TEST REPORT

FCC DTS Test for LGSWNAX61
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2509-FC004

DATE OF ISSUE
September 3, 2025

Tested by
Jeong Ho Kim

Technical Manager
Jong Seok Lee

Accredited by KOLAS, Republic of KOREA

HCT CO., LTD.
BongJai Huh / CEO

HCT CO., LTD. 2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea Tel. +82 31 645 6300 Fax. +82 31 645 6401

HCT CO.,LTD.
2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea
Tel. +82 31 645 6300 Fax. +82 31 645 6401

TEST REPORT

REPORT NO.
HCT-RF-2509-FC004

DATE OF ISSUE
September 03, 2025

Applicant	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Republic of Korea
Product Name Model Name	RF Module LGSWNAX61
FCC ID	2BO3LLGSWNAX61
Date of Test	July 21, 2025 ~ August 29, 2025
FCC Classification	Digital Transmission System(DTS)
Test Standard Used	FCC Rule Part(s): Part 15.247
Test Results	PASS
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)
Brand	LG

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	September 03, 2025	Initial Release

Notice

Content

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.

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.
The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.
Information provided by the applicant is marked **.
Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

This test report provides test result(s) under the scope accredited by the Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.
(KOLAS (KS Q ISO/IEC 17025) Accreditation No. KT197)

CONTENTS

1. EUT DESCRIPTION

Model	LGSWNAX61		
Additional Model	-		
EUT Type	RF Module		
Power Supply	DC 3.30 V		
Frequency Range	2 412 MHz ~ 2 472 MHz		
Max. RF Output Power	Average Power	SISO (Ant.1) : SISO (Ant.2) : MIMO_CDD (Ant.1+ Ant.2) :	15.14 dBm 15.10 dBm 18.13 dBm
	Peak Power	SISO (Ant.1) : SISO (Ant.2) : MIMO_CDD (Ant.1+ Ant.2) :	22.50 dBm 22.78 dBm 25.65 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n		
Number of Channels	13 Channels		
Antenna Specification	Type: Metal Press		
Serial number	Conducted : 6C15DB1726F0 Radiated : 0827A8A35F68		

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant.1	Ant.2	CDD	SDM
802.11b	O	O	O	X
802.11g	O	O	O	X
802.11n(HT20)	O	O	O	O

Note:

(1) O = Support, X = Not Support

(2) SISO = Single Input Single Output

(3) SDM = Spatial Diversity Multiplexing

(4) CDD = Cyclic Delay Diversity

2.This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the 2.4 GHz and 5 GHz or 6GHz Bands simultaneously on each antenna.

Simultaneous transmission Scenario	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	6 GHz WiFi Ant.1	6 GHz WiFi Ant.2	Bluetooth	Test Case
Bluetooth + 2.4 GHz WiFi MIMO	on	on	-	-	-	-	on	
Bluetooth + 5 GHz WiFi MIMO	-	-	on	on	-	-	on	Scenario 1
Bluetooth + 6 GHz WiFi MIMO	-	-			on	on	on	
2.4 GHz WiFi SISO + 5 GHz WiFi SISO	-	on	on	-	-	-	-	
2.4 GHz WiFi SISO + 6 GHz WiFi SISO	-	on	-	-	on	-	-	
Bluetooth + 2.4 GHz WiFi SISO + 6 GHz WiFi SISO	-	on	-	-	on	-	on	
Bluetooth + 2.4 GHz WiFi SISO + 5 GHz WiFi SISO	-	on	on	-	-	-	on	Scenario 2

3. Directional Gain Calculation

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

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

Directional gain(SDM) = Gmax + 10·LOG(N_{ANT}/ N_{ss})

Ant Gain (dBi)		N_{ANT}/ N_{ss}	Directional Gain (dBi)	
			CDD	SDM
ANT.1	0.49	2/2	3.60	0.69
ANT.2	0.69			

Note

According to ANSI C63.10-2020 section 14.6.3, the directional gain is calculated using the formula, where G_N is the gain of the nth antenna and N_{ANT} is the total number of antennas used.

Directional gain(CDD) = 10·log(((10$^{(ANT.1\ Gain/20)}$+10$^{(ANT.2\ Gain/20)}$)^2)/2) dBi

Directional gain(SDM) = Gmax + 10·log(N_{ANT}/ N_{ss})

Sample MIMO Calculation:

Ex) ANT.1 : 11.58 dBm ANT.2 : 12.08 dBm

MIMO = ANT.1 + ANT.2

(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 : 2020) '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 :-2020) 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

According to the requirements in Section 6.3 ~ Section 6.6 of ANSI C63.10. (Version: 2020),
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.

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, Republic of Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated March 11, 2024 (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 C63.10-2020.

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.

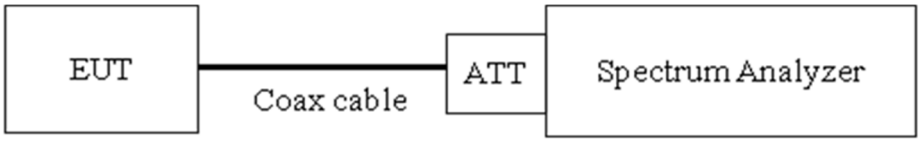
Parameter	Expanded Uncertainty (±kHz)
X dB, 99% Bandwidth	95 (Confidence level about 95 %, *k*=2)
Frequency stability	28 (Confidence level about 95 %, *k*=2)

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.54 (Confidence level about 95 %, *k*=2)
Conducted Output Power(Power Meter)	0.54 (Confidence level about 95 %, k=2)
Conducted Output Power(Signal Analyzer)	0.68 (Confidence level about 95 %, k=2)
Power Spectral Density	1.03 (Confidence level about 95 %, k=2)
Band Edge (Out of Band Emissions)	0.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.68 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.75 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.82 (Confidence level about 95 %, *k*=2)

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

Test Standard Used : Section 11.6 in ANSI C63.10-2020

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.

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to

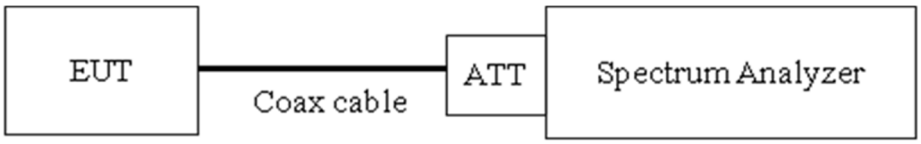
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz or 50 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Average
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6 dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

Test Standard Used : Section 11.8 in ANSI C63.10-2020

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to

1) RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
2) VBW ≥ 3 x RBW
3) Detector = Peak
4) Trace mode = max hold
5) Sweep = No faster than coupled (auto) time.
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.

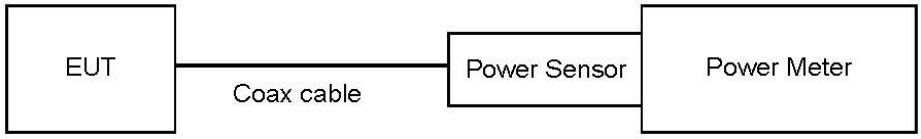
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

Test Standard Used(Peak) : Section 11.9.1.2 in ANSI C63.10-2020

Test Standard Used(Average) : Section 11.9.2.3 in ANSI C63.10-2020

The transmitter output is connected to the Power Meter.

▪ Peak Power

: Measure the peak power of the transmitter.

▪ Average Power

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

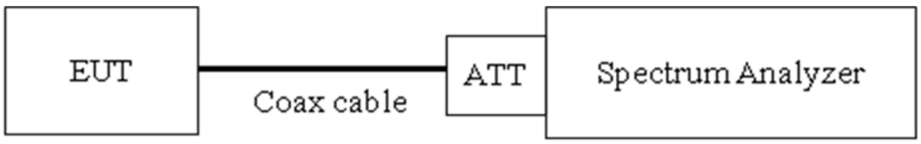
▪ Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

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

Test Standard Used : Section 11.10 in ANSI C63.10-2020

The transmitter output is connected to the Spectrum Analyzer.
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 DTS bandwidth.
3) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x RBW.
5) Sweep = No faster than coupled (auto) time.
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.
10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

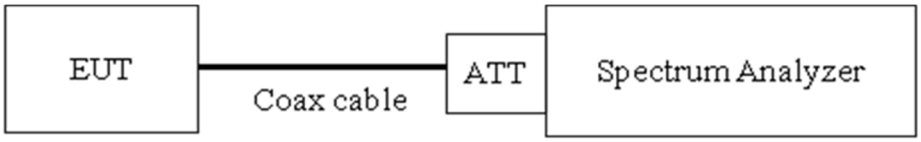
▪ Power Spectral Density = Measured Value + ATT loss + Cable loss

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

Test Standard Used : Section 11.11 in ANSI C63.10-2020

The transmitter output is connected to the spectrum analyzer.
The spectrum analyzer is set to :

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 = No faster than coupled (auto) time.
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	10.11
200	10.15
300	10.18
400	10.19
500	10.26
600	10.25
700	10.28
800	10.29
900	10.30
1000	10.30
2000	10.52
2400	10.60
2500	10.60
3000	10.62
4000	10.67
5000	10.80
6000	10.90
7000	10.90
8000	10.94
9000	11.04
10000	11.14
11000	11.18
12000	11.22
13000	11.28
14000	11.35
15000	11.44
16000	11.49
17000	11.53
18000	11.57
19000	11.63
20000	11.68
21000	11.71
22000	11.80
23000	11.82
24000	11.93
25000	11.95

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

2. Factor = Attenuator loss + Cable loss

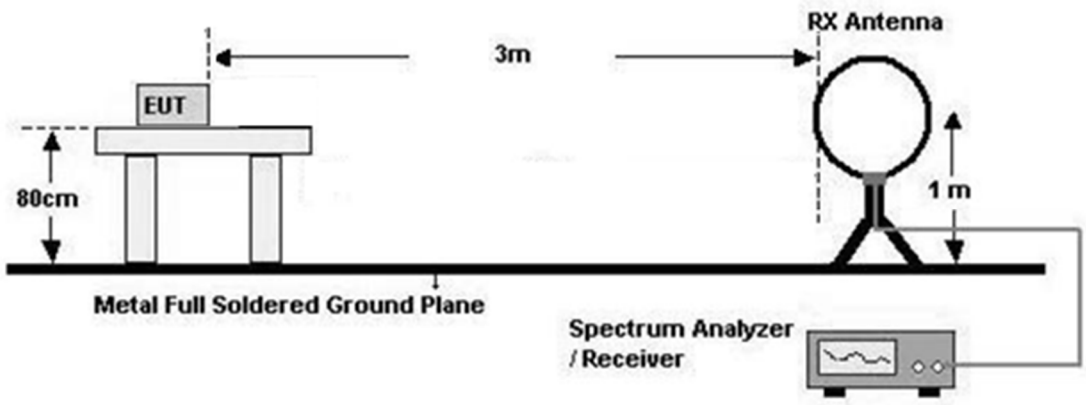
7.6. Radiated Test

Limit

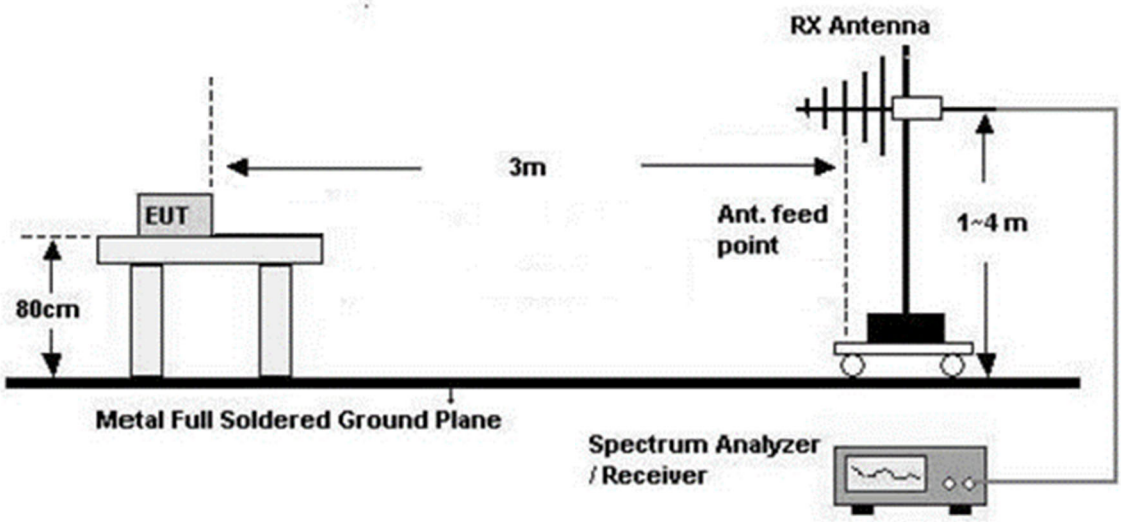
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

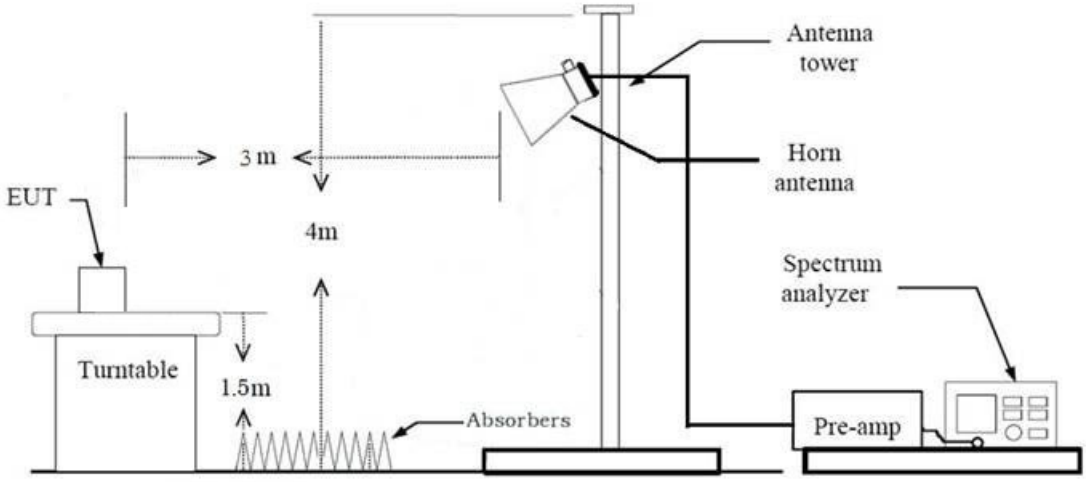
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions (Below 30 MHz)

Test Standard Used : Section 6.4 in ANSI C63.10-2020

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

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions (Below 1 GHz)

Test Standard Used : Section 6.5 in ANSI C63.10-2020

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 = Max hold
      - RBW = 100 kHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Quasi-peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Quasi-Peak
      - RBW = 120 kHz

   In general, (1) is used mainly
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

Test Standard Used : Section 6.6 in ANSI C63.10-2020

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. 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): Duty cycle ≥ 98 %
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
      - Sweep time = auto.
      - Trace mode = average (at least 100 traces).
   (3) Measurement Type(Average): Duty cycle < 98 %, duty cycle variations are less than ±2 %
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
      - Sweep time = auto.
      - Trace mode = average (at least 100 traces).
      - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 % duty cycle.
      - Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.
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.

9. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
10. Total(Measurement Type : Peak)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

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

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

Test Procedure of Radiated Restricted Band Edge

Test Standard Used : Section 6.10 & 11.12 in ANSI C63.10-2020

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. Spectrum Setting
(1) Measurement Type(Peak):
- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 3 x RBW

(2) Measurement Type(Average): Duty cycle ≥ 98 %
- Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle < 98 %, duty cycle variations are less than ±2 %
- Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz

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

(4) Measurement Type(Average , Integration Method) : Duty cycle ≥ 98 %

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 100 kHz
- VBW ≥ 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Compute the power by integrating the spectrum over 1 MHz using the analyzer's band-power measurement function with band limits set equal to the emission frequency ($f_{emission}$) ± 0.5 MHz. If the instrument does not have a band-power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by $f_{emission}$ ± 0.5 MHz

(5) Measurement Type(Average , Integration Method) : 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 = 100 kHz
- VBW ≥ 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Compute the power by integrating the spectrum over 1 MHz using the analyzer's band-power measurement function with band limits set equal to the emission frequency ($f_{emission}$) ± 0.5 MHz. If the instrument does not have a band-power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by $f_{emission}$ ± 0.5 MHz.
- 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.

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.
9. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
10. Total (Measurement Type : Peak)
    = Peak Measured Value
    Total(Measurement Type : Average, Duty cycle ≥ 98 %)
    = Average Measured Value
    Total(Measurement Type : Average, Duty cycle < 98 %)
    = Average Measured Value + Duty Cycle Factor
        - We apply to the offset in the range 1 GHz - 18 GHz.
        - The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

7.7. AC Power line Conducted Emissions

Limit

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

Test Standard Used : Section 6.2 in ANSI C63.10-2020)

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(Connector Type FFC / HW ver.1.0), Stand alone(Connector Type Harness / HW ver.1.1)
   - Worstcase : Stand alone(Connector Type FFC / HW ver.1.0)
2. All Antennas of operation were investigated and the worst case results are reported
   - Antenna Operation Type : SISO, MIMO_CDD(Ant.1+Ant.2), MIMO_SDM(Ant.1+Ant.2)
   - Worstcase : MIMO_CDD(Ant.1+Ant.2)
3. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge : X
4. All test was performed with continuous signal.(Duty Cycle ≥ 98%)
5. All data rate of operation were investigated and the test results are worst case in lowest Data Rate of each mode.
   - 802.11b : 1 Mbps
   - 802.11g : 6 Mbps
   - 802.11n(HT20): MCS0
6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
7. Radiated Spurious Emission
   - All modes of operation were investigated and the worst case results are reported.
   - Mode: 802.11b, 802.11g, 802.11n(HT20)
   - Worst case: 802.11b

Radiated test(Simultaneous transmission Scenario)

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone(Connector Type FFC / HW ver.1.0), Stand alone(Connector Type Harness / HW ver.1.1)
   - Worstcase : Stand alone(Connector Type FFC / HW ver.1.0)
2. EUT Axis
   - Radiated Spurious Emissions : X
3. All of Simultaneous transmission Scenario were investigated and the worst case configuration results are reported. (Bluetooth Worst case : BTLE)

Simultaneous transmission Scenario	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	6 GHz WiFi Ant.1	6 GHz WiFi Ant.2	Bluetooth	Test Case
Bluetooth + 2.4 GHz WiFi MIMO	on	on	-	-	-	-	on	
Bluetooth + 5 GHz WiFi MIMO	-	-	on	on	-	-	on	Scenario 1
Bluetooth + 6 GHz WiFi MIMO	-	-			on	on	on	
2.4 GHz WiFi SISO + 5 GHz WiFi SISO	-	on	on	-	-	-	-	
2.4 GHz WiFi SISO + 6 GHz WiFi SISO	-	on	-	-	on	-	-	
Bluetooth + 2.4 GHz WiFi SISO + 6 GHz WiFi SISO	-	on	-	-	on	-	on	
Bluetooth + 2.4 GHz WiFi SISO + 5 GHz WiFi SISO	-	on	on	-	-	-	on	Scenario 2

4. The Simultaneous transmission Scenario mode test investigated both intermodulation and radiated spurious emissions.
   - Worst result: Radiated spurious emissions
   - Intermodulation: No signals are generated.
   - Radiated spurious emissions: cf. Section 9.6
5. The following tables show the worst case configurations determined during testing.
   (Worst case: The lowest margin condition the channels and modes were selected for test.)

Scenario 2	Description	Bluetooth Emission	2.4 GHz Emission	5 GHz Emission
Bluetooth + 2.4 GHz WiFi SISO + 5 GHz WiFi SISO	Antenna	Bluetooth ANT	ANT 2	ANT 1
	Channel	39	6	149
	Data Rate	1 Mbps	1 Mbps	6 Mbps
	Mode	1M 37 Bytes	802.11b	802.11a

Note : UNII Simultaneous transmission Data refer to [UNII] Test Report

Note : BTLE Simultaneous transmission Data refer to [BTLE] Test Report

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + Notebook
   - Worstcase : Stand alone + Notebook
2. Harness Cable Type, FFC Cable Type were tested and the worst case results are reported.
(Worst case : FFC Cable Type)

Conducted test

1. The EUT was configured with data rate of highest power.
2. All test was performed with continuous signal.(Duty Cycle ≥ 98%)

8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 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

Note. The decision rule applies 'simple acceptance'

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)	-	-	-	-

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% Occupied Bandwidth

[ANT. 1]

Mode	Freq. [MHz]	CH.	6dB Bandwidth [MHz]	99% OBW [MHz]	Minimum Bandwidth [MHz]
802.11b	2412	1	8.148	12.326	0.50
	2437	6	8.149	12.399	0.50
	2462	11	8.146	12.379	0.50
	2467	12	8.150	12.518	0.50
	2472	13	8.149	12.516	0.50
802.11g	2412	1	15.97	16.466	0.50
	2437	6	16.24	16.958	0.50
	2462	11	16.32	16.973	0.50
	2467	12	15.98	16.452	0.50
	2472	13	16.05	16.464	0.50
802.11n (HT20)	2412	1	17.31	17.555	0.50
	2437	6	17.58	18.062	0.50
	2462	11	17.52	18.053	0.50
	2467	12	17.28	17.550	0.50
	2472	13	17.24	17.540	0.50

[ANT. 2]

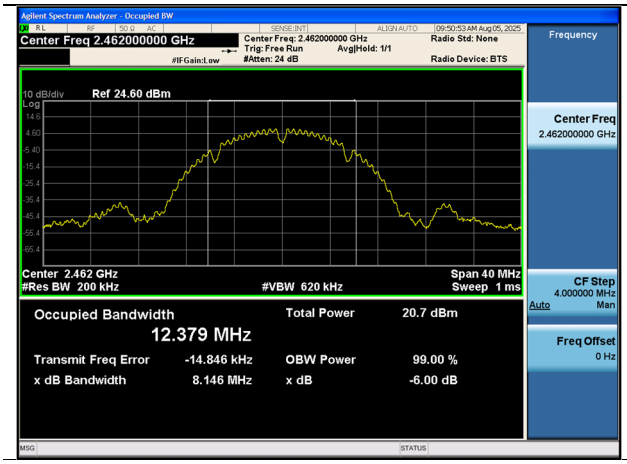
Mode	Freq. [MHz]	CH.	6dB Bandwidth [MHz]	99% OBW [MHz]	Minimum Bandwidth [MHz]
802.11b	2412	1	8.139	12.158	0.50
	2437	6	8.141	12.272	0.50
	2462	11	8.139	12.261	0.50
	2467	12	8.147	12.526	0.50
	2472	13	8.147	12.523	0.50
802.11g	2412	1	16.01	16.433	0.50
	2437	6	16.25	16.945	0.50
	2462	11	16.25	16.976	0.50
	2467	12	16.07	16.441	0.50
	2472	13	16.05	16.459	0.50
802.11n (HT20)	2412	1	17.29	17.576	0.50
	2437	6	17.59	18.039	0.50
	2462	11	17.57	18.091	0.50
	2467	12	17.27	17.572	0.50
	2472	13	17.23	17.557	0.50

▣ Test Plots

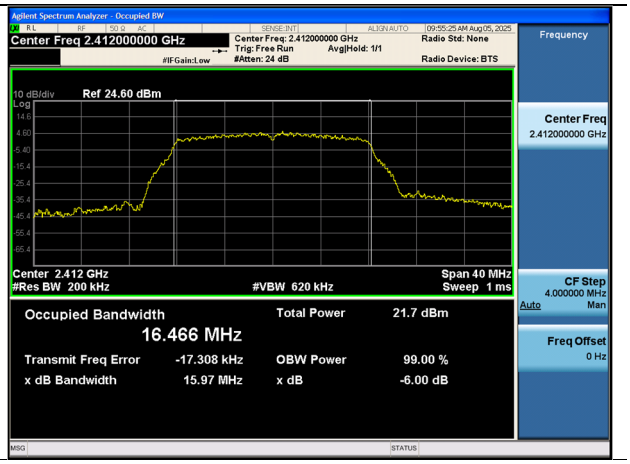
[ANT. 1]

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

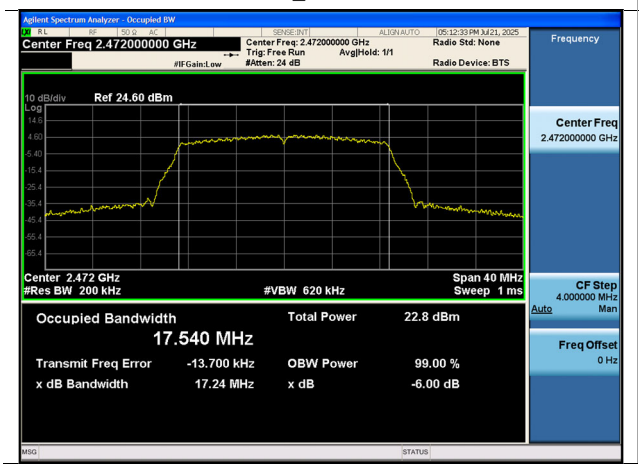
802.11b-CH 11



802.11g-CH 1



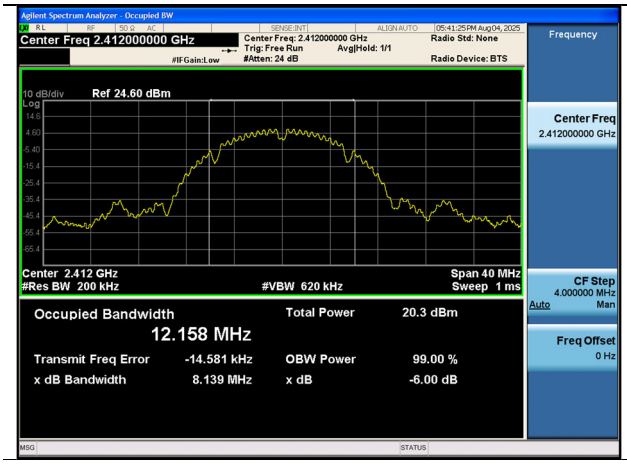
802.11n_HT20-CH 13



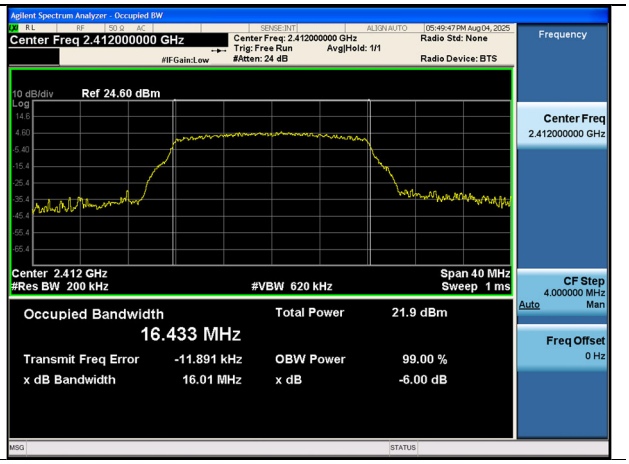
[ANT. 2]

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

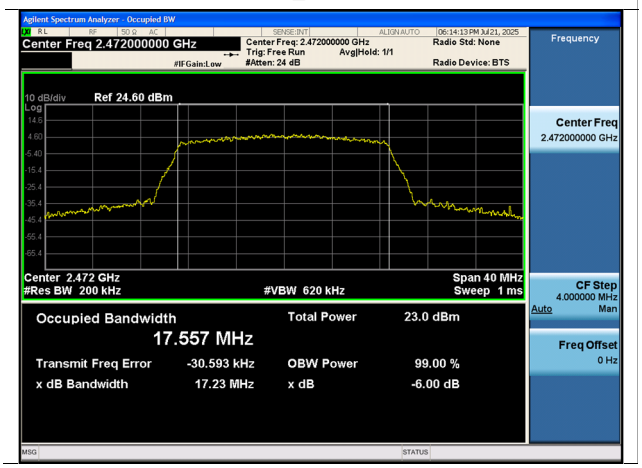
802.11b-CH 1



802.11g-CH 1



802.11n_HT20-CH 13



9.3 OUTPUT POWER

Note :

1. MIMO_CDD(Ant.1+Ant.2) Power = 10•log((10^(Ant.1 power /10))+(10^(Ant.2 power /10)))

Peak Power

[MIMO_CDD(Ant.1+Ant.2)]

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Peak Power [dBm]			Limit [dBm]
				ANT1	ANT2	MIMO	
802.11b	2412	1	1M	17.69	17.99	20.85	30
	2437	6	1M	17.89	18.16	21.04	30
	2462	11	1M	18.10	18.14	21.13	30
	2467	12	1M	17.22	17.50	20.37	30
	2472	13	1M	11.66	12.08	14.89	30
802.11g	2412	1	6M	22.50	22.78	25.65	30
	2437	6	6M	22.23	22.41	25.33	30
	2462	11	6M	22.32	22.44	25.39	30
	2467	12	6M	18.55	19.03	21.81	30
	2472	13	6M	15.67	17.10	19.45	30
802.11n HT20	2412	1	MCS0	22.28	22.68	25.49	30
	2437	6	MCS0	22.17	22.42	25.30	30
	2462	11	MCS0	22.12	22.44	25.29	30
	2467	12	MCS0	18.48	18.96	21.74	30
	2472	13	MCS0	15.52	16.08	18.82	30

Average Power

Note :

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

[MIMO_CDD(Ant.1+Ant.2)]

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Average Power [dBm]			Limit [dBm]
				ANT1	ANT2	MIMO	
802.11b	2412	1	1M	14.75	14.90	17.83	30
	2437	6	1M	14.95	15.08	18.03	30
	2462	11	1M	15.14	15.10	18.13	30
	2467	12	1M	14.34	14.47	17.41	30
	2472	13	1M	8.79	9.06	11.94	30
802.11g	2412	1	6M	14.56	14.83	17.71	30
	2437	6	6M	14.30	14.48	17.40	30
	2462	11	6M	14.37	14.50	17.44	30
	2467	12	6M	10.65	10.85	13.76	30
	2472	13	6M	7.74	9.09	11.48	30
802.11n HT20	2412	1	MCS0	14.36	14.74	17.57	30
	2437	6	MCS0	14.24	14.46	17.36	30
	2462	11	MCS0	14.17	14.48	17.34	30
	2467	12	MCS0	10.56	10.98	13.78	30
	2472	13	MCS0	7.60	8.04	10.83	30

9.4 POWER SPECTRAL DENSITY

Note :

1. MIMO_CDD(Ant1+Ant2) PSD = 10•log((10^(Ant. 1 PSD /10))+(10^(Ant. 2 PSD /10)))

[MIMO_CDD(Ant.1+Ant.2)]

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Power Spectral Density [dBm/kHz]			Limit
				ANT1	ANT2	MIMO	
802.11b	2412	1	1M	-2.139	-1.728	1.082	8 dBm / 3 kHz
	2437	6	1M	-1.660	-1.263	1.553	
	2462	11	1M	-1.529	-1.666	1.413	
	2467	12	1M	-2.017	-2.436	0.789	
	2472	13	1M	-8.158	-7.430	-4.768	
802.11g	2412	1	6M	-3.984	-1.789	0.261	
	2437	6	6M	-4.236	-1.556	0.318	
	2462	11	6M	-4.338	-2.873	-0.534	
	2467	12	6M	-7.363	-4.808	-2.890	
	2472	13	6M	-11.105	-7.159	-5.688	
802.11n HT20	2412	1	MCS0	-3.140	-1.750	0.621	
	2437	6	MCS0	-3.761	-1.891	0.284	
	2462	11	MCS0	-4.980	-2.892	-0.801	
	2467	12	MCS0	-7.843	-5.236	-3.336	
	2472	13	MCS0	-10.356	-6.959	-5.323	

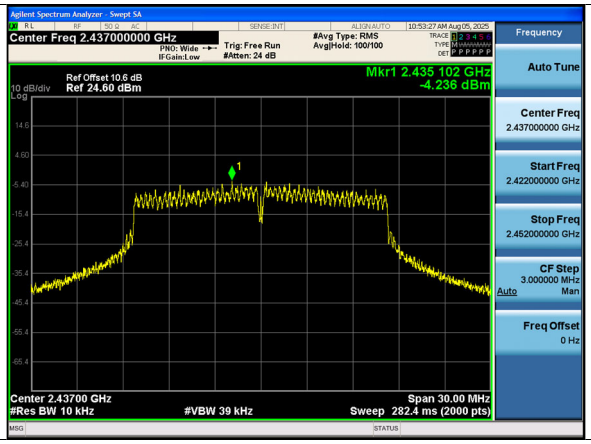
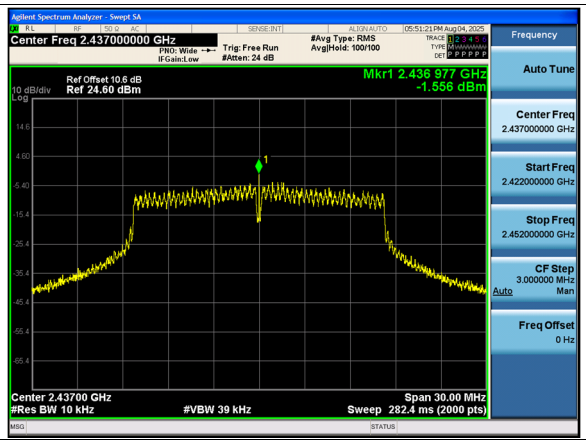
▣ Test Plots

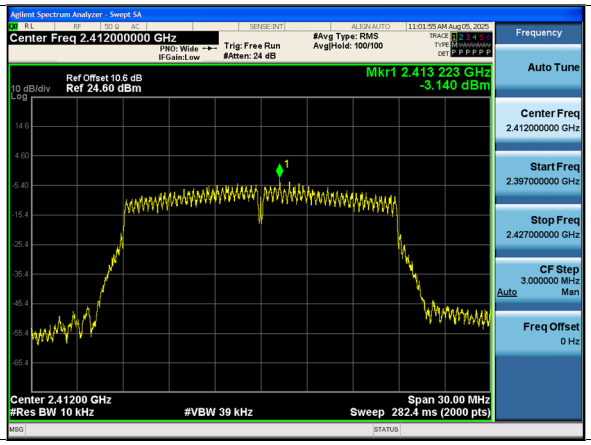
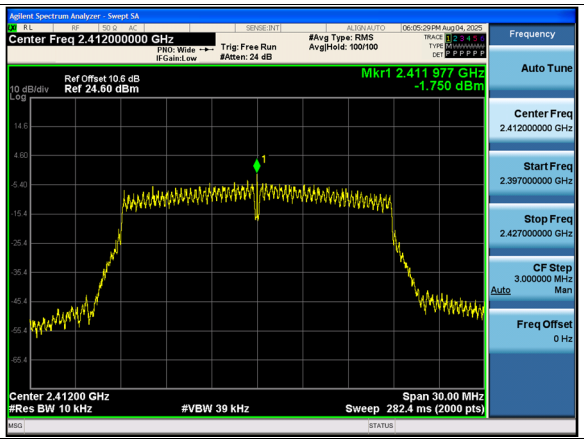
Note :

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

[MIMO_CDD(Ant.1+Ant.2)]

Power Spectral Density (802.11b-CH 6)	
ANT. 1	ANT. 2
	

Power Spectral Density (802.11g-CH 6)	
ANT. 1	ANT. 2
	

Power Spectral Density (802.11n-CH 1)	
ANT. 1	ANT. 2
	

9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

Band Edge

Limit : 20 dBc

[ANT. 1]

Mode	Frequency [MHz]	Channel No.	Measured Position	Band-Edge [dB]
802.11b	2412	1	Lowest Bandedge	49.035
	2462	11	Highest Bandedge	59.742
	2467	12	Highest Bandedge	57.695
	2472	13	Highest Bandedge	47.607
802.11g	2412	1	Lowest Bandedge	39.715
	2462	11	Highest Bandedge	48.545
	2467	12	Highest Bandedge	44.039
	2472	13	Highest Bandedge	40.244
802.11n HT20	2412	1	Lowest Bandedge	41.064
	2462	11	Highest Bandedge	46.938
	2467	12	Highest Bandedge	43.676
	2472	13	Highest Bandedge	40.235

[ANT. 2]

Mode	Frequency [MHz]	Channel No.	Measured Position	Band-Edge [dB]
802.11b	2412	1	Lowest Bandedge	44.412
	2462	11	Highest Bandedge	60.785
	2467	12	Highest Bandedge	53.004
	2472	13	Highest Bandedge	44.618
802.11g	2412	1	Lowest Bandedge	40.589
	2462	11	Highest Bandedge	51.130
	2467	12	Highest Bandedge	43.322
	2472	13	Highest Bandedge	38.655
802.11n HT20	2412	1	Lowest Bandedge	38.207
	2462	11	Highest Bandedge	48.131
	2467	12	Highest Bandedge	41.480
	2472	13	Highest Bandedge	37.980

Conducted Spuirous Emission

Limit : 20 dBc

[ANT. 1]

Mode	Frequency [MHz]	Channel No.	Conducted Spuirous Emission [dB]
802.11b	2412	1	62.254
	2437	6	64.224
	2462	11	63.074
	2467	12	62.547
	2472	13	57.472
802.11g	2412	1	59.157
	2437	6	58.059
	2462	11	57.853
	2467	12	53.908
	2472	13	52.405
802.11n HT20	2412	1	57.936
	2437	6	58.526
	2462	11	57.121
	2467	12	54.938
	2472	13	51.108

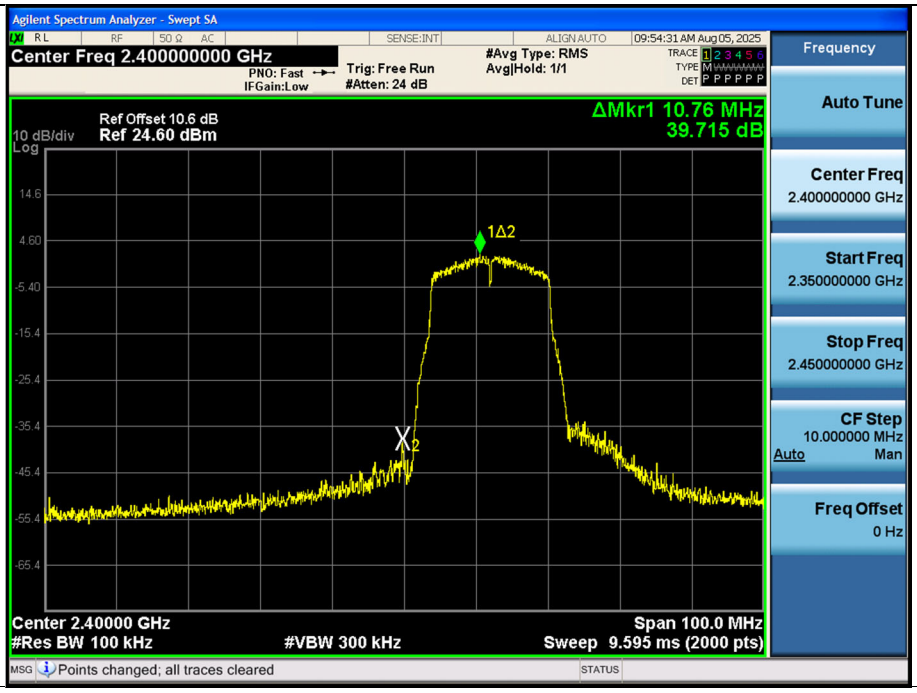
[ANT. 2]

Mode	Frequency [MHz]	Channel No.	Conducted Spuirous Emission [dB]
802.11b	2412	1	62.730
	2437	6	62.068
	2462	11	63.104
	2467	12	62.753
	2472	13	57.047
802.11g	2412	1	59.050
	2437	6	57.897
	2462	11	58.170
	2467	12	54.536
	2472	13	53.959
802.11n HT20	2412	1	58.213
	2437	6	57.497
	2462	11	58.438
	2467	12	54.668
	2472	13	51.980

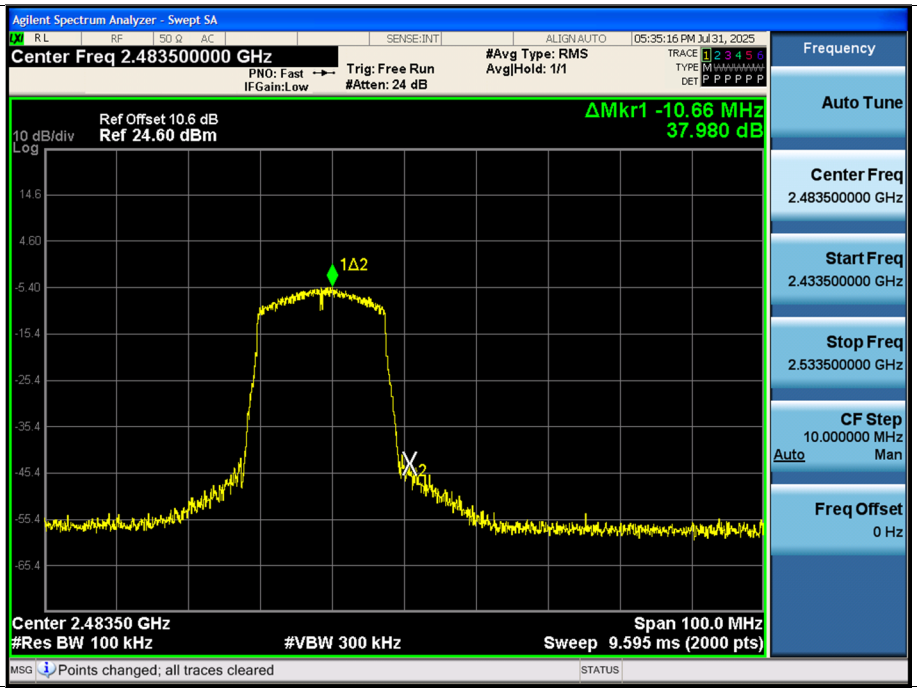
▣ Test Plots

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

[ANT. 1] 802.11g - CH 1



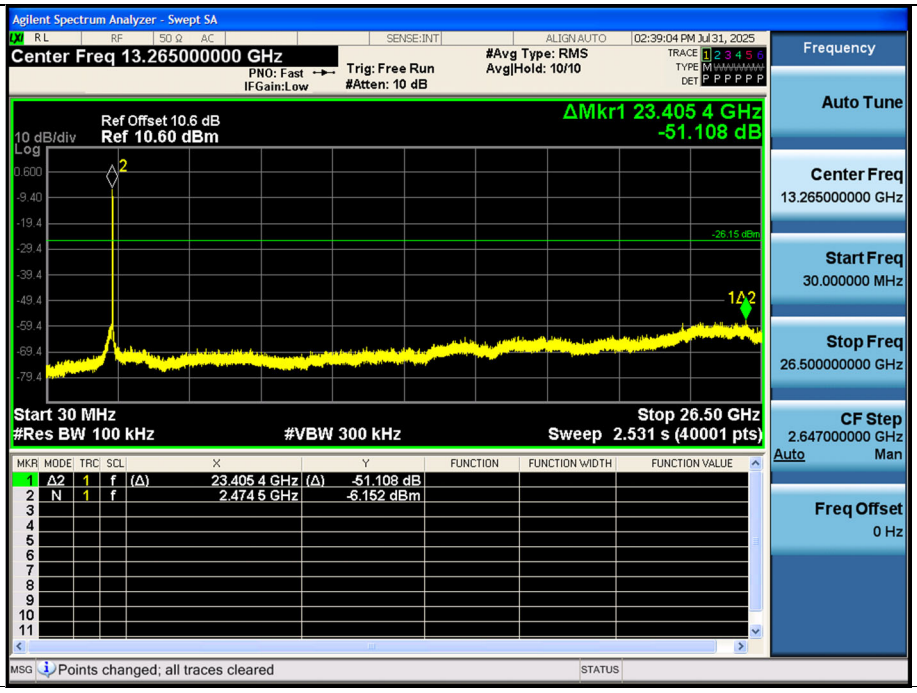
[ANT. 2] 802.11n - CH 13



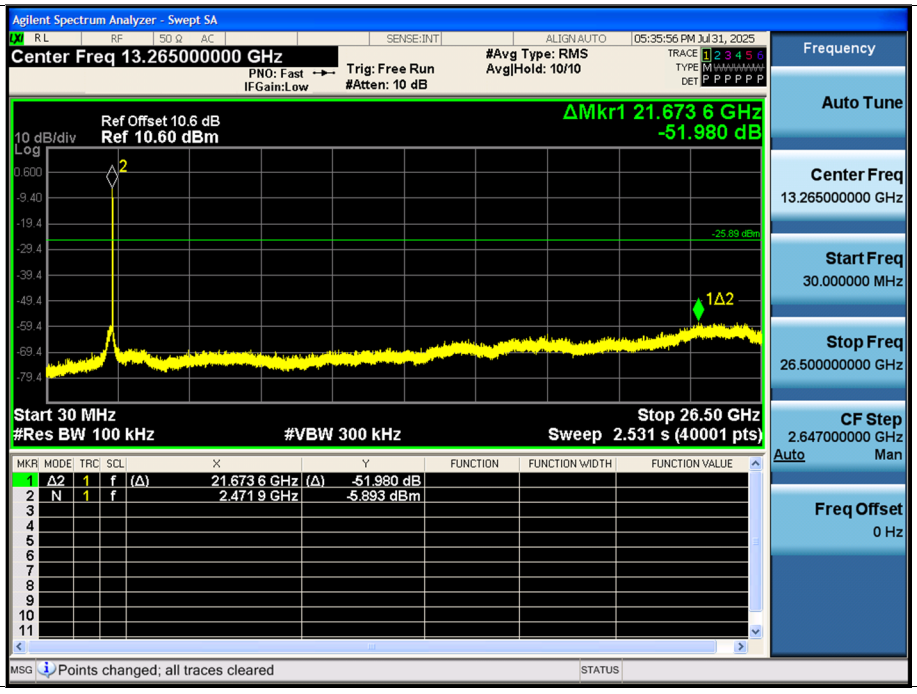
▣ Test Plots(Conducted Spurious Emission)

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

[ANT. 1] 802.11n - CH 13



[ANT. 2] 802.11n - CH 13



Limit

ANT.1 : -26.152 dBm, ANT.2 : -25.893 dBm

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/m]	[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/m]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]
No Critical peaks found						

Note:

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

Frequency Range : Above 1 GHz

[MIMO_CDD(Ant1+Ant2)]

Band :	DTS		Operation Mode :		802.11b 1Mbps			
CH.1	2412 MHz		Transfer Rate :		1Mbps			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4824	50.66	0.00	1.95	V	52.61	73.98	21.37	PK
4824	46.51	0.00	1.95	V	48.46	53.98	5.52	AV
7236	42.11	0.00	10.48	V	52.59	73.98	21.39	PK
7236	33.01	0.00	10.48	V	43.49	53.98	10.49	AV
4824	52.76	0.00	1.95	H	54.71	73.98	19.27	PK
4824	48.47	0.00	1.95	H	50.42	53.98	3.56	AV
7236	42.89	0.00	10.48	H	53.37	73.98	20.61	PK
7236	33.46	0.00	10.48	H	43.94	53.98	10.04	AV

Band :	DTS		Operation Mode :		802.11b 1Mbps			
CH.6	2437 MHz		Transfer Rate :		1Mbps			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4874	51.55	0.00	2.26	V	53.81	73.98	20.17	PK
4874	47.92	0.00	2.26	V	50.18	53.98	3.80	AV
7311	41.46	0.00	9.95	V	51.41	73.98	22.57	PK
7311	30.81	0.00	9.95	V	40.76	53.98	13.22	AV
4874	53.04	0.00	2.26	H	55.30	73.98	18.68	PK
4874	48.41	0.00	2.26	H	50.67	53.98	3.31	AV
7311	42.19	0.00	9.95	H	52.14	73.98	21.84	PK
7311	31.12	0.00	9.95	H	41.07	53.98	12.91	AV

Band :	DTS		Operation Mode :		802.11b 1Mbps			
CH.11	2462 MHz		Transfer Rate :		1Mbps			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4924	49.94	0.00	3.14	V	53.08	73.98	20.90	PK
4924	44.86	0.00	3.14	V	48.00	53.98	5.98	AV
7386	41.14	0.00	10.39	V	51.53	73.98	22.45	PK
7386	29.27	0.00	10.39	V	39.66	53.98	14.32	AV
4924	50.92	0.00	3.14	H	54.06	73.98	19.92	PK
4924	45.52	0.00	3.14	H	48.66	53.98	5.32	AV
7386	42.21	0.00	10.39	H	52.60	73.98	21.38	PK
7386	30.94	0.00	10.39	H	41.33	53.98	12.65	AV

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

[Simultaneous transmission]

Scenario 2

BT LE Ch. 39_1 Mbps_1M 37 Bytes + ANT 2_2.4 GHz 802.11b Ch. 6_1 Mbps + ANT 1_5 GHz 802.11a Ch. 149_6 Mbps

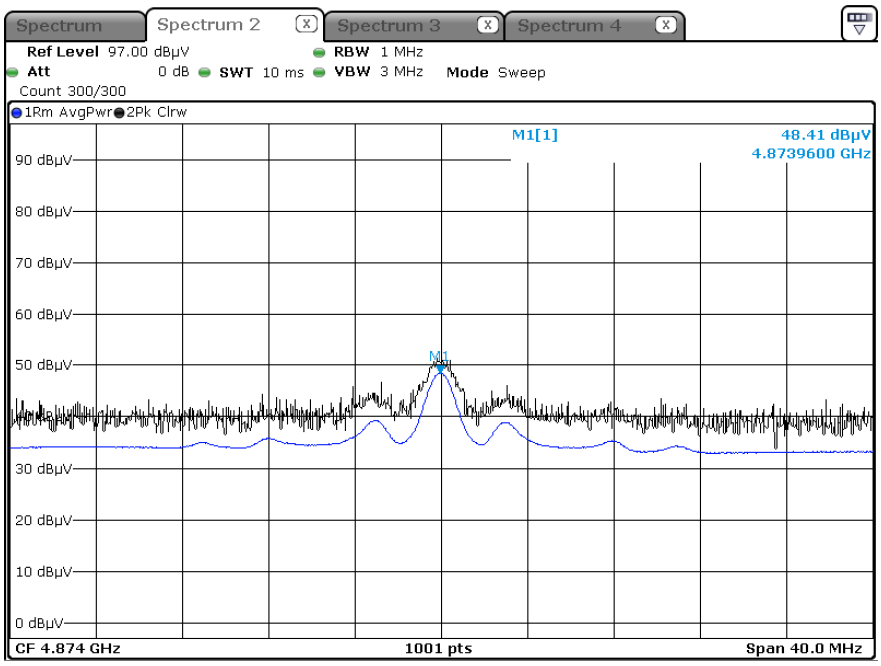
Frequency	Measured value	D.C.F	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
4874	48.42	0.00	2.26	V	50.68	73.98	23.30	PK
4874	40.76	0.00	2.26	V	43.02	53.98	10.96	AV
7311	41.68	0.00	9.95	V	51.63	73.98	22.35	PK
7311	30.66	0.00	9.95	V	40.61	53.98	13.37	AV
4874	49.15	0.00	2.26	H	51.41	73.98	22.57	PK
4874	42.61	0.00	2.26	H	44.87	53.98	9.11	AV
7311	40.61	0.00	9.95	H	50.56	73.98	23.42	PK
7311	29.34	0.00	9.95	H	39.29	53.98	14.69	AV

▣ Test Plots

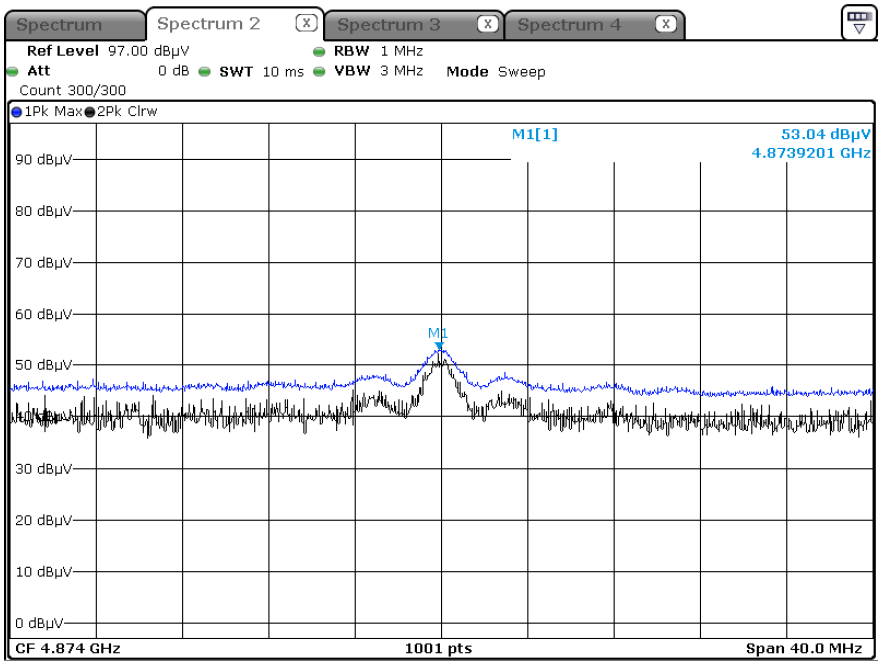
Note: In order to simplify the report, Plots of worst case are only reported.

[MIMO_CDD(Ant1+Ant2)]

Radiated Spurious Emissions plot – Average Result (802.11b_1 Mbps, Ch.6 2nd Harmonic, Y-H)



Radiated Spurious Emissions plot – Peak Result (802.11b_1 Mbps, Ch.6 2nd Harmonic, Y-H)

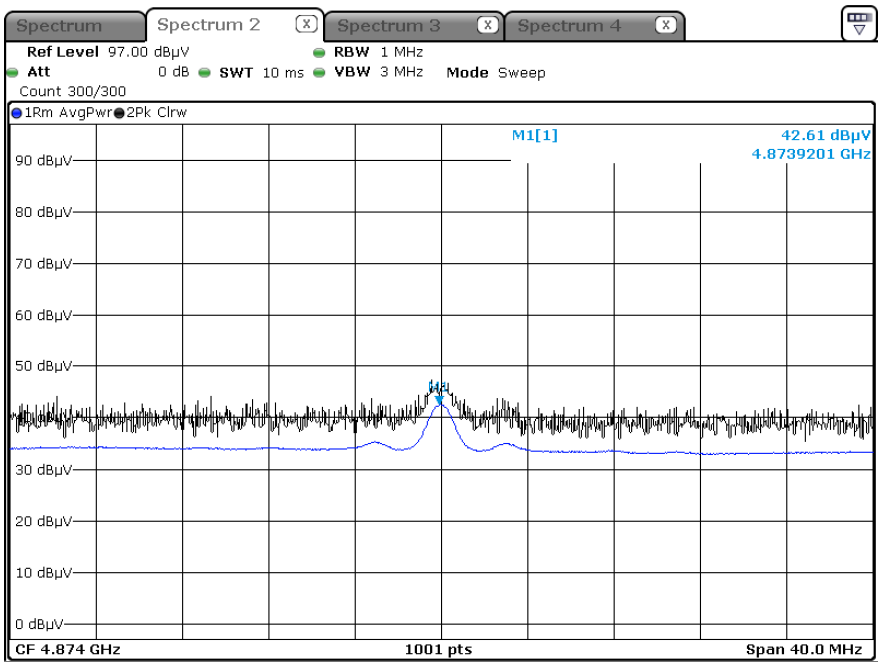


[Simultaneous transmission]

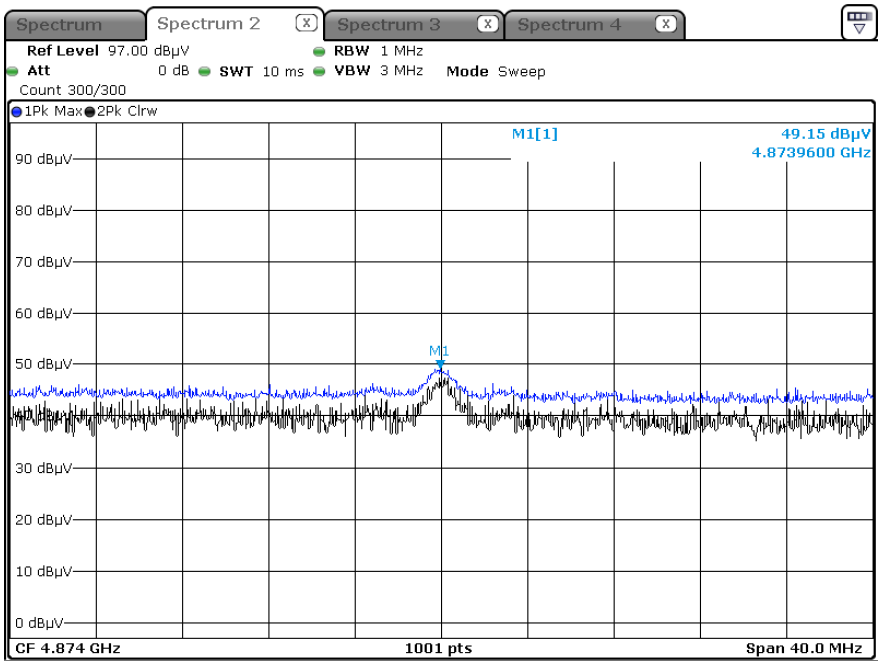
Scenario 2

BT LE Ch. 39_1 Mbps_1M 37 Bytes + ANT 2_2.4 GHz 802.11b Ch. 6_1 Mbps + ANT 1_5 GHz 802.11a Ch. 149_6 Mbps

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



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



9.7 RADIATED RESTRICTED BAND EDGES

9.7.1 Channel 1, 11

[MIMO_CDD(Ant1+Ant2)]

802.11b	Channel	01 Ch	Freq	2412 MHz		Transfer Rate	1 Mbps
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
2390.0	56.97	-	H	56.97	73.98	17.01	PK
2390.0	45.82	-	H	45.82	53.98	8.16	AV

802.11b	Channel	11 Ch	Freq	2462 MHz		Transfer Rate	1 Mbps
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	57.66	-	H	57.66	73.98	16.32	PK
2483.5	45.89	-	H	45.89	53.98	8.09	AV

802.11g		Channel	01 Ch	Freq	2412 MHz		Transfer Rate	6 Mbps
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
2390.0	60.52	0.00	-	H	60.52	73.98	13.46	PK
2390.0	48.04	0.00	-	H	48.04	53.98	5.94	AV

802.11g		Channel	11 Ch	Freq	2462 MHz		Transfer Rate	6 Mbps
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	64.25	0.00	-	H	64.25	73.98	9.73	PK
2483.5	50.61	0.00	-	H	50.61	53.98	3.37	AV

802.11n (HT20)		Channel	01 Ch	Freq	2412 MHz		Transfer MCS Index	MCS0
Frequency	Measured Value	Duty Cycle Factor	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2390.0	63.30	0.00	-	H	63.30	73.98	10.68	PK
2390.0	49.56	0.00	-	H	49.56	53.98	4.42	AV

802.11n (HT20)		Channel	11 Ch	Freq	2462 MHz		Transfer MCS Index	MCS0
Frequency	Measured Value	Duty Cycle Factor	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	64.88	0.00	-	H	64.88	73.98	9.10	PK
2483.5	49.94	0.00	-	H	49.94	53.98	4.04	AV

9.7.2 Channel 12, 13

[MIMO_CDD(Ant1+Ant2)]

802.11b	Channel	12 Ch	Freq	2467 MHz		Transfer Rate	1 Mbps
Frequency	Measured Value	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	59.44	-	H	59.44	73.98	14.54	PK
2483.5	49.07	-	H	49.07	53.98	4.91	AV

802.11b	Channel	13 Ch	Freq	2472 MHz		Transfer Rate	1 Mbps
Frequency	Measured Value	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	57.87	-	H	57.87	73.98	16.11	PK
2483.5	47.59	-	H	47.59	53.98	6.39	AV

802.11g		Channel	12 Ch	Freq	2467 MHz		Transfer Rate	6 Mbps
Frequency	Measured Value	Duty Cycle Factor	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	62.94	0.00	-	H	62.94	73.98	11.04	PK
2483.5	49.79	0.00	-	H	49.79	53.98	4.19	AV

802.11g		Channel	13 Ch	Freq	2472 MHz		Transfer Rate	6 Mbps
Frequency	Measured Value	Duty Cycle Factor	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	63.13	0.00	-	H	63.13	73.98	10.85	PK
2483.5	49.72	0.00	-	H	49.72	53.98	4.26	AV

802.11n (HT20)		Channel	12 Ch	Freq	2467 MHz		Transfer MCS Index	MCS0
Frequency	Measured Value	Duty Cycle Factor	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	63.30	0.00	-	H	63.30	73.98	10.68	PK
2483.5	49.48	0.00	-	H	49.48	53.98	4.50	AV

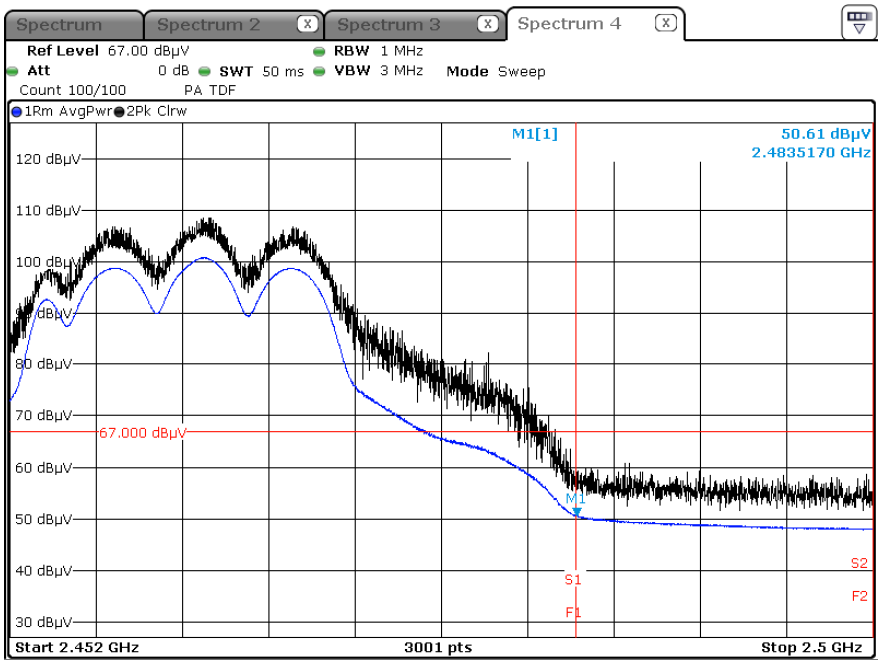
802.11n (HT20)		Channel	13 Ch	Freq	2472 MHz		Transfer MCS Index	MCS0
Frequency	Measured Value	Duty Cycle Factor	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
2483.5	63.16	0.00	-	H	63.16	73.98	10.82	PK
2483.5	49.97	0.00	-	H	49.97	53.98	4.01	AV

▣ Test Plots

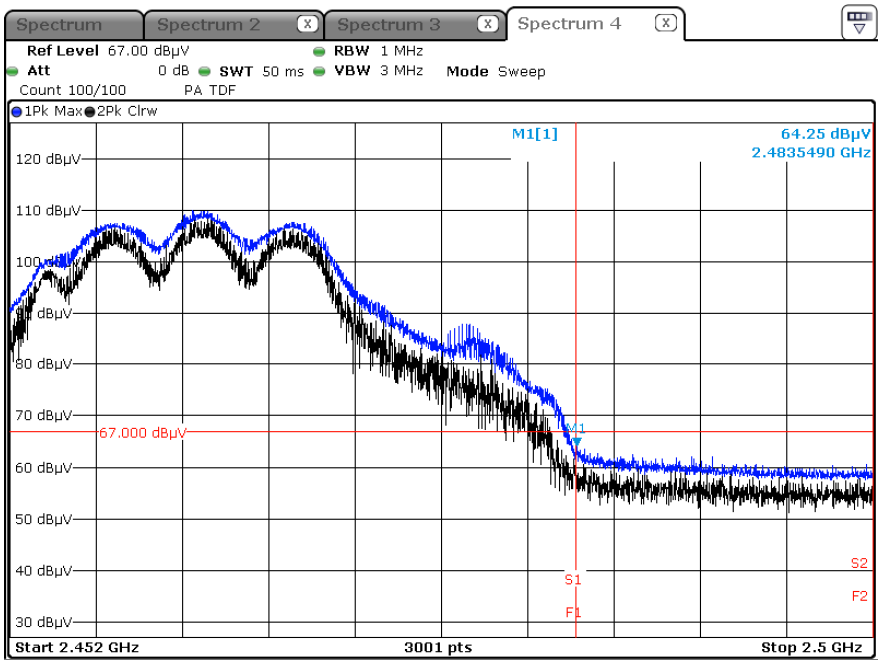
Note: In order to simplify the report, Plots of worst case are only reported.

[MIMO_CDD(Ant1+Ant2)]

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



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



9.8 POWERLINE CONDUCTED EMISSIONS

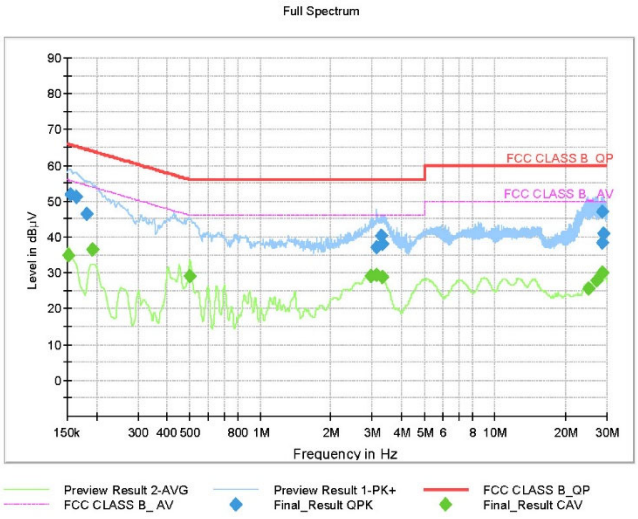
Conducted Emissions

Test 1 / 1

Test Report

Common Information

EUT : LGSWNAX61
Operating Conditions : 2.4G WLAN Mode
Comment :



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1545	51.84	65.75	13.92	9.000	L1	9.6
0.1635	51.13	65.28	14.15	9.000	L1	9.6
0.1815	46.55	64.42	17.87	9.000	L1	9.6
3.1415	37.13	56.00	18.87	9.000	N	9.7
3.2878	40.29	56.00	15.71	9.000	N	9.7
3.3238	37.94	56.00	18.06	9.000	N	9.7
28.6115	38.47	60.00	21.53	9.000	L1	10.0
28.7960	46.90	60.00	13.10	9.000	L1	10.0
28.9805	41.00	60.00	19.00	9.000	L1	10.0

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1523	34.95	55.88	20.92	9.000	N	9.6
0.1928	36.45	53.92	17.46	9.000	L1	9.6
0.5023	29.08	46.00	16.92	9.000	N	9.6
2.9413	29.10	46.00	16.90	9.000	N	9.7
3.1370	29.44	46.00	16.56	9.000	N	9.7
3.2900	28.87	46.00	17.13	9.000	N	9.7
25.0093	25.50	50.00	24.50	9.000	L1	10.0
27.0095	27.80	50.00	22.20	9.000	L1	10.0
28.7983	29.98	50.00	20.02	9.000	L1	10.0

2025-08-15 오전 10:46:31

10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	07/15/2026	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	08/20/2026	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	02/11/2026	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	12/12/2025	Annual
Power Measurement Set	OSP 120	Rohde & Schwarz	101231	10/17/2025	Annual
Power Meter	N1911A	Agilent	MY45100523	02/21/2026	Annual
Power Sensor	N1921A	Agilent	MY57820067	02/04/2026	Annual
Directional Coupler	87300B	Agilent	3116A03621	10/21/2025	Annual
Power Splitter	11667B	Hewlett Packard	5001	04/10/2026	Annual
DC Power Supply	E3632A	H.P	KR75303243	04/16/2026	Annual
Attenuator(10 dB)	8493C	Hewlett Packard	07560	05/27/2026	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
Automation Software	FCC WLAN Conducted	HCT CO., LTD	-	-	-
Automation Software	FCC Bluetooth Conducted	HCT CO., LTD	-	-	-

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 & Turn Table)	CO3000	Innco system	CO3000/1031/ 41190717/P	N/A	N/A
Antenna Mast	MA4640	Innco system	S2AM	07/25/2026	Annual
Turn Table	DS2000-S	Innco system	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/07/2026	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	760	02/17/2027	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	02299	01/29/2026	Biennial
Horn Antenna (15GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
Spectrum Analyzer	FSV40	Rohde & Schwarz	100901	02/21/2026	Annual
Signal Analyzer	N9030A	Agilent	MY52350879	03/25/2026	Annual
Attenuator(3 dB)	18B-03	Api tech.	1	04/21/2026	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	05/27/2026	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	05/27/2026	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	12/26/2025	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	01/09/2026	Annual
RF Switching System	FMSR-04B (3G HPF+LNA)	T&M SYSTEM	S2L1	12/23/2025	Annual
RF Switching System	FMSR-04B (10dB ATT+LNA)	T&M SYSTEM	S2L2	12/23/2025	Annual
RF Switching System	FMSR-04B (3dB ATT+LNA)	T&M SYSTEM	S2L3	12/23/2025	Annual
RF Switching System	FMSR-04B (LNA)	T&M SYSTEM	S2L4	12/23/2025	Annual
RF Switching System	FMSR-04B (7G HPF+LNA)	T&M SYSTEM	S2L5	12/23/2025	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/07/2025	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/19/2026	Annual
Automation Software	FCC WLAN Radiated	HCT CO., LTD	-	-	-

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-2509-FC004-P