

FCC UNII REPORT

Certification

Applicant Name: SAMSUNG Electronics Co., Ltd.	Date of Issue: November 22, 2022
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	Report No.: HCT-RF-2211-FC027

FCC ID:	A3LSMA146M
APPLICANT:	SAMSUNG Electronics Co., Ltd.
Model:	SM-A146M/DS
Additional Model:	SM-A146M
EUT Type:	Mobile Phone
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s):	Part 15.407

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 : Kyung Jun Woo
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)

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2211-FC027	November 22, 2022	- First Approval Report

Table of Contents

REVIEWED BY	2
1. GENERAL INFORMATION	5
EUT DESCRIPTION	5
2. MAXIMUM OUTPUT POWER.....	6
3. TEST METHODOLOGY	7
EUT CONFIGURATION	7
EUT EXERCISE	7
GENERAL TEST PROCEDURES	7
DESCRIPTION OF TEST MODES	7
4. INSTRUMENT CALIBRATION.....	8
5. FACILITIES AND ACCREDITATIONS	8
5.1 FACILITIES	8
5.2 EQUIPMENT	8
6. ANTENNA REQUIREMENTS	8
7. MEASUREMENT UNCERTAINTY	9
8. DESCRIPTION OF TESTS.....	10
9. SUMMARY OF TEST RESULTS	27
10. TEST RESULT	28
10.1 DUTY CYCLE.....	28
10.2 26 dB Bandwidth	31
10.3 6 dB BANDWIDTH	40
10.4 OUTPUT POWER MEASUREMENT.....	42
10.5 POWER SPECTRAL DENSITY	46
10.6 FREQUENCY STABILITY	55
10.6.1 80 MHz BW.....	55
10.7 STRADDLE CHANNEL	71
10.7.1 26 dB Bandwidth	71
10.7.2 6 dB Bandwidth	74
10.7.3 Output Power.....	77
10.7.4 Power Spectral Density	80
10.8 RADIATED SPURIOUS EMISSIONS.....	83
10.9 RADIATED RESTRICTED BAND EDGE	93
10.10 POWERLINE CONDUCTED EMISSIONS	112
11. LIST OF TEST EQUIPMENT	116
12. ANNEX A_ TEST SETUP PHOTO.....	118

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	SM-A146M/DS	
Additional Model	SM-A146M	
EUT Type	Mobile Phone	
Power Supply	DC 4.2 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20 MHz BW : 5180 - 5240 40 MHz BW : 5190 - 5230 80 MHz BW : 5210
	U-NII-2A	20 MHz BW : 5260 - 5320 40 MHz BW : 5270 - 5310 80 MHz BW : 5290
	U-NII-2C	20 MHz BW : 5500 - 5720 40 MHz BW : 5510 - 5710 80 MHz BW : 5530 – 5690
	U-NII-3	20 MHz BW : 5745 - 5825 40 MHz BW : 5755 - 5795 80 MHz BW : 5775
Straddle channel	Supported	
TDWR Band	Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	October 04, 2022 ~ November 18, 2022	
Serial number	Radiated: R93T900CNST Conducted : R93T8000K9P	

2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Band	Mode	Power	
		(dBm)	(W)
UNII1	802.11a	15.60	0.036
	802.11n (HT20)	15.67	0.037
	802.11n (HT40)	14.22	0.026
	802.11ac (VHT20)	15.69	0.037
	802.11ac (VHT40)	14.27	0.027
	802.11ac (VHT80)	8.32	0.007
UNII2A	802.11a	15.51	0.036
	802.11n (HT20)	15.49	0.035
	802.11n (HT40)	13.79	0.024
	802.11ac (VHT20)	15.61	0.036
	802.11ac (VHT40)	13.83	0.024
	802.11ac (VHT80)	7.37	0.005
UNII2C	802.11a	15.14	0.033
	802.11n (HT20)	15.10	0.032
	802.11n (HT40)	13.61	0.023
	802.11ac (VHT20)	14.98	0.031
	802.11ac (VHT40)	13.72	0.024
	802.11ac (VHT80)	11.86	0.015
UNII3	802.11a	15.02	0.032
	802.11n (HT20)	14.89	0.031
	802.11n (HT40)	13.29	0.021
	802.11ac (VHT20)	14.85	0.031
	802.11ac (VHT40)	13.27	0.021
	802.11ac (VHT80)	11.65	0.015

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E" and ANSI C63.10(Version : 2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices' were used in the measurement.

EUT CONFIGURATION

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

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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

DESCRIPTION OF TEST MODES

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

4. 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).

5. FACILITIES AND ACCREDITATIONS

5.1 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).

5.2 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."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407:

"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, §15.407

7. MEASUREMENT UNCERTAINTY

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

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

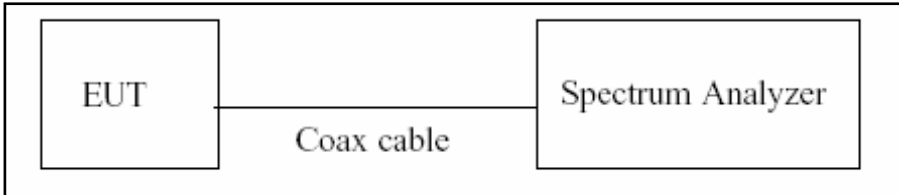
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.48 (Confidence level about 95 %, $k=2$)

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure B.2 in KDB 789033 D02 v02r01.

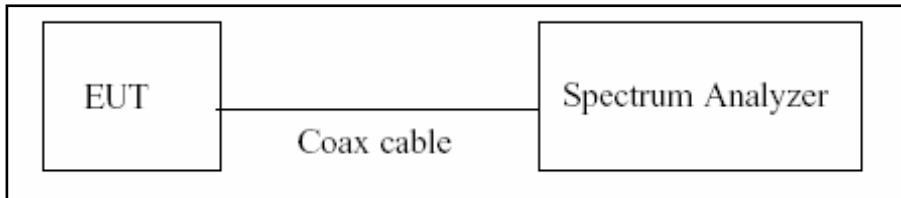
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10\log(1/\text{Duty Cycle})$

8.2. 6 dB Bandwidth & 26 dB Bandwidth

Limit

Within the 5.725-5.85 GHz(NII-3), the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Configuration



Test Procedure(26 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.1 in KDB 789033 D02 v02r01.

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.
Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Test Procedure (6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.2 in KDB 789033 D02 v02r01.

1. RBW = 100 kHz
2. VBW $\geq 3 \times$ RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.
3. The 26 dB bandwidth is used to determine the conducted power limits.

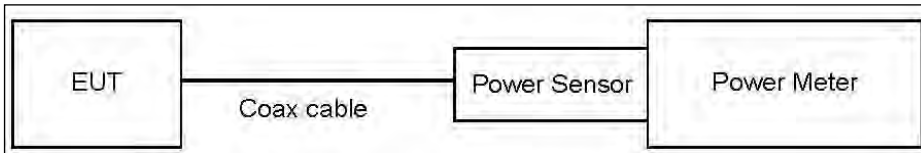
8.3. Output Power Measurement

Limit

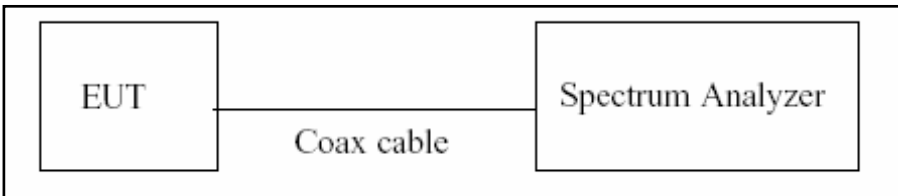
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30 dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

We tested according to Procedure E.3.a in KDB 789033 D02 v02r01.

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.

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

We use the spectrum analyzer’s integrated band power measurement function.

We tested according to Procedure E.2.d) in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2 x span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to “free run”.
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. 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

Total Power(dBm) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum Measured Levels are not plot data.

The power results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset Loss = Attenuator loss(10 dB) + Cable loss

3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	12.08
UNII 2A	12.08
UNII 2C	12.08
UNII 3	12.08

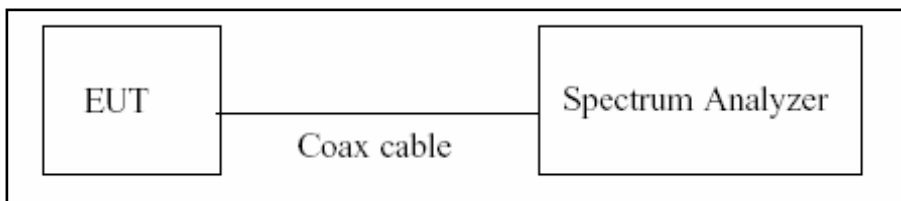
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 2A, 2C	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

We tested according to Procedure F in KDB 789033 D02 v02r01.

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW \geq 3 MHz
4. Number of points in sweep \geq 2 x span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

Sample Calculation

Total PSD(dBm) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum Measured Levels 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 Loss = Attenuator loss + Cable loss

3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	12.08
UNII 2A	12.08
UNII 2C	12.08
UNII 3	12.08

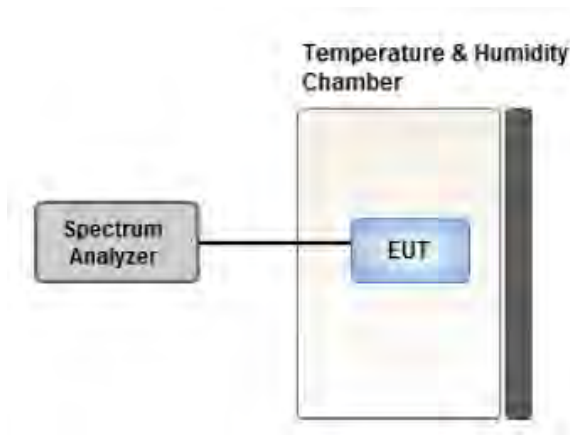
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 °C and 50 °C.
2. The temperature was incremented by 10 °C intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.
3. The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.
4. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

8.6. 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 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 ^(a)	56 to 46 ^(a)
0.50 to 5	56	46
5 to 30	60	50

^(a)Decreases with the logarithm of the frequency.

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

8.7. Radiated Test

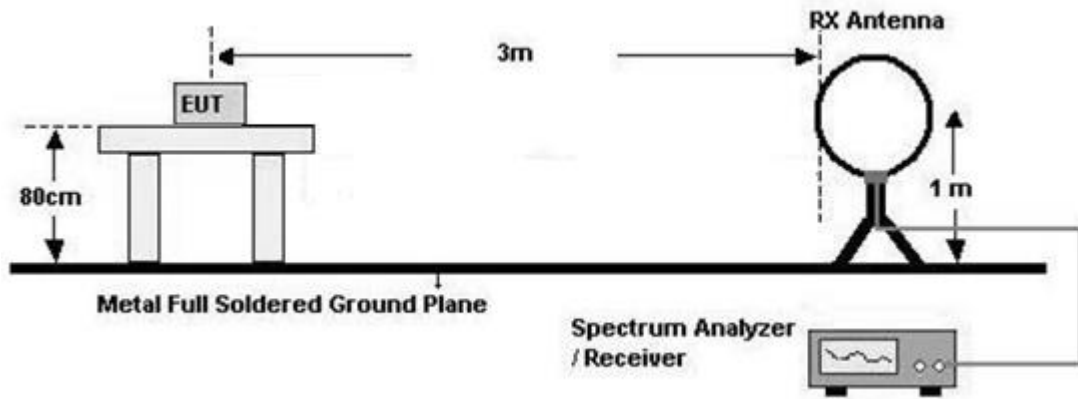
Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
2. UNII 2A, 2C: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
3. UNII 3: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
4. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Section 15.209.

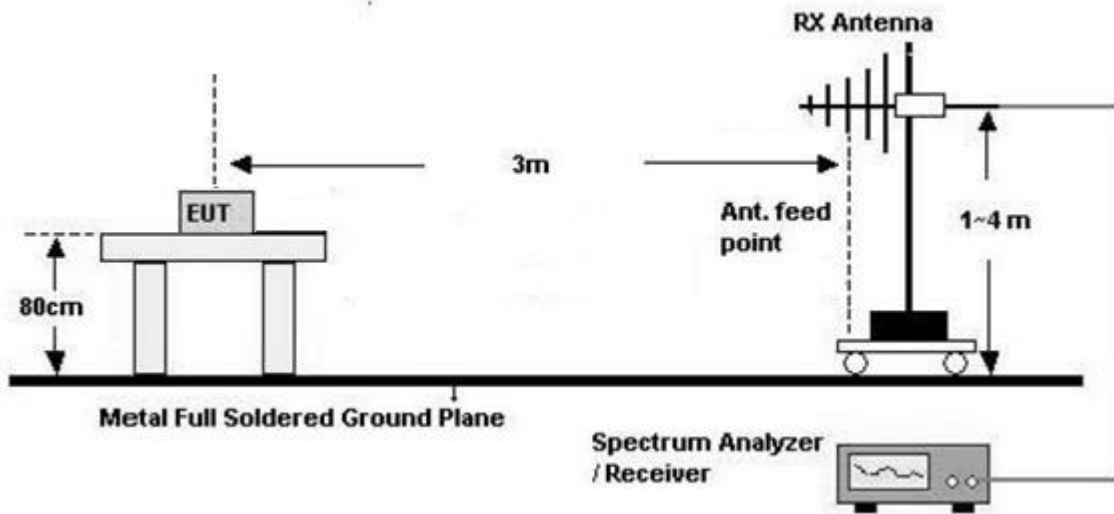
Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

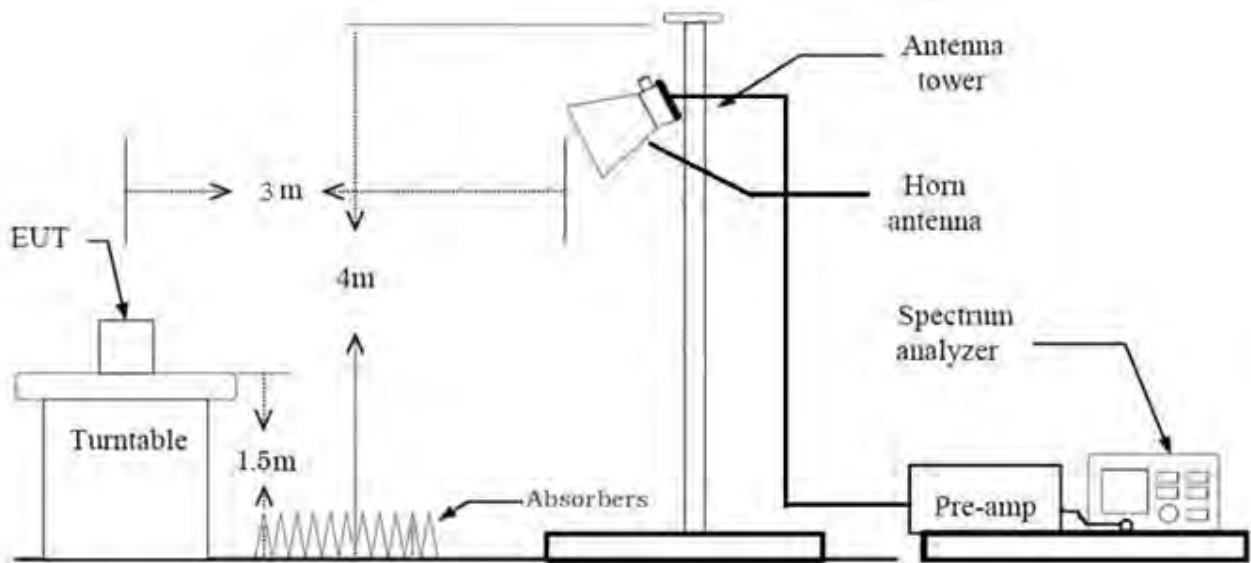
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz

**Test Procedure of Radiated spurious emissions(Below 30 MHz)**

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions(Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- ※ In general, (1) is used mainly
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type (Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW \geq 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.

(2) Measurement Type (Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle \geq 98 %) = $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is $<$ 98 %) = $VBW \geq 1/T$, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of $1/x$, where x is the duty cycle.

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. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
11. Distance extrapolation factor = $20\log(\text{test distance} / \text{specific distance})$ (dB)
12. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW \geq 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.

(2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle \geq 98 %) = $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) = $VBW \geq 1/T$, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of $1/x$, where x is the duty cycle.

9. Measured Frequency Range :

- 4 500 MHz ~ 5 150 MHz
- 5 350 MHz ~ 5 460 MHz
- 5 460 MHz ~ 5 470 MHz
- (75 MHz or more below the 5 725 MHz) ~ 5 725 MHz
- 5 850 MHz ~ (75 MHz or more above the 5 850 MHz)

10. Distance extrapolation factor = $20\log(\text{test distance} / \text{specific distance})$ (dB)

11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Attenuator(ATT)
+ Distance Factor(D.F)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.926	0.334	1 000
802.11n(HT20)	MCS0	0.921	0.358	1 000
802.11n(HT40)	MCS0	0.869	0.608	3 000
802.11ac(VHT20)	MCS0	0.918	0.372	1 000
802.11ac(VHT40)	MCS0	0.854	0.688	3 000
802.11ac(VHT80)	MCS0	0.741	1.301	10 000

8.8. 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
 - Radiated Restricted Band Edge : X
3. All datarate of operation were investigated and the worst case datarate results are reported.
 - 802.11a : 6 Mbps
 - 802.11n_HT20 : MCS0
 - 802.11n_HT40 : MCS0
 - 802.11ac_VHT20 : MCS0
 - 802.11ac_VHT40 : MCS0
 - 802.11ac_VHT80 : MCS0
4. Radiated Spurious Emission
 - All modulation of operation were investigated and the worst case modulation results are reported.
(Worstcase : 802.11a_6 Mbps)
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-A146M/DS, SM-A146M were tested and the worst case results are reported.
(Worst case : SM-A146M/DS)

Radiated test(Non-DBS)

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
3. The following tables show the worst case configurations determined during testing.

Description	Bluetooth Emission	5 GHz Emission
Antenna	WIFI/BT	WIFI/BT
Channel	78	64
Data Rate	1 Mbps	6 Mbps
Mode	GFSK : DH5	802.11a

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-A146M/DS, SM-A146M were tested and the worst case results are reported.
(Worst case : SM-A146M/DS)

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. SM-A146M/DS, SM-A146M were tested and the worst case results are reported.
(Worst case : SM-A146M/DS)

9. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§15.407(e)	> 500 kHz (5725-5850 MHz)(UNII-3)		PASS
Maximum Conducted Output Power	§15.407(a)(1),(2),(3)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10log ₁₀ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10log ₁₀ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Maximum Power Spectral Density	§15.407(a)(1),(2),(3)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207 15.407(b)(9)	<FCC 15.207 limits		PASS
Frequency Stability	§15.407(g) §2.1055	Maintained within the band		PASS
Undesirable Emissions	§15.407(b) (1),(2),(3),(4)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.6 (UNII 3)	Radiated	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(9),(10)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

10. TEST RESULT

10.1 DUTY CYCLE

Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.427	1.541	0.926	0.334
	9	0.963	1.059	0.909	0.414
	12	0.725	0.831	0.872	0.595
	18	0.491	0.608	0.808	0.924
	24	0.375	0.491	0.763	1.175
	36	0.258	0.375	0.689	1.617
	48	0.193	0.309	0.623	2.055
	54	0.177	0.294	0.603	2.194

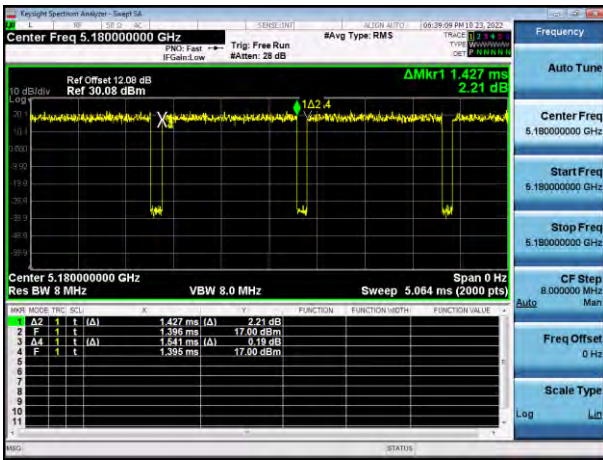
Mode	MCS Index	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.340	1.455	0.921	0.358
	1	0.689	0.795	0.866	0.624
	2	0.476	0.588	0.810	0.913
	3	0.360	0.461	0.780	1.078
	4	0.253	0.370	0.685	1.644
	5	0.198	0.314	0.629	2.013
	6	0.182	0.289	0.632	1.996
	7	0.162	0.274	0.593	2.272
802.11n (HT40)	0	0.665	0.765	0.869	0.608
	1	0.350	0.451	0.775	1.105
	2	0.253	0.375	0.676	1.703
	3	0.198	0.304	0.650	1.871
	4	0.147	0.258	0.569	2.452
	5	0.117	0.223	0.523	2.817
	6	0.106	0.213	0.500	3.010
	7	0.101	0.208	0.488	3.118

Mode	MCS Index	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.340	1.460	0.918	0.372
	1	0.694	0.801	0.867	0.619
	2	0.476	0.583	0.817	0.876
	3	0.365	0.491	0.742	1.294
	4	0.258	0.365	0.708	1.498
	5	0.208	0.324	0.641	1.934
	6	0.187	0.284	0.661	1.800
	7	0.172	0.282	0.612	2.136
	8	0.152	0.269	0.565	2.481
802.11ac (VHT40)	0	0.670	0.785	0.854	0.688
	1	0.355	0.466	0.761	1.187
	2	0.253	0.360	0.704	1.523
	3	0.203	0.309	0.656	1.833
	4	0.147	0.243	0.604	2.188
	5	0.117	0.223	0.523	2.817
	6	0.111	0.218	0.511	2.913
	7	0.101	0.218	0.465	3.324
	8	0.096	0.214	0.449	3.475
	9	0.086	0.213	0.405	3.928
802.11ac (VHT80)	0	0.332	0.448	0.741	1.301
	1	0.187	0.304	0.617	2.099
	2	0.137	0.243	0.563	2.499
	3	0.117	0.213	0.548	2.615
	4	0.096	0.193	0.500	3.010
	5	0.081	0.198	0.410	3.869
	6	0.076	0.203	0.375	4.260
	7	0.071	0.187	0.378	4.221
	8	0.068	0.183	0.372	4.300
	9	0.061	0.167	0.364	4.393

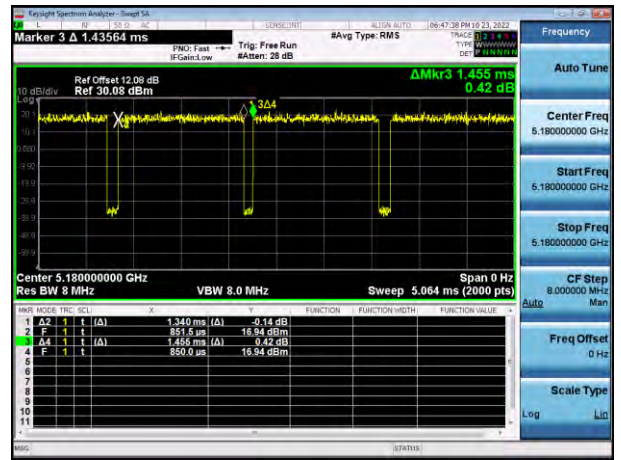
Note:

In order to simplify the report, attached plots were only lowest datarate.

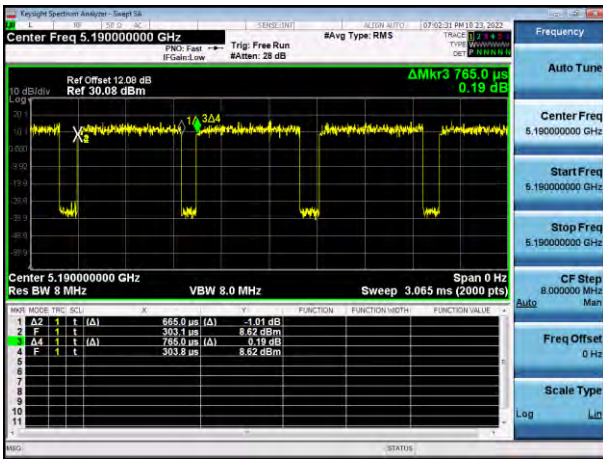
802.11a



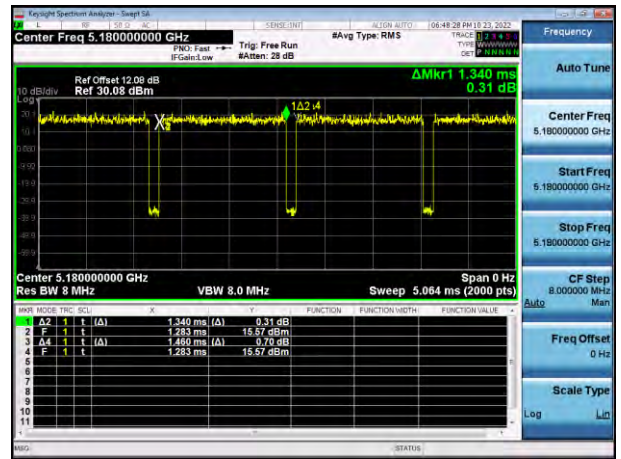
802.11n(HT20)



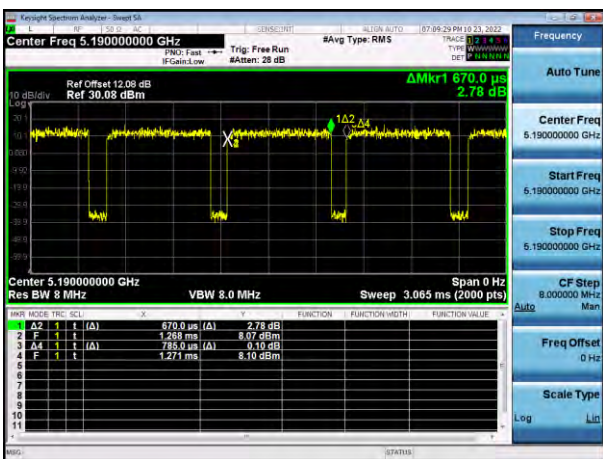
802.11n(HT40)



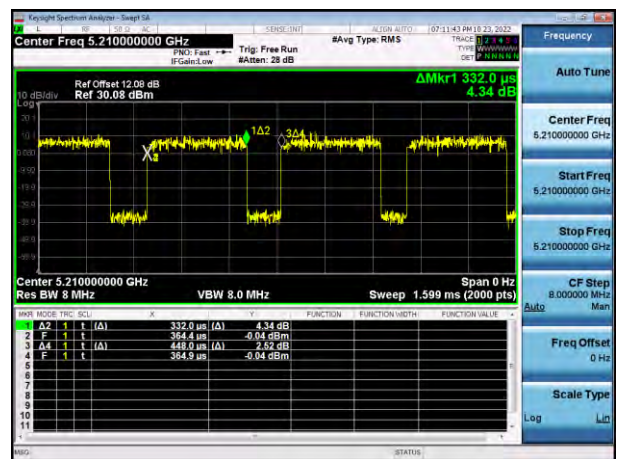
802.11ac(VHT20)



802.11ac(VHT40)



802.11ac(VHT80)



10.2 26 dB Bandwidth

Straddle channel data in the table below are for reporting purposes only.

Straddle channel data were added in section 10.7.1.

802.11a Mode		26dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.55	16.337
5200	40	19.63	16.314
5240	48	19.89	16.330
5260	52	19.42	16.344
5300	60	19.72	16.329
5320	64	19.29	16.308
5500	100	19.48	16.317
5600	120	20.05	16.293
5720	144	19.35	16.310
5745	149	19.78	16.322
5785	157	19.41	16.324
5825	165	20.00	16.347

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	20.50	17.406
5200	40	20.98	17.464
5240	48	20.58	17.471
5260	52	20.75	17.420
5300	60	20.54	17.481
5320	64	20.36	17.416
5500	100	20.68	17.448
5600	120	20.40	17.437
5720	144	20.68	17.442
5745	149	20.29	17.441
5785	157	20.64	17.397
5825	165	20.66	17.413

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.86	35.703
5230	46	39.82	35.765
5270	54	39.57	35.738
5310	62	39.81	35.670
5510	102	39.72	35.714
5590	118	40.05	35.712
5710	142	39.69	35.683
5755	151	39.69	35.746
5795	159	39.76	35.651

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	20.79	17.401
5200	40	20.58	17.455
5240	48	22.66	17.459
5260	52	20.91	17.443
5300	60	20.32	17.440
5320	64	20.47	17.413
5500	100	20.53	17.396
5600	120	21.92	17.423
5720	144	20.29	17.438
5745	149	20.74	17.439
5785	157	20.48	17.412
5825	165	20.62	17.400

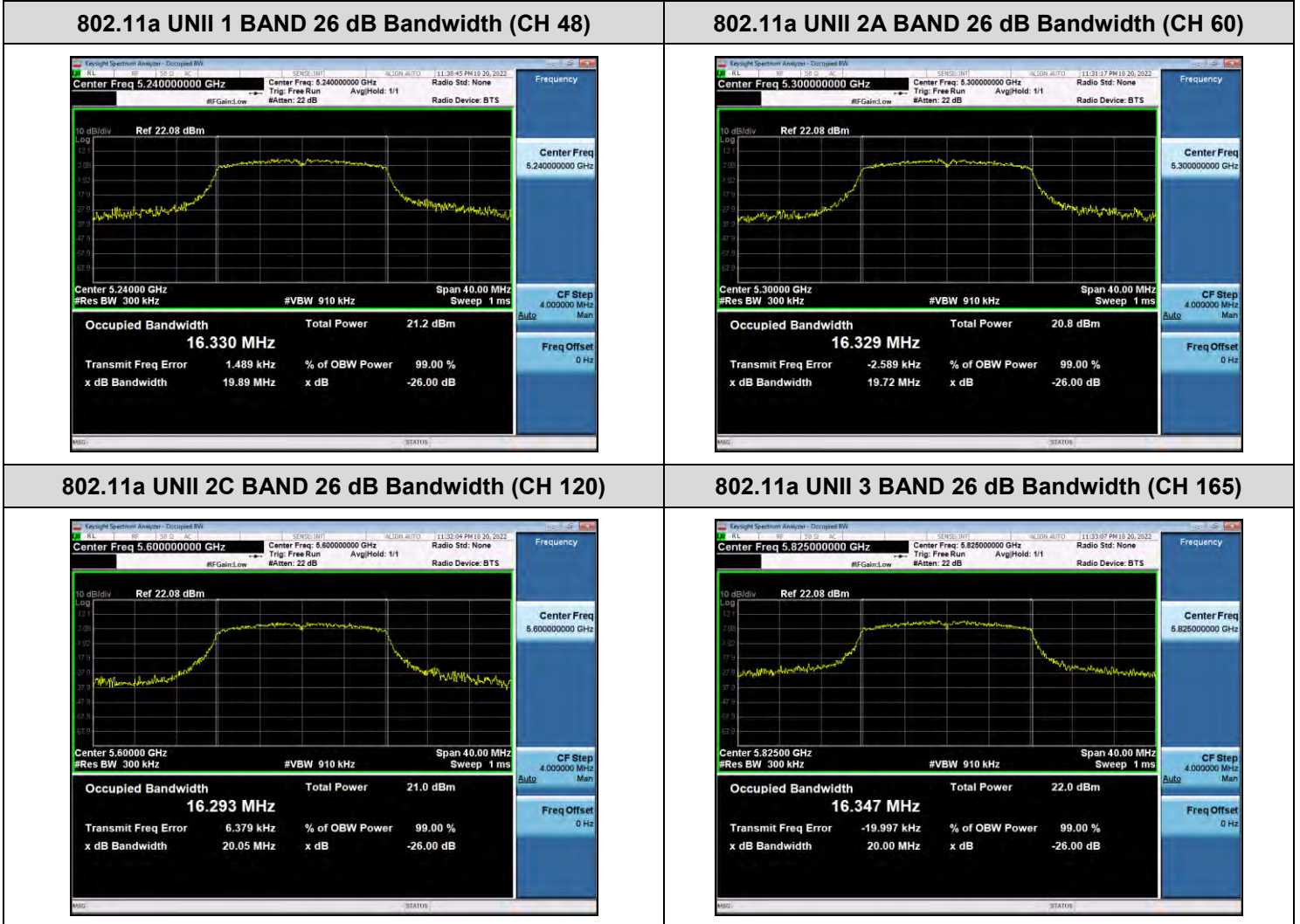
802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.72	35.693
5230	46	40.24	35.695
5270	54	39.74	35.727
5310	62	39.80	35.611
5510	102	39.87	35.624
5590	118	39.89	35.674
5710	142	39.90	35.769
5755	151	39.90	35.617
5795	159	39.73	35.736

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	85.78	76.075
5290	58	86.92	76.055
5530	106	85.39	76.233
5610	122	86.36	76.130
5690	138	86.69	76.267
5775	155	85.89	76.084

☐ Test Plots(802.11a)

Note:

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

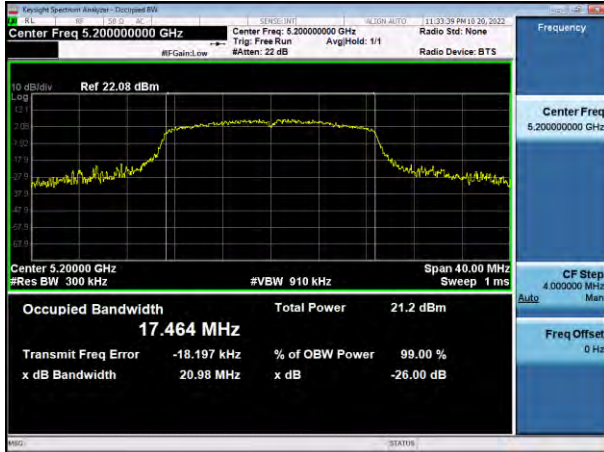


☐ Test Plots(802.11n(HT20))

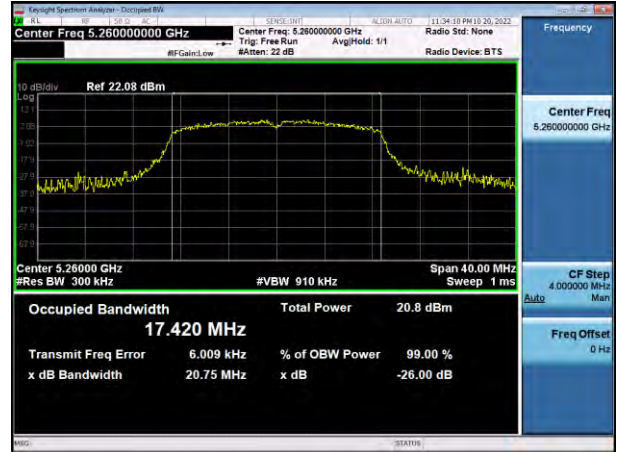
Note:

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

802.11n_HT20 UNII 1 BAND 26 dB Bandwidth(CH 40)



802.11n_HT20 UNII 2A BAND 26 dB Bandwidth(CH 52)



802.11n_HT20 UNII 2C BAND 26 dB Bandwidth(CH 144)



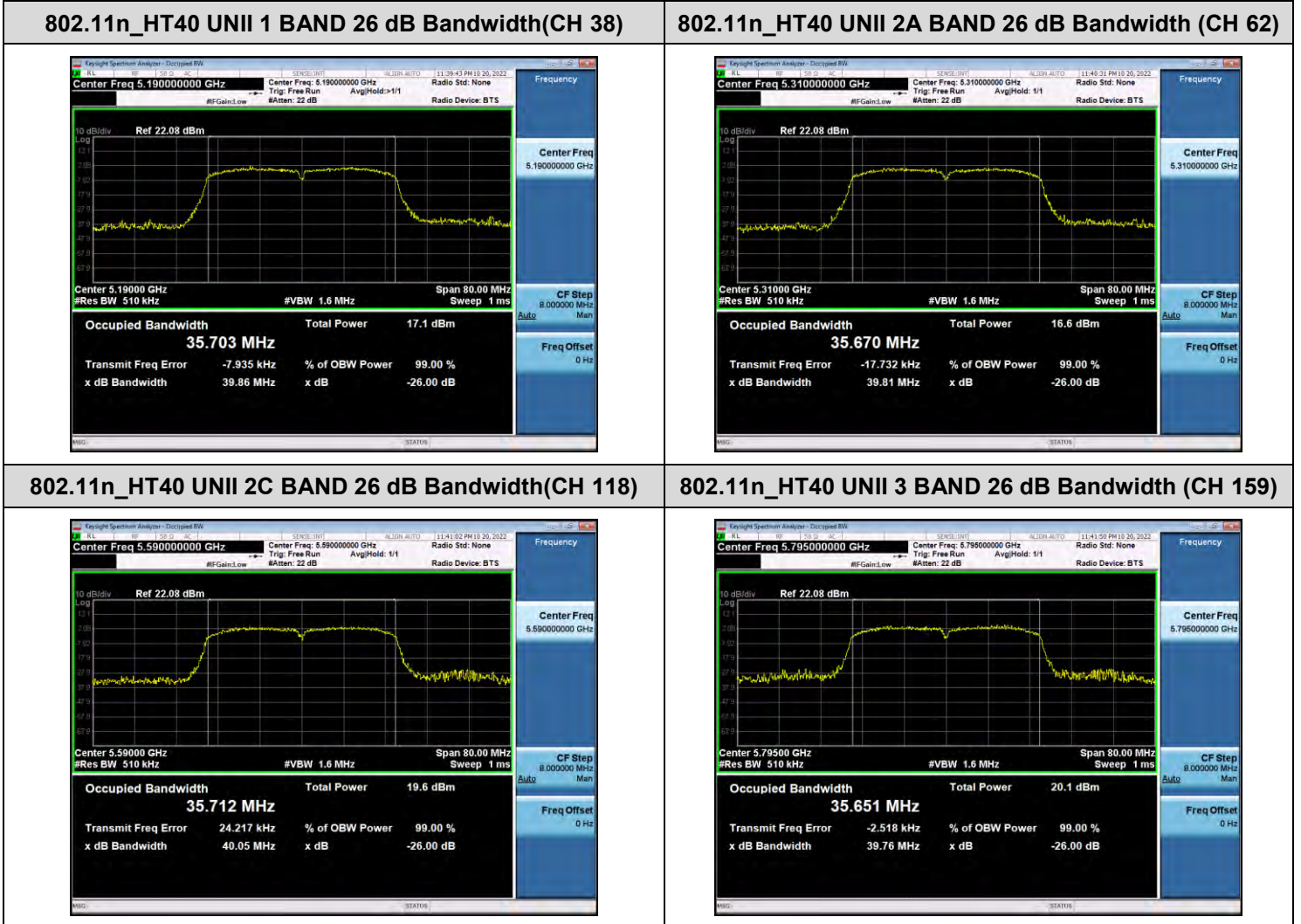
802.11n_HT20 UNII 3 BAND 26 dB Bandwidth(CH 165)



☐ Test Plots(802.11n(HT40))

Note:

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



☑ Test Plots(802.11ac(VHT20))

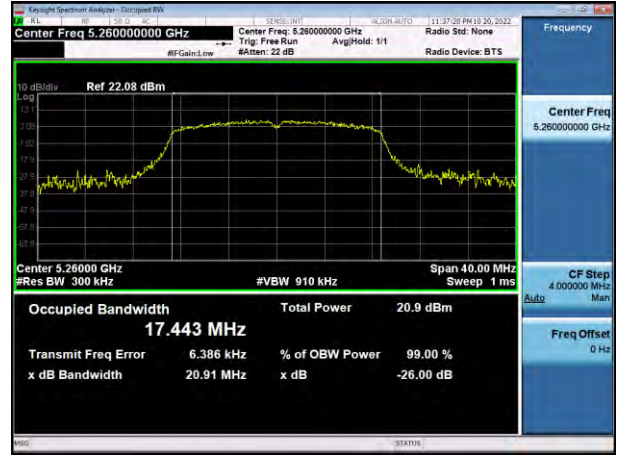
Note:

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

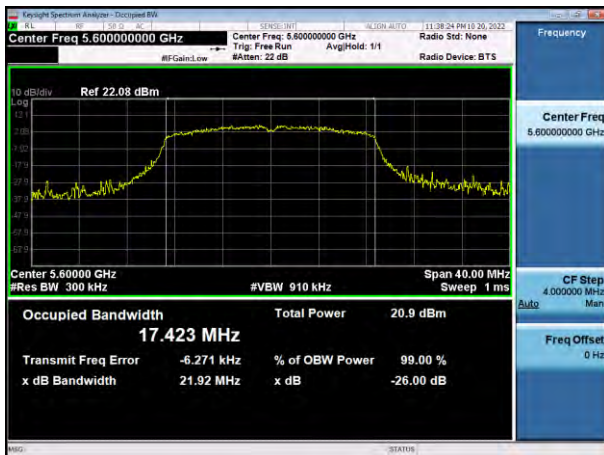
802.11ac_VHT20 UNII 1 BAND 26 dB Bandwidth(CH 48)



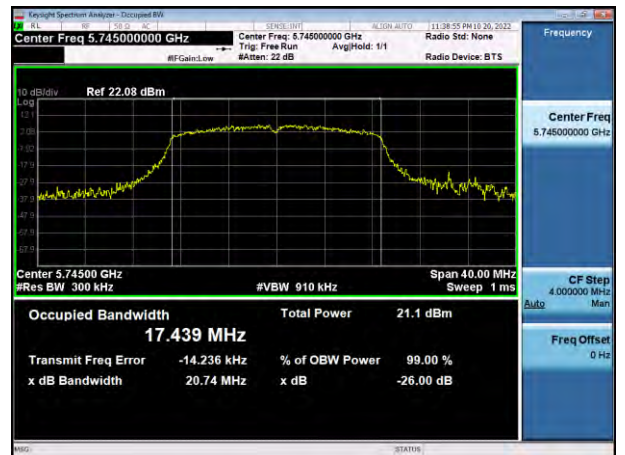
802.11ac_VHT20 UNII 2A BAND 26 dB Bandwidth(CH 52)



802.11ac_VHT20 UNII 2C BAND 26 dB Bandwidth(CH 120)



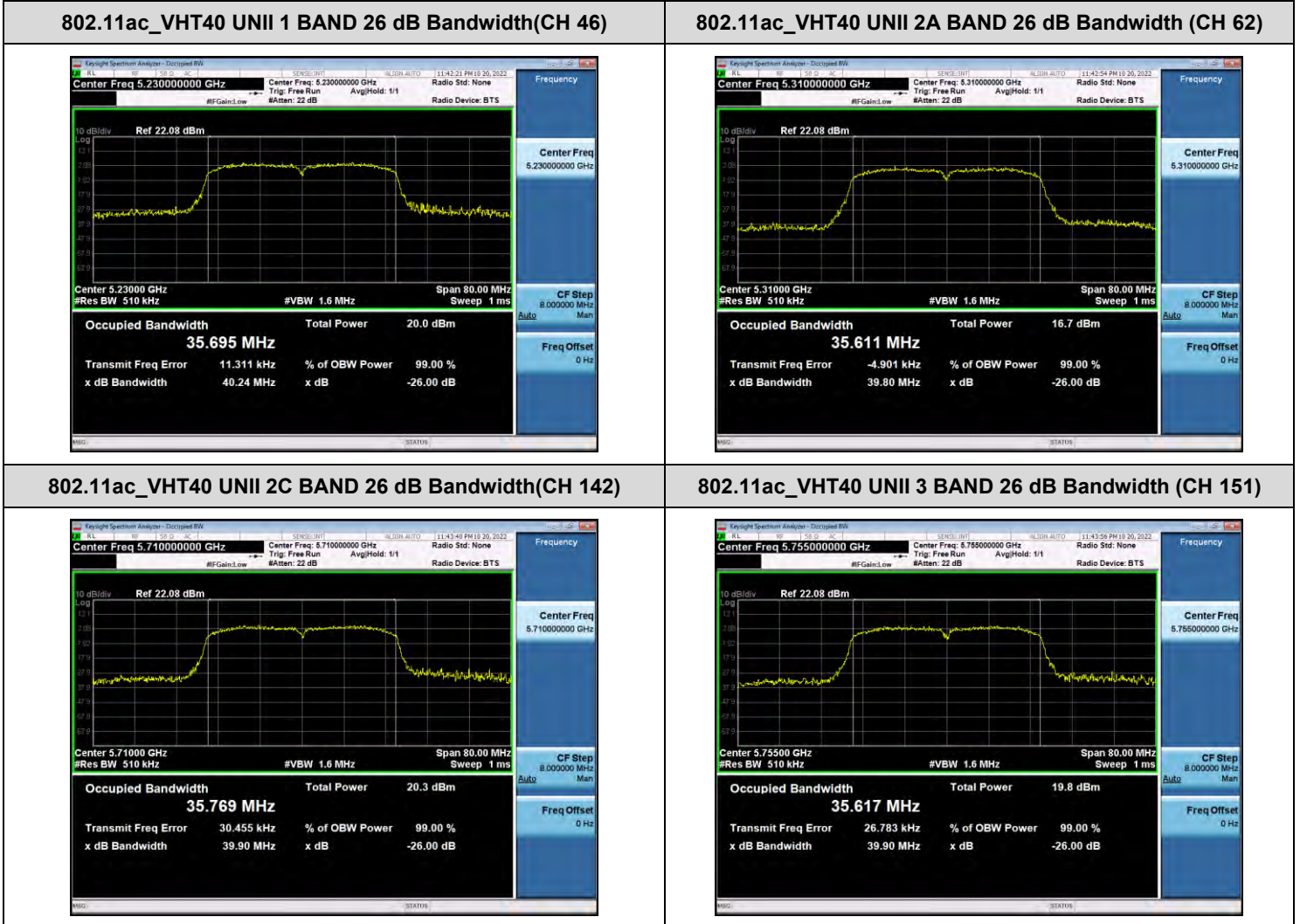
802.11ac_VHT20 UNII 3 BAND 26 dB Bandwidth(CH 149)



☑ Test Plots(802.11ac(VHT40))

Note:

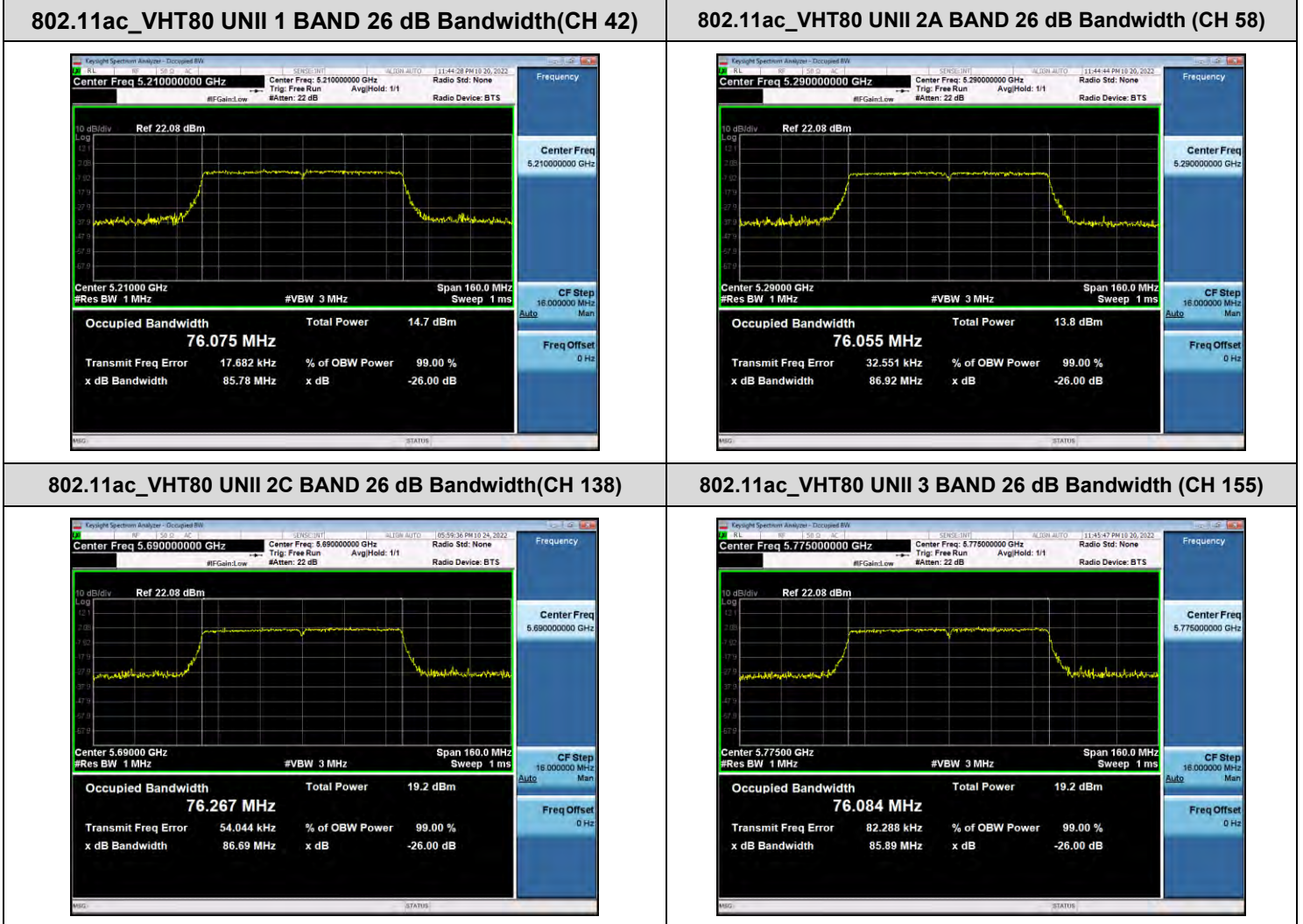
In order to simplify the report, attached plots were only the most wide channel.



☐ Test Plots(802.11ac(VHT80))

Note:

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



10.3 6 dB BANDWIDTH

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	14.50	> 0.5	Pass
5785	157	15.11	> 0.5	Pass
5825	165	15.14	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.13	> 0.5	Pass
5785	157	15.07	> 0.5	Pass
5825	165	15.11	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.07	> 0.5	Pass
5795	159	35.10	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.10	> 0.5	Pass
5785	157	15.08	> 0.5	Pass
5825	165	15.10	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.10	> 0.5	Pass
5795	159	35.11	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	76.01	> 0.5	Pass

Test Plots

Note: In order to simplify the report, attached plots were only the most narrow channel.

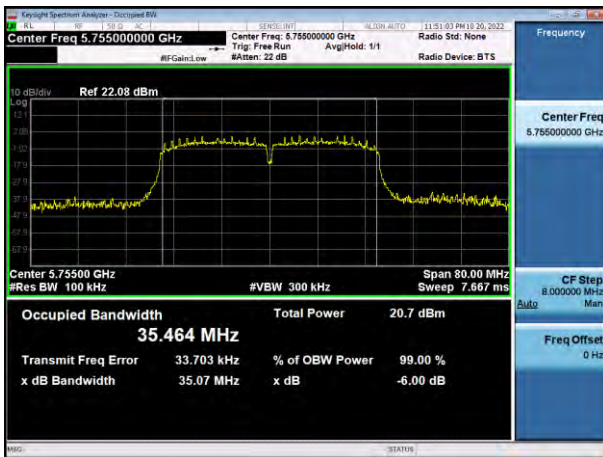
802.11a (CH.149)



802.11n(HT20) (CH.157)



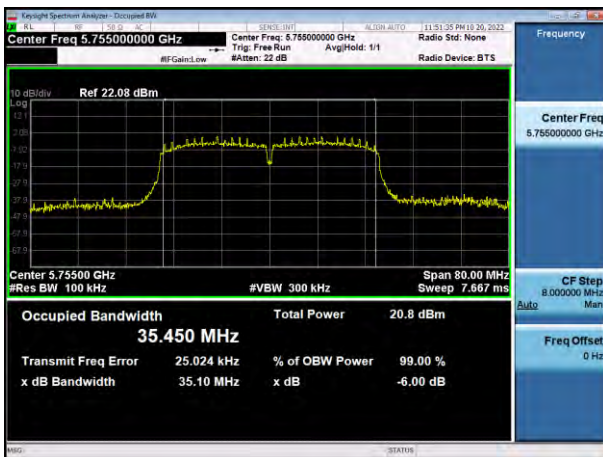
802.11n(HT40) (CH.151)



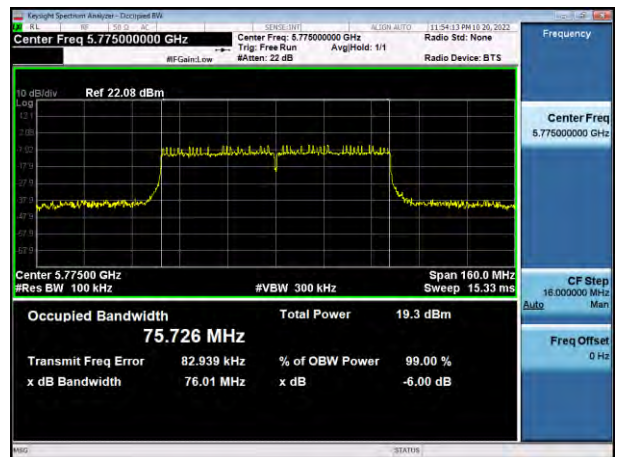
802.11ac(VHT20) (CH.157)



802.11ac(VHT40) (CH.151)



802.11ac(VHT80) (CH.155)



10.4 OUTPUT POWER MEASUREMENT

Straddle channel data in the table below are for reporting purposes only.

Straddle channel data were added in section 10.7.3.

Limit

(UNII 1) : 23.98 dBm

(UNII 2A, 2C) : 23.98 dBm or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)

(UNII 3) : 30.00 dBm

802.11a Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate [Mbps]
Frequency [MHz]	Channel No.					
5180	36	13.47	0.334	13.80	23.98	6M
5200	40	15.12	0.334	15.45	23.98	6M
5240	48	15.27	0.334	15.60	23.98	6M
5260	52	15.18	0.334	15.51	23.88	6M
5300	60	14.94	0.334	15.27	23.95	6M
5320	64	12.72	0.334	13.05	23.85	6M
5500	100	12.07	0.334	12.40	23.90	6M
5600	120	14.81	0.334	15.14	23.98	6M
5720	144	14.66	0.334	14.99	23.87	6M
5745	149	14.22	0.334	14.55	30.00	6M
5785	157	14.43	0.334	14.76	30.00	6M
5825	165	14.69	0.334	15.02	30.00	6M

802.11n(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	13.31	0.358	13.67	23.98	MCS0
5200	40	15.06	0.358	15.42	23.98	MCS0
5240	48	15.31	0.358	15.67	23.98	MCS0
5260	52	15.13	0.358	15.49	23.98	MCS0
5300	60	14.87	0.358	15.23	23.98	MCS0
5320	64	13.13	0.358	13.49	23.98	MCS0
5500	100	11.96	0.358	12.32	23.98	MCS0
5600	120	14.74	0.358	15.10	23.98	MCS0
5720	144	14.61	0.358	14.97	23.98	MCS0
5745	149	14.25	0.358	14.61	30.00	MCS0
5785	157	14.46	0.358	14.82	30.00	MCS0
5825	165	14.53	0.358	14.89	30.00	MCS0

802.11n(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	10.43	0.608	11.04	23.98	MCS0
5230	46	13.61	0.608	14.22	23.98	MCS0
5270	54	13.18	0.608	13.79	23.98	MCS0
5310	62	10.23	0.608	10.84	23.98	MCS0
5510	102	10.03	0.608	10.64	23.98	MCS0
5590	118	12.71	0.608	13.32	23.98	MCS0
5710	142	13.00	0.608	13.61	23.98	MCS0
5755	151	12.51	0.608	13.12	30.00	MCS0
5795	159	12.68	0.608	13.29	30.00	MCS0

802.11ac(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	13.26	0.372	13.63	23.98	MCS0
5200	40	15.08	0.372	15.45	23.98	MCS0
5240	48	15.32	0.372	15.69	23.98	MCS0
5260	52	15.24	0.372	15.61	23.98	MCS0
5300	60	14.83	0.372	15.20	23.98	MCS0
5320	64	13.04	0.372	13.41	23.98	MCS0
5500	100	11.81	0.372	12.18	23.98	MCS0
5600	120	14.61	0.372	14.98	23.98	MCS0
5720	144	14.53	0.372	14.90	23.98	MCS0
5745	149	14.26	0.372	14.63	30.00	MCS0
5785	157	13.52	1.294	14.82	30.00	MCS3
5825	165	14.48	0.372	14.85	30.00	MCS0

802.11ac(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	10.47	0.688	11.16	23.98	MCS0
5230	46	13.58	0.688	14.27	23.98	MCS0
5270	54	13.14	0.688	13.83	23.98	MCS0
5310	62	10.31	0.688	11.00	23.98	MCS0
5510	102	10.08	0.688	10.77	23.98	MCS0
5590	118	12.70	0.688	13.39	23.98	MCS0
5710	142	13.03	0.688	13.72	23.98	MCS0
5755	151	12.40	0.688	13.09	30.00	MCS0
5795	159	12.58	0.688	13.27	30.00	MCS0

802.11ac(80 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5210	42	7.02	1.301	8.32	23.98	MCS0
5290	58	6.07	1.301	7.37	23.98	MCS0
5530	106	5.64	1.301	6.94	23.98	MCS0
5610	122	10.37	1.301	11.67	23.98	MCS0
5690	138	10.56	1.301	11.86	23.98	MCS0
5775	155	10.35	1.301	11.65	30.00	MCS0

10.5 POWER SPECTRAL DENSITY

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase Datarate [Mbps]	Limit
Frequency [MHz]	Channel No.					
5180	36	2.470	0.334	2.804	6M	11 dBm/MHz
5200	40	4.520	0.334	4.854	6M	
5240	48	4.749	0.334	5.083	6M	
5260	52	4.559	0.334	4.893	6M	
5300	60	4.580	0.334	4.914	6M	
5320	64	2.641	0.334	2.975	6M	
5500	100	1.619	0.334	1.953	6M	
5600	120	4.074	0.334	4.408	6M	
5720	144	4.476	0.334	4.810	6M	
5745	149	1.417	0.334	1.751	6M	
5785	157	1.082	0.334	1.416	6M	30 dBm/500 kHz
5825	165	2.055	0.334	2.389	6M	

802.11n(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	2.325	0.358	2.683	MCS0	11 dBm/MHz
5200	40	4.657	0.358	5.015	MCS0	
5240	48	4.346	0.358	4.704	MCS0	
5260	52	4.188	0.358	4.546	MCS0	
5300	60	4.323	0.358	4.681	MCS0	
5320	64	2.054	0.358	2.412	MCS0	
5500	100	1.133	0.358	1.491	MCS0	
5600	120	3.790	0.358	4.148	MCS0	
5720	144	4.113	0.358	4.471	MCS0	
5745	149	1.060	0.358	1.418	MCS0	
5785	157	1.126	0.358	1.484	MCS0	30 dBm/500 kHz
5825	165	1.652	0.358	2.010	MCS0	

802.11n(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	-3.511	0.608	-2.903	MCS0	11 dBm/MHz
5230	46	-0.549	0.608	0.059	MCS0	
5270	54	-0.751	0.608	-0.143	MCS0	
5310	62	-4.064	0.608	-3.456	MCS0	
5510	102	-3.716	0.608	-3.108	MCS0	
5590	118	-1.440	0.608	-0.832	MCS0	
5710	142	-0.793	0.608	-0.185	MCS0	
5755	151	-3.919	0.608	-3.311	MCS0	30 dBm /500 kHz
5795	159	-3.801	0.608	-3.193	MCS0	

802.11ac(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	2.464	0.372	2.836	MCS0	11 dBm/MHz
5200	40	4.290	0.372	4.662	MCS0	
5240	48	4.494	0.372	4.866	MCS0	
5260	52	3.957	0.372	4.329	MCS0	
5300	60	4.123	0.372	4.495	MCS0	
5320	64	2.029	0.372	2.401	MCS0	
5500	100	0.989	0.372	1.361	MCS0	
5600	120	3.883	0.372	4.255	MCS0	
5720	144	4.175	0.372	4.547	MCS0	
5745	149	1.046	0.372	1.418	MCS0	
5785	157	0.850	1.294	2.144	MCS3	30 dBm/500 kHz
5825	165	1.746	0.372	2.118	MCS0	

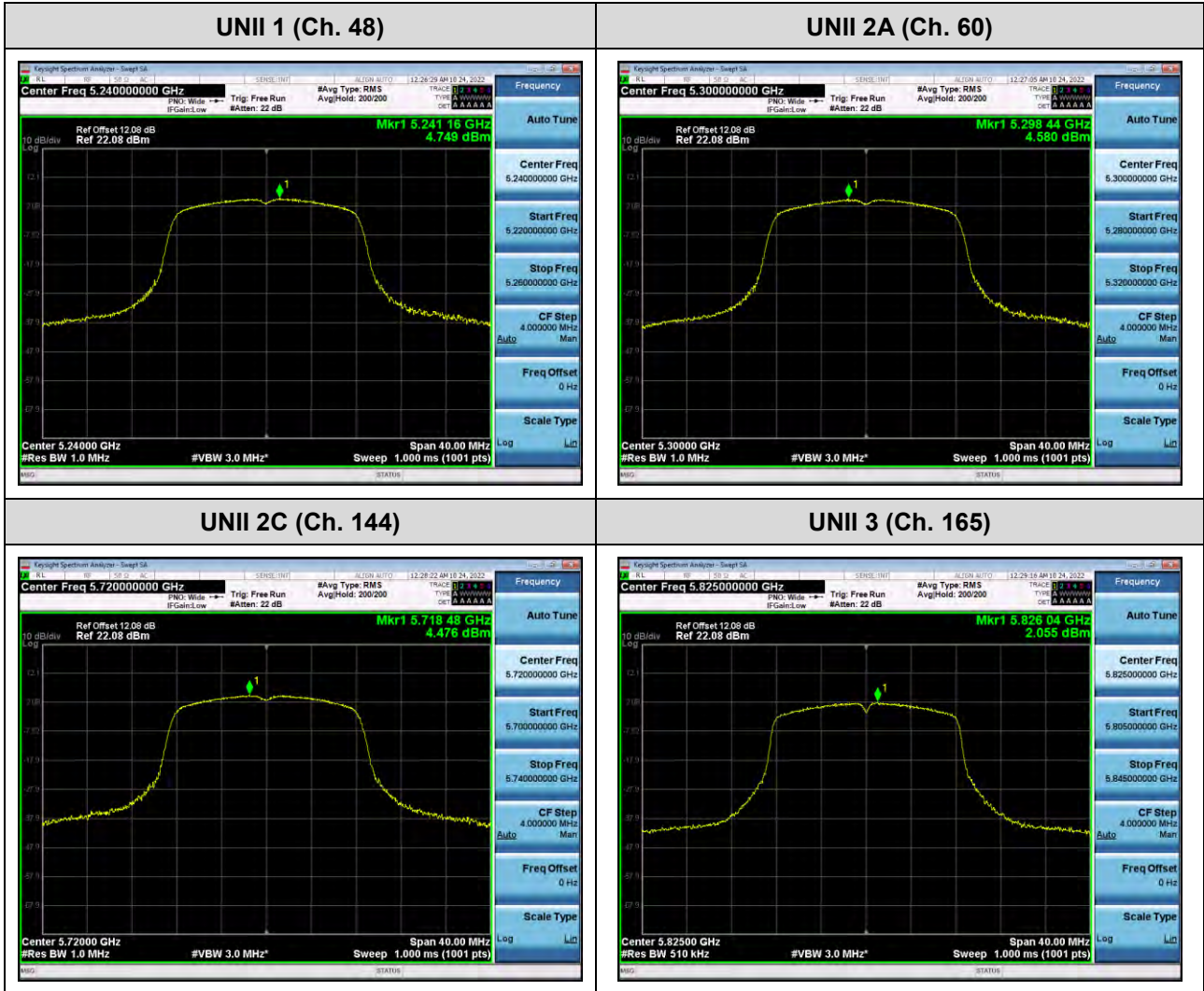
802.11ac(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	-3.707	0.688	-3.019	MCS0	11 dBm/MHz
5230	46	-0.315	0.688	0.373	MCS0	
5270	54	-0.798	0.688	-0.110	MCS0	
5310	62	-3.939	0.688	-3.251	MCS0	
5510	102	-4.321	0.688	-3.633	MCS0	
5590	118	-1.368	0.688	-0.680	MCS0	
5710	142	-1.097	0.688	-0.409	MCS0	
5755	151	-4.012	0.688	-3.324	MCS0	30 dBm/500 kHz
5795	159	-3.840	0.688	-3.152	MCS0	

802.11ac(80 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5210	42	-11.379	1.301	-10.078	MCS0	11 dBm/MHz
5290	58	-11.910	1.301	-10.609	MCS0	
5530	106	-12.527	1.301	-11.226	MCS0	
5610	122	-7.264	1.301	-5.963	MCS0	
5690	138	-7.139	1.301	-5.838	MCS0	
5775	155	-9.973	1.301	-8.672	MCS0	30 dBm/500 kHz

☐ Test Plots(802.11a)

Note:

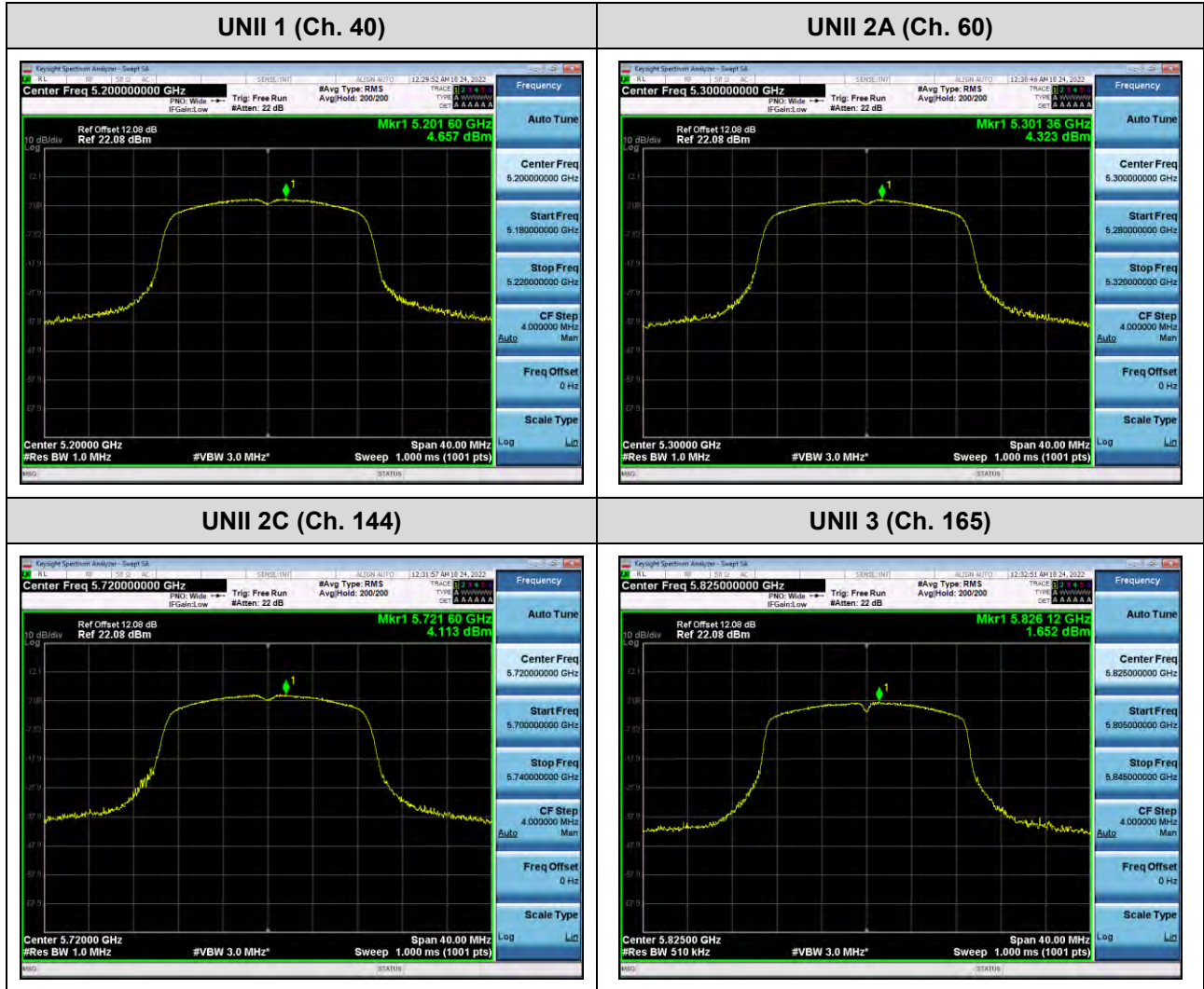
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11n(HT20))

Note:

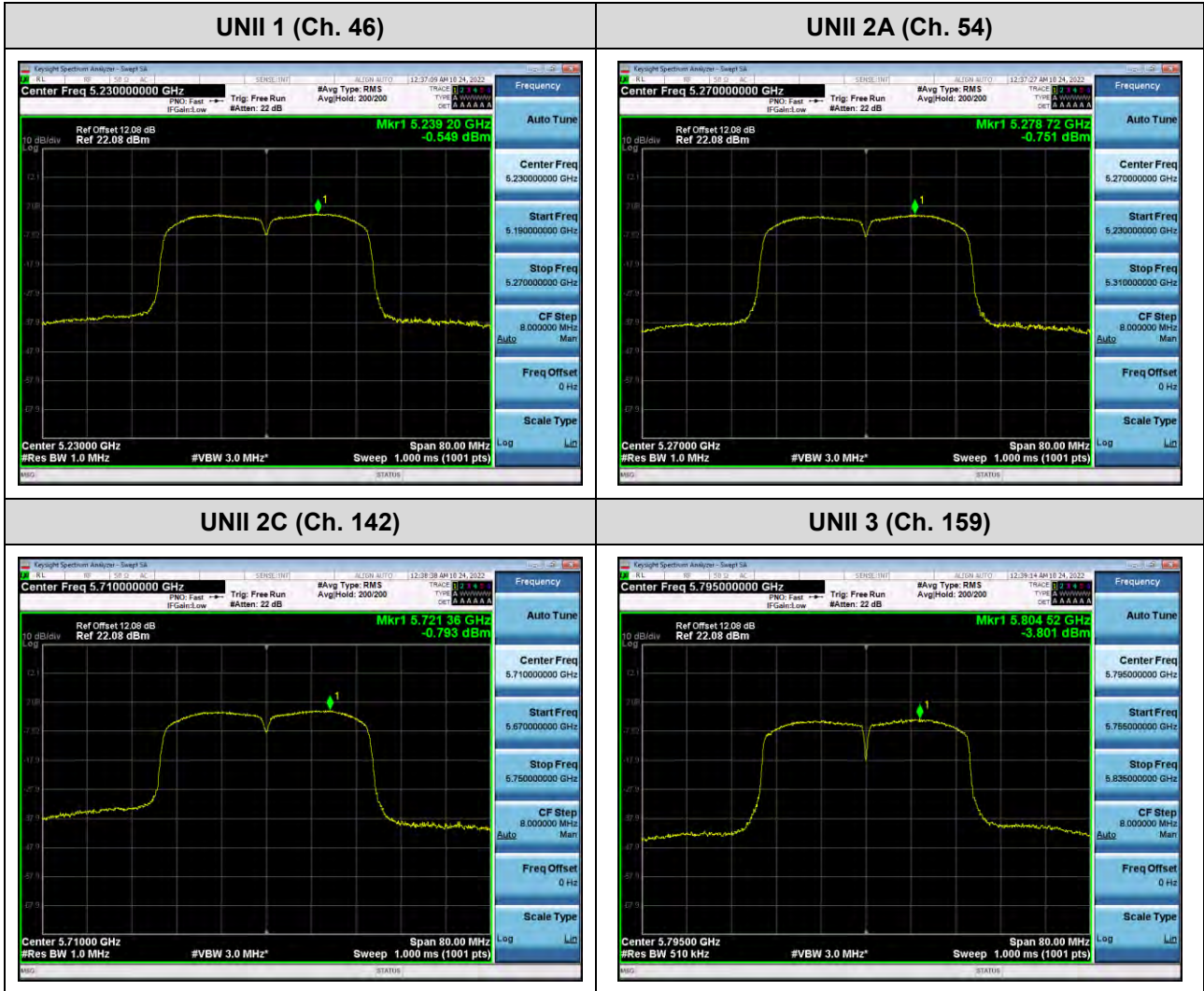
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11n(HT40))

Note:

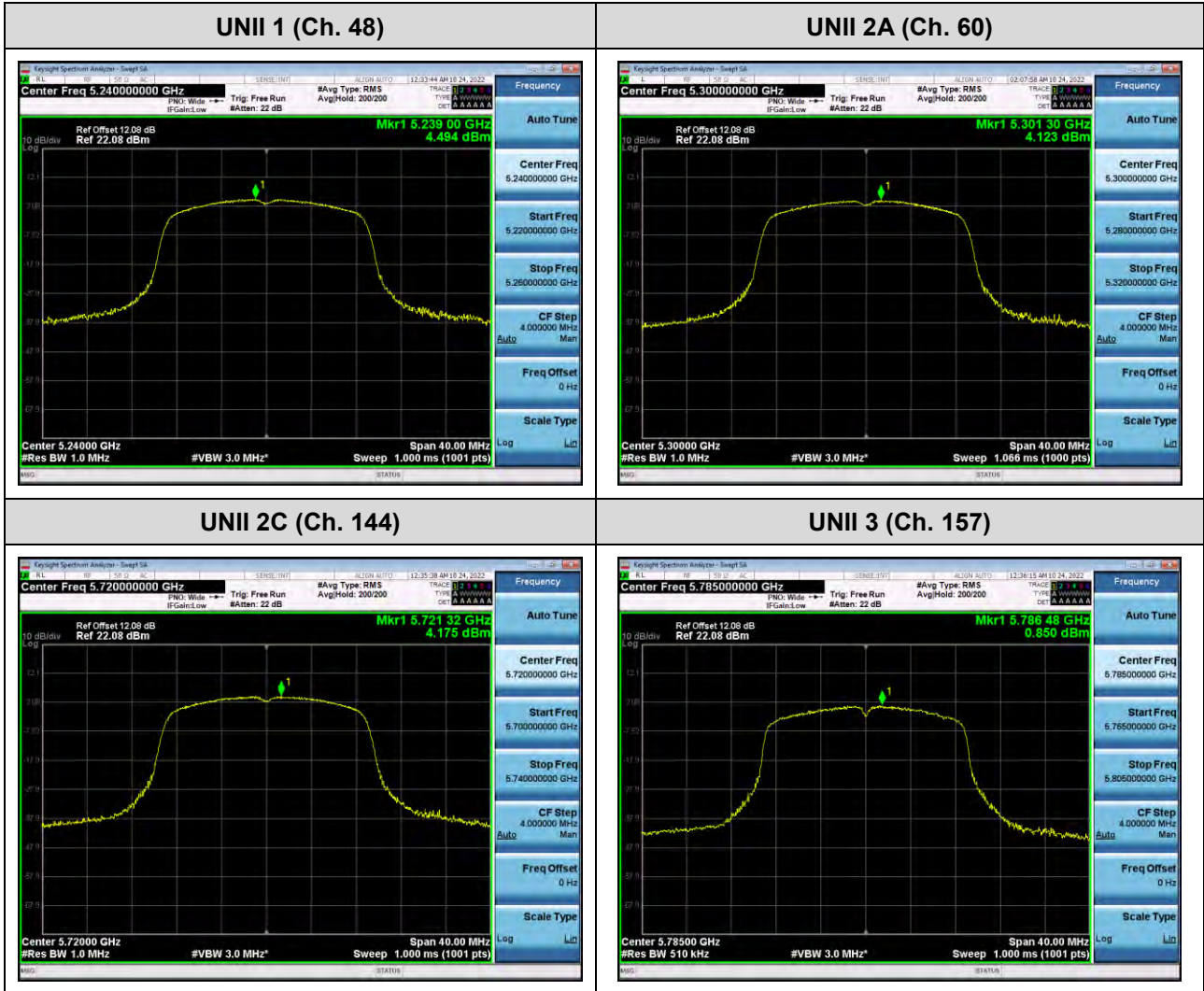
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT20))

Note:

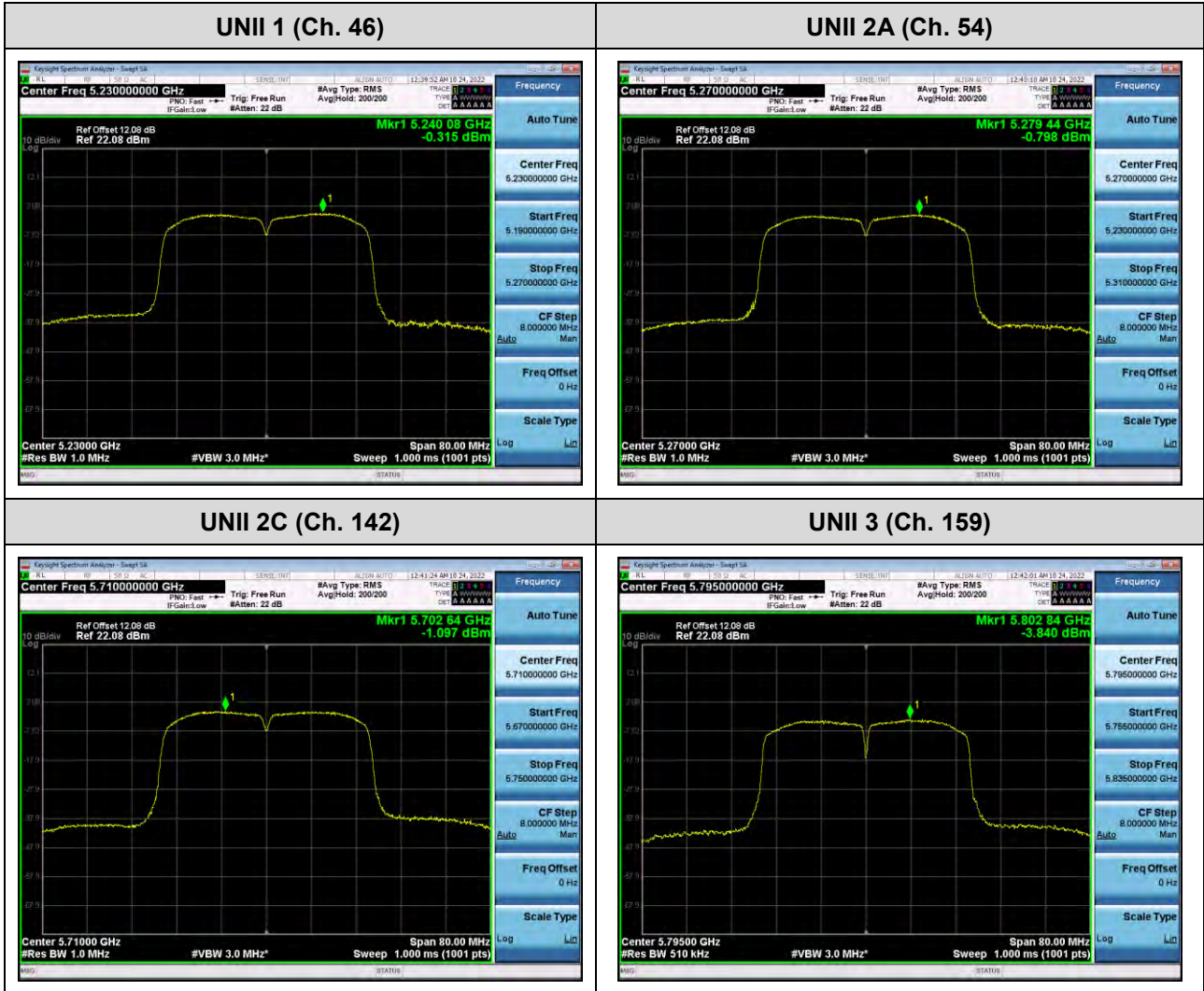
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT40))

Note:

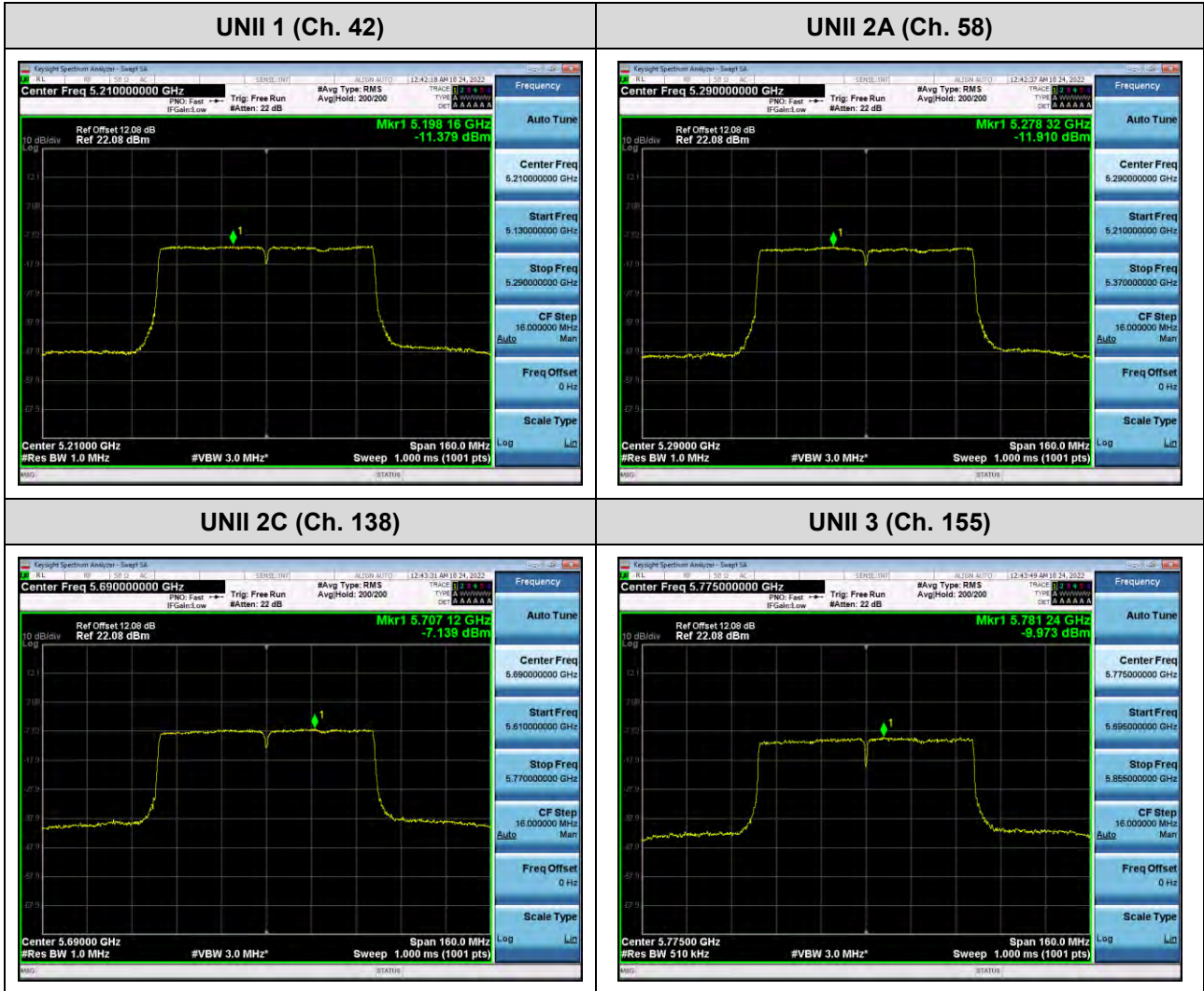
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only channel of highest power.



10.6 FREQUENCY STABILITY.

10.6.1 80 MHz BW

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210012.61	12.61
100%		-30	5210013.85	13.85
100%		-20	5210072.93	72.93
100%		-10	5210048.76	48.76
100%		0	5210078.27	78.27
100%		+10	5210081.79	81.79
100%		+30	5210058.22	58.22
100%		+40	5210058.98	58.98
100%		+50	5210083.51	83.51
High		4.4	+20	5210075.39
Low	3.8	+20	5210045.11	45.11

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290060.52	60.52
100%		-30	5290074.67	74.67
100%		-20	5290057.70	57.7
100%		-10	5290052.98	52.98
100%		0	5290027.59	27.59
100%		+10	5290076.67	76.67
100%		+30	5290059.28	59.28
100%		+40	5290046.32	46.32
100%		+50	5290085.73	85.73
High		4.4	+20	5210006.94
Low	3.8	+20	5210056.20	56.20

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530098.27	98.27
100%		-30	5530087.73	87.73
100%		-20	5530084.72	84.72
100%		-10	5530034.12	34.12
100%		0	5530068.09	68.09
100%		+10	5530085.30	85.3
100%		+30	5530027.91	27.91
100%		+40	5530078.60	78.6
100%		+50	5530045.87	45.87
High		4.4	+20	5210005.69
Low	3.8	+20	5210064.92	64.92

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775064.49	64.49
100%		-30	5775091.98	91.98
100%		-20	5775009.97	9.97
100%		-10	5775040.38	40.38
100%		0	5775064.74	64.74
100%		+10	5775088.04	88.04
100%		+30	5775015.40	15.4
100%		+40	5775033.88	33.88
100%		+50	5775082.96	82.96
High		4.4	+20	5210097.82
Low	3.8	+20	5210076.59	76.59

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210010.46	10.46
100%		-30	5210037.43	37.43
100%		-20	5210079.40	79.40
100%		-10	5210063.90	63.90
100%		0	5210059.36	59.36
100%		+10	5210073.85	73.85
100%		+30	5210092.53	92.53
100%		+40	5210043.25	43.25
100%		+50	5210023.45	23.45
High		4.4	+20	5210096.79
Low	3.8	+20	5210093.45	93.45

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290077.03	77.03
100%		-30	5290003.65	3.65
100%		-20	5290009.33	9.33
100%		-10	5290018.95	18.95
100%		0	5290074.24	74.24
100%		+10	5290060.50	60.5
100%		+30	5290069.91	69.91
100%		+40	5290022.24	22.24
100%		+50	5290060.92	60.92
High		4.4	+20	5210012.26
Low	3.8	+20	5210077.17	77.17

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530034.98	34.98
100%		-30	5530088.96	88.96
100%		-20	5530037.50	37.5
100%		-10	5530092.05	92.05
100%		0	5530041.92	41.92
100%		+10	5530088.66	88.66
100%		+30	5530029.24	29.24
100%		+40	5530050.32	50.32
100%		+50	5530029.67	29.67
High		4.4	+20	5210009.73
Low	3.8	+20	5210091.58	91.58

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775044.97	44.97
100%		-30	5775015.55	15.55
100%		-20	5775079.65	79.65
100%		-10	5775076.98	76.98
100%		0	5775076.58	76.58
100%		+10	5775087.39	87.39
100%		+30	5775032.42	32.42
100%		+40	5775079.33	79.33
100%		+50	5775061.64	61.64
High		4.4	+20	5210059.52
Low	3.8	+20	5210051.09	51.09

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210091.56	91.56
100%		-30	5210031.11	31.11
100%		-20	5210083.39	83.39
100%		-10	5210095.64	95.64
100%		0	5210061.86	61.86
100%		+10	5210063.08	63.08
100%		+30	5210004.93	4.93
100%		+40	5210058.11	58.11
100%		+50	5210066.13	66.13
High		4.4	+20	5210022.03
Low	3.8	+20	5210010.08	10.08

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2A
 OPERATING FREQUENCY: 5,290,000,000 Hz
 CHANNEL: 58
 REFERENCE VOLTAGE: 4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290039.11	39.11
100%		-30	5290068.68	68.68
100%		-20	5290037.91	37.91
100%		-10	5290042.51	42.51
100%		0	5290042.90	42.9
100%		+10	5290035.43	35.43
100%		+30	5290087.58	87.58
100%		+40	5290023.71	23.71
100%		+50	5290043.43	43.43
High		4.4	+20	5210087.80
Low	3.8	+20	5210040.81	40.81

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2C
 OPERATING FREQUENCY: 5,530,000,000 Hz
 CHANNEL: 106
 REFERENCE VOLTAGE: 4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530069.32	69.32
100%		-30	5530059.77	59.77
100%		-20	5530043.33	43.33
100%		-10	5530015.22	15.22
100%		0	5530059.21	59.21
100%		+10	5530019.99	19.99
100%		+30	5530072.02	72.02
100%		+40	5530072.89	72.89
100%		+50	5530056.69	56.69
High		4.4	+20	5210048.43
Low	3.8	+20	5210044.69	44.69

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775090.91	90.91
100%		-30	5775026.11	26.11
100%		-20	5775023.13	23.13
100%		-10	5775031.25	31.25
100%		0	5775069.31	69.31
100%		+10	5775091.08	91.08
100%		+30	5775024.08	24.08
100%		+40	5775038.47	38.47
100%		+50	5775080.19	80.19
High		4.4	+20	5210093.37
Low	3.8	+20	5210032.67	32.67

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210070.28	70.28
100%		-30	5210036.21	36.21
100%		-20	5210003.59	3.59
100%		-10	5210027.73	27.73
100%		0	5210055.14	55.14
100%		+10	5210021.38	21.38
100%		+30	5210009.26	9.26
100%		+40	5210087.27	87.27
100%		+50	5210084.81	84.81
High		4.4	+20	5210090.34
Low	3.8	+20	5210002.76	2.76

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290097.83	97.83
100%		-30	5290061.03	61.03
100%		-20	5290074.36	74.36
100%		-10	5290089.69	89.69
100%		0	5290041.54	41.54
100%		+10	5290043.20	43.2
100%		+30	5290098.92	98.92
100%		+40	5290085.49	85.49
100%		+50	5290053.72	53.72
High		4.4	+20	5210023.02
Low	3.8	+20	5210012.99	12.99

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530015.17	15.17
100%		-30	5530031.84	31.84
100%		-20	5530038.49	38.49
100%		-10	5530039.46	39.46
100%		0	5530011.25	11.25
100%		+10	5530004.27	4.27
100%		+30	5530004.54	4.54
100%		+40	5530010.44	10.44
100%		+50	5530015.18	15.18
High		4.4	+20	5210088.50
Low	3.8	+20	5210033.49	33.49

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.20 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775009.35	9.35
100%		-30	5775092.65	92.65
100%		-20	5775024.23	24.23
100%		-10	5775014.78	14.78
100%		0	5775032.55	32.55
100%		+10	5775072.95	72.95
100%		+30	5775028.61	28.61
100%		+40	5775004.03	4.03
100%		+50	5775055.90	55.90
High		4.4	+20	5210013.93
Low	3.8	+20	5210002.90	2.90

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10.7 STRADDLE CHANNEL

10.7.1 26 dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.36	14.64
802.11n(HT20)				5709.80	15.20
802.11ac(VHT20)				5709.60	15.40
802.11a	UNII 3	5720	144	5730.00	5.00
802.11n(HT20)				5730.20	5.20
802.11ac(VHT20)				5730.40	5.40

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5690.08	34.92
802.11ac(VHT40)				5690.08	34.92
802.11n(HT40)	UNII 3	5710	142	5729.76	4.76
802.11ac(VHT40)				5729.84	4.84

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5646.48	78.52
	UNII 3	5690	138	5733.52	8.52

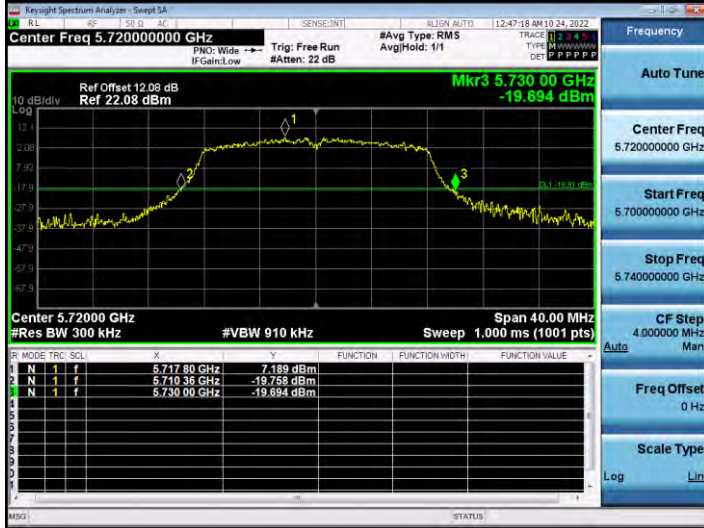
Note:

[UNII 2C] 26 dB Bandwidth = 5 725 MHz - Measured Frequency[MHz]

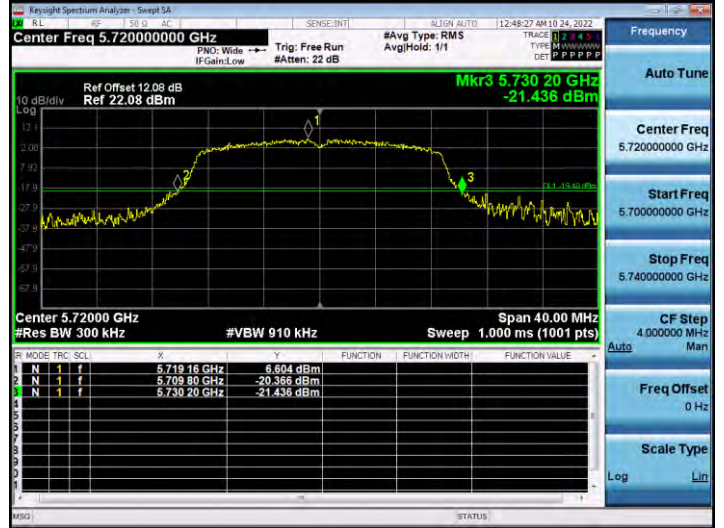
[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

Test Plots (26 dB Bandwidth)

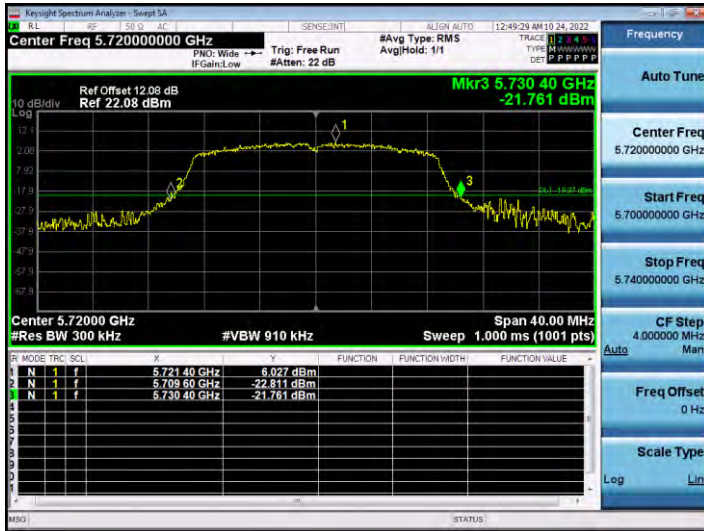
802.11a UNII Band



802.11n(HT20) UNII Band

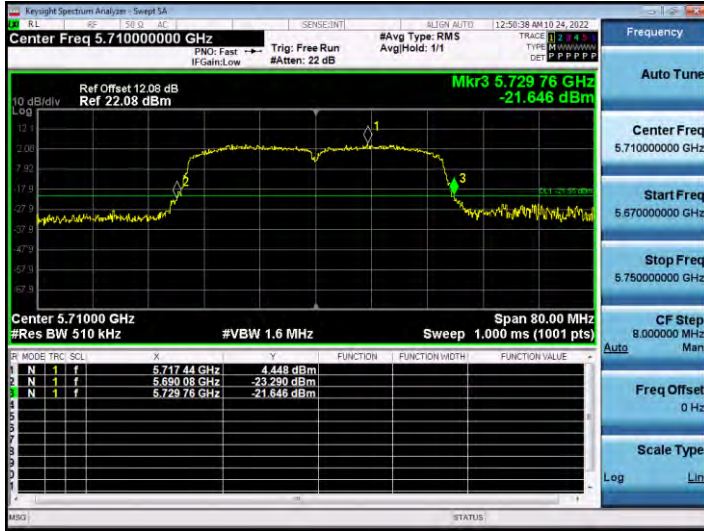


802.11ac(VHT20) UNII Band

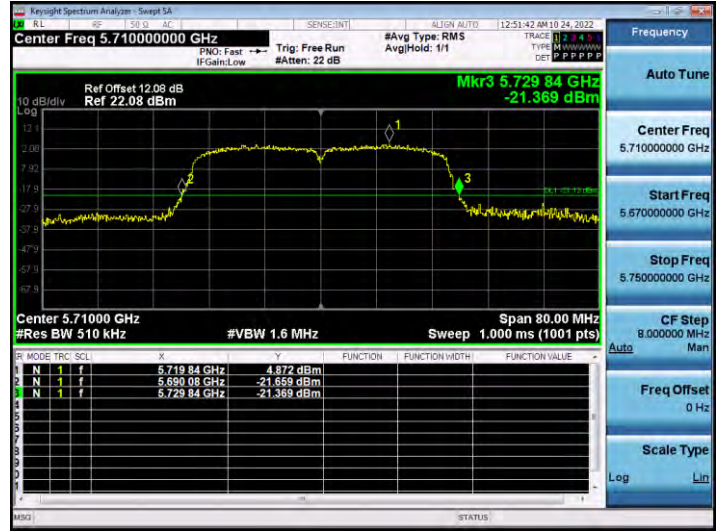


☐ Test Plots (26 dB Bandwidth)

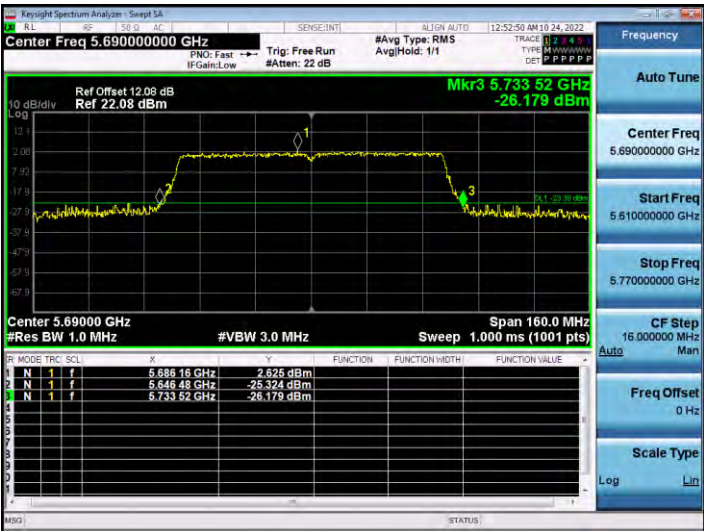
802.11n(HT40) UNII Band



802.11ac(VHT40) UNII Band



802.11ac(VHT80) UNII Band



10.7.2 6 dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5727.92	2.92	> 0.5
802.11n(HT20)				5727.56	2.56	> 0.5
802.11ac(VHT20)				5727.56	2.56	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5727.60	2.60	> 0.5
802.11ac(VHT40)				5727.60	2.60	> 0.5

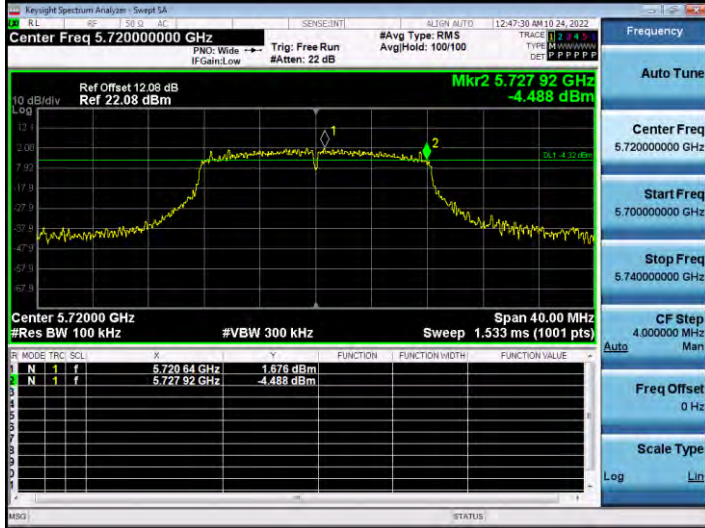
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac(VHT80)	UNII 3	5690	138	5728.24	3.24	> 0.5

Note:

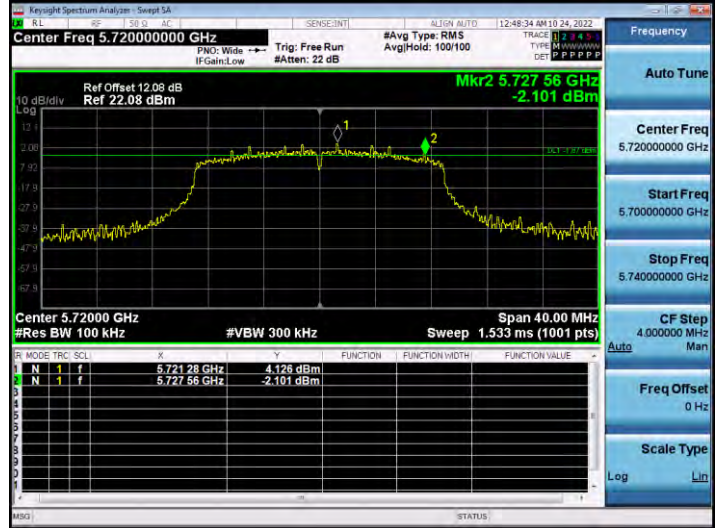
6 dB Bandwidth = Measured Frequency[MHz] – 5725MHz

Test Plots(UNII 3 Band 6 dB Bandwidth)

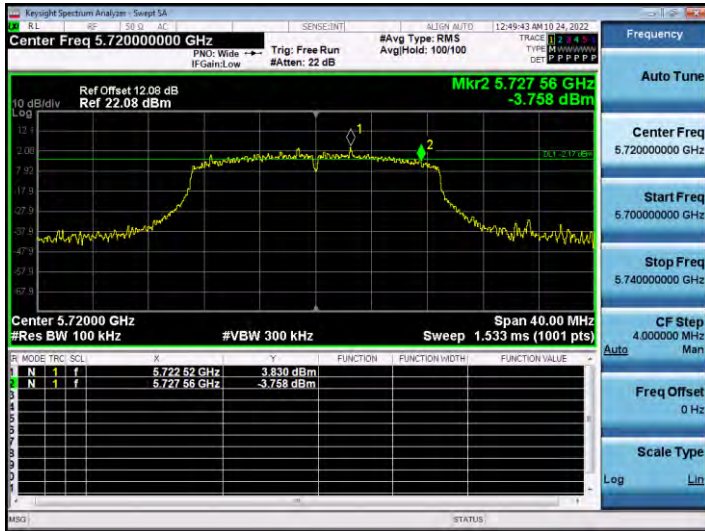
802.11a CH.144



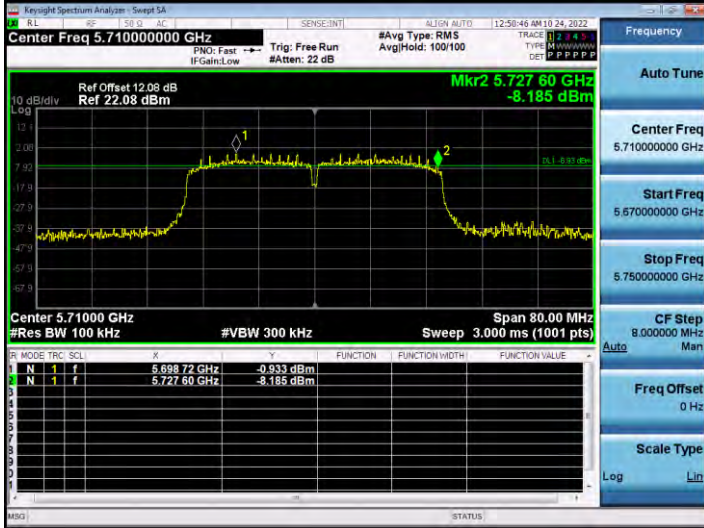
802.11n_HT20 CH.144



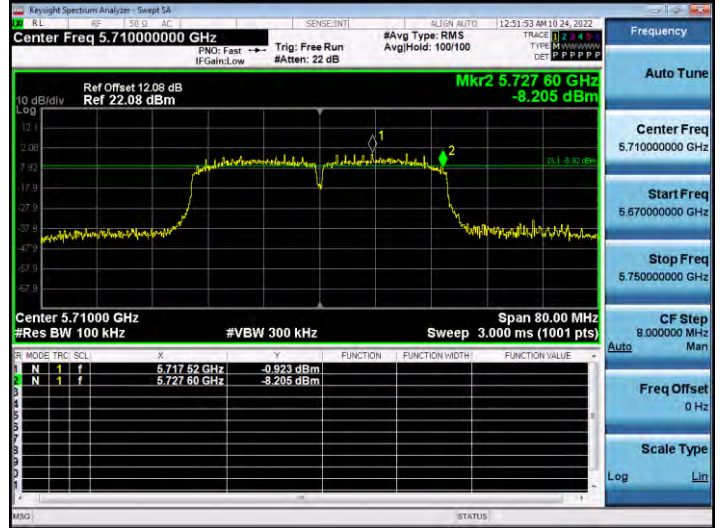
802.11ac_VHT20 CH.144



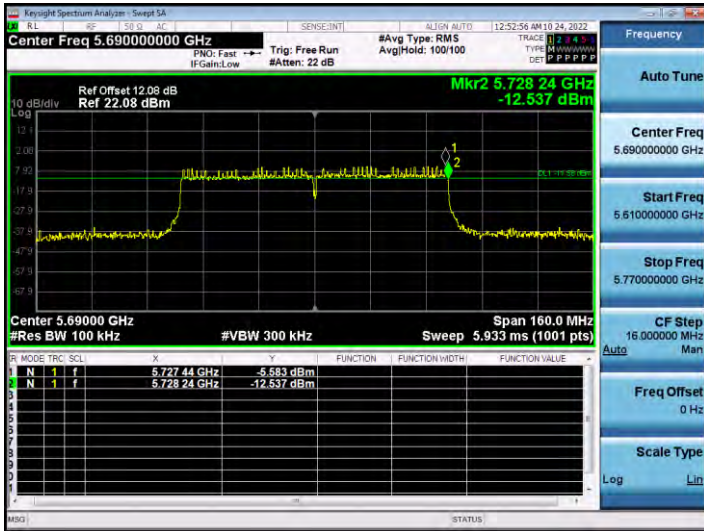
802.11n_HT40 CH.142



802.11ac_VHT40 CH.142



802.11ac_VHT80 CH.138



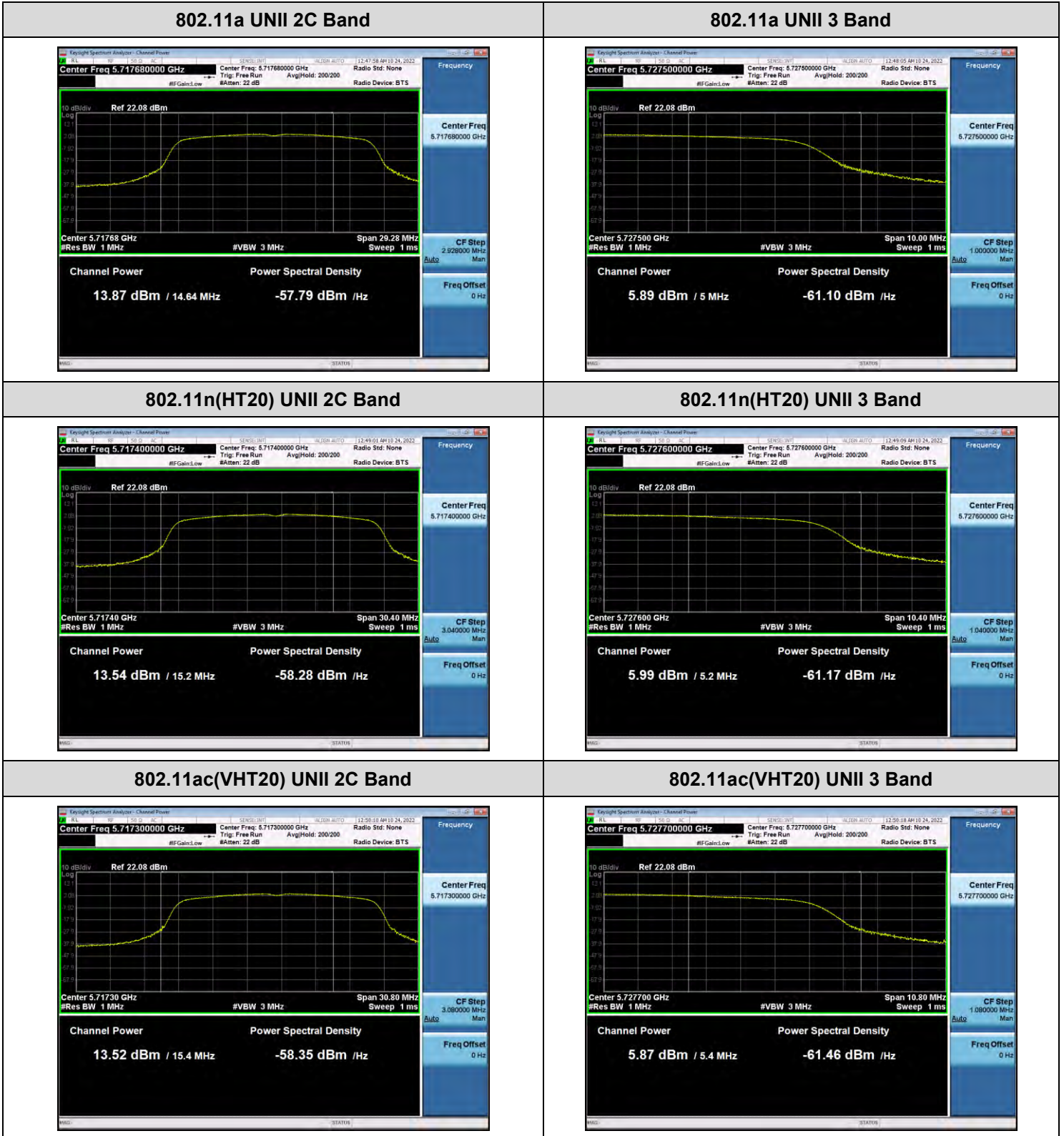
10.7.3 Output Power

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720	144	13.87	0.334	14.20	22.66	6 Mbps
802.11n(HT20)	(UNII 2C		13.54	0.358	13.89	22.82	MCS0
802.11ac(VHT20)	Band)		13.52	0.372	13.90	22.88	MCS0
802.11a	5720	144	5.89	0.334	6.23	30.00	6 Mbps
802.11n(HT20)	(UNII 3		5.99	0.358	6.34	30.00	MCS0
802.11ac(VHT20)	Band)		5.87	0.372	6.24	30.00	MCS0

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710	142	12.60	0.608	13.21	23.98	MCS0
802.11ac(VHT40)	(UNII 2C Band)		12.53	0.688	13.22	23.98	MCS0
802.11n(HT40)	5710	142	-0.04	0.608	0.57	30.00	MCS0
802.11ac(VHT40)	(UNII 3 Band)		0.05	0.688	0.74	30.00	MCS0

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	10.18	1.301	11.48	23.98	MCS0
	5690 (UNII 3 Band)	138	-3.17	1.301	-1.87	30.00	MCS0

Test Plots



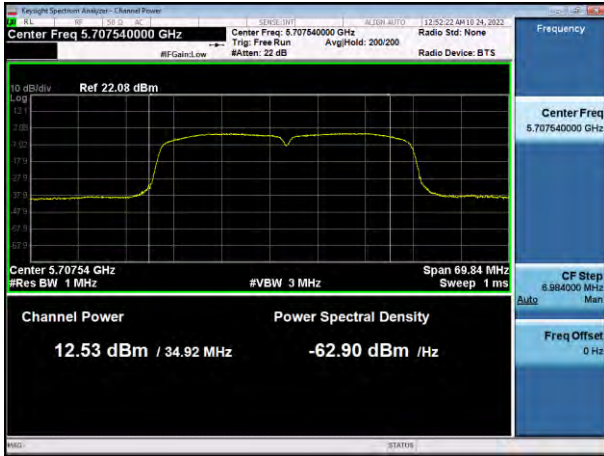
802.11n(HT40) UNII 2C Band



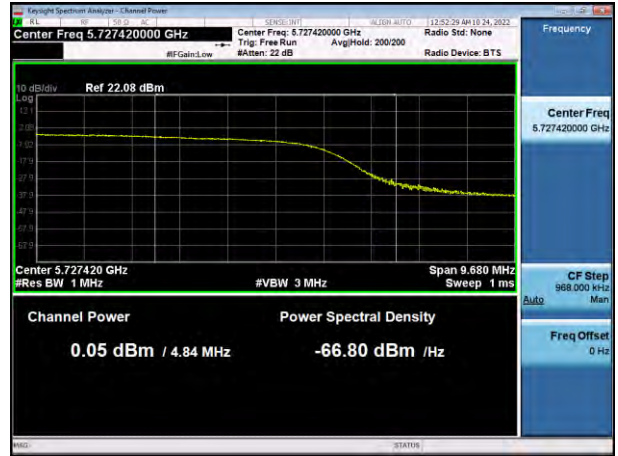
802.11n(HT40) UNII 3 Band



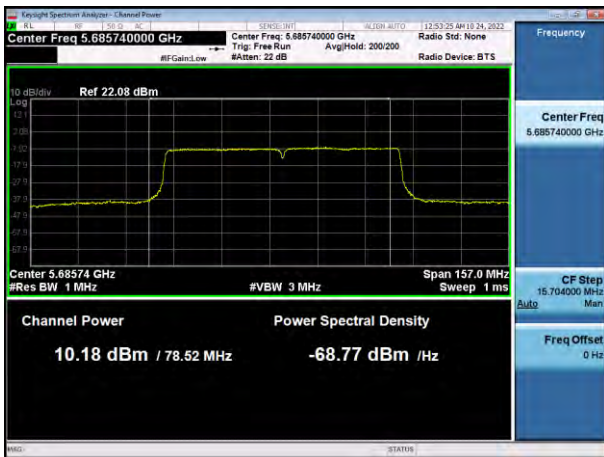
802.11ac(VHT40) UNII 2C Band



802.11ac(VHT40) UNII 3 Band



802.11ac(VHT80) UNII 2C Band



802.11ac(VHT80) UNII 3 Band



10.7.4 Power Spectral Density

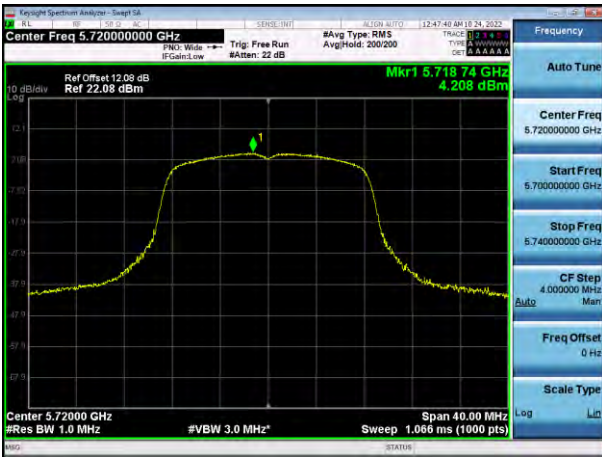
Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C)	144	4.208	0.334	4.541	11 dBm/ MHz	6 Mbps
802.11n(HT20)			3.750	0.358	4.108		MCS0
802.11ac(VHT20)			3.949	0.372	4.321		MCS0
802.11a	5720 (UNII 3)	144	-0.476	0.334	-0.142	30 dBm /500 kHz	6 Mbps
802.11n(HT20)			-0.709	0.358	-0.351		MCS0
802.11ac(VHT20)			-0.399	0.372	-0.026		MCS0

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C)	142	-1.013	0.608	-0.405	11 dBm/ MHz	MCS0
802.11ac(VHT40)			-0.998	0.688	-0.310		MCS0
802.11n(HT40)	5710 (UNII 3)	142	-6.202	0.608	-5.593	30 dBm/ 500 kHz	MCS0
802.11ac(VHT40)			-5.963	0.688	-5.275		MCS0

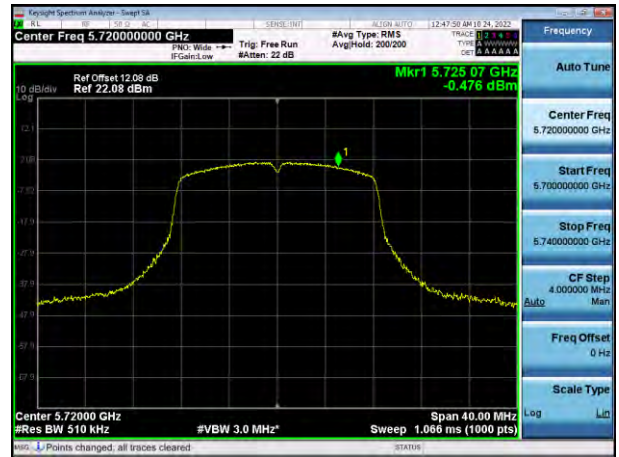
Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C)	138	-7.003	1.301	-5.701	11 dBm/ MHz	MCS0
	5690 (UNII 3)	138	-10.378	1.301	-9.076	30 dBm/ 500 kHz	MCS0

Test Plots

802.11a UNII 2C Band



802.11a UNII 3 Band



802.11n(HT20) UNII 2C Band



802.11n(HT20) UNII 3 Band



802.11ac(VHT20) UNII 2C Band



802.11ac(VHT20) UNII 3 Band



802.11n(HT40) UNII 2C Band



802.11n(HT40) UNII 3 Band



802.11ac(VHT40) UNII 2C Band



802.11ac(VHT40) UNII 3 Band



802.11ac(VHT80) UNII 2C Band



802.11ac(VHT80) UNII 3 Band



10.8 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

Frequency	Measured Value	A.F+D.F+C.L	POL	Total	Limit	Margin
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]
No Critical peaks found						

Note:

1. The Measured Value of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = $40\log(\text{specific distance} / \text{test distance})$ (dB)
3. Limit line = specific Limits (dBµV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]
No Critical peaks found						

Note:

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

Frequency Range : Above 1 GHz

Band : UNII 1
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10360	49.78	4.62	V	54.40	68.20	13.80	PK
15540	50.45	5.19	V	55.64	73.98	18.34	PK
15540	34.89	5.19	V	40.08	53.98	13.90	AV
10360	49.74	4.62	H	54.36	68.20	13.84	PK
15540	50.88	5.19	H	56.07	73.98	17.91	PK
15540	35.96	5.19	H	41.15	53.98	12.83	AV

Band : UNII 1
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5200 MHz
 Channel No. 40 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10400	51.35	4.10	V	55.45	68.20	12.75	PK
15600	51.65	3.72	V	55.37	73.98	18.61	PK
15600	37.36	3.72	V	41.08	53.98	12.90	AV
10400	52.07	4.10	H	56.17	68.20	12.03	PK
15600	52.69	3.72	H	56.41	73.98	17.57	PK
15600	38.27	3.72	H	41.99	53.98	11.99	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Measured Value [dB μ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
10480	51.52	5.11	V	56.63	68.20	11.57	PK
15720	54.27	3.36	V	57.63	73.98	16.35	PK
15720	40.13	3.36	V	43.49	53.98	10.49	AV
10480	50.63	5.11	H	55.74	68.20	12.46	PK
15720	55.31	3.36	H	58.67	73.98	15.31	PK
15720	40.84	3.36	H	44.20	53.98	9.78	AV

Band : UNII 2A
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5260 MHz
 Channel No. 52 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10520	50.98	4.77	V	55.75	68.20	12.45	PK
15780	54.18	3.59	V	57.77	73.98	16.21	PK
15780	38.96	3.59	V	42.55	53.98	11.43	AV
10520	50.77	4.77	H	55.54	68.20	12.66	PK
15780	55.90	3.59	H	59.49	73.98	14.49	PK
15780	40.67	3.59	H	44.26	53.98	9.72	AV

Band : UNII 2A
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5300 MHz
 Channel No. 60 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10600	50.07	4.75	V	54.82	73.98	19.16	PK
10600	36.98	4.75	V	41.73	53.98	12.25	AV
15900	54.16	6.09	V	60.25	73.98	13.73	PK
15900	38.75	6.09	V	44.84	53.98	9.14	AV
10600	50.91	4.75	H	55.66	73.98	18.32	PK
10600	37.53	4.75	H	42.28	53.98	11.70	AV
15900	55.20	6.09	H	61.29	73.98	12.69	PK
15900	39.60	6.09	H	45.69	53.98	8.29	AV

Band :	UNII 2A
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Measured Value [dB μ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
10640	50.14	5.04	V	55.18	73.98	18.80	PK
10640	36.63	5.04	V	41.67	53.98	12.31	AV
15960	52.41	4.55	V	56.96	73.98	17.02	PK
15960	37.32	4.55	V	41.87	53.98	12.11	AV
10640	50.56	5.04	H	55.60	73.98	18.38	PK
10640	37.02	5.04	H	42.06	53.98	11.92	AV
15960	53.10	4.55	H	57.65	73.98	16.33	PK
15960	37.73	4.55	H	42.28	53.98	11.70	AV

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Measured Value [dB μ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Measurement Type
11000	48.64	5.17	V	53.81	73.98	20.17	PK
11000	34.62	5.17	V	39.79	53.98	14.19	AV
16500	47.06	8.27	V	55.33	68.20	12.87	PK
11000	49.06	5.17	H	54.23	73.98	19.75	PK
11000	35.45	5.17	H	40.62	53.98	13.36	AV
16500	46.25	8.27	H	54.52	68.20	13.68	PK

Band : UNII 2C
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5600 MHz
 Channel No. 120 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11200	49.96	5.48	V	55.44	73.98	18.54	PK
11200	36.24	5.48	V	41.72	53.98	12.26	AV
16800	47.21	8.76	V	55.97	68.20	12.23	PK
11200	50.75	5.48	H	56.23	73.98	17.75	PK
11200	36.80	5.48	H	42.28	53.98	11.70	AV
16800	46.34	8.76	H	55.10	68.20	13.10	PK

Band : UNII 2C
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5720 MHz
 Channel No. 144 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11440	49.89	4.69	V	54.58	73.98	19.40	PK
11440	36.71	4.69	V	41.40	53.98	12.58	AV
17160	47.33	8.92	V	56.25	68.20	11.95	PK
11440	50.89	4.69	H	55.58	73.98	18.40	PK
11440	37.39	4.69	H	42.08	53.98	11.90	AV
17160	46.98	8.92	H	55.90	68.20	12.30	PK

Band : UNII 3
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5745MHz
 Channel No. 149 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11490	50.32	4.55	V	54.87	73.98	19.11	PK
11490	36.91	4.55	V	41.46	53.98	12.52	AV
17235	47.49	10.31	V	57.80	68.20	10.40	PK
11490	50.08	4.55	H	54.63	73.98	19.35	PK
11490	37.02	4.55	H	41.57	53.98	12.41	AV
17235	47.22	10.31	H	57.53	68.20	10.67	PK

Band : UNII 3
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5785 MHz
 Channel No. 157 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11570	49.15	4.82	V	53.97	73.98	20.01	PK
11570	34.99	4.82	V	39.81	53.98	14.17	AV
17355	47.47	9.73	V	57.20	68.20	11.00	PK
11570	51.11	4.82	H	55.93	73.98	18.05	PK
11570	36.96	4.82	H	41.78	53.98	12.20	AV
17355	47.69	9.73	H	57.42	68.20	10.78	PK

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11650	50.44	4.42	V	54.86	73.98	19.12	PK
11650	37.03	4.42	V	41.45	53.98	12.53	AV
17475	49.22	10.15	V	59.37	68.20	8.83	PK
11650	49.49	4.42	H	53.91	73.98	20.07	PK
11650	36.83	4.42	H	41.25	53.98	12.73	AV
17475	49.47	10.15	H	59.62	68.20	8.58	PK

[Non-DBS Mode]

Bluetooth Ch. 78 (GFSK) + WLAN 5 GHz Ch.60 (802.11a)

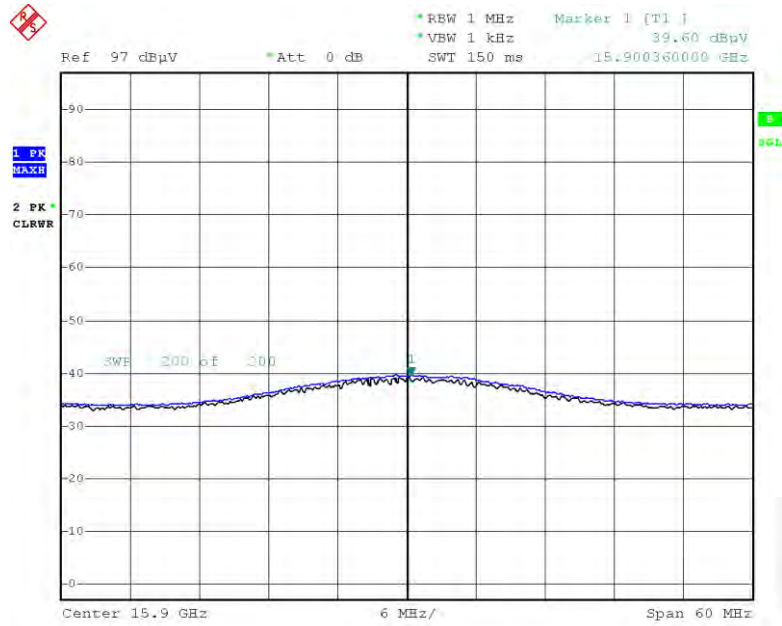
Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10600	49.40	4.75	V	54.15	73.98	19.83	PK
10600	36.34	4.75	V	41.09	53.98	12.89	AV
15900	49.65	6.09	V	55.74	73.98	18.24	PK
15900	35.34	6.09	V	41.43	53.98	12.55	AV
10600	49.24	4.75	H	53.99	73.98	19.99	PK
10600	36.59	4.75	H	41.34	53.98	12.64	AV
15900	53.20	6.09	H	59.29	73.98	14.69	PK
15900	37.63	6.09	H	43.72	53.98	10.26	AV

Note :

Bluetooth Non-DBS Data refer to Bluetooth Test Report.

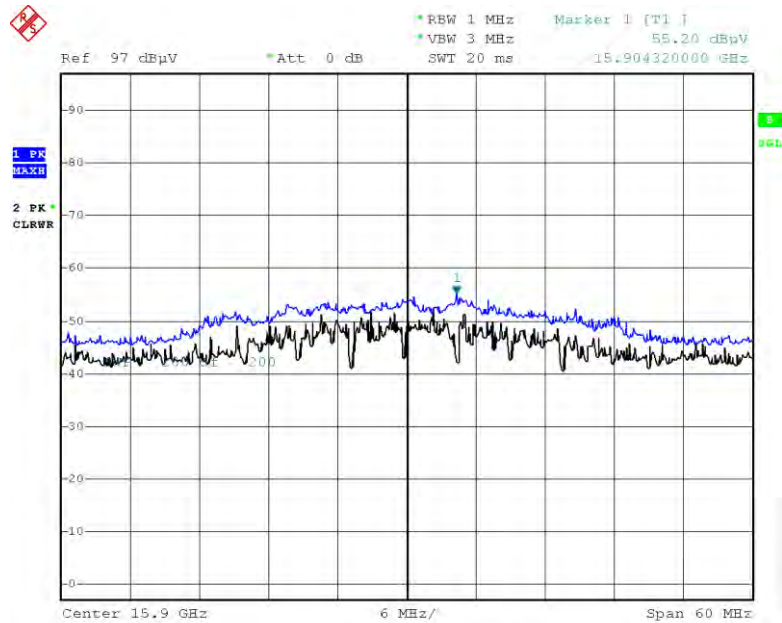
▣ Test Plots

Average Result (802.11a, Ch.60 3rd Spurious Emissions, Y-H)



Date: 12.OCT.2022 23:19:08

Peak Result (802.11a, Ch.60 3rd Spurious Emissions, Y-H)



Date: 12.OCT.2022 23:19:22

Note:

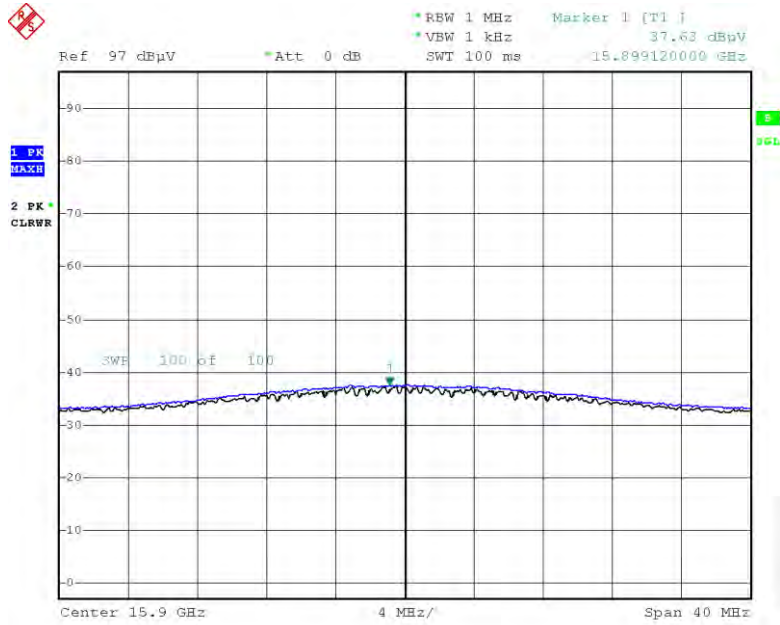
Only the worst case plots for Radiated Spurious Emissions.

▣ Test Plots

[Non-DBS Mode]

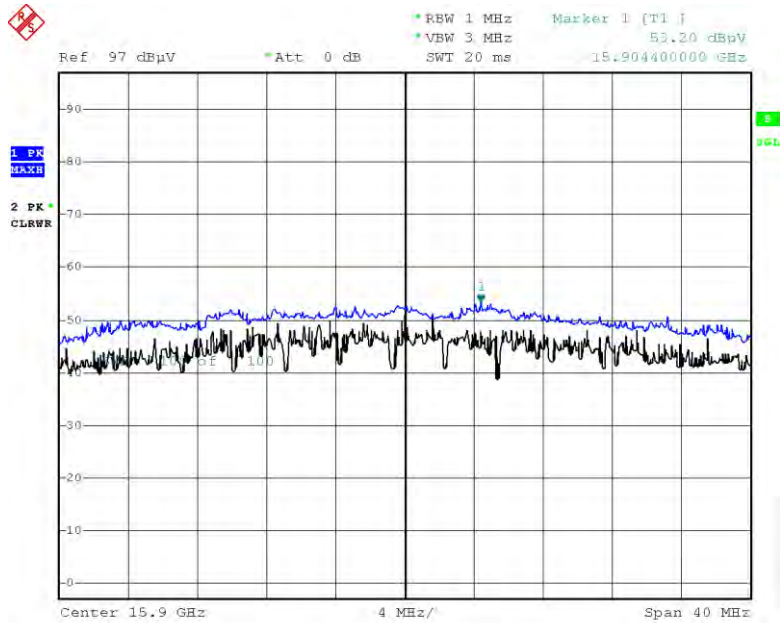
Bluetooth Ch. 78 (GFSK) + WLAN 5 GHz Ch.60 (802.11a)

Average Result (3rd Spurious Emissions, Y-H)



Date: 24.OCT.2022 14:52:49

Peak Result (3rd Spurious Emissions, Y-H)



Date: 24.OCT.2022 14:53:30

Note:

Only the worst case plots for Radiated Spurious Emissions.

10.9 RADIATED RESTRICTED BAND EDGE

Band : UNII 1
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	55.68	11.85	H	67.53	73.98	6.45	PK
5150	39.89	11.85	H	51.74	53.98	2.24	AV
5150	54.69	11.85	V	66.54	73.98	7.44	PK
5150	39.51	11.85	V	51.36	53.98	2.62	AV

Band : UNII 2A
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5320 MHz
 Channel No. 64 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	55.70	11.89	H	67.59	73.98	6.39	PK
5350	39.92	11.89	H	51.81	53.98	2.17	AV
5350	55.30	11.89	V	67.19	73.98	6.79	PK
5350	39.59	11.89	V	51.48	53.98	2.50	AV

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	52.07	12.31	H	64.38	73.98	9.60	PK
5460	35.67	12.31	H	47.98	53.98	6.00	AV
5470	53.37	12.53	H	65.90	68.20	2.30	PK
5460	47.99	12.31	V	60.30	73.98	13.68	PK
5460	34.67	12.31	V	46.98	53.98	7.00	AV
5470	52.69	12.53	V	65.22	68.20	2.98	PK

Band :	UNII 1
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	57.40	11.85	H	69.25	73.98	4.73	PK
5150	39.72	11.85	H	51.57	53.98	2.41	AV
5150	57.27	11.85	V	69.12	73.98	4.86	PK
5150	39.69	11.85	V	51.54	53.98	2.44	AV

Band :	UNII 2A
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	57.75	11.89	H	69.64	73.98	4.34	PK
5350	39.79	11.89	H	51.68	53.98	2.30	AV
5350	54.72	11.89	V	66.61	73.98	7.37	PK
5350	38.86	11.89	V	50.75	53.98	3.23	AV

Band :	UNII 2C
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	48.38	12.31	H	60.69	73.98	13.29	PK
5460	33.98	12.31	H	46.29	53.98	7.69	AV
5470	53.39	12.53	H	65.92	68.20	2.28	PK
5460	49.01	12.31	V	61.32	73.98	12.66	PK
5460	34.29	12.31	V	46.60	53.98	7.38	AV
5470	52.92	12.53	V	65.45	68.20	2.75	PK

Band : UNII 1
 Operation Mode: 802.11 ac_VHT20
 Transfer MCS Index: 0
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	58.34	11.85	H	70.19	73.98	3.79	PK
5150	39.95	11.85	H	51.80	53.98	2.18	AV
5150	57.49	11.85	V	69.34	73.98	4.64	PK
5150	39.55	11.85	V	51.40	53.98	2.58	AV

Band : UNII 2A
 Operation Mode: 802.11 ac_VHT20
 Transfer MCS Index: 0
 Operating Frequency 5320 MHz
 Channel No. 64 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	56.90	11.89	H	68.79	73.98	5.19	PK
5350	39.81	11.89	H	51.70	53.98	2.28	AV
5350	57.06	11.89	V	68.95	73.98	5.03	PK
5350	39.07	11.89	V	50.96	53.98	3.02	AV

Band :	UNII 2C
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	48.88	12.31	H	61.19	73.98	12.79	PK
5460	34.11	12.31	H	46.42	53.98	7.56	AV
5470	53.03	12.53	H	65.56	68.20	2.64	PK
5460	47.61	12.31	V	59.92	73.98	14.06	PK
5460	34.56	12.31	V	46.87	53.98	7.11	AV
5470	53.18	12.53	V	65.71	68.20	2.49	PK

Band :	UNII 1
Operation Mode:	802.11 n_HT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	56.65	11.85	H	68.50	73.98	5.48	PK
5150	39.92	11.85	H	51.77	53.98	2.21	AV
5150	56.87	11.85	V	68.72	73.98	5.26	PK
5150	39.37	11.85	V	51.22	53.98	2.76	AV

Band : UNII 2A
 Operation Mode: 802.11 n_HT40
 Transfer MCS Index: 0
 Operating Frequency 5310 MHz
 Channel No. 62 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	56.86	11.89	H	68.75	73.98	5.23	PK
5350	39.44	11.89	H	51.33	53.98	2.65	AV
5350	54.85	11.89	V	66.74	73.98	7.24	PK
5350	39.83	11.89	V	51.72	53.98	2.26	AV

Band : UNII 2C
 Operation Mode: 802.11 n_HT40
 Transfer MCS Index: 0
 Operating Frequency 5510 MHz
 Channel No. 102 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	49.42	12.31	H	61.73	73.98	12.25	PK
5460	34.23	12.31	H	46.54	53.98	7.44	AV
5470	53.19	12.53	H	65.72	68.20	2.48	PK
5460	50.40	12.31	V	62.71	73.98	11.27	PK
5460	34.08	12.31	V	46.39	53.98	7.59	AV
5470	52.24	12.53	V	64.77	68.20	3.43	PK

Band : UNII 1
 Operation Mode: 802.11 ac_VHT40
 Transfer MCS Index: 0
 Operating Frequency 5190 MHz
 Channel No. 38 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	55.05	11.85	H	66.90	73.98	7.08	PK
5150	39.98	11.85	H	51.83	53.98	2.15	AV
5150	53.77	11.85	V	65.62	73.98	8.36	PK
5150	39.35	11.85	V	51.20	53.98	2.78	AV

Band : UNII 2A
 Operation Mode: 802.11 ac_VHT40
 Transfer MCS Index: 0
 Operating Frequency 5310 MHz
 Channel No. 62 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	54.89	11.89	H	66.78	73.98	7.20	PK
5350	39.38	11.89	H	51.27	53.98	2.71	AV
5350	54.85	11.89	V	66.74	73.98	7.24	PK
5350	39.83	11.89	V	51.72	53.98	2.26	AV

Band : UNII 2C
 Operation Mode: 802.11 ac_VHT40
 Transfer MCS Index: 0
 Operating Frequency 5510 MHz
 Channel No. 102 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	49.57	12.31	H	61.88	73.98	12.10	PK
5460	34.02	12.31	H	46.33	53.98	7.65	AV
5470	52.82	12.53	H	65.35	68.20	2.85	PK
5460	48.87	12.31	V	61.18	73.98	12.80	PK
5460	34.17	12.31	V	46.48	53.98	7.50	AV
5470	52.83	12.53	V	65.36	68.20	2.84	PK

Band : UNII 1
 Operation Mode: 802.11 ac_VHT80
 Transfer MCS Index: 0
 Operating Frequency 5210 MHz
 Channel No. 42 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	53.59	11.85	H	65.44	73.98	8.54	PK
5150	39.74	11.85	H	51.59	53.98	2.39	AV
5150	52.18	11.85	V	64.03	73.98	9.95	PK
5150	39.39	11.85	V	51.24	53.98	2.74	AV

Band : UNII 2A
 Operation Mode: 802.11 ac_VHT80
 Transfer MCS Index: 0
 Operating Frequency 5290 MHz
 Channel No. 58 Ch

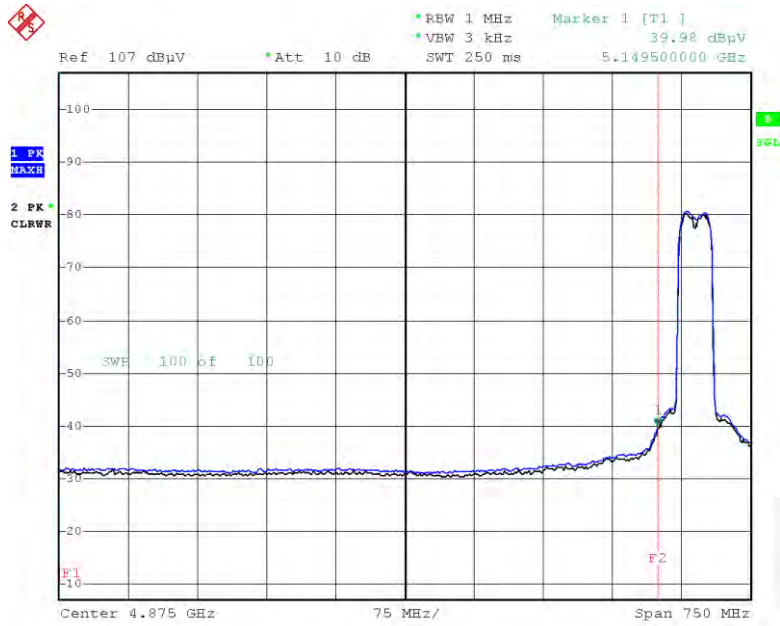
Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	56.93	11.89	H	68.82	73.98	5.16	PK
5350	39.47	11.89	H	51.36	53.98	2.62	AV
5350	55.18	11.89	V	67.07	73.98	6.91	PK
5350	39.79	11.89	V	51.68	53.98	2.30	AV

Band : UNII 2C
 Operation Mode: 802.11 ac_VHT80
 Transfer MCS Index: 0
 Operating Frequency 5530 MHz
 Channel No. 106 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	50.12	12.31	H	62.43	73.98	11.55	PK
5460	35.80	12.31	H	48.11	53.98	5.87	AV
5470	53.16	12.53	H	65.69	68.20	2.51	PK
5460	50.29	12.31	V	62.60	73.98	11.38	PK
5460	36.25	12.31	V	48.56	53.98	5.42	AV
5470	52.90	12.53	V	65.43	68.20	2.77	PK

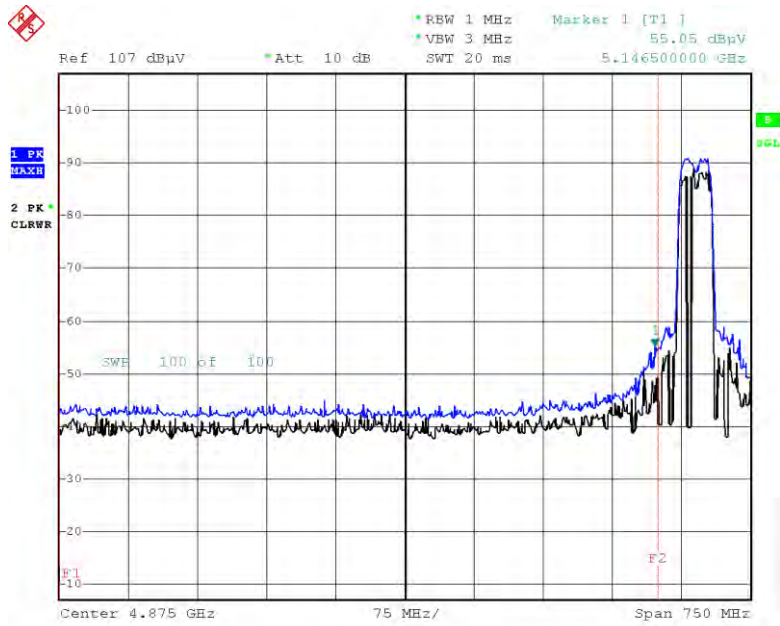
▣ Test Plots(UNII 1, 2A, 2C)

Average Result 802.11ac(VHT40), Ch.38 Spurious Emissions, Y-H)



Date: 10.OCT.2022 13:01:31

Peak Result (802.11ac(VHT40), Ch.38 Spurious Emissions, Y-H)



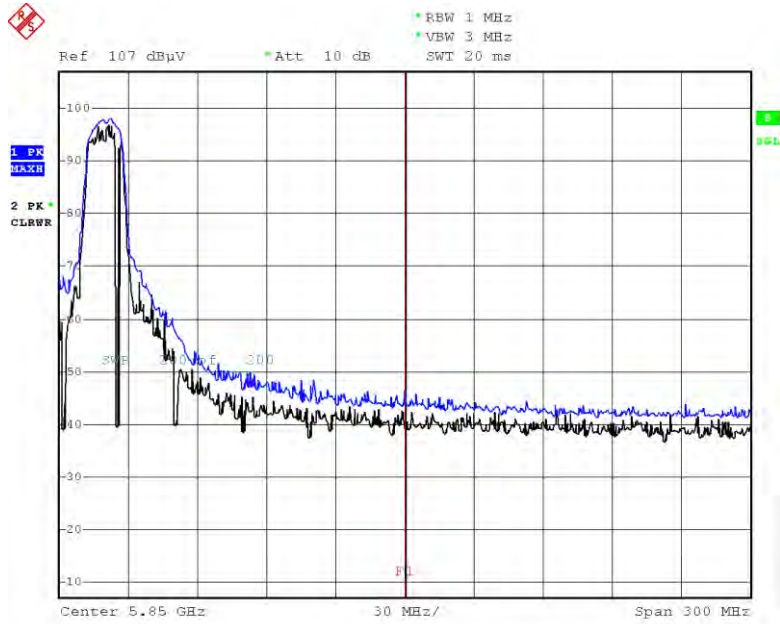
Date: 10.OCT.2022 13:01:50

Note:

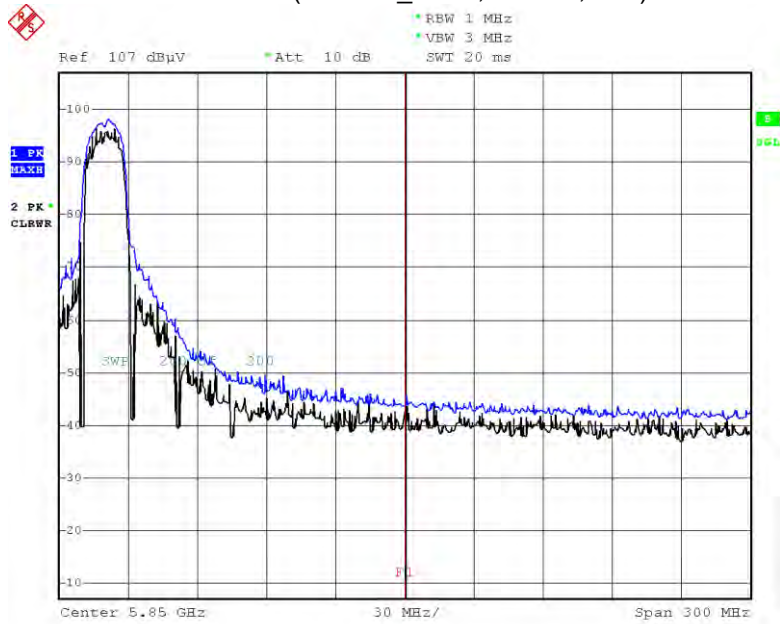
Only the worst case plots for Radiated Restricted Band Edge.

▣ Test Plots(Straddle Channel)

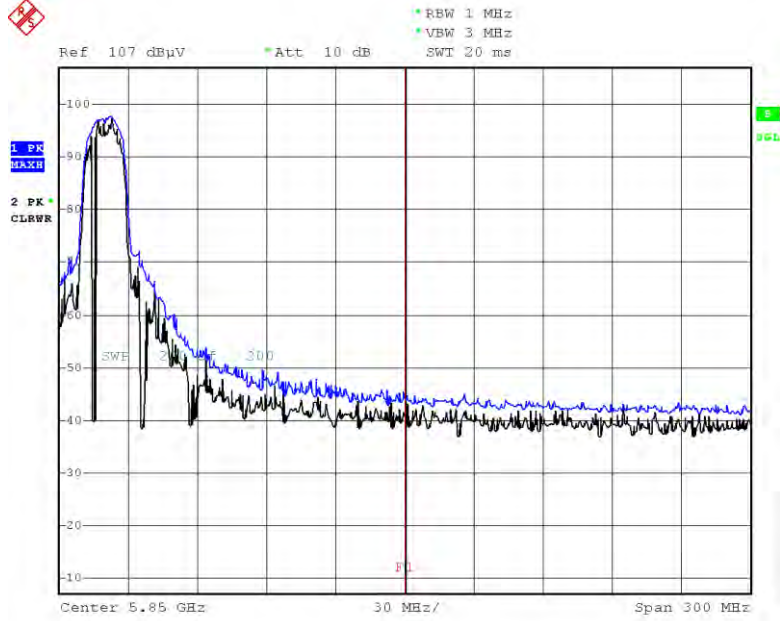
Peak Result (802.11a, Ch.144, Y-H)



Peak Result (802.11n_HT20, Ch.144, Y-H)

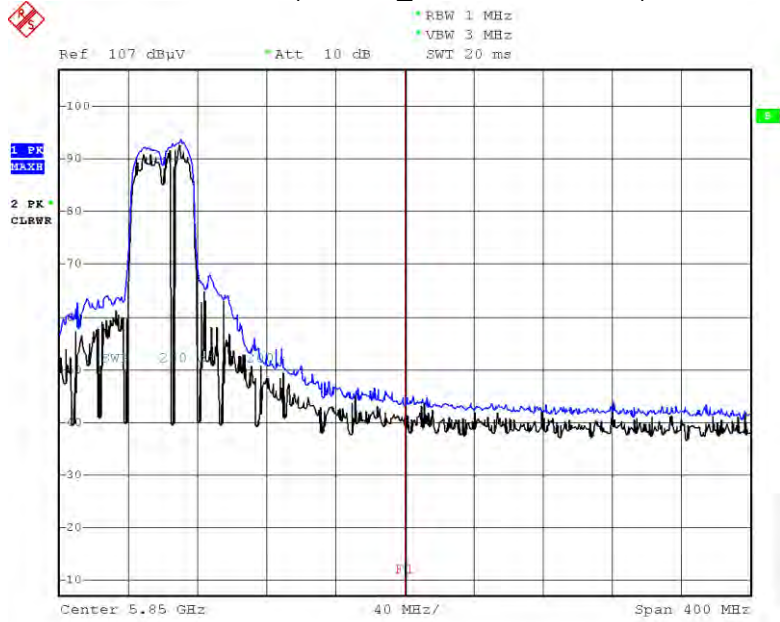


Peak Result (802.11ac_VHT20, Ch.144, Y-H)



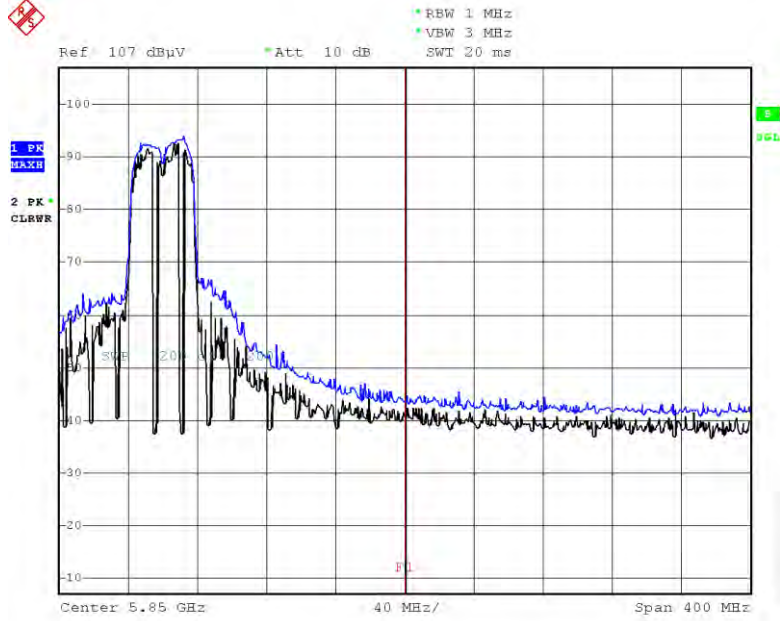
Date: 12.OCT.2022 21:00:08

Peak Result (802.11n_HT40, Ch.142, Y-H)



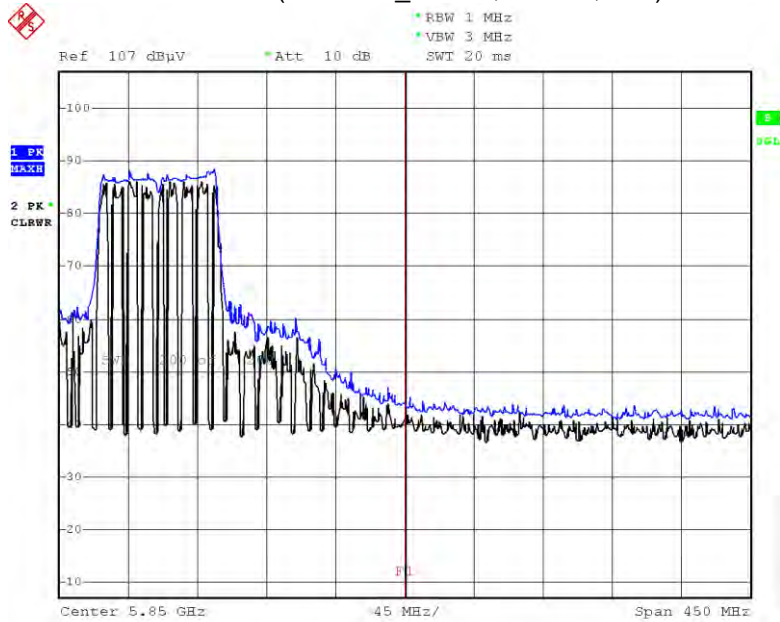
Date: 12.OCT.2022 21:07:40

Peak Result (802.11ac_VHT40, Ch.142, Y-H)



Date: 12.OCT.2022 21:08:46

Peak Result (802.11ac_VHT80, Ch.138, Y-H)

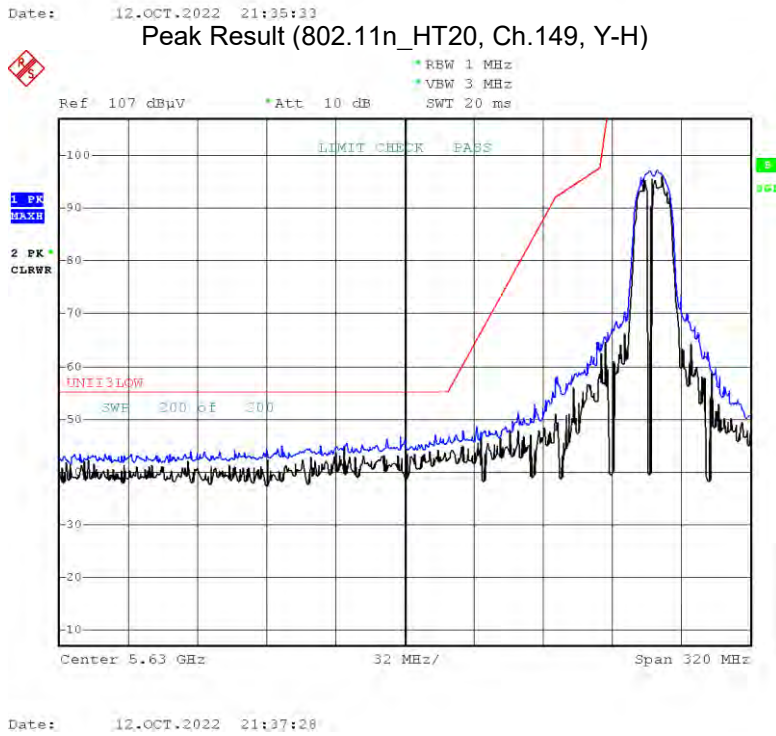
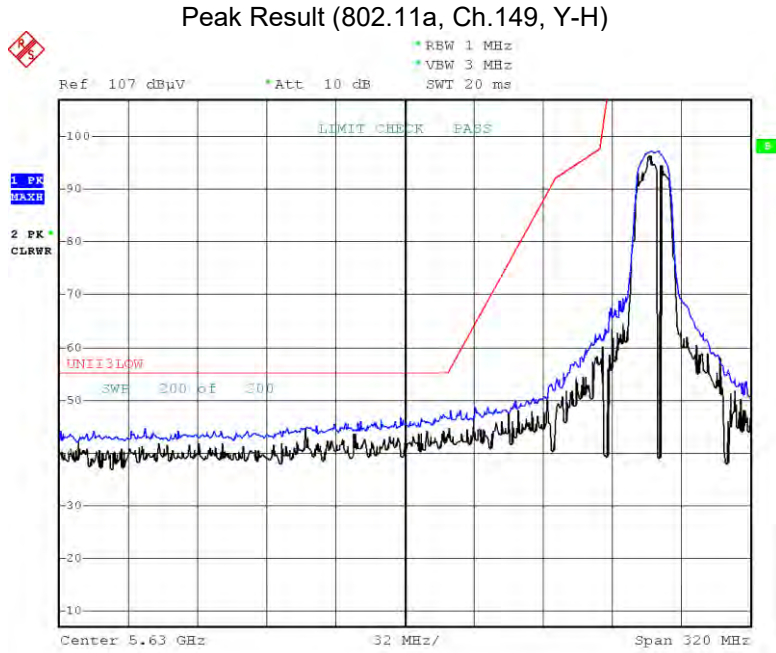


Date: 12.OCT.2022 21:15:22

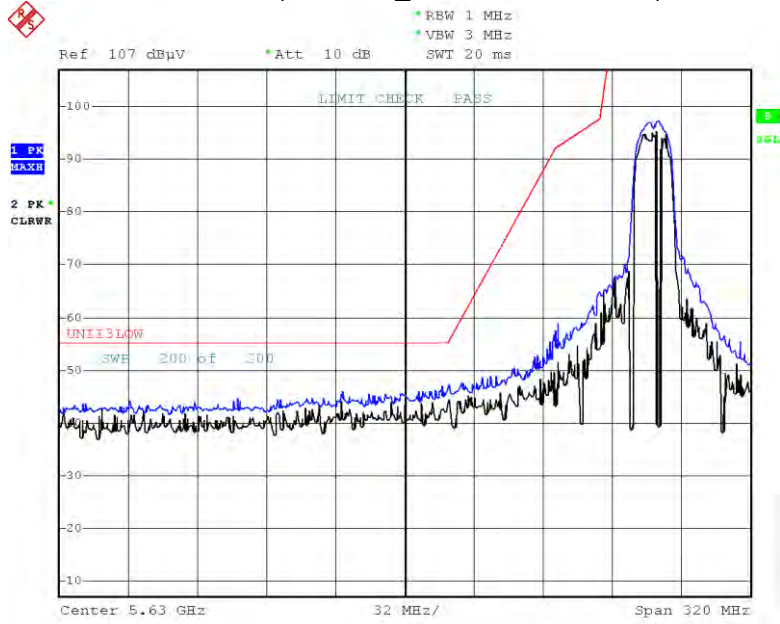
Note :

1. Only the worst case plots for Radiated Restricted Band Edge.
2. Red line : 5 850 MHz
3. Ambient Noise (Because of ambient noise, We attached only the worst plot without a data table)

▣ Test Plots(UNII 3)

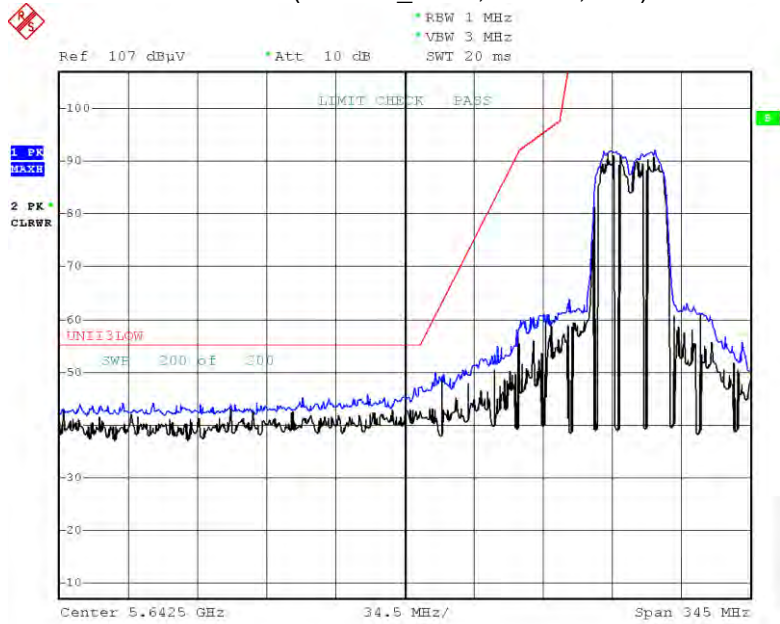


Peak Result (802.11ac_VHT20, Ch.149, Y-H)



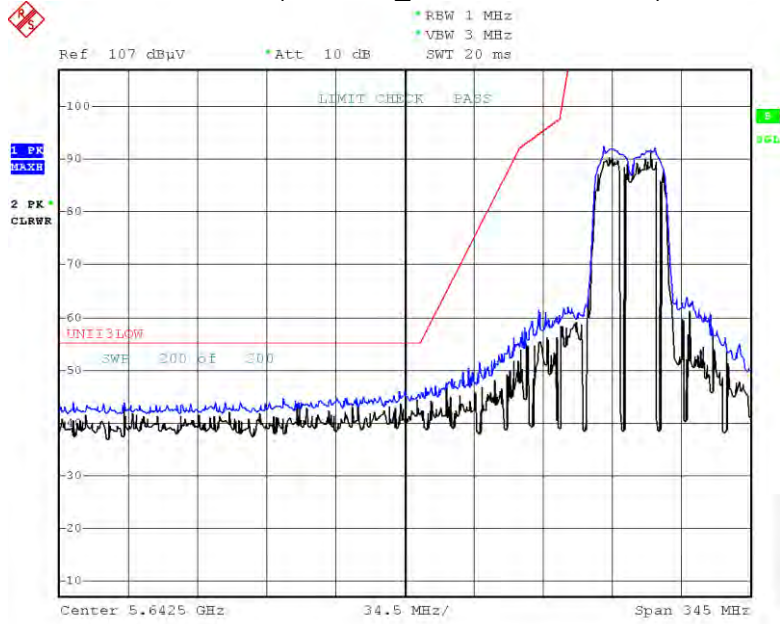
Date: 12.OCT.2022 21:38:45

Peak Result (802.11n_HT40, Ch.151, Y-H)



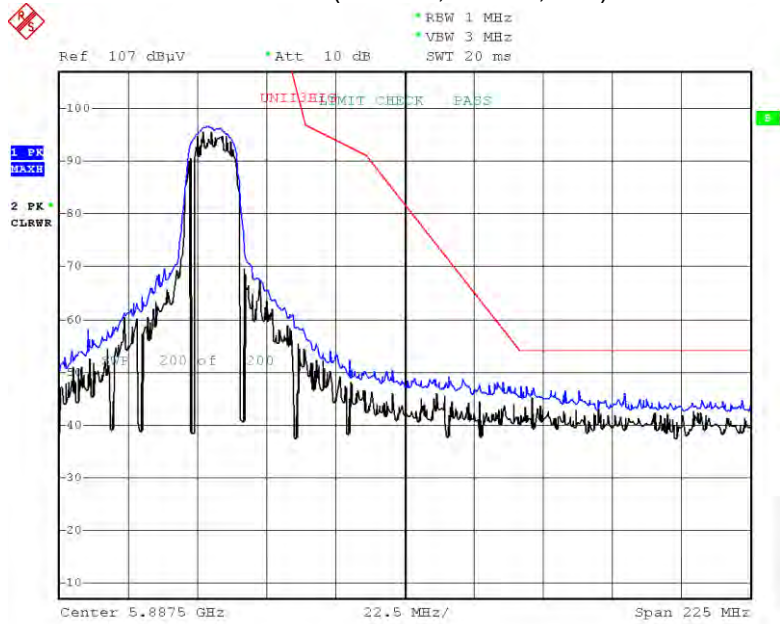
Date: 12.OCT.2022 21:28:32

Peak Result (802.11ac_VHT40, Ch.151, Y-H)



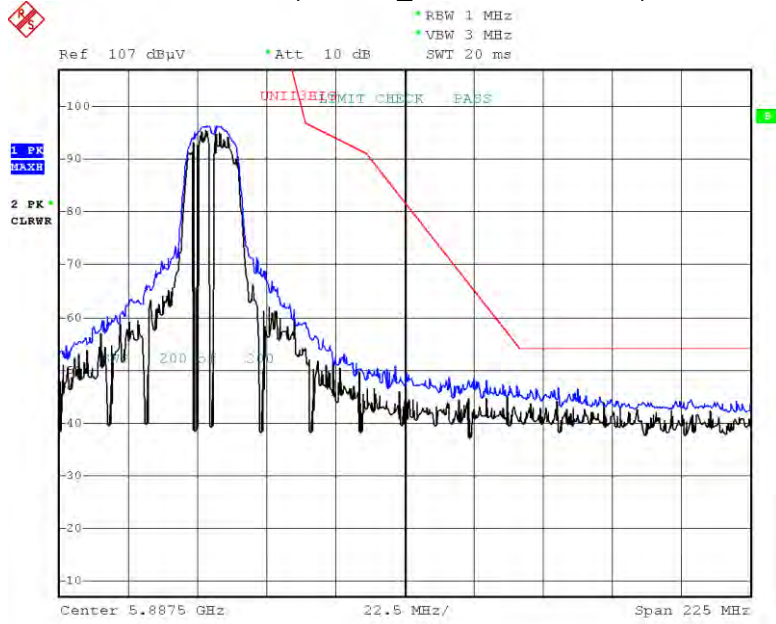
Date: 12.OCT.2022 21:29:56

Peak Result (802.11a, Ch.165, Y-H)



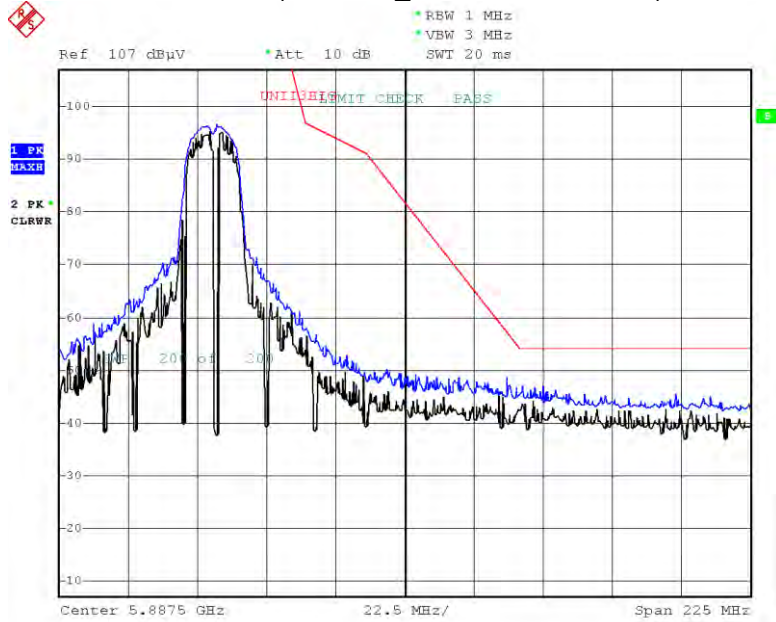
Date: 12.OCT.2022 21:45:17

Peak Result (802.11n_HT20, Ch.165, Y-H)



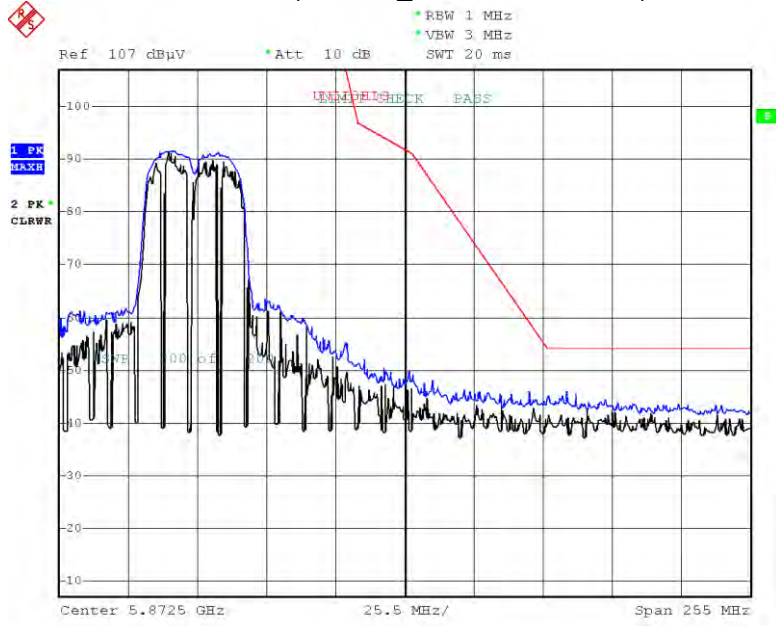
Date: 12.OCT.2022 21:46:31

Peak Result (802.11ac_VHT20, Ch.165, Y-H)



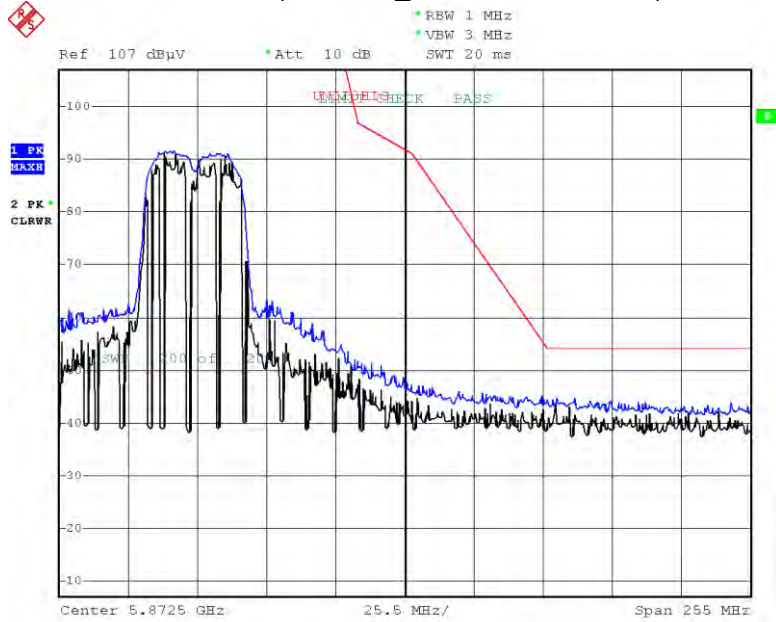
Date: 12.OCT.2022 21:47:50

Peak Result (802.11n_HT40, Ch.159, Y-H)

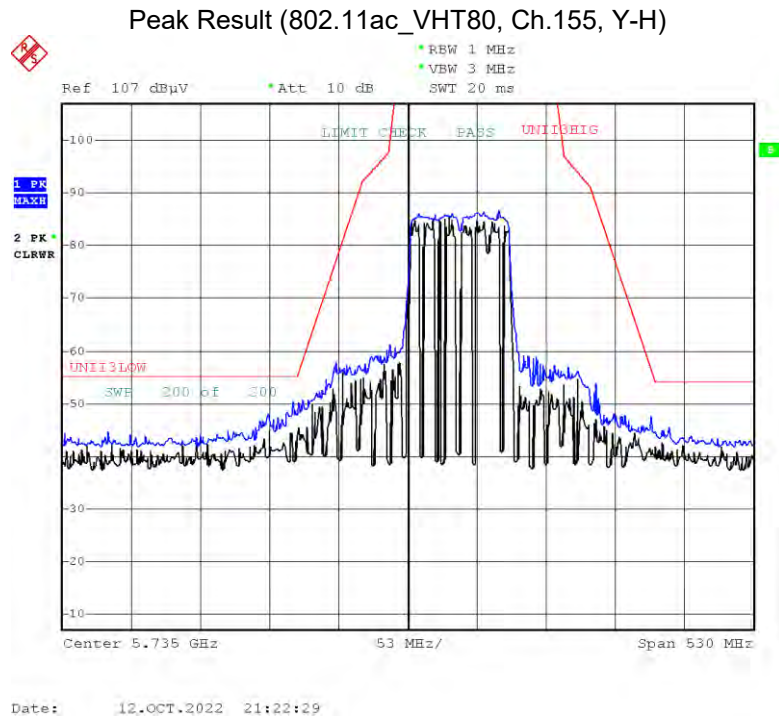


Date: 12.OCT.2022 21:54:13

Peak Result (802.11ac_VHT40, Ch.159, Y-H)



Date: 12.OCT.2022 21:55:33



Note :

1. Only the worst case plots for U-NII-3 Out of Band e.i.r.p Emission.
2. U-NII-3 Low & High Band Edge RedLine is Final Test Limit about factor value compensation.

10.10 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

Test

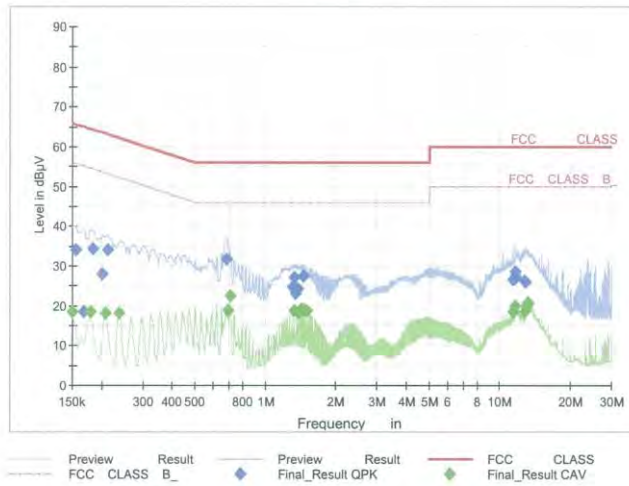
1 / 2

Test Report

Common Information

EUT : SM-A146M/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WLAN 5G MODE_L1

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1545	34.05	65.75	31.70	9.000	L1	OFF	9.7	
0.1680	18.60	65.06	46.46	9.000	L1	OFF	9.7	
0.1838	34.18	64.31	30.13	9.000	L1	OFF	9.7	
0.2018	27.95	63.54	35.59	9.000	L1	OFF	9.7	
0.2130	34.09	63.09	29.00	9.000	L1	OFF	9.7	
0.6868	31.64	56.00	24.36	9.000	L1	OFF	9.7	
1.3168	24.62	56.00	31.38	9.000	L1	OFF	9.7	
1.3213	24.78	56.00	31.22	9.000	L1	OFF	9.7	
1.3280	27.02	56.00	28.98	9.000	L1	OFF	9.7	
1.3415	23.20	56.00	32.80	9.000	L1	OFF	9.7	
1.3820	24.25	56.00	31.75	9.000	L1	OFF	9.7	
1.4473	27.29	56.00	28.71	9.000	L1	OFF	9.7	
11.3765	26.67	60.00	33.33	9.000	L1	OFF	10.1	
11.7118	27.48	60.00	32.52	9.000	L1	OFF	10.1	
11.7163	28.48	60.00	31.52	9.000	L1	OFF	10.1	
11.7230	26.83	60.00	33.17	9.000	L1	OFF	10.1	
12.7535	26.23	60.00	33.77	9.000	L1	OFF	10.1	
12.8840	26.07	60.00	33.93	9.000	L1	OFF	10.1	

2022-10-19

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Test

2 / 2

Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1500	18.50	56.00	37.50	9.000	L1	OFF	9.7	
0.1793	18.42	54.52	36.10	9.000	L1	OFF	9.7	
0.2085	18.18	53.27	35.08	9.000	L1	OFF	9.7	
0.2378	18.21	52.17	33.97	9.000	L1	OFF	9.7	
0.6913	18.73	46.00	27.27	9.000	L1	OFF	9.7	
0.7093	22.41	46.00	23.59	9.000	L1	OFF	9.7	
1.3280	18.72	46.00	27.28	9.000	L1	OFF	9.7	
1.3888	18.31	46.00	27.69	9.000	L1	OFF	9.7	
1.4180	19.00	46.00	27.00	9.000	L1	OFF	9.7	
1.4473	18.91	46.00	27.09	9.000	L1	OFF	9.7	
1.4765	18.72	46.00	27.28	9.000	L1	OFF	9.7	
1.5058	18.68	46.00	27.32	9.000	L1	OFF	9.7	
11.3720	18.59	50.00	31.41	9.000	L1	OFF	10.1	
11.7185	19.97	50.00	30.03	9.000	L1	OFF	10.1	
12.7535	18.35	50.00	31.65	9.000	L1	OFF	10.1	
13.0798	20.04	50.00	29.96	9.000	L1	OFF	10.1	
13.1675	20.81	50.00	29.19	9.000	L1	OFF	10.1	
13.1968	20.46	50.00	29.54	9.000	L1	OFF	10.1	

2022-10-19

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Conducted Emissions (Line 2)

Test

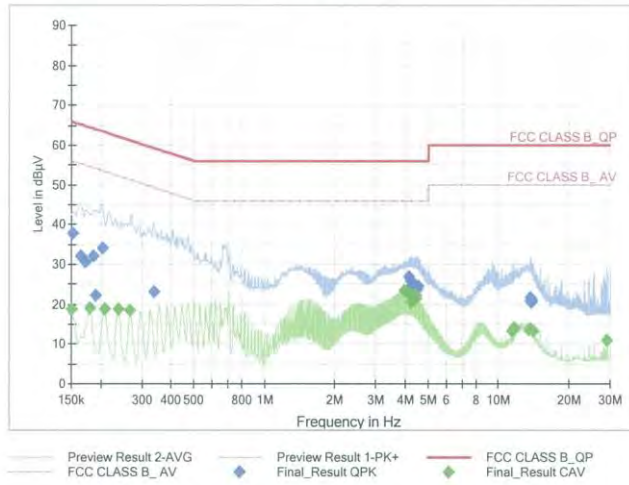
1 / 2

Test Report

Common Information

EUT : SM-A146M/DS
 Manufacturer : SAMSUNG
 Test Site : SHIELD ROOM
 Operating Conditions : WLAN 5G MODE_N

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1523	37.79	65.88	28.09	9.000	N	OFF	9.6	
0.1635	32.06	65.28	33.23	9.000	N	OFF	9.6	
0.1725	30.72	64.84	34.12	9.000	N	OFF	9.6	
0.1860	31.97	64.21	32.25	9.000	N	OFF	9.6	
0.1905	22.33	64.02	41.69	9.000	N	OFF	9.6	
0.2040	33.93	63.45	29.51	9.000	N	OFF	9.6	
0.3390	23.14	59.23	36.09	9.000	N	OFF	9.6	
4.1315	26.82	56.00	29.18	9.000	N	OFF	9.8	
4.2373	24.59	56.00	31.41	9.000	N	OFF	9.8	
4.2530	25.69	56.00	30.31	9.000	N	OFF	9.8	
4.3430	24.55	56.00	31.45	9.000	N	OFF	9.8	
4.4645	23.60	56.00	32.40	9.000	N	OFF	9.8	
4.5118	24.46	56.00	31.54	9.000	N	OFF	9.8	
13.6490	20.76	60.00	39.24	9.000	N	OFF	10.2	
13.6918	21.50	60.00	38.50	9.000	N	OFF	10.2	
13.7345	20.76	60.00	39.24	9.000	N	OFF	10.2	
13.7750	21.20	60.00	38.80	9.000	N	OFF	10.2	
13.8178	20.54	60.00	39.46	9.000	N	OFF	10.2	

2022-10-19

오후 7:02:46

Test

2 / 2

Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1500	18.75	56.00	37.25	9.000	N	OFF	9.6	
0.1793	19.02	54.52	35.50	9.000	N	OFF	9.6	
0.2085	18.74	53.27	34.53	9.000	N	OFF	9.6	
0.2378	18.72	52.17	33.45	9.000	N	OFF	9.6	
0.2670	18.49	51.21	32.72	9.000	N	OFF	9.6	
3.9538	23.48	46.00	22.52	9.000	N	OFF	9.8	
4.1315	22.88	46.00	23.12	9.000	N	OFF	9.8	
4.2508	20.60	46.00	25.40	9.000	N	OFF	9.8	
4.3385	21.17	46.00	24.83	9.000	N	OFF	9.8	
4.3970	22.12	46.00	23.88	9.000	N	OFF	9.8	
4.4263	22.19	46.00	23.81	9.000	N	OFF	9.8	
4.4555	21.48	46.00	24.52	9.000	N	OFF	9.8	
11.3720	13.29	50.00	36.71	9.000	N	OFF	10.1	
11.7163	14.00	50.00	36.00	9.000	N	OFF	10.1	
13.5433	13.61	50.00	36.39	9.000	N	OFF	10.2	
13.6895	13.73	50.00	36.27	9.000	N	OFF	10.2	
14.1305	13.31	50.00	36.69	9.000	N	OFF	10.2	
28.9490	10.87	50.00	39.13	9.000	N	OFF	10.8	

2022-10-19

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11. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/22/2023	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Keysight	MY55410508	09/06/2023	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Agilent	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2023	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/03/2023	Annual
DC Power Supply	E3646A	Agilent	MY40002937	12/14/2022	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	08285	06/21/2023	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	03/07/2023	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A

Note:

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

Radiated Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM2090	Emco	060520	N/A	N/A
Turn Table	N/A	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/16/2024	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1191	11/18/2023	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Amp & Filter Bank Switch Controller	FBSM-01A	TNM system	0	N/A	N/A
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/06/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/13/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/13/2023	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/07/2023	Annual
ATT(3 dB) + LNA2(6~18 GHz)	18B-03, CBL06185030	WEINSCHEL CERNEK	N/A	12/22/2022	Annual
ATT(10 dB) + LNA1(0.1~18 GHz)	56-10, CBLU1183540B-01	Api tech, CERNEK	N/A	12/22/2022	Annual
High Pass Filter	WHKX10-2700-3000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
Thru	COAXIAL ATTENUATOR	T&M SYSTEM	N/A	12/22/2022	Annual
Power Amplifier	CBL18265035	CERNEK	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEK	25956	03/11/2023	Annual
Spectrum Analyzer	FSP(9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/06/2023	Annual
Spectrum Analyzer	FSV40-N(9 kHz ~ 30 GHz)	Rohde & Schwarz	101068-SZ	09/07/2023	Annual

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

12. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2211-FC027-P