

PCTEST

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MEASUREMENT REPORT

Part 96 LTE

Applicant Name:

LG Electronics USA, Inc. 111 Sylvan Avenue, North Building Englewood Cliffs, NJ 07632 United States

Date of Testing: 06/26/2020-08/18/2020 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M2006150096-05.ZNF

FCC ID:	ZNFF100VM
APPLICANT:	LG Electronics USA, Inc.
A	
Application Type:	Certification
Model:	LM-F100VM
Additional Models: LMF100VM, F100VM, LM-F101V, LMF101V, F101V	
EUT Type:	Portable Handset
FCC Classification:	Citizens Band End User Devices (CBE)
FCC Rule Part(s):	96
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,
	KDB 648474 D03 v01r04, KDB 940660 D01 v02, WINNF-TS-0122 V1.0.0

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

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

Randy Ortanez President



FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 1 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 1 of 49
© 2020 PCTEST	•	·		V1.0 12/17/2018



TABLE OF CONTENTS

1.0	INTR	ODUCTION	.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	DESC	RIPTION OF TESTS	.6
	3.1	Measurement Procedure	.6
	3.2	Radiated Power and Radiated Spurious Emissions	.6
4.0	MEAS	SUREMENT UNCERTAINTY	.7
5.0	TEST	EQUIPMENT CALIBRATION DATA	.8
6.0	SAMF	PLE CALCULATIONS	.9
7.0	TEST	RESULTS1	0
	7.1	Summary	10
	7.2	Occupied Bandwidth	12
	7.3	Spurious and Harmonic Emissions at Antenna Terminal	13
	7.4	Band Edge Emissions at Antenna Terminal	25
	7.5	Radiated Power (EIRP)	32
	7.6	Radiated Spurious Emissions Measurements	35
	7.7	Frequency Stability / Temperature Variation	11
	7.8	End User Device Additional Requirement (CBSD Protocol)	14
8.0	CON	CLUSION	19

FCC ID: ZNFF100VM	PCTEST [®] Proud to be part of [®] element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:	Dage 2 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 2 of 49
© 2020 PCTEST	-		V1.0 12/17/2018





MEASUREMENT REPORT FCC Part 96



				EII	RP	
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator
		QPSK	3560.0 - 3690.0	0.095	19.75	18M0G7D
	20 MHz	16QAM	3560.0 - 3690.0	0.073	18.62	17M9W7D
		64QAM	3560.0 - 3690.0	0.043	16.29	17M9W7D
	15 MHz	QPSK	3557.5 - 3692.5	0.091	19.60	13M5G7D
		16QAM	3557.5 - 3692.5	0.077	18.88	13M4W7D
LTE Band 48		64QAM	3557.5 - 3692.5	0.058	17.64	13M5W7D
LIE Band 48	10 MHz	QPSK	3555.0 - 3695.0	0.094	19.73	8M95G7D
		16QAM	3555.0 - 3695.0	0.068	18.30	8M98W7D
		64QAM	3555.0 - 3695.0	0.054	17.35	8M90W7D
		QPSK	3552.5 - 3697.5	0.091	19.60	4M52G7D
	5 MHz	16QAM	3552.5 - 3697.5	0.067	18.25	4M51W7D
		64QAM	3552.5 - 3697.5	0.051	17.04	4M52W7D
		EUT C	Verview (I TE B48	1		

EUT Overview (LTE B48)

Note: EIRP levels shown in the table above are measured over the full channel bandwidth. These values will appear on the Grant of Authorization.

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Daga 2 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 3 of 49
© 2020 PCTEST		•		V1.0 12/17/2018



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.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST 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 located in Columbia, MD 21046, U.S.A.

- PCTEST is a CBRS Alliance (OnGo) Approved Test Lab
- PCTEST is a WInnForum Approved Test Lab
- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for CBRS Alliance Certification Test Plan and WInnForum Conformance and Performance Test Technical Standard.
- 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: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:	Dage 4 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 4 of 49
© 2020 PCTEST			V1.0 12/17/2018



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFF100VM**. The test data contained in this report pertains only to the emissions due to the EUT's LTE Band 48 operation in the CBRS band. Per FCC Part 96, this device is evaluated under Citizens Band End User Devices (CBE).

Test Device Serial No.: 00229, 00328

2.2 Device Capabilities

This device contains the following capabilities:

CDMA, GSM/GPRS/EDGE, WCDMA/HSPA, LTE, NR, WLAN, UNII, BT(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.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT placed on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage E of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 5 of 49
© 2020 PCTEST	•		V1.0 12/17/2018



3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) 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

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. 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-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].

The calculated P_d levels are then compared to the absolute spurious emission limit of -40dBm/MHz for End User Devices.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01.

FCC ID: ZNFF100VM	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage C of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 6 of 49
© 2020 PCTEST	·	•		V1.0 12/17/2018



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: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 7 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 7 of 49
© 2020 PCTEST				V1.0 12/17/2018



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	4/9/2020	Annual	4/9/2021	LTx2
-	LTx3	Licensed Transmitter Cable Set	10/30/2019	Annual	10/30/2020	LTx3
Anritsu	MT8821C	Radio Communication Analyzer	3/10/2020	Annual	3/10/2021	6200901190
Anritsu	MS46322A	Vector Network Analyzer	8/19/2019	Annual	8/19/2020	1521001
Anritsu	MT8821C	Radio Communication Analyzer	6/15/2020	Annual	6/15/2021	6201381794
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Espec	ESX-2CA	Environmental Chamber	8/13/2019	Annual	8/13/2020	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	2/14/2019	Biennial	2/14/2021	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/12/2020	Biennial	3/12/2022	150693
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11208010032
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		107826
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		836536/0005
Rohde & Schwarz	CMW500	Radio Communication Tester	8/26/2019	Annual	8/26/2020	100976
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	11/1/2019	Annual	11/1/2020	100040
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511

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: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Daga 8 of 40	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 8 of 49	
© 2020 PCTEST				V1.0 12/17/2018	



6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM 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 (7250 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 analzyer. 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: ZNFF100VM	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 0 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 9 of 49
© 2020 PCTEST	•			V1.0 12/17/2018



7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics USA, Inc.
FCC ID:	ZNFF100VM
FCC Classification:	Citizens Band End User Devices (CBE)
Mode(s):	LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1046	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
2.1051 96.41(e)(ii)	Out of Band Emissions	 -13 dBm/MHz at frequencies within 0-B MHz of channel edge (where B is the bandwidth of the assigned channel) -25 dBm/MHz at frequencies greater than B MHz above and below channel edge -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz 	CONDUCTED	PASS	Section 7.3, 7.4
2.1055	Frequency Stability	Fundamental emissions stay within authorized frequency block		PASS	Section 7.7
96.47	End User Device Additional Requirements (CBSD Protocol)	 End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation. An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD. 		Section 7.8	

Table 7-1. Summary of Conducted Test Results

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 10 of 10
1M2006150096-05.ZNF 06/26/2020-08/18/2020		Portable Handset		Page 10 of 49
© 2020 PCTEST	•	·		V1.0 12/17/2018



FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
96.41(b)	Equivalent Isotropic Radiated Power (EIRP)	23 dBm/10MHz	RADIATED	PASS	Section 7.5
2.1053 96.41(e)	Undesirable Emissions	-40 dBm/MHz		PASS	Section 7.6

Table 7-2. Summary of Radiated 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 "LTE Automation," Version 5.1.

FCC ID: ZNFF100VM	Proud to be part of relement	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Dogo 11 of 40	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 11 of 49	
© 2020 PCTEST				V1.0 12/17/2018	



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

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates: EUT Type:		Dage 12 of 10
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 12 of 49
© 2020 PCTEST			V1.0 12/17/2018



LTE Band 48



Plot 7-1. Occupied Bandwidth Plot (LTE Band 48 - 5.0MHz QPSK - Full RB Configuration)



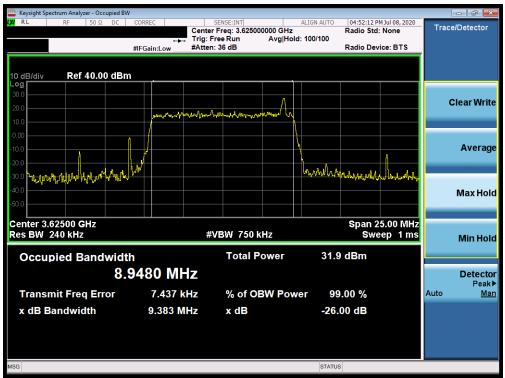
Plot 7-2. Occupied Bandwidth Plot (LTE Band 48 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Daga 12 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 13 of 49
© 2020 PCTEST	-	•		V1.0 12/17/2018



🔤 Keysight Sp	oectrum Analyzer - Oc	cupied BW									
L <mark>XI</mark> RL	RF 50 Ω	DC C	ORREC		NSE:INT reg: 3.62500	0000 GHz	ALIGN AUTO	05:15:02 P Radio Std	M Jul 08, 2020	Trace	e/Detector
			÷.	📕 Trig: Fre	e Run		d: 100/100				
		#	IFGain:Low	#Atten: 3	6 dB			Radio Dev	vice: BTS		
10 dB/div Log	Ref 35.0	0 dBm									
25.0											
15.0			0/1 -0/19-	mantham	And had a c	- Ale man				C	Clear Write
5.00						01-40 4					
-5.00											
-15.0							h				Average
-25.0			<u>/</u>								_
-35.0 d o d	witherthand	NWW	N				L' WWW	man	w.M. Mar		
-45.0											Max Hold
-55.0											
	.625000 GHz			40 M					2.50 MHz		
Res BW	120 KHZ			#VE	3W 390 k	HZ		SWe	eep 1 ms		Min Hold
Occu	pied Band	lwidth			Total P	ower	28.5	dBm			
			235 M	LI-7							Detector
		4.5	235 IVI	ПΖ							Detector Peak▶
Trans	mit Freq Er	ror	-3.250	kHz	% of O	BW Pow	/er 99	.00 %		Auto	Man
x dB E	Bandwidth		4.892	/Hz	x dB		-26.	00 dB			
	Junannaun		11002		A GE		201				
MSG							STATUS				
							STATUS				

Plot 7-3. Occupied Bandwidth Plot (LTE Band 48 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 48 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 14 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 14 of 49
© 2020 PCTEST	-	•		V1.0 12/17/2018



Keysight Spectrum Analyzer - Occupied BW							ŀ	
(X) RL RF 50Ω DC	CORREC	SENSE:INT Center Freg: 3.6250		ALIGN AUTO	04:52:40 Pt Radio Std:	M Jul 08, 2020	Trace	/Detector
			Avg Hold	: 100/100	Radio Std:	None		
	#IFGain:Low	#Atten: 36 dB			Radio Dev	ice: BTS		
10 dB/div Ref 40.00 dBm								
Log								
30.0							0	lear Write
20.0	- Alana	our manuel manuel	a data An . a sala				-	
10.0	J Venue	a de Duis de Guella, Chas Hana an-Le	Charles and Shared					
0.00								
-10.0								Average
-20.0	A.A			h	1			
-20.0 -30.0 Mar July Mar	(WP			mar and my	and the state of t	man		
-40.0								
								Max Hold
-50.0								
Center 3.62500 GHz					Span 2	5.00 MHz		
Res BW 240 kHz		#VBW 750	kHz			ep 1 ms		Min Hold
								MITTIOIG
Occupied Bandwidth		Total I	ower	31.1	dBm			
8.9	796 MH	7						Detector
								Peak▶
Transmit Freq Error	-4.369 k	Hz % of O	BW Powe	er 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth	9.522 M	Hz xdB		-26.	00 dB			
MSG				STATUS	6			

Plot 7-5. Occupied Bandwidth Plot (LTE Band 48 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 48 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	G	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dage 15 of 10		
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 15 of 49		
© 2020 PCTEST V1.0 12/17/2018						



Keysight Spectrum Analyzer - Occupied BW	/							
X RL RF 50Ω DC	CORREC	SENSE:INT Center Freg: 3.625		ALIGN AUTO	04:47:57 PI Radio Std:	M Jul 08, 2020	Trac	e/Detector
	↔		Avg Hold:	100/100	Radio Sta	None		
	#IFGain:Low	#Atten: 36 dB			Radio Dev	ice: BTS		
10 dB/div Ref 35.00 dBn	า							
Log								
25.0								Clear Write
15.0	providentile	And when a for the state of the second states and the second seco	www.www.www.					
5.00	— /							
-5.00	¥		<u> </u> }					
-15.0								Average
-25.0 Holden for all the market and	ALANNI .			wyw.Whitewery	where the start	Man Marine		
-35.0								
-45.0								
								Max Hold
-55.0								
Center 3.62500 GHz					Span 3	7.50 MHz		
Res BW 360 kHz		#VBW 1.1	MHz			ep 1 ms		Min Hold
								Milling
Occupied Bandwidt	h	Total	Power	30.8	dBm			
13	3.499 M	Hz						Detector
								Peak▶
Transmit Freq Error	17.371	kHz % of C	DBW Powe	er 99	.00 %		Auto	Man
x dB Bandwidth	14.61 M	MHz xdB		-26.	00 dB			
MSG				STATUS	3			

Plot 7-7. Occupied Bandwidth Plot (LTE Band 48 - 15.0MHz QPSK - Full RB Configuration)



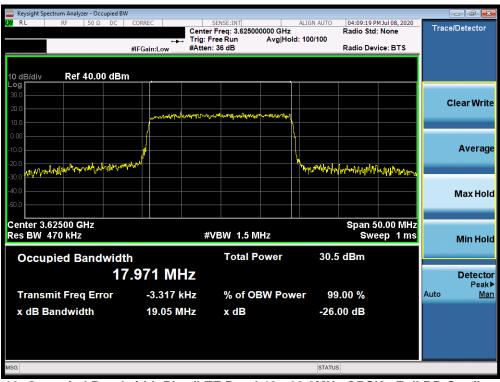
Plot 7-8. Occupied Bandwidth Plot (LTE Band 48 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 16 of 49
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	landset	
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🔤 Keysight Spectrum Analyzer - Occup					
<mark>ιχι</mark> RL RF 50 Ω	DC CORREC	SENSE:INT Center Freg: 3.6250	ALIGN AUTO	04:49:02 PM Jul 08, 2020 Radio Std: None	Trace/Detector
		Trig: Free Run	Avg Hold: 100/100		
	#IFGain:Low	#Atten: 36 dB		Radio Device: BTS	
10 dB/div Ref 35.00	dBm				
25.0					
					Clear Write
15.0	hall and the second sec	harrow prover a state of the second of the s	And Badden Stranger		
5.00					
-5.00	/				
-15.0					Average
-25.0	h h w				
-35.0 Commission and land Min	hdr-1, haven			mound helder	
-45.0					Max Hold
-55.0					Muxitoru
Center 3.62500 GHz				Span 37.50 MHz	
Res BW 360 kHz		#VBW 1.1 N	MHZ	Sweep 1 ms	Min Hold
Occupied Bandw	vidth	Total F	Power 29.	1 dBm	
Occupied Ballow			201		
	13.500 MI	ΗZ			Detector Peak▶
Transmit Freq Erro	r -6.183	KHz % of O	BW Power 99	9.00 %	Auto Man
x dB Bandwidth	14.75 N	lHz xdB	-26	.00 dB	
MSG			STATU	s	

Plot 7-9. Occupied Bandwidth Plot (LTE Band 48 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 48 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	PCTEST [®] Proud to be part of ® element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 17 of 49
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		
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Keysight Spectrum Analyzer - Occupied BW				
LXI RL RF 50 Ω DC CORREC	SENSE:INT Center Freg: 3.62500	ALIGN AUTO	04:10:17 PM Jul 08, 2020 Radio Std: None	Trace/Detector
	Total France Brown	Avg Hold: 100/100	Radio Sta. None	
#IFGain:Low	#Atten: 36 dB		Radio Device: BTS	
10 dB/div Ref 40.00 dBm				
Log				
30.0				Clear Write
20.0	๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	-ALINE NUTERIA		
10.0	and a start of the state of the second st	A second s		
0.00				
-10.0				Average
-20.0		h ttill at a second		
-30.0 Waller and hit fit for any ful marker of		-իսկիս իկ	ᢂᡃᠬᢇᠬ᠇ᢛᡀᡆᡍᡗᡍᠮᢥᡕᠴᡃᡅᡰ᠋ᢛ᠕ᢩᢣᡊᢋᡃᡙ	
-40.0				Max Hold
-50.0				Waxhord
Center 3.62500 GHz			Span 50.00 MHz	
Res BW 470 kHz	#VBW 1.5 M	HZ	Sweep 1 ms	Min Hold
Occupied Bandwidth	Total P	ower 29.3	dBm	
		20.0	dem	
17.900 M	HZ			Detector Peak▶
Transmit Freq Error 6.595	kHz % of OF	3W Power 99	.00 %	Auto Man
x dB Bandwidth 19.23 I	MHz xdB	-26.	00 dB	
MSG		STATUS	3	

Plot 7-11. Occupied Bandwidth Plot (LTE Band 48 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (LTE Band 48 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFF100VM	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 18 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 18 of 49
© 2020 PCTEST			V1.0 12/17/2018



7.3 Spurious and Harmonic Emissions at Antenna Terminal §2.1051 §96.41(e)

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 its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/Mhz.

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 at least 10 * the fundamental frequency (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = Max Hold
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

Test Setup

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



Figure 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 frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. 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.

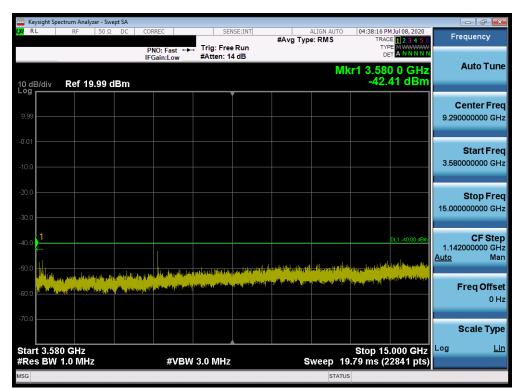
FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 10 of 10
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 19 of 49
© 2020 PCTEST	-	•		V1.0 12/17/2018



LTE Band 48

		trum Analy		pt SA										
lxi r	L	RF	50 Ω	DC (CORREC		SEN	ISE:INT	#Avg Typ	ALIGN AUTO		4 Jul 08, 2020	F	requency
					PNO: Fas		Trig: Free #Atten: 20				TYP			
					IFGain:Lo	w	#Atten. 20	7 d B		M	(r1 3.32			Auto Tune
10 dE Log	3/div	Ref 20).00 d	Bm							-43.	61 dBm		
3														Center Freq
10.0														80000000 GHz
0.00														Start Freq
-10.0													3	0.000000 MHz
-10.0														
-20.0														Stop Freq
													3.53	80000000 GHz
-30.0														
-40.0												DL1 -49 1 dBm		CF Step
-40.0												 • - _	35 <u>Auto</u>	0.000000 MHz Man
-50.0												adaa adagaa	Auto	Wall
	ب العالية الم	فالعرفية وبالله	li-power)	Presel approve		ni penter la nomente de pe			ing hip out in this is national sectors	lers of the second less				Freq Offset
-60.0		معدادين إينان	أغالغاته وبغرقه	lend and a second										0 Hz
-70.0														Scale Type
													1.00	
			7		#	/BIAL	3 0 MHz			Sween_4	Stop 3	.530 GHz 7001 nts)	Log	Lin
	5 674						0.0 10112			STATU		roor ptsj		
	t 30 M s BW 1	Hz I.0 MH:	z		#\	vBW	3.0 MHz				.667 ms (.530 GHz 7001 pts)	Log	<u>Lin</u>

Plot 7-13. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



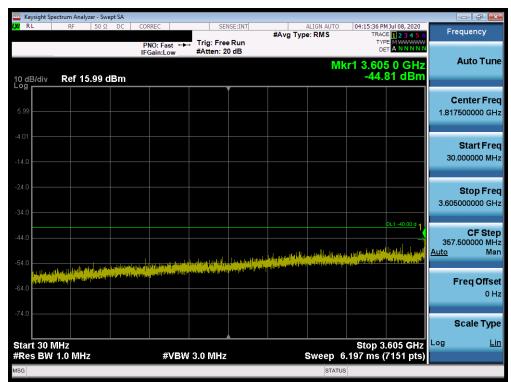
Plot 7-14. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 20 of 49
© 2020 PCTEST	•			V1.0 12/17/2018



Keysight Spectrum Analyzer - Swept SA					- 2 -
LX/ RL RF 50 Ω DC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	04:39:19 PMJul 08, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ↔→ IFGain:Low	Trig: Free Run #Atten: 10 dB		TYPE M WWWW DET A N N N N N	A
10 dB/div Ref 0.00 dBm			Mkr	1 26.540 0 GHz -44.76 dBm	Auto Tune
-10.0					Center Freq 21.00000000 GHz
-20.0					Start Freq 15.000000000 GHz
-40.0 -50.0 <mark>1984 - 189 (1984), 1994 (1984), 1995 (1986),</mark>	planting and the next start of the level	is the complete ways of the state	ر (مراجع محمد بالمراجع من المراجع من المراجع من المراجع المراجع من ال	DL1 -40.00 1 m Legendation (Market) Legendation (Market)	Stop Freq 27.000000000 GHz
 In the left of a particle statement of the left of the state of the left of the statement of the left of the statement of the left of the statement of the left o	and a state of the second s	lands de man al mérine de la décarde de			CF Step 1.200000000 GHz <u>Auto</u> Man
-80.0					Freq Offset 0 Hz
-90.0					Scale Type
Start 15.000 GHz #Res BW 1.0 MHz	#VBW :	3.0 MHz	Sweep 20	Stop 27.000 GHz .80 ms (24001 pts)	Log <u>Lin</u>
MSG			STATUS		

Plot 7-15. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



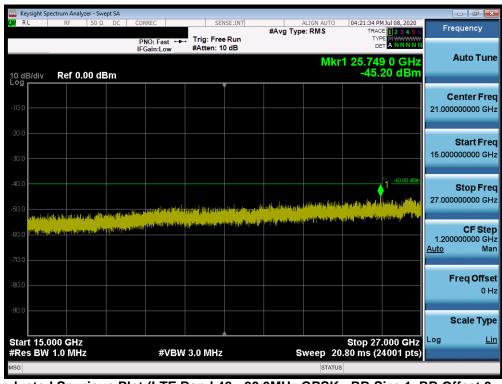
Plot 7-16. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFF100VM	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dege 21 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 21 of 49
© 2020 PCTEST			V1.0 12/17/2018



	pectrum Analyz											- 6	×
l <mark>XI</mark> RL	RF	50 Ω	DC	CORREC		SEI	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Jul 08, 2020 DE <mark>1 2 3 4 5 6</mark>	Frequency	y
				PNO: Fa IFGain:Lo		Trig: Free #Atten: 1		•		TY D	PE MWWWWW ET A NNNNN		
				IF Galli.L	0w	Witten: P	T UD		M	kr1 3 66	2 5 GHz	Auto T	une
10 dB/div	Ref 19	.99 di	Зm							-44.	10 dBm		
												Center I	From
9.99												9.322500000	
-0.01												Start	Fred
-10.0												3.645000000	
-10.0													
-20.0												Stop F	Freq
												15.000000000	
-30.0													
-40.0 1											DL1 -40.00 dBm		Step
-+0.0												1.135500000 Auto	GHz Man
-50.0					الاللية المعاد	l	and the state of the	n an an an bann	day digener	a particular de la comparte	lage (beat) and the part		
	en geben her her her gegen der her her her her her her her her her h	al and a state	ere non er Menskindelige	nor operate Mediation a servi	unit culture	e que en que en construir de la construcción de la construcción de la construcción de la construcción de la co En la construcción de la construcción	and the second	وفالفظ سأطر والأصرية	أمأل الألطر حمدته بأخلام	الأوبالاستويرياء ال	- inclusion of the	Freq Of	ffset
-60.0		i se la cale da la cale La cale da la											0 Hz
-70.0													
												Scale T	Гуре
Start 3.6	15 GH7									Stop 15	.000 GHz	Log	Lin
#Res BW		2		#	VBW	3.0 MHz		s	weep 1	9.68 ms (2	2711 pts)	_	
MSG									STATU	s			

Plot 7-17. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



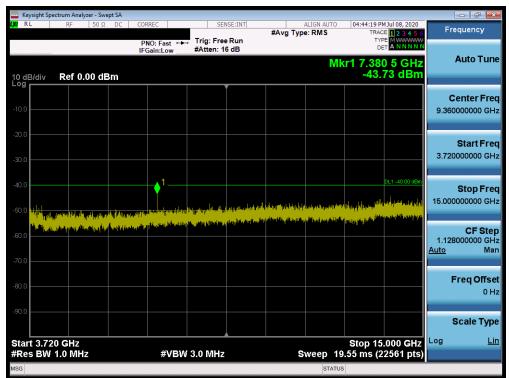
Plot 7-18. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 22 of 49
© 2020 PCTEST			V1.0 12/17/2018



🔤 Keysight Sp	oectrum Analyz	er - Swept	: SA										
LXI RL	RF	50 Ω	DC C	ORREC		SEN	ISE:INT	#Avg Typ	ALIGN AUTO		PM Jul 08, 2020 ACE 1 2 3 4 5 6	Frequ	Jency
				PNO: Fast FGain:Low		ig: Free Atten: 22				T			
10 dB/div Log	Ref 0.0	00 dBr	n						٨	/kr1 3.60 -44	69 0 GHz .23 dBm	Au	ito Tune
-10.0													n ter Freq 0000 GHz
-20.0													t art Freq 0000 MHz
-40.0		. I. anda	s i tiling s Land	ster start line og s	PROFESSION OF THE	a particular	र भारत के बिजाय के ब	a per parta propria de la filia. La compacta de la com	a pina di Superna pina A pina di Superna pina pina	, al traj de de la traj de la traj 1941 : Propositor de la traj de la traj			top Freq 0000 GHz
-60.0 <mark>444.000 -70.0</mark>			ومحيادة فالعرام	h, profile and search and a	isaan oo kata	utt in the state of the state o	-1, 49 I A I I A I						CF Step 0000 MHz Man
-80.0												Fre	e q Offset 0 Hz
-90.0	MHz									Ston	3.670 GHz		ale Type <u>Lin</u>
#Res BW				#VI	BW 3.0	MHz			Sweep	6.309 ms	(7281 pts)		
MSG									STA	TUS			

Plot 7-19. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-20. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 23 of 49
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 23 01 49
© 2020 PCTEST			V1.0 12/17/2018



	ectrum Analyzer - Swept SA									
X/RL	RF 50 Ω DC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	1 Jul 08, 2020 E 1 2 3 4 5 6 E M WWWW	Fr	equency
		PNO: Fast +++ IFGain:Low	#Atten: 10				DE			Auto Tune
10 dB/div Log	Ref 0.00 dBm					Mkr	1 26.541 -45.0	08 dBm		Autorune
									(Center Freq
-10.0									21.00	0000000 GHz
-20.0										Start Freq
-30.0									15.00	0000000 GHz
-40.0								DL1 -40.00 1 n		Stop Freq
-50.0	galantating ang the state of th	الم (مع الم المالية ، مع الم المالية (مع الم	بالبلبان للمحفد والا	l pa light and a light	the Materia Magazi	and the second	and a standard and a standard and a standard a standard a standard a standard a standard a standard a standard A standard a	performante de la constante Constante de la constante de la	27.00	0000000 GHz
a statistication of the second se	fi bayan bi Afgene yangi faya dan bi	والاعتماد والشاريط والمراورة	allated participation	aller filler af	a later la band la band	Antoination	والمتلقل فيكتن المتنابعة والم	المتناقي والتلاك		CF Step
-60.0 17 12 14									1.20 <u>Auto</u>	0000000 GHz Mar
70.0										Freq Offse
-80.0										0 Hz
-90.0										Scale Type
Start 15.0 #Res BW		#VBW	3.0 MHz		s	weep 2(Stop 27. 0.80 ms (24	.000 GHz 4001 pts)	Log	Lin
ISG						STATU	s			

Plot 7-21. Conducted Spurious Plot (LTE Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFF100VM	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 24 of 49
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 24 01 49
© 2020 PCTEST			V1.0 12/17/2018



7.4 Band Edge Emissions at Antenna Terminal §2.1051 §96.41(e)(ii)

Test Overview

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

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 to B MHz (where B is the bandwidth in MHz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B MHz below the lower CBSD-assigned channel edge. At all frequencies greater than B MHz above the upper CBSD assigned channel edge and less than B MHz below the lower CBSD-assigned channel edge, the conducted power of any end user device emission shall not exceed -25 dBm/MHz. The conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

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
- 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.



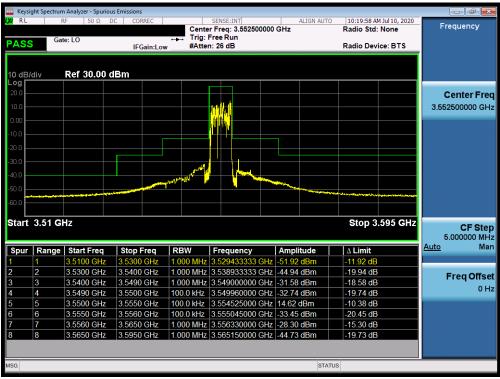
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

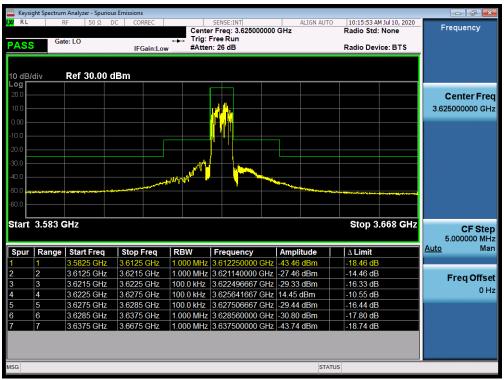
FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 25 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 25 of 49
© 2020 PCTEST		•		V1.0 12/17/2018



LTE Band 48



Plot 7-22. Lower ACP Plot (LTE Band 48 - 5.0MHz QPSK - Full RB Configuration)



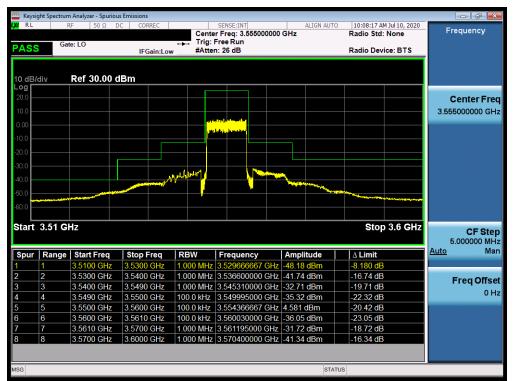
Plot 7-23. Mid ACP Plot (LTE Band 48 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 26 of 49
© 2020 PCTEST	•	•		V1.0 12/17/2018



C RL	2 .	n Analyzer - Spuriou RF 50 Ω [us Emissions DC CORREC		SENSE:INT	ALIGN AUTO	10:26:26 AM Jul 10, 2020	
PASS	S Gat	te: LO	IFGain:Lov	Trig:	er Freq: 3.6975000 Free Run en: 26 dB	000 GHz	Radio Std: None Radio Device: BTS	Frequency
10 dB/	/div	Ref 30.00 c	dBm					
- og 20.0								Center Fre 3.697500000 GH
0.00								
20.0 30.0								
40.0				A Barrad White anger				
50.0	يونيونيونيونيونيونيونيونيونيونيونيونيوني		and the second se					
60.0	3.655 C	GHz					Stop 3.74 GHz	CrSie
50.0 Start		GHZ Start Freq	Stop Freq	RBW	Frequency	Amplitude	Stop 3.74 GHz	CF Ste 5.000000 MH <u>Auto</u> Ma
itart				RBW				5.000000 MH
io.o Start	Range	Start Freq	Stop Freq	RBW	Frequency	Hz -44.31 dBm	∆ Limit	5.00000 MH <u>Auto</u> Ma
so.o Start	Range	Start Freq 3.6550 GHz	Stop Freq 3.6850 GHz	RBW 1.000 MHz 1.000 MHz	Frequency 3.684400000 G	Hz -44.31 dBm Hz -33.50 dBm	Δ Limit -19.31 dB	5.000000 MH Auto Ma
start	Range	Start Freq 3.6550 GHz 3.6850 GHz	Stop Freq 3.6850 GHz 3.6940 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz	Frequency 3.684400000 Gi 3.693910000 Gi	Hz -44.31 dBm Hz -33.50 dBm Hz -31.57 dBm	Δ Limit -19.31 dB -20.50 dB	5.000000 MH Auto Ma
start	Range 1 2 3	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz	RBW 1.000 MHz 1.000 MHz 100.0 KHz 100.0 KHz	Frequency 3.684400000 G 3.693910000 G 3.694990000 G	Hz -44.31 dBm Hz -33.50 dBm Hz -31.57 dBm Hz 14.35 dBm	Δ Limit -19.31 dB -20.50 dB -18.57 dB	5.000000 MH Auto Ma
50.0 Start	Range 1 2 3 4	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz	Frequency 3.684400000 Gi 3.693910000 Gi 3.694900000 Gi 3.69490000 Gi	Hz -44.31 dBm Hz -33.50 dBm Hz -31.57 dBm Hz 14.35 dBm Hz -31.27 dBm	Δ Limit -19.31 dB -20.50 dB -18.57 dB -10.65 dB	5.00000 MH Auto Ma
50.0 Start	Range 1 2 3 4 5	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 1.000 MHz	Frequency 3.684400000 G 3.693910000 G 3.694990000 G 3.698141667 G 3.700006667 G	Hz -44.31 dBm Hz -33.50 dBm Hz -31.57 dBm Hz 14.35 dBm Hz -31.27 dBm Hz -31.32 dBm	Δ Limit -19.31 dB -20.50 dB -18.57 dB -10.65 dB -18.27 dB	5.000000 MH
60.0	Range 1 2 3 4 5 6	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz 3.7010 GHz	RBW 1.000 MHz 1.000 MHz 1000 kHz 100.0 kHz 100.0 kHz 1.000 MHz 1.000 MHz	Frequency 3.684400000 G 3.693910000 G 3.694990000 G 3.698141667 G 3.700006667 G 3.701075000 G	Hz -44.31 dBm Hz -33.50 dBm Hz -31.57 dBm Hz 14.35 dBm Hz -31.27 dBm Hz -31.32 dBm Hz -31.42 dBm	Δ Limit -19.31 dB -20.50 dB -18.57 dB -10.65 dB -18.27 dB -18.32 dB	5.00000 MH Auto Ma
50.0 Start	Range 1 2 3 4 5 6 7	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz	Stop Freq 3.6350 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz 3.7000 GHz 3.7000 GHz	RBW 1.000 MHz 1.000 MHz 1000 kHz 100.0 kHz 100.0 kHz 1.000 MHz 1.000 MHz	Frequency 3.684400000 G 3.693910000 G 3.694990000 G 3.698141667 G 3.70006667 G 3.701075000 G 3.710616667 G	Hz -44.31 dBm Hz -33.50 dBm Hz -31.57 dBm Hz 14.35 dBm Hz -31.27 dBm Hz -31.32 dBm Hz -31.42 dBm	ΔLimit -19.31 dB -20.50 dB -18.57 dB -10.65 dB -18.27 dB -18.27 dB -18.22 dB -19.49 dB	5.00000 MH Auto Ma

Plot 7-24. Upper ACP Plot (LTE Band 48 - 5.0MHz QPSK - Full RB Configuration)



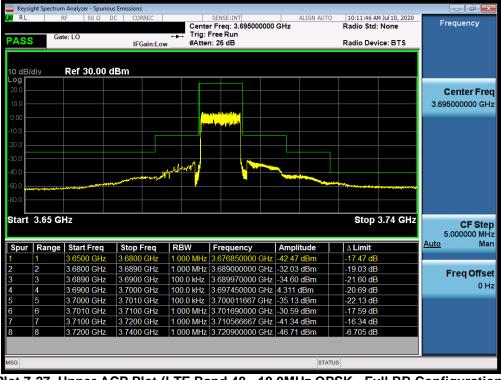
Plot 7-25. Lower ACP Plot (LTE Band 48 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 07 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 27 of 49
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	ight Spectrum		- Colored Barrier 1997													
LXU RL		₹F 50 te:LO	Ω [DC C	ORREC		. Trig:	Free F	q: 3.625 Run	000000	GHz	ALIGN AUTO	Radio Sto		F	requency
PASS				1	FGain:L	DW	#Atte	en: 26	зB				Radio De	vice: BTS		
10 dB/	div	Ref 30	.00 c	dBm												
Log 20.0																Center Fred
10.0																5000000 GHz
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-10.0																
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-30.0					ازاطه ^ر وتهرفون	at an J	wh 1		-	N.U						
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-60.0																
-00.0																
Start	3.58 G	Hz											Stop	3.67 GHz		CF Step 5.000000 MHz
Spur	Range	Start Fr	req	Stop	Freq	R	зw	Fre	quency	1	Ampl	itude	∆ Limit		<u>Auto</u>	Mar
1	1	3.5800 (GHz	3.610	0 GHz	1.0	00 MHz	z 3.60	950000	0 GHz	-39.37	dBm	-14.37 d	В		
2	2	3.6100 (GHz	3.619	0 GHz	1.0	00 MHz	z 3.61	864000	0 GHz	-29.03	dBm	-16.03 d	В		Freq Offse
3	3	3.6190 ()0 GHz		0.0 kHz						-18.29 d			0 Hz
4	4	3.6200 (0 GHz		0.0 kHz						-20.59 d			0 11.
5	5	3.6300 (I0 GHz		0.0 kHz						-19.51 d			
6	6	3.6310 (0 GHz		00 MHz						-15.82 d			
7	7	3.6400 (GHz	3.670	00 GHz	1.0	00 MHz	z 3.64	125000	0 GHz	-37.64	dBm	-12.64 d	В		
ISG			_	_	_	_	_		_	_	_	STATU	s			
_			_		_	_	_			_	_					

Plot 7-26. Mid ACP Plot (LTE Band 48 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-27. Upper ACP Plot (LTE Band 48 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 28 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 28 of 49
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	C-4	₹F 50 Ω te: LO	DC CORREC	Trig:	SENSE:INT r Freq: 3.557500000 Free Run	GHz	Radio Std: None	Frequency
PAS	s		IFGain:Lov	w #Atter	n: 26 dB		Radio Device: BTS	
10 dB	/div	Ref 30.00	dBm					
_ og 20.0								Center Fre
10.0								3.557500000 GH
0.00 -								
10.0								
20.0								
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60.0 E								
60.0 E	3.51 GI						Stop 3.605 GHz	5.000000 MH
60.0 E		Hz	Stop Freq	RBW	Frequency	Amplitude		5.000000 MH
60.0 Start		Hz			Frequency 3.528633333 GHz	Amplitude	Stop 3.605 GHz	CF Ste 5.000000 M⊦ <u>Auto</u> Ma
Spur	Range	Hz Start Freq	3.5300 GHz	1.000 MHz		Amplitude	Stop 3.605 GHz	5.000000 MH <u>Auto</u> Ma
60.0 Start	Range	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz	1.000 MHz 1.000 MHz 1.000 MHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz	Amplitude -43.03 dBm -34.54 dBm -30.08 dBm	Stop 3.605 GHz △ Limit -3.027 dB -9.538 dB -17.08 dB	5.000000 MH <u>Auto</u> Ma Freq Offse
60.0 Start Start	Range 1 2 3 4	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 100.0 kHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz 3.549978333 GHz	Amplitude -43.03 dBm -34.54 dBm -30.08 dBm -36.38 dBm	Stop 3.605 GHz ▲ Limit -3.027 dB -9.538 dB -17.08 dB -23.38 dB	5.000000 MH <u>Auto</u> Ma Freq Offso
50.0 Start	Range 1 2 3 4 5	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5590 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 100.0 KHz 100.0 KHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz 3.549978333 GHz 3.553575000 GHz	Amplitude -43.03 dBm -34.54 dBm -30.08 dBm -36.38 dBm 2.862 dBm	Stop 3.605 GHz Δ Limit -3.027 dB -9.538 dB -17.08 dB -23.38 dB -22.14 dB	5.000000 MH <u>Auto</u> Ma Freq Offse
50.0 Start	Range 1 2 3 4 5 6	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5500 GHz 3.5650 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz 3.5660 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz 3.549978333 GHz 3.553575000 GHz 3.565073333 GHz	Amplitude 43.03 dBm -34.54 dBm -30.08 dBm -36.38 dBm -36.38 dBm -37.00 dBm	Δ Limit -3.027 dB -9.538 dB -17.08 dB -22.14 dB -22.14 dB -24.00 dB	5.000000 MH <u>Auto</u> Ma Freq Offse
60.0 Start Spur 1 2 3 4 5 3 7	Range 1 2 3 4 5 6 7	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz 3.5660 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz 3.5660 GHz 3.5750 GHz	1.000 MHz 1.000 MHz 1.000 MHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz 3.549978333 GHz 3.553575000 GHz 3.565073333 GHz 3.566900000 GHz	Amplitude 43.03 dBm -34.54 dBm -30.08 dBm -36.38 dBm 2.862 dBm -37.00 dBm -30.49 dBm	Δ Limit -3.027 dB -9.538 dB -17.08 dB -23.38 dB -22.14 dB -24.00 dB -17.49 dB	5.000000 MH
50.0 Start	Range 1 2 3 4 5 6	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5500 GHz 3.5650 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz 3.5660 GHz	1.000 MHz 1.000 MHz 1.000 MHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz 3.549978333 GHz 3.553575000 GHz 3.565073333 GHz	Amplitude 43.03 dBm -34.54 dBm -30.08 dBm -36.38 dBm 2.862 dBm -37.00 dBm -30.49 dBm	Δ Limit -3.027 dB -9.538 dB -17.08 dB -22.14 dB -22.14 dB -24.00 dB	5.000000 MH <u>Auto</u> Ma Freq Offso
50.0 Start Spur	Range 1 2 3 4 5 6 7	Hz 3.5100 GHz 3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz 3.5660 GHz	3.5300 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz 3.5650 GHz 3.5660 GHz 3.5750 GHz	1.000 MHz 1.000 MHz 1.000 MHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz 100.0 KHz	3.528633333 GHz 3.539633333 GHz 3.548820000 GHz 3.549978333 GHz 3.553575000 GHz 3.565073333 GHz 3.566900000 GHz	Amplitude 43.03 dBm -34.54 dBm -30.08 dBm -36.38 dBm 2.862 dBm -37.00 dBm -30.49 dBm	Δ Limit -3.027 dB -9.538 dB -17.08 dB -23.38 dB -22.14 dB -24.00 dB -17.49 dB	5.000000 MH <u>Auto</u> Ma Freq Offse

Plot 7-28. Lower ACP Plot (LTE Band 48 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-29. Mid ACP Plot (LTE Band 48 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 29 of 49
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		₹F 50Ω [DC CORREC		SENSE:INT Freq: 3.692500000 Free Run	ALIGN AUTO	05:35:57 PM Jul 08, 2020 Radio Std: None	Frequency
PAS	SGa	te: LO	IFGain:Lov		n: 26 dB		Radio Device: BTS	_
10 dB	/div	Ref 30.00 (dBm					
20.0 -								Center Fre 3.692500000 GH
0.00				and a second				
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40.0 50.0	الوطيري ومعاديات	and the second second						
-50.0								
	3.645 (GHz					Stop 3.74 GHz	CE Ste
								5.000000 MH
	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	∆ Limit	5.000000 MH
Spur 1	Range	Start Freq 3.6450 GHz	3.6750 GHz	1.000 MHz	3.673450000 GHz	-31.48 dBm	Δ Limit -6.478 dB	5.000000 M⊢ <u>Auto</u> Ma
Spur 1 2	Range	Start Freq 3.6450 GHz 3.6750 GHz	3.6750 GHz 3.6840 GHz	1.000 MHz 1.000 MHz	3.673450000 GHz 3.683445000 GHz	-31.48 dBm -27.29 dBm	Δ Limit -6.478 dB -14.29 dB	5.000000 MH <u>Auto</u> Ma
Spur 1 2 3	Range 1 2 3	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz	3.6750 GHz 3.6840 GHz 3.6850 GHz	1.000 MHz 1.000 MHz 100.0 kHz	3.673450000 GHz 3.683445000 GHz 3.684990000 GHz	-31.48 dBm -27.29 dBm -34.20 dBm	Δ Limit -6.478 dB -14.29 dB -21.20 dB	5.000000 MH Auto Ma
Spur 1 2 3	Range 1 2 3 4	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz	3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz	1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz	3.673450000 GHz 3.683445000 GHz 3.684990000 GHz 3.689350000 GHz	-31.48 dBm -27.29 dBm -34.20 dBm 2.956 dBm	Δ Limit -6.478 dB -14.29 dB -21.20 dB -22.04 dB	5.000000 MH Auto Ma
Spur 1 2 3 4	Range 1 2 3 4 5	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz	3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz	1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz	3.673450000 GHz 3.683445000 GHz 3.684990000 GHz 3.689350000 GHz 3.700000000 GHz	-31.48 dBm -27.29 dBm -34.20 dBm 2.956 dBm -33.95 dBm	Δ Limit -6.478 dB -14.29 dB -21.20 dB -22.04 dB -20.95 dB	5.000000 M⊢ Auto Ma
Spur 1 2 3 4 5	Range 1 2 3 4	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz	3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz	1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz	3.673450000 GHz 3.683445000 GHz 3.684990000 GHz 3.689350000 GHz 3.700000000 GHz 3.702230000 GHz	-31.48 dBm -27.29 dBm -34.20 dBm 2.956 dBm -33.95 dBm -27.24 dBm	Δ Limit -6.478 dB -14.29 dB -21.20 dB -22.04 dB -20.95 dB -14.24 dB	5.000000 M⊢ Auto Ma
Start Spur 1 2 3 4 5 6 7 8	Range 1 2 3 4 5 6 7	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz	3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz 3.7200 GHz	1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 1.000 MHz 1.000 MHz 1.000 MHz	3.673450000 GHz 3.683445000 GHz 3.684990000 GHz 3.689350000 GHz 3.700000000 GHz 3.702230000 GHz 3.711850000 GHz	-31.48 dBm -27.29 dBm -34.20 dBm 2.956 dBm -33.95 dBm -27.24 dBm -29.10 dBm	Δ Limit -6.478 dB -14.29 dB -21.20 dB -22.04 dB -20.95 dB -14.24 dB -4.100 dB	5.000000 M⊢ Auto Ma
Spur 1 2 3 4 5 5 7	Range 1 2 3 4 5 6	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz	3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz	1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 1.000 MHz 1.000 MHz 1.000 MHz	3.673450000 GHz 3.683445000 GHz 3.684990000 GHz 3.689350000 GHz 3.700000000 GHz 3.702230000 GHz	-31.48 dBm -27.29 dBm -34.20 dBm 2.956 dBm -33.95 dBm -27.24 dBm -29.10 dBm	Δ Limit -6.478 dB -14.29 dB -21.20 dB -22.04 dB -20.95 dB -14.24 dB	5.000000 MH

Plot 7-30. Upper ACP Plot (LTE Band 48 - 15.0MHz QPSK - Full RB Configuration)



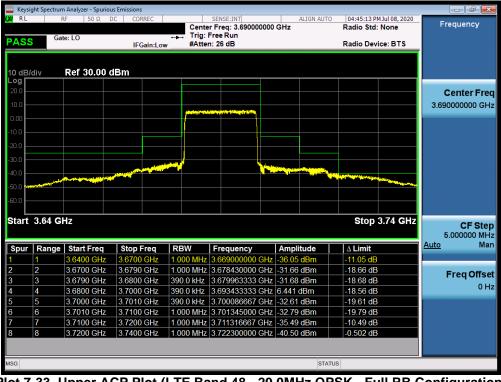
Plot 7-31. Lower ACP Plot (LTE Band 48 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 40	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 30 of 49	
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PASS	Gat	e: LO			IFGai	n:Low	•••	Trig: #Atter	Free	Run	00000	JGHZ			Radio Sto		Ī	
10 dB/ Log 20.0	/div	Ref 3	0.00	dBm						Ver dayda sin b								Center Fred 25000000 GHz
0.00																		
-30.0		a a the second		n fertilitetetetet									the first and the second	10-10-0	an a	Verfaða, seguli virstafaria í star		
Start	3.575 0	Hz													Stop 3	3.675 GHz		CF Stej 5.000000 MH
Spur	Range	Start F	req	St	op Fre	pe	RBV	V	Fre	quency		Amp	litude		∆ Limit		Auto	Ma
1	1	3.5750	GHz	3.6	050 G	Hz	1.000) MHz	3.60	390000	0 GHz	-32.50) dBm		-7.502 dE	3		
2	2	3.6050	GHz	3.6	140 G	Hz	1.000) MHz	3.61	400000	0 GHz	29.15	5 dBm		-16.15 dE	3		Freq Offse
3	3	3.6140	GHz	3.6	150 G	Hz	390.0) kHz	3.61	493666	7 GHz	-29.47	7 dBm		-16.47 dE	3		
4	4	3.6150	GHz	3.6	350 G	Hz	390.0) kHz	3.62	863333	3 GHz	6.867	dBm		-18.13 dE	3		0 H
5	5	3.6350	GHz	3.6	360 G	Hz	390.0) kHz	3.63	506666	7 GHz	-32.53	3 dBm		-19.53 dE	3		
6	6	3.6360	GHz	3.6	450 G	Hz	1.000) MHz	3.63	699000	0 GHz	-33.31	1 dBm		-20.31 dE	3		
7	7	3.6450	GHz	3.6	750 G	Hz	1.000) MHz	3.64	670000	0 GHz	-36.35	5 dBm		-11.35 dE	3		
ISG													STA	TUS				

Plot 7-32. Mid ACP Plot (LTE Band 48 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-33. Upper ACP Plot (LTE Band 48 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFF100VM	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Bara 21 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 31 of 49
© 2020 PCTEST			V1.0 12/17/2018



7.5 Radiated Power (EIRP) §96.41(b)

Test Overview

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 above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 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.
- 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".
- 8. The integration bandwidth was set equal to 10MHz.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 40	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 32 of 49	
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Test Setup

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

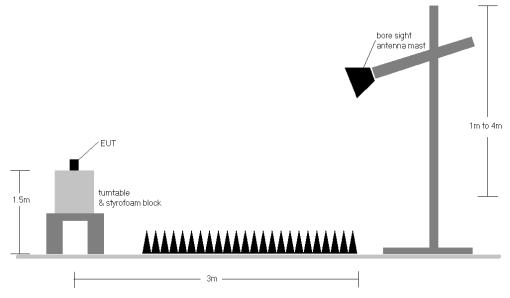


Figure 7-4. Radiated Test Setup >1GHz

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.
- 3) The worst case EIRP shown in this section is found with LTE operating only using 1RB. As such, the EIRP/10MHz and full channel EIRP values will be identical since 1RB is fully contained within all available channel bandwidths for LTE Band 48 (i.e. 5, 10, 15, 20MHz).

FCC ID: ZNFF100VM	Proud to be part of relement	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 40		
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 33 of 49		
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Bandwidth	Modulation	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
		3560.0	Н	110	221	7.16	1 / 99	12.17	19.33	0.086	23.00	-3.67
Ηz	QPSK	3625.0	Н	113	222	6.87	1 / 50	12.88	19.75	0.095	23.00	-3.25
20 MHz		3690.0	Н	106	212	6.30	1/0	11.71	18.01	0.063	23.00	-4.99
20	16-QAM	3625.0	Н	113	222	6.87	1 / 50	11.75	18.62	0.073	23.00	-4.38
	64-QAM	3625.0	Н	113	222	6.87	1 / 50	9.42	16.29	0.043	23.00	-6.71
		3557.5	Н	110	221	7.17	1 / 37	12.01	19.18	0.083	23.00	-3.82
15 MHz	QPSK	3625.0	Н	113	222	6.87	1 / 37	12.72	19.60	0.091	23.00	-3.40
M		3692.5	Н	106	212	6.26	1/0	11.82	18.09	0.064	23.00	-4.91
15	16-QAM	3625.0	Н	113	222	6.87	1 / 37	12.01	18.88	0.077	23.00	-4.12
	64-QAM	3625.0	Н	113	222	6.87	1 / 37	10.76	17.64	0.058	23.00	-5.36
		3555.0	Η	110	221	7.18	1 / 49	11.35	18.53	0.071	23.00	-4.47
10 MHz	QPSK	3625.0	Н	113	222	6.87	1 / 49	12.85	19.73	0.094	23.00	-3.27
Σ		3695.0	Н	106	212	6.23	1 / 49	11.96	18.20	0.066	23.00	-4.80
10	16-QAM	3625.0	Н	113	222	6.87	1 / 49	11.43	18.30	0.068	23.00	-4.70
	64-QAM	3625.0	Н	113	222	6.87	1 / 49	10.47	17.35	0.054	23.00	-5.65
		3552.5	Н	110	221	7.19	1 / 24	12.01	19.20	0.083	23.00	-3.80
부	QPSK	3625.0	Η	113	222	6.87	1 / 12	12.72	19.60	0.091	23.00	-3.40
5 MHz		3697.5	Н	106	212	6.20	1 / 12	11.81	18.02	0.063	23.00	-4.98
5	16-QAM	3625.0	H	113	222	6.87	1 / 12	11.38	18.25	0.067	23.00	-4.75
	64-QAM	3625.0	Н	113	222	6.87	1 / 12	10.16	17.04	0.051	23.00	-5.96
	QPSK	3625.0	V	318	285	6.99	1 / 50	11.43	18.42	0.070	23.00	-4.58
	QPSK	3625.0	H-Swivel	113	222	6.87	1 / 50	12.85	19.72	0.094	23.00	-3.28
	QPSK (WCP)	3625.0	Н	109	217	6.87	1 / 50	10.44	17.31	0.054	23.00	-5.69

Table 7-3. EIRP Data (Band 48)

FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 24 of 40	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 34 of 49	
© 2020 PCTEST			V1.0 12/17/2018	



7.6 Radiated Spurious Emissions Measurements §2.1053 §96.41(e)

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 vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

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

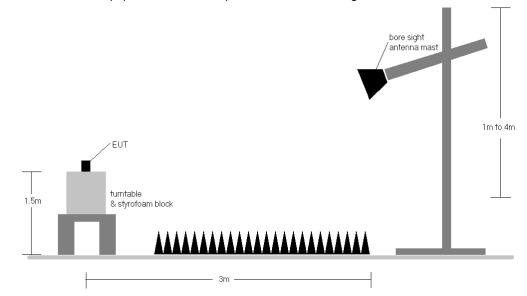
Test Settings

- 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 $\geq 2 \times \text{span} / \text{RBW}$
- 5. Detector = RMS
- Trace mode = Max Hold (In cases where the level is within 2dB of the limit, the final measurement is taken using triggering/gating and trace averaging.)
- 7. The trace was allowed to stabilize

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 35 of 49
© 2020 PCTEST	•		V1.0 12/17/2018



Test Setup



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

Figure 7-5. Test Instrument & Measurement Setup

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.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- Per KDB 971168, Field Strength Level (dBµV/m) is converted to EIRP Spurious Emission Level (dBm) using the formula in Section 5.8.4 (d):

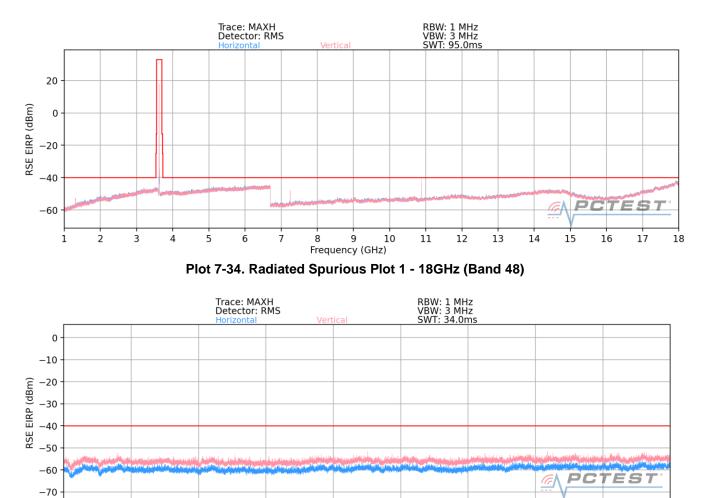
EIRP (dBm) = E (dB μ V/m) + 20 log D - 104.8; where D is the measurement distance in meters

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 36 of 49	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		
© 2020 PCTEST			V1.0 12/17/2018	



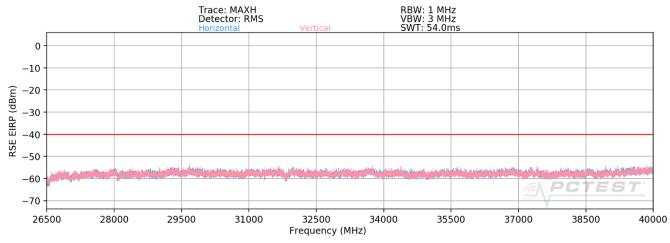
LTE Band 48

Frequency (MHz) Plot 7-35. Radiated Spurious Plot 18 - 26.5GHz (Band 48)



FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 27 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 37 of 49
© 2020 PCTEST	•	•		V1.0 12/17/2018







OPERATING FREQUENCY:	356	0.00	MHz
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	20.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-40	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]
7120.00	V	392	329	-67.01	11.74	-55.28	-15.3
10680.00	V	220	283	-53.04	12.61	-40.43	-0.4
14240.00	V	212	33	-58.85	11.40	-47.45	-7.5
17800.00	V	-	-	-58.44	10.04	-48.40	-8.4

Table 7-4. Radiated Spurious Data (Band 48 - Low Channel)

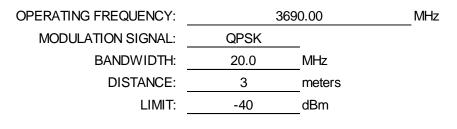
FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:	Dage 29 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 38 of 49
© 2020 PCTEST			V1.0 12/17/2018



OPERATING FREQUENCY:	3625.00		
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	20.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-40	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]
7250.00	V	396	333	-61.49	11.35	-50.14	-10.1
10875.00	V	191	281	-53.71	12.77	-40.94	-0.9
14500.00	V	195	28	-61.86	11.64	-50.22	-10.2

Table 7-5. Radiated Spurious Data (Band 48 – Mid Channel)



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]
7380.00	V	226	352	-62.13	10.98	-51.15	-11.1
11070.00	V	286	275	-54.19	12.78	-41.41	-1.4
14760.00	V	188	28	-63.94	12.07	-51.87	-11.9

Table 7-6. Radiated Spurious Data (Band 48 – High Channel)

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 20 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 39 of 49
© 2020 PCTEST	•	•		V1.0 12/17/2018



3560.00		
QPSK	_	
20.0	MHz	
3	meters	
-40	dBm	
	QPSK 20.0 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]
7120.00	V	335	299	-66.98	11.74	-55.25	-15.2
10680.00	V	236	59	-56.59	12.61	-43.98	-4.0
14240.00	V	160	335	-59.37	11.40	-47.97	-8.0
17800.00	V	-	-	-58.49	10.04	-48.45	-8.5

Table 7-7. Radiated Spurious Data with WCP (Band 48 – Low Channel)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 40 of 49
© 2020 PCTEST				V1.0 12/17/2018



7.7 Frequency Stability / Temperature Variation §2.1055

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 96, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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

Test Setup

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

Test Notes

None

FCC ID: ZNFF100VM	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager		
Test Report S/N: Test Dates:		EUT Type:	Dage 41 of 40		
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 41 of 49		
© 2020 PCTEST V1.0 12/17/2018					



LTE Band 48 Frequency Stability Measurements

OPERATING FREQUENCY:	3,625,000,000	Hz
CHANNEL:	55990	-
REFERENCE VOLTAGE:	4.41	VDC

VOLTAGE (%)	POWER (VDC)	ТЕМР (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.41	- 30	3,625,000,121	121	0.0000033
100 %		- 20	3,625,000,277	277	0.0000076
100 %		- 10	3,625,000,056	56	0.0000015
100 %		0	3,625,000,063	63	0.0000017
100 %		+ 10	3,624,999,724	-276	-0.0000076
100 %		+ 20	3,625,000,180	180	0.0000050
100 %		+ 30	3,625,000,145	145	0.0000040
100 %		+ 40	3,624,999,990	-10	-0.0000003
100 %		+ 50	3,625,000,123	123	0.0000034
BATT. ENDPOINT	3.51	+ 20	3,624,999,657	-343	-0.0000095

 Table 7-8. Frequency Stability Data (LTE Band 48)

Note:

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

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 42 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 42 of 49
© 2020 PCTEST V1.0 12/17/2018				





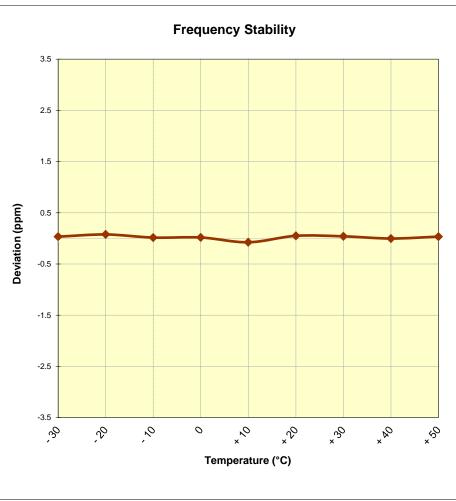


Figure 7-6. Frequency Stability Graph (LTE Band 48)

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 42 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 43 of 49
© 2020 PCTEST			V1.0 12/17/2018



7.8 End User Device Additional Requirement (CBSD Protocol) §96.47

Test Overview and Limit

End user device additional requirements (CBSD Protocol) are tested per the test procedures listed below. During testing, the EUT is connected to a certified CBSD (Ruckus FCC ID: S9GQ910US00) as a companion device to show compliance with Part 96.47.

End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.

Test Procedure Used

KDB 940660 D01 v02, WINNF-TS-0122 V1.0.0.

Test Setup/Method

The EUT was connected via an RF cable to a certified CBSD and spectrum analyzer. The following procedure is performed by applying WINNF-TS-0122 CBRS CBSD Test Specification.

- 1. Run#1:
 - a. Setup WINNF.PT.C.HBT.1 with 3615MHz 3635MHz.
 - b. Enable AP service from Ruckus Cloud management.
 - c. Check EUT Tx frequency.
 - d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.
- 2. Run#2:
 - a. Setup WINNF.PT.C.HBT.1 with 3660MHz 3680MHz.
 - b. Enable AP service from Ruckus Cloud management.
 - c. Check EUT Tx frequency.
 - d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.

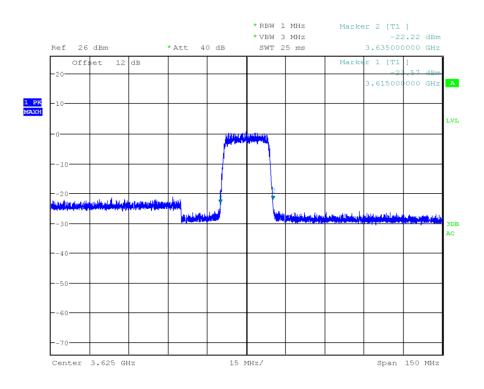
Test Notes

The EUT is an End User Device.

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 11 of 10
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 44 of 49
© 2020 PCTEST	•			V1.0 12/17/2018



Run#1:

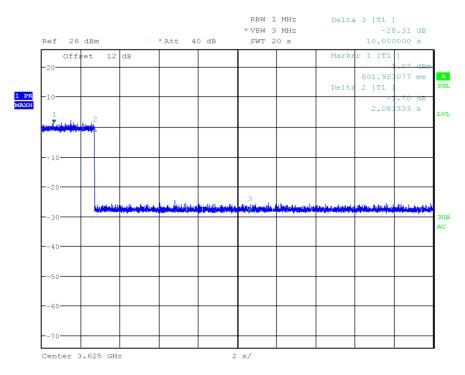


Date: 10.AUG.2020 17:18:00

Plot 7-37. Run#1 End User Device Frequency of Operations

FCC ID: ZNFF100VM	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 45 of 49
© 2020 PCTEST				V1.0 12/17/2018





Date: 10.AUG.2020 17:20:13

Plot 7-38. Run#1 End User Device Discontinues Operations within 10s

Note:

Marker 1: CBSD sends instructions to discontinue LTE operations.

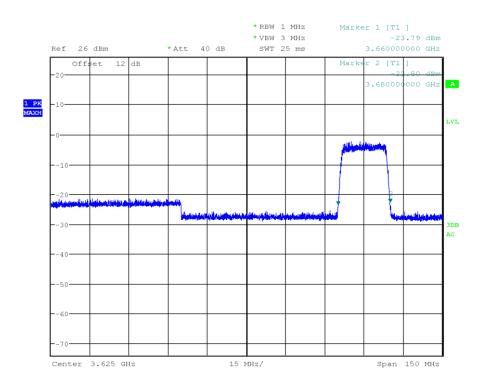
Marker 2: EUT discontinues operation.

Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

FCC ID: ZNFF100VM		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 46 of 49
© 2020 PCTEST V1.0 12/17/2018				



Run#2:

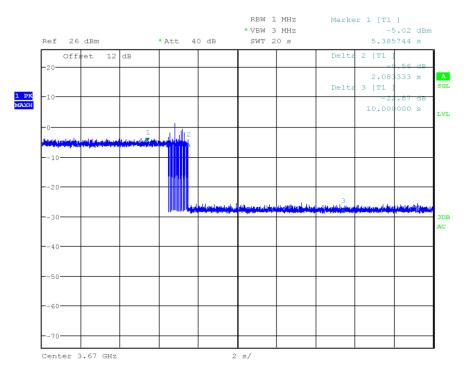


Date: 10.AUG.2020 17:26:38

Plot 7-39. Run#2 End User Device Frequency of Operations

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 47 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset		Page 47 of 49
© 2020 PCTEST	•			V1.0 12/17/2018





Date: 10.AUG.2020 17:31:28

Plot 7-40. Run#2 End User Device Discontinues Operations within 10s

Note:

Marker 1: CBSD sends instructions to discontinue LTE operations.

Marker 2: EUT discontinues operation.

Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

FCC ID: ZNFF100VM	PCTEST [®] Proud to be part of [®] element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 48 of 40	
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 48 of 49	
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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: ZNFF100VM** complies with all of the End User Device requirements of Part 96 of the FCC Rules for LTE operation only.

FCC ID: ZNFF100VM	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 40 of 40
1M2006150096-05.ZNF	06/26/2020-08/18/2020	Portable Handset	Page 49 of 49
© 2020 PCTEST V1.0 12/17/2018			