



MEASUREMENT REPORT

LTE

Applicant Name:

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

Date of Testing:

5/3 - 6/22/2018

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1804300090-03.A3L

FCC ID:

A3LSMN9600

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type:

Certification

Model:

SM-N9600

Additional Model(s):

SM-N9600/SS, SM-N9608

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

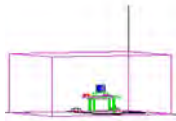


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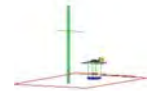
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FCC Part 22, 24, & 27



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	0.052	17.18	0.086	19.33	1M10G7D	QPSK
LTE Band 12	27	699.7 - 715.3	0.044	16.43	0.072	18.58	1M10W7D	16QAM
LTE Band 12	27	699.7 - 715.3	0.035	15.50	0.058	17.65	1M10W7D	64QAM
LTE Band 12	27	700.5 - 714.5	0.055	17.40	0.090	19.55	2M70G7D	QPSK
LTE Band 12	27	700.5 - 714.5	0.047	16.73	0.077	18.88	2M71W7D	16QAM
LTE Band 12	27	700.5 - 714.5	0.037	15.67	0.061	17.82	2M71W7D	64QAM
LTE Band 12/17	27	701.5 - 713.5	0.057	17.59	0.094	19.74	4M52G7D	QPSK
LTE Band 12/17	27	701.5 - 713.5	0.050	16.98	0.082	19.13	4M52W7D	16QAM
LTE Band 12/17	27	701.5 - 713.5	0.043	16.31	0.070	18.46	4M52W7D	64QAM
LTE Band 12/17	27	704 - 711	0.053	17.22	0.087	19.37	9M01G7D	QPSK
LTE Band 12/17	27	704 - 711	0.042	16.25	0.069	18.40	8M99W7D	16QAM
LTE Band 12/17	27	704 - 711	0.036	15.61	0.060	17.76	9M00W7D	64QAM
LTE Band 13	27	779.5 - 784.5	0.036	15.61	0.060	17.76	4M52G7D	QPSK
LTE Band 13	27	779.5 - 784.5	0.031	14.86	0.050	17.01	4M52W7D	16QAM
LTE Band 13	27	779.5 - 784.5	0.023	13.68	0.038	15.83	4M52W7D	64QAM
LTE Band 13	27	782	0.042	16.25	0.069	18.40	9M00G7D	QPSK
LTE Band 13	27	782	0.034	15.31	0.056	17.46	8M96W7D	16QAM
LTE Band 13	27	782	0.029	14.62	0.048	16.77	8M98W7D	64QAM
LTE Band 26/5	22H	824.7 - 848.3	0.063	17.98	0.103	20.13	1M10G7D	QPSK
LTE Band 26/5	22H	824.7 - 848.3	0.055	17.38	0.090	19.53	1M10W7D	16QAM
LTE Band 26/5	22H	824.7 - 848.3	0.042	16.24	0.069	18.39	1M10W7D	64QAM
LTE Band 26/5	22H	825.5 - 847.5	0.067	18.28	0.110	20.43	2M71G7D	QPSK
LTE Band 26/5	22H	825.5 - 847.5	0.055	17.40	0.090	19.55	2M71W7D	16QAM
LTE Band 26/5	22H	825.5 - 847.5	0.045	16.55	0.074	18.70	2M71W7D	64QAM
LTE Band 26/5	22H	826.5 - 846.5	0.065	18.16	0.107	20.31	4M52G7D	QPSK
LTE Band 26/5	22H	826.5 - 846.5	0.056	17.52	0.093	19.67	4M52W7D	16QAM
LTE Band 26/5	22H	826.5 - 846.5	0.046	16.59	0.075	18.74	4M52W7D	64QAM
LTE Band 26/5	22H	829 - 844	0.064	18.03	0.104	20.18	9M04G7D	QPSK
LTE Band 26/5	22H	829 - 844	0.058	17.64	0.095	19.79	8M98W7D	16QAM
LTE Band 26/5	22H	829 - 844	0.045	16.49	0.073	18.64	9M01W7D	64QAM
LTE Band 26	22H	831.5 - 841.5	0.061	17.85	0.100	20.00	13M5G7D	QPSK
LTE Band 26	22H	831.5 - 841.5	0.055	17.44	0.091	19.59	13M5W7D	16QAM
LTE Band 26	22H	831.5 - 841.5	0.041	16.16	0.068	18.31	13M5W7D	64QAM

EUT Overview (<1GHz)

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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	0.259	24.14	1M09G7D	QPSK
LTE Band 66/4	27	1710.7 - 1779.3	0.209	23.19	1M10W7D	16QAM
LTE Band 66/4	27	1710.7 - 1779.3	0.168	22.26	1M10W7D	64QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.263	24.19	2M70G7D	QPSK
LTE Band 66/4	27	1711.5 - 1778.5	0.227	23.55	2M70W7D	16QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.189	22.77	2M71W7D	64QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.268	24.28	4M51G7D	QPSK
LTE Band 66/4	27	1712.5 - 1777.5	0.214	23.30	4M51W7D	16QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.167	22.22	4M50W7D	64QAM
LTE Band 66/4	27	1715 - 1775	0.262	24.18	9M04G7D	QPSK
LTE Band 66/4	27	1715 - 1775	0.225	23.53	8M99W7D	16QAM
LTE Band 66/4	27	1715 - 1775	0.185	22.67	9M02W7D	64QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.279	24.45	13M5G7D	QPSK
LTE Band 66/4	27	1717.5 - 1772.5	0.215	23.32	13M5W7D	16QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.177	22.48	13M5W7D	64QAM
LTE Band 66/4	27	1720 - 1770	0.279	24.46	18M0G7D	QPSK
LTE Band 66/4	27	1720 - 1770	0.232	23.66	18M0W7D	16QAM
LTE Band 66/4	27	1720 - 1770	0.189	22.77	18M0W7D	64QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.181	22.59	1M09G7D	QPSK
LTE Band 25/2	24E	1850.7 - 1914.3	0.157	21.96	1M09W7D	16QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.128	21.06	1M10W7D	64QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.194	22.88	2M70G7D	QPSK
LTE Band 25/2	24E	1851.5 - 1913.5	0.164	22.14	2M70W7D	16QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.129	21.11	2M70W7D	64QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.198	22.97	4M51G7D	QPSK
LTE Band 25/2	24E	1852.5 - 1912.5	0.163	22.11	4M51W7D	16QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.134	21.28	4M51W7D	64QAM
LTE Band 25/2	24E	1855 - 1910	0.217	23.36	9M04G7D	QPSK
LTE Band 25/2	24E	1855 - 1910	0.192	22.83	8M98W7D	16QAM
LTE Band 25/2	24E	1855 - 1910	0.154	21.88	8M99W7D	64QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.196	22.93	13M5G7D	QPSK
LTE Band 25/2	24E	1857.5 - 1907.5	0.161	22.06	13M5W7D	16QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.130	21.14	13M5W7D	64QAM
LTE Band 25/2	24E	1860 - 1905	0.201	23.03	18M0G7D	QPSK
LTE Band 25/2	24E	1860 - 1905	0.188	22.74	17M9W7D	16QAM
LTE Band 25/2	24E	1860 - 1905	0.148	21.70	18M0W7D	64QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.340	25.32	4M53G7D	QPSK
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.283	24.51	4M52W7D	16QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.280	24.47	4M52W7D	64QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.446	26.49	9M04G7D	QPSK
LTE Band 41 (PC2)	27	2501 - 2685	0.387	25.87	9M00W7D	16QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.321	25.06	9M05W7D	64QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.267	24.26	13M5G7D	QPSK
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.237	23.75	13M5W7D	16QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.183	22.62	13M5W7D	64QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.418	26.21	18M0G7D	QPSK
LTE Band 41 (PC2)	27	2506 - 2680	0.290	24.62	18M0W7D	16QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.177	22.47	17M9W7D	64QAM
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.184	22.64	4M52G7D	QPSK
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.106	20.27	4M53W7D	16QAM
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.118	20.73	4M53W7D	64QAM
LTE Band 41 (PC3)	27	2501 - 2685	0.222	23.46	9M00G7D	QPSK
LTE Band 41 (PC3)	27	2501 - 2685	0.200	23.01	8M99W7D	16QAM
LTE Band 41 (PC3)	27	2501 - 2685	0.116	20.65	9M00W7D	64QAM
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.231	23.63	13M5G7D	QPSK
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.183	22.62	13M5W7D	16QAM
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.192	22.82	13M5W7D	64QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.247	23.92	17M9G7D	QPSK
LTE Band 41 (PC3)	27	2506 - 2680	0.182	22.59	18M0W7D	16QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.149	21.74	17M9W7D	64QAM

EUT Overview (>1GHz)

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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 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMN9600**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 30740, 32241, 32381, 24610, 22754

2.2 Device Capabilities

This device contains the following capabilities:

850 CDMA (BC0), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

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.

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.

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 lying flat 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.

This device uses a stylus pen for several functions. The EUT can operate with the stylus pen inserted or removed and the emissions measurements for the EUT were performed with and without the stylus pen inserted into the EUT. There was no degradation found without the stylus pen removed so all emission measurements were performed with the pen inserted into the EUT.

2.4 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

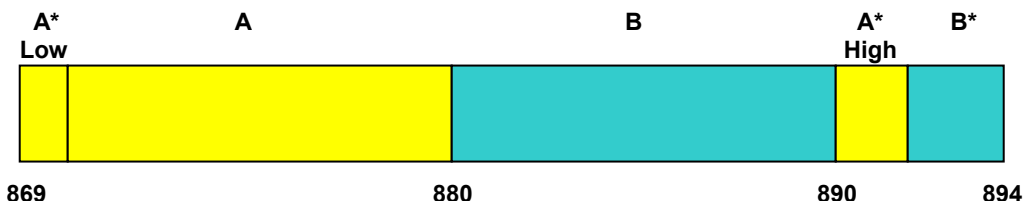
Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results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

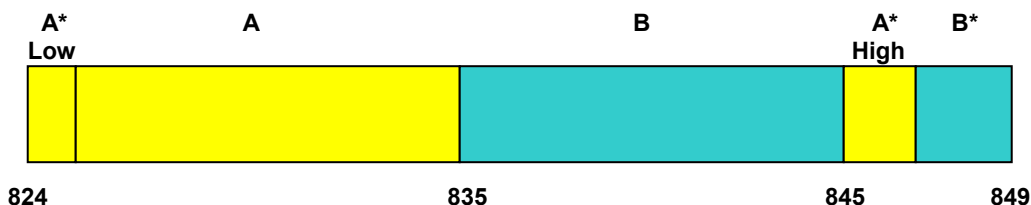
3.4 Cellular - Base Frequency Blocks



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

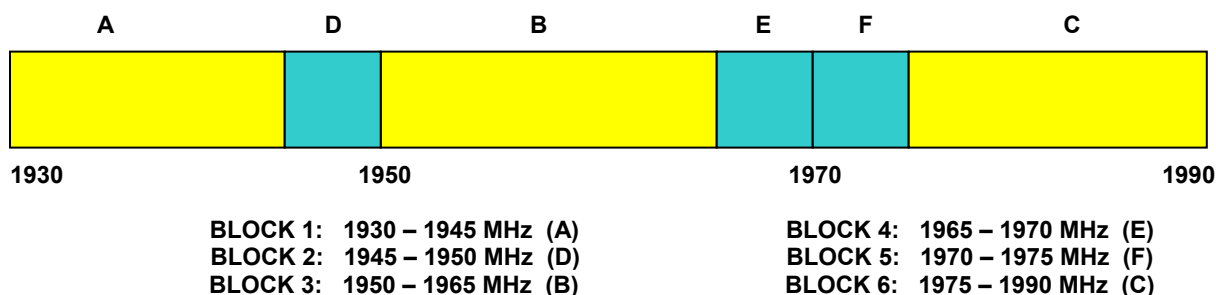


BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

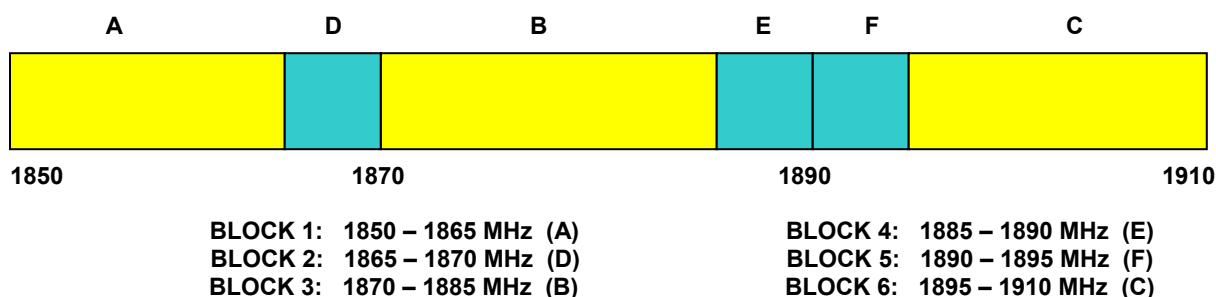
BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

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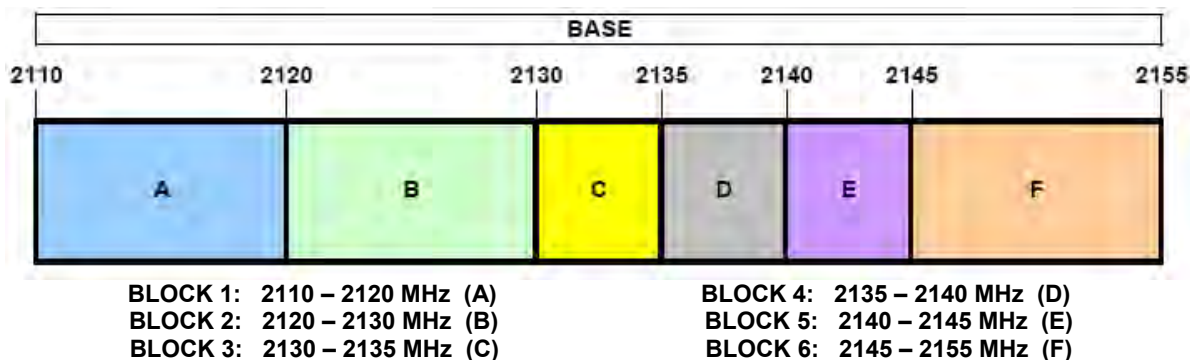
3.6 PCS - Base Frequency Blocks



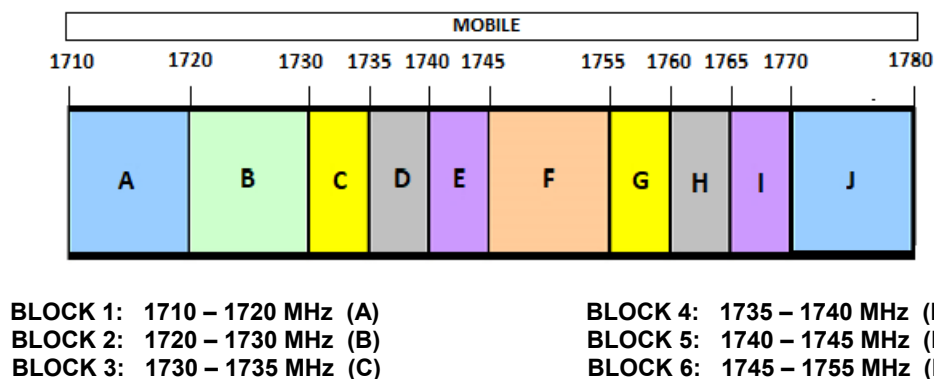
3.7 PCS - Mobile Frequency Blocks



3.8 AWS - Base Frequency Blocks



3.9 AWS - Mobile Frequency Blocks



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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 $43 + 10\log_{10}(\text{Power [Watts]})$. For Band 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 $55 + 10\log_{10}(\text{Power [Watts]})$.

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

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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
-	LTx3	Licensed Transmitter Cable Set	2/21/2018	Annual	2/21/2019	LTx3
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	8/28/2017	Annual	8/28/2018	MY49432391
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
ETS Lindgren	3148B	Log Periodic Dipole Array Antenna	8/9/2016	Biennial	8/9/2018	156993
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/20/2018	Annual	3/20/2019	MY49430494
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	3/30/2018	Annual	3/30/2019	11210140001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102135
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100040
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	1/22/2018	Annual	1/22/2019	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol Sciences	DRH-118	Horn Antenna (1-18GHz)	1/11/2018	Biennial	1/11/2020	A060215

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

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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).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMN9600
 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) 27.53(m)	Out of Band Emissions	> 43 + 10log ₁₀ (P[Watts]) at Band Edge and for all out-of-band emissions Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3, 7.4
24.232(d)	Peak-Average Ratio	< 13 dB			Section 7.5
2.1046	Transmitter Conducted Output Power	N/A			See RF Exposure Report
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 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 12/17, 13)	< 3 Watts max. ERP			Section 7.6
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 25/2, 41)	< 2 Watts max. EIRP			Section 7.6
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66/4)	< 1 Watts max. EIRP			Section 7.6
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

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 4.8.
- 5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

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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.

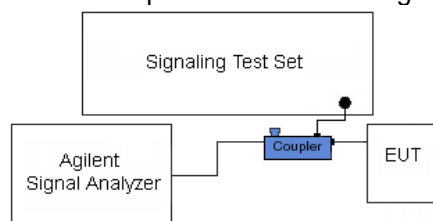


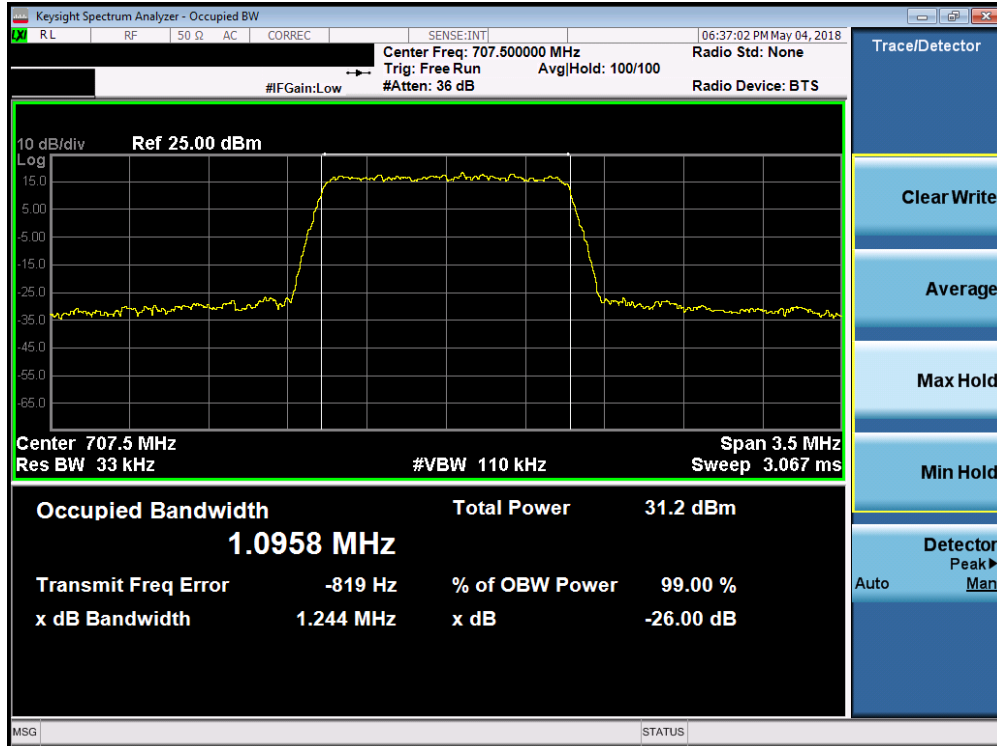
Figure 7-1. Test Instrument & Measurement Setup

Test Notes

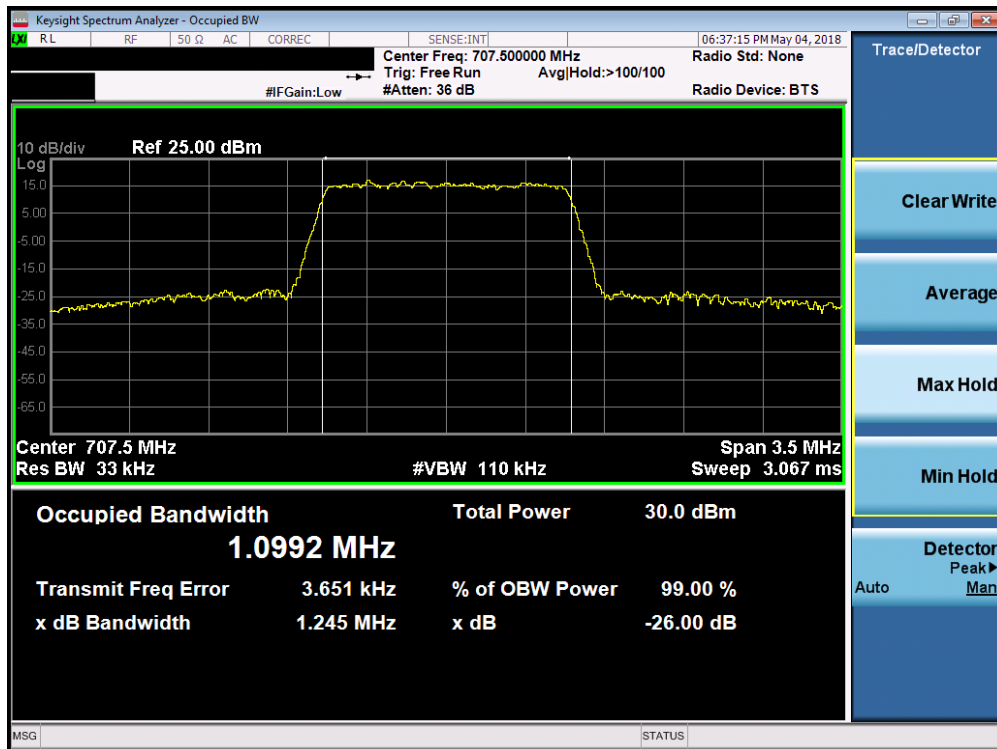
None.

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Band 12/17

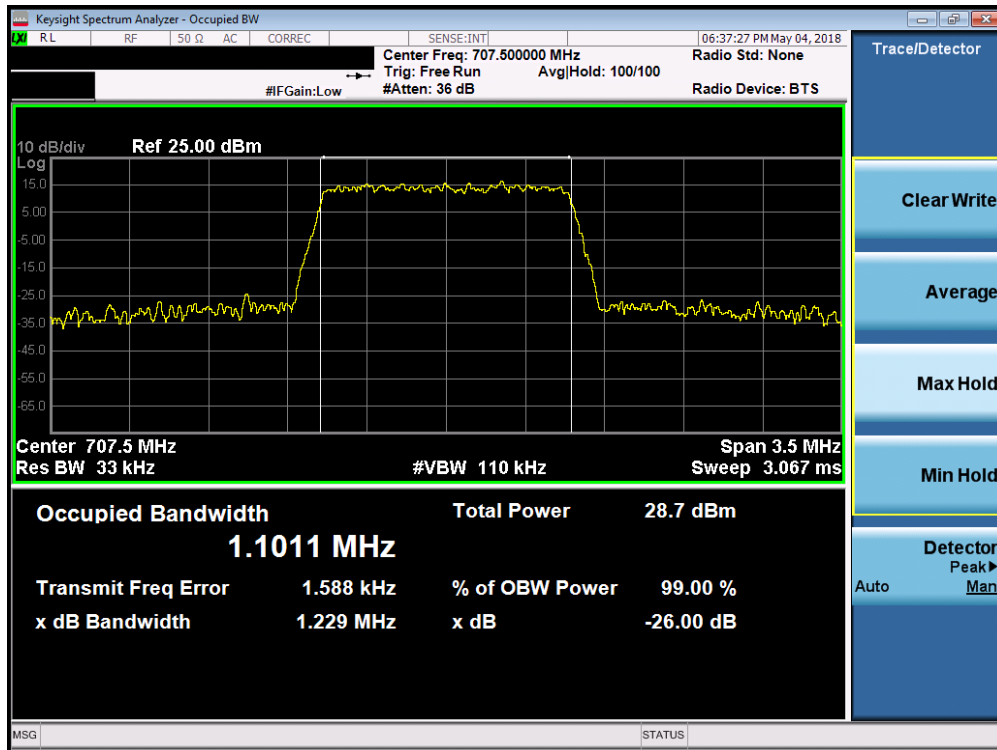


Plot 7-1. Occupied Bandwidth Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

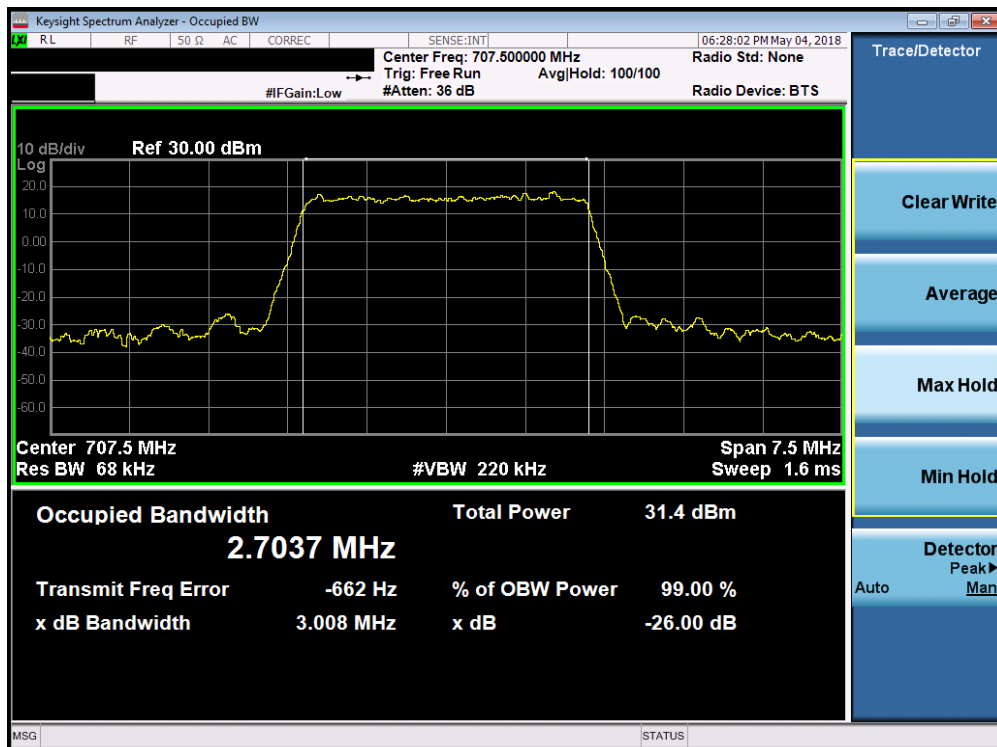


Plot 7-2. Occupied Bandwidth Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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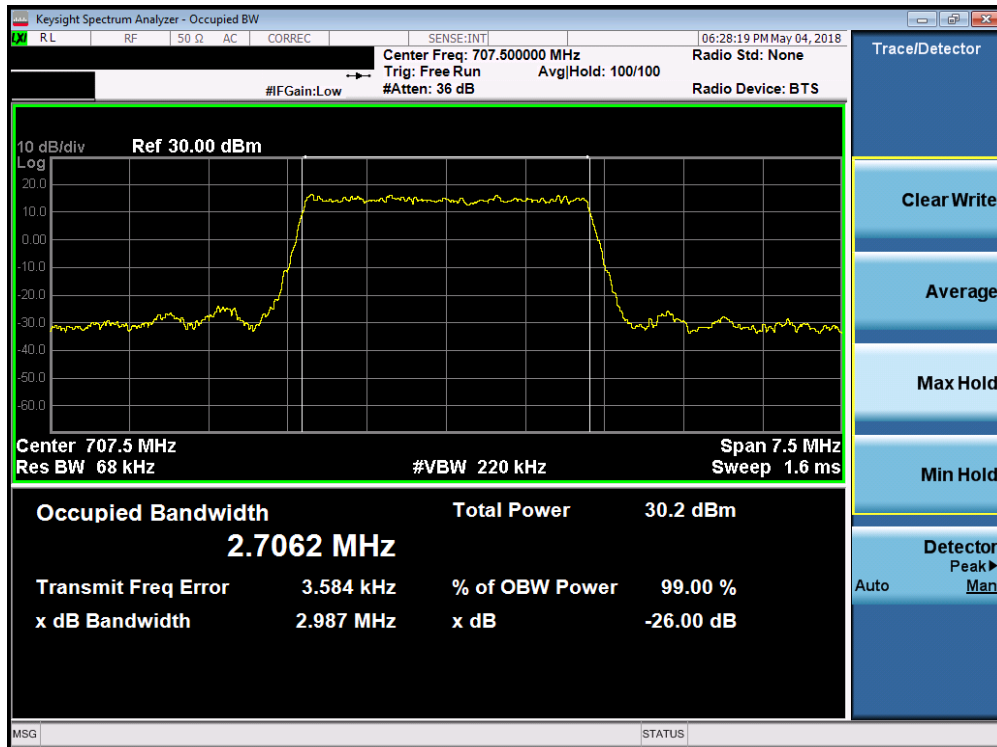


Plot 7-3. Occupied Bandwidth Plot (Band 12 - 1.4MHz 64-QAM - Full RB Configuration)

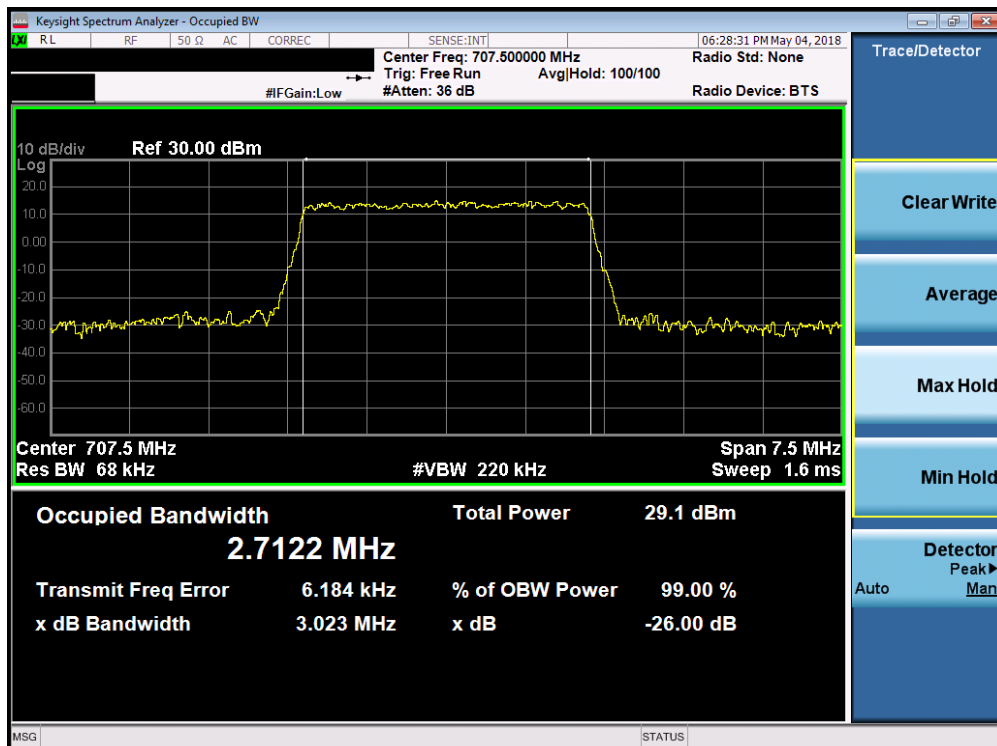


Plot 7-4. Occupied Bandwidth Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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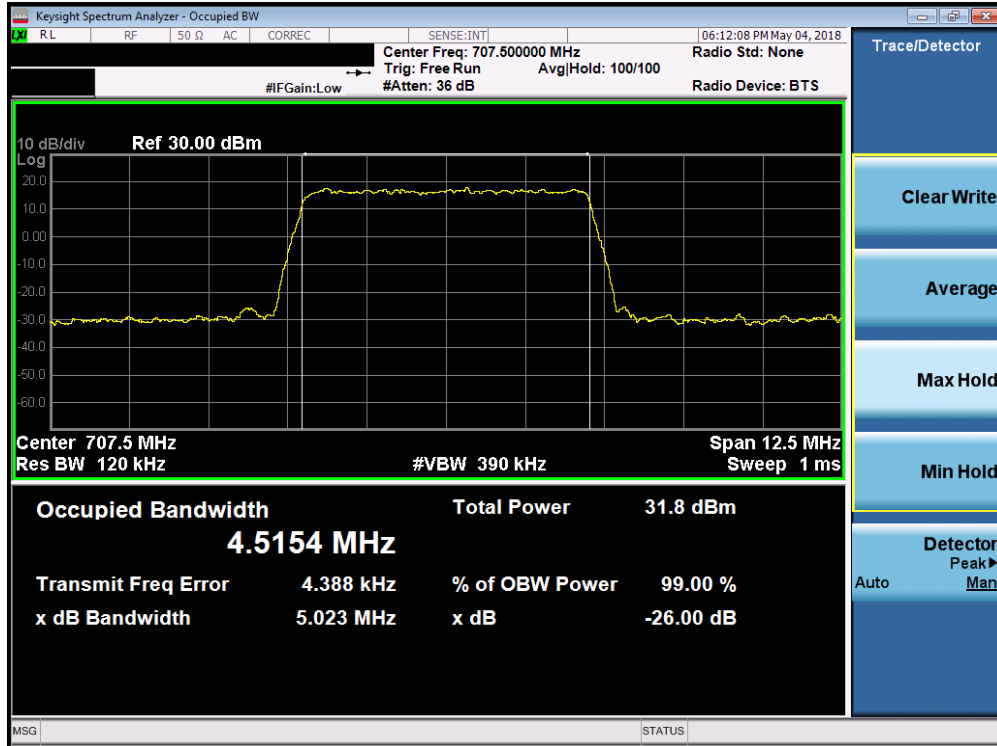


Plot 7-5. Occupied Bandwidth Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

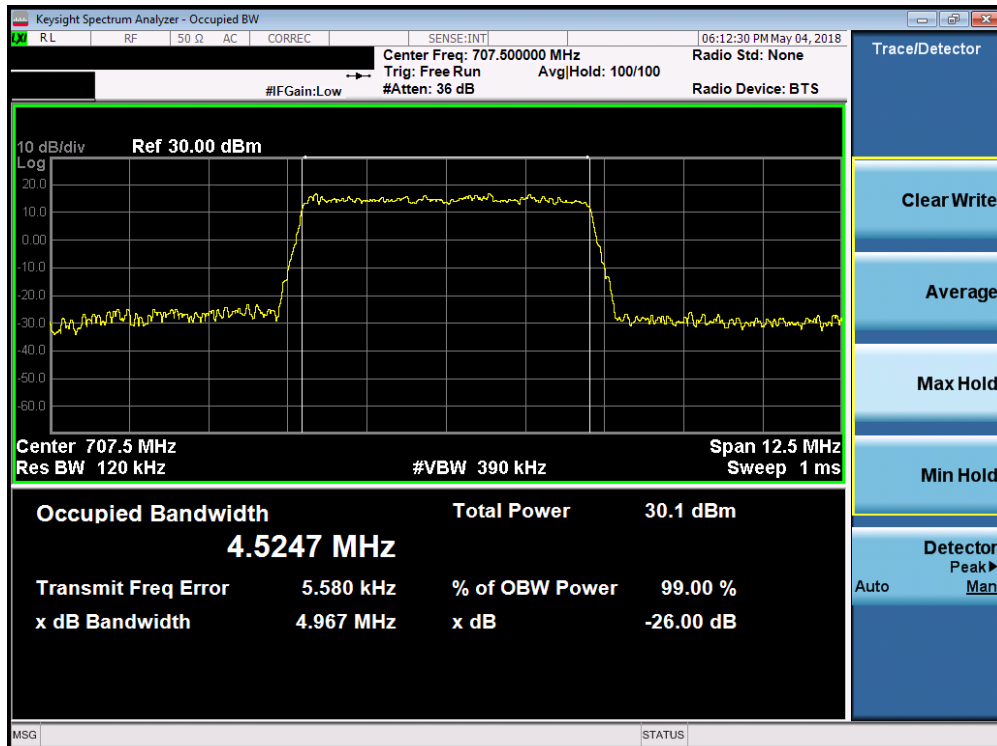


Plot 7-6. Occupied Bandwidth Plot (Band 12 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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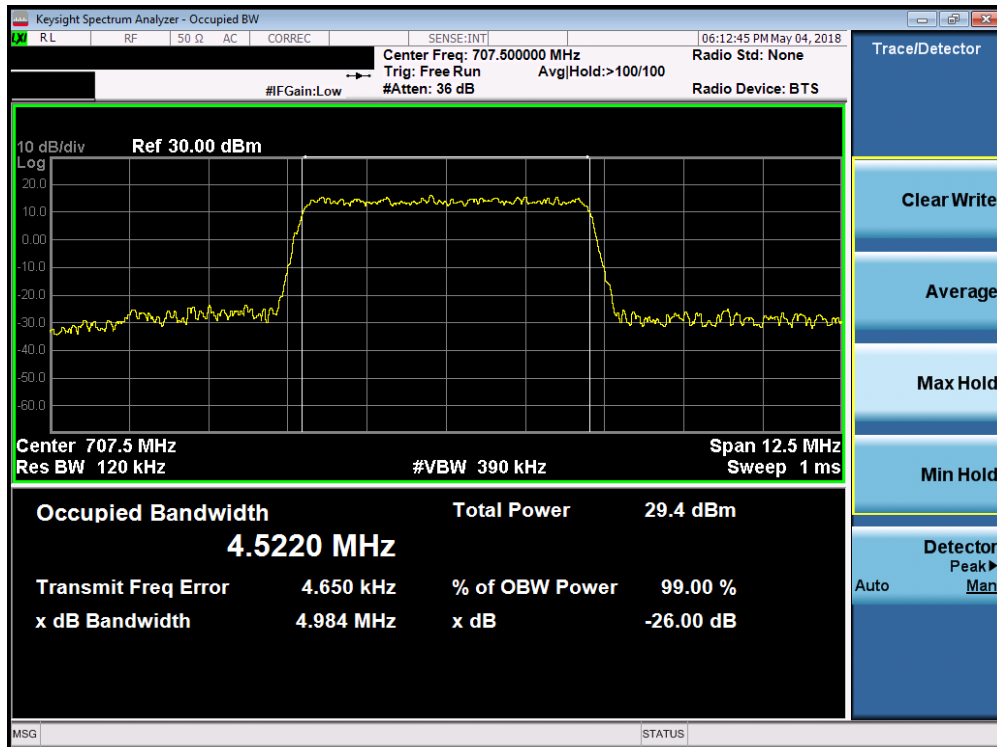


Plot 7-7. Occupied Bandwidth Plot (Band 12/17 - 5.0MHz QPSK - Full RB Configuration)

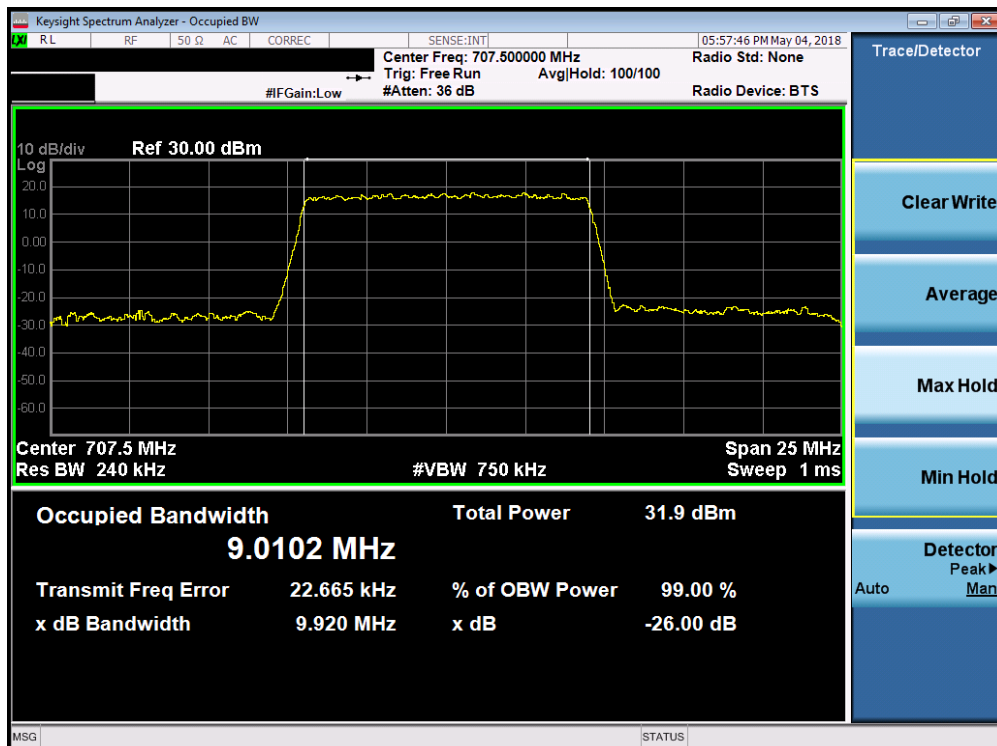


Plot 7-8. Occupied Bandwidth Plot (Band 12/17 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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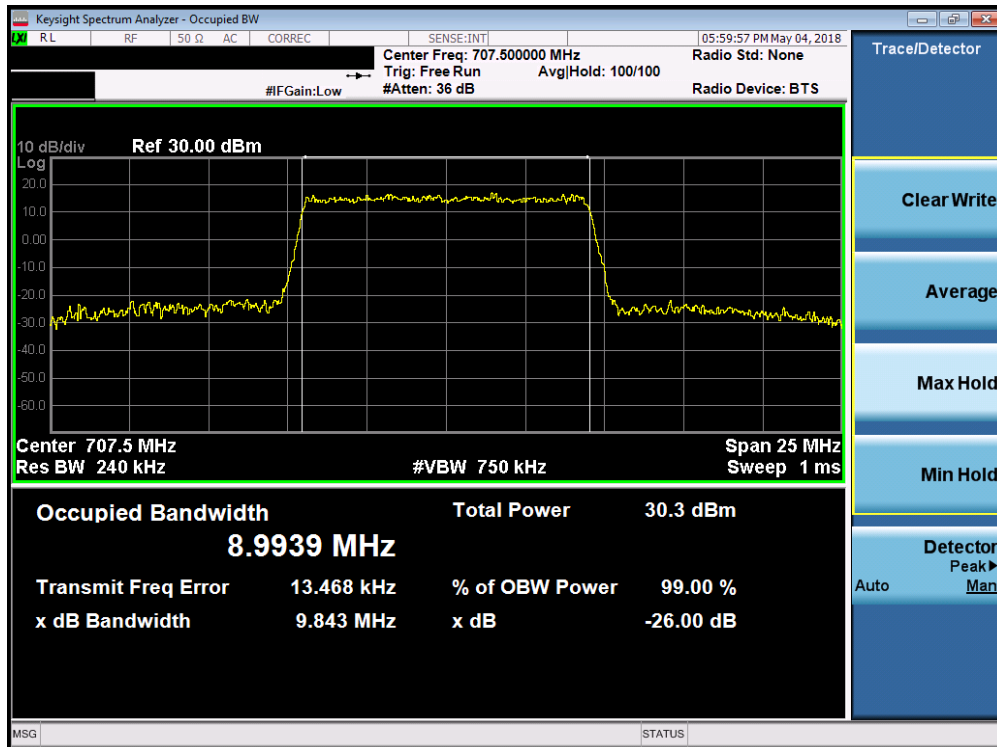


Plot 7-9. Occupied Bandwidth Plot (Band 12/17 - 5.0MHz 64-QAM - Full RB Configuration)

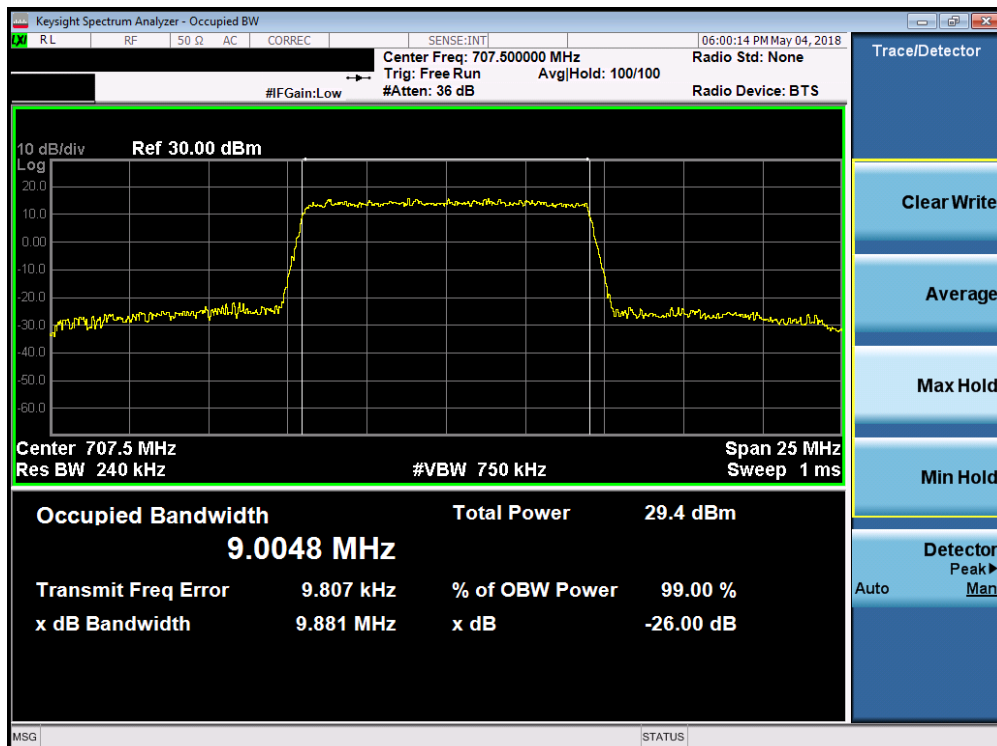


Plot 7-10. Occupied Bandwidth Plot (Band 12/17 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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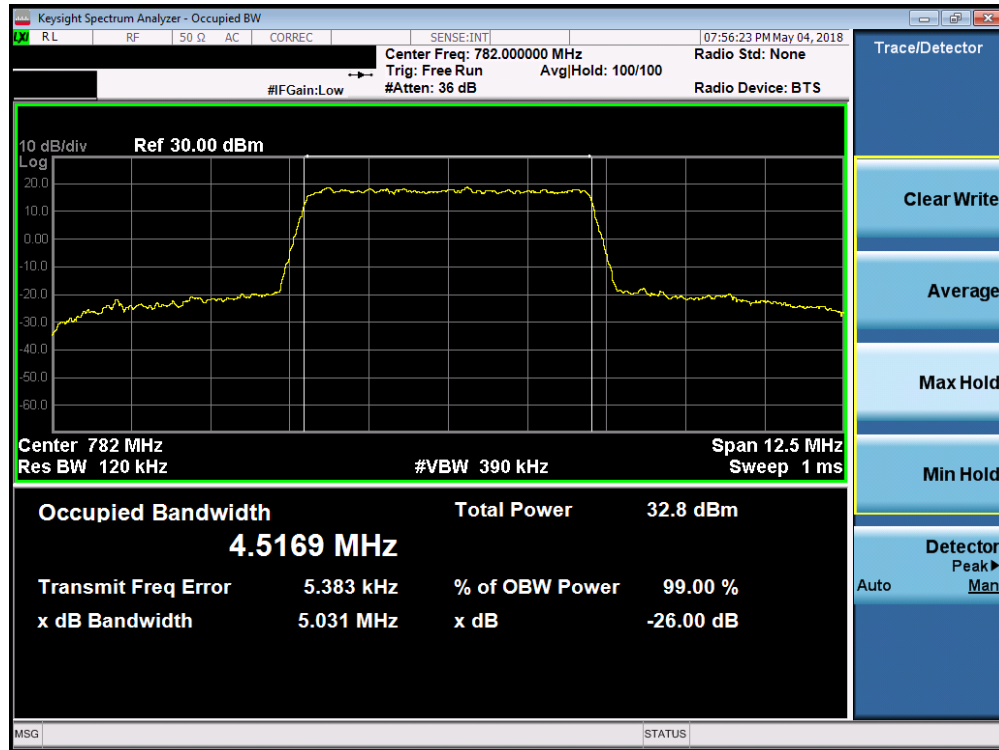
Plot 7-11. Occupied Bandwidth Plot (Band 12/17 - 10.0MHz 16-QAM - Full RB Configuration)



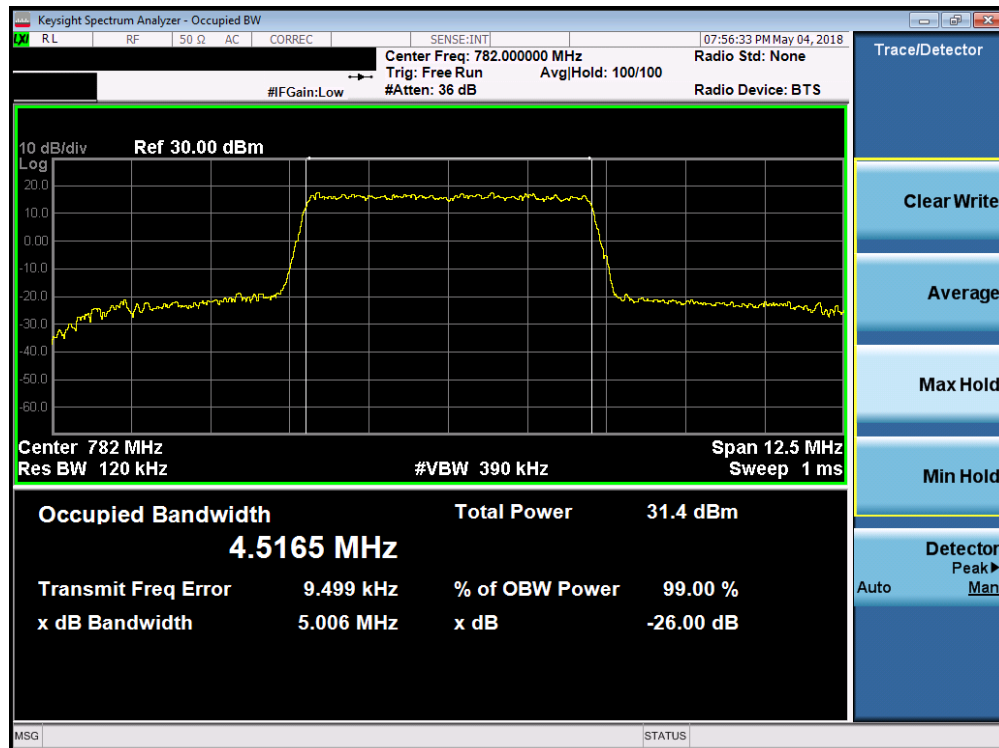
Plot 7-12. Occupied Bandwidth Plot (Band 12/17 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Band 13

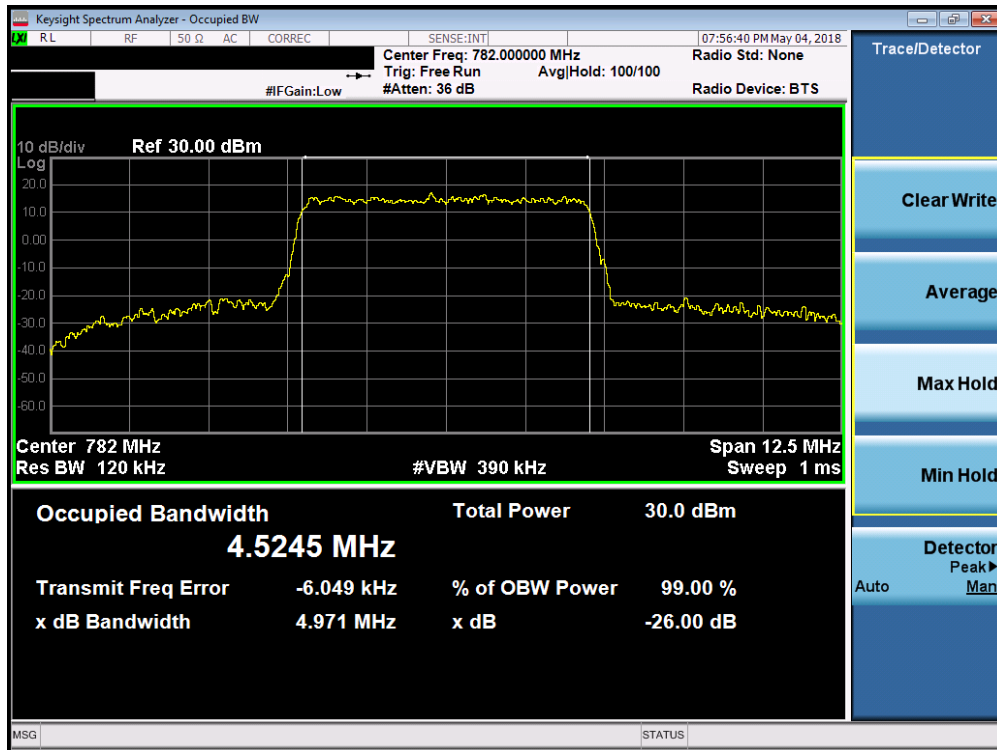


Plot 7-13. Occupied Bandwidth Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

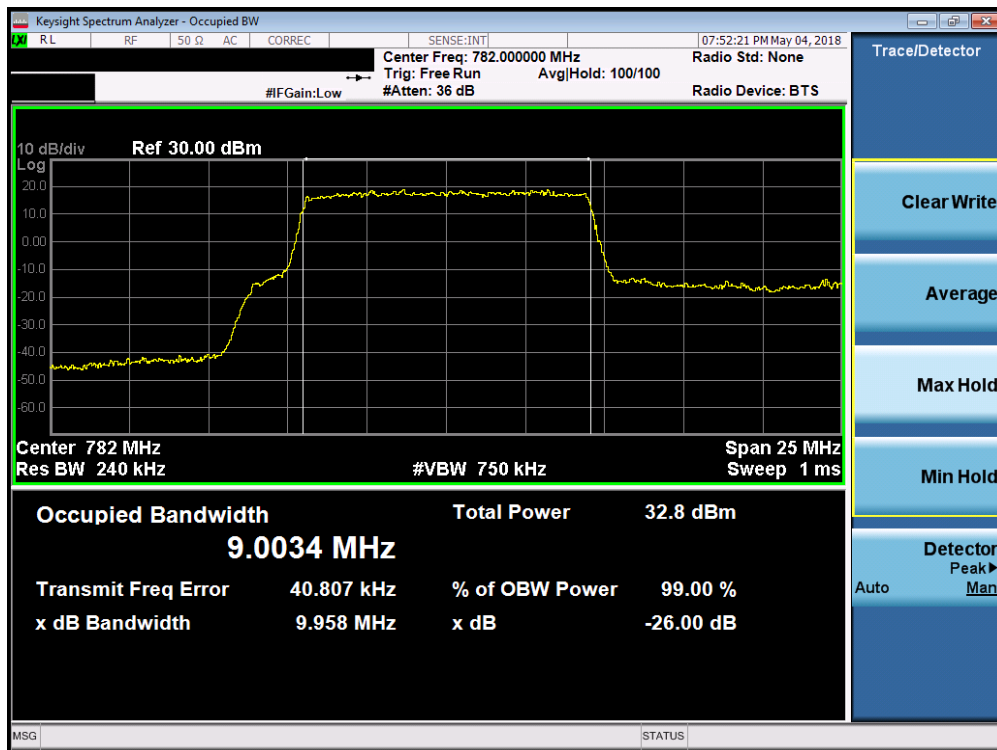


Plot 7-14. Occupied Bandwidth Plot (Band 13 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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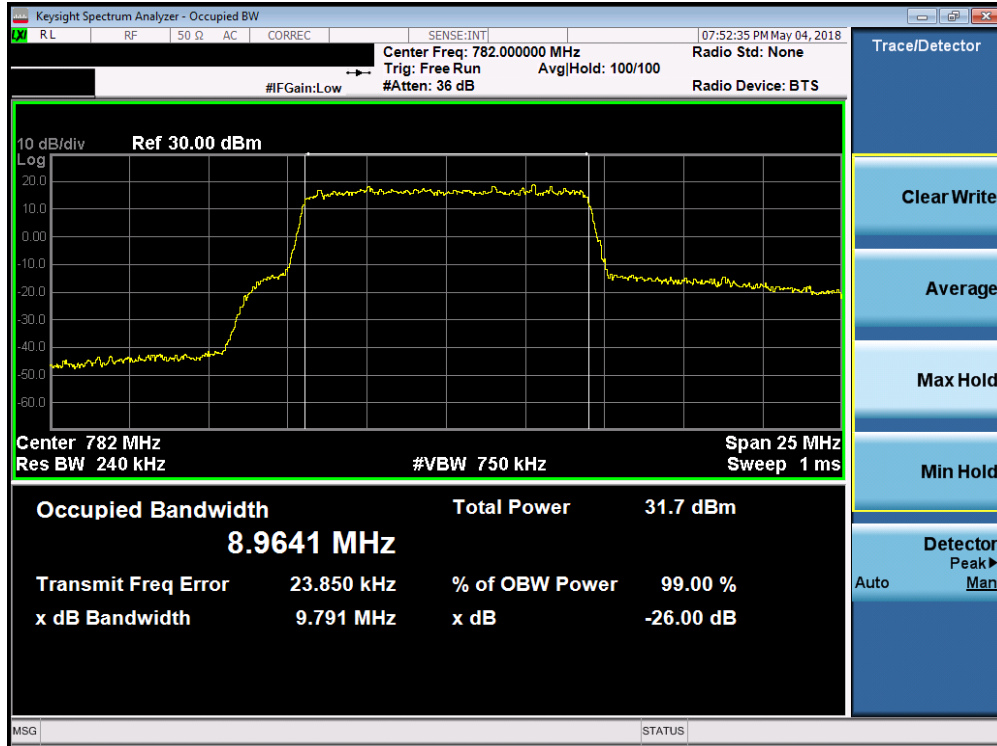


Plot 7-15. Occupied Bandwidth Plot (Band 13 - 5.0MHz 64-QAM - Full RB Configuration)

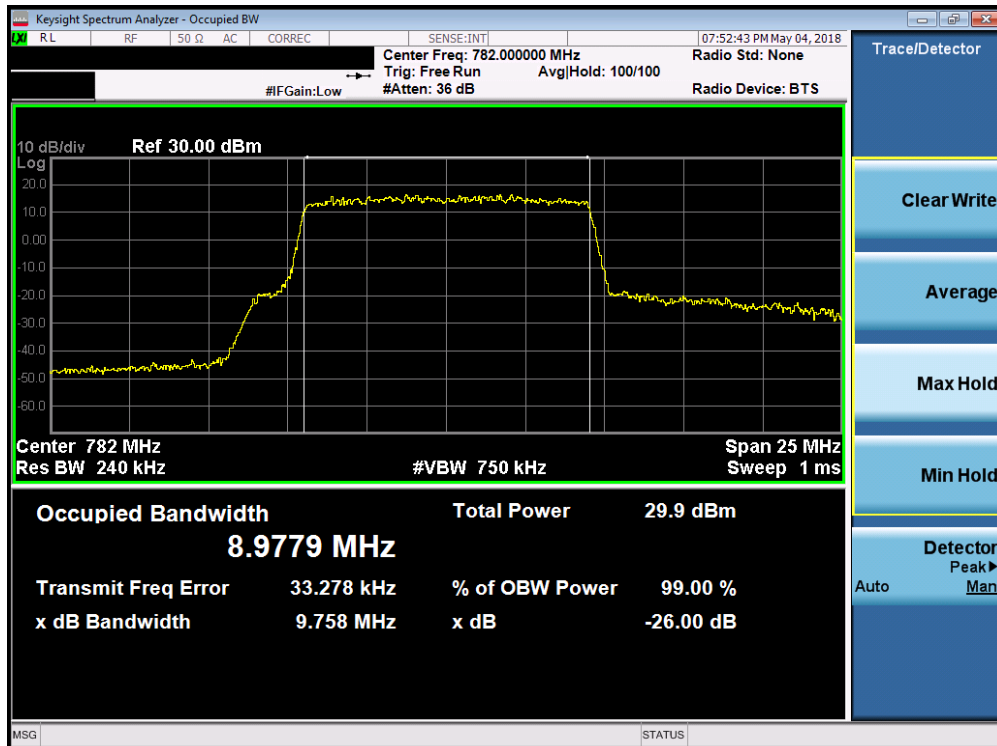


Plot 7-16. Occupied Bandwidth Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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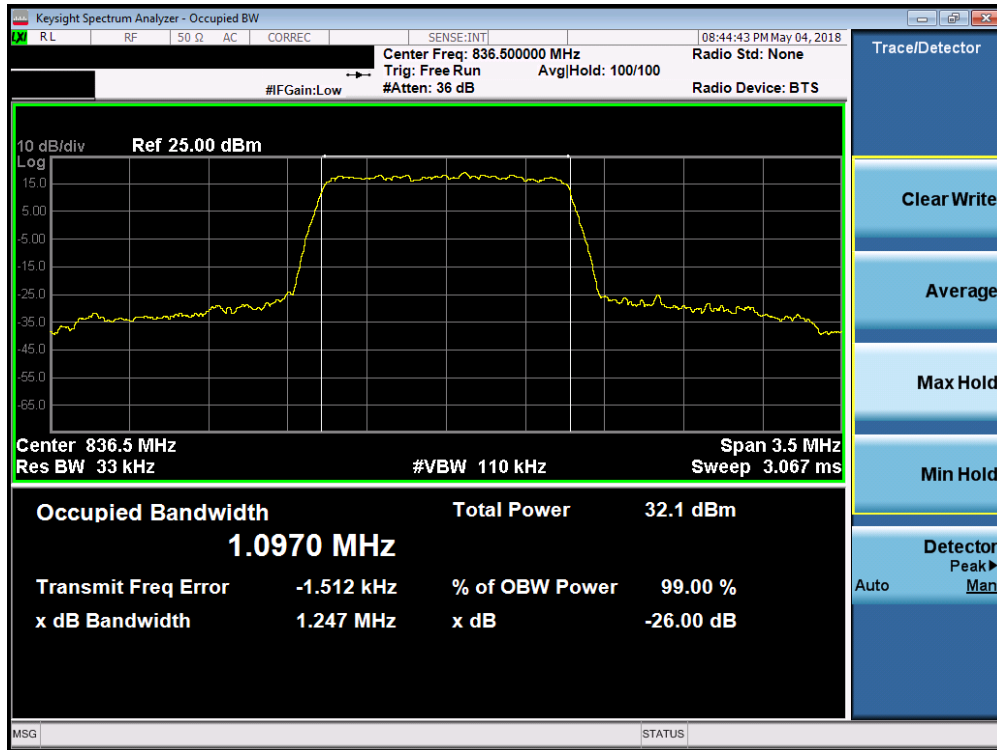
Plot 7-17. Occupied Bandwidth Plot (Band 13 - 10.0MHz 16-QAM - Full RB Configuration)



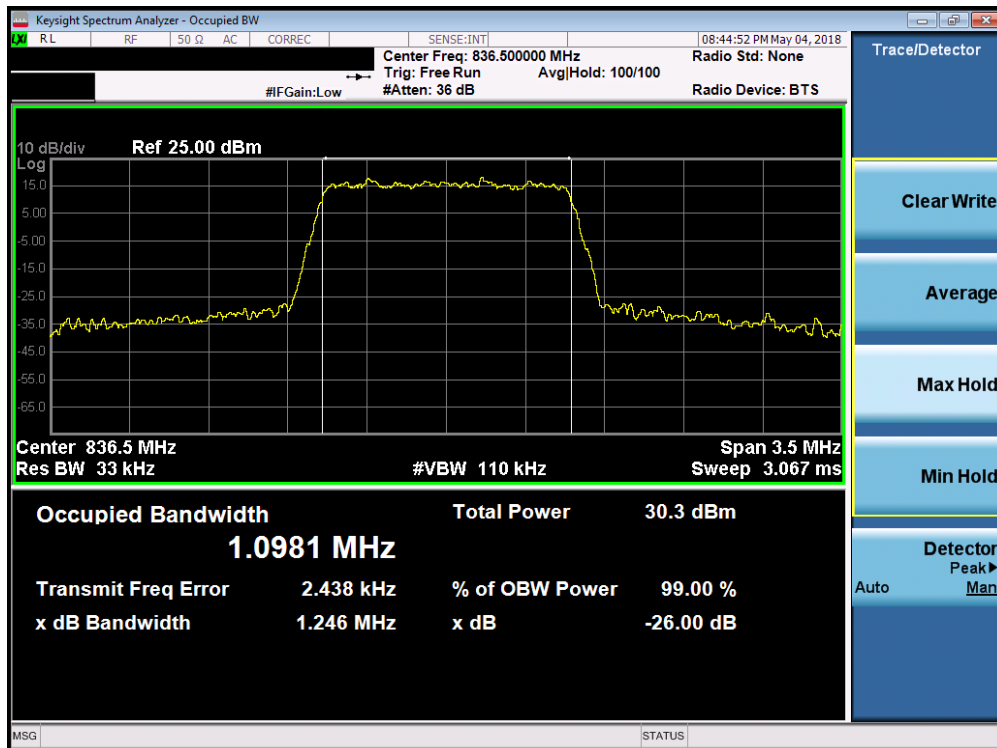
Plot 7-18. Occupied Bandwidth Plot (Band 13 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Band 26/5

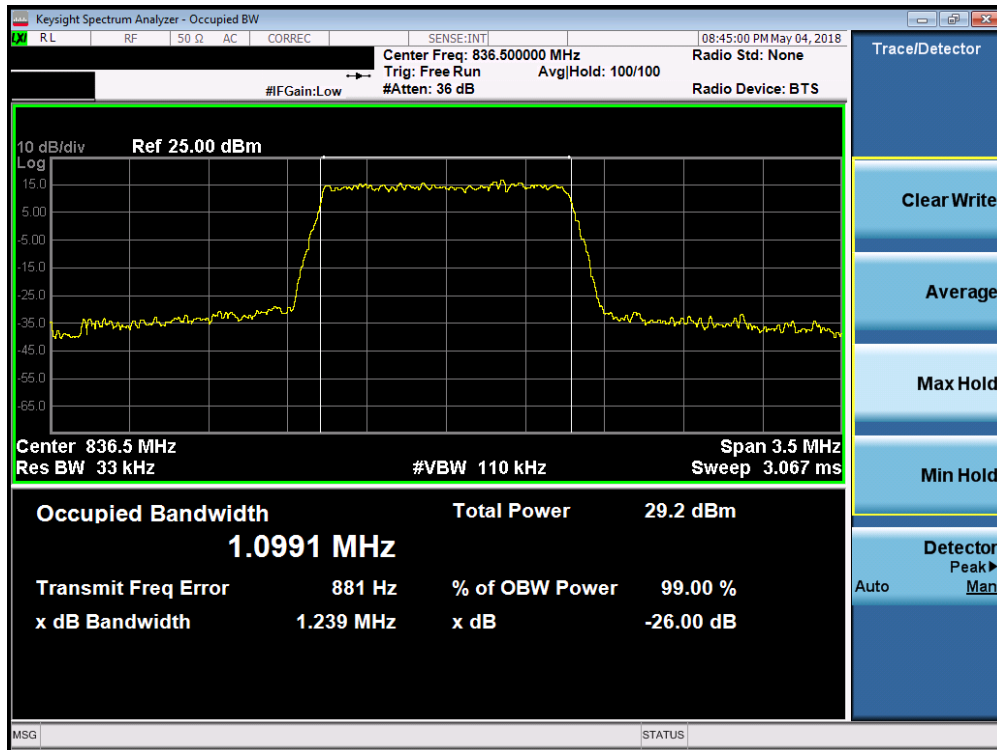


Plot 7-19. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz QPSK - Full RB Configuration)

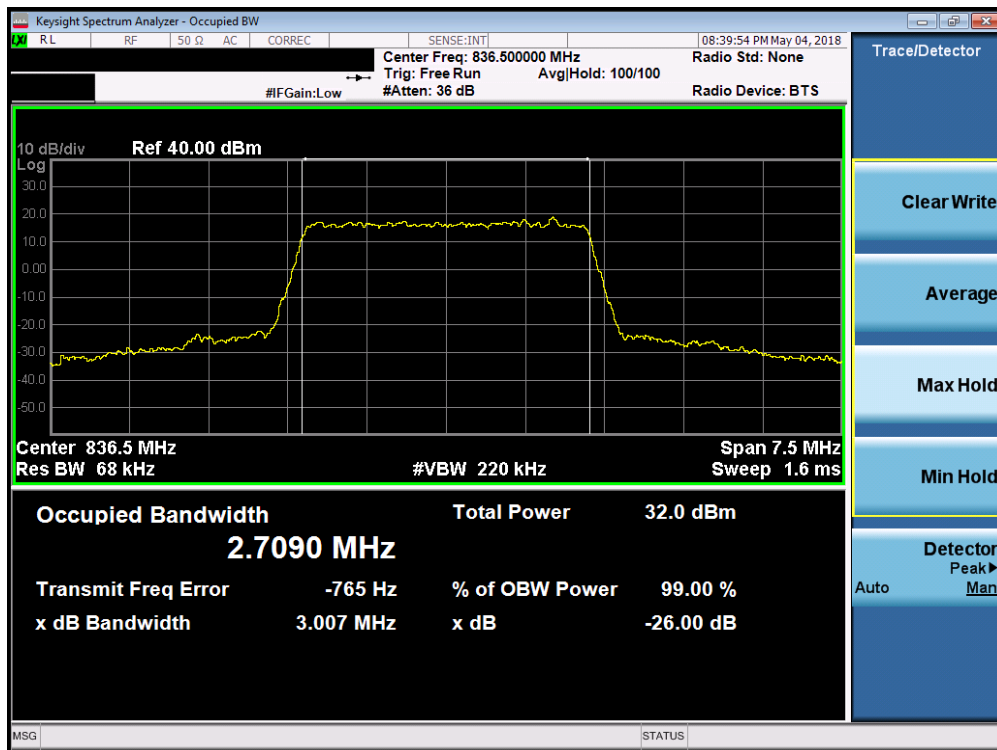


Plot 7-20. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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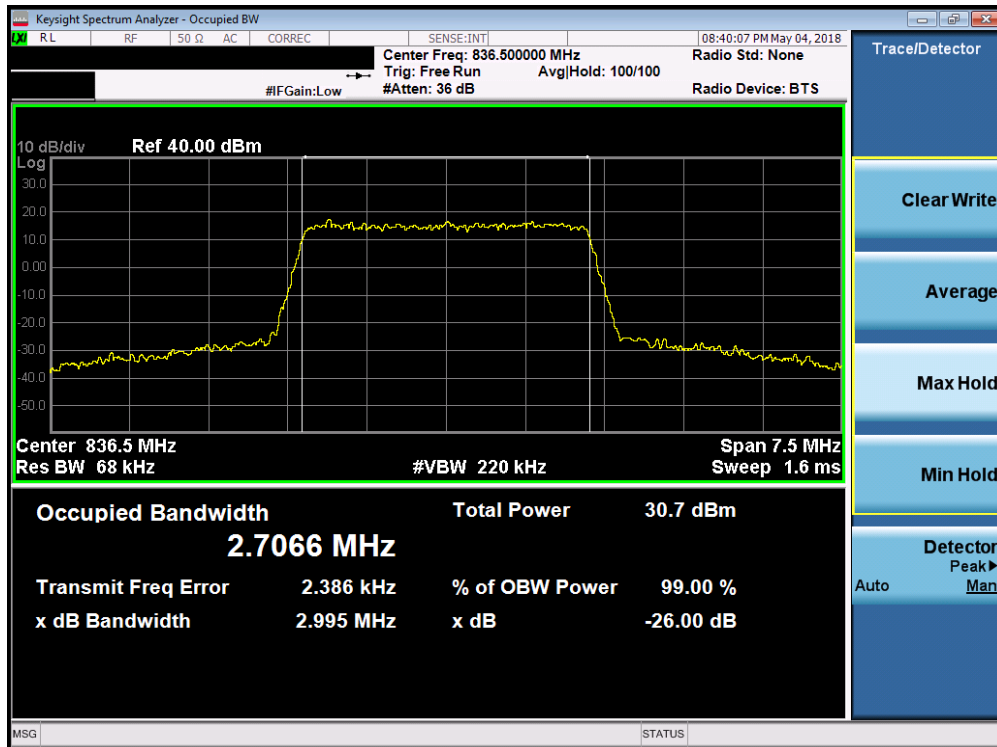


Plot 7-21. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz 64-QAM - Full RB Configuration)

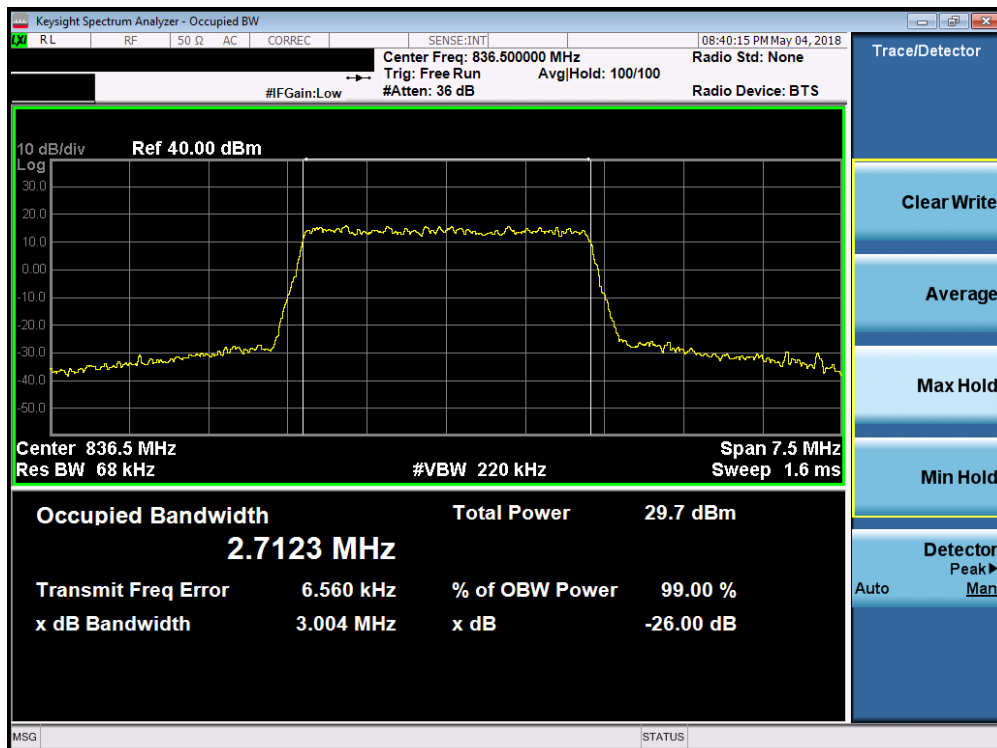


Plot 7-22. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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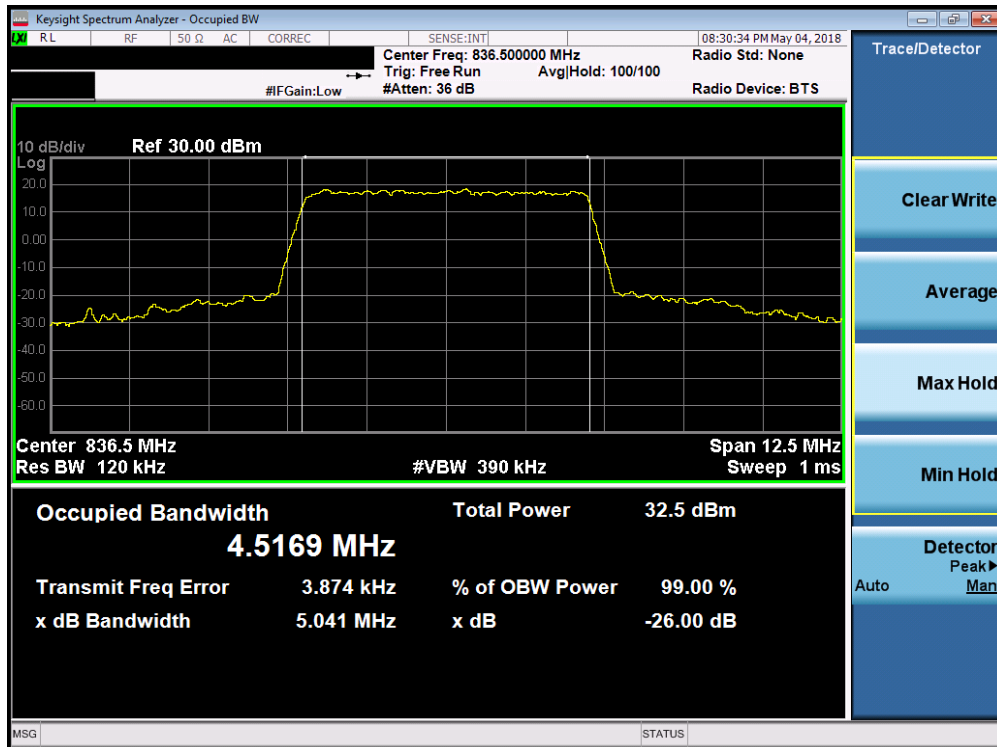


Plot 7-23. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz 16-QAM - Full RB Configuration)

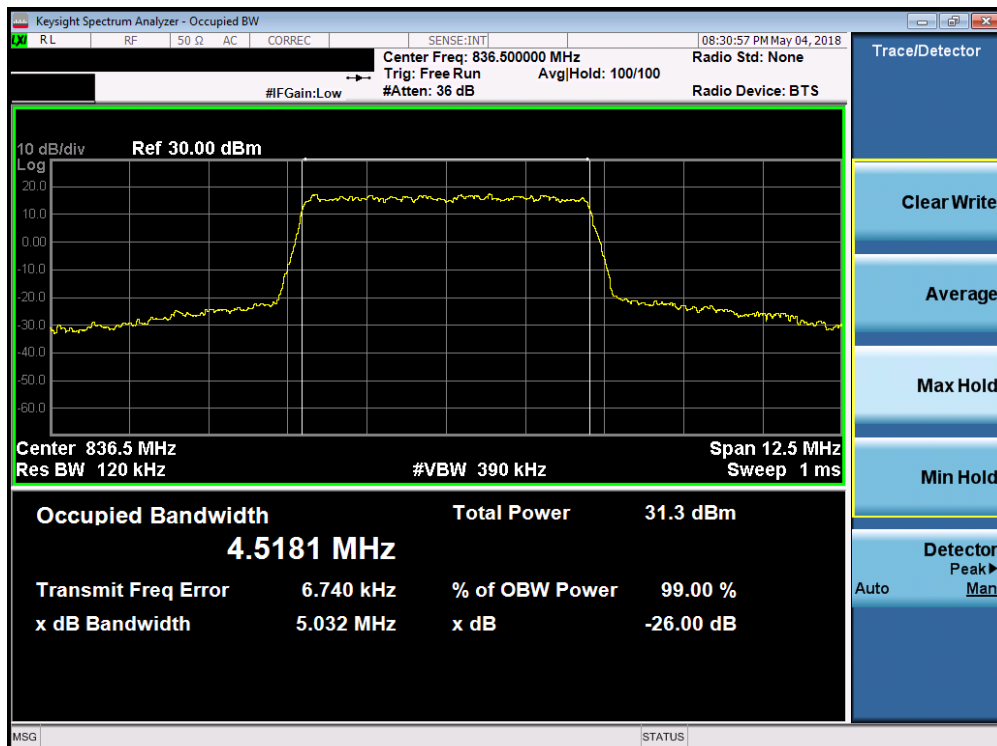


Plot 7-24. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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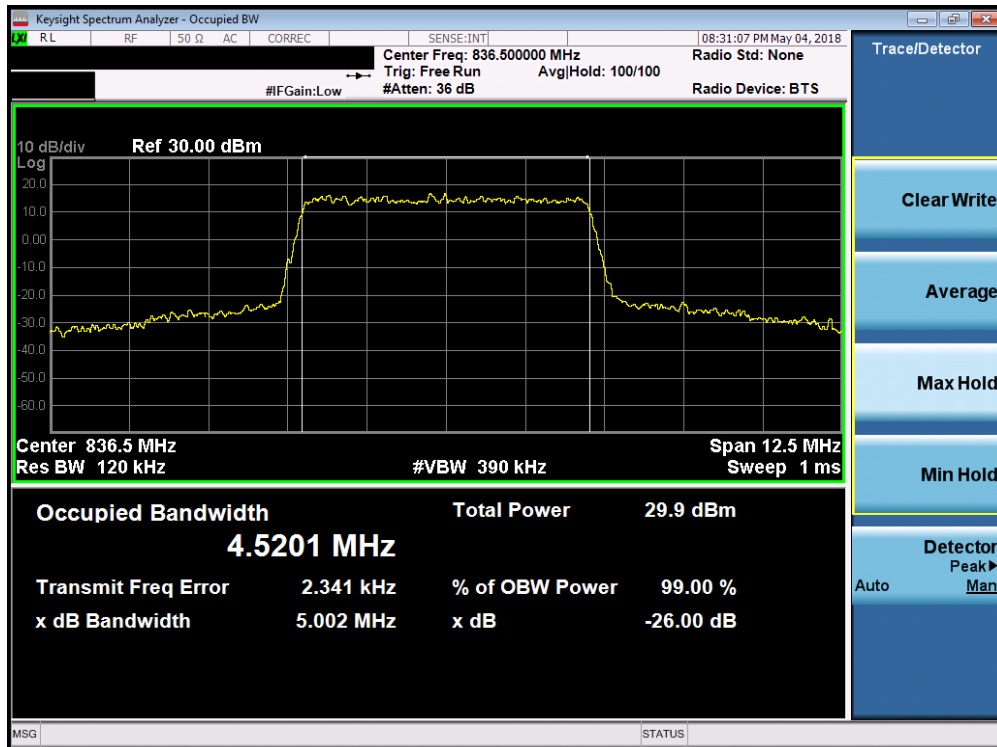


Plot 7-25. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz QPSK - Full RB Configuration)

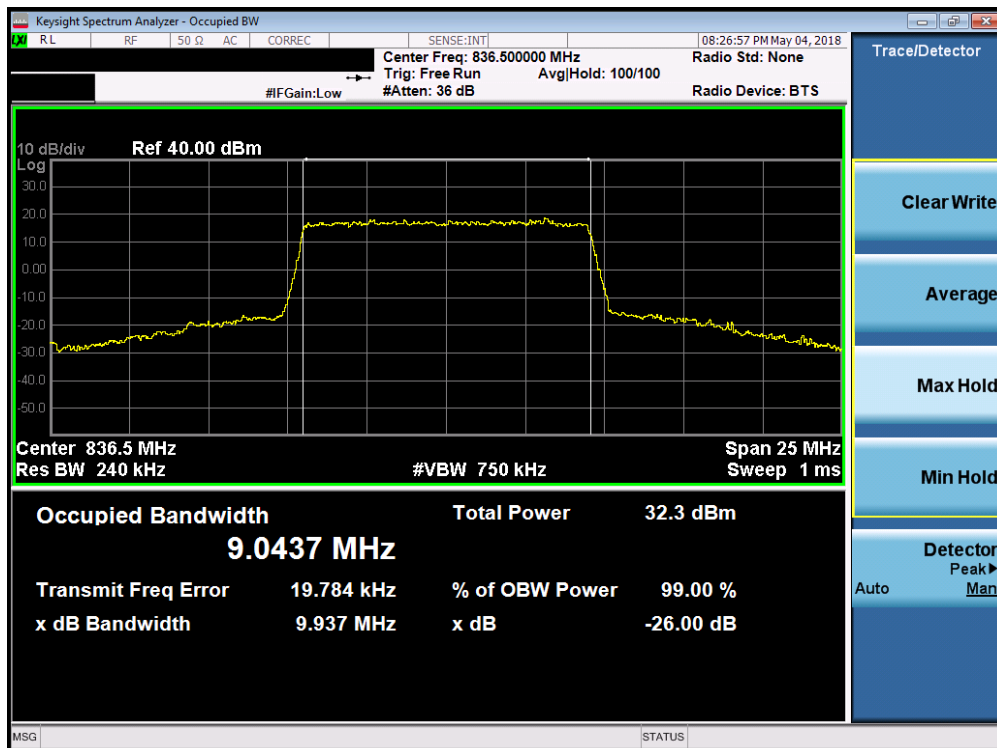


Plot 7-26. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 28 of 261

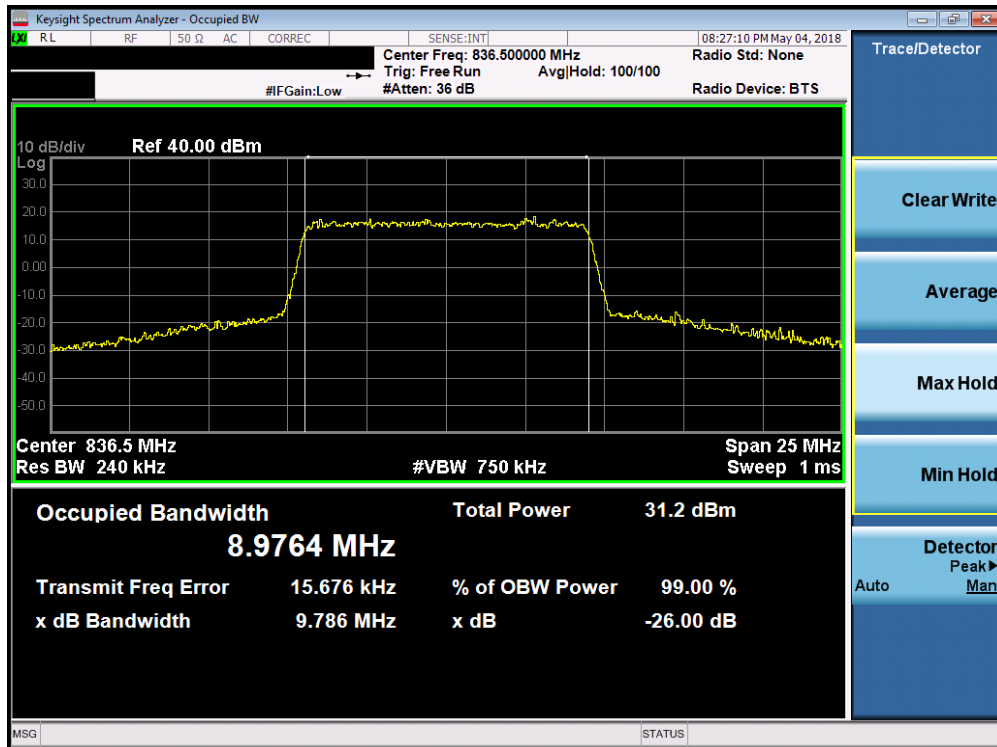


Plot 7-27. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz 64-QAM - Full RB Configuration)

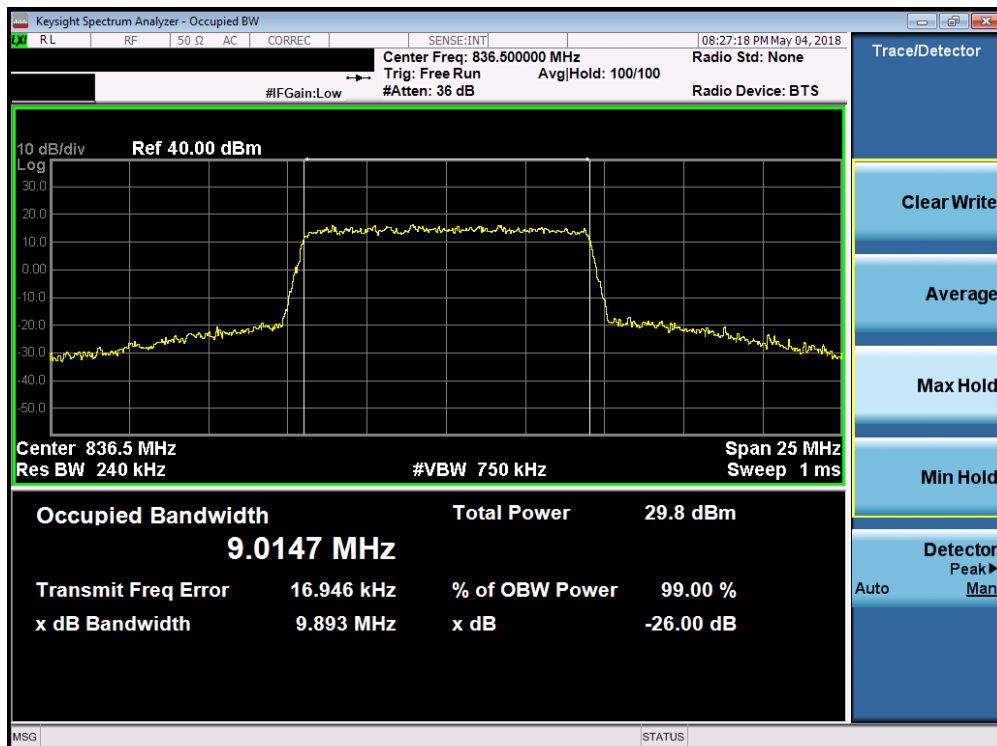


Plot 7-28. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 29 of 261

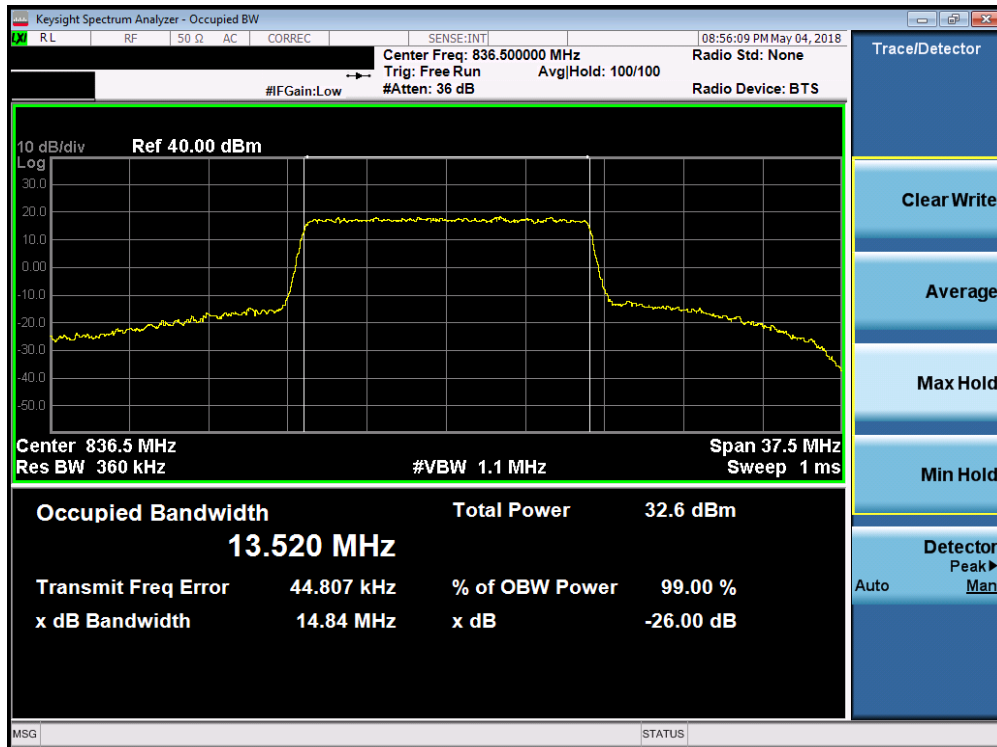


Plot 7-29. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz 16-QAM - Full RB Configuration)

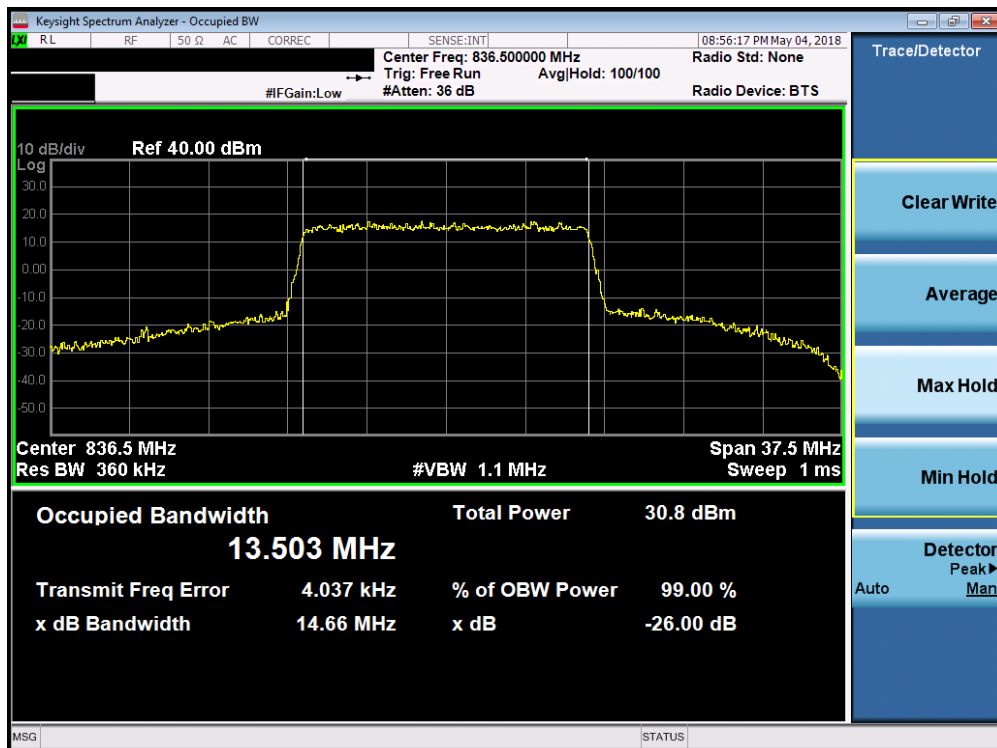


Plot 7-30. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 30 of 261

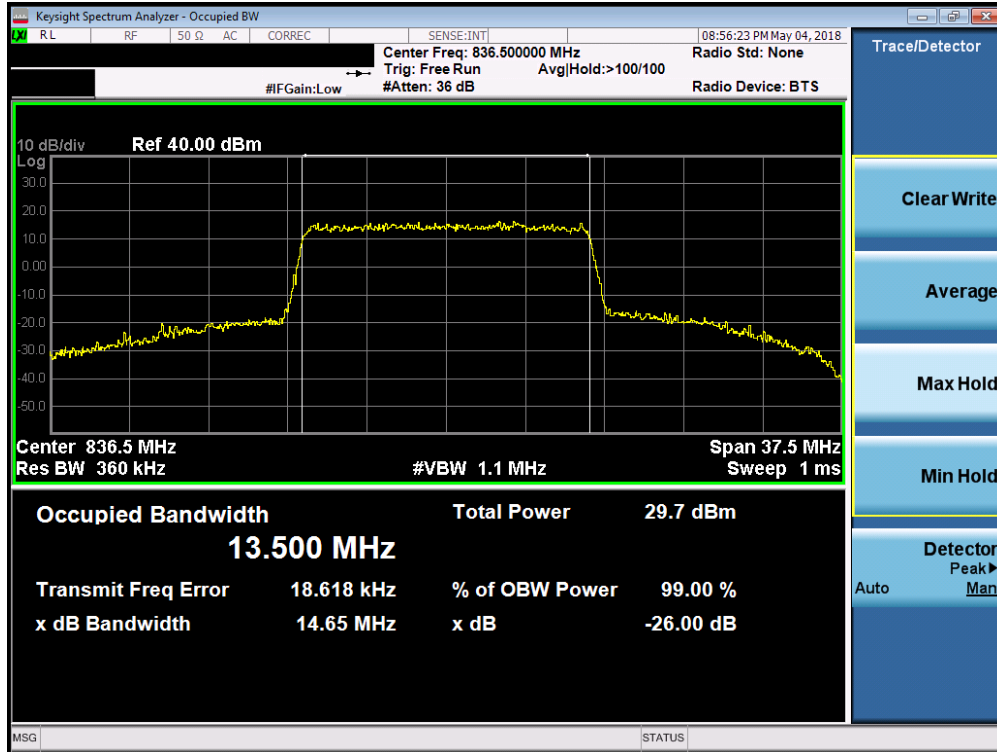


Plot 7-31. Occupied Bandwidth Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-32. Occupied Bandwidth Plot (Band 26 - 15.0MHz 16-QAM - Full RB Configuration)

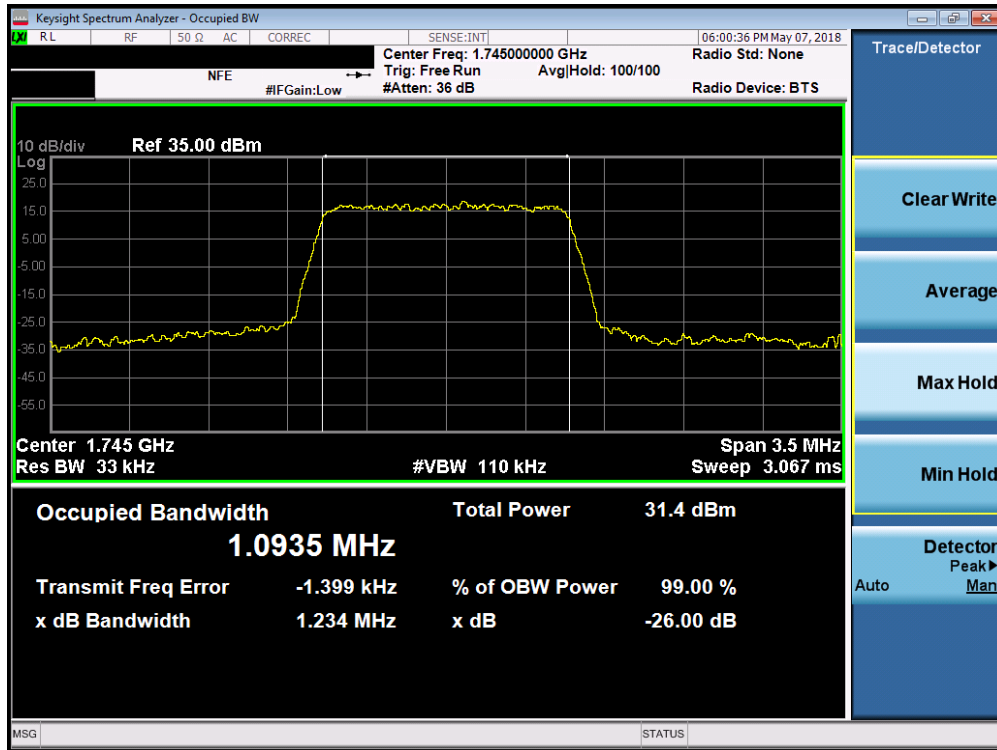
FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 31 of 261



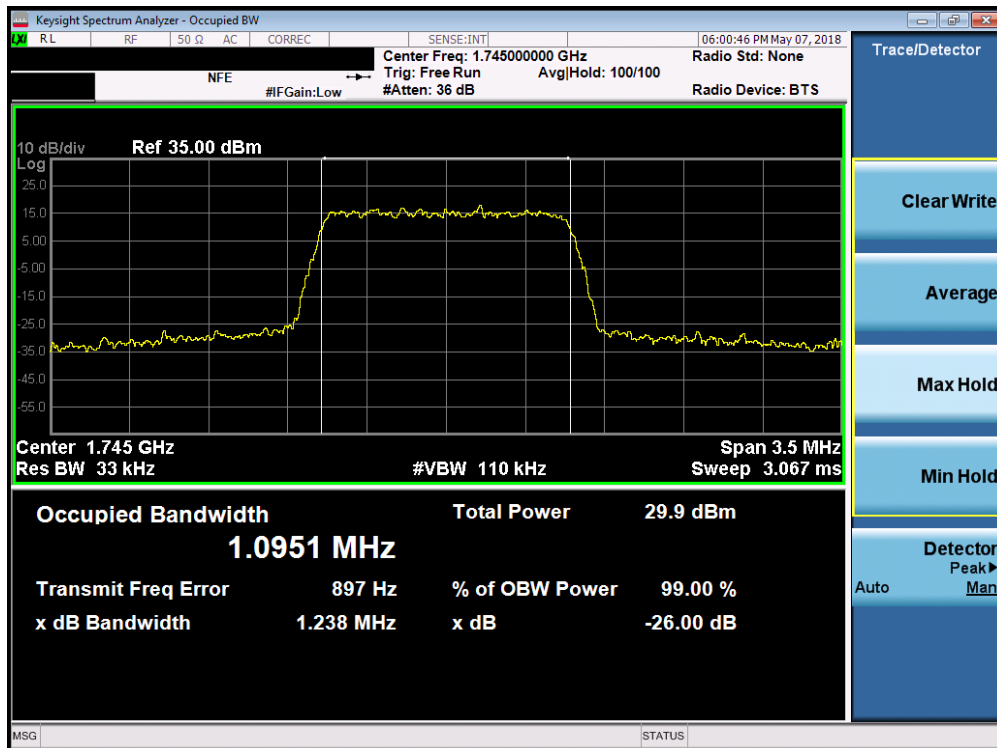
Plot 7-33. Occupied Bandwidth Plot (Band 26 - 15.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 32 of 261

Band 66/4

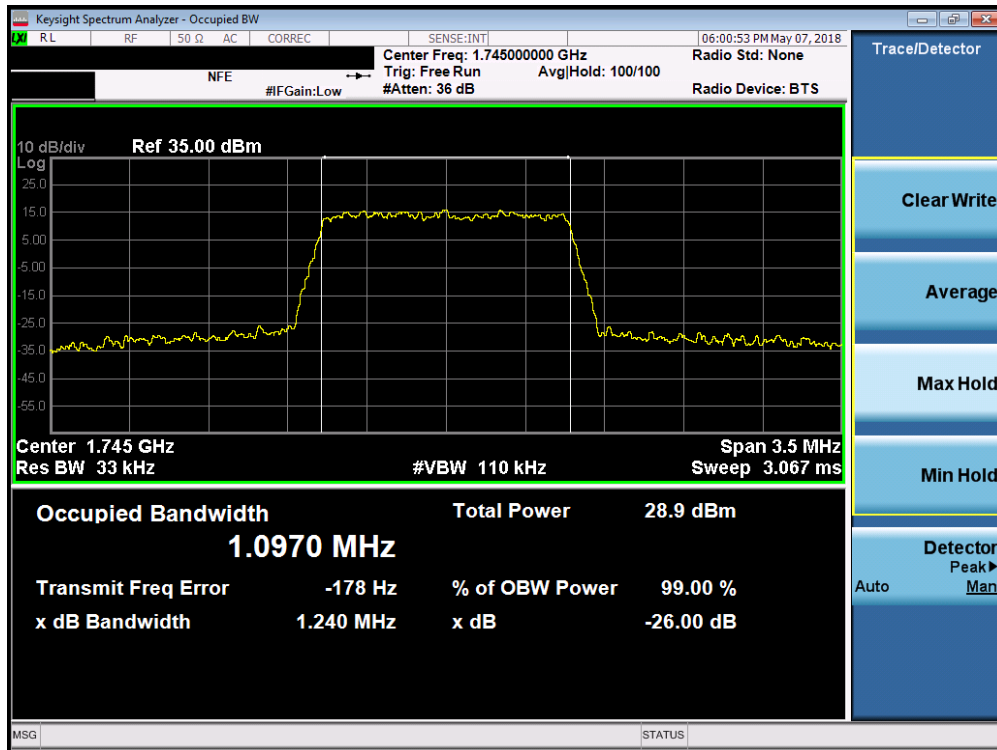


Plot 7-34. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

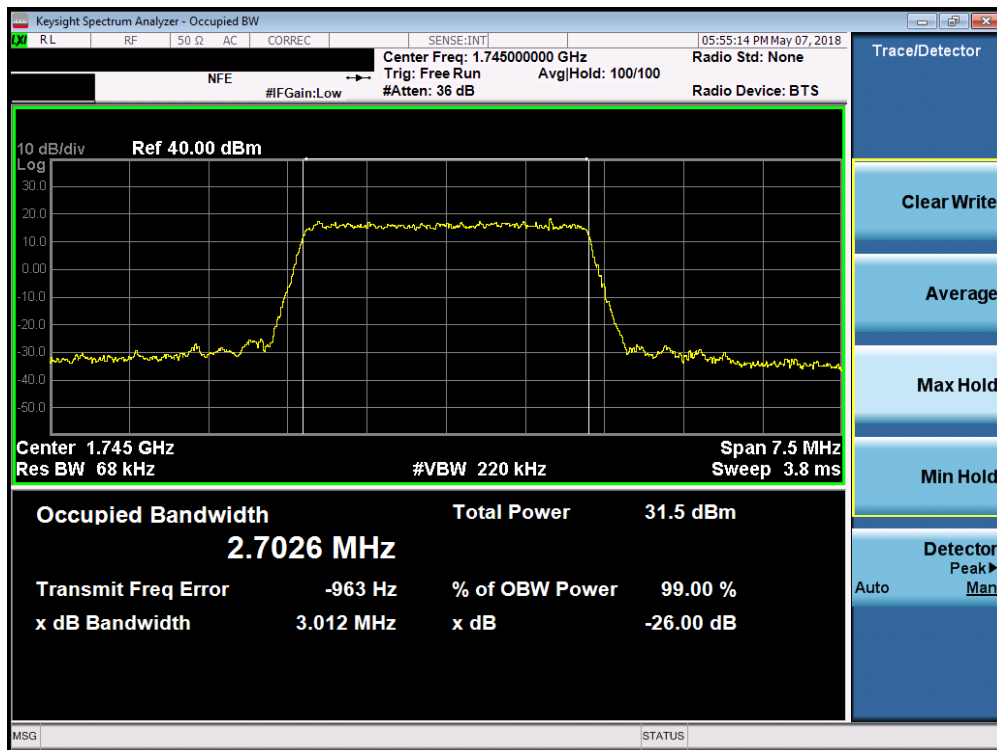


Plot 7-35. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset	Page 33 of 261	

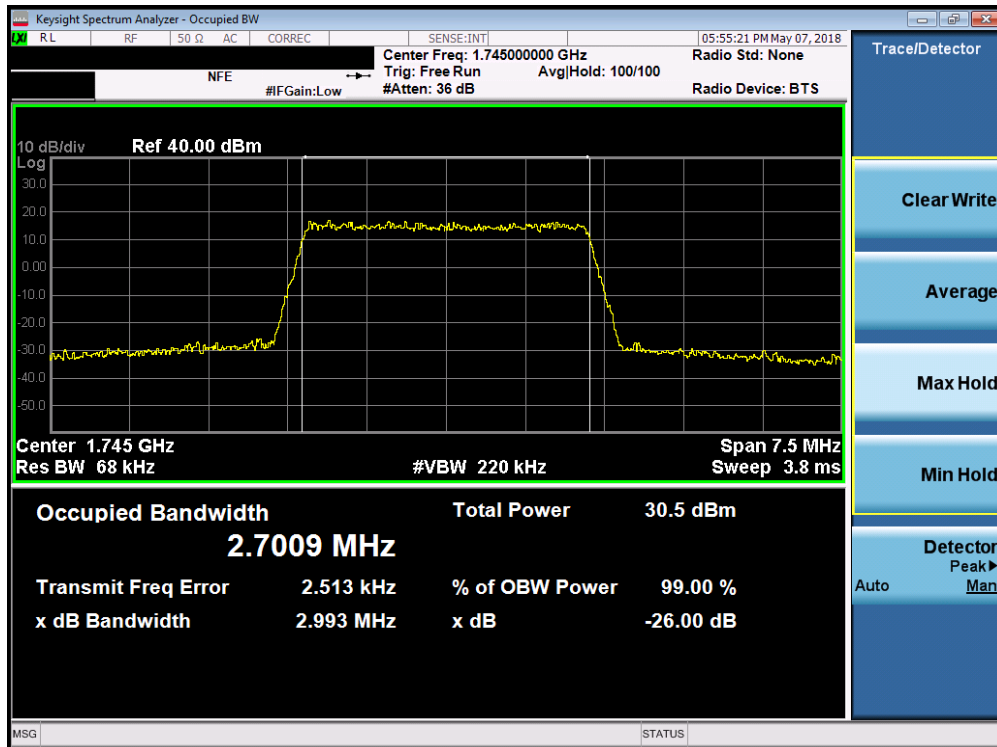


Plot 7-36. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)

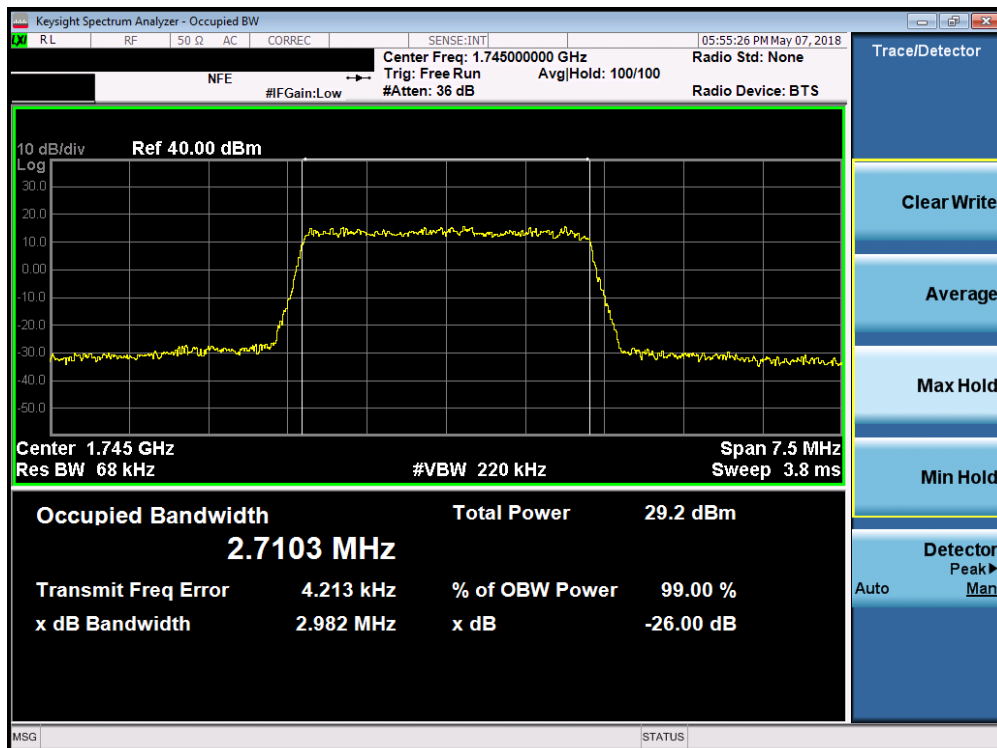


Plot 7-37. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 34 of 261

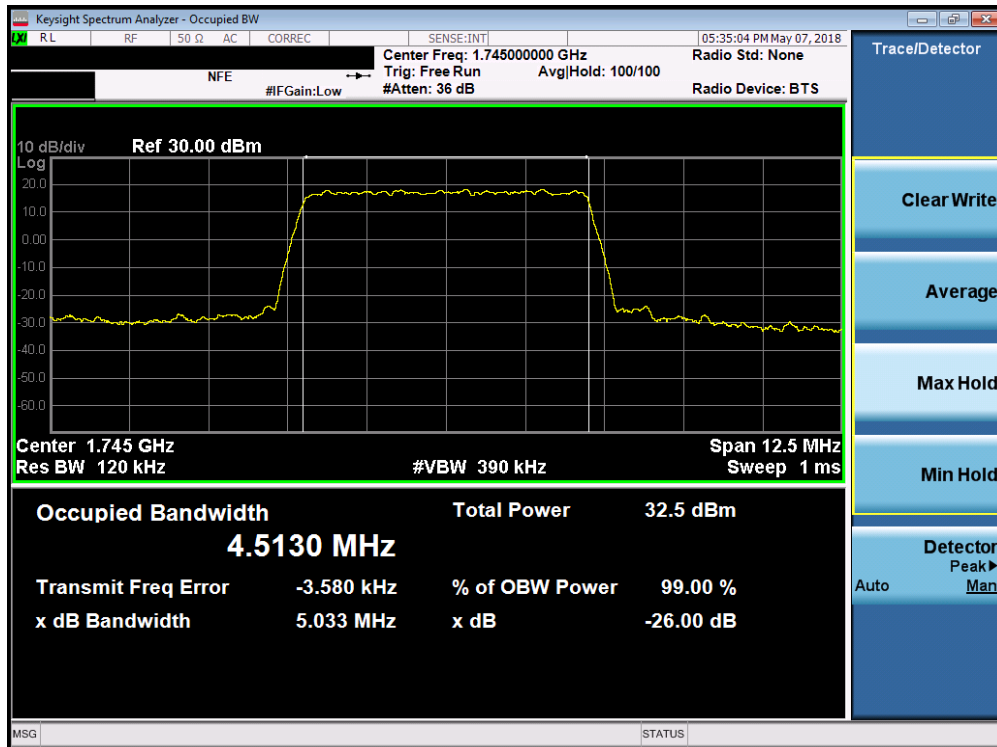


Plot 7-38. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

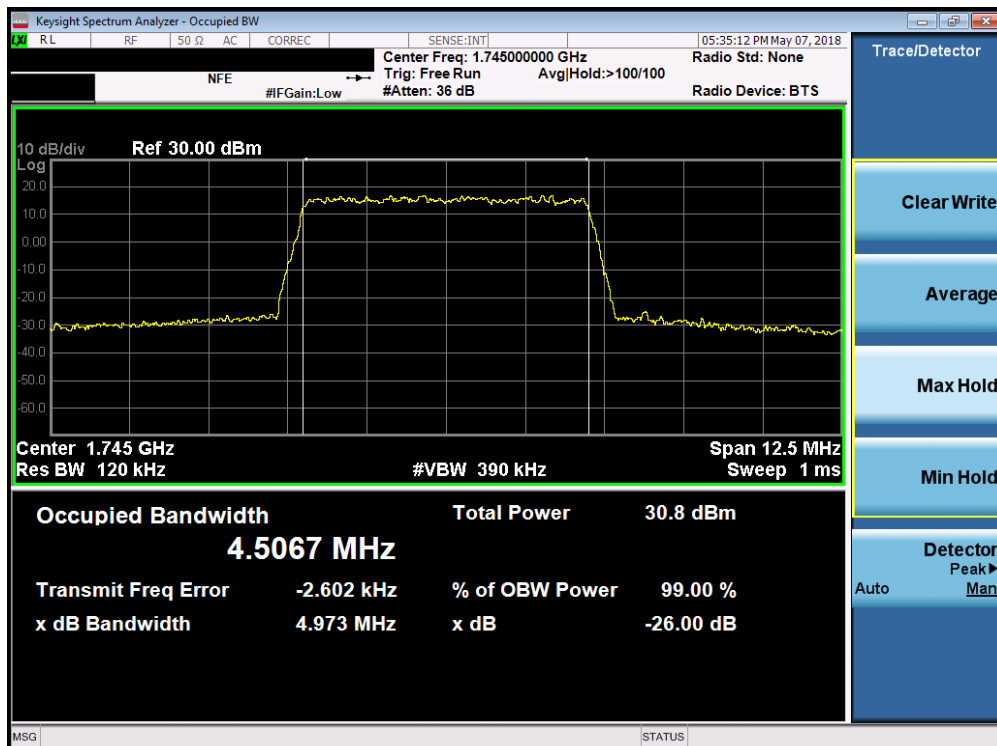


Plot 7-39. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 35 of 261

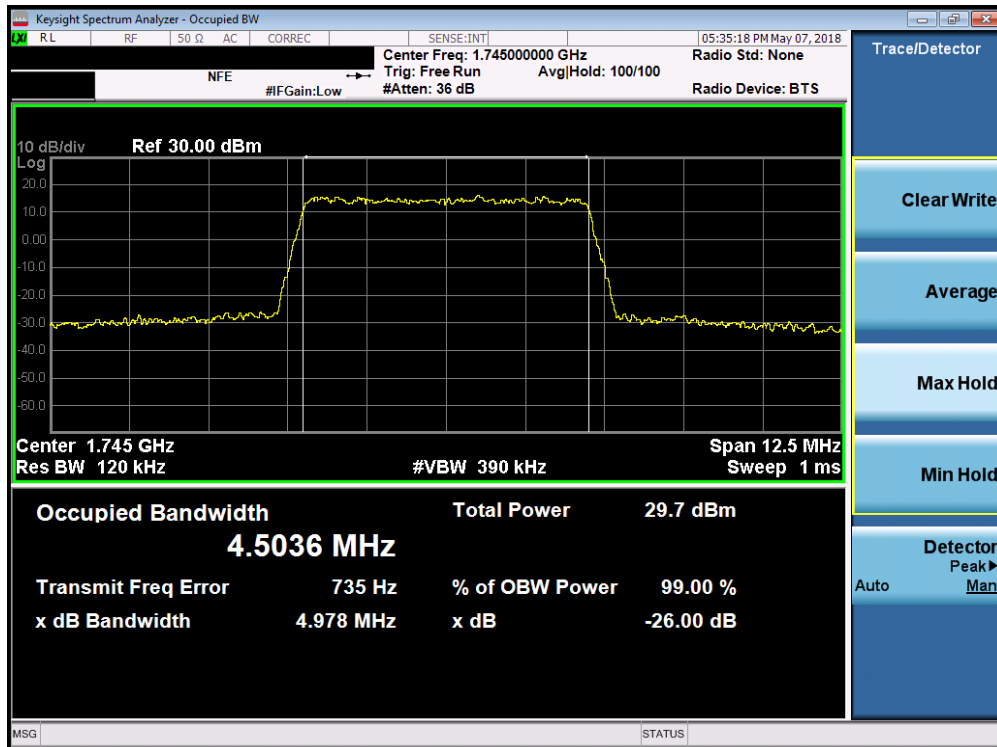


Plot 7-40. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)

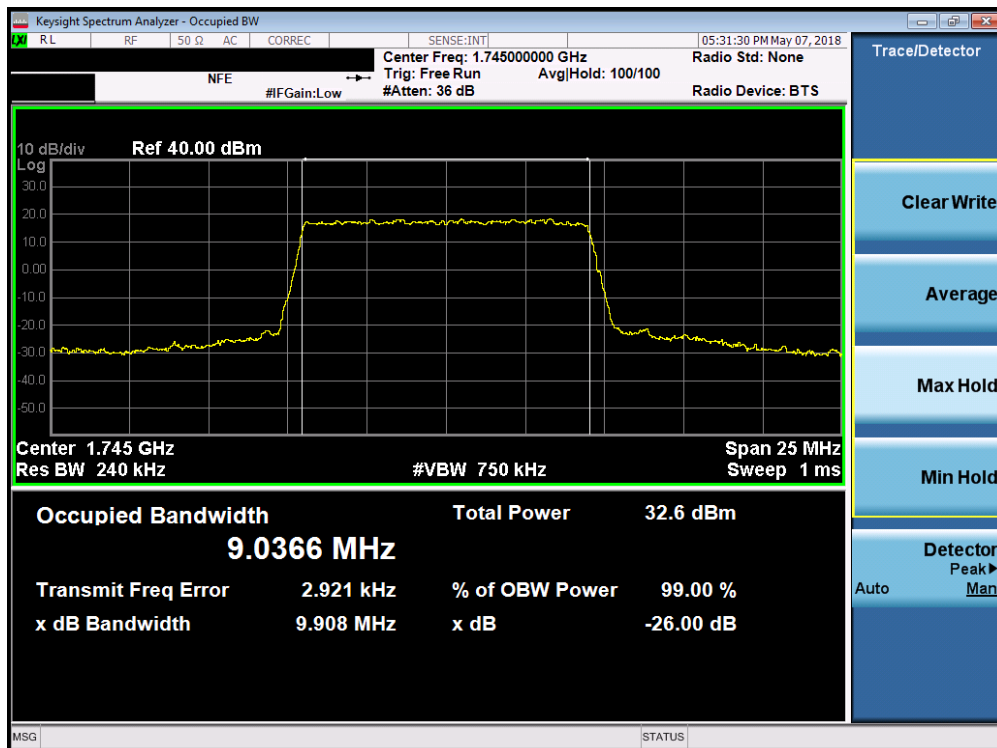


Plot 7-41. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 36 of 261

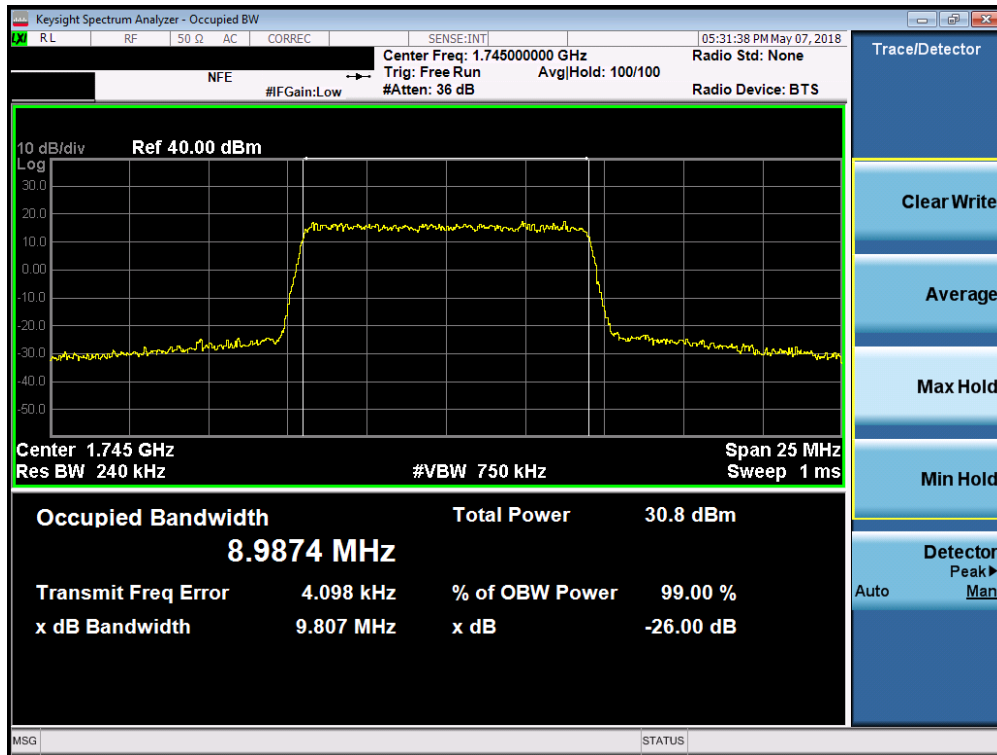


Plot 7-42. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 64-QAM - Full RB Configuration)

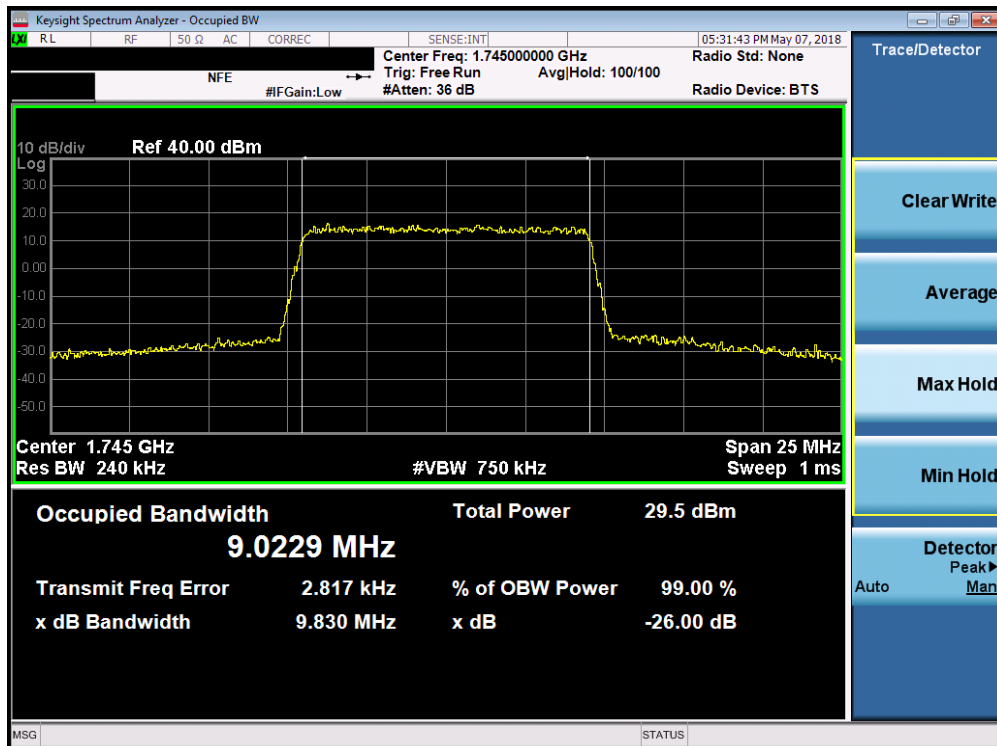


Plot 7-43. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 37 of 261

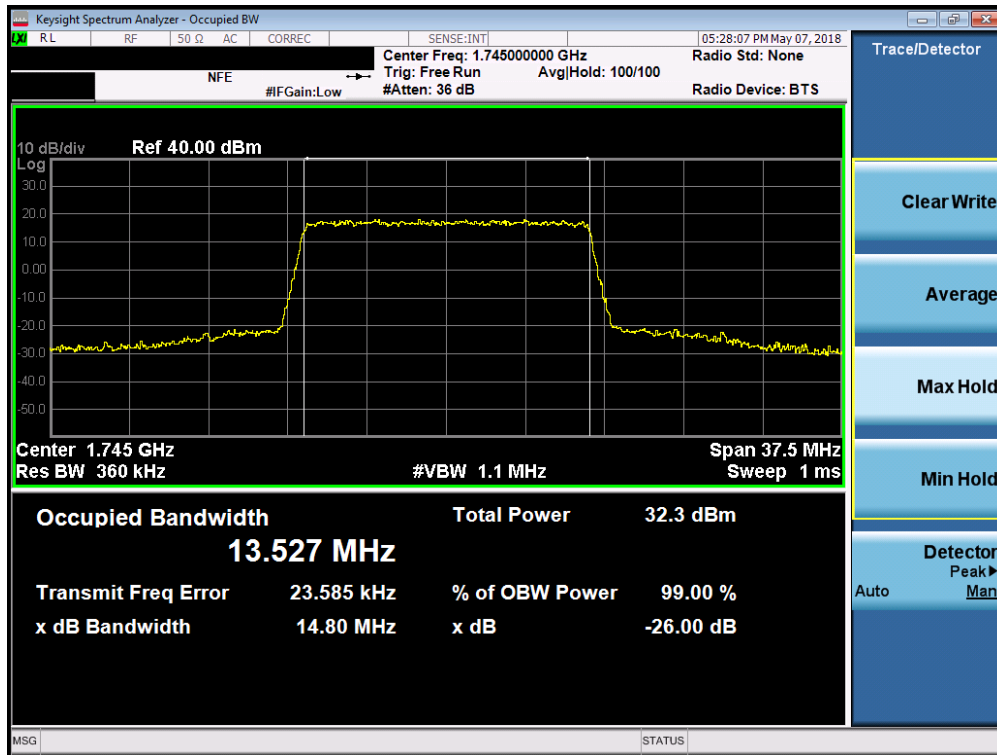


Plot 7-44. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

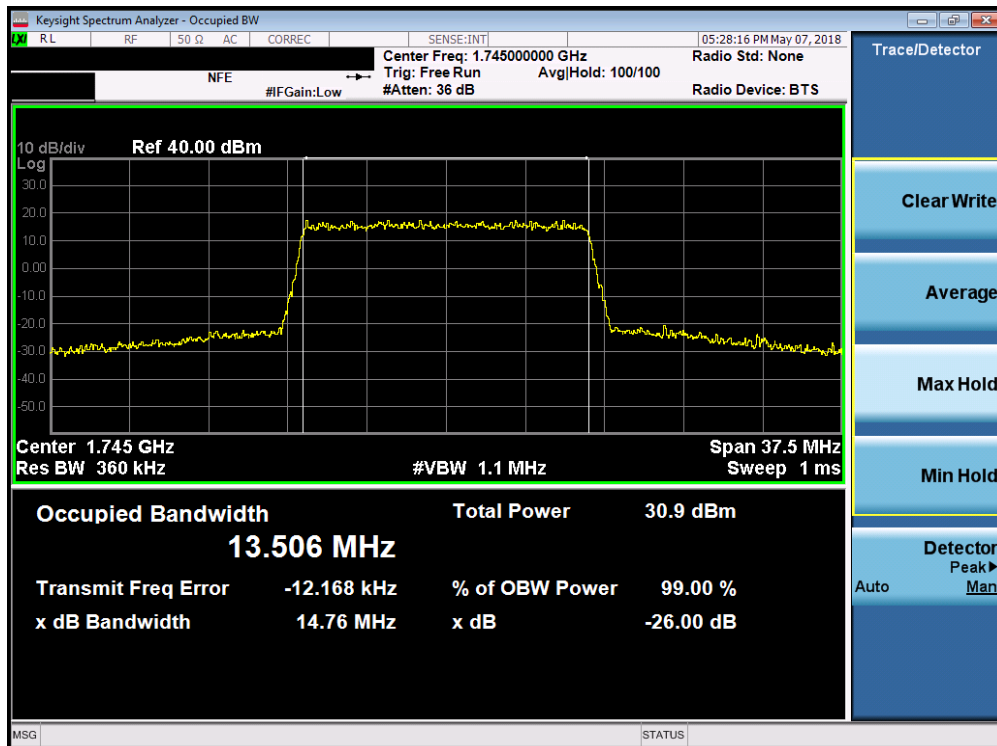


Plot 7-45. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 38 of 261

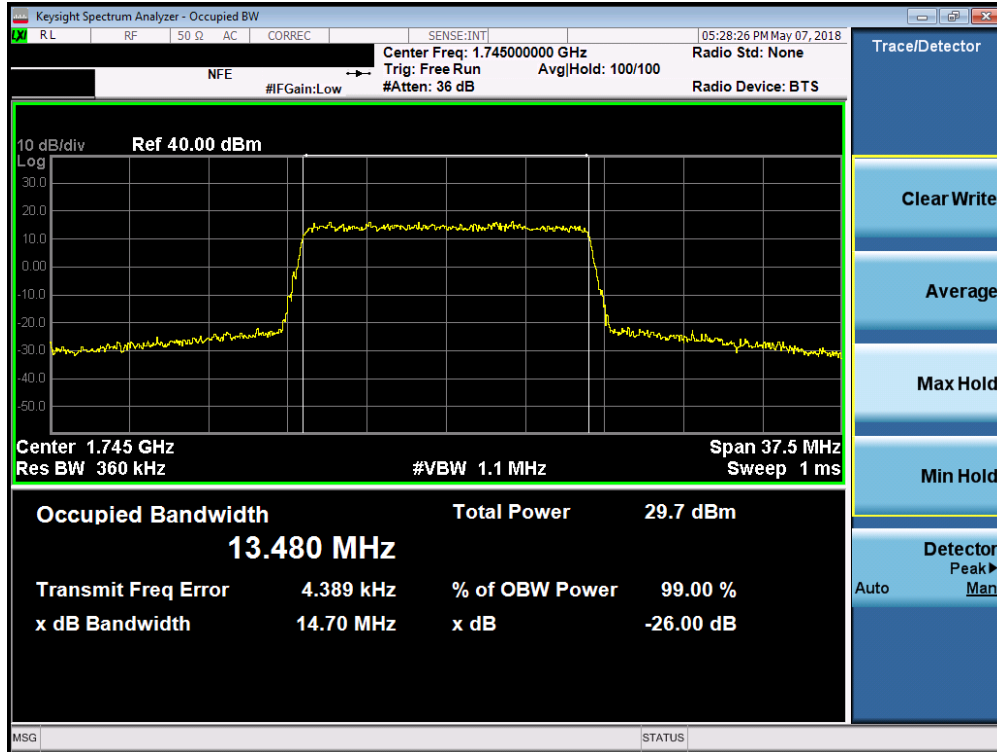


Plot 7-46. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)

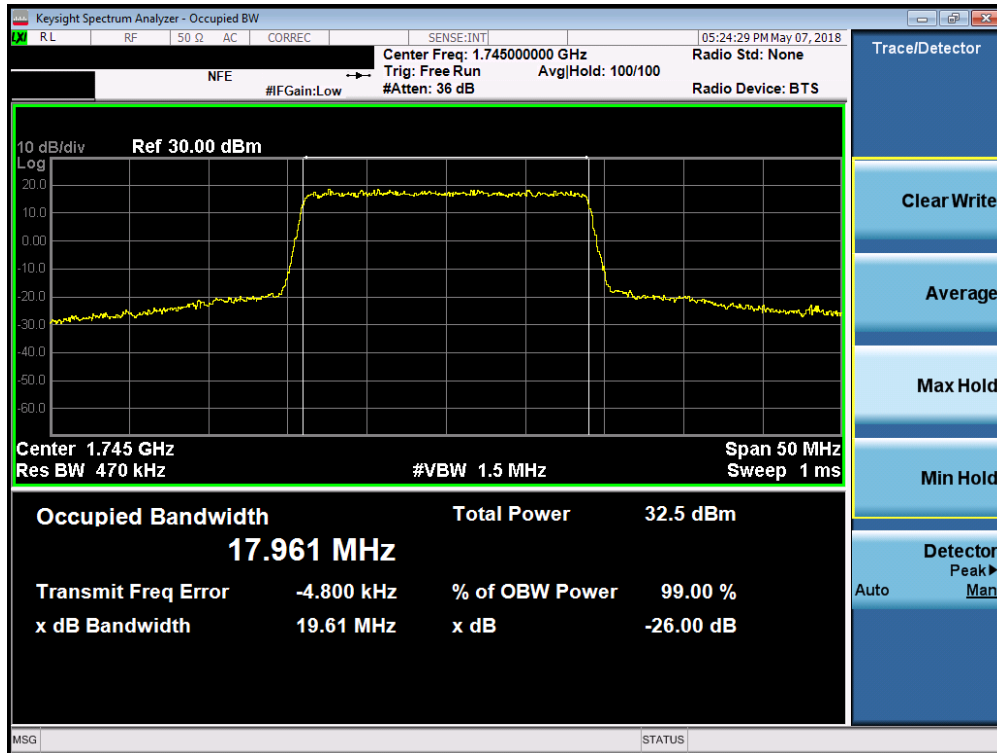


Plot 7-47. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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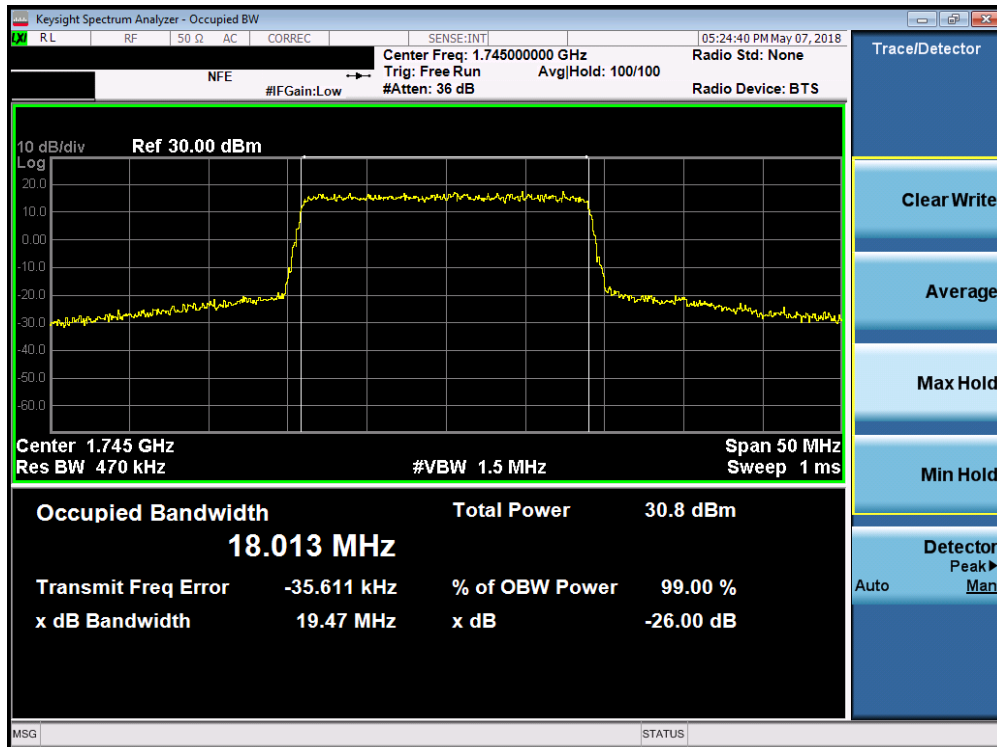


Plot 7-48. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 64-QAM - Full RB Configuration)

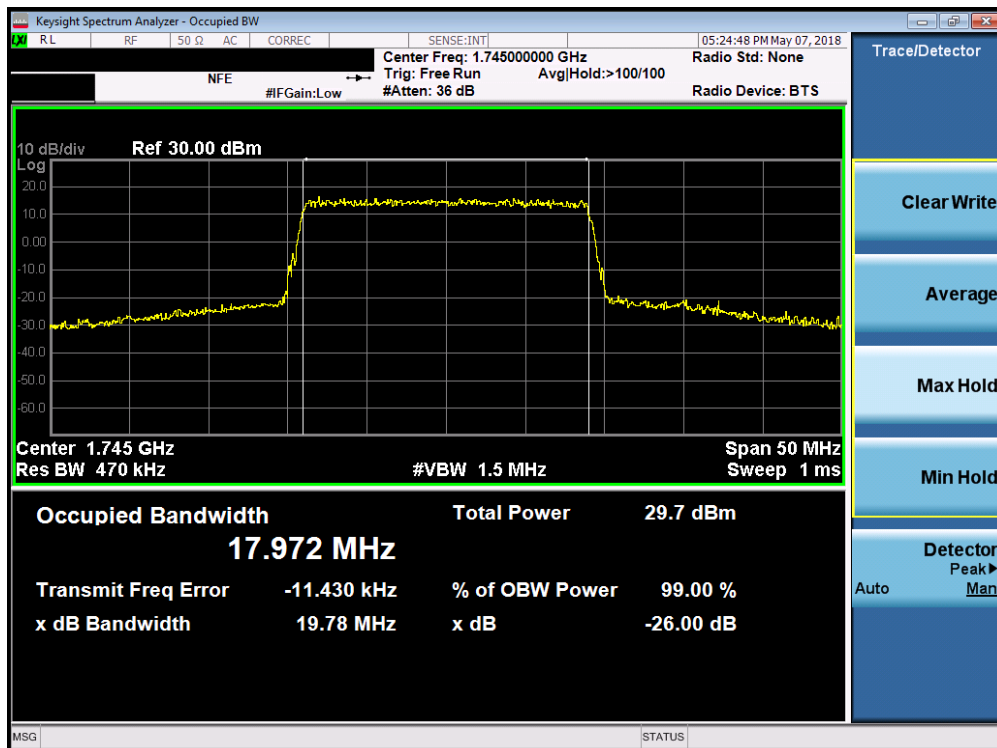


Plot 7-49. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 40 of 261



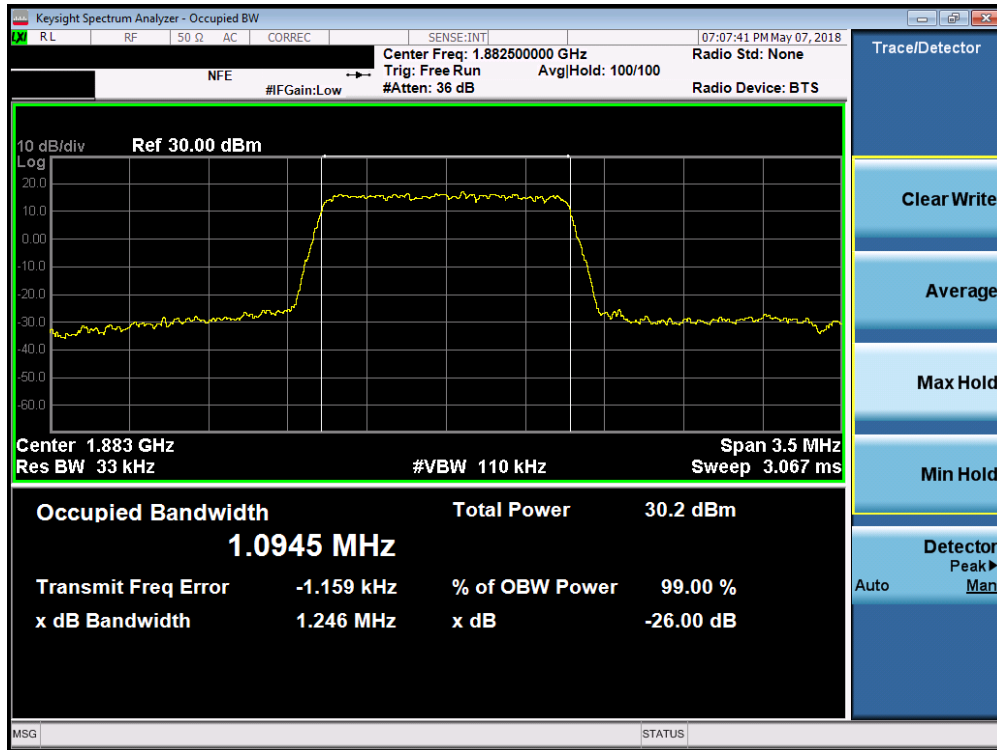
Plot 7-50. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)



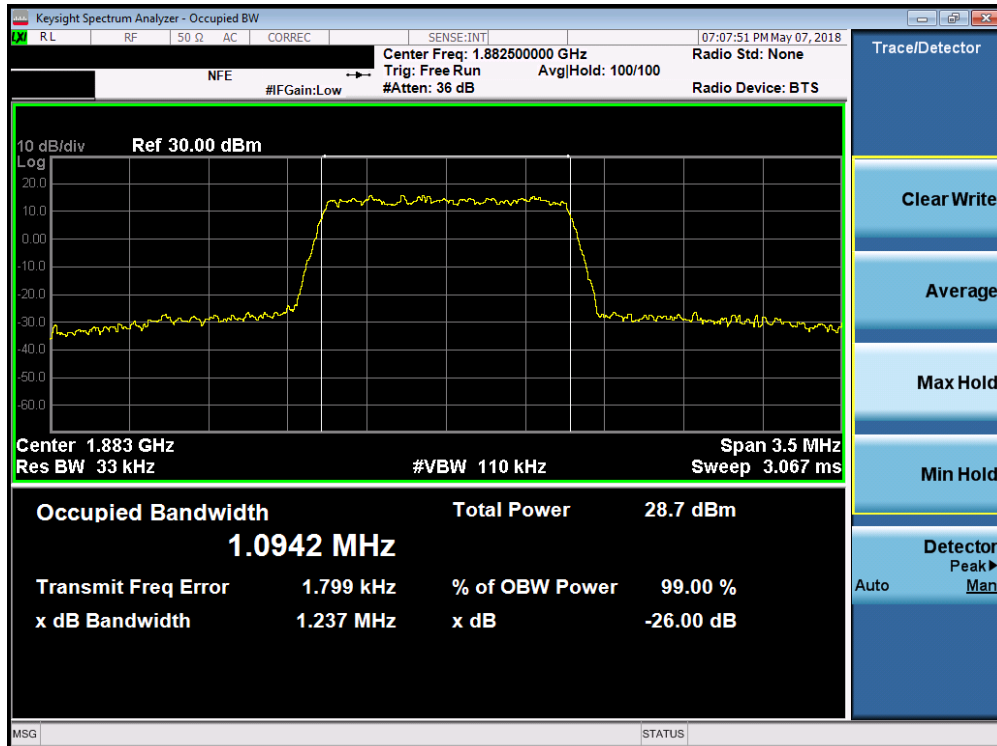
Plot 7-51. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 41 of 261

Band 25/2

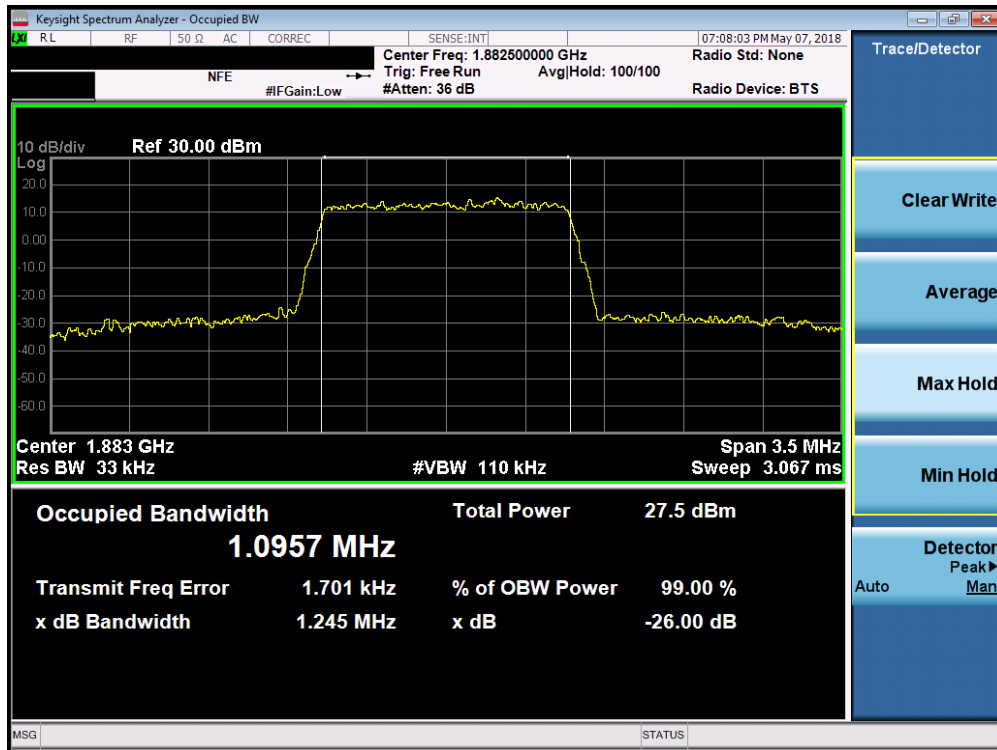


Plot 7-52. Occupied Bandwidth Plot (Band 25/2 - 1.4MHz QPSK - Full RB Configuration)

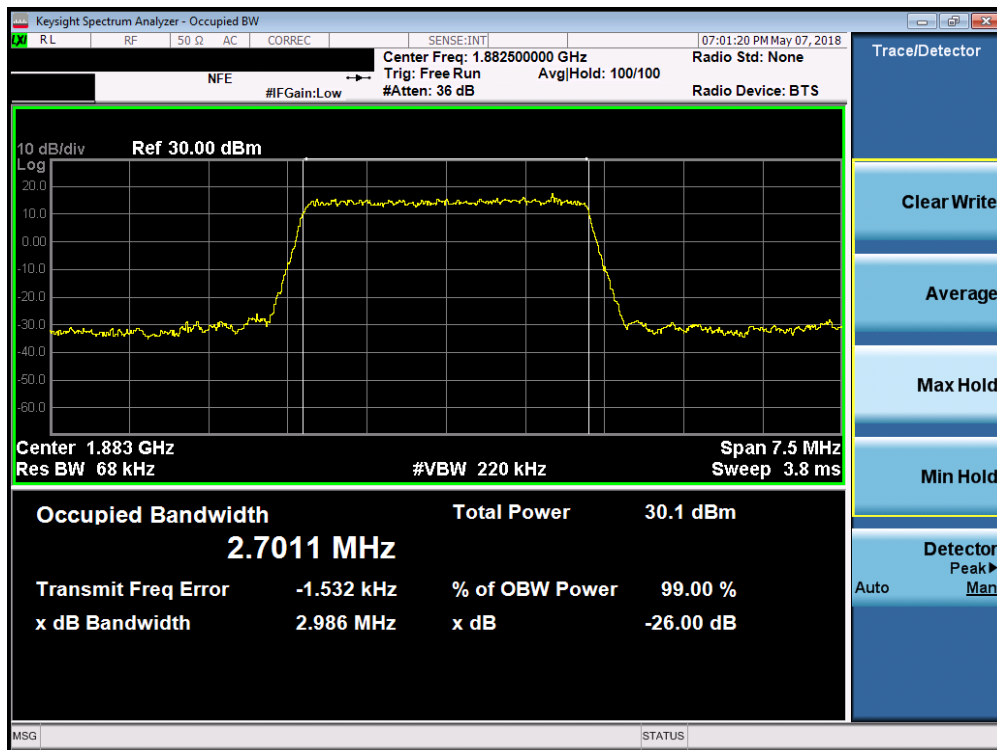


Plot 7-53. Occupied Bandwidth Plot (Band 25/2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset	Page 42 of 261	

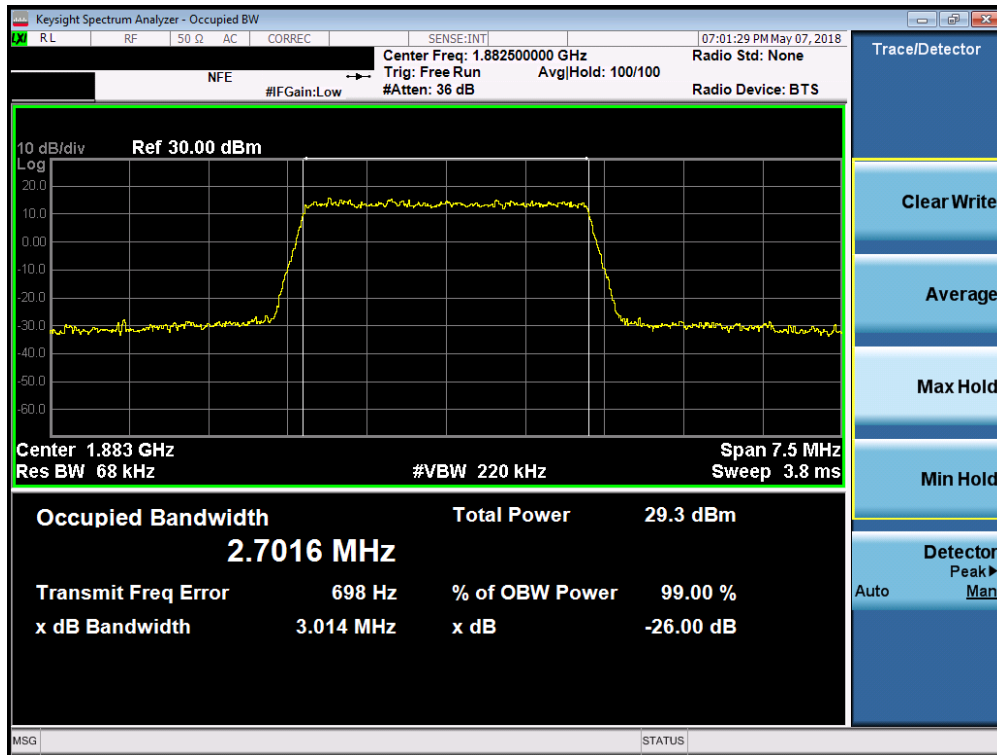


Plot 7-54. Occupied Bandwidth Plot (Band 25/2 - 1.4MHz 64-QAM - Full RB Configuration)

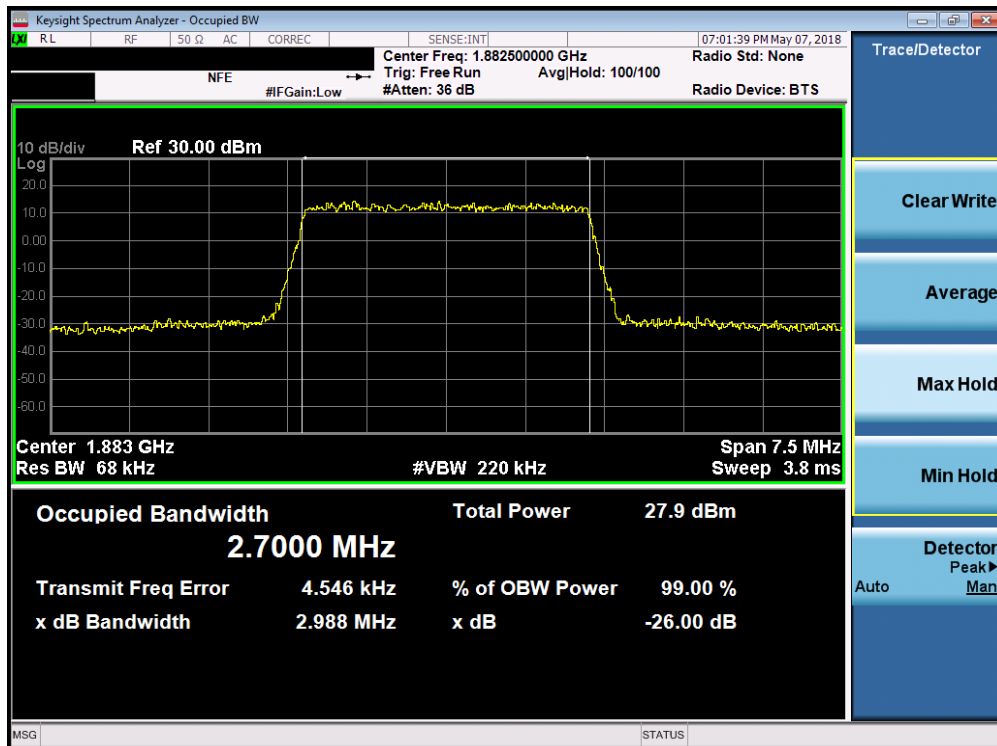


Plot 7-55. Occupied Bandwidth Plot (Band 25/2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 43 of 261

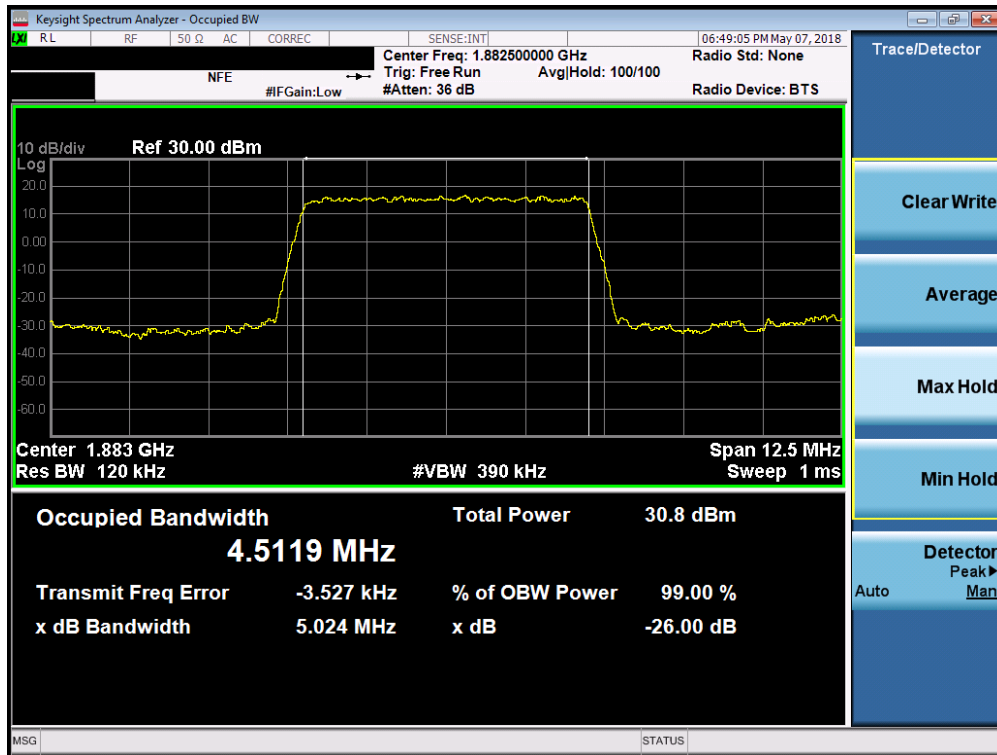


Plot 7-56. Occupied Bandwidth Plot (Band 25/2 - 3.0MHz 16-QAM - Full RB Configuration)

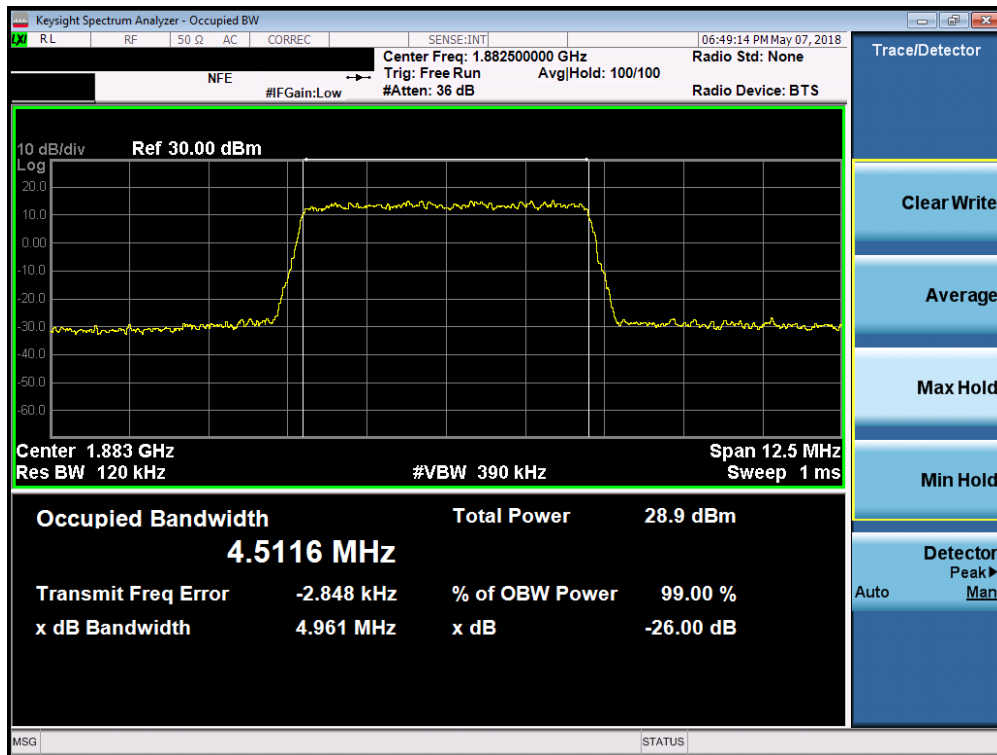


Plot 7-57. Occupied Bandwidth Plot (Band 25/2 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 44 of 261

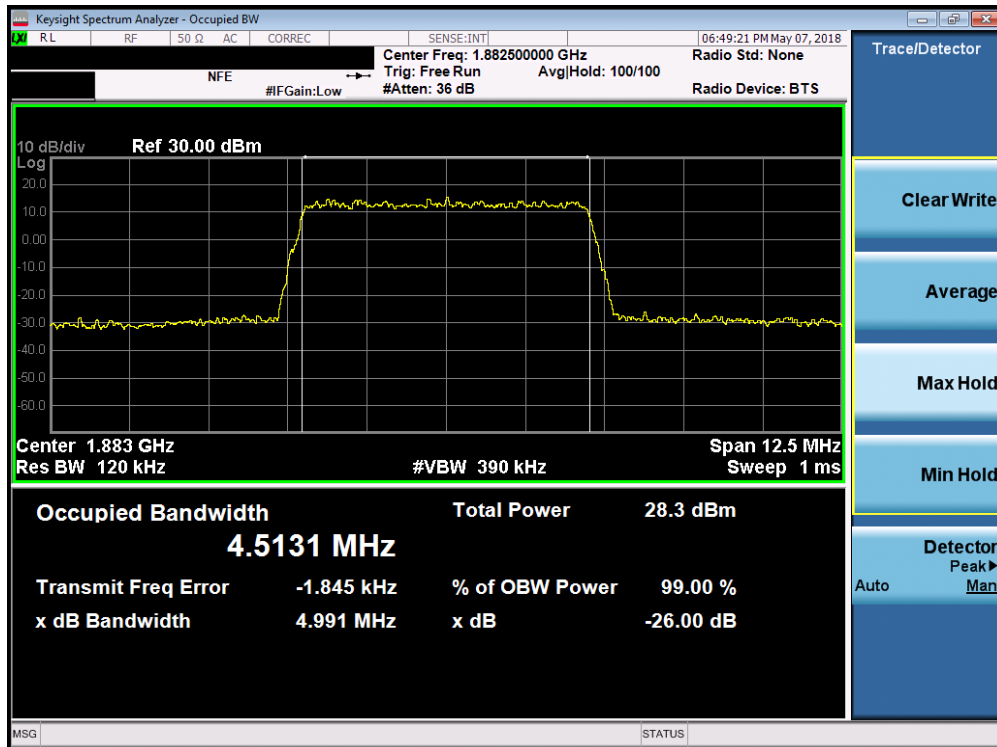


Plot 7-58. Occupied Bandwidth Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)

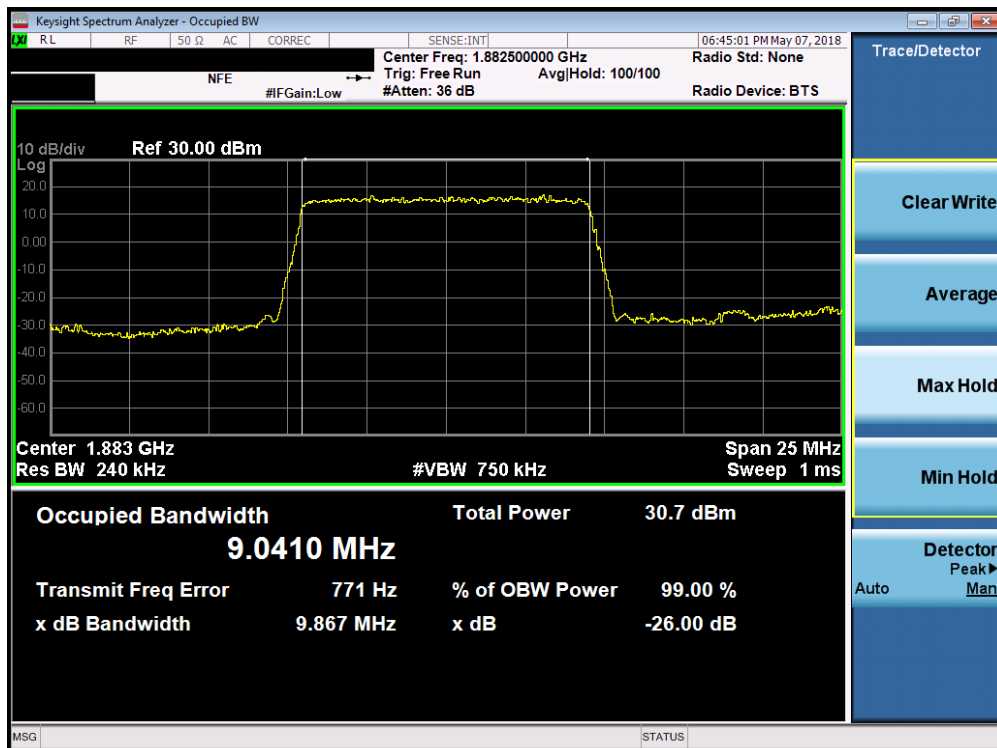


Plot 7-59. Occupied Bandwidth Plot (Band 25/2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 45 of 261

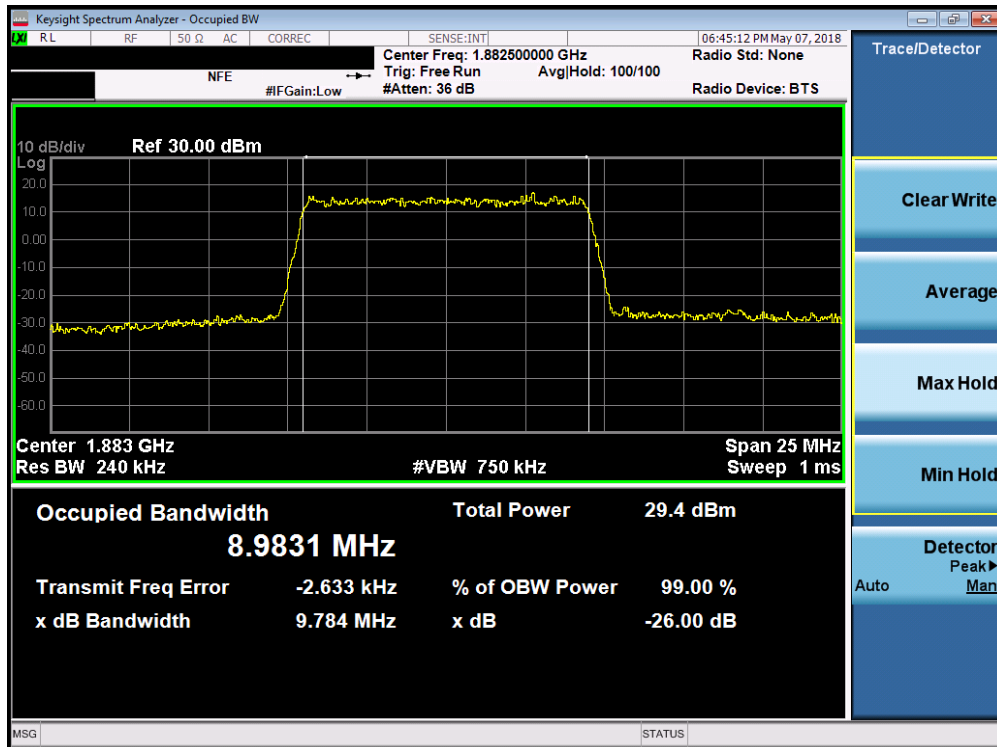


Plot 7-60. Occupied Bandwidth Plot (Band 25/2 - 5.0MHz 64-QAM - Full RB Configuration)

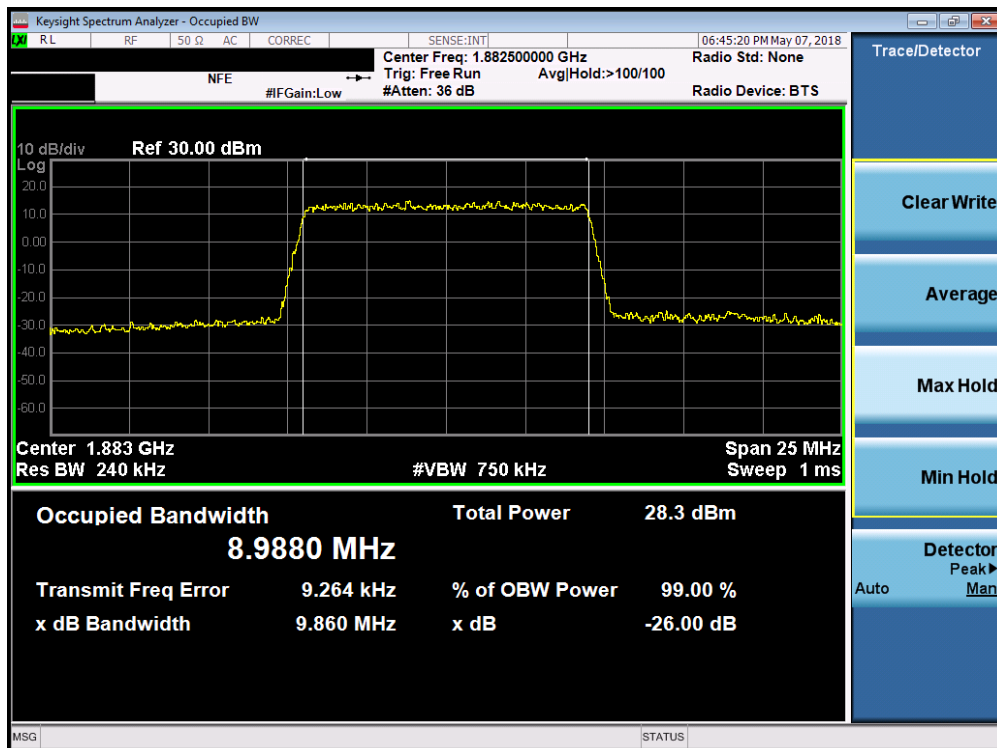


Plot 7-61. Occupied Bandwidth Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 46 of 261

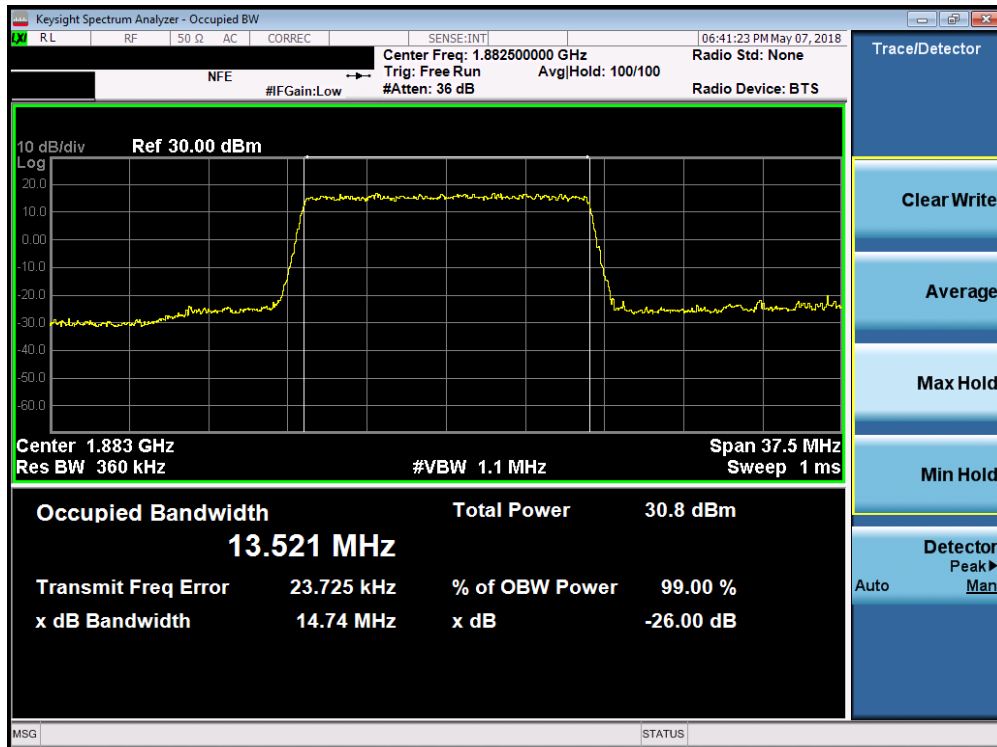


Plot 7-62. Occupied Bandwidth Plot (Band 25/2 - 10.0MHz 16-QAM - Full RB Configuration)

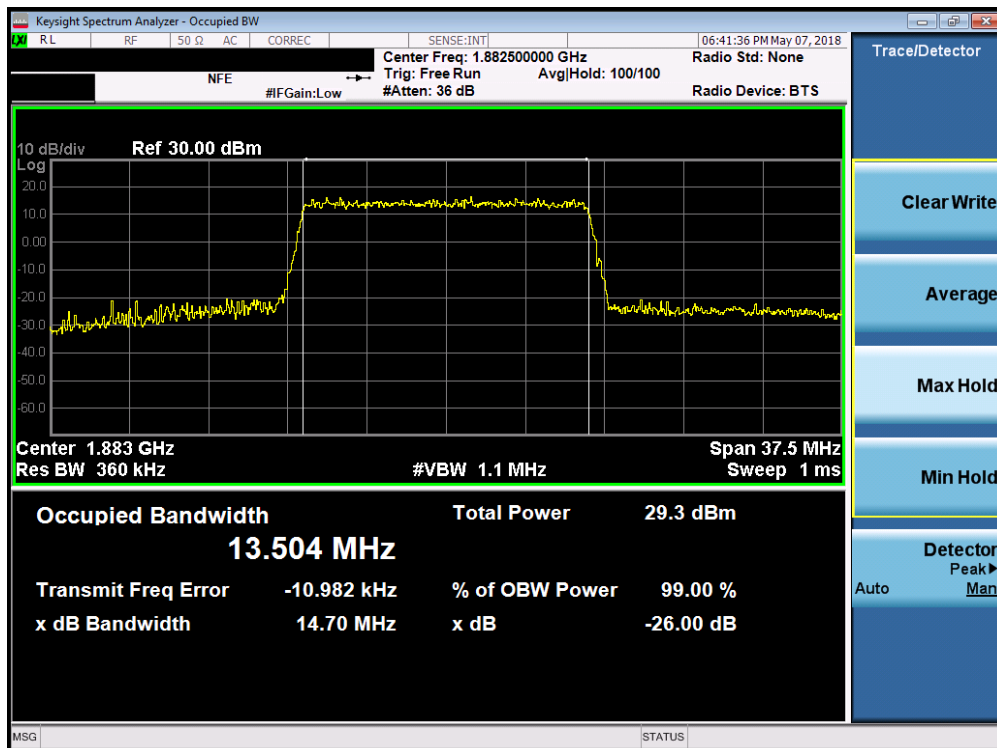


Plot 7-63. Occupied Bandwidth Plot (Band 25/2 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 47 of 261

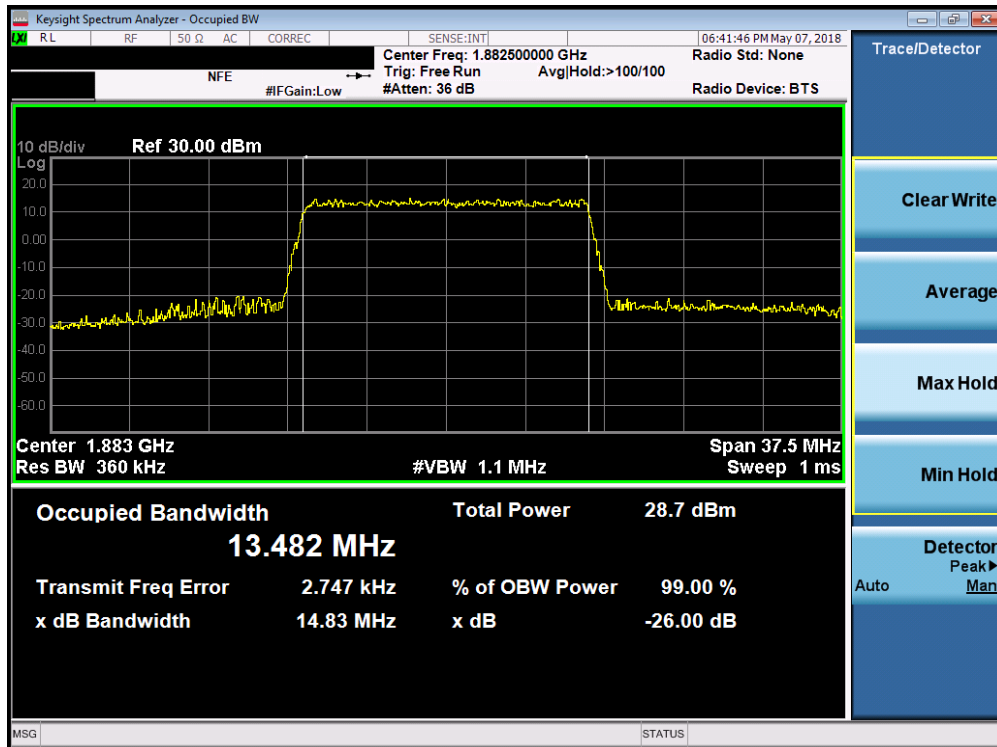


Plot 7-64. Occupied Bandwidth Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)

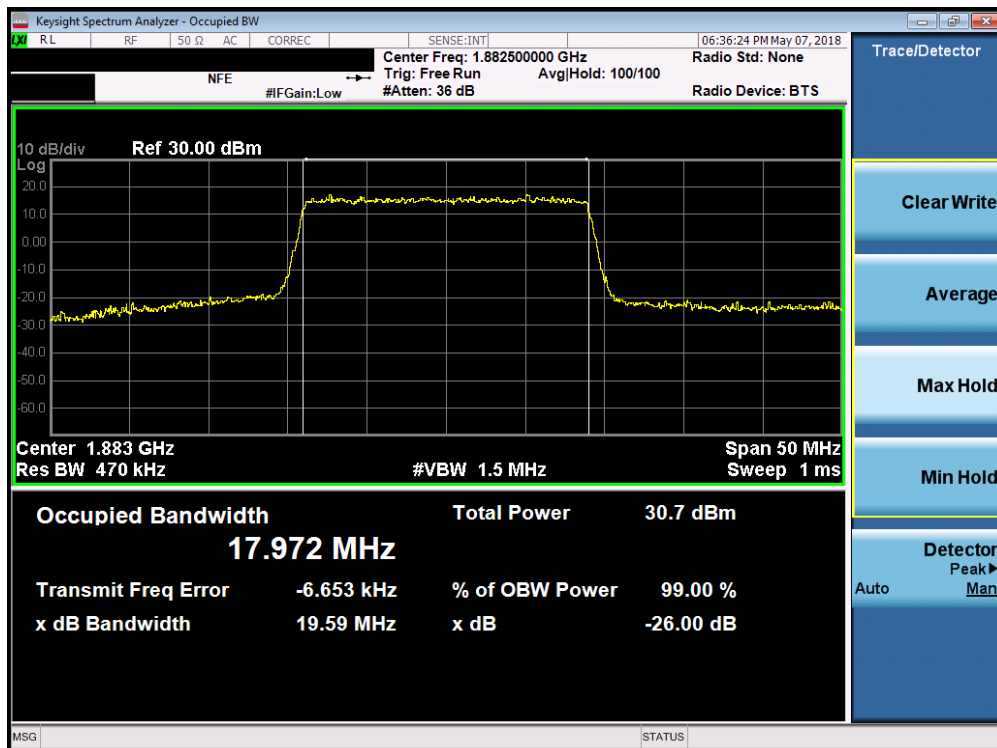


Plot 7-65. Occupied Bandwidth Plot (Band 25/2 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 48 of 261

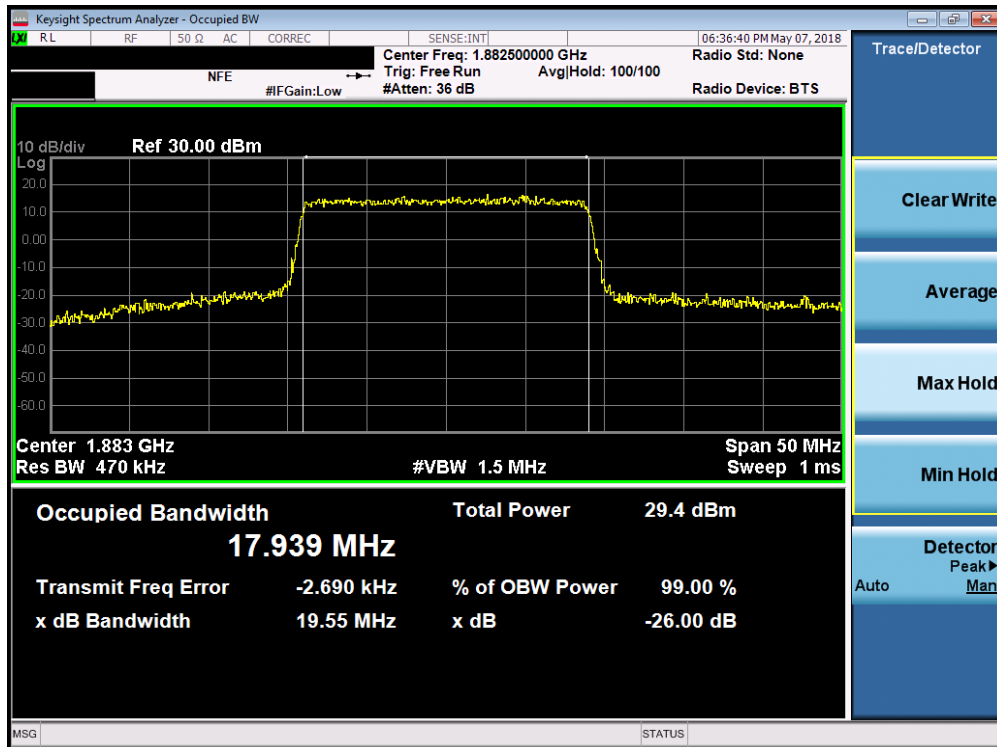


Plot 7-66. Occupied Bandwidth Plot (Band 25/2 - 15.0MHz 64-QAM - Full RB Configuration)

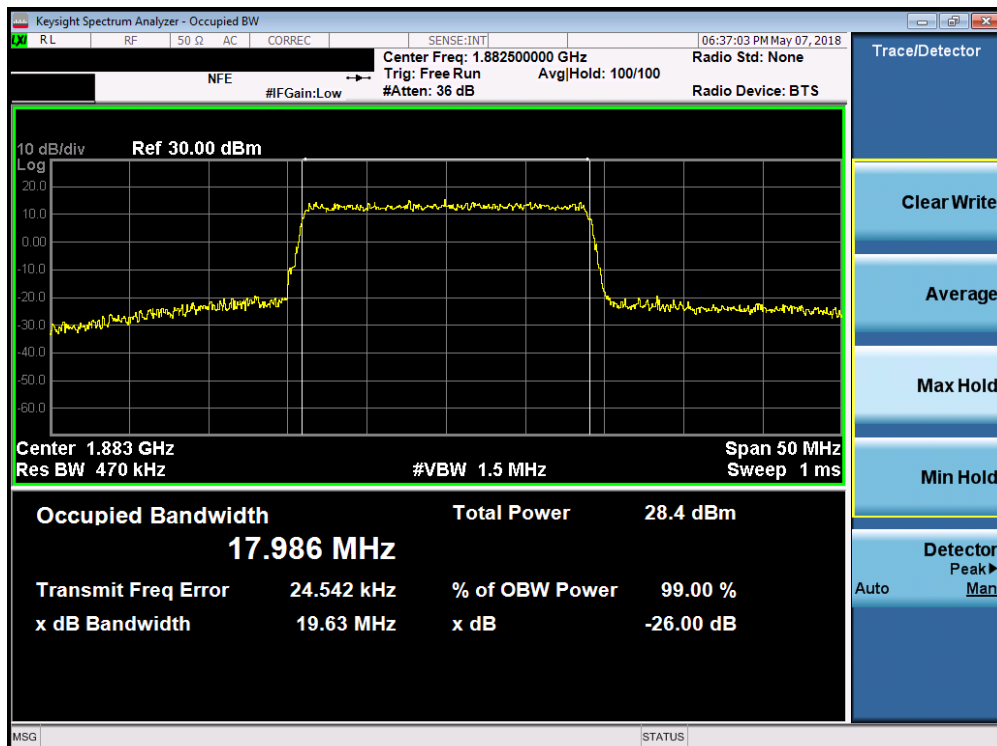


Plot 7-67. Occupied Bandwidth Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 49 of 261



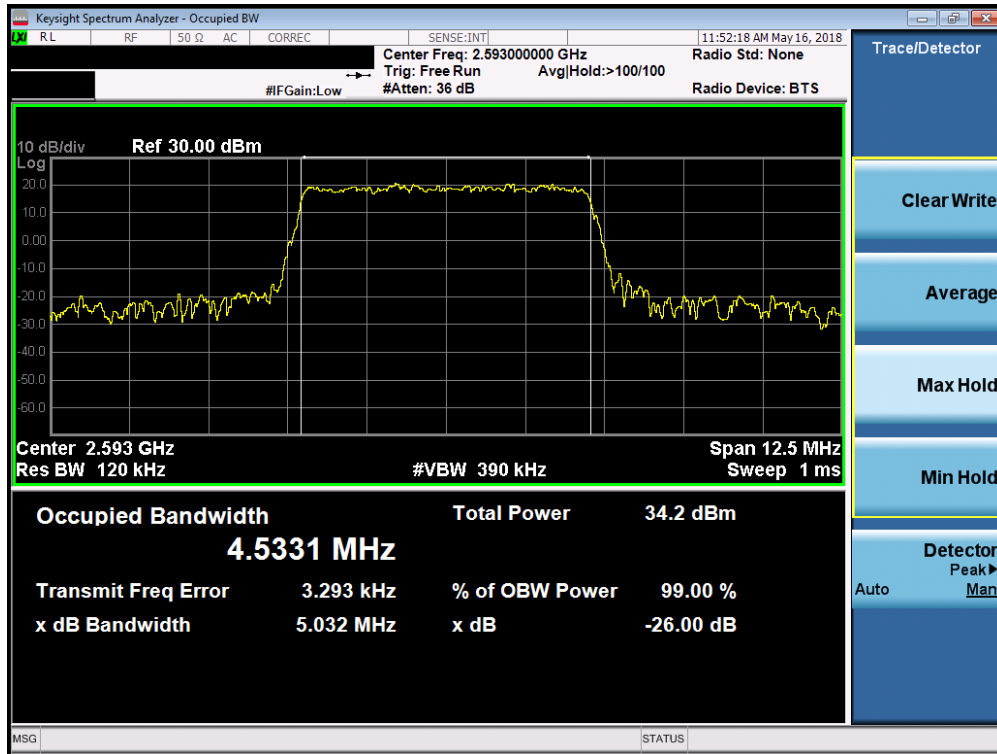
Plot 7-68. Occupied Bandwidth Plot (Band 25/2 - 20.0MHz 16-QAM - Full RB Configuration)



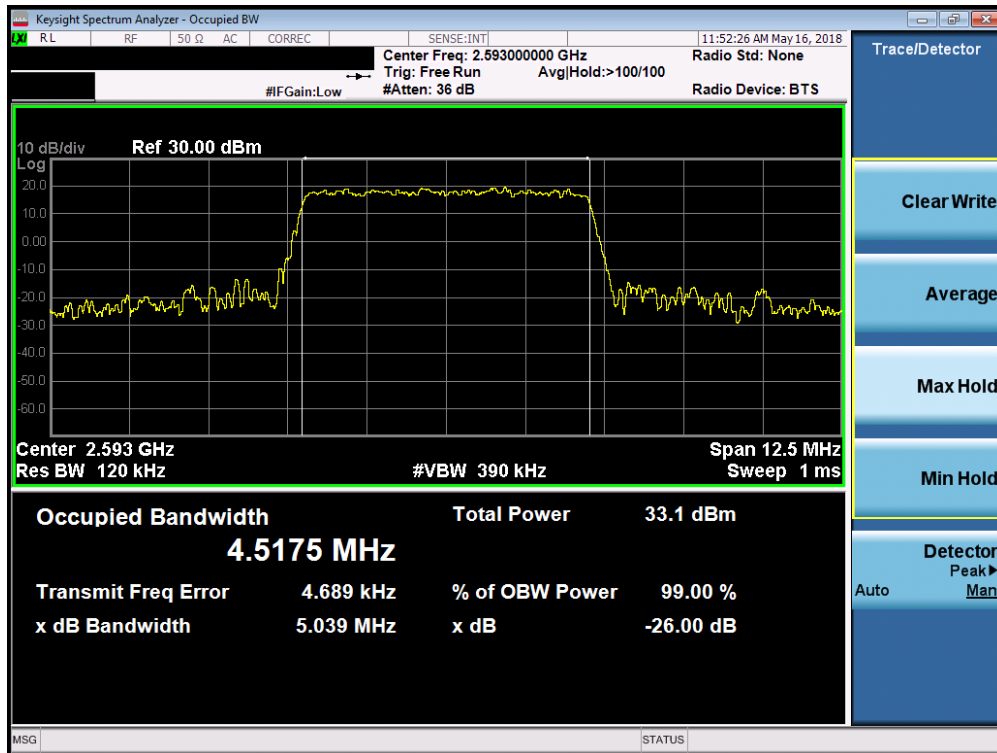
Plot 7-69. Occupied Bandwidth Plot (Band 25/2 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 50 of 261

Band 41 (PC2)

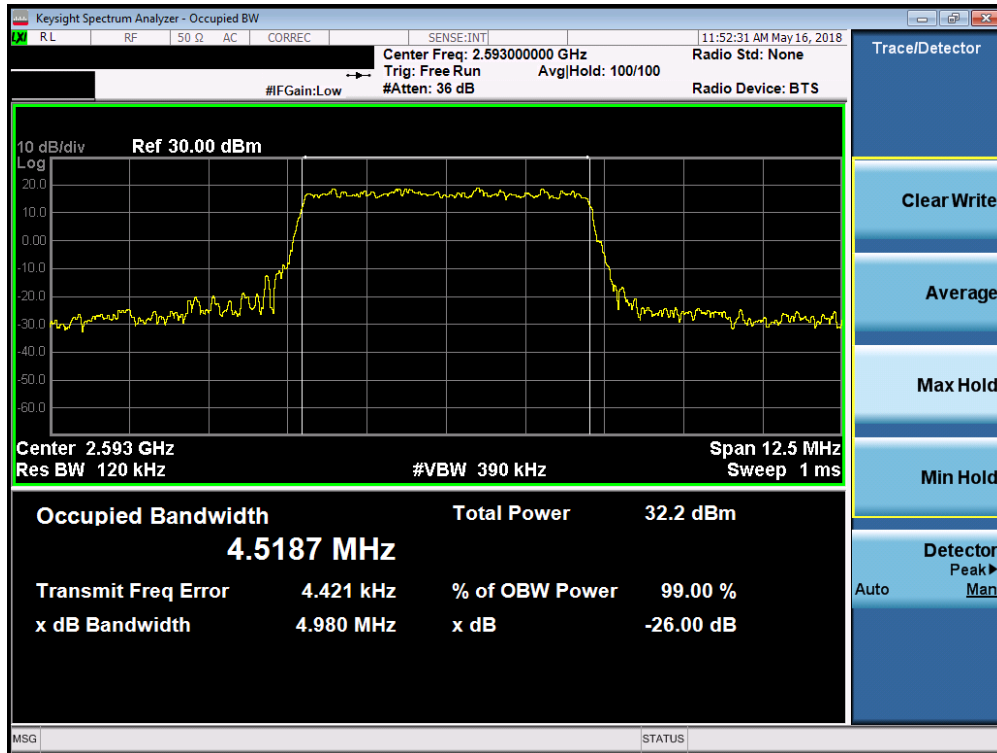


Plot 7-70. Occupied Bandwidth Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)

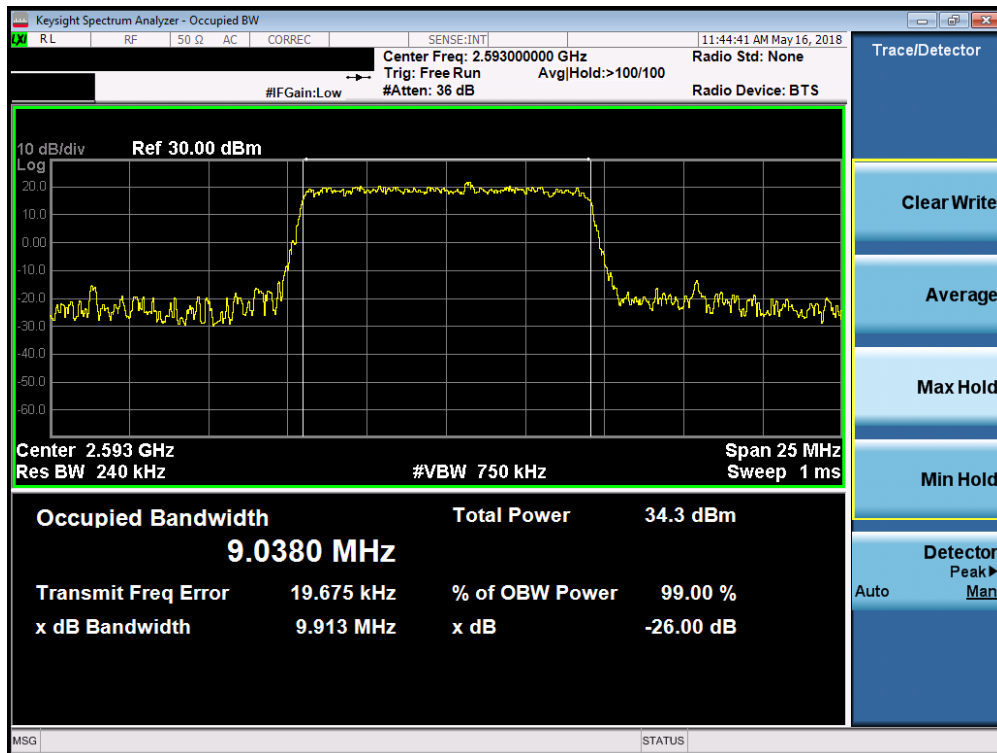


Plot 7-71. Occupied Bandwidth Plot (Band 41 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 51 of 261

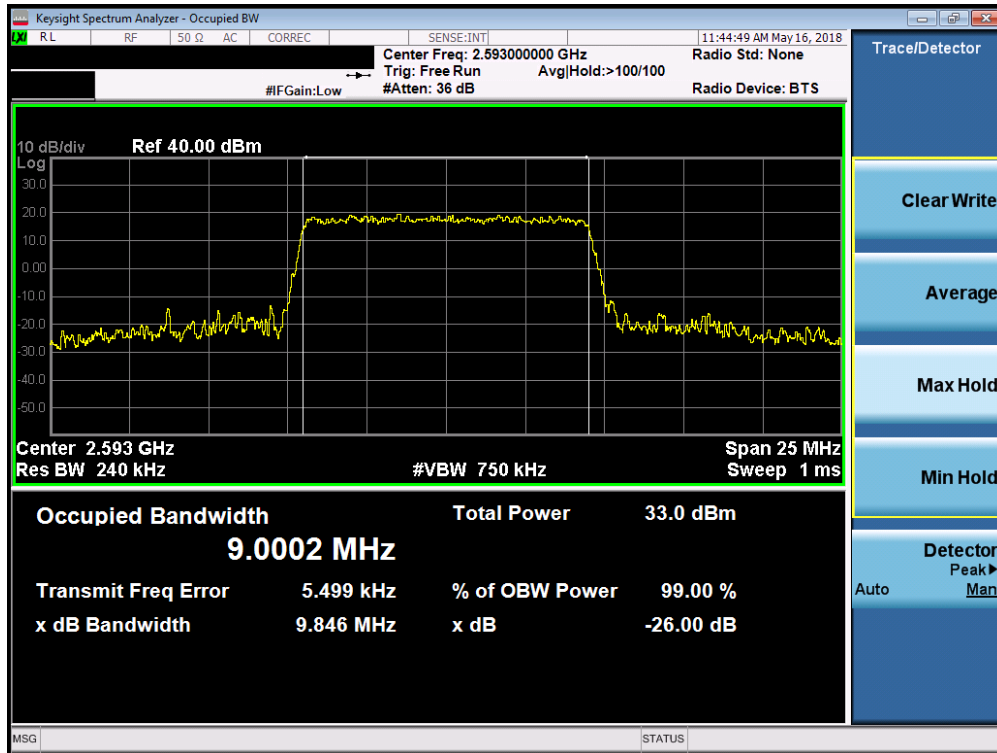


Plot 7-72. Occupied Bandwidth Plot (Band 41 - 5.0MHz 64-QAM - Full RB Configuration)

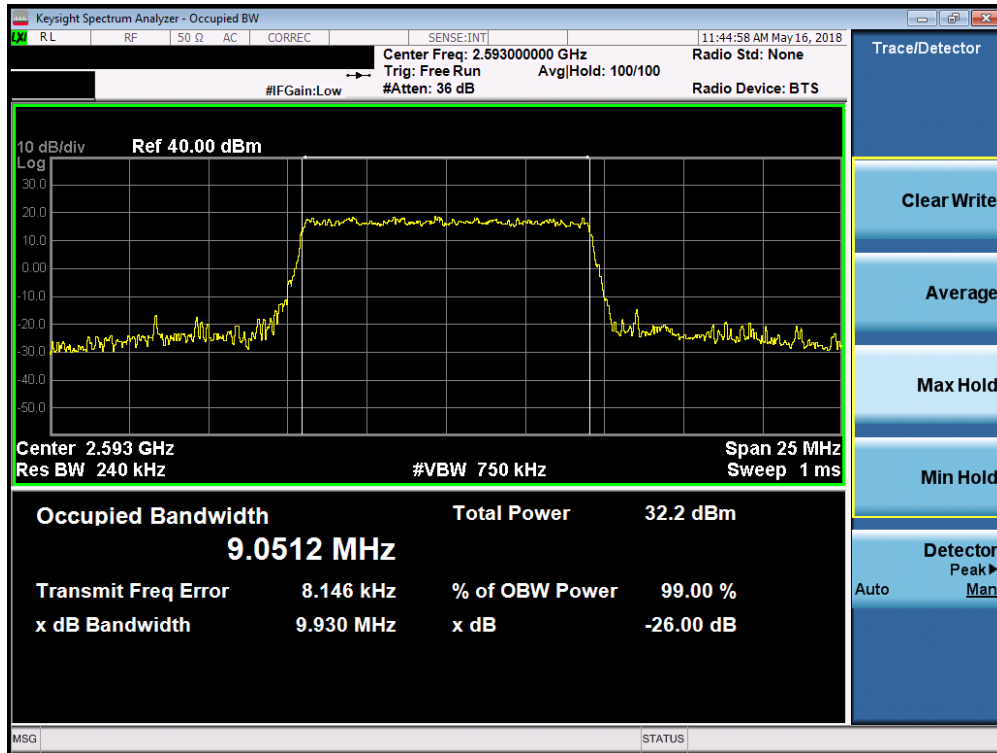


Plot 7-73. Occupied Bandwidth Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 52 of 261

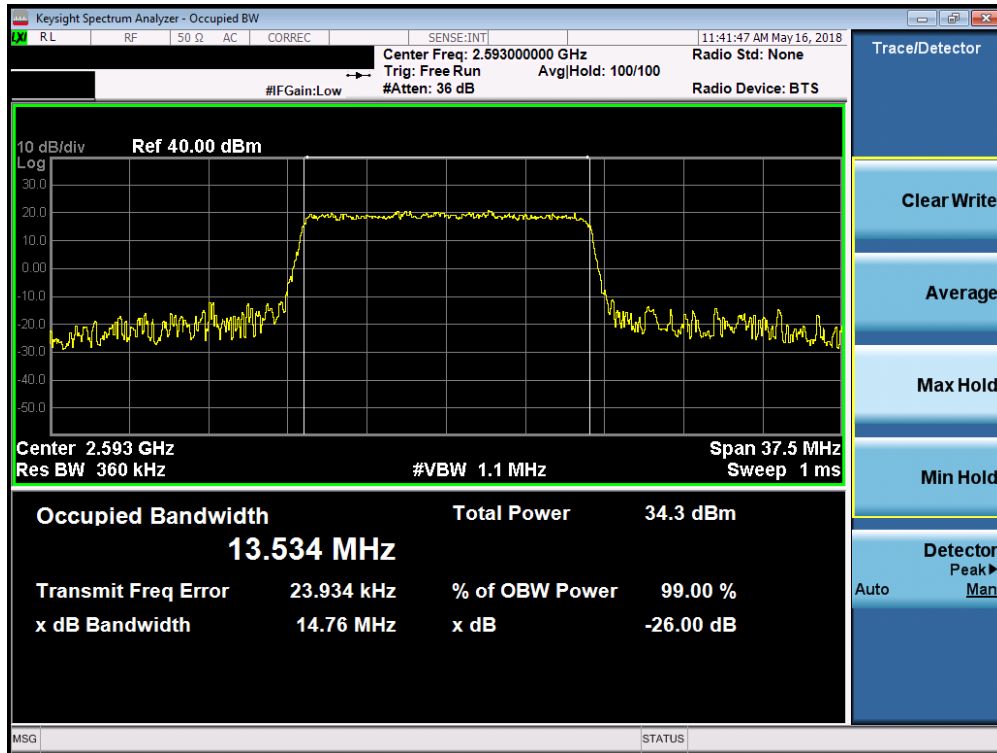


Plot 7-74. Occupied Bandwidth Plot (Band 41 - 10.0MHz 16-QAM - Full RB Configuration)

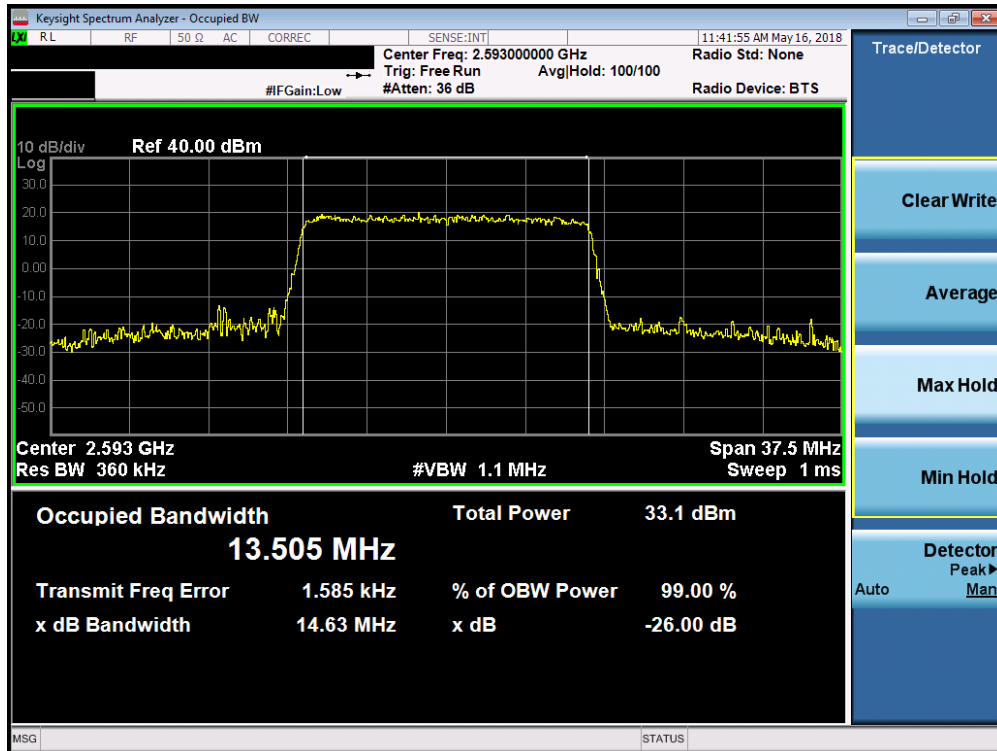


Plot 7-75. Occupied Bandwidth Plot (Band 41 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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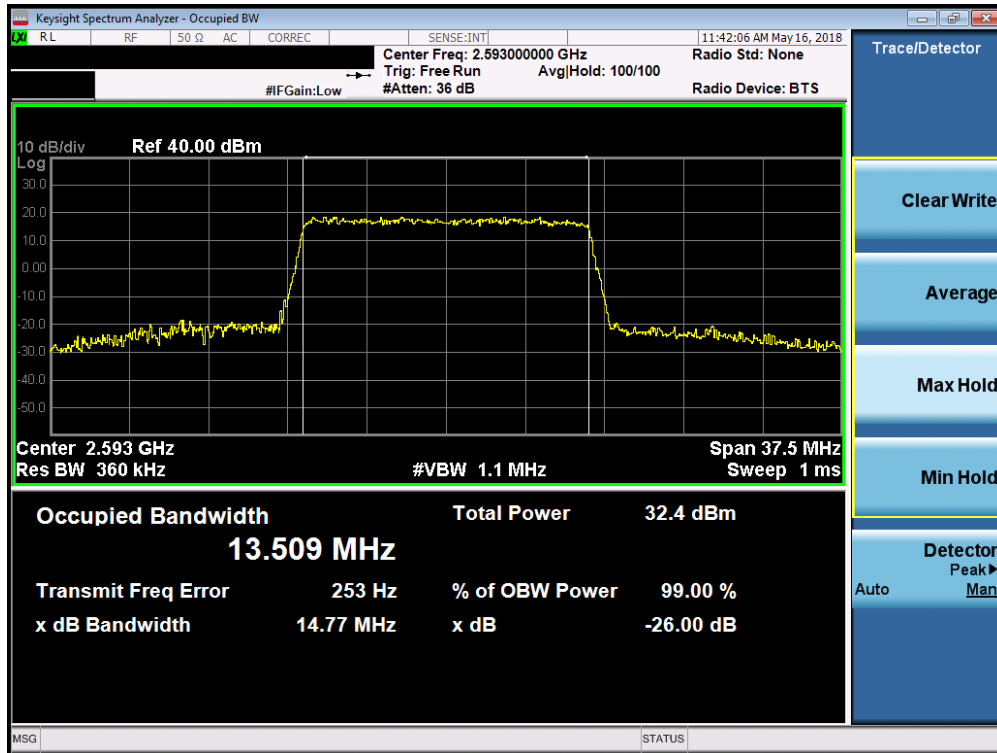


Plot 7-76. Occupied Bandwidth Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)

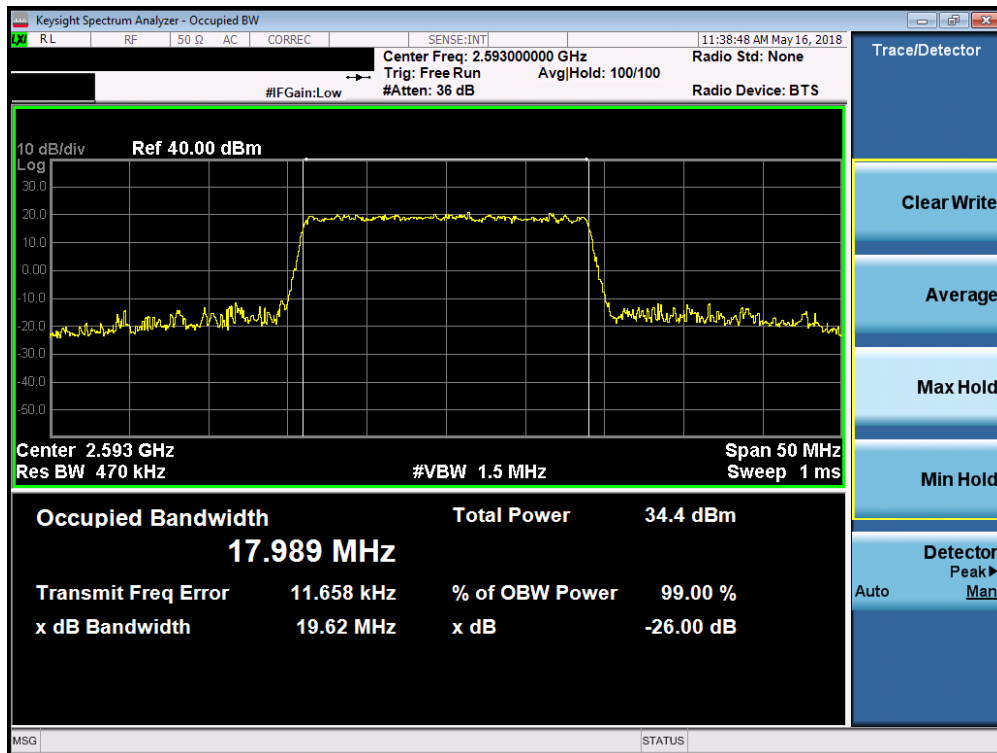


Plot 7-77. Occupied Bandwidth Plot (Band 41 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 54 of 261

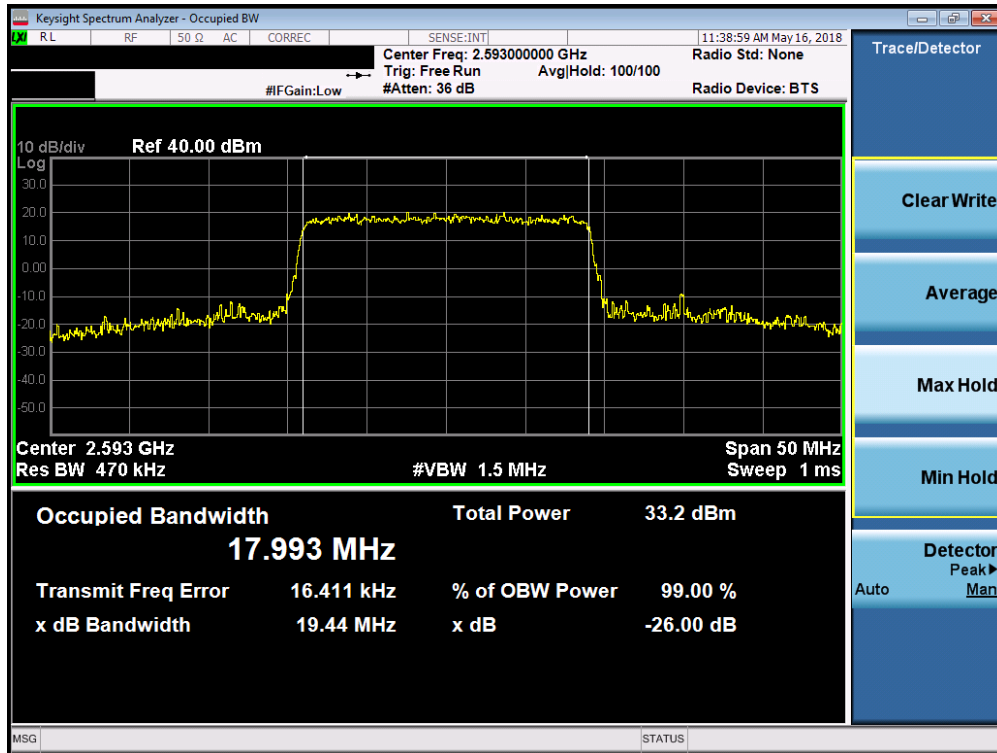


Plot 7-78. Occupied Bandwidth Plot (Band 41 - 15.0MHz 64-QAM - Full RB Configuration)

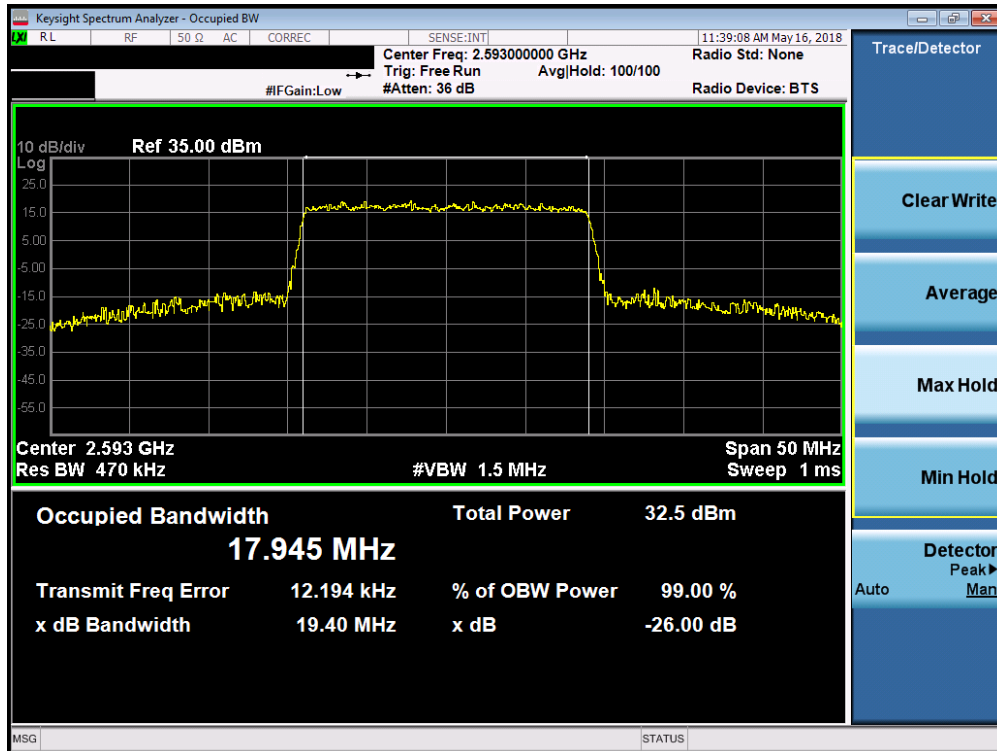


Plot 7-79. Occupied Bandwidth Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-80. Occupied Bandwidth Plot (Band 41 - 20.0MHz 16-QAM - Full RB Configuration)



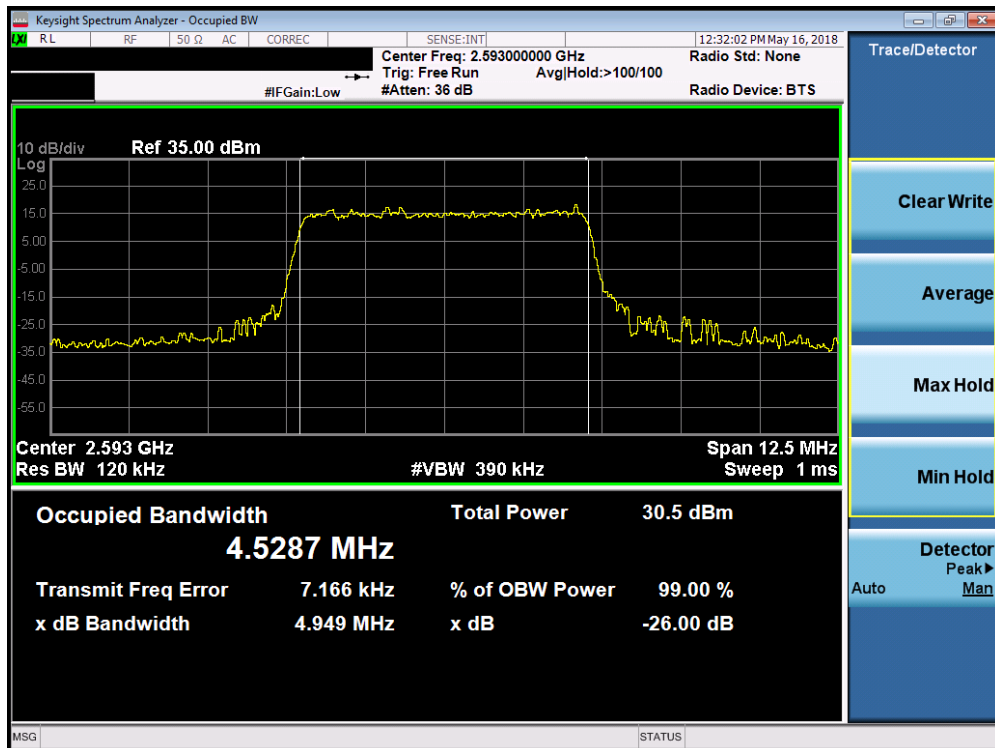
Plot 7-81. Occupied Bandwidth Plot (Band 41 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 56 of 261

Band 41 (PC3)



Plot 7-82. Occupied Bandwidth Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)

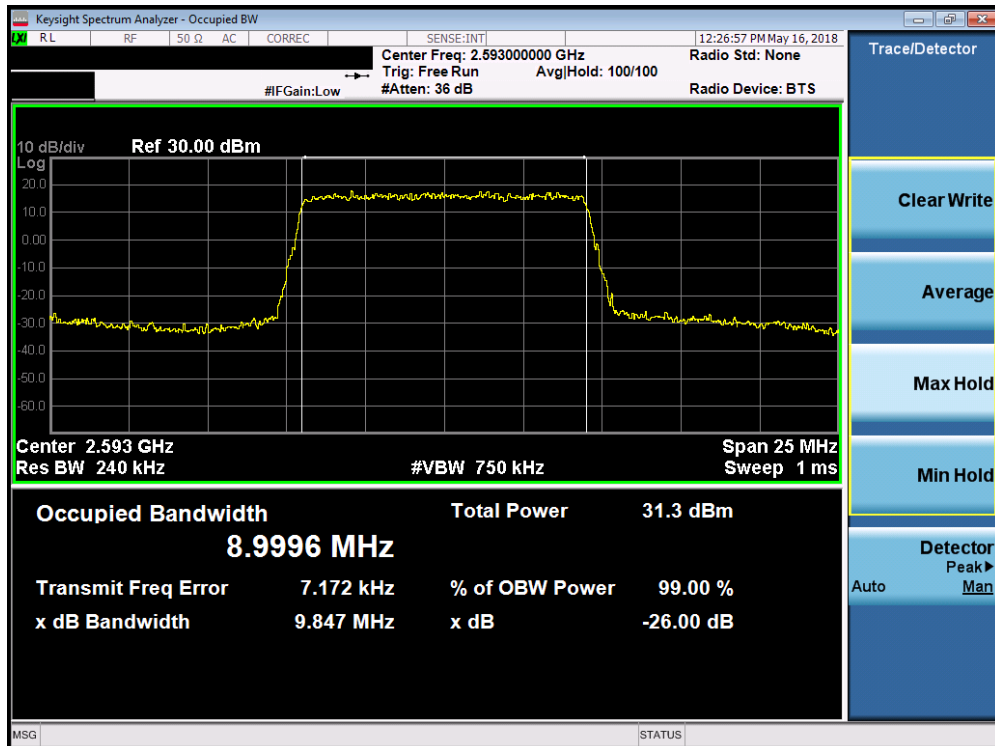


Plot 7-83. Occupied Bandwidth Plot (Band 41 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset	Page 57 of 261	

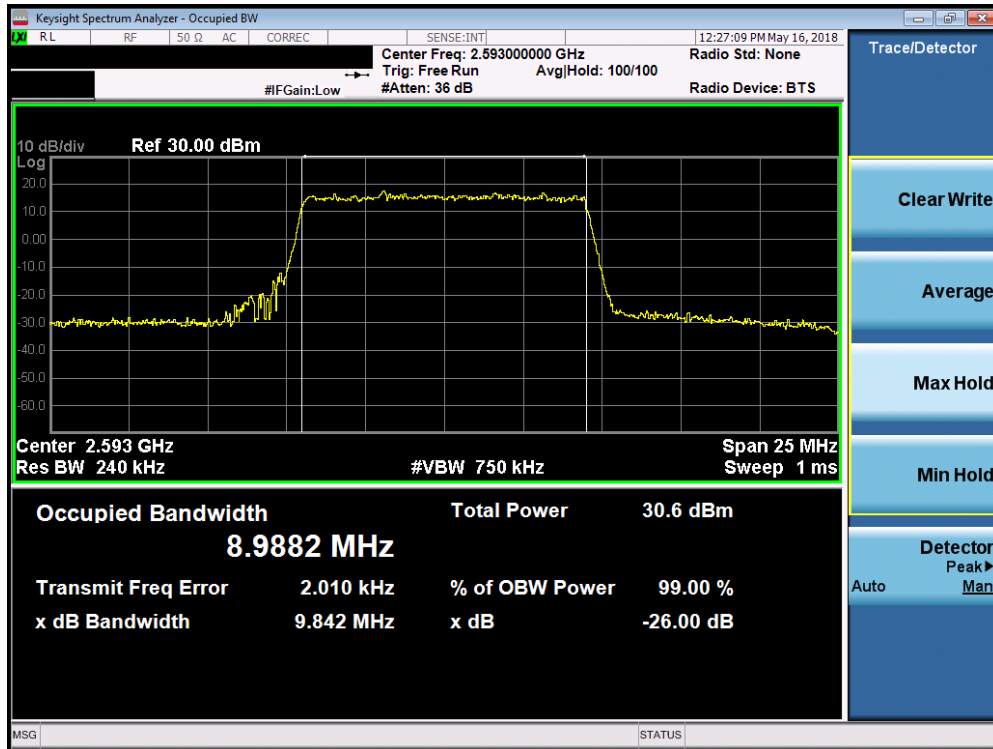


Plot 7-84. Occupied Bandwidth Plot (Band 41 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-85. Occupied Bandwidth Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 58 of 261

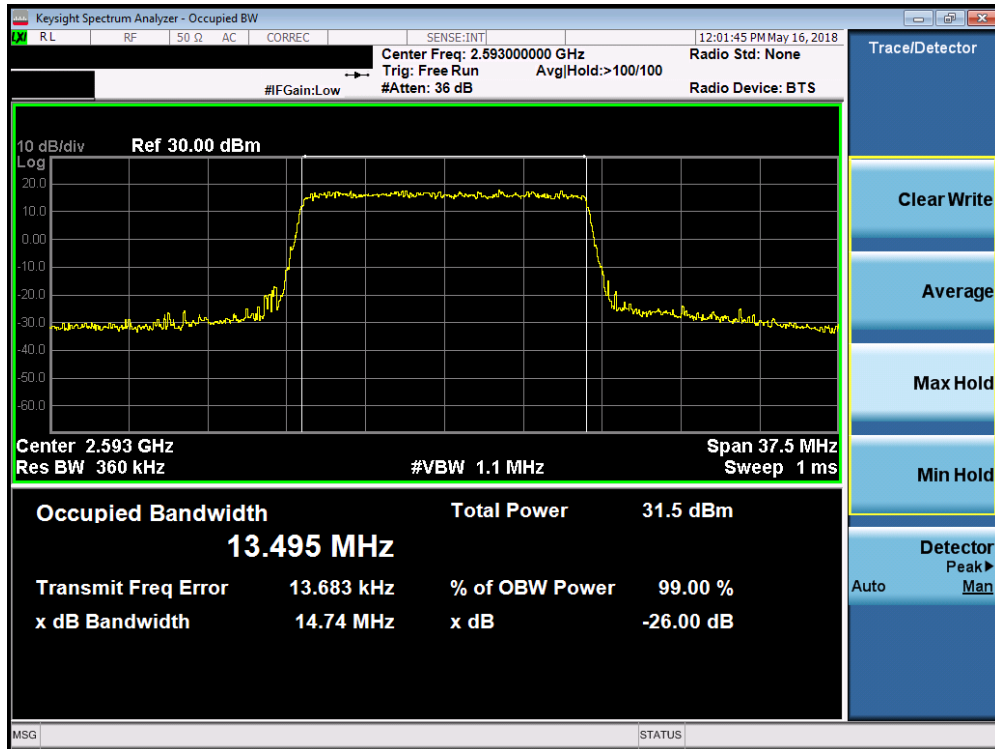


Plot 7-86. Occupied Bandwidth Plot (Band 41 - 10.0MHz 16-QAM - Full RB Configuration)

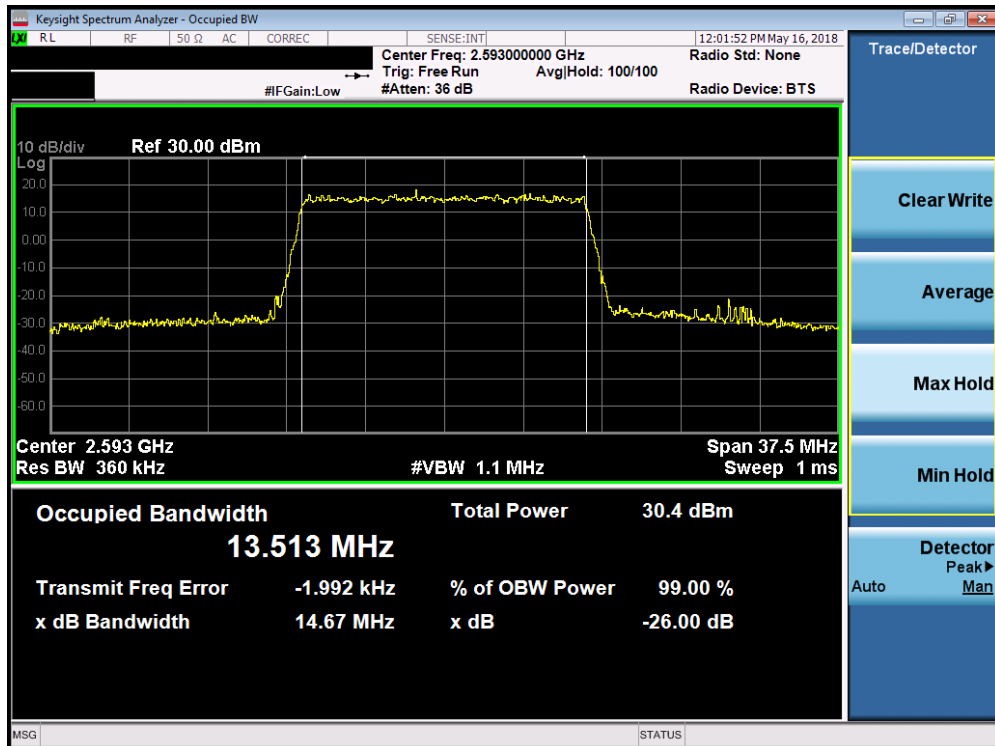


Plot 7-87. Occupied Bandwidth Plot (Band 41 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 59 of 261

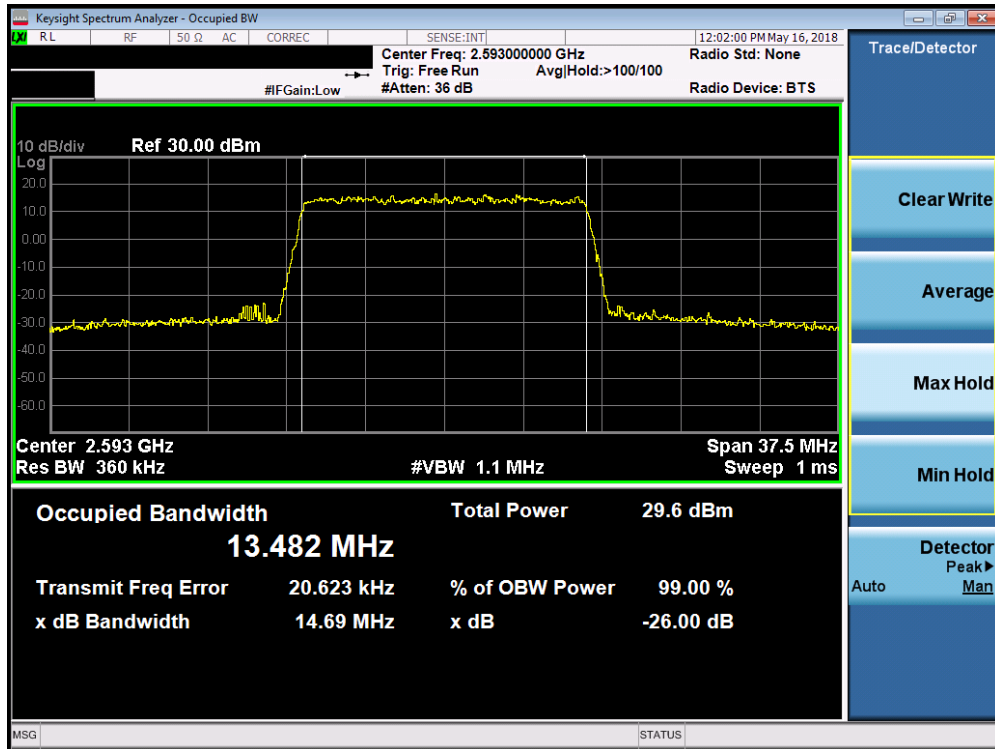


Plot 7-88. Occupied Bandwidth Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)

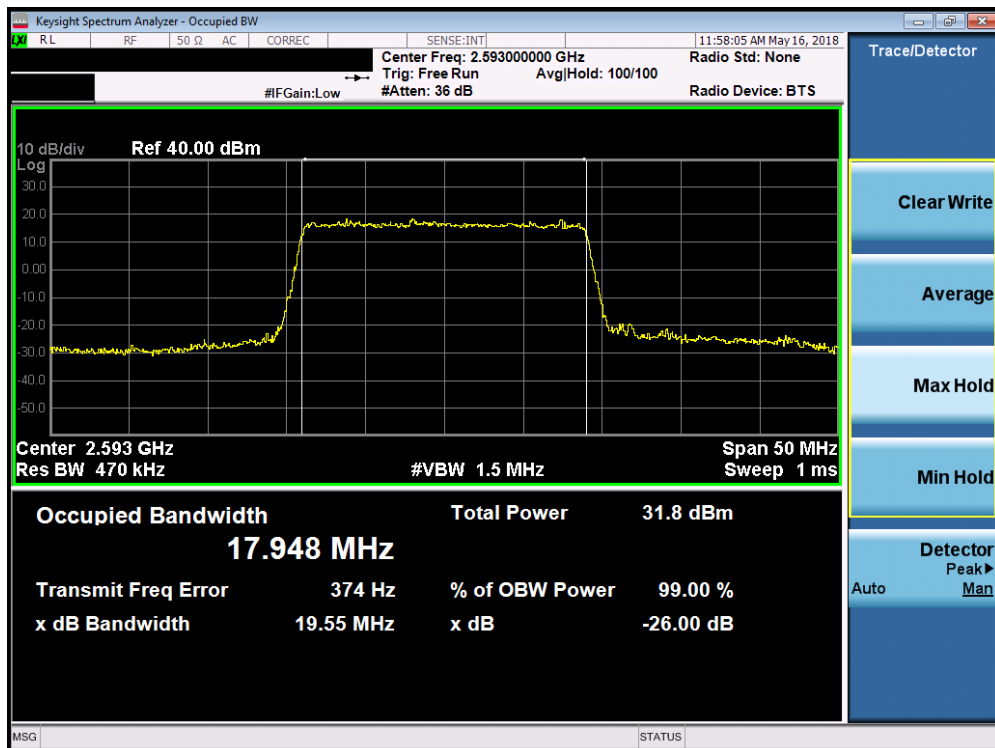


Plot 7-89. Occupied Bandwidth Plot (Band 41 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 60 of 261

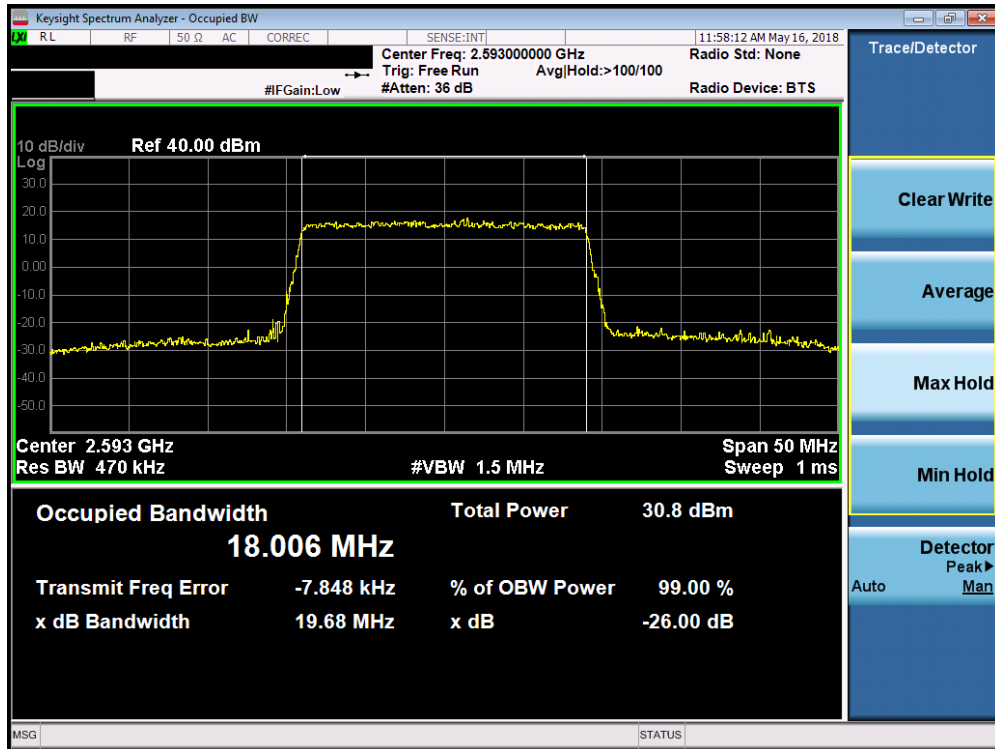


Plot 7-90. Occupied Bandwidth Plot (Band 41 - 15.0MHz 64-QAM - Full RB Configuration)

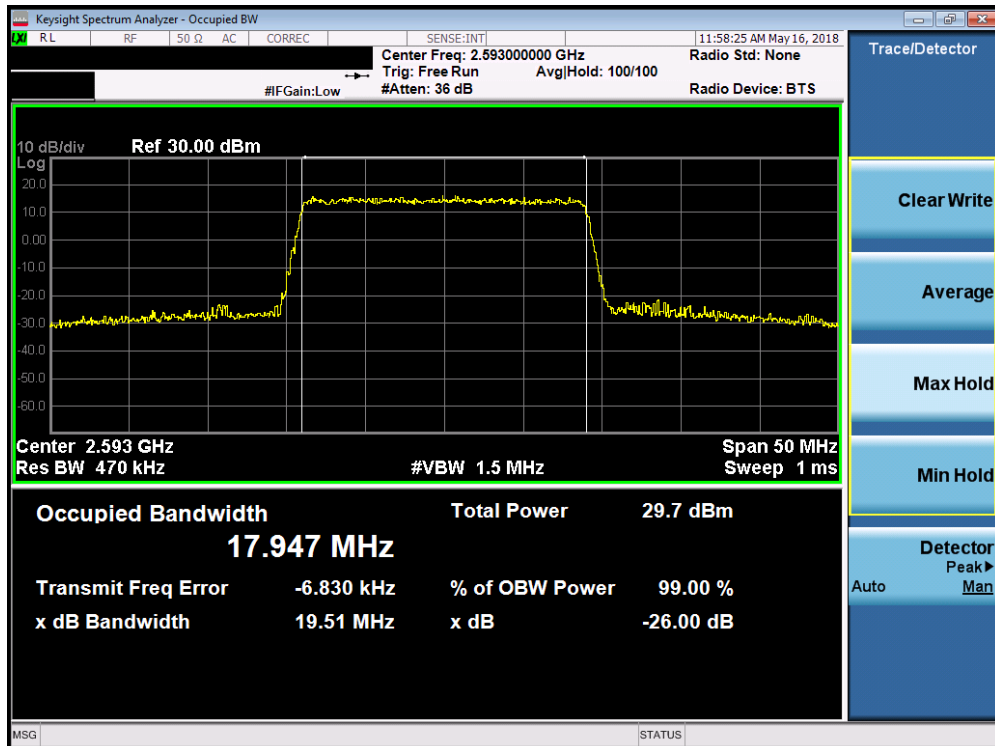


Plot 7-91. Occupied Bandwidth Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-92. Occupied Bandwidth Plot (Band 41 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-93. Occupied Bandwidth Plot (Band 41 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 62 of 261

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 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
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.

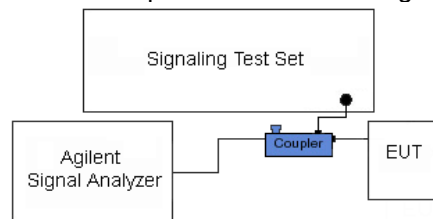


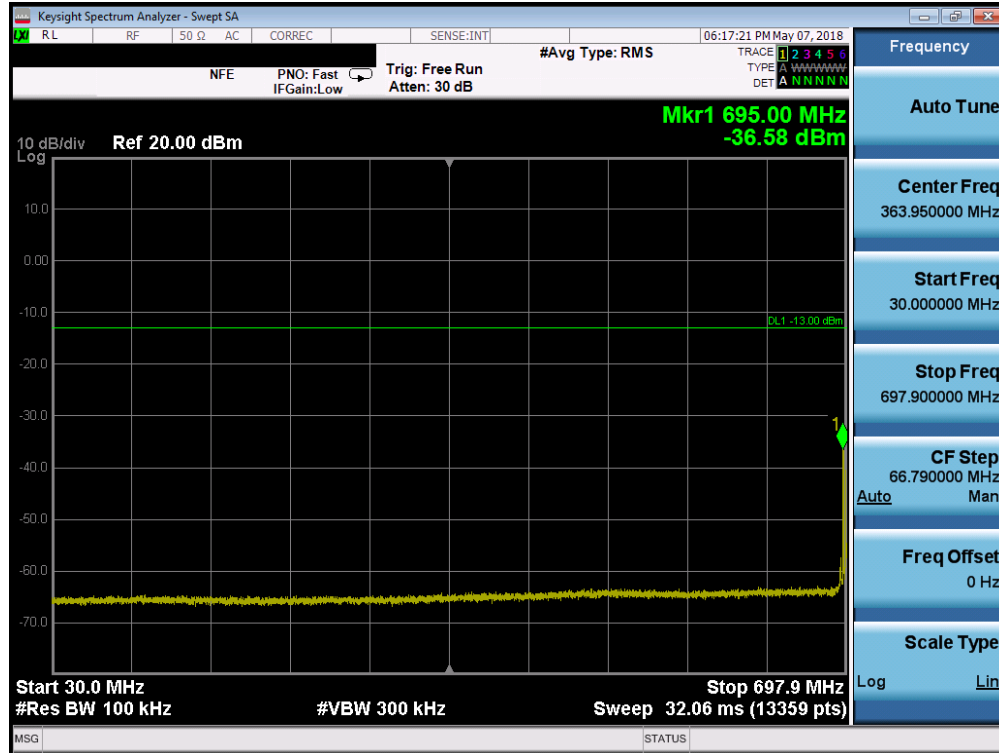
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

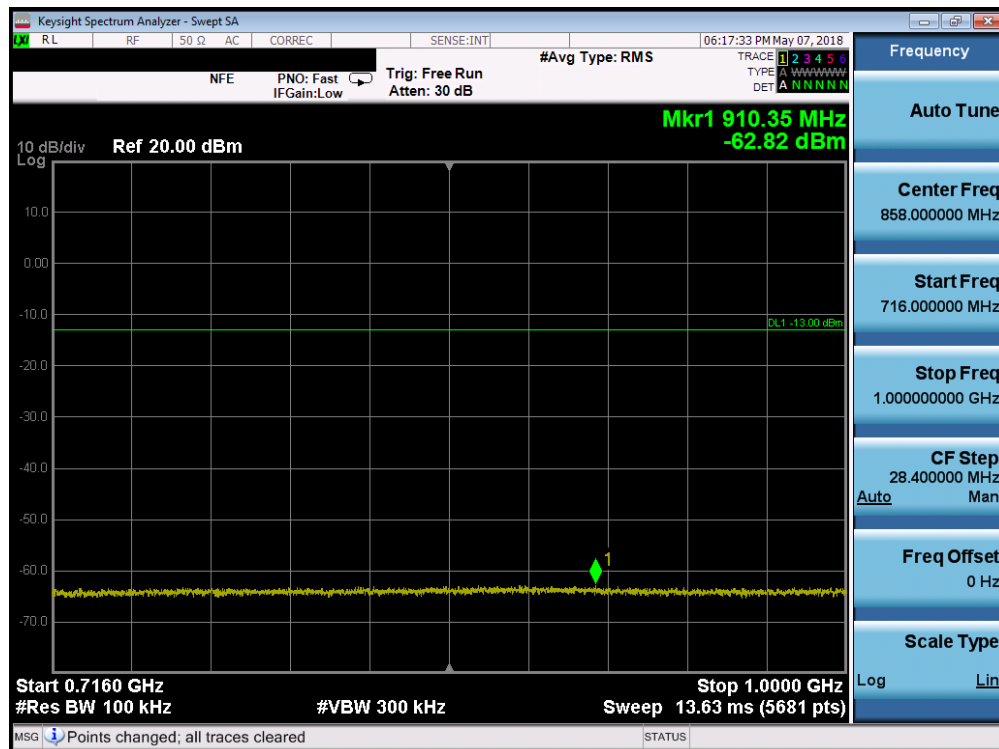
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the 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.

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Band 12/17



Plot 7-94. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

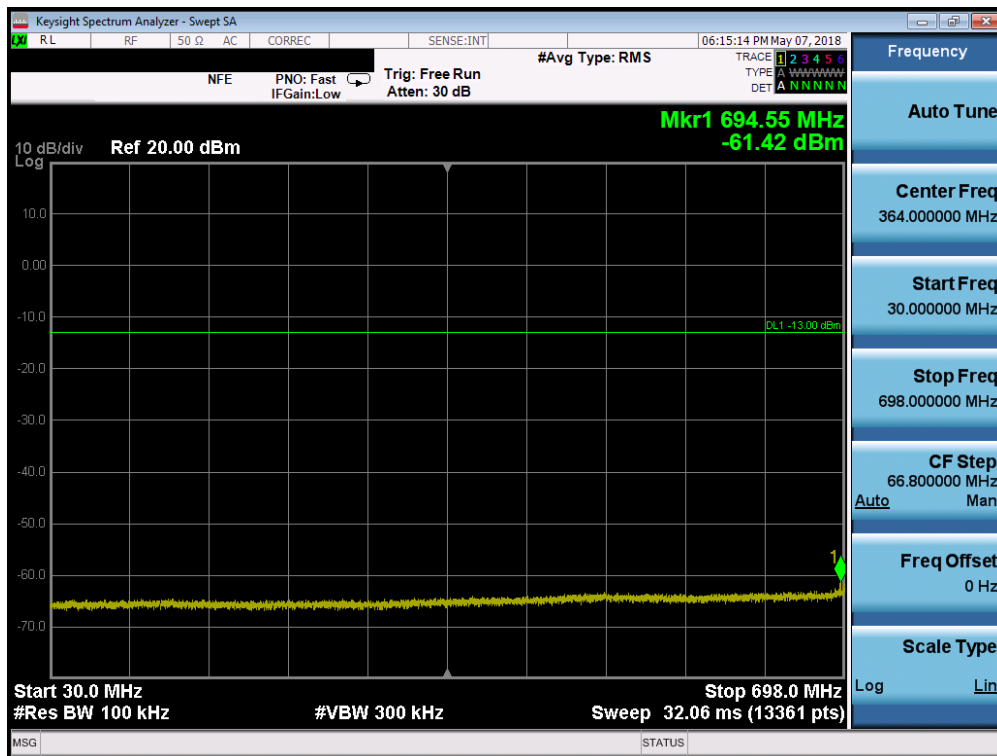


Plot 7-95. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 64 of 261

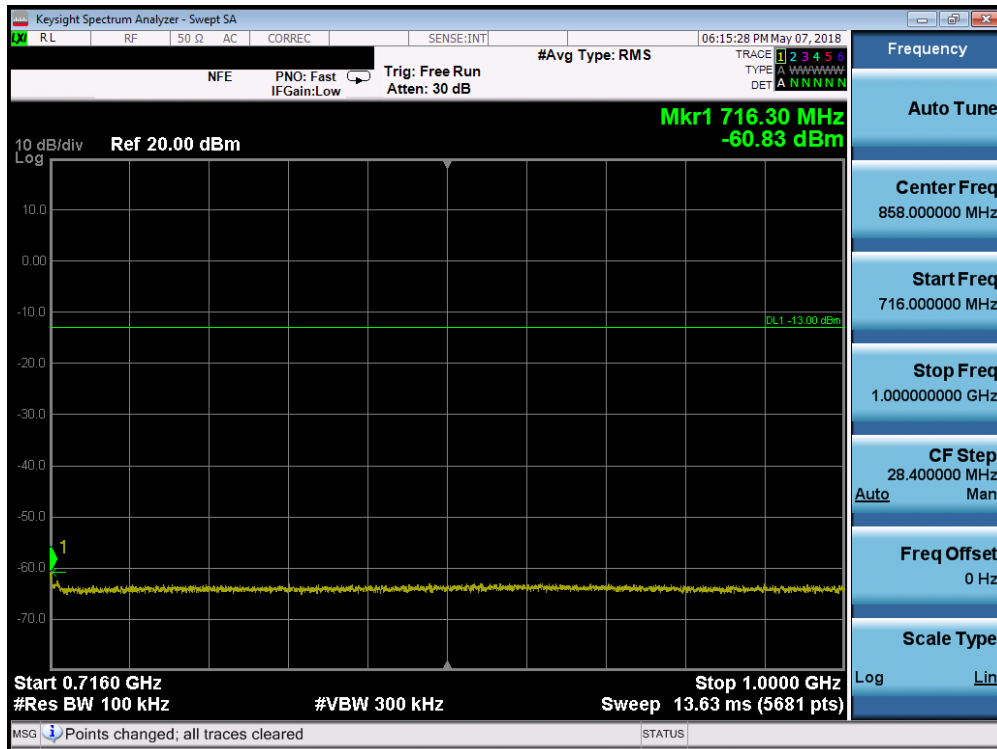


Plot 7-96. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-97. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 65 of 261

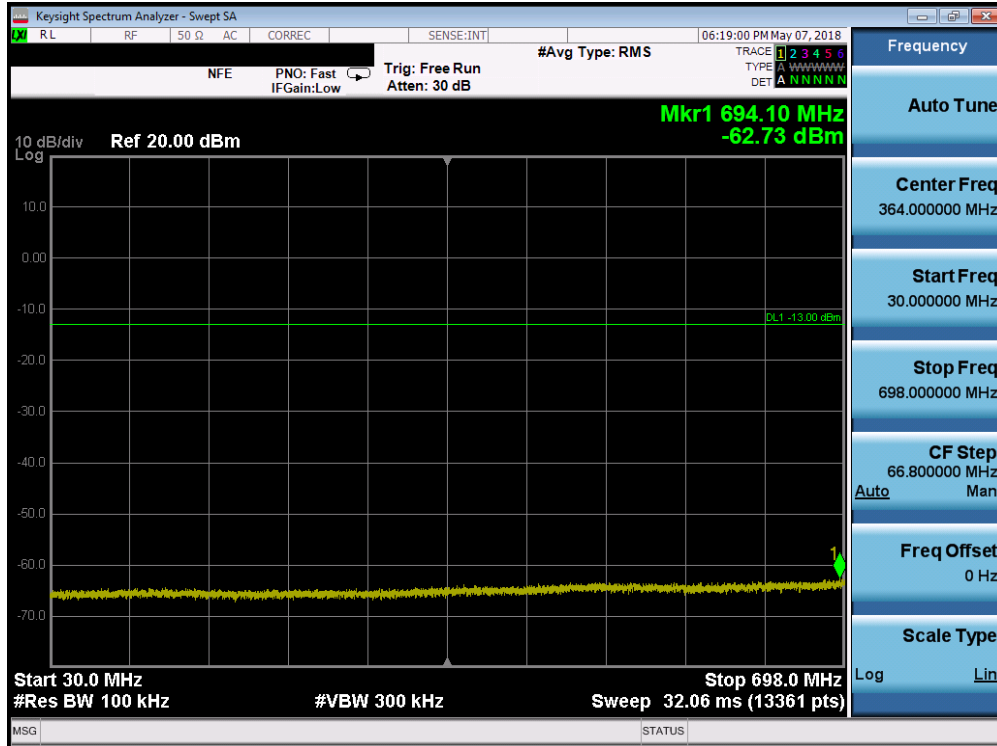


Plot 7-98. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

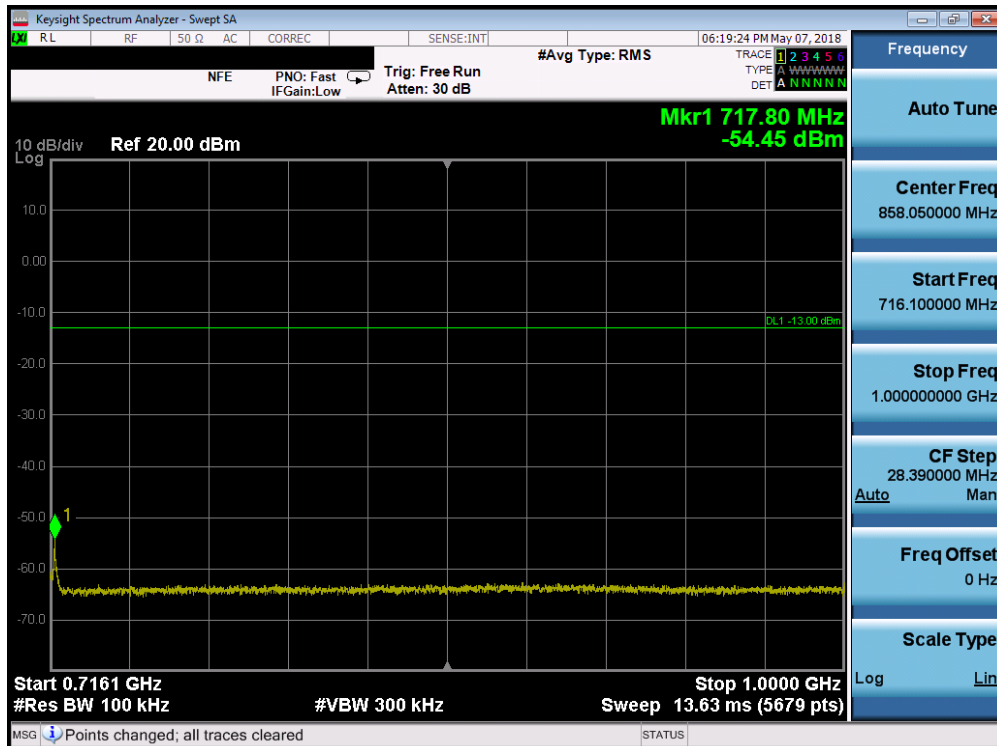


Plot 7-99. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN9600	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-100. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-101. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

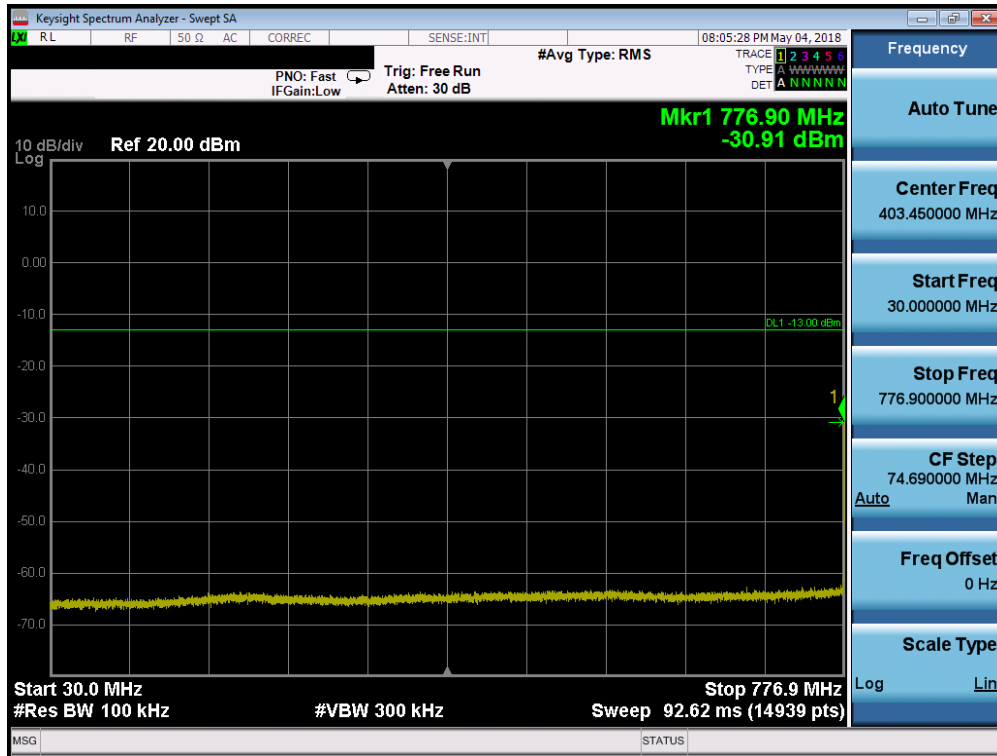
FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 67 of 261



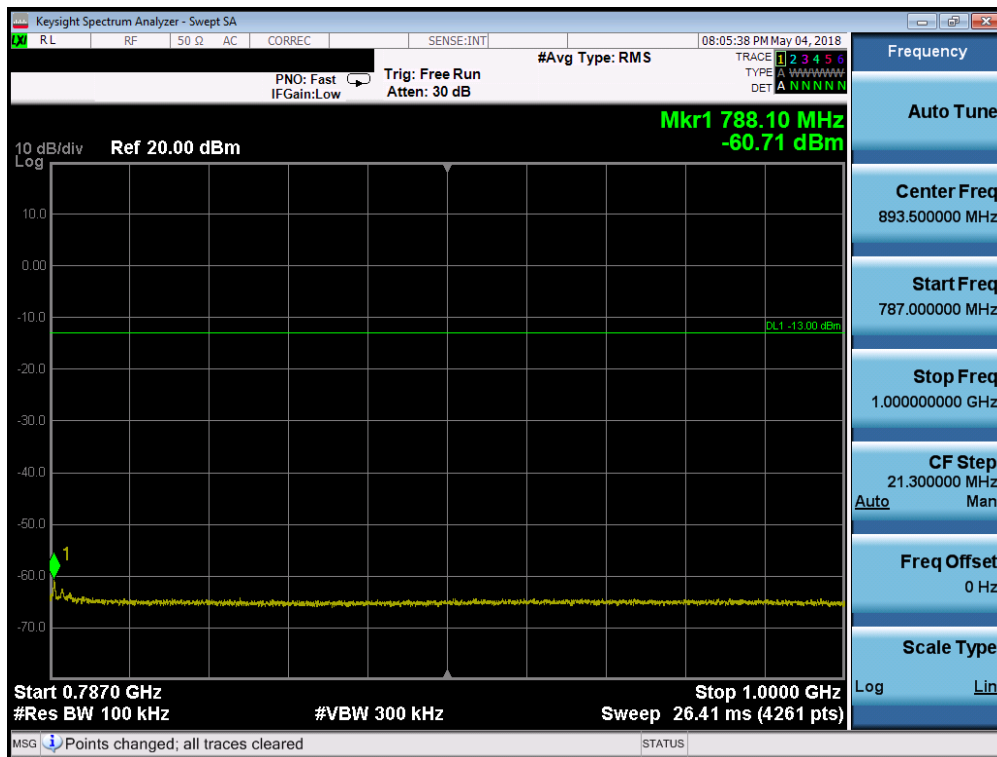
Plot 7-102. Conducted Spurious Plot (Band 12/17 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 68 of 261

Band 13

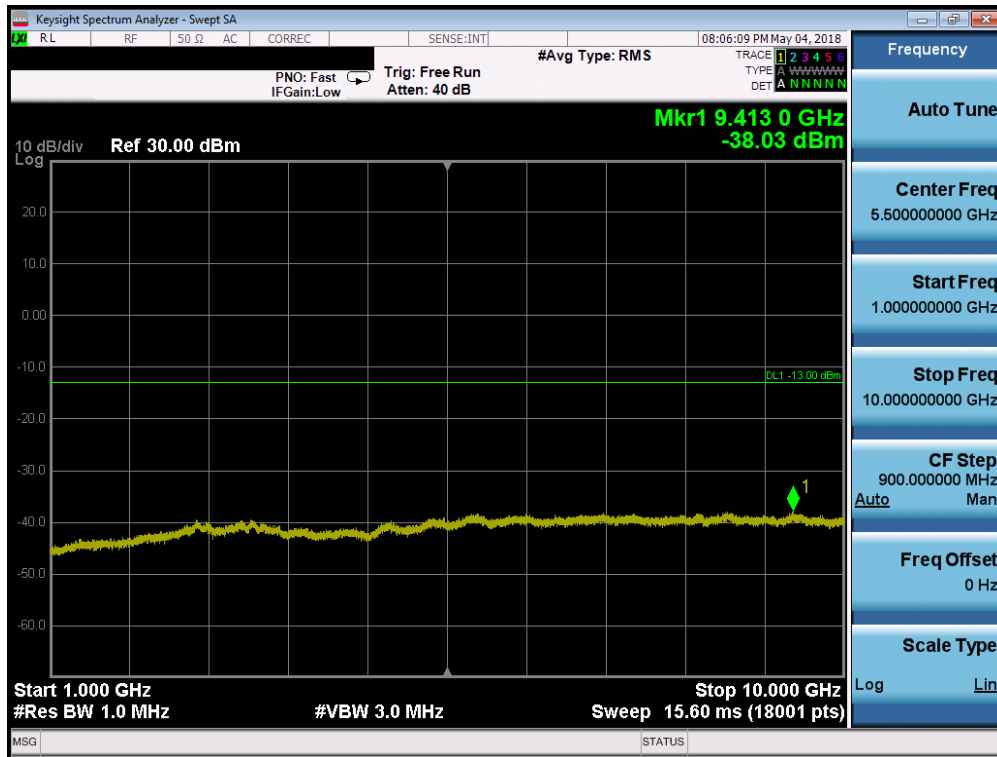


Plot 7-103. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

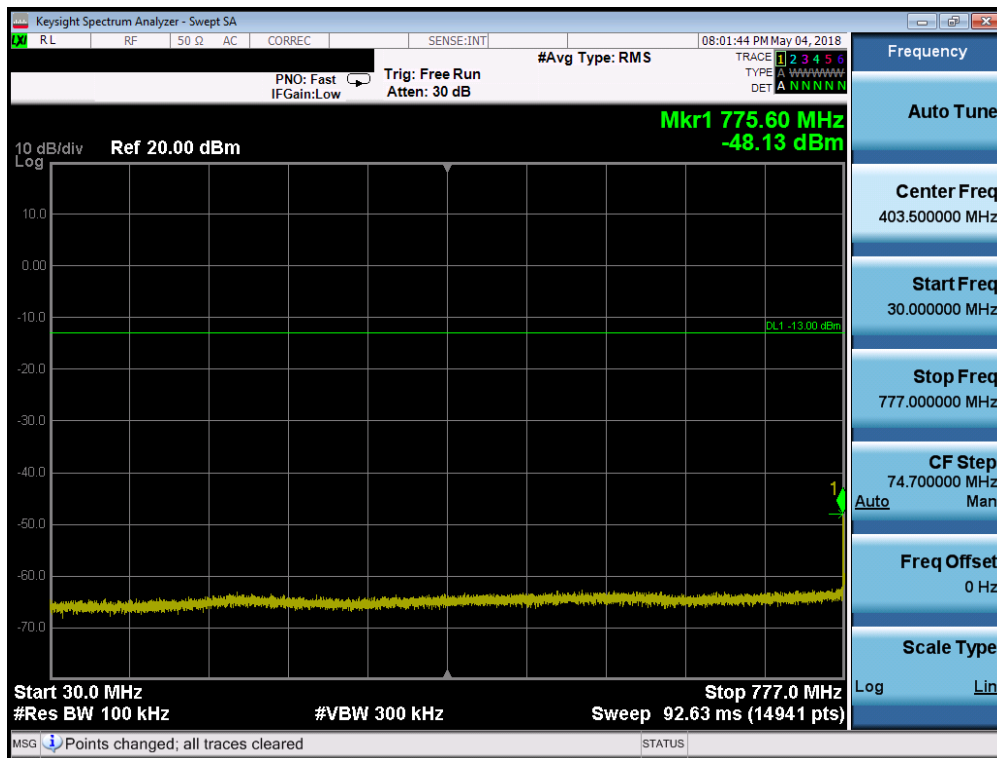


Plot 7-104. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset	Page 69 of 261	

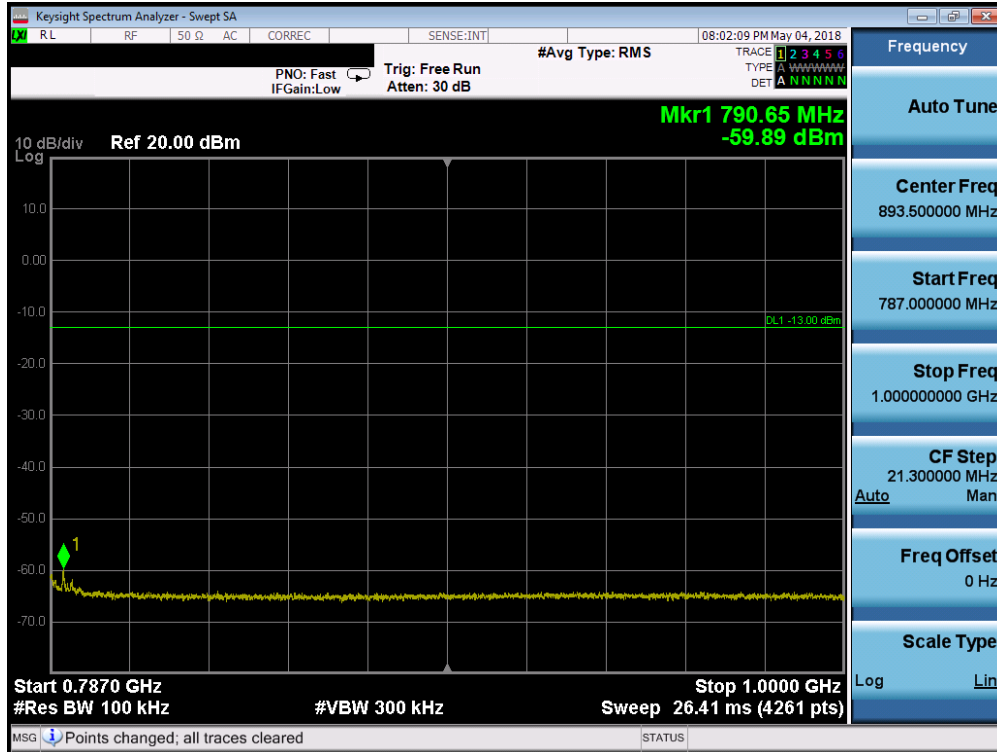


Plot 7-105. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

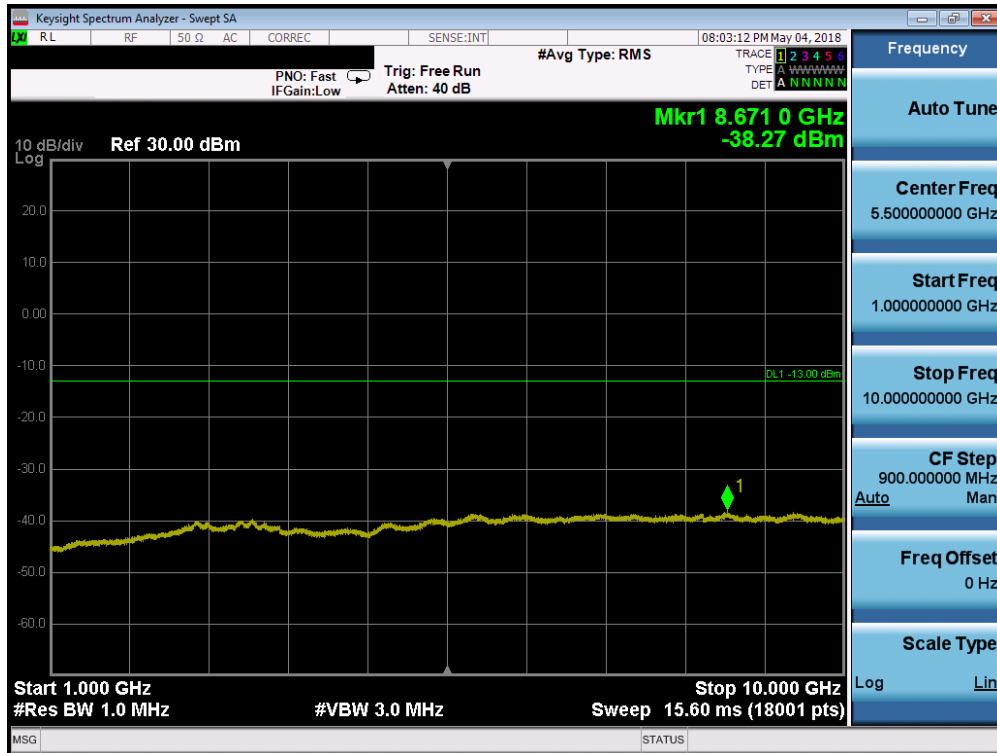


Plot 7-106. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 70 of 261

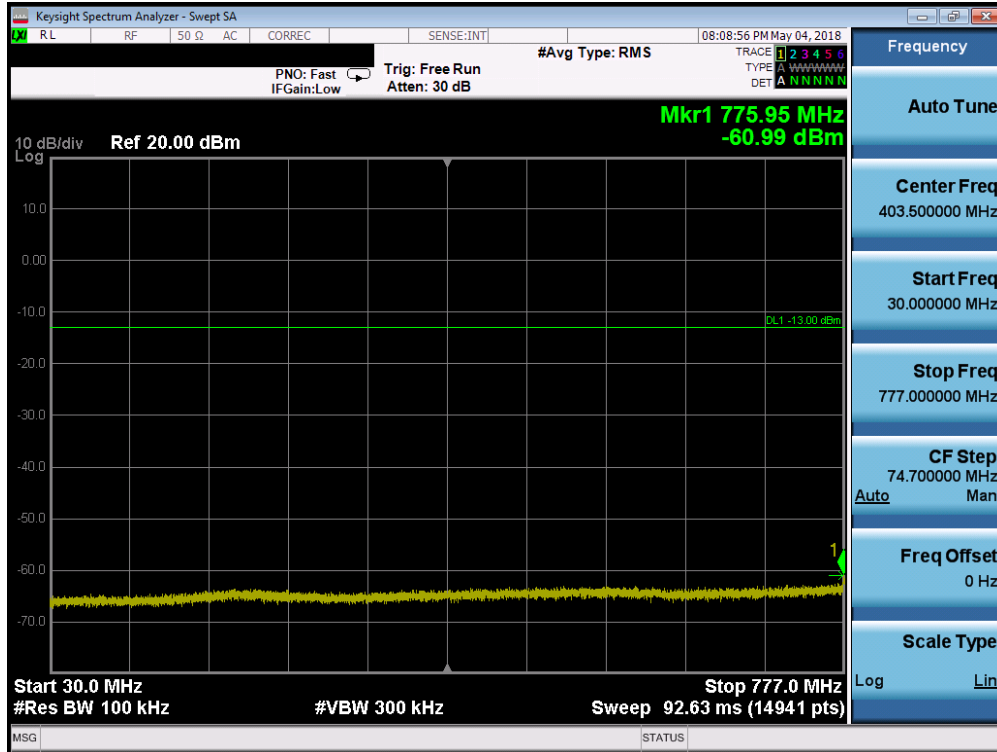


Plot 7-107. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

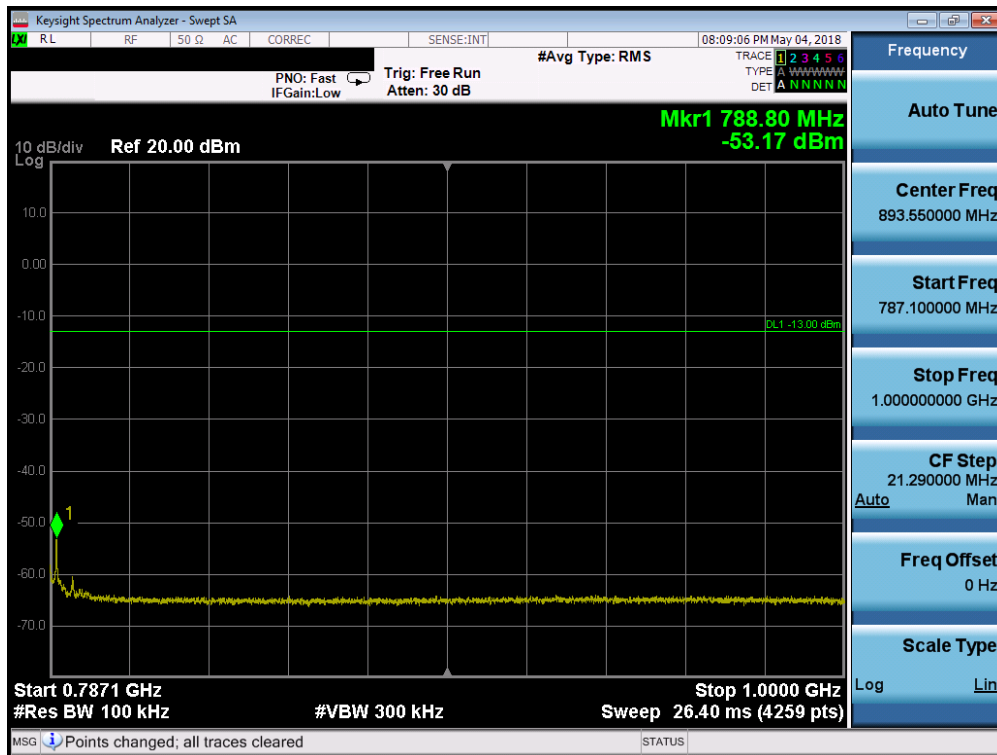


Plot 7-108. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN9600	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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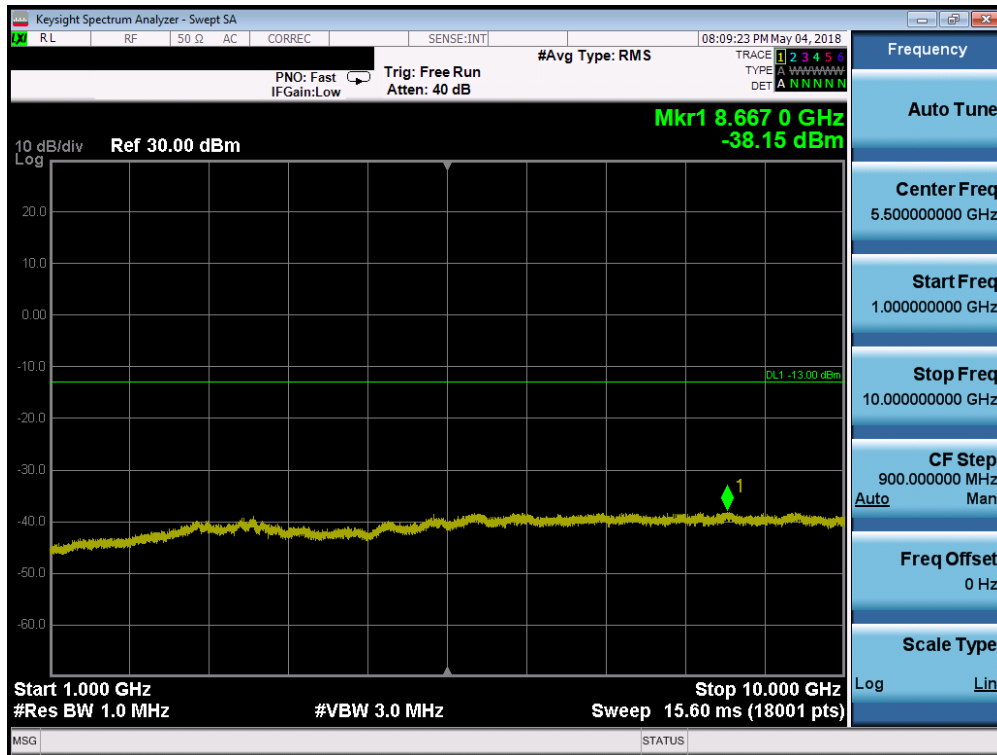


Plot 7-109. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



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

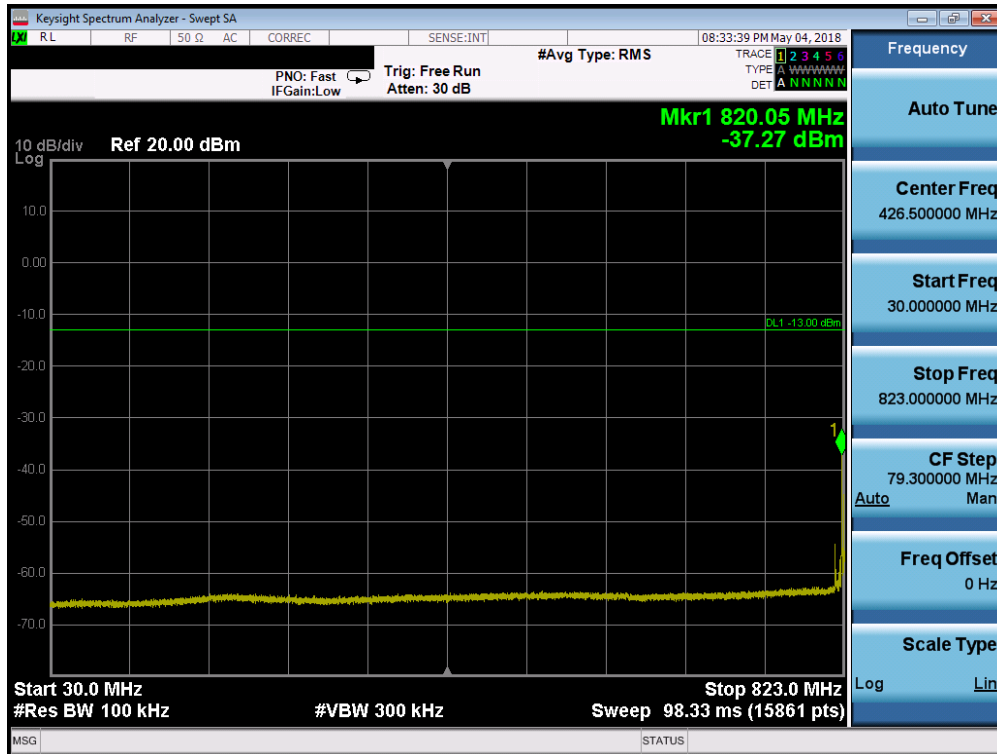
FCC ID: A3LSMN9600	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 72 of 261



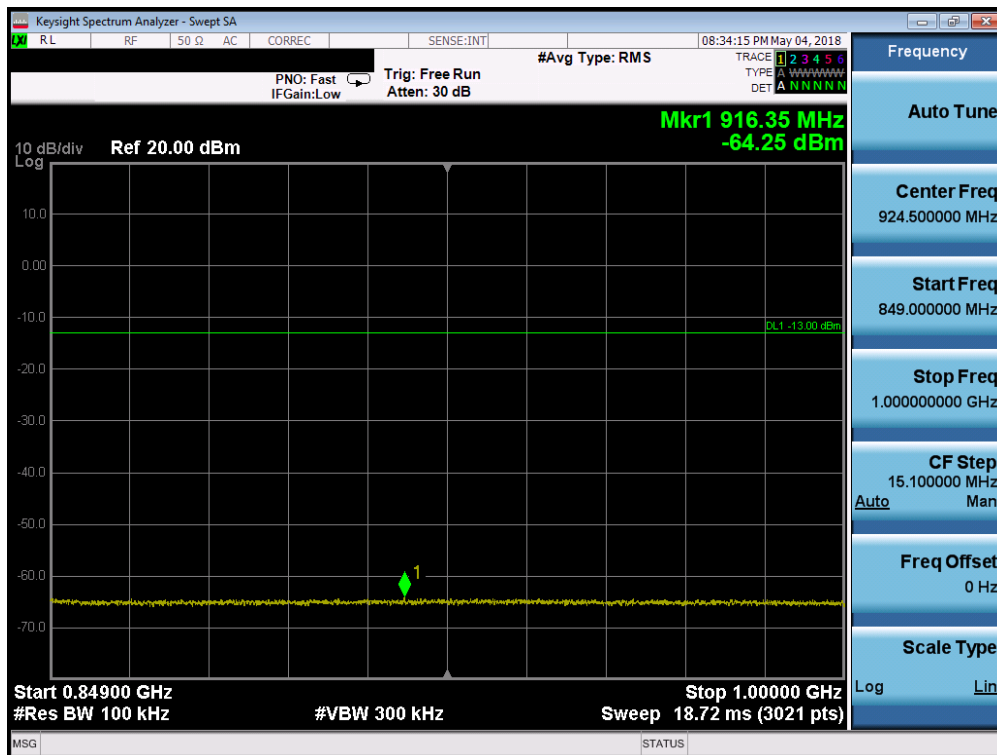
Plot 7-111. Conducted Spurious Plot (Band 13 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 73 of 261

Band 26/5

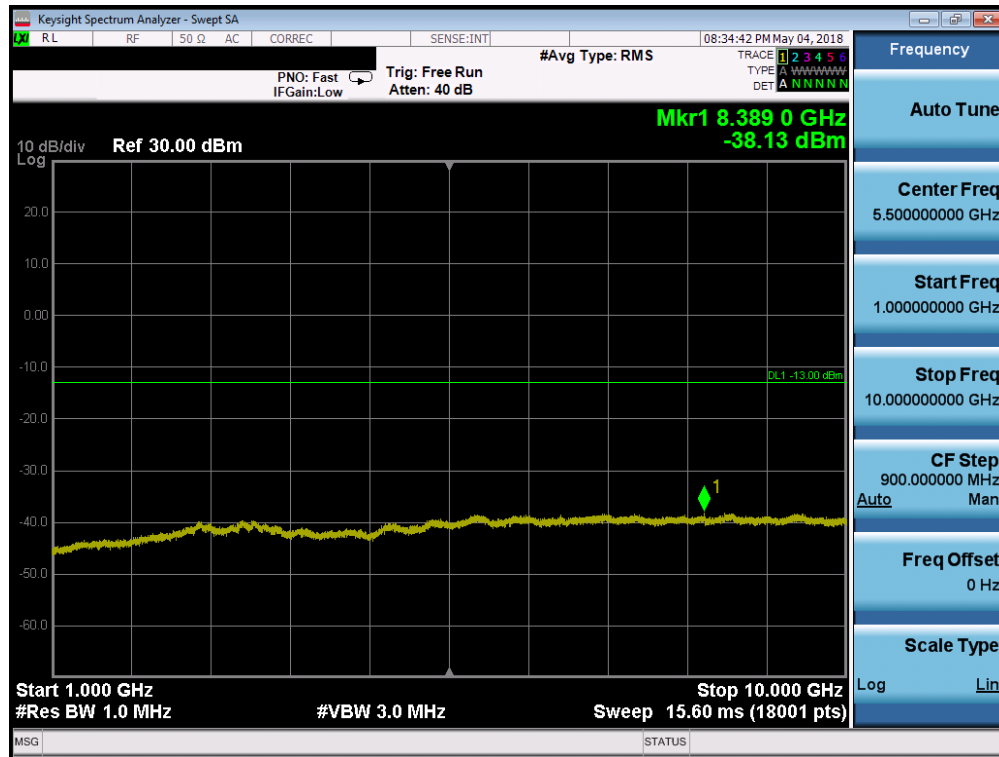


Plot 7-112. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-113. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 74 of 261

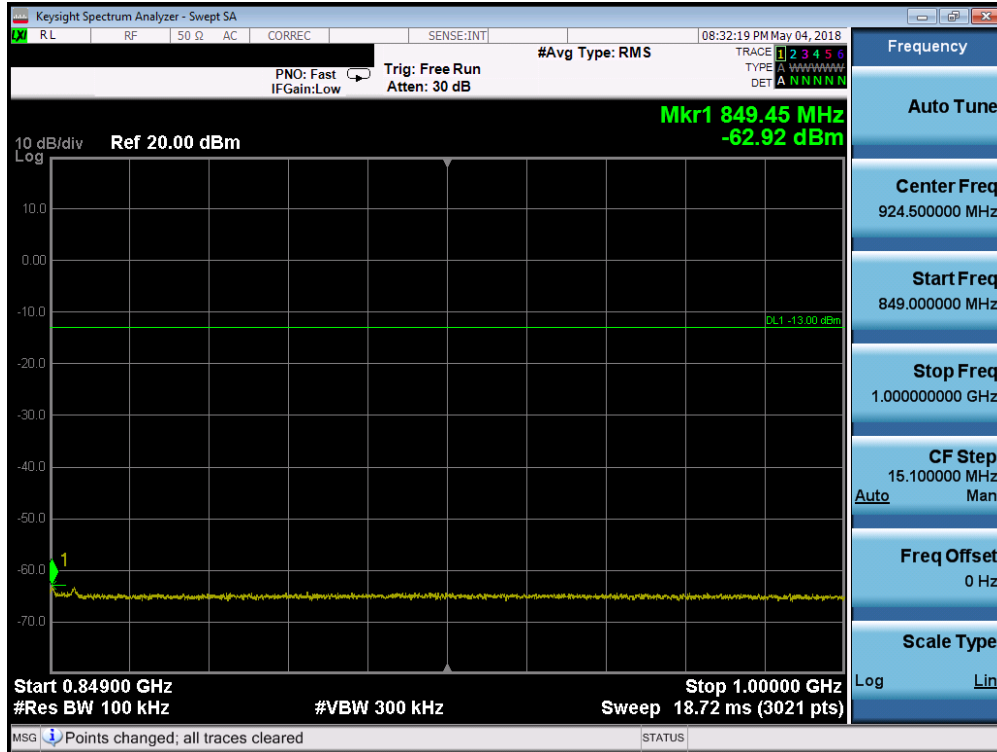


Plot 7-114. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

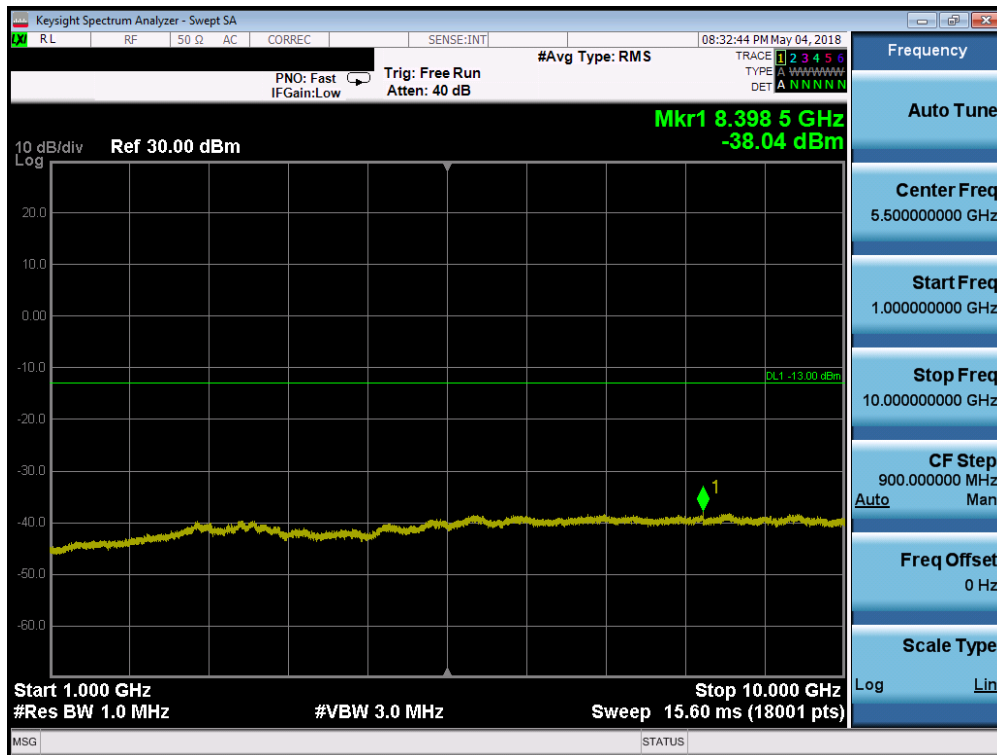


Plot 7-115. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN9600	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 75 of 261

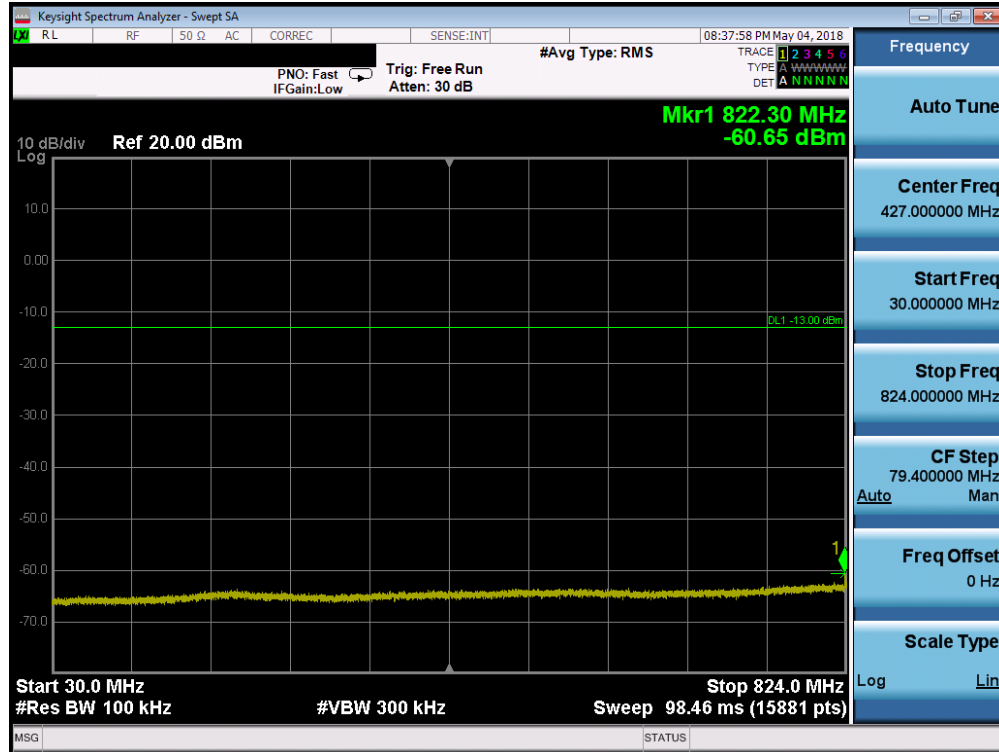


Plot 7-116. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

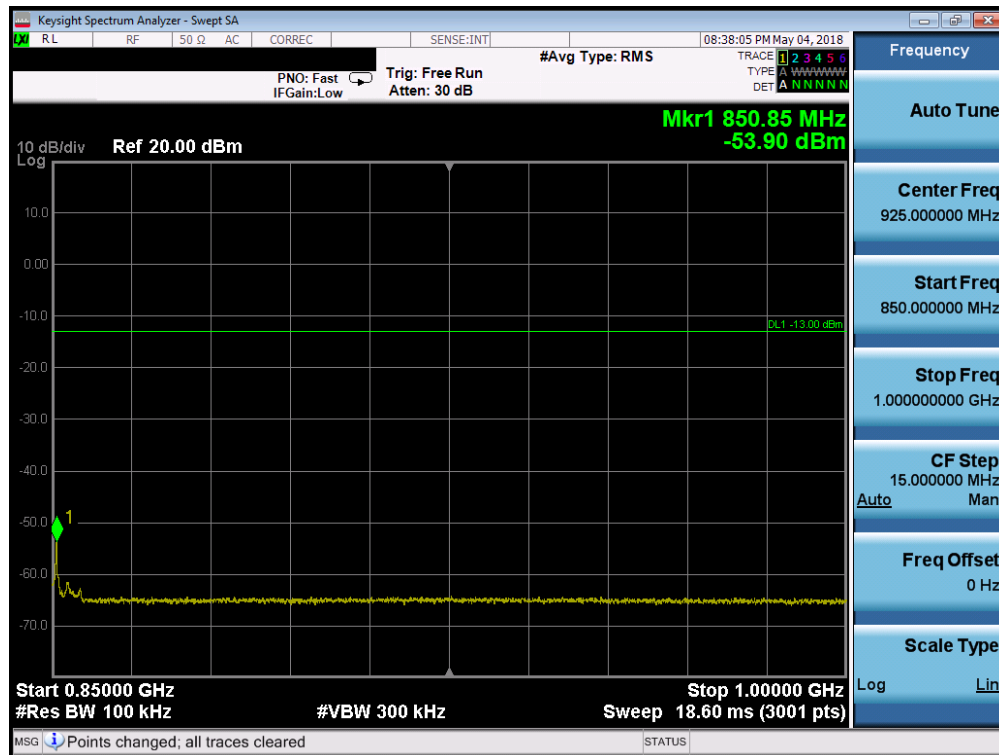


Plot 7-117. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Plot 7-118. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-119. Conducted Spurious Plot (Band 26/5 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMN9600	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1804300090-03.A3L	Test Dates: 5/3 - 6/22/2018	EUT Type: Portable Handset		Page 77 of 261