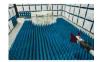


PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



# MEASUREMENT REPORT

LTE

#### **Applicant Name:**

LG Electronics USA, Inc. 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States

### Date of Testing: 5/9 - 5/29/2019 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1905090070-03-R1.ZNF

# FCC ID:

### ZNFX420AS

APPLICANT:

# LG Electronics USA, Inc.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s):

Certification LM-X420AS LMX420AS, X420AS Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 22, 24, & 27 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.

This revised Test Report (S/N: 1M1905090070-03-R1.ZNF) supersedes and replaces the previously issued test report (S/N: 1M1905090070-03.ZNF) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

Randy Ortanez President



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# MEASUREMENT REPORT FCC Part 22, 24, & 27

			ERP		EIRP			
Mode FCC Rule Part		Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Emission Designator	Modulation
LTE Band 12	27	699.7 - 715.3	0.115	20.60	0.188	22.75	1M09G7D	QPSK
LTE Band 12	27	699.7 - 715.3	0.091	19.60	0.150	21.75	1M10W7D	16QAM
LTE Band 12	27	700.5 - 714.5	0.120	20.80	0.197	22.95	2M70G7D	QPSK
LTE Band 12	27	700.5 - 714.5	0.093	19.68	0.152	21.83	2M69W7D	16QAM
LTE Band 12	27	701.5 - 713.5	0.116	20.65	0.191	22.80	4M56G7D	QPSK
LTE Band 12	27	701.5 - 713.5	0.091	19.60	0.150	21.75	4M54W7D	16QAM
LTE Band 12	27	704 - 711	0.119	20.75	0.195	22.90	9M03G7D	QPSK
LTE Band 12	27	704 - 711	0.096	19.83	0.158	21.98	9M04W7D	16QAM
LTE Band 5	22H	824.7 - 848.3	0.151	21.79	0.248	23.94	1M11G7D	QPSK
LTE Band 5	22H	824.7 - 848.3	0.121	20.84	0.199	22.99	1M11W7D	16QAM
LTE Band 5	22H	825.5 - 847.5	0.148	21.69	0.242	23.84	2M70G7D	QPSK
LTE Band 5	22H	825.5 - 847.5	0.119	20.77	0.196	22.92	2M71W7D	16QAM
LTE Band 5	22H	826.5 - 846.5	0.153	21.84	0.251	23.99	4M56G7D	QPSK
LTE Band 5	22H	826.5 - 846.5	0.127	21.04	0.208	23.19	4M53W7D	16QAM
LTE Band 5	22H	829 - 844	0.152	21.83	0.250	23.98	9M03G7D	QPSK
LTE Band 5	22H	829 - 844	0.120	20.79	0.197	22.94	9M05W7D	16QAM

EUT Overview (<1 GHz)

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			EI	RP		
Mode	FCC Rule Part	Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Emission Designator	Modulation
LTE Band 66/4	27	1710.7 - 1779.3	0.263	24.20	1M09G7D	QPSK
LTE Band 66/4	27	1710.7 - 1779.3	0.214	23.30	1M11W7D	16QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.248	23.95	2M71G7D	QPSK
LTE Band 66/4	27	1711.5 - 1778.5	0.209	23.20	2M71W7D	16QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.254	24.05	4M55G7D	QPSK
LTE Band 66/4	27	1712.5 - 1777.5	0.204	23.10	4M53W7D	16QAM
LTE Band 66/4	27	1715 - 1775	0.251	24.00	9M03G7D	QPSK
LTE Band 66/4	27	1715 - 1775	0.204	23.10	9M04W7D	16QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.248	23.95	13M6G7D	QPSK
LTE Band 66/4	27	1717.5 - 1772.5	0.204	23.10	13M6W7D	16QAM
LTE Band 66/4	27	1720 - 1770	0.244	23.87	18M1G7D	QPSK
LTE Band 66/4	27	1720 - 1770	0.203	23.07	18M1W7D	16QAM
LTE Band 2	24E	1850.7 - 1909.3	0.273	24.36	1M10G7D	QPSK
LTE Band 2	24E	1850.7 - 1909.3	0.234	23.70	1M11W7D	16QAM
LTE Band 2	24E	1851.5 - 1908.5	0.268	24.28	2M69G7D	QPSK
LTE Band 2	24E	1851.5 - 1908.5	0.223	23.48	2M71W7D	16QAM
LTE Band 2	24E	1852.5 - 1907.5	0.263	24.20	4M56G7D	QPSK
LTE Band 2	24E	1852.5 - 1907.5	0.232	23.65	4M53W7D	16QAM
LTE Band 2	24E	1855 - 1905	0.263	24.20	9M02G7D	QPSK
LTE Band 2	24E	1855 - 1905	0.229	23.60	9M04W7D	16QAM
LTE Band 2	24E	1857.5 - 1902.5	0.268	24.28	13M5G7D	QPSK
LTE Band 2	24E	1857.5 - 1902.5	0.229	23.60	13M6W7D	16QAM
LTE Band 2	24E	1860 - 1900	0.264	24.22	18M0G7D	QPSK
LTE Band 2	24E	1860 - 1900	0.230	23.62	18M1W7D	16QAM

EUT Overview (Mid Bands)

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			EIRP			
Mode	FCC Rule Part	Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Emission Designator	Modulation
LTE Band 30	27	2307.5 - 2312.5	0.172	22.36	4M52G7D	QPSK
LTE Band 30	27	2307.5 - 2312.5	0.138	21.41	4M52W7D	16QAM
LTE Band 30	27	2310	0.177	22.47	9M02G7D	QPSK
LTE Band 30	27	2310	0.140	21.46	9M02W7D	16QAM

EUT Overview (High Bands)

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# **1.0 INTRODUCTION**

### 1.1 Scope

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

### 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST 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 ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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# 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFX420AS**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 51568, 51519, 51477, 51550

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, Bluetooth (1x, EDR, LE), NFC

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.

### 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.

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# 3.0 DESCRIPTION OF TESTS

### 3.1 Measurement Procedure

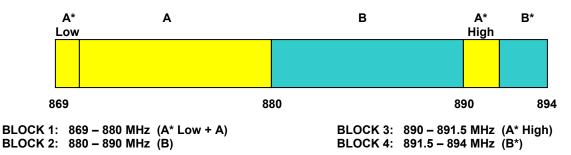
The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission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

### 3.2 Block A Frequency Range

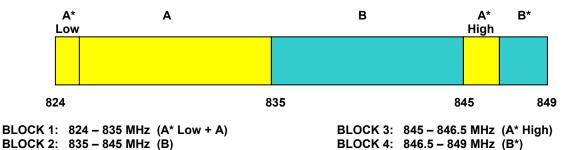
<u>698-746 MHz band</u>. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

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.

# 3.3 Cellular - Base Frequency Blocks



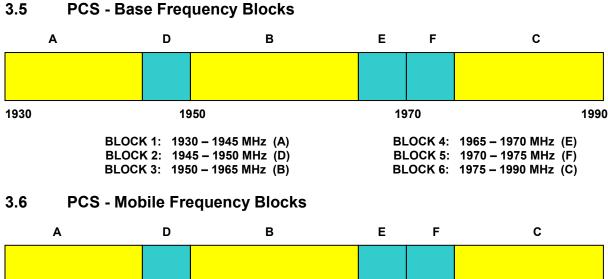
### 3.4 Cellular - Mobile Frequency Blocks

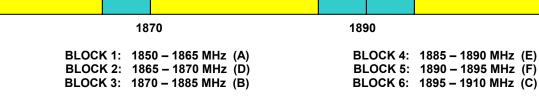


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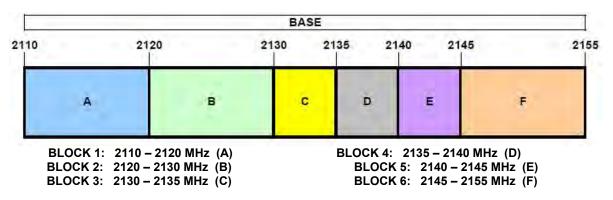


1850





### 3.7 AWS - Base Frequency Blocks

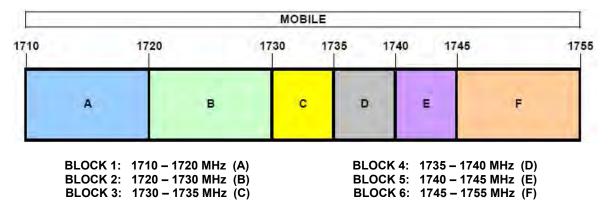


1910

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### 3.8 AWS - Mobile Frequency Blocks



# 3.9 WCS – Mobile/Base Frequency Blocks

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

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

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

BLOCK 3: 2315-2320 MHz (C)

BLOCK 4: 2345-2350 MHz (D)

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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:

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  $P_g$  [dBm] – 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<sub>10</sub>(Power [Watts]). For Band 30, the calculated  $P_d$  levels are compared to the absolute spurious emission limit of -40dBm which is equivalent to the required minimum attenuation of 70 + 10 log<sub>10</sub>(Power [Watts]).

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

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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 (±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	8/23/2018	Annual	8/23/2019	LTx3
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
Espec	ESX-2CA	Environmental Chamber	5/28/2018	Annual	5/28/2019	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	TVA-11-422	RF Power Amp		N/A		QA1317001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/19/2019	Annual	4/19/2020	11401010036
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11208010032
Rohde & Schwarz	TC-TA18	Vivaldi Antenna	8/17/2018	Biennial	8/17/2020	101072
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	9/19/2018	Annual	9/19/2019	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	CMW500	Radio Communication Tester	11/14/2018	Annual	11/14/2019	100976
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

#### Notes:

- 1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- 2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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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 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 analzyer. 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:	LG Electronics USA, Inc.
FCC ID:	ZNFX420AS
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>LTE</u>

**FCC Part** Test Test **Test Description Test Limit** Reference Section(s) Condition Result 2.1049 N/A Occupied Bandwidth Section 7.2 2.1051 22.917(a) > 43 + 10 log<sub>10</sub> (P[Watts]) at Section 7.3, 24.238(a) Out of Band Emissions Band Edge and for all out-of-7.4 27.53(g) band emissions 27.53(h) Undesirable emissions must Section 7.3, 27.53(a) Out of Band Emissions meet the limits detailed in 7.4 27.53(a) CONDUCTED PASS 24.232(d) Peak-Average Ratio < 13 dB Section 7.5 27.50 See RF Transmitter Conducted 2.1046 N/A Exposure **Output Power** Report 2.1055 < 2.5 ppm (Part 22) and 22.355 fundamental emissions stay Frequency Stability Section 7.8 24.235 within authorized frequency 27.54 block (Part 24, 27)

Table 7-1. Summary of Conducted Test Results

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FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5)	< 7 Watts max. ERP			Section 7.6
27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 12)	< 3 Watts max. ERP			Section 7.6
24.232(c)	Equivalent Isotropic Radiated Power (Band 2)	< 2 Watts max. EIRP			Section 7.6
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66/4)	< 1 Watts max. EIRP	RADIATED	PASS	Section 7.6
27.50(a)(3)	Equivalent Isotropic Radiated Power (Band 30)	< 0.25 Watts max. EIRP			Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(g) 27.53(h)	Undesirable Emissions	> 43 + 10 log <sub>10</sub> (P[Watts]) for all out-of-band emissions			Section 7.7
27.53(a)	Undesirable Emissions (Band 30)	> 70 + 10 log <sub>10</sub> (P[Watts])			Section 7.7

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 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.

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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)

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Plot 7-3. Occupied Bandwidth Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



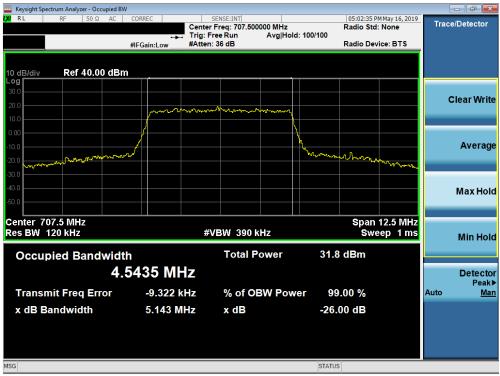
Plot 7-4. Occupied Bandwidth Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied BV				
<b>LX RL RF 50 Ω AC</b>	Center	SENSE:INT Freq: 707.500000 MHz	05:02:18 PM May 16, 201 Radio Std: None	<sup>9</sup> Trace/Detector
		ree Run Avg Hold: 10 : 36 dB	0/100 Radio Device: BTS	
	#I Gam.Low			Ĩ
10 dB/div Ref 40.00 dBn	า			
Log 30.0				
20.0				Clear Write
10.0		mannen		
0.00				
-10.0		\	Un Manager and a construction of the construct	Average
-20.0 monorman and a second se			a so a solution may be a	
-30.0				
-40.0				Max Hold
-50.0				
Center 707.5 MHz			Span 12.5 MH:	
Res BW 120 kHz	#	VBW 390 kHz	Sweep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	32.9 dBm	
4.	5553 MHz			Detector
Transmit Freq Error	-14.036 kHz	% of OBW Power	99.00 %	Peak≱ Auto Man
				Auto <u>man</u>
x dB Bandwidth	5.284 MHz	x dB	-26.00 dB	
MSG			STATUS	

Plot 7-5. Occupied Bandwidth Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (Band 12 - 5.0MHz 16-QAM - Full RB Configuration)

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Keysight Spectrum Analyzer - Occupied BW					
X/RL RF 50Ω AC	CORREC	SENSE:INT r Freg: 707.500000 MHz	04:49:43 F Radio Std	M May 16, 2019 : None	Trace/Detector
	🛶 Trig: F	ree Run Avg Hold: : 36 dB	:>100/100 Radio Dev	des DTC	
	#IFGain:Low #Atter	1: 36 dB	Radio Dev	/ice: BTS	
10 dB/div Ref 40.00 dBm Log					
30.0					
20.0	munder mar Mar	Manna and marked and			Clear Write
10.0					
0.00	_/				
-10.0			the fla states		Average
-20.0	~~~~		mannen	monton	
-30.0					
-40.0					Max Hole
-50.0					
Center 707.5 MHz			Eng	in 25 MHz	
Res BW 240 kHz	#	VBW 750 kHz		eep 1 ms	Min Hol
Occupied Bandwidt	h	Total Power	33.1 dBm		
9.	0303 MHz				Detecto
Tuonomit From France	-2.130 kHz	% of OBW Powe	er 99.00 %	,	Peakl Auto Mai
Transmit Freq Error				<i>,</i>	Auto <u>Mai</u>
x dB Bandwidth	10.06 MHz	x dB	-26.00 dB		
ISG			STATUS		

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

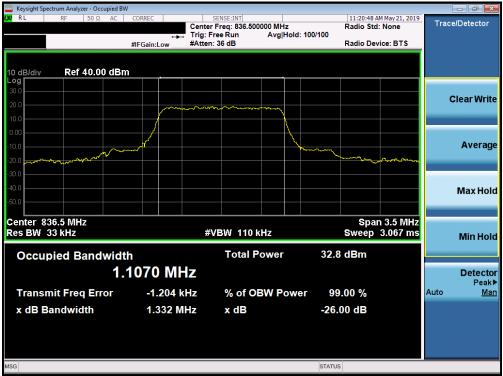


Plot 7-8. Occupied Bandwidth Plot (Band 12 - 10.0MHz 16-QAM - Full RB Configuration)

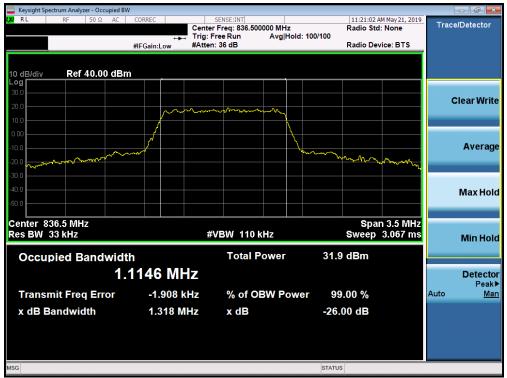
FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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#### Band 5



Plot 7-9. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)

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🔤 Keysight Spectrum Analyzer - Occupied BW					_	- I I - X-
LXI RL RF 50Ω AC		SENSE:INT Freq: 836.500000 MHz	11:17:22 A Radio Std	M May 21, 2019	Tracel	Detector
	Trig: F	ree Run Avg Hold: 10		. None		
	#IFGain:Low #Atten	: 36 dB	Radio Dev	rice: BTS		
10 dB/div Ref 40.00 dBm						
Log						
30.0					С	ear Write
20.0	m	mmm_n_n				our mile
10.0						
0.00	/	<u> </u>				
-10.0						Average
-20.0 mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm			mar mar and a second se	mannen		
-30.0						
-40.0						
-50.0						Max Hold
-50.0						
Center 836.5 MHz			Spar	17.5 MHz		
Res BW 68 kHz	#	VBW 220 kHz		p 1.6 ms		Min Hold
		- / 15				
Occupied Bandwidth	า	Total Power	32.9 dBm			
2.7	7019 MHz					Detector
						Peak▶
Transmit Freq Error	7.343 kHz	% of OBW Power	99.00 %		Auto	<u>Man</u>
x dB Bandwidth	2.962 MHz	x dB	-26.00 dB			
MSG			074740			
MSG			STATUS			

Plot 7-11. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



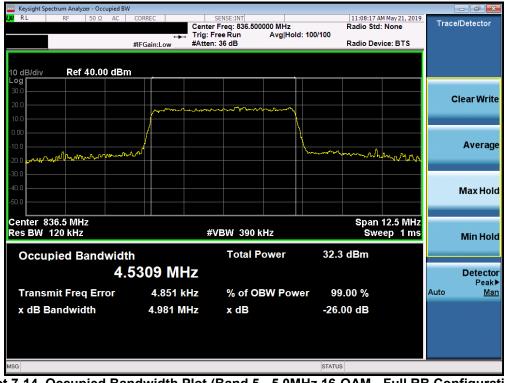
Plot 7-12. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied BW					
LXX RL RF 50Ω AC C		SENSE:INT r Freq: 836.500000 MHz		:08:03 AM May 21, 2019 dio Std: None	Trace/Detector
	Trig: F	Free Run Avg Ho	ld: 100/100		
#	FGain:Low #Atten	n: 36 dB	Ra	dio Device: BTS	
10 dB/div Ref 40.00 dBm					
Log 30.0					
20.0					Clear Write
10.0	m	monormul			
0.00					
	1				Average
-10.0	<u>کر</u>		Junion	- marting mart	Average
-30.0					
-40.0					Max Hold
-50.0					
Center 836.5 MHz				Span 12.5 MHz	
Res BW 120 kHz	#	VBW 390 kHz		Sweep 1 ms	Min Hold
					WIITTOIG
Occupied Bandwidth		Total Power	32.9 dE	3m	
4.5	648 MHz				Detector
					Peak►
Transmit Freq Error	-9.634 kHz	% of OBW Pov	ver 99.00	%	Auto <u>Man</u>
x dB Bandwidth	5.001 MHz	x dB	-26.00	dB	
MSG			STATUS		

Plot 7-13. Occupied Bandwidth Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Occupied B\	N					_	- 🗗 🔀
IX RL RF 50Ω AC		SENSE:INT Center Freq: 836.500 Trig: Free Run	000 MHz Avg Hold: 100/100	Radio Std	M May 21, 2019 : None	Trace	Detector
		#Atten: 36 dB	<b>.</b>	Radio Dev	ice: BTS		
10 dB/div Ref 40.00 dBr	n						
30.0	مارسرردماتهم					с	ear Write
10.0							
-10.0 -20.0	unnt			hand the first the state of the	Martonardonad		Average
-30.0							Max Hold
Center 836.5 MHz Res BW 240 kHz		#VBW 750 k	Hz		n 25 MHz ep 1 ms		Min Hold
Occupied Bandwidt		Total P	ower 32	2.9 dBm			
9.	0250 MH	Z					Detector Peak▶
Transmit Freq Error	25.607 kH	z % of OE	BW Power	99.00 %		Auto	<u>Man</u>
x dB Bandwidth	9.957 MH	lz xdB	-2	6.00 dB			
MSG			ST/	TUS			

Plot 7-15. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



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

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω AC	CORREC	SENSE:INT	00-53-35 4	M May 21, 2019	
KE KF 50.52 AC	Cen Trig	ter Freq: 1.732500000 GHz		: None	Frace/Detector
10 dB/div Ref 30.00 dBn	in Guineow	ien. oo ub	Radio Dev		
10 dB/div Ref 30.00 dBn Log 20.0 10.0		when when the			Clear Write
0.00 10.0 20.0 Martin Martin 30.0			han	hunne	Averag
40.0					Max Hol
Center 1.733 GHz Res BW 27 kHz		VBW 270 kHz		an 3 MHz p 3.8 ms	Min Hol
Occupied Bandwidt	<sup>h</sup> 0868 MHz	Total Power	31.0 dBm		Detecto
Transmit Freq Error x dB Bandwidth	-1.108 kHz 1.276 MHz	% of OBW Por x dB	wer 99.00 % -26.00 dB	Au	
G			STATUS		

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



Plot 7-18. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

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	trum Analyzer	- Occupie	ed BW										
L <mark>XI</mark> RL	RF	50Ω A	C COI	RREC		NSE:INT req: 1.73250	0000 GHz			10:03:07 A Radio Std	M May 21, 2019	Trac	e/Detector
				Trig: Free Run Avg Hold: 100/100									
_			#IF	Gain:Low	#Atten: 3	36 dB				Radio Dev	vice: BTS		
10 dB/div Log	Ref 4	0.00 d	IBm	_									
30.0													
20.0													Clear Write
10.0				m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		m						
0.00				1									
-10.0				/									Average
-20.0 Mm	mm	$\sim$	mm					Lon	-~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m			
-30.0													
-40.0													
-40.0													Max Hold
-50.0													
Center 1.7											n 7.5 MHz		
Res BW 6	8 kHz				#VI	BW 2201	٢Hz			Swee	p 1.6 ms		Min Hold
0		n els si	el tile			Total P	ower		32.2	dBm			
Occup	ied Ba					TOLAT	Ower		32.2	ubili			
			2.71	07 M	Hz								Detector
Transm	nit Freq	Error		-61	5 Hz	% of O	BW Pow	er	99.	00 %		Auto	Peak▶ Man
X dB Ba	andwidt	n		2.985	MHZ	x dB			-26.0	U aB			
MSG									STATUS				

Plot 7-19. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-20. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

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Keysight Spectrum Analyzer - Occupied BW					
RL RF 50Ω AC	🛶 Trig:	sense:INT r Freq: 1.732500000 GHz Free Run Avg Hol n: 36 dB	10:11:00 A Radio Std d: 100/100 Radio Dev	None	race/Detector
0 dB/div Ref 30.00 dBm					
0.0				_	Clear Writ
0.0					Averaç
0.0					Max Ho
enter 1.733 GHz es BW 120 kHz		VBW 390 kHz		12.5 MHz ep 1 ms	Min Ho
Occupied Bandwidth	5460 MHz	Total Power	52.4 UBIII		Detect
Transmit Freq Error	-1.523 kHz	% of OBW Pow	ver 99.00 %	Auto	Peal
x dB Bandwidth	4.975 MHz	x dB	-26.00 dB		
G			STATUS		

Plot 7-21. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-22. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

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Plot 7-23. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-24. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

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Plot 7-25. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-26. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

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Keysight Spectrum Analyzer - Occupied BW           RL         RF         50 Ω         AC	CORREC	SENSE:INT	10:27:17 A Radio Std	M May 21, 2019	Trace/Detector
	Trig: F	Free Run Avg Hold: 1: 36 dB			
0 dB/div Ref 40.00 dBn					
30.0					Clear Wri
20.0	allen marenet	*~~m~~~~m~~~m~~m~~m			orear min
10.0					
					Avera
20.0 What was a strain the second sec			well allow a growthe the	Manusel	
30.0					
40.0					Max Ho
50.0					
Center 1.733 GHz Res BW 470 kHz	#	VBW 1.5 MHz		n 50 MHz eep 1 ms	
					Min Ho
Occupied Bandwidt		Total Power	32.6 dBm		
18	.052 MHz				Detect
Transmit Freq Error	-3.382 kHz	% of OBW Powe	r 99.00 %	P	Auto <u>M</u>
x dB Bandwidth	19.47 MHz	x dB	-26.00 dB		

Plot 7-27. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

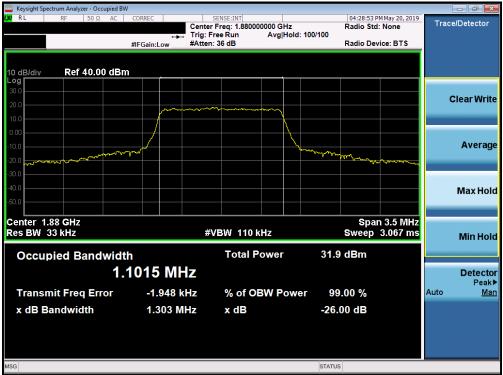


Plot 7-28. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

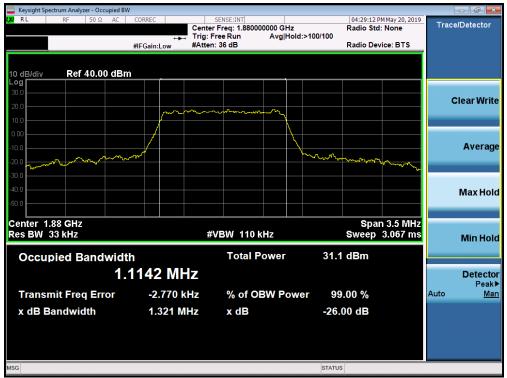
FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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#### Band 2



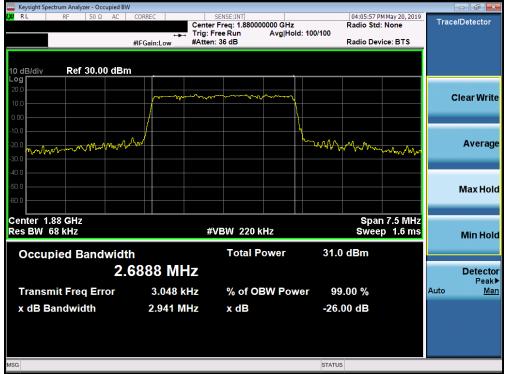
Plot 7-29. Occupied Bandwidth Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-30. Occupied Bandwidth Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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Plot 7-31. Occupied Bandwidth Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



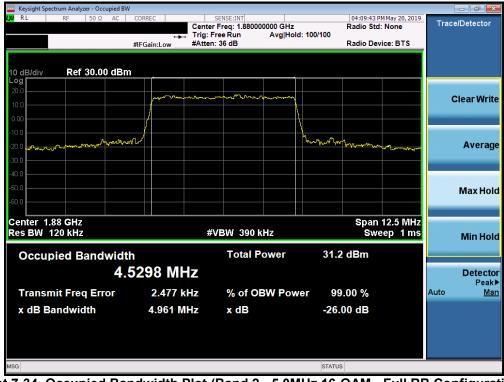
Plot 7-32. Occupied Bandwidth Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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🔤 Keysight Spectrum Analyzer - Occupied BW							
LXX RL RF 50Ω AC	CORREC #IFGain:Low	SENSE:INT Center Freq: 1.88000 Trig: Free Run #Atten: 36 dB	00000 GHz Avg Hold:>100/10	Radio Std		Trace/D	etector
10 dB/div Ref 30.00 dBm							
20.0	f	᠂ᡔ᠊ᠬᠬ᠁ᠱ᠆ᠮ᠕ᢩᡔᠬᢧᡪᢧᠰ				Cle	ar Write
0.00 -10.0			- han	- Mrangerting			Warana
-20.0							Average
-50.0						N	lax Hold
Center 1.88 GHz Res BW 120 kHz		#VBW 390 k	kHz		12.5 MHz ep 1 ms	N	Ain Hold
Occupied Bandwidt	י 5606 MH	Total P Z	ower 3	2.1 dBm			Detector
Transmit Freq Error	-9.574 kl	Hz % of OE	BW Power	99.00 %		Auto	Peak▶ <u>Man</u>
x dB Bandwidth	5.012 MH	Hz xdB	-2	26.00 dB			
MSG			ST	ATUS			

Plot 7-33. Occupied Bandwidth Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-34. Occupied Bandwidth Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied BW					
IX RL RF 50Ω AC	🛶 Tri		z Radio S old: 100/100	3 PM May 20, 2019 td: None	Trace/Detector
	#FGain:Low #Atten: 36 dB Radio Device: BTS				
10 dB/div Ref 30.00 dBm					
20.0					
10.0	how	an a	7		Clear Write
0.00					
-10.0					
-20.0 Warner Burner Charles and a star	ww		proversation and and	And the second	Average
-30.0					Ū
-40.0					
-50.0					Max Hold
-60.0					Maxitola
Center 1.88 GHz Res BW 240 kHz		#VBW 750 kHz		an 25 MHz veep 1 ms	
		#VDVV 750 KHZ		acch i illa	Min Hold
Occupied Bandwidt	h	Total Power	32.0 dBm		
9.0	0235 MHz				Detector
					Peak►
Transmit Freq Error	11.899 kHz	% of OBW Po	wer 99.00 %		Auto <u>Man</u>
x dB Bandwidth	9.973 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-35. Occupied Bandwidth Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-36. Occupied Bandwidth Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied B\	N				
<b>ΙΧΊ RL   RF   50 Ω AC  </b>		SENSE:INT Freq: 1.880000000 GHz Free Run Avg Ho		:11 PM May 20, 2019 Std: None	Trace/Detector
		n: 36 dB		Device: BTS	
10 dB/div Ref 40.00 dBr	n				
Log 30.0					
20.0					Clear Write
10.0	monumen	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
0.00	/		(		
-10.0					Average
-20.0	utraf		mannen	A.Marine and and a	,
-30.0					
-40.0					
-50.0					Max Hold
-30.0					
Center 1.88 GHz				an 37.5 MHz	
Res BW 360 kHz	#	VBW 1.1 MHz		Sweep 1 ms	Min Hold
Occupied Bandwid	th	Total Power	32.3 dBm		
	3.535 MHz				Detector
	5.555 WITZ				Peak►
Transmit Freq Error	10.196 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	14.74 MHz	x dB	-26.00 dE		
MSG			STATUS		

Plot 7-37. Occupied Bandwidth Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



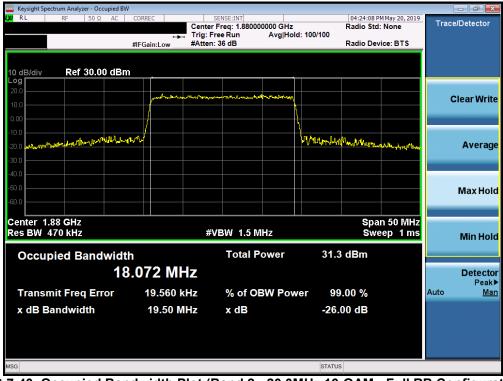
Plot 7-38. Occupied Bandwidth Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied BW					
	🛶 Tri		z Radio St old: 100/100		Trace/Detector
	#IFGain:Low #A1	tten: 36 dB	Radio De	evice: BTS	
10 dB/div Ref 30.00 dBm					
20.0	- monther hunge	Mangage martle and a strategy and a	<b>X</b>		Clear Write
0.00					orear write
-10.0	~~		Multime physic	<i>(</i> ), (), (), (), (), (), (), (), (), (), (	Average
-20.0 <b>Manual Control</b>				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Average
-40.0					
-60.0					Max Hold
Center 1.88 GHz			Sp	an 50 MHz	
Res BW 470 kHz		#VBW 1.5 MHz	SW	/eep 1 ms	Min Hold
Occupied Bandwidth		Total Power	32.4 dBm		
18.	.029 MHz				Detector Peak▶
Transmit Freq Error	7.466 kHz	% of OBW Po	wer 99.00 %		Auto <u>Man</u>
x dB Bandwidth	19.54 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-39. Occupied Bandwidth Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-40. Occupied Bandwidth Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω AC NFE	Trig: F	SENSE:INT r Freq: 2.310000000 GHz Free Run Avg Hold: 10 n: 36 dB	02:18:08 PM May 17, 20 Radio Std: None 0/100 Radio Device: BTS	9 Trace/Detector
5 dB/div Ref 40.00 dBm				Clear Writ
10.0 5.00 20.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Averag
500				Max Ho
enter 2.31 GHz es BW 120 kHz	#	VBW 390 kHz	Span 12.5 MH Sweep 1 m	
	5156 MHz	Total Power	31.3 dBm	Detect
Transmit Freq Error x dB Bandwidth	246 Hz 4.974 MHz	% of OBW Power x dB	99.00 % -26.00 dB	Auto <u>M</u>
G			STATUS	

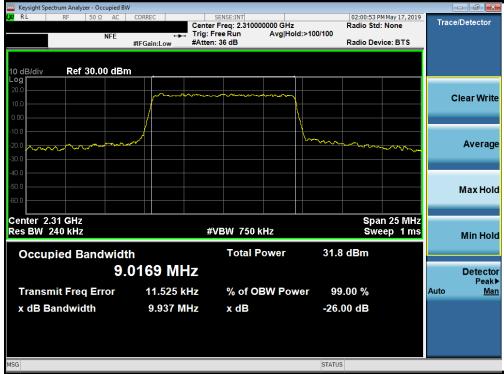
Plot 7-41. Occupied Bandwidth Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-42. Occupied Bandwidth Plot (Band 30 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
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Plot 7-43. Occupied Bandwidth Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-44. Occupied Bandwidth Plot (Band 30 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
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## 7.3 Spurious and Harmonic Emissions at Antenna Terminal

## **Test Overview**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 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 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 $43 + 10 \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

For Band 30, the minimum permissible attenuation level of any spurious emission <2288MHz and >2365MHz is 70 + 10 log10(P[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

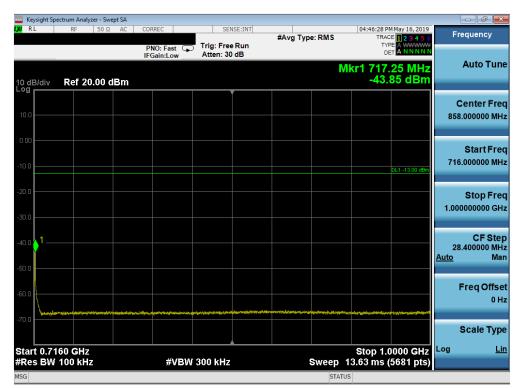
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the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

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RL	RF	50 Ω	AC	CORREC		S	ENSE:INT			04:46:18 P	M May 16, 2019		
					ast ⊂ Low		ee Run	#Avg Typ	e: RMS	TRAC	DE 1 2 3 4 5 6 PE A WWWWW ET A NNNNN		quency
0 dB/div	Ref	20.00 d	Bm						N	lkr1 697 -46.	.55 MHz 03 dBm		Auto Tur
10.0													enter Fre 950000 M
0.00											DL1 -13.00 dBm		Start Fr 000000 M
20.0													Stop Fr 900000 M
io.o											1 	66. <u>Auto</u>	CF St 790000 M M
i0.0												F	req Offs 0
70.0													Scale Ty
	).0 MHz W 100 k	Hz			#VBV	/ 300 kH	z	s	weep 3	Stop 6 2.06 ms (1	31.3 1112	Log	ļ

Plot 7-45. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



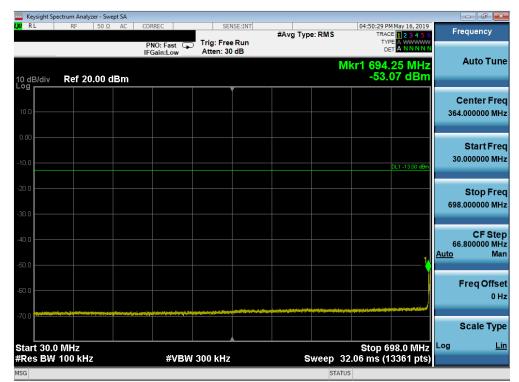
Plot 7-46. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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	ectrum Analyzer - Sw									d X
(XI RL	RF 50 Ω	AC	CORREC		#Avg Typ	e: RMS	TRA	M May 16, 2019 CE 1 2 3 4 5 6 PE A WWWWW	Frequen	ncy
10 dB/div Log	Ref 0.00 d	Bm	PNO: Fast C IFGain:Low	#Atten: 3		N	⊡ /kr1 1.39	A N N N N N	Auto	Tune
-10.0								DL1 -13.00 dBm	Cente 5.5000000	
-20.0									Star 1.0000000	t Freq 00 GHz
-40.0									Stoj 10.0000000	p Freq 00 GHz
-60.0									CF 900.00000 <u>Auto</u>	= Step 00 MHz Man
-80.0									Freq	Offset 0 Hz
-90.0 Start 1.00	0.6Hz						Stop 1	0.000 GHz		e Type Lin
#Res BW			#VB	W 3.0 MHz	S	weep	15.60 ms (	18001 pts)		
MSG						STA	TUS			

Plot 7-47. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-48. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
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	ctrum Analyzer -										×
LXI RL	RF 50	Ω AC	CORREC	SEI	SE:INT	#Avg Typ	e: RMS	TRAC	MMay 16, 2019	Frequency	
10 dB/div	Ref 20.00	) dBm	PNO: Fast IFGain:Low	Atten: 30			Μ	DI <b>kr1 720</b> .	75 MHz 94 dBm	Auto Tu	ne
10.0										Center Fr 858.000000 M	
-10.0									DL1 -13.00 dBm	Start Fr 716.000000 M	
-20.0										Stop Fre 1.000000000 G	
-40.0 1										CF Ste 28.400000 M <u>Auto</u> M	
-60.0	مىرىمىيەتلەرم مەرمەيمەتلەرمىيەر بىرى مەرمەر مەر	n ha fina i dan ƙalanta Isan alin di ka	nitet- fil floatet-titet terracite	*********	a reason find path of stationization affer	en filmen andare and	Arman and a second	megladi detera 1959 per kara sanang ng	141.144.144.1	Freq Offs 0	set Hz
-70.0 Start 0.71	60 GHz							Stop 1.	0000 GHz	Scale Tyj Log <u>l</u>	pe Lin
#Res BW			#V	BW 300 kHz			Sweep	13.63 ms (	5681 pts)		
MSG							STATU	s			_

Plot 7-49. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



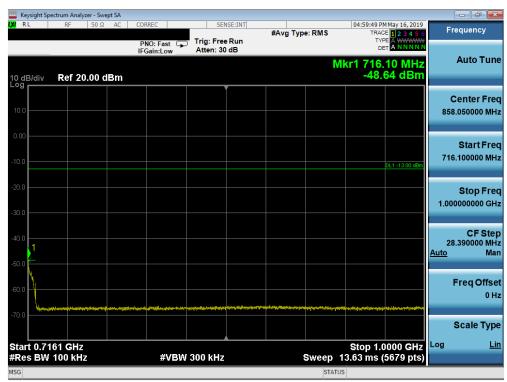
Plot 7-50. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Keysight Spectrum		t SA									
LXIRL P	RF 50 Ω	AC CO	ORREC	SEI	NSE:INT	#Avg Typ	e: RMS	TRA	M May 16, 2019 CE 1 2 3 4 5 6	Fr	equency
10 dB/div Re	ef 20.00 dE	I	PNO: Fast ( FGain:Low	Trig: Free Atten: 30				™ 1007 Mkr1 697			Auto Tune
10.0											Center Freq .000000 MHz
-10.0									DL1 -13.00 dBm	30	Start Freq .000000 MHz
-20.0										698	Stop Freq .000000 MHz
-40.0									1,	66 <u>Auto</u>	CF Step .800000 MHz Man
-60.0	kentelisterer, sikkests om så sta						distrongelaure bit	h. Densed - ray particulation of the data			Freq Offset 0 Hz
-70.0		an a fail ain a dhun an	n Hand Million Rock of States								Scale Type
Start 30.0 MH #Res BW 100			#\/R	W 300 kHz		-	ween	Stop 6 32.06 ms (*	698.0 MHz	Log	Lin
MSG			<i></i>	N-300-N112			_		looo i pis)		

Plot 7-51. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-52. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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	ectrum Analyzer -								(	- 6 ×
LXI RL	RF 5	Ω AC	CORREC	SENS	E:INT #Av	g Type: RMS		M May 16, 2019	Fre	equency
			PNO: Fast G	Trig: Free F #Atten: 30	Run	•	TY			Auto Tune
10 dB/div Log	Ref 10.0	0 dBm		<b>•</b>			-43.	74 dBm		
									С	enter Freq
0.00									5.500	000000 GHz
-10.0								DL1 -13.00 dBm		Start Freq
-20.0									1.000	0000000 GHz
-30.0										Stop Freq
									10.000	0000000 GHz
-40.0	۱ <u> </u>									CF Step
-50.0		~~~~	~~~~						900 <u>Auto</u>	.000000 MHz Man
-60.0										
-70.0									F	req Offset <sup>-</sup> 0 Hz
-80.0										UHZ
									:	Scale Type
Start 1.00							Stop 10	.000 0112	Log	<u>Lin</u>
#Res BW	1.0 MHz		#VBW	3.0 MHz			15.60 ms (1	8001 pts)		
MSG						ST/	ATUS			

Plot 7-53. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

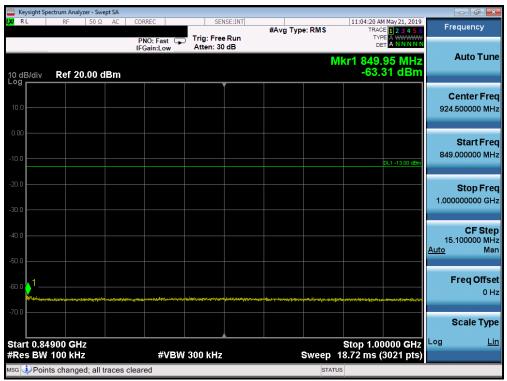
FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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## Band 5

Keysight Spectrum Analyzer - Swept SA				
XX RL RF 50Ω AC	PNO: Fast Trig: Free IFGain:Low Atten: 30		11:04:13 AM May 21, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 20.00 dBm	ii dameon		Mkr1 822.40 MHz -49.29 dBm	Auto Tune
10.0				<b>Center Fred</b> 426.500000 MH;
-10.0			DL1 -13.00 dBm	Start Free 30.000000 MH
-20.0				Stop Free 823.000000 MH
-40.0			<u>\</u>	<b>CF Ste</b> 79.300000 MH <u>Auto</u> Ma
-60.0		un alter som		Freq Offse 0 H
-70.0 Start 30.0 MHz			JUDD 023.0 IVII 12	Scale Type
#Res BW 100 kHz	#VBW 300 kHz	-	98.33 ms (15861 pts)	

Plot 7-54. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-55. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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IXX RL RF 50Ω AC CORREC PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run Atten: 20 dB	#Avg Type: RMS	11:04:42 AM May 21, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
			DET A NNNN	
			r1 1 658 5 GHz	Auto Tune
10 dB/div Ref 10.00 dBm			r1 1.658 5 GHz -33.06 dBm	
	Ĭ			Center Freq
0.00				5.500000000 GHz
-10.0			DL1 -13.00 dBm	Start Freq
-20.0				1.000000000 GHz
-30.0				Stop Freq
-40.0				10.00000000 GHz
-50.0				CF Step
-60.0				900.000000 MHz <u>Auto</u> Man
-70.0				Freq Offset 0 Hz
-80.0				
				Scale Type
Start 1.000 GHz #Res BW 1.0 MHz #VBW	3.0 MHz	Sweep 15	Stop 10.000 GHz .60 ms (18001 pts)	Log <u>Lin</u>
msg	UN MILL	STATUS		

Plot 7-56. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-57. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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	rum Analyzer - Swej									
(XI RL	RF 50 Ω	AC (	ORREC	SENS	E:INT	#Avg Type	: RMS		May 21, 2019	Frequency
			PNO: Fast 🕞 IFGain:Low	Trig: Free Atten: 30			м	TYF DE kr1 849.	45 MHz	Auto Tu
10 dB/div Log	Ref 20.00 d	Bm						-49.	74 dBm	
10.0										Center Fr 924.500000 M
-10.0									DL1 -13.00 dBm	<b>Start Fr</b> 849.000000 M
-20.0										<b>Stop Fr</b> 1.000000000 G
-40.0										<b>CF St</b> 15.100000 M <u>Auto</u> M
-60.0	alanga, takan ya kuta sa kuta sa	4665 <sup>1</sup> 81 <sup>1</sup> 92-4-11-11-11	غاربون ماروز رومانورز وموانو روم	angle meriline mener	ting to the second second	e chirologic dige the following on g	<del>ور من و</del> ر من ورو من	Seferent sources and sources	i den fingenese festernese	<b>Freq Offs</b> 0
-70.0										Scale Ty
Start 0.849 #Res BW 1			#VBW	300 kHz		ę	Sweep 1	Stop 1.00 8.72 ms (	000 012	Log <u>l</u>
MSG 🔱 Points	changed; all tr	races cle	ared				STATUS	5		

Plot 7-58. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



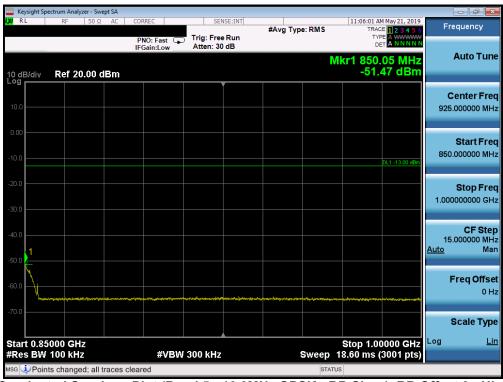
Plot 7-59. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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	ectrum Analyzer - Swe									_	
LX/RL	RF 50 Ω	AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		May 21, 2019	Fre	equency
			PNO: Fast G	Trig: Free Atten: 30				TYP			
10 dB/div Log	Ref 20.00 c	iBm					Μ	kr1 822. -59.	30 MHz 30 dBm		Auto Tune
10.0											enter Freq
0.00										421	
-10.0										30.	Start Freq
									DL1 -13.00 dBm		
-20.0										824	Stop Freq
-30.0											CF Step
-40.0										79. <u>Auto</u>	400000 MHz Man
-50.0									1	F	Freq Offset
-60.0											0 Hz
-70.0										5	Scale Type
Start 30.0 #Res BW			#VBM	/ 300 kHz			weep 9	Stop 8 3.46 ms (1	24.0 MHz 5881 pts)	Log	Lin
MSG							STATU	_			

Plot 7-60. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-61. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 150		
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	ectrum Analy:		pt SA										×
I,XI RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Avg Typ	e: RMS		AM May 21, 2019 CE 1 2 3 4 5 6	Frequency	/
				PNO: Fa IFGain:Lo	st 🖵 ow	Trig: Free Atten: 20	Run dB			T` [			
10 dB/div Log	Ref 10	.00 d	Bm						N	/lkr1 1.67 -31	′9 5 GHz .81 dBm	Auto T	une
0.00												Center F 5.500000000	
-10.0											DL1 -13.00 dBm	Start F	
-20.0	<b>↓</b> <sup>1</sup>											1.000000000	
-40.0												Stop F 10.000000000	
-50.0												CF S 900.000000 <u>Auto</u>	
-60.0												Freq Of	f <b>fset</b> 0 Hz
-80.0												Scale T	
Start 1.00 #Res BW				#	VBW :	3.0 MHz		s	weep	Stop 1 15.60 ms (	0.000 GHz 18001 pts)	Log	Lin
MSG									STA	TUS			

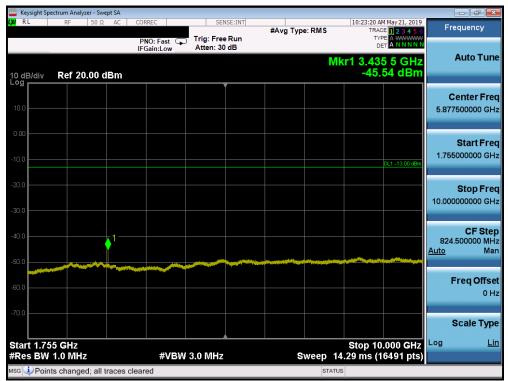
Plot 7-62. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 150
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PNO: Fast IFGain:Low         Trig: Free Run Atten: 30 dB         #Avg Type: RMS         Trace (D 2 3 4 5 6 (D 2 3 4 5 6))         Frequency           10 dB/div         Ref 20.00 dBm         Mkr1 1.709 0 GHz -43.17 dBm         Auto Tu           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           10 dB/div         Ref 20.00 dBm         Start F         869,50000 M           200         Start F         869,50000 M         80,0000 M           200         Start F         869,50000 M         80,0000 M           200         Start F         80,0000 M         80,0000 M           200         Start F         80,0000 M         90,0000 M           200 </th <th>Keysight Spectrum Analyzer - Swept SA</th> <th></th> <th></th> <th></th> <th></th>	Keysight Spectrum Analyzer - Swept SA				
Order       Ref 20.00 dBm       Center F         00 dB/div       Ref 20.00 dBm       Center F         00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       Start F         00 dB/div         00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div       00 dB/div	α RL RF 50 Ω AC		#Avg Type: RMS	TYPE A WAAWAAWAA	Frequency
10.0       Center F         0.00       Start F         0.00       0.1 - 1300 dEm         0.00       0.1 - 1	0 dB/div Ref 20.00 dBm		M	r1 1.709 0 GHz -43.17 dBm	Auto Tur
10.0       0.1.1.300.dem       Start F         200       0.1.1.300.dem       0.1.1.300.dem         300       0.1.1.300.dem       1.1.100.dem         400       0.1.1.300.dem       1.1.100.dem         500       0.1.1.300.dem       1.1.100.dem         600       0.1.1.100.dem       1.1.100.dem         700       0.1.1.100.dem       1.1.100.dem         600       0.1.1.100.dem       1.1.100.dem         700       0.1.1.100.dem       1.1.100.dem         600       0.1.1.100.dem       1.1.100.dem         700       0.1.1.100.dem       1.1.100.dem         700       0.1.100.dem       1.1.100.dem         700       0.1.100.dem       1.1.100.dem         700       0.1.100.dem       1.1.100.dem         700       0.1.100.dem       1.					Center Fre 869.500000 MH
Stop F           1.709000000           CF S           160           000				DL1 -13.00 dBm	Start Fre 30.000000 Mi
167.900000 M           4uto           500					<b>Stop Fre</b> 1.709000000 GH
The second secon				1	CF Ste 167.900000 M Auto M
tart 0.0300 GHz Stop 1.7090 GHz	Papetan and a second de la construction de la const	penetristeren erinteren frederikon open derekterekterekteren erinteren erinteren erinteren erinteren erinteren	and an address of the second	n na	Freq Offs 0
					Scale Ty
	tart 0.0300 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 2	Stop 1.7090 GHz .239 ms (3359 pts)	Log <u>L</u>

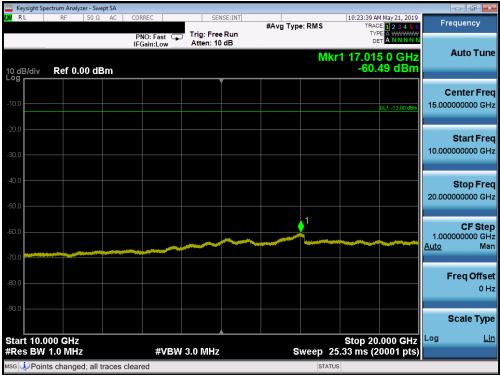
Plot 7-63. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-64. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere E1 of 150
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Plot 7-65. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



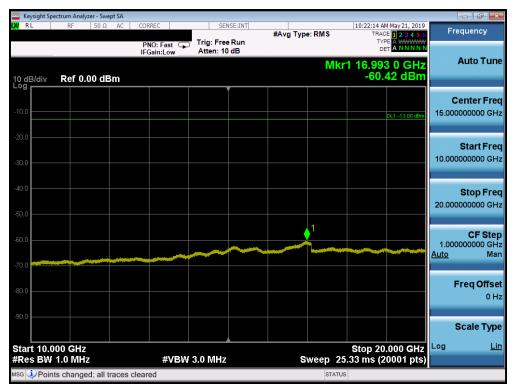
Plot 7-66. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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	ctrum Analyze											
L <mark>XI</mark> RL	RF	50 Ω A		REC		NSE:INT	#Avg Typ	e: RMS	TRA	M May 21, 2019 CE <b>1 2 3 4 5 6</b> PE A WWWWW ET A N N N N N	F	requency
10 dB/div Log	Ref 20.	00 dBr	IFC	Gain:Low	Atten: 3	) dB		M	kr1 1.76	7 5 GHz 93 dBm		Auto Tune
10.0						• 						<b>Center Freq</b> 8000000 GHz
-10.0										DL1 -13.00 dBm	1.75	Start Freq 6000000 GHz
-20.0 1											10.00	Stop Freq 0000000 GHz
-40.0											824 <u>Auto</u>	<b>CF Step</b> 4.400000 MHz Man
-60.0												Freq Offset 0 Hz
-70.0 Start 1.75	6 GH7								Stop 10	.000 GHz	Log	Scale Type Lin
#Res BW				#VBV	V 3.0 MHz		\$	weep 14	4.29 ms (1	6489 pts)		
мsg 🗼 Point	s changed	; all trac	ces clear	ed				STATU	s			

Plot 7-67. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-68. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 52 of 150
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	ectrum Analyzer										- # *
l <b>XI</b> RL	RF 5	50Ω AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS	10:24:50 AM TRAC	May 21, 2019	Fre	equency
			PNO: Fast 🕞 IFGain:Low	Trig: Free Atten: 30				TYP DE			
10 dB/div Log	Ref 20.0	0 dBm					M	kr1 1.708 -52.1	5 0 GHz 19 dBm		Auto Tune
10.0											enter Freq
										870	.000000 MHz
0.00										30	Start Freq
-10.0									DL1 -13.00 dBm		.000000 Mil 12
-20.0										1.710	Stop Freq
-30.0											
-40.0										168. <u>Auto</u>	CF Step 000000 MHz Man
-50.0		C. Martin Martin					مەچە ئىن باسلىرىنى بىرىنىي				
-60.0										F	F <b>req Offset</b> 0 Hz
-70.0											Scale Type
Start 0.03								Stop 1.7	100 0112	Log	<u>Lin</u>
#Res BW	1.0 MHz		#VBW	3.0 MHz				2.240 ms (	3361 pts)		
MSG							STATU	S			

Plot 7-69. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-70. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 54 of 150
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🔤 Keysight Spr	ectrum Analyzer -	Swept SA								
I <mark>XI</mark> RL	RF 50	Ω AC	CORREC PNO: Fast	Trig: Free		#Avg Typ	e:RMS	TRAC	M May 21, 2019 CE <b>1 2 3 4 5 6</b> PE A WWWWW ET A N N N N N	Frequency
10 dB/div	Ref 0.00	dBm	IFGain:Low	Atten: 10	dB		M	kr1 16.99		Auto Tune
-10.0									DL1 -13.00 dBm	Center Fred 15.000000000 GHz
-20.0										Start Fred 10.000000000 GHz
-40.0										Stop Fred 20.000000000 GHz
-60.0							<b>↓</b> 1 Thusan		~~~~	<b>CF Step</b> 1.000000000 GH: <u>Auto</u> Mar
-70.0										Freq Offse 0 Ha
-90.0	00 CH2							Stop 20	.000 GHz	Scale Type
#Res BW			#VE	W 3.0 MHz		s	weep 2	25.33 ms (2	.000 0112	
MSG 🗼 Poin	ts changed; a	all traces of	leared				STAT	rus		

Plot 7-71. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

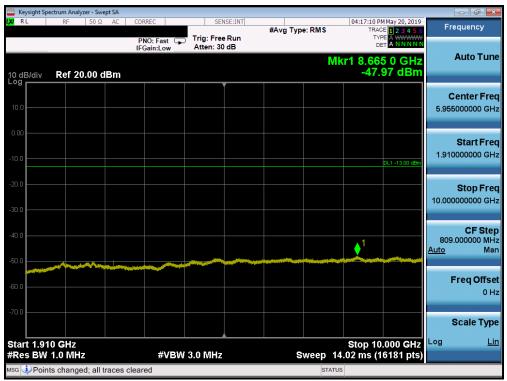
FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage EE of 150
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## Band 2

🔤 Keysight Spe													- • ×
<mark>XI</mark> RL	RF	50Ω A	F	NO: Fas Gain:Lo	st 😱	S Trig: Fr Atten:		#Avg Typ	e:RMS	т	5 PM May 20, 2019 RACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Fre	equency
10 dB/div Log	Ref 20	.00 dBi							N	1kr1 1.8 -4	49 0 GHz 2.01 dBm		Auto Tune
10.0													enter Fred 500000 MH
10.00											DL1 -13.00 dBm	30.	Start Free 000000 MH
-20.0												1.849	<b>Stop Fre</b> 000000 GH
-40.0											1	181. <u>Auto</u>	CF Ste 900000 MH Ma
60.0	947-11-1 <sup>49</sup> -14-195-1969-1960	and the second	gengenge folge bester		angi mangange	allers part to family the second	the second s	tered Restored Andrewski Trades			1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	F	req Offse 0 H
-70.0												tog	Scale Typ
Start 0.03 Res BW				#	VBW	3.0 MH	z		Sweep	Stop 2.425 m	1.8490 GHz s (3639 pts)	LUg	Li
ISG									STAT	US			

Plot 7-72. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-73. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage EC of 150
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	ctrum Analy:		ot SA									
LXI RL	RF	50 Ω	AC	CORREC			SENSE:INT	#Avg Typ	e: RMS	TRA	PM May 20, 2019 CE 1 2 3 4 5 6	Frequency
				PNO: IFGain	Fast ⊂ ⊧Low		Free Run : 10 dB	• •		T) [		
10 dB/div Log	Ref 0.0	00 dB	m						Mk	r1 17.00 -60	4 5 GHz .46 dBm	Auto Tur
-10.0											DL1 -13.00 dBm	Center Fre
-20.0												
-30.0												Start Fre 10.000000000 GH
-40.0												<b>Stop Fre</b> 20.000000000 GH
-60.0									1			CF Ste 1.00000000 GH <u>Auto</u> Ma
-70.0			dalah dalah barangan dalah d									<b>Freq Offs</b> 0 F
-90.0												Scale Typ
Start 10.0 #Res BW		2			#VBW	/ 3.0 M	Hz	s	weep 2	Stop 20 5.33 ms ()	0.000 GHz 20001 pts)	Log <u>L</u>
мsg 連 Point	ts change	d; all tr	aces o	leared					STATU			

Plot 7-74. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-75. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 57 of 150
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DXI RL										
	RF 50 Ω	AC CO	ORREC	SE	NSE:INT	#Avg Type	e: RMS		M May 20, 2019 CE 1 2 3 4 5 6	Frequency
		1	PNO: Fast ⊂ FGain:Low	Trig: Free Atten: 30				TY D	9 5 GHz	Auto Tune
10 dB/div R	ef 20.00 d	Bm						-48.	11 dBm	
10.0										Center Freq 5.955000000 GHz
-10.0									DL1 -13.00 dBm	<b>Start Freq</b> 1.910000000 GHz
-20.0										<b>Stop Freq</b> 10.000000000 GHz
-40.0								↓ <sup>1</sup>		CF Step 809.000000 MHz <u>Auto</u> Man
-60.0										<b>Freq Offset</b> 0 Hz
-70.0										Scale Type
Start 1.910 G #Res BW 1.0			#VBW	/ 3.0 MHz		S	weep 14	Stop 10 .02 ms (1	.000 GHz 6181 pts)	Log <u>Lin</u>
мsg 🗼 Points cl	hanged; all t	races clea	ared				STATUS	;		

Plot 7-76. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



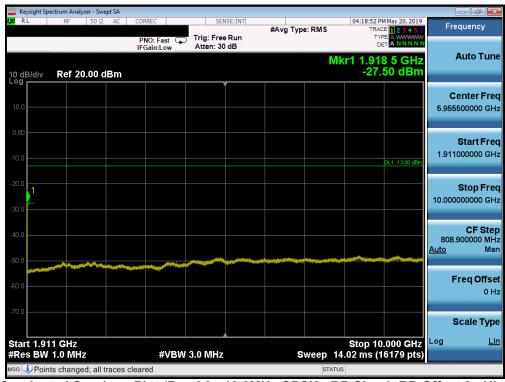
Plot 7-77. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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	ectrum Analyzei									_	
LXI RL	RF	50 Ω AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS	TRAC	May 20, 2019	Fre	equency
	<b>D</b> -6 00 /		PNO: Fast G	Trig: Free Atten: 30			Mk	r1 1.84	B 5 GHz 06 dBm		Auto Tune
10 dB/div Log	Ref 20.0							-02.			enter Freq .000000 MHz
-10.0									DL1 -13.00 dBm	30.	Start Freq 000000 MHz
-20.0										1.850	<b>Stop Freq</b> 0000000 GHz
-40.0							Lan-Approximityal	an a shekara ka shekar	1	182. <u>Auto</u>	CF Step 000000 MHz Man
-60.0	and the second second		ef fendrænigt Angelige og en en er stad ford <sup>ar fer</sup>							F	F <b>req Offset</b> 0 Hz
Start 0.03 #Res BW			#VBV	V 3.0 MHz			Sweep 2.	Stop 1.8 427 ms (	500 GHz 3641 pts)	Log	Scale Type <u>Lin</u>
MSG							STATUS				

Plot 7-78. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-79. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 50 of 150
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	sight Spectre	um Analyzer - Sw	ept SA								
LXI RL		RF 50 Ω	AC	CORREC	SEI	NSE:INT	#Avg Typ	e: RMS		May 20, 2019	Frequency
				PNO: Fast IFGain:Low	Trig: Free Atten: 10				TYF DE		A
10 dB Log r	/div	tef 0.00 d	Bm					M	kr1 16.98 -60.	2 5 GHz 30 dBm	Auto Tune
											Center Freq
-10.0										DL1 -13.00 dBm	15.00000000 GHz
-20.0											Start Freq
-30.0											10.000000000 GHz
-40.0											Stop Freq
-50.0											20.000000000 GHz
co o								1			CF Step
-60.0 -						~~~		1			1.000000000 GHz <u>Auto</u> Man
-70.0	and a state of the second s										Ener Offerst
-80.0											Freq Offset 0 Hz
-90.0											Scale Type
	40.000								<b>.</b>		Log Lin
	10.000 BW 1.			#VBW	/ 3.0 MHz		s	weep 2	Stop 20 25.33 ms (2	.000 GHz 0001 pts)	
MSG 🤙	Points of	changed; all	traces cle	eared				STAT	rus		

Plot 7-80. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

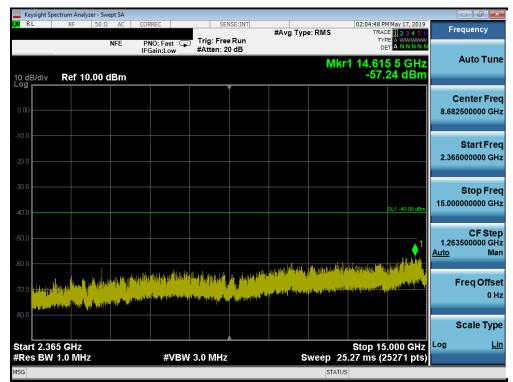
FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 60 of 150
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Band 30

	ysight Spectru			ot SA										
<b>lxi</b> Ri	L	RF	50 Ω	AC	CORRE			NSE:INT	#Avg Typ	e:RMS	TRAC	MMay 17, 2019 E 1 2 3 4 5 6	Fr	equency
10 dE Log	3/div F	Ref 20.		IFE Bm		:Fast 🕞	Trig: Fre Atten: 30			N	Ikr1 2.28	B 0 GHz 27 dBm		Auto Tune
10.0														Center Fred 9000000 GH
0.00 -10.0													30	Start Fred
-20.0 -30.0													2.28	Stop Free 8000000 GH
-40.0												DL1 -40.00 dBm 1 →	228 <u>Auto</u>	CF Stej 5.800000 MH Mar
-60.0	ur, 144 <b>1</b> 14.	a dadaa sa												Freq Offse 0 H
	t 0.030 ( s BW 1.0	GHz	in the second	استند <b>ا</b> الأسار	ni di		3.0 MHz					.288 GHz	Log	Scale Type <u>Lir</u>
MSG										STAT				

Plot 7-81. Conducted Spurious Plot (Band 30 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-82. Conducted Spurious Plot (Band 30 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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🔤 Keysight Sp	ectrum Analyzer - Swep	ot SA									
LXI RL	RF 50 Ω	AC COR		SEN	ISE:INT	#Avg Typ	e: RMS	TRA	PM May 17, 2019 CE 1 2 3 4 5 6 (PE A +++++++++++++++++++++++++++++++++++	Fr	equency
	N	IFE PN IFG	IO: Fast 🖵 Sain:Low	#Atten: 8				[			• • • • <b>-</b> • • • •
10 dB/div Log	Ref -2.00 dE	ßm					M	kr1 25.55 -56	8 0 GHz .64 dBm		Auto Tune
				1	7					c	enter Fred
-12.0										21.00	0000000 GH
-22.0											Start Free
-32.0										15.00	000000 GH
									DL1 -40.00 dBm		
42.0										27.00	Stop Free
-52.0								_	1	27.00	000000 GH.
62.0									the state and		CF Step
		, kalan pulak pula	while an	h in the factor of the		physical participation of	district of	и израницани. А. А.	<b>T</b>	1.20 Auto	0000000 GH Mai
-72.0			i in the state		na dina dia kaominina dia k	ىل ئىسارتلاردىڭ مىس	in the second second	Las, et al station and a	al <b>haile</b> is Marketing		
82.0	المتعالم والمرياني	gen anven de van	e el la folga de car							1	req Offse
.02.0											0 H
-92.0											
											Scale Type
Start 15.0				2.0 Miles				Stop 2	1000 0112	Log	<u>Lir</u>
#Res BW	1.0 MHz		#VBW	3.0 MHz		s		30.40 ms ()	24001 pts)		

Plot 7-83. Conducted Spurious Plot (Band 30 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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

The minimum permissible attenuation level for Band 30 is > 43 + 10 log10 (P[Watts] at 2300-2305MHz & 2345-2360MHz, > 55 + 10 log10 (P[Watts]) at 2320-2324MHz & 2341-2345MHz, > 61 + 10 log10 (P[Watts]) at 2324-2328MHz & 2337-2341MHz, > 67 + 10 log10 (P[Watts]) at 2288-2292MHz & 2328-2337MHz, and > 70 + 10 log10 (P[Watts]) at frequencies < 2288MHz & >2365MHz.

## 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 <u>></u> 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average
- 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

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#### Test Notes

Per 22.917(b) 24.238(a) 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 698-746 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.

Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). 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 emissions are attenuated at least 26 dB below the transmitter power.

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Plot 7-84. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



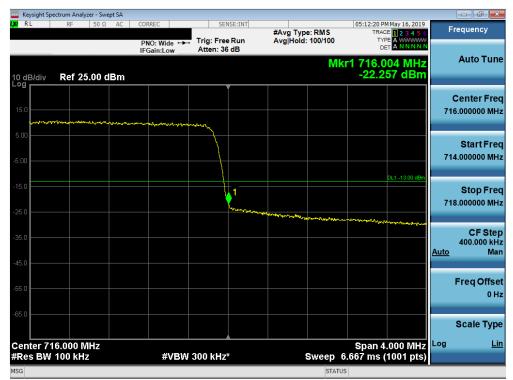
Plot 7-85. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

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🔤 Keysight Spectrun										- 6 ×
<b>LXU</b> RL F	RF 50 Ω	AC	CORREC	SENSE:INT	#Avg Type	RMS		May 16, 2019	Fre	quency
			PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 36 dB	Avg Hold:		TYP			
10 dB/div Re	ef 25.00 d	Bm				Mki	1 697.9 -27.8	84 MHz 08 dBm		Auto Tune
15.0							Jungstreengenger			enter Freq 000000 MHz
-5.00								DL1 -13.00 dBm	696.	Start Freq 000000 MHz
-15.0				1	العندل أعلمه الموالعة بعضارت الالمنع			UL1 -13.00 dBm	700.	Stop Freq 000000 MHz
-35.0	and a second standard by	State of the state	re-good-and-bob proved provide	ngnay ng panghan na sa					<u>Auto</u>	CF Step 400.000 kHz Man
-55.0									F	req Offset 0 Hz
-65.0 Center 698.04							Spop 4	000 MH-		Scale Type Lin
#Res BW 100			#VBV	/ 300 kHz*	s	weep 6	- span 4 .667 ms (	.000 MHz 1001 pts)	_	
MSG						STATUS				

Plot 7-86. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-87. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

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	ectrum Analyzer - Swe										
LXU RL	RF 50 Ω	AC C	ORREC	SE	NSE:INT	#Avg Typ	e: RMS		M May 16, 2019	F	requency
10 dB/div	Ref 25.00 d	I	PNO: Wide ↔ FGain:Low	→ Trig: Fre Atten: 3		Avg Hold:		r1 697.9	984 MHz 54 dBm		Auto Tune
15.0											Center Freq 3.000000 MHz
-5.00							/			69	Start Freq 5.000000 MHz
-15.0					1	and the second statement of th	MAN AND		DL1 -13.00 dBm	70	Stop Freq 0.000000 MHz
-35.0	Meneraldena	┉┉୷୶ୄ୷ୣ୷୶୶	~~##~~~~~J&~~!**8							<u>Auto</u>	CF Step 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0										Log	Scale Type <u>Lin</u>
#Res BW	8.000 MHz 100 kHz		#VBV	V 300 kHz	*		Sweep 6	span 4 6.667 ms (	.000 MHz (1001 pts)	209	<u></u>
MSG							STATUS	S			





Plot 7-89. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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	ectrum Analyzer - Swe										
LXVI RL	RF 50 Ω	AC C	ORREC		ISE:INT	#Avg Typ		TRAC	May 16, 2019	Fr	equency
10 dB/div	Ref 25.00 d		PNO: Wide ↔ IFGain:Low	Trig: Free Atten: 36		Avg Hold		₀. 1 697.9	44 MHz 27 dBm		Auto Tune
15.0											Center Freq 000000 MHz
-5.00									DL1 -13.00 dBm	694	Start Freq 0.000000 MHz
-15.0					1	and a second				702	Stop Freq 2.000000 MHz
-35.0	Warden Verland after and a star	and the second second	Marat Marat and Marat No.		an and a start of the start of					<u>Auto</u>	CF Step 800.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0 Center 69	8.000 MHz							Span 8	.000 MHz	Log	Scale Type <u>Lin</u>
#Res BW	100 kHz		#VBV	V 300 kHz*	*		Sweep	13.33 ms (	1001 pts)		
MSG							STATU	IS			

Plot 7-90. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-91. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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## Band 5



Plot 7-92. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-93. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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	ectrum Analyzer -							
(IRL	RF 5	DΩ AC	CORREC	SENSE:IN	#Avg Type	e: RMS	11:19:21 AM May 21, 2019 TRACE <b>1 2 3 4 5 6</b> TYPE A WWWW DET A N N N N N	Frequency
0 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 36 dB		Mk	r1 824.000 MHz -20.43 dBm	Auto Tur
15.0						~~~~ <u>~</u>		Center Fre 824.000000 MH
.00								<b>Start Fr</b> 822.000000 M
5.0				1-			DL1 -13.00 dBm	Stop Fr 826.000000 M
5.0	~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					CF St 400.000 k <u>Auto</u> M
5.0								Freq Offs 0
5.0	4.000 MHz						Spop 4 000 Mile	Scale Ty
Res BW			#VBV	V 300 kHz		Sweep	Span 4.000 MHz 1.000 ms (1001 pts)	
ŝG						STATU	IS	

Plot 7-94. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-95. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Swept SA					
LXI RE 50Ω AC		NSE:INT #Avg	Type: RMS	11:16:01 AM May 21, 2019 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide Trig: Fre IFGain:Low Atten: 3		Mkr	1 824.000 MHz -24.68 dBm	Auto Tune
10 dB/div Ref 25.00 dBm		•		-24.00 UBIII	
15.0					Center Freq 824.000000 MHz
-5.00					Start Freq 822.000000 MHz
-15.0		1		DL1 -13.00 dBm	Stop Freq 826.000000 MHz
-25.0	mmmm				CF Step 400.000 kHz Auto Mar
-45.0					Freq Offset
-65.0					Scale Type
Center 824.000 MHz #Res BW 100 kHz	#VBW 300 kHz		Sweep 1.	Span 4.000 MHz 000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS		



Plot 7-96. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-97. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX420AS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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LX/RL RF 50Ω AC	CORREC	SENSE:INT	#Avg Type: RMS	11:05:05 AM May 21, 2019 TRACE 1 2 3 4 5 6	Frequency
		g: Free Run en: 36 dB		DET A NNNN	
10 dB/div Ref 25.00 dBm			Mk	r1 824.000 MHz -25.67 dBm	Auto Tune
					Center Freq
15.0					824.000000 MHz
5.00					
0.00					Start Freq
-5.00					820.000000 MHz
				DL1 -13.00 dBm	
-15.0					Stop Freq
-25.0					828.000000 MHz
-20.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~			
-35.0					CF Step 800.000 kHz
					Auto Man
-45.0					
-55.0					Freq Offset
-35.0					0 Hz
-65.0					
					Scale Type
Center 824.000 MHz				Span 8.000 MHz	Log <u>Lin</u>
#Res BW 100 kHz	#VBW 300	kHz	Sweep 1	.000 ms (1001 pts)	
MSG			STATU	S	

Plot 7-98. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-99. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

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