

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 GSM / GPRS / EDGE / WCDMA

#### **Applicant Name:**

LG Electronics USA, Inc. 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: 4/11 - 5/4/2019 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1904090058-02.ZNF

### FCC ID:

#### ZNFX420AS8

APPLICANT:

### LG Electronics USA, Inc.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s): Certification LM-X420AS8 LMX420AS8, X420AS8, LM-X420CS, LMX420CS, X420CS 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.

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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			Ef	RP	EI	RP	
Mode	FCC Rule Part	Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Emission Designator
GPRS850	22H	824.2 - 848.8	0.922	29.65	1.513	31.80	245KGXW
EDGE850	22H	824.2 - 848.8	0.225	23.53	0.370	25.68	251KG7W
WCDMA850	22H	826.4 - 846.6	0.142	21.52	0.233	23.67	4M24F9W
WCDMA1700	27	1712.4 - 1752.6			0.258	24.12	4M19F9W
GPRS1900	24E	1850.2 - 1909.8			0.773	28.88	242KGXW
EDGE1900	24E	1850.2 - 1909.8			0.265	24.23	239KG7W
WCDMA1900	24E	1852.4 - 1907.6			0.318	25.02	4M20F9W

**EUT** Overview

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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: ZNFX420AS8**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

Test Device Serial No.: 53726, 53718

#### 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)

#### 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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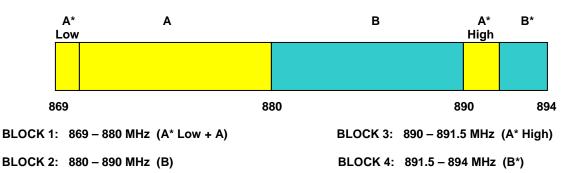
# 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

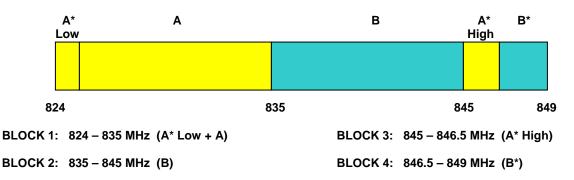
The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

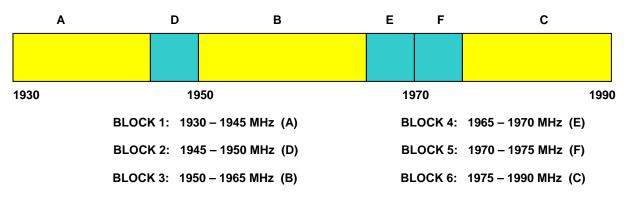
### 3.2 Cellular - Base Frequency Blocks



### 3.3 Cellular - Mobile Frequency Blocks



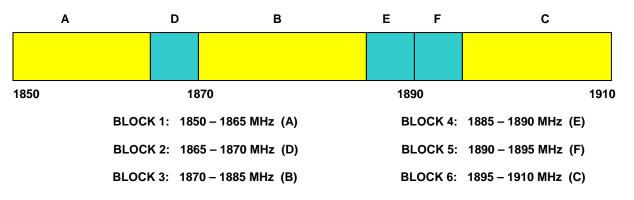
### 3.4 PCS - Base Frequency Blocks



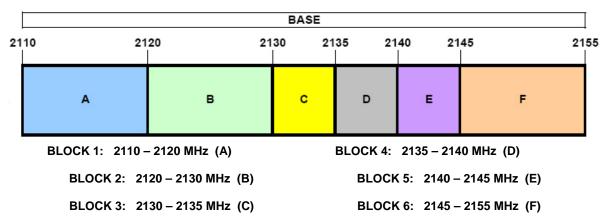
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### 3.5 PCS - Mobile Frequency Blocks



### 3.6 AWS - Base Frequency Blocks



### 3.7 AWS - Mobile Frequency Blocks

				MOBIL	E				
17	10	1	720	1730	1735	174	10 17	45	1755
		A	в	с		D	E	F	
		BLOCK 2: 1	710 – 1720 MHz (A) 720 – 1730 MHz (B) 730 – 1735 MHz (C)		BI	LOCK 5	5: 1740 –	1740 MHz (D) 1745 MHz (E) 1755 MHz (F)	

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### 3.8 Radiated Measurements

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

Per the 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:

$$P_{d [dBm]} = P_{g [dBm]} - cable loss [dB] + antenna gain [dBd/dBi]$$

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

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.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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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
-	LTx2	Licensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx2
-	LTx3	Licensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx3
Anritsu	MT8821C	Radio Communication Analyzer	11/6/2018	Annual	11/6/2019	6200901190
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
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	Quad Ridge Horn Antenna 3/28/2018 Biennial 3/28		3/28/2020	128337
ETS-Lindgren	3164-10	Quad Ridge Horn 400MHz - 10000MHz	Quad Ridge Horn 400MHz - 10000MHz 3/5/2019 Biennial 3/		3/5/2021	166283
Keysight Technologies	N9030A	PXA Signal Analyzer	8/6/2018	8/6/2018 Annual 8/6/201		MY54490576
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		107826
Rohde & Schwarz	CMW500	Radio Communication Tester	11/14/2018	11/14/2018 Annual 11/14/2019		100976
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	5/21/2018 Annual 5/21/		100342
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	9/12/2018	Annual	9/12/2019	101716
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/17/2018	Annual	8/17/2019	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073
Rohde & Schwarz	TC-TA18	Vivaldi Antenna	8/17/2018	Biennial	8/17/2020	101072
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107
Sunol Sciences	DRH-118	Antenna	2/14/2019	Biennial	2/14/2021	A102416-2

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

### **GPRS Emission Designator**

#### Emission Designator = 250KGXW

GPRS BW = 250 kHz G = Phase Modulation X = Cases not otherwise covered W = Combination (Audio/Data)

### **EDGE Emission Designator**

#### Emission Designator = 250KG7W

EDGE BW = 250 kHz G = Phase Modulation 7 = Quantized/Digital Info W = Combination (Audio/Data)

### 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**

#### Example: Spurious emission at 3700.40 MHz

The receive 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 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm -(-24.80) = 50.3 dBc.

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# 7.0 TEST RESULTS

### 7.1 Summary

Company Name:	LG Electronics USA, Inc.
FCC ID:	ZNFX420AS8
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>GSM / GPRS / EDGE / WCDMA</u>

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	RSS-Gen (4.6.1) RSS-133(2.3) RSS-139(2.3)	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Conducted Band Edge / Spurious Emissions	> 43 + 10 $\log_{10}$ (P[Watts]) at Band Edge and for all out-of- band emissions		PASS	Sections 7.3, 7.4
24.232(d)	RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)	Peak-Average Ratio	< 13 dB	CONDUCTED	PASS	Section 7.5
2.1046	RSS-132(5.4) RSS-133(4.1) RSS-139(4.1)	Transmitter Conducted Output Power	N/A		PASS	RF Exposure Report
2.1055 22.355 24.235 27.54	RSS-132(5.3) RSS-133(6.3) RSS-139(6.4)	Frequency Stability	ency Stability <a></a> < 2.5 ppm (Part 22) Emission must remain in band (Part 24, 27)		PASS	Section 7.8
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP		PASS	Section 7.6
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 7.6
27.50(d)(4)	RSS-139(6.5)	Equivalent Isotropic Radiated Power	< 1 Watts max. EIRP	RADIATED	PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	> 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 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 "2G/3G Automation," Version 3.1.

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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 (Cellular GPRS Mode)



Plot 7-2. Occupied Bandwidth Plot (EDGE850 Mode)

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Plot 7-3. Occupied Bandwidth Plot (PCS GPRS Mode)



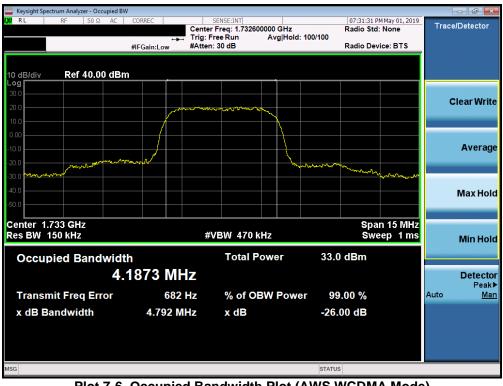
Plot 7-4. Occupied Bandwidth Plot (EDGE1900 Mode)

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Plot 7-5. Occupied Bandwidth Plot (Cellular WCDMA Mode)



Plot 7-6. Occupied Bandwidth Plot (AWS WCDMA Mode)

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Keysight Spectrum Analyzer - Occupied BW				
<b>CIRL</b> RF 50Ω AC	CORREC Cente	SENSE:INT r Freq: 1.880000000 GHz	07:28:50 PM May 01, 201 Radio Std: None	9 Trace/Detector
	+++ Trig: F	Free Run Avg Hold: 1 n: 30 dB	00/100 Radio Device: BTS	
	#IFGain:Low #Atter	1. 30 dB	Radio Device. D 13	<b>-</b>
10 dB/div Ref 40.00 dBn				
30.0				Clear Write
20.0		mont and the second		Cicarwine
10.0				
0.00				
10.0				Average
the re all warman	may		more marked bally of	
40.0				Max Hold
50.0				
Center 1.88 GHz			Span 15 MH	
Res BW 150 kHz	#	VBW 470 kHz	Sweep 1 m	S Min Hold
Occupied Bandwidt	h	Total Power	33.0 dBm	
	1968 MHz			Detector
4.				Detector Peak
Transmit Freq Error	-2.944 kHz	% of OBW Power	99.00 %	Auto <u>Mar</u>
x dB Bandwidth	4.805 MHz	x dB	-26.00 dB	
ISG			STATUS	

Plot 7-7. Occupied Bandwidth Plot (PCS WCDMA Mode)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 17 of 95	
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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 maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

# The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{[Watts]})$ , 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 10GHz for Cell, 20GHz for AWS, 20GHz for PCS (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

#### Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

#### Test Notes

Per 24.238(b), 27.53(h)(3), and RSS-133(6.5), RSS-139(6.5), compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz, and 100 kHz or greater for Part 22 and RSS-132 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.

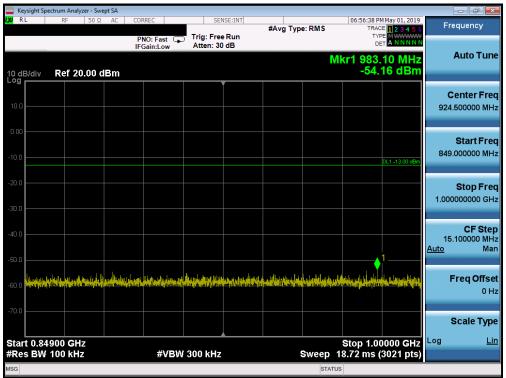
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 40 at 05	
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# Cellular GPRS Mode

🔤 Keysight Spectrum Analyzer - Swe	ept SA			
<b>LXU</b> RL RF 50 Ω	PNO: Fast 🕞 Trig:	SENSE:INT #Avg Typ Free Run n: 30 dB	06:56:31 PM May 01, 201 De: RMS TRACE 1 2 3 4 5 TYPE MWWWW DFT A N NNN	6 Frequency
10 dB/div Ref 20.00 d	il Guilleow	1. 30 00	Mkr1 822.05 MH -50.23 dBn	z Auto Tune
10.0				Center Fred 426.500000 MHz
-10.0			DL1 -13.00 dBr	Start Free 30.000000 MH:
-20.0				Stop Free 823.000000 MH
-40.0			1	<b>CF Ste</b> j 79.300000 MH <u>Auto</u> Ma
-60.0 <mark>DH MARSHIN MANA MANA MIRAN MIRAN (</mark>	nya katalan yang basa balang kang katalan yang basa basa yang katalan yang basa basa yang katalan katalan yang Katalan katalan yang	l for a factor of the factor o	en 11 Åregna han med og gevind på gjelde til er dører på som skan her til et dører af til en vingen er som er forset spesjonenen og set sjon af bleg. Forset en set sjon former af	Freq Offse
-70.0 Start 30.0 MHz			Stop 823.0 MH:	Scale Type
#Res BW 100 kHz	#VBW 300 k	S S	weep 98.33 ms (15861 pts	

Plot 7-8. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)



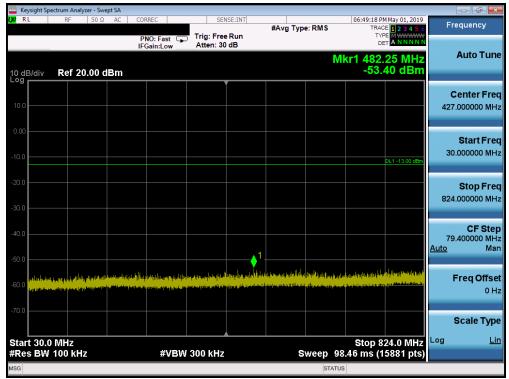
#### Plot 7-9. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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© 2010 DCTEST Engineering Labor	ston/ Inc			V/ 0 0 02/01/2010



PNO: Fast IFGain.Low       Trig: Free Run #Atten: 40 dB       Trig: Free Run #Atten: 40 dB       Trig: Free Run Trig: Free Run and the state of the state o		ectrum Analyzer - S	wept SA								d X
PN:: Fast       Trig: Free Run #Atten: 40 dB       Mkr1 8.3.49 0 GHz -30.49 dBm       Auto Tun         0 dE/div       Ref 10.00 dBm       -30.49 dBm </th <th>LXVI RL</th> <th>RF 50</th> <th>Ω AC</th> <th>CORREC</th> <th>SENSI</th> <th></th> <th>Type: RMS</th> <th>TRA</th> <th>CE 1 2 3 4 5 6</th> <th>Frequen</th> <th>су</th>	LXVI RL	RF 50	Ω AC	CORREC	SENSI		Type: RMS	TRA	CE 1 2 3 4 5 6	Frequen	су
OBJECTIV       Ref 10.00 dBm       -30.49 dBm         0000       -30.49 dBm       -30.49 dBm         000000				PNO: Fast G				TY D	PE M WWWWW ET A N N N N N	_	_
0.000       Image: start free         1.000       Image: start free	10 dB/div	Ref 10.00	dBm				N	/kr1 8.34 -30.	9 0 GHz 49 dBm	Auto	Tune
2000       20000       2000       20000       20000       20000       20000       20000       20000       20000       20000       20000       20000       20000       20000       20000       20000       200000       200000       200000000       2000000000       2000000000       2000000000000000000000000000000000000	0.00										
200 a a a a a a a a a a a a a a a a a a	-10.0								DL1 -13.00 dBm	Star	tFree
000       1	20.0										
S000       Image: CF Step 900.000000 MH         S000       Image: CF Step 900.00000 MH         S000       Image: CF Step 900.0000 MH         Stop 10.000 GHz       Image: CF Step 900.0000 MH         Stop 10.000 GHz       Image: CF Step 900.0000 MH         Stop 10.000 GHz       Image: CF Step 900.0000 MH         Image: CF Step 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz         Image: Stop 10.000 GHz       Image: CF Step 10.000 GHz	-30.0	tal terrest and the second second	Aper glasgenerated of	مرا <sup>10</sup> ورا <sup>1</sup>	h <sub>a s</sub> ag kan b <sub>a sha</sub> taan ka ta fa	Landers for Landers and States and	naka seri ka Afrika afrika si ka seri Manaka si ka Afrika seri ka seri ka seri ka seri ka seri ka seri ka seri	1 - The State Market M	n stander son er soner		
tart 1.000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 15.60 ms (18001 pts)	-50.0									900.0000	о мн
tart 1.000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 15.60 ms (18001 pts)	-70.0									Freq	
Res BW 1.0 MHz #VBW 3.0 MHz Sweep 15.60 ms (18001 pts)	-80.0									Scale	туре
				#VBV	V 3.0 MHz		Sweep	Stop 10 15.60 m <u>s (1</u>	).000 GHz 18001 pt <u>s)</u>	Log	Lir
	MSG										

Plot 7-10. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)



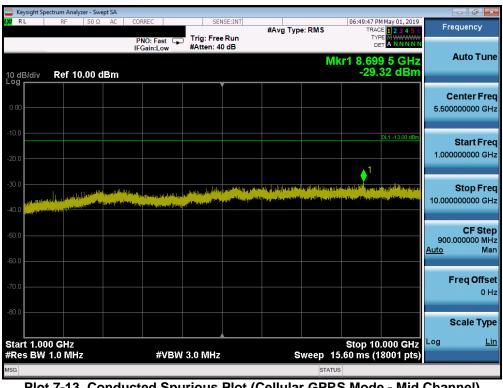
Plot 7-11. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 95	
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© 2019 PCTEST Engineering Lab	V 9.0 02/01/2019				



	ectrum Analyzer - Sv	vept SA								
(XV) RL	RF 50 Ω	2 AC CO	RREC	SEN	NSE:INT	#Avg Typ	e: RMS	TRAC	MMay 01, 2019 E <b>1 2 3 4 5 6</b>	Frequency
		P	NO: Fast 🕞 Gain:Low	Trig: Free Atten: 30		•		TYF		
			Gumeow				M	kr1 942.	15 MHz	Auto Tune
10 dB/div	Ref 20.00	dBm						-54.	84 dBm	
				`````	Í					Center Freq
10.0										924.500000 MHz
0.00										Start Freq
-10.0										849.000000 MHz
									DL1 -13.00 dBm	
-20.0										Stop Freq
										1.00000000 GHz
-30.0										
-40.0										CF Step 15.100000 MHz
										Auto Man
-50.0						<b>↓</b> 1 ——				
-60.0	a in an	and the second	فالمبر وتناويه ومعال	يريا والمتحدثين للله	وبالانتقادة أو	والمتركب والمتحر والمترك	with the second	aller de let av di	وي البلية الذي	Freq Offset
	The other states of					<b>.</b>		construction and		0 Hz
-70.0										O a a la T
										Scale Type
Start 0.84									0000 GHz	Log <u>Lin</u>
#Res BW	100 KHZ		#VBW	300 kHz					3021 pts)	
MSG							STATUS			

Plot 7-12. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)



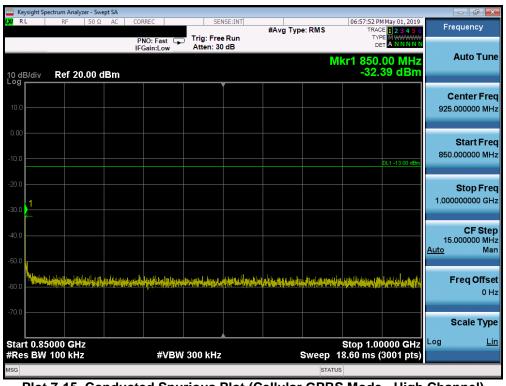
Plot 7-13. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 95	
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	wept SA								
RF 50	Ω AC CO	ORREC	SEN	NSE:INT	#Avg Type	:RMS	TRACE	123456	Frequency
		PNO:Fast 🕞					TYP DE		
		Guin.Eow					Mkr1 561.	35 MHz	Auto Tun
Ref 20.00	dBm						-53.7	′6 dBm	
			)	Í					Contor Ero
									Center Fre 427.000000 MH
									421.000000 1111
									Otort Ero
									Start Fre 30.000000 MH
								0L1 -13.00 dBm	
									Step Ere
									Stop Fre 824.000000 MH
									CF Ste
									79.400000 MH Auto Ma
					1				<u>Auto</u> Ma
		d that will so as	U U Garada	و اللوريان المرة	يورجوا لوراني المرادي	ul Danika.	k, ulkatanahaank	, Li su har sint	Freq Offse
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									Scale Typ
B.41									Log <u>Li</u>
		#VBW	/ 300 kHz		S	weep		-+.V WII 12	
						_			
	Ref 20.00	Ref 20.00 dBm	Ref       50 Ω       Ac       CORREC         PNO: Fast IFGain:Low       PNO: Fast IFGain:Low         Ref       20.00 dBm         Image: The second s	RF     50 Ω     AC     CORREC     SET       PNO: Fast (FGain:Low)     Trig: Free Atten: 30       Ref 20.00 dBm       Image: The set of	RF       50 Ω       AC       CORREC       SENSE:INT         PNO: Fast       Trig: Free Run Atten: 30 dB         Ref 20.00 dBm         Image: Provide the second and the second an	RF     50 Ω     AC     CORREC     SENSE:INT       PNO: Fast IFGain:Low     Trig: Free Run Atten: 30 dB     #Avg Type       Ref 20.00 dBm     Image: Argument of the second	RF     50 Ω     AC     CORREC     SENSE:INT       PNO: Fast IFGain:Low     Trig: Free Run Atten: 30 dB     #Avg Type: RMS       Ref 20.00 dBm     Image: Sense: Sens: Sense: Sense: Sense: Sense: Sens: Sense:	RF         50 Ω         AC         CORREC         SENSE:INT         #Avg Type: RMS         TRACE           PNO: Fast IFGain:Low         Trig: Free Run Atten: 30 dB         #Avg Type: RMS         Trig: Tree Run Atten: 30 dB         #Avg Type: RMS         Trig: Free Run Atten: 30 dB         Trig: Free Run Atten: 30 dB         Image: Ref 20.00 dBm         Image: Ref 20.00 dBm	RF       50 Ω       AC       CORREC       SENSE:INT       (06:57:44 PMMay 01, 2019)         PNO: Fast       Trig: Free Run       #Avg Type: RMS       Trace       D2:44 96         Mikr1       561.35 MHz       Stop 824.0 MHz       D0:1-13.00 dBm         Mikr1       106:57:44 PMMay 01, 2019       Trace       D2:44 96         PNO: Fast       Trig: Free Run       #Avg Type: RMS       Trace         Mikr1       561.35 MHz       -53.76 dBm       -53.76 dBm         Correct       Correct       Correct       0       0         Image: Stop 824.0 MHz       Stop 824.0 MHz       Stop 824.0 MHz       Stop 824.0 MHz

Plot 7-14. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)



Plot 7-15. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 95	
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	pectrum Analyzer	- Swept SA						- 5 🔀
<mark>u</mark> RL	RF	50 Ω AC	CORREC	SENSE	#Avg Typ		16:58:05 PM May 01, 2019 TRACE 1 2 3 4 5 6 TYPE M	Frequency
0 dB/div	Ref 10.0	00 dBm	IFGain:Low	#Atten: 40 d	В	Mkr1	8.668 5 GHz -29.05 dBm	Auto Tuno
0.00								Center Fre 5.50000000 GH
20.0							DL1 -13.00 dBm	<b>Start Fre</b> 1.000000000 GH
30.0 40.0	Seeling of the second sec	poster Deperty authorization	alan Departmenter Angeler (State State Stat	and a second	n ten j <sub>egu</sub> (mini kanya jene jeni kuji <sup>1</sup> 1) A titu <sub>se s</sub> ana dan <sup>k</sup> ten pa tene pjetit	lisinga pangangang kataplanj Disky jada basa basin jiwati	and provide the first of the second state of t	<b>Stop Fre</b> 10.000000000 GH
50.0								CF Ste 900.000000 MH <u>Auto</u> Ma
'0.0								Freq Offs 0 H
80.0								Scale Typ
Start 1.0 Res BW	00 GHz / 1.0 MHz		#VBW	/ 3.0 MHz	5	Sweep 15.60	top 10.000 GHz ) ms (18001 pts)	Log <u>Li</u>
SG						STATUS		

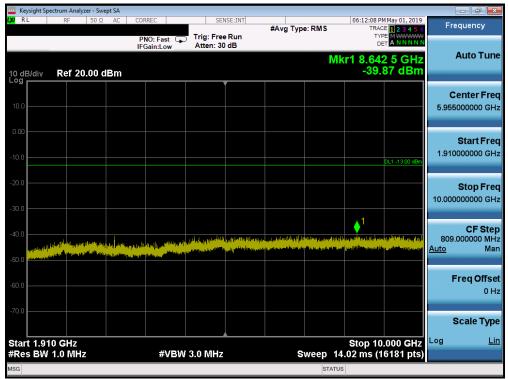
Plot 7-16. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 22 of 95
1M1904090058-02.ZNF	4/11 - 5/4/2019	Portable Handset		Page 23 of 85
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Keysight Spectrum Analyzer - Swept					
RL RF 50 Ω	AC CORREC PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	06:11:53 PM May 01, 2019 TRACE 1 2 3 4 5 6 TYPE M	Frequency
0 dB/div Ref 20.00 dB		Autor of all	MI	r1 1.578 5 GHz -42.32 dBm	Auto Tur
og 10.0					Center Fre 937.500000 M⊦
10.0				DL1 -13.00 dBm	Start Fre 30.000000 MH
0.0					<b>Stop Fre</b> 1.845000000 GF
10.0	haistarthabartha i greatais mal i suidh mile	hydraffi a sydl a thala hil a swy di bid d thala			CF Ste 181.500000 MH <u>Auto</u> Ma
0.0					Freq Offs 0
70.0					Scale Typ
tart 0.0300 GHz Res BW 1.0 MHz	#VBW :	3.0 MHz	Sweep 2	Stop 1.8450 GHz 420 ms (3631 pts)	Log <u>L</u>
5G			STATUS	3	

Plot 7-17. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)



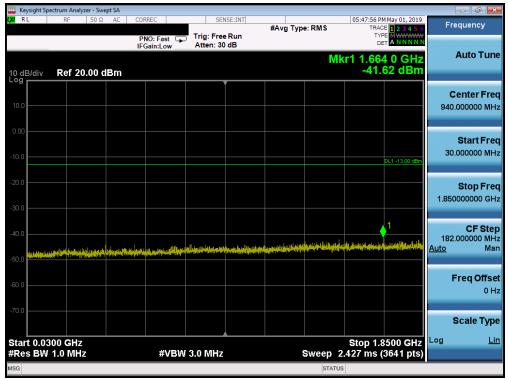
#### Plot 7-18. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 04 of 95
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	pectrum Analyzer -	Swept SA								- F	×
X/ RL	RF 50	ΩΩ AC	CORREC		NSE:INT	#Avg Typ	e: RMS	TRAC	MMay 01, 2019	Frequency	у
			PNO: Fast IFGain:Low	Trig: Free Atten: 20				TYF			
10 dB/div	Ref 10.0	0 dBm					Mki	r1 16.92 -42.	65GHz 57dBm	Auto T	Tun
0.00										Center F 15.000000000	
-10.0									DL1 -13.00 dBm	<b>Start F</b> 10.000000000	
-30.0							1			<b>Stop F</b> 20.000000000	
-50.0	الل) تأمل المرجوع والمحروم	ena (12) <sub>an</sub> les calere (12) (11) a constant estat (12)	<u>ti i an </u>					al and a second se	i i <sub>la po</sub> sti di la contra la Transferita di contra di la	CF S 1.000000000 <u>Auto</u>	
70.0										Freq Of	ffso 0⊦
-80.0										Scale T	Гур
	000 GHz / 1.0 MHz		#VBV	V 3.0 MHz		S	weep 2	Stop 20 5.33 ms (2	.000 GHz 0001 pts)	Log	Li
ISG							STATU	_			

Plot 7-19. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)



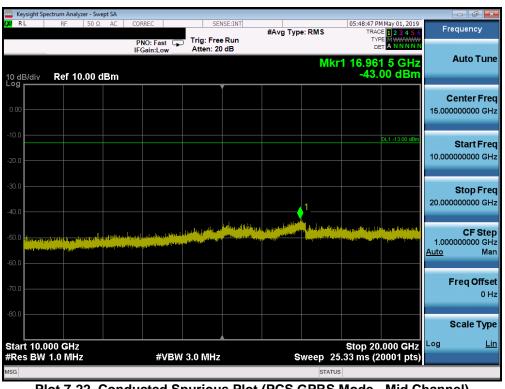
Plot 7-20. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 25
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	Spectrum Analy	zer - Swept	t SA										
L <mark>XI</mark> RL	RF	50 Ω	AC CO	ORREC			ISE:INT	#Avg Typ	e: RMS	TR	PM May 01, 2019 ACE 1 2 3 4 5 6	Fr	requency
				PNO: Fast FGain:Low		g: Free ten: 40				1			
				Guilleon					I	/kr1 8.6	96 5 GHz		Auto Tune
10 dB/div	Ref 30	).00 dE	Зm							-28	3.74 dBm		
													Center Freq
20.0													5000000 GHz
10.0													Start Freq
0.00												1.91	0000000 GHz
0.00													
-10.0											DL1 -13.00 dBm		Stop Freq
												10.00	0000000 GHz
-20.0										<u>, 1</u>			
-30.0										•			CF Step
	Rep Handler Handler Hand			a we can	Contract Contract	alaquintera Alaquintera	an a fille a la sur An a stalle a la sur	and a special state of the second	an and a static static field and	nan manggan sa	and Array a	809 Auto	0.000000 MHz Man
-40.0 <b>-40.0</b>	a di kata di k		l de la company de la comp La company de la company de	فالتعريد احفا النا									
													Freq Offset
-50.0													0 Hz
-60.0													
													Scale Type
Start 1.9	910 GHz									Stop 1	0.000 GHz	Log	Lin
	W 1.0 MH	z		#V	BW 3.0	MHz		S	weep	14.02 ms	(16181 pts)		
MSG									STA	TUS			

Plot 7-21. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)



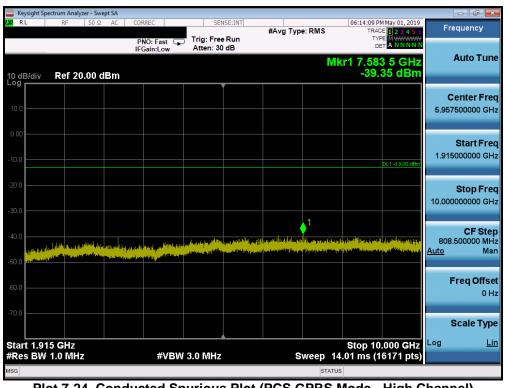
Plot 7-22. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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🔤 Keysight Sp	ectrum Analyze	r - Swept SA									
LXI RL	RF	50 Ω AC	CORREC	Trig: Free		#Avg Typ	e: RMS	TRAC	M May 01, 2019 DE <b>1 2 3 4 5 6</b> PE M WWWWW ET A N N N N N	Freque	ncy
10 dB/div	Ref 20.	00 dBm	IFGain:Low	Atten: 30	dB		Μ	kr1 1.77	6 0 GHz 87 dBm	Auto	o Tune
10.0										Cente 940.0000	e <b>r Freq</b> 00 MHz
-10.0									DL1 -13.00 dBm	Sta 30.0000	rt Frec 00 MHz
-20.0										<b>Sto</b> 1.8500000	<b>p Frec</b> 000 GH:
-40.0	a for the formation of the second	a gi dan bahi jaran	n kole alta a construction de la desta de la desta La desta de la d	dat ki da aka sa kara s	tergi and in the state of a	in the state of the	i njedi mijetnoji	hogentijden stoden stading de	1 Letin Jogen Hild	<b>C</b> 182.0000 <u>Auto</u>	F Step 00 MHz Man
-60.0										Freq	Offse 0 Ha
-70.0											е Туре
Start 0.03 #Res BW			#VBN	/ 3.0 MHz			Sweep	Stop 1.3 2.427 ms (	8500 GHz (3641 pts)	Log	Lin
MSG							STATI	JS			

Plot 7-23. Conducted Spurious Plot (PCS GPRS Mode - High Channel)



Plot 7-24. Conducted Spurious Plot (PCS GPRS Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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	ectrum Anal	yzer - Swep	pt SA										r X
I <mark>X/</mark> RL	RF	50 Ω		CORREC PNO: Fa	list 🖵	Trig: Free		#Avg Typ	e: RMS	т	7 PM May 01, 2019 RACE 1 2 3 4 5 6 TYPE M WWWWW DET A N N N N N	Frequer	ncy
10 dB/div	Ref 1	0.00 dl		IFGain:L	ow	Atten: 20	dB		М	kr1 16.9	84 5 GHz 2.68 dBm	Auto	o Tune
0.00												Cente 15.0000000	e <b>r Freq</b> 00 GHz
-10.0											DL1 -13.00 dBm	Star 10.0000000	r <b>t Freq</b> 00 GHz
-30.0									1			<b>Sto</b> 20.0000000	<b>p Freq</b> 00 GHz
-50.0	er i ser gegen jere ser g ter i se gener felding g		un an	dala para 1841 National José Dala	Los Fictoria Marchiel Terra	a tils og af lift som Standarden som	an a	ter ender i til Afas Bale Reference		a dia dia mandri di Alama Anna ang ang ang ang ang ang ang ang ang	nga kana dingga nga kana kana pangangang kana pangang kana pangang kana kana pangang kana kana pangang kana ka Kang pangang kana kana kana kana kana kana kan	C 1.0000000 <u>Auto</u>	F Step 00 GHz Man
-70.0												Freq	Offset 0 Hz
-80.0	000 GH2	,								Stop	20.000 GHz	Scale	e Type <u>Lin</u>
#Res BW				#	VBW	3.0 MHz		8	weep	25.33 ms	(20001 pts)		
MSG									STA	TUS			

Plot 7-25. Conducted Spurious Plot (PCS GPRS Mode - High Channel)

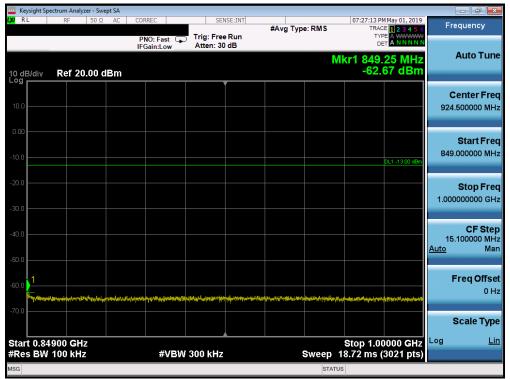
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of 95
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### Cellular WCDMA Mode

	ectrum Analyzer -	Swept SA									
XI RL	RF 5		ORREC PNO: Fast 😱 FGain:Low			#Avg Typ	e: RMS	TRAC	MMay 01, 2019 E 1 2 3 4 5 6 E A WWWWW A N N N N N	Fre	quency
10 dB/div	Ref 20.0		Gam.Low				Μ	kr1 822. -29.	00 MHz 20 dBm		Auto Tune
10.0											enter Fred 500000 MH
-10.0									DL1 -13.00 dBm		Start Fre 000000 MH
-20.0											<b>Stop Fre</b> 000000 MH
-40.0										79.: <u>Auto</u>	CF Ste 300000 MH Ma
-60.0	en fan de fan De fan de fan	a per constitución de la const	د میں اور میں میں از اور دور میں اور میں میں اور دور میں میں اور دور میں میں اور دور میں میں دور دور دور دور د دور دور دور دور دور دور دور دور دور دور	gannes fyjerendel sektore skydeljeredel	Types generatives, factors for her plantices of sta	ng lagt king satur filman konst	e de Generes ( que per de la presi 11 per del de la presi per de la de	a na antana ang sana ang sana Ing sana ang		F	r <b>eq Offse</b> 0 H
-70.0											Scale Type
Start 30.0 #Res BW	) MHz 100 kHz		#VBW	300 kHz		s	weep 98	Stop 8 3.33 ms (1	23.0 MHz 5861 pts)	Log	Lir
MSG							STATU	S			

Plot 7-26. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)



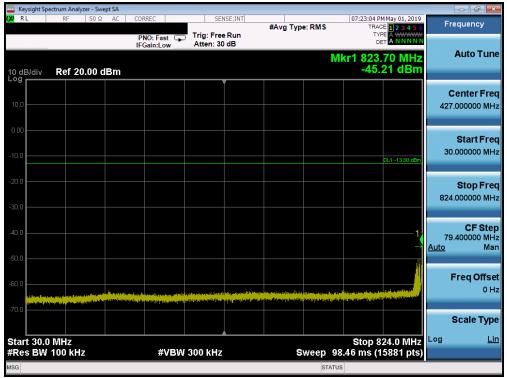
Plot 7-27. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 95
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🔤 Keysight Sp	pectrum Analyzer - Si	wept SA						
L <mark>XI</mark> RL	RF 50 9	Ω AC C	ORREC	SENSE:IN	IT #Avg Typ	e: RMS	07:27:25 PM May 01, 2019 TRACE 1 2 3 4 5 6	Frequency
	_	1	PNO: Fast 🖵 FGain:Low	Trig: Free Run #Atten: 34 dB			DET A NNNN	
10 dB/div Log	Ref 10.00	dBm				MI	(r1 9.446 5 GHz -42.68 dBm	Auto Tune
0.00								Center Freq 5.50000000 GHz
-10.0							DL1 -13.00 dBm	Start Fred 1.000000000 GHz
-30.0							<b>↓</b> 1	Stop Fred 10.000000000 GHz
-50.0					nden og sjonet Allen Friedrik og som en stande som en s Ned som provider af det en stande som en s			<b>CF Step</b> 900.000000 MH <del>;</del> <u>Auto</u> Mar
-70.0								Freq Offse 0 H:
-80.0								Scale Type
Start 1.0 #Res BW	00 GHz / 1.0 MHz		#VBW	3.0 MHz	s	weep 1	Stop 10.000 GHz 5.60 ms (18001 pts)	Log <u>Lin</u>
MSG						STATU	3	





Plot 7-29. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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	ectrum Analyzer	- Swept SA	A										
LXU RL	RF	50Ω A0	Р	NO: Fast		g: Free		#Avg Typ	e: RMS	TRAC	May 01, 2019 E 1 2 3 4 5 6 E A WWWW T A N N N N N	Fr	equency
10 dB/div	Ref 20.0	0 dBn		Gain:Low	At	ten: 30	dB		N	lkr1 849.			Auto Tune
10.0							, 						<b>Center Freq</b> .500000 MHz
-10.0											DL1 -13.00 dBm	849	Start Freq 0.000000 MHz
-20.0												1.00	Stop Freq
-40.0 1												15 <u>Auto</u>	CF Step 0.100000 MHz Man
-60.0	alter for the start for the start for the start of the st	andorry <sup>Kl</sup> ftred	lung-soupet-12/4		<b>~#</b> ****	efterheigt staapag	Manjifattan Kadhariyi	mydrwydryddalegonad	an service and the second s	etalaashiri kishasetijogoo pi			Freq Offset 0 Hz
-70.0													Scale Type
Start 0.84 #Res BW				#VI	BW 300	) kHz			Sweep	Stop 1.00 18.72 ms (	0000 GHz 3021 pts)	Log	Lin
MSG									STATU	IS			

Plot 7-30. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)



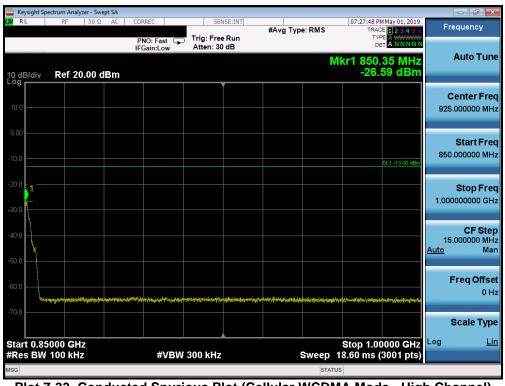
Plot 7-31. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 21 of 95
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	pectrum Ana												
LXI RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Type	e: RMS	TRAC	MMay 01, 2019	Fr	equency
				PNO: Fa IFGain:L	ow	Trig: Fre Atten: 3				TYF DE			
									N	lkr1 823.	90 MHz		Auto Tune
10 dB/div Log	Ref 2	0.00 d	Bm				-			-59.	14 dBm		
												c	enter Freq
10.0												427	.000000 MHz
0.00													
0.00													Start Freq
-10.0											DL1 -13.00 dBm	30	.000000 MHz
-20.0													
-20.0												004	Stop Freq .000000 MHz
-30.0												024	.000000 101-12
													CF Step
-40.0												79 Auto	.400000 MHz Man
-50.0												Auto	wan
											1		Freq Offset
-60.0	للمعط والمتعاد والمعا	فالمربقين ال		ال الما وقد وسأة فقا عنادة بل	والمروانية والمرورة والرو	a a product to defende		hang alama kinya kana kana da		epidantalis poddinejtedd	and the of the second second		0 Hz
	alan si sa da si s			and the second second	and a last of the state of the	ويتلقك أرقب الملحور ومع		an in the second se	Carally day and	الالالانة وروحه الخلي وال			
													Scale Type
Start 30	0 MHz									Stop 8	24.0 191112	Log	Lin
#Res BV	V 100 kH	lz		#	VBW	300 kHz	2	S	weep 9	8.46 ms (1	5881 pts)		
MSG									STATU	JS			

Plot 7-32. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)



Plot 7-33. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 95
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		ctrum Analy	yzer - Swej	pt SA									-	
l <mark>XI</mark> RI	L	RF	50 Ω	AC	CORREC		SEI	NSE:INT	#Avg Typ	e: RMS		PM May 01, 2019 ACE 1 2 3 4 5 6	Fre	quency
					PNO: Fa IFGain:L	ast 🖵 .ow	Trig: Fre #Atten: 3				т			
10 dE Log	3/div	Ref 1	0.00 d	Bm						M	lkr1 8.66 -41	67 5 GHz .39 dBm		Auto Tune
0.00														e <b>nter Freq</b> 000000 GHz
-10.0 -20.0												DL1 -13.00 dBm		<b>Start Freq</b> 000000 GHz
-30.0 -40.0								latte			1			<b>Stop Freq</b> 000000 GHz
-50.0						na filmhair ag							900.0 <u>Auto</u>	<b>CF Step</b> 000000 MHz Man
-70.0													F	r <b>eq Offset</b> 0 Hz
-80.0														cale Type
	t 1.00 s BW	0 GHz 1.0 MH	z		#	≠vbw	3.0 MHz		s	weep 1	Stop 1 5.60 ms (	0.000 GHz 18001 pts)	Log	Lin
MSG										STAT				

Plot 7-34. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

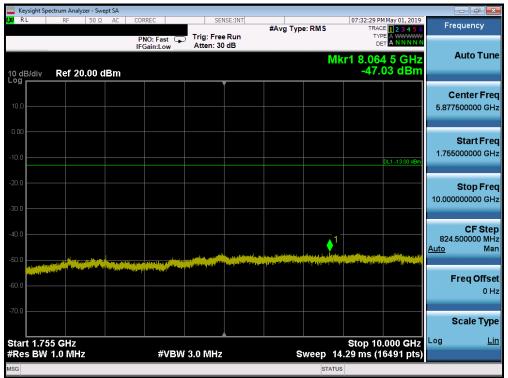
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 95
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# AWS WCDMA Mode

SG				STAT	US	
itart 0.03 Res BW		#VB	№ 3.0 MHz	Sweep	Stop 1.7050 GHz 2.233 ms (3351 pts)	
					04411 4 7050 8	Log L
70.0						Scale Typ
						UF
60.0						Freq Offs 0 H
50.0		and a second state of the second state of the second state			and the second s	
						167.500000 MH <u>Auto</u> Ma
10.0						CF Ste
30.0						
0.0					1,	Stop Fre 1.705000000 GI
0.0						
10.0					DL1 -13.00 dBm	30.000000 MI
3.00						Start Fre
10.0						Center Fre 867.500000 MH
0 dB/div <sup>og</sup>	Ref 20.00 dBi		The second secon			
	B.600.00 JB.			Μ	lkr1 1.705 0 GHz -29.93 dBm	Auto Tur
		PNO: Fast G	Trig: Free Run Atten: 30 dB			
RL	RF 50 Ω A	C CORREC	SENSE:INT	#Avg Type: RMS	07:32:24 PM May 01, 2019 TRACE 1 2 3 4 5 6	Frequency
	ctrum Analyzer - Swept S					

Plot 7-35. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)



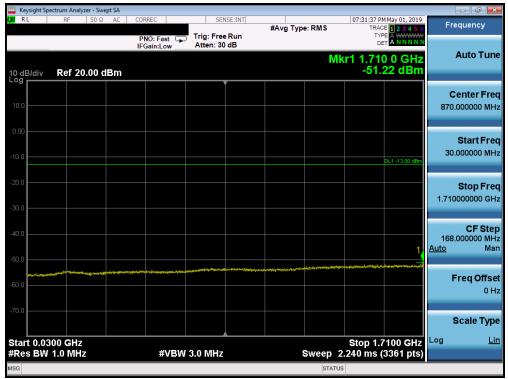
#### Plot 7-36. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 95
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	trum Analyzer - S	Swept SA							
LXU RL	RF 50	Ω AC	CORREC	SENSE:IN	#Avg Typ	e: RMS	07:32:35 PM M TRACE	1 2 3 4 5 6	Frequency
			PNO: Fast G	Trig: Free Run Atten: 20 dB			DET	A WWWWW A NNNNN	
	Ref 10.00	dBm				Mki	1 16.958 -49.0	5 GHz 2 dBm	Auto Tune
									Center Fred
0.00									15.00000000 GH
-10.0							DL	.1 -13.00 dBm	
-20.0									Start Free 10.000000000 GH
-20.0									
-30.0									Stop Free
-40.0									20.000000000 GH
50.0						<b>1</b>			CF Ster
-50.0		and Laborate	talaya na kata mada			Charlen		an a station of the second	1.000000000 GH Auto Mar
-60.0	المسلمانية والمسلم	العمران والمدين والمعا	and a second						
-70.0									Freq Offse
									U H
-80.0									Scale Type
Start 10.00							Stop 20.0		Log <u>Lir</u>
#Res BW 1	.0 MHz		#VBV	V 3.0 MHz	2	weep 2	5.33 ms (20	001 pts)	
MSG						STATU	S		

Plot 7-37. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)



Plot 7-38. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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	🔤 Keysight Spectrum Analyzer - Swept SA 👘 💼 📾													
LXI RL		RF	50 Ω	AC	CORREC		SEI	ISE:INT	#Avg Type	e: RMS		CE 1 2 3 4 5 6	Fre	equency
					PNO: F IFGain:	ast 🖵	Trig: Free Atten: 30		• ,,		T)	PE A WWWWW ET A N N N N N		
					IFGain:	LOW	Atten: ot	ub .		MI	or1 9 15	1 5 GHz		Auto Tune
10 dB Log r	//div	Ref 2	0.00 d	Bm							-47	.03 dBm		
													C	enter Freq
10.0														500000 GHz
0.00														Start Freq
-10.0													1.755	000000 GHz
-10.0												DL1 -13.00 dBm		
-20.0														Stop Freq
													10.000	000000 GHz
-30.0														
														CF Step
-40.0										<b>▲</b> 1			824. Auto	500000 MHz Man
-50.0		and the state		Million Lothe	The state of the s		- Hereiter			Construction of the second	and provide different procession		Auto	WidiT
				Addance for a	alle sulles a stille sulle	-ula								req Offset
-60.0														0 Hz
70.0														
-70.0													:	Scale Type
													Log	
		5 GHz 1.0 MH	7			#VBW	3.0 MHz		s	ween 14	Stop 10	).000 GHz 16491 pts)	_	Lin
MSG							0.0 10112			STATUS		rovo i pio)		
										- OTATO				

Plot 7-39. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)



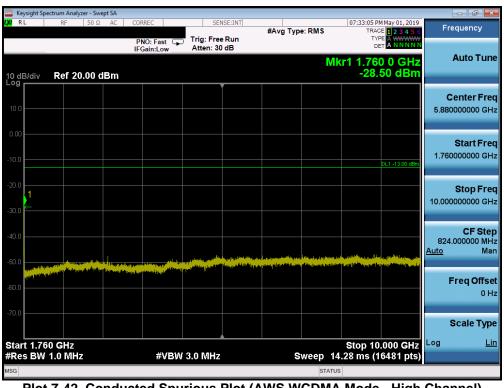
Plot 7-40. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

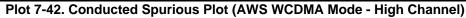
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 26 of 85		
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	ectrum Analyzer -	Swept SA									
LXU RL	RF 5	0Ω AC	CORREC	Trig: Free		#Avg Type	RMS	TRAC	May 01, 2019 E 1 2 3 4 5 6 E A WWWW T A N N N N N	Freq	uency
10 dB/div Log	Ref 20.0	0 dBm	IFGain:Low	Atten: 30	) dB		Mk	(r1 1.65)	7 5 GHz 83 dBm	A	uto Tune
10.0											n <b>ter Freq</b> 00000 MHz
-10.0									DL1 -13.00 dBm		<b>tart Freq</b> 00000 MHz
-20.0											<b>top Freq</b> 00000 GHz
-40.0									1	168.00 <u>Auto</u>	CF Step 00000 MHz Man
-60.0	*****		999	22,214,224,224,271,271,271,224,11,1		ana ya ka na ya ka na ya ka				Fr	e <b>q Offset</b> 0 Hz
Start 0.03	00 GHz							Stop 1.7	7100 GHz	Sc Log	ale Type: <u>Lin</u>
#Res BW			#VBI	N 3.0 MHz		s		2.240 ms (	3361 pts)		
MSG							STATUS	S			

Plot 7-41. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)





FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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	pectrum Analyze	er - Swept	t SA									- F	×
L <mark>X/</mark> RL	RF	50 Ω	AC	CORREC	ast 🖵	Trig: Fre		#Avg Ty	pe:RMS	т	1 PM May 01, 2019 RACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency	/
10 dB/div	Ref 10.	.00 dE	3m	IFGain:L	.ow	Atten: 2	0 dB		М		92 5 GHz 9.64 dBm	Auto T	ʻune
0.00												Center F 15.000000000	
-10.0											DL1 -13.00 dBm	Start F 10.000000000	
-30.0									4			Stop F 20.000000000	
-50.0	a na a sa ta da ay na sa tika Ina ya sa ta ta ay na sa tika ta										ng the first of th	CF S 1.000000000 <u>Auto</u>	
70.0												Freq Of	ffse 0 H:
-80.0										Stop	20.000 GHz	Scale T	Гуре <u>Lir</u>
#Res BW	1.0 MHz			#	¢VB₩	3.0 MH	2		Sweep		(20001 pts)		

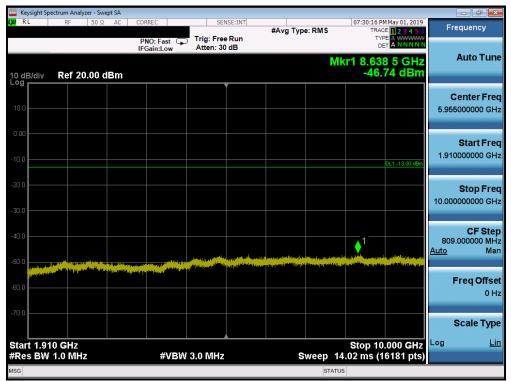
Plot 7-43. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 95
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	ectrum Analyzer - Swe		250						
RL	RF 50 Ω	P	REC			#Avg Type: R		7:30:10 PM May 01, 201 TRACE 1 2 3 4 5 TYPE A WWW DET A N N N N	6 Frequency
) dB/div	Ref 20.00 d						Mkr1	1.845 0 GH -35.14 dBr	z Auto Tu n
0.0									Center F 937.500000 r
.00								DL1 -13.00 dB	Start F 30.000000 r
D.O									Stop F 1.845000000
D.O									CF S 181.50000 r <u>Auto</u>
).0	With the second s	andi ni	<b>1</b> 998-11-1499-1999-1999 <sup>1</sup> -1-1-1-1	antijekonski kunski i ferd	<sup>1</sup> 55- <sub>10-00</sub> -1-6-5-5-5-7-4		ayın, saara <sub>e</sub> ge <sup>n</sup> i see <mark></mark> digah m	sigt of the stand of the second grad	Freq Off
D.O									Scale T
tart 0.03 Res BW	00 GHz 1.0 MHz		#VBW	3.0 MHz		Sw	S eep 2.42	top 1.8450 GH 0 ms (3631 pts	z <sup>Log</sup> 5)
G							STATUS		

Plot 7-44. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)



## Plot 7-45. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swept SA			
XIRL RF 50Ω AC	PNO: East Trig: Free	TYPE A WWWWW	Frequency
10 dB/div Ref 10.00 dBm	IFGain:Low Atten: 20	DET A NNNNN Mkr1 17.005 5 GHz -49.65 dBm	Auto Tun
0.00			Center Fre 15.000000000 GH
-10.0		DL1 -13.00 dBm	Start Fre 10.00000000 GF
40.0			<b>Stop Fre</b> 20.000000000 GH
		ani ka na mana ang kang sa kina sa pang ang kang sa kina sa pang ang kang sa kina Kina pang ang kang sa kina pang sa kina pang ang kang sa kina pang kang sa kina pang sa kina pang sa kina pang	CF Ste 1.00000000 GH <u>Auto</u> Ma
70.0			Freq Offs 01
80.0			Scale Typ
Start 10.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Stop 20.000 GHz 25.33 ms (20001 pts)	Log <u>L</u>

Plot 7-46. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)



Plot 7-47. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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			alyzer - Swej											d X
<b>l,XI</b> RL		RF	50 Ω	AC	CORREC		SE	NSE:INT	#Avg Typ	e: RMS	TRA	M May 01, 2019 CE <mark>1 2 3 4 5</mark> 6	Frequer	ncy
					PNO: Fa	ast 🖵	Trig: Fre Atten: 3				TY D	PE A WWWWW ET A N N N N N		
					II Outilie					M	kr1 9.17	0 5 GHz	Auto	Tune
10 dE	3/div	Ref 2	20.00 d	Bm							-46.	70 dBm		
Log								Ť					Questo	
10.0													5.9550000	on GHz
													0.5550000	00 0112
0.00													-	
													1.9100000	t Freq
-10.0												DL1 -13.00 dBm	1.3100000	00 0112
-20.0														-
													10.0000000	p Freq
-30.0													10.0000000	00 0112
													C	F Step
-40.0												1	809.0000	00 MHz
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	and horses in Normality of the	al al al al	and all the set	and a group of the set	add Intelector	المستعطاتان	فناكثتم بويتعقا إتذب	A DECEMPTOR OF A DECE	and the second		an defense a standaren.	a station of the state of the s	_	
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-70.0													Scale	е Туре
	t 1.91						0.0.04				Stop 10	.000 GHz	Log	<u>Lin</u>
	s BW	1.0 WI	ΗZ		#	VBW	3.0 MHz		s			l6181 pts)		
MSG										STATU	15			

Plot 7-48. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)



Plot 7-49. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 95
1M1904090058-02.ZNF	4/11 - 5/4/2019	Portable Handset		Page 41 of 85
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	ectrum Analyzer	- Swept SA								
L <mark>XI</mark> RL	RF 5	iOΩ AC	CORREC		SENSE:INT	#Avg	Type: RMS	TRA	M May 01, 2019 CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	Frequency
10 dB/div	Ref 20.0	0 dBm	IFGain:L	.ow At	ten: 30 dB		N	/kr1 1.59		Auto Tune
10.0										Center Freq 940.000000 MHz
-10.0									DL1 -13.00 dBm	Start Freq 30.000000 MHz
-20.0										<b>Stop Freq</b> 1.85000000 GHz
-40.0								∳ <sup>1</sup>		<b>CF Step</b> 182.000000 MHz <u>Auto</u> Man
-60.0	and a second	900-0505 <sup>0</sup> 00 <sup>0</sup> 0000	*****************************			, 1994 - 1995 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994	4.5.5.5000 400 140.3 14.4 140 fra diga 414		₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	Freq Offset 0 Hz
-70.0								04+++ 4		Scale Type
Start 0.03 #Res BW			#	¢VBW 3.0	MHz		Sweep	Stop 1. 2.427 ms	0000 0112	
MSG							STAT	TUS		

Plot 7-50. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)



Plot 7-51. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 95
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Keysight Sp	ectrum Analy	/zer - Swej	pt SA										7 ×
LXU RL	RF	50 Ω	AC	CORREC	ast 😱	Trig: Free		#Avg Typ	e: RMS		00 PM May 01, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequen	су
10 dB/div	Ref 1	0.00 d	Bm	IFGain:L	ow	Atten: 20	) dB		Μ	kr1 17. -4	020 5 GHz 19.38 dBm	Auto	Tune
0.00												Cente 15.00000000	
-10.0											DL1 -13.00 dBm	Star 10.00000000	<b>t Freq</b> 00 GHz
-30.0									4			Stop 20.00000000	<b>o Freq</b> 00 GHz
-50.0											Securit Marine Security Secure	CF 1.00000000 <u>Auto</u>	<b>Step</b> 00 GHz Man
-70.0												Freq	Offset 0 Hz
Start 10.0					žVRM	3.0 MHz			ween	Stop	20.000 GHz s (20001 pts)	Scale	Type Lin
MSG	T.O IWIT					5.0-101112				TUS	-(2000 T pts)		

Plot 7-52. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 95
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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 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 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  $\geq 2 \times \text{Span/RBW}$
- 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

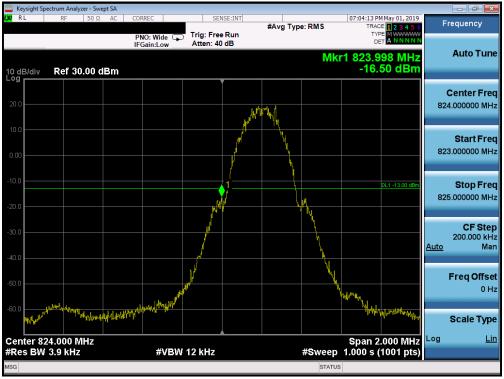
#### Test Notes

Per 22.917(b), 24.238(b), 27.53(h)(3), and RSS-132(5.5), RSS-133(6.5), RSS-139(6.5), 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.

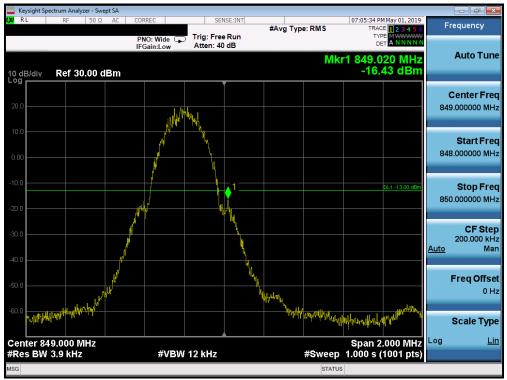
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 44 of 95
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# Cellular GSM Mode



Plot 7-53. Band Edge Plot (Cellular GSM Mode - Low Channel)



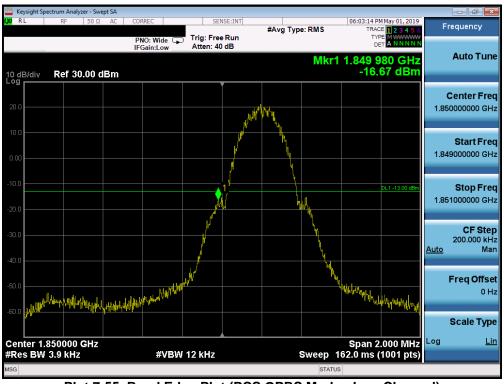
## Plot 7-54. Band Edge Plot (Cellular GSM Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 95
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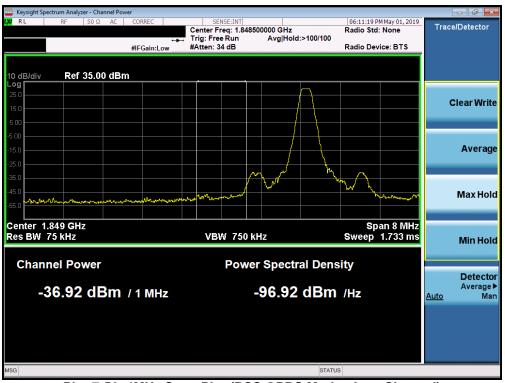
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# PCS GSM/GPRS Mode



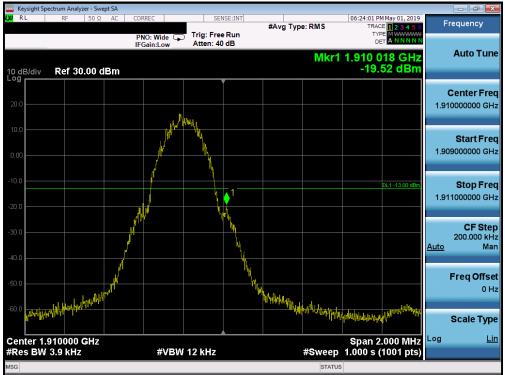
Plot 7-55. Band Edge Plot (PCS GPRS Mode - Low Channel)



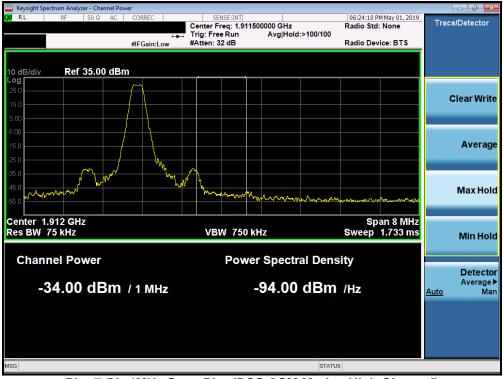
## Plot 7-56. 4MHz Span Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 95
1M1904090058-02.ZNF	4/11 - 5/4/2019	Portable Handset		Page 46 of 85
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Plot 7-57. Band Edge Plot (PCS GSM Mode - High Channel)



Plot 7-58. 4MHz Span Plot (PCS GSM Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 95		
1M1904090058-02.ZNF 4/11 - 5/4/2019		Portable Handset		Page 47 of 85		
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# Cellular WCDMA Mode



Plot 7-59. Band Edge Plot (Cellular WCDMA Mode - Low Channel)

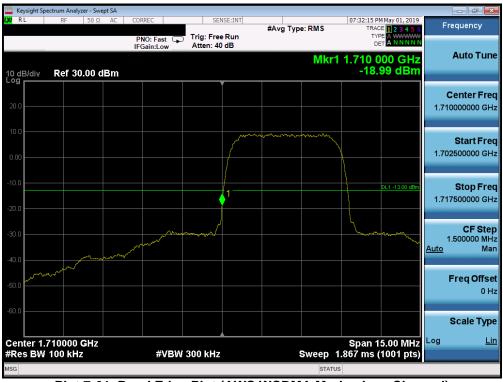


## Plot 7-60. Band Edge Plot (Cellular WCDMA Mode - High Channel)

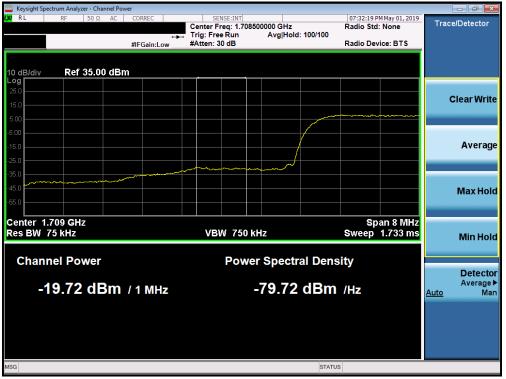
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 49 of 95
1M1904090058-02.ZNF	4/11 - 5/4/2019	019 Portable Handset		Page 48 of 85
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# AWS WCDMA Mode



Plot 7-61. Band Edge Plot (AWS WCDMA Mode - Low Channel)



## Plot 7-62. 4MHz Span Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 40 of 95
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© 2010 PCTEST Engineering Lab	oratory Inc			V 0 0 02/01/2010



	ctrum Analyzer - Swept SA					
0 RL	RF 50 Ω AC	PNO: Fast	Trig: Free Run Atten: 40 dB	#Avg Type: RMS	07:32:50 PM May 01, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
0 dB/div	Ref 30.00 dBm			Mkr	1 1.755 000 GHz -20.01 dBm	Auto Tun
20.0						Center Fre 1.755000000 GH
0.00		un mana				<b>Start Fre</b> 1.747500000 G⊦
20.0			1		DL1 -13.00 dBm	<b>Stop Fre</b> 1.762500000 GH
30.0 	ummed a			man	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	CF Ste 1.500000 MH <u>Auto</u> Ma
50.0						Freq Offs 0 F
60.0						Scale Typ
enter 1.7 Res BW 1	55000 GHz 100 kHz	#VBW	300 kHz	Sweep	Span 15.00 MHz 1.867 ms (1001 pts)	Log <u>L</u>

Plot 7-63. Band Edge Plot (AWS WCDMA Mode - High Channel)



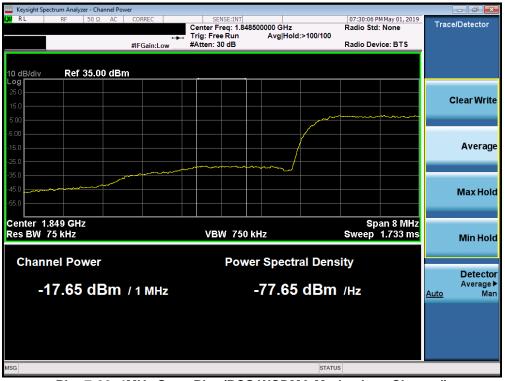
Plot 7-64. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Report S/N: Test Dates: EUT Type:			Page 50 of 85		
1M1904090058-02.ZNF	4/11 - 5/4/2019	19 Portable Handset				
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Plot 7-65. Band Edge Plot (PCS WCDMA Mode - Low Channel)



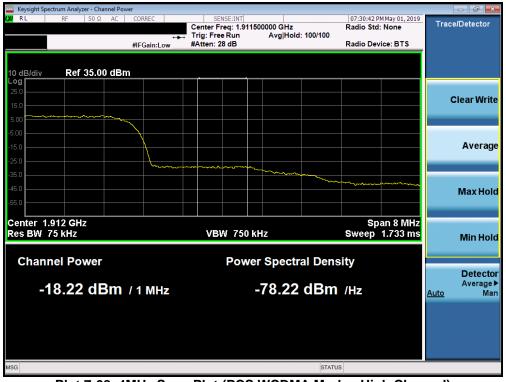
#### Plot 7-66. 4MHz Span Plot (PCS WCDMA Mode - Low Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo E1 of 95
1M1904090058-02.ZNF	4/11 - 5/4/2019	4/2019 Portable Handset		Page 51 of 85
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🔤 Keysight Spectrum An						
🗶 RL RF	50 Ω AC	CORREC PNO: Fast	Trig: Free Run Atten: 40 dB	#Avg Type: RMS	07:30:38 PM May 01, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
10 dB/div <b>Ref</b>	30.00 dBm			Mkr	1 1.910 000 GHz -17.34 dBm	Auto Tuno
20.0						Center Free 1.910000000 GH
0.00		Mun March	m			Start Free 1.902500000 GH
-10.0			1		DL1 -13.00 dBm	<b>Stop Fre</b> 1.917500000 GH
30.0	~~/			www.		<b>CF Ste</b> 1.50000 MH <u>Auto</u> Ma
50.0					and the second s	Freq Offse 0 H
60.0						Scale Typ
Center 1.91000 #Res BW 100 k		#VBV	/ 300 kHz	Sweep	Span 15.00 MHz 1.867 ms (1001 pts)	Log <u>Lir</u>
MSG				STAT	US	

Plot 7-67. Band Edge Plot (PCS WCDMA Mode - High Channel)



Plot 7-68. 4MHz Span Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage E2 of 95	
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# 7.5 Peak-Average Ratio

## **Test Overview**

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

## Test Procedure Used

KDB 971168 D01 v03r01 - Section 5.7.1

## Test Settings

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW > Emission bandwidth of signal
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

#### Test Setup

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



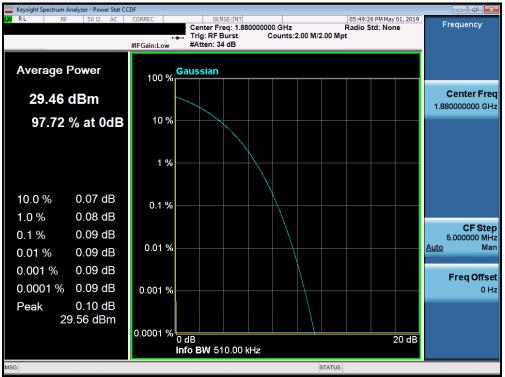
Figure 7-4. Test Instrument & Measurement Setup

#### Test Notes

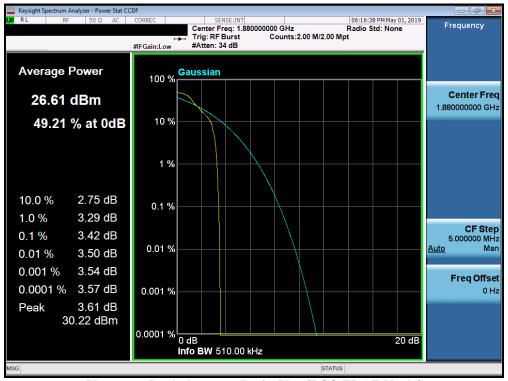
None

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Dama 52 af 05	
1M1904090058-02.ZNF	4/11 - 5/4/2019			Page 53 of 85	
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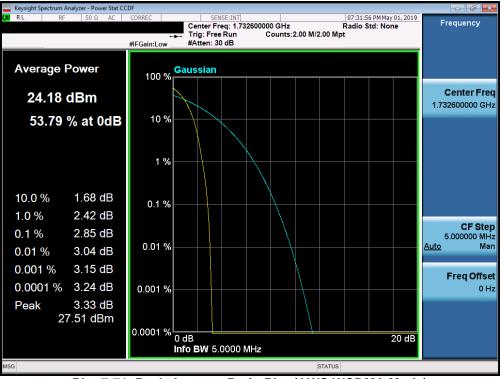




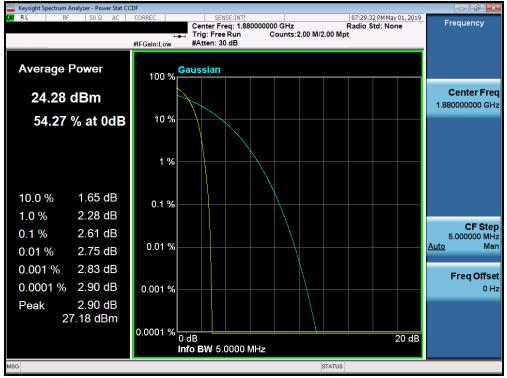
Plot 7-70. Peak-Average Ratio Plot (PCS EDGE Mode)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:			Dage 54 of 95	
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Plot 7-71. Peak-Average Ratio Plot (AWS WCDMA Mode)



Plot 7-72. Peak-Average Ratio Plot (PCS WCDMA Mode)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Daga FE of 95	
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# 7.6 Radiated Power (ERP/EIRP)

## **Test Overview**

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

#### Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

ANSI/TIA-603-E-2016 - Section 2.2.17

#### Test Settings

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points  $\geq$  2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Dama 50 at 05	
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# Test Setup

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

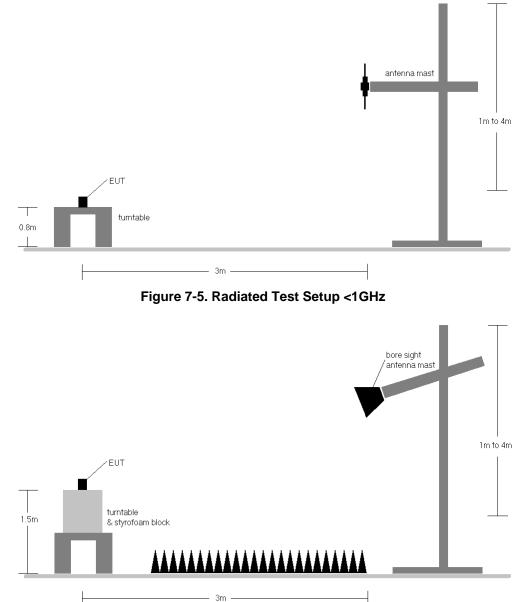


Figure 7-6. Radiated Test Setup >1GHz

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Dama 57 at 05	
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- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage EQ of QE
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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	V	273	312	21.08	7.11	26.04	38.45	-12.41	28.19	40.61	-12.42
836.60	GPRS850	V	142	244	24.46	7.34	29.65	38.45	-8.80	31.80	40.61	-8.81
848.80	GPRS850	V	152	327	23.09	7.56	28.50	38.45	-9.95	30.65	40.61	-9.96
836.60	GPRS850	н	142	244	24.14	7.09	29.08	38.45	-9.37	31.23	40.61	-9.38
836.60	EDGE850	V	142	244	18.34	7.34	23.53	38.45	-14.92	25.68	40.61	-14.93

Table 7-2. ERP/EIRP (Cellular GPRS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	н	223	286	16.75	6.92	21.52	38.45	-16.93	23.67	40.61	-16.94
836.60	WCDMA850	н	223	297	16.41	7.09	21.35	38.45	-17.11	23.50	40.61	-17.11
846.60	WCDMA850	н	206	299	15.66	7.25	20.76	38.45	-17.69	22.91	40.61	-17.70
826.40	WCDMA850	V	133	261	16.10	7.34	21.29	38.45	-17.16	23.44	40.61	-17.17

Table 7-3. ERP/EIRP (Cellular WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	Н	105	20	13.16	9.62	22.78	30.00	-7.22
1732.60	WCDMA1700	Н	102	22	14.58	9.54	24.12	30.00	-5.88
1752.60	WCDMA1700	н	102	21	14.11	9.45	23.56	30.00	-6.44
1732.60	WCDMA1700	V	100	51	14.55	9.53	24.08	30.00	-5.92

Table 7-4. EIRP (AWS WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	Н	261	43	19.82	9.06	28.88	33.01	-4.13
1880.00	GPRS1900	н	316	41	19.58	9.15	28.73	33.01	-4.28
1909.80	GPRS1900	н	345	131	17.83	9.27	27.10	33.01	-5.91
1850.20	GPRS1900	V	357	289	15.41	9.15	24.56	33.01	-8.45
1850.20	EDGE1900	н	261	43	15.08	9.15	24.23	33.01	-8.78

# Table 7-5. EIRP (PCS GPRS)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega E0 of 9E
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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	V	110	108	15.11	9.06	24.17	33.01	-8.84
1880.00	WCDMA1900	V	100	117	15.93	9.09	25.02	33.01	-7.99
1907.60	WCDMA1900	V	100	117	13.43	9.15	22.58	33.01	-10.43
1880.00	WCDMA1900	н	102	233	14.03	9.09	23.12	33.01	-9.89

Table 7-6. EIRP (PCS WCDMA)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 95	
1M1904090058-02.ZNF	4/11 - 5/4/2019	Portable Handset		Page 60 of 85	
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# 7.7 Radiated Spurious Emissions Measurements

#### **Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

#### **Test Procedures Used**

KDB 971168 D01 v03r01 - Section 5.8

ANSI/TIA-603-E-2016 - Section 2.2.12

## Test Settings

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW  $\geq$  3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed to stabilize

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
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The EUT and measurement equipment were set up as shown in the diagram below.

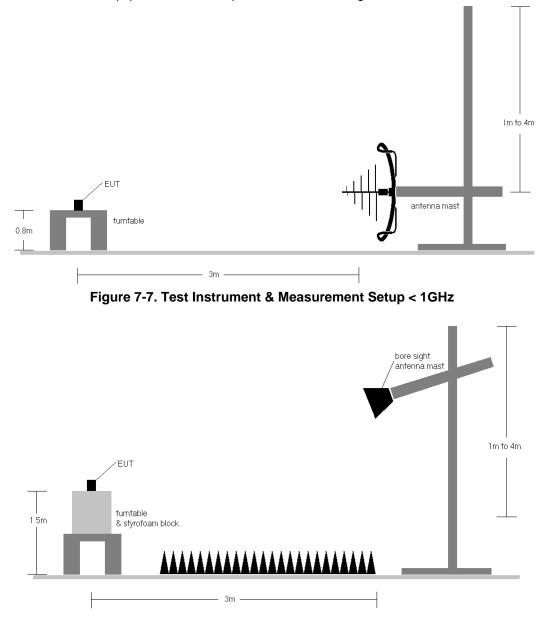


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

## Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."

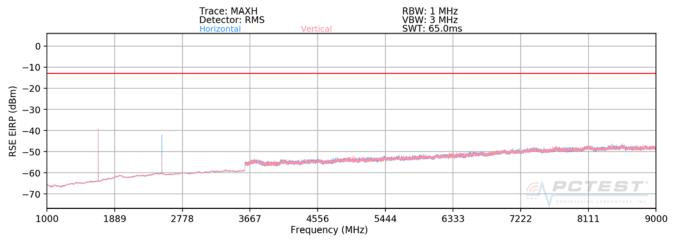
FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 95
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- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 6) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 7) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
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Plot 7-73. Radiated Spurious Plot above 1GHz (Cellular GPRS Mode)

OPERATING FREQUENCY:	82	4.20	MHz
MODULATION SIGNAL:	GPRS (GMSK)	_	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1648.40	Н	356	211	-43.10	3.07	-40.03	-27.0
2472.60	Н	111	190	-54.35	3.82	-50.53	-37.5
3296.80	Н	113	267	-65.80	6.00	-59.80	-46.8
4121.00	Н	347	101	-70.49	7.67	-62.82	-49.8
4945.20	Н	-	-	-71.07	8.72	-62.35	-49.3
5769.40	Н	-	-	-70.37	9.09	-61.28	-48.3
6593.60	Н	-	-	-69.49	9.22	-60.27	-47.3

Table 7-7. Radiated Spurious Data (Cellular GPRS Mode – Ch. 128)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 64 of 95
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OPERATING FREQUENCY:	83	6.60	MHz
MODULATION SIGNAL:	GPRS (GMSK)	_	
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	134	233	-40.29	3.10	-37.19	-24.2
2509.80	Н	153	203	-51.58	4.02	-47.56	-34.6
3346.40	Н	112	142	-62.41	6.03	-56.38	-43.4
4183.00	Н	400	237	-68.49	7.79	-60.70	-47.7
5019.60	Н	-	-	-70.03	8.78	-61.24	-48.2
5856.20	Н	-	-	-69.92	9.18	-60.73	-47.7
6692.80	Н	112	341	-68.69	9.43	-59.27	-46.3
7529.40	Н	-	-	-63.42	9.31	-54.11	-41.1
8366.00	Н	-	-	-69.29	9.45	-59.85	-46.8

Table 7-8. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

OPERATING FREQUENCY:	84	8.80	MHz
MODULATION SIGNAL:	GPRS (GMSK)	_	
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

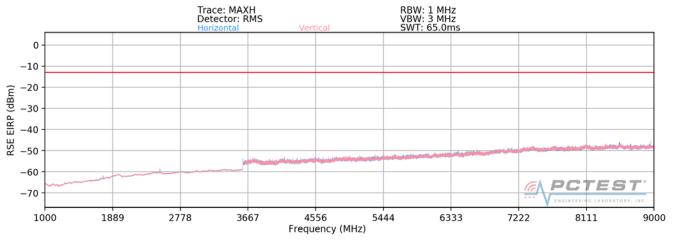
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1697.60	Н	137	234	-38.76	3.15	-35.61	-22.6
2546.40	Н	123	37	-52.87	4.15	-48.72	-35.7
3395.20	Н	114	143	-64.15	6.24	-57.91	-44.9
4244.00	Н	397	239	-69.13	7.97	-61.15	-48.2
5092.80	Н	-	-	-70.18	8.88	-61.30	-48.3
5941.60	Н	-	-	-69.33	9.31	-60.02	-47.0
6790.40	Н	-	-	-69.07	9.45	-59.62	-46.6

Table 7-9. Radiated Spurious Data (Cellular GPRS Mode – Ch. 251)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege CE of PE	
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# Cellular WCDMA Mode



Plot 7-74. Radiated Spurious Plot above 1GHz (Cellular WCDMA Mode)

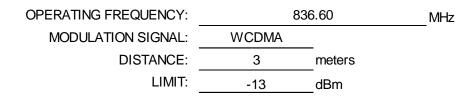
OPERATING FREQUENCY:	82	6.40 N	/Hz
MODULATION SIGNAL:	WCDMA	_	
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1652.80	V	112	35	-61.20	3.09	-58.11	-45.1
2479.20	V	166	246	-54.61	3.91	-50.70	-37.7
3305.60	V	-	-	-68.26	6.00	-62.26	-49.3
4132.00	V	-	-	-69.54	7.72	-61.83	-48.8

Table 7-10. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 66 of 95
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	V	102	358	-64.44	3.10	-61.34	-48.3
2509.80	V	197	260	-56.94	4.02	-52.92	-39.9
3346.40	V	-	-	-68.51	6.03	-62.48	-49.5
4183.00	V	-	-	-68.60	7.79	-60.80	-47.8

Table 7-11. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

MHz

OPERATING FREQUENCY:

MODULATION SIGNA

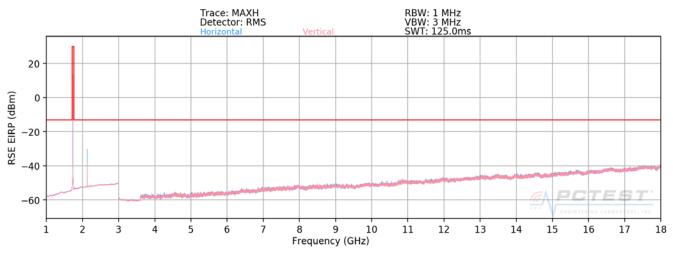
REQUENCY:	84	46.60
ON SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

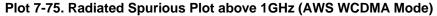
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1693.20	V	146	26	-63.78	3.17	-60.60	-47.6
2539.80	V	170	262	-55.23	4.13	-51.11	-38.1
3386.40	V	-	-	-68.18	6.20	-61.98	-49.0
4233.00	V	-	-	-69.44	7.93	-61.51	-48.5

Table 7-12. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 67 of 95	
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OPERATING FREQUENCY:	171	MHz	
MODULATION SIGNAL:	WCDMA	_	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3424.80	Н	103	130	-61.38	6.27	-55.11	-42.1
5137.20	Н	-	-	-69.76	8.94	-60.82	-47.8
6849.60	Н	-	-	-67.04	9.44	-57.59	-44.6

Table 7-13. Radiated Spurious Data (AWS WCDMA Mode - Ch. 1312)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege C0 of 05
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OPERATING FREQUENCY:	173	32.60	MHz
MODULATION SIGNAL:	WCDMA	_	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.20	Н	145	139	-62.93	6.35	-56.58	-43.6
5197.80	Н	-	-	-69.44	9.05	-60.39	-47.4
6930.40	Н	-	-	-67.59	9.38	-58.21	-45.2

Table 7-14. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

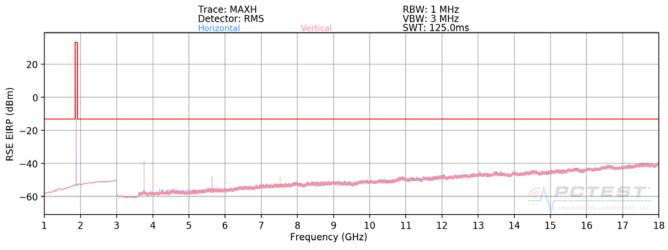
OPERATING FREQUENCY:	175	52.60	MHz
MODULATION SIGNAL:	WCDMA		
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3505.20	Н	132	128	-61.82	6.50	-55.32	-42.3
5257.80	Н	-	-	-69.58	8.96	-60.62	-47.6
7010.40	Н	-	-	-66.71	9.14	-57.57	-44.6

Table 7-15. Radiated Spurious Data (AWS WCDMA Mode - Ch. 1513)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates: EUT Type:			Dage CO of 95		
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Plot 7-76. Radiated Spurious Plot above 1GHz (PCS GPRS Mode)

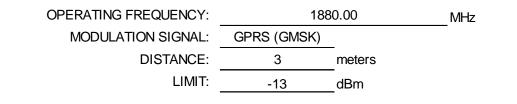
OPERATING FREQUENCY:	185	60.20	MHz
MODULATION SIGNAL:	GPRS (GMSK)	_	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3700.40	V	354	10	-49.41	6.89	-42.51	-29.5
5550.60	V	373	10	-53.29	9.02	-44.27	-31.3
7400.80	V	341	346	-58.81	9.21	-49.60	-36.6
9251.00	V	222	29	-58.47	9.45	-49.01	-36.0
11101.20	V	242	40	-63.88	9.44	-54.44	-41.4
12951.40	V	-	-	-62.10	8.77	-53.33	-40.3
14801.60	V	-	-	-58.65	8.64	-50.01	-37.0

Table 7-16. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	376	370	-48.22	6.93	-41.29	-28.3
5640.00	V	393	359	-53.03	9.15	-43.88	-30.9
7520.00	V	346	343	-59.05	9.31	-49.73	-36.7
9400.00	V	231	36	-58.85	9.49	-49.35	-36.4
11280.00	V	-	-	-63.71	9.48	-54.24	-41.2
13160.00	V	361	24	-60.15	8.71	-51.44	-38.4
15040.00	V	-	-	-60.82	8.85	-51.97	-39.0
16920.00	V	276	356	-58.68	8.54	-50.14	-37.1

Table 7-17. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

MHz

OPERATING FREQUENCY: MODULATION SIGNAL:

 REQUENCY:
 1909.80

 ON SIGNAL:
 GPRS (GMSK)

 DISTANCE:
 3

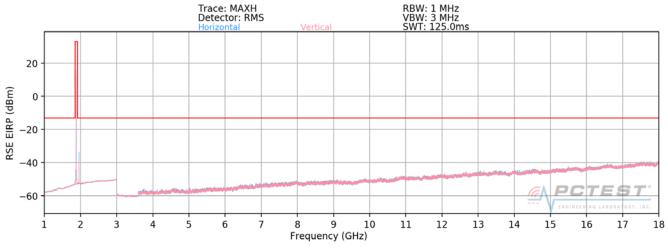
 LIMIT:
 -13

Ant. Antenna Turntable **Substitute Spurious** Frequency Level at Antenna Margin Pol. Height Azimuth Antenna Gain **Emission Level** [MHz] Terminals [dBm] [dB] [H/V] [cm] [degree] [dBi] [dBm] V 3819.60 400 8 -45.11 7.11 -38.00 -25.0 5729.40 V 355 358 -54.37 9.03 -45.33 -32.3 V 7639.20 348 349 -60.24 9.29 -50.95 -37.99549.00 V 198 33 -61.13 9.43 -51.70 -38.7 11458.80 V -64.22 9.49 -54.73 -41.7 --V 13368.60 ---60.488.71 -51.76 -38.8 15278.40 V -61.76 8.55 -53.20 -40.2 --

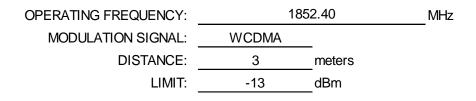
Table 7-18. Radiated Spurious Data (PCS GPRS Mode – Ch. 810)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Dogo 71 of 95	
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Plot 7-77. Radiated Spurious Plot above 1GHz (PCS WCDMA Mode)

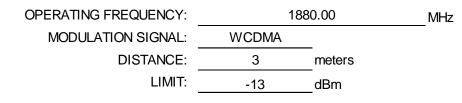


Fr	equency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3	3704.80	Н	186	78	-60.98	6.89	-54.09	-41.1
Ę	5557.20	Н	132	349	-68.10	9.03	-59.07	-46.1
7	7409.60	Н	-	-	-66.51	9.23	-57.29	-44.3

Table 7-19. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 70 of 95
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	Н	203	64	-58.69	6.93	-51.76	-38.8
5640.00	Н	186	4	-68.49	9.15	-59.34	-46.3
7520.00	Н	-	-	-66.49	9.31	-57.18	-44.2
9400.00	Н	-	-	-63.20	9.49	-53.70	-40.7

Table 7-20. Radiated Spurious Data (PCS WCDMA Mode - Ch. 9400)

1007 60

MHz

OPERATING FREQUENCY:

MODULATION SIGNA

REQUENCT.	190	00.00
ON SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3815.20	Н	289	69	-59.25	7.09	-52.16	-39.2
5722.80	Н	-	-	-69.06	9.04	-60.03	-47.0
7630.40	Н	-	-	-65.86	9.28	-56.58	-43.6
9538.00	Н	-	-	-63.69	9.44	-54.25	-41.3

Table 7-21. Radiated Spurious Data (PCS WCDMA Mode - Ch. 9538)

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#### **Test Overview and Limit**

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, RSS-132, and RSS-133, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24, Part 27, and RSS-139, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### Test Procedure Used

ANSI/TIA-603-E-2016

#### Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

#### Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

#### Test Notes

None

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OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	4.25	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	836,599,848	-152	-0.0000182
100 %		- 20	836,599,623	-377	-0.0000451
100 %		- 10	836,599,863	-137	-0.0000164
100 %		0	836,600,171	171	0.0000204
100 %		+ 10	836,599,740	-260	-0.0000311
100 %		+ 20	836,600,146	146	0.0000175
100 %		+ 30	836,599,977	-23	-0.0000027
100 %		+ 40	836,599,942	-58	-0.0000069
100 %		+ 50	836,599,954	-46	-0.0000055
BATT. ENDPOINT	3.52	+ 20	836,600,262	262	0.0000313

Table 7-22. Frequency Stability Data (Cellular GPRS Mode - Ch. 190)

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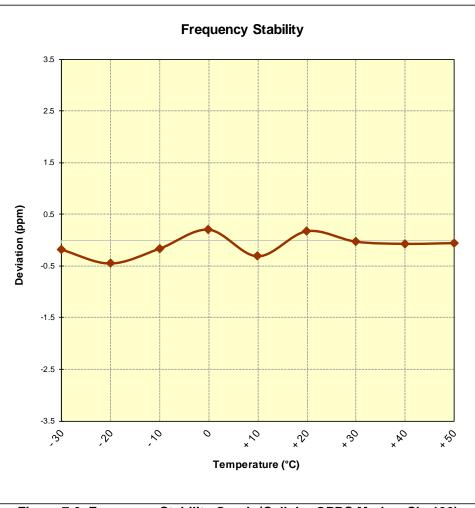


Figure 7-9. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.25	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	836,600,128	128	0.0000153
100 %		- 20	836,600,023	23	0.0000027
100 %		- 10	836,600,023	23	0.0000027
100 %		0	836,600,400	400	0.0000478
100 %		+ 10	836,600,325	325	0.0000388
100 %		+ 20	836,599,730	-270	-0.0000323
100 %		+ 30	836,599,695	-305	-0.0000365
100 %		+ 40	836,600,016	16	0.0000019
100 %		+ 50	836,600,119	119	0.0000142
BATT. ENDPOINT	3.52	+ 20	836,599,977	-23	-0.0000027

Table 7-23. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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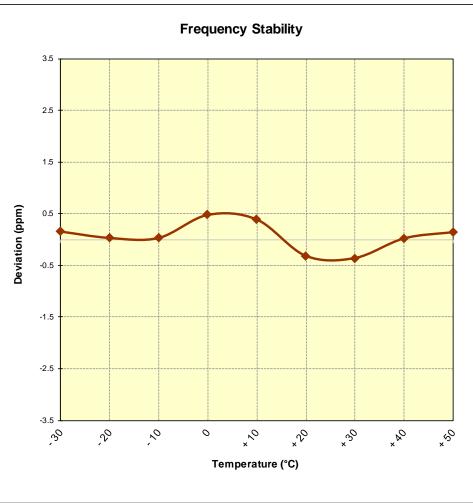


Figure 7-10. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	1,732,599,767	-233	-0.0000134
100 %		- 20	1,732,599,748	-252	-0.0000145
100 %		- 10	1,732,600,260	260	0.0000150
100 %		0	1,732,599,911	-89	-0.0000051
100 %		+ 10	1,732,600,024	24	0.0000014
100 %		+ 20	1,732,599,709	-291	-0.0000168
100 %		+ 30	1,732,600,227	227	0.0000131
100 %		+ 40	1,732,600,052	52	0.0000030
100 %		+ 50	1,732,599,911	-89	-0.0000051
BATT. ENDPOINT	3.52	+ 20	1,732,599,832	-168	-0.0000097

Table 7-24. Frequency Stability Data (AWS WCDMA Mode – Ch. 1413)

#### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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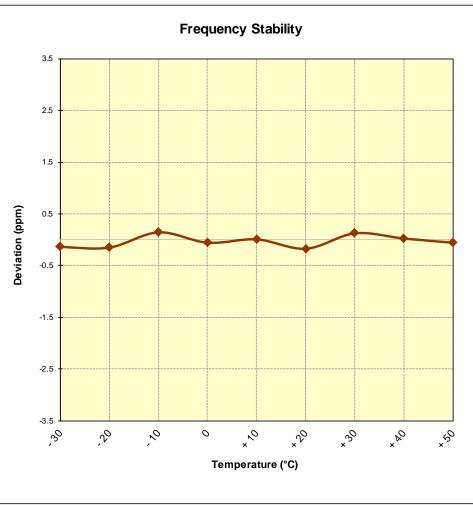


Figure 7-11. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	1,880,000,044	44	0.0000023
100 %		- 20	1,880,000,214	214	0.0000114
100 %		- 10	1,879,999,812	-188	-0.0000100
100 %		0	1,879,999,928	-72	-0.000038
100 %		+ 10	1,879,999,871	-129	-0.0000069
100 %		+ 20	1,880,000,071	71	0.0000038
100 %		+ 30	1,880,000,066	66	0.0000035
100 %		+ 40	1,880,000,194	194	0.0000103
100 %		+ 50	1,880,000,099	99	0.0000053
BATT. ENDPOINT	3.52	+ 20	1,879,999,920	-80	-0.0000043

Table 7-25. Frequency Stability Data (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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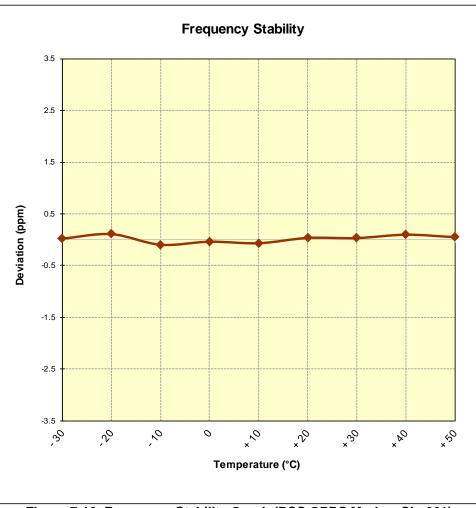


Figure 7-12. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.25	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	1,880,000,078	78	0.0000041
100 %		- 20	1,880,000,250	250	0.0000133
100 %		- 10	1,879,999,962	-38	-0.0000020
100 %		0	1,880,000,029	29	0.0000015
100 %		+ 10	1,880,000,164	164	0.0000087
100 %		+ 20	1,880,000,236	236	0.0000126
100 %		+ 30	1,879,999,964	-36	-0.0000019
100 %		+ 40	1,880,000,041	41	0.0000022
100 %		+ 50	1,879,999,850	-150	-0.000080
BATT. ENDPOINT	3.52	+ 20	1,879,999,881	-119	-0.0000063

Table 7-26. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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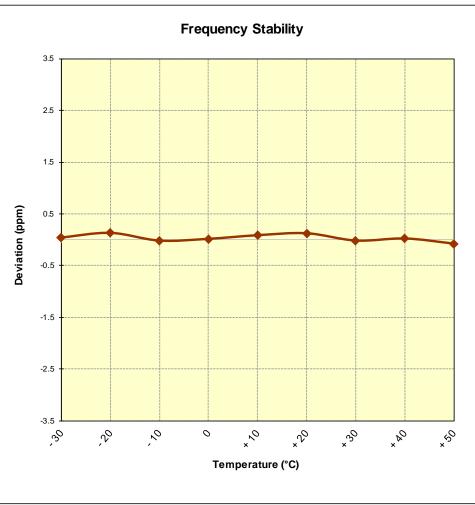


Figure 7-13. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFX420AS8		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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#### 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG Portable Handset FCC ID: ZNFX420AS8 complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.

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