RF Test Report

U-NII 802.11a/n

Report No.	:	FCCBVCO-WAY-P21090030-3R2
Customer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Use of Report	:	Certification
Model Name	:	SM-R875U (Alt. SM-R875F)
FCC ID (Model)	:	A3LSMR875 (SM-R875U, SM-R875F)
IC No. (Model)	:	649E-SMR8751 (SM-R875F)
Date of Test	:	2021.10.07 to 2021.10.15
Test Method Used	:	FCC 47 CFR PART 15 Subpart E (Section §15.407) / ISED RSS-247
Testing Environment	:	Refer to the Test Condition
ISED# / CAB Identifier	:	26316 / KR0158

Test Result : ☒ **Pass** ☐ **Fail**

ISSUED BY: BV CPS ADT Korea Ltd., EMC/RF Laboratory

ADDRESS: Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 16675

TEST LOCATION: HeungAn-daero 49, DongAn-gu, Anyang-si, Gyeonggi-do, Korea, 14119

Tested by

Name : Donghwa Shin (Signature)

Technical Manager

Name : Jongha Choi (Signature)

2021. 10. 28

BV CPS ADT Korea Ltd.

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
FCCBVCO-WAY-P21090030-3	Original release	2021.10.18
FCCBVCO-WAY-P21090030-3R1	Update	2021.10.26
FCCBVCO-WAY-P21090030-3R2	Update	2021.10.28

Table of Contents

1 Summary of Test Results

The EUT has been tested according to the following specifications

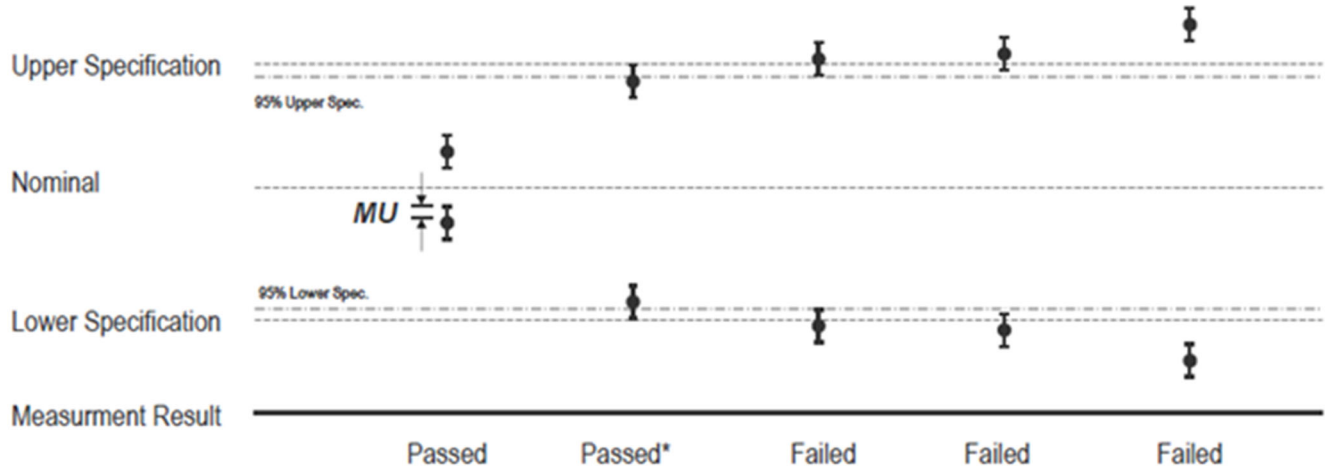
Applied Standard : FCC Part 15, Subpart E 15.407, RSS-247					
FCC Part Section(s)	**RSS Section(s)**	**Test Description**	**Limit**	**Test Result**	**Reference**
N/A	RSS-Gen [6.6]	26 dB Bandwidth	N/A	PASS	Section 2.5
15.407(e)	RSS-Gen [6.6]	6 dB Bandwidth	> 500 kHz (5 725 – 5 850 MHz)	PASS	Section 3.2
-	-	Occupied Bandwidth (99 % Bandwidth)	N/A	PASS	Section 2.5
15.407(a)(1)(iv) 15.407(a)(2) 15.407(a)(3)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum Conducted power must meet the limits in 15.407(a) (RSS-247 [6.2])	PASS	Section 3.3
15.407(a)(1)(iv) 15.407 (a)(2) 15.407 (a)(3)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum Conducted power must meet the limits in 15.407(a) (RSS-247 [6.2])	PASS	Section 3.4
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	Refer to the Section 4.	PASS	Section 4
15.407(b)(1), (2),(3),(4)	RSS-247 [6.2]	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2])	PASS	Section 3.5
15.205 15.407(b)(1), (4), (5), (6)	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	PASS	Section 3.5
15.407	RSS-Gen [8.8]	AC Conducted Emissions (150 kHz – 30 MHz)	< FCC 15.207 (RSS-Gen [8.8]) Limits	PASS	Section 3.6

NOTES

1) The general test methods used to test on this devices are ANSI C63.10.

2) Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

1.1 Decision Rules for Statement of Conformity



QUA-52 Decision Rule(QA Document) was applied.

Step 1) : Reference Check, Daily Check, Peripheral device Check

Step 2) : Re-test Procedure (Repeat the test maximum 3 times, Different Test Engineer)

1) If the original test results are subject to retesting and the judgement is unclear, the retest is carried out.

2) If the result of the first retest is the same as the initial test, the judgement is made based on the value.

3) If the result of the first retest differ from the results of the initial test, the second re-test is carried out.

4) After completion of the second retest, the average of the three test results is determined as the final result. However, if the deviation of the three test values is more than 5 % of the reference value, the technical manager should review the reproducibility of the test from the beginning.

1.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement Items	Frequency Range	Expanded Uncertainty U = *k*Uc (*k* = 2)
Conducted Emissions at main ports	150 kHz – 30 MHz	2.99
Radiated Spurious Emissions	9 kHz – 30 MHz	1.92
	30 MHz – 1 GHz	4.00
	1 GHz – 18 GHz	5.68
	18 GHz – 40 GHz	5.24

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k = 2.

2 General Information

2.1 General Description of EUT

Product	Smart Wearable
Brand	Samsung
Model	SM-R875U (Alt. SM-R875F) for FCC ID : A3LSMR875
Identification No. of EUT	-
Series Model	SM-R875F for IC No. : 649E-SMR8751
HVIN	SM-R875F1
Model Difference	-
Power Supply	DC 3.88 V
Modulation Type	OFDM
Transfer Rate	6, 9, 12, 18, 24, 36, 48, 54 Mbps (802.11a) MCS0 to MCS7 (802.11n(HT20))
Operating Frequency	5 180 to 5 240 MHz (U-NII-1) 5 260 to 5 320 MHz (U-NII-2A) 5 500 to 5 720 MHz (U-NII-2C) 5 745 to 5 825 MHz (U-NII-3)
Number of Channel	4 Channels (U-NII-1)_20 MHz BW 4 Channels (U-NII-2A)_20 MHz BW 11 Channels (U-NII-2C)_20 MHz BW 1 Channels (Straddle)_20 MHz BW 5 Channels (U-NII-3)_20 MHz BW
Output Power	14.20 dBm (26.33 mW)
Antenna Type	LDS Antenna
Antenna Connector	Internal
H/W Version	REV1.0
S/W Version	R875U.001(SM-R875U), R875F.001(SM-R875F)
Test device Information	Model : SM-R875U Serial number - Conducted(R3AR400CDNM, 41000837e49a4861), Radiated(R3AR400CDEH, R3AR400CD5P, R3AR400CDAR, R3AR400CDDX)

NOTES

1) The above equipment has been tested by **Bureau Veritas Consumer Products Services ADT Korea**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2) The following antennas were provided to the EUT

Antenna	Type	Connector	Peak Gain (dBi)				
			2.4 GHz	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
Bluetooth/ Wi-Fi	LDS Antenna	Internal	-7.7	-9.2	-7.3	-8.1	-7.6

3) Spurious emission of the simultaneous operation and the test data please refer to clause 3.5.6 in this test report.

4) **List of Accessories**

Accessories	Brand	Model	Manufacturer	Specification
Wireless Charger	Samsung	EP-OR825	Samsung	FCC ID : A3LEPOR825/ IC : 649E-EPOR825

2.2 Description of Test Mode

[Test Channel of EUT]

- 5 GHz 802.11a/n (20 MHz BW)

U-NII-1		U-NII-2A		U-NII-2C		U-NII-3	
Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
36	5 180	52	5 260	100	5 500	149	5 745
40	5 200	56	5 280	104	5 520	153	5 765
44	5 220	60	5 300	108	5 540	157	5 785
48	5 240	64	5 320	112	5 560	161	5 805
				116	5 580	165	5 825
				120	5 600		
				124	5 620		
				128	5 640		
				132	5 660		
				136	5 680		
				140	5 700		
				144	5 720		

2.2.1 Test Mode Applicability and Tested Channel Details

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. All Radiated emission tests have been performed two mode(with charger and without charger). The worst case was found when positioned on Y axis and without charger mode for radiated emission. Following channel(s) was(were) selected for the final test as listed below :

EUT Configure mode	Applicable to				Description
	RE < 1G	RE ≥ 1G	PLC	APCM	
Without Charger	√	√	-	√	-
With Charger	-	-	√	-	-

Where RE ≥ 1 G : Radiated Emission above 1 GHz & Bandedge Measurement
RE < 1 G : Radiated Emission below 1 GHz
PLC : Power Line Conducted Emission
APCM : Antenna Port Conducted Measurement

Radiated Emission Test (Below 1 GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

Frequency Band	EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
U-NII-2C (5 500 – 5 700)	802.11a	149 to 165	140	OFDM	6 Mbps

NOTES

According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz.

Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Radiated Emission Test (Above 1 GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

Frequency Band	EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
U-NII-1 (5 180 - 5 240)	802.11a	36 to 48	36, 44, 48	OFDM	6 Mbps
	802.11n(HT20)	36 to 48	36, 44, 48	OFDM	MCS0
U-NII-2A (5 260 - 5 320)	802.11a	52 to 64	52, 60, 64	OFDM	6 Mbps
	802.11n(HT20)	52 to 64	52, 60, 64	OFDM	MCS0
U-NII-2C (5 500 - 5 700)	802.11a	100 to 140	100, 120, 140	OFDM	6 Mbps
	802.11n(HT20)	100 to 140	100, 120, 140	OFDM	MCS0
Straddle	802.11a	144	144	OFDM	6 Mbps
	802.11n(HT20)	144	144	OFDM	MCS0
U-NII-3 (5 745 – 5 825)	802.11a	149 to 165	149, 161, 165	OFDM	6 Mbps
	802.11n(HT20)	149 to 165	149, 161, 165	OFDM	MCS0

Radiated Emission Test (Above 18 GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

Frequency Band	EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
U-NII-2C (5 500 – 5 700)	802.11a	149 to 165	140	OFDM	6 Mbps

Power line Conducted Emission Test

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

Frequency Band	EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
U-NII-2C (5 500 – 5 700)	802.11a	149 to 165	140	OFDM	6 Mbps

Antenna Port Conducted Measurement

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and data rate.
☒ Following channel(s) was (were) selected for the final test as listed below.

Frequency Band	EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
U-NII-1 (5 180 - 5 240)	802.11a	36 to 48	36, 44, 48	OFDM	6 Mbps
	802.11n(HT20)	36 to 48	36, 44, 48	OFDM	MCS0
U-NII-2A (5 260 - 5 320)	802.11a	52 to 64	52, 60, 64	OFDM	6 Mbps
	802.11n(HT20)	52 to 64	52, 60, 64	OFDM	MCS0
U-NII-2C (5 500 - 5 700)	802.11a	100 to 140	100, 120, 140	OFDM	6 Mbps
	802.11n(HT20)	100 to 140	100, 120, 140	OFDM	MCS0
Straddle	802.11a	144	144	OFDM	6 Mbps
	802.11n(HT20)	144	144	OFDM	MCS0
U-NII-3 (5 745 – 5 825)	802.11a	149 to 165	149, 161, 165	OFDM	6 Mbps
	802.11n(HT20)	149 to 165	149, 161, 165	OFDM	MCS0

Test Condition

Applicable to	Environmental Conditions	Test Voltage	Tested by
RE < 1G	22 °C, 48 % RH	DC 3.88 V	Donghwa Shin
RE ≥ 1G	22 °C, 50 % RH	DC 3.88 V	Donghwa Shin
PLC	23 °C, 47 % RH	DC 3.88 V	Donghwa Shin
APCM	22 °C, 46 % RH	DC 3.88 V	Donghwa Shin

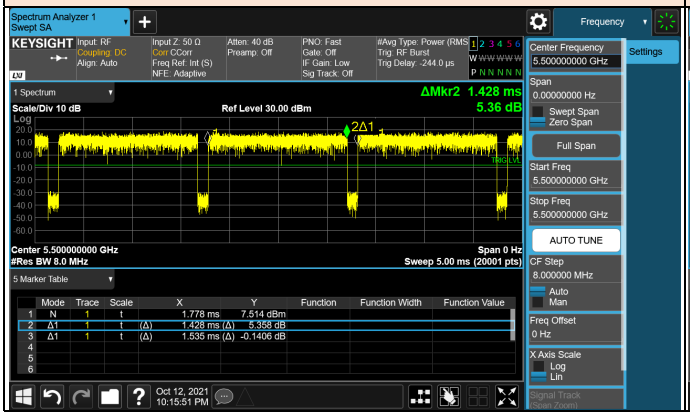
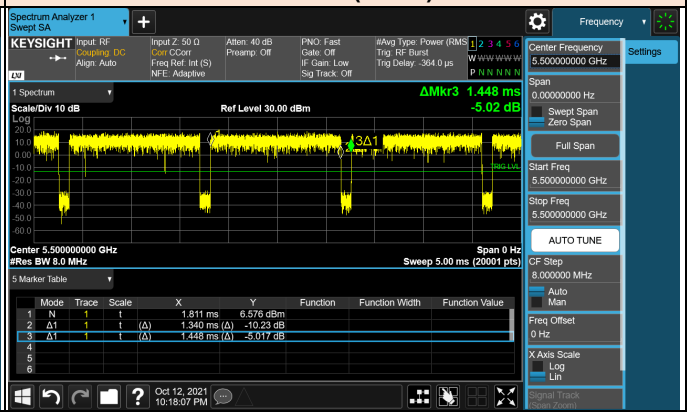
2.3 Maximum Output Power

Frequency Range [MHz]	Test Mode	Output Power [dBm]	Output Power [mW]
5 180 - 5 240	802.11a	13.60	22.93
	802.11n(HT20)	13.55	22.63
5 260 - 5 320	802.11a	13.48	22.30
	802.11n(HT20)	14.14	25.92
5 500 - 5 720	802.11a	14.20	26.33
	802.11n(HT20)	13.90	24.53
5 745 - 5 825	802.11a	14.20	26.33
	802.11n(HT20)	14.09	25.62

2.4 Duty Cycle of Test Signal

Mode	On Time [msec]	Period [msec]	Duty Cycle X [Linear]	Duty Cycle [%]	DCCF [dB]
802.11a	1.43	1.54	0.930	93.03	0.31
802.11n(HT20)	1.34	1.45	0.925	92.54	0.34

[Test Plot of Duty Cycle]

802.11a	802.11n(HT20)
	

2.5 26 dB and 99 % Bandwidth

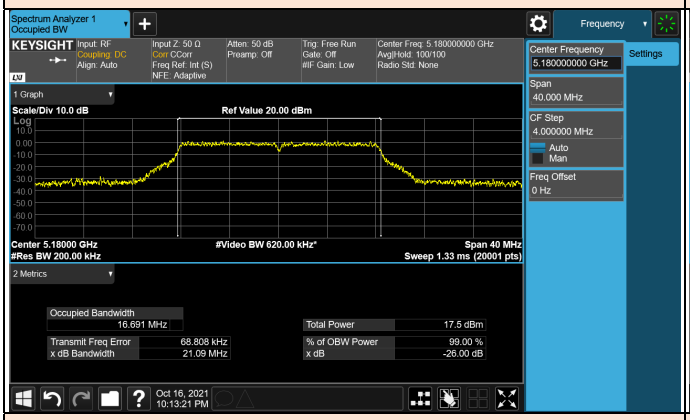
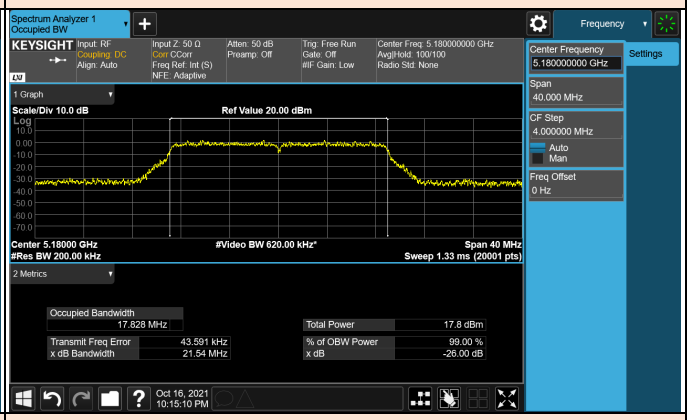
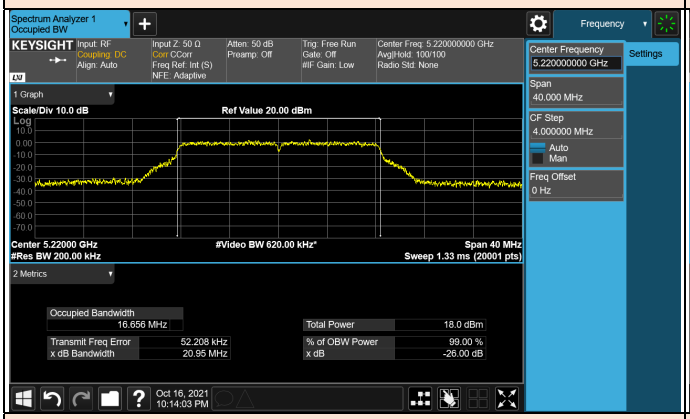
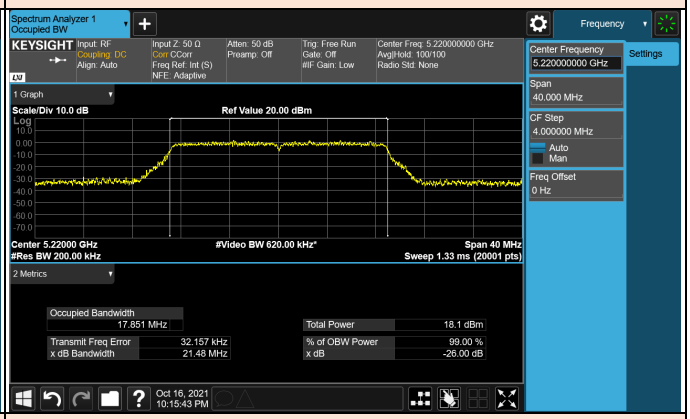
[Test Data of 26 dB Bandwidth]

Band	Test Mode	Channel	Frequency [MHz]	26 dB BW [MHz]	Worst Result
U-NII-1	802.11a	Lowest	5 180	21.09	21.09
		Middle	5 220	20.95	
		Highest	5 240	20.88	
	802.11n (HT20)	Lowest	5 180	21.54	21.54
		Middle	5 220	21.48	
		Highest	5 240	21.37	
U-NII-2A	802.11a	Lowest	5 260	21.19	21.36
		Middle	5 300	21.36	
		Highest	5 320	21.04	
	802.11n (HT20)	Lowest	5 260	21.32	21.44
		Middle	5 300	21.44	
		Highest	5 320	21.10	
U-NII-2C	802.11a	Lowest	5 500	21.05	21.24
		Middle	5 600	21.24	
		Highest	5 700	21.09	
	802.11n (HT20)	Lowest	5 500	21.33	21.33
		Middle	5 600	21.29	
		Highest	5 700	20.98	
U-NII-2C	802.11a	Straddle	5 720	15.13	-
	802.11n(HT20)	Straddle	5 720	15.26	-
U-NII-3	802.11a	Straddle	5 720	5.26	-
	802.11n(HT20)	Straddle	5 720	5.41	-

[Test Data of 99 % Bandwidth]

Band	Test Mode	Channel	Frequency [MHz]	99 % BW [MHz]
U-NII-1	802.11a	Lowest	5 180	16.69
		Middle	5 220	16.66
		Highest	5 240	16.71
	802.11n (HT20)	Lowest	5 180	17.83
		Middle	5 220	17.85
		Highest	5 240	17.81
U-NII-2A	802.11a	Lowest	5 260	16.70
		Middle	5 300	16.69
		Highest	5 320	16.70
	802.11n (HT20)	Lowest	5 260	17.84
		Middle	5 300	17.79
		Highest	5 320	17.82
U-NII-2C	802.11a	Lowest	5 500	16.70
		Middle	5 600	16.73
		Highest	5 700	16.73
	802.11n (HT20)	Lowest	5 500	17.82
		Middle	5 600	17.83
		Highest	5 700	17.81
Straddle	802.11a	Middle	5 720	16.75
	802.11n(HT20)	Middle	5 720	17.86
U-NII-3	802.11a	Lowest	5 745	16.70
		Middle	5 805	16.71
		Highest	5 825	16.71
	802.11n (HT20)	Lowest	5 745	17.85
		Middle	5 805	17.81
		Highest	5 825	17.84

Test Plot of 26 dB & 99 % Bandwidth

U-NII-1 (26 dB & 99 % Bandwidth)	
802.11a	**802.11n(HT20)**
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
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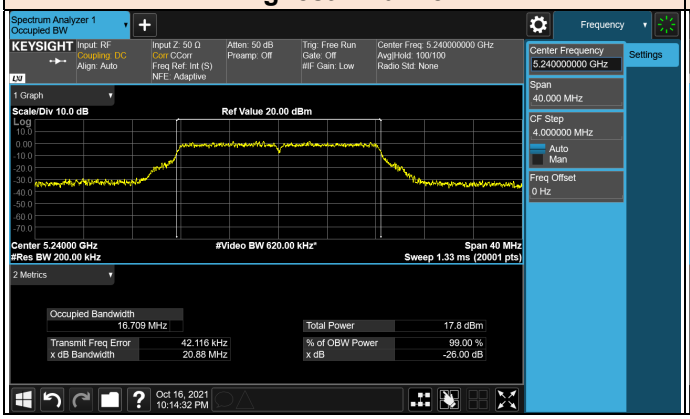
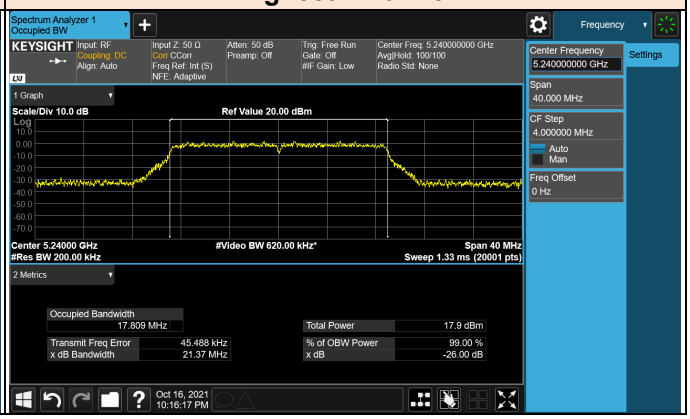
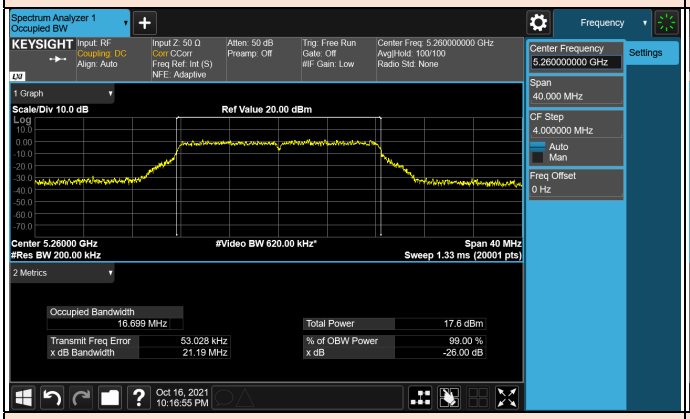
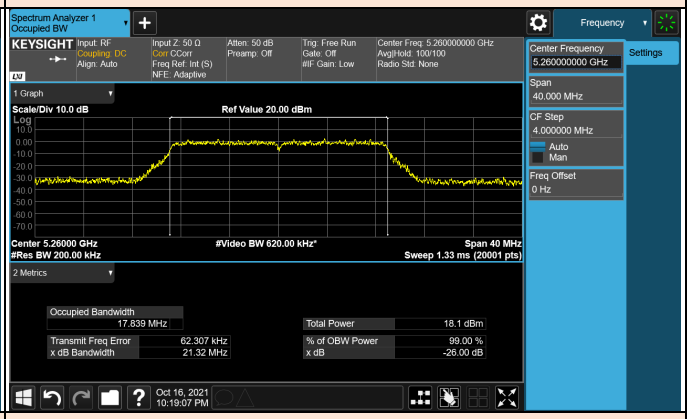
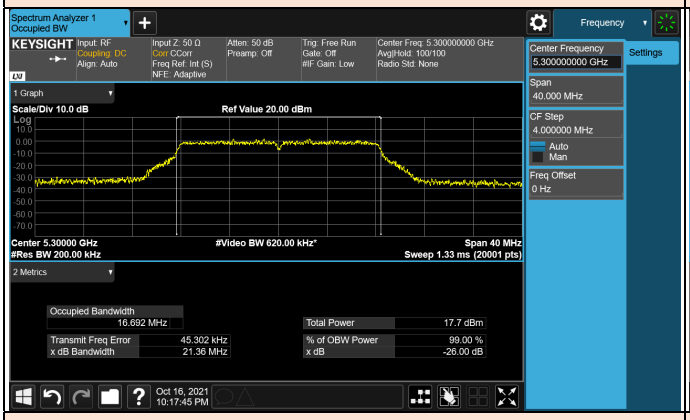
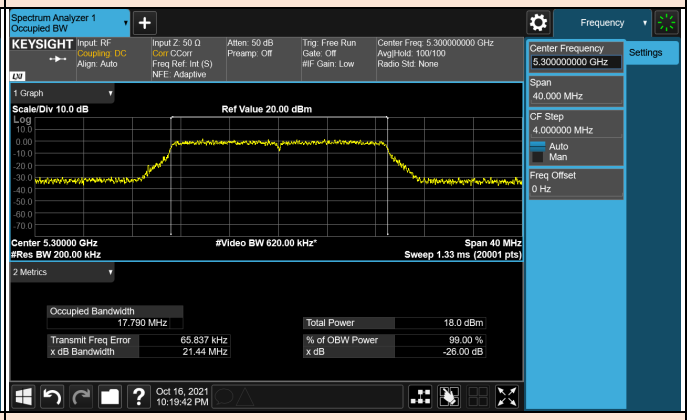
	

U-NII-2A (26 dB & 99 % Bandwidth)	
802.11a	802.11n(HT20)
Lowest Channel	Lowest Channel
	
Middle Channel	Middle Channel
	
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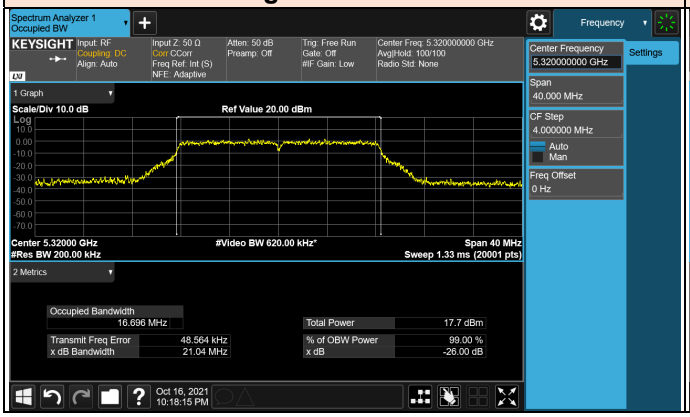
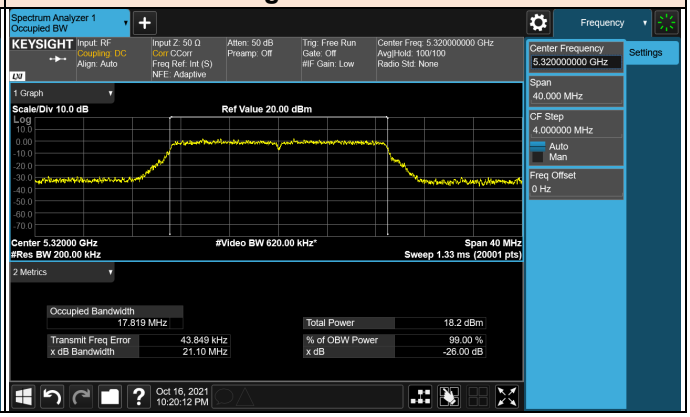
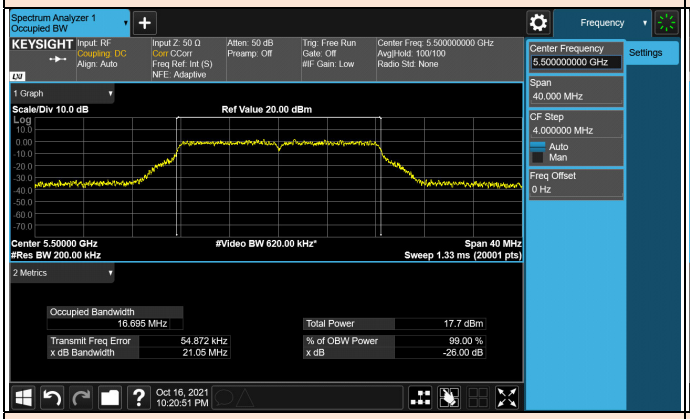
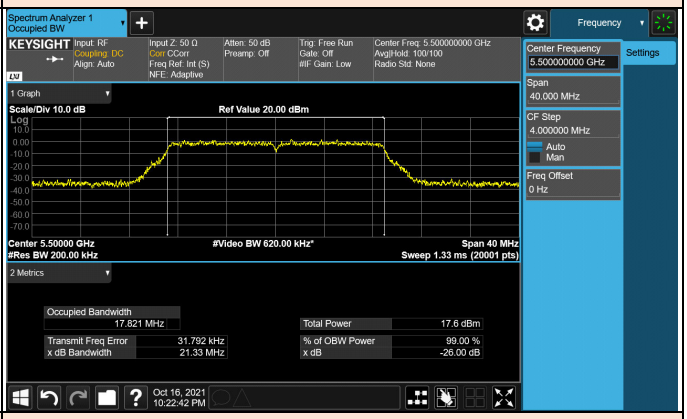
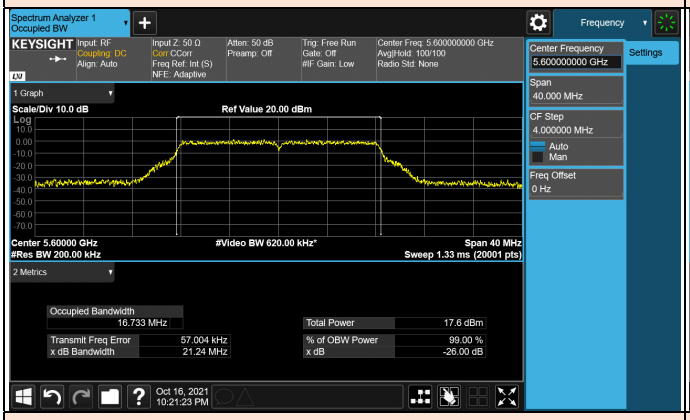
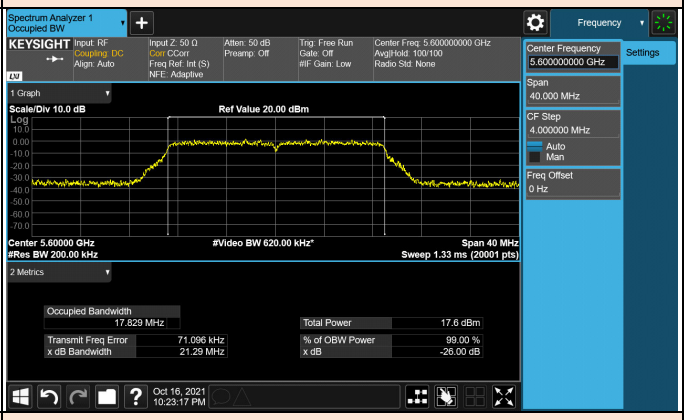
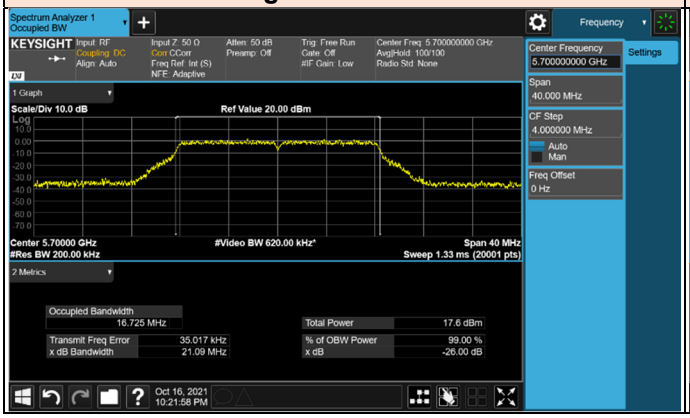
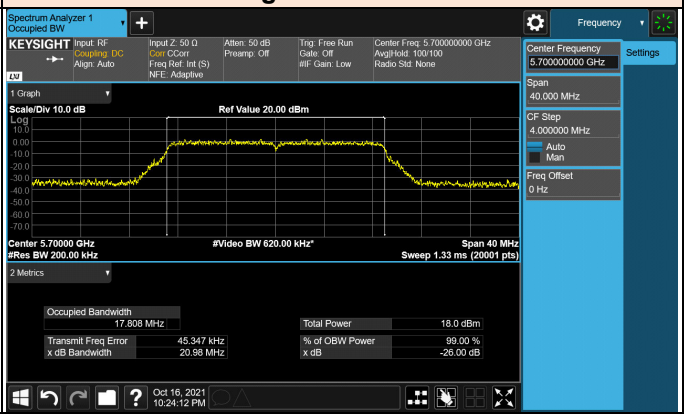
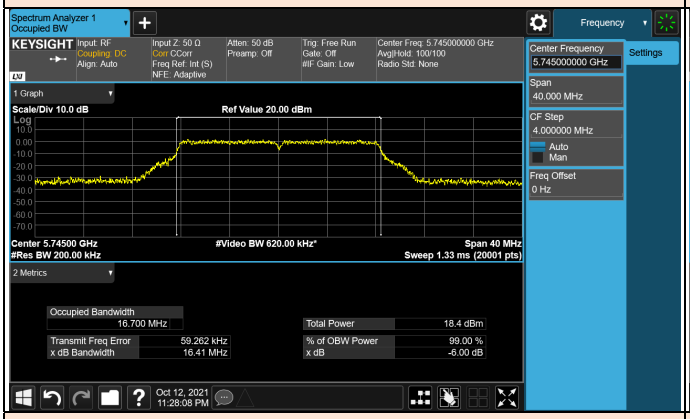
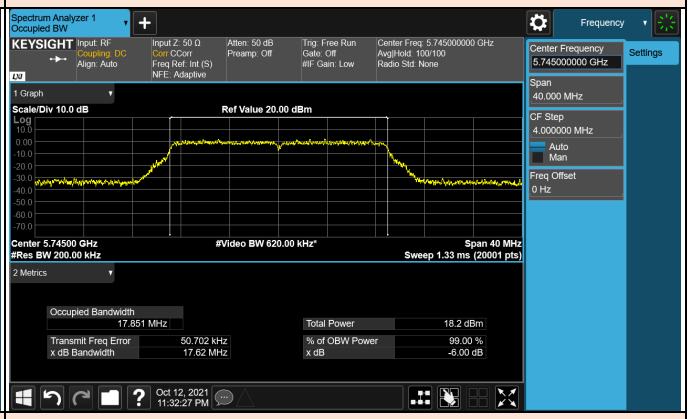
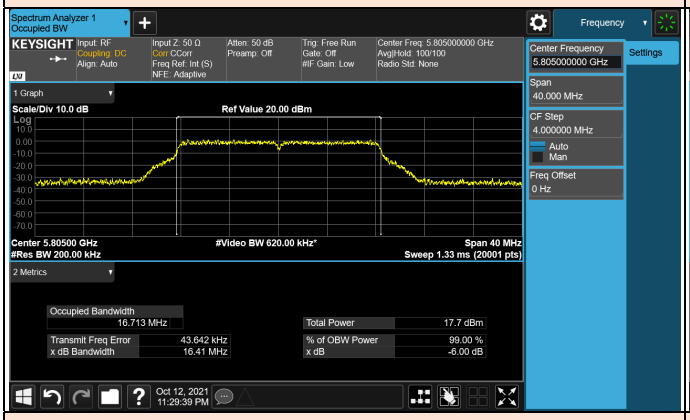
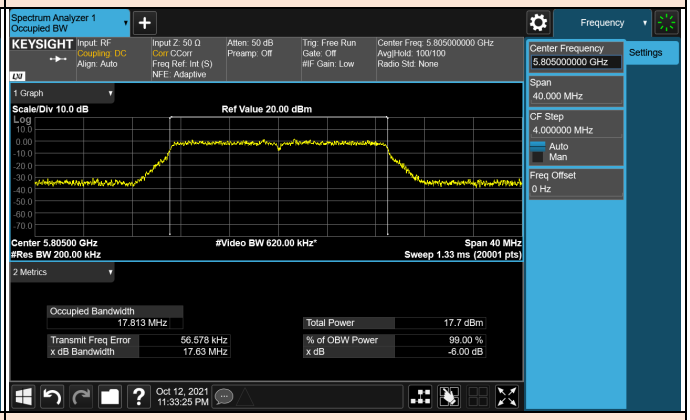
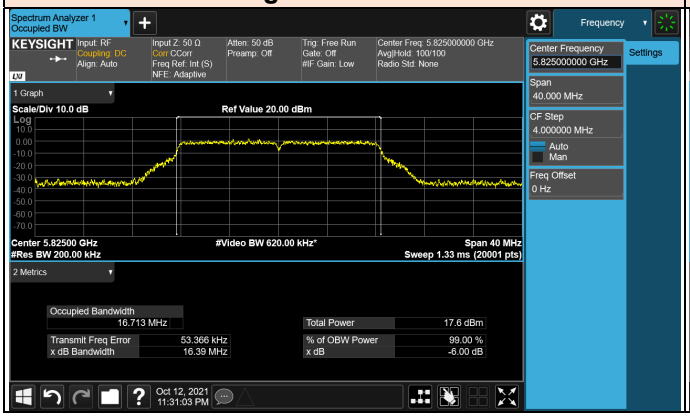
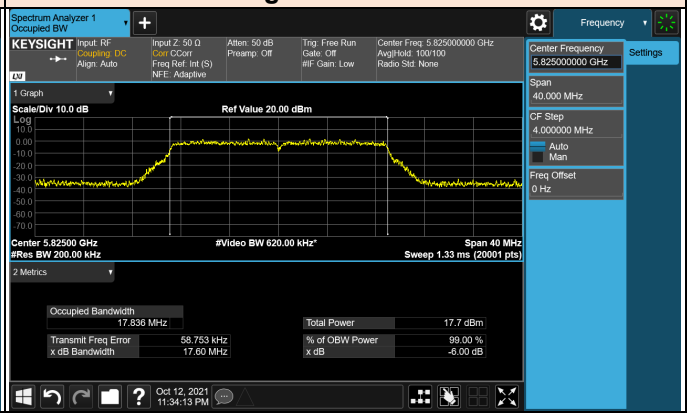
	

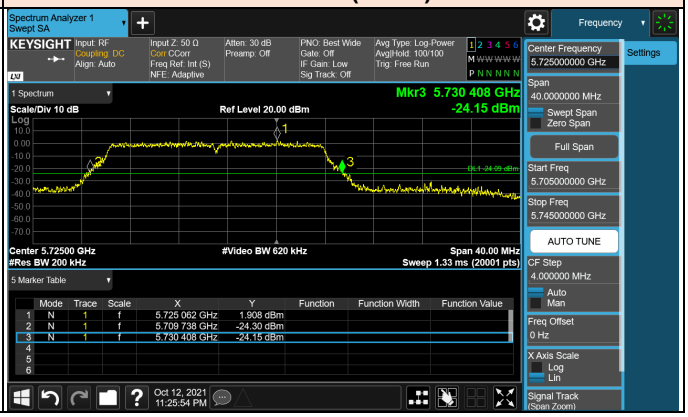
U-NII-2C (26 dB & 99 % Bandwidth)	
802.11a	**802.11n(HT20)**
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

U-NII-3 (99 % Bandwidth)	
802.11a	**802.11n(HT20)**
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

U-NII Straddle Channel (26 dB Bandwidth)

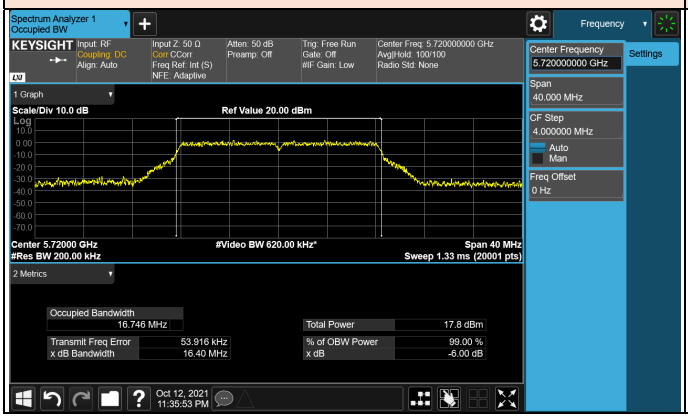
802.11a

802.11n(HT20)

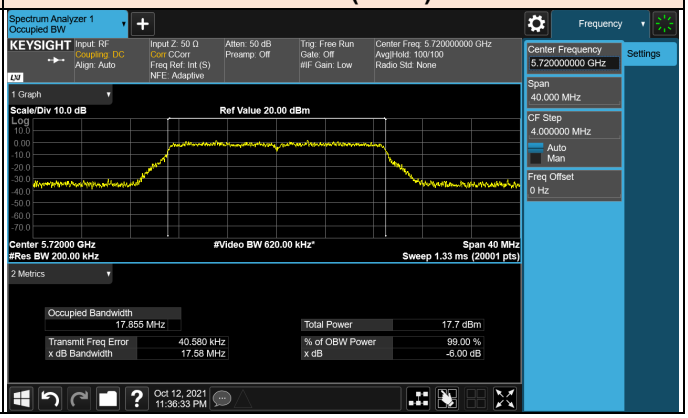


U-NII Straddle Channel (99 % Bandwidth)

802.11a



802.11n(HT20)



2.6 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards.

FCC CFR 47 Part 15, Subpart E (§15.407)
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013
RSS-247 Issue 2
RSS-GEN Issue 5

All test items in this test report have been performed and recorded as per the above standards.

2.7 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Serial Number	Cal Date	Cal Due
R&S	HFH2-Z2E	Active Loop Antenna, 30 MHz	349806	2021.02.18	2023.02.18
Schwarzbeck	VULB 9163	Trilog Antenna, 3 GHz (with 6 dB ATT.)	01199	2021.02.22	2023.02.22
Schwarzbeck	VUBA 9117	30 MHz ~ 1 GHz	403	2020.01.09	2022.01.09
R&S	HF907	Horn Antenna, 18 GHz	102772	2020.12.09	2021.12.09
R&S	SCU08F2	Signal Conditioning Unit, 8 GHz	08400016	2020.12.09	2021.12.09
R&S	SCU-18F	Signal Conditioning Unit, 18 GHz	180111	2020.12.09	2021.12.09
Schwarzbeck	BBHA9170	15 - 40 GHz, 10 W (cont.) 25 W (peak)	00955	2020.12.09	2021.12.09
L3 Narda-MITEQ	JS44-18004000-33-8P	Amplifier, 40 GHz	2142086	2021.01.05	2022.01.05
R&S	FSW50	DC Coupled : 2 Hz to 50 GHz AC Coupled : 10 MHz to 50 GHz	101403	2020.12.09	2021.12.09
R&S	ESW44	EMI Test Receiver, 44 GHz	101812	2020.12.09	2021.12.09
R&S	FSV30	Spectrum Analyzer, 30 GHz	103017	2020.12.07	2021.12.07
Aeroflex	40AH2W-3	Attenuator, 3 dB	1	2020.12.24	2021.12.24
Mini-Circuits	VAT-10W2+	Attenuator, 10 dB	1531	2020.12.08	2021.12.08
Micro-Tronics	HPS17542	6 GHz High Pass Filter	028	2021.06.04	2022.06.04
Aeroflex	40AH2W-10	Attenuator, 10 dB	1	2021.06.04	2022.06.04
Weinschel	89-30-12	DC to 40 GHz / 30 dB / 20 W	CK7372	2021.01.04	2022.01.04
API inmet	40AH2W-10	DC-40 GHz, 2W, 10 dB	2	2021.06.04	2022.06.04
API inmet	40AH2W-10	DC-40 GHz, 2W, 10 dB	3	2021.06.04	2022.06.04
Aeroflex	40AH2W-20	DC to 40 GHz / 20 dB / 2 W	1	2021.06.04	2022.06.04
Micro-Tronics	HPM17543	High Pass Filter 3 GHz	028	2021.06.04	2022.06.04
R&S	NRP6A	Average Power Sensor	102045	2020.12.07	2021.12.07
R&S	NRP6A	Average Power Sensor	102044	2020.12.07	2021.12.07
R&S	NRX	Power Meter, 110 GHz	100947	2020.12.07	2021.12.07
Keysight Technologies	MP400B	MIMO Power Set Master, 18 GHz	None	2020.12.31	2021.12.31
R&S	ENV216	LISN	102437	2020.12.08	2021.12.08
R&S	ESR	EMI Test Receiver, 3.6 GHz	102529	2020.12.08	2021.12.08
Weinschel	1579	Power Splitter	71667	2021.01.04	2022.01.04
Weinschel	1580	Divider	UA422	2021.01.04	2022.01.04

3 Test Results

3.1 Antenna Requirement

Except from §15.203 of the FCC Rules/Regulations:

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 the section.

- The antenna(s) of the EUT are Permanently attached.
- There are no provisions for connection to an external antenna.

Result

The EUT complies with the requirement of §15.203

3.2 6 dB Bandwidth

3.2.1 Regulation

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

3.2.2 Test Procedure

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725−5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 x RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

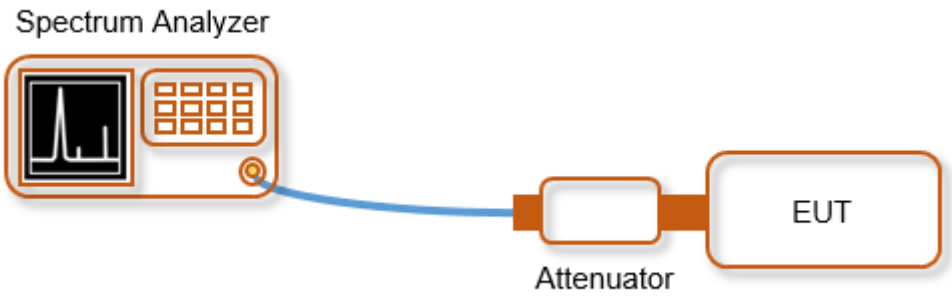
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

3.2.3 Deviation from Test Standard

No deviation.

3.2.4 Test Setup



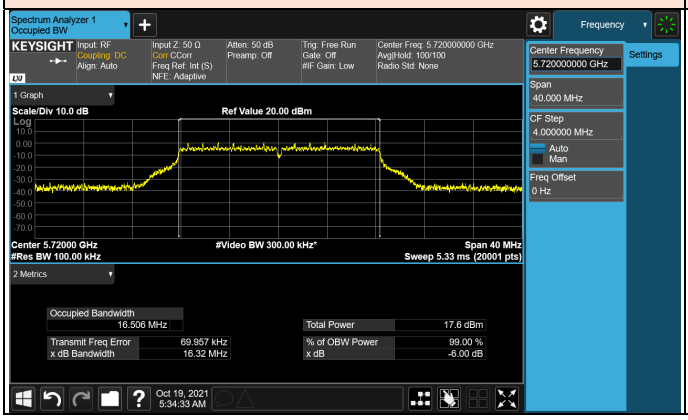
3.2.5 Test Result

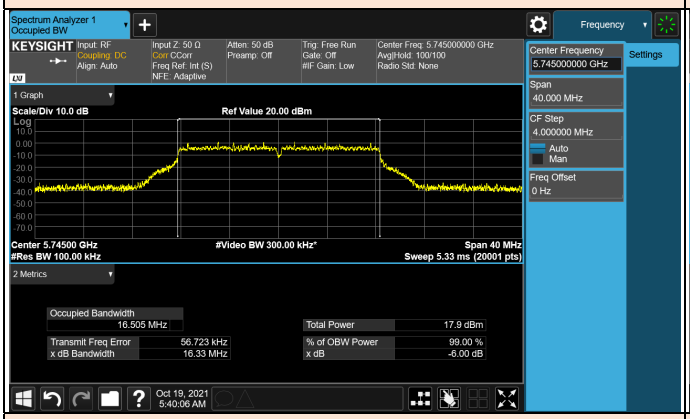
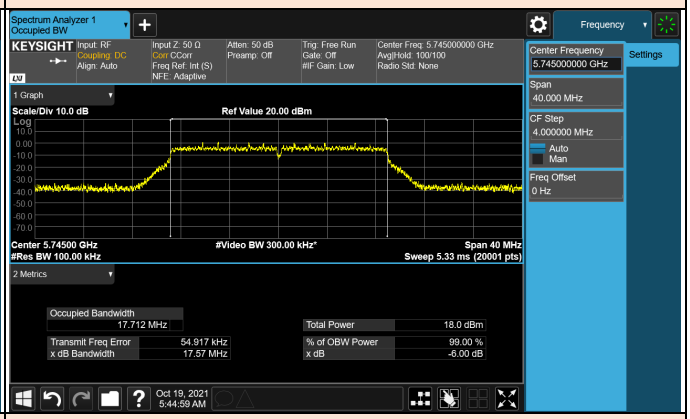
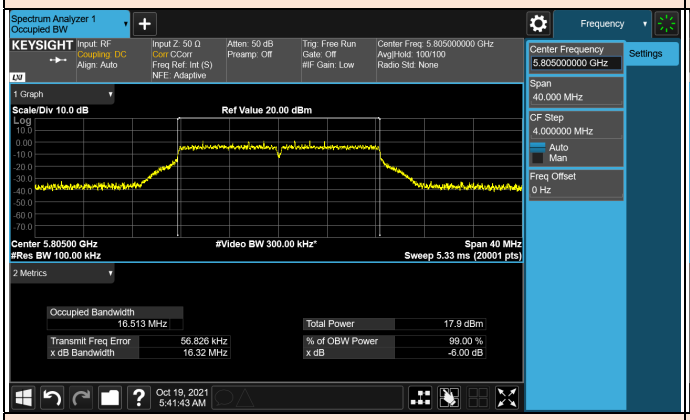
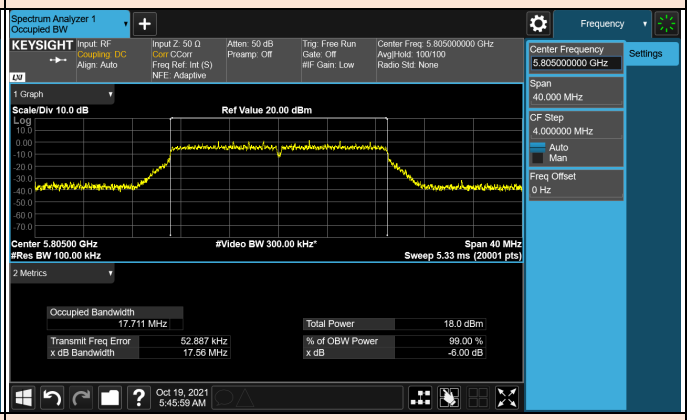
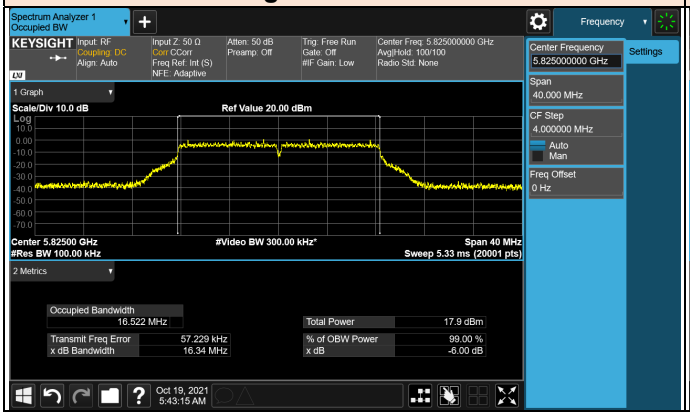
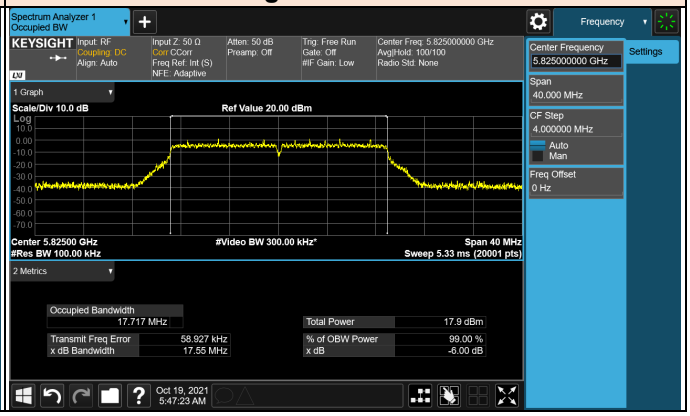
[Test Data of 6 dB Bandwidth]

Band	Test Mode	Channel	Frequency [MHz]	6 dB BW [MHz]	Worst Result	Limit [MHz]
Straddle	802.11a	Middle	5 720	16.32	16.32	0.500
	802.11n (HT20)	Middle	5 720	17.55		

Band	Test Mode	Channel	Frequency [MHz]	6 dB BW [MHz]	Worst Result	Limit [MHz]
U-NII-3	802.11a	Lowest	5 745	16.33	16.32	0.500
		Middle	5 805	16.32		
		Highest	5 825	16.34		
	802.11n (HT20)	Lowest	5 745	17.57	17.55	
		Middle	5 805	17.56		
		Highest	5 825	17.55		

[Test Plot of 6 dB Bandwidth]

Straddle	
802.11a	802.11n(HT20)
Middle Channel	Middle Channel
	

U-NII-3	
802.11a	**802.11n(HT20)**
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

3.3 Maximum Conducted Output Power

3.3.1 Regulation

§15.407(a)(1)(iv) : For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(2) : For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(3) : For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.3.2 Test Procedure

Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

a) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:

   1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.

   2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.

   3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle D of the transmitter output signal as described in 12.2.

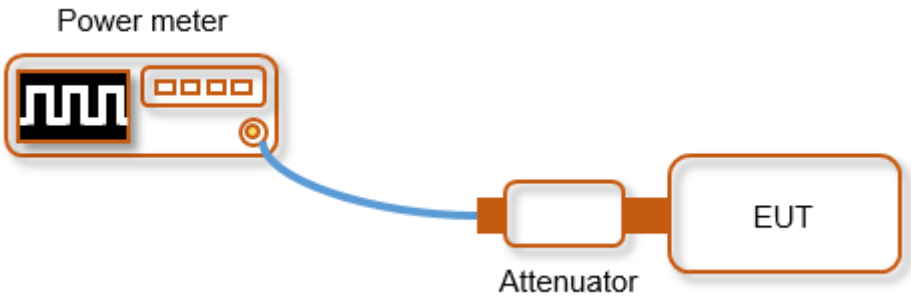
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.

d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g.,[10 log (1 / 0.25)], if the duty cycle is 25%}.

3.3.3 Deviation from Test Standard

No deviation.

3.3.4 Test Setup



[Average Power Measurement]

3.3.5 Test Result

[Antenna Gain]

Frequency Range [MHz]	Antenna Gain [dBi]	Correlated Chains Directional Gain [dBi]
U-NII-1 5 150 - 5 250	-9.20	N/A
U-NII-2A 5 250 - 5 350	-7.30	N/A
U-NII-2C 5 470 - 5 725	-8.10	N/A
U-NII-3 5 725 - 5 850	-7.60	N/A

[Test Result of Maximum Power]

- U-NII-1

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW[MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-1	802.11a	Lowest	5 180	21.09	N/A	23.98	11.00
		Middle	5 220	20.95		23.98	
		Highest	5 240	20.88		23.98	
	802.11n (HT20)	Lowest	5 180	21.54		23.98	
		Middle	5 220	21.48		23.98	
		Highest	5 240	21.37		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured Power [dBm]	Result [dBm]	Power Limit [dBm]
U-NII-1	802.11a	Lowest	5 180	13.07	13.38	23.98
		Middle	5 220	13.26	13.57	23.98
		Highest	5 240	13.29	13.60	23.98
	802.11n (HT20)	Lowest	5 180	12.91	13.25	23.98
		Middle	5 220	13.20	13.54	23.98
		Highest	5 240	13.21	13.55	23.98

- U-NII-2A

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW[MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2A	802.11a	Lowest	5 260	21.19	N/A	23.98	11.00
		Middle	5 300	21.36		23.98	
		Highest	5 320	21.04		23.98	
	802.11n (HT20)	Lowest	5 260	21.32		23.98	
		Middle	5 300	21.44		23.98	
		Highest	5 320	21.10		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured Power [dBm]	Result [dBm]	Power Limit [dBm]
U-NII-2A	802.11a	Lowest	5 260	13.09	13.40	23.98
		Middle	5 300	13.08	13.39	23.98
		Highest	5 320	13.17	13.48	23.98
	802.11n (HT20)	Lowest	5 260	13.40	13.74	23.98
		Middle	5 300	13.67	14.01	23.98
		Highest	5 320	13.80	14.14	23.98

- U-NII-2C

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Lowest	5 500	21.05	N/A	23.98	11.00
		Middle	5 600	21.24		23.98	
		Highest	5 700	21.09		23.98	
	802.11n (HT20)	Lowest	5 500	21.33		23.98	
		Middle	5 600	21.29		23.98	
		Highest	5 700	20.98		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured Power [dBm]	Result [dBm]	Power Limit [dBm]
U-NII-2C	802.11a	Lowest	5 500	13.35	13.66	23.98
		Middle	5 600	13.77	14.08	23.98
		Highest	5 700	13.89	14.20	23.98
	802.11n (HT20)	Lowest	5 500	13.37	13.71	23.98
		Middle	5 600	13.46	13.80	23.98
		Highest	5 700	13.56	13.90	23.98

- U-NII-3

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-3	802.11a	Lowest	5 745	N/A	30.00	11.00
		Middle	5 805			
		Highest	5 825			
	802.11n (HT20)	Lowest	5 745			
		Middle	5 805			
		Highest	5 825			

Band	Test Mode	Channel	Frequency [MHz]	Measured Power [dBm]	Result [dBm]	Power Limit [dBm]
U-NII-3	802.11a	Lowest	5 745	13.73	14.04	30.00
		Middle	5 805	13.74	14.05	
		Highest	5 825	13.89	14.20	
	802.11n (HT20)	Lowest	5 745	13.70	14.04	
		Middle	5 805	13.75	14.09	
		Highest	5 825	13.71	14.05	

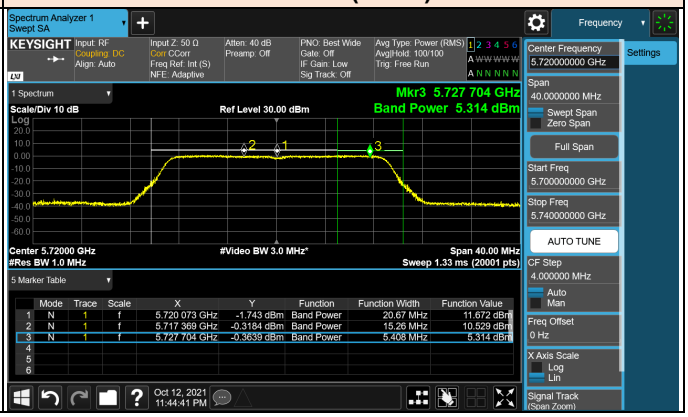
- Straddle Channel

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Straddle	5 720	15.13	N/A	22.80	11.00
	802.11n(HT20)	Straddle	5 720	15.26		22.84	
U-NII-3	802.11a	Straddle	5 720	5.26		30.00	
	802.11n(HT20)	Straddle	5 720	5.41		30.00	

Band	Test Mode	Channel	Frequency [MHz]	Measured Power [dBm]	Result [dBm]	Power Limit [dBm]
U-NII-2C	802.11a	Straddle	5 720	10.67	10.98	22.80
	802.11n(HT20)	Straddle	5 720	10.53	10.87	22.84
U-NII-3	802.11a	Straddle	5 720	4.86	5.17	30.00
	802.11n(HT20)	Straddle	5 720	5.31	5.65	30.00

[Test Plot of Straddle Channel Maximum Power]

U-NII Straddle Channel (Maximum Power)	
802.11a	802.11n(HT20)
	

3.4 Maximum Power Spectral Density

3.4.1 Regulation

§15.407(a)(1)(iv) : For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(2) : For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(3) : For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.4.2 Test Procedure

Method SA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep. The procedure for this method is as follows:

a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.

b) Set RBW = 1 MHz.

c) Set VBW ≥ 3 MHz.

d) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)

e) Sweep time = auto.

f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full

power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."

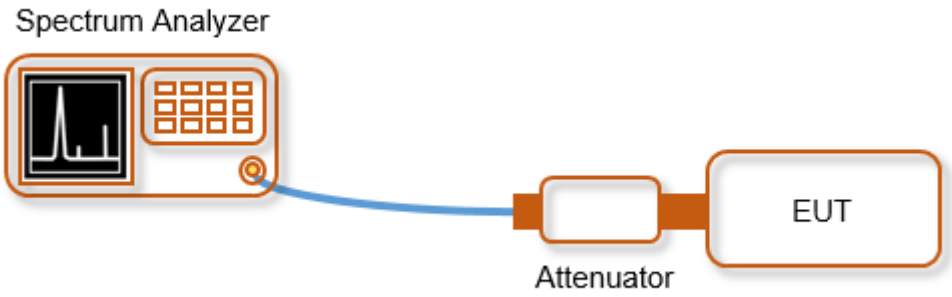
h) Trace average at least 100 traces in power averaging (rms) mode.

i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument's band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

3.4.3 Deviation from Test Standard

No deviation.

3.4.4 Test Setup



3.4.5 Test Result

[Test Result of Power Spectral Density]

- U-NII-1

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW[MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-1	802.11a	Lowest	5 180	21.09	N/A	23.98	11.00
		Middle	5 220	20.95		23.98	
		Highest	5 240	20.88		23.98	
	802.11n (HT20)	Lowest	5 180	21.54		23.98	
		Middle	5 220	21.48		23.98	
		Highest	5 240	21.37		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSD [dBm/MHz]	Result [dBm/MHz]	PPSD Limit [dBm/MHz]
U-NII-1	802.11a	Lowest	5 180	1.23	1.54	11.00
		Middle	5 220	1.75	2.06	
		Highest	5 240	1.57	1.88	
	802.11n (HT20)	Lowest	5 180	1.09	1.43	
		Middle	5 220	0.94	1.28	
		Highest	5 240	0.97	1.31	

- U-NII-2A

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW[MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2A	802.11a	Lowest	5 260	21.19	N/A	23.98	11.00
		Middle	5 300	21.36		23.98	
		Highest	5 320	21.04		23.98	
	802.11n (HT20)	Lowest	5 260	21.32		23.98	
		Middle	5 300	21.44		23.98	
		Highest	5 320	21.10		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSD [dBm/MHz]	Result [dBm/MHz]	PPSD Limit [dBm/MHz]
U-NII-2A	802.11a	Lowest	5 260	1.25	1.56	11.00
		Middle	5 300	1.64	1.95	
		Highest	5 320	1.40	1.71	
	802.11n (HT20)	Lowest	5 260	1.43	1.77	
		Middle	5 300	1.39	1.73	
		Highest	5 320	1.61	1.95	

- U-NII-2C

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Lowest	5 500	21.05	N/A	23.98	11.00
		Middle	5 600	21.24		23.98	
		Highest	5 700	21.09		23.98	
	802.11n (HT20)	Lowest	5 500	21.33		23.98	
		Middle	5 600	21.29		23.98	
		Highest	5 700	20.98		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSD [dBm/MHz]	Result [dBm/MHz]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Lowest	5 500	1.29	1.60	11.00
		Middle	5 600	1.43	1.74	
		Highest	5 700	1.87	2.18	
	802.11n (HT20)	Lowest	5 500	1.04	1.38	
		Middle	5 600	1.04	1.38	
		Highest	5 700	0.97	1.31	

- U-NII-3

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-3	802.11a	Lowest	5 745	N/A	30.00	11.00
		Middle	5 805			
		Highest	5 825			
	802.11n (HT20)	Lowest	5 745			
		Middle	5 805			
		Highest	5 825			

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSD [dBm/MHz]	Result [dBm/MHz]	PPSD Limit [dBm/MHz]
U-NII-3	802.11a	Lowest	5 745	1.92	2.23	30.00
		Middle	5 805	1.39	1.70	
		Highest	5 825	1.58	1.89	
	802.11n (HT20)	Lowest	5 745	1.91	2.25	
		Middle	5 805	1.07	1.41	
		Highest	5 825	1.27	1.61	

- Straddle Channel

Duty Cycle Correction Factor [dB]	
802.11a	0.31 dB
802.11n(HT20)	0.34 dB

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Straddle	5 720	15.13	N/A	22.80	11.00
	802.11n(HT20)	Straddle	5 720	15.26		22.84	
U-NII-3	802.11a	Straddle	5 720	5.26		30.00	
	802.11n(HT20)	Straddle	5 720	5.41		30.00	

Band	Test Mode	Channel	Frequency [MHz]	Measured Power [dBm]	Result [dBm]	Power Limit [dBm]
U-NII-2C	802.11a	Straddle	5 720	10.67	10.98	22.80
	802.11n(HT20)	Straddle	5 720	10.53	10.87	22.84
U-NII-3	802.11a	Straddle	5 720	4.86	5.17	30.00
	802.11n(HT20)	Straddle	5 720	5.31	5.65	30.00