

PCTEST ENGINEERING LABORATORY, INC.

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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: 05/19-05/26/2014 Test Site/Location: PCTEST Lab., Columbia, MD, USA Test Report Serial No.: 0Y1405161013.ZNF

FCC ID:

ZNFB450

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-B450, LGB450, B450, LG-MS450, LGMS450, MS450 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: 17DRS]

			ERP/EIRP		
Mode	Tx Frequency (MHz)	Emission Designator	Max. Power (W)	Max. Power (dBm)	
GSM850	824.2 - 848.8	246KGXW	0.434	26.37	
GSM1900	1850.2 - 1909.8	246KGXW	0.853	29.31	
WCDMA1900	1852.4 - 1907.6	4M15F9W	0.229	23.59	

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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APPLICANT:	LG Electronics MobileComm	U.S.A		
APPLICANT ADDRESS:	1000 Sylvan Avenue			
	Englewood Cliffs, NJ 07632,	United States		
TEST SITE:	PCTEST ENGINEERING LA	BORATORY, IN	C.	
TEST SITE ADDRESS:	7185 Oakland Mills Road, Co	olumbia, MD 210	946 USA	
FCC RULE PART(S):	§2 §22(H) §24(E)			
BASE MODEL:	LG-B450			
FCC ID:	ZNFB450			
FCC CLASSIFICATION:	PCS Licensed Transmitte	r Held to Ear (F	PCE)	
MODE:	GSM / WCDMA			
FREQUENCY TOLERANCE:	±0.00025 % (2.5 ppm)			
Test Device Serial No.:	17DRS	Production	Pre-Production	Engineering
DATE(S) OF TEST:	05/19-05/26/2014			
TEST REPORT S/N:	0Y1405161013.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. 159966) 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 (2451B-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 (2451B-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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INTRODUCTION 1.0

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 located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. 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 February 15, 2012.

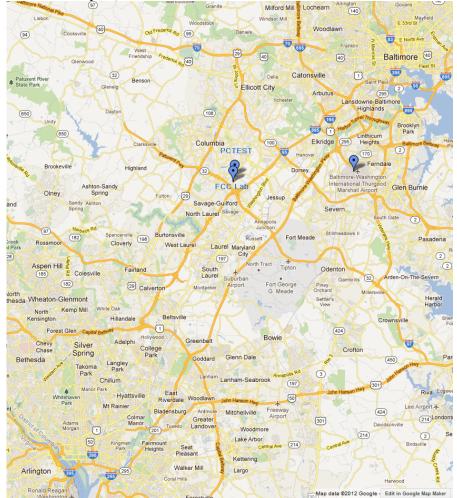


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFB450**. 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, 1900 WCDMA, Bluetooth (1x, EDR)

2.3 Test Configuration

The LG Portable Handset FCC ID: ZNFB450 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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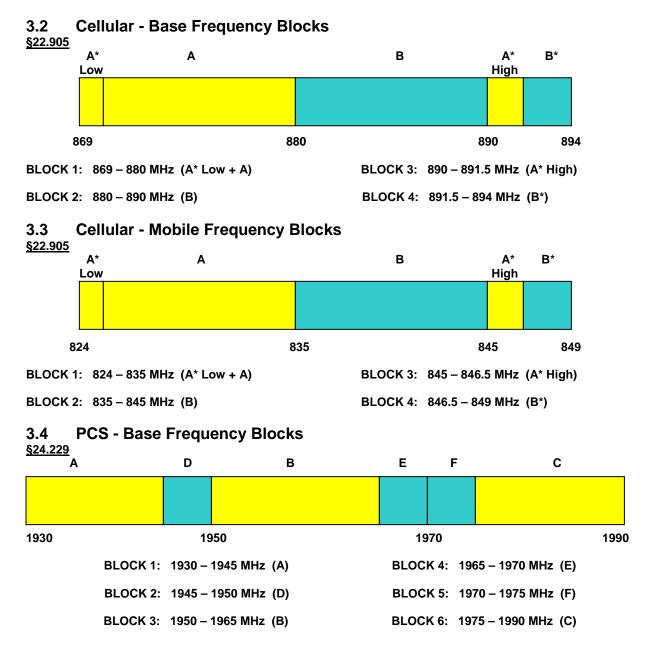


3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

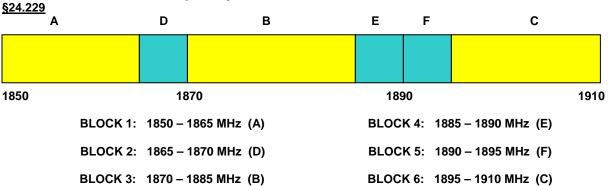
The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-C-2004) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 v02r01) were used in the measurement of the LG Portable Handset FCC ID: ZNFB450.





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3.5 PCS - Mobile Frequency Blocks

3.6 Radiated Measurements

§2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a)

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 Clause 5, Figure 5.7 of ANSI C63.4-2009. For measurements above 1GHz 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 below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It 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. A 78cm high PVC support structure is placed on top of the turntable. A $\frac{3}{4}$ " (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

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 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. For the EUT positioning, "H" is defined with the EUT lying flat on the test surface, "H2" is defined with the EUT standing up on its side, and "V" is defined with the EUT standing upright.

Per the guidance of ANSI/TIA-603-C-2004, 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 $P_{g \text{ [dBm]}}$ – cable loss $_{\text{[dB]}}$.

Radiated power levels are investigated with the receive antenna vertically polarized while radiated spurious emissions levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-C-2004.

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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
-	LTx3	Licensed Transmitter Cable Set	1/30/2014	Annual	1/30/2015	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/25/2014	Annual	3/25/2015	N/A
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	2443A01900
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	1/17/2014	Annual	1/17/2015	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Annual	6/26/2014	121034
Emco	3115	Horn Antenna (1-18GHz)	1/30/2014	Biennial	1/30/2016	9704-5182
Espec	ESX-2CA	Environmental Chamber	4/16/2014	Annual	4/16/2015	17620
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2014	Biennial	3/12/2016	128337
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2014	Annual	4/17/2015	11210140001
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator		N/A		11208010032
Mini-Circuits	TVA-11-422	RF Power Amp	N/A		QA1303002	
Mini-Circuits	VHF-1200+	High Pass Filter	1/27/2014	Annual	1/27/2015	30923
Mini-Circuits	VHF-1300+	High Pass Filter	1/29/2014	Annual	1/29/2015	30716
Mini-Circuits	VHF-3100+	High Pass Filter	1/27/2014	Annual	1/27/2015	30841
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		836536/0005
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	1/27/2014	Annual	1/27/2015	100342
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100040
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/21/2013	Biennial	11/21/2015	9105-2404
Seekonk	NC-100	Torque Wrench (8" lb)	4/16/2014	Biennial	4/16/2016	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107

Table 4-1. Test Equipment

Note:

Equipment with a calibration date of "N/A" shown in this list 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)

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:	ZNFB450
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>GSM / WCDMA</u>

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER					
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 ₁₀ (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	N/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 ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 6.7

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 2.5.

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6.2 Occupied Bandwidth §2.1049

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

- 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.

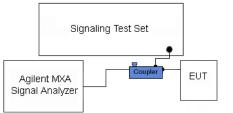


Figure 6-1. Test Instrument & Measurement Setup

Test Notes

None.

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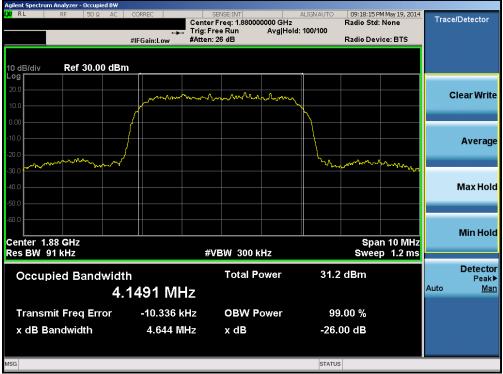
Plot 6-1. Occupied Bandwidth Plot (Cellular GSM Mode - Ch. 190)



Plot 6-2. Occupied Bandwidth Plot (PCS GSM Mode - Ch. 661)

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Plot 6-3. Occupied Bandwidth Plot (PCS WCDMA Mode - Ch. 9400)

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6.3 Spurious and Harmonic Emissions at Antenna Terminal §22.1051 §22.917(a) §24.238(a)

Test Overview

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

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

Test Procedure Used

KDB 971168 v02r01 – Section 6.0

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz for Cell, 20GHz for PCS (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = max hold
- 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.

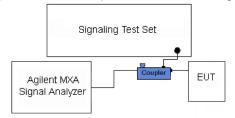


Figure 6-2. Test Instrument & Measurement Setup

Test Notes

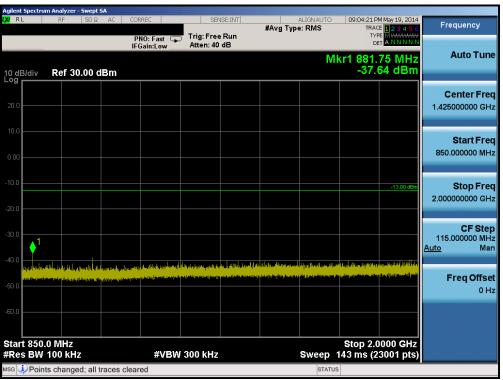
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at 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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	um Analyzer - Swept !			1		-		1		
L XI RL	RF 50 Ω	AC COF	RREC	SEN	SE:INT	#Avg Typ	ALIGNAUTO e: RMS		May 19, 2014	Frequency
			NO: Fast 🖵 Gain:Low	Trig: Free Atten: 40				TYP	E M WAWAAA T A N N N N N	
10 dB/div Log	Ref 30.00 d	Bm					M	kr1 766. -37.3	58 MHz 36 dBm	Auto Tune
20.0										Center Freq 426.500000 MHz
0.00										Start Freq 30.000000 MHz
-10.0									-13.00 dBm	Stop Freq 823.000000 MHz
-30.0									¢ ¹	CF Step 79.300000 MHz <u>Auto</u> Man
parter (en	yahaya asoloada hadada maxaa ya sangan sandad		terliftikkylenergeikart. Malafrikkylenergiadek	A		ang talang kang kang ta na ang kang kang talang kang talang kang talang kang talang kang talang kang talang kang ng kang talang talang talang			and provide a spectrum. And a second	Freq Offset 0 Hz
-60.0										
Start 30.0 #Res BW			#\/D\//	200 64-			Swoon 0	Stop 8	23.0 MHz	
	TOU KHZ		#VBW	300 kHz			Sweep 9		0001 pts)	
MSG						((0 - 11-	STATUS			400)

Plot 6-4. Conducted Spurious Plot (Cellular GSM Mode – Ch. 128)



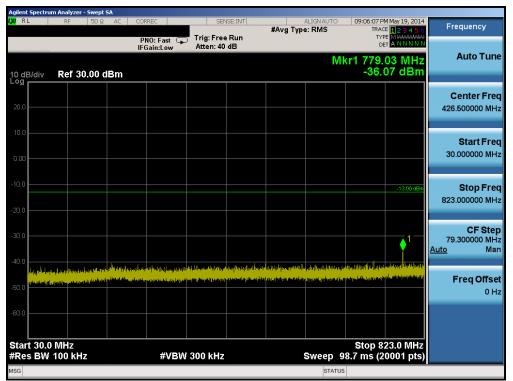
Plot 6-5. Conducted Spurious Plot (Cellular GSM Mode - Ch. 128)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Daga 15 of 40		
0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 15 of 49		
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	ectrum Anal										
l <mark>xi</mark> RL	RF	50 Ω	AC C	ORREC	SEM	VSE:INT	#Ava Ti	ALIGN AUTO		M May 19, 2014 E <mark>1 2 3 4 5 6</mark>	Frequency
				PNO: Fast 🖵 IFGain:Low	Trig: Free Atten: 36			pe. rano	TYI		
				IFGain:Low	Atten. 50	40		N/L	w4 0 70		Auto Tun
10 dB/c Log	div Re l	f 25.00 c	IBm						-29.	7 5 GHz 03 dBm	
											Center Free
15.0											6.00000000 GH
5.00											Start Free
											2.000000000 GH
-5.00											
-15.0										-13.00 dBm	
-13.0											Stop Free
-25.0									1		10.00000000 GH
					r Itlaa	. بېرىلىدا		http://www.upers.com/		and the street of	
-35.0 🐙	- ter for a ter for the first ter	a particular as	a di kata panana	All and a state of the state of		Land Street of Long		and the second sec		an and the first law, but	CF Step 800.000000 MH
1	A Number of Street, or a street		r - aithreis								<u>Auto</u> Mar
-45.0											
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-55.0											0 H
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	2.000 GH BW 1.0 I			#\/B\	3.0 MHz			Swoon 4	Stop 10	.000 GHz	
	BW 1.01	VINZ		#VDVV	3.0 WHZ					6001 pts)	
MSG								STATUS			

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



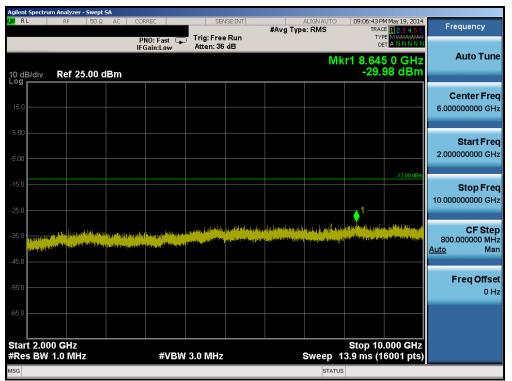
Plot 6-7. Conducted Spurious Plot (Cellular GSM Mode - Ch. 190)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dega 16 of 40			
0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 16 of 49			
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	Spectrum	n Analyze	r - Swept	5A									
l <mark>XI</mark> RL		RF	50 Ω	AC	CORREC		SE	VSE:INT	WA.um	ALIGN AUTO Type: RMS		M May 19, 2014	Frequency
					PNO:	Fast 😱	Trig: Fre		#nig	Type. Rivio	TY	PE MWWWWW FT A N N N N N	
					IFGain		Atten: 40	dB					Auto Tune
										M	kr1 894.	20 MHz	Auto Tune
10 dBi Log r	/div	Ref 3	80.00 d	lBm							-37.	38 dBm	
Γ													0
20.0													Center Freq
20.0													1.425000000 GHz
10.0													
10.0													Start Freq
													850.000000 MHz
0.00													
-10.0												-13.00 dBm	Stop Freq
													2.000000000 GHz
-20.0													
													CF Step
-30.0	<u>_ 1</u>												115.000000 MHz
	•												<u>Auto</u> Man
-40.0	ku . ktu	atal in	14.61	1.01.000	امداد مر	الدور والمراجع و	يدار ليا العراقين العر	and a start when a start	nda ana an tao in tao in	And the state of the state of	pharlase New Holmes		
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-50.0													0 Hz
-60.0													
Stort	950 () MHz									Eton 2		
		100 kł				#VBW	300 kHz			Sween		0000 GHz 3001 pts)	
			ed; all t	10000						STATU			
mod 🛶	Form	schang	jeu, an i	laces c	leared					STATU	3		

Plot 6-8. Conducted Spurious Plot (Cellular GSM Mode – Ch. 190)



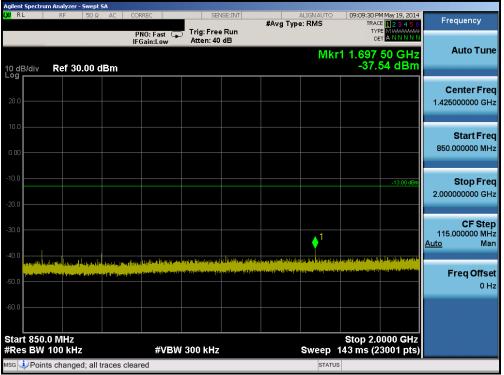
Plot 6-9. Conducted Spurious Plot (Cellular GSM Mode - Ch. 190)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 17 of 40
0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 17 of 49
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	um Analyzer - Swej						
L <mark>XI</mark> RL	RF 50	ΩAC	CORREC	SENSE:INT	ALIGNAUTO #Avg Type: RMS	09:09:11 PM May 19, 2014 TRACE 1 2 3 4 5 6	Frequency
			PNO: Fast 🖵	Trig: Free Run Atten: 40 dB		TYPE MWWWWWW DET A N N N N N	
			IFGain:Low	Atten: 40 db			Auto Tune
	B-6 00 00	-18			IVI	kr1 791.24 MHz -36.27 dBm	
10 dB/div	Ref 30.00	авт				-00.27 dDm	
							Center Freq
20.0							426.500000 MHz
10.0							Start Freq
							30.000000 MHz
0.00							30.000000 MIH2
-10.0						-13.00 dBm	Stop Freq
							823.000000 MHz
-20.0							
-30.0							CF Step
-30.0							79.300000 MHz Auto Man
-40.0							Adto
patrolise	and the state of the second	and a second	an a fan i stan a fan de stan fan de s	a na na fa fan yn an ar ar yn ar	en en angelen son ander en angelen angelen ander ander en andere en andere en andere en andere en andere en an Andere en angelen andere en and	al a president de la contra de la La contra de la contr	Energy Office at
-50.0	all destruction of the state						Freq Offset 0 Hz
							0 H2
-60.0							
Start 30.0	0 MHz					Stop 823.0 MHz	
#Res BW			#VBW	300 kHz	Sweep	98.7 ms (20001 pts)	
MSG					STATU		





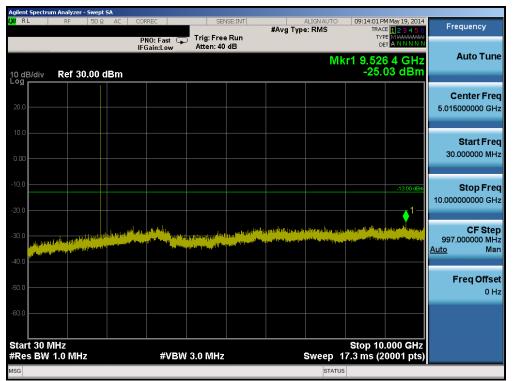


FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 19 of 40
0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 18 of 49
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	m Analyzer - Swept									
L <mark>XI</mark> RL	RF 50 Ω	AC CO	RREC	SEN	JSE:INT	#Avg Typ	ALIGN AUTO		M May 19, 2014	Frequency
		P	'NO: Fast 🖵 Gain:Low	Trig: Free Atten: 36		0.11		TYF	PE MWWWWW ET A N N N N N	
10 dB/div	Ref 25.00 (dBm					Mł	(r1 9.92) -29.	9 5 GHz 78 dBm	Auto Tune
15.0										Center Freq 6.000000000 GHz
-5.00									-13.00 dBm	Start Freq 2.000000000 GHz
-15.0									<u>-13.00 dBM</u>	Stop Freq 10.000000000 GHz
-35.0 <mark>நூர்கள்</mark> கூற்றில் ^{கண்ணகள்} -45.0	an a	n daga (dalar yang malanda Ang sa kili ing sa pang mala		and the part of the state of th	agan kenden di kanalan 200 juwa kendari kena pada	a <mark>a anna 1879 anna anna anna anna anna anna anna an</mark>	la Taling ang pang taling ang pang pang pang pang pang pang pan	a da anga banasa (pyper). A na anga banasa (pyper).		CF Step 800.000000 MHz <u>Auto</u> Man
-55.0										Freq Offset 0 Hz
-65.0	0 GH7							Stop 10	.000 GHz	
#Res BW			#VBW	3.0 MHz			Sweep 1	3.9 ms (1	6001 pts)	
MSG							STATUS	3		





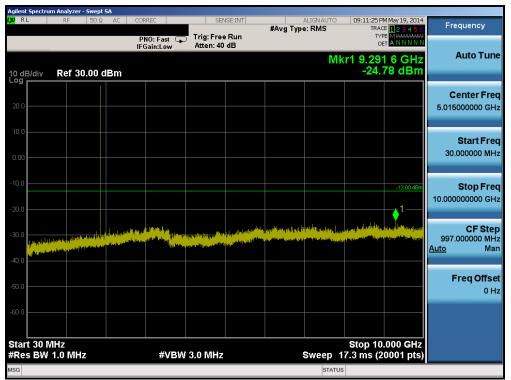
Plot 6-13. Conducted Spurious Plot (PCS GSM Mode - Ch. 512)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 10 of 10
0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 19 of 49
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	m Analyzer - Swept							-		
X/RL	RF 50 Ω	AC C	ORREC	SEI	VSE:INT	#Ava]	ALIGN AUTO		4 May 19, 2014	Frequency
			PNO: Fast 🕞 IFGain:Low	Trig: Free Atten: 10			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	TYP		
10 dB/div Log	Ref 0.00 dl	3m					Mkr	1 17.019 -48.0	0 GHz 61 dBm	Auto Tune
-10.0									-13.00 dBm	Center Freq 15.000000000 GHz
-20.0										Start Freq 10.000000000 GHz
-40.0							1			Stop Freq 20.000000000 GHz
	n an 1978 an an an Anna	u _{ga} aliyyatihiyoy 1						ithe print of the state	tilli pina Maja din Sangi Sinang Sali	CF Step 1.000000000 GHz <u>Auto</u> Mar
80.0										Freq Offse 0 Ha
-90.0								Stop 20	000 GHz	
#Res BW			#VBW	/ 3.0 MHz			Sweep 2			
//SG							STATUS			





Plot 6-15. Conducted Spurious Plot (PCS GSM Mode - Ch. 661)

FCC ID: ZNFB450	PCTEST	FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 40
0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 20 of 49
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	ım Analyzer - Swept									
L <mark>XI</mark> RL	RF 50 Ω	AC CC	RREC	SEN	JSE:INT	#Ava Tu	ALIGN AUTO		M May 19, 2014	Frequency
			PNO: Fast 🖵 Gain:Low	Trig: Free Atten: 10		ming iy	perrano	TYP		
10 dB/div Log	Ref 0.00 dE	3m					Mkr	1 17.050 -49.0	6 5 GHz 80 dBm	Auto Tune
-10.0										Center Freq
									-13.00 dBm	15.00000000 GHz
-20.0										Start Freq
-30.0										10.000000000 GHz
-40.0										Stop Freq
-50.0							1			20.00000000 GHz
-60.0	فالمحطفير إفرارها مسرأتي	L _{effe} rstpoletigt	Million and a	norda (norda (norda) Alexandra (norda) Alexandra (norda) (norda)	n and the product of the second s		seated.t	alata palana pal ^{an} Ngjara distance di		CF Step
-70.0	an an ann an Anna an An Anna an Anna an A	n a haha sa ƙƙƙara a ƙƙƙara	hang di Jacin Stilling							1.000000000 GHz <u>Auto</u> Man
										Freq Offset
-80.0										0 Hz
-90.0										
Start 10.0								Stop 20	.000 GHz	
#Res BW	1.0 MHz		#VBW	3.0 MHz					0001 pts)	
MSG							STATUS			





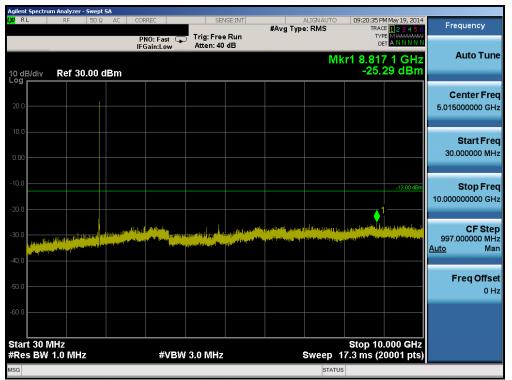
Plot 6-17. Conducted Spurious Plot (PCS GSM Mode - Ch. 810)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 21 of 40
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	m Analyzer - Swept									
X/RL	RF 50 Ω	AC	CORREC		ISE:INT	#Avg Typ	ALIGNAUTO	TRACE	May 19, 2014	Frequency
			PNO: Fast 🕞 IFGain:Low	Trig: Free Atten: 10		•		TYPE DET	ANNNN	
10 dB/div Log	Ref 0.00 dE	3m					Mkr	1 16.895 -50.2	5 GHz 3 dBm	Auto Tune
										Center Free
-10.0									-13.00 dBm	15.000000000 GHz
20.0										Start Free
30.0										10.000000000 GH
40.0										Stop Free
-50.0							1			20.00000000 GH
ka do di a	II. Dobula, minife albitrati	ruflesteart	Bargaret provided The	n gestikken og som forsegjons an som at her som forsegjons	lasing pipering	الم المراجعة والمعالمة المراجع مع المراجع الم		le les diplomatiques parties El transmitte transmitte d		CF Ster
50.0 alukational	na jadari kan dati Makalah jirih		والمتعاد المتلكانية بالتلميرية ويماداها							1.000000000 GH <u>Auto</u> Ma
70.0										
80.0										Freq Offse 0 H
90.0										
itart 10.0 Res BW			#VBW	/ 3.0 MHz			Sweep 2	Stop 20.0 5.3 ms (20	000 GHz 1001 pts)	
SG							STATUS			





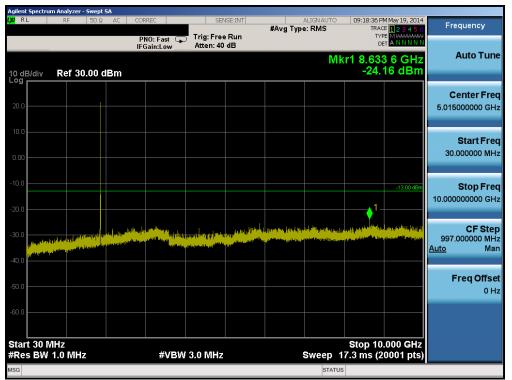
Plot 6-19. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9262)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 40
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jilent Spectru / RL	RF 50 Ω		CORREC	SEN	SE:INT		ALIGN AUTO		1 May 19, 2014	Frequency
			PNO: Fast ⊂ IFGain:Low	Trig: Free Atten: 10	Run dB	#Avg Type	e: RMS	TYP	123456 Mwwwww ANNNNN	Frequency
0 dB/div	Ref 0.00 d	Bm					Mkr	1 16.990 -49.7	0 GHz 79 dBm	Auto Tuno
10.0									-13.00 dBm	Center Fre 15.000000000 GH
80.0										Start Fre 10.000000000 GH
40.0 50.0							1			Stop Fre 20.000000000 GH
50.0 <mark>Manadowy)</mark> Manadowy 10.0	astanta la ant <mark>ensergi tenseratura</mark> General Jacobi estas a tense	n prista prista di Santa di Sa Nga kana di Santa di S	ny fallany yang bahar dan pangkan dan salah s		A Diversity of the second s		M	lad oo kentika oo di Di Paangoo di Kaasani di	a kypenin Synolycki magnatiki	CF Ste 1.000000000 GH <u>Auto</u> Ma
60.0										Freq Offse 0 ⊦
30.0	00 GHz							Stop 20.	000 GHz	
Res BW			#VB	N 3.0 MHz			Sweep 2	5.3 ms (2	0001 pts)	





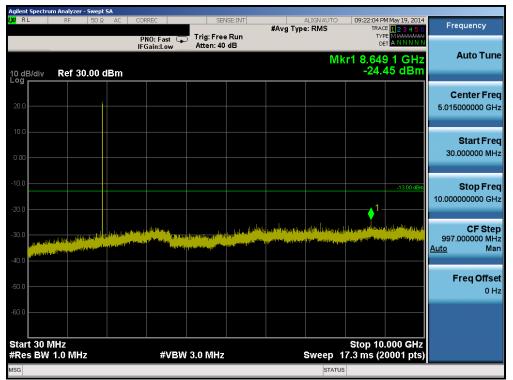
Plot 6-21. Conducted Spurious Plot (PCS WCDMA Mode - Ch. 9400)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 40				
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Agilent Spectru <mark>X/</mark> R L	m Analyzer - Swer RF 50		CORREC	SEN	ISE:INT		ALIGN AUTO	09:19:04 Pf	May 19, 2014	_
			PNO: Fast 🕞	Trig: Free Atten: 10	Run dB	#Avg Typ	e: RMS	TRAC	E 1 2 3 4 5 6 E M WWWWWW T A N N N N N	Frequency
10 dB/div	Ref 0.00 c	IBm					Mkr	1 16.913 -49.4	3 0 GHz 47 dBm	Auto Tune
-10.0									-13.00 dBm	Center Freq 15.000000000 GHz
-20.0										Start Freq 10.000000000 GHz
-40.0					natural na statu su na statu		1	akar alata sa Is	التعاريب المتعار	Stop Freq 20.000000000 GHz
60.0 (1994)	dan bergan dan pada atanan dara dara dara dara dara dara dara		the Second Letter State of Let						n an	CF Step 1.000000000 GH <u>Auto</u> Mar
-80.0										Freq Offse 0 H:
-90.0	00 GHz							Stop 20	.000 GHz	
#Res BW			#VBW	/ 3.0 MHz			Sweep 2	5.3 ms (2	0001 pts)	
ISG							STATUS			





Plot 6-23. Conducted Spurious Plot (PCS WCDMA Mode - Ch. 9538)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 40				
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	m Analyzer - Swep									
X/RL	RF 50 \$	Ω AC CC	DRREC		JSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	4 May 19, 2014	Frequency
		IF	PNO: Fast Ģ -Gain:Low	Trig: Free Atten: 10			Mkr	DE 1 17.043	3 0 GHz 24 dBm	Auto Tune
10 dB/div Log	Ref 0.00 d	Bm						-50.2		
-10.0									-13.00 dBm	Center Freq 15.000000000 GHz
-20.0										Start Freq 10.000000000 GHz
-40.0							∳ 1			Stop Freq 20.000000000 GHz
-60.0	u an d'f fan de gener fan de fan de gener new de gener gener fan de fan de gener new de gener gener fan de fan de gener	hing land too Harry Se soor farmata alaa y	the difference of the ball	ىلىرىدى يوروغان يورى. 14-يىغ ئاسان وي والاست.	aleka _{pa} laping Bélen, Joseph			n gywr fergyddol Chigaet y gwlana yn diff		CF Step 1.00000000 GHz <u>Auto</u> Man
-80.0										Freq Offset 0 Hz
-90.0										
Start 10.0 #Res BW			#VBW	/ 3.0 MHz			Sweep 2	Stop 20. 5.3 ms (2	000 GHz 0001 pts)	
MSG							STATUS			

Plot 6-24. Conducted Spurious Plot (PCS WCDMA Mode - Ch. 9538)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Daga 25 of 40				
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6.4 Band Edge Emissions at Antenna Terminal §2.1051 §22.917(a) §24.238(a)

Test Overview

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

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

Test Procedure Used

KDB 971168 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 \geq 1% of the emission bandwidth
- 4. VBW <u>></u> 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.

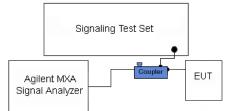


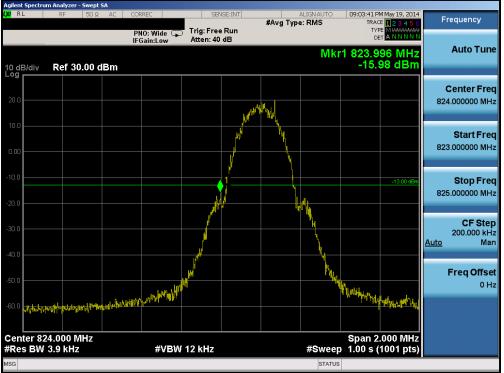
Figure 6-3. Test Instrument & Measurement Setup

Test Notes

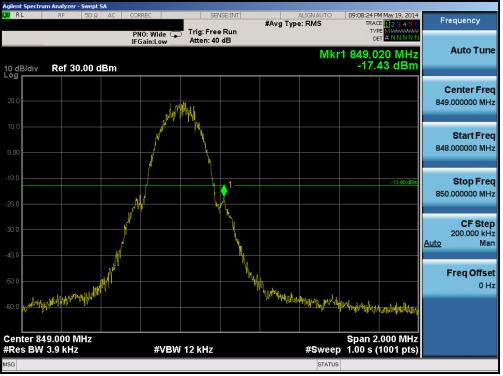
Per 22.917(b), 24.238(b), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. 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: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager				
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0Y1405161013.ZNF	05/19-05/26/2014	Portable Handset		Page 26 of 49				
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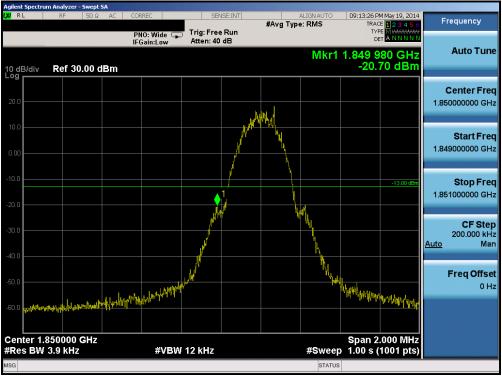
Plot 6-25. Band Edge Plot (Cellular GSM Mode – Ch. 128)

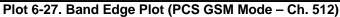


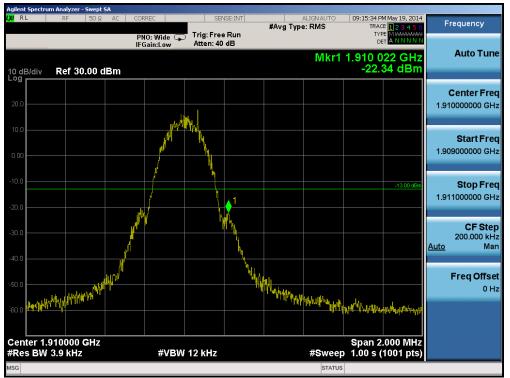
Plot 6-26. Band Edge Plot (Cellular GSM Mode - Ch. 251)

FCC ID: ZNFB450	CALEST.	FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 27 of 49
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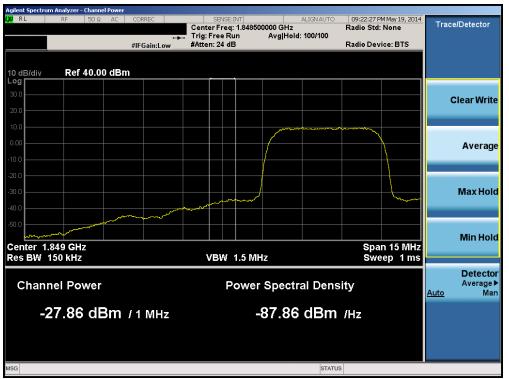
Plot 6-28. Band Edge Plot (PCS GSM Mode - Ch. 810)

FCC ID: ZNFB450	PCTEST	FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 28 of 40
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	m Analyzer - Swept SA					T		
LX/RL	RF 50 Ω AC	CORREC	SENSE:	Avg Type	LIGNAUTO		May 19, 2014	Frequency
		PNO: Fast 🖵	Trig: Free R Atten: 40 dE	•		TYP	E MWWWWWW T A NNNNN	
		IFGain:Low	Allen. 40 dL		Miland			Auto Tun
40.151.1	D-5 20 00 dDm				IVIKET	-26.2	00 GHz 91 dBm	
10 dB/div Log	Ref 30.00 dBm			 		20.2		
								Center Fre
20.0								1.850000000 GH
10.0				 	in an			
					and the second se			Start Fre
0.00								1.842500000 GH
						l I		
-10.0						}	-13.00 dBm	Stop Fre
						{		1.857500000 GH
-20.0			1					
			- T					CF Ste
-30.0						-{		1.500000 MH
			and see the			myneen	bouluman	<u>Auto</u> Ma
-40.0		and the second and the second and the					~~~~~	
	person and and and and and and and and and an	A.						Freq Offse
-50.0 -50.0								0 н
-60.0								
	350000 GHz					Span 1	5.00 MHz 1001 pts)	
#Res BW	100 kHz	#VBW	300 kHz		#Sweep	1.00 s (1001 pts)	
MSG					STATUS			

Plot 6-29. Band Edge Plot (PCS WCDMA Mode – Ch. 9262)



Plot 6-30. 4MHz Span Plot (PCS WCDMA Mode - Ch. 9262)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Page 29 of 49				
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5/16/2014



Agilent Spectru	ım Analyzer - Sv		CORDEC	051100				00.01.00.0			
L yd RL	RF 5	iOΩ AC	CORREC PNO: Fast	SENSE		#Avg Type	ALIGN AUTO E: RMS	TRAC	M May 19, 2014 E 1 2 3 4 5 6 E M MAAAAAAA	Frequency	
10 dB/div	Ref 30.0	0 dBm	IFGain:Low	Atten: 40 d	8		Mkr1		00 GHz 84 dBm	Auto Tu	une
20.0										Center F 1.91000000 (
0.00			hattern samatannahaan an ara							Start F 1.902500000 (
-10.0									-13.00 dBm	Stop F 1.917500000 (
-30.0	an a			h	hanna	and the second second	angeorge and complex of	100 Autor		CF Si 1.500000 M Auto	
-50.0							The second s		and the second	Freq Off C	f set) Hz
Center 1. #Res BW	910000 GI	Hz	#\/B\M	300 kHz			#Sween	Span 1	5.00 MHz 1001 pts)		
#RES DW	TOO KHZ		#VDVV	JUU KHZ			#oweep	1.00 S (ioo r pis)		





Plot 6-32. 4MHz Span Plot (PCS WCDMA Mode - Ch. 9538)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager		
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6.5 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 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.

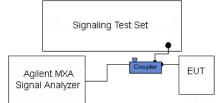


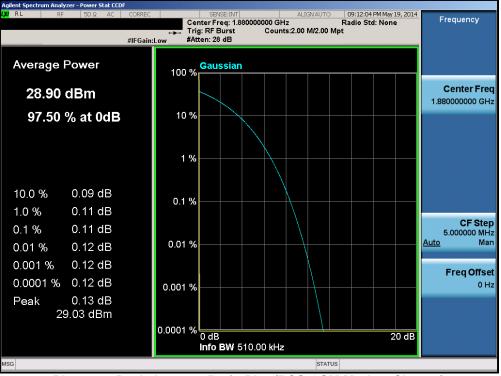
Figure 6-4. Test Instrument & Measurement Setup

Test Notes

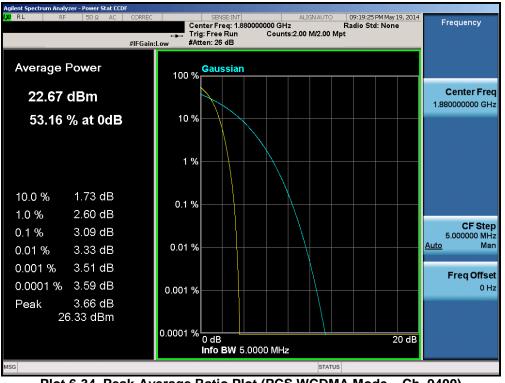
None

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Plot 6-33. Peak-Average Ratio Plot (PCS GSM Mode – Ch. 661)



Plot 6-34. Peak-Average Ratio Plot (PCS WCDMA Mode - Ch. 9400)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 32 of 49	
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6.6 Radiated Power (ERP/EIRP) §22.913(a)(2) 24.232(c)

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 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 \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

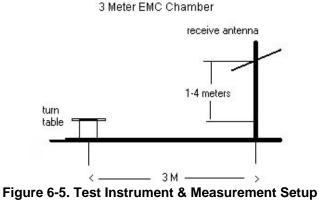
FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
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Test Setup

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



Test Notes

- This device employs GSM and GPRS capabilities. The EUT was tested under all configurations and the highest power is reported in GSM mode using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "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 upright. The worst case setup is reported in the tables below.

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
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Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Ant. Gain [dBd]	-	EUT Pol.	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.20	GSM850	Standard	19.96	4.59	V	V	24.55	0.285	38.45	-13.90
836.60	GSM850	Standard	21.55	4.82	V	V	26.37	0.434	38.45	-12.08
848.80	GSM850	Standard	21.04	5.05	V	V	26.09	0.406	38.45	-12.36

Table 6-2. ERP (Cellular GSM)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Ant. Gain [dBi]	-	EUT Pol.	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GSM1900	Standard	19.71	9.60	V	V	29.31	0.853	33.01	-3.70
1880.00	GSM1900	Standard	18.54	9.53	V	V	28.07	0.641	33.01	-4.94
1909.80	GSM1900	Standard	19.44	9.47	V	V	28.91	0.779	33.01	-4.10

Table 6-3. EIRP (PCS GSM)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Ant. Gain [dBi]	-	EUT Pol.	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	Standard	13.95	9.59	V	V	23.54	0.226	33.01	-9.47
1880.00	WCDMA1900	Standard	14.06	9.53	V	V	23.59	0.229	33.01	-9.42
1907.60	WCDMA1900	Standard	12.23	9.48	V	V	21.71	0.148	33.01	-11.30

Table 6-4. EIRP (PCS WCDMA)

FCC ID: ZNFB450	PCTEST	FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
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Radiated Spurious Emissions Measurements 6.7 §2.1053 §22.917(a) 24.238(a)

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 maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 v02r01 - Section 5.8

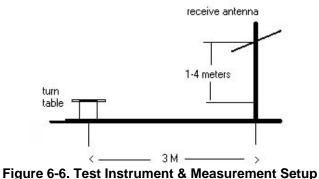
ANSI/TIA-603-C-2004 - Section 2.2.12

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

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager		
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Test Notes

- 1) This device employs GSM and GPRS capabilities. The EUT was tested under all configurations and the highest power is reported in GSM mode using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "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 upright. The worst case setup is reported in the tables below.
- 5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter 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.

OPERATING FREQUENCY:	824.20		MHz
CHANNEL:	128	- -	
MEASURED OUTPUT POWER:	24.55	dBm =	0.285 W
MODULATION SIGNAL:	GSM (GMSK)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	37.55	dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1648.40	-47.04	6.56	-40.48	Н	H2	65.0
2472.60	-39.76	7.29	-32.47	Н	H2	57.0
3296.80	-49.04	7.37	-41.67	Н	H2	66.2
4121.00	-58.01	8.02	-49.99	Н	H2	74.5
4945.20	-57.09	8.74	-48.36	Н	H2	72.9
5769.40	-58.30	9.20	-49.10	Н	H2	73.7

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

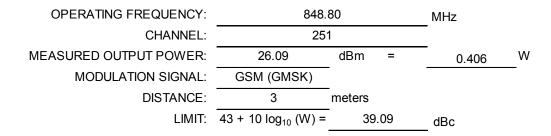
FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 27 of 40	
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OPERATING FREQUENCY:	836.60		MHz
CHANNEL:	190		_
MEASURED OUTPUT POWER:	26.37	dBm =	0.434 W
MODULATION SIGNAL:	GSM (GMSK)	-	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	39.37	dBc

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1673.20	-46.88	6.55	-40.33	Н	H2	66.7
2509.80	-41.80	7.34	-34.46	Н	H2	60.8
3346.40	-46.89	7.44	-39.45	Н	H2	65.8
4183.00	-53.56	8.20	-45.36	Н	H2	71.7
5019.60	-58.27	8.74	-49.52	Н	H2	75.9
5856.20	-59.38	9.29	-50.08	Н	H2	76.5

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



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
1697.60	-45.92	6.55	-39.38	Н	H2	65.5
2546.40	-40.87	7.36	-33.51	Н	H2	59.6
3395.20	-46.52	7.51	-39.01	Н	H2	65.1
4244.00	-57.18	8.40	-48.78	Н	H2	74.9
5092.80	-57.74	8.60	-49.14	Н	H2	75.2
5941.60	-58.75	9.25	-49.50	Н	H2	75.6

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

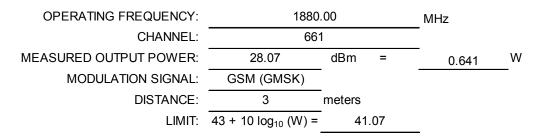
FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dege 29 of 40		
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OPERATING FREQUENCY:	1850.20		MHz
CHANNEL:	512		-
MEASURED OUTPUT POWER:	29.31	dBm =	0.853 W
MODULATION SIGNAL:	GSM (GMSK)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	42.31	_

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3700.40	-36.19	9.44	-26.75	Н	H2	56.1
5550.60	-55.48	10.78	-44.69	Н	H2	74.0
7400.80	-48.64	10.69	-37.95	Н	H2	67.3
9251.00	-58.58	11.58	-47.00	Н	H2	76.3
11101.20	-55.94	12.79	-43.14	Н	H2	72.4
12951.40	-53.81	13.19	-40.62	Н	H2	69.9
14801.60	-54.41	12.10	-42.31	Н	H2	71.6
16651.80	-52.59	15.29	-37.30	Н	H2	66.6

Table 6-7. Radiated Spurious Data (PCS GSM Mode – Ch. 512)

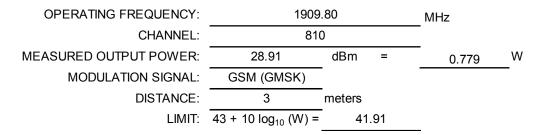


Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3760.00	-40.55	9.28	-31.26	Н	H2	60.6
5640.00	-54.02	11.03	-42.99	Н	H2	72.3
7520.00	-47.34	10.97	-36.36	Н	H2	65.7
9400.00	-56.53	11.53	-45.00	Н	H2	74.3
11280.00	-51.76	12.71	-39.05	Н	H2	68.4
13160.00	-54.68	12.74	-41.94	Н	H2	71.2
15040.00	-56.41	13.50	-42.91	Н	H2	72.2
16920.00	-54.76	14.06	-40.70	Н	H2	70.0

Table 6-8. Radiated Spurious Data (PCS GSM Mode - Ch. 661)

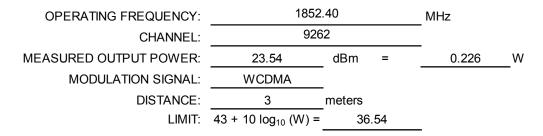
FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3819.60	-43.63	9.19	-34.44	Н	H2	63.7
5729.40	-54.62	11.28	-43.34	Н	H2	72.6
7639.20	-49.17	11.17	-38.00	Н	H2	67.3
9549.00	-57.09	11.83	-45.26	Н	H2	74.6
11458.80	-50.38	12.71	-37.67	Н	H2	67.0
13368.60	-56.24	12.46	-43.77	Н	H2	73.1
15278.40	-58.09	14.89	-43.20	Н	H2	72.5
17188.20	-52.60	13.25	-39.35	Н	H2	68.7

Table 6-9. Radiated Spurious Data (PCS GSM Mode - Ch. 810)



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3704.80	-47.49	9.43	-38.07	Н	H2	61.6
5557.20	-53.87	10.80	-43.07	Н	H2	66.6
7409.60	-60.12	10.71	-49.41	Н	H2	73.0

Table 6-10. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

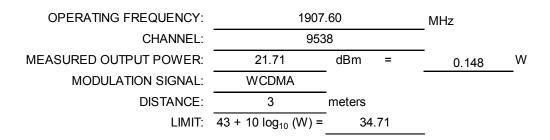
FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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OPERATING FREQUENCY:	1880	.00	MHz
CHANNEL:	9400		-
MEASURED OUTPUT POWER:	23.59	dBm =	0.229 W
MODULATION SIGNAL:	WCDMA	-	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	36.59	

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]		EUT Pol. [H/H2/V]	[dBc]
3760.00	-44.25	9.28	-34.96	Н	H2	58.5
5640.00	-54.36	11.03	-43.33	Н	H2	66.9
7520.00	-60.40	10.97	-49.42	Н	H2	73.0

Table 6-11. Radiated Spurious Data (PCS WCDMA Mode - Ch. 9400)



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	[dBc]
3815.20	-42.72	9.19	-33.53	Н	H2	57.1
5722.80	-55.19	11.27	-43.91	Н	H2	67.5
7630.40	-58.67	11.17	-47.50	Н	H2	71.0
9538.00	-58.18	11.80	-46.38	Н	H2	69.9

Table 6-12. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Frequency Stability / Temperature Variation 6.8 §2.1055 §22.355 §24.229 §24.235

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:

- **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an a.) 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 ±0.00025% (±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

OPERATING FREQUENCY: 836,600,000 Hz

CHANNEL:

190

VDC

REFERENCE VOLTAGE: 3.70

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.70	+ 20 (Ref)	836,599,989	-11	-0.0000013
100 %		- 30	836,599,992	-8	-0.0000010
100 %		- 20	836,600,006	6	0.000007
100 %		- 10	836,599,975	-25	-0.0000030
100 %		0	836,599,975	-25	-0.0000030
100 %		+ 10	836,600,016	16	0.0000019
100 %		+ 20	836,600,024	24	0.0000029
100 %		+ 30	836,599,988	-12	-0.0000014
100 %		+ 40	836,600,021	21	0.0000025
100 %		+ 50	836,600,006	6	0.000007
115 %	4.26	+ 20	836,600,022	22	0.0000026
BATT. ENDPOINT	3.40	+ 20	836,599,991	-9	-0.0000011

Table 6-13. Frequency Stability Data (Cellular GSM Mode – Ch. 190)

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Frequency Stability / Temperature Variation §2.1055 §22.355

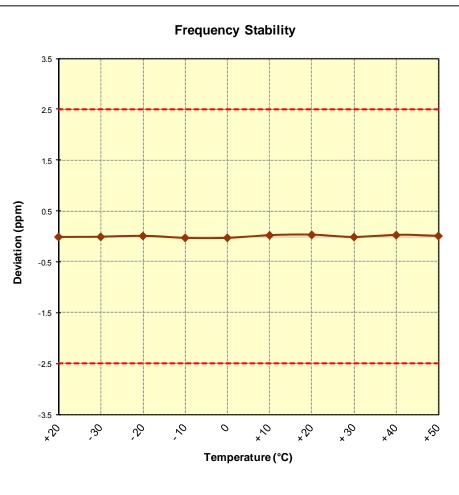


Figure 6-7. Frequency Stability Graph (Cellular GSM Mode – Ch. 190)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Frequency Stability / Temperature Variation §2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	3.70	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.70	+ 20 (Ref)	1,879,999,985	-15	-0.000008
100 %		- 30	1,880,000,022	22	0.0000012
100 %		- 20	1,880,000,018	18	0.0000010
100 %		- 10	1,880,000,006	6	0.0000003
100 %		0	1,879,999,985	-15	-0.0000008
100 %		+ 10	1,879,999,992	-8	-0.0000004
100 %		+ 20	1,880,000,020	20	0.0000011
100 %		+ 30	1,880,000,016	16	0.0000009
100 %		+ 40	1,880,000,001	1	0.0000001
100 %		+ 50	1,879,999,988	-12	-0.0000006
115 %	4.26	+ 20	1,879,999,999	-1	-0.0000001
BATT. ENDPOINT	3.40	+ 20	1,880,000,027	27	0.0000014

Table 6-14. 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.

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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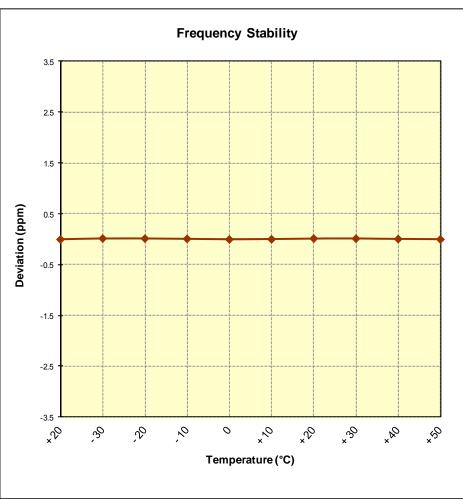


Figure 6-8. Frequency Stability Graph (PCS GSM Mode – Ch. 661)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Frequency Stability / Temperature Variation §2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	3.70	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.70	+ 20 (Ref)	1,880,000,012	12	0.0000006
100 %		- 30	1,879,999,981	-19	-0.0000010
100 %		- 20	1,880,000,009	9	0.0000005
100 %		- 10	1,880,000,024	24	0.0000013
100 %		0	1,879,999,986	-14	-0.000007
100 %		+ 10	1,880,000,018	18	0.0000010
100 %		+ 20	1,880,000,002	2	0.0000001
100 %		+ 30	1,879,999,982	-18	-0.0000010
100 %		+ 40	1,880,000,021	21	0.0000011
100 %		+ 50	1,879,999,987	-13	-0.000007
115 %	4.26	+ 20	1,880,000,005	5	0.0000003
BATT. ENDPOINT	3.40	+ 20	1,880,000,006	6	0.0000003

Table 6-15. 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.

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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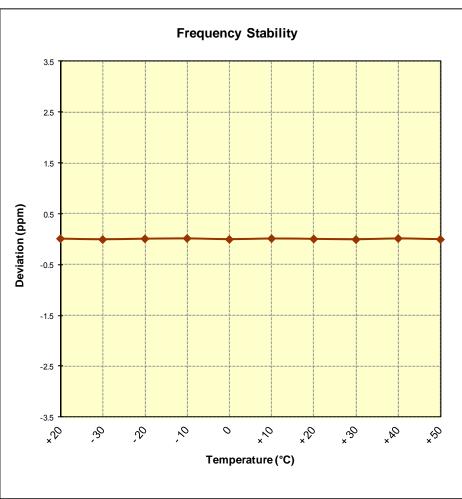


Figure 6-9. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG Portable Handset FCC ID: ZNFB450 complies with all the requirements of Parts 2, 22, 24 of the FCC rules.

FCC ID: ZNFB450		FCC Pt. 22 & 24 GSM / WCDMA MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Reviewed by: Quality Manager
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