

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT GSM / GPRS / EDGE / WCDMA

Applicant Name:

FCC ID:

LG Electronics U.S.A, INC 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: 7/31 - 8/21/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1808100154-02.ZNF

ZNFH871S

APPLICANT: LG Electronics U.S.A, INC

Certification
LG-H871S
LGH871S, H871S
Portable Handset
PCS Licensed Transmitter Held to Ear (PCE)
22 & 24
ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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

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





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			Ef	RP	EI	RP	
Mode	FCC Rule Part	Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Emission Designator
GPRS850	22H	824.2 - 848.8	0.729	28.63	1.197	30.78	243KGXW
EDGE850	22H	824.2 - 848.8	0.158	22.00	0.260	24.15	248KG7W
WCDMA850	22H	826.4 - 846.6	0.081	19.08	0.133	21.23	4M15F9W
GPRS1900	24E	1850.2 - 1909.8			1.109	30.45	245KGXW
EDGE1900	24E	1850.2 - 1909.8			0.444	26.47	246KG7W
WCDMA1900	24E	1852.4 - 1907.6			0.185	22.67	4M17F9W

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

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

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

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFH871S**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

Test Device Serial No.: 00786, 00836, 00794

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GPRS/EDGE, 850/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ac WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC

2.3 Test Configuration

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

2.4 EMI Suppression Device(s)/Modifications

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

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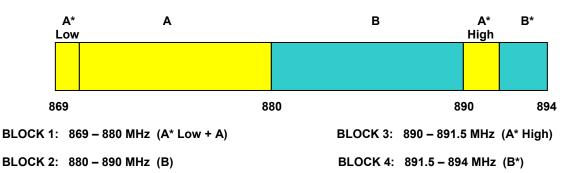
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

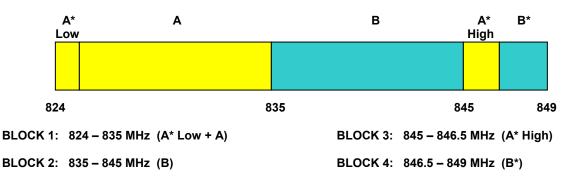
The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

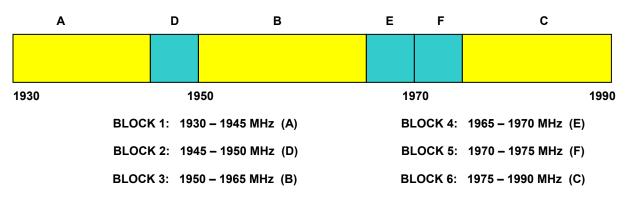
3.2 Cellular - Base Frequency Blocks



3.3 Cellular - Mobile Frequency Blocks

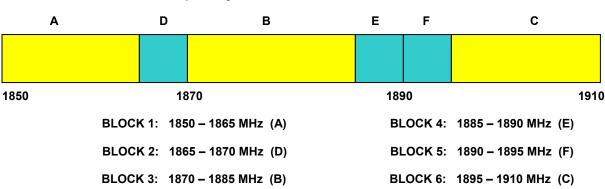


3.4 PCS - Base Frequency Blocks



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3.5 PCS - Mobile Frequency Blocks

3.6 Radiated Measurements

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

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

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

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

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

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

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx2	Licensed Transmitter Cable Set	1/23/2018	Annual	1/23/2019	LTx2
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
Espec	ESX-2CA	Environmental Chamber	3/28/2018	Annual	3/28/2019	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/20/2018	Annual	3/20/2019	MY49430494
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/30/2018	Annual	3/30/2019	11401010036
Mini Circuits	TVA-11-422	RF Power Amp	N/A		N/A	QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A		N/A	11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	10/13/2017	Annual	10/13/2018	102060
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	9/11/2017	Annual	9/11/2018	102132
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/25/2018	Annual	6/25/2019	102133
Anritsu	MT8820C	Radio Communication Analyzer	10/25/2017	Annual	10/25/2018	6201144419
Rohde & Schwarz	TC-TA18	Cross-Pol Antenna 400MHz-18GHz	10/30/2017	Annual	10/30/2018	101058
Schwarzbeck	UHA 9105	Dipole Antenna	8/26/2016	Biennial	8/26/2018	2696
Rohde & Schwarz	TS-PR8	Preamplifier-Antenna SYS; 30MHz-8GHz	10/19/2017	Annual	10/19/2018	102324
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100040
Seekonk	NC-100	Torque Wrench	12/28/2017	Annual	12/28/2018	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

Notes:

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

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6.0 SAMPLE CALCULATIONS

GPRS Emission Designator

Emission Designator = 250KGXW

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

EDGE Emission Designator

Emission Designator = 250KG7W

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

WCDMA Emission Designator

Emission Designator = 4M16F9W

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

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

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

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7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics U.S.A, INC
FCC ID:	ZNFH871S
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>GSM / GPRS / EDGE / WCDMA</u>

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	RSS-Gen (4.6.1) RSS-133(2.3)	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5)	Conducted Band Edge / Spurious Emissions	> 43 + log ₁₀ (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Sections 7.3, 7.4
24.232(d)	RSS-132(5.4) RSS-133(6.4)	Peak-Average Ratio	< 13 dB	CONDUCTED	PASS	Section 7.5
2.1046	RSS-132(5.4) RSS-133(4.1)	Transmitter Conducted Output Power	N/A		PASS	RF Exposure Report
2.1055 22.355 24.235 27.54	RSS-132(5.3) RSS-133(6.3)	Frequency Stability	< 2.5 ppm (Part 22) Emission must remain in band (Part 24)		PASS	Section 7.8
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP		PASS	Section 7.6
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP	RADIATED	PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5)	Radiated Spurious Emissions	> 43 + log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 7.7

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "2G/3G Automation," Version 3.11.

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7.2 Occupied Bandwidth

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 4.2

Test Settings

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

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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Keysight Spectrum Analyzer - Occupied BW					
KL RF 50Ω AC	CORREC Center	SENSE:INT er Freg: 836.600000 MHz	10:55:33 F Radio Sto	M Aug 01, 2018 : None	Trace/Detector
		Free Run Avg Ho n: 32 dB	ld: 100/100 Radio De	vice: BTS	
	#IFGain:Low #Atte	in. 32 dB	Radio De	VICE. B13	
15 dB/div Ref 40.00 dBm					
25.0	harmon	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			Clear Write
10.0	~^^				Clear write
-5.00			- murren		
-20.0				m	
-35.0					Average
-50.0					
-65.0					
-80.0					Max Hold
-95.0					
Center 836.6 MHz			Sna	n 625 kHz	
Res BW 6.2 kHz	#	#VBW 18 kHz	Sweep	0 15.6 ms	Min Hol
Occupied Bandwidth		Total Power	40.5 dBm		
24	2.93 kHz				Detecto Peak
Transmit Freq Error	1.283 kHz	% of OBW Pov	wer 99.00 %	A	uto <u>Ma</u>
x dB Bandwidth	320.8 kHz	x dB	-26.00 dB		
ISG			STATUS		

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



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

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



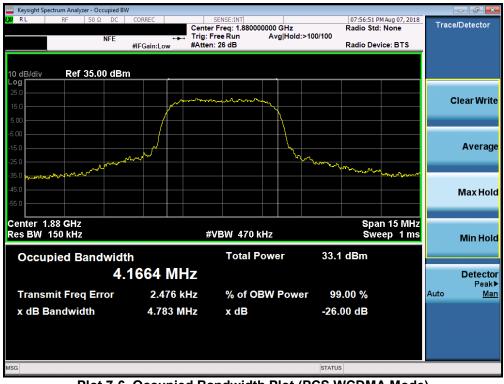
Plot 7-4. Occupied Bandwidth Plot (EDGE1900 Mode)

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



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

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7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz for Cell, 20GHz for AWS, 20GHz for PCS (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

<u>Test Setup</u>

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



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

Per 24.238(b), and RSS-133(6.5), compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz, and 100 kHz or greater for Part 22 and RSS-132 measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

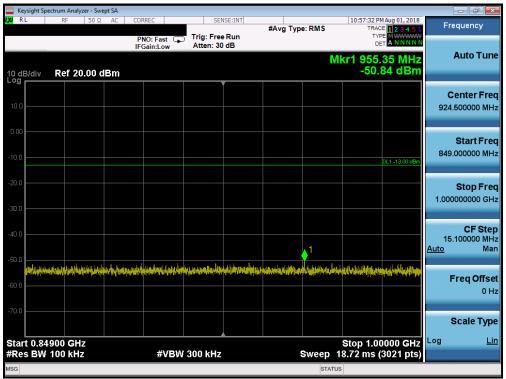
FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 16 of 70
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Cellular GPRS Mode

🦲 Keysight Spectrum A	Analyzer - Swept SA					
IXI RL RF	50 Ω AC	PNO: Fast	Trig: Free Run Atten: 30 dB	#Avg Type: RMS	10:57:25 PM Aug 01, 2018 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A N N N N N	Frequency
10 dB/div Ref	⁻ 20.00 dBm		Atten: 30 dB		Mkr1 822.45 MHz -42.69 dBm	Auto Tune
10.0						Center Freq 426.500000 MHz
-10.0					DL1 -13.00 dBm	Start Freq 30.000000 MHz
-20.0						Stop Freq 823.000000 MHz
-40.0					1	CF Step 79.300000 MHz <u>Auto</u> Mar
-50.0 Allpool (se) angel (-60.0		n ^{te} nders kannen se den geste son den se de se de se d Se de se de se Se de se	l yr pydraedau bag i ynadarorydd yw diad yn bernyn yn ddiadau ard	yn fylwyd ma yn Allannyn er y Haglyf â'r y Allan y Pylyn yn Yw enwyn ei fan wyarfar a wef ffwrmy y Armail (mwaryw)	n fran mener (al managera and an la garanta da sa sina anti- anti-anti-anti-anti-anti-anti-anti-anti-	Freq Offset 0 Hz
-70.0						Scale Type
Start 30.0 MHz #Res BW 100		#VBV	/ 300 kHz	Sweep	Stop 823.0 MHz 98.33 ms (15861 pts)	Log <u>Lin</u>
MSG				s	TATUS	

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



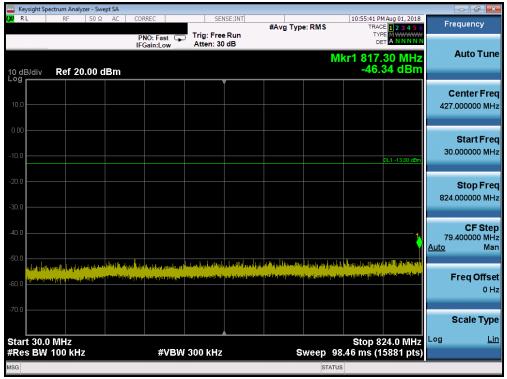
Plot 7-8. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	pectrum Analy												
L <mark>XI</mark> RL	RF	50 Ω	AC	CORREC		SEN	SE:INT	#Avg Typ	e: RMS	TR	PM Aug 01, 2018 ACE 1 2 3 4 5 6	Fre	equency
10 dB/div	Ref 10	0.00 dl	Bm	PNO: F IFGain:I	ast ⊊ ₋ow	#Atten: 30			N	lkr1 7.6	50 0 GHz .97 dBm		Auto Tune
0.00													enter Fred 000000 GH:
-10.0									×1		DL1 -13.00 dBm	1.000	Start Free 000000 GH
-30.0	The second s				ligg förstationen Ligg förstationen		louinten järki aasta ^{kolo} sissaat	1992 (I. Y. Bardani and I. Sanayan (I. Sanayan) Antini barya salaman ang kandaran	ر ا یک الطلب والد الدار الک الطلب والد	energy _{and} the transmission of the	an ar an	10.000	Stop Fred 000000 GH2
-50.0												900. <u>Auto</u>	CF Stej 000000 MH Ma
-70.0												F	F req Offse 0 H
-80.0													Scale Type
Start 1.0 #Res BW	00 GHz / 1.0 MHz	z			#VBW	3.0 MHz		s	weep	Stop 1 15.60 ms (0.000 GHz 18001 pts)	Log	<u>Lir</u>
MSG									STAT				

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



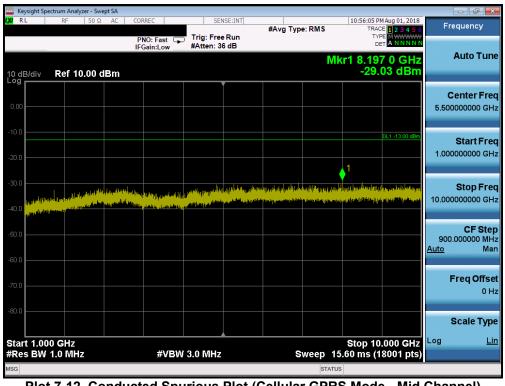
Plot 7-10. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	sight Spect													
l <mark>XI</mark> RL	-	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Typ	e: RMS	TRAC	MAug 01, 2018 E 1 2 3 4 5 6	Fre	equency
					PNO: IFGain	Fast 🖵 n:Low	Trig: Fre Atten: 3				TYF			
										Ν	/kr1 855.	75 MHz		Auto Tune
10 dE Log r	3/div	Ref 2	20.00 d	Bm				-			-47.5	57 dBm		
													С	enter Freq
10.0													924.	500000 MHz
0.00														
														Start Freq
-10.0												DL1 -13.00 dBm	849.	.000000 MHz
-20.0														
20.0													1 000	Stop Freq
-30.0													1.000	000000 8112
-40.0														CF Step
-40.0	. ▲1												15. Auto	100000 MHz. Man
-50.0		- 41						and the second	i lla ritati	L L L L L L L L L L L L L L L L L L L			<u>/(uto</u>	man
		il an		h in the second s		ahan ha ha				e sintina A	ula haran barin bi		F	req Offset
-60.0														0 Hz
-70.0														
													\$	Scale Type
	t 0.849										Stop 1.00	0000 GHz	Log	<u>Lin</u>
	s BW 1	00 ki	IZ			#VBW	300 kHz				18.72 ms (3021 pts)		
MSG										STAT	US			

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



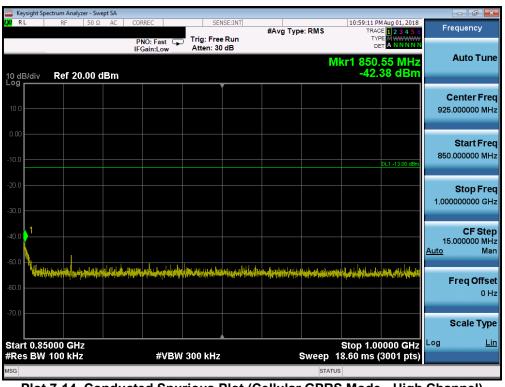
Plot 7-12. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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🔤 Keysight Sp	ectrum Analyzer -	Swept SA									
LXI RL	RF 5	0Ω AC	CORREC		NSE:INT	#Avg Type	e: RMS	TRAC	MAug 01, 2018 E 1 2 3 4 5 6	Frequer	ісу
			PNO: Fast G	Trig: Free Atten: 30				TY D	PE M WWWWW ET A N N N N N		
								Mkr1 810		Auto	Tune
10 dB/div Log	Ref 20.0	0 dBm						-49.	43 dBm		
										Cente	r Frea
10.0										427.0000	
0.00										Star	tFreq
-10.0									DL1 -13.00 dBm	30.0000	00 MHz
									DL1 -13.00 dBm		
-20.0										Sto	p Freq
-30.0										824.0000	00 MHz
-30.0											
-40.0										CI 79,4000	Step
									4	Auto	Man
-50.0	hatara dina Mantahan atkan	dan dalam yaka	tel ¹ [10] a pal <mark>(10,10] pal(10)</mark>	nd) di kanalar		i dan kangar pagan	(Harappe	Marketer	YPRYDICKOR ON		
-60.0 -60.0	فأطباره لحرجتم وحزرم لغناه	فلينتج إدالكم كراش	line of the second s	التركيكة كالطعي	and the state of the	الراداط والمعطور الراطع المراج	Can ^d ense datas	da tan na ta sa mana ang	, al de la desta distancials	Freq	Offset
											0 Hz
-70.0										Occile	Time
										Scale	е Туре
Start 30.0			//) (1914						24.0 MHz	Log	Lin
#Res BW	100 KHZ		#VBW	/ 300 kHz		S		98.46 ms (1	5881 pts)		
mod							51.	4103			

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



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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	05 55	Swept SA	000050					10.50.55			
RL	RF 50	Ω AC	PNO: Fast			#Avg Typ	e: RMS	TRA	PM Aug 01, 2018 ACE 1 2 3 4 5 6 YPE M WWWWW DET A N N N N N	Frequei	псу
) dB/div	Ref 10.00) dBm	IFGain:Low	#Atten: 0			М	kr1 9.49	8 0 GHz .90 dBm	Auto	o Tun
										Cente 5.5000000	
D.O									DL1 -13.00 dBm	Sta 1.0000000	rt Fre 00 Gi
0.0	المتعارم والمتعارية المالية	and particulation	Harland Alternation Justice Media (1997) Media and a Malalance and an Antara	and at the second	<mark>y (Darley Joper)</mark> 	e <mark>na posta populación de la compositación de</mark>	and a state of the second s	in this card	ng si tu juli fin digada ti junu Mangang an ^{gada} di sa saya say	Sto	p Fre
LU Provinsi											
).0											F Ste
										C 900.0000	F Ste 00 MI M
)00 GHz								0.000 GHz	C 900.0000 <u>Auto</u>	F Ste 00 MI M 0 0 1

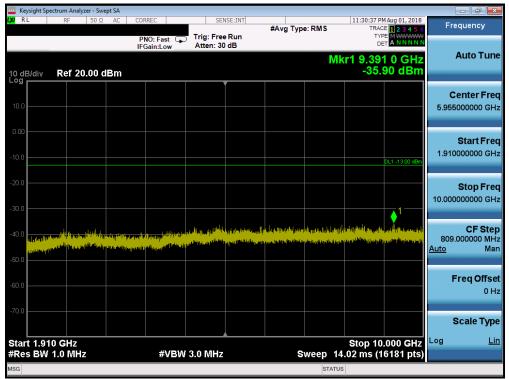
Plot 7-15. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analyz	er - Swept SA							
K RL RF		NO: Fast	SENSE:IN	#Avg Typ	e: RMS	TRAC	Aug 01, 2018 E 1 2 3 4 5 6 E M WWWWW	Frequency
	IFC	Gain:Low	Atten: 30 dB		Mk	r1 1.704	⁴ 0 GHz	Auto Tun
0 dB/div Ref 20	.00 dBm					-38.	19 dBm	
10.0								Center Fre 937.500000 M⊦
10.00							DL1 -13.00 dBm	Start Fre 30.000000 MH
20.0								Stop Fre 1.845000000 GH
40.0	i na stadaja i stada je se sta	in the second second second	unit and a state of the state of the	din prin print a dia dia dia dia dia dia dia dia dia d				CF Ste 181.500000 MH
0.0								Auto M
60.0								Freq Offs 01
"0.0								Scale Ty
tart 0.0300 GHz Res BW 1.0 MHz		#VBW 3	.0 MHz		Sweep 2	Stop 1.8 420 ms (450 GHz 3631 pts)	Log <u>L</u>
SG					STATUS			

Plot 7-16. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)



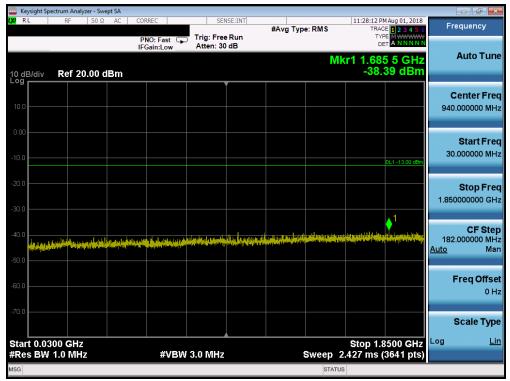
Plot 7-17. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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		Analyzer - Sw	ept SA									×
L <mark>XI</mark> RL	R	= 50 Ω	AC	PNO: Fast		e Run	#Avg Typ	e: RMS	TRAC	I Aug 01, 2018 E 1 2 3 4 5 6 E M WWWWWW T A N N N N N	Frequency	1
				IFGain:Low	Atten: 20						Auto T	une
10 dB/c	div Re	f 10.00 c	dBm					WIK	r1 16.847 -39.3	37 dBm		
						Ĭ					Center F	Fre
0.00											15.000000000	GH
-10.0										DL1 -13.00 dBm	Start F	Fre
-20.0											10.000000000	
-30.0								1			Stop F	
-40.0					The state of the s	والدوالي والطعار	والمتعالية والمتعادية		ti linan ya ti mali wakazi waka	halandat ^{ta} rdan pali	20.00000000	GII
-50.0	an gan gadda	ling and a state of the	halalana pro-	in an	يرين الألادة الملكمين في المرينة الالادة الملكمين في	alla antonia	Longerstein ander hit		اللدن يسأسان ريان والم		CF S 1.000000000	
-60.0												Ma
-60.0											Freq Of	ffer
-70.0												0 H
-80.0												
											Scale T	-
	10.000 (BW 1.0			#VBV	V 3.0 MHz		_s	weep 2	Stop 20. 5.33 ms (2	000 9112	Log	Li
ASG								STATU				

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



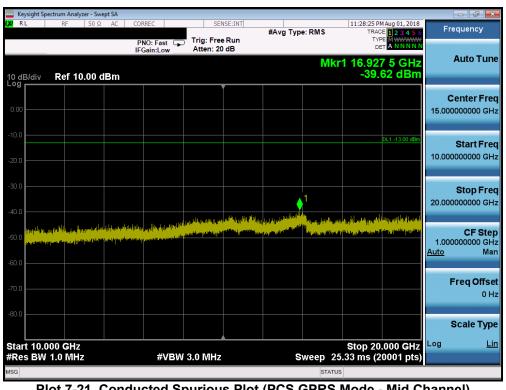
Plot 7-19. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analy:													
LX/RL	RF	50 Ω	AC CO	ORREC		SEN	ISE:INT	#Avg Typ	e: RMS	11		MAug 01, 2018	F	requency
				PNO: Fast FGain:Low		Trig: Free Atten: 30		• ,,			TYP			
				-Gain:Low	v	Atten: 30	uВ			Mkrd	0 74	5 5 GHz		Auto Tune
10 dB/div	Ref 20	.00 dE	3m								-35.	67 dBm		
														Center Freq
10.0													5.95	5000000 GHz
0.00														
0.00														Start Freq
-10.0												DL1 -13.00 dBm	1.91	0000000 GHz
												DL1 -13.00 dBm		
-20.0														Stop Freq
													10.00	0000000 GHz
-30.0											<u>1</u>			
						li ana salada	. I Kalkaraa	a	a kinatan		بدرار بدر الله	a fa oldiad etc not		CF Step
-40.0	արույցներիս Դերենին	त कर जिस्सी सुमुख को रहे	أنشمطان ليغط	in the class of		Kathalan Sabala	ى يەرىپەر بىلى ئىر بىر يېرى بىلى يەتتەر (ئىتاتلار ياخلى	n ang ang ang ang ang ang ang ang ang an	ng meneration Alternation	أعلامها إندادها	لي المركز المركز الالمركز المركز	List of the second s		9.000000 MHz
-50.0	الأنفر أأنا أألزاداه		فاعر رازانة أأتأس	Hillings, and	an na an a								<u>Auto</u>	Man
-30.0														
-60.0														Freq Offset
														0 Hz
-70.0														
														Scale Type
Start 1.91	0 GHz									St	on 10	.000 GHz	Log	Lin
#Res BW		z		#V	BW 3	.0 MHz		s	weep	14.02	ms (1	6181 pts)	_	
MSG										ATUS				

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



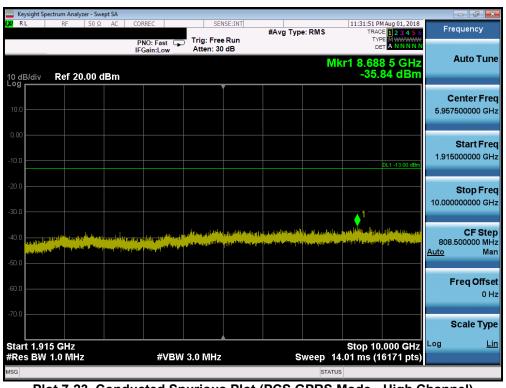
Plot 7-21. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyz											
LX/IRL	RF	50 Ω A	C COR	REC	SEI	NSE:INT	#Avg Typ	e: RMS		MAug 01, 2018 CE 1 2 3 4 5 6	Freque	ncy
				lO:Fast ⊆ ain:Low	Trig: Free Atten: 30		• ,,		TΥ	PE M WWWWW ET A N N N N N		
			IFG	ain:Low	Atten: 50	UD		M	kr1 1 20	3 0 GHz	Aut	o Tune
10 dB/div	Ref 20	.00 dBn	n					IVI	-38.	38 dBm		
						Í						_
10.0												er Freq
10.0											940.0000	
0.00												
												rt Freq
-10.0										DL1 -13.00 dBm	30.0000	00 MHz
-20.0											Sto	p Freq
											1.8500000	000 GHz
-30.0								1				
-40.0						- to at a			ويبيد والمطالح ويرو			F Step
	المانيون أناليل	an distant lateral		a si			len hundelin der			the state of the later	182.0000 Auto	00 MHz Man
-50.0												
											Fred	Offset
-60.0											iicq	0 Hz
-70.0											Scal	е Туре
Start 0.03									Stop 1.	0000 0112	Log	Lin
#Res BW	1.0 MHz			#VBN	/ 3.0 MHz			-		(3641 pts)		
MSG								STATI	JS			

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



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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	pectrum Analyzer	- Swept SA									×
X/RL	RF	50 Ω AC	CORREC PNO: Fast	Trig: Free		#Avg Typ	e: RMS	TRAC	M Aug 01, 2018 DE 1 2 3 4 5 6 PE M WWWWW T A N N N N N	Frequency	
10 dB/div Log	Ref 10.0	0 dBm	IFGain:Low _	Atten: 20	dB		Mki	1 16.88	2 5 GHz 69 dBm	Auto Tu	une
0.00										Center F 15.000000000 (
-10.0									DL1 -13.00 dBm	Start F 10.000000000 (
40.0					inter of 1913 and 1914	م اللو به بالدار ال	1 	lette en		Stop F 20.0000000000	
50.0 	And a state of the second	ng Ayal Dy Shey Do	na lipater <mark>en generation para de la composiciona de la</mark>		aladayy area filosoo	Anners, der infernit		n fire a shekara shiki	(in the proposition of the pro-	CF S 1.000000000 (<u>Auto</u>	
70.0										Freq Off (fse 0 H
	000 GHz							Stop 20	.000 962	Scale Ty Log	ype Lii
FRes BW	1.0 MHz		#VB	W 3.0 MHz		s	statu		0001 pts)		

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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Cellular WCDMA Mode

	ectrum Analyzer - Sv	vept SA								- đ	×
RL	RF 50 S	NFE	CORREC		Run	#Avg Type	RMS	TYPE	1 2 3 4 5 6 A WWWWW	Frequency	
			IFGain:Low	Atten: 30	dB				ANNNN	Auto Tu	
10 dB/div	Ref 20.00	dBm					Μ	lkr1 822.8 -32.6	4 dBm	Auto Tu	'n
- ⁰ 9										Center Fr	rei
10.0										426.500000 M	
0.00										Start Fr	re
-10.0										30.000000 N	
								D	L1 -13.00 dBm		
-20.0										Stop Fr	re
									1	823.000000 N	ин
-30.0											
-40.0										CF St 79.300000 N	
									A		Ma
-50.0											
-60.0										Freq Off	
and the second			ter de lans traduction d'arte			and the second	a de la compañía (para a a fra ana de compañía (para a			0	ЭН
-70.0											
										Scale Ty	/ P
Start 30.0								Stop 82	5.0 IVIII12	Log	Li
Res BW	100 kHz		#VBN	/ 300 kHz		Sv	veep 3	8.06 ms (15	861 pts)		
SG							STATU	IS			

Plot 7-25. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

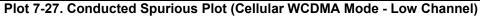


Plot 7-26. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analyz	er - Swept SA					
LX/RL RF	50 Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	08:08:59 PM Aug 07, 2018 TRACE 1 2 3 4 5 6	Frequency
	NFE	PNO: Fast 🖵 IFGain:Low	Trig: Free Run #Atten: 32 dB		DET A WWWWW	
10 dB/div Ref 10	.00 dBm			M	kr1 9.777 5 GHz -38.73 dBm	Auto Tune
						Center Fred
0.00						5.50000000 GHz
-10.0					DL1 -13.00 dBm	Start Fred
-20.0						1.000000000 GHz
-30.0						
					↓ ¹	Stop Fred 10.000000000 GHz
-40.0		MAN AN	market for the			OE Otor
-50.0						CF Step 900.000000 MH Auto Mar
-60.0						<u>Auto</u> mai
-70.0						Freq Offse
-80.0						
						Scale Type
Start 1.000 GHz #Res BW 1.0 MHz		#VBW	3.0 MHz	Sweep 1	Stop 10.000 GHz 5.60 ms (18001 pts)	Log <u>Lir</u>
MSG				STATU		





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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 29 of 72
1M1808100154-02.ZNF	7/31 - 8/21/2018	Portable Handset		Page 28 of 72
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	ctrum Analyzer - Swe									
RL RL	RF 50 Ω	NFE P	RREC	Trig: Free		#Avg Typ	e: RMS	TRAC	Aug 07, 2018 E 1 2 3 4 5 6 E A WWWW T A N N N N N	Frequency
10 dB/div	Ref 20.00 d		Gain:Low	Atten: 30	dB		N	lkr1 849.		Auto Tun
10.0										Center Fre 924.500000 MH
-10.0									DL1 -13.00 dBm	Start Fre 849.000000 MH
-20.0										Stop Fre 1.000000000 GH
-40.0										CF Ste 15.100000 MH <u>Auto</u> Ma
-60.0	hunatha fhailanniteisidathi	weet work of the two	iyiqeeye ye afaliyin qafa	ซาร์งกระเห็นไม่งายได้รังเร	ti-ining-chaped	an for for the state of the sta	pergalambatahanyah	enterenter for for the second	rsiqtest atom	Freq Offse 0 H
Start 0.84								Stop 1 00	0000 GHz	Scale Typ
#Res BW			#VBW	300 kHz			Sweep	7.248 ms (3021 pts)	
MSG							STATU	JS		

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

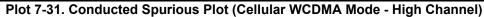


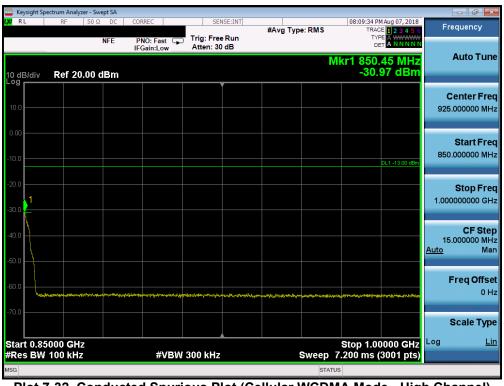
Plot 7-30. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyze										
LXI RL	RF	50 Ω DC	CORREC		SE:INT	#Avg Typ	e: RMS	TRAC	4 Aug 07, 2018 E <mark>1 2 3 4 5 6</mark>	Fre	quency
		NFE	PNO: Fast G	Trig: Free Atten: 30				DE			
10 dB/div	Ref 20.	00 dBm					M	kr1 824. -56.	00 MHz 35 dBm		Auto Tune
10.0											e nter Freq 000000 MHz
-10.0									DL1 -13.00 dBm		Start Freq
-20.0											Stop Freq 000000 MHz
-40.0										79.4 <u>Auto</u>	CF Step 400000 MH2 Mar
-60.0	n denne fill a skiller fra skiller skiller 19 segar 11 se av skiller skiller skiller		the property that the balance of the		ng an ang kalon dala sana kalo. Mang ang kalon dala sang ang kalong ka	alere and the second	tala di Statumente di Statua di Statu di Statua di Sta	a a gun ha an		F	req Offsel 0 Hz
-70.0										S	cale Type
Start 30.0 #Res BW			#VBM	/ 300 kHz		s	weep <u>38</u>	Stop 8	24.0 MHz 5881 pts)	Log	Lin
MSG							STATUS				





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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 72
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	ectrum Analyze							
XI RL	RF	50 Ω DC	PNO: Fast	Trig: Free		#Avg Type: RMS	08:09:49 PM Aug 07 TRACE 1 2 3 TYPE A WW DET A N N	4.5.6 Frequency
10 dB/div Log	Ref 10.	00 dBm	IFGain:Low	#Atten: 32	dB		Mkr1 9.770 5 0 -38.59 d	Auto Tune
0.00								Center Fred 5.500000000 GH
-10.0							DL1 -13/	10 dem Start Fred 1.000000000 GHz
-30.0							and a particular particular and the	Stop Fred 10.000000000 GH2
-50.0 								CF Step 900.000000 MH <u>Auto</u> Mar
70.0								Freq Offse 0 H
-80.0				N 3.0 MHz		0	Stop 10.000	Scale Type
	1.0 MHz		#VB	N 3.0 MH2			15.60 ms (18001	

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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 31 of 72
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		n Analyzer - S									- 2
U RL	F	RF 50	Ω DC NFE	CORREC	Trig: Free R Atten: 30 d	Run	#Avg Type	e: RMS	07:58:27 PM Aug 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency	У
0 dB/c	div Re	ef 20.00	dBm	IFGain:Low	Atten: 00 u			Mkr'	1.845 0 GHz -37.87 dBm	Auto T	'ur
. og										Center F 937.500000	
10.0									DL1 -13.00 dBm	Start F 30.000000	
20.0 -									1	Stop F 1.845000000	
0.0										CF S 181.500000 <u>Auto</u>	
50.0	An United States of the	A _{rada} ratiyi d ^a gariidaay		angang tang tang tang tang tang tang tan	ang Berri han di kana yang yang mang kang	e de Persetta (1947)			ġġnyayyaka filogogo da katalan ngangala katala	Freq Of	ffs 0
'0.0 —										Scale T	Гу
	0.0300 (BW 1.0			#VBV	/ 3.0 MHz			sweep 2.4	Stop 1.8450 GHz 20 ms (3631 pts)	Log	l
SG								STATUS			

Plot 7-34. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)



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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	- Swept SA				
RL RF	50 Ω DC CORREC NFE PNO: Fas IFGain:Lo	Trig: Free Run Atten: 20 dB	#Avg Type: RMS	07:58:54 PM Aug 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
0 dB/div Ref 10.0		W Atten: 20 dB	Mk	r1 19.312 5 GHz -46.17 dBm	Auto Tur
0.00					Center Fre 15.00000000 GF
20.0				DL1 -13.00 dBm	Start Fre 10.00000000 GF
40.0				1	Stop Fre 20.000000000 GF
50.0					CF Ste 1.000000000 GI <u>Auto</u> M
70.0					Freq Offs 0
30.0 start 10.000 GHz				Stop 20.000 GHz	Scale Tyj

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



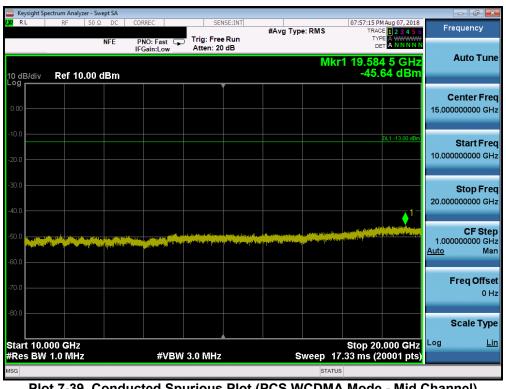
Plot 7-37. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 72
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	ht Spectrum Analy											
L <mark>XI</mark> RL	RF	50 Ω DC	CORREC		SEI	ISE:INT	#Avg Typ	e: RMS	TRA	MAug 07, 2018 CE 1 2 3 4 5 6	Freq	uency
		NFE		Fast 😱	Trig: Free Atten: 30		• ,,		TY D	PE A WWWWW ET A N N N N N		
			IFGain	1:Low	Atten: 30	uБ		M		7 0 GHz	A	uto Tune
10 dB/d	iv Ref 20).00 dBm						IVI	-40.	31 dBm		
					,						6.	ntor Ero <i>r</i>
10.0												n ter Freq 00000 GHz
											0.9000	0000 8112
0.00												
												tart Freq
-10.0										DL1 -13.00 dBm	1.91000	00000 GHz
-20.0												top Freq
-30.0											10.0000	00000 GHz
30.0								.1				
-40.0								• • • • •		ويعاطر ويعتدوا	800.00	CF Step
			and the second	Hand States of the Sector Also also any Dispace					the second s	and the second states and the second	Auto	Man
-50.0	Control of the second second	to all in the later										
l ľ											En	eq Offset
-60.0												0 Hz
-70.0												
											Sc	ale Type
											Log	
	1.910 GHz 3W 1.0 MH:	,		#VBW	3.0 MHz		6	ween 1	Stop 10).000 GHz 16181 pts)	Log	Lin
MSG					5.0 WH12		3	statu		io io i pisj		
								UIAIG				

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



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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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🔤 Keysight Spectrum Analyzer - Swept SA									- # ×		
LXI RL	RF 50	0Ω DC	CORREC		Run	#Avg Type	e: RMS	TRAC	MAug 07, 2018 E 1 2 3 4 5 6 E A WWWW A N N N N N	Fre	equency
10 dB/div	Ref 20.0		IFGain:Low	Atten: 30			Mk	(r1 1.84)	6 5 GHz 08 dBm		Auto Tune
10.0											enter Freq 000000 MHz
-10.0									DL1 -13.00 dBm	30.	Start Freq 000000 MHz
-20.0										1.850	Stop Freq 000000 GHz
-40.0						an billing as the designability	age in we do a first state		1	182. <u>Auto</u>	CF Step 000000 MHz Man
-60.0	mahaya ya		**************************************							F	F req Offset 0 Hz
Start 0.03			<i>4</i> 0 (P) (A)					Stop 1.8	3500 GHz	s Log	Scale Type Lin
#Res BW	1.U IVIH2		#VBW	/ 3.0 MHz			Sweep 2		3641 pts)		

Plot 7-40. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)



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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:	Dogo 25 of 72		
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🔤 Keysight Spectrum Analyzer - Swept SA 🛛 👘							
<mark>XI</mark> RL	RF	50 Ω DC NFE	PNO: Fast	Trig: Free Run Atten: 20 dB	#Avg Type: RMS	07:59:53 PM Aug 07, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
10 dB/div	Ref 10	.00 dBm	IFGain:Low	Atten: 20 dB	Ν	/kr1 18.995 0 GHz -45.58 dBm	Auto Tune
0.00							Center Fre 15.000000000 GH
20.0						DL1 -13.00 dBm	Start Fre 10.000000000 G⊦
30.0 40.0						1	Stop Fre 20.000000000 GF
50.0 50.0		er mar from anger og grand fogs for generaliset og en blev af skrifter grand generaliset og en blev af skrifter grand		ang publish nogonalismo on ya Tikino, na pub Mgandra kang kwang atala panina pana.	na partina manana kita pata pana ang pangana pangana pangana pangana pangana pangana pangana pangana pangana p Pangana kang pangana pan Pangana pangana	ng 1 fel ang	CF Ste 1.00000000 GH <u>Auto</u> Ma
70.0							Freq Offs 0 H
	000 GHz					Stop 20.000 GHz	Scale Typ
Res BW 1.0 MHz #VBW 3.0 MHz Sweep 17.33 ms (20001 pts)							

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

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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7.4 Band Edge Emissions at Antenna Terminal

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

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

Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

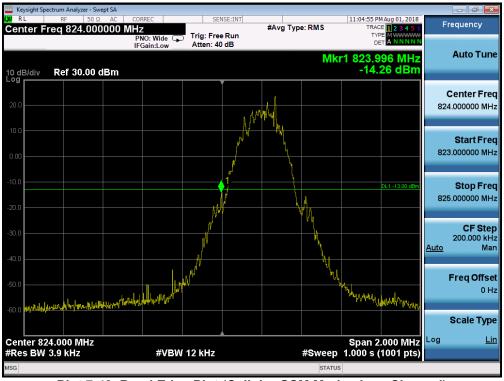
Test Notes

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

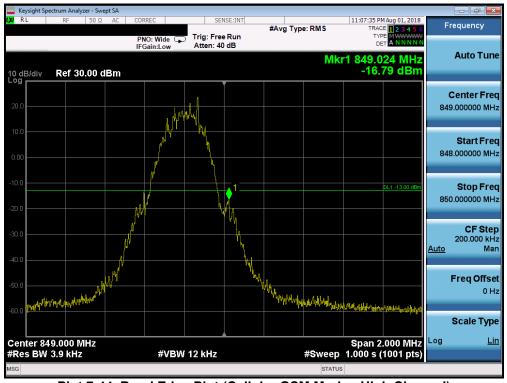
FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Cellular GSM Mode



Plot 7-43. Band Edge Plot (Cellular GSM Mode - Low Channel)



Plot 7-44. Band Edge Plot (Cellular GSM Mode - High Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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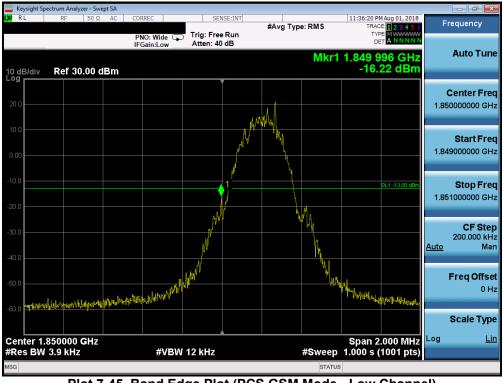


Note:

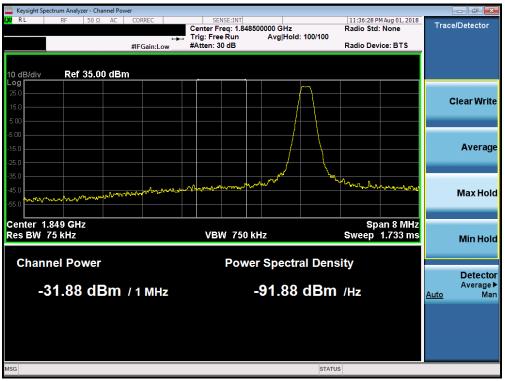
Both GSM and GPRS mode were investigated, and GSM mode was found to be the worst case for band edge emission. So, GSM mode is included in the report instead of GPRS mode.

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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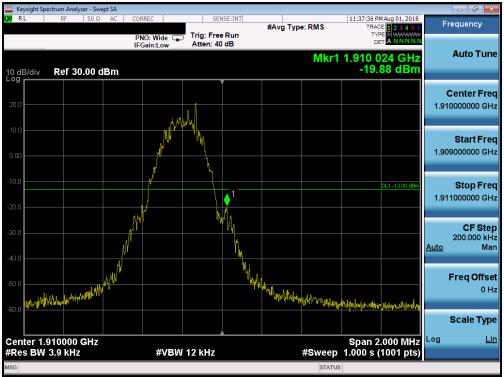
Plot 7-45. Band Edge Plot (PCS GSM Mode - Low Channel)



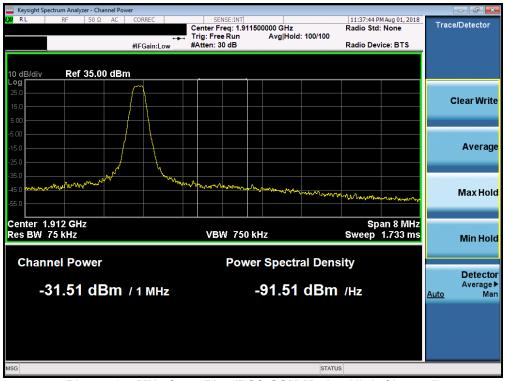
Plot 7-46. 4MHz Span Plot (PCS GSM Mode - Low Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 70
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Plot 7-48. 4MHz Span Plot (PCS GSM Mode - High Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Note:

Both GSM and GPRS mode were investigated, and GSM mode was found to be the worst case for band edge emission. So, GSM mode is included in the report instead of GPRS mode.

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Cellular WCDMA Mode



Plot 7-49. Band Edge Plot (Cellular WCDMA Mode - Low Channel)



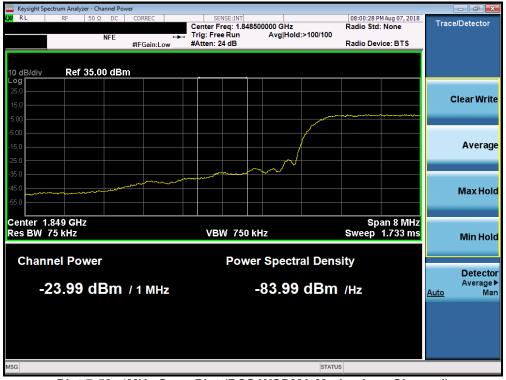
Plot 7-50. Band Edge Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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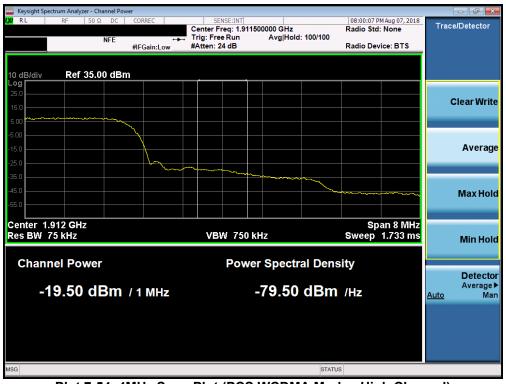
Plot 7-52. 4MHz Span Plot (PCS WCDMA Mode - Low Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 44 of 70
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Plot 7-53. Band Edge Plot (PCS WCDMA Mode - High Channel)



Plot 7-54. 4MHz Span Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
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7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 5.7.1

Test Settings

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

Test Setup

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



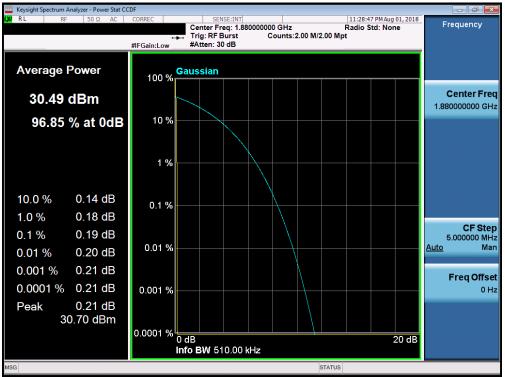
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

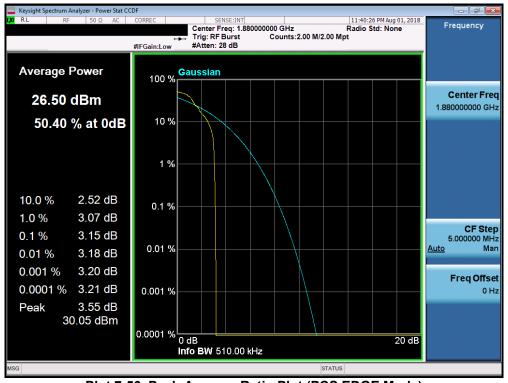
None

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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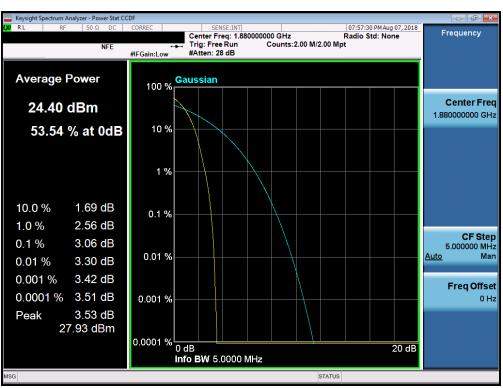




Plot 7-56. Peak-Average Ratio Plot (PCS EDGE Mode)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-57. Peak-Average Ratio Plot (PCS WCDMA Mode)

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7.6 Radiated Power (ERP/EIRP)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

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

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Test Setup

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

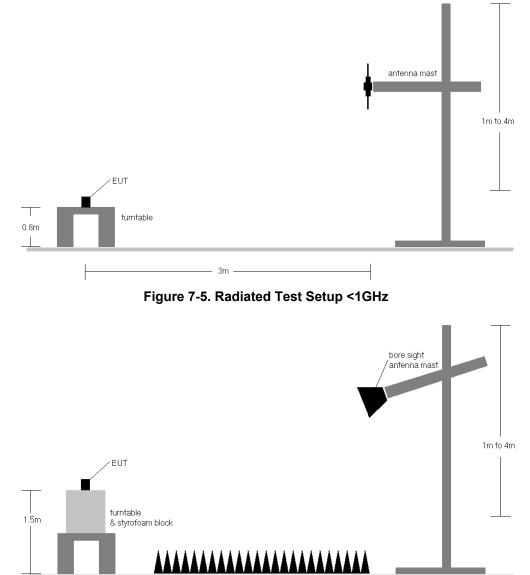


Figure 7-6. Radiated Test Setup >1GHz

3m –

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- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	н	150	169	27.83	1.50	27.18	38.45	-11.27	29.33	40.61	-11.28
836.60	GPRS850	н	150	166	29.28	1.50	28.63	38.45	-9.82	30.78	40.61	-9.83
848.80	GPRS850	н	150	162	27.40	1.50	26.75	38.45	-11.70	28.90	40.61	-11.71
836.60	GPRS850	V	150	149	26.72	1.50	26.07	38.45	-12.38	28.22	40.61	-12.39
836.60	EDGE850	Н	150	166	22.65	1.50	22.00	38.45	-16.45	24.15	40.61	-16.46

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	н	150	86	18.92	1.50	18.27	38.45	-20.18	20.42	40.61	-20.19
836.60	WCDMA850	н	150	97	19.11	1.50	18.46	38.45	-19.99	20.61	40.61	-20.00
846.60	WCDMA850	н	150	93	19.73	1.50	19.08	38.45	-19.37	21.23	40.61	-19.38
846.60	WCDMA850	V	150	359	14.35	1.50	13.70	38.45	-24.75	15.85	40.61	-24.76

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	н	150	11	25.63	4.82	30.45	33.01	-2.56
1880.00	GPRS1900	н	150	10	24.33	4.74	29.07	33.01	-3.94
1909.80	GPRS1900	н	150	328	24.37	4.68	29.05	33.01	-3.96
1850.20	GPRS1900	V	150	313	25.13	4.82	29.95	33.01	-3.06
1850.20	EDGE1900	Н	150	11	21.65	4.82	26.47	33.01	-6.54

Table 7-4. EIRP (PCS GPRS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	Н	150	1	17.86	4.81	22.67	33.01	-10.34
1880.00	WCDMA1900	н	150	359	17.14	4.74	21.88	33.01	-11.13
1907.60	WCDMA1900	н	150	228	16.67	4.68	21.35	33.01	-11.66
1852.40	WCDMA1900	V	150	313	16.90	4.81	21.71	33.01	-11.30

Table 7-5. EIRP (PCS WCDMA)

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7.7 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

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

Test Settings

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

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EUT turntable 8. styrofoam block

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

Figure 7-7. Test Instrument & Measurement Setup

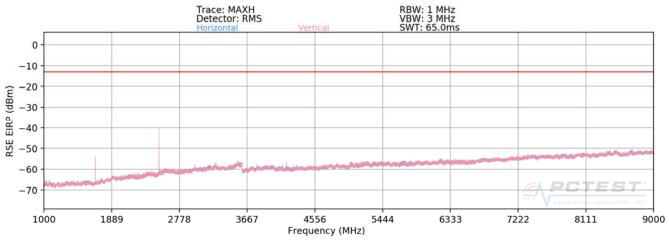
Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 6) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 7) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

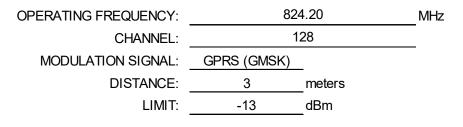
FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Plot 7-58. Radiated Spurious Plot Above 1GHz (Cellular GPRS Mode)



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1648.40	Н	123	277	-41.87	8.94	-32.93	-19.9
2472.60	Н	121	197	-28.06	9.64	-18.42	-5.4
3296.80	Н	122	224	-63.43	9.57	-53.85	-40.9
4121.00	Н	115	31	-54.67	10.17	-44.50	-31.5
4945.20	Н	126	171	-71.85	10.90	-60.95	-47.9
5769.40	Н	116	327	-70.30	11.47	-58.84	-45.8
6593.60	Н	300	153	-68.44	12.12	-56.32	-43.3
7417.80	Н	-	-	-68.16	10.97	-57.19	-44.2

Table 7-6. Radiated Spurious Data (Cellular GPRS Mode – Ch. 128)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 55 of 72
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MHz	.60	830	OPERATING FREQUENCY:
_	0	1	CHANNEL:
		GPRS (GMSK)	MODULATION SIGNAL:
	meters	3	DISTANCE:
	dBm	-13	LIMIT:

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	151	218	-43.25	8.95	-34.30	-21.3
2509.80	Н	115	202	-32.92	9.75	-23.17	-10.2
3346.40	Н	113	223	-63.37	9.60	-53.77	-40.8
4183.00	Н	111	22	-54.69	10.35	-44.34	-31.3
5019.60	Н	-	-	-71.97	10.88	-61.09	-48.1
5856.20	Н	113	234	-71.57	11.52	-60.05	-47.1
6692.80	Н	316	153	-69.80	11.76	-58.03	-45.0
7529.40	Н	-	-	-68.20	11.13	-57.07	-44.1

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

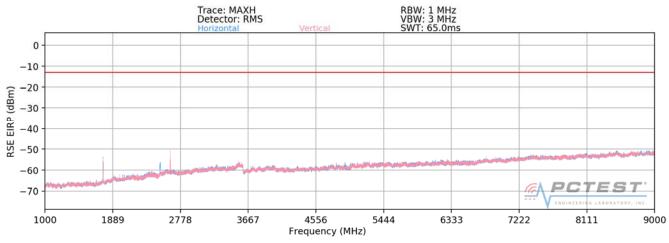
OPERATING FREQUENCY:	84	MHz	
CHANNEL:	2	_	
MODULATION SIGNAL:	GPRS (GMSK)		_
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1697.60	Н	206	213	-46.08	8.95	-37.13	-24.1
2546.40	Н	120	205	-39.06	9.74	-29.32	-16.3
3395.20	Н	130	225	-61.35	9.78	-51.57	-38.6
4244.00	Н	117	26	-56.84	10.58	-46.26	-33.3
5092.80	Н	145	233	-71.83	10.69	-61.14	-48.1
5941.60	Н	374	332	-69.11	11.45	-57.66	-44.7
6790.40	Н	113	313	-68.37	11.62	-56.75	-43.7
7639.20	Н	-	-	-69.12	11.33	-57.79	-44.8

Table 7-8. Radiated Spurious Data (Cellular GPRS Mode – Ch. 251)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 56 of 70	
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Plot 7-59. Radiated Spurious Plot Above 1GHz (Cellular WCDMA Mode)

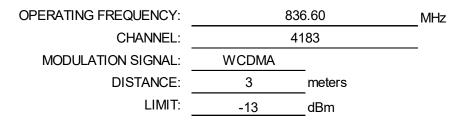
826	5.40 MHz
41	32
WCDMA	_
3	meters
-13	dBm
	41 WCDMA 3

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1652.80	Н	157	27	-78.50	8.95	-69.55	-56.6
2479.20	Н	219	58	-71.33	9.67	-61.66	-48.7
3305.60	Н	-	-	-75.56	9.58	-65.98	-53.0
4132.00	Н	-	-	-75.15	10.19	-64.96	-52.0

Table 7-9. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 57 of 72
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	Н	351	55	-79.41	8.95	-70.46	-57.5
2509.80	H	353	261	-72.46	9.75	-62.71	-49.7
3346.40	H	-	-	-75.08	9.60	-65.48	-52.5
4183.00	H	-	-	-74.83	10.35	-64.48	-51.5

Table 7-10. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

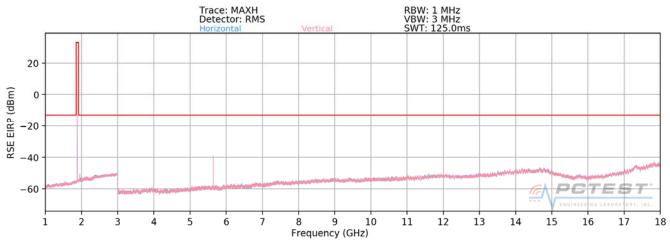
MHz	6.60	84	OPERATING FREQUENCY:
	233	42	CHANNEL:
_	_	WCDMA	MODULATION SIGNAL:
	meters	3	DISTANCE:
	dBm	-13	LIMIT:

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1693.20	Н	147	138	-78.78	8.95	-69.82	-56.8
2539.80	Н	178	306	-71.11	9.74	-61.36	-48.4
3386.40	Н	-	-	-76.12	9.75	-66.38	-53.4
4233.00	Н	-	-	-75.53	10.53	-64.99	-52.0

Table 7-11. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 59 of 70
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Plot 7-60. Radiated Spurious Plot Above 1GHz (PCS GPRS Mode)

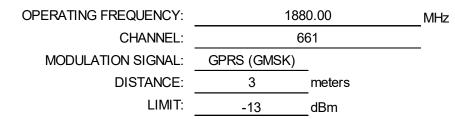
185	50.20	MHz
5	512	_
GPRS (GMSK)	_	
3	meters	
-13	_dBm	
	GPRS (GMSK) 3	<u> </u>

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3700.40	V	153	247	-63.66	9.58	-54.08	-41.1
5550.60	V	114	24	-43.65	10.94	-32.71	-19.7
7400.80	V	113	318	-65.85	10.96	-54.89	-41.9
9251.00	V	374	329	-56.97	11.63	-45.34	-32.3
11101.20	V	140	20	-63.98	12.74	-51.24	-38.2
12951.40	V	123	353	-53.47	13.30	-40.17	-27.2
14801.60	V	-	-	-62.62	12.45	-50.18	-37.2

Table 7-12. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 70
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	155	267	-62.22	9.37	-52.86	-39.9
5640.00	V	114	331	-41.27	11.17	-30.10	-17.1
7520.00	V	390	340	-67.29	11.11	-56.18	-43.2
9400.00	V	347	329	-60.95	11.57	-49.38	-36.4
11280.00	V	126	8	-64.25	12.72	-51.53	-38.5
13160.00	V	148	358	-56.24	13.15	-43.10	-30.1
15040.00	V	-	-	-64.90	13.52	-51.38	-38.4

Table 7-13. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

OPERATING FREQUENCY: CHANNEL: MODULATION SIGNAL:

DISTANCE: <u>GPRS (GI</u> DISTANCE: <u>3</u> LIMIT: -13

 1909.80
 MHz

 810
 810

 GPRS (GMSK)
 3

 3
 meters

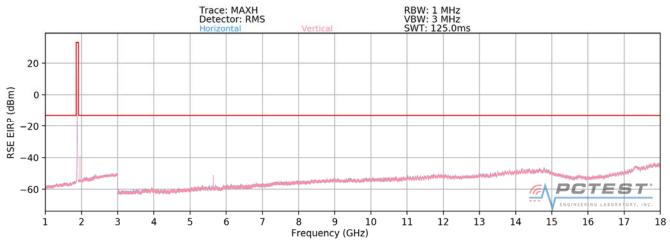
 -13
 dBm

Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
V	141	232	-65.38	9.30	-56.08	-43.1
V	114	36	-44.03	11.39	-32.64	-19.6
V	-	-	-68.66	11.33	-57.32	-44.3
V	400	335	-62.34	11.79	-50.56	-37.6
V	114	10	-65.78	12.82	-52.97	-40.0
V	169	25	-63.95	12.78	-51.16	-38.2
V	-	-	-67.88	14.90	-52.99	-40.0
	Pol. [H/V] V V V V	Pol. [H/V] Height [cm] V 141 V 114 V - V 400 V 114 V - V 169 V -	Pol. [H/V] Height [cm] Azimuth [degree] V 141 232 V 114 36 V - - V 400 335 V 114 10 V 169 25 V - -	Pol. [H/V] Height [cm] Azimuth [degree] Level at Antenna Terminals [dBm] V 141 232 -65.38 V 114 36 -44.03 V 114 36 -44.03 V - - -68.66 V 400 335 -62.34 V 114 10 -65.78 V 169 25 -63.95 V - - -67.88	Pol. [H/V] Height [cm] Azimuth [degree] Level at Antenna Terminals [dBm] Antenna Gain [dBi] V 141 232 -65.38 9.30 V 114 36 -44.03 11.39 V - - -68.66 11.33 V 400 335 -62.34 11.79 V 114 10 -65.78 12.82 V 169 25 -63.95 12.78 V - - -67.88 14.90	Pol. [H/V] Height [cm] Azimuth [degree] Level at Antenna Terminals [dBm] Antenna Gain [dBi] Emission Level [dBm] V 141 232 -65.38 9.30 -56.08 V 114 36 -44.03 11.39 -32.64 V - - -68.66 11.33 -57.32 V 400 335 -62.34 11.79 -50.56 V 114 10 -65.78 12.82 -52.97 V 169 25 -63.95 12.78 -51.16 V - - -67.88 14.90 -52.99

Table 7-14. Radiated Spurious Data (PCS GPRS Mode – Ch. 810)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-61. Radiated Spurious Plot Above 1GHz (PCS WCDMA Mode)

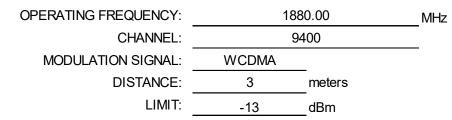
185	2.40 N	1Hz
92	262	
WCDMA	_	
3	meters	
-13	dBm	
	92 WCDMA 3	9262 WCDMA 3 meters

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3704.80	V	125	30	-68.63	9.57	-59.06	-46.1
5557.20	V	271	338	-61.27	10.95	-50.32	-37.3
7409.60	V	-	-	-70.26	10.96	-59.30	-46.3
9262.00	V	-	-	-69.45	11.63	-57.83	-44.8

Table 7-15. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

FCC ID: ZNFH871S		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	356	46	-70.74	9.37	-61.38	-48.4
5640.00	V	113	336	-59.35	11.17	-48.18	-35.2
7520.00	V	-	-	-70.44	11.11	-59.33	-46.3
9400.00	V	-	-	-68.91	11.57	-57.34	-44.3

Table 7-16. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)

MHz	60	190	OPERATING FREQUENCY:			
_	8	99	CHANNEL:			
_		WCDMA	MODULATION SIGNAL:			
	neters	3	DISTANCE:			
	IBm	-13	LIMIT:			

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3815.20	V	-	-	-73.58	9.30	-64.28	-51.3
5722.80	V	312	334	-60.01	11.37	-48.64	-35.6
7630.40	V	-	-	-70.50	11.31	-59.19	-46.2
9538.00	V	-	-	-69.01	11.76	-57.24	-44.2

Table 7-17. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

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Test Overview and Limit

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

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

For Part 22, RSS-132, and RSS-133, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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

Test Setup

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

Test Notes

None

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OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	+ 20 (Ref)	836,600,130	130	0.0000155
100 %		- 30	836,600,154	154	0.0000184
100 %		- 20	836,600,129	129	0.0000154
100 %		- 10	836,600,063	63	0.0000075
100 %		0	836,599,972	-28	-0.0000033
100 %		+ 10	836,600,198	198	0.0000237
100 %		+ 20	836,599,830	-170	-0.0000203
100 %		+ 30	836,599,896	-104	-0.0000124
100 %		+ 40	836,600,069	69	0.0000082
100 %		+ 50	836,600,211	211	0.0000252
BATT. ENDPOINT	3.40	+ 20	836,600,158	158	0.0000189

Table 7-18. Frequency Stability Data (Cellular GPRS Mode – Ch. 190)

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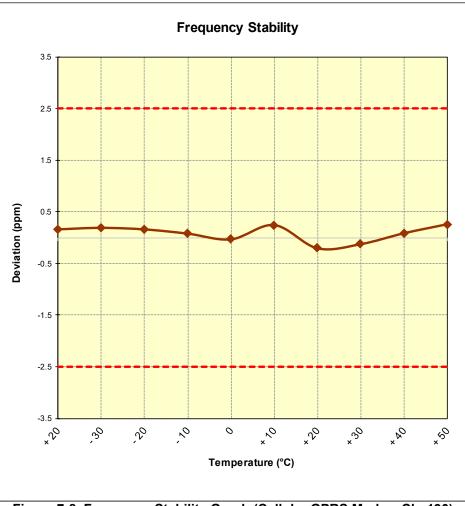


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

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OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	_
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	+ 20 (Ref)	836,600,082	82	0.0000098
100 %		- 30	836,600,065	65	0.0000078
100 %		- 20	836,600,077	77	0.0000092
100 %		- 10	836,599,939	-61	-0.0000073
100 %		0	836,600,025	25	0.0000030
100 %		+ 10	836,599,628	-372	-0.0000445
100 %		+ 20	836,600,221	221	0.0000264
100 %		+ 30	836,599,884	-116	-0.0000139
100 %		+ 40	836,600,094	94	0.0000112
100 %		+ 50	836,599,798	-202	-0.0000241
BATT. ENDPOINT	3.40	+ 20	836,600,158	158	0.0000189

Table 7-19. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

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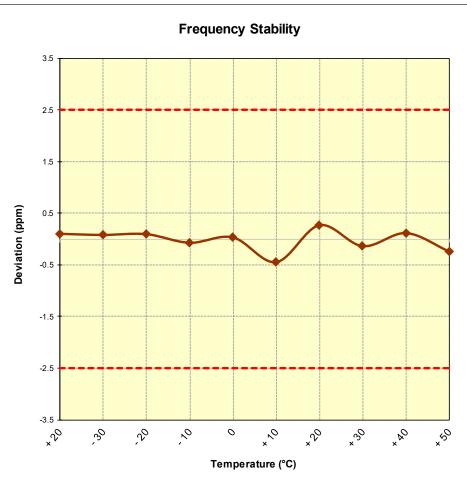


Figure 7-9. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT :	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	+ 20 (Ref)	1,879,999,854	-146	-0.0000078
100 %		- 30	1,879,999,891	-109	-0.0000058
100 %		- 20	1,880,000,056	56	0.0000030
100 %		- 10	1,880,000,176	176	0.0000094
100 %		0	1,879,999,659	-341	-0.0000181
100 %		+ 10	1,880,000,288	288	0.0000153
100 %		+ 20	1,880,000,183	183	0.0000097
100 %		+ 30	1,879,999,704	-296	-0.0000157
100 %		+ 40	1,880,000,312	312	0.0000166
100 %		+ 50	1,880,000,069	69	0.0000037
BATT. ENDPOINT	3.40	+ 20	1,879,999,554	-446	-0.0000237

 Table 7-20. Frequency Stability Data (PCS GPRS Mode – Ch. 661)

Note:

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

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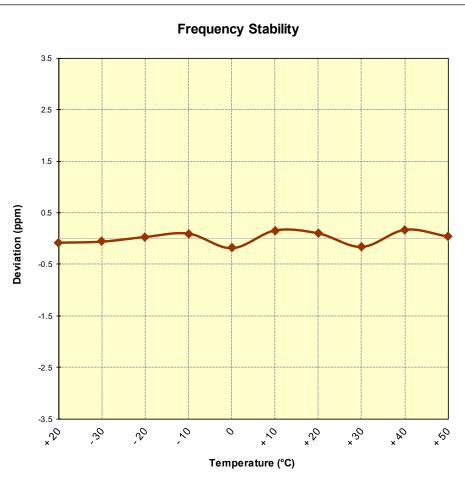


Figure 7-10. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

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OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.36	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	+ 20 (Ref)	1,879,999,836	-164	-0.000087
100 %		- 30	1,879,999,889	-111	-0.0000059
100 %		- 20	1,880,000,319	319	0.0000170
100 %		- 10	1,879,999,995	-5	-0.0000003
100 %		0	1,880,000,031	31	0.0000016
100 %		+ 10	1,879,999,745	-255	-0.0000136
100 %		+ 20	1,879,999,627	-373	-0.0000198
100 %		+ 30	1,880,000,380	380	0.0000202
100 %		+ 40	1,880,000,224	224	0.0000119
100 %		+ 50	1,879,999,871	-129	-0.0000069
BATT. ENDPOINT	3.40	+ 20	1,879,999,662	-338	-0.0000180

Table 7-21. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

Note:

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

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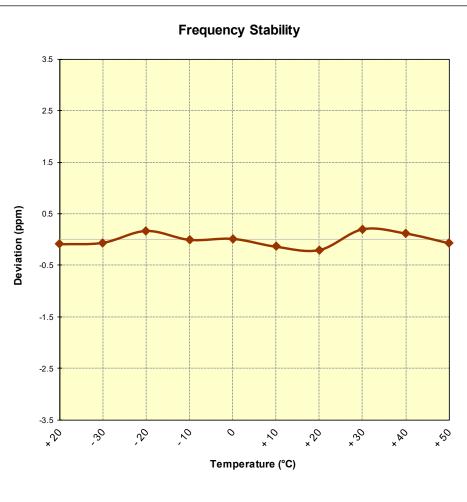


Figure 7-11. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFH871S** complies with all the requirements of Part 22 & 24 of the FCC Rules.

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