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TEST REPORT

FCC/ISED UNII Test for IL7SF
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2307-FI009-R1

DATE OF ISSUE
July 31, 2023

Tested by
Jeong Ho Kim

Technical Manager
Jong Seok Lee

HCT CO., LTD.
BongJai Huh / CEO

HCT CO., LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 Fax. +82 31 645 6401

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Additional Model
-

Applicant	**LG Electronics Inc.** 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Republic of Korea
Eut Type Model Name	Silverbox RADIO ASM-RECEIVER IL7SF
FCC ID	BEJIL7SF3
IC	2703H-IL7SF3
Modulation type	OFDM
FCC Classification	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s)	Part 15.407
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5_Amendment 2 (February 2021)

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 27, 2023	Initial Release
1	July 31, 2023	- Revised The typo (Page 5, 31, 33) - Added The Antenna gain measurement procedure. (Page.34)

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 / ISED Rules under normal use and maintenance.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

CONTENTS

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	IL7SF	
Additional Model	-	
EUT Type	Silverbox RADIO ASM-RECEIVER	
Power Supply	DC 12.0 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20MHz BW : 5180 - 5240 40MHz BW : 5190 - 5230 80MHz BW : 5210
	U-NII-3	20MHz BW : 5745 - 5825 40MHz BW : 5755 - 5795 80MHz BW : 5775
Antenna Peak Gain	**Internal Antenna:** Peak Gain : 5.95 dBi (UNII 1) / 4.79 dBi(UNII 3)	
Straddle channel	Not Supported	
TDWR Band	Not Supported	
Dynamic Frequency Selection	Not Supported	
Date(s) of Tests	June 9, 2023 ~ July 26, 2023	
EUT serial numbers	Conduction : 210D83900 Radiation : 210D83901	
PMN (Product Marketing Number)	Silverbox RADIO ASM-RECEIVER	
HVIN (Hardware Version Identification Number)	IL7SF3	
FVIN (Firmware Version Identification Number)	N/A	
HMN (Host Marketing Name)	N/A	

2. MAXIMUM OUTPUT POWER

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

Band	Mode	Internal Ant Power		RADIATED OUTPUT POWER (E.I.R.P)	
		(dBm)	(W)	(dBm)	(W)
UNII1	802.11a	8.14	0.007	13.85	0.024
	802.11n (HT20)	8.17	0.007	13.94	0.025
	802.11n (HT40)	9.12	0.008	14.52	0.028
	802.11ac (VHT20)	8.23	0.007	14.00	0.025
	802.11ac (VHT40)	9.08	0.008	14.52	0.028
	802.11ac (VHT80)	9.00	0.008	14.41	0.028
UNII3	802.11a	21.07	0.128	23.75	0.237
	802.11n (HT20)	21.14	0.130	23.78	0.239
	802.11n (HT40)	19.46	0.088	24.25	0.266
	802.11ac (VHT20)	20.98	0.125	23.83	0.242
	802.11ac (VHT40)	19.39	0.087	24.17	0.261
	802.11ac (VHT80)	15.12	0.033	17.09	0.051

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. / RSS-Gen issue 5, RSS-247 issue 2.

GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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

DESCRIPTION OF TEST MODES

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

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, 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).
For ISED, test facility was accepted dated January 26, 2021 (CAB identifier: 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 / RSS-Gen (Issue 5) Section 8:

"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

According to RSS-GEN(Issue 5) Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

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.

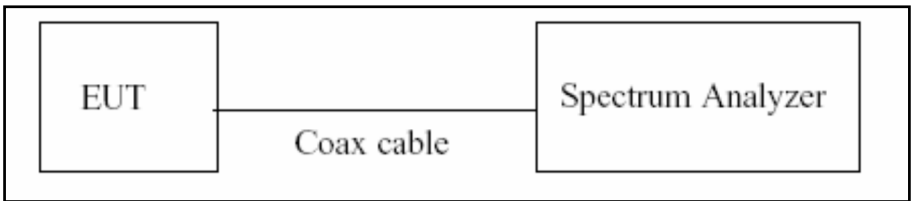
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.90 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.52 (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.

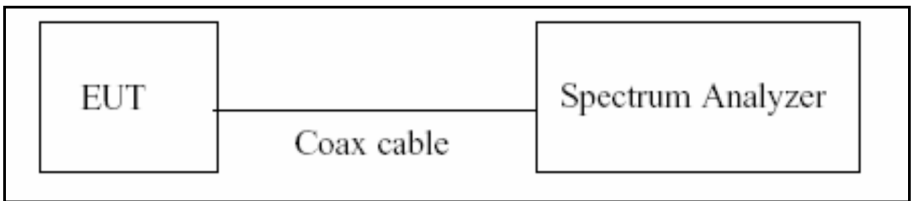
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6 dB Bandwidth & 26 dB Bandwidth & 99 % Bandwidth

Limit

Within the 5.725-5.85 GHz band, 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 ≥ 3 x 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 lever 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.

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW ≒ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

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

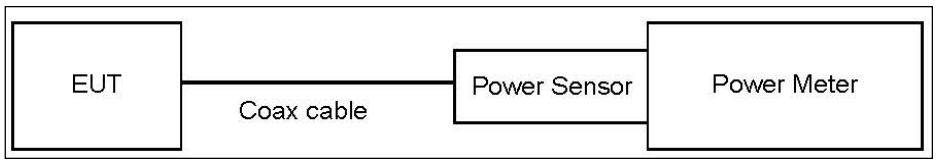
8.3. Output Power Measurement

Limit

Band	Limit
UNII 1	FCC - Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm) IC - 30 mW (14.77 dBm) or 1.76 + 10 log B, dBm, whichever power is less (where B is the 99% emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(= 30 dBm)

Test Configuration

Power Meter



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 10log(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)

Note

1. Spectrum Measured Level 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 = Attenuator loss + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	20.82
UNII 3	20.82

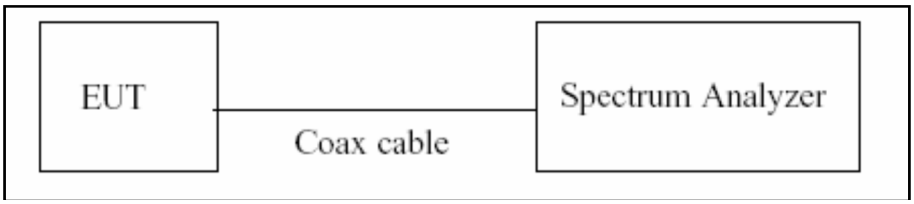
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	FCC - 11 dBm/MHz IC - (EIRP) 10 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 ≥ 3 MHz
4. Number of points in sweep ≥ 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 Level are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	20.82
UNII 3	20.82

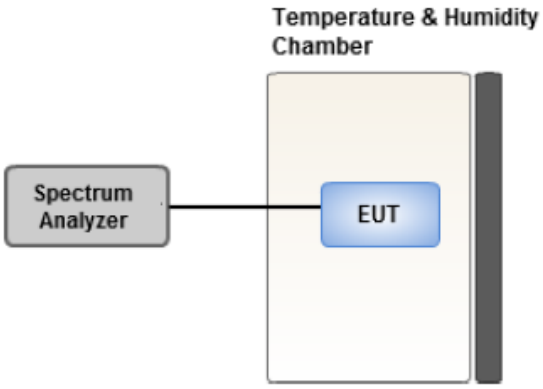
(Actual value of loss for the attenuator and cable combination)

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. 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 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.

3. 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.

FCC

Frequency (MHz)	Field Strength (V/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

ISED

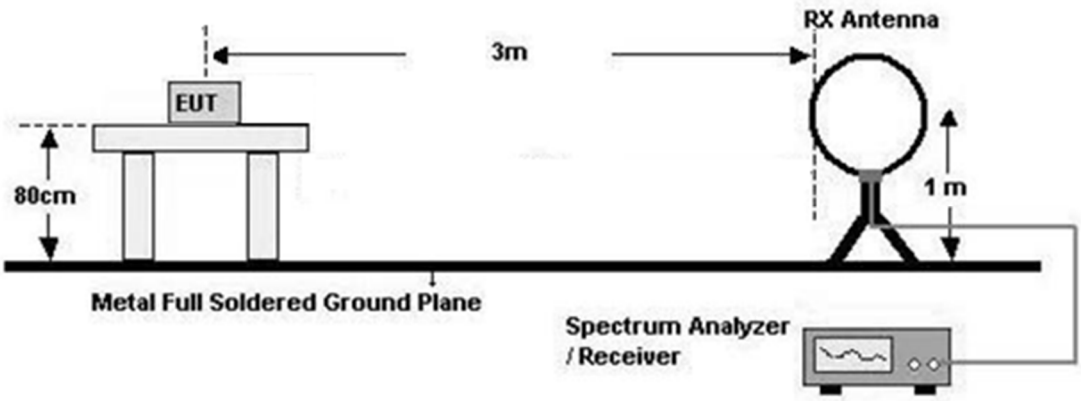
Frequency (MHz)	Field Strength (A/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC & ISED

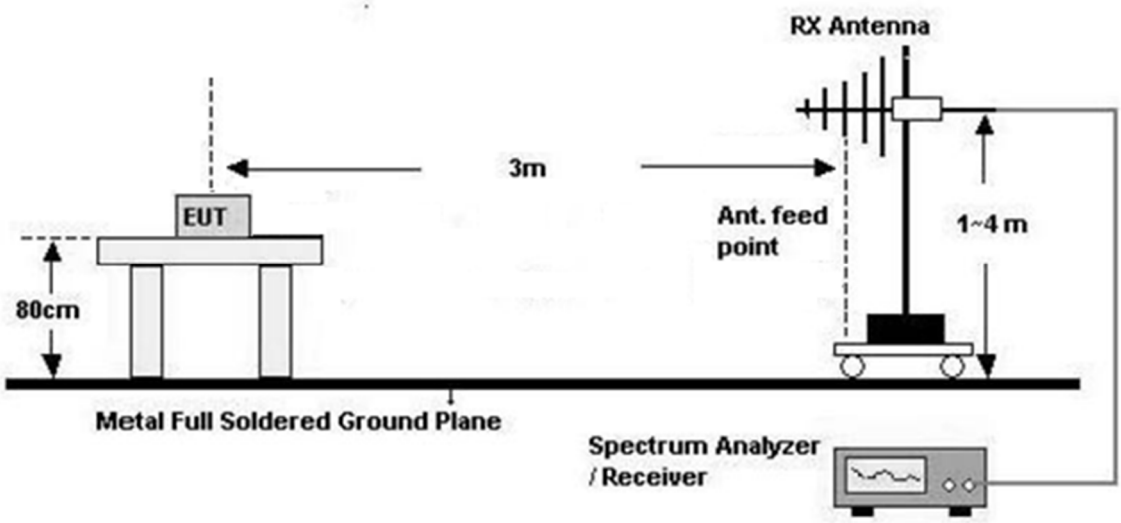
Frequency (MHz)	Field Strength (V/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

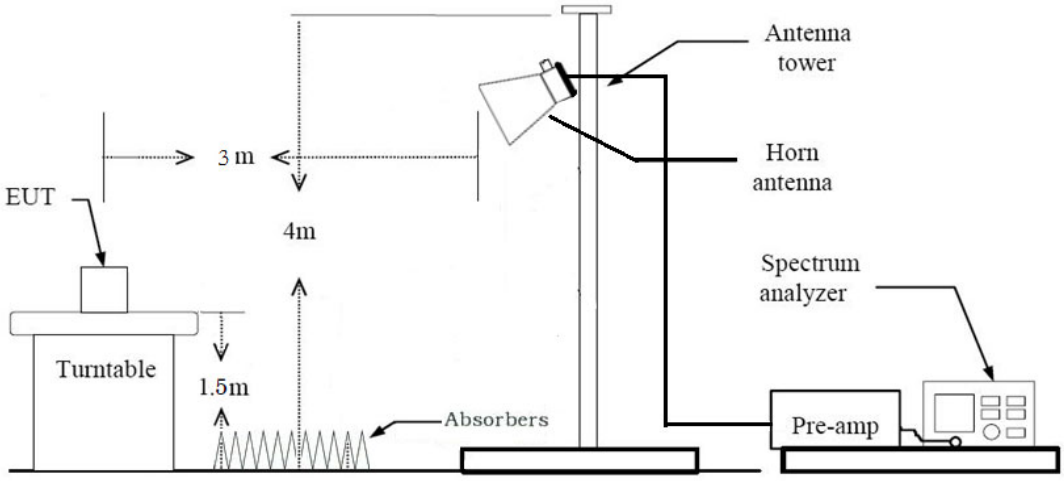
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions (Below 30 MHz)

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions (Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 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 ≥ 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 1m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Spectrum Setting

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

- RBW = 1 MHz
- VBW ≥ 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 ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) = VBW ≥ 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.

8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor
9. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. 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 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Spectrum Setting
   (1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
   - RBW = 1 MHz
   - VBW ≥ 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 ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   - VBW(Duty cycle is < 98 %) = VBW ≥ 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.

8. Measured Frequency Range :
   - 4500MHz ~ 5150MHz
   - 5350MHz ~ 5460MHz
   - 5460MHz ~ 5470MHz
   - (75 MHz or more below the 5725MHz) ~ 5725MHz
   - 5850MHz ~ (75 MHz or more above the 5850MHz)
9. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
10. 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	0.990	0.045	1000
802.11n(HT20)	MCS 0(6.5)	0.989	0.048	1000
802.11n(HT40)	MCS 0(13.5)	0.978	0.097	2000
802.11ac(VHT20)	MCS 0(6.5)	0.988	0.051	1000
802.11ac(VHT40)	MCS 0(13.5)	0.978	0.096	2000
802.11ac(VHT80)	MCS 0(29.3)	0.954	0.203	5000

8.7. Receiver Spurious Emissions

Limit

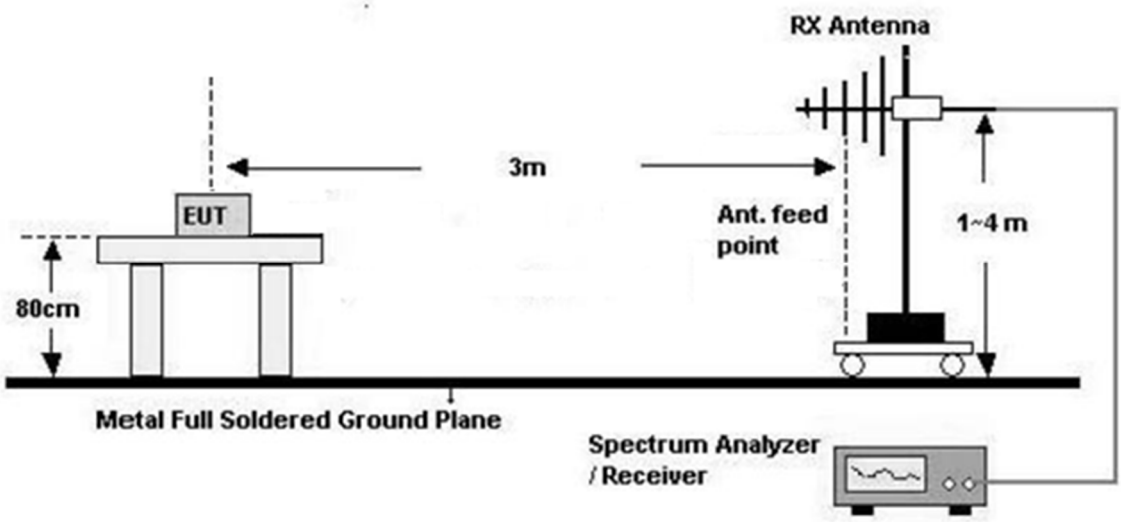
Frequency (MHz)	Field Strength (V/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration

30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission

level.

6. Spectrum Setting

(1) Measurement Type(Peak):

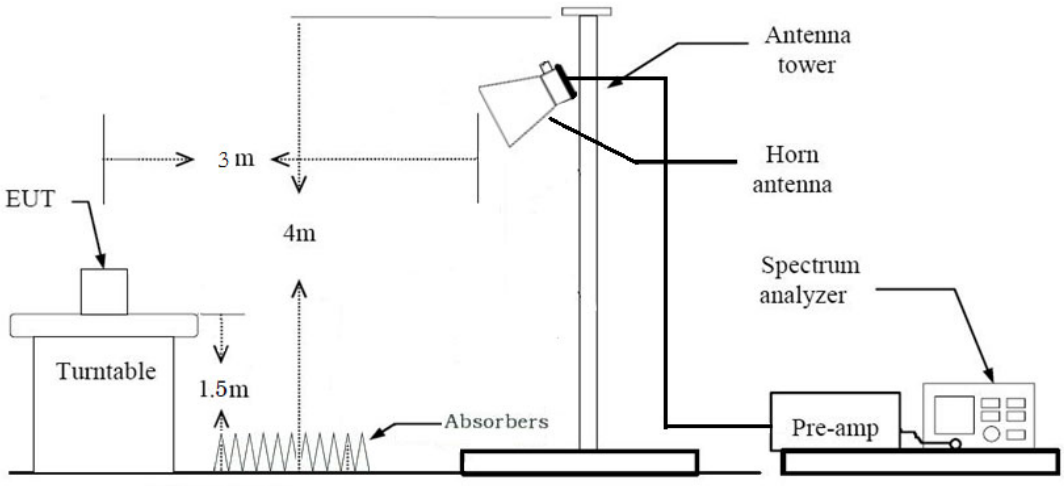
- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW ≥ 3 x RBW

(2) Measurement Type(Quasi-peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)

Above 1 GHz

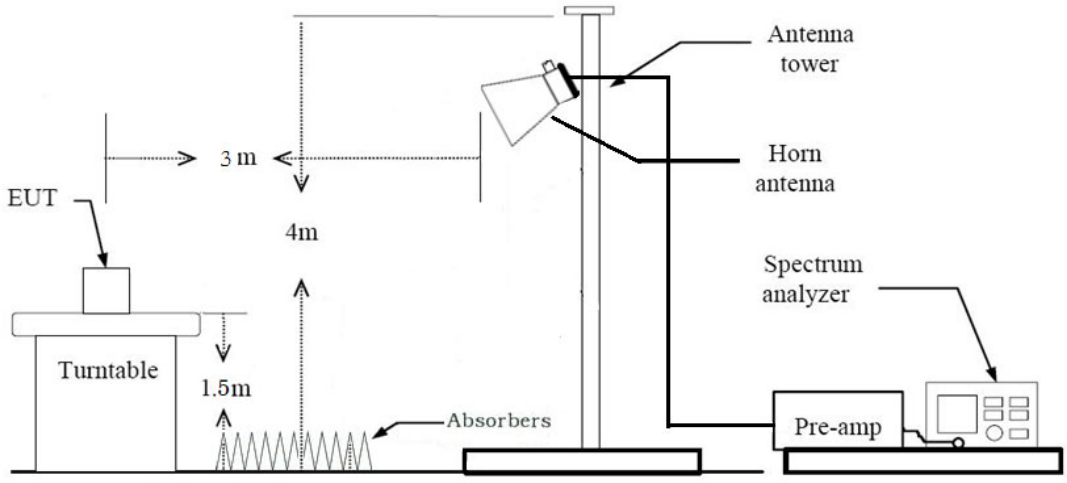


Test Procedure of Radiated spurious emissions (Above 1 GHz)

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

6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Average):
      - We performed using a reduced video BW method was done with the analyzer in linear mode
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 1/τ Hz, where τ = pulse width in seconds
        The actual setting value of VBW = 1 kHz
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
9. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
10. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

8.8. Radiated Output Power (E.I.R.P)



Test Procedure of Radiated Output Power (E.I.R.P)

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

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

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 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

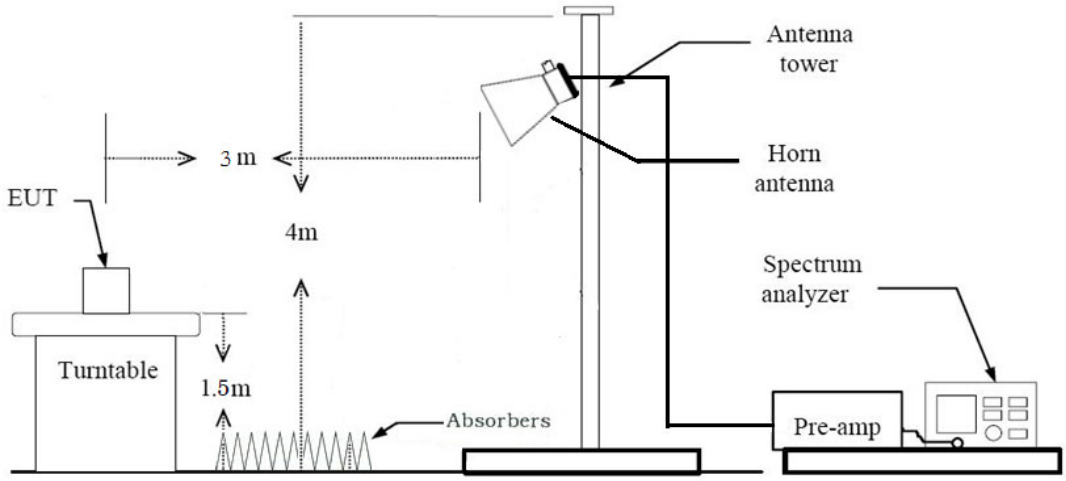
Note:

Field Strength (dBμV/m) = Measured Value(dBμV/m) + Antenna Factor(A.F) + Cable Loss(C.L) +DutyCycle Factor(D.F)

EIRP (dBm) = Field Strength (dBμV/m) – 95.2

Max Antenna Gain = EIRP(dBm) – Conducted Output Power(dBm)

8.9. Radiated Power Spectral Density



Test Procedure of Radiated Power Spectral Density

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

   1) Set span to encompass the entire emission bandwidth(EBW) of the signal.
   2) RBW = 1 MHz(510 kHz for UNII 3)
   3) VBW ≥ 3 MHz
   4) Number of points in sweep ≥ 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.

Note:

Field Strength (dBμV/m) = Measured Value(dBμV/m) + Antenna Factor(A.F) + Cable Loss(C.L)+DutyCycle Factor(D.F)

PSD (dBm) = Field Strength (dBμV/m) – 95.2

8.10. Antenna Gain calculations

Test Procedure of Antenna gain calculations

1. Measured Radiated Ouput Power(EIRP) according to Section 8.8
2. Measured Conducted Ouput Power according to Section 8.3
3. Calculatated Antenna gain according to below equation

[Antenna gain calculation]

Antenna Gain(dBi) = EIRP(dBm) – Conducted Output Power(dBm)

[Max Antenna Gain] U-NII internal Antenna

Band	Gain[dBi]
UNII1	5.95
UNII3	4.79

Mode	Freq [MHz]	Gain [dBi]
802.11a	5180	5.95
	5200	5.81
	5240	5.71
	5745	2.67
	5785	2.38
	5825	3.66
802.11n20	5180	5.95
	5200	5.84
	5240	5.77
	5745	2.64
	5785	2.44
	5825	3.74
802.11ac20	5180	5.89
	5200	5.84
	5240	5.77
	5745	2.85
	5785	2.67
	5825	3.83
802.11n40	5190	5.48
	5230	5.40
	5755	4.79
	5795	2.53
802.11ac40	5190	5.72
	5230	5.44
	5755	4.78
	5795	2.47
802.11ac80	5190	5.41
	5230	1.97

8.11. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
2. All configurations of antenna were investigated and the worst case configuration results are reported.
   - Mode : Internal Ant
3. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge : Z
4. 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
5. Radiated Spurious Emission

All modulation of operation were investigated and the test results are worst case modulation of each mode.

6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane

Radiated test(RSDB)

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : X
3. . All of RSDB Scenario were investigated and the worst case configuration results are reported.

RSDB Scenario	2.4 GHz WiFi	5 GHz WiFi	Bluetooth
2.4 GHz WiFi + 5 GHz WiFi	on	on	
2.4 GHz WiFi + Bluetooth	on		on

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

(Worst case: The lowest margin condition the channels and modes were selected for test.)

Description	2.4 GHz Emission	5 GHz Emission
Antenna	WIFI	WIFI/BT
Channel	6	165
Data Rate	1Mbps	6 Mbps
Mode	802.11b	802.11a

Note : WLAN 2.4 GHz RSDB Data refer to [DTS] Test Report.

AC Power line Conducted Emissions

1. We don't perform powerline conducted emission test. Because this EUT is used with vehicle.

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.

9. SUMMARY OF TEST RESULTS

FCC

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§ 15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§ 15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§ 15.407(a)(1),(2),(3)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10log $_{10}$ (BW) dBm (5470-5725 MHz) <1 W(5725-5850 MHz)		PASS
Peak 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
Frequency Stability	§ 15.407(g) § 2.1055	Maintained within the band		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207 15.407(b)(8)	<FCC 15.207 limits		N/A (#Note)
Undesirable Emissions	§ 15.407(b) (1),(2),(3),(4)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.7 (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
Radiated Output Power(E.I.R.P)	-	-		-
Radiated Power Spectral Density	-	-		-

#Note: Not Tested.

ISED

Test Description	ISED Part Section(s)	Test Limit	Test Condition	Test Result
99% Bandwidth	RSS-GEN, 6.7	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-247, 6.2.4 1	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250 MHz) < 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 1 W or 17+10 log $_{10}$ (BW) dBm (5470-5725 MHz) Whichever power is less		PASS
Power Spectral Density	RSS-247 6.2	<10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		PASS
	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		
Frequency Stability	RSS-GEN 8.11	should be kept within at least the central 80 % of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.		PASS
AC Conducted Emissions 150 kHz-30 MHz	RSS-GEN, 8.8	RSS-GEN section 8.8 table 4		N/A (#Note)
Undesirable Emissions	RSS-247, 6.2.1 2	26 dBc at 5250~5350 MHz (5150~5350 MHz)		PASS
	RSS-247, 6.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
	RSS-247, 6.2.4 2	cf. Section 9.8.1 (UNII 3)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-Gen, 8.9 RSS-Gen, 8.10	RSS-Gen section 8.9 table 5, 6 section 8.10 table 7		PASS
Receiver Spurious Emissions	RSS-GEN, 5 RSS-GEN, 7.3	RSS-GEN section 7.3 table 3		PASS
Radiated Output Power(E.I.R.P)	-	-		-
Radiated Power Spectral Density	-	-		-

#Note: Not Tested.

10. TEST RESULT

10.1 DUTY CYCLE

Mode	Data Rate (Mbps)	Ton (ms)	Ttotal (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.433	1.448	0.990	0.045
	9	0.960	0.975	0.985	0.067
	12	0.728	0.743	0.980	0.089
	18	0.492	0.507	0.971	0.129
	24	0.376	0.391	0.961	0.172
	36	0.256	0.271	0.945	0.247
	48	0.200	0.215	0.931	0.310
	54	0.180	0.195	0.923	0.348

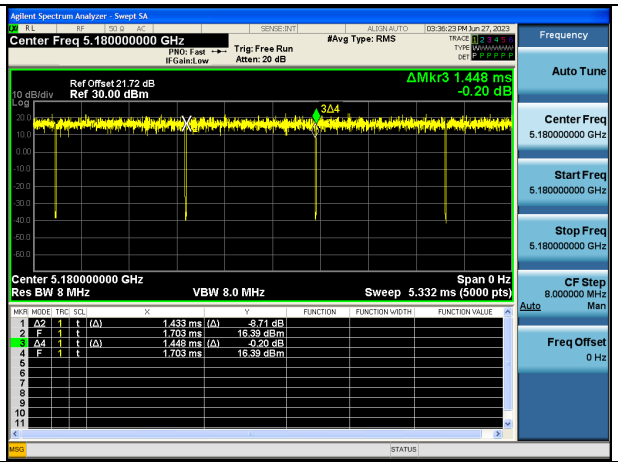
Mode	MCS Index	Ton (ms)	Ttotal (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.340	1.355	0.989	0.048
	1	0.688	0.703	0.979	0.094
	2	0.472	0.487	0.969	0.138
	3	0.364	0.379	0.960	0.179
	4	0.256	0.271	0.945	0.247
	5	0.200	0.215	0.931	0.310
	6	0.184	0.199	0.926	0.336
	7	0.168	0.183	0.919	0.366
802.11n (HT40)	0	0.664	0.679	0.978	0.097
	1	0.352	0.367	0.960	0.179
	2	0.248	0.263	0.944	0.250
	3	0.196	0.211	0.930	0.316
	4	0.144	0.159	0.908	0.419
	5	0.116	0.131	0.889	0.510
	6	0.108	0.123	0.880	0.553
	7	0.100	0.115	0.872	0.595

Mode	MCS Index	Ton (ms)	Ttotal (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.348	1.364	0.988	0.051
	1	0.695	0.711	0.978	0.096
	2	0.476	0.491	0.969	0.135
	3	0.368	0.383	0.960	0.176
	4	0.260	0.275	0.944	0.248
	5	0.204	0.219	0.932	0.308
	6	0.188	0.203	0.926	0.333
	7	0.172	0.187	0.920	0.363
	8	0.152	0.167	0.909	0.414
802.11ac (VHT40)	0	0.672	0.687	0.978	0.096
	1	0.356	0.371	0.960	0.177
	2	0.252	0.267	0.945	0.246
	3	0.200	0.215	0.930	0.314
	4	0.148	0.163	0.910	0.411
	5	0.120	0.135	0.889	0.510
	6	0.112	0.127	0.883	0.542
	7	0.108	0.123	0.880	0.553
	8	0.100	0.115	0.871	0.599
	9	0.092	0.107	0.862	0.642
802.11ac (VHT80)	0	0.332	0.348	0.954	0.203
	1	0.188	0.204	0.922	0.355
	2	0.144	0.160	0.902	0.446
	3	0.116	0.132	0.883	0.540
	4	0.096	0.112	0.859	0.662
	5	0.080	0.096	0.837	0.771
	6	0.076	0.092	0.828	0.819
	7	0.072	0.088	0.820	0.861
	8	0.068	0.084	0.813	0.901
	9	0.064	0.080	0.802	0.959

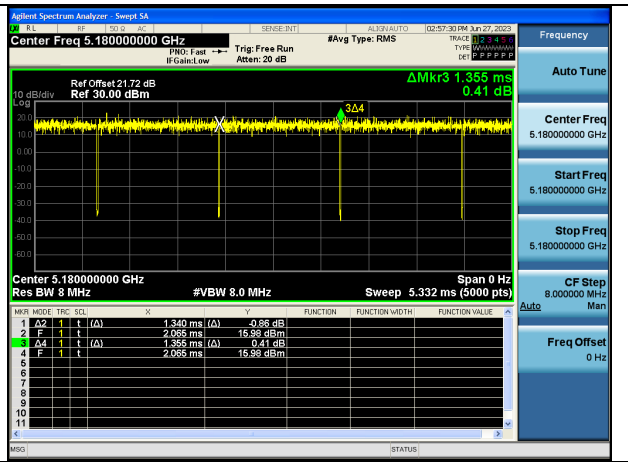
Note:

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

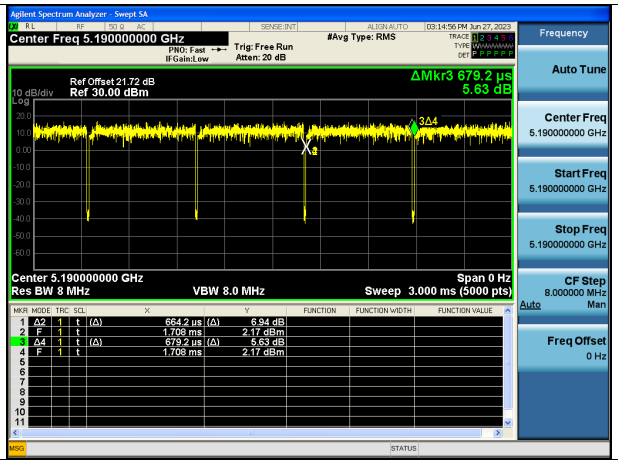
802.11a



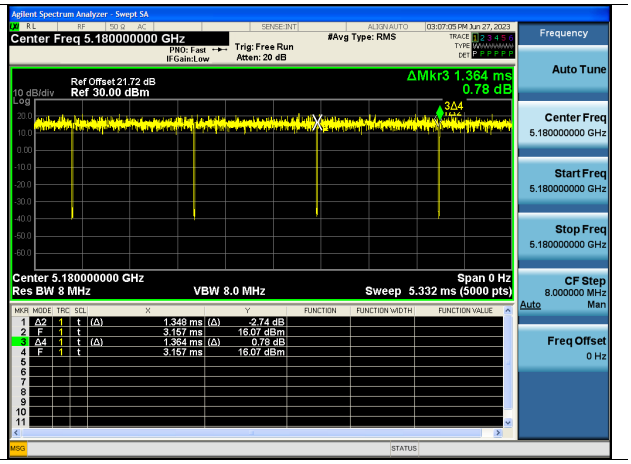
802.11n(HT20)



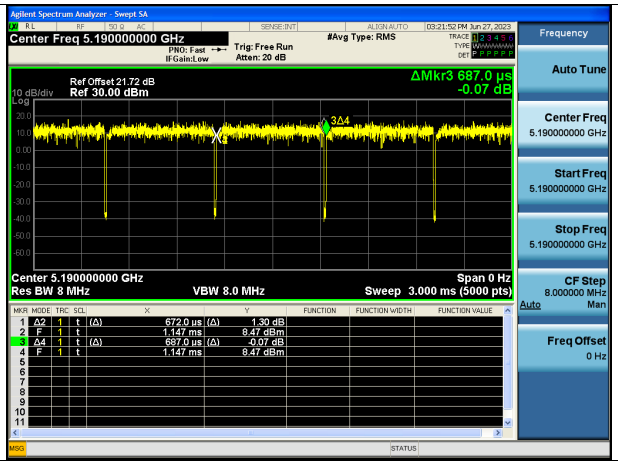
802.11n(HT40)



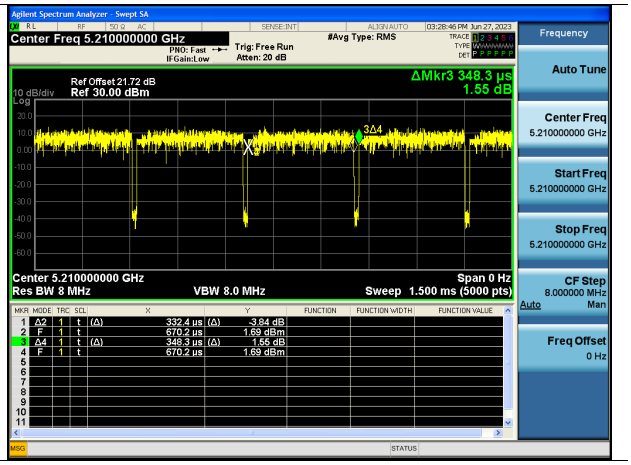
802.11ac(VHT20)



802.11ac(VHT40)



802.11ac(VHT80)



10.2 26dB BANDWIDTH & 99 % BANDWIDTH

[Internal ANT]

802.11a Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.49	16.583
5200	40	19.66	16.610
5240	48	19.51	16.595
5745	149	34.65	17.407
5785	157	26.60	16.870
5825	165	26.78	16.809

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.81	17.621
5200	40	20.04	17.612
5240	48	19.73	17.606
5745	149	35.12	18.154
5785	157	31.66	17.886
5825	165	29.42	17.811

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	40.17	36.153
5230	46	41.15	36.173
5755	151	48.88	36.163
5795	159	40.19	36.223

802.11ac(VHT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.75	17.613
5200	40	19.93	17.617
5240	48	19.78	17.599
5745	149	39.21	18.200
5785	157	32.45	17.880
5825	165	27.78	17.802

802.11ac(VHT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	41.23	36.135
5230	46	40.28	36.099
5755	151	44.80	36.251
5795	159	44.96	36.269

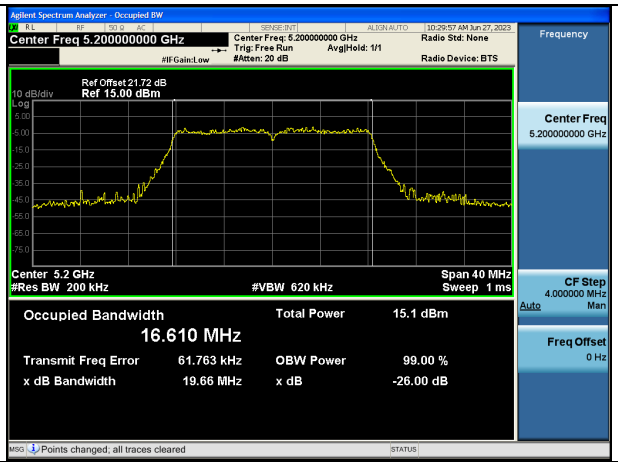
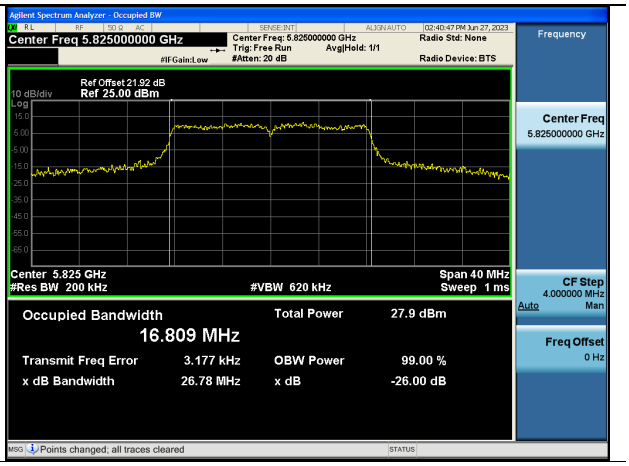
802.11ac(VHT80) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	81.87	76.094
5775	155	81.75	76.099

[Internal ANT]

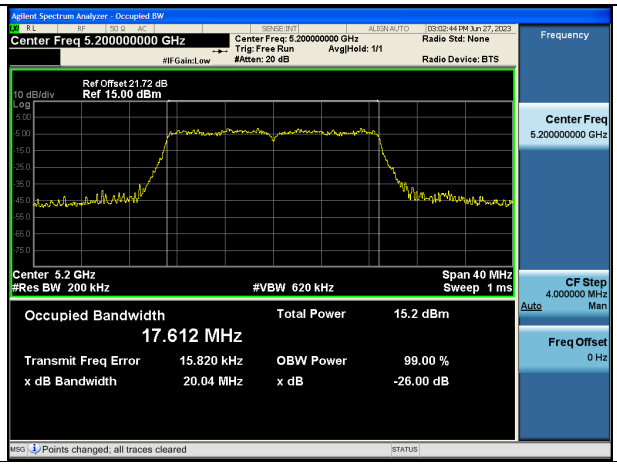
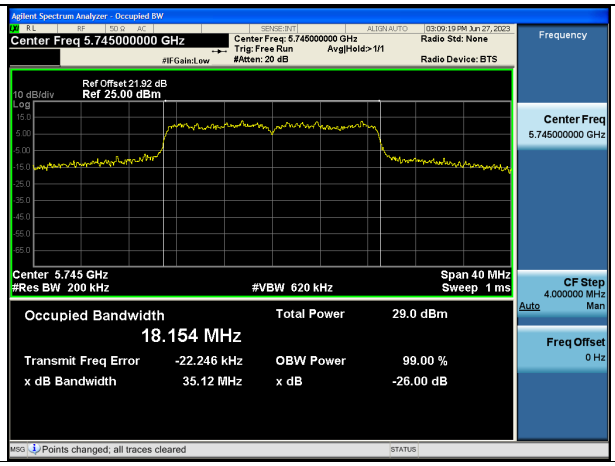
▣ Test Plots(802.11a)

Note:

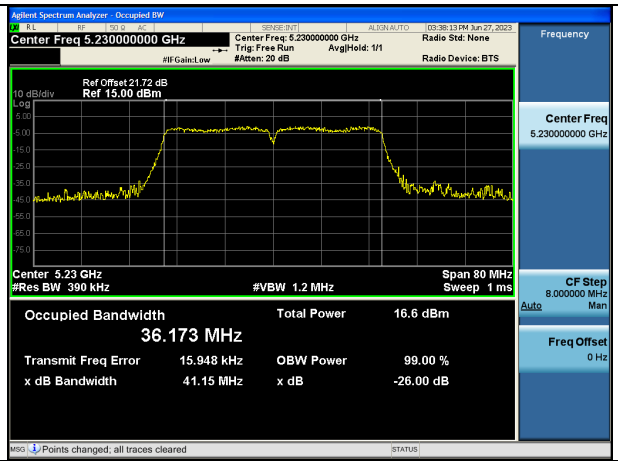
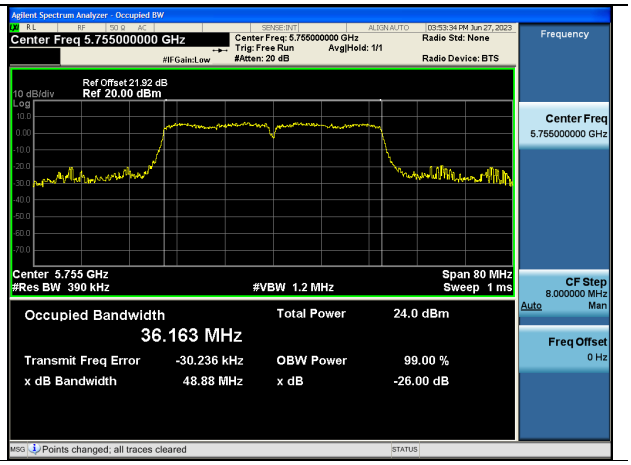
In order to simplify the report, attached plots were only the widest channel.

802.11a UNII 1 BAND 26dB Bandwidth (CH 40)	802.11a UNII 3 BAND 26dB Bandwidth (CH 165)
	

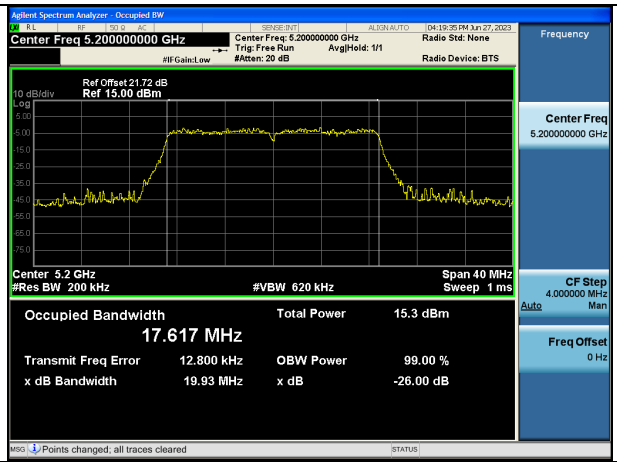
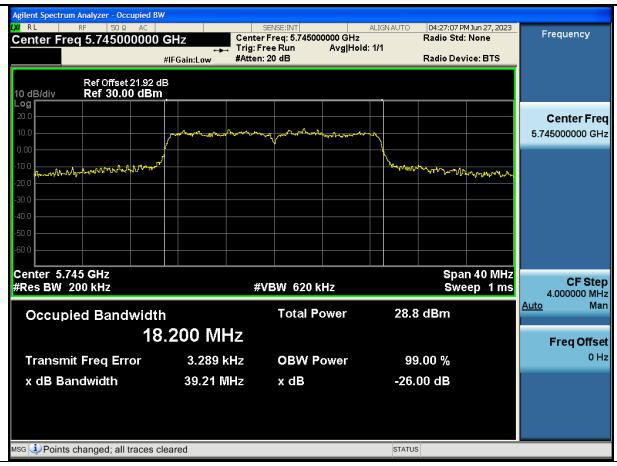
▣ Test Plots(802.11n(HT20))

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 40)	802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 149)
	

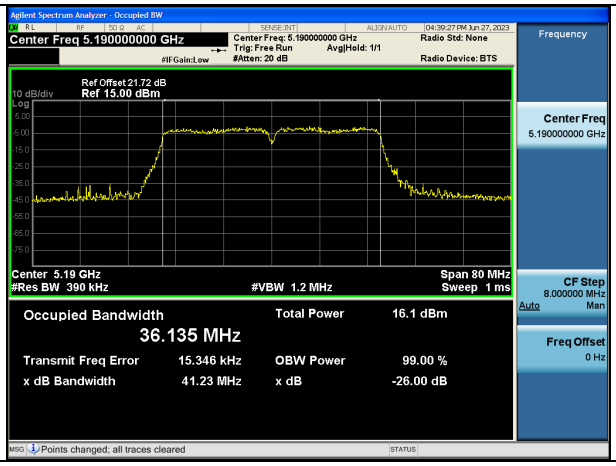
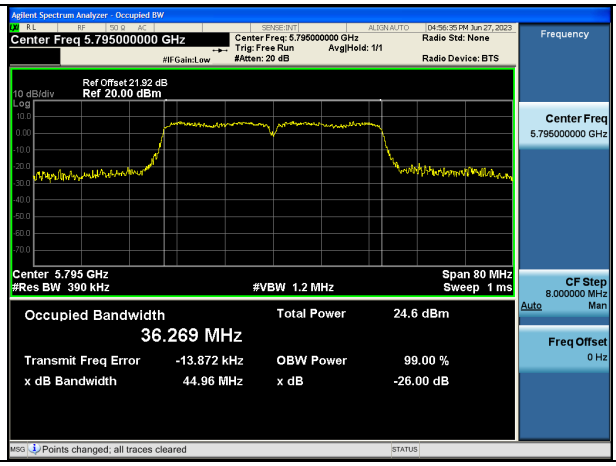
▣ Test Plots(802.11n(HT40))

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 151)
	

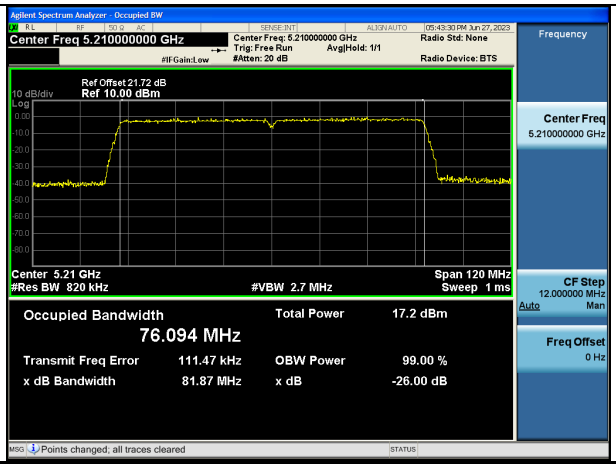
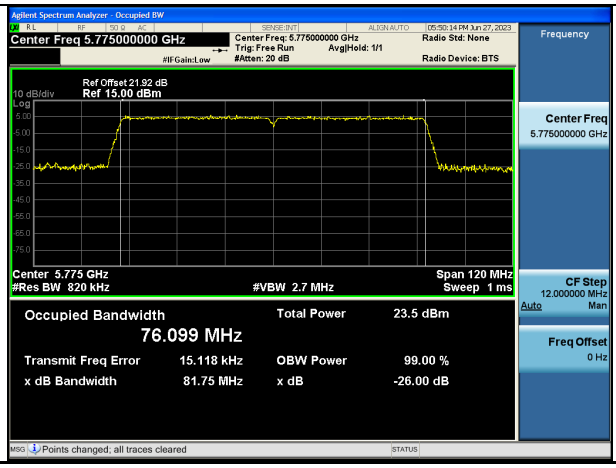
▣ Test Plots(802.11ac(VHT20))

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 40)	802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 149)
	

▣ Test Plots(802.11ac(VHT40))

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 159)
	

▣ Test Plots(802.11ac(VHT80))

802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth (CH 155)
	

99% Bandwidth [For ISED]

[Internal ANT]

802.11a Mode		99% Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	17.251
5785	157	16.876
5825	165	16.865

802.11n(HT20) Mode		99% Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	18.187
5785	157	17.876
5825	165	17.846

802.11n(HT40) Mode		99% Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5755	151	36.189
5795	159	36.171

802.11ac(VHT20) Mode		99% Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	18.132
5785	157	17.868
5825	165	17.843

802.11ac(VHT40) Mode		99% Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5755	151	36.252
5795	159	36.218

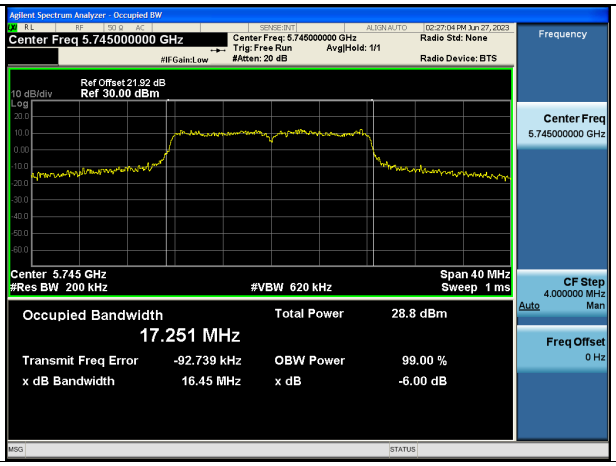
802.11ac(VHT80) Mode		99% Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5775	155	76.116

[Internal ANT_SISO]

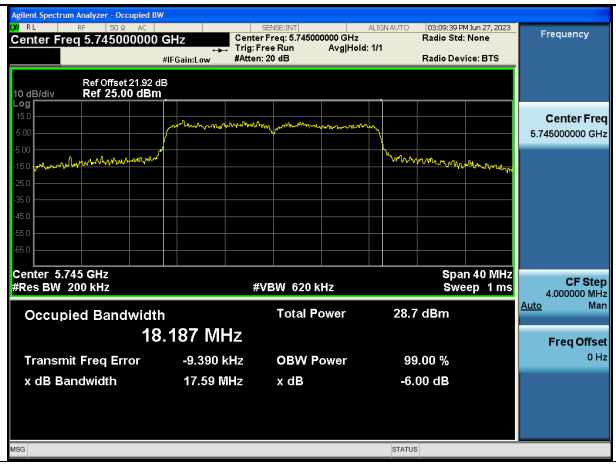
▣ Test Plots(99% Bandwidth)

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

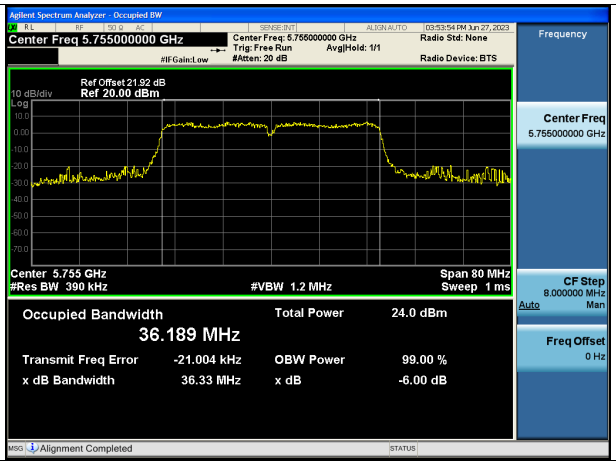
802.11a (CH.149)



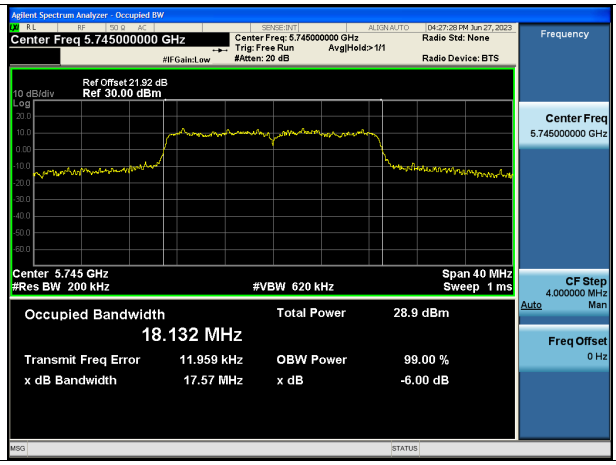
802.11n(HT20) (CH.149)



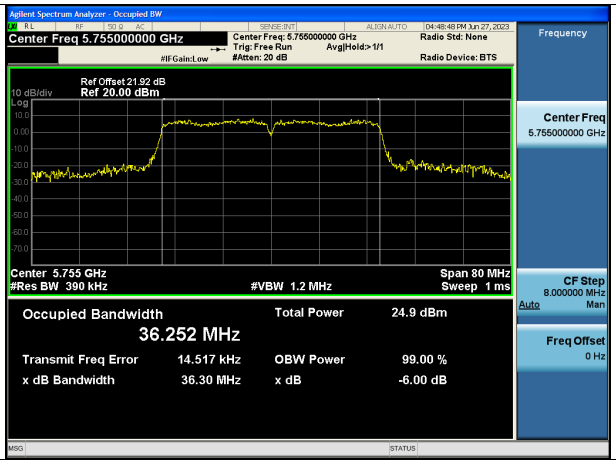
802.11n(HT40) (CH.151)



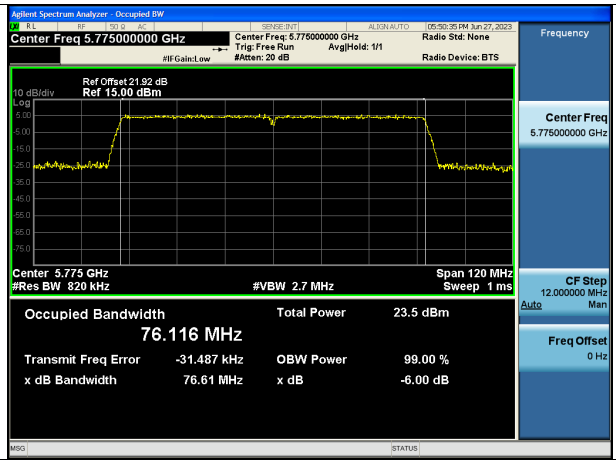
802.11ac(VHT20) (CH.149)



802.11ac(VHT40) (CH.151)



802.11ac(VHT80) (CH.155)



10.3 6dB BANDWIDTH

[Internal ANT]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.36	> 0.5	Pass
5785	157	16.38	> 0.5	Pass
5825	165	16.40	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.56	> 0.5	Pass
5785	157	17.09	> 0.5	Pass
5825	165	17.31	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.64	> 0.5	Pass
5795	159	35.49	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.55	> 0.5	Pass
5785	157	17.55	> 0.5	Pass
5825	165	17.11	> 0.5	Pass

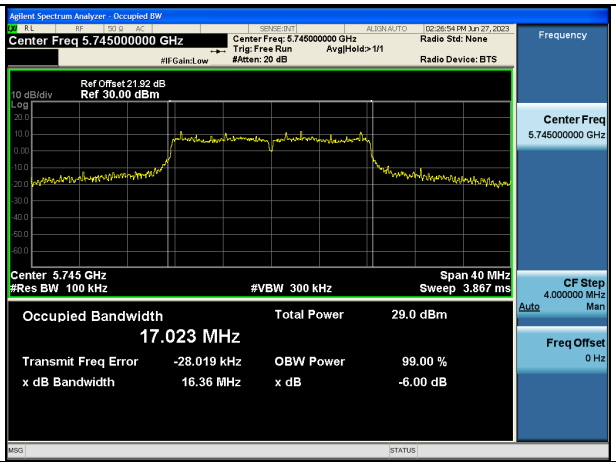
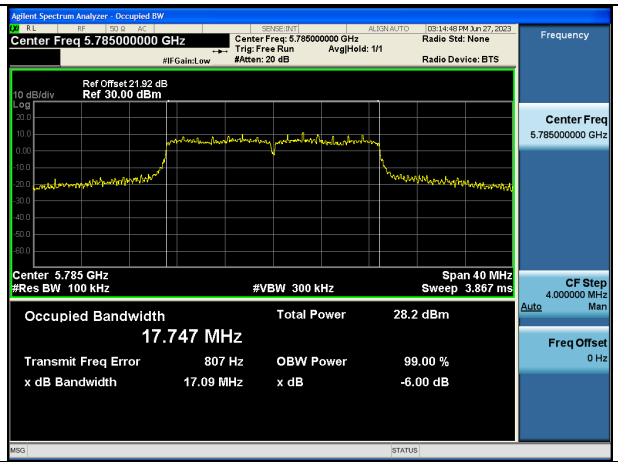
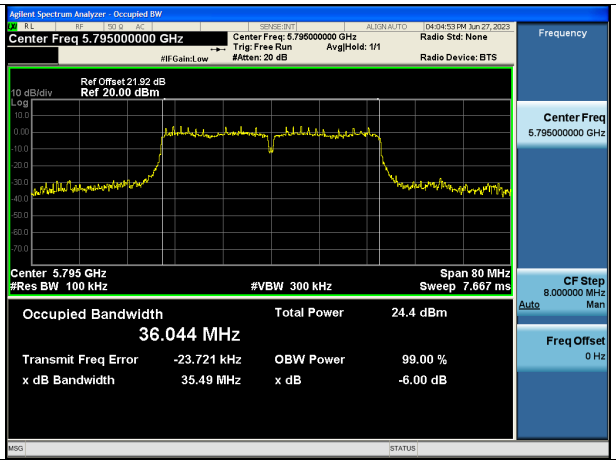
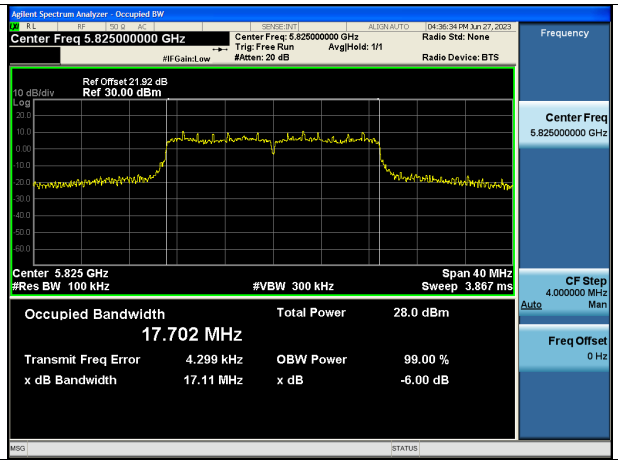
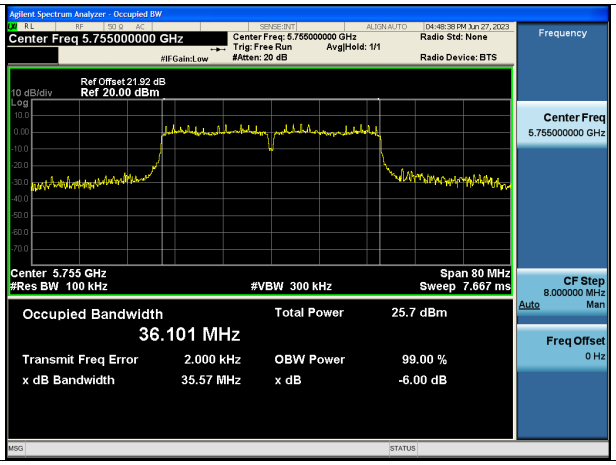
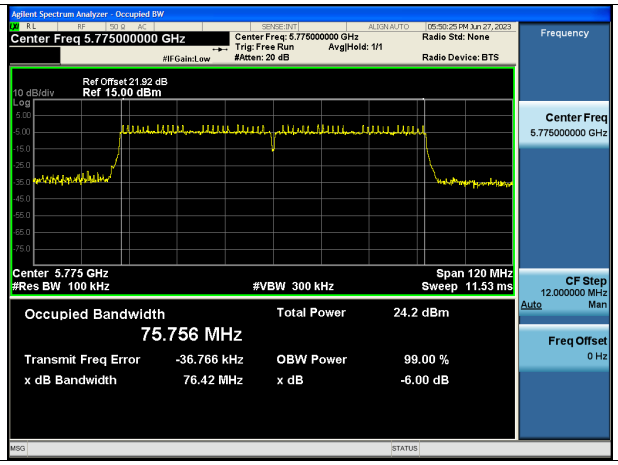
802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.57	> 0.5	Pass
5795	159	35.72	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	76.42	> 0.5	Pass

[Internal ANT]

▣ Test Plots

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

802.11a (CH.149)	802.11n(HT20) (CH.157)
	
802.11n(HT40) (CH.159)	**802.11ac(VHT20) (CH.165)**
	
802.11ac(VHT40) (CH.151)	**802.11ac(VHT80) (CH.155)**
	

10.4 OUTPUT POWER MEASUREMENT

[Power & EIRP]

802.11a Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	IC Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	7.19	0.05	7.24	5.95	13.19	13.96	23.98
5200	40	7.55	0.05	7.59	5.81	13.40		
5240	48	8.10	0.05	8.14	5.71	13.85		
5745	149	21.02	0.05	21.07	-	-	30.00	30.00
5785	157	20.25	0.05	20.30	-	-		
5825	165	19.99	0.05	20.04	-	-		

802.11n(20MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	IC Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	7.32	0.05	7.37	5.95	13.32	14.22	23.98
5200	40	7.57	0.05	7.62	5.84	13.46		
5240	48	8.12	0.05	8.17	5.77	13.94		
5745	149	21.09	0.05	21.14	-	-	30.00	30.00
5785	157	20.16	0.05	20.21	-	-		
5825	165	19.82	0.05	19.87	-	-		

802.11ac(20MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	IC Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	7.33	0.05	7.38	5.89	13.27	14.21	23.98
5200	40	7.63	0.05	7.68	5.84	13.52		
5240	48	8.18	0.05	8.23	5.77	14.00		
5745	149	20.93	0.05	20.98	-	-	30.00	30.00
5785	157	20.04	0.05	20.09	-	-		
5825	165	19.77	0.05	19.82	-	-		

802.11n(40MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	IC Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5190	38	8.47	0.10	8.57	5.48	14.05	14.77	23.98
5230	46	9.02	0.10	9.12	5.40	14.52		
5755	151	19.36	0.10	19.46	-	-	30.00	30.00
5795	159	18.90	0.10	19.00	-	-		

802.11ac(40MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	IC Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5190	38	8.43	0.10	8.53	5.72	14.25	14.77	23.98
5230	46	8.98	0.10	9.08	5.44	14.52		
5755	151	19.29	0.10	19.39	-	-	30.00	30.00
5795	159	18.88	0.10	18.98	-	-		

802.11ac(80MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	IC Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5210	42	8.80	0.20	9.00	5.41	14.41	14.77	23.98
5775	155	14.92	0.20	15.12	-	-	30.00	30.00

10.5 FREQUENCY STABILITY.

10.5.1 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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210061.94	61.94
100%		-30	5210081.38	81.38
100%		-20	5210077.33	77.33
100%		-10	5210071.40	71.40
100%		0	5210066.45	66.45
100%		+10	5210063.75	63.75
100%		+30	5210064.08	64.08
100%		+40	5210072.85	72.85
100%		+50	5210077.77	77.77
High	16.00	+20	5210080.86	80.86
Low	9.00	+20	5210081.62	81.62

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775062.51	62.51
100%		-30	5775081.62	81.62
100%		-20	5775077.74	77.74
100%		-10	5775071.38	71.38
100%		0	5775067.03	67.03
100%		+10	5775063.42	63.42
100%		+30	5775065.05	65.05
100%		+40	5775073.60	73.60
100%		+50	5775077.53	77.53
High	16.00	+20	5775080.44	80.44
Low	9.00	+20	5775079.88	79.88

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210067.95	67.95
100%		-30	5210087.85	87.85
100%		-20	5210085.48	85.48
100%		-10	5210079.04	79.04
100%		0	5210073.97	73.97
100%		+10	5210071.39	71.39
100%		+30	5210071.29	71.29
100%		+40	5210081.82	81.82
100%		+50	5210086.58	86.58
High	16.00	+20	5210086.71	86.71
Low	9.00	+20	5210084.95	84.95

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775066.27	66.27
100%		-30	5775085.38	85.38
100%		-20	5775082.01	82.01
100%		-10	5775076.83	76.83
100%		0	5775073.60	73.60
100%		+10	5775070.98	70.98
100%		+30	5775068.90	68.90
100%		+40	5775078.11	78.11
100%		+50	5775083.88	83.88
High	16.00	+20	5775086.04	86.04
Low	9.00	+20	5775085.26	85.26

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210072.33	72.33
100%		-30	5210091.38	91.38
100%		-20	5210087.39	87.39
100%		-10	5210080.45	80.45
100%		0	5210075.62	75.62
100%		+10	5210072.82	72.82
100%		+30	5210076.06	76.06
100%		+40	5210083.77	83.77
100%		+50	5210087.58	87.58
High	16.00	+20	5210090.14	90.14
Low	9.00	+20	5210089.54	89.54

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775071.87	71.87
100%		-30	5775092.54	92.54
100%		-20	5775088.49	88.49
100%		-10	5775082.47	82.47
100%		0	5775077.57	77.57
100%		+10	5775074.31	74.31
100%		+30	5775074.79	74.79
100%		+40	5775084.71	84.71
100%		+50	5775088.22	88.22
High	16.00	+20	5775089.38	89.38
Low	9.00	+20	5775089.12	89.12

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210077.73	77.73
100%		-30	5210097.41	97.41
100%		-20	5210093.59	93.59
100%		-10	5210086.62	86.62
100%		0	5210082.49	82.49
100%		+10	5210078.72	78.72
100%		+30	5210081.37	81.37
100%		+40	5210089.29	89.29
100%		+50	5210093.55	93.55
High	16.00	+20	5210095.99	95.99
Low	9.00	+20	5210096.01	96.01

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:	12.0 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775078.29	78.29
100%		-30	5775098.66	98.66
100%		-20	5775095.00	95.00
100%		-10	5775088.05	88.05
100%		0	5775083.90	83.90
100%		+10	5775080.55	80.55
100%		+30	5775081.93	81.93
100%		+40	5775091.16	91.16
100%		+50	5775096.84	96.84
High	16.00	+20	5775097.97	97.97
Low	9.00	+20	5775097.79	97.79

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.

10.6 POWER SPECTRAL DENSITY

FCC & ISED

802.11a Mode		Max. Power Spectral Density [dBm]	Duty Cycle Factor (dB)	Total PSD	Limit
Frequency [MHz]	Channel No.			Measured Power(dBm) + Duty Cycle Factor (dB)	
5180	36	-3.534	0.045	-3.489	11 dBm/MHz
5200	40	-3.177	0.045	-3.132	
5240	48	-3.005	0.045	-2.960	
5745	149	7.398	0.045	7.443	30 dBm/500 kHz
5785	157	6.857	0.045	6.902	
5825	165	6.353	0.045	6.398	

802.11n(20 MHz) Mode		Max. Power Spectral Density [dBm]	Duty Cycle Factor (dB)	Total PSD	Limit
Frequency [MHz]	Channel No.			Measured Power(dBm) + Duty Cycle Factor (dB)	
5180	36	-3.669	0.048	-3.621	11 dBm/MHz
5200	40	-3.452	0.048	-3.404	
5240	48	-3.399	0.048	-3.351	
5745	149	7.042	0.048	7.090	30 dBm/500 kHz
5785	157	6.506	0.048	6.554	
5825	165	5.968	0.048	6.016	

802.11n(40 MHz) Mode		Max. Power Spectral Density [dBm]	Duty Cycle Factor (dB)	Total PSD	Limit
Frequency [MHz]	Channel No.			Measured Power(dBm) + Duty Cycle Factor (dB)	
5190	38	-5.388	0.097	-5.291	11 dBm/MHz
5230	46	-5.266	0.097	-5.169	
5755	151	1.746	0.097	1.843	30 dBm/500 kHz
5795	159	1.872	0.097	1.969	

802.11ac(20 MHz) Mode		Max. Power Spectral Density [dBm]	Duty Cycle Factor (dB)	Total PSD	Limit
Frequency [MHz]	Channel No.			Measured Power(dBm) + Duty Cycle Factor (dB)	
5180	36	-3.763	0.051	-3.712	11 dBm/MHz
5200	40	-3.451	0.051	-3.400	
5240	48	-3.294	0.051	-3.243	
5745	149	7.220	0.051	7.271	30 dBm/500 kHz
5785	157	6.033	0.051	6.084	
5825	165	6.081	0.051	6.132	

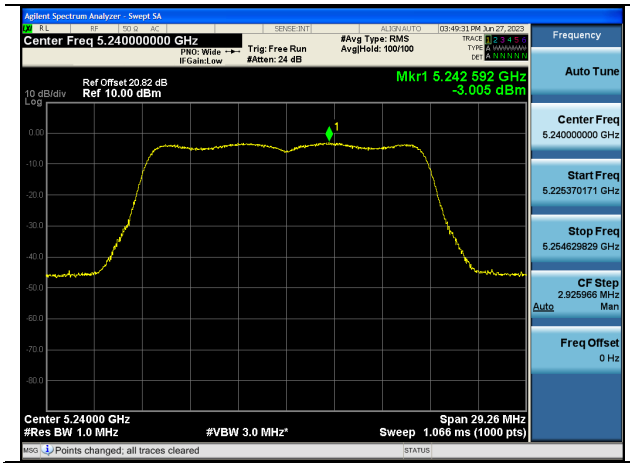
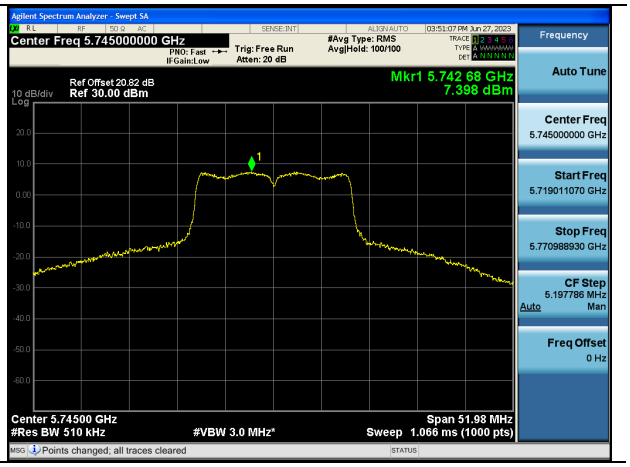
802.11ac(40 MHz) Mode		Max. Power Spectral Density [dBm]	Duty Cycle Factor (dB)	Total PSD	Limit
Frequency [MHz]	Channel No.			Measured Power(dBm) + Duty Cycle Factor (dB)	
5190	38	-5.374	0.096	-5.278	11 dBm/MHz
5230	46	-5.371	0.096	-5.275	
5755	151	1.950	0.096	2.046	30 dBm/500 kHz
5795	159	1.866	0.096	1.962	

802.11ac(80 MHz) Mode		Max. Power Spectral Density [dBm]	Duty Cycle Factor (dB)	Total PSD	Limit
Frequency [MHz]	Channel No.			Measured Power(dBm) + Duty Cycle Factor (dB)	
5210	42	-8.727	0.203	-8.524	11 dBm/MHz
5775	155	-5.839	0.203	-5.636	30 dBm/500 kHz

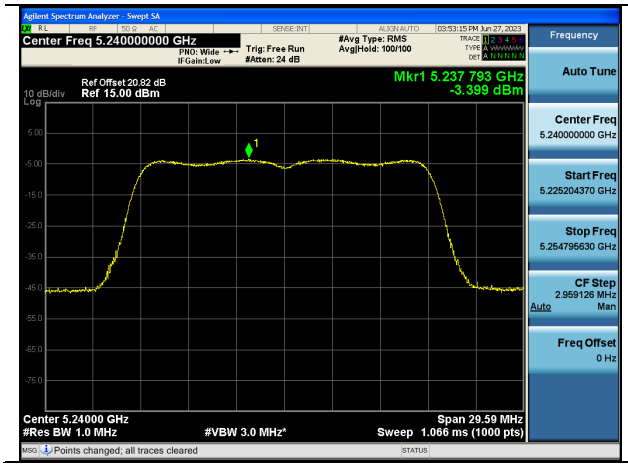
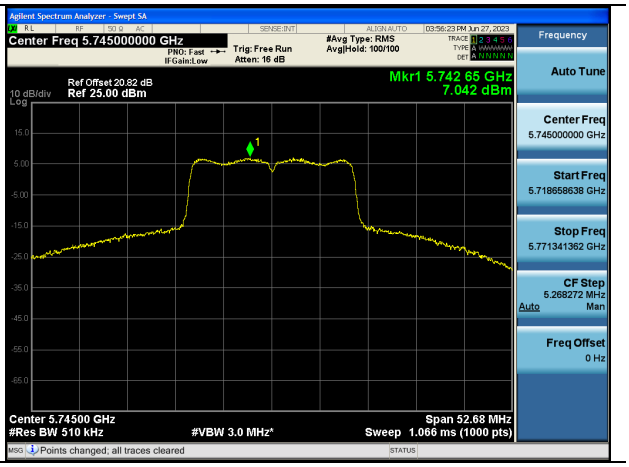
▣ Test Plots(802.11a)

Note:

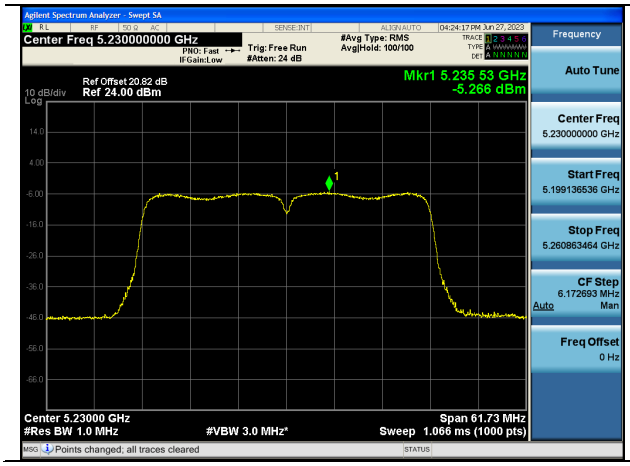
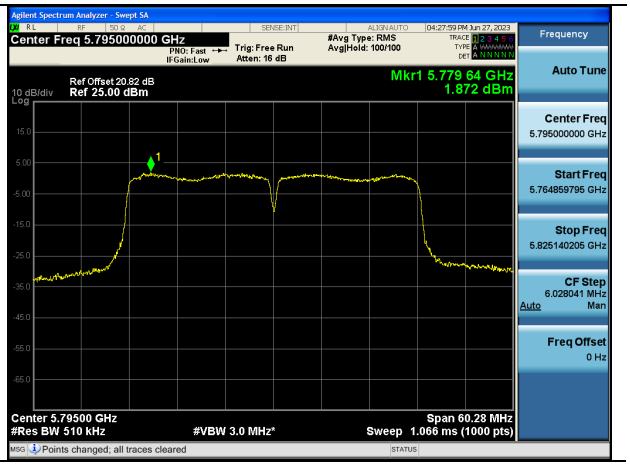
In order to simplify the report, attached plots were only the highest PSD Channel.

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

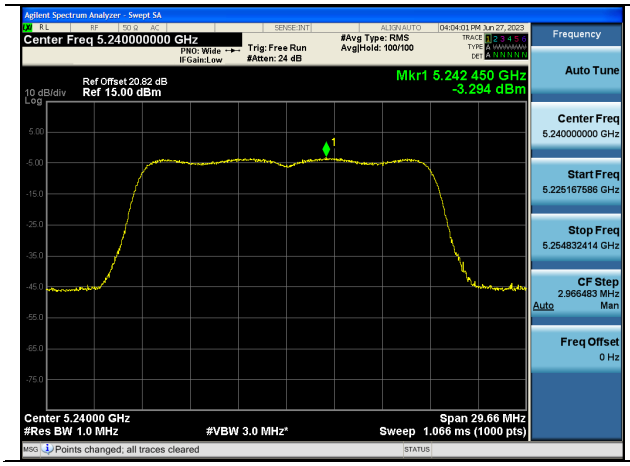
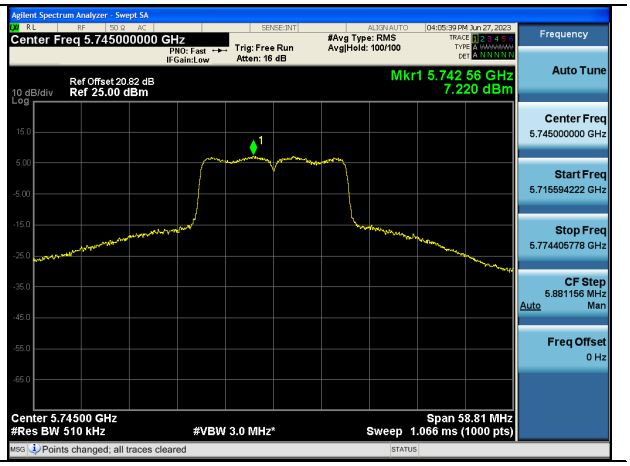
▣ Test Plots(802.11n(HT20))

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

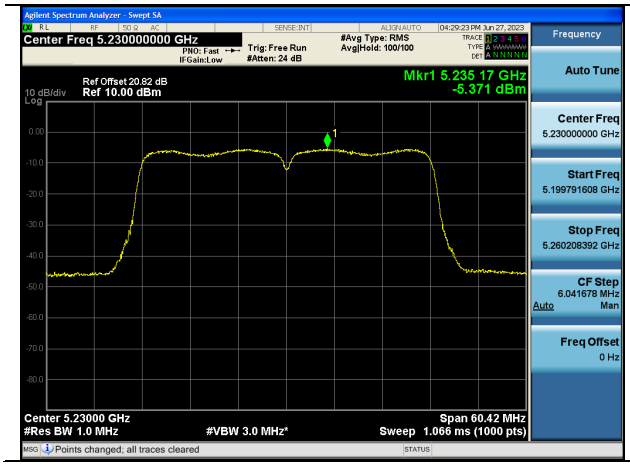
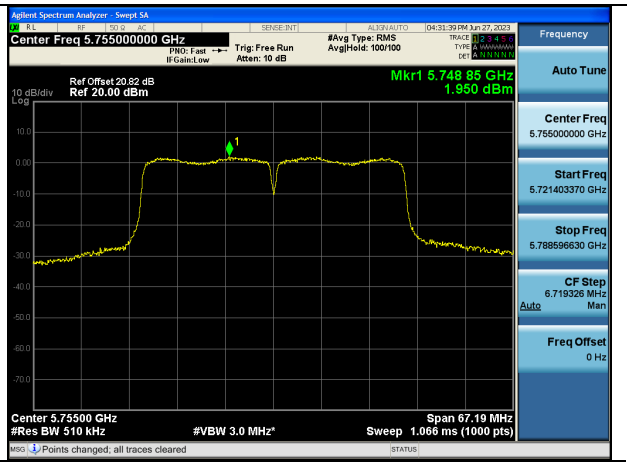
▣ Test Plots(802.11n(HT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 159)
	

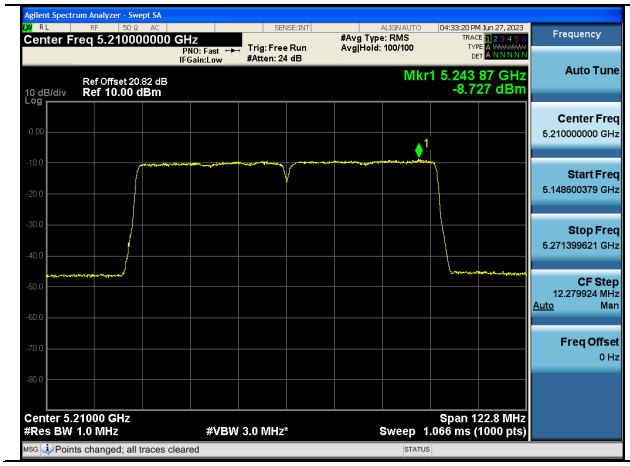
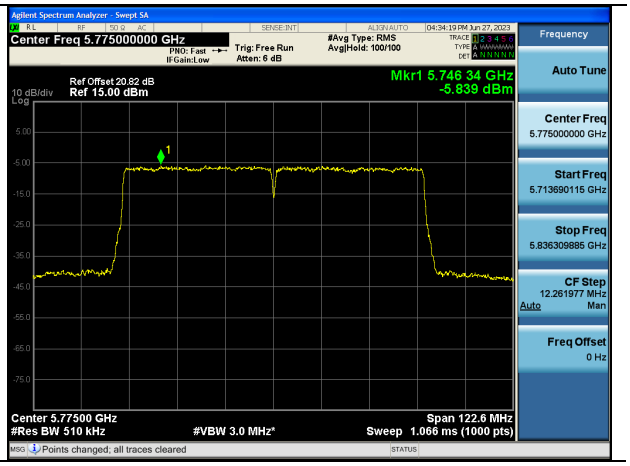
▣ Test Plots(802.11ac(VHT20))

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

▣ Test Plots(802.11ac(VHT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT80))

UNII 1 (Ch. 42)	UNII 3 (Ch. 155)
	

10.7 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

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

Note:

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

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	Ant. POL	Total	Limit	Margin
[MHz]	[dBµV]	[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	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10360	44.02	8.12	V	52.14	68.20	16.06	PK
15540	40.55	12.95	V	53.50	73.98	20.48	PK
15540	27.12	12.95	V	40.07	53.98	13.91	AV
10360	44.11	8.12	H	52.23	68.20	15.97	PK
15540	40.73	12.95	H	53.68	73.98	20.30	PK
15540	27.32	12.95	H	40.27	53.98	13.71	AV

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

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10400	43.71	8.14	V	51.85	68.20	16.35	PK
15600	41.22	13.29	V	54.51	73.98	19.47	PK
15600	27.02	13.29	V	40.31	53.98	13.67	AV
10400	43.82	8.14	H	51.96	68.20	16.24	PK
15600	41.32	13.29	H	54.61	73.98	19.37	PK
15600	27.21	13.29	H	40.50	53.98	13.48	AV

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

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10480	43.78	8.62	V	52.40	68.20	15.80	PK
15720	40.33	13.21	V	53.54	73.98	20.44	PK
15720	27.52	13.21	V	40.73	53.98	13.25	AV
10480	43.91	8.62	H	52.53	68.20	15.67	PK
15720	40.41	13.21	H	53.62	73.98	20.36	PK
15720	27.68	13.21	H	40.89	53.98	13.09	AV

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

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11490	44.41	10.81	V	55.22	73.98	18.76	PK
11490	31.31	10.81	V	42.12	53.98	11.86	AV
17235	41.31	14.28	V	55.59	68.20	12.61	PK
11490	44.25	10.81	H	55.06	73.98	18.92	PK
11490	31.22	10.81	H	42.03	53.98	11.95	AV
17235	41.21	14.28	H	55.49	68.20	12.71	PK

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

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11570	44.96	10.13	V	55.09	73.98	18.89	PK
11570	32.36	10.13	V	42.49	53.98	11.49	AV
17355	41.22	15.62	V	56.84	68.20	11.36	PK
11570	44.85	10.13	H	54.98	73.98	19.00	PK
11570	32.12	10.13	H	42.25	53.98	11.73	AV
17355	41.18	15.62	H	56.80	68.20	11.40	PK

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

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11650	46.14	9.58	V	55.72	73.98	18.26	PK
11650	34.01	9.58	V	43.59	53.98	10.39	AV
17475	41.33	17.18	V	58.51	68.20	9.69	PK
11650	45.95	9.58	H	55.53	73.98	18.45	PK
11650	33.89	9.58	H	43.47	53.98	10.51	AV
17475	41.11	17.18	H	58.29	68.20	9.91	PK

Band :	UNII 1
Operation Mode:	802.11n(HT20)
MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10360	44.11	8.12	V	52.23	68.20	15.97	PK
15540	40.52	12.95	V	53.47	73.98	20.51	PK
15540	27.15	12.95	V	40.10	53.98	13.88	AV
10360	44.35	8.12	H	52.47	68.20	15.73	PK
15540	40.74	12.95	H	53.69	73.98	20.29	PK
15540	27.33	12.95	H	40.28	53.98	13.70	AV

Band :	UNII 1
Operation Mode:	802.11n(HT20)
MCS Index:	0
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10400	43.85	8.14	V	51.99	68.20	16.21	PK
15600	41.42	13.29	V	54.71	73.98	19.27	PK
15600	27.02	13.29	V	40.31	53.98	13.67	AV
10400	43.97	8.14	H	52.11	68.20	16.09	PK
15600	41.54	13.29	H	54.83	73.98	19.15	PK
15600	27.20	13.29	H	40.49	53.98	13.49	AV

Band :	UNII 1
Operation Mode:	802.11n(HT20)
MCS Index:	0
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10480	43.32	8.62	V	51.94	68.20	16.26	PK
15720	40.55	13.21	V	53.76	73.98	20.22	PK
15720	27.39	13.21	V	40.60	53.98	13.38	AV
10480	43.54	8.62	H	52.16	68.20	16.04	PK
15720	40.65	13.21	H	53.86	73.98	20.12	PK
15720	27.53	13.21	H	40.74	53.98	13.24	AV

Band :	UNII 3
Operation Mode:	802.11n(HT20)
MCS Index:	0
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11490	44.10	10.81	V	54.91	73.98	19.07	PK
11490	31.41	10.81	V	42.22	53.98	11.76	AV
17235	41.41	14.28	V	55.69	68.20	12.51	PK
11490	43.95	10.81	H	54.76	73.98	19.22	PK
11490	31.33	10.81	H	42.14	53.98	11.84	AV
17235	41.29	14.28	H	55.57	68.20	12.63	PK

Band :	UNII 3
Operation Mode:	802.11n(HT20)
MCS Index:	0
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11570	44.87	10.13	V	55.00	73.98	18.98	PK
11570	32.02	10.13	V	42.15	53.98	11.83	AV
17355	41.39	15.62	V	57.01	68.20	11.19	PK
11570	44.12	10.13	H	54.25	73.98	19.73	PK
11570	31.86	10.13	H	41.99	53.98	11.99	AV
17355	41.19	15.62	H	56.81	68.20	11.39	PK

Band :	UNII 3
Operation Mode:	802.11n(HT20)
MCS Index:	0
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11650	47.58	9.58	V	57.16	73.98	16.82	PK
11650	34.17	9.58	V	43.75	53.98	10.23	AV
17475	41.23	17.18	V	58.41	68.20	9.79	PK
11650	47.35	9.58	H	56.93	73.98	17.05	PK
11650	34.02	9.58	H	43.60	53.98	10.38	AV
17475	41.05	17.18	H	58.23	68.20	9.97	PK

Band :	UNII 1
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10360	43.77	8.12	V	51.89	68.20	16.31	PK
15540	40.32	12.95	V	53.27	73.98	20.71	PK
15540	27.12	12.95	V	40.07	53.98	13.91	AV
10360	43.92	8.12	H	52.04	68.20	16.16	PK
15540	40.48	12.95	H	53.43	73.98	20.55	PK
15540	27.32	12.95	H	40.27	53.98	13.71	AV

Band :	UNII 1
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10400	43.89	8.14	V	52.03	68.20	16.17	PK
15600	40.09	13.29	V	53.38	73.98	20.60	PK
15600	27.02	13.29	V	40.31	53.98	13.67	AV
10400	44.12	8.14	H	52.26	68.20	15.94	PK
15600	40.15	13.29	H	53.44	73.98	20.54	PK
15600	27.25	13.29	H	40.54	53.98	13.44	AV

Band :	UNII 1
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10480	43.69	8.62	V	52.31	68.20	15.89	PK
15720	40.39	13.21	V	53.60	73.98	20.38	PK
15720	27.48	13.21	V	40.69	53.98	13.29	AV
10480	43.85	8.62	H	52.47	68.20	15.73	PK
15720	40.43	13.21	H	53.64	73.98	20.34	PK
15720	27.60	13.21	H	40.81	53.98	13.17	AV

Band :	UNII 3
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11490	44.21	10.81	V	55.02	73.98	18.96	PK
11490	31.38	10.81	V	42.19	53.98	11.79	AV
17235	41.32	14.28	V	55.60	68.20	12.60	PK
11490	44.09	10.81	H	54.90	73.98	19.08	PK
11490	31.12	10.81	H	41.93	53.98	12.05	AV
17235	41.21	14.28	H	55.49	68.20	12.71	PK

Band :	UNII 3
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11570	45.10	10.13	V	55.23	73.98	18.75	PK
11570	32.12	10.13	V	42.25	53.98	11.73	AV
17355	41.33	15.62	V	56.95	68.20	11.25	PK
11570	44.89	10.13	H	55.02	73.98	18.96	PK
11570	31.89	10.13	H	42.02	53.98	11.96	AV
17355	41.11	15.62	H	56.73	68.20	11.47	PK

Band :	UNII 3
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11650	48.14	9.58	V	57.72	73.98	16.26	PK
11650	34.23	9.58	V	43.81	53.98	10.17	AV
17475	41.18	17.18	V	58.36	68.20	9.84	PK
11650	47.95	9.58	H	57.53	73.98	16.45	PK
11650	34.05	9.58	H	43.63	53.98	10.35	AV
17475	41.07	17.18	H	58.25	68.20	9.95	PK

Band :	UNII 1
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10380	44.32	8.11	V	52.43	68.20	15.77	PK
15570	40.51	12.96	V	53.47	73.98	20.51	PK
15570	27.62	12.96	V	40.58	53.98	13.40	AV
10380	44.47	8.11	H	52.58	68.20	15.62	PK
15570	40.78	12.96	H	53.74	73.98	20.24	PK
15570	27.81	12.96	H	40.77	53.98	13.21	AV

Band :	UNII 1
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10460	43.95	8.45	V	52.40	68.20	15.80	PK
15690	40.12	13.07	V	53.19	73.98	20.79	PK
15690	27.31	13.07	V	40.38	53.98	13.60	AV
10460	44.04	8.45	H	52.49	68.20	15.71	PK
15690	40.33	13.07	H	53.40	73.98	20.58	PK
15690	27.43	13.07	H	40.50	53.98	13.48	AV

Band :	UNII 3
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5755
Channel No.	151 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11510	44.53	10.44	V	54.97	73.98	19.01	PK
11510	31.43	10.44	V	41.87	53.98	12.11	AV
17265	41.21	14.73	V	55.94	68.20	12.26	PK
11510	44.21	10.44	H	54.65	73.98	19.33	PK
11510	31.33	10.44	H	41.77	53.98	12.21	AV
17265	41.02	14.73	H	55.75	68.20	12.45	PK

Band :	UNII 3
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11590	44.19	9.85	V	54.04	73.98	19.94	PK
11590	31.34	9.85	V	41.19	53.98	12.79	AV
17385	41.21	15.67	V	56.88	68.20	11.32	PK
11590	43.99	9.85	H	53.84	73.98	20.14	PK
11590	31.22	9.85	H	41.07	53.98	12.91	AV
17385	41.12	15.67	H	56.79	68.20	11.41	PK

Band :	UNII 1
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10380	44.32	8.11	V	52.43	68.20	15.77	PK
15570	40.39	12.96	V	53.35	73.98	20.63	PK
15570	27.81	12.96	V	40.77	53.98	13.21	AV
10380	44.51	8.11	H	52.62	68.20	15.58	PK
15570	40.55	12.96	H	53.51	73.98	20.47	PK
15570	27.95	12.96	H	40.91	53.98	13.07	AV

Band :	UNII 1
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10460	43.89	8.45	V	52.34	68.20	15.86	PK
15690	39.65	13.07	V	52.72	73.98	21.26	PK
15690	27.22	13.07	V	40.29	53.98	13.69	AV
10460	44.10	8.45	H	52.55	68.20	15.65	PK
15690	39.74	13.07	H	52.81	73.98	21.17	PK
15690	27.44	13.07	H	40.51	53.98	13.47	AV

Band :	UNII 3
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5755
Channel No.	151 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11510	44.63	10.44	V	55.07	73.98	18.91	PK
11510	31.43	10.44	V	41.87	53.98	12.11	AV
17265	41.18	14.73	V	55.91	68.20	12.29	PK
11510	44.51	10.44	H	54.95	73.98	19.03	PK
11510	31.33	10.44	H	41.77	53.98	12.21	AV
17265	41.02	14.73	H	55.75	68.20	12.45	PK

Band :	UNII 3
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11590	44.42	9.85	V	54.27	73.98	19.71	PK
11590	31.44	9.85	V	41.29	53.98	12.69	AV
17385	41.20	15.67	V	56.87	68.20	11.33	PK
11590	44.25	9.85	H	54.10	73.98	19.88	PK
11590	31.34	9.85	H	41.19	53.98	12.79	AV
17385	41.01	15.67	H	56.68	68.20	11.52	PK

Band :	UNII 1
Operation Mode:	802.11ac(VHT80)
MCS Index:	0
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10420	44.22	8.10	V	52.32	68.20	15.88	PK
15630	43.07	13.16	V	56.23	73.98	17.75	PK
15630	28.34	13.16	V	41.50	53.98	12.48	AV
10420	44.34	8.10	H	52.44	68.20	15.76	PK
15630	43.35	13.16	H	56.51	73.98	17.47	PK
15630	28.42	13.16	H	41.58	53.98	12.40	AV

Band :	UNII 3
Operation Mode:	802.11ac(VHT80)
MCS Index:	0
Operating Frequency	5775 MHz
Channel No.	155 Ch

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11550	43.14	10.04	V	53.18	73.98	20.80	PK
11550	30.53	10.04	V	40.57	53.98	13.41	AV
17325	41.24	15.42	V	56.66	68.20	11.54	PK
11550	43.09	10.04	H	53.13	73.98	20.85	PK
11550	30.33	10.04	H	40.37	53.98	13.61	AV
17325	40.89	15.42	H	56.31	68.20	11.89	PK

[RSDB]

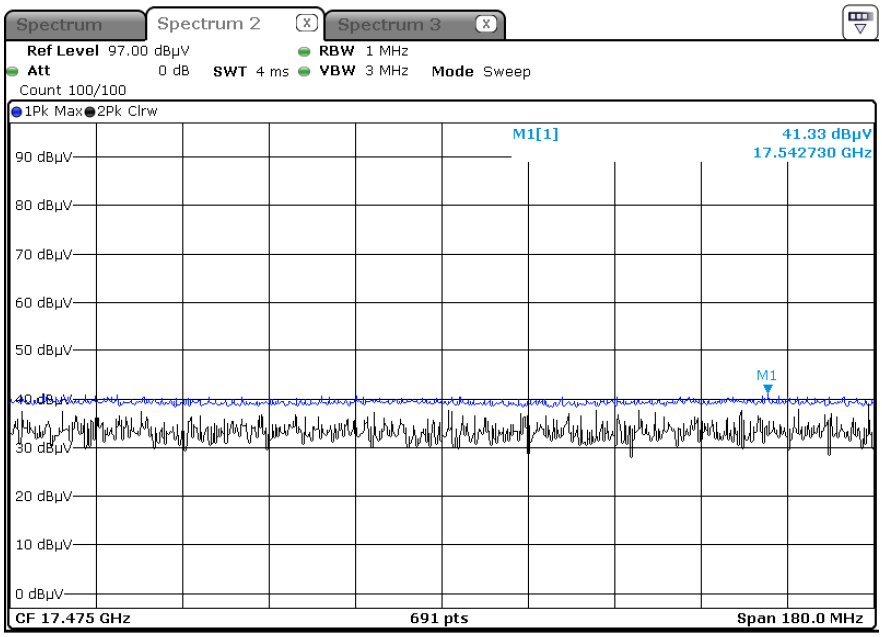
DTS 802.11b 1 Mbps Ch.6 + UNII 802.11a 6 Mbps Ch.165

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11650	46.78	9.58	V	56.36	73.98	17.62	PK
11650	33.77	9.58	V	43.35	53.98	10.63	AV
17475	41.22	17.18	V	58.40	68.20	9.80	PK
11650	46.05	9.58	H	55.63	73.98	18.35	PK
11650	32.77	9.58	H	42.35	53.98	11.63	AV
17475	41.41	17.18	H	58.59	68.20	9.61	PK

Note : WLAN 2.4 GHz RSDB Data refer to [DTS] Test Report.

▣ Test Plots

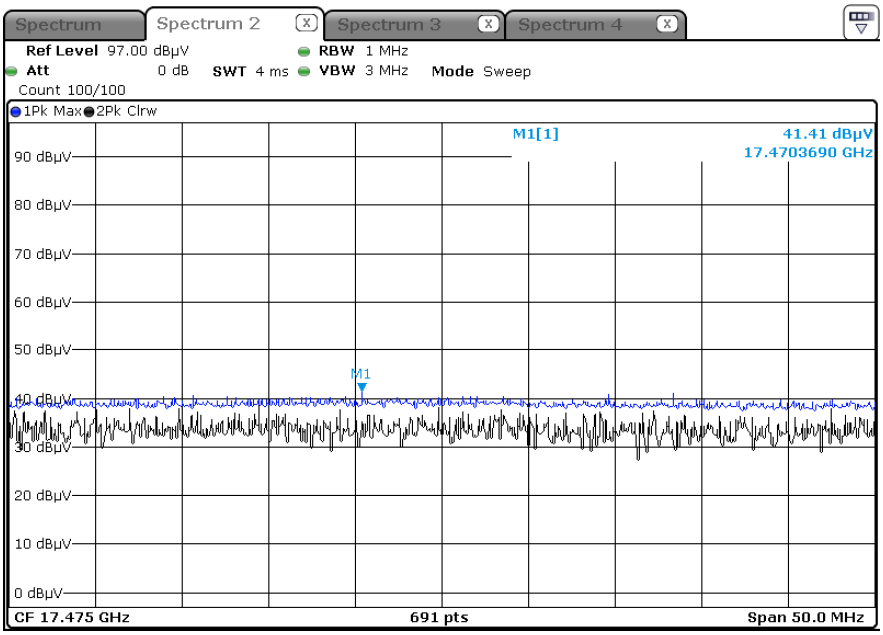
Peak Measured Value (802.11a, Ch.165 3rd Harmonic, Y-V)



[RSDB] DTS 802.11b 1 Mbps Ch.6 + UNII 802.11a 6 Mbps Ch.165

▣ Test Plots (Worst case : X-H)

Radiated Spurious Emissions plot – Peak Measured Value



Note:

Plot of worst case are only reported.

10.8 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	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
5150	53.05	8.43	H	61.48	73.98	12.50	PK
5150	34.55	8.43	H	42.98	53.98	11.00	AV
5150	53.45	8.43	V	61.88	73.98	12.10	PK
5150	34.75	8.43	V	43.18	53.98	10.80	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
5150	53.29	8.43	H	61.72	73.98	12.26	PK
5150	34.62	8.43	H	43.05	53.98	10.93	AV
5150	53.45	8.43	V	61.88	73.98	12.10	PK
5150	34.91	8.43	V	43.34	53.98	10.64	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
5150	51.89	8.43	H	60.32	73.98	13.66	PK
5150	34.32	8.43	H	42.75	53.98	11.23	AV
5150	52.18	8.43	V	60.61	73.98	13.37	PK
5150	34.59	8.43	V	43.02	53.98	10.96	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
5150	54.89	15.59	H	70.48	73.98	3.50	PK
5150	32.65	15.59	H	48.24	53.98	5.74	AV
5150	55.14	15.59	V	70.73	73.98	3.25	PK
5150	32.82	15.59	V	48.41	53.98	5.57	AV

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

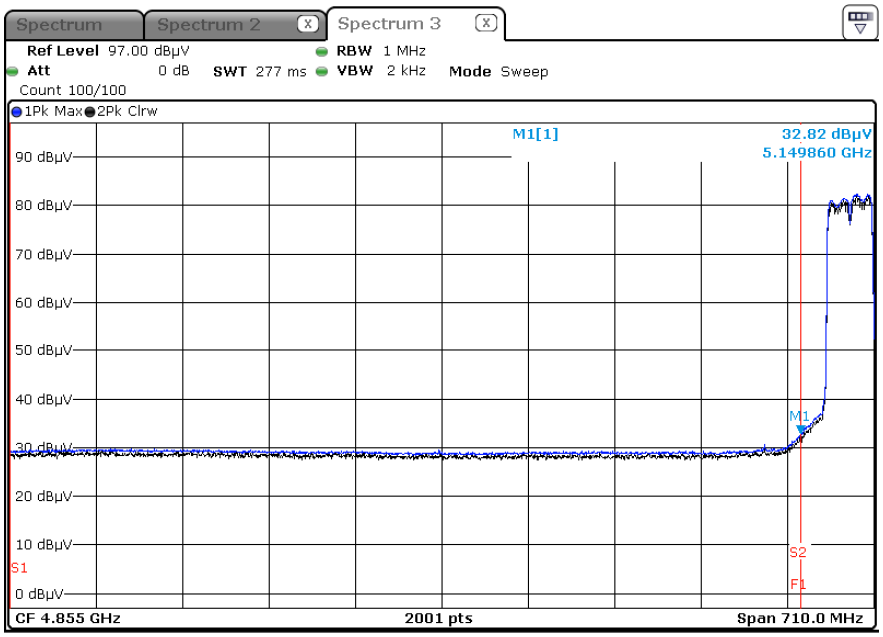
Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
5150	53.29	15.59	H	68.88	73.98	5.10	PK
5150	32.33	15.59	H	47.92	53.98	6.06	AV
5150	53.47	15.59	V	69.06	73.98	4.92	PK
5150	32.67	15.59	V	48.26	53.98	5.72	AV

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

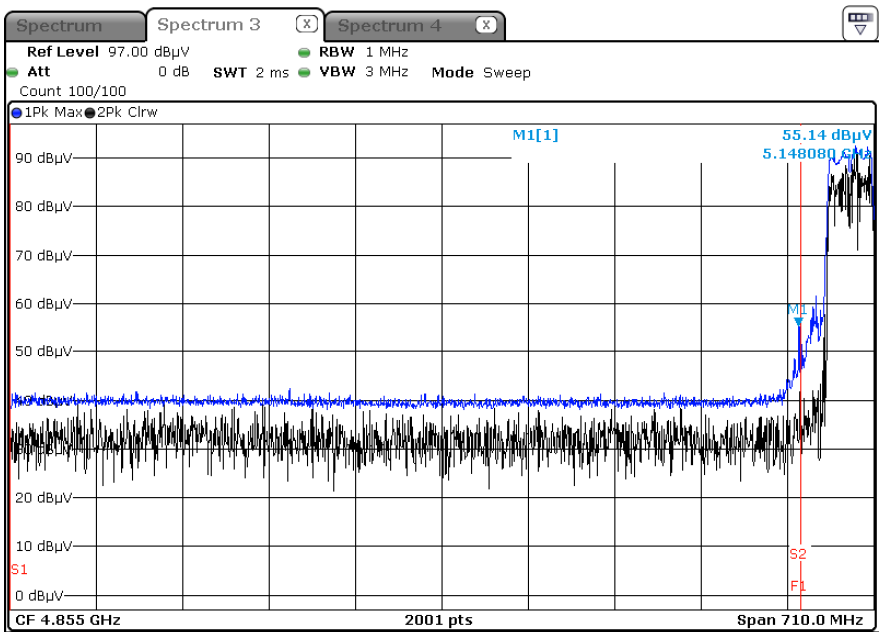
Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
5150	48.89	15.59	H	64.48	73.98	9.50	PK
5150	34.89	15.59	H	50.48	53.98	3.50	AV
5150	49.13	15.59	V	64.72	73.98	9.26	PK
5150	35.06	15.59	V	50.65	53.98	3.33	AV

▣ Test Plots(UNII 1)

Average Measured Value (802.11 n_HT40, Ch.38, Z-V)



Peak Measured Value (802.11 n_HT40, Ch.38, Z-V)

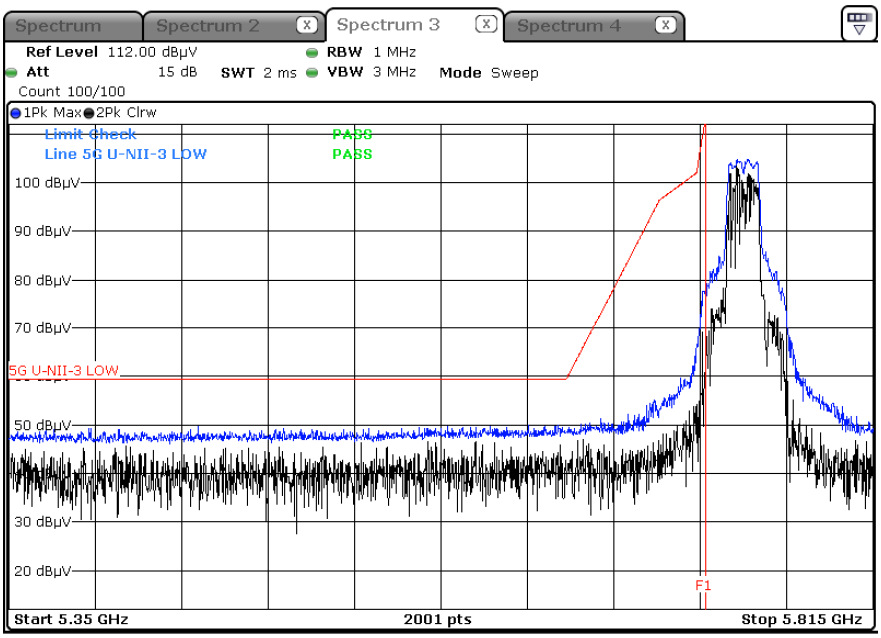


Note:

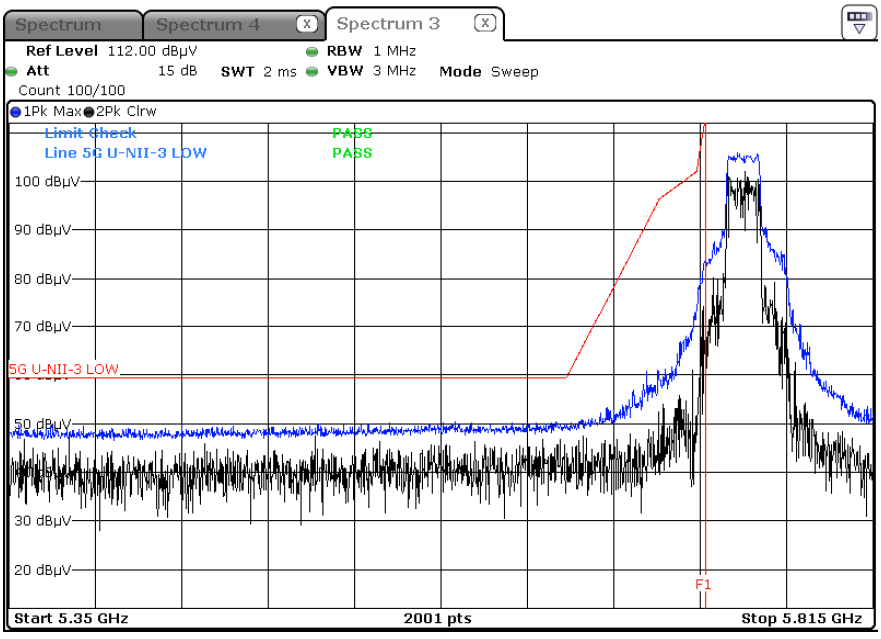
Only the worst case plots for Radiated Restricted Band Edge.

▣ Test Plots(UNII 3)

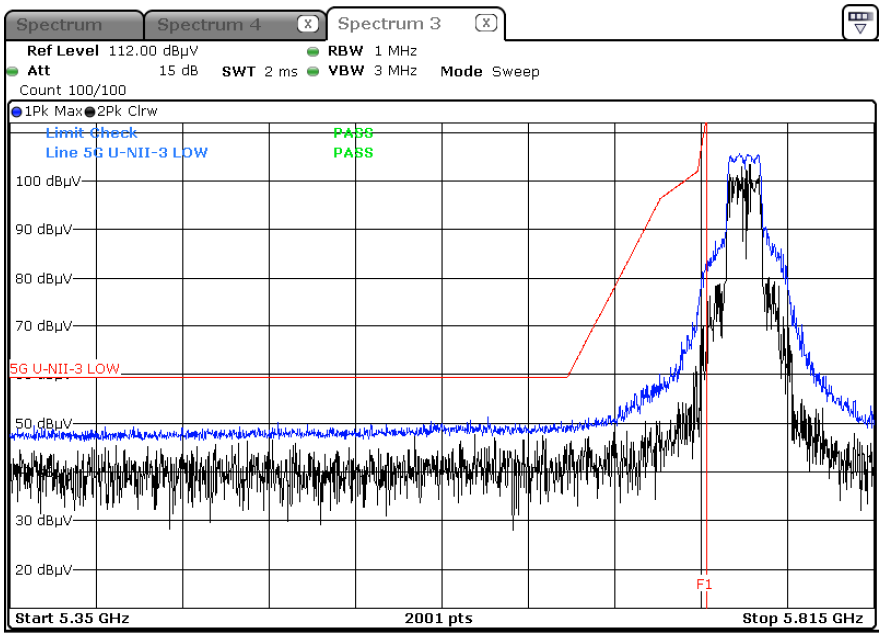
Peak Result (802.11a, Ch.149, Z-V)



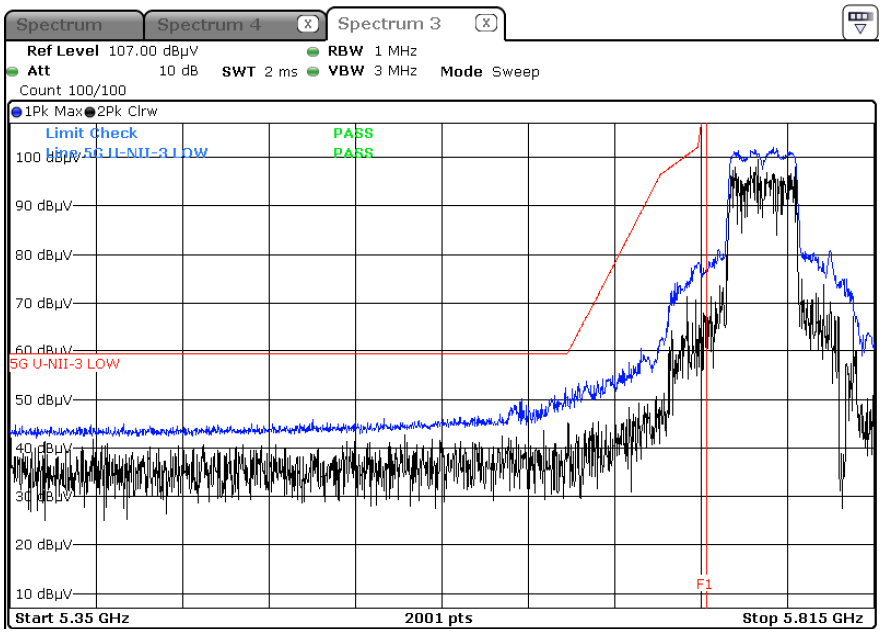
Peak Result (802.11n_HT20, Ch.149, Z-V)



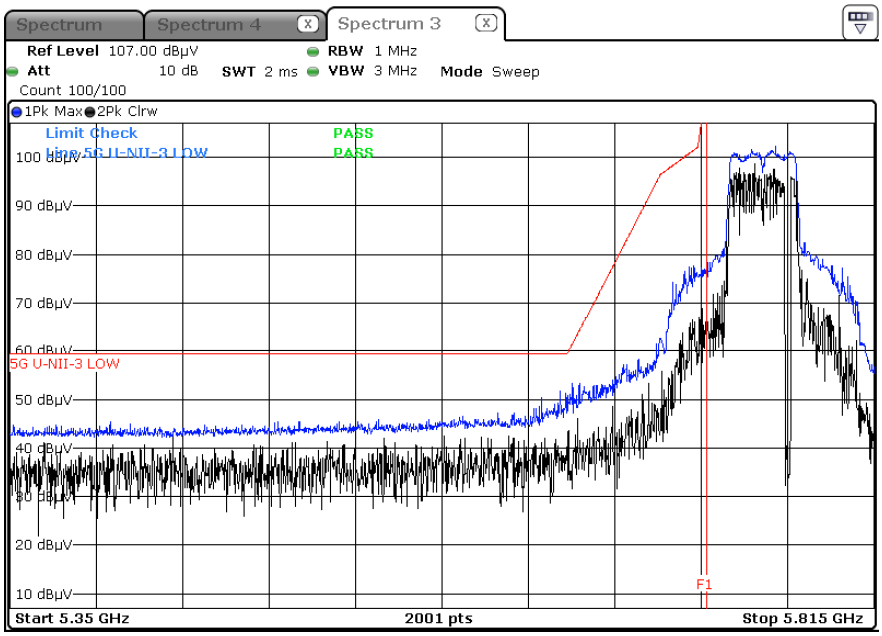
Peak Result (802.11ac_VHT20, Ch.149, Z-V)



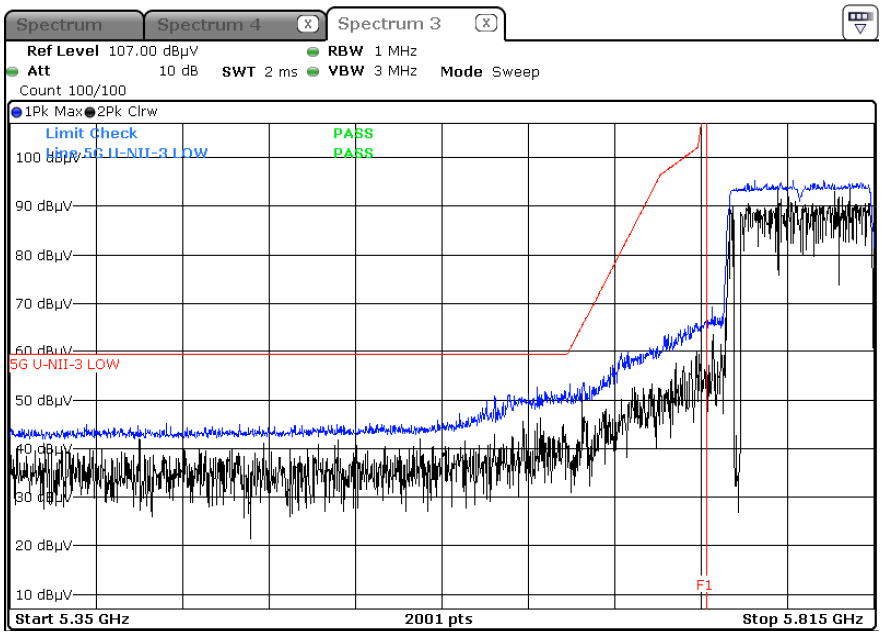
Peak Result (802.11n_HT40, Ch.151, Z-V)



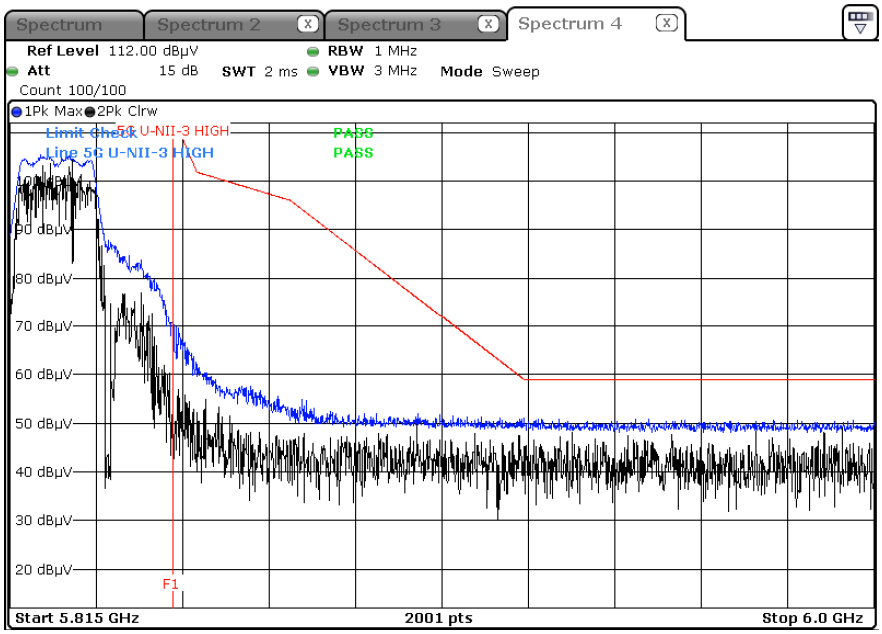
Peak Result (802.11ac_VHT40, Ch.151, Z-V)



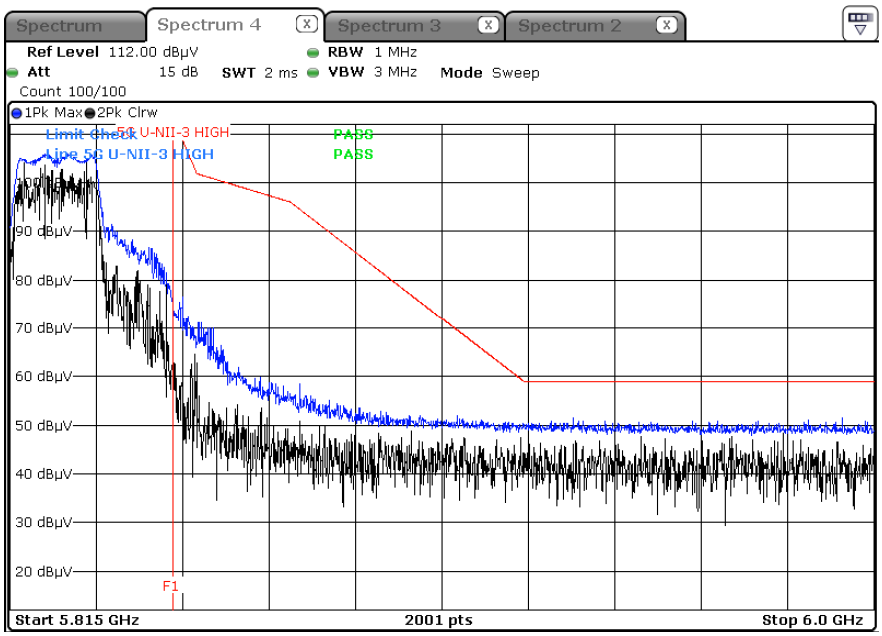
Peak Result (802.11ac_VHT80, Ch.155, Z-V)



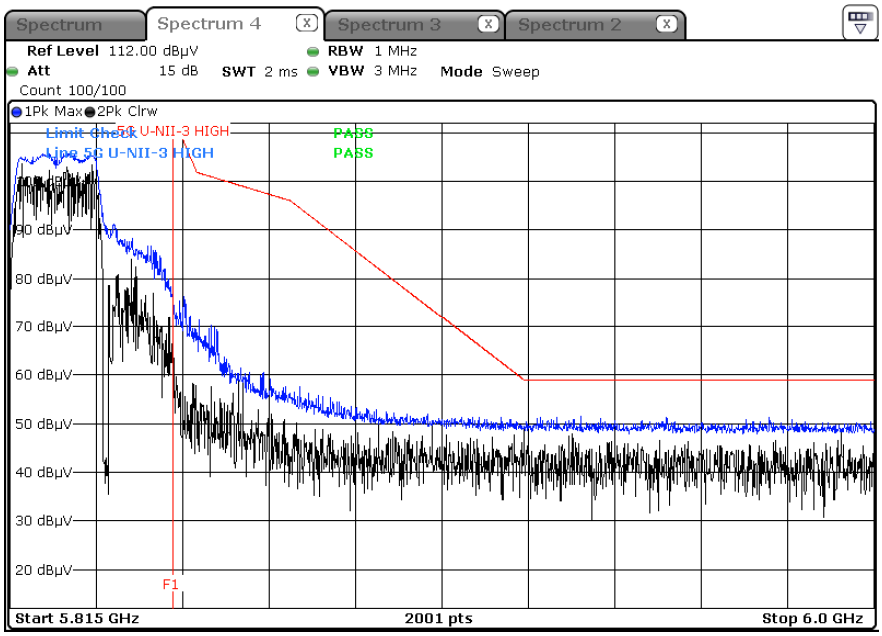
Peak Result (802.11a, Ch.165, Z-V)



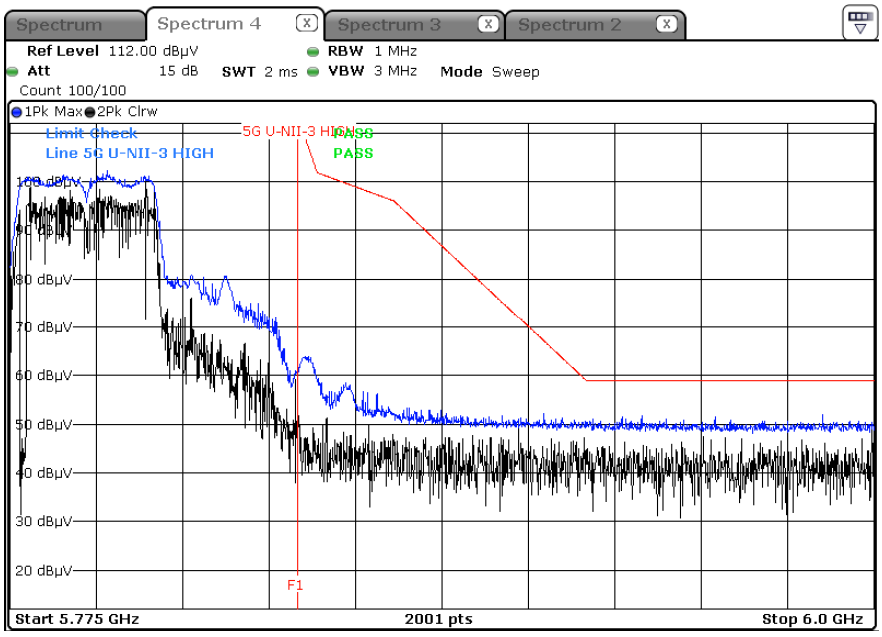
Peak Result (802.11n_HT20, Ch.165, Z-V)



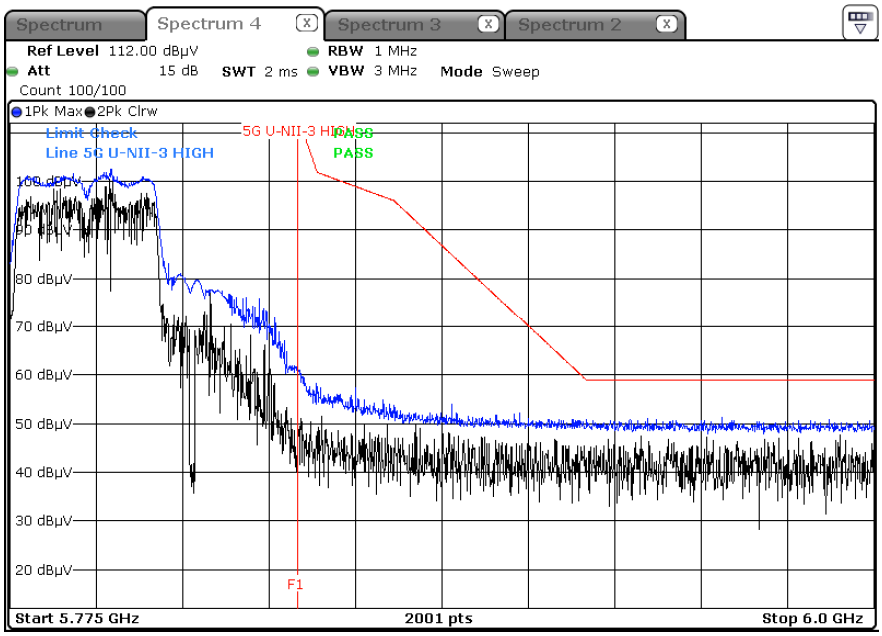
Peak Result (802.11ac_VHT20, Ch.165, Z-V)



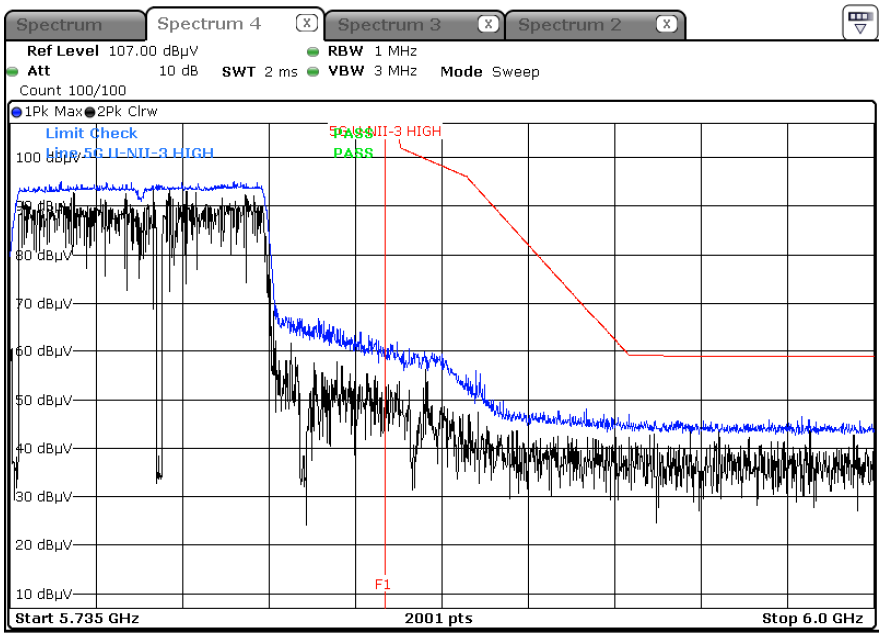
Peak Result (802.11n_HT40, Ch.159, Z-V)



Peak Result (802.11ac_VHT40, Ch.159, Z-V)



Peak Result (802.11ac_VHT80, Ch.155, Z-V)



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.

10.9 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F + C.L	Ant. POL	Total	Limit	Margin
[MHz]	[dBμV]	[dBm/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

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

10.10 RADIATED OUTPUT POWER (E.I.R.P)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz / 5200 MHz / 5240 MHz
Channel No.	36 Ch / 40 Ch / 48 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5180	65.23	43.16	V	108.39	13.19
5200	65.35	43.25	V	108.60	13.40
5240	66.06	42.99	V	109.05	13.85

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5745 MHz / 5785 MHz / 5825 MHz
Channel No.	149 Ch / 157 Ch / 165 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5745	74.82	44.13	V	118.95	23.75
5785	73.30	44.53	V	117.83	22.63
5825	74.07	44.78	V	118.85	23.65

Band :	UNII 1
Operation Mode:	802.11 n(HT20)
MCS Index:	0
Operating Frequency	5180 MHz / 5200 MHz / 5240 MHz
Channel No.	36 Ch / 40 Ch / 48 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5180	65.32	43.20	V	108.52	13.32
5200	65.37	43.29	V	108.66	13.46
5240	66.10	43.04	V	109.14	13.94

Band :	UNII 3
Operation Mode:	802.11 n(HT20)
MCS Index:	0
Operating Frequency	5745 MHz / 5785 MHz / 5825 MHz
Channel No.	149 Ch / 157 Ch / 165 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5745	74.81	44.17	V	118.98	23.78
5785	73.28	44.57	V	117.85	22.65
5825	73.98	44.83	V	118.81	23.61

Band :	UNII 1
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5180 MHz / 5200 MHz / 5240 MHz
Channel No.	36 Ch / 40 Ch / 48 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5180	65.22	43.25	V	108.47	13.27
5200	65.38	43.34	V	108.72	13.52
5240	66.11	43.09	V	109.20	14.00

Band :	UNII 3
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5745 MHz / 5785 MHz / 5825 MHz
Channel No.	149 Ch / 157 Ch / 165 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5745	74.81	44.22	V	119.03	23.83
5785	73.33	44.63	V	117.96	22.76
5825	73.97	44.88	V	118.85	23.65

Band :	UNII 1
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5190 MHz / 5230 MHz
Channel No.	38 Ch / 46 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5190	66.03	43.22	V	109.25	14.05
5230	66.63	43.09	V	109.72	14.52

Band :	UNII 3
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5755 MHz / 5795 MHz
Channel No.	151 Ch / 159 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5755	75.22	44.23	V	119.45	24.25
5795	71.80	44.93	V	116.73	21.53

Band :	UNII 1
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5190 MHz / 5230 MHz
Channel No.	38 Ch / 46 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5190	66.23	43.22	V	109.45	14.25
5230	66.63	43.09	V	109.72	14.52

Band :	UNII 3
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5755 MHz / 5795 MHz
Channel No.	151 Ch / 159 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5755	75.14	44.23	V	119.37	24.17
5795	71.72	44.93	V	116.65	21.45

Band :	UNII 1
Operation Mode:	802.11ac(VHT80)
MCS Index:	0
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5210	66.11	43.50	V	109.61	14.41

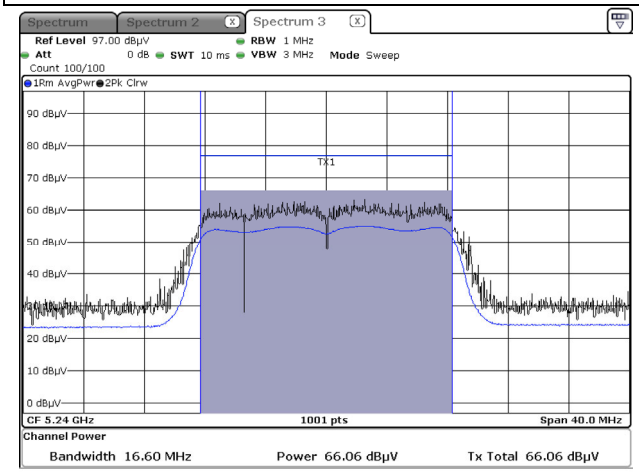
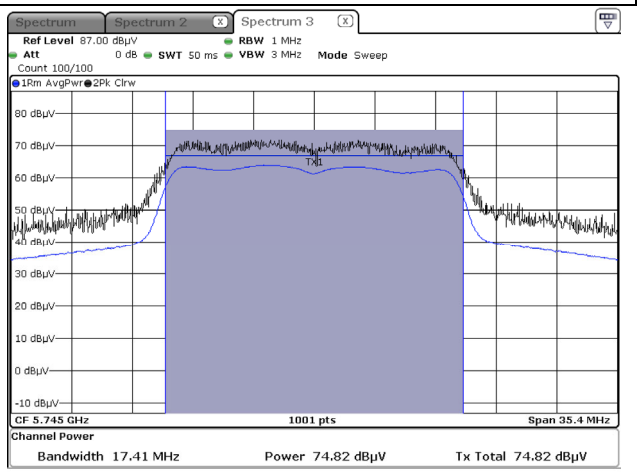
Band :	UNII 3
Operation Mode:	802.11ac(VHT80)
MCS Index:	0
Operating Frequency	5775 MHz
Channel No.	155 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	EIRP
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5775	69.09	43.20	V	112.29	17.09

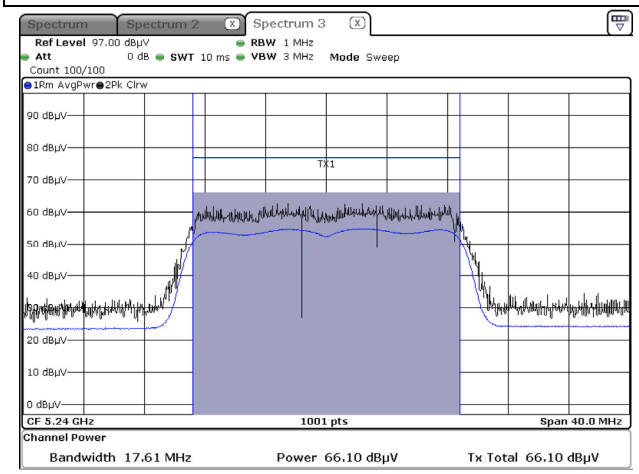
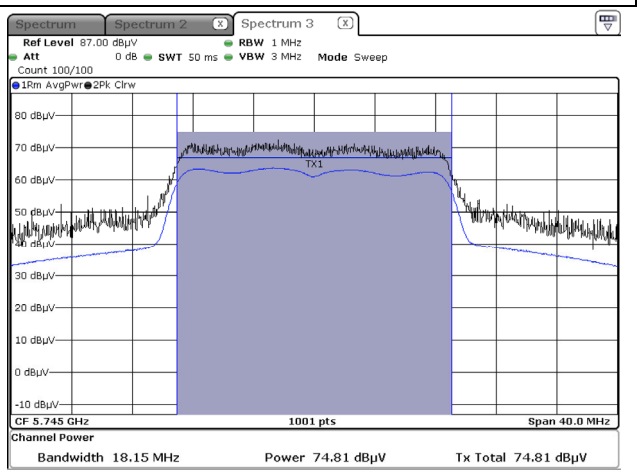
▣ Test Plots(802.11a)

Note:

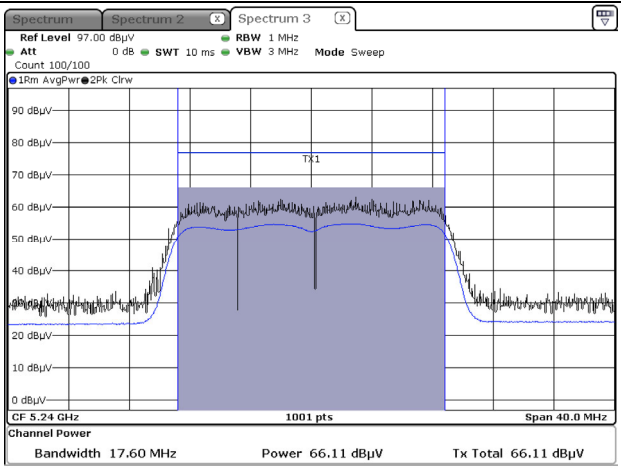
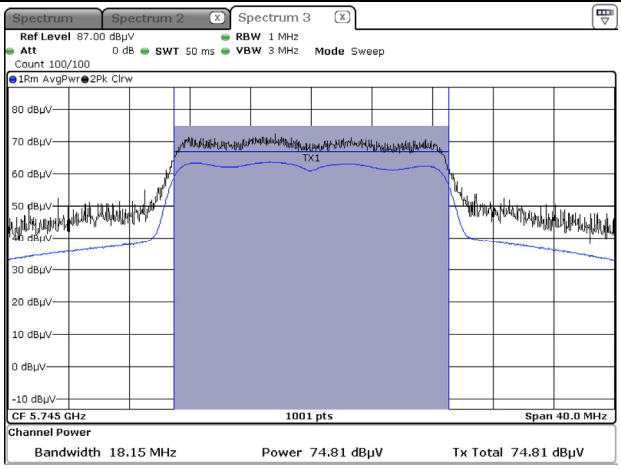
In order to simplify the report, attached plots were only the highest Power Channel

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

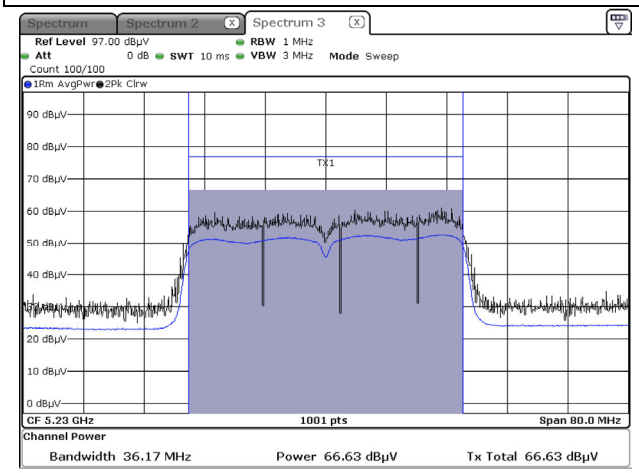
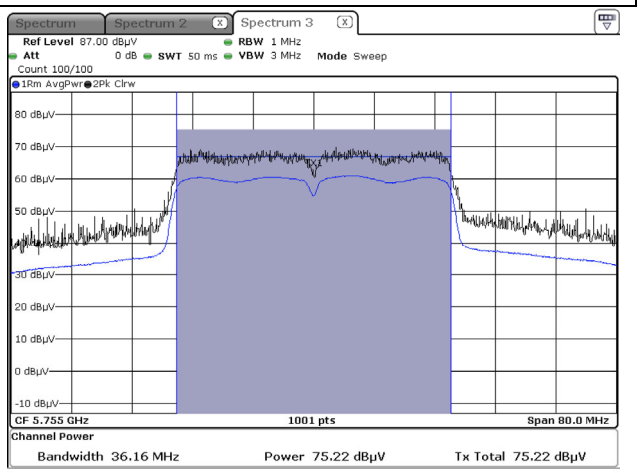
▣ Test Plots(802.11n(HT20))

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

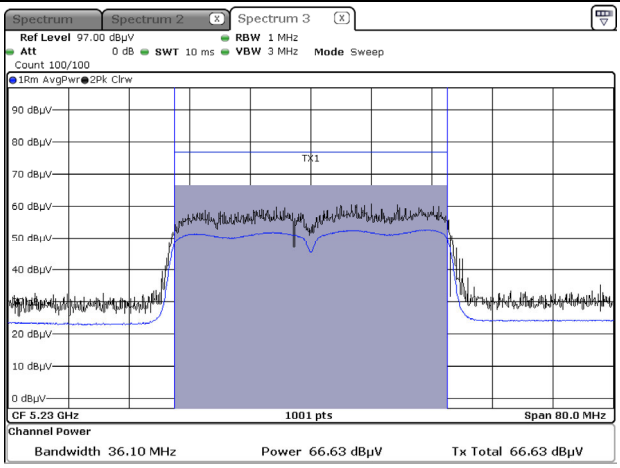
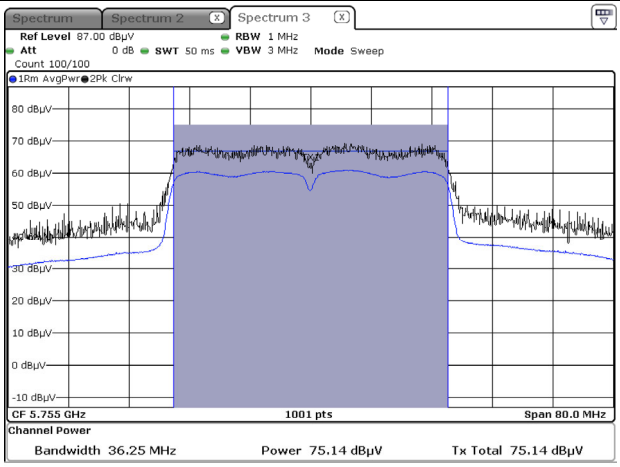
▣ Test Plots(802.11ac(VHT20))

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

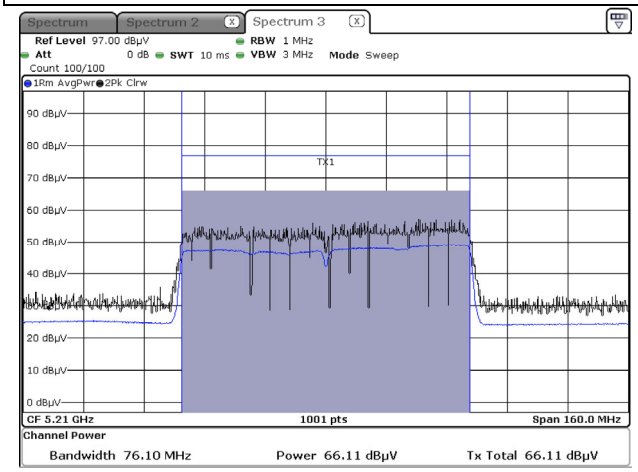
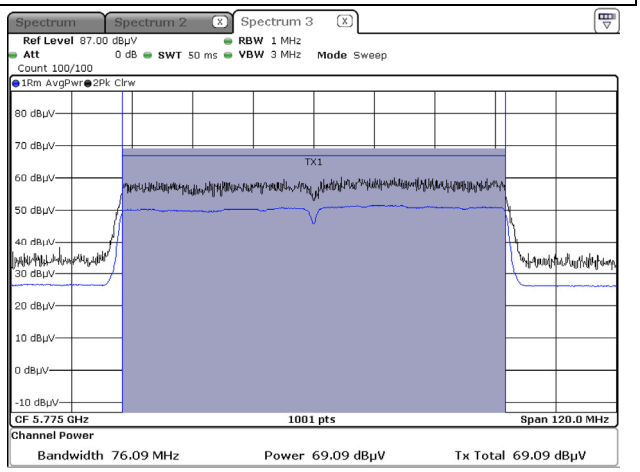
▣ Test Plots(802.11n(HT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT80))

UNII 1 (Ch. 42)	UNII 3 (Ch. 155)
	

10.11 RADIATED POWER SPECTRAL DENSTY

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz / 5200 MHz / 5240 MHz
Channel No.	36 Ch / 40 Ch / 48 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBm]
5180	54.37	43.16	V	97.53	2.33
5200	54.34	43.25	V	97.59	2.39
5240	55.26	42.99	V	98.25	3.05

Note : ISED e.i.r.p Spectral density Limit : 10 dBm/MHz

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5745 MHz / 5785 MHz / 5825 MHz
Channel No.	149 Ch / 157 Ch / 165 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBm]
5745	61.06	44.13	V	105.19	9.99
5785	59.42	44.53	V	103.95	8.75
5825	60.44	44.78	V	105.22	10.02

Band :	UNII 1
Operation Mode:	802.11 n(HT20)
MCS Index:	0
Operating Frequency	5180 MHz / 5200 MHz / 5240 MHz
Channel No.	36 Ch / 40 Ch / 48 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBm]
5180	54.13	43.20	V	97.33	2.13
5200	54.25	43.29	V	97.54	2.34
5240	55.00	43.04	V	98.04	2.84

Note : ISED e.i.r.p Spectral density Limit : 10 dBm/MHz

Band :	UNII 3
Operation Mode:	802.11 n(HT20)
MCS Index:	0
Operating Frequency	5745 MHz / 5785 MHz / 5825 MHz
Channel No.	149 Ch / 157 Ch / 165 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBm]
5745	61.09	44.17	V	105.26	10.06
5785	59.09	44.57	V	103.66	8.46
5825	60.12	44.83	V	104.95	9.75

Band :	UNII 1
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5180 MHz / 5200 MHz / 5240 MHz
Channel No.	36 Ch / 40 Ch / 48 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5180	54.23	43.25	V	97.48	2.28
5200	54.20	43.34	V	97.54	2.34
5240	54.98	43.09	V	98.07	2.87

Note : ISED e.i.r.p Spectral density Limit : 10 dBm/MHz

Band :	UNII 3
Operation Mode:	802.11ac(VHT20)
MCS Index:	0
Operating Frequency	5745 MHz / 5785 MHz / 5825 MHz
Channel No.	149 Ch / 157 Ch / 165 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5745	60.93	44.22	V	105.15	9.95
5785	59.15	44.63	V	103.78	8.58
5825	60.16	44.88	V	105.04	9.84

Band :	UNII 1
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5190 MHz / 5230 MHz
Channel No.	38 Ch / 46 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5190	51.94	43.22	V	95.16	-0.04
5230	52.77	43.09	V	95.86	0.66

Note : ISED e.i.r.p Spectral density Limit : 10 dBm/MHz

Band :	UNII 3
Operation Mode:	802.11n(HT40)
MCS Index:	0
Operating Frequency	5755 MHz / 5795 MHz
Channel No.	151 Ch / 159 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5755	58.17	44.23	H	102.40	7.20
5795	54.55	44.93	H	99.48	4.28

Band :	UNII 1
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5190 MHz / 5230 MHz
Channel No.	38 Ch / 46 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5190	52.06	43.22	V	95.28	0.08
5230	52.71	43.09	V	95.80	0.60

Note : ISED e.i.r.p Spectral density Limit : 10 dBm/MHz

Band :	UNII 3
Operation Mode:	802.11ac(VHT40)
MCS Index:	0
Operating Frequency	5755 MHz / 5795 MHz
Channel No.	151 Ch / 159 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5755	58.13	44.23	H	102.36	7.16
5795	54.57	44.93	H	99.50	4.30

Band :	UNII 1
Operation Mode:	802.11ac(VHT80)
MCS Index:	0
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5210	49.17	43.50	V	92.67	-2.53

Note : ISED e.i.r.p Spectral density Limit : 10 dBm/MHz

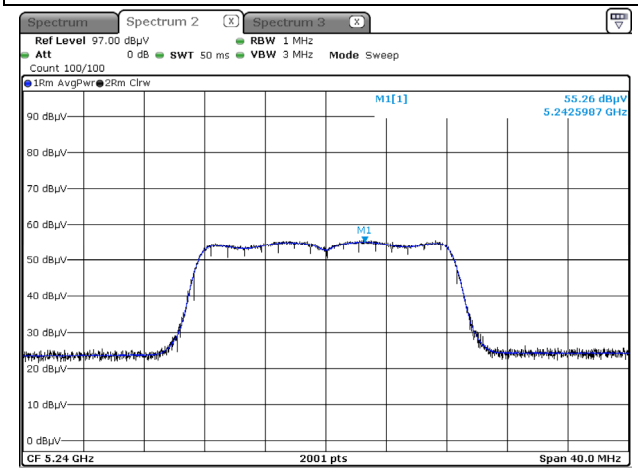
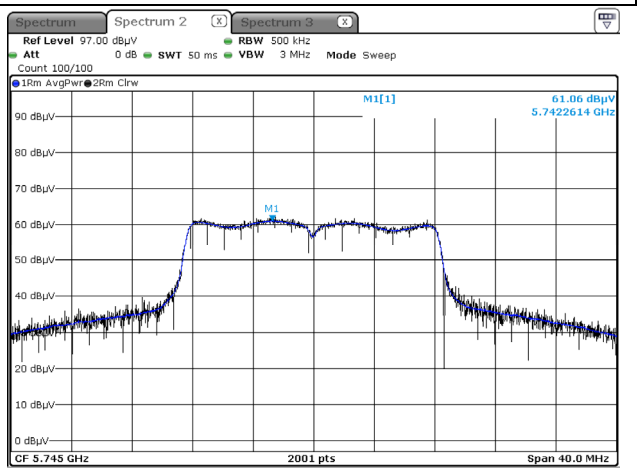
Band :	UNII 3
Operation Mode:	802.11ac(VHT80)
MCS Index:	0
Operating Frequency	5775 MHz
Channel No.	155 Ch

Frequency	Measured Value	C.L+A.F+D.F	ANT. POL	Field Strength	PSD
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBm]
5775	48.43	43.20	V	91.63	-3.57

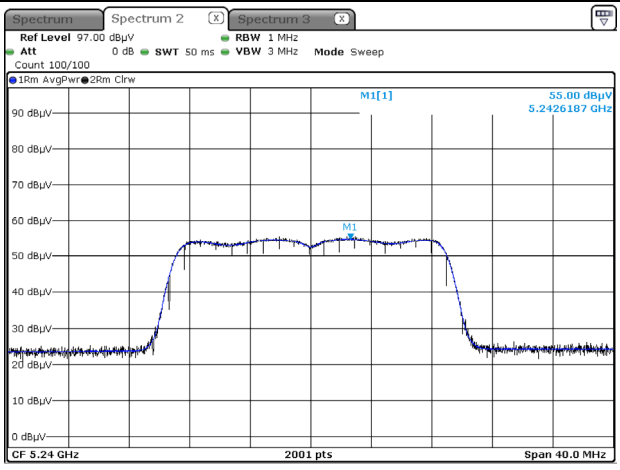
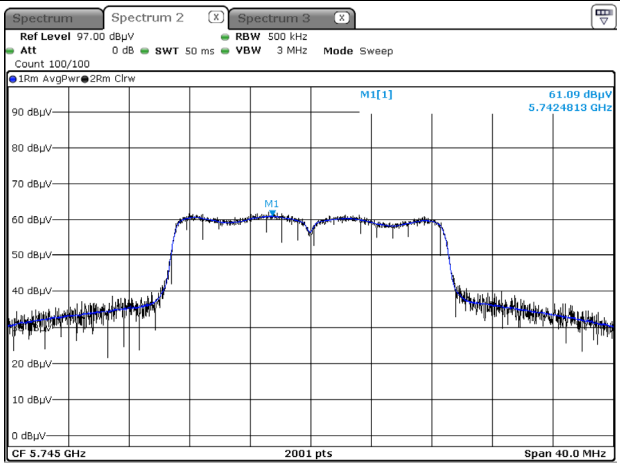
▣ Test Plots(802.11a)

Note:

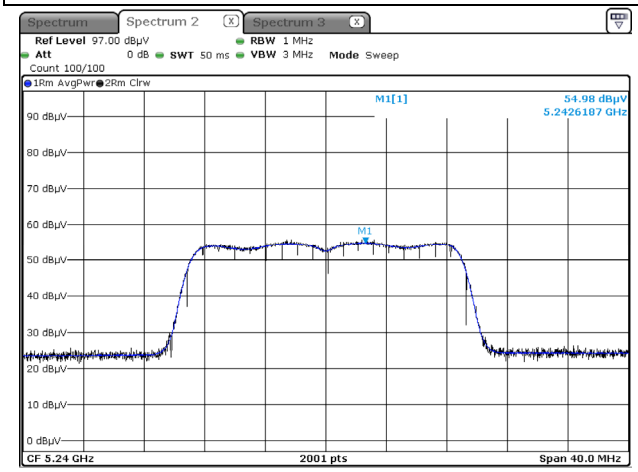
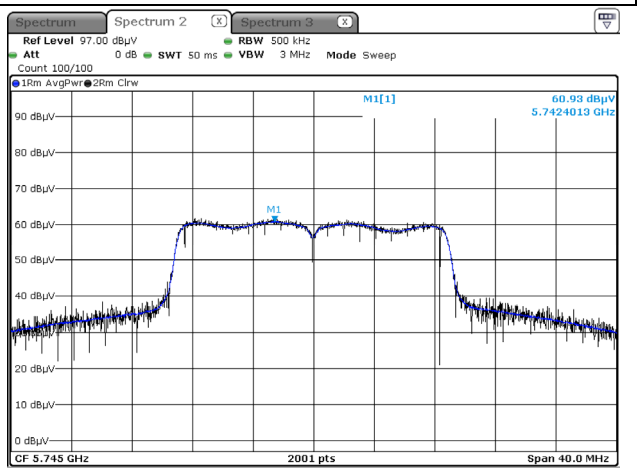
In order to simplify the report, attached plots were only the highest PSD Channel.

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

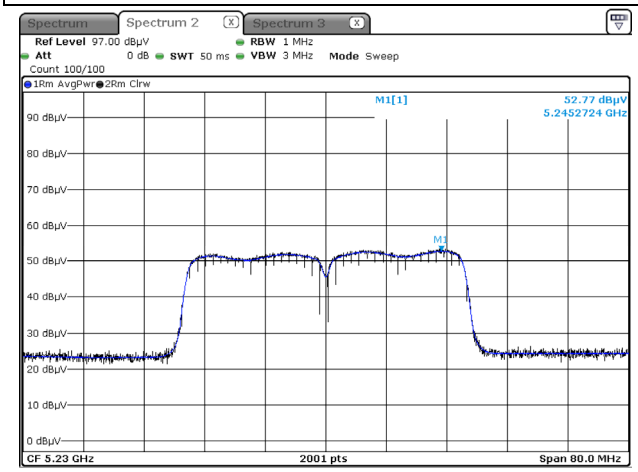
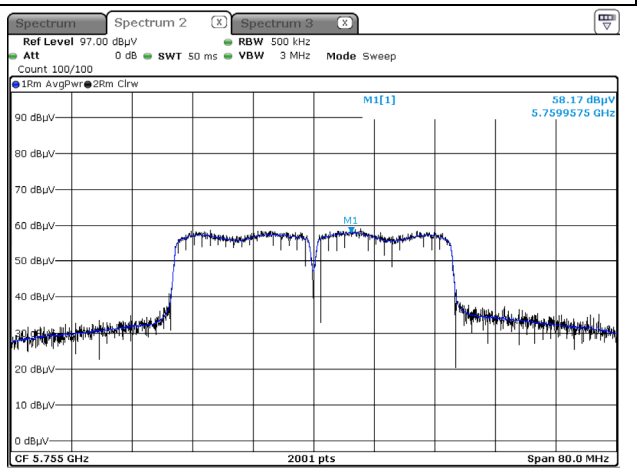
▣ Test Plots(802.11n(HT20))

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

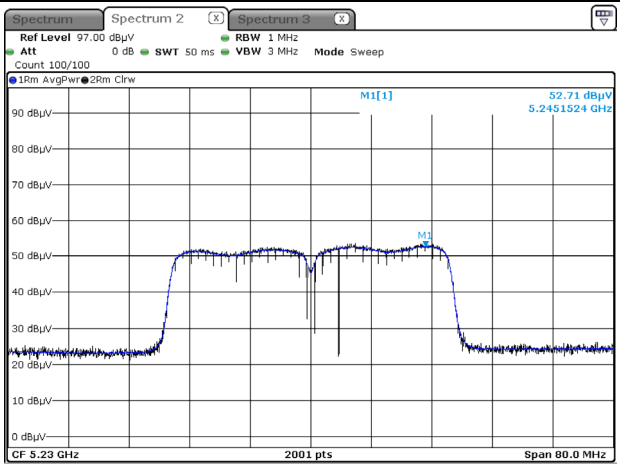
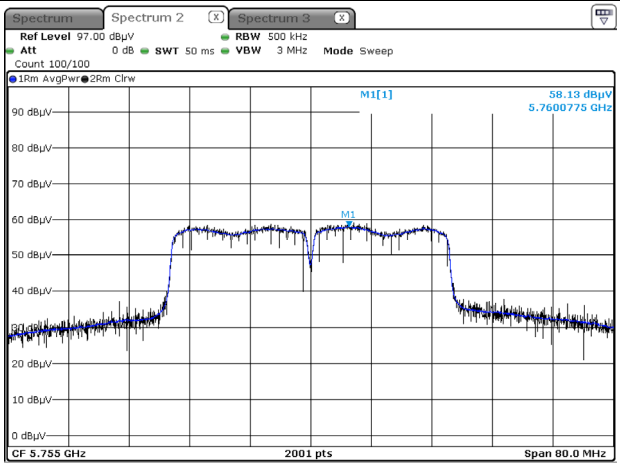
▣ Test Plots(802.11ac(VHT20))

UNII 1 (Ch. 48)	UNII 3 (Ch. 149)
	

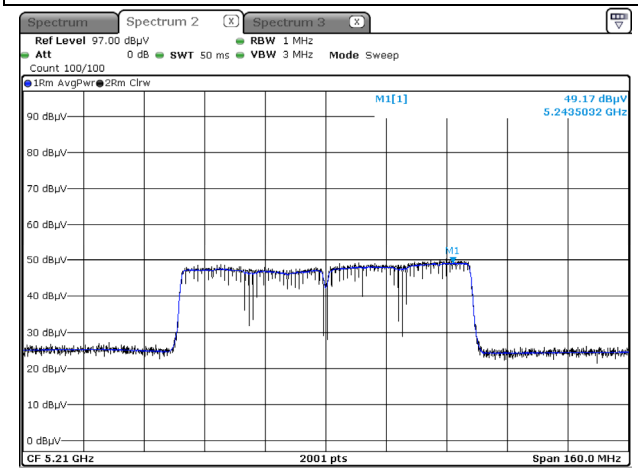
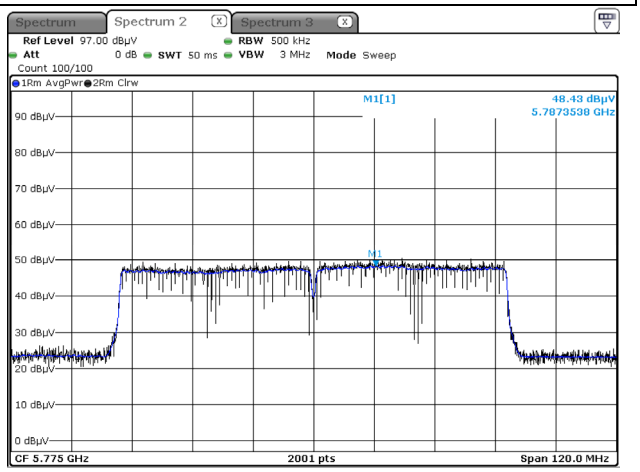
▣ Test Plots(802.11n(HT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT80))

UNII 1 (Ch. 42)	UNII 3 (Ch. 155)
	

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	Agilent	MY49432108	03/08/2023	Annual
Power Measurement Set	OSP 120	Rohde & Schwarz	101231	06/14/2023	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	02/06/2024	Annual
DC Power Supply	E3632A	HP	KR75303243	04/25/2023	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C	HP	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
Bluetooth Tester	CBT	Rohde & Schwarz	100808	02/22/2023	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.

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
EM1000 / Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Amp &Filter Bank Switch Controller	FBSM-01B	TNM system	TM19050002	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-1300	01/18/2024	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Spectrum Analyzer	FSV(10 Hz ~ 40 GHz)	Rohde & Schwarz	101055	05/16/2023	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/05/2024	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
High Pass Filter(7 GHz ~ 18 GHz)	WHKX10-7150-8000-18000-50SS	Wainwright Instruments	1	03/11/2023	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000175	04/05/2023	Annual
HPF(3~18GHz)+LNA1(1~18GHz)	FMSR-05B	TNM system	F6	01/17/2024	Annual
ATT(10dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/17/2024	Annual
ATT(3dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/17/2024	Annual
LNA1(1~18GHz)	FMSR -05B	TNM system	25540	01/17/2024	Annual
HPF(7~18GHz)+LNA2(6~18GHz)	FMSR -05B	TNM system	28550	01/17/2024	Annual
Thru(30MHz ~ 18GHz)	FMSR -05B	TNM system	None	01/17/2024	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-2307-FI009-P