

TEST REPORT

FCC UNII Test for VCLB0ZZZAN
Certification

APPLICANT
Hyundai Mobis Co., Ltd

REPORT NO.
HCT-RF-2605-FC027-R1

DATE OF ISSUE
June 12, 2026

Tested by
Kyung Jun Woo



Technical Manager
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Accredited by KOLAS, Republic of KOREA

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Applicant

Hyundai Mobis Co., Ltd

203, Teheran-ro, Gangnam-gu, Seoul, Republic of Korea

Product Name

Car infotainment system

Model Name

VCLB0ZZZAN

FCC ID

TQ8-VCLB0ZZZAN

Date of Test

March 26, 2026 ~ May 29, 2026

FCC Classification

Unlicensed National Information Infrastructure(NII)

Test Standard Used

FCC Rule Part(s): Part 15.407

Test Results

PASS

Location of Test

☒ Permanent Testing Lab ☐ On Site Testing Lab

(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	May 29, 2026	Initial Release
1	June 12, 2026	Revised antenna gain, Conducted power limit, and PSD limit

Notice

Content

Engineering Statement:

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

The laboratory is not accredited for the test results marked *.

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

This test report provides test result(s) under the scope accredited by the Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.
(KOLAS (KS Q ISO/IEC 17025) Accreditation No. KT197)

This test report provides test result(s) under the lab's valid Scope of Accreditation by A2LA (American Association for Laboratory Accreditation), signatory of the ILAC-MRA.
(A2LA (ISO/IEC 17025) Certificate No. 4114.01)

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1. GENERAL INFORMATION

EUT DESCRIPTION

Model	VCLB0ZZZAN	
Additional Model	VCLC0ZZZXX, VCLB0ZZZXX, VCLC0ZZZAN, VCLB0ZZZKN, VCLC0ZZZKN, VCLB0ZZZFN, VCLC0ZZZFN, VCL10ZZZXX, VCL20ZZZXX, VCL10ZZZAN, VCL20ZZZAN, VCL10ZZZKN, VCL20ZZZKN, VCL10ZZZFN, VCL20ZZZFN, VCL30ZZZXX, VCL30ZZZAN, VCL30ZZZKN, VCL30ZZZFN, VCL40ZZZXX, VCL40ZZZAN, VCL40ZZZKN, VCL40ZZZFN, VCL60ZZZXX, VCL60ZZZAN, VCL60ZZZKN, VCL60ZZZFN	
EUT Type	Car infotainment system	
Power Supply	DC 14.4 V	
Modulation Type	OFDM : 802.11a, 802.11n(HT20/40), 802.11ac(VHT20/40/80)	
Frequency Range (MHz)	U-NII-1	20 MHz BW : 5180 - 5240
		40 MHz BW : 5190 - 5230
		80 MHz BW : 5210
	U-NII-3	20 MHz BW : 5745 - 5805
		40 MHz BW : 5755 - 5795
		80 MHz BW : 5775
Antenna Information	Please refer to the Antenna Specification document.	
Serial number	Conducted : 00 QRFQ300002	
	Radiated : 00 QRFQ300003	

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant.1	Ant.2	CDD	SDM
802.11a	O	O	X	X
802.11n(HT20/40)	O	O	O	O
802.11ac(VHT20/40/80)	O	O	O	O

Note:

- (1) O = Support, X = Not Support
- (2) SISO = Single Input Single Output
- (3) SDM = Spatial Diversity Multiplexing
- (4) CDD = Cyclic Delay Diversity

2. This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the 2.4 GHz and 5 GHz Band simultaneously on each antenna.

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

3. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) e) (iii), f) ii)

$$\text{Directional Gain(CDD)} = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left(\sum_{k=1}^{N_{ANT}} g_{j,k} \right)^2}{N_{ANT}} \right]$$

$$\text{Directional gain(SDM)} = G_{\max} + 10 \cdot \text{LOG}(N_{ANT} / N_{SS})$$

Band	Ant Gain (dBi)		N _{ANT} / N _{SS}	Directional Gain (dBi)	
	ANT1	ANT2		CDD	SDM
UNII 1	4.30	5.00	2 / 2	7.67	5.00
UNII 3	4.70	4.00		7.37	4.70

Note

According to Ansi C63.10-2020 section 14.6.3, the directional gain is calculated using the formula, where GN is the gain of the nth antenna and NANT is the total number of antennas used.

$$\text{Directional gain(CDD)} = 10 \cdot \log \left(\left(10^{(\text{ANT1 Gain}/20)} + 10^{(\text{ANT2 Gain}/20)} \right)^2 / 2 \right) \text{ dBi}$$

$$\text{Directional gain(SDM)} = G_{\max} + 10 \cdot \text{LOG}(N_{ANT} / N_{SS})$$

Sample Calculation (Conducted Power, MIMO):

Ex) Ant 1 : 11.58 dBm Ant 2 : 12.08 dBm

$$\text{Ant1} + \text{Ant 2} = \text{MIMO}$$

$$(11.58 \text{ dBm} + 12.08 \text{ dBm}) = (14.387 \text{ mW} + 16.143 \text{ mW}) = 30.53 \text{ mW} = 14.88 \text{ dBm}$$

Sample Calculation (E.I.R.P & E.I.R.P Spectral Density, MIMO):

Ex) ANT1 : 15.35 dBm , ANT2 : 15.12 dBm, Directional Gain : 3 dBi

$$\text{Conducted Power} = (15.35 \text{ dBm} + 15.12 \text{ dBm}) = (34.276 \text{ mW} + 32.508 \text{ mW}) = 66.784 \text{ mW} = 18.25 \text{ dBm}$$

$$\text{E.I.R.P} = 18.25 \text{ dBm} + 3 \text{ dBi} = 21.25 \text{ dBm}$$

2. MAXIMUM OUTPUT POWER

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

Band	Mode	SISO			
		Ant.1 Power		Ant.2 Power	
		(dBm)	(W)	(dBm)	(W)
UNII1	802.11a	8.28	0.007	8.46	0.007
UNII3	802.11a	8.12	0.006	8.50	0.007

Band	Mode	MIMO_CDD(Ant.1+ Ant.2)					
		Ant.1 Power		Ant.2 Power		Ant.1 + Ant.2 Power	
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
UNII1	802.11n (HT20)	8.15	0.007	8.29	0.007	11.23	0.013
	802.11n (HT40)	7.83	0.006	8.00	0.006	10.93	0.012
	802.11ac (VHT20)	8.10	0.006	8.13	0.007	11.12	0.013
	802.11ac (VHT40)	7.91	0.006	8.14	0.007	11.04	0.013
	802.11ac (VHT80)	8.04	0.006	8.65	0.007	11.37	0.014
UNII3	802.11n (HT20)	8.04	0.006	8.61	0.007	11.35	0.014
	802.11n (HT40)	7.88	0.006	7.95	0.006	10.92	0.012
	802.11ac (VHT20)	8.00	0.006	8.33	0.007	11.18	0.013
	802.11ac (VHT40)	7.90	0.006	7.89	0.006	10.91	0.012
	802.11ac (VHT80)	7.75	0.006	7.63	0.006	10.71	0.012

3. TEST METHODOLOGY

Unlicensed wireless device were tested using the following measurement procedure.

[1] KDB 789033 D02 15.407 Meas Guidance v02r01.

[2] ANSI C63.10-2020 + Cor. 1-2023

Note : Here in after, ANSI C63.10-2020 + Cor. 1-2023 will be referred to as ANSI C63.10-2020

EUT CONFIGURATION

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

EUT EXERCISE

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

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10-2020 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

According to the requirements in Section 6.3 ~ Section 6.6 of ANSI C63.10-2020

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

DESCRIPTION OF TEST MODES

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

4. INSTRUMENT CALIBRATION

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

Especially, all antenna for measurement is calibrated in accordance with the requirements of ANSI C63.5-2017.

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, Republic of Korea. The site is constructed in conformance with the requirements of ANSI C63.4-2014 and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated February 26, 2026 (Registration Number: KR0032).

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to ANSI/USEMCSC C63.2-2023, "American National Standard for Specifications of Electromagnetic Interference and Field Strength Measuring Instrumentation in the Frequency Range 9 kHz to 40 GHz".

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203, § 15.407:

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

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2020.

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 ($\pm$ kHz)
X dB, 99% Bandwidth	95 (Confidence level about 95 %, $k=2$)
Frequency stability	28 (Confidence level about 95 %, $k=2$)

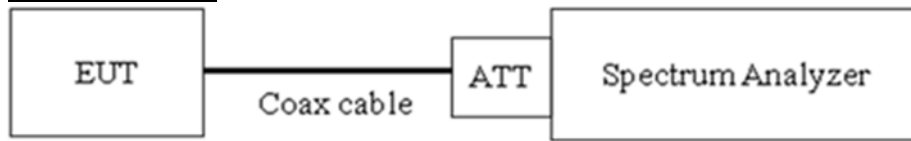
Parameter	Expanded Uncertainty ($\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.96 (Confidence level about 95 %, $k=2$)
Conducted Output Power(Power Meter)	0.54 (Confidence level about 95 %, $k=2$)
Conducted Output Power(Signal Analyzer)	0.73 (Confidence level about 95 %, $k=2$)
Power Spectral Density	0.98 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.54 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.80 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.86 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.44 (Confidence level about 95 %, $k=2$)

8. DESCRIPTION OF TESTS

Test Item	Test Procedure
Duty Cycle	- KDB 789033 D02 – Section B.2
6 dB Bandwidth & 26dB Bandwidth	- KDB 789033 D02 - Section C
Output Power	- KDB 789033 D02 - Section E
Power Spectral Density	- KDB 789033 D02 - Section F
Frequency Stability	- ANSI C63.10-2020 - Section 6.8
AC Power line Conducted Emissions	- ANSI C63.10-2020– Section 6.2
Radiated Test	- KDB 789033 D02 – Section II.G - ANSI C63.10-2020 – Section 6.4 (Below 30 MHz) - ANSI C63.10-2020 – Section 6.5 (30 MHz to 1000 MHz) - ANSI C63.10-2020 – Section 6.6 (1 GHz to 40 GHz) - ANSI C63.10-2020 – Section 6.10 & 12.7 (Unwanted emissions)

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to

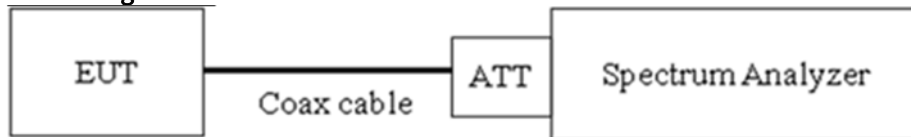
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ RBW)
3. SPAN = 0 Hz
4. Detector = Average
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = $T_{\text{on}} / T_{\text{total}}$ and Duty Cycle Factor = $10\log(1/\text{Duty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

8.2. 6 dB Bandwidth & 26 dB Bandwidth

Limit

Within the 5.725-5.85 GHz(NII-3) 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.

The Spectrum Analyzer is set to

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.

The Spectrum Analyzer is set to

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

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

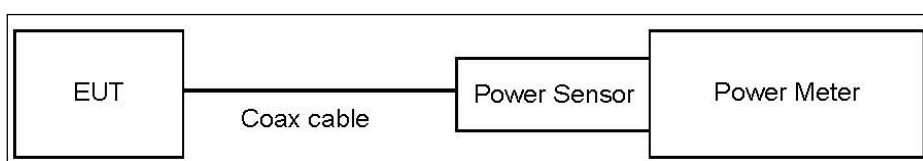
8.3. Output Power Measurement

Limit

Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 3	Not exceed 1 W(=30 dBm)

Test Configuration

Power Meter



Test Procedure(Power Meter)

The transmitter output is connected to the Power Meter.

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

Sample Calculation

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

Note

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

Band	Loss(dB)
UNII 1	20.84
UNII 3	20.84

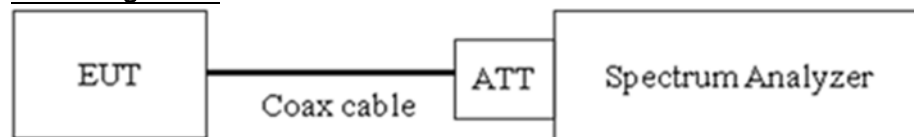
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to

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

Sample Calculation

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

Note

1. Spectrum Measured Levels are not plot data.

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

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

Band	Loss(dB)
UNII 1	20.84
UNII 3	20.84

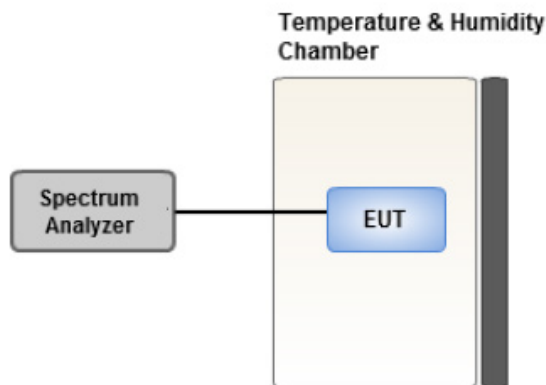
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

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

8.6. AC Power line Conducted Emissions

Limit

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

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

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

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

8.7. Radiated Test

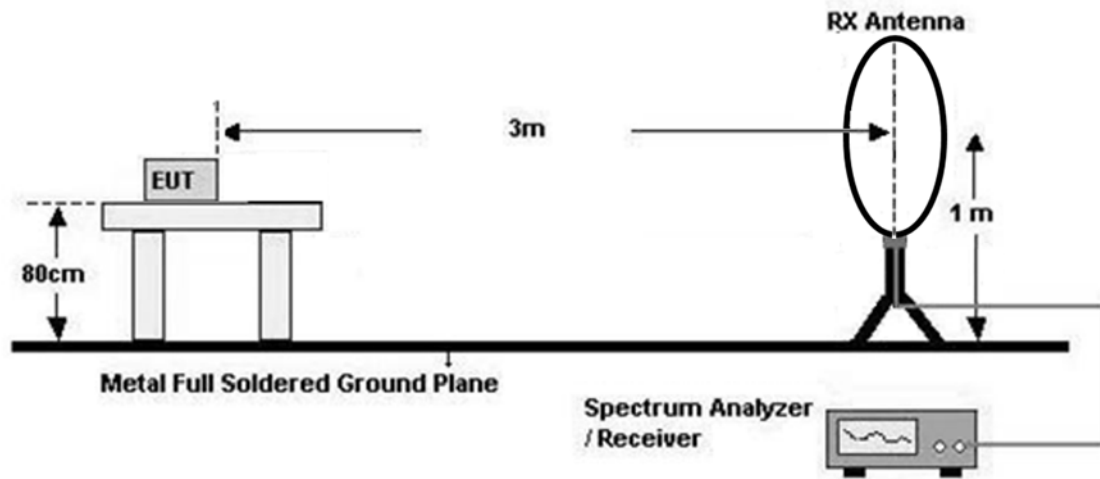
Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
2. UNII 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.

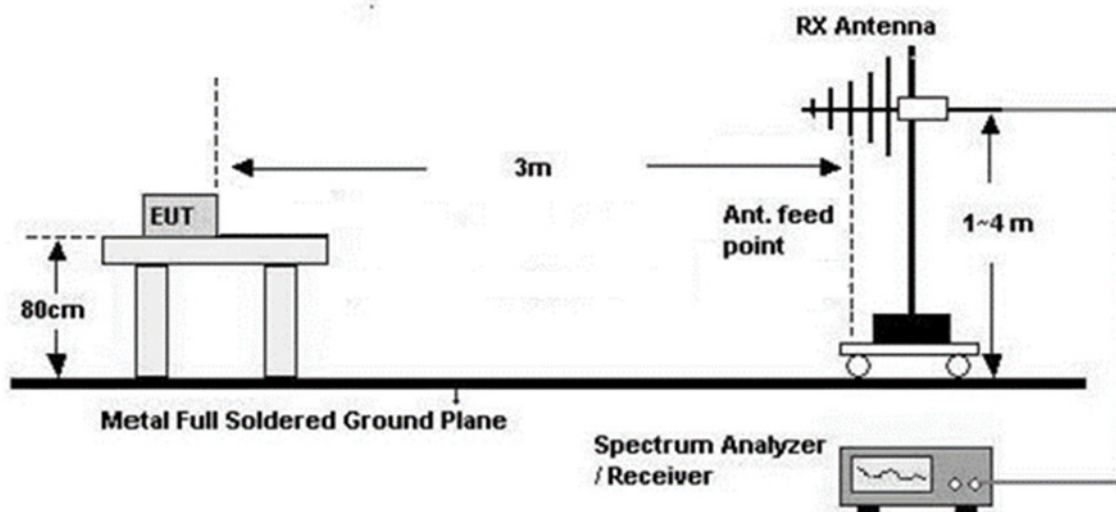
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

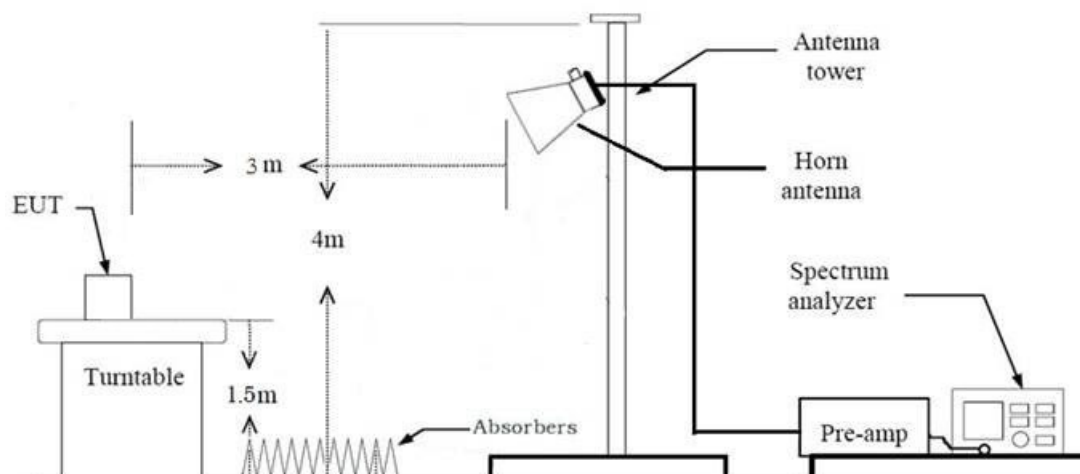
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions (Below 30 MHz)

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions (Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m 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 Analyzer Setting
 - (1) Measurement Type(Peak) :
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Max Hold
 - RBW = 100 kHz
 - VBW $\geq 3 \times$ RBW
 - (2) Measurement Type(Quasi-peak) :
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- ※In general, (1) is used mainly
- 7.Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Spectrum Analyzer Setting
 - (1) Measurement Type (Peak) :
 - RBW = 1 MHz
 - VBW $\geq$ 3 MHz
 - Detector = Peak
 - Sweep Time = auto
 - Trace mode = Max Hold
 - Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.
 - (2) Measurement Type (Average) :
 - RBW = 1 MHz
 - VBW(Duty cycle $\geq$ 98 percent) = VBW $\leq$ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
 - VBW(Duty cycle is < 98 percent) = VBW $\geq$ $1/T$, where T is the minimum transmission duration.
 - The analyzer is set to linear detector mode.
 - Detector = Peak.
 - Sweep time = auto.
 - Trace mode = Max Hold.
 - Allow Max Hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent 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 = $20\log(\text{test distance} / \text{specific distance})$ (dB)
11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G)
+ Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

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

7. Spectrum Analyzer Setting**(1) Measurement Type (Peak) :**

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

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

(2) Measurement Type (Average) :

- RBW = 1 MHz
- VBW(Duty cycle $\geq$ 98 percent) = VBW $\leq$ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is $<$ 98 percent) = VBW $\geq$ $1/T$, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = Max Hold.
- Allow Max Hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent 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 :

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

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

10. Total

(1) Measurement(Peak)

= Measured Value(Peak)

(2) Measurement(Avg)

= Measured Value (Avg)

- We apply to the offset in the range 1 GHz - 18 GHz.

- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – Amp. Gain(A.G) + Attenuator (ATT)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	VBW (1/T) (kHz)	The actual setting value of VBW (Hz)
802.11a	6 Mbps	0.558	2.534	7.862	10 000
802.11n(HT20)	MCS0	0.582	2.351	7.158	10 000
802.11n(HT40)	MCS0	0.543	2.649	8.354	10 000
802.11ac(VHT20)	MCS0	0.596	2.247	6.760	10 000
802.11ac(VHT40)	MCS0	0.558	2.530	7.843	10 000
802.11ac(VHT80)	MCS0	0.533	2.735	8.658	10 000

8.8. Worst case configuration and mode

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. VCLB0ZZZAN, Additional Models were tested and the worst case results are reported.
(Worst case : VCLB0ZZZAN)

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone + Shark Antenna, Stand alone + Shark Antenna + External accessories
 - Worstcase : Stand alone + Shark Antenna
2. EUT Axis
 - Radiated Spurious Emissions : X
 - Radiated Restricted Band Edge : X
3. All datarate of operation were investigated and the worst case datarate results are reported.
 - 802.11a : 6 Mbps
 - 802.11n(HT20/40) : MCS0
 - 802.11ac(VHT20/40/80) : MCS 0
4. All Antennas of operation were investigated and the worst case results are reported
 - Antenna Operation Type : SISO, MIMO_CDD(Ant.1+Ant.2), MIMO_SDM(Ant.1+Ant.2)
 - Worstcase : SISO, MIMO_CDD(Ant.1+Ant.2)
 - SISO : 802.11a
 - MIMO_CDD(Ant.1+Ant.2) : 802.11n(HT20/40), 802.11ac(VHT20/40/80)
5. Radiated Spurious Emission

All modulations of operation were investigated and the worst case modulation results are reported.

 - SISO : 802.11a
 - MIMO_CDD(Ant.1+Ant.2): 802.11n(HT20)
6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
 - Position: Horizontal, Vertical, Parallel to the ground plane
7. VCLB0ZZZAN, Additional Models were tested and the worst case results are reported.
(Worst case : VCLB0ZZZAN)

AC Power line Conducted Emissions

1. We don't perform powerline conducted emission test. The device only employ battery power for operation.

Radiated test(Simultaneous transmission Scenario)

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

- Mode : Stand alone + Shark Antenna, Stand alone + Shark Antenna + External accessories

- Worstcase : Stand alone + Shark Antenna

2. EUT Axis

- Radiated Spurious Emissions : X

3. All of Simultaneous transmission Scenario were investigated and the worst case configuration results are reported. (Bluetooth Worst case : BTLE)

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

4. The Simultaneous transmission Scenario mode test investigated both intermodulation and radiated spurious emissions.

- Worst result : Radiated spurious emissions

- Intermodulation : No signals are generated.

5. The following tables show the worst cases configurations determined during testing.

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

Scenario 1	Description	BT Emission	5 GHz Emission
5 GHz WiFi MIMO + BT ANT	Antenna	BT ANT	ANT ALL
	Channel	39	161
	Data Rate	1 Mbps	MCS 0
	Mode	BTLE 1M 37 Bytes	802.11n(HT20)

Note : BTLE Simultaneous transmission Data refer to [BT LE] Test Report

6. VCLB0ZZZAN, Additional Models were tested and the worst case results are reported.

(Worst case : VCLB0ZZZAN)

9. SUMMARY OF TEST RESULTS

Test Item	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§ 15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§ 15.407(e)	>500 kHz (5725-5850 MHz)(UNII-3)		PASS
Maximum Conducted Output Power	§ 15.407(a)(1),(3)	< 250 mW(5150-5250 MHz) <1 W (5725-5850 MHz)		PASS
Maximum Power Spectral Density	§ 15.407(a)(1),(3)	<11 dBm/ MHz (5150-5250 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)(9)	<FCC 15.207 limits		N/A (Note1)
Undesirable Emissions	§ 15.407(b) (1),(4) § 15.35(b)	<-27 dBm/MHz EIRP (UNII1) 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

Note:

1. The device only employ battery power for operation.
2. The decision rule applies 'simple acceptance'

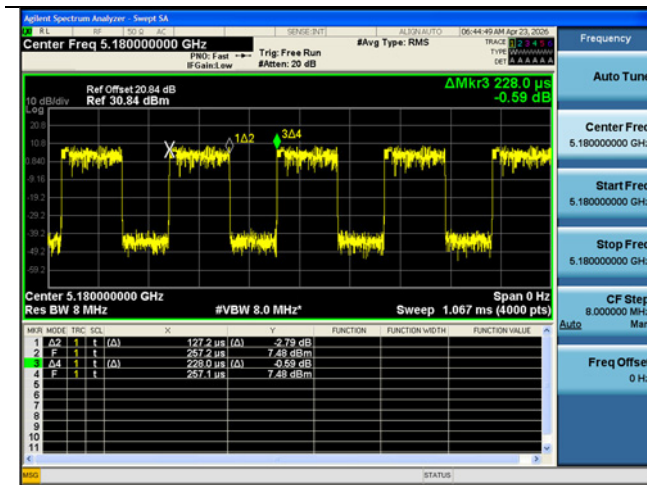
10. TEST RESULT

10.1 DUTY CYCLE

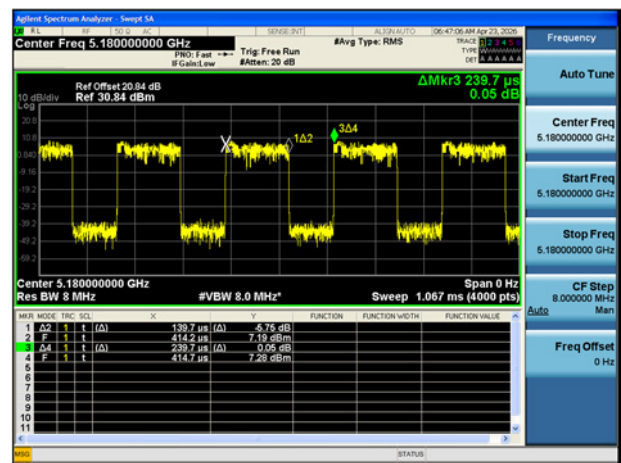
Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6 Mbps	0.127	0.228	0.558	2.534
802.11n(HT20)	MCS0	0.140	0.240	0.582	2.351
802.11n(HT40)	MCS0	0.120	0.220	0.543	2.649
802.11ac(VHT20)	MCS0	0.148	0.248	0.596	2.247
802.11ac(VHT40)	MCS0	0.128	0.228	0.558	2.530
802.11ac(VHT80)	MCS0	0.116	0.217	0.533	2.735

Test Plots(DUTY CYCLE)

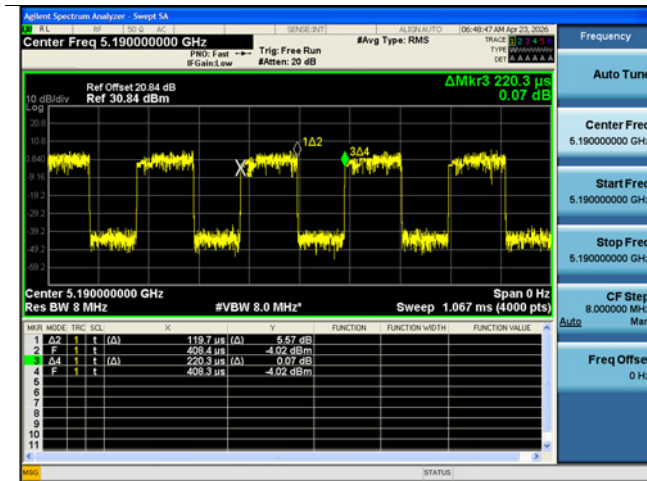
802.11a



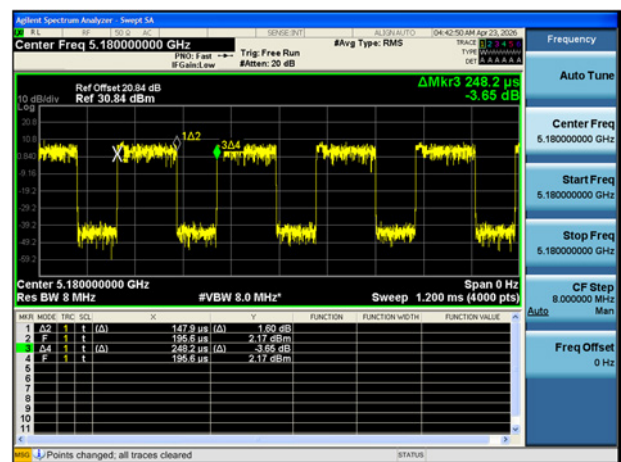
802.11n(HT20)



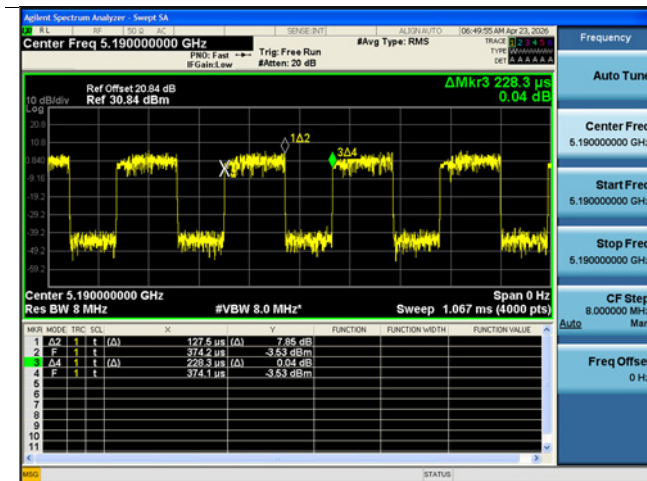
802.11n(HT40)



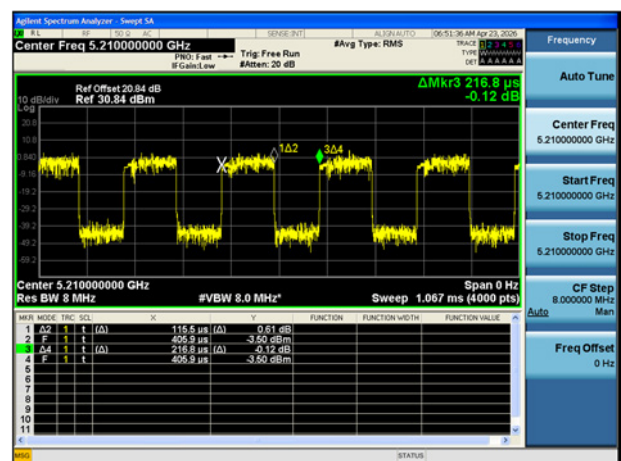
802.11ac(VHT20)



802.11ac(VHT40)



802.11ac(VHT80)



10.2 26 dB BANDWIDTH & 99% BANDWIDTH

[Ant.1]

Mode : 802.11a				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5180	36	21.19	16.722
	5200	40	21.17	16.732
	5240	48	21.21	16.741
UNII3	5745	149	21.17	16.815
	5785	157	21.23	16.786
	5805	161	21.14	16.713

Mode : 802.11n(HT20)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5180	36	21.53	17.841
	5200	40	21.47	17.900
	5240	48	21.43	17.828
UNII3	5745	149	21.51	17.883
	5785	157	21.48	17.838
	5805	161	21.48	17.837

Mode : 802.11ac(VHT20)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5180	36	21.60	17.808
	5200	40	21.48	17.782
	5240	48	21.44	17.782
UNII3	5745	149	21.63	17.757
	5785	157	21.35	17.742
	5805	161	21.45	17.804

Mode : 802.11n(HT40)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5190	38	40.05	36.406
	5230	46	40.52	36.405
UNII3	5755	151	40.38	36.377
	5795	159	40.32	36.373

Mode : 802.11ac(VHT40)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5190	38	40.80	36.356
	5230	46	39.91	36.444
UNII3	5755	151	40.28	36.369
	5795	159	40.17	36.267

Mode : 802.11ac(VHT80)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5210	42	81.84	75.942
UNII3	5775	155	81.82	75.871

[Ant.2]

Mode : 802.11a				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5180	36	21.32	16.762
	5200	40	21.34	16.759
	5240	48	21.33	16.772
UNII3	5745	149	21.27	16.762
	5785	157	21.13	16.738
	5805	161	21.16	16.753

Mode : 802.11n(HT20)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5180	36	21.55	17.826
	5200	40	21.57	17.820
	5240	48	21.42	17.848
UNII3	5745	149	21.51	17.900
	5785	157	21.53	17.793
	5805	161	21.52	17.766

Mode : 802.11ac(VHT20)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5180	36	21.40	17.810
	5200	40	21.49	17.784
	5240	48	21.31	17.820
UNII3	5745	149	21.63	17.801
	5785	157	21.52	17.764
	5805	161	21.47	17.780

Mode : 802.11n(HT40)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5190	38	40.16	36.328
	5230	46	40.44	36.413
UNII3	5755	151	40.54	36.432
	5795	159	40.42	36.295

Mode : 802.11ac(VHT40)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5190	38	40.35	36.467
	5230	46	40.08	36.322
UNII3	5755	151	40.13	36.385
	5795	159	40.15	36.341

Mode : 802.11ac(VHT80)				
BAND	Freq. [MHz]	CH.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
UNII1	5210	42	82.25	75.896
UNII3	5775	155	82.50	75.896

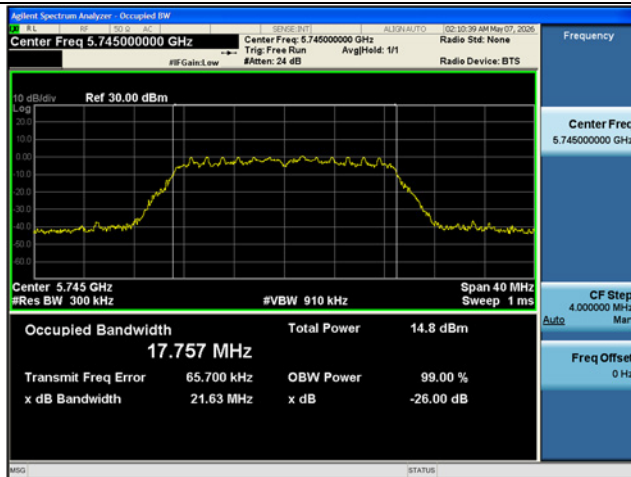
Test Plots(26 dB Bandwidth)

Note:

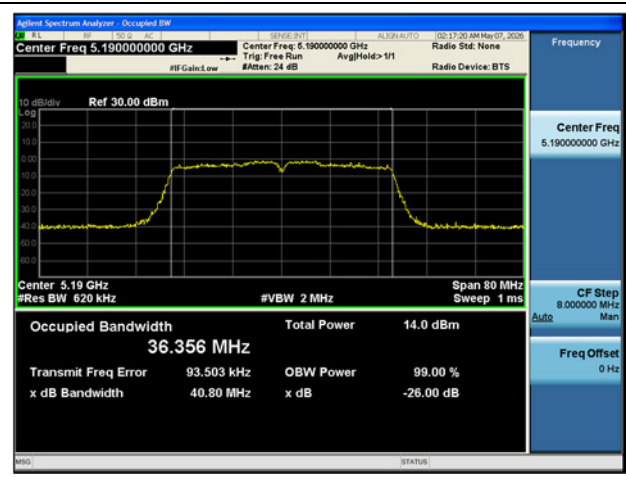
In order to simplify the report, attached plots were only the widest channel per channel bandwidth.

[ANT. 1]

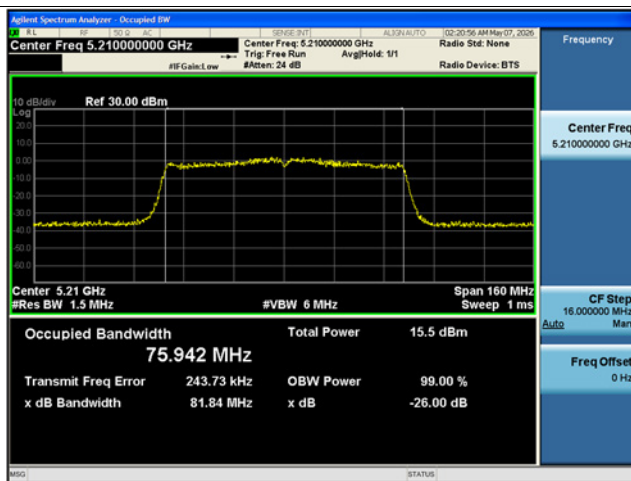
Bandwidth 20M, 802.11ac(VHT20) Ch.149



Bandwidth 40M, 802.11ac(VHT40) Ch.38

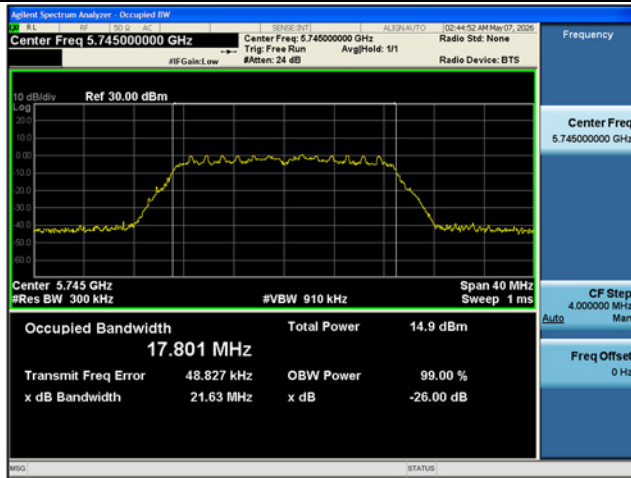


Bandwidth 80M, 802.11ac(VHT80) Ch.42

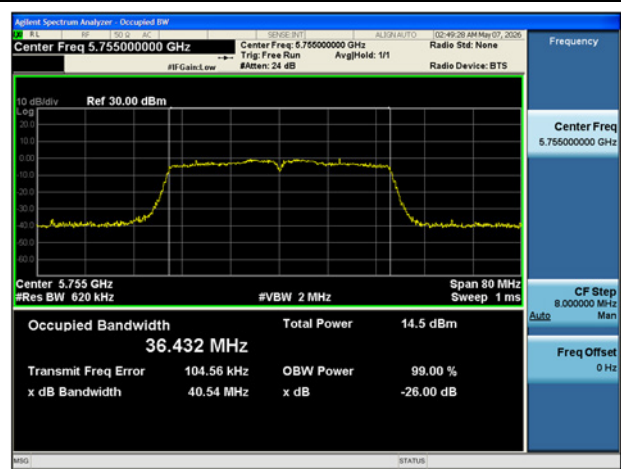


[ANT. 2]

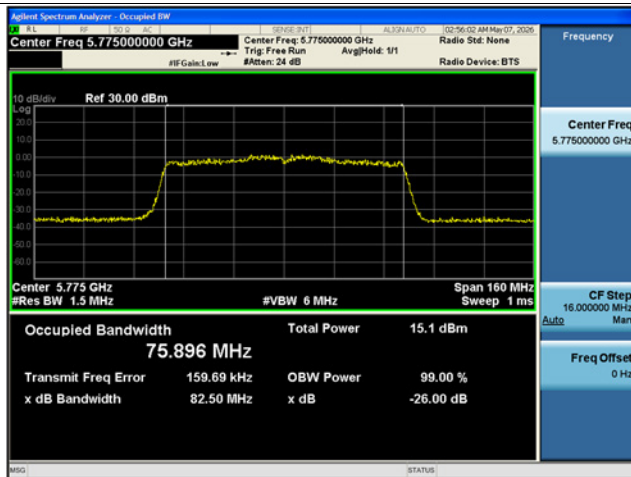
Bandwidth 20M, 802.11ac(VHT20) Ch.149



Bandwidth 40M, 802.11n(HT40) Ch.151



Bandwidth 80M, 802.11ac(VHT80) Ch.155



10.3 6 dB BANDWIDTH

[Ant.1]

Mode : 802.11a				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5745	149	15.23	> 0.5
	5785	157	15.23	> 0.5
	5805	161	15.21	> 0.5
Mode : 802.11n(HT20)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5745	149	15.24	> 0.5
	5785	157	15.22	> 0.5
	5805	161	15.23	> 0.5
Mode : 802.11ac(VHT20)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5745	149	15.23	> 0.5
	5785	157	15.23	> 0.5
	5805	161	15.23	> 0.5
Mode : 802.11n(HT40)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5755	151	35.27	> 0.5
	5795	159	35.44	> 0.5
Mode : 802.11ac(VHT40)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5755	151	35.52	> 0.5
	5795	159	35.25	> 0.5
Mode : 802.11ac(VHT80)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5775	155	75.45	> 0.5

[Ant.2]

Mode : 802.11a				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5745	149	15.23	> 0.5
	5785	157	15.23	> 0.5
	5805	161	15.21	> 0.5
Mode : 802.11n(HT20)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5745	149	15.23	> 0.5
	5785	157	15.23	> 0.5
	5805	161	15.21	> 0.5
Mode : 802.11ac(VHT20)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5745	149	15.23	> 0.5
	5785	157	15.22	> 0.5
	5805	161	15.23	> 0.5
Mode : 802.11n(HT40)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5755	151	35.60	> 0.5
	5795	159	35.51	> 0.5
Mode : 802.11ac(VHT40)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5755	151	36.25	> 0.5
	5795	159	35.25	> 0.5
Mode : 802.11ac(VHT80)				
BAND	Freq. [MHz]	CH.	6 dB Bandwidth [MHz]	Limit [MHz]
UNII3	5775	155	75.47	> 0.5

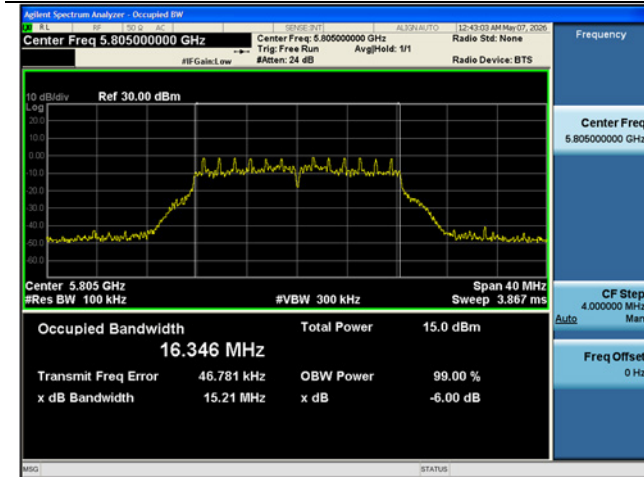
Test Plots(6 dB BANDWIDTH)

Note:

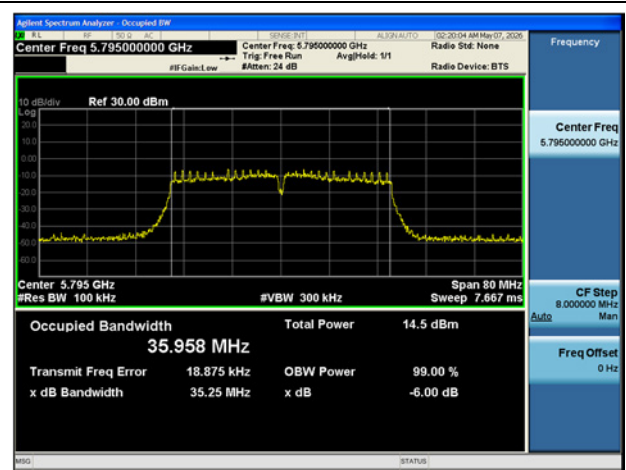
In order to simplify the report, attached plots were only the narrowest channel.

[ANT. 1]

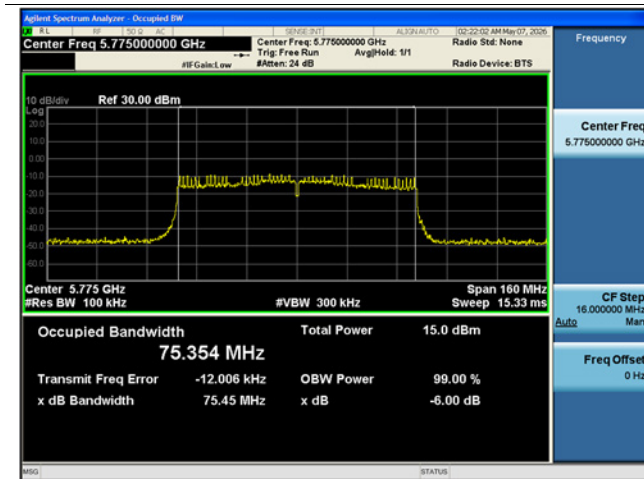
Bandwidth 20M, 802.11a Ch.161



Bandwidth 40M, 802.11ac(HT40) Ch.159

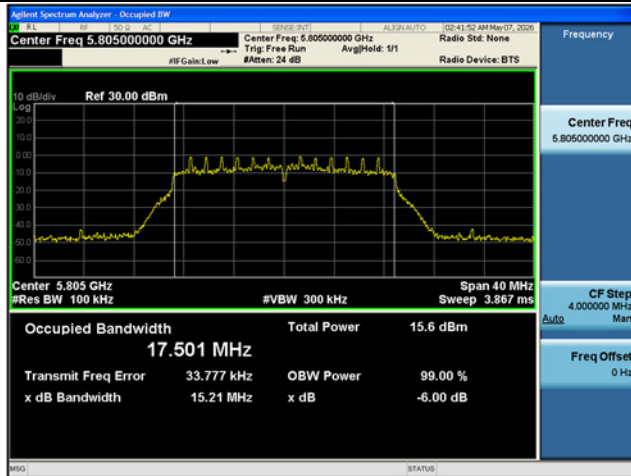


Bandwidth 80M, 802.11ac(VHT80) Ch.155

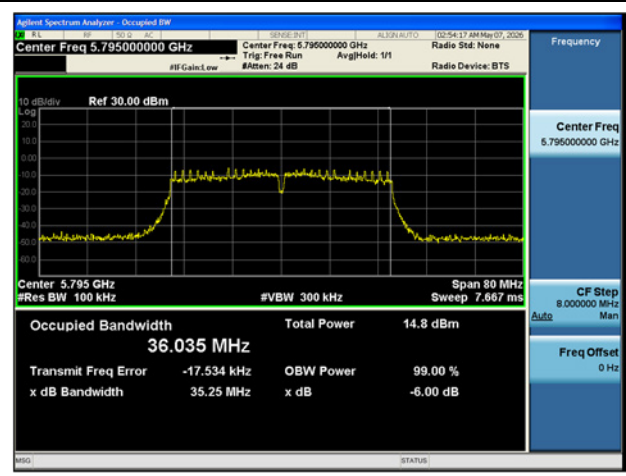


[ANT. 2]

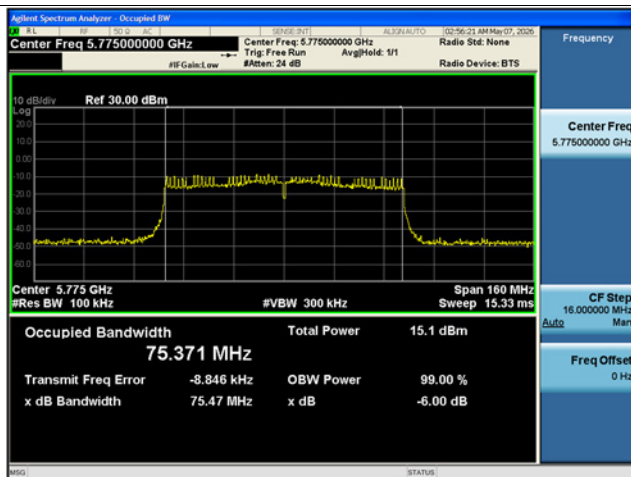
Bandwidth 20M, 802.11n(HT20) Ch.161



Bandwidth 40M, 802.11ac(VHT40) Ch.159



Bandwidth 80M, 802.11ac(VHT80) Ch.155



10.4 OUTPUT POWER MEASUREMENT

Note:

1. The maximum conducted output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
2. Ant Total Power [dBm] = Measured Power [dBm] + Duty Cycle Factor [dB]
3. MIMO Total Power [dBm] = Ant.1 Total Power [dBm] + Ant.2 Total Power [dBm]
4. Limit
 - UNII 1 : 23.98 dBm
 - UNII 3 : 30 dBm

[SISO Ant]

Mode : 802.11a							
BAND	Freq. [MHz]	CH.	Datarate	Total Average Power [dBm]			Limit
				ANT1	ANT2	MIMO	[dBm]
UNII1	5180	36	6M	8.28	8.46	-	23.98
	5200	40	6M	7.98	8.20	-	23.98
	5240	48	6M	7.97	8.43	-	23.98
UNII3	5745	149	6M	8.12	8.50	-	30.00
	5785	157	6M	7.98	8.35	-	30.00
	5805	161	6M	7.80	8.24	-	30.00

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

Mode : 802.11n(HT20)							
BAND	Freq. [MHz]	CH.	Datarate	Total Average Power [dBm]			Limit
				ANT1	ANT2	MIMO	[dBm]
UNII1	5180	36	MCS0	8.15	8.29	11.23	22.31
	5200	40	MCS0	7.85	7.86	10.87	22.31
	5240	48	MCS0	8.10	8.25	11.19	22.31
UNII3	5745	149	MCS0	8.04	8.61	11.35	28.63
	5785	157	MCS0	7.90	8.36	11.15	28.63
	5805	161	MCS0	7.98	8.30	11.15	28.63

Mode : 802.11ac(VHT20)							
BAND	Freq. [MHz]	CH.	Datarate	Total Average Power [dBm]			Limit
				ANT1	ANT2	MIMO	[dBm]
UNII1	5180	36	MCS0	8.10	8.13	11.12	22.31
	5200	40	MCS0	7.81	8.03	10.93	22.31
	5240	48	MCS0	8.05	8.00	11.03	22.31
UNII3	5745	149	MCS0	8.00	8.33	11.18	28.63
	5785	157	MCS0	7.87	8.19	11.04	28.63
	5805	161	MCS0	7.71	8.16	10.95	28.63

Mode : 802.11n(HT40)							
BAND	Freq. [MHz]	CH.	Datarate	Total Average Power [dBm]			Limit
				ANT1	ANT2	MIMO	[dBm]
UNII1	5190	38	MCS0	7.71	8.03	10.88	22.31
	5230	46	MCS0	7.83	8.00	10.93	22.31
UNII3	5755	151	MCS0	7.88	7.95	10.92	28.63
	5795	159	MCS0	7.77	7.71	10.75	28.63

Mode : 802.11ac(VHT40)							
BAND	Freq. [MHz]	CH.	Datarate	Total Average Power [dBm]			Limit
				ANT1	ANT2	MIMO	[dBm]
UNII1	5190	38	MCS0	7.74	8.09	10.93	22.31
	5230	46	MCS0	7.91	8.14	11.04	22.31
UNII3	5755	151	MCS0	7.90	7.89	10.91	28.63
	5795	159	MCS0	7.58	7.69	10.65	28.63

Mode : 802.11ac(VHT80)							
BAND	Freq. [MHz]	CH.	Datarate	Total Average Power [dBm]			Limit
				ANT1	ANT2	MIMO	[dBm]
UNII1	5210	42	MCS0	8.04	8.65	11.37	22.31
UNII3	5775	155	MCS0	7.75	7.63	10.71	28.63

10.5 POWER SPECTRAL DENSITY

Note :

1. U-NII 3 Measured PSD, Total PSD Unit : [dBm/500kHz]
2. The maximum power spectral density limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. Ant Total PSD [dBm] = Measured PSD [dBm/MHz] + Duty Cycle Factor [dB]
4. MIMO Total PSD [dBm/MHz] = Ant.1 Total PSD [dBm/MHz] + Ant.2 Total PSD [dBm/MHz]
5. Limit
 - UNII 1 : 11.0 dBm/MHz
 - UNII 3 : 30.0 dBm/500 kHz

[SISO Ant]

Mode : 802.11a							
BAND	Freq. [MHz]	CH.	Datarate	Total Power Spectral Density [dBm/MHz] Note.1			Limit [dBm/MHz]
				ANT1	ANT2	MIMO	
UNII1	5180	36	6Mbps	-1.565	-1.686	-	11.00
	5200	40	6Mbps	-1.464	-1.343	-	11.00
	5240	48	6Mbps	-1.601	-0.906	-	11.00
UNII3	5745	149	6Mbps	-4.137	-4.038	-	30 dBm/ 500kHz
	5785	157	6Mbps	-4.148	-4.277	-	30 dBm/ 500kHz
	5805	161	6Mbps	-4.592	-4.274	-	30 dBm/ 500kHz

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

Mode : 802.11n(HT20)							
BAND	Freq. [MHz]	CH.	Datarate	Total Power Spectral Density [dBm/MHz] Note.1			Limit [dBm/MHz]
				ANT1	ANT2	MIMO	
UNII1	5180	36	MCS0	-2.205	-1.809	1.008	9.33
	5200	40	MCS0	-2.059	-2.005	0.979	9.33
	5240	48	MCS0	-1.858	-2.249	0.961	9.33
UNII3	5745	149	MCS0	-4.518	-4.568	-1.532	28.63 dBm/ 500kHz
	5785	157	MCS0	-4.645	-3.885	-1.238	28.63 dBm/ 500kHz
	5805	161	MCS0	-4.959	-3.813	-1.338	28.63 dBm/ 500kHz

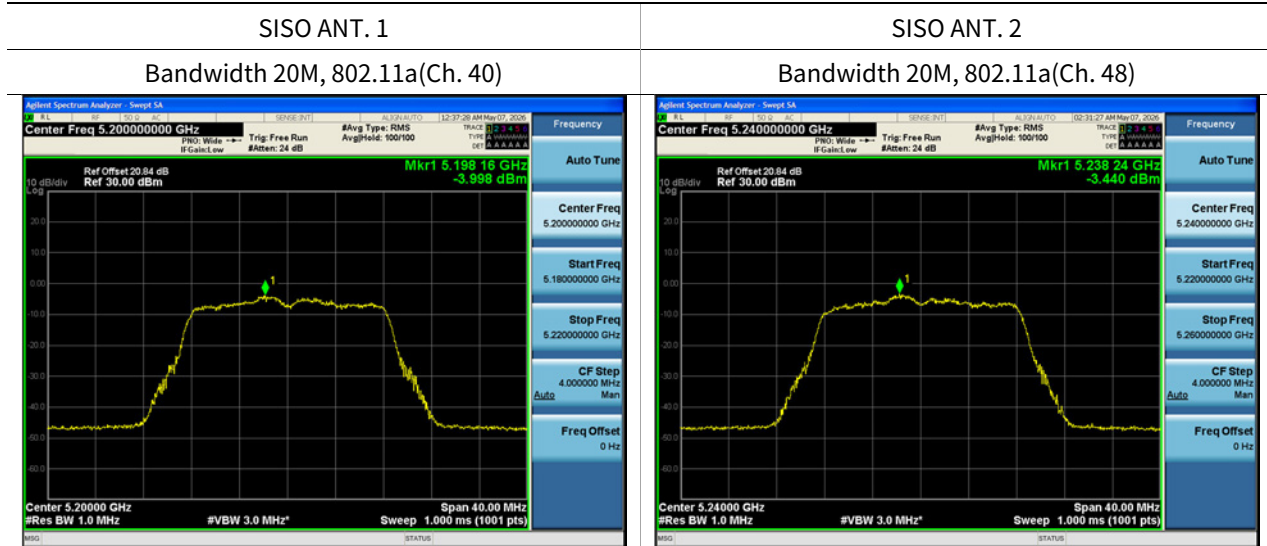
Mode : 802.11ac(VHT20)							
BAND	Freq. [MHz]	CH.	Datarate	Total Power Spectral Density [dBm/MHz] Note.1			Limit [dBm/MHz]
				ANT1	ANT2	MIMO	
UNII1	5180	36	MCS0	-1.984	-1.495	1.277	9.33
	5200	40	MCS0	-2.063	-1.769	1.096	9.33
	5240	48	MCS0	-2.393	-1.933	0.853	9.33
UNII3	5745	149	MCS0	-4.665	-4.416	-1.529	28.63 dBm/ 500kHz
	5785	157	MCS0	-4.519	-4.356	-1.427	28.63 dBm/ 500kHz
	5805	161	MCS0	-4.872	-4.300	-1.567	28.63 dBm/ 500kHz

Mode : 802.11n(HT40)							
BAND	Freq. [MHz]	CH.	Datarate	Total Power Spectral Density [dBm/MHz] Note.1			Limit
				ANT1	ANT2	MIMO	[dBm/MHz]
UNII1	5190	38	MCS0	-5.669	-5.199	-2.417	9.33
	5230	46	MCS0	-4.796	-4.689	-1.732	9.33
UNII3	5755	151	MCS0	-8.252	-7.519	-4.860	28.63 dBm/ 500kHz
	5795	159	MCS0	-7.820	-7.552	-4.673	28.63 dBm/ 500kHz
Mode : 802.11ac(VHT40)							
BAND	Freq. [MHz]	CH.	Datarate	Total Power Spectral Density [dBm/MHz] Note.1			Limit
				ANT1	ANT2	MIMO	[dBm/MHz]
UNII1	5190	38	MCS0	-6.024	-4.931	-2.433	9.33
	5230	46	MCS0	-5.464	-4.624	-2.013	9.33
UNII3	5755	151	MCS0	-7.704	-7.731	-4.707	28.63 dBm/ 500kHz
	5795	159	MCS0	-8.169	-7.778	-4.959	28.63 dBm/ 500kHz
Mode : 802.11ac(VHT80)							
BAND	Freq. [MHz]	CH.	Datarate	Total Power Spectral Density [dBm/MHz] Note.1			Limit
				ANT1	ANT2	MIMO	[dBm/MHz]
UNII1	5210	42	MCS0	-8.015	-7.641	-4.814	9.33
UNII3	5775	155	MCS0	-11.560	-11.376	-8.457	28.63 dBm/ 500kHz

■ Test Plots(POWER SPECTRAL DENSITY)

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

[SISO Ant]

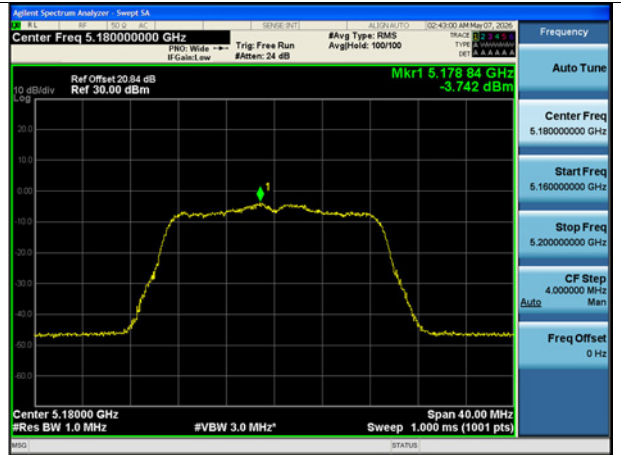


[MIMO_CDD(Ant.1+ Ant.2)]

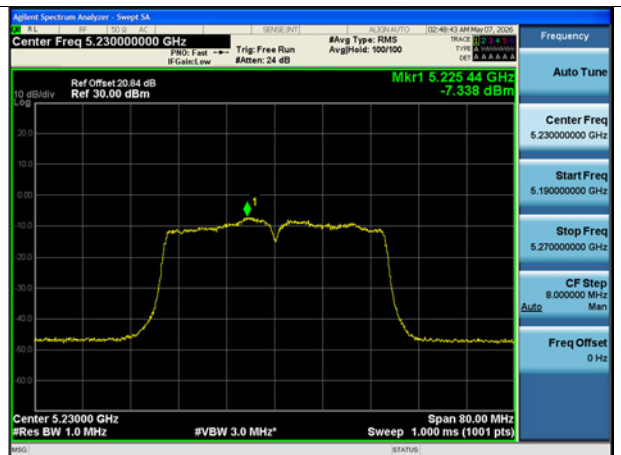
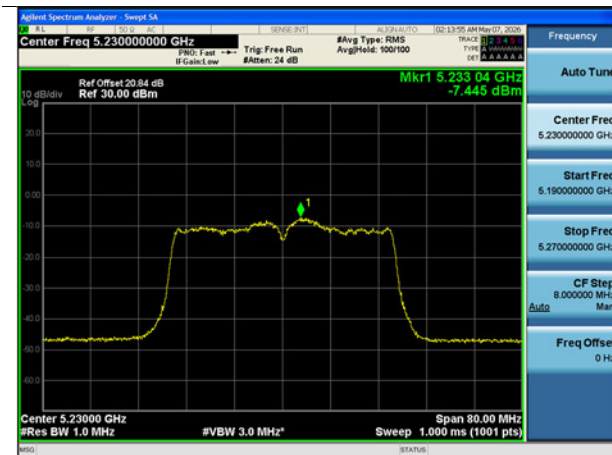
ANT. 1

ANT. 2

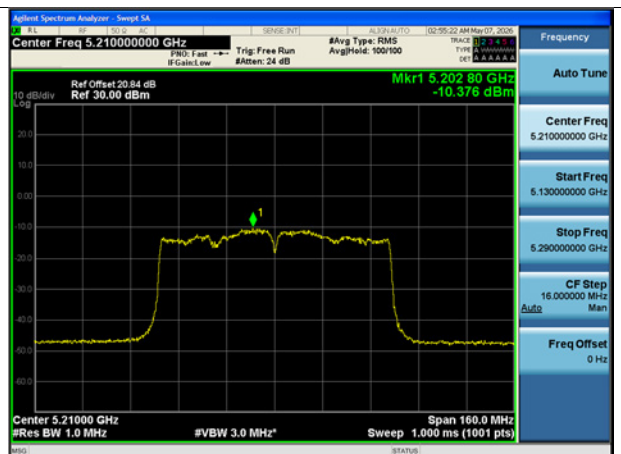
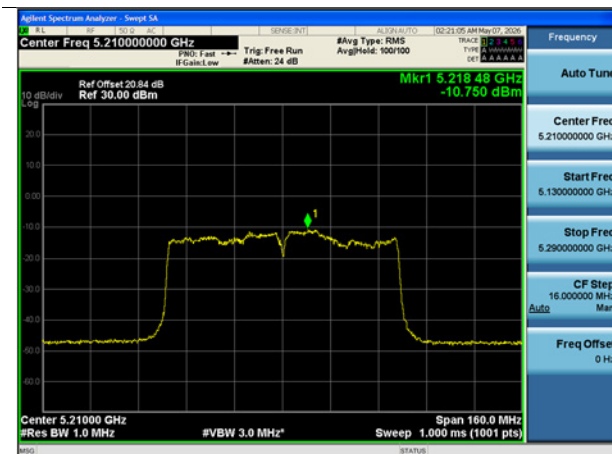
Bandwidth 20M, 802.11ac(VHT20) (Ch. 36)



Bandwidth 40M, 802.11n(HT40) (Ch. 46)



Bandwidth 80M, 802.11ac(VHT80) (Ch. 42)



10.6 FREQUENCY STABILITY

Note:

1. All modes of operation were investigated and the worst case configuration results are reported.
2. 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.

10.6.1 802.11ac 80 MHz BW

REFERENCE VOLTAGE: 14.4 VDC

Startup after the EUT is energized

OPERATING BAND:			UNII Band 1		UNII Band 3	
OPERATING FREQUENCY:			5,210,000,000 Hz		5,775,000,000 Hz	
CHANNEL:			42		155	
Voltage	Power	Temp.	Frequency	Frequency Error	Frequency	Frequency Error
(%)	(VDC)	(°C)	(kHz)	(kHz)	(kHz)	(kHz)
100%	14.40	+20(Ref)	5210023.43	23.43	5775022.53	22.53
100%		-30	5210013.64	13.64	5775012.70	12.70
100%		-20	5210013.90	13.90	5775013.03	13.03
100%		-10	5210017.20	17.20	5775012.08	12.08
100%		0	5210024.93	24.93	5775029.56	29.56
100%		+10	5210035.29	35.29	5775036.52	36.52
100%		+30	5210049.84	49.84	5775045.01	45.01
100%		+40	5210040.48	40.48	5775044.11	44.11
100%		+50	5210056.90	56.90	5775058.01	58.01
High	16.00	+20	5210059.88	59.88	5775059.96	59.96
Low	9.00	+20	5210058.17	58.17	5775059.95	59.95

2 minutes after the EUT is energized

OPERATING BAND:			UNII Band 1		UNII Band 3	
OPERATING FREQUENCY:			5,210,000,000 Hz		5,775,000,000 Hz	
CHANNEL:			42		155	
Voltage	Power	Temp.	Frequency	Frequency Error	Frequency	Frequency Error
(%)	(VDC)	(°C)	(kHz)	(kHz)	(kHz)	(kHz)
100%	14.40	+20(Ref)	5210022.29	22.29	5775023.60	23.60
100%		-30	5210008.45	8.45	5775009.72	9.72
100%		-20	5210014.11	14.11	5775013.04	13.04
100%		-10	5210012.50	12.50	5775014.97	14.97
100%		0	5210023.03	23.03	5775028.51	28.51
100%		+10	5210032.95	32.95	5775038.23	38.23
100%		+30	5210046.17	46.17	5775042.84	42.84
100%		+40	5210045.64	45.64	5775040.17	40.17
100%		+50	5210059.88	59.88	5775055.74	55.74
High	16.00	+20	5210050.16	50.16	5775056.67	56.67
Low	9.00	+20	5210057.60	57.60	5775055.79	55.79

5 minutes after the EUT is energized

OPERATING BAND:			UNII Band 1		UNII Band 3	
OPERATING FREQUENCY:			5,210,000,000 Hz		5,775,000,000 Hz	
CHANNEL:			42		155	
Voltage	Power	Temp.	Frequency	Frequency Error	Frequency	Frequency Error
(%)	(VDC)	(°C)	(kHz)	(kHz)	(kHz)	(kHz)
100%	14.40	+20(Ref)	5210024.54	24.54	5775022.61	22.61
100%		-30	5210013.87	13.87	5775010.62	10.62
100%		-20	5210010.97	10.97	5775011.65	11.65
100%		-10	5210019.55	19.55	5775013.08	13.08
100%		0	5210021.70	21.70	5775029.39	29.39
100%		+10	5210035.78	35.78	5775034.82	34.82
100%		+30	5210040.45	40.45	5775044.58	44.58
100%		+40	5210046.23	46.23	5775049.20	49.20
100%		+50	5210056.41	56.41	5775053.02	53.02
High	16.00	+20	5210056.87	56.87	5775058.52	58.52
Low	9.00	+20	5210059.99	59.99	5775055.82	55.82

10 minutes after the EUT is energized

OPERATING BAND:			UNII Band 1		UNII Band 3	
OPERATING FREQUENCY:			5,210,000,000 Hz		5,775,000,000 Hz	
CHANNEL:			42		155	
Voltage	Power	Temp.	Frequency	Frequency Error	Frequency	Frequency Error
(%)	(VDC)	(°C)	(kHz)	(kHz)	(kHz)	(kHz)
100%	14.40	+20(Ref)	5210024.00	24.00	5775023.02	23.02
100%		-30	5210011.02	11.02	5775005.01	5.01
100%		-20	5210012.07	12.07	5775013.30	13.30
100%		-10	5210019.23	19.23	5775017.60	17.60
100%		0	5210027.76	27.76	5775024.25	24.25
100%		+10	5210037.93	37.93	5775035.45	35.45
100%		+30	5210044.82	44.82	5775040.64	40.64
100%		+40	5210041.25	41.25	5775044.37	44.37
100%		+50	5210056.59	56.59	5775056.80	56.80
High	16.00	+20	5210056.34	56.34	5775051.24	51.24
Low	9.00	+20	5210054.99	54.99	5775051.01	51.01

10.7 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

Frequency	Measured Value	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]

No Critical peaks found

Note:

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

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	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

[SISO Ant 1]

[802.11a]

Band : UNII 1			Operation Mode : 802.11a				
CH.36 5180 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10360	48.62	6.43	V	55.05	68.20	13.15	PK
15540	47.97	7.10	V	55.07	73.98	18.91	PK
15540	35.91	7.10	V	43.01	53.98	10.97	AV
10360	48.77	6.43	H	55.20	68.20	13.00	PK
15540	48.00	7.10	H	55.10	73.98	18.88	PK
15540	35.97	7.10	H	43.07	53.98	10.91	AV

Band : UNII 1			Operation Mode : 802.11a				
CH.40 5200 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10400	48.79	6.32	V	55.11	68.20	13.09	PK
15600	47.54	6.64	V	54.18	73.98	19.80	PK
15600	35.67	6.64	V	42.31	53.98	11.67	AV
10400	48.83	6.32	H	55.15	68.20	13.05	PK
15600	47.66	6.64	H	54.30	73.98	19.68	PK
15600	35.69	6.64	H	42.33	53.98	11.65	AV

Band : UNII 1			Operation Mode : 802.11a				
CH.48 5240 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10480	48.11	6.93	V	55.04	68.20	13.16	PK
15720	47.95	6.26	V	54.21	73.98	19.77	PK
15720	35.73	6.26	V	41.99	53.98	11.99	AV
10480	48.26	6.93	H	55.19	68.20	13.01	PK
15720	48.03	6.26	H	54.29	73.98	19.69	PK
15720	35.81	6.26	H	42.07	53.98	11.91	AV

Band : UNII 3			Operation Mode : 802.11a				
CH.149 5745 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11490	47.52	6.47	V	53.99	73.98	19.99	PK
11490	35.82	6.47	V	42.29	53.98	11.69	AV
17235	47.27	11.48	V	58.75	68.20	9.45	PK
11490	47.65	6.47	H	54.12	73.98	19.86	PK
11490	35.83	6.47	H	42.30	53.98	11.68	AV
17235	47.38	11.48	H	58.86	68.20	9.34	PK

Band : UNII 3			Operation Mode : 802.11a				
CH.157 5785 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11570	48.84	6.94	V	55.78	73.98	18.20	PK
11570	36.97	6.94	V	43.91	53.98	10.07	AV
17355	47.48	12.71	V	60.19	68.20	8.01	PK
11570	48.88	6.94	H	55.82	73.98	18.16	PK
11570	37.08	6.94	H	44.02	53.98	9.96	AV
17355	47.56	12.71	H	60.27	68.20	7.93	PK

Band : UNII 3			Operation Mode : 802.11a				
CH.161 5805 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11610	48.07	6.54	V	54.61	73.98	19.37	PK
11610	36.36	6.54	V	42.90	53.98	11.08	AV
17415	46.95	13.30	V	60.25	68.20	7.95	PK
11610	48.20	6.54	H	54.74	73.98	19.24	PK
11610	36.42	6.54	H	42.96	53.98	11.02	AV
17415	47.00	13.30	H	60.30	68.20	7.90	PK

[SISO Ant 2]

[802.11a]

Band : UNII 1			Operation Mode : 802.11a				
CH.36 5180 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10360	48.54	6.43	V	54.97	68.20	13.23	PK
15540	47.99	7.10	V	55.09	73.98	18.89	PK
15540	36.18	7.10	V	43.28	53.98	10.70	AV
10360	48.64	6.43	H	55.07	68.20	13.13	PK
15540	48.14	7.10	H	55.24	73.98	18.74	PK
15540	36.22	7.10	H	43.32	53.98	10.66	AV

Band : UNII 1			Operation Mode : 802.11a				
CH.40 5200 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10400	48.55	6.32	V	54.87	68.20	13.33	PK
15600	47.91	6.64	V	54.55	73.98	19.43	PK
15600	35.42	6.64	V	42.06	53.98	11.92	AV
10400	48.59	6.32	H	54.91	68.20	13.29	PK
15600	47.99	6.64	H	54.63	73.98	19.35	PK
15600	35.56	6.64	H	42.20	53.98	11.78	AV

Band : UNII 1			Operation Mode : 802.11a				
CH.48 5240 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10480	48.78	6.93	V	55.71	68.20	12.49	PK
15720	47.24	6.26	V	53.50	73.98	20.48	PK
15720	35.67	6.26	V	41.93	53.98	12.05	AV
10480	48.82	6.93	H	55.75	68.20	12.45	PK
15720	47.38	6.26	H	53.64	73.98	20.34	PK
15720	35.79	6.26	H	42.05	53.98	11.93	AV

Band : UNII 3			Operation Mode : 802.11a				
CH.149 5745 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11490	48.43	6.47	V	54.90	73.98	19.08	PK
11490	35.66	6.47	V	42.13	53.98	11.85	AV
17235	46.84	11.48	V	58.32	68.20	9.88	PK
11490	48.49	6.47	H	54.96	73.98	19.02	PK
11490	35.67	6.47	H	42.14	53.98	11.84	AV
17235	46.89	11.48	H	58.37	68.20	9.83	PK

Band : UNII 3			Operation Mode : 802.11a				
CH.157 5785 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11570	48.92	6.94	V	55.86	73.98	18.12	PK
11570	36.90	6.94	V	43.84	53.98	10.14	AV
17355	47.23	12.71	V	59.94	68.20	8.26	PK
11570	48.98	6.94	H	55.92	73.98	18.06	PK
11570	36.96	6.94	H	43.90	53.98	10.08	AV
17355	47.30	12.71	H	60.01	68.20	8.19	PK

Band : UNII 3			Operation Mode : 802.11a				
CH.161 5805 MHz			Transfer Rate : 6 Mbps				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11610	48.85	6.54	V	55.39	73.98	18.59	PK
11610	36.31	6.54	V	42.85	53.98	11.13	AV
17415	47.57	13.30	V	60.87	68.20	7.33	PK
11610	48.98	6.54	H	55.52	73.98	18.46	PK
11610	36.44	6.54	H	42.98	53.98	11.00	AV
17415	47.62	13.30	H	60.92	68.20	7.28	PK

[MIMO_CDD(Ant 1+Ant 2)]

[802.11n(HT20)]

Band : UNII 1			Operation Mode : 802.11n_HT20				
CH.36 5180 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10360	49.13	6.43	V	55.56	68.20	12.64	PK
15540	48.76	7.10	V	55.86	73.98	18.12	PK
15540	35.97	7.10	V	43.07	53.98	10.91	AV
10360	49.20	6.43	H	55.63	68.20	12.57	PK
15540	48.80	7.10	H	55.90	73.98	18.08	PK
15540	36.10	7.10	H	43.20	53.98	10.78	AV

Band : UNII 1			Operation Mode : 802.11n_HT20				
CH.40 5200 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10400	49.10	6.32	V	55.42	68.20	12.78	PK
15600	47.97	6.64	V	54.61	73.98	19.37	PK
15600	35.60	6.64	V	42.24	53.98	11.74	AV
10400	49.11	6.32	H	55.43	68.20	12.77	PK
15600	48.02	6.64	H	54.66	73.98	19.32	PK
15600	35.67	6.64	H	42.31	53.98	11.67	AV

Band : UNII 1			Operation Mode : 802.11n_HT20				
CH.48 5240 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10480	48.80	6.93	V	55.73	68.20	12.47	PK
15720	49.11	6.26	V	55.37	73.98	18.61	PK
15720	36.22	6.26	V	42.48	53.98	11.50	AV
10480	48.94	6.93	H	55.87	68.20	12.33	PK
15720	49.15	6.26	H	55.41	73.98	18.57	PK
15720	36.25	6.26	H	42.51	53.98	11.47	AV

Band : UNII 3			Operation Mode : 802.11n_HT20				
CH.149 5745 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11490	49.02	6.47	V	55.49	73.98	18.49	PK
11490	35.72	6.47	V	42.19	53.98	11.79	AV
17235	47.17	11.48	V	58.65	68.20	9.55	PK
11490	49.08	6.47	H	55.55	73.98	18.43	PK
11490	35.80	6.47	H	42.27	53.98	11.71	AV
17235	47.19	11.48	H	58.67	68.20	9.53	PK

Band : UNII 3			Operation Mode : 802.11n_HT20				
CH.157 5785 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11570	49.69	6.94	V	56.63	73.98	17.35	PK
11570	36.96	6.94	V	43.90	53.98	10.08	AV
17355	47.83	12.71	V	60.54	68.20	7.66	PK
11570	49.71	6.94	H	56.65	73.98	17.33	PK
11570	37.01	6.94	H	43.95	53.98	10.03	AV
17355	47.87	12.71	H	60.58	68.20	7.62	PK

Band : UNII 3			Operation Mode : 802.11n_HT20				
CH.161 5805 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11610	48.68	6.54	V	55.22	73.98	18.76	PK
11610	36.47	6.54	V	43.01	53.98	10.97	AV
17415	48.60	13.30	V	61.90	68.20	6.30	PK
11610	48.76	6.54	H	55.30	73.98	18.68	PK
11610	36.48	6.54	H	43.02	53.98	10.96	AV
17415	48.69	13.30	H	61.99	68.20	6.21	PK

[Simultaneous transmission Scenario]

Scenario :

BTLE 1M 37 Bytes Ch. 39 + 5G WLAN MIMO(CDD) 802.11n(HT20) Ch. 161 MCS 0

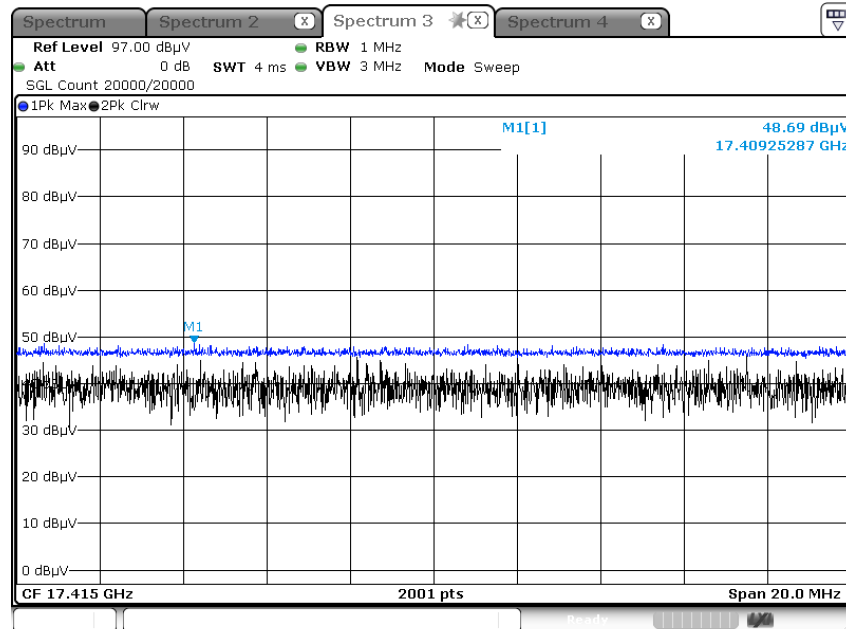
Band : UNII 3			Operation Mode : 802.11n_HT20				
CH.161 5805 MHz			Transfer Rate : MCS0				
Frequency [MHz]	Measured value [dBμV]	CL+AF+DF-AG [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11610	48.86	6.54	V	55.40	73.98	18.58	PK
11610	36.27	6.54	V	42.81	53.98	11.17	AV
17415	47.59	13.30	V	60.89	68.20	7.31	PK
11610	49.02	6.54	H	55.56	73.98	18.42	PK
11610	36.34	6.54	H	42.88	53.98	11.10	AV
17415	47.70	13.30	H	61.00	68.20	7.20	PK

Test Plots(RADIATED SPURIOUS EMISSIONS)

Note: Only the worst case plot for Radiated Spurious Emissions.

[MIMO_CDD(Ant1+Ant2)]

Radiated Spurious Emissions plot – Peak Result (802.11n_HT20, Ch.161 Spurious Emissions, X-H)



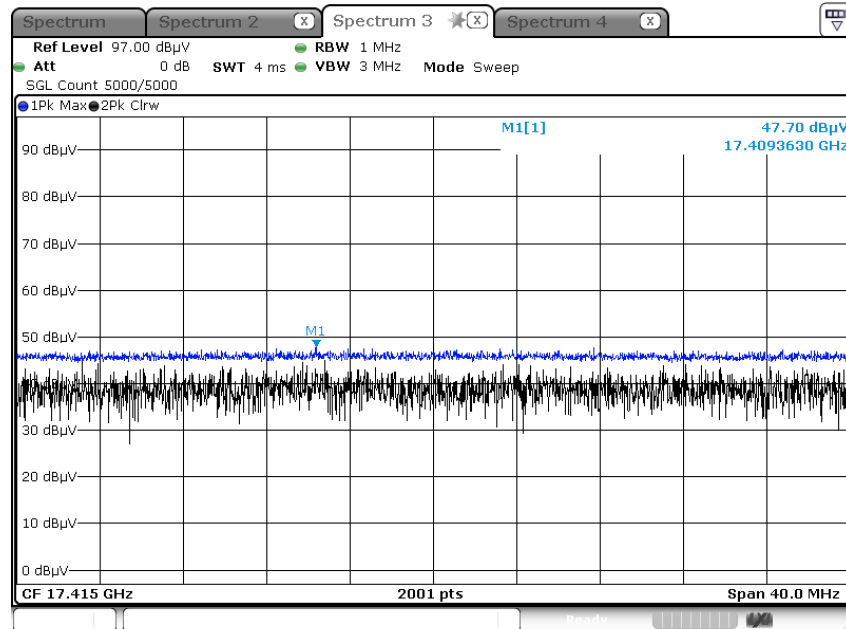
Date: 15.MAY.2026 14:49:55

[Simultaneous transmission Scenario]

Scenario :

BTLE 1M 37 Bytes Ch. 39 + 5G WLAN MIMO(CDD) 802.11n(HT20) Ch. 161 MCS 0

Radiated Spurious Emissions plot – Peak Result (Spurious Emissions, X-H)



Date: 19.MAY.2026 09:50:39

10.8 RADIATED RESTRICTED BAND EDGE

[SISO Ant 1]

[802.11a]

Operation Mode :		802.11a	Tone & RU Index :		N/A	Transfer Rate :		6M
Channel No. :		36	Frequency :		5180 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	57.77	H	57.77	73.98	16.21	PK		
4500 - 5150	46.60	H	46.60	53.98	7.38	AV		
Operation Mode :		802.11a	Tone & RU Index :		N/A	Transfer Rate :		6M
Channel No. :		48	Frequency :		5240 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	57.83	H	57.83	73.98	16.15	PK		
5350 - 5460	46.55	H	46.55	53.98	7.43	AV		

[SISO Ant 2]

[802.11a]

Operation Mode :		802.11a	Tone & RU Index :		N/A	Transfer Rate :		6M
Channel No. :		36	Frequency :		5180 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	57.97	H	57.97	73.98	16.01	PK		
4500 - 5150	46.02	H	46.02	53.98	7.96	AV		
Operation Mode :		802.11a	Tone & RU Index :		N/A	Transfer Rate :		6M
Channel No. :		48	Frequency :		5240 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	57.49	H	57.49	73.98	16.49	PK		
5350 - 5460	46.24	H	46.24	53.98	7.74	AV		

[MIMO (Ant 1+Ant 2)]
[802.11n(HT20)]

Operation Mode :		802.11n_20	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		36	Frequency :		5180 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	57.76	H	57.76	73.98	16.22	PK		
4500 - 5150	47.40	H	47.40	53.98	6.58	AV		
Operation Mode :		802.11n_20	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		48	Frequency :		5240 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	57.59	H	57.59	73.98	16.39	PK		
5350 - 5460	46.47	H	46.47	53.98	7.51	AV		

[802.11ac(VHT20)]

Operation Mode :		802.11ac_20	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		36	Frequency :		5180 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	57.39	H	57.39	73.98	16.59	PK		
4500 - 5150	47.16	H	47.16	53.98	6.82	AV		
Operation Mode :		802.11ac_20	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		48	Frequency :		5240 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	57.35	H	57.35	73.98	16.63	PK		
5350 - 5460	46.39	H	46.39	53.98	7.59	AV		

[802.11n(HT40)]

Operation Mode :		802.11n_40	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		38	Frequency :		5190 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	57.60	H	57.60	73.98	16.38	PK		
4500 - 5150	47.67	H	47.67	53.98	6.31	AV		
Operation Mode :		802.11n_40	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		46	Frequency :		5230 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	57.66	H	57.66	73.98	16.32	PK		
5350 - 5460	46.69	H	46.69	53.98	7.29	AV		

[802.11ac(VHT40)]

Operation Mode :		802.11ac_40	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		38	Frequency :		5190 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	57.95	H	57.95	73.98	16.03	PK		
4500 - 5150	47.36	H	47.36	53.98	6.62	AV		

Operation Mode :		802.11ac_40	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		46	Frequency :		5230 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	57.58	H	57.58	73.98	16.40	PK		
5350 - 5460	46.24	H	46.24	53.98	7.74	AV		

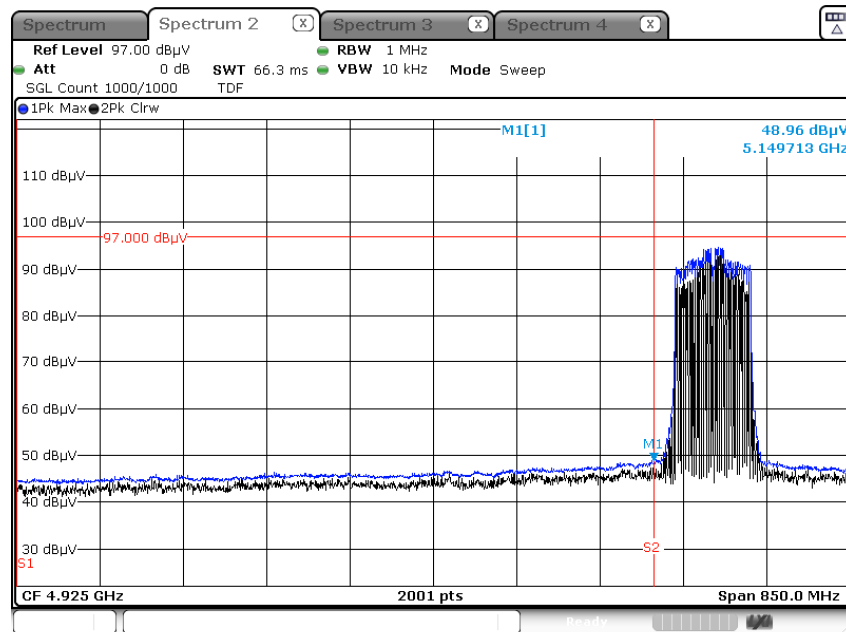
[802.11ac(VHT80)]

Operation Mode :		802.11ac_80	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		42	Frequency :		5210 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
4500 - 5150	58.46	H	58.46	73.98	15.52	PK		
4500 - 5150	48.96	H	48.96	53.98	5.02	AV		
Operation Mode :		802.11ac_80	Tone & RU Index :		N/A	MCS index :		MCS0
Channel No. :		42	Frequency :		5210 MHz	Band :		UNII-1
Frequency [MHz]	Measured Value [dBμV]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type		
5350 - 5460	58.92	H	58.92	73.98	15.06	PK		
5350 - 5460	46.98	H	46.98	53.98	7.00	AV		

Test Plots(RADIATED RESTRICTED BAND EDGE)

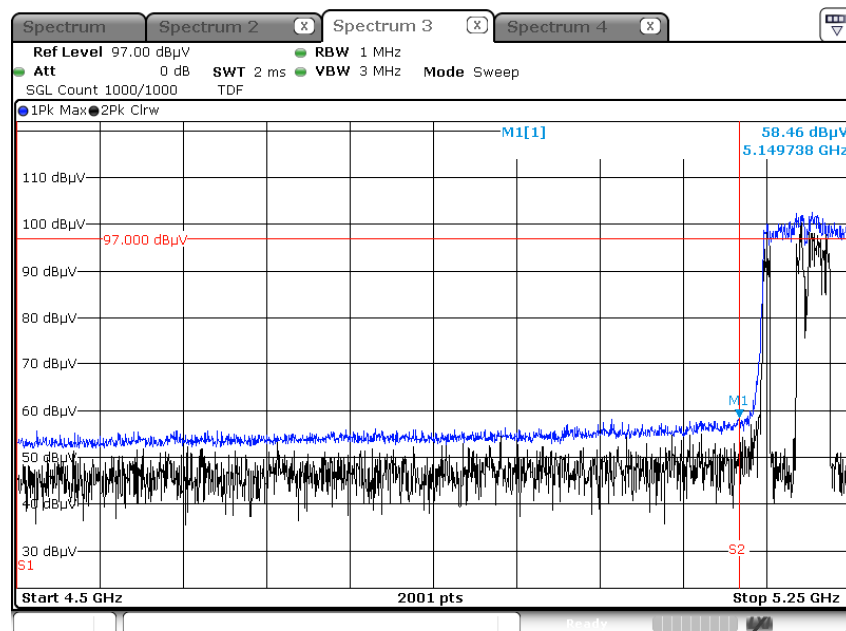
[MIMO_CDD(Ant 1+Ant 2)] (UNII 1)

Average Result (802.11ac80_ MCS0, Ch. 42, X-H)



Date: 29.MAY.2026 14:17:13

Peak Result (802.11ac80_ MCS0, Ch. 42, X-H)



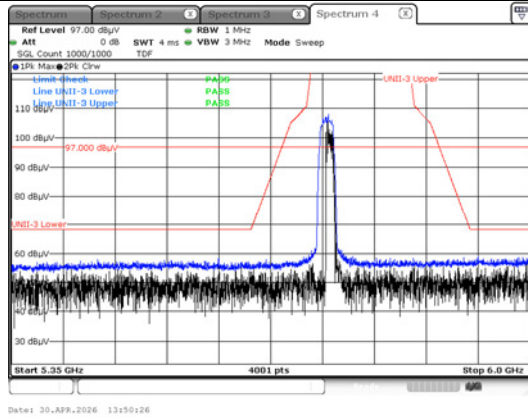
Date: 27.APR.2026 15:41:41

Note: Only the worst case plots for Radiated Restricted Band Edge.

Test Plots(UNII 3)

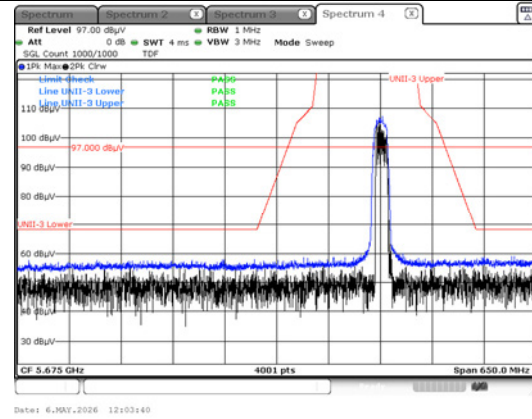
[SISO Ant 1]

Peak Result (802.11a, Ch. 149, X-H)



Date: 30.APR.2026 13:50:26

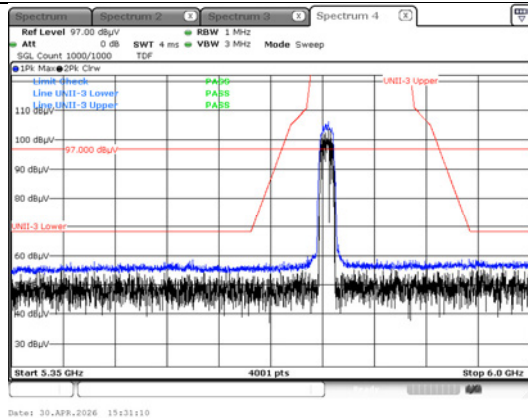
Peak Result (802.11a, Ch. 161, X-H)



Date: 6.MAY.2026 12:03:40

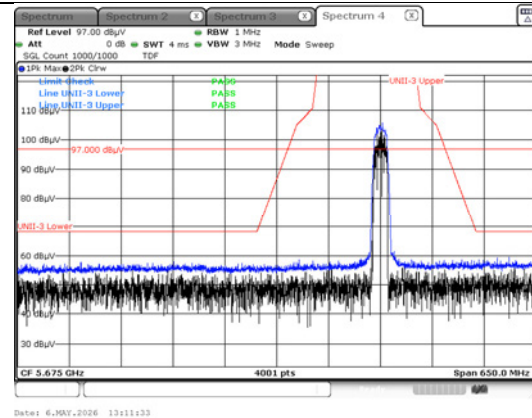
[SISO Ant 2]

Peak Result (802.11a, Ch. 149, X-H)



Date: 30.APR.2026 15:31:10

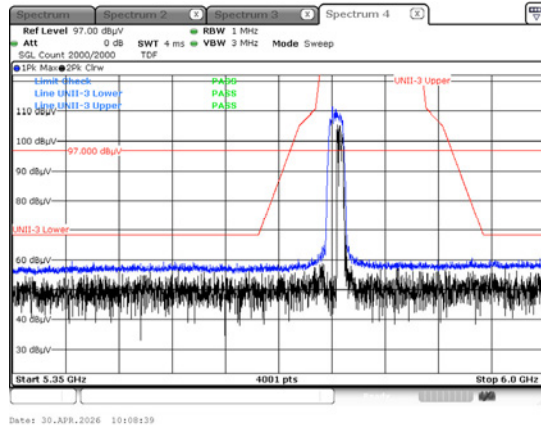
Peak Result (802.11a, Ch. 161, X-H)



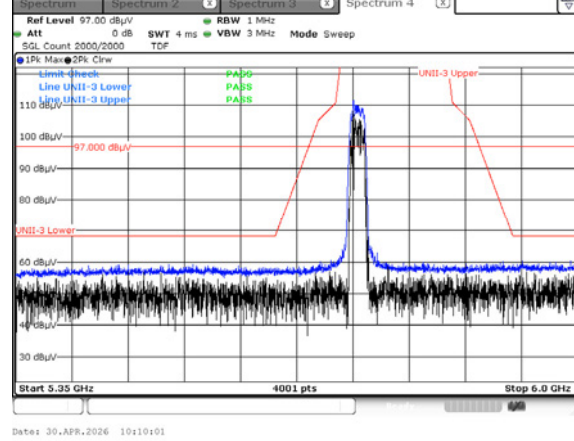
Date: 6.MAY.2026 13:11:33

[MIMO(Ant 1+Ant 2)]

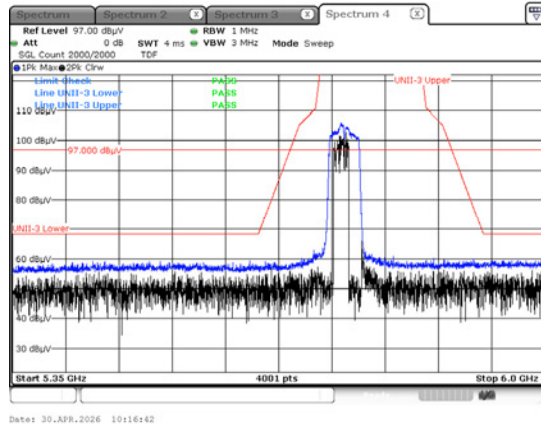
Peak Result (802.11n_HT20, Ch.149, X-H)



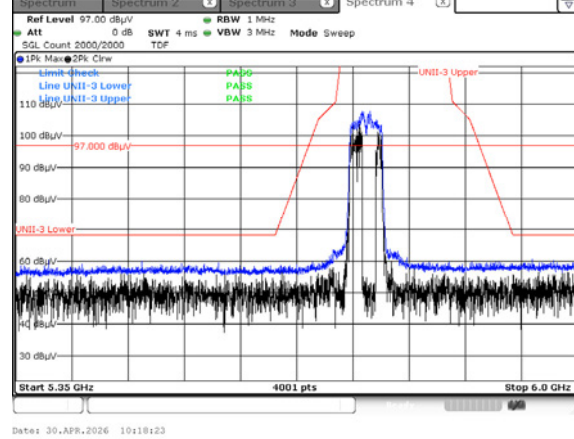
Peak Result (802.11ac_VHT20, Ch.149, X-H)



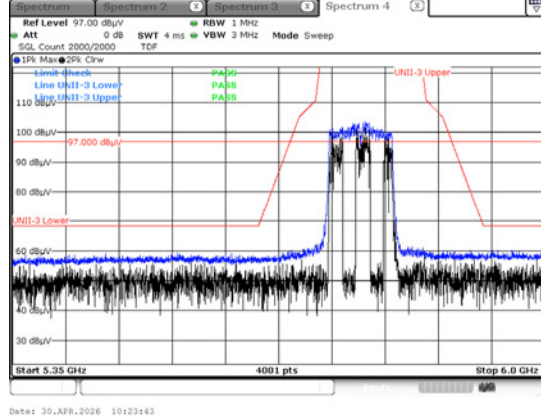
Peak Result (802.11n_HT40, Ch.151, X-H)



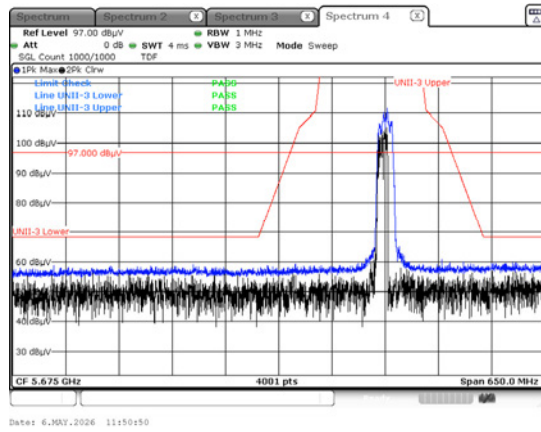
Peak Result (802.11ac_VHT40, Ch.151, X-H)



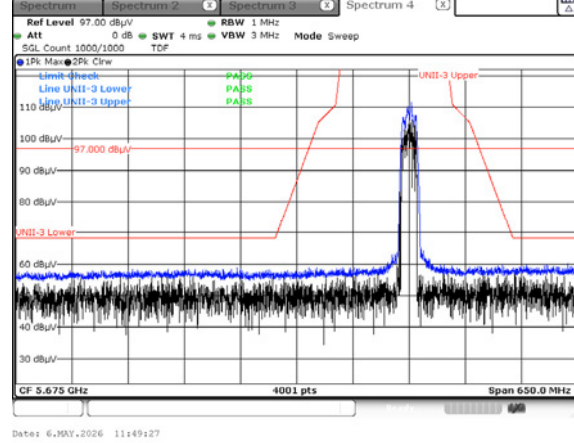
Peak Result (802.11ac_VHT80, Ch.155, X-H)



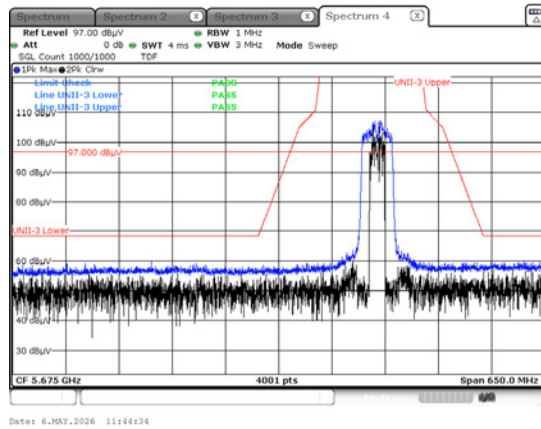
Peak Result (802.11n_HT20, Ch.161, X-H)



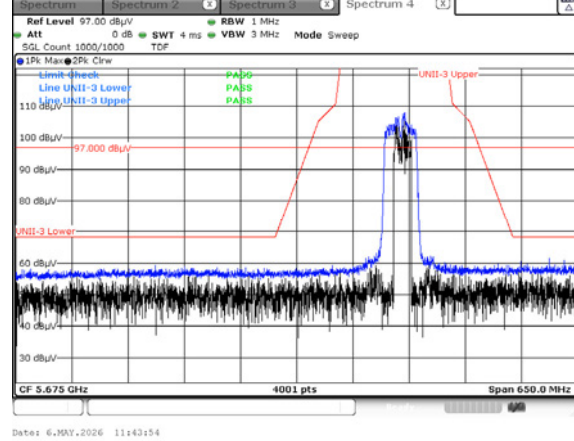
Peak Result (802.11ac_VHT20, Ch.161, X-H)



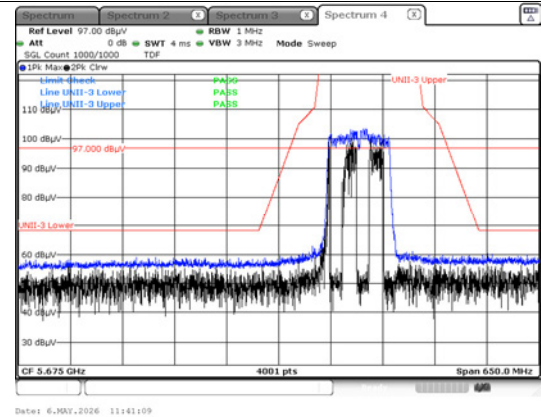
Peak Result (802.11n_HT40, Ch.159, X-H)



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



Peak Result (802.11ac_VHT80, Ch.155, X-H)



Note :

1. Only the worst case plots for U-NII-3 Out of Band e.i.r.p Emission.

11. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	07/15/2026	Annual
EMI Test Receiver	ESR7	Rohde & Schwarz	101910	08/20/2026	Annual
Chamber	SU-642	ESPEC	93008124	02/04/2027	Annual
PXA Signal Analyzer	N9030A	Agilent	MY49432108	02/09/2027	Annual
Open Switch and Control Platform	OSP 120	Rohde & Schwarz	100935	07/24/2026	Annual
Power Meter	N1911A	Agilent	MY45100523	02/13/2027	Annual
WIDEBAND POWER SENSOR	N1921A	Keysight	MY57820067	01/26/2027	Annual
Directional Coupler	87300B	Agilent	3116A03621	10/14/2026	Annual
Power Splitter	11667B	Hewlett Packard	10545	01/15/2027	Annual
DC Power Supply	E3632A	Hewlett Packard	KR40010370	07/07/2026	Annual
Attenuator	8493C-010	Keysight	07560	04/29/2027	Annual
Attenuator	8493C-010	HP	08285	05/08/2027	Annual
Attenuator	18N-20dB	Rohde & Schwarz	8	02/09/2027	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
Bluetooth Tester	CBT	Rohde & Schwarz	100752	12/22/2026	Annual
Automation Software	FCC WLAN Conducted	HCT CO., LTD	N/A	N/A	N/A
Automation Software	FCC Bluetooth Conducted	HCT CO., LTD	N/A	N/A	N/A

Note:

1. Equipment whose calibration due date was updated during the test period was not used between the previous due date and the update.

All reported measurements were performed using equipment within valid calibration.

2. Especially, all antenna for measurement is calibrated in accordance with the requirements of ANSI C63.5-2017.

Radiated Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Antenna Mast Controller	CO3000	Innco system GmbH	CO3000/842/35030115/L	N/A	N/A
Antenna Mast	MA4640/800-XP-EP	Innco system GmbH	S3AM	07/25/2026	Annual
Turn Table	DS1500-S-1t	Innco system GmbH	6290425	N/A	N/A
Loop Antenna	FMZB 1513	Schwarzbeck Mess-Elektronik OHG	1513-175	06/24/2027	Biennial
Trilog Broadband Antenna	VULB 9168	Schwarzbeck Mess-Elektronik OHG	01135	08/19/2026	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck Mess-Elektronik OHG	9120D-1191	10/21/2027	Biennial
Horn Antenna	BBHA 9170	Schwarzbeck Mess-Elektronik OHG	BBHA9170124	03/23/2027	Biennial
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments GmbH	2	12/11/2026	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments GmbH	5	03/19/2027	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments GmbH	6	03/19/2027	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments GmbH	1	01/07/2027	Annual
RF Switching System	FBSR-03A (3G HPF+LNA)	T&M SYSTEM	S3L1	10/20/2026	Annual
RF Switching System	FBSR-03A (10dB ATT+LNA)	T&M SYSTEM	S3L2	10/20/2026	Annual
RF Switching System	FBSR-03A (7G HPF+LNA)	T&M SYSTEM	S3L3	10/20/2026	Annual
RF Switching System	FBSR-03A (3dB ATT+LNA)	T&M SYSTEM	S3L4	10/20/2026	Annual
RF Switching System	FBSR-03A (Thru)	T&M SYSTEM	S3L5	10/20/2026	Annual
DC Power Supply	E3632A	Hewlett Packard	KR75305528	12/12/2026	Annual
Automation Software	FCC WLAN Radiated	HCT CO., LTD.	-	-	-
Broadband LNA	CBL18265035	CERNEX	22966	10/21/2026	Annual
Broadband LNA	CBL26405040	CERNEX	25956	02/09/2027	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000175	03/03/2027	Annual
Spectrum Analyzer	FSV40	Rohde & Schwarz	100900	04/14/2027	Annual

Note:

- Equipment whose calibration due date was updated during the test period was not used between the previous due date and the update.
All reported measurements were performed using equipment within valid calibration.
- Especially, all antenna for measurement is calibrated in accordance with the requirements of ANSI C63.5-2017.

12. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2605-FC027-P