

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: 3/14 - 5/17/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1803140041-02-R1.ZNF

FCC ID:

ZNFX410AS

Certification

APPLICANT:

LG Electronics MobileComm U.S.A

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

LM-X410AS LMX410AS, X410AS, LM-X410ASR, LMX410ASR, X410ASR Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 22, 24, & 27 ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03

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

This revised Test Report (S/N: 1M1803140041-02-R1.ZNF) supersedes and replaces the previously issued test report (S/N: 1M1803140041-02.ZNF) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

Randy Ortanez President



FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 1 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 1 of 84
© 2018 PCTEST Engineering Laboratory Inc				V 8 0 03/13/2018



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	8
4.0	MEA	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)	56
	7.7	Radiated Spurious Emissions Measurements	61
	7.8	Frequency Stability / Temperature Variation	73
8.0	CON	CLUSION	84

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 2 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018





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	2.041	33.10	3.349	35.25	243KGXW
EDGE850	22H	824.2 - 848.8	0.473	26.75	0.776	28.90	247KG7W
WCDMA850	22H	826.4 - 846.6	0.257	24.11	0.422	26.26	4M20F9W
WCDMA1700	27	1712.4 - 1752.6			0.198	22.96	4M16F9W
GPRS1900	24E	1850.2 - 1909.8			0.925	29.66	243KGXW
EDGE1900	24E	1850.2 - 1909.8			0.223	23.48	249KG7W
WCDMA1900	24E	1852.4 - 1907.6			0.221	23.44	4M15F9W

EUT Overview

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 3 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕞 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 4 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 4 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFX410AS**. 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.: 1223, 1413, 1231

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 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 v03. 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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage E of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 5 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018



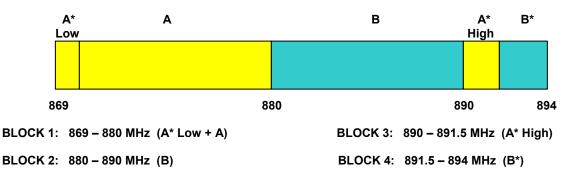
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

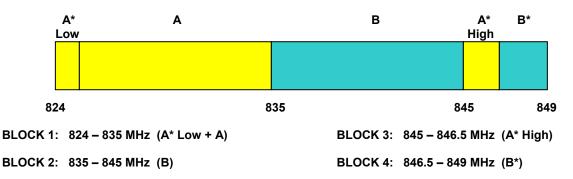
The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

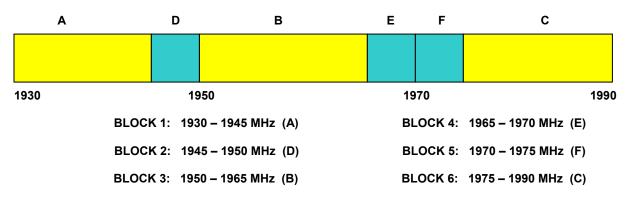
3.2 Cellular - Base Frequency Blocks



3.3 Cellular - Mobile Frequency Blocks



3.4 PCS - Base Frequency Blocks



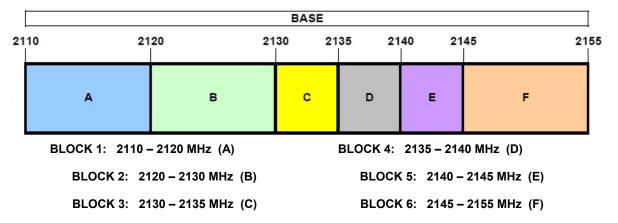
FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 6 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 6 of 84
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 03/13/2018



D С В Е F Α 1870 1850 1890 1910 BLOCK 1: 1850 - 1865 MHz (A) BLOCK 4: 1885 - 1890 MHz (E) BLOCK 2: 1865 - 1870 MHz (D) BLOCK 5: 1890 - 1895 MHz (F) BLOCK 3: 1870 - 1885 MHz (B) BLOCK 6: 1895 - 1910 MHz (C)

3.5 PCS - Mobile Frequency Blocks





3.7 AWS - Mobile Frequency Blocks

[MOBILE				
17	10	1	720 17 	/30 17 	35 17	40 17	45	1755
		A	в	с	D	E	F	
		BLOCK 1: 17	710 – 1720 MHz (A)		BLOCK	4: 1735 –	1740 MHz (D)	
		BLOCK 2: 17	720 – 1730 MHz (B)		BLOCK	5: 1740 –	1745 MHz (E)	
		BLOCK 3: 17	730 – 1735 MHz (C)		BLOCK	6: 1745 –	1755 MHz (F)	

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega Z of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 7 of 84
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 03/13/2018



3.8 Radiated Measurements

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

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

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

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

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

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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 9 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 8 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.	•		V 8.0 03/13/2018



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_{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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 0 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 9 of 84	
© 2018 PCTEST Engineering Labo	ratory. Inc.	•		V 8.0 03/13/2018	



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
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
-	LTx3	Licensed Transmitter Cable Set	8/10/2017	Annual	8/10/2018	LTx3
Agilent	N9038A	MXE EMI Receiver	4/26/2017	Annual	4/26/2018	MY51210133
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	8/28/2017	Annual	8/28/2018	MY49432391
Agilent	N9030A	PXA Signal Analyzer (44GHz)	3/27/2017	Annual	3/27/2018	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	6/21/2017	Annual	6/21/2018	441119
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
Espec	ESX-2CA	Environmental Chamber	3/28/2018	Annual	3/28/2019	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	TVA-11-422	RF Power Amp		N/A		QA1317001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/30/2018 Annual 3/30/2019		11401010036	
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11403100002
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		107826
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/11/2017	Biennial	8/11/2019	A042511
Sunol Sciences	DRH-118	Horn Antenna (1-18GHz)	1/11/2018	Biennial	1/11/2020	A060215

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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 10 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 10 of 84
© 2018 PCTEST Engineering Laboratory. Inc.				V 8.0 03/13/2018



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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 11 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset	landset	
© 2018 PCTEST Engineering Laboratory, Inc.				V 8 0 03/13/2018



7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics MobileComm U.S.A
FCC ID:	ZNFX410AS
Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>GSM / GPRS / EDGE / WCDMA</u>

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 ₁₀ (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Sections 7.3, 7.4
24.232(d)	RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)	Peak-Average Ratio	< 13 dB	CONDUCTED	PASS	Section 7.5
2.1046	RSS-132(5.4) RSS-133(4.1) RSS-139(4.1)	Transmitter Conducted Output Power	N/A		PASS	RF Exposure Report
2.1055 22.355 24.235 27.54	RSS-132(5.3) RSS-133(6.3) RSS-139(6.4)	Frequency Stability	< 2.5 ppm (Part 22) Emission must remain in band (Part 24, 27)		PASS	Section 7.8
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP		PASS	Section 7.6
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 7.6
27.50(d)(4)	RSS-139(6.5)	Equivalent Isotropic Radiated Power	< 1 Watts max. EIRP	RADIATED	PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	> 43 + log ₁₀ (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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 12 of 84	
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018				



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 v03 - 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

For GSM/EDGE, OBW measurements have been verified to be correct.

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dage 12 of 94		
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset	Page 13 of 84		
© 2018 PCTEST Engineering Laboratory, Inc. V 8.0 03/13/2018					



🔤 Keysight Spectrum Analyzer - Occupied BW					- F	×
KL RF 50Ω DC		SENSE:INT Freq: 836.600000 MHz	04:04:50 P Radio Std	M Mar 27, 2018 : None	Trace/Detecto	br
NFE		ree Run Avg Hold: : 34 dB	100/100 Radio Dev	vice: BTS		
	#IFGain:Low #Atten	. 34 00	Radio Dev	ice. DT3		
15 dB/div Ref 35.00 dBm						
20.0		and my ford			Clear Wr	rite
5.00	war		Vr-		Clear Wr	ILE
-10.0						
-25.0				m Marine		
-40.0					Avera	age
-55.0						
-70.0						
-85.0					MaxHe	olo
-100						
Center 836.6 MHz			Cno	n 625 kHz		
Res BW 6.2 kHz	#	VBW 18 kHz		15.6 ms	Min He	olo
Occupied Bandwidth	ı	Total Power	38.8 dBm			
	2.64 kHz				Detec	to
					Pea	ak
Transmit Freq Error	-270 Hz	% of OBW Powe	er 99.00 %		Auto <u>N</u>	Mai
x dB Bandwidth	302.1 kHz	x dB	-26.00 dB			
ISG			STATUS			

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 14 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 14 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			





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



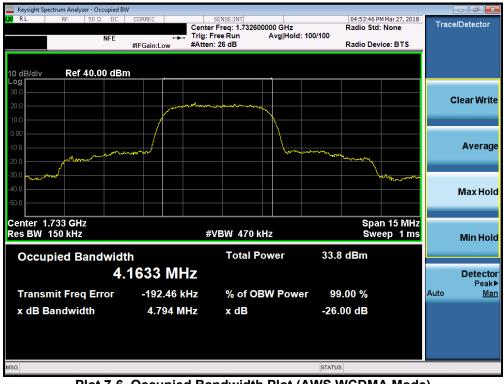
Plot 7-4. Occupied Bandwidth Plot (EDGE1900 Mode)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 15 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset	Page 15 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018		





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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 16 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 16 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



Keysight Spectrum Analyzer - Occupied BV				
X/RL RF 50Ω DC	CORREC	SENSE:INT er Freq: 1.880000000 GHz	04:43:33 PM Mar 27, Radio Std: None	Trace/Detector
NFE	+++ Trig:	Free Run Avg Hold: 1 n: 26 dB	00/100 Radio Device: BT	
	#IFGain:Low #Atte	n. 20 dB	Radio Device. B 1	
10 dB/div Ref 40.00 dBn				
30.0				Clear Write
20.0		when the house the has		Clear Write
10.0	/			
0.00	/			
-10.0				Average
-20.0	Jonan	300 m	man man man and man	
30.0				~~~~
-40.0				Max Hold
-50.0				
Center 1.88 GHz			Span 15 N	
Res BW 150 kHz	#	¢VBW 470 kHz	Sweep 1	ms Min Hold
			00.4.15	
Occupied Bandwidt		Total Power	33.4 dBm	
4.	1544 MHz			Detecto
Transmit Freq Error	-1.963 kHz	% of OBW Power	99.00 %	Peak Auto Ma
x dB Bandwidth	4.770 MHz	x dB	-26.00 dB	
SG			STATUS	

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 17 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 17 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



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 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at 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 v03 - 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.

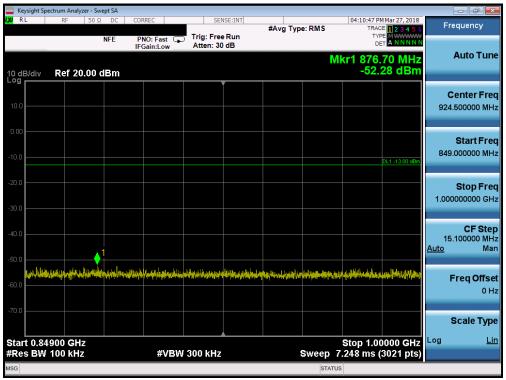
FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 19 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 18 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



Cellular GPRS Mode

	pectrum Analyze									d X
XI RL	RF	50 Ω DC NFE	PNO: Fast		#Avg Type	e: RMS	TRAC	M Mar 27, 2018 DE 1 2 3 4 5 6 PE M WWWWW ET A N N N N N	Freque	ncy
10 dB/div	Ref 20.	00 dBm					Mkr1 822. -26.	.90 MHz 52 dBm	Aut	o Tune
10.0									Cent 426.5000	e r Frec 000 MH:
-10.0								DL1 -13.00 dBm	Sta 30.0000	I rt Fre DOO MH
-20.0								1	Sto 823.0000	р Fre 000 мн
-40.0									C 79.3000 <u>Auto</u>	F Stej 000 MH Ma
60.0 1989	ppupupupupupupupupupupupupupupupupupup	liktry tyj by pytter fran Historicki socialisticki			ladarik di kana tala teris constancenti	Nethingtonia) Antibiotectural	i na filmini na na program indefinant na filmini na na na hada ana indefinitiona	<mark>les les définites des des stant</mark> Propositions de la constant Proposition de la constant	Freq	I Offse 0 H
-70.0							Stop	23.0 MHz	Scal	l e Typ Li
	i 100 kHz		#VBV	V 300 kHz	s	weep	38.06 ms (1	5861 pts)	-	
ISG						STA	TUS			

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

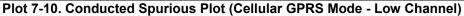


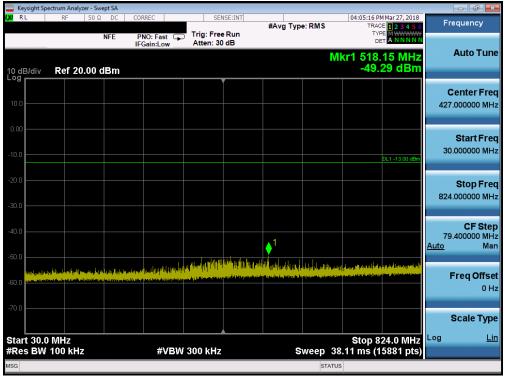
Plot 7-9. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 19 of 84
© 2019 DCTEST Engineering Labo	roton/ Inc			V 0 0 02/12/2010



	ight Spectrum		Swept	SA									- 6 💌
X/RL	R	F 5			ORREC	Tric	SENSI	 #Avg Typ	e: RMS	TRA	M Mar 27, 2018 CE 1 2 3 4 5 6 PE M WWWWWWW	Fre	quency
10 dB/c	div Re	ef 10.0	NF 0 dE	I	PNO: Fast Gain:Low		en: 20 d		М	kr1 2.47	2 5 GHz 53 dBm	,	Auto Tun
0.00													enter Fre 000000 GH
-10.0			1								DL1 -13.00 dBm		Start Fre 000000 G⊦
-30.0													Stop Fre 000000 G⊢
50.0 60.0	parta parte de la contra de la co Contra de la contra d	a da aktika	aliana (n	an a		a Pala Ba Anna Anna Anna Anna Anna Anna Anna Ann			a hataa daa adaa aasaa ay ahaa adaa	ay Mary a User bits particular and a second	a the product of the second	900.0 <u>Auto</u>	CF Ste 000000 MH Ma
70.0												F	r eq Offs 0 H
												S	cale Typ
	1.000 G BW 1.0				#VE	3W 3.0 I	MHz	s	weep 1	Stop 10 5.60 ms (*).000 GHz 8001 pts)	Log	L
ISG									STATU	IS			





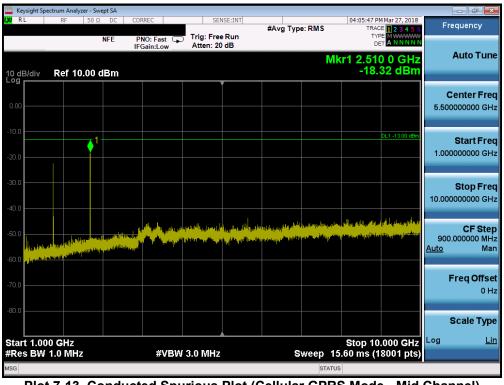
Plot 7-11. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 20 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.	·		V 8.0 03/13/2018



	oectrum Analyzer -	Swept SA								
LXU RL	RF 50)Ω DC (CORREC		ISE:INT	#Avg Type	e: RMS	TRAC	Mar 27, 2018 E 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast IFGain:Low	Trig: Free Atten: 30						
10 dB/div	Ref 20.00) dBm					N	lkr1 854. -52.	30 MHz 21 dBm	Auto Tune
										Center Fred
10.0										924.500000 MH;
0.00										
-10.0										Start Fred 849.000000 MH;
-10.0									DL1 -13.00 dBm	
-20.0										Stop Free
-30.0										1.000000000 GH;
										CF Step
-40.0										15.100000 MHz Auto Mar
-50.0										
-60.0	hyperfectionersembled in Andre	un a l'hann an	Universitation		n finan berge Mara in s		hite of the state	and the physical products	anti dala andre andre andre	Freq Offse
										0 H;
-70.0										Scale Type
Start 0.9/	4900 GHz							Stop 1-00	0000 GHz	Log <u>Lir</u>
	100 kHz		#VBW	300 kHz			Sweep	7.248 ms (000 0112	
MSG							STATU	JS		

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



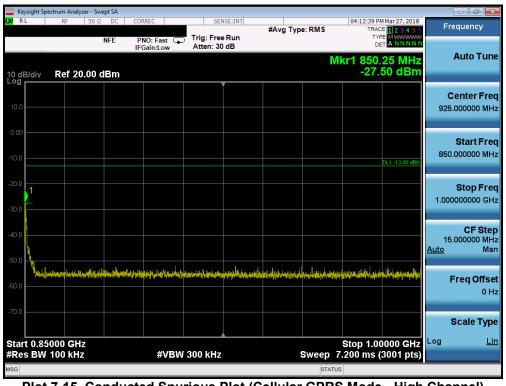
Plot 7-13. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 21 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.	•		V 8.0 03/13/2018



	ght Spectrum											-	
L <mark>XI</mark> RL	RF	50 Ω	DC	CORREC			NSE:INT	#Avg Typ	e: RMS	TR	PM Mar 27, 2018 ACE <mark>1 2 3 4 5 6</mark>	Fre	quency
			NFE	PNO: Fa IFGain:Lo		Trig: Free Atten: 30				т	YPE M WWWWW DET A N N N N N		
				ii Game						Mkr1 430	.75 MHz	1	Auto Tune
10 dB/c	div Re	f 20.00 d	∄Bm							-50	.10 dBm		
							Í					C.	enter Freg
10.0													000000 MHz
0.00													Start Freq
-10.0													000000 MHz
-10.0											DL1 -13.00 dBm		
-20.0													Stop Freq
													000000 MHz
-30.0													
-40.0													CF Step
40.0							.1					79.4 Auto	100000 MHz Man
-50.0						والمعالية الم	National International Action						
- Th	er por fragetister de la	արութորե	- pupperpurger-st	any Mind Appelo	nander of the last	dall at the Alexa	an a	thraiden grafiger. An det er er sterretter	i folki pri poli Pali. Na obvidencia	المطحة المسأور (الجائز التروية). مشيحة بالمستوحية وجنبي ويستار	nd position of the party of the local sector of the local sector of the local sector of the local sector of the	F	req Offset
-60.0	a da san na di ju da kati da di												0 Hz
-70.0													
												S	cale Type
Start 3	30.0 MH	7								Stop	824.0 MHz	Log	Lin
	BW 100			#	VBW	300 kHz		s	weep	38.11 m <u>s (</u>	15881 pts)		
MSG									STA				

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 22 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.			V 8.0 03/13/2018



	pectrum Analyz											
RL	RF	50Ω D				ISE:INT	#Avg Typ	e: RMS	TRAC	M Mar 27, 2018 E 1 2 3 4 5 6	Fre	quency
		NFE		NO: Fast 🕞 Gain:Low	Trig: Free Atten: 20							
0 dB/div	Ref 10	.00 dBr	m					M	(r1 2.54 -18.	6 5 GHz 42 dBm		Auto Tun
0.00												enter Fre 000000 GH
20.0		↓1								DL1 -13.00 dBm		Start Fre 000000 GH
10.0												Stop Fre 000000 G⊦
50.0 <mark>ایسرونی</mark> 10.0 میلیونی		a de segure a parti	and the second		n principality and internet Net President of President	i ya kata ya Milayasin Taya ta ana di ina pina	hana paga Nasa In Nasa Ingga Ng Kan ¹ a	<mark>a (na sana) na na sana (na sana) na na sana sana sana sana sana </mark>	مرا اليمر وتروي ما الي معمر ويش محمد و	latera gran populativana Anter gran populativana	900.0 <u>Auto</u>	CF Ste 000000 MF Ma
70.0											F	req Offs 0 ⊦
80.0												cale Typ
tart 1.00 Res BW	00 GHz 1.0 MHz			#VBM	/ 3.0 MHz		0	weep 15	Stop 10 5.60 ms (1	.000 GHz 8001 pts)	Log	Li
G								STATUS				

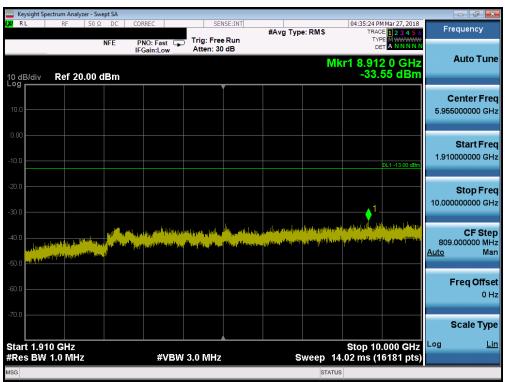
Plot 7-16. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dago 22 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 23 of 84	
© 2018 PCTEST Engineering Labo	ratory. Inc.	•		V 8.0 03/13/2018	



	Analyzer - Swept SA					
URL R	F 50 Ω DC	PNO: Fast	SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	04:35:16 PM Mar 27, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET A N N N N N	Frequency
0 dB/div Re	ef 20.00 dBm	IFGain:Low	Atten: 30 dB	Μ	lkr1 1.482 5 GHz -40.89 dBm	Auto Tur
10.0						Center Fre 937.500000 MH
10.0					DL1 -13.00 dBm	Start Fre 30.000000 Mi
80.0						Stop Fr 1.845000000 Gi
	an a state of the state of the state	n stalet by salet an ar shift of the	genanglan aliratingin ningan selapat	<u>hi ali ali tati tati ka a</u> rlati adi ka tati a	1 halparatundakelaphakennisaanhisti	CF Ste 181.500000 M Auto M
0.0						Freq Offs 0
°0.0						Scale Ty
tart 0.0300 (Res BW 1.0		#VBW	3.0 MHz	Sweep	Stop 1.8450 GHz 2.420 ms (3631 pts)	Log <u>L</u>
SG				STAT	US	

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



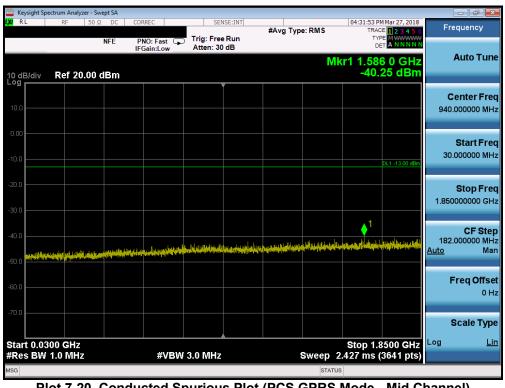
Plot 7-18. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 24 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018 Portable Handset			Page 24 of 84
© 2018 DCTEST Engineering Labo	ratory Inc	•		V 8 0 03/13/2018



	Spectrum Analyz										
LXI RL	RF	50 Ω DC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		Mar 27, 2018	Fre	quency
		NFE	PNO: Fast G	Trig: Free Atten: 20				TYF			
			IFGalli.LOW	/ defi. 20	ub .		MI	(r1 18.94 ⁻	1.5 GHz		Auto Tune
10 dB/div Log	Ref 10.	.00 dBm						-38.	41 dBm		
										C	enter Freq
0.00											000000 GHz
-10.0									DL1 -13.00 dBm		Start Freq
											000000 GHz
-20.0											
-30.0											Stop Freq
									1		000000 GHz
-40.0	a a the r		relation of the state	. ara makitan na arabb	alta casale .	na ante en de la la	الاسلام ومن ا	and the state of t			
the contra		and a state of the s	And the second s	(in the second second		Per destriction of the second	and a second	the property interested			CF Step
-50.0											000000 GHz
-60.0										<u>Auto</u>	Man
-70.0										F	req Offset 0 Hz
											0112
-80.0											cale Type
	.000 GHz		40 (P)14					Stop 20	.000 GHZ	Log	<u>Lin</u>
	№ 1.0 MHz		#VBW	/ 3.0 MHz		S		17.33 ms (2	0001 pts)		
MSG							STAT	US			

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 94				
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 25 of 84				
© 2018 PCTEST Engineering Labo	2018 PCTEST Engineering Laboratory. Inc.							



	pectrum Analyz	er - Swept SA							
XI RL	RF	50 Ω DC	CORREC		Run	Avg Type: RM	IS TF	PM Mar 27, 2018 LACE 1 2 3 4 5 6 TYPE M WWWWWW DET A N N N N N	Frequency
10 dB/div	Ref 20	.00 dBm	IFGain:Low	Atten: 30			Mkr1 8.3	62 5 GHz 3.74 dBm	Auto Tune
10.0									Center Free 5.955000000 GH
•10.00								DL1 -13.00 dBm	Start Fre 1.910000000 GH
30.0							1		Stop Fre 10.000000000 GH
-40.0 101/101 -50.0	paul kaya ila ny posisité Paul kaya ina panahité na panahité ng			a ballanga sana gana baga P ^{alla} nga sinaga sinang d	lite _{pe} ration _{tot} den ¹⁴ orthographics and t	lyseisele hyseisele sysieles segendie kaastille _{se} reitee	aluseusea (d ^a agus ¹ 14) _{an d} ar a'	1940) ^b arjawa (na ji kutika pa _{Na} ngtina <u>na kipan</u> a na kutika an	CF Ste 809.000000 MH <u>Auto</u> Ma
60.0									Freq Offse 0 ⊦
-70.0	10 GHz						Stop 1	0.000 GHz	Scale Typ
	/ 1.0 MHz		#VBV	/ 3.0 MHz		Swee	p 14.02 ms		
ISG							STATUS		

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



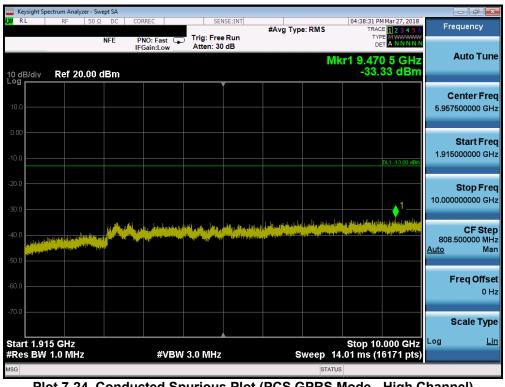
Plot 7-22. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 94				
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 26 of 84				
© 2018 PCTEST Engineering Labo	2018 PCTEST Engineering Laboratory. Inc.							



	pectrum Analyz											
LXU RL	RF	50 Ω DC NFE	PNO:	Fast 🔾	Trig: Free		#Avg Typ	e: RMS	TRAC	Mar 27, 2018 E 1 2 3 4 5 6 E M WWWW T A N N N N N	Fr	equency
10 dB/div Log	Ref 20	.00 dBm	IFGain	n:Low	Atten: 30	dB		Μ	kr1 1.61: -40.			Auto Tune
10.0												Center Freq
-10.0										DL1 -13.00 dBm	30	Start Fred
-20.0											1.850	Stop Free
-40.0	Hedro, II. Hildela	terilgened al address	n i distat na dista	ana ialaania a	alater faction the providence of the providence	interio di cherite i	deegegeringte formet	hidardi, dayaha	1 Tereforming and the Andrews	and the states	182 <u>Auto</u>	CF Step .000000 MH: Mar
-60.0												F req Offse 0 H:
-70.0												Scale Type
Start 0.03 #Res BW				#VBW :	3.0 MHz			Sweep 2	Stop 1.8 2.427 ms (3500 GHz 3641 pts)	Log	
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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 27 of 94				
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 27 of 84				
© 2018 PCTEST Engineering Labo	2018 PCTEST Engineering Laboratory. Inc.							



	ectrum Analyzer	- Swept SA					
LXI RL	RF	50 Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	04:38:49 PM Mar 27, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET A N N N N N	Frequency
10 dB/div	Ref 10.0	00 dBm	IFGain:Low	Atten: 20 dB	Μ	kr1 19.208 5 GHz -37.60 dBm	Auto Tune
0.00							Center Freq 15.00000000 GHz
-10.0						DL1 -13.00 dBm	Start Fred 10.000000000 GHz
-30.0	atra da como			acolikansko z ok historena			Stop Fred 20.000000000 GH
-50.0		, and the second se	in Carple -	tertentikansa akater kontan		Af 2 and 10 Million and 10 Mi	CF Step 1.00000000 GH: <u>Auto</u> Mar
-70.0							Freq Offse 0 Hi
-80.0 Start 10.0						Stop 20.000 GHz	Scale Type
#Res BW	1.U WIHZ		#VBW	3.0 MHz		17.33 ms (20001 pts)	

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

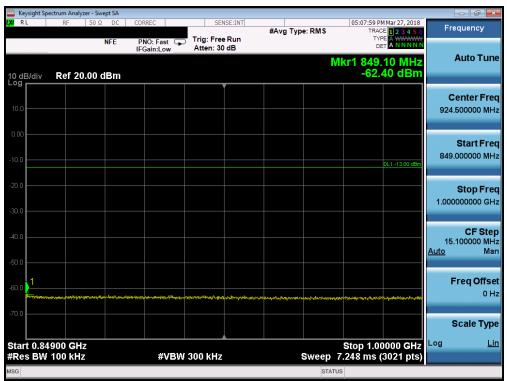
FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dege 20 of 94			
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018 Portable Handset			Page 28 of 84			
© 2018 PCTEST Engineering Labo	2018 PCTEST Engineering Laboratory. Inc.						



Cellular WCDMA Mode

Keysight Spectrum An						
C RL RF	50 Ω DC NFE		SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	05:07:50 PM Mar 27, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 2	20.00 dBm	I Gam.Low		N	lkr1 822.95 MHz -25.99 dBm	Auto Tune
10.0						Center Fre 426.500000 MH
10.0					DL1 -13.00 dBm	Start Fre 30.000000 MH
30.0					1,	Stop Fre 823.000000 MH
40.0						CF Ste 79.300000 M⊦ <u>Auto</u> Ma
60.0	i da esta de la compania en esta esta esta esta esta esta esta esta	in the start of th				Freq Offs 0 F
70.0						Scale Typ
Start 30.0 MHz Res BW 100 ki	Hz	#VBW 3	00 kHz	Sweep 3	Stop 823.0 MHz 8.06 ms (15861 pts)	Log <u>Li</u>

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



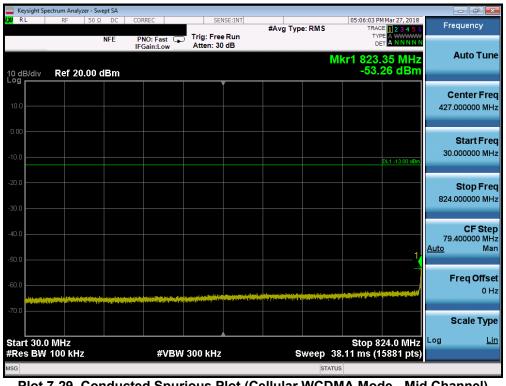
Plot 7-27. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset	Page 29 of 84	
© 2010 DOTECT Engine sping Labo	natami laa			V 0 0 02/12/2010



RL RF 50 Ω DC CORREC SENSE:INT 05:08:06 PM Mar 27, 2018 #Avg Type: RMS TRACE 12.34 5 0 NFE PNO: Fast IFGain:Low Trig: Free Run Atten: 20 dB Trig: Area Mkr1 1.651 5 GHz Auto T dB/div Ref 10.00 dBm
NFE PNO: Fast Trig: Free Run Trie Awwwww IFGain:Low Atten: 20 dB DET ANNNN Mkr1 1.651 5 GHz Auto T
MRT 11:6513 GHZ
dB/div Ref 10.00 dBm -45.22 dBm
00 Center 1 5.50000000
0.0 0.1 -13 00 dBm 0.0 0.0 0.1 -13 00 dBm 1.0 0.00000000
10 10 10 10 10 10 10 10 10 10
Scale T
art 1.000 GHz Stop 10.000 GHz L ^{og} Res BW 1.0 MHz #VBW 3.0 MHz Sweep 15.60 ms (18001 pts)
STATUS

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



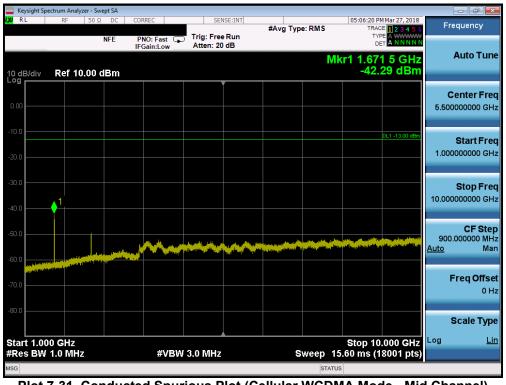
Plot 7-29. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 30 of 84
© 2018 PCTEST Engineering Labo	pratory. Inc.	·		V 8.0 03/13/2018



	ctrum Analyzer -									
X/RL	RF 5	0Ω DC	CORREC PNO: Fa	st 🕞 Trig:	SENSE:INT	#Avg Type:	RMS	TRAC	Mar 27, 2018 E 1 2 3 4 5 6 E A MMMM T A N N N N N	Frequency
10 dB/div	Ref 20.0		IFGain:Lo	Atte	n: 30 dB		M	(r1 849.	00 MHz 19 dBm	Auto Tun
10.0										Center Fre 924.500000 MH
-10.0									DL1 -13.00 dBm	Start Fre 849.000000 MH
-20.0										Stop Fre 1.000000000 GH
40.0 50.0 <mark>1</mark> —										CF Ste 15.100000 MH <u>Auto</u> Ma
60.0 4	al tagens de parte de parte de parte de parte de la	der lange værder og der ger	to the angle of the second second	ðugf telgr flynn yn flyf fu flyn y flyn	nan an	4.485.000,000,000,000,000,000,000,000,000,00	ndredaattaalijaardeelijioo	bernysmennen er efter Streffe	erner og blevet om og be	Freq Offse 0 H
										Scale Typ
Start 0.84 ≇Res BW	900 GHz 100 kHz		#	VBW 300 I	Hz	SI			0000 GHz 3021 pts)	Log <u>Li</u>
ISG							STATUS			

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



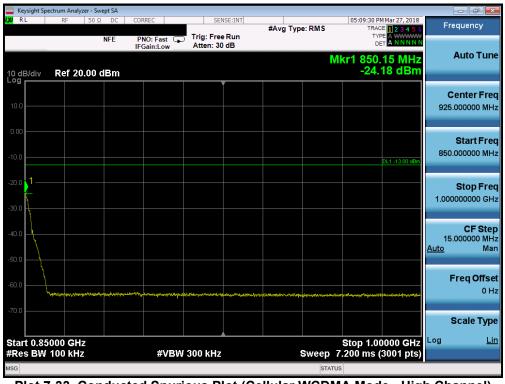
Plot 7-31. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 94
1M1803140041-02-R1.ZNF 3/14 - 5/17/2018		Portable Handset	Page 31 of 84	
© 2018 PCTEST Engineering Labo	ratory, Inc.	·		V 8.0 03/13/2018



	ectrum Analyzer - Swe										
XV RL	RF 50 Ω	NFE	PNO: Fast	Trig: Free		#Avg Type	e: RMS	TRAC	M Mar 27, 2018 E 1 2 3 4 5 6 PE A WWWWW T A N N N N N	Frequ	uency
10 dB/div Log	Ref 20.00 d		IFGain:Low	Atten: 30	dB		Μ	lkr1 822.		A	uto Tune
10.0											n ter Freq 0000 MHz
-10.0									DL1 -13.00 dBm		tart Freq 0000 MHz
-20.0											top Freq 0000 MHz
-40.0											CF Step 0000 MH Mar
-60.0	an bit a star a san far bit star da star st Star gan et al star star far bit star star								despectation of	Fre	e q Offsel 0 Hz
-70.0											ale Type
Start 30.0 #Res BW			#VBW	300 kHz		S	weep 3	8.11 ms (1	24.0 MHz 5881 pts)	Log	<u>Lin</u>
bow											

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 32 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



🔤 Keysight Sp		zer - Swept SA	4									×
XIRL	RF	50 Ω DO	C CORREC			NSE:INT	#Avg Typ	e: RMS	TRAC	M Mar 27, 2018	Frequency	
		NFE	PNO: IFGain	Fast 🖵	Trig: Fre Atten: 20				TYI Di	ET A WWWWW A N N N N N		
			ii Guin					M	(r1 1.69	4 5 GHz	Auto Tu	ine
10 dB/div	Ref 10).00 dBn	n						-44.	47 dBm		
						Ť					Center Fr	rea
0.00											5.50000000 G	
-10.0										DL1 -13.00 dBm	Start Fr	rea
-20.0											1.000000000 G	
-20.0												
-30.0											Stop Fr	rea
											10.00000000 G	
-40.0	_ ≬ 1											
-50.0		_									CF St	tep
				And				and a start of the second			900.000000 M Auto N	/IHz ∕Ian
-60.0	THE COLUMN			in the second		1987 - 1997 - 1977 - 19						
											Freq Offs	set
-70.0											0	Hz
-80.0												
											Scale Ty	/pe
Start 1.00	IN GH7								Stop 10	.000 GHz	Log	Lin
#Res BW	1.0 MH	z		#VBW	3.0 MHz		s	weep 15	i.60 ms (1	8001 pts)		
MSG								STATUS	3			

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	ЈТ Туре:		Daga 22 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 33 of 84	
© 2018 PCTEST Engineering Labo	ratory. Inc.	·		V 8.0 03/13/2018	



Keysight:	Spectrum Analyzer - Sv		ORREC	(T)	SE:INT			04:57:53 PM Mar 27, 2018	
KL	KF 50 3	NFE	PNO: Fast Gain:Low		Run	#Avg Typ	e: RMS	04:57:53 PM Mai 27, 2018 TRACE 1 2 3 4 5 0 TYPE A WWWW DET A NNNN	Frequency
0 dB/div	Ref 20.00	dBm					Mł	r1 1.705 0 GHz -33.50 dBm	Auto Tur
10.0									Center Fre 867.500000 MH
10.00								DL1 -13.00 dBm	Start Fre 30.000000 Mi
20.0								1	Stop Fre 1.705000000 GF
40.0									CF Ste 167.500000 Mi <u>Auto</u> Mi
50.0 60.0	ya, ata, handa mangala yana nga mangan nga kata na tang			ala fan selen an fan selen	intelle ingestandinge			an a	Freq Offs 0 F
70.0									Scale Typ
	0300 GHz N 1.0 MHz		#VBW	3.0 MHz			Sweep 2	Stop 1.7050 GHz 2.233 ms (3351 pts)	Log <u>L</u>
SG							STATUS	3	

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 34 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset	Fage 34 01 64
© 2019 DCTEST Engineering Labo	roton/ Inc		1/ 0 0 02/12/2010



🔤 Keysight S	pectrum Analyze	er - Swept SA									×
<mark>XI</mark> RL	RF	50 Ω DC	CORREC	SENS	#/	Avg Type:	RMS	TRAC	4 Mar 27, 2018 E 1 2 3 4 5 6	Frequency	
	_	NFE	PNO: Fast G	Trig: Free F Atten: 20 d				DE			
							Mkr	1 19.62	7 5 GH <mark>z</mark> 89 dBm	Auto Tu	Ine
10 dB/div	Ref 10.	.00 dBm						-40.			
										Center Fi	req
0.00										15.00000000 0	GHz
-10.0											
10.0									DL1 -13.00 dBm	Start Fr	
-20.0										10.00000000 0	GHz
-30.0										Stop Fr	
-40.0									1 -	20.00000000 0	GHz
								والمراجع والمراجع	te aut characterises are	05.00	
-50.0				and a standard based on the second states are s	a kanang pang baga kanang sa k		n ya ya ya ya ku ya	And the second	in ma utinain an 1. e.	CF St 1.000000000 G	
-60.0	an and a second	an del tradicione de la constation de la co								<u>Auto</u> N	Man
-60.0											
-70.0										Freq Off	i set) Hz
										0	
-80.0										Scale Ty	me
										-	
	000 GHz		-#\ /D14	0.0 MU-		0	4 7	Stop 20	000 0112		Lin
	/ 1.0 MHz		#VBW	3.0 MHz		SW	status		0001 pts)		
MSG							STATUS				

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 35 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



🔤 Keysight Sp	ectrum Analy	zer - Swept SA	4							
X/RL	RF	50 Ω DC		C Fast 🖵		#Avg Typ	e: RMS	TRA	M Mar 27, 2018 CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	Frequency
10 dB/div Log	Ref 20	0.00 dBn	IFGai		Atten: 30		М	kr1 9.76	7 5 GHz 23 dBm	Auto Tur
10.0										Center Fre 5.877500000 GH
-10.0									DL1 -13.00 dBm	Start Fre 1.755000000 GH
-20.0										Stop Fre 10.000000000 GH
-40.0			\sim		\sim					CF Ste 824.500000 MH <u>Auto</u> Ma
-60.0										Freq Offs 0 H
										Scale Typ
Start 1.75 #Res BW		z		#VBW	3.0 MHz	s	weep 1	Stop 10 4.29 ms (7	.000 GHz 6491 pts)	
ISG							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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 36 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.			V 8.0 03/13/2018



	ectrum Analyzer - S							
L <mark>XI</mark> RL	RF 50	Ω DC	CORREC	SENSE:I	#Avg Typ	e: RMS	05:01:39 PM Mar 27, 2018 TRACE 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast IFGain:Low	Trig: Free Ru Atten: 30 dB	n		TYPE A WWWWW DET A N N N N N	
10 dB/div Log	Ref 20.00	dBm				Mk	r1 1.656 5 GHz -50.60 dBm	Auto Tune
10.0								Center Freq 870.000000 MHz
-10.0							DL1 -13.00 dBm	Start Freq 30.000000 MHz
-20.0								Stop Freq 1.710000000 GHz
-40.0							1	CF Step 168.000000 MHz <u>Auto</u> Man
-60.0	however, and a second	and a second		۵ <u>۵۵۵ مېلوم کې د د د د د د د د د د د د د د د د د د </u>	4haaaaaaaa,ayhaandohdayahiyaanndohiin daanh			Freq Offset 0 Hz
-70.0								Scale Type
Start 0.03 #Res BW			#VBW	3.0 MHz		Sweep 2.	Stop 1.7100 GHz 240 ms (3361 pts)	Log <u>Lin</u>
MSG						STATUS		

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 27 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 37 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.			V 8.0 03/13/2018



	pectrum Analyzer	- Swept SA						
L <mark>XI</mark> RL	RF	50 Ω DC NFE	PNO: Fast	Trig: Free Run Atten: 20 dB	#Avg Type:		03 PM Mar 27, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
10 dB/div Log	Ref 10.0	00 dBm	IFGain:Low	Atten: 20 dB		Mkr1 19.	635 5 GHz 46.09 dBm	Auto Tune
0.00								Center Fred 15.000000000 GH;
-10.0							DL1 -13.00 dBm	Start Fred 10.000000000 GH
-30.0							1-	Stop Free 20.000000000 GH
-50.0				tan () den fan ywerdd wennen de Merie (ywerd Meriod Alei (ywerdd werder a werd bywerd Meriod Alei (ywerdd werder a werd bywerd		ga king ganagga kikanan ta ana samutana na kyang mangka da na pagtak ta kina king ji	energi bilan silar disa di Angara (kana di Angara) Angara pata di Sala Laba Manda da angara	CF Stej 1.000000000 GH <u>Auto</u> Ma
70.0								Freq Offse 0 H
-80.0						Stop	20.000 0112	Scale Type
#Res BW	/ 1.0 MHz		#VBW	3.0 MHz	Sv	status	s (20001 pts)	

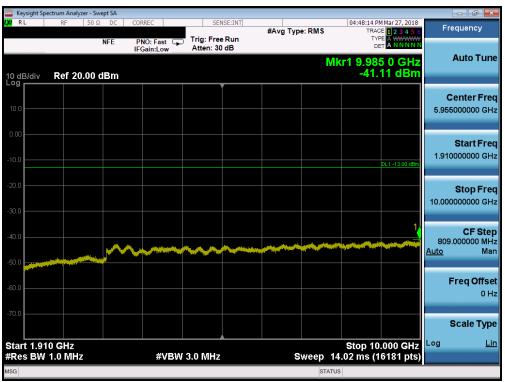
Plot 7-43. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 20 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 38 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.	·		V 8.0 03/13/2018



		Analyzer - Sw									d X
K <mark>U</mark> RL	R	F 50 Ω	NFE	CORREC PNO: Fast		#Avg Type	RMS	TRAI TY	M Mar 27, 2018 DE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	Frequer	ncy
10 dB/	div Re	ef 20.00 (dBm	PGain.Low	, men o		MI	kr1 1.84 -38.	5 0 GHz 41 dBm	Auto	o Tun
10.0										Cente 937.5000	
0.00									DL1 -13.00 dBm	Star 30.0000	rt Fre 00 M⊦
20.0 - 30.0 -										Sto 1.8450000	pFre 00 G⊦
40.0 -										C 181.5000 <u>Auto</u>	F Ste 00 MH Ma
60.0		hin direktore for alle	talen mentelinia Patiente	aturati adan katu ang	and the second secon		n ang sa	n jag elser sed er pelej fan je el	oʻy cardan siste olin s ^a	Freq	Offs 0 I
70.0										Scale	е Тур
start Res	0.0300 (BW 1.0	GHz MHz		#VBI	∿ 3.0 MHz		Sweep 2	Stop 1. 2.420 ms	8450 GHz (3631 pts)	Log	L
SG							STATU	S			

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 39 of 84
© 2018 DCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018



🔤 Keysight Spectrum An						
LXV RL RF	50 Ω DC NFE	CORREC	SENSE:INT Trig: Free Run Atten: 20 dB	#Avg Type: RMS	04:48:25 PM Mar 27, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
10 dB/div Ref	10.00 dBm	IFGain:Low	Atten: 20 dB	Μ	kr1 19.550 0 GHz -45.93 dBm	Auto Tune
0.00						Center Free 15.000000000 GH
-10.0					DL1 -13.00 dBm	Start Free 10.000000000 GH
-40.0					1-	Stop Fre 20.000000000 GH
50.0 60.0	Section of the sector of the s		n an the design of the section of th	an a	ningan program bilan kina paka kina paka kina paka paka paka paka paka paka paka pa	CF Ste 1.000000000 G⊢ <u>Auto</u> Ma
70.0						Freq Offs 0 H
80.0 Start 10.000 GH	Iz				Stop 20.000 GHz	Scale Typ
#Res BW 1.0 MI		#VBW 3	3.0 MHz	-	17.33 ms (20001 pts)	
SG				SIA	TUS	

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



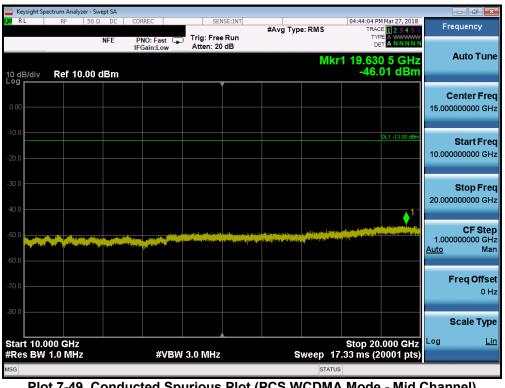
Plot 7-47. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 40 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



Mikr 19.727 0 Gr2 41.06 dBm 41.06 dBm 41.06 dBm 00 Center Fr 000 Start Fr 100 Clinitation 000 Clinitation 0000 Clinitation 0000 Clinitation 0000 Clinitation 00000 Clinitation 000000 Clinitation 0000000 Clinitation 00000000 Clinitation		pectrum Analyz	er - Swept SA										- • •
Instruction Mkr1 9.727 0 GHz -41.06 dBm Auto Tur Center Fri 5.95500000 G 0000 000	<mark>u</mark> RL	RF			st (D) T			#Avg Typ	e: RMS	TRA	CE 1 2 3 4 5 6	Fre	quency
100 Center Fr 000 Start Fr 000 Cut - 1300 sem 1000 Cut - 1300 sem 10000 Cut - 1300 sem	10 dB/div	Ref 20.		IFGain:Lo	w A	Atten: 30	dB		Mł	(r1 9.72	7 0 GHz	,	Auto Tune
100 Image: Start Fr 100 Image: Start Fr 200	10.0												
300 Stop Fr 400 Image: CF Stop Stop Stop Option 500 Image: CF Stop Stop Stop Option 600 Image: CF Stop Stop Stop Option 700 Image: CF Stop Stop Stop Option Start 1.910 GHz Stop 10.000 GHz											DL1 -13.00 dBm		Start Fred 000000 GH:
4400 4400 600 </td <td></td> <td>Stop Fred 000000 GH:</td>													Stop Fred 000000 GH:
60.0 70.0 Start 1.910 GHz Stop 10.000 GHz Log			<u> </u>	~~~~		~~~							CF Step 000000 MH Mar
Start 1.910 GHz Stop 10.000 GHz												F	r eq Offse 0 H
		10 GH7								Stop 10	000 GHz		cale Type
ASG STATUS	#Res BW			#	VBW 3.	0 MHz		s		.02 ms (1	.000 0112		

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



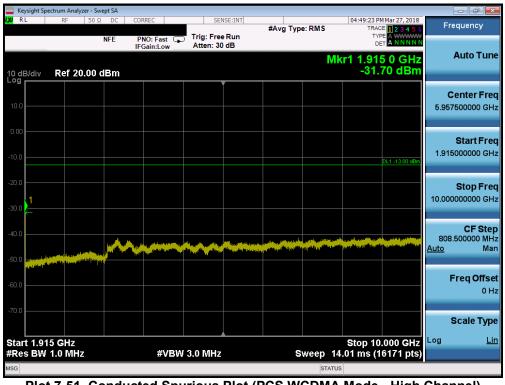
Plot 7-49. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 41 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.	·		V 8.0 03/13/2018



	ectrum Analyzer - S										
L <mark>XI</mark> RL	RF 50		CORREC			#Avg Type	RMS	TRAC	Mar 27, 2018	Fre	quency
		NFE	PNO: Fast IFGain:Low	Atten: 30							Auto Tune
10 dB/div Log	Ref 20.00	dBm					Mk	r1 1.829 -50.1	9 5 GHz 29 dBm	'	auto rune
10.0											e nter Freq 000000 MHz
-10.0									DL1 -13.00 dBm		Start Freq 000000 MHz
-20.0											Stop Freq 000000 GHz
-40.0									`	182.0 <u>Auto</u>	CF Step 000000 MHz Man
-60.0	internation		in dan pangan manginan dan dan dari dari dari kar	<u></u>	nguyal yang kalang k			nangang Kanapaté NgPar	tera terin indul fundante dis	F	req Offsel 0 Hz
-70.0										S	cale Type
Start 0.03 #Res BW			#VBW	3.0 MHz		S	weep 2	Stop 1.8 .427 ms (3500 GHz 3641 pts)	Log	Lin
MSG							STATUS				

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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 42 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.	·		V 8.0 03/13/2018



10 dB/div Re	NFE		SENSE:INT Free Run : 20 dB	#Avg Type: RMS	TRAC	M Mar 27, 2018 DE 1 2 3 4 5 6 DE A WWWW ET A N N N N N	Frequency
Log		IFGain:Low Atten	: 20 06				
					/kr1 19.54 -46.	8 5 GHz 00 dBm	Auto Tune
							Center Fred 15.00000000 GHz
-20.0						DL1 -13.00 dBm	Start Fred 10.000000000 GHz
-30.0						1	Stop Fred 20.000000000 GH
-50.0						a laga baga kana Pilang ang sa a laga biga ang sang sa kang sa pilang sa	CF Step 1.000000000 GH <u>Auto</u> Mar
70.0							Freq Offse 0 H
-80.0 Start 10.000 G					Stop 20	.000 0112	Scale Type
#Res BW 1.0	MHz	#VBW 3.0 M	Hz		17.33 ms (2	0001 pts)	

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 43 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.	·		V 8.0 03/13/2018



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 v03 - 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

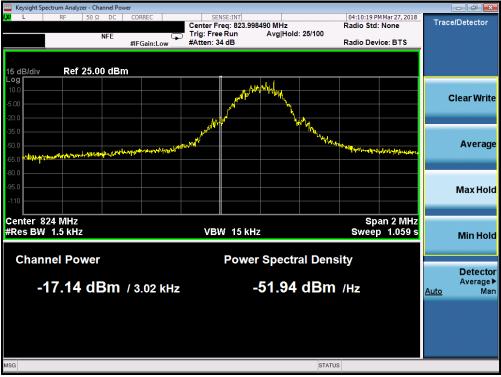
Test Notes

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.

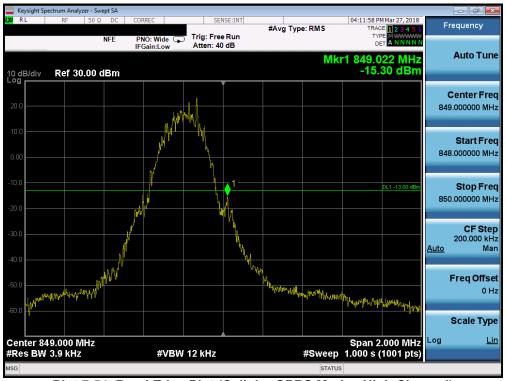
FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 14 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 44 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



Cellular GPRS Mode



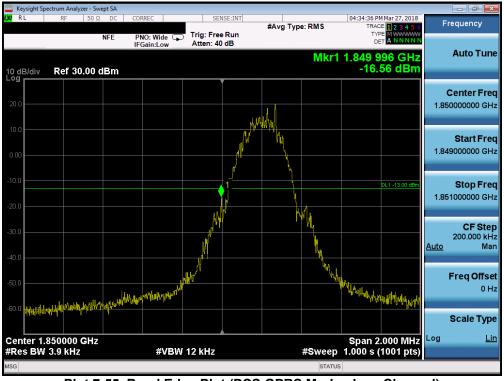
Plot 7-53. Band Edge Plot (Cellular GPRS Mode - Low Channel)



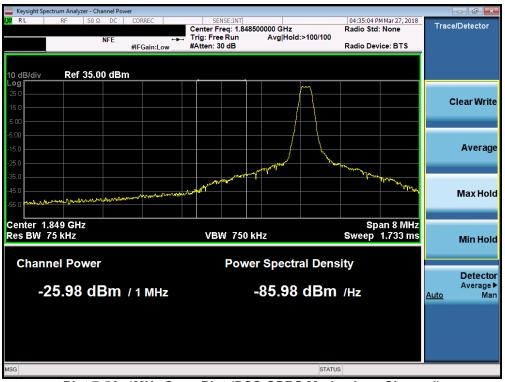
Plot 7-54. Band Edge Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 45 of 84
© 0040 DOTEOT Ex size a size a Labo	antona lan			1/0.0.00/40/0040





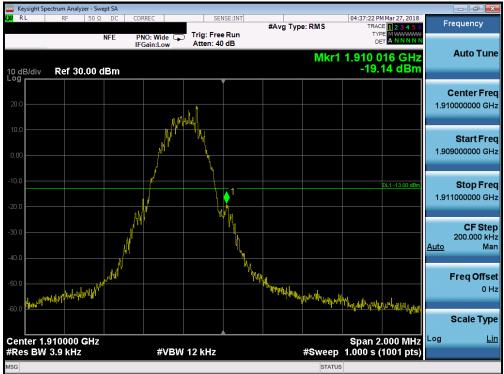
Plot 7-55. Band Edge Plot (PCS GPRS Mode - Low Channel)



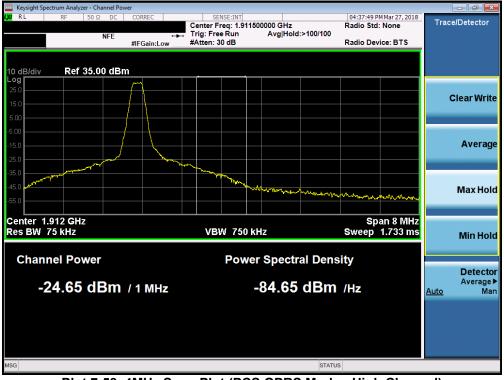
Plot 7-56. 4MHz Span Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 46 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018





Plot 7-57. Band Edge Plot (PCS GPRS Mode - High Channel)



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates: EUT Type:		EUT Type:		Dage 47 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 47 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.			V 8.0 03/13/2018



Cellular WCDMA Mode



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



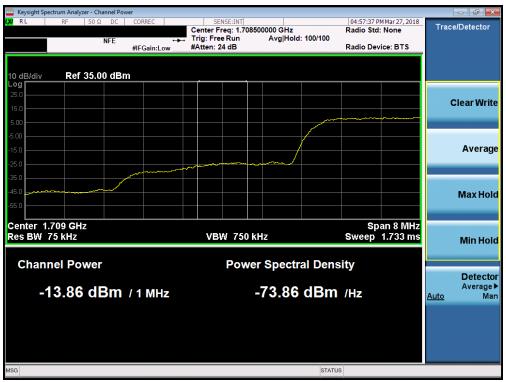
Plot 7-60. Band Edge Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 49 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 48 of 84
© 2018 DCTEST Engineering Labo	ratory Inc	•		V 8 0 03/13/2018





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



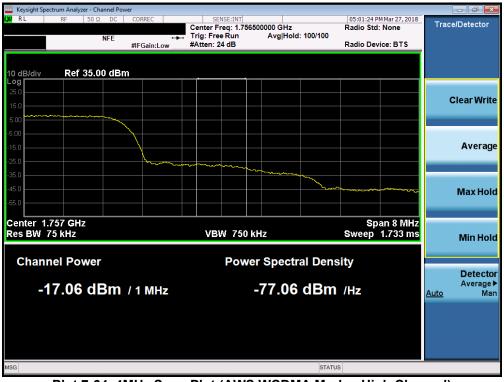
Plot 7-62. 4MHz Span Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 49 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018



	ectrum Analyzer -									-0	
IXI RL	RF 5	0Ω DC	CORREC	Trig: Free		#Avg Typ	e:RMS	TRA	M Mar 27, 2018 CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	Frequ	ency
10 dB/div Log	Ref 30.0		IFGain:Low	Atten: 40	dB		Mkr	1 1.755 (000 GHz 14 dBm	Au	to Tune
20.0										Cen 1.755000	ter Fred 0000 GHz
0.00										St 1.747500	art Fred 0000 GH:
-10.0					1				DL1 -13.00 dBm	St 1.762500	op Fred 0000 GHz
-30.0					~~~~	- tron					CF Step 1000 MH: Mar
-50.0								- March	- March	Fre	q Offse 0 Ha
-60.0											ale Type
Center 1. #Res BW	755000 GH 100 kHz	IZ	#VBW	300 kHz			Sweep	Span 1 1.000 ms	15.00 MHz (1001 pts)	Log	Lin
MSG							STATI	JS			

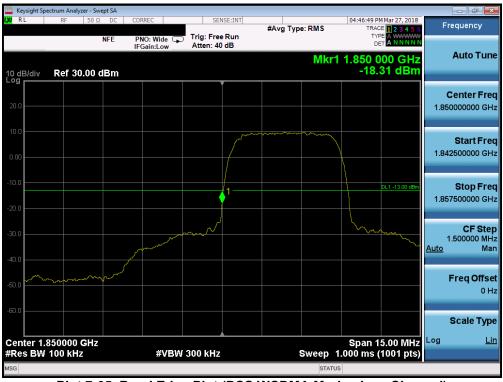
Plot 7-63. Band Edge Plot (AWS WCDMA Mode - High Channel)



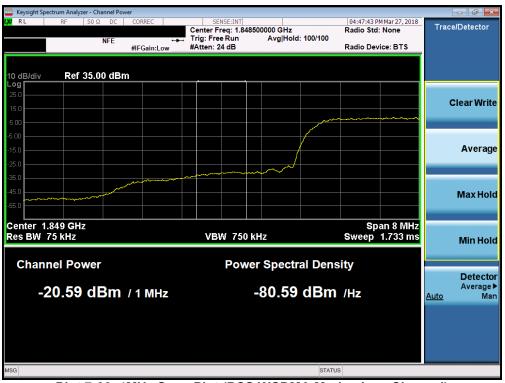
Plot 7-64. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 50 of 84
© 2018 PCTEST Engineering Labo	ratory, Inc.			V 8.0 03/13/2018





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



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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 51 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 51 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018



	ectrum Analyzer - Sv										di X
X/RL	RF 50 S	DC NFE	CORREC		SENSE:INT	#Avg Typ	e: RMS	TRA	PM Mar 27, 2018 CE 1 2 3 4 5 6 (PE A WWWWW DET A NNNNN	Frequer	су
10 dB/div	Ref 30.00		IFGain:Lo				Mkr	1 1.910	000 GHz 70 dBm	Auto	Tune
20.0										Cente 1.9100000	
0.00			~~~~~	mund						Star 1.9025000	t Fre 00 GH
20.0					1				DL1 -13.00 dBm	Stoj 1.9175000	o Free DO GH
30.0							m de la come			CI 1.50000 <u>Auto</u>	F Stej DO MH Ma
50.0										Freq	Offse 0 H
	910000 GHz							Span '	15.00 MHz	Scale	e Type Lii
	100 kHz		#	VBW 300 kH	Iz		Sweep	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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 52 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



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 v03 - 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.



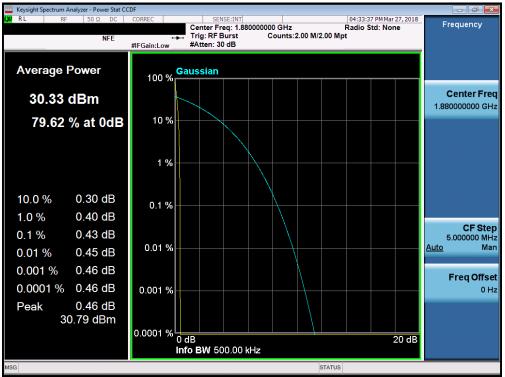
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

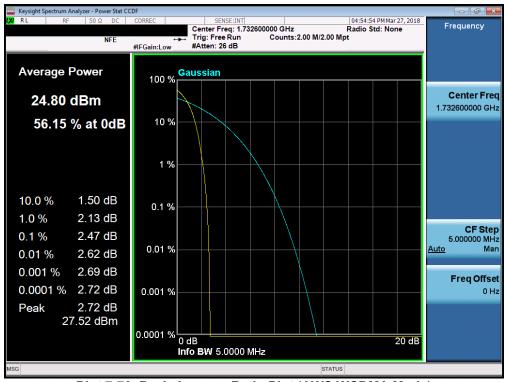
None

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 53 of 84
© 2018 PCTEST Engineering Labo	V 8 0 03/13/2018			





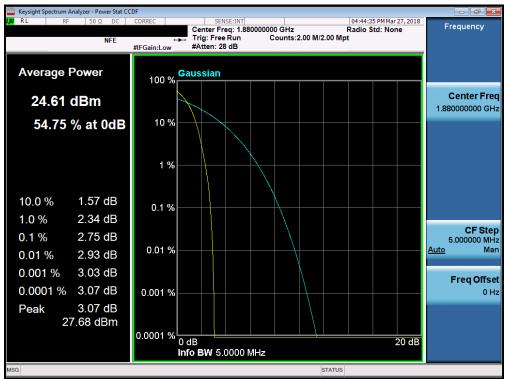




Plot 7-70. Peak-Average Ratio Plot (AWS WCDMA Mode)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 54 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	17/2018 Portable Handset		Page 54 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018





Plot 7-71. Peak-Average Ratio Plot (PCS WCDMA Mode)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage EE of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 55 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



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 v03 - 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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 56 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 56 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



Test Setup

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

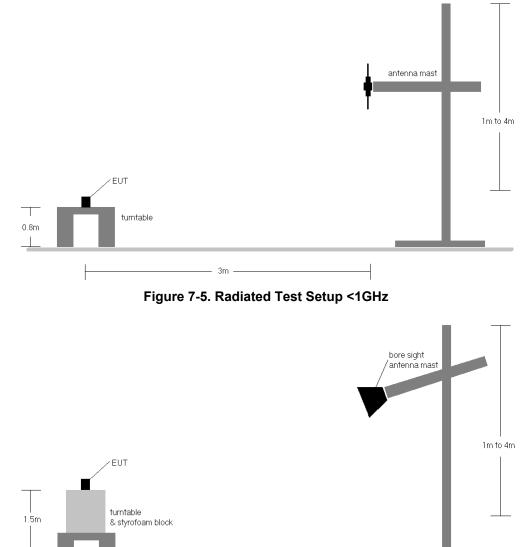


Figure 7-6. Radiated Test Setup >1GHz

3m

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 57 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 57 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



- 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), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 50 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 58 of 84	
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018				



Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	н	150	6	32.35	2.57	32.76	38.45	-5.69	34.91	40.61	-5.69
836.60	GPRS850	н	150	6	32.47	2.78	33.10	38.45	-5.35	35.25	40.61	-5.36
848.80	GPRS850	н	150	186	32.02	2.98	32.84	38.45	-5.61	34.99	40.61	-5.62
836.60	GPRS850	V	150	218	29.88	2.78	30.51	38.45	-7.95	32.66	40.61	-7.95
836.60	EDGE850	н	150	6	26.12	2.78	26.75	38.45	-11.71	28.90	40.61	-11.71

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	Н	150	356	23.17	2.61	23.63	38.45	-14.82	25.78	40.61	-14.83
836.60	WCDMA850	Н	150	10	23.48	2.78	24.11	38.45	-14.35	26.26	40.61	-14.35
846.60	WCDMA850	н	150	190	22.98	2.94	23.77	38.45	-14.68	25.92	40.61	-14.69
836.60	WCDMA850	V	150	199	21.15	2.78	21.78	38.45	-16.68	23.93	40.61	-16.68

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	V	150	12	17.44	4.32	21.76	30.00	-8.24
1732.60	WCDMA1700	V	150	350	18.46	4.26	22.72	30.00	-7.28
1752.60	WCDMA1700	V	150	344	18.78	4.18	22.96	30.00	-7.04
1752.60	WCDMA1700	н	150	260	17.29	4.26	21.55	30.00	-8.45

Table 7-4. EIRP (AWS WCDMA)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage E0 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 59 of 84	
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018				



Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	Н	150	356	25.93	3.73	29.66	33.01	-3.35
1880.00	GPRS1900	Н	150	3	25.68	3.72	29.39	33.01	-3.62
1909.80	GPRS1900	Н	150	358	25.11	3.64	28.75	33.01	-4.26
1850.20	GPRS1900	V	150	136	24.44	3.72	28.16	33.01	-4.85
1850.20	EDGE1900	н	150	356	19.76	3.72	23.48	33.01	-9.53

Table 7-5. EIRP (PCS GPRS)

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	282	19.71	3.73	23.44	0.221	33.01	-9.57
1880.00	WCDMA1900	н	150	353	19.00	3.72	22.72	0.187	33.01	-10.29
1907.60	WCDMA1900	н	150	349	19.35	3.66	23.01	0.200	33.01	-10.00
1852.40	WCDMA1900	V	150	123	17.82	3.72	21.54	0.142	33.01	-11.47

Table 7-6. EIRP (PCS WCDMA)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	Dates: EUT Type:		Page 60 of 84	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 60 01 64	
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018	



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 v03 - 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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dege 61 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 61 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



EUT turntable 8. styrofoam block

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), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 62 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 62 of 84
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018



OPERATING FREQUENCY:	824	MHz	
CHANNEL:	1		
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	125	350	-57.04	9.05	-47.99	-35.0
2472.60	Н	130	260	-58.80	8.96	-49.84	-36.8
3296.80	Н	-	-	-59.27	9.28	-49.99	-37.0

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

0	PERATING FREQUENCY:	830	6.60	MHz
	CHANNEL:	1	-	
	MODULATION SIGNAL:	GPRS (GMSK)		_
	DISTANCE:	3	meters	
	LIMIT:	-13	dBm	
			_	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	157	25	-57.29	8.83	-48.45	-35.5
2509.80	Н	126	320	-58.02	9.03	-49.00	-36.0
3346.40	Н	-	-	-58.24	9.32	-48.92	-35.9

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Dage 62 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 63 of 84	
© 2018 PCTEST Engineering Labo	V 8 0 03/13/2018				



MHz	3.80	848	OPERATING FREQUENCY:
	51	2	CHANNEL:
		GPRS (GMSK)	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]
1697.60	Н	100	271	-48.42	8.61	-39.82	-26.8
2546.40	Н	100	280	-53.08	9.13	-43.95	-31.0
3395.20	Н	-	-	-57.73	9.45	-48.28	-35.3

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Dage 64 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 64 of 84	
© 2018 PCTEST Engineering Labo	ratory. Inc.			V 8.0 03/13/2018	



Cellular WCDMA Mode

OPERATING FREQUENCY:	8	26.40	MHz
CHANNEL:			
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	130	350	-63.47	9.03	-54.44	-41.4
2479.20	Н	133	312	-59.51	8.97	-50.54	-37.5
3305.60	Н	-	-	-59.09	9.29	-49.80	-36.8

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

MHz	6.60	83	OPERATING FREQUENCY:
	83	4	CHANNEL:
		WCDMA	MODULATION SIGNAL:
	meters	3	DISTANCE:
	- dBm	-13	LIMIT:
	-		

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	136	293	-62.55	8.83	-53.71	-40.7
2509.80	Н	-	-	-60.52	9.03	-51.50	-38.5

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dege 65 of 94			
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 65 of 84			
© 2018 PCTEST Engineering Labo	© 2018 PCTEST Engineering aboratory Inc						



0	PERATING FREQUENCY:	84	46.60	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]
1693.20	Н	-	-	-64.28	8.65	-55.63	-42.6
2539.80	Н	-	-	-58.13	9.11	-49.02	-36.0

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dege 66 of 94				
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 66 of 84				
© 2018 PCTEST Engineering Labo	2018 PCTEST Engineering Laboratory. Inc.							



OPERATING FREQUENCY:	17	712.40	MHz
CHANNEL:			
MODULATION SIGNAL:	WCDMA		
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3424.80	Н	-	-	-58.34	9.51	-48.83	-35.8
5137.20	Н	-	-	-54.14	10.96	-43.17	-30.2

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

17	32.60	MHz
1413		
WCDMA		_
3	meters	
-13	dBm	
	WCDMA 3	WCDMA 3 meters

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.20	Н	-	-	-57.52	9.58	-47.94	-34.9
5197.80	Н	-	-	-53.79	10.97	-42.82	-29.8

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 67 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 67 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	175	52.60	MHz
CHANNEL:	1	513	
MODULATION SIGNAL:	WCDMA		
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3505.20	Н	110	36	-54.92	9.66	-45.26	-32.3
5257.80	Н	-	-	-54.65	11.07	-43.58	-30.6

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 69 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 68 of 84	
© 2018 PCTEST Engineering Laboratory. Inc.					



OPERATING FREQUENCY:	185	MHz	
CHANNEL:	512		
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	117	164	-52.73	9.60	-43.13	-30.1
5550.60	Н	120	168	-50.99	10.97	-40.02	-27.0
7400.80	Н	-	-	-49.60	10.69	-38.91	-25.9

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

MHz	0.00	188	OPERATING FREQUENCY:
-	61	6	CHANNEL:
_		GPRS (GMSK)	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]
3760.00	Н	120	335	-52.94	9.28	-43.66	-30.7
5640.00	Н	118	350	-51.25	11.14	-40.11	-27.1
7520.00	Н	-	-	-50.71	10.88	-39.83	-26.8

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 69 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	190	9.80	MHz
CHANNEL:	8	10	-
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]
3819.60	Н	115	80	-52.25	9.07	-43.18	-30.2
5729.40	Н	115	237	-52.83	11.30	-41.54	-28.5
7639.20	Н	-	-	-50.47	11.08	-39.39	-26.4

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 70 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	/14 - 5/17/2018 Portable Handset		Page 70 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	18	MHz	
CHANNEL:	g		
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]
3704.80	Н	106	107	-54.42	9.58	-44.84	-31.8
5557.20	Н	-	-	-53.83	10.98	-42.85	-29.8
7409.60	Н	-	-	-49.63	10.70	-38.92	-25.9

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

MHz	1880.00		OPERATING FREQUENCY:			
	400	94	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]
3760.00	Н	153	105	-51.99	9.28	-42.71	-29.7
5640.00	Н	-	-	-54.14	11.14	-43.00	-30.0
7520.00	Н	-	-	-49.58	10.88	-38.70	-25.7

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 71 of 94	
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 71 of 84	
© 2018 PCTEST Engineering Laboratory Inc					



MHz	7.60	190	OPERATING FREQUENCY:
-	538	95	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]
3815.20	Н	147	106	-51.01	9.08	-41.94	-28.9
5722.80	Н	-	-	-54.88	11.29	-43.59	-30.6
7630.40	Н	-	-	-49.90	11.07	-38.84	-25.8

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 72 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 72 of 84
© 2018 PCTEST Engineering Labo	V 8 0 03/13/2018			



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 $\pm 0.00025\%$ (± 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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 72 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 73 of 84
© 2018 PCTEST Engineering Labo	ratory Inc			V 8 0 03/13/2018



OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	-
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	-

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,600,005	5	0.0000006
100 %		- 30	836,599,950	-50	-0.0000060
100 %		- 20	836,600,171	171	0.0000204
100 %		- 10	836,599,837	-163	-0.0000195
100 %		0	836,600,078	78	0.0000093
100 %		+ 10	836,600,239	239	0.0000286
100 %		+ 20	836,599,894	-106	-0.0000127
100 %		+ 30	836,600,037	37	0.0000044
100 %		+ 40	836,600,205	205	0.0000245
100 %		+ 50	836,599,911	-89	-0.0000106
BATT. ENDPOINT	3.05	+ 20	836,600,066	66	0.0000079

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 74 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 74 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



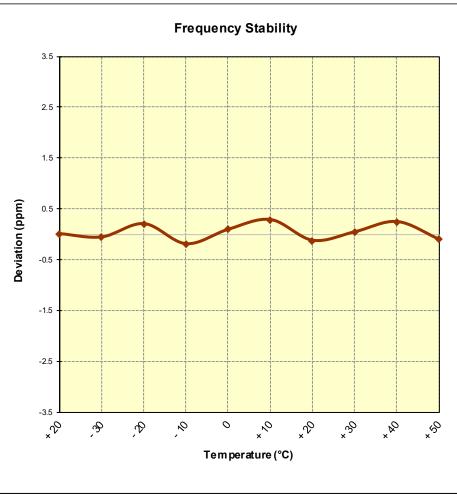


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 75 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 75 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,600,011	11	0.0000013
100 %		- 30	836,599,887	-113	-0.0000135
100 %		- 20	836,600,118	118	0.0000141
100 %		- 10	836,600,114	114	0.0000136
100 %		0	836,599,960	-40	-0.0000048
100 %		+ 10	836,599,990	-10	-0.0000012
100 %		+ 20	836,600,042	42	0.0000050
100 %		+ 30	836,599,867	-133	-0.0000159
100 %		+ 40	836,599,969	-31	-0.0000037
100 %		+ 50	836,600,086	86	0.0000103
BATT. ENDPOINT	3.05	+ 20	836,599,943	-57	-0.0000068

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 76 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 76 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



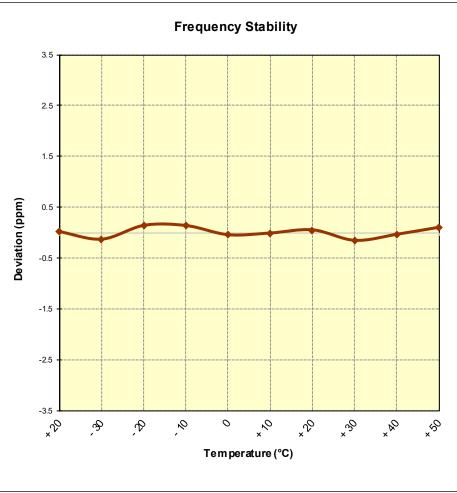


Figure 7-9. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 77 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 77 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,599,914	-86	-0.0000050
100 %		- 30	1,732,600,122	122	0.0000070
100 %		- 20	1,732,599,780	-220	-0.0000127
100 %		- 10	1,732,599,853	-147	-0.000085
100 %		0	1,732,600,065	65	0.000038
100 %		+ 10	1,732,600,273	273	0.0000158
100 %		+ 20	1,732,599,656	-344	-0.0000199
100 %		+ 30	1,732,600,054	54	0.0000031
100 %		+ 40	1,732,600,115	115	0.0000066
100 %		+ 50	1,732,599,995	-5	-0.0000003
BATT. ENDPOINT	3.05	+ 20	1,732,599,913	-87	-0.0000050

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: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 78 of 84
© 2018 PCTEST Engineering Laboratory. Inc.				V 8.0 03/13/2018



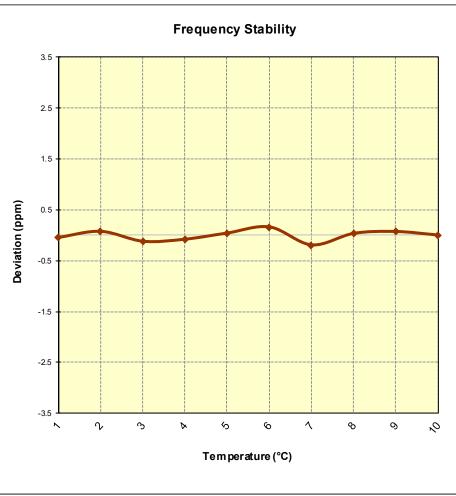


Figure 7-10. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 79 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 79 01 64
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT :	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,940	-60	-0.0000032
100 %		- 30	1,879,999,832	-168	-0.000089
100 %		- 20	1,879,999,657	-343	-0.0000182
100 %		- 10	1,879,999,765	-235	-0.0000125
100 %		0	1,880,000,160	160	0.0000085
100 %		+ 10	1,880,000,031	31	0.0000016
100 %		+ 20	1,879,999,919	-81	-0.0000043
100 %		+ 30	1,879,999,949	-51	-0.0000027
100 %		+ 40	1,879,999,654	-346	-0.0000184
100 %		+ 50	1,879,999,898	-102	-0.0000054
BATT. ENDPOINT	3.05	+ 20	1,879,999,954	-46	-0.0000024

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 80 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Fage 00 01 04
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



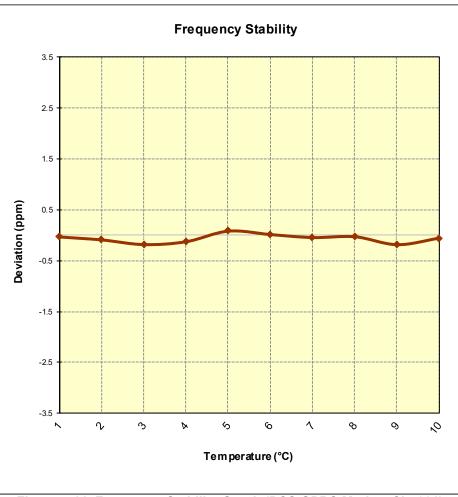


Figure 7-11. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 91 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 81 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,843	-157	-0.000084
100 %		- 30	1,879,999,784	-216	-0.0000115
100 %		- 20	1,880,000,032	32	0.0000017
100 %		- 10	1,879,999,916	-84	-0.0000045
100 %		0	1,879,999,929	-71	-0.000038
100 %		+ 10	1,879,999,797	-203	-0.0000108
100 %		+ 20	1,880,000,048	48	0.0000026
100 %		+ 30	1,879,999,906	-94	-0.0000050
100 %		+ 40	1,880,000,458	458	0.0000244
100 %		+ 50	1,880,000,049	49	0.0000026
BATT. ENDPOINT	3.05	+ 20	1,880,000,133	133	0.0000071

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

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 82 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 02 01 04
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



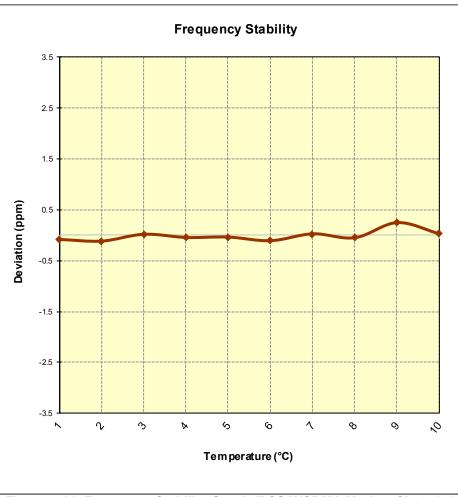


Figure 7-12. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 92 of 94
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Page 83 of 84
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			



8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFX410AS** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.

FCC ID: ZNFX410AS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 84 of 84
1M1803140041-02-R1.ZNF	3/14 - 5/17/2018	Portable Handset		Fage 64 01 64
© 2018 PCTEST Engineering Labo	V 8.0 03/13/2018			