TEST REPORT

FCC DTS Test for SM-X528U
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2502-FC030

DATE OF ISSUE
February 13, 2025

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Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Product Name Model Name	Tablet SM-X528U
FCC ID	A3LSMX528U
Date of Test	December 23, 2024 ~ February 13, 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)

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	February 13, 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). When confirmation of authenticity of this test report is required, please contact www.hct.co.kr The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

1. EUT DESCRIPTION

Model	SM-X528U			
Additional Model	-			
EUT Type	Tablet			
Power Supply	DC 3.86 V			
Frequency Range	2 412 MHz ~ 2 462 MHz			
Max. RF Output Power	Average Power	SISO Ant.1	802.11b : 802.11g : 802.11n(HT20) :	19.56 dBm 17.28 dBm 16.09 dBm
		MIMO(Ant.1+Ant.2)	802.11b : 802.11g : 802.11n(HT20) :	22.74 dBm 20.18 dBm 18.75 dBm
	Peak Power	SISO Ant.1	802.11b : 802.11g : 802.11n(HT20) :	25.86 dBm 25.33 dBm 25.02 dBm
		MIMO(Ant.1+Ant.2)	802.11b : 802.11g : 802.11n(HT20) :	28.85 dBm 28.05 dBm 27.26 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n			
Number of Channels	11 Channels			
Antenna Specification	Type: Metal			
Serial number	Conducted : R32XC00A7QD Radiated : R32XC00A53E			

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant.1	Ant.2	CDD	SDM
802.11b	O	X	O	X
802.11g	O	X	O	X
802.11n(HT20)	O	X	X	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 bands simultaneously on each antenna.

Simultaneous transmission Scenario	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	BT	Test Case
Bluetooth + 5 GHz WiFi MIMO	on	on	on	Scenario1

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	-4.50	2/2	-1.64	-4.50
ANT.2	-4.80			

Note

According to ANSI C63.10-2013 section 14.4.3, the directional gain is calculated using the formula, where G_N is the gain of the nth antenna and N_{ANT} is the total number of antennas used.

Directional gain(CDD) = 10·log(((10$^{(ANT.0\ Gain/20)}$+10$^{(ANT.1\ Gain/20)}$)^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 : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

EUT CONFIGURATION

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

EUT EXERCISE

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

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated March 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 C63.10-2013.

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.

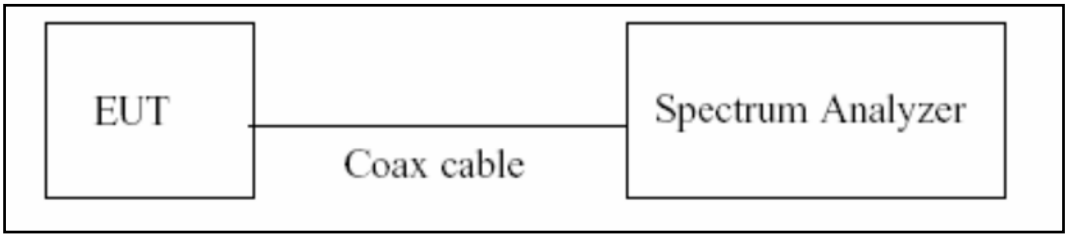
Parameter	Expanded Uncertainty (±kHz)
X dB, 99% Bandwidth	95 (Confidence level about 95 %, k=2)
Frequency stability	28 (Confidence level about 95 %, k=2)

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (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)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.58 (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*.

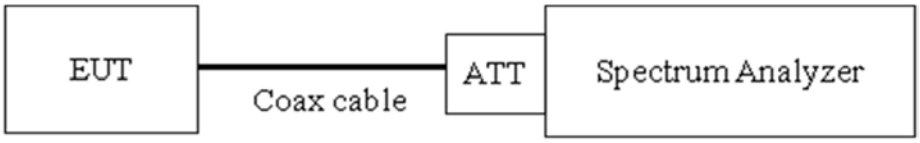
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz or 50 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Average
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6 dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

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

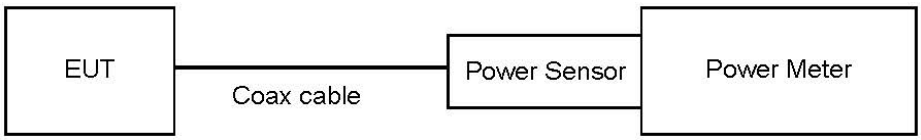
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

▪ Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)

: Measure the peak power of the transmitter.

▪ Average Power (Procedure 11.9.2.3 in ANSI 63.10-2013)

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

Sample Calculation

▪ Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss

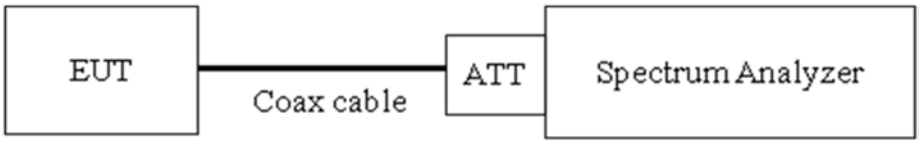
▪ Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

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

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

The spectrum analyzer is set to :

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

Sample Calculation

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

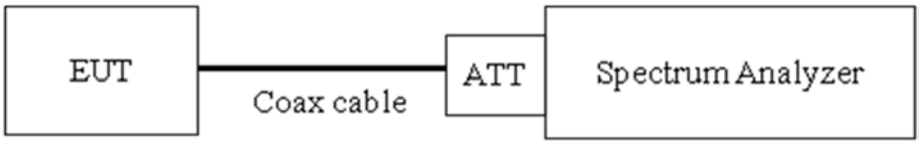
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

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

[Conducted > 30 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Set span to encompass the spectrum to be examined
4) Detector = Peak
5) Trace Mode = max hold
6) Sweep time = auto couple
7) Allow trace to fully stabilize.
8) 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

3. EUT cable loss = 0.36 dB

4. Total Port offest = 10.96 dB

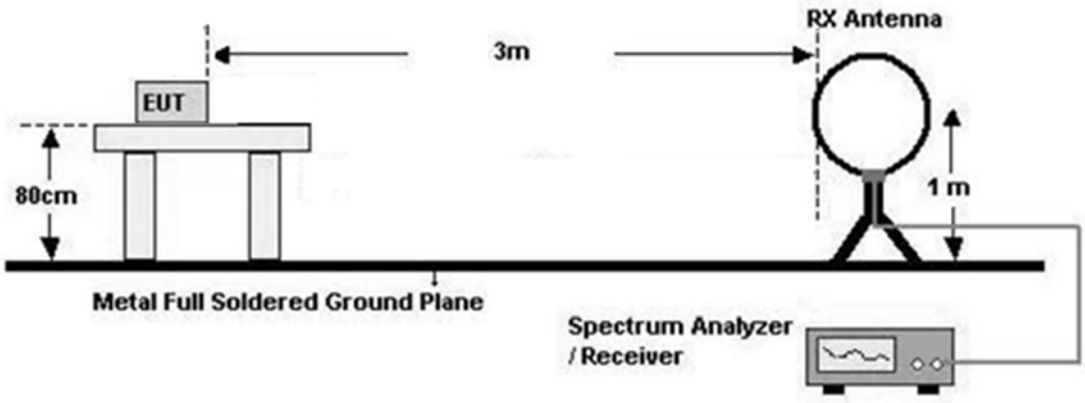
7.6. Radiated Test

Limit

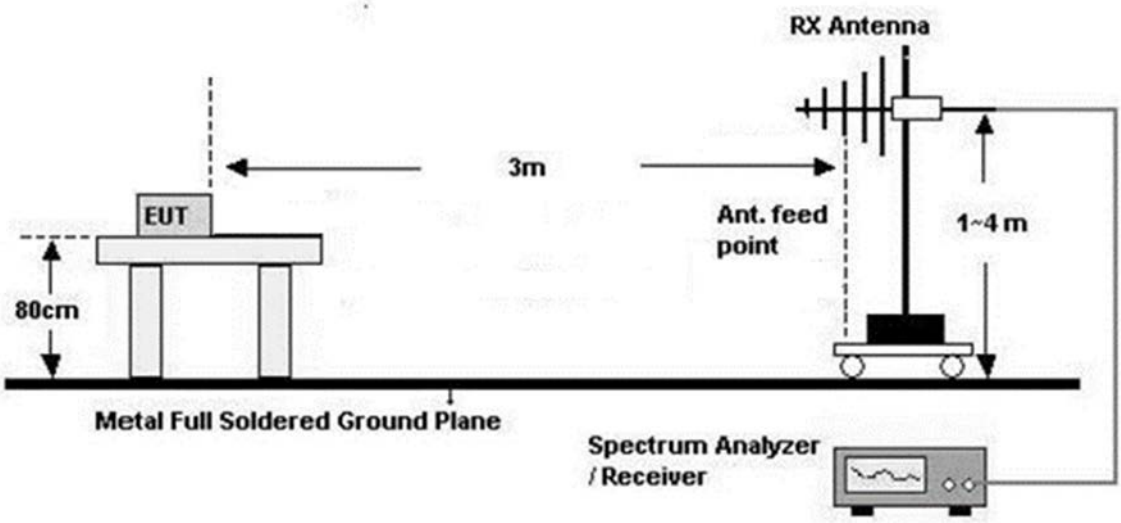
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

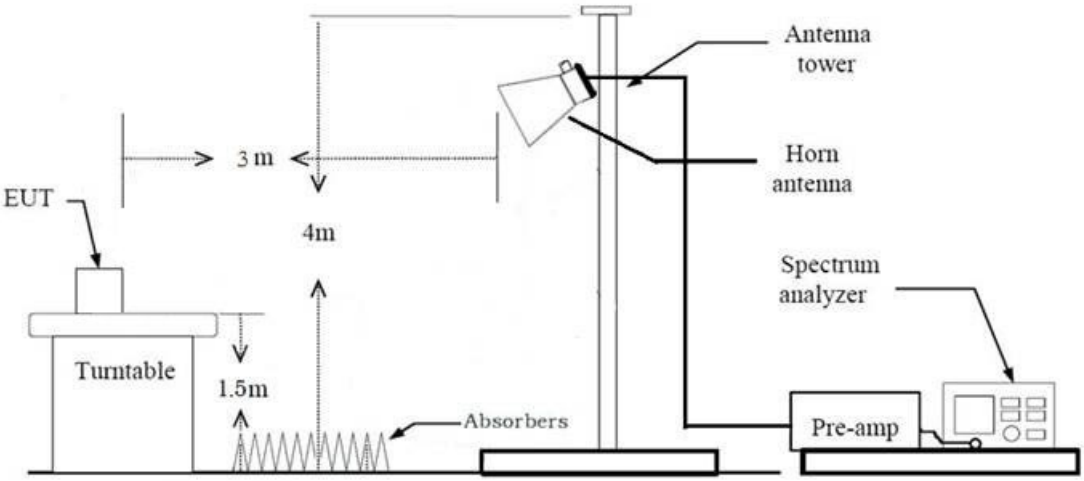
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions (Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = 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)

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)

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

- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 3 x RBW

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

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

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

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

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total(Measurement Type : Peak)
= Measured value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

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

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

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Average): Duty cycle ≥ 98 %,
      - Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
      - Sweep time = auto.
      - Trace mode = average (at least 100 traces).
   (3) Measurement Type(Average): Duty cycle < 98 %, duty cycle variations are less than ±2 %
      - Measured Frequency Range : 2310 MHz ~ 2390 MHz / 2483.5 MHz ~ 2500 MHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
      - Sweep time = auto.
      - Trace mode = average (at least 100 traces).
      - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 % duty cycle.

- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total (Measurement Type : Peak)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
    Total(Measurement Type : Average, Duty cycle ≥ 98 %)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
    Total(Measurement Type : Average, Duty cycle < 98 %)
    = Measured value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) + Duty Cycle Factor

7.7. AC Power line Conducted Emissions

Limit

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

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56[a]	56 to 46[a]
0.50 to 5	56	46
5 to 30	60	50

[a]Decreases with the logarithm of the frequency.

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. All Antenna of operation were investigated and the worst case results are reported
   - Mode : SISO(Ant.1), MIMO_CDD(Ant.1+Ant.2), MIMO_SDM(Ant.1+Ant.2)
   - Worst case : MIMO_CDD(Ant.1+Ant.2), MIMO_SDM(Ant.1+Ant.2)
3. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge : X
4. Duty cycle factor applies only 802.11g/n (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 [SISO(Ant.1), MIMO_CDD(Ant.1+Ant.2)]
   - 802.11g : 6 Mbps [SISO(Ant.1), MIMO_CDD(Ant.1+Ant.2)]
   - 802.11n(HT20): MCS 0 [SISO(Ant.1)], MCS 8 [MIMO_SDM(Ant.1+Ant.2)]
6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
7. Radiated Spurious Emission
   - All mode of operation were investigated and the worst case results are reported.
   - 802.11b : 1 Mbps [SISO(Ant.1), MIMO_CDD(Ant.1+Ant.2)]
   - 802.11g : 6 Mbps [SISO(Ant.1), MIMO_CDD(Ant.1+Ant.2)]
   - 802.11n(HT20): MCS 0 [SISO(Ant.1)], MCS 8 [MIMO_SDM(Ant.1+Ant.2)]
   - Worst case : 802.11n(HT20): MCS 8 [MIMO_SDM(Ant.1+Ant.2)]

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone+ External accessories(Earphone, etc) + Travel Adapter
     Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter

Radiated test(Simultaneous transmission Scenario)

1. Please refer to the [BT], [UNII ax] Test Report.

Conducted test

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

8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 30 dBc		PASS
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

9. TEST RESULT

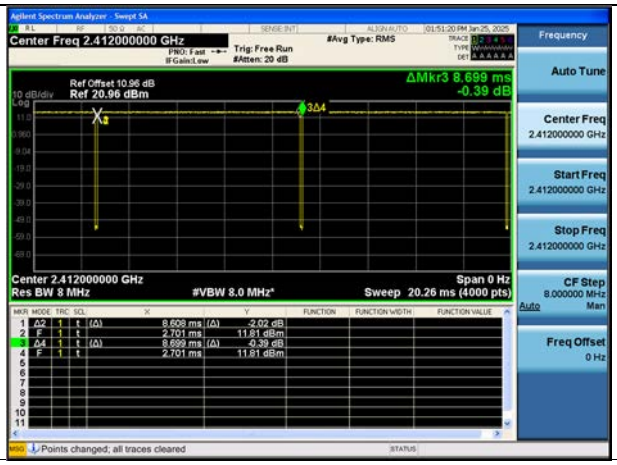
9.1 DUTY CYCLE

Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1 Mbps	8.608	8.699	0.990	0.046
802.11g	6 Mbps	1.428	1.525	0.936	0.286
802.11n (HT20)	MCS0	1.336	1.432	0.933	0.301
	MCS8	0.692	0.788	0.878	0.565

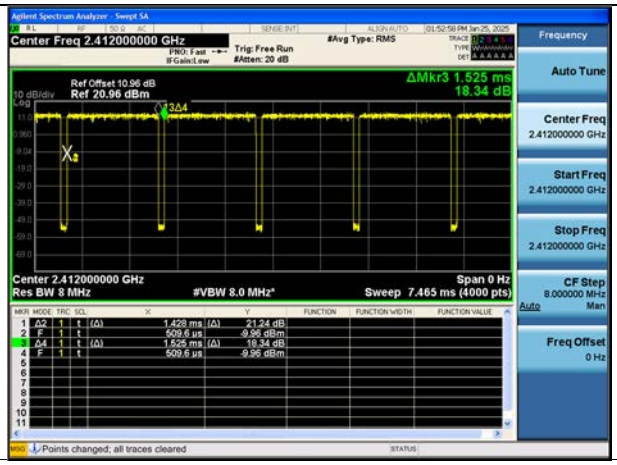
▣ Test Plots

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

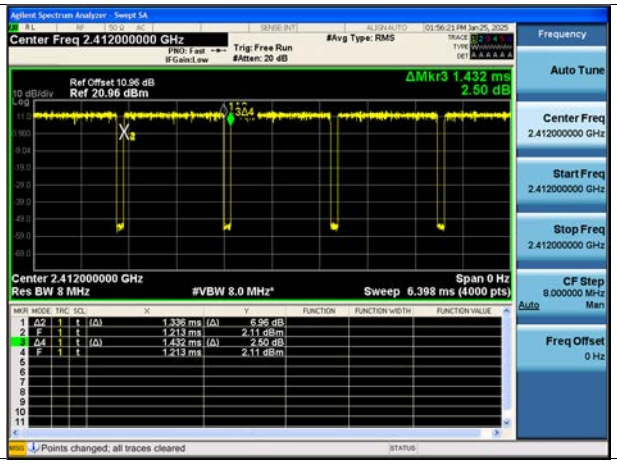
802.11b (1 Mbps)



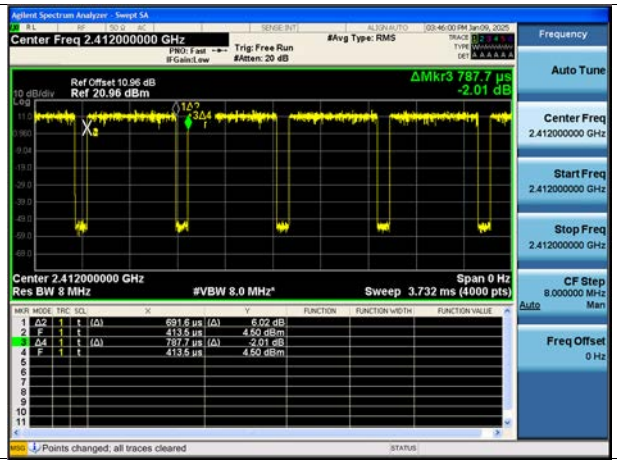
802.11g (6 Mbps)



802.11n (MCS0)



802.11n (MCS8)



9.2 6 dB BANDWIDTH

[Ant.1]

Mode	Frequency [MHz]	Channel No.	6dB Bandwidth [MHz]	Limit [MHz]
802.11b	2412	1	10.16	0.50
	2437	6	10.15	0.50
	2462	11	10.16	0.50
802.11g	2412	1	12.65	0.50
	2437	6	12.65	0.50
	2462	11	13.84	0.50
802.11n (HT20)	2412	1	12.66	0.50
	2437	6	13.86	0.50
	2462	11	13.83	0.50

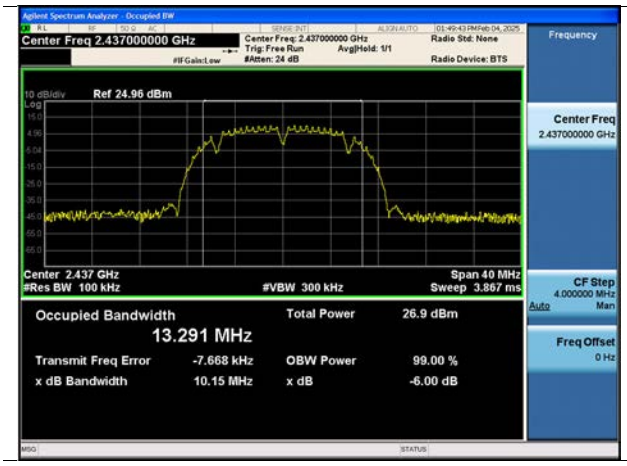
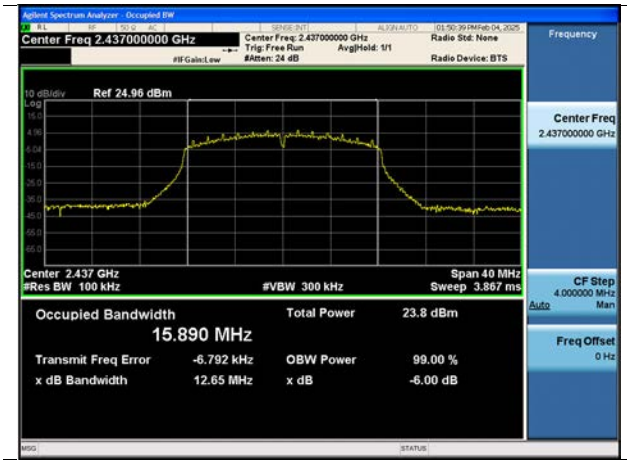
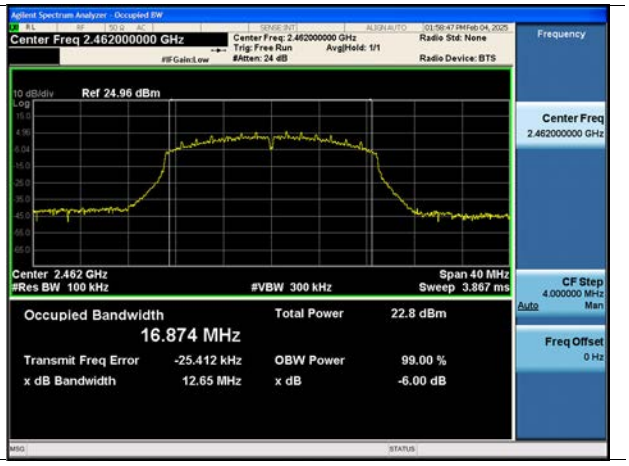
[Ant.2]

Mode	Frequency [MHz]	Channel No.	6dB Bandwidth [MHz]	Limit [MHz]
802.11b	2412	1	10.15	0.50
	2437	6	10.16	0.50
	2462	11	10.16	0.50
802.11g	2412	1	12.65	0.50
	2437	6	12.64	0.50
	2462	11	12.66	0.50
802.11n (HT20)	2412	1	12.65	0.50
	2437	6	15.04	0.50
	2462	11	12.65	0.50

▣ Test Plots(6 dB Bandwidth)

Note:

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

Ant.1	Ant.2
802.11b-CH 6	802.11b-CH 1
	
802.11g-CH 6	802.11g-CH 6
	
802.11n_HT20-CH 1	802.11n_HT20-CH 11
	

9.3 OUTPUT POWER

Note :

1. MIMO Power = 10·log((10^(Ant.1 power /10))+(10^(Ant.2 power /10)))

Peak Power

[SISO Ant.1]

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Peak Power [dBm]	Limit [dBm]
802.11b	2412	1	11M	25.36	30
	2437	6	11M	25.17	30
	2462	11	11M	25.86	30
802.11g	2412	1	54M	24.38	30
	2437	6	54M	25.33	30
	2462	11	54M	24.81	30
802.11n HT20	2412	1	MCS4	24.70	30
	2437	6	MCS4	25.02	30
	2462	11	MCS4	24.08	30

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

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Peak Power [dBm]			Limit [dBm]
				ANT1	ANT2	MIMO	
802.11b	2412	1	11M	25.36	25.54	28.46	30
	2437	6	11M	25.17	24.56	27.89	30
	2462	11	11M	25.86	25.82	28.85	30
802.11g	2412	1	54M	24.38	24.53	27.47	30
	2437	6	54M	25.33	24.72	28.05	30
	2462	11	54M	24.81	24.73	27.78	30
802.11n HT20	2412	1	MCS8	24.10	24.39	27.26	30
	2437	6	MCS8	23.59	23.97	26.80	30
	2462	11	MCS8	24.03	23.97	27.01	30

Average Power

Note :

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

[SISO Ant.1]

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Average Power [dBm]			Limit [dBm]
				Measured Value	D.C.F	Summed	
802.11b	2412	1	1M	19.51	0.05	19.56	30
	2437	6	1M	19.14	0.05	19.19	30
	2462	11	1M	19.31	0.05	19.36	30
802.11g	2412	1	6M	16.41	0.29	16.70	30
	2437	6	6M	16.47	0.29	16.76	30
	2462	11	6M	16.99	0.29	17.28	30
802.11n HT20	2412	1	MCS0	15.24	0.30	15.54	30
	2437	6	MCS0	15.42	0.30	15.72	30
	2462	11	MCS0	15.79	0.30	16.09	30

[MIMO(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	19.56	19.90	22.74	30
	2437	6	1M	19.19	19.28	22.25	30
	2462	11	1M	19.36	19.43	22.41	30
802.11g	2412	1	6M	16.70	16.85	19.78	30
	2437	6	6M	16.76	16.78	19.78	30
	2462	11	6M	17.28	17.06	20.18	30
802.11n HT20	2412	1	MCS8	15.44	15.83	18.65	30
	2437	6	MCS8	15.23	15.30	18.28	30
	2462	11	MCS8	15.67	15.81	18.75	30

9.4 POWER SPECTRAL DENSITY

Note :

1. MIMO PSD = 10·log((10^(Ant.1 PSD /10))+(10^(Ant.2 PSD /10)))
2. Total PSD = Measured Value + Duty Cycle Factor

[SISO_Ant.1]

Mode	Frequency [MHz]	Channel No.	Data Rate	Total Power Spectral Density [dBm]			Limit [dBm/3 kHz]
				Measured Value	D.C.F	Summed	
802.11b	2412	1	1M	-3.941	0.05	-3.895	8
	2437	6	1M	-4.059	0.05	-4.013	8
	2462	11	1M	-3.707	0.05	-3.661	8
802.11g	2412	1	6M	-5.724	0.29	-5.438	8
	2437	6	6M	-5.852	0.29	-5.566	8
	2462	11	6M	-5.839	0.29	-5.553	8
802.11n HT20	2412	1	MCS0	-7.487	0.30	-7.186	8
	2437	6	MCS0	-7.546	0.30	-7.245	8
	2462	11	MCS0	-7.527	0.30	-7.226	8

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

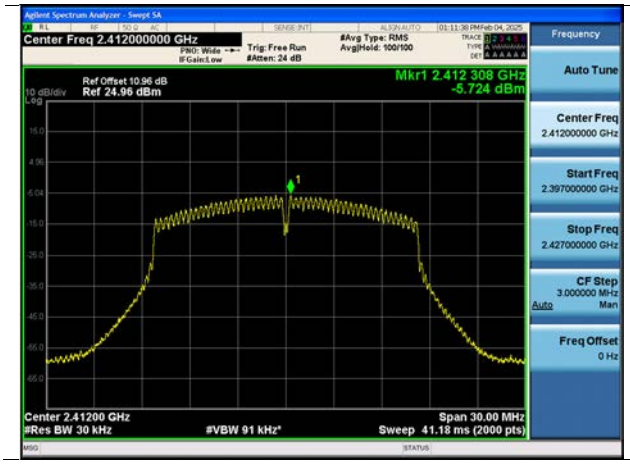
Mode	Frequency [MHz]	Channel No.	Data Rate	Total Power Spectral Density [dBm]			Limit [dBm/3 kHz]
				ANT1	ANT2	MIMO	
802.11b	2412	1	1M	-3.895	-3.621	-0.746	8
	2437	6	1M	-4.013	-3.754	-0.872	8
	2462	11	1M	-3.661	-3.813	-0.726	8
802.11g	2412	1	6M	-5.438	-5.409	-2.414	8
	2437	6	6M	-5.566	-5.765	-2.654	8
	2462	11	6M	-5.553	-5.876	-2.702	8
802.11n HT20	2412	1	MCS8	-7.089	-7.960	-4.492	8
	2437	6	MCS8	-7.652	-7.417	-4.522	8
	2462	11	MCS8	-7.830	-7.618	-4.712	8

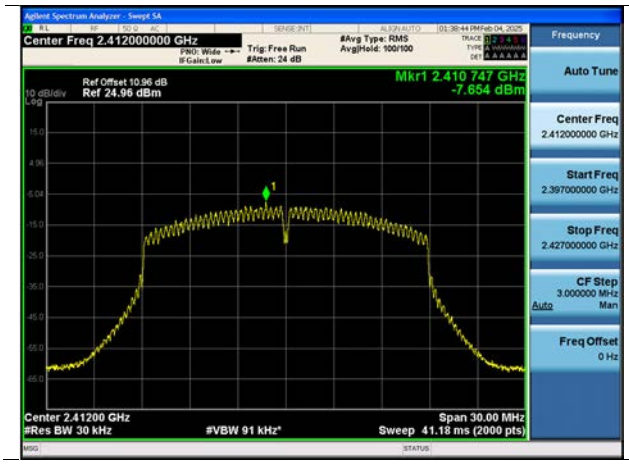
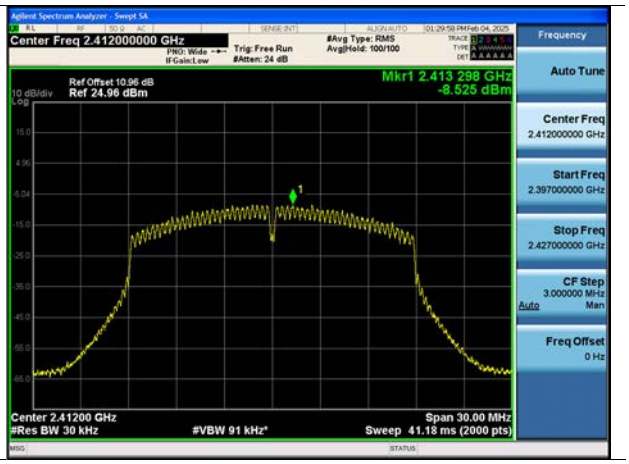
▣ Test Plots

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

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

Power Spectral Density (802.11b-CH 11)	
Ant.1	Ant.2
	

Power Spectral Density (802.11g-CH 1)	
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 : 30 dBc

[Ant.1]

Mode	Frequency [MHz]	Channel No.	TEST Position	Band-Edge [dB]
802.11b	2412	1	Low	50.539
	2462	11	High	56.129
802.11g	2412	1	Low	45.329
	2462	11	High	49.239
802.11n HT20	2412	1	Low	43.163
	2462	11	High	48.316

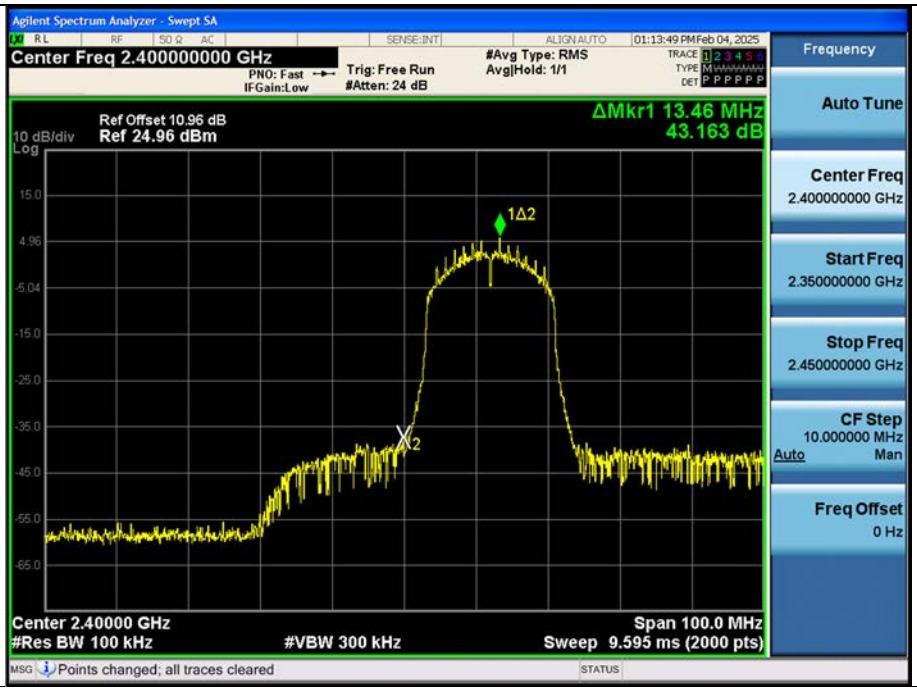
[Ant.2]

Mode	Frequency [MHz]	Channel No.	TEST Position	Band-Edge [dB]
802.11b	2412	1	Low	51.259
	2462	11	High	54.872
802.11g	2412	1	Low	44.465
	2462	11	High	51.126
802.11n HT20	2412	1	Low	45.627
	2462	11	High	50.330

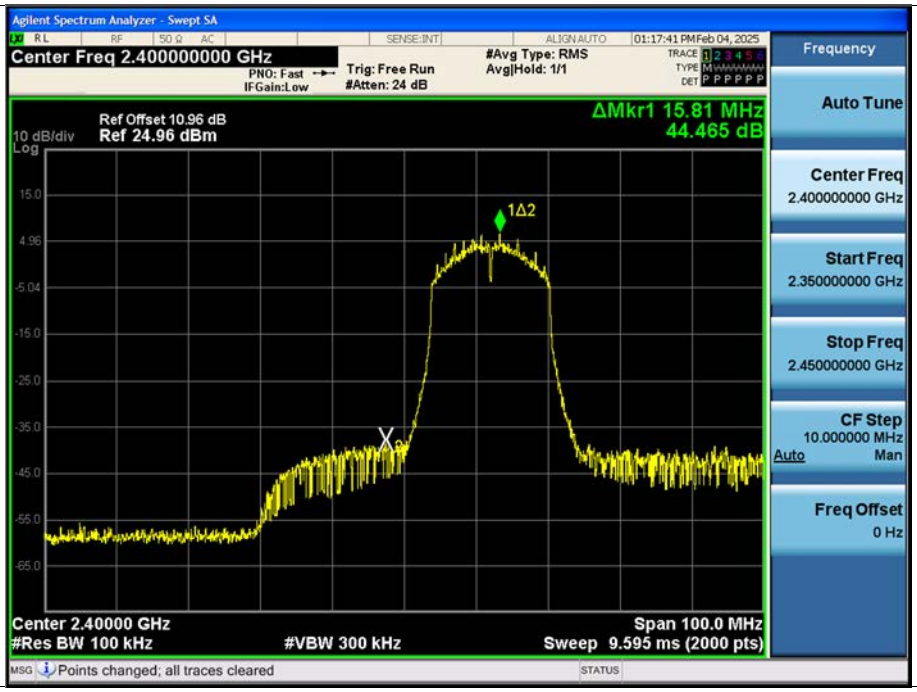
▣ Test Plots(Band Edge)

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

[Ant.1] 802.11n-CH 1



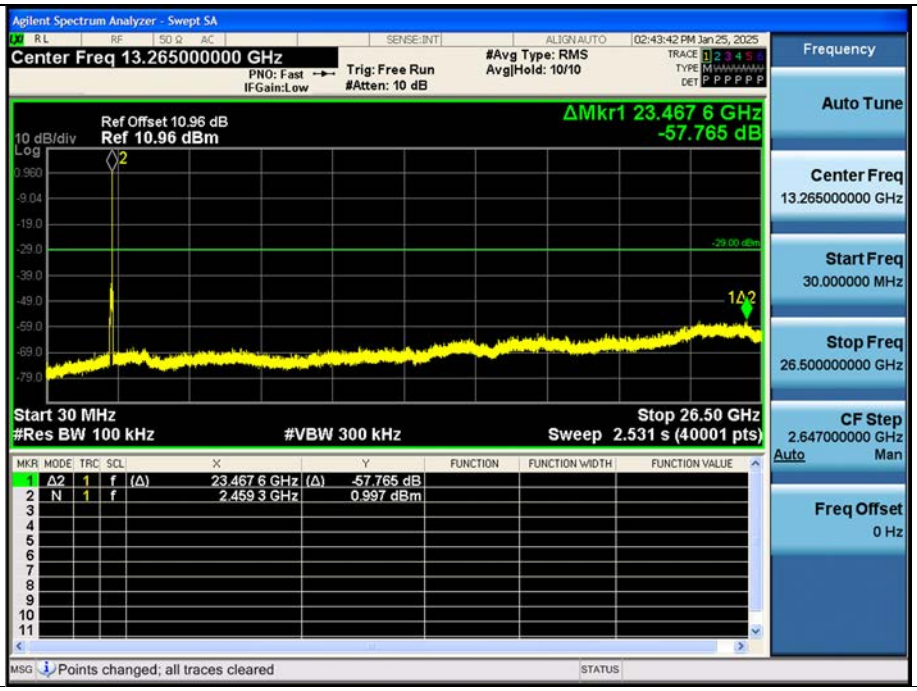
[Ant.2] 802.11g-CH 1



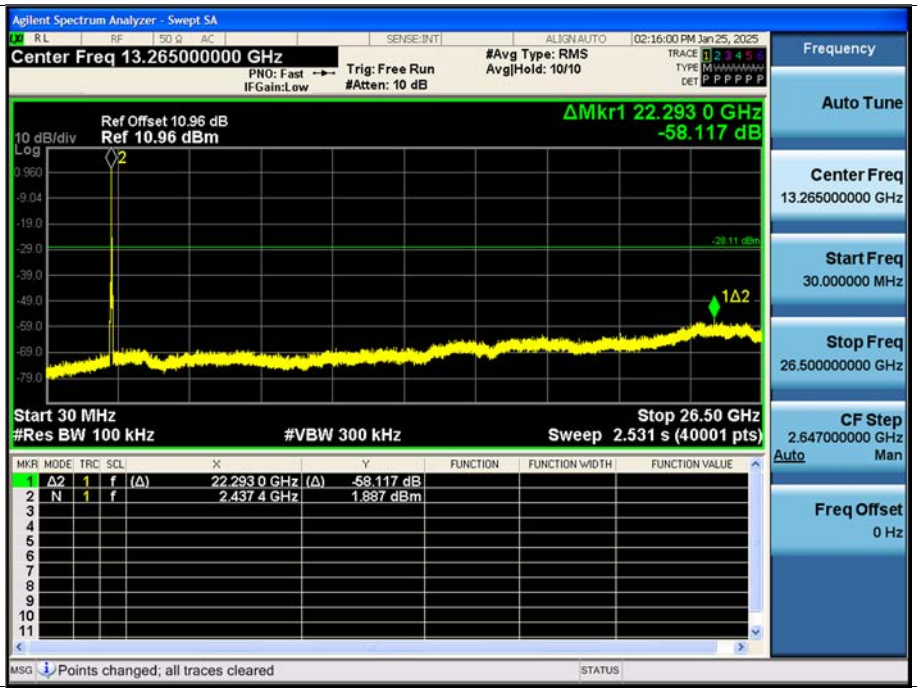
▣ Test Plots(Conducted Spurious Emission)

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

[Ant.1] 802.11n-CH 11



[Ant.2] 802.11n-CH 6



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(Ant.1+Ant.2)]

802.11b								
Band :	DTS		Operation Mode :		802.11b			
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	42.25	0.00	4.18	V	46.43	73.98	27.55	PK
4824	31.04	0.00	4.18	V	35.22	53.98	18.76	AV
7236	39.20	0.00	12.95	V	52.15	73.98	21.83	PK
7236	27.21	0.00	12.95	V	40.16	53.98	13.82	AV
4824	43.45	0.00	4.18	H	47.63	73.98	26.35	PK
4824	32.02	0.00	4.18	H	36.20	53.98	17.78	AV
7236	38.62	0.00	12.95	H	51.57	73.98	22.41	PK
7236	27.01	0.00	12.95	H	39.96	53.98	14.02	AV

Band :	DTS		Operation Mode :		802.11b			
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	43.49	0.00	4.19	V	47.68	73.98	26.30	PK
4874	31.64	0.00	4.19	V	35.83	53.98	18.15	AV
7311	39.74	0.00	12.31	V	52.05	73.98	21.93	PK
7311	27.31	0.00	12.31	V	39.62	53.98	14.36	AV
4874	44.62	0.00	4.19	H	48.81	73.98	25.17	PK
4874	32.52	0.00	4.19	H	36.71	53.98	17.27	AV
7311	38.59	0.00	12.31	H	50.90	73.98	23.08	PK
7311	26.53	0.00	12.31	H	38.84	53.98	15.14	AV

Band :	DTS		Operation Mode :		802.11b			
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	42.39	0.00	5.07	V	47.46	73.98	26.52	PK
4924	31.11	0.00	5.07	V	36.18	53.98	17.80	AV
7386	39.93	0.00	12.82	V	52.75	73.98	21.23	PK
7386	27.25	0.00	12.82	V	40.07	53.98	13.91	AV
4924	43.99	0.00	5.07	H	49.06	73.98	24.92	PK
4924	31.69	0.00	5.07	H	36.76	53.98	17.22	AV
7386	38.56	0.00	12.82	H	51.38	73.98	22.60	PK
7386	26.98	0.00	12.82	H	39.80	53.98	14.18	AV

802.11g

Band :	DTS		Operation Mode :		802.11g			
CH.1	2412 MHz		Transfer Rate :		6Mbps			
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	42.02	0.00	4.18	V	46.20	73.98	27.78	PK
4824	30.24	0.29	4.18	V	34.71	53.98	19.27	AV
7236	38.66	0.00	12.95	V	51.61	73.98	22.37	PK
7236	26.69	0.29	12.95	V	39.93	53.98	14.05	AV
4824	43.64	0.00	4.18	H	47.82	73.98	26.16	PK
4824	31.95	0.29	4.18	H	36.42	53.98	17.56	AV
7236	38.07	0.00	12.95	H	51.02	73.98	22.96	PK
7236	26.11	0.29	12.95	H	39.35	53.98	14.63	AV

Band :	DTS		Operation Mode :		802.11g			
CH.6	2437 MHz		Transfer Rate :		6Mbps			
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	43.67	0.00	4.19	V	47.86	73.98	26.12	PK
4874	31.59	0.29	4.19	V	36.07	53.98	17.91	AV
7311	39.59	0.00	12.31	V	51.90	73.98	22.08	PK
7311	27.33	0.29	12.31	V	39.93	53.98	14.05	AV
4874	44.46	0.00	4.19	H	48.65	73.98	25.33	PK
4874	32.49	0.29	4.19	H	36.97	53.98	17.01	AV
7311	38.55	0.00	12.31	H	50.86	73.98	23.12	PK
7311	26.59	0.29	12.31	H	39.19	53.98	14.79	AV

Band :	DTS		Operation Mode :		802.11g			
CH.11	2462 MHz		Transfer Rate :		6Mbps			
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	43.14	0.00	5.07	V	48.21	73.98	25.77	PK
4924	30.26	0.29	5.07	V	35.62	53.98	18.36	AV
7386	39.56	0.00	12.82	V	52.38	73.98	21.60	PK
7386	27.38	0.29	12.82	V	40.49	53.98	13.49	AV
4924	44.39	0.00	5.07	H	49.46	73.98	24.52	PK
4924	31.74	0.29	5.07	H	37.10	53.98	16.88	AV
7386	38.59	0.00	12.82	H	51.41	73.98	22.57	PK
7386	26.88	0.29	12.82	H	39.99	53.98	13.99	AV

802.11n_HT20

Band :	DTS		Operation Mode :		802.11n_HT20			
CH.1	2412 MHz		Transfer Rate :		MCS8			
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	42.03	0.00	4.18	V	46.21	73.98	27.77	PK
4824	31.02	0.57	4.18	V	35.77	53.98	18.21	AV
7236	39.47	0.00	12.95	V	52.42	73.98	21.56	PK
7236	26.77	0.57	12.95	V	40.29	53.98	13.69	AV
4824	43.77	0.00	4.18	H	47.95	73.98	26.03	PK
4824	32.04	0.57	4.18	H	36.79	53.98	17.19	AV
7236	38.97	0.00	12.95	H	51.92	73.98	22.06	PK
7236	26.19	0.57	12.95	H	39.71	53.98	14.27	AV

Band :	DTS		Operation Mode :		802.11n_HT20			
CH.6	2437 MHz		Transfer Rate :		MCS8			
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	43.24	0.00	4.19	V	47.43	73.98	26.55	PK
4874	31.99	0.57	4.19	V	36.75	53.98	17.23	AV
7311	39.07	0.00	12.31	V	51.38	73.98	22.60	PK
7311	27.38	0.57	12.31	V	40.26	53.98	13.72	AV
4874	44.75	0.00	4.19	H	48.94	73.98	25.04	PK
4874	32.46	0.57	4.19	H	37.22	53.98	16.76	AV
7311	38.42	0.00	12.31	H	50.73	73.98	23.25	PK
7311	26.58	0.57	12.31	H	39.46	53.98	14.52	AV

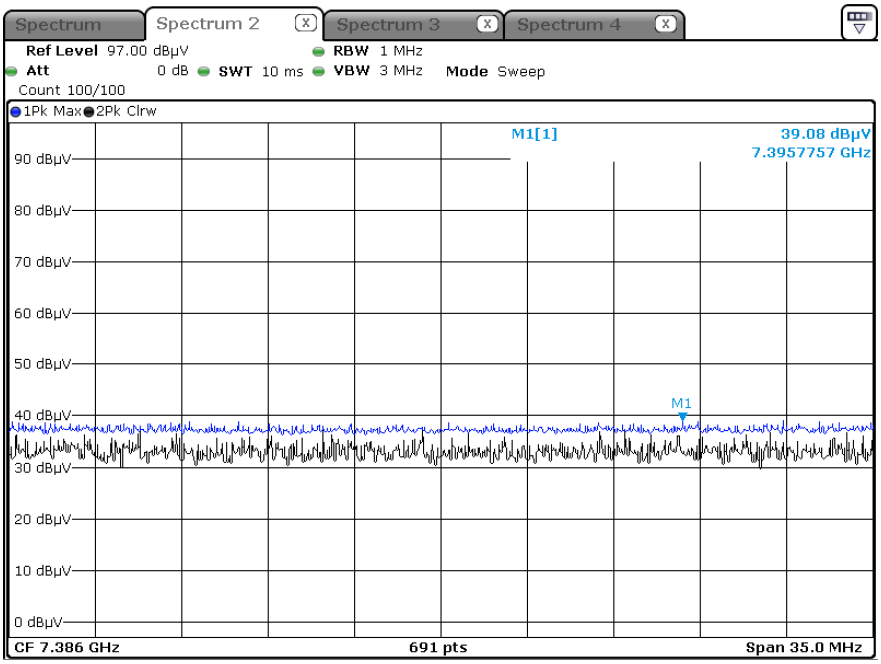
Band :	DTS		Operation Mode :		802.11n_HT20			
CH.11	2462 MHz		Transfer Rate :		MCS8			
Frequency [MHz]	Measured value [dBµV]	D.C.F [dB]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4924	42.67	0.00	5.07	V	47.74	73.98	26.24	PK
4924	30.05	0.57	5.07	V	35.69	53.98	18.29	AV
7386	**39.08**	**0.00**	**12.82**	**V**	**51.90**	**73.98**	**22.08**	**PK**
7386	**27.33**	**0.57**	**12.82**	**V**	**40.72**	**53.98**	**13.26**	**AV**
4924	43.27	0.00	5.07	H	48.34	73.98	25.64	PK
4924	31.72	0.57	5.07	H	37.36	53.98	16.62	AV
7386	38.22	0.00	12.82	H	51.04	73.98	22.94	PK
7386	26.98	0.57	12.82	H	40.37	53.98	13.61	AV

▣ Test Plots

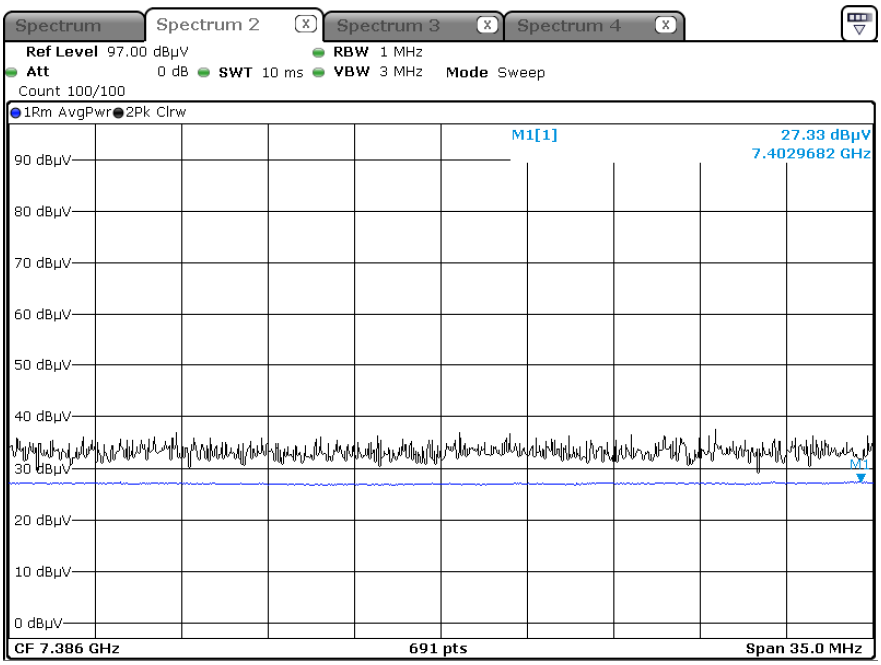
Note: In order to simplify the report, Plot of worst case are only reported.

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

Radiated Spurious Emissions plot – Average Result (802.11n_HT20_MCS8, Ch.11 3rd Harmonic, Y-V)



Radiated Spurious Emissions plot – Peak Result (802.11n_HT20_MCS8, Ch.11 3rd Harmonic, Y-V)



9.7 RADIATED RESTRICTED BAND EDGES

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

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

802.11b	Channel	01 Ch	Freq	2412 MHz		Transfer Rate	1 Mbps
Frequency	Measured Value	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
#2380~2390	24.44	34.84	H	59.28	73.98	14.70	PK
#2380~2390	14.55	34.84	H	49.39	53.98	4.59	AV
2310~2380	27.73	34.84	H	62.57	73.98	11.41	PK
2310~2380	10.31	34.84	H	45.15	53.98	8.83	AV

802.11b	Channel	11 Ch	Freq	2462 MHz		Transfer Rate	1 Mbps
Frequency	Measured Value	A.F.+C.L+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
#2483.5~2493.5	23.27	35.63	H	58.90	73.98	15.08	PK
#2483.5~2493.5	13.45	35.63	H	49.08	53.98	4.90	AV
2493.5~2500	22.32	35.63	H	57.95	73.98	16.03	PK
2493.5~2500	9.33	35.63	H	44.96	53.98	9.02	AV

802.11g		Channel	01 Ch	Freq	2412 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]	
#2380~2390	32.06	0.00	34.84	H	66.90	73.98	7.08	PK
#2380~2390	14.74	0.29	34.84	H	49.87	53.98	4.11	AV
2310~2380	29.75	0.00	34.84	H	64.59	73.98	9.39	PK
2310~2380	10.34	0.29	34.84	H	45.47	53.98	8.51	AV

802.11g		Channel	11Ch	Freq	2462MHz		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]	
#2483.5~2493.5	28.99	0.00	35.63	H	64.62	73.98	9.36	PK
#2483.5~2493.5	13.46	0.29	35.63	H	49.38	53.98	4.60	AV
2493.5~2500	21.22	0.00	35.63	H	56.85	73.98	17.13	PK
2493.5~2500	9.35	0.29	35.63	H	45.27	53.98	8.71	AV

802.11n (HT20)		Channel	01 Ch	Freq	2412 MHz		Transfer MCS Index	MCS8
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]	
#2380~2390	31.02	0.00	34.84	H	65.86	73.98	8.12	PK
#2380~2390	15.21	0.57	34.84	H	50.62	53.98	3.36	AV
2310~2380	28.12	0.00	34.84	H	62.96	73.98	11.02	PK
2310~2380	10.21	0.57	34.84	H	45.62	53.98	8.36	AV

802.11n (HT20)		Channel	11 Ch	Freq	2462 MHz		Transfer MCS Index	MCS8
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]	
#2483.5~2493.5	30.06	0.00	35.63	H	65.69	73.98	8.29	PK
#2483.5~2493.5	14.23	0.57	35.63	H	50.43	53.98	3.55	AV
2493.5~2500	23.02	0.00	35.63	H	58.65	73.98	15.33	PK
2493.5~2500	9.37	0.57	35.63	H	45.57	53.98	8.41	AV

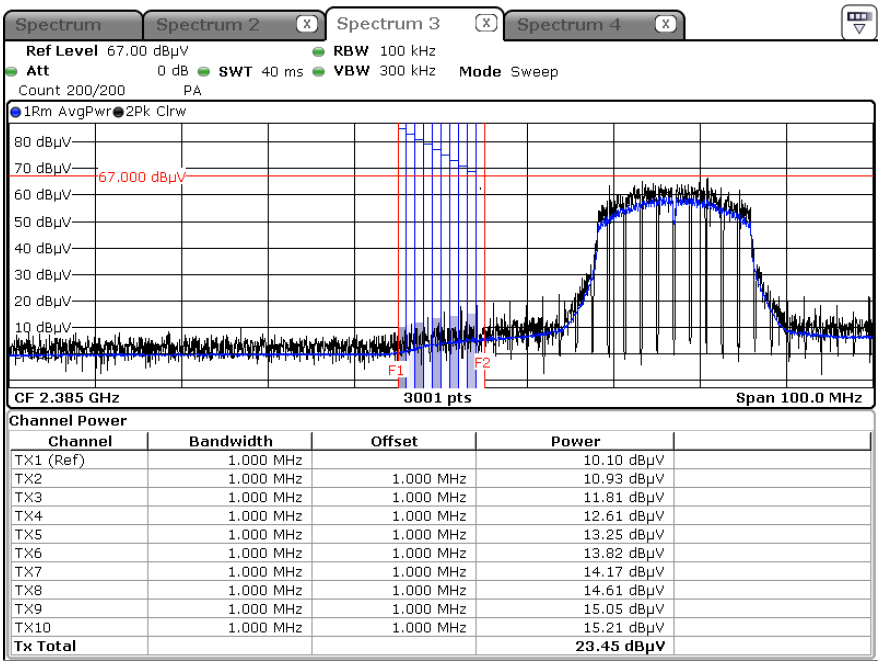
▣ Test Plots

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

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

Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_MCS8, Ch.1, X-H)

(Integration method Used)

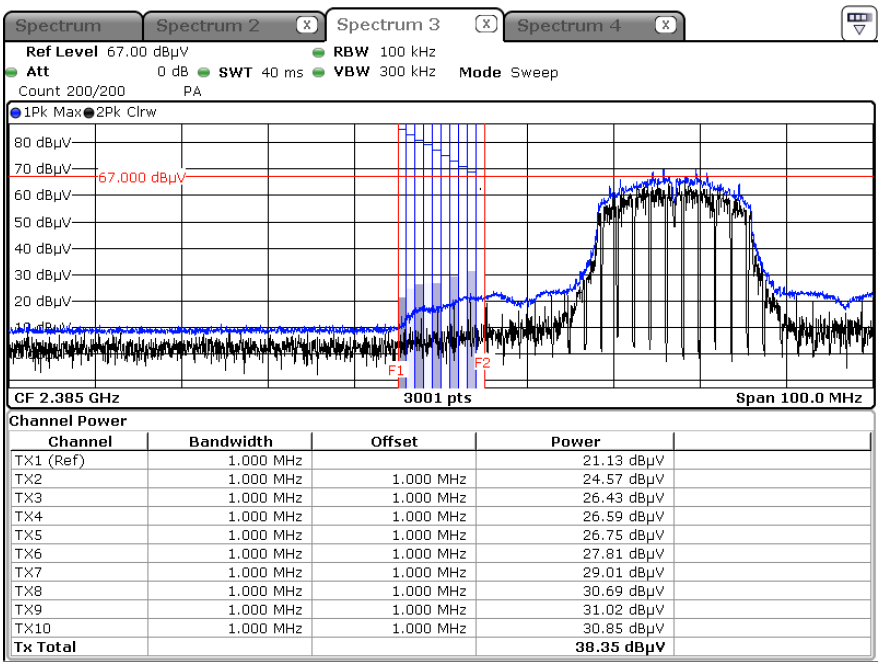


Channel Power

Channel	Bandwidth	Offset	Power
TX1 (Ref)	1.000 MHz		10.10 dBµV
TX2	1.000 MHz	1.000 MHz	10.93 dBµV
TX3	1.000 MHz	1.000 MHz	11.81 dBµV
TX4	1.000 MHz	1.000 MHz	12.61 dBµV
TX5	1.000 MHz	1.000 MHz	13.25 dBµV
TX6	1.000 MHz	1.000 MHz	13.82 dBµV
TX7	1.000 MHz	1.000 MHz	14.17 dBµV
TX8	1.000 MHz	1.000 MHz	14.61 dBµV
TX9	1.000 MHz	1.000 MHz	15.05 dBµV
TX10	1.000 MHz	1.000 MHz	15.21 dBµV
Tx Total			**23.45 dBµV**

Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_MCS8, Ch.1, X-H)

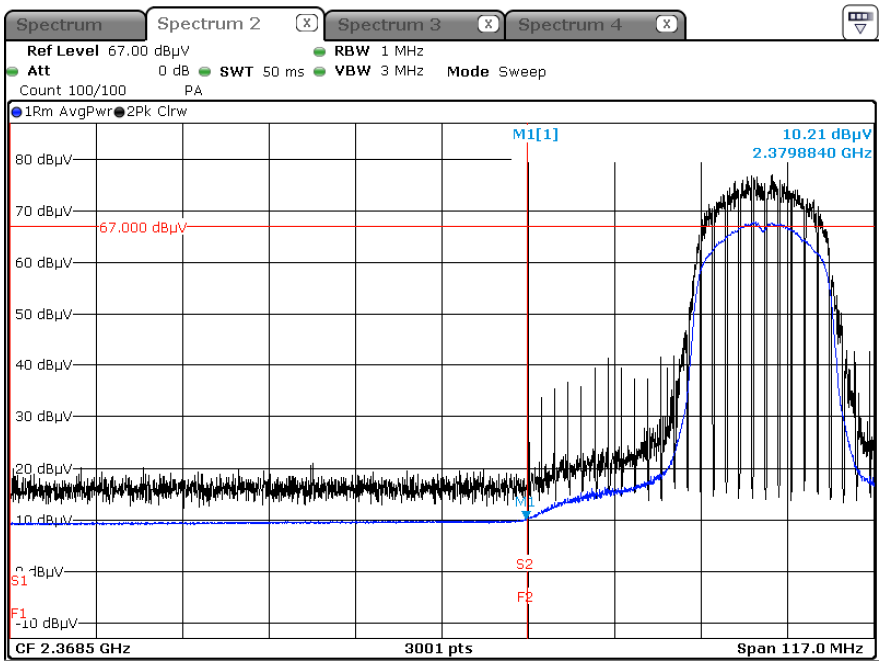
(Integration method Used)



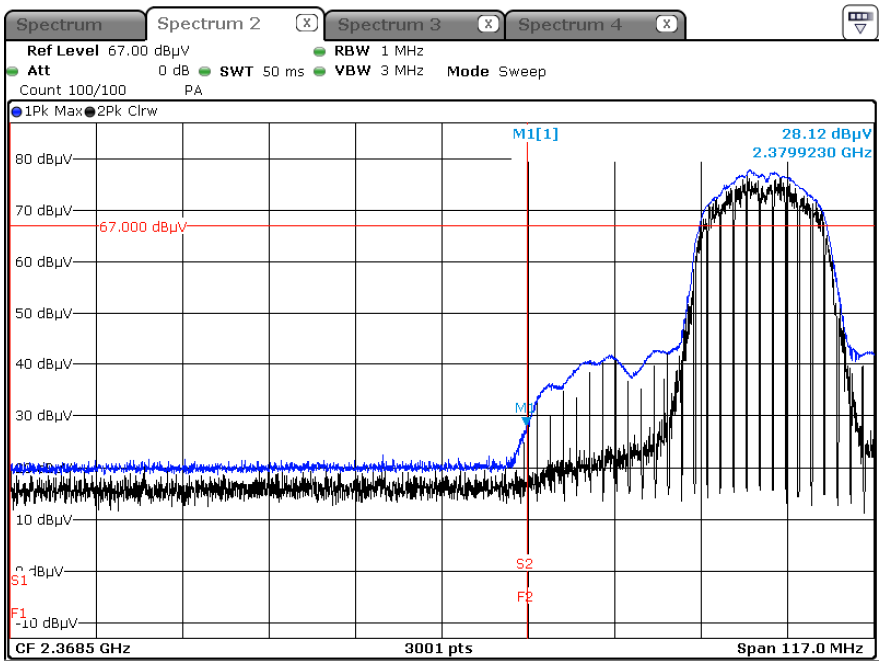
Channel Power

Channel	Bandwidth	Offset	Power
TX1 (Ref)	1.000 MHz		21.13 dBµV
TX2	1.000 MHz	1.000 MHz	24.57 dBµV
TX3	1.000 MHz	1.000 MHz	26.43 dBµV
TX4	1.000 MHz	1.000 MHz	26.59 dBµV
TX5	1.000 MHz	1.000 MHz	26.75 dBµV
TX6	1.000 MHz	1.000 MHz	27.81 dBµV
TX7	1.000 MHz	1.000 MHz	29.01 dBµV
TX8	1.000 MHz	1.000 MHz	30.69 dBµV
TX9	1.000 MHz	1.000 MHz	31.02 dBµV
TX10	1.000 MHz	1.000 MHz	30.85 dBµV
Tx Total			**38.35 dBµV**

Radiated Restricted Band Edges plot – Average Result (802.11n (HT20)_MCS8, Ch.1, X-H)



Radiated Restricted Band Edges plot – Peak Result (802.11n (HT20)_MCS8, Ch.1, X-H)



9.8 POWERLINE CONDUCTED EMISSIONS

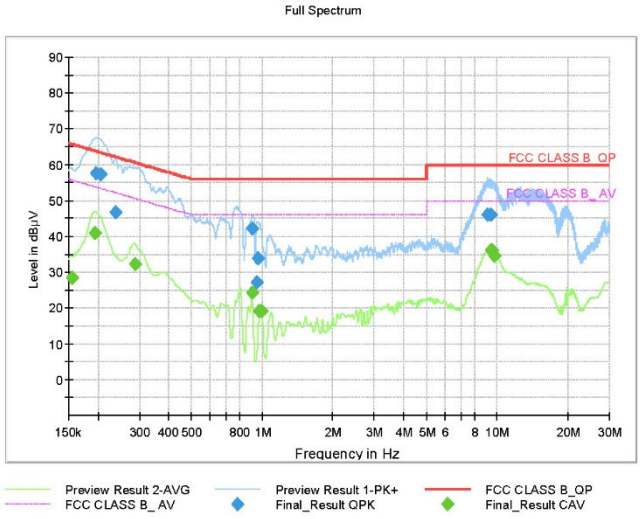
Conducted Emissions

Test 1 / 1

Test Report

Common Information

EUT : SM-X528U
Operating Conditions : 2.4G WLAN Mode
Comment :



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1973	57.74	63.73	5.98	9.000	N	9.6
0.2063	57.22	63.36	6.13	9.000	N	9.6
0.2378	46.69	62.17	15.48	9.000	N	9.6
0.9050	42.34	56.00	13.66	9.000	N	9.7
0.9523	27.34	56.00	28.66	9.000	N	9.7
0.9590	33.84	56.00	22.16	9.000	N	9.7
9.1040	46.23	60.00	13.77	9.000	L1	10.0
9.3920	46.17	60.00	13.83	9.000	L1	10.0
9.4438	46.07	60.00	13.93	9.000	L1	10.0

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1545	28.36	55.75	27.39	9.000	N	9.6
0.1950	40.81	53.82	13.01	9.000	N	9.6
0.2873	32.22	50.60	18.39	9.000	N	9.6
0.9073	24.40	46.00	21.60	9.000	N	9.7
0.9748	19.07	46.00	26.93	9.000	L1	9.7
0.9973	19.19	46.00	26.81	9.000	L1	9.7
9.4483	36.14	50.00	13.86	9.000	L1	10.0
9.5225	36.30	50.00	13.70	9.000	L1	10.1
9.7858	34.46	50.00	15.54	9.000	L1	10.1

2025-02-05 오전 9:54:58

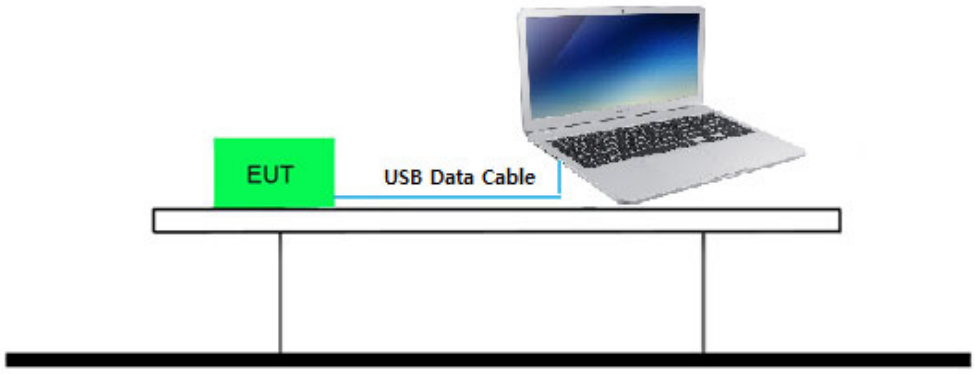
9.9 CONFIRMATION OF GEO-LOCATION MECHANISM

The device uses MCC information obtained from the public cellular carrier to determine that it is operating outside the U.S. and then enable channels 12 and 13 only if a non-US MCC that supports channel 12 and 13 is confirmed.
The device uses a geo-location mechanism based on the Country in order to only enable certain WLAN DTS bands when the device is not in the USA.

WLAN	Country code = US	Country code = KR(Korea)
CH 12	Did not connect	Connected
CH 13	Did not connect	Connected

The verification tests confirmed the operational of the geo-location mechanism.

Test Setup



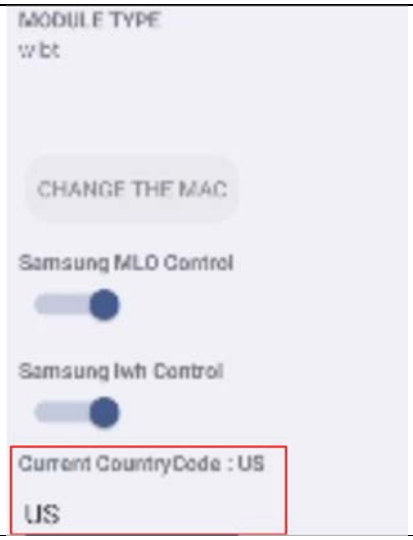
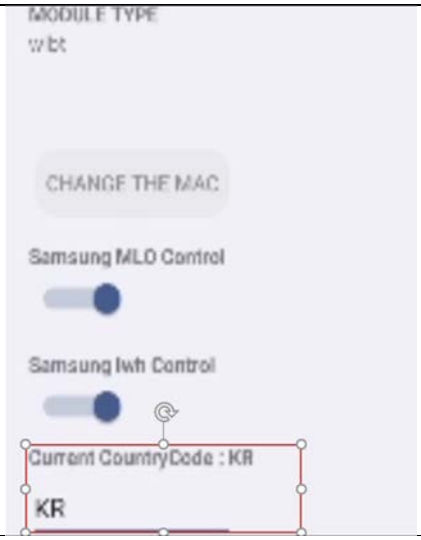
Test Procedure

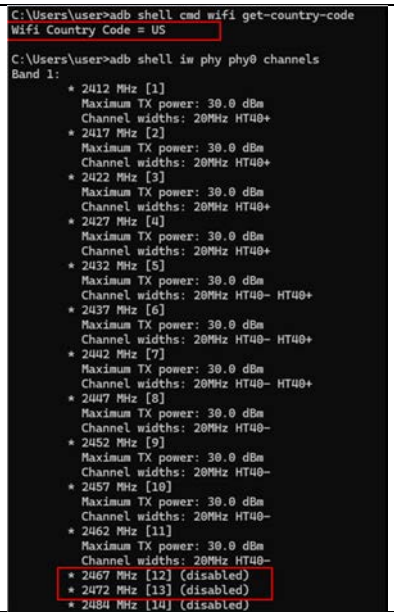
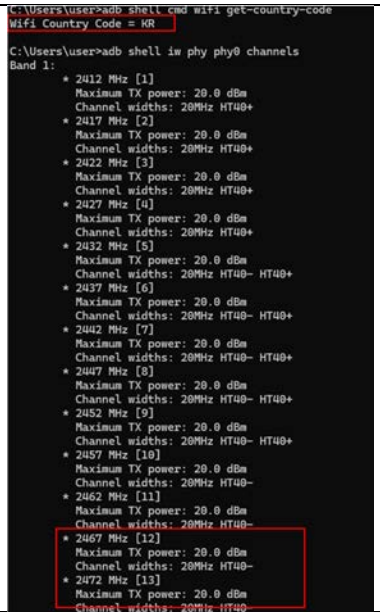
In case of Country code

1. Open Command Prompt.
2. Setting the country for product
3. At the Command Prompt, enter the command.

>adb root
>adb remount
>adb shell cmd wifi get-country-code
>adb shell iw phy phy0 channels

Setting the country for product

Country code = US	Country code = KR(Korea)
	

Country code = US	Country code = KR (Korea)
	

10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	07/17/2025	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	07/02/2025	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	02/19/2025	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	02/28/2025	Annual
Power Sensor	N1921A	Agilent	MY57820067	02/04/2026	Annual
Directional Coupler	87300B	Agilent	3116A03621	10/21/2025	Annual
Power Splitter	11667B	Hewlett Packard	05001	04/17/2025	Annual
DC Power Supply	E3632A	H.P	KR75303243	04/19/2025	Annual
Attenuator(10 dB)	8493C	Hewlett Packard	07560	06/05/2025	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/07/2026	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	760	02/24/2025	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	02/22/2025	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	12/12/2025	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/04/2025	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/04/2025	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	02/26/2025	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-2502-FC030-P