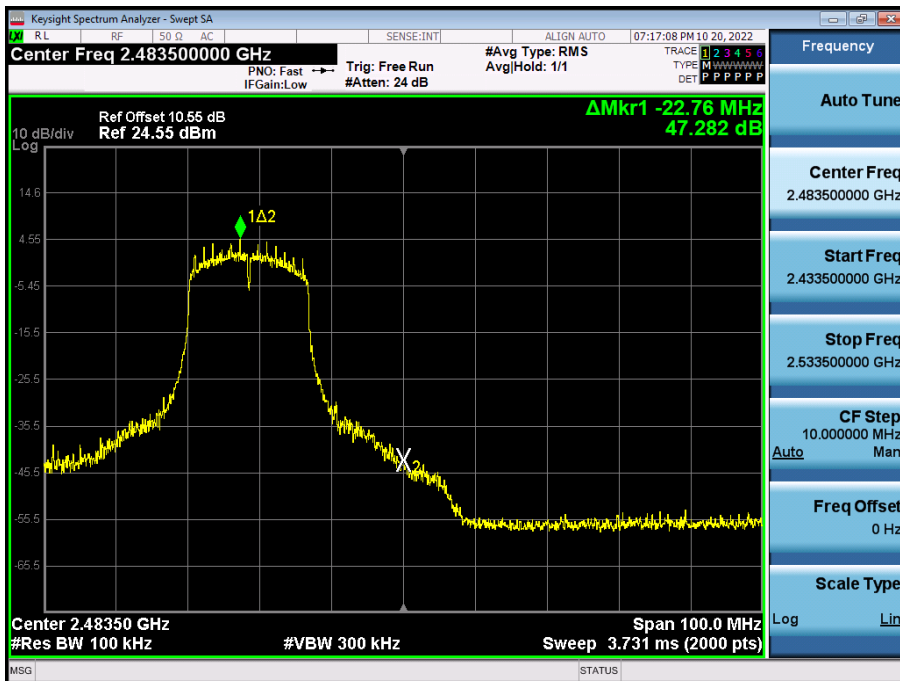
Band Edge (802.11b -CH13)



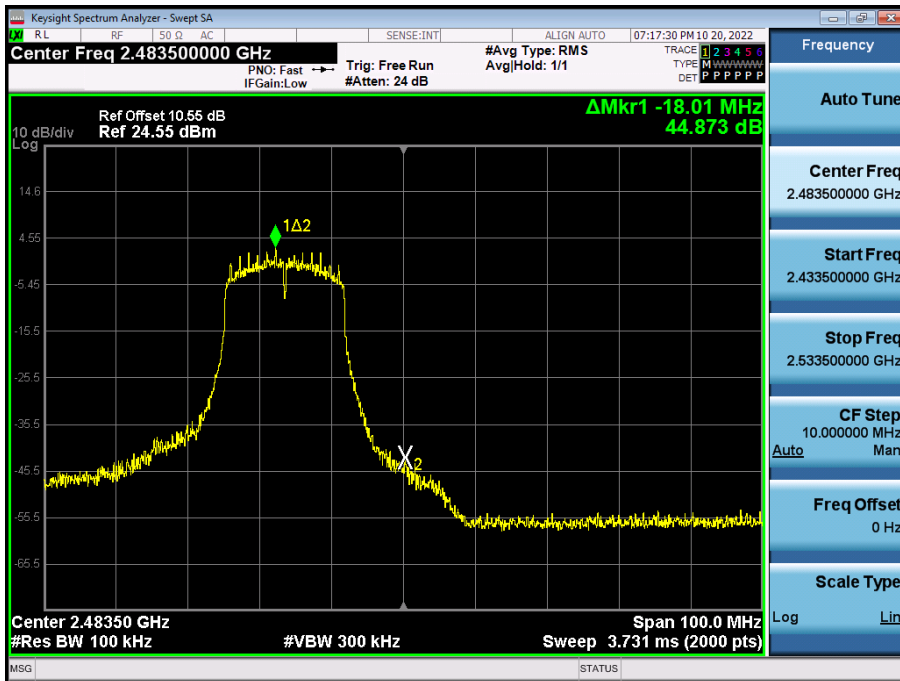
Band Edge (802.11g -CH1)



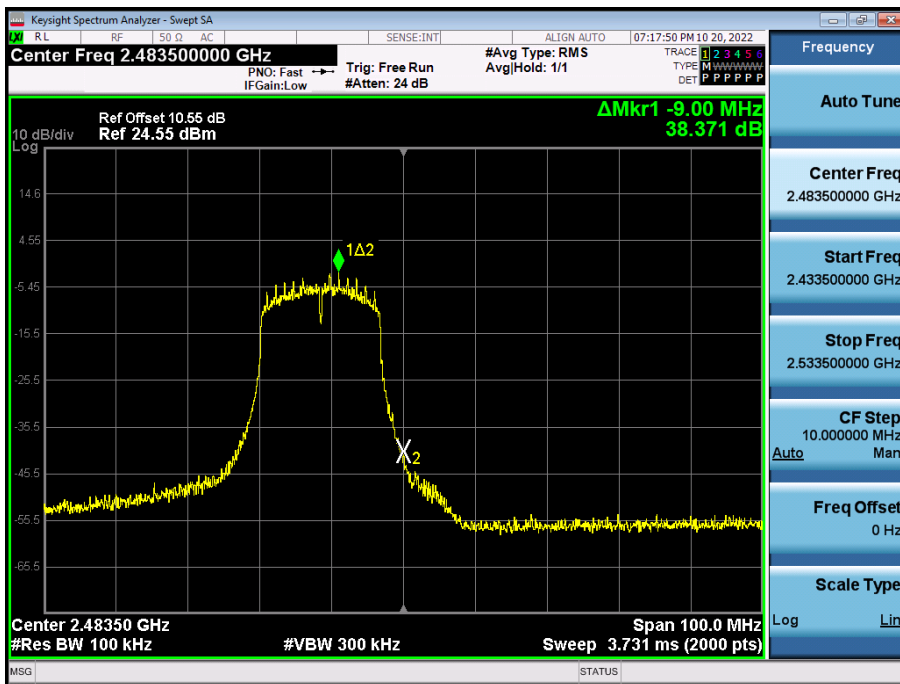
Band Edge (802.11g -CH11)



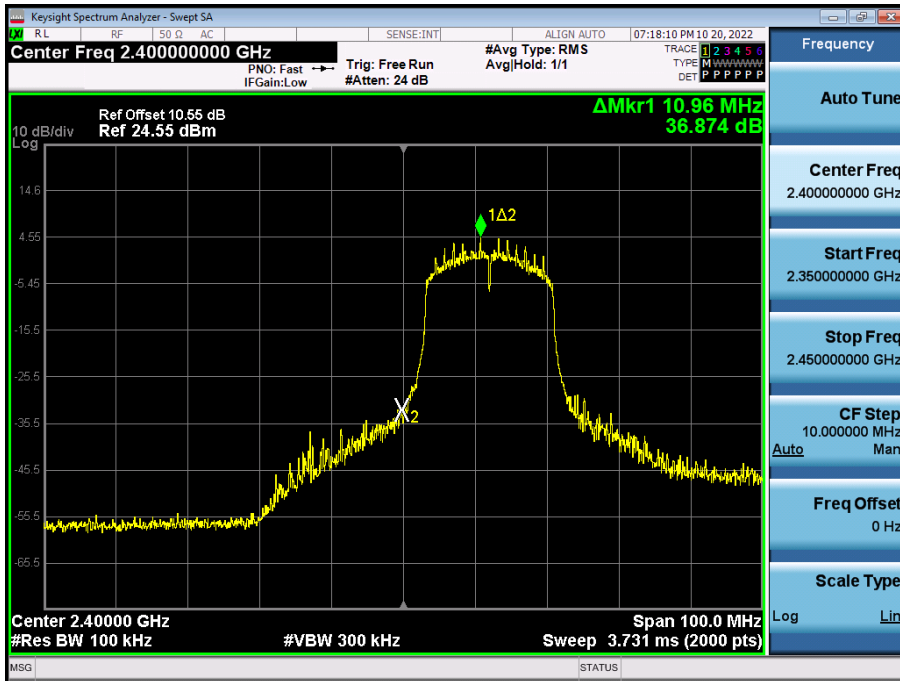
Band Edge (802.11g -CH12)



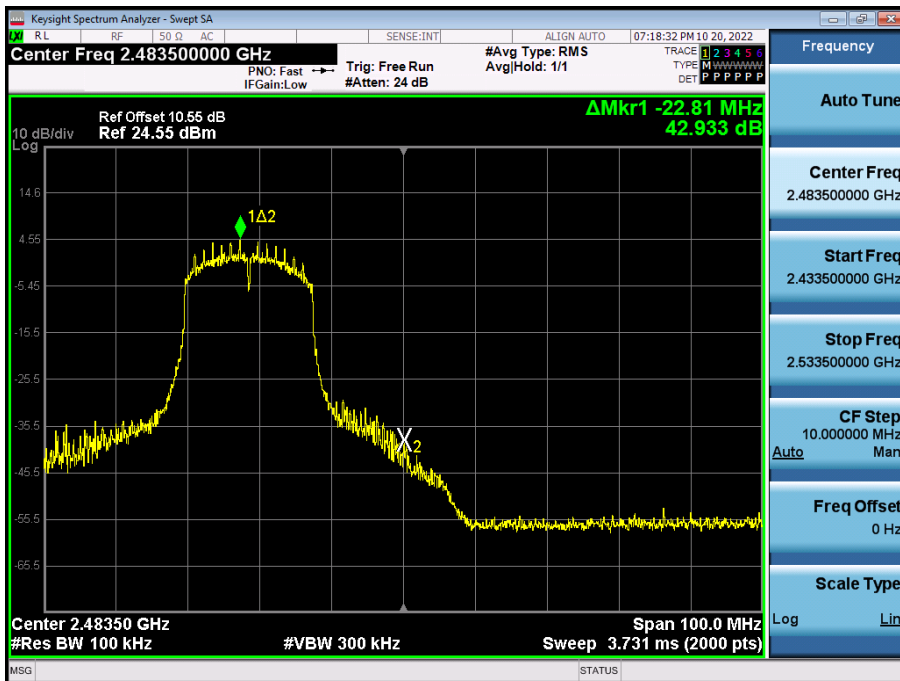
Band Edge (802.11g -CH13)



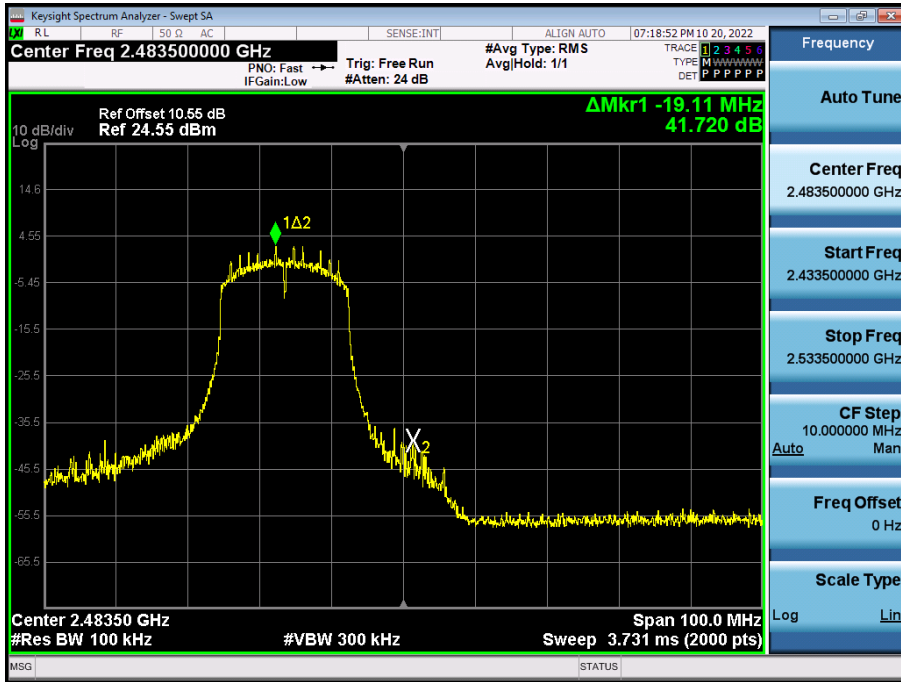
Band Edge (802.11n_HT20-CH1)



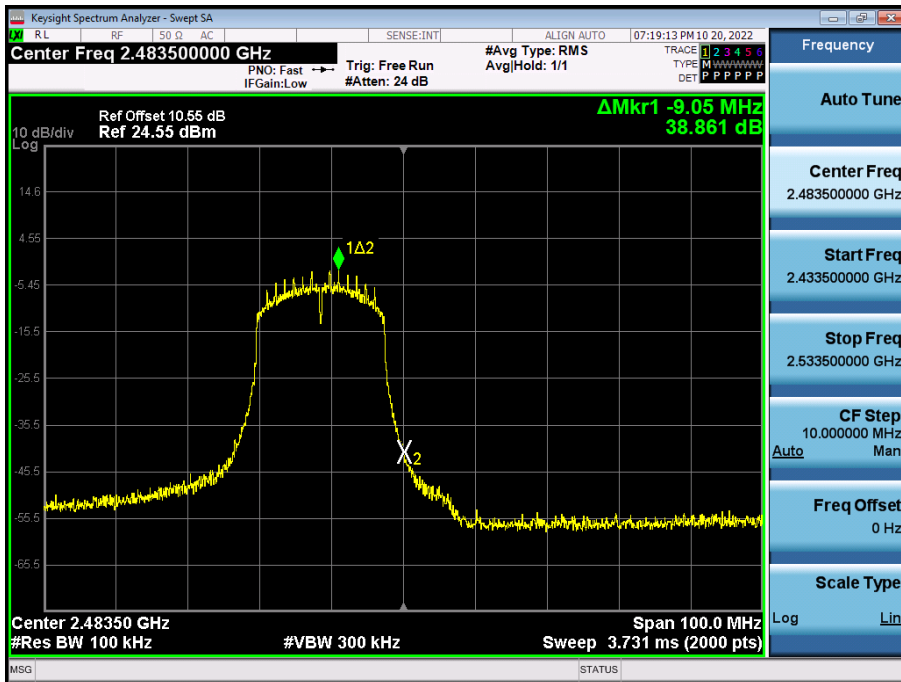
Band Edge (802.11n_HT20-CH11)



Band Edge (802.11n_HT20-CH12)



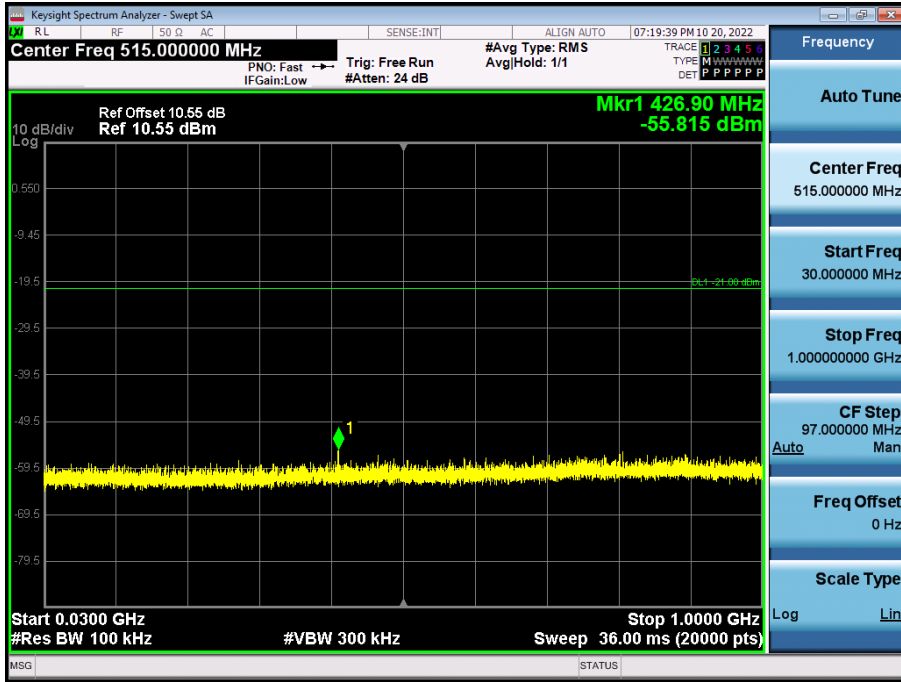
Band Edge (802.11n_HT20-CH13)



Test Plots(Conducted Spurious Emission)

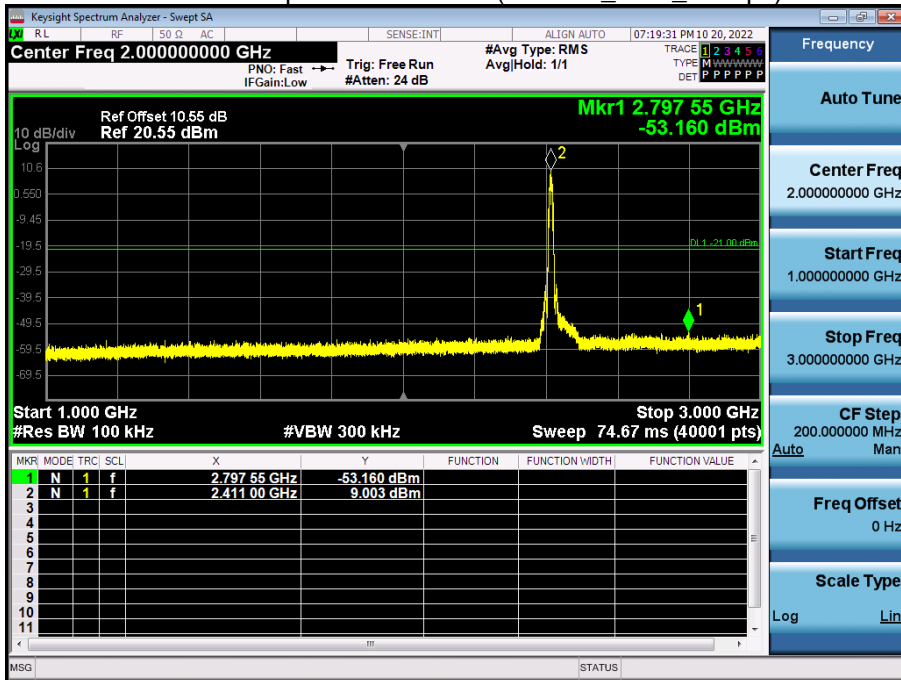
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



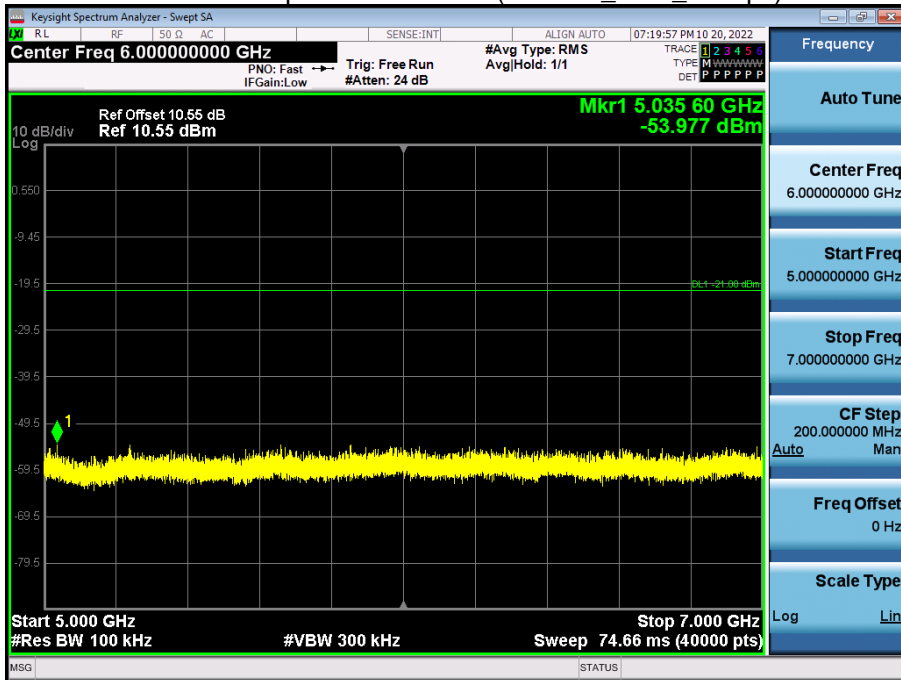
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



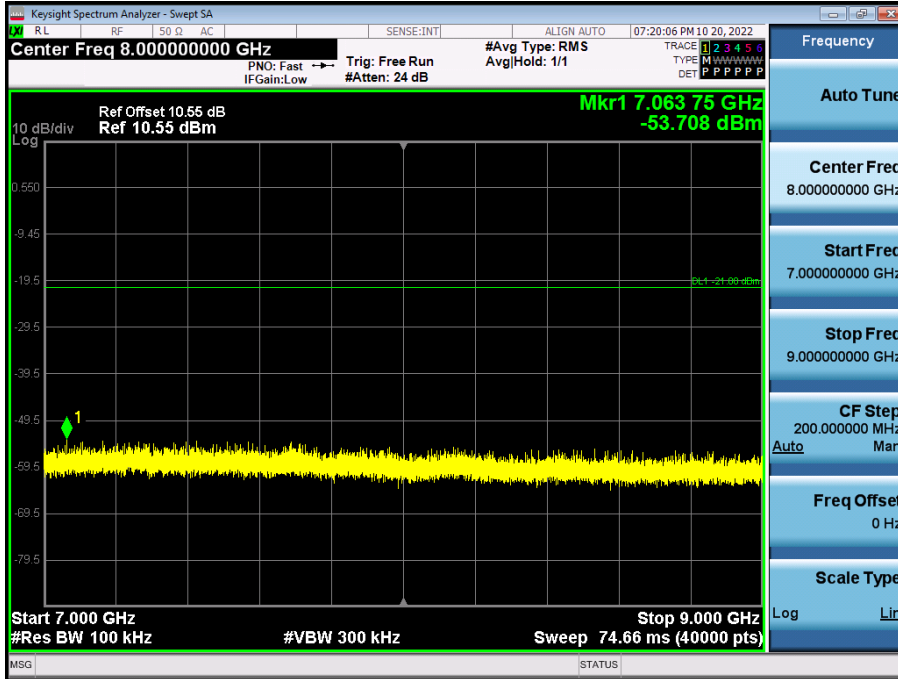
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



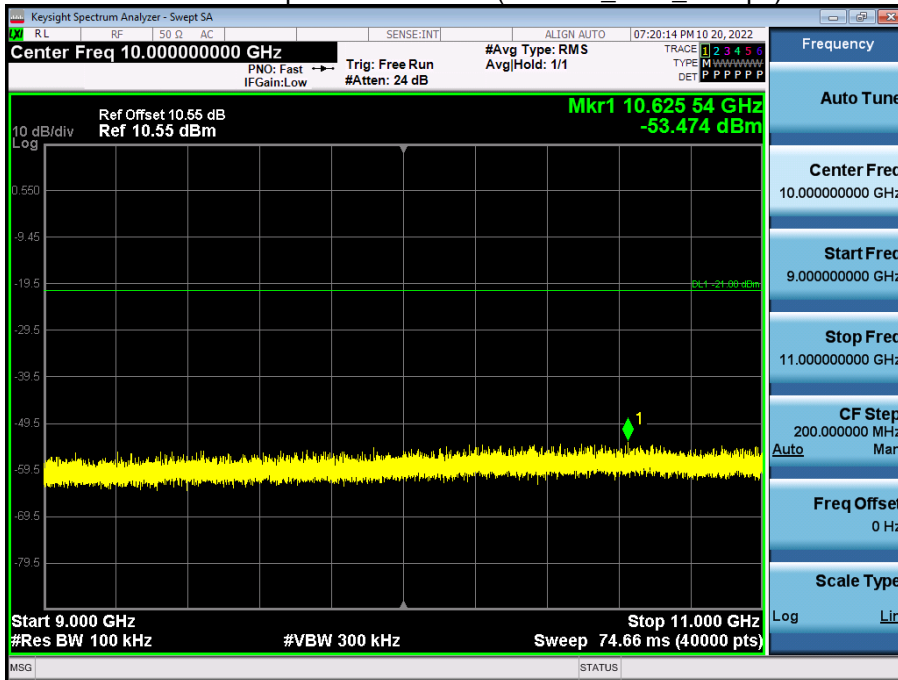
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



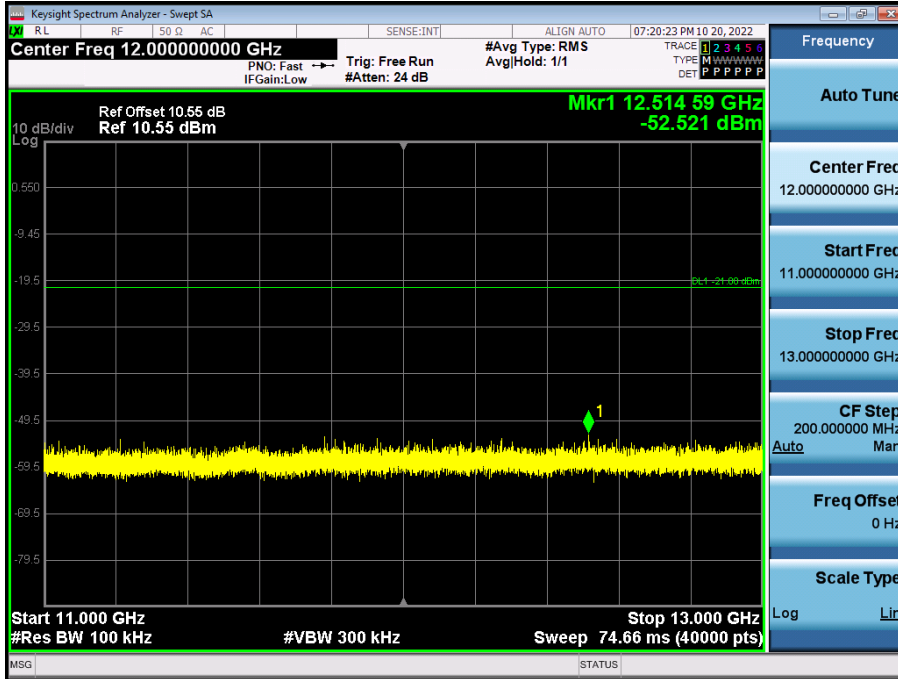
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



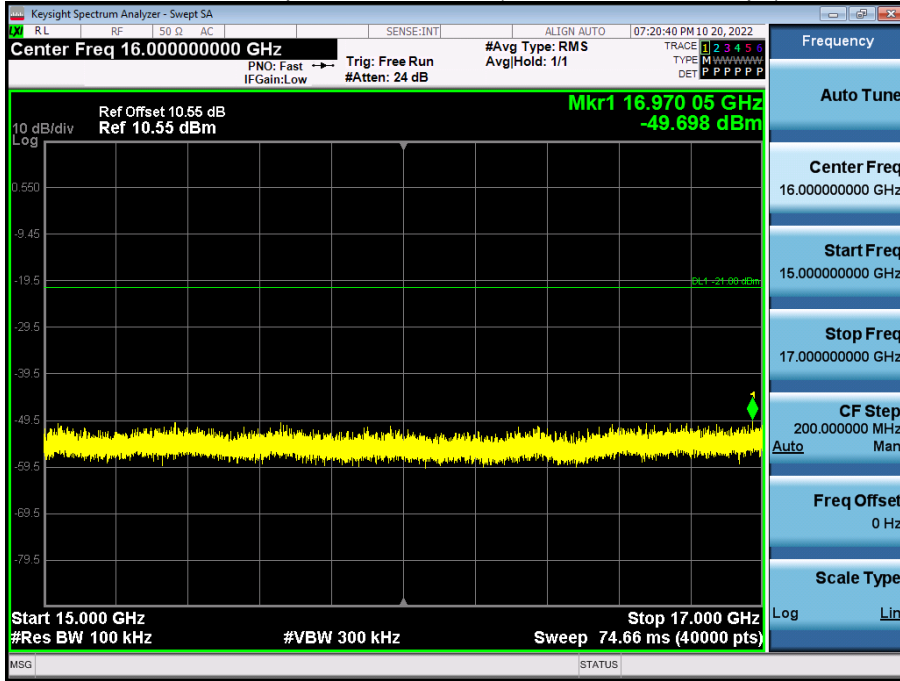
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



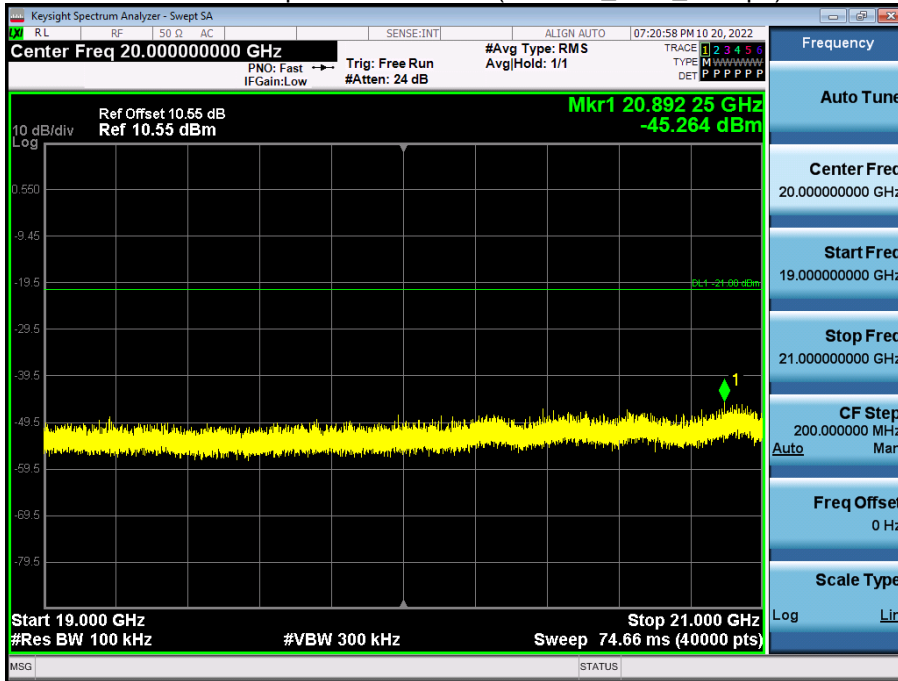
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



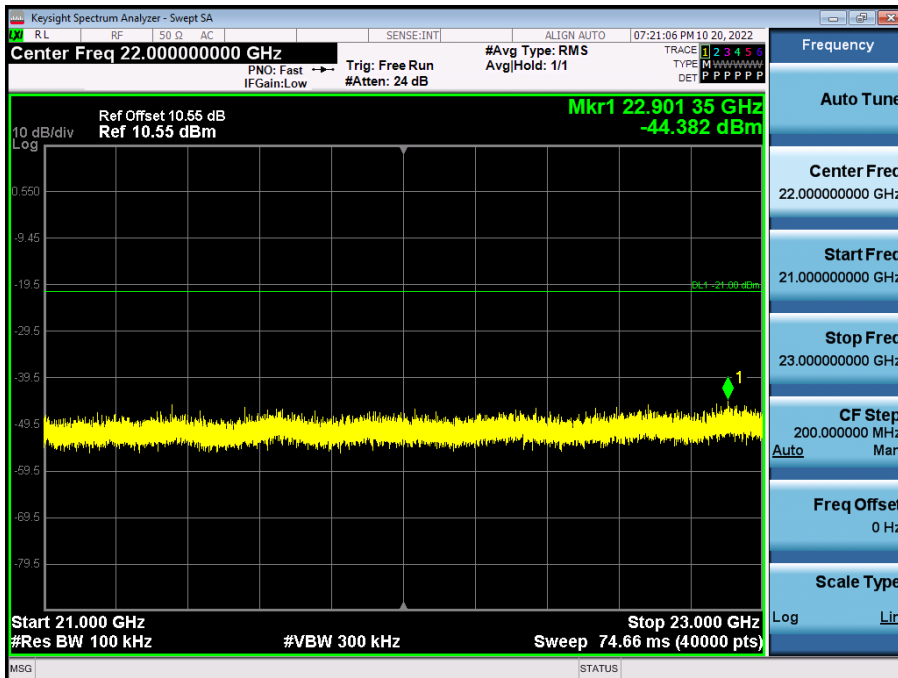
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.1_1 Mbps)



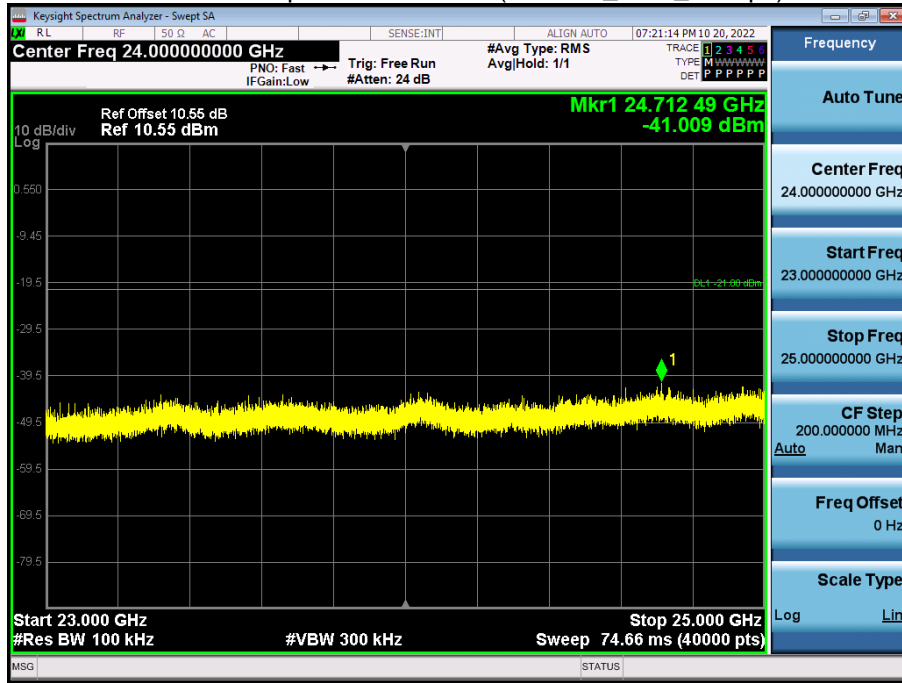
21 GHz ~ 23 GHz

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]	[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

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

Frequency [MHz]	Measured Value [dB μ V/m]	AF+CL+DF-AG [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4824	50.31	3.54	V	53.85	73.98	20.13	PK
4824	46.42	3.54	V	49.96	53.98	4.02	AV
7236	41.99	8.25	V	50.24	73.98	23.74	PK
7236	29.96	8.25	V	38.21	53.98	15.77	AV
4824	50.78	3.54	H	54.32	73.98	19.66	PK
4824	46.51	3.54	H	50.05	53.98	3.93	AV
7236	42.60	8.25	H	50.85	73.98	23.13	PK
7236	29.98	8.25	H	38.23	53.98	15.75	AV

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

Frequency [MHz]	Measured Value [dB μ V/m]	AF+CL+DF-AG [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4874	51.34	2.70	V	54.04	73.98	19.94	PK
4874	48.03	2.70	V	50.73	53.98	3.25	AV
7311	41.61	9.28	V	50.89	73.98	23.09	PK
7311	29.68	9.28	V	38.96	53.98	15.02	AV
4874	51.88	2.70	H	54.58	73.98	19.40	PK
4874	48.18	2.70	H	50.88	53.98	3.10	AV
7311	41.79	9.28	H	51.07	73.98	22.91	PK
7311	29.71	9.28	H	38.99	53.98	14.99	AV

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

Frequency [MHz]	Measured Value [dBμV/m]	AF+CL+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
4924	51.97	2.21	V	54.18	73.98	19.80	PK
4924	48.72	2.21	V	50.93	53.98	3.05	AV
7386	41.22	9.95	V	51.17	73.98	22.81	PK
7386	29.27	9.95	V	39.22	53.98	14.76	AV
4924	52.25	2.21	H	54.46	73.98	19.52	PK
4924	48.73	2.21	H	50.94	53.98	3.04	AV
7386	41.29	9.95	H	51.24	73.98	22.74	PK
7386	29.30	9.95	H	39.25	53.98	14.73	AV

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

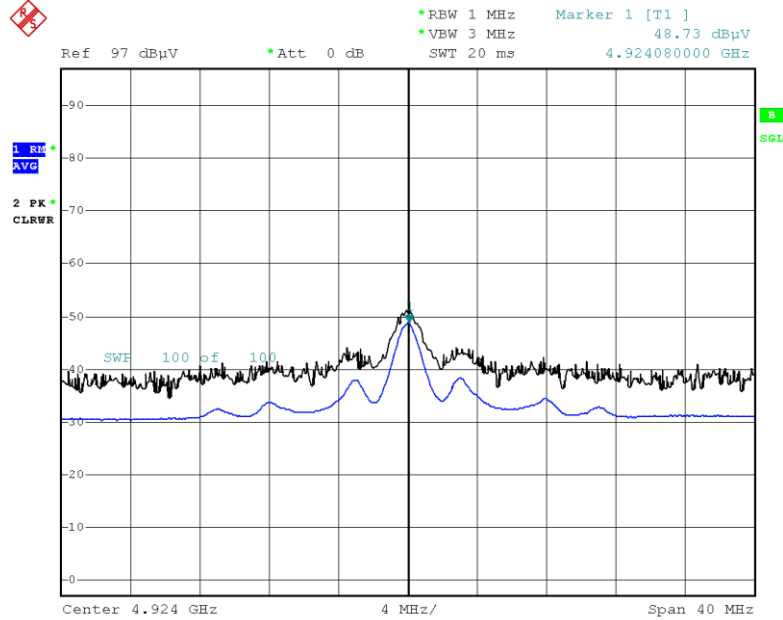
Frequency [MHz]	Measured Value [dBμV/m]	AF+CL+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
4934	51.40	1.96	V	53.36	73.98	20.62	PK
4934	47.98	1.96	V	49.94	53.98	4.04	AV
7401	40.69	9.73	V	50.42	73.98	23.56	PK
7401	28.82	9.73	V	38.55	53.98	15.43	AV
4934	51.40	1.96	H	53.36	73.98	20.62	PK
4934	47.53	1.96	H	49.49	53.98	4.49	AV
7401	40.84	9.73	H	50.57	73.98	23.41	PK
7401	28.84	9.73	H	38.57	53.98	15.41	AV

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

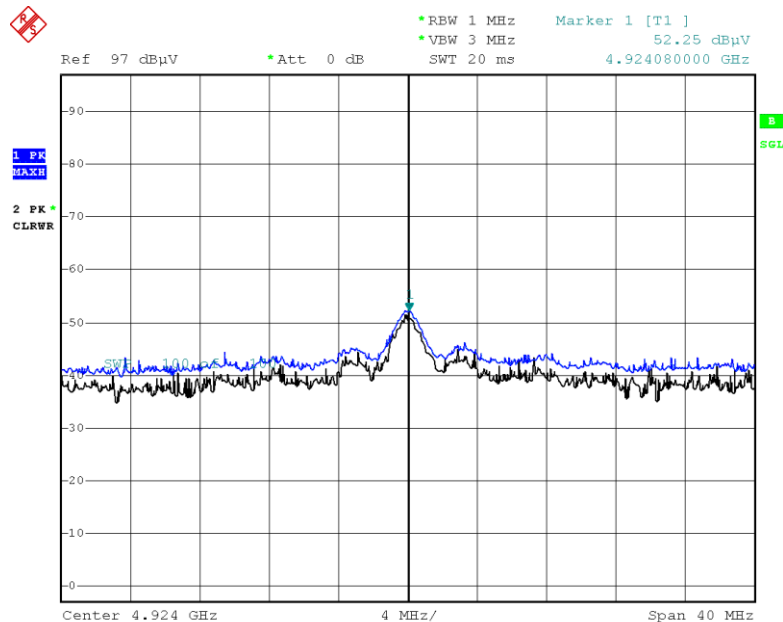
Frequency [MHz]	Measured Value [dB μ V/m]	AF+CL+DF-AG [dB/m]	ANT. POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
4944	48.17	1.93	V	50.10	73.98	23.88	PK
4944	42.52	1.93	V	44.45	53.98	9.53	AV
7416	40.67	9.76	V	50.43	73.98	23.55	PK
7416	28.67	9.76	V	38.43	53.98	15.55	AV
4944	48.20	1.93	H	50.13	73.98	23.85	PK
4944	42.53	1.93	H	44.46	53.98	9.52	AV
7416	40.90	9.76	H	50.66	73.98	23.32	PK
7416	28.78	9.76	H	38.54	53.98	15.44	AV

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+ D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2310.0~2390.0	27.28	35.43	H	62.71	73.98	11.27	PK
2310.0~2390.0	12.68	35.43	H	48.11	53.98	5.87	AV
2310.0~2390.0	27.03	35.43	V	62.45	73.98	11.53	PK
2310.0~2390.0	12.50	35.43	V	47.92	53.98	6.06	AV
2483.5~2500.0	23.81	35.57	H	59.38	73.98	14.60	PK
2483.5~2500.0	10.81	35.57	H	46.37	53.98	7.61	AV
2483.5~2500.0	23.80	35.57	V	59.37	73.98	14.61	PK
2483.5~2500.0	10.79	35.57	V	46.35	53.98	7.63	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+ D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2483.5~2500.0	22.18	35.57	H	57.75	73.98	16.23	PK
2483.5~2500.0	9.45	35.57	H	45.01	53.98	8.97	AV
2483.5~2500.0	21.88	35.57	V	57.44	73.98	16.54	PK
2483.5~2500.0	9.32	35.57	V	44.88	53.98	9.10	AV
2483.5~2500.0	21.37	35.57	H	56.93	73.98	17.05	PK
2483.5~2500.0	9.54	35.57	H	45.11	53.98	8.87	AV
2483.5~2500.0	21.06	35.57	V	56.62	73.98	17.36	PK
2483.5~2500.0	9.35	35.57	V	44.92	53.98	9.06	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+ D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2310.0~2390.0	33.99	0.00	35.43	H	69.42	73.98	4.56	PK
2310.0~2388.0	14.35	0.28	35.43	H	50.06	53.98	3.92	AV
#2388.0~2389.0	14.10	0.28	35.43	H	49.81	53.98	4.17	AV
#2389.0~2390.0	15.40	0.28	35.43	H	51.11	53.98	2.87	AV
2310.0~2390.0	33.79	0.00	35.43	V	69.22	73.98	4.76	PK
2310.0~2388.0	14.33	0.28	35.43	V	50.04	53.98	3.94	AV
#2388.0~2389.0	14.03	0.28	35.43	V	49.74	53.98	4.24	AV
#2389.0~2390.0	15.32	0.28	35.43	V	51.03	53.98	2.95	AV
2483.5~2500.0	35.52	0.00	35.57	H	71.08	73.98	2.90	PK
#2483.5~2484.5	15.35	0.28	35.57	H	51.20	53.98	2.78	AV
2484.5~2500.0	15.24	0.28	35.57	H	51.09	53.98	2.89	AV
2483.5~2500.0	35.18	0.00	35.57	V	70.75	73.98	3.23	PK
#2483.5~2484.5	15.25	0.28	35.57	V	51.10	53.98	2.88	AV
2484.5~2500.0	15.12	0.28	35.57	V	50.97	53.98	3.01	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+ D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2483.5~2500.0	32.25	0.00	35.57	H	67.82	73.98	6.16	PK
#2483.5~2484.5	16.08	0.28	35.57	H	51.93	53.98	2.05	AV
#2484.5~2485.5	15.30	0.28	35.57	H	51.15	53.98	2.83	AV
2485.5~2500.0	15.06	0.28	35.57	H	50.90	53.98	3.08	AV
2483.5~2500.0	32.18	0.00	35.57	V	67.75	73.98	6.23	PK
#2483.5~2484.5	15.86	0.28	35.57	V	51.71	53.98	2.27	AV
#2484.5~2485.5	15.12	0.28	35.57	V	50.97	53.98	3.01	AV
2485.5~2500.0	14.97	0.28	35.57	V	50.81	53.98	3.17	AV
2483.5~2500.0	34.86	0.00	35.57	H	70.42	73.98	3.56	PK
#2483.5~2484.5	15.55	0.28	35.57	H	51.39	53.98	2.59	AV
#2484.5~2485.5	12.48	0.28	35.57	H	48.33	53.98	5.65	AV
2485.5~2500.0	11.71	0.28	35.57	H	47.55	53.98	6.43	AV
2483.5~2500.0	34.19	0.00	35.57	V	69.76	73.98	4.22	PK
#2483.5~2484.5	15.19	0.28	35.57	V	51.04	53.98	2.94	AV
#2484.5~2485.5	12.05	0.28	35.57	V	47.90	53.98	6.08	AV
2485.5~2500.0	11.12	0.28	35.57	V	46.97	53.98	7.01	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+ D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
2310.0~2388.0	36.51	0.00	35.43	H	71.93	73.98	2.05	PK
#2388.0~2389.0	30.25	0.00	35.43	H	65.67	73.98	8.31	PK
#2389.0~2390.0	30.75	0.00	35.43	H	66.18	73.98	7.80	PK
2310.0~2388.0	14.64	0.36	35.43	H	50.42	53.98	3.56	AV
#2388.0~2389.0	15.06	0.36	35.43	H	50.84	53.98	3.14	AV
#2389.0~2390.0	16.15	0.36	35.43	H	51.93	53.98	2.05	AV
2310.0~2388.0	36.11	0.00	35.43	V	71.54	73.98	2.44	PK
#2388.0~2389.0	30.21	0.00	35.43	V	65.64	73.98	8.34	PK
#2389.0~2390.0	30.65	0.00	35.43	V	66.07	73.98	7.91	PK
2310.0~2388.0	14.33	0.36	35.43	V	50.11	53.98	3.87	AV
#2388.0~2389.0	14.99	0.36	35.43	V	50.77	53.98	3.21	AV
#2389.0~2390.0	16.10	0.36	35.43	V	51.88	53.98	2.10	AV
2483.5~2500.0	35.29	0.00	35.57	H	70.85	73.98	3.13	PK
#2483.5~2484.5	15.17	0.36	35.57	H	51.09	53.98	2.89	AV
#2484.5~2485.5	13.86	0.36	35.57	H	49.78	53.98	4.20	AV
2485.5~2500.0	13.75	0.36	35.57	H	49.67	53.98	4.31	AV
2483.5~2500.0	35.20	0.00	35.57	V	70.76	73.98	3.22	PK
#2483.5~2484.5	14.98	0.36	35.57	V	50.90	53.98	3.08	AV
#2484.5~2485.5	13.45	0.36	35.57	V	49.37	53.98	4.61	AV
2485.5~2500.0	13.31	0.36	35.57	V	49.23	53.98	4.75	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+ D.F [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
#2483.5~2484.5	30.77	0.00	35.57	H	66.33	73.98	7.65	PK
#2484.5~2485.5	29.91	0.00	35.57	H	65.48	73.98	8.50	PK
2485.5~2500.0	35.87	0.00	35.57	H	71.44	73.98	2.54	PK
#2483.5~2484.5	15.46	0.36	35.57	H	51.38	53.98	2.60	AV
#2484.5~2485.5	15.24	0.36	35.57	H	51.16	53.98	2.82	AV
2485.5~2500.0	15.26	0.36	35.57	H	51.18	53.98	2.80	AV
#2483.5~2484.5	29.67	0.00	35.57	V	65.23	73.98	8.75	PK
#2484.5~2485.5	29.19	0.00	35.57	V	64.75	73.98	9.23	PK
2485.5~2500.0	34.93	0.00	35.57	V	70.50	73.98	3.48	PK
#2483.5~2484.5	15.06	0.36	35.57	V	50.98	53.98	3.00	AV
#2484.5~2485.5	14.93	0.36	35.57	V	50.85	53.98	3.13	AV
2485.5~2500.0	14.67	0.36	35.57	V	50.59	53.98	3.39	AV
2483.5~2500.0	35.62	0.00	35.57	H	71.19	73.98	2.79	PK
#2483.5~2484.5	15.94	0.36	35.57	H	51.86	53.98	2.12	AV
#2484.5~2485.5	12.60	0.36	35.57	H	48.52	53.98	5.46	AV
2485.5~2500.0	11.36	0.36	35.57	H	47.28	53.98	6.70	AV
2483.5~2500.0	34.96	0.00	35.57	V	70.53	73.98	3.45	PK
#2483.5~2484.5	15.38	0.36	35.57	V	51.30	53.98	2.68	AV
#2484.5~2485.5	12.19	0.36	35.57	V	48.11	53.98	5.87	AV
2485.5~2500.0	11.28	0.36	35.57	V	47.20	53.98	6.78	AV

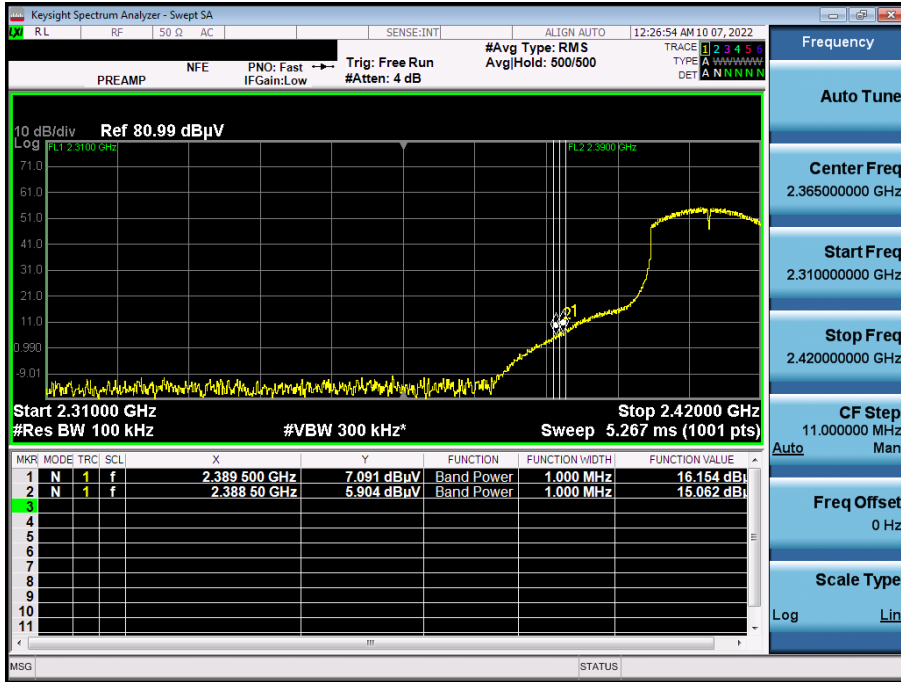
Note : integration method Used (ANSI C63.10 Section11.13.3)

■ Test Plots

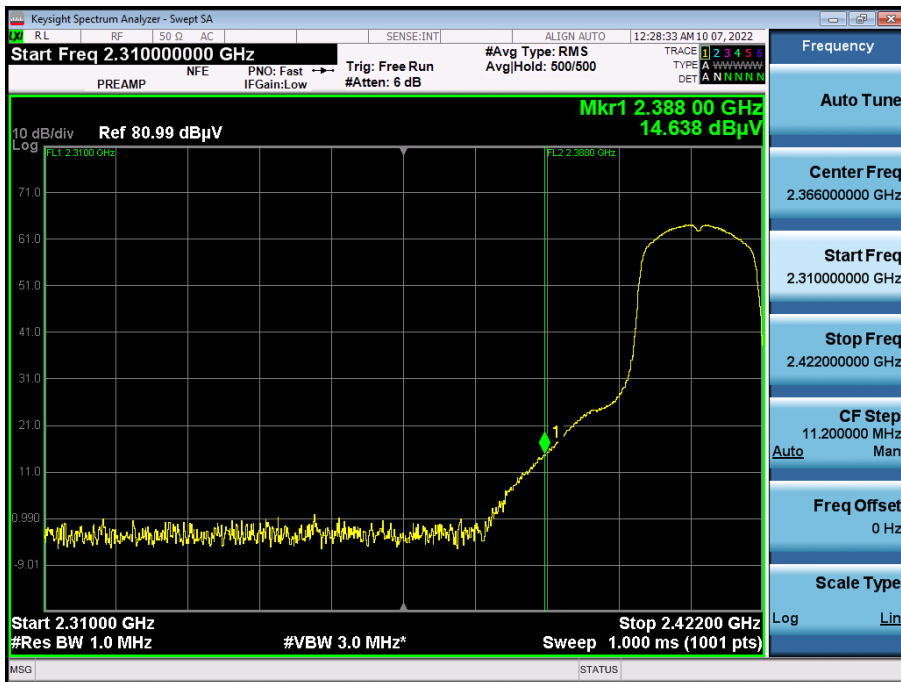
(Worst case : X-H)

Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_MCS0, Ch.1)

integration method Used_ 2 388 MHz ~ 2 389 MHz, 2 389 MHz ~ 2 390 MHz

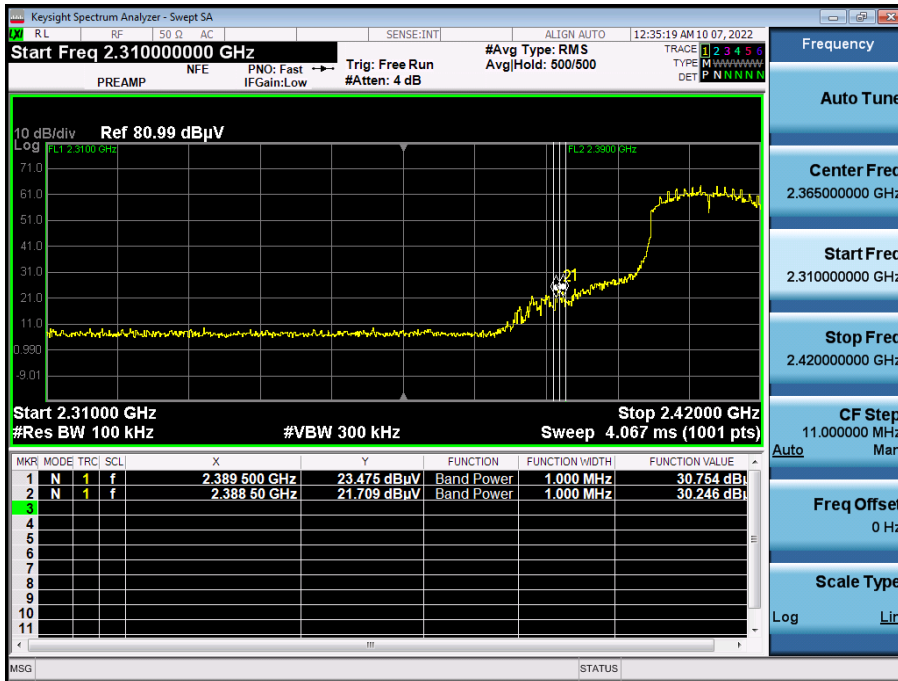


Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_MCS0, Ch.1)

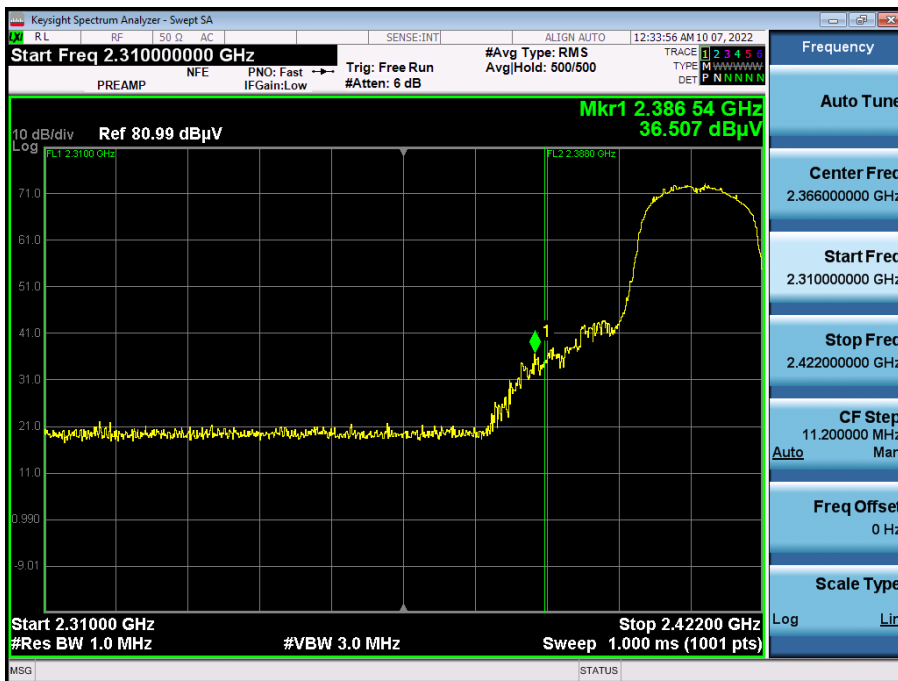


Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_MCS0, Ch.1)

integration method Used_ 2 388 MHz ~ 2 389 MHz, 2 389 MHz ~ 2 390 MHz



Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_MCS0, Ch.1)



Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

Test

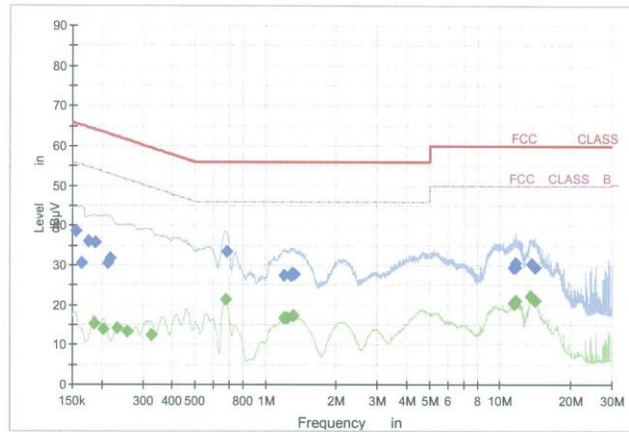
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Test Report

Common Information

EUT : SM-A047MDS
 Manufacturer : SAMSUNG
 Test Site : SHIELD ROOM
 Operating Conditions : WLAN 2.4G MODE_L1

Full Spectrum



Legend:
 - Preview Result: FCC CLASS B_
 - Preview Result: Final_Result QPK (Blue Diamond)
 - Preview Result: Final_Result CAV (Green Diamond)
 - FCC CLASS (Red Line)

Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1545	38.74	65.75	27.02	9.000	L1	OFF	9.7	
0.1635	30.61	65.28	34.68	9.000	L1	OFF	9.7	
0.1748	35.97	64.73	28.76	9.000	L1	OFF	9.7	
0.1883	35.80	64.11	28.31	9.000	L1	OFF	9.7	
0.2130	30.71	63.09	32.37	9.000	L1	OFF	9.7	
0.2175	31.79	62.91	31.12	9.000	L1	OFF	9.7	
0.6823	33.51	56.00	22.49	9.000	L1	OFF	9.7	
1.1975	27.43	56.00	28.57	9.000	L1	OFF	9.7	
1.2875	27.49	56.00	28.51	9.000	L1	OFF	9.7	
1.2943	27.67	56.00	28.33	9.000	L1	OFF	9.7	
1.3010	27.78	56.00	28.22	9.000	L1	OFF	9.7	
1.3055	27.87	56.00	28.13	9.000	L1	OFF	9.7	
1.3235	27.70	56.00	28.30	9.000	L1	OFF	9.7	
11.3788	29.44	60.00	30.56	9.000	L1	OFF	10.1	
11.7163	29.50	60.00	30.50	9.000	L1	OFF	10.1	
11.7230	30.47	60.00	29.53	9.000	L1	OFF	10.1	
13.6805	30.35	60.00	29.65	9.000	L1	OFF	10.2	
14.1373	29.40	60.00	30.60	9.000	L1	OFF	10.2	

2022-10-19

오후 6:45:36

Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1860	15.20	54.21	39.02	9.000	L1	OFF	9.7	
0.2040	13.73	53.45	39.72	9.000	L1	OFF	9.7	
0.2333	14.27	52.33	38.07	9.000	L1	OFF	9.7	
0.2580	13.25	51.50	38.24	9.000	L1	OFF	9.7	
0.3255	12.36	49.57	37.20	9.000	L1	OFF	9.7	
0.6755	21.28	46.00	24.72	9.000	L1	OFF	9.7	
1.1953	16.77	46.00	29.23	9.000	L1	OFF	9.7	
1.2065	16.64	46.00	29.36	9.000	L1	OFF	9.7	
1.2133	16.72	46.00	29.28	9.000	L1	OFF	9.7	
1.2200	16.81	46.00	29.19	9.000	L1	OFF	9.7	
1.2448	16.60	46.00	29.40	9.000	L1	OFF	9.7	
1.3145	17.37	46.00	28.63	9.000	L1	OFF	9.7	
11.3765	20.57	50.00	29.43	9.000	L1	OFF	10.1	
11.5880	20.11	50.00	29.89	9.000	L1	OFF	10.1	
11.7208	21.00	50.00	29.00	9.000	L1	OFF	10.1	
13.5298	22.13	50.00	27.87	9.000	L1	OFF	10.2	
13.6805	22.02	50.00	27.98	9.000	L1	OFF	10.2	
14.1328	21.15	50.00	28.85	9.000	L1	OFF	10.2	

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Conducted Emissions (Line 2)

Test

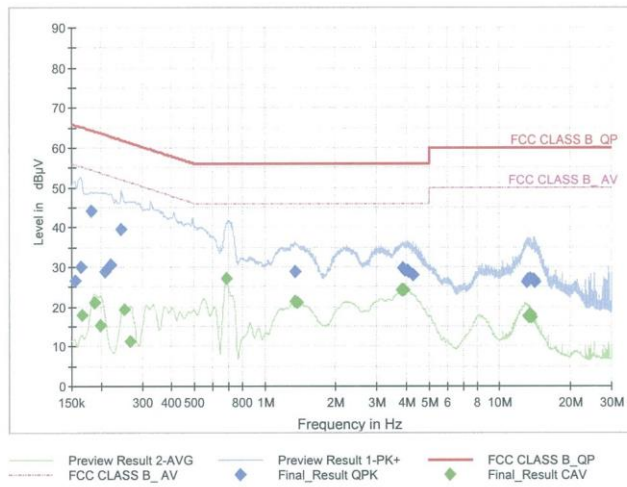
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Test Report

Common Information

EUT : SM-A146M/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WLAN 2.4G MODE_N

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1545	26.63	65.75	39.12	9.000	N	OFF	9.6	
0.1635	30.02	65.28	35.26	9.000	N	OFF	9.6	
0.1815	43.99	64.42	20.42	9.000	N	OFF	9.6	
0.2085	28.94	63.27	34.33	9.000	N	OFF	9.6	
0.2198	30.54	62.83	32.29	9.000	N	OFF	9.6	
0.2445	39.57	61.94	22.38	9.000	N	OFF	9.6	
1.3438	28.88	56.00	27.12	9.000	N	OFF	9.7	
3.8818	29.58	56.00	26.43	9.000	N	OFF	9.8	
3.9560	29.17	56.00	26.83	9.000	N	OFF	9.8	
4.0370	29.05	56.00	26.95	9.000	N	OFF	9.8	
4.1068	28.97	56.00	27.03	9.000	N	OFF	9.8	
4.2778	27.84	56.00	28.16	9.000	N	OFF	9.8	
13.0708	26.35	60.00	33.65	9.000	N	OFF	10.2	
13.1900	26.43	60.00	33.57	9.000	N	OFF	10.2	
13.2598	26.80	60.00	33.20	9.000	N	OFF	10.2	
13.4420	27.01	60.00	32.99	9.000	N	OFF	10.2	
13.9348	26.69	60.00	33.31	9.000	N	OFF	10.2	
14.1395	26.35	60.00	33.65	9.000	N	OFF	10.2	

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1658	17.95	55.17	37.22	9.000	N	OFF	9.6	
0.1883	21.00	54.11	33.12	9.000	N	OFF	9.6	
0.1995	15.29	53.63	38.35	9.000	N	OFF	9.6	
0.2513	19.33	51.72	32.39	9.000	N	OFF	9.6	
0.2670	11.38	51.21	39.83	9.000	N	OFF	9.6	
0.6868	27.03	46.00	18.97	9.000	N	OFF	9.7	
1.3505	21.24	46.00	24.76	9.000	N	OFF	9.7	
1.3708	21.13	46.00	24.87	9.000	N	OFF	9.7	
3.8368	24.21	46.00	21.79	9.000	N	OFF	9.8	
3.8593	24.36	46.00	21.64	9.000	N	OFF	9.8	
3.8773	24.21	46.00	21.79	9.000	N	OFF	9.8	
3.9043	24.11	46.00	21.89	9.000	N	OFF	9.8	
13.1900	17.45	50.00	32.55	9.000	N	OFF	10.2	
13.2733	17.81	50.00	32.19	9.000	N	OFF	10.2	
13.3273	17.32	50.00	32.68	9.000	N	OFF	10.2	
13.4668	18.21	50.00	31.79	9.000	N	OFF	10.2	
13.4825	17.98	50.00	32.02	9.000	N	OFF	10.2	
13.6985	17.45	50.00	32.55	9.000	N	OFF	10.2	

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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	Keysight	MY55410508	09/06/2023	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	E3646A	Agilent	MY40002937	12/14/2022	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	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
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	04/12/2023	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	01/06/2023	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
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/07/2023	Annual
ATT(3 dB) + LNA2(6~18 GHz)	18B-03, CBL06185030	WEINSCHEL CERNEK	N/A	12/22/2022	Annual
ATT(10 dB) + LNA1(0.1~18 GHz)	56-10, CBLU1183540B-01	Api tech, CERNEK	N/A	12/22/2022	Annual
High Pass Filter	WHKX10-2700-3000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
Thru	COAXIAL ATTENUATOR	T&M SYSTEM	N/A	12/22/2022	Annual
Power Amplifier	CBL18265035	CERNEK	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEK	25956	03/11/2023	Annual
Spectrum Analyzer	FSP(9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/06/2023	Annual
Spectrum Analyzer	FSV40-N(9 kHz ~ 30 GHz)	Rohde & Schwarz	101068-SZ	09/07/2023	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-2211-FC029-P