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FCC DTS REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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

Date of Issue:
February 10, 2021

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

Report No.: HCT-RF-2102-FC007

FCC ID:	**A3LSMA326U**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model:	SM-A326U
Additional Model:	SM-A326U1/DS, SM-S326DL
EUT Type:	Mobile Phone
Average Output Power:	802.11b : 19.06 dBm / 802.11g : 18.22 dBm / 802.11n(HT20) : 18.04 dBm
Frequency Range:	2 412 MHz ~ 2 462 MHz
Modulation type:	CCK/DSSS/OFDM
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

REVIEWED BY

Report prepared by : Woong Jin Kim
Engineer of Telecommunication Testing Center

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

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

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2102-FC007	February 10, 2021	- First Approval Report

Table of Contents

1. EUT DESCRIPTION

Model	SM-A326U	
Additional Model	SM-A326U1/DS, SM-S326DL	
EUT Type	Mobile Phone	
Power Supply	DC 3.86 V	
Frequency Range	2 412 MHz ~ 2 462 MHz	
Max. RF Output Power	Peak Power (For information only)	802.11b : 24.95 dBm 802.11g : 26.44 dBm 802.11n(HT20) : 26.14 dBm
	Average Power	802.11b : 19.06 dBm 802.11g : 18.22 dBm 802.11n(HT20) : 18.04 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n	
Number of Channels	11 Channels	
Date(s) of Tests	December 22, 2020 ~ February 04, 2021	
Serial number	Radiated: R3CNC01K89M Conducted: 4C19CDC0BB1C7ECE	

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 purpse 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 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

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

DESCRIPTION OF TEST MODES

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

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

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

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of §15.203

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

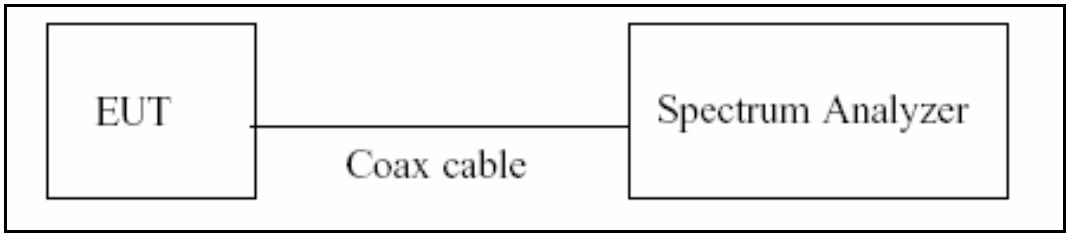
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

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 availble 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*.

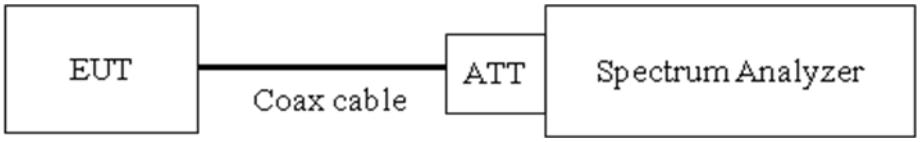
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6dB 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.

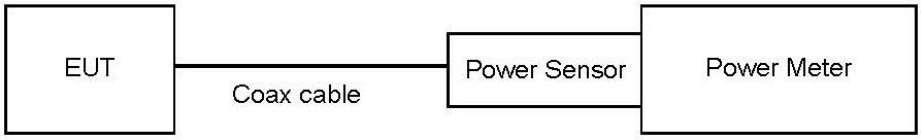
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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) = Reading Value + ATT loss + Cable loss

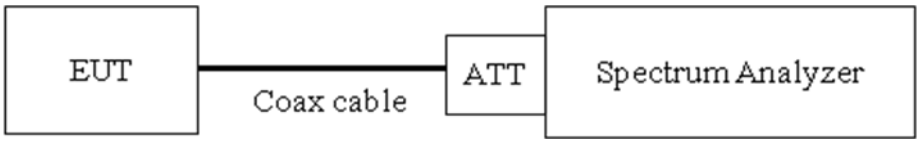
▪ Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

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

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 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) modeover 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 = Reading Value + ATT loss + Cable loss

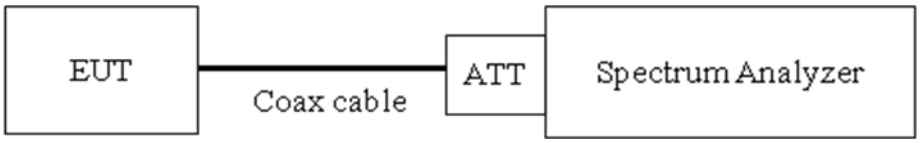
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

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

[Conducted > 30 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

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

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

Factors for frequency

Freq(MHz)	Factor(dB)
30	10.04
100	10.07
200	10.12
300	10.17
400	10.20
500	10.21
600	10.21
700	10.23
800	10.24
900	10.26
1000	10.27
2000	10.41
2400	10.45
2500	10.47
3000	10.52
4000	10.60
5000	10.71
6000	10.73
7000	10.80
8000	10.85
9000	10.91
10000	10.97
11000	11.02
12000	11.10
13000	11.19
14000	11.16
15000	11.21
16000	11.22
17000	11.25
18000	11.30
19000	11.32
20000	11.36
21000	11.48
22000	11.55
23000	11.55
24000	11.59
25000	11.68
26000	11.69

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

2. Factor = Attenuator loss(10 dB) + Cable loss(1ea)

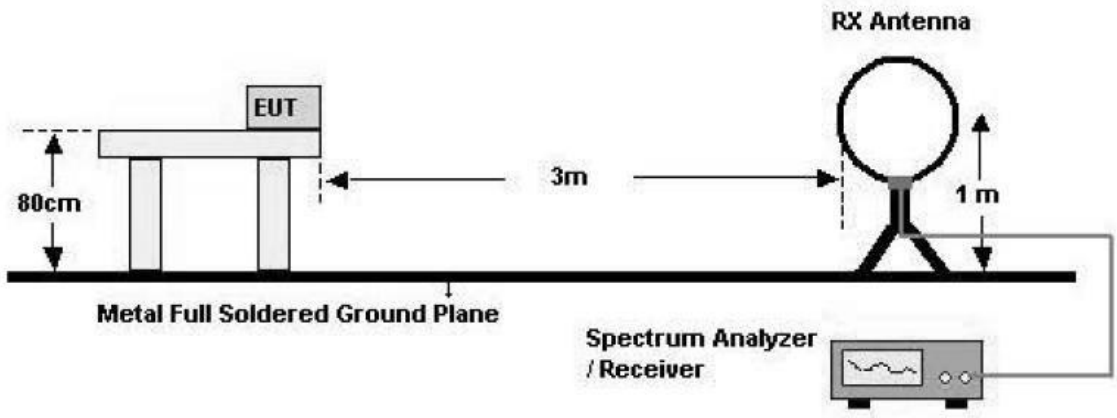
7.6. Radiated Test

Limit

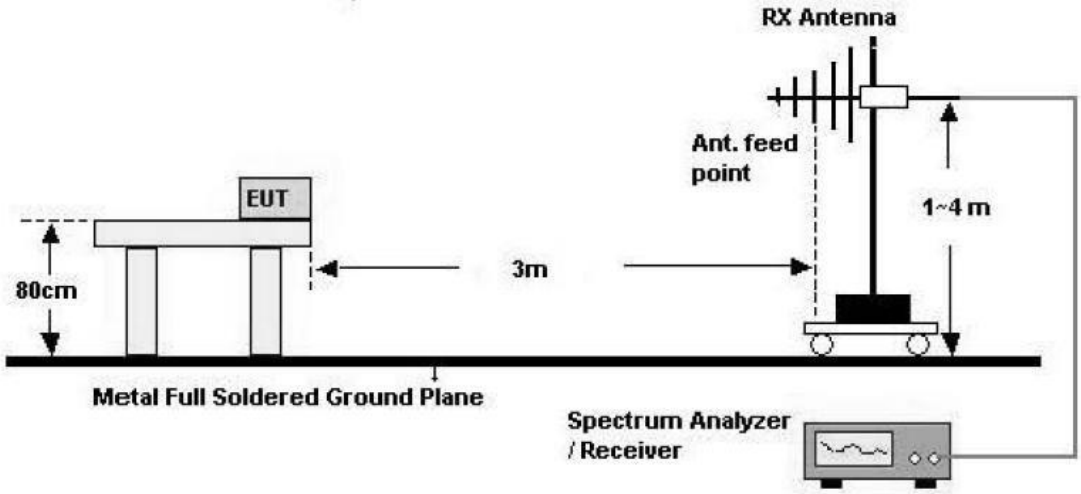
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

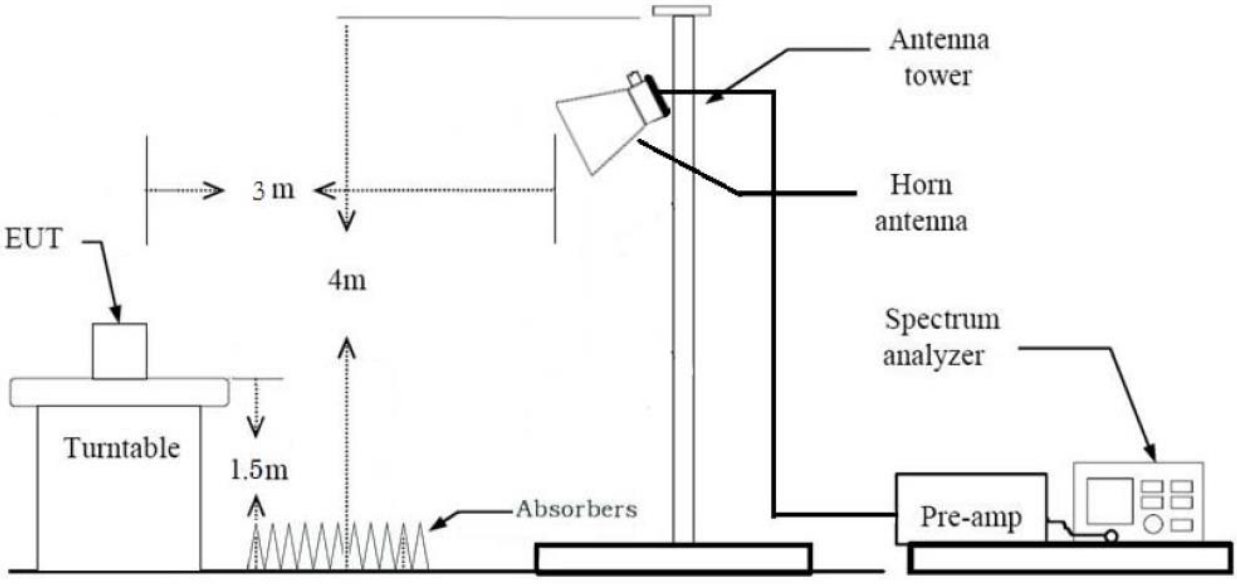
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Quasi-peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Quasi-Peak
      - RBW = 120 kHz

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

Test Procedure of Radiated spurious emissions (Above 1 GHz)

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

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

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

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

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

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

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

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

    Total(Measurement Type : Average, Duty cycle < 98%)
    = Reading 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 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 3 x RBW

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

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

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

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

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

7.7. AC Power line Conducted Emissions

Limit

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

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

[a]Decreases with the logarithm of the frequency.

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : X, Y, Z
   - Radiated Restricted Band Edge : X
3. Duty cycle factor applies only 802.11g/n (Duty cycle < 98%).
4. All data rate of operation were investigated and the test results are worst case in lowest datarate of each mode.
   - 802.11b : 1 Mbps
   - 802.11g : 6 Mbps
   - 802.11n_HT20 : MCS0
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
6. SM-A326U, SM-A326U1/DS, SM-S326DL were tested and the worst case results are reported.
   - Worst case : SM-A326U

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone, etc)+Travel Adapter, Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter
2. SM-A326U, SM-A326U1/DS, SM-S326DL were tested and the worst case results are reported.
   - Worst case : SM-A326U

Conducted test

1. The EUT was configured with data rate of highest power.
2. SM-A326U, SM-A326U1/DS, SM-S326DL were tested and the worst case results are reported.
   - Worst case : SM-A326U

8. SUMMARY TEST OF RESULTS

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

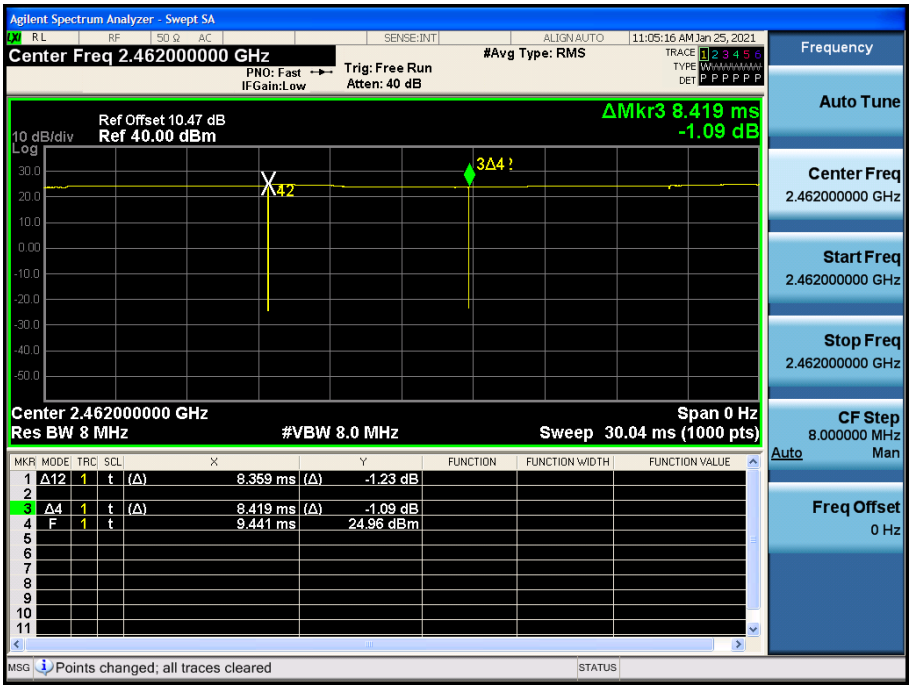
9. TEST RESULT

9.1 DUTY CYCLE

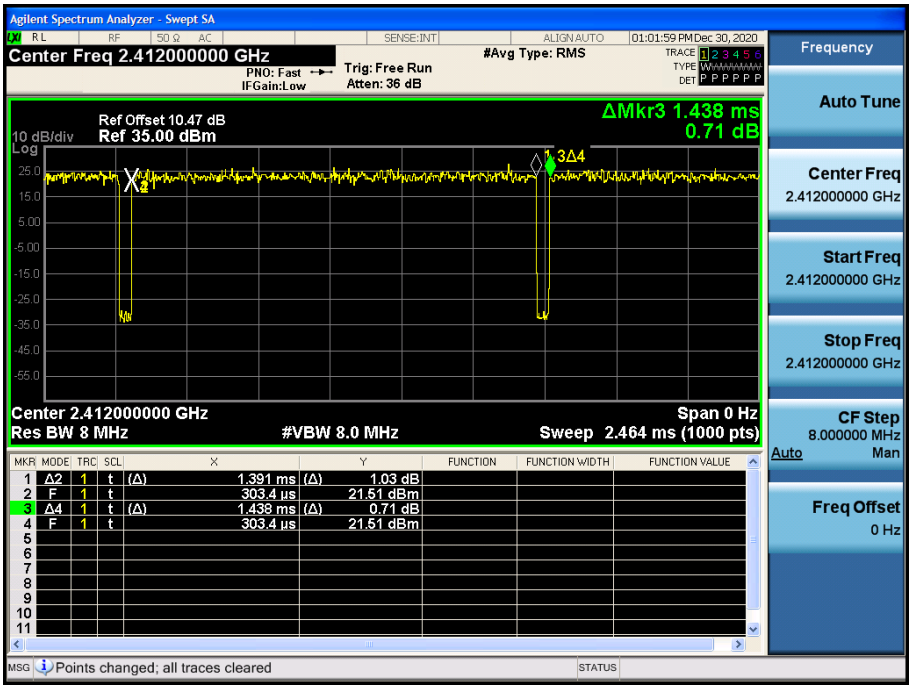
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.359	8.419	0.993	0.031
	2	4.283	4.324	0.991	0.041
	5.5	1.681	1.719	0.978	0.098
	11	0.938	0.976	0.961	0.172
802.11g	6	1.391	1.438	0.967	0.144
	9	0.937	0.982	0.955	0.201
	12	0.708	0.752	0.941	0.264
	18	0.480	0.525	0.914	0.390
	24	0.364	0.408	0.892	0.498
	36	0.252	0.297	0.848	0.718
	48	0.192	0.237	0.809	0.920
	54	0.177	0.221	0.798	0.978
802.11n (HT20)	6.5 (MCS0)	1.300	1.345	0.966	0.150
	13 (MCS1)	0.667	0.712	0.937	0.284
	19.5 (MCS2)	0.460	0.504	0.912	0.398
	26 (MCS3)	0.352	0.397	0.887	0.520
	39 (MCS4)	0.248	0.293	0.847	0.724
	52 (MCS5)	0.196	0.241	0.815	0.887
	58.5 (MCS6)	0.180	0.225	0.800	0.969
	65 (MCS7)	0.164	0.209	0.785	1.052

▣ Test Plots

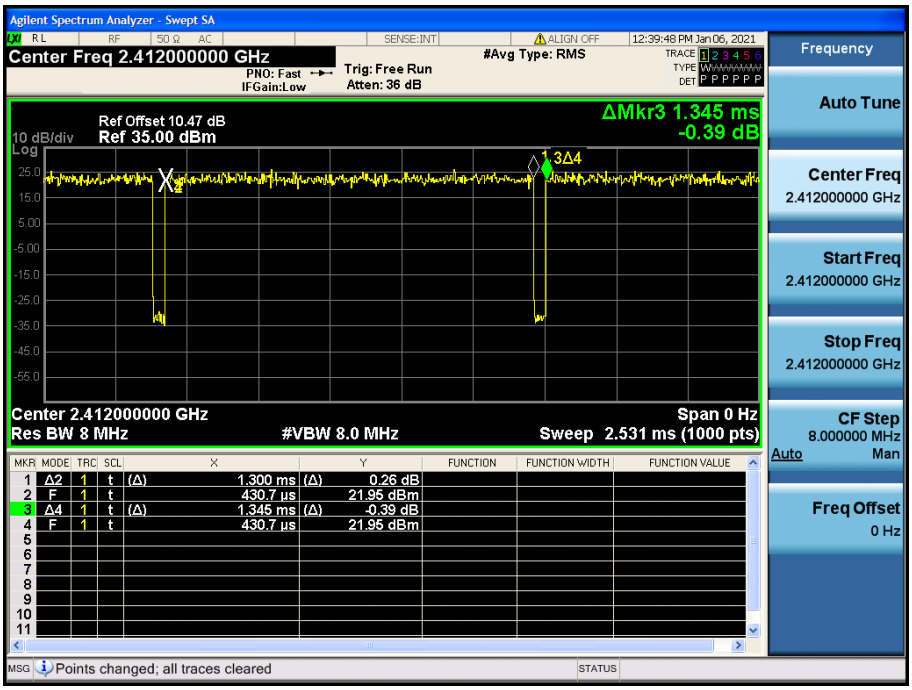
Duty cycle plot (802.11b(1Mbps))



Duty cycle plot (802.11g(6Mbps))



Duty cycle plot (802.11n(MCS0))



Note:

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

9.2 6dB BANDWIDTH

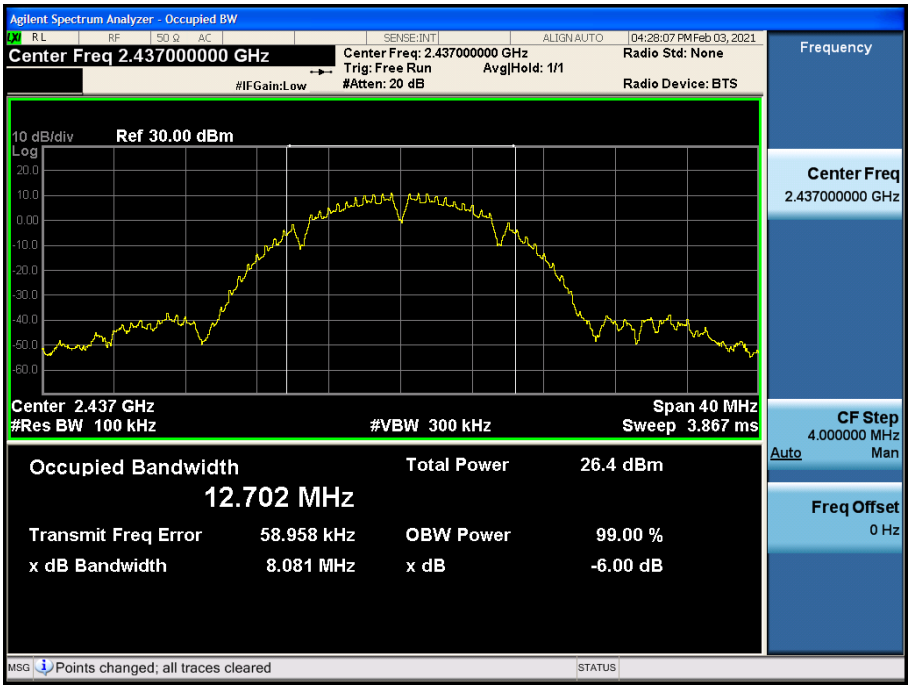
802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.092	0.5
2437	6	8.081	0.5
2462	11	8.097	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.17	0.5
2437	6	15.35	0.5
2462	11	15.73	0.5

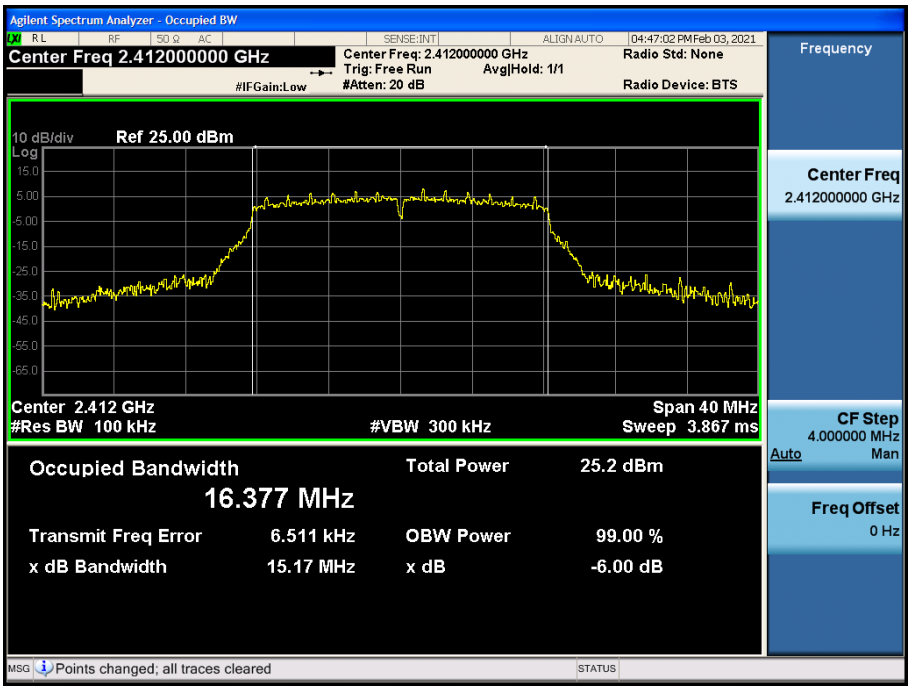
802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.48	0.5
2437	6	15.11	0.5
2462	11	16.12	0.5

▣ Test Plots

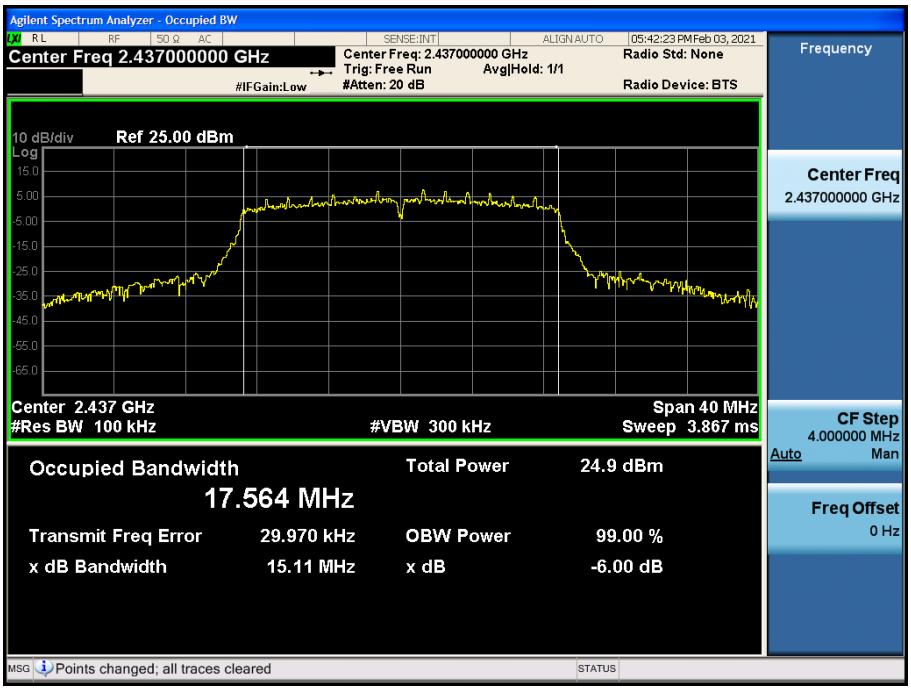
6dB Bandwidth plot (802.11b-CH 6)



6dB Bandwidth plot (802.11g-CH 1)



6dB Bandwidth plot (802.11n_HT20-CH 6)



Note:

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

9.3 OUTPUT POWER

Peak Power

1. Power Meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.47 dB is offset for 2.4 GHz Band

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	1	21.74	30	19
		2	21.94	30	
		5.5	23.24	30	
		11	24.95	30	
2437	6	1	21.54	30	19
		2	21.79	30	
		5.5	23.08	30	
		11	24.77	30	
2462	11	1	21.71	30	19
		2	21.81	30	
		5.5	23.07	30	
		11	24.91	30	

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	6	25.82	30	18
		9	25.87	30	
		12	25.72	30	
		18	25.75	30	
		24	26.31	30	
		36	26.28	30	
		48	26.40	30	
		54	26.38	30	
2437	6	6	25.69	30	18
		9	25.55	30	
		12	25.38	30	
		18	25.49	30	
		24	26.03	30	
		36	25.96	30	
		48	26.03	30	
		54	26.09	30	
2462	11	6	25.82	30	18
		9	25.80	30	
		12	25.64	30	
		18	25.73	30	
		24	26.23	30	
		36	26.31	30	
		48	26.43	30	
		54	26.44	30	

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	0	25.61	30	18
		1	25.51	30	
		2	25.55	30	
		3	26.03	30	
		4	26.05	30	
		5	26.14	30	
		6	26.10	30	
		7	26.08	30	
2437	6	0	25.18	30	18
		1	25.08	30	
		2	25.08	30	
		3	25.56	30	
		4	25.53	30	
		5	25.58	30	
		6	25.66	30	
		7	25.66	30	
2462	11	0	25.63	30	18
		1	25.51	30	
		2	25.52	30	
		3	26.01	30	
		4	25.98	30	
		5	26.12	30	
		6	26.08	30	
		7	26.10	30	

Average Power

1. Power Meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.47 dB is offset for 2.4 GHz Band.

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	1	18.93	0.031	18.96	30	19
		2	18.99	0.041	19.03	30	
		5.5	18.89	0.098	18.98	30	
		11	18.88	0.172	19.06	30	
2437	6	1	18.93	0.031	18.96	30	19
		2	18.72	0.041	18.76	30	
		5.5	18.80	0.098	18.90	30	
		11	18.60	0.172	18.77	30	
2462	11	1	18.78	0.031	18.81	30	19
		2	18.65	0.041	18.69	30	
		5.5	18.79	0.098	18.89	30	
		11	18.67	0.172	18.84	30	

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	6	17.96	0.144	18.11	30	18
		9	17.76	0.201	17.96	30	
		12	17.74	0.264	18.00	30	
		18	17.73	0.390	18.12	30	
		24	17.58	0.498	18.08	30	
		36	17.44	0.718	18.16	30	
		48	17.29	0.920	18.21	30	
		54	17.24	0.978	18.22	30	
2437	6	6	17.60	0.144	17.75	30	18
		9	17.66	0.201	17.86	30	
		12	17.62	0.264	17.88	30	
		18	17.31	0.390	17.70	30	
		24	17.12	0.498	17.62	30	
		36	17.08	0.718	17.79	30	
		48	16.85	0.920	17.77	30	
		54	16.81	0.978	17.79	30	
2462	11	6	17.70	0.144	17.84	30	18
		9	17.70	0.201	17.90	30	
		12	17.73	0.264	17.99	30	
		18	17.65	0.390	18.04	30	
		24	17.41	0.498	17.91	30	
		36	17.36	0.718	18.08	30	
		48	17.13	0.920	18.05	30	
		54	17.06	0.978	18.04	30	

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	0	17.82	0.150	17.97	30	18
		1	17.71	0.284	17.99	30	
		2	17.63	0.398	18.03	30	
		3	17.41	0.520	17.93	30	
		4	17.31	0.724	18.04	30	
		5	16.97	0.887	17.86	30	
		6	17.06	0.969	18.03	30	
		7	16.90	1.052	17.95	30	
2437	6	0	17.50	0.150	17.65	30	18
		1	17.24	0.284	17.52	30	
		2	17.26	0.398	17.66	30	
		3	17.11	0.520	17.63	30	
		4	16.96	0.724	17.69	30	
		5	16.68	0.887	17.57	30	
		6	16.64	0.969	17.61	30	
		7	16.65	1.052	17.71	30	
2462	11	0	17.69	0.150	17.84	30	18
		1	17.56	0.284	17.84	30	
		2	17.46	0.398	17.86	30	
		3	17.33	0.520	17.85	30	
		4	17.18	0.724	17.90	30	
		5	16.96	0.887	17.85	30	
		6	16.91	0.969	17.88	30	
		7	16.92	1.052	17.97	30	

9.4 POWER SPECTRAL DENSITY

Mode	Frequency (MHz)	Channel No.	Test Result			
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11b	2412	1	1.316	0.172	1.488	8
	2437	6	2.083	0.031	2.114	
	2462	11	1.314	0.098	1.412	
802.11g	2412	1	-1.114	0.978	-0.136	
	2437	6	-1.852	0.264	-1.588	
	2462	11	-1.347	0.718	-0.629	
802.11n	2412	1	-1.407	0.724	-0.683	
	2437	6	-1.779	1.052	-0.727	
	2462	11	-0.710	1.052	0.342	

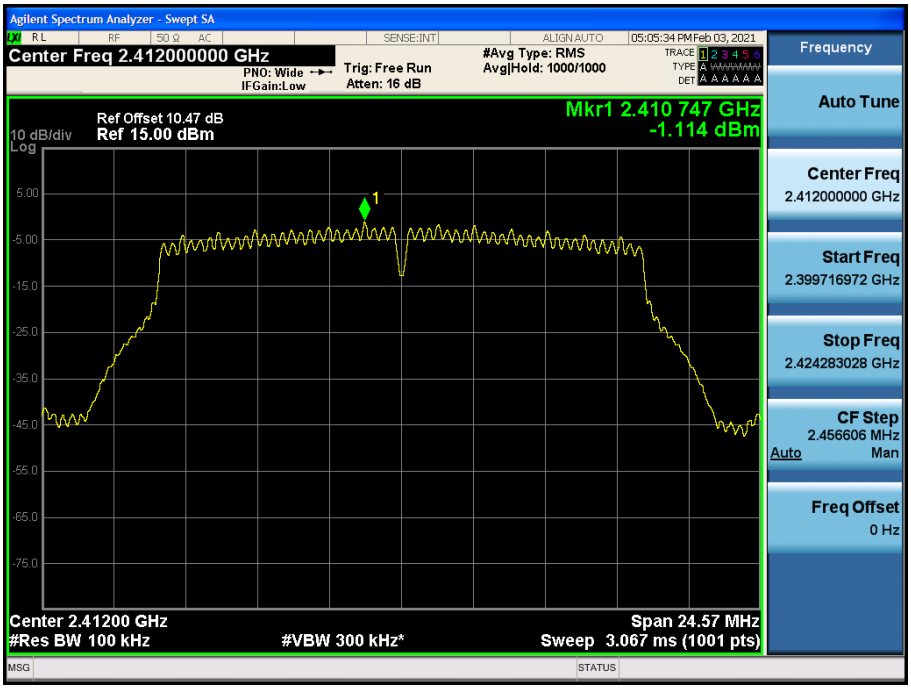
Note :

1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss(10 dB) + Cable loss
3. 10.47 dB is offset for 2.4 GHz Band.

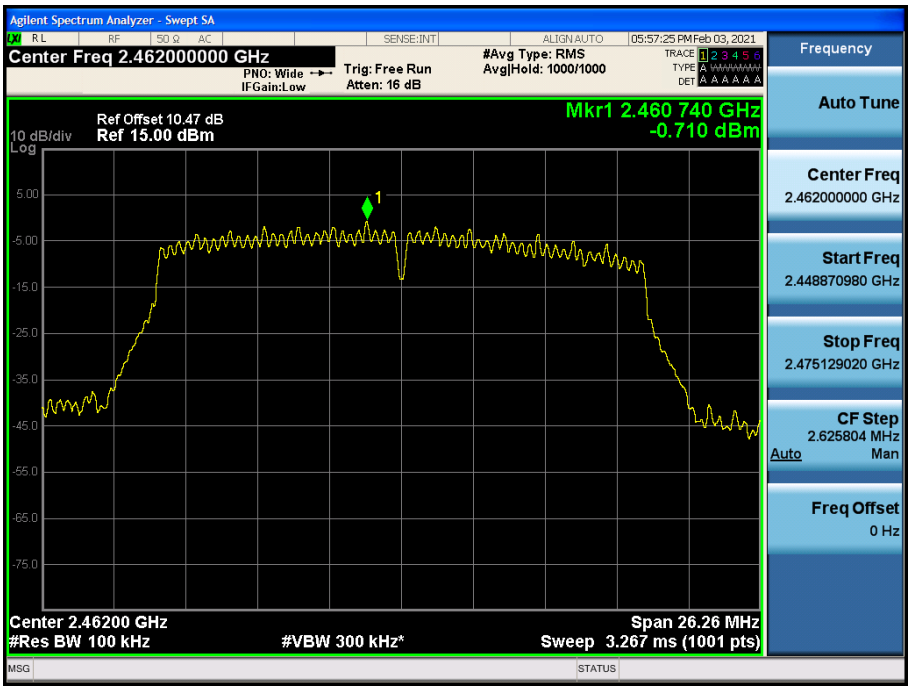
▣ Test Plots

Power Spectral Density (802.11b-CH 6)

Power Spectral Density (802.11g-CH 1)



Power Spectral Density (802.11n_HT20-CH 11)



Note :

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

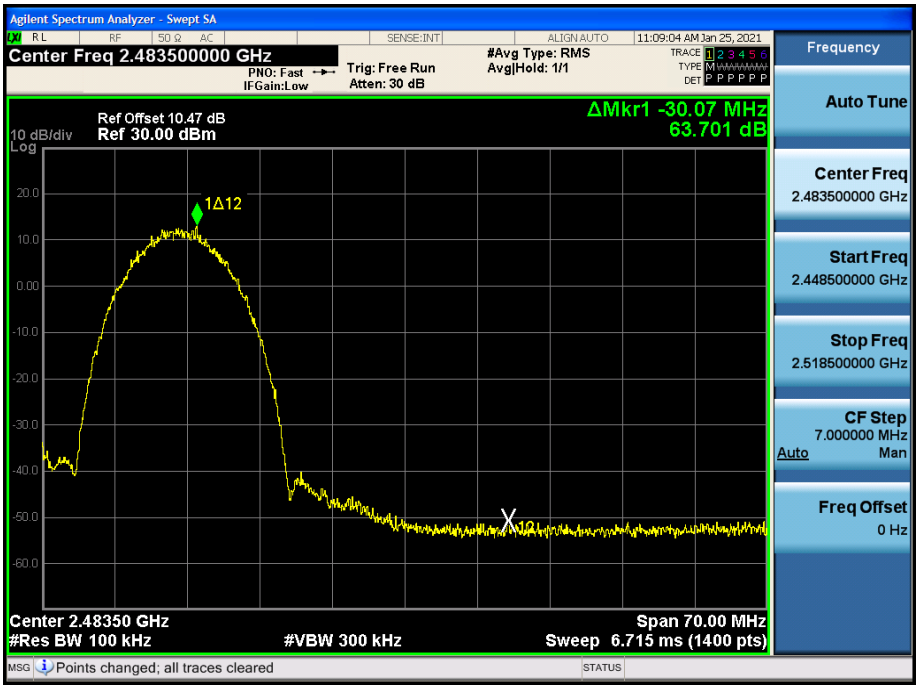
9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

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

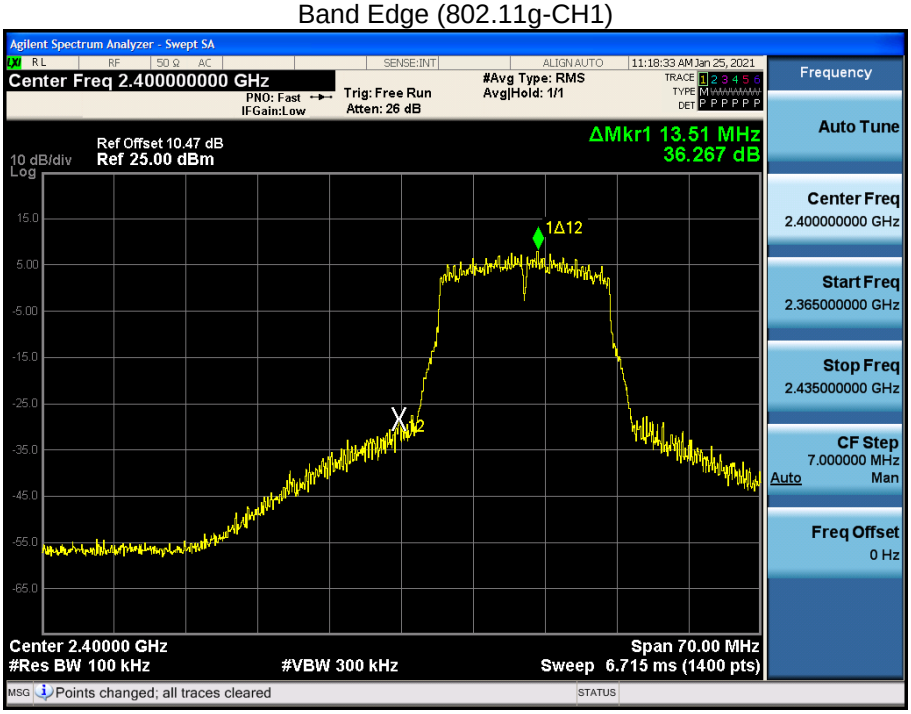
▣ Test Plots(BandEdge)

Band Edge (802.11b-CH1)

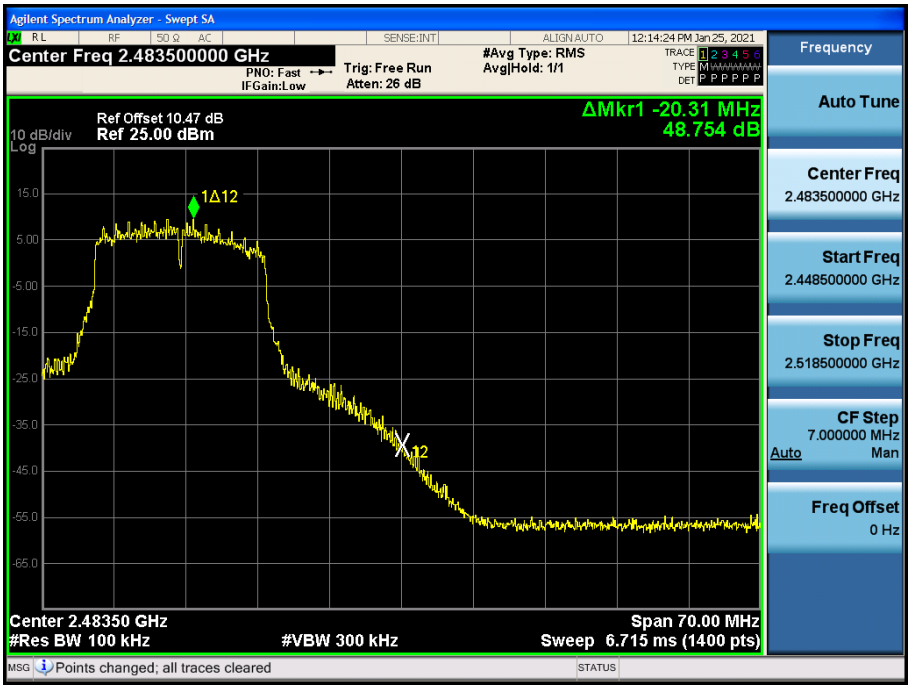
Band Edge (802.11b-CH11)



Band Edge (802.11g-CH1)



Band Edge (802.11g-CH11)



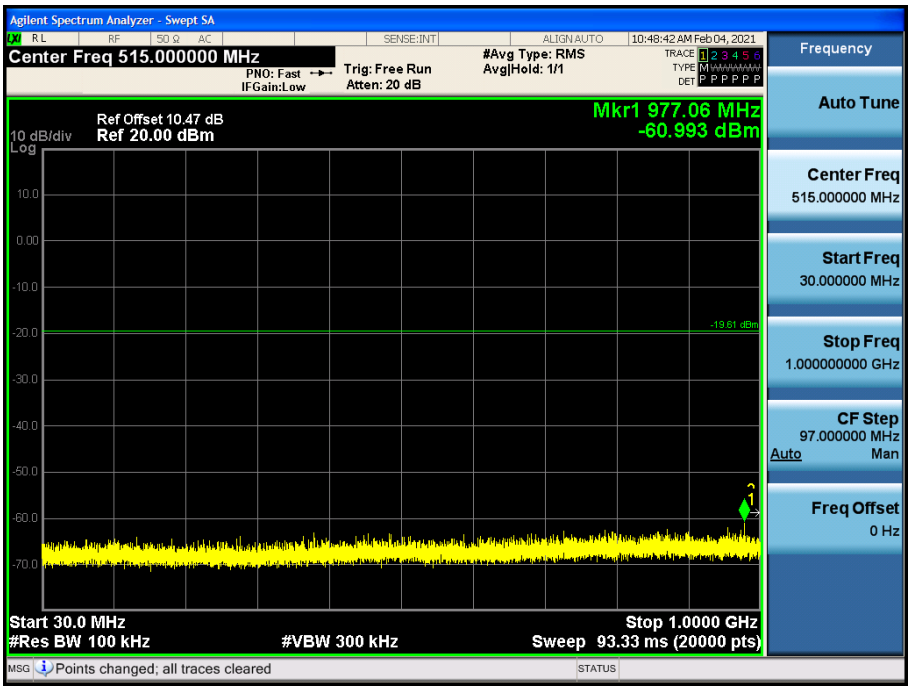
Band Edge (802.11n_HT20 -CH1)

Band Edge (802.11n_HT20 –CH11)

▣ Test Plots(Conducted Spurious Emission)

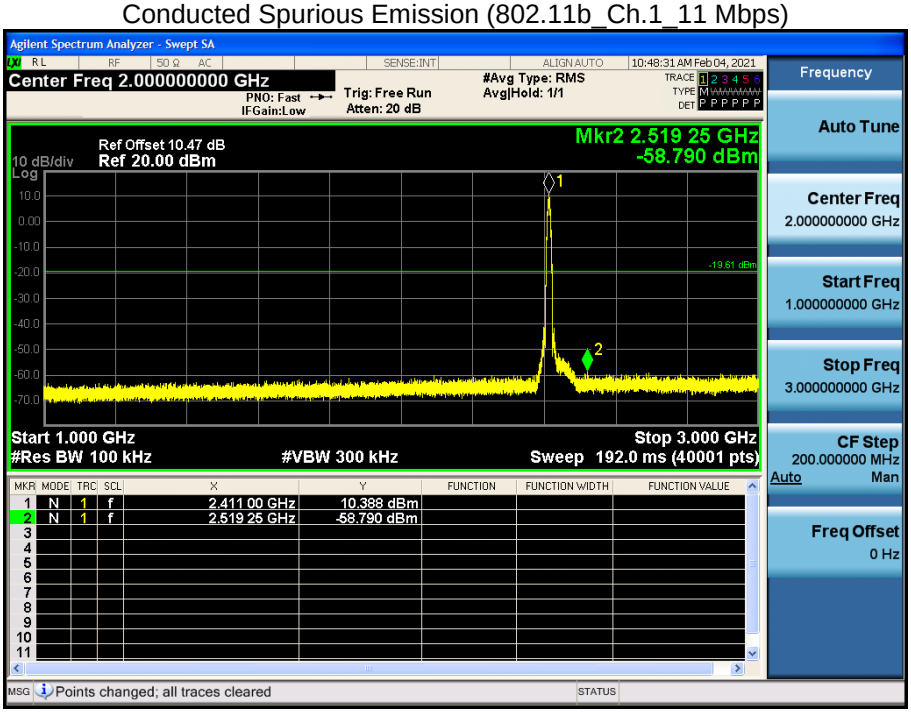
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



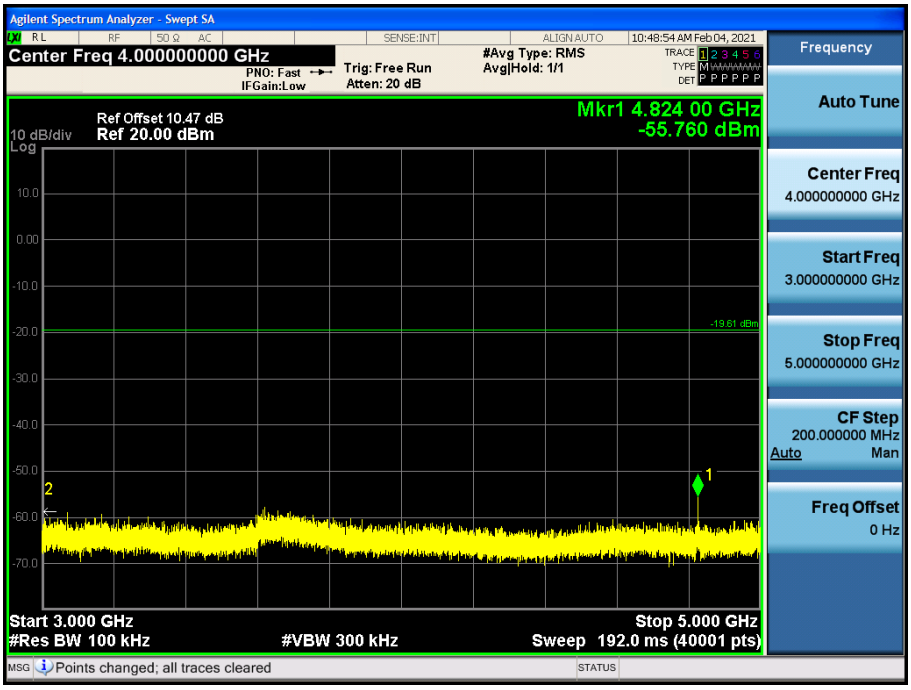
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



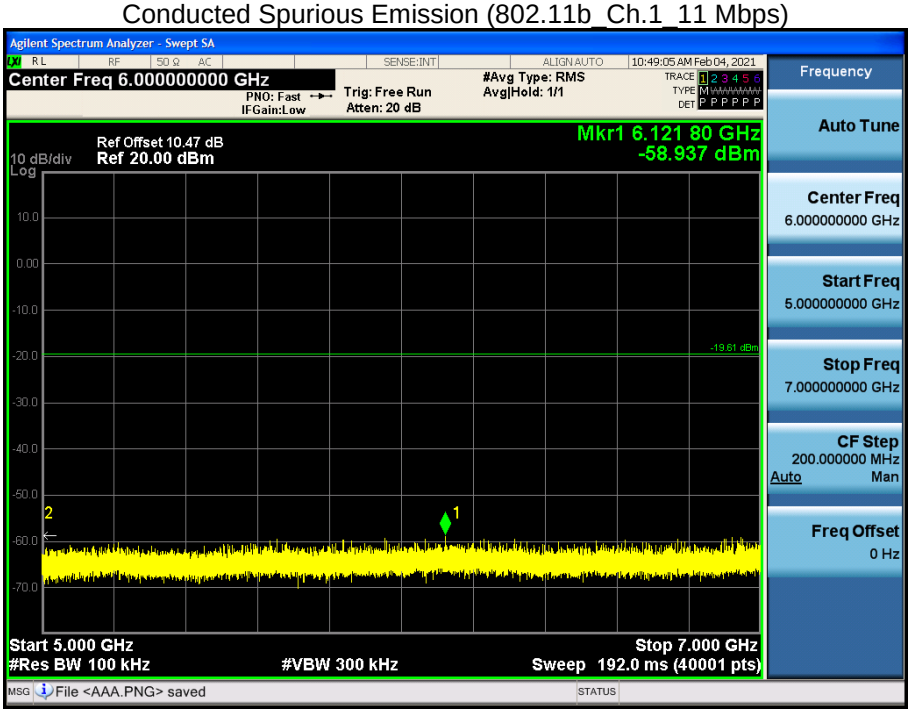
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



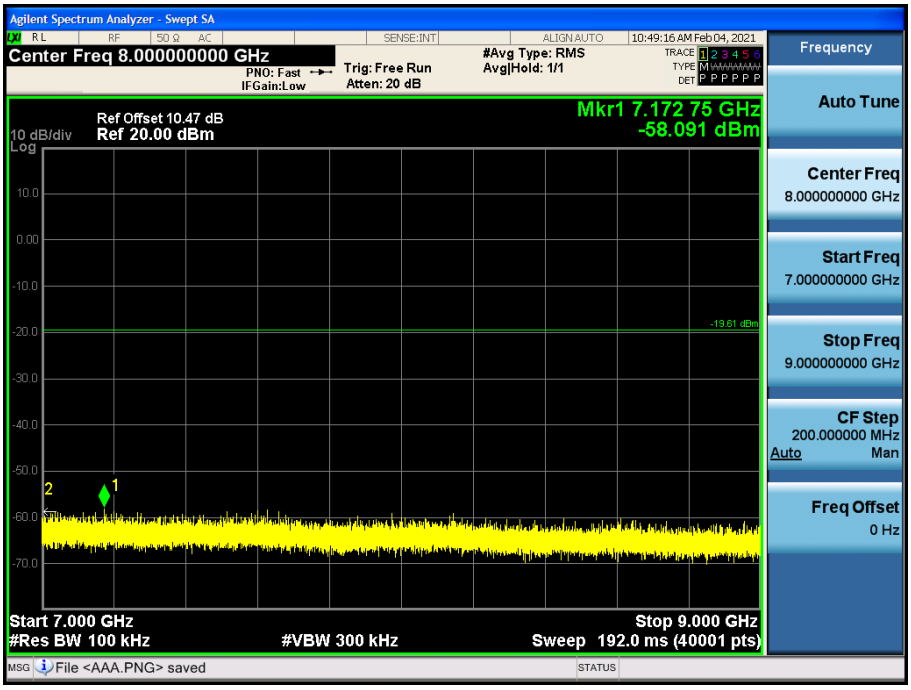
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



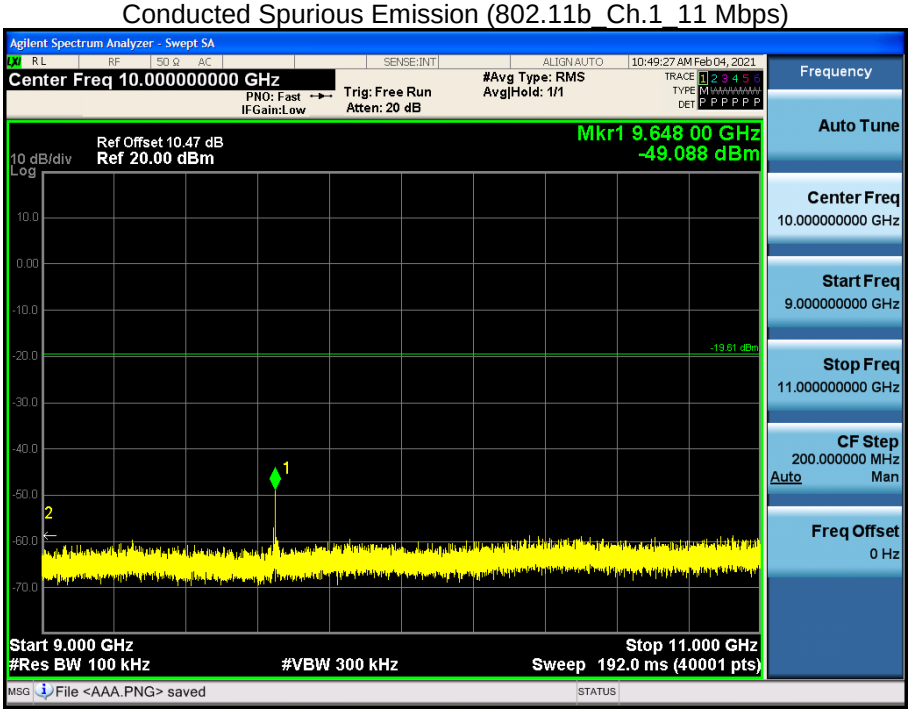
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



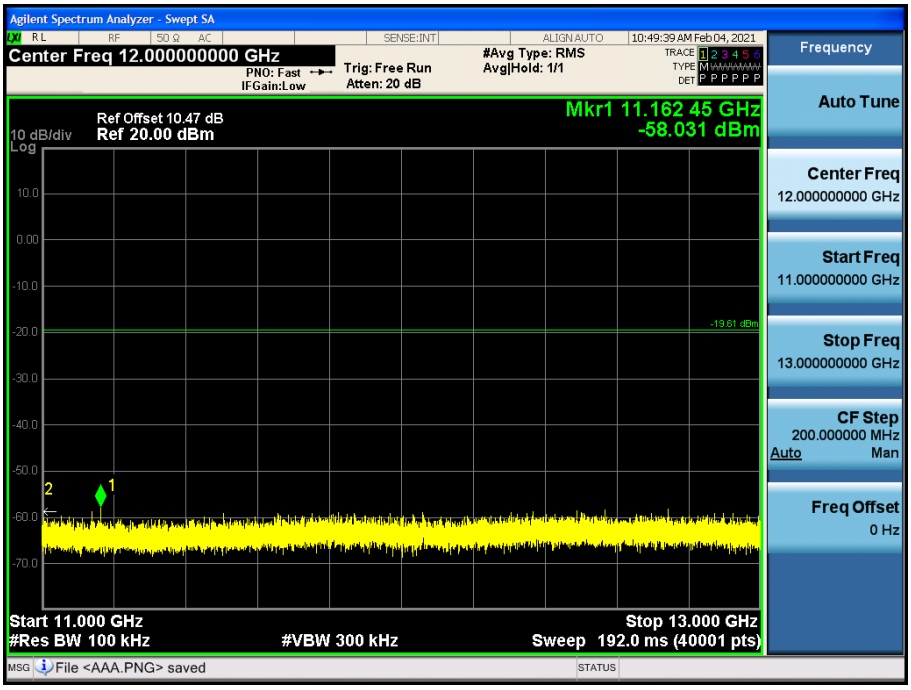
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



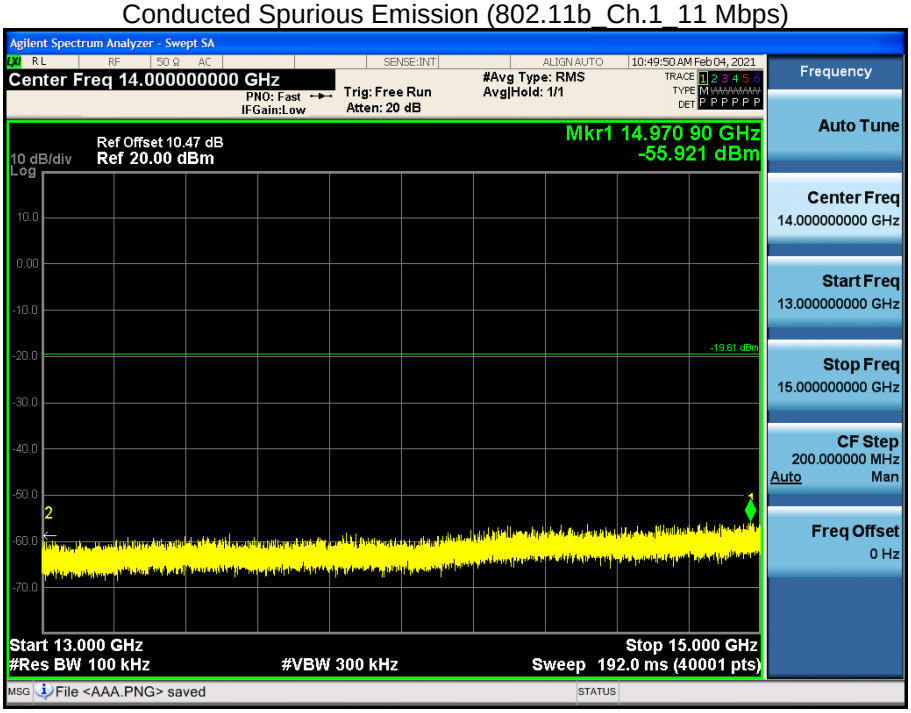
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



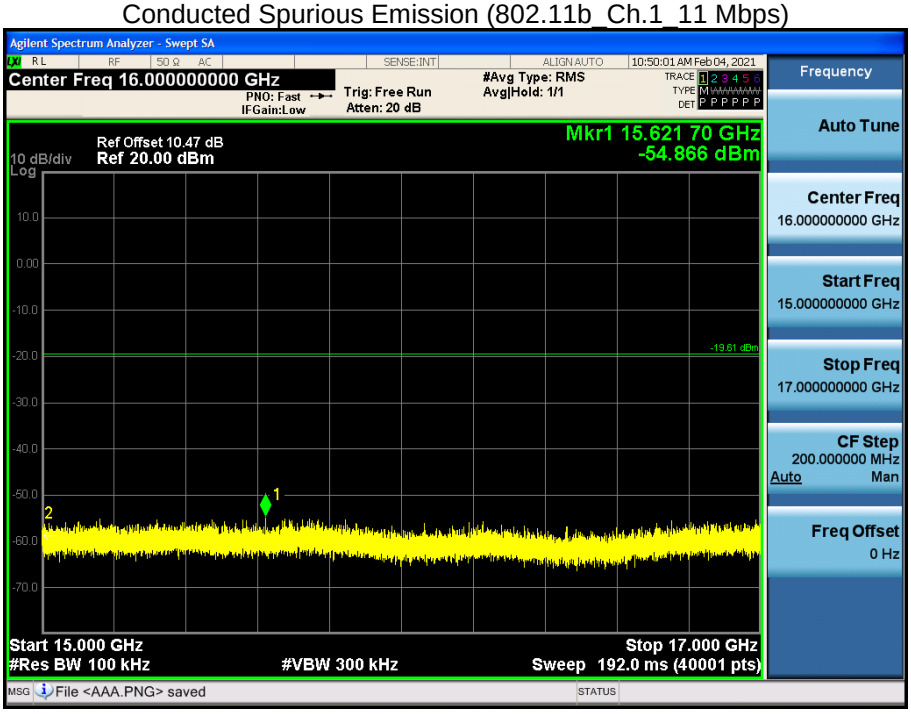
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



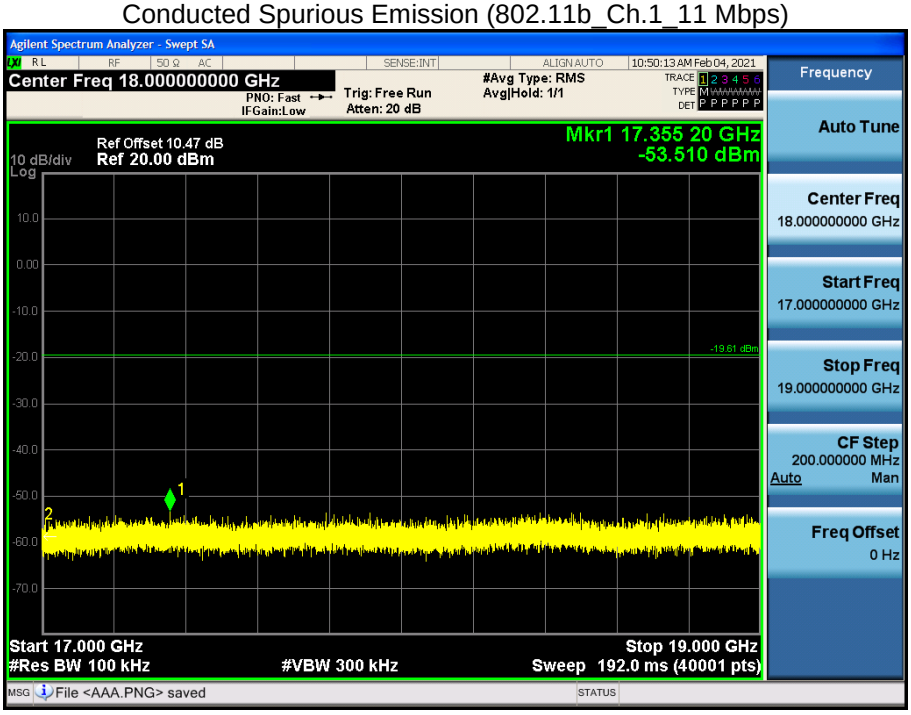
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



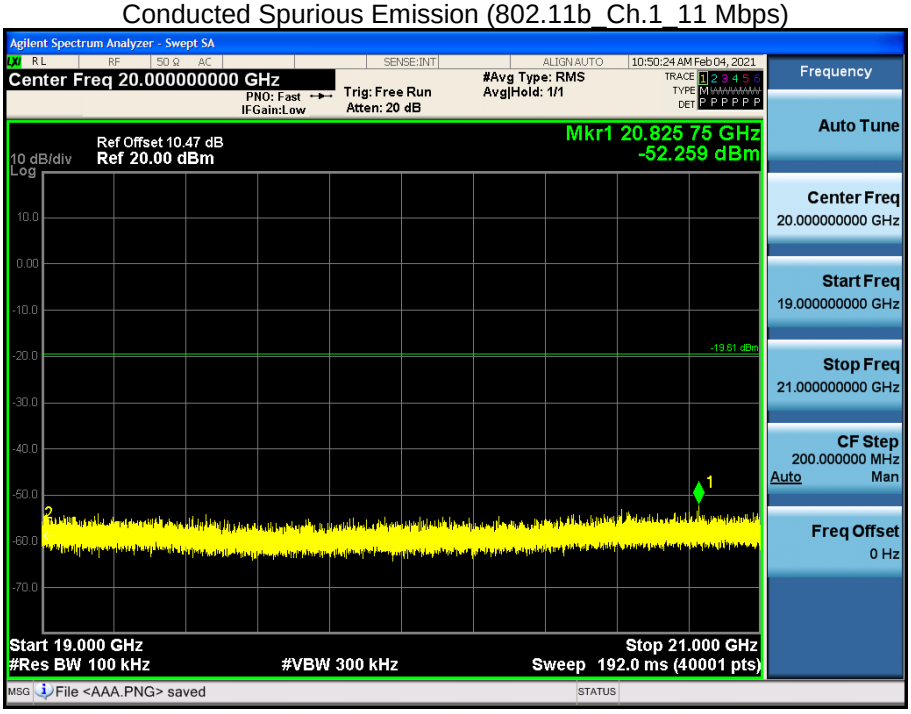
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



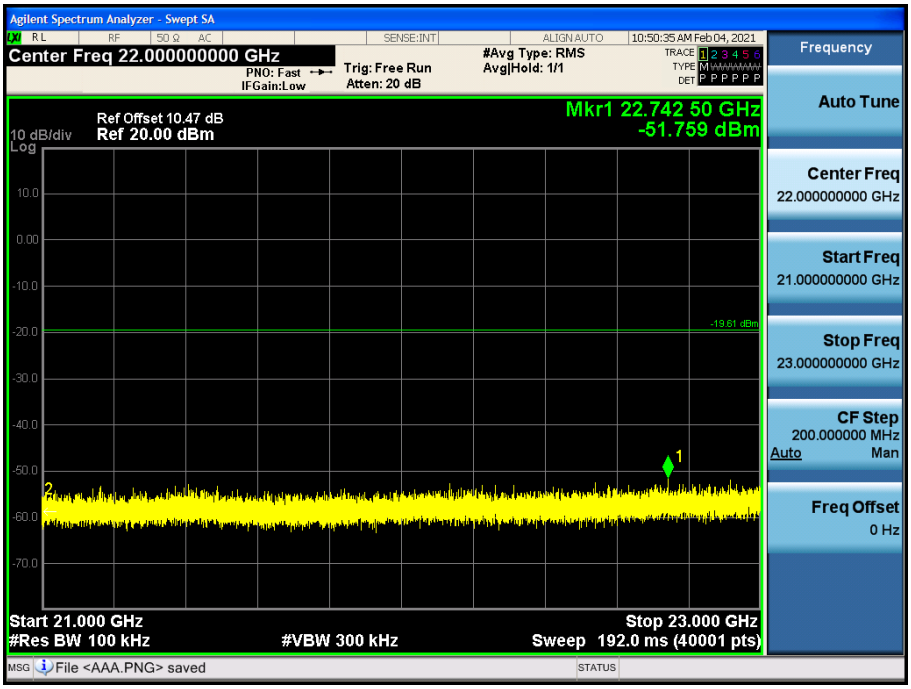
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



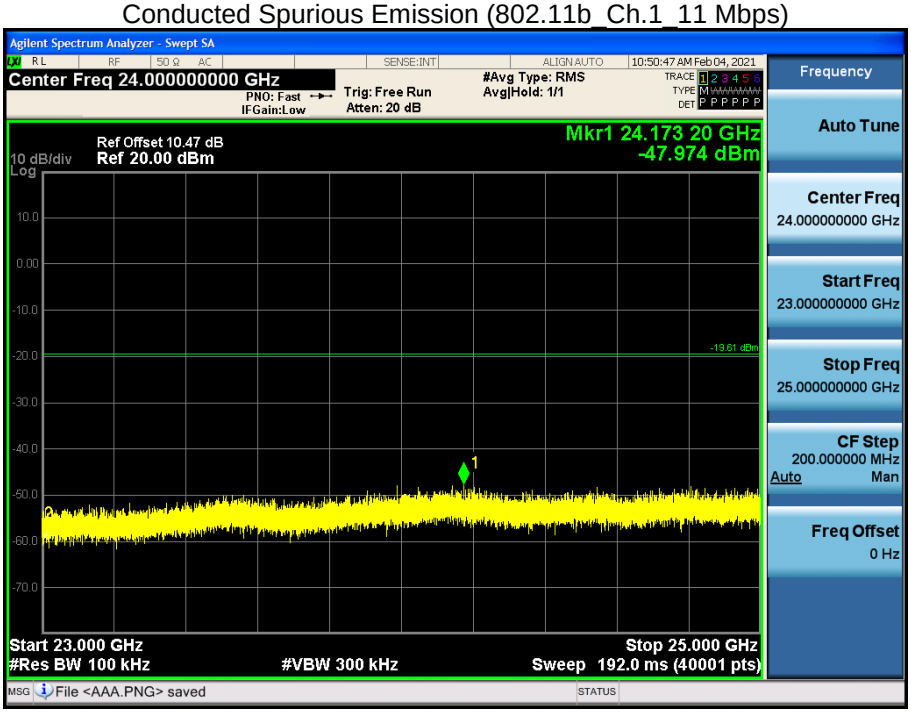
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b_Ch.1_11 Mbps)



9.6 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

1. The reading 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 (dBuV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

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

Frequency Range : Above 1 GHz

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	47.57	1.76	V	49.33	73.98	24.65	PK
4824	41.36	1.76	V	43.12	53.98	10.86	AV
7236	39.75	12.28	V	52.03	73.98	21.95	PK
7236	27.78	12.28	V	40.06	53.98	13.92	AV
4824	47.02	1.76	H	48.78	73.98	25.20	PK
4824	39.99	1.76	H	41.75	53.98	12.23	AV
7236	39.90	12.28	H	52.18	73.98	21.80	PK
7236	27.88	12.28	H	40.16	53.98	13.82	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	46.02	1.96	V	47.98	73.98	26.00	PK
4874	39.57	1.96	V	41.53	53.98	12.45	AV
7311	39.56	11.45	V	51.01	73.98	22.97	PK
7311	28.51	11.45	V	39.96	53.98	14.02	AV
4874	46.18	1.96	H	48.14	73.98	25.84	PK
4874	39.75	1.96	H	41.71	53.98	12.27	AV
7311	40.79	11.45	H	52.24	73.98	21.74	PK
7311	31.31	11.45	H	42.76	53.98	11.22	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	44.16	2.83	V	46.99	73.98	26.99	PK
4924	36.15	2.83	V	38.98	53.98	15.00	AV
7386	39.36	11.87	V	51.23	73.98	22.75	PK
7386	26.52	11.87	V	38.39	53.98	15.59	AV
4924	44.02	2.83	H	46.85	73.98	27.13	PK
4924	36.12	2.83	H	38.95	53.98	15.03	AV
7386	39.25	11.87	H	51.12	73.98	22.86	PK
7386	26.48	11.87	H	38.35	53.98	15.63	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz
Channel No.	01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	44.93	0.000	1.76	V	46.69	73.98	27.29	PK
4824	31.65	0.144	1.76	V	33.55	53.98	20.43	AV
7236	38.65	0.000	12.28	V	50.93	73.98	23.05	PK
7236	26.58	0.144	12.28	V	39.00	53.98	14.98	AV
4824	44.72	0.000	1.76	H	46.48	73.98	27.50	PK
4824	31.45	0.144	1.76	H	33.35	53.98	20.63	AV
7236	38.81	0.000	12.28	H	51.09	73.98	22.89	PK
7236	26.75	0.144	12.28	H	39.17	53.98	14.81	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	43.47	0.00	1.96	V	45.43	73.98	28.55	PK
4874	31.95	0.144	1.96	V	34.05	53.98	19.93	AV
7311	39.80	0.00	11.45	V	51.25	73.98	22.73	PK
7311	27.45	0.144	11.45	V	39.04	53.98	14.94	AV
4874	44.73	0.00	1.96	H	46.69	73.98	27.29	PK
4874	32.15	0.144	1.96	H	34.25	53.98	19.73	AV
7311	39.97	0.00	11.45	H	51.42	73.98	22.56	PK
7311	28.02	0.144	11.45	H	39.61	53.98	14.37	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	42.43	0.00	2.83	V	45.26	73.98	28.72	PK
4924	30.35	0.144	2.83	V	33.32	53.98	20.66	AV
7386	38.61	0.00	11.87	V	50.48	73.98	23.50	PK
7386	26.72	0.144	11.87	V	38.73	53.98	15.25	AV
4924	42.35	0.00	2.83	H	45.18	73.98	28.80	PK
4924	30.22	0.144	2.83	H	33.19	53.98	20.79	AV
7386	38.58	0.00	11.87	H	50.45	73.98	23.53	PK
7386	26.52	0.144	11.87	H	38.53	53.98	15.45	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz
Channel No.	01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	44.85	0.000	1.76	V	46.61	73.98	27.37	PK
4824	31.32	0.150	1.76	V	33.23	53.98	20.75	AV
7236	38.98	0.000	12.28	V	51.26	73.98	22.72	PK
7236	26.62	0.150	12.28	V	39.05	53.98	14.93	AV
4824	44.62	0.000	1.76	H	46.38	73.98	27.60	PK
4824	31.12	0.150	1.76	H	33.03	53.98	20.95	AV
7236	39.10	0.000	12.28	H	51.38	73.98	22.60	PK
7236	26.78	0.150	12.28	H	39.21	53.98	14.77	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2437 MHz
Channel No.	06 Ch

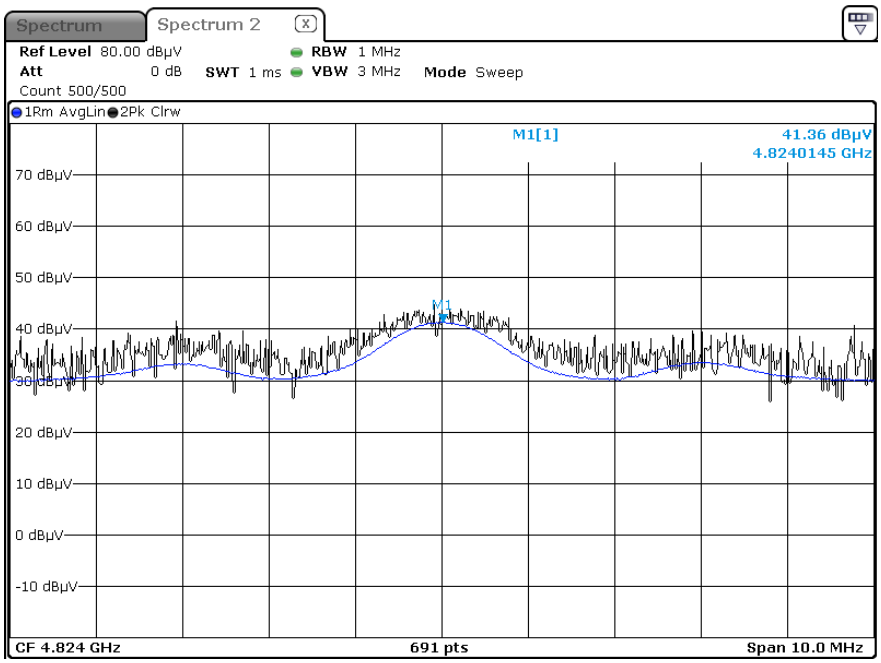
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	43.69	0.000	1.96	V	45.65	73.98	28.33	PK
4874	31.98	0.150	1.96	V	34.09	53.98	19.89	AV
7311	38.98	0.000	11.45	V	50.43	73.98	23.55	PK
7311	27.38	0.150	11.45	V	38.98	53.98	15.00	AV
4874	44.13	0.000	1.96	H	46.09	73.98	27.89	PK
4874	32.15	0.150	1.96	H	34.26	53.98	19.72	AV
7311	40.08	0.000	11.45	H	51.53	73.98	22.45	PK
7311	28.02	0.150	11.45	H	39.62	53.98	14.36	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2462 MHz
Channel No.	11 Ch

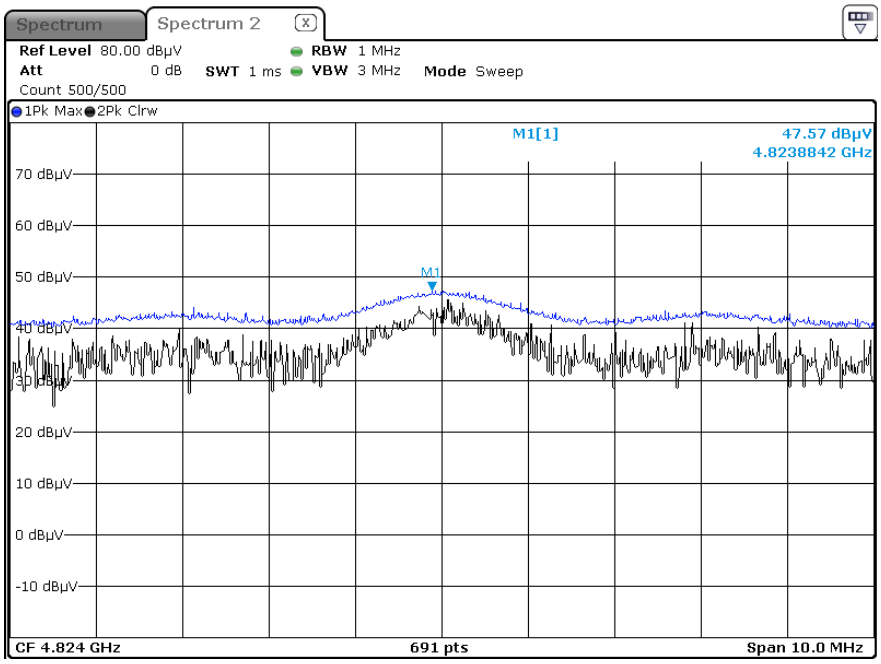
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	42.71	0.000	2.83	V	45.54	73.98	28.44	PK
4924	30.48	0.150	2.83	V	33.46	53.98	20.52	AV
7386	38.81	0.000	11.87	V	50.68	73.98	23.30	PK
7386	26.65	0.150	11.87	V	38.67	53.98	15.31	AV
4924	41.52	0.000	2.83	H	44.35	73.98	29.63	PK
4924	30.28	0.150	2.83	H	33.26	53.98	20.72	AV
7386	38.65	0.000	11.87	H	50.52	73.98	23.46	PK
7386	26.48	0.150	11.87	H	38.50	53.98	15.48	AV

▣ Test Plots (Worst case : Z-V)

Radiated Spurious Emissions plot – Average Reading (802.11b_1 Mbps, Ch.1 2nd Harmonic)



Radiated Spurious Emissions plot – Peak Reading (802.11b_1 Mbps, Ch.1 2nd Harmonic)



Note: Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+ C.L+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	23.903	34.77	H	58.67	73.98	15.31	PK
2390.0	12.985	34.77	H	47.76	53.98	6.22	AV
2390.0	23.538	34.77	V	58.31	73.98	15.67	PK
2390.0	12.542	34.77	V	47.31	53.98	6.67	AV
2483.5	23.757	34.25	H	58.01	73.98	15.97	PK
2483.5	12.331	34.25	H	46.58	53.98	7.40	AV
2483.5	23.352	34.25	V	57.60	73.98	16.38	PK
2483.5	11.985	34.25	V	46.24	53.98	7.75	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+ C.L+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	36.640	0.000	34.77	H	71.41	73.98	2.57	PK
2390.0	16.487	0.144	34.77	H	51.40	53.98	2.58	AV
2390.0	36.254	0.000	34.77	V	71.02	73.98	2.96	PK
2390.0	16.125	0.144	34.77	V	51.04	53.98	2.94	AV
2483.5	37.567	0.000	34.25	H	71.82	73.98	2.16	PK
2483.5	16.796	0.144	34.25	H	51.19	53.98	2.79	AV
2483.5	37.325	0.000	34.25	V	71.58	73.98	2.41	PK
2483.5	16.525	0.144	34.25	V	50.92	53.98	3.06	AV

Operation Mode:	802.11n (HT20)
Transfer Rate:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+ C.L+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
#2389 ~ 2390	29.700	0.000	34.77	H	64.47	73.98	9.51	PK
#2389 ~ 2390	16.120	0.150	34.77	H	51.04	53.98	2.94	AV
2310.0 ~ 2389.0	34.917	0.000	34.77	H	69.69	73.98	4.29	PK
2310.0 ~ 2389.0	16.056	0.150	34.77	H	50.98	53.98	3.00	AV
#2389 ~ 2390	28.591	0.000	34.77	V	63.36	73.98	10.62	PK
#2389 ~ 2390	15.692	0.150	34.77	V	50.61	53.98	3.37	AV
2310.0 ~ 2389.0	33.471	0.000	34.77	V	68.24	73.98	5.74	PK
2310.0 ~ 2389.0	15.425	0.150	34.77	V	50.35	53.98	3.63	AV
#2483.5 ~ 2484.5	31.120	0.000	34.25	H	65.37	73.98	8.61	PK
#2483.5 ~ 2484.5	16.290	0.150	34.25	H	50.69	53.98	3.29	AV
2484.5 ~ 2500.0	36.698	0.000	34.25	H	70.95	73.98	3.03	PK
2484.5 ~ 2500.0	16.014	0.150	34.25	H	50.41	53.98	3.57	AV
#2483.5 ~ 2484.5	30.480	0.000	34.25	V	64.73	73.98	9.25	PK
#2483.5 ~ 2484.5	16.120	0.150	34.25	V	50.52	53.98	3.46	AV
2484.5 ~ 2500.0	35.676	0.000	34.25	V	69.93	73.98	4.05	PK
2484.5 ~ 2500.0	16.025	0.150	34.25	V	50.43	53.98	3.56	AV

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

▣ Test Plots (Worst case : X-H)

Radiated Restricted Band Edges plot – Average Reading (802.11g_6 Mbps Ch.11)

Radiated Restricted Band Edges plot – Peak Reading 802.11g_ 6 Mbps Ch.11)

Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

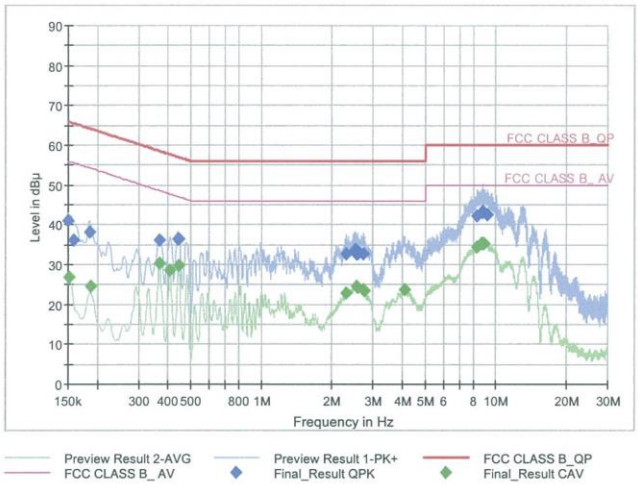
2.4G WLAN L1 1 / 2

Test Report

Common Information

EUT :	SM-A326U
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	2.4G WLAN L1
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.150000	41.05	66.00	24.95	9.000	L1	OFF	9.7
0.159000	36.00	65.52	29.52	9.000	L1	OFF	9.6
0.186000	37.96	64.21	26.25	9.000	L1	OFF	9.6
0.368250	35.99	58.54	22.55	9.000	L1	OFF	9.6
0.440250	36.43	57.06	20.63	9.000	L1	OFF	9.6
0.444750	36.28	56.97	20.69	9.000	L1	OFF	9.6
2.318000	32.56	56.00	23.44	9.000	L1	OFF	9.7
2.500250	33.17	56.00	22.83	9.000	L1	OFF	9.8
2.536250	33.61	56.00	22.39	9.000	L1	OFF	9.8
2.549750	32.46	56.00	23.54	9.000	L1	OFF	9.8
2.570000	32.66	56.00	23.34	9.000	L1	OFF	9.8
2.720750	32.67	56.00	23.33	9.000	L1	OFF	9.8
8.348000	42.10	60.00	17.90	9.000	L1	OFF	10.0
8.780000	43.18	60.00	16.82	9.000	L1	OFF	10.0
8.791250	43.21	60.00	16.79	9.000	L1	OFF	10.0
8.813750	43.16	60.00	16.84	9.000	L1	OFF	10.0
8.829500	42.94	60.00	17.06	9.000	L1	OFF	10.0
9.232250	42.40	60.00	17.60	9.000	L1	OFF	10.0

Final_Result_CAV

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2.4G WLAN L1 2 / 2

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	26.93	55.88	28.95	9.000	L1	OFF	9.6
0.188250	24.54	54.11	29.57	9.000	L1	OFF	9.6
0.368250	30.20	48.54	18.34	9.000	L1	OFF	9.6
0.406500	28.61	47.72	19.11	9.000	L1	OFF	9.6
0.444750	29.72	46.97	17.26	9.000	L1	OFF	9.6
2.318000	22.87	46.00	23.13	9.000	L1	OFF	9.7
2.549750	24.39	46.00	21.61	9.000	L1	OFF	9.8
2.588000	24.28	46.00	21.72	9.000	L1	OFF	9.8
2.720750	23.66	46.00	22.34	9.000	L1	OFF	9.8
2.759000	23.24	46.00	22.76	9.000	L1	OFF	9.8
4.082000	23.56	46.00	22.44	9.000	L1	OFF	9.8
8.327750	34.38	50.00	15.62	9.000	L1	OFF	10.0
8.345750	34.40	50.00	15.60	9.000	L1	OFF	10.0
8.735000	35.33	50.00	14.67	9.000	L1	OFF	10.0
8.773250	35.30	50.00	14.70	9.000	L1	OFF	10.0
8.793500	35.24	50.00	14.76	9.000	L1	OFF	10.0
8.813750	35.21	50.00	14.79	9.000	L1	OFF	10.0
8.854250	35.09	50.00	14.91	9.000	L1	OFF	10.0

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Conducted Emissions (Line 2)

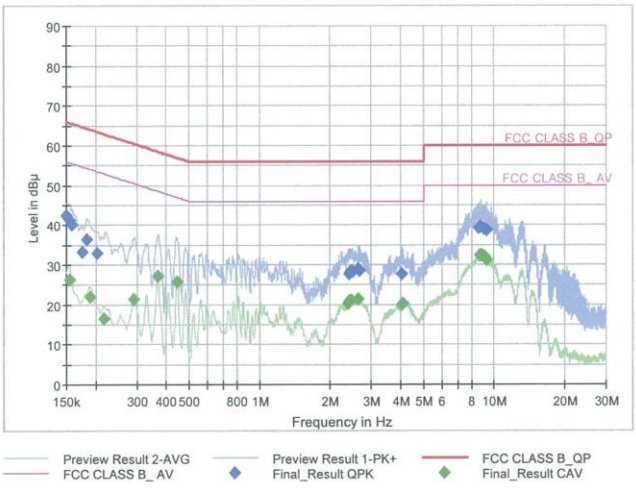
2.4G WLAN N 1 / 2

Test Report

Common Information

EUT :	SM-A326U
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	2.4G WLAN N
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.150000	42.41	66.00	23.59	9.000	N	OFF	9.6
0.154500	41.30	65.75	24.45	9.000	N	OFF	9.6
0.159000	40.04	65.52	25.48	9.000	N	OFF	9.6
0.174750	33.29	64.73	31.44	9.000	N	OFF	9.6
0.183750	36.44	64.31	27.87	9.000	N	OFF	9.6
0.204000	32.75	63.45	30.69	9.000	N	OFF	9.6
2.419250	27.84	56.00	28.16	9.000	N	OFF	9.8
2.455250	28.22	56.00	27.78	9.000	N	OFF	9.8
2.493500	28.19	56.00	27.81	9.000	N	OFF	9.8
2.633000	28.85	56.00	27.15	9.000	N	OFF	9.8
2.669000	28.59	56.00	27.41	9.000	N	OFF	9.8
4.041500	27.75	56.00	28.25	9.000	N	OFF	9.8
8.573000	39.23	60.00	20.77	9.000	N	OFF	10.0
8.750750	39.63	60.00	20.37	9.000	N	OFF	10.0
8.777750	39.50	60.00	20.50	9.000	N	OFF	10.0
8.818250	39.57	60.00	20.43	9.000	N	OFF	10.1
9.065750	39.03	60.00	20.97	9.000	N	OFF	10.1
9.268250	38.58	60.00	21.42	9.000	N	OFF	10.1

Final_Result_CAV

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2.4G WLAN N 2 / 2

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	26.35	55.75	29.41	9.000	N	OFF	9.6
0.190500	21.99	54.02	32.03	9.000	N	OFF	9.6
0.217500	16.47	52.91	36.44	9.000	N	OFF	9.6
0.291750	21.42	50.47	29.05	9.000	N	OFF	9.6
0.368250	27.03	48.54	21.51	9.000	N	OFF	9.6
0.444750	25.61	46.97	21.36	9.000	N	OFF	9.6
2.381000	20.28	46.00	25.72	9.000	N	OFF	9.8
2.419250	20.81	46.00	25.19	9.000	N	OFF	9.8
2.457500	20.92	46.00	25.08	9.000	N	OFF	9.8
2.635250	21.41	46.00	24.59	9.000	N	OFF	9.8
4.041500	20.04	46.00	25.96	9.000	N	OFF	9.8
4.115750	20.13	46.00	25.87	9.000	N	OFF	9.8
8.712500	32.24	50.00	17.76	9.000	N	OFF	10.0
8.753000	32.28	50.00	17.72	9.000	N	OFF	10.0
8.775500	32.27	50.00	17.73	9.000	N	OFF	10.0
8.858750	32.23	50.00	17.77	9.000	N	OFF	10.1
9.068000	31.90	50.00	18.10	9.000	N	OFF	10.1
9.308750	31.27	50.00	18.73	9.000	N	OFF	10.1

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9.9 CONFIRMATION OF GEO-LOCATION MECHANISM

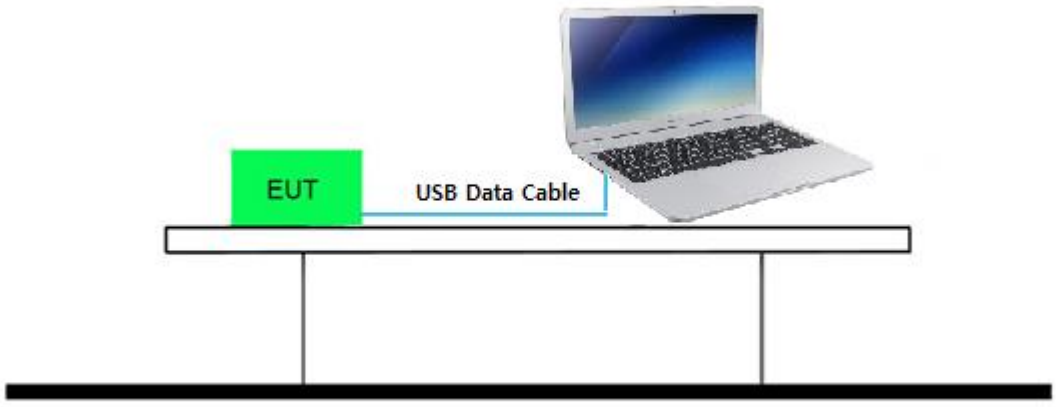
The device uses MCC information obtained from the public cellular carrier to determine that it is operating outside the U.S. and then enable channels 12 and 13 only if a non-US MCC that supports channel 12 and 13 is confirmed.

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. At the Command Prompt, enter the command.

>adb root

>adb remount

>adb push C:\adb\iwpriv /system/bin

>adb shell "chmod 777 /system/bin/iwpriv"

>adb shell cmd wifi force-country-code enabled [country-code]

>adb shell cmd wifi get-country-code

>adb shell iwpriv wlan0 get_ch_list

Setting the country for product

Country code = US

```
C:₩adb>adb root
adbd is already running as root

C:₩adb>   adb remount
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
remount succeeded

C:₩adb>adb push C:₩adb₩iwpriv /system/bin
826 KB/s (17760 bytes in 0.020s)

C:₩adb>adb shell "chmod 777 /system/bin/iwpriv"

C:₩adb>adb shell cmd wifi force-country-code enabled US

C:₩adb>adb shell cmd wifi get-country-code
Wifi Country Code = US

C:₩adb>adb shell iwpriv wlan0 get_ch_list
wlan0     get_ch_list:1  2  3  4  5  6  7  8  9  10  11  36  40  44  48  52  56  60  64  100  104  108  112  116  120  124  128  132  136  140  144  149  153  157  161  165
```

Country code = KR(Korea)

```
C:₩>adb root

C:₩>adb remount
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
[libfs_mgr]make ext4 filesystem on /dev/block/dm-5 return=256
remount succeeded

C:₩>adb push C:₩adb₩iwpriv /system/bin
C:₩adb₩iwpriv: 1 file pushed. 0.8 MB/s (17760 bytes in 0.022s)

C:₩>adb shell "chmod 777 /system/bin/iwpriv"

C:₩>adb shell cmd wifi force-country-code enabled KR

C:₩>adb shell cmd wifi get-country-code
Wifi Country Code = KR

C:₩>adb shell iwpriv wlan0 get_ch_list
wlan0     get_ch_list:1  2  3  4  5  6  7  8  9  10  11  12  13  36  40  44  48  52  56  60  64  100  104  108  112  116  120  124  128  132  136  140  144  149  153  157  161  165
```

Airplane on

```
C:₩adb>adb shell iwpriv wlan0 get_ch_list
wlan0     get_ch_list:1  2  3  4  5  6  7  8  9  10  11  36  40  44  48  52  56  60  64  100  104  108  112  116  120  124  128  132  136  140  144  149  153  157  161  165
```

10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESR / EMI Test Receiver	09/16/2020	Annual	101910
ESPAC	SU-642 /Temperature Chamber	03/18/2020	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/11/2020	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/02/2020	Annual	101231
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Keysight	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/25/2020	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/12/2020	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	06/26/2020	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	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

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	07/28/2020	Annual	102168
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/06/2021	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/08/2021	Annual	1
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	03/02/2020	Annual	8
Wainwright Instruments	WHKX8-6090-7000-18000-40SS/ High Pass Filter	03/02/2020	Annual	25
Api tech.	18B-03 / Attenuator (3 dB)	03/02/2020	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	03/02/2020	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	03/02/2020	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	03/02/2020	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956

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-2102-FC007-P