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TEST REPORT

FCC/ISED DTS Test for LGSBWAC97

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2207-FI013

DATE OF ISSUE
July 20, 2022

Tested by
Jin Gwan Lee

Technical Manager
Se Wook Park

Accredited by KOLAS, Republic of KOREA

HCT CO., LTD.
BongJai Huh / CEO

HCT CO., LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 Fax. +82 31 645 6401

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Additional Model
-

Applicant	**LG Electronics Inc.** 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Republic of Korea
Eut Type Model Name	RF Module LGSBWAC97
FCC ID IC	BEJLGSBWAC97 2703H-LGSBWAC97
Modulation type	CCK/DSSS/OFDM
FCC Classification	Digital Transmission System(DTS)
FCC Rule Part(s)	Part 15.247
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5_Amendment 2 (February 2021)

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

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	July 20, 2022	Initial Release

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 / ISED Rules under normal use and maintenance.

KOLAS Statement:
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. (KOLAS Accreditation No. KT197)

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

CONTENTS

1. EUT DESCRIPTION

Model	LGSBWAC97			
Additional Model	-			
EUT Type	RF Module			
Power Supply	DC 3.30 V			
Frequency Range	2 412 MHz – 2 472 MHz			
Max. RF Output Power	Peak Power	Ant. 1 (SISO)	802.11b: 802.11g: 802.11n(HT20): 802.11n(HT40):	21.30 dBm 24.22 dBm 24.55 dBm 22.48 dBm
		Ant. 2 (SISO)	802.11b: 802.11g: 802.11n(HT20): 802.11n(HT40):	21.06 dBm 24.09 dBm 24.11 dBm 23.18 dBm
		Ant. 1 + Ant. 2 (MIMO)	802.11b: 802.11g: 802.11n(HT20): 802.11n(HT40):	24.19 dBm 27.16 dBm 27.34 dBm 25.85 dBm
	Average Power	Ant. 1 (SISO)	802.11b: 802.11g: 802.11n(HT20): 802.11n(HT40):	15.48 dBm 16.76 dBm 16.63 dBm 15.64 dBm
		Ant. 2 (SISO)	802.11b: 802.11g: 802.11n(HT20): 802.11n(HT40):	15.29 dBm 16.90 dBm 16.23 dBm 15.37 dBm
		Ant. 1 + Ant. 2 (MIMO)	802.11b: 802.11g: 802.11n(HT20): 802.11n(HT40):	18.38 dBm 19.84 dBm 19.44 dBm 18.52 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n			
Number of Channels	13 Channels			
Antenna type	Metal press Antenna			
Antenna Peak Gain	Ant 1 : -0.94 dBi Ant 2 : -1.68 dBi			
Date(s) of Tests	June 08, 2022 ~ July 19, 2022			
PMN (Product Marketing Number)	RF Module			
HVIN (Hardware Version Identification Number)	LGSBWAC97			
FVIN (Firmware Version Identification Number)	MT7668_V1.0			
HMN (Host Marketing Name)	N/A			
EUT serial numbers	Radiated: ETWCFMBC03-01 Conducted : ETWCFMBC03-02			
Factory	1) PT. LG INNOTEK INDONESIA Bekasi International Industrial Estate, Blok C8 NO. 12 & 12 A, Desa Cibatu, Cikarang Selatan, Bekasi 17750 Indonesia 2) COMPAL NETWORKING(KUNSHAN)CO.,LTD No. 520, Nanbang Rd, Economic & Technical Development Zone, Kunshan, Jiangsu Province, China			
EUT Connetor Type	Top connector_FFC Cable Type Bottom Connector_FFC Cable Type			

ANTENNA CONFIGURATIONS

1. The device employs MIMO technology. Below are the possible configurations

Configurations	SISO		SDM	CDD
	Ant1	Ant2	Ant1 + Ant2	Ant1 + Ant2
802.11b	O	O	X	O
802.11g	O	O	X	O
802.11n(HT20)	O	O	O	O
802.11n(HT40)	O	O	O	O

Note:

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

2. Directional Gain Calculation

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

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

▣ Antenna Gain

2.4 GHz Band

Antenna Gain	Ant 1	-0.94 dBi
	Ant 2	-1.68 dBi
Directional Antenna Gain	CDD : 1.71 dBi SDM : -1.68 dBi	
N_{ANT}/N_{SS}	2/2	

Note

According to ANSI C63.10-2013 section 14.4.3, the directional gain is calculated using the formula, where GN is the gain of the nth antenna and NANT is the total number of antennas used.

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

Sample MIMO Calculation:

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

Ant1 + Ant 2 = MIMO

(11.58 dBm + 12.08 dBm) = (14.387 mW + 16.143 mW) = 30.53 mW = 14.88 dBm

2. TEST METHODOLOGY

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

EUT CONFIGURATION

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

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C. / RSS-Gen issue 5, RSS-247 issue 2.

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 30MHz 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 1GHz. Above 1GHz with 1.5m 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, 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).
For ISED, test facility was accepted dated January 26, 2021 (CAB identifier: 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.

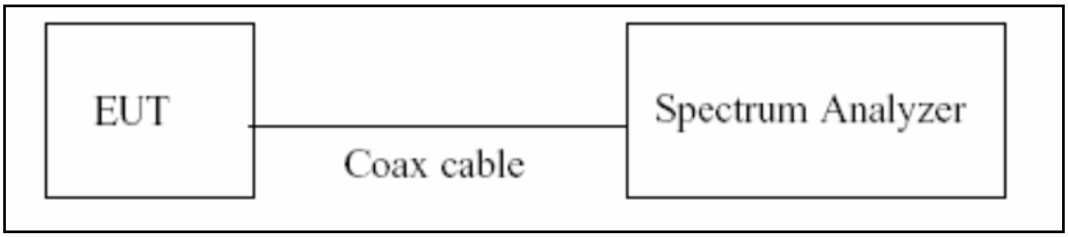
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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*.

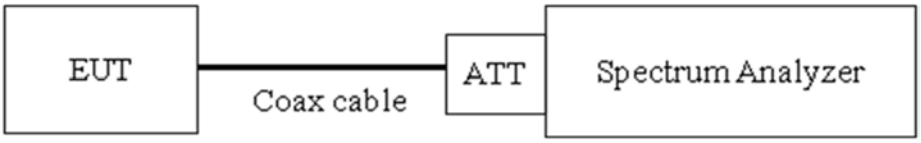
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6 dB Bandwidth & 99 % 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.

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW ≒ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

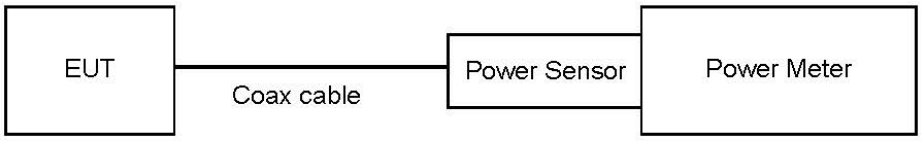
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

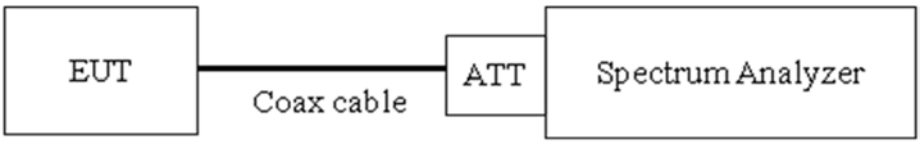
- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz 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 11.10.2 in ANSI 63.10-2013.

The spectrum analyzer is set to :

1) Set analyzer center frequency to DTS channel center frequency.
2) Span = 1.5 times the DTS channel bandwidth.
3) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x RBW.
5) Sweep = auto couple
6) Detector = peak
7) Trace Mode = max hold
8) Allow trace to fully stabilize.
9) 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.

Sample Calculation

- Power Spectral Density = Reading Value + ATT loss + Cable loss

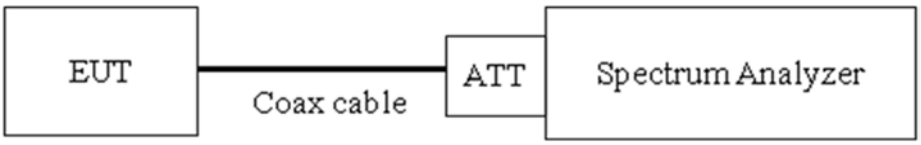
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (Peak) 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 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 20 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	10.10
100	10.15
200	10.20
300	10.22
400	10.25
500	10.26
600	10.26
700	10.28
800	10.30
900	10.32
1000	10.34
2000	10.49
2400	**10.55**
2480	**10.55**
2500	10.55
3000	10.60
4000	10.70
5000	10.79
5150	10.87
5850	10.87
6000	10.87
7000	10.97
8000	11.03
9000	11.10
10000	11.15
11000	11.18
12000	11.23
13000	11.29
14000	11.30
15000	11.33
16000	11.39
17000	11.40
18000	11.45
19000	11.47
20000	11.51
21000	11.64
22000	11.63
23000	11.60
24000	11.65
25000	11.76
26000	11.79

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

2. Factor = Attenuator loss + Cable loss

7.6. Radiated Test

Limit

FCC

Frequency (MHz)	Field Strength (uV/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

ISED

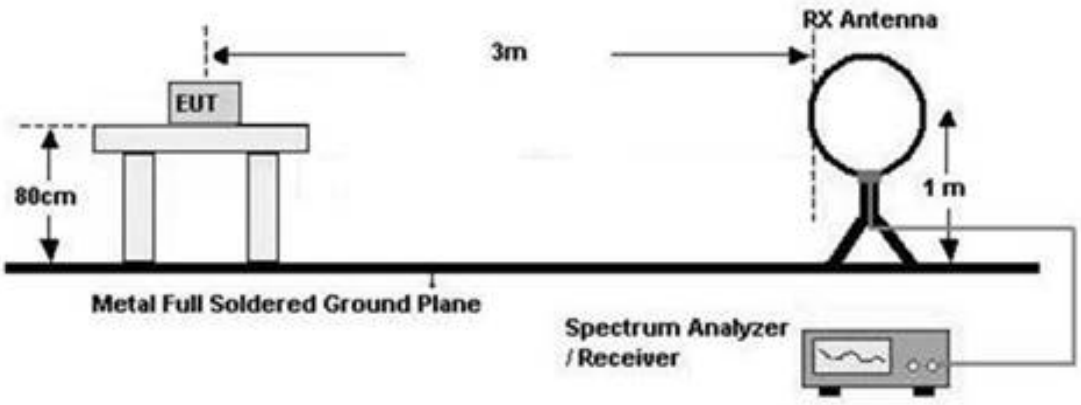
Frequency (MHz)	Field Strength (uA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

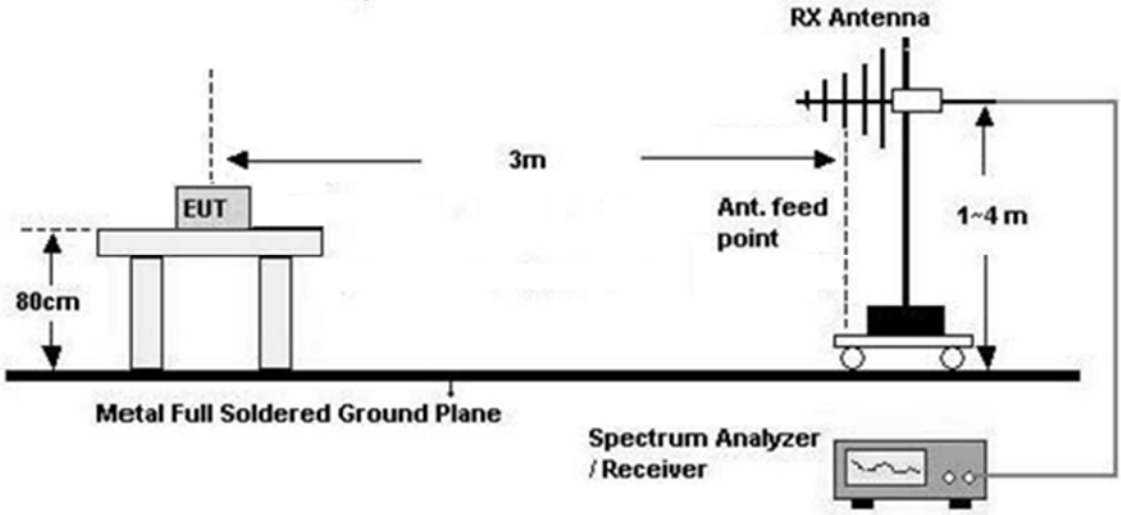
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

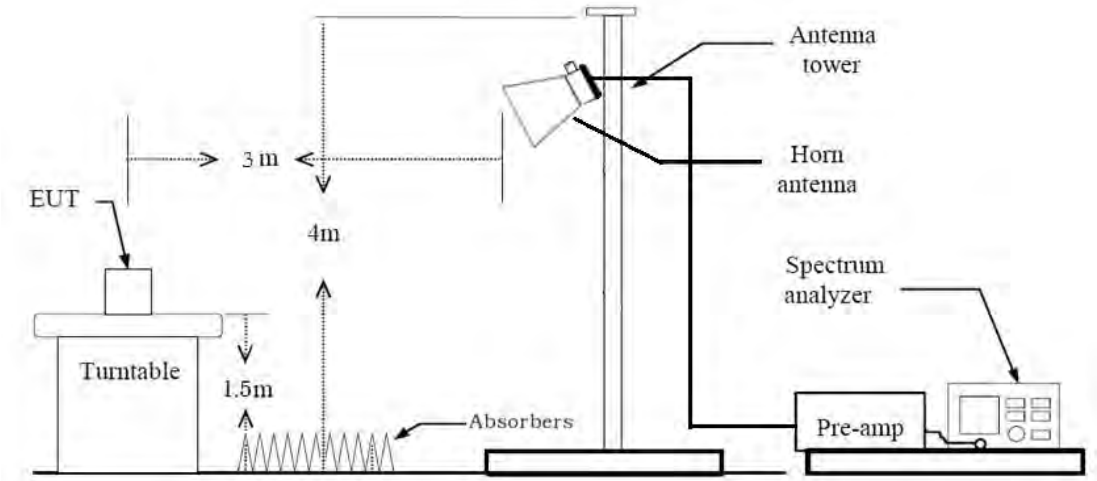
Below 30 MHz



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 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m 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 = Reading 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 1GHz)

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 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m 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 = Reading 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 1m to 4m 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 percent 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)

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

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

Total(Measurement Type : Average, Duty cycle < 98%)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(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 1m to 4m 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 percent 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)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle ≥ 98%)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle < 98%)
= Reading 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) = Reading Value + Correction Factor

7.8. Receiver Spurious Emissions

Limit

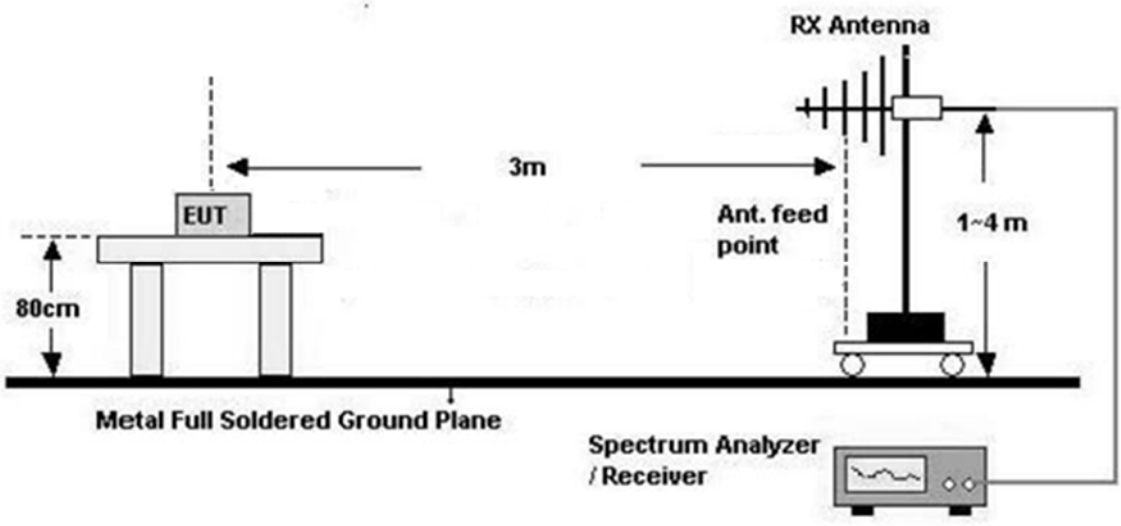
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration

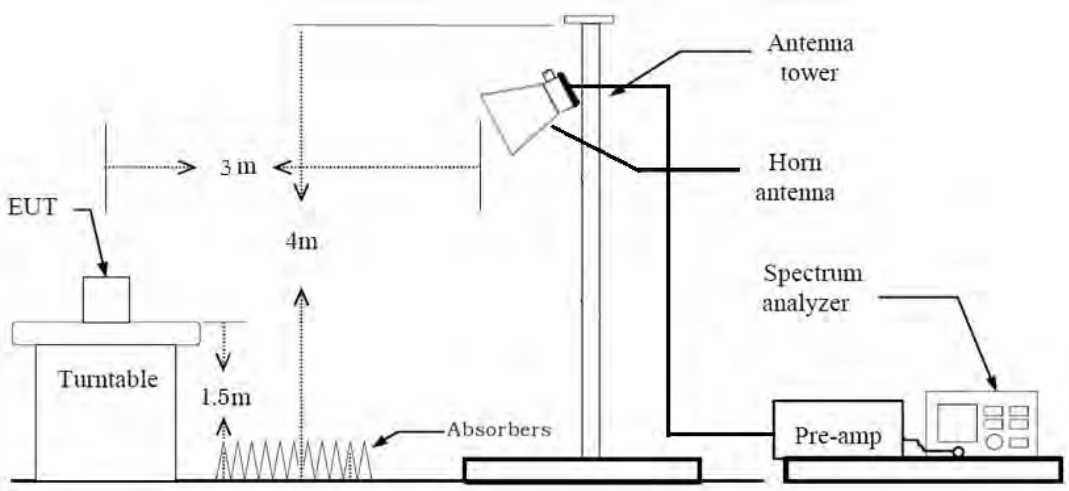
30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

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 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m 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
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

Above 1 GHz



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 1m to 4m 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 : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW

(2) Measurement Type(Average):

- We performed using a reduced video BW method was done with the analyzer in linear mode
- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 3 x RBW

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.
11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G)

7.9. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
2. All configurations of antenna were investigated and the worst case configuration results are reported.
   - Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(CDD,SDM)
   - Worstcase : Ant1+Ant2(CDD)
3. EUT Axis
   - Radiated Spurious Emissions : Z
   - Radiated Restricted Band Edge : Y
4. Test was performed with continuous Tx.
5. All data rate of operation were investigated and the worst case data rate results are reported
   - 802.11b : 1Mbps
   - 802.11g : 6Mbps
   - 802.11n : MCS0
6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.

- Position : Horizontal, Vertical, Parallel to the ground plane

7. Top connector_FFC Cable Type, Bottom Connector_FFC Cable Type were tested and the worst case results are reported.

(Worst case : Bottom Connector_FFC Cable Type)

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 (Notebook)

Conducted test

1. The EUT was configured with data rate of highest power.
2. SISO & MIMO were tested and the all case results are reported.
   - Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(MIMO)
3. All data rate of operation were investigated and the worst case data rate results are reported.
   - 802.11b : 11Mbps
   - 802.11g : 24Mbps
   - 802.11n HT20 : MCS3
   - 802.11n HT40 : MCS0

8. SUMMARY TEST OF RESULTS

FCC Part

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 > 20 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

ISED Part

Test Description	ISED Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	RSS-247, 5.2	> 500 kHz	Conducted	PASS
99% Bandwidth	RSS-GEN, 6.7	N/A		PASS
Conducted Maximum Peak Output Power And e.i.r.p.	RSS-247, 5.4.	< 1 Watt <4 Watt(e.i.r.p.)		PASS
Power Spectral Density	RSS-247, 5.2	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	RSS-247, 5.5	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	RSS-GEN, 8.8	cf. Section 7.7		PASS
Radiated Spurious Emissions	RSS-GEN, 8.9	cf. Section 7.6	Radiated	PASS
Receiver Spurious Emissions	RSS-GEN, 7	cf. Section 7.8		PASS
Radiated Restricted Band Edge	RSS-GEN, 8.10	cf. Section 7.6		PASS

9. TEST RESULT

9.1 DUTY CYCLE

Mode	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	-	-	-	-
802.11g	-	-	-	-
802.11n (HT20)	-	-	-	-
802.11n (HT40)	-	-	-	-

Note:

1. Duty Cycle Factor = 10Xlog(1/Duty Cycle). where, Duty Cycle = T_{on} / T_{total}
2. Test was performed with continuous Tx.

9.2 6 dB BANDWIDTH & 99 % BANDWIDTH

FCC

[ANT 1]

802.11b Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.607	> 0.5
2437	6	8.307	> 0.5
2462	11	8.689	> 0.5
2467	12	8.227	> 0.5
2472	13	8.262	> 0.5

802.11g Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.39	> 0.5
2437	6	16.40	> 0.5
2462	11	16.39	> 0.5
2467	12	16.46	> 0.5
2472	13	16.41	> 0.5

802.11n(HT20) Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.59	> 0.5
2437	6	17.69	> 0.5
2462	11	17.67	> 0.5
2467	12	17.58	> 0.5
2472	13	17.60	> 0.5

802.11n(HT40) Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.38	> 0.5
2437	6	36.41	> 0.5
2452	9	36.33	> 0.5

[ANT 2]

802.11b Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.581	> 0.5
2437	6	8.431	> 0.5
2462	11	7.990	> 0.5
2467	12	8.686	> 0.5
2472	13	8.352	> 0.5

802.11g Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.38	> 0.5
2437	6	16.43	> 0.5
2462	11	16.37	> 0.5
2467	12	16.42	> 0.5
2472	13	16.32	> 0.5

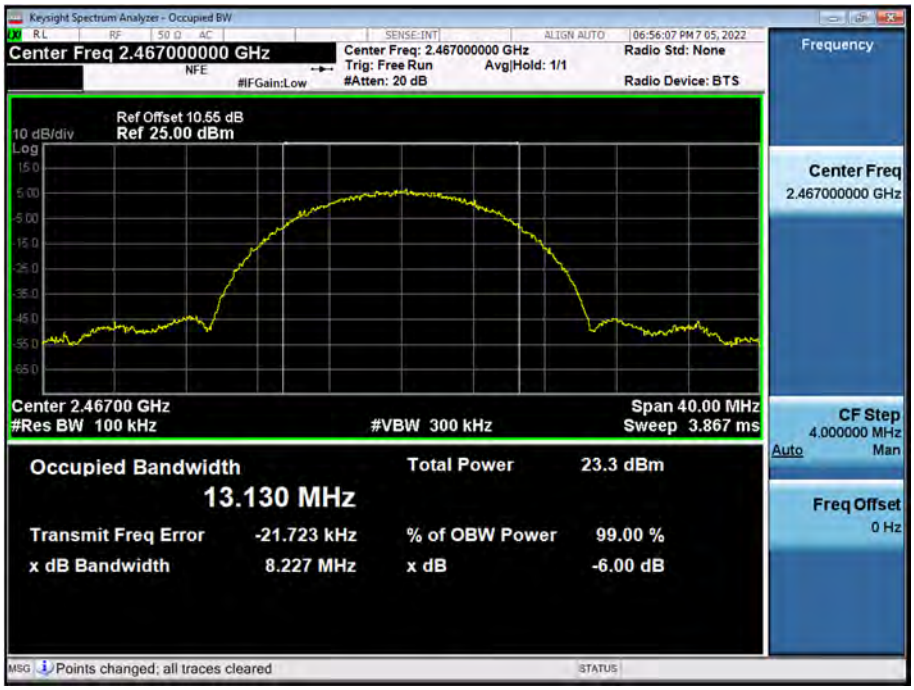
802.11n(HT20) Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.60	> 0.5
2437	6	17.63	> 0.5
2462	11	17.65	> 0.5
2467	12	17.68	> 0.5
2472	13	17.63	> 0.5

802.11n(HT40) Mode		6 dB Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.39	> 0.5
2437	6	36.44	> 0.5
2452	9	36.41	> 0.5

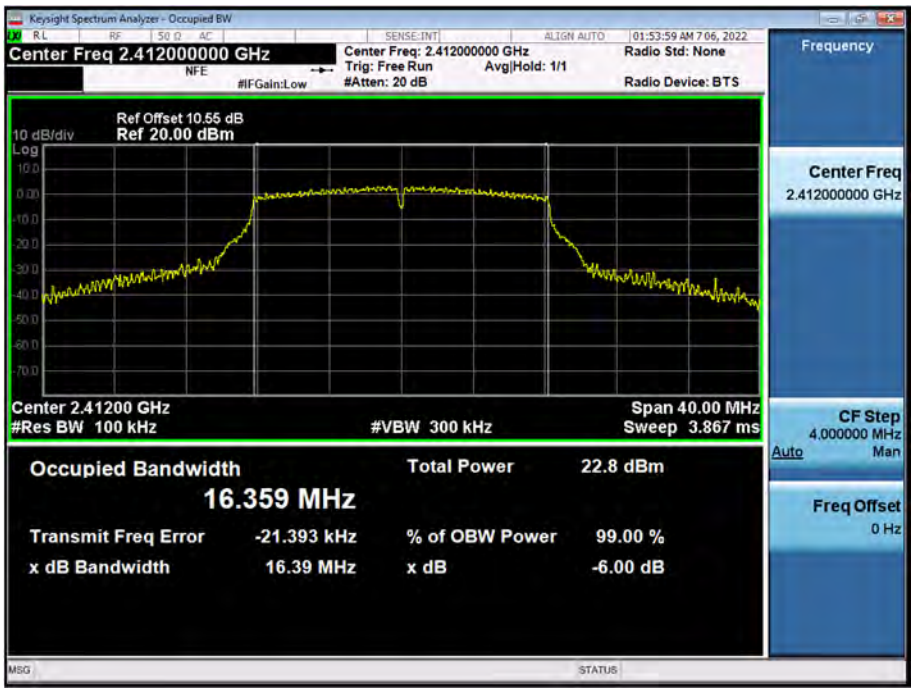
[ANT 1]

▣ Test Plots

6 dB Bandwidth plot (802.11b-CH 12)



6 dB Bandwidth plot (802.11g-CH 1)



6 dB Bandwidth plot (802.11n_HT20-CH 12)

6 dB Bandwidth plot (802.11n_HT40-CH 9)

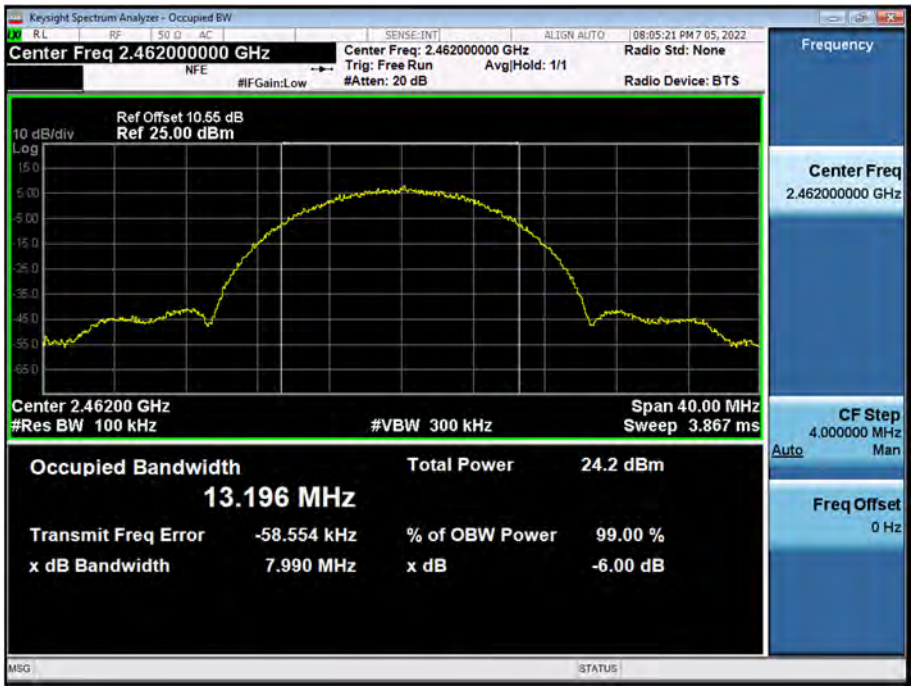
Note:

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

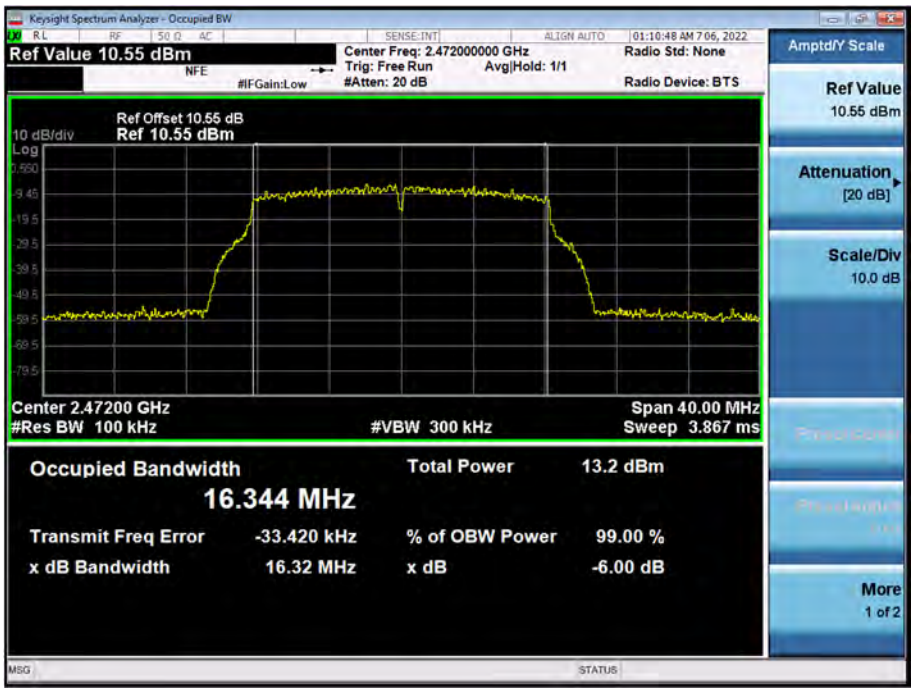
[ANT 2]

▣ Test Plots

6 dB Bandwidth plot (802.11b-CH 11)

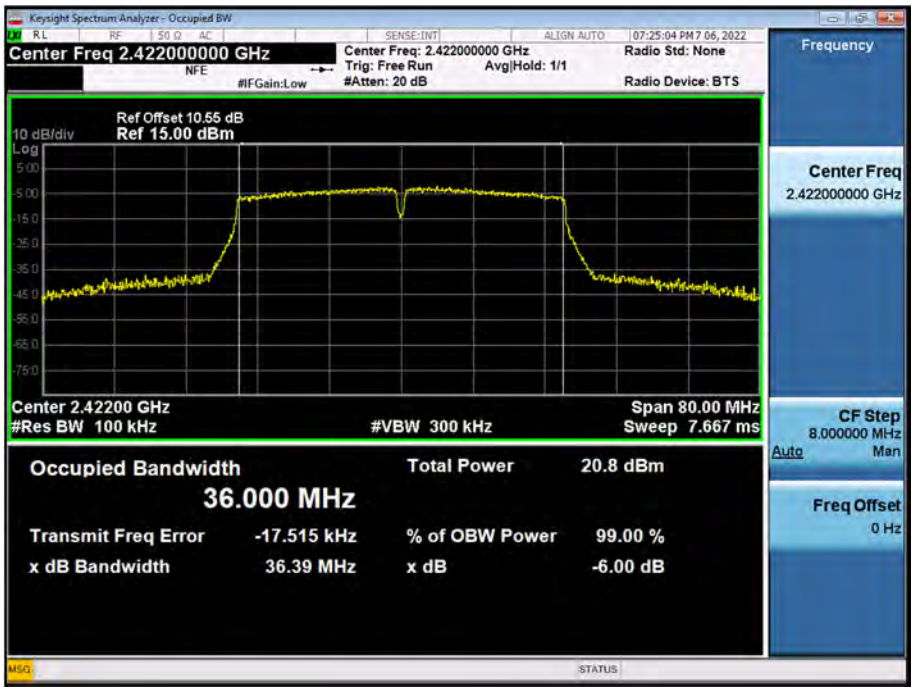


6 dB Bandwidth plot (802.11g-CH 13)



6 dB Bandwidth plot (802.11n_HT20-CH 1)

6 dB Bandwidth plot (802.11n_HT40-CH 3)



Note:

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

99% Bandwidth Measurements(ISED)

[ANT 1]

802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	13.300	N/A
2437	6	13.234	N/A
2462	11	13.226	N/A
2467	12	13.254	N/A
2472	13	13.247	N/A

802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.646	N/A
2437	6	16.647	N/A
2462	11	16.660	N/A
2467	12	16.662	N/A
2472	13	16.656	N/A

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.679	N/A
2437	6	17.758	N/A
2462	11	17.751	N/A
2467	12	17.643	N/A
2472	13	17.718	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.038	N/A
2437	6	36.040	N/A
2452	9	35.990	N/A

[ANT 2]

802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	13.362	N/A
2437	6	13.264	N/A
2462	11	13.263	N/A
2467	12	13.249	N/A
2472	13	13.274	N/A

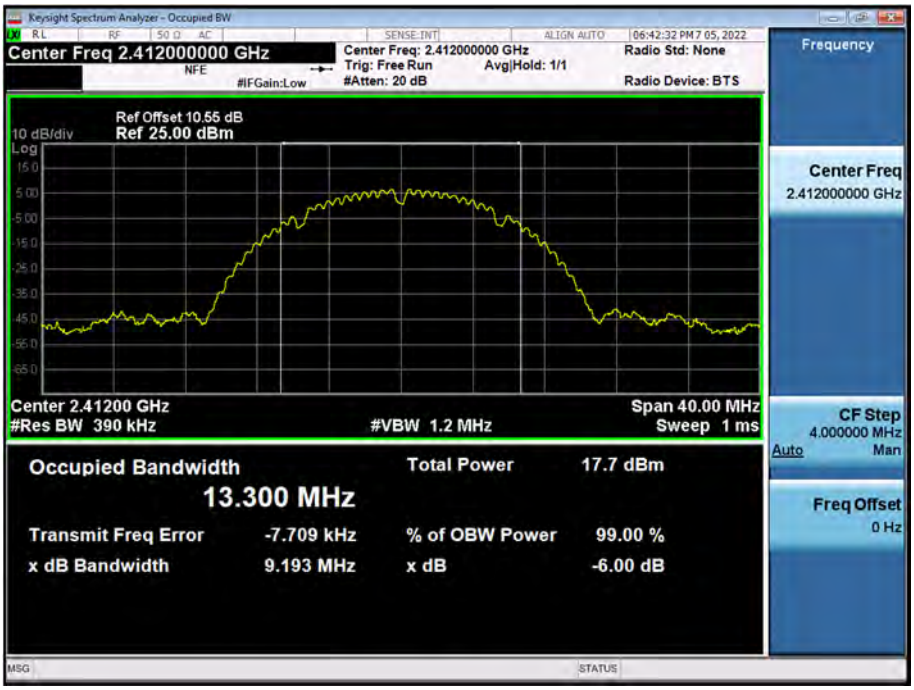
802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.897	N/A
2437	6	16.699	N/A
2462	11	16.628	N/A
2467	12	16.657	N/A
2472	13	16.643	N/A

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.914	N/A
2437	6	17.811	N/A
2462	11	17.760	N/A
2467	12	17.734	N/A
2472	13	17.737	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.172	N/A
2437	6	36.099	N/A
2452	9	36.066	N/A

▣ Test Plots_[ANT 1]

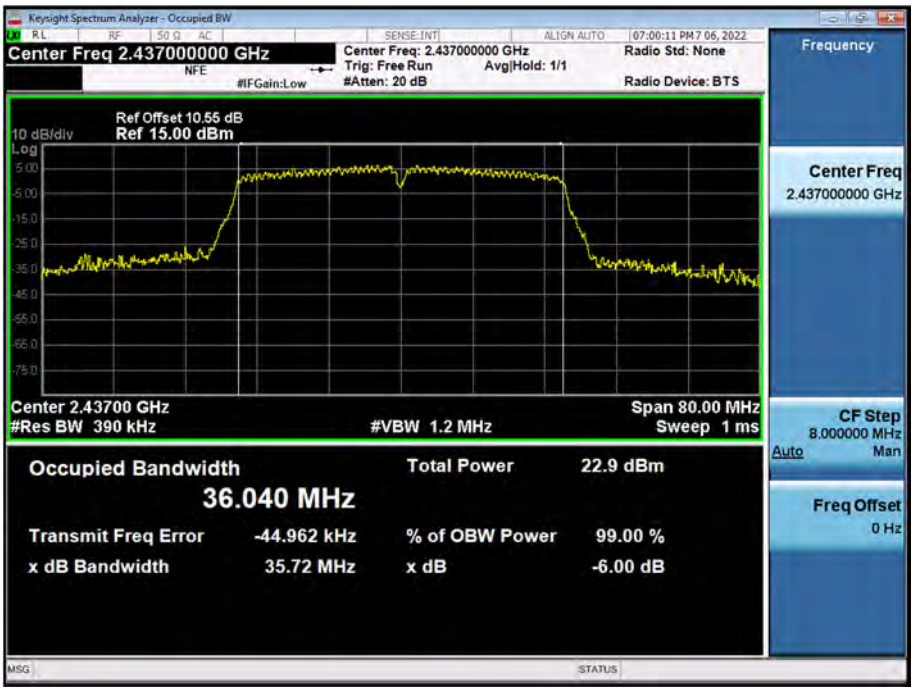
99% Bandwidth plot (802.11b-CH 1)



99% Bandwidth plot (802.11g-CH 12)

99% Bandwidth plot (802.11n_HT20-CH 6)

99% Bandwidth plot (802.11n_HT40-CH 6)

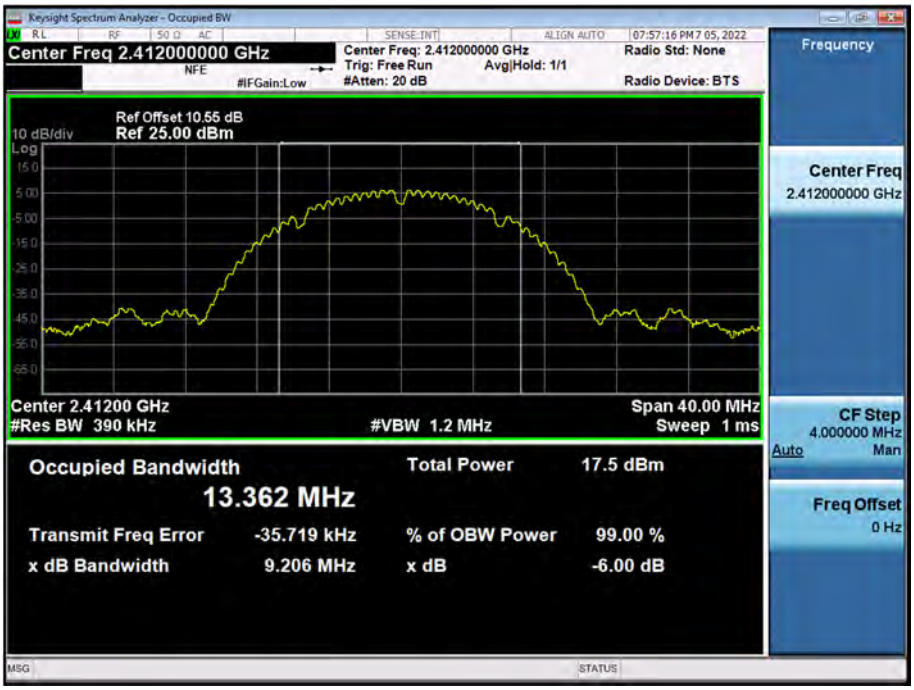


Note:

In order to simplify the report, attached plots were only the most wide 99% Bandwidth channel.

▣ Test Plots_[ANT 2]

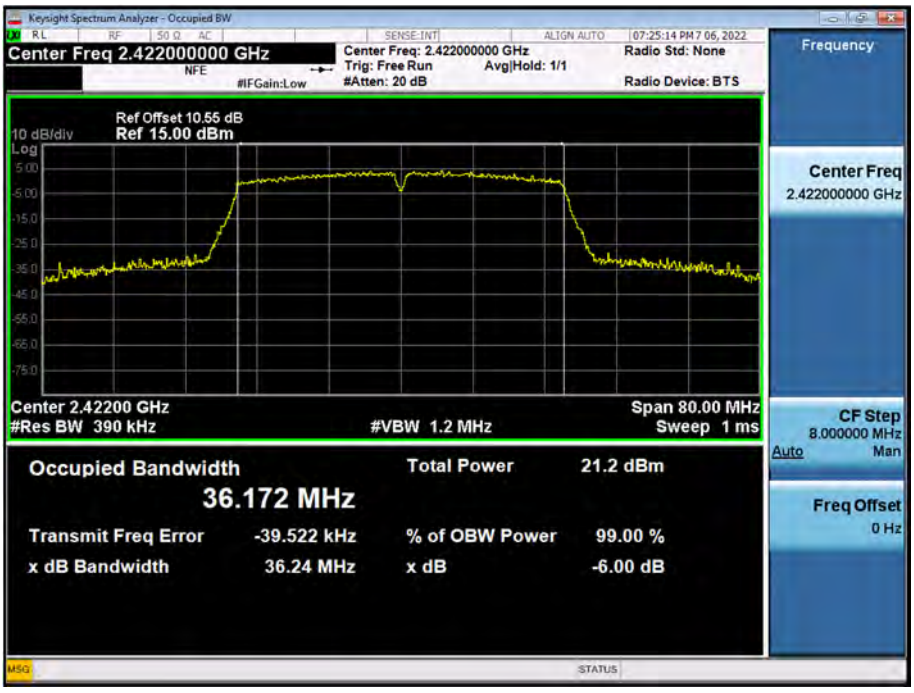
99% Bandwidth plot (802.11b-CH 1)



99% Bandwidth plot (802.11g-CH 1)

99% Bandwidth plot (802.11n_HT20-CH 1)

99% Bandwidth plot (802.11n_HT40-CH 3)



Note:

In order to simplify the report, attached plots were only the most wide 99% Bandwidth channel.

9.3 OUTPUT POWER

Note:

Power Meter offset = Attenuator loss+ Cable loss.
We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
So, 10.82 dB is offset for 2.4 GHz Band

Peak Power

Mode	Worst case Datarate	Channel No.	SISO Output Power (dBm)		MIMO (CDD) Output Power (dBm)	Limit (dBm)
			Ant1	Ant2	Ant1 + Ant2	
802.11b	11 Mbps	1	20.67	20.63	23.66	30
		6	20.55	20.83	23.71	
		11	21.30	21.06	24.19	
		12	20.13	20.07	23.11	
		13	19.13	19.16	22.16	
802.11g	24 Mbps	1	24.16	23.83	27.01	
		6	24.22	24.09	27.16	
		11	22.12	22.04	25.09	
		12	21.15	20.99	24.08	
		13	16.00	15.95	18.99	
802.11n (HT20)	MCS3	1	24.55	24.11	27.34	
		6	23.93	23.94	26.95	
		11	21.87	21.69	24.79	
		12	20.24	19.92	23.09	
		13	13.06	13.02	16.05	
802.11n (HT40)	MCS0	3	21.97	22.56	25.29	
		6	22.48	23.18	25.85	
		9	20.21	20.83	23.54	

Average Power

Mode	Worst case Datarate	Channel No.	SISO Output Power (dBm)		MIMO (CDD) Output Power (dBm)	Limit (dBm)
			Ant1	Ant2	Ant1 + Ant2	
802.11b	11 Mbps	1	14.58	14.51	17.56	30
		6	15.31	15.29	18.31	
		11	15.48	15.26	18.38	
		12	14.79	14.20	17.52	
		13	13.53	13.13	16.34	
802.11g	24 Mbps	1	16.37	16.43	19.41	
		6	16.76	16.90	19.84	
		11	14.72	14.59	17.67	
		12	13.19	13.08	16.15	
		13	7.71	7.31	10.52	
802.11n (HT20)	MCS3	1	16.63	16.23	19.44	
		6	16.59	16.23	19.42	
		11	14.12	13.65	16.90	
		12	14.14	13.80	16.98	
		13	4.21	4.03	7.13	
802.11n (HT40)	MCS0	3	15.03	14.56	17.81	
		6	15.64	15.37	18.52	
		9	13.23	13.11	16.18	

9.4 POWER SPECTRAL DENSITY

[Ant.1]

Mode	Frequency (MHz)	Channel No.	Test Result	
			Max. PSD (dBm/3 kHz)	Limit (dBm/3 kHz)
802.11b	2412	1	-7.852	8
	2437	6	-8.018	
	2462	11	-6.616	
	2467	12	-8.843	
	2472	13	-9.934	
802.11g	2412	1	-8.826	
	2437	6	-8.649	
	2462	11	-9.752	
	2467	12	-10.944	
	2472	13	-17.329	
802.11n(HT20)	2412	1	-8.052	
	2437	6	-8.015	
	2462	11	-10.950	
	2467	12	-12.296	
	2472	13	-19.382	
802.11n(HT40)	2422	3	-13.232	
	2437	6	-12.855	
	2452	9	-14.822	

[Ant.2]

Mode	Frequency (MHz)	Channel No.	Test Result	
			Max. PSD (dBm/3 kHz)	Limit (dBm/3 kHz)
802.11b	2412	1	-8.694	8
	2437	6	-8.315	
	2462	11	-6.819	
	2467	12	-8.197	
	2472	13	-10.350	
802.11g	2412	1	-9.330	
	2437	6	-8.663	
	2462	11	-11.267	
	2467	12	-11.892	
	2472	13	-16.943	
802.11n(HT20)	2412	1	-8.560	
	2437	6	-8.718	
	2462	11	-11.509	
	2467	12	-13.025	
	2472	13	-19.774	
802.11n(HT40)	2422	3	-13.971	
	2437	6	-13.718	
	2452	9	-15.361	

[MIMO]

Mode	Frequency (MHz)	Channel No.	Test Result			
			Ant. 1 Max. PSD	Ant. 2 Max PSD	MIMO PSD(dBm/3 kHz)	Limit (dBm/3 kHz)
802.11b	2412	1	-7.852	-8.694	-5.229	8
	2437	6	-8.018	-8.315	-5.086	
	2462	11	-6.616	-6.819	-3.665	
	2467	12	-8.843	-8.197	-5.528	
	2472	13	-9.934	-10.350	-7.212	
802.11g	2412	1	-8.826	-9.330	-6.021	
	2437	6	-8.649	-8.663	-5.528	
	2462	11	-9.752	-11.267	-7.447	
	2467	12	-10.944	-11.892	-8.539	
	2472	13	-17.329	-16.943	-13.979	
802.11n(HT20)	2412	1	-8.052	-8.560	-5.229	
	2437	6	-8.015	-8.718	-5.376	
	2462	11	-10.950	-11.509	-8.239	
	2467	12	-12.296	-13.025	-9.586	
	2472	13	-19.382	-19.774	-16.383	
802.11n(HT40)	2422	3	-13.232	-13.971	-10.458	
	2437	6	-12.855	-13.718	-10.458	
	2452	9	-14.822	-15.361	-12.218	

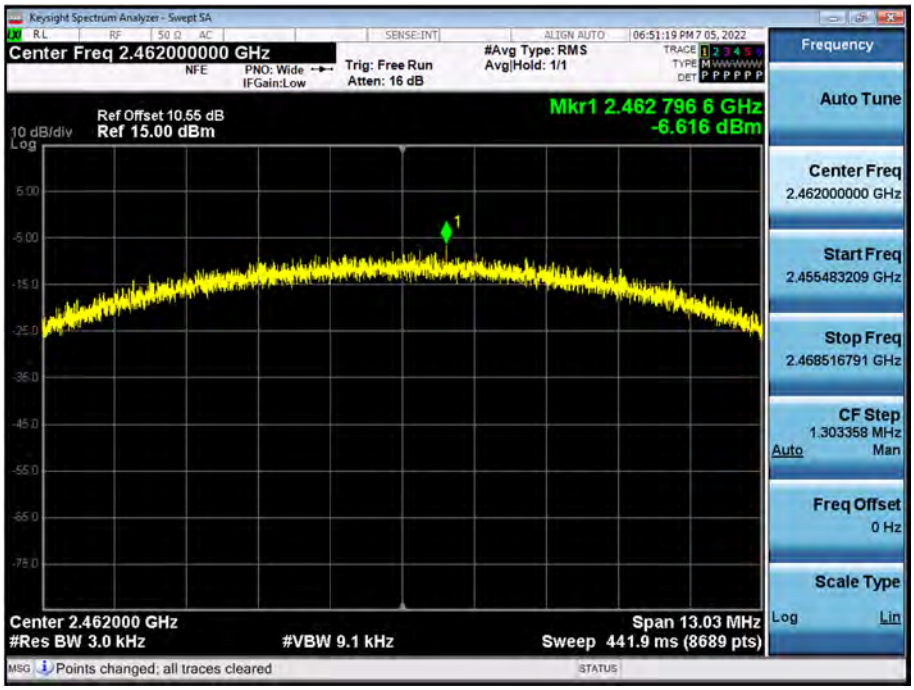
Note :

1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss(1ea)
3. 10.55 dB is offset for 2.4 GHz Band.

[Ant1]

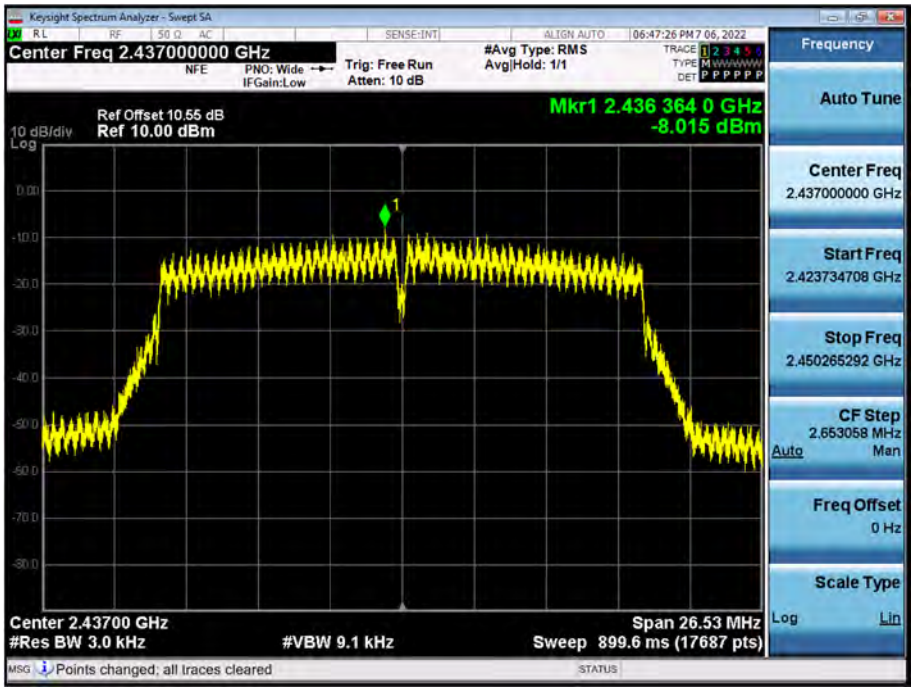
▣ Test Plots

Power Spectral Density (802.11b-CH 11)

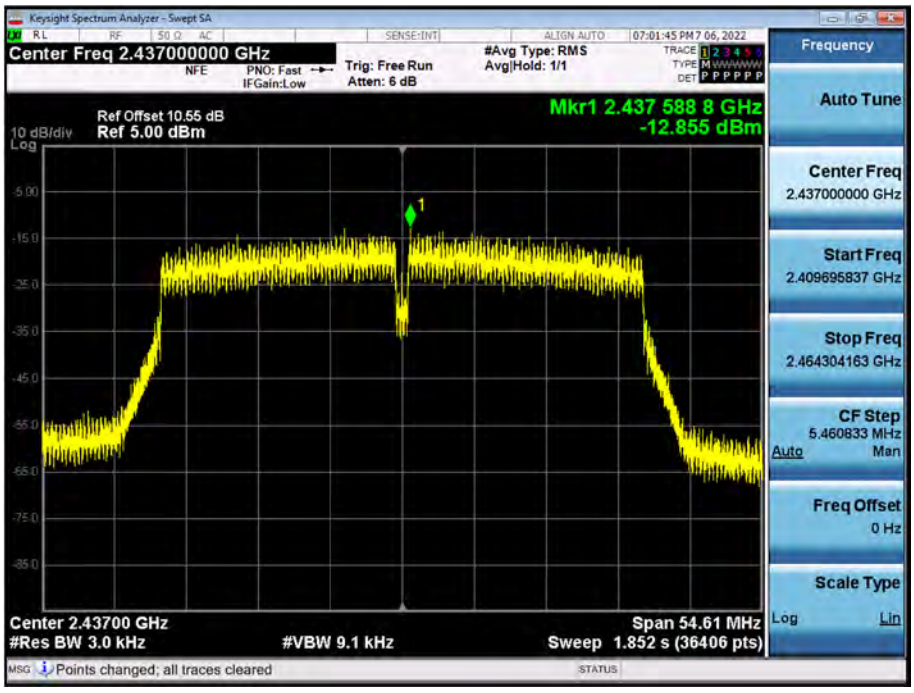


Power Spectral Density (802.11g-CH 6)

Power Spectral Density (802.11n_HT20 -CH 6)



Power Spectral Density (802.11n_HT40 -CH 6)



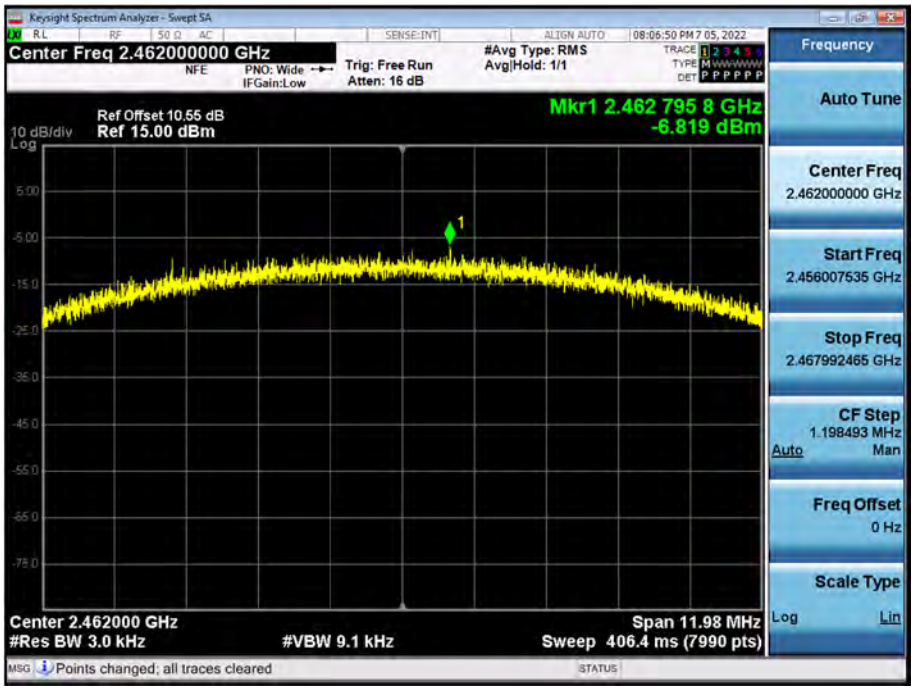
Note :

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

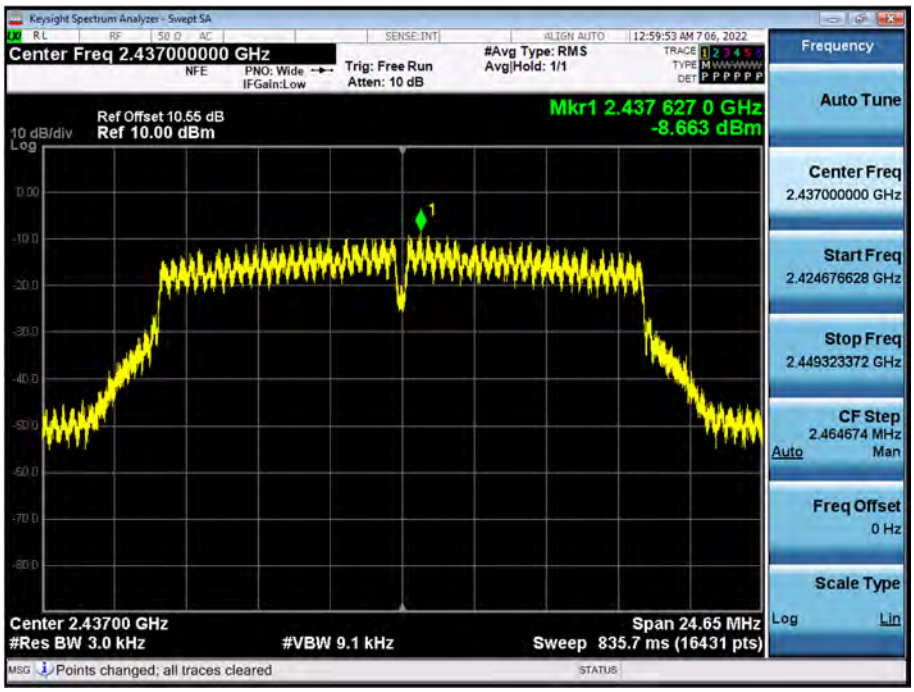
[Ant2]

▣ Test Plots

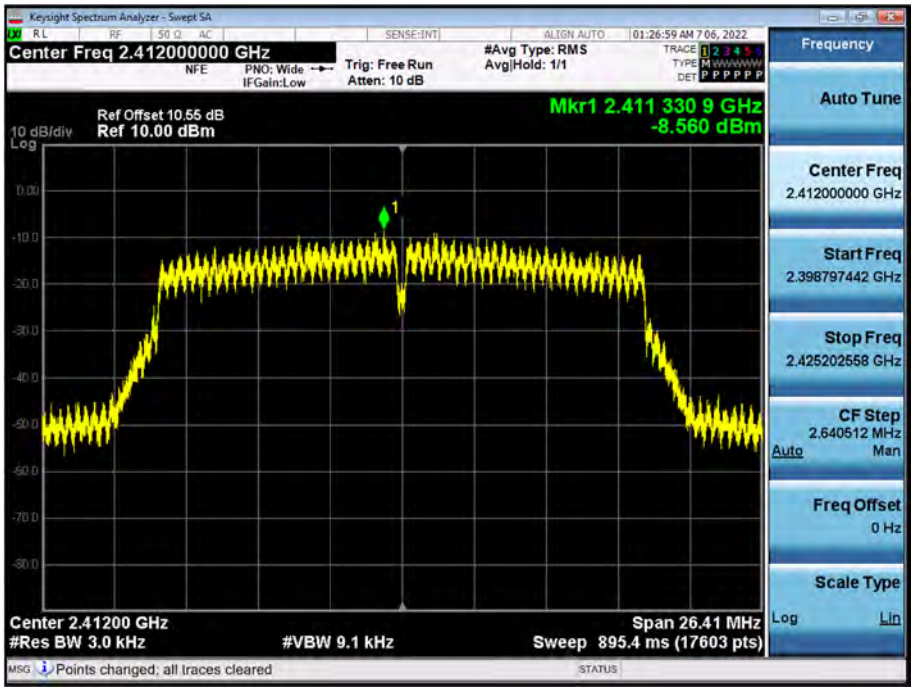
Power Spectral Density (802.11b-CH 11)



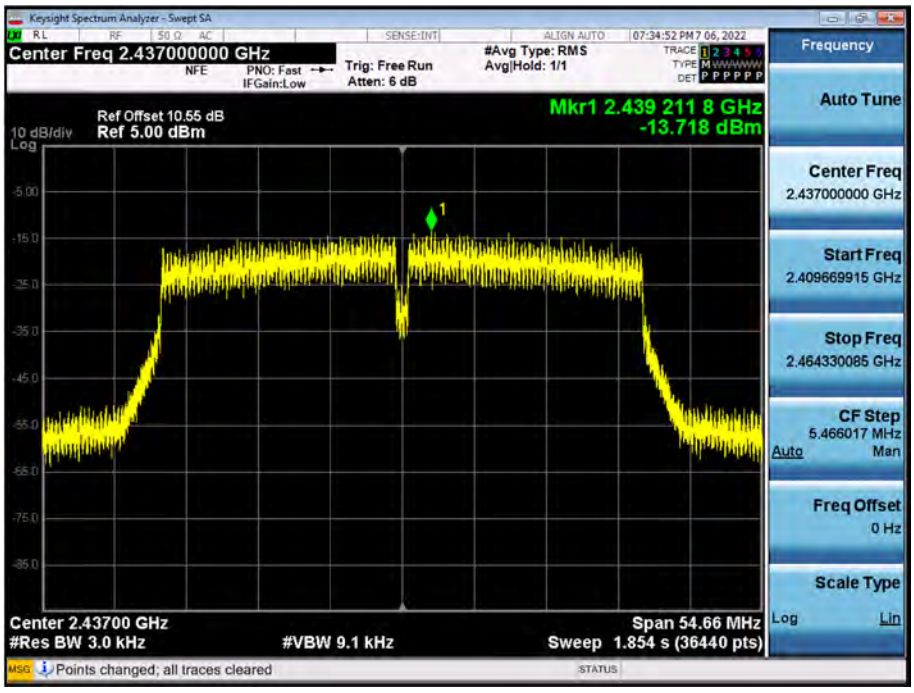
Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20 -CH 1)



Power Spectral Density (802.11n_HT40 -CH 6)



Note :

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

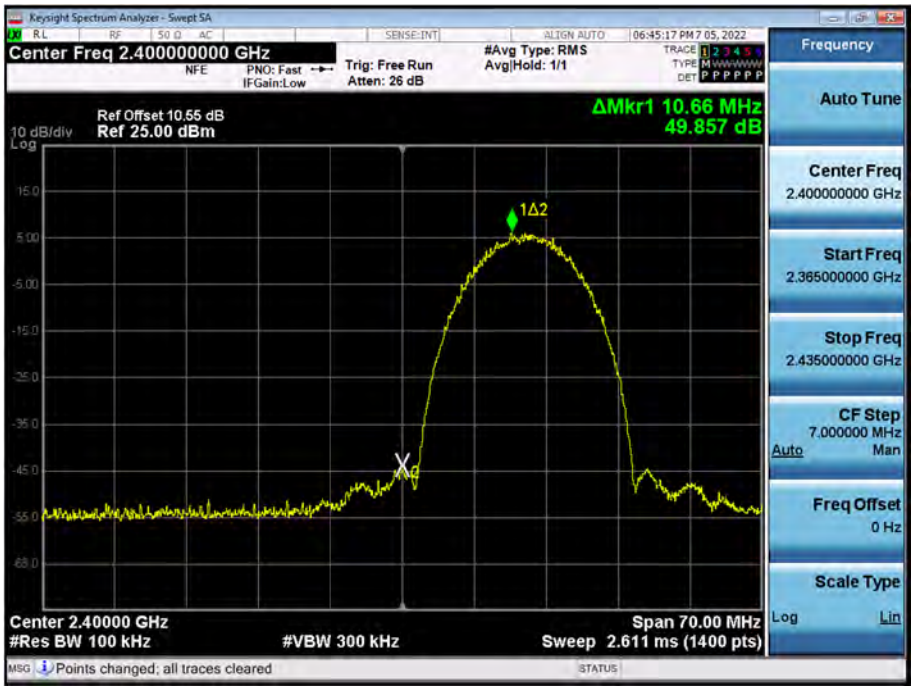
9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

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.

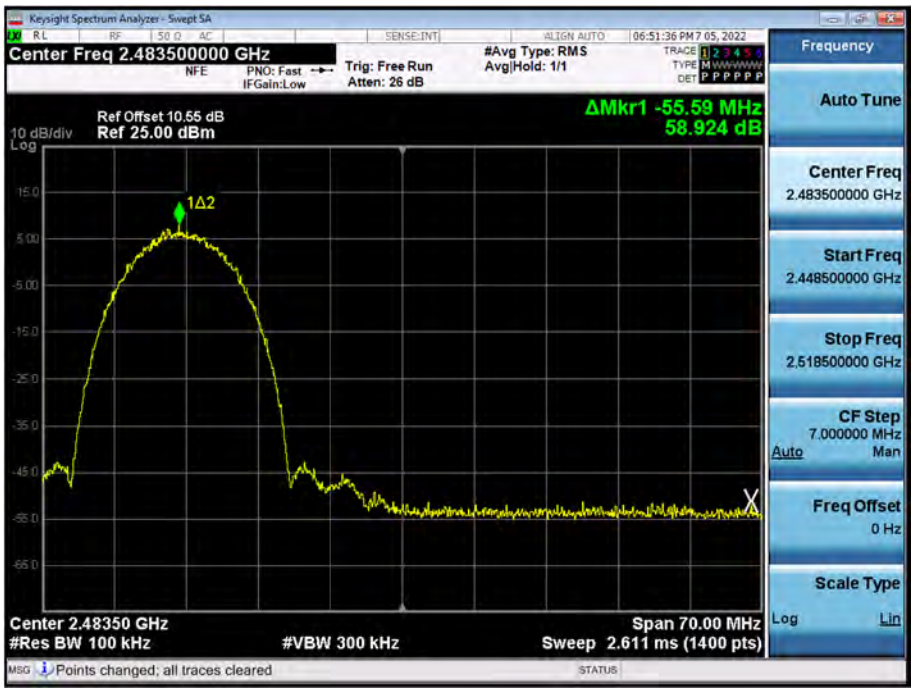
[ANT1]

▣ Test Plots(BandEdge)

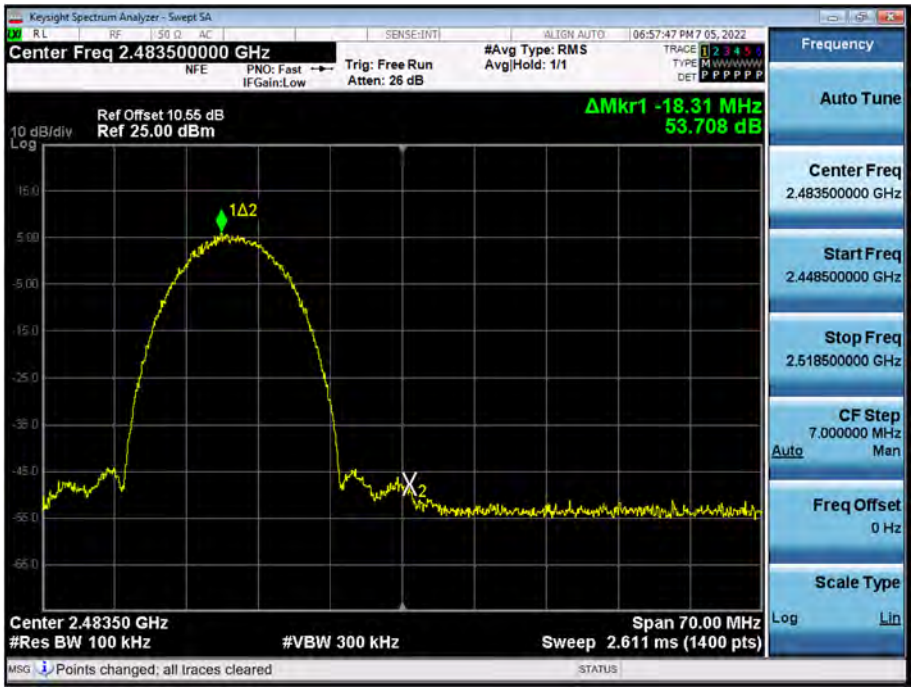
Band Edge (802.11b-CH1)



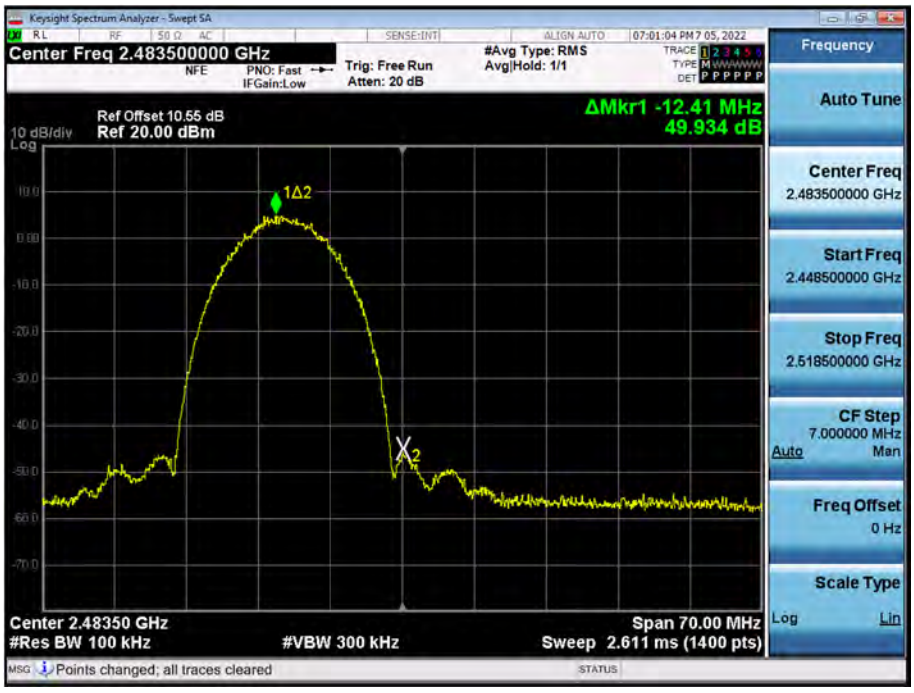
Band Edge (802.11b-CH11)



Band Edge (802.11b-CH12)



Band Edge (802.11b-CH13)

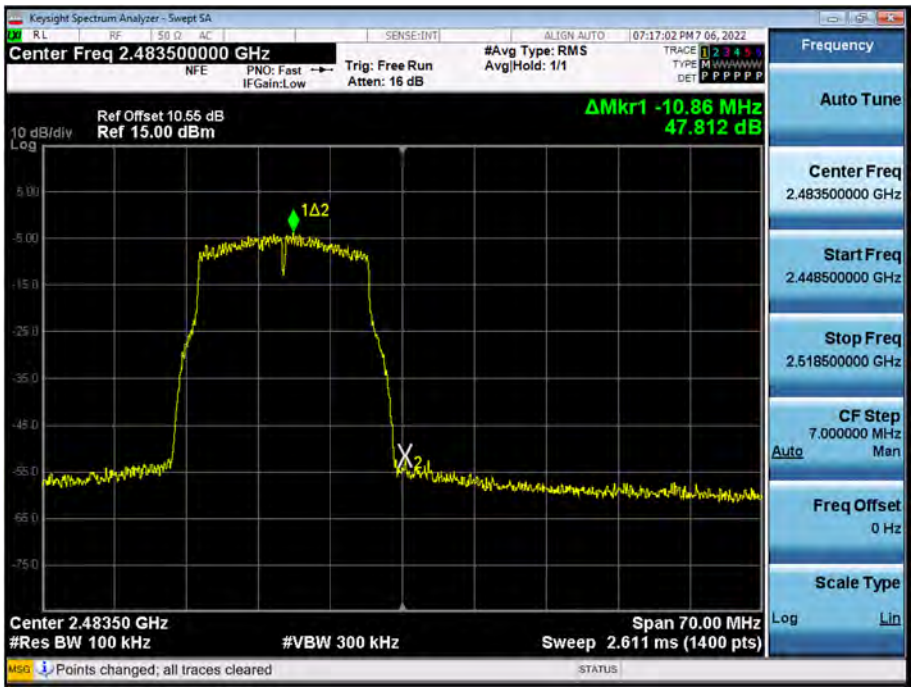


Band Edge (802.11g-CH1)

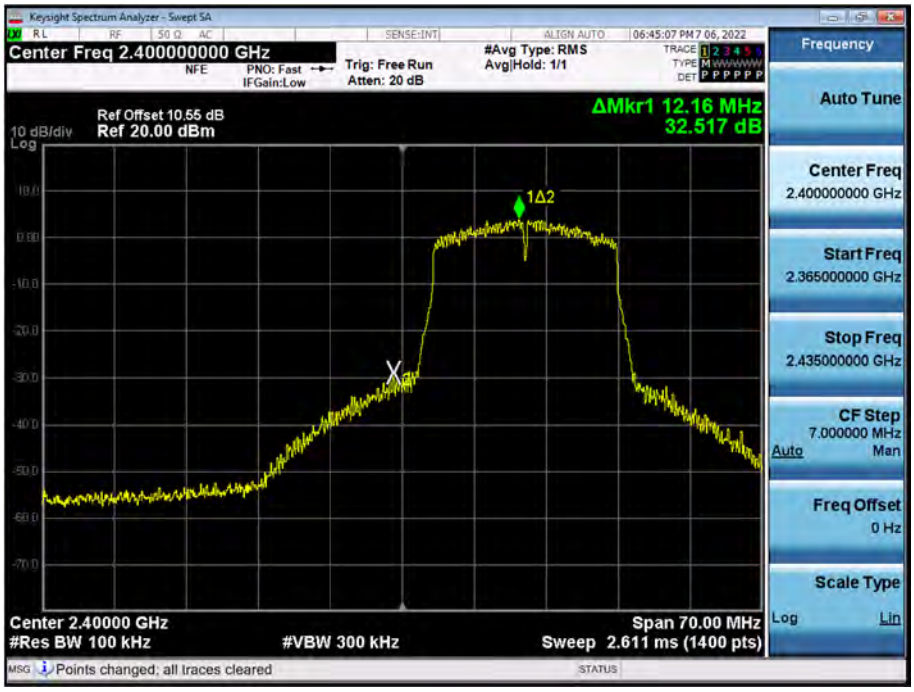
Band Edge (802.11g-CH11)

Band Edge (802.11g-CH12)

Band Edge (802.11g-CH13)



Band Edge (802.11n_HT20 -CH1)

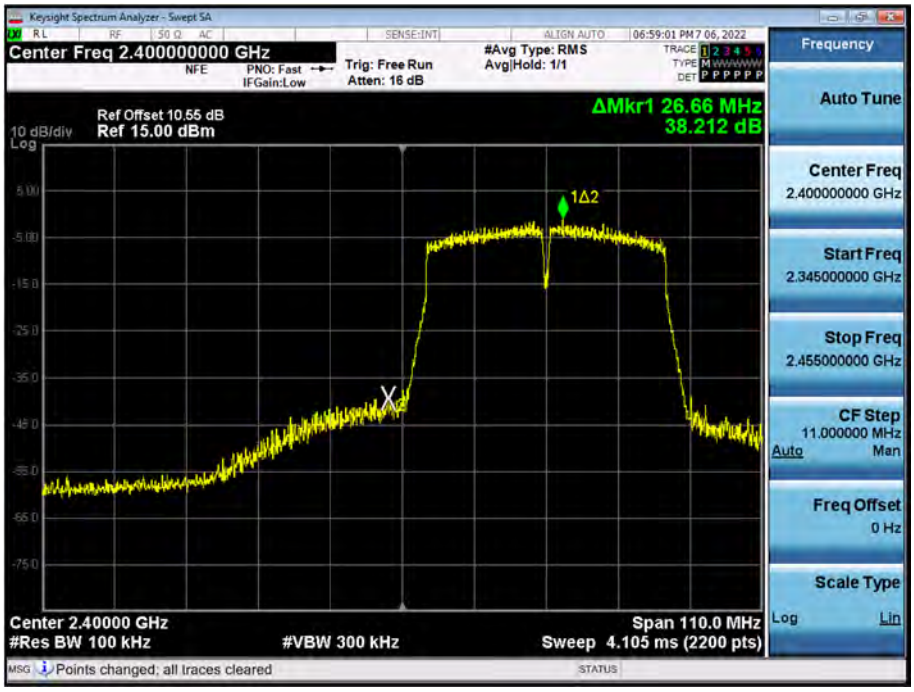


Band Edge (802.11n_HT20 -CH11)

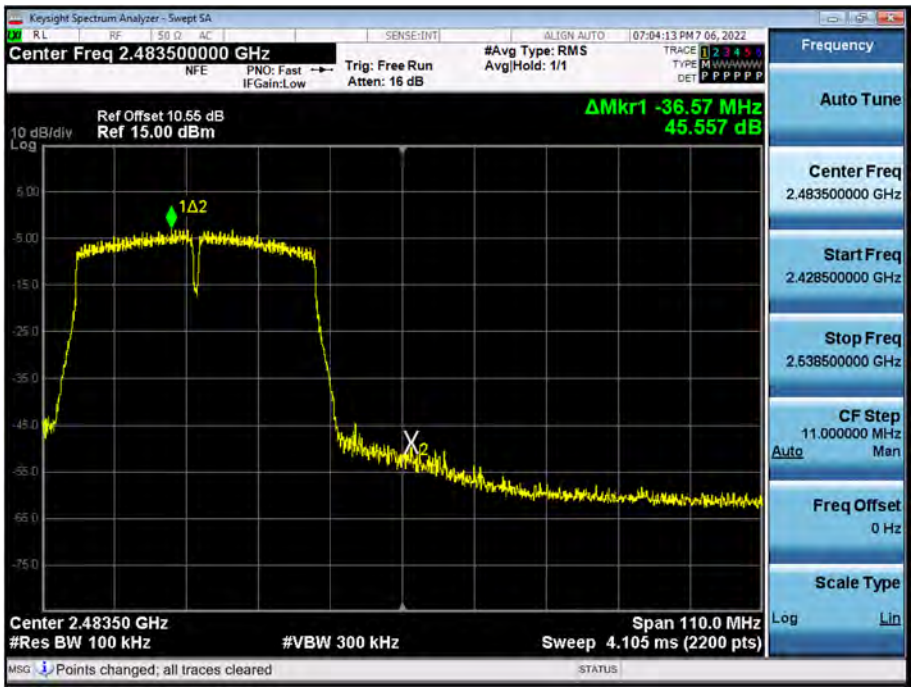
Band Edge (802.11n_HT20 -CH12)

Band Edge (802.11n_HT20 -CH13)

Band Edge (802.11n_HT40 -CH3)



Band Edge (802.11n_HT40 –CH9)

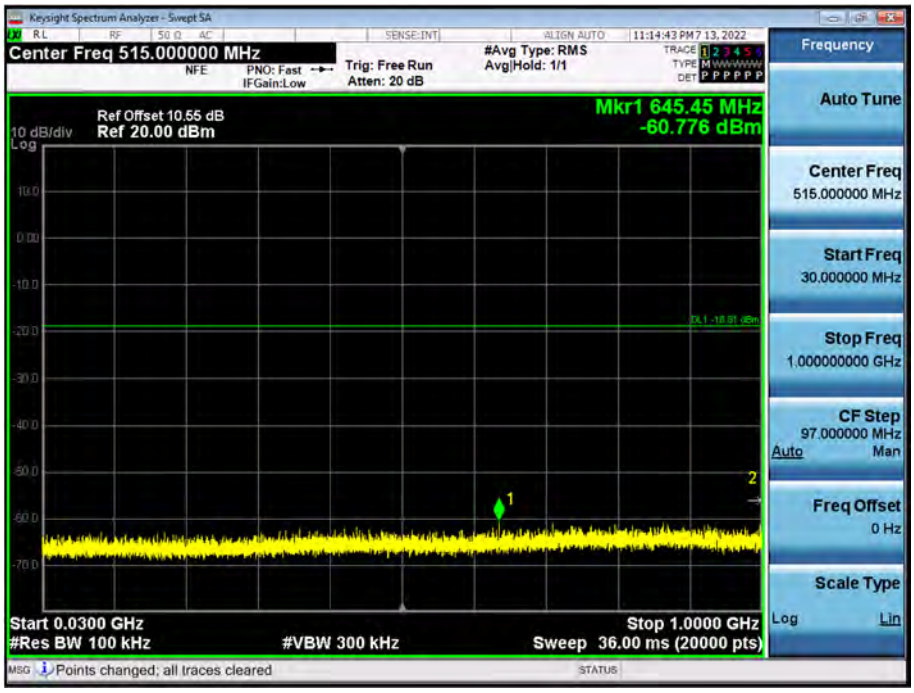


▣ Test Plots(Conducted Spurious Emission)

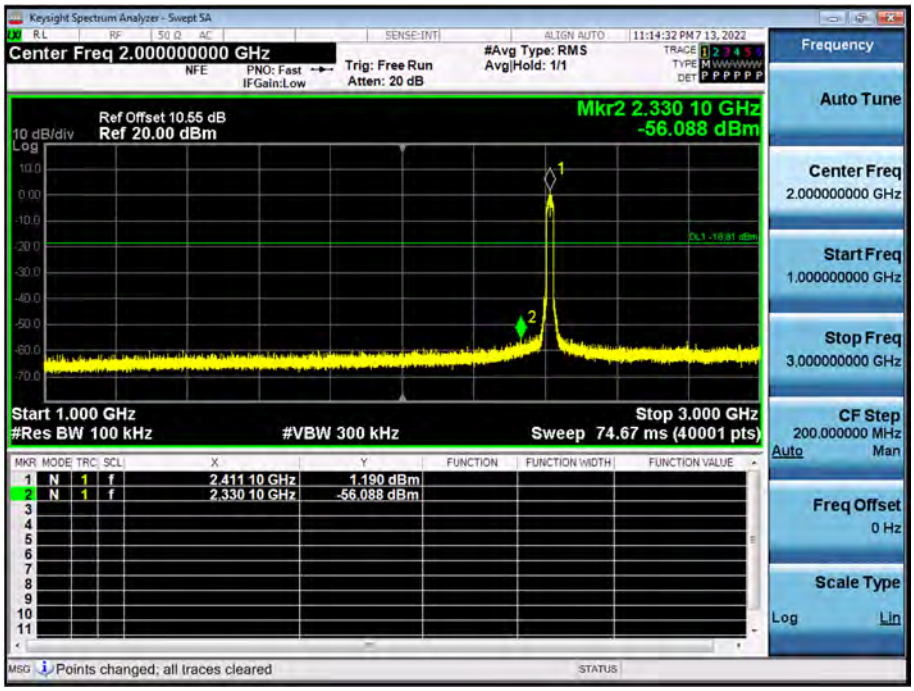
Worst case : 802.11n HT20_Ch. 1_MCS3

Limit : -18.81 dBm

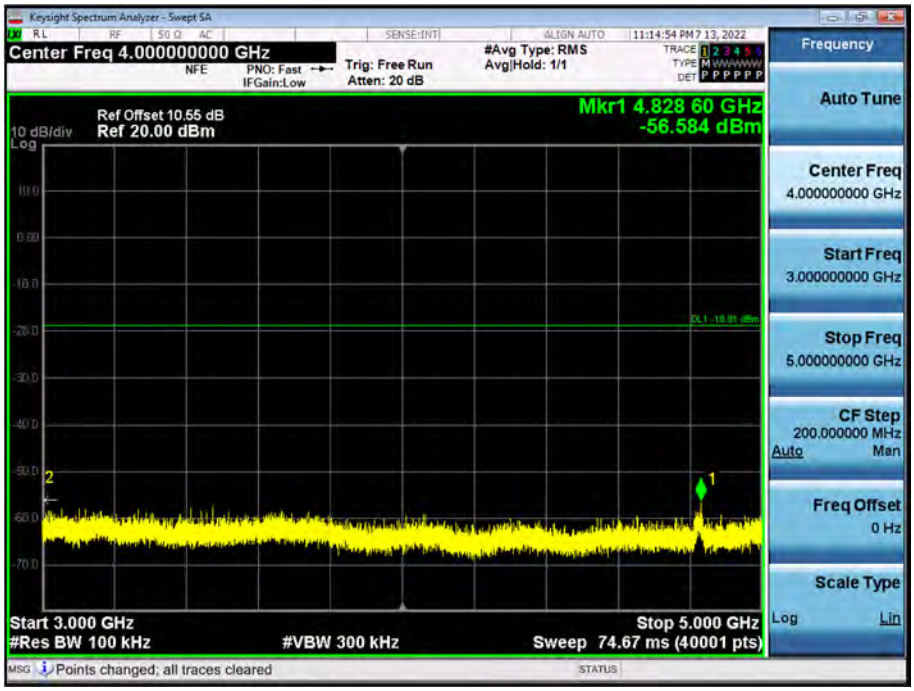
Conducted Spurious Emission (30 MHz ~ 1 GHz)



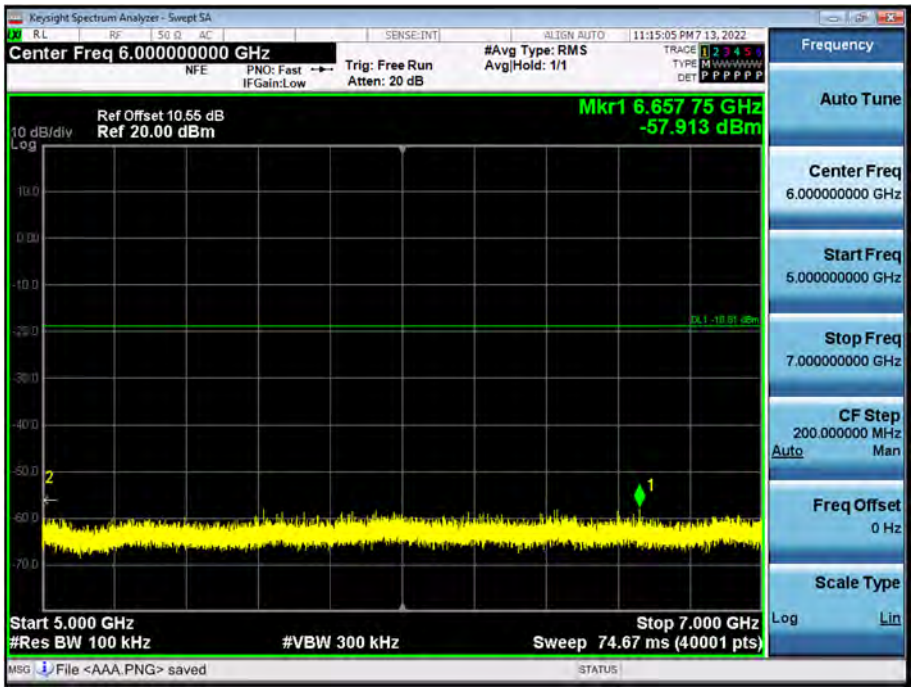
Conducted Spurious Emission (1 GHz ~ 3 GHz)



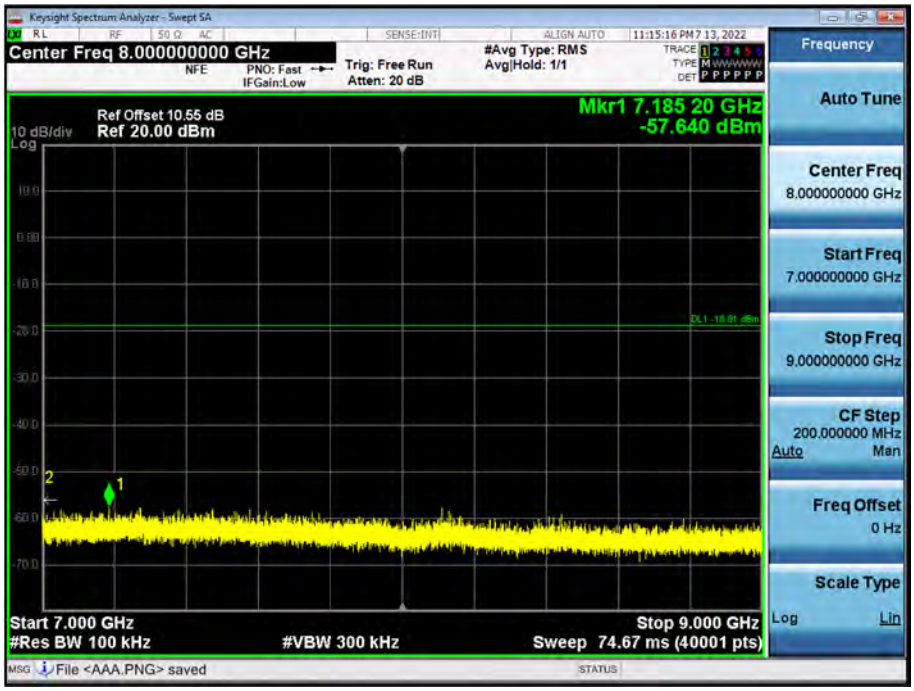
Conducted Spurious Emission (3 GHz ~ 5 GHz)



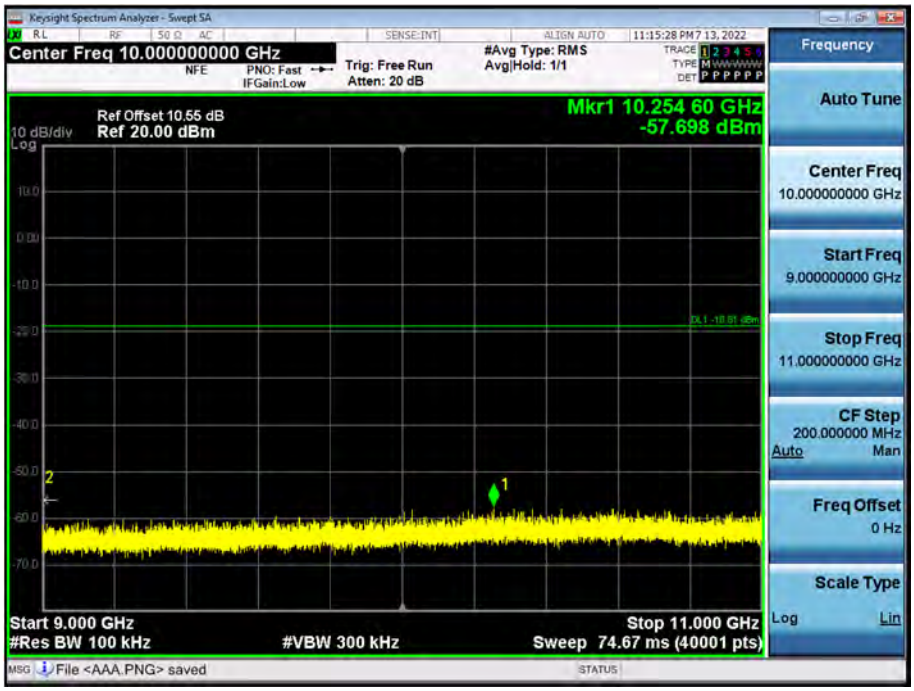
Conducted Spurious Emission (5 GHz ~ 7 GHz)



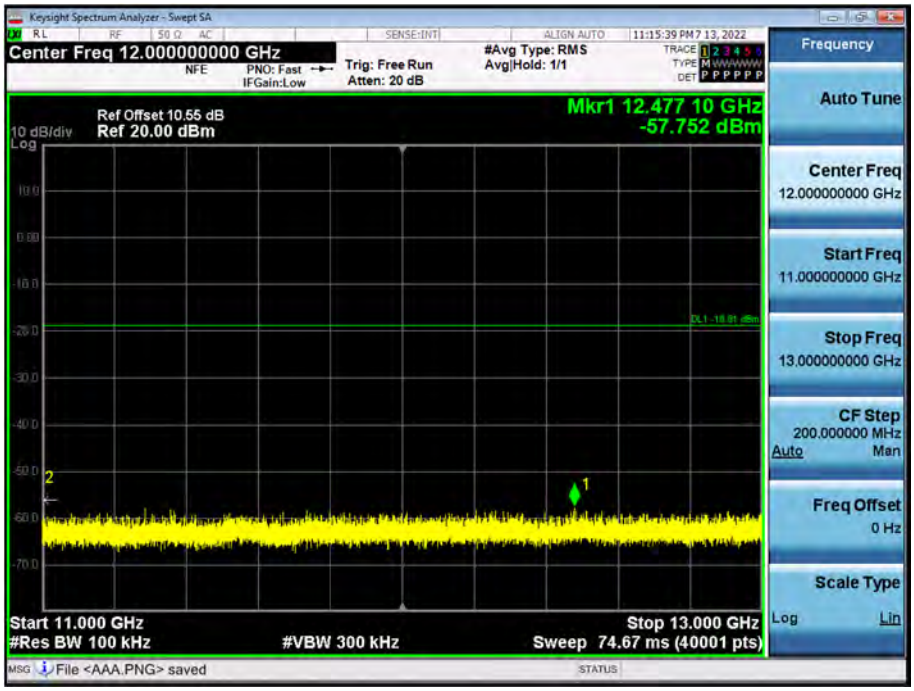
Conducted Spurious Emission (7 GHz ~ 9 GHz)



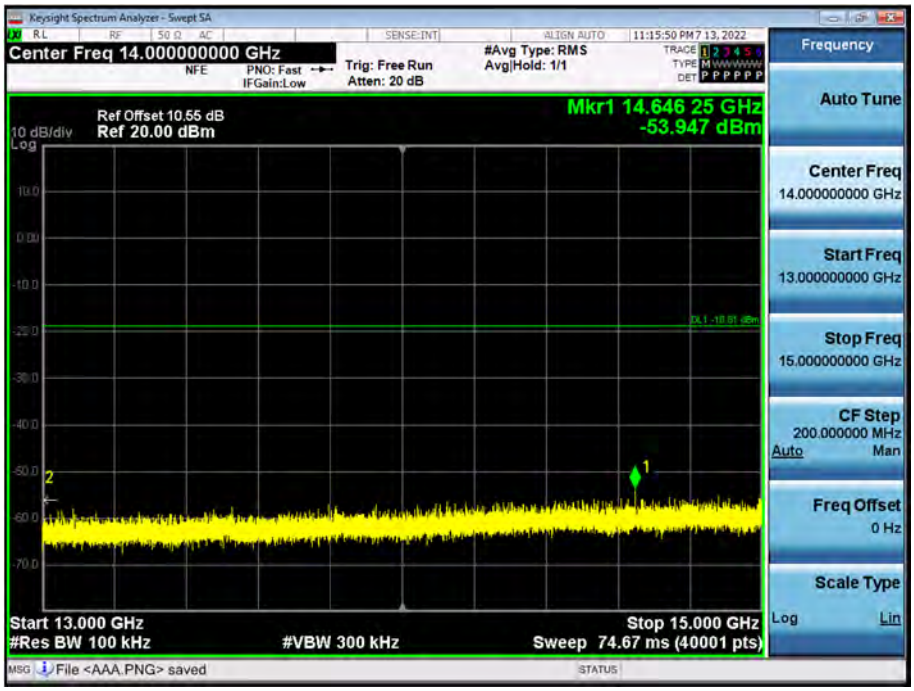
Conducted Spurious Emission (9 GHz ~ 11 GHz)



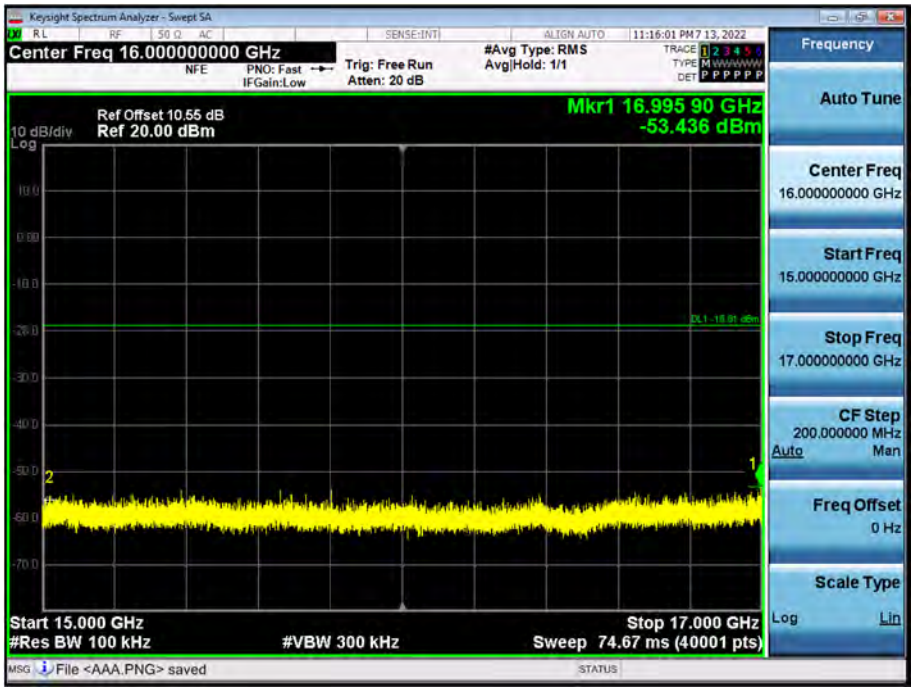
Conducted Spurious Emission (11 GHz ~ 13 GHz)



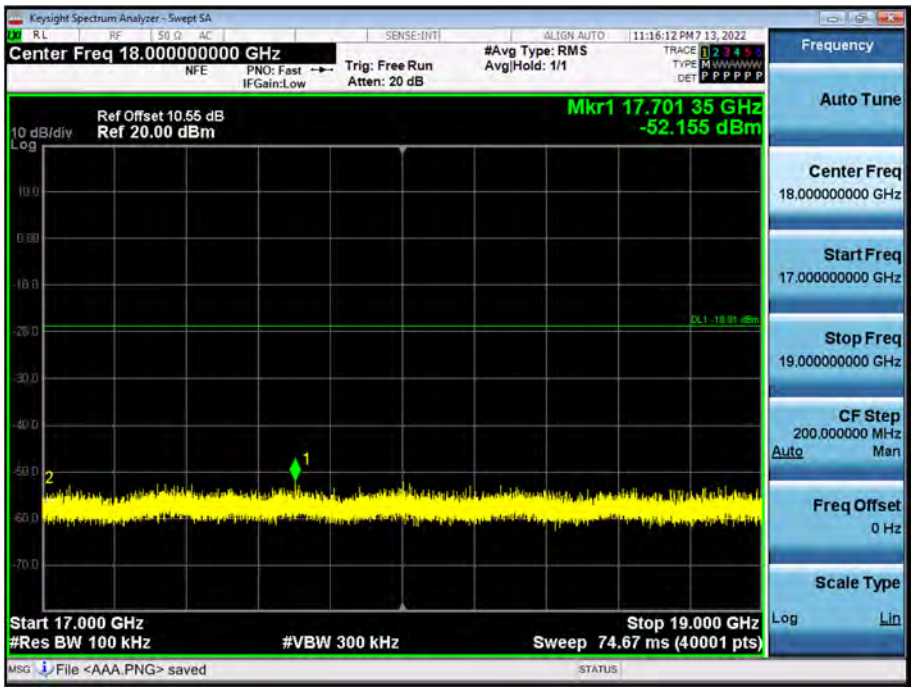
Conducted Spurious Emission (13 GHz ~ 15 GHz)



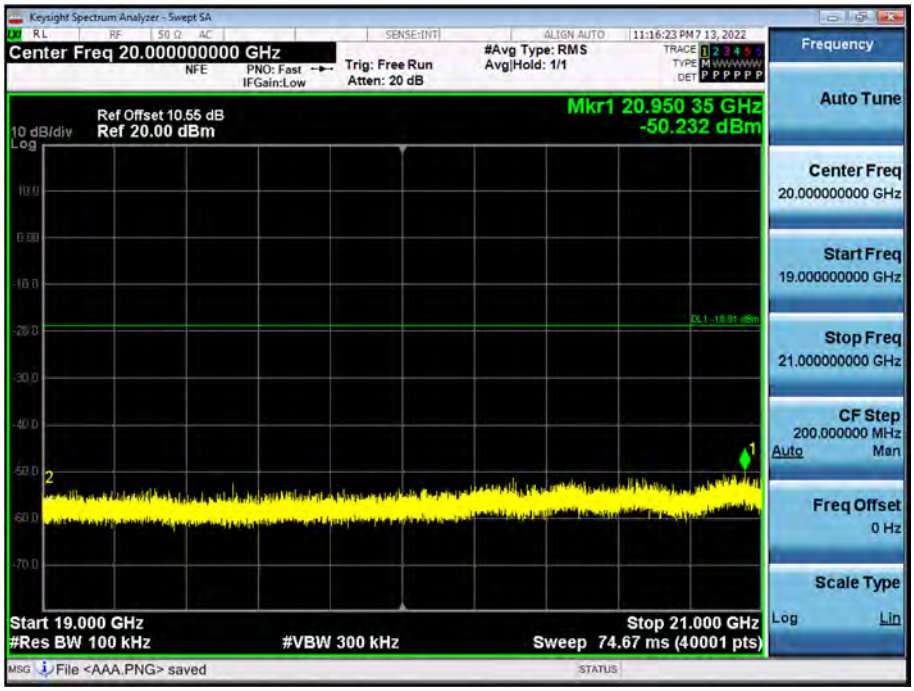
Conducted Spurious Emission (15 GHz ~ 17 GHz)



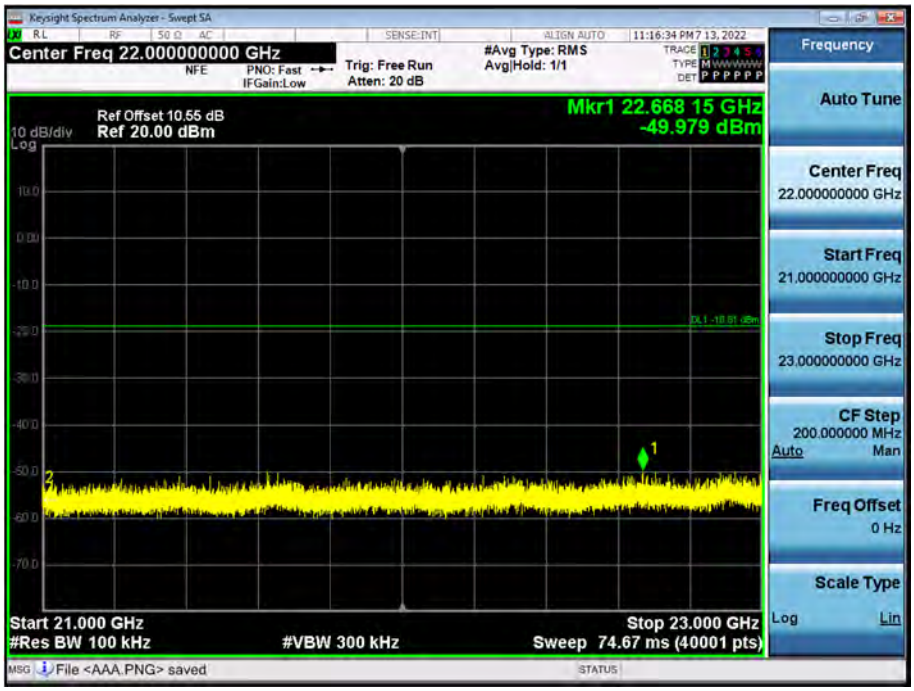
Conducted Spurious Emission (17 GHz ~ 19 GHz)



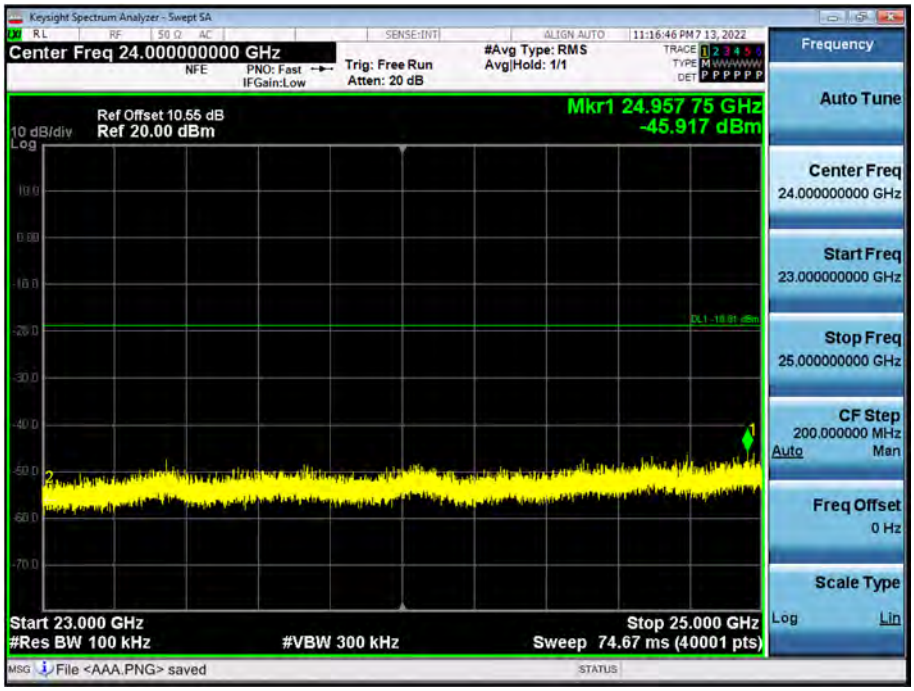
Conducted Spurious Emission (19 GHz ~ 21 GHz)



Conducted Spurious Emission (21 GHz ~ 23 GHz)



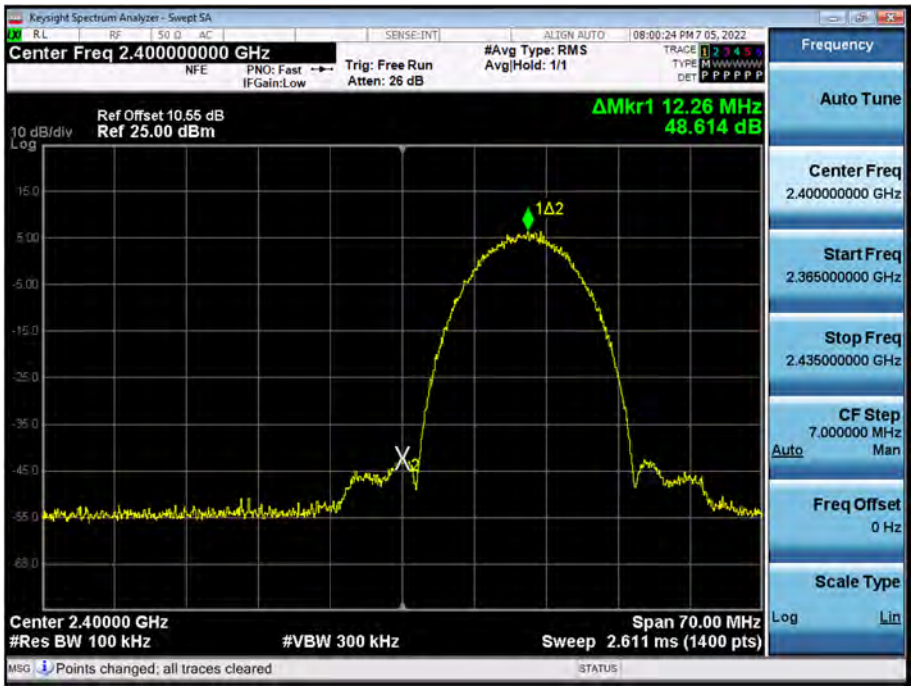
Conducted Spurious Emission (23 GHz ~ 25 GHz)



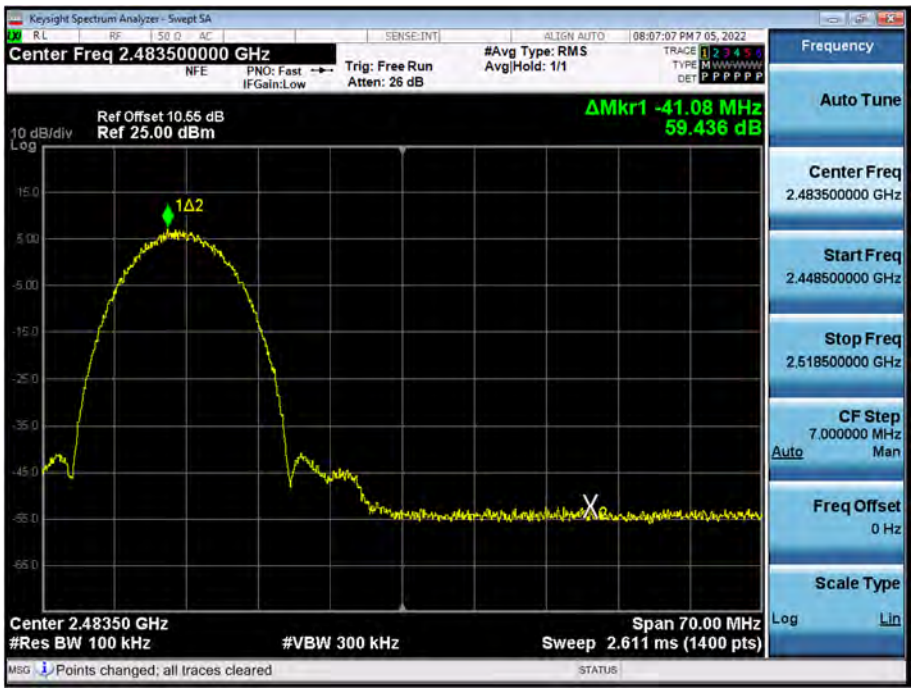
[ANT2]

▣ Test Plots(BandEdge)

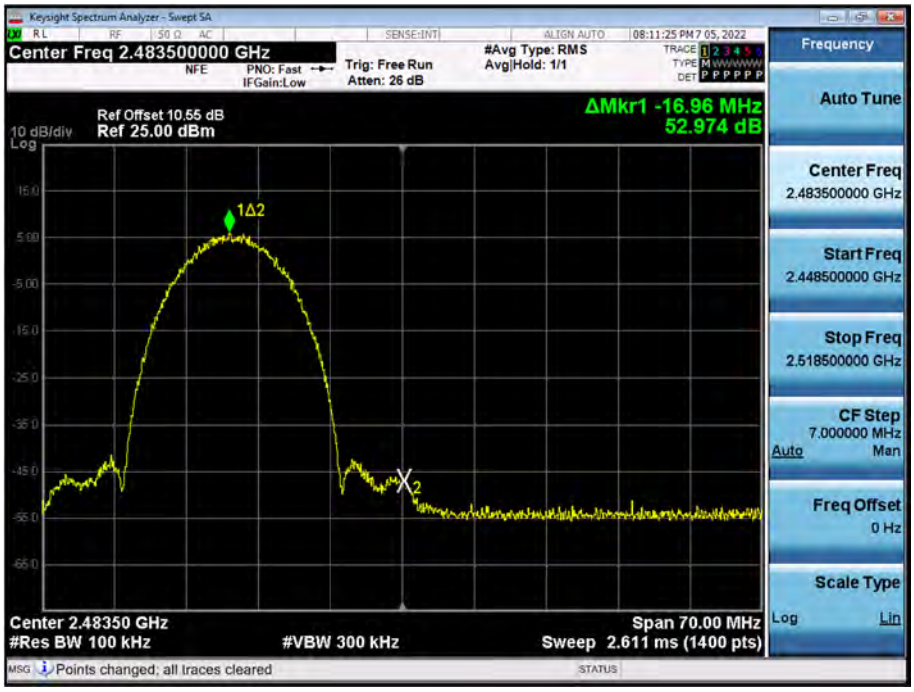
Band Edge (802.11b-CH1)



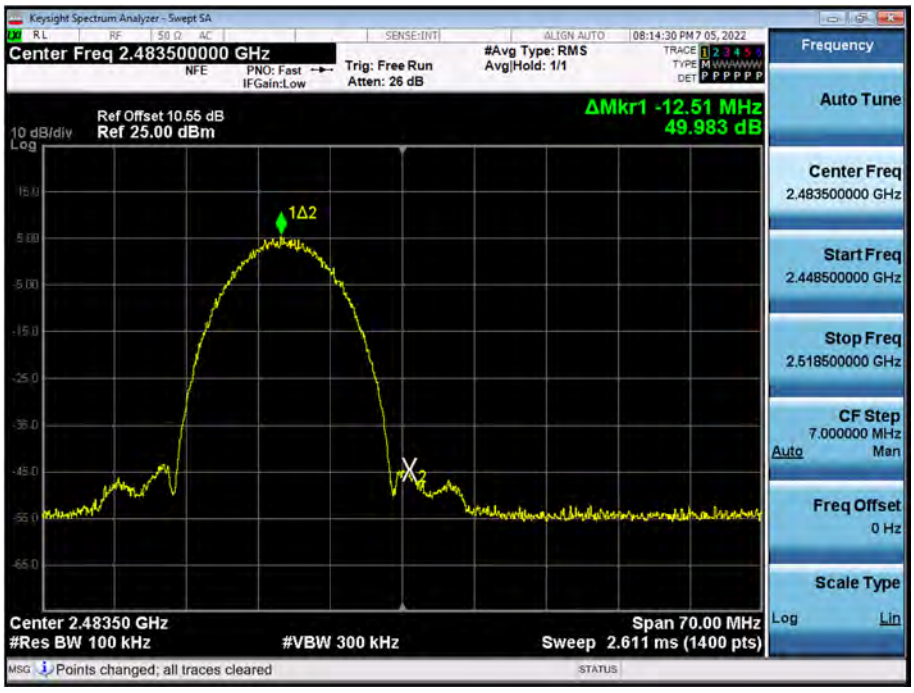
Band Edge (802.11b-CH11)



Band Edge (802.11b-CH12)



Band Edge (802.11b-CH13)

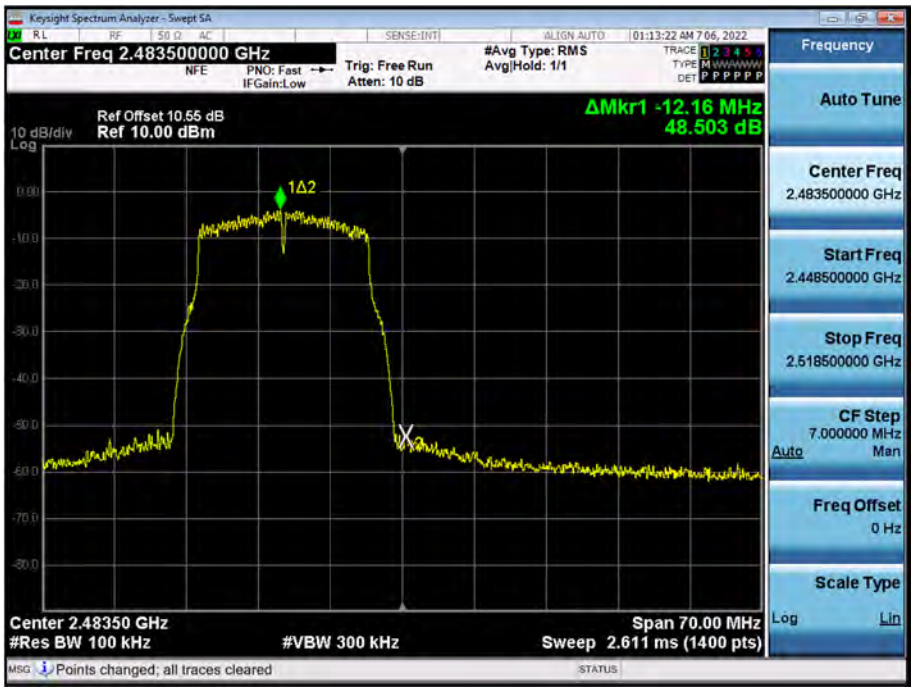


Band Edge (802.11g-CH1)

Band Edge (802.11g-CH11)

Band Edge (802.11g-CH12)

Band Edge (802.11g-CH13)

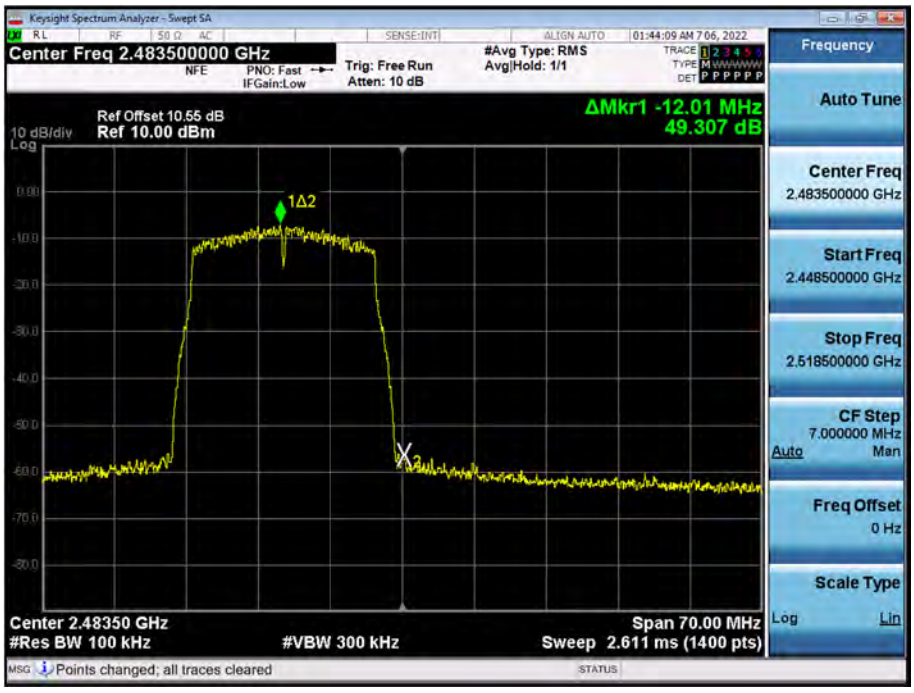


Band Edge (802.11n_HT20 -CH1)

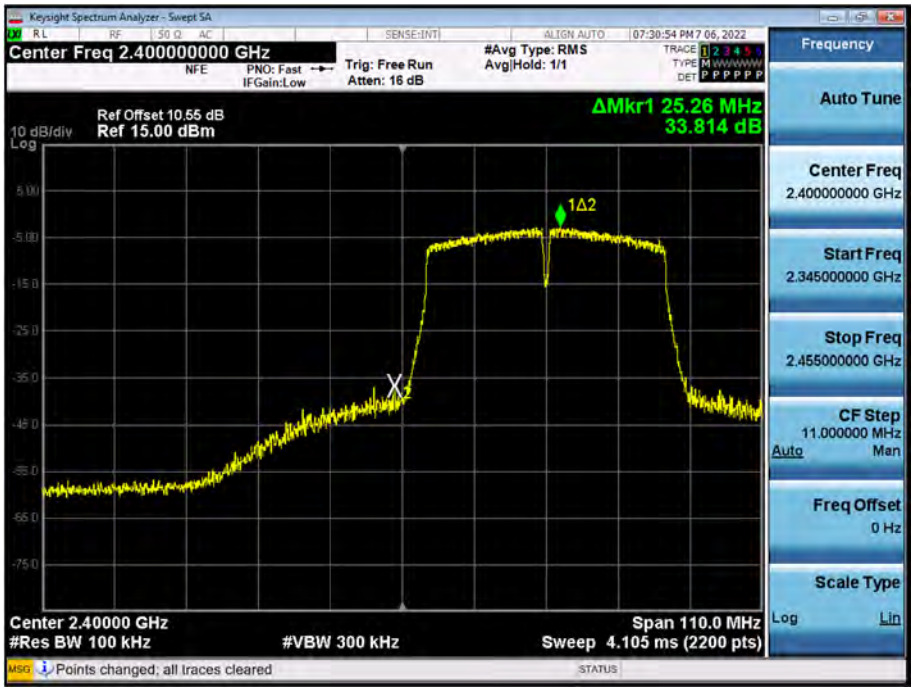
Band Edge (802.11n_HT20 -CH11)

Band Edge (802.11n_HT20 -CH12)

Band Edge (802.11n_HT20 -CH13)



Band Edge (802.11n_HT40 -CH3)



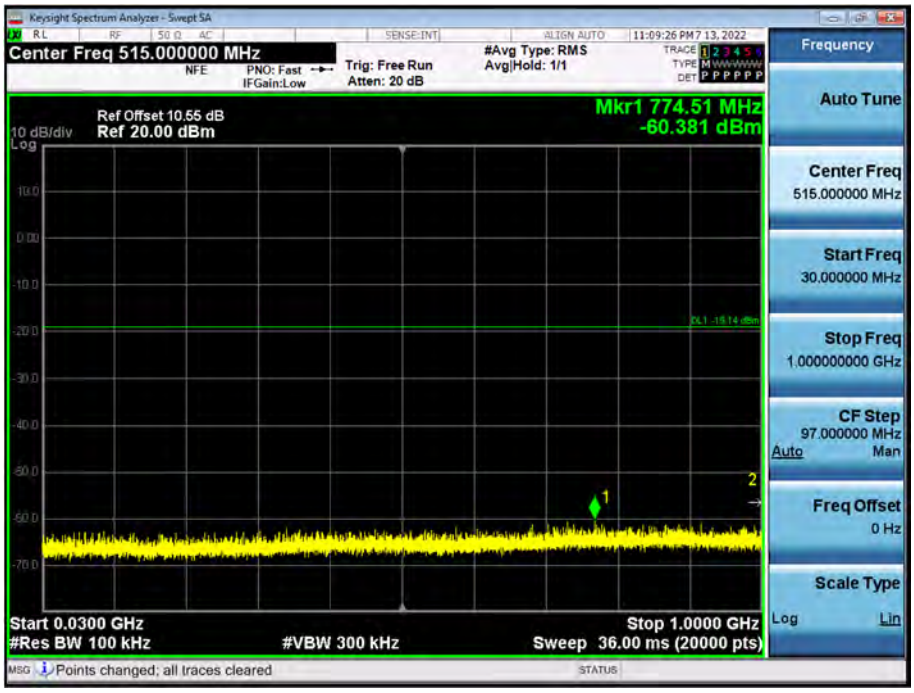
Band Edge (802.11n_HT40 –CH9)

▣ Test Plots(Conducted Spurious Emission)

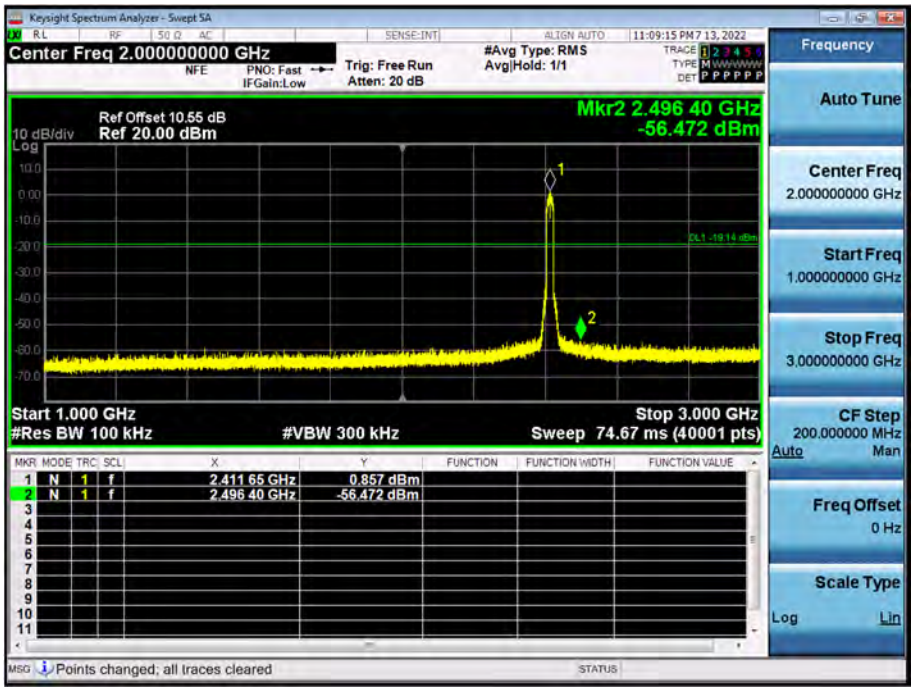
Worst case : 802.11n HT20_Ch. 1_MCS 3

Limit : -19.14 dBm

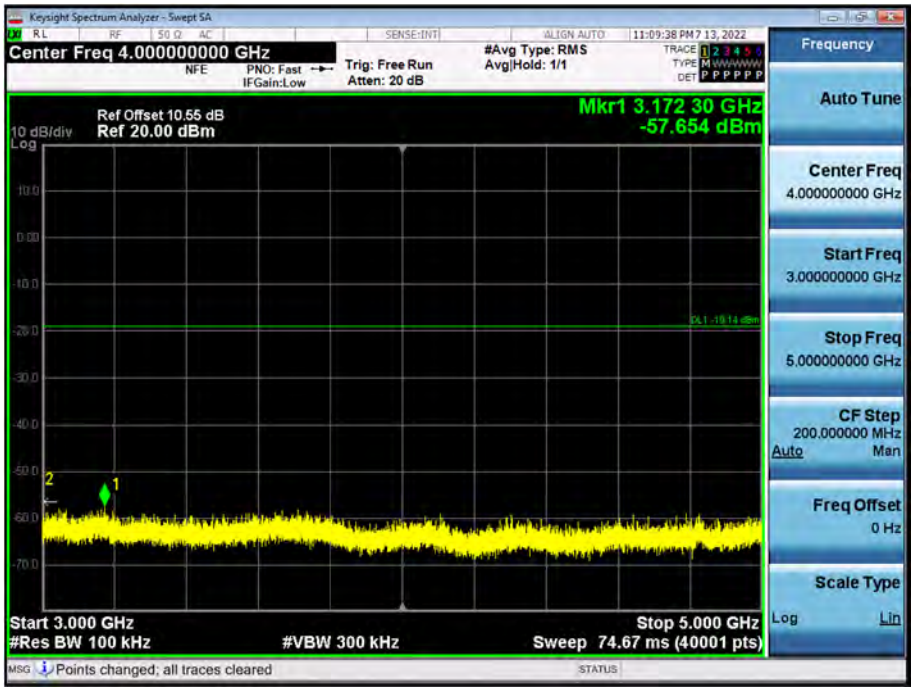
Conducted Spurious Emission (30 MHz ~ 1 GHz)



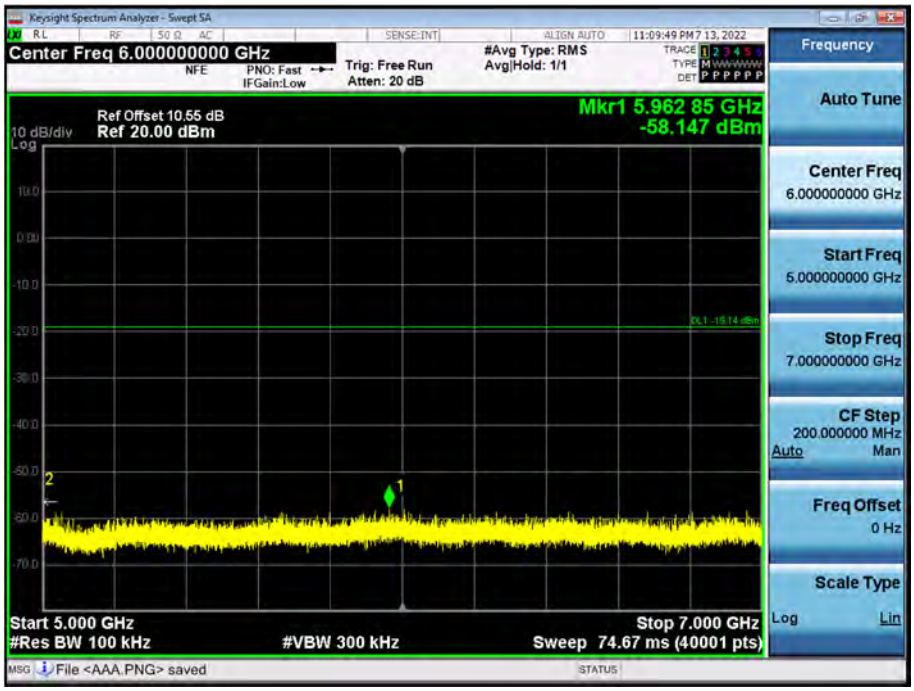
Conducted Spurious Emission (1 GHz ~ 3 GHz)



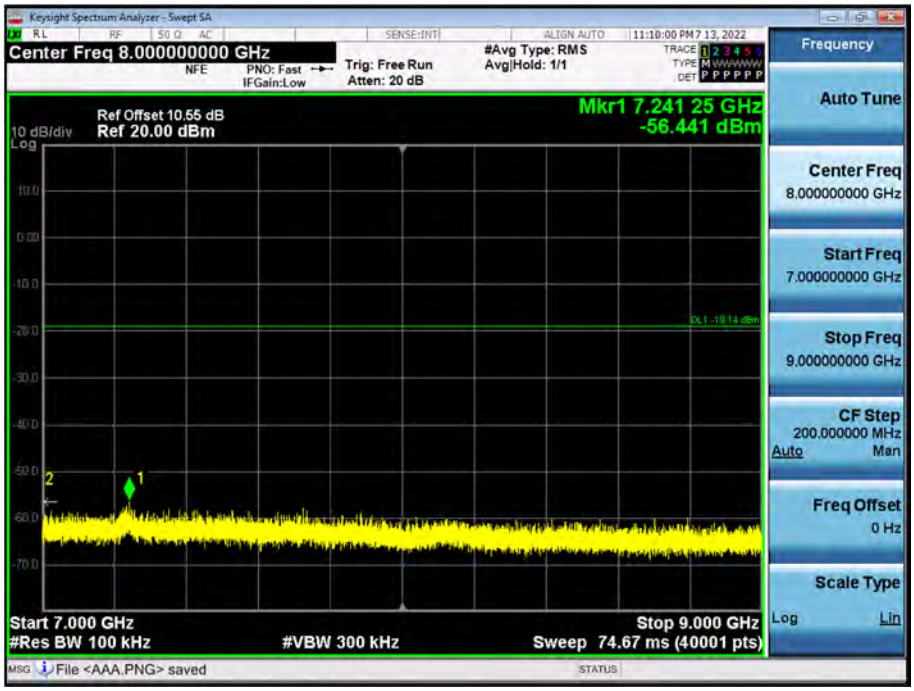
Conducted Spurious Emission (3 GHz ~ 5 GHz)



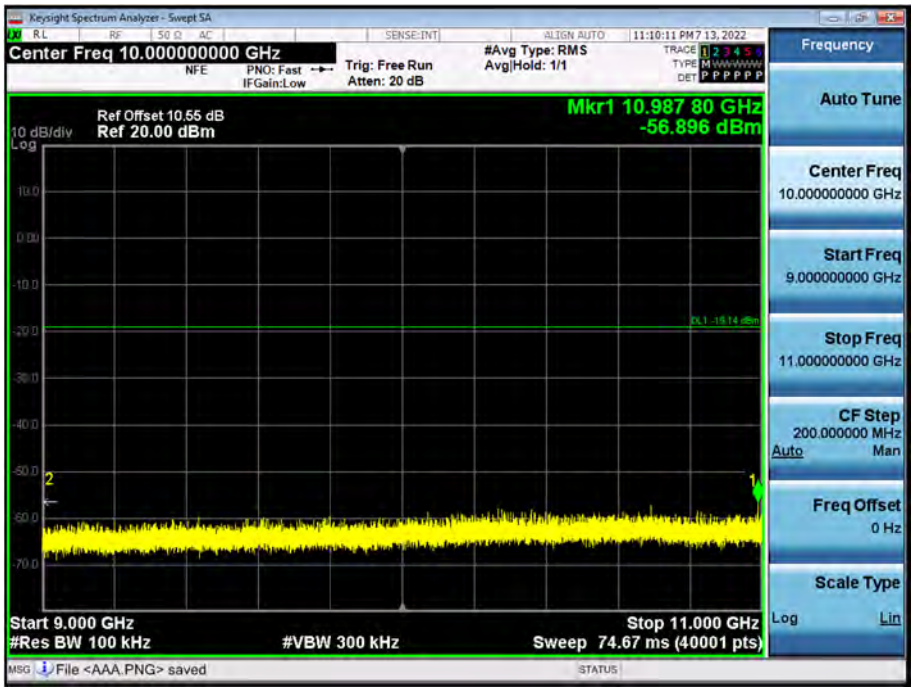
Conducted Spurious Emission (5 GHz ~ 7 GHz)



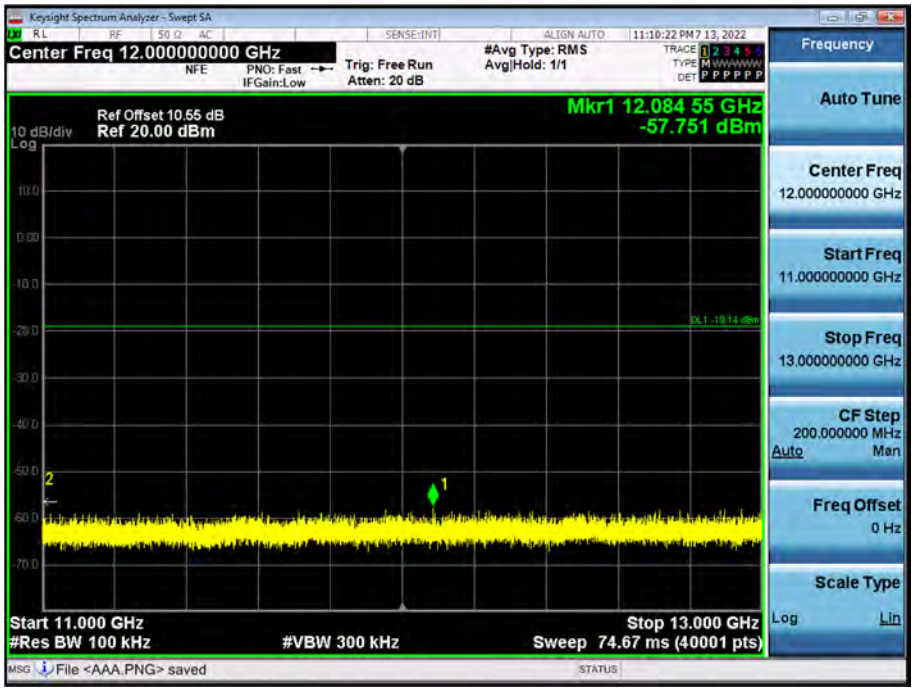
Conducted Spurious Emission (7 GHz ~ 9 GHz)



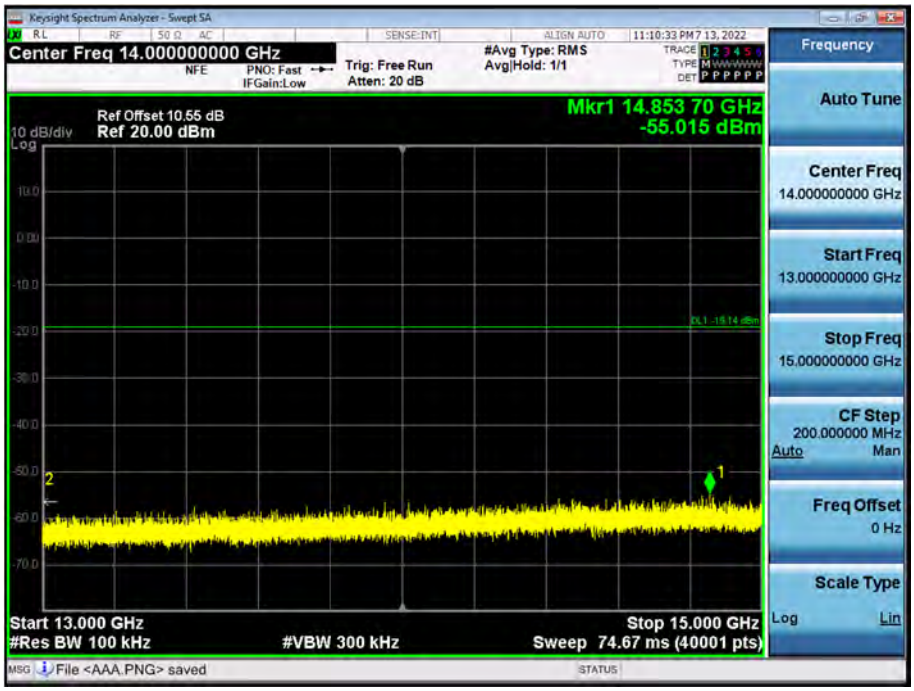
Conducted Spurious Emission (9 GHz ~ 11 GHz)



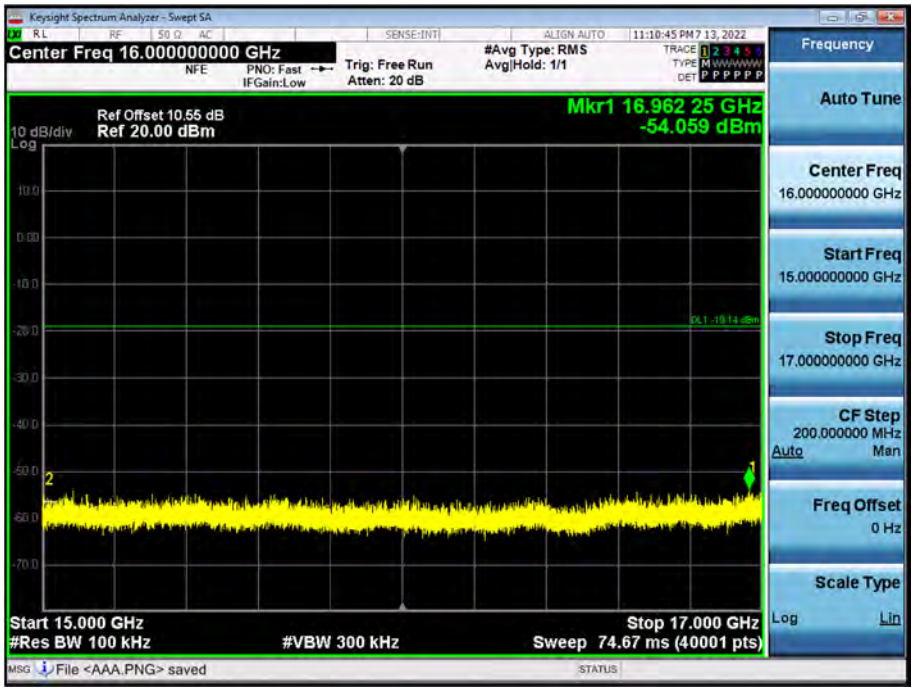
Conducted Spurious Emission (11 GHz ~ 13 GHz)



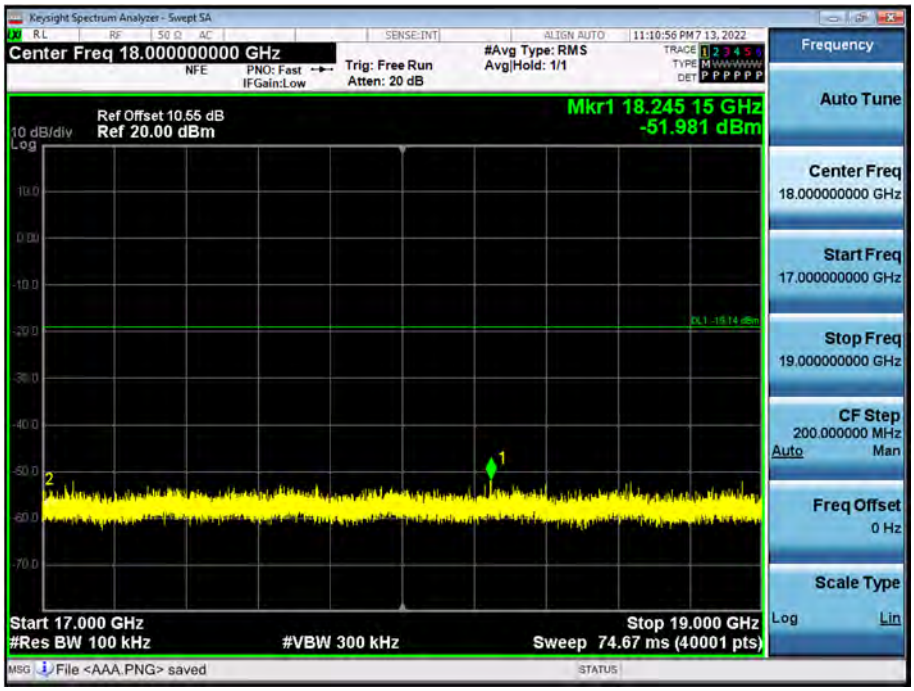
Conducted Spurious Emission (13 GHz ~ 15 GHz)



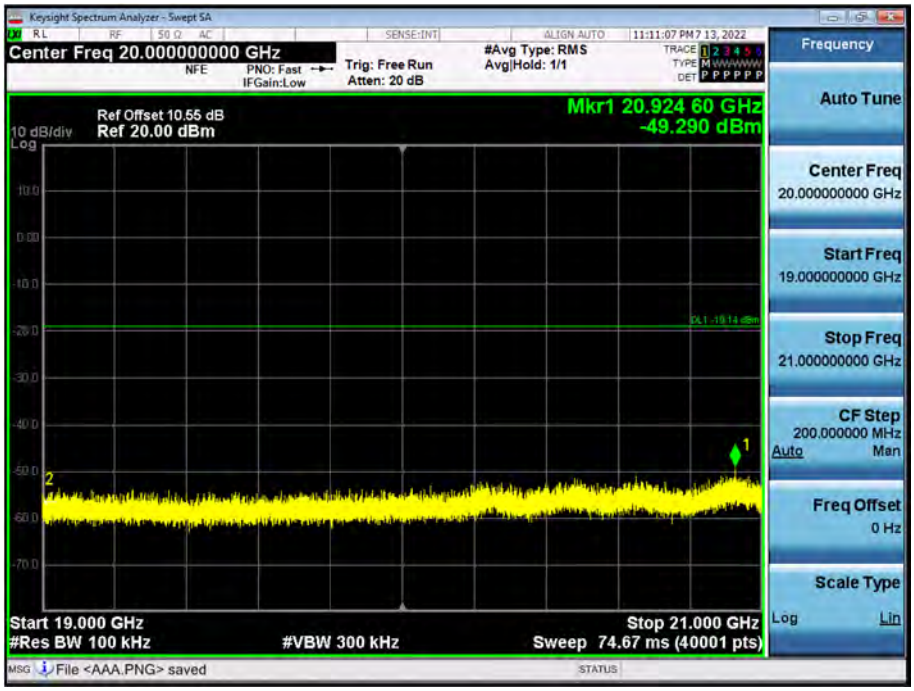
Conducted Spurious Emission (15 GHz ~ 17 GHz)



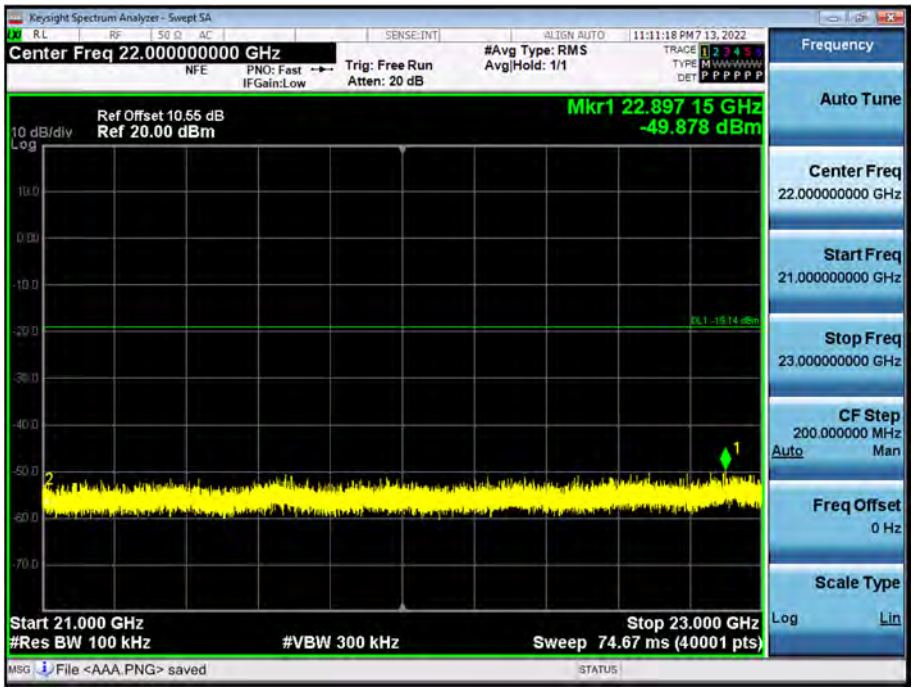
Conducted Spurious Emission (17 GHz ~ 19 GHz)



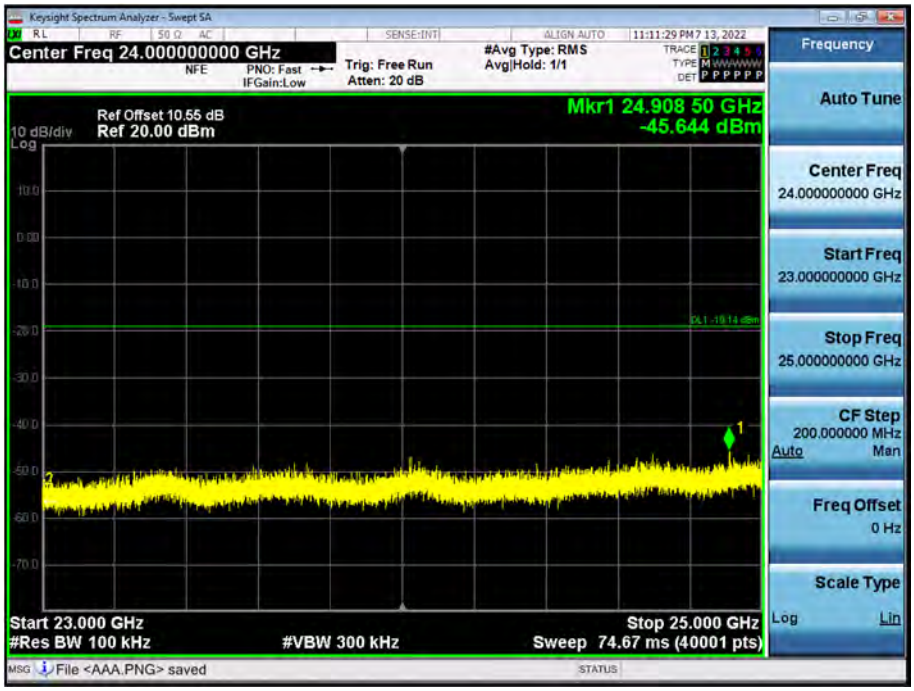
Conducted Spurious Emission (19 GHz ~ 21 GHz)



Conducted Spurious Emission (21 GHz ~ 23 GHz)



Conducted Spurious Emission (23 GHz ~ 25 GHz)



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.

[Only MIMO]

Frequency Range : Above 1 GHz

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2 412 MHz
Channel No.	01 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 824	45.96	3.54	V	49.50	73.98	24.48	PK
4 824	39.51	3.54	V	43.05	53.98	10.93	AV
7 236	43.45	8.25	V	51.70	73.98	22.28	PK
7 236	33.88	8.25	V	42.13	53.98	11.85	AV
4 824	46.87	3.54	H	50.41	73.98	23.57	PK
4 824	40.23	3.54	H	43.77	53.98	10.21	AV
7 236	43.75	8.25	H	52.00	73.98	21.98	PK
7 236	33.31	8.25	H	41.56	53.98	12.42	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2 437 MHz
Channel No.	06 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 874	46.01	2.70	V	48.71	73.98	25.27	PK
4 874	39.42	2.70	V	42.12	53.98	11.86	AV
7 311	42.80	9.28	V	52.08	73.98	21.90	PK
7 311	32.29	9.28	V	41.57	53.98	12.41	AV
4 874	46.19	2.70	H	48.89	73.98	25.09	PK
4 874	39.55	2.70	H	42.25	53.98	11.73	AV
7 311	44.90	9.28	H	54.18	73.98	19.80	PK
7 311	36.47	9.28	H	45.75	53.98	8.23	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2 462 MHz
Channel No.	11 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 924	46.11	2.21	V	48.32	73.98	25.66	PK
4 924	40.11	2.21	V	42.32	53.98	11.66	AV
7 386	41.69	9.95	V	51.64	73.98	22.34	PK
7 386	30.04	9.95	V	39.99	53.98	13.99	AV
4 924	45.88	2.21	H	48.09	73.98	25.89	PK
4 924	39.64	2.21	H	41.85	53.98	12.13	AV
7 386	41.28	9.95	H	51.23	73.98	22.75	PK
7 386	29.95	9.95	H	39.90	53.98	14.08	AV

Operation Mode:	802.11g
Transfer Rate:	1 Mbps
Operating Frequency	2 412 MHz
Channel No.	01 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 824	50.20	3.54	V	53.74	73.98	20.24	PK
4 824	37.18	3.54	V	40.72	53.98	13.26	AV
7 236	53.28	8.25	V	61.53	73.98	12.45	PK
7 236	35.53	8.25	V	43.78	53.98	10.20	AV
4 824	49.57	3.54	H	53.11	73.98	20.87	PK
4 824	36.36	3.54	H	39.90	53.98	14.08	AV
7 236	53.71	8.25	H	61.96	73.98	12.02	PK
7 236	38.79	8.25	H	47.04	53.98	6.94	AV

Operation Mode:	802.11g
Transfer Rate:	1 Mbps
Operating Frequency	2 437 MHz
Channel No.	06 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 874	53.19	2.70	V	55.89	73.98	18.09	PK
4 874	39.44	2.70	V	42.14	53.98	11.84	AV
7 311	54.39	9.28	V	63.67	73.98	10.31	PK
7 311	38.35	9.28	V	47.63	53.98	6.35	AV
4 874	52.29	2.70	H	54.99	73.98	18.99	PK
4 874	38.84	2.70	H	41.54	53.98	12.44	AV
7 311	46.00	9.28	H	55.28	73.98	18.70	PK
7 311	29.72	9.28	H	39.00	53.98	14.98	AV

Operation Mode:	802.11g
Transfer Rate:	1 Mbps
Operating Frequency	2 462 MHz
Channel No.	11 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 924	51.87	2.21	V	54.08	73.98	19.90	PK
4 924	39.25	2.21	V	41.46	53.98	12.52	AV
7 386	52.82	9.95	V	62.77	73.98	11.21	PK
7 386	35.99	9.95	V	45.94	53.98	8.04	AV
4 924	50.99	2.21	H	53.20	73.98	20.78	PK
4 924	39.01	2.21	H	41.22	53.98	12.76	AV
7 386	51.74	9.95	H	61.69	73.98	12.29	PK
7 386	36.54	9.95	H	46.49	53.98	7.49	AV

Operation Mode:	802.11n(HT20)
Transfer MCS Index:	0
Operating Frequency	2 412 MHz
Channel No.	01 Ch

Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 824	48.26	3.54	V	51.80	73.98	22.18	PK
4 824	35.63	3.54	V	39.17	53.98	14.81	AV
7 236	52.50	8.25	V	60.75	73.98	13.23	PK
7 236	34.95	8.25	V	43.20	53.98	10.78	AV
4 824	48.25	3.54	H	51.79	73.98	22.19	PK
4 824	35.46	3.54	H	39.00	53.98	14.98	AV
7 236	53.28	8.25	H	61.53	73.98	12.45	PK
7 236	38.75	8.25	H	47.00	53.98	6.98	AV

Operation Mode:	802.11n(HT20)
Transfer MCS Index:	0
Operating Frequency	2 437 MHz
Channel No.	06 Ch

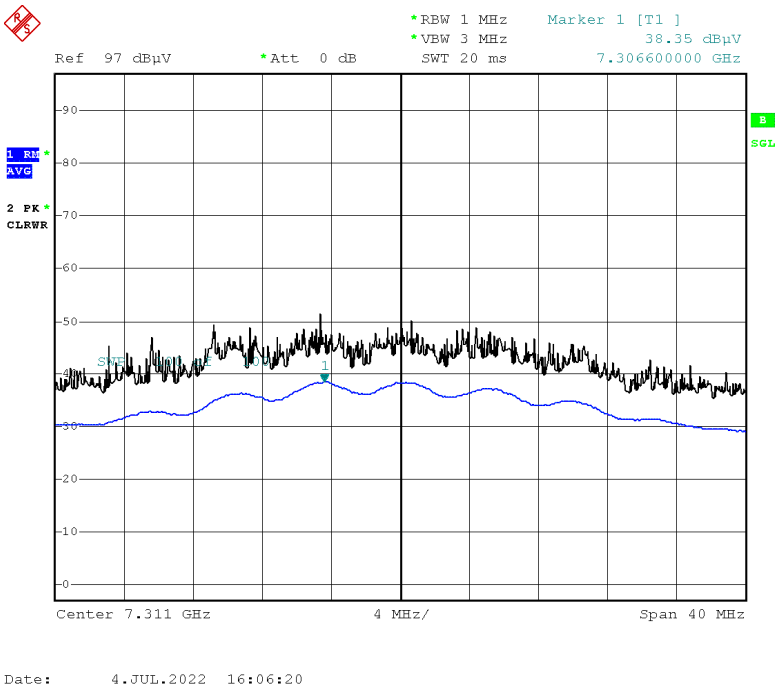
Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 874	50.42	2.70	V	53.12	73.98	20.86	PK
4 874	36.70	2.70	V	39.40	53.98	14.58	AV
7 311	52.73	9.28	V	62.01	73.98	11.97	PK
7 311	36.74	9.28	V	46.02	53.98	7.96	AV
4 874	49.51	2.70	H	52.21	73.98	21.77	PK
4 874	37.14	2.70	H	39.84	53.98	14.14	AV
7 311	46.36	9.28	H	55.64	73.98	18.34	PK
7 311	30.14	9.28	H	39.42	53.98	14.56	AV

Operation Mode:	802.11n(HT20)
Transfer MCS Index:	0
Operating Frequency	2 462 MHz
Channel No.	11 Ch

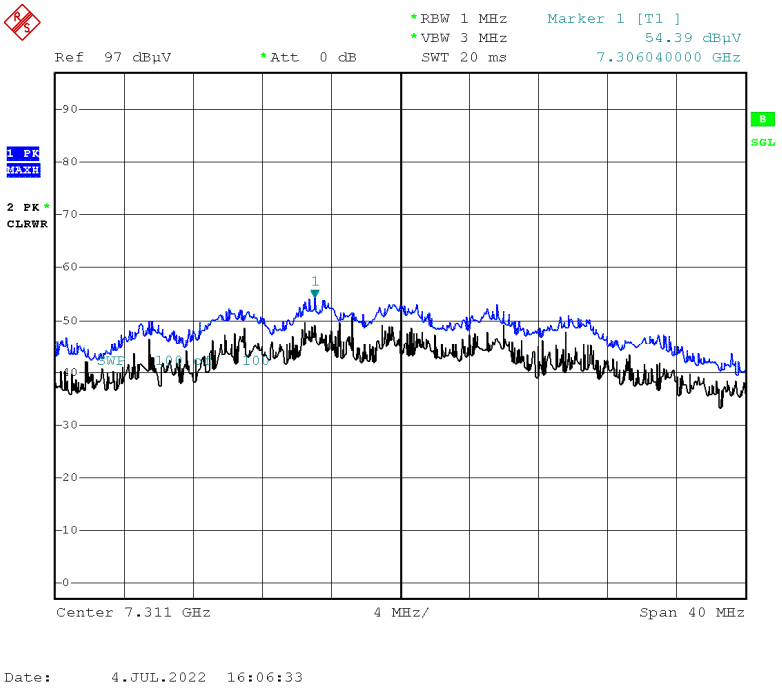
Frequency	Measured Value	AF+CL+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4 924	50.33	2.21	V	52.54	73.98	21.44	PK
4 924	37.39	2.21	V	39.60	53.98	14.38	AV
7 386	49.35	9.95	V	59.30	73.98	14.68	PK
7 386	34.90	9.95	V	44.85	53.98	9.13	AV
4 924	49.57	2.21	H	51.78	73.98	22.20	PK
4 924	37.25	2.21	H	39.46	53.98	14.52	AV
7 386	51.70	9.95	H	61.65	73.98	12.33	PK
7 386	36.56	9.95	H	46.51	53.98	7.47	AV

▣ Test Plots (Worst case : V)

Radiated Spurious Emissions plot – Average Reading (802.11g, Ch.6 3rd Harmonic)



Radiated Spurious Emissions plot – Peak Reading (802.11g, Ch.6 3rd Harmonic)



Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2 412 MHz, 2 462 MHz
Channel No.	01 Ch, 11 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
2310~2390	22.79	35.43	H	58.22	73.98	15.76	PK
2310~2390	12.66	35.43	H	48.09	53.98	5.89	AV
2310~2390	22.62	35.43	V	58.04	73.98	15.94	PK
2310~2390	12.37	35.43	V	47.79	53.98	6.19	AV
2483.5~2500	20.66	35.57	H	56.22	73.98	17.76	PK
2483.5~2500	9.38	35.57	H	44.95	53.98	9.03	AV
2483.5~2500	20.49	35.57	V	56.05	73.98	17.93	PK
2483.5~2500	9.32	35.57	V	44.89	53.98	9.09	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2 467 MHz
Channel No.	12 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2483.5~2484.5	23.92	35.57	H	59.48	73.98	14.50	PK
#2483.5~2484.5	14.19	35.57	H	49.75	53.98	4.23	AV
2484.5~2500	22.13	35.57	H	57.70	73.98	16.28	PK
2484.5~2500	11.82	35.57	H	47.38	53.98	6.60	AV
#2483.5~2484.5	23.62	35.57	V	59.18	73.98	14.80	PK
#2483.5~2484.5	14.10	35.57	V	49.66	53.98	4.32	AV
2484.5~2500	22.10	35.57	V	57.66	73.98	16.32	PK
2484.5~2500	11.43	35.57	V	46.99	53.98	6.99	AV

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

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2 472 MHz
Channel No.	13 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV/m]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5~2500	24.78	35.57	H	60.34	73.98	13.64	PK
2483.5~2500	15.41	35.57	H	50.97	53.98	3.01	AV
2483.5~2500	24.65	35.57	V	60.21	73.98	13.77	PK
2483.5~2500	15.20	35.57	V	50.76	53.98	3.22	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2 412 MHz, 2 462 MHz
Channel No.	01 Ch, 11 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
2310~2389	30.41	35.43	H	65.84	73.98	8.14	PK
2310~2389	14.51	35.43	H	49.93	53.98	4.05	AV
#2389~2390	25.80	35.43	H	61.23	73.98	12.75	PK
#2389~2390	15.03	35.43	H	50.46	53.98	3.52	AV
2310~2389	30.20	35.43	V	65.62	73.98	8.36	PK
2310~2389	13.69	35.43	V	49.12	53.98	4.86	AV
#2389~2390	**25.42**	**35.43**	**V**	**60.84**	**73.98**	**13.14**	**PK**
#2389~2390	**14.93**	**35.43**	**V**	**50.36**	**53.98**	**3.62**	**AV**
#2483.5~2484.5	26.07	35.57	H	61.63	73.98	12.35	PK
#2483.5~2484.5	15.14	35.57	H	50.71	53.98	3.27	AV
2484.5~2500	31.26	35.57	H	66.82	73.98	7.16	PK
2484.5~2500	13.82	35.57	H	49.39	53.98	4.59	AV
#2483.5~2484.5	**26.00**	**35.57**	**V**	**61.57**	**73.98**	**12.41**	**PK**
#2483.5~2484.5	**15.05**	**35.57**	**V**	**50.62**	**53.98**	**3.36**	**AV**
2484.5~2500	**31.18**	**35.57**	**V**	**66.75**	**73.98**	**7.23**	**PK**
2484.5~2500	**13.75**	**35.57**	**V**	**49.32**	**53.98**	**4.66**	**AV**

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

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2 467 MHz
Channel No.	12 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2483.5~2484.5	26.52	35.57	H	62.09	73.98	11.89	PK
#2483.5~2484.5	15.12	35.57	H	50.68	53.98	3.30	AV
2484.5~2500	31.22	35.57	H	66.78	73.98	7.20	PK
2484.5~2500	13.10	35.57	H	48.67	53.98	5.31	AV
#2483.5~2484.5	26.47	35.57	V	62.04	73.98	11.94	PK
#2483.5~2484.5	14.97	35.57	V	50.54	53.98	3.44	AV
2484.5~2500	30.92	35.57	V	66.49	73.98	7.49	PK
2484.5~2500	13.09	35.57	V	48.66	53.98	5.32	AV

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

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2 472 MHz
Channel No.	13 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
#2483.5~2484.5	27.49	35.57	H	63.05	73.98	10.93	PK
#2483.5~2484.5	15.13	35.57	H	50.69	53.98	3.29	AV
#2484.5~2485.5	26.99	35.57	H	62.55	73.98	11.43	PK
#2484.5~2485.5	14.28	35.57	H	49.84	53.98	4.14	AV
2485.5~2500	31.48	35.57	H	67.04	73.98	6.94	PK
2485.5~2500	13.03	35.57	H	48.59	53.98	5.39	AV
#2483.5~2484.5	27.62	35.57	V	63.19	73.98	10.79	PK
#2483.5~2484.5	14.86	35.57	V	50.42	53.98	3.56	AV
#2484.5~2485.5	26.48	35.57	V	62.05	73.98	11.93	PK
#2484.5~2485.5	14.10	35.57	V	49.66	53.98	4.32	AV
2485.5~2500	30.64	35.57	V	66.21	73.98	7.77	PK
2485.5~2500	12.92	35.57	V	48.49	53.98	5.49	AV

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

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2 412 MHz, 2 462 MHz
Channel No.	01 Ch, 11 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
2310~2389	30.64	35.43	H	66.07	73.98	7.91	PK
2310~2389	13.79	35.43	H	49.22	53.98	4.76	AV
#2389~2390	25.60	35.43	H	61.03	73.98	12.95	PK
#2389~2390	14.45	35.43	H	49.87	53.98	4.11	AV
2310~2389	30.58	35.43	V	66.00	73.98	7.98	PK
2310~2389	13.46	35.43	V	48.88	53.98	5.10	AV
#2389~2390	25.46	35.43	V	60.89	73.98	13.09	PK
#2389~2390	14.33	35.43	V	49.76	53.98	4.22	AV
2483.5~2500	29.80	35.57	H	65.37	73.98	8.61	PK
2483.5~2500	14.35	35.57	H	49.92	53.98	4.06	AV
2483.5~2500	29.76	35.43	V	65.18	73.98	8.80	PK
2483.5~2500	14.32	35.43	V	49.74	53.98	4.24	AV

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

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2 467 MHz
Channel No.	12 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV/m]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
#2483.5~2484.5	26.51	35.57	H	62.08	73.98	11.90	PK
#2483.5~2484.5	15.42	35.57	H	50.98	53.98	3.00	AV
2484.5~2500	32.28	35.57	H	67.84	73.98	6.14	PK
2484.5~2500	14.43	35.57	H	49.99	53.98	3.99	AV
#2483.5~2484.5	26.42	35.57	V	61.99	73.98	11.99	PK
#2483.5~2484.5	15.31	35.57	V	50.88	53.98	3.10	AV
2484.5~2500	31.89	35.57	V	67.45	73.98	6.53	PK
2484.5~2500	14.32	35.57	V	49.88	53.98	4.10	AV

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

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2 472 MHz
Channel No.	13 Ch

Frequency	Measured Value	Duty Cycle	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	Factor [dB]	[dB]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
2483.5~2500	26.42	35.57	H	61.98	73.98	12.00	PK	2483.5
2483.5~2500	14.89	35.57	H	50.46	53.98	3.52	AV	2483.5
2483.5~2500	26.19	35.57	V	61.76	73.98	12.22	PK	2483.5
2483.5~2500	14.54	35.57	V	50.10	53.98	3.88	AV	2483.5

Operation Mode:	802.11n (HT40)
Transfer MCS Index:	0
Operating Frequency	2 422 MHz, 2 452 MHz
Channel No.	03 Ch, 09 Ch

Frequency	Measured Value	AF+CL+DF	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV/m]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
2310~2389	28.70	35.43	H	64.13	73.98	9.85	PK
2310~2389	14.73	35.43	H	50.15	53.98	3.83	AV
#2389~2390	25.29	35.43	H	60.71	73.98	13.27	PK
#2389~2390	14.57	35.43	H	50.00	53.98	3.98	AV
2310~2389	28.12	35.43	V	63.54	73.98	10.44	PK
2310~2389	14.64	35.43	V	50.07	53.98	3.91	AV
#2389~2390	25.19	35.43	V	60.62	73.98	13.36	PK
#2389~2390	14.40	35.43	V	49.82	53.98	4.16	AV
#2483.5~2484.5	28.54	35.57	H	64.11	73.98	9.87	PK
#2483.5~2484.5	15.37	35.57	H	50.94	53.98	3.04	AV
2484.5~2500	29.92	35.57	H	65.48	73.98	8.50	PK
2484.5~2500	15.02	35.57	H	50.59	53.98	3.39	AV
#2483.5~2484.5	28.12	35.57	V	63.68	73.98	10.30	PK
#2483.5~2484.5	15.33	35.57	V	50.90	53.98	3.08	AV
2484.5~2500	29.64	35.57	V	65.21	73.98	8.77	PK
2484.5~2500	14.93	35.57	V	50.50	53.98	3.48	AV

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

▣ Test Plots

Radiated Restricted Band Edges plot – Average Reading (802.11n (HT20), MCS0 Ch.12, X-H)

integration method Used

Radiated Restricted Band Edges plot – Peak Reading (802.11n (HT20), MCS0 Ch.12, X-H)

integration method Used

Radiated Restricted Band Edges plot – Average Reading (802.11n (HT20), MCS0 Ch.12, X-H)

Radiated Restricted Band Edges plot – Peak Reading (802.11n (HT20), MCS0 Ch.12, X-H)

Note:

Plot of worst case are only reported.

9.8 RECEIVER SPURIOUS EMISSIONS

equency Range : Below 1 GHz

Frequency	Measured Value	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	[dBμV/m]	dBm/m	dBm	(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

Frequency	Measured Value	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	[dBμV/m]	dBm/m	dBm	(H/V)	[dBμV/m]	[dBμV/m]	dB
No Critical peaks found							

9.9 POWERLINE CONDUCTED EMISSIONS

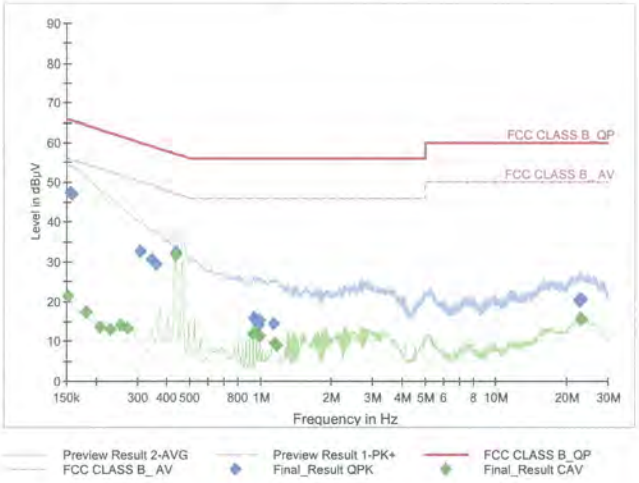
Conducted Emissions (Line 1)

Test Report

Common Information

EUT :	LGSBWAC97
Manufacturer :	LG Innotek
Test Site:	SHIELD ROOM
Operating Conditions :	2.4G WLAN_L1
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	47.39	65.75	18.36	9.000	L1	OFF	9.6
0.1590	46.88	65.52	18.64	9.000	L1	OFF	9.6
0.3098	32.53	59.98	27.45	9.000	L1	OFF	9.6
0.3458	30.44	59.06	28.62	9.000	L1	OFF	9.6
0.3593	29.50	58.75	29.25	9.000	L1	OFF	9.6
0.4380	32.27	57.10	24.83	9.000	L1	OFF	9.6
0.9343	15.76	56.00	40.24	9.000	L1	OFF	9.6
0.9635	15.69	56.00	40.31	9.000	L1	OFF	9.6
0.9703	14.77	56.00	41.23	9.000	L1	OFF	9.6
0.9793	14.21	56.00	41.79	9.000	L1	OFF	9.6
0.9973	15.16	56.00	40.84	9.000	L1	OFF	9.6
1.1390	14.31	56.00	41.69	9.000	L1	OFF	9.6
22.6828	20.53	60.00	39.47	9.000	L1	OFF	9.9
22.6895	20.24	60.00	39.76	9.000	L1	OFF	9.9
22.9010	20.14	60.00	39.86	9.000	L1	OFF	9.9
22.9955	20.08	60.00	39.92	9.000	L1	OFF	9.9
23.1193	20.45	60.00	39.55	9.000	L1	OFF	9.9
23.1238	20.53	60.00	39.47	9.000	L1	OFF	9.9

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Test 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	21.47	55.88	34.41	9.000	L1	OFF	9.6
0.1815	17.31	54.42	37.11	9.000	L1	OFF	9.6
0.2085	13.60	53.27	39.67	9.000	L1	OFF	9.6
0.2288	12.87	52.50	39.62	9.000	L1	OFF	9.6
0.2558	14.06	51.57	37.51	9.000	L1	OFF	9.6
0.2715	13.21	51.07	37.86	9.000	L1	OFF	9.6
0.4358	31.83	47.14	15.31	9.000	L1	OFF	9.6
0.9320	11.75	46.00	34.25	9.000	L1	OFF	9.6
0.9635	12.46	46.00	33.54	9.000	L1	OFF	9.6
0.9928	11.16	46.00	34.84	9.000	L1	OFF	9.6
1.1435	9.65	46.00	36.35	9.000	L1	OFF	9.6
1.1728	8.90	46.00	37.10	9.000	L1	OFF	9.6
22.7840	15.91	50.00	34.09	9.000	L1	OFF	9.9
22.8560	15.73	50.00	34.27	9.000	L1	OFF	9.9
22.9010	15.64	50.00	34.36	9.000	L1	OFF	9.9
23.1215	15.61	50.00	34.39	9.000	L1	OFF	9.9
23.1620	15.45	50.00	34.55	9.000	L1	OFF	9.9
23.2588	15.58	50.00	34.42	9.000	L1	OFF	9.9

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Conducted Emissions (Line 2)

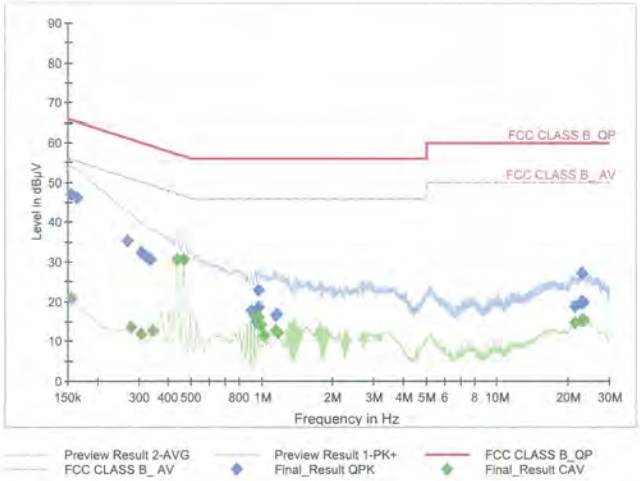
Test 1 / 2

Test Report

Common Information

EUT : LGSBWAC97
Manufacturer : LG Innotek
Test Site: SHIELD ROOM
Operating Conditions : 2.4G WLAN_N
Operator Name:
Comment:

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	47.14	65.75	18.61	9.000	N	OFF	9.6
0.1635	46.05	65.28	19.23	9.000	N	OFF	9.6
0.2693	35.18	61.14	25.96	9.000	N	OFF	9.6
0.3098	32.23	59.98	27.74	9.000	N	OFF	9.6
0.3255	31.15	59.57	28.42	9.000	N	OFF	9.6
0.3368	30.49	59.28	28.80	9.000	N	OFF	9.6
0.9073	17.68	56.00	38.32	9.000	N	OFF	9.6
0.9478	14.92	56.00	41.08	9.000	N	OFF	9.6
0.9703	18.55	56.00	37.45	9.000	N	OFF	9.6
0.9748	22.74	56.00	33.26	9.000	N	OFF	9.6
1.1458	16.47	56.00	39.53	9.000	N	OFF	9.6
1.1615	16.60	56.00	39.40	9.000	N	OFF	9.6
21.5038	18.80	60.00	41.20	9.000	N	OFF	9.9
22.7120	19.56	60.00	40.44	9.000	N	OFF	9.9
22.9415	27.22	60.00	32.78	9.000	N	OFF	9.9
22.9775	19.78	60.00	40.22	9.000	N	OFF	9.9
23.1080	19.81	60.00	40.19	9.000	N	OFF	9.9
23.2048	19.73	60.00	40.27	9.000	N	OFF	9.9

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Test 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	20.67	55.75	35.08	9.000	N	OFF	9.6
0.2783	13.45	50.87	37.42	9.000	N	OFF	9.6
0.3075	11.76	50.04	38.28	9.000	N	OFF	9.6
0.3458	12.63	49.06	36.44	9.000	N	OFF	9.6
0.4358	30.48	47.14	16.66	9.000	N	OFF	9.6
0.4673	30.66	46.56	15.91	9.000	N	OFF	9.6
0.9343	16.28	46.00	29.72	9.000	N	OFF	9.6
0.9658	16.06	46.00	29.94	9.000	N	OFF	9.6
0.9973	14.01	46.00	31.99	9.000	N	OFF	9.6
1.0288	11.45	46.00	34.55	9.000	N	OFF	9.6
1.1458	12.61	46.00	33.39	9.000	N	OFF	9.6
1.1728	12.19	46.00	33.81	9.000	N	OFF	9.6
21.5038	14.58	50.00	35.42	9.000	N	OFF	9.9
22.7773	15.33	50.00	34.67	9.000	N	OFF	9.9
23.0630	15.39	50.00	34.61	9.000	N	OFF	9.9
23.1080	15.41	50.00	34.59	9.000	N	OFF	9.9
23.3128	15.34	50.00	34.66	9.000	N	OFF	9.9
23.3983	15.23	50.00	34.77	9.000	N	OFF	9.9

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10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/23/2022	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	09/07/2022	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Agilent	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2022	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)	5910-N-50-010	H+S	00801	10/29/2022	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	03/07/2023	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A
Bluetooth Tester	CBT	Rohde & Schwarz	100808	02/22/2023	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.

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	09/04/2022	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 CERNEX	N/A	12/22/2022	Annual
ATT(10 dB) + LNA1(0.1~18 GHz)	56-10, CBLU1183540B-01	Api tech, CERNEX	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	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000175	04/05/2023	Annual
Spectrum Analyzer	FSP(9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/13/2022	Annual
Spectrum Analyzer	FSV40-N(9 kHz ~ 30 GHz)	Rohde & Schwarz	101068-SZ	09/15/2022	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-2207-FI013-P