

PCTEST ENGINEERING LABORATORY, INC.

6660-B Dobbin Road, Columbia, MD 21045 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctestlab.com



## MEASUREMENT REPORT

FCC Part 22 & 24

#### Applicant Name:

LG Electronics MobileComm U.S.A 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: 3/11 - 3/12/2014 Test Site/Location: PCTEST Lab., Columbia, MD, USA Test Report Serial No.: 0Y1403110556.ZNF

## FCC ID:

## ZNFD321

**APPLICANT:** 

## LG ELECTRONICS MOBILECOMM U.S.A

Application Type: Model(s): EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s): Test Device Serial No.: Certification LG-D321, D321, LGD321, LGL42G, L42G Portable Handset PCS Licensed Transmitter Held to Ear (PCE) §2 §22(H) §24(E) ANSI/TIA-603-C-2004, KDB 971168 v02r01 *identical prototype* [S/N: RF#1]

			ERP/	'EIRP
Mode	Tx Frequency (MHz)	Emission Designator	Max. Power (W)	Max. Power (dBm)
GSM850	824.2 - 848.8	243KGXW	0.451	26.54
EDGE850	824.2 - 848.8	244KG7W	0.092	19.66
GSM1900	1850.2 - 1909.8	245KGXW	1.288	31.10
EDGE1900	1850.2 - 1909.8	246KG7W	0.352	25.46
WCDMA850	826.4 - 846.6	4M17F9W	0.053	17.28
WCDMA1900	1852.4 - 1907.6	4M16F9W	0.299	24.76

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

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

Randy Ortanez President



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## MEASUREMENT REPORT FCC Part 22 & 24



## §2.1033 General Information

APPLICANT:	LG Electronics MobileComm U.S.A
APPLICANT ADDRESS:	1000 Sylvan Avenue
	Englewood Cliffs, NJ 07632, United States
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S):	§2 §22(H) §24(E)
BASE MODEL:	LG-D321
FCC ID:	ZNFD321
FCC CLASSIFICATION:	PCS Licensed Transmitter Held to Ear (PCE)
MODE:	GSM / EDGE / WCDMA
FREQUENCY TOLERANCE:	±0.00025 % (2.5 ppm)
Test Device Serial No.:	RF#1
DATE(S) OF TEST:	3/11 - 3/12/2014
TEST REPORT S/N:	0Y1403110556.ZNF

#### **Test Facility / Accreditations**

#### Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451A-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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## **1.0 INTRODUCTION**

#### 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) 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 Industry Canada Certification and Engineering Bureau.

### 1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'I (BWI) airport, the city of Baltimore and the Washington, DC area. (*See Figure 1-1*).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on January 10, 2012.

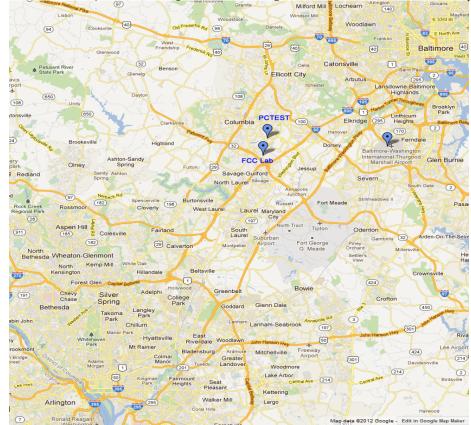


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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## 2.0 PRODUCT INFORMATION

#### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LGE Portable Handset FCC ID: ZNFD321**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

#### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, 802.11b/g/n WLAN, Bluetooth (1x,EDR, LE)

### 2.3 Test Configuration

The LGE Portable Handset FCC ID: ZNFD321 was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168 v02r01. See Section 6.0 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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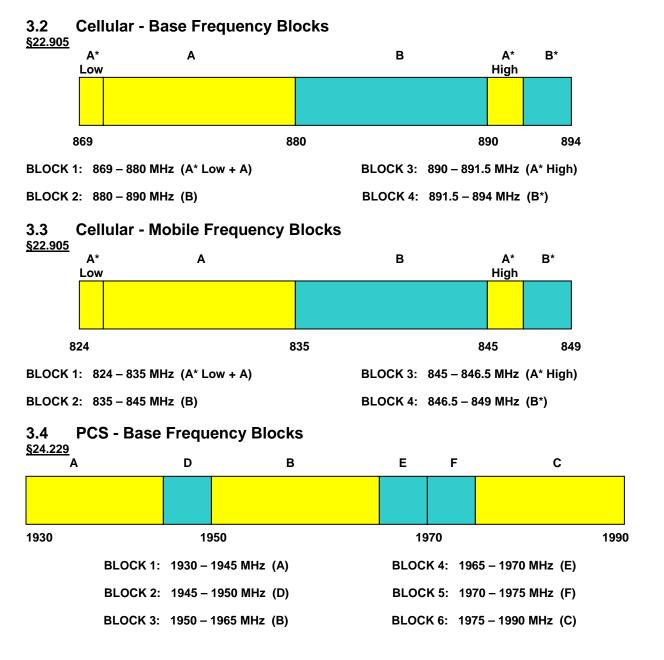


#### **DESCRIPTION OF TESTS** 3.0

#### **Evaluation Procedure** 3.1

The measurement procedures described in the "Land Mobile FM or PM - Communications Equipment -Measurements and Performance Standards" (ANSI/TIA-603-C-2004) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 v02r01) were used in the measurement of the LGE Portable Handset FCC ID: ZNFD321.





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# 3.5 PCS - Mobile Frequency Blocks

<u>§24.229</u>	A	D	В	E	F	С	
1850		18	370	189	<b>)</b> 90		1910
	BLOCK 1:	1850 –	1865 MHz (A)	BLOC	K4: 18	85 – 1890 MHz (E)	
	BLOCK 2:	1865 –	1870 MHz (D)	BLOC	K 5: 18	90 – 1895 MHz (F)	
	BLOCK 3:	1870 –	1885 MHz (B)	BLOC	K6: 18	95 – 1910 MHz (C)	

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#### 3.6 Radiated Measurements

#### §2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a) RSS-132(4.4) RSS-132(4.5.1) RSS-133(6.4) RSS-133(6.5.1)

Radiated spurious emissions are investigated indoors in a semi-anechoic chamber to determine the frequencies producing the worst case emissions. Final measurements for radiated power and radiated spurious emissions are performed on the 3 meter OATS per the guidelines of ANSI/TIA-603-C-2004. The measurement area is situated on an 18 meter x 20 meter galvanized 1/2" hardware cloth as the conducting ground plane. This material is sewn together in sections 4 feet wide and 60 feet long. A total of eighteen sections are required to cover the entire measurement area. Sections are laid across the width of the pad, overlapped 1" and sewn and soldered together at intervals of 3" (7.6 cm.) The terrain of the test site is reasonably flat and level. Power and cable to the test site are buried 18" deep into the ground outside the perimeter of the site. An all-weather non-metallic housing is situated on a 2 x 3 meter area adjacent to the measurement area to house the test equipment. The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. 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. Emissions are also investigated with the receive antenna horizontally and vertically polarized. The level of the maximized emission is recorded with the spectrum analyzer using a peak detector with RBW = 1MHz, VBW = 3MHz for emissions greater than 1GHz. For emissions below 1GHz, the spectrum analyzer is set to RBW = 100kHz and VBW = 300kHz.

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

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

The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10log<sub>10</sub>(Power [Watts]) specified in 22.917(a) and 24.238(a).

Open Area Test Site

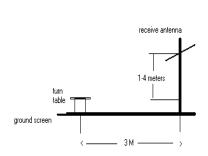


Figure 3-1. Diagram of 3-meter Test Range

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## 4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/29/2013	Annual	3/29/2014	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	3/29/2013	Annual	3/29/2014	N/A
-	LTx2	Licensed Transmitter Cable Set	1/30/2014	Bi-annual	7/30/2014	N/A
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	4/17/2013	Annual	4/17/2014	3008A00985
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/28/2013	Annual	10/28/2014	3613A00315
Agilent	N9038A	MXE EMI Receiver	1/3/2014	Annual	1/3/2015	MY51210133
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	1937A03348
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
Anritsu	MA2411B	Pulse Sensor	11/13/2013	Annual	11/13/2014	846215
Anritsu	ML2495A	Power Meter	10/31/2013	Annual	10/31/2014	1039008
Emco	6502	Active Loop Antenna (10k - 30 MHz)	5/31/2012	Biennial	5/31/2014	267
Espec	ESX-2CA	Environmental Chamber	4/16/2013	Annual	4/16/2014	17620
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
ETS Lindgren	3160-10	26.5-40 GHz Standard Gain Horn	6/6/2012	Biennial	6/6/2014	130993
Mini-Circuits	VHF-1300+	High Pass Filter	1/29/2014	Bi-annual	7/29/2014	30716
Mini-Circuits	VHF-3100+	High Pass Filter	1/29/2014	Bi-annual	7/29/2014	31144
Rohde & Schwarz	CMU200	Base Station Simulator	N/A		N/A	836536/0005
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	6/6/2012	Biennial	6/6/2014	100037
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	11/1/2013	Biennial	11/1/2015	91052522TX
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/1/2013	Biennial	11/1/2015	91052523RX
Schwarzbeck	VULB-9161SE	Trilog Super Broadband Test Antenna	10/23/2013	Biennial	10/23/2015	9161-4075
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	6/19/2013	Biennial	6/19/2015	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/19/2013	Biennial	6/19/2015	A042511

Table 4-1. Test Equipment

#### Notes:

1. Equipment used for signaling with a calibration date of "N/A" shown in this list was only used for maintaining a link between the piece of equipment and the EUT. This equipment was not used to make direct calibrated measurements.

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## 5.0 SAMPLE CALCULATIONS

#### **GSM Emission Designator**

#### Emission Designator = 250KGXW

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

#### **EDGE Emission Designator**

#### Emission Designator = 250KG7W

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

### WCDMA Emission Designator

#### Emission Designator = 4M16F9W

WCDMA BW = 4.16 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

## **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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## 6.0 TEST RESULTS

#### 6.1 Summary

Company Name:	LG Electronics MobileComm U.S.A
FCC ID:	ZNFD321
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>GSM / EDGE / WCDMA</u>

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER	MODE (TX)	-			
2.1049	Occupied Bandwidth	N/A		PASS	Section 6.2
2.1051 22.917(a) 24.238(a)	Conducted Band Edge / Spurious Emissions	> 43 + log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Sections 6.3, 6.4
24.232(d)	Peak-Average Ratio	< 13 dB	CONDUCTED	PASS	Section 6.5
2.1046	Transmitter Conducted Output Power	NI/A		PASS	RF Exposure Report
2.1055 22.355 24.235	Frequency Stability	< 2.5 ppm (Part 22) Emission must remain in band (Part 24)		PASS	Section 6.8
22.913(a.2)	Effective Radiated Power	< 7 Watts max. ERP		PASS	Section 6.6
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP	RADIATED	PASS	Section 6.6
2.1053 22.917(a) 24.238(a)	Radiated Spurious Emissions	> 43 + log <sub>10</sub> (P[Watts]) for all out-of-band emissions		PASS	Section6.7

Table 6-1. 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 2.3.

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#### 6.2 Occupied Bandwidth §2.1049 RSS-Gen(4.6.1) RSS-133(2.3)

#### 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 v02r01 - 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.

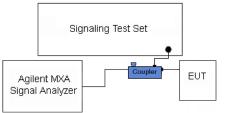


Figure 6-1. Test Instrument & Measurement Setup

#### Test Notes

None.

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Plot 6-1. Occupied Bandwidth Plot (Cellular GSM Mode - Ch. 190)



Plot 6-2. Occupied Bandwidth Plot (EDGE850 Mode - Ch. 190)

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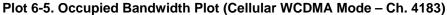


Plot 6-4. Occupied Bandwidth Plot (EDGE1900 Mode - Ch. 661)

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Plot 6-6. Occupied Bandwidth Plot (PCS WCDMA Mode - Ch. 9400)

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#### Spurious and Harmonic Emissions at Antenna Terminal 6.3 §2.1051 §22.917(a) §24.238(a) RSS-132(4.5.1) RSS-133(6.5.1)

#### **Test Overview**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

#### The minimum permissible attenuation level of any spurious emission is 43 + log<sub>10</sub>(P<sub>[Watts]</sub>), where P is the transmitter power in Watts.

#### **Test Procedure Used**

KDB 971168 v02r01 - Section 6.0

#### Test Settings

- 1. Start frequency was set to 30MHz and stop frequencies were set to 10GHz (Cell Band)/20GHz (PCS Band) (separated into at least two plots per channel).
- 2. RBW > 100kHz
- 3. VBW > 3 X RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

#### Test Setup

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

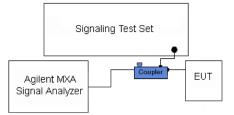


Figure 6-2. Test Instrument & Measurement Setup

#### Test Notes

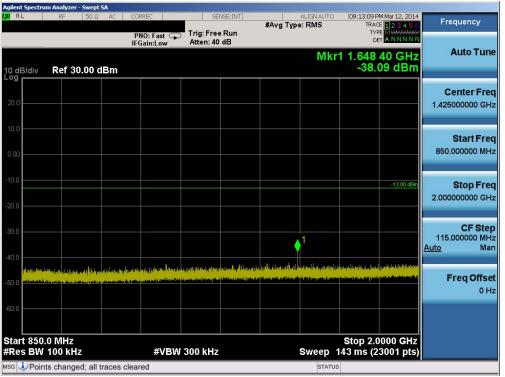
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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Agilent Spectrum Ana						
LXIRL R	RF 50 Ω AC	CORREC	SENSE:INT	ALIGNAUTO #Avg Type: RMS	09:12:49 PM Mar 12, 2014 TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
		PNO: Fast 🖵	Trig: Free Run Atten: 40 dB		TYPE M WWWWWW DET A N N N N N	
		IFGain:Low	Atten. 40 db	5/1		Auto Tune
	ef 30.00 dBm			IVI	(r1 822.80 MHz -36.80 dBm	
10 dB/div Re	er 30.00 ubili					
						Center Freq
20.0						426.500000 MHz
10.0						Start Freq
						30.000000 MHz
0.00						00.000000 11112
-10.0						
-10.0					-13.00 dBm	Stop Freq
-20.0						823.000000 MHz
20.0						
-30.0						CF Step
						79.300000 MHz <u>Auto</u> Man
-40.0						Auto
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-50.0 dependention	and and participants participants		م بالم الراب و بران به م مد ال	مار المار أسار عند معالماً والمرحم ، والتي من 15 إلى ويترط عار المرحم (1999). الم	a translation a local binds if private all thirds in the	Freq Offset 0 Hz
						UHZ
-60.0						
Start 30.0 MH	z				Stop 823.0 MHz	
#Res BW 100		#VBW	300 kHz	Sweep 9	8.7 ms (20001 pts)	
MSG				STATUS		



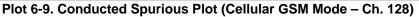


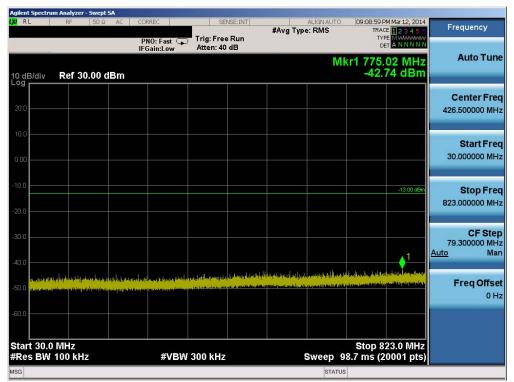
Plot 6-8. Conducted Spurious Plot (Cellular GSM Mode - Ch. 128)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Agilent Spectrum Analyzer - Swept S					
<b>RL</b> RF 50 Ω	AC CORREC PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 26 dB	ALIGN AUTO	09:13:33 PM Mar 12, 2014 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET A N N N N N	Frequency
10 dB/div Ref 5.00 dB			M	(r1 2.473 5 GHz -31.11 dBm	Auto Tune
-5.00				-13.00 dBm	Center Freq 6.000000000 GHz
-15.0					Start Fred 2.000000000 GHz
-35.0			dag daga basis dalah salar salar salar salar sa	La constante de la constante d	Stop Fred 10.000000000 GHz
.65.0					CF Step 800.000000 MH Auto Mar
75.0					Freq Offse 0 H
-85.0 Start 2.000 GHz #Res BW 1.0 MHz	#\/B\M	3.0 MHz	Succes 4	Stop 10.000 GHz 3.9 ms (16001 pts)	
	#VBW	3.0 WIHZ	Sweep	7	





Plot 6-10. Conducted Spurious Plot (Cellular GSM Mode - Ch. 190)

FCC ID: ZNFD321	<u>PCTEST</u>	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
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	m Analyzer - Swept !									
LXI RL	RF 50 Ω	AC CORRE	EC		VSE:INT	#Avg Ty	ALIGNAUTO	TRAC	M Mar 12, 2014	Frequency
			:Fast 🖵 in:Low	Trig: Free Run Atten: 40 dB				TYI DI		
		II Ga	III.LUW				Mki	1 1.673	30 GHz	Auto Tune
10 dB/div	Ref 30.00 d	IBm						-39.	20 dBm	
Log										Center Freq
20.0										1.425000000 GHz
10.0										Start Freq
0.00										850.000000 MHz
0.00										
-10.0									-13.00 dBm	Stop Freq
									10.00 400	2.000000000 GHz
-20.0										
-30.0										CF Step
							<b>1</b>			115.000000 MHz <u>Auto</u> Man
-40.0										Auto
<b>CARACTARIA</b>	uniona della podeta	hand a state of the second	Proposition and	and a second		nanistra da menistra d			a se la construction de la construcción de la construcción de la construcción de la construcción de la constru La construcción de la construcción d	Freq Offset
-50.0	and a start of the spectra start spectrum start spectrum start spectrum start spectrum start spectrum start sp	a a suit sa bi yi miki dha yi ki	and an office of the second							0 Hz
-60.0										
Start 850.	0 MHz							Stop 24	0000 GHz	
#Res BW			#VBW	300 kHz			Sweep	143 ms (2	3001 pts)	
MSG							STATU			





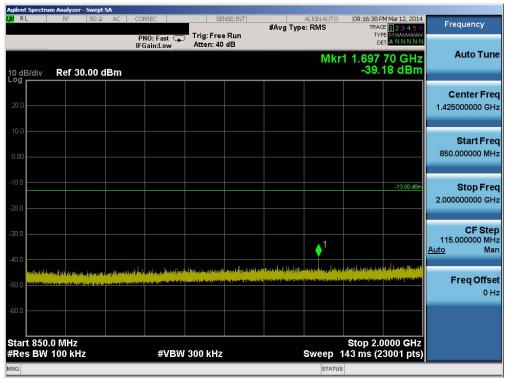
Plot 6-12. Conducted Spurious Plot (Cellular GSM Mode - Ch. 190)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
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	Analyzer - Swept S	and the second se								
LXU RL	RF 50 Ω		RREC	Trig: Free		#Avg Typ	ALIGN AUTO	TRAC TYP	M Mar 12, 2014 E 1 2 3 4 5 6 E M WWWWW	Frequency
10 dB/div	Ref 30.00 d	IF	Gain:Low	Atten: 40	dB		N	lkr1 732.	28 MHz 58 dBm	Auto Tune
20.0										Center Freq 426.500000 MHz
0.00										Start Freq 30.000000 MHz
-10.0									-13.00 dBm	<b>Stop Freq</b> 823.000000 MHz
-30.0									1	CF Step 79.300000 MHz <u>Auto</u> Man
-50.0 P-Indexed			ayen aa stelfniker Statistister	ngadaosanala dal faso na na n	and the second secon	A Handbergann An Alexandra		and a straight and the straight second s	ny sing pang mengah pike Indépensi Mengaha Bahar	Freq Offset 0 Hz
-80.0 Start 30.0 M #Res BW 1			#\/D\\	300 kHz			Curran .	Stop 8 98.7 ms (2	23.0 MHz	
#Res DW 1	UU KHZ		#VDW	300 KHZ			Sweep	,	oou r pis)	





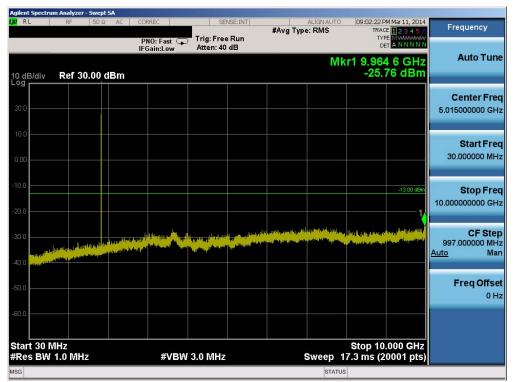
Plot 6-14. Conducted Spurious Plot (Cellular GSM Mode - Ch. 251)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
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Agilent Spectrum Analyzer - Swe					
XI RE 50	Ω AC CORREC PNO: Fast IFGain:Low	Trig: Free Run #Atten: 26 dB	ALIGNAUTO #Avg Type: RMS	09:17:12 PM Mar 12, 2014 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET A N N N N N	Frequency
10 dB/div Ref 5.00 d			M	r1 2.547 0 GHz -30.99 dBm	Auto Tune
-5.00				-13.00 dBm	Center Freq 6.000000000 GHz
-15.0					Start Fred 2.000000000 GHz
-35.0		And the second state of th	an a	en mennedes y nation, ay ak détre tel élem a de	Stop Fred 10.000000000 GHz
65.0					CF Step 800.000000 MH Auto Mar
75.0					Freq Offse 0 H
85.0 GHz				Stop 10.000 GHz	
Res BW 1.0 MHz	#VBW	/ 3.0 MHz	Sweep 1	3.9 ms (16001 pts)	





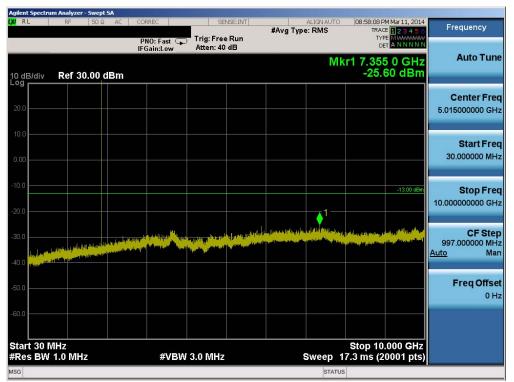
Plot 6-16. Conducted Spurious Plot (PCS GSM Mode - Ch. 512)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Agilent Spectru	m Analyzer - Swept S RF 50 Ω			SENSE:INT		ALIGNAUTO	00,00,00	M Mar 11, 2014	
LA KL	RF 50 2			ee Run	#Avg Typ		TRAC	XE 123456 XE 123456 XE MWWWWW	Frequency
		PNO: F IFGain:I					DI	ANNNNN	
10 dB/div	Ref 0.00 dB	m				Mk	r1 18.50 -44.	1 0 GHz 22 dBm	Auto Tune
Log									Center Freq
-10.0								-13.00 dBm	15.00000000 GHz
-20.0									
									Start Freq 10.000000000 GHz
-30.0									10.00000000 GH2
-40.0							<b>1</b>		Stop Freq
-50.0						Alter			20.000000000 GHz
-50.0	day the dependence of the second of	فتقتهوا ورأم بطره ألمراه عقاد	and the management of the	an an an ann an an an an an an an an an	Il's super los de		and standing a spectrum of the second s	and the second s	E
-60.0	Allow the second second	الاستريار والمحمد والدام مسالدات الم	and a second						CF Step 1.000000000 GHz
-70.0									<u>Auto</u> Man
									Freg Offset
-80.0									0 Hz
-90.0									
Start 10.0 #Res BW			VBW 3.0 MH	z		Sweep	Stop 20 25.3 ms (2	.000 GHz	
MSG						STAT			





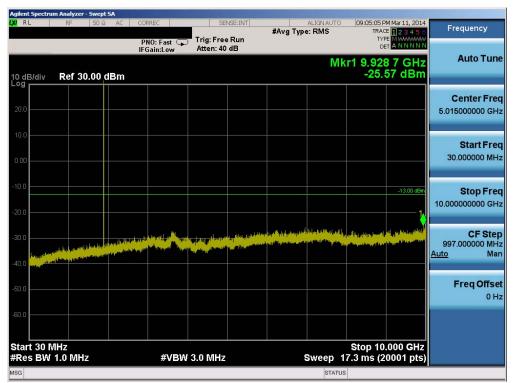
Plot 6-18. Conducted Spurious Plot (PCS GSM Mode - Ch. 661)

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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RL	im Analyzer - Swe RF 50		CORREC	SE	NSE:INT		ALIGNAUTO		PM Mar 11, 2014	-
			PNO: Fast 🖵 IFGain:Low	Trig: Free Atten: 10		#Avg Ty	rpe: RMS	TΥ	CE 123456 (PE MWWWWW DET A N N N N N	Frequency
) dB/div	Ref 0.00 (	dBm					Mk	r1 18.25 -48.	7 5 GHz 66 dBm	Auto Tune
0.0									-13.00 dBm	Center Fred 15.000000000 GH:
0.0										Start Free 10.000000000 GH
0.0			ومعالفته ار		an Labhtar dite Meine.		The strength of the	1	ni na <sup>sa</sup> ng kalang kalan	Stop Free 20.000000000 GH
										CF Ste 1.00000000 GH <u>Auto</u> Ma
0.0										Freq Offse 0 H
0.0 tart 10.0	000 GHz							Stop 20	).000 GHz	
	1.0 MHz		#VBW	/ 3.0 MHz			Sweep	25.3 ms (2	20001 pts)	
G							STAT	JS		





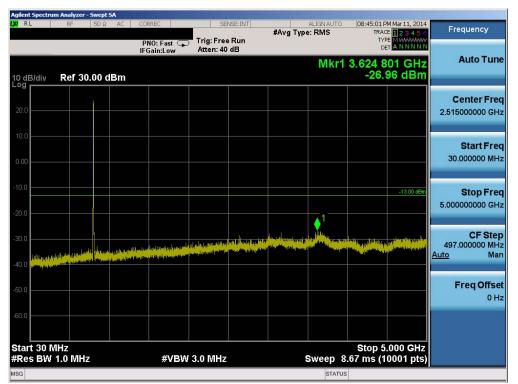
Plot 6-20. Conducted Spurious Plot (PCS GSM Mode - Ch. 810)

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Agilent Spectru	um Analyzer - Swept RF 50 Q	SA AC CORREC	CTNC	E:INT	ALIGNA	ITO 00005-001	PM Mar 11, 2014	
CA RL	KF 50 M			*	Avg Type: RMS	TRAC	DE 123456	Frequency
		PNO: Fast C IFGain:Low	Trig: Free F Atten: 10 d			D		
10 dB/div	Ref 0.00 dE	Rm			N	1kr1 17.88 -47.	8 5 GHz 41 dBm	Auto Tune
	Kei 0.00 ul							
-10.0								Center Freq
-10.0							-13.00 dBm	15.00000000 GHz
-20.0								
								Start Freq
-30.0								10.00000000 GHz
-40.0								
						<b>▲</b> 1		Stop Freq
-50.0		a dathalignalain na mar thatal da		r Falle and a s	il and a	Parter Ingentering and	a a statute	20.00000000 GHz
a anti-	والاستارات بالمعاليك	and the standard standard standard		and the second sec		and the second secon		05.044
-60.0 arthur	and a statistic surface and	and a second party concernence of the second se The second sec						CF Step 1.00000000 GHz
-70.0								<u>Auto</u> Man
-70,0								
-80.0								Freq Offset
								0 Hz
-90.0								
Start 10.0 #Res BW		#\/B	W 3.0 MHz		Sweet	Stop 20 25.3 ms (2	.000 GHz	
#RES DVV		#VD	W D.O IVINZ			atus		
					51			



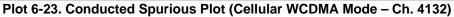


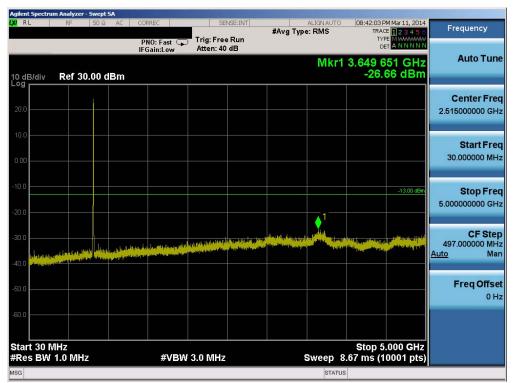
Plot 6-22. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4132)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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	m Analyzer - Swept S							
XV RL	RF 50 Ω	): Fast 🕞 in:Low		#Avg 1	ALIGNAUTO	TRAI TY	PM Mar 11, 2014 CE <b>1 2 3 4 5 6</b> PE M <del>WWWWW</del> ET A N N N N N	Frequency
10 dB/div	Ref 0.00 dB				Μ	lkr1 9.44 -55.	6 0 GHz 94 dBm	Auto Tune
-10.0							-13.00 dBm	Center Freq 7.50000000 GHz
-20.0								Start Free 5.000000000 GHz
-40.0							1	Stop Fred 10.000000000 GHz
-60.0 <mark>///////</mark>	ndiny i davata bird da ingk da no ing ca		a ba kanalata di ba Ang ng panalata di ta					CF Step 500.000000 MH Auto Mar
80.0								Freq Offse 0 H:
-90.0 Start 5.00 #Res BW		#VBW	3.0 MHz		Sweep	Stop 10 8.67 ms (1	0.000 GHz	
ISG					STAT			



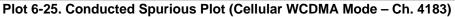


Plot 6-24. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4183)

FCC ID: ZNFD321	<u>PCTEST</u>	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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	pectrum	Analyzer - Sı										
LXI RL	2	RF	50Ω AC	CORR	EC		NSE:INT	#Avg Typ	ALIGN AUT e: RMS	TR/	PM Mar 11, 2014 ACE 1 2 3 4 5 6	Frequency
					): Fast 🕞 in:Low	Trig: Free Atten: 10					DET A N N N N N	
					IIII COM				N	1kr1 9.01	9 5 GHz	Auto Tune
10 dB/d	div	Ref 0.00	dBm							-55	.87 dBm	
												Conton From
-10.0												Center Freq 7.50000000 GHz
											-13.00 dBm	7.000000000000
-20.0												
												Start Freq 5.00000000 GHz
-30.0												3.00000000 GH2
-40.0												
												Stop Freq 10.00000000 GHz
-50.0										1		10.00000000 GH2
				the state	rana I. atatakan	والمرابعة والمراجع				The star to a setter.	ملى يحصلون ليادر اوند	CF Step
-60.0	protection of the	and the second second	ographic producting	adad starburget	a biberta all a latha		The share of the second	Abedd an Calebran Shedd	April Alexandra	and middle in a start	A Description of the second of	500.000000 MHz
-70.0	1.											<u>Auto</u> Man
-70.0												
-80.0												Freq Offset
												0 Hz
-90.0												
Start :									_	Stop 1	0.000 GHz	
	BW 1	.0 MHz			#VBW	3.0 MHz					10001 pts)	
MSG									STAT	IUS		



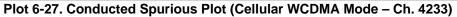


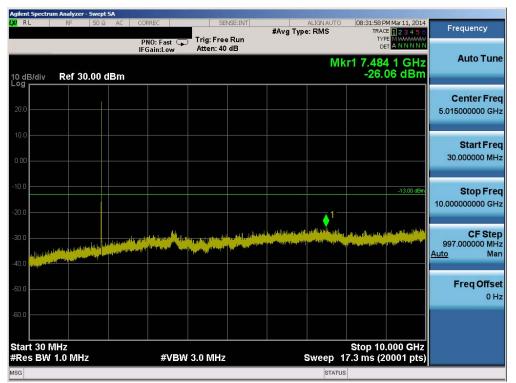
Plot 6-26. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4233)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Agilent Spectru	m Analyzer - Swept						00.10.11		
L <mark>XI</mark> RL	RF 50 Ω	AC CORREC		ENSE:INT	#Avg Type	ALIGNAUTO e: RMS	TRAC	M Mar 11, 2014 E 1 2 3 4 5 6	Frequency
		PNO: I IFGain	Fast 😱 Trig: Fn :Low Atten: 1				TYI DI		
10 dB/div	Ref 0.00 dE	3m				M	kr1 7.23 -56.	4 0 GHz 25 dBm	Auto Tune
-10.0								-13.00 dBm	Center Freq 7.50000000 GHz
-20.0									Start Freq 5.00000000 GHz
-40.0									<b>Stop Freq</b> 10.000000000 GHz
-60.0		a ya hen Terri ( la landi andi Yang	natifestanis national distance		la Laffik danata shaat <sub>Yafa</sub> ni 200 waxaya jara k			al alda anta da altar Managaran pananan	<b>CF Step</b> 500.000000 MHz <u>Auto</u> Man
-80.0									Freq Offset 0 Hz
-90.0 Start 5.00	0 GHz						Stop 10	.000 GHz	
#Res BW			#VBW 3.0 MH	z	:	Sweep	8.67 ms (1		
MSG						STATU	IS		





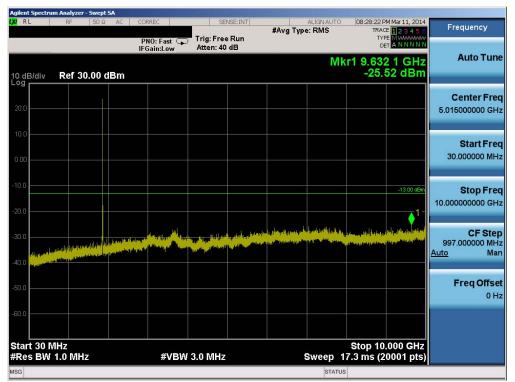
Plot 6-28. Conducted Spurious Plot (PCS WCDMA Mode - Ch. 9262)

FCC ID: ZNFD321	<u>PCTEST</u>	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Agilent Spectru	m Analyzer - Swept SA			uer va uer					
LA RL	RF 50 Ω	AC CORREC		E:INT	#Avg Type	ALIGNAUTO	TRAC	Mar 11, 2014	Frequency
		PNO: Fast 🖵 IFGain:Low	Trig: Free Atten: 10 c				DE	ANNNN	
10 dB/div Log	Ref 0.00 dBr	n				Mkr	1 17.692 -48.3	2 5 GHz 34 dBm	Auto Tune
-10.0								-13.00 dBm	Center Freq 15.00000000 GHz
-20.0									Start Freq 10.000000000 GHz
-40.0		stering is smaller of particular back to be set to be		a abhaile aire i a	لەل بەرىر	1	and and a second se	n, politica della carta	<b>Stop Freq</b> 20.000000000 GHz
-60.0	fan fan ser fan sjon fan ster fan ster Fan ster fan				Complete of the later				CF Step 1.000000000 GHz <u>Auto</u> Man
-80.0									Freq Offset 0 Hz
-90.0									
Start 10.0 #Res BW		#VBW	3.0 MHz			Sweep 2		000 GHz 0001 pts)	
MSG						STATUS			





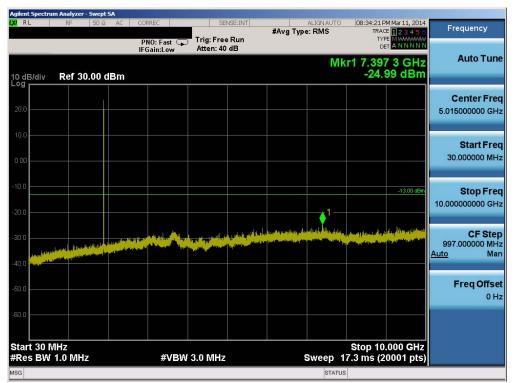
Plot 6-30. Conducted Spurious Plot (PCS WCDMA Mode - Ch. 9400)

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 28 of 61
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	m Analyzer - Swej									
LXI RL	RF 50 :	Ω AC COR	KEC		VSE:INT	#Avg Typ	ALIGN AUT	TRA	PM Mar 11, 2014 CE <b>1 2 3 4 5 6</b>	Frequency
			0: Fast 😱 ain:Low	Trig: Free Atten: 10				۲۲ ا		
							M	(r1 18.21	3 5 GHz	Auto Tune
10 dB/div Log	Ref 0.00 c	lBm						-48	.43 dBm	
										Center Freq
-10.0									-13.00 dBm	15.00000000 GHz
-20.0										
-20.0										Start Freq
-30.0										10.00000000 GHz
-40.0								<b>1</b>		Stop Freq
-50.0							والتعالية بدال	e dan da de la casa de	ultrate the state	20.00000000 GHz
	alasan da sa	وبأويار فلنظور الأرادا			N DUAL THE CALL	the party is all the	and the state of	and and finding our		
-60.0 pediately	Real Property and the second second	eda (lés ell'armont and	and the second states in the							CF Step 1.00000000 GHz
-70.0										<u>Auto</u> Man
-70.0										
-80.0										Freq Offset 0 Hz
										0 HZ
-90.0										
Start 10.0 #Res BW			#VBW	3.0 MHz			Sweep		0.000 GHz 20001 pts)	
MSG							STAT			





Plot 6-32. Conducted Spurious Plot (PCS WCDMA Mode - Ch. 9538)

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 29 of 61		
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage 29 01 01		
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	m Analyzer - Swept								
LXI RL	RF 50 Ω	AC CORRE	ic	SENSE:INT	#Avg Type	ALIGNAUTO	TRACE	Mar 11, 2014	Frequency
				rig: Free Run tten: 10 dB			TYPE	ANNNN	
10 dB/div Log	Ref 0.00 di	Bm				Mkr	17.897 -48.5	0 GHz 7 dBm	Auto Tune
-10.0								-13.00 dBm	Center Freq 15.00000000 GHz
-20.0									Start Freq 10.000000000 GHz
-40.0				a seculation in the film of the second	المرادر المراجع والمراجع		1 ******************	· · · · · · · · · · · · · · · · · · ·	<b>Stop Freq</b> 20.000000000 GHz
-60.0					Ste Marchille a State Albert				CF Step 1.00000000 GHz <u>Auto</u> Man
-80.0									<b>Freq Offset</b> 0 Hz
-90.0 Start 10.0							Stop 20.		
#Res BW	1.0 MHz		#VBW 3.0	) MHz	5		5.3 ms (20	100Tpts)	
MSG						STATUS			

Plot 6-33. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9538)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 30 of 61		
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage 30 01 01		
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# 6.4 Band Edge Emissions at Antenna Terminal §2.1051 §22.917(a) §24.238(a) RSS-132(4.5.1) RSS-133(6.5.1)

#### Test Overview

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

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

#### Test Procedure Used

KDB 971168 v02r01 - 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 > 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 = max hold
- 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.

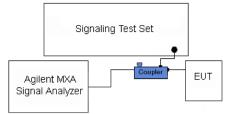


Figure 6-3. Test Instrument & Measurement Setup

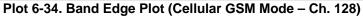
#### Test Notes

Per 22.917(b) and 24.238(b), 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.

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 31 of 61		
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage ST 01 01		
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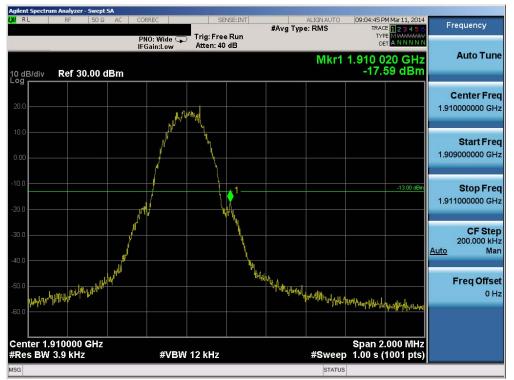
Plot 6-35. Band Edge Plot (Cellular GSM Mode - Ch. 251)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 32 of 61		
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage 32 01 01		
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Plot 6-37. Band Edge Plot (PCS GSM Mode - Ch. 810)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 33 of 61	
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Agilent Spectrum	Analyzer - Swept SA					00.44.40.0		
L <mark>XV</mark> RL	RF 50 Ω AC	CORREC	SENSE	 #Avg Type	ALIGNAUTO	TRAC	M Mar 11, 2014 E <mark>1 2 3 4 5 6</mark>	Frequency
		PNO: Wide 🖵 IFGain:Low	Trig: Free R Atten: 40 dE			DE		Auto Tune
10 dB/div Log	Ref 30.00 dBm				IVIKE	-16.1	00 MHz 73 dBm	
20.0								Center Freq 824.000000 MHz
0.00			/		- And a start of the start of t			Start Freq 816.500000 MHz
-10.0			<sup>1</sup>				-13.00 dBm	Stop Freq 831.500000 MHz
-30.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			hh	2	<b>CF Step</b> 1.500000 MHz <u>Auto</u> Man
-50.0								Freq Offset 0 Hz
-60.0 Center 824					<i>"</i> <b>0</b>	Span 1	5.00 MHz	
#Res BW 1		#VBW	300 kHz		#Sweep	1.00 s (	1001 pts)	
wood					STATUS			





Plot 6-39. Band Edge Plot (Cellular WCDMA Mode - Ch. 4233)

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 34 of 61		
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage 34 01 01		
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QX RL RF 50 Ω AC CORREC SENSE PNO: Wide Trig: Free R IFGain:Low Atten: 40 dE	#Avg Type: RMS TRACE 123456 Frequency
IFGain:Low Atten: 40 dE	UN TYPE MWWWWW 3 DET A NINNIN
10 dB/div Def 30 00 dBm	Mkr1 1.850 000 GHz -18.044 dBm
Log	
20.0	Center Freq 1.85000000 GHz
0.00	Start Freq 1.842500000 GHz
-10.0	
-30.0	CF Step 1.500000 MHz <u>Auto</u> Man
-50.0	Freq Offset 0 Hz
-80.0 Center 1.850000 GHz #Res BW 100 kHz #VBW 300 kHz	Span 15.00 MHz #Sweep 1.00 s (1001 pts)
MSG	status



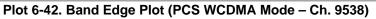


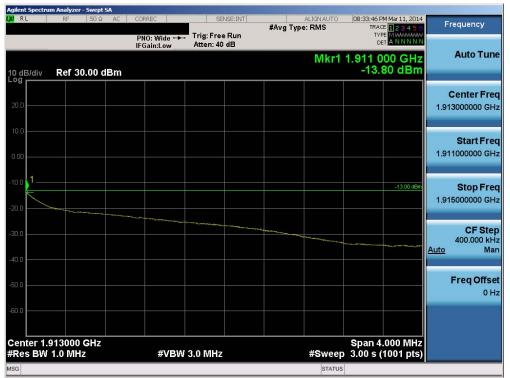
Plot 6-41. 4MHz Span Plot (PCS WCDMA Mode - Ch. 9262)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 35 of 61	
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage 35 01 01	
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d RL	RF 50 Ω AC	CORREC	SENSE:INT	ALIGNAUTO	08:33:00 PM Mar 11, 2014	A CONTRACTOR OF A CONTRACTOR O
		PNO: Wide 🕞 IFGain:Low		#Avg Type: RMS	TRACE 123456 TYPE MWWWWW DET ANNNN	Frequency
0 dB/div	Ref 30.00 dBm			Mkr1	1.910 000 GHz -17.081 dBm	Auto Tune
20.0						Center Fred 1.910000000 GHz
0.00						Start Fred 1.902500000 GH2
20.0			1		-13.00 dBm	Stop Fred 1.917500000 GHz
30.0						CF Step 1.500000 MH <u>Auto</u> Mar
50.0					masser and	Freq Offse 0 H
Center 1.9	910000 GHz	#\/B\A	/ 300 kHz	#Swoo	Span 15.00 MHz p 1.00 s (1001 pts)	
KGS DW		#404	1 300 KH2	#SWEE	<del>p 1.00 s (</del> 1001 pis)	





Plot 6-43. 4MHz Span Plot (PCS WCDMA Mode - Ch. 9538)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 36 of 61		
0Y1403110556.ZNF	3/11 - 3/12/2014	Portable Handset		Fage 30 01 01		
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#### 6.5 Peak-Average Ratio §24.232(d) RSS-132(5.4) RSS-133(6.4)

#### 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 v02r01 - 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.

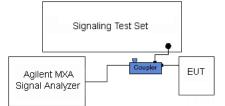


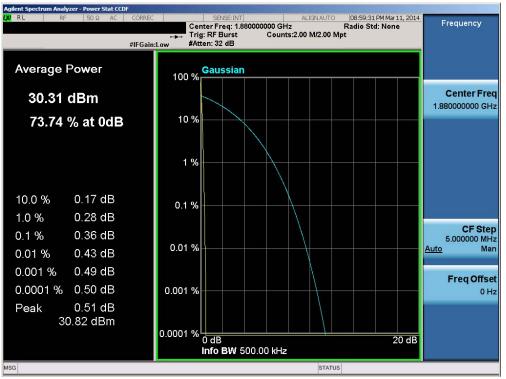
Figure 6-4. Test Instrument & Measurement Setup

#### Test Notes

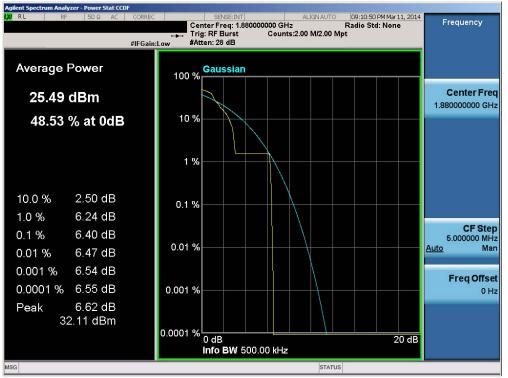
None.

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Reviewed by: Quality Manager	
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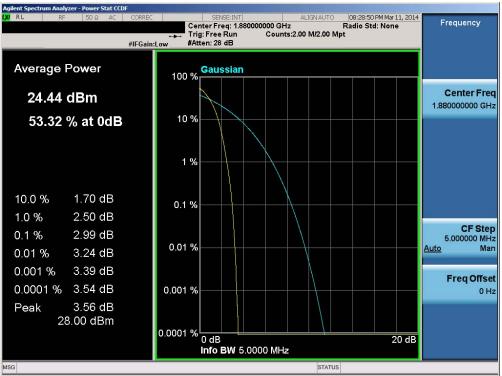




Plot 6-45. Peak-Average Ratio Plot (EDGE1900 Mode - Ch. 661)

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 29 of 61	
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Plot 6-46. Peak-Average Ratio Plot (PCS WCDMA Mode - Ch. 9400)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 39 of 61
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#### 6.6 Radiated Power (ERP/EIRP) §22.913(a)(2) RSS-132(4.4) [SRSP-503(5.1.3)]

#### Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

#### **Test Procedures Used**

KDB 971168 v02r01 – Section 5.2.1

ANSI/TIA-603-C-2004 - Section 2.2.17

#### Test Settings

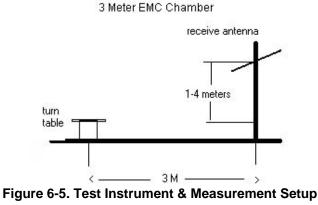
- Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 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: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Reviewed by: Quality Manager
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#### Test Setup

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



#### Test Notes

- 1) This device 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, HSUPA, and GSM/GPRS/EDGE capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The worst case test configuration was found in the EUT in the V positioning for the Cell Band, and H positioning for the PCS Band. The data reported in the tables below was measured in this test setup.

FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBd]	EUT Pol [H/V]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.20	GSM850	Standard	28.38	-1.84	V	26.54	0.451	38.45	-11.91
836.60	GSM850	Standard	26.82	-1.94	V	24.88	0.308	38.45	-13.57
848.80	GSM850	Standard	25.98	-2.04	V	23.94	0.248	38.45	-14.51
824.20	EDGE850	Standard	21.50	-1.84	V	19.66	0.092	38.45	-18.79

Table 6-2. ERP (Cellular GSM)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBd]	EUT Pol [H/V]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
826.40	WCDMA850	Standard	16.16	-1.84	V	14.32	0.027	38.45	-24.13
836.60	WCDMA850	Standard	19.22	-1.94	V	17.28	0.053	38.45	-21.17
846.60	WCDMA850	Standard	17.00	-2.04	V	14.96	0.031	38.45	-23.49

Table 6-4. ERP (Cellular WCDMA)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBi]	EUT Pol [H/V]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GSM1900	Standard	22.78	7.97	Н	30.75	1.189	33.01	-2.26
1880.00	GSM1900	Standard	23.07	8.02	Н	31.10	1.288	33.01	-1.91
1909.80	GSM1900	Standard	21.12	8.11	Н	29.23	0.838	33.01	-3.78
1880.00	EDGE1900	Standard	17.44	8.02	Н	25.46	0.352	33.01	-7.55

#### Table 6-3. EIRP (PCS GSM)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBi]	EUT Pol [H/V]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	Standard	16.78	7.98	Н	24.76	0.299	33.01	-8.25
1880.00	WCDMA1900	Standard	16.51	8.02	Н	24.54	0.284	33.01	-8.47
1907.60	WCDMA1900	Standard	13.57	8.10	Н	21.67	0.147	33.01	-11.34

Table 6-4. EIRP (PCS WCDMA)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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#### **Radiated Spurious Emissions Measurements** 6.7 §2.1053 §22.917(a) RSS-132(4.5.1)

### **Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically 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 its maximum duty cycle, at maximum power, and at the appropriate frequencies.

#### **Test Procedures Used**

KDB 971168 v02r01 - Section 5.8

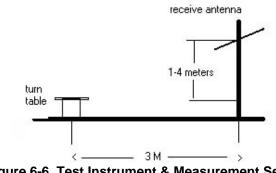
ANSI/TIA-603-C-2004 – Section 2.2.12

#### **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 = Peak
- 6. Trace mode = max hold
- 7. The trace was allowed to stabilize

#### Test Setup

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



3 Meter EMC Chamber

Figure 6-6. Test Instrument & Measurement Setup

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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#### Test Notes

- 1) This device 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, HSUPA, and GSM/GPRS/EDGE capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the H2 positioning for the Cell Band, and H positioning for the PCS Band. The data reported in the table below was measured in this test setup.
- 5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 6) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 7) Peak levels at -125dBm represent the analyzer noise floor and signify that no emission was detected.

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OPERATING FREQUENCY:	824.	20	MHz
CHANNEL:	12	_	
MEASURED OUTPUT POWER:	26.54	dBm =	0.451 W
MODULATION SIGNAL:	GSM (GMSK)	-	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	39.54	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1648.40	-50.18	6.35	-43.84	H2	70.4
2472.60	-47.33	6.60	-40.73	H2	67.3
3296.80	-52.66	6.96	-45.70	H2	72.2
4121.00	-81.49	7.59	-73.89	H2	100.4
4945.20	-81.43	9.08	-72.35	H2	98.9

Table 6-4. Radiated Spurious Data (Cellular GSM Mode – Ch. 128)

OPERATING FREQUENCY:	836.	.60	MHz
CHANNEL:	19	_	
MEASURED OUTPUT POWER:	24.88	dBm =	0.308 W
MODULATION SIGNAL:	GSM (GMSK)	_	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	37.88	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1673.20	-50.80	6.19	-44.62	H2	69.5
2509.80	-53.99	6.58	-47.41	H2	72.3
3346.40	-52.45	7.16	-45.29	H2	70.2
4183.00	-82.08	8.00	-74.09	H2	99.0
5019.60	-80.96	8.97	-71.99	H2	96.9

Table 6-5. Radiated Spurious Data (Cellular GSM Mode – Ch. 190)

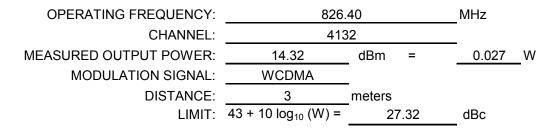
FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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OPERATING FREQUENCY:		80	MHz
CHANNEL:	25	_	
MEASURED OUTPUT POWER:	23.94	dBm =	0.248 W
MODULATION SIGNAL:	GSM (GMSK)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	36.94	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1697.60	-50.36	6.03	-44.33	H2	68.3
2546.40	-55.29	6.71	-48.57	H2	72.5
3395.20	-83.57	7.36	-76.22	H2	100.2
4244.00	-82.41	8.27	-74.14	H2	98.1
5092.80	-80.30	8.83	-71.47	H2	95.4

Table 6-6. Radiated Spurious Data (Cellular GSM Mode – Ch. 251)

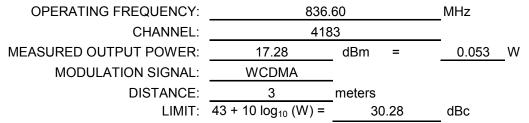


FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1652.80	-59.05	6.32	-52.73	H2	67.1
2479.20	-55.81	6.58	-49.22	H2	63.5
3305.60	-83.16	6.99	-76.17	H2	90.5
4132.00	-81.59	7.67	-73.93	H2	88.2
4958.40	-81.36	9.07	-72.29	H2	86.6

Table 6-7. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

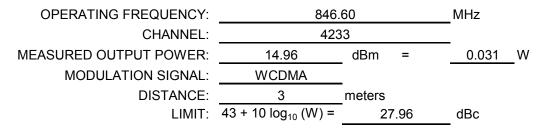
FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1673.20	-53.65	6.21	-47.44	H2	64.7
2509.80	-55.98	6.56	-49.42	H2	66.7
3346.40	-83.31	7.13	-76.17	H2	93.5
4183.00	-81.87	7.94	-73.93	H2	91.2
5019.60	-81.28	8.99	-72.29	H2	89.6

Table 6-8. Radiated Spurious Data (Cellular WCDMA Mode - Ch. 4183)



FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1693.20	-49.92	6.06	-43.86	H2	58.8
2539.80	-56.32	6.69	-49.63	H2	64.6
3386.40	-83.49	7.32	-76.17	H2	91.1
4233.00	-82.15	8.23	-73.93	H2	88.9
5079.60	-81.15	8.86	-72.29	H2	87.2

Table 6-9. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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OPERATING FREQUENCY:	1850	MHz	
CHANNEL:	512	_	
MEASURED OUTPUT POWER:	30.75	dBm =	<u>1.189</u> W
MODULATION SIGNAL:	GSM (GMSK)	_	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	43.75	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3700.40	-50.45	9.93	-40.52	Н	71.3
5550.60	-47.33	11.11	-36.23	н	67.0
7400.80	-46.06	10.74	-35.32	н	66.1
9251.00	-74.88	12.31	-62.57	Н	93.3
11101.20	-72.39	12.90	-59.48	Н	90.2

Table 6-10. Radiated Spurious Data (PCS GSM Mode – Ch. 512)

OPERATING FREQUENCY:	1880	MHz		
CHANNEL:	66	1	_	
MEASURED OUTPUT POWER:	31.10	dBm =	1.288	W
MODULATION SIGNAL:	GSM (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 log <sub>10</sub> (W) =	44.10	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3760.00	-51.65	9.70	-41.95	Н	73.0
5640.00	-49.05	11.25	-37.80	Н	68.9
7520.00	-46.83	10.99	-35.84	н	66.9
9400.00	-74.60	12.26	-62.35	н	93.4
11280.00	-42.14	12.95	-29.18	н	60.3

Table 6-11. Radiated Spurious Data (PCS GSM Mode – Ch. 661)

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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OPERATING FREQUENCY:	1909	MHz	
CHANNEL:	81	_	
MEASURED OUTPUT POWER:	29.23	dBm =	0.838 W
MODULATION SIGNAL:	GSM (GMSK)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	42.23	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3819.60	-52.78	9.48	-43.30	н	72.5
5729.40	-48.56	11.30	-37.26	Н	66.5
7639.20	-46.60	11.22	-35.37	н	64.6
9549.00	-74.54	12.35	-62.19	н	91.4
11458.80	-40.63	13.12	-27.51	Н	56.7

 Table 6-12. Radiated Spurious Data (PCS GSM Mode – Ch. 810)

OPERATING FREQUENCY:	1852	MHz	
CHANNEL:	926	62	_
MEASURED OUTPUT POWER:	24.76	dBm =	0.299 W
MODULATION SIGNAL:	WCDMA		
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	37.76	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3704.80	-45.07	9.91	-35.15	Н	59.9
5557.20	-52.24	11.12	-41.12	н	65.9
7409.60	-41.57	10.76	-30.82	н	55.6
9262.00	-45.36	12.31	-33.06	н	57.8
11114.40	-72.34	12.90	-59.44	н	84.2

 Table 6-13. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

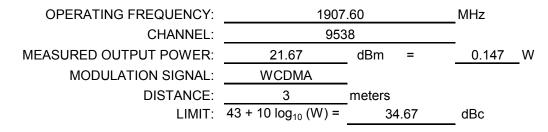
FCC ID: ZNFD321	PCTEST	FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Reviewed by: Quality Manager
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OPERATING FREQUENCY:	1880	MHz	
CHANNEL:	940		
MEASURED OUTPUT POWER:	24.54	dBm =	0.284 W
MODULATION SIGNAL:	WCDMA		
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	37.54	dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3760.00	-41.75	9.70	-32.05	Н	56.6
5640.00	-52.17	11.25	-40.92	Н	65.5
7520.00	-43.87	10.99	-32.89	н	57.4
9400.00	-74.81	12.26	-62.55	Н	87.1
11280.00	-72.40	12.95	-59.44	Н	84.0

Table 6-14. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)



FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3815.20	-46.29	9.49	-36.80	Н	58.5
5722.80	-46.07	11.29	-34.77	Н	56.4
7630.40	-47.91	11.21	-36.70	Н	58.4
9538.00	-74.88	12.32	-62.55	Н	84.2
11445.60	-72.54	13.10	-59.44	Н	81.1

Table 6-15. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

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#### 6.8 Frequency Stability / Temperature Variation §2.1055 §22.355 §24.229 §24.235 RSS-132(4.3) RSS-133(6.3)

#### Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. 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, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### Test Procedure Used

ANSI/TIA-603-C-2004

#### Test Settings

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

#### Test Setup

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

#### Test Notes

None

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## Frequency Stability / Temperature Variation (Cont'd) §2.1055 §22.355 §24.229 §24.235 RSS-132(4.3) RSS-133(6.3)

OPERATING FREQUENCY:	836,600,000	Hz

CHANNEL: 190

REFERENCE VOLTAGE: 3.8 VDC

DEVIATION LIMIT:	± 0.00025	% or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,599,989	-11	-0.0000014
100 %		- 30	836,599,992	-8	-0.0000010
100 %		- 20	836,599,985	-15	-0.0000018
100 %		- 10	836,599,998	-2	-0.0000003
100 %		0	836,599,988	-12	-0.0000014
100 %		+ 10	836,599,994	-6	-0.0000007
100 %		+ 20	836,599,991	-9	-0.0000011
100 %		+ 30	836,599,988	-12	-0.0000015
100 %		+ 40	836,599,989	-11	-0.0000013
100 %		+ 50	836,599,985	-15	-0.0000017
115 %	4.37	+ 20	836,599,998	-2	-0.0000003
BATT. ENDPOINT	3.40	+ 20	836,599,998	-2 Mada Ch 1	-0.0000002

Table 6-16. Frequency Stability Data (Cellular GSM Mode – Ch. 190)

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## Frequency Stability / Temperature Variation (Cont'd) §2.1055 §22.355 RSS-132(4.3)

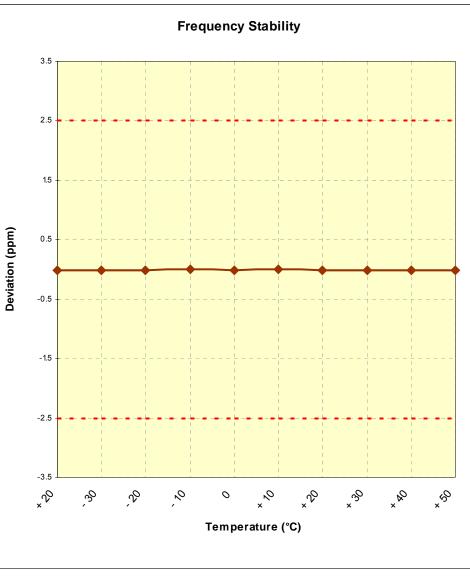


Figure 6-7. Frequency Stability Graph (Cellular GSM Mode – Ch. 190)

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## Frequency Stability / Temperature Variation (Cont'd) §2.1055 §22.355 RSS-132(4.3)

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	

REFERENCE VOLTAGE: 3.8 VDC

DEVIATION LIMIT:	± 0.00025	% or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,599,989	-11	-0.0000013
100 %		- 30	836,599,994	-6	-0.0000007
100 %		- 20	836,599,988	-12	-0.0000014
100 %		- 10	836,599,982	-18	-0.0000022
100 %		0	836,599,991	-9	-0.0000011
100 %		+ 10	836,599,995	-5	-0.0000006
100 %		+ 20	836,599,998	-2	-0.0000003
100 %		+ 30	836,599,998	-2	-0.0000002
100 %		+ 40	836,599,987	-13	-0.0000015
100 %		+ 50	836,599,981	-19	-0.0000023
115 %	4.37	+ 20	836,599,997	-3	-0.0000003
BATT. ENDPOINT	3.40	+ 20	836,599,981	-19	-0.0000023

Table 6-17. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

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# Frequency Stability / Temperature Variation (Cont'd) §2.1055 §22.355 RSS-132(4.3)

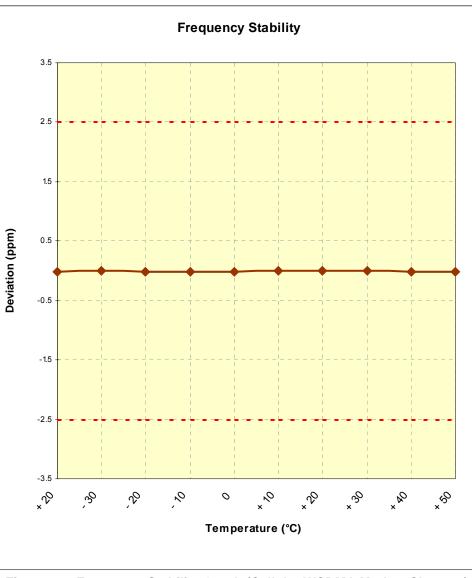


Figure 6-8. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

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## Frequency Stability / Temperature Variation (Cont'd) §2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	_
REFERENCE VOLTAGE:	3.8	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,880,000,000	0	0.0000000
100 %		- 30	1,879,999,991	-9	-0.0000005
100 %		- 20	1,879,999,998	-2	-0.0000001
100 %		- 10	1,879,999,990	-10	-0.0000005
100 %		0	1,879,999,987	-13	-0.0000007
100 %		+ 10	1,879,999,994	-6	-0.0000003
100 %		+ 20	1,879,999,980	-20	-0.0000011
100 %		+ 30	1,879,999,987	-13	-0.0000007
100 %		+ 40	1,879,999,982	-18	-0.0000009
100 %		+ 50	1,879,999,984	-16	-0.0000008
115 %	4.37	+ 20	1,879,999,997	-3	-0.0000002
BATT. ENDPOINT	3.40	+ 20	1,879,999,986	-14	-0.0000007

Table 6-18. Frequency Stability Data (PCS GSM 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 inband 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 (Cont'd) §2.1055 §24.235

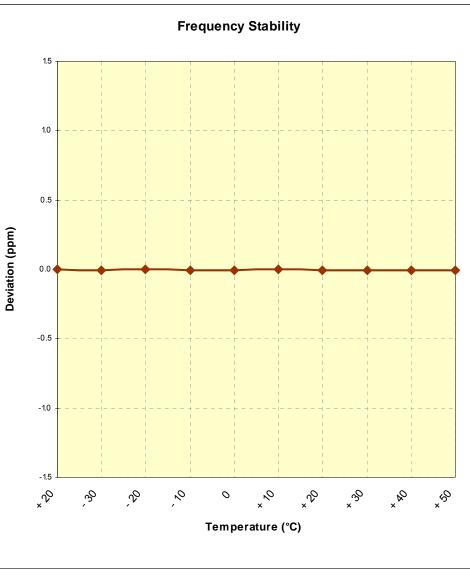


Figure 6-9. Frequency Stability Graph (PCS GSM Mode – Ch. 661)

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## Frequency Stability / Temperature Variation (Cont'd) §2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	3.8	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,984	-16	-0.0000009
100 %		- 30	1,879,999,999	-1	-0.0000001
100 %		- 20	1,879,999,981	-19	-0.0000010
100 %		- 10	1,879,999,988	-12	-0.0000006
100 %		0	1,879,999,997	-3	-0.0000002
100 %		+ 10	1,879,999,994	-6	-0.0000003
100 %		+ 20	1,879,999,990	-10	-0.0000005
100 %		+ 30	1,879,999,995	-5	-0.0000003
100 %		+ 40	1,879,999,992	-8	-0.0000004
100 %		+ 50	1,879,999,999	-1	-0.0000001
115 %	4.37	+ 20	1,879,999,985	-15	-0.0000008
BATT. ENDPOINT	3.40	+ 20	1,879,999,981	-19	-0.0000010

Table 6-19. 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 inband 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 (Cont'd) §2.1055 §24.235

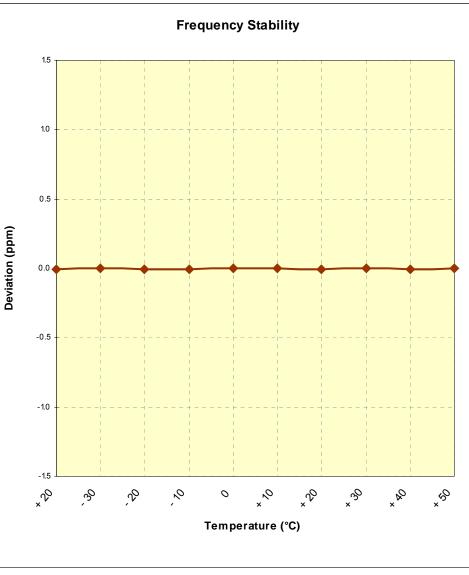


Figure 6-10. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

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## 7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LGE Portable Handset FCC ID: ZNFD321 complies with all the requirements of Parts 2, 22, 24 of the FCC rules.

FCC ID: ZNFD321		FCC Pt. 22 & 24 GSM / EDGE / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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