

MEASUREMENT REPORT

FCC PART 15.407 / ISSED RSS-247 UNII 802.11a/n/ac/ax(SU)

Applicant Name:

Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States

Date of Testing:

02/15/2021 - 3/22/2021

Test Site/Location:

PCTEST Lab. Morgan Hill, CA, USA

Test Report Serial No.:

1C2101020001-08-R1.BCG

FCC ID:

BCGA2377

IC:

579C-A2377

APPLICANT:

Apple Inc.

Application Type:

Certification

Model/HVIN:

A2377

EUT Type:

Tablet Device

Frequency Range:

5180 – 5825MHz

Modulation Type:

OFDM

FCC Classification:

Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s):

Part 15 Subpart E (15.407)

ISED Specification:

RSS-247 Issue 2

Test Procedure(s):

ANSI C63.10-2013, KDB 789033 D02 v02r01
KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 789033 D02 v02r01. Test results reported herein relate only to the item(s) tested.

This revised Test Report (S/N: 1C2101020001-08-R1.BCG) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

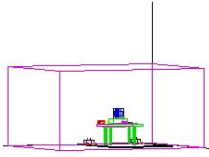

Randy Ortanez
President


FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 1 of 348

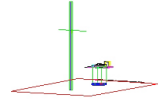
T A B L E O F C O N T E N T S

1.0	INTRODUCTION	6
1.1	Scope.....	6
1.2	PCTEST Test Location.....	6
1.3	Test Facility / Accreditations.....	6
2.0	PRODUCT INFORMATION	7
2.1	Equipment Description	7
2.2	Device Capabilities.....	7
2.3	Antenna Description.....	9
2.4	Test Support Equipment.....	10
2.5	Test Configuration	10
2.6	Software and Firmware	11
2.7	EMI Suppression Device(s)/Modifications.....	11
3.0	DESCRIPTION OF TESTS	12
3.1	Evaluation Procedure	12
3.2	AC Line Conducted Emissions	12
3.3	Radiated Emissions.....	13
3.4	Environmental Conditions.....	13
4.0	ANTENNA REQUIREMENTS	14
5.0	MEASUREMENT UNCERTAINTY	15
6.0	TEST EQUIPMENT CALIBRATION DATA.....	16
7.0	TEST RESULTS	17
7.1	Summary.....	17
7.2	26dB & 99% Bandwidth Measurement – 802.11a/n/ac/ax-SU	18
7.3	6dB & 99% Bandwidth Measurement – 802.11a/n/ac/ax-SU	43
7.4	Conducted Output Power and Max EIRP Measurement – 802.11a/n/ac/ax-SU	52
7.5	Maximum Power Spectral Density – 802.11a/n/ac/ax-SU	83
7.6	Radiated Spurious Emissions – Above 1GHz.....	160
7.7	AC Line-Conducted Emissions Measurement.....	342
8.0	CONCLUSION.....	348

FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 2 of 348



MEASUREMENT REPORT



UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM					
				Antenna 5T		Antenna 5B		Antenna 5T		Antenna 5B		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	100.000	20.00	99.541	19.98	50.119	17.00	50.119	17.00	100.231	20.01
2A		802.11a/n	5260 - 5320	99.312	19.97	100.000	20.00	50.119	17.00	50.003	16.99	100.231	20.01
2C		802.11a/n	5500 - 5720	100.000	20.00	99.083	19.96	49.204	16.92	49.431	16.94	98.401	19.93
3	40	802.11a/n	5745 - 5825	125.893	21.00	125.893	21.00	124.451	20.95	124.451	20.95	247.742	23.94
1		802.11n	5190 - 5230	123.310	20.91	123.027	20.90	99.541	19.98	99.083	19.96	198.609	22.98
2A		802.11n	5270 - 5310	121.899	20.86	124.165	20.94	97.949	19.91	98.175	19.92	196.336	22.93
2C	80	802.11n	5510 - 5710	125.893	21.00	124.451	20.95	99.770	19.99	99.770	19.99	195.884	22.92
3		802.11n	5755 - 5795	123.310	20.91	124.738	20.96	123.595	20.92	119.950	20.79	242.103	23.84
1		802.11ac	5210	48.529	16.86	50.003	16.99	16.827	12.26	17.660	12.47	34.514	15.38
2A	20	802.11ac	5290	30.974	14.91	31.046	14.92	17.219	12.36	17.298	12.38	34.514	15.38
2C		802.11ac	5530 - 5690	121.060	20.83	123.310	20.91	95.499	19.80	100.000	20.00	195.434	22.91
3		802.11ac	5775	54.325	17.35	56.105	17.49	49.317	16.93	47.863	16.80	97.275	19.88
1	40	802.11ax (SU)	5180 - 5240	99.541	19.98	98.855	19.95	48.306	16.84	48.753	16.88	96.828	19.86
2A		802.11ax (SU)	5260 - 5320	99.541	19.98	97.275	19.88	49.774	16.97	49.659	16.96	99.541	19.98
2C		802.11ax (SU)	5500 - 5720	97.051	19.87	100.000	20.00	49.317	16.93	50.003	16.99	99.083	19.96
3	80	802.11ax (SU)	5745 - 5825	125.603	20.99	125.893	21.00	125.314	20.98	123.310	20.91	247.742	23.94
1		802.11ax (SU)	5190 - 5230	108.393	20.35	109.648	20.40	98.628	19.94	99.770	19.99	198.609	22.98
2A		802.11ax (SU)	5270 - 5310	125.603	20.99	125.893	21.00	86.896	19.39	88.716	19.48	175.792	22.45
2C	20	802.11ax (SU)	5510 - 5710	125.893	21.00	124.738	20.96	96.383	19.84	99.083	19.96	194.089	22.88
3		802.11ax (SU)	5755 - 5795	125.314	20.98	125.603	20.99	119.674	20.78	124.165	20.94	243.781	23.87
1		802.11ax (SU)	5210	21.429	13.31	21.627	13.35	15.849	12.00	15.704	11.96	31.550	14.99
2A	40	802.11ax (SU)	5290	21.577	13.34	21.577	13.34	15.346	11.86	15.066	11.78	30.409	14.83
2C		802.11ax (SU)	5530 - 5690	118.032	20.72	122.180	20.87	95.499	19.80	100.000	20.00	195.434	22.91
3		802.11ax (SU)	5775	50.003	16.99	49.091	16.91	44.668	16.50	44.463	16.48	89.125	19.50

FCC EUT Overview (Low Data Rate)

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM					
				Antenna 5T		Antenna 5B		Antenna 5T		Antenna 5B		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	26.485	14.23	26.607	14.25	14.125	11.50	14.125	11.50	27.990	14.47
2A		802.11a/n	5260 - 5320	99.312	19.97	100.000	20.00	50.119	17.00	50.003	16.99	100.231	20.01
2C		802.11a/n	5500 - 5720	100.000	20.00	99.083	19.96	49.204	16.92	49.431	16.94	98.401	19.93
3	40	802.11a/n	5745 - 5825	125.893	21.00	125.893	21.00	124.451	20.95	124.451	20.95	247.742	23.94
1		802.11n	5190 - 5230	52.360	17.19	52.723	17.22	28.184	14.50	28.184	14.50	56.364	17.51
2A		802.11n	5270 - 5310	121.899	20.86	124.165	20.94	97.949	19.91	98.175	19.92	196.336	22.93
2C	80	802.11n	5510 - 5710	122.180	20.87	119.950	20.79	96.605	19.85	96.828	19.86	193.642	22.87
3		802.11n	5755 - 5795	123.310	20.91	124.738	20.96	123.595	20.92	119.950	20.79	242.103	23.84
1		802.11ac	5210	48.529	16.86	50.003	16.99	16.827	12.26	17.660	12.47	34.514	15.38
2A	20	802.11ac	5290	30.974	14.91	31.046	14.92	17.219	12.36	17.298	12.38	34.514	15.38
2C		802.11ac	5530 - 5690	121.060	20.83	123.310	20.91	95.499	19.80	100.000	20.00	195.434	22.91
3		802.11ac	5775	54.325	17.35	56.105	17.49	49.317	16.93	47.863	16.80	97.275	19.88
1	40	802.11ax (SU)	5180 - 5240	26.424	14.22	26.607	14.25	14.125	11.50	13.996	11.46	27.861	14.45
2A		802.11ax (SU)	5260 - 5320	99.541	19.98	97.275	19.88	49.774	16.97	49.659	16.96	99.541	19.98
2C		802.11ax (SU)	5500 - 5720	97.051	19.87	100.000	20.00	49.317	16.93	50.003	16.99	99.083	19.96
3	80	802.11ax (SU)	5745 - 5825	125.603	20.99	125.893	21.00	125.314	20.98	123.310	20.91	247.742	23.94
1		802.11ax (SU)	5190 - 5230	52.602	17.21	52.119	17.17	28.184	14.50	28.184	14.50	56.364	17.51
2A		802.11ax (SU)	5270 - 5310	125.603	20.99	125.893	21.00	86.896	19.39	88.716	19.48	175.792	22.45
2C	20	802.11ax (SU)	5510 - 5710	125.893	21.00	120.504	20.81	95.940	19.82	95.940	19.82	191.867	22.83
3		802.11ax (SU)	5755 - 5795	125.314	20.98	125.603	20.99	119.674	20.78	124.165	20.94	243.781	23.87
1		802.11ax (SU)	5210	21.429	13.31	21.627	13.35	15.849	12.00	15.704	11.96	31.550	14.99
2A	40	802.11ax (SU)	5290	21.577	13.34	21.577	13.34	15.346	11.86	15.066	11.78	30.409	14.83
2C		802.11ax (SU)	5530 - 5690	118.032	20.72	122.180	20.87	95.499	19.80	100.000	20.00	195.434	22.91
3		802.11ax (SU)	5775	50.003	16.99	49.091	16.91	44.668	16.50	44.463	16.48	89.125	19.50

ISED EUT Overview (Low Data Rate)

FCC ID: BCGA2377 IC: 579C-A2377		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG		Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 3 of 348

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM					
				Antenna 5T		Antenna 5B		Antenna 5T		Antenna 5B		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	100.000	20.00	100.000	20.00	50.119	17.00	50.119	17.00	99.541	19.98
2A		802.11a/n	5260 - 5320	100.000	20.00	100.000	20.00	50.119	17.00	49.545	16.95	99.312	19.97
2C		802.11a/n	5500 - 5720	100.000	20.00	100.000	20.00	50.119	17.00	50.119	17.00	100.231	20.01
3	40	802.11a/n	5745 - 5825	125.893	21.00	125.893	21.00	125.893	21.00	125.893	21.00	251.189	24.00
1		802.11n	5190 - 5230	125.893	21.00	125.893	21.00	98.628	19.94	100.000	20.00	198.609	22.98
2A		802.11n	5270 - 5310	125.893	21.00	122.462	20.88	100.000	20.00	100.000	20.00	199.986	23.01
2C	80	802.11n	5510 - 5710	122.462	20.88	125.893	21.00	97.051	19.87	99.083	19.96	196.336	22.93
3		802.11n	5755 - 5795	125.893	21.00	125.893	21.00	125.893	21.00	125.893	21.00	250.035	23.98
1		802.11ac	5210	39.355	15.95	39.174	15.93	17.061	12.32	17.783	12.50	34.834	15.42
2A	80	802.11ac	5290	25.119	14.00	25.119	14.00	17.338	12.39	17.620	12.46	34.995	15.44
2C		802.11ac	5530 - 5690	125.893	21.00	125.893	21.00	97.499	19.89	98.855	19.95	196.336	22.93
3		802.11ac	5775	46.666	16.69	47.098	16.73	44.361	16.47	43.551	16.39	87.902	19.44
1	20	802.11ax (SU)	5180 - 5240	98.401	19.93	100.000	20.00	50.119	17.00	50.119	17.00	100.231	20.01
2A		802.11ax (SU)	5260 - 5320	97.724	19.90	94.842	19.77	50.119	17.00	50.119	17.00	99.541	19.98
2C		802.11ax (SU)	5500 - 5720	100.000	20.00	100.000	20.00	48.978	16.90	49.659	16.96	97.949	19.91
3	40	802.11ax (SU)	5745 - 5825	125.893	21.00	125.893	21.00	125.893	21.00	125.893	21.00	251.768	24.01
1		802.11ax (SU)	5190 - 5230	110.917	20.45	108.643	20.36	100.000	20.00	96.383	19.84	196.336	22.93
2A		802.11ax (SU)	5270 - 5310	110.408	20.43	110.917	20.45	89.125	19.50	87.297	19.41	176.604	22.47
2C	80	802.11ax (SU)	5510 - 5710	125.893	21.00	124.738	20.96	99.083	19.96	98.855	19.95	198.153	22.97
3		802.11ax (SU)	5755 - 5795	125.893	21.00	125.893	21.00	123.880	20.93	125.893	21.00	250.035	23.98
1		802.11ax (SU)	5210	19.543	12.91	19.055	12.80	14.723	11.68	14.289	11.55	29.040	14.63
2A	80	802.11ax (SU)	5290	19.498	12.90	19.815	12.97	13.614	11.34	13.932	11.44	27.542	14.40
2C		802.11ax (SU)	5530 - 5690	124.738	20.96	125.893	21.00	100.000	20.00	98.401	19.93	198.609	22.98
3		802.11ax (SU)	5775	44.463	16.48	42.658	16.30	39.811	16.00	38.726	15.88	78.524	18.95

FCC EUT Overview (Mid Data Rate)

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM					
				Antenna 5T		Antenna 5B		Antenna 5T		Antenna 5B		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	26.607	14.25	26.607	14.25	13.900	11.43	13.868	11.42	27.797	14.44
2A		802.11a/n	5260 - 5320	100.000	20.00	100.000	20.00	50.119	17.00	49.545	16.95	99.312	19.97
2C		802.11a/n	5500 - 5720	100.000	20.00	100.000	20.00	50.119	17.00	50.119	17.00	100.231	20.01
3	40	802.11a/n	5745 - 5825	125.893	21.00	125.893	21.00	125.893	21.00	125.893	21.00	251.189	24.00
1		802.11n	5190 - 5230	50.933	17.07	52.723	17.22	28.119	14.49	27.164	14.34	55.335	17.43
2A		802.11n	5270 - 5310	125.893	21.00	122.462	20.88	100.000	20.00	100.000	20.00	199.986	23.01
2C	80	802.11n	5510 - 5710	119.399	20.77	125.893	21.00	97.051	19.87	98.628	19.94	195.884	22.92
3		802.11n	5755 - 5795	125.893	21.00	125.893	21.00	125.893	21.00	125.893	21.00	250.035	23.98
1		802.11ac	5210	39.355	15.95	39.174	15.93	17.061	12.32	17.783	12.50	34.834	15.42
2A	80	802.11ac	5290	25.119	14.00	25.119	14.00	17.338	12.39	17.620	12.46	34.995	15.44
2C		802.11ac	5530 - 5690	125.893	21.00	125.893	21.00	97.499	19.89	98.855	19.95	196.336	22.93
3		802.11ac	5775	46.666	16.69	47.098	16.73	44.361	16.47	43.551	16.39	87.902	19.44
1	20	802.11ax (SU)	5180 - 5240	26.303	14.20	25.351	14.04	13.804	11.40	13.868	11.42	27.542	14.40
2A		802.11ax (SU)	5260 - 5320	97.724	19.90	94.842	19.77	50.119	17.00	50.119	17.00	99.541	19.98
2C		802.11ax (SU)	5500 - 5720	100.000	20.00	100.000	20.00	48.978	16.90	49.659	16.96	97.949	19.91
3	40	802.11ax (SU)	5745 - 5825	125.893	21.00	125.893	21.00	125.893	21.00	125.893	21.00	251.768	24.01
1		802.11ax (SU)	5190 - 5230	51.761	17.14	51.523	17.12	26.485	14.23	26.977	14.31	53.456	17.28
2A		802.11ax (SU)	5270 - 5310	110.408	20.43	110.917	20.45	89.125	19.50	87.297	19.41	176.604	22.47
2C	80	802.11ax (SU)	5510 - 5710	125.893	21.00	124.738	20.96	99.083	19.96	98.855	19.95	198.153	22.97
3		802.11ax (SU)	5755 - 5795	125.893	21.00	125.893	21.00	123.880	20.93	125.893	21.00	250.035	23.98
1		802.11ax (SU)	5210	19.543	12.91	19.055	12.80	14.723	11.68	14.289	11.55	29.040	14.63
2A	80	802.11ax (SU)	5290	19.498	12.90	19.815	12.97	13.614	11.34	13.932	11.44	27.542	14.40
2C		802.11ax (SU)	5530 - 5690	124.738	20.96	125.893	21.00	100.000	20.00	98.401	19.93	198.609	22.98
3		802.11ax (SU)	5775	44.463	16.48	42.658	16.30	39.811	16.00	38.726	15.88	78.524	18.95

ISED EUT Overview (Mid Data Rate)

FCC ID: BCGA2377 IC: 579C-A2377		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG		Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 4 of 348

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM					
				Antenna 5T		Antenna 5B		Antenna 5T		Antenna 5B		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	100.000	20.00	99.770	19.99	49.545	16.95	48.753	16.88	98.401	19.93
2A		802.11a/n	5260 - 5320	100.000	20.00	98.628	19.94	50.119	17.00	49.204	16.92	99.312	19.97
2C		802.11a/n	5500 - 5720	100.000	20.00	99.770	19.99	49.888	16.98	49.774	16.97	99.541	19.98
3		802.11a/n	5745 - 5825	125.893	21.00	125.603	20.99	125.893	21.00	125.893	21.00	249.459	23.97
1	40	802.11n	5190 - 5230	112.202	20.50	112.202	20.50	74.473	18.72	79.433	19.00	153.815	21.87
2A		802.11n	5270 - 5310	110.154	20.42	110.662	20.44	75.858	18.80	79.433	19.00	155.239	21.91
2C		802.11n	5510 - 5710	125.893	21.00	125.893	21.00	96.161	19.83	100.000	20.00	196.336	22.93
3		802.11n	5755 - 5795	124.738	20.96	125.893	21.00	96.605	19.85	100.000	20.00	196.789	22.94
1	80	802.11ac	5210	27.479	14.39	27.733	14.43	15.560	11.92	15.776	11.98	31.333	14.96
2A		802.11ac	5290	20.893	13.20	21.135	13.25	15.560	11.92	15.849	12.00	31.405	14.97
2C		802.11ac	5530 - 5690	124.738	20.96	123.880	20.93	96.161	19.83	98.175	19.92	194.536	22.89
3		802.11ac	5775	38.107	15.81	38.019	15.80	34.674	15.40	35.481	15.50	70.146	18.46
1	20	802.11ax (SU)	5180 - 5240	98.855	19.95	99.083	19.96	49.545	16.95	48.529	16.86	97.499	19.89
2A		802.11ax (SU)	5260 - 5320	100.000	20.00	96.828	19.86	49.545	16.95	48.753	16.88	98.401	19.93
2C		802.11ax (SU)	5500 - 5720	100.000	20.00	99.083	19.96	50.119	17.00	48.753	16.88	98.855	19.95
3		802.11ax (SU)	5745 - 5825	125.893	21.00	125.893	21.00	125.893	21.00	124.451	20.95	247.172	23.93
1	40	802.11ax (SU)	5190 - 5230	100.000	20.00	100.000	20.00	66.527	18.23	70.307	18.47	136.773	21.36
2A		802.11ax (SU)	5270 - 5310	100.000	20.00	100.000	20.00	70.795	18.50	67.608	18.30	138.357	21.41
2C		802.11ax (SU)	5510 - 5710	125.893	21.00	125.026	20.97	96.828	19.86	100.000	20.00	196.789	22.94
3		802.11ax (SU)	5755 - 5795	125.893	21.00	125.893	21.00	96.828	19.86	100.000	20.00	196.789	22.94
1	80	802.11ax (SU)	5210	17.258	12.37	17.701	12.48	12.531	10.98	12.359	10.92	24.889	13.96
2A		802.11ax (SU)	5290	17.378	12.40	16.827	12.26	12.417	10.94	12.445	10.95	24.889	13.96
2C		802.11ax (SU)	5530 - 5690	121.619	20.85	125.314	20.98	97.949	19.91	95.940	19.82	194.089	22.88
3		802.11ax (SU)	5775	37.670	15.76	39.811	16.00	34.198	15.34	33.729	15.28	67.920	18.32

FCC EUT Overview (High Data Rate)

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO				CDD/SDM					
				Antenna 5T		Antenna 5B		Antenna 5T		Antenna 5B		Summed	
				Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1	20	802.11a/n	5180 - 5240	26.607	14.25	26.607	14.25	14.125	11.50	14.125	11.50	28.119	14.49
2A		802.11a/n	5260 - 5320	100.000	20.00	98.628	19.94	50.119	17.00	49.204	16.92	99.312	19.97
2C		802.11a/n	5500 - 5720	100.000	20.00	99.770	19.99	49.888	16.98	49.774	16.97	99.541	19.98
3		802.11a/n	5745 - 5825	125.893	21.00	125.603	20.99	125.893	21.00	125.893	21.00	249.459	23.97
1	40	802.11n	5190 - 5230	52.119	17.17	52.240	17.18	28.184	14.50	27.733	14.43	55.976	17.48
2A		802.11n	5270 - 5310	110.154	20.42	110.662	20.44	75.858	18.80	79.433	19.00	155.239	21.91
2C		802.11n	5510 - 5710	125.893	21.00	123.027	20.90	96.161	19.83	100.000	20.00	196.336	22.93
3		802.11n	5755 - 5795	124.738	20.96	125.893	21.00	96.605	19.85	100.000	20.00	196.789	22.94
1	80	802.11ac	5210	27.479	14.39	27.733	14.43	15.560	11.92	15.776	11.98	31.333	14.96
2A		802.11ac	5290	20.893	13.20	21.135	13.25	15.560	11.92	15.849	12.00	31.405	14.97
2C		802.11ac	5530 - 5690	124.738	20.96	123.880	20.93	96.161	19.83	98.175	19.92	194.536	22.89
3		802.11ac	5775	38.107	15.81	38.019	15.80	34.674	15.40	35.481	15.50	70.146	18.46
1	20	802.11ax (SU)	5180 - 5240	26.424	14.22	26.242	14.19	14.125	11.50	14.125	11.50	28.184	14.50
2A		802.11ax (SU)	5260 - 5320	100.000	20.00	96.828	19.86	49.545	16.95	48.753	16.88	98.401	19.93
2C		802.11ax (SU)	5500 - 5720	100.000	20.00	99.083	19.96	50.119	17.00	48.753	16.88	98.855	19.95
3		802.11ax (SU)	5745 - 5825	125.893	21.00	125.893	21.00	125.893	21.00	124.451	20.95	247.172	23.93
1	40	802.11ax (SU)	5190 - 5230	51.404	17.11	51.168	17.09	27.990	14.47	27.542	14.40	55.590	17.45
2A		802.11ax (SU)	5270 - 5310	100.000	20.00	100.000	20.00	70.795	18.50	67.608	18.30	138.357	21.41
2C		802.11ax (SU)	5510 - 5710	125.893	21.00	125.026	20.97	95.940	19.82	99.541	19.98	195.434	22.91
3		802.11ax (SU)	5755 - 5795	125.893	21.00	125.893	21.00	96.828	19.86	100.000	20.00	196.789	22.94
1	80	802.11ax (SU)	5210	17.258	12.37	17.701	12.48	12.531	10.98	12.359	10.92	24.889	13.96
2A		802.11ax (SU)	5290	17.378	12.40	16.827	12.26	12.417	10.94	12.445	10.95	24.889	13.96
2C		802.11ax (SU)	5530 - 5690	121.619	20.85	125.314	20.98	97.949	19.91	95.940	19.82	194.089	22.88
3		802.11ax (SU)	5775	37.670	15.76	39.811	16.00	34.198	15.34	33.729	15.28	67.920	18.32

ISED EUT Overview (High Data Rate)

FCC ID: BCGA2377 IC: 579C-A2377		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG		Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 5 of 348

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST located in Morgan Hill, CA 95037, U.S.A.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISSED Standards (RSS).
- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISSED.

FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 6 of 348

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2377** and **IC: 579C-A2377**. The test data contained in this report pertains only to the emissions due to the EUT's UNII 802.11a/n/ac/ax(SU) transmitter.

Test Device Serial No.: YF092RF4L7, GY9D56L6LW, DD72F029PT, YHY093KYQW

2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE1M, LE2M, HDR4, HDR8), WPT

This device supports BT Beamforming

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5180	52	5260	100	5500	149	5745
:	:	:	:	:	:	:	:
42	5210	56	5280	116	5580	157	5785
:	:	:	:	:	:	:	:
48	5240	64	5320	144	5720	165	5825

Table 2-1. 802.11a / 802.11n / 802.11ac / 802.11ax (20MHz) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755
:	:	:	:	:	:	:	:
46	5230	62	5310	110	5550	159	5795
				:	:		
				142	5710		

Table 2-2. 802.11n / 802.11ac / 802.11ax (40MHz BW) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5210	58	5290	106	5530	155	5775
				:	:		
				138	5690		

Table 2-3. 802.11ac / 802.11ax (80MHz BW) Frequency / Channel Operations

FCC ID: BCGA2377 IC: 579C-A2377		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device		Page 7 of 348

Notes:

- 5GHz NII operation is possible in 20MHz, and 40MHz, and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) KDB 789033 D02 v02r01 and ANSI C63.10-2013. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Measured Duty Cycles				
802.11 Mode/Band		Duty Cycle [%]		
		Antenna 5T	Antenna 5B	CDD/SDM
5GHz	a (Low Rate)	99.1	99.0	98.8
	a (Mid Rate)	96.3	96.5	94.1
	a (High Rate)	94.4	94.5	91.2
	n (HT20) (Low Rate)	98.9	98.9	98.0
	n (HT20) (Mid Rate)	96.0	95.8	92.8
	n (HT20) (High Rate)	93.2	93.2	89.1
	ax(SU) (HT20 Low Rate)	98.4	98.0	98.6
	ax(SU) (HT20 Mid Rate)	94.6	95.0	94.6
	ax(SU) (HT20 High Rate)	87.2	87.5	88.1
	n (HT40 Low Rate)	98.0	98.0	96.1
	n (HT40 Mid Rate)	93.2	92.9	88.9
	n (HT40 High Rate)	88.5	88.2	83.2
	ax(SU) (HT40 Low Rate)	97.1	98.4	97.1
	ax(SU) (HT40 Mid Rate)	92.0	91.8	91.5
	ax(SU) (HT40 High Rate)	83.6	83.3	83.3
	ac (HT80 Low Rate)	95.2	95.0	91.9
	ac (HT80 Mid Rate)	86.4	87.0	82.2
	ac (HT80 High Rate)	81.9	81.5	77.0
	ax(SU) (HT80 Low Rate)	94.2	94.8	94.6
	ax(SU) (HT80 Mid Rate)	86.9	86.9	87.0
	ax(SU) (HT80 High Rate)	80.0	80.2	80.6

Table 2-4. Measured Duty Cycles

- The device employs MIMO technology. Below are the possible configurations.

WiFi Configurations		SISO		CDD		SDM		STBC	
		Antenna 5T	Antenna 5B	Antenna 5T	Antenna 5B	Antenna 5T	Antenna 5B	Antenna 5T	Antenna 5B
5GHz	11a	✓	✓	✓	✓	✗	✗	✗	✗
	11n (20MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (20MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11n (40MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (40MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ac (80MHz)	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(SU) (80MHz)	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-5. WIFI Configurations

✓ = Support ; ✗ = NOT Support

SISO = Single Input Single Output

SDM = Spatial Diversity Multiplexing – MIMO function

CDD = Cyclic Delay Diversity - 2Tx Function

STBC = Space-Time Block Coding – 2Tx Function

FCC ID: BCGA2377 IC: 579C-A2377		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device		Page 8 of 348

Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)
6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2Mbps (n – 20MHz)
13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150Mbps (n – 40MHz BW)
29.3/32.5, 58.5/65, 87.8/97.5, 117/130, 175.5/195, 234/260, 263.3/292.5, 292.5/325, 351/390,
390/433.3Mbps (ac – 80MHz BW)
13/14.4, 26.28.9, 39/43.3, 52/57.8, 78/86.7, 104/115.6, 117/130, 130/144.4Mbps (MIMO n/ac – 20MHz)
156/173Mbps (MIMO ac – 20MHz)
27/30, 54/60, 81/90, 108/120, 162/180, 216/240, 243/270, 270/300Mbps (MIMO n/ac – 40MHz) 324/360,
360/400Mbps (MIMO ac – 40MHz)
58.5/65, 117/130, 175.5/195, 234/260, 351/390, 468/520, 526.5/585, 585/650, 702/780, 780/866.7Mbps
(MIMO ac – 80MHz)
8/8.6, 16/17.2, 24/25.8, 33/34.4, 49/51.6, 65/68.8, 73/77.4, 81/86.0, 98/103.2, 108/114.7, 122/129.0,
135/143.4Mbps (ax – 20MHz BW)
16/17.2, 33/34.4, 49/51.6, 65/68.8, 98/103.2, 130/137.6, 146/154.9, 163/172.1, 195/206.5, 217/229.4,
244/258.1, 271/286.8Mbps (ax – 40MHz BW)
34/36.0, 68/72.1, 102/108.1, 136/144.1, 204/216.2, 272/288.2, 306/324.4, 340/360.3, 408/432.4, 453/480.4,
510/540.4, 567/600.5Mbps (ax – 80MHz BW)
16/17.2, 33/34.4, 49/51.6, 65/68.8, 98/103.2, 130/137.6, 146/154.9, 163/172.1, 195/206.5, 217/229.4,
244/258.1, 271/286.8Mbps (MIMO ax – 20MHz BW)
32/34.4, 66/68.8, 98/103.2, 130/137.6, 196/206.5, 260/275.3, 292/309.7, 326/344.1, 390/412.9, 434/458.8,
488/516.2, 542/573.5Mbps (MIMO ax – 40MHz BW)
68/72, 136/144.1, 204/216.2, 272/288.2, 408/432.4, 544/576.4, 612/648.8, 680/720.6, 816/864.8, 906/960.8,
1020/1080.8, 1134/1201Mbps (MIMO ax – 80MHz BW)

2.3 Antenna Description

Following antenna gains provided by manufacturer were used for the testing.

Frequency [GHz]	Antenna Gain (dBi)	
	Antenna 5T	Antenna 5B
5.150 – 5.250	3.3	3.6
5.250 – 5.350	3.9	4.7
5.470 – 5.725	4.6	3.9
5725 – 5.850	4.8	4.6

Table 2-6. Highest Antenna Gain

FCC ID: BCGA2377 IC: 579C-A2377		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 9 of 348

2.4 Test Support Equipment

1	Apple MacBook Pro	Model: A2141	S/N: C02DV7VKMD6T
	w/AC/DC Adapter	Model: A2166	S/N: N/A
2	Apple USB-C Cable	Model: Chimp	S/N: 420A57
3	USB-C Cable	Model: A146	S/N: N/A
	w/ AC Adapter	Model: A2305	S/N: N/A
4	Apple Pencil	Model: N/A	S/N: GQXYGSXBJKM9
5	DC Power Supply	Model: KPS3010D	S/N: N/A

Table 2-7. Test Support Equipment List

2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 789033 D02 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

There are two vendors of the WiFi/Bluetooth radio modules, variant 1 and variant 2. Both radio modules have the same mechanical outline, same on-board antenna matching circuit, identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances. The worst case configuration was found between the two variants. The EUT was also investigated with and without charger.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz and above 18GHz were tested with the highest transmitting power and the worst case channel.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

For AC line conducted and radiated test below 1GHz, following configuration were investigated and EUT powered by AC/DC was the worst case.

- EUT powered by AC/DC adaptor via USB-C cable with wire charger
- EUT powered by host PC via USB-C cable with wire charger

802.11n HT20/40, 11ax(SU) HE20/40/80 and acVHT80 2TX CDD/SDM mode test data provided in this report covers 802.11n HT20/40, 11ax(SU) HE20/40/80 and 802.11acVHT80 2TX STBC mode

802.11ac VHT20 and VHT40 mode are different from 802.11n HT20 and HT40 only in control messages and have the same power settings.

FCC ID: BCGA2377 IC: 579C-A2377	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 10 of 348

The data rates have been classified into three different groups; low data rate, middle data rate, and high data rate. All three groups of data rate have been investigated and only the worst case data rate per group is reported. The worst case data rate for each group per mode are as follows:

- 802.11a:
 - Low Data Rate: 6Mbps
 - Mid Data Rate: 18Mbps
 - High Data Rate: 36Mbps
- 802.11n HT20/40:
 - Low Data Rate: MCS0/MCS8 (SISO/CDD)
 - Mid Data Rate: MCS3/MCS11 (SISO/CDD)
 - High Data Rate: MCS5/MCS13 (SISO/CDD)
- 802.11ac VHT80:
 - Low Data Rate: MCS0
 - Mid Data Rate: MCS3
 - High Data Rate: MCS5
- 802.11ax(SU) HE20/HE40/HE80:
 - Low Data Rate: MCS0
 - Mid Data Rate: MCS3
 - High Data Rate: MCS11

For 802.11ax-RU test results, see separate UNII 802.11ax (OFDMA) report, 1C2101020001-09.BCG.

2.6 Software and Firmware

The test was conducted with firmware version 18E20700y installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 11 of 348

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 v02r01 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 7m x 3.66m x 2.7m shielded enclosure. The shielded enclosure is manufactured by AP Americas. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is EPCOS 2X60A Power Line Filter (100dB Attenuation, 14kHz-18GHz) and the two EPCOs 2X48A filters (100dB Minimum Insertion Loss, 14kHz - 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.8. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 10.50.40.

FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 12 of 348

3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

Per KDB 414788, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was used while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: BCGA2377 IC: 579C-A2377	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 13 of 348

4.0 ANTENNA REQUIREMENTS

Excerpt 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 this section.”

- The antennas of the EUT are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 14 of 348

5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.23-2012. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below 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.

Contribution	Expanded Uncertainty ($\pm$ dB)
Conducted Bench Top Measurements	1.65
Line Conducted Disturbance	2.71
Radiated Disturbance (<30MHz)	4.06
Radiated Disturbance (30MHz - 1GHz)	4.30
Radiated Disturbance (1 - 18GHz)	4.78
Radiated Disturbance (>18GHz)	4.79

FCC ID: BCGA2377 IC: 579C-A2377	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 15 of 348

6.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent Technologies	N9030A	PXA Signal Analyzer (3Hz - 26.5 GHz)	7/24/2020	Annual	7/24/2021	MY49430244
Anritsu	ML2496A	Power Meter	4/9/2020	Annual	4/9/2021	2002005
Anritsu	MA2411B	Pulse Power Sensor	11/10/2020	Annual	11/10/2021	1726261
Anritsu	MA2411B	Pulse Power Sensor	12/9/2020	Annual	12/9/2021	1726262
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	8/11/2020	Annual	8/11/2021	T058701-01
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	12/3/2020	Annual	12/3/2021	102328
ETS-Lindgren	3142E	BiConiLog Antenna (30MHz - 6GHz)	9/15/2020	Annual	9/15/2021	208204
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	4/21/2020	Annual	4/21/2021	205956
Rohde & Schwarz	ESW26	EMI Test Receiver	6/1/2020	Annual	6/1/2021	101299
Rohde & Schwarz	ESW44	EMI Test Receiver	8/7/2020	Annual	8/7/2021	101668
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	4/3/2020	Annual	4/3/2021	100052
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna (400MHz-18GHz)	10/2/2020	Annual	10/2/2021	101063
Rohde & Schwarz	HFH2-Z2	Loop Antenna	3/12/2020	Annual	3/12/2021	100546
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	12/3/2020	Annual	12/3/2021	101648
Rohde & Schwarz	ENV216	Two-Line V-Network (LISN)	12/7/2020	Annual	12/7/2021	101364

Table 6-1. Test Equipment List

Note:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

FCC ID: BCGA2377 IC: 579C-A2377	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 16 of 348

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.
FCC ID: BCGA2377
IC: 579C-A2377
FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407	RSS-Gen [6.7]	26dB Bandwidth	N/A	CONDUCTED	N/A	Section 7.2
15.407(e)	RSS-Gen [6.7]	6dB Bandwidth	>500kHz(5725-5850MHz)		PASS	Section 7.3
2.1049	RSS-Gen [6.7]	Occupied Bandwidth	N/A		PASS	Section 7.2, Section 7.3
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.4
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.5
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS Test Report	RADIATED	PASS	See DFS Test Report (1C21010200 01-07)
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 7.6
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 7.6, 7.7
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 (RSS-Gen [8.8]) limits	LINE CONDUCTED	PASS	Section 7.8

Table 7-1. Summary of Test Results

Notes:

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "UNII Automation," Version 5.2.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.3.1.
- 6) Per RSS-247 Section 6.2.3, transmission on channels which overlap the 5600-5650 MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in UNII Bands 2A or 2C.

FCC ID: BCGA2377 IC: 579C-A2377		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 17 of 348

7.2 26dB & 99% Bandwidth Measurement – 802.11a/n/ac/ax-SU §2.1049; §15.407; RSS-Gen [6.7]

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

The 26dB bandwidth is used to determine the conducted power limits.

Test Procedure Used

ANSI C63.10-2013 – Section 12.4
KDB 789033 D02 v02r01 – Section C

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. All antenna configurations and data rates were investigated and only the worst case are reported.
2. The data rates have been classified into three different groups; Low Data Rate, middle rate, and High Data Rate. All three data rate groups of data rate have been investigated and only the worst case data rate per group is reported.
3. Low, mid, and high channels were tested and tabular data has been reported. Only mid channels bandwidths plots have been reported.

FCC ID: BCGA2377 IC: 579C-A2377	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 18 of 348

Antenna 5T 26dB & 99% Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	6.5/7.2 (MCS0)	17.93	21.71
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	17.80	21.10
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	17.77	21.02
	5180	36	ax-SU (20MHz)	8/8.6 (MCS0)	19.13	22.31
	5200	40	ax-SU (20MHz)	8/8.6 (MCS0)	19.05	21.19
	5240	48	ax-SU (20MHz)	8/8.6 (MCS0)	19.06	21.32
	5190	38	n (40MHz)	13.5/15 (MCS0)	36.56	41.98
	5230	46	n (40MHz)	13.5/15 (MCS0)	36.37	41.52
	5190	38	ax-SU (40MHz)	16/17.2 (MCS0)	38.02	42.17
	5230	46	ax-SU (40MHz)	16/17.2 (MCS0)	38.02	41.56
Band 2A	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	75.40	81.90
	5210	42	ax-SU (80MHz)	34/36 (MCS0)	77.30	82.74
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	17.78	20.93
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	17.74	21.07
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	17.88	21.74
	5260	52	ax-SU (20MHz)	8/8.6 (MCS0)	19.08	21.27
	5280	56	ax-SU (20MHz)	8/8.6 (MCS0)	19.04	21.32
	5320	64	ax-SU (20MHz)	8/8.6 (MCS0)	19.10	22.84
	5270	54	n (40MHz)	13.5/15 (MCS0)	36.43	41.35
	5310	62	n (40MHz)	13.5/15 (MCS0)	36.51	42.83
Band 2C	5270	54	ax-SU (40MHz)	16/17.2 (MCS0)	37.94	41.49
	5310	62	ax-SU (40MHz)	16/17.2 (MCS0)	38.01	42.26
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	75.35	81.78
	5290	58	ax-SU (80MHz)	34/36 (MCS0)	77.22	83.19
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	17.90	21.85
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	17.82	20.88
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	17.75	20.54
	5500	100	ax-SU (20MHz)	8/8.6 (MCS0)	19.07	23.12
	5580	116	ax-SU (20MHz)	8/8.6 (MCS0)	19.05	21.11
	5720	144	ax-SU (20MHz)	8/8.6 (MCS0)	19.07	21.23
	5510	102	n (40MHz)	13.5/15 (MCS0)	36.55	44.85
	5550	110	n (40MHz)	13.5/15 (MCS0)	36.36	41.16
	5710	142	n (40MHz)	13.5/15 (MCS0)	36.33	41.16
	5510	102	ax-SU (40MHz)	16/17.2 (MCS0)	38.01	42.84
	5550	110	ax-SU (40MHz)	16/17.2 (MCS0)	38.01	41.50
	5710	142	ax-SU (40MHz)	16/17.2 (MCS0)	38.00	41.77
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	75.52	81.99
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	75.42	81.41
	5530	106	ax-SU (80MHz)	34/36 (MCS0)	77.29	82.46
	5690	138	ax-SU (80MHz)	34/36 (MCS0)	77.24	81.64

Table 7-2. Conducted Bandwidth Measurements Antenna 5T (Low Data Rate)

FCC ID: BCGA2377 IC: 579C-A2377		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 19 of 348

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	26/28.9 (MCS3)	17.83	21.11
	5200	40	n (20MHz)	26/28.9 (MCS3)	17.71	20.63
	5240	48	n (20MHz)	26/28.9 (MCS3)	17.72	20.69
	5180	36	ax-SU (20MHz)	33/34.4 (MCS3)	19.09	22.32
	5200	40	ax-SU (20MHz)	33/34.4 (MCS3)	19.04	21.40
	5240	48	ax-SU (20MHz)	33/34.4 (MCS3)	19.02	21.08
	5190	38	n (40MHz)	54/60 (MCS3)	36.29	41.31
	5230	46	n (40MHz)	54/60 (MCS3)	36.35	41.31
	5190	38	ax-SU (40MHz)	65/68.8 (MCS3)	38.00	52.91
	5230	46	ax-SU (40MHz)	65/68.8 (MCS3)	37.94	41.44
	5210	42	ac (80MHz)	117/130 (MCS3)	75.44	81.62
	5210	42	ax-SU (80MHz)	136/144.1 (MCS3)	77.33	81.86
Band 2A	5260	52	n (20MHz)	26/28.9 (MCS3)	17.71	20.79
	5280	56	n (20MHz)	26/28.9 (MCS3)	17.72	20.88
	5320	64	n (20MHz)	26/28.9 (MCS3)	17.75	20.99
	5260	52	ax-SU (20MHz)	33/34.4 (MCS3)	19.05	21.22
	5280	56	ax-SU (20MHz)	33/34.4 (MCS3)	19.05	21.03
	5320	64	ax-SU (20MHz)	33/34.4 (MCS3)	19.11	22.05
	5270	54	n (40MHz)	54/60 (MCS3)	36.32	41.13
	5310	62	n (40MHz)	54/60 (MCS3)	36.37	41.16
	5270	54	ax-SU (40MHz)	65/68.8 (MCS3)	37.95	41.75
	5310	62	ax-SU (40MHz)	65/68.8 (MCS3)	38.15	52.93
	5290	58	ac (80MHz)	117/130 (MCS3)	75.46	81.53
	5290	58	ax-SU (80MHz)	136/144.1 (MCS3)	77.32	81.84
Band 2C	5500	100	n (20MHz)	26/28.9 (MCS3)	17.78	21.57
	5580	116	n (20MHz)	26/28.9 (MCS3)	17.72	20.81
	5720	144	n (20MHz)	26/28.9 (MCS3)	17.71	20.85
	5500	100	ax-SU (20MHz)	33/34.4 (MCS3)	19.08	22.06
	5580	116	ax-SU (20MHz)	33/34.4 (MCS3)	19.04	21.22
	5720	144	ax-SU (20MHz)	33/34.4 (MCS3)	19.05	21.38
	5510	102	n (40MHz)	54/60 (MCS3)	36.32	40.83
	5550	110	n (40MHz)	54/60 (MCS3)	36.23	40.96
	5710	142	n (40MHz)	54/60 (MCS3)	36.27	40.52
	5510	102	ax-SU (40MHz)	65/68.8 (MCS3)	37.97	52.88
	5550	110	ax-SU (40MHz)	65/68.8 (MCS3)	37.97	41.46
	5710	142	ax-SU (40MHz)	65/68.8 (MCS3)	37.93	41.41
	5530	106	ac (80MHz)	117/130 (MCS3)	75.42	80.79
	5690	138	ac (80MHz)	117/130 (MCS3)	75.47	81.60
	5530	106	ax-SU (80MHz)	136/144.1 (MCS3)	77.22	81.93
	5690	138	ax-SU (80MHz)	136/144.1 (MCS3)	77.19	81.90

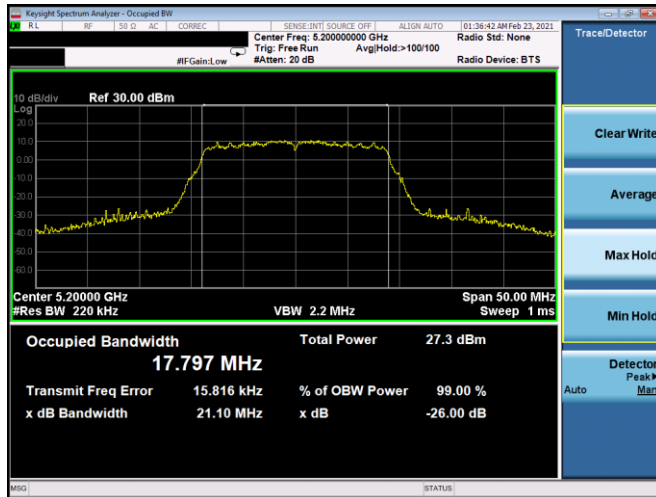
Table 7-3. Conducted Bandwidth Measurements Antenna 5T (Mid Data Rate)

FCC ID: BCGA2377 IC: 579C-A2377	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 20 of 348

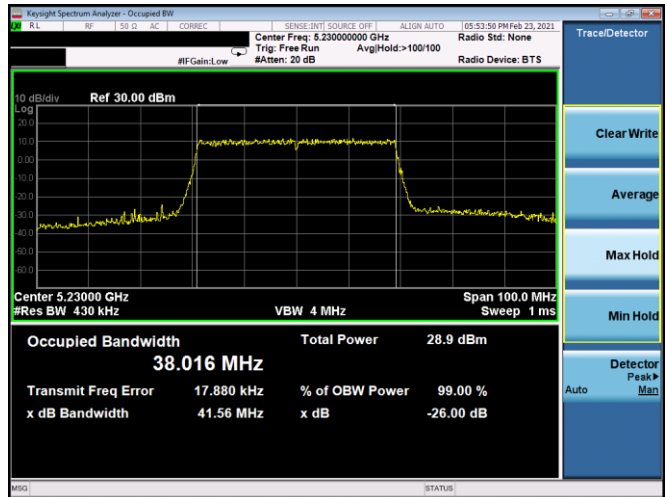
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	n (20MHz)	52/57.8 (MCS5)	17.79	20.95
	5200	40	n (20MHz)	52/57.8 (MCS5)	17.90	22.49
	5240	48	n (20MHz)	52/57.8 (MCS5)	17.83	20.65
	5180	36	ax-SU (20MHz)	135/143.4 (MCS11)	19.04	21.02
	5200	40	ax-SU (20MHz)	135/143.4 (MCS11)	19.12	24.82
	5240	48	ax-SU (20MHz)	135/143.4 (MCS11)	19.13	24.79
	5190	38	n (40MHz)	108/120 (MCS5)	36.45	41.24
	5230	46	n (40MHz)	108/120 (MCS5)	36.65	43.49
	5190	38	ax-SU (40MHz)	271/286.8 (MCS11)	37.86	41.21
	5230	46	ax-SU (40MHz)	271/286.8 (MCS11)	37.94	44.11
	5210	42	ac (80MHz)	234/260 (MCS5)	75.78	81.62
	5210	42	ax-SU (80MHz)	567/600.5 (MCS11)	77.14	81.61
Band 2A	5260	52	n (20MHz)	52/57.8 (MCS5)	18.45	24.22
	5280	56	n (20MHz)	52/57.8 (MCS5)	17.72	20.88
	5320	64	n (20MHz)	52/57.8 (MCS5)	17.76	20.79
	5260	52	ax-SU (20MHz)	135/143.4 (MCS11)	19.04	21.25
	5280	56	ax-SU (20MHz)	135/143.4 (MCS11)	19.06	21.19
	5320	64	ax-SU (20MHz)	135/143.4 (MCS11)	19.05	21.18
	5270	54	n (40MHz)	108/120 (MCS5)	36.56	42.95
	5310	62	n (40MHz)	108/120 (MCS5)	36.51	40.96
	5270	54	ax-SU (40MHz)	271/286.8 (MCS11)	38.03	44.52
	5310	62	ax-SU (40MHz)	271/286.8 (MCS11)	37.88	41.27
	5290	58	ac (80MHz)	234/260 (MCS5)	75.79	81.57
	5290	58	ax-SU (80MHz)	567/600.5 (MCS11)	77.11	81.67
Band 2C	5500	100	n (20MHz)	52/57.8 (MCS5)	17.79	21.01
	5580	116	n (20MHz)	52/57.8 (MCS5)	17.79	21.05
	5720	144	n (20MHz)	52/57.8 (MCS5)	17.78	21.02
	5500	100	ax-SU (20MHz)	135/143.4 (MCS11)	19.00	21.09
	5580	116	ax-SU (20MHz)	135/143.4 (MCS11)	19.06	20.96
	5720	144	ax-SU (20MHz)	135/143.4 (MCS11)	19.11	22.49
	5510	102	n (40MHz)	108/120 (MCS5)	36.48	40.93
	5550	110	n (40MHz)	108/120 (MCS5)	36.49	41.48
	5710	142	n (40MHz)	108/120 (MCS5)	36.64	43.02
	5510	102	ax-SU (40MHz)	271/286.8 (MCS11)	37.85	41.06
	5550	110	ax-SU (40MHz)	271/286.8 (MCS11)	37.91	41.14
	5710	142	ax-SU (40MHz)	271/286.8 (MCS11)	38.06	60.51
	5530	106	ac (80MHz)	234/260 (MCS5)	75.81	81.80
	5690	138	ac (80MHz)	234/260 (MCS5)	76.12	99.04
	5530	106	ax-SU (80MHz)	567/600.5 (MCS11)	77.10	81.36
	5690	138	ax-SU (80MHz)	567/600.5 (MCS11)	77.18	81.76

Table 7-4. Conducted Bandwidth Measurements Antenna 5T (High Data Rate)

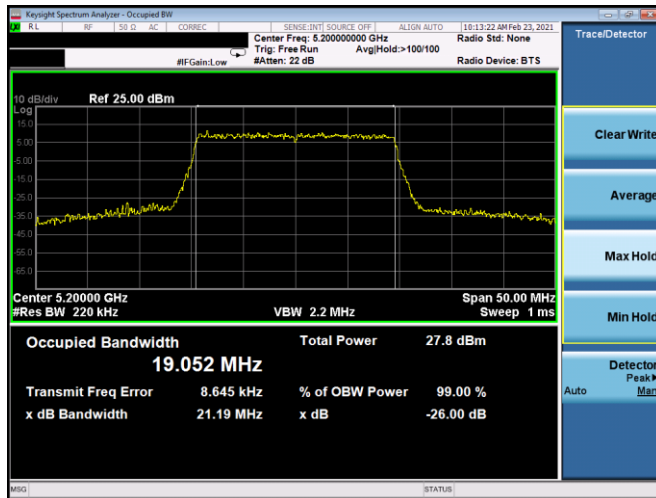
FCC ID: BCGA2377 IC: 579C-A2377		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device		Page 21 of 348



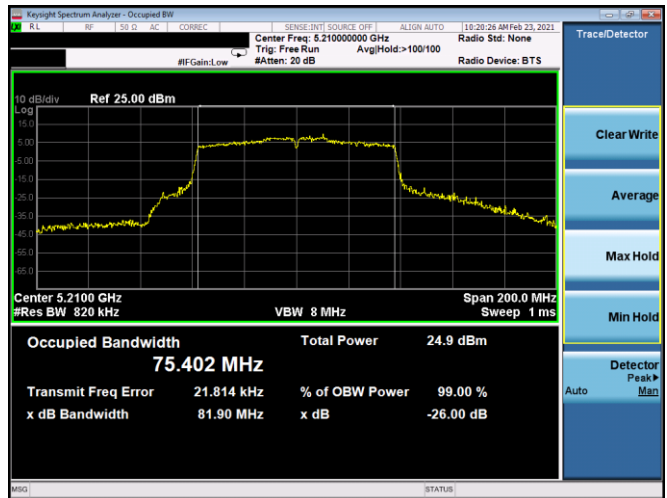
Plot 7-1. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 40, MCS0)



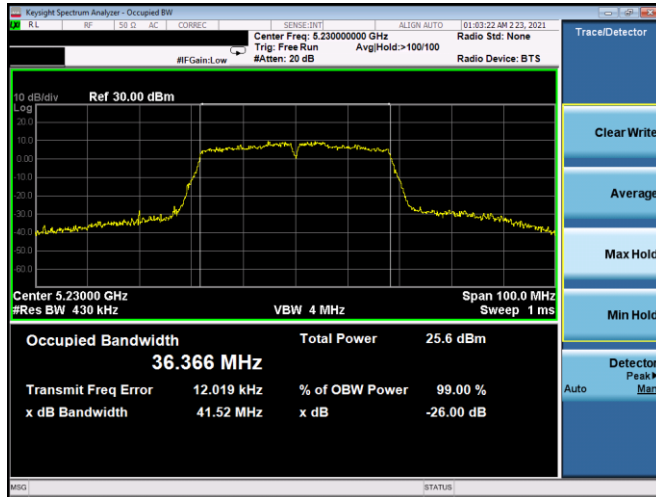
Plot 7-4. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 46, MCS0)



Plot 7-2. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 40, MCS0)



Plot 7-5. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 42, MCS0)

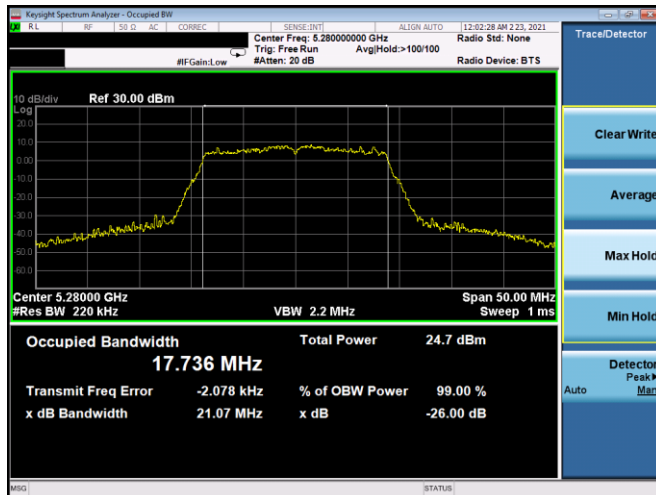


Plot 7-3. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 46, MCS0)

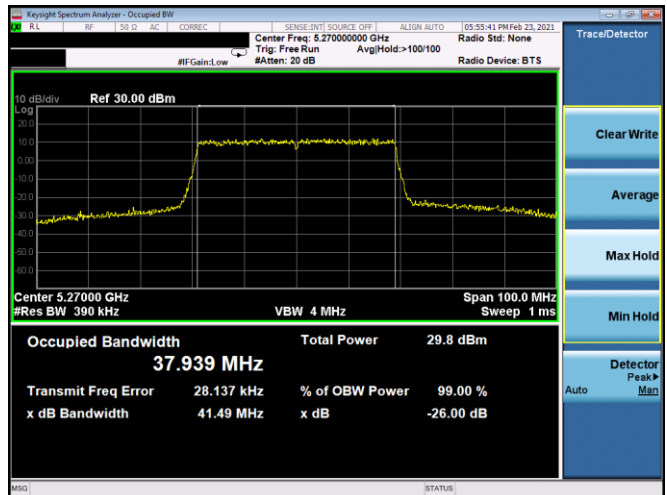


Plot 7-6. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 42, MCS0)

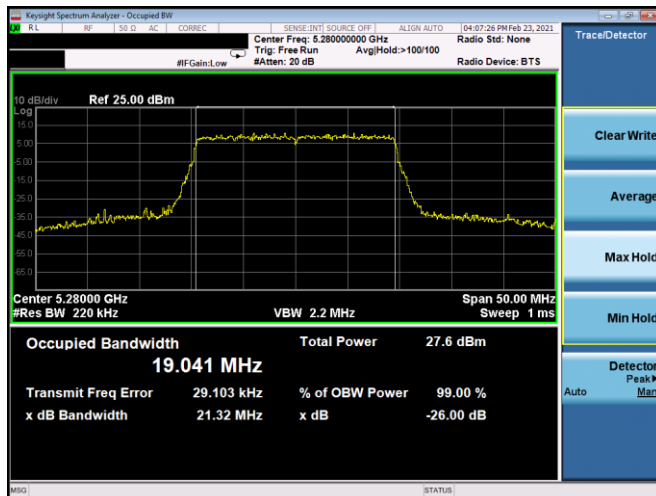
FCC ID: BCGA2377 IC: 579C-A2377	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 22 of 348



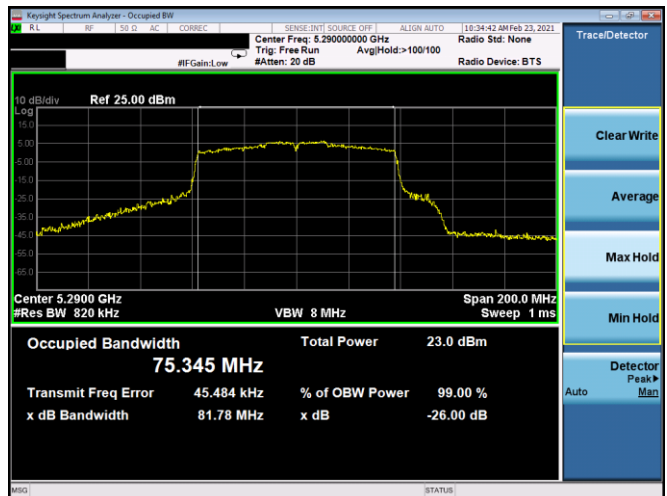
Plot 7-7. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 56, MCS0)



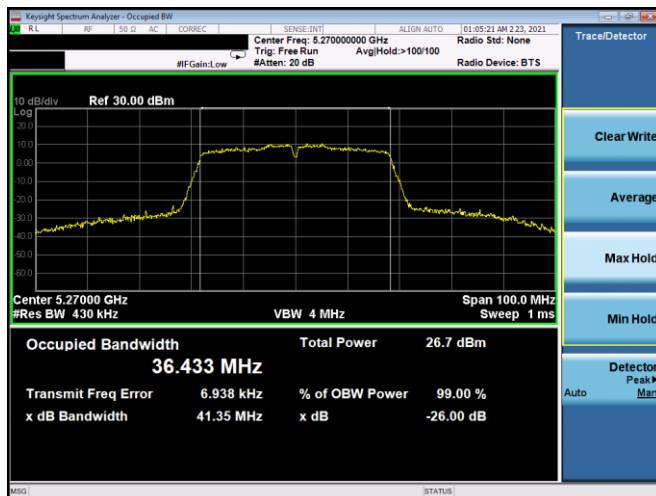
Plot 7-10. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 54, MCS0)



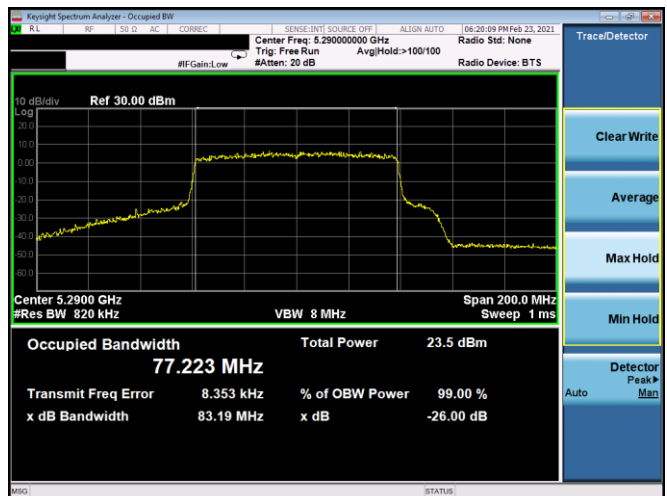
Plot 7-8. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 56, MCS0)



Plot 7-11. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 58, MCS0)

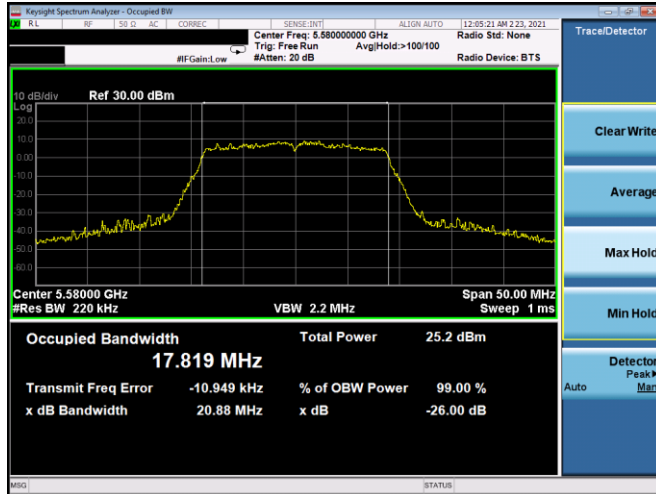


Plot 7-9. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 54, MCS0)

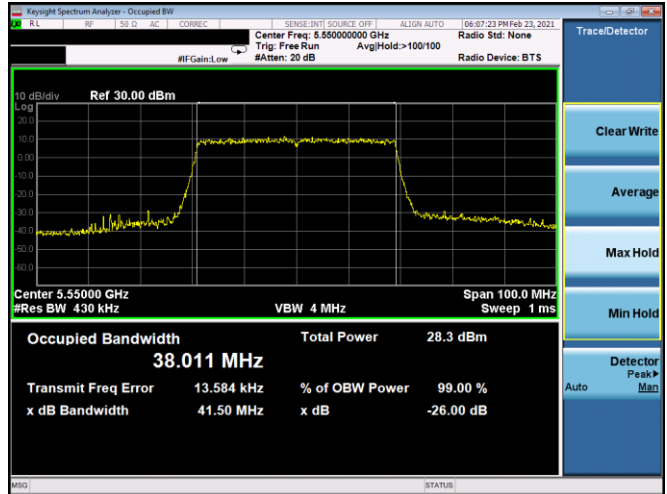


Plot 7-12. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 58, MCS0)

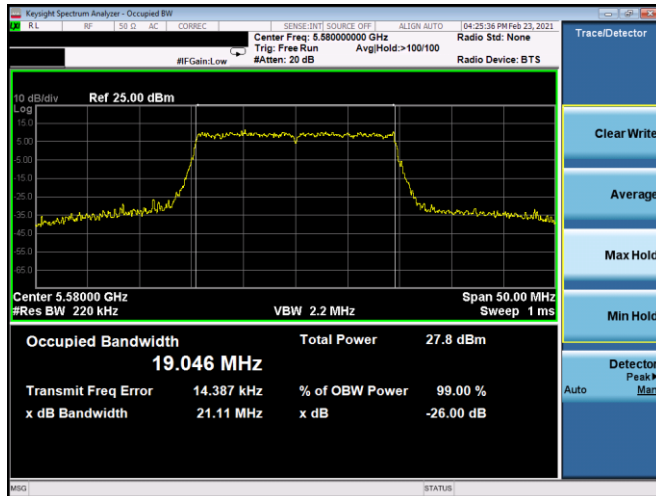
FCC ID: BCGA2377 IC: 579C-A2377	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 23 of 348



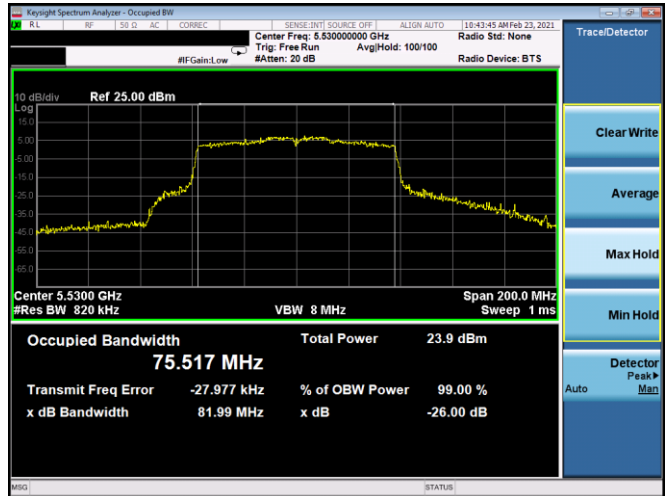
Plot 7-13. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 116, MCS0)



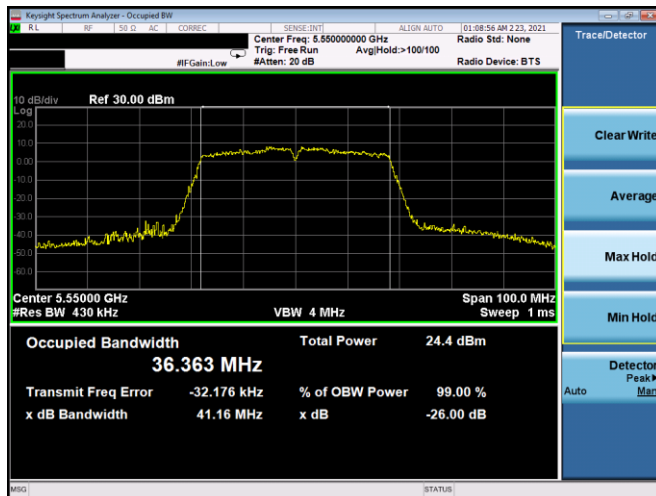
Plot 7-16. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 110, MCS0)



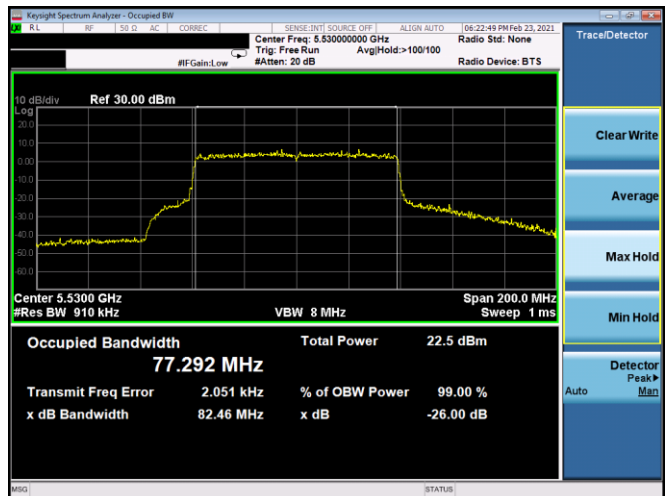
Plot 7-14. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 116, MCS0)



Plot 7-17. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 106, MCS0)

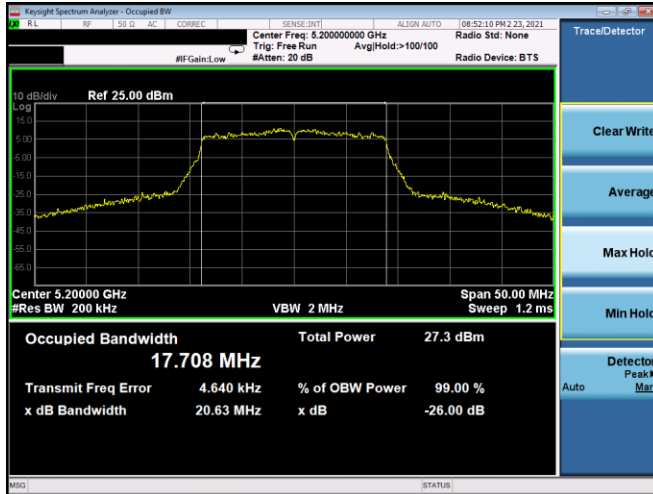


Plot 7-15. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 110, MCS0)

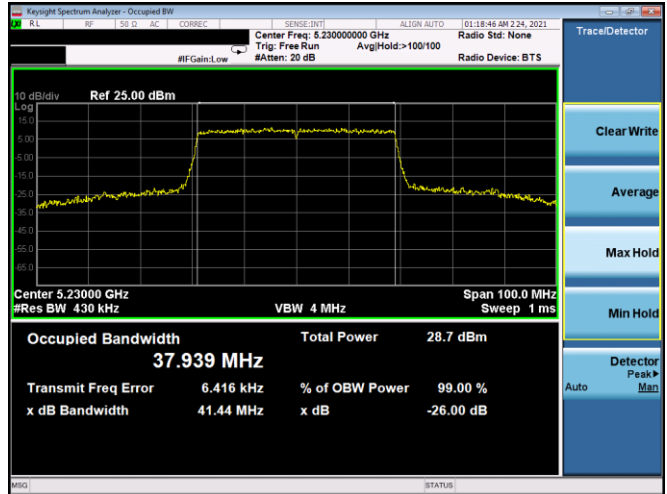


Plot 7-18. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 106, MCS0)

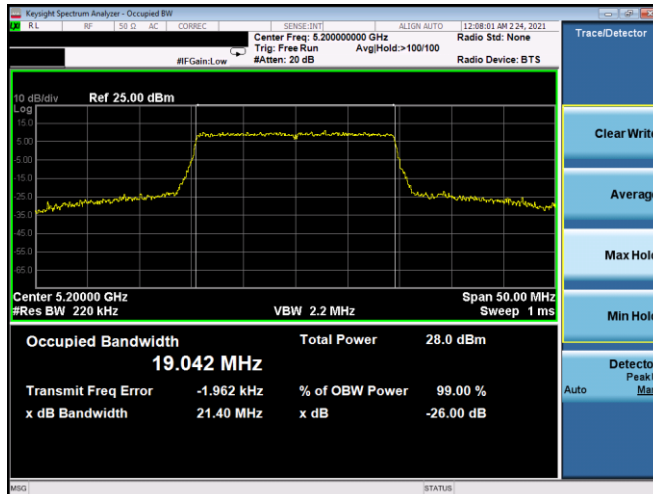
FCC ID: BCGA2377 IC: 579C-A2377		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021		Page 24 of 348



Plot 7-19. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 40, MCS3)



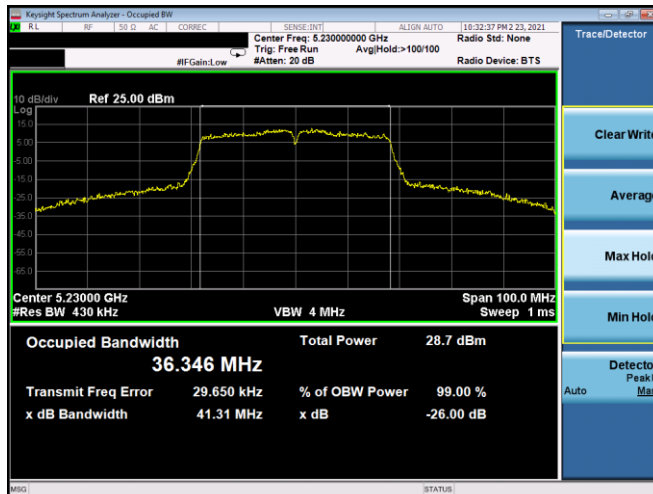
Plot 7-22. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 46, MCS3)



Plot 7-20. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 40, MCS3)



Plot 7-23. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 42, MCS3)

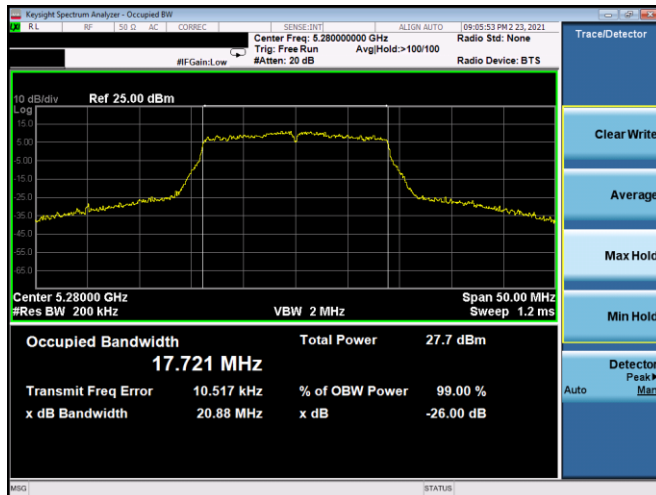


Plot 7-21. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 46, MCS3)

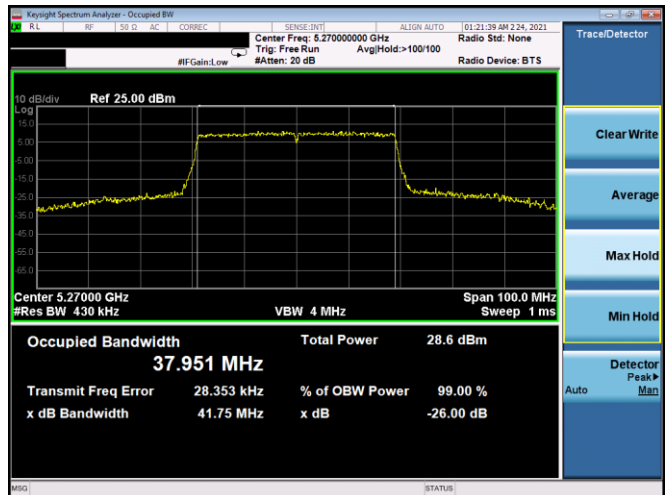


Plot 7-24. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 42, MCS3)

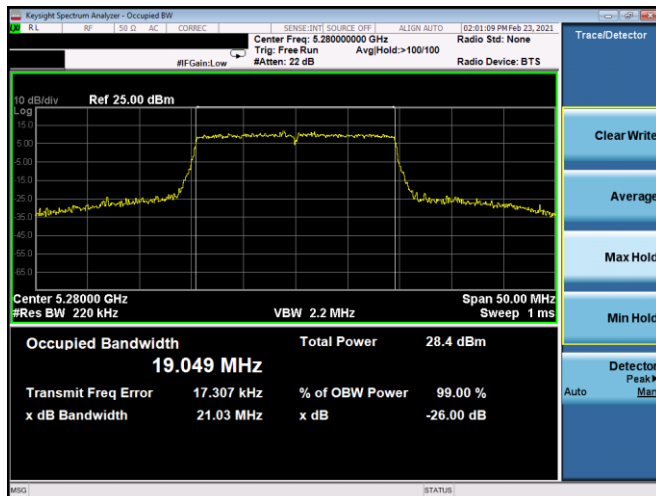
FCC ID: BCGA2377 IC: 579C-A2377	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 25 of 348



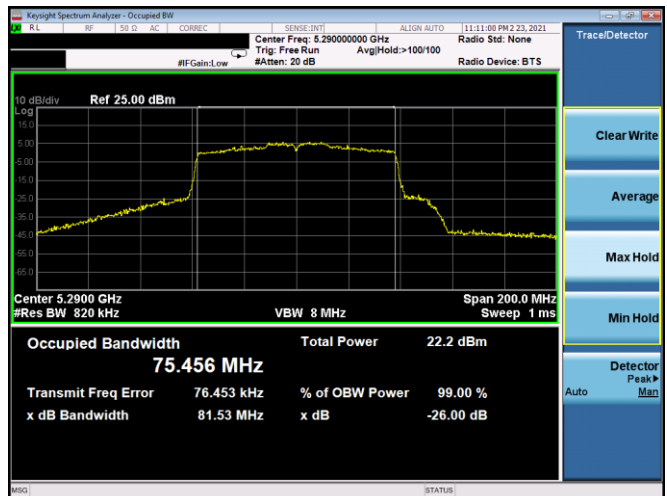
Plot 7-25. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 56, MCS3)



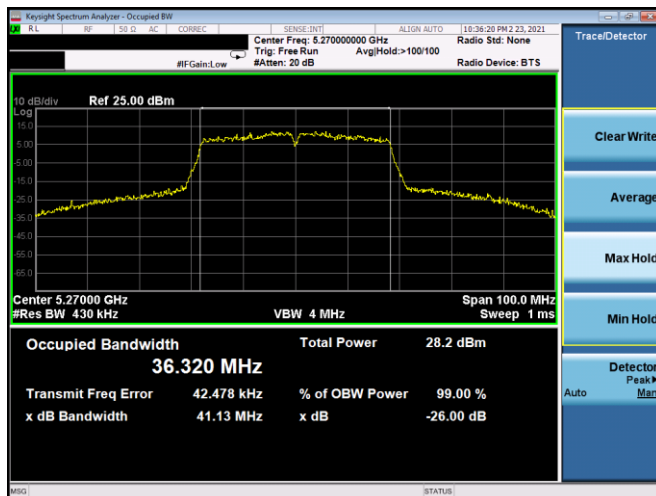
Plot 7-28. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 54, MCS3)



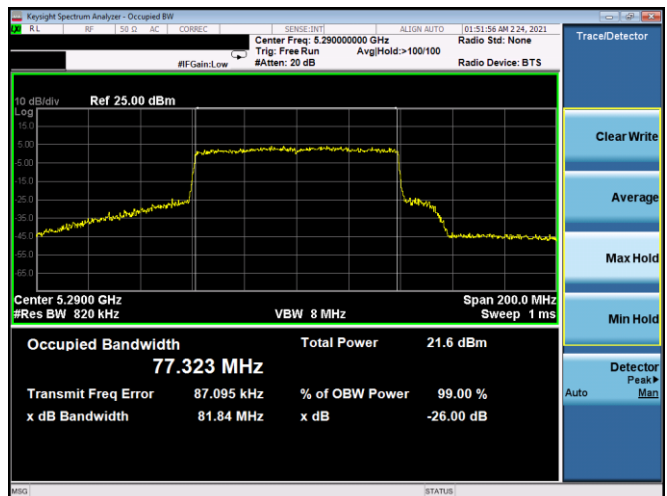
Plot 7-26. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 56, MCS3)



Plot 7-29. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 58, MCS3)

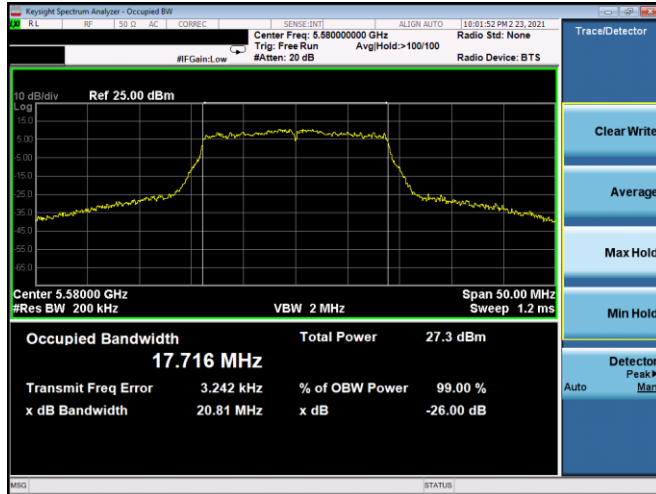


Plot 7-27. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 54, MCS3)

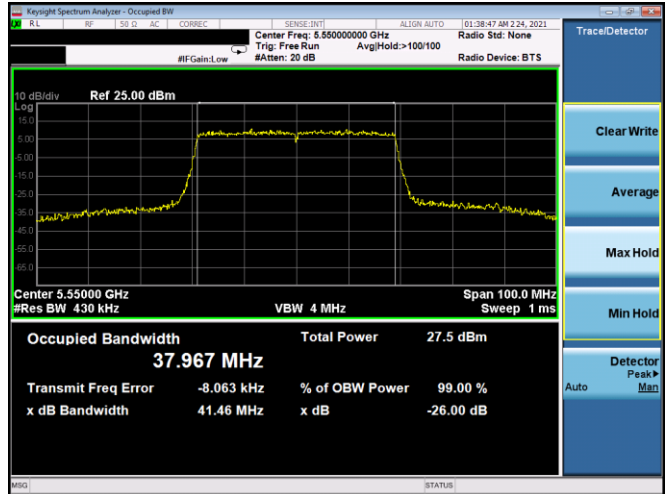


Plot 7-30. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 58, MCS3)

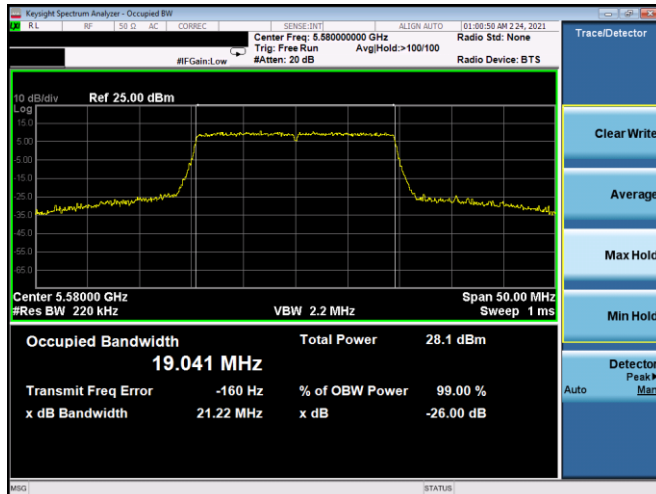
FCC ID: BCGA2377 IC: 579C-A2377			MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device		Page 26 of 348



Plot 7-31. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 116, MCS3)



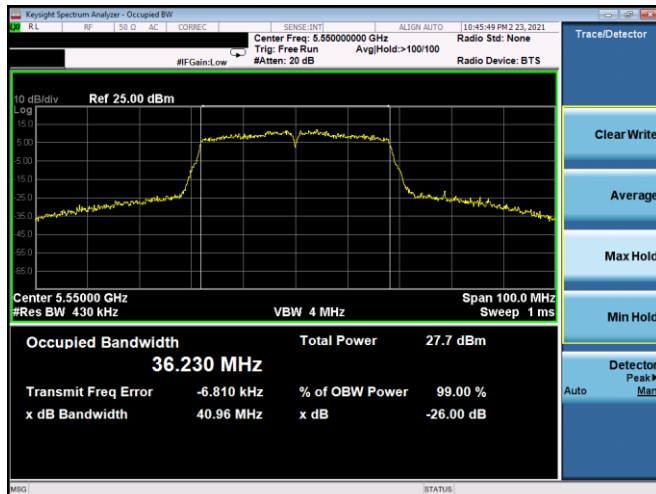
Plot 7-34. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 110, MCS3)



Plot 7-32. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 116, MCS3)



Plot 7-35. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 106, MCS3)

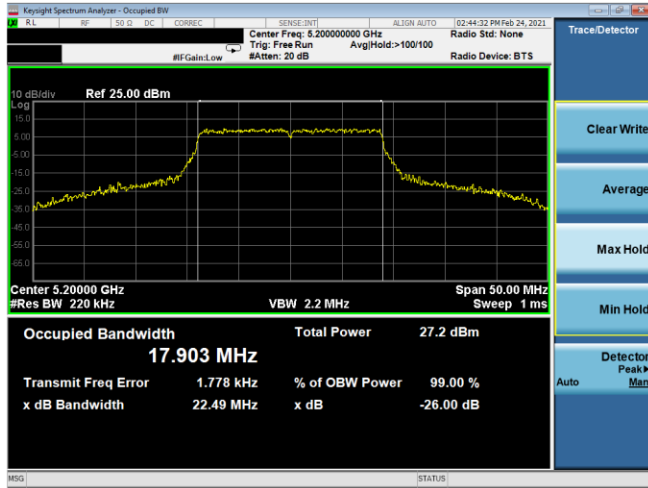


Plot 7-33. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 110, MCS3)

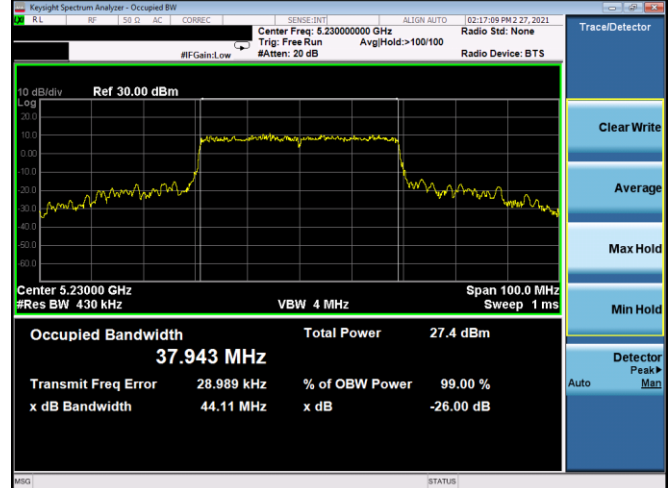


Plot 7-36. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 106, MCS3)

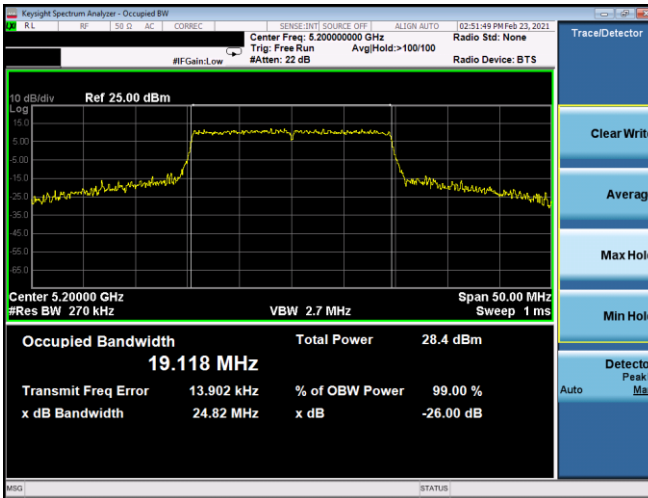
FCC ID: BCGA2377 IC: 579C-A2377	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 27 of 348



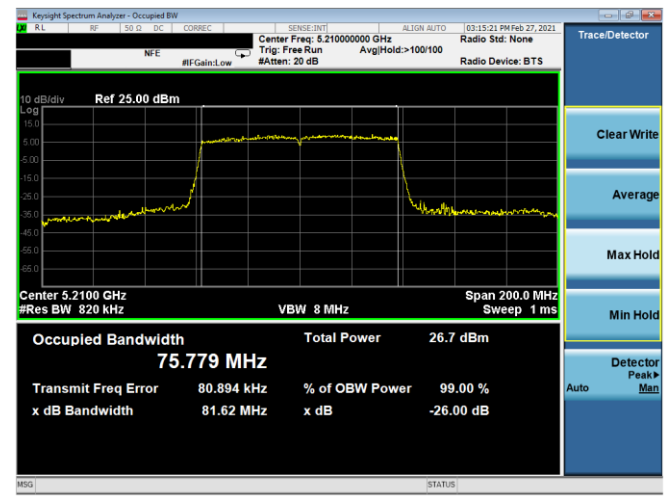
Plot 7-37. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 40, MCS5)



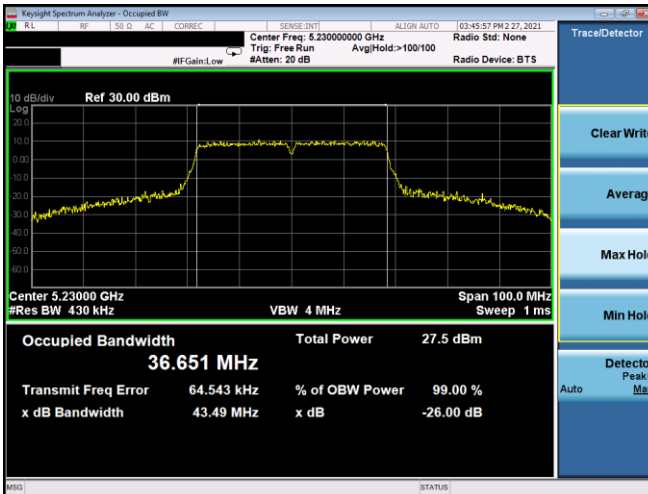
Plot 7-40. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 46, MCS11)



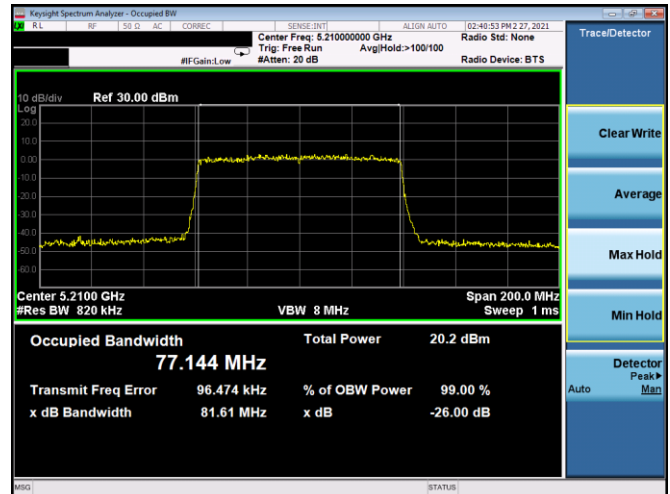
Plot 7-38. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 40, MCS11)



Plot 7-41. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 42, MCS5)

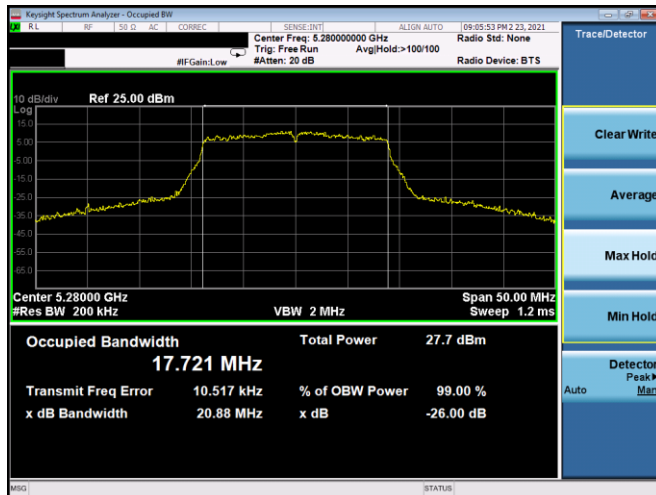


Plot 7-39. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 46, MCS5)

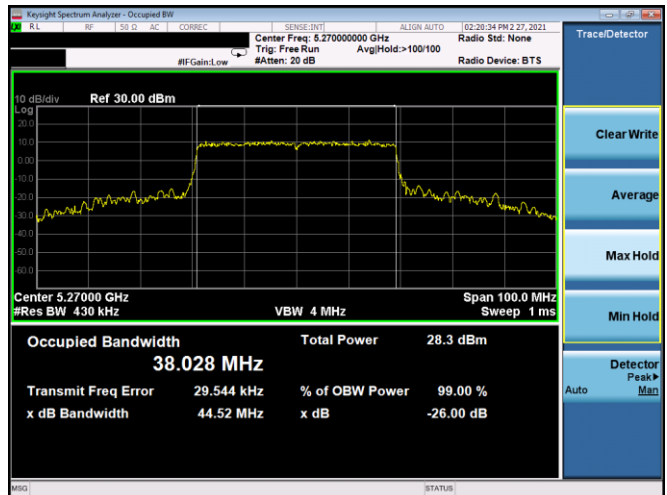


Plot 7-42. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 42, MCS11)

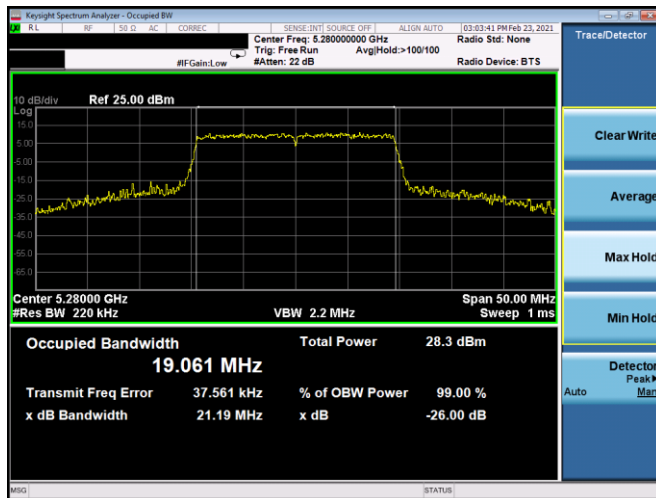
FCC ID: BCGA2377 IC: 579C-A2377	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device	Page 28 of 348



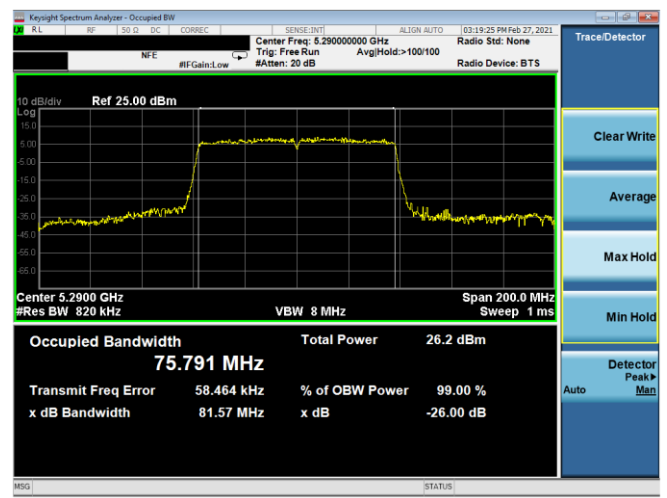
Plot 7-43. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11n – Ch. 56, MCS5)



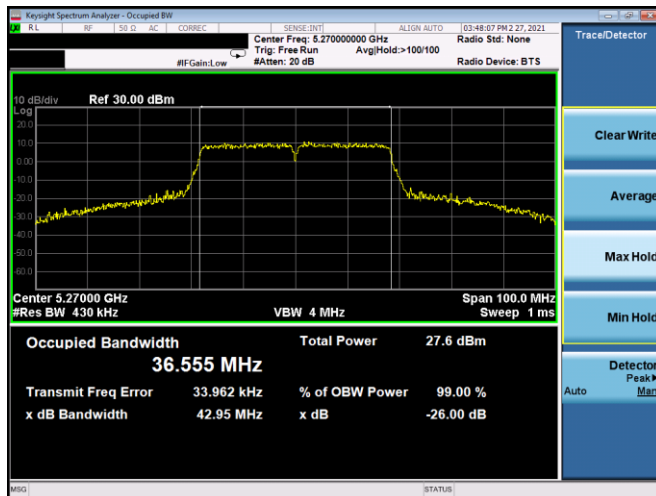
Plot 7-46. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11ax(SU) – Ch. 54, MCS11)



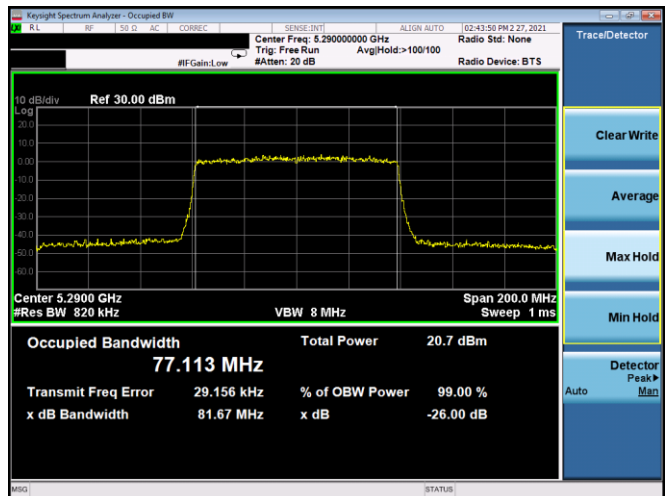
Plot 7-44. 26dB BW & 99% OBW Antenna 5T (20MHz BW 802.11ax(SU) – Ch. 56, MCS11)



Plot 7-47. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ac – Ch. 58, MCS5)



Plot 7-45. 26dB BW & 99% OBW Antenna 5T (40MHz BW 802.11n – Ch. 54, MCS5)



Plot 7-48. 26dB BW & 99% OBW Antenna 5T (80MHz BW 802.11ax(SU) – Ch. 58, MCS11)

FCC ID: BCGA2377 IC: 579C-A2377			MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C2101020001-08-R1.BCG	Test Dates: 02/15/2021 - 3/22/2021	EUT Type: Tablet Device		Page 29 of 348