

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 MobileComm U.S.A 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: 4/24 - 5/9/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1804200078-02.ZNF

# FCC ID:

#### ZNFX410CS

APPLICANT:

# LG Electronics MobileComm U.S.A

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s): Certification LM-X410CS LMX410CS, X410CS 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



FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 1 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 1 of 86
			V 8 0 04/05/2018	



# TABLE OF CONTENTS

1.0	INTR	ODUCTION	4
	1.1	Scope	4
	1.2	PCTEST Test Location	4
	1.3	Test Facility / Accreditations	4
2.0	PRO	DUCT INFORMATION	5
	2.1	Equipment Description	5
	2.2	Device Capabilities	5
	2.3	Test Configuration	5
	2.4	EMI Suppression Device(s)/Modifications	5
3.0	DESC	CRIPTION OF TESTS	6
	3.1	Evaluation Procedure	6
	3.2	Cellular - Base Frequency Blocks	6
	3.3	Cellular - Mobile Frequency Blocks	6
	3.4	PCS - Base Frequency Blocks	6
	3.5	PCS - Mobile Frequency Blocks	7
	3.6	AWS - Base Frequency Blocks	7
	3.7	AWS - Mobile Frequency Blocks	7
	3.8	Radiated Measurements	7
4.0	MEAS	SUREMENT UNCERTAINTY	9
5.0	TEST	EQUIPMENT CALIBRATION DATA	10
6.0	SAM	PLE CALCULATIONS	11
7.0	TEST	RESULTS	12
	7.1	Summary	12
	7.2	Occupied Bandwidth	13
	7.3	Spurious and Harmonic Emissions at Antenna Terminal	18
	7.4	Band Edge Emissions at Antenna Terminal	44
	7.5	Peak-Average Ratio	53
	7.6	Radiated Power (ERP/EIRP)	58
	7.7	Radiated Spurious Emissions Measurements	63
	7.8	Frequency Stability / Temperature Variation	75
8.0	CON	CLUSION	86

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 2 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 2 of 86
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018





# MEASUREMENT REPORT GSM / GPRS / EDGE / WCDMA



			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	0.747	28.73	1.225	30.88	243KGXW
EDGE850	22H	824.2 - 848.8	0.218	23.38	0.358	25.53	245KG7W
WCDMA850	22H	826.4 - 846.6	0.118	20.71	0.193	22.86	4M18F9W
WCDMA1700	27	1712.4 - 1752.6			0.256	24.08	4M16F9W
GPRS1900	24E	1850.2 - 1909.8			0.811	29.09	244KGXW
EDGE1900	24E	1850.2 - 1909.8			0.285	24.55	249KG7W
WCDMA1900	24E	1852.4 - 1907.6			0.190	22.79	4M16F9W

**EUT Overview** 

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 3 of 86
© 2018 PCTEST Engineering Laboratory, Inc.			V 8.0 04/05/2018	



# **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.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 4 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 4 of 86
© 2018 PCTEST Engineering Laboratory Inc			V 8 0 04/05/2018	



# 2.0 PRODUCT INFORMATION

# 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFX410CS**. 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.: 00383, 00367, 00425, 00525

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, 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.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege E of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 5 of 86
© 2018 PCTEST Engineering Laboratory Inc.			V 8 0 04/05/2018	



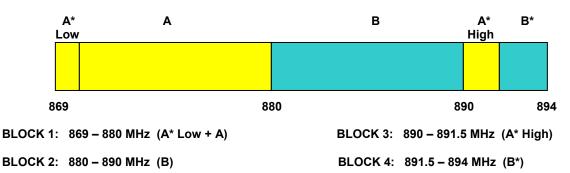
# 3.0 DESCRIPTION OF TESTS

# 3.1 Evaluation Procedure

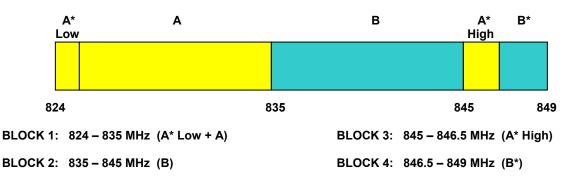
The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

#### Deviation from Measurement Procedure.....None

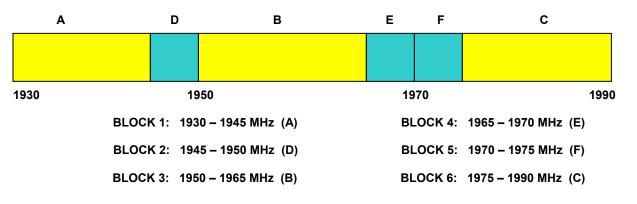
# 3.2 Cellular - Base Frequency Blocks



# 3.3 Cellular - Mobile Frequency Blocks



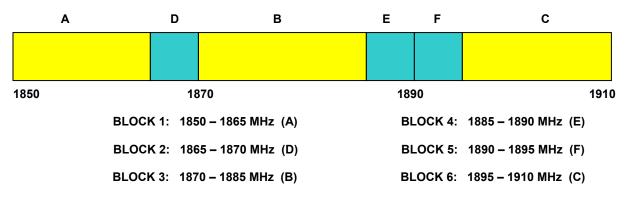
# 3.4 PCS - Base Frequency Blocks



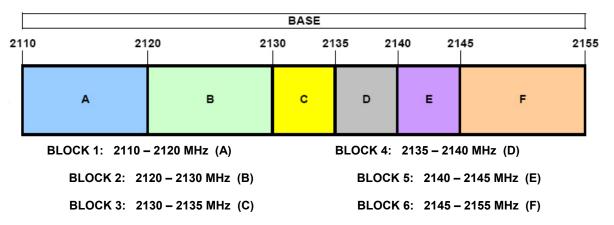
FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 6 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 6 of 86
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018



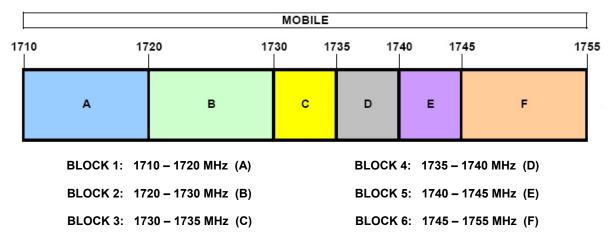
# 3.5 PCS - Mobile Frequency Blocks



#### 3.6 AWS - Base Frequency Blocks



### 3.7 AWS - Mobile Frequency Blocks



### 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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 7 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 7 of 86
© 2018 PCTEST Engineering Laboratory Inc			V 8 0 04/05/2018	



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<sub>d [dBm]</sub> = P<sub>g [dBm]</sub> – cable loss <sub>[dB]</sub> + antenna gain <sub>[dBd/dBi]</sub>

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].

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 8 of 86
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page o ol oo
© 2018 PCTEST Engineering Laboratory Inc.				V 8 0 04/05/2018



# 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  $U_{\text{CISPR}}$  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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 0 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 9 of 86
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018



# 5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx3	LIcensed Transmitter Cable Set	8/10/2017	Annual	8/10/2018	LTx3
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	8/28/2017	Annual	8/28/2018	MY49432391
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
ETS-Lindgren	3164-10	Quad Ridge Horn 400MHz - 10000MHz	12/14/2016	Biennial	12/14/2018	166283
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/20/2018	Annual	3/20/2019	MY49430494
Mini Circuits	TVA-11-422	RF Power Amp	N/A		N/A	QA1317001
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	3/30/2018	Annual	3/30/2019	11210140001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A		N/A	11208010032
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/19/2017	Annual	5/19/2018	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100037
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	1/22/2018	Annual	1/22/2019	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

#### Table 5-1. Test Equipment

#### Notes:

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	8 Portable Handset		Page 10 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



# 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.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 11 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 11 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



# 7.0 TEST RESULTS

# 7.1 Summary

Company Name:	LG Electronics MobileComm U.S.A
FCC ID:	ZNFX410CS
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 + log <sub>10</sub> (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	< 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			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 + 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 3.9.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 12 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



# 7.2 Occupied Bandwidth

#### **Test Overview**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

#### Test Procedure Used

KDB 971168 D01 v03r01- Section 4.2

#### **Test Settings**

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
  - 1-5% of the 99% occupied bandwidth observed in Step 7

#### Test Setup

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

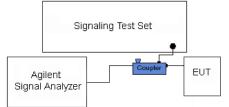


Figure 7-1. Test Instrument & Measurement Setup

#### **Test Notes**

None.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 12 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 13 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





Plot 7-1. Occupied Bandwidth Plot (Cellular GPRS Mode)



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 14 of 86		
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset Page 1				
© 2018 PCTEST Engineering Laboratory, Inc. V 8.0 04/05/2018						



Keysight Spectrum Analyzer - Occupied BW							
LX1 RE 50Ω DC	Center	SENSE:INT Freq: 1.880000000 GHz Free Run Avg Hold		01:15:37 PM Radio Std:	May 07, 2018 None	Trac	e/Detector
NFE		: 30 dB		Radio Devid	ce: BTS		
15 dB/div Ref 30.00 dBm	<u> </u>						
Log 15.0	mun	man					
0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	· · · ·	hanne -			(	Clear Write
			www.	Am			
-15.0				ئىسى يە	m		
-30.0							_
-45.0							Average
-60.0							
-75.0							
-90.0							Max Hold
-105							
Center 1.88 GHz Res BW 6.2 kHz	-41	VBW 18 kHz			625 kHz 15.6 ms		
Res BW 0.2 KHZ	#1			Sweep	15.0 IIIS		Min Hold
Occupied Bandwidt	h	Total Power	36.6 c	lBm			
24	43.50 kHz						Detector
							Peak▶
Transmit Freq Error	159 Hz	% of OBW Pow	er 99.0	00 %		Auto	<u>Man</u>
x dB Bandwidth	303.4 kHz	x dB	-26.00	dB			
MSG			STATUS				
mod			31/(103				

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



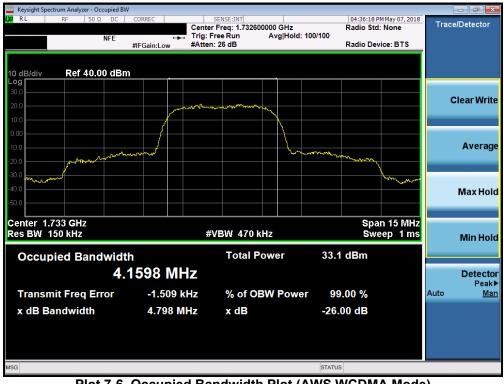
Plot 7-4. Occupied Bandwidth Plot (EDGE1900 Mode)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 15 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset	Page 15 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 16 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 16 of 86	
2018 PCTEST Engineering Laboratory, Inc. V 8.0 04/05/2018					



Keysight Spectrum Analyzer - Occu				
<b>XI</b> RL RF 50 Ω		SENSE:INT Center Freg: 1.880000000 GHz	01:45:08 PM May 07, 2018 Radio Std: None	Trace/Detector
N	NFE ++-	Γrig: Free Run Avg∣Hold: 10 4Atten: 26 dB	0/100 Radio Device: BTS	
	#IFGain:Low	Atten: 26 dB	Radio Device: B13	
10 dB/div Ref 40.00	dDm			
10 dB/div Ref 40.00				
30.0				Clear Write
20.0	/man	Mar marken and marken my		Cical Will
10.0				
0.00				
-10.0	0 000			Average
-20.0	man	V.\	Marine Construction of the second sec	
-30.0			have and	
-40.0				Max Hold
-50.0				
Center 1.88 GHz			Span 15 MHz	
Res BW 150 kHz		#VBW 470 kHz	Sweep 1 ms	Min Hold
Occupied Band	width	Total Power	33.1 dBm	
Occupied Bailer				
	4.1572 MHz	4		Detecto Peak
Transmit Freq Erro	or -898 H	z % of OBW Power	99.00 %	Auto <u>Mar</u>
x dB Bandwidth	4.788 MH	z xdB	-26.00 dB	
ISG			STATUS	

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 17 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 17 of 86
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018



# 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.

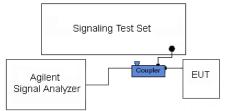


Figure 7-2. Test Instrument & Measurement Setup

#### **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.

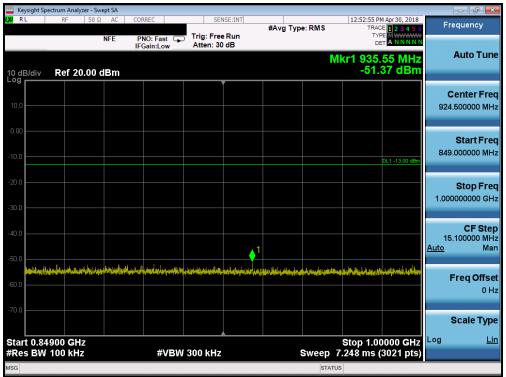
FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 18 of 86		
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset	able Handset			
© 2018 PCTEST Engineering La	V 8.0 04/05/2018					



# Cellular GPRS Mode

	ectrum Analyze	er - Swept S	SA								[	
I <mark>XI</mark> RL	RF	50 Ω A	E	NO: Fast	t 🖵	Trig: Free Atten: 30	#Avg Typ	e: RMS	TR	PM Apr 30, 2018 ACE 1 2 3 4 5 6 TYPE A N N N N N	Fre	quency
10 dB/div	Ref 20.	.00 dBi		Guinteon					Mkr1 82 -26	2.85 MHz 3.34 dBm		Auto Tune
10.0												<b>enter Freq</b> 500000 MHz
-10.0										DL1 -13.00 dBm	30.	Start Freq 000000 MHz
-20.0										1	823.	Stop Freq 000000 MHz
-40.0											79. <u>Auto</u>	CF Step 300000 MHz Mar
-60.0 <b>******</b>	y tanyan da yana katikan mananan yana katikan	a like ng Karing	<b>ing Propinsi Sana</b> Shara atawa shara				n Mandel (destad) An an		ndi di di da ang kang kang pina Kang panalawan di antari	e di se tre en provident i en consider 1 Leo constituti na mento constituti na	F	r <b>eq Offsel</b> 0 Hz
-70.0												Cale Type
Start 30.0 #Res BW				#\	/BW :	300 kHz	S	weep		823.0 MHz (15861 pts)	-	
MSG								STAT	rus			

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

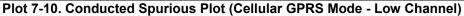


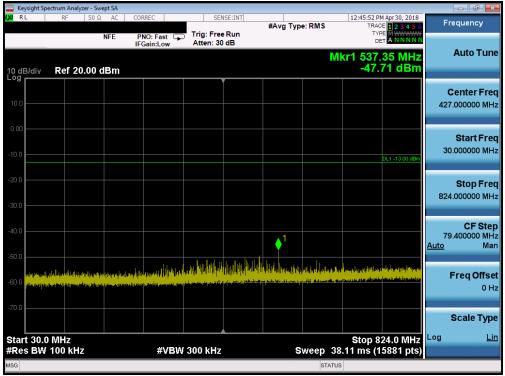
#### Plot 7-9. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 19 of 86
© 2018 PCTEST Engineering La	V 8 0 04/05/2018			



	pectrum Analyze									
LXU RL	RF	50 Ω AC	CORREC PNO: Fast		#Avg Typ	e: RMS	TRAC	Apr 30, 2018 E 1 2 3 4 5 6 E A N N N N N	Frec	uency
10 dB/div	Ref 10.	00 dBm	IFGain:Low	#Atten: 3		MI	kr1 7.30		A	uto Tune
0.00										nter Freq 00000 GHz
-10.0						. 1		DL1 -13.00 dBm		Start Fred 00000 GHz
-30.0							and the state of t	ly profile to a life of the second second		Stop Fred 00000 GH:
-50.0									900.0 <u>Auto</u>	CF Stej 00000 MH Mai
-70.0									Fr	e <b>q Offse</b> 0 H
-80.0										cale Type
Start 1.0 #Res BW	00 GHz / 1.0 MHz		#VE	3W 3.0 MHz	s	weep 1	Stop 10 5.60 ms (1	000 9112	Log	Lir
MSG						STATU	s			





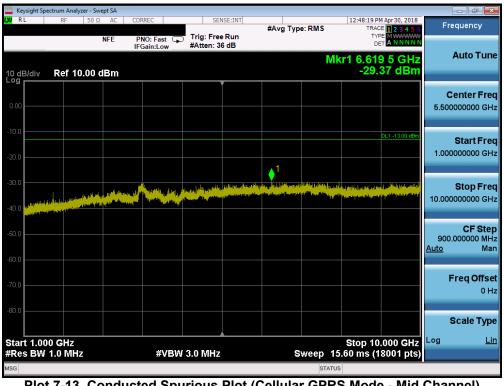
Plot 7-11. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 26	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 20 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



	ectrum Analyzer -			1				
X/RL	RF 5	0Ω AC NFE	CORREC	Trig: Free Run	#Avg Type	RMS	12:47:18 PM Apr 30, 2018 TRACE 1 2 3 4 5 TYPE MWWWW DET A N N N N	Frequency
10 dB/div	Ref 20.0	0 dBm	IFGain:Low	Atten: 30 dB		Μ	kr1 866.85 MHz -51.41 dBm	Auto Tun
10.0								Center Fre 924.500000 MH
10.00							DL1 -13.00 dBm	Start Fre 849.000000 MH
-20.0								<b>Stop Fre</b> 1.000000000 GH
40.0	<b>♦</b> <sup>1</sup>							<b>CF S</b> te 15.100000 M⊢ <u>Auto</u> Ma
60.0	() an a faire an a faire an		and and an interview.	hatelik olen de eksemen en e	tir de site de la segui de la segui de la segui	<u>ىلەر بار بار بار بار بار بار بار بار بار با</u>	n of shall be at a section is specific the second	Freq Offse 0 H
r0.0								Scale Typ
	900 GHz 100 kHz		#VBW	300 kHz	s	weep 7	Stop 1.00000 GHz .248 ms (3021 pts)	Log <u>Li</u>
ISG						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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 01 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	rtable Handset		Page 21 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



	ectrum Analy									
LX/RL	RF	50 Ω AC	CORREC	SEI	NSE:INT	#Avg Typ	e: RMS		M Apr 30, 2018	Frequency
		NFE	PNO: Fast	Trig: Free Atten: 30				TY		
			IFGain:Low	Atten. 30	ub .			lkr1 537.		Auto Tun
10 dB/div	Pef 20	.00 dBm						-46.	52 dBm	
					1					
										Center Fre
10.0										427.000000 MH
0.00										Start Fre
-10.0										30.000000 MH
-10.0									DL1 -13.00 dBm	
-20.0										Otop Ero
										Stop Fre 824.000000 MH
-30.0										824.000000 Wilh
										05.014
-40.0						1				CF Ste 79.400000 MH
						•				<u>Auto</u> Ma
-50.0				a	Line (aliane Area)	tillantin activat		h	and a state	
Prostal.	a koogh allough	Stanlard of All and gall		angen ster en de ster ster ster ster ster ster ster ste	a man pakata kata kata	e na ana ara-delara. Na ana ara-delara	reladia and aired	, fo detect of the most in		Freq Offse
-60.0 <b>dom.ab</b>										0 Н
-70.0										
10.0										Scale Typ
Start 30.0 #Res BW			#\/D\/	V 300 kHz				8 Stop 8.11 ms (1	24.0 MHz	Log <u>Li</u>
	100 KH2		#VDV	7 300 KHZ		3			3881 pts)	
MSG							STATU	15		

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset	Page 22 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



	ectrum Analyze								
X/RL	RF	50 Ω AC	CORREC	SENSE:IN	#Avg Typ	e: RMS	12:57:42 PM Ap TRACE	2 3 4 5 6	Frequency
		NFE	PNO: Fast ↔ IFGain:Low	Trig: Free Run #Atten: 36 dB			TYPE		
10 dB/div Log	Ref 10.0	00 dBm				Mk	r1 7.503 ( -28.60	5 GHz ) dBm	Auto Tune
0.00									Center Freq 5.500000000 GHz
-10.0						▲1	DL1	-13.00 dBm	Start Fred 1.000000000 GHz
-30.0		an taga an ta		Wingstfangessongfabel Abergstfangestere	ng thế phi Ng thế ng transmistration (thể ng transmistration ng thế ng được ng thế ng transmistration ng thế ng transmistration (thể ng transmistration)		<sup>an</sup> (an a <sup>b</sup> haile lean gun a bhaile an Mag ailtean ta coiltean ach bhain		Stop Fred 10.000000000 GHz
-50.0									CF Step 900.000000 MH: <u>Auto</u> Mar
70.0									Freq Offse 0 Hi
-80.0									Scale Type
Start 1.00 #Res BW	00 GHz 1.0 MHz		#VBW	3.0 MHz	s	weep 15	Stop 10.00 60 ms (180.	JO GIIZ	Log <u>Lin</u>
MSG						STATUS			

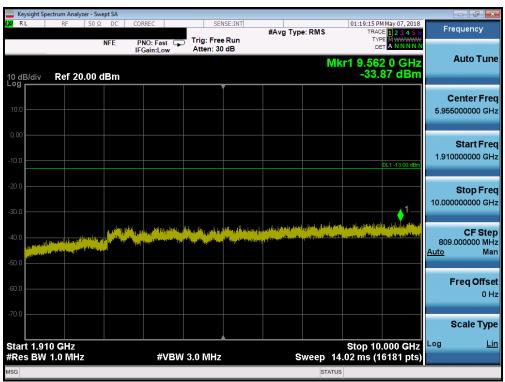
Plot 7-16. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 23 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



🔤 Keysight Spectrum Anal						
XIRL RF	50 Ω DC NFE	PNO: Fast	SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	01:18:57 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET A N N N N N	Frequency
10 dB/div Ref 2	0.00 dBm	IFGain:Low	Atten: 30 dB	N	lkr1 1.650 5 GHz -41.21 dBm	Auto Tune
10.0						Center Fred 937.500000 MH:
-10.0					DL1 -13.00 dBm	Start Free 30.000000 MH
-20.0						<b>Stop Fre</b> 1.845000000 GH
-40.0		فيطف يعضين إصعبهم التلاء	higunan hills a hills and the shirt of the same	ulgangan pering de dani de di bergener	1 Seymen Maily and Addition of the	CF Step 181.50000 MH <u>Auto</u> Ma
-60.0						<b>Freq Offse</b> 0 H
-70.0						Scale Type
Start 0.0300 GHz #Res BW 1.0 MH		#VBW	3.0 MHz	Sweep	Stop 1.8450 GHz 2.420 ms (3631 pts)	Log <u>Lir</u>
MSG				STAT	US	

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



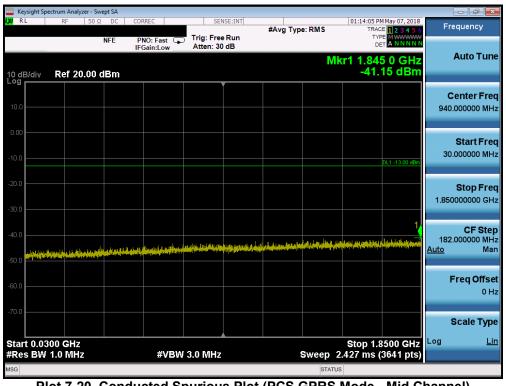
#### Plot 7-18. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 24 of 86
© 2018 PCTEST Engineering La	V 8 0 04/05/2018			



	ectrum Analyz							
LXI RL	RF	50 Ω DC	CORREC	SENSE:I	#Avg Typ	e: RMS	01:19:40 PM May 07, 2018 TRACE 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast G	Trig: Free Ru Atten: 20 dB			TYPE M WWWWW DET A N N N N N	
			IFGain:Low	Atten. 20 ub		ML	(r1 18.892 5 GHz	Auto Tune
10 dB/div	Ref 10	.00 dBm					-38.21 dBm	
								Center Freq
0.00								15.00000000 GHz
-10.0								
-10.0							DL1 -13.00 dBm	Start Freq
-20.0								10.00000000 GHz
-30.0								Stop Freq
							↓ ♦ <sup>1</sup>	20.000000000 GHz
-40.0				n and and a state of the		البرامر للأستدار	ante a la familia de la compañía de la compañía de la compañía	
1		a set the set of the s	and the state of the second second	- Anne - Anne - Anne	na geranggaran gerangga Pigen ina. Ining kanalaka di sa di sa salama	and the second	Long a Manager and a start of the	CF Step
-50.0		de la principal	in a surger surger and the state of the stat					1.000000000 GHz
-60.0								<u>Auto</u> Man
-60.0								
-70.0								Freq Offset
								0 Hz
-80.0								
								Scale Type
Start 10.0	INN GHZ						Stop 20.000 GHz	Log <u>Lin</u>
#Res BW			#VBV	V 3.0 MHz	8	weep	17.33 ms (20001 pts)	
MSG						STAT		

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



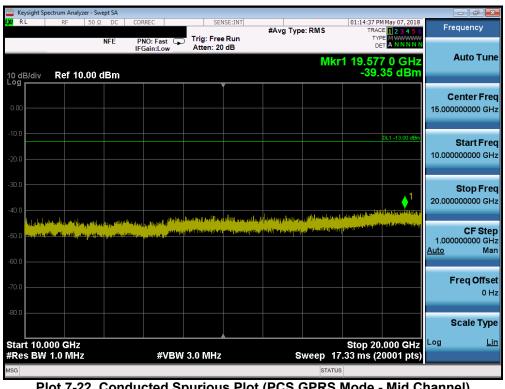
Plot 7-20. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 25 of 86	
1M1804200078-02.ZNF	4/24 - 5/9/2018				
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



	ectrum Analyz										j X
LXI RL	RF	50 Ω DC	CORREC	SEI	NSE:INT	#Avg Typ	e: RMS		M May 07, 2018	Frequen	су
		NFE	PNO: Fast G	Trig: Free Atten: 30		• 71		TY	PE MWWWWW ET A NNNNN		
			IFGain:Low	Atten. 50	Jub		M	kr1 0 74	8 0 GHz	Auto	Tune
10 dB/div	Ref 20	.00 dBm					141	-33.	15 dBm		
					1						
										Cente	
10.0										5.95500000	00 GHz
0.00											
0.00										Star	t Freq
-10.0									DL1 -13.00 dBm	1.9100000	00 GHz
									DL1 -13.00 dBm		
-20.0										Stor	Freq
									4	10.00000000	
-30.0									<u>├</u>		
		1. Martin	Maria States	ومعر والجريدان	del partitiones	and shink a state	Were held a sparter	المحاصي المراوية الل	the the particular of the second s	CF	Step
-40.0	and in the state of the state o	AND A REAL PROPERTY OF A DESCRIPTION OF	A	and the second s	A state of the second second	الشيرينية الشيري <u>الشرق.</u> ا	مى يمالية. المراجعين	المراجع <sub>و ا</sub> که		809.0000	о мнz
-50.0	ألغر ومراد والتقوان									<u>Auto</u>	Man
-30.0											
-60.0										Freq	
											0 Hz
-70.0											
										Scale	Туре
Start 1.91	0 GHz							Stop 10	.000 GHz	Log	Lin
#Res BW			#VBV	/ 3.0 MHz		S	weep 1	4.02 ms (1	6181 pts)		
MSG							STATU	JS			

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



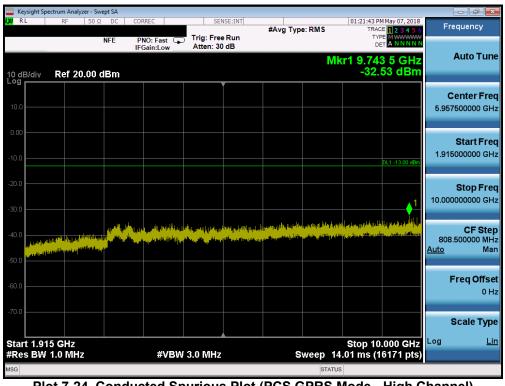
Plot 7-22. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:			Page 26 of 86	
1M1804200078-02.ZNF	4/24 - 5/9/2018				
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



Keysight Spectrum Anal									- ē 🛃
KARL RF	50 Ω DC	CORREC	SEN	SE:INT	#Avg Typ	e: RMS	01:21:30 P	M May 07, 2018	Frequency
	NFE	PNO: Fast IFGain:Low	Trig: Free Atten: 30		• ,,		TY		
		IFGain:Low	Atten: 00	ab		м	kr1 1 52	8 5 GHz	Auto Tun
10 dB/div Ref 2	0.00 dBm						-41.	40 dBm	
			Ĭ						
10.0									Center Fre 940.000000 MH
10.0									940.000000 MIH
0.00									
									Start Fre 30.000000 MH
-10.0								DL1 -13.00 dBm	30.000000 MIH
-20.0									
-20.0									Stop Fre 1.85000000 GH
-30.0									1.85000000 GH
							<b>1</b>		CF Ste
-40.0			1. I.I.			a kasuna den ada	all the address and adjust	an initiality , the site	182.000000 MH
-50.0	and the state of the state of the	paying all here a leader the				and a state of the	in a subscription of a set.		<u>Auto</u> Ma
-50.0									
-60.0									FreqOffse
									0 H
-70.0									Coole Tree
									Scale Typ
Start 0.0300 GHz							Stop 1.	5000 GHZ	Log <u>Li</u>
#Res BW 1.0 MH	Z	#VBW	3.0 MHz					(3641 pts)	
MSG						STATU	IS		

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 27 of 86	
1M1804200078-02.ZNF	4/24 - 5/9/2018				
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



	pectrum Analyzer	- Swept SA					- 5 💌
XI RL	RF 5	NFE	CORREC	SENSE:INT	#Avg Type: RMS	01:22:00 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A N N N N N	Frequency
10 dB/div	Ref 10.0		IFGain:Low	Atten: 20 dB	Mk	r1 19.489 5 GHz -37.93 dBm	Auto Tuno
0.00							Center Fre 15.000000000 GH
20.0						DL1 -13.00 dBm	<b>Start Fre</b> 10.000000000 GH
40.0	de ato a co			. 1.เปลี่ยี่ไหน มาเป็นสีอง (แมวง (เปม)	ny territoristikan pakan pakan pakatan ter	1	<b>Stop Fre</b> 20.000000000 GH
50.0 <b></b>	an an in the second	i far yn yn yn yn ddar ar ffel		in yang dikaning pada sang bang pada sang bang bang bang bang bang bang bang b	ngen egypte annen en	n an a de la constante de la co La constante de la constante de	<b>CF Ste</b> 1.000000000 G⊢ <u>Auto</u> Ma
70.0							Freq Offso 0 ⊦
	000 GHz 1.0 MHz		#)(B)	/ 3.0 MHz	Swoon-4	Stop 20.000 GHz 7.33 ms (20001 pts)	Scale Typ
SG SG	T.O WINZ		#VDV	- 5.0 WHZ	Sweep		

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

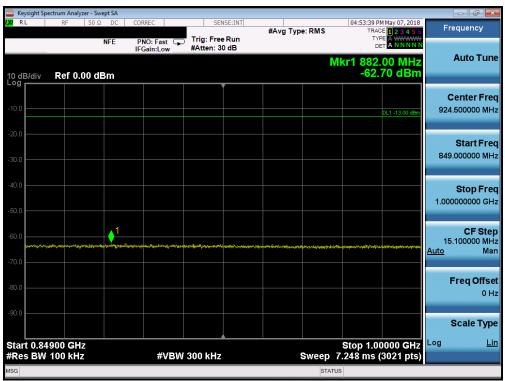
FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 28 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



# Cellular WCDMA Mode

	ectrum Analyzer - Swept SA					
URL	RF 50 Ω DC	PNO: Fast	SENSE:INT Trig: Free Run #Atten: 30 dB	#Avg Type: RMS	04:53:31 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
0 dB/div	Ref 0.00 dBm	IFGain:Low	#Atten: 30 dB	N	lkr1 822.80 MHz -31.34 dBm	Auto Tun
10.0					DL1 -13.00 dBm	Center Fre 426.500000 MH
30.0					1	Start Fre 30.000000 MH
40.0 50.0						Stop Fre 823.000000 M⊦
70.0				ne a fra a paga se a di se constigna di para ta para data para gang seja.	ng an ang pangang mang ming ting ting pang mang pang mang pang mang pang pang pang pang pang pang pang p	CF Ste 79.300000 M⊦ <u>Auto</u> Ma
80.0						Freq Offs 0 F
90.0						Scale Typ
Start 30.0 ≉Res BW		#VBW	300 kHz	Sweep 3	Stop 823.0 MHz 8.06 ms (15861 pts)	Log <u>L</u> i
SG				STATU	JS	

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



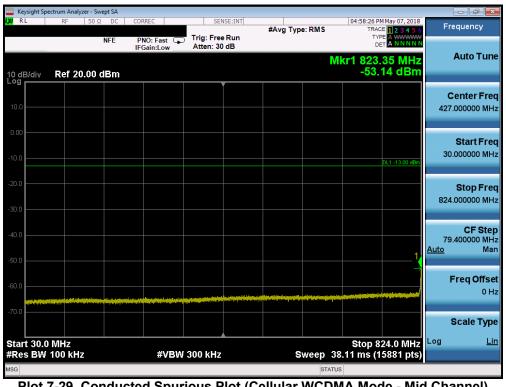
Plot 7-27. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 26	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 29 of 86	
© 2018 PCTEST Engineering La	V 8 0 04/05/2018				



	ectrum Analyze									- F
L <mark>XI</mark> RL	RF	50 Ω DC	CORREC	SEN	ISE:INT	#Avg Typ	e RMS		M May 07, 2018	Frequency
		NFE	PNO: Fast G	Trig: Free #Atten: 3				TY		
10 dB/div Log	Ref 10.	.00 dBm					MI	kr1 9.73 -40.	4 5 GHz 84 dBm	Auto Tur
0.00										Center Fre 5.500000000 GH
-10.0									DL1 -13.00 dBm	<b>Start Fre</b> 1.000000000 GH
-30.0							ىنلەر يۈم بەر	s Dist, or decry <sup>th</sup> it.	1	<b>Stop Fre</b> 10.000000000 GH
-50.0								a ( <sup>14</sup> 1) <sub>a an</sub> stal <sub>lare</sub> fran	a filen skan stall film	CF Ste 900.000000 Mł <u>Auto</u> Ma
-70.0										Freq Offs 0 F
-80.0								Stop 44		Scale Typ
start 1.00 #Res BW			#VBI	W 3.0 MHz		s	weep 1:	5.60 ms (1	.000 GHz 18001 pts)	
MSG							STATU	S		

Plot 7-28. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

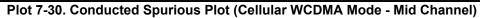


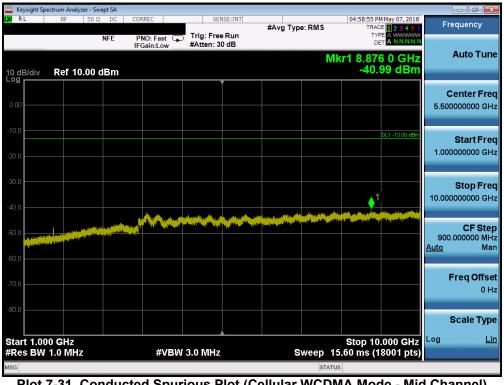
Plot 7-29. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 30 of 86
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018



	ectrum Analyzer -									
L <mark>XI</mark> RL	RF 5	0Ω DC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		MMay 07, 2018	Frequency
		NFE	PNO: Fast 🖵	Trig: Free Atten: 30		• 71		TYP		
			IFGain:Low	Atten: 30	ub		M	lkr1 849.	95 MHz	Auto Tune
10 dB/div	Ref 20.0	0 dBm						-52.	26 dBm	
				,						
										Center Freq
10.0										924.500000 MHz
0.00										
0.00										Start Freq
-10.0									DL1 -13.00 dBm	849.00000 MHz
									DE1 -15.00 dBm	
-20.0										Stop Freq
										1.00000000 GHz
-30.0										
										CF Step
-40.0										15.100000 MHz
-50.0										<u>Auto</u> Man
i i i i i i i i i i i i i i i i i i i										
-60.0										Freq Offset
-	ani tala si ga anga saga saga saga saga saga saga s	antiger an produce a partie	waren of the strength of the state of the st	uteringer hiederson	enter and a second			hels/mpfwherewerners	ang dalaphistra pangalania	0 Hz
-70.0										
										Scale Type
Start 0.84	900 GHz							Stop 1.00	0000 GHz	Log <u>Lin</u>
#Res BW			#VBW	300 kHz			Sweep	7.248 ms (	3021 pts)	
MSG							STATU	s		





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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 31 of 86
© 2018 PCTEST Engineering Lal	poratory, Inc.			V 8.0 04/05/2018



	Spectrum Analyze							
L <mark>X/</mark> RL	RF	50 Ω DC	CORREC	SENSE:INT	#Avg Type:	RMS	04:54:39 PM May 07, 2018 TRACE 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast 🕞 IFGain:Low	Trig: Free Run Atten: 30 dB			DET A NNNN	
						Mki	1 813.00 MHz	Auto Tune
10 dB/div Log	Ref 20.0	00 dBm					-62.27 dBm	
								Center Freq
10.0								427.000000 MHz
0.00								
								Start Freq
-10.0							DL1 -13.00 dBm	30.000000 MHz
-20.0								
20.0								Stop Freq 824.000000 MHz
-30.0								024.000000 11112
-40.0								CF Step
-40.0								79.400000 MHz <u>Auto</u> Man
-50.0								
							1	Freq Offset
-60.0	and the second	Line and the second	and a start of the s					0 Hz
-70.0	in the design of the flat back of the		a phone of the second secon					
								Scale Type
Start 30							Stop 824.0 MHz	Log <u>Lin</u>
	V 100 kHz		#VBW	300 kHz	Sw		1 ms (15881 pts)	
MSG						STATUS		



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 32 of 86
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018



	ectrum Analyzer - Swept SA					
<mark>x</mark> RL Marker 1	RF 50 Ω DC 9.80100000000 NFE	PNO: Fast 😱	SENSE:INT	#Avg Type: RMS	04:57:45 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Peak Search
10 dB/div	Ref 10.00 dBm	IFGain:Low	#Atten: 30 dB		Mkr1 9.801 0 GHz -42.02 dBm	Next Peal
0.00						Next Pk Righ
20.0					DL1 -13.00 dBm	Next Pk Lei
40.0						Marker Delt
50.0	and many in the second s					Mkr→C
70.0						Mkr→RefL
30.0					Stop 10.000 GHz	Mor 1 of
Res BW	1.0 MHz	#VBW	3.0 MHz		15.60 ms (18001 pts)	

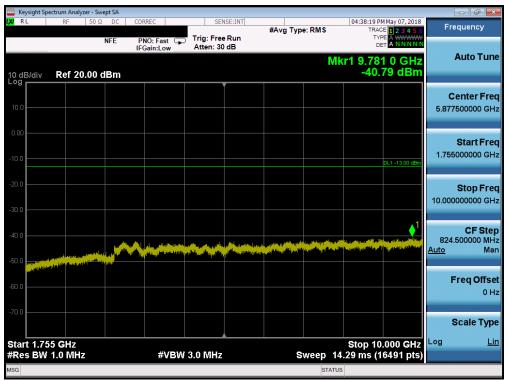
Plot 7-34. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 33 of 86
© 2018 PCTEST Engineering La	aboratory, Inc.	•		V 8.0 04/05/2018



Keysight Spectrum Analyz						
RL RF	NFE F	RREC NO: Fast	SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	04:38:12 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
0 dB/div Ref 20	.00 dBm			М	kr1 1.705 0 GHz -35.05 dBm	Auto Tur
10.0						Center Fre 867.500000 MH
10.0					DL1 -13.00 dBm	Start Fre 30.000000 Mi
20.0					1,	<b>Stop Fr</b> 1.705000000 Gi
0.0						CF Sto 167.500000 M <u>Auto</u> M
50.0	Marina Angangan Angan Albanya ang ang ang ang ang ang ang ang ang an	de angles of down of the state	<u>, , , , , , , , , , , , , , , , , , , </u>	ykanga ng kang ng kang Ng kang ng kang	**************************************	Freq Offs
70.0						Scale Ty
tart 0.0300 GHz Res BW 1.0 MHz		#VBW 3	8.0 MHz	Sweep	Stop 1.7050 GHz 2.233 ms (3351 pts)	Log <u>l</u>
6G				STATU	JS	

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 34 of 86
© 2018 PCTEST Engineering La	horatory Inc			V 8 0 04/05/2018



		zer - Swept SA								
LX/RL	RF	50 Ω DC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS	04:38:29 PI TRAC	MMay 07, 2018	Frequency
		NFE	PNO: Fast G	Trig: Free Atten: 20		• ,1		TYF		
10 dB/div Log	Ref 10	.00 dBm					M	kr1 18.89 -45.	1 5 GHz 69 dBm	Auto Tune
0.00										Center Freq 15.000000000 GHz
-10.0									DL1 -13.00 dBm	Start Fred 10.000000000 GHz
-30.0									1	Stop Freq 20.000000000 GHz
-50.0		i sani i ruga nagagi saniri Yangini inga ngagagi saniri	i firsten og gesster og som for skaleter Militære og som skaleter for skaleter Militære og som skaleter for skaleter	Annon Interdentian Manager Interdentian Manager Interdentian	litilite et traver d'appe	strychist Adverte Printette D'rygels Sytter Patrice	i general a l'an a d'a	salaj dis diamandria di Gylenia Della Contace di	r bene <sup>fra</sup> gene fra Livere Dene oppj. 1993 – Konstan Livere Dene oppj. 1993 – Konstan Liver, som opp	CF Step 1.00000000 GH: <u>Auto</u> Mar
-70.0										Freq Offse 0 H;
-80.0										Scale Type
Start 10.0 #Res BW	000 GHz 1.0 MHz	2	#VBV	V 3.0 MHz		s	weep	Stop 20 17.33 ms (2	.000 0112	Log <u>Lin</u>
MSG							STAT	rus		

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



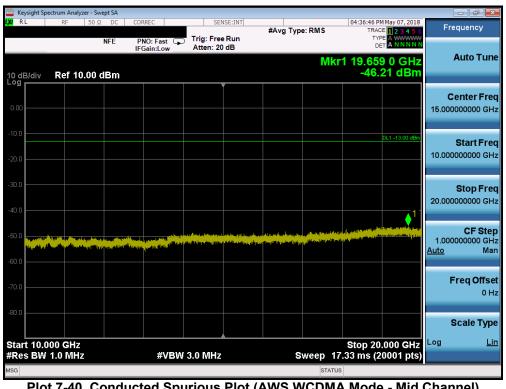
Plot 7-38. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 35 of 86	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset			
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



	ectrum Analyze	er - Swept SA							
XV RL	RF	50 Ω DC	PNO: Fast	Trig: Free Run	#Avg Type	e: RMS	04:36:37 PM M TRACE TYPE	ay 07, 2018 2 3 4 5 6 A NNNNN	Frequency
10 dB/div Log	Ref 20.	00 dBm	IFGain:Low	Atten: 30 dB		N	lkr1 9.728		Auto Tune
10.0									Center Fred 5.877500000 GHz
-10.0							DL	1 -13.00 dBm	Start Fred 1.755000000 GH:
-20.0									<b>Stop Fred</b> 10.000000000 GH;
-40.0	to and the bir of the bir			an a	and a second		tin kong ti dan se ti dalah se seti dalah se		<b>CF Step</b> 824.500000 MH: <u>Auto</u> Mar
-60.0									Freq Offse 0 H
-70.0 Start 1.75	5 GHz						Stop 10.0	00 GH7	Scale Type
#Res BW	1.0 MHz		#VBW	3.0 MHz	S	weep	14.29 ms (164		
MSG						STAT	US		

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 36 of 86	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset			
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



	ectrum Analyzer -									(	
L <mark>XI</mark> RL	RF 5	0Ω DC	CORREC			#Avg Typ	e: RMS	TRAC	M May 07, 2018	Fre	quency
		NFE	PNO: Fast G	Atten: 30							Auto Tune
10 dB/div Log	Ref 20.0	0 dBm					M	kr1 1.70 -50.	1 0 GHz 80 dBm		
											enter Freq
10.0										870.	000000 MHz
0.00											Start Freq
-10.0									DL1 -13.00 dBm	30.	000000 MHz
-20.0											Stop Freq
-30.0										1.710	000000 GHz
-40.0										168	CF Step
-50.0									1	<u>Auto</u>	Man
-60.0	an a	errefer tel alf alf for		مانيوريه به و القريد و دواري و ور	******	ner internet and an and a state of the	<sup>ي</sup> ر يلمد ڪرين پر جو ڪري	and the second secon		F	req Offset
											0 Hz
-70.0										5	Scale Type
Start 0.03 #Res BW			#\/P\	V 3.0 MHz			Sween -	Stop 1.7	7100 GHz (3361 pts)	Log	Lin
MSG			#VD1	9 <b>3.</b> 0 MH2			STATU		ooon pis)		

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



Plot 7-42. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 37 of 86
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 37 01 00
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



	pectrum Analyzer	- Swept SA					
LXU RL	RF	50 Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	04:40:14 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div	Ref 10.0	00 dBm	IFGain:Low	#Atten: 30 dB	MI	r1 18.920 0 GHz -36.49 dBm	Auto Tune
0.00							Center Fred 15.00000000 GHz
-10.0						DL1 -13.00 dBm	Start Free 10.000000000 GH:
-30.0		and the second second	All generating the second s	ternetten ut title bei gefähren under			Stop Free 20.000000000 GH
-50.0		Alder a ser parties and					CF Step 1.000000000 GH <u>Auto</u> Mar
70.0							Freq Offse 0 H
-80.0 Start 10.0						310p 20.000 GHZ	Scale Type
#Res BW	1.0 MHz		#VBW	3.0 MHz	Sweep 1	17.33 ms (20001 pts)	

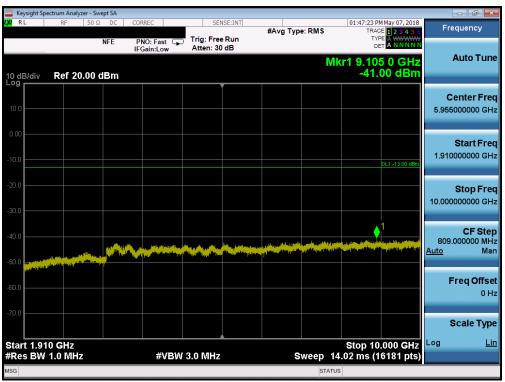
Plot 7-43. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 38 of 86
© 2018 PCTEST Engineering La	aboratory, Inc.	•		V 8.0 04/05/2018



	jht Spectrum /										- 6
RL	RF		DC NFE	CORREC PNO: Fast IFGain:Low		SENSE:INT	#Avg Type:	RMS	TYPE	ay 07, 2018 <b>1 2 3 4 5 6</b> A WWWWW A N N N N	Frequency
I0 dB/c	liv Ref	f 20.00 c	IBm	IFGain:Low	<u>/                                     </u>	.en. 30 ab		Mk	(r1 1.845 -33.88	0 GHz 8 dBm	Auto Tun
10.0											<b>Center Fre</b> 937.500000 MH
0.00									DL	1 -13.00 dBm	Start Fre 30.000000 M⊦
20.0 — 30.0 —										1	Stop Fre 1.845000000 GF
40.0											<b>CF Ste</b> 181.500000 MH <u>Auto</u> Ma
50.0	al maan tigtel a meeting op of	لىكە <u>تۇرىيىل بو</u> موتۇرىد	maryn y malaida			en Paris Association and a	9417)h 49414 (1974)	a da	444-94-94-94-94-94-94-94-94-94-94-94-94-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Freq Offs 0 ⊦
70.0											Scale Typ
	0.0300 G BW 1.0 N			#V	BW 3.0	MHz	s	weep 2	Stop 1.84 420 ms (36		Log <u>L</u>
SG								STATUS	5		

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 39 of 86
© 2018 PCTEST Engineering La	boratory Inc			V 8 0 04/05/2018



	ectrum Analyze									
L <mark>XI</mark> RL	RF	50 Ω DC	CORREC	SEN	SE:INT	#Avg Typ	e: RMS		M May 07, 2018	Frequency
		NFE	PNO: Fast	Trig: Free Atten: 20		•		TY		
			II Gain.cow				M	kr1 19.38	2 0 GHz	Auto Tune
10 dB/div	Ref 10.	00 dBm						-45.	96 dBm	
										Center Freq
0.00										15.00000000 GHz
										10.000000000000
-10.0									DL1 -13.00 dBm	Otent From
										Start Freq 10.00000000 GHz
-20.0										10.0000000000000
-30.0										
										Stop Freq 20.00000000 GHz
-40.0										20.00000000000000
								. a unitabilit	a contraction of the party	CF Step
-50.0	and the second secon	and the property of the second		na produktivní kvezna produ Maria (Maria (Maria (Maria)	ليبة مرجوع المأكلة. أريالة مرجوع المأكلة	an an the art for a state of the state of th	Contraction of the local sector	and - A without Mintelli	والمعاطوية والمعاول	1.000000000 GHz
-60.0			and the second							<u>Auto</u> Man
-00.0										_
-70.0										Freq Offset 0 Hz
										0 Hz
-80.0										Scale Type
										Scale Type
Start 10.0	000 GHz		10.2					Stop 20	.000 0112	Log <u>Lin</u>
#Res BW	1.0 MHz		#VBW	3.0 MHz		S		17.33 ms (2	20001 pts)	
MSG							STAT	TUS		

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 40 of 86
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



	ght Spectrum Ar											
LXI RL	RF	50 Ω	DC O	ORREC	SE	NSE:INT	#Avg Typ	e: RMS		M May 07, 2018	Frequ	ency
		1	IFE	PNO: Fast 🖵	Trig: Fre				TY			
				FGain:Low	Atten: 30	) dB			_		Au	to Tune
	Dof	- 00 0C	Dime					IV	lkr1 9.72 -40	7 5 GHZ 83 dBm		
10 dB/c	alv Rei	20.00 d	-100			• · · · · ·		1				
											Cen	ter Freq
10.0											5.955000	0000 GHz
0.00											C+	art Freg
												0000 GHz
-10.0										DL1 -13.00 dBm	1.910000	0000 0112
-20.0												op Freq
-30.0											10.00000	0000 GHz
-30.0												
-40.0										<b>↓</b>	1	CF Step
			hand he	Station in the			and the part of the second sec	مرد الأخريبي الأخرى مسالك إنها الأجرار		in a second the post of the second	809.000 Auto	0000 MHz Man
-50.0	second of Million	And the local distribution of the local distribution of the local distribution of the local distribution of the									<u>/(uco</u>	man
1												
-60.0											ге	q Offset 0 Hz
												0112
-70.0												
											Sca	ale Type
Start_	1.910 GHz	z			·	· · · · · ·			Stop 10	.000 GHz	Log	<u>Lin</u>
	BW 1.0 M			#VBW	/ 3.0 MHz		s	weep 1	4.02 ms (1	6181 pts)		
MSG								STAT				

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 41 of 86
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



	ectrum Analyzer - Sw									
L <mark>XI</mark> RL	RF 50 Ω	DC (	PNO: Fast		#Avg Type	e: RMS	TRAC	M May 07, 2018 E 1 2 3 4 5 6 E A WWWWW A N N N N N	Fre	quency
10 dB/div Log	Ref 20.00 (		IFGain:Low	Atten: 30		M		5 5 GHz 65 dBm	,	Auto Tune
10.0										e <b>nter Freq</b> 000000 MHz
-10.0								DL1 -13.00 dBm		<b>Start Freq</b> 000000 MHz
-20.0										<b>Stop Freq</b> 000000 GHz
-40.0						ويعتود والمروا مرد مروا المراجع	and produced optime is strain and		182.0 <u>Auto</u>	CF Step 000000 MHz Man
-60.0	<sup>16</sup> 16) 1994 - 1995 - 1997 -								F	r <b>eq Offset</b> 0 Hz
Start 0.03 #Res BW			-#\/D\\/	3.0 MHz			Stop 1.8	3500 GHz	S Log	cale Type <u>Lin</u>
#Res BW			#VBW	3.0 MHZ		sweep 2		3641 pts)		

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 42 of 86
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018



	ectrum Analyze						- <b>6 -</b>
X/RL	RF	50 Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	01:49:55 PM May 07, 2018 TRACE 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast 😱 IFGain:Low	Trig: Free Run #Atten: 30 dB			
10 dB/div Log	Ref 10.	.00 dBm			MI	kr1 19.547 5 GHz -35.88 dBm	Auto Tune
0.00							Center Freq 15.000000000 GHz
-10.0						DL1 -13.00 dBm	Start Freq 10.000000000 GHz
-30.0			Telefore and the second se	na na Shifa La China a su a shifa su a shifa Ma fa shifa Shif	and any intervention of the set o	Area with an end such as for the second state of the second state	Stop Freq 20.000000000 GHz
-50.0							CF Step 1.000000000 GH: <u>Auto</u> Mar
-70.0							Freq Offse 0 Ha
-80.0						Stop 20.000 GHz	Scale Type
#Res BW			#VBW	3.0 MHz	Sweep	17.33 ms (20001 pts)	
MSG					STA	TUS	

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 43 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



## 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 $43 + \log_{10}(P_{[Watts]})$ , 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.

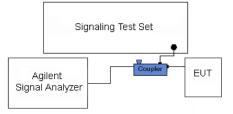


Figure 7-3. Test Instrument & Measurement Setup

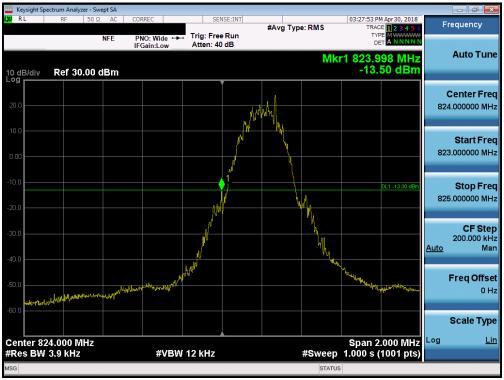
#### Test Notes

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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 44 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 44 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



# **Cellular GPRS Mode**



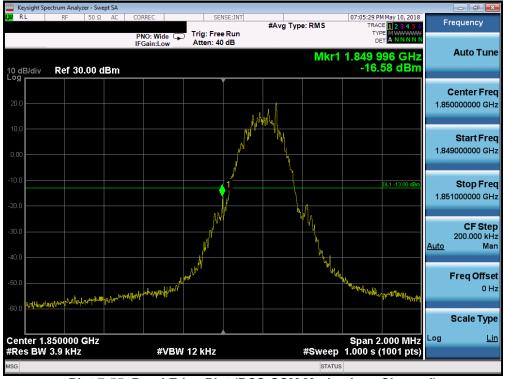
Plot 7-53. Band Edge Plot (Cellular GSM Mode - Low Channel)



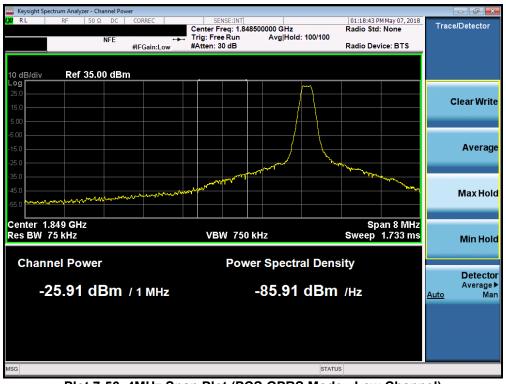
#### Plot 7-54. Band Edge Plot (Cellular GSM Mode - High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 45 of 86	





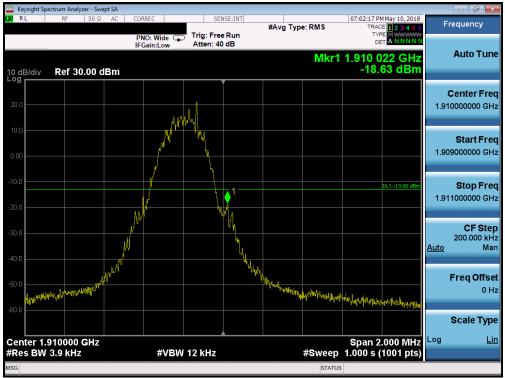
Plot 7-55. Band Edge Plot (PCS GSM Mode - Low Channel)



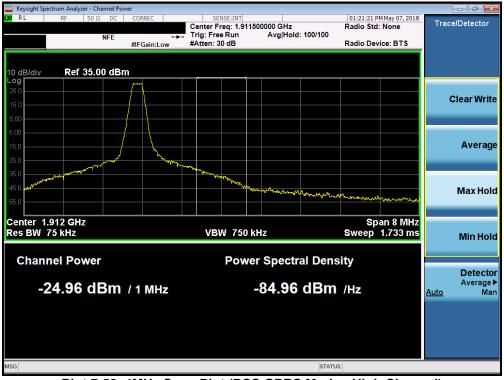
#### Plot 7-56. 4MHz Span Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 46 of 86	
© 2018 PCTEST Engineering La	V 8 0 04/05/2018				









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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 47 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



## Cellular WCDMA Mode



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



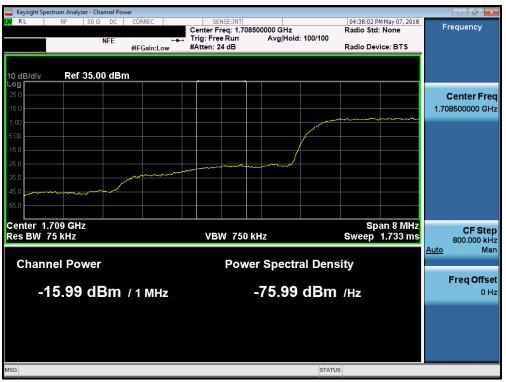
#### Plot 7-60. Band Edge Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 49 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 48 of 86	
© 2018 PCTEST Engineering La	V 8 0 04/05/2018				





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



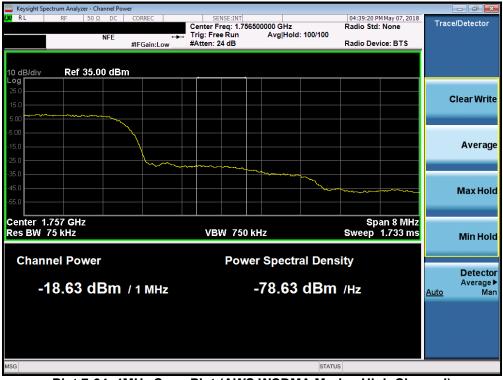
#### Plot 7-62. 4MHz Span Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 49 of 86
© 2018 PCTEST Engineering La	V 8 0 04/05/2018			



🔤 Keysight Sp	ectrum Analyzer - Swept SA	4				
L <mark>XU</mark> RL	RF 50 Ω DC	PNO: Wide 🗔	SENSE:INT	#Avg Type: RMS	04:39:11 PM May 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div	Ref 30.00 dBn	IFGain:Low	Atten: 40 dB	Mkr1	1.755 390 GHz -25.24 dBm	Auto Tune
20.0						Center Free 1.755000000 GH
0.00						<b>Start Fre</b> 1.747500000 GH
-10.0					DL1 -13.00 dBm	Stop Free 1.762500000 GH
30.0	~~~~~		<u> </u>			CF Ste 1.500000 M⊢ <u>Auto</u> Ma
.50.0					mont	Freq Offse 0 ⊦
	755000 GHz				Span 15.00 MHz	Scale Typ
#Res BW	100 kHz	#VBW	300 kHz	Sweep '	1.000 ms (1001 pts)	

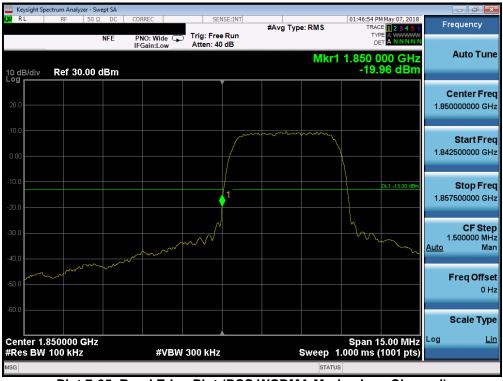
Plot 7-63. Band Edge Plot (AWS WCDMA Mode - High Channel)



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:	Dage 50 of 96			
1M1804200078-02.ZNF	M1804200078-02.ZNF 4/24 - 5/9/2018 Portable Handset		Page 50 of 86			
© 2018 PCTEST Engineering Laboratory, Inc. V 8.0 04/05/201						





Plot 7-65. Band Edge Plot (PCS WCDMA Mode - Low Channel)



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 51 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 51 of 86	
© 2018 PCTEST Engineering La	2018 PCTEST Engineering Laboratory Inc				



Mint 1.510.00 GH2         O dB/div       Ref 30.00 dBm       -18.11 dBm         Center Fre         100	Keysight Spee	ctrum Analyzer - Swept SA					
Incluin Low       Auto Turn         0 dB/div       Ref 30.00 dBm       -18.11 dBm         0 dB/div       Ref 30.00 dBm       -18.11 dBm         0 dB/div       Ref 30.00 dBm       -18.11 dBm         0 dB/div       Ref 30.00 dBm       -19.00000 GHz         10 0	X/RL		PNO: Wide	Trig: Free Run	#Avg Type: RMS	TRACE 1 2 3 4 5 6	Frequency
200 200 200 200 200 200 200 200	10 dB/div	Ref 30.00 dBm	IFGain:Low	Atten: 40 dB	Mkr	1 1.910 000 GHz	Auto Tune
Start Fre 1.902500000 GH 1.902500000 GH 1.917500000 GH CF Ste 1.500000 MH Auto Ma Scale Typ Center 1.910000 GHz #VBW 300 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	20.0						Center Fre 1.910000000 GH
200 200 200 400 500 500 500 500 500 500 5	0.00		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~			<b>Start Fre</b> 1.902500000 GH
Auto Ma 40.0 50.	-10.0			1		DL1 -13.00 dBm	<b>Stop Fre</b> 1.917500000 GH
50.0 50.0	30.0	~~~~		- Loon	un many		1.500000 MH
Center 1.910000 GHz Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	50.0						Freq Offse 0 H
Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	-60.0 Center 1.9	10000 GHz				Span 15.00 MHz	Scale Typ
			#VBW	300 kHz	-	1.000 ms (1001 pts)	

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



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 52 of 86
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



## 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.

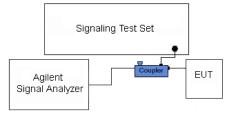


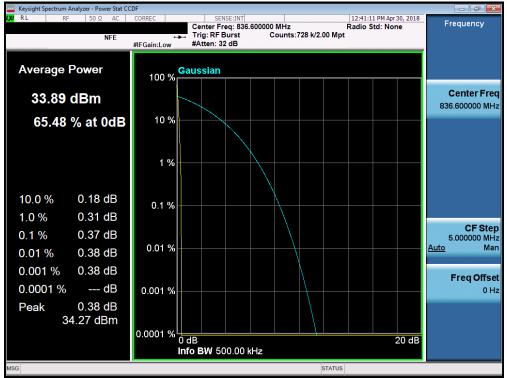
Figure 7-4. Test Instrument & Measurement Setup

#### Test Notes

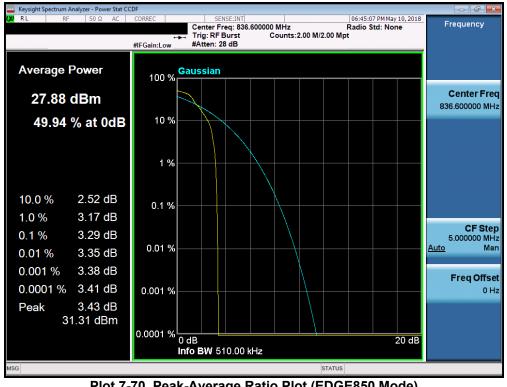
None

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 53 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





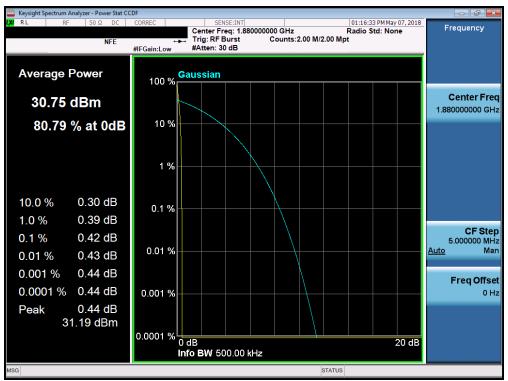




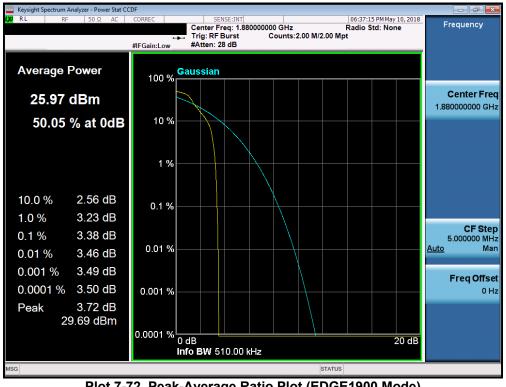
Plot 7-70. Peak-Average Ratio Plot (EDGE850 Mode)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 54 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 54 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				





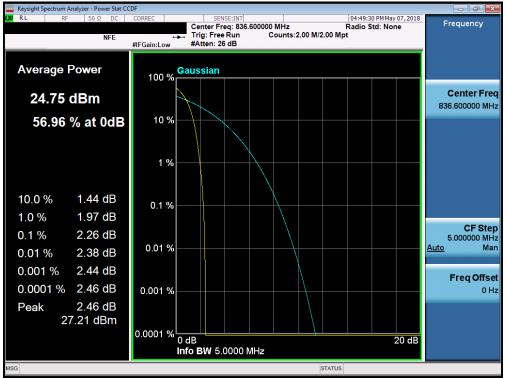




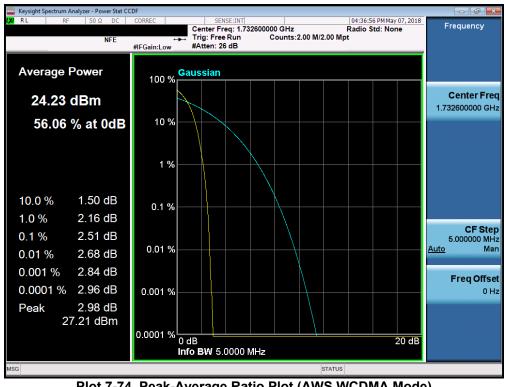
Plot 7-72. Peak-Average Ratio Plot (EDGE1900 Mode)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage FE of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 55 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





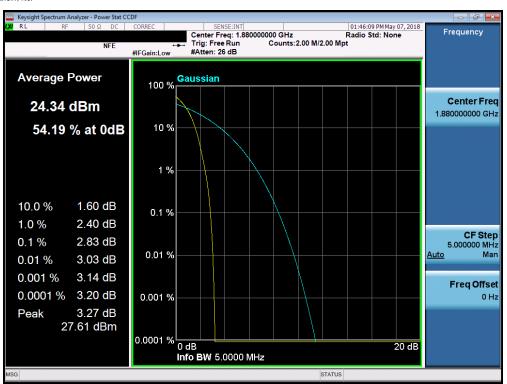




Plot 7-74. Peak-Average Ratio Plot (AWS WCDMA Mode)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage FC of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 56 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				





Plot 7-75. Peak-Average Ratio Plot (PCS WCDMA Mode)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage EZ of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 57 of 86	
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018	



## 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

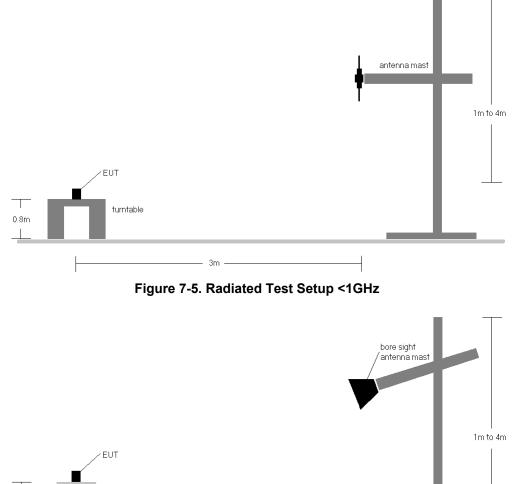
- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
- 2. RBW = 1 5% of the expected OBW, not 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

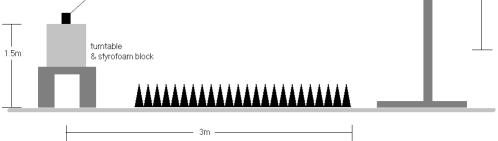
FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 59 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	9/2018 Portable Handset		Page 58 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				

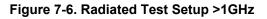


### Test Setup

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







FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 59 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



- 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) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC 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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 60 of 86
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Fage 00 01 00
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	н	150	3	29.35	1.50	28.70	0.741	38.45	-9.76	30.85	1.215	40.61	-9.76
836.60	GPRS850	Н	150	3	28.93	1.50	28.28	0.673	38.45	-10.17	30.43	1.105	40.61	-10.17
848.80	GPRS850	Н	150	3	29.38	1.50	28.73	0.747	38.45	-9.72	30.88	1.225	40.61	-9.72
848.80	GPRS850	V	150	351	28.04	1.50	27.39	0.548	38.45	-11.06	29.54	0.899	40.61	-11.07
848.80	EDGE850	Н	150	3	24.03	1.50	23.38	0.218	38.45	-15.07	25.53	0.358	40.61	-15.07

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 [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	н	150	358	20.56	1.50	19.91	0.098	38.45	-18.54	22.06	0.161	40.61	-18.55
836.60	WCDMA850	н	150	358	20.92	1.50	20.27	0.106	38.45	-18.18	22.42	0.175	40.61	-18.19
846.60	WCDMA850	н	150	356	21.36	1.50	20.71	0.118	38.45	-17.74	22.86	0.193	40.61	-17.75
846.60	WCDMA850	V	150	350	19.09	1.50	18.44	0.070	38.45	-20.01	20.59	0.115	40.61	-20.02

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	Н	150	16	18.53	5.55	24.08	0.256	30.00	-5.92
1732.60	WCDMA1700	Н	150	13	18.15	5.41	23.56	0.227	30.00	-6.44
1752.60	WCDMA1700	Н	150	16	18.00	5.27	23.27	0.212	30.00	-6.73
1712.40	WCDMA1700	V	150	289	17.27	5.55	22.82	0.191	30.00	-7.18

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	н	150	359	20.43	8.66	29.09	0.811	33.01	-3.92
1880.00	GPRS1900	Н	150	288	19.84	8.36	28.20	0.661	33.01	-4.81
1909.80	GPRS1900	Н	150	356	20.13	8.17	28.30	0.677	33.01	-4.71
1850.20	GPRS1900	V	150	237	17.05	8.66	25.72	0.373	33.01	-7.29
1850.20	EDGE1900	Н	150	359	15.88	8.66	24.55	0.285	33.01	-8.46

Table 7-5. EIRP (PCS GPRS)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:         Test Dates:           1M1804200078-02.ZNF         4/24 - 5/9/2018		EUT Type:		Dage 61 of 96	
		Portable Handset		Page 61 of 86	



Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	н	150	13	17.98	4.81	22.79	0.190	33.01	-10.22
1880.00	WCDMA1900	Н	150	16	17.05	4.74	21.79	0.151	33.01	-11.22
1907.60	WCDMA1900	н	150	16	16.28	4.68	20.96	0.125	33.01	-12.05
1852.40	WCDMA1900	V	150	262	16.03	4.81	20.84	0.121	33.01	-12.17

Table 7-6. EIRP (PCS WCDMA)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Dage 62 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 62 of 86	
© 2018 PCTEST Engineering La	2018 PCTEST Engineering Laboratory. Inc.				



## 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  $\geq$  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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Fest Report S/N: Test Dates: EUT Type:			Dage 62 of 96	
1M1804200078-02.ZNF 4/24 - 5/9/2018		Portable Handset		Page 63 of 86	
© 2018 PCTEST Engineering La	2018 PCTEST Engineering Laboratory, Inc.				



EUT turntable 8. styrofoam block 3m \_\_\_\_\_\_

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

Figure 7-7. Test Instrument & Measurement Setup

#### 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) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC 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.
- 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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dege 64 of 96
1M1804200078-02.ZNF 4/24 - 5/9/2018		Portable Handset		Page 64 of 86
© 2018 PCTEST Engineering La	boratory Inc	·		V 8 0 04/05/2018



OPERATING FREQUENCY:	824	4.20	MHz
CHANNEL:	1	28	_
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	111	27	-59.07	8.94	-50.13	-37.1
2472.60	Н	125	232	-59.97	9.64	-50.32	-37.3
3296.80	Н	-	-	-68.68	9.57	-59.11	-46.1
4121.00	Н	130	213	-70.17	10.17	-60.00	-47.0
4945.20	Н	-	-	-70.44	10.90	-59.53	-46.5

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

OPERATING FREQUENCY: CHANNEL: MODULATION SIGNAL:

DISTANCE:

836.60 190 GPRS (GMSK) 3 meters

MHz

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	110	23	-58.63	8.95	-49.68	-36.7
2509.80	Н	161	223	-59.38	9.75	-49.63	-36.6
3346.40	Н	-	-	-67.65	9.60	-58.04	-45.0
4183.00	Н	189	197	-70.45	10.35	-60.10	-47.1
5019.60	Н	-	-	-69.89	10.88	-59.01	-46.0

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N: Test Dates:		EUT Type:		Dege 65 of 96		
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 65 of 86		
© 2018 PCTEST Engineering La	2018 PCTEST Engineering Laboratory Inc.					



OPERATING FREQUENCY:	84	8.80	MHz
CHANNEL:		251	
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	357	16	-58.76	8.95	-49.80	-36.8
2546.40	Н	119	201	-60.27	9.74	-50.53	-37.5
3395.20	Н	-	-	-68.78	9.78	-59.00	-46.0
4244.00	Н	385	220	-71.63	10.58	-61.05	-48.1
5092.80	Н	-	-	-69.19	10.69	-58.50	-45.5

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 66 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 66 of 86
© 2018 PCTEST Engineering La	V 8 0 04/05/2018			



# Cellular WCDMA Mode

OPERATING FREQUENCY:	82	MHz	
CHANNEL:	4	_	
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	Н	112	217	-63.80	8.95	-54.85	-41.8
2479.20	Н	111	354	-65.97	9.67	-56.30	-43.3
3305.60	Н	-	-	-75.30	9.58	-65.71	-52.7

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

MHz	6.60	836	OPERATING FREQUENCY:
_	183	41	CHANNEL:
-	_	WCDMA	MODULATION SIGNAL:
	meters	3	DISTANCE:
	dBm	-13	LIMIT:

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	112	215	-62.08	8.95	-53.13	-40.1
2509.80	Н	170	351	-63.02	9.75	-53.27	-40.3
3346.40	Н	-	-	-74.39	9.60	-64.78	-51.8

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 67 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 67 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



OPERATING FREQUENCY:	846.60		MHz
CHANNEL:	2		
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]
1693.20	Н	110	218	-61.96	8.95	-53.01	-40.0
2539.80	Н	119	323	-64.06	9.74	-54.31	-41.3
3386.40	Н	-	-	-74.94	9.75	-65.19	-52.2

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 69 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	24 - 5/9/2018 Portable Handset		Page 68 of 86	
© 2018 PCTEST Engineering Laboratory. Inc.					



OPERATING FREQUENCY:	171	MHz	
CHANNEL:	1;	_	
MODULATION SIGNAL:	WCDMA	_	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

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]
:	3424.80	Н	335	212	-73.73	9.83	-63.90	-50.9
Į	5137.20	Н	109	316	-67.92	10.69	-57.23	-44.2
(	6849.60	Н	-	-	-70.74	11.64	-59.10	-46.1

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

OPERATING FREQUENCY:	17	32.60	MHz
CHANNEL:	1413		
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	109	130	-72.55	9.88	-62.68	-49.7
5197.80	Н	109	323	-67.34	10.76	-56.58	-43.6
6930.40	Н	-	-	-70.08	11.74	-58.34	-45.3

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 60 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 69 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



OPERATING FREQUENCY:	17	52.60	MHz
CHANNEL:	1		
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	391	217	-72.98	9.92	-63.06	-50.1
5257.80	Н	110	327	-68.78	10.72	-58.07	-45.1
7010.40	Н	-	-	-71.15	11.86	-59.29	-46.3

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dage 70 of 96		
1M1804200078-02.ZNF 4/24 - 5/9/2018		Portable Handset		Page 70 of 86		
© 2018 PCTEST Engineering Laboratory. Inc.						



OPERATING FREQUENCY:	185	MHz	
CHANNEL:	5	_	
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	Н	394	171	-65.93	9.58	-56.35	-43.3
5550.60	Н	110	230	-48.45	10.94	-37.51	-24.5
7400.80	Н	-	-	-66.36	10.96	-55.41	-42.4
9251.00	Н	112	33	-59.98	11.63	-48.35	-35.3
11101.20	Н	-	-	-65.98	12.74	-53.24	-40.2

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

**OPERATING FREQUENCY:** CHANNEL:

MODULATION SIGNAL

661 GPRS (GMSK) 3 meters

1880.00

MHz

DULATION SIGNAL	
DISTANCE	:

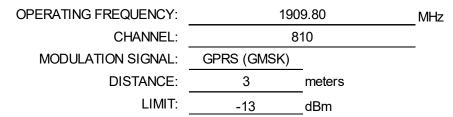
LIMIT: -13 dBm

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]
3760.00	Н	112	223	-64.31	9.37	-54.95	-41.9
5640.00	Н	111	180	-53.66	11.17	-42.49	-29.5
7520.00	Н	-	-	-65.77	11.11	-54.66	-41.7
9400.00	Н	110	40	-61.02	11.57	-49.45	-36.5
11280.00	Н	-	-	-63.63	12.72	-50.92	-37.9

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 71 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 71 of 86
© 2018 PCTEST Engineering La	horatory Inc			V 8 0 04/05/2018





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]
3819.60	Н	116	223	-65.94	9.30	-56.64	-43.6
5729.40	Н	110	175	-53.26	11.39	-41.87	-28.9
7639.20	Н	-	-	-65.17	11.33	-53.83	-40.8
9549.00	Н	122	171	-60.36	11.79	-48.57	-35.6
11458.80	Н	-	-	-63.05	12.82	-50.23	-37.2

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 72 of 96	
1M1804200078-02.ZNF 4/24 - 5/9/2018		Portable Handset		Page 72 of 86	
© 2018 PCTEST Engineering La	horatory Inc			V 8 0 04/05/2018	



OPERATING FREQUENCY:	1852.40		
CHANNEL:	9262		
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]	Antonna Gain	Spurious Emission Level [dBm]	Margin [dB]
3704.80	V	109	118	-70.42	9.57	-60.85	-47.8
5557.20	V	-	-	-70.95	10.95	-60.00	-47.0

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

OPERATING FREQUENCY:	1880.00		
CHANNEL:	9400		
MODULATION SIGNAL:	WCDMA		
DISTANCE:	3 meters		
LIMIT:	-13dBm		

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Antonna (Jain	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	110	111	-69.13	9.37	-59.77	-46.8
5640.00	V	-	-	-72.34	11.17	-61.17	-48.2

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 72 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 73 of 86
© 2018 PCTEST Engineering Laboratory, Inc.				



OPERATING FREQUENCY:	1907.60		
CHANNEL:	9538		
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]
3815.20	V	109	99	-68.52	9.30	-59.22	-46.2
5722.80	V	-	-	-71.00	11.37	-59.63	-46.6

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 74 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 74 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



#### **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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 75 of 96	
1M1804200078-02.ZNF	4/24 - 5/9/2018	018 Portable Handset		Page 75 of 86	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	4.30	VDC
<b>DEVIATION LIMIT:</b>	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	836,599,743	-257	-0.0000307
100 %		- 30	836,599,972	-28	-0.0000033
100 %		- 20	836,599,958	-42	-0.0000050
100 %		- 10	836,600,019	19	0.0000023
100 %		0	836,599,924	-76	-0.0000091
100 %		+ 10	836,600,336	336	0.0000402
100 %		+ 20	836,600,168	168	0.0000201
100 %		+ 30	836,600,065	65	0.0000078
100 %		+ 40	836,599,992	-8	-0.0000010
100 %		+ 50	836,599,994	-6	-0.0000007
BATT. ENDPOINT	3.40	+ 20	836,599,995	-5	-0.0000006

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 76 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 76 of 86
© 2018 PCTEST Engineering Laboratory. Inc.				



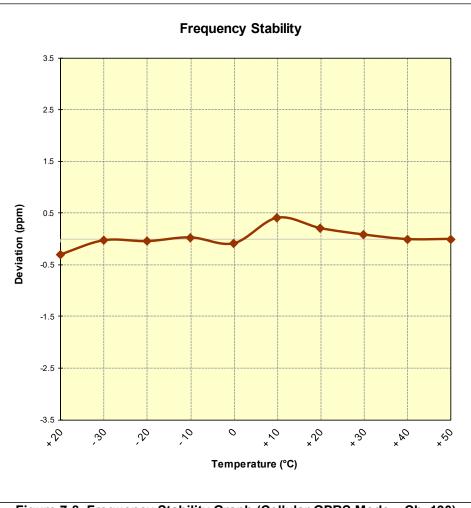


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 77 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 77 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.30	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	836,599,812	-188	-0.0000225
100 %		- 30	836,600,086	86	0.0000103
100 %		- 20	836,599,965	-35	-0.0000042
100 %		- 10	836,600,434	434	0.0000519
100 %		0	836,600,061	61	0.0000073
100 %		+ 10	836,599,789	-211	-0.0000252
100 %		+ 20	836,600,142	142	0.0000170
100 %		+ 30	836,599,898	-102	-0.0000122
100 %		+ 40	836,599,740	-260	-0.0000311
100 %		+ 50	836,599,903	-97	-0.0000116
BATT. ENDPOINT	3.40	+ 20	836,600,251	251	0.0000300

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 70 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 78 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



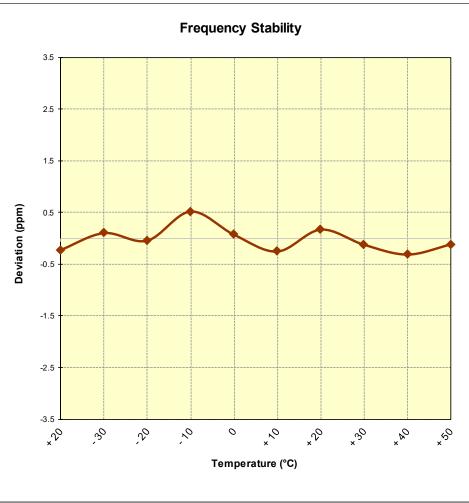


Figure 7-9. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 70 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 79 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	_
REFERENCE VOLTAGE:	4.30	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	1,732,599,878	-122	-0.0000070
100 %		- 30	1,732,600,172	172	0.0000099
100 %		- 20	1,732,599,746	-254	-0.0000147
100 %		- 10	1,732,599,907	-93	-0.0000054
100 %		0	1,732,599,978	-22	-0.0000013
100 %		+ 10	1,732,599,886	-114	-0.0000066
100 %		+ 20	1,732,600,047	47	0.0000027
100 %		+ 30	1,732,599,983	-17	-0.0000010
100 %		+ 40	1,732,600,017	17	0.0000010
100 %		+ 50	1,732,600,172	172	0.0000099
BATT. ENDPOINT	3.40	+ 20	1,732,599,783	-217	-0.0000125

 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.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 90 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 80 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



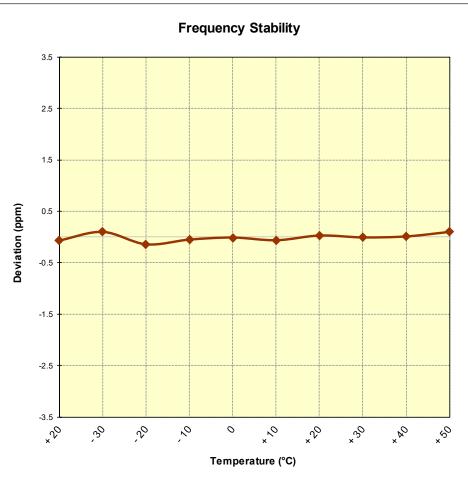


Figure 7-10. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 91 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 81 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.30	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	1,879,999,800	-200	-0.0000106
100 %		- 30	1,879,999,918	-82	-0.0000044
100 %		- 20	1,880,000,304	304	0.0000162
100 %		- 10	1,880,000,052	52	0.0000028
100 %		0	1,880,000,062	62	0.0000033
100 %		+ 10	1,879,999,966	-34	-0.0000018
100 %		+ 20	1,880,000,063	63	0.0000034
100 %		+ 30	1,879,999,957	-43	-0.0000023
100 %		+ 40	1,880,000,129	129	0.0000069
100 %		+ 50	1,880,000,070	70	0.0000037
BATT. ENDPOINT	3.40	+ 20	1,879,999,818	-182	-0.0000097

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 92 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 82 of 86
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



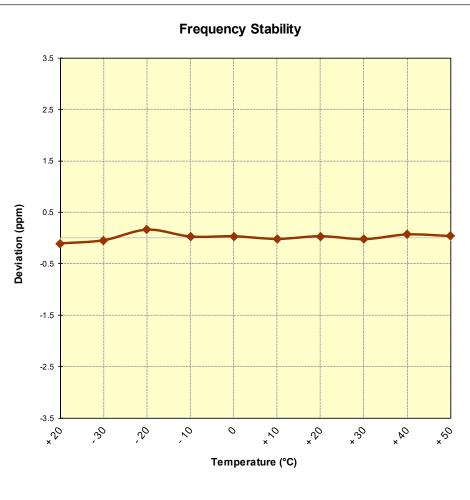


Figure 7-11. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 92 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 83 of 86
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018



OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.30	VDC
<b>DEVIATION LIMIT:</b>	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	1,879,999,776	-224	-0.0000119
100 %		- 30	1,880,000,012	12	0.0000006
100 %		- 20	1,879,999,942	-58	-0.0000031
100 %		- 10	1,879,999,695	-305	-0.0000162
100 %		0	1,879,999,873	-127	-0.000068
100 %		+ 10	1,879,999,655	-345	-0.0000184
100 %		+ 20	1,879,999,991	-9	-0.0000005
100 %		+ 30	1,880,000,093	93	0.0000049
100 %		+ 40	1,880,000,053	53	0.0000028
100 %		+ 50	1,879,999,913	-87	-0.0000046
BATT. ENDPOINT	3.40	+ 20	1,880,000,087	87	0.0000046

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 04 af 00	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 84 of 86	
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018	



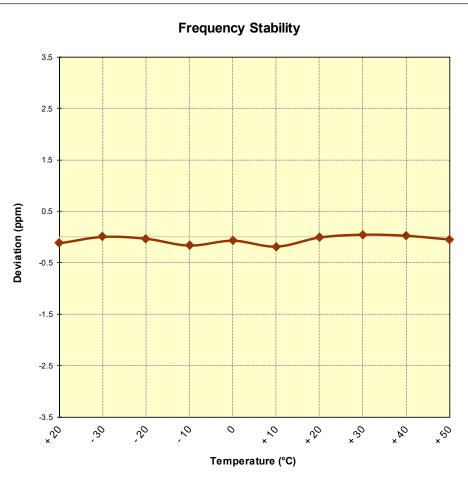


Figure 7-12. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 95 of 97	
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 85 of 87	
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018	



#### 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFX410CS** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 96 of 96
1M1804200078-02.ZNF	4/24 - 5/9/2018	Portable Handset		Page 86 of 86
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 04/05/2018