

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 / CDMA / WCDMA

Applicant Name:

LG Electronics USA, Inc. 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: 12/10 - 12/21/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1812110223-02.ZNF

FCC ID:

ZNFX220QM

APPLICANT:

LG Electronics USA, Inc.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s): Certification LM-X220QM LMX220QM, X220QM Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 22, 24, & 27 ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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

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





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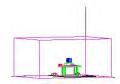


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			Ef	RP	EI	RP	
Mode	FCC Rule Part	Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Emission Designator
GPRS850	22H	824.2 - 848.8	1.048	30.20	1.719	32.35	243KGXW
EDGE850	22H	824.2 - 848.8	0.284	24.53	0.466	26.68	244KG7W
CDMA850	22H	824.70 - 848.31	0.195	22.89	0.319	25.04	1M28F9W
WCDMA850	22H	826.4 - 846.6	0.192	22.82	0.314	24.97	4M15F9W
WCDMA1700	27	1712.4 - 1752.6			0.317	25.01	4M14F9W
GPRS1900	24E	1850.2 - 1909.8			1.046	30.20	246KGXW
EDGE1900	24E	1850.2 - 1909.8			0.458	26.61	249KG7W
CDMA1900	24E	1851.25 - 1908.75			0.440	26.44	1M28F9W
WCDMA1900	24E	1852.4 - 1907.6			0.380	25.79	4M14F9W

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFX220QM**. 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.: 00307, 00313, 00784, 00776

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA (BC0, BC1), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA, Multi-band LTE, 802.11b/g/n WLAN, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

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

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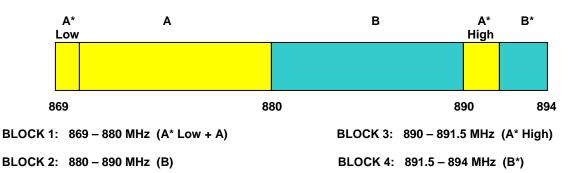
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

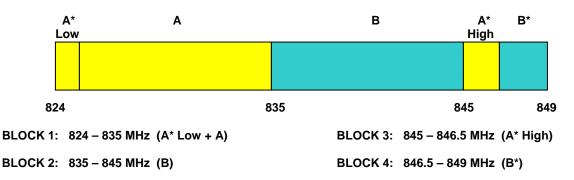
The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

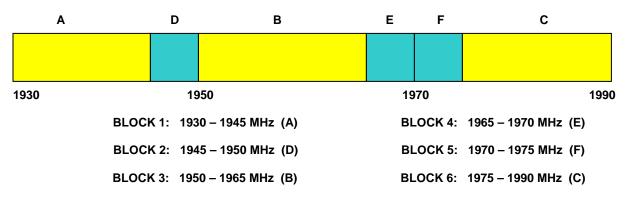
3.2 Cellular - Base Frequency Blocks



3.3 Cellular - Mobile Frequency Blocks



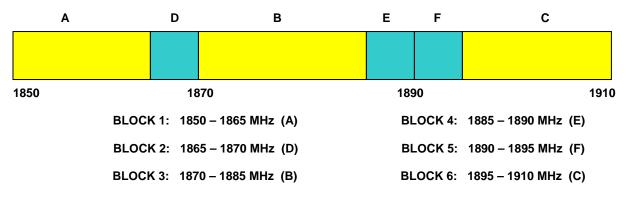
3.4 PCS - Base Frequency Blocks



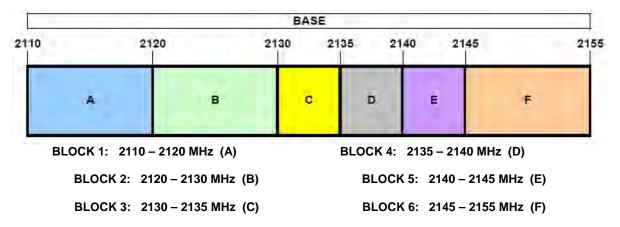
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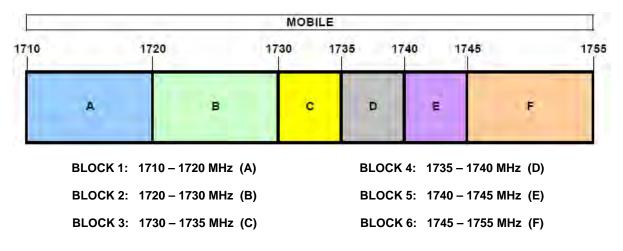
3.5 PCS - Mobile Frequency Blocks



3.6 AWS - Base Frequency Blocks



3.7 AWS - Mobile Frequency Blocks



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3.8 Radiated Measurements

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

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

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

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

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

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

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

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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx3	LIcensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx3
Agilent	E5515C	Wireless Communications Test Set	1/29/2016	Triennial	1/29/2019	GB46310798
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	E5515C	Wireless Communications Test Set	3/4/2016	Triennial	3/4/2019	GB45360985
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
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		N/A	QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	3/30/2018	Annual	3/30/2019	11210140001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11403100002
Rohde & Schwarz	CMU200	Base Station Simulator	5/18/2018	Annual	5/18/2019	109892
Rohde & Schwarz	CMW500	Radio Communication Tester	6/8/2018	Annual	6/8/2019	112347
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	4/30/2018	Biennial	4/30/2020	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	4/30/2018	Biennial	4/30/2020	9105-2403
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/11/2017	Biennial	8/11/2019	A042511

Notes:

- Table 5-1. Test Equipment
- 1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- 2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

GPRS Emission Designator

Emission Designator = 250KGXW

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

EDGE Emission Designator

Emission Designator = 250KG7W

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

CDMA Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W

WCDMA BW = 4.16 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data)

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm -(-24.80) = 50.3 dBc.

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7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics USA, Inc.
FCC ID:	ZNFX220QM
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>GSM / GPRS / EDGE / CDMA / WCDMA</u>

FCC Part Section(s)	RSS Section(s)	Test Description	Test Description Test Limit		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 + 10log 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	NI/A		PASS	RF Exposure Report
2.1055 22.355 24.235 27.54	RSS-132(5.3) RSS-133(6.3) RSS-139(6.4)	Frequency Stability	< 2.5 ppm (Part 22) Emission must remain in band (Part 24, 27)		PASS	Section 7.8
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP		PASS	Section 7.6
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 7.6
27.50(d)(4)	RSS-139(6.5)	Equivalent Isotropic Radiated Power			PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	> 43 + 10log 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 3.11.

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7.2 Occupied Bandwidth

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 4.2

Test Settings

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

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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🔤 Keysight Spectrum Analyzer - Occupied BW					- ē 💌
LX RL RF 50Ω AC	CORREC	SENSE:INT Freg: 836.600000 MHz	07:51:47 Pt Radio Std:	1Dec 20, 2018 None	Trace/Detector
	Trig:	Free Run Avg Hold: n: 38 dB	100/100 Radio Devi	ine: BTS	
	#IFGain:Low #Atte	n. 36 dB	Radio Dev	ce. BT3	
15 dB/div Ref 35.00 dBm					
Log					
20.0	· · · · · · · · · · · · · · · · · · ·		_		Clear Write
5.00			March 1		Cicui Mila
-10.0			Marine Contraction of the second s	Mm-	
-25.0				- Andrew	A
-40.0					Average
-55.0					
-70.0					
-85.0					Max Hold
-100					
Center 836.6 MHz				625 kHz	
Res BW 6.2 kHz	#	¢VBW 18 kHz	Sweep	15.6 ms	Min Hold
Occupied Bandwidt	า	Total Power	39.4 dBm		
	13.13 kHz				Detecto
24	+J. 13 KI IZ				Peakl
Transmit Freq Error	-756 Hz	% of OBW Powe	r 99.00 %		Auto <u>Mar</u>
x dB Bandwidth	312.7 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)

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



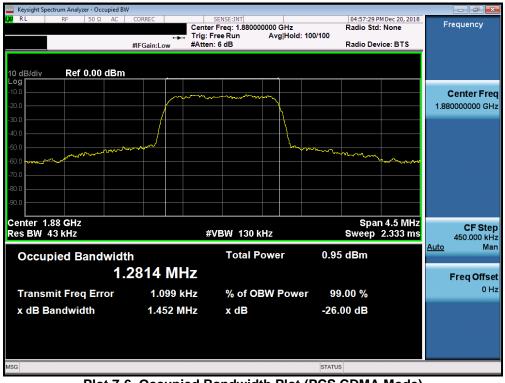
Plot 7-4. Occupied Bandwidth Plot (EDGE1900 Mode)

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



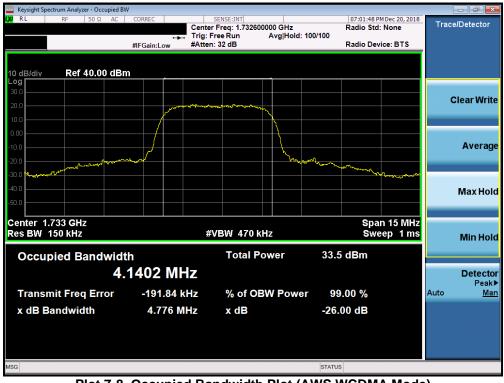
Plot 7-6. Occupied Bandwidth Plot (PCS CDMA Mode)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 16 of 102
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Plot 7-7. Occupied Bandwidth Plot (Cellular WCDMA Mode)



Plot 7-8. Occupied Bandwidth Plot (AWS WCDMA Mode)

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Plot 7-9. Occupied Bandwidth Plot (PCS WCDMA Mode)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 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.

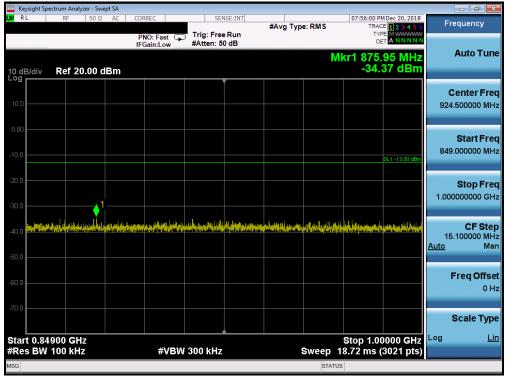
FCC ID: ZNFX220QM	(USIAL EVE STEET	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 10 of 102
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Cellular GPRS Mode

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MSG													ST	TATUS				

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

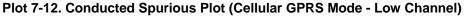


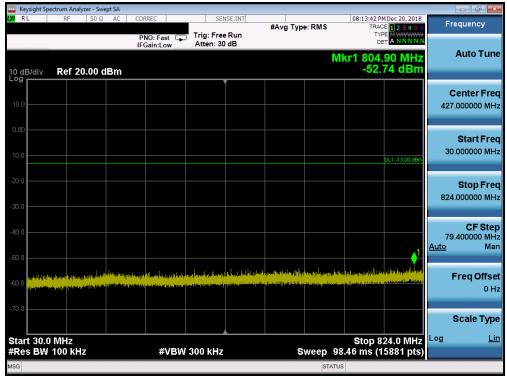
Plot 7-11. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dago 20 of 102
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	pectrum Analyzer -						- ē -
X/RL	RF 5	OΩ AC	CORREC	SENSE:INT	#Avg Type: F	07:56:25 PM Dec 2 CMS TRACE 12	Frequency
			PNO: Fast 📮 IFGain:Low	Trig: Free Run #Atten: 38 dB			N N N N
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	/ 1.0 MHz		#VBV	/ 3.0 MHz	SWe	ep 15.60 ms (18001	prsj
50						STATUS	





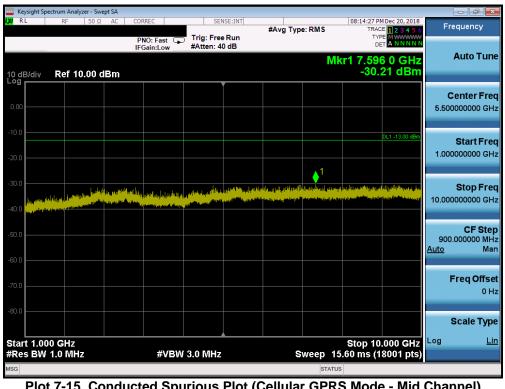
Plot 7-13. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX220QM	SISTALLEY STATEST	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	pectrum Analyz										×
l XI RL	RF	50 Ω AC	CORREC	SE	NSE:INT	#Avg Typ	e: RMS		M Dec 20, 2018	Frequency	
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			IFGain:Low	#Atten: 5	U UB			/kr1 938.	10 MH-	Auto Tu	Ine
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										Scale Ty	/ре
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	TUU KHZ		#VBV	V 300 KHZ				18.72 ms ((SUZT PLS)		
MSG							STAT	US			

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



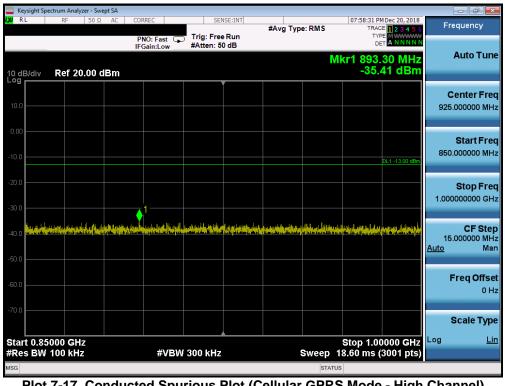
Plot 7-15. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFX220QM	CALIFICATION OF STREET	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N: Test Dates: EUT T		EUT Type:		Dage 22 of 102
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	ectrum Analyze											
LXI RL	RF	50Ω A	C COF	RREC	SEN	NSE:INT	#Avg Typ	e: RMS		M Dec 20, 2018 CE 1 2 3 4 5 6	Fre	quency
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-10.0										DL1 -13.00 dBm	30.0	
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MSG								STA	TUS			

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



Plot 7-17. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	pectrum Analyzer -									x
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			PNO: Fast 🕞 IFGain:Low	Trig: Free Ru #Atten: 40 dl	un 🔍		TYPE DET r1 8.587	0 GHz	Auto Tu	ne
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MSG						STATUS				

Plot 7-18. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

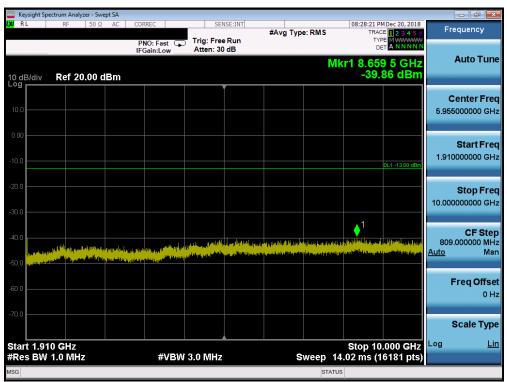
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 24 of 102
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© 2010 PCTEST Engineering Labo	ratory Inc			\/ 8 8 11/10/2018



PCS GPRS Mode

	ctrum Analyzer - Sw	ept SA								
LXI RL	RF 50 Ω	AC CC	ORREC		VSE:INT	#Avg Typ	e: RMS	TRAC	M Dec 20, 2018 DE 1 2 3 4 5 6	Frequency
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										Start Fre 30.000000 MH
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WSG			<i>"</i> • E •				STATUS		eeer pto)	

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



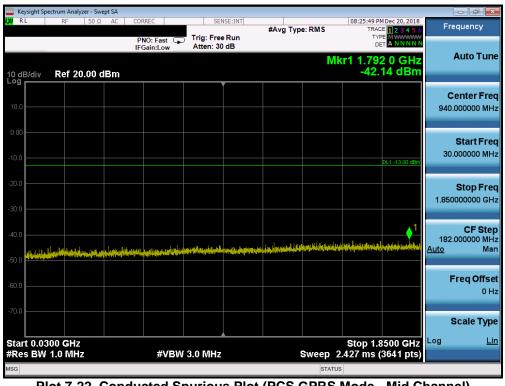
Plot 7-20. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	ectrum Analyz	er - Swept SA	4								- F
XI RL	RF	50 Ω AC		REC		e Run	#Avg Typ	e: RMS	TR/	PM Dec 20, 2018 ACE 1 2 3 4 5 6 YPE M WWWWWW DET A N N N N N	Frequency
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-80.0 Start 10.0									Stop 2	0.000 GHz	Scale Ty
#Res BW	1.0 MHz			#VB	W 3.0 MH	2	8		25.33 ms (mus	20001 pts)	

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



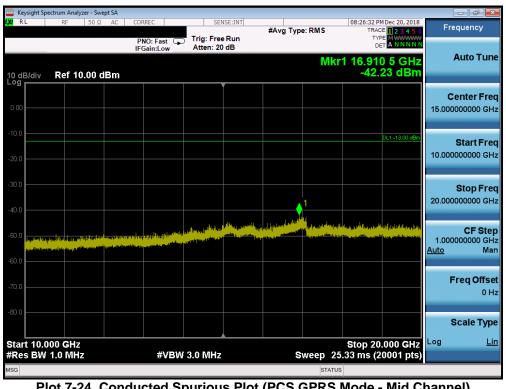
Plot 7-22. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX220QM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	ectrum Analyz												
L <mark>XI</mark> RL	RF	50 Ω	AC (CORREC		SEI	NSE:INT	#Avg Typ	e: RMS		PM Dec 20, 2018 ACE 1 2 3 4 5 6	Frequer	icy
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				IFGall:LOV	N	Atten. ot	ub.		M	kr1 9 4	48 0 GHz	Auto	Tune
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												0.5000000	00 0112
0.00													
												1.9100000	t Freq
-10.0											DL1 -13.00 dBm	1.9100000	JU GH2
-20.0													
20.0												Stoj 10.0000000	o Freq
-30.0												10.0000000	JU GHZ
											▲1		Oton
-40.0	AL	ر . اسرار			سريلەت بىلە	والمراجعة والمراجعة	Aller and a group of the state		P Block and the	and the second	AN COLOR OF STREET	809.0000	Step
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-30.0													
-60.0												Freq	Offset
													0 Hz
-70.0												0	-
												Scale	е Туре
Start 1.91										Stop 1	0.000 0112	Log	Lin
#Res BW	1.0 MHz			#\	/BW 3	.0 MHz		s			(16181 pts)		
MSG									STAT	US			

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



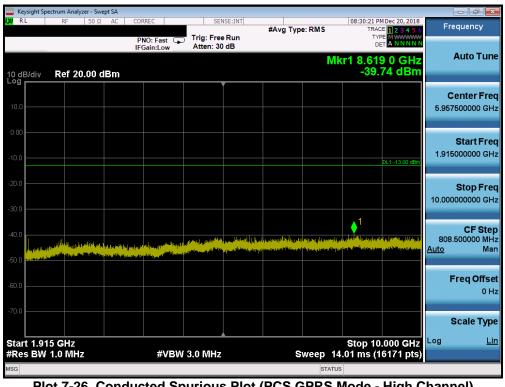
Plot 7-24. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 27 of 102
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	pectrum Analyz	zer - Swept S	SA								
LXI RL	RF	50 Ω)		RREC		NSE:INT	#Avg Typ	e: RMS	TRAC	M Dec 20, 2018	Frequency
10 dB/div	Ref 20	.00 dB	IF	PNO: Fast (Gain:Low	Atten: 30			М	kr1 1.51	6 5 GHz 38 dBm	Auto Tur
10.0											Center Fre 940.000000 MH
10.00										DL1 -13.00 dBm	Start Fre 30.000000 Mi
20.0											Stop Fre 1.850000000 GF
40.0	an daa dada ka sa daa	and statistics	inger bier er britte	n (jatalan) (n in de	n in the second	alay ya ang bahara ka s		an a	1 rapate star franks fra	, naji si da kiyo iyo diyo da ki k	CF Ste 182.000000 MH <u>Auto</u> Ma
60.0											Freq Offs 0 F
-70.0	300 GHz								Stop 11	8500 GHz	Scale Typ
	1.0 MHz	4		#VB	W 3.0 MHz			Sweep	2.427 ms ((3641 pts)	
ISG								STAT	JS		

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



Plot 7-26. Conducted Spurious Plot (PCS GPRS Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 102
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	ectrum Analy:												×
X/RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Avg Typ	e: RMS		PM Dec 20, 2018 ACE 1 2 3 4 5 6	Frequenc	y
				PNO: Fa		Trig: Free Atten: 20				1			
10 dB/div Log	Ref 10	.00 dE	Вm						Mk	r1 17.0 -42	70 5 GHz 79 dBm	Auto 1	Tune
0.00												Center 15.000000000	
-10.0											DL1 -13.00 dBm	Start 10.000000000	
-30.0									↓ 1			Stop 20.000000000	
-50.0	jan (1944) ka Ali ya ya ka Angaza kana ka Kangara ka ka	<mark>na je poplatel k</mark> Analisek stal ¹ (*	maile active a	inger gjur fille	and a state of the		, ²⁰¹ 0, (A., 197), (A., 197), 				a da da ya ya da da da gaya wa da ya	CF 1.000000000 <u>Auto</u>	Step O GHz Man
.70.0												Freq O	offsel 0 Hz
-80.0										Stor		Scale	Type Lin
start 10.0 #Res BW		2		#	VBW	3.0 MHz		s	weep 2	5.33 ms	0.000 GHz (20001 pts)		
MSG									STAT	JS			

Plot 7-27. Conducted Spurious Plot (PCS GPRS Mode - High Channel)

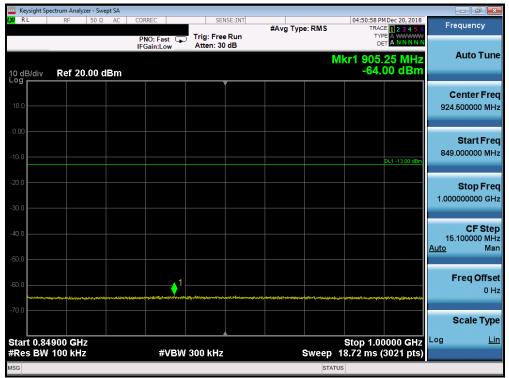
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of 102
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Cellular CDMA Mode

	ectrum Analyzer - S						
I <mark>XI</mark> RL	RF 50	Ω AC	PNO: Fast	Trig: Free Run Atten: 30 dB	#Avg Type: RMS	04:50:50 PM Dec 20, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div	Ref 20.00	dBm	I Guilleow		N	lkr1 822.90 MHz -33.34 dBm	Auto Tune
10.0							Center Fred 426.500000 MH:
-10.0						DL1 -13.00 dBm	Start Free 30.000000 MH
-20.0						1	Stop Free 823.000000 MH
-40.0							CF Ste 79.300000 MH <u>Auto</u> Ma
60.0	nyanian da ingeneration						Freq Offse 0 H
-70.0							Scale Type
Start 30.0 #Res BW			#VBV	/ 300 kHz	Sweep 9	Stop 823.0 MHz 8.33 ms (15861 pts)	Log <u>Lir</u>
MSG					STATU	JS	

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



Plot 7-29. Conducted Spurious Plot (Cellular CDMA Mode - Low Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 102
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	ectrum Analyzer -										a X
LXI RL	RF 50	Ω AC	CORREC	SEN	SE:INT	#Avg Typ	e: RMS	TRAC	M Dec 20, 2018 E 1 2 3 4 5 6	Frequ	ency
			PNO: Fast IFGain:Low	Trig: Free #Atten: 36			Mk	۳۲ ۵ 19.48		Au	to Tune
10 dB/div Log	Ref 10.00	0 dBm						-42.	19 dBm		
0.00					<i>.</i>					Cent 5.500000	e r Freq 000 GHz
-10.0									DL1 -13.00 dBm	Sta	art Frec
-20.0										1.000000	
-30.0									1	St 10.000000	o p Frec 000 GHz
-50.0			~								CF Step
-60.0										900.000 <u>Auto</u>	000 MHz Mar
-70.0										Free	Offset 0 Hz
-80.0										Sca	іе Туре
Start 1.00 #Res BW			#VBW	3.0 MHz			weep <u>15</u>	Stop 10 .60 ms <u> (1</u>	.000 GHz 8001 pts)	Log	Lin
MSG							STATUS				

Plot 7-30. Conducted Spurious Plot (Cellular CDMA Mode - Low Channel)

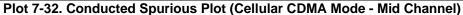


Plot 7-31. Conducted Spurious Plot (Cellular CDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 102
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		rig: Free Run Atten: 30 dB	#Avg Type: RMS	TRACE 12345 TYPE A WWWW DET A NNNN Mkr1 852.25 MH: -64.09 dBn	Auto Tun
99 10.0 0.00				Mkr1 852.25 MH: -64.09 dBn	Center Fre
10.0 0.00					
				DL1 -13.00 dB	Start Fre 849.000000 MH
0,0 0,0					Stop Fre 1.000000000 GF
0.0					CF Ste 15.100000 MH Auto Ma
0.0 1	ang tang ang ang ang ang ang ang ang ang ang	درمهم میکور درمهم میکور میکور درمهم میکور میکو میکور مممم می می میم می میکور مممم می می میم می می مم میم می میکور میکو می می میم می می می میکو می می میکو می	1927-001-728-7-02-9-1-42-9-1-42-8-2-02-	ah, dati ing ina ami pakang kang kang kang kang kang kang kang	Freq Offs 0 H
tart 0.84900 GHz				Stop 1.00000 GH	Scale Typ
Res BW 100 kHz	#VBW 30	10 kHz	Sweep	18.72 ms (3021 pts	5)



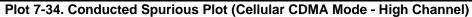


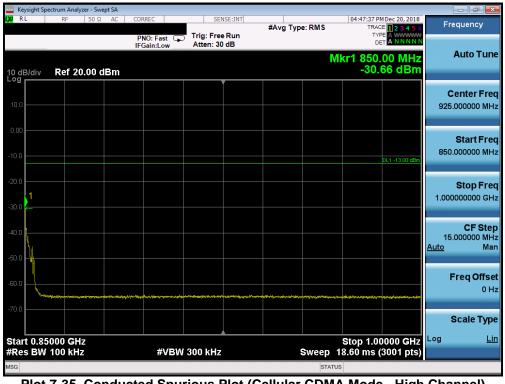
Plot 7-33. Conducted Spurious Plot (Cellular CDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 102
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	ectrum Analyzer - S									
LXI RL	RF 50	Ω AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		M Dec 20, 2018 CE 1 2 3 4 5 6	Frequency
			PNO: Fast G	Trig: Free Atten: 30				TY D		Auto Tune
10 dB/div Log	Ref 20.00	dBm						/lkr1 799 -62	.45 MHZ .49 dBm	
3				Ì	,					Center Freq
10.0										427.000000 MHz
0.00										
										Start Freq 30.000000 MHz
-10.0									DL1 -13.00 dBm	
-20.0										Stop Freq
-30.0										824.000000 MHz
										CF Step
-40.0										79.400000 MHz
-50.0										<u>Auto</u> Man
-60.0									1	Freq Offset
-80.0		den state and a low service se								0 Hz
-70.0										Scale Type
Start 30.0 #Res BW			#VBW	300 kHz		s	weep 9	Stop 8)8.46 m <u>s (</u>	324.0 MHz 15881 pts)	
MSG							STAT	_		





Plot 7-35. Conducted Spurious Plot (Cellular CDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 102
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	ectrum Analyzer - S										
I,XI RL	RF 50	Ω AC	CORREC	SENS	E:INT	#Avg Type:	RMS		Dec 20, 2018	Frequenc	cy
10 dB/div	Ref 10.00	dBm	PNO: Fast G	Trig: Free #Atten: 36				TYF DE r1 8.70	9 5 GHz 27 dBm	Auto	Tune
										Center 5.50000000	
-10.0									DL1 -13.00 dBm	Start 1.00000000	: Freq 0 GHz
-30.0								1		Stop 10.00000000	Freq 0 GHz
-50.0										CF 900.000000 <u>Auto</u>	Step 0 MHz Man
-70.0										Freq C	Offset 0 Hz
Start 1.00			#\/B\A	3.0 MHz		 Sw	een 15	Stop 10	.000 GHz 8001 pts)	Scale	Type Lin
MSG				5.0 191112		37	STATUS	vo mis (n	000 F pts)		

Plot 7-36. Conducted Spurious Plot (Cellular CDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 24 of 102
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Keysight	Spectrum Analyzer - Sw								
RL	RF 50 Ω	Р	RREC NO:Fast 🖵 Gain:Low	Trig: Free R Atten: 30 d	:un #	Avg Type: R		25:42 PM Dec 20, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
0 dB/div	Ref 20.00 c	dBm					Mkr1	1.845 0 GHz -50.05 dBm	Auto Tur
10.0									Center Fre 937.500000 MH
10.00								DL1 -13.00 dBm	Start Fro 30.000000 Mi
20.0									Stop Fr 1.845000000 G
10.0								1	CF Ste 181.500000 M <u>Auto</u> M
50.0	nga Sanagan ng Kang dan pang d			all where the state of a		مەيدانچەيياملىدىرىنچۇدۇلىرىمىسى 1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and a second	Freq Offs 0
70.0									Scale Ty
	0300 GHz N 1.0 MHz		#VBW	3.0 MHz		Swe	Steep 2.420	op 1.8450 GHz ms (3631 pts)	Log <u>l</u>
SG							STATUS		

Plot 7-37. Conducted Spurious Plot (PCS CDMA Mode - Low Channel)



Plot 7-38. Conducted Spurious Plot (PCS CDMA Mode - Low Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 25 of 102
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	ectrum Analyzer - Sv										
LXI RL	RF 50 S	AC AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		MDec 20, 2018	Frequ	ency
			PNO: Fast IFGain:Low	Trig: Free Atten: 20		0 71		TYF DE		A.,	to Tune
10 dB/div Log	Ref 10.00	dBm					Mkr	1 16.92 -50.	6 5 GHz 43 dBm	Au	lo i une
											ter Freq
0.00										15.000000	000 GHz
-10.0									DL1 -13.00 dBm	St	art Freq
-20.0										10.000000	
-30.0										St	op Freq
-40.0										20.000000	0000 GHz
-50.0							1			1.000000	CF Step
-60.0		-			~~~					Auto	Man
-70.0										Fre	q Offset
											0 Hz
-80.0										Sca	le Type
Start 10.0 #Res BW			#\/B\//	3.0 MHz		e	woon 25	Stop 20	.000 GHz 0001 pts)	Log	Lin
MSG	TRO INITIZ			5.0 Wi12			status		ooo r pis)		

Plot 7-39. Conducted Spurious Plot (PCS CDMA Mode - Low Channel)



Plot 7-40. Conducted Spurious Plot (PCS CDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 36 of 103
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	ectrum Analy	zer - Swept	t SA										i X
L <mark>XI</mark> RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Avg Typ	e: RMS	TRA	M Dec 20, 2018 CE 1 2 3 4 5 6	Freque	ncy
				PNO: Fa	ast 🖵	Trig: Free Atten: 30				TY D	PE A WWWWW ET A N N N N N		
				II Gam.E					M	(r1 5.55	4 5 GHz	Auto	o Tune
10 dB/div Log	Ref 20).00 dE	3m							-48.	09 dBm		
												Cente	er Freq
10.0												5.9550000	
0.00													
0.00													rt Freq
-10.0											DL1 -13.00 dBm	1.9100000	00 GHz
-20.0													
-20.0												Sto 10.0000000	p Free
-30.0												10.0000000	UU GH
												с	F Ster
-40.0						▲1						809.0000 Auto	00 MH: Mar
-50.0					Constant of the second s				*****			<u>/(uto</u>	mai
			1									Freq	Offse
-60.0													0 H;
-70.0													
												Scal	е Туре
Start 1.91				'						Stop 10	.000 GHz	Log	Lin
#Res BW	1.0 MH:	Z		#	VBW	3.0 MHz		S			6181 pts)		
150									STATUS				

Plot 7-41. Conducted Spurious Plot (PCS CDMA Mode - Mid Channel)



Plot 7-42. Conducted Spurious Plot (PCS CDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 27 of 102
1M1812110223-02.ZNF	12/10 - 12/21/2018	Portable Handset		Page 37 of 103
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	ectrum Analyz												
LXI RL	RF	50 Ω /	AC (CORREC		SE	NSE:INT	#Avg Typ	e: RMS	т	3 PM Dec 20, 2018 RACE 1 2 3 4 5 6	Frequ	iency
				PNO: Fa IFGain:Lo		Trig: Fre Atten: 30							
10 dB/div Log	Ref 20	.00 dB	m						N	/kr1 1.8 -5	44 5 GHz 1.63 dBm	Au	ito Tune
10.0													i ter Freq 0000 MHz
-10.0											DL1 -13.00 dBm		a rt Freq 0000 MHz
-20.0													t op Freq 0000 GHz
-40.0											1		CF Step 0000 MHz Man
-60.0			14	ntro projeko M		₩₩₩₽Ŷ₩ĊġĿŊĴĔ <i>ĸŊŢŔĬĬĬŶŶ</i> Ŧ		işe ci ng ti shi jinin keya din bili	5. Anoris-Antonio V	4+++**********************************	n kan ana ya ya ma siyo na ang mana ang	Fre	q Offse l 0 Hz
-70.0													ale Type
Start 0.03 #Res BW				#	VBW	3.0 MHz			Sweep	Stop 2.427 m	1.8500 GHz s (3641 pts)	Log	<u>Lin</u>
MSG									STAT	TUS			

Plot 7-43. Conducted Spurious Plot (PCS CDMA Mode - High Channel)



Plot 7-44. Conducted Spurious Plot (PCS CDMA Mode - High Channel)

FCC ID: ZNFX220QM	SUSALING STORE OF	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 102
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	ctrum Analyzer -	Swept SA									
LXI RL	RF 50	Ω AC	CORREC	SEN	ISE:INT	#Avg Typ			MDec 20, 2018	Fre	quency
			PNO: Fast 🕞 IFGain:Low	Trig: Free #Atten: 40		#/(19 1)P		TYF DE			Auto Tune
10 dB/div Log	Ref 10.00) dBm						-29.	95 dBm		
										C	enter Freq
0.00										15.000	000000 GHz
-10.0									DL1 -13.00 dBm		Start Freq
-20.0											000000 GHz
-30.0							1				o
				and the second s			L				Stop Freq 000000 GHz
-40.0											CF Step
-50.0										1.000 <u>Auto</u>	000000 GHz Man
-60.0											
-70.0										F	req Offset 0 Hz
-80.0											
											cale Type
Start 10.0 #Res BW			#VBN	/ 3.0 MHz		s	weep 25	Stop 20 .33 ms (2	.000 GHz 0001 pts)	Log	<u>Lin</u>
MSG							STATUS				

Plot 7-45. Conducted Spurious Plot (PCS CDMA Mode - High Channel)

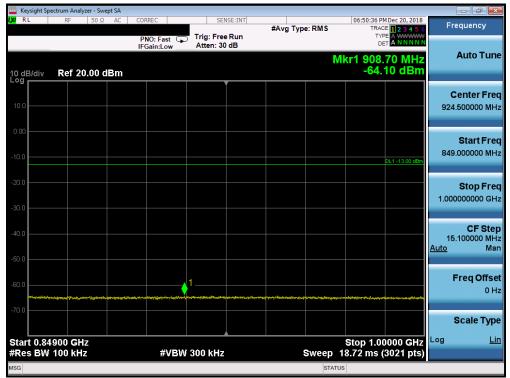
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of 102
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Cellular WCDMA Mode

	trum Analyzer - Swept						
XI RL	RF 50 Ω	AC CORREC PNO: Fas IFGain:Lo	Trig: Fre	#Avg Type: RN		28 PM Dec 20, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div	Ref 20.00 dB		W Atten. 0		Mkr1 8	22.85 MHz 38.00 dBm	Auto Tun
10.0							Center Free 426.500000 MH
10.0						DL1 -13.00 dBm	Start Fre 30.000000 MH
30.0							Stop Fre 823.000000 M⊦
40.0							CF Ste 79.300000 MH <u>Auto</u> Ma
60.0							Freq Offse 0 ⊦
-70.0						- 000 0 Mal	Scale Typ
Start 30.0 I #Res BW 1	00 kHz	#\	/BW 300 kHz	Swee	sto p 98.33 m	p 823.0 MHz s (15861 pts)	
MSG					STATUS		

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



Plot 7-47. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 102
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	ectrum Analyzer -							
L <mark>XI</mark> RL	RF 50	ΩAC	CORREC	SENSE:	INT #Avg Typ		TRACE 1 2 3 4 5 6	Frequency
	D -5 40.00		PNO: Fast IFGain:Low	Trig: Free Ru #Atten: 36 dl		Mkr1 8	CET A NNNN DET A NNNNN 3.671 5 GHz -42.43 dBm	Auto Tune
10 dB/div Log	Ref 10.00	dBm					-42.45 UBIII	Center Freq 5.50000000 GHz
-10.0							DL1 -13.00 dBm	Start Freq 1.000000000 GHz
-30.0							1	Stop Freq 10.000000000 GHz
-50.0			********	~~~				CF Step 900.000000 MHz <u>Auto</u> Man
-60.0								Freq Offset 0 Hz
-80.0								Scale Type
Start 1.00 #Res BW			#VBW	3.0 MHz	S	Sto weep 15.60 n	p 10.000 GHz ns (18001 pts)	Log <u>Lin</u>
MSG						STATUS		

Plot 7-48. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)



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

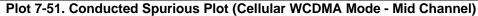
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 102
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© 2010 PCTEST Engineering Lab	oratory Inc			\/ 8 8 11/10/2018



	ectrum Analyz		t SA									- F	x
X/RL	RF	50 Ω	AC	CORREC		SE	NSE:INT	#Avg Typ	e: RMS	TR	PM Dec 20, 2018 ACE 1 2 3 4 5 6	Frequency	,
				PNO: Fa		Trig: Free Atten: 30				Т	TYPE A WWWWW DET A NNNNN		
				II Guille					Ν	/kr1 849	9.00 MHz	Auto T	une
10 dB/div Log	Ref 20	.00 dE	3m							-58	.32 dBm		
							Ĭ					Center F	rea
10.0												924.500000	
0.00												Start F	req
-10.0											DL1 -13.00 dBm	849.000000	MHz
											UL1 -13.00 dBm		
-20.0												Stop F	req
-30.0												1.000000000	GHz
30.0													
-40.0												CF S 15.100000	
													Man
-50.0													
-60.0												Freq Of	
Sunny Strategies	man			1	-		مريد نيميز ويور ويور ويور ويور ويور ويور ويور وي	na magainstanaan					0 Hz
-70.0												Ocolo T	
												Scale T	уре
Start 0.84									_	Stop 1.	00000 GHz	Log	Lin
#Res BW	100 kHz			#	VBW	300 kHz					(3021 pts)		
ISG									STAT	05			

Plot 7-50. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

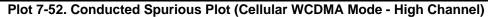


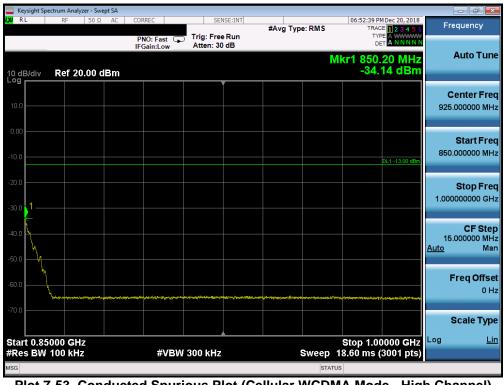


FCC ID: ZNFX220QM	(SSIALENS ASSISTER, S)	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	ectrum Analyzer - Sw								
XI RL	RF 50 Ω	AC	CORREC		#Avg Type	RMS	TRAC	M Dec 20, 2018 E 1 2 3 4 5 6 E A WWWW	Frequency
10 dB/div	Ref 20.00 d	dBm	PNO: Fast G	Atten: 30		М	kr1 796.	20 MHz 31 dBm	Auto Tun
10.0									Center Fre 427.000000 MH
-10.0								DL1 -13.00 dBm	Start Free 30.000000 MH
-20.0									Stop Free 824.000000 MH
-40.0									CF Step 79.400000 MH <u>Auto</u> Mar
-60.0					llerge of system of the system of the second states				Freq Offse 0 H
-70.0									Scale Type
Start 30.0 #Res BW			#VBI	N 300 kHz	SI	weep 98	Stop 8 3.46 ms (1	24.0 MHz 5881 pts)	Log <u>Li</u> i
MSG						STATUS	S		





Plot 7-53. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFX220QM	(USALLEYS - SELECT - S)	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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LXIRL	RF 50 Ω		ORREC		NSE:INT			06:53:04 P	MDec 20, 2018	_	
			B110 5				e: RMS	TRAC	E 1 2 3 4 5 6	Free	quency
			PNO: Fast 🕞	Trig: Free #Atten: 3				TYI DI	3 5 GHz 01 dBm	Ļ	luto Tune
10 dB/div Log	Ref 10.00 c	dBm						-42.			enter Freq
-10.0									DL1 -13.00 dBm		Start Freq
-30.0								.1			Stop Freq
-40.0										900.0 Auto	CF Step 00000 MHz Man
-60.0											req Offset 0 Hz
-80.0											cale Type
Start 1.000 #Res BW 1) GHz I.0 MHz		#VBV	/ 3.0 MHz		S	weep 15	.60 ms (1	.000 GHz 8001 pts)	Log	Lin

Plot 7-54. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

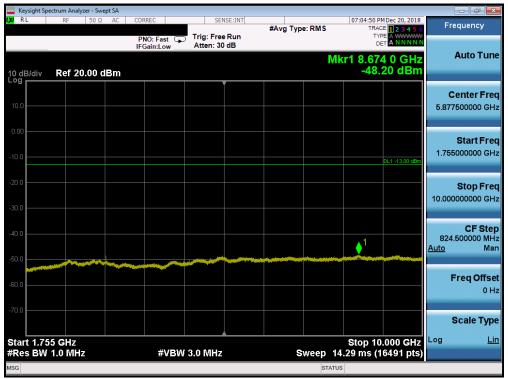
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 44 of 102
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AWS WCDMA Mode

	ectrum Analyzer - Swept SA					
KU RL	RF 50 Ω AC	PNO: Fast	SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	07:04:36 PM Dec 20, 2018 TRACE 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
I0 dB/div	Ref 20.00 dBn			М	kr1 1.705 0 GHz -32.94 dBm	Auto Tun
10.0						Center Free 867.500000 MH
10.0					DL1 -13.00 dBm	Start Fre 30.000000 MH
30.0					<u>1</u>	Stop Fre 1.705000000 GH
40.0						CF Ste 167.50000 MH <u>Auto</u> Ma
60.0	and the second	and and segment of instruction and second	and a state of the	an and a fair of the state of the	lan gana ana ana ang kana kana kana kana	Freq Offse 0 H
70.0						Scale Typ
Start 0.03 Res BW	000 GHz 1.0 MHz	#VBW	3.0 MHz	Sweep :	Stop 1.7050 GHz 2.233 ms (3351 pts)	Log <u>Li</u>
ISG				STATU	IS	

Plot 7-55. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)



Plot 7-56. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager	
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	ectrum Analyzer - Sv										
L <mark>XI</mark> RL	RF 50 S	2 AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		MDec 20, 2018	Freque	ncy
			PNO: Fast IFGain:Low	Trig: Free Atten: 20		0 ,1		TYF DE			-
10 dB/div Log	Ref 10.00	dBm					Mkr	1 17.03 -50.	0 0 GHz 50 dBm	Auto	o Tune
					/						er Freq
0.00										15.0000000	00 GHz
-10.0									DL1 -13.00 dBm	Sta	rt Freq
-20.0										10.0000000	
-30.0										Sto	p Freq
-40.0										20.0000000	00 GHz
-50.0							1			C 1.0000000	F Step
-60.0				~~	~~~					Auto	Man
-70.0										Freq	Offset
-80.0											0 Hz
										Scal	е Туре
Start 10.0 #Res BW			#VBW	3.0 MHz		s	weep 25	Stop 20 .33 ms (2	.000 GHz 0001 pts)	Log	<u>Lin</u>
MSG							STATUS				

Plot 7-57. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)



Plot 7-58. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:			Dama 40 af 400	
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IX RL RF 50 Ω AC CORREC SENSE:INT #Avg T PNO: Fast Trig: Free Run IFGain:Low Atten: 30 dB	0	7:02:17 PM Dec 20, 2018	
PNO: Fast 😱 Trig: Free Run	Type: RMS	TRACE 1 2 3 4 5 6	Frequency
			Auto Tune
10 dB/div Ref 20.00 dBm	MKM	8.685 0 GHz -48.12 dBm	
			Center Freq
10.0			5.877500000 GHz
0.00			Start Freq
-10.0		DL1 -13.00 dBm	1.755000000 GHz
-20.0			Stop Freq
-30.0			10.000000000 GHz
			CF Step
-40.0		♦ ¹	824.500000 MHz <u>Auto</u> Man
-50.0			
-60.0			Freq Offset 0 Hz
-70.0			0 H2
			Scale Type
Start 1.755 GHz #Res BW 1.0 MHz #VBW 3.0 MHz	Swoon 14 20	top 10.000 GHz ms (16491 pts)	Log <u>Lin</u>
	Sweep 14.29	ms (10491 pts)	

Plot 7-59. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)



Plot 7-60. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager	
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🔤 Keysight Spe			it SA										
LXI RL	RF	<u>50 Ω</u>	AC	CORREC		SE	NSE:INT	#Avg Typ	e: RMS	т	2 PM Dec 20, 2018 RACE 1 2 3 4 5 6	Freque	ency
				PNO: F IFGain:	ast 🖵 .ow	Trig: Fre Atten: 3							_
10 dB/div Log	Ref 20	.00 di	Зm						N	1kr1 1.6 -5	83 5 GHz 1.59 dBm	Aut	o Tune
							Ĭ					Cent	er Freq
10.0												870.000	000 MHz
0.00													art Freq
-10.0											DL1 -13.00 dBm	30.000	000 MHz
-20.0													op Freq
-30.0												1.710000	000 GHz
-40.0													CF Step
-50.0												Auto	Man
-60.0			المحيوات الجين	ومعودته وأفادوستمر	pa daga pa da filipa	and the second		an in the state of		andi and i and a since a since	wynangenie wedin de generale ander de	Free	q Offset
													0 Hz
-70.0												Sca	Іе Туре
Start 0.030 #Res BW		,			#\/B\M	3.0 MHz	<u> </u>		Sween	Stop	1.7100 GHz s (3361 pts)	Log	<u>Lin</u>
WSG						5.0 10112			SWEEP		s (5501 pts)		

Plot 7-61. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)



Plot 7-62. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	ctrum Analyzer	- Swept S	SA									
IXI RL	RF	50Ω/	AC CO	RREC	SEI	NSE:INT	#Avg Typ	e: RMS		M Dec 20, 2018	Fr	equency
			P	NO: Fast 🔾 Gain:Low	Trig: Free Atten: 20				TY	PE A WWWWW ET A N N N N N		
			11	Game	/11011.20	ub .		Mk	1 16 98	1 0 GHz		Auto Tune
10 dB/div	Ref 10.0)0 dB	m						-50.	11 dBm		
)							enter Freq
0.00												0000000 GHz
-10.0										DL1 -13.00 dBm		Start Freq
											10.000	0000000 GHz
-20.0												
-30.0												Stop Freq
											20.000	0000000 GHz
-40.0												
								1				CF Step
-50.0										and the second		0000000 GHz
-60.0											<u>Auto</u>	Man
-70.0												Freq Offset 0 Hz
												0 H2
-80.0												Scale Type
												scale Type
Start 10.0									Stop 20	.000 GHz	Log	<u>Lin</u>
#Res BW					/ 3.0 MHz		s			20001 pts)		
мsg 🤹 Point	s changed;	all trac	ces clea	red				STATU	S			

Plot 7-63. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

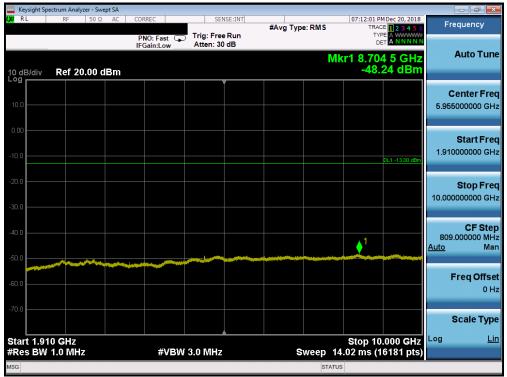
FCC ID: ZNFX220QM	SISTALLEY STATEST	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 102
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PCS WCDMA Mode

	ectrum Analyzer - Sv								
XI RL	RF 50 Ω	P	RREC			#Avg Type: RM		1:45 PM Dec 20, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
10 dB/div	Ref 20.00		Gain:Low	Atten: 30	dB		Mkr1 1	.845 0 GHz 39.76 dBm	Auto Tune
10.0									Center Fred 937.500000 MH;
-10.0								DL1 -13.00 dBm	Start Free 30.000000 MH:
-20.0									Stop Fred 1.845000000 GH
-40.0								1,	CF Step 181.500000 MH <u>Auto</u> Mar
60.0		n fan fan de fan			an ali la si an			ling de State of an	Freq Offse 0 H
-70.0									Scale Type
Start 0.03 #Res BW	00 GHz 1.0 MHz		#VBW	3.0 MHz		Swee	Sto 2.420	p 1.8450 GHz ms (3631 pts)	Log <u>Lir</u>
ISG							STATUS		

Plot 7-64. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)



Plot 7-65. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)

FCC ID: ZNFX220QM	SUSALING ASSISTED	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 50 of 102
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	ectrum Analyzer - S										
LXI RL	RF 50	Ω AC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS		MDec 20, 2018	Frequ	ency
			PNO: Fast 🖵 IFGain:Low	Trig: Free Atten: 20		• ,,		TYP			
10 dB/div Log	Ref 10.00	dBm					Mkr	1 17.01 -50.	7 0 GHz 43 dBm	Au	to Tune
				Ì							er Freq
0.00										15.000000	000 GHz
-10.0									DL1 -13.00 dBm	Sta	art Freq
-20.0										10.000000	
-30.0										St	op Freq
-40.0										20.000000	000 GHz
-50.0							1			1.000000	CF Step
-60.0				-	<u> </u>					Auto	Man
-70.0										Free	q Offset
											0 Hz
-80.0										Sca	le Type
Start 10.0 #Res BW			#\/B\//	3.0 MHz			ween 25	Stop 20	.000 GHz 0001 pts)	Log	<u>Lin</u>
MSG	110 10112		# ¥ 13 ¥ 4	0.0 10112			STATUS		ocor pts)		

Plot 7-66. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)



Plot 7-67. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	ectrum Analyzer - Sv										
I,XI RL	RF 50 \$	2 AC	CORREC	SENS	E:INT	#Avg Type	e: RMS		M Dec 20, 2018 CE 1 2 3 4 5 6	Frequ	ency
			PNO: Fast 😱 IFGain:Low	Trig: Free #Atten: 34				TΥ			
10 dB/div Log	Ref 20.00	dBm					Mk	(r1 8.66 -44	8 0 GHz .09 dBm	Au	to Tune
10.0										Cent 5.955000	e r Freq 000 GHz
-10.0									DL1 -13.00 dBm	St a 1.910000	art Freq 000 GHz
-20.0										Sto 10.000000	o p Freq 000 GHz
-40.0					-						C F Step 000 MHz Man
-60.0										Free	offset 0 Hz
-70.0											le Type
Start 1.91 #Res BW			#VBW	3.0 MHz		S	weep 14	Stop 10 .02 ms (*	0.000 GHz 16181 pts)	LUg	Lin
MSG							STATUS	6			

Plot 7-68. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)



Plot 7-69. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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	ectrum Analyzer -										×
<mark>XI</mark> RL	RF 5	OΩ AC	CORREC	SEN	SE:INT	#Avg Typ	e: RMS		M Dec 20, 2018 CE 1 2 3 4 5 6	Frequenc	:y
			PNO: Fast 🖵 IFGain:Low	Trig: Free Atten: 30		• /		TY D			_
10 dB/div Log	Ref 20.0	0 dBm					Μ	kr1 1.84 -51.	2 5 GHz 69 dBm	Auto [•]	Tune
10.0										Center 940.000000	
0.00											
-10.0									DL1 -13.00 dBm	Start 30.000000	
-20.0									Der - 13.00 dom	Stop	Fre
-30.0										1.85000000	
-40.0										CF 182.00000	Step
-50.0									<u> </u>	Auto	Mar
-60.0	47.100 Mar 199	and the second		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	**************************************	1,2,5,4,4,02,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,				Freq O)ffse 0 H:
-70.0											
										Scale	Type <u>Lir</u>
Start 0.03 #Res BW			#VBW	3.0 MHz			Sweep	Stop 1. 2.427 ms	8500 GHz (3641 pts)		<u>LII</u>
MSG							STATU	JS			

Plot 7-70. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)



Plot 7-71. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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	ctrum Analyzer - Sw									[
LXI RL	RF 50 Ω	AC	CORREC	SEN	ISE:INT	#Avg Typ			M Dec 20, 2018 E 1 2 3 4 5 6	Fre	equency
10 dB/div	Ref 10.00 (dBm	PNO: Fast G	Trig: Free #Atten: 40				TYF	2 0 GHz 33 dBm		Auto Tune
0.00											enter Freq 000000 GHz
-10.0							.1		DL1 -13.00 dBm	10.000	Start Freq 000000 GHz
-30.0	and the second			~~~	~~~					20.000	Stop Freq 000000 GHz
-50.0										1.000 <u>Auto</u>	CF Step 000000 GHz Man
-70.0										F	F req Offset 0 Hz
-80.0								.		s Log	Scale Type Lin
Start 10.0 #Res BW			#VBW	3.0 MHz		S	weep 25	stop 20 .33 ms (2	.000 GHz 20001 pts)		<u></u>
MSG							STATUS				

Plot 7-72. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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7.4 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + 10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

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

Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

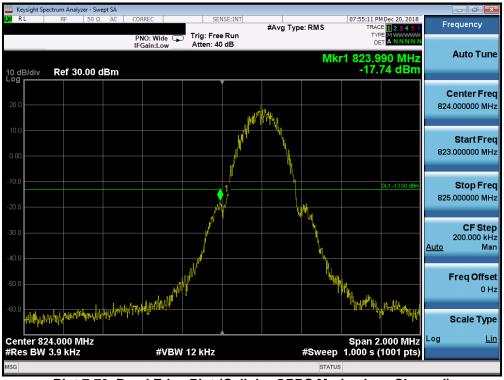
Test Notes

Per 22.917(b), 24.238(b), 27.53(h)(3), and RSS-132(5.5), RSS-133(6.5), RSS-139(6.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

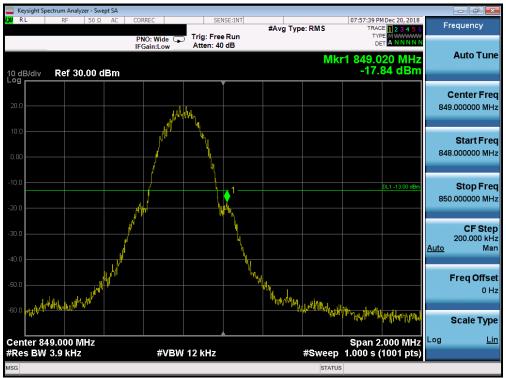
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Cellular GPRS Mode



Plot 7-73. Band Edge Plot (Cellular GPRS Mode - Low Channel)



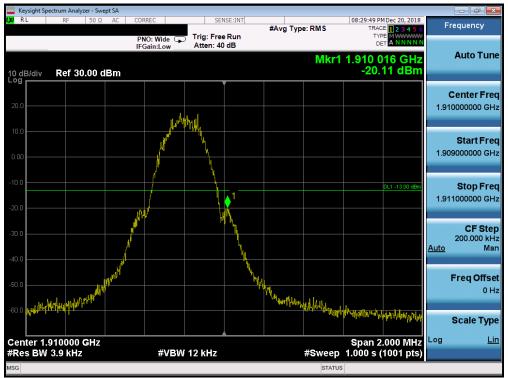
Plot 7-74. Band Edge Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swept SA RI 08:27:57 PM Dec 20, 2018 Frequency TRACE 1 2 3 4 5 TYPE MWWWW DET A NNNN #Avg Type: RMS PNO: Wide Trig: Free Run Atten: 40 dB Auto Tune Mkr1 1.849 996 GHz -19.73 dBm Ref 30.00 dBm 10 dB/div **Center Freq** 1.850000000 GHz Start Freq 1.849000000 GHz Stop Freq L1 -13.00 dB 1.851000000 GHz **CF Step** 200 000 kHz Auto Man **Freq Offset** 0 Hz li Ilui W.M. YANA MANAGA Scale Type Center 1.850000 GHz #Res BW 3.9 kHz Span 2.000 MHz #Sweep 1.000 s (1001 pts) Log Lin #VBW 12 kHz MSG STATUS

Plot 7-75. Band Edge Plot (PCS GPRS Mode - Low Channel)

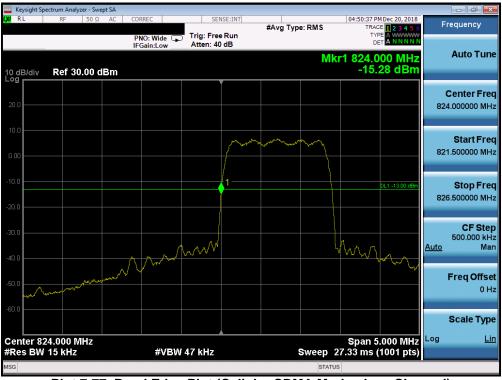


Plot 7-76. Band Edge Plot (PCS GPRS Mode - High Channel)

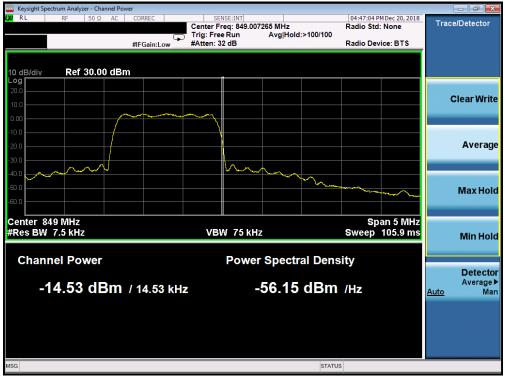
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage EZ of 102
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2010 POTE OT Excitational charactery line				V/0.0.44/40/2040



Cellular CDMA Mode



Plot 7-77. Band Edge Plot (Cellular CDMA Mode - Low Channel)



Plot 7-78. Band Edge Plot (Cellular CDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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Plot 7-79. Band Edge Plot (PCS CDMA Mode - Low Channel)



Plot 7-80. Band Edge Plot (PCS CDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 50 of 102
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Cellular WCDMA Mode



Plot 7-81. Band Edge Plot (Cellular WCDMA Mode - Low Channel)



Plot 7-82. Band Edge Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 60 of 102
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AWS WCDMA Mode



Plot 7-83. Band Edge Plot (AWS WCDMA Mode - Low Channel)



Plot 7-84. Band Edge Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 61 of 102
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				1/ 0 0 11/10/2010



PCS WCDMA Mode



Plot 7-85. Band Edge Plot (PCS WCDMA Mode - Low Channel)



Plot 7-86. Band Edge Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 62 of 102
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7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 5.7.1

Test Settings

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

Test Setup

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



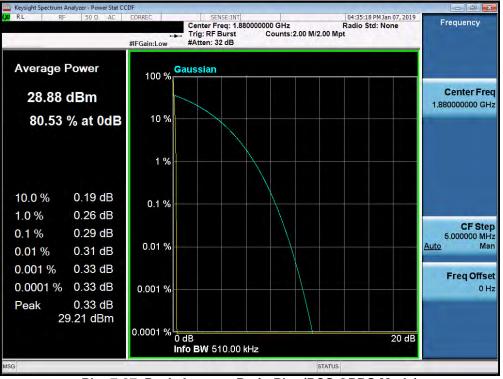
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 62 of 102
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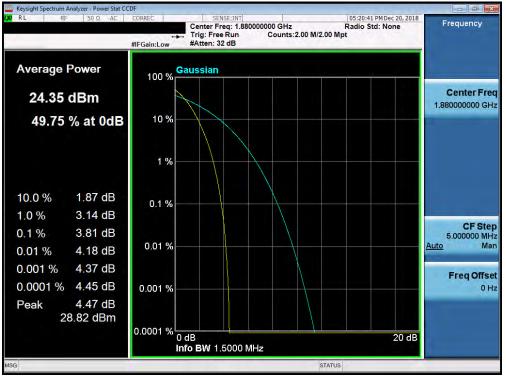
Plot 7-87. Peak-Average Ratio Plot (PCS GPRS Mode)



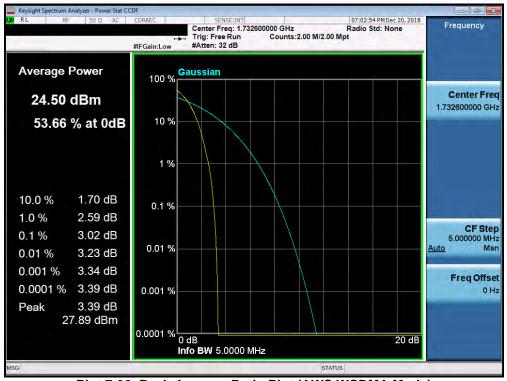
Plot 7-88. Peak-Average Ratio Plot (EDGE1900 Mode)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 64 of 102
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				V/0.0.44/40/2040









Plot 7-90. Peak-Average Ratio Plot (AWS WCDMA Mode)

FCC ID: ZNFX220QM	CALIFORNIA CONTRACTOR	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga CE of 102
1M1812110223-02.ZNF	12/10 - 12/21/2018	Portable Handset		Page 65 of 103
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Plot 7-91. Peak-Average Ratio Plot (PCS WCDMA Mode)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 66 of 102
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7.6 Radiated Power (ERP/EIRP)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

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

Test Settings

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

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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Test Setup

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

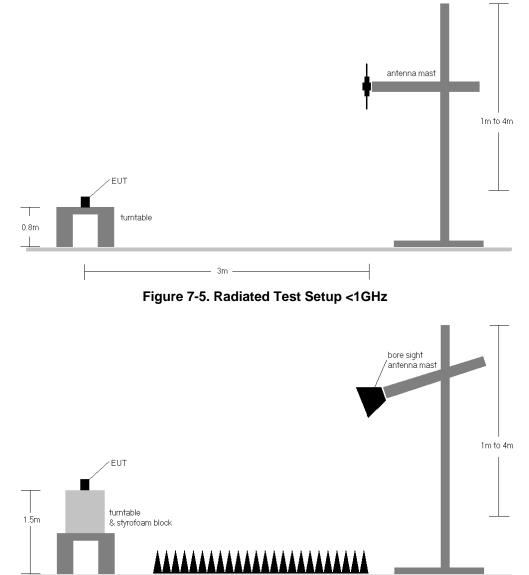


Figure 7-6. Radiated Test Setup >1GHz

3m –

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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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 device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 4) This unit was tested with its standard battery.
- 5) 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.

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	182	201	30.67	1.65	30.17	38.45	-8.28	32.32	40.61	-8.29
836.60	GPRS850	н	110	221	30.78	1.57	30.20	38.45	-8.25	32.35	40.61	-8.25
848.80	GPRS850	н	182	206	28.94	1.50	28.29	38.45	-10.16	30.44	40.61	-10.17
836.60	GPRS850	V	198	199	30.04	1.57	29.46	38.45	-8.99	31.61	40.61	-8.99
836.60	EDGE850	н	110	221	25.11	1.57	24.53	38.45	-13.92	26.68	40.61	-13.92

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

FCC ID: ZNFX220QM	CASE ALL RANGE CASE AND	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 60 of 102	
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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.70	CDMA850	н	197	314	22.55	1.65	22.05	38.45	-16.40	24.20	40.61	-16.41
836.52	CDMA850	н	109	103	23.47	1.57	22.89	38.45	-15.56	25.04	40.61	-15.56
848.31	CDMA850	н	110	317	22.73	1.50	22.08	38.45	-16.37	24.23	40.61	-16.37
836.52	CDMA850	V	127	294	21.46	1.57	20.88	38.45	-17.57	23.03	40.61	-17.57

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

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	V	191	125	23.34	1.63	22.82	38.45	-15.63	24.97	40.61	-15.63
836.60	WCDMA850	V	199	206	22.71	1.57	22.13	38.45	-16.32	24.28	40.61	-16.32
846.60	WCDMA850	V	198	194	21.58	1.51	20.94	38.45	-17.51	23.09	40.61	-17.52
826.40	WCDMA850	н	179	218	22.57	1.63	22.06	38.45	-16.40	24.21	40.61	-16.40

Table 7-4. ERP/EIRP (Cellular WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	Н	115	324	16.80	8.21	25.01	30.00	-4.99
1732.60	WCDMA1700	Н	100	326	11.78	8.06	19.84	30.00	-10.16
1752.60	WCDMA1700	Н	117	132	15.70	7.91	23.61	30.00	-6.39
1712.40	WCDMA1700	V	123	355	14.33	7.91	22.24	30.00	-7.76

Table 7-5. EIRP (AWS WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	Н	107	252	20.63	8.42	29.05	33.01	-3.96
1880.00	GPRS1900	Н	177	273	21.99	8.21	30.20	33.01	-2.82
1909.80	GPRS1900	н	105	290	21.72	8.08	29.79	33.01	-3.22
1880.00	GPRS1900	V	155	51	21.88	8.21	30.09	33.01	-2.92
1880.00	EDGE1900	Н	177	273	18.40	8.21	26.61	33.01	-6.41

Table 7-6. EIRP (PCS GPRS)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1851.25	CDMA1900	Н	112	114	18.09	7.72	25.80	33.01	-7.21
1880.00	CDMA1900	Н	107	306	18.64	7.80	26.44	33.01	-6.57
1908.75	CDMA1900	н	106	126	17.91	7.88	25.79	33.01	-7.22
1880.00	CDMA1900	V	155	171	16.24	7.80	24.04	33.01	-8.97

Table 7-7. EIRP (PCS CDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	Н	109	296	16.72	7.72	24.43	33.01	-8.58
1880.00	WCDMA1900	н	108	148	16.00	7.80	23.80	33.01	-9.21
1907.60	WCDMA1900	н	110	118	17.92	7.88	25.79	33.01	-7.22
1907.60	WCDMA1900	V	188	208	14.54	7.72	22.26	33.01	-10.75

Table 7-8. EIRP (PCS WCDMA)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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7.7 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

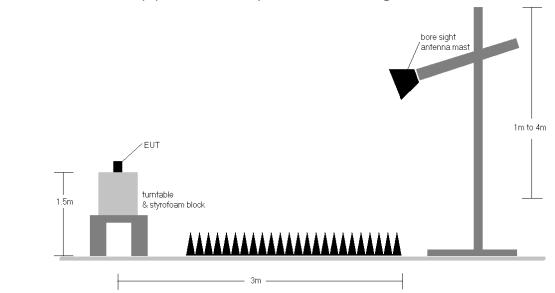
ANSI/TIA-603-E-2016 - Section 2.2.12

Test Settings

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

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 72 of 103
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The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-7. Test Instrument & Measurement Setup

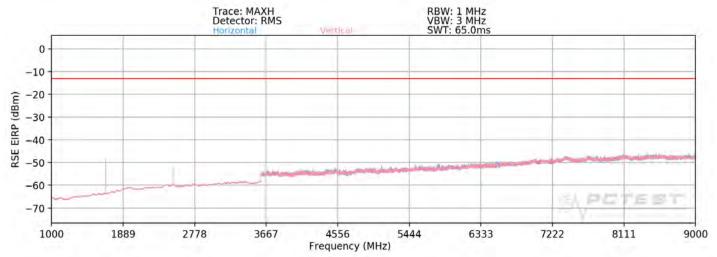
Test Notes

- 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 device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 4) This unit was tested with its standard battery.
- 5) 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.
- 6) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 7) 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.
- 8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 72 of 102
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Cellular GPRS Mode



Plot 7-92. Radiated Spurious Plot Above 1GHz (Cellular GPRS Mode)

824.20

MHz

OPERATING FREQUENCY:

	-
MODULATION SIGNAL:	

GNAL:	GPRS (GMSK)		
	0		

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	110	23	-55.88	8.61	-47.27	-34.3
2472.60	Н	127	46	-53.73	8.78	-44.95	-31.9
3296.80	Н	-	-	-63.19	8.52	-54.68	-41.7
4121.00	Н	-	-	-65.77	9.40	-56.37	-43.4

Table 7-9. Radiated Spurious Data (Cellular GPRS Mode – Ch. 128)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	830	6.60	MHz
MODULATION SIGNAL:	GPRS (GMSK)		
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	237	3	-57.55	8.46	-49.08	-36.1
2509.80	Н	154	13	-55.43	8.81	-46.62	-33.6
3346.40	Н	-	-	-62.51	8.65	-53.86	-40.9
4183.00	Н	-	-	-65.72	9.77	-55.95	-43.0

Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

OPERATING FREQUENCY: MODULATION SIGNAL:

REQUENCY:	848.80					
ON SIGNAL:	GPRS (GMSK)	_				
DISTANCE:	3	meters				
LIMIT:	-13	dBm				

MHz

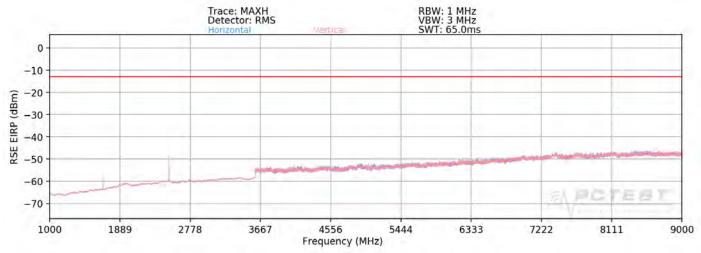
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1697.60	Н	133	4	-54.77	8.32	-46.45	-33.4
2546.40	Н	234	166	-54.29	8.81	-45.49	-32.5
3395.20	Н	-	-	-62.74	8.79	-53.95	-40.9
4244.00	Н	-	-	-65.92	9.99	-55.93	-42.9

Table 7-11. Radiated Spurious Data (Cellular GPRS Mode – Ch. 251)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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Cellular CDMA Mode



Plot 7-93. Radiated Spurious Plot Above 1GHz (Cellular CDMA Mode)

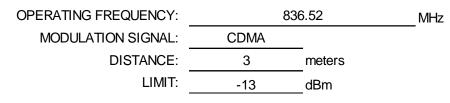
OPERATING FREQUENCY:	8	24.70	MHz
MODULATION SIGNAL:	CDMA		
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

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]
1649.40	H	124	30	-53.57	8.60	-44.97	-32.0
2474.10	H	127	60	-54.67	8.78	-45.89	-32.9
3298.80	Н	-	-	-56.42	8.51	-47.91	-34.9
4123.50	Н	-	-	-54.11	9.42	-44.69	-31.7

Table 7-12. Radiated Spurious Data (Cellular CDMA Mode – Ch. 1013)

FCC ID: ZNFX220QM	SISTALLEY STATEST	MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 76 of 102
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.04	Н	157	50	-53.26	8.46	-44.79	-31.8
2509.56	Н	125	12	-55.99	8.81	-47.19	-34.2
3346.08	Н	-	-	-56.94	8.65	-48.29	-35.3
4182.60	Н	-	-	-55.88	9.77	-46.11	-33.1

Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

848 31

MHz

OPERATING FREQUENCY:

		0.01
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

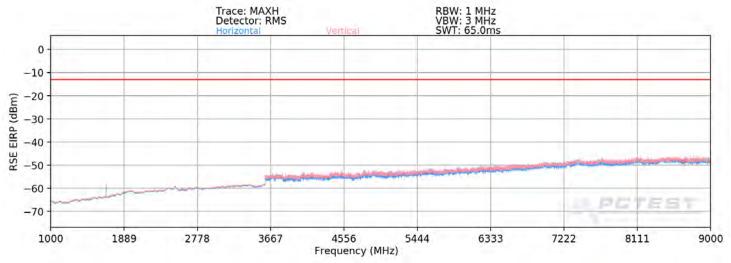
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1696.62	Н	158	58	-53.38	8.33	-45.05	-32.0
2544.93	Н	151	180	-57.97	8.81	-49.16	-36.2
3393.24	Н	-	-	-56.36	8.78	-47.58	-34.6
4241.55	Н	-	-	-54.73	9.98	-44.75	-31.7

Table 7-14. Radiated Spurious Data (Cellular CDMA Mode – Ch. 777)

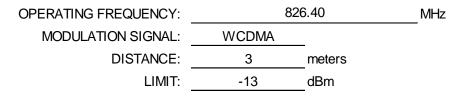
FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 77 of 102	
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Cellular WCDMA Mode



Plot 7-94. Radiated Spurious Plot Above 1GHz (Cellular WCDMA Mode)



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	118	8	-71.04	8.58	-62.46	-49.5
2479.20	H	144	166	-69.89	8.79	-61.10	-48.1
3305.60	Н	-	-	-73.75	8.53	-65.22	-52.2
4132.00	Н	-	-	-73.86	9.47	-64.39	-51.4

Table 7-15. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 102	
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OPERATING FREQUENCY:	83	6.60	MHz
MODULATION SIGNAL:	WCDMA		_
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	155	211	-66.69	8.46	-58.23	-45.2
2509.80	Н	134	167	-70.61	8.81	-61.80	-48.8
3346.40	Н	-	-	-73.94	8.65	-65.29	-52.3
4183.00	Н	-	-	-74.49	9.77	-64.72	-51.7

Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

OPERATING FREQUENCY: MODULATION SIGNAL: DISTANCE:

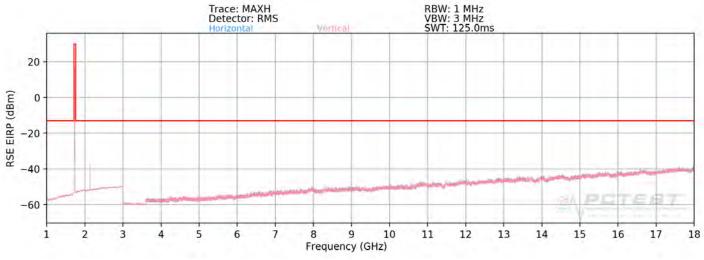
JENCY:		6.60	MHz
IGNAL:	WCDMA	_	
TANCE:	3	meters	
LIMIT:	-13	dBm	

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	148	207	-68.63	8.35	-60.29	-47.3
2539.80	Н	122	170	-69.99	8.81	-61.19	-48.2
3386.40	Н	-	-	-74.56	8.76	-65.79	-52.8
4233.00	Н	-	-	-74.82	9.96	-64.86	-51.9

Table 7-17. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 70 of 102
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Plot 7-95. Radiated Spurious Plot Above 1GHz (AWS WCDMA Mode)

MHz

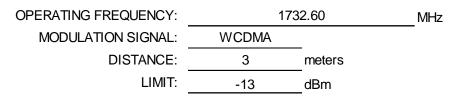
OPERATING FREQUENCY:	17	12.40
MODULATION SIGNAL:	WCDMA	_
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3424.80	Н	398	51	-71.66	8.83	-62.83	-49.8
5137.20	Н	112	299	-73.19	10.63	-62.56	-49.6
6849.60	Н	-	-	-71.24	10.24	-61.00	-48.0
8562.00	Н	-	-	-69.63	11.48	-58.15	-45.2

Table 7-18. Radiated Spurious Data (AWS WCDMA Mode - Ch. 1312)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 90 of 102
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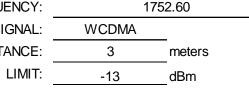




Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.20	Н	349	4	-70.62	8.88	-61.74	-48.7
5197.80	Н	-	-	-71.63	10.33	-61.30	-48.3
6930.40	Н	-	-	-71.94	10.53	-61.41	-48.4

Table 7-19. Radiated Spurious Data (AWS WCDMA Mode - Ch. 1413)

OPERATING FREQUENCY: MODULATION SIGNAL: DISTANCE:



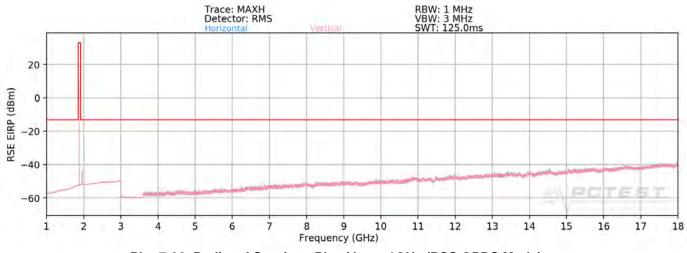
MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3505.20	Н	200	54	-70.26	8.92	-61.34	-48.3
5257.80	Н	400	330	-72.09	10.38	-61.71	-48.7
7010.40	Н	-	-	-72.42	10.53	-61.88	-48.9
8763.00	Н	-	-	-71.41	11.74	-59.67	-46.7

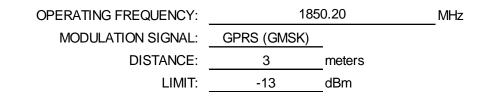
Table 7-20. Radiated Spurious Data (AWS WCDMA Mode - Ch. 1513)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 91 of 102
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Plot 7-96. Radiated Spurious Plot Above 1GHz (PCS GPRS Mode)



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	118	240	-52.86	8.83	-44.03	-31.0
5550.60	Н	135	286	-50.62	10.44	-40.18	-27.2
7400.80	Н	-	-	-48.67	10.34	-38.33	-25.3
9251.00	Н	-	-	-49.52	11.92	-37.60	-24.6

Table 7-21. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 92 of 102
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OPERATING FREQUENCY:	188	0.00	MHz
MODULATION SIGNAL:	GPRS (GMSK)		
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	Н	123	132	-50.96	8.44	-42.53	-29.5
5640.00	H	121	309	-50.95	10.64	-40.31	-27.3
7520.00	Н	-	-	-48.18	11.10	-37.08	-24.1
9400.00	Н	-	-	-49.35	12.77	-36.58	-23.6

Table 7-22. Radiated Spurious Data (PCS GPRS Mode - Ch. 661)

OPERATING FREQUENCY: MODULATION SIGNAL:

REQUENCY:	1909.80					
ON SIGNAL:	GPRS (GMSK)	_				
DISTANCE:	3	meters				
LIMIT:	-13	_dBm				

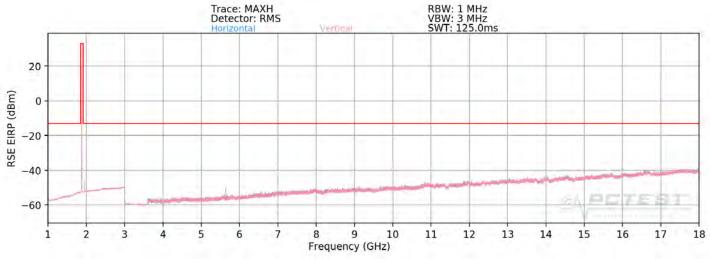
MHz

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	136	111	-51.00	8.22	-42.79	-29.8
5729.40	Н	137	84	-50.59	10.40	-40.19	-27.2
7639.20	Н	-	-	-49.43	11.23	-38.21	-25.2
9549.00	Н	-	-	-48.77	12.34	-36.43	-23.4

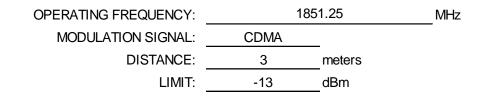
Table 7-23. Radiated Spurious Data (PCS GPRS Mode - Ch. 810)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 92 of 102
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Plot 7-97. Radiated Spurious Plot Above 1GHz (PCS CDMA Mode)

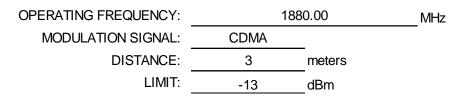


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3702.50	Н	112	350	-53.44	8.81	-44.63	-31.6
5553.75	Н	126	1	-50.59	10.46	-40.13	-27.1
7405.00	Н	-	-	-49.20	10.37	-38.82	-25.8
9256.25	Н	-	-	-49.21	11.90	-37.32	-24.3

Table 7-24. Radiated Spurious Data (PCS CDMA Mode – Ch. 25)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 94 of 102
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	Н	124	355	-53.05	8.44	-44.61	-31.6
5640.00	Н	109	183	-51.06	10.64	-40.42	-27.4
7520.00	Н	-	-	-48.97	11.10	-37.87	-24.9
9400.00	Н	-	-	-49.59	12.77	-36.82	-23.8

Table 7-25. Radiated Spurious Data (PCS CDMA Mode - Ch. 600)

1908 75

MHz

OPERATING FREQUENCY:

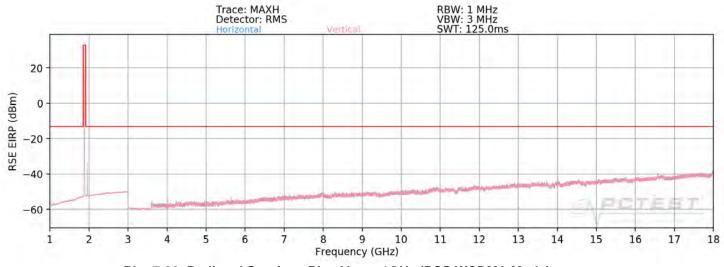
	150	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

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]
3817.50	Н	112	5	-51.91	8.21	-43.70	-30.7
5726.25	н	134	4	-50.18	10.40	-39.78	-26.8
7635.00	Н	-	-	-49.97	11.22	-38.75	-25.8
9543.75	н	-	-	-49.47	12.34	-37.14	-24.1

Table 7-26. Radiated Spurious Data (PCS CDMA Mode – Ch. 1175)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 05 of 102
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Plot 7-98. Radiated Spurious Plot Above 1GHz (PCS WCDMA Mode)

185	52.40	MHz
WCDMA	_	
3	meters	
-13	dBm	
	WCDMA 3	<u> </u>

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	400	16	-72.58	8.80	-63.79	-50.8
5557.20	Н	117	322	-68.78	10.49	-58.29	-45.3
7409.60	Н	-	-	-70.08	10.41	-59.68	-46.7
9262.00	Н	-	-	-70.26	11.87	-58.39	-45.4

Table 7-27. Radiated Spurious Data (PCS WCDMA Mode - Ch. 9262)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
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OPERATING FREQUENCY:	188	MHz	
MODULATION SIGNAL:	WCDMA	_	
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	111	55	-71.54	8.44	-63.10	-50.1
5640.00	H	149	317	-66.83	10.64	-56.19	-43.2
7520.00	Н	-	-	-71.32	11.10	-60.22	-47.2
9400.00	Н	-	-	-71.12	12.77	-58.35	-45.3

Table 7-28. Radiated Spurious Data (PCS WCDMA Mode - Ch. 9400)

OPERATING FREQUENCY MODULATION SIGNAL

REQUENCY:	1907.60			
ON SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	-13	dBm		

MHz

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	-	-	-72.34	8.21	-64.13	-51.1
5722.80	Н	115	339	-62.41	10.40	-52.01	-39.0
7630.40	Н	-	-	-70.83	11.21	-59.62	-46.6
9538.00	Н	-	-	-70.38	12.34	-58.05	-45.0

Table 7-29. Radiated Spurious Data (PCS WCDMA Mode - Ch. 9538)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 07 of 102
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Test Overview and Limit

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

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

For Part 22, RSS-132, and RSS-133, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 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: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 99 of 102
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OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	836,600,224	224	0.0000268
100 %		- 20	836,599,981	-19	-0.0000023
100 %		- 10	836,599,928	-72	-0.000086
100 %		0	836,599,834	-166	-0.0000198
100 %		+ 10	836,600,191	191	0.0000228
100 %		+ 20	836,600,005	5	0.0000006
100 %		+ 30	836,600,060	60	0.0000072
100 %		+ 40	836,599,684	-316	-0.0000378
100 %		+ 50	836,600,069	69	0.0000082
BATT. ENDPOINT	3.40	+ 20	836,600,084	84	0.0000100

 Table 7-30. Frequency Stability Data (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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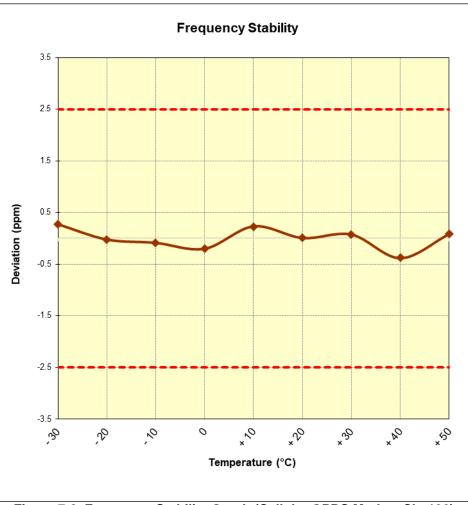


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 00 of 102
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OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	836,519,930	-70	-0.0000084
100 %		- 20	836,519,912	-88	-0.0000105
100 %		- 10	836,519,755	-245	-0.0000293
100 %		0	836,520,078	78	0.0000093
100 %		+ 10	836,520,147	147	0.0000176
100 %		+ 20	836,520,307	307	0.0000367
100 %		+ 30	836,520,296	296	0.0000354
100 %		+ 40	836,520,028	28	0.0000033
100 %		+ 50	836,519,907	-93	-0.0000111
BATT. ENDPOINT	3.40	+ 20	836,519,839	-161	-0.0000192

Table 7-31. Frequency Stability Data (Cellular CDMA Mode – Ch. 384)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	G	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 91 of 103
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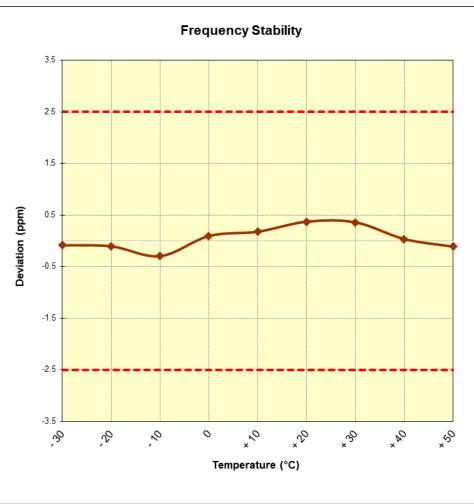


Figure 7-9. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 02 of 102
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OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	_
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT :	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	836,600,005	5	0.0000006
100 %		- 20	836,600,012	12	0.0000014
100 %		- 10	836,599,742	-258	-0.0000308
100 %		0	836,599,833	-167	-0.0000200
100 %		+ 10	836,599,990	-10	-0.0000012
100 %		+ 20	836,600,042	42	0.0000050
100 %		+ 30	836,599,844	-156	-0.0000186
100 %		+ 40	836,599,904	-96	-0.0000115
100 %		+ 50	836,600,211	211	0.0000252
BATT. ENDPOINT	3.40	+ 20	836,599,673	-327	-0.0000391

Table 7-32. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

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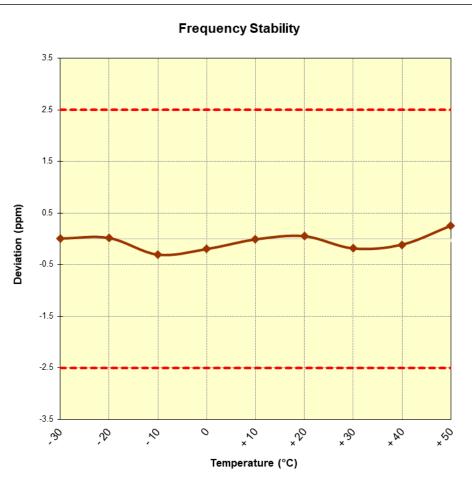


Figure 7-10. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.36	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	1,732,600,196	196	0.0000113
100 %		- 20	1,732,600,008	8	0.0000005
100 %		- 10	1,732,599,782	-218	-0.0000126
100 %		0	1,732,599,933	-67	-0.0000039
100 %		+ 10	1,732,600,358	358	0.0000207
100 %		+ 20	1,732,600,010	10	0.0000006
100 %		+ 30	1,732,600,322	322	0.0000186
100 %		+ 40	1,732,600,334	334	0.0000193
100 %		+ 50	1,732,599,845	-155	-0.000089
BATT. ENDPOINT	3.40	+ 20	1,732,600,069	69	0.0000040

Table 7-33. Frequency Stability Data (AWS WCDMA Mode – Ch. 1413)

Note:

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

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Frequency Stability / Temperature Variation

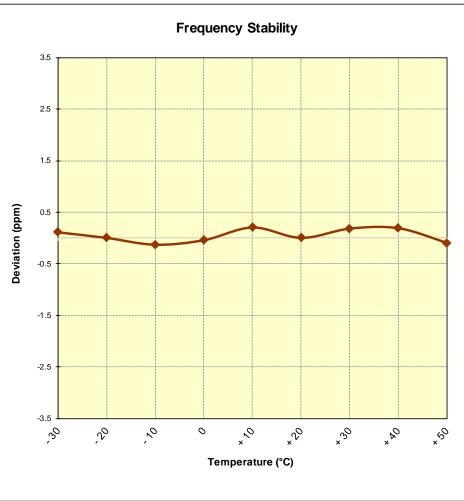


Figure 7-11. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.36	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	1,879,999,948	-52	-0.0000028
100 %		- 20	1,879,999,873	-127	-0.0000068
100 %		- 10	1,880,000,275	275	0.0000146
100 %		0	1,880,000,113	113	0.0000060
100 %		+ 10	1,879,999,769	-231	-0.0000123
100 %		+ 20	1,879,999,986	-14	-0.0000007
100 %		+ 30	1,880,000,264	264	0.0000140
100 %		+ 40	1,880,000,197	197	0.0000105
100 %		+ 50	1,880,000,162	162	0.000086
BATT. ENDPOINT	3.40	+ 20	1,879,999,761	-239	-0.0000127

Table 7-34. Frequency Stability Data (PCS GPRS Mode - Ch. 661)

Note:

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

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Frequency Stability / Temperature Variation

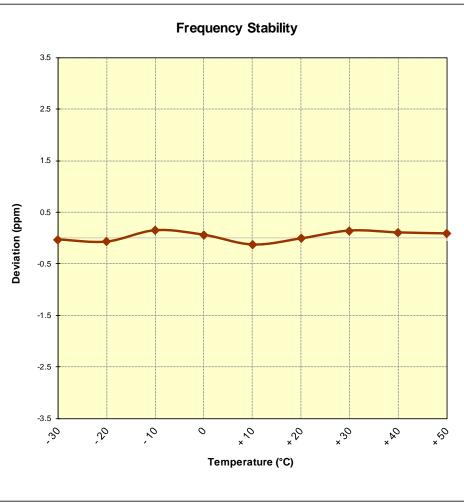


Figure 7-12. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	_
REFERENCE VOLTAGE:	4.36	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	1,880,000,057	57	0.0000030
100 %		- 20	1,879,999,968	-32	-0.0000017
100 %		- 10	1,880,000,101	101	0.0000054
100 %		0	1,880,000,149	149	0.0000079
100 %		+ 10	1,879,999,887	-113	-0.0000060
100 %		+ 20	1,880,000,336	336	0.0000179
100 %		+ 30	1,879,999,802	-198	-0.0000105
100 %		+ 40	1,880,000,215	215	0.0000114
100 %		+ 50	1,879,999,953	-47	-0.0000025
BATT. ENDPOINT	3.40	+ 20	1,880,000,164	164	0.000087

Table 7-35. Frequency Stability Data (PCS CDMA Mode - Ch. 600)

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: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
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Frequency Stability / Temperature Variation

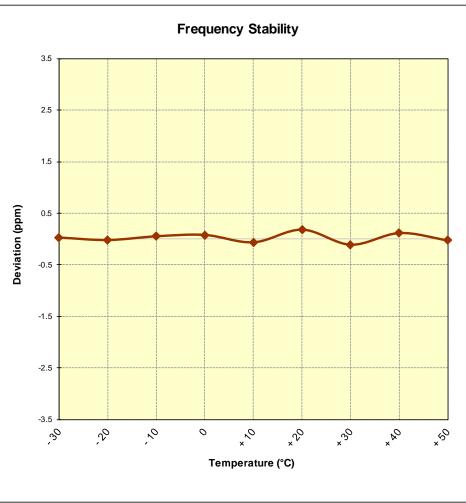


Figure 7-13. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	_
REFERENCE VOLTAGE:	4.36	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	1,879,999,853	-147	-0.0000078
100 %		- 20	1,880,000,155	155	0.0000082
100 %		- 10	1,879,999,979	-21	-0.0000011
100 %		0	1,880,000,260	260	0.0000138
100 %		+ 10	1,879,999,877	-123	-0.0000065
100 %		+ 20	1,879,999,787	-213	-0.0000113
100 %		+ 30	1,879,999,868	-132	-0.0000070
100 %		+ 40	1,879,999,956	-44	-0.0000023
100 %		+ 50	1,879,999,911	-89	-0.0000047
BATT. ENDPOINT	3.40	+ 20	1,880,000,314	314	0.0000167

Table 7-36. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

Note:

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

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Frequency Stability / Temperature Variation

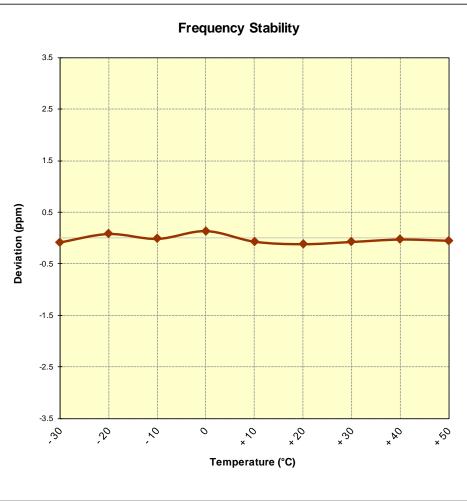


Figure 7-14. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG Portable Handset FCC ID: ZNFX220QM complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.

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