

## PART 27 MEASUREMENT REPORT

**Applicant Name:**  
LG Electronics USA, Inc.  
111 Sylvan Avenue, North Building  
Englewood Cliffs, NJ 07632  
United States

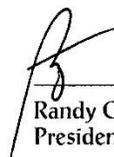
**Date of Testing:**  
12/1 – 1/8/2021  
**Test Site/Location:**  
PCTEST Lab. Columbia, MD, USA  
**Test Report Serial No.:**  
1M2011180184-14.ZNF

<b>FCC ID:</b>	<b>ZNFK420TM</b>
<b>APPLICANT:</b>	<b>LG Electronics USA, Inc.</b>

**Application Type:** Certification  
**Model:** LM-K420TM  
**Additional Model(s):** LMK420TM, K420TM, LM-K420MM, LMK420MM, K420MM, LM-K420PM, LMK420PM, K420PM, LG L560DL, LGL560DL, L560DL, LM-K420QM, LMK420QM, K420QM, LM-K420QM5, LMK420QM5, K420QM5, LM-K420QM6, LMK420QM6, K420QM6, LM-K420QA, LMK420QA, K420QA  
**EUT Type:** Portable Handset  
**FCC Classification:** PCS Licensed Transmitter Held to Ear (PCE)  
**FCC Rule Part:** 27  
**Test Procedure(s):** ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

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

  
\_\_\_\_\_  
Randy Ortanez  
President

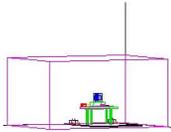


<b>FCC ID:</b> ZNFK420TM		<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2011180184-14.ZNF	<b>Test Dates:</b> 12/1 – 1/8/2021	<b>EUT Type:</b> Portable Handset		Page 1 of 129

## TABLE OF CONTENTS

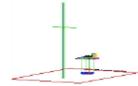
1.0	INTRODUCTION .....	5
1.1	Scope .....	5
1.2	PCTEST Test Location.....	5
1.3	Test Facility / Accreditations.....	5
2.0	PRODUCT INFORMATION.....	6
2.1	Equipment Description .....	6
2.2	Device Capabilities.....	6
2.3	Test Configuration .....	6
2.4	EMI Suppression Device(s)/Modifications .....	6
2.5	Software and Firmware .....	6
3.0	DESCRIPTION OF TESTS .....	7
3.1	Evaluation Procedure .....	7
3.2	Radiated Power and Radiated Spurious Emissions .....	7
4.0	MEASUREMENT UNCERTAINTY .....	8
5.0	TEST EQUIPMENT CALIBRATION DATA .....	9
6.0	SAMPLE CALCULATIONS .....	10
7.0	TEST RESULTS .....	11
7.1	Summary .....	11
7.2	Occupied Bandwidth .....	12
7.3	Spurious and Harmonic Emissions at Antenna Terminal .....	38
7.4	Band Edge Emissions at Antenna Terminal.....	61
7.5	Peak-Average Ratio .....	95
7.6	Radiated Power (ERP/EIRP).....	106
7.7	Radiated Spurious Emissions Measurements.....	111
7.8	Frequency Stability / Temperature Variation .....	123
8.0	CONCLUSION.....	129

<b>FCC ID:</b> ZNFK420TM	 <b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2011180184-14.ZNF	<b>Test Dates:</b> 12/1 – 1/8/2021	<b>EUT Type:</b> Portable Handset	Page 2 of 129



# MEASUREMENT REPORT

## FCC Part 27



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.079	18.98	0.130	21.13	9M09G7D
		16QAM	704.0 - 711.0	0.064	18.06	0.105	20.21	9M02W7D
		64QAM	704.0 - 711.0	0.050	17.03	0.083	19.18	9M05W7D
	5 MHz	QPSK	701.5 - 713.5	0.078	18.90	0.127	21.05	4M54G7D
		16QAM	701.5 - 713.5	0.065	18.15	0.107	20.30	4M54W7D
		64QAM	701.5 - 713.5	0.051	17.06	0.083	19.21	4M55W7D
	3 MHz	QPSK	700.5 - 714.5	0.080	19.05	0.132	21.20	2M69G7D
		16QAM	700.5 - 714.5	0.067	18.29	0.111	20.44	2M69W7D
		64QAM	700.5 - 714.5	0.052	17.20	0.086	19.35	2M70W7D
	1.4 MHz	QPSK	699.7 - 715.3	0.066	18.21	0.109	20.36	1M10G7D
		16QAM	699.7 - 715.3	0.055	17.39	0.090	19.54	1M10W7D
		64QAM	699.7 - 715.3	0.043	16.34	0.071	18.49	1M10W7D
LTE Band 13	10 MHz	QPSK	782.0	0.075	18.75	0.123	20.90	9M04G7D
		16QAM	782.0	0.064	18.03	0.104	20.18	8M99W7D
		64QAM	782.0	0.049	16.91	0.081	19.06	9M01W7D
	5 MHz	QPSK	779.5 - 784.5	0.078	18.89	0.127	21.04	4M50G7D
		16QAM	779.5 - 784.5	0.067	18.27	0.110	20.42	4M51W7D
		64QAM	779.5 - 784.5	0.051	17.09	0.084	19.24	4M49W7D
LTE Band 71	20 MHz	QPSK	673.0 - 688.0	0.100	19.99	0.164	22.14	18M1G7D
		16QAM	673.0 - 688.0	0.082	19.14	0.135	21.29	18M1W7D
		64QAM	673.0 - 688.0	0.065	18.16	0.107	20.31	18M1W7D
	15 MHz	QPSK	670.5 - 690.5	0.102	20.07	0.167	22.22	13M6G7D
		16QAM	670.5 - 690.5	0.085	19.31	0.140	21.46	13M5W7D
		64QAM	670.5 - 690.5	0.066	18.19	0.108	20.34	13M5W7D
	10 MHz	QPSK	668.0 - 693.0	0.096	19.81	0.157	21.96	9M01G7D
		16QAM	668.0 - 693.0	0.082	19.13	0.134	21.28	9M01W7D
		64QAM	668.0 - 693.0	0.064	18.08	0.106	20.23	9M03W7D
	5 MHz	QPSK	665.5 - 695.5	0.092	19.64	0.151	21.79	4M52G7D
		16QAM	665.5 - 695.5	0.077	18.85	0.126	21.00	4M52W7D
		64QAM	665.5 - 695.5	0.060	17.80	0.099	19.95	4M53W7D

**Overview Table (<1GHz Bands)**

Mode	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
			Max. Power [W]	Max. Power [dBm]	
WCDMA1700	Spread Spectrum	1712.4 - 1752.6	0.297	24.73	4M19F9W

**Overview Table (>1GHz WCDMA)**

FCC ID: ZNFK420TM	 Proud to be part of element	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset	Page 3 of 129	

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 66/4	20 MHz	QPSK	1720.0 - 1770.0	0.279	24.46	18M0G7D
		16QAM	1720.0 - 1770.0	0.233	23.67	18M0W7D
		64QAM	1720.0 - 1770.0	0.180	22.56	18M1W7D
	15 MHz	QPSK	1717.5 - 1772.5	0.270	24.32	13M6G7D
		16QAM	1717.5 - 1772.5	0.228	23.57	13M6W7D
		64QAM	1717.5 - 1772.5	0.181	22.58	13M5W7D
	10 MHz	QPSK	1715.0 - 1775.0	0.275	24.39	9M04G7D
		16QAM	1715.0 - 1775.0	0.222	23.47	9M02W7D
		64QAM	1715.0 - 1775.0	0.184	22.65	9M04W7D
	5 MHz	QPSK	1712.5 - 1777.5	0.285	24.56	4M53G7D
		16QAM	1712.5 - 1777.5	0.246	23.92	4M52W7D
		64QAM	1712.5 - 1777.5	0.186	22.69	4M52W7D
	3 MHz	QPSK	1711.5 - 1778.5	0.291	24.63	2M69G7D
		16QAM	1711.5 - 1778.5	0.234	23.68	2M69W7D
		64QAM	1711.5 - 1778.5	0.194	22.88	2M69W7D
	1.4 MHz	QPSK	1710.7 - 1779.3	0.277	24.42	1M10G7D
		16QAM	1710.7 - 1779.3	0.234	23.68	1M10W7D
		64QAM	1710.7 - 1779.3	0.182	22.59	1M10W7D

**Overview Table (>1GHz Bands)**

FCC ID: ZNFK420TM		<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2011180184-14.ZNF	<b>Test Dates:</b> 12/1 – 1/8/2021	<b>EUT Type:</b> Portable Handset	Page 4 of 129	

## 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 17025-2017 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 ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

FCC ID: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	 LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset	Page 5 of 129	

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFK420TM**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate <2GHz and under the provisions of Part 27.

**Test Device Serial No.:** 12577, 11660

### 2.2 Device Capabilities

This device contains the following capabilities:

CDMA, GSM/GPRS/EDGE, WCDMA/HSPA, Multi-band LTE, WLAN, UNII, BT (1x, EDR, LE)

### 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.

### 2.4 EMI Suppression Device(s)/Modifications

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

### 2.5 Software and Firmware

Testing was conducted with firmware version K420TM06f installed on the EUT.

FCC ID: ZNFK420TM	 <b>PCTEST</b> Proud to be part of element	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2011180184-14.ZNF	<b>Test Dates:</b> 12/1 – 1/8/2021	<b>EUT Type:</b> Portable Handset	Page 6 of 129	

## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation 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 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 wooden turntable 80cm above the ground plane and 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:

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

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 (dBi) or an isotropic source (dBd). The substitute level is equal to  $P_g \text{ [dBm]} - \text{cable loss [dB]}$ .

For fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.

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: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	 LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 7 of 129

## 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: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	 LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 8 of 129

## 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	9/16/2020	Annual	9/16/2021	LTx2
-	LTx3	Licensed Transmitter Cable Set	8/28/2020	Annual	8/28/2021	LTx3
Anritsu	MT8820C	Radio Communication Analyzer	N/A			6201300731
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201381794
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Keysight Technologies	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	MY 54500644
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMU 200	Base Station Simulator	N/A			836371/0079
Rohde & Schwarz	CMU 200	Base Station Simulator	N/A			833855/0010
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU 26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/3/2020	Annual	3/3/2021	A042511
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307

Table 5-1. List of 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.

FCC ID: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset	Page 9 of 129	

## 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

#### WCDMA Emission Designator

**Emission Designator = 4M16F9W**

WCDMA BW = 4.16 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

### Spurious Radiated Emission – LTE Band

#### **Example: Middle Channel LTE Mode 2<sup>nd</sup> 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: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 10 of 129

## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: LG Electronics USA, Inc.  
 FCC ID: ZNFK420TM  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): LTE/WCDMA

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	RSS-Gen(6.7)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 27.53	RSS-139(6.6)	> 43 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	RSS-139(4.1)	N/A	PASS	See RF Exposure Report
	Frequency Stability	2.1055, 27.54	RSS-139(6.4)	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 12)	27.50(b)(10)	RSS-130(4.4)	< 3 Watts max. ERP < 5 Watts max. EIRP	PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 13)	27.50(c)(10)	RSS-130(4.4)	< 3 Watts max. ERP < 5 Watts max. EIRP	PASS	Section 7.6
	Equivalent Isotropic Radiated Power (WCDMA)	27.50(d)(4)	RSS-139(6.5)	< 1 Watts max. EIRP	PASS	Section 7.6
	Equivalent Isotropic Radiated Power (LTE Band 4/66)				PASS	Section 7.6
	Radiated Spurious Emissions (LTE Band 13)	2.1053, 27.53(f)	RSS-139(6.6)	< -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 7.7
	Radiated Spurious Emissions	2.1053, 27.53	RSS-139(6.6)	> 43 + 10 log <sub>10</sub> (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

Table 7-1. Summary of 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 shown in Section 7.0 were 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 2G/3G Automation Version 4.2.

FCC ID: ZNFK420TM	 PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset	Page 11 of 129

## 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

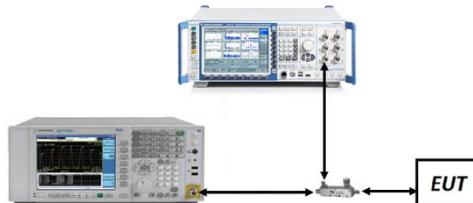
KDB 971168 D01 v03r01 – Section 4.2

### 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 x 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.



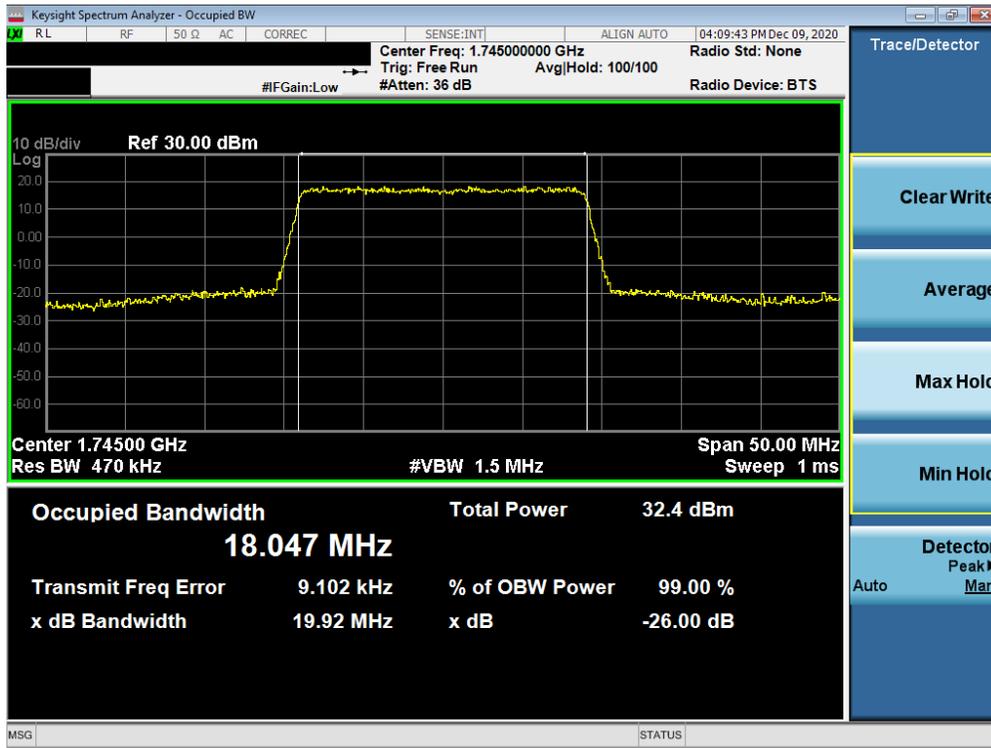
**Figure 7-1. Test Instrument & Measurement Setup**

### Test Notes

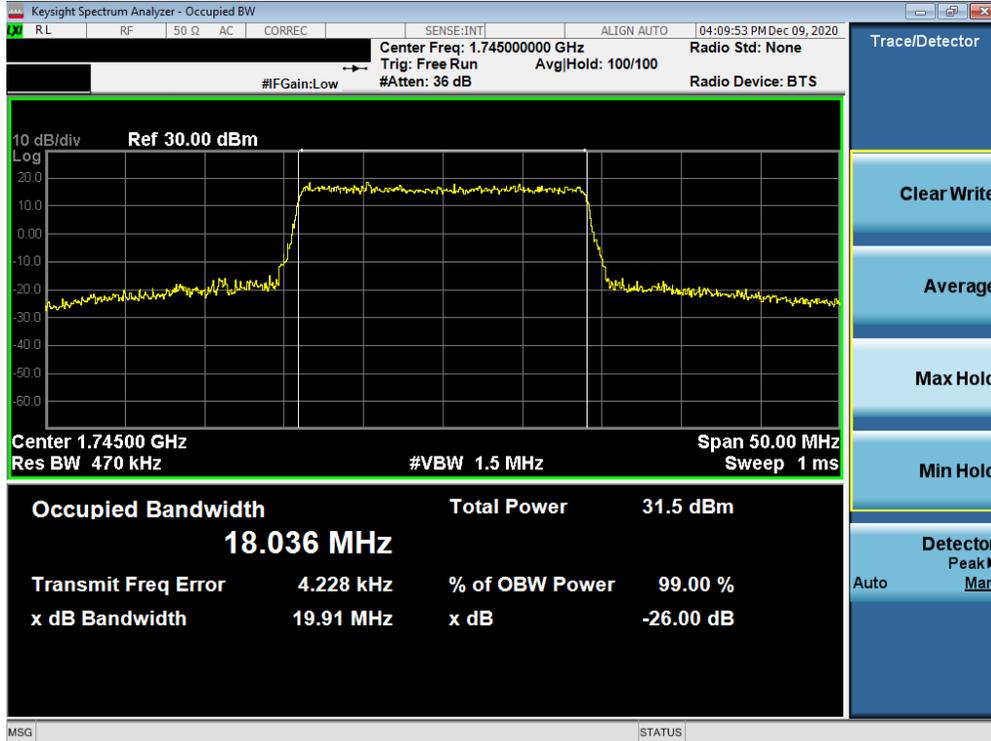
None.

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	<b>PART 27 MEASUREMENT REPORT</b>	<b>LG</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2011180184-14.ZNF	<b>Test Dates:</b> 12/1 – 1/8/2021	<b>EUT Type:</b> Portable Handset	Page 12 of 129	

## LTE Band 66/4

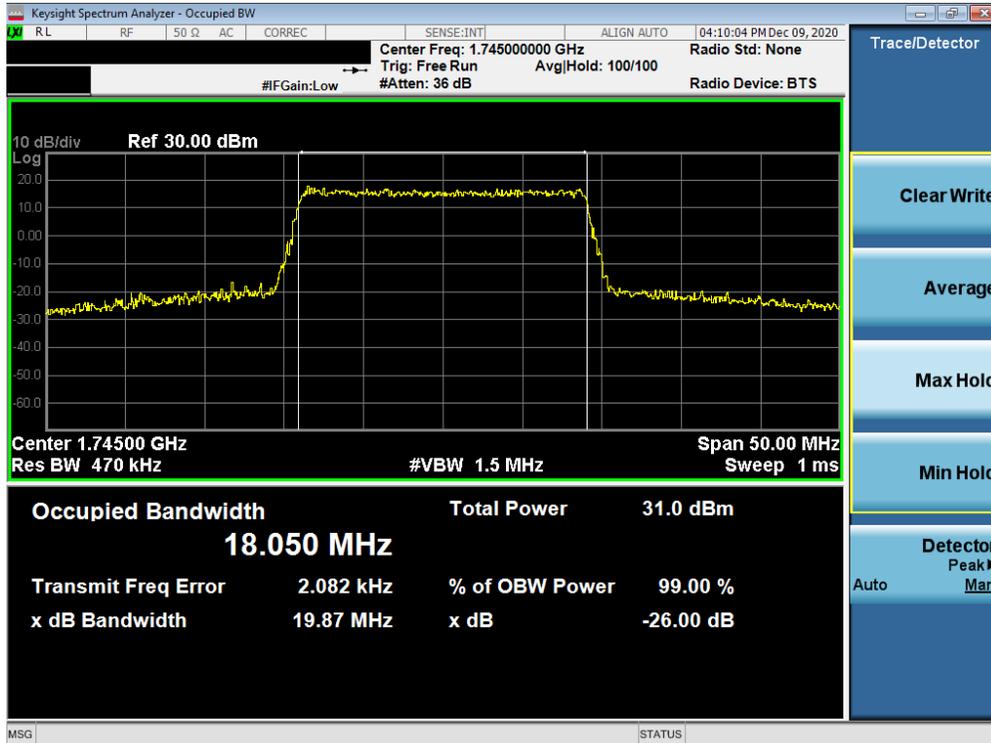


Plot 7-1. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz QPSK - Full RB Configuration)



Plot 7-2. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 13 of 129

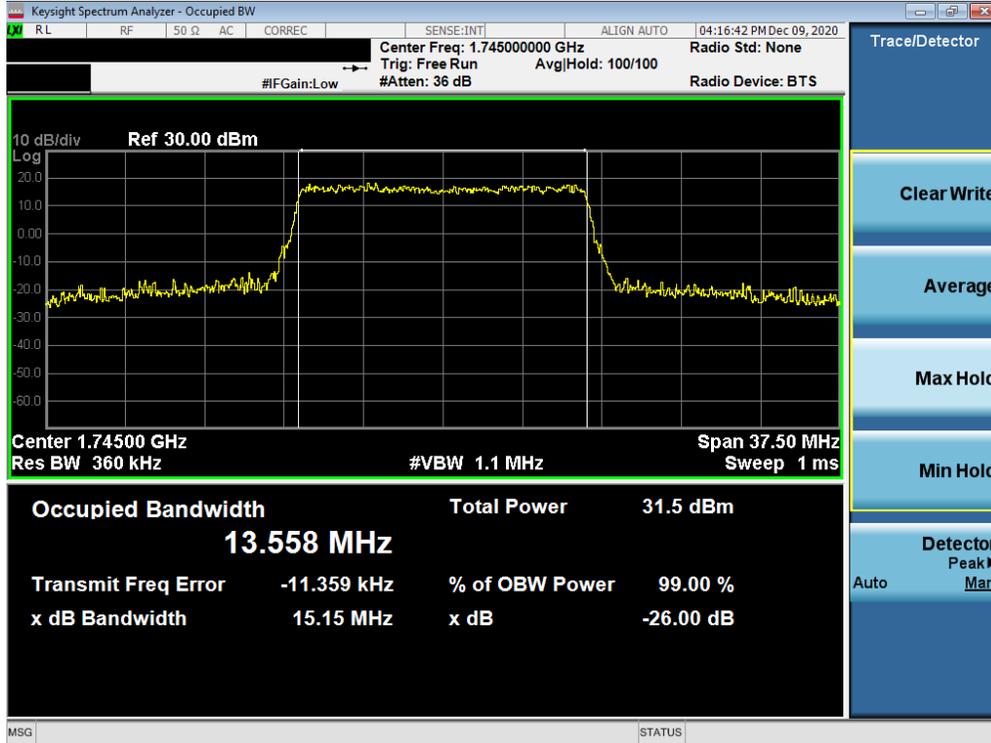


Plot 7-3. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 64-QAM - Full RB Configuration)

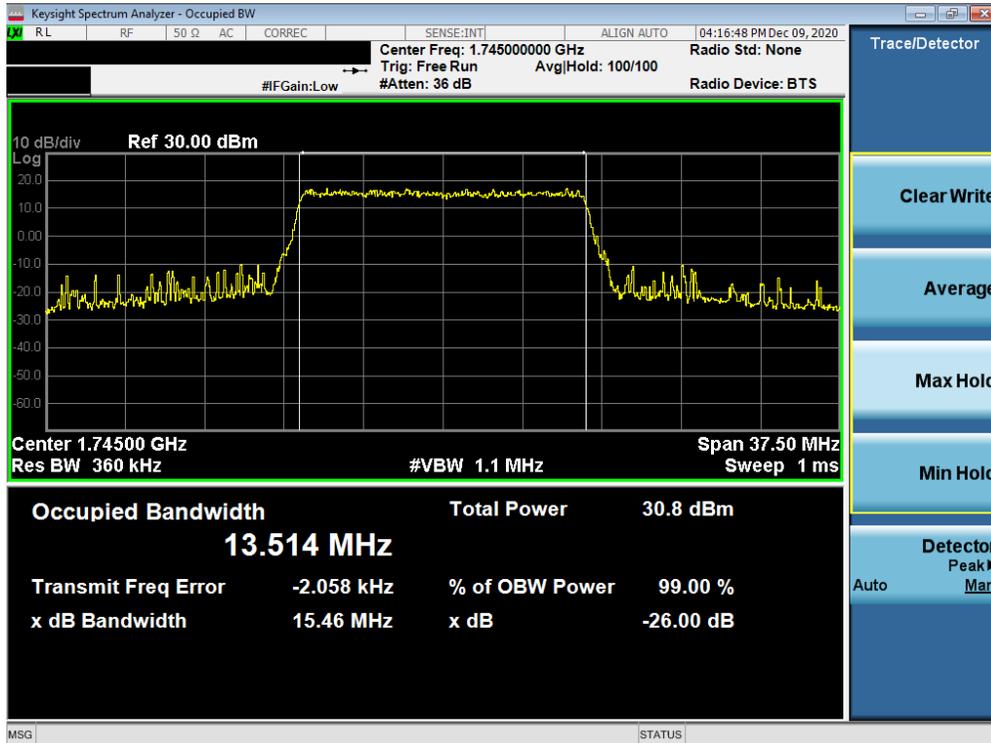


Plot 7-4. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 14 of 129

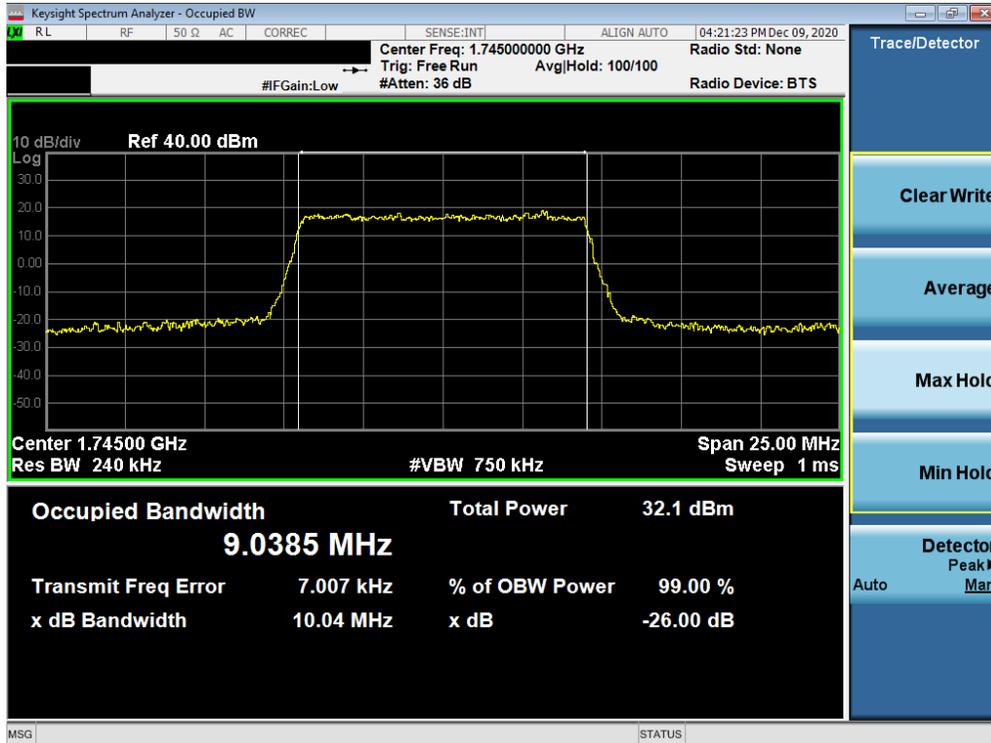


Plot 7-5. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 16-QAM - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 15 of 129

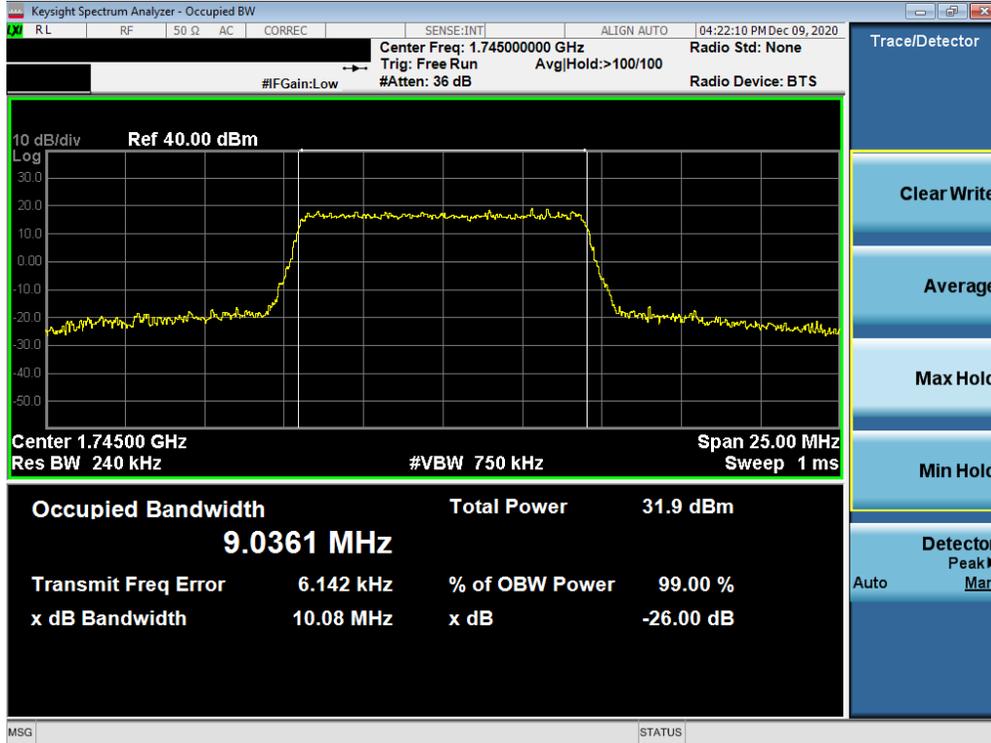


Plot 7-7. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz QPSK - Full RB Configuration)

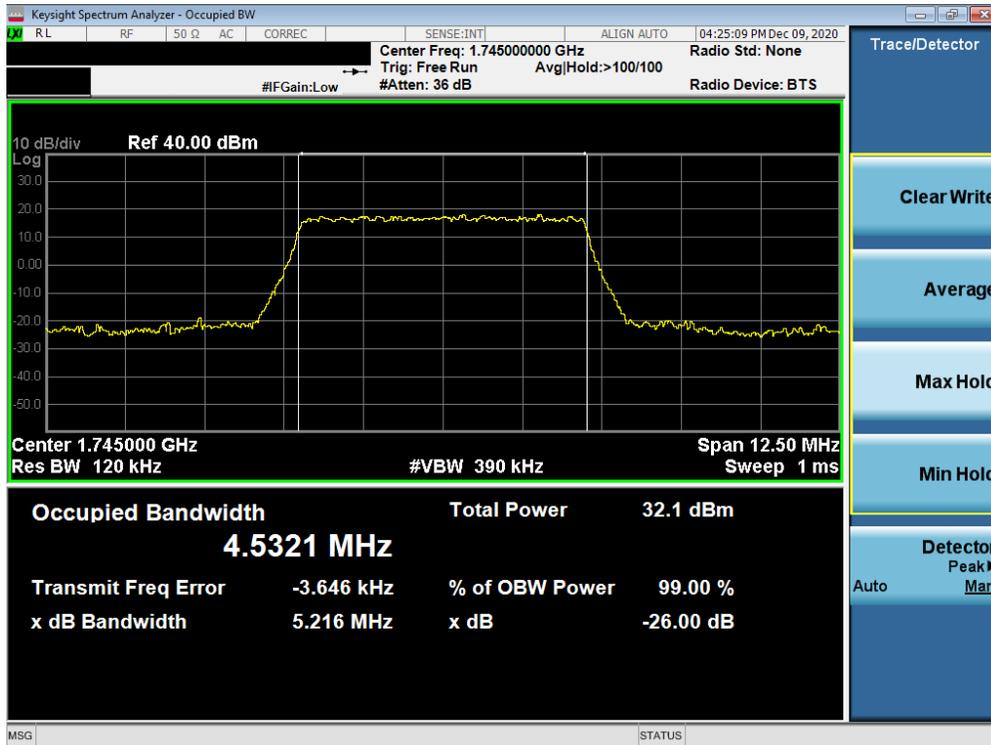


Plot 7-8. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 16 of 129

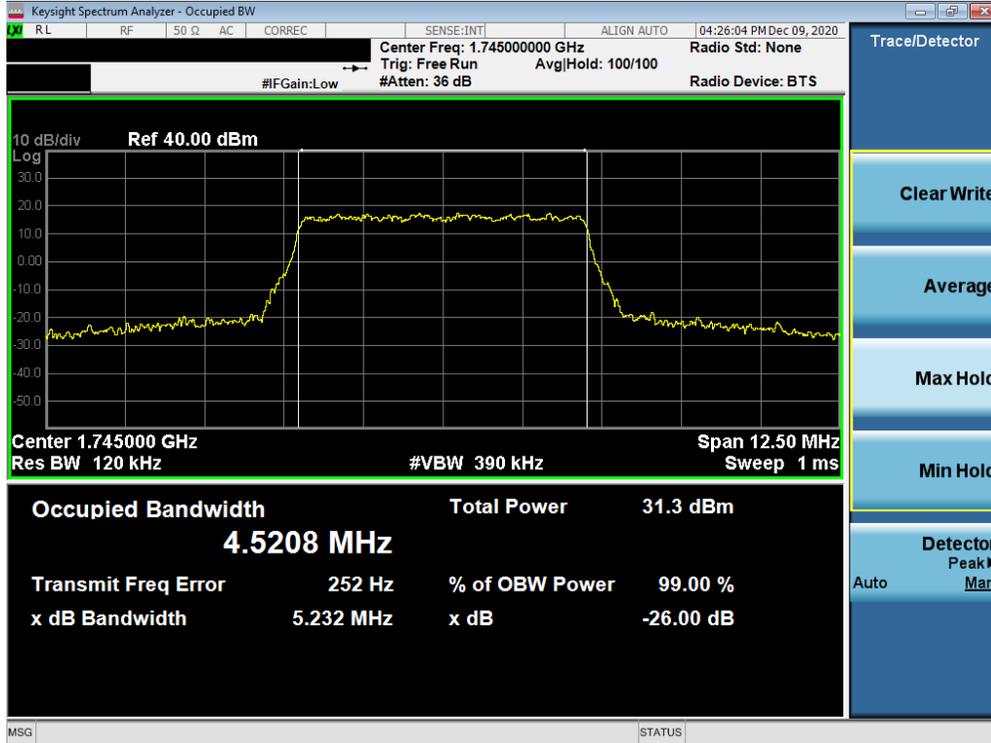


Plot 7-9. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 64-QAM - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 17 of 129

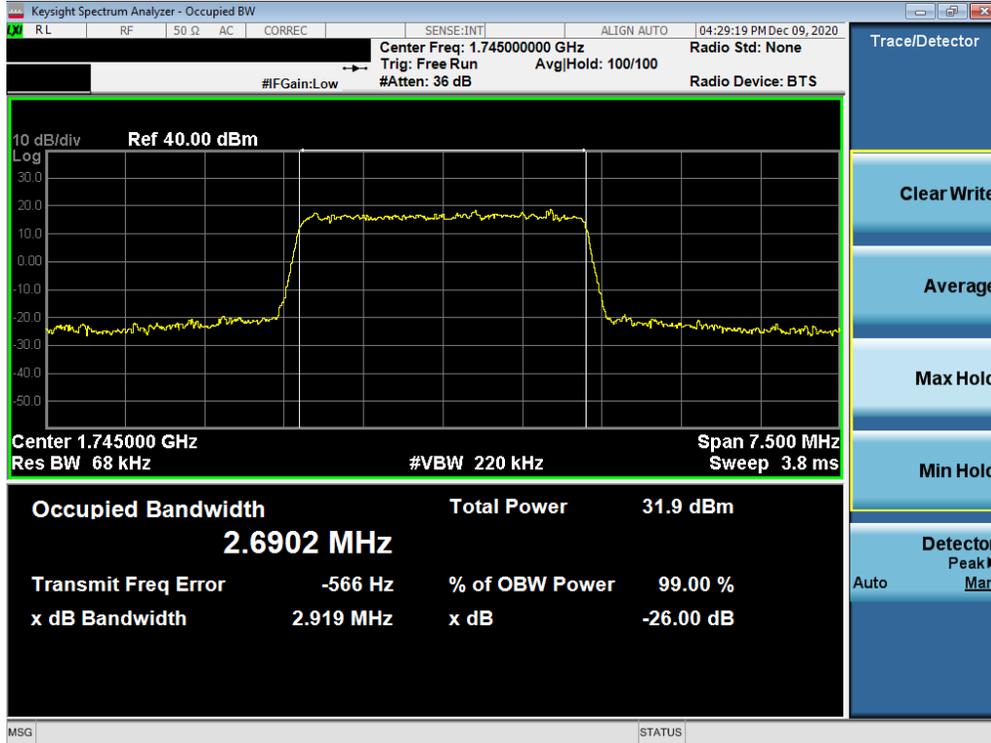


Plot 7-11. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 16-QAM - Full RB Configuration)

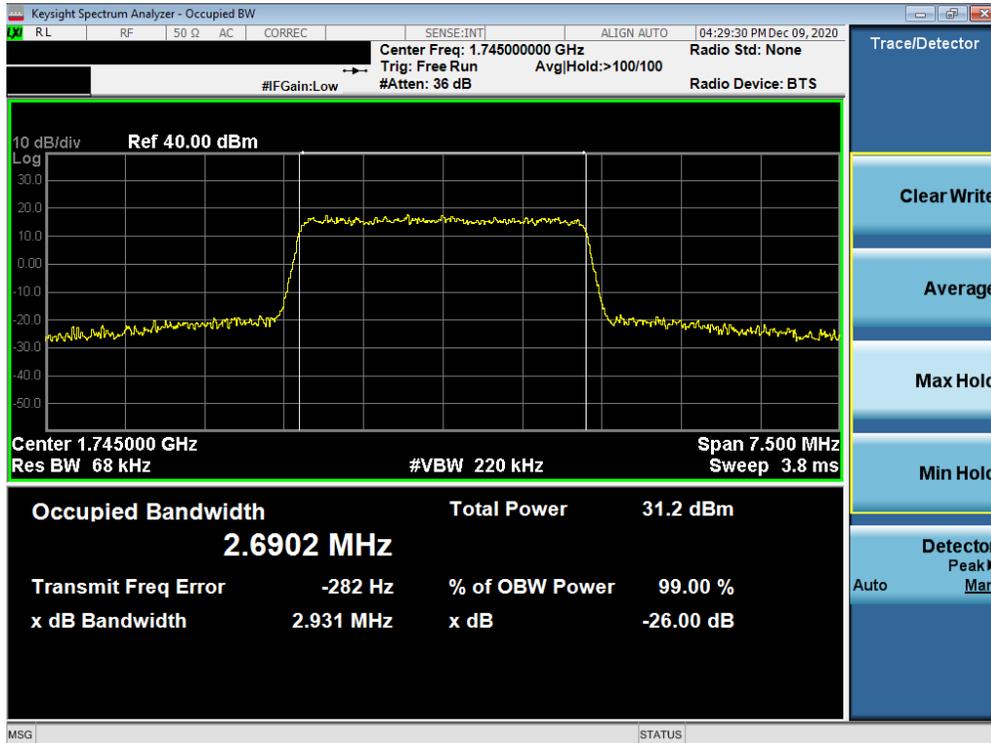


Plot 7-12. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 18 of 129



Plot 7-13. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 19 of 129

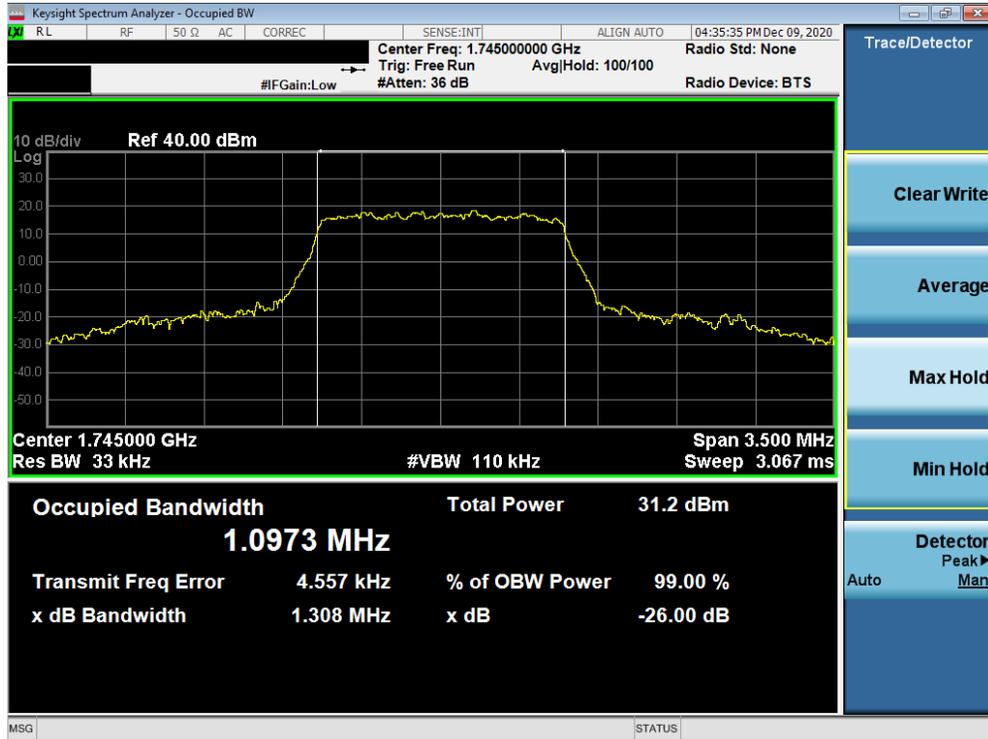


Plot 7-15. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 64-QAM - Full RB Configuration)

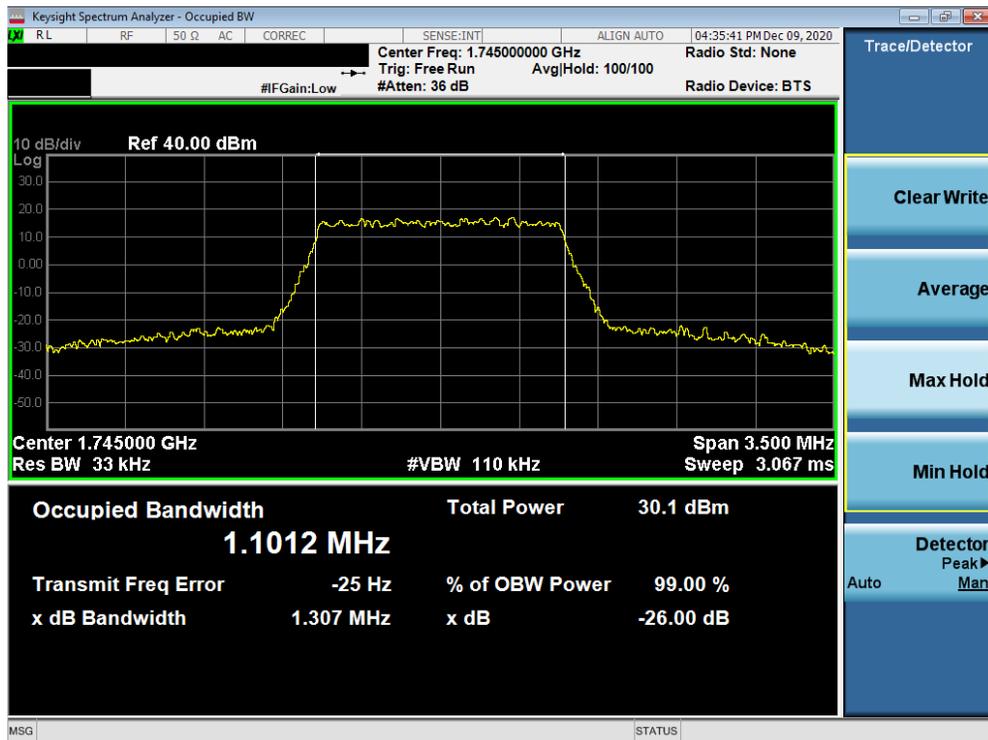


Plot 7-16. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 20 of 129



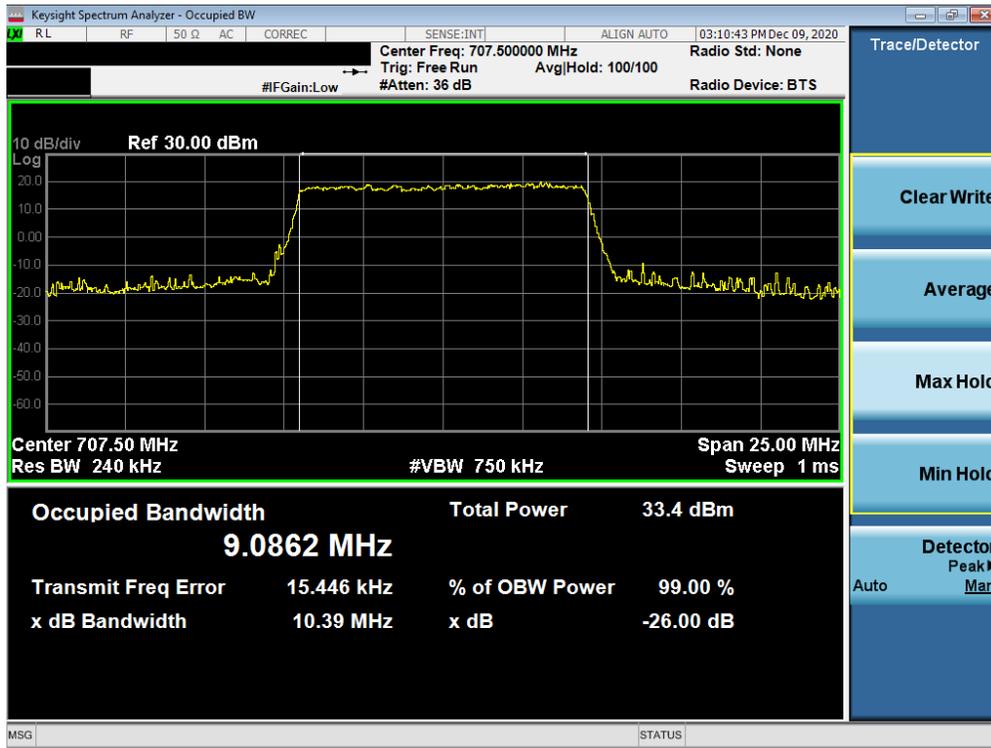
Plot 7-17. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)



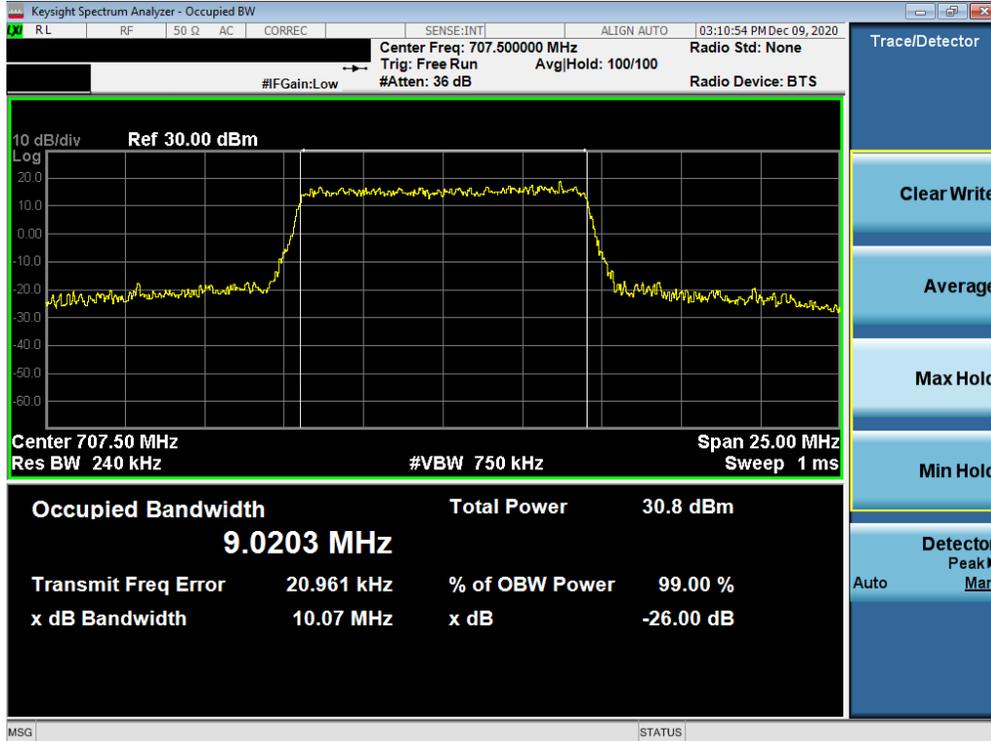
Plot 7-18. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 21 of 129

## LTE Band 12

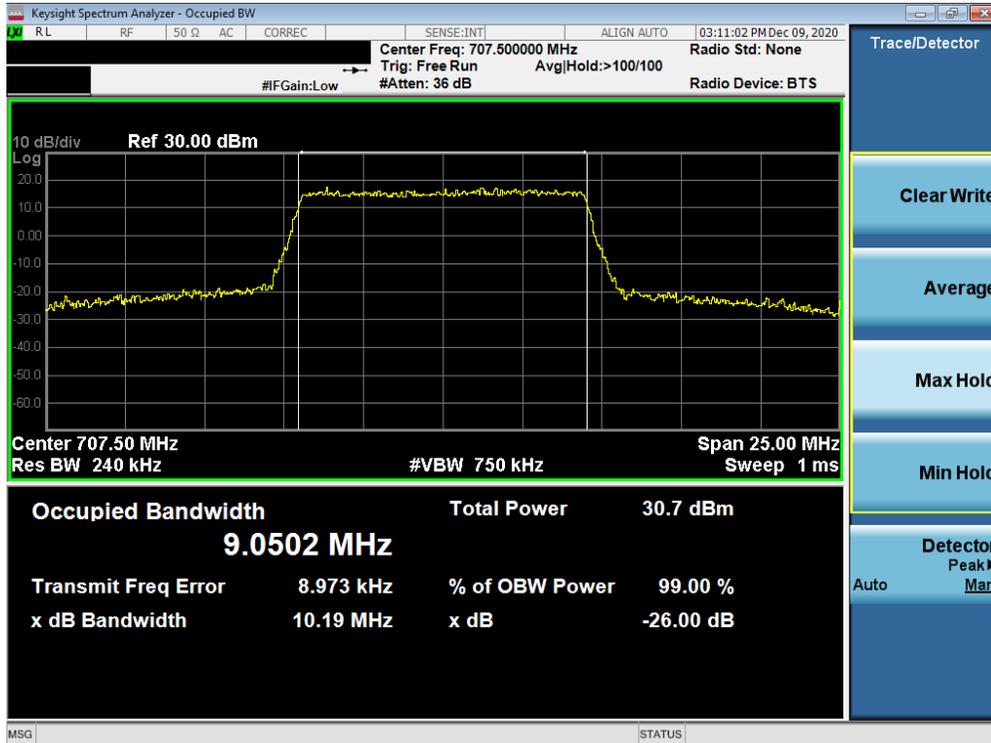


Plot 7-19. Occupied Bandwidth Plot (LTE Band 12 - 10MHz QPSK - Full RB Configuration)



Plot 7-20. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 22 of 129

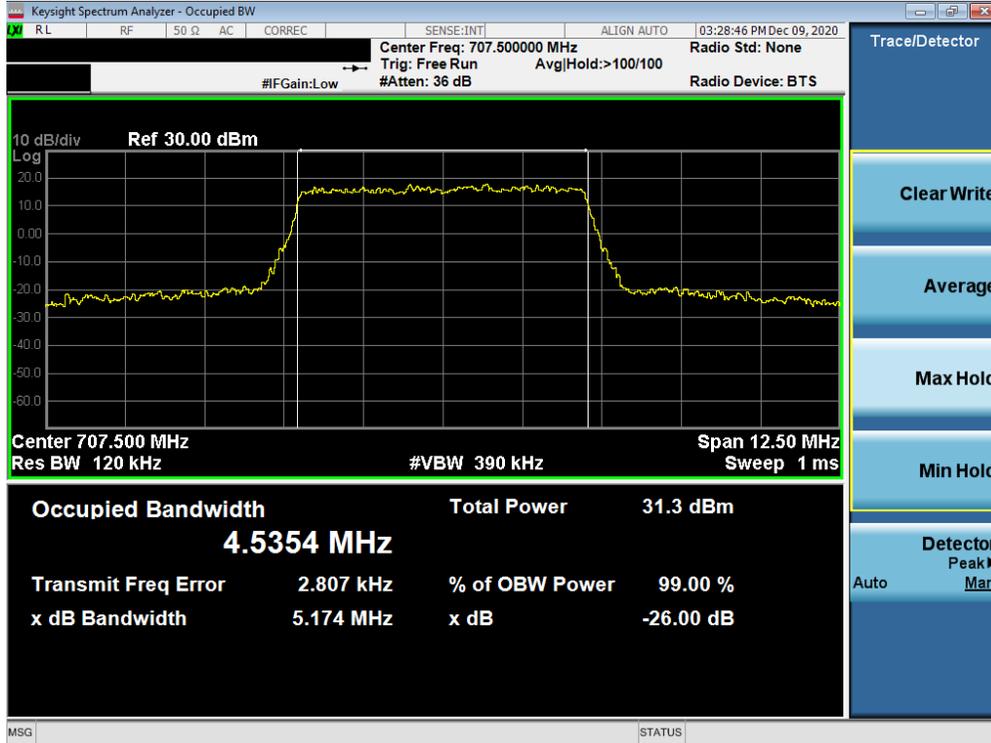


Plot 7-21. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 64-QAM - Full RB Configuration)

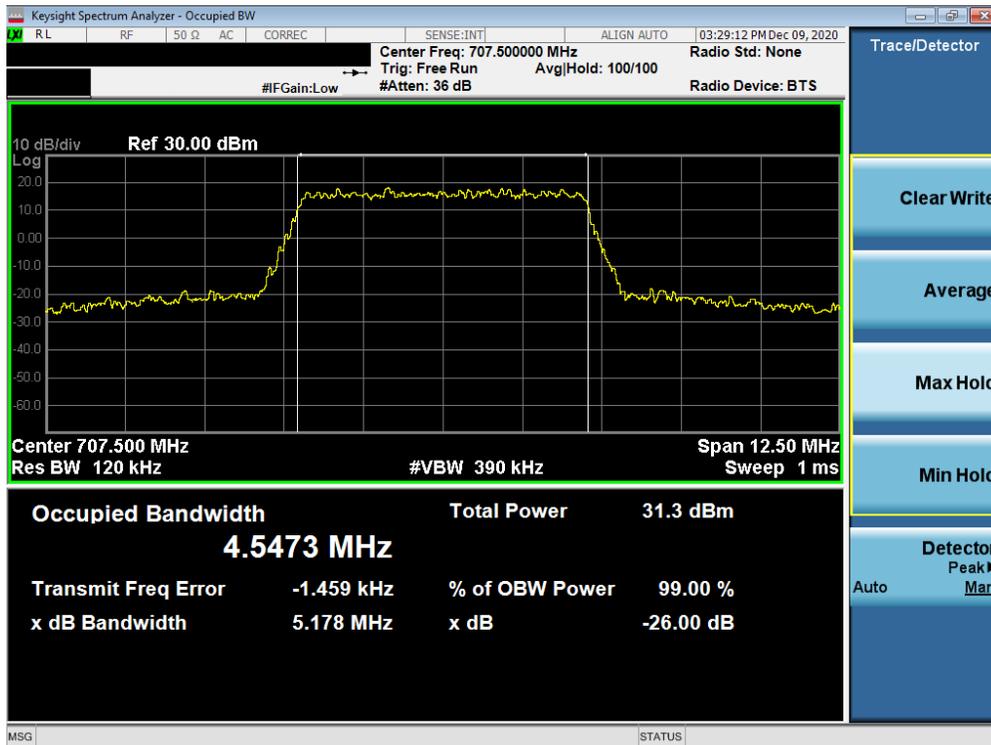


Plot 7-22. Occupied Bandwidth Plot (LTE Band 12 - 5MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 23 of 129

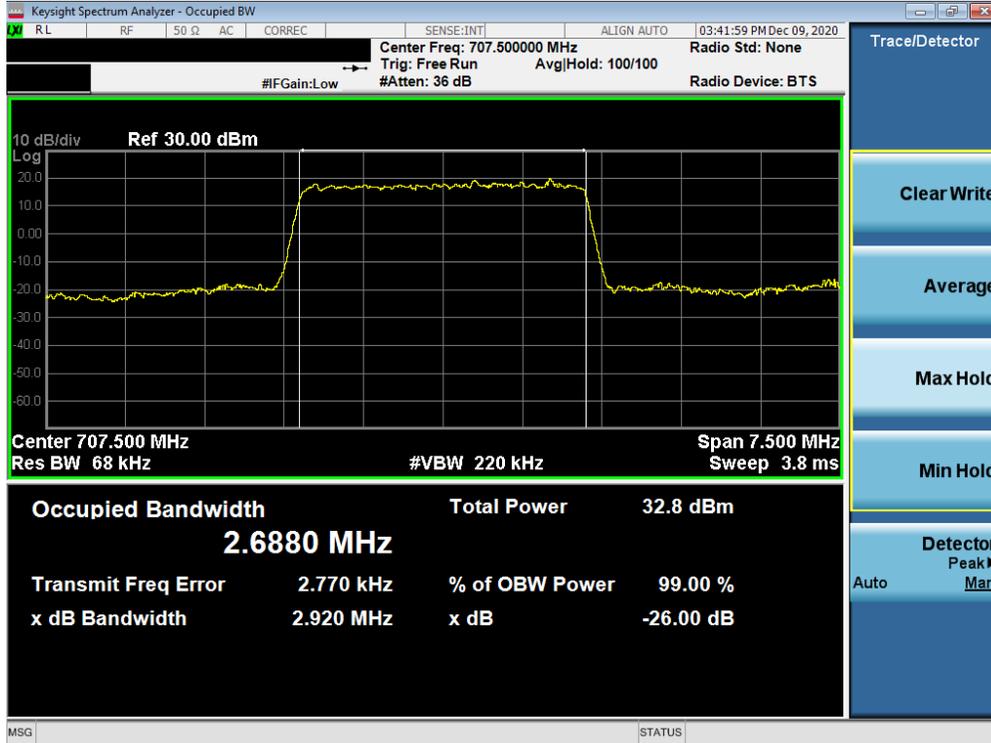


Plot 7-23. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 16-QAM - Full RB Configuration)

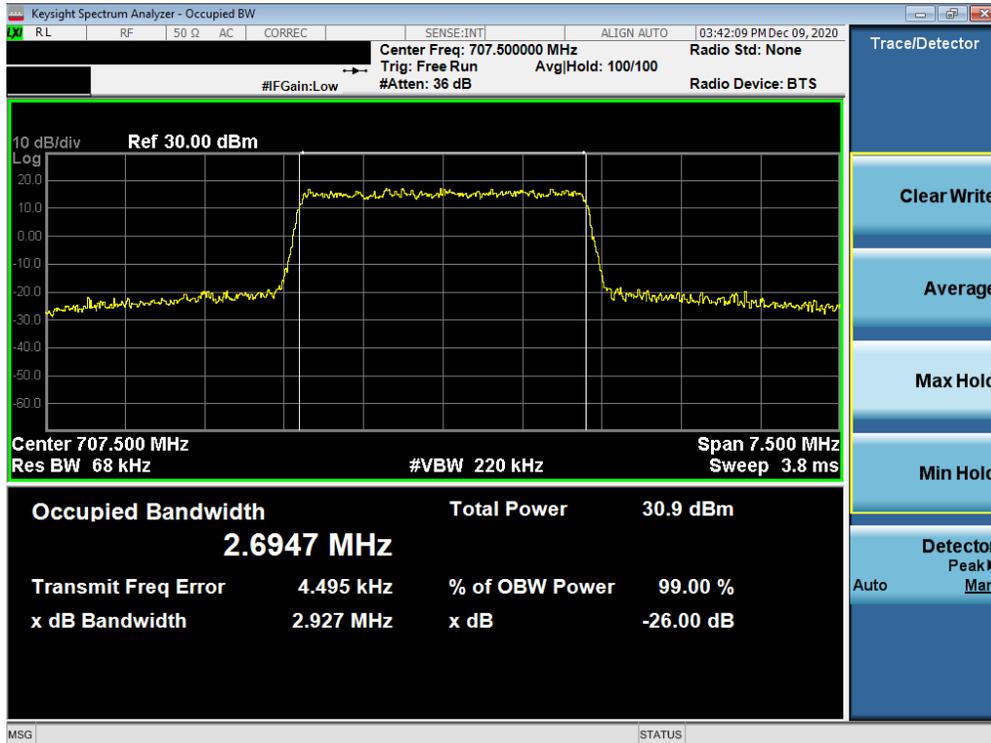


Plot 7-24. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 24 of 129



Plot 7-25. Occupied Bandwidth Plot (LTE Band 12 - 3MHz QPSK - Full RB Configuration)

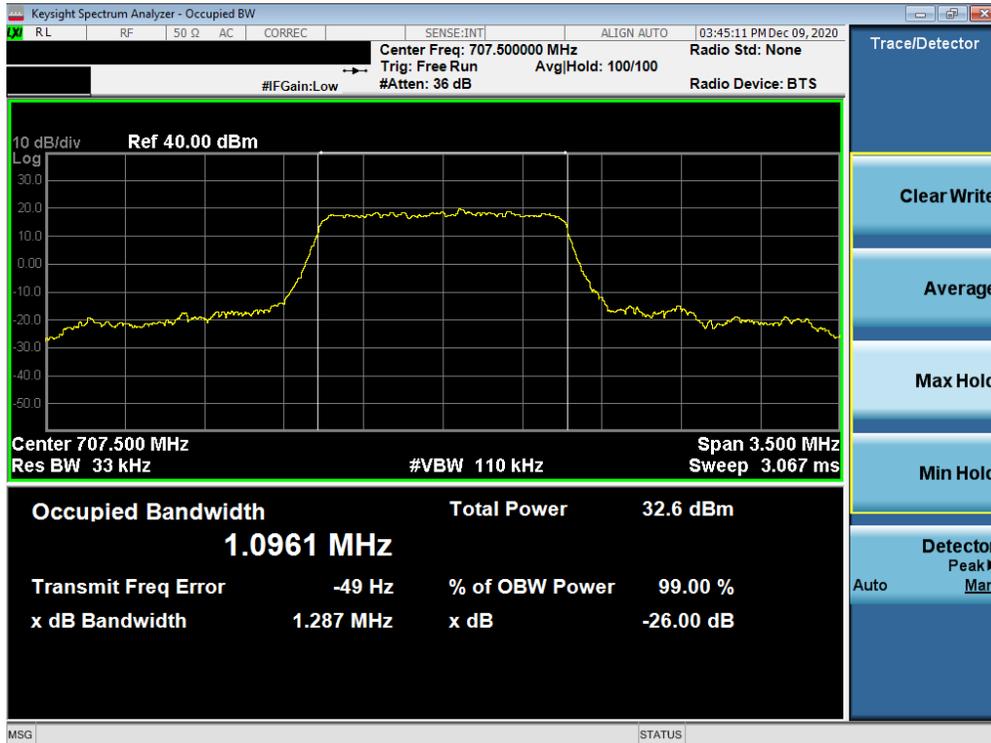


Plot 7-26. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 25 of 129

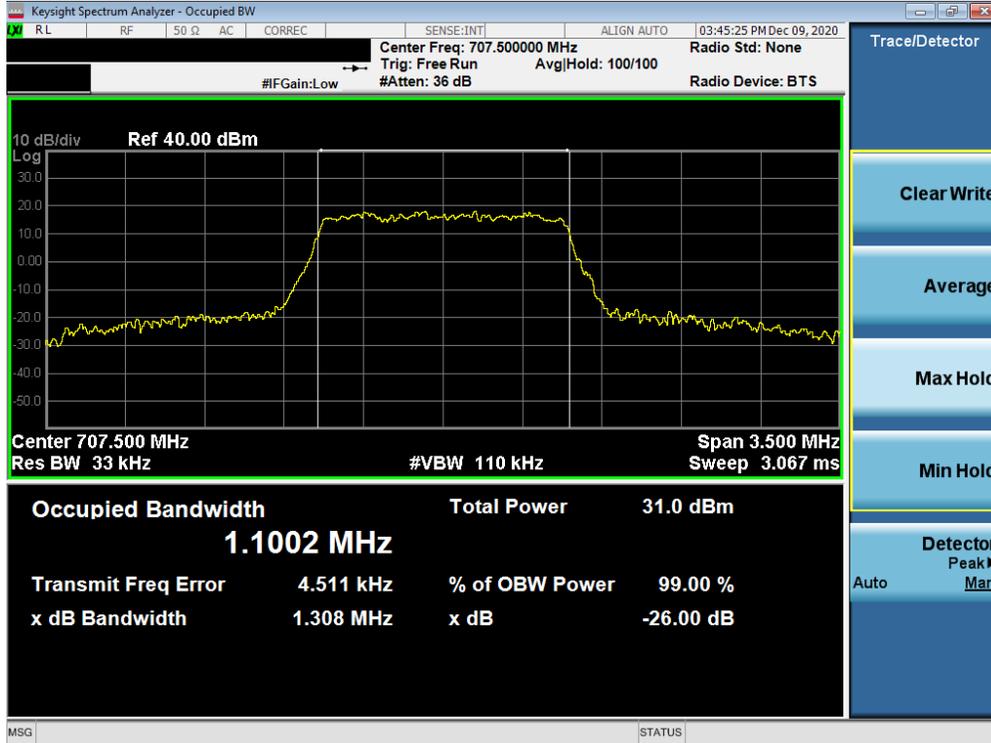


Plot 7-27. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 64-QAM - Full RB Configuration)

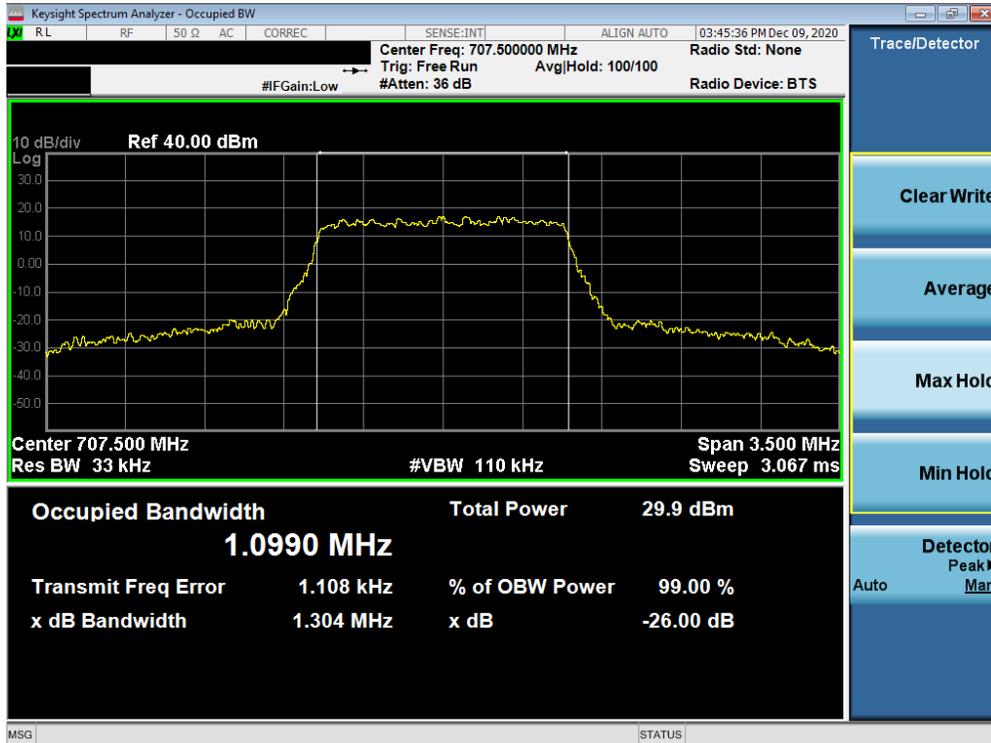


Plot 7-28. Occupied Bandwidth Plot (LTE Band 12 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 26 of 129



Plot 7-29. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 16-QAM - Full RB Configuration)



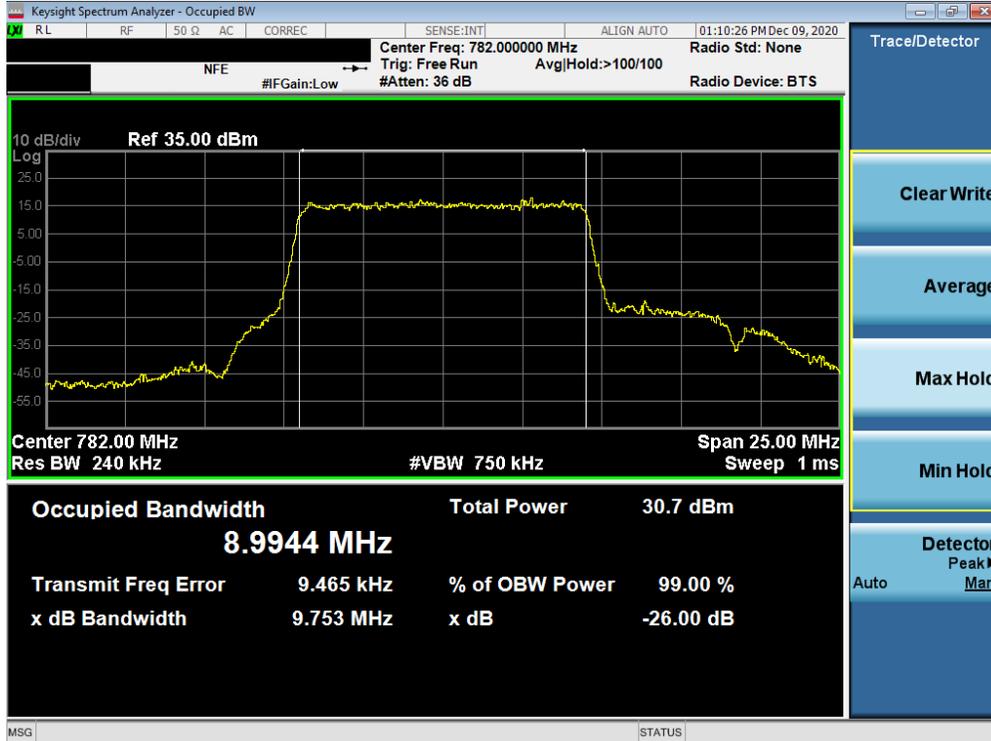
Plot 7-30. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 27 of 129

## LTE Band 13



Plot 7-31. Occupied Bandwidth Plot (LTE Band 13 - 10MHz QPSK - Full RB Configuration)

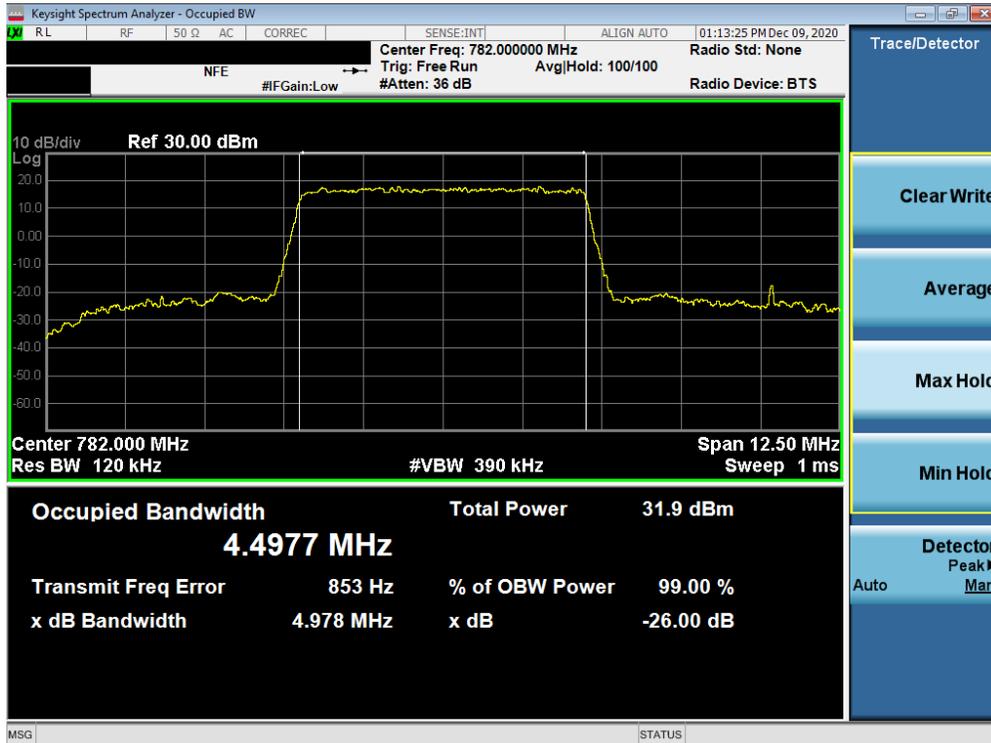


Plot 7-32. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 28 of 129

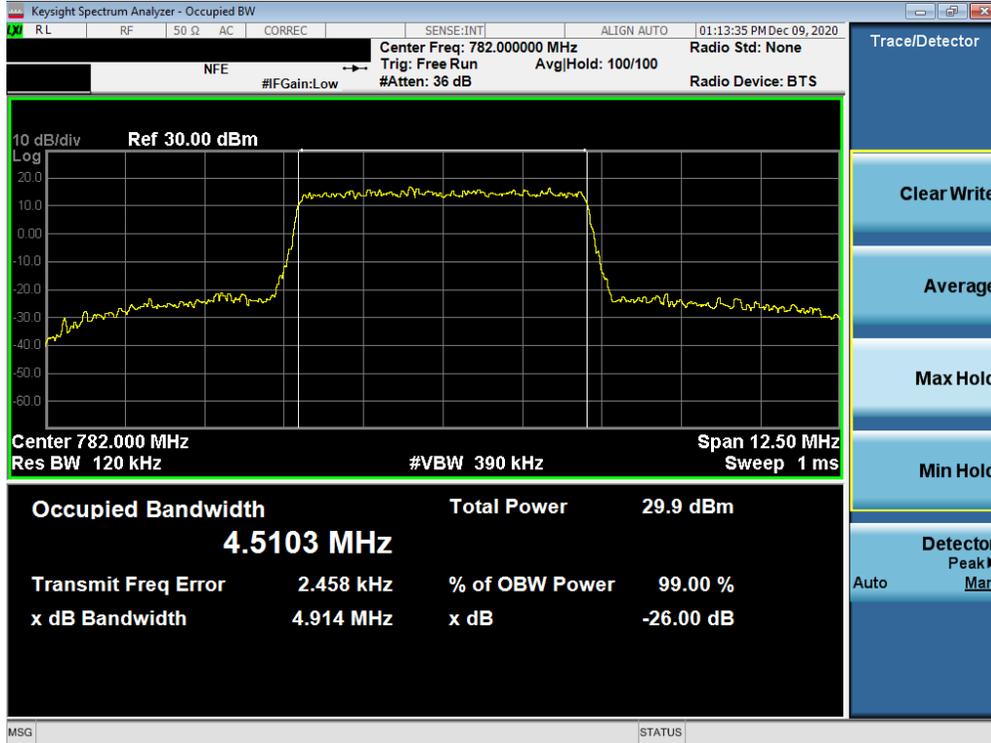


Plot 7-33. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 64-QAM - Full RB Configuration)



Plot 7-34. Occupied Bandwidth Plot (LTE Band 13 - 5MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 29 of 129



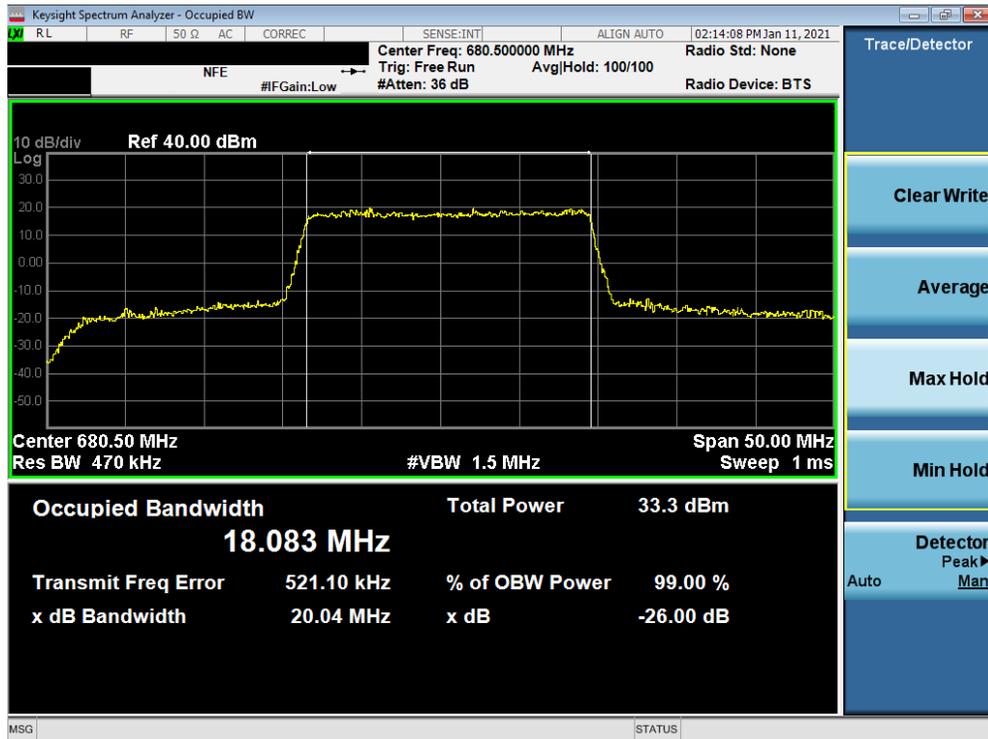
Plot 7-35. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 16-QAM - Full RB Configuration)



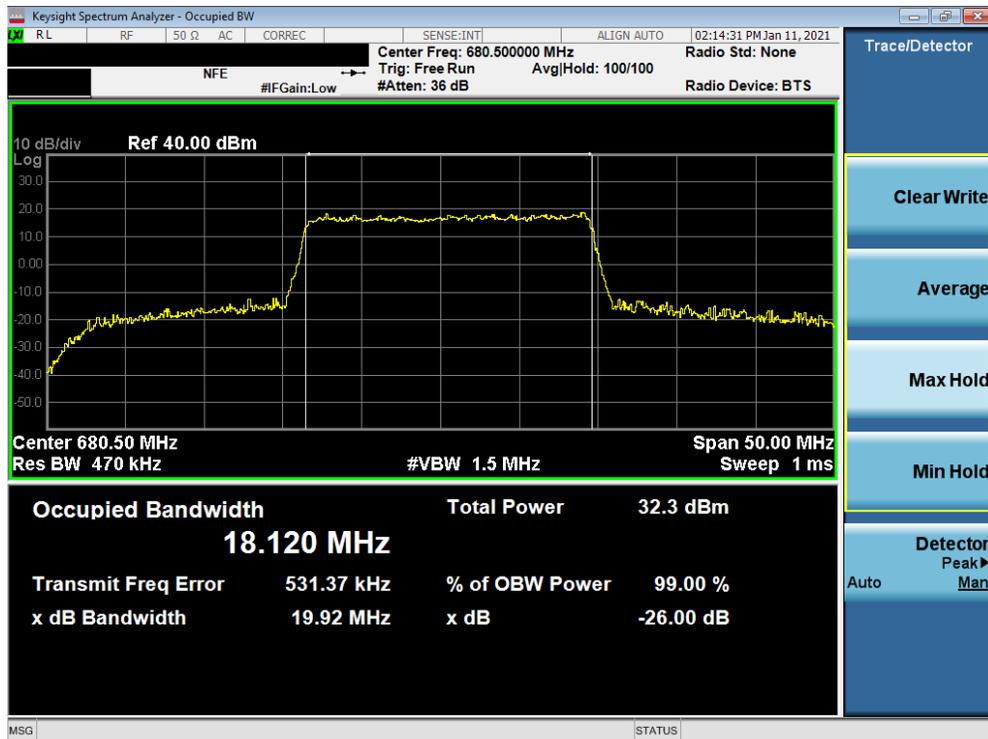
Plot 7-36. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 30 of 129

## LTE Band 71



Plot 7-37. Occupied Bandwidth Plot (LTE Band 71 - 20MHz QPSK - Full RB Configuration)

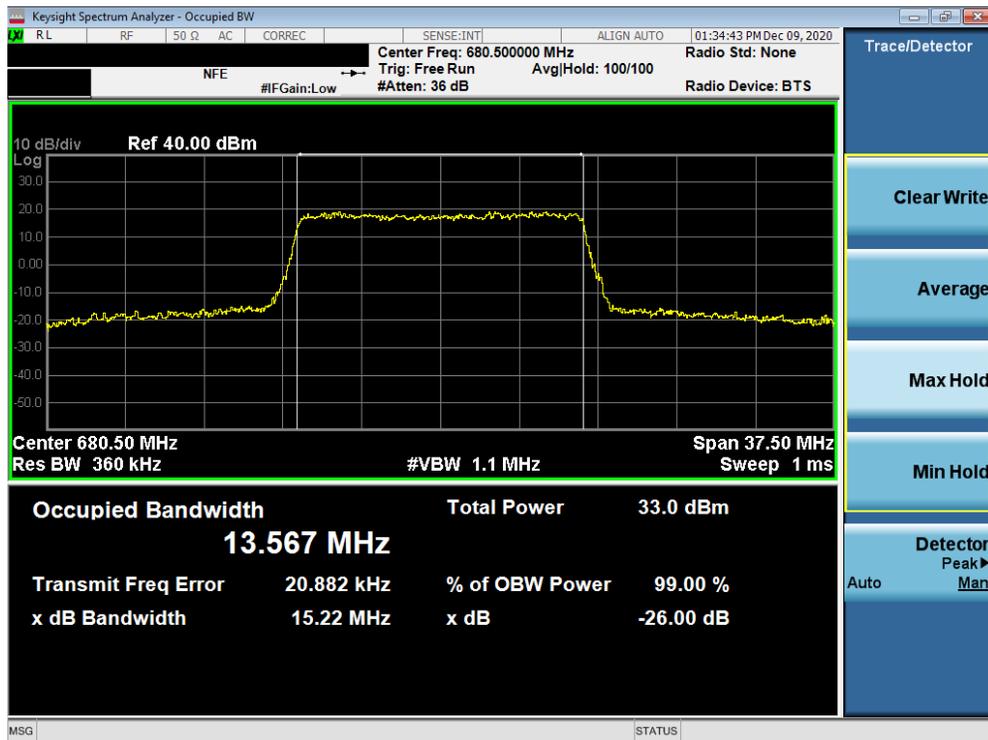


Plot 7-38. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 31 of 129

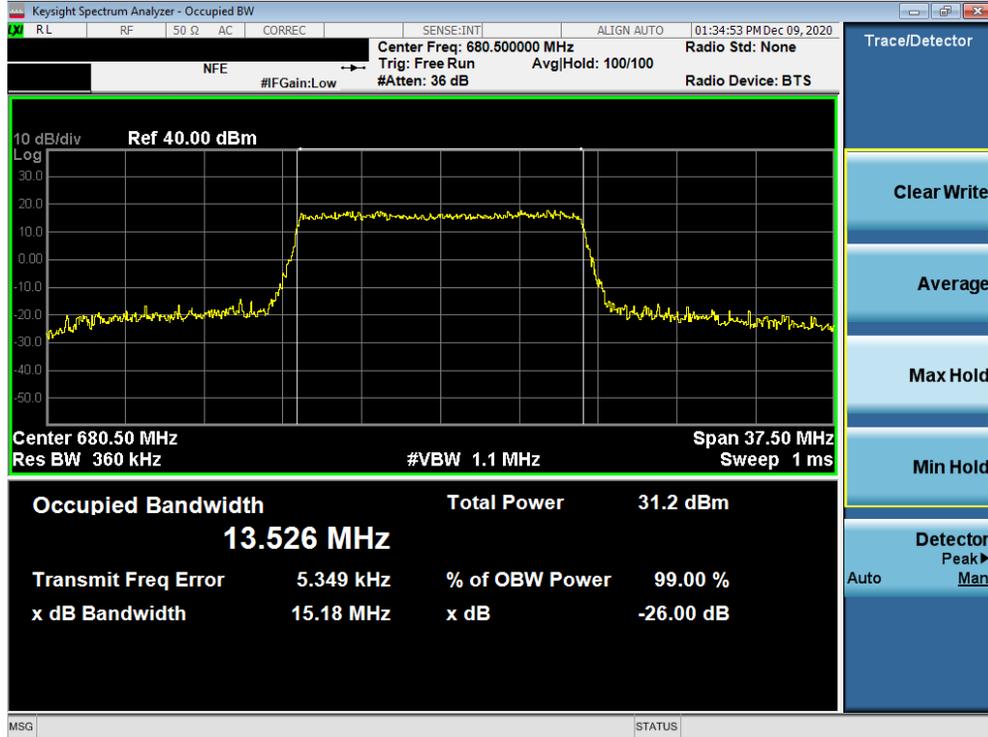


Plot 7-39. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 64-QAM - Full RB Configuration)

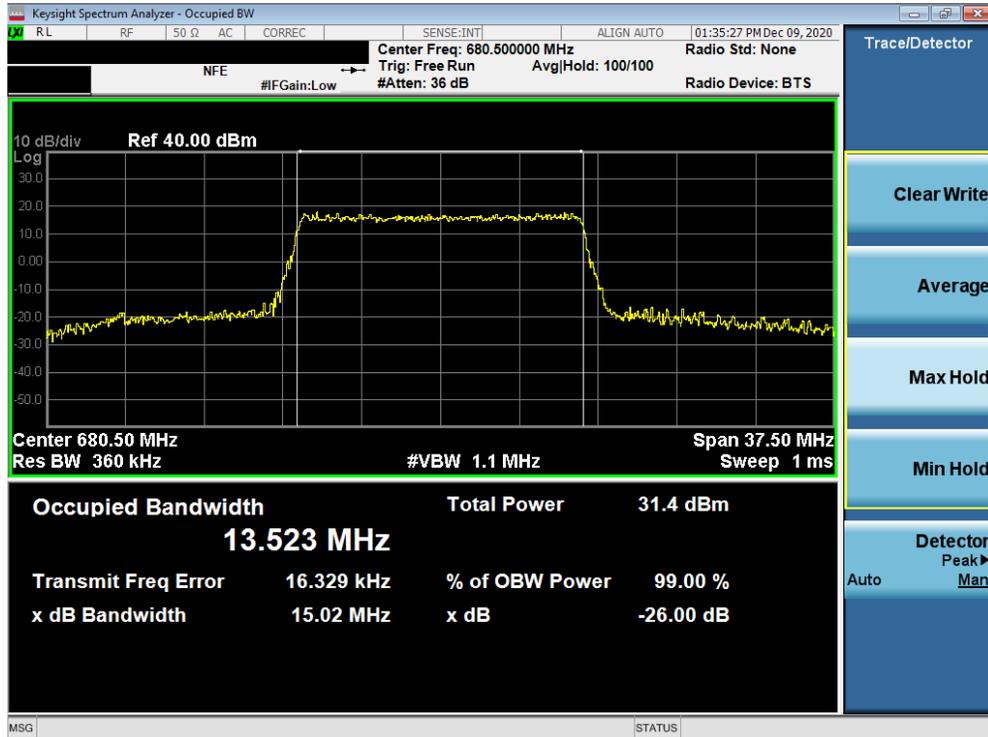


Plot 7-40. Occupied Bandwidth Plot (LTE Band 71 - 15MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 32 of 129

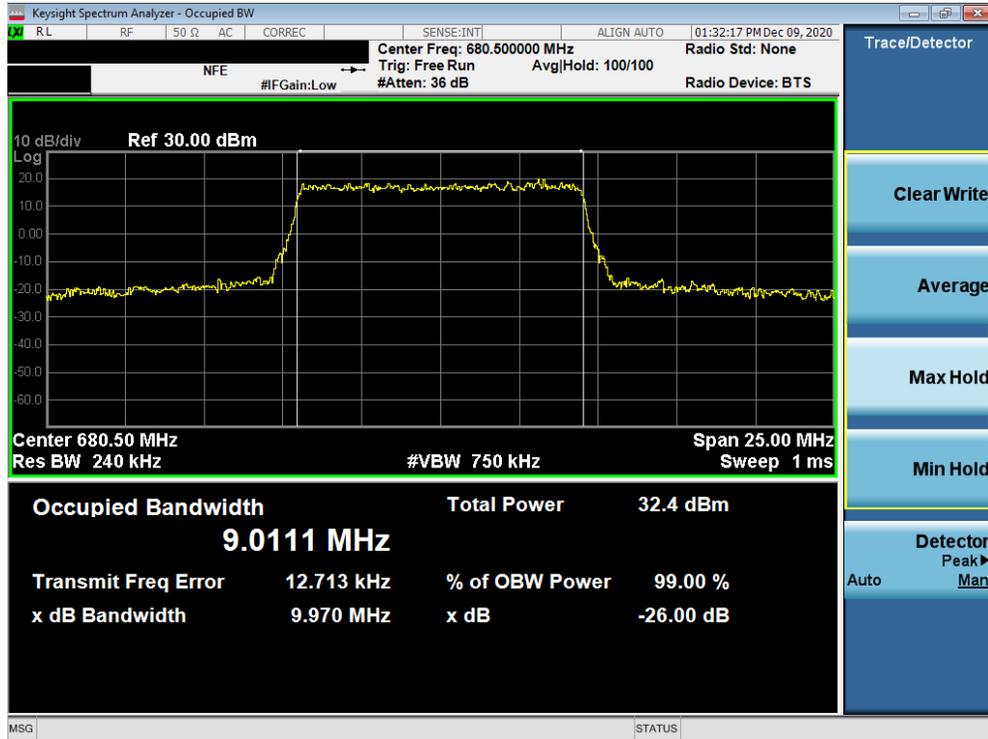


Plot 7-41. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 16-QAM - Full RB Configuration)

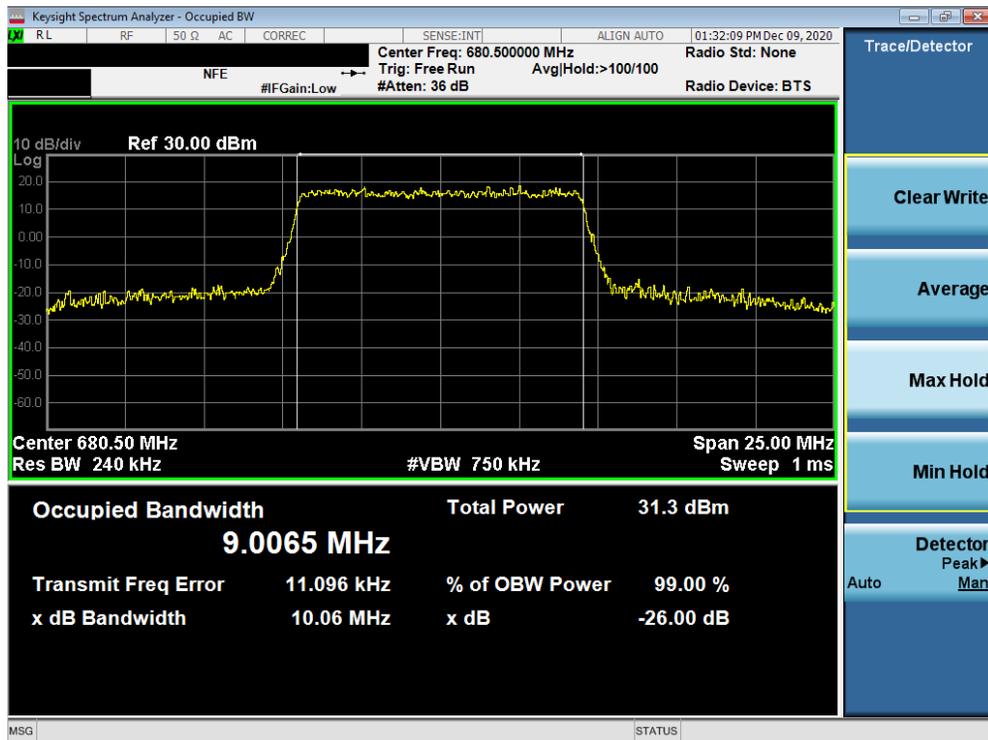


Plot 7-42. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 33 of 129

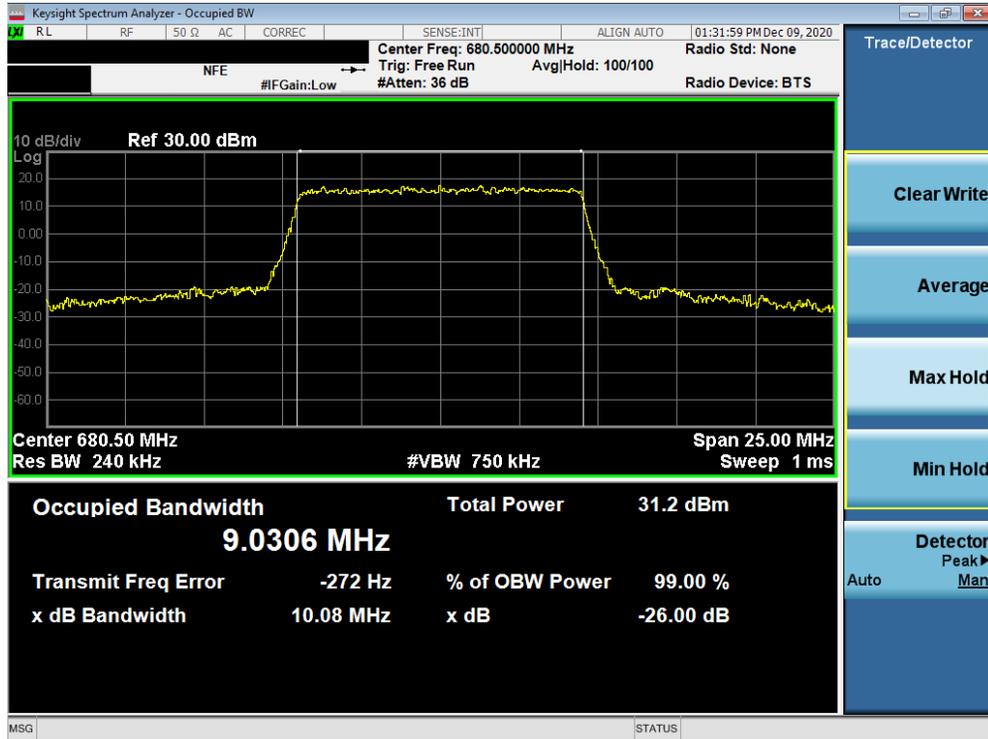


Plot 7-43. Occupied Bandwidth Plot (LTE Band 71 - 10MHz QPSK - Full RB Configuration)

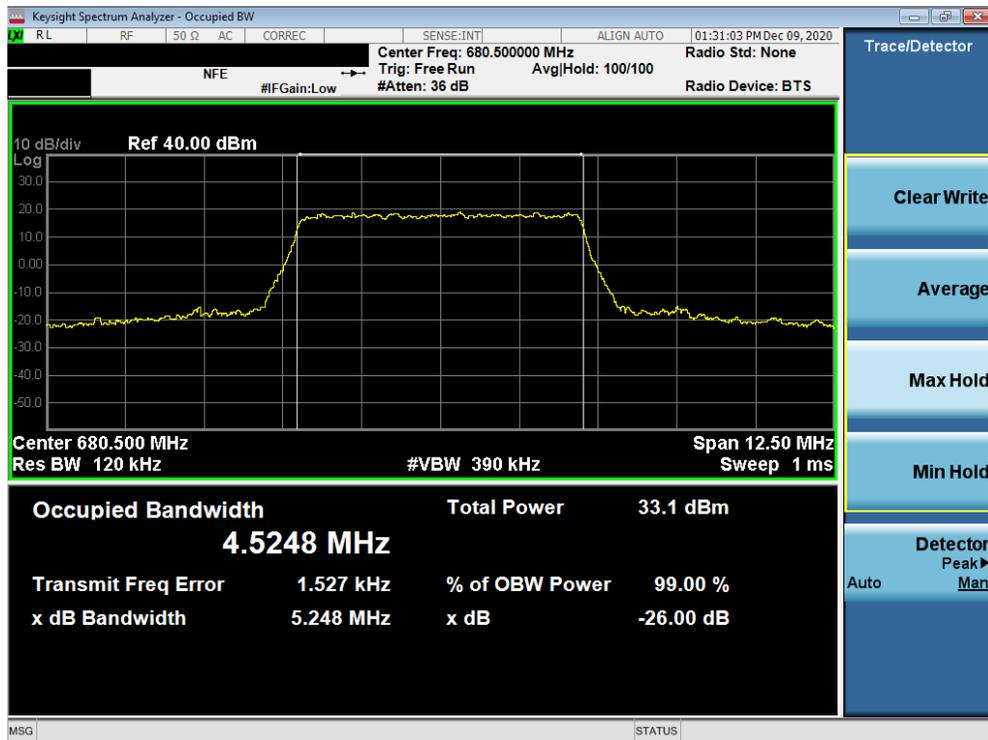


Plot 7-44. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 34 of 129

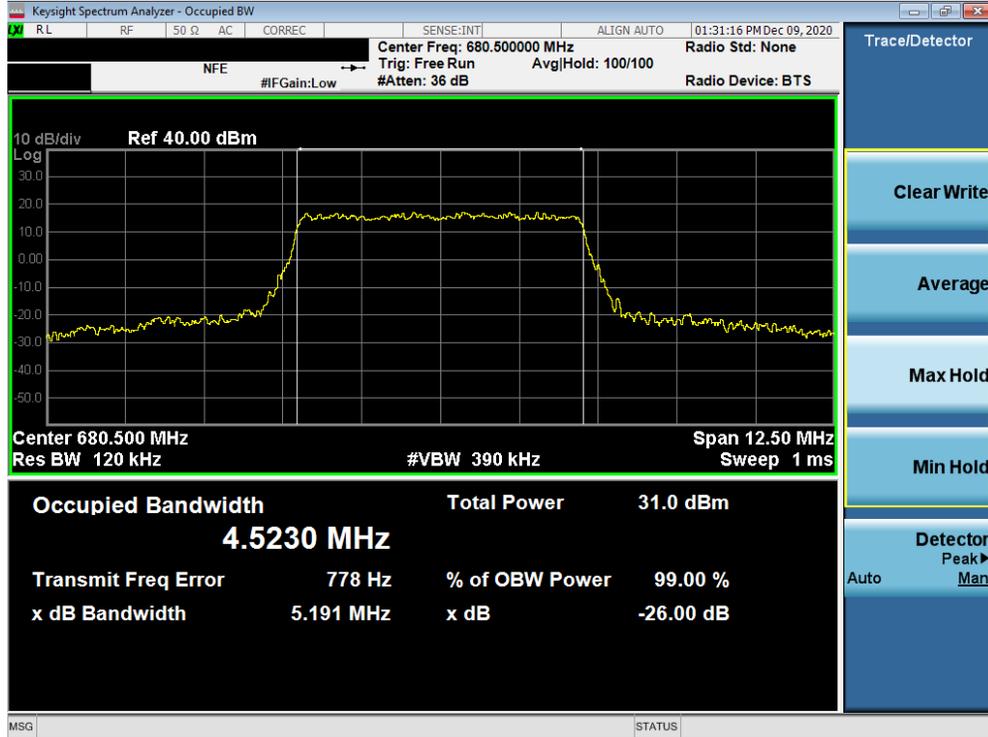


Plot 7-45. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 64-QAM - Full RB Configuration)

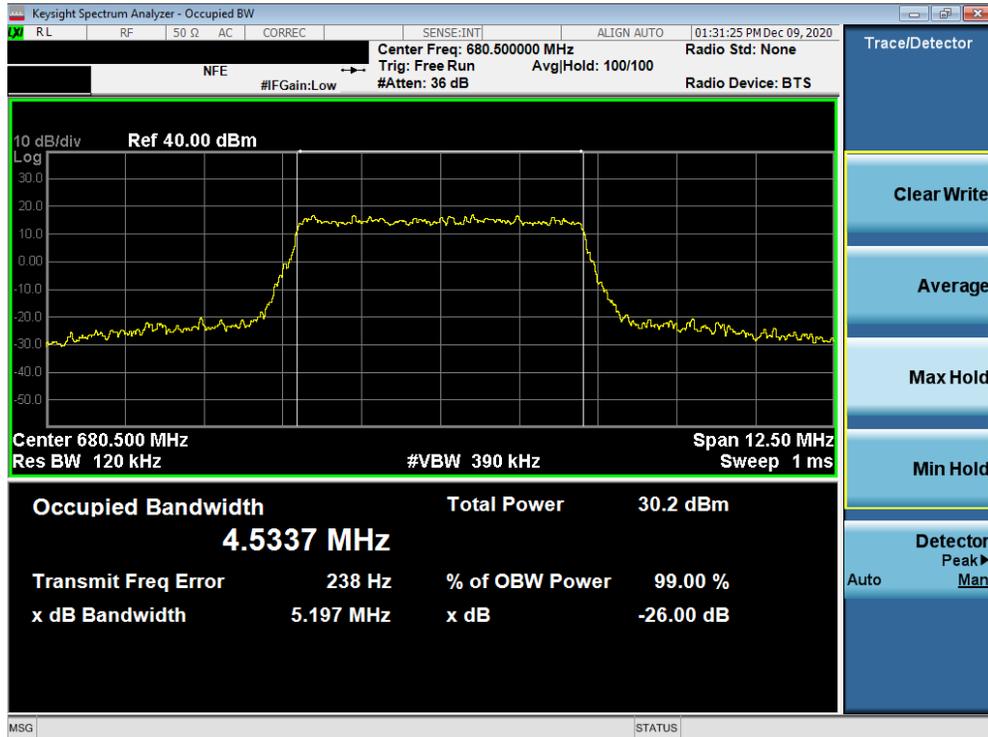


Plot 7-46. Occupied Bandwidth Plot (LTE Band 71 - 5MHz QPSK - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 35 of 129



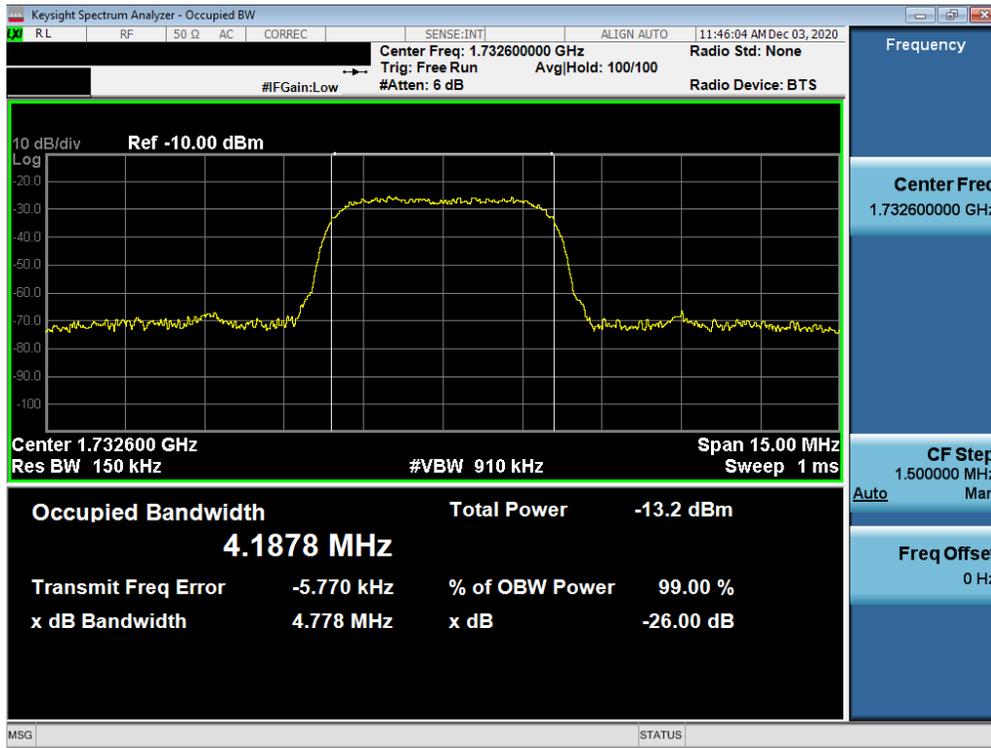
Plot 7-47. Occupied Bandwidth Plot (LTE Band 71 – 5MHz 16-QAM - Full RB Configuration)



Plot 7-48. Occupied Bandwidth Plot (LTE Band 71 – 5MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 36 of 129

**WCDMA AWS**



**Plot 7-49. Occupied Bandwidth Plot (WCDMA, Ch. 1413)**

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	<b>PART 27 MEASUREMENT REPORT</b>	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 37 of 129

### 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 10<sup>th</sup> 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 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  $43 + 10 \log_{10}(P_{[Watts]})$ , where  $P$  is the transmitter power in 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 18GHz (separated into at least two plots per channel)
2. RBW  $\geq$  100kHz
3. VBW  $\geq$  3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

#### Test Setup

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

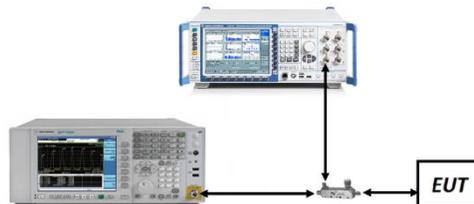


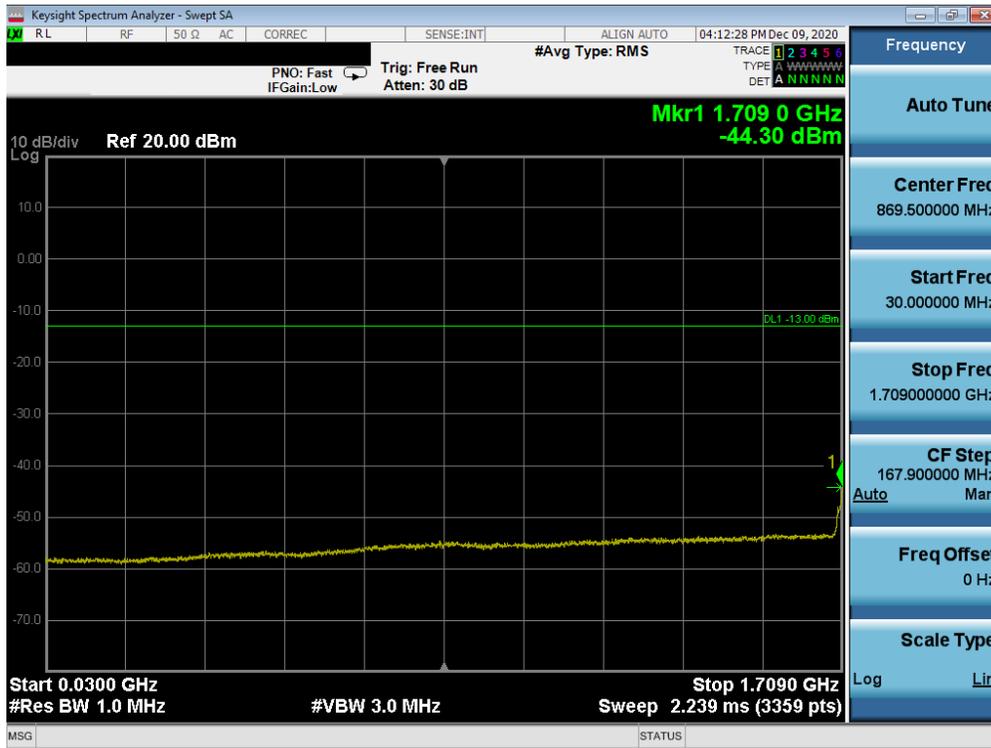
Figure 7-2. Test Instrument & Measurement Setup

#### Test Notes

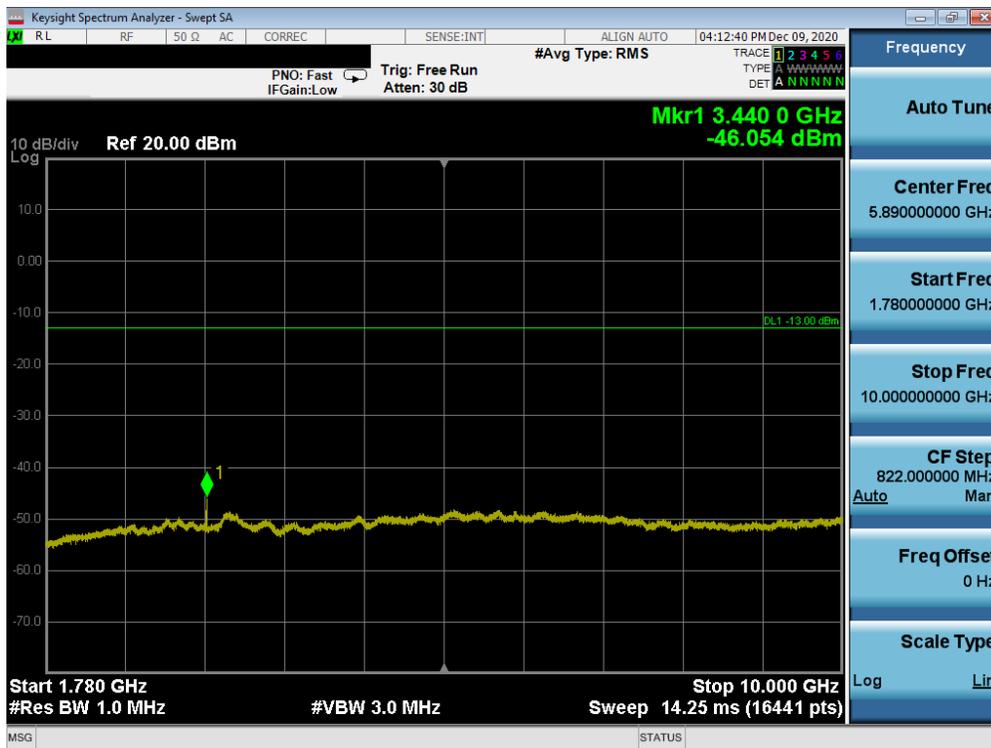
Per Part 27 and RSS-139, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth 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: ZNFK420TM	 <b>PCTEST</b> Proud to be part of element	<b>PART 27 MEASUREMENT REPORT</b>	 <b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 38 of 129

### LTE Band 66/4

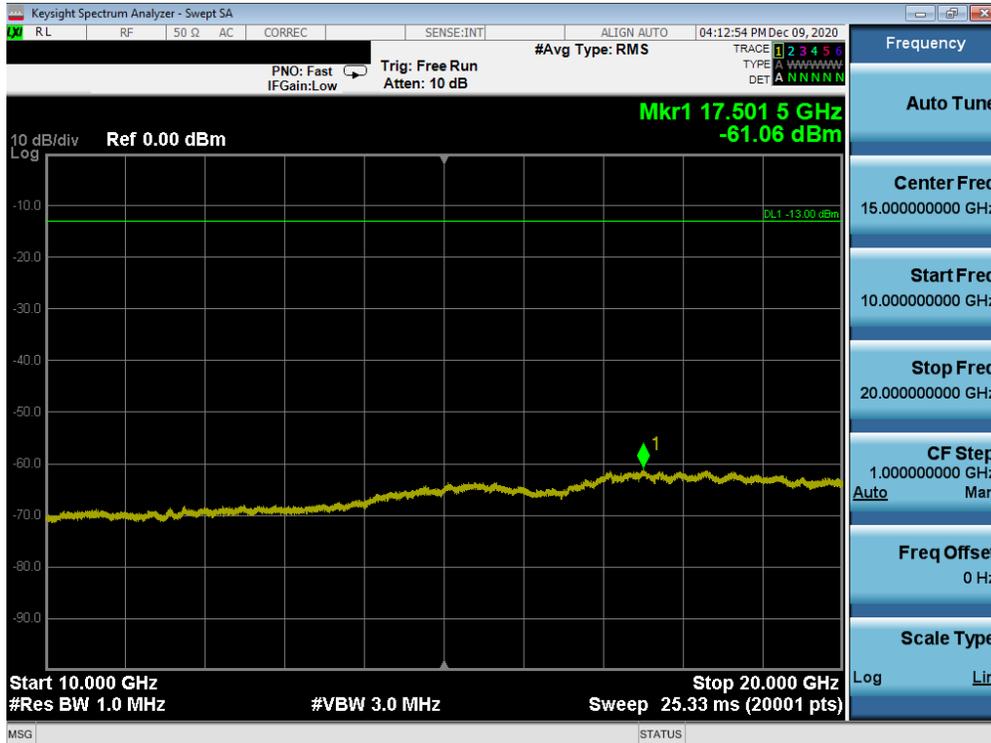


Plot 7-50. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-51. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 39 of 129

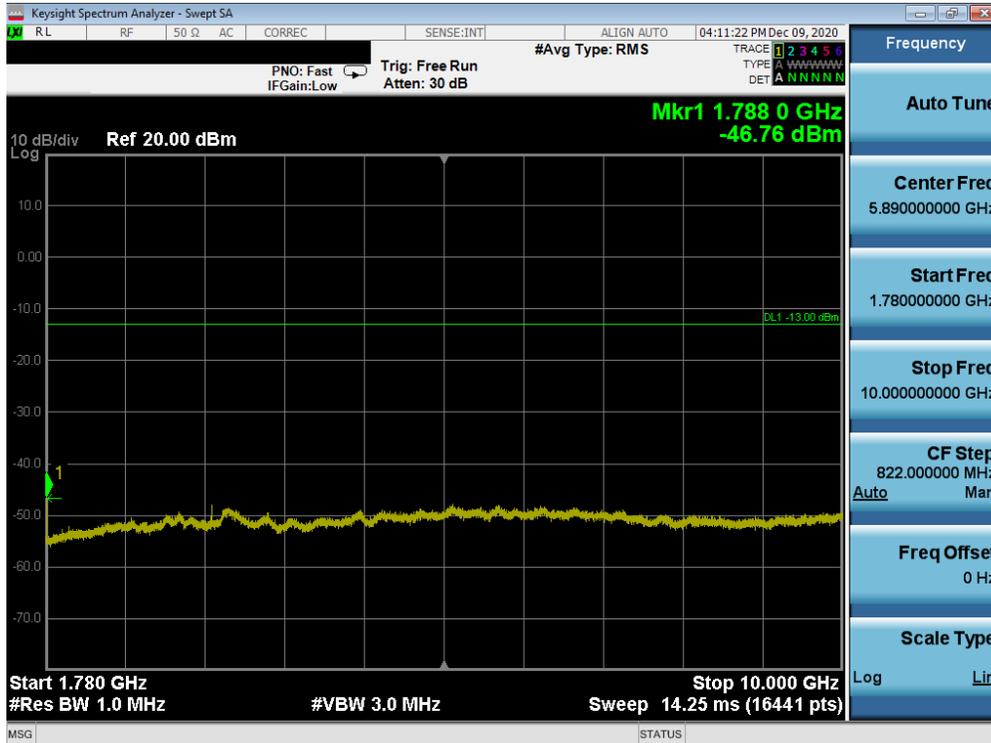


Plot 7-52. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

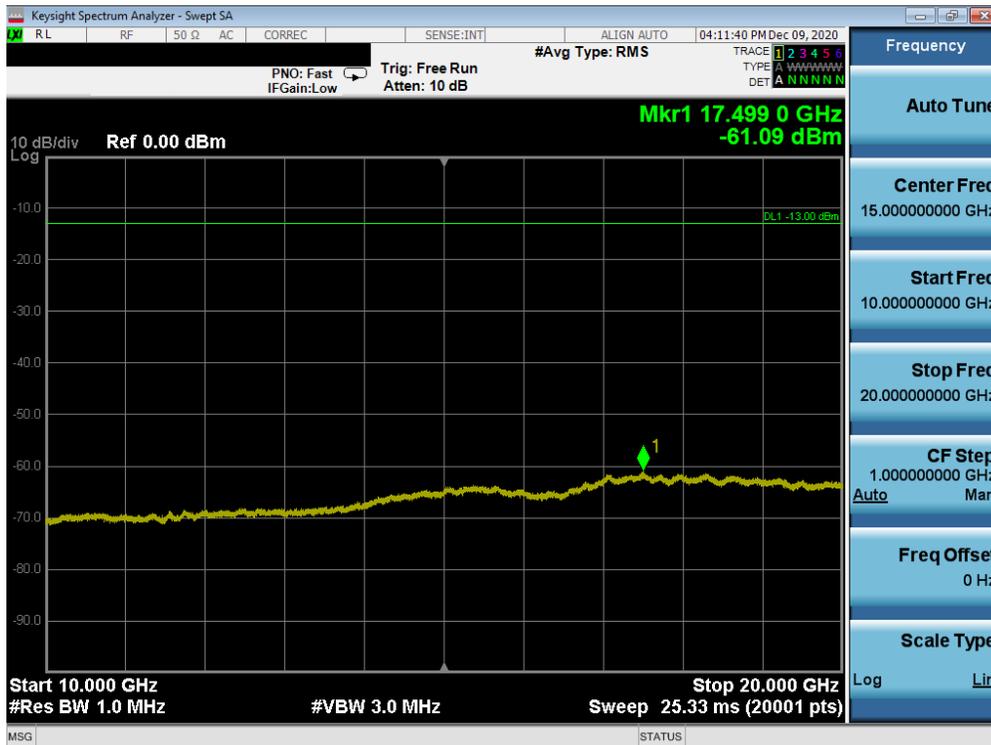


Plot 7-53. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 40 of 129

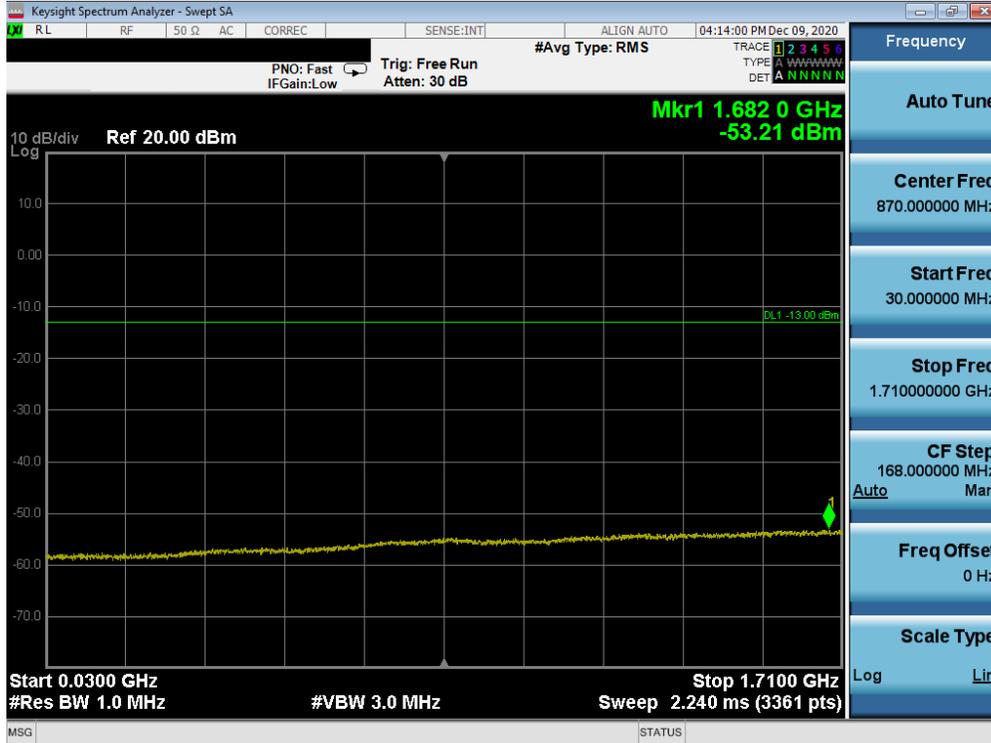


Plot 7-54. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

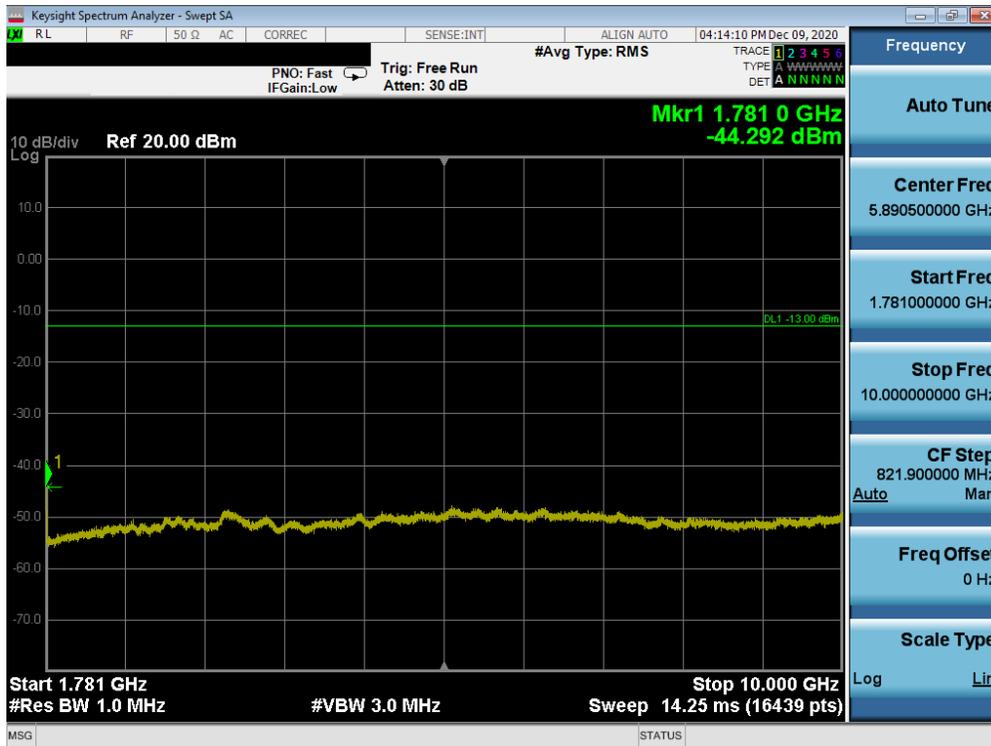


Plot 7-55. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 41 of 129

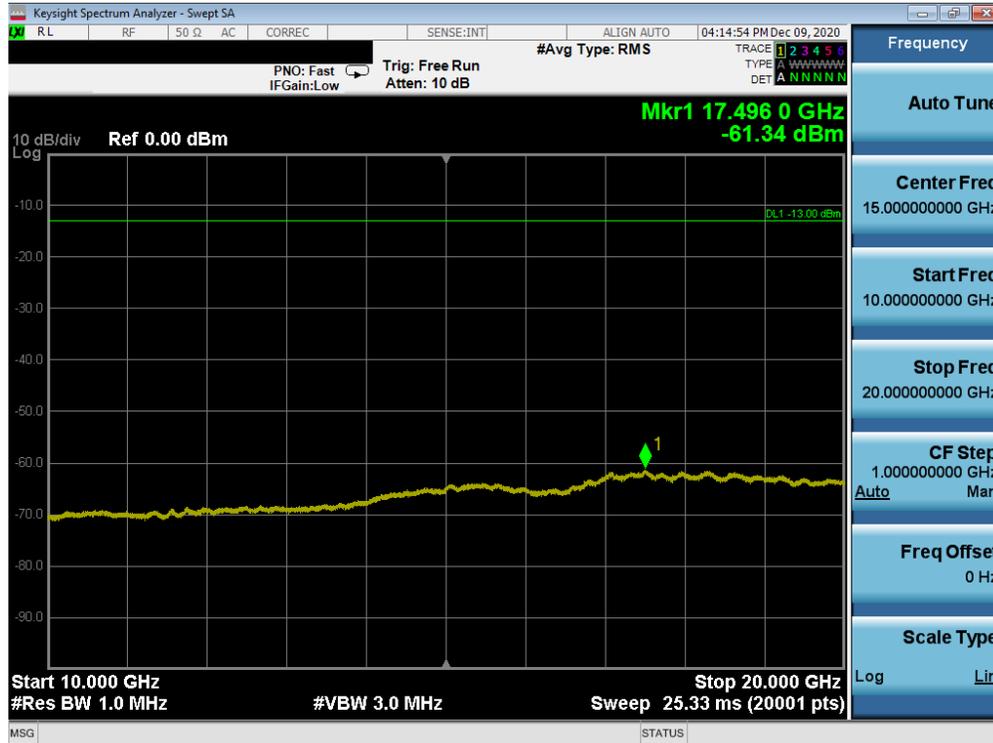


Plot 7-56. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-57. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

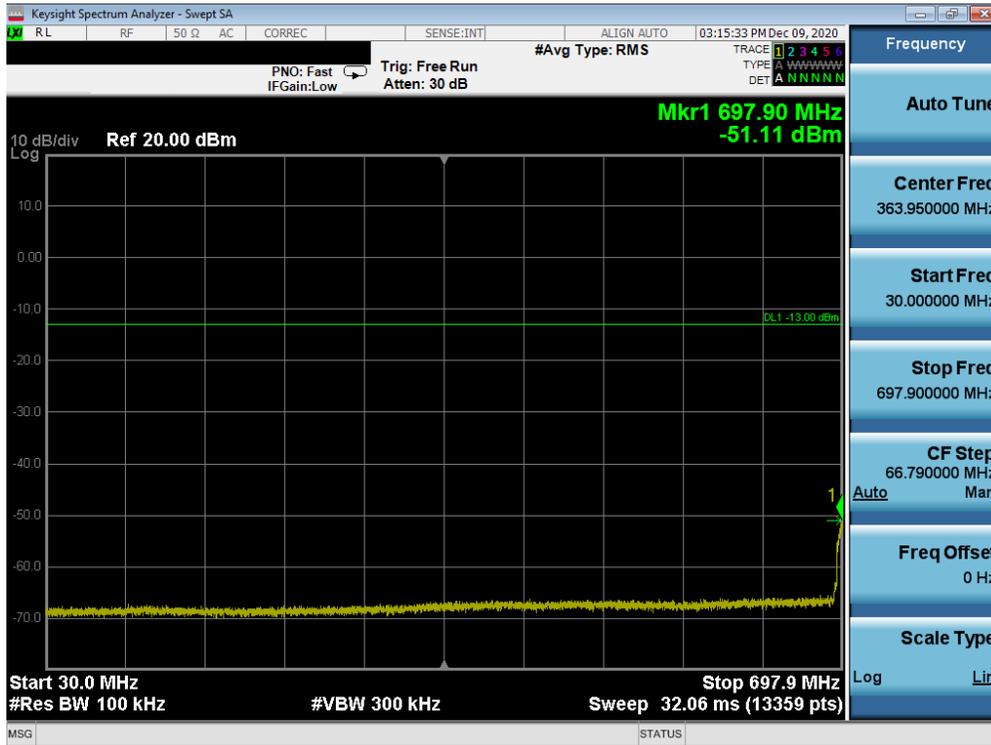
FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 42 of 129



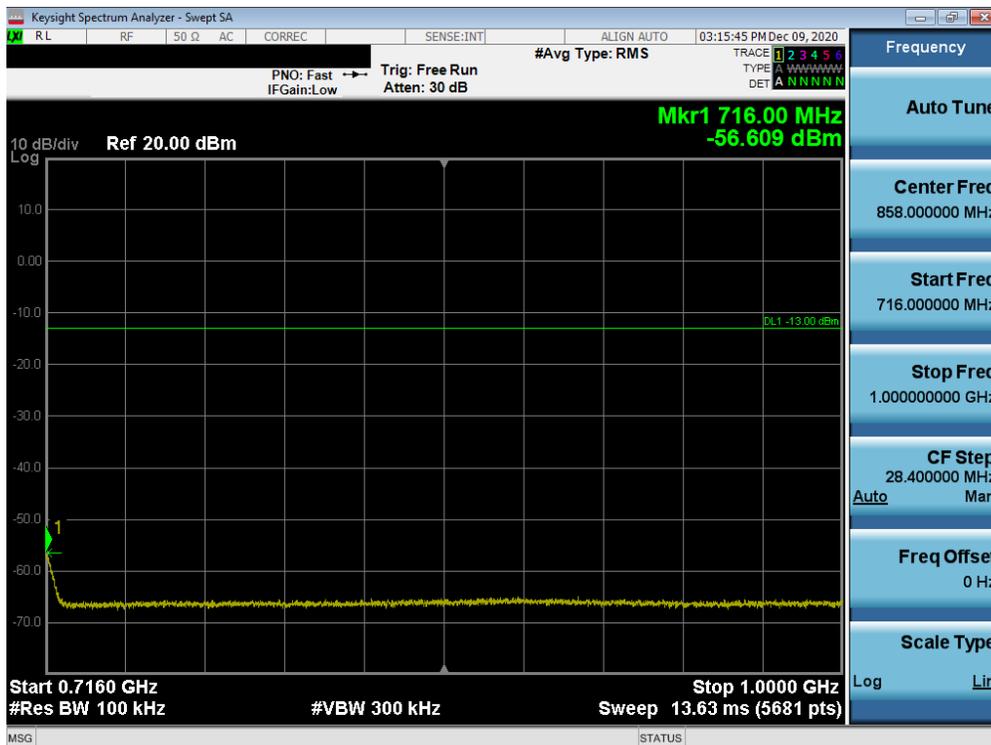
Plot 7-58. Conducted Spurious Plot (LTE Band 66/4 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 43 of 129

## LTE Band 12



Plot 7-59. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

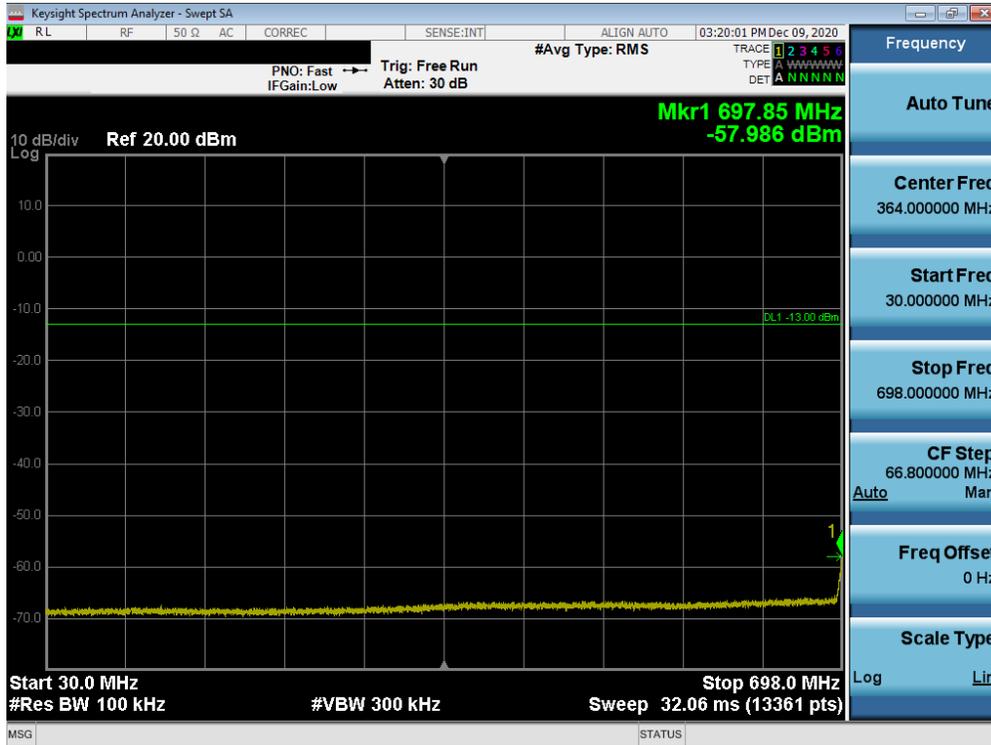


Plot 7-60. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

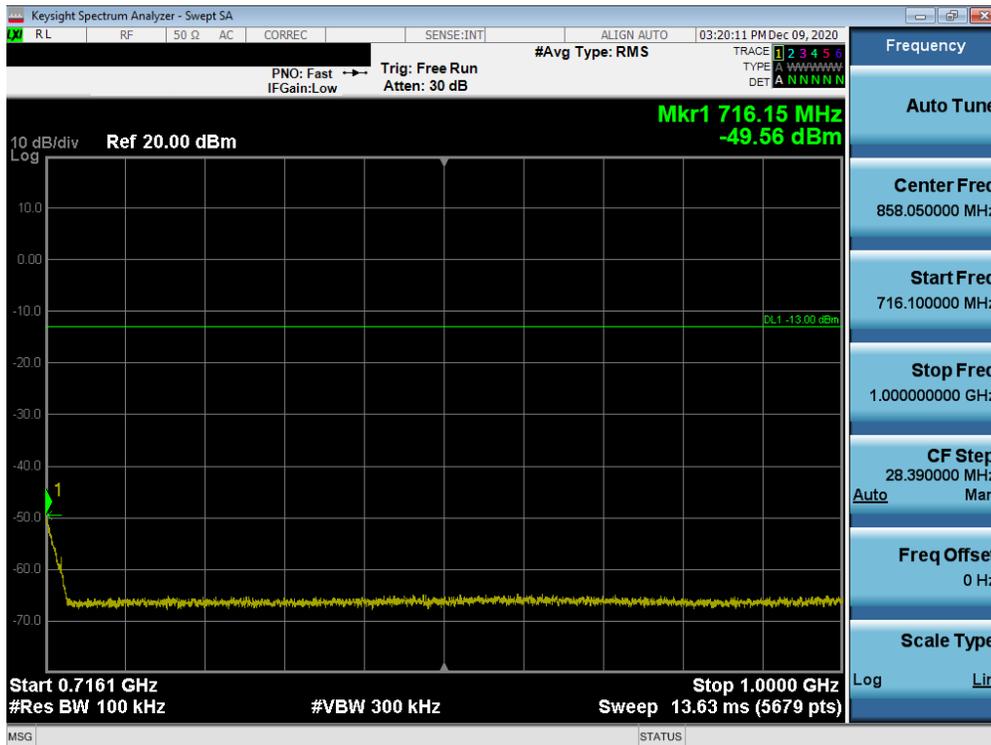
FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 44 of 129







Plot 7-65. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-66. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 47 of 129



Plot 7-67. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 48 of 129

### LTE Band 13

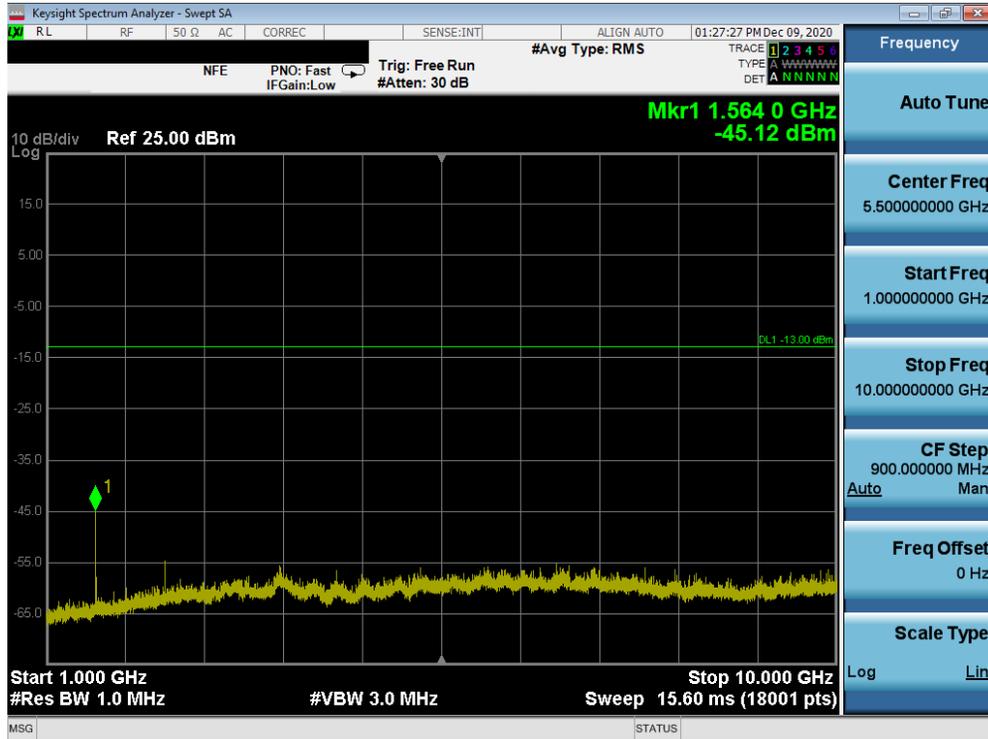


Plot 7-68. Conducted Spurious Plot (LTE Band 13 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-69. Conducted Spurious Plot (LTE Band 13 - 10MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 49 of 129



**Plot 7-70. Conducted Spurious Plot (LTE Band 13 - 10MHz QPSK - RB Size 1, RB Offset 0)**

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 50 of 129

### LTE Band 71

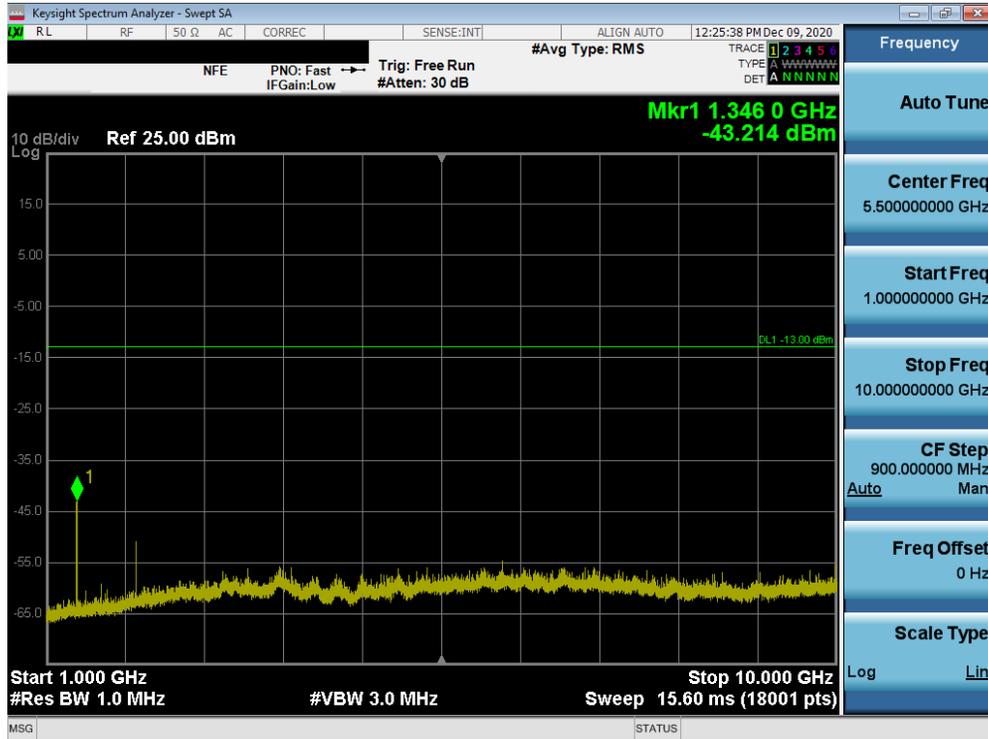


Plot 7-71. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

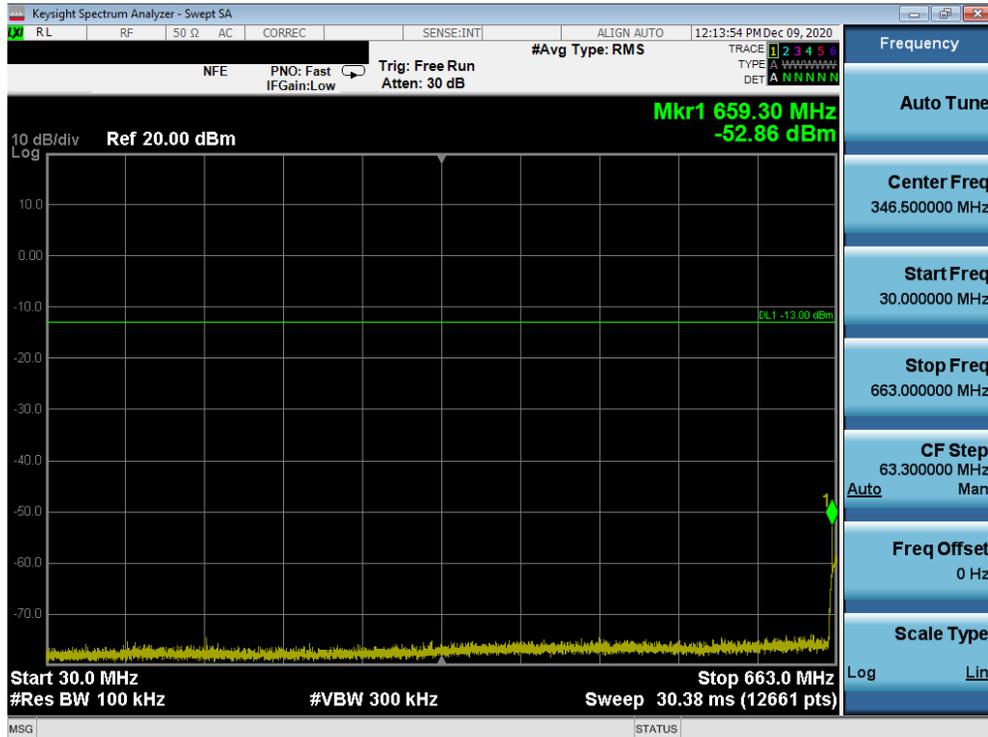


Plot 7-72. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 51 of 129



Plot 7-73. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

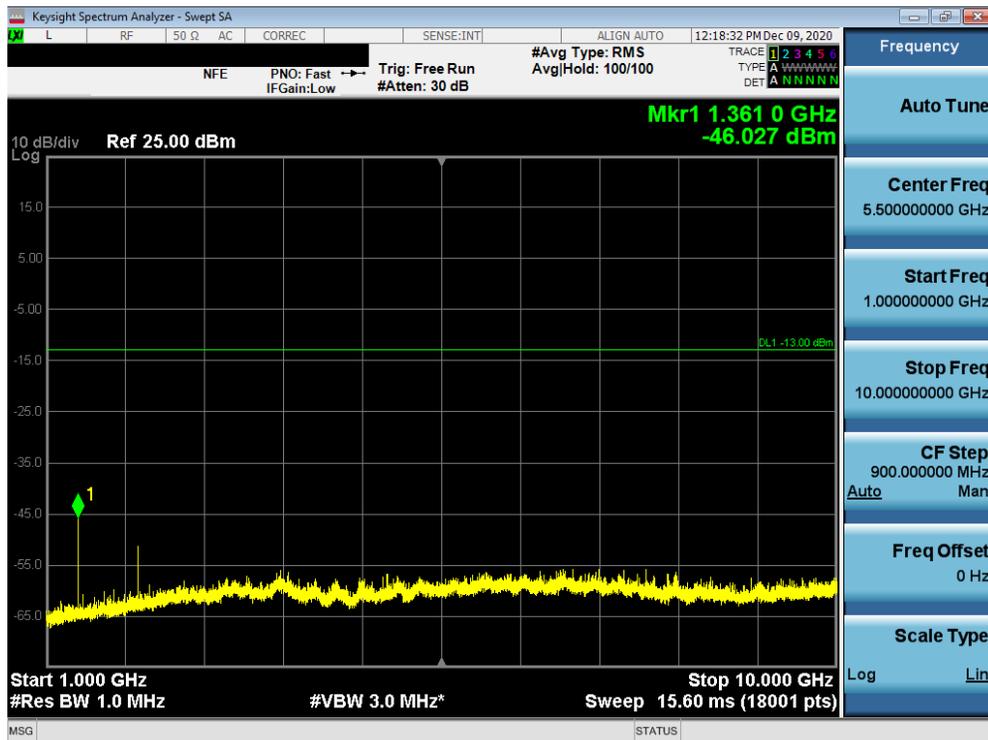


Plot 7-74. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 52 of 129



Plot 7-75. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

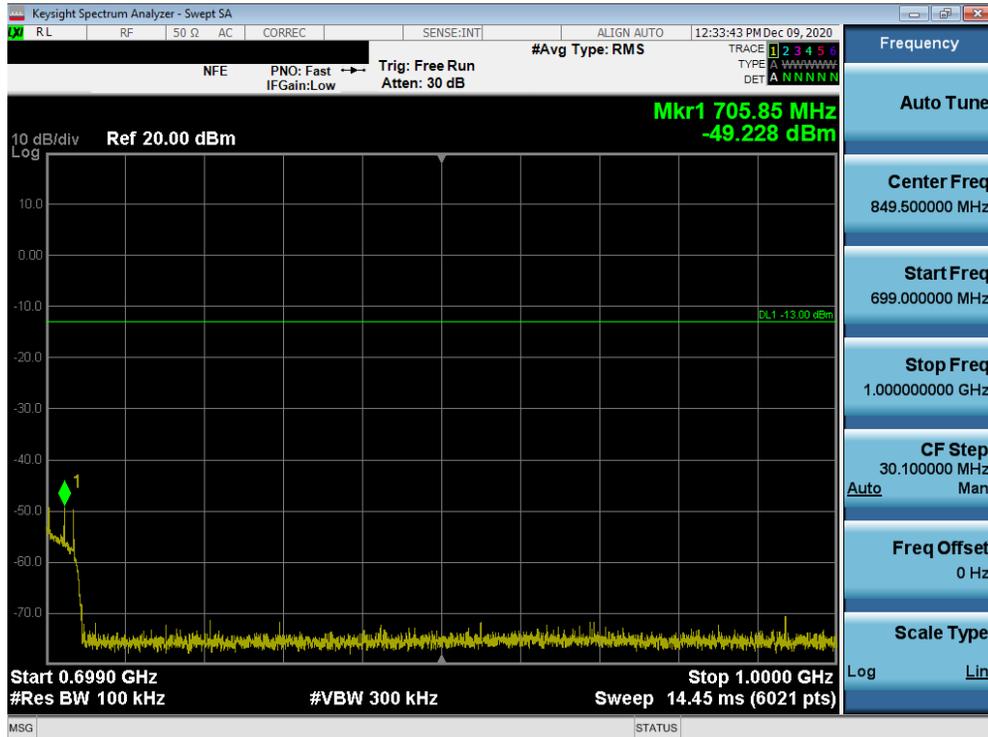


Plot 7-76. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 53 of 129

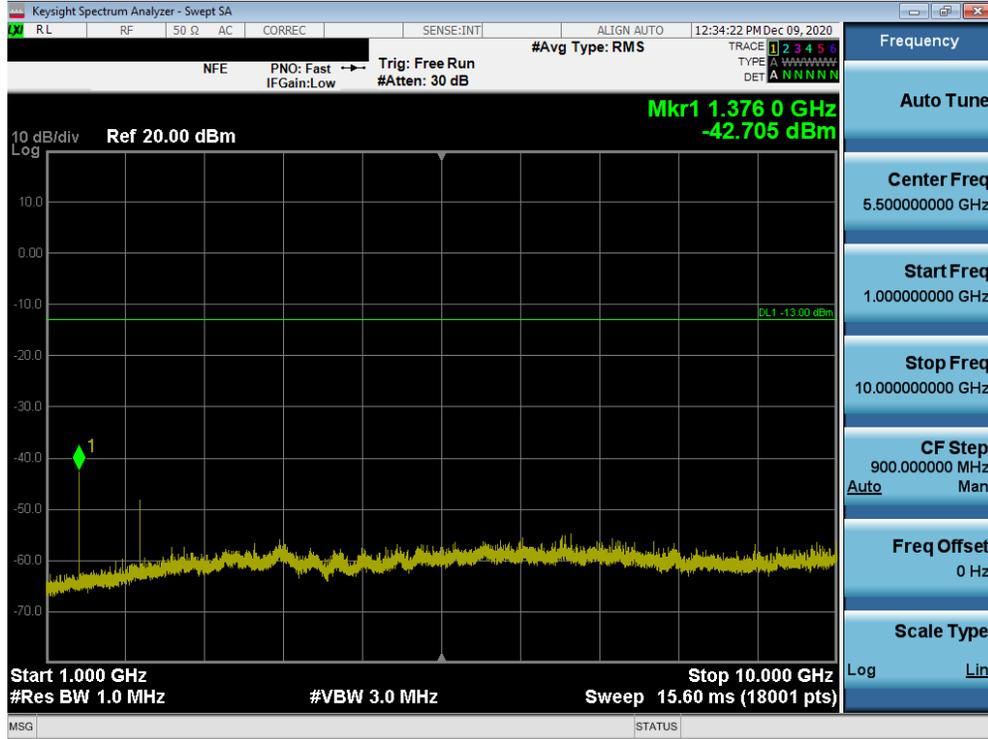


Plot 7-77. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-78. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

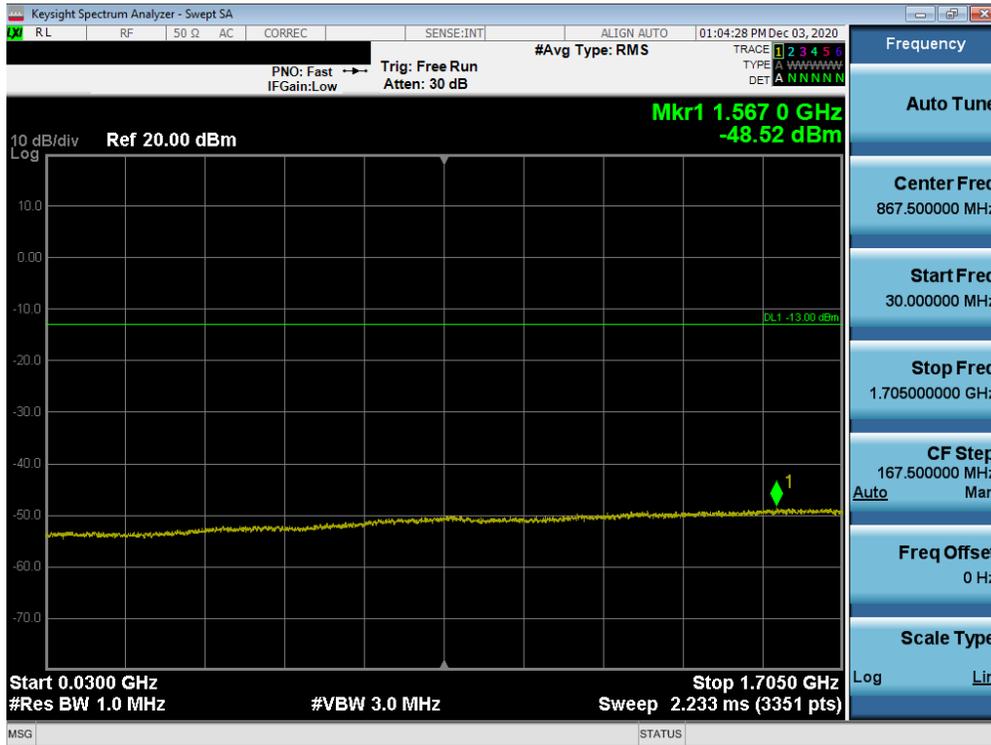
FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 54 of 129



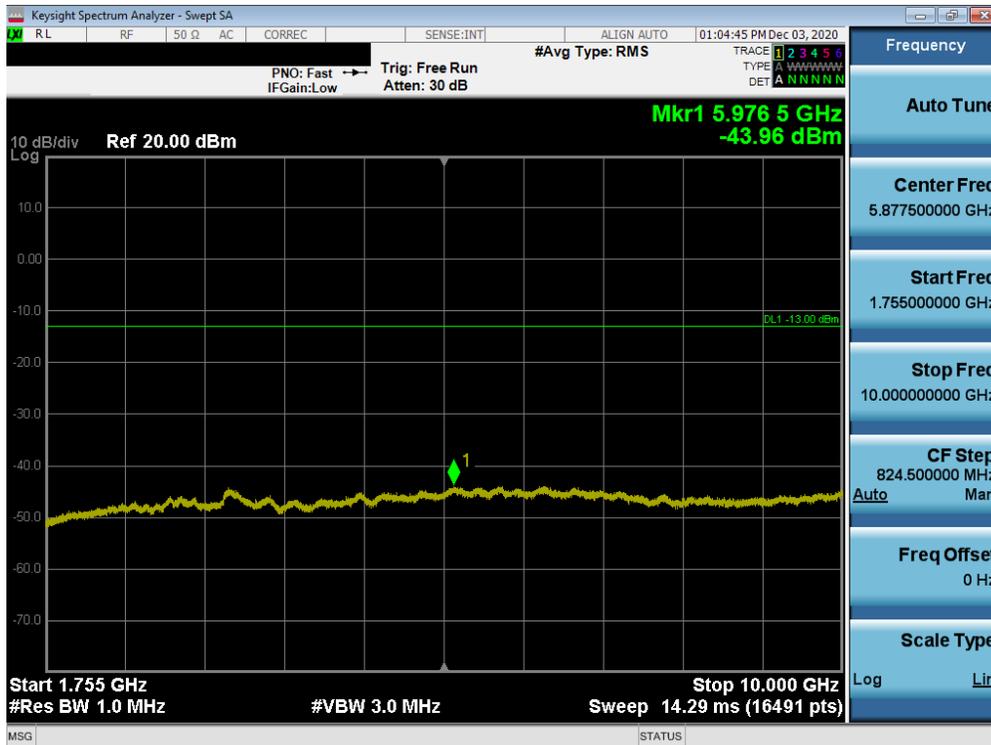
**Plot 7-79. Conducted Spurious Plot (LTE Band 71 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)**

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	<b>PART 27 MEASUREMENT REPORT</b>	<b>LG</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2011180184-14.ZNF	<b>Test Dates:</b> 12/1 – 1/8/2021	<b>EUT Type:</b> Portable Handset	Page 55 of 129	

**WCDMA AWS**

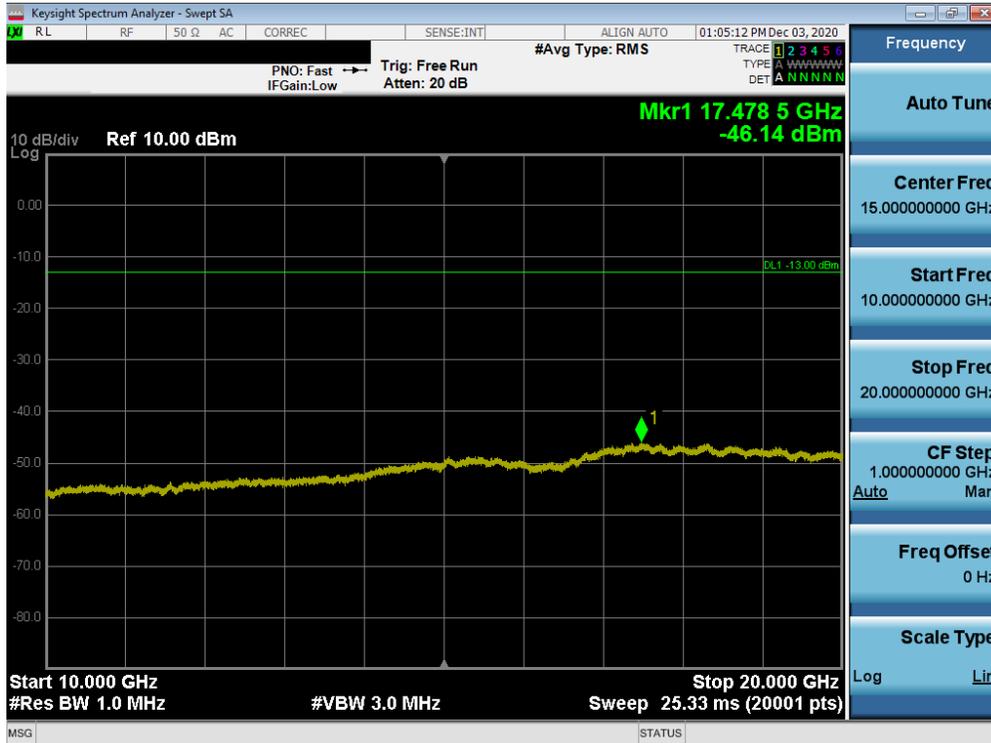


**Plot 7-80. Conducted Spurious Plot (WCDMA Ch. 1312- Low Channel)**

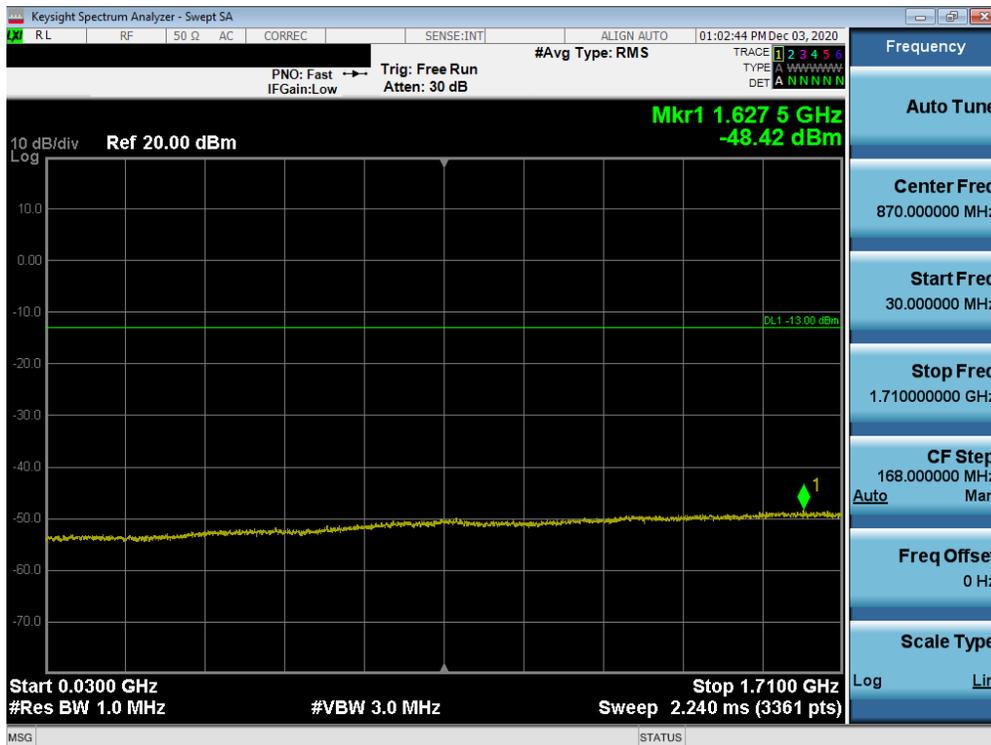


**Plot 7-81. Conducted Spurious Plot (WCDMA Ch. 1312- Low Channel)**

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 56 of 129

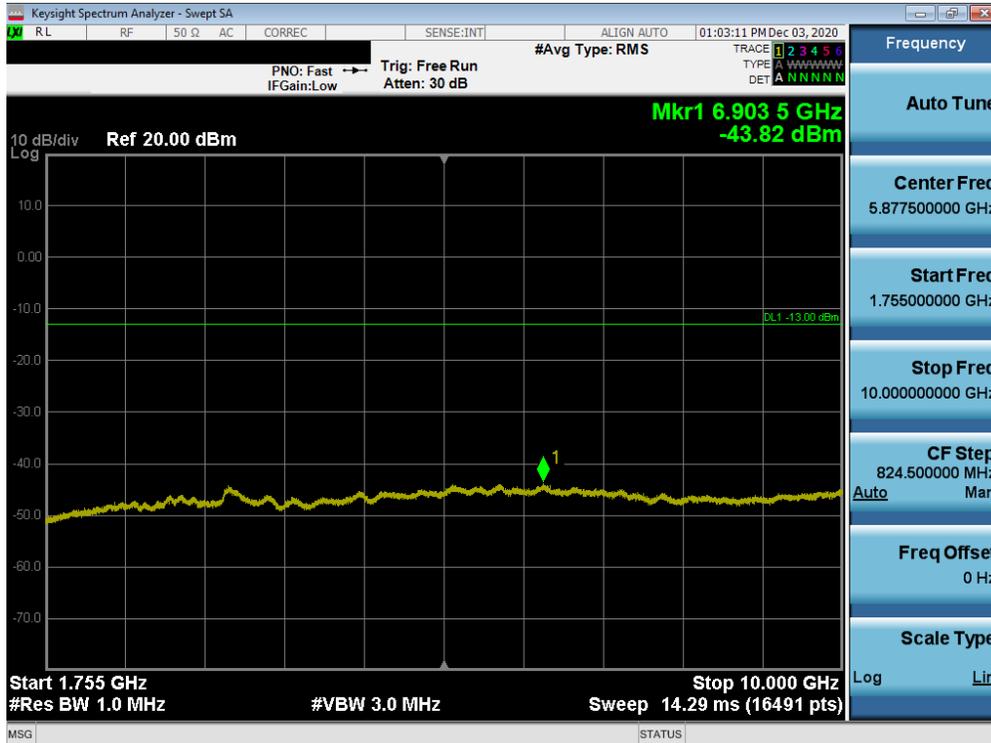


Plot 7-82. Conducted Spurious Plot (WCDMA Ch. 1312- Low Channel)

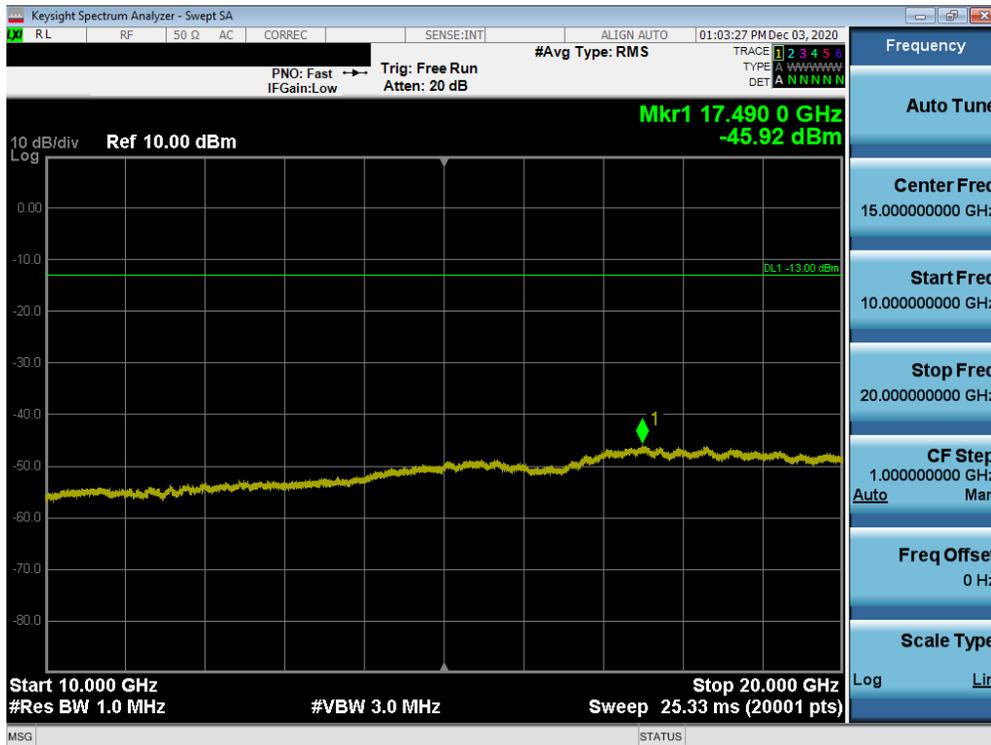


Plot 7-83. Conducted Spurious Plot (WCDMA Ch. 1413- Mid Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 57 of 129



**Plot 7-84. Conducted Spurious Plot (WCDMA Ch. 1413- Mid Channel)**

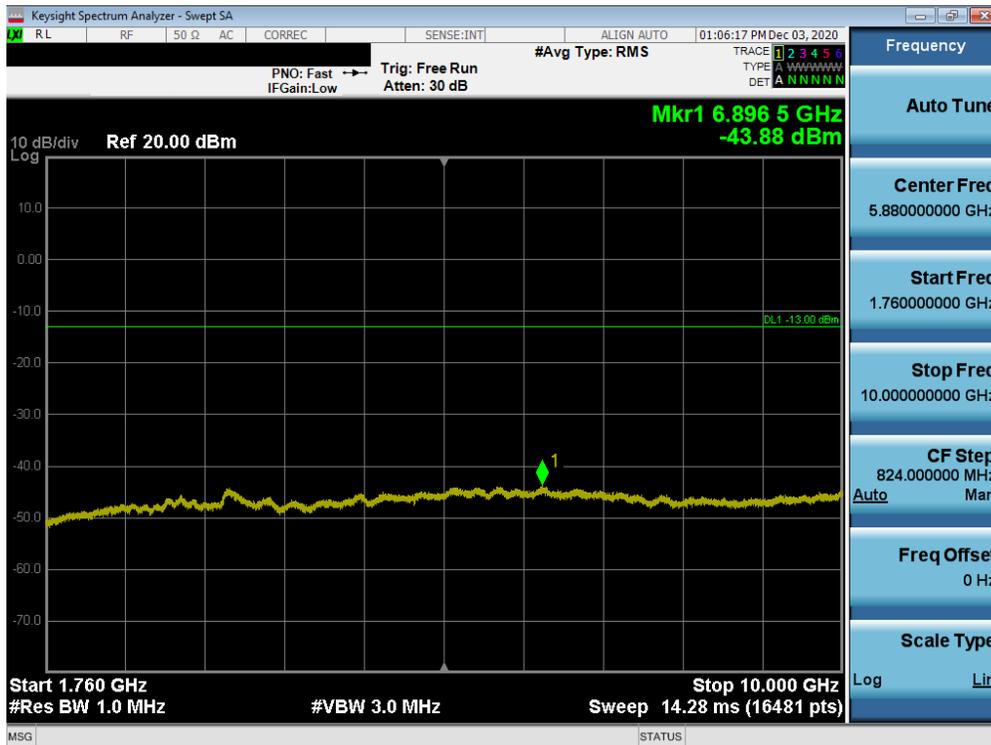


**Plot 7-85. Conducted Spurious Plot (WCDMA Ch. 1413- Mid Channel)**

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 58 of 129



Plot 7-86. Conducted Spurious Plot (WCDMA Ch. 1513- High Channel)



Plot 7-87. Conducted Spurious Plot (WCDMA Ch. 1513- High Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 - 1/8/2021	EUT Type: Portable Handset		Page 59 of 129



Plot 7-88. Conducted Spurious Plot (WCDMA Ch. 1513- High Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 60 of 129

## 7.4 Band Edge Emissions at Antenna Terminal

### Test Overview

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  $43 + 10 \log_{10}(P_{\text{Watts}})$ , where  $P$  is the transmitter power in Watts.***

### Test Procedure Used

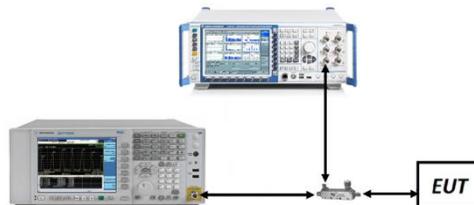
KDB 971168 D01 v03r01 – Section 6.0

### Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW  $\geq$  1% of the emission bandwidth
4. VBW  $\geq$  3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq$  2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

### Test Setup

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



**Figure 7-3. Test Instrument & Measurement Setup**

FCC ID: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	 LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 61 of 129

### Test Notes

Per 27.53(h) 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 to demonstrate compliance with the out-of-band emissions limit. 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.

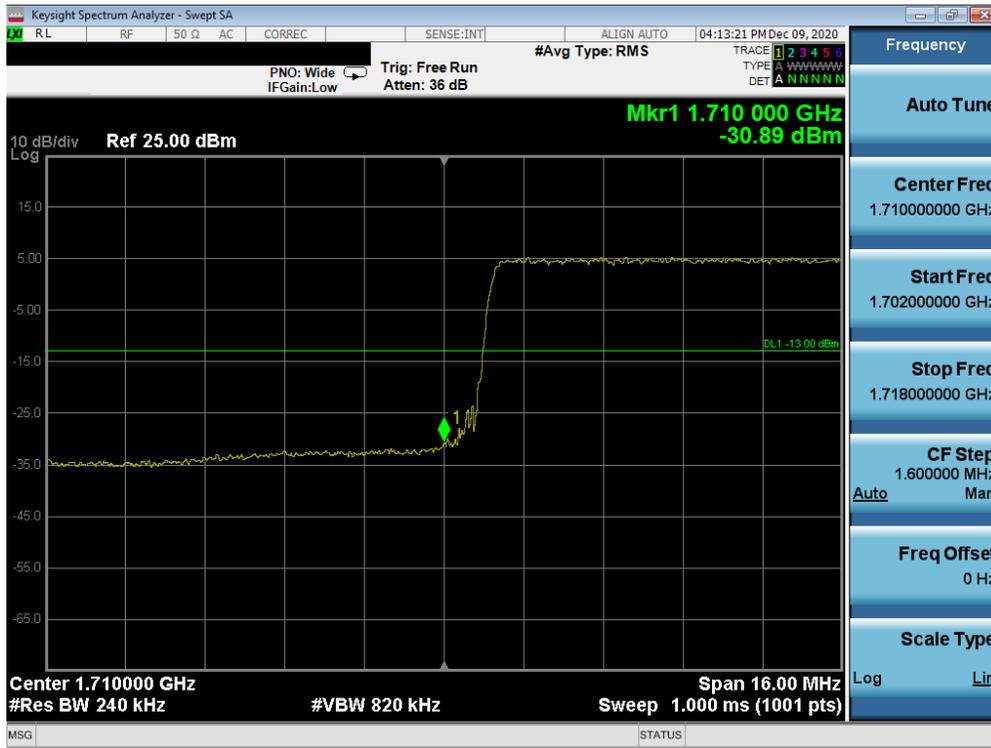
Per 27.53(g) for operations in the 663 - 698 MHz and 698 – 746MHz bands, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is  $65 + 10 \log_{10}(P) = -35\text{dBm}$  in a 6.25kHz bandwidth.

FCC ID: ZNFK420TM	 <b>PART 27 MEASUREMENT REPORT</b> 		Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset	Page 62 of 129

**LTE Band 66/4**

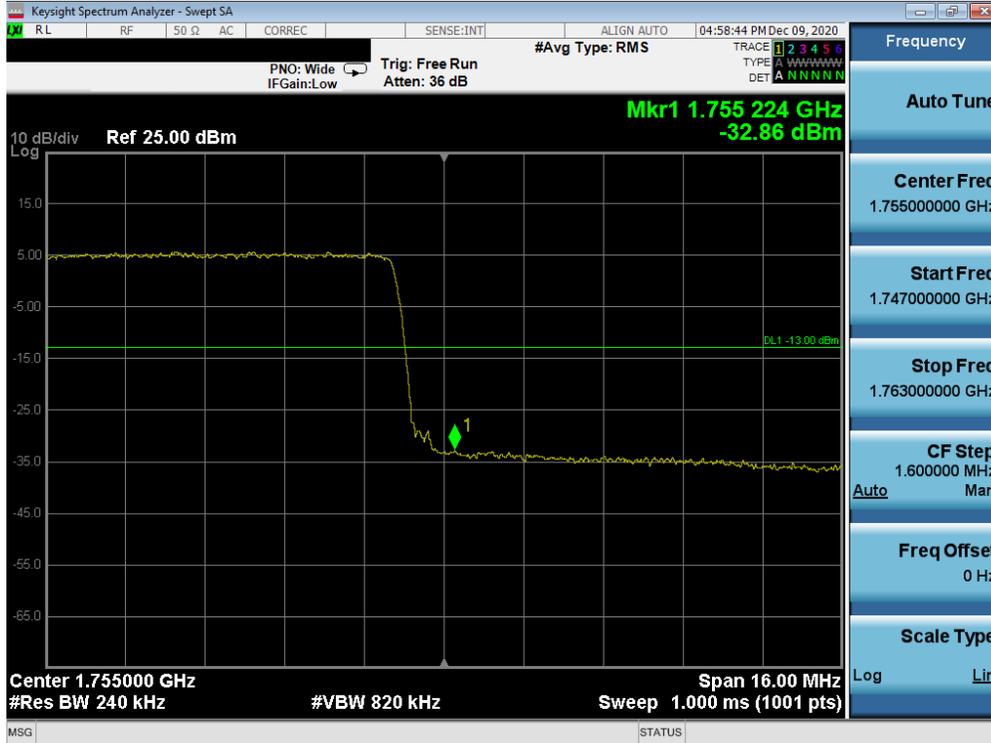


**Plot 7-89. Lower Band Edge Plot (LTE Band 66/4 - 20MHz QPSK – Full RB Configuration)**



**Plot 7-90. Lower Extended Band Edge Plot (LTE Band 66/4 - 20MHz QPSK – Full RB Configuration)**

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 63 of 129

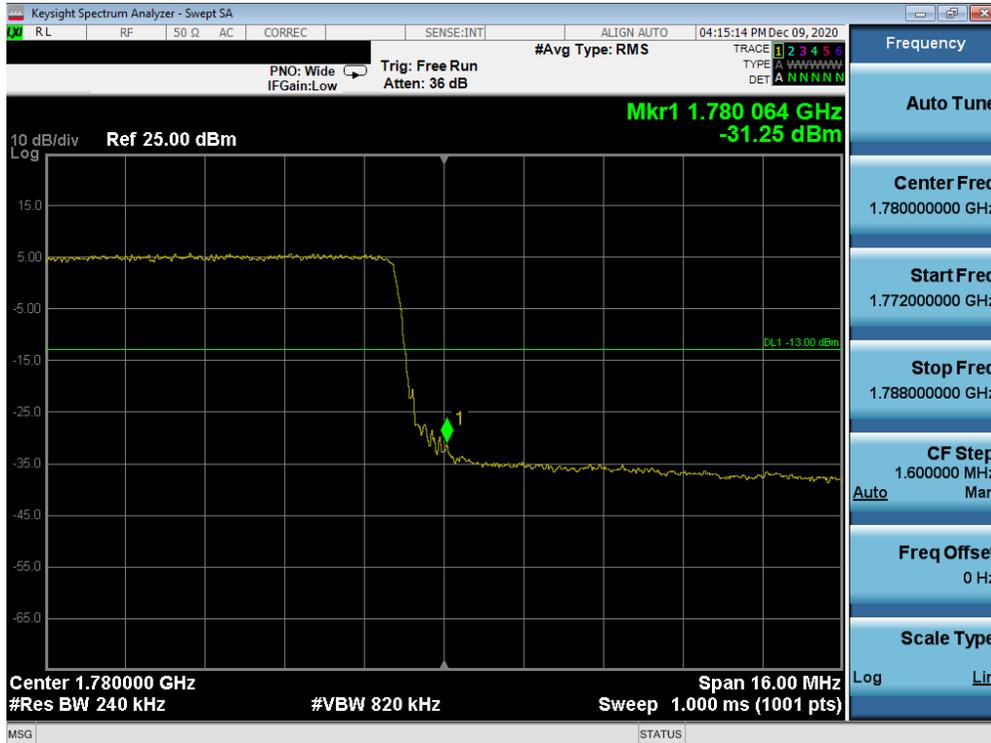


Plot 7-91. Upper Band Edge Plot (LTE Band 4 - 20MHz QPSK – Full RB Configuration)



Plot 7-92. Upper Extended Band Edge Plot (LTE Band 4 - 20MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 64 of 129

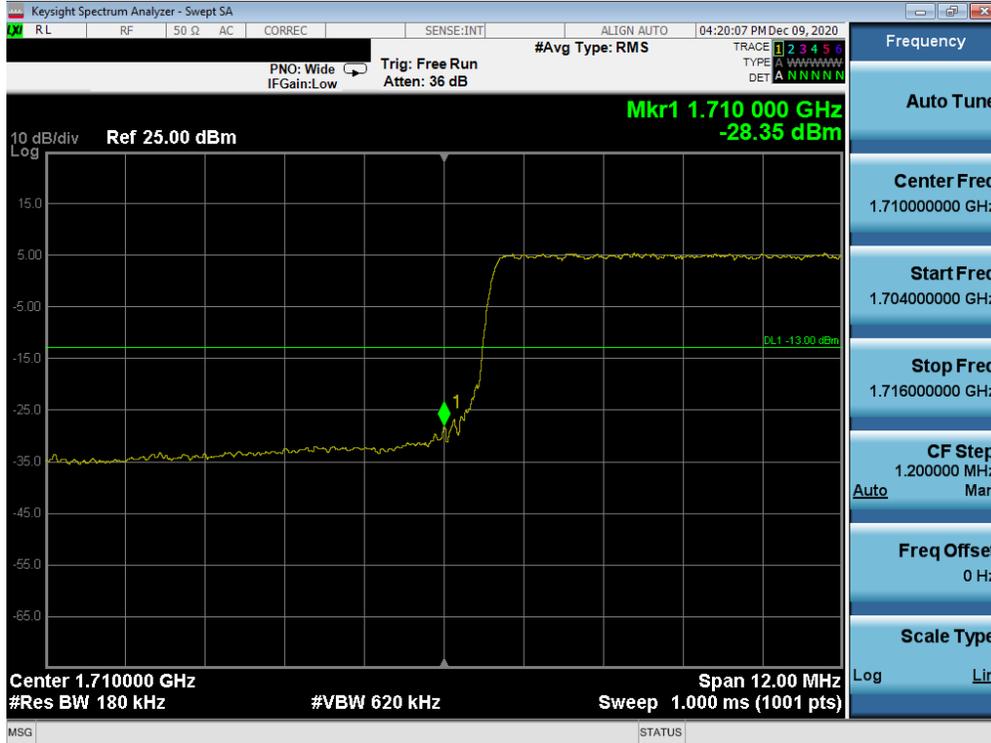


Plot 7-93. Upper Band Edge Plot (LTE Band 66 - 20MHz QPSK – Full RB Configuration)



Plot 7-94. Upper Extended Band Edge Plot (LTE Band 66 - 20MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 65 of 129



Plot 7-95. Lower Band Edge Plot (LTE Band 66/4 - 15MHz QPSK – Full RB Configuration)

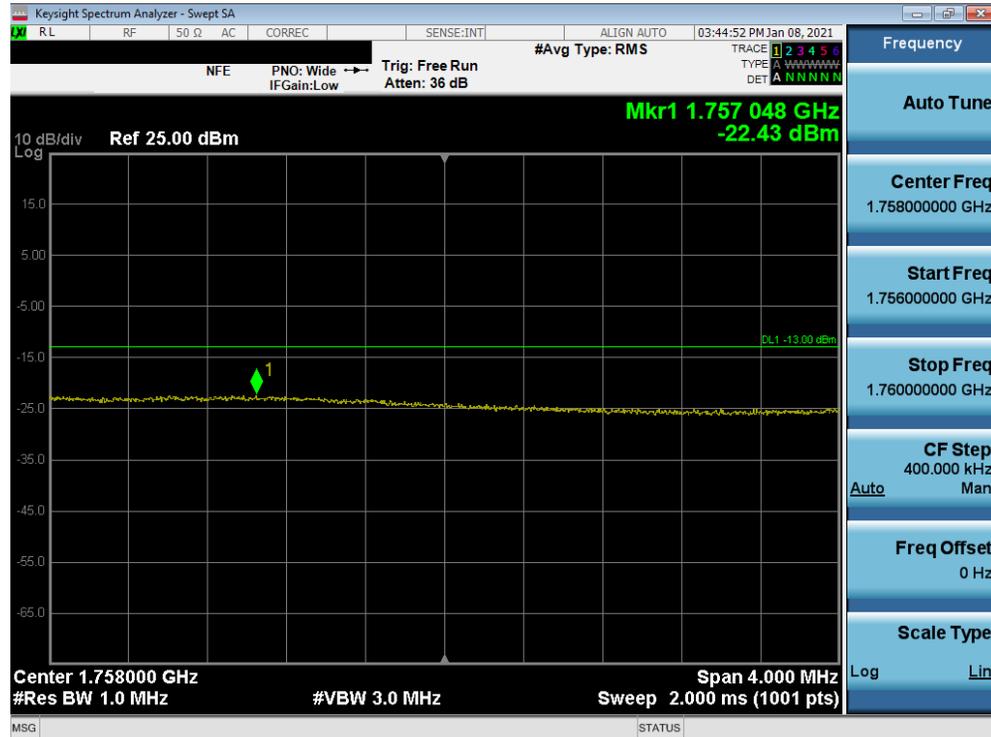


Plot 7-96. Lower Extended Band Edge Plot (LTE Band 66/4 - 15MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 66 of 129



Plot 7-97. Upper Band Edge Plot (LTE Band 4 - 15MHz QPSK – Full RB Configuration)



Plot 7-98. Upper Extended Band Edge Plot (LTE Band 4 - 15MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 67 of 129

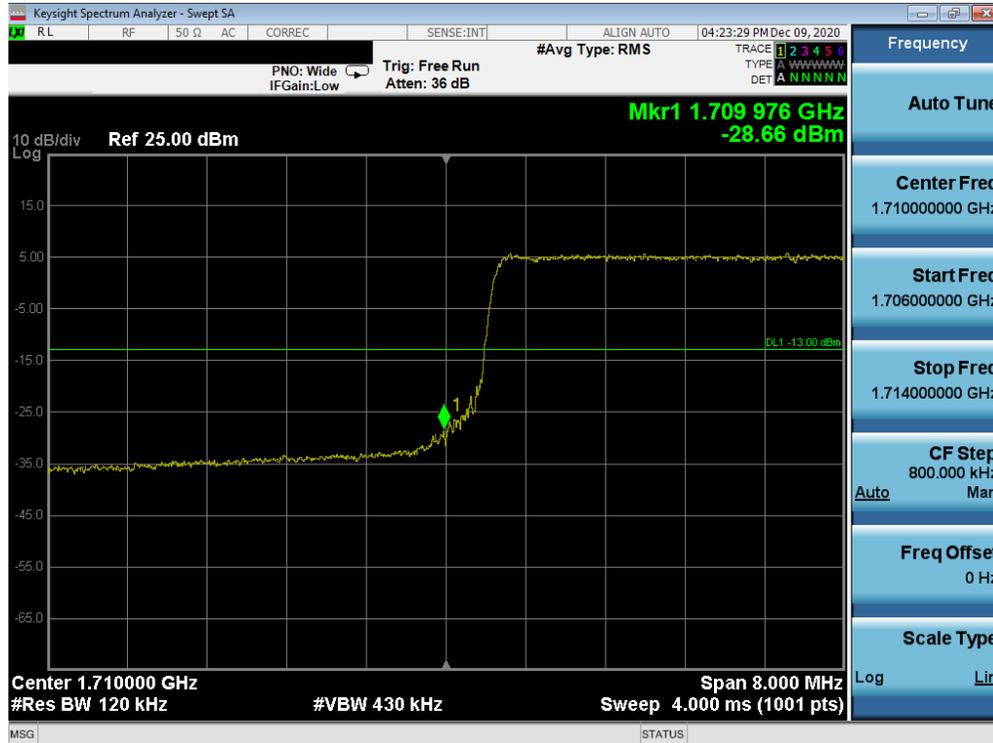


Plot 7-99. Upper Band Edge Plot (LTE Band 66 - 15MHz QPSK – Full RB Configuration)

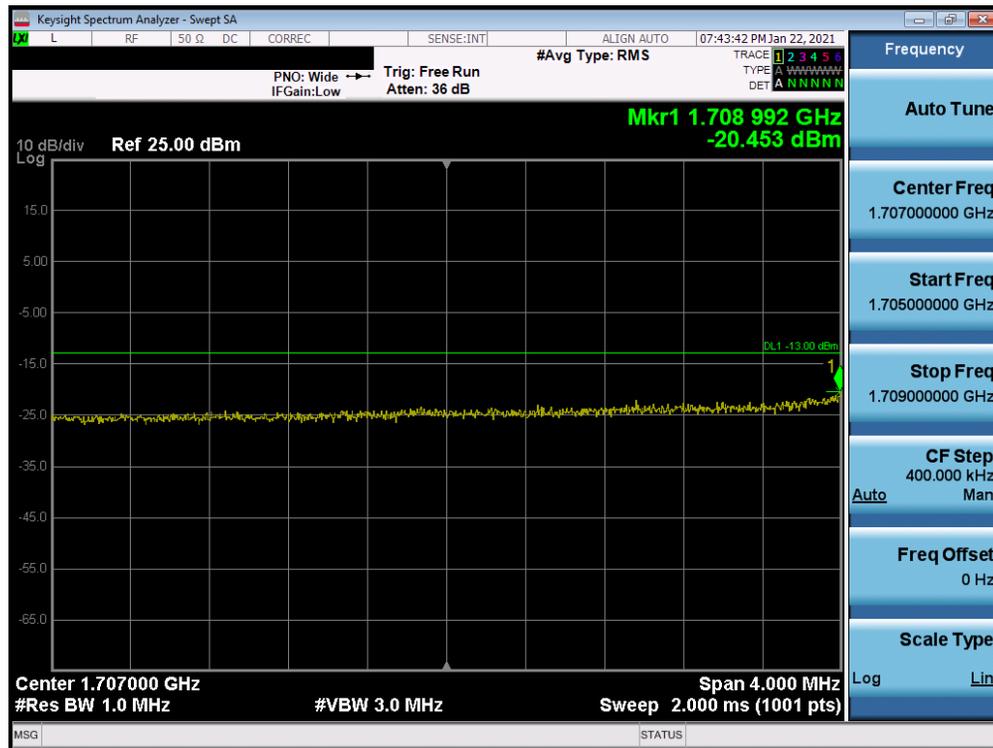


Plot 7-100. Upper Extended Band Edge Plot (LTE Band 66 - 15MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 68 of 129

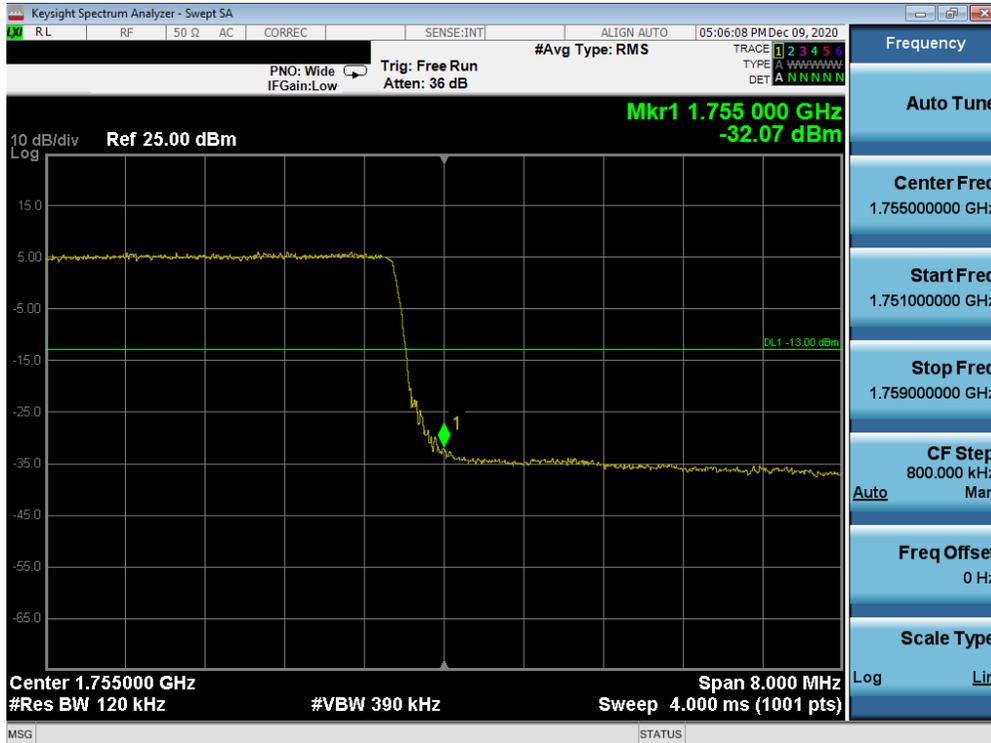


Plot 7-101. Lower Band Edge Plot (LTE Band 66/4 - 10MHz QPSK – Full RB Configuration)



Plot 7-102. Lower Extended Band Edge Plot (LTE Band 66/4 - 10MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 69 of 129

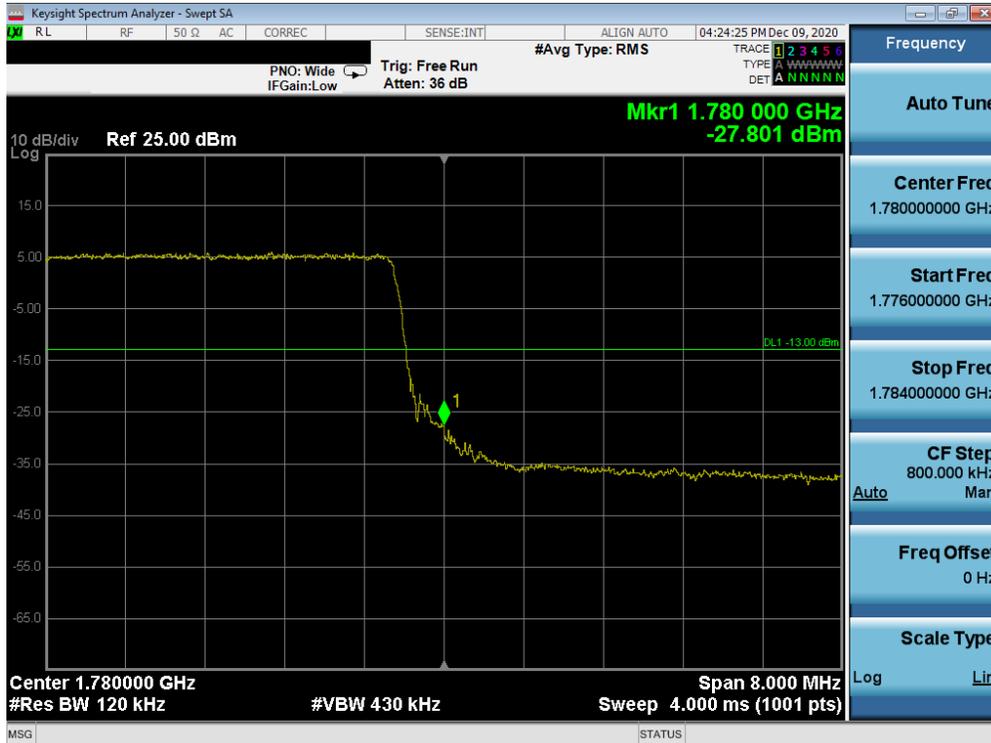


Plot 7-103. Upper Band Edge Plot (LTE Band 4 - 10MHz QPSK – Full RB Configuration)

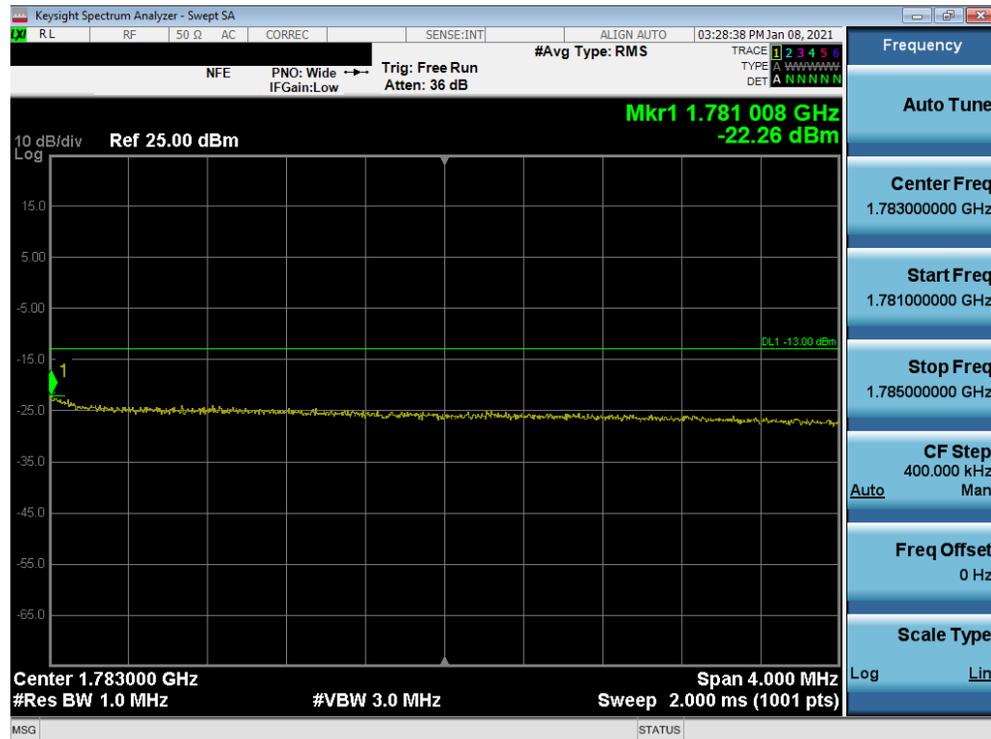


Plot 7-104. Upper Extended Band Edge Plot (LTE Band 4 - 10MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 70 of 129

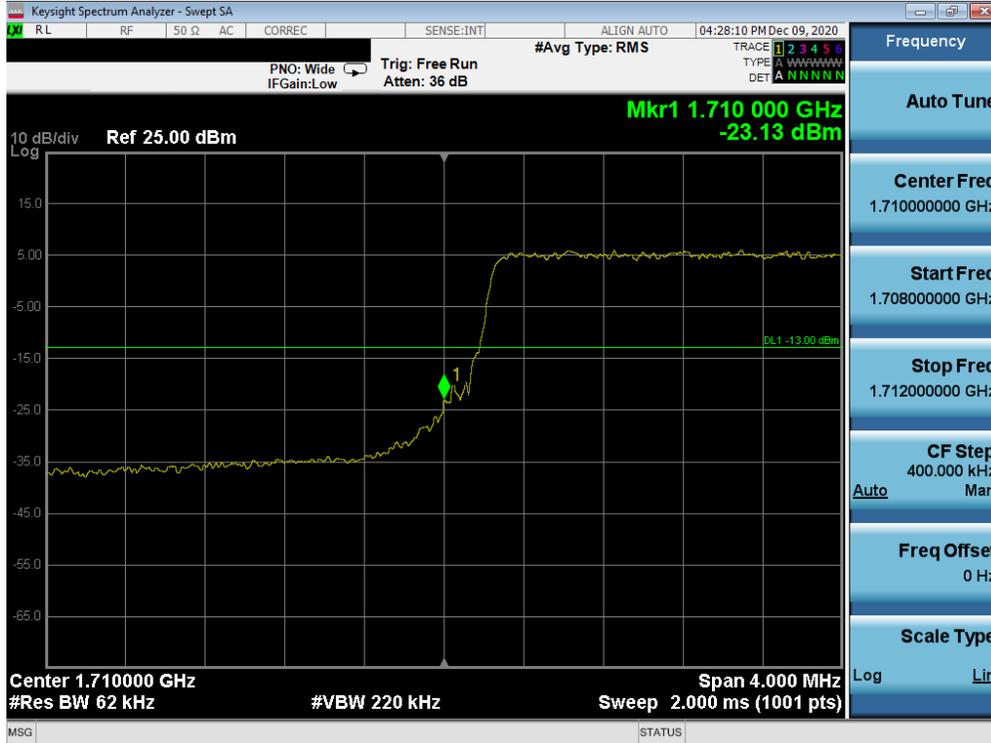


Plot 7-105. Upper Band Edge Plot (LTE Band 66 - 10MHz QPSK – Full RB Configuration)

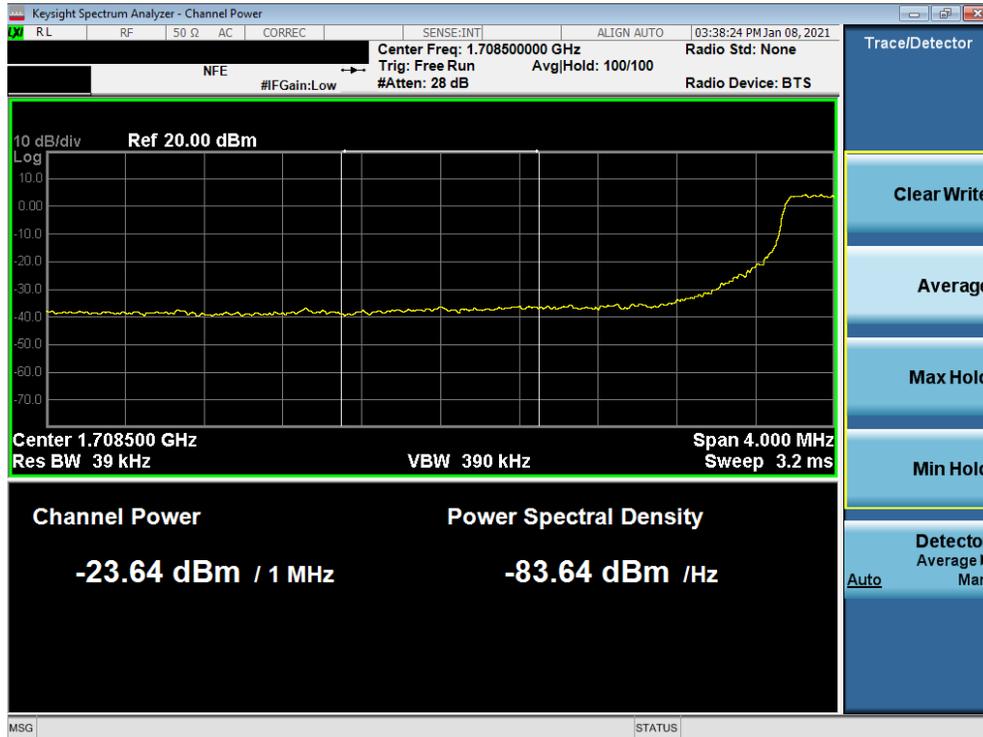


Plot 7-106. Upper Extended Band Edge Plot (LTE Band 66 - 10MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 71 of 129



Plot 7-107. Lower Band Edge Plot (LTE Band 66/4 - 5MHz QPSK – Full RB Configuration)

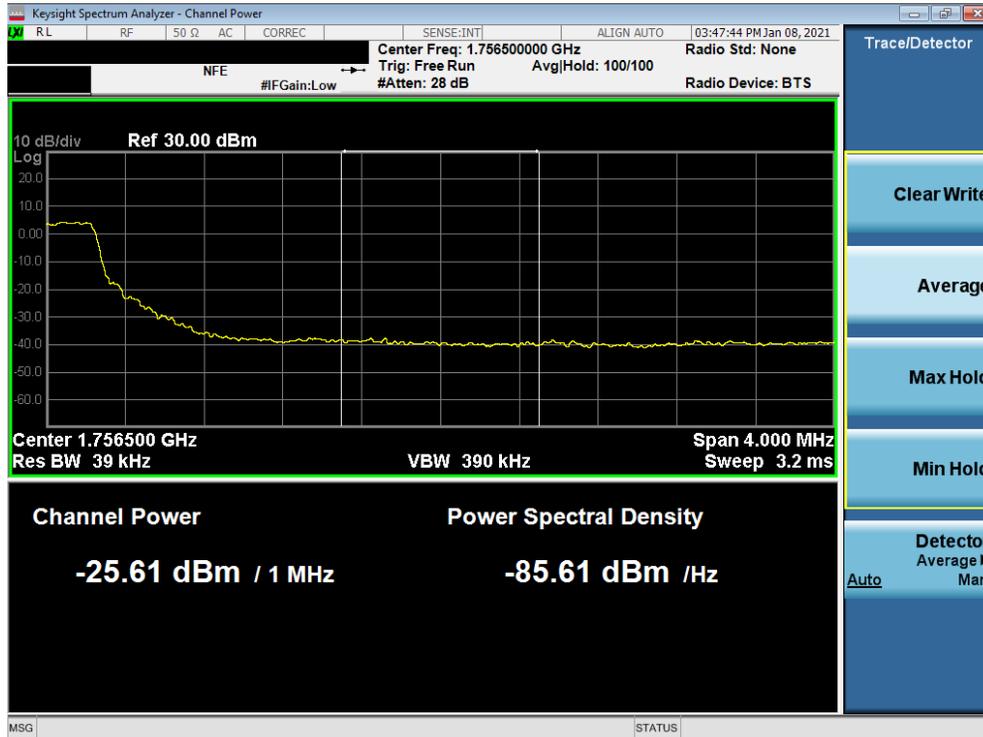


Plot 7-108. Lower Extended Band Edge Plot (LTE Band 66/4 - 5MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 72 of 129



Plot 7-109. Upper Band Edge Plot (LTE Band 4 - 5MHz QPSK – Full RB Configuration)

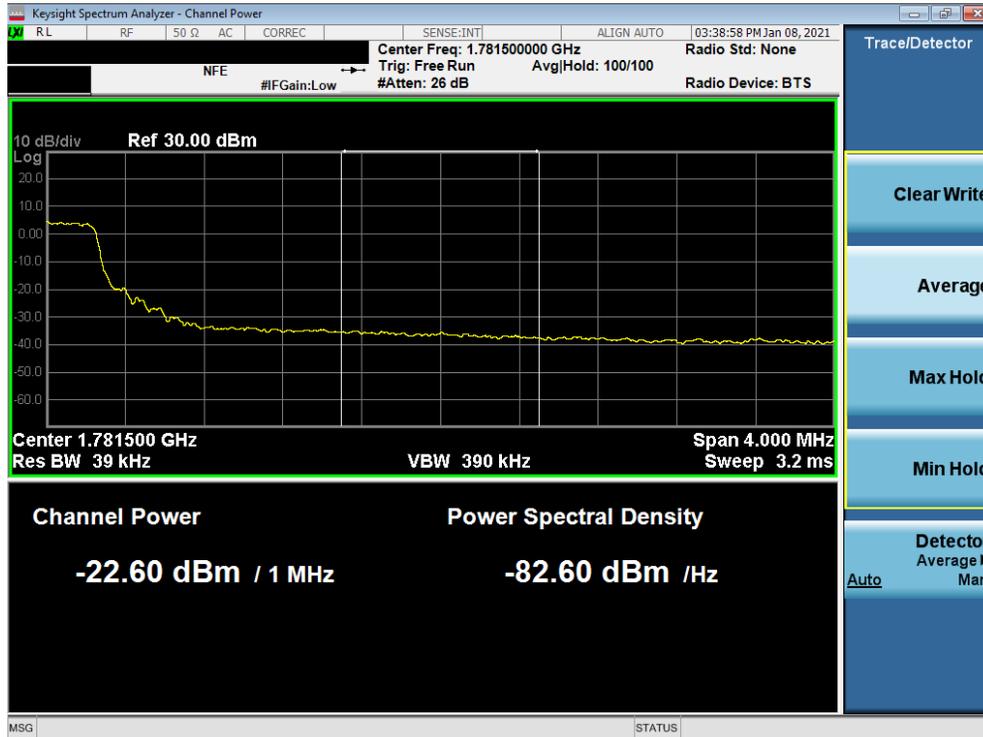


Plot 7-110. Upper Extended Band Edge Plot (LTE Band 4 - 5MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 73 of 129

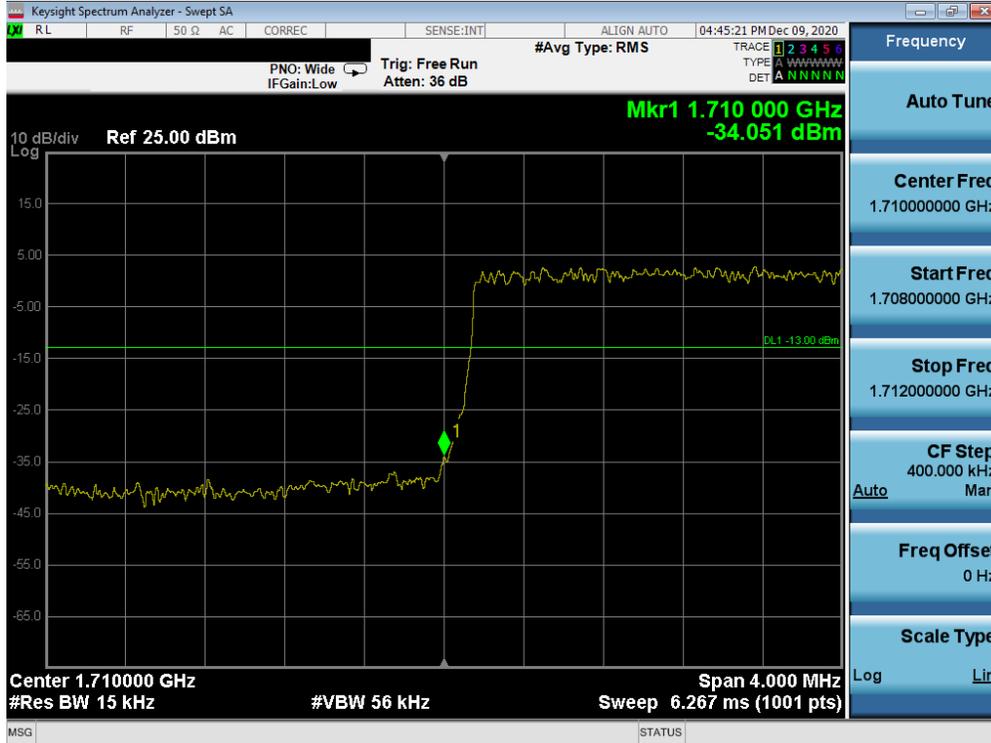


Plot 7-111. Upper Band Edge Plot (LTE Band 66 - 5MHz QPSK – Full RB Configuration)

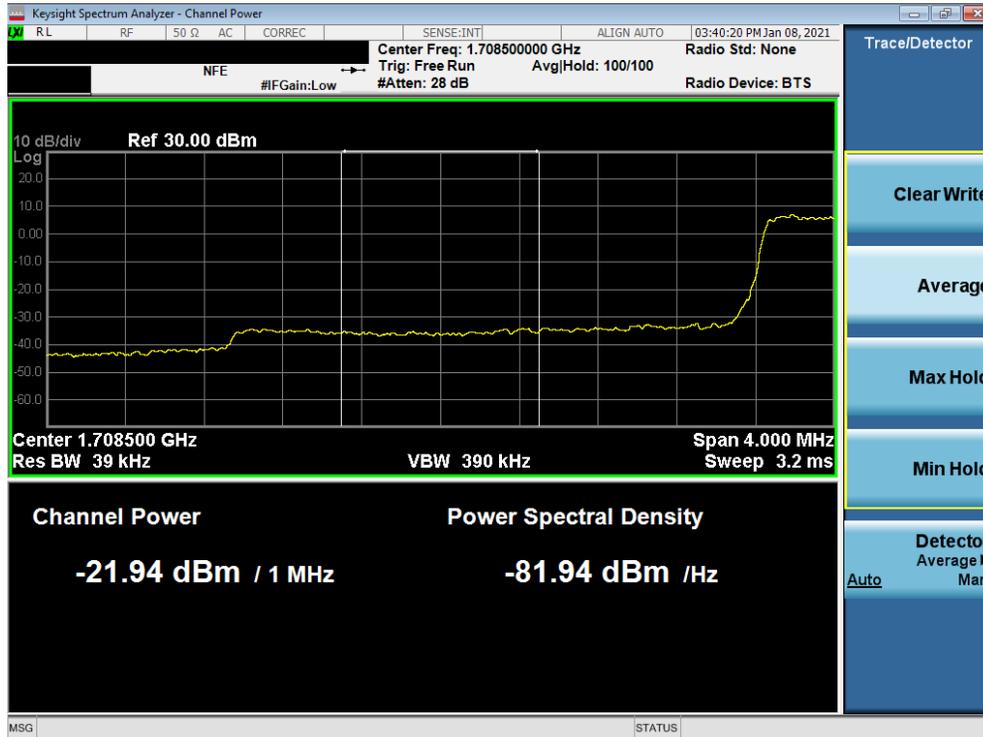


Plot 7-112. Upper Extended Band Edge Plot (LTE Band 66 - 5MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 74 of 129



Plot 7-113. Lower Band Edge Plot (LTE Band 66/4 - 3MHz QPSK – Full RB Configuration)

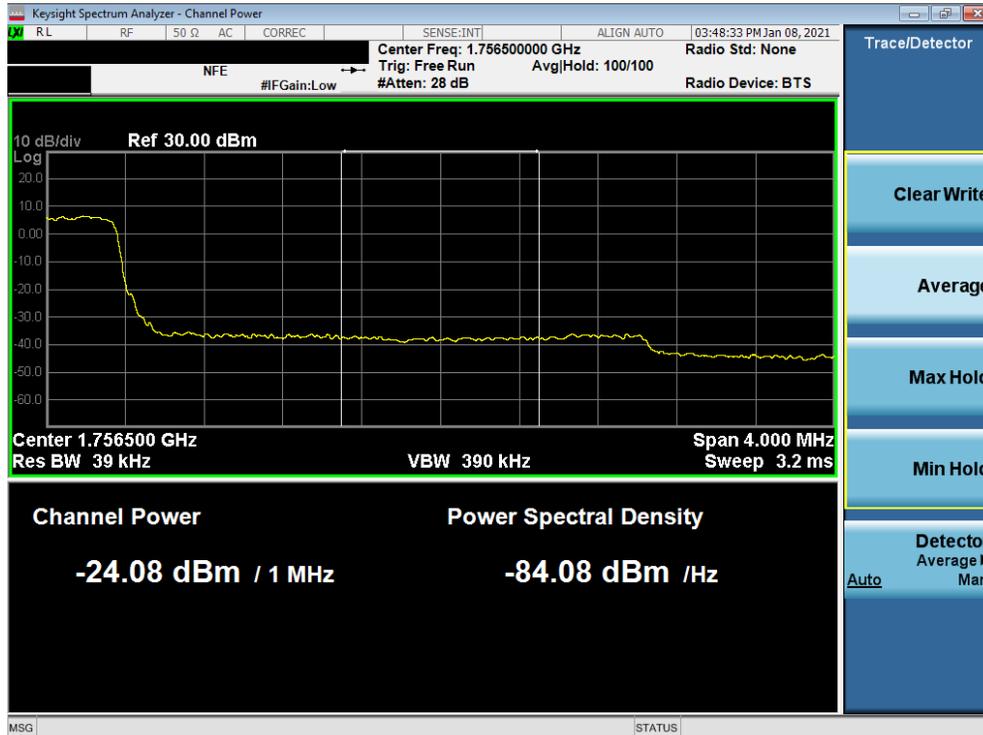


Plot 7-114. Lower Extended Band Edge Plot (LTE Band 66/4 - 3MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 75 of 129



Plot 7-115. Upper Band Edge Plot (LTE Band 4 - 3MHz QPSK – Full RB Configuration)

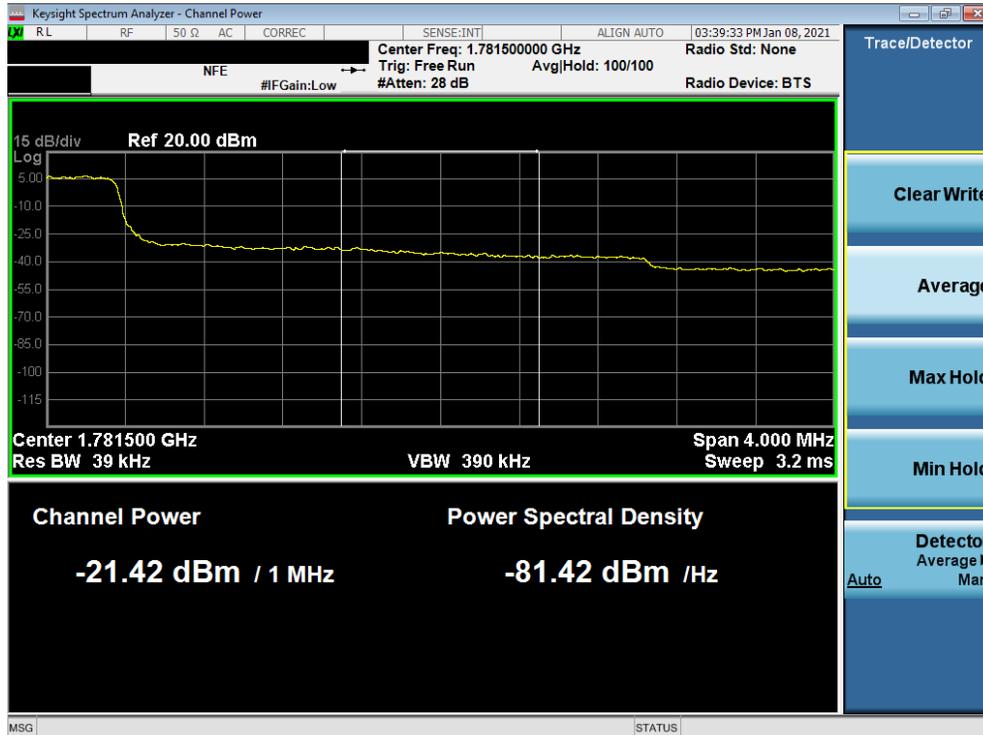


Plot 7-116. Upper Extended Band Edge Plot (LTE Band 4 - 3MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 76 of 129



Plot 7-117. Upper Band Edge Plot (LTE Band 66 - 3MHz QPSK – Full RB Configuration)

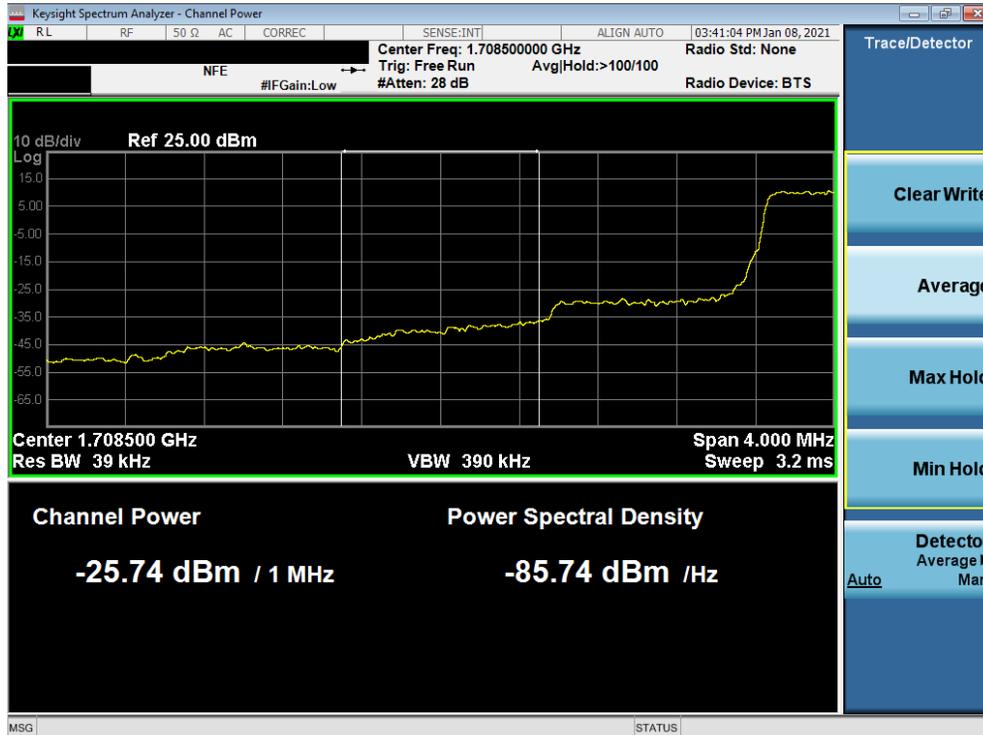


Plot 7-118. Upper Extended Band Edge Plot (LTE Band 66 - 3MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 77 of 129

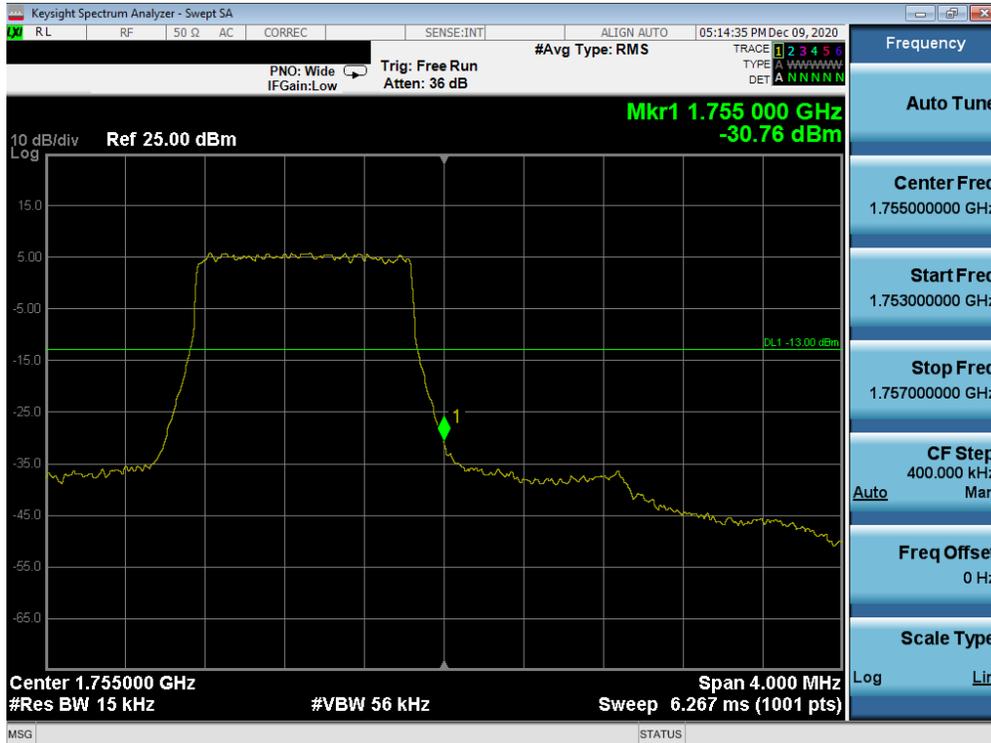


Plot 7-119. Lower Band Edge Plot (LTE Band 66/4 – 1.4MHz QPSK – Full RB Configuration)

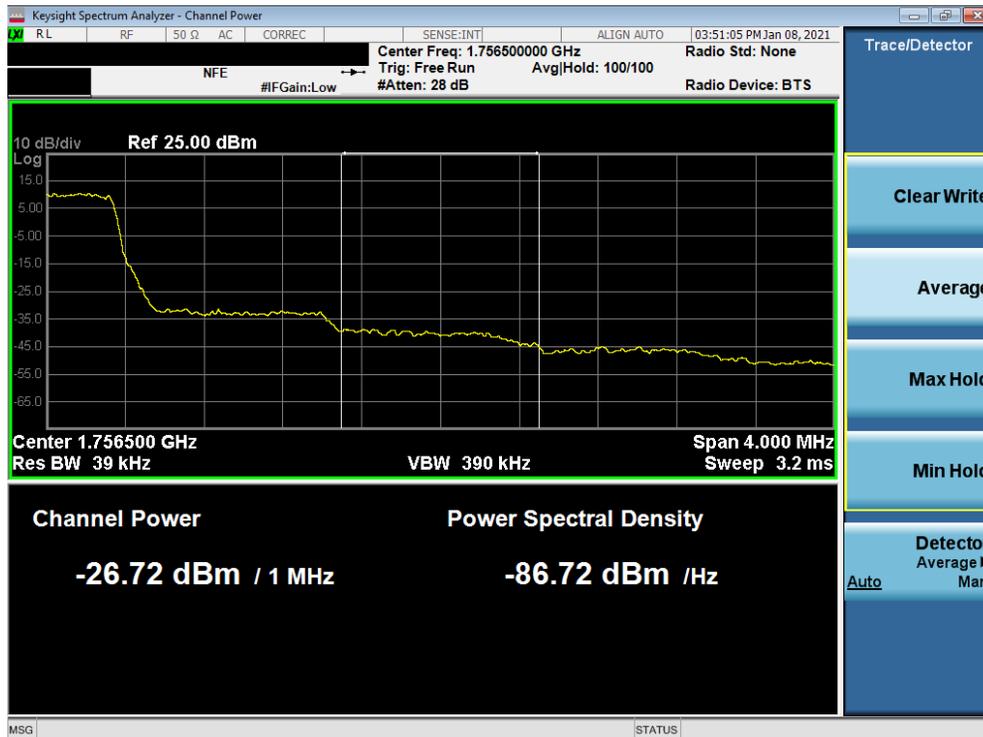


Plot 7-120. Lower Extended Band Edge Plot (LTE Band 66/4 – 1.4MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 78 of 129



Plot 7-121. Upper Band Edge Plot (LTE Band 4 – 1.4MHz QPSK – Full RB Configuration)

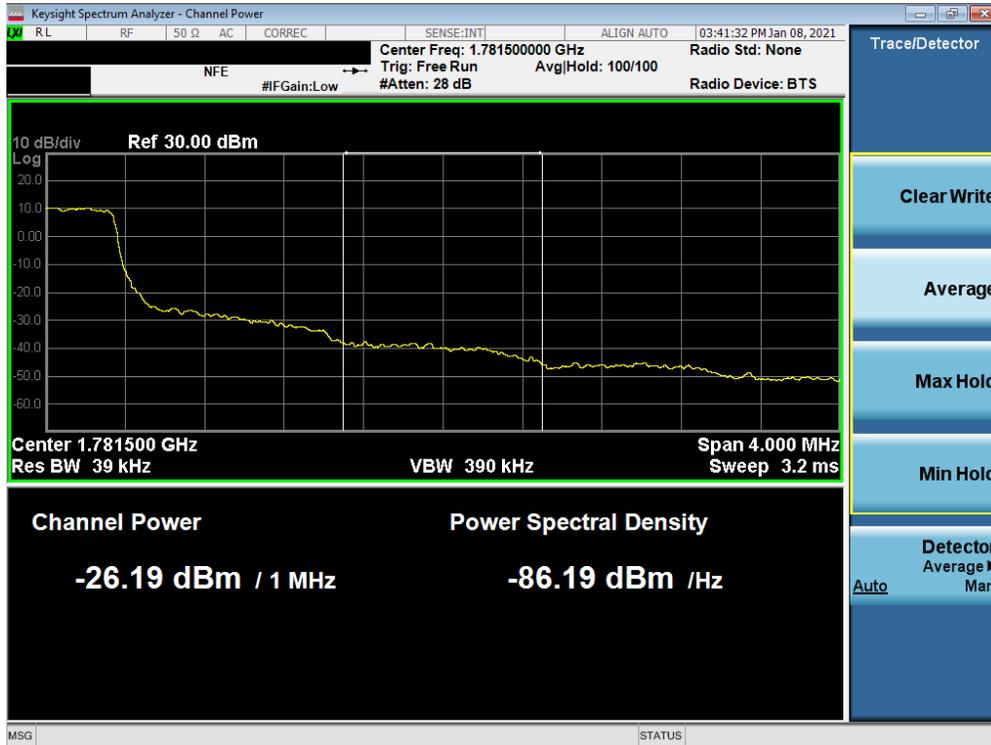


Plot 7-122. Upper Extended Band Edge Plot (LTE Band 4 – 1.4MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 79 of 129



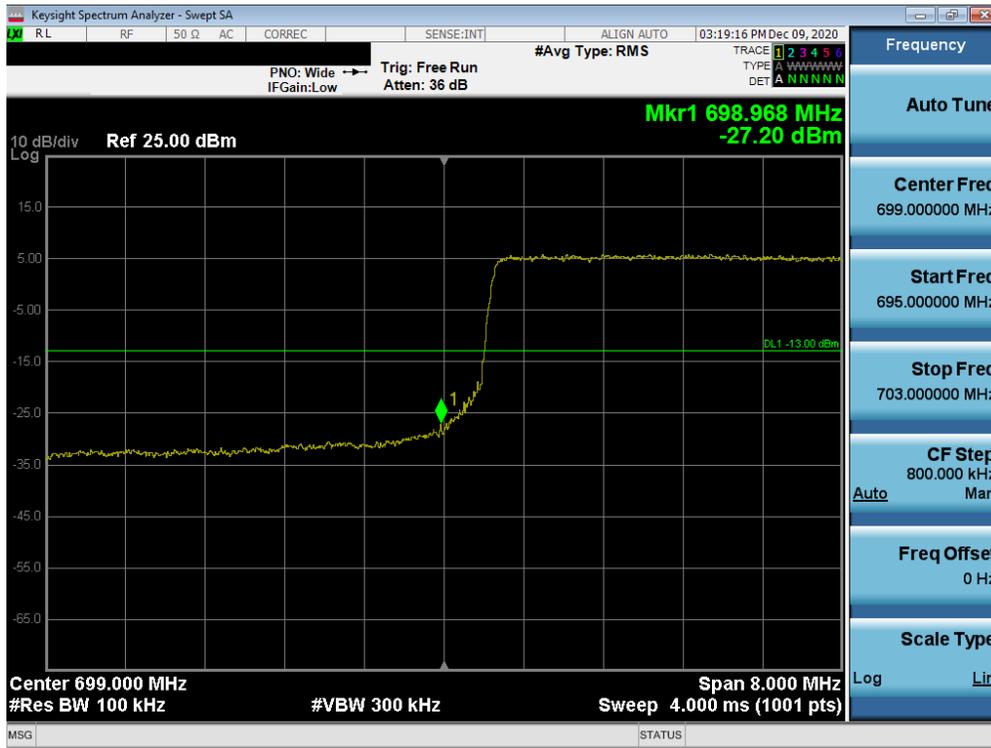
Plot 7-123. Upper Band Edge Plot (LTE Band 66 – 1.4MHz QPSK – Full RB Configuration)



Plot 7-124. Upper Extended Band Edge Plot (LTE Band 66 – 1.4MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	<b>LG</b>	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 80 of 129

## LTE Band 12

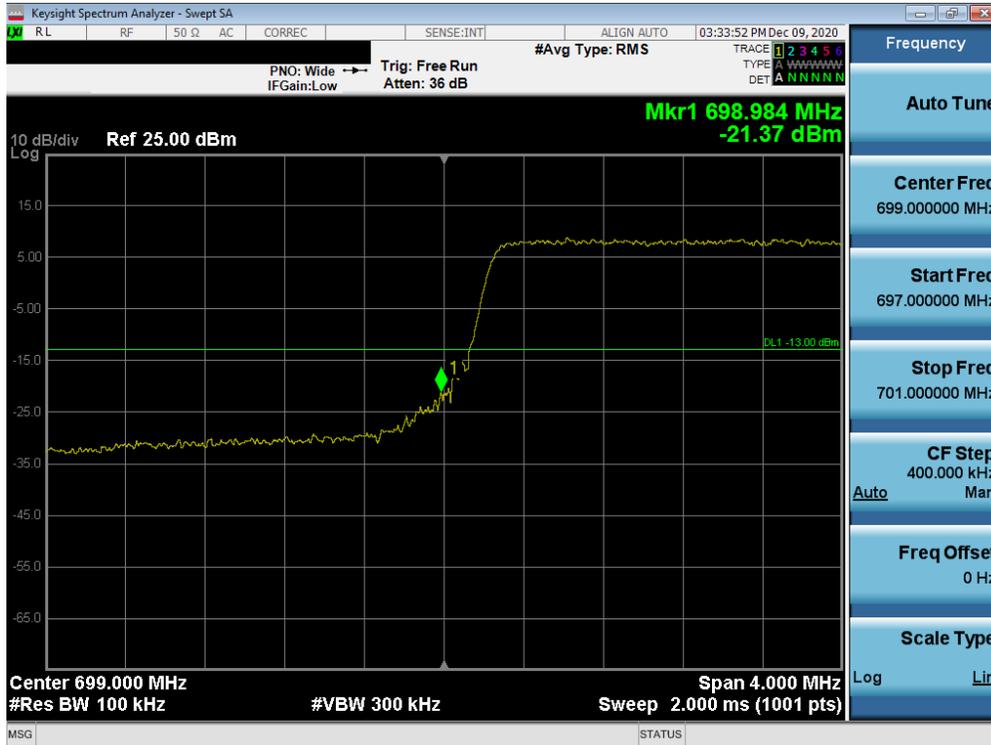


Plot 7-125. Lower Band Edge Plot (LTE Band 12 - 10MHz QPSK – Full RB Configuration)



Plot 7-126. Upper Band Edge Plot (LTE Band 12 - 10MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	<b>PCTEST</b> Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 81 of 129



Plot 7-127. Lower Band Edge Plot (LTE Band 12 - 5MHz QPSK – Full RB Configuration)



Plot 7-128. Upper Band Edge Plot (LTE Band 12 - 5MHz QPSK – Full RB Configuration)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT	LG	Approved by: Technical Manager
Test Report S/N: 1M2011180184-14.ZNF	Test Dates: 12/1 – 1/8/2021	EUT Type: Portable Handset		Page 82 of 129