

TEST REPORT

**CTK Co., Ltd.**

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Report No.:

CTK-2025-01771

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1. Applicant

- Name : SOLUM CO.,LTD.
- Address : 7F, 2354, Yonggu-daero, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2025-03-07

2. Manufacturer

- Name : SOLUM CO., LTD.
- Address : 7F, 2354, Yonggu-daero, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea

3. Use of Report : For FCC Certification & ISED Certification**4. Test Sample / Model:** ESL Label / EL315TRB6S**5. Date of Test :** 2025-06-11 to 2025-06-24**6. Test Standard(method) used :** FCC 47 CFR part 15 subpart E 15.407
ISED RSS-247 & RSS-Gen**7. Testing Environment:** refer to 10 page**8. Test Results :** Compliance**9. Location of Test :** ☒ Permanent Testing Lab ☐ On Site Testing

(Address : 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, 17141 Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This report cannot be reproduced or copied without the written consent of CTK.

Approval	Tested by	Technical Manager
	Min-Wook Jung: (Signature) 	Young-taek Lee: (Signature) 

2025-07-08

CTK Co., Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2025-07-08	Issued (CTK-2025-01771)	all

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1. General Product Description

1.1 Applicant Information

Company	SOLUM CO.,LTD.
Contact Point	7F, 2354, Yonggu-daero, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
Contact Person	Name : Ki Dong Lee E-mail : kdlee007@solu-m.com Tel : +82-31-8006-7677

1.2 Manufacturer Information

Manufacturer	SOLUM VINA CO., LTD
Address	Plot B3, Ba Thien 2 Industrial park, Thien Ke Ward, Binh Xuyen District, Vinh Phuc Province, 281200.,Peple's Republic of Vietnam

1.3 Product Information

FCC ID	2AFWN-EL315TRB6S	
IC	22800-EL315TRB6S	
Product Description	ESL Label	
Model name	EL315TRB6S	
Variant Model name	EL315TRW6S (Variant model has no technical differences with each model except for the model name and color for marketing purposes.)	
Operating Frequency	UNII 1	20 MHz_BW : 5 180 MHz – 5 240 MHz
	UNII 2A	20 MHz_BW : 5 260 MHz – 5 320 MHz
	UNII 2C	20 MHz_BW : 5 500 MHz – 5 720 MHz
RF Output Power	UNII 1	802.11a : 11.36 dBm (13.68 mW) 802.11n_HT20 : 11.43 dBm (13.90 mW)
	UNII 2A	802.11a : 9.54 dBm (8.995 mW) 802.11n_HT20 : 9.09 dBm (8.11 mW)
	UNII 2C	802.11a : 8.70 dBm (7.413 mW) 802.11n_HT20 : 7.50 dBm (5.623 mW)
Antenna Specification	Antenna type : PCB Antenna	
	UNII 1, UNII 2A	Peak Gain : 2.94 dBi
	UNII 2C	Peak Gain : 3.61 dBi
Antenna Configurations	802.11a : SISO 802.11n : SISO	
Type of Modulation	802.11a/n : OFDM	
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 72.2 Mbps	
Power Source	DC 12 V	
Hardware Rev	29	
Software Rev	36	
Dynamic Frequency Selection	Slave without radar detection	

RF Power setting in Test SW

Mode	Frequency Band	Power Setting Value
802.11a	UNII 1	115
	UNII 2A	115
	UNII 2C	90
802.11n_HT20	UNII 1	119
	UNII 2A	113
	UNII 2C	85

1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6N
AC/DC Adapter	HP	HSTNN-LA40	-

2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	CN : 8737A CAB ID : KR0025
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

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3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Limit	Status (Note 1)	Test Condition
15.407 (e)	6 dB Bandwidth	> 500 kHz (5 725 – 5 850 MHz)	C	Conducted
15.407 (a)	26 dB Bandwidth and 99% Bandwidth	NA	C	
15.407 (a)(1),(2),(3)	Conducted Output Power	< 250 mW (5 150 – 5 250 MHz) < 250 mW (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
15.407 (a)(1),(2),(3)	Power Spectral Density	< 11 dBm/MHz (5 150 – 5 250 MHz) < 11 dBm/MHz (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
15.407 (g)	Frequency Stability	NA	C	
15.407 (b)	Undesirable emission	< -27 dBm/MHz EIRP (5 150 – 5 250 MHz, 5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < -27 dBm/MHz EIRP < 10 dBm/MHz EIRP < 15.6 dBm/MHz EIRP	C	Radiated
15.205, 15.407 (b)(9),(10)	Radiated Spurious Emission	15.209(a)	C	
15.407 (b)(9)	AC Conducted Emissions	15.207(a)	C	Line Conducted
<u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				
<u>Note 2:</u> The data in this test report are traceable to the national or international standards.				
<u>Note 3:</u> The sample was tested according to the following specification: FCC Part 15.407, ANSI C63.10-2013				
<u>Note 4:</u> The tests were performed according to the method of measurements prescribed in KDB No.789033				

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ISED Part Section(s)	Requirement(s)	Limit	Status (Note 1)	Test Condition
RSS-Gen 6.7	26 dB Bandwidth and 99% Bandwidth	NA	C	Conducted
RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.2	Conducted Output Power	< 200 mW EIRP (5 150 – 5 250 MHz) < 250 mW (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.2	Power Spectral Density	< 10 dBm/MHz EIRP (5 150 – 5 250 MHz) < 11 dBm/MHz (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
RSS-Gen 6.11	Frequency Stability	NA	C	
RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.3	Undesirable emission	< -27 dBm/MHz EIRP (5 150 – 5 250 MHz, 5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < -27 dBm/MHz EIRP < 10 dBm/MHz EIRP < 15.6 dBm/MHz EIRP	C	Radiated
RSS-Gen 6.13, 7.3, 8.9, 8.10	Radiated Spurious Emission	RSS-Gen 7.3 8.9, 8.10	C	
RSS-Gen 8.8	AC Conducted Emissions	RSS-Gen 8.8	C	Line Conducted
<u>Note 1</u> : C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				
<u>Note 2</u> : The data in this test report are traceable to the national or international standards.				
<u>Note 3</u> : The sample was tested according to the following specification: RSS-247, RSS-GEN				
<u>Note 4</u> : The tests were performed according to the method of measurements prescribed in KDB No.789033, ANSI C63.10-2013				

3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
 During at testing, system components were manipulated within the confines of typical usage to maximize each emission.
 For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit.
 All modulation modes were tests. The results are only attached worst cases.

Test Frequency & Bandwidth

- 802.11a, 802.11n_HT20

	Lowest channel	Middle channel	Highest channel
UNII 1	5 180 MHz	5 200 MHz	5 240 MHz
UNII 2A	5 260 MHz	5 300 MHz	5 320 MHz
UNII 2C	5 500 MHz	5 600 MHz	5 700 MHz, 5 720 MHz

Test mode & Worst case

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	OFDM	6 Mbps	94.1 %	0.27 dB
802.11n_HT20	OFDM	MCS 0	93.7 %	0.29 dB

3.3 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
 Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB (C.L.: Approx. 95 %, $k = 2$)
Power Spectral Density	1.5 dB (C.L.: Approx. 95 %, $k = 2$)
Occupied Bandwidth	0.1 MHz (C.L.: Approx. 95 %, $k = 2$)
Unwanted Emission(conducted)	3.0 dB (C.L.: Approx. 95 %, $k = 2$)
Radiated Emissions ($f \leq 1$ GHz)	3.88 dB (C.L.: Approx. 95 %, $k = 2$)
Radiated Emissions ($f > 1$ GHz)	4.50 dB (C.L.: Approx. 95 %, $k = 2$)
Line Conducted Emission	2.08 dB (C.L.: Approx. 95 %, $k = 2$)

3.4 Test Software

Conducted Test	Ics Pro Ver. 7.0.8
Radiated Test	EP5RE Ver. 6.0.10, ES10 Ver. 2022.04.000
Line Conducted Test	EMC32 Ver. 10.50.00

3.5 Testing Environment

Test Item	Test Date	Temperature (°C)	Relative Humidity (%)
26 dB Bandwidth and 99% Bandwidth	2025-06-11 ~ 2025-06-24	23 ±1 ~ 25 ±1	46 ±3 ~ 55 ±3
Maximum Output Power	2025-06-11 ~ 2025-06-24	23 ±1 ~ 25 ±1	46 ±3 ~ 55 ±3
Unwanted Emission(Conducted)	2025-06-11 ~ 2025-06-24	23 ±1 ~ 25 ±1	46 ±3 ~ 55 ±3
Transmitter Power Spectral Density	2025-06-11 ~ 2025-06-24	23 ±1 ~ 25 ±1	46 ±3 ~ 55 ±3
Radiated Emissions ($f > 1$ GHz)	2025-06-13 ~ 2025-06-24	23 ±1 ~ 24 ±1	48 ±3 ~ 56 ±3
Radiated Emissions ($f < 1$ GHz)	2025-06-11 ~ 2025-06-17	23 ±1 ~ 25 ±1	44 ±3 ~ 47 ±3
AC Conducted Emissions	2025-06-11	23	46

4. Technical Characteristic Test

4.1 26 dB Bandwidth and 99% Bandwidth

Test Procedures

KDB 789033 – Section C.1
 ANSI C63.10-2013 - Section 6.9.2

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 26 dB relative to the maximum level measured in the fundamental emission.

Test Procedures

KDB 789033 – Section C.1
 ANSI C63.10-2013 - Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = approximately 1 % of the emission bandwidth
- b) VBW $\geq$ RBW
- c) Detector = peak
- d) Trace mode = Max hold
- e) 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%.

Minimum Standard:

NA

Test Data:

	26 dB Bandwidth and 99 % Bandwidth (MHz)			
Mode	802.11a		802.11n_HT20	
Frequency	26 dB	99 %	26 dB	99 %
5 180 MHz	30.73	16.81	30.39	17.72
5 200 MHz	24.17	16.67	24.82	17.83
5 240 MHz	24.98	16.70	26.41	17.85
5 260 MHz	22.17	16.61	21.30	17.69
5 300 MHz	21.19	16.65	21.83	17.77
5 320 MHz	27.01	16.67	21.50	17.73
5 500 MHz	24.33	16.71	27.01	17.84
5 600 MHz	20.64	16.53	21.38	17.64
5 700 MHz	20.64	16.57	21.50	17.68
5 720 MHz	20.68	16.54	21.53	17.69
Measurement uncertainty	± 0.1 MHz			

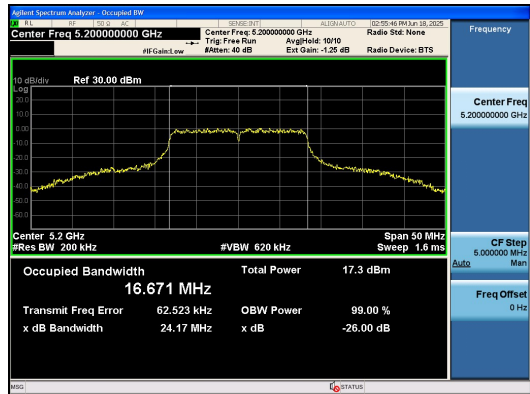
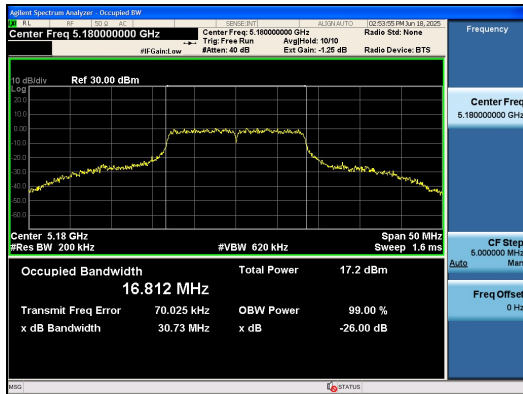
See next pages for actual measured spectrum plots.



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802.11a_UNII 1



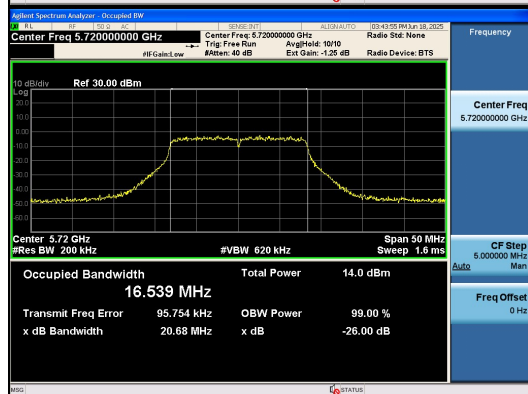
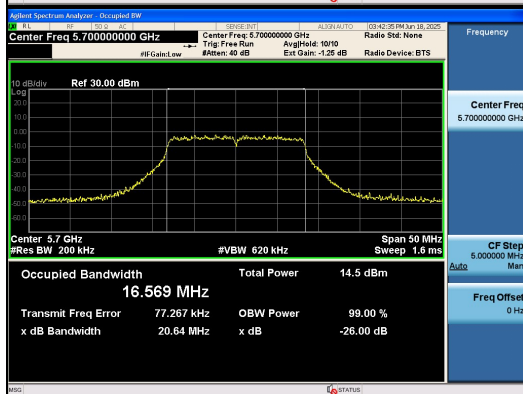
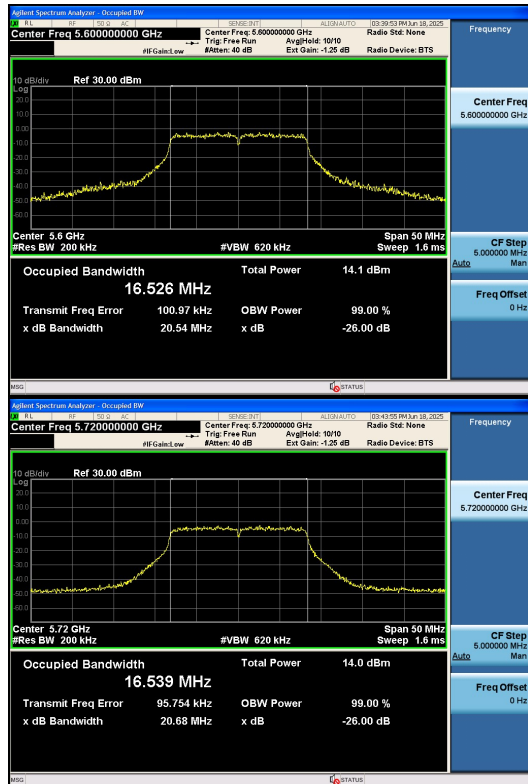
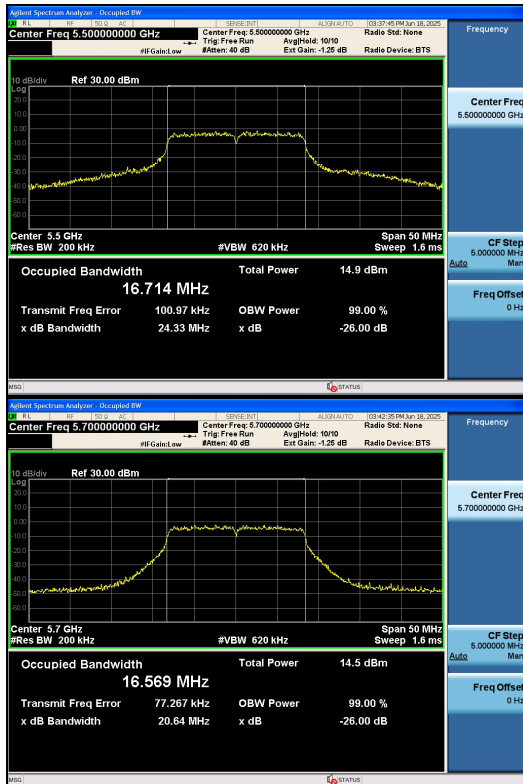
802.11a_UNII 2A



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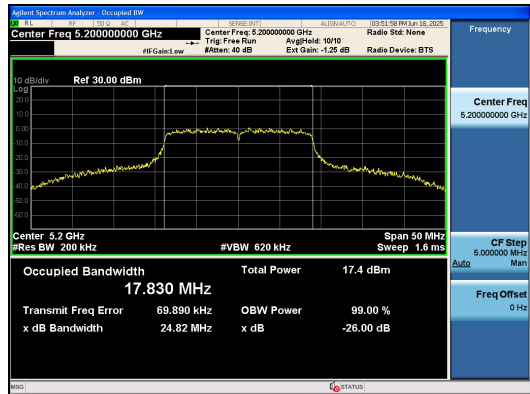
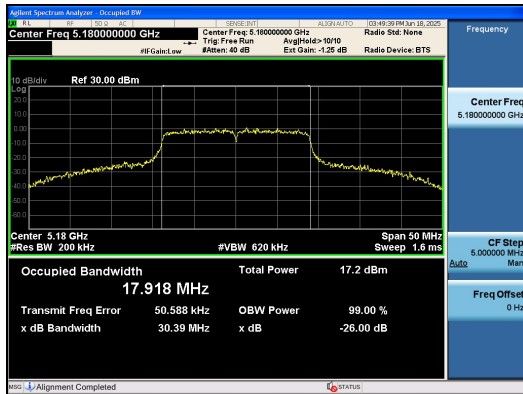
802.11a_UNIT 2C



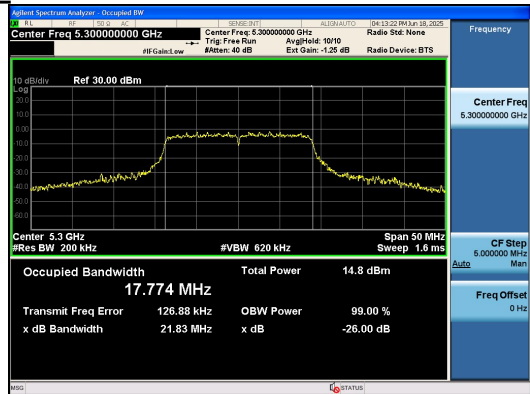
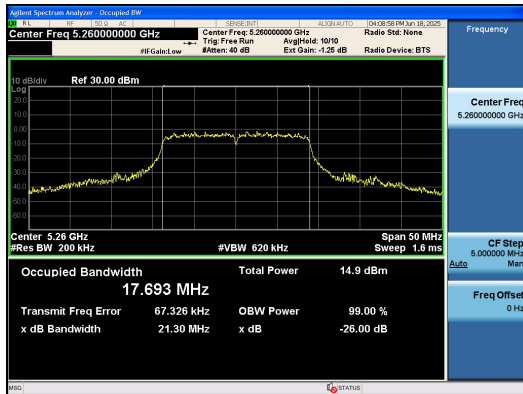
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802.11n_HT20_UNII 1



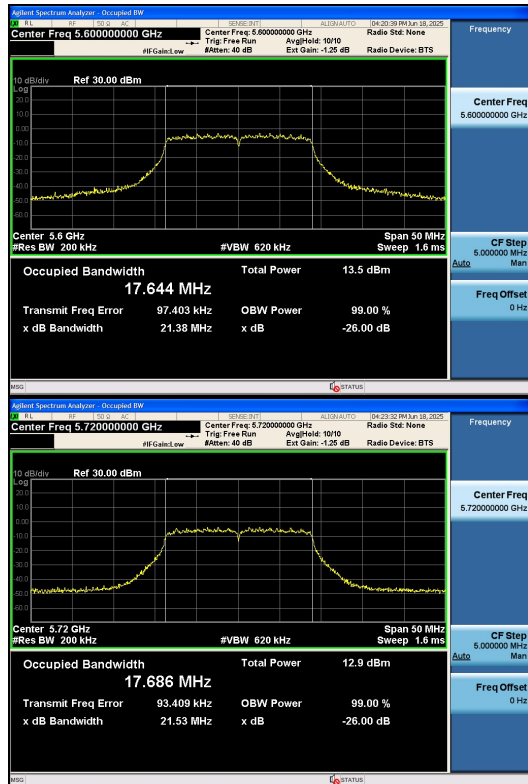
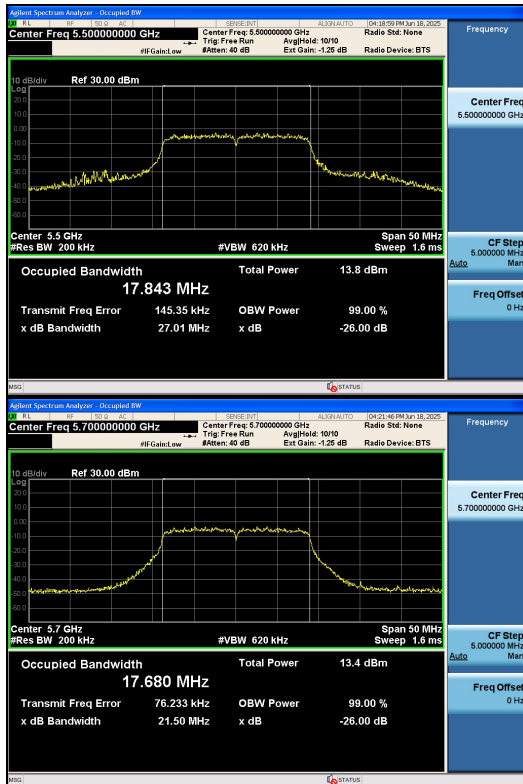
802.11n_HT20_UNII 2A



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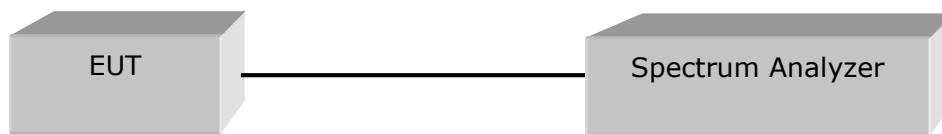
802.11n_HT20_UNII 2C

4.2 Output Power

Test Procedures

KDB 789033 – Section E.2.d (Method SA-2, Maximum Conducted Output Power)
 ANSI C63.10-2013 – Section 12.3.2.4

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 1 MHz
- b) VBW $\geq 3 \times$ RBW
- c) Sweep time = auto
- d) Detector = power averaging (rms)
- e) Trace mode = Average at least 100
- f) Duty cycle factor = $10\log(1/x)$

Test mode	Duty Cycle Factor (dB)
802.11a	0.27
802.11n_HT20	0.29

Limit

Operating Mode	Mode	ANT Gain (dBi)	Band	FCC Limit (dBm)	ISED Limit (dBm)
SISO	802.11a/n	2.94	UNII 1	24.00	Note
			UNII 2A	24.00	Note
		3.61	UNII 2C	24.00	Note

Note :

Band	Limit (dBm)
UNII 1	the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.
UNII 2A	The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.
UNII 2C	The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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Test Data**[FCC]**

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	11.00	0.27	11.27	24	12.73
	5 200	11.09	0.27	11.36	24	12.64
	5 240	10.78	0.27	11.05	24	12.95
	5 260	9.14	0.27	9.41	24	14.59
	5 300	9.06	0.27	9.33	24	14.67
	5 320	9.27	0.27	9.54	24	14.46
	5 500	8.43	0.27	8.70	24	15.3
	5 600	8.36	0.27	8.63	24	15.37
	5 700	8.17	0.27	8.44	24	15.56
	5 720	7.91	0.27	8.18	24	15.82
802.11n _HT20	5 180	11.10	0.29	11.39	24	12.61
	5 200	11.14	0.29	11.43	24	12.57
	5 240	10.55	0.29	10.84	24	13.16
	5 260	8.45	0.29	8.74	24	15.26
	5 300	8.50	0.29	8.79	24	15.21
	5 320	8.80	0.29	9.09	24	14.91
	5 500	7.21	0.29	7.50	24	16.5
	5 600	7.13	0.29	7.42	24	16.58
	5 700	6.99	0.29	7.28	24	16.72
	5 720	6.61	0.29	6.90	24	17.10
Measurement uncertainty		± 1.5 dB				

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[ISED]

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result (dBm)		Limit (dBm)		Margin (dB)	
				Conducted Output Power	EIRP	Conducted Output Power	EIRP	Conducted Output Power	EIRP
802.11a	5 180	11.00	0.27	11.27	14.21	-	22.26	-	8.05
	5 200	11.09	0.27	11.36	14.30	-	22.22	-	7.92
	5 240	10.78	0.27	11.05	13.99	-	22.23	-	8.24
	5 260	9.14	0.27	9.41	12.35	23.20	29.20	13.79	16.85
	5 300	9.06	0.27	9.33	12.27	23.21	29.21	13.88	16.94
	5 320	9.27	0.27	9.54	12.48	23.22	29.22	13.68	16.74
	5 500	8.43	0.27	8.70	12.31	23.23	29.23	14.53	16.92
	5 600	8.36	0.27	8.63	12.24	23.18	29.18	14.55	16.94
	5 700	8.17	0.27	8.44	12.05	23.19	29.19	14.75	17.14
	5 720	7.91	0.27	8.18	11.79	23.19	29.19	15.01	17.40
802.11n _HT20	5 180	11.10	0.29	11.39	14.33	-	22.48	-	8.15
	5 200	11.14	0.29	11.43	14.37	-	22.51	-	8.14
	5 240	10.55	0.29	10.84	13.78	-	22.52	-	8.74
	5 260	8.45	0.29	8.74	11.68	23.48	29.48	14.74	17.80
	5 300	8.50	0.29	8.79	11.73	23.50	29.50	14.71	17.77
	5 320	8.80	0.29	9.09	12.03	23.49	29.49	14.40	17.46
	5 500	7.21	0.29	7.50	11.11	23.51	29.51	16.01	18.40
	5 600	7.13	0.29	7.42	11.03	23.46	29.46	16.04	18.43
	5 700	6.99	0.29	7.28	10.89	23.47	29.47	16.19	18.58
	5 720	6.61	0.29	6.90	10.51	23.48	29.48	16.58	18.97
Measurement uncertainty		± 1.5 dB							

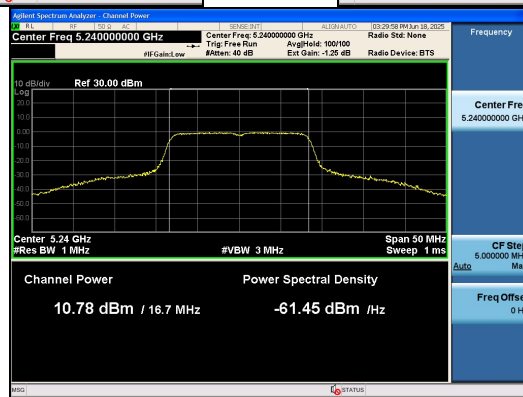
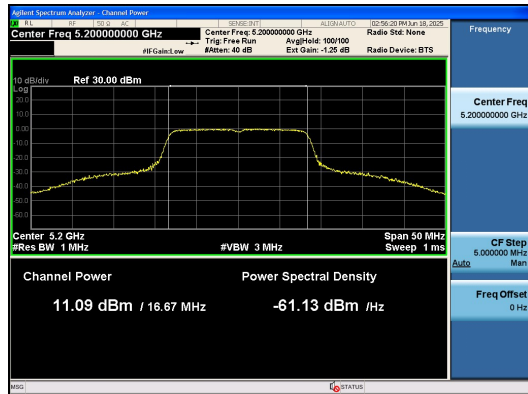
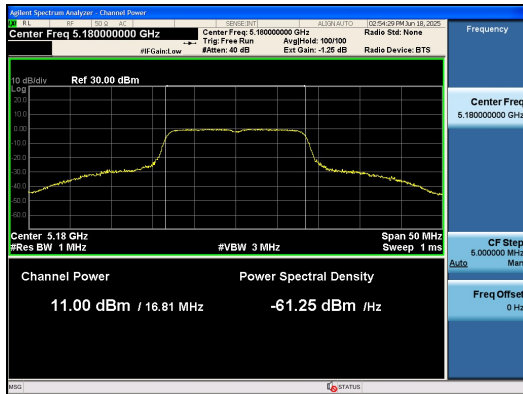
See next pages for actual measured spectrum plots.



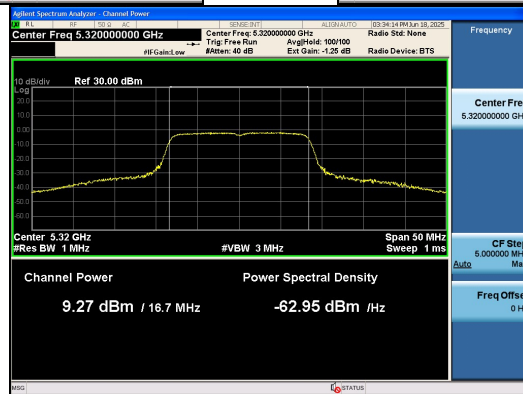
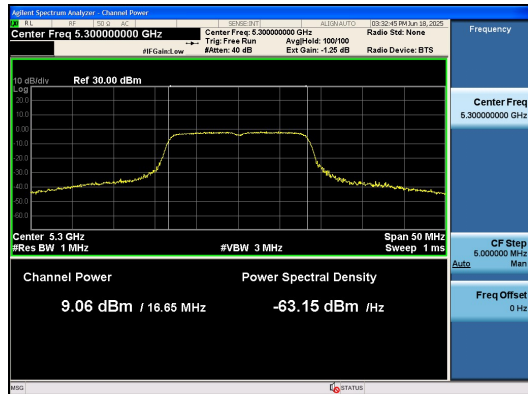
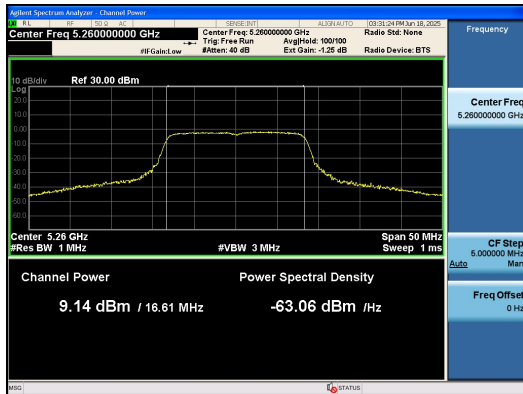
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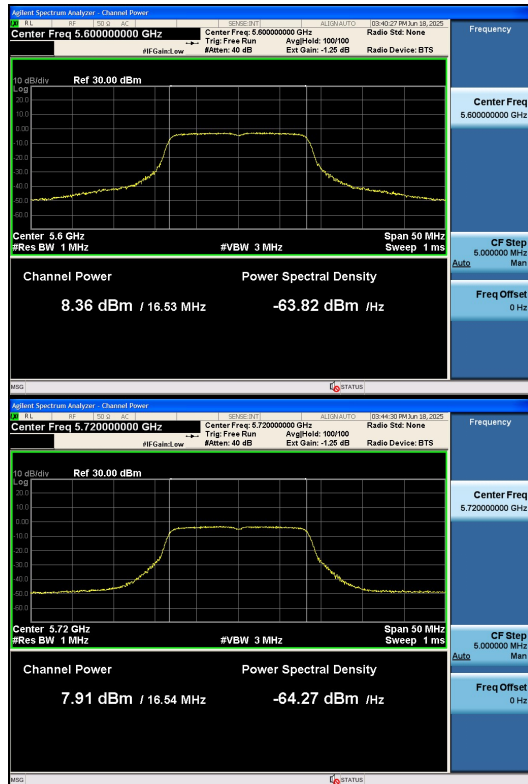
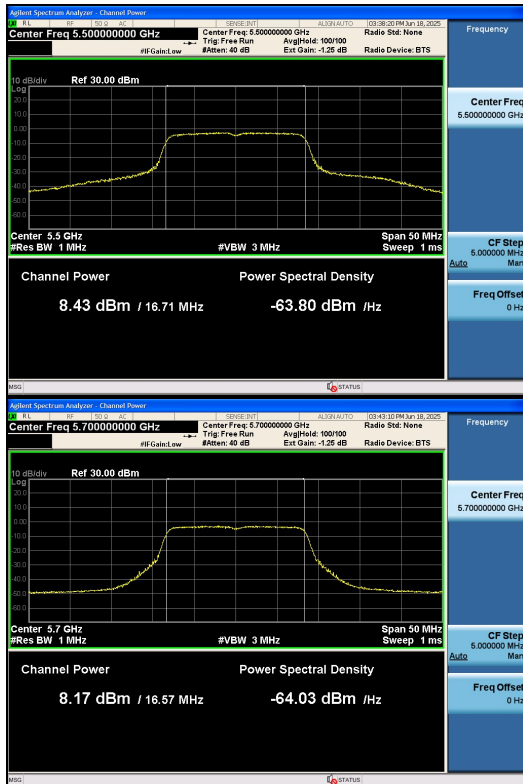
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