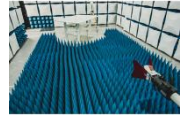




PCTEST
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MEASUREMENT REPORT LTE

Applicant Name:

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

Date of Testing:

12/10/2019 - 02/18/2020

Test Site/Location:

PCTEST. Morgan Hill, CA, USA

Test Report Serial No.:

1C1912170052-03.BCG

FCC ID:

BCGA2230

APPLICANT:

Apple Inc.

Application Type:

Certification

Model:

A2230, A2231

EUT Type:

Tablet Device

FCC Classification:

PCS Licensed Transmitter (PCB)

FCC Rule Part(s):

22, 24, & 27

Test Procedure(s):

ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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 §2.947. Test results reported herein relate only to the item(s) tested.

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



TESTING CERT#2041.02

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 1 of 398

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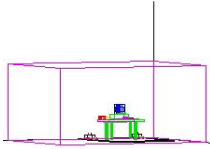
V 9.5 12/16/2019

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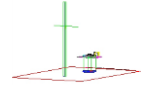
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MEASUREMENT REPORT

FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)		
LTE Band 12	27	699.7 - 715.3	0.172	22.35	0.282	24.50	1M11G7W	QPSK
LTE Band 12	27	699.7 - 715.3	0.143	21.54	0.234	23.69	1M11D7W	16QAM
LTE Band 12	27	699.7 - 715.3	0.115	20.61	0.189	22.76	1M10D7W	64QAM
LTE Band 12	27	700.5 - 714.5	0.172	22.35	0.282	24.50	2M73G7W	QPSK
LTE Band 12	27	700.5 - 714.5	0.144	21.59	0.237	23.74	2M73D7W	16QAM
LTE Band 12	27	700.5 - 714.5	0.115	20.60	0.188	22.75	2M73D7W	64QAM
LTE Band 12	27	701.5 - 713.5	0.172	22.35	0.282	24.50	4M55G7W	QPSK
LTE Band 12	27	701.5 - 713.5	0.146	21.63	0.239	23.78	4M55D7W	16QAM
LTE Band 12	27	701.5 - 713.5	0.111	20.47	0.183	22.62	4M54D7W	64QAM
LTE Band 12	27	704 - 711	0.172	22.35	0.282	24.50	9M07G7W	QPSK
LTE Band 12	27	704 - 711	0.146	21.63	0.239	23.78	9M08D7W	16QAM
LTE Band 12	27	704 - 711	0.119	20.76	0.195	22.91	9M05D7W	64QAM
LTE Band 17	27	706.5 - 713.5	0.172	22.35	0.282	24.50	4M55G7W	QPSK
LTE Band 17	27	706.5 - 713.5	0.142	21.51	0.232	23.66	4M55D7W	16QAM
LTE Band 17	27	706.5 - 713.5	0.116	20.63	0.190	22.78	4M54D7W	64QAM
LTE Band 17	27	709 - 711	0.172	22.35	0.282	24.50	9M07G7W	QPSK
LTE Band 17	27	709 - 711	0.145	21.61	0.238	23.76	9M08D7W	16QAM
LTE Band 17	27	709 - 711	0.116	20.65	0.191	22.80	9M05D7W	64QAM
LTE Band 13	27	779.5 - 784.5	0.172	22.35	0.282	24.50	4M54G7W	QPSK
LTE Band 13	27	779.5 - 784.5	0.143	21.56	0.235	23.71	4M53D7W	16QAM
LTE Band 13	27	779.5 - 784.5	0.113	20.52	0.185	22.67	4M55D7W	64QAM
LTE Band 13	27	782	0.172	22.35	0.282	24.50	9M06G7W	QPSK
LTE Band 13	27	782	0.143	21.54	0.234	23.69	9M04D7W	16QAM
LTE Band 13	27	782	0.117	20.69	0.192	22.84	9M07D7W	64QAM
LTE Band 5	22H	824.7 - 848.3	0.193	22.85	0.316	25.00	1M11G7W	QPSK
LTE Band 5	22H	824.7 - 848.3	0.161	22.08	0.265	24.23	1M11D7W	16QAM
LTE Band 5	22H	824.7 - 848.3	0.125	20.97	0.205	23.12	1M11D7W	64QAM
LTE Band 5	22H	825.5 - 847.5	0.193	22.85	0.316	25.00	2M73G7W	QPSK
LTE Band 5	22H	825.5 - 847.5	0.160	22.05	0.263	24.20	2M73D7W	16QAM
LTE Band 5	22H	825.5 - 847.5	0.132	21.19	0.216	23.34	2M74D7W	64QAM
LTE Band 5	22H	826.5 - 846.5	0.193	22.85	0.316	25.00	4M55G7W	QPSK
LTE Band 5	22H	826.5 - 846.5	0.155	21.90	0.254	24.05	4M54D7W	16QAM
LTE Band 5	22H	826.5 - 846.5	0.125	20.97	0.205	23.12	4M55D7W	64QAM
LTE Band 5	22H	829 - 844	0.193	22.85	0.316	25.00	9M07G7W	QPSK
LTE Band 5	22H	829 - 844	0.160	22.05	0.263	24.20	9M10D7W	16QAM
LTE Band 5	22H	829 - 844	0.132	21.19	0.216	23.34	9M06D7W	64QAM
LTE Band 26	22H	824.7 - 848.3	0.193	22.85	0.316	25.00	1M11G7W	QPSK
LTE Band 26	22H	824.7 - 848.3	0.161	22.06	0.264	24.21	1M11D7W	16QAM
LTE Band 26	22H	824.7 - 848.3	0.126	21.01	0.207	23.16	1M11D7W	64QAM
LTE Band 26	22H	825.5 - 847.5	0.193	22.85	0.316	25.00	2M73G7W	QPSK
LTE Band 26	22H	825.5 - 847.5	0.157	21.95	0.257	24.10	2M73D7W	16QAM
LTE Band 26	22H	825.5 - 847.5	0.125	20.98	0.206	23.13	2M74D7W	64QAM
LTE Band 26	22H	826.5 - 846.5	0.193	22.85	0.316	25.00	4M55G7W	QPSK
LTE Band 26	22H	826.5 - 846.5	0.161	22.08	0.265	24.23	4M54D7W	16QAM
LTE Band 26	22H	826.5 - 846.5	0.126	21.00	0.207	23.15	4M55D7W	64QAM
LTE Band 26	22H	829 - 844	0.193	22.85	0.316	25.00	9M07G7W	QPSK
LTE Band 26	22H	829 - 844	0.156	21.94	0.256	24.09	9M10D7W	16QAM
LTE Band 26	22H	829 - 844	0.125	20.96	0.205	23.11	9M06D7W	64QAM

EUT Overview (Low Bands)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device		Page 3 of 398

Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
LTE Band 4	27	1710.7 - 1754.3	0.224	23.50	1M11G7W	QPSK
LTE Band 4	27	1710.7 - 1754.3	0.187	22.71	1M11D7W	16QAM
LTE Band 4	27	1710.7 - 1754.3	0.150	21.75	1M11D7W	64QAM
LTE Band 4	27	1711.5 - 1753.5	0.224	23.50	2M73G7W	QPSK
LTE Band 4	27	1711.5 - 1753.5	0.185	22.68	2M74D7W	16QAM
LTE Band 4	27	1711.5 - 1753.5	0.151	21.79	2M73D7W	64QAM
LTE Band 4	27	1712.5 - 1752.5	0.224	23.50	4M56G7W	QPSK
LTE Band 4	27	1712.5 - 1752.5	0.192	22.84	4M54D7W	16QAM
LTE Band 4	27	1712.5 - 1752.5	0.154	21.87	4M54D7W	64QAM
LTE Band 4	27	1715 - 1750	0.224	23.50	9M08G7W	QPSK
LTE Band 4	27	1715 - 1750	0.193	22.85	9M08D7W	16QAM
LTE Band 4	27	1715 - 1750	0.150	21.77	9M04D7W	64QAM
LTE Band 4	27	1717.5 - 1747.5	0.224	23.50	13M6G7W	QPSK
LTE Band 4	27	1717.5 - 1747.5	0.185	22.66	13M6D7W	16QAM
LTE Band 4	27	1717.5 - 1747.5	0.150	21.75	13M6D7W	64QAM
LTE Band 4	27	1720 - 1745	0.224	23.50	18M2G7W	QPSK
LTE Band 4	27	1720 - 1745	0.185	22.67	18M1D7W	16QAM
LTE Band 4	27	1720 - 1745	0.147	21.68	18M1D7W	64QAM
LTE Band 66	27	1710.7 - 1779.3	0.224	23.50	1M11G7W	QPSK
LTE Band 66	27	1710.7 - 1779.3	0.186	22.69	1M11D7W	16QAM
LTE Band 66	27	1710.7 - 1779.3	0.147	21.67	1M11D7W	64QAM
LTE Band 66	27	1711.5 - 1778.5	0.224	23.50	2M73G7W	QPSK
LTE Band 66	27	1711.5 - 1778.5	0.186	22.70	2M74D7W	16QAM
LTE Band 66	27	1711.5 - 1778.5	0.149	21.72	2M73D7W	64QAM
LTE Band 66	27	1712.5 - 1777.5	0.224	23.50	4M56G7W	QPSK
LTE Band 66	27	1712.5 - 1777.5	0.189	22.76	4M54D7W	16QAM
LTE Band 66	27	1712.5 - 1777.5	0.148	21.70	4M54D7W	64QAM
LTE Band 66	27	1715 - 1775	0.224	23.50	9M08G7W	QPSK
LTE Band 66	27	1715 - 1775	0.190	22.78	9M08D7W	16QAM
LTE Band 66	27	1715 - 1775	0.149	21.72	9M04D7W	64QAM
LTE Band 66	27	1717.5 - 1772.5	0.224	23.50	13M6G7W	QPSK
LTE Band 66	27	1717.5 - 1772.5	0.182	22.59	13M6D7W	16QAM
LTE Band 66	27	1717.5 - 1772.5	0.146	21.65	13M6D7W	64QAM
LTE Band 66	27	1720 - 1770	0.224	23.50	18M2G7W	QPSK
LTE Band 66	27	1720 - 1770	0.185	22.66	18M1D7W	16QAM
LTE Band 66	27	1720 - 1770	0.149	21.74	18M1D7W	64QAM
LTE Band 2	24E	1850.7 - 1909.3	0.224	23.50	1M11G7W	QPSK
LTE Band 2	24E	1850.7 - 1909.3	0.182	22.60	1M11D7W	16QAM
LTE Band 2	24E	1850.7 - 1909.3	0.146	21.63	1M11D7W	64QAM
LTE Band 2	24E	1851.5 - 1908.5	0.224	23.50	2M72G7W	QPSK
LTE Band 2	24E	1851.5 - 1908.5	0.197	22.95	2M72D7W	16QAM
LTE Band 2	24E	1851.5 - 1908.5	0.152	21.82	2M72D7W	64QAM
LTE Band 2	24E	1852.5 - 1907.5	0.224	23.50	4M55G7W	QPSK
LTE Band 2	24E	1852.5 - 1907.5	0.184	22.65	4M54D7W	16QAM
LTE Band 2	24E	1852.5 - 1907.5	0.148	21.70	4M54D7W	64QAM
LTE Band 2	24E	1855 - 1905	0.224	23.50	9M04G7W	QPSK
LTE Band 2	24E	1855 - 1905	0.188	22.75	9M07D7W	16QAM
LTE Band 2	24E	1855 - 1905	0.150	21.76	9M08D7W	64QAM
LTE Band 2	24E	1857.5 - 1902.5	0.224	23.50	13M5G7W	QPSK
LTE Band 2	24E	1857.5 - 1902.5	0.179	22.52	13M6D7W	16QAM
LTE Band 2	24E	1857.5 - 1902.5	0.145	21.61	13M6D7W	64QAM
LTE Band 2	24E	1860 - 1900	0.224	23.50	18M1G7W	QPSK
LTE Band 2	24E	1860 - 1900	0.184	22.65	18M1D7W	16QAM
LTE Band 2	24E	1860 - 1900	0.147	21.66	18M0D7W	64QAM
LTE Band 25	24E	1850.7 - 1914.3	0.224	23.50	1M11G7W	QPSK
LTE Band 25	24E	1850.7 - 1914.3	0.179	22.54	1M11D7W	16QAM
LTE Band 25	24E	1850.7 - 1914.3	0.144	21.59	1M11D7W	64QAM
LTE Band 25	24E	1851.5 - 1913.5	0.224	23.50	2M72G7W	QPSK
LTE Band 25	24E	1851.5 - 1913.5	0.192	22.84	2M72D7W	16QAM
LTE Band 25	24E	1851.5 - 1913.5	0.155	21.90	2M72D7W	64QAM
LTE Band 25	24E	1852.5 - 1912.5	0.224	23.50	4M55G7W	QPSK
LTE Band 25	24E	1852.5 - 1912.5	0.189	22.77	4M54D7W	16QAM
LTE Band 25	24E	1852.5 - 1912.5	0.149	21.74	4M54D7W	64QAM
LTE Band 25	24E	1855 - 1910	0.224	23.50	9M04G7W	QPSK
LTE Band 25	24E	1855 - 1910	0.187	22.73	9M07D7W	16QAM
LTE Band 25	24E	1855 - 1910	0.152	21.83	9M08D7W	64QAM
LTE Band 25	24E	1857.5 - 1907.5	0.224	23.50	13M6G7W	QPSK
LTE Band 25	24E	1857.5 - 1907.5	0.190	22.78	13M6D7W	16QAM
LTE Band 25	24E	1857.5 - 1907.5	0.141	21.50	13M6D7W	64QAM
LTE Band 25	24E	1860 - 1905	0.224	23.50	18M1G7W	QPSK
LTE Band 25	24E	1860 - 1905	0.179	22.52	18M1D7W	16QAM
LTE Band 25	24E	1860 - 1905	0.145	21.61	18M0D7W	64QAM

EUT Overview (Mid Bands)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
LTE Band 30	27	2307.5 - 2312.5	0.213	23.29	4M53G7W	QPSK
LTE Band 30	27	2307.5 - 2312.5	0.179	22.53	4M53D7W	16QAM
LTE Band 30	27	2307.5 - 2312.5	0.142	21.52	4M53D7W	64QAM
LTE Band 30	27	2310	0.214	23.30	9M06G7W	QPSK
LTE Band 30	27	2310	0.181	22.57	9M04D7W	16QAM
LTE Band 30	27	2310	0.153	21.86	9M03D7W	64QAM
LTE Band 7	27	2502.5 - 2567.5	0.363	25.60	4M54G7W	QPSK
LTE Band 7	27	2502.5 - 2567.5	0.299	24.76	4M53D7W	16QAM
LTE Band 7	27	2502.5 - 2567.5	0.239	23.78	4M52D7W	64QAM
LTE Band 7	27	2505 - 2565	0.363	25.60	9M07G7W	QPSK
LTE Band 7	27	2505 - 2565	0.299	24.76	9M07D7W	16QAM
LTE Band 7	27	2505 - 2565	0.241	23.82	9M09D7W	64QAM
LTE Band 7	27	2507.5 - 2562.5	0.363	25.60	13M6G7W	QPSK
LTE Band 7	27	2507.5 - 2562.5	0.303	24.82	13M6D7W	16QAM
LTE Band 7	27	2507.5 - 2562.5	0.239	23.79	13M6D7W	64QAM
LTE Band 7	27	2510 - 2560	0.363	25.60	18M1G7W	QPSK
LTE Band 7	27	2510 - 2560	0.292	24.65	18M1D7W	16QAM
LTE Band 7	27	2510 - 2560	0.234	23.69	18M1D7W	64QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.676	28.30	4M54G7W	QPSK
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.541	27.33	4M53D7W	16QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.442	26.45	4M55D7W	64QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.675	28.29	9M07G7W	QPSK
LTE Band 41 (PC2)	27	2501 - 2685	0.541	27.33	9M08D7W	16QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.443	26.46	9M05D7W	64QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.676	28.30	13M6G7W	QPSK
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.531	27.25	13M6D7W	16QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.438	26.41	13M6D7W	64QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.676	28.30	18M1G7W	QPSK
LTE Band 41 (PC2)	27	2506 - 2680	0.553	27.43	18M0D7W	16QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.453	26.56	18M1D7W	64QAM
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.380	25.80	4M54G7W	QPSK
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.329	25.17	4M53D7W	16QAM
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.281	24.48	4M55D7W	64QAM
LTE Band 41 (PC3)	27	2501 - 2685	0.379	25.79	9M07G7W	QPSK
LTE Band 41 (PC3)	27	2501 - 2685	0.352	25.46	9M08D7W	16QAM
LTE Band 41 (PC3)	27	2501 - 2685	0.278	24.44	9M05D7W	64QAM
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.379	25.79	13M6G7W	QPSK
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.324	25.11	13M6D7W	16QAM
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.267	24.27	13M6D7W	64QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.377	25.76	18M1G7W	QPSK
LTE Band 41 (PC3)	27	2506 - 2680	0.343	25.35	18M0D7W	16QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.274	24.37	18M1D7W	64QAM

EUT Overview (High Bands)

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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 17025-2005 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2230**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: DLXZN002P7GH, DLXZN003P7GG

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE, HDR4, HDR8)

LTE Band 12 (698 - 716 MHz) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz). Therefore, test data provided in this report covers Band 17 as well as Band 12.

LTE Band 26 (814.7 – 849 MHz) overlaps the entire frequency range of LTE Band 5 (824 – 849 MHz). Therefore, test data provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

LTE Band 25 (1850 - 1915 MHz) overlaps the entire frequency range of LTE Band 2 (1850 - 1910 MHz). Therefore, test data provided in this report covers Band 2 as well as Band 25.

LTE Band 41 (2496 - 2690 MHz) overlaps the entire frequency range of LTE Band 38 (2570 - 2620 MHz). Therefore, test data provided in this report covers Band 38 as well as Band 41.

This device supports BT Beamforming

This device supports simultaneous transmission operation, which allows for two transmitters to transmit simultaneously on the same antenna. The table below shows all configurations possible.

Simultaneous Tx	Antenna							
	4a				2a			
	Config 1	Config 2	Config 3	Config 4	Config 5	Config 6	Config 7	Config 8
WIFI 2.4GHz	✓	✓	✗	✗	✓	✓	✗	✗
Bluetooth (1x, EDR, LE, HDR4, HDR8)	✗	✗	✓	✓	✗	✗	✓	✓
LTE Mid Bands	✓	✗	✓	✗	✓	✗	✓	✗
LTE High Bands	✗	✓	✗	✓	✗	✓	✗	✓

Table 2-1. Simultaneous Tx Configurations

✓ = Support ; ✗ = NOT Support

Worst Case Configuration

Description	Bluetooth BDR	LTE
Antenna	4a	4a
Channel	6	39750
Operating Frequency (MHz)	2480	2506
Mode/Modulation	GFSK ePA	QPSK/1RB/20MHz

Table 2-2. Worst Case Configuration

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2.3 Antenna Description

Following antennas were used for the testing.

Frequency [MHz]	Antennas			
	Port A	Port B	Port C	Port D
650-800	ANT 3	ANT 1	N/A	
820-960				
1700-1800	ANT 4b	ANT 2b	ANT 4a	ANT 2a
1820-2100				
2300-2320				
2400-2700				

Table 2-3. Antennas vs Ports

Frequency [MHz]	Antenna Gain (dBi)					
	ANT 3	ANT 1	ANT 4b	ANT 2b	ANT 4a	ANT 2a
650-800	-1.2	-1.9	N/A			
820-960	-0.7	-0.6				
1700-1800	N/A		-2.2	-2.7	-1.5	-1.2
1820-2100			-2.2	-2.6	-1.7	-0.3
2300-2320			-1.0	-3.1	-0.2	0.4
2400-2700			-0.1	-0.4	0.3	0.5

Table 2-4. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple MacBook w/ AC/DC Adapter	Model: A1398 Model: A1435	S/N: C2QKP008F6F3 S/N: C04325505K1F288BG
2	Apple USB-C Cable	Model: Chimp	S/N: 304523
3	USB-C Cable w / AC/DC Adapter	Model: A1997 Model: A1720	S/N: N/A S/N: C3D9274B06YLHDAE
4	Apple Pencil	Model: A2051	S/N: GQXYGSXCJKM9
5	DC Power Supply	Model: KPS3010D	S/N N/A

Table 2-5. Test Support Equipment Used

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2.5 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

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 channel and the worst case configuration.

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.

2.6 Software and Firmware

The test was conducted with firmware version 17E228 installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

3.2 Block C Frequency Range

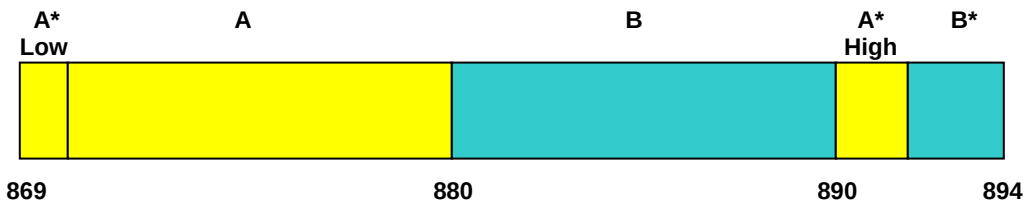
Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

3.3 Block A Frequency Range

698-746 MHz band. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz;
Block B: 704-710 MHz and 734-740 MHz; and
Block C: 710-716 MHz and 740-746 MHz.

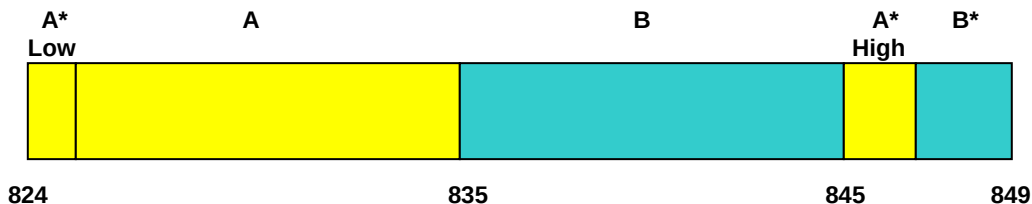
3.4 Cellular - Base Frequency Blocks



BLOCK 1: 869 – 880 MHz (A* Low + A)
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)
BLOCK 4: 891.5 – 894 MHz (B*)

3.5 Cellular - Mobile Frequency Blocks

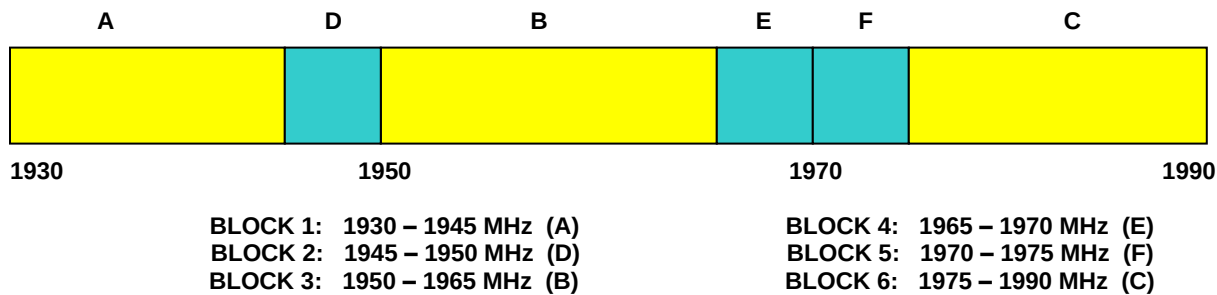


BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

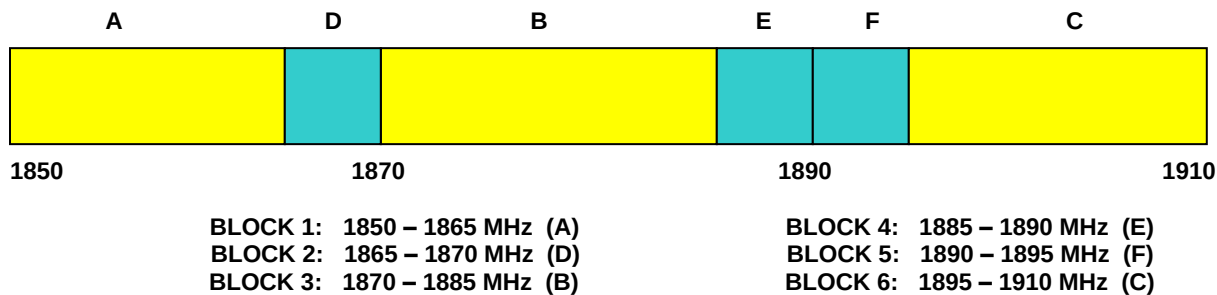
BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

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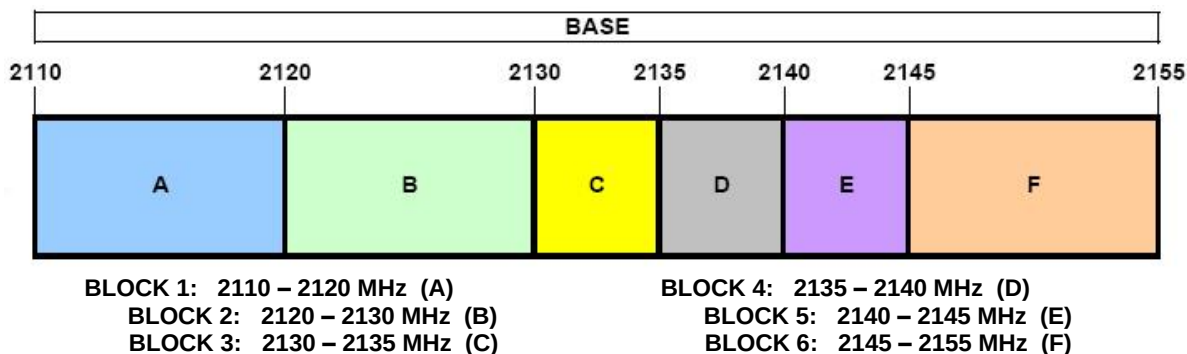
3.6 PCS - Base Frequency Blocks



3.7 PCS - Mobile Frequency Blocks

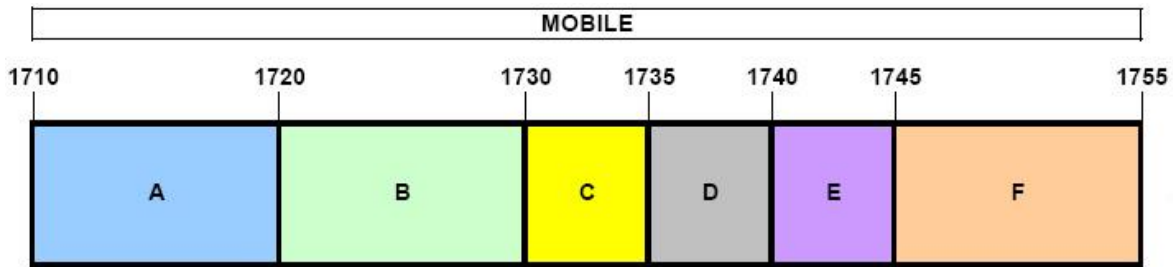


3.8 AWS - Base Frequency Blocks



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3.9 AWS - Mobile Frequency Blocks



BLOCK 1: 1710 – 1720 MHz (A)
 BLOCK 2: 1720 – 1730 MHz (B)
 BLOCK 3: 1730 – 1735 MHz (C)

BLOCK 4: 1735 – 1740 MHz (D)
 BLOCK 5: 1740 – 1745 MHz (E)
 BLOCK 6: 1745 – 1755 MHz (F)

3.10 WCS – Mobile/Base Frequency Blocks

The following frequencies are available for WCS in the 2305-2320 MHz and 2345-2360 MHz bands:

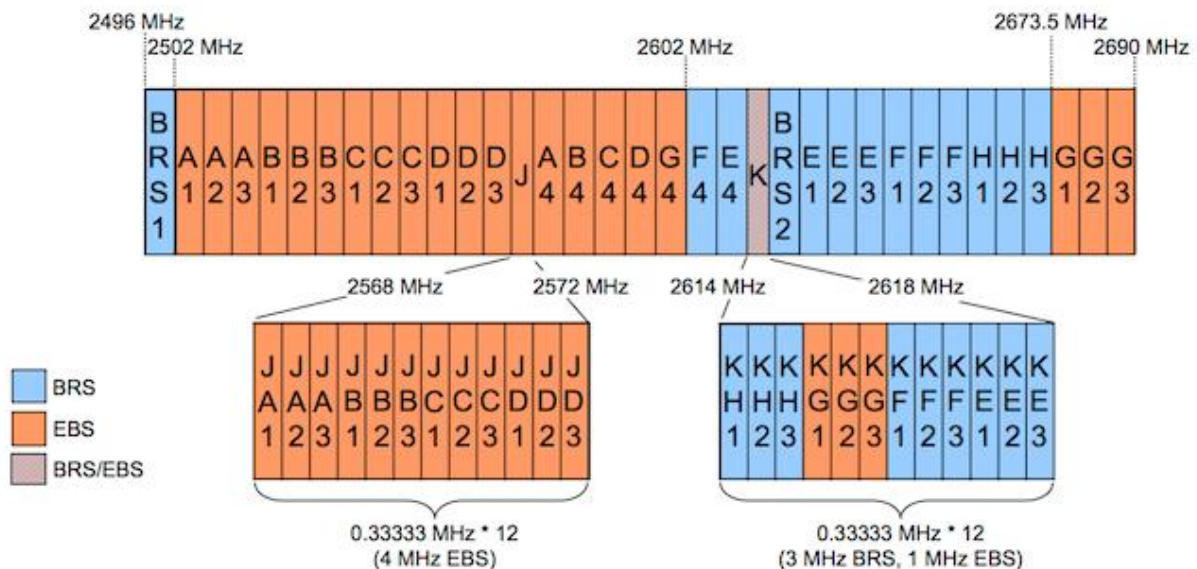
BLOCK 1: 2305-2310 and 2350-2355 MHz (A)

BLOCK 2: 2310-2315 and 2355-236 MHz (B)

BLOCK 3: 2315-2320 MHz (C)

BLOCK 4: 2345-2350 MHz (D)

3.11 BRS/EBS Frequency Block



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3.12 Radiated Power and Radiated Spurious 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. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Per the guidelines of KDB 412172 D01 v01r01, radiated power levels are measured using the following formula:

$$ERP \text{ or } EIRP = P_T + G_T - L_C$$

Where P_T is the transmitter output power, expressed in dBm, G_T is the gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP), and L_C signal attenuation in the connecting cable between the transmitter and antenna in dB.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$. For Band 7 and 41, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of $55 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$. For Band 30, the calculated P_d levels are compared to the absolute spurious emission limit of -40dBm which is equivalent to the required minimum attenuation of $70 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$.

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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. 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	1.29
Radiated Disturbance (<1GHz)	4.15
Radiated Disturbance (>1GHz)	4.70
Radiated Disturbance (>18GHz)	5.01
Temperature	0.01

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5.0 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	3Hz-44GHz PXA Signal Analyzer	3/13/2019	Annual	3/13/2020	MY49430244
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	10/29/2019	Annual	10/29/2020	T058701-02
ESPEC	SU-241	Tabletop Temperature Chamber	9/3/2019	Annual	9/3/2020	92009574
ETS-Lindgren	3142E-PA	Pre-Amplifier (30MHz - 6GHz)	9/19/2019	Annual	9/19/2020	213236
ETS-Lindgren	3142E	BiConiLog Antenna (30MHz - 6GHz)	8/14/2019	Annual	8/14/2020	224569
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	3/12/2019	Annual	3/12/2020	205956
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	2/27/2019	Annual	2/27/2020	101619
Rohde & Schwarz	ESW26	EMI Test Receiver	5/21/2019	Annual	5/21/2020	101299
Rohde & Schwarz	ESW44	EMI Test Receiver	7/27/2019	Annual	7/27/2020	101668
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/20/2019	Annual	4/20/2020	161617
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	8/8/2019	Annual	8/8/2020	151888
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	9/19/2019	Annual	9/19/2020	100051
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna (400MHz-18GHz)	11/14/2019	Annual	11/14/2020	101057
Rohde & Schwarz	HFH2-Z2	Loop Antenna	3/21/2019	Annual	3/21/2020	100519

Table 5-1. Test Equipment

Notes:

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.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7W

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination of any

QAM Modulation

Emission Designator = 8M45D7W

LTE BW = 8.45 MHz

D = Amplitude/Angle Modulated

7 = Quantized/Digital Info

W = Combination of any

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.
 FCC ID: BCGA2230
 FCC Classification: PCS Licensed Transmitter (PCB)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 2.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Out of Band Emissions	$> 43 + 10\log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions			Section 7.3, 7.4
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3, 7.4
27.53(a)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(a)			Section 7.3, 7.4
24.232(d) 27.50(d)(5)	Peak-Average Ratio	< 13 dB			Section 7.5
2.1046	Transmitter Conducted Output Power	N/A			Section 7.8
2.1046	Additional Maximum Power Reduction (A-MPR)	N/A			Section 7.6
27.53(m)	Uplink Carrier Aggregation	N/A			Section 7.7
2.1055 22.355 24.235 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24, 27)			Section 7.11

Table 7-1. Summary of Conducted Test Results

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FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5, 26)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.8
27.50(b)(10) 27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 12, 17, 13)	< 3 Watts max. ERP			Section 7.8
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 2, 25, 7, 41)	< 2 Watts max. EIRP			Section 7.8
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4, 66)	< 1 Watts max. EIRP			Section 7.8
27.50(a)(3)	Equivalent Isotropic Radiated Power (Band 30)	< 0.25 Watts max. EIRP			Section 7.8
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions	> 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions			Section 7.9
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz			Section 7.9
27.53(a)	Undesirable Emissions (Band 30)	> 70 + 10log ₁₀ (P[Watts])			Section 7.9
27.53(m)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.9

Table 7-2. Summary of Radiated Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots (Sections 7.2, 7.3, 7.4, 7.5) were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT 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, attenuators, and couplers.
- 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 "LTE Automation," Version 5.3.

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7.2 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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

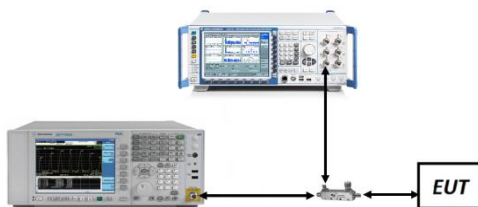


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. All ports were tested and only the worst case data were reported.
2. Refer to Table 2-1 Section 2.3 of this test report for correlation between Antennas and Ports.

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Mode	BW (MHz)	Modulation	Occupied BW [kHz]
LTE Band 12	1.4	QPSK	1108.0
LTE Band 12	1.4	16QAM	1108.7
LTE Band 12	1.4	64QAM	1104.0
LTE Band 12	3	QPSK	2733.4
LTE Band 12	3	16QAM	2734.3
LTE Band 12	3	64QAM	2727.3
LTE Band 12	5	QPSK	4552.3
LTE Band 12	5	16QAM	4545.1
LTE Band 12	5	64QAM	4540.9
LTE Band 12	10	QPSK	9069.3
LTE Band 12	10	16QAM	9076.6
LTE Band 12	10	64QAM	9054.6
LTE Band 17	5	QPSK	4552.3
LTE Band 17	5	16QAM	4545.1
LTE Band 17	5	64QAM	4540.9
LTE Band 17	10	QPSK	9069.3
LTE Band 17	10	16QAM	9076.6
LTE Band 17	10	64QAM	9054.6
LTE Band 13	5	QPSK	4542.1
LTE Band 13	5	16QAM	4534.1
LTE Band 13	5	64QAM	4548.4
LTE Band 13	10	QPSK	9055.6
LTE Band 13	10	16QAM	9044.8
LTE Band 13	10	64QAM	9069.7
LTE Band 5	1.4	QPSK	1109.2
LTE Band 5	1.4	16QAM	1109.4
LTE Band 5	1.4	64QAM	1109.8
LTE Band 5	3	QPSK	2734.3
LTE Band 5	3	16QAM	2733.3
LTE Band 5	3	64QAM	2735.0
LTE Band 5	5	QPSK	4551.1
LTE Band 5	5	16QAM	4541.5
LTE Band 5	5	64QAM	4551.0
LTE Band 5	10	QPSK	9065.0
LTE Band 5	10	16QAM	9095.1
LTE Band 5	10	64QAM	9055.4
LTE Band 26	1.4	QPSK	1109.2
LTE Band 26	1.4	16QAM	1109.4
LTE Band 26	1.4	64QAM	1109.8
LTE Band 26	3	QPSK	2734.3
LTE Band 26	3	16QAM	2733.3
LTE Band 26	3	64QAM	2735.0
LTE Band 26	5	QPSK	4551.1
LTE Band 26	5	16QAM	4541.5
LTE Band 26	5	64QAM	4551.0
LTE Band 26	10	QPSK	9065.0
LTE Band 26	10	16QAM	9095.1
LTE Band 26	10	64QAM	9055.4

Table 7-3. Occupied Band Width Results (Low Bands)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 20 of 398

Mode	BW (MHz)	Modulation	Occupied BW [kHz]
LTE Band 4	1.4	QPSK	1114.8
LTE Band 4	1.4	16QAM	1110.2
LTE Band 4	1.4	64QAM	1109.9
LTE Band 4	3	QPSK	2733.7
LTE Band 4	3	16QAM	2737.1
LTE Band 4	3	64QAM	2725.4
LTE Band 4	5	QPSK	4562.8
LTE Band 4	5	16QAM	4541.6
LTE Band 4	5	64QAM	4539.4
LTE Band 4	10	QPSK	9075.4
LTE Band 4	10	16QAM	9075.7
LTE Band 4	10	64QAM	9037.8
LTE Band 4	15	QPSK	13606.9
LTE Band 4	15	16QAM	13576.5
LTE Band 4	15	64QAM	13580.7
LTE Band 4	20	QPSK	18167.2
LTE Band 4	20	16QAM	18111.0
LTE Band 4	20	64QAM	18139.0
LTE Band 66	1.4	QPSK	1114.8
LTE Band 66	1.4	16QAM	1110.2
LTE Band 66	1.4	64QAM	1109.9
LTE Band 66	3	QPSK	2733.7
LTE Band 66	3	16QAM	2737.1
LTE Band 66	3	64QAM	2725.4
LTE Band 66	5	QPSK	4562.8
LTE Band 66	5	16QAM	4541.6
LTE Band 66	5	64QAM	4539.4
LTE Band 66	10	QPSK	9075.4
LTE Band 66	10	16QAM	9075.7
LTE Band 66	10	64QAM	9037.8
LTE Band 66	15	QPSK	13606.9
LTE Band 66	15	16QAM	13576.5
LTE Band 66	15	64QAM	13580.7
LTE Band 66	20	QPSK	18167.2
LTE Band 66	20	16QAM	18111.0
LTE Band 66	20	64QAM	18139.0
LTE Band 2	1.4	QPSK	1112.8
LTE Band 2	1.4	16QAM	1111.5
LTE Band 2	1.4	64QAM	1112.9
LTE Band 2	3	QPSK	2721.4
LTE Band 2	3	16QAM	2723.8
LTE Band 2	3	64QAM	2721.2
LTE Band 2	5	QPSK	4551.1
LTE Band 2	5	16QAM	4542.5
LTE Band 2	5	64QAM	4544.6
LTE Band 2	10	QPSK	9041.7
LTE Band 2	10	16QAM	9070.2
LTE Band 2	10	64QAM	9080.0
LTE Band 2	15	QPSK	13570.0
LTE Band 2	15	16QAM	13608.2
LTE Band 2	15	64QAM	13573.4
LTE Band 2	20	QPSK	18106.0
LTE Band 2	20	16QAM	18074.0
LTE Band 2	20	64QAM	18038.3
LTE Band 25	1.4	QPSK	1112.8
LTE Band 25	1.4	16QAM	1111.5
LTE Band 25	1.4	64QAM	1112.9
LTE Band 25	3	QPSK	2721.4
LTE Band 25	3	16QAM	2723.8
LTE Band 25	3	64QAM	2721.2
LTE Band 25	5	QPSK	4551.1
LTE Band 25	5	16QAM	4542.5
LTE Band 25	5	64QAM	4544.6
LTE Band 25	10	QPSK	9041.7
LTE Band 25	10	16QAM	9070.2
LTE Band 25	10	64QAM	9080.0
LTE Band 25	15	QPSK	13570.0
LTE Band 25	15	16QAM	13608.2
LTE Band 25	15	64QAM	13573.4
LTE Band 25	20	QPSK	18106.0
LTE Band 25	20	16QAM	18074.0
LTE Band 25	20	64QAM	18038.3

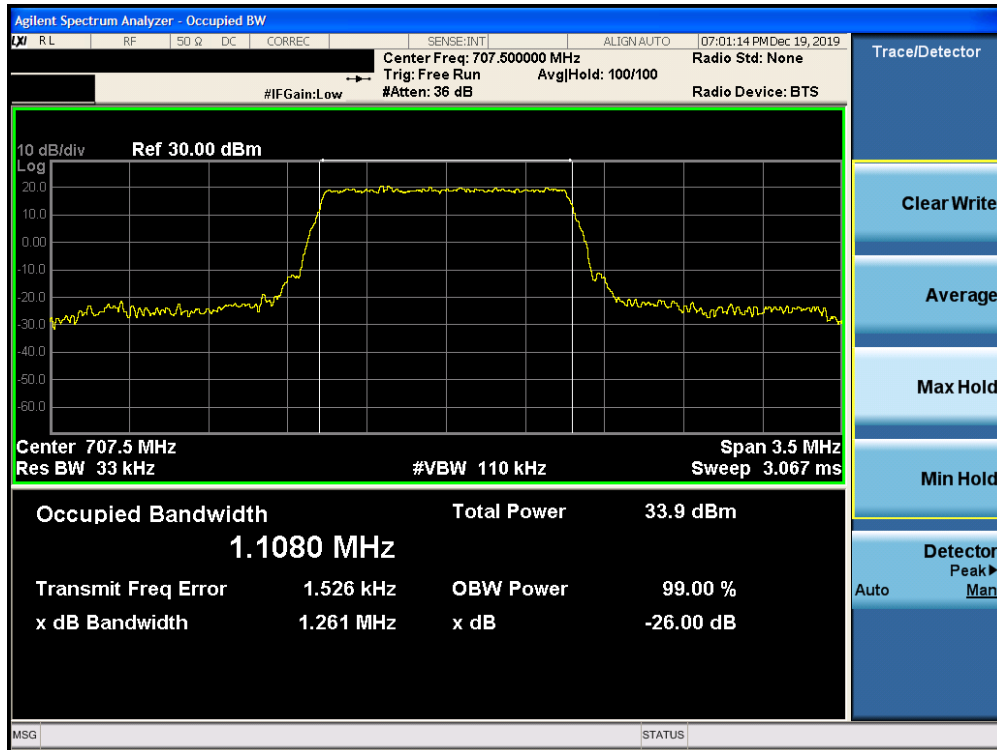
Table 7-4. Occupied Band Width Results (Mid Bands)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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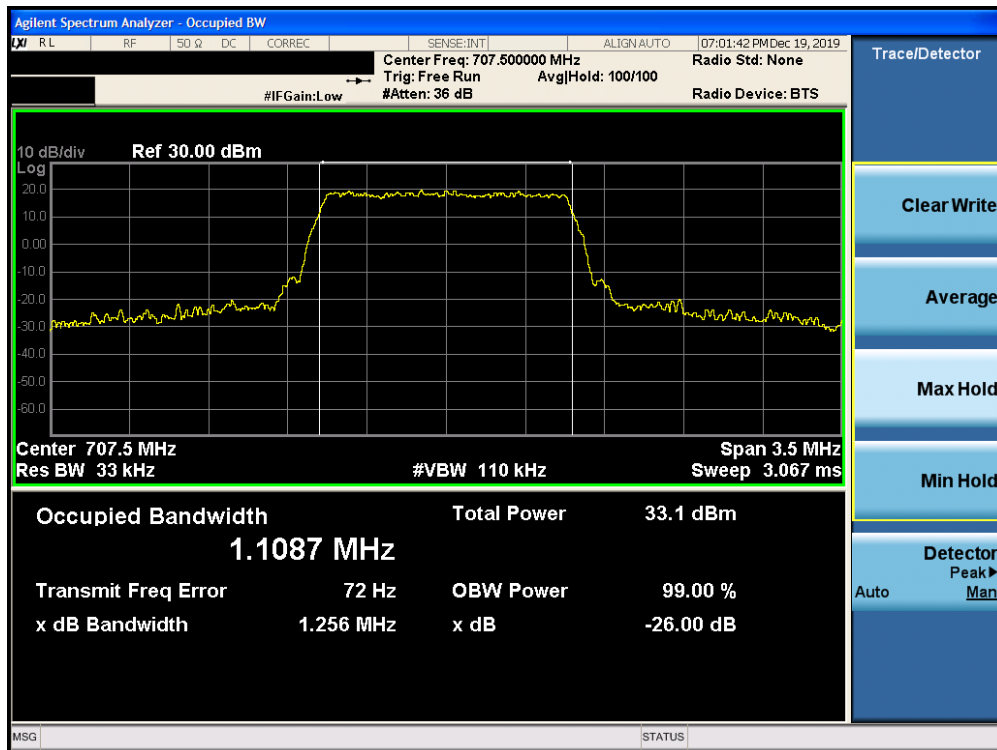
Mode	BW (MHz)	Modulation	Occupied BW [kHz]
LTE Band 30	5	QPSK	4527.5
LTE Band 30	5	16QAM	4534.4
LTE Band 30	5	64QAM	4526.4
LTE Band 30	10	QPSK	9058.7
LTE Band 30	10	16QAM	9037.9
LTE Band 30	10	64QAM	9026.1
LTE Band 7	5	QPSK	4535.3
LTE Band 7	5	16QAM	4528.8
LTE Band 7	5	64QAM	4523.6
LTE Band 7	10	QPSK	9068.0
LTE Band 7	10	16QAM	9067.5
LTE Band 7	10	64QAM	9086.1
LTE Band 7	15	QPSK	13616.2
LTE Band 7	15	16QAM	13586.4
LTE Band 7	15	64QAM	13612.2
LTE Band 7	20	QPSK	18076.5
LTE Band 7	20	16QAM	18118.8
LTE Band 7	20	64QAM	18084.5
LTE Band 41	5	QPSK	4539.7
LTE Band 41	5	16QAM	4530.5
LTE Band 41	5	64QAM	4547.4
LTE Band 41	10	QPSK	9071.1
LTE Band 41	10	16QAM	9082.6
LTE Band 41	10	64QAM	9054.9
LTE Band 41	15	QPSK	13577.1
LTE Band 41	15	16QAM	13561.8
LTE Band 41	15	64QAM	13577.4
LTE Band 41	20	QPSK	18078.8
LTE Band 41	20	16QAM	18048.6
LTE Band 41	20	64QAM	18071.7

Table 7-5. Occupied Band Width Results (High Bands)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 22 of 398

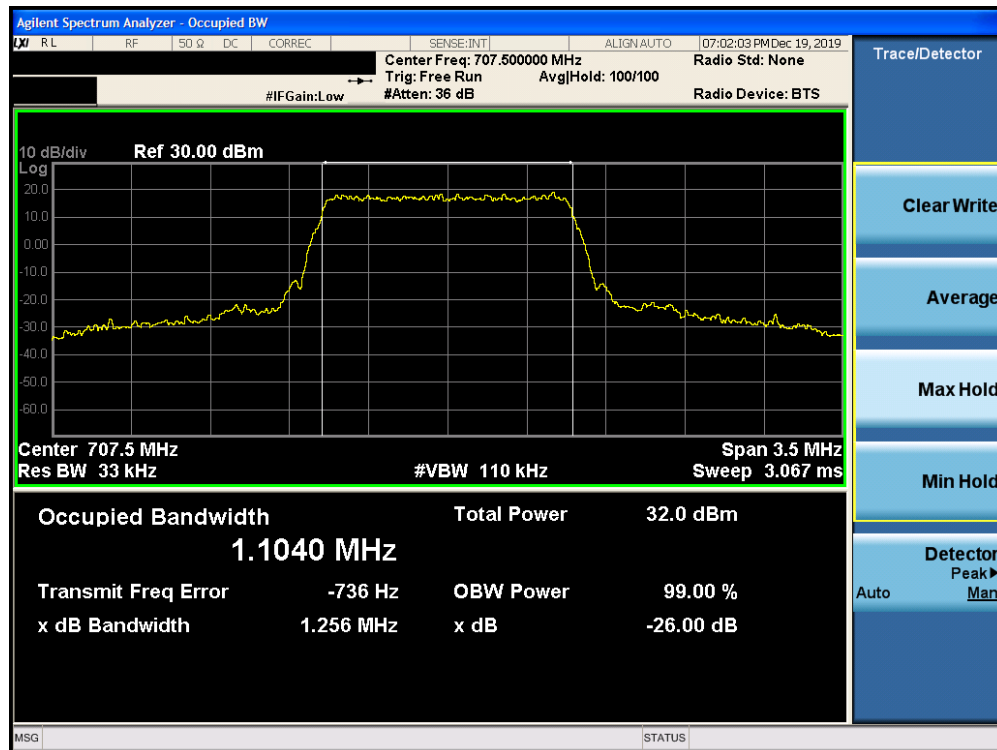


Plot 7-1. Occupied Bandwidth Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

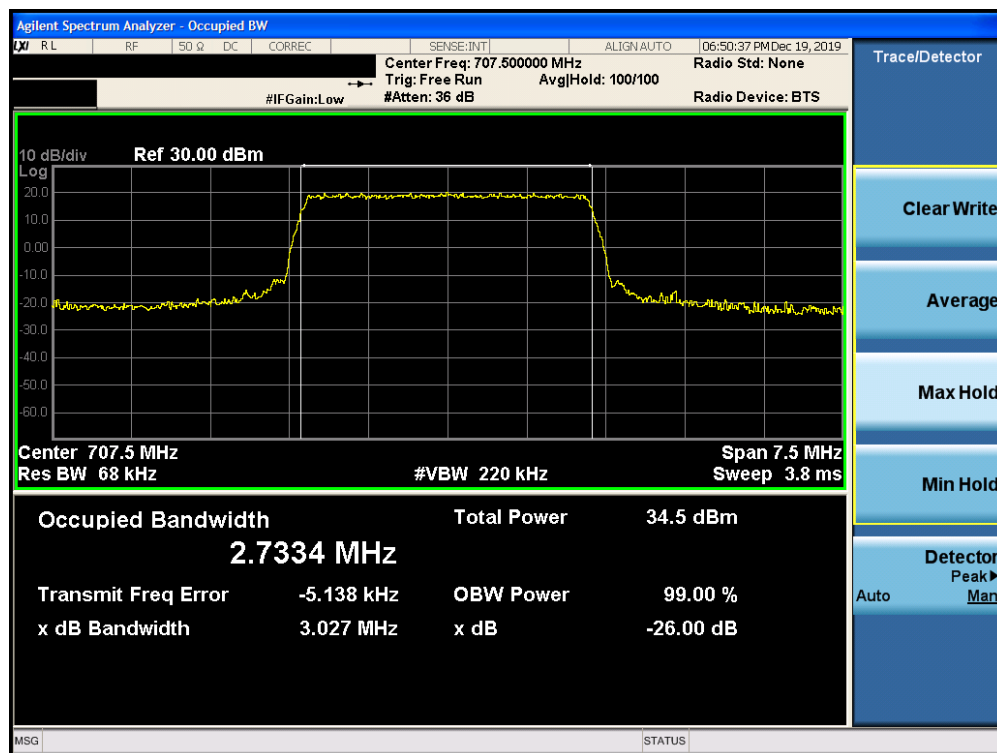


Plot 7-2. Occupied Bandwidth Plot (Band 12 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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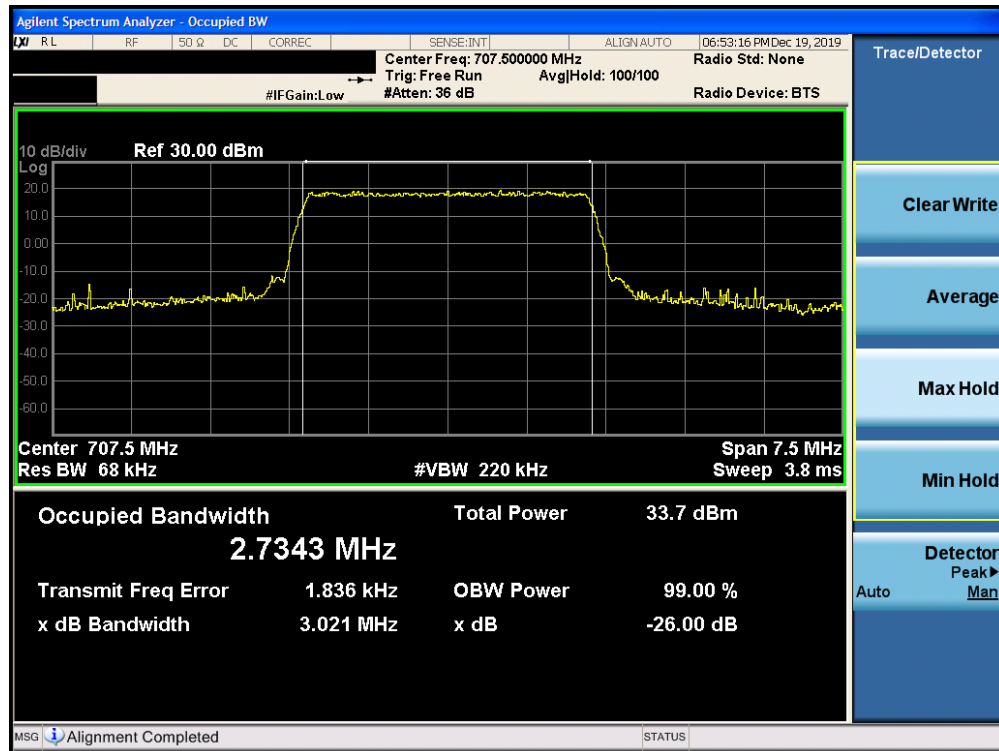


Plot 7-3. Occupied Bandwidth Plot (Band 12 – 1.4MHz 64-QAM – RB Size 6)

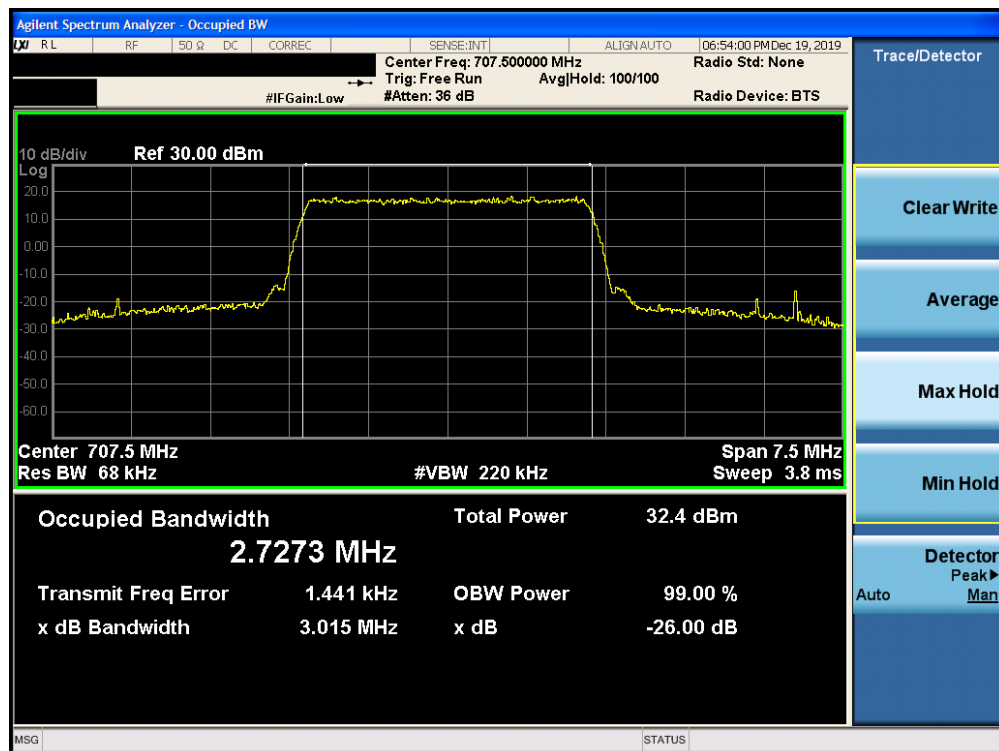


Plot 7-4. Occupied Bandwidth Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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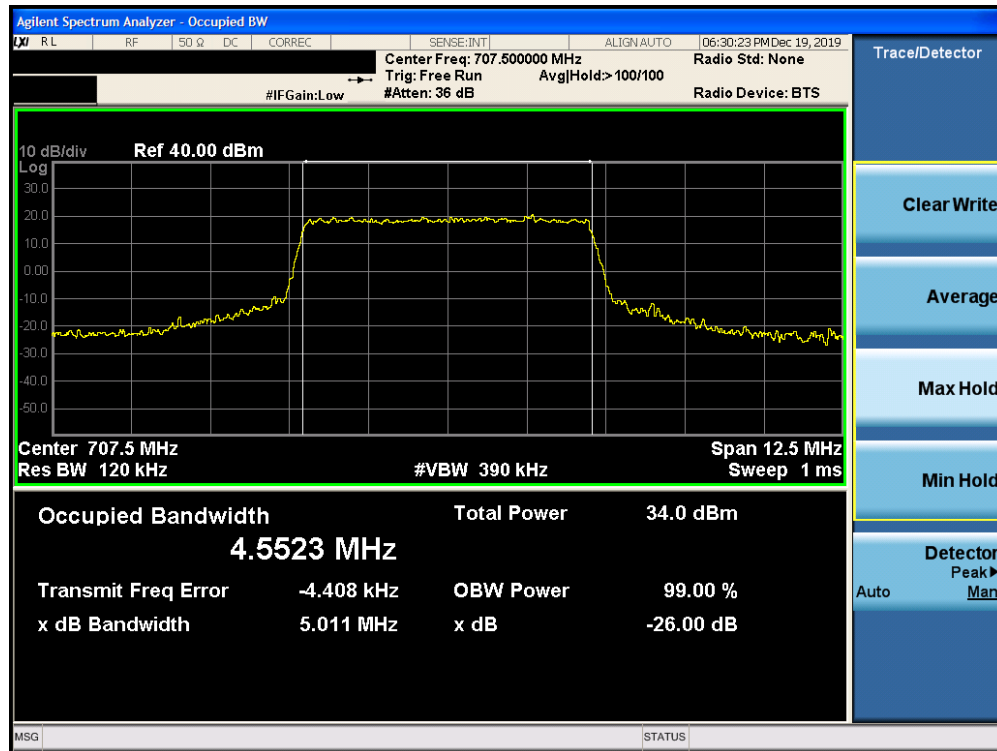


Plot 7-5. Occupied Bandwidth Plot (Band 12 – 3.0MHz 16-QAM – RB Size 15)



Plot 7-6. Occupied Bandwidth Plot (Band 12 – 3.0MHz 64-QAM – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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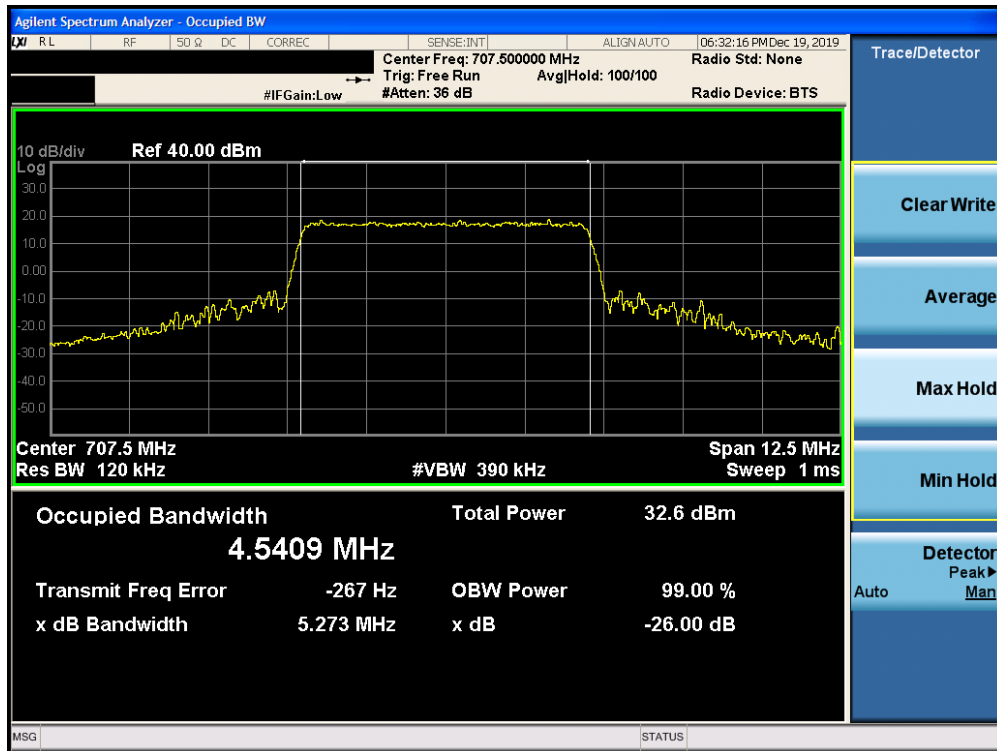


Plot 7-7. Occupied Bandwidth Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

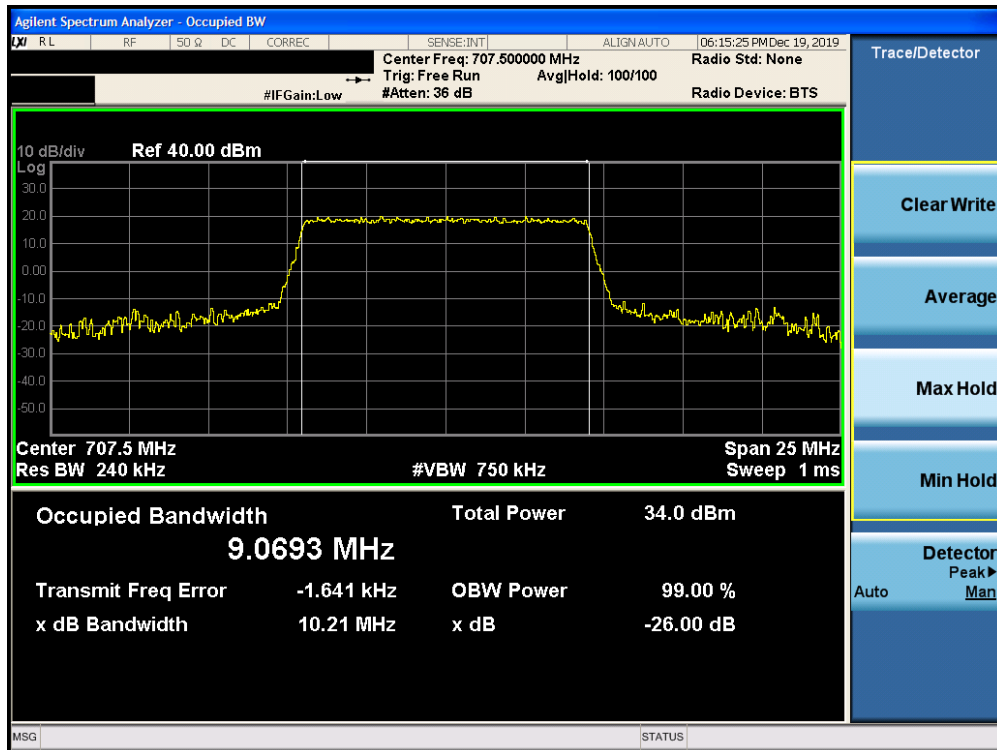


Plot 7-8. Occupied Bandwidth Plot (Band 12/17 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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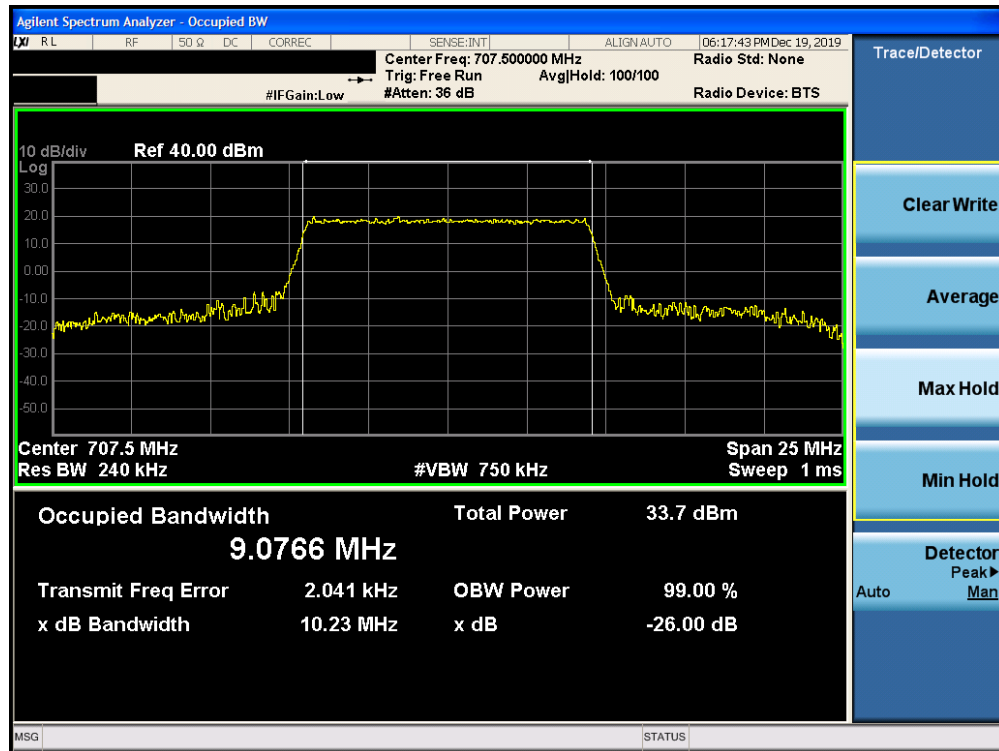


Plot 7-9. Occupied Bandwidth Plot (Band 12/17 – 5.0MHz 64-QAM – RB Size 25)

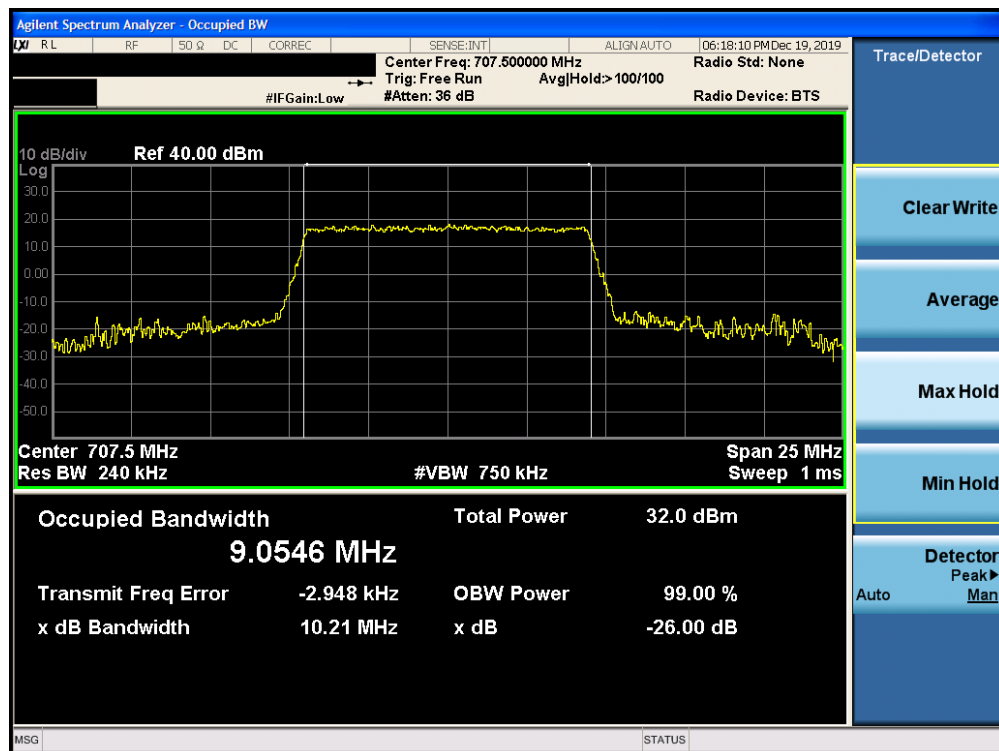


Plot 7-10. Occupied Bandwidth Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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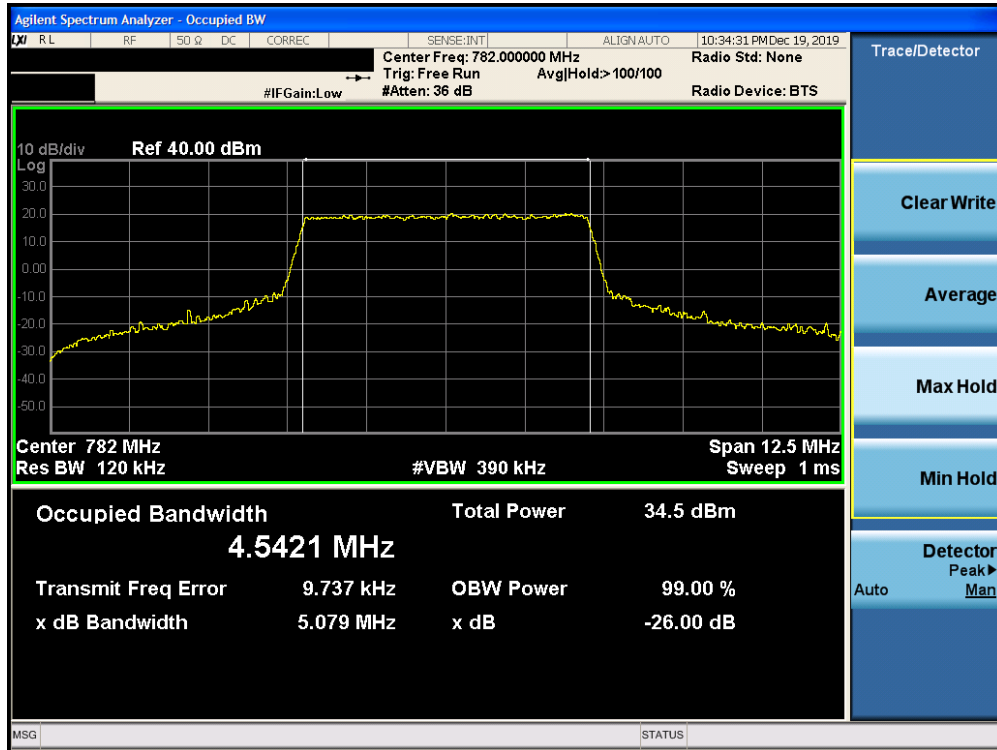
Plot 7-11. Occupied Bandwidth Plot (Band 12/17 – 10.0MHz 16-QAM – RB Size 50)



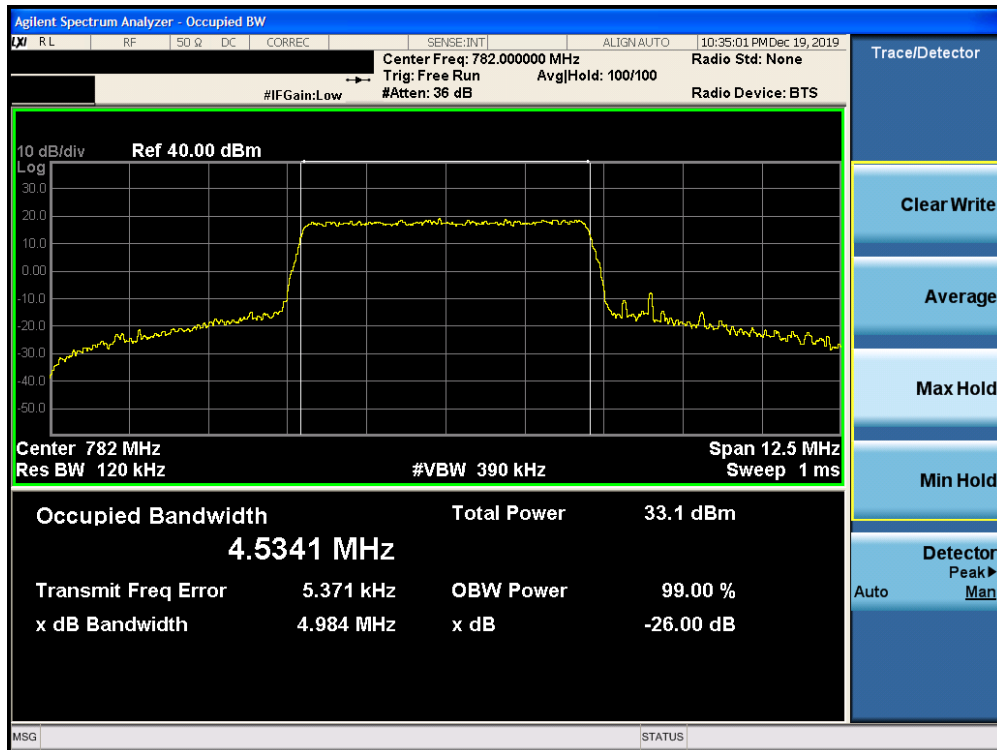
Plot 7-12. Occupied Bandwidth Plot (Band 12/17 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 28 of 398

Band 13

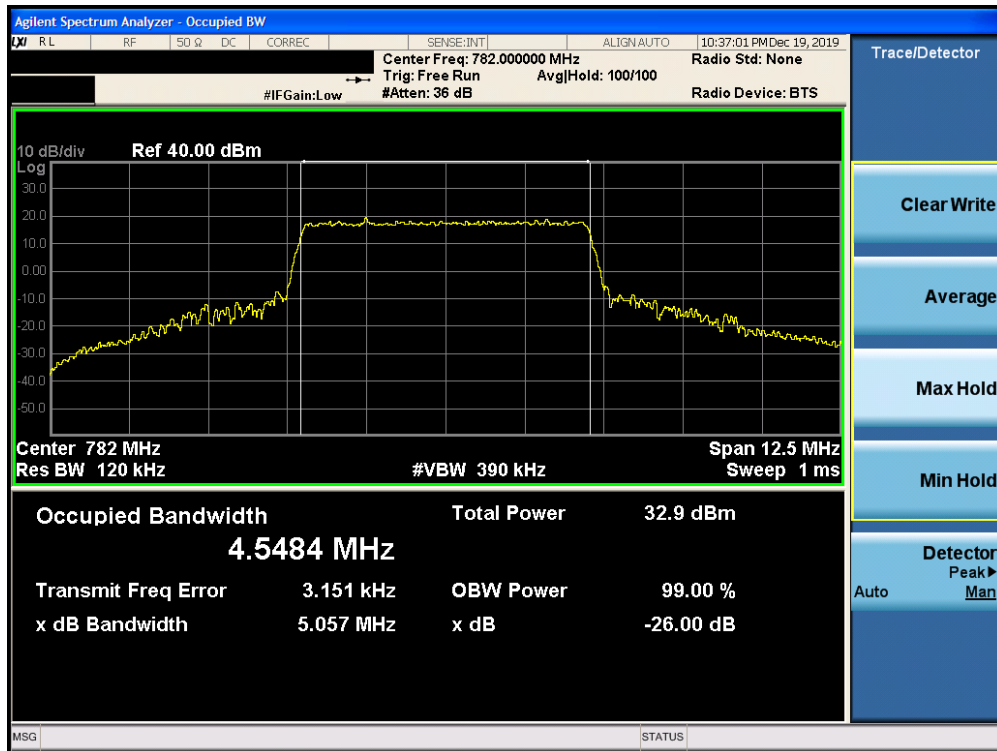


Plot 7-13. Occupied Bandwidth Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

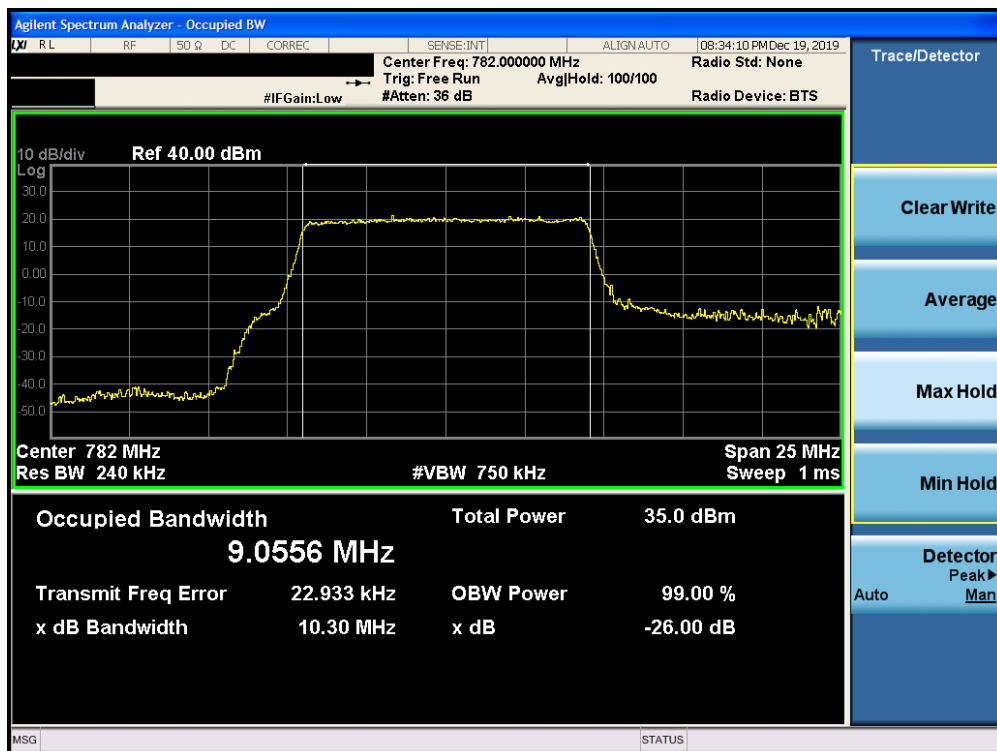


Plot 7-14. Occupied Bandwidth Plot (Band 13 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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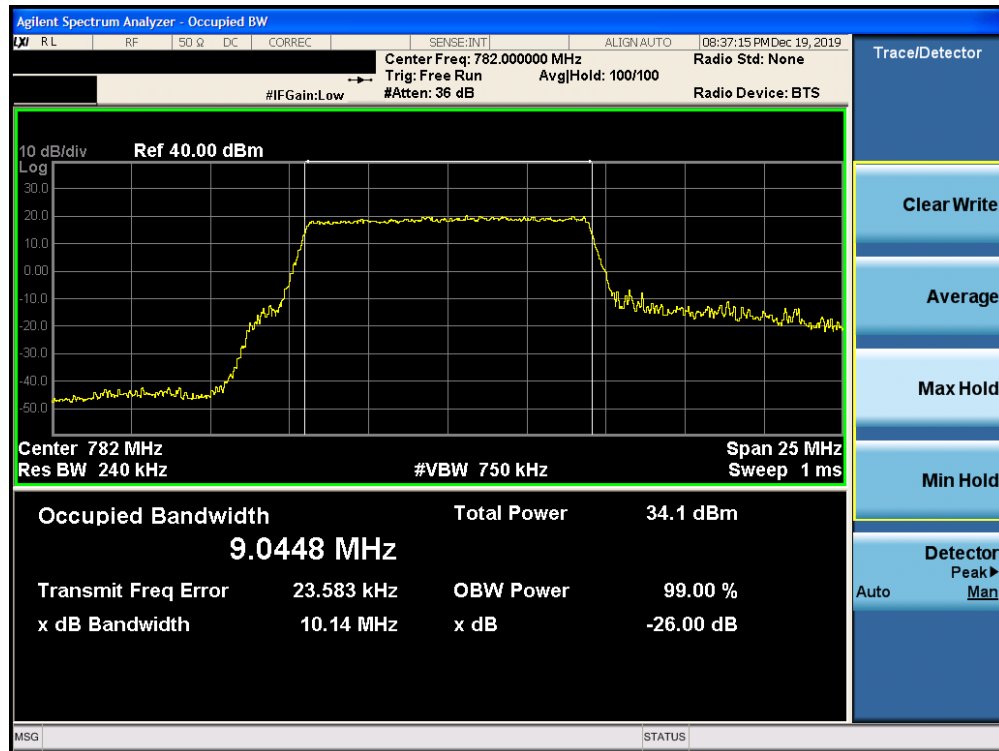


Plot 7-15. Occupied Bandwidth Plot (Band 13 – 5.0MHz 64-QAM – RB Size 25)

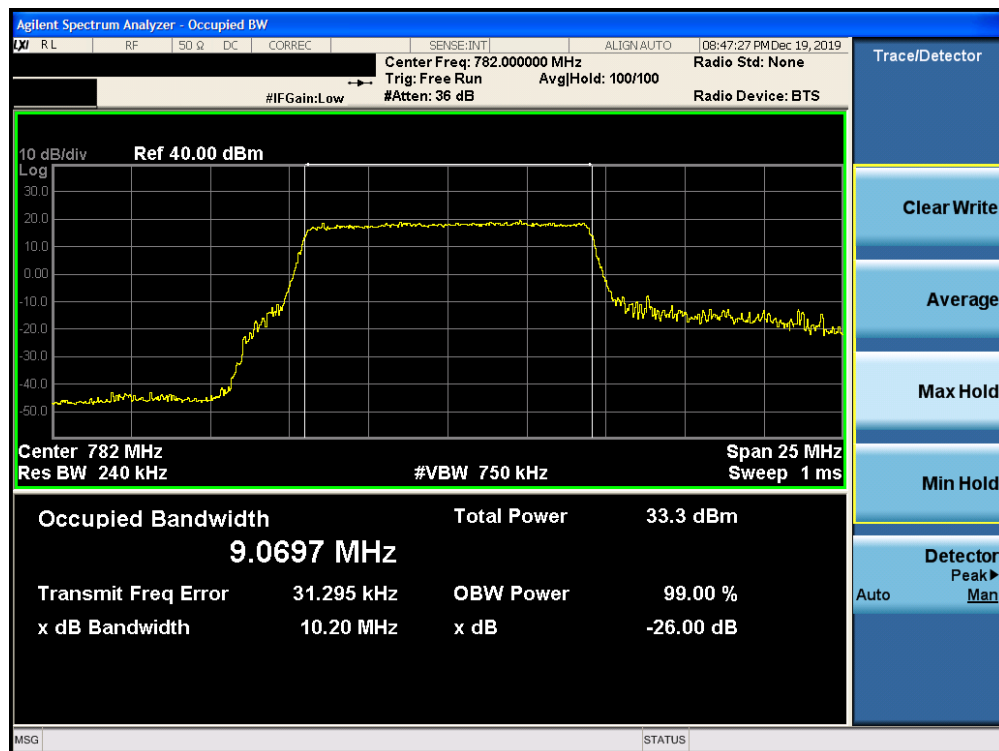


Plot 7-16. Occupied Bandwidth Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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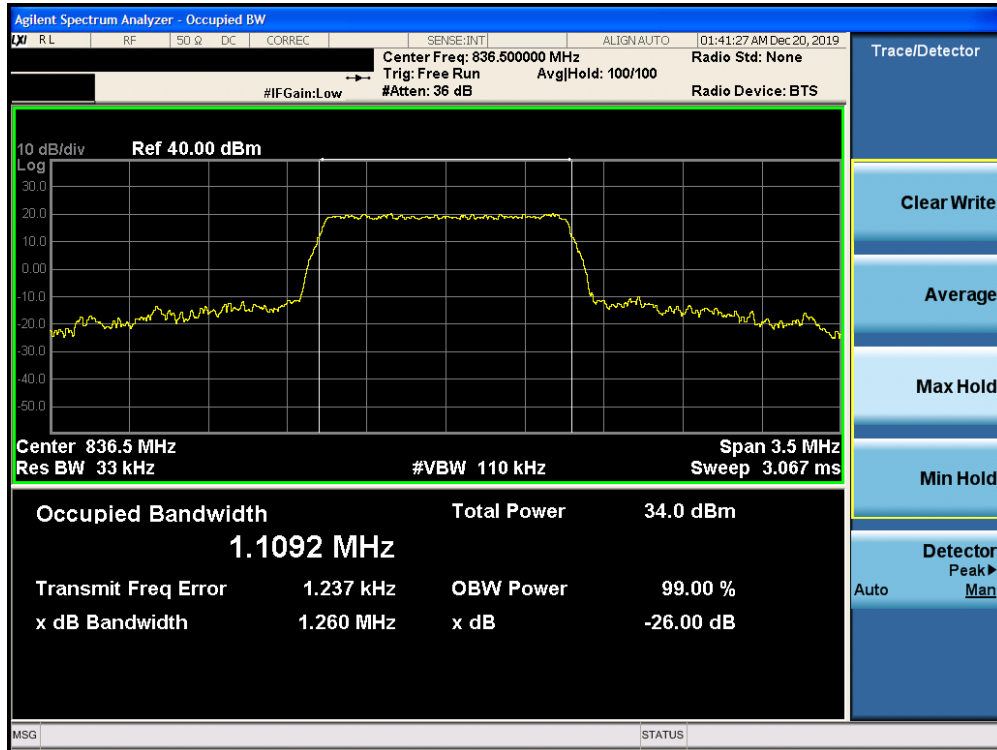


Plot 7-17. Occupied Bandwidth Plot (Band 13 – 10.0MHz 16-QAM – RB Size 50)

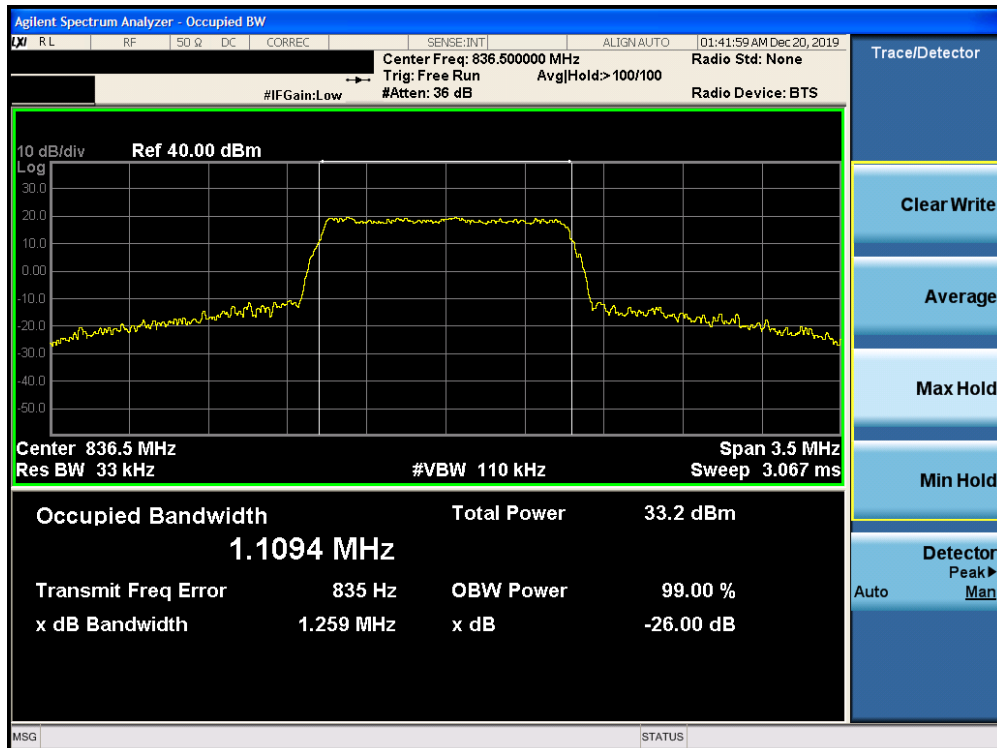


Plot 7-18. Occupied Bandwidth Plot (Band 13 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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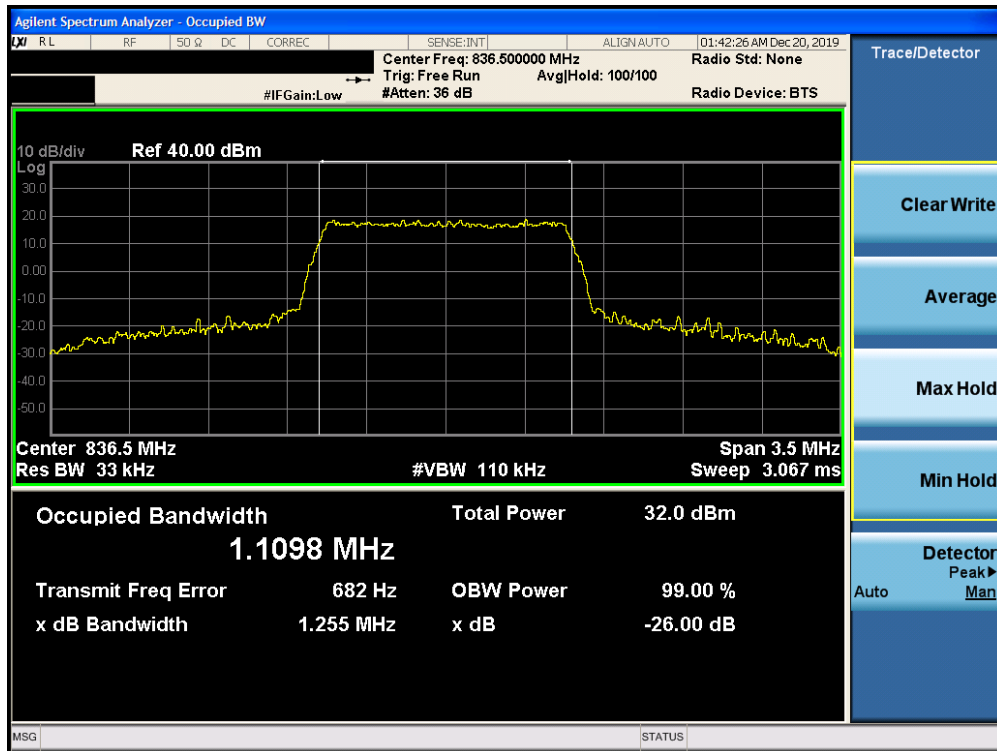


Plot 7-19. Occupied Bandwidth Plot (Band 26/5 – 1.4MHz QPSK – RB Size 6)

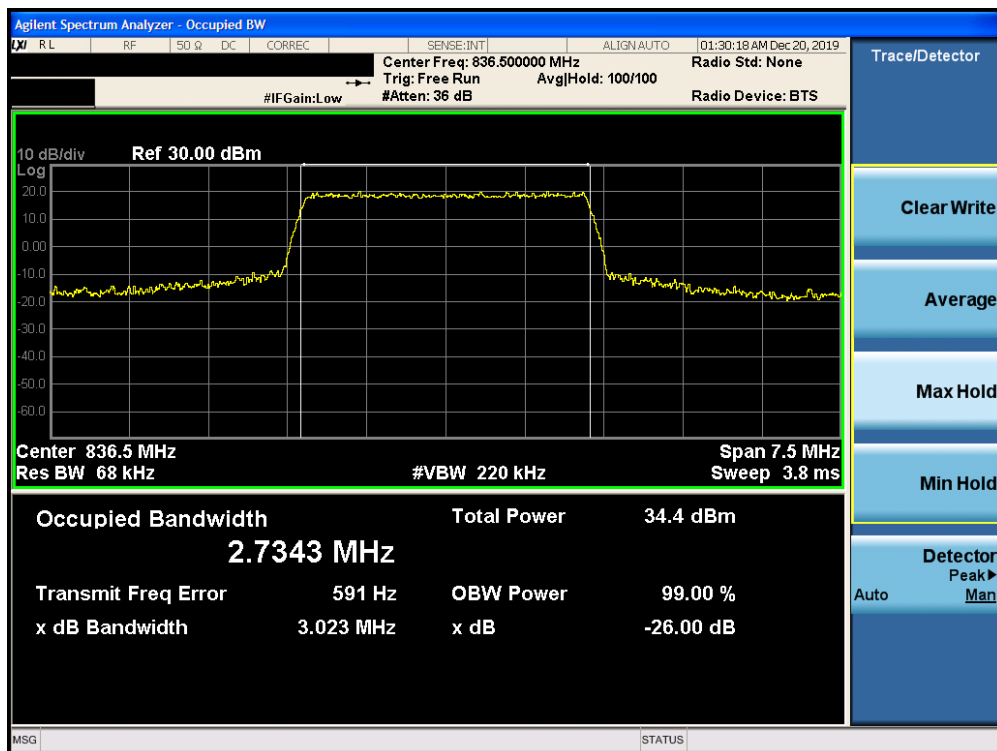


Plot 7-20. Occupied Bandwidth Plot (Band 26/5 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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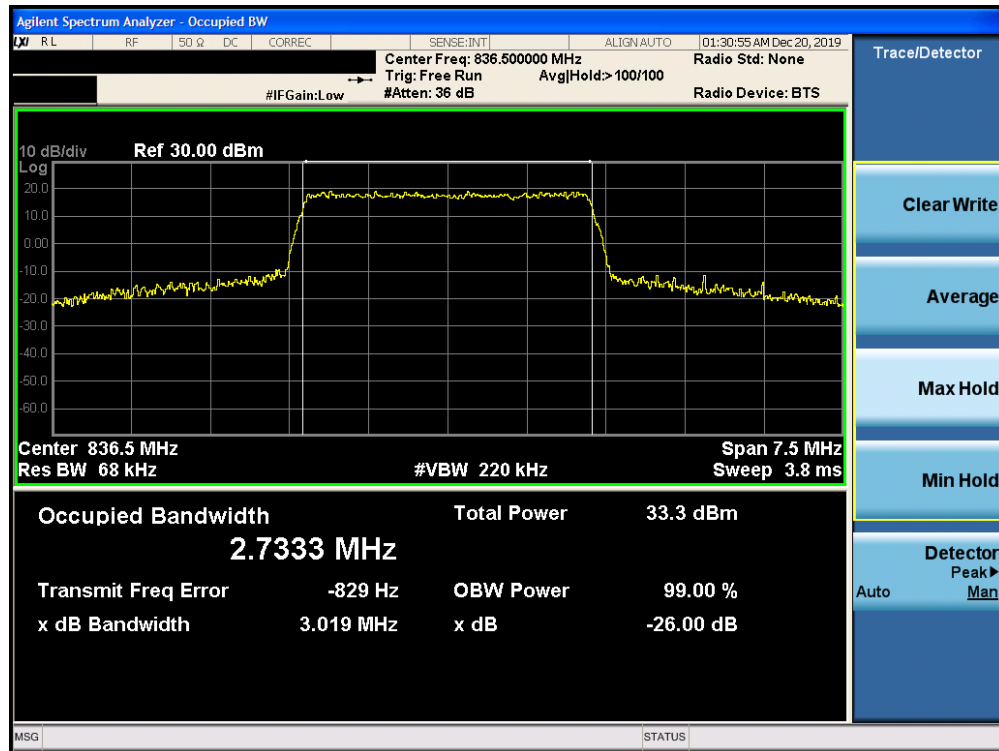


Plot 7-21. Occupied Bandwidth Plot (Band 26/5 – 1.4MHz 64-QAM – RB Size 6)

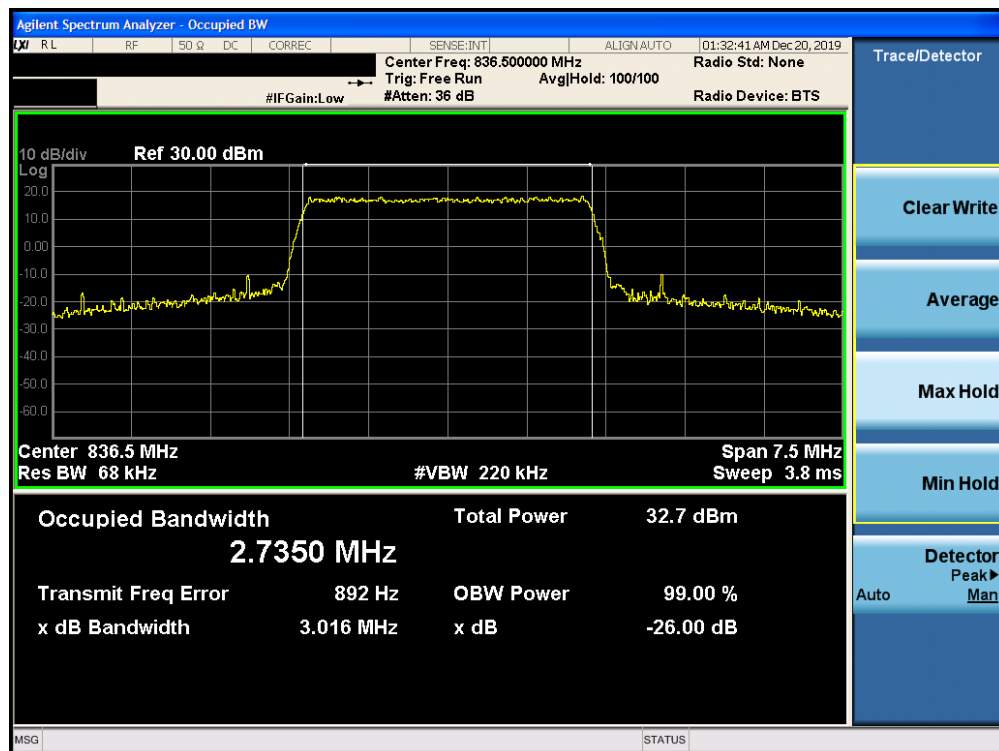


Plot 7-22. Occupied Bandwidth Plot (Band 26/5 – 3.0MHz QPSK – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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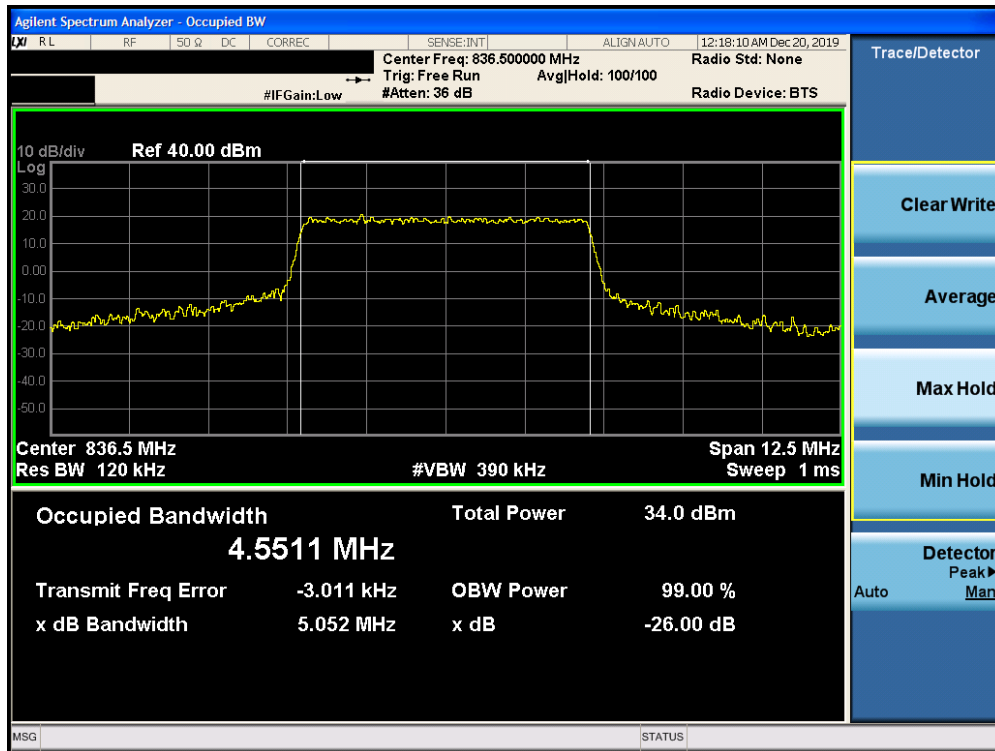


Plot 7-23. Occupied Bandwidth Plot (Band 26/5 – 3.0MHz 16-QAM – RB Size 15)

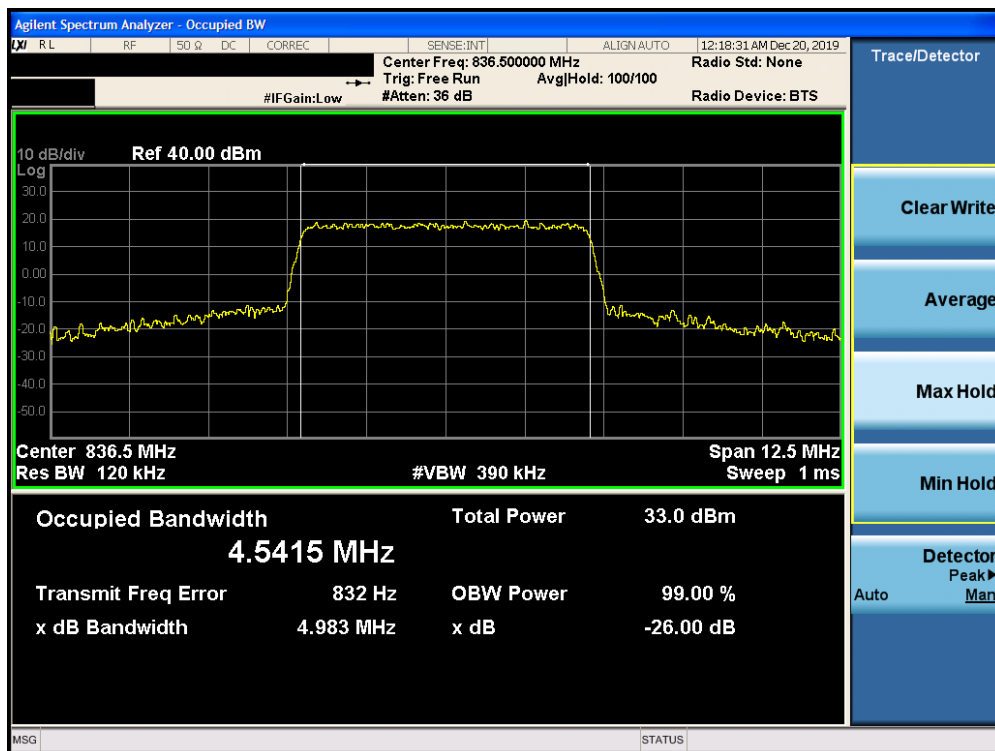


Plot 7-24. Occupied Bandwidth Plot (Band 26/5 – 3.0MHz 64-QAM – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 34 of 398

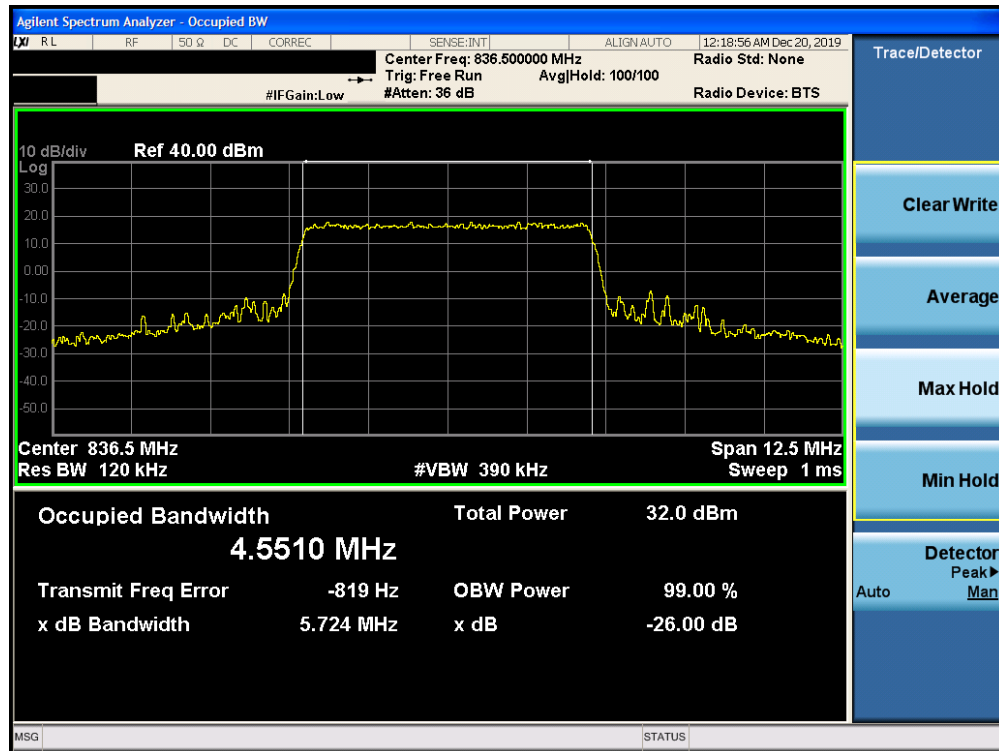


Plot 7-25. Occupied Bandwidth Plot (Band 26/5 – 5.0MHz QPSK – RB Size 25)

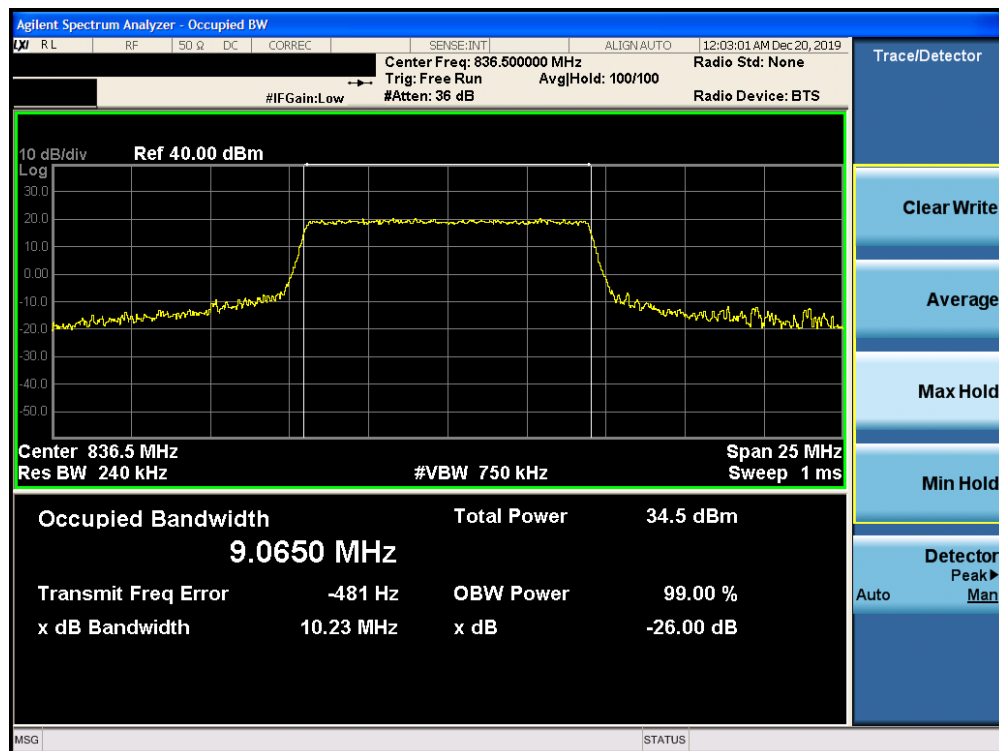


Plot 7-26. Occupied Bandwidth Plot (Band 26/5 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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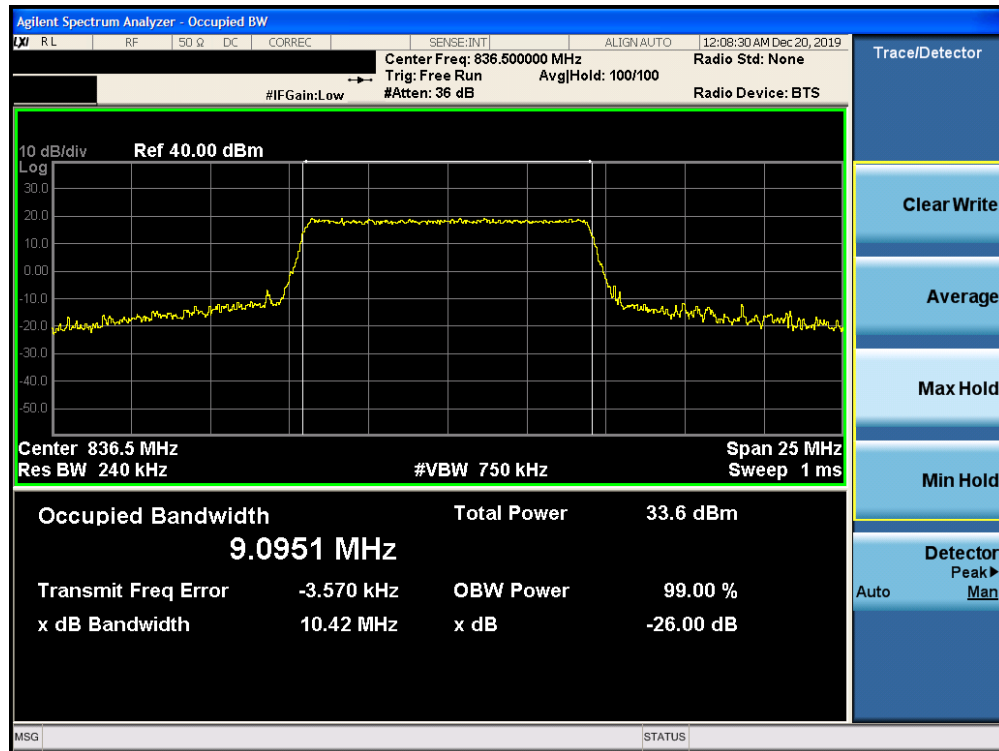


Plot 7-27. Occupied Bandwidth Plot (Band 26/5 – 5.0MHz 64-QAM – RB Size 25)

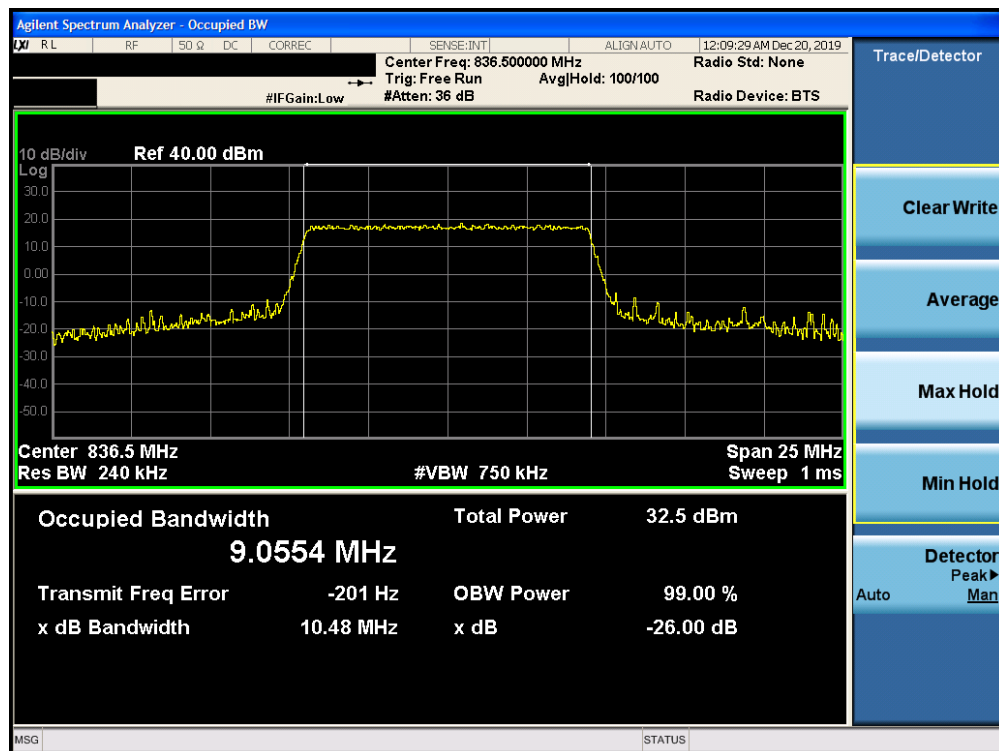


Plot 7-28. Occupied Bandwidth Plot (Band 26/5 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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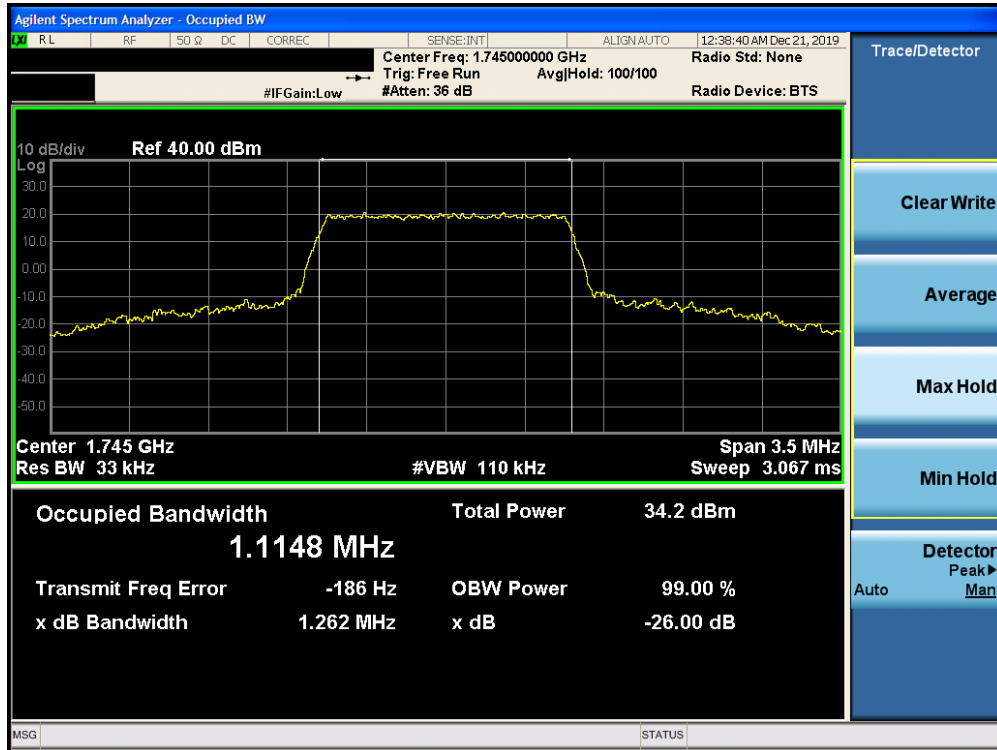


Plot 7-29. Occupied Bandwidth Plot (Band 26/5 – 10.0MHz 16-QAM – RB Size 50)

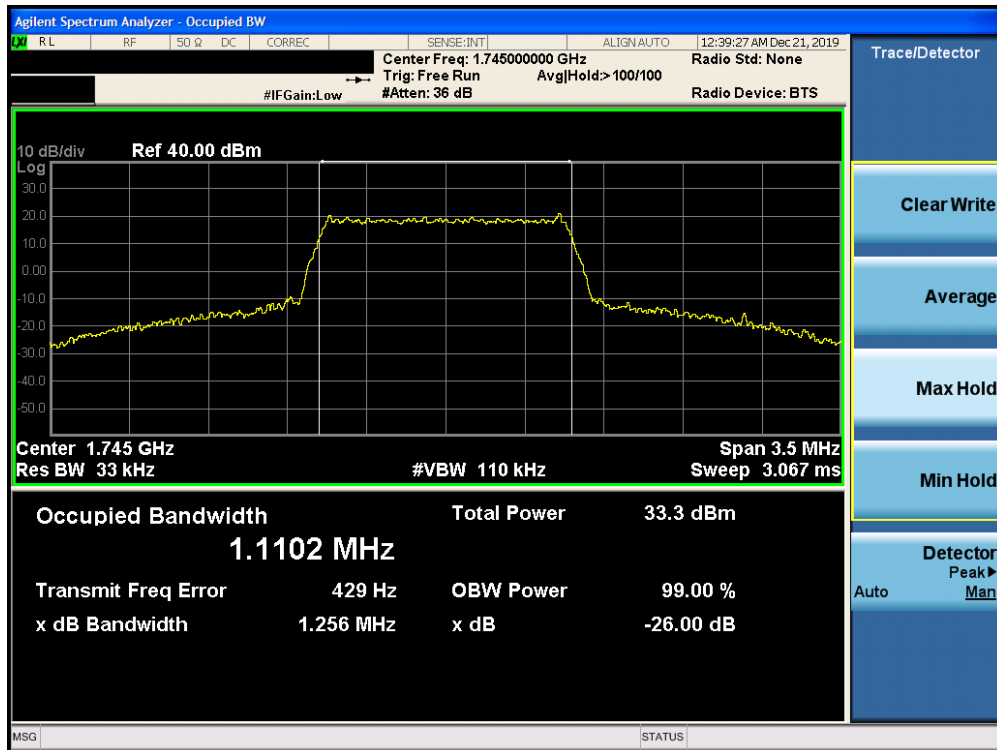


Plot 7-30. Occupied Bandwidth Plot (Band 26/5 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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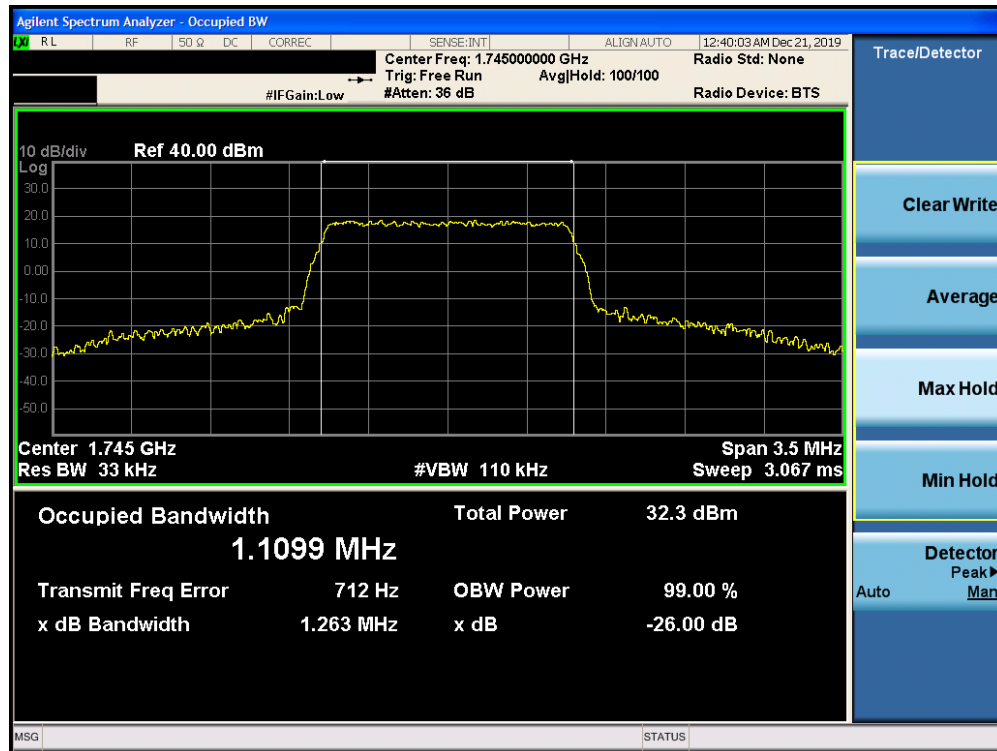


Plot 7-31. Occupied Bandwidth Plot (Band 66/4 – 1.4MHz QPSK – RB Size 6)

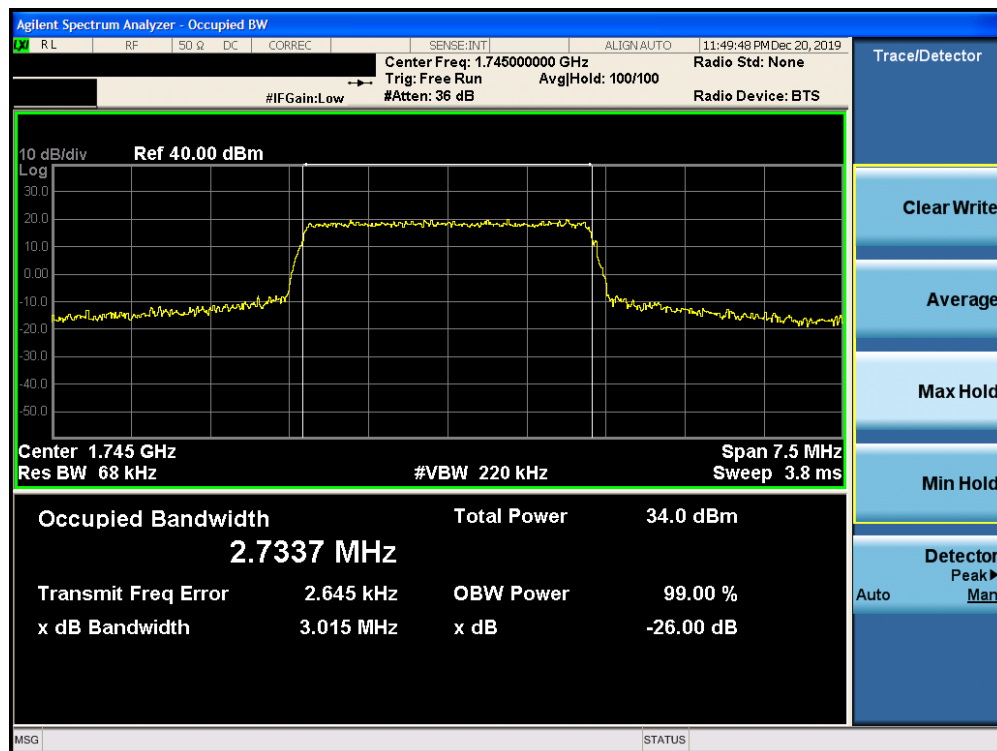


Plot 7-32. Occupied Bandwidth Plot (Band 66/4 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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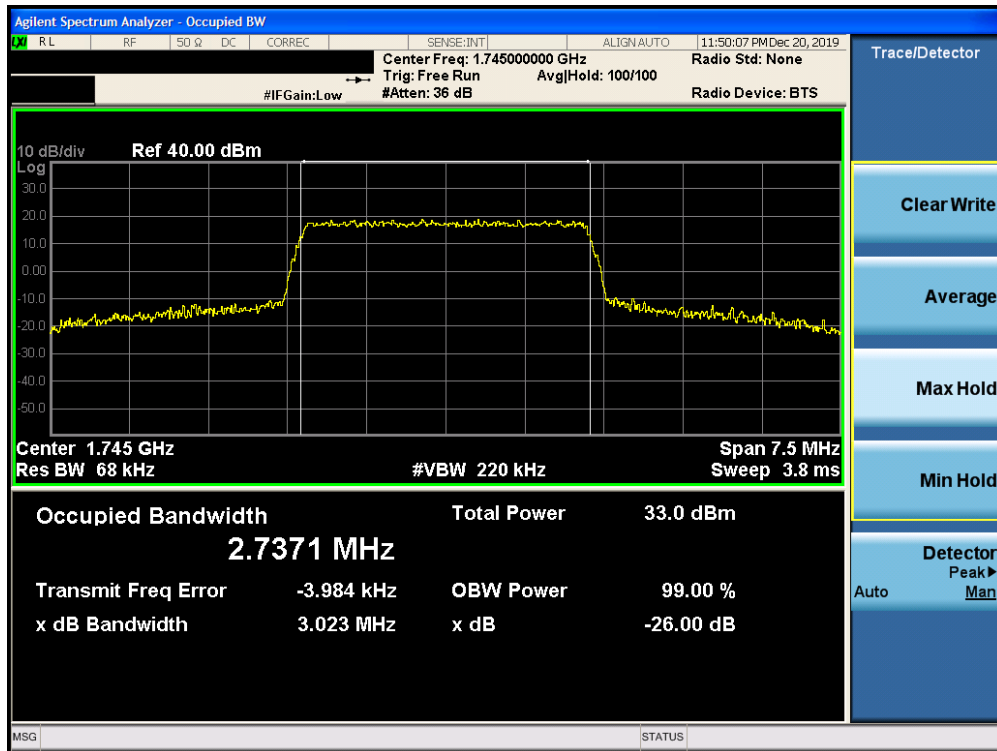


Plot 7-33. Occupied Bandwidth Plot (Band 66/4 – 1.4MHz 64-QAM – RB Size 6)

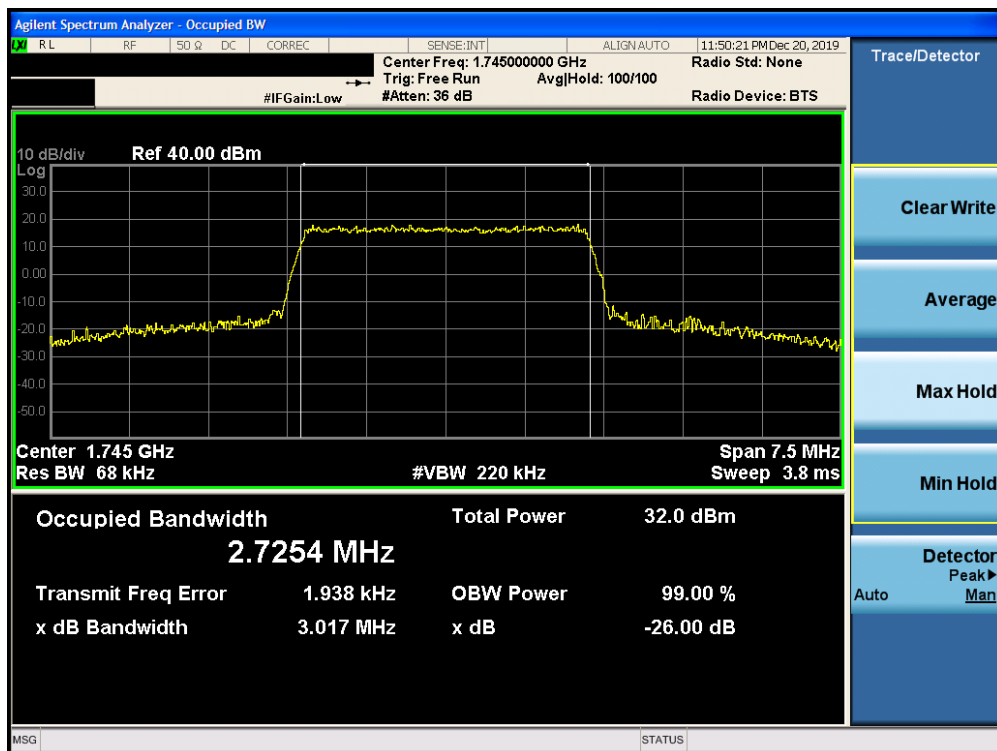


Plot 7-34. Occupied Bandwidth Plot (Band 66/4 – 3.0MHz QPSK – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 39 of 398

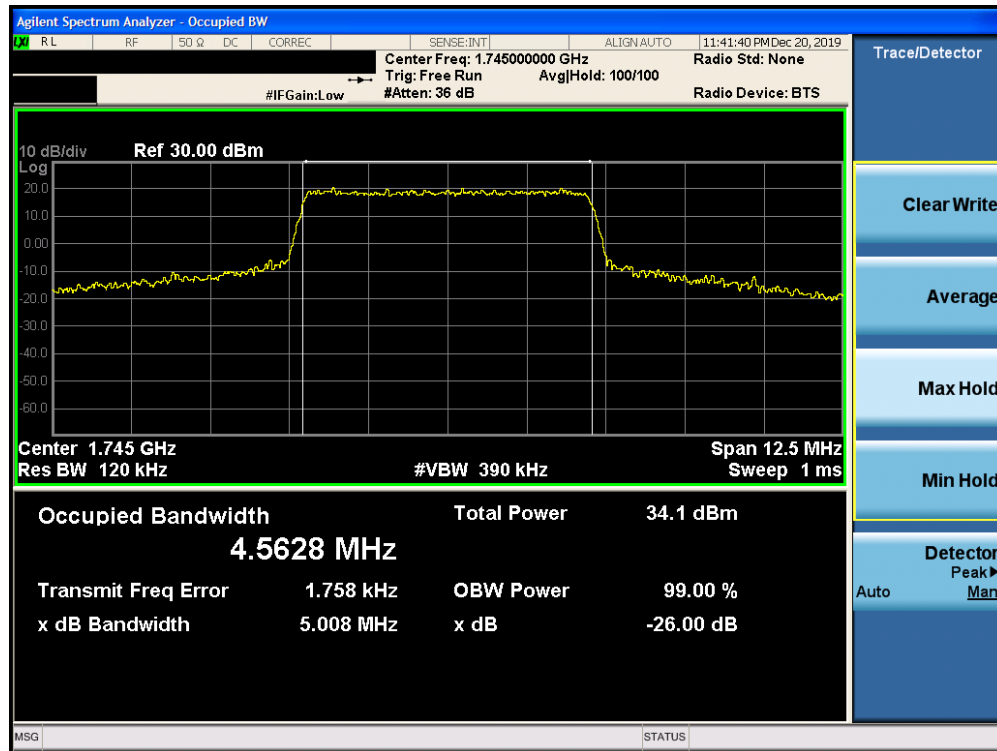


Plot 7-35. Occupied Bandwidth Plot (Band 66/4 – 3.0MHz 16-QAM – RB Size 15)

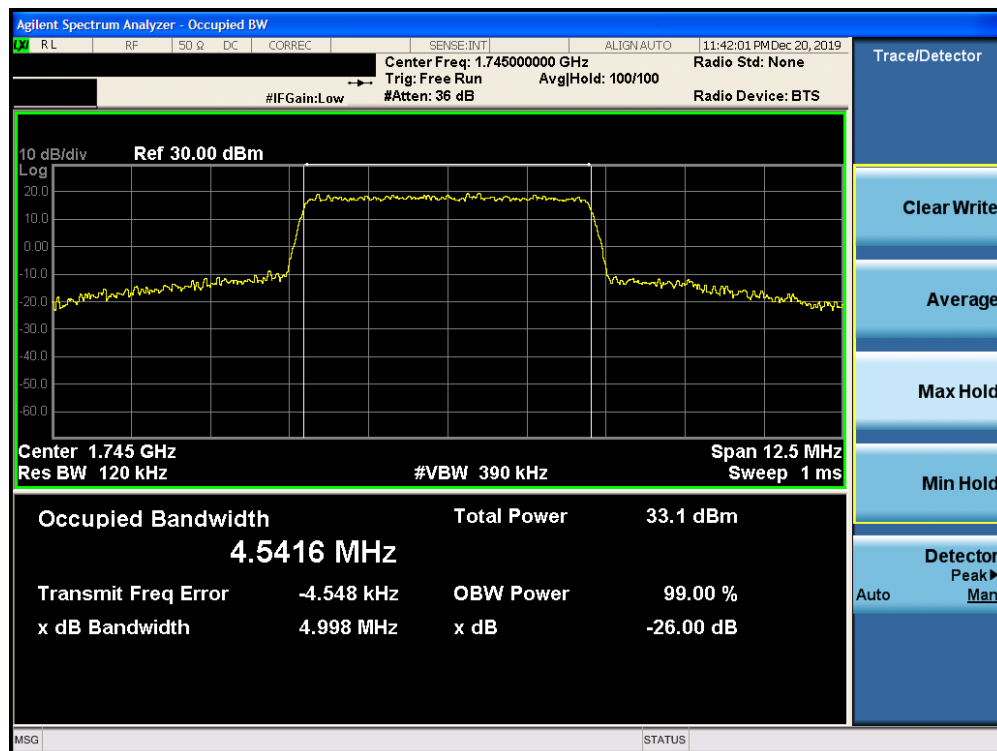


Plot 7-36. Occupied Bandwidth Plot (Band 66/4 – 3.0MHz 64-QAM – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 40 of 398

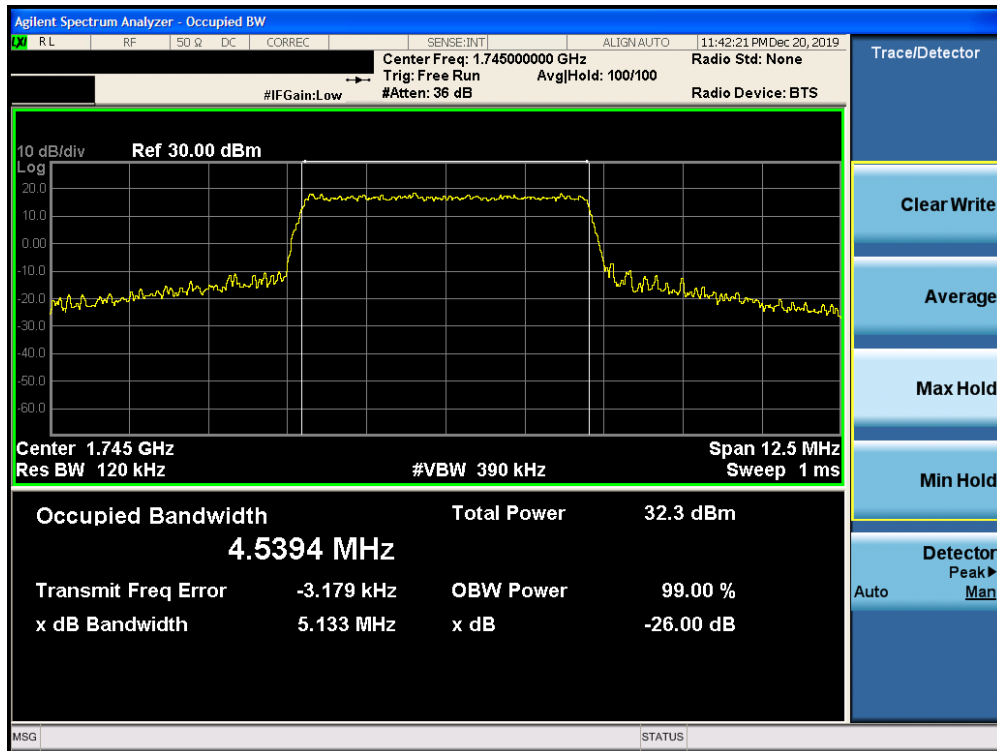


Plot 7-37. Occupied Bandwidth Plot (Band 66/4 – 5.0MHz QPSK – RB Size 25)

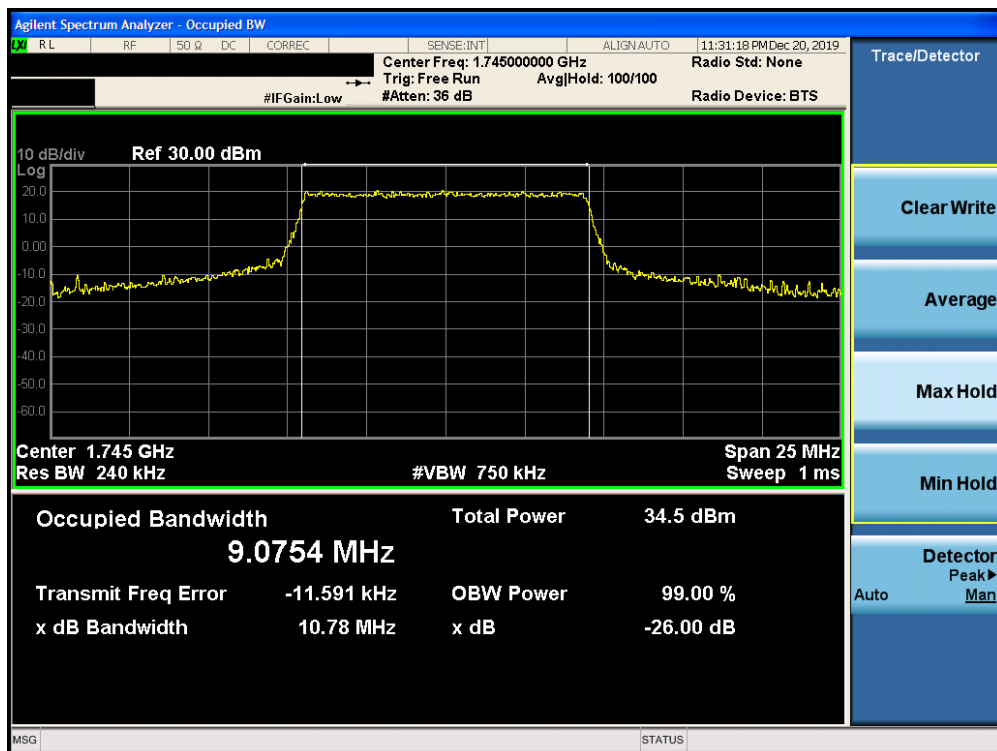


Plot 7-38. Occupied Bandwidth Plot (Band 66/4 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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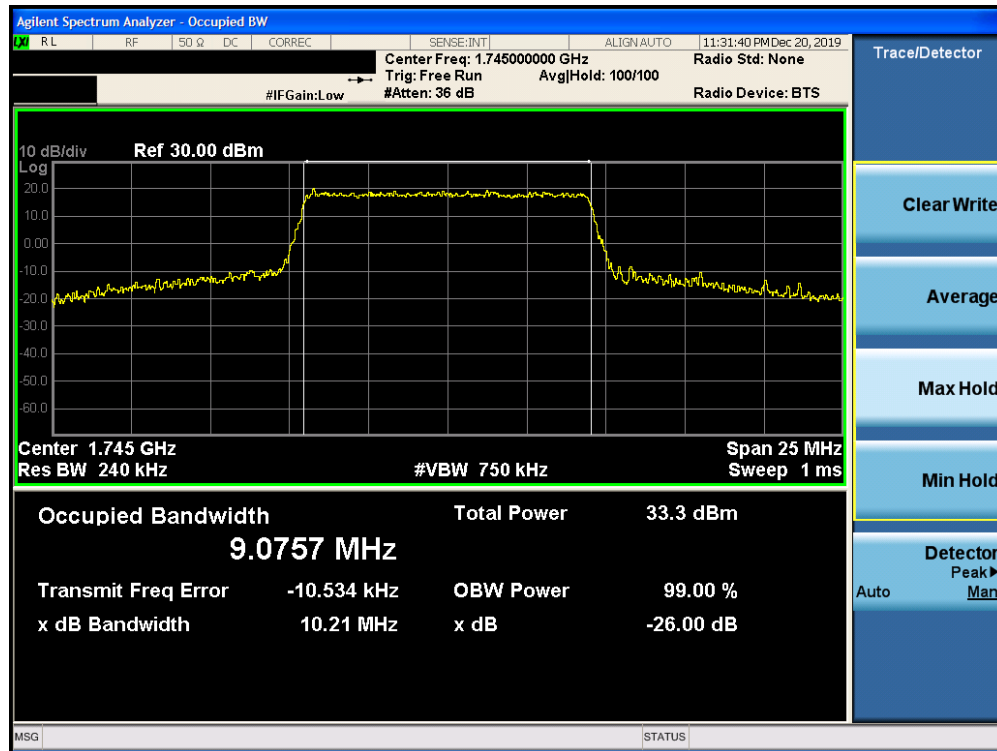


Plot 7-39. Occupied Bandwidth Plot (Band 66/4 – 5.0MHz 64-QAM – RB Size 25)

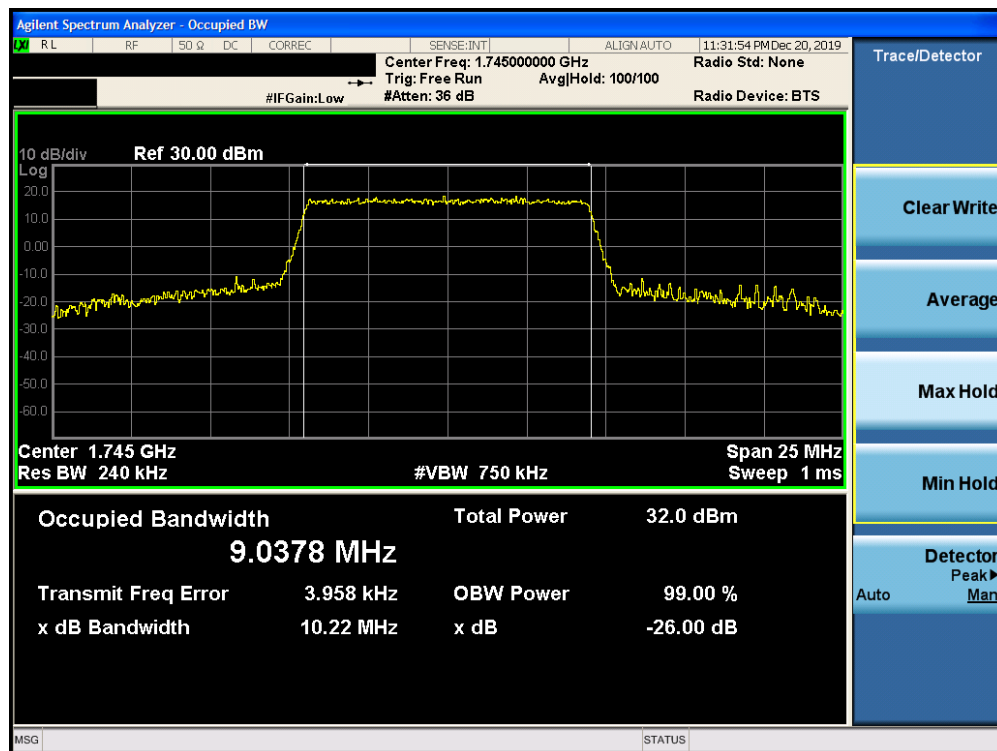


Plot 7-40. Occupied Bandwidth Plot (Band 66/4 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 42 of 398

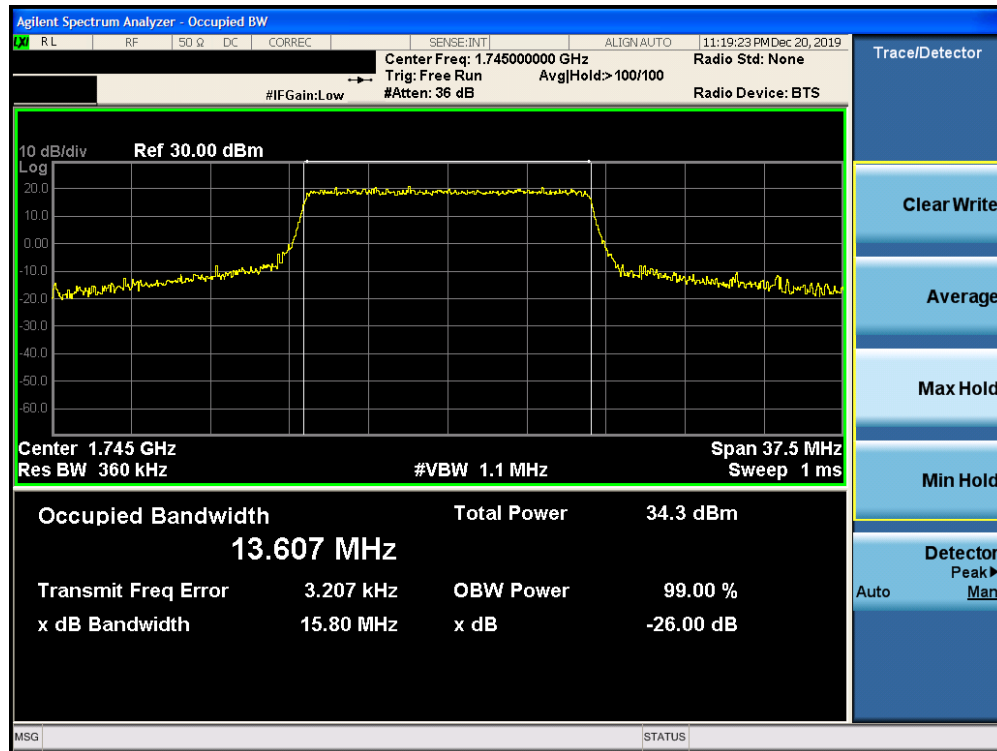


Plot 7-41. Occupied Bandwidth Plot (Band 66/4 – 10.0MHz 16-QAM – RB Size 50)

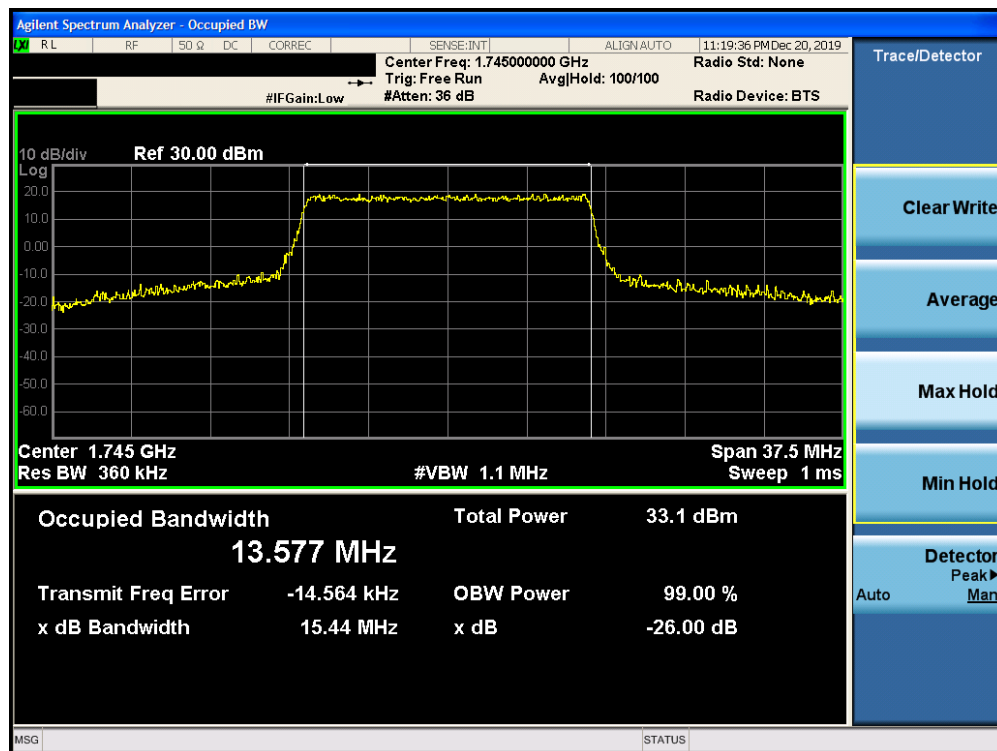


Plot 7-42. Occupied Bandwidth Plot (Band 66/4 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 43 of 398

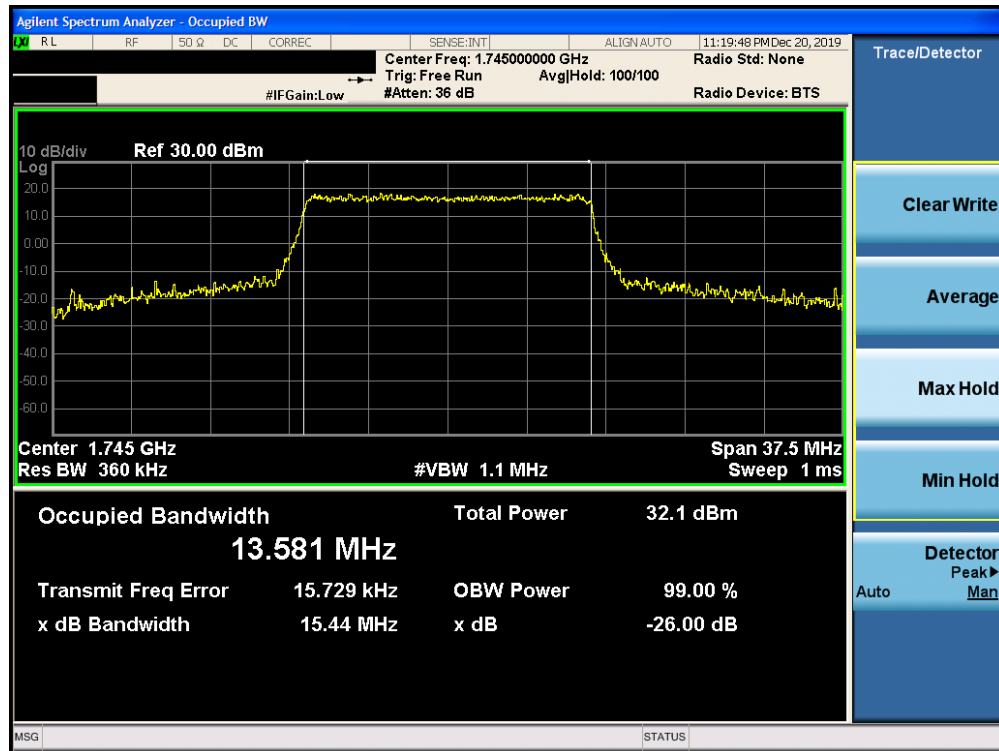


Plot 7-43. Occupied Bandwidth Plot (Band 66/4 – 15.0MHz QPSK – RB Size 75)

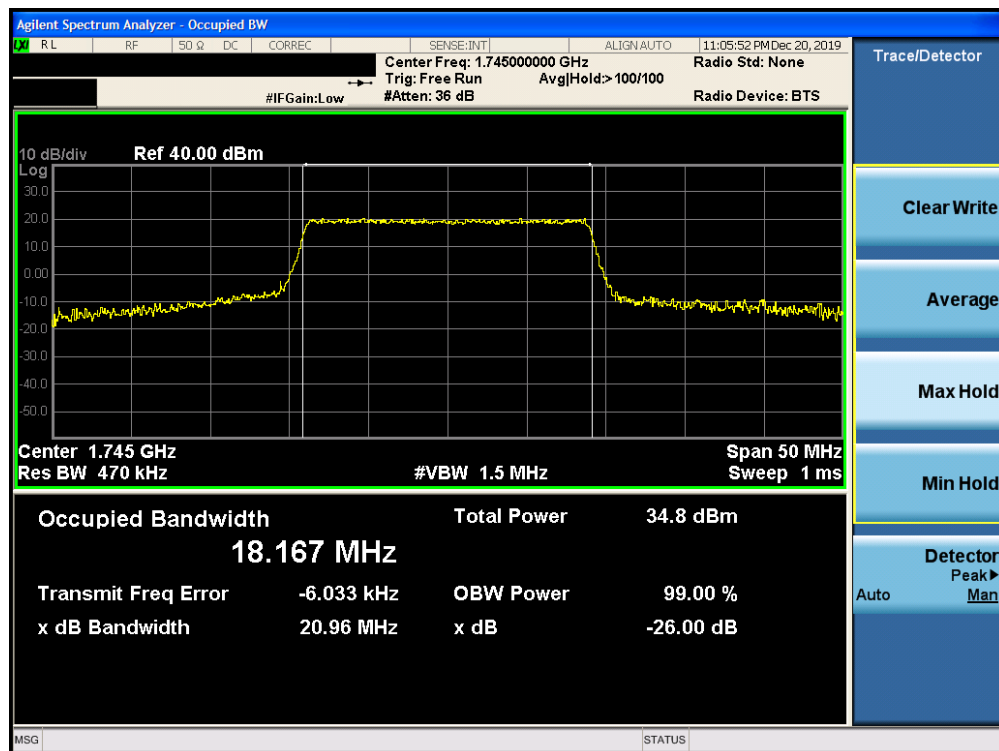


Plot 7-44. Occupied Bandwidth Plot (Band 66/4 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 44 of 398

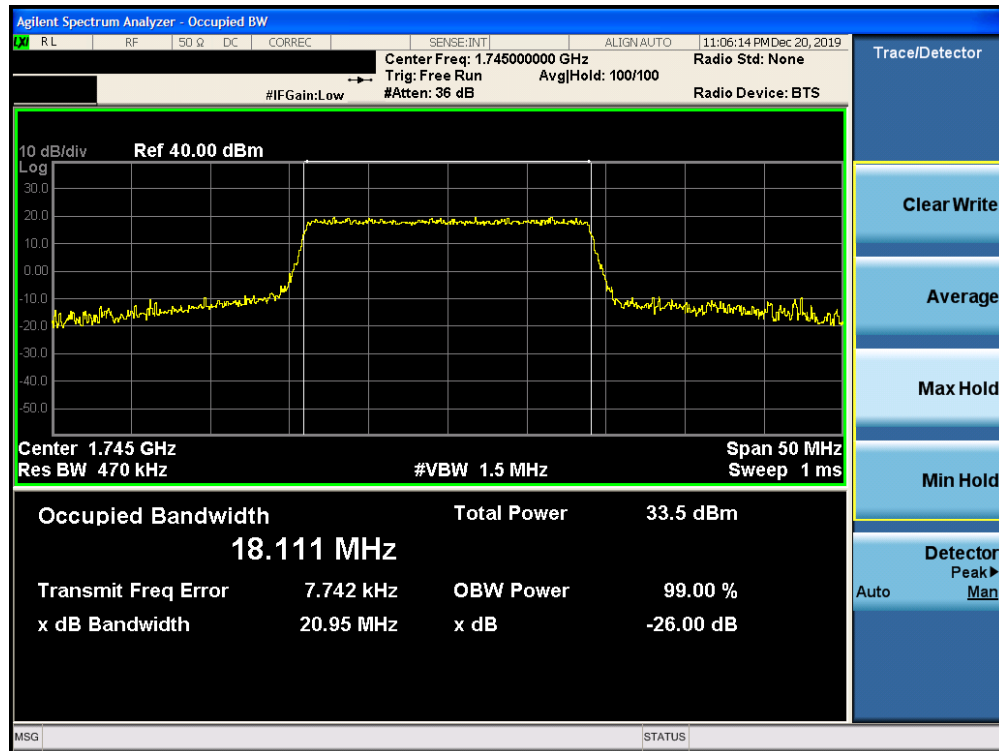


Plot 7-45. Occupied Bandwidth Plot (Band 66/4 – 15.0MHz 64-QAM – RB Size 75)

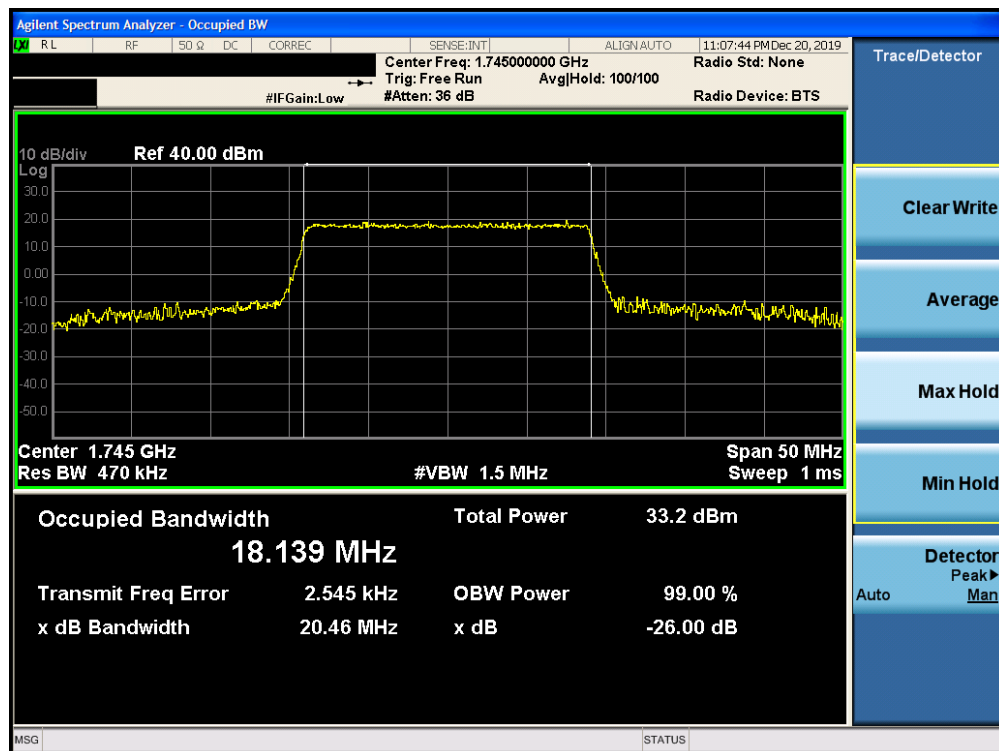


Plot 7-46. Occupied Bandwidth Plot (Band 66/4 – 20.0MHz QPSK – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 45 of 398

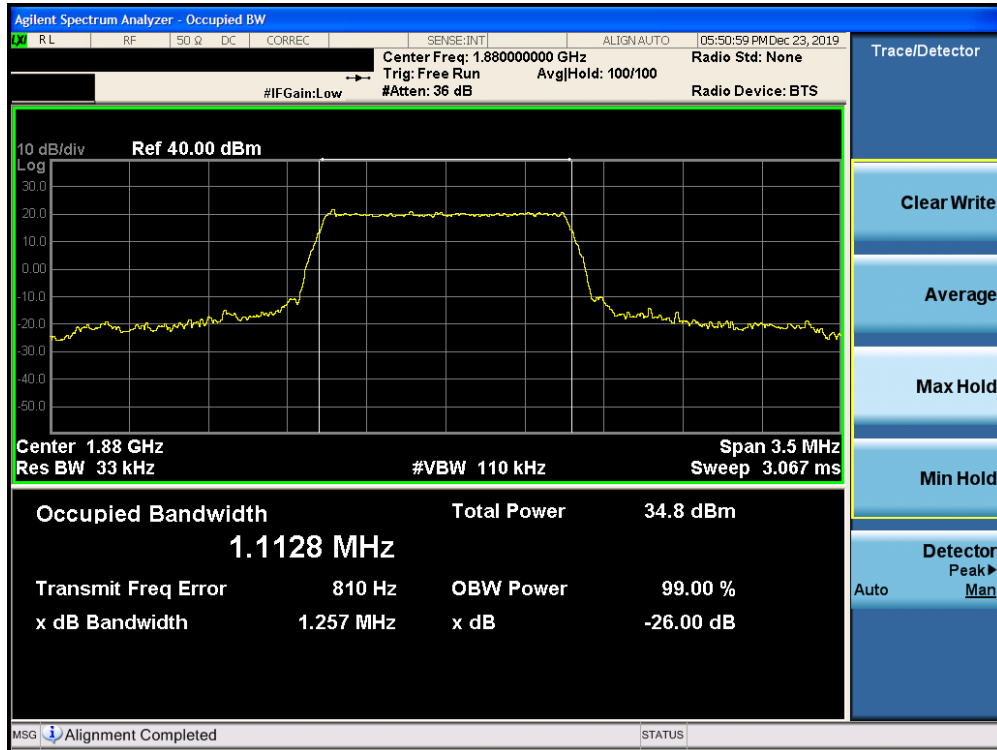


Plot 7-47. Occupied Bandwidth Plot (Band 66/4 – 20.0MHz 16-QAM – RB Size 100)

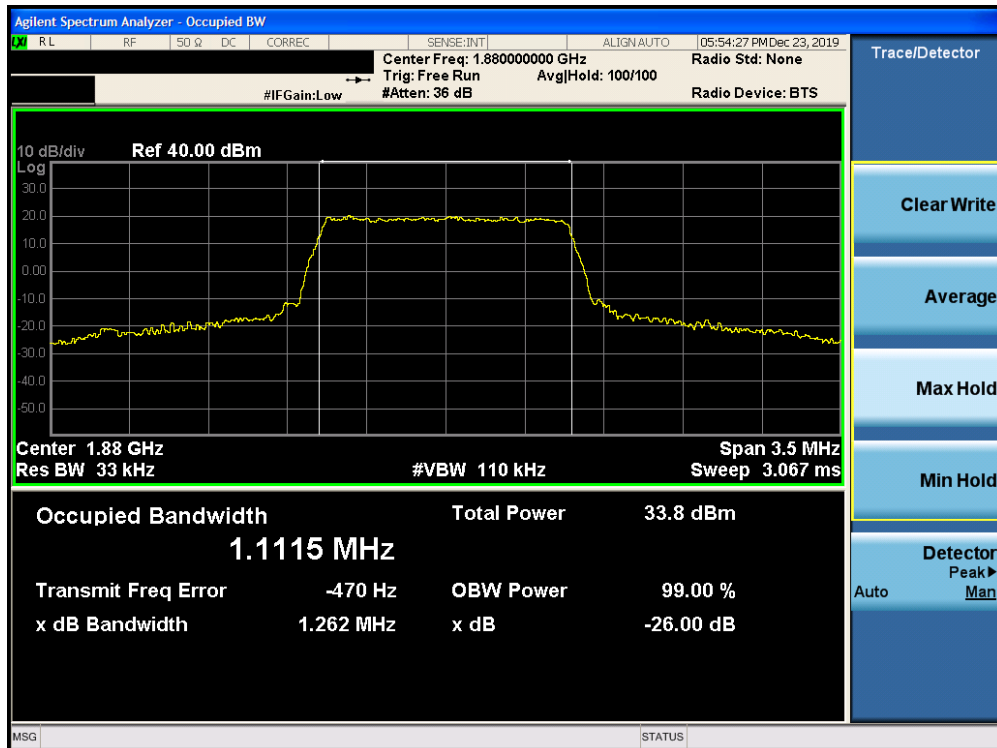


Plot 7-48. Occupied Bandwidth Plot (Band 66/4 – 20.0MHz 64-QAM – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 46 of 398

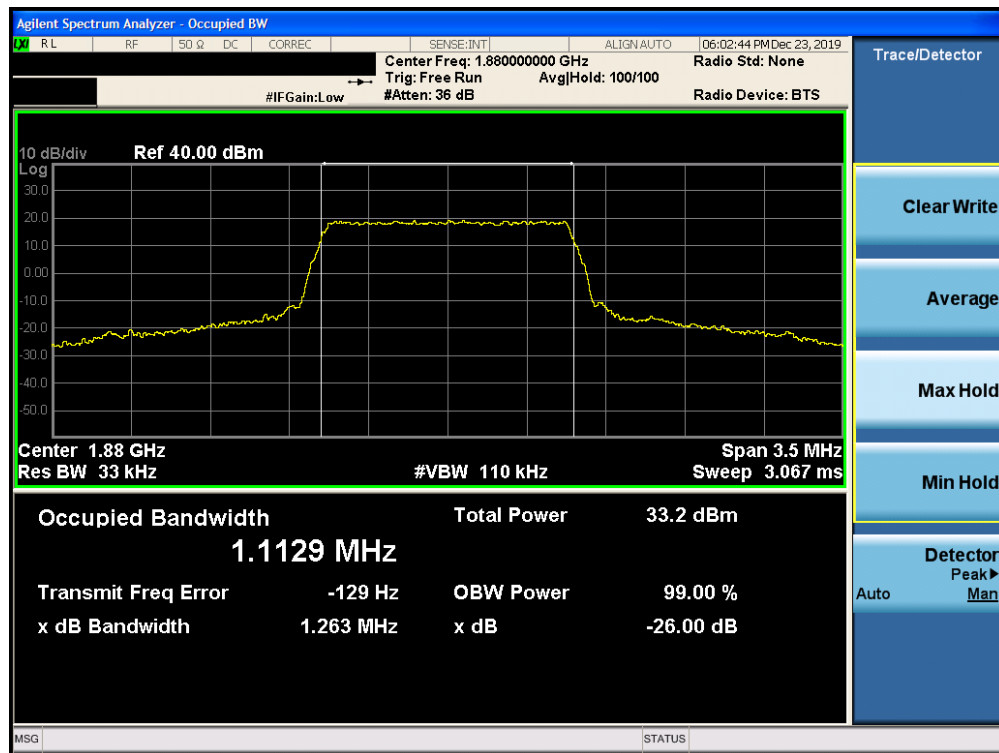


Plot 7-49. Occupied Bandwidth Plot (Band 25/2 – 1.4MHz QPSK – RB Size 6)

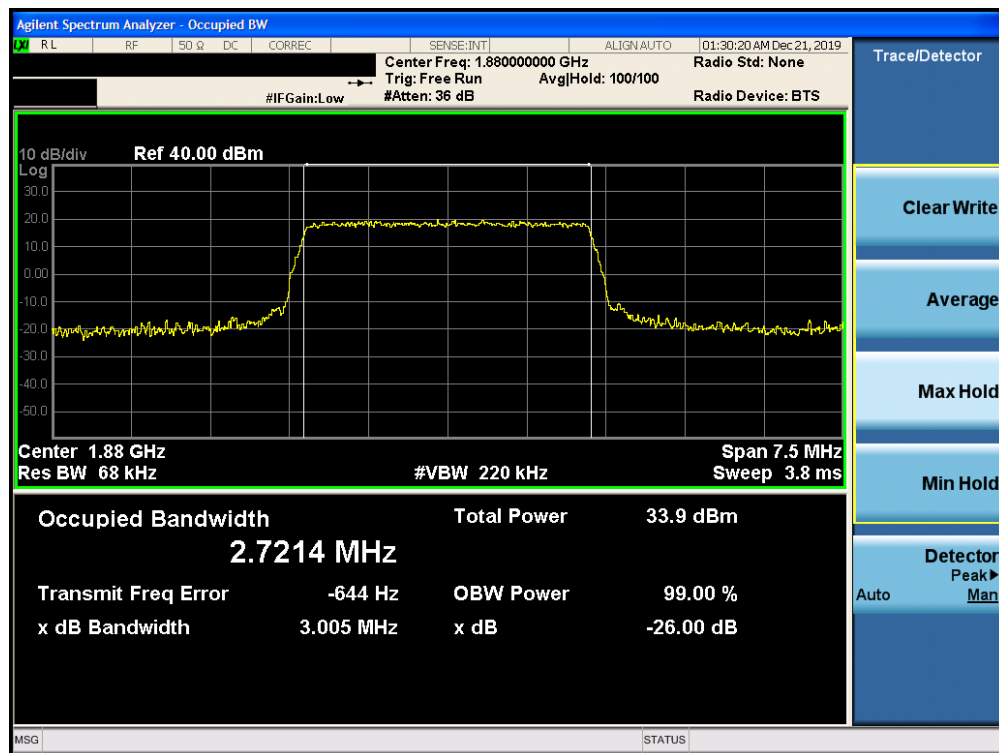


Plot 7-50. Occupied Bandwidth Plot (Band 25/2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 47 of 398

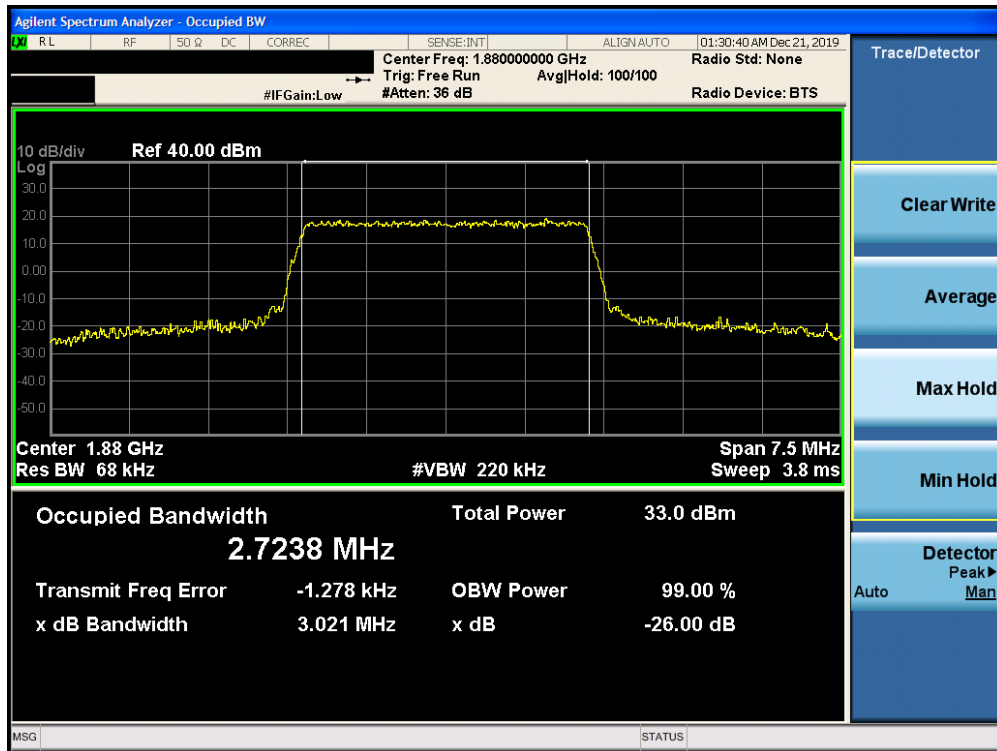


Plot 7-51. Occupied Bandwidth Plot (Band 25/2 – 1.4MHz 64-QAM – RB Size 6)

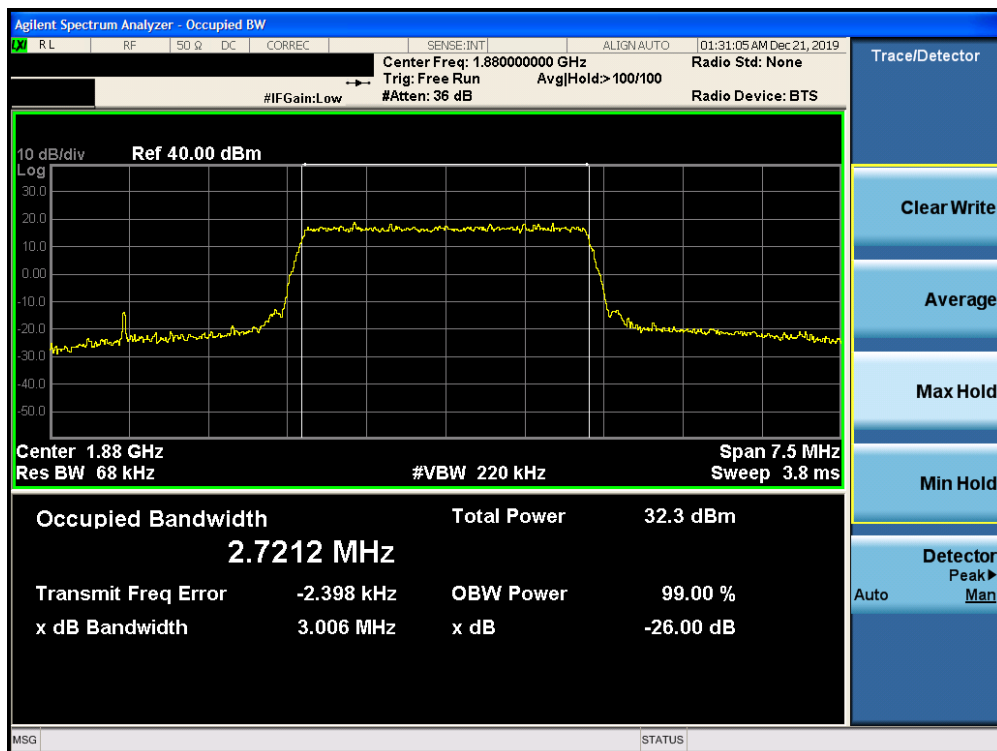


Plot 7-52. Occupied Bandwidth Plot (Band 25/2 – 3.0MHz QPSK – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 48 of 398

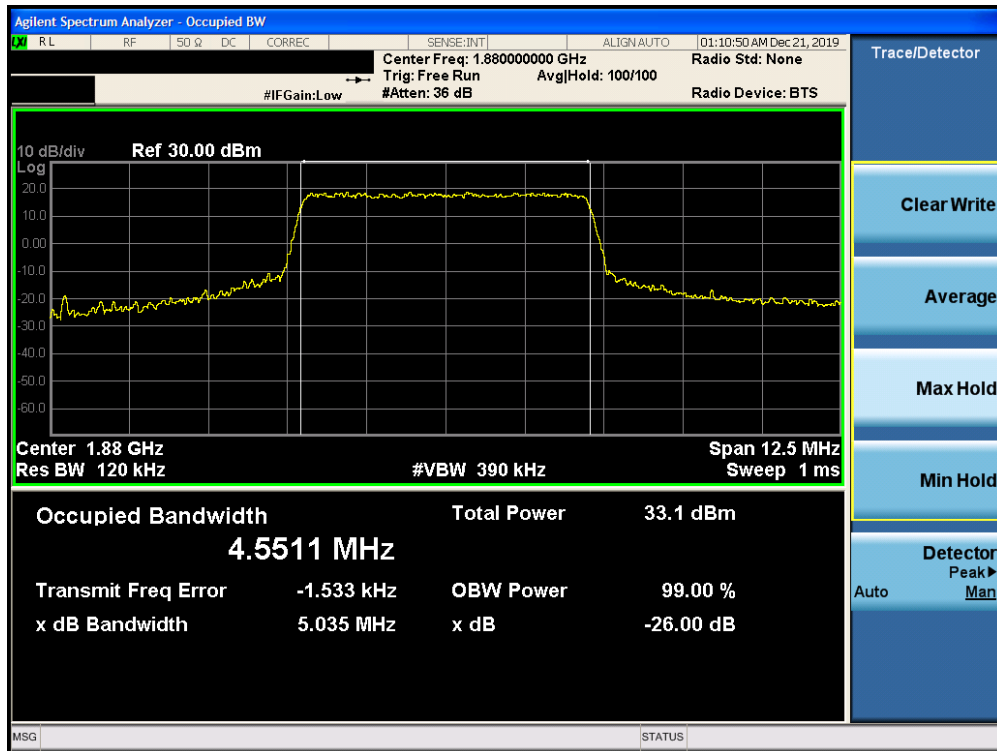


Plot 7-53. Occupied Bandwidth Plot (Band 25/2 – 3.0MHz 16-QAM – RB Size 15)

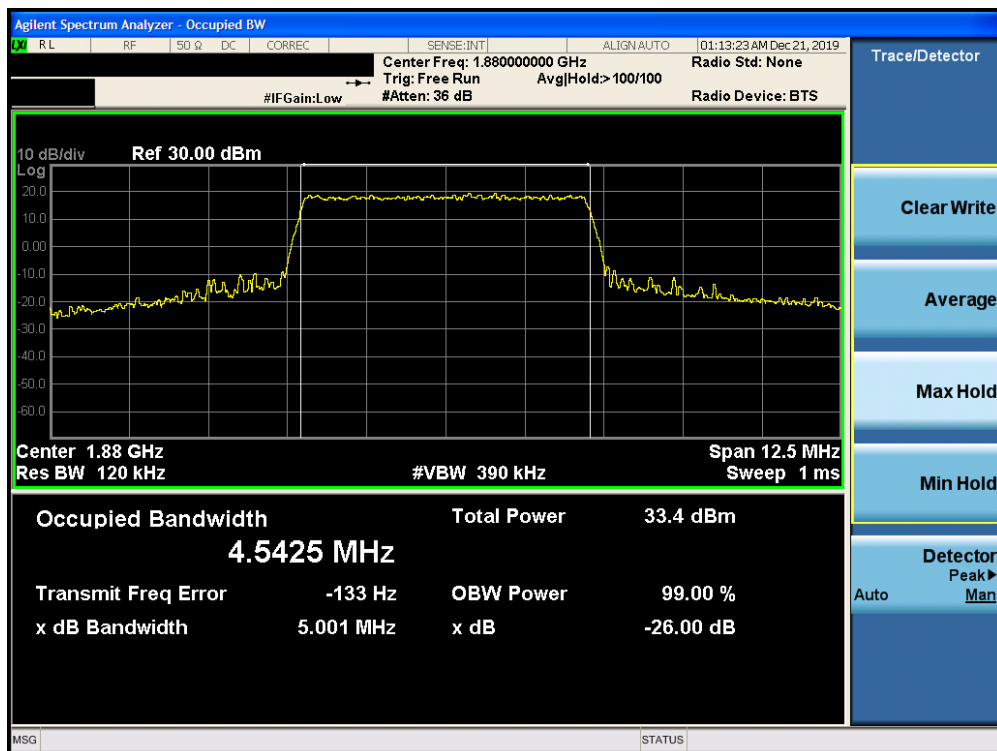


Plot 7-54. Occupied Bandwidth Plot (Band 25/2 – 3.0MHz 64-QAM – RB Size 15)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 49 of 398

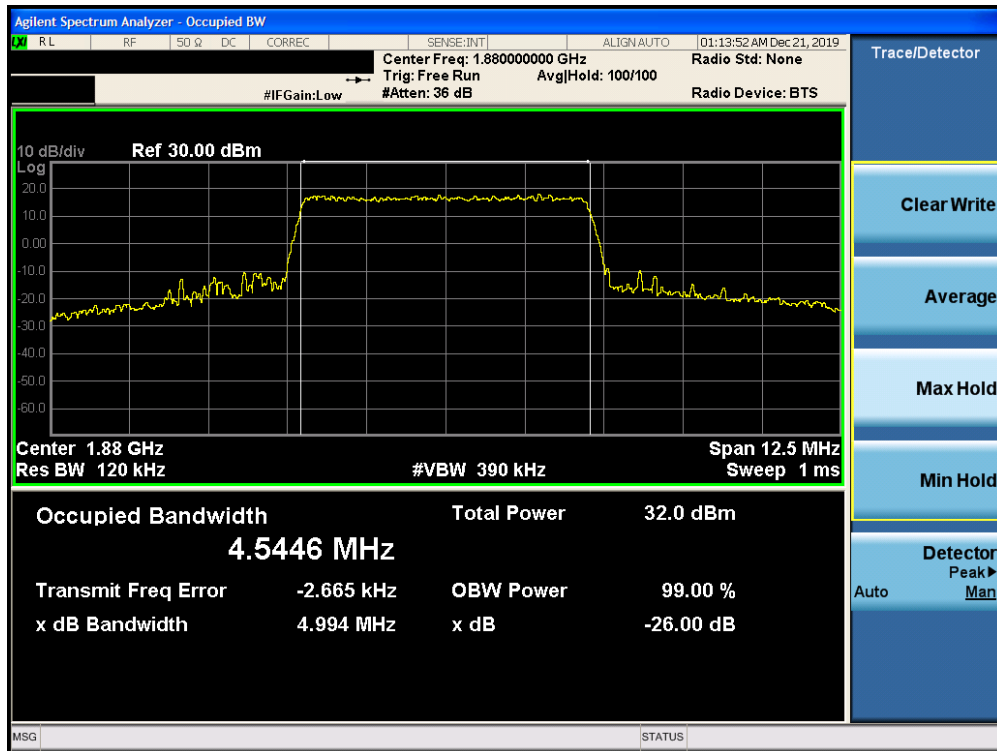


Plot 7-55. Occupied Bandwidth Plot (Band 25/2 – 5.0MHz QPSK – RB Size 25)

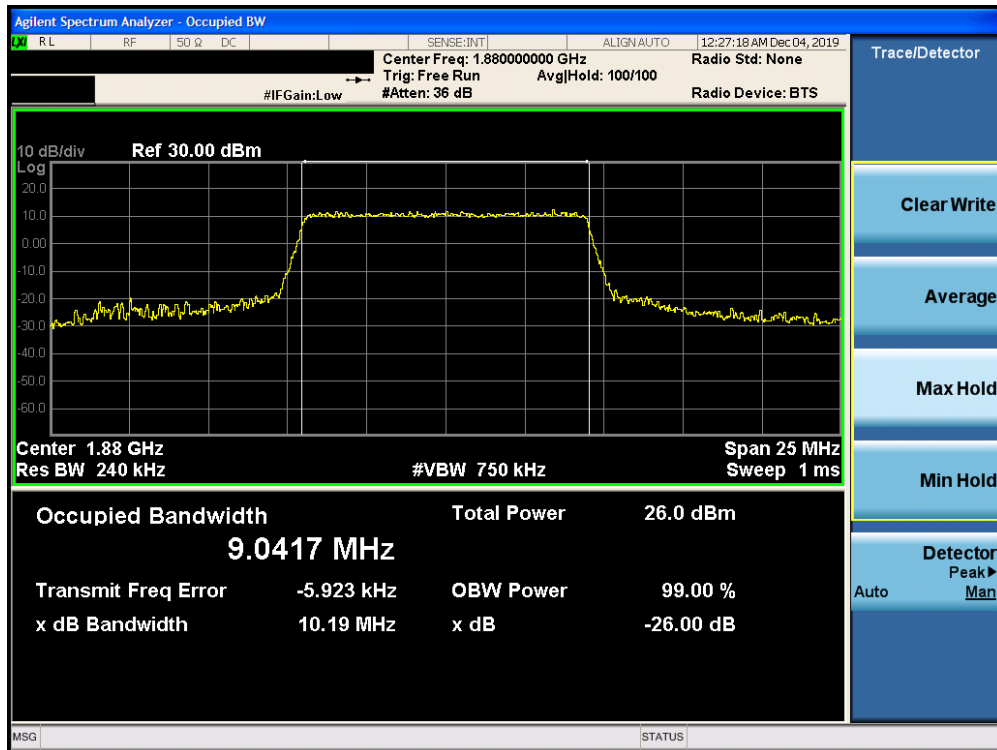


Plot 7-56. Occupied Bandwidth Plot (Band 25/2 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 50 of 398

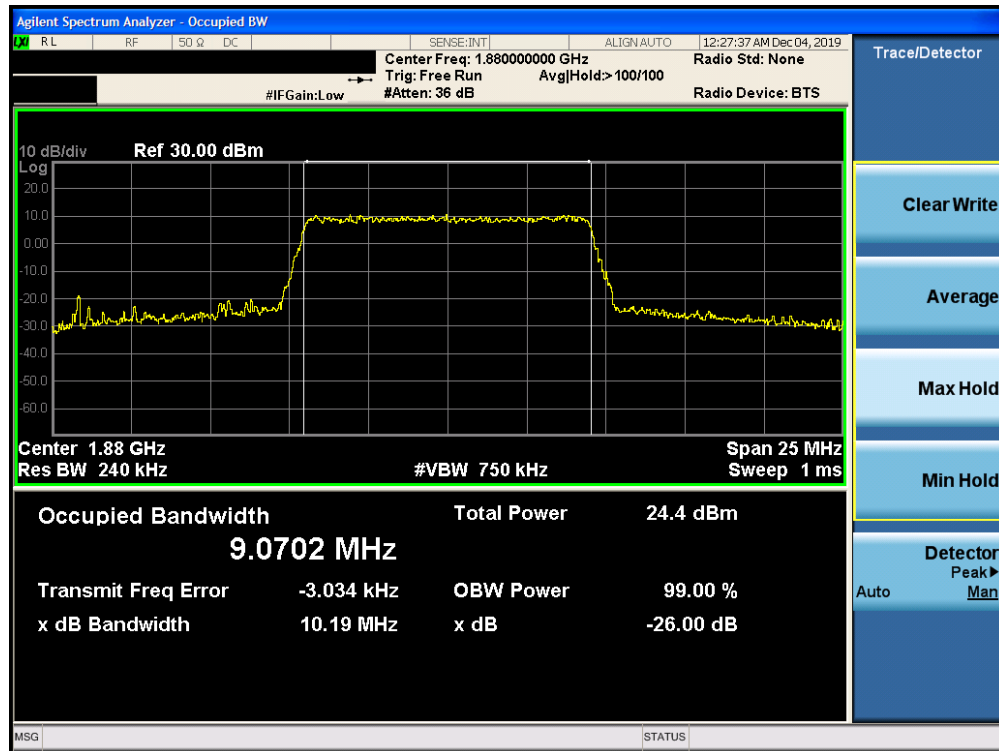


Plot 7-57. Occupied Bandwidth Plot (Band 25/2 – 5.0MHz 64-QAM – RB Size 25)

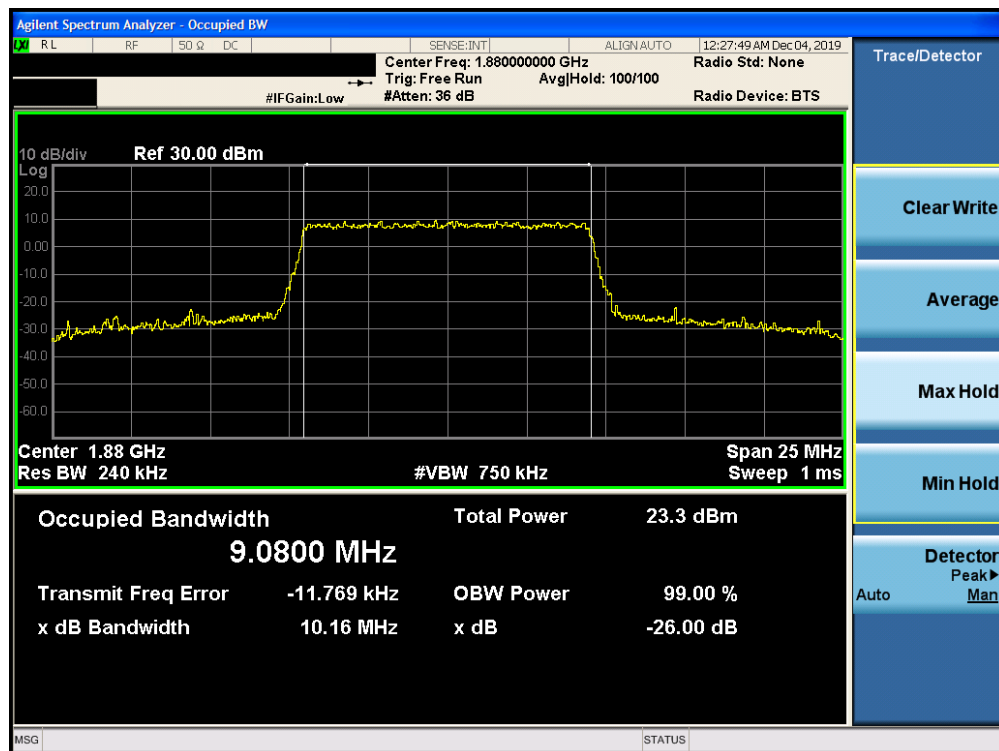


Plot 7-58. Occupied Bandwidth Plot (Band 25/2 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 51 of 398

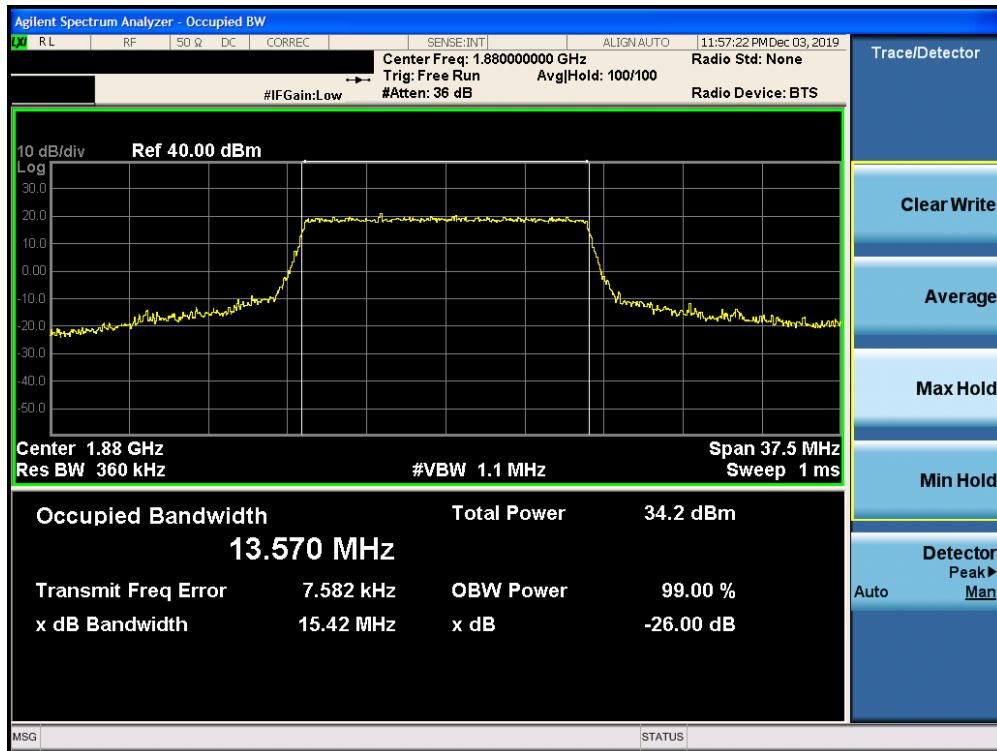


Plot 7-59. Occupied Bandwidth Plot (Band 25/2 – 10.0MHz 16-QAM – RB Size 50)

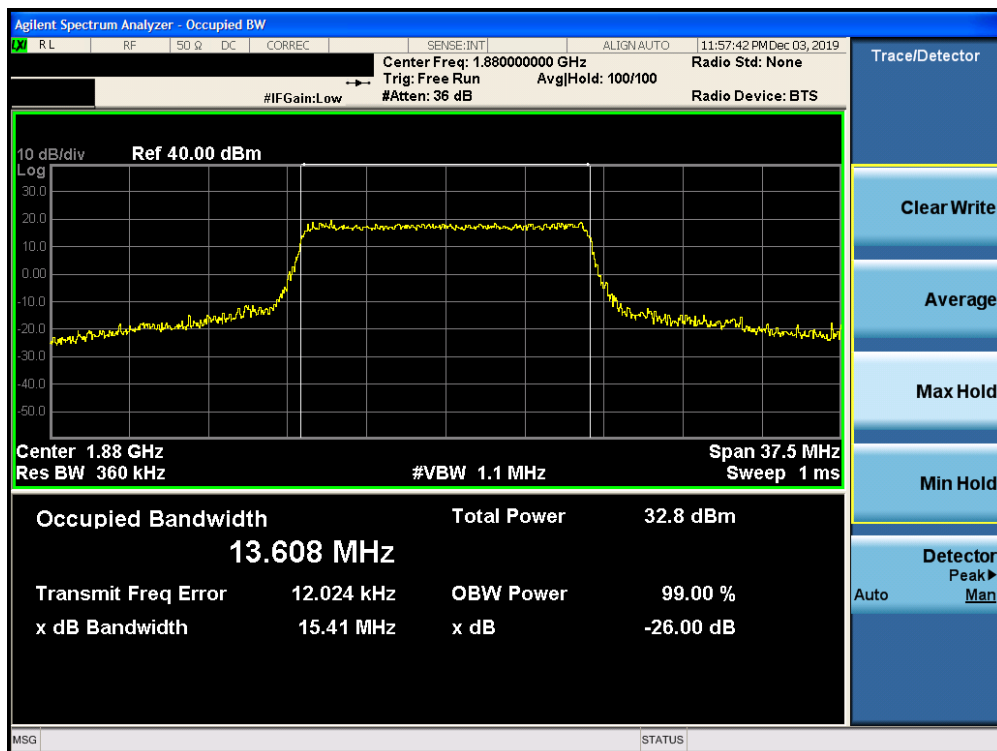


Plot 7-60. Occupied Bandwidth Plot (Band 25/2 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 52 of 398

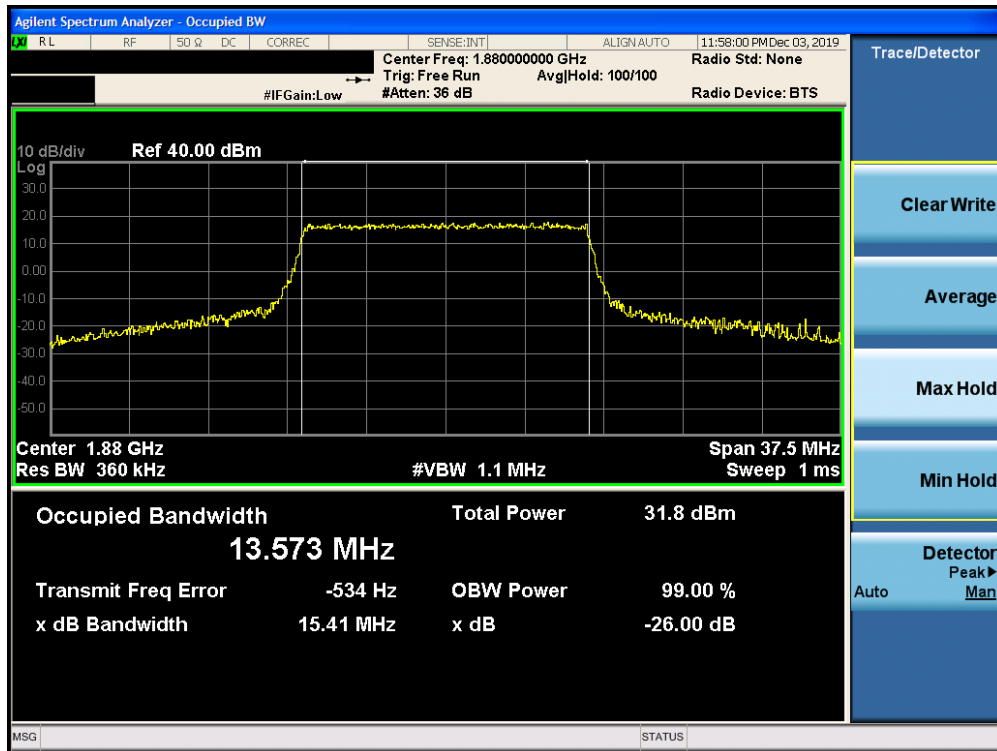


Plot 7-61. Occupied Bandwidth Plot (Band 25/2 – 15.0MHz QPSK – RB Size 75)

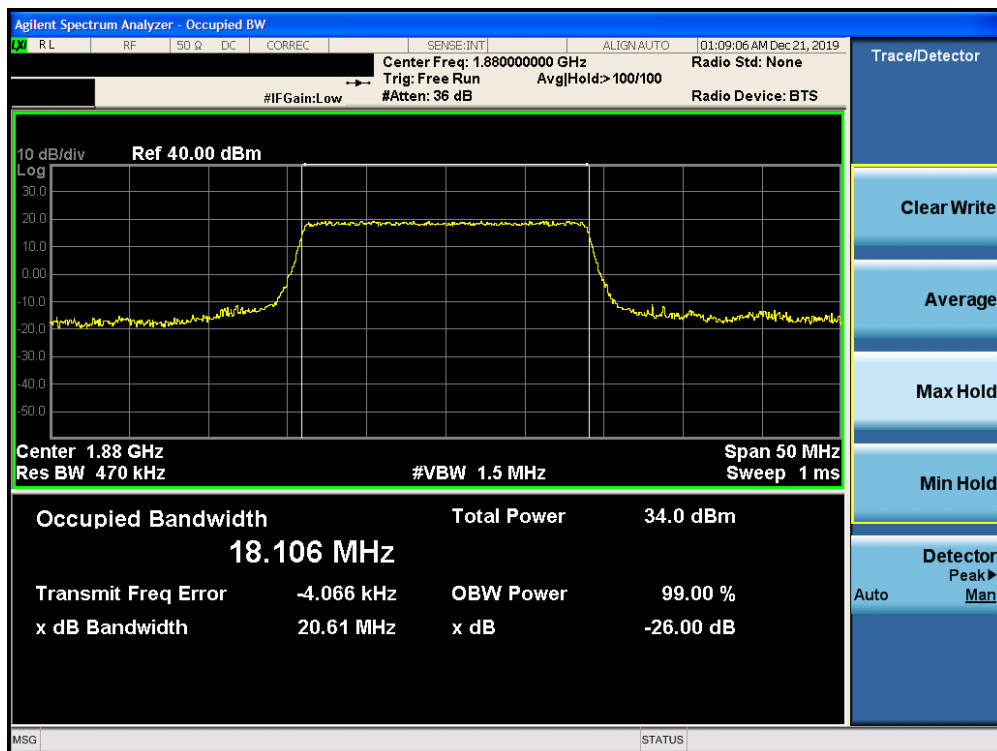


Plot 7-62. Occupied Bandwidth Plot (Band 25/2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 53 of 398

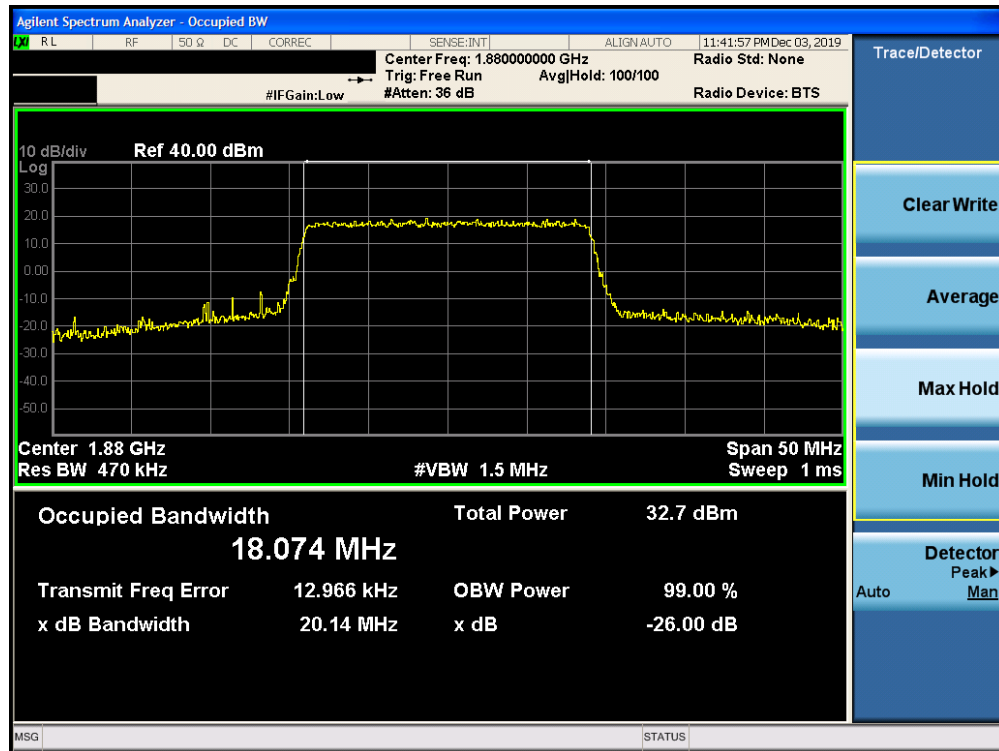


Plot 7-63. Occupied Bandwidth Plot (Band 25/2 – 15.0MHz 64-QAM – RB Size 75)

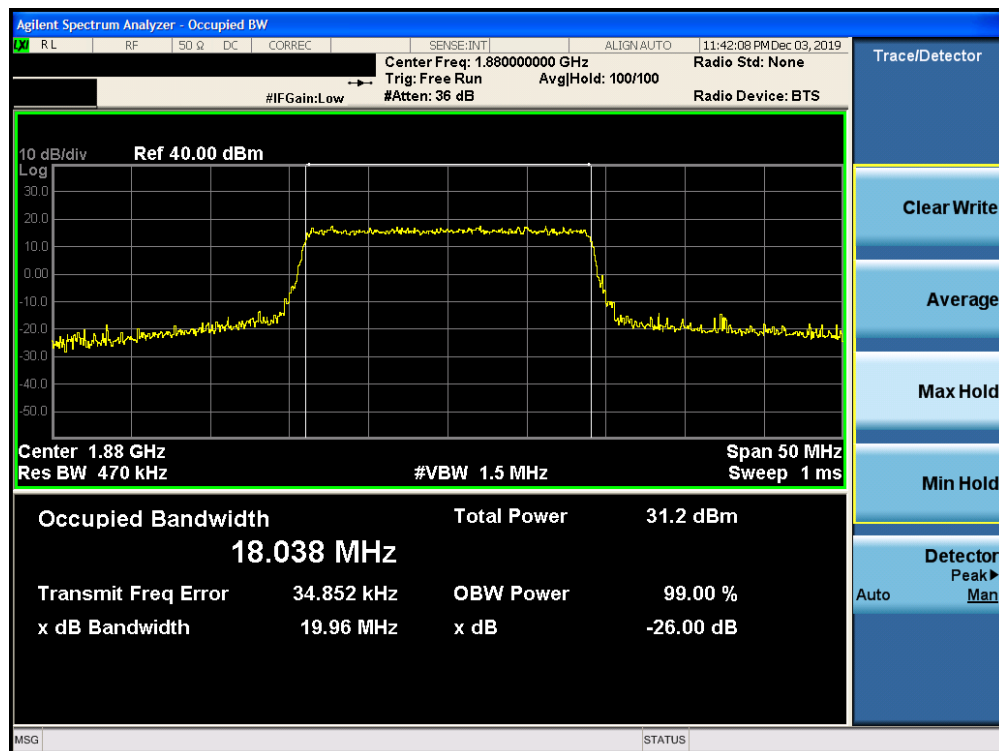


Plot 7-64. Occupied Bandwidth Plot (Band 25/2 – 20.0MHz QPSK – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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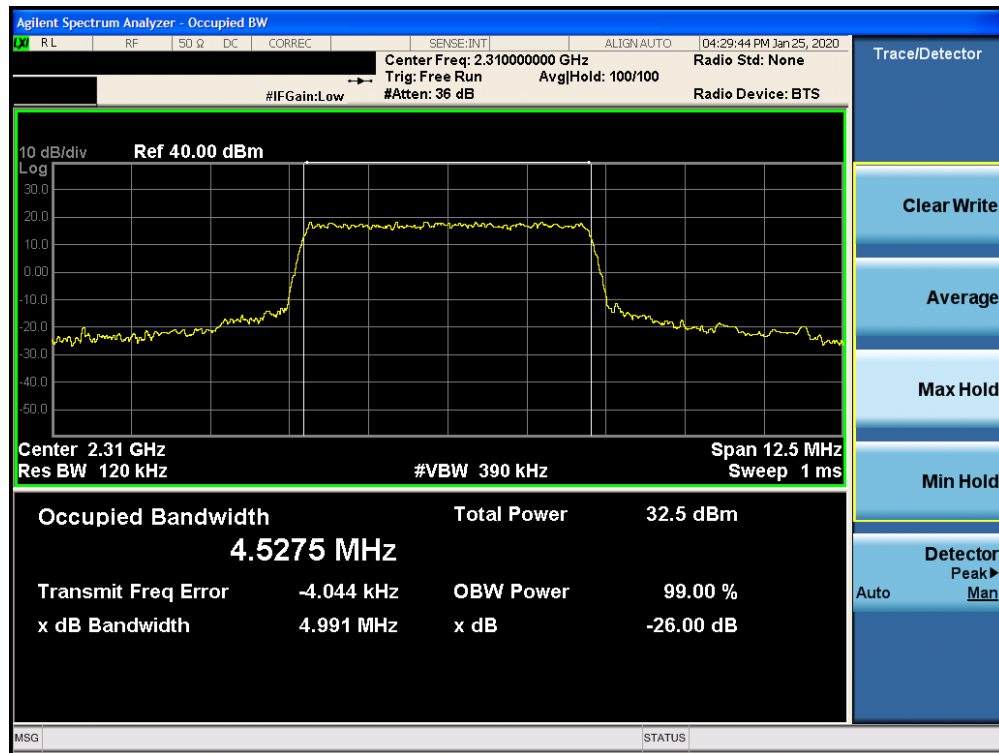
Plot 7-65. Occupied Bandwidth Plot (Band 25/2 – 20.0MHz 16-QAM – RB Size 100)



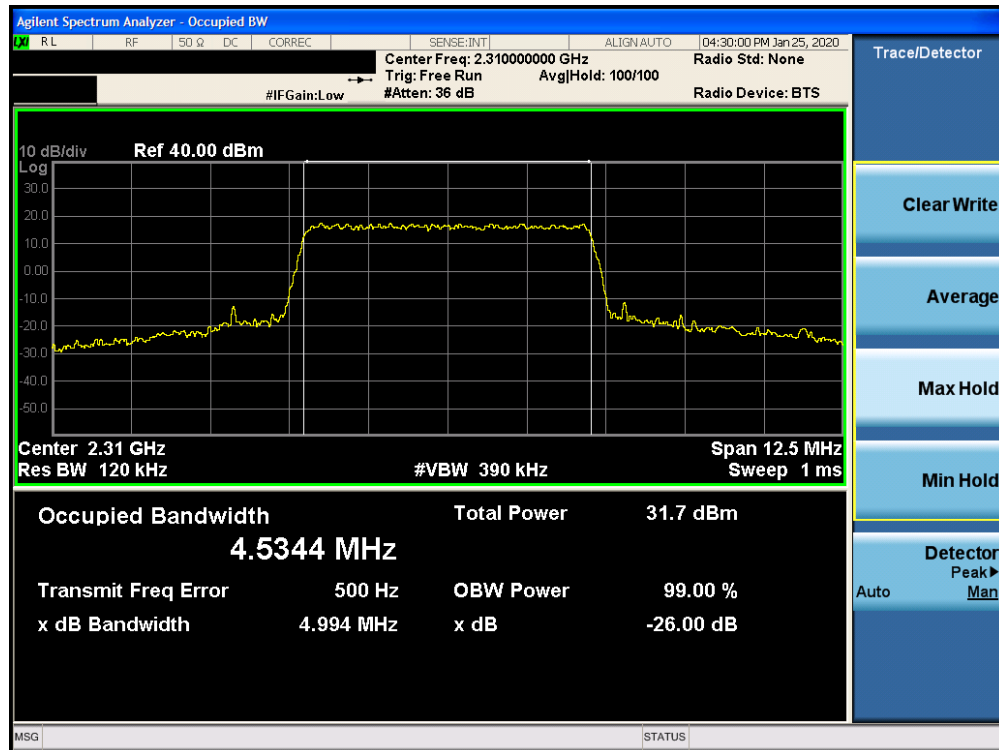
Plot 7-66. Occupied Bandwidth Plot (Band 25/2 – 20.0MHz 64-QAM – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 55 of 398

Band 30

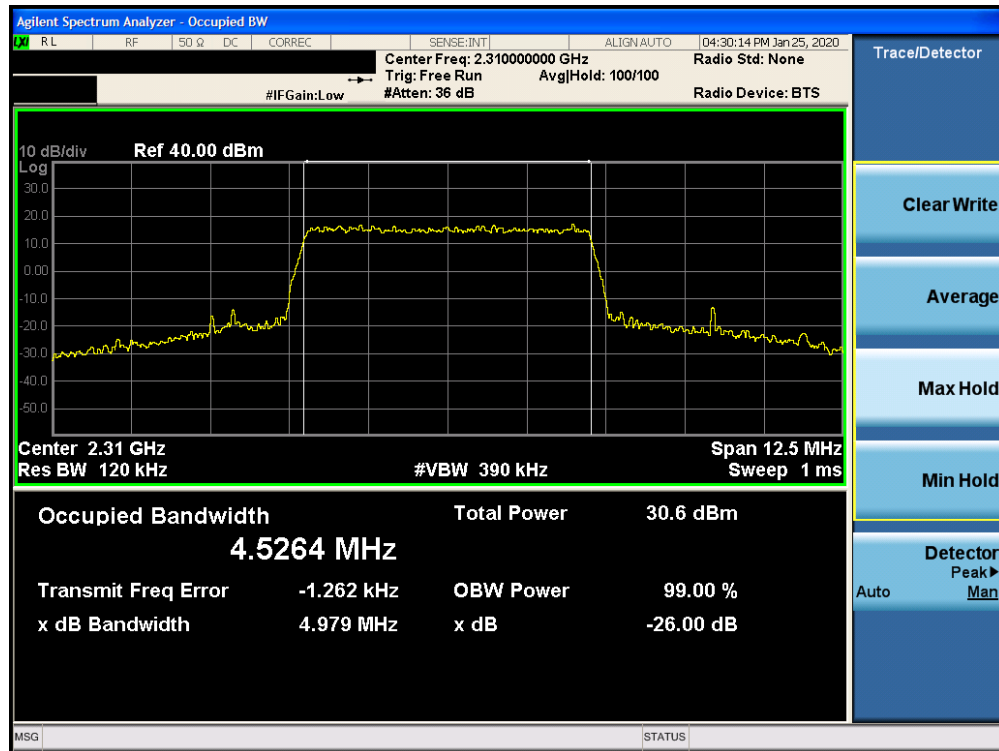


Plot 7-67. Occupied Bandwidth Plot (Band 30 – 5.0MHz QPSK – RB Size 25)

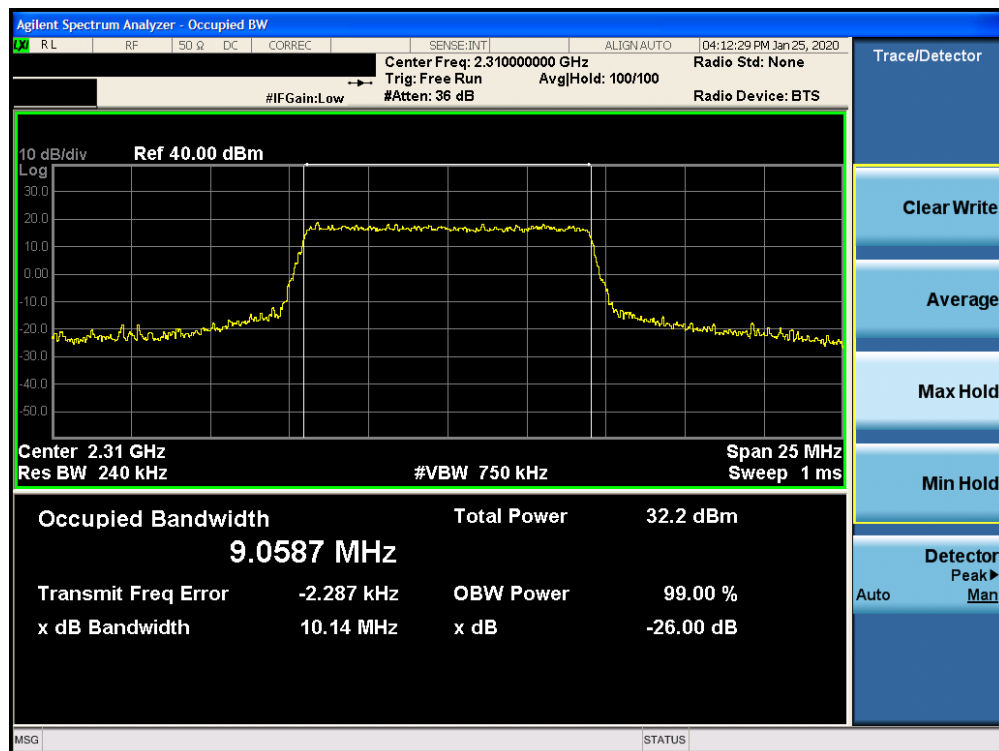


Plot 7-68. Occupied Bandwidth Plot (Band 30 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 56 of 398

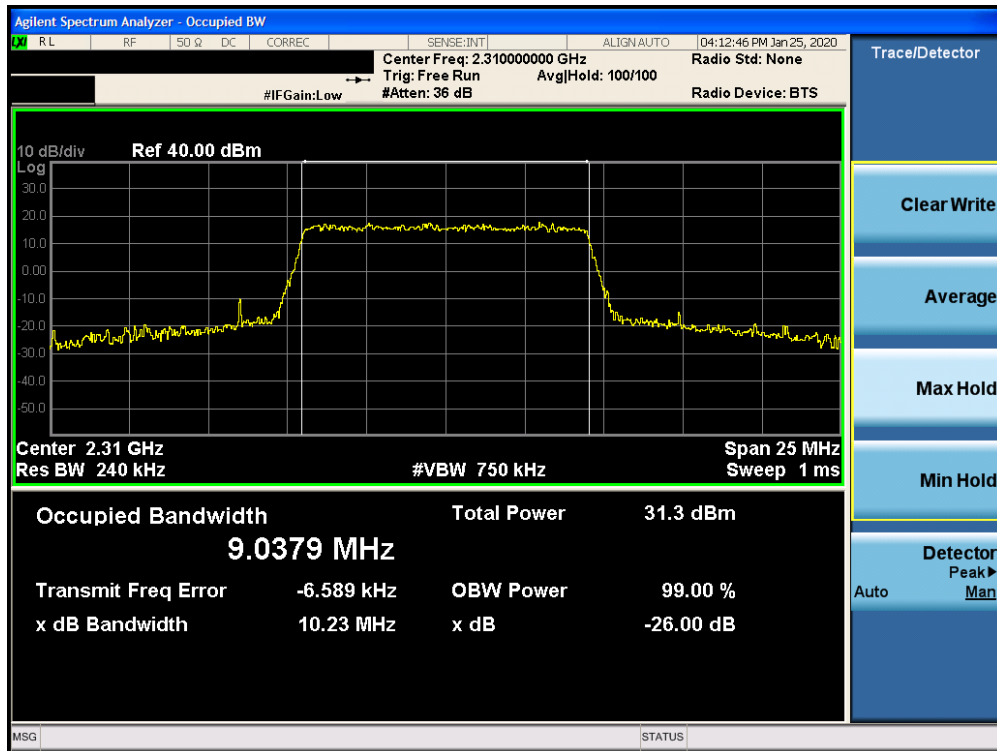


Plot 7-69. Occupied Bandwidth Plot (Band 30 – 5.0MHz 64-QAM – RB Size 25)

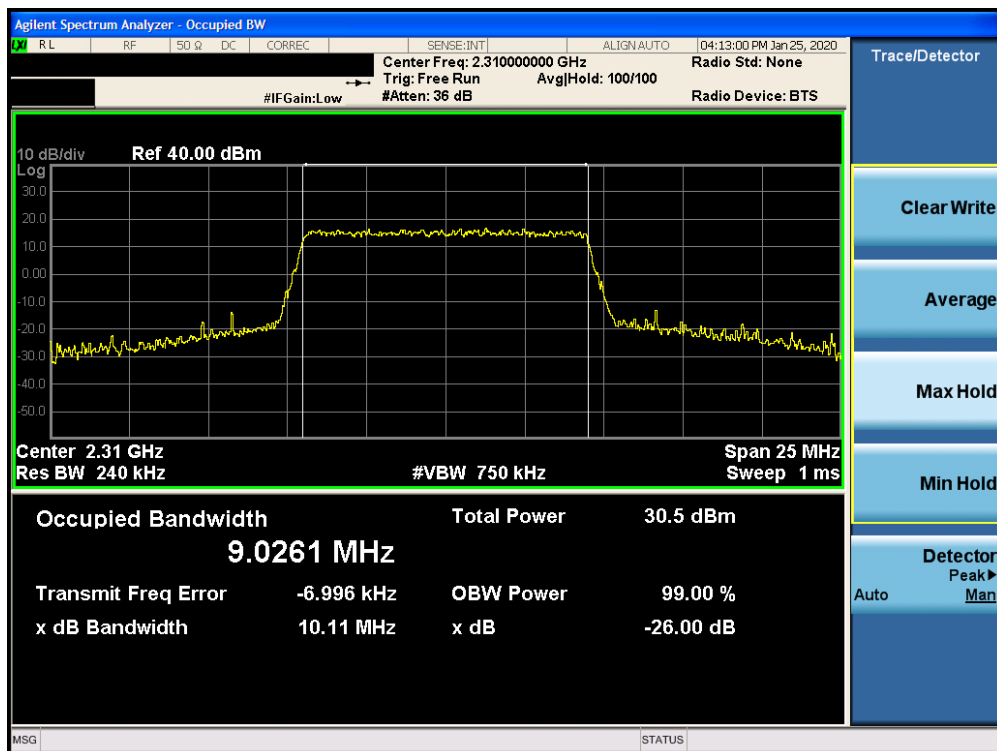


Plot 7-70. Occupied Bandwidth Plot (Band 30 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-71. Occupied Bandwidth Plot (Band 30 – 10.0MHz 16-QAM – RB Size 50)



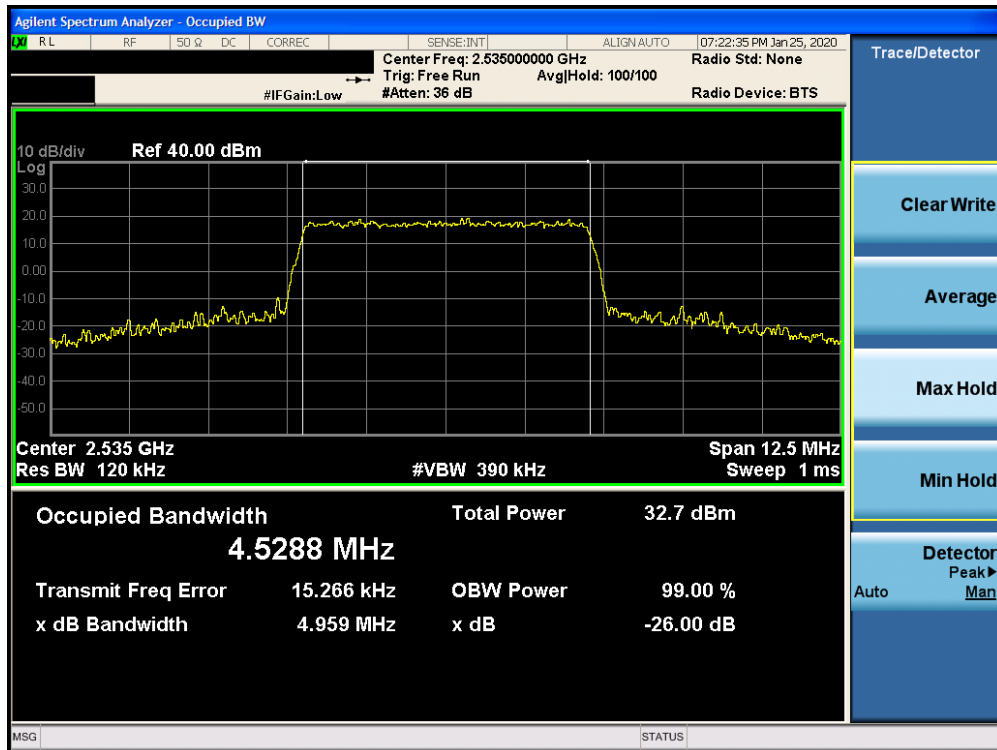
Plot 7-72. Occupied Bandwidth Plot (Band 30 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 58 of 398

Band 7

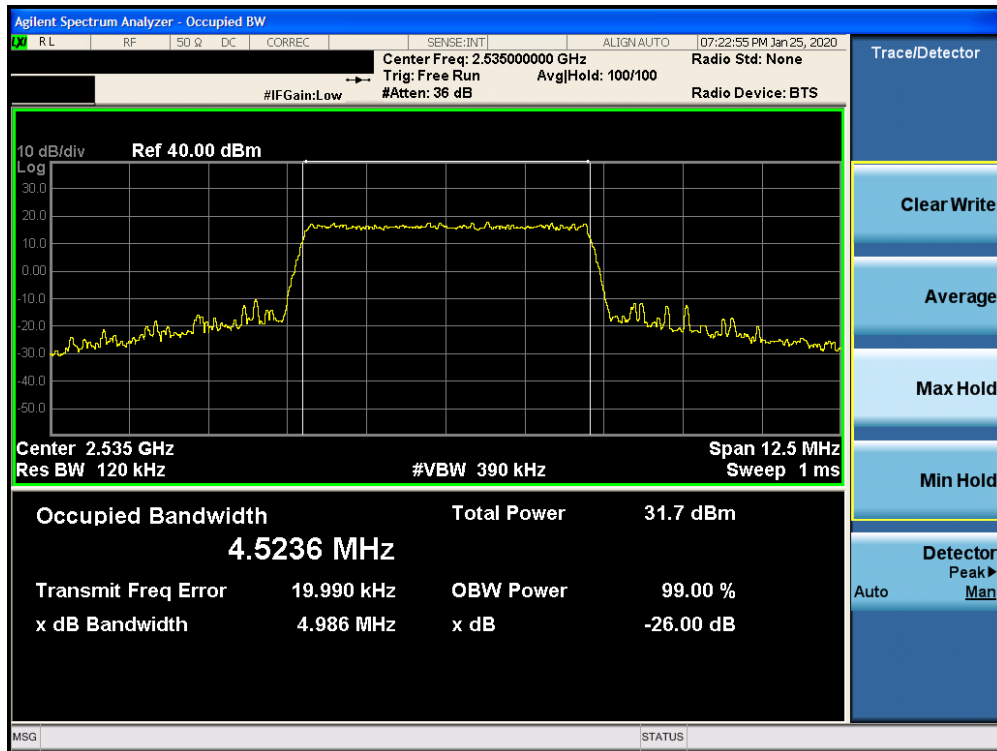


Plot 7-73. Occupied Bandwidth Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

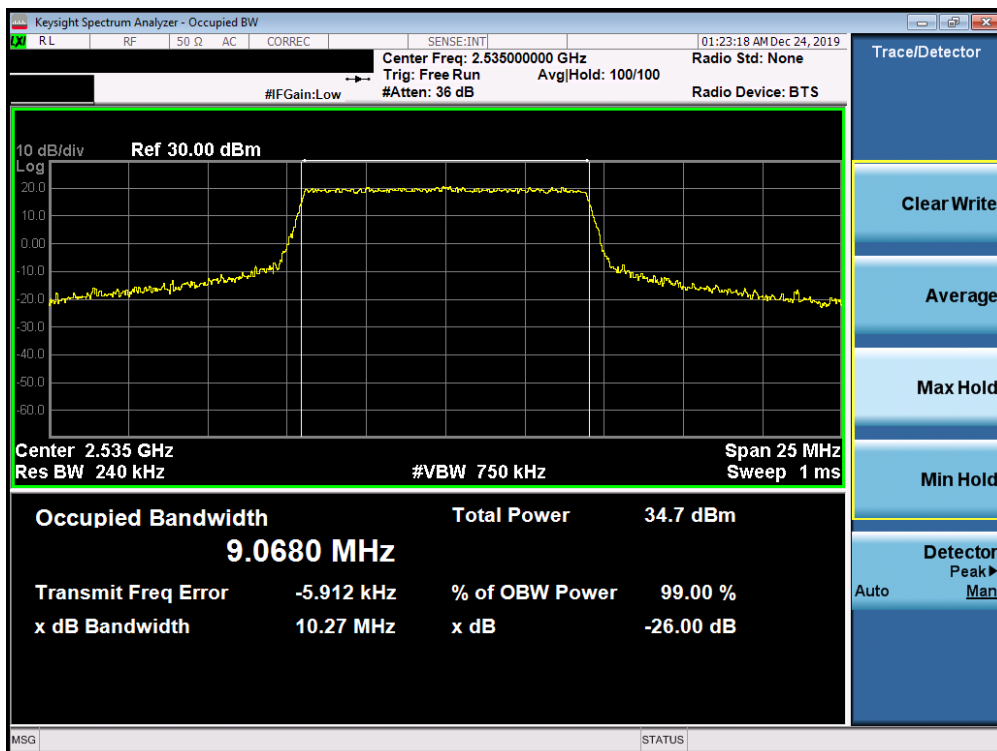


Plot 7-74. Occupied Bandwidth Plot (Band 7 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 59 of 398

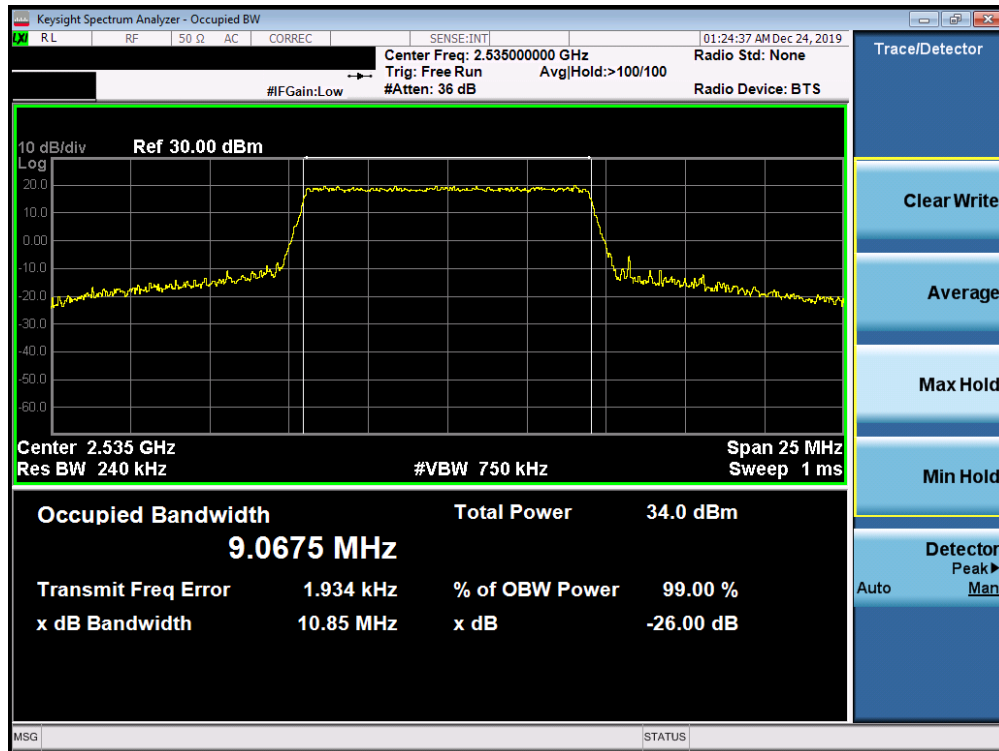


Plot 7-75. Occupied Bandwidth Plot (Band 7 – 5.0MHz 64-QAM – RB Size 25)

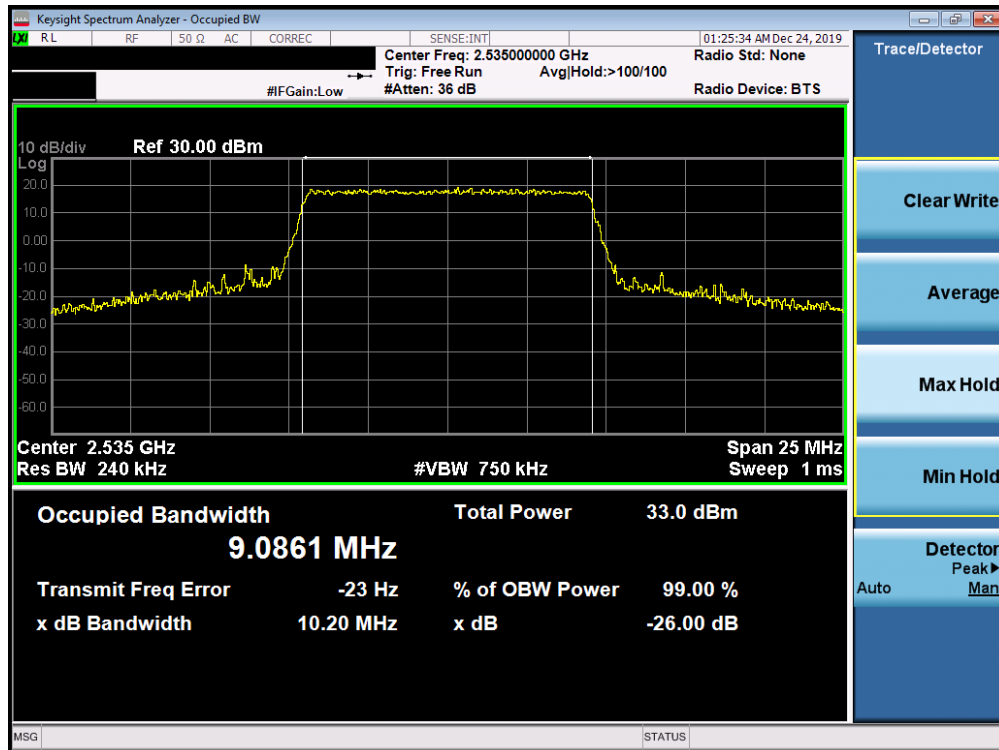


Plot 7-76. Occupied Bandwidth Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1C1912170052-03.BCG	Test Dates: 12/10/2019 - 02/18/2020	EUT Type: Tablet Device	Page 60 of 398

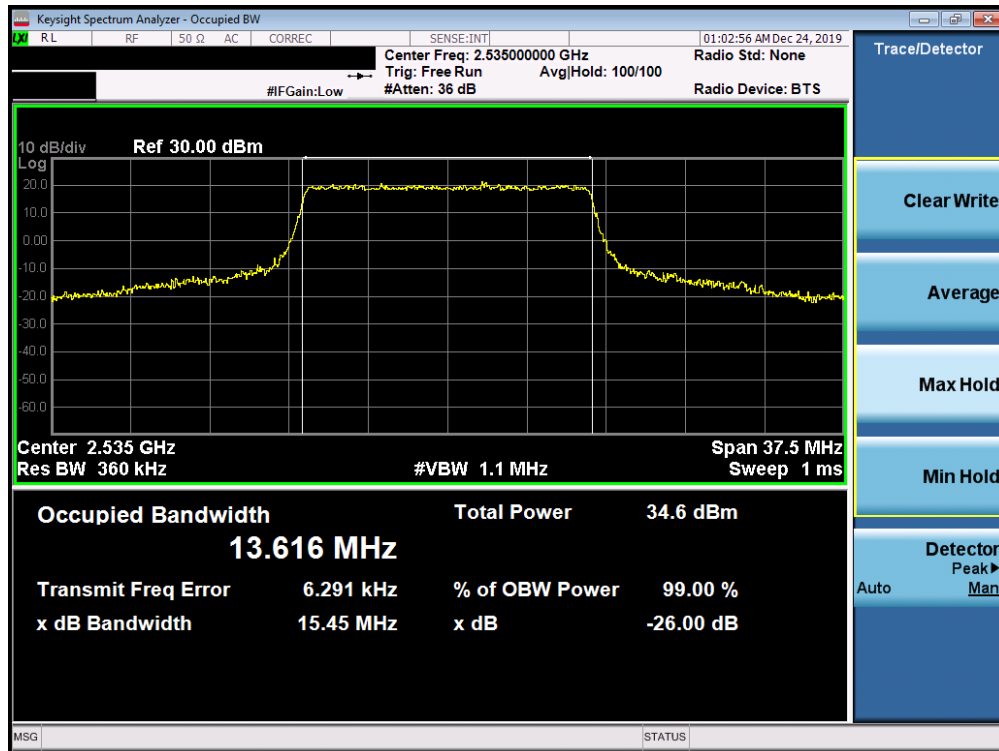


Plot 7-77. Occupied Bandwidth Plot (Band 7 – 10.0MHz 16-QAM – RB Size 50)

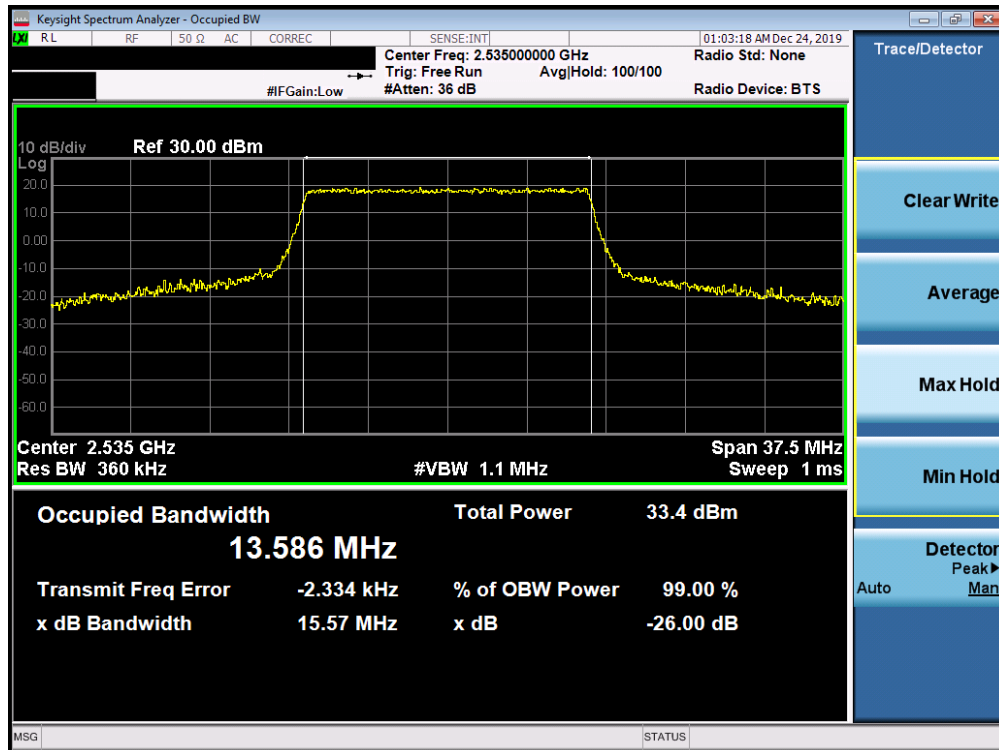


Plot 7-78. Occupied Bandwidth Plot (Band 7 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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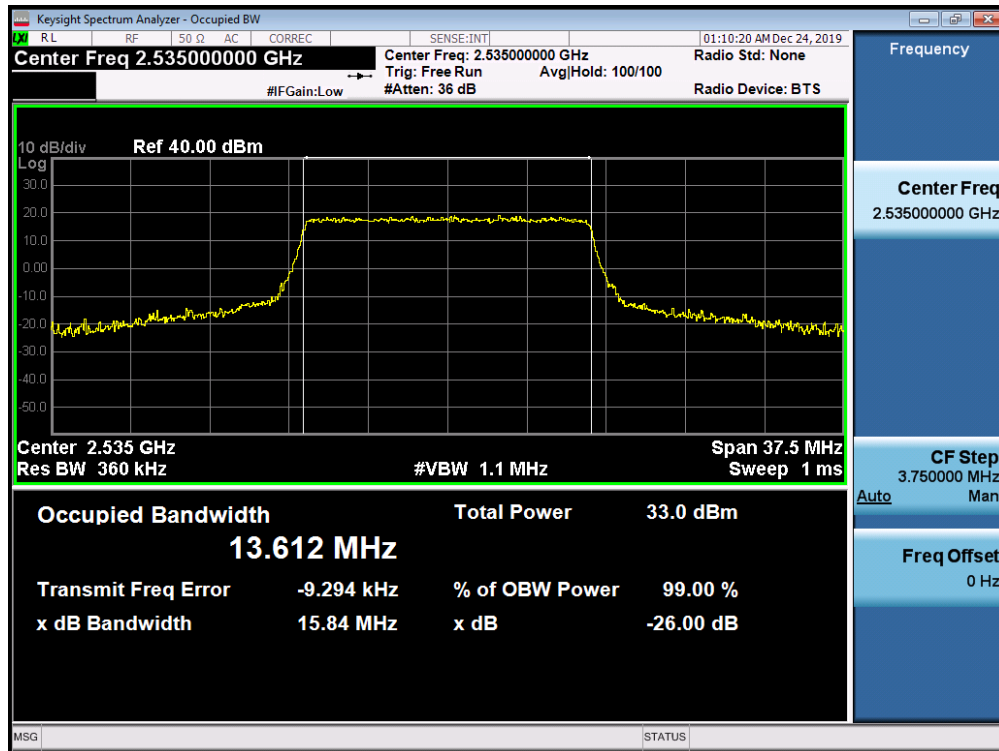


Plot 7-79. Occupied Bandwidth Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

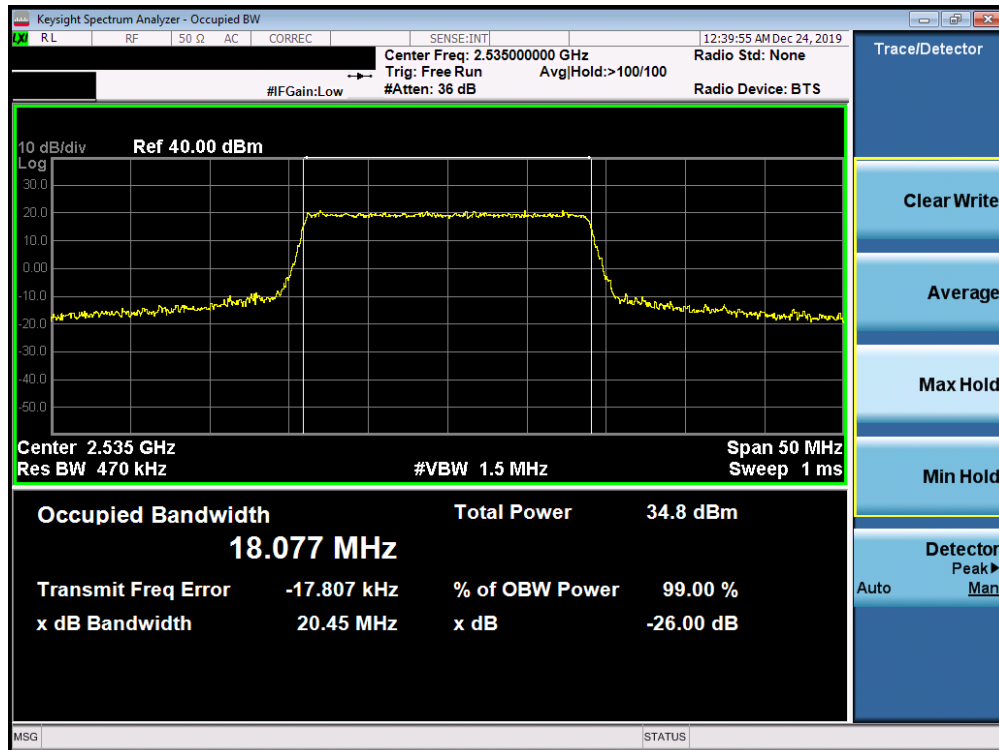


Plot 7-80. Occupied Bandwidth Plot (Band 7 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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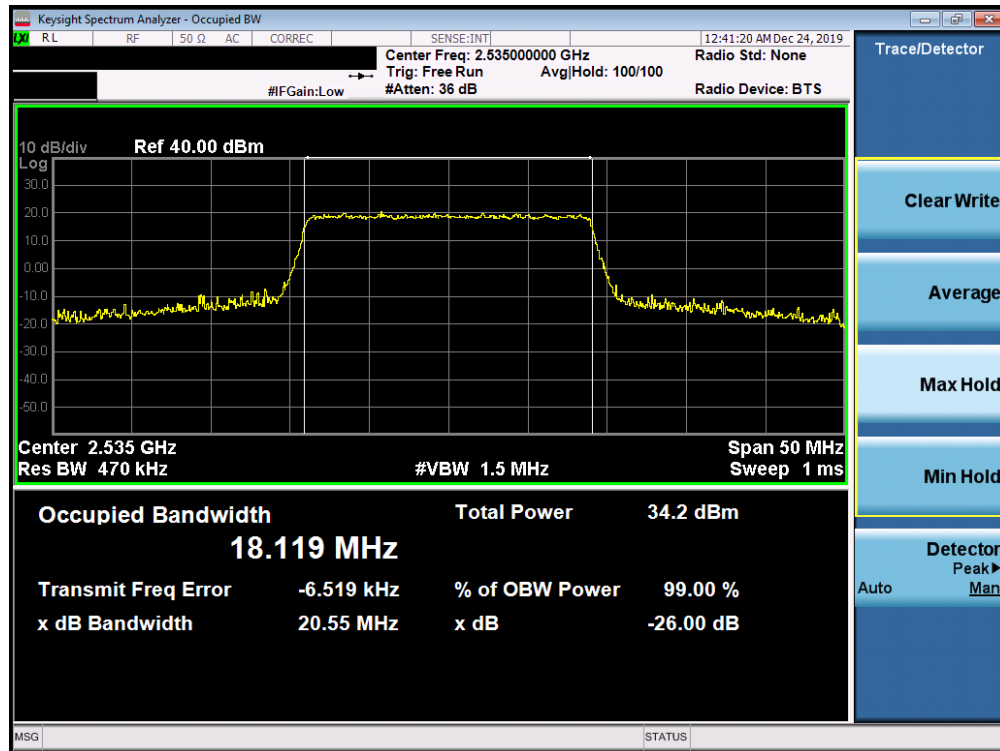


Plot 7-81. Occupied Bandwidth Plot (Band 7 – 15.0MHz 64-QAM – RB Size 75)

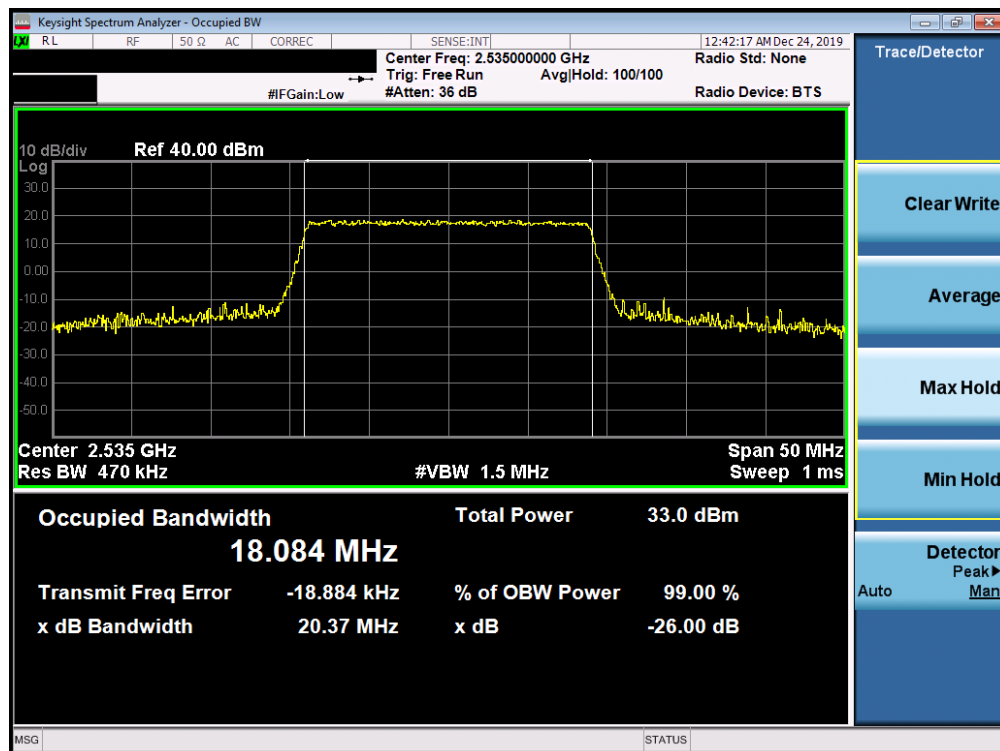


Plot 7-82. Occupied Bandwidth Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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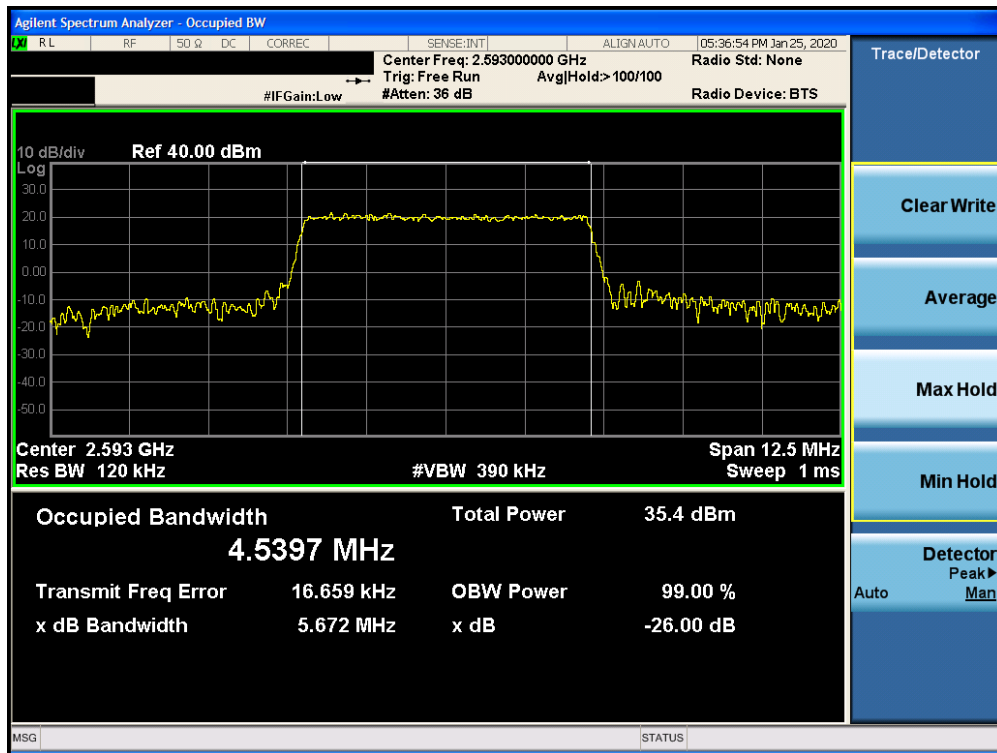
Plot 7-83. Occupied Bandwidth Plot (Band 7 – 20.0MHz 16-QAM – RB Size 100)



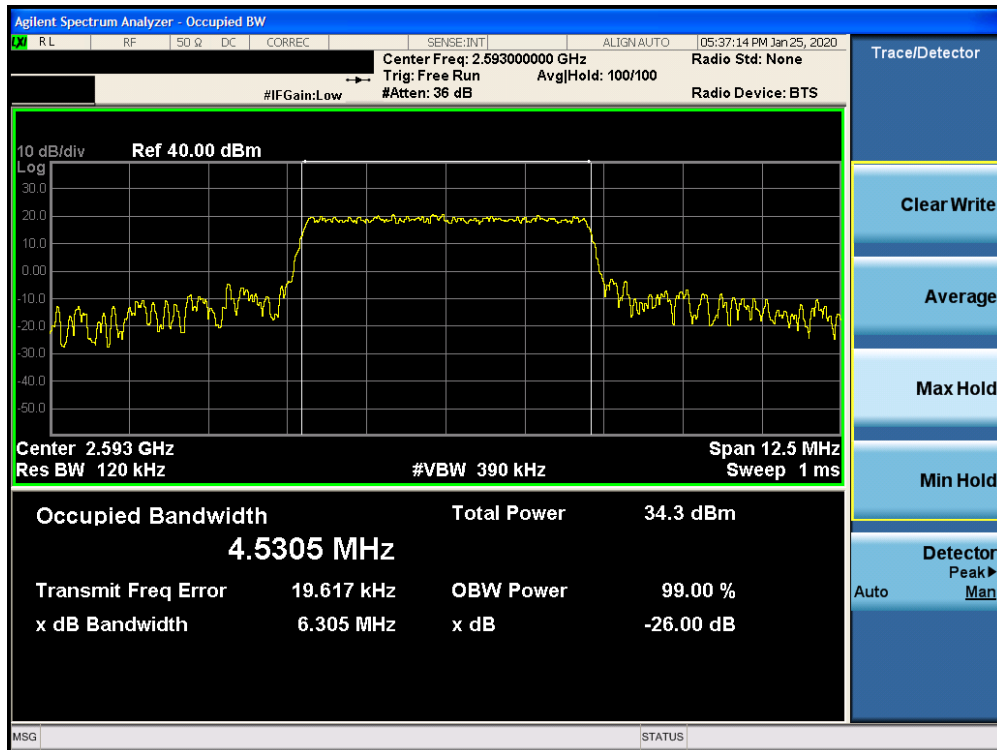
Plot 7-84. Occupied Bandwidth Plot (Band 7 – 20.0MHz 64-QAM – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Band 41

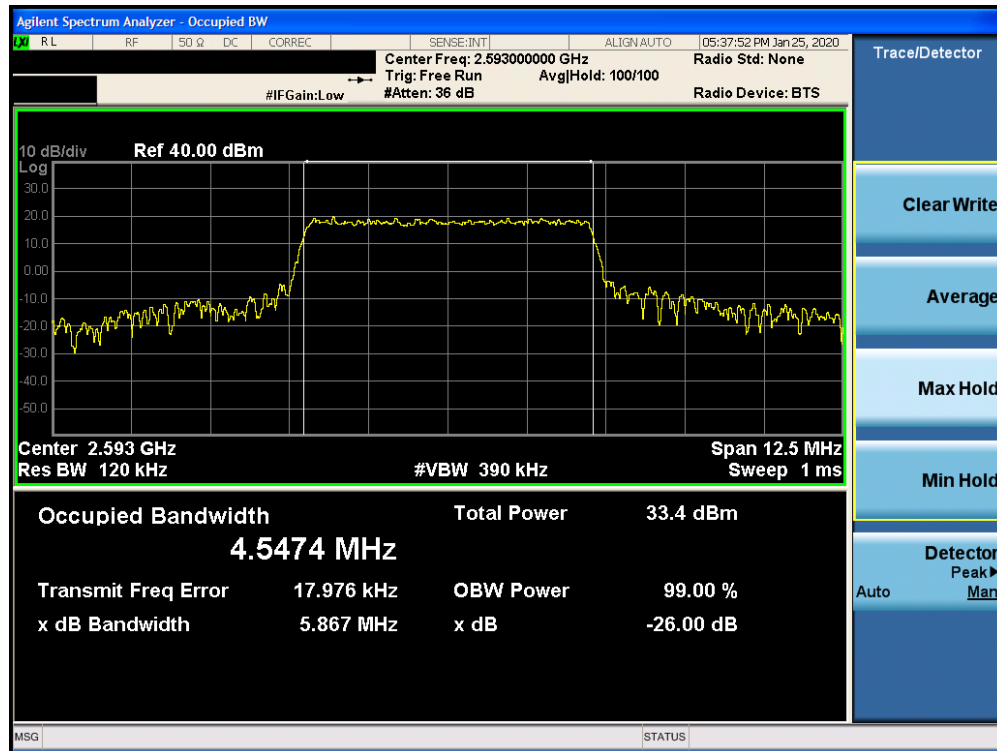


Plot 7-85. Occupied Bandwidth Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

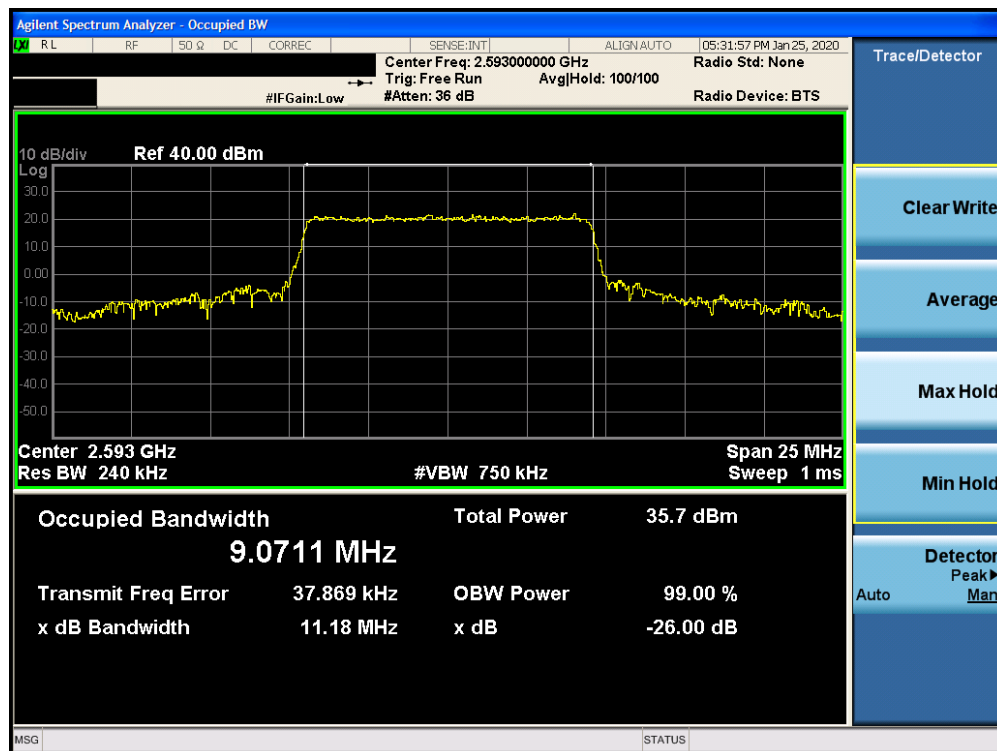


Plot 7-86. Occupied Bandwidth Plot (Band 41 – 5.0MHz 16-QAM – RB Size 25)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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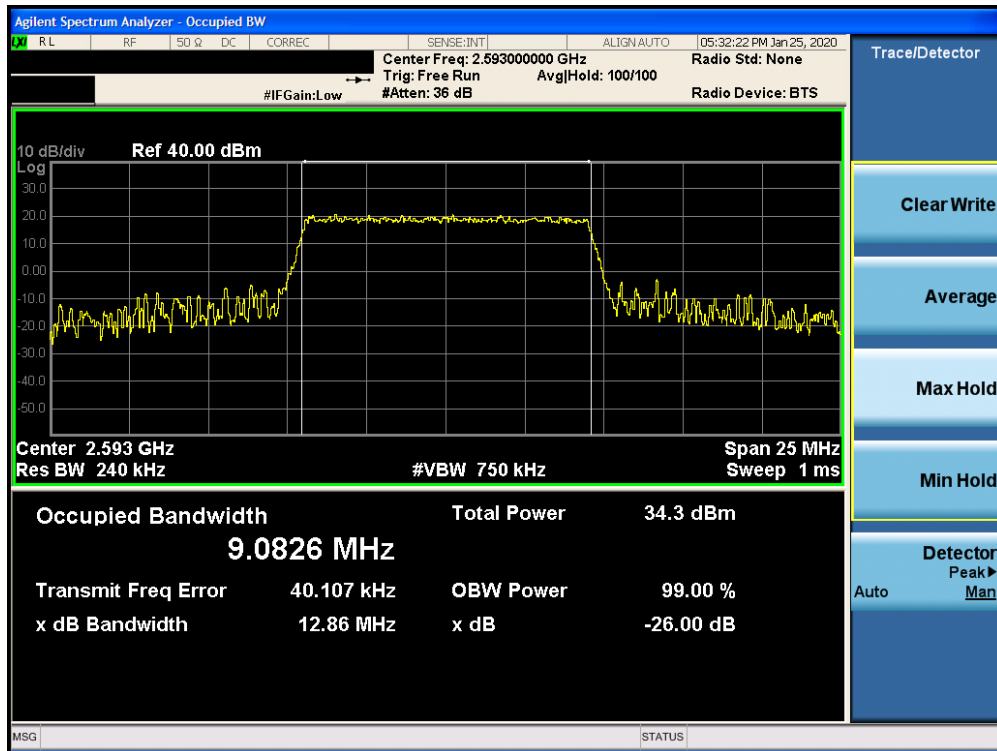


Plot 7-87. Occupied Bandwidth Plot (Band 41 – 5.0MHz 64-QAM – RB Size 25)

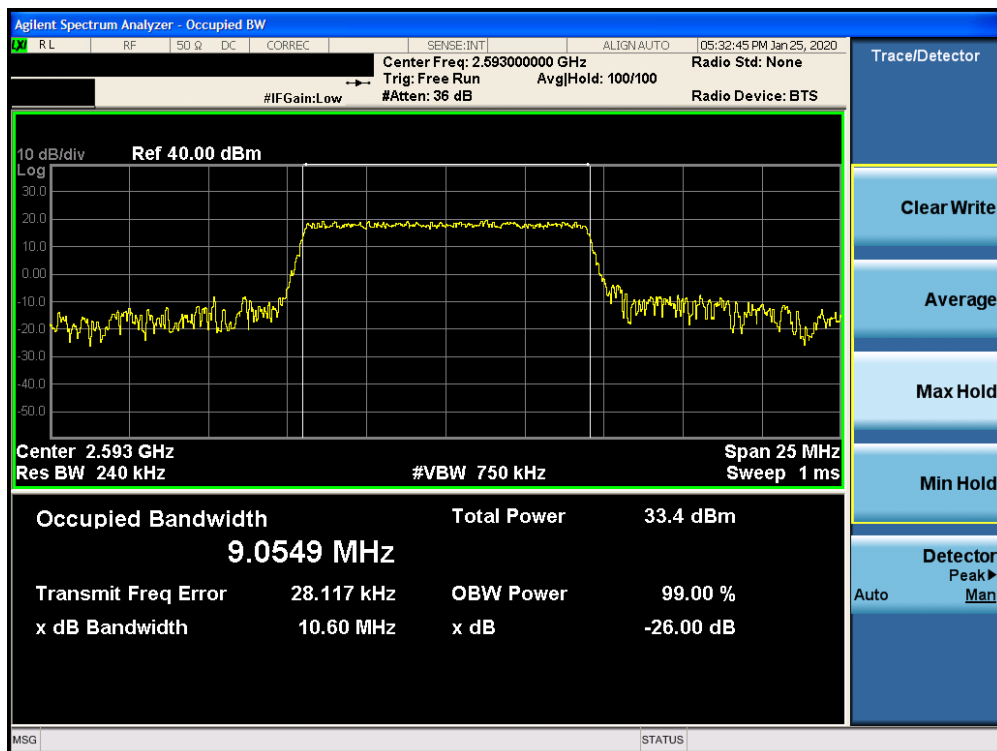


Plot 7-88. Occupied Bandwidth Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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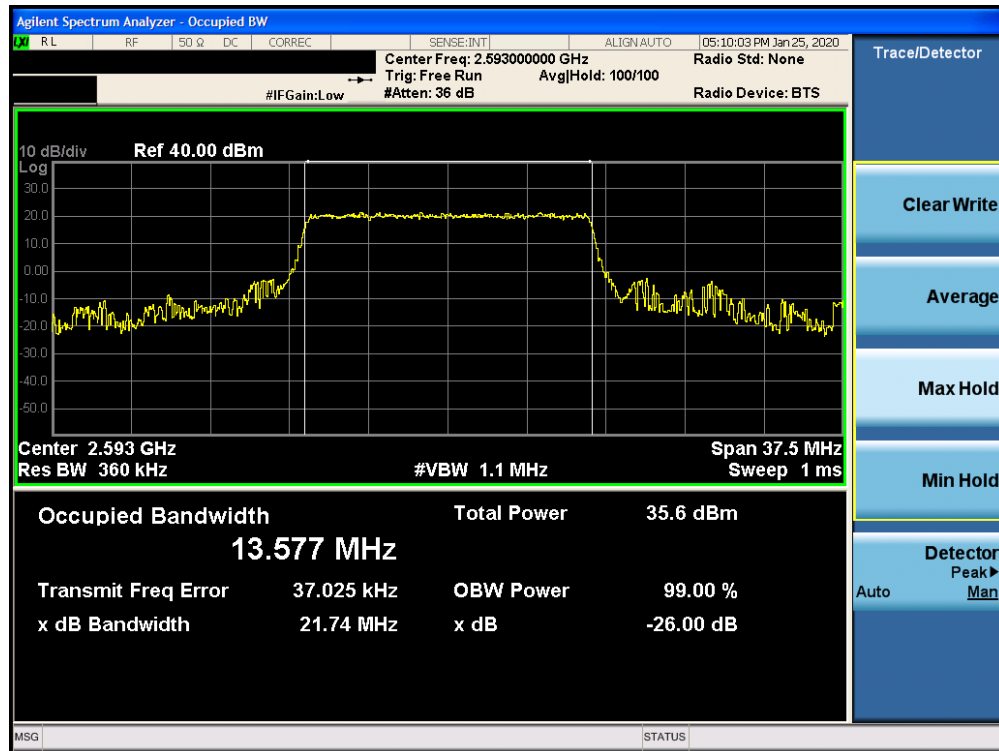


Plot 7-89. Occupied Bandwidth Plot (Band 41 – 10.0MHz 16-QAM – RB Size 50)

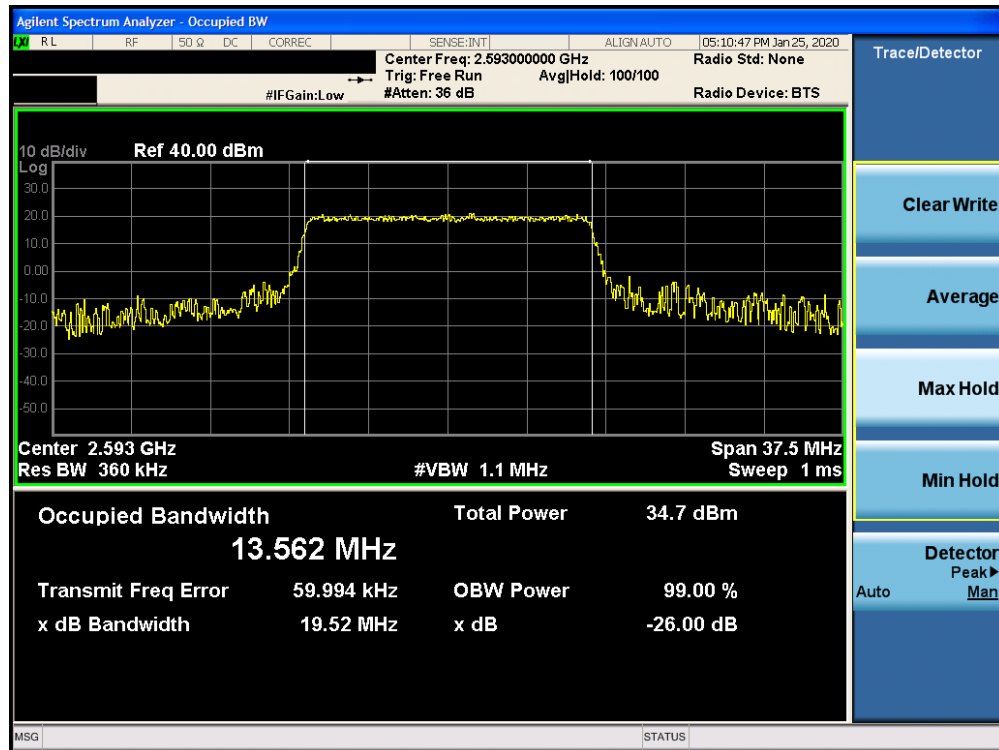


Plot 7-90. Occupied Bandwidth Plot (Band 41 – 10.0MHz 64-QAM – RB Size 50)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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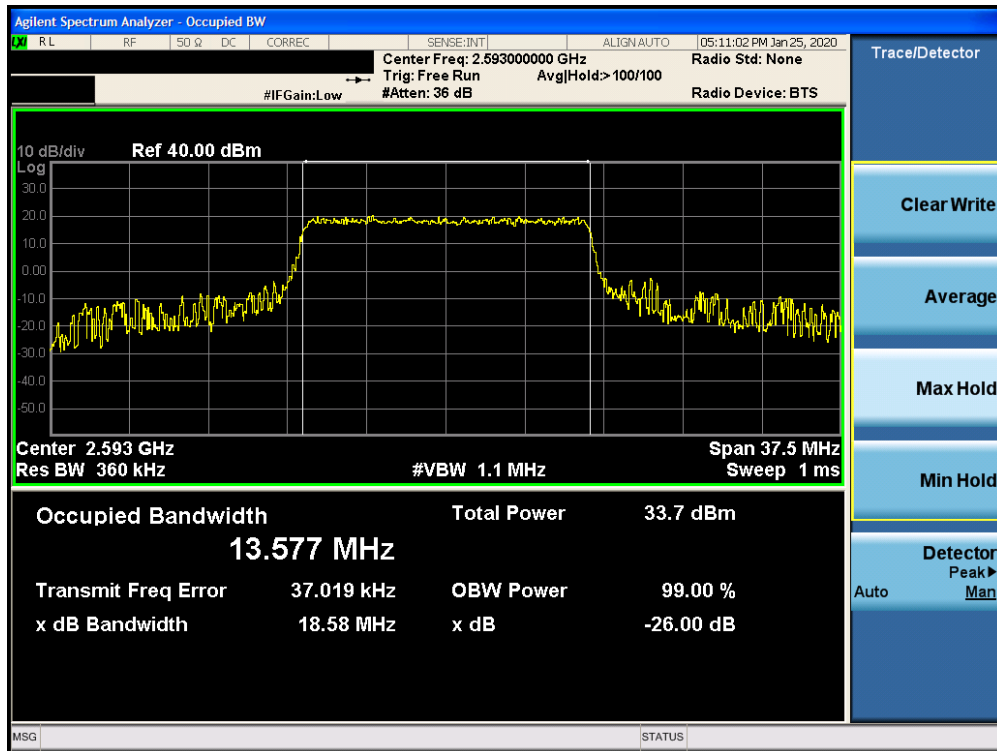


Plot 7-91. Occupied Bandwidth Plot (Band 41 – 15.0MHz QPSK – RB Size 75)

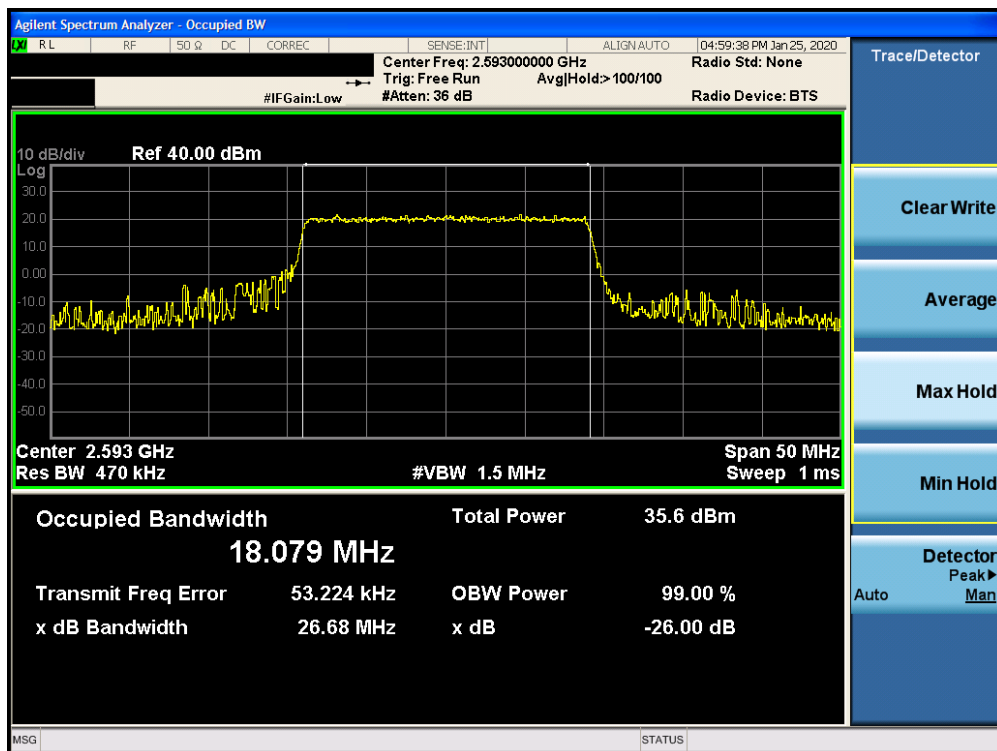


Plot 7-92. Occupied Bandwidth Plot (Band 41 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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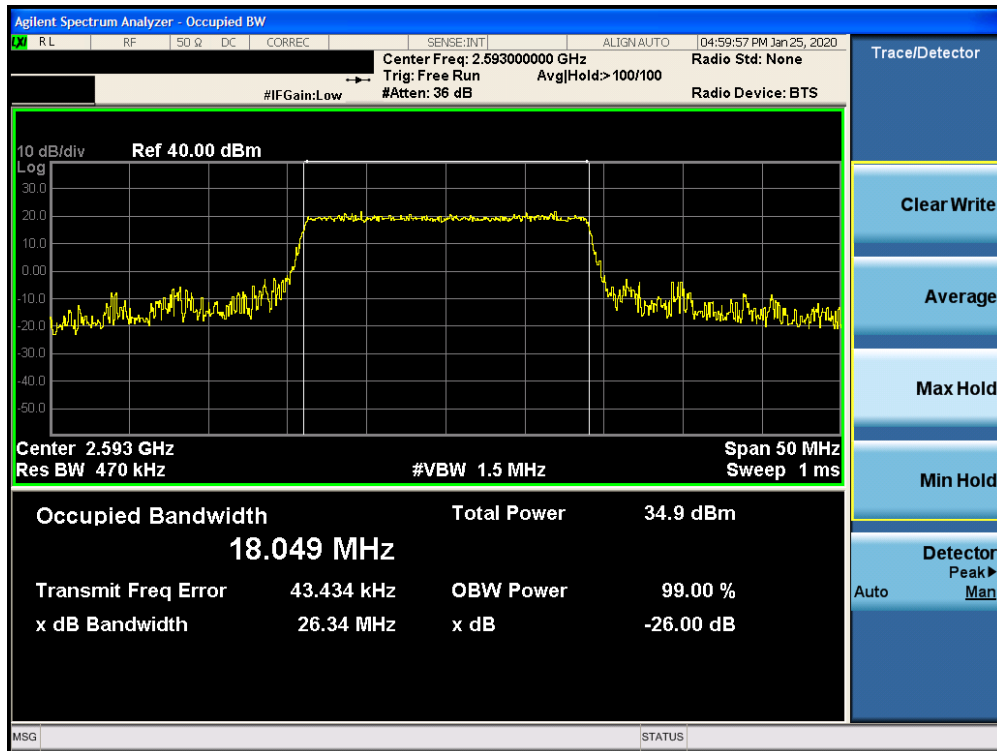


Plot 7-93. Occupied Bandwidth Plot (Band 41 – 15.0MHz 64-QAM – RB Size 75)

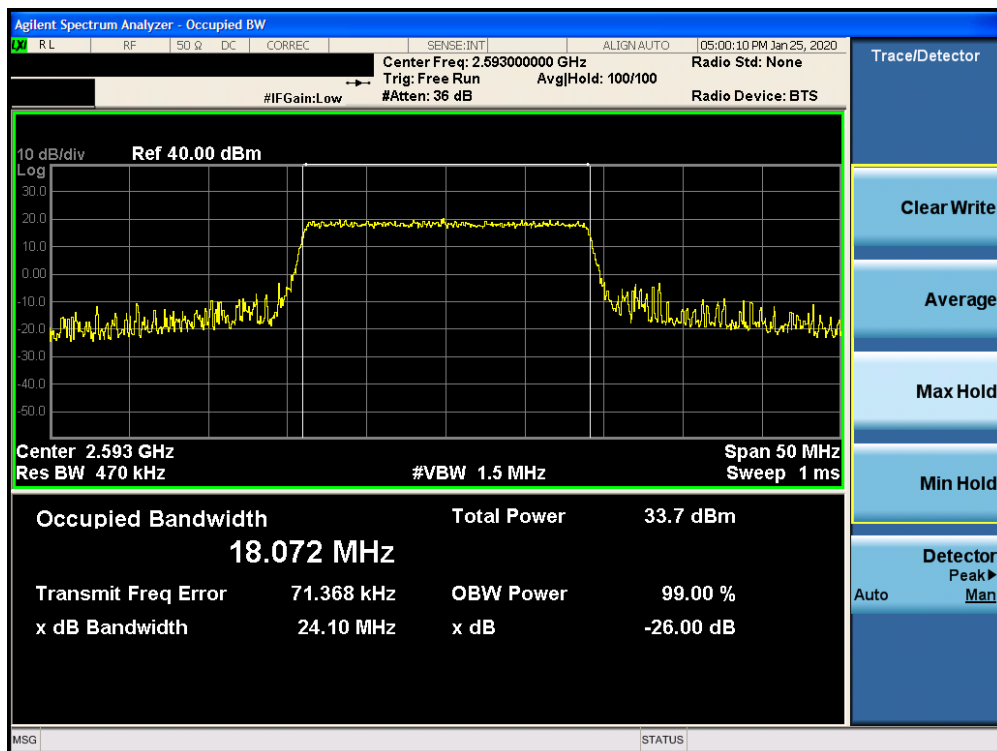


Plot 7-94. Occupied Bandwidth Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-95. Occupied Bandwidth Plot (Band 41 – 20.0MHz 16-QAM – RB Size 100)



Plot 7-96. Occupied Bandwidth Plot (Band 41 – 20.0MHz 64-QAM – RB Size 100)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{\text{Watts}})$, where P is the transmitter power in Watts.

For Band 30, the minimum permissible attenuation level of any spurious emission <2288MHz and >2365MHz is $70 + \log_{10}(P_{\text{Watts}})$.

For Band 7 and 41, the minimum permissible attenuation level of any spurious emission is $55 + \log_{10}(P_{\text{Watts}})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

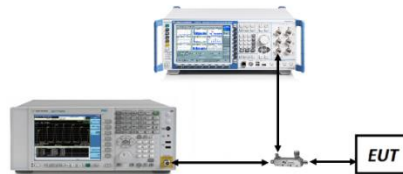
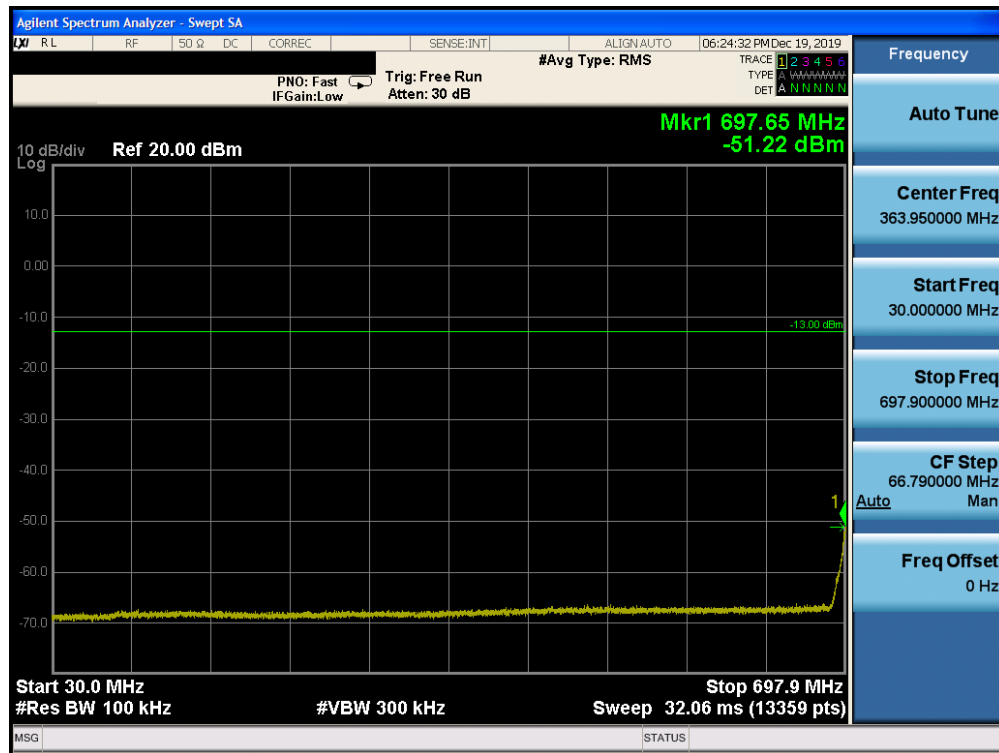


Figure 7-2. Test Instrument & Measurement Setup

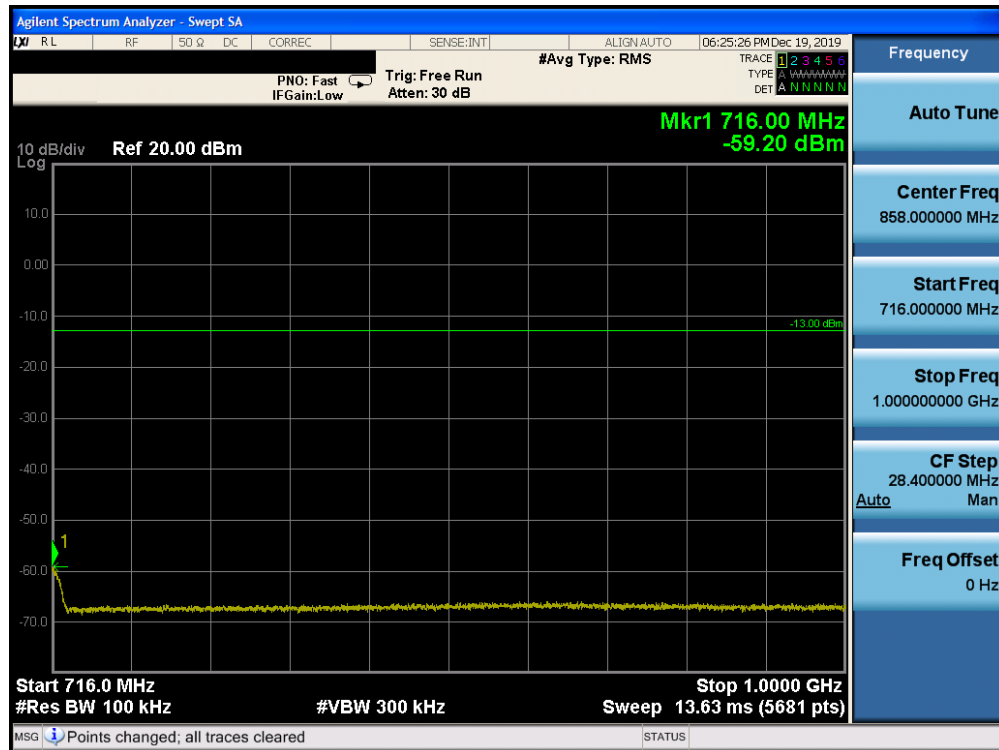
Test Notes

1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.
2. All ports were tested and only the worst case data were reported.
3. Refer to Table 2-1 Section 2.3 of this test report for correlation between Antennas and Ports.

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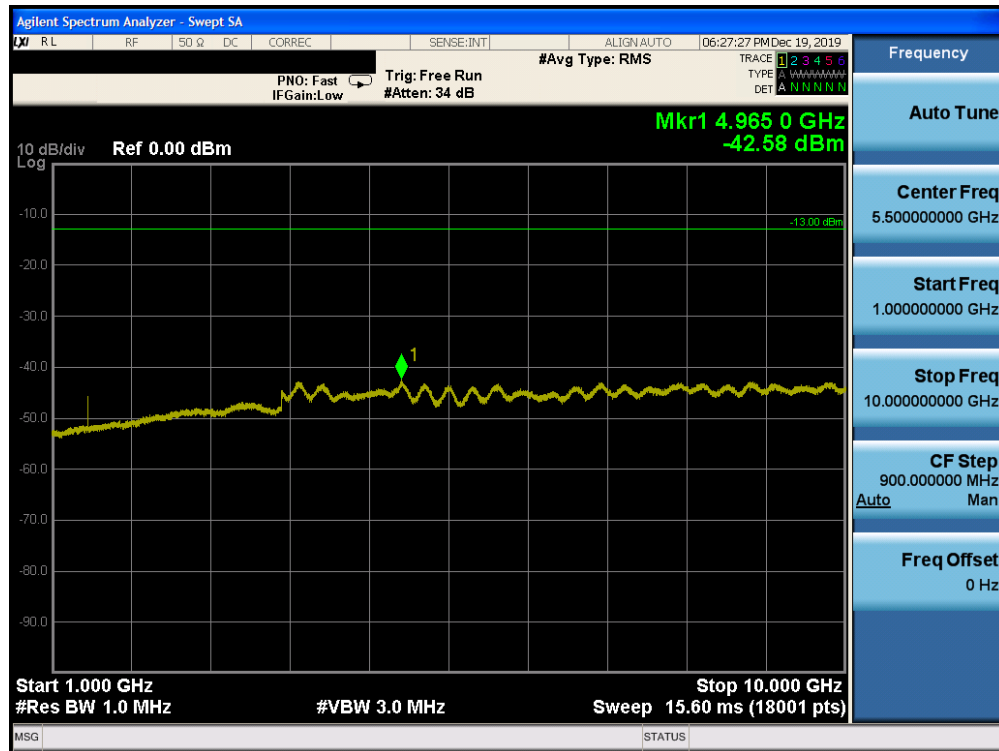


Plot 7-97. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

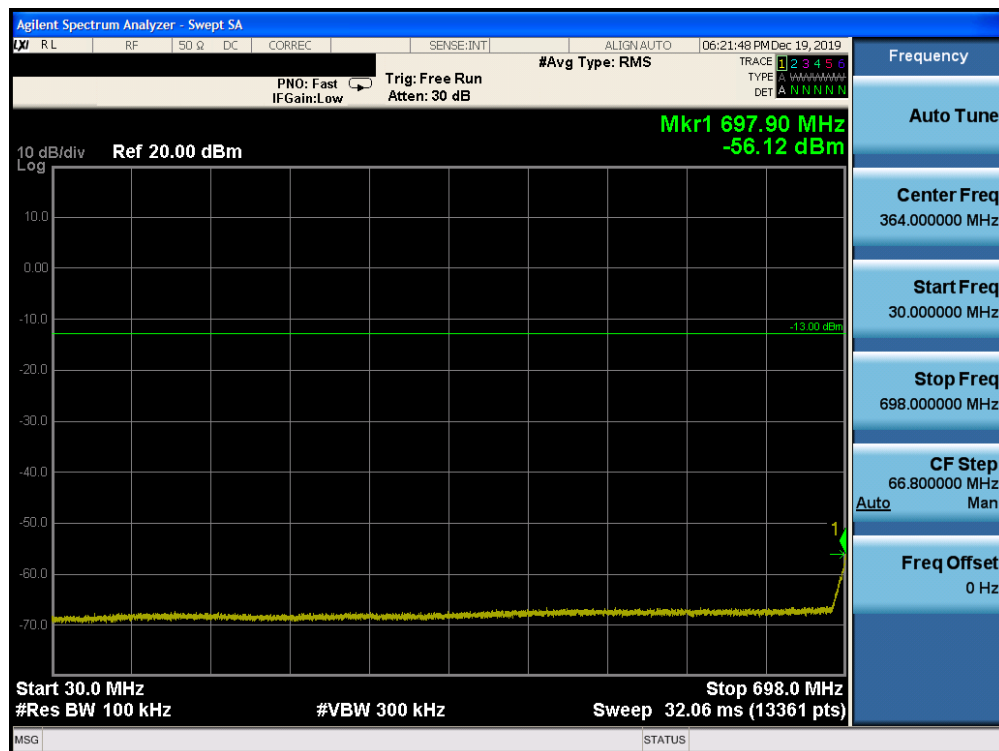


Plot 7-98. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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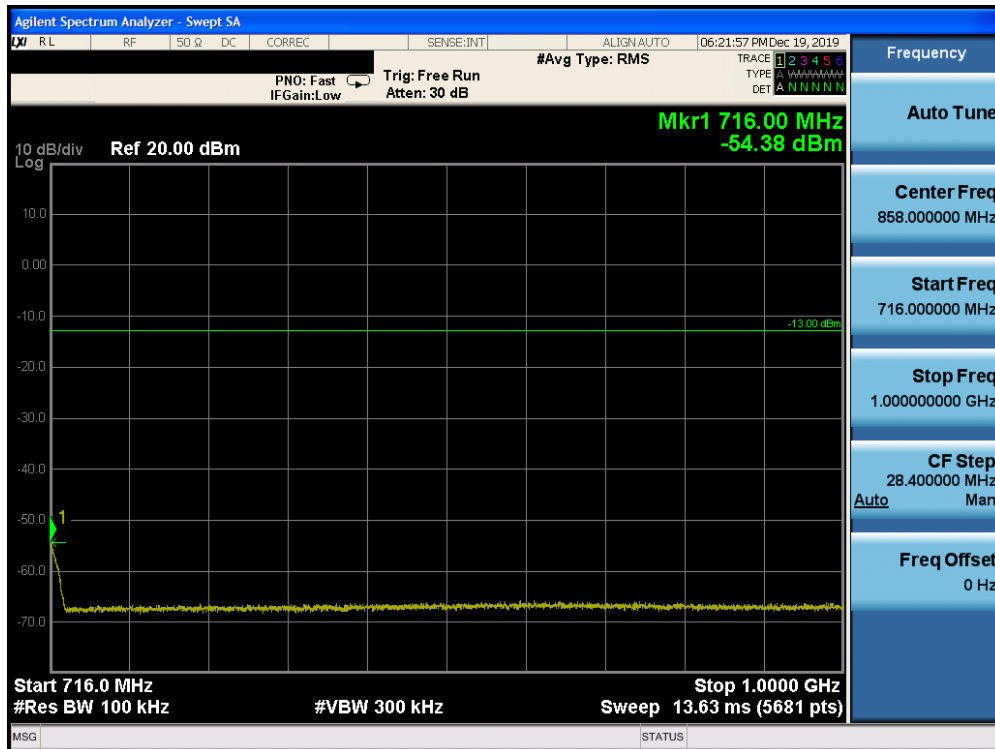


Plot 7-99. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

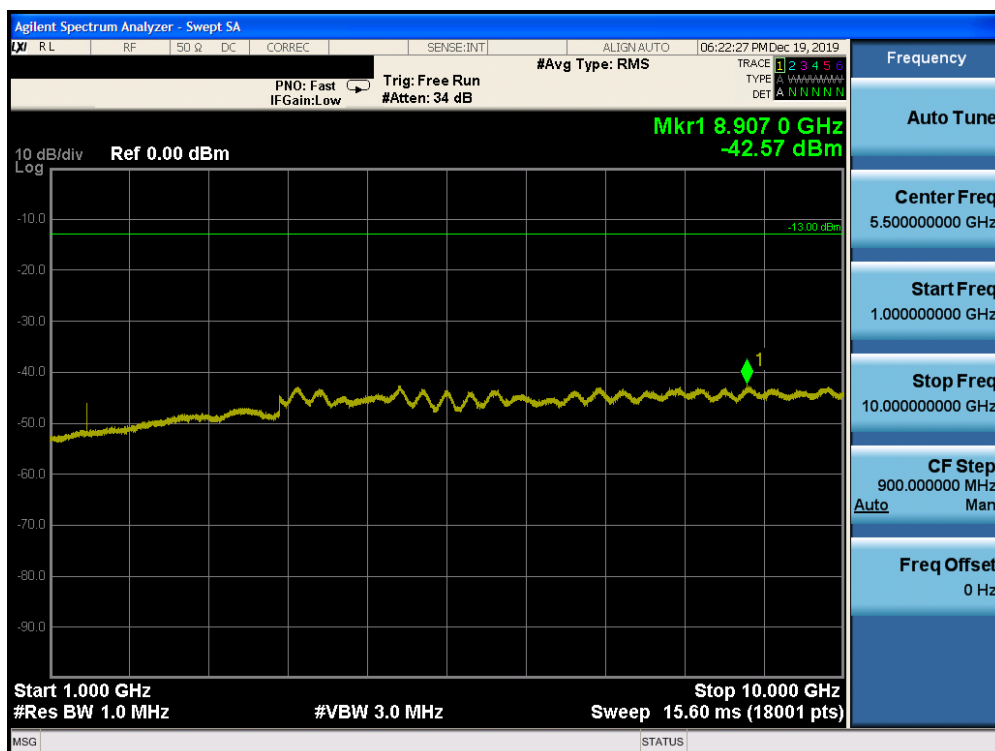


Plot 7-100. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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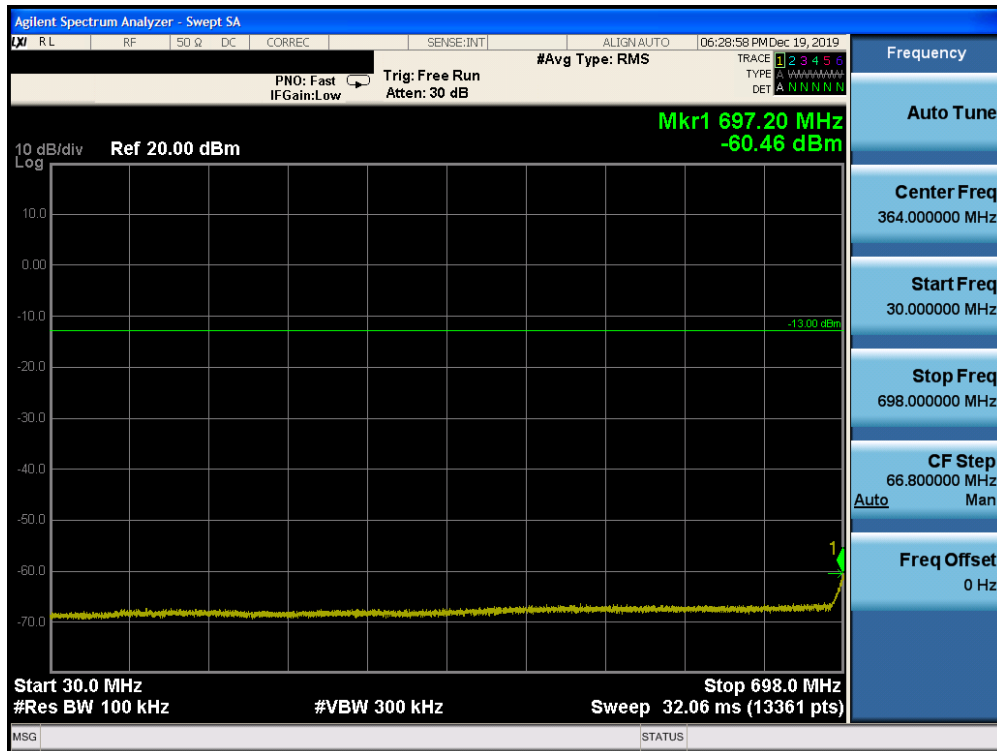


Plot 7-101. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

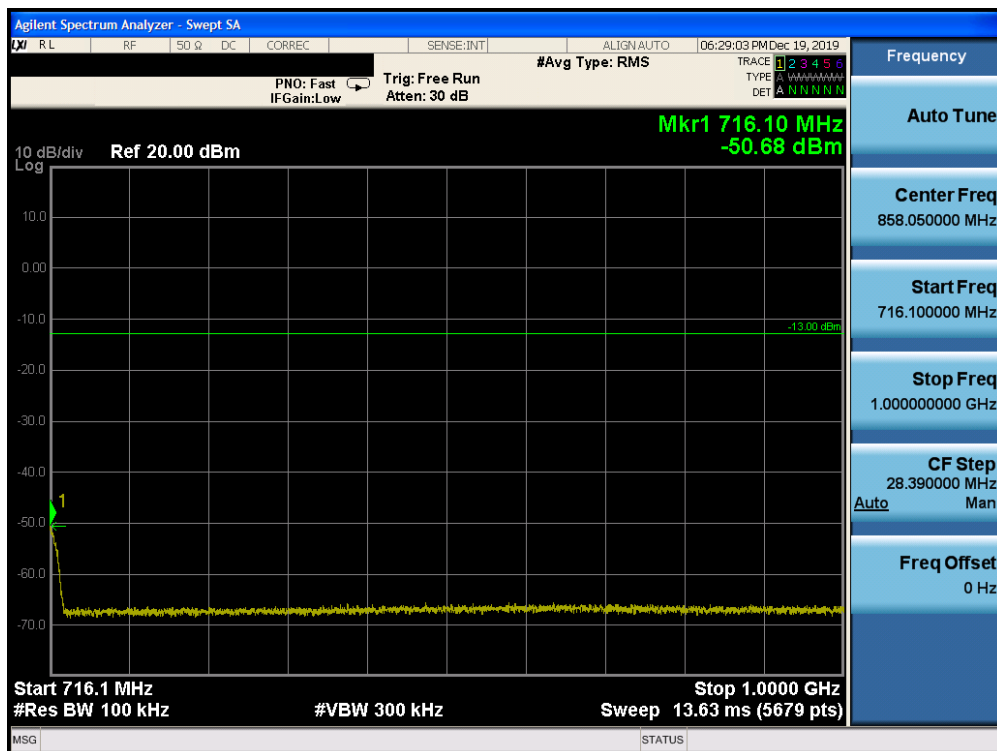


Plot 7-102. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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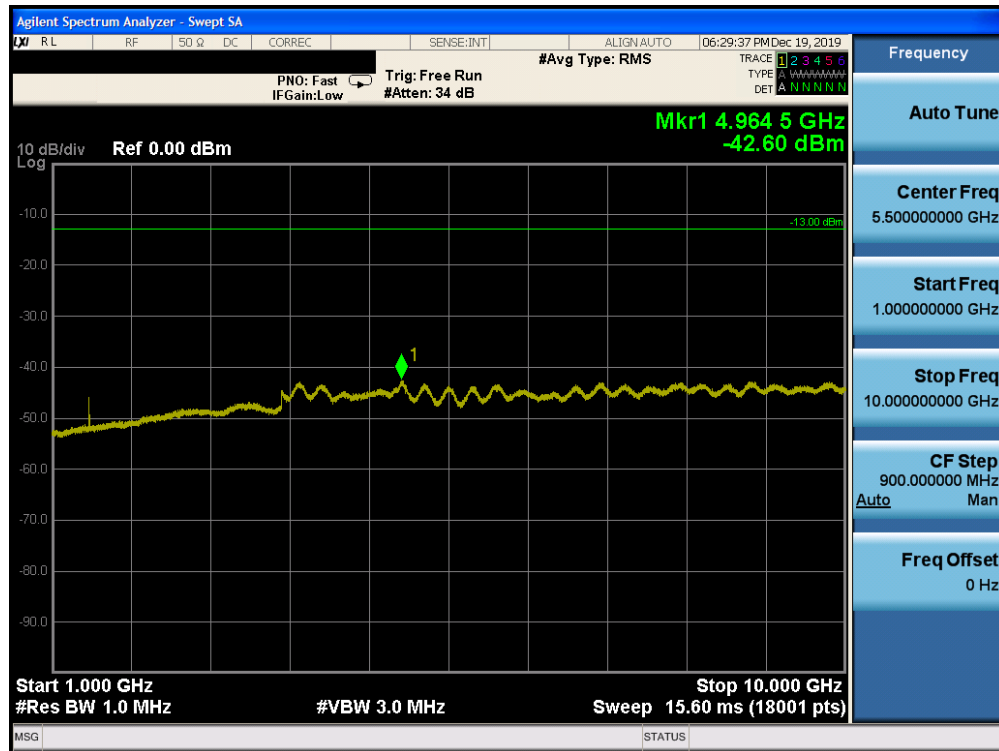


Plot 7-103. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-104. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

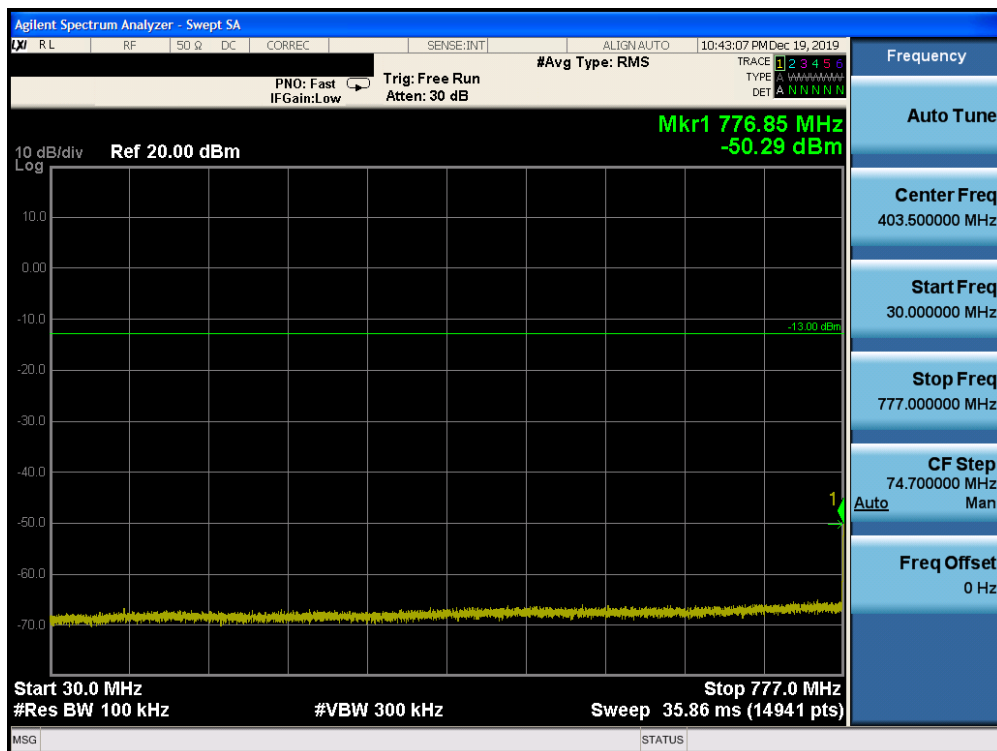
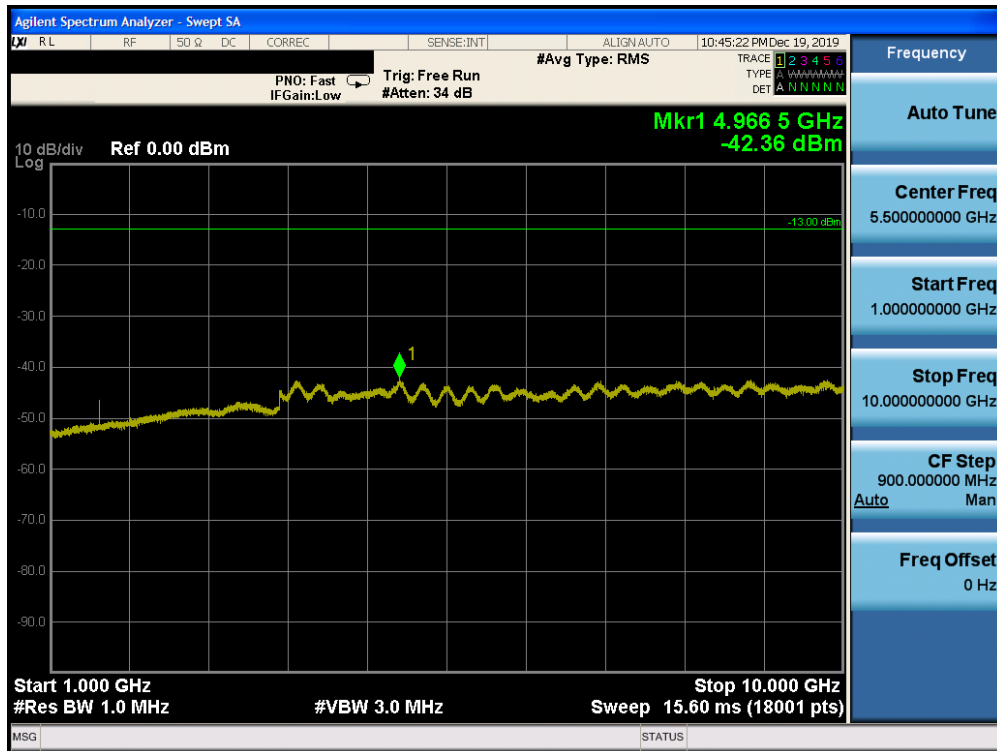
FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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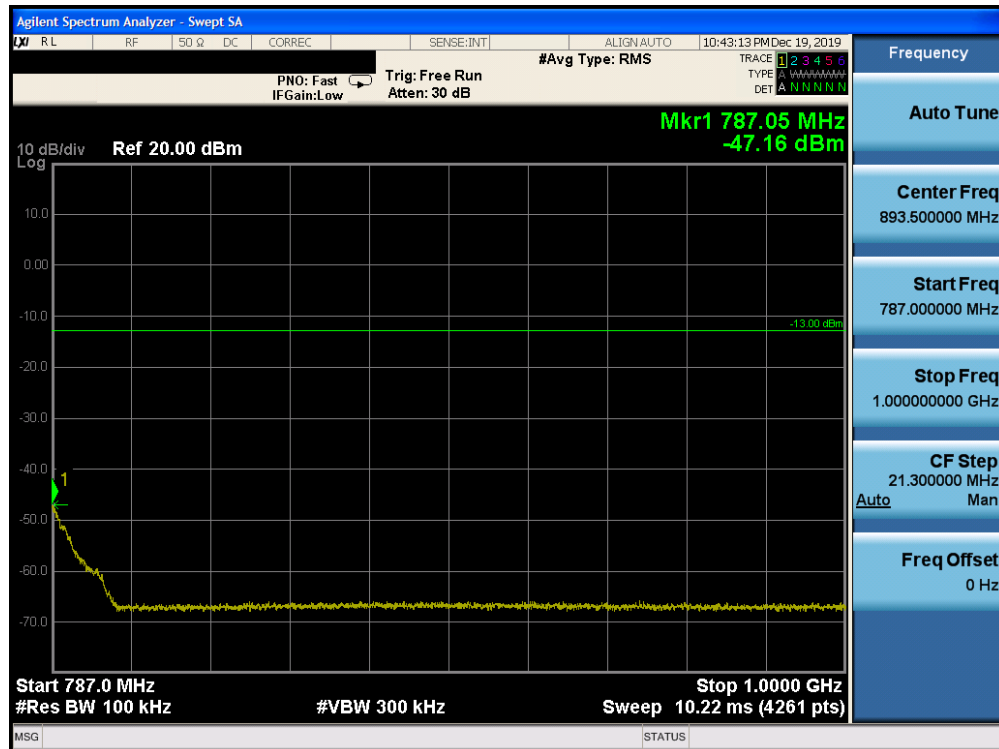
Plot 7-105. Conducted Spurious Plot (Band 12/17 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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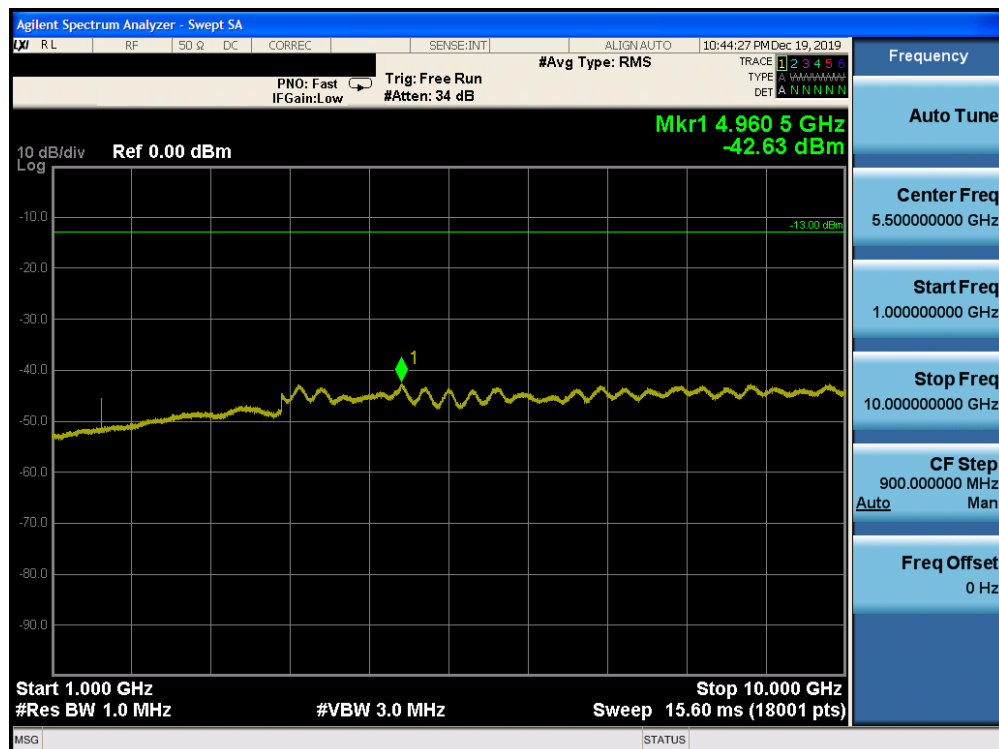
V 9.5 12/16/2019



FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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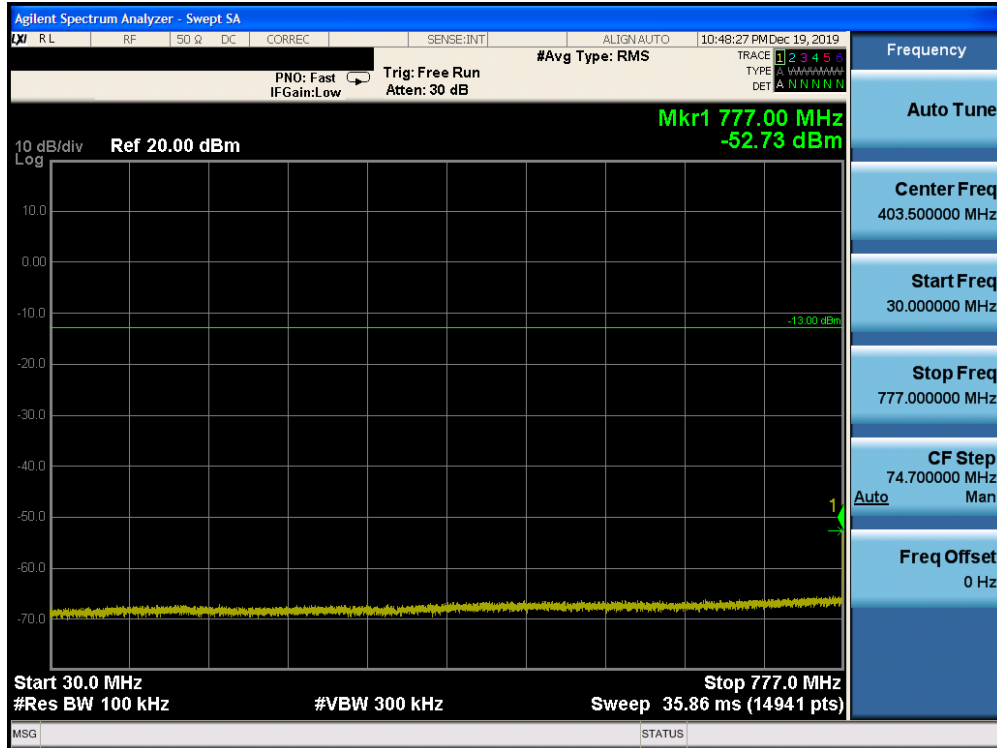


Plot 7-110. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

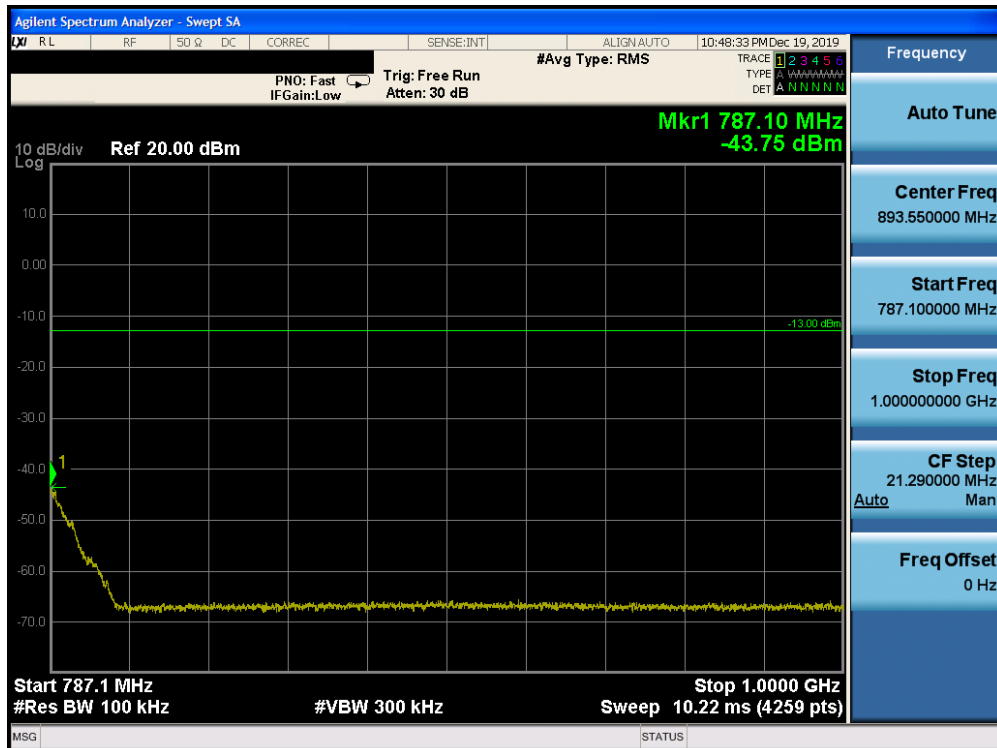


Plot 7-111. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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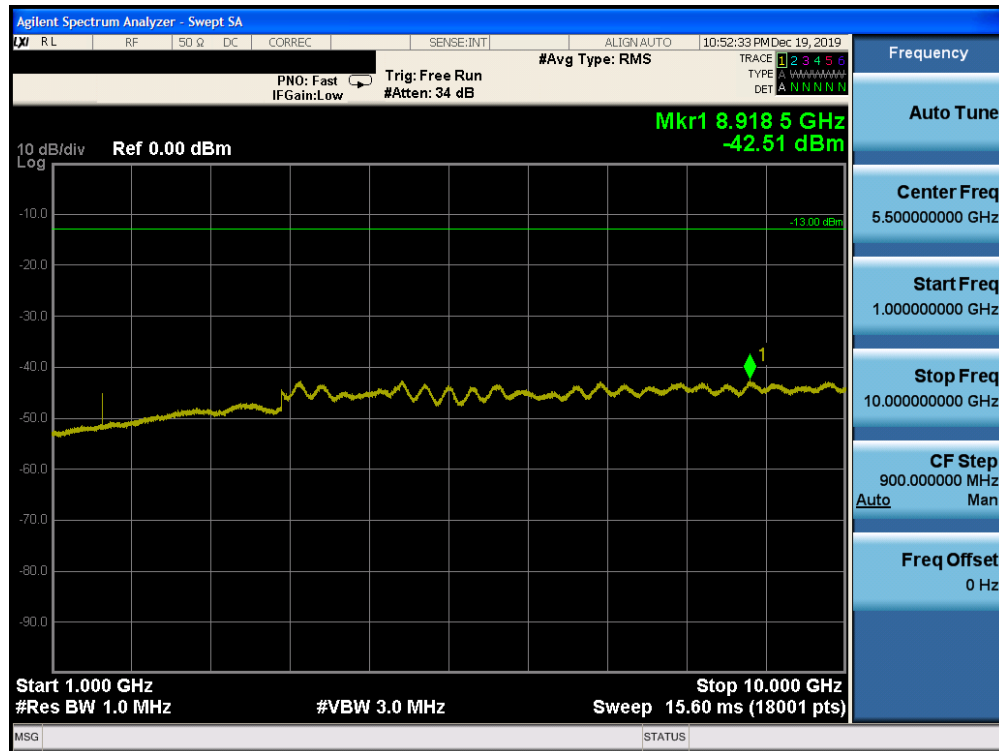


Plot 7-112. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



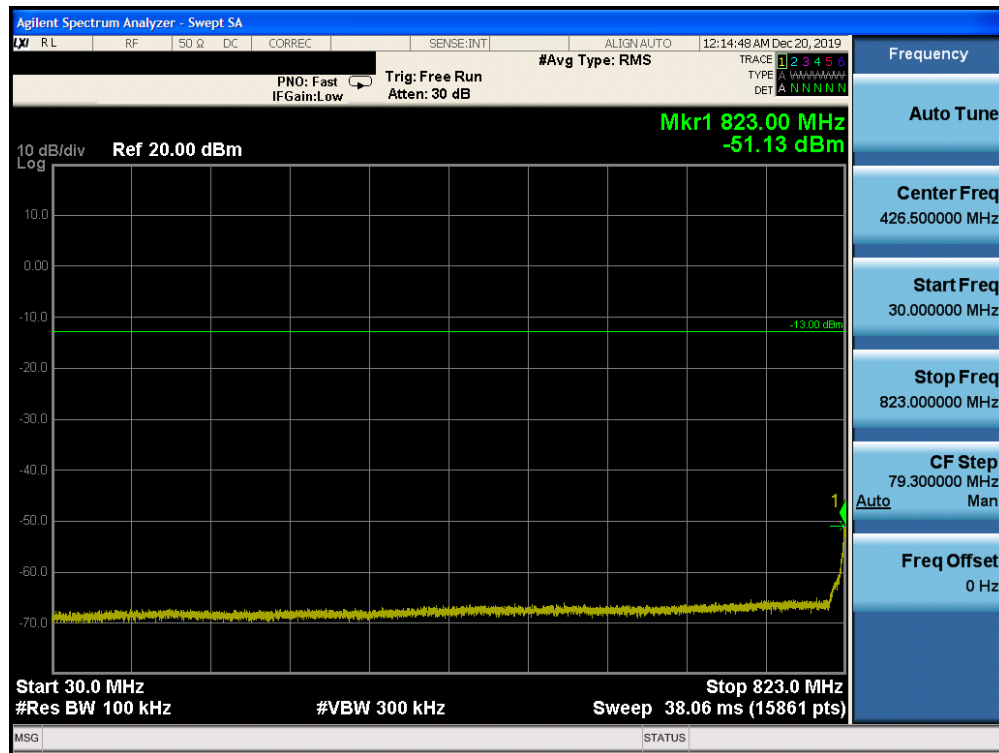
Plot 7-113. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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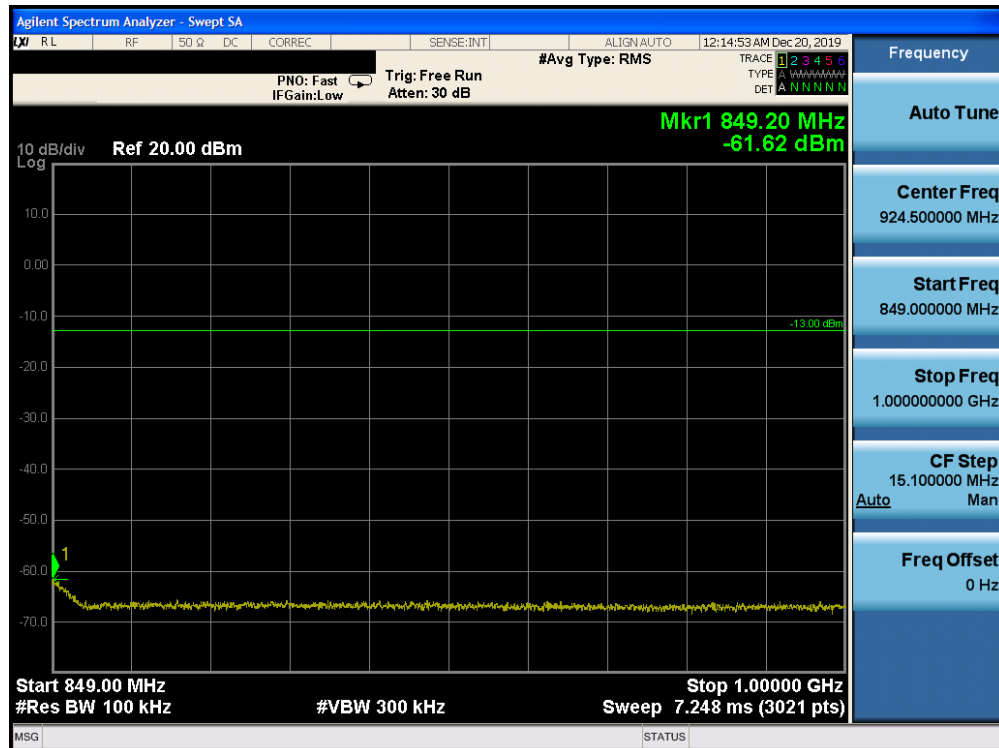


Plot 7-114. Conducted Spurious Plot (Band 13 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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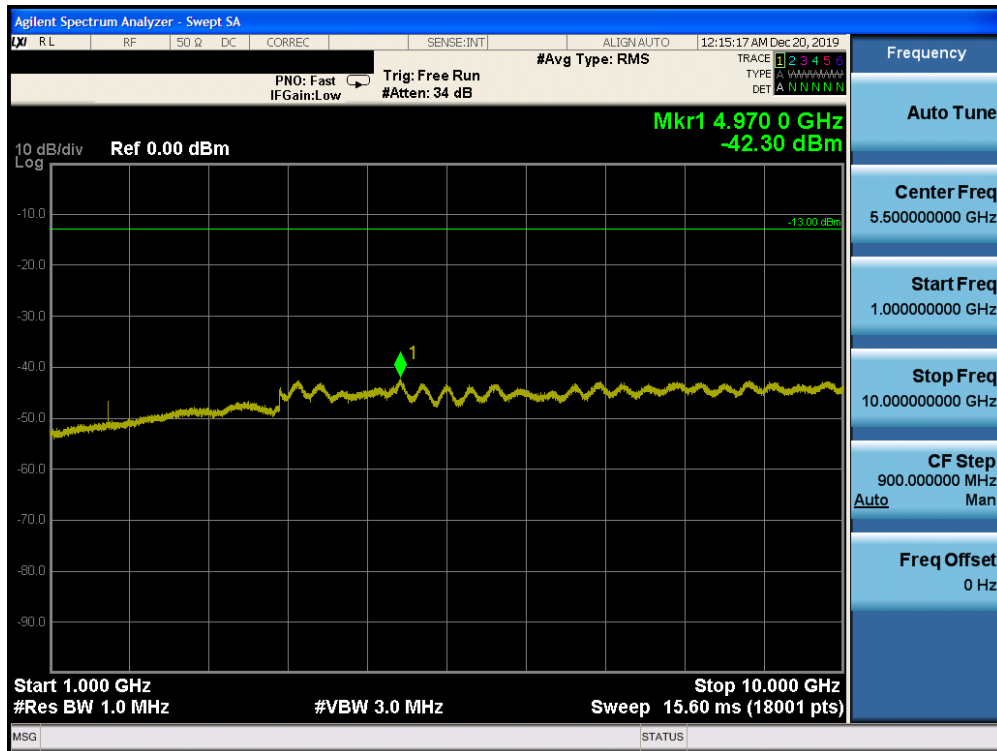


Plot 7-115. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

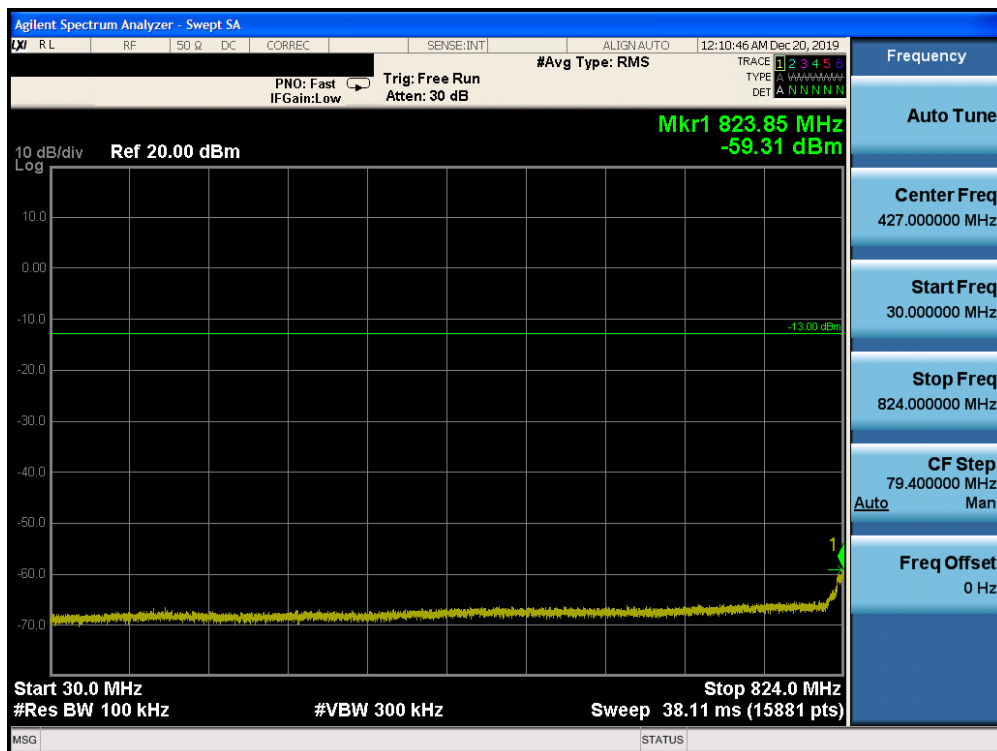


Plot 7-116. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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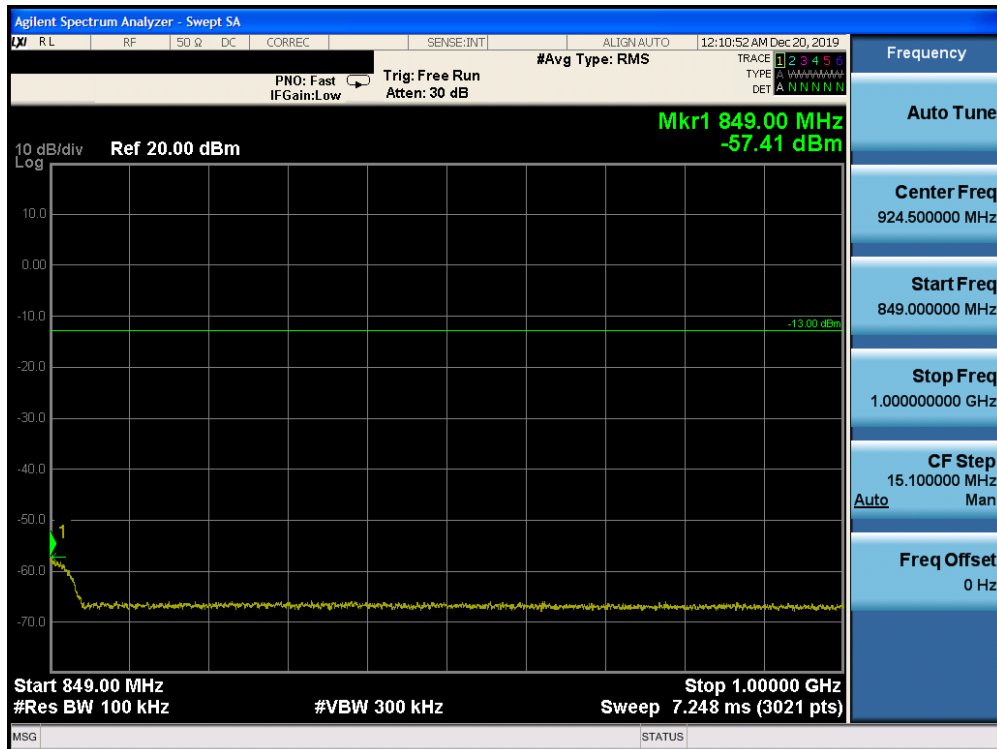


Plot 7-117. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

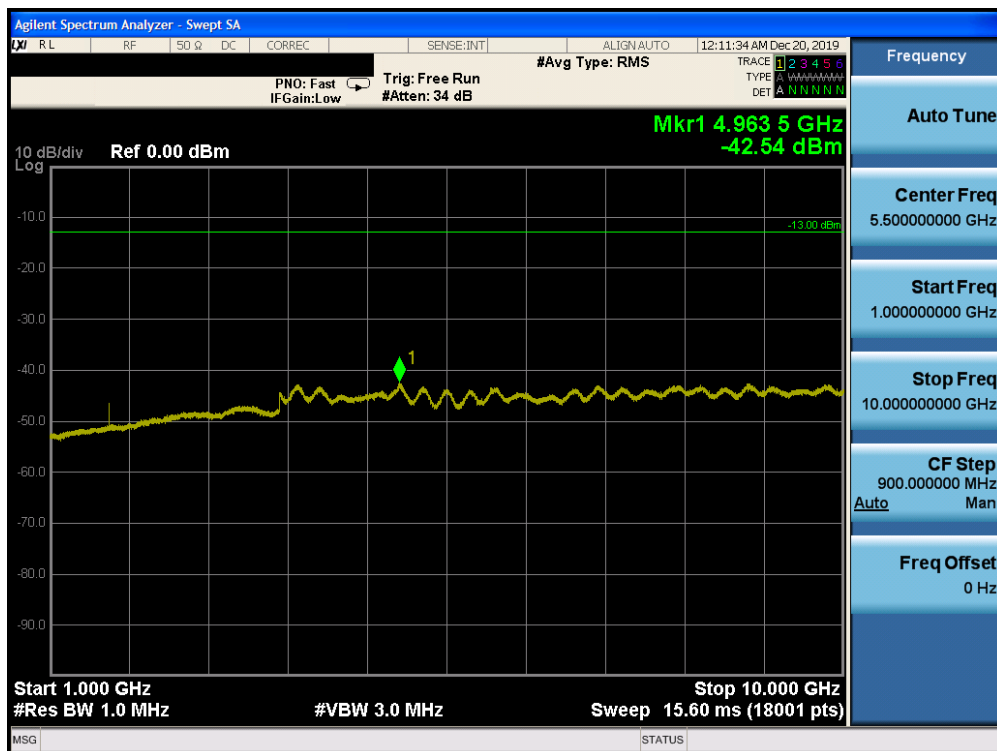


Plot 7-118. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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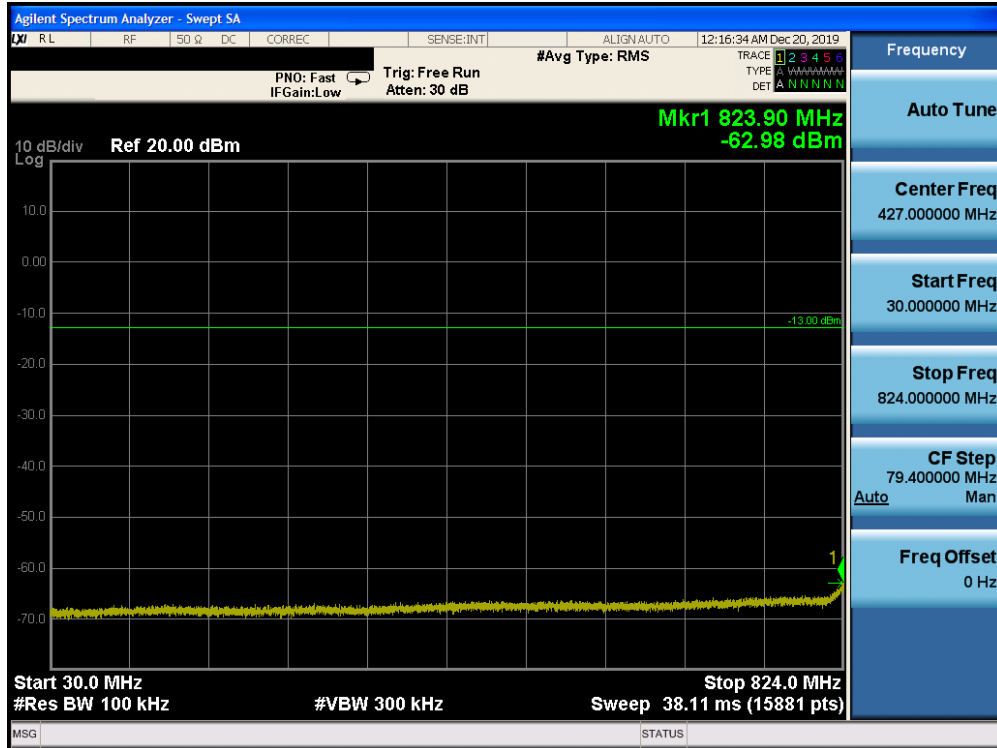


Plot 7-119. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

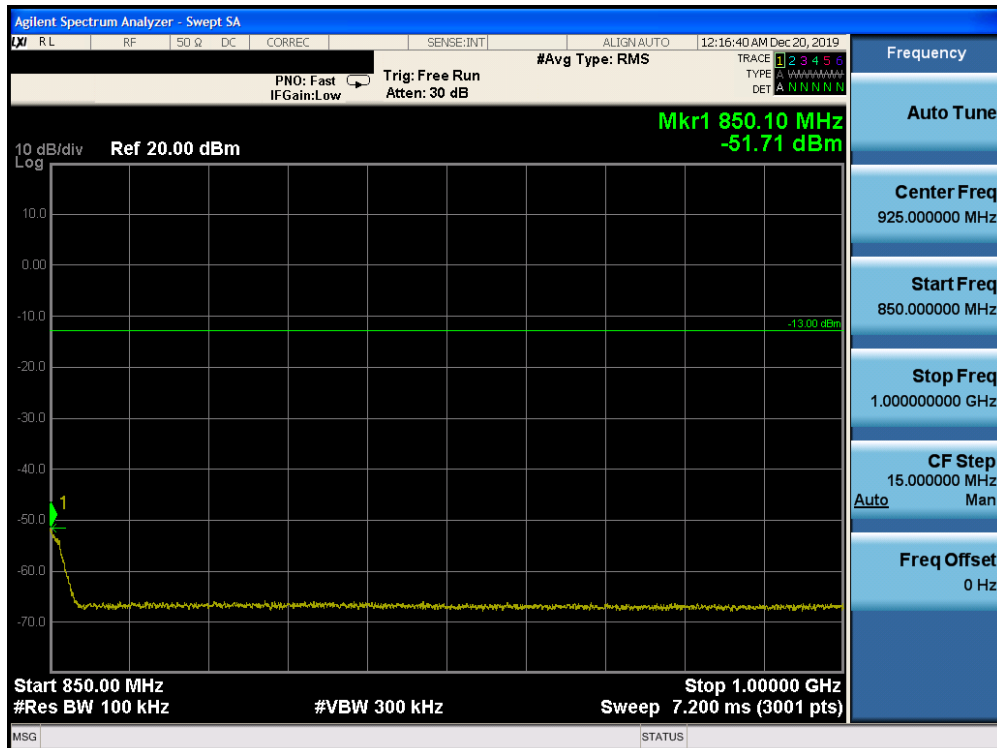


Plot 7-120. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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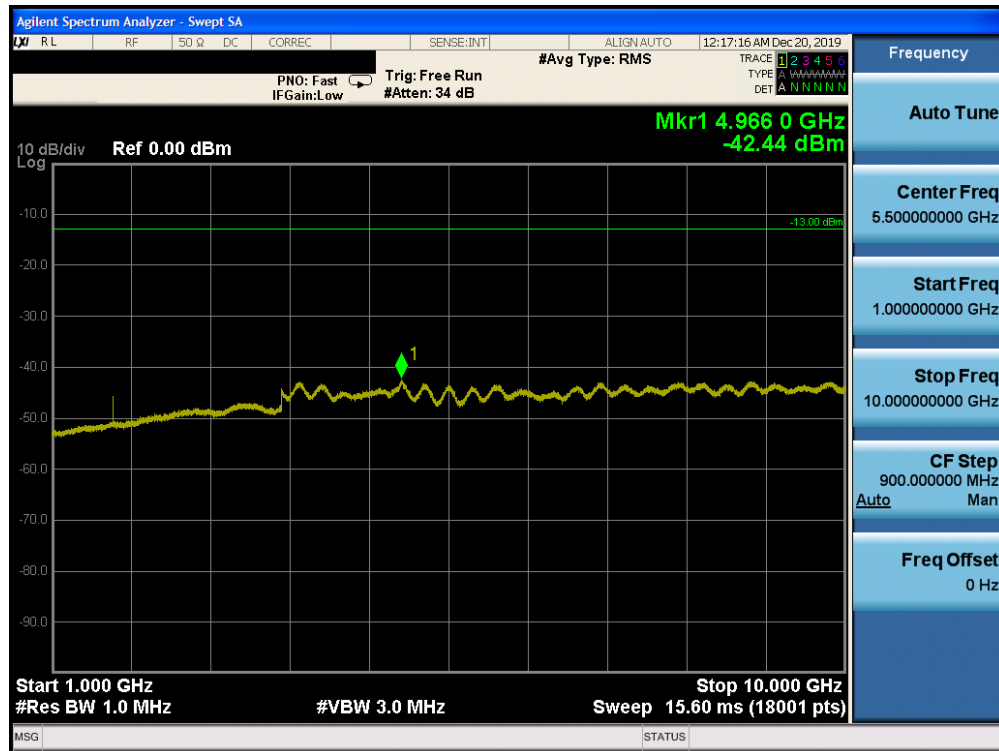


Plot 7-121. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



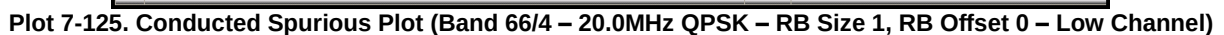
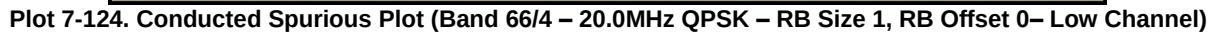
Plot 7-122. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: BCGA2230	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-123. Conducted Spurious Plot (Band 26/5 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: BCGA2230		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC CORREC SENSE:INT ALIGN AUTO 11:12:56 PM Dec 20, 2019

#Avg Type: RMS

TRAC 1 2 3 4 5 6

TYPE A NNNNNN

DET A NNNNNN

PNO: Fast IFGain:Low Trig: Free Run Atten: 30 dB

10 dB/div Ref 20.00 dBm

Log

Mkr1 1.705 5 GHz -53.38 dBm

-13.00 dBm

1

Start 30.0 MHz Stop 1.7100 GHz

#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 2.240 ms (3361 pts)

MSG STATUS

Frequency

Auto Tune

Center Freq 870.000000 MHz

Start Freq 30.000000 MHz

Stop Freq 1.71000000 GHz

CF Step 168.000000 MHz

Auto Man

Freq Offset 0 Hz

FCC ID: BCGA2230	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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