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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:
May 27, 2021

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

Report No.: HCT-RF-2105-FC062

FCC ID:	**A3LSMM325FV**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**
Model:	SM-M325FV/DS
Additional Model:	-
EUT Type:	Mobile Phone
Average Output Power:	802.11b : 19.68 dBm / 802.11g : 17.72 dBm / 802.11n(HT20) : 17.65 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 : Sang Hoon Lee
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-2105-FC062	May 27, 2021	- First Approval Report

Table of Contents

1. EUT DESCRIPTION

Model	SM-M325FV/DS	
Additional Model	-	
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 : 25.72 dBm 802.11g : 26.22 dBm 802.11n(HT20) : 25.82 dBm
	Average Power	802.11b : 19.68 dBm 802.11g : 17.72 dBm 802.11n(HT20) : 17.65 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n	
Number of Channels	11 Channels	
Date(s) of Tests	April 19, 2021 ~ May 27, 2021	
Serial number	Radiated: UDU1500M Conducted: UDN0325H	

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.

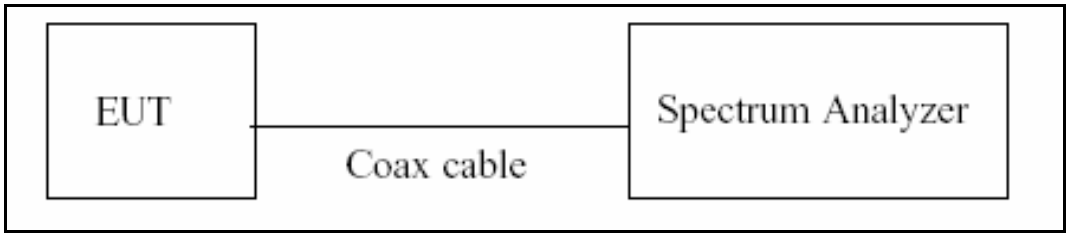
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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*.

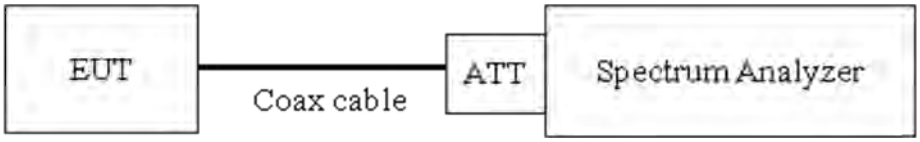
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

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.

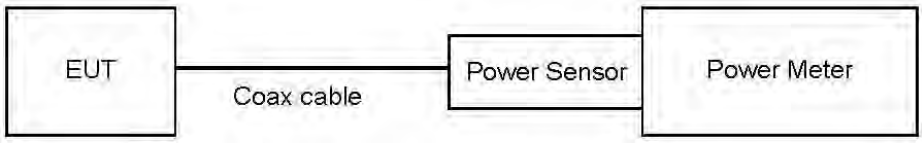
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

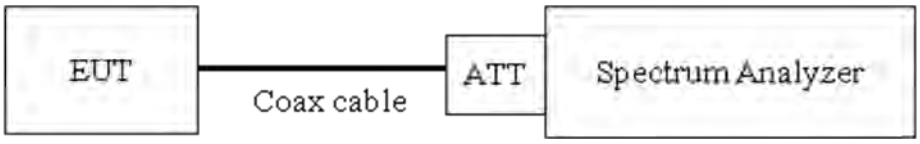
▪ Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

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

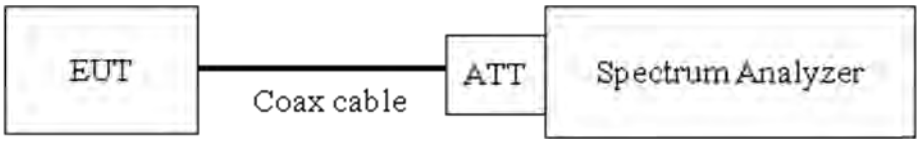
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

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	20.04
100	20.09
200	20.13
300	20.19
400	20.22
500	20.23
600	20.23
700	20.25
800	20.27
900	20.29
1000	20.31
2000	20.46
2400	20.52
2480	20.52
2500	20.52
3000	20.57
4000	20.67
5000	20.75
5150	20.77
5850	20.82
6000	20.82
7000	20.91
8000	20.98
9000	21.05
10000	21.12
11000	21.16
12000	21.24
13000	21.32
14000	21.30
15000	21.32
16000	21.37
17000	21.41
18000	21.47
19000	21.50
20000	21.56
21000	21.77
22000	21.74
23000	21.94
24000	21.77
25000	21.80
26000	21.80

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

2. Factor = Attenuator loss(20 dB) + Cable loss(1ea)

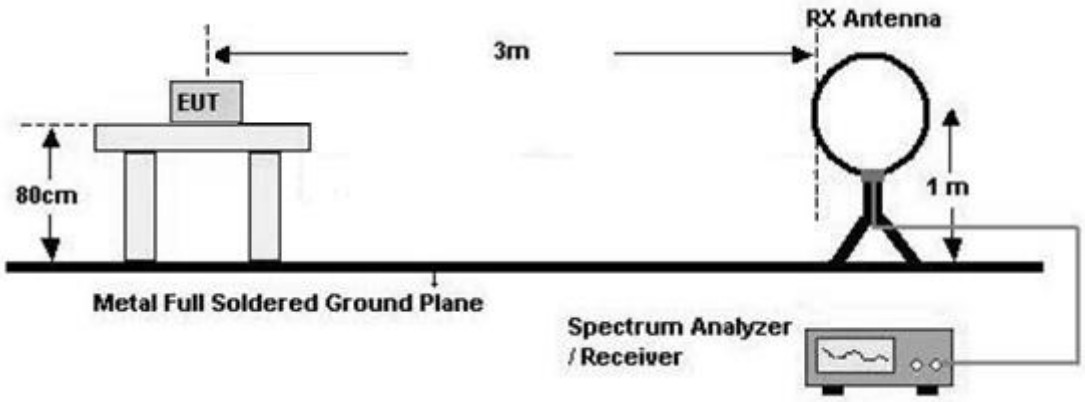
7.6. Radiated Test

Limit

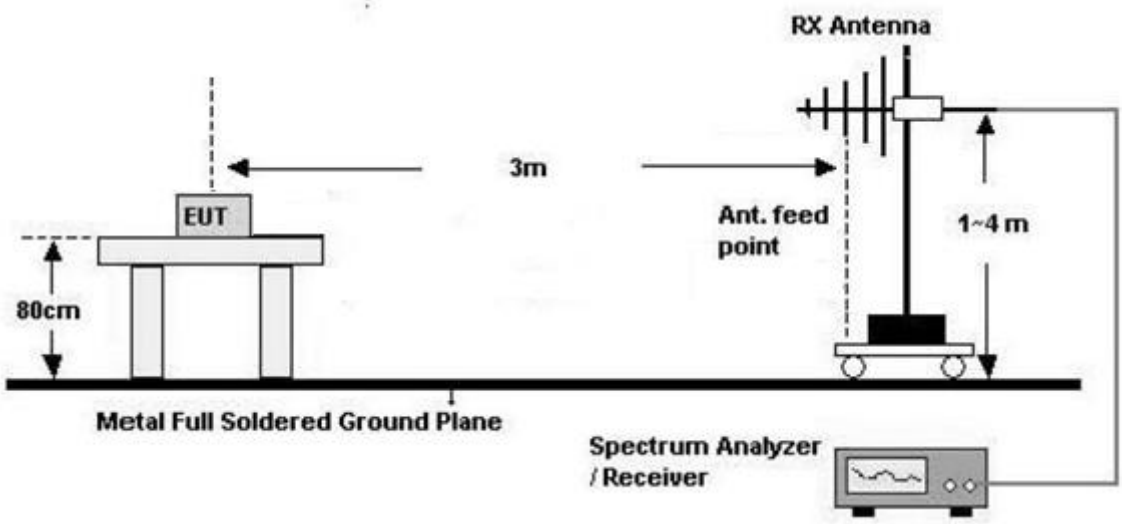
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

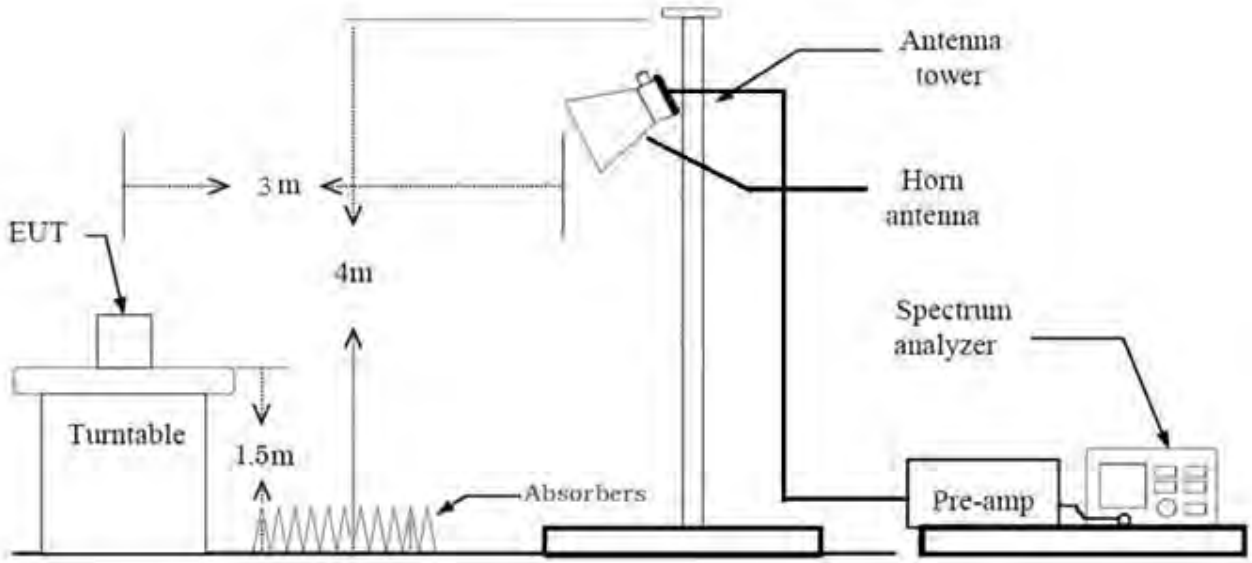
Below 30 MHz



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, Z
   - Radiated Restricted Band Edge : X, Y
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

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

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

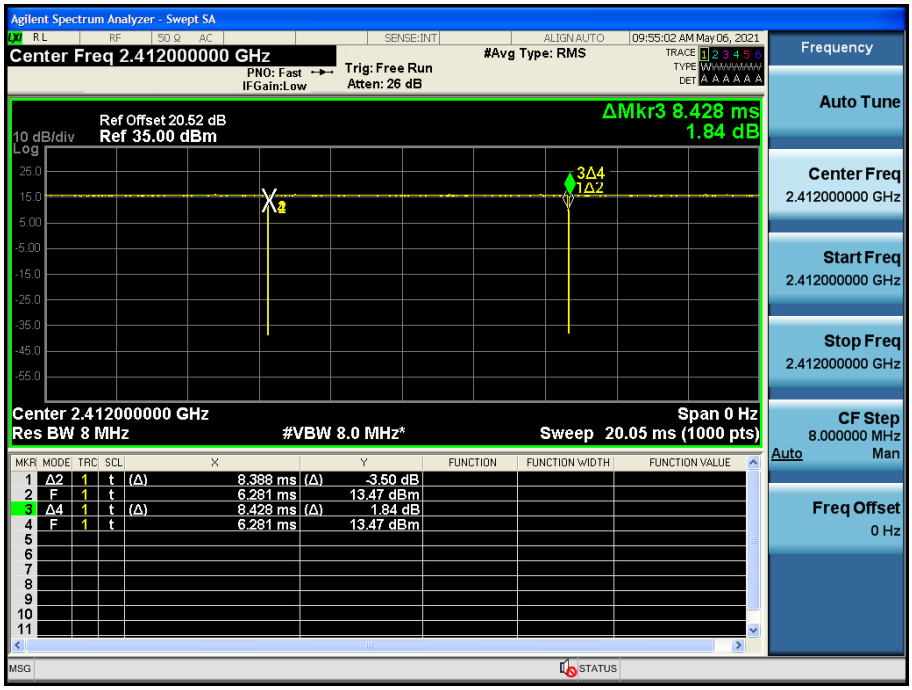
9. TEST RESULT

9.1 DUTY CYCLE

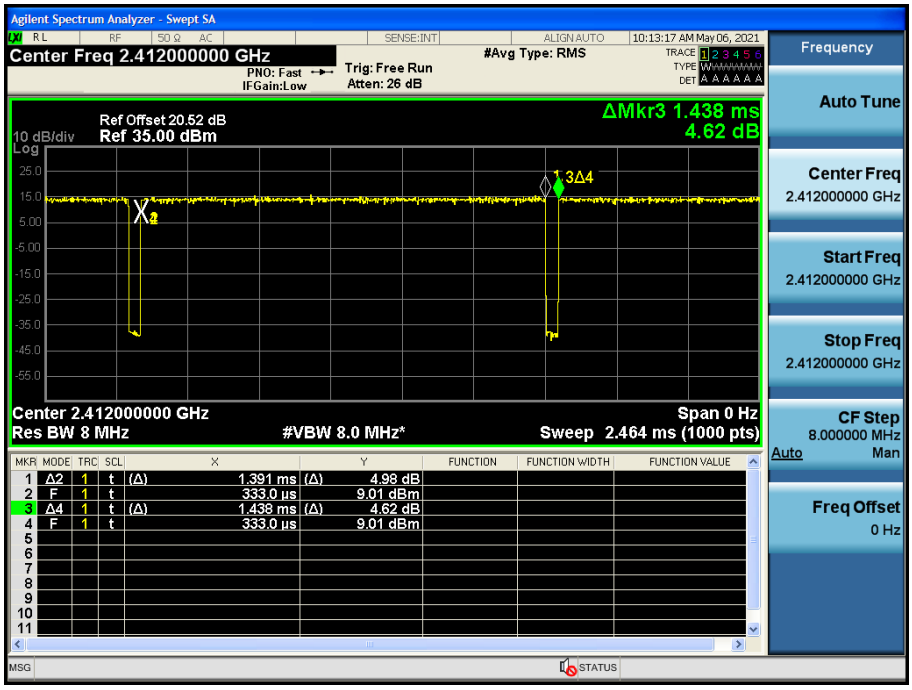
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.388	8.428	0.995	0.021
	2	4.291	4.324	0.993	0.033
	5.5	1.682	1.722	0.977	0.100
	11	0.937	0.975	0.961	0.174
802.11g	6	1.391	1.438	0.967	0.144
	9	0.935	0.979	0.955	0.202
	12	0.708	0.753	0.941	0.266
	18	0.480	0.525	0.915	0.388
	24	0.364	0.409	0.890	0.504
	36	0.253	0.297	0.850	0.705
	48	0.192	0.237	0.811	0.910
	54	0.176	0.221	0.797	0.983
802.11n (HT20)	6.5 (MCS0)	1.301	1.345	0.967	0.144
	13 (MCS1)	0.669	0.713	0.939	0.273
	19.5 (MCS2)	0.460	0.505	0.911	0.404
	26 (MCS3)	0.352	0.397	0.887	0.520
	39 (MCS4)	0.248	0.293	0.847	0.720
	52 (MCS5)	0.196	0.241	0.814	0.892
	58.5 (MCS6)	0.180	0.225	0.801	0.964
	65 (MCS7)	0.164	0.209	0.786	1.048

▣ Test Plots

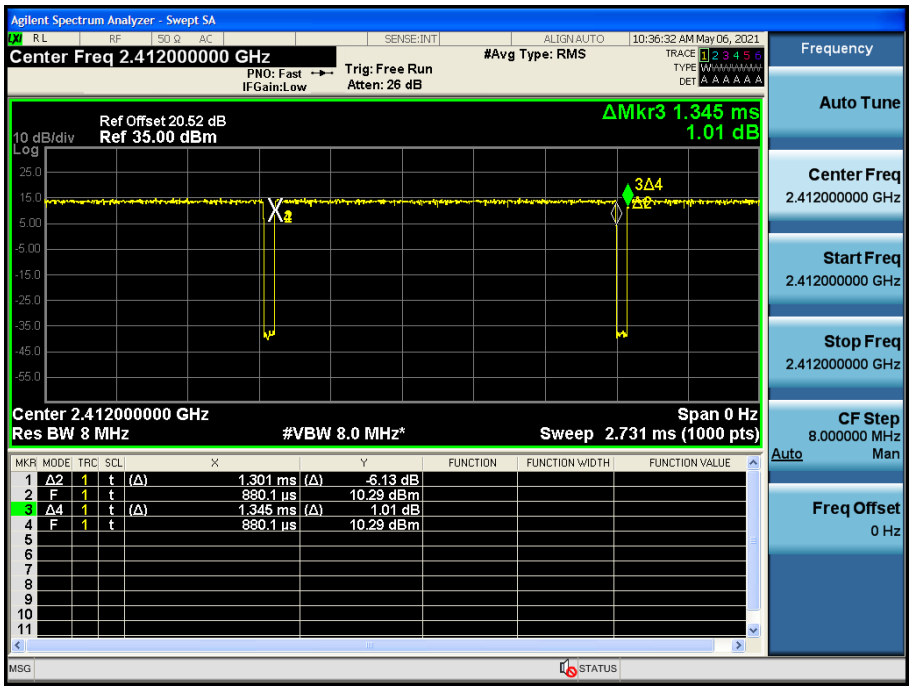
Duty cycle plot (802.11b(1Mbps))



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

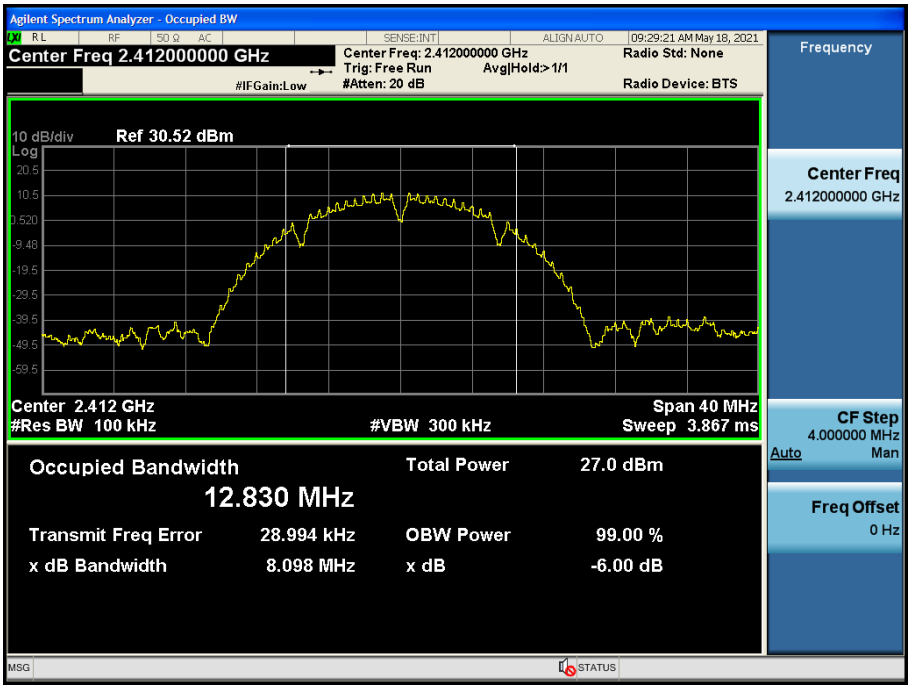
802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.098	0.5
2437	6	8.557	0.5
2462	11	8.109	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.52	0.5
2437	6	15.17	0.5
2462	11	15.17	0.5

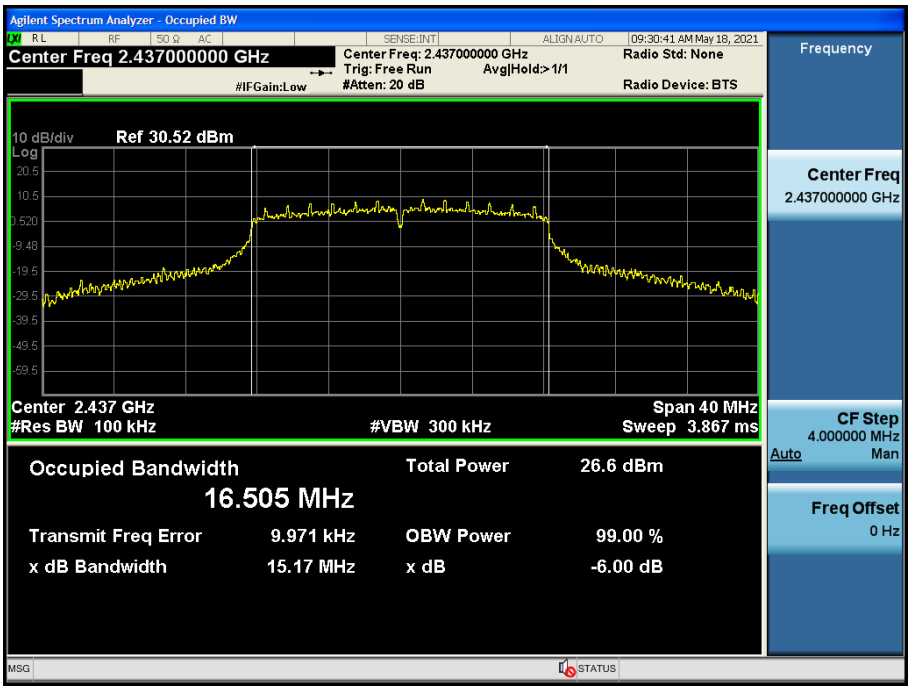
802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.03	0.5
2437	6	15.17	0.5
2462	11	15.17	0.5

▣ Test Plots

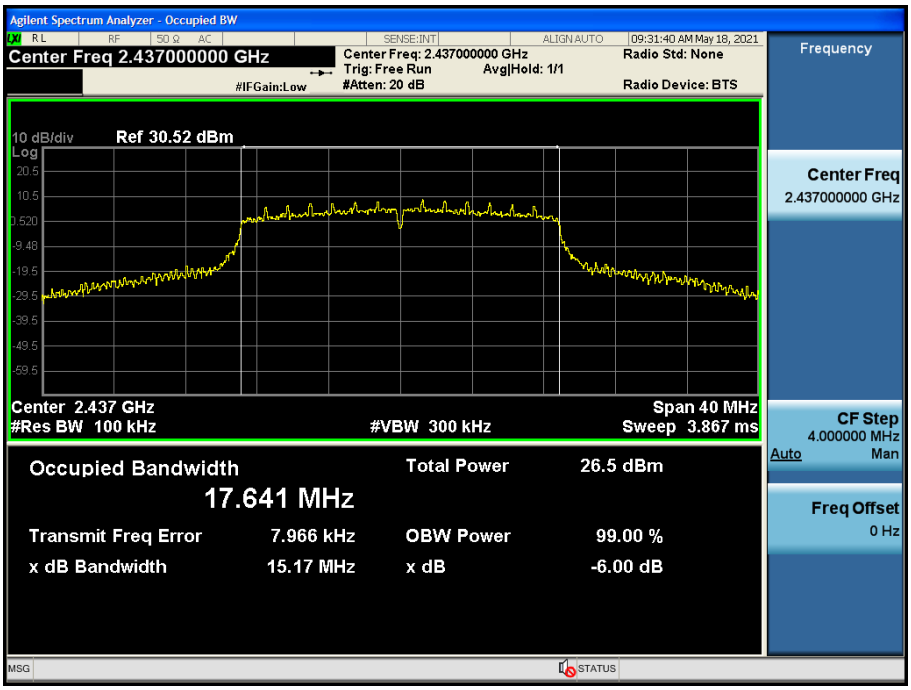
6dB Bandwidth plot (802.11b-CH 1)



6dB Bandwidth plot (802.11g-CH 6)



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, 20.52 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	21.95	30	18
		2	22.18	30	
		5.5	23.93	30	
		11	25.57	30	
2437	6	1	22.05	30	
		2	22.34	30	
		5.5	23.89	30	
		11	25.72	30	
2462	11	1	22.01	30	
		2	22.27	30	
		5.5	23.85	30	
		11	25.66	30	

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	6	25.19	30	16
		9	25.20	30	
		12	25.33	30	
		18	25.22	30	
		24	25.73	30	
		36	25.74	30	
		48	26.08	30	
		54	26.04	30	
2437	6	6	25.34	30	16
		9	25.28	30	
		12	25.41	30	
		18	25.42	30	
		24	25.88	30	
		36	25.68	30	
		48	26.07	30	
		54	26.04	30	
2462	11	6	25.34	30	16
		9	25.32	30	
		12	25.34	30	
		18	25.34	30	
		24	25.76	30	
		36	25.74	30	
		48	26.22	30	
		54	26.18	30	

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	0	24.08	30	15
		1	24.21	30	
		2	24.11	30	
		3	24.60	30	
		4	24.58	30	
		5	24.90	30	
		6	24.88	30	
		7	24.76	30	
2437	6	0	25.02	30	16
		1	25.09	30	
		2	25.12	30	
		3	25.49	30	
		4	25.35	30	
		5	25.78	30	
		6	25.78	30	
		7	25.70	30	
2462	11	0	25.03	30	16
		1	25.06	30	
		2	24.96	30	
		3	25.47	30	
		4	25.42	30	
		5	25.80	30	
		6	25.82	30	
		7	25.79	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, 20.52 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	19.54	0.021	19.56	30	18
		2	19.54	0.033	19.57	30	
		5.5	19.58	0.100	19.68	30	
		11	19.23	0.174	19.41	30	
2437	6	1	19.39	0.021	19.41	30	
		2	19.40	0.033	19.43	30	
		5.5	19.41	0.100	19.51	30	
		11	19.33	0.174	19.50	30	
2462	11	1	19.45	0.021	19.47	30	
		2	19.44	0.033	19.47	30	
		5.5	19.46	0.100	19.56	30	
		11	19.34	0.174	19.51	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	17.25	0.144	17.39	30	16
		9	17.17	0.202	17.37	30	
		12	17.11	0.266	17.38	30	
		18	17.00	0.388	17.39	30	
		24	16.89	0.504	17.40	30	
		36	16.73	0.705	17.44	30	
		48	16.67	0.910	17.58	30	
		54	16.61	0.983	17.60	30	
2437	6	6	17.40	0.144	17.54	30	16
		9	17.32	0.202	17.52	30	
		12	17.27	0.266	17.54	30	
		18	17.16	0.388	17.55	30	
		24	17.07	0.504	17.57	30	
		36	16.80	0.705	17.51	30	
		48	16.70	0.910	17.61	30	
		54	16.64	0.983	17.63	30	
2462	11	6	17.46	0.144	17.61	30	16
		9	17.40	0.202	17.60	30	
		12	17.35	0.266	17.61	30	
		18	17.24	0.388	17.63	30	
		24	16.95	0.504	17.45	30	
		36	16.75	0.705	17.45	30	
		48	16.80	0.910	17.71	30	
		54	16.73	0.983	17.72	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	16.29	0.144	16.43	30	15
		1	16.20	0.273	16.48	30	
		2	16.05	0.404	16.45	30	
		3	15.88	0.520	16.40	30	
		4	15.62	0.720	16.34	30	
		5	15.69	0.892	16.59	30	
		6	15.60	0.964	16.56	30	
		7	15.46	1.048	16.51	30	
2437	6	0	17.29	0.144	17.43	30	16
		1	17.16	0.273	17.44	30	
		2	17.05	0.404	17.45	30	
		3	16.97	0.520	17.49	30	
		4	16.60	0.720	17.32	30	
		5	16.64	0.892	17.53	30	
		6	16.59	0.964	17.55	30	
		7	16.51	1.048	17.56	30	
2462	11	0	17.36	0.144	17.51	30	16
		1	17.24	0.273	17.52	30	
		2	17.13	0.404	17.54	30	
		3	16.82	0.520	17.34	30	
		4	16.65	0.720	17.37	30	
		5	16.73	0.892	17.62	30	
		6	16.66	0.964	17.63	30	
		7	16.60	1.048	17.65	30	

9.4 POWER SPECTRAL DENSITY

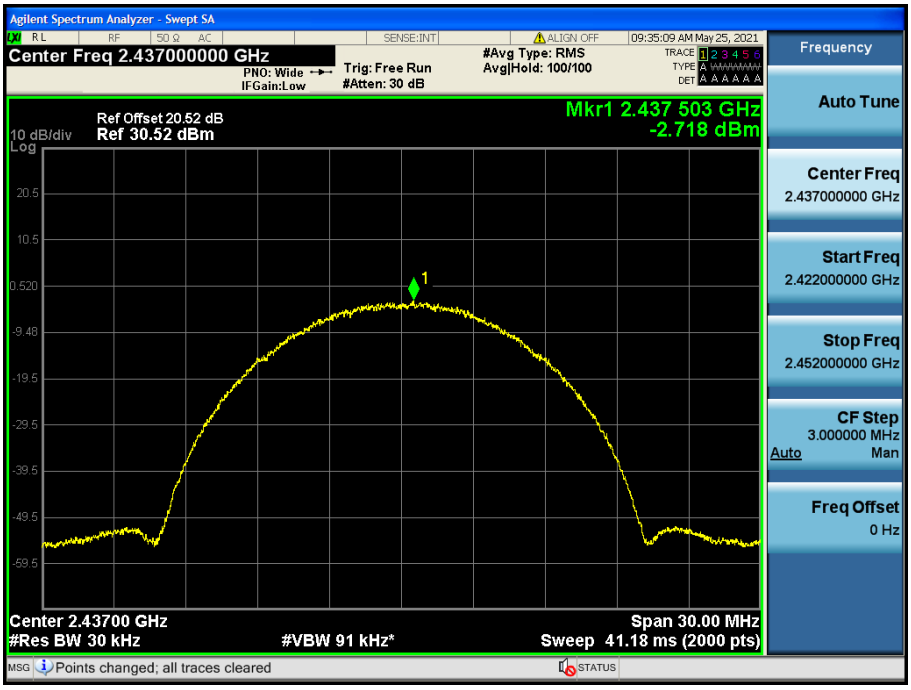
Mode	Frequency (MHz)	Channel No.	Test Result			
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11b	2412	1	-3.005	0.977	-2.028	8 dBm / 3 kHz
	2437	6	-2.718	0.977	-1.741	
	2462	11	-2.755	0.977	-1.778	
802.11g	2412	1	-5.876	0.797	-5.079	
	2437	6	-5.983	0.797	-5.186	
	2462	11	-5.937	0.797	-5.140	
802.11n	2412	1	-6.031	0.814	-5.217	
	2437	6	-5.638	0.786	-4.852	
	2462	11	-4.790	0.786	-4.004	

Note :

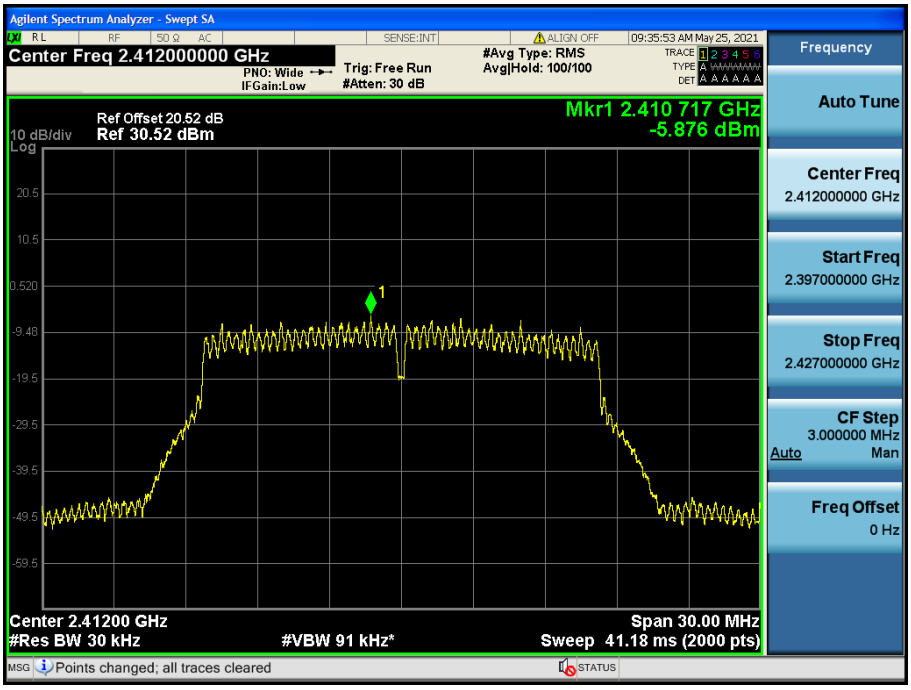
1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. 20.52 dB is offset for 2.4 GHz Band.

▣ Test Plots

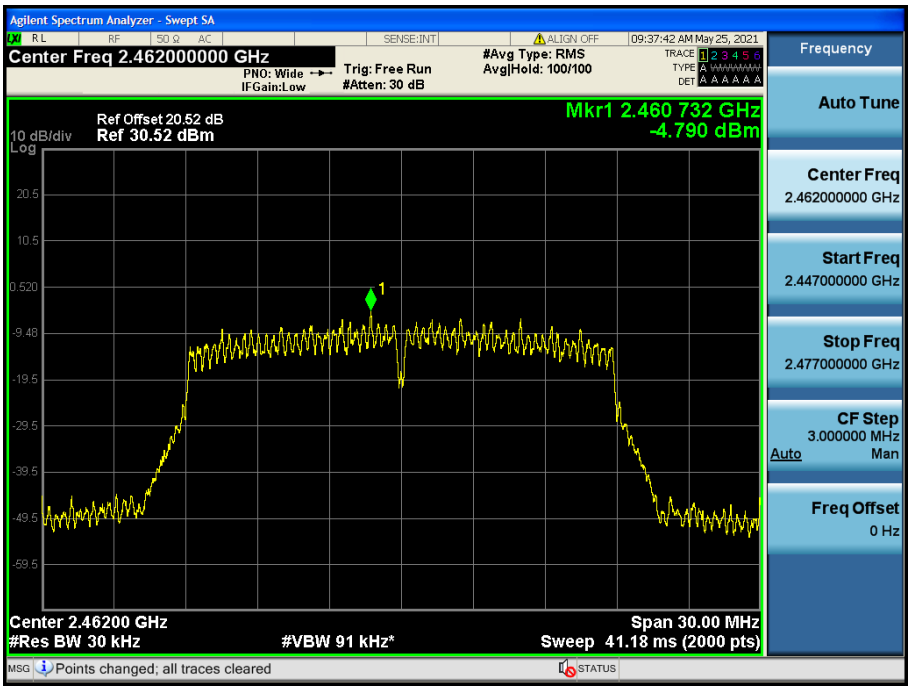
Power Spectral Density (802.11b-CH 6)



Power Spectral Density (802.11g-CH 1)



Power Spectral Density (802.11n_HT20-CH 11)



Note :

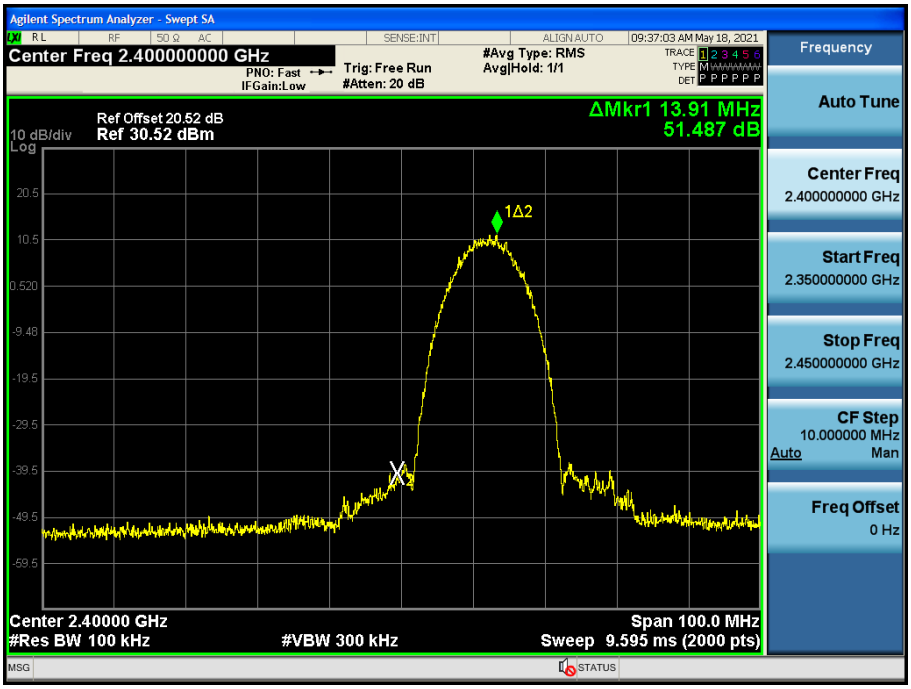
In order to simplify the report, attached plots were only the worstcase PSD channel.

9.5 BAND EDGE / CONDUCTED SPURIOUS EMISSIONS

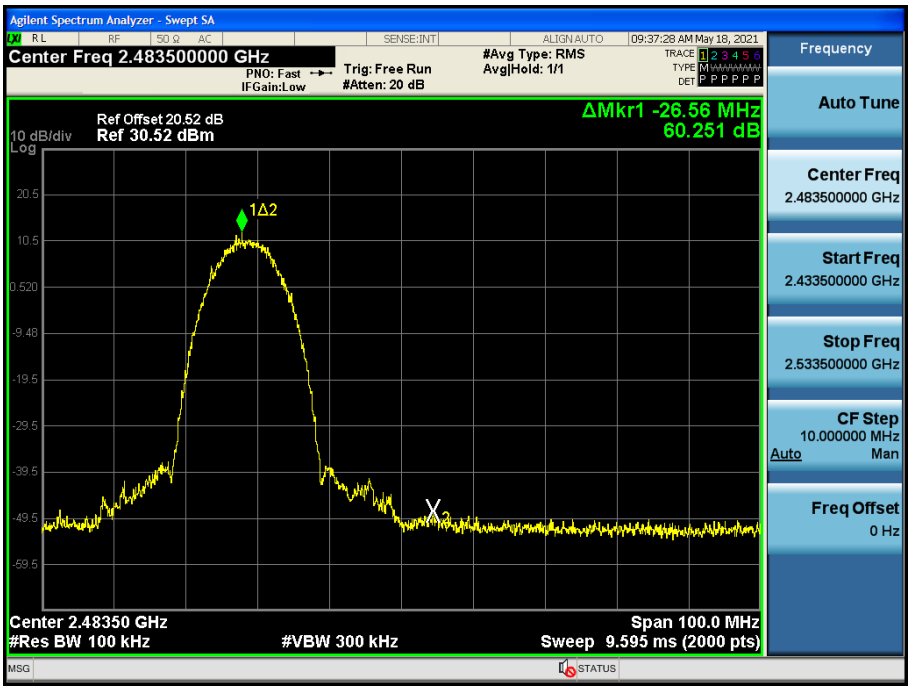
Test Result : please refer to the plot below.
In order to simplify the report, attached plots were only the worst case channel and data rate.

▣ Test Plots(BandEdge)

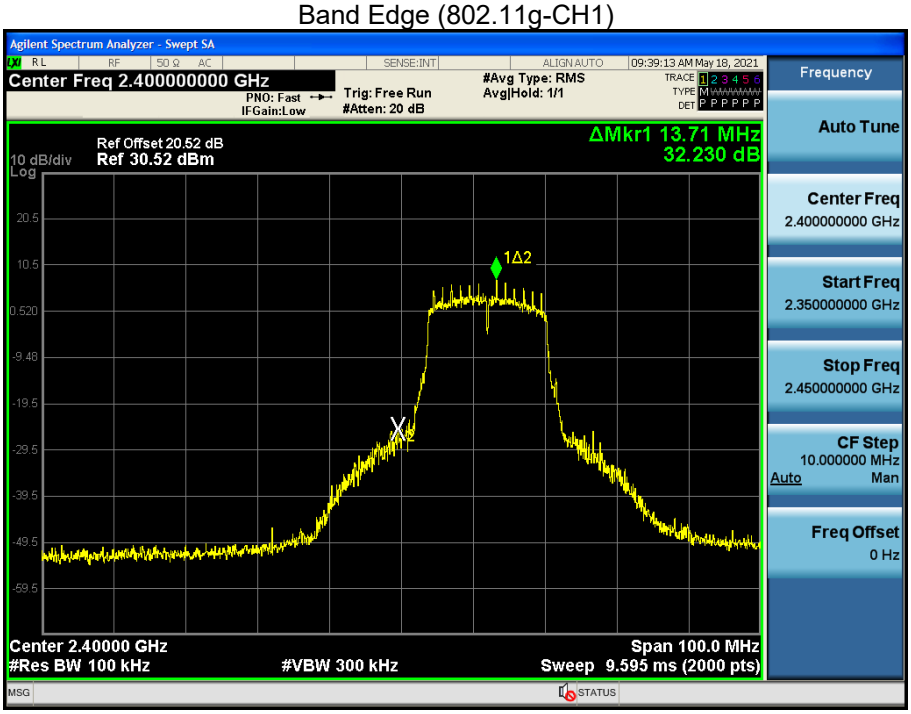
Band Edge (802.11b-CH1)



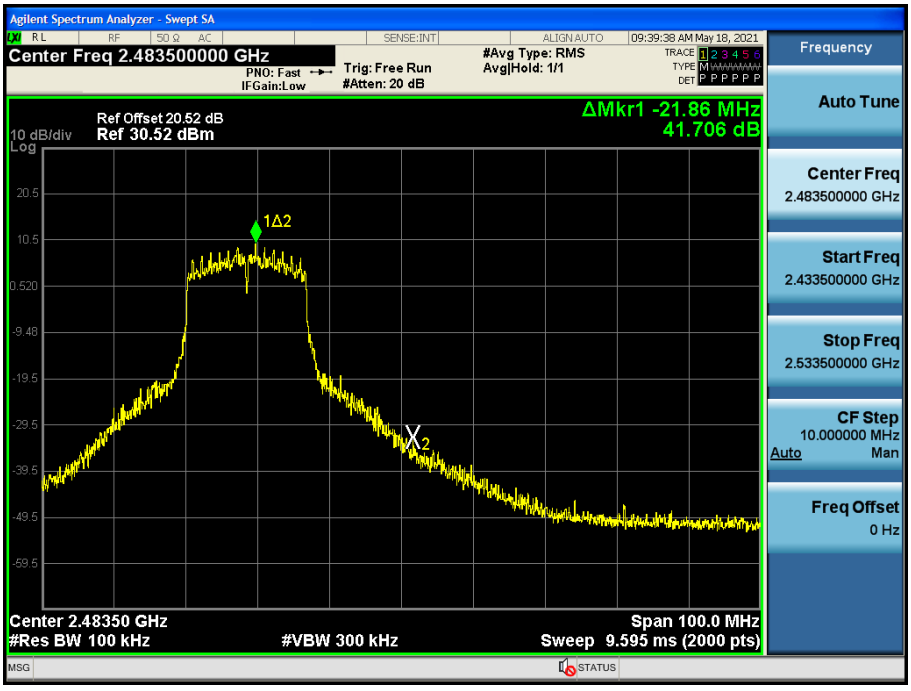
Band Edge (802.11b-CH11)



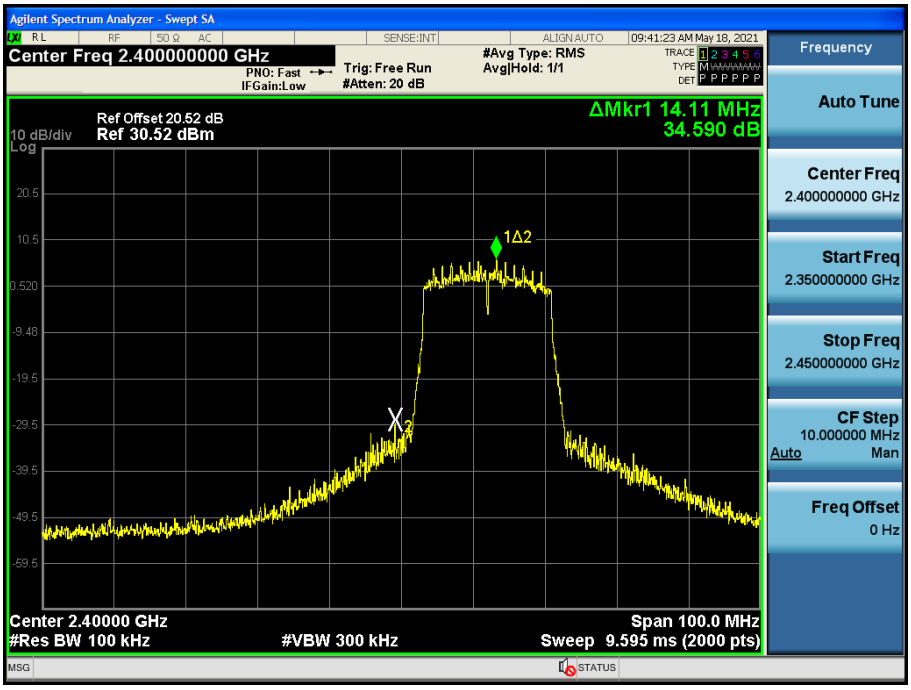
Band Edge (802.11g-CH1)



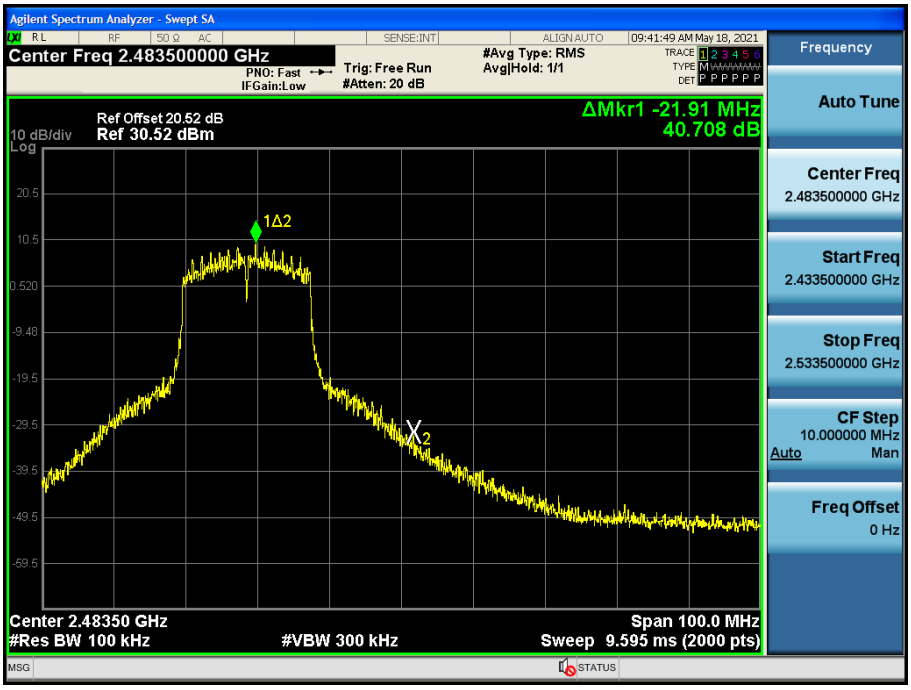
Band Edge (802.11g-CH11)



Band Edge (802.11n_HT20 -CH1)



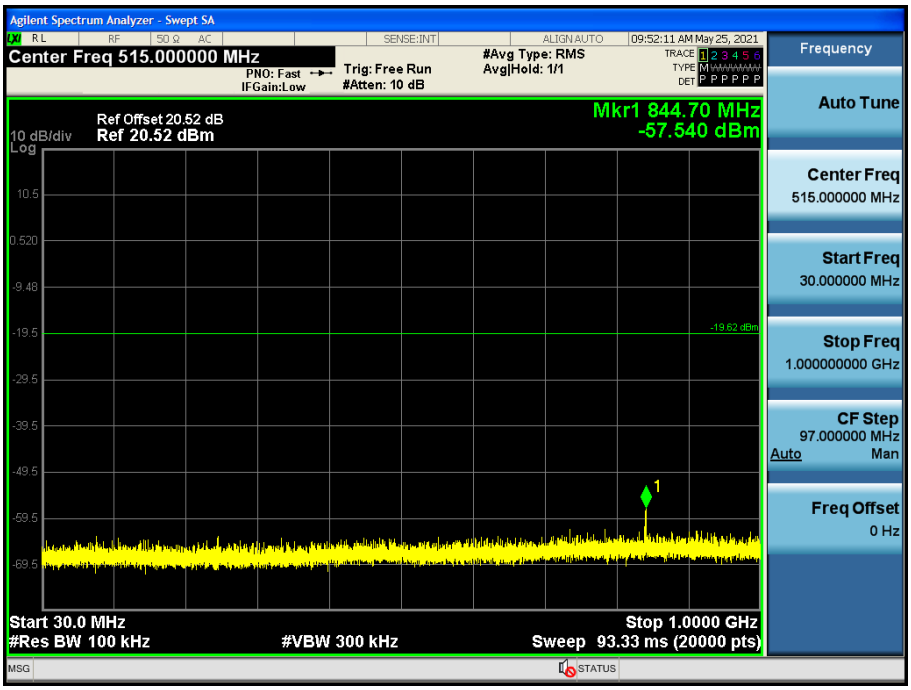
Band Edge (802.11n_HT20 –CH11)



▣ Test Plots(Conducted Spurious Emission)

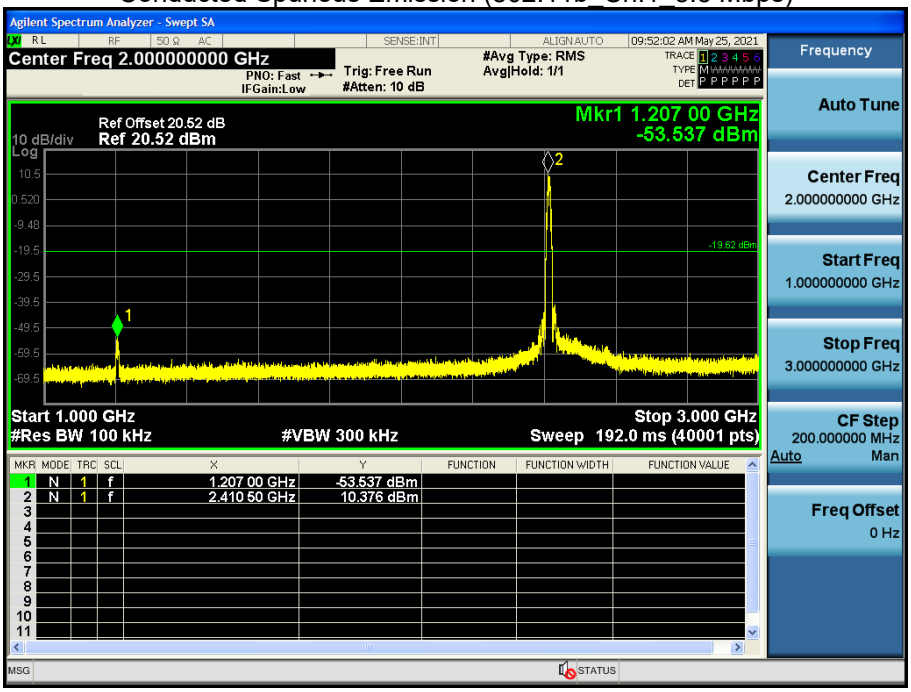
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



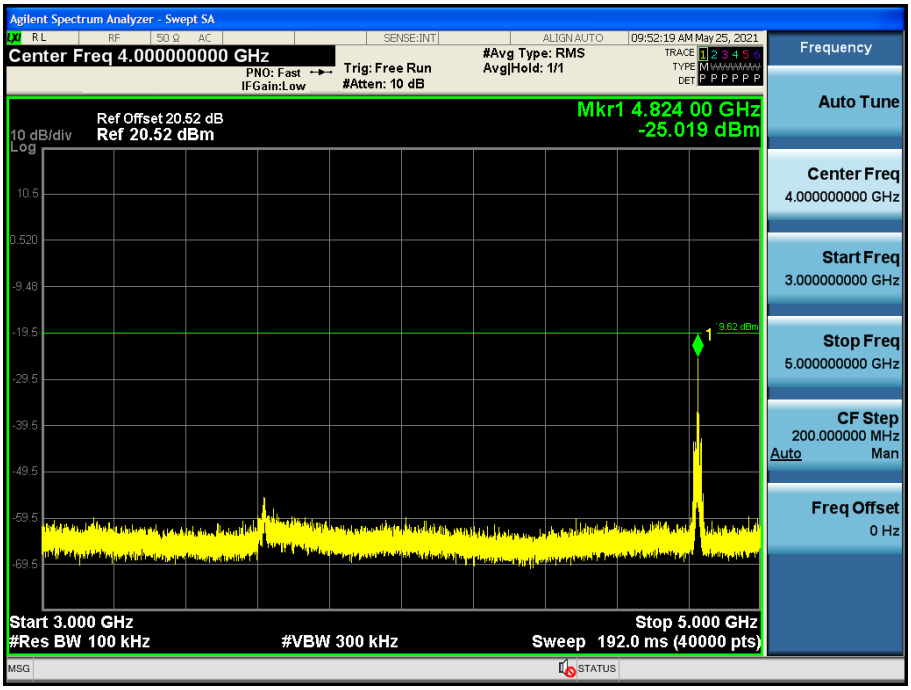
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



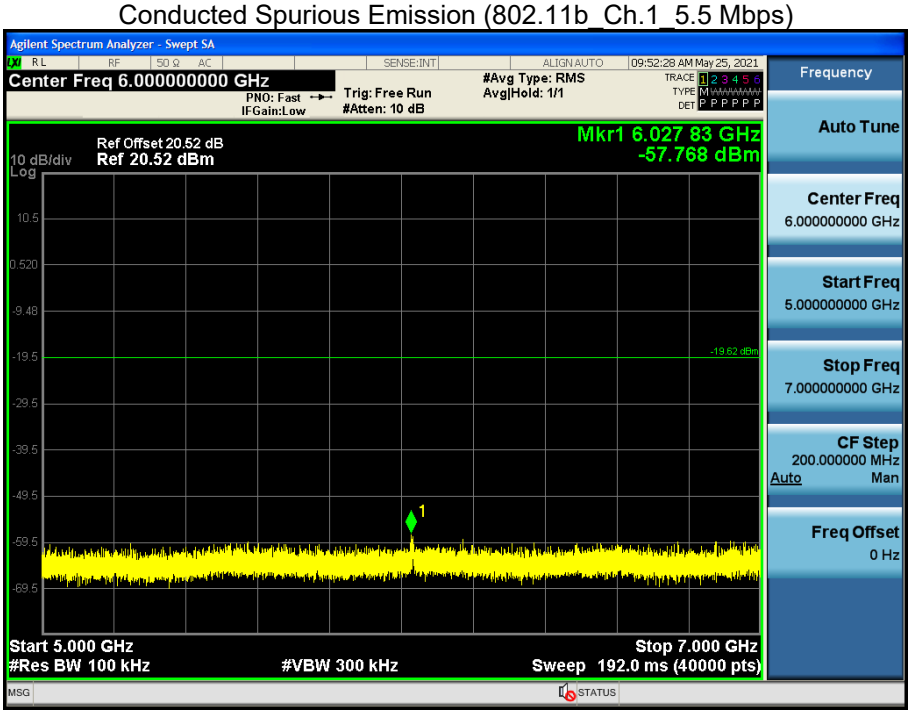
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



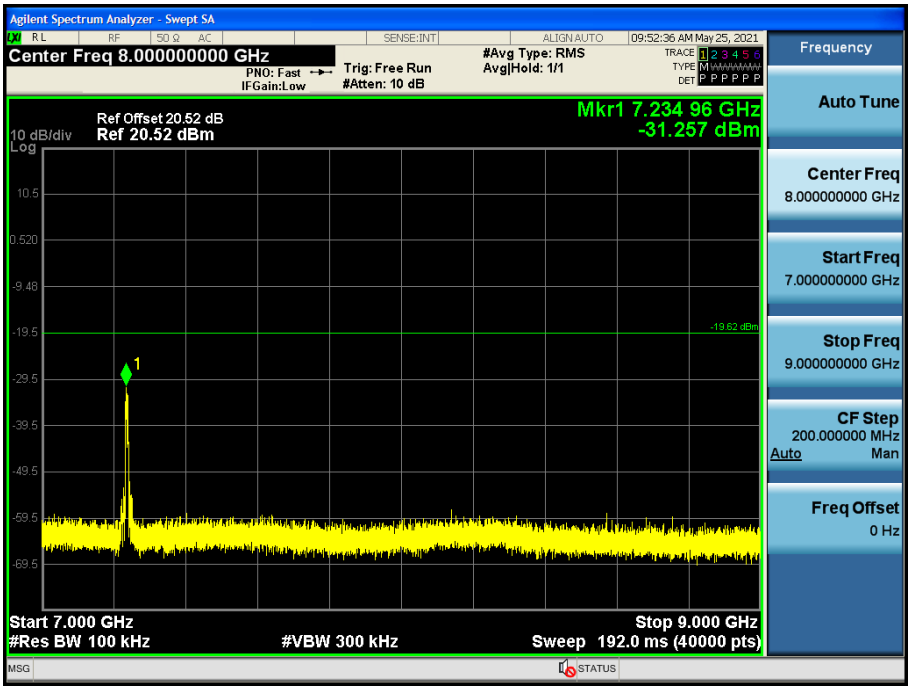
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



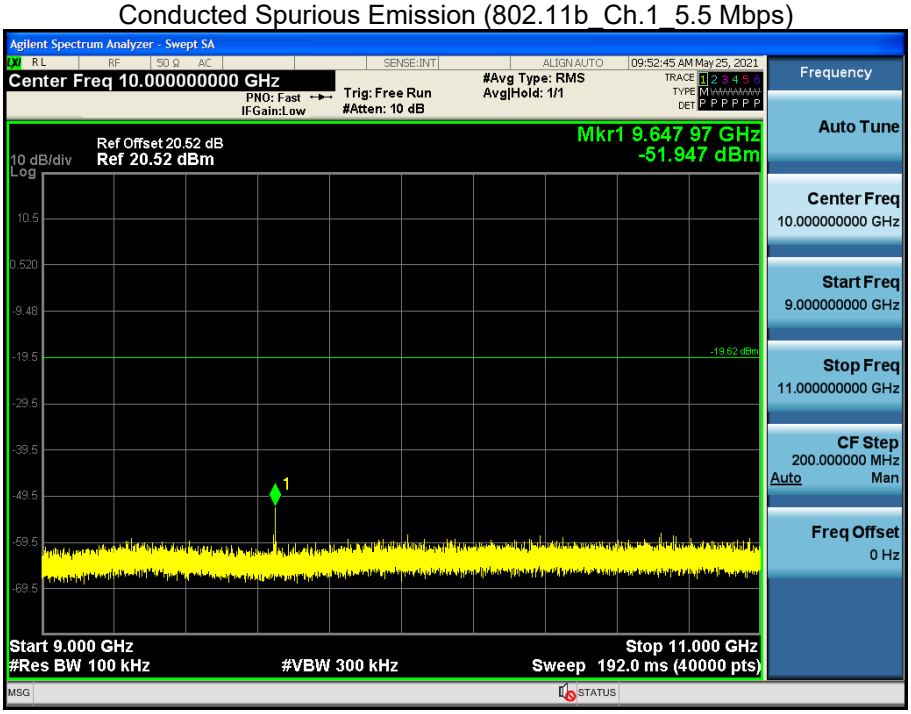
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



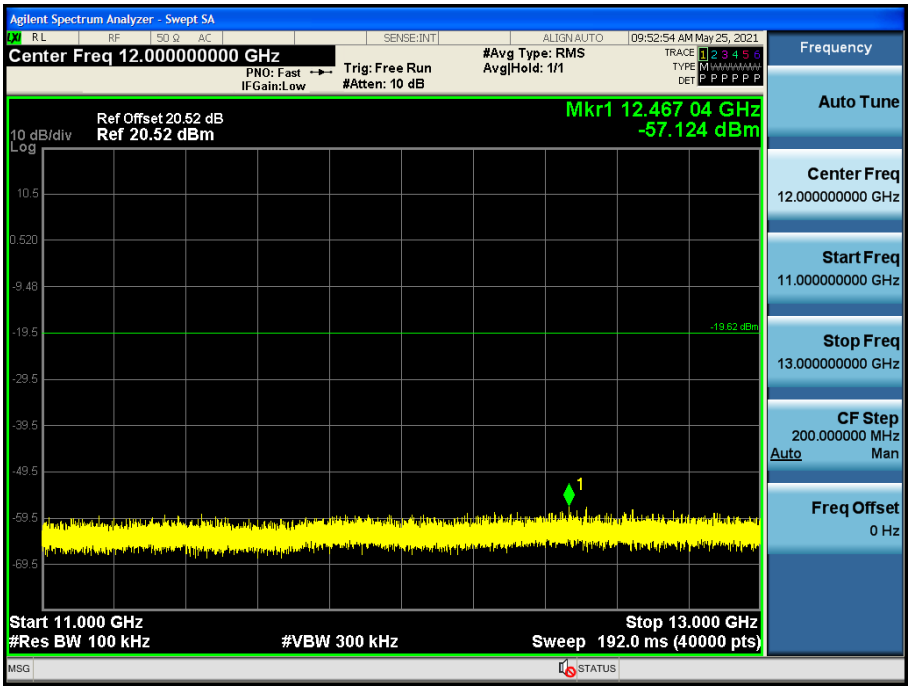
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



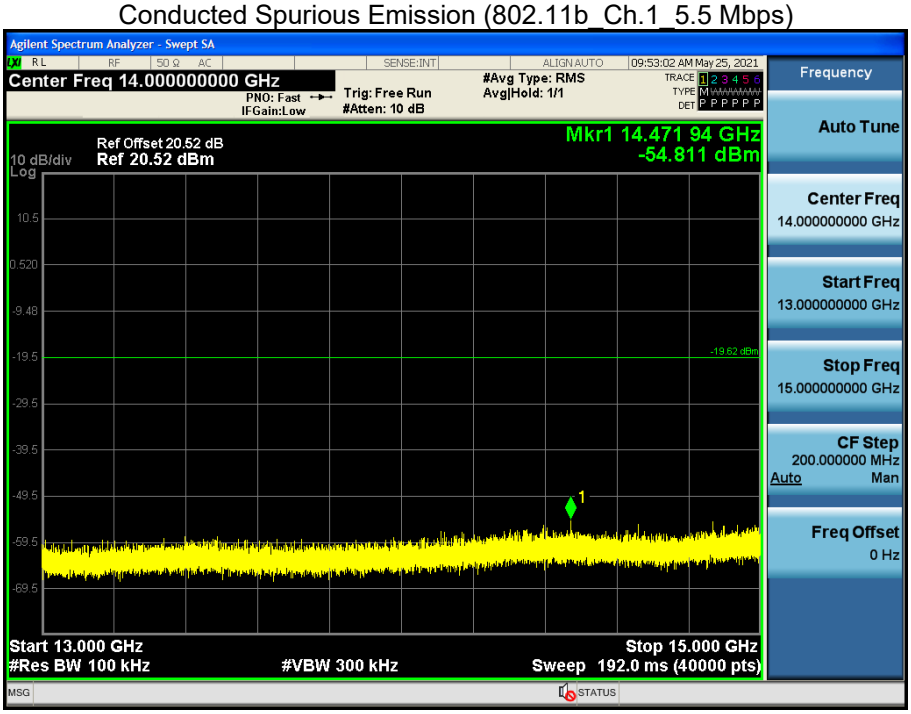
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



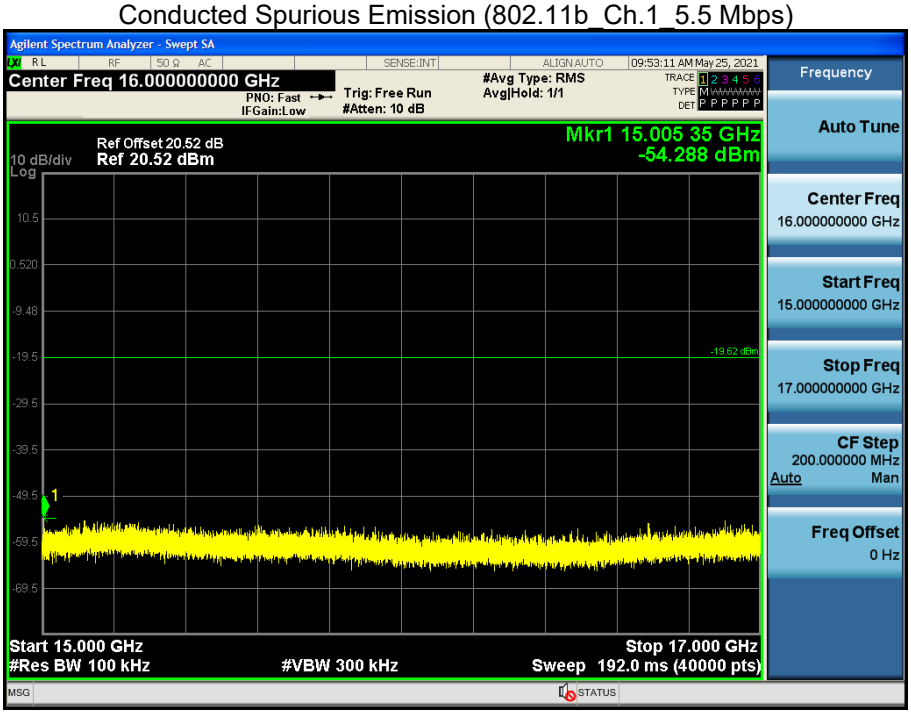
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



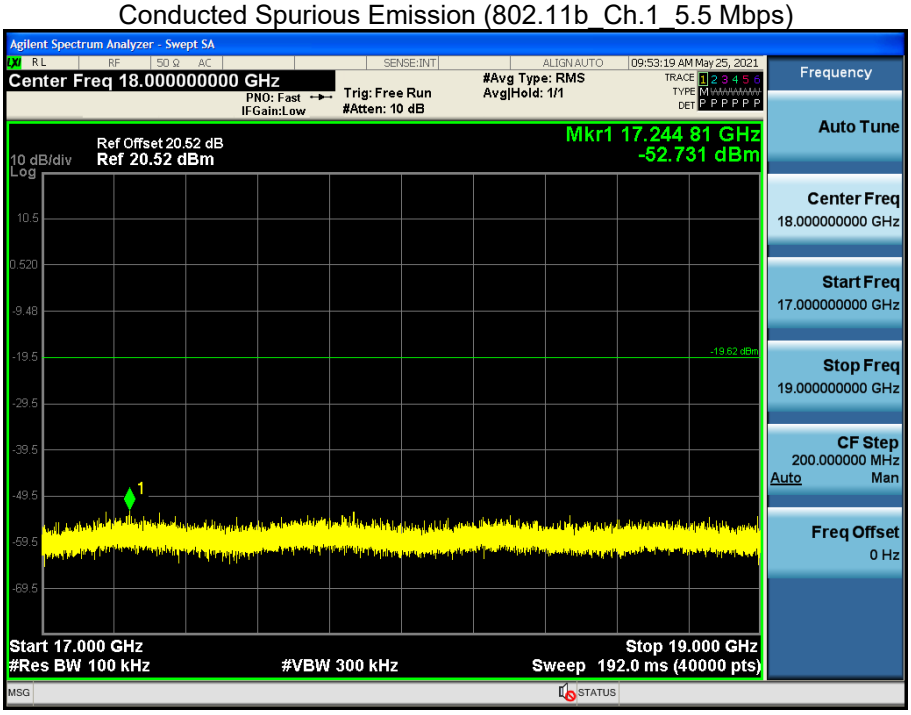
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



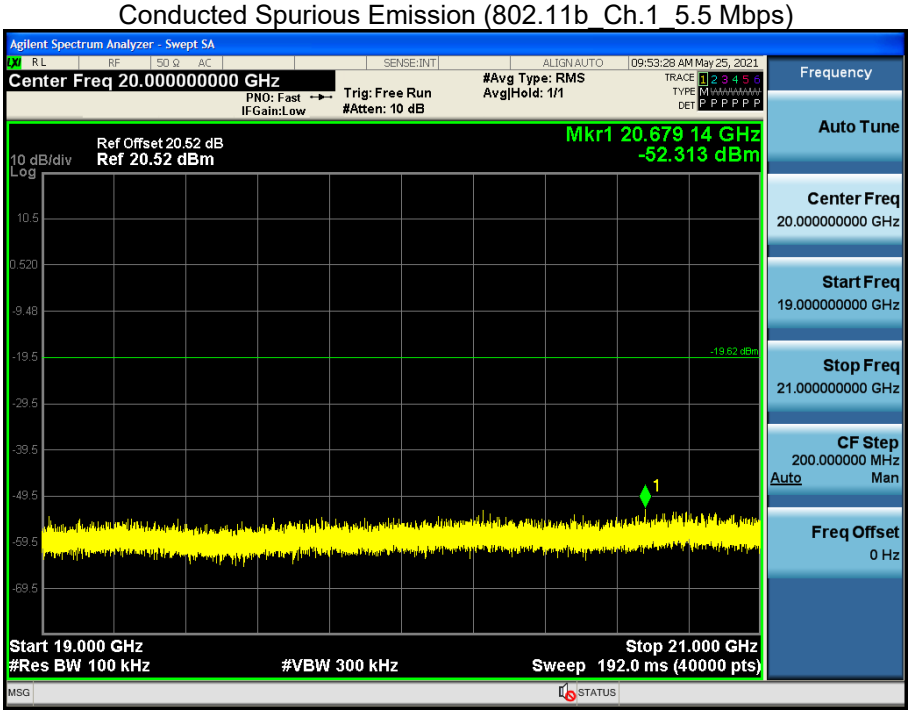
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



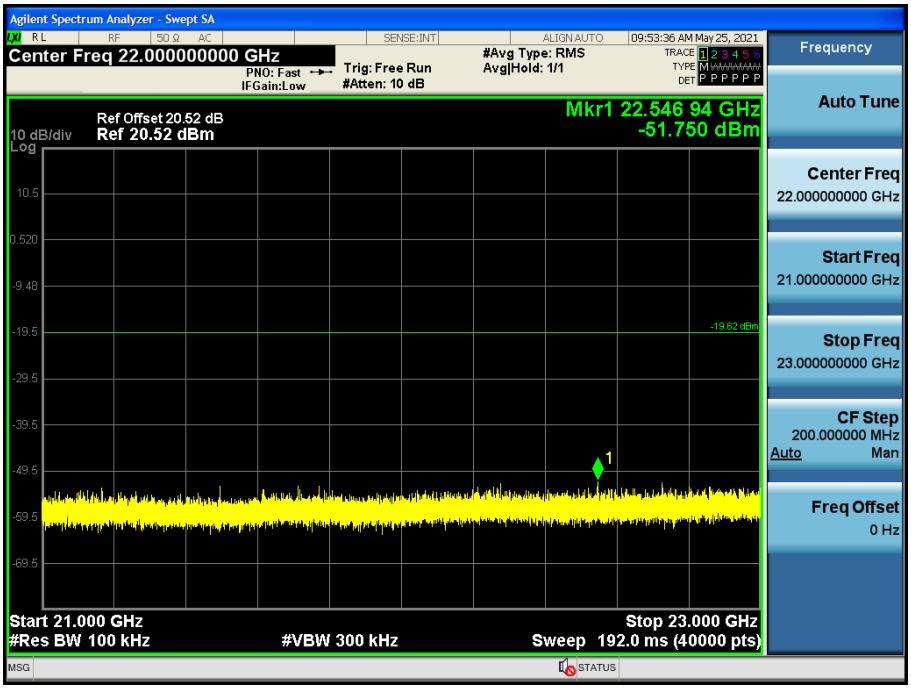
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



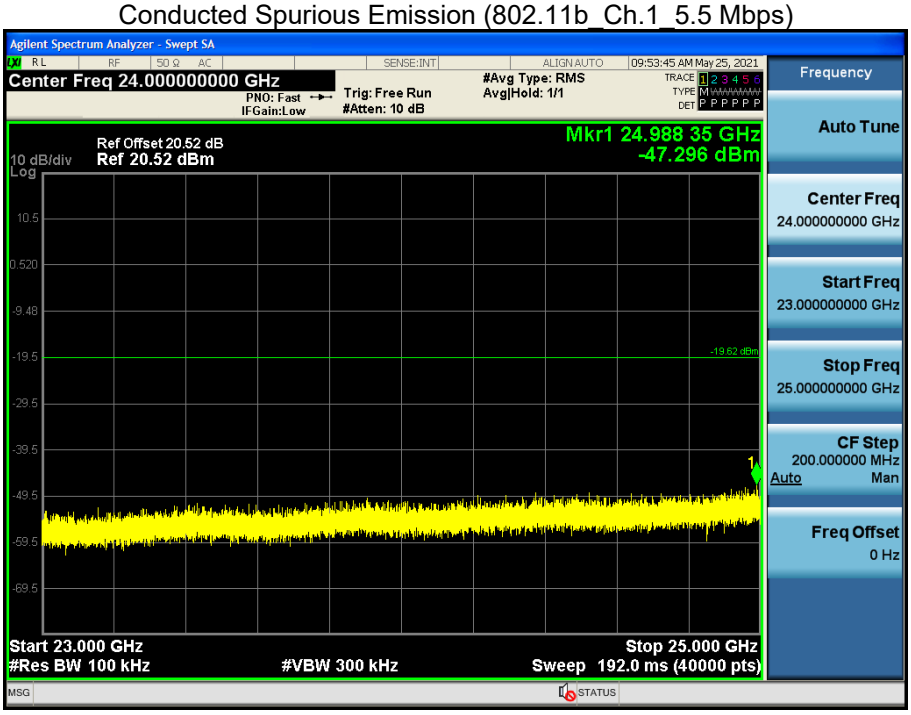
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b_Ch.1_5.5 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	46.78	4.11	V	50.89	73.98	23.09	PK
4824	41.93	4.11	V	46.04	53.98	7.94	AV
7236	38.73	12.15	V	50.88	73.98	23.10	PK
7236	26.56	12.15	V	38.71	53.98	15.27	AV
4824	47.54	4.11	H	51.65	73.98	22.33	PK
4824	42.22	4.11	H	46.33	53.98	7.65	AV
7236	38.82	12.15	H	50.97	73.98	23.01	PK
7236	26.76	12.15	H	38.91	53.98	15.07	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	47.21	4.00	V	51.21	73.98	22.77	PK
4874	42.33	4.00	V	46.33	53.98	7.65	AV
7311	38.73	12.39	V	51.12	73.98	22.86	PK
7311	26.20	12.39	V	38.59	53.98	15.39	AV
4874	46.85	4.00	H	50.85	73.98	23.13	PK
4874	41.88	4.00	H	45.88	53.98	8.10	AV
7311	39.10	12.39	H	51.49	73.98	22.49	PK
7311	26.55	12.39	H	38.94	53.98	15.04	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	48.37	4.29	V	52.66	73.98	21.32	PK
4924	43.66	4.29	V	47.95	53.98	6.03	AV
7386	37.93	12.44	V	50.37	73.98	23.61	PK
7386	25.61	12.44	V	38.05	53.98	15.93	AV
4924	48.53	4.29	H	52.82	73.98	21.16	PK
4924	44.22	4.29	H	48.51	53.98	5.47	AV
7386	38.40	12.44	H	50.84	73.98	23.14	PK
7386	25.76	12.44	H	38.20	53.98	15.78	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	44.51	0.00	4.11	V	48.62	73.98	25.36	PK
4824	31.42	0.14	4.11	V	35.67	53.98	18.31	AV
7236	37.73	0.00	12.15	V	49.88	73.98	24.10	PK
7236	25.47	0.14	12.15	V	37.76	53.98	16.22	AV
4824	45.19	0.00	4.11	H	49.30	73.98	24.68	PK
4824	31.55	0.14	4.11	H	35.80	53.98	18.18	AV
7236	38.01	0.00	12.15	H	50.16	73.98	23.82	PK
7236	25.51	0.14	12.15	H	37.80	53.98	16.18	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	45.52	0.00	4.00	V	49.52	73.98	24.46	PK
4874	31.94	0.14	4.00	V	36.08	53.98	17.90	AV
7311	38.02	0.00	12.39	V	50.41	73.98	23.57	PK
7311	25.67	0.14	12.39	V	38.20	53.98	15.78	AV
4874	45.82	0.00	4.00	H	49.82	73.98	24.16	PK
4874	32.14	0.14	4.00	H	36.28	53.98	17.70	AV
7311	38.31	0.00	12.39	H	50.70	73.98	23.28	PK
7311	25.83	0.14	12.39	H	38.36	53.98	15.62	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	45.12	0.00	4.29	V	49.41	73.98	24.57	PK
4924	32.02	0.14	4.29	V	36.45	53.98	17.53	AV
7386	37.56	0.00	12.44	V	50.00	73.98	23.98	PK
7386	25.55	0.14	12.44	V	38.13	53.98	15.85	AV
4924	45.44	0.00	4.29	H	49.73	73.98	24.25	PK
4924	32.31	0.14	4.29	H	36.74	53.98	17.24	AV
7386	37.61	0.00	12.44	H	50.05	73.98	23.93	PK
7386	25.70	0.14	12.44	H	38.28	53.98	15.70	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	43.83	0.00	4.11	V	47.94	73.98	26.04	PK
4824	31.06	0.14	4.11	V	35.31	53.98	18.67	AV
7236	37.72	0.00	12.15	V	49.87	73.98	24.11	PK
7236	25.36	0.14	12.15	V	37.65	53.98	16.33	AV
4824	44.42	0.00	4.11	H	48.53	73.98	25.45	PK
4824	31.28	0.14	4.11	H	35.53	53.98	18.45	AV
7236	38.14	0.00	12.15	H	50.29	73.98	23.69	PK
7236	25.48	0.14	12.15	H	37.77	53.98	16.21	AV

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

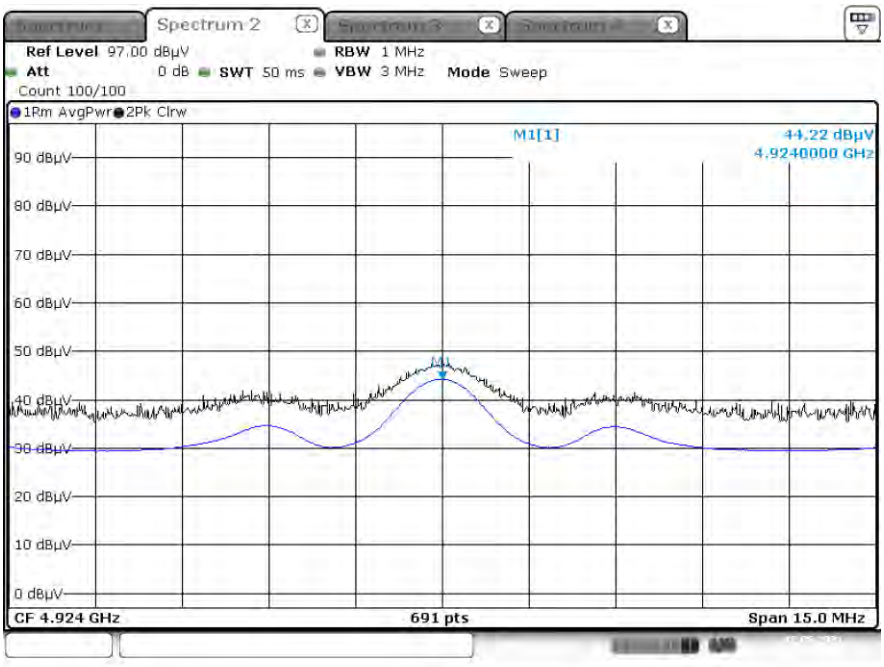
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	44.92	0.00	4.00	V	48.92	73.98	25.06	PK
4874	31.68	0.14	4.00	V	35.82	53.98	18.16	AV
7311	37.74	0.00	12.39	V	50.13	73.98	23.85	PK
7311	25.78	0.14	12.39	V	38.31	53.98	15.67	AV
4874	45.17	0.00	4.00	H	49.17	73.98	24.81	PK
4874	31.92	0.14	4.00	H	36.06	53.98	17.92	AV
7311	37.96	0.00	12.39	H	50.35	73.98	23.63	PK
7311	25.82	0.14	12.39	H	38.35	53.98	15.63	AV

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

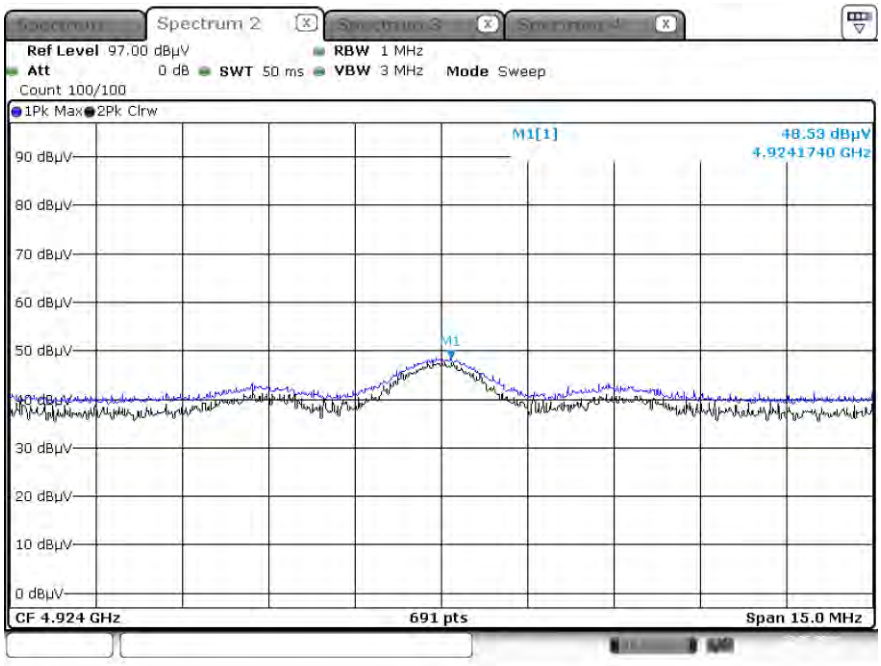
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G + D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	44.93	0.00	4.29	V	49.22	73.98	24.76	PK
4924	31.89	0.14	4.29	V	36.32	53.98	17.66	AV
7386	37.67	0.00	12.44	V	50.11	73.98	23.87	PK
7386	25.56	0.14	12.44	V	38.14	53.98	15.84	AV
4924	46.35	0.00	4.29	H	50.64	73.98	23.34	PK
4924	32.09	0.14	4.29	H	36.52	53.98	17.46	AV
7386	38.01	0.00	12.44	H	50.45	73.98	23.53	PK
7386	25.70	0.14	12.44	H	38.28	53.98	15.70	AV

▣ Test Plots (Worst case : X-H)

Radiated Spurious Emissions plot – Average Reading (802.11b_1 Mbps, Ch.11 2nd Harmonic)



Radiated Spurious Emissions plot – Peak Reading (802.11b_1 Mbps, Ch.11 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-A.G +ATT+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	48.11	6.32	H	54.43	73.98	19.55	PK
2390.0	35.94	6.32	H	42.26	53.98	11.72	AV
2390.0	47.52	6.32	V	53.84	73.98	20.14	PK
2390.0	35.87	6.32	V	42.19	53.98	11.79	AV
2483.5	46.87	6.78	H	53.65	73.98	20.33	PK
2483.5	35.27	6.78	H	42.05	53.98	11.93	AV
2483.5	46.63	6.78	V	53.41	73.98	20.57	PK
2483.5	35.22	6.78	V	42.00	53.98	11.98	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-A.G +ATT+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	58.37	0.00	6.32	H	64.69	73.98	9.29	PK
2390.0	38.32	0.14	6.32	H	44.78	53.98	9.20	AV
2390.0	59.28	0.00	6.32	V	65.60	73.98	8.38	PK
2390.0	38.13	0.14	6.32	V	44.59	53.98	9.39	AV
2483.5	57.51	0.00	6.78	H	64.29	73.98	9.69	PK
2483.5	39.05	0.14	6.78	H	45.97	53.98	8.01	AV
2483.5	55.13	0.00	6.78	V	61.91	73.98	12.07	PK
2483.5	38.64	0.14	6.78	V	45.56	53.98	8.42	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2417 MHz
Channel No.	02 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+ C.L-A.G +ATT+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	57.62	0.00	6.32	H	63.94	73.98	10.04	PK
2390.0	38.26	0.14	6.32	H	44.72	53.98	9.26	AV
2390.0	57.20	0.00	6.32	V	63.52	73.98	10.46	PK
2390.0	38.53	0.14	6.32	V	44.99	53.98	8.99	AV

Operation Mode:	802.11n (HT20)
Transfer Rate:	6.5 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-A.G +ATT+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	57.51	0.00	6.32	H	63.83	73.98	10.15	PK
2390.0	37.54	0.14	6.32	H	44.00	53.98	9.98	AV
2390.0	56.85	0.00	6.32	V	63.17	73.98	10.81	PK
2390.0	37.81	0.14	6.32	V	44.27	53.98	9.71	AV
2483.5	59.28	0.00	6.78	H	66.06	73.98	7.92	PK
2483.5	40.12	0.14	6.78	H	47.04	53.98	6.94	AV
2483.5	58.06	0.00	6.78	V	64.84	73.98	9.14	PK
2483.5	39.71	0.14	6.78	V	46.63	53.98	7.35	AV

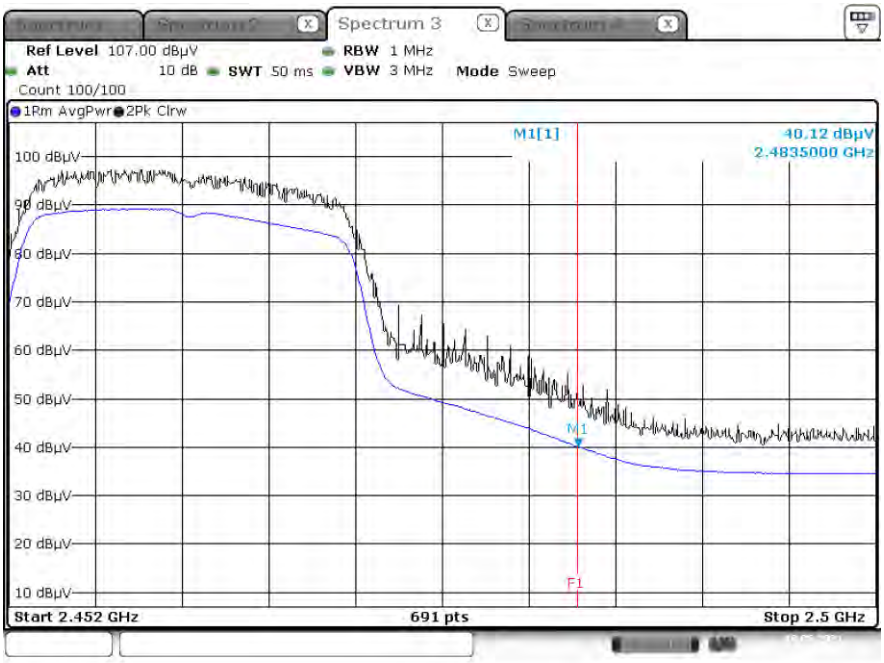
Operation Mode:	802.11n (HT20)
Transfer Rate:	6.5 Mbps
Operating Frequency	2417 MHz
Channel No.	02 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+ C.L-A.G +ATT+ D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	57.91	0.00	6.32	H	64.23	73.98	9.75	PK
2390.0	38.88	0.14	6.32	H	45.34	53.98	8.64	AV
2390.0	58.20	0.00	6.32	V	64.52	73.98	9.46	PK
2390.0	39.14	0.14	6.32	V	45.60	53.98	8.38	AV

▣ Test Plots (Worst case : X-H)

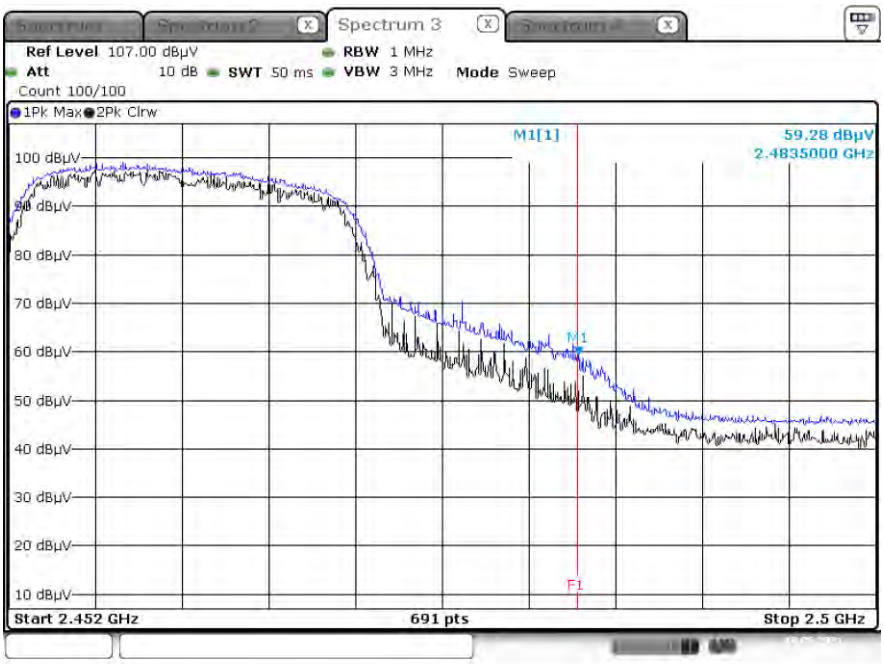
Radiated Restricted Band Edges plot – Average Reading (802.11n (HT20)_MCS0 Ch.11)

2483.5M-2.5G



Radiated Restricted Band Edges plot – Peak Reading (802.11n (HT20)_MCS0 Ch.11)

2483.5M-2.5G



Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

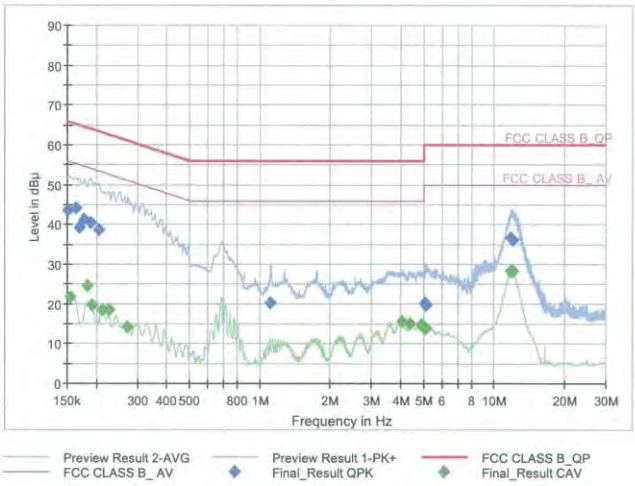
WLAN 2.4G MODE_L1 1 / 2

Test Report

Common Information

EUT :	SM-M325FV/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	WLAN 2.4G MODE_L1

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.1523	43.62	65.88	22.26	9.000	L1	OFF	9.6
0.1635	44.22	65.28	21.07	9.000	L1	OFF	9.6
0.1703	39.25	64.95	25.70	9.000	L1	OFF	9.6
0.1770	41.26	64.63	23.37	9.000	L1	OFF	9.6
0.1905	40.34	64.02	23.68	9.000	L1	OFF	9.6
0.2063	38.52	63.36	24.84	9.000	L1	OFF	9.6
1.1165	20.11	56.00	35.89	9.000	L1	OFF	9.6
5.0810	20.28	60.00	39.72	9.000	L1	OFF	9.8
5.1170	19.67	60.00	40.33	9.000	L1	OFF	9.8
5.1328	19.98	60.00	40.02	9.000	L1	OFF	9.8
5.1440	20.04	60.00	39.96	9.000	L1	OFF	9.8
5.1485	19.94	60.00	40.06	9.000	L1	OFF	9.8
11.8535	36.58	60.00	23.42	9.000	L1	OFF	9.9
11.8873	36.44	60.00	23.56	9.000	L1	OFF	9.9
11.8963	36.41	60.00	23.59	9.000	L1	OFF	9.9
11.9278	36.44	60.00	23.56	9.000	L1	OFF	9.9
11.9390	36.26	60.00	23.74	9.000	L1	OFF	9.9
12.0763	35.96	60.00	24.04	9.000	L1	OFF	9.9

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WLAN 2.4G MODE_L1 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	21.73	55.75	34.03	9.000	L1	OFF	9.6
0.1838	24.62	54.31	29.69	9.000	L1	OFF	9.6
0.1928	19.67	53.92	34.24	9.000	L1	OFF	9.6
0.2130	18.56	53.09	34.53	9.000	L1	OFF	9.6
0.2265	18.38	52.58	34.20	9.000	L1	OFF	9.6
0.2738	14.21	51.00	36.79	9.000	L1	OFF	9.6
4.0640	15.48	46.00	30.52	9.000	L1	OFF	9.7
4.3925	15.06	46.00	30.94	9.000	L1	OFF	9.7
4.9280	14.66	46.00	31.34	9.000	L1	OFF	9.7
5.0788	13.94	50.00	36.06	9.000	L1	OFF	9.8
5.1080	13.88	50.00	36.12	9.000	L1	OFF	9.8
11.8468	28.33	50.00	21.67	9.000	L1	OFF	9.9
11.8873	28.31	50.00	21.69	9.000	L1	OFF	9.9
11.9390	28.34	50.00	21.66	9.000	L1	OFF	9.9
11.9503	28.23	50.00	21.77	9.000	L1	OFF	9.9
11.9795	28.34	50.00	21.66	9.000	L1	OFF	9.9
12.0245	28.15	50.00	21.85	9.000	L1	OFF	9.9
12.0403	28.26	50.00	21.74	9.000	L1	OFF	9.9

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Conducted Emissions (Line 2)

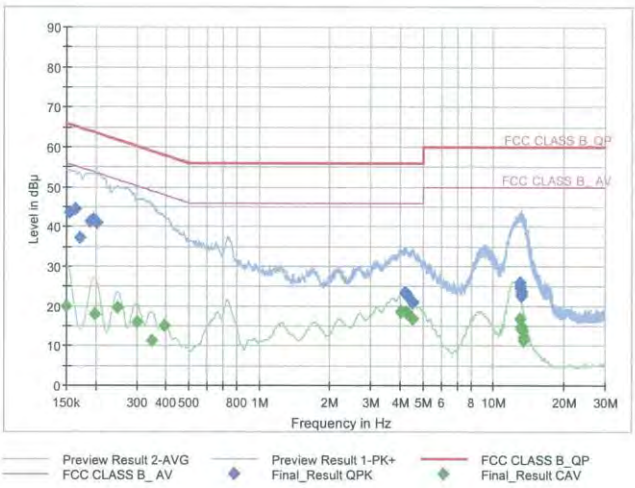
WLAN 2.4G MODE_N 1 / 2

Test Report

Common Information

EUT :	SM-M325FV/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	WLAN 2.4G MODE_N

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.1545	43.48	65.75	22.28	9.000	N	OFF	9.6
0.1635	44.43	65.28	20.85	9.000	N	OFF	9.6
0.1725	37.33	64.84	27.51	9.000	N	OFF	9.6
0.1905	41.39	64.02	22.63	9.000	N	OFF	9.6
0.1973	41.74	63.73	21.99	9.000	N	OFF	9.6
0.2040	40.84	63.45	22.61	9.000	N	OFF	9.6
4.1788	23.37	56.00	32.63	9.000	N	OFF	9.7
4.2170	23.38	56.00	32.62	9.000	N	OFF	9.7
4.2530	23.01	56.00	32.99	9.000	N	OFF	9.7
4.2868	22.76	56.00	33.24	9.000	N	OFF	9.7
4.5298	21.03	56.00	34.97	9.000	N	OFF	9.7
4.5545	20.74	56.00	35.26	9.000	N	OFF	9.7
12.9965	25.88	60.00	34.12	9.000	N	OFF	9.8
13.0303	25.11	60.00	34.89	9.000	N	OFF	9.8
13.0978	24.61	60.00	35.39	9.000	N	OFF	9.8
13.1653	23.78	60.00	36.22	9.000	N	OFF	9.8
13.2305	23.21	60.00	36.79	9.000	N	OFF	9.8
13.2643	22.40	60.00	37.60	9.000	N	OFF	9.8

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WLAN 2.4G MODE_N 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	20.03	56.00	35.97	9.000	N	OFF	9.6
0.1995	17.96	53.63	35.67	9.000	N	OFF	9.6
0.2490	19.75	51.79	32.04	9.000	N	OFF	9.6
0.3008	15.75	50.22	34.48	9.000	N	OFF	9.6
0.3480	11.12	49.01	37.89	9.000	N	OFF	9.6
0.3930	15.03	48.00	32.97	9.000	N	OFF	9.6
4.0370	18.75	46.00	27.25	9.000	N	OFF	9.7
4.0528	18.51	46.00	27.49	9.000	N	OFF	9.7
4.2508	18.55	46.00	27.45	9.000	N	OFF	9.7
4.2868	18.28	46.00	27.72	9.000	N	OFF	9.7
4.3003	18.58	46.00	27.42	9.000	N	OFF	9.7
4.5478	16.62	46.00	29.38	9.000	N	OFF	9.7
13.0033	16.84	50.00	33.16	9.000	N	OFF	9.8
13.1990	14.72	50.00	35.28	9.000	N	OFF	9.8
13.2305	14.26	50.00	35.74	9.000	N	OFF	9.8
13.3250	13.78	50.00	36.22	9.000	N	OFF	9.8
13.4533	12.13	50.00	37.87	9.000	N	OFF	9.8
13.5320	11.39	50.00	38.61	9.000	N	OFF	9.8

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9.9 CONFIRMATION OF GEO-LOCATION MECHANISM

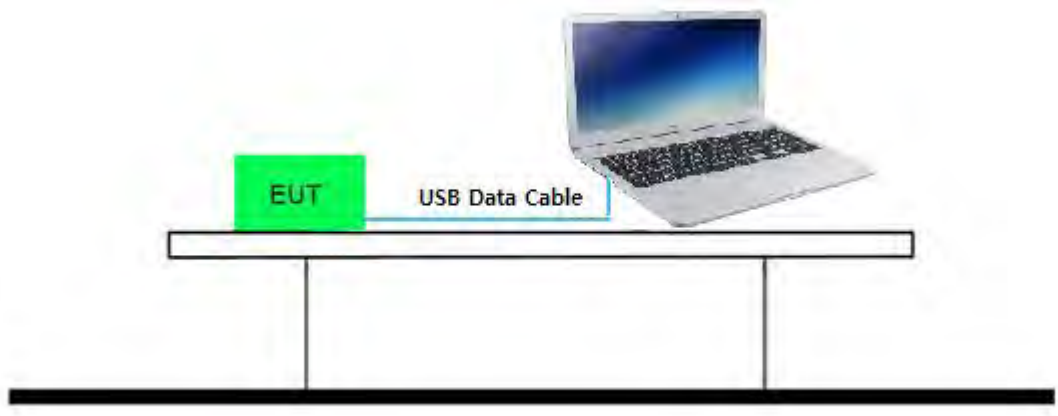
The device uses MCC information obtained from the public cellular carrier to determine that it is operating outside the U.S. and then enable channels 12 and 13 only if a non-US MCC that supports channel 12 and 13 is confirmed.

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.

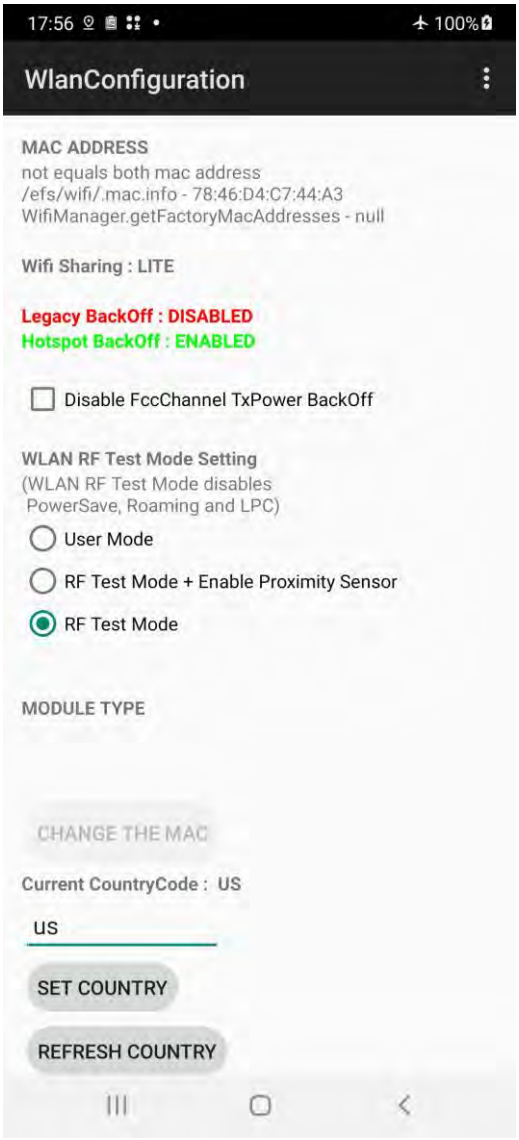
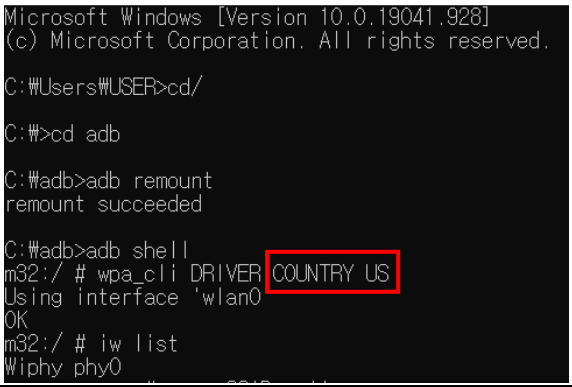
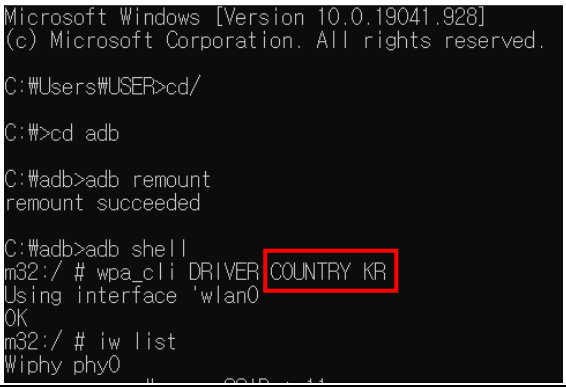
Test Setup

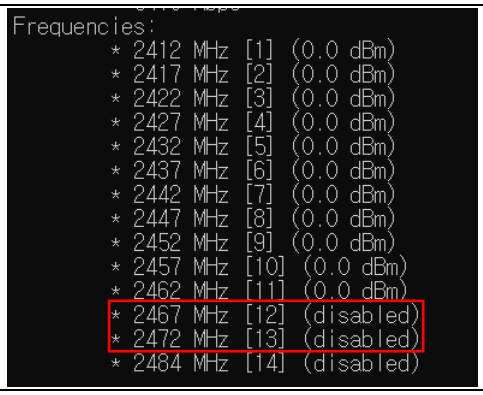


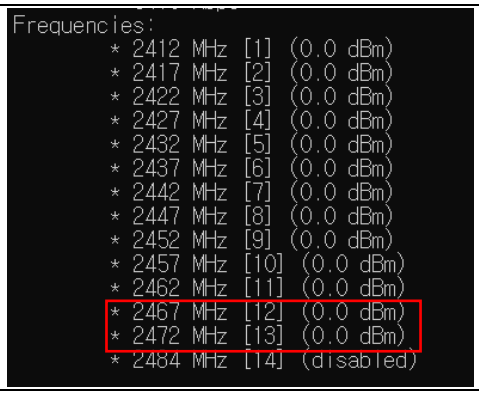
Test Procedure

In case of Country code	In case of airplane mode
1. Open Command Prompt. 2. At the Command Prompt, enter the command. - C:\adb>adb remount - C:\adb>adb shell - gts4lv:/ # wpa_cli driver country US // Setting the country. - gts4lv:/ # iw list // Channel list is obtain.	1. airplane mode on 2. Wifi on 3. Open Command Prompt. 4. At the Command Prompt, enter the command. - C:\adb>adb remount - C:\adb>adb shell - gts4lv:/ # iw list // support band in case of airplane mode

Setting the country for product

Country code = US	Country code = KR(Korea)
	
	





Airplane on

Airplane off

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
ESPEC	SU-642 /Temperature Chamber	07/30/2020	Annual	0093000718
Agilent	N9020A / Signal Analyzer	05/03/2021	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	03/09/2021	Annual	MY49432108
Agilent	N1911A / Power Meter	04/08/2021	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/08/2021	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	02/09/2021	Annual	10545
HP	E3632A / DC Power Supply	09/16/2020	Annual	MY40004427
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	06/26/2020	Annual	07560
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	07/03/2020	Annual	08285
Rohde & Schwarz	18N-20dB / Attenuator(20 dB)	03/08/2021	Annual	8
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
Rohde & Schwarz	CBT / Bluetooth Tester	02/23/2021	Annual	100808

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
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
Schwarzbeck	Loop Antenna	03/19/2020	Biennial	1513-333
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	08/01/2019	Biennial	912D-1151
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	02/11/2020	Biennial	BBHA9170124
Rohde & Schwarz	FSV(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/14/2021	Annual	101055
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/06/2021	Annual	2
Wainwright Instruments	WRCJV12-4900-5100-5900-6100-50SS	06/24/2021	Annual	5
Wainwright Instruments	WRCJV12-4900-5100-5900-6100-50SS	06/24/2021	Annual	6
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2021	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	04/19/2021	Annual	3000C000175
TNM system	FBSM-05B / HPF(3~18GHz) + LNA1(1~18GHz)	01/20/2021	Annual	F6
TNM system	FBSM-05B / ATT(10dB) + LNA1(1~18GHz)	01/20/2021	Annual	None
TNM system	FBSM-05B / ATT(3dB) + LNA1(1~18GHz)	01/20/2021	Annual	None
TNM system	FBSM-05B / LNA1(1~18GHz)	01/20/2021	Annual	25540
TNM system	FBSM-05B / HPF(7~18GHz) + LNA2(6~18GHz)	01/20/2021	Annual	28550
TNM system	FBSM-05B / Thru(30MHz ~ 18GHz)	01/20/2021	Annual	None

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-2105-FC062-P