

Test Mode

Test Channel

Verdict

11a

5280

PASS

Spectrum Analyzer 1
Channel Power

Frequency

Frequency

Staings

Staings

Scale Div 10.0 dB

Ref Value 30.00 dBm

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

Freq Offset

Output Divided 10.010 dB

Ref Value 30.00 dBm

#Video BW 3.0000 MHz*

13.16 dBm / 19.9 MHz

-59.84 dBm/Hz

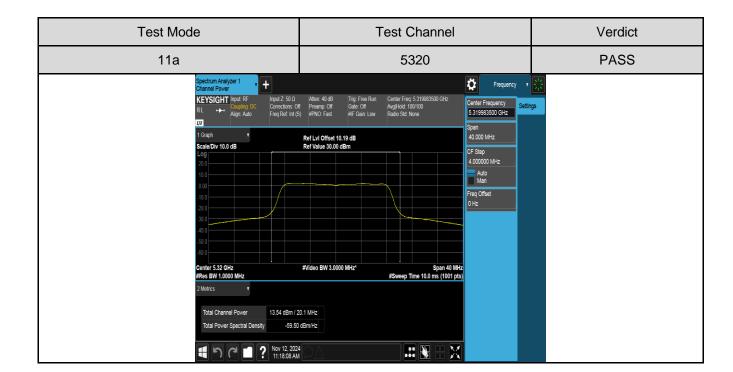
Span 40 MHz #Sweep Time 10.0 ms (1001 pts)

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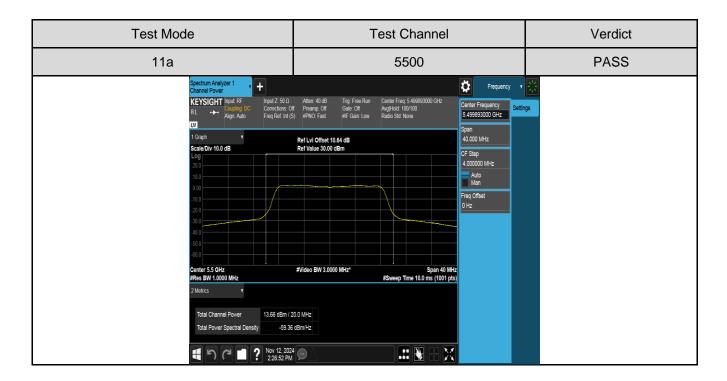
Center 5.28 GHz Res BW 1.0000 MHz

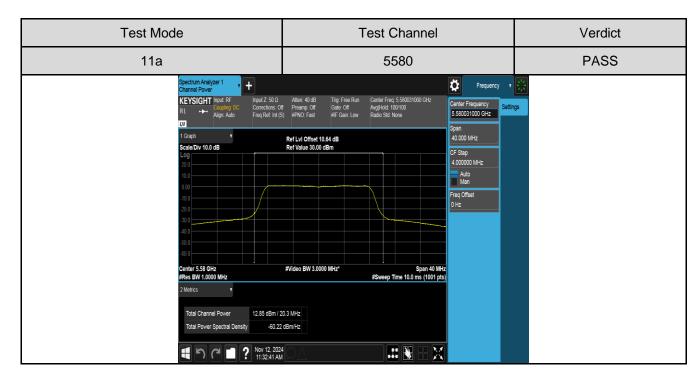
Total Channel Power

Total Power Spectral Density

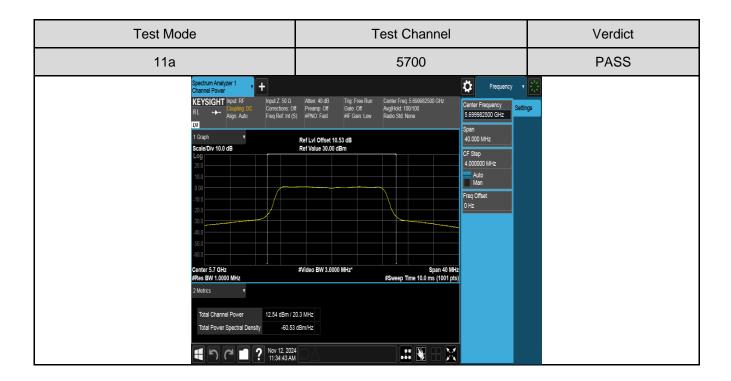


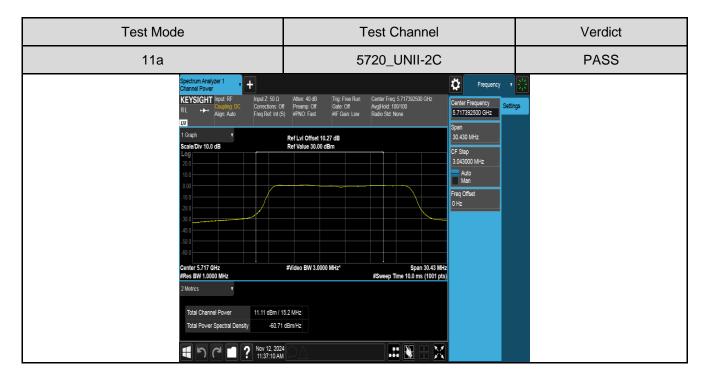




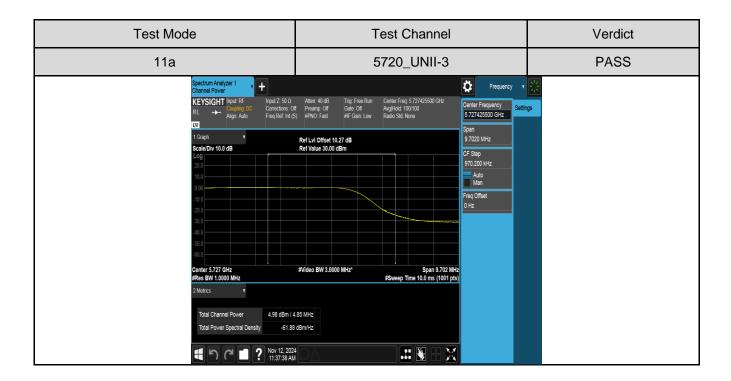


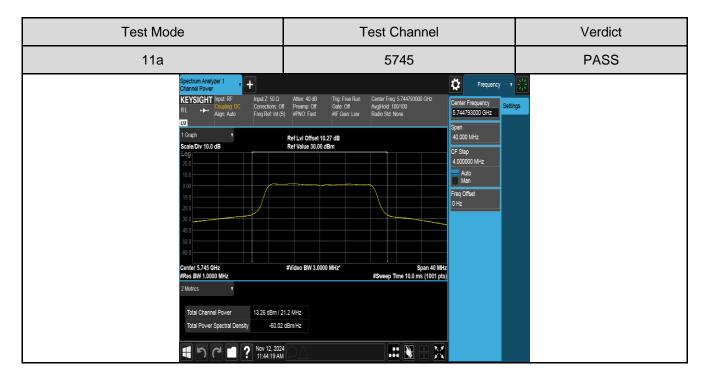




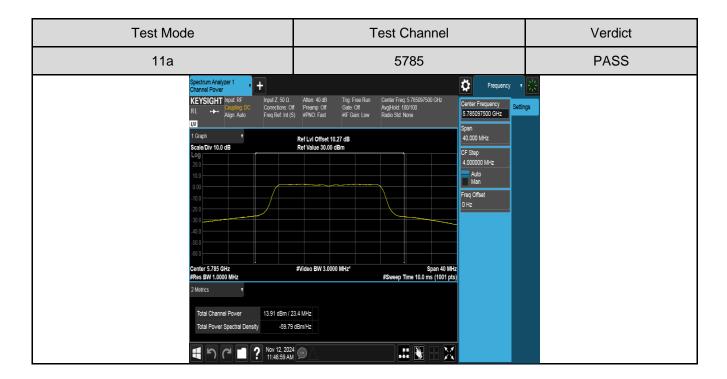


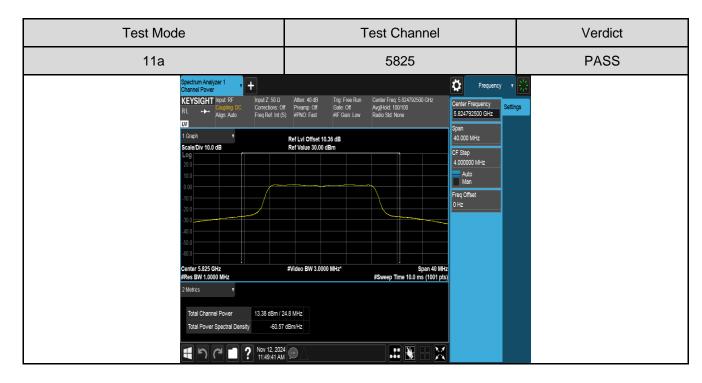














Test Mode

Test Channel

11ac VHT20

5180

PASS

Section Analyzer 1
Channel Fower

KEYSIGHT Input RF

Channel Fower

KEYSIGHT Input RF

Channel Rower

KEYSIGHT Input RF

Ref Lyd Disput RF

Ref Lyd Disput

#Video BW 3.0000 MHz*

13.49 dBm / 20.3 MHz

-59.58 dBm/Hz

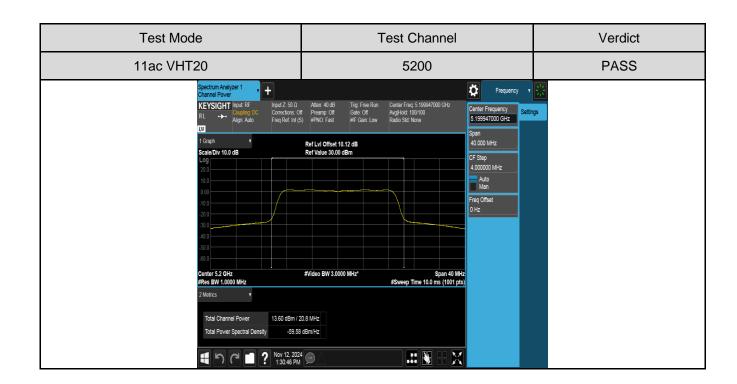
Span 40 MHz #Sweep Time 10.0 ms (1001 pts)

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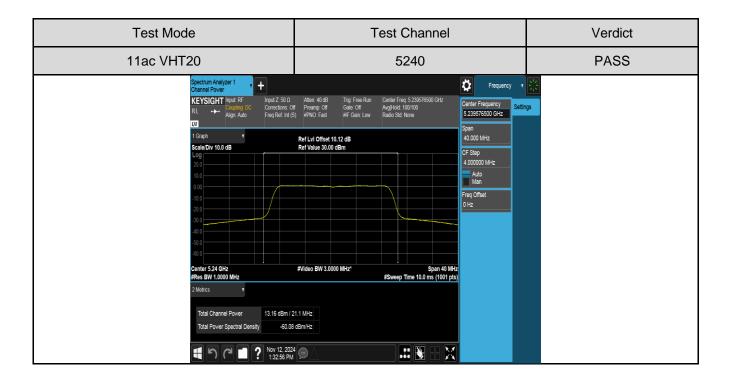
Center 5.18 GHz Res BW 1.0000 MHz

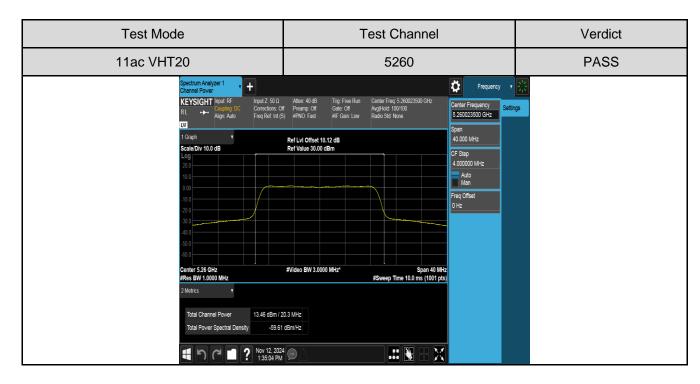
Total Channel Power

Total Power Spectral Density





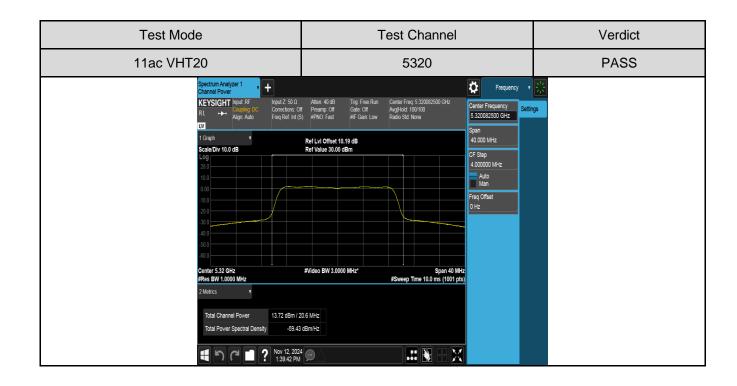




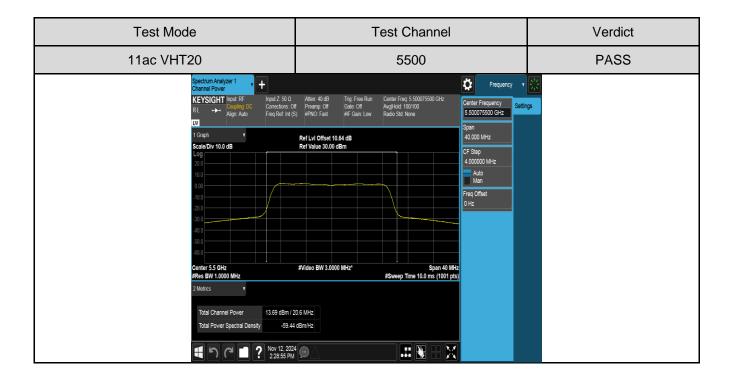


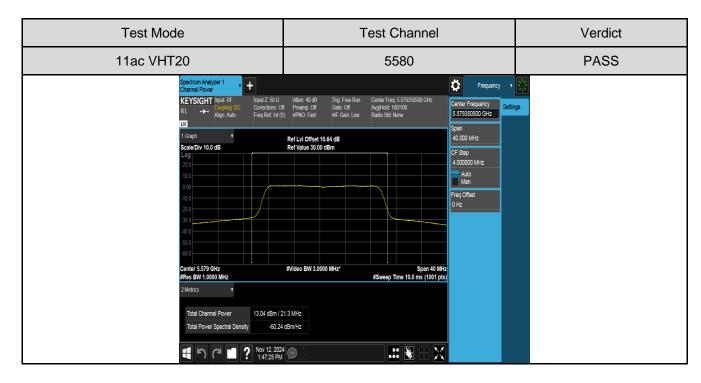
Test Mode **Test Channel** Verdict **PASS** 11ac VHT20 5280 Ö KEYSIGHT Input RF Center Frequency 5.280042500 GHz 40.000 MHz Ref Lvl Offset 10.19 dB Ref Value 30.00 dBm Scale/Div 10.0 dB CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz Center 5.28 GHz Res BW 1.0000 MHz Span 40 MHz #Sweep Time 10.0 ms (1001 pts) #Video BW 3.0000 MHz* Total Channel Power 13.36 dBm / 20.5 MHz Total Power Spectral Density -59.76 dBm/Hz

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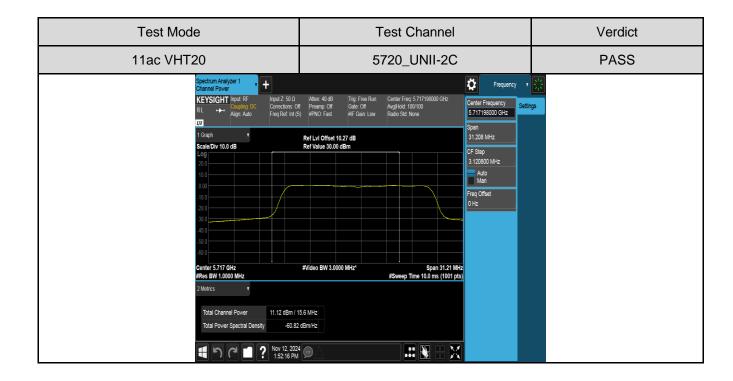








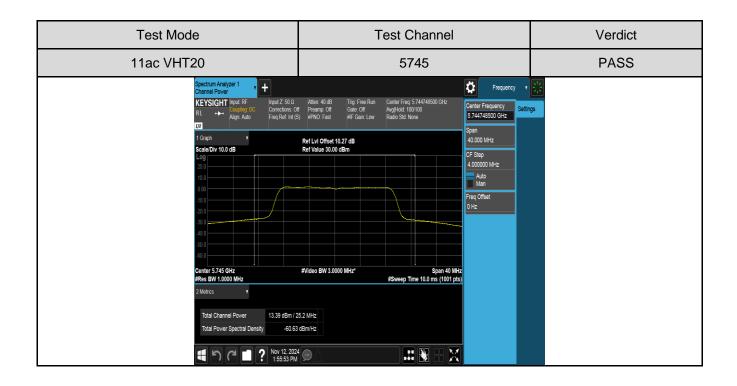
Test Mode **Test Channel** Verdict **PASS** 11ac VHT20 5700 Ö KEYSIGHT Input RF Center Frequency 5.699554500 GHz 40.000 MHz Ref Lvl Offset 10.53 dB Ref Value 30.00 dBm Scale/Div 10.0 dB CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz Center 5.7 GHz Res BW 1.0000 MHz Span 40 MHz #Sweep Time 10.0 ms (1001 pts) #Video BW 3.0000 MHz* Total Channel Power 12.72 dBm / 21.1 MHz Total Power Spectral Density -60.51 dBm/Hz .:: ₹



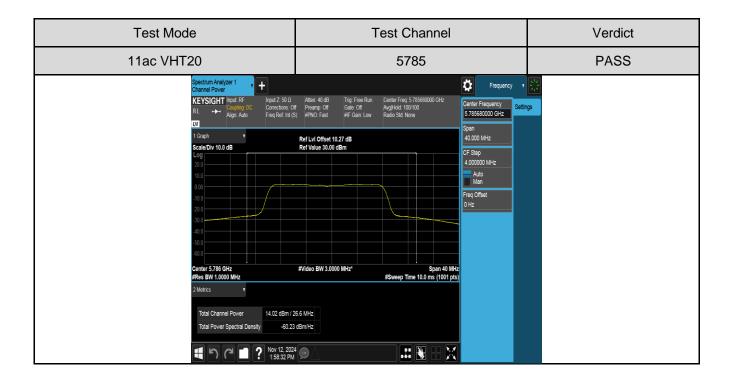


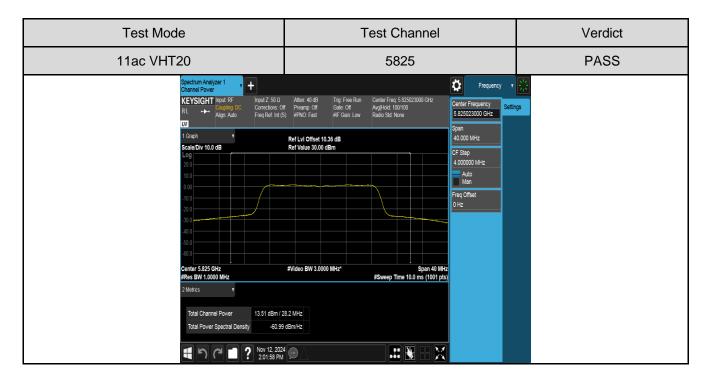
Test Mode Test Channel Verdict **PASS** 11ac VHT20 5720_UNII-3 ₿ KEYSIGHT Input RF 5.727610000 GHz Ref Lvl Offset 10.27 dB Ref Value 30.00 dBm CF Step 1.044000 MHz Auto Man Freq Offset Center 5.728 GHz #Res BW 1.0000 MHz #Video BW 3.0000 MHz* Total Channel Power 5.52 dBm / 5.22 MHz Total Power Spectral Density -61.66 dBm/Hz

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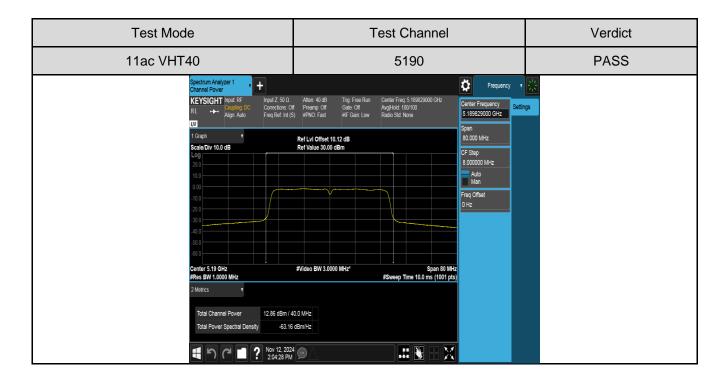


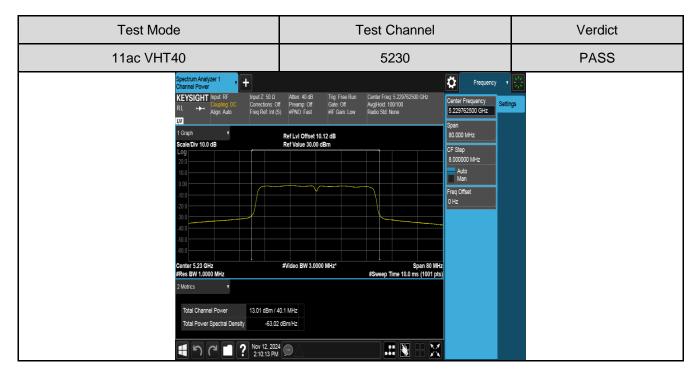




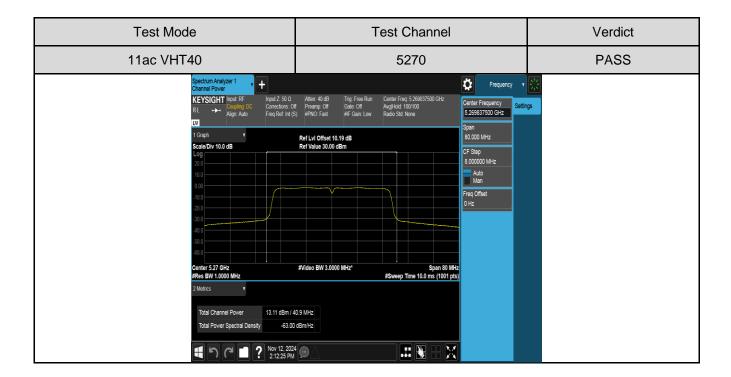


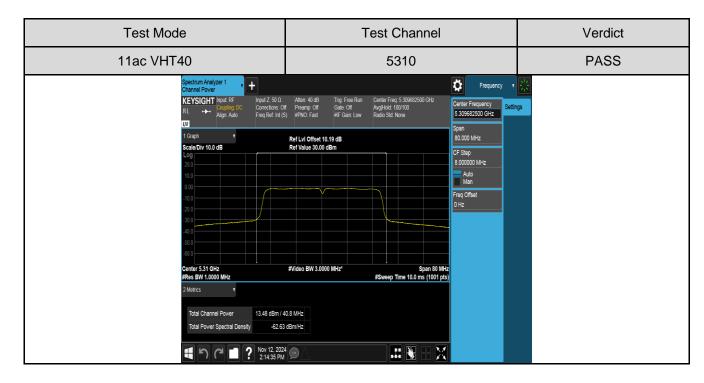




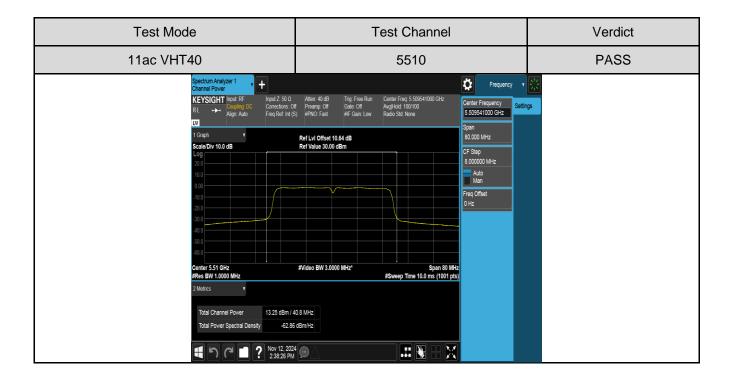


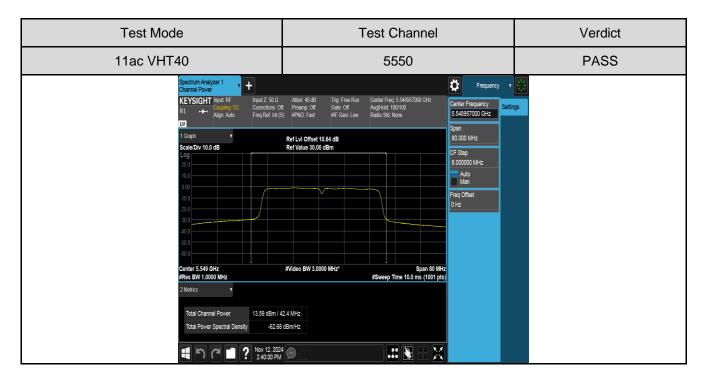




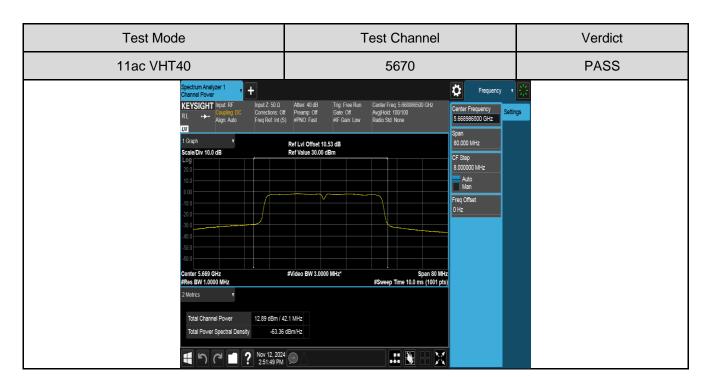


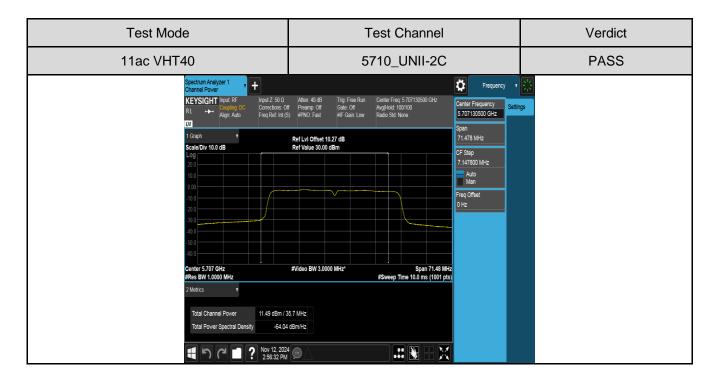






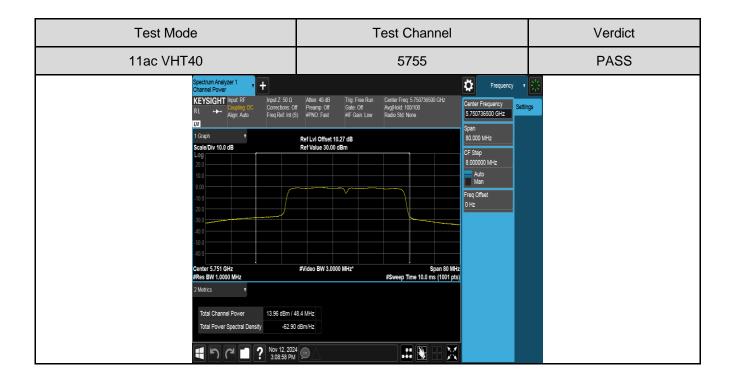




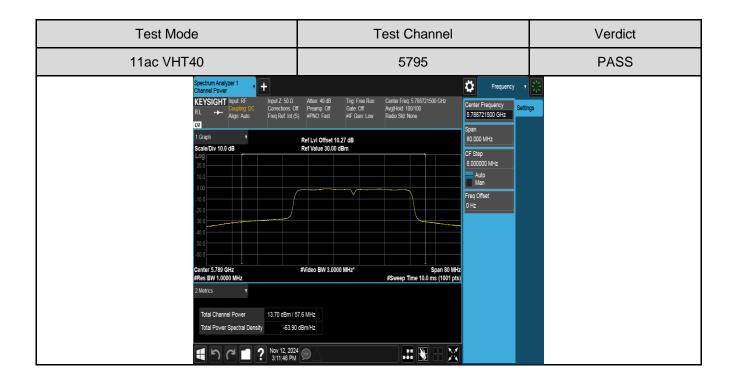


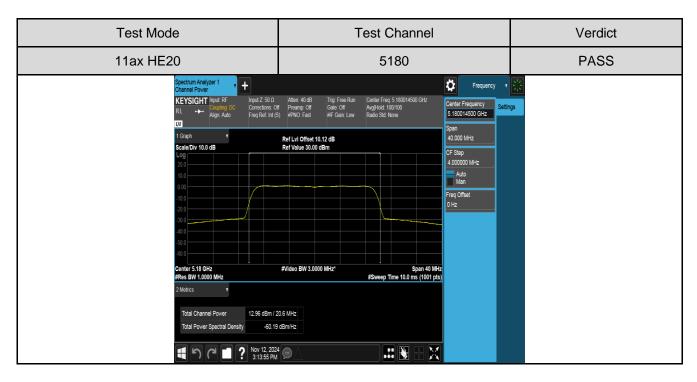


Test Mode **Test Channel** Verdict **PASS** 11ac VHT40 5710_UNII-3 ₿ KEYSIGHT Input RF 5.727480000 GHz Ref Lvl Offset 10.27 dB Ref Value 30.00 dBm CF Step 992.000 kHz Auto Man Freq Offset 0 Hz Center 5.727 GHz #Res BW 1.0000 MHz #Video BW 3.0000 MHz* Total Channel Power 0.31 dBm / 4.96 MHz Total Power Spectral Density -66.64 dBm/Hz .:: ₹



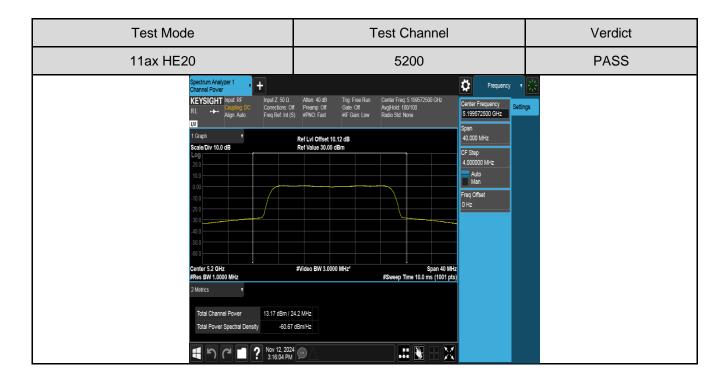


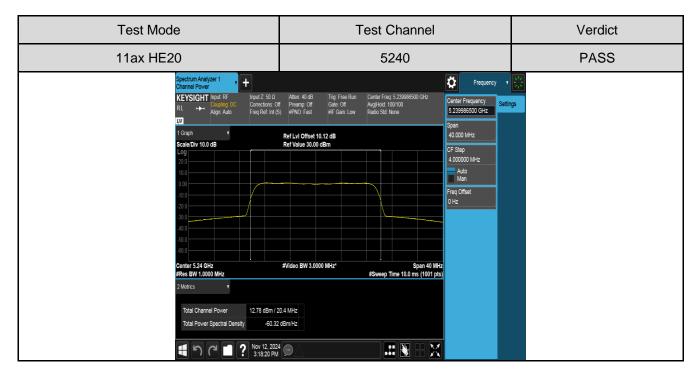




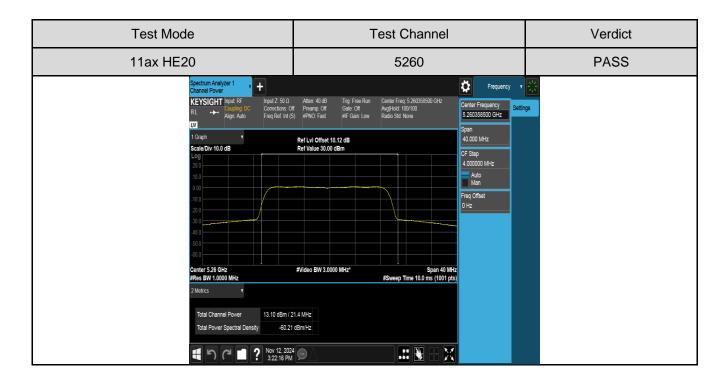


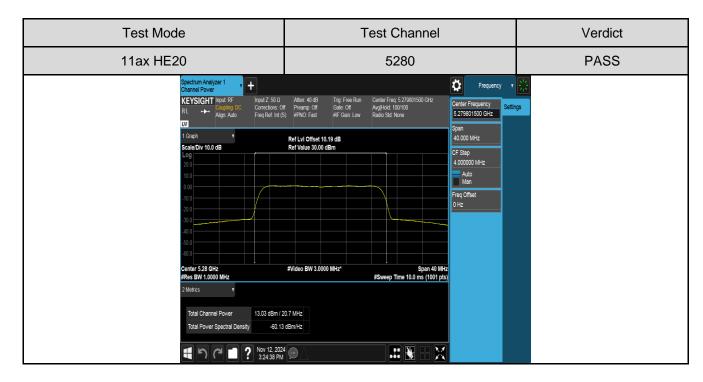
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Test Mode

Test Channel

Verdict

11ax HE20

5320

PASS

SectionAdalyzer1
Channel Power

KEVSIGHT Input RF
RL
Agra Ado
Fires Red Int (S)
F

#Video BW 3.0000 MHz*

13.43 dBm / 20.6 MHz

-59.70 dBm/Hz

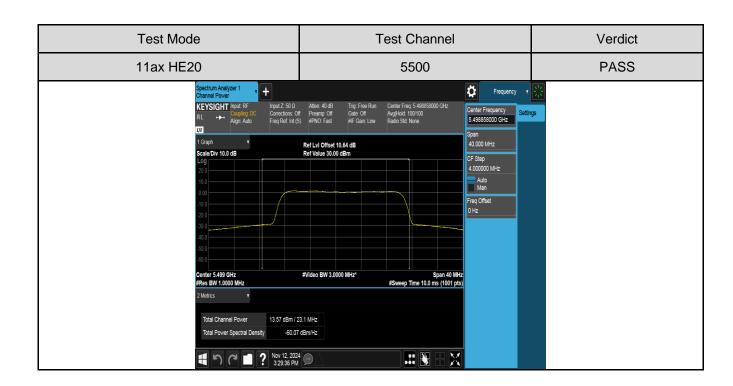
Span 40 MHz #Sweep Time 10.0 ms (1001 pts)

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Center 5.32 GHz Res BW 1.0000 MHz

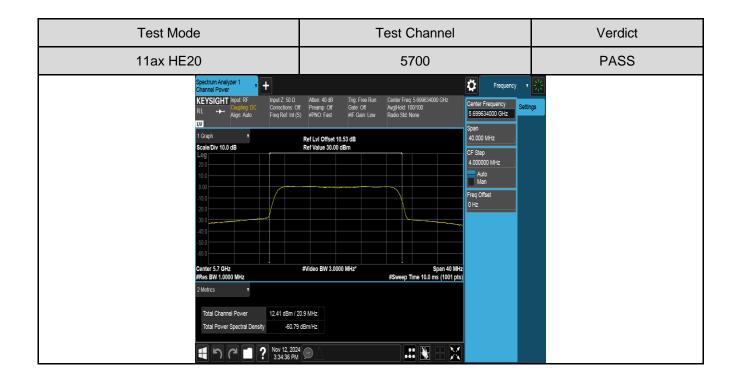
Total Channel Power

Total Power Spectral Density

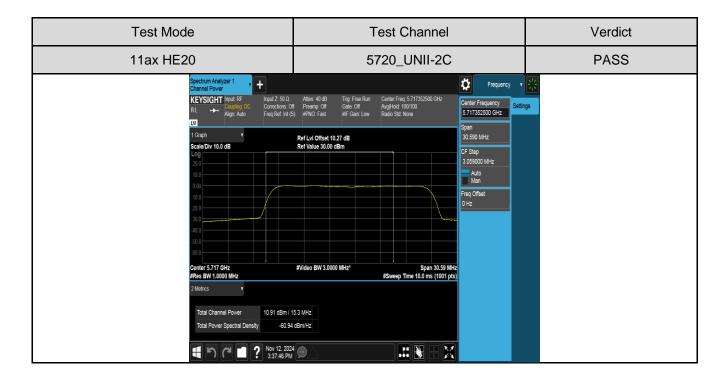


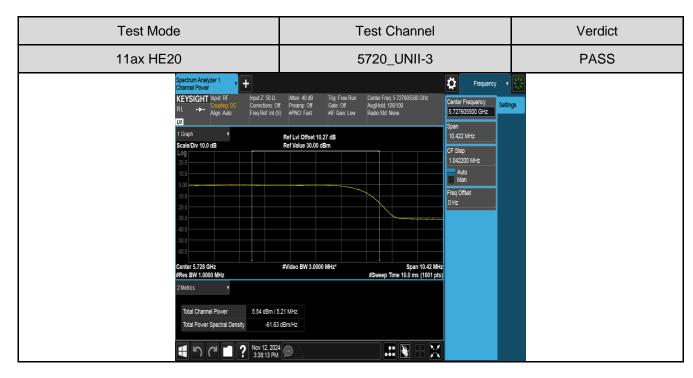


Test Mode Test Channel Verdict **PASS** 11ax HE20 5580 Ö KEYSIGHT Input RF 5.579892500 GHz 40.000 MHz Ref Lvl Offset 10.64 dB Ref Value 30.00 dBm Scale/Div 10.0 dB CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz Center 5.58 GHz Res BW 1.0000 MHz Span 40 MHz #Sweep Time 10.0 ms (1001 pts) #Video BW 3.0000 MHz* Total Channel Power 12.78 dBm / 20.4 MHz Total Power Spectral Density -60.32 dBm/Hz .:: ₹











Test Mode Test Channel Verdict **PASS** 11ax HE20 5745 Ö KEYSIGHT Input RF 5.744849500 GHz Ref Lvl Offset 10.27 dB Ref Value 30.00 dBm 40.000 MHz Scale/Div 10.0 dB CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz Center 5.745 GHz #Res BW 1.0000 MHz Span 40 MHz #Sweep Time 10.0 ms (1001 pts) #Video BW 3.0000 MHz*

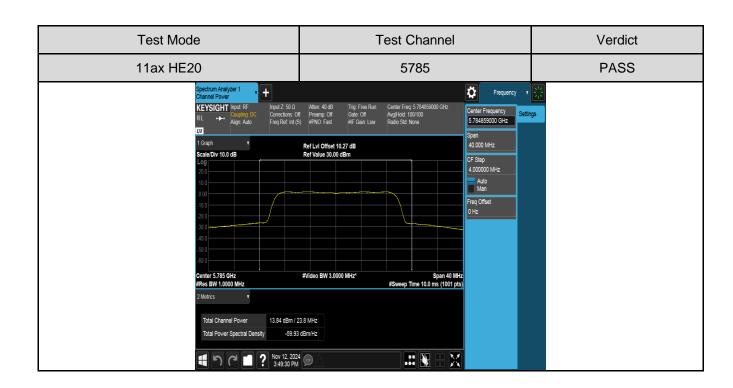
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Total Channel Power

Total Power Spectral Density

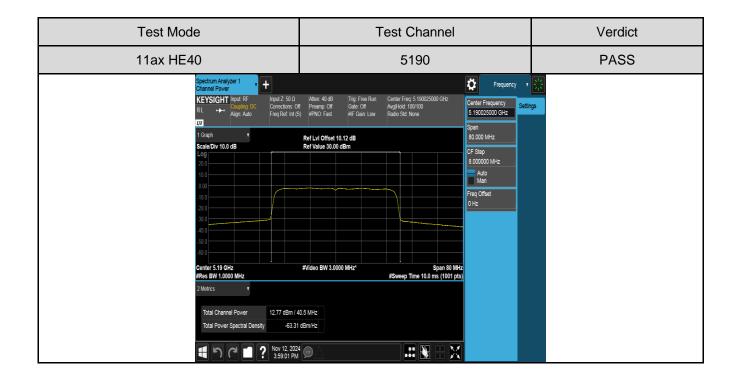
13.17 dBm / 20.9 MHz

-60.02 dBm/Hz





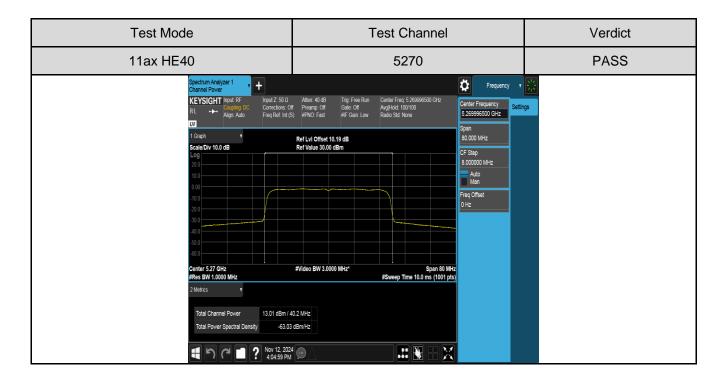
Test Mode **Test Channel** Verdict **PASS** 11ax HE20 5825 Ö KEYSIGHT Input RF Center Frequency 5.823314500 GHz 40.000 MHz Ref Lvl Offset 10.36 dB Ref Value 30.00 dBm Scale/Div 10.0 dB CF Step 4.000000 MHz Auto Man Freq Offset Center 5.823 GHz #Res BW 1.0000 MHz Span 40 MHz #Sweep Time 10.0 ms (1001 pts) #Video BW 3.0000 MHz* Total Channel Power 13.31 dBm / 24.6 MHz Total Power Spectral Density -60.60 dBm/Hz .:: ₹



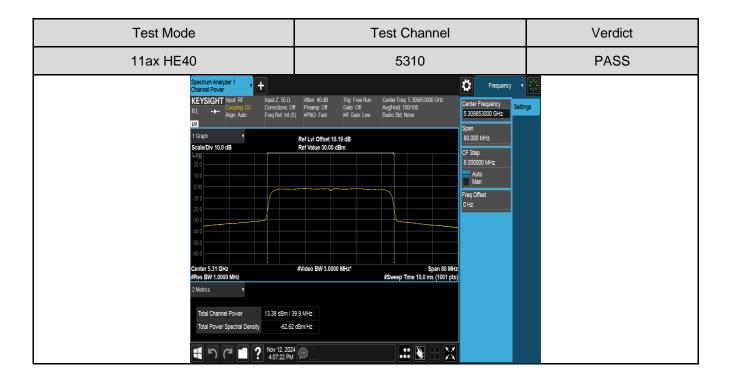


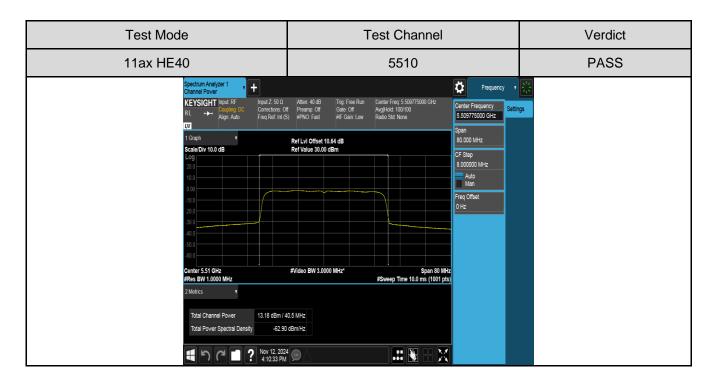
Test Channel Verdict
5230 PASS

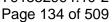




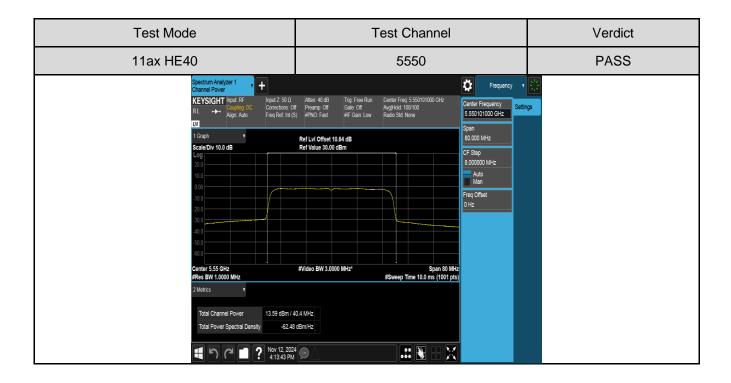


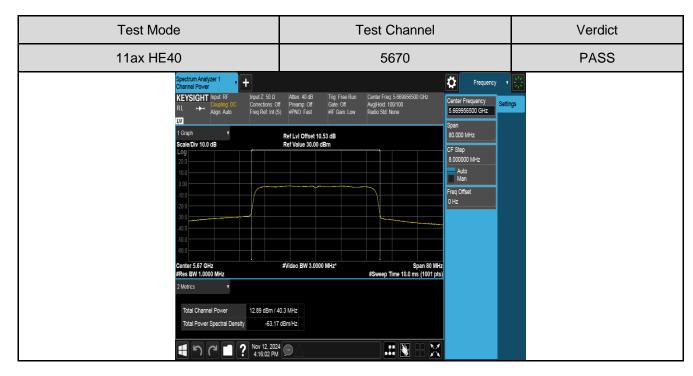




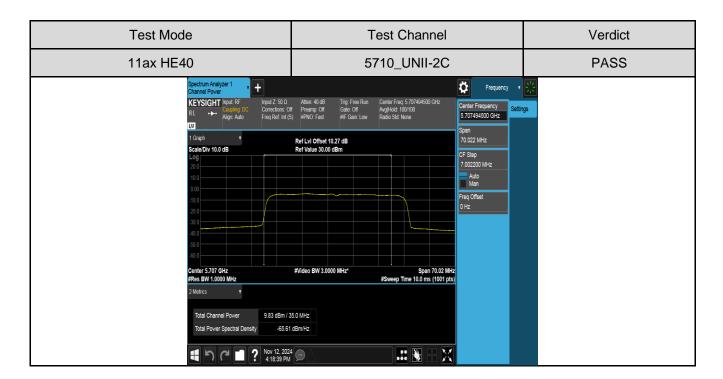


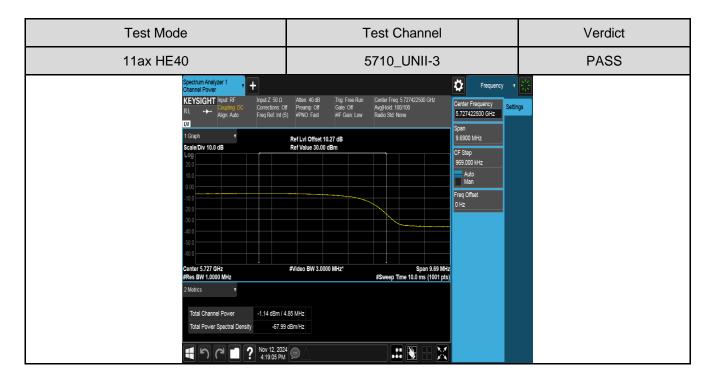














Test Mode Test Channel Verdict **PASS** 11ax HE40 5755 Ö KEYSIGHT Input: RF 5.749833500 GHz Ref LvI Offset 10.27 dB Ref Value 30.00 dBm 80.000 MHz Scale/Div 10.0 dB CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz Center 5.75 GHz Res BW 1.0000 MHz Span 80 MHz #Sweep Time 10.0 ms (1001 pts) #Video BW 3.0000 MHz*

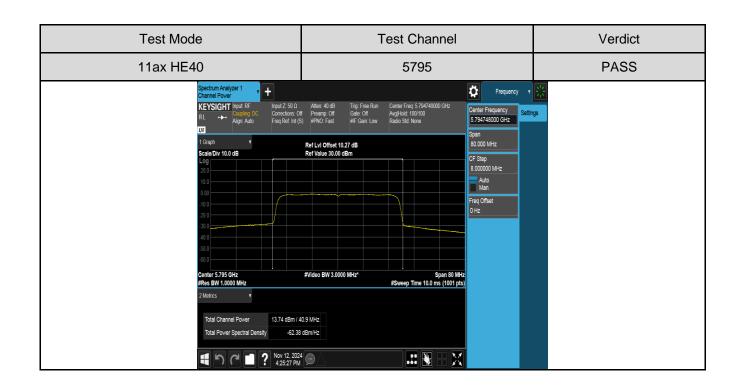
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Total Channel Power

Total Power Spectral Density

13.92 dBm / 55.8 MHz

-63.55 dBm/Hz





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6.4. POWER SPECTRAL DENSITY

LIMITS

	CFR 47 FCC Part15, Subpart E							
Test Item	Limit	Frequency Range (MHz)						
Power Spectral Density	☐ Outdoor Access Point: 17 dBm/MHz ☐ Indoor Access Point: 17 dBm/MHz ☐ Fixed Point-To-Point Access Points: 17 dBm/MHz ☐ Client Devices: 11 dBm/MHz	5150 ~ 5250						
Density	11 dBm/MHz	5250 ~ 5350 5470 ~ 5725						
	30 dBm/500kHz	5725 ~ 5850						

ISED RSS-247 ISSUE 3								
Test Item	Limit	Frequency Range (MHz)						
	The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.	5150 ~ 5250						
Power Spectral Density	The power spectral density shall not exceed 11 dBm inany 1.0 MHz band.	5250 ~ 5350 5470 ~ 5600 5650 ~ 5725						
	30 dBm / 500 kHz	5725 ~ 5850						

Note:

The above limits are based upon the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.F.



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Connect the EUT to the spectrum analyser and use the following settings:

For U-NII-1, U-NII-2A and U-NII-2C band:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	1 MHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

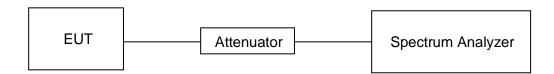
For U-NII-3:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	500 kHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Allow trace to fully stabilize and Use the peak search function on the instrument to find the peak of the spectrum and record its value.

Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum, the result is the Maximum PSD over 1 MHz / 500 kHz reference bandwidth.

TEST SETUP



TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests
Relative Humidity	60%
Atmospheric Pressure:	101kPa
Temperature	22.2°C
Test Voltage	AC 120V
Test Date	11/12/2024

Form-ULID-008536-8 V2.0

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RESULTS

Band 1 & Band 2:

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD /MHz	FCC PSD Limit	ISED PSD Limit	Antenna Gain	EIRP PSD	ISED EIRP PSD Limit
	MHz	dBm	dB	dBm	dBm	dBm	dBi	dBm	dBm
	5180	-0.52	0	-0.52	11	/	2.66	2.14	10
	5200	2.28	0	2.28	11	/	2.66	4.94	10
	5240	1.88	0	1.88	11	/	2.66	4.54	10
	5260	2.21	0	2.21	11	11	2.66	4.87	/
	5280	2.19	0	2.19	11	11	2.66	4.85	/
11a	5320	2.46	0	2.46	11	11	2.66	5.12	/
	5500	2.71	0	2.71	11	11	2.66	5.37	/
	5580	1.93	0	1.93	11	11	2.66	4.59	/
	5700	1.52	0	1.52	11	11	2.66	4.18	/
	5720_ UNII-2C	1.06	0	1.06	11	11	2.66	3.72	/

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD /MHz	FCC PSD Limit	ISED PSD Limit	Antenna Gain	EIRP PSD	ISED EIRP PSD Limit
	MHz	dBm	dB	dBm	dBm	dBm	dBi	dBm	dBm
	5180	-0.52	0	2.11	11	/	2.66	4.77	10
	5200	2.28	0	2.27	11	/	2.66	4.93	10
	5240	1.88	0	1.91	11	/	2.66	4.57	10
	5260	2.21	0	2.07	11	11	2.66	4.73	/
11ac	5280	2.19	0	2.03	11	11	2.66	4.69	/
VHT20	5320	2.46	0	2.41	11	11	2.66	5.07	/
	5500	2.71	0	2.45	11	11	2.66	5.11	/
	5580	1.93	0	1.84	11	11	2.66	4.50	/
	5700	1.52	0	1.41	11	11	2.66	4.07	/
	5720_ UNII-2C	1.06	0	0.91	11	11	2.66	3.57	/



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Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD /MHz	FCC PSD Limit	ISED PSD Limit	Antenna Gain	EIRP PSD	ISED EIRP PSD Limit
	MHz	dBm	dB	dBm	dBm	dBm	dBi	dBm	dBm
	5190	-1.38	0	-1.38	11	/	2.66	1.28	10
	5230	-1.10	0	-1.10	11	/	2.66	1.56	10
	5270	-1.11	0	-1.11	11	/	2.66	1.55	/
11ac	5310	-0.82	0	-0.82	11	11	2.66	1.84	/
VHT40	5510	-0.94	0	-0.94	11	11	2.66	1.72	/
	5550	-0.54	0	-0.54	11	11	2.66	2.12	/
	5670	-1.44	0	-1.44	11	11	2.66	1.22	/
	5710_UNII- 2C	-2.38	0	-2.38	11	11	2.66	0.28	/

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD /MHz	FCC PSD Limit	ISED PSD Limit	Antenna Gain	EIRP PSD	ISED EIRP PSD Limit
	MHz	dBm	dB	dBm	dBm	dBm	dBi	dBm	dBm
	5180	1.64	0	1.64	11	/	2.66	4.30	10
	5200	1.83	0	1.83	11	/	2.66	4.49	10
	5240	1.46	0	1.46	11	/	2.66	4.12	10
	5260	1.73	0	1.73	11	11	2.66	4.39	/
11ax	5280	1.64	0	1.64	11	11	2.66	4.30	/
HE20	5320	2.03	0	2.03	11	11	2.66	4.69	/
	5500	2.44	0	2.44	11	11	2.66	5.10	/
	5580	1.63	0	1.63	11	11	2.66	4.29	/
	5700	1.05	0	1.05	11	11	2.66	3.71	/
	5720_ UNII-2C	0.88	0	0.88	11	11	2.66	3.54	/



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Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD /MHz	FCC PSD Limit	ISED PSD Limit	Antenna Gain	EIRP PSD	ISED EIRP PSD Limit
	MHz	dBm	dB	dBm	dBm	dBm	dBi	dBm	dBm
	5190	-1.58	0	-1.58	11	/	2.66	1.08	10
	5230	-1.25	0	-1.25	11	/	2.66	1.41	10
	5270	-1.12	0	-1.12	11	/	2.66	1.54	/
11ac	5310	-0.92	0	-0.92	11	11	2.66	1.74	/
VHT40	5510	-1.02	0	-1.02	11	11	2.66	1.64	/
	5550	-0.50	0	-0.50	11	11	2.66	2.16	/
	5670	-1.28	0	-1.28	11	11	2.66	1.38	/
	5710_UNII- 2C	-4.04	0	-4.04	11	11	2.66	-1.38	/

Band 3:

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD/300 kHz	Correct Factor	PSD/500 kHz	Limit
	MHz	dBm	dBm	dBm	dB	dBm	dBm
	5720_UNII-3	-1.87	0	-1.87	2.22	0.35	30
110	5745	1.65	0	-0.57	2.22	1.65	30
11a	5785	2.30	0	0.08	2.22	2.30	30
	5825	1.71	0	-0.51	2.22	1.71	30

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD/300 kHz	Correct Factor	PSD/500 kHz	Limit
	MHz	dBm	dBm	dBm	dB	dBm	dBm
	5720_UNII-3	-2.32	0	-2.32	2.22	-0.10	30
11ac	5745	1.66	0	-0.56	2.22	1.66	30
VHT20	5785	2.08	0	-0.14	2.22	2.08	30
	5825	1.82	0	-0.40	2.22	1.82	30



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Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD/300 kHz	Correct Factor	PSD/500 kHz	Limit
	MHz	dBm	dBm	dBm	dB	dBm	dBm
11ac VHT40	5710_UNII-3	-6.36	0	-6.36	2.22	-4.14	30
	5755	-0.83	0	-3.05	2.22	-0.83	30
	5795	-1.20	0	-3.42	2.22	-1.20	30

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD/300 kHz	Correct Factor	PSD/500 kHz	Limit
	MHz	dBm	dBm	dBm	dB	dBm	dBm
11ax HE20	5720_UNII-3	-2.20	0	-2.20	2.22	0.02	30
	5745	1.30	0	-0.92	2.22	1.30	30
	5785	1.83	0	-0.39	2.22	1.83	30
	5825	1.39	0	-0.83	2.22	1.39	30

Mode	Frequency	Measurement Value	Duty Cycle Correction Factor	PSD/300 kHz	Correct Factor	PSD/500 kHz	Limit
	MHz	dBm	dBm	dBm	dB	dBm	dBm
11ax HE40	5710_UNII-3	-8.16	0	-8.16	2.22	-5.94	30
	5755	-0.65	0	-2.87	2.22	-0.65	30
	5795	-1.19	0	-3.41	2.22	-1.19	30

Note:

- The Result and Limit Unit is dBm/500 kHz in the band 5.725 5.85 GHz.
 PSD/500 kHz = 10*log (10^((PSD/300 kHz)/10)/300*500) = PSD/300 kHz + 2.2 dB