

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT

FCC Part 22 & 90

Applicant Name:

LG Electronics MobileComm U.S.A 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: 3/27 - 5/2/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1803280057-04.ZNF

FCC ID:

ZNFQ710US

APPLICANT:

LG Electronics MobileComm U.S.A

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s): Certification LM-Q710US, LM-Q710ULM LMQ710US, Q710US, LMQ710ULM, Q710ULM Portable Handset PCS Licensed Transmitter Held to Ear (PCE) §2.1049, §22(H), §90.691 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.



 FCC ID: ZNFQ710US
 MEASUREMENT REPORT (CERTIFICATION)
 (b) LG
 Approved by: Quality Manager

 Test Report S/N:
 Test Dates:
 EUT Type:
 Page 1 of 46

 1M1803280057-04.ZNF
 3/27 - 5/2/2018
 Portable Handset
 Page 1 of 46

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 V 8.0 03/13/2018



TABLE OF CONTENTS

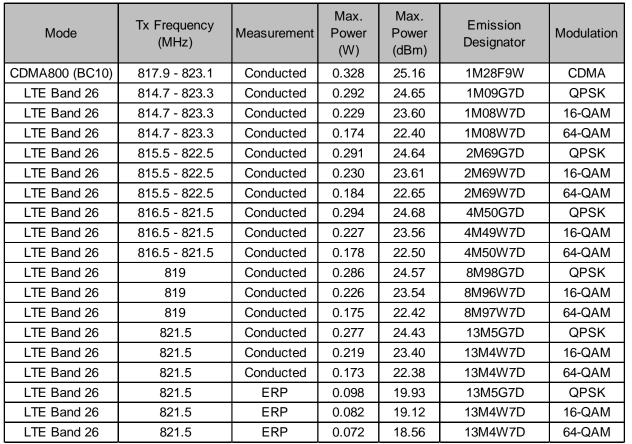
1.0	INTF	RODUCTION	4
	1.1	Scope	4
	1.2	PCTEST Test Location	4
	1.3	Test Facility / Accreditations	4
2.0	PRO	DUCT INFORMATION	5
	2.1	Equipment Description	5
	2.2	Device Capabilities	5
	2.3	Test Configuration	5
	2.4	EMI Suppression Device(s)/Modifications	5
3.0	DES	CRIPTION OF TESTS	6
	3.1	Evaluation Procedure	6
	3.2	Radiated Power and Radiated Spurious Emissions	6
4.0	MEA	SUREMENT UNCERTAINTY	7
5.0	TES	T EQUIPMENT CALIBRATION DATA	8
6.0	SAM	IPLE CALCULATIONS	9
7.0	TES	T RESULTS	10
	7.1	Summary	10
	7.2	Occupied Bandwidth	11
	7.3	Spurious and Harmonic Emissions at Antenna Terminal	21
	7.4	Band Edge Emissions at Antenna Terminal	28
	7.5	Conducted Power Output Data	34
	7.6	Radiated Power (ERP)	35
	7.7	Radiated Spurious Emissions Measurements	37
	7.8	Frequency Stability / Temperature Variation	41
8.0	CONCLUSION		

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 2 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 2 01 46
© 2018 PCTEST Engineering Laboratory, Inc. V 8.0 03/13/				





MEASUREMENT REPORT FCC Part 22(H) & 90



EUT Overview

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 46
1M1803280057-04.ZNF 3/27 - 5/2/2018		Portable Handset		Page 3 of 46
© 2018 PCTEST Engineering Laboratory, Inc.			V 8.0 03/13/2018	



1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

1.3 Test Facility / Accreditations

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

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for 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.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dama 4 of 40
1M1803280057-04.ZNF 3/27 - 5/2/2018		Portable Handset		Page 4 of 46
© 2018 PCTEST Engineering Laboratory, Inc. V				



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFQ710US**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 22(H) and 90.691.

Test Device Serial No.: 00061, 00079, 00053,,00002

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-D-2010 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.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Daga E of 46	
1M1803280057-04.ZNF 3/27 - 5/2/2018		Portable Handset		Page 5 of 46	
© 2018 PCTEST Engineering Laboratory, Inc. V 8.0 03/13/201				V 8.0 03/13/2018	



3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-D-2010) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

3.2 Radiated Power and Radiated Spurious Emissions

<u>§2.1053, §90.635, §90.691</u>

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 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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-D-2010, 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].

The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10log₁₀(Power [Watts]) specified in 90.691.

For fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-D-2010.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 6 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 6 of 46
© 2018 PCTEST Engineering Laboratory. Inc.			V 8.0 03/13/2018	



4.0 MEASUREMENT UNCERTAINTY

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

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

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 7 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 7 of 46
© 2018 PCTEST Engineering Laboratory, Inc.				V 8.0 03/13/2018



5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx2	Licensed Transmitter Cable Set	8/10/2017	Annual	8/10/2018	LTx2
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	8/28/2017	Annual	8/28/2018	MY49432391
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	5/19/2017	Annual	5/19/2018	251425001
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/20/2018	Annual	3/20/2019	MY49430494
Mini Circuits	TVA-11-422	RF Power Amp		N/A		QA1317001
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	4/24/2017	Annual	4/24/2018	11210140001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11403100002
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	5/31/2017	Annual	5/31/2018	NMLC-1
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102135
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100037
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	1/22/2018	Annual	1/22/2019	N/A
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	8/14/2017	Biennial	8/14/2019	310233
Sunol Sciences	JB6	JB6 Antenna	9/27/2016	Biennial	9/27/2018	A082816

Table 5-1. Test Equipment

Notes:

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

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 9 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 8 of 46
© 2018 PCTEST Engineering Laboratory, Inc.			V 8.0 03/13/2018	



6.0 SAMPLE CALCULATIONS

CDMA Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

Spurious Radiated Emission – BC10

Example: Channel 476 CDMA BC10 Mode 3rd Harmonic (2453.70MHz)

The average spectrum analzyer 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 analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm -(-24.80) = 50.3 dBc.

LTE Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

- G = Phase Modulation
- 7 = Quantized/Digital Info
- D = Data transmission, telemetry, telecommand

16QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average 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 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 0 of 46
1M1803280057-04.ZNF 3/27 - 5/2/2018		Portable Handset		Page 9 of 46
© 2018 PCTEST Engineering Laboratory Inc.			V 8 0 03/13/2018	



7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics MobileComm U.S.A
FCC ID:	ZNFQ710US
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>CDMA / EvDO / LTE</u>
Band:	Band Class 10 / Band 26

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1051 90.691	Conducted Band Edge / Spurious Emissions	 > 43 + log₁₀ (P[Watts]) for all out- of-band emissions except > 50 + 10log₁₀ (P[Watts]) at Band Edge and for all out-of- band emissions within 37.5kHz of Block Edge 	CONDUCTED	PASS	Sections 7.3, 7.4
2.1055 90.213	Frequency Stability	< 2.5 ppm		PASS	Section 7.8
2.1046 90.635	Conducted Power	< 100 Watts		PASS	Section 7.5
22.913(a.2)	Effective Radiated Power (Band 26)	< 7 Watts max. ERP		PASS	Section 7.6
2.1053 90.691	Radiated Spurious Emissions	 > 43 + log₁₀ (P[Watts]) for all out- of-band emissions except > 50 + 10log₁₀ (P[Watts]) at Band Edge and for all out-of- band emissions within 37.5kHz of Block Edge 	RADIATED	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 shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "2G/3G Automation," Version 3.9.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 10 of 16
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset	Page 10 of 46
© 2018 PCTEST Engineering La	boratory, Inc.	·	V 8.0 03/13/2018



7.2 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 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.

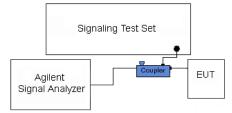


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	_G	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 11 of 16
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 11 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			









Plot 7-2. Occupied Bandwidth Plot (CDMA Ch. 684)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dogo 10 of 16		
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 12 of 46		
© 2018 PCTEST Engineering La	© 2018 PCTEST Engineering Laboratory, Inc.					



Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω AC	CORREC	SENSE:INT	03:4	4:38 PM May 02, 2018		
		er Freq: 814.700000 MHz Free Run Avg Hold	Radio d: 100/100	o Std: None	Trace/Dete	ctor
		en: 40 dB		Device: BTS		
0 dB/div Ref 30.00 dBm						
og 20.0						
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1.00						
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50.0					Max	ίНο
90.0						
enter 814.7 MHz				Span 2 MHz		
tes BW 18 kHz		VBW 180 kHz	Swe	ep 5.733 ms	Min	Но
Occupied Bandwidth		Total Power	32.0 dBr	n		
)883 MHz				D -4	
1.0					Det	Peal
Transmit Freq Error	1.729 kHz	% of OBW Pow	er 99.00 %	6	Auto	M
x dB Bandwidth	1.278 MHz	x dB	-26.00 dl	3		
G			STATUS			-

Plot 7-3. Occupied Bandwidth Plot (LTE B26 - 1.4MHz QPSK - RB Size 6- Low Channel)



Plot 7-4. Occupied Bandwidth Plot (LTE B26 - 1.4MHz 16-QAM – RB Size 6– Low Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 12 of 16	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 13 of 46	
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



Keysight Spectrum Analyzer - Occupied BW					
XIRL RF 50Ω AC		SENSE:INT er Freq: 814.700000 MHz	Radio S	9 PM Apr 27, 2018 Std: None	Trace/Detector
NFE		Free Run Avg Hold en: 40 dB		evice: BTS	
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30.0					
0.0					
50.0					Max Ho
60.0					
enter 814.7 MHz			e	Span 2 MHz	
es BW 18 kHz	١	VBW 180 kHz		p 5.733 ms	Min Ho
					WIITTO
Occupied Bandwidth		Total Power	30.1 dBm		
1.0)821 MHz				Detect
Transmit Freq Error	1.126 kHz	% of OBW Pow	er 99.00 %		Peak Auto Ma
					- <u> </u>
x dB Bandwidth	1.280 MHz	x dB	-26.00 dB		
G			STATUS		

Plot 7-5. Occupied Bandwidth Plot (LTE B26 - 1.4MHz 64-QAM - RB Size 6- Low Channel)



Plot 7-6. Occupied Bandwidth Plot (LTE B26 - 3MHz QPSK - RB Size 15- Low Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 14 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



Keysight Spectrum Analyzer - Occu RL RF 50 Ω		RREC	Center F	NSE:INT			Ra	9:22:00 P dio Std	M Apr 27, 2018 None	Trac	e/Detector
N	FE #IF	⊶ Gain:Low	Trig: Fre #Atten: 4		Avg Hold	: 100/100		dio Dev	ice: BTS		
10 dB/div Ref 30.00	dBm										
.og 20.0											01
0.0	ma		ᡃᠰᡊᡀᠰᢇᠬ	v way was		www	<u> </u>				Clear Wri
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20.0 											Avera
0.0											
0.0											Max Ho
0.0											maxmo
enter 815.5 MHz								Sp	an 5 MHz		
es BW 47 kHz			VB	W 470 ki	lz		Sv		2.533 ms		Min Ho
Occupied Bandy	vidth			Total P	ower	3	2.0 dE	3m			
		01 M	H7								Detect
Tronowit From Free		4.104		% 	BW Pow		99.00	0/		Auto	Peal
Transmit Freq Erro					SW FOW					Auto	191
x dB Bandwidth		2.949 N	IHZ	x dB		-2	26.00	dB			
G						ST/	ATUS				

Plot 7-7. Occupied Bandwidth Plot (LTE B26 - 3MHz 16-QAM - RB Size 15- Low Channel)



Plot 7-8. Occupied Bandwidth Plot (LTE B26 - 3MHz 64-QAM – RB Size 15– Low Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 45 at 40
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 15 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



					Trig: Fre		Avg Hold:	100/100		td: None		e/Detector
			#IFGain:	Low #	Atten: 4	0 dB			Radio D	evice: BTS		
0 dB/div	Ref 30.00) dBm										
.og												
20.0					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					Clear Writ
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0.0												
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0.0												_
enter 81										oan 10 MHz		
es BW 9	J1 KHZ				VB	N 910 ki	IZ		Swee	o 1.133 ms		Min Ho
Occup	bied Band	widt	ו			Total P	ower	32	.7 dBm			
		4.	5007	MHz	Z							Detect
_	nit Freq Err	or	14	358 kH	Z	% of O	3W Powe	r 🤇	9.00 %		Auto	Pea <u>M</u>
Iransn	طفاه اندر باه م		5.	002 MH	7	x dB		-20	6.00 dB			
	anowidin											
ransn x dB B	andwidth											

Plot 7-9. Occupied Bandwidth Plot (LTE B26 - 5MHz QPSK - RB Size 25- Low Channel)



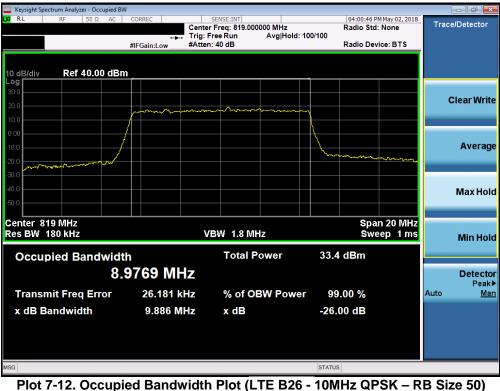
Plot 7-10. Occupied Bandwidth Plot (LTE B26 - 5MHz 16-QAM – RB Size 25– Low Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 16 of 46		
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset				
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Plot 7-11. Occupied Bandwidth Plot (LTE B26 - 5MHz 64-QAM – RB Size 25– Low Channel)

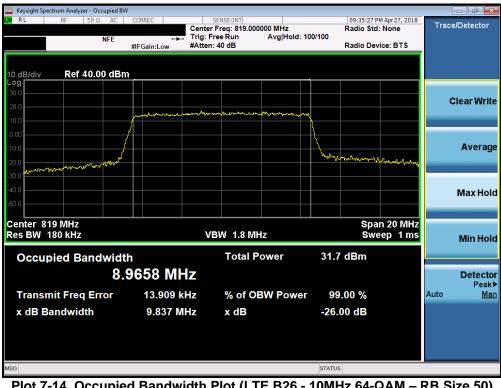


FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 17 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset	Page 17 of 46		
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Plot 7-13. Occupied Bandwidth Plot (LTE B26 - 10MHz 16-QAM - RB Size 50)



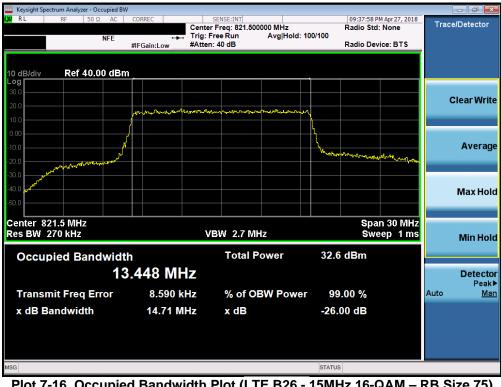
Plot 7-14. Occupied Bandwidth Plot (LTE B26 - 10MHz 64-QAM – RB Size 50)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 10	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset	Page 18 of 46		
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Plot 7-15. Occupied Bandwidth Plot (LTE B26 - 15MHz QPSK - RB Size 75)



Plot 7-16. Occupied Bandwidth Plot (LTE B26 - 15MHz 16-QAM – RB Size 75)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 10	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset	Page 19 of 46		
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Keysight Spectrum Analyzer - Occupied E							
🗶 RL RF 50Ω AC		SENSE:INT Freq: 821.500000 MHz		09:38:08 PM Radio Std: I		Tracel	Detector
NFE		Free Run Avg Ho n: 40 dB	ld: 100/100	Radio Devid	e: BTS		
>	an ouncou						
10 dB/div Ref 40.00 dB	m						
Log 30.0							
20.0						C	lear Write
10.0	And mark y room have	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m				
0.00							
-10.0	<u>/</u>		\				Average
-20.0			"hunder	4-m-www.ang.	annal trail		
-30.0							
-40.0							Max Hold
-50.0							
Center 821.5 MHz				Span	30 MHz		
Res BW 270 kHz	١	/BW 2.7 MHz			ep 1ms		Min Hold
Occupied Bandwid	th	Total Power	31.5	dBm			
	3.437 MHz	i otari i otior	0110				Detector
	3.437 WINZ						Detector Peak▶
Transmit Freq Error	17.135 kHz	% of OBW Pov	wer 99.	.00 %		Auto	<u>Man</u>
x dB Bandwidth	14.68 MHz	x dB	-26.0)0 dB			
ISG			STATUS				

Plot 7-17. Occupied Bandwidth Plot (LTE B26 - 15MHz 64-QAM - RB Size 75)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 20 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
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7.3 Spurious and Harmonic Emissions at Antenna Terminal §2.1051 §90.691

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 (separated into at least two plots per channel)
- 2. RBW ≥ 1MHz
- 3. VBW \geq 3 x RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

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

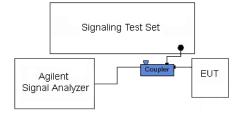


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

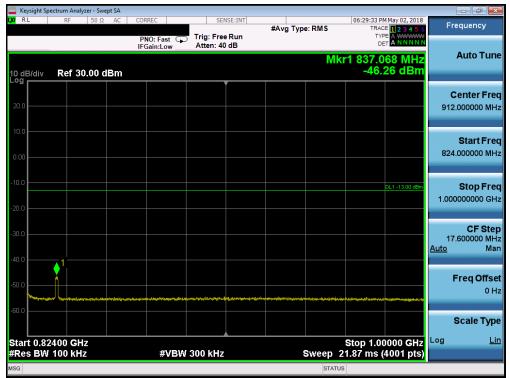
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission 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: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	pe:		
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 21 of 46	
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



	ectrum Analyze	er - Swept S	SA										
X/RL	RF	50 Ω /			ast ↦	Trig: Free		#Avg Typ	e: RMS	TRAC	M May 02, 2018 DE 1 2 3 4 5 6 DE A WWWWW T A N N N N N	Fr	requency
10 dB/div Log	Ref 30.	00 dB		IFGain:L	.ow	Atten: 40) dB		Mkr1	401.57	6 8 MHz 34 dBm		Auto Tune
20.0													Center Fred 2.000000 MH;
0.00												30	Start Free
-10.0											DL1 -13.00 dBm	814	Stop Free 1.000000 MH
-30.0												78 <u>Auto</u>	CF Ste 8.400000 MH Ma
-50.0						1		ي مطالح محجمين المراجع الأخر. و في محالج محجمين المراجع المحجم المراجع			دي مور کې ور ک د ور کې و		Freq Offse 0 H
-60.0													Scale Type
Start 30.0 #Res BW				;	¢VBW	300 kHz		S	weep 97	Stop 8 7.33 ms <u>(</u> 2	14.0 MHz :0001 pts)	Log	<u>Lii</u>
MSG									STATU	s			

Plot 7-18. Conducted Spurious Plot (CDMA Ch. 476)



Plot 7-19. Conducted Spurious Plot (CDMA Ch. 476)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 22 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
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Keysight Specific Keysight	ectrum Analyze	er - Swep	ot SA									
XI RL	RF	50 Ω	AC		Fast ↔		SENSE:INT	#Avg Ty	pe:RMS	TR	PM May 02, 2018 ACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
10 dB/div	Ref 30.	00 di	Bm	IFGai	1:Low	Atte	n: 40 dB		Mk		3 20 GHz 3.08 dBm	Auto Tu
20.0												Center Fr 5.500000000 G
0.00												Start Fr 1.000000000 G
20.0											DL1 -13.00 dBm	Stop Fr 10.000000000 G
40.0										↓ ¹		CF St 900.000000 M <u>Auto</u> M
50.0												Freq Offs 0
60.0	0 GHz									Stop 1	0.000 GHz	Scale Ty
Res BW					#VBW	/ 3.0 N	1Hz		Sweep 1	6.00 ms	(20001 pts)	

Plot 7-20. Conducted Spurious Plot (CDMA Ch. 476)



Plot 7-21. Conducted Spurious Plot (CDMA Ch. 684)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dana 00 at 40	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 23 of 46	
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



	ectrum Analyzer - Swep	pt SA								_	
IXV RL	RF 50 Ω		PNO: Fast			#Avg Type	:RMS	TRAC	M May 02, 2018 DE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	Freq	luency
10 dB/div	Ref 30.00 d		FGain:Low	Atten: 40	dB		Mł	(r1 824.0		A	uto Tune
20.0											nter Fred 00000 MH:
0.00											Start Free
-10.0									DL1 -13.00 dBm		Stop Free 00000 GH
30.0										17.6 <u>Auto</u>	CF Ste 00000 MH Ma
50.0	n and the second se	4.1.218-10-11-10-11-11-1		y. definent lange angeselan generen	an Marin Contact States		1041-12-, 00-1-1 Tayly (align)	in pintona (Strangetta)		Fr	eq Offse 0 H
-60.0										S	cale Typ
Start 0.82 #Res BW			#VBV	V 300 kHz			Sweep	Stop 1.0 21.87 ms (0000 GHz (4001 pts)	Log	Lii
ISG							STATU	JS			

Plot 7-22. Conducted Spurious Plot (CDMA Ch. 684)



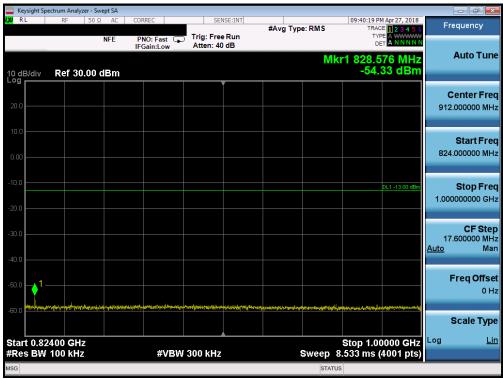
Plot 7-23. Conducted Spurious Plot (CDMA Ch. 684)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 24 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
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			yzer - Swep												
lxi Ri	L	RF	50 Ω	AC	CORREC		SEI	NSE:INT	#Avg Typ	e: RMS	09		Apr 27, 2018		Frequency
			N	FE	PNO: Fa		Trig: Free Atten: 40					TYP	EAWWWWW		
					IF Gall.L	UW	7 taten: 4	ub		Mk	r1 42	0 941	6 MHz		Auto Tune
10 dE	3/div	Ref 3	0.00 dE	Зm								-58.4	42 dBm		
Log								í							Center Freq
20.0														4	22.000000 MHz
10.0															04
															Start Freq 30.000000 MHz
0.00															30.000000 WIF12
-10.0															
-10.0													DL1 -13.00 dBm		Stop Freq 14.000000 MHz
-20.0														8	14.000000 MHz
															05.04++
-30.0															CF Step 78.400000 MHz
														Auto	
-40.0															
-50.0															Freq Offset
								1							0 Hz
-60.0	,			in provide the			and a state of the	Reprosperations	a para se la sua companya su su si s A filo da la su		and a second		and a second		
				- la maine pri	dia gan bana ani										Scale Type
Star	t 30.0	MHz									s	top 8	14.0 MHz	Log	<u>Lin</u>
		100 kH	z		#	VBW 3	300 kHz		S	weep	37.33	ms (2	0001 pts)		
MSG										ST/	ATUS				

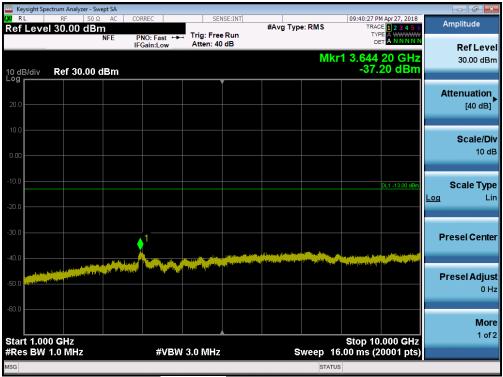
Plot 7-24. Conducted Spurious Plot (LTE B26 - 1.4 MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



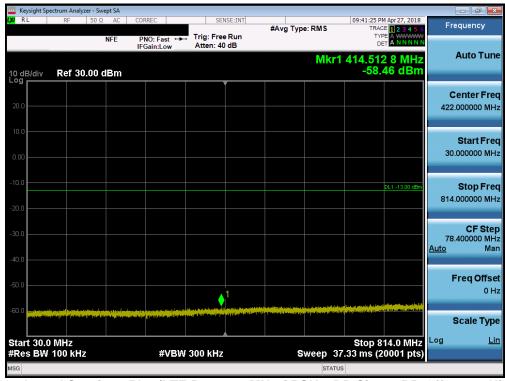
Plot 7-25. Conducted Spurious Plot (LTE B26 - 1.4 MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 25 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018				
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Plot 7-26. Conducted Spurious Plot (LTE B26 - 1.4 MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



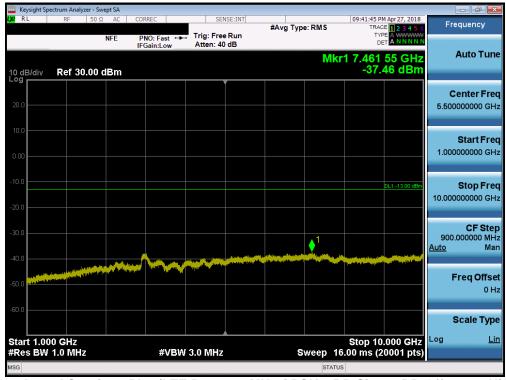
Plot 7-27. Conducted Spurious Plot (LTE B26 - 1.4 MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 26 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset	Page 26 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018		



	pectrum Analyze										
LX/IRL	RF	50 Ω AC	CORREC	SEN	SE:INT	#Avg Typ	e: RMS		M Apr 27, 2018	Fr	equency
		NFE	PNO: Fast 🖵	Trig: Free Atten: 40		• ,,		TY	PE A WWWWW A NNNNN		
			IFGam:Low	Atten: 40	ub		MI	(r1 824.0			Auto Tune
10 dB/div	Ref 30	00 dBm						-44.	03 dBm		
					/						
											enter Freq
20.0										912	.000000 MHz
40.0											
10.0											Start Freq
0.00										824	.000000 MHz
0.00											
-10.0									DL1 -13.00 dBm		Stop Freq
									UL1 -13.00 dBm	1.000	0000000 GHz
-20.0										1.000	
											OF Oton
-30.0										17	CF Step .600000 MHz
										<u>Auto</u>	Man
-40.0											
										I	req Offset
-50.0											0 Hz
-60.0	And the stand of the stand	manterin	an direkan karan kar		the second	where the second	alana ing management	-	With which any set of the		
										:	Scale Type
										Log	Lin
	2400 GHz 100 kHz		#VRM	300 kHz			Sween	Stop 1.0 8.533 ms (2000 012	Log	Lin
#Res DW			#VDVV	500 KHZ			Sweep		400 r pts)		
Mag							STAIL				

Plot 7-28. Conducted Spurious Plot (LTE B26 - 1.4 MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-29. Conducted Spurious Plot (LTE B26 - 1.4 MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 27 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018				
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7.4 Band Edge Emissions at Antenna Terminal §2.1051 §90.691

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 removed from the EA licensee's frequency block by greater than 37.5 kHz is $43 + \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is $50 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Span was set large enough so as to capture all out of band emissions near the band edge
- 2. RBW = 100 kHz
- 3. VBW = 300 kHz
- 4. Detector = RMS
- 5. Trace mode = trace average
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

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

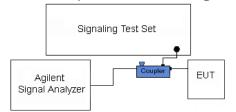


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

For channel edge emission, the signal analyzer's "ACP" measurement capability is used.

Per 22.917(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.

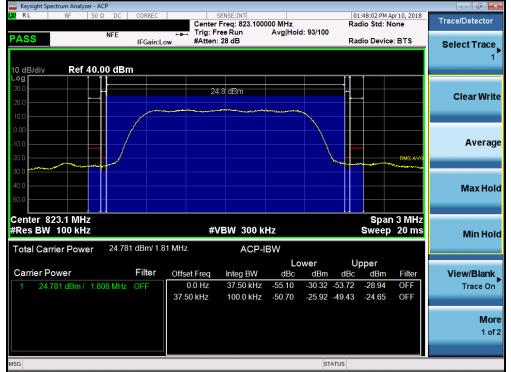
FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 28 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018				
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CDMA B10



Plot 7-30. Channel Edge Plot (CDMA Ch. 476)

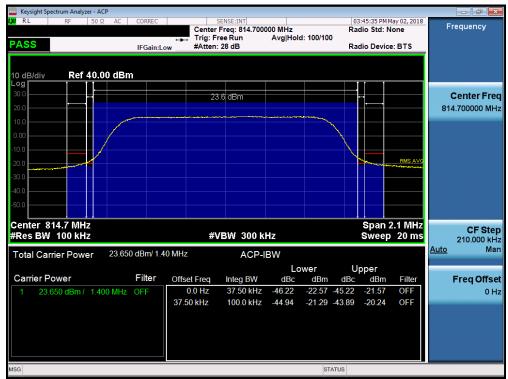


Plot 7-31. Channel Edge Plot (CDMA Ch. 684)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 29 of 46	
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LTE B26



Plot 7-32. Channel Edge Plot (LTE B26 - 1.4MHz QPSK - RB Size 6- Low Channel)



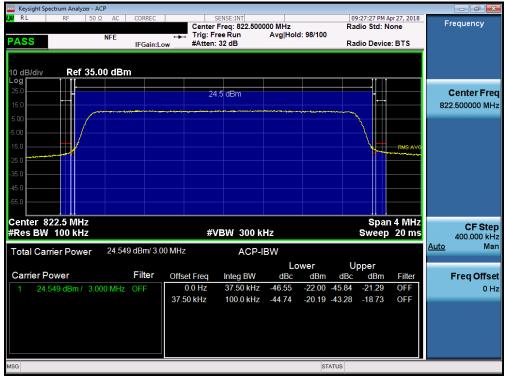
Plot 7-33. Channel Edge Plot (LTE B26 - 1.4MHz QPSK – RB Size 6 – High Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 40	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 30 of 46	
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Keysight Spectrum Analyzer - ACP RL RF 50 Ω AC CORREC		SENSE:INT			00-23-23 DM	Apr 27, 2018	
	Center	Freq: 815.500		R	adio Std: I		Trace/Detector
ASS NFE IFGain:L		ree Run 32 dB	Avg Hold		adio Devic	e: BTS	Select Trace
							1
0 dB/div Ref 35.00 dBm							
.og 25.0					<u> </u>		
	24	.5 dBm			•		Clear Writ
5.00			······		<u>∖</u>		
5.00					\rightarrow		
15.0							Averag
					1	RMS AVG	7110101
35.0							
45.0							
55.0							Max Ho
enter 815.5 MHz						n 4 MHz	
Res BW 100 kHz	#\	/BW 300 k	HZ		Sweep	o 20 ms	Min Ho
Total Carrier Power 24.516 dBm/ 3.	00 MHz	ACP-I	BW				
					Jpper		
Carrier Power Filter	Offset Freq 0.0 Hz	Integ BW 37.50 kHz	dBc -47.29	dBm dBc		Filter	View/Blank
1 24.516 dBm / 3.000 MHz OFF	37.50 kHz	37.50 KHZ 100.0 kHz		-22.77 -45.89		OFF	Trace On
	07.50 KHZ	100-0 KHZ	-15.05	-21.10 -43.32	-13.40		
							Мо
							1 of

Plot 7-34. Channel Edge Plot (LTE B26 - 3MHz QPSK - RB Size 15- Low Channel)



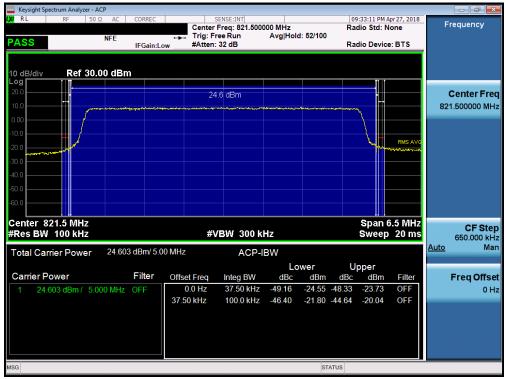
Plot 7-35. Channel Edge Plot (LTE B26 - 3MHz QPSK - RB Size 15 - High Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 46		
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 31 of 46		
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🧱 Keysight Spectrum Analyzer - ACP								J X
X RL RF 50 Ω AC CORREC		ENSE:INT Freg: 816.5000	00 MHz		09:30:35 PM / Radio Std: N		Frequen	су
NFE NFE	🛶 Trig: Fr	ee Run	Avg Hold	: 95/100				
PASS IFGain:L	ow #Atten:	32 dB			Radio Devic	e: BTS		
10 dB/div Ref 35.00 dBm								
25.0								-
	24	.5 dBm			·		Cente	
15.0							816.50000	
5.00								
-5.00								
-15.0					- \	RMS AVG		
-25.0					h			
-35.0								
-45.0								
-55.0								
Center 816.5 MHz					Span (6.5 MHz	CE	Ster
#Res BW 100 kHz	#V	BW 300 k	Hz		Sweep) 20 ms	650.00	
Total Carrier Power 24.526 dBm/ 5.0	00 MHz	ACP-I	BW				<u>Auto</u>	Mar
			Lov	ver	Upper			
Carrier Power Filter	Offset Freq	Integ BW	dBc	dBm d	Bc dBm	Filter	Freq	Offse
1 24.526 dBm / 5.000 MHz OFF	0.0 Hz	37.50 kHz		-25.77 -48.		OFF		0 H
	37.50 kHz	100.0 kHz	-47.79	-23.27 -45.	95 -21.42	OFF		
ISG				STATUS				
								_

Plot 7-36. Channel Edge Plot (LTE B26 - 5MHz QPSK - RB Size 25- Low Channel)



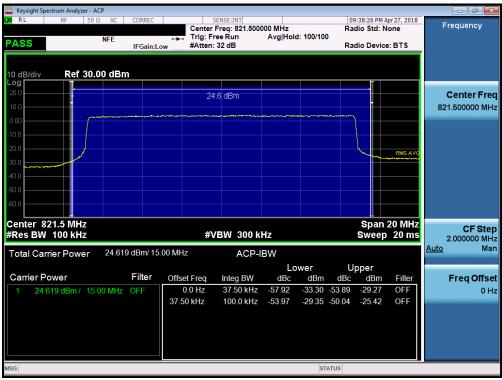
Plot 7-37. Channel Edge Plot (LTE B26 - 5MHz QPSK - RB Size 25 - High Channel)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 32 of 46	
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



Keysight Spectrum Analyzer - ACP RL RF 50 Ω AC CORREC PASS NFE ICCoincid	Center F			I: 100/100	09:36:05 PM A Radio Std: N Radio Device	one	Frequency
10 dB/div Ref 30.00 dBm	ow #Atten.	94 GD					
	24.	7 dBm					Center Freq 819.000000 MHz
-10.0						RMS AVG	
Center 819 MHz						12 MHz	CF Step
#Res BW 100 kHz Total Carrier Power 24.735 dBm/ 10		BW 300 k			sweep	20 ms	1.200000 MHz <u>Auto</u> Man
		ACP-I		wer	Upper		
Carrier Power Filter 1 24.735 dBm / 10.00 MHz OFF	Offset Freq 0.0 Hz 37.50 kHz	Integ BW 37.50 kHz 100.0 kHz		dBm dB -29.63 -51.5 -26.01 -47.6	5 -26.82	Filter OFF OFF	Freq Offsel 0 Hz
	37.50 KHZ	100.0 KHZ	-50.74	-20.01 -47.0	3 -22.89	OFF	
MSG				STATUS			

Plot 7-38. Channel Edge Plot (LTE B26 - 10MHz QPSK - RB Size 50)



Plot 7-39. Channel Edge Plot (LTE B26 - 15MHz QPSK – RB Size 75)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 33 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



7.5 Conducted Power Output Data §90.635

Frequency [MHz]	BC10 [Channel]	Battery Type	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
817.90	476	Standard	25.10	0.324	50.00	-24.90
823.10	684	Standard	25.16	0.328	50.00	-24.84

Table 7-2. CDMA BC10 Conducted Power Output Data

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
814.70	1.4	QPSK	24.65	0.292	50.00	-25.35
823.30	1.4	QPSK	24.35	0.272	50.00	-25.65
814.70	1.4	16-QAM	23.53	0.225	50.00	-26.47
823.30	1.4	16-QAM	23.60	0.229	50.00	-26.40
814.70	1.4	64-QAM	22.40	0.174	50.00	-27.60
823.30	1.4	64-QAM	22.38	0.173	50.00	-27.62
815.50	3	QPSK	24.62	0.290	50.00	-25.38
822.50	3	QPSK	24.64	0.291	50.00	-25.36
815.50	3	16-QAM	23.53	0.225	50.00	-26.47
822.50	3	16-QAM	23.61	0.230	50.00	-26.39
815.50	3	64-QAM	22.47	0.177	50.00	-27.53
822.50	3	64-QAM	22.65	0.184	50.00	-27.35
816.50	5	QPSK	24.57	0.286	50.00	-25.43
821.50	5	QPSK	24.68	0.294	50.00	-25.32
816.50	5	16-QAM	23.54	0.226	50.00	-26.46
821.50	5	16-QAM	23.56	0.227	50.00	-26.44
816.50	5	64-QAM	22.50	0.178	50.00	-27.50
821.50	5	64-QAM	22.38	0.173	50.00	-27.62
819.00	10	QPSK	24.57	0.286	50.00	-25.43
819.00	10	16-QAM	23.54	0.226	50.00	-26.46
819.00	10	64-QAM	22.42	0.175	50.00	-27.58
821.50	15	QPSK	24.43	0.277	50.00	-25.57
821.50	15	16-QAM	23.40	0.219	50.00	-26.60
821.50	15	64-QAM	22.38	0.173	50.00	-27.62

NOTES:

Table 7-3. LTE Band 26 Conducted Power Output Data

- 1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 2. This unit was tested with its standard battery.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 34 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



7.6 Radiated Power (ERP) §22.913(a.2)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

ANSI/TIA-603-D-2010 - Section 2.2.17

Test Settings

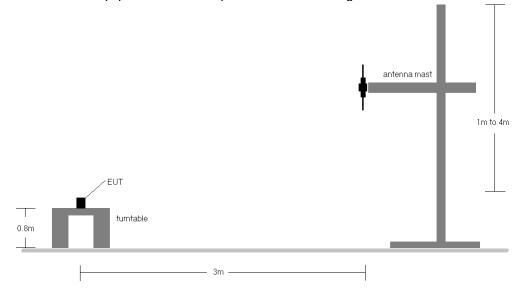
- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW \geq 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points $\geq 2 \times \text{span} / \text{RBW}$
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

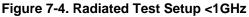
FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 40
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 35 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



Test Setup

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





Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
821.50	15	QPSK	Н	358	72	1 / 0	20.59	1.49	19.93	0.098	38.45	-18.52
821.50	15	16-QAM	Н	358	72	1 / 0	19.78	1.49	19.12	0.082	38.45	-19.33
821.50	15	64-QAM	н	358	72	1 / 0	19.22	1.49	18.56	0.072	38.45	-19.89

Table 7-40. ERP Data (Band 26)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 36 of 46
© 2018 PCTEST Engineering La	boratory. Inc.	•		V 8.0 03/13/2018



7.7 Radiated Spurious Emissions Measurements §2.1053 §90.691

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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

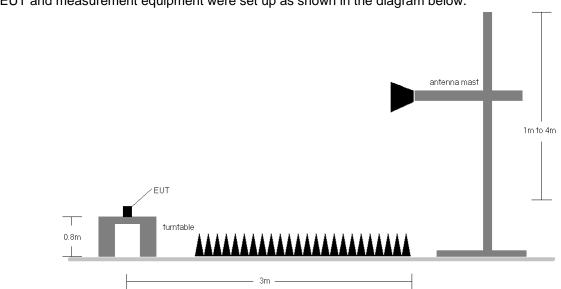
ANSI/TIA-603-D-2010 - Section 2.2.12

Test Settings

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

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 27 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 37 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			





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

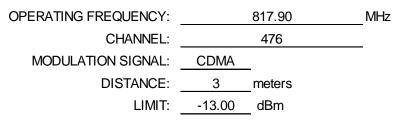
Figure 7-5. Test Instrument & Measurement Setup

Test Notes

- 1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 2. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 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 "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 29 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset	Page 38 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018		





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]
1635.80	Н	110	284	-64.13	9.00	-55.13	-42.1
2453.70	Н	100	229	-58.25	8.94	-49.31	-36.3
3271.60	Н	-	-	-57.86	9.26	-48.60	-35.6

Table 7-4. CDMA BC10 Radiated Spurious Data (Ch. 476)

OPERATING FREQUENCY:		823.10	MHz
CHANNEL:		684	-
MODULATION SIGNAL:	CDMA	_	
DISTANCE:	3	meters	
LIMIT:	-13.00	_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]
1646.20	Н	105	246	-63.69	9.04	-54.65	-41.6
2469.30	Н	100	284	-57.58	8.96	-48.62	-35.6
3292.40	Н	-	-	-57.05	9.28	-47.77	-34.8

Table 7-5. CDMA BC10 Radiated Spurious Data (Ch. 684)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 39 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Fage 39 01 40
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



OPERATING FREQUENCY:		814.70	MHz
CHANNEL:		26697	_
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	1.4	MHz	
DISTANCE:	3	meters	
LIMIT:	-13.00	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]
1629.40	Н	116	310	-64.18	8.98	-55.20	-42.2
2444.10	Н	-	-	-60.20	8.94	-51.26	-38.3

Table 7-6. LTE B26 Radiated Spurious Data (Ch. 26697)

OPERATING FREQUENCY:		823.30	MHz
CHANNEL:		26783	_
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	1.4	MHz	
DISTANCE:	3	meters	
LIMIT:	-13.00	_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]
1646.60	Н	-	-	-65.37	9.04	-56.33	-43.3
2469.90	Н	-	-	-59.69	8.96	-50.73	-37.7

Table 7-7. LTE B26 Radiated Spurious Data (Ch. 26783)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 40 of 46	
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. 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.

The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Test Procedure Used

ANSI/TIA-603-D-2010

Test Settings

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

Test Setup

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

Test Notes

None

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 41 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



OPERATING FREQUENCY:	817,900,000	Hz
CHANNEL:	476	_
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	ТЕМР (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	817,899,974	-26	-0.0000032
100 %		- 30	817,900,153	153	0.0000187
100 %		- 20	817,900,195	195	0.0000238
100 %		- 10	817,899,879	-121	-0.0000148
100 %		0	817,899,668	-332	-0.0000406
100 %		+ 10	817,899,925	-75	-0.0000092
100 %		+ 20	817,899,876	-124	-0.0000152
100 %		+ 30	817,900,124	124	0.0000152
100 %		+ 40	817,900,264	264	0.0000323
100 %		+ 50	817,899,634	-366	-0.0000447
BATT. ENDPOINT	3.40	+ 20	817,899,805	-195	-0.0000238

Table 7-8. CDMA BC10 Frequency Stability Data (Ch. 670)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 42 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 42 of 46	
© 2018 PCTEST Engineering La	V 8.0 03/13/2018				



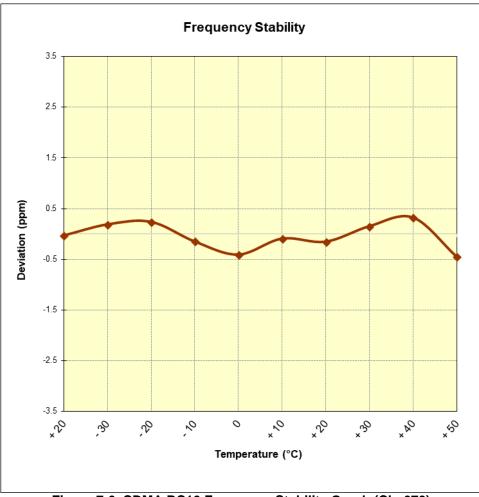


Figure 7-6. CDMA BC10 Frequency Stability Graph (Ch. 670)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 46
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset		Page 43 of 46
© 2018 PCTEST Engineering La	V 8.0 03/13/2018			



OPERATING FREQUENCY:	819,000,000	Hz
CHANNEL:	26740	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	ТЕМР (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	819,000,015	15	0.0000018
100 %		- 30	818,999,891	-109	-0.0000133
100 %		- 20	818,999,707	-293	-0.0000358
100 %		- 10	818,999,860	-140	-0.0000171
100 %		0	818,999,923	-77	-0.0000094
100 %		+ 10	818,999,849	-151	-0.0000184
100 %		+ 20	818,999,742	-258	-0.0000315
100 %		+ 30	819,000,031	31	0.0000038
100 %		+ 40	818,999,919	-81	-0.0000099
100 %		+ 50	819,000,066	66	0.0000081
BATT. ENDPOINT	3.40	+ 20	818,999,846	-154	-0.0000188

Table 7-9. LTE Band 26 Frequency Stability Data (Ch. 26697)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 44 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
© 2018 PCTEST Engineering Laboratory, Inc.			V 8.0 03/13/2018		



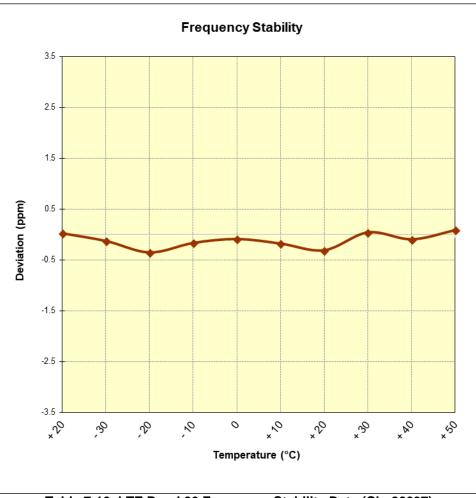


Table 7-10. LTE Band 26 Frequency Stability Data (Ch. 26697)

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 45 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
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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: ZNFQ710US complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

FCC ID: ZNFQ710US		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 46 of 46	
1M1803280057-04.ZNF	3/27 - 5/2/2018	Portable Handset			
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