

**MEASUREMENT REPORT**
LTE**Applicant Name:**

Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:

10/23/2018 - 1/18/2019

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1810250193-03.A3L

FCC ID:

A3LSMG970U

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type:

Certification

Model:

SM-G970U

Additional Model(s):

SM-G970U1, SM-G970W, SM-G970XU

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part(s):


22, 24, & 27

Test Procedure(s):

ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,
KDB 648474 D03 v01r04

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.

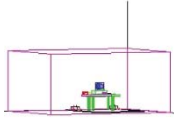

Randy Ortanez
President

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 1 of 391

TABLE OF CONTENTS

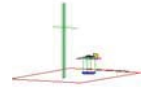
1.0	INTRODUCTION	6
1.1	Scope	6
1.2	PCTEST Test Location.....	6
1.3	Test Facility / Accreditations.....	6
2.0	PRODUCT INFORMATION.....	7
2.1	Equipment Description	7
2.2	Device Capabilities.....	7
2.3	Test Configuration	7
2.4	EMI Suppression Device(s)/Modifications	7
3.0	DESCRIPTION OF TESTS	8
3.1	Measurement Procedure.....	8
3.2	Block C Frequency Range	8
3.3	Block A Frequency Range.....	8
3.4	Cellular - Base Frequency Blocks	8
3.5	Cellular - Mobile Frequency Blocks	8
3.6	PCS - Base Frequency Blocks	9
3.7	PCS - Mobile Frequency Blocks.....	9
3.8	AWS - Base Frequency Blocks	9
3.9	AWS - Mobile Frequency Blocks.....	9
3.10	Radiated Power and Radiated Spurious Emissions	10
4.0	MEASUREMENT UNCERTAINTY	11
5.0	TEST EQUIPMENT CALIBRATION DATA	12
6.0	SAMPLE CALCULATIONS	13
7.0	TEST RESULTS	14
7.1	Summary.....	14
7.2	Occupied Bandwidth	17
7.3	Spurious and Harmonic Emissions at Antenna Terminal	108
7.4	Band Edge Emissions at Antenna Terminal	161
7.5	Peak-Average Ratio	240
7.6	Additional Maximum Power Reduction (A-MPR).....	265
7.7	Uplink Carrier Aggregation	267
7.8	Radiated Power (ERP/EIRP).....	304
7.9	Radiated Spurious Emissions Measurements	318
7.10	Uplink Carrier Aggregation Radiated Measurements	351
7.11	Frequency Stability / Temperature Variation	372
8.0	CONCLUSION.....	391

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 2 of 391



MEASUREMENT REPORT

FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
LTE Band 71	27	665.5 - 695.5	0.152	21.82	4M53G7D	QPSK
LTE Band 71	27	665.5 - 695.5	0.123	20.89	4M51W7D	16QAM
LTE Band 71	27	665.5 - 695.5	0.108	20.34	4M53W7D	64QAM
LTE Band 71	27	665.5 - 695.5	0.074	18.72	4M51W7D	256QAM
LTE Band 71	27	668 - 693	0.161	22.06	9M04G7D	QPSK
LTE Band 71	27	668 - 693	0.142	21.53	9M04W7D	16QAM
LTE Band 71	27	668 - 693	0.119	20.77	9M06W7D	64QAM
LTE Band 71	27	668 - 693	0.065	18.16	9M01W7D	256QAM
LTE Band 71	27	670.5 - 690.5	0.185	22.67	13M5G7D	QPSK
LTE Band 71	27	670.5 - 690.5	0.144	21.59	13M5W7D	16QAM
LTE Band 71	27	670.5 - 690.5	0.132	21.19	13M5W7D	64QAM
LTE Band 71	27	670.5 - 690.5	0.074	18.69	13M5W7D	256QAM
LTE Band 71	27	673 - 688	0.143	21.55	18M1G7D	QPSK
LTE Band 71	27	673 - 688	0.108	20.35	18M0W7D	16QAM
LTE Band 71	27	673 - 688	0.090	19.56	18M0W7D	64QAM
LTE Band 71	27	673 - 688	0.047	16.71	18M0W7D	256QAM
LTE Band 12	27	699.7 - 715.3	0.106	20.27	1M10G7D	QPSK
LTE Band 12	27	699.7 - 715.3	0.083	19.17	1M10W7D	16QAM
LTE Band 12	27	699.7 - 715.3	0.067	18.29	1M10W7D	64QAM
LTE Band 12	27	699.7 - 715.3	0.046	16.65	1M09W7D	256QAM
LTE Band 12	27	700.5 - 714.5	0.101	20.06	2M71G7D	QPSK
LTE Band 12	27	700.5 - 714.5	0.080	19.03	2M71W7D	16QAM
LTE Band 12	27	700.5 - 714.5	0.062	17.91	2M72W7D	64QAM
LTE Band 12	27	700.5 - 714.5	0.042	16.27	2M71W7D	256QAM
LTE Band 12	27	701.5 - 713.5	0.094	19.74	4M55G7D	QPSK
LTE Band 12	27	701.5 - 713.5	0.076	18.81	4M54W7D	16QAM
LTE Band 12	27	701.5 - 713.5	0.060	17.78	4M55W7D	64QAM
LTE Band 12	27	701.5 - 713.5	0.041	16.14	4M50W7D	256QAM
LTE Band 12	27	704 - 711	0.101	20.03	9M08G7D	QPSK
LTE Band 12	27	704 - 711	0.077	18.85	9M05W7D	16QAM
LTE Band 12	27	704 - 711	0.061	17.88	9M04W7D	64QAM
LTE Band 12	27	704 - 711	0.042	16.24	9M01W7D	256QAM
LTE Band 13	27	779.5 - 784.5	0.130	21.15	4M54G7D	QPSK
LTE Band 13	27	779.5 - 784.5	0.110	20.42	4M53W7D	16QAM
LTE Band 13	27	779.5 - 784.5	0.083	19.20	4M54W7D	64QAM
LTE Band 13	27	779.5 - 784.5	0.046	16.60	4M50W7D	256QAM
LTE Band 13	27	782	0.126	21.00	9M01G7D	QPSK
LTE Band 13	27	782	0.104	20.15	9M01W7D	16QAM
LTE Band 13	27	782	0.085	19.31	9M00W7D	64QAM
LTE Band 13	27	782	0.043	16.30	8M98W7D	256QAM
LTE Band 26/5	22H	824.7 - 848.3	0.126	21.01	1M11G7D	QPSK
LTE Band 26/5	22H	824.7 - 848.3	0.104	20.17	1M09W7D	16QAM
LTE Band 26/5	22H	824.7 - 848.3	0.083	19.18	1M10W7D	64QAM
LTE Band 26/5	22H	824.7 - 848.3	0.044	16.48	1M09W7D	256QAM
LTE Band 26/5	22H	825.5 - 847.5	0.125	20.98	2M71G7D	QPSK
LTE Band 26/5	22H	825.5 - 847.5	0.101	20.04	2M72W7D	16QAM
LTE Band 26/5	22H	825.5 - 847.5	0.084	19.22	2M72W7D	64QAM
LTE Band 26/5	22H	825.5 - 847.5	0.043	16.31	2M71W7D	256QAM
LTE Band 26/5	22H	826.5 - 846.5	0.129	21.10	4M56G7D	QPSK
LTE Band 26/5	22H	826.5 - 846.5	0.110	20.41	4M54W7D	16QAM
LTE Band 26/5	22H	826.5 - 846.5	0.082	19.13	4M56W7D	64QAM
LTE Band 26/5	22H	826.5 - 846.5	0.043	16.33	4M51W7D	256QAM
LTE Band 26/5	22H	829 - 844	0.136	21.34	9M04G7D	QPSK
LTE Band 26/5	22H	829 - 844	0.114	20.56	9M02W7D	16QAM
LTE Band 26/5	22H	829 - 844	0.081	19.06	9M04W7D	64QAM
LTE Band 26/5	22H	829 - 844	0.043	16.32	9M00W7D	256QAM
LTE Band 26	22H	831.5 - 841.5	0.133	21.23	13M5G7D	QPSK
LTE Band 26	22H	831.5 - 841.5	0.110	20.41	13M5W7D	16QAM
LTE Band 26	22H	831.5 - 841.5	0.082	19.11	13M5W7D	64QAM
LTE Band 26	22H	831.5 - 841.5	0.042	16.25	13M5W7D	256QAM

EUT Overview (<1GHz)

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 3 of 391

Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
LTE Band 66/4	27	1710.7 - 1779.3	0.199	22.99	1M10G7D	QPSK
LTE Band 66/4	27	1710.7 - 1779.3	0.173	22.37	1M10W7D	16QAM
LTE Band 66/4	27	1710.7 - 1779.3	0.120	20.80	1M09W7D	64QAM
LTE Band 66/4	27	1710.7 - 1779.3	0.068	18.33	1M09W7D	256QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.180	22.55	2M72G7D	QPSK
LTE Band 66/4	27	1711.5 - 1778.5	0.174	22.40	2M72W7D	16QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.122	20.85	2M72W7D	64QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.061	17.89	2M71W7D	256QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.179	22.53	4M58G7D	QPSK
LTE Band 66/4	27	1712.5 - 1777.5	0.140	21.46	4M54W7D	16QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.121	20.83	4M54W7D	64QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.062	17.93	4M51W7D	256QAM
LTE Band 66/4	27	1715 - 1775	0.186	22.70	9M04G7D	QPSK
LTE Band 66/4	27	1715 - 1775	0.154	21.87	9M05W7D	16QAM
LTE Band 66/4	27	1715 - 1775	0.132	21.20	9M04W7D	64QAM
LTE Band 66/4	27	1715 - 1775	0.066	18.19	9M01W7D	256QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.188	22.74	13M5G7D	QPSK
LTE Band 66/4	27	1717.5 - 1772.5	0.176	22.44	13M5W7D	16QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.127	21.04	13M5W7D	64QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.065	18.14	13M5W7D	256QAM
LTE Band 66/4	27	1720 - 1770	0.175	22.42	18M1G7D	QPSK
LTE Band 66/4	27	1720 - 1770	0.137	21.36	18M0W7D	16QAM
LTE Band 66/4	27	1720 - 1770	0.118	20.72	18M0W7D	64QAM
LTE Band 66/4	27	1720 - 1770	0.061	17.85	18M0W7D	256QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.173	22.37	1M10G7D	QPSK
LTE Band 25/2	24E	1850.7 - 1914.3	0.140	21.46	1M10W7D	16QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.121	20.82	1M09W7D	64QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.064	18.06	1M09W7D	256QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.163	22.13	2M72G7D	QPSK
LTE Band 25/2	24E	1851.5 - 1913.5	0.136	21.34	2M72W7D	16QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.116	20.63	2M72W7D	64QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.061	17.82	2M70W7D	256QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.166	22.21	4M58G7D	QPSK
LTE Band 25/2	24E	1852.5 - 1912.5	0.138	21.41	4M54W7D	16QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.114	20.58	4M52W7D	64QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.059	17.69	4M50W7D	256QAM
LTE Band 25/2	24E	1855 - 1910	0.173	22.38	9M03G7D	QPSK
LTE Band 25/2	24E	1855 - 1910	0.143	21.54	9M02W7D	16QAM
LTE Band 25/2	24E	1855 - 1910	0.121	20.83	9M01W7D	64QAM
LTE Band 25/2	24E	1855 - 1910	0.063	17.98	9M00W7D	256QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.192	22.82	13M5G7D	QPSK
LTE Band 25/2	24E	1857.5 - 1907.5	0.158	21.98	13M5W7D	16QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.134	21.27	13M5W7D	64QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.068	18.35	13M5W7D	256QAM
LTE Band 25/2	24E	1860 - 1905	0.182	22.59	18M0G7D	QPSK
LTE Band 25/2	24E	1860 - 1905	0.153	21.84	18M0W7D	16QAM
LTE Band 25/2	24E	1860 - 1905	0.129	21.09	18M0W7D	64QAM
LTE Band 25/2	24E	1860 - 1905	0.067	18.28	18M0W7D	256QAM

EUT Overview (Mid Bands)

FCC ID: A3LSMG970U	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset	Page 4 of 391

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	0.174	22.40	4M52G7D	QPSK
LTE Band 30	27	2307.5 - 2312.5	0.147	21.68	4M53W7D	16QAM
LTE Band 30	27	2307.5 - 2312.5	0.121	20.83	4M52W7D	64QAM
LTE Band 30	27	2307.5 - 2312.5	0.063	18.00	4M51W7D	256QAM
LTE Band 30	27	2310	0.162	22.09	9M04G7D	QPSK
LTE Band 30	27	2310	0.135	21.30	9M01W7D	16QAM
LTE Band 30	27	2310	0.113	20.54	9M02W7D	64QAM
LTE Band 30	27	2310	0.058	17.65	8M99W7D	256QAM
LTE Band 7 (ANT A)	27	2502.5 - 2567.5	0.100	20.01	4M52G7D	QPSK
LTE Band 7 (ANT A)	27	2502.5 - 2567.5	0.074	18.69	4M51W7D	16QAM
LTE Band 7 (ANT A)	27	2502.5 - 2567.5	0.048	16.79	4M50W7D	64QAM
LTE Band 7 (ANT A)	27	2502.5 - 2567.5	0.032	15.03	4M50W7D	256QAM
LTE Band 7 (ANT A)	27	2505 - 2565	0.100	20.02	9M05G7D	QPSK
LTE Band 7 (ANT A)	27	2505 - 2565	0.074	18.67	9M02W7D	16QAM
LTE Band 7 (ANT A)	27	2505 - 2565	0.045	16.56	9M02W7D	64QAM
LTE Band 7 (ANT A)	27	2505 - 2565	0.030	14.82	9M01W7D	256QAM
LTE Band 7 (ANT A)	27	2507.5 - 2562.5	0.100	20.00	13M5G7D	QPSK
LTE Band 7 (ANT A)	27	2507.5 - 2562.5	0.068	18.35	13M6W7D	16QAM
LTE Band 7 (ANT A)	27	2507.5 - 2562.5	0.044	16.41	13M6W7D	64QAM
LTE Band 7 (ANT A)	27	2507.5 - 2562.5	0.029	14.61	13M5W7D	256QAM
LTE Band 7 (ANT A)	27	2510 - 2560	0.104	20.15	18M1G7D	QPSK
LTE Band 7 (ANT A)	27	2510 - 2560	0.075	18.74	18M0W7D	16QAM
LTE Band 7 (ANT A)	27	2510 - 2560	0.047	16.71	18M0W7D	64QAM
LTE Band 7 (ANT A)	27	2510 - 2560	0.030	14.75	18M0W7D	256QAM
LTE Band 7 (ANT B)	27	2502.5 - 2567.5	0.107	20.28	4M51G7D	QPSK
LTE Band 7 (ANT B)	27	2502.5 - 2567.5	0.090	19.53	4M50W7D	16QAM
LTE Band 7 (ANT B)	27	2502.5 - 2567.5	0.072	18.58	4M52W7D	64QAM
LTE Band 7 (ANT B)	27	2502.5 - 2567.5	0.037	15.62	4M50W7D	256QAM
LTE Band 7 (ANT B)	27	2505 - 2565	0.122	20.88	9M03G7D	QPSK
LTE Band 7 (ANT B)	27	2505 - 2565	0.102	20.10	8M99W7D	16QAM
LTE Band 7 (ANT B)	27	2505 - 2565	0.084	19.22	9M01W7D	64QAM
LTE Band 7 (ANT B)	27	2505 - 2565	0.042	16.27	9M00W7D	256QAM
LTE Band 7 (ANT B)	27	2507.5 - 2562.5	0.133	21.22	13M5G7D	QPSK
LTE Band 7 (ANT B)	27	2507.5 - 2562.5	0.110	20.39	13M5W7D	16QAM
LTE Band 7 (ANT B)	27	2507.5 - 2562.5	0.093	19.67	13M5W7D	64QAM
LTE Band 7 (ANT B)	27	2507.5 - 2562.5	0.047	16.71	13M5W7D	256QAM
LTE Band 7 (ANT B)	27	2510 - 2560	0.103	19.99	18M0G7D	QPSK
LTE Band 7 (ANT B)	27	2510 - 2560	0.077	18.87	18M0W7D	16QAM
LTE Band 7 (ANT B)	27	2510 - 2560	0.069	18.38	18M0W7D	64QAM
LTE Band 7 (ANT B)	27	2510 - 2560	0.034	15.28	18M0W7D	256QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.457	26.60	4M54G7D	QPSK
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.355	25.51	4M53W7D	16QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.307	24.88	4M54W7D	64QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.166	22.21	4M51W7D	256QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.456	26.59	9M02G7D	QPSK
LTE Band 41 (PC2)	27	2501 - 2685	0.333	25.22	9M05W7D	16QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.235	23.70	9M03W7D	64QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.159	22.03	9M00W7D	256QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.425	26.29	13M5G7D	QPSK
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.309	24.90	13M6W7D	16QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.272	24.35	13M5W7D	64QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.151	21.80	13M5W7D	256QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.379	25.78	18M0G7D	QPSK
LTE Band 41 (PC2)	27	2506 - 2680	0.321	25.07	18M0W7D	16QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.257	24.10	17M9W7D	64QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.147	21.67	18M0W7D	256QAM

EUT Overview (High Bands)

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 5 of 391

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 Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 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 (2451B) test laboratory with the site description on file with ISSED.

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 6 of 391

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG970U**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 0388M, 0500M, 0358M, 0372M, 0348M, 0161M, 0163M, 0409M, 0157M, 0300M, 0474M, 5125B

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 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), NFC, ANT+, Wireless Power Transfer

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.

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

This device employs an antenna switching mechanism that allows for radiated transmission from one of two antennas at a time for LTE B7. LTE B7 RF tests were performed with a manufacturer SW test code that simulated the two transmit conditions, and it was verified that the test results in this report reflect the actual transmit conditions. Both antennas cannot transmit simultaneously so dual transmission conditions were not investigated. The main transmit antenna data is labeled as "Antenna B" and the secondary transmit antenna data is labeled as "Antenna A" in the radiated section of this report.

2.3 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.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT placed on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 7 of 391

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

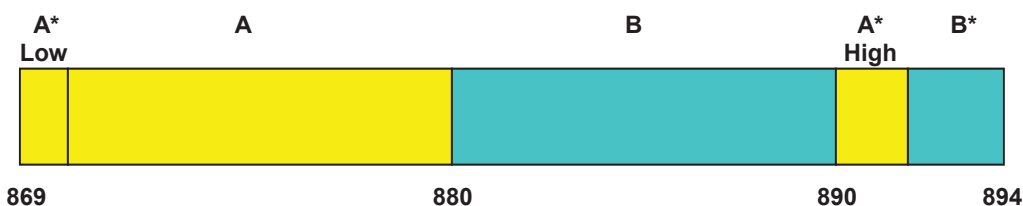
Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results 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.

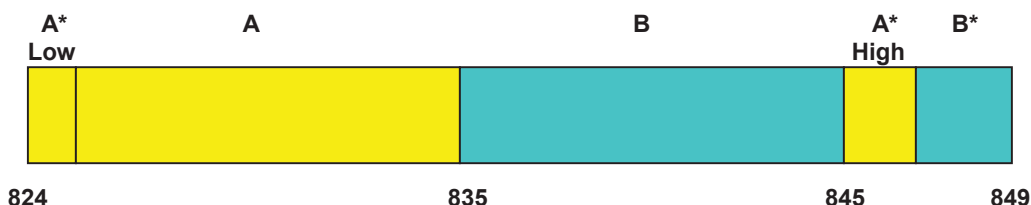
3.4 Cellular - Base Frequency Blocks



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

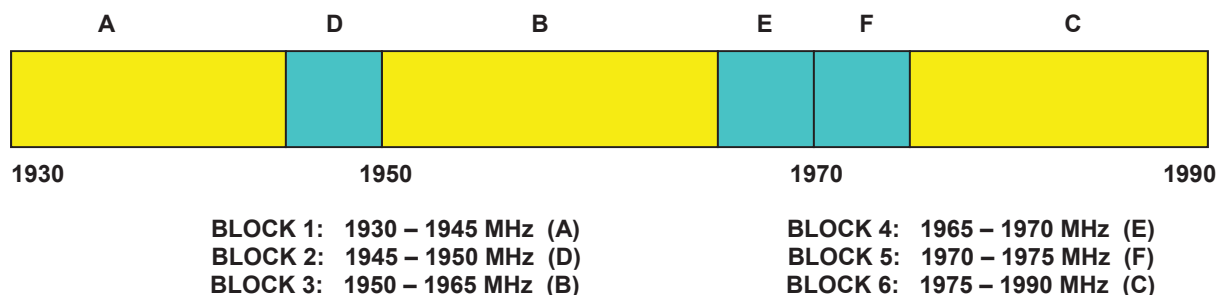


BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

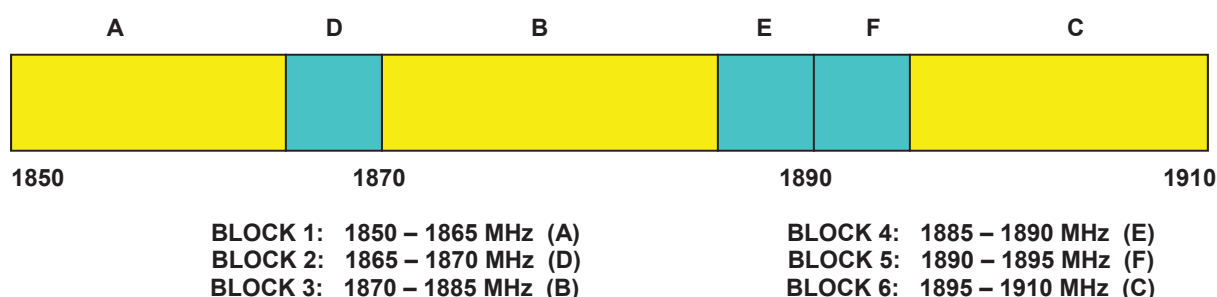
BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 8 of 391

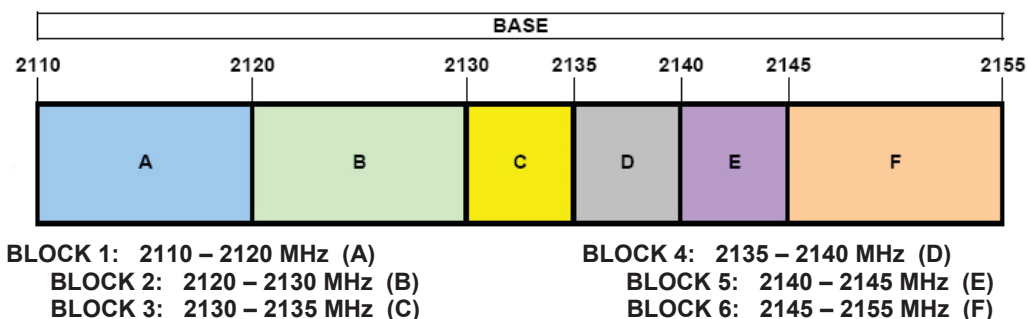
3.6 PCS - Base Frequency Blocks



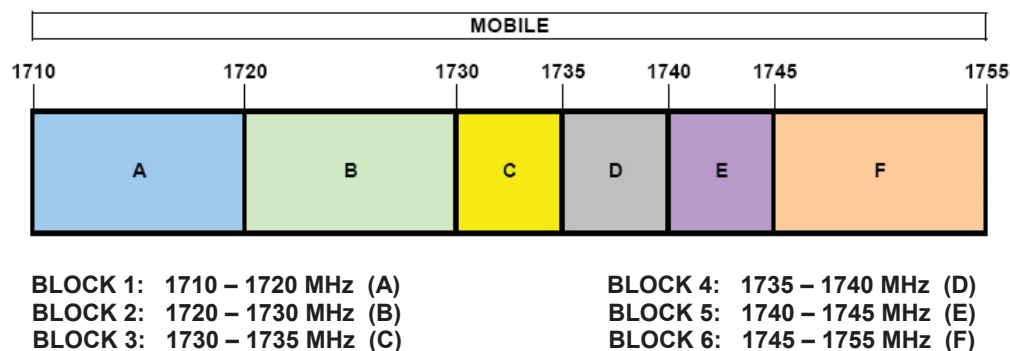
3.7 PCS - Mobile Frequency Blocks



3.8 AWS - Base Frequency Blocks



3.9 AWS - Mobile Frequency Blocks



FCC ID: A3LSMG970U	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset	Page 9 of 391

3.10 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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

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 $43 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 10 of 391

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	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 11 of 391

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
-	LTX2	Licensed Transmitter Cable Set	1/23/2018	Annual	1/23/2019	LTX2
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Anritsu	MT8821C	Radio Communication Analyzer	7/24/2018	Annual	7/24/2019	6201664756
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Espec	ESX-2CA	Environmental Chamber	3/28/2018	Annual	3/28/2019	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Huber + Suhner	Sucoflex 102A	40GHz Radiated Cable Set	1/23/2018	Annual	1/23/2019	251425001
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/20/2018	Annual	3/20/2019	MY49430494
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/30/2018	Annual	3/30/2019	11401010036
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	9/25/2018	Annual	9/25/2019	102060
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/25/2018	Annual	6/25/2019	102133
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100040
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

Notes:

1. 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.
2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset	Page 12 of 391	

6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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).

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 13 of 391

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMG970U
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 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		PASS	Section 7.3, 7.4
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)		PASS	Section 7.3, 7.4
27.53(a)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(a)		PASS	Section 7.3, 7.4
24.232(d) 27.50(d)(5)	Peak-Average Ratio	< 13 dB		PASS	Section 7.5
2.1046	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
2.1046	Additional Maximum Power Reduction (A-MPR)	N/A		PASS	Section 7.6
27.53(m)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 27.53(m)		PASS	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)		PASS	Section 7.11

Table 7-1. Summary of Conducted Test Results

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 14 of 391

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 26/5)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.6
27.50(b)(10) 27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 71, 12, 13)	< 3 Watts max. ERP		PASS	Section 7.6
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 25/2, 7, 41/38)	< 2 Watts max. EIRP		PASS	Section 7.6
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66/4)	< 1 Watts max. EIRP		PASS	Section 7.6
27.50(a)(3)	Equivalent Isotropic Radiated Power (Band 30)	< 0.25 Watts max. EIRP		PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions (Band 12, 26/5, 66/4, 25/2)	> 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	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		PASS	Section 7.9
27.53(a)	Undesirable Emissions (Band 30)	> 70 + 10log ₁₀ (P[Watts])		PASS	Section 7.9
27.53(m)	Undesirable Emissions (Band 7, 41/38)	Undesirable emissions must meet the limits detailed in 27.53(m)		PASS	Section 7.9
27.53(m)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 27.53(m)		PASS	Section 7.10

Table 7-2. Summary of Radiated Test Results

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset	Page 15 of 391	

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 4.8.

FCC ID: A3LSMG970U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 16 of 391

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

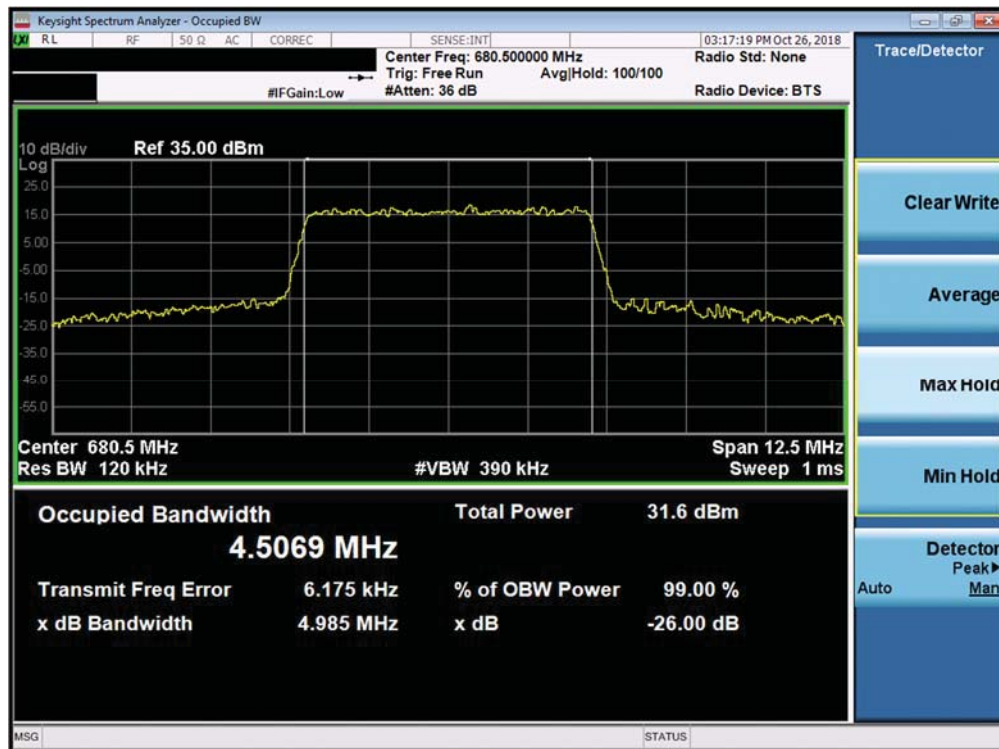
None.

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 17 of 391

Band 71

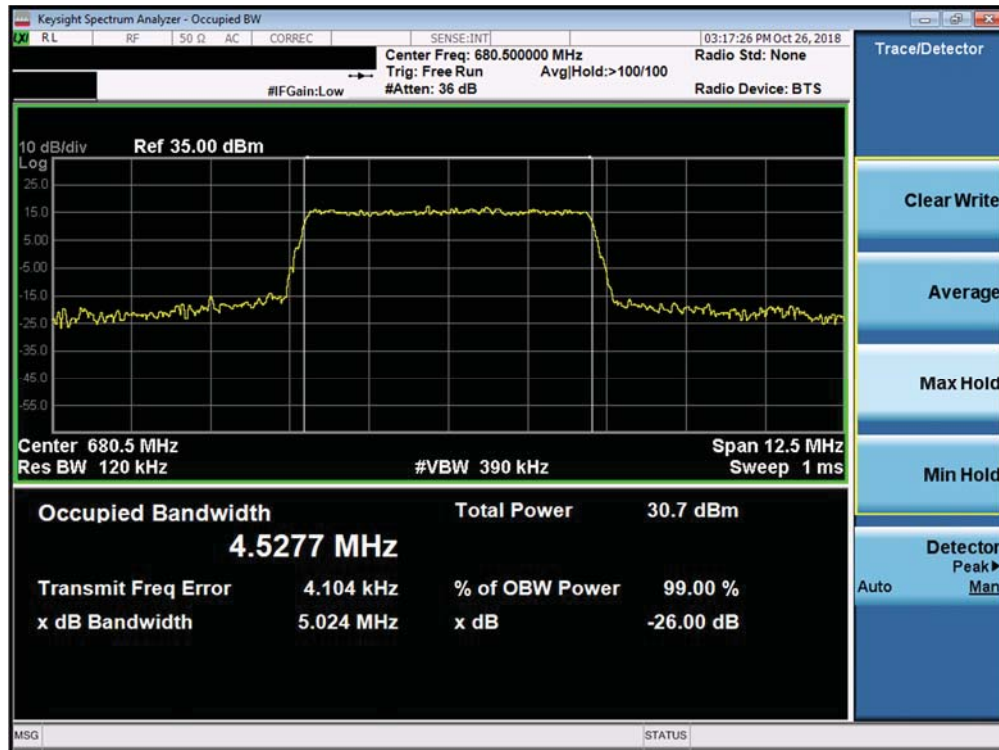


Plot 7-1. Occupied Bandwidth Plot (Band 71 - 5.0MHz QPSK - Full RB Configuration)

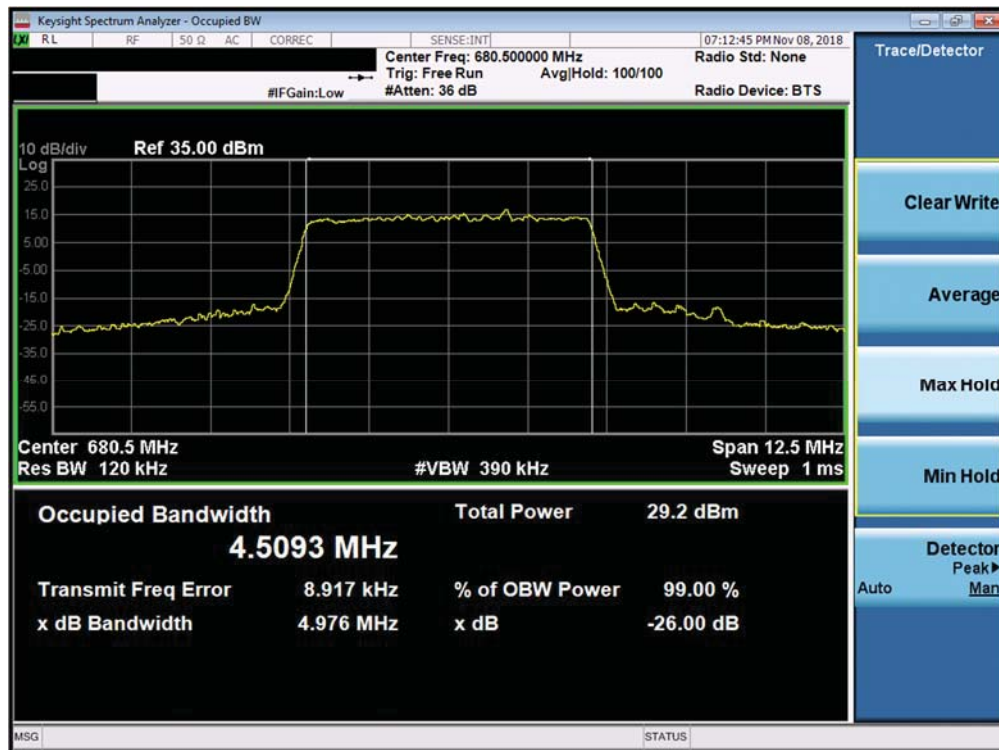


Plot 7-2. Occupied Bandwidth Plot (Band 71 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 18 of 391

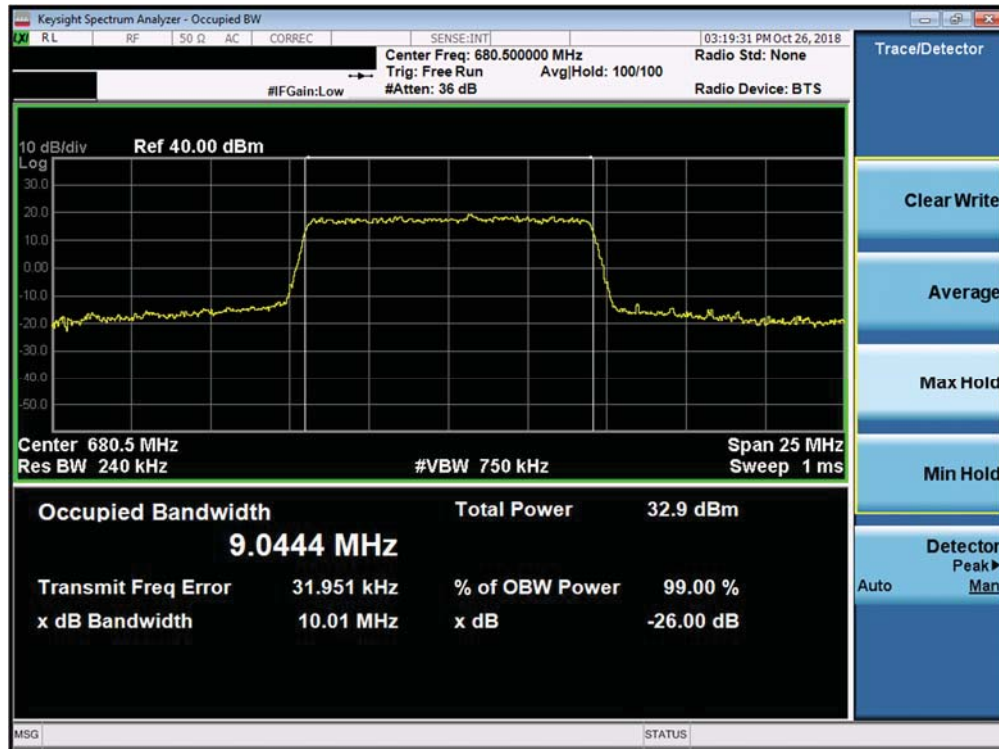


Plot 7-3. Occupied Bandwidth Plot (Band 71 - 5.0MHz 64-QAM - Full RB Configuration)

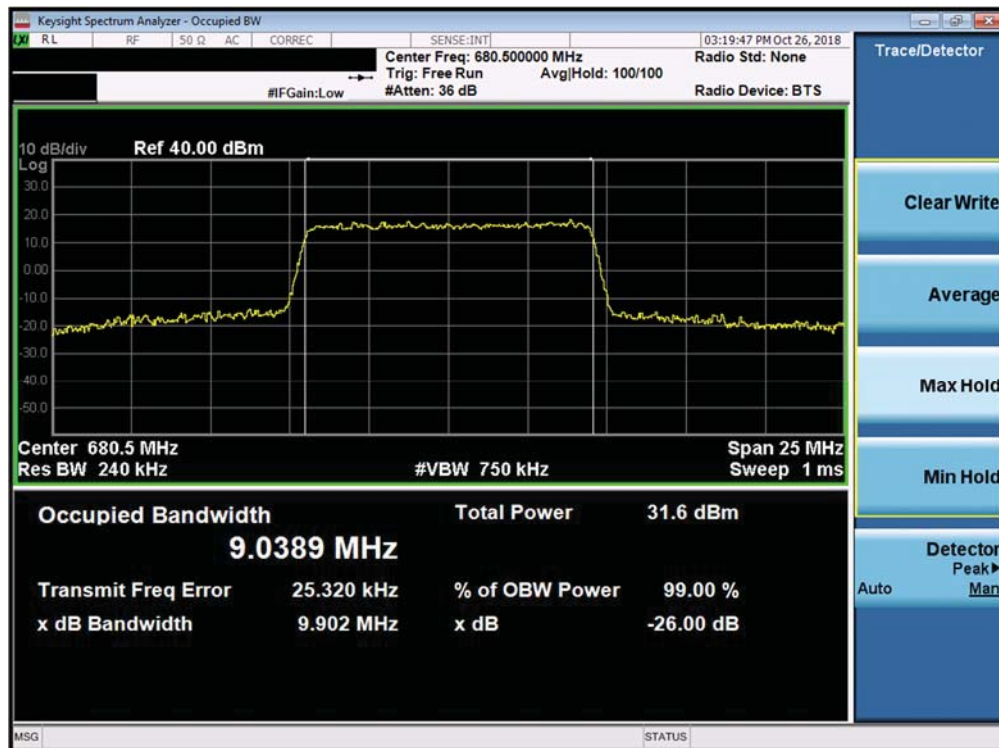


Plot 7-4. Occupied Bandwidth Plot (Band 71 - 5.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 19 of 391



Plot 7-5. Occupied Bandwidth Plot (Band 71 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (Band 71 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 20 of 391

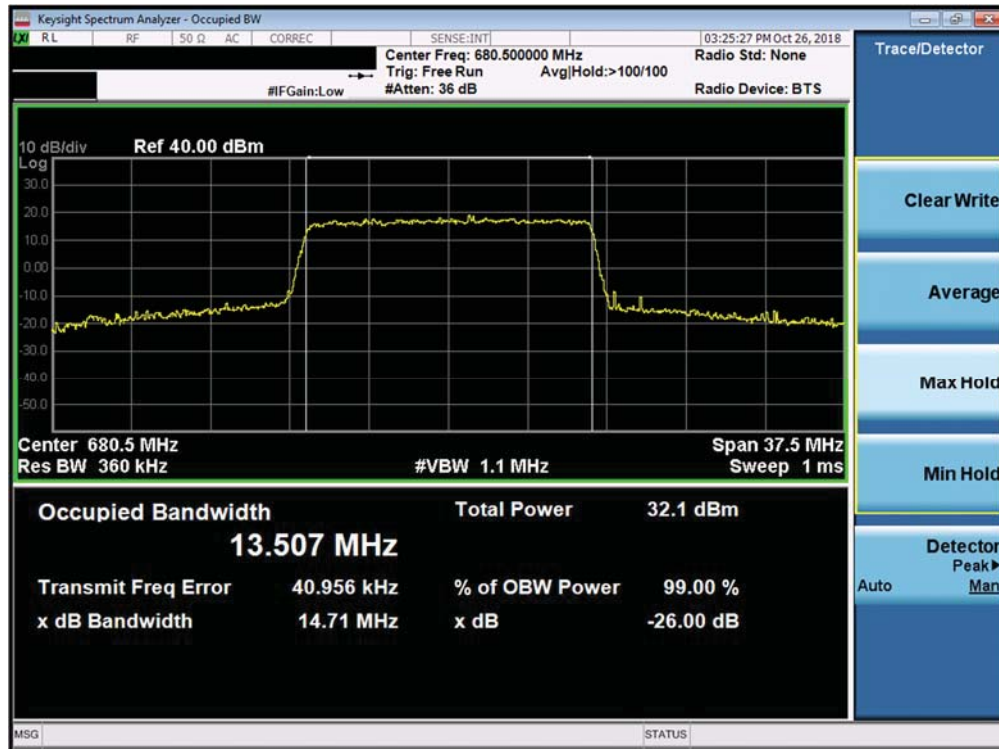


Plot 7-7. Occupied Bandwidth Plot (Band 71 - 10.0MHz 64-QAM - Full RB Configuration)



Plot 7-8. Occupied Bandwidth Plot (Band 71 - 10.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 21 of 391

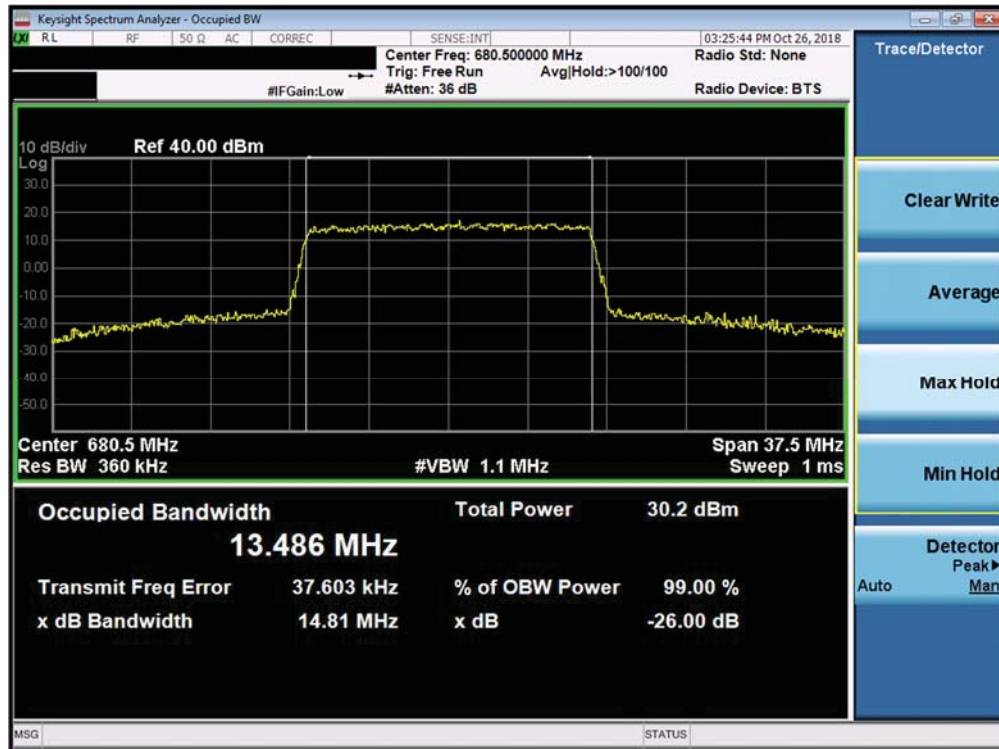


Plot 7-9. Occupied Bandwidth Plot (Band 71 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 71 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 22 of 391

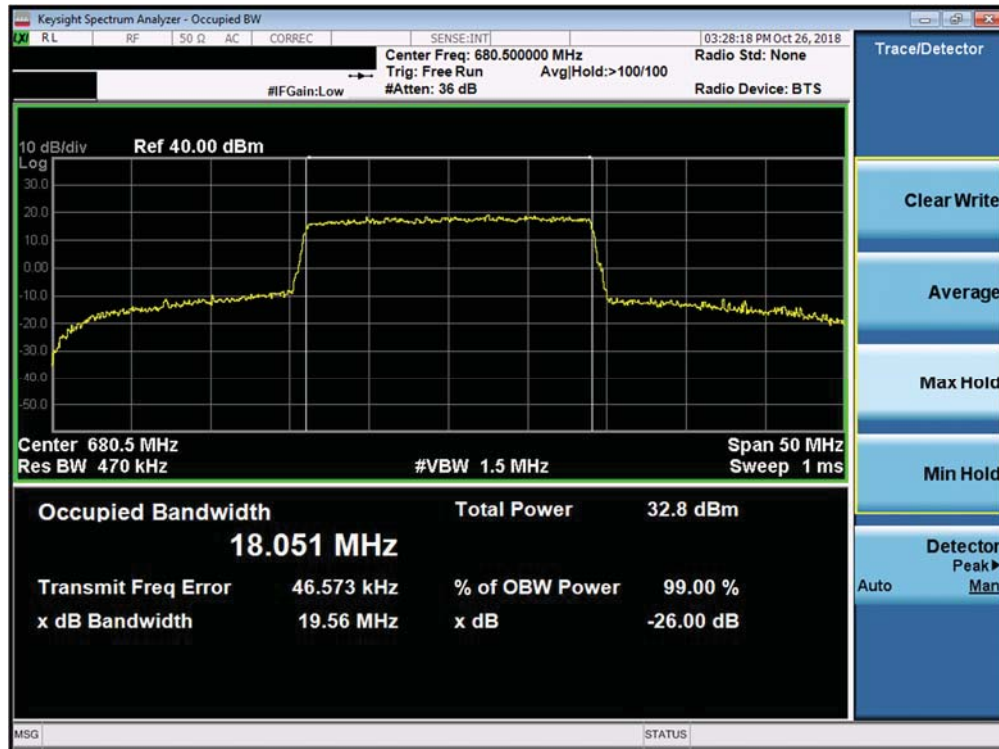


Plot 7-11. Occupied Bandwidth Plot (Band 71 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (Band 71 - 15.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 23 of 391

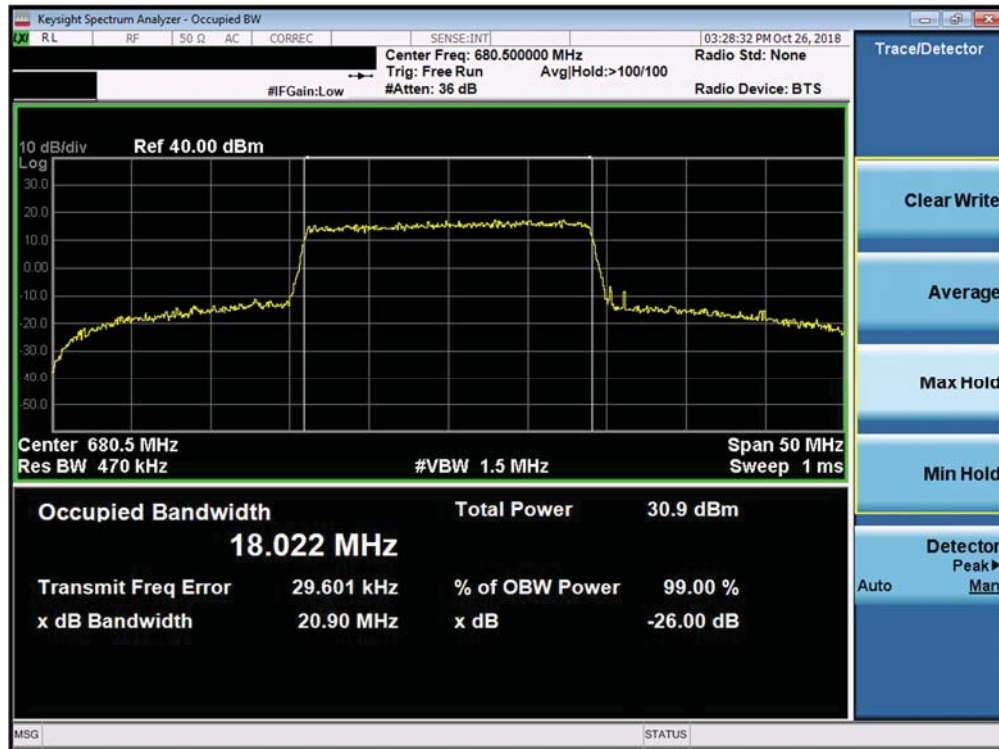


Plot 7-13. Occupied Bandwidth Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)

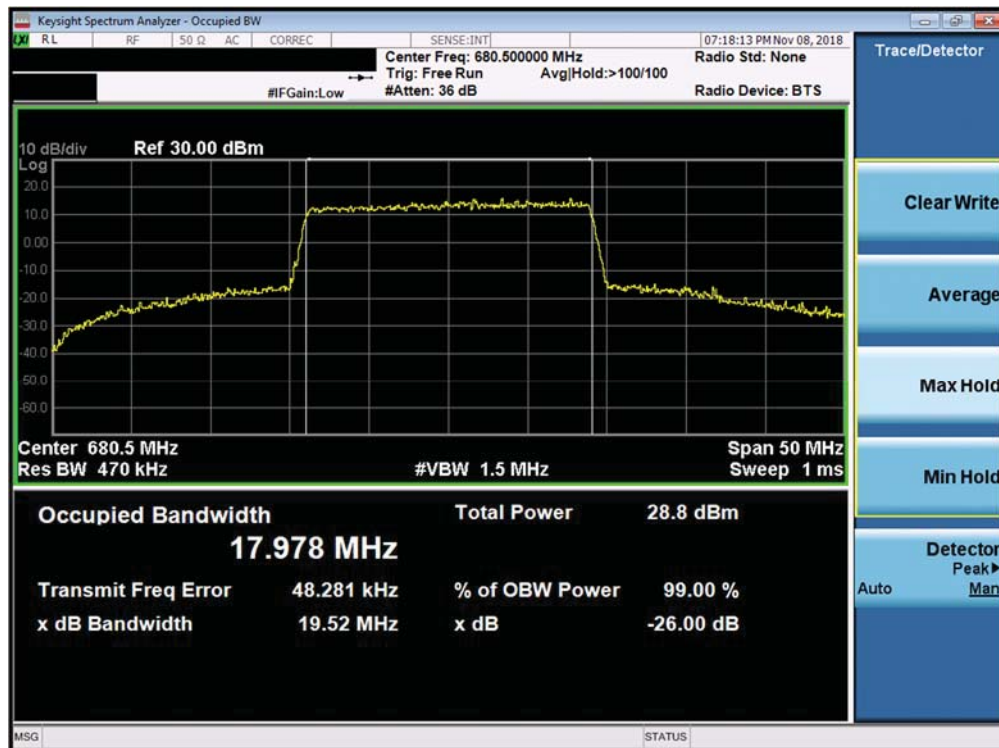


Plot 7-14. Occupied Bandwidth Plot (Band 71 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 24 of 391



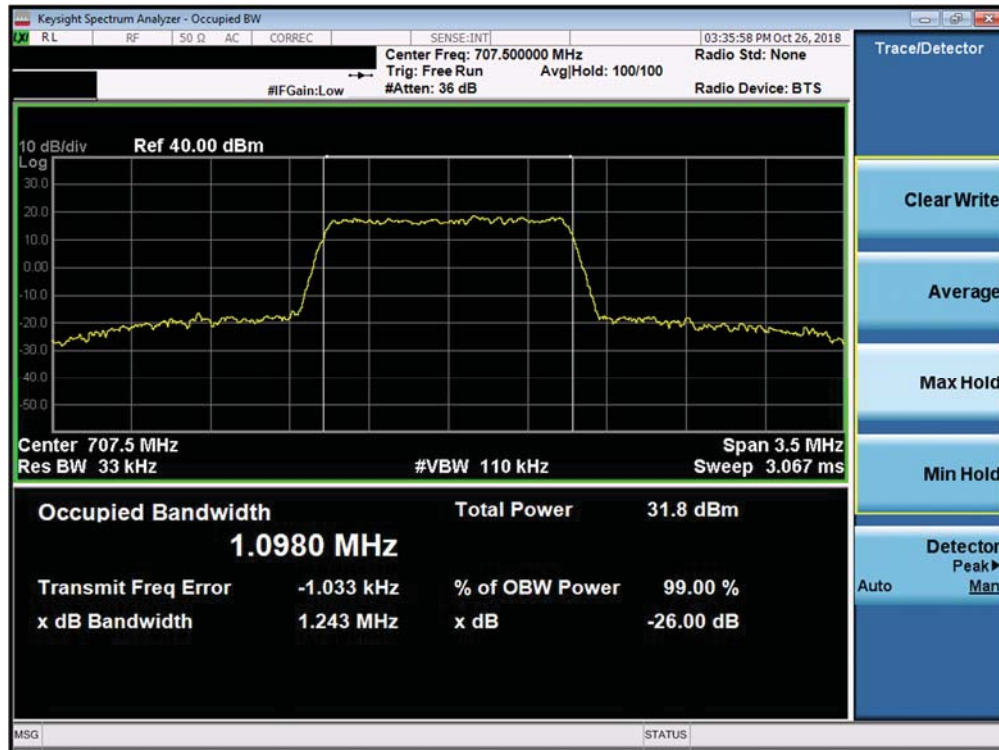
Plot 7-15. Occupied Bandwidth Plot (Band 71 - 20.0MHz 64-QAM - Full RB Configuration)



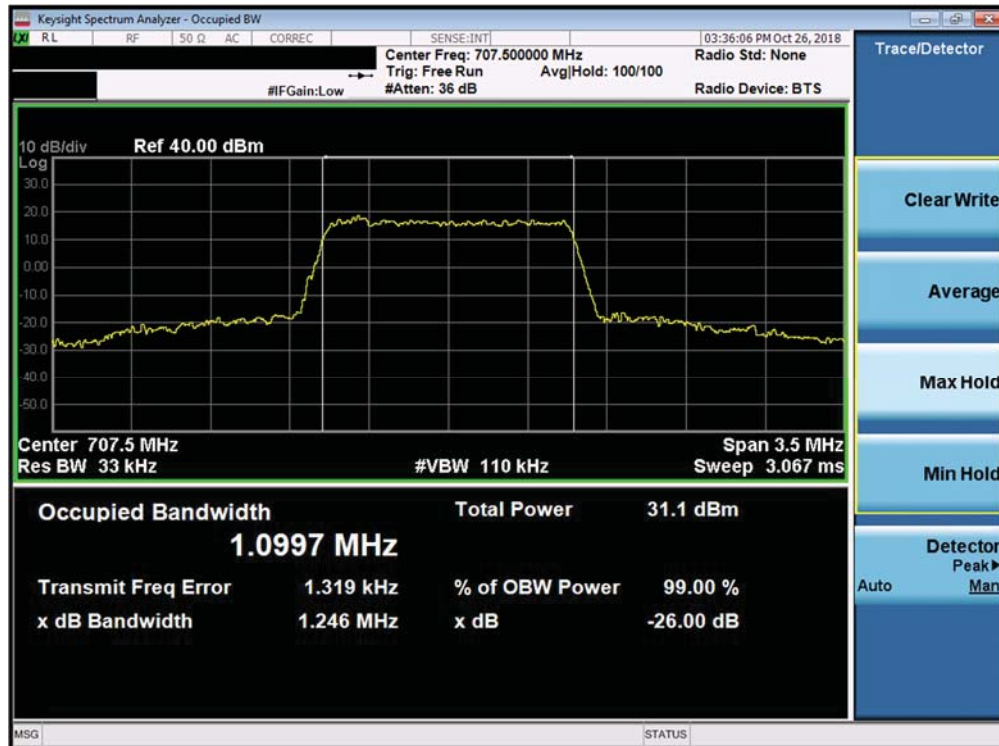
Plot 7-16. Occupied Bandwidth Plot (Band 71 - 20.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 25 of 391

Band 12

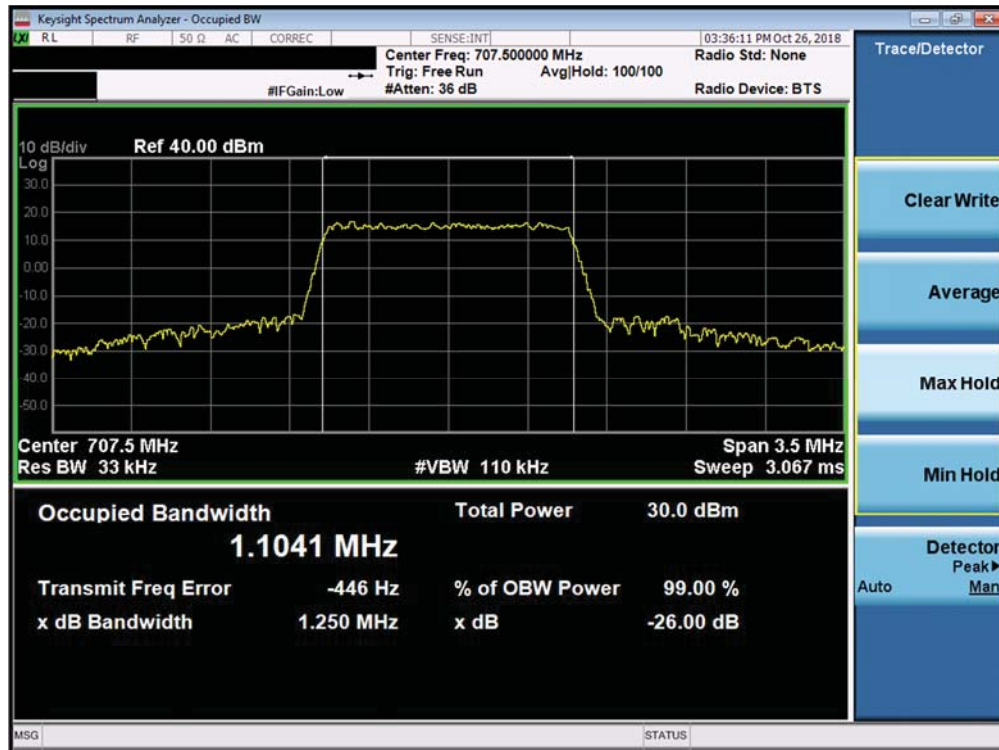


Plot 7-17. Occupied Bandwidth Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

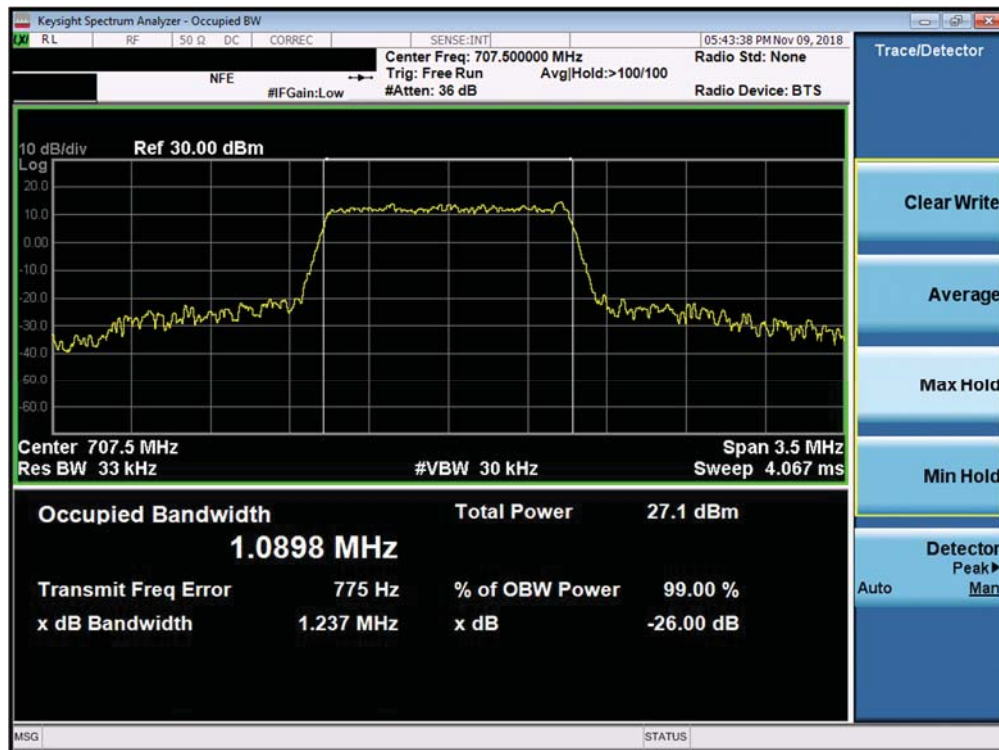


Plot 7-18. Occupied Bandwidth Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 26 of 391

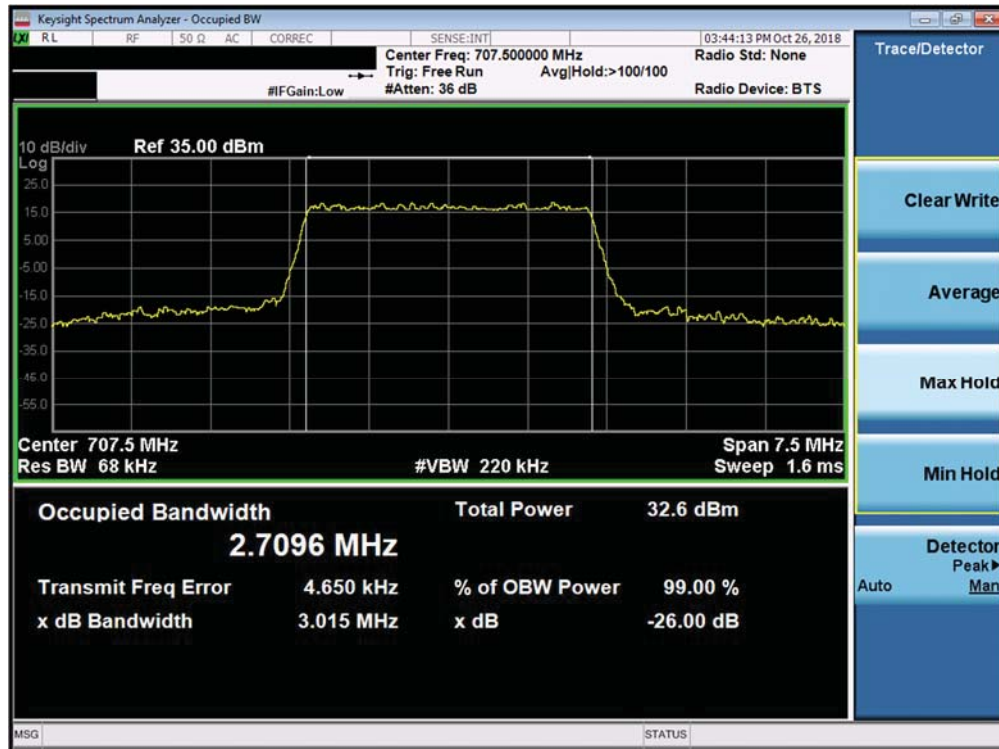


Plot 7-19. Occupied Bandwidth Plot (Band 12 - 1.4MHz 64-QAM - Full RB Configuration)

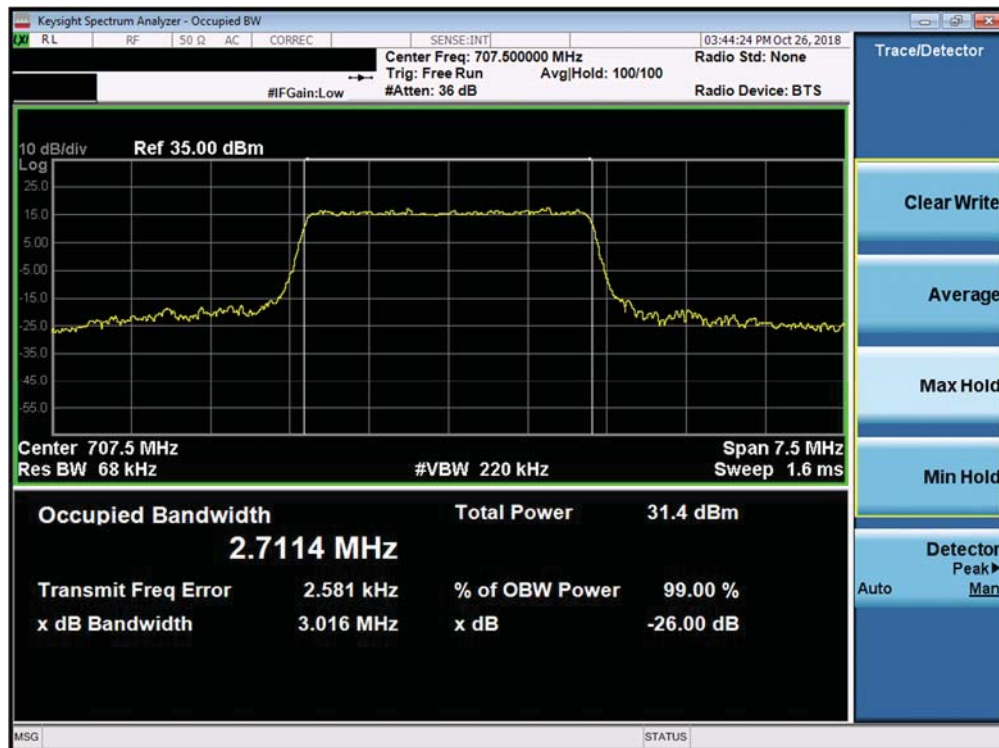


Plot 7-20. Occupied Bandwidth Plot (Band 12 - 1.4MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 27 of 391

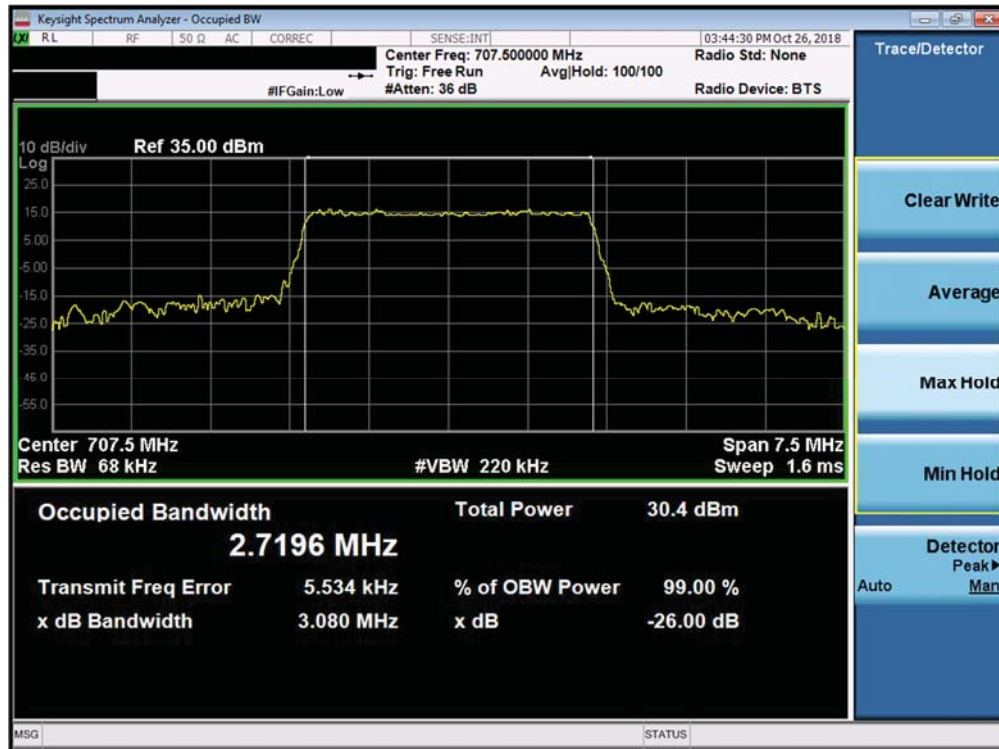


Plot 7-21. Occupied Bandwidth Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

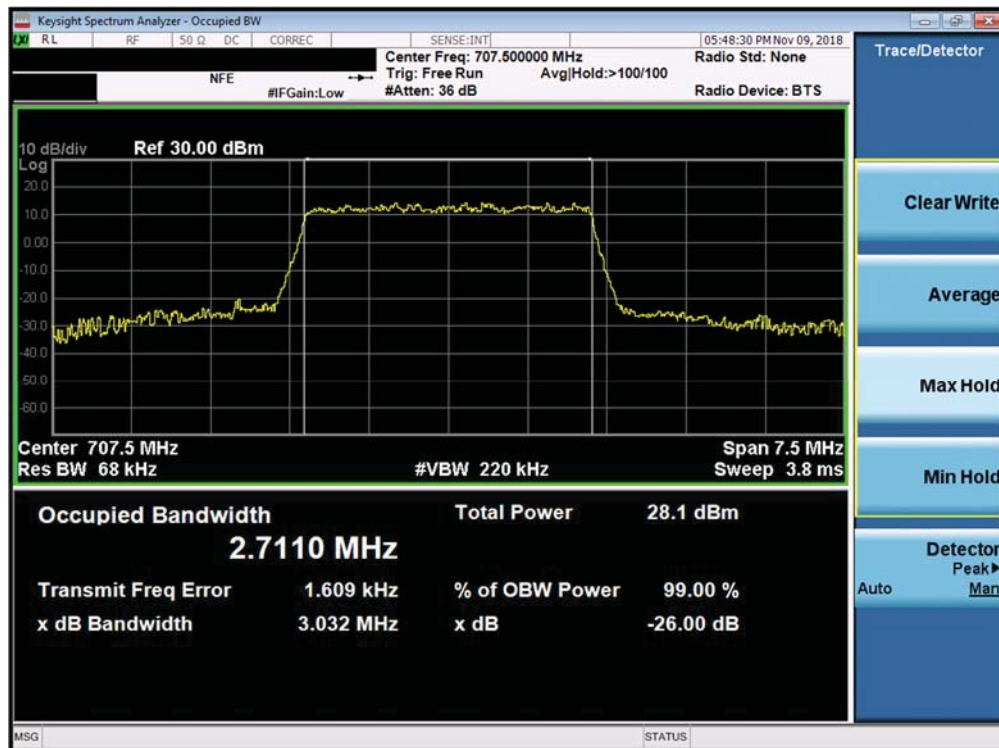


Plot 7-22. Occupied Bandwidth Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 28 of 391

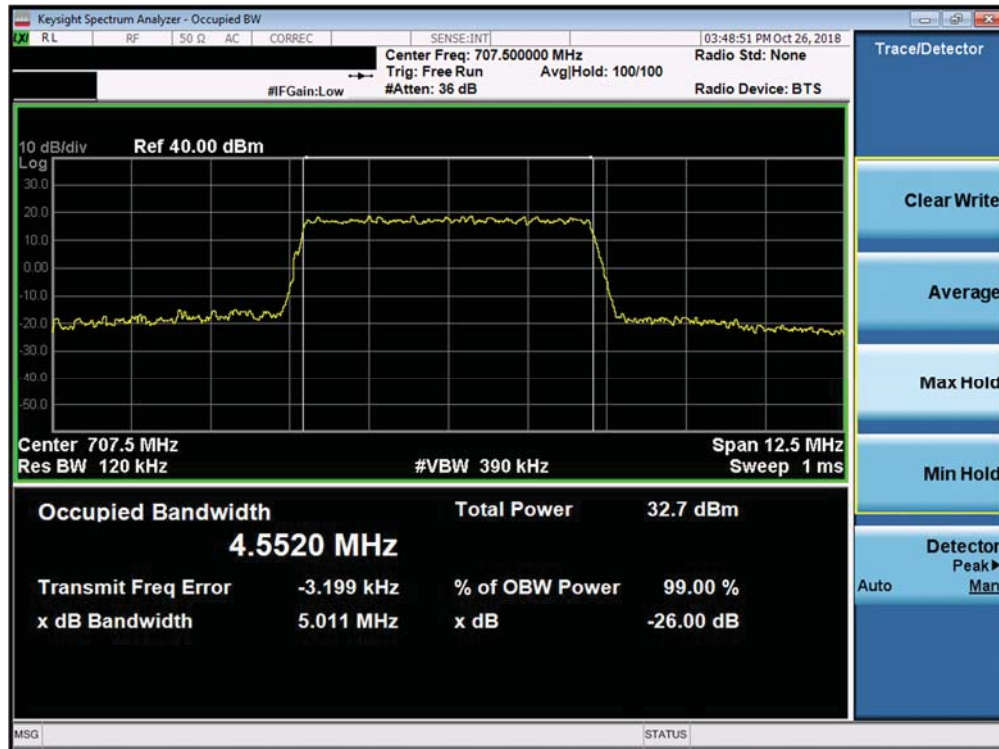


Plot 7-23. Occupied Bandwidth Plot (Band 12 - 3.0MHz 64-QAM - Full RB Configuration)



Plot 7-24. Occupied Bandwidth Plot (Band 12 - 3.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 29 of 391

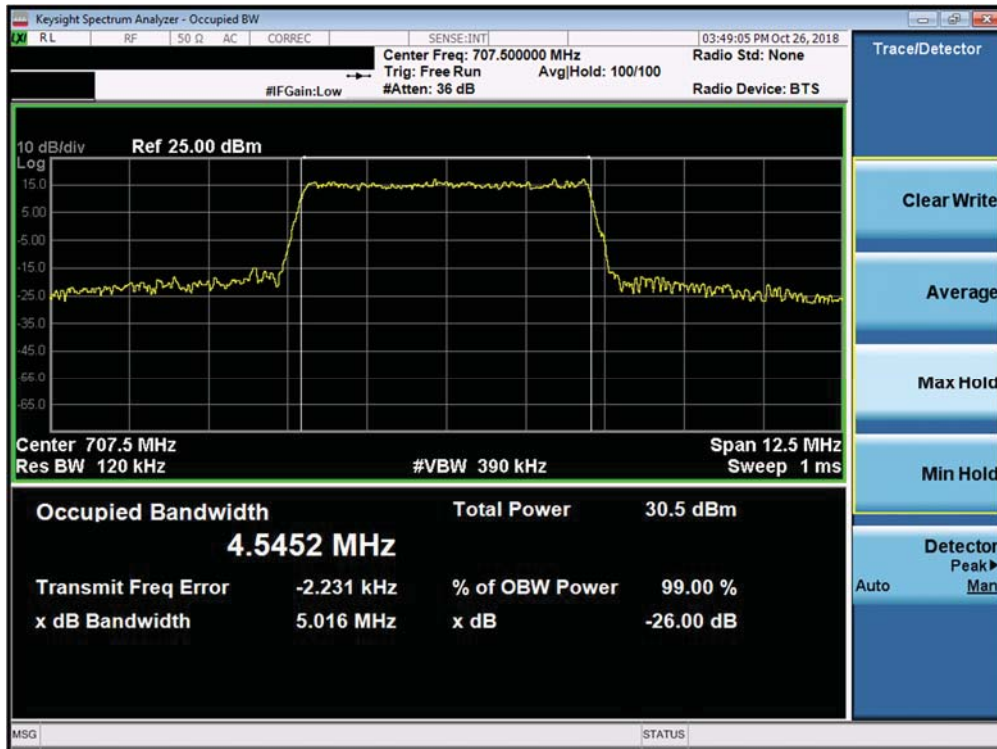


Plot 7-25. Occupied Bandwidth Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

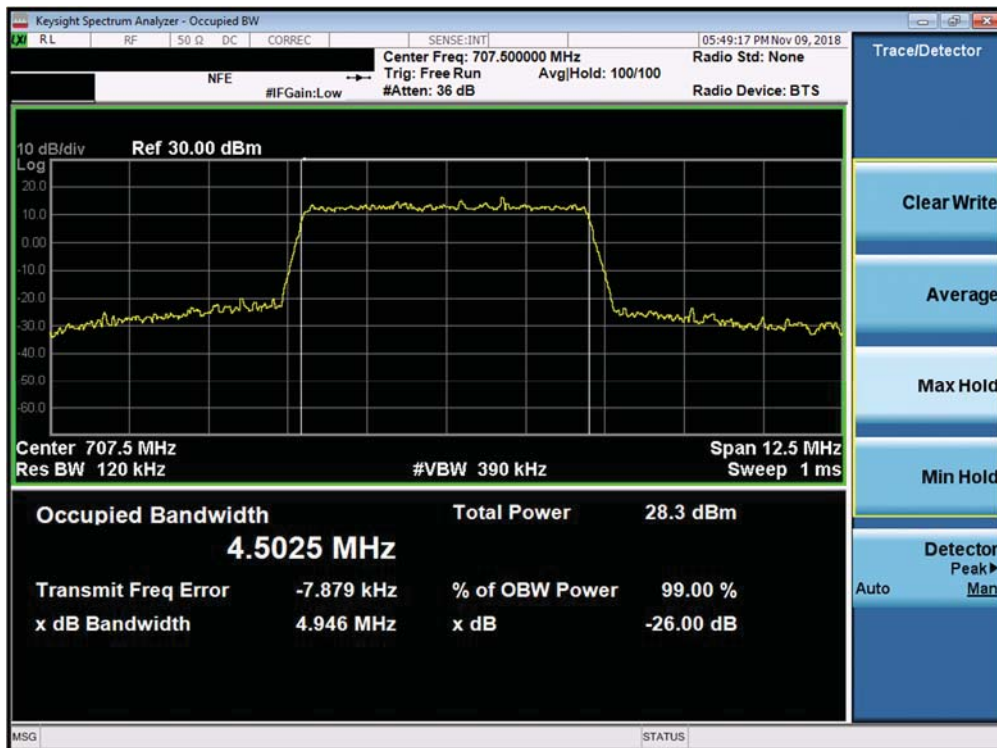


Plot 7-26. Occupied Bandwidth Plot (Band 12 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 30 of 391

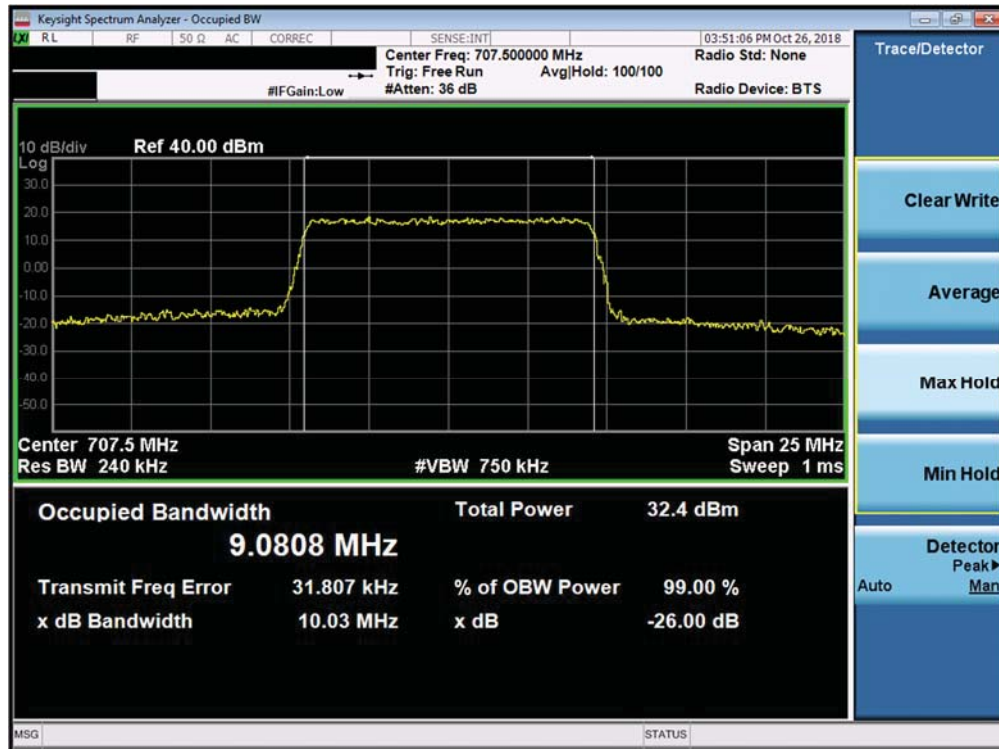


Plot 7-27. Occupied Bandwidth Plot (Band 12 - 5.0MHz 64-QAM - Full RB Configuration)

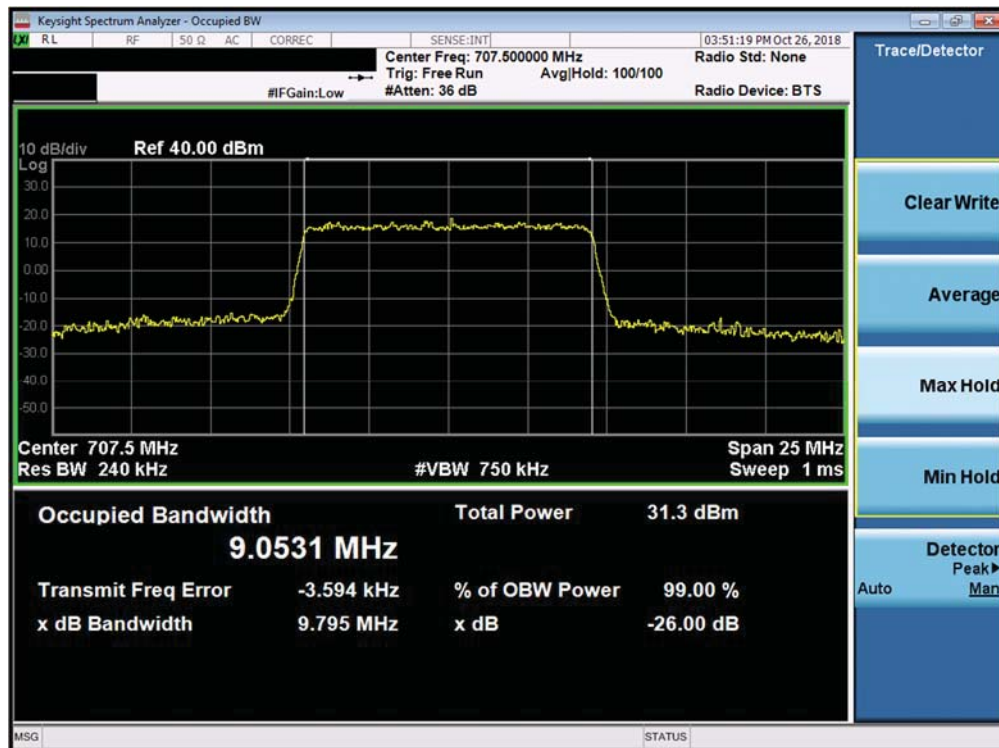


Plot 7-28. Occupied Bandwidth Plot (Band 12 - 5.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 31 of 391

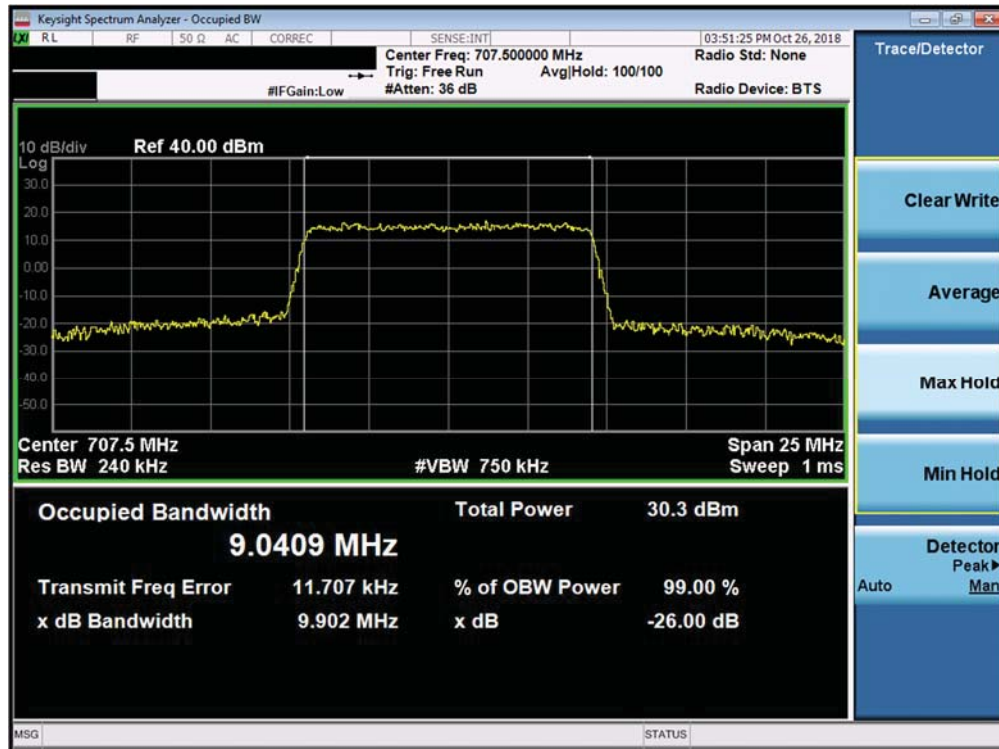


Plot 7-29. Occupied Bandwidth Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

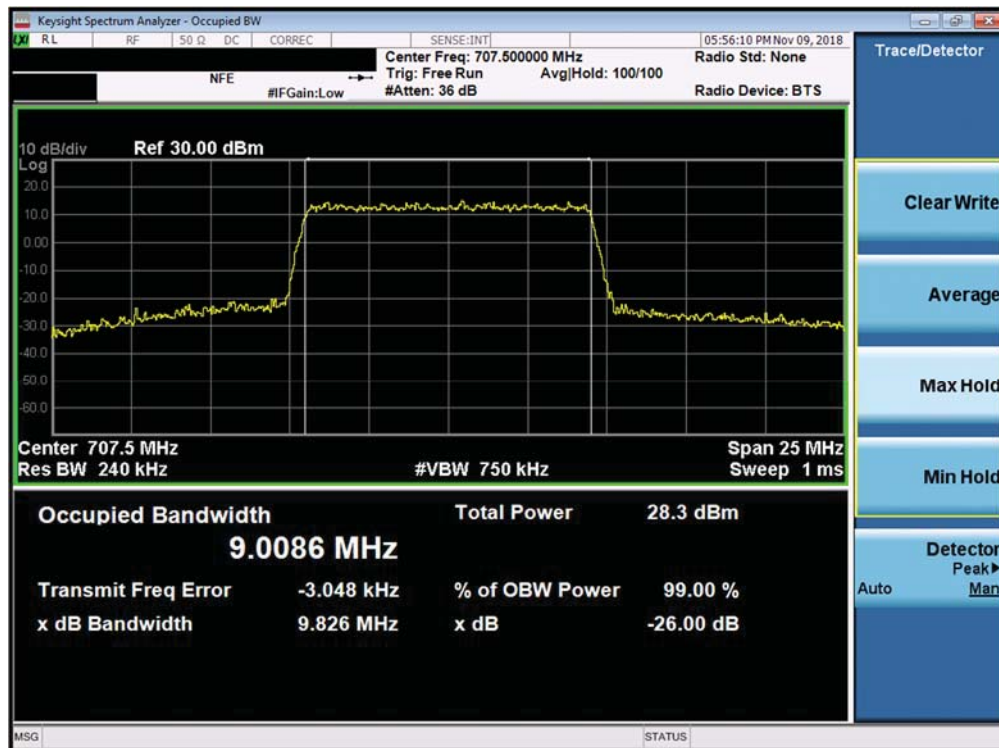


Plot 7-30. Occupied Bandwidth Plot (Band 12 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 32 of 391



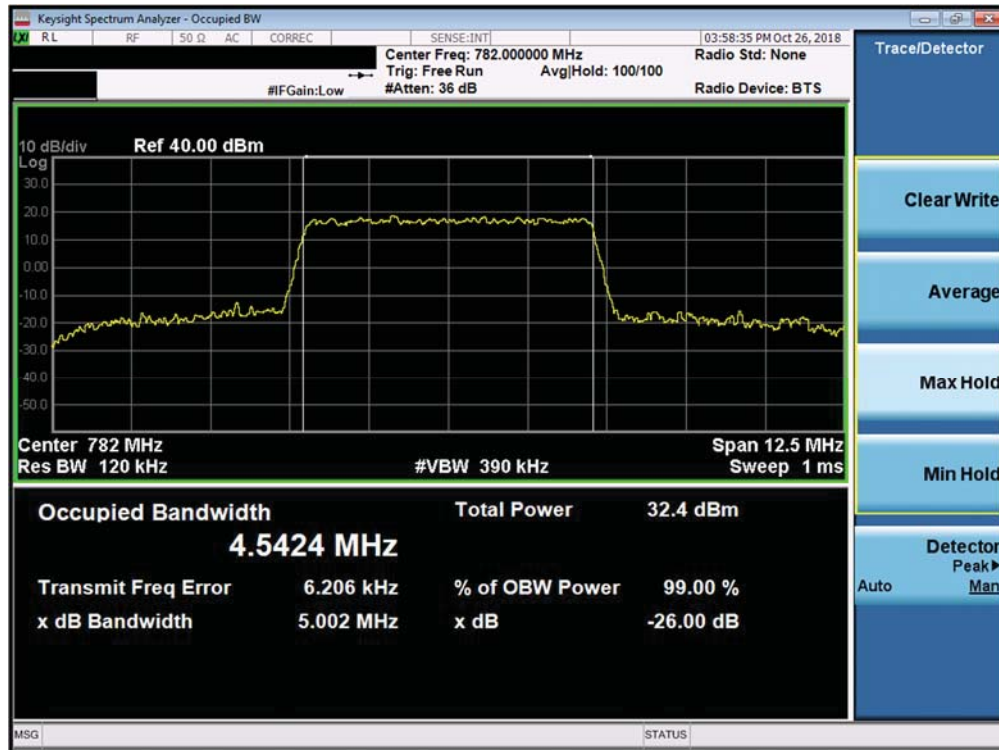
Plot 7-31. Occupied Bandwidth Plot (Band 12 - 10.0MHz 64-QAM - Full RB Configuration)



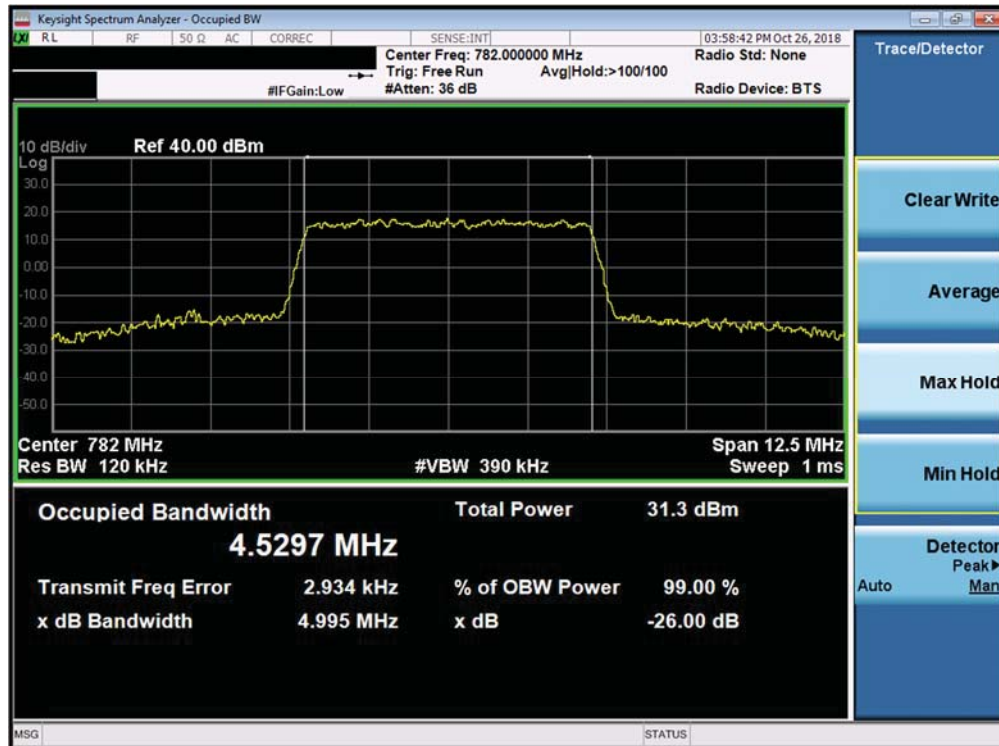
Plot 7-32. Occupied Bandwidth Plot (Band 12 - 10.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 33 of 391

Band 13

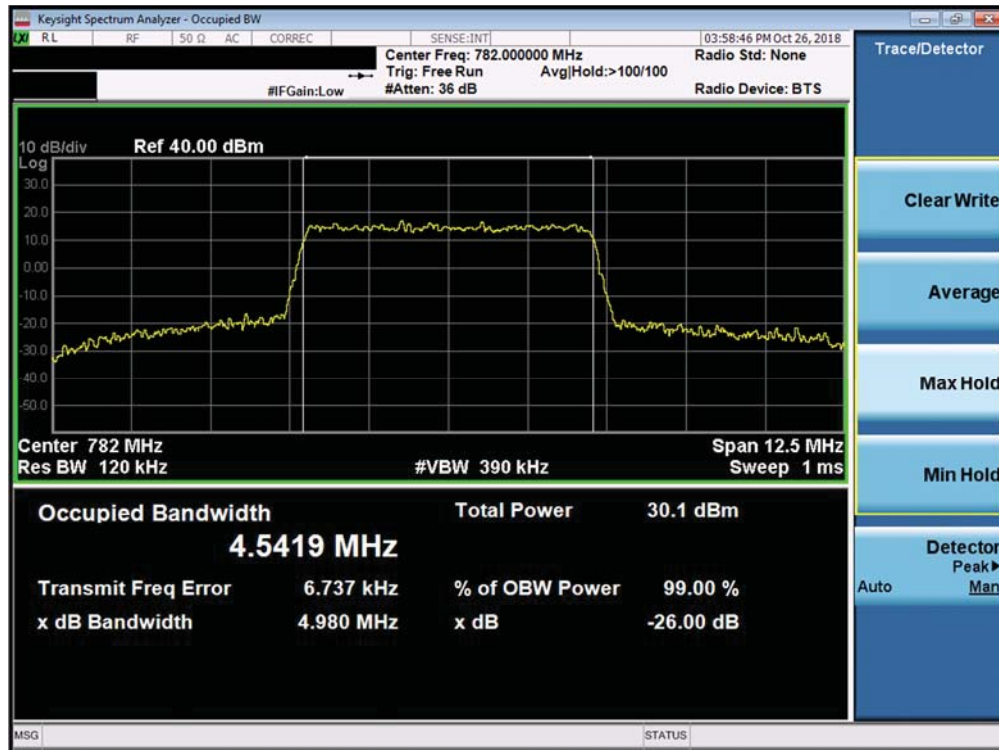


Plot 7-33. Occupied Bandwidth Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

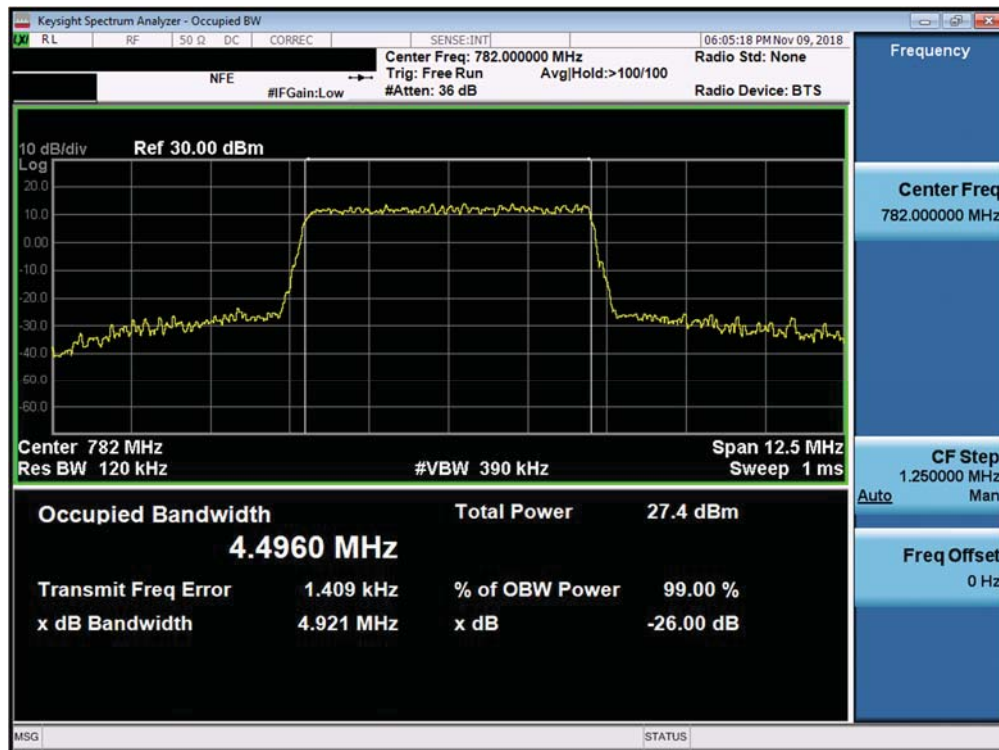


Plot 7-34. Occupied Bandwidth Plot (Band 13 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 34 of 391

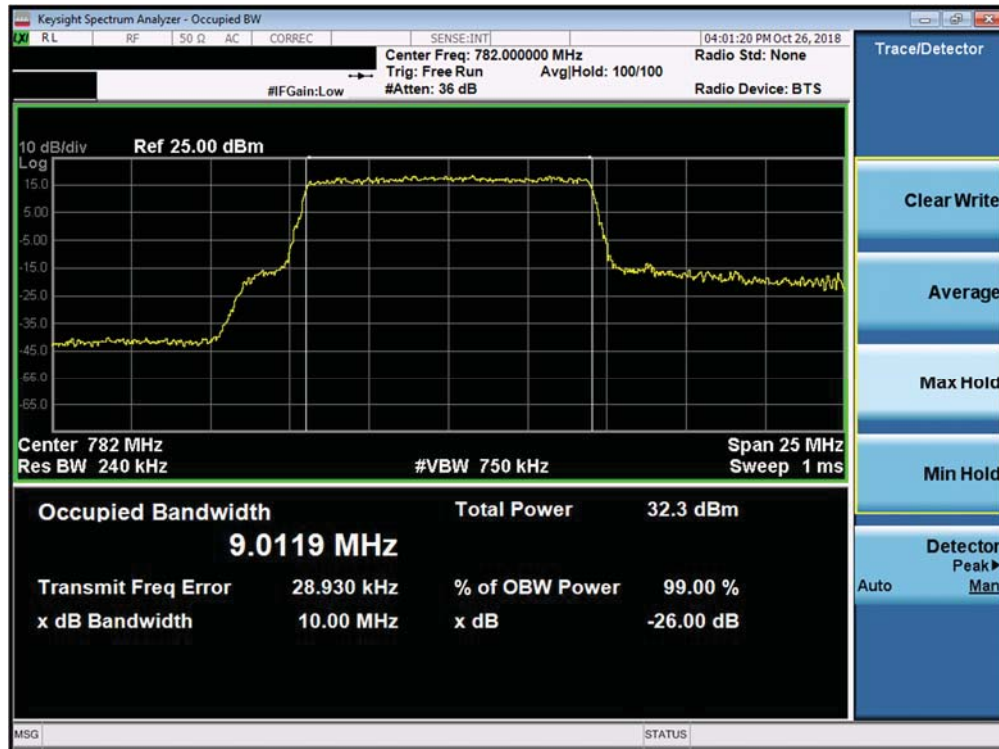


Plot 7-35. Occupied Bandwidth Plot (Band 13 - 5.0MHz 64-QAM - Full RB Configuration)

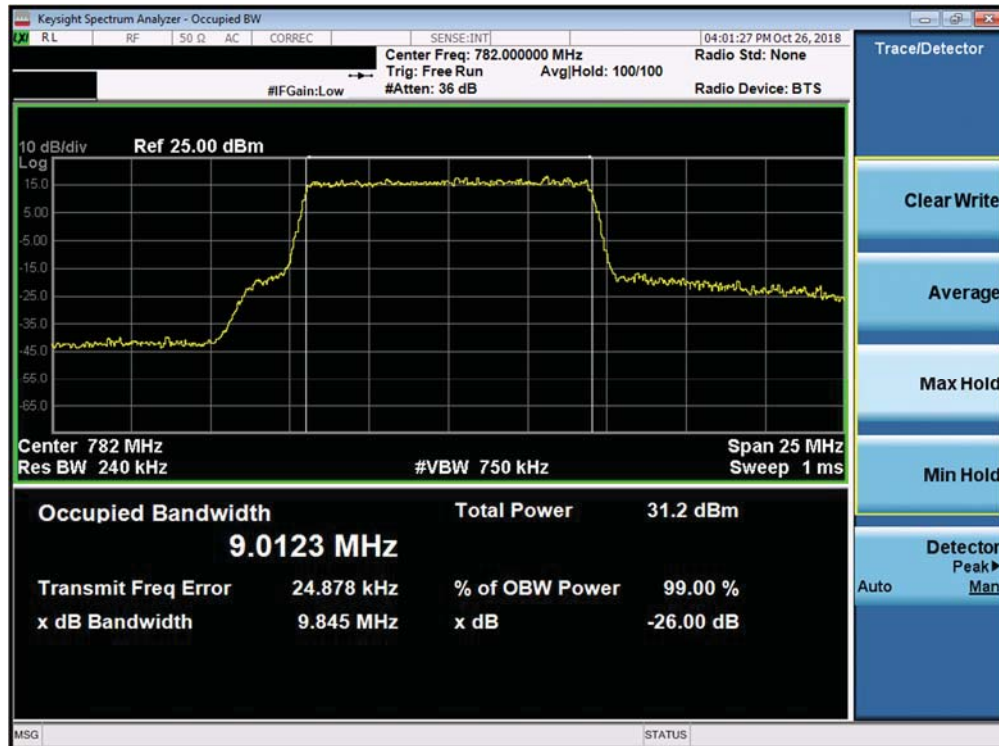


Plot 7-36. Occupied Bandwidth Plot (Band 13 - 5.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 35 of 391

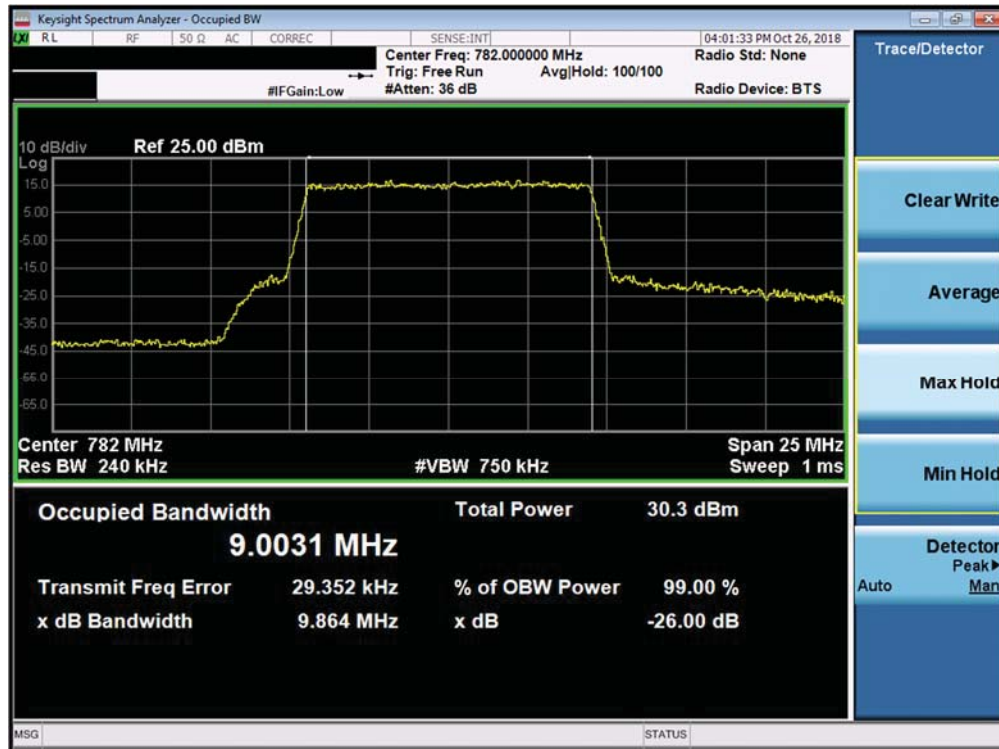


Plot 7-37. Occupied Bandwidth Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

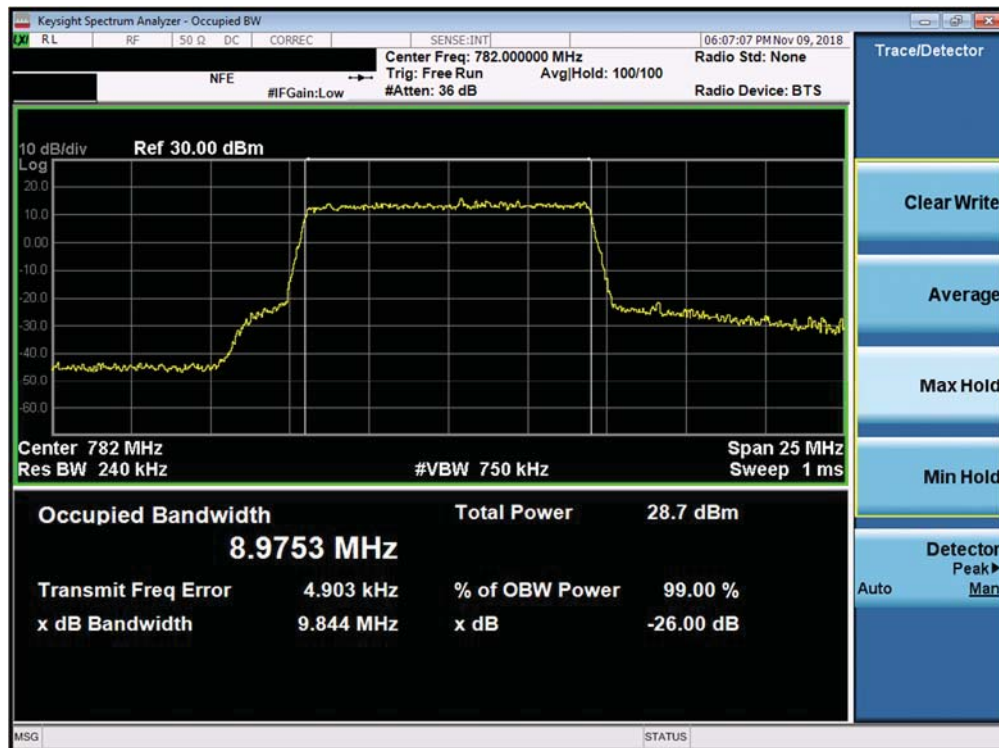


Plot 7-38. Occupied Bandwidth Plot (Band 13 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 36 of 391



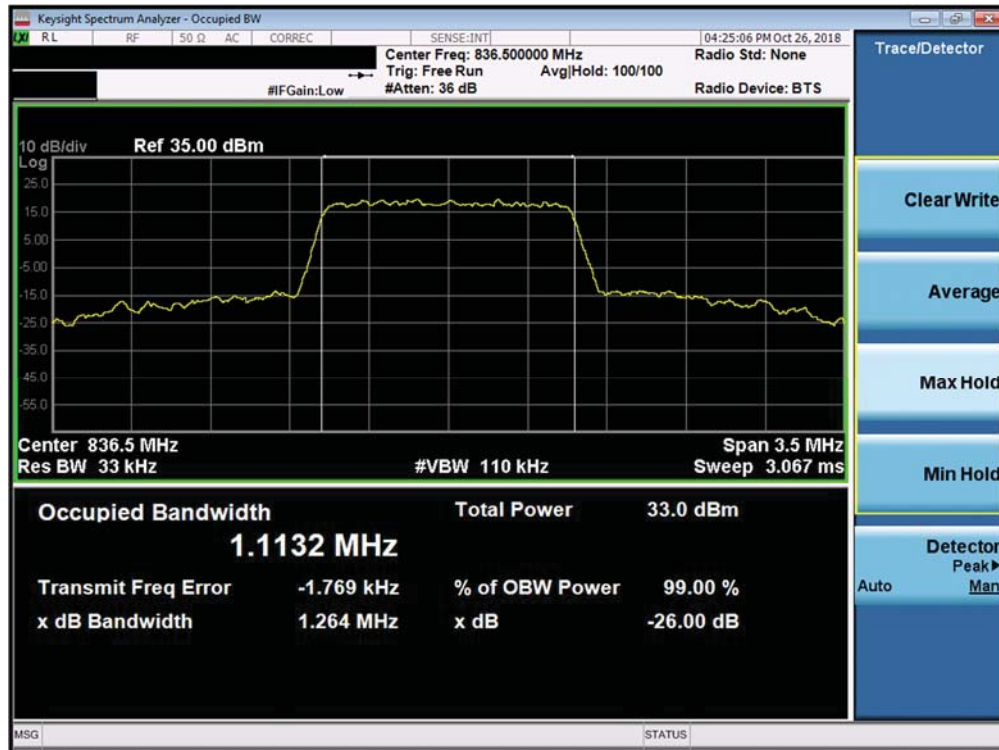
Plot 7-39. Occupied Bandwidth Plot (Band 13 - 10.0MHz 64-QAM - Full RB Configuration)



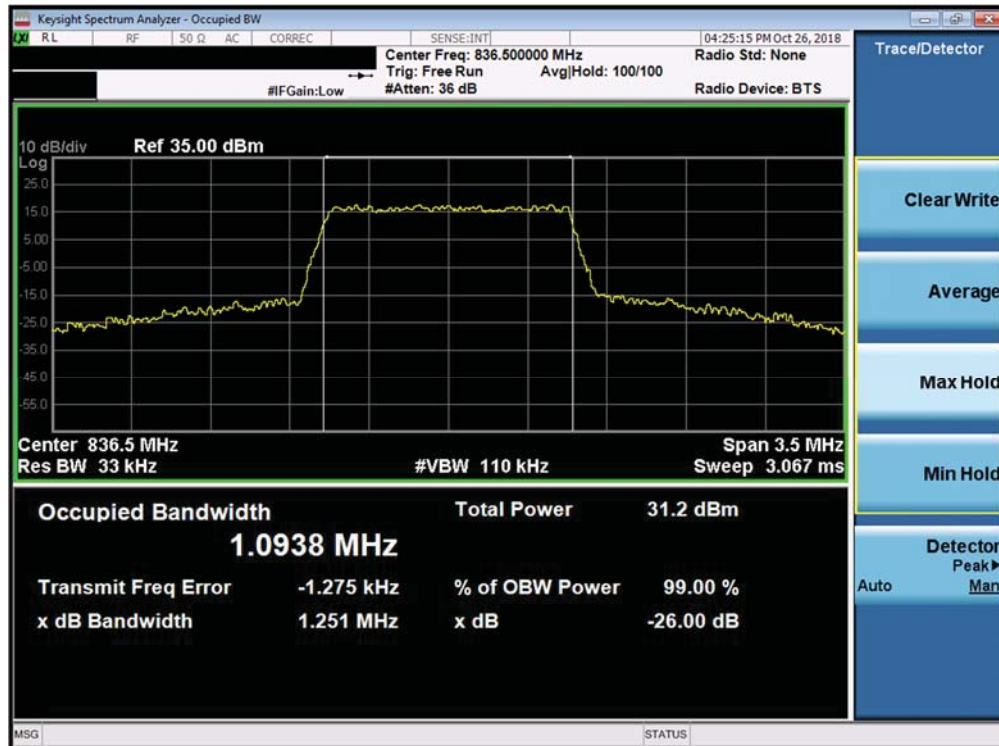
Plot 7-40. Occupied Bandwidth Plot (Band 13 - 10.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 37 of 391

Band 26/5

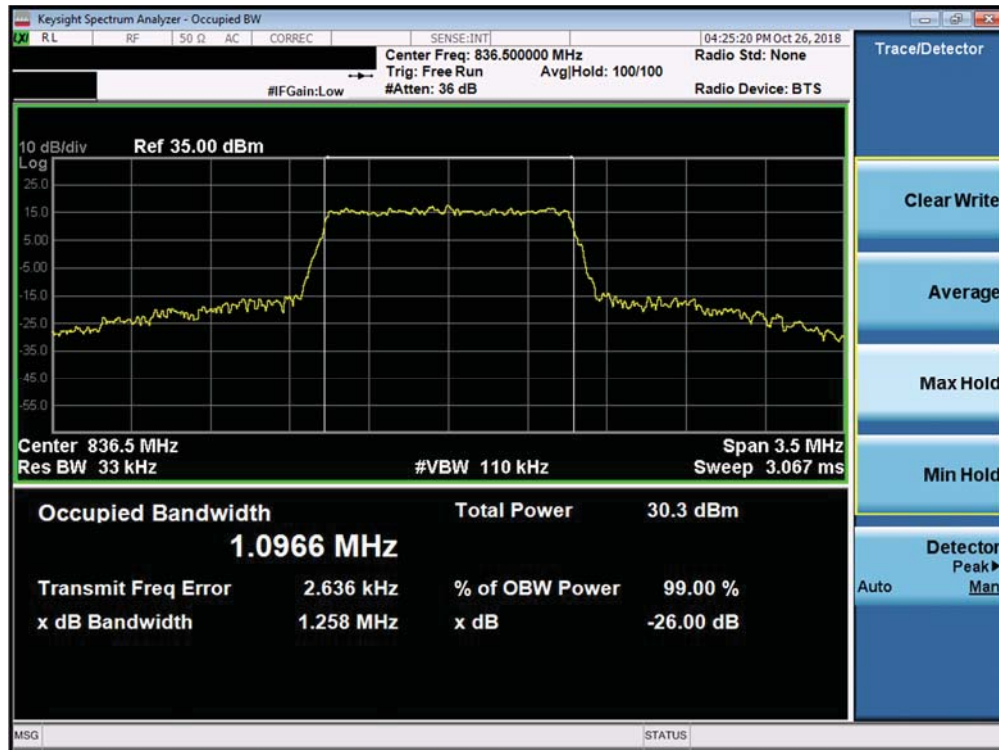


Plot 7-41. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz QPSK - Full RB Configuration)

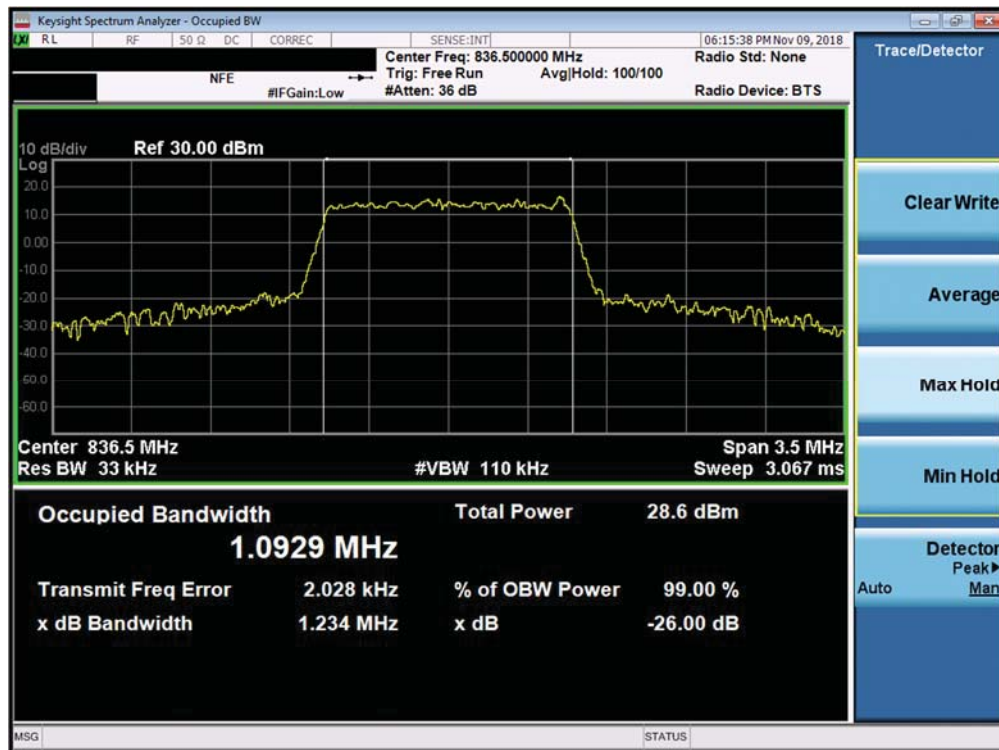


Plot 7-42. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 38 of 391

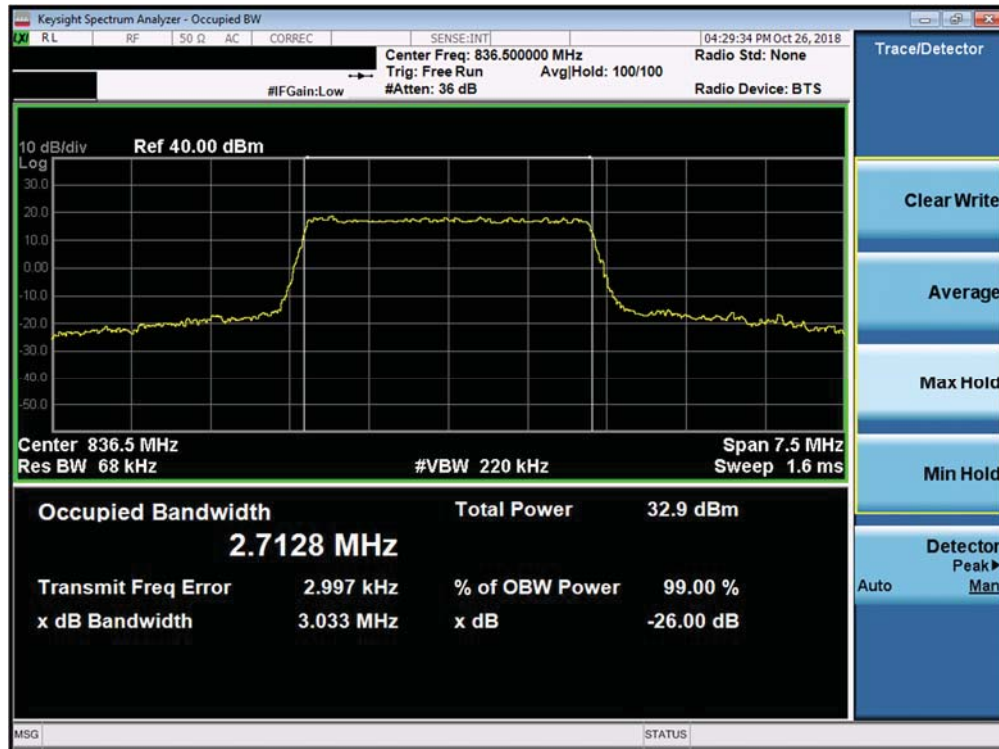


Plot 7-43. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz 64-QAM - Full RB Configuration)

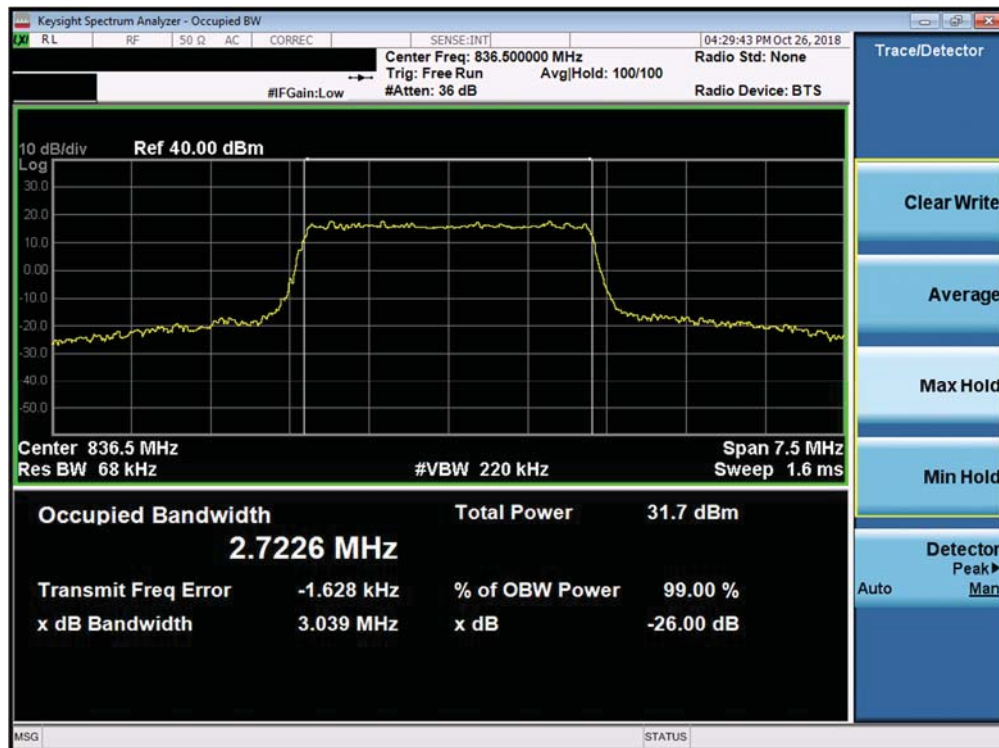


Plot 7-44. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 39 of 391

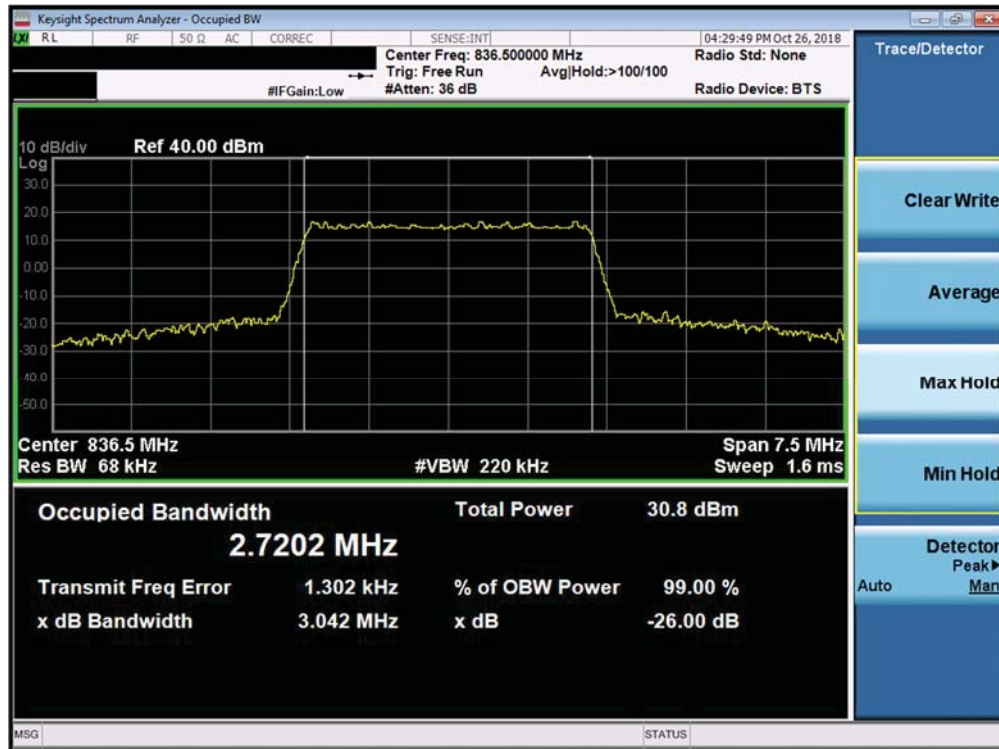


Plot 7-45. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-46. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 40 of 391

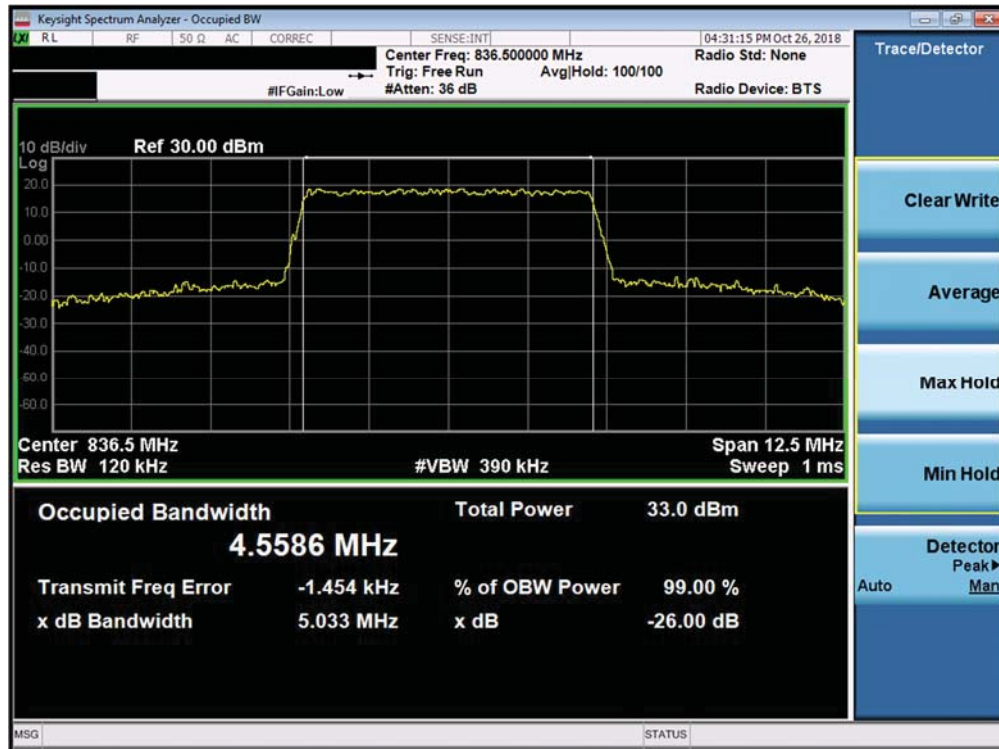


Plot 7-47. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz 64-QAM - Full RB Configuration)

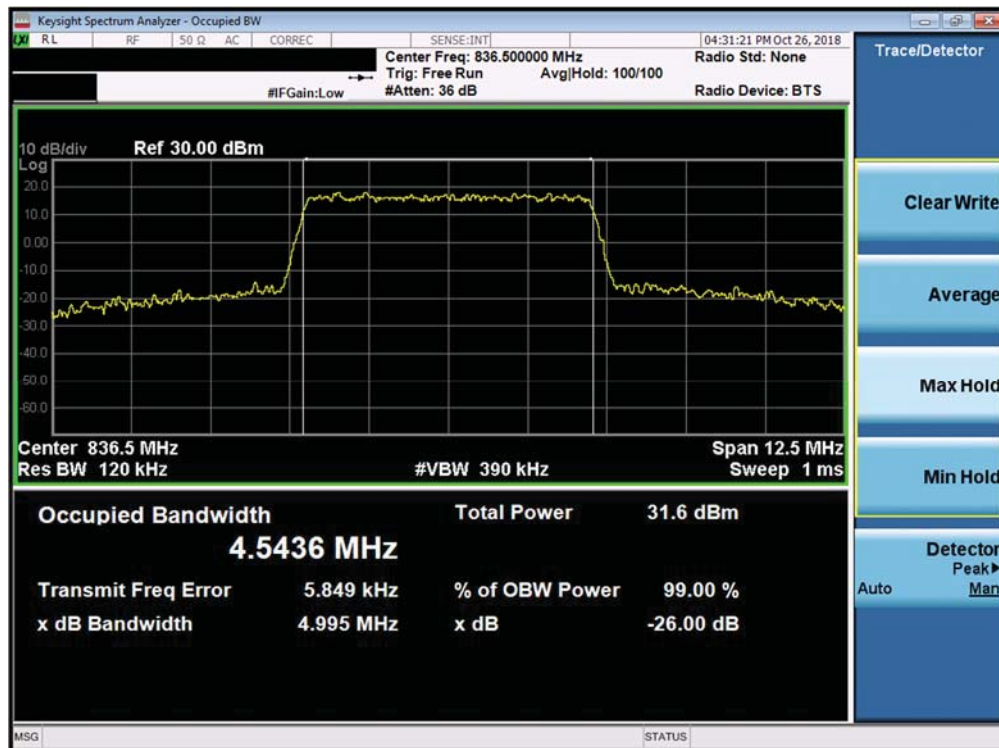


Plot 7-48. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 41 of 391

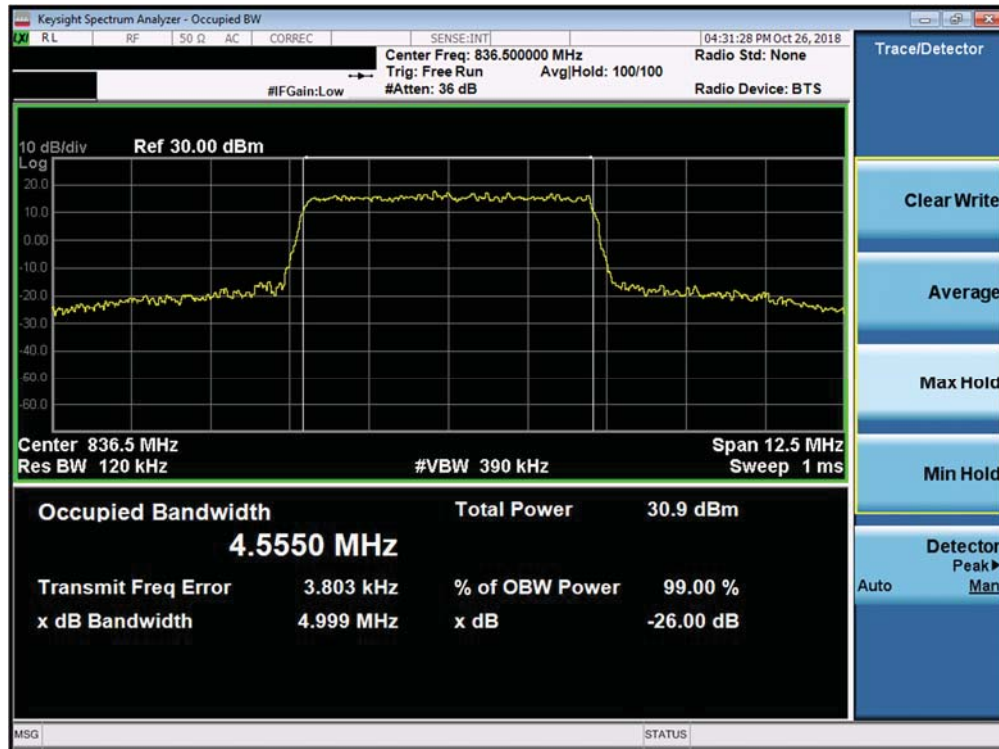


Plot 7-49. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz QPSK - Full RB Configuration)

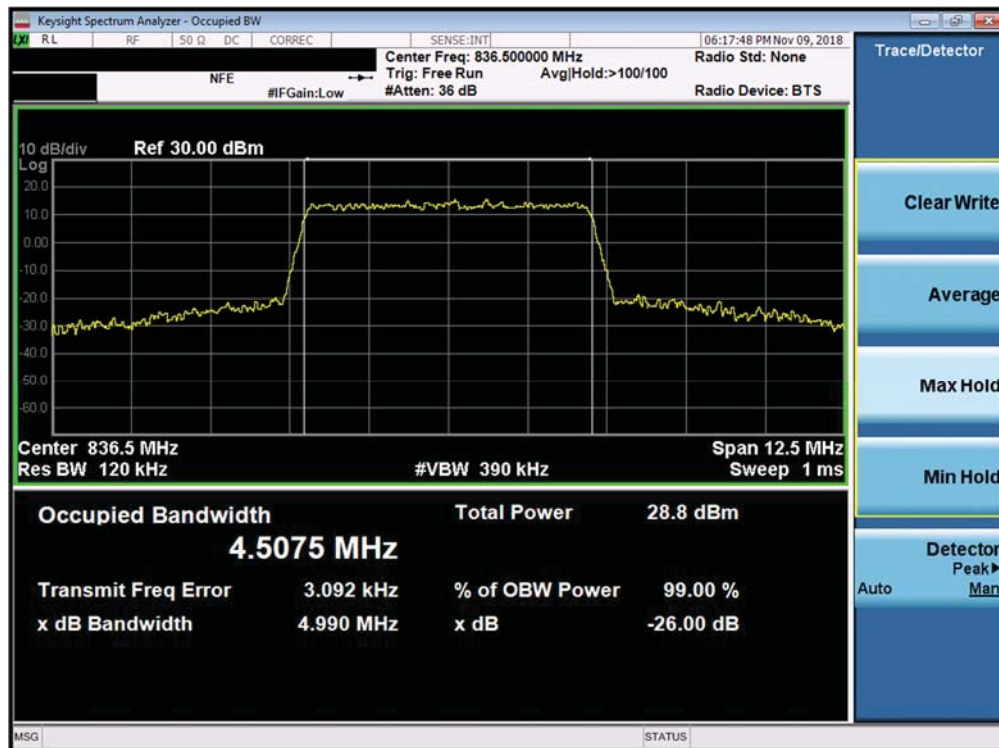


Plot 7-50. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 42 of 391

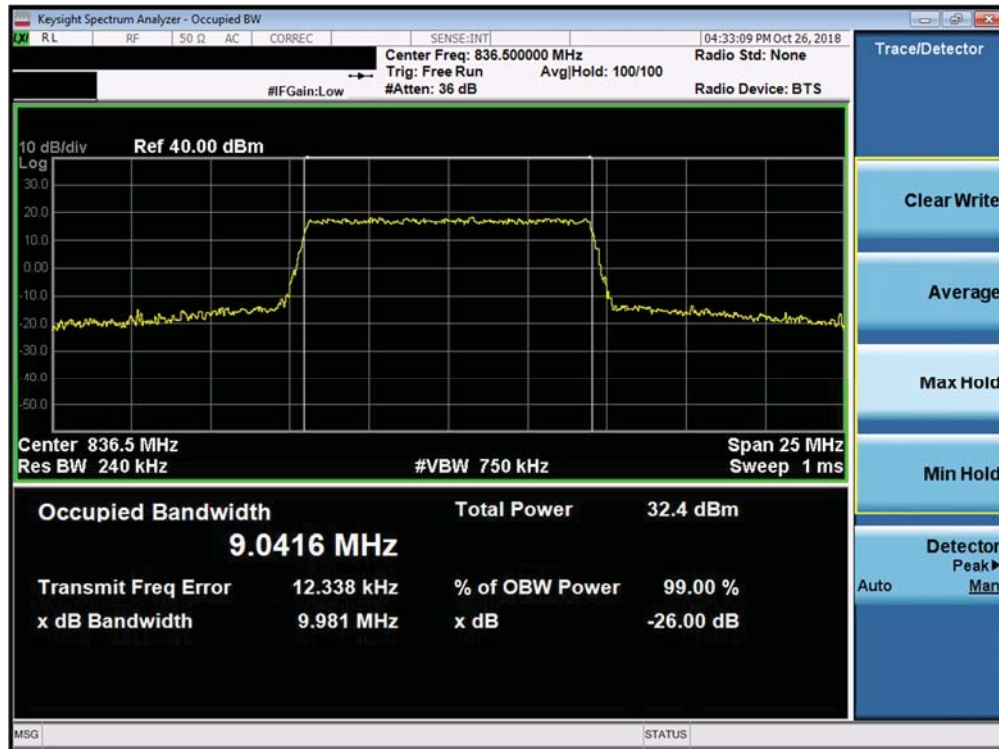


Plot 7-51. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz 64-QAM - Full RB Configuration)

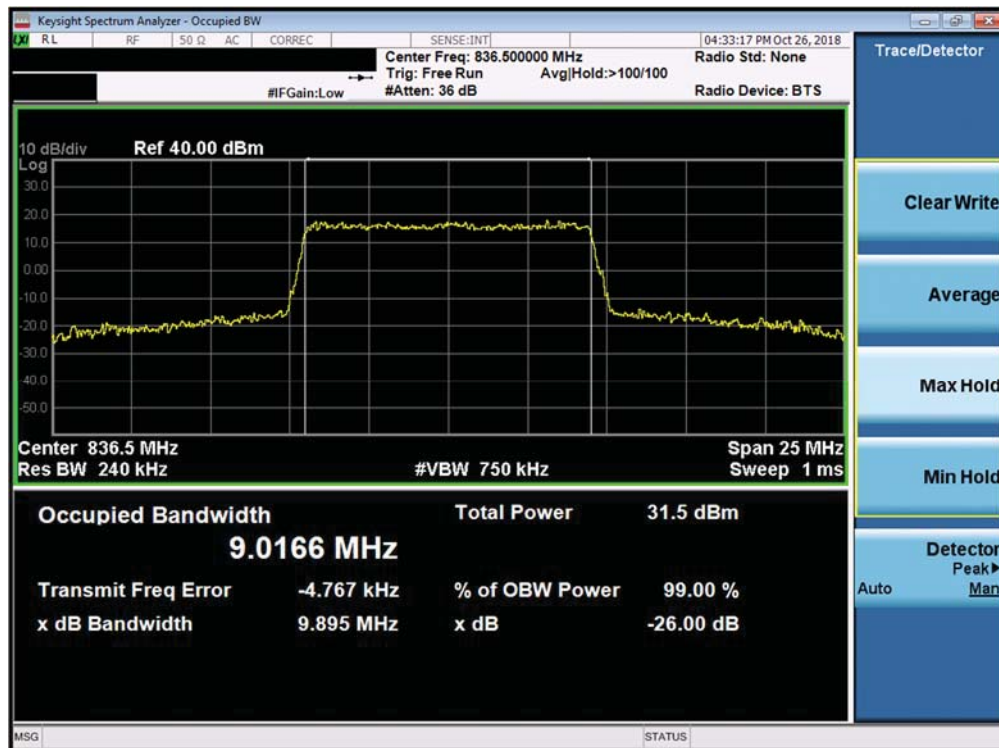


Plot 7-52. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 43 of 391

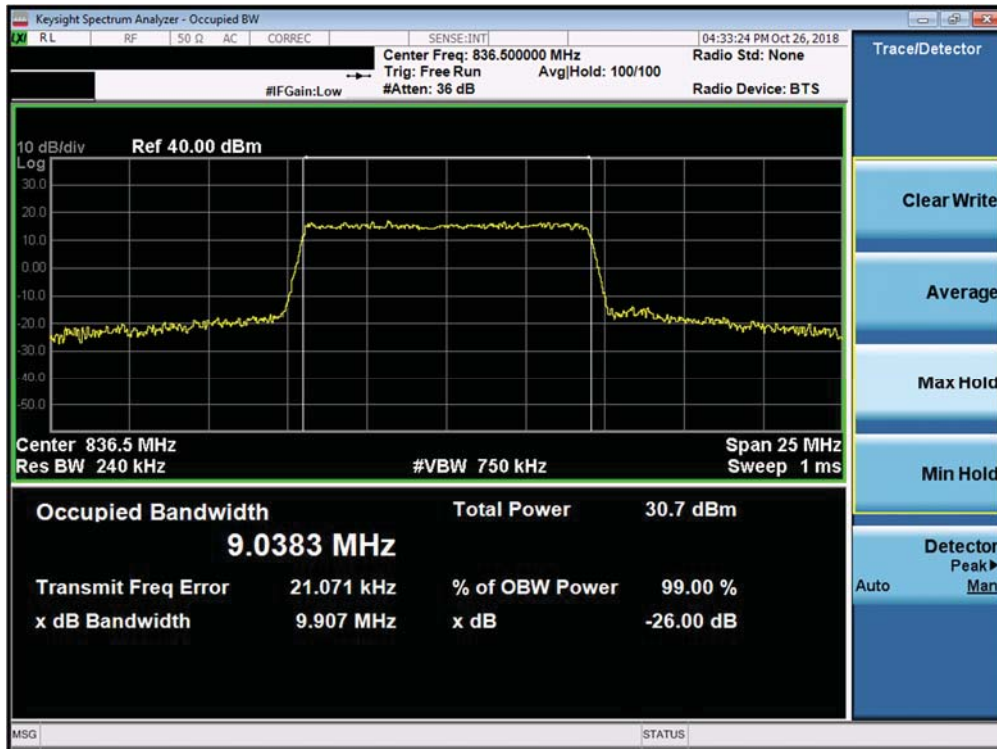


Plot 7-53. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz QPSK - Full RB Configuration)

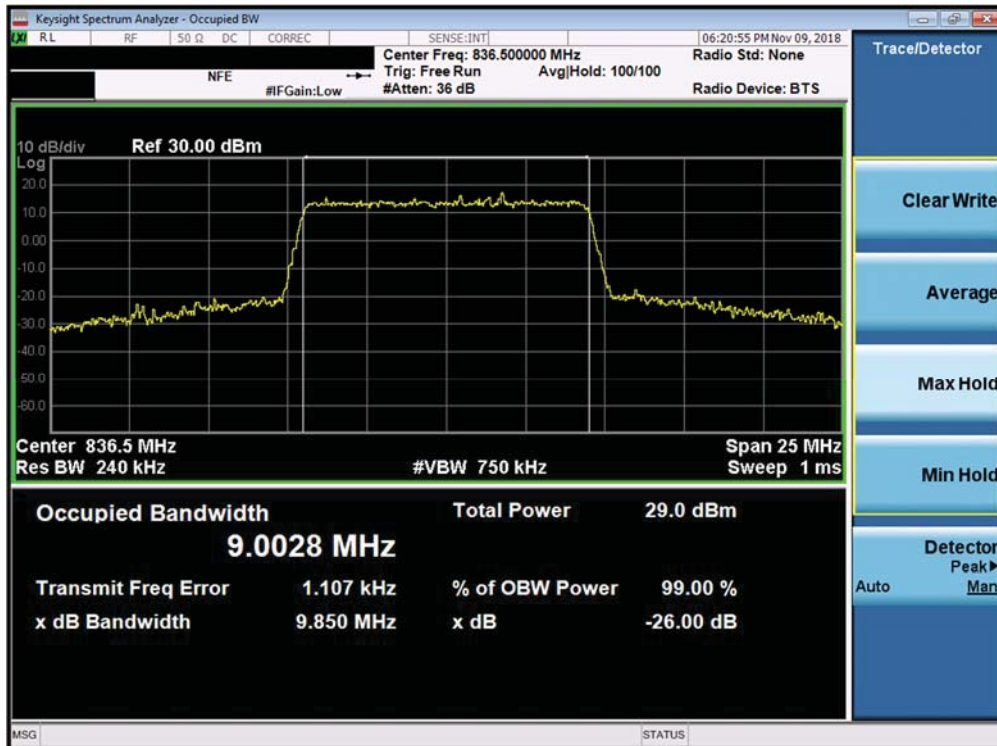


Plot 7-54. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 44 of 391

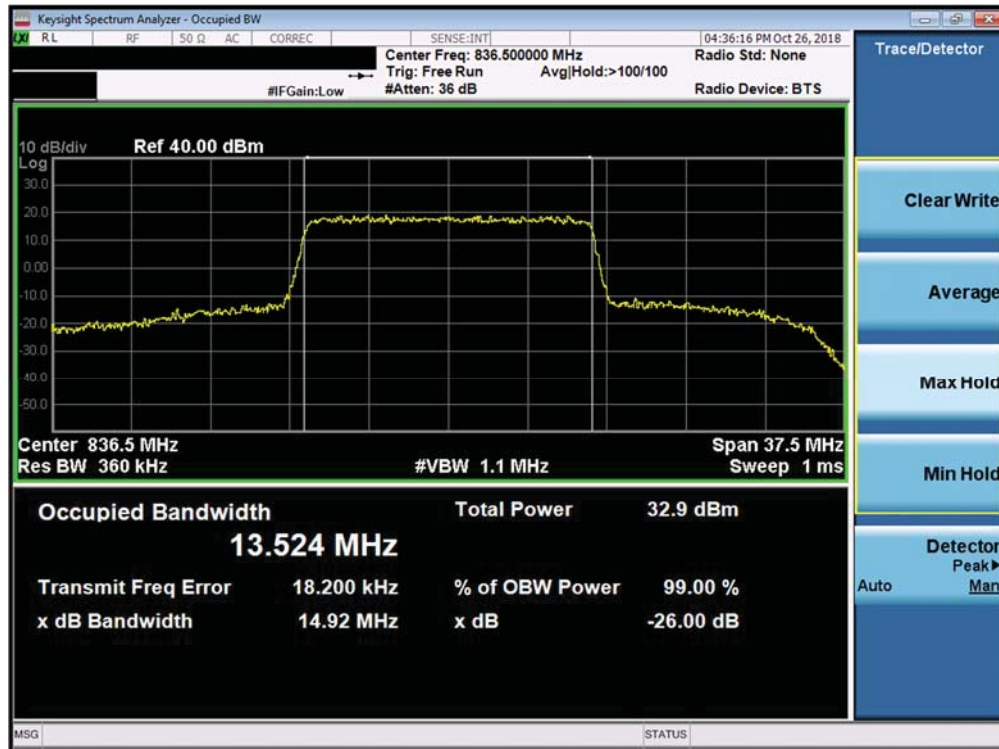


Plot 7-55. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz 64-QAM - Full RB Configuration)

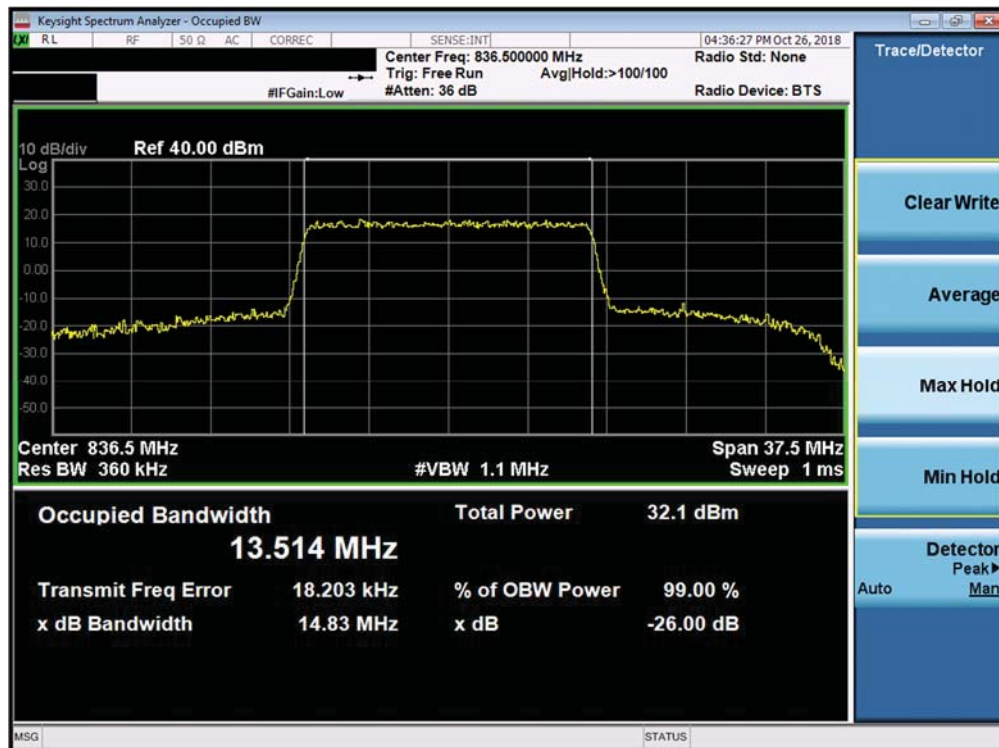


Plot 7-56. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 45 of 391

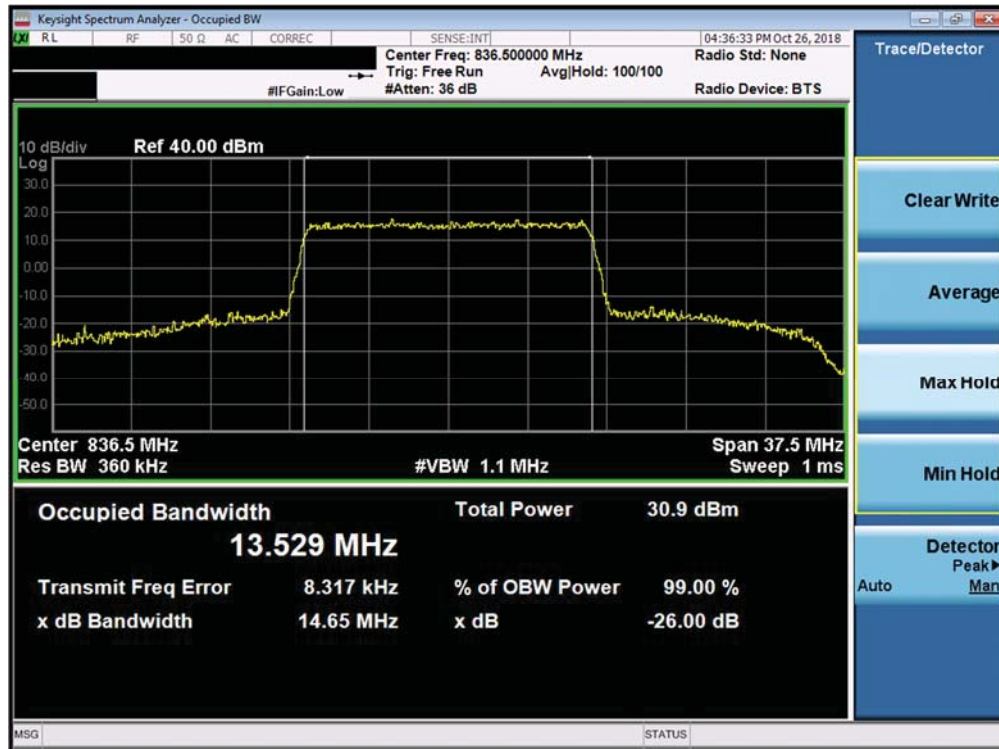


Plot 7-57. Occupied Bandwidth Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)

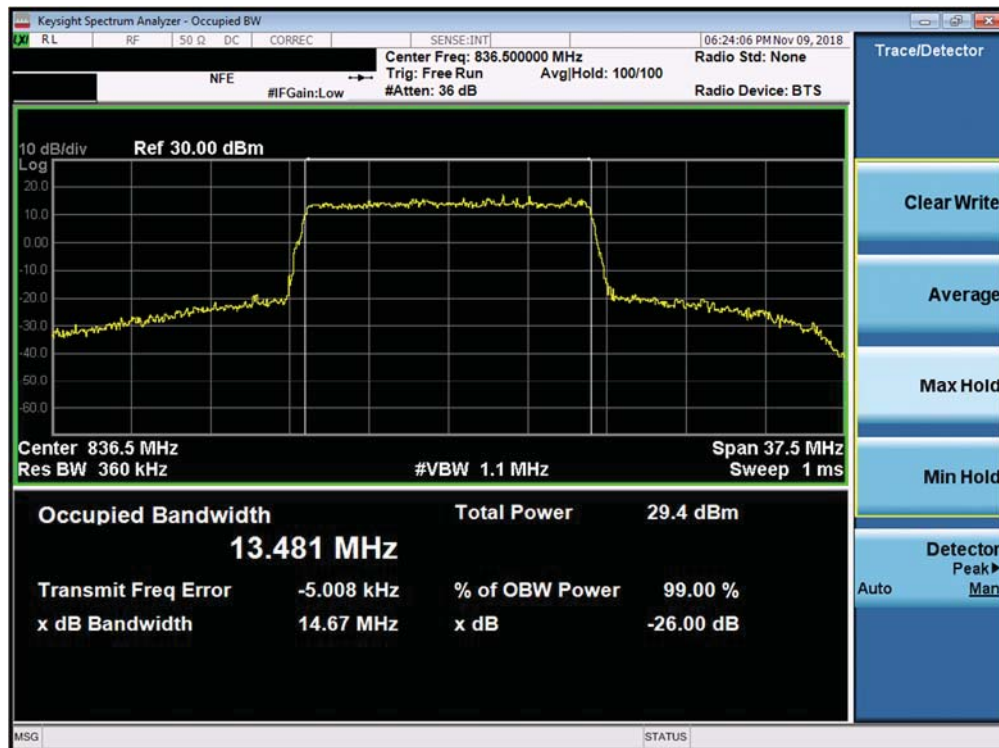


Plot 7-58. Occupied Bandwidth Plot (Band 26 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 46 of 391



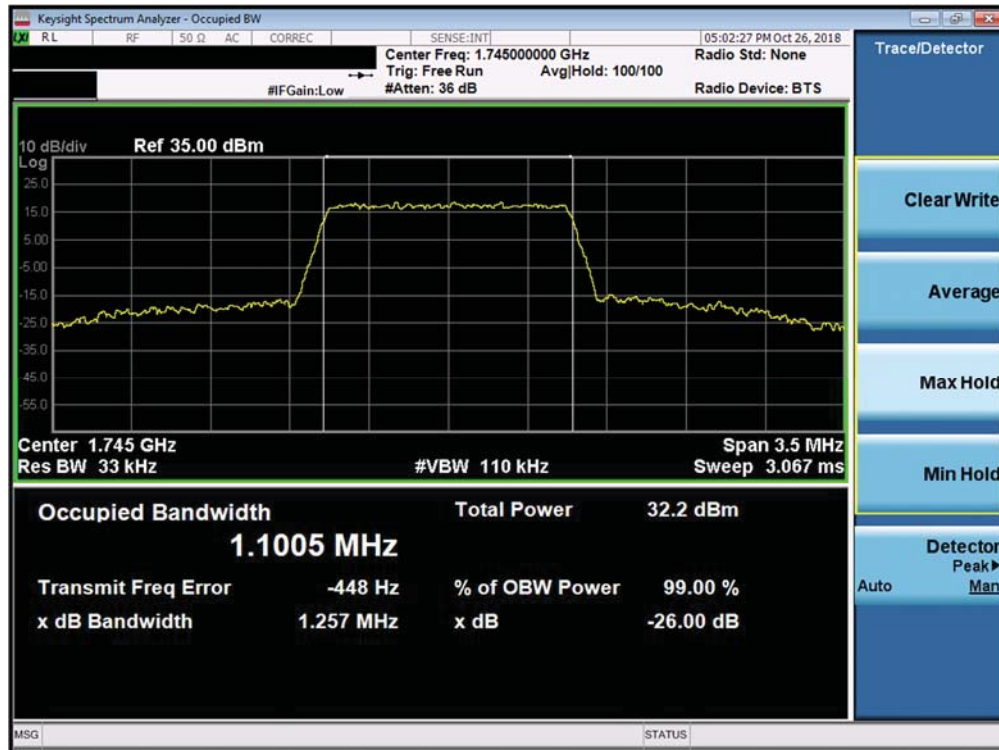
Plot 7-59. Occupied Bandwidth Plot (Band 26 - 15.0MHz 64-QAM - Full RB Configuration)



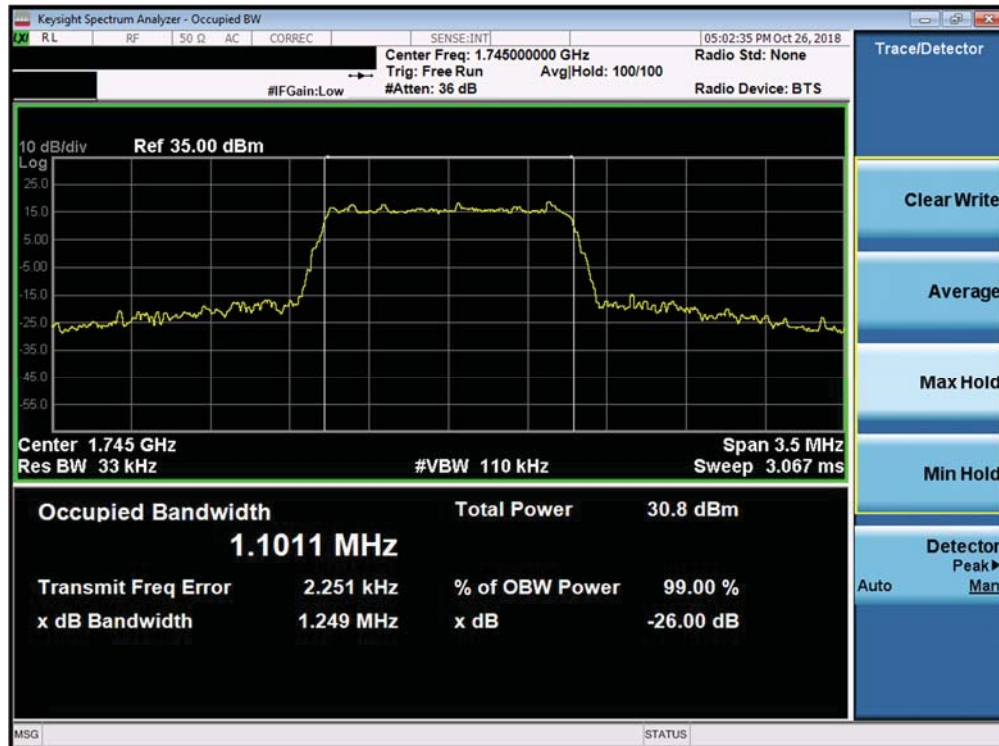
Plot 7-60. Occupied Bandwidth Plot (Band 26 - 15.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 47 of 391

Band 66/4

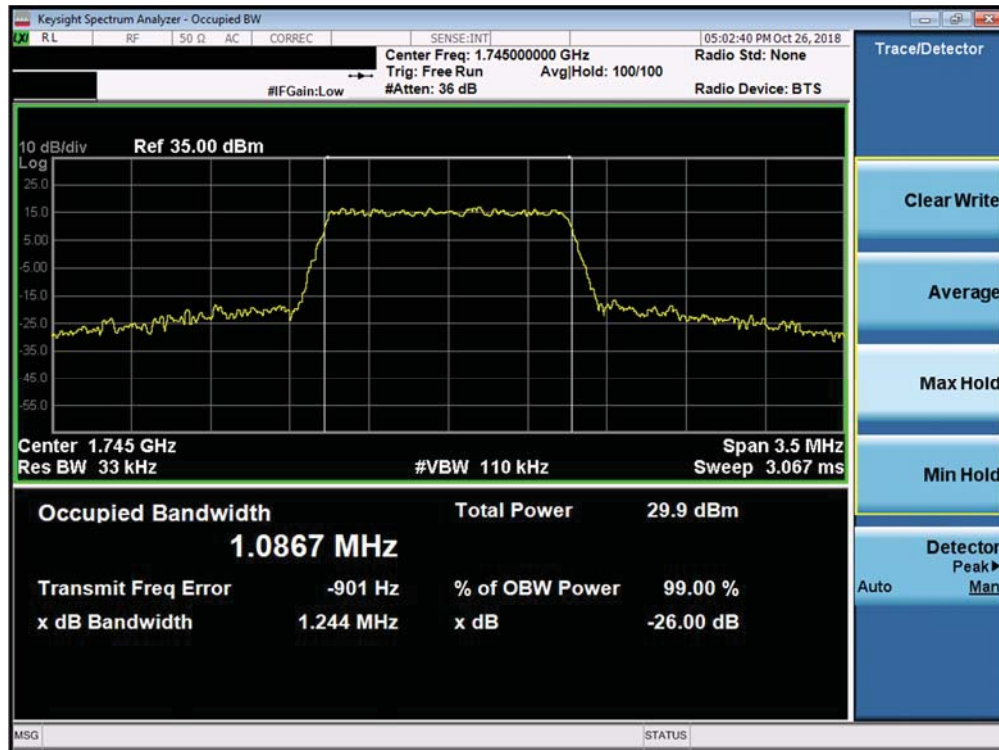


Plot 7-61. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

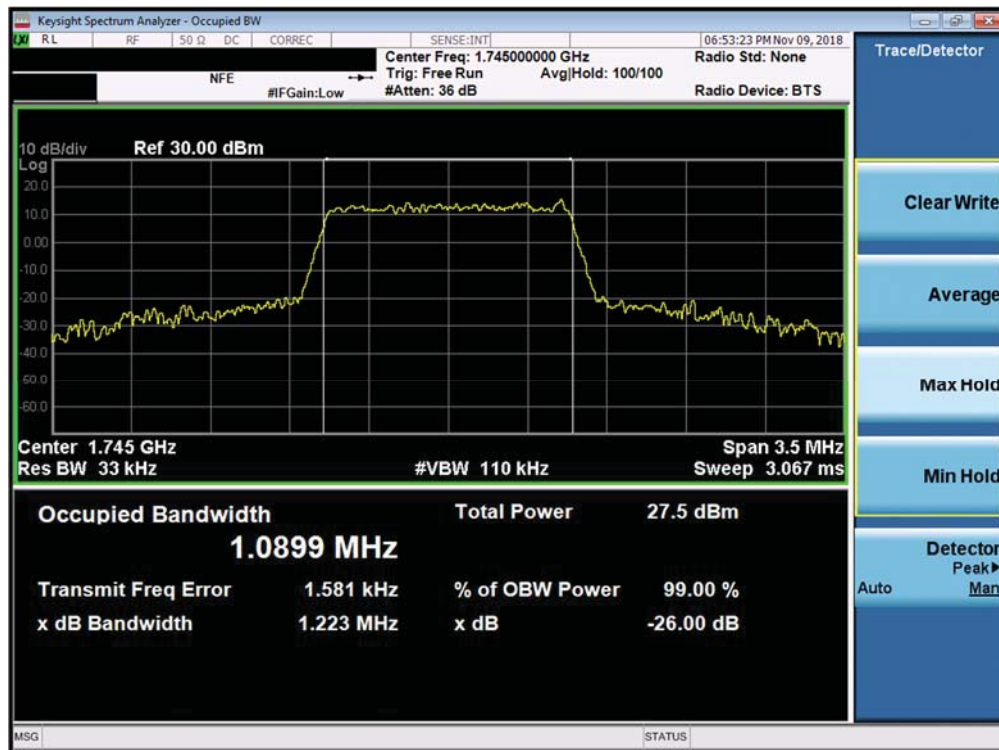


Plot 7-62. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 48 of 391

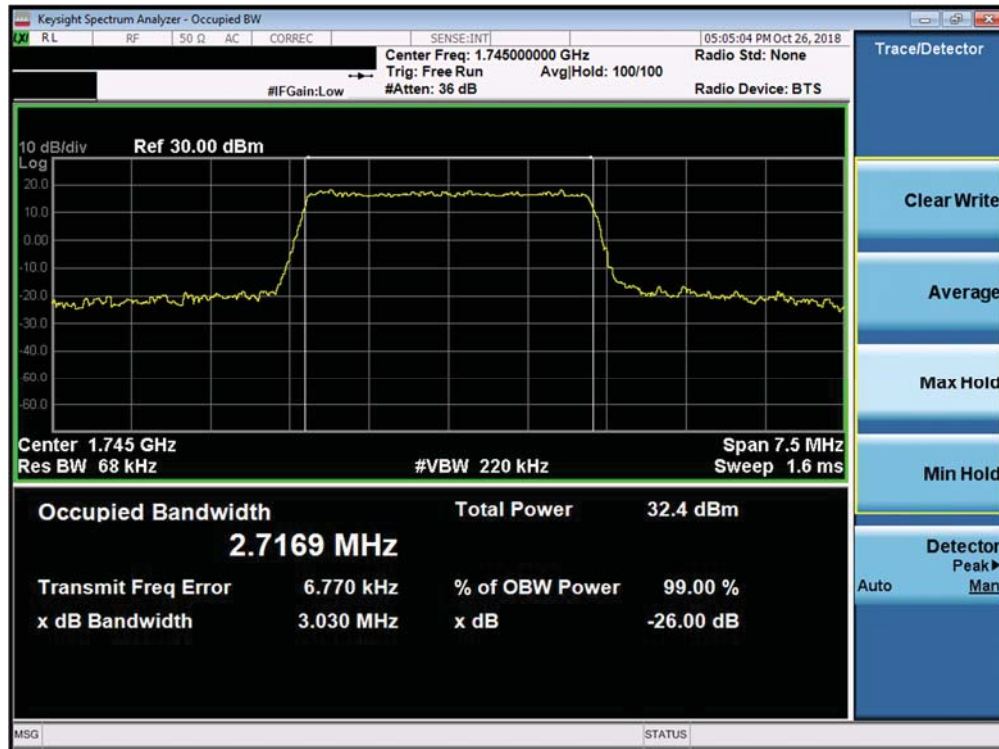


Plot 7-63. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)

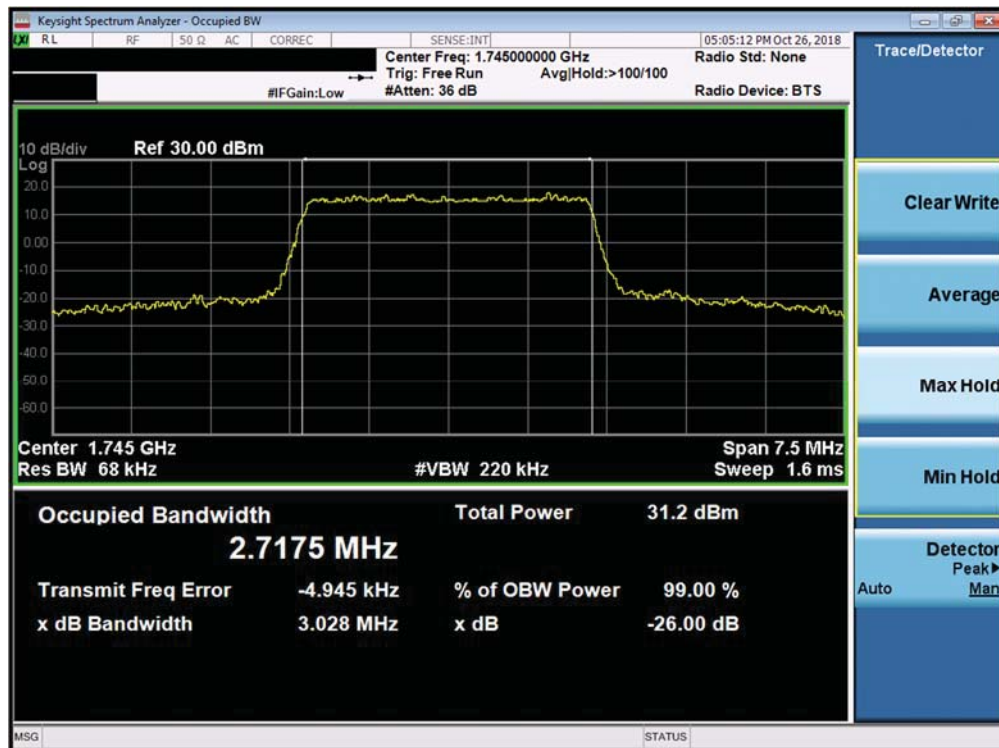


Plot 7-64. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 49 of 391

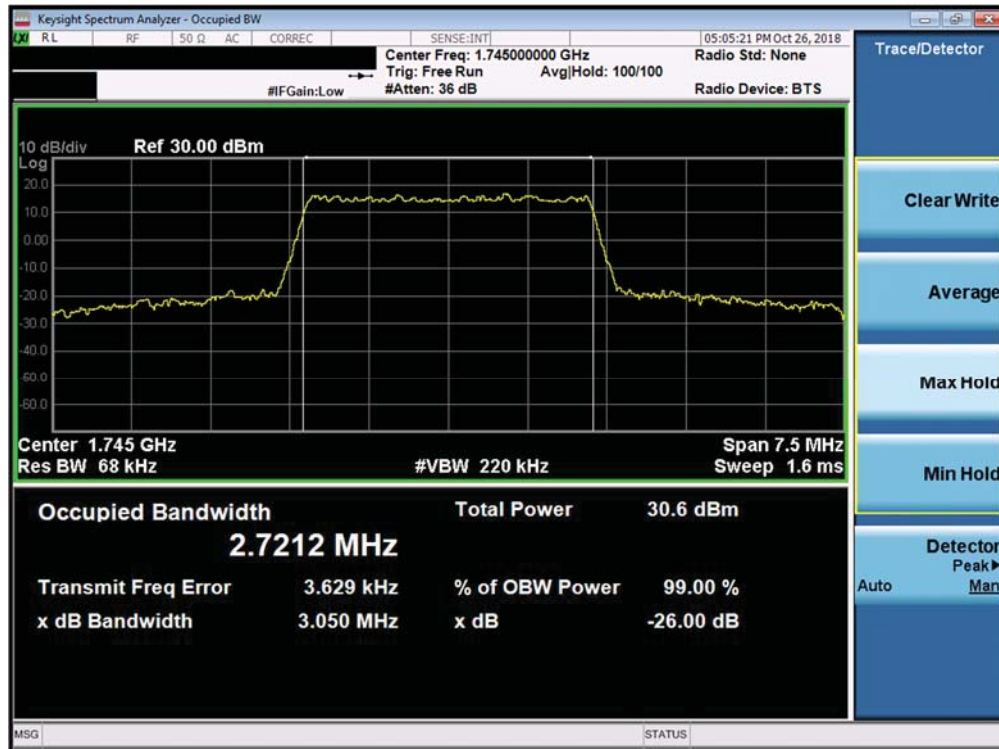


Plot 7-65. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

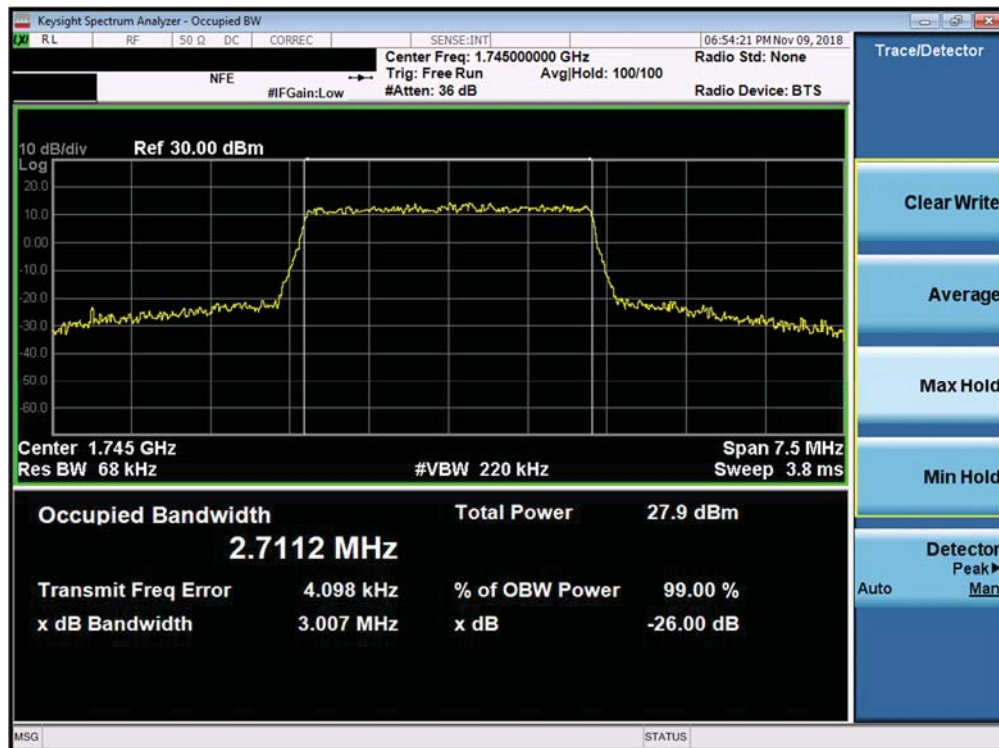


Plot 7-66. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 50 of 391

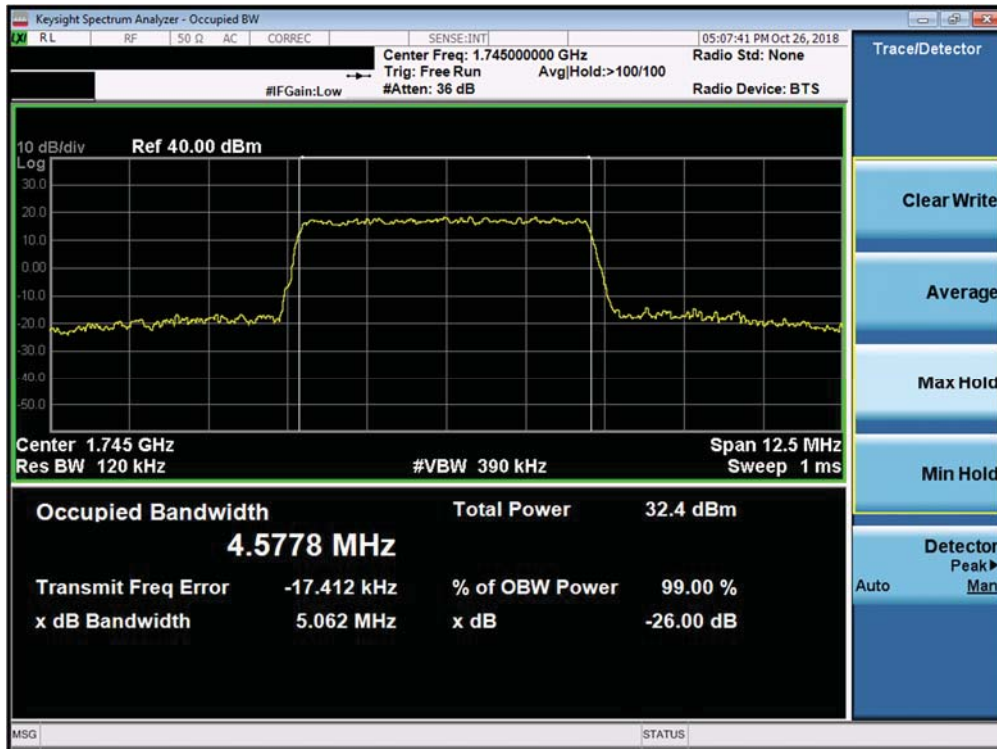


Plot 7-67. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 64-QAM - Full RB Configuration)

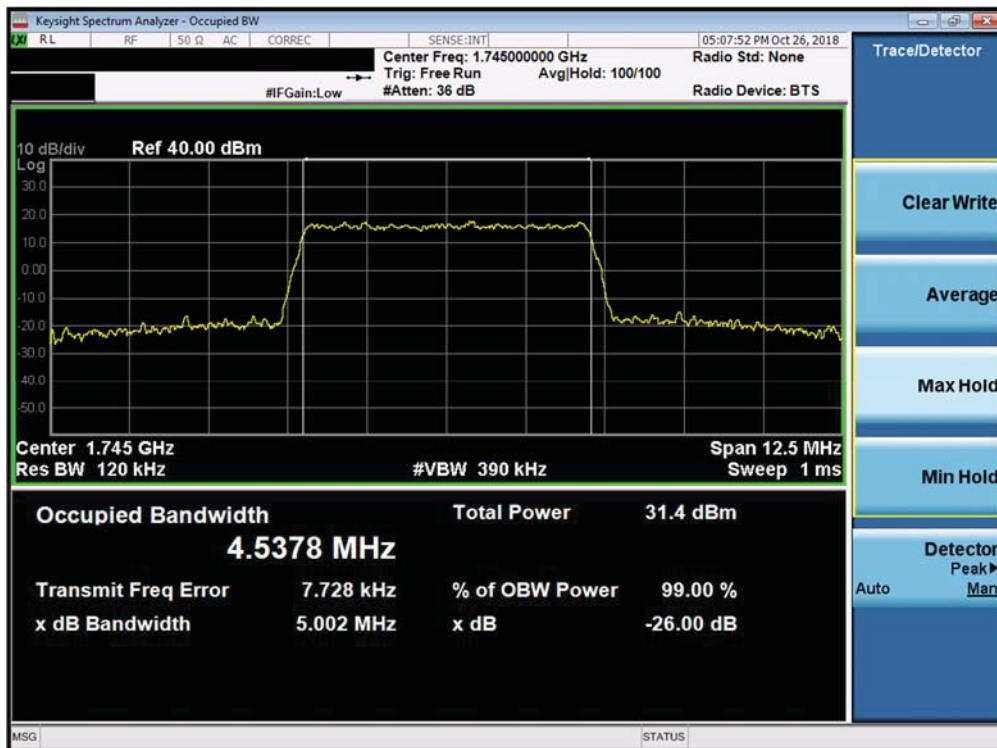


Plot 7-68. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 51 of 391

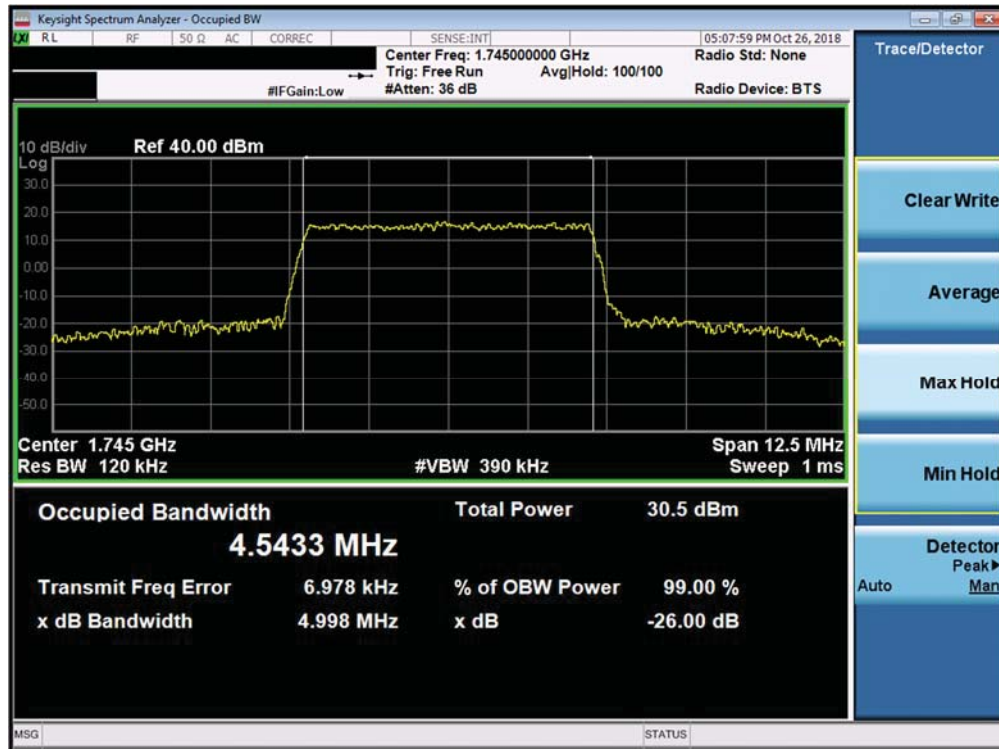


Plot 7-69. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)

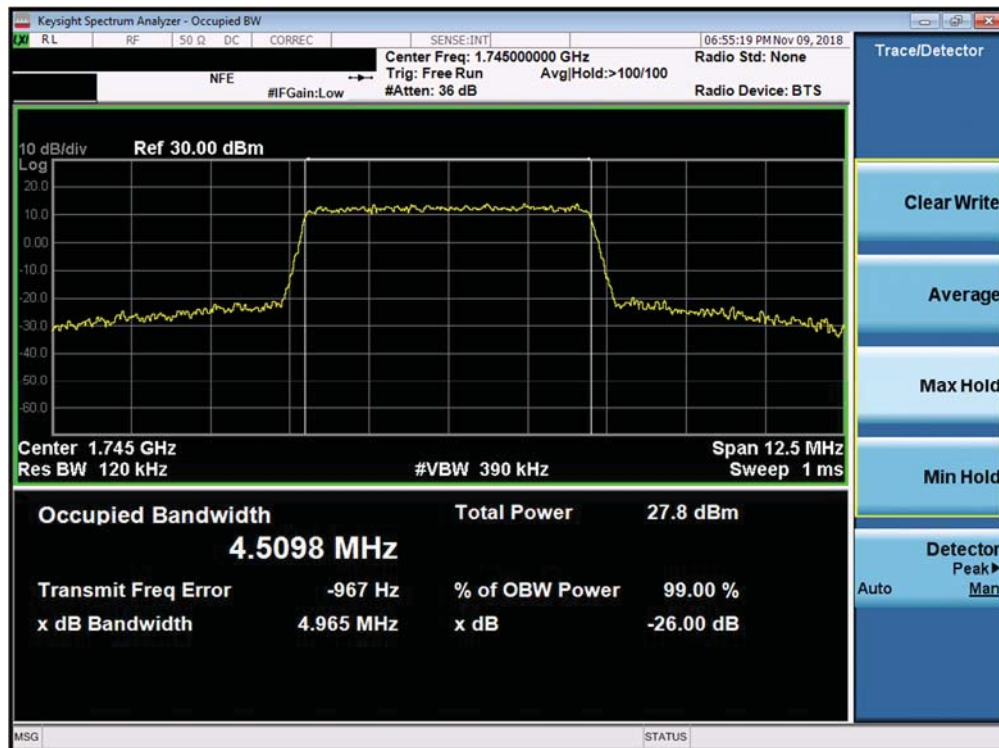


Plot 7-70. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 52 of 391

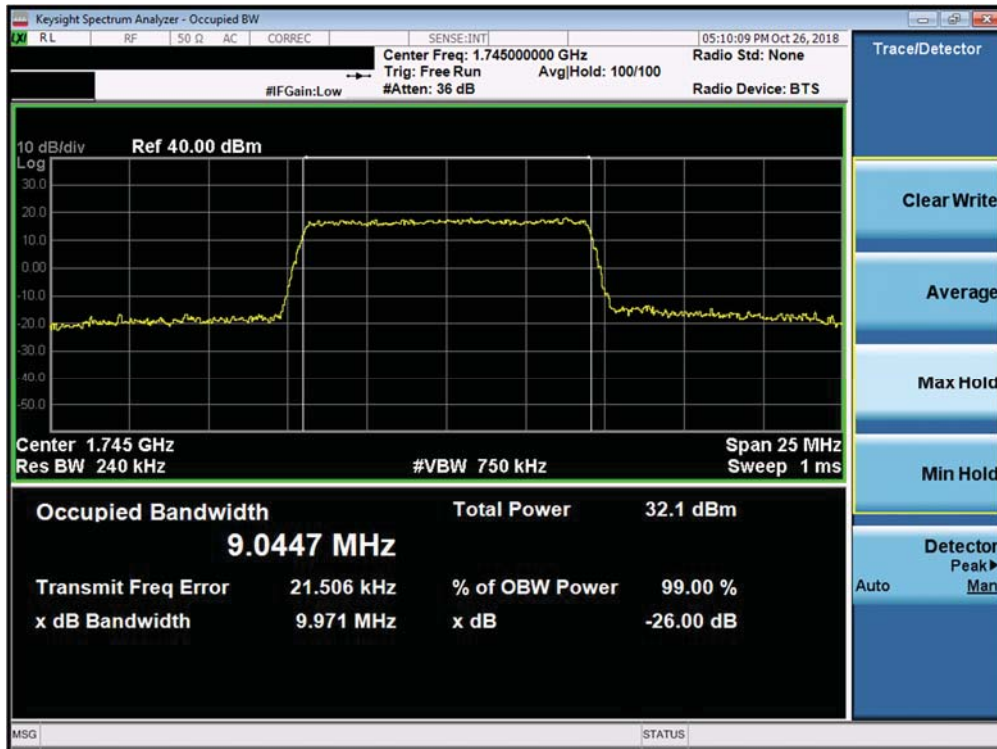


Plot 7-71. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-72. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 53 of 391

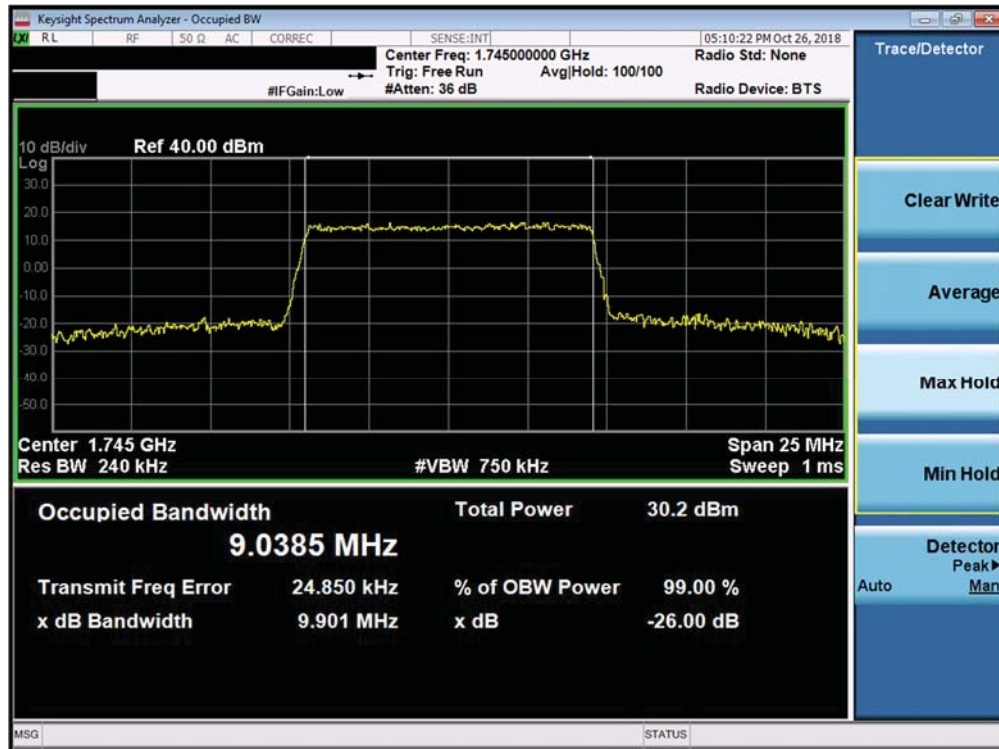


Plot 7-73. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)

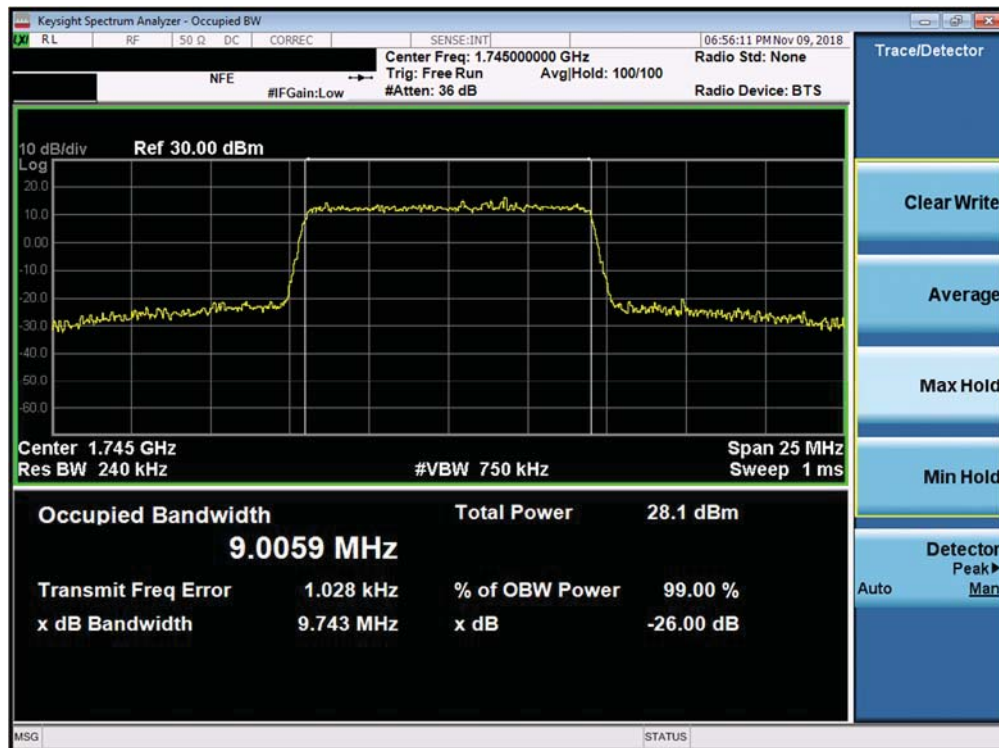


Plot 7-74. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 54 of 391



Plot 7-75. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 64-QAM - Full RB Configuration)



Plot 7-76. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 256-QAM - Full RB Configuration)

FCC ID: A3LSMG970U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1810250193-03.A3L	Test Dates: 10/23/2018 - 1/18/2019	EUT Type: Portable Handset		Page 55 of 391