

PCTEST

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MEASUREMENT REPORT

FCC Part 90

Applicant Name:

LG Electronics USA, Inc. 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States

Date of Testing: 01/12/2020 - 02/14/2020 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M2001200008-10.ZNF

FCC ID:

ZNFK300AM

APPLICANT:

LG Electronics USA, Inc.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s): Certification LM-K300AM LM-K300CMR, LMK300AM, LMK300CMR, K300AM, K300CMR Portable Handset PCS Licensed Transmitter Held to Ear (PCE) §2.1049, §90(R) 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.

Randy Ortanez President



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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Measurement	Max. Power [W]	Max. Power [dBm]	Emission Designator
	QPSK	793.0	ERP	0.098	19.91	9M03G7D	
LTE Bond 14	10 MHz	16QAM	793.0	ERP	0.078	18.92	9M02W7D
LTE Band 14		QPSK	790.5 - 795.5	ERP	0.096	19.84	4M53G7D
	5 MHz	16QAM	790.5 - 795.5	ERP	0.084	19.24	4M53W7D

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFK300AM**. 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 90(R).

Test Device Serial No.: 01396, 01305, 01388

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11 b/g/n, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

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

2.4 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the 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 §2.1053, §90(R)

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-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].

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-E-2016.

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 474788 D01.

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx1	Licensed Transmitter Cable Set	6/4/2019	Annual	6/4/2020	LTx1
Agilent	E5515C	Wireless Communications Test Set		N/A		GB45360985
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	5/10/2019	Annual	5/10/2020	441112
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Keysight Technologies	N9020A	MXA Signal Analyzer	4/29/2019	Annual	4/29/2020	MY54500644
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		100976
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/8/2019	Annual	7/8/2020	102133
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

Notes:

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

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6.0 SAMPLE CALCULATIONS

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).

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7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics USA, Inc.
FCC ID:	ZNFK300AM
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	LTE
Band:	Band 14

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(R).543(a)	Conducted Band Edge / Spurious Emissions	On all frequencies between 769- 775 MHz and 799-805 MHz, attenuation by a factor not less than 65 + 10 log(P) dB in a 6.25 kHz band segment, for mobile and portable stations. On any frequency between 775- 788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least 43 + 10 log(P) dB.(Band 14)	CONDUCTED	PASS	Sections 7.3, 7.4
2.1055 90.213	Frequency Stability	< 2.5 ppm		PASS	Section 7.7
90.542(a)(7)	Effective Radiated Power (Band 14)	< 3 Watts max. ERP		PASS	Section 7.5
2.1053 90(R).543(e)	Radiated Spurious Emissions	 > 43 + 10 log₁₀ (P[Watts]) for all out-of-band emissions except > 50 + 10 log₁₀ (P[Watts]) at Band Edge and for all out-of- band emissions within 37.5kHz of Block Edge 	RADIATED	PASS	Section 7.6

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 LTE B14 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.5.3.

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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.

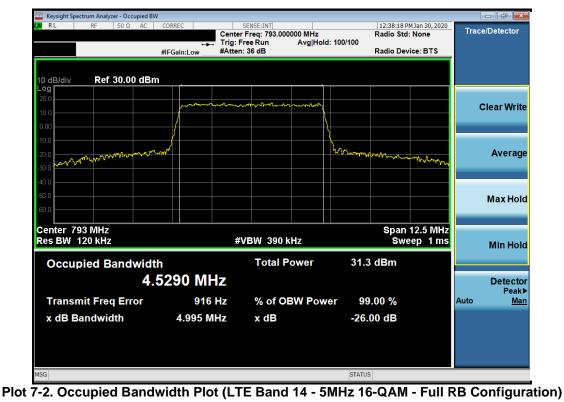
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LTE Band 14



Plot 7-1. Occupied Bandwidth Plot (LTE Band 14 - 5MHz QPSK - Full RB Configuration)



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Keysight Spectrum Analyzer - Occupied B\	N				
LXIRL RF 50Ω AC	CORREC	SENSE:INT er Freg: 793.000000 MHz		9:23 PM Jan 30, 2020 o Std: None	Trace/Detector
	🛶 Trig: I	Free Run Avg Hol	d:>100/100		
	#IFGain:Low #Atter	n: 36 dB	Radi	o Device: BTS	
10 dB/div Ref 30.00 dBr	n				
20.0					
10.0	monum	and from the second second			Clear Write
0.00					
			N.		
-10.0			h how the second and		A
-20.0			and the second s	menter and	Average
-30.0					
-40.0					
-50.0					Max Hold
-60.0					
Center 793 MHz				Onon 25 Mills	
Res BW 240 kHz	#	VBW 750 kHz		Span 25 MHz Sweep 1 ms	
	"			encep into	Min Hold
Occupied Bandwidt	th	Total Power	32.4 dBr	n	
	0252 MHz				Detector
J					Peak►
Transmit Freq Error	11.644 kHz	% of OBW Pow	ver 99.00 9	6	Auto <u>Man</u>
x dB Bandwidth	9.945 MHz	x dB	-26.00 d	в	
	0.040 11112	A dB	20.00 4		
MSG			STATUS		

Plot 7-3. Occupied Bandwidth Plot (LTE Band 14 - 10MHz QPSK - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 16-QAM - Full RB Configuration)

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7.3 Spurious and Harmonic Emissions at Antenna Terminal §2.1051 §90(R).543(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 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 $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
- 2. RBW ≥ 100kHz
- 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.

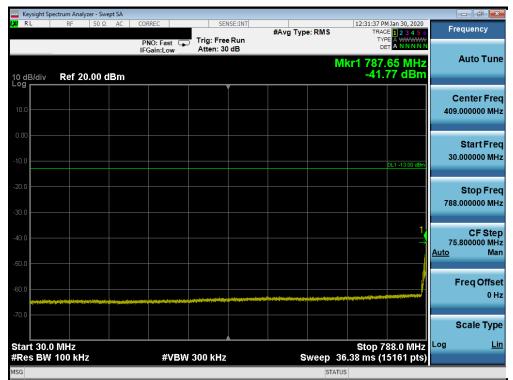


Figure 7-2. Test Instrument & Measurement Setup

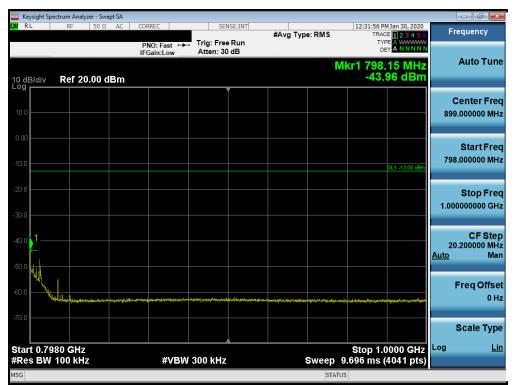
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LTE Band 14



Plot 7-5. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-6. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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	ectrum Analyzer -	Swept SA									r x
LXI RL	RF 50	Ω AC	CORREC	Trig: Free		#Avg Type:	RMS	TRAC	1 Jan 30, 2020 E 1 2 3 4 5 6 E A WWWW	Frequ	ency
10 dB/div Log	Ref 0.00	dBm	IFGain:Low	#Atten: 3	2 dB		Mk	r1 9.974	4 5 GHz 58 dBm	Au	to Tune
-10.0									DL1 -13.00 dBm	Cent 5.500000	ter Freq 000 GHz
-20.0										Sta 1.000000	art Freq 000 GHz
-40.0									1	Ste 10.000000	op Freq 000 GHz
-60.0											CF Step 000 MHz Man
-70.0											q Offset
-80.0											0 Hz
Start 1.00 #Res BW			#VBM	/ 3.0 MHz		Sv	/eep 15	Stop 10 .60 ms (1	.000 GHz 8001 pts)	Sca Log	le Type <u>Lin</u>
MSG							STATUS	· · · ·			

Plot 7-7. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §90(R).543(e)

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.

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.

For LTE Band 14 operation under Part 90.543, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

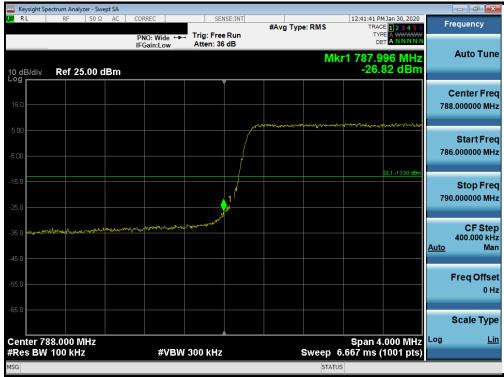
Additionally, for LTE Band 14 operation, on all frequencies between 769-775 MHz and 799-805 MHz, the power of any emission shall be attenuated by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

FCC ID: ZNFK300AM	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 17 of 20
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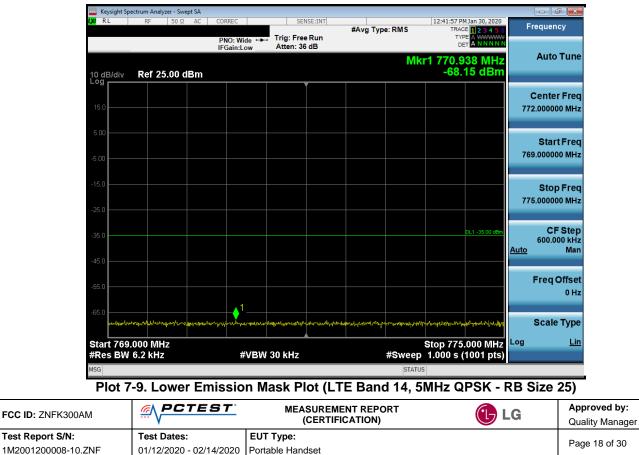


LTE Band 14

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Plot 7-8. Lower Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

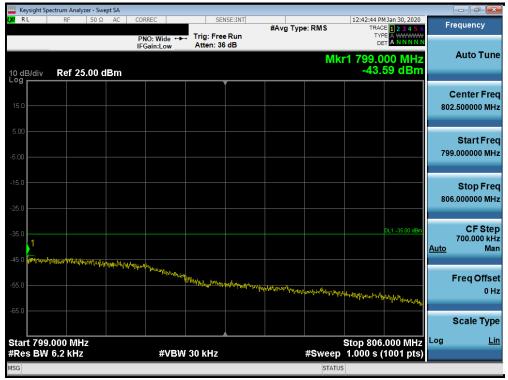


V 9.0 02/01/2019



Keysight Spectrum Analyzer - Swept SA				
XIRL RF 50Ω AC	CORREC SEM PNO: Wide ↔ Trig: Free IFGain: Jow Atten: 36	#Avg Type: RMS Run dB	12:42:26 PM Jan 30, 2020 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00 dBm	I Gameow	N	/kr1 798.012 MHz -26.88 dBm	Auto Tune
15.0	not - also for Min-reaction of			Center Fred 798.000000 MHz
5.00 5.00				Start Fred 796.000000 MH:
-15.0		1	DL1 -13.00 dBm	Stop Free 800.000000 MH;
35.0		an and a second a second a second	withunantaura	CF Stej 400.000 kH <u>Auto</u> Mar
55.0				Freq Offse 0 H
.65.0				Scale Type
Center 798.000 MHz #Res BW 100 kHz	#VBW 300 kHz		Span 4.000 MHz 6.667 ms (1001 pts)	Log <u>Lir</u>





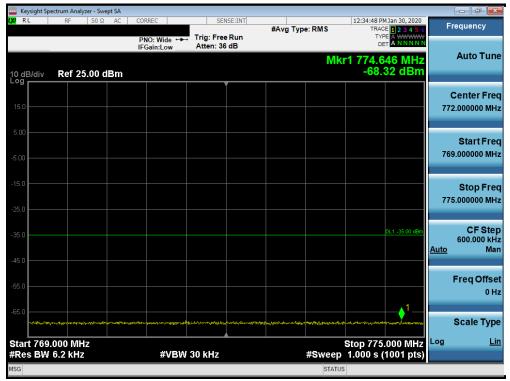
Plot 7-11. Upper Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

FCC ID: ZNFK300AM	<u><i>CPCTEST</i></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 20
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🔤 Keysight Spectrum Analyzer - Swept SA 👘					
LXI RL RF 50Ω AC	CORREC PNO: Wide ↔→→	SENSE:INT Trig: Free Run Atten: 36 dB	#Avg Type: RMS	12:34:04 PM Jan 30, 2020 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00 dBm	I Gam.Low		Mk	r1 787.968 MHz -33.59 dBm	Auto Tune
15.0					Center Freq 788.000000 MHz
-5.00			n an		Start Freq 784.000000 MHz
-15.0				DL1 -13.00 dBm	Stop Freq 792.000000 MHz
-35.0	adaga galan daga daga daga daga daga daga daga da	-regendeddoraenaet			CFStep 800.000 kHz <u>Auto</u> Mar
-55.0					Freq Offse 0 Hz
-65.0					Scale Type
Center 788.000 MHz #Res BW 100 kHz MSG	#VBW	300 kHz	Sweep	Span 8.000 MHz 13.33 ms (1001 pts)	Log <u>Lin</u>





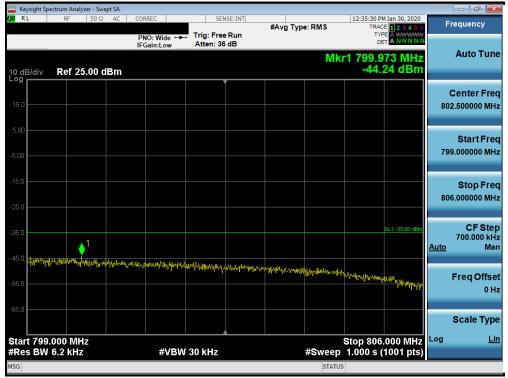
Plot 7-13. Lower Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: ZNFK300AM	<u><u><u></u><u>PCTEST</u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 20
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	ectrum Analyzer	- Swept SA									
LXU RL	RF 5	iOΩ AC	CORREC PNO: Wide ↔ IFGain:Low			#Avg Typ	e: RMS	TRAC	M Feb 12, 2020 E 1 2 3 4 5 6 E A WWWWW A N N N N N	F	requency
10 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 00	ab		Mk	r1 798.0 -31.	32 MHz 77 dBm		Auto Tune
15.0											Center Freq 8.000000 MHz
-5.00	pa ⁿ	And the state of t	nfutantaga matuugi yuushirutau.	strutury						794	Start Freq 4.000000 MHz
-15.0					1				DL1 -13.00 dBm	80:	Stop Freq 2.000000 MHz
-35.0					ייא ^{ויאני} ולאיי	han an a	and the second	an Mangal War	ᡰ/ ^{ϼͻ} ϻͶϧϼϷͶϲͷϧϼϘͷ	<u>Auto</u>	CF Step 800.000 kHz Man
-45.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 79 #Res BW		Z	#VBV	V 300 kHz			Sweep 1	Span 8 3.33 ms (.000 MHz 1001 pts)	Log	<u>Lin</u>
MSG							STATUS	5			





Plot 7-15. Upper Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: ZNFK300AM	<u><u><u></u><u>PCTEST</u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 20
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7.5 Radiated Power (ERP) §90.542(a)(7)

Test Overview

Effective Radiated Power (ERP) 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. 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

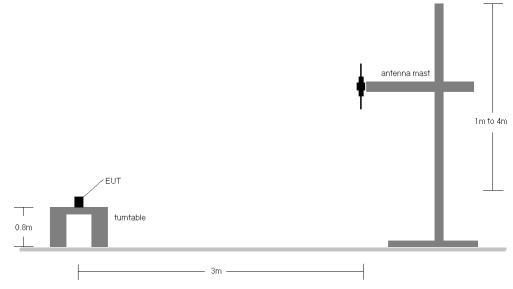
- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW \geq 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points $\geq 2 \times \text{span} / \text{RBW}$
- 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

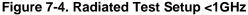
FCC ID: ZNFK300AM	<u><u><u></u><u>PCTEST</u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 20
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Test Setup

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.

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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5	QPSK	Н	241	262	1/0	15.98	6.00	19.83	0.096	34.77	-14.94	21.98	0.158	36.99	-15.01
5	QPSK	Н	241	262	1 / 12	15.89	6.10	19.84	0.096	34.77	-14.93	21.99	0.158	36.99	-15.00
5	QPSK	н	241	262	1 / 24	15.68	6.20	19.73	0.094	34.77	-15.04	21.88	0.154	36.99	-15.11
5	16-QAM	н	241	262	1 / 12	15.29	6.10	19.24	0.084	34.77	-15.53	21.39	0.138	36.99	-15.60
10	QPSK	н	241	262	1/0	15.96	6.10	19.91	0.098	34.77	-14.86	22.06	0.161	36.99	-14.93
10	16-QAM	н	241	262	1/0	14.97	6.10	18.92	0.078	34.77	-15.85	21.07	0.128	36.99	-15.92
10	QPSK	V	143	17	1/0	15.62	5.90	19.37	0.086	34.77	-15.40	21.52	0.142	36.99	-15.47
	Bandwidth [MHz] 5 5 5 5 10 10	Bandwidth [MHz] Mod. 5 QPSK 5 QPSK 5 QPSK 5 QPSK 10 QPSK 10 QPSK 10 QPSK	Bandwidth [MHz]Mod. [I/V]5QPSKH5QPSKH5QPSKH5QPSKH10QPSKH10QPSKH1016-QAMH	Bandwidth [MH2]Mod.Pol. [HV9]Height [cm]5QPSKH2415QPSKH2415QPSKH241516-QAMH24110QPSKH24110I6-QAMH241	Bandwidth [MH2]Mod.Pol. [HY)Height [cm]Azimuth (degree)5QPSKH2412625QPSKH2412625QPSKH241262516-QAMH24126210QPSKH2412621016-QAMH241262	Bandwidth [MH2] Mod. Pol. [HV7] Height [cm] Azimuth (degree) RB Size/Offset 5 QPSK H 241 262 1/0 5 QPSK H 241 262 1/12 5 QPSK H 241 262 1/12 5 QPSK H 241 262 1/12 5 16-QAM H 241 262 1/12 10 QPSK H 241 262 1/0 10 I6-QAM H 241 262 1/0 10 I6-QAM H 241 262 1/0	Bandwidth [MH2] Mod. Pol. [H/V] Height [cm] Azimuth [degree] RB Size/Offset Level [dBm] 5 QPSK H 241 262 1/0 15.98 5 QPSK H 241 262 1/12 15.89 5 QPSK H 241 262 1/24 15.69 5 QPSK H 241 262 1/24 15.69 5 QPSK H 241 262 1/12 15.29 10 QPSK H 241 262 1/10 15.96 10 QPSK H 241 262 1/10 15.97 10 QPSK H 241 262 1/0 15.96 10 I6-QAM H 241 262 1/0 14.97	Bandwidth [MHz] Mod. Pol. (H/V) Height [cm] Azimuth [degree] RB size/Offset Level [dBm] Gain [dBn] 5 QPSK H 241 262 1/0 15.98 6.00 5 QPSK H 241 262 1/12 15.89 6.00 5 QPSK H 241 262 1/12 15.89 6.10 5 QPSK H 241 262 1/24 15.68 6.20 5 QPSK H 241 262 1/12 15.29 6.10 5 16-QAM H 241 262 1/10 15.96 6.10 10 QPSK H 241 262 1/0 15.96 6.10 10 I6-QAM H 241 262 1/0 14.97 6.10	Bandwidth [MHz] Mod. Pol. [H/V] Height [cm] Azimuth (degree) RB Size/Offset Level [dBm] Gain [dBi] ERP [dBn] 5 QPSK H 241 262 1/0 15.98 6.00 19.83 5 QPSK H 241 262 1/12 15.98 6.00 19.83 5 QPSK H 241 262 1/12 15.89 6.00 19.83 5 QPSK H 241 262 1/24 15.68 6.20 19.73 5 16-QAM H 241 262 1/12 15.29 6.10 19.24 10 QPSK H 241 262 1/0 15.96 6.10 19.24 10 QPSK H 241 262 1/0 15.96 6.10 19.91 10 16-QAM H 241 262 1/0 14.97 6.10 18.92	Bandwidth [MHz] Mod. Pol. [HVy] Height [cm] Azimuth (degree) RB size/Offset Level [dBm] Gain [dBi] ERP [dBm] ERP [watts] 5 QPSK H 241 262 1/0 15.98 6.00 19.83 0.096 5 QPSK H 241 262 1/12 15.89 6.00 19.83 0.096 5 QPSK H 241 262 1/24 15.68 6.20 19.73 0.094 5 QPSK H 241 262 1/12 15.29 6.10 19.24 0.094 5 16-QAM H 241 262 1/12 15.29 6.10 19.24 0.094 10 QPSK H 241 262 1/0 15.96 6.10 19.91 0.094 10 QPSK H 241 262 1/0 14.97 6.10 19.91 0.094 10 16-QAM H 241	Bandwidth [MHz] Mod. Pol. [H/V] Height [Cm] Azimuth (degree) RB size/Offset Level [dBm] Gain [dBm] ERP [dBm] ERP [WAtts] Limit [dBm] 5 QPSK H 241 262 1/0 15.98 6.00 19.83 0.096 34.77 5 QPSK H 241 262 1/12 15.89 6.00 19.83 0.096 34.77 5 QPSK H 241 262 1/12 15.89 6.10 19.84 0.096 34.77 5 QPSK H 241 262 1/24 15.68 6.20 19.73 0.094 34.77 5 QPSK H 241 262 1/12 15.29 6.10 19.24 0.084 34.77 10 QPSK H 241 262 1/10 15.96 6.10 19.91 0.098 34.77 10 QPSK H 241 262 1/0 15.96	Bandwidth [MHz] Mod. Pol. [H/V] Height [cm] Azimuth [degree] RB Size/Offset Level [dBm] Gain [dBm] ERP [dBm] ERP [dBm] ERP [dBm] Limit (dBm] Margin [dB] 5 OPSK H 241 262 1/0 15.98 6.00 19.83 0.096 34.77 -14.94 5 OPSK H 241 262 1/12 15.89 6.00 19.83 0.096 34.77 -14.94 5 OPSK H 241 262 1/12 15.89 6.00 19.84 0.096 34.77 -14.94 5 OPSK H 241 262 1/12 15.68 6.20 19.73 0.094 34.77 -15.04 5 I6-QAM H 241 262 1/12 15.29 6.10 19.24 0.084 34.77 -15.04 10 QPSK H 241 262 1/10 15.96 6.10 19.91 0.098 34.77 <td>Bandwidth Mod. Pol. Height (rem) Azimuth (regree) RB size/Offset Level (rdBm) Gain (rdBm) ERP (rdBm) ERP (rdBm) Limit (rdBm) Margin (rdBm) ERP (rdBm) 5 QPSK H 241 262 1/0 15.88 6.00 19.83 0.096 34.77 14.94 21.98 5 QPSK H 241 262 1/12 15.89 6.00 19.83 0.096 34.77 14.94 21.98 5 QPSK H 241 262 1/12 15.89 6.10 19.84 0.096 34.77 14.94 21.98 5 QPSK H 241 262 1/12 15.68 6.20 19.73 0.094 34.77 15.04 21.88 5 I6-QAM H 241 262 1/12 15.29 6.10 19.94 0.098 34.77 15.53 21.98 10 QPSK H 241 262 1/10</td> <td>Bandwidth Mod. Pol. Height Azimuth RB Level Gain ERP ERP Limit Margin ERP ERP (dBm) (dBm) (dBm) Margin ERP ERP ERP Margin ERP ERP Margin ERP ERP Margin ERP ERP Margin ERP ERP Imit Margin Imit Margin Imit <t< td=""><td>Bandwidth Mod. Pol. Height (cm) <math>azimuth (degree) RB size/Offset Level (dBm) Gain (dBi) ERP (dBm) Limit (dBm) Margin (dB) ERP (dBm) <t< math=""></t<></math></td></t<></td>	Bandwidth Mod. Pol. Height (rem) Azimuth (regree) RB size/Offset Level (rdBm) Gain (rdBm) ERP (rdBm) ERP (rdBm) Limit (rdBm) Margin (rdBm) ERP (rdBm) 5 QPSK H 241 262 1/0 15.88 6.00 19.83 0.096 34.77 14.94 21.98 5 QPSK H 241 262 1/12 15.89 6.00 19.83 0.096 34.77 14.94 21.98 5 QPSK H 241 262 1/12 15.89 6.10 19.84 0.096 34.77 14.94 21.98 5 QPSK H 241 262 1/12 15.68 6.20 19.73 0.094 34.77 15.04 21.88 5 I6-QAM H 241 262 1/12 15.29 6.10 19.94 0.098 34.77 15.53 21.98 10 QPSK H 241 262 1/10	Bandwidth Mod. Pol. Height Azimuth RB Level Gain ERP ERP Limit Margin ERP ERP (dBm) (dBm) (dBm) Margin ERP ERP ERP Margin ERP ERP Margin ERP ERP Margin ERP ERP Margin ERP ERP Imit Margin Imit Margin Imit Imit <t< td=""><td>Bandwidth Mod. Pol. Height (cm) <math>azimuth (degree) RB size/Offset Level (dBm) Gain (dBi) ERP (dBm) Limit (dBm) Margin (dB) ERP (dBm) <t< math=""></t<></math></td></t<>	Bandwidth Mod. Pol. Height (cm) $azimuth (degree) RB size/Offset Level (dBm) Gain (dBi) ERP (dBm) Limit (dBm) Margin (dB) ERP (dBm) $

Table 7-2. ERP Data (Band 14)

FCC ID: ZNFK300AM	<u><i>CPCTEST</i></u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 20
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Radiated Spurious Emissions Measurements 7.6 §2.1053 §90(R).543(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 horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

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

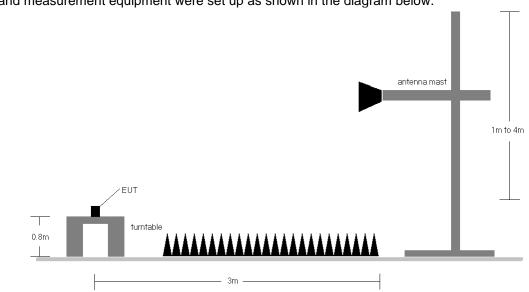
Test Settings

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

FCC ID: ZNFK300AM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 20
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Test Setup



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

Figure 7-5. Test Instrument & Measurement Setup

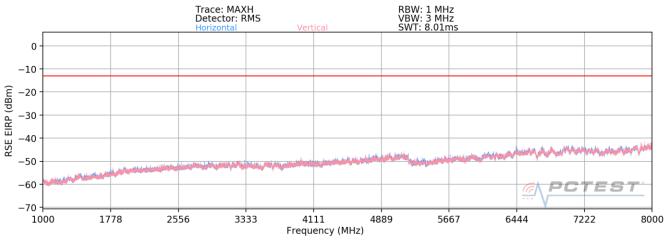
Test Notes

- 1. 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.
- 3. 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.
- 4. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 5. Per 90(R)(f), emissions in the 1559 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals. These emission measurements are shown in this section below.

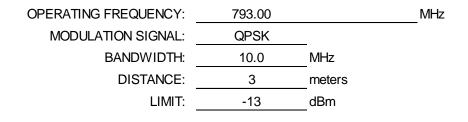
FCC ID: ZNFK300AM	<u><u><u></u><u>PCTEST</u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 20
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Plot 7-16. Radiated Spurious Plot (Band 14)



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]
2379.00	Н	119	217	-64.78	3.77	-61.01	-48.0
3172.00	H	-	-	-68.16	5.86	-62.30	-49.3
3965.00	Н	-	-	-68.52	7.29	-61.22	-48.2

Table 7-2. Radiated Spurious Data (LTE Band 14 – Mid Channel)

MODULATION SIGNAL:	QPSK	_
BANDWIDTH:	10.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

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]
1586.00	Н	141	198	-67.83	2.68	-65.16	-25.2

Table 7-4. Radiated Spurious Data (LTE Band 14 - Wide Band)

FCC ID: ZNFK300AM	<u><u><u></u><u>PCTEST</u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 20
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7.7 Frequency Stability / Temperature Variation §2.1055 §90.213

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.

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-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: ZNFK300AM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 07 of 20
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Frequency Stability / Temperature Variation §2.1055, §90.213

OPERATING FREQUENCY:	793,000,000	Hz
CHANNEL:	23330	_
REFERENCE VOLTAGE:	4.34	VDC

VOLTAGE (%)	POWER (VDC)	ТЕМР (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.34	- 30	792,999,781	-219	-0.0000276
100 %		- 20	793,000,018	18	0.0000023
100 %		- 10	793,000,196	196	0.0000247
100 %		0	792,999,798	-202	-0.0000255
100 %		+ 10	792,999,862	-138	-0.0000174
100 %		+ 20	793,000,045	45	0.0000057
100 %		+ 30	793,000,019	19	0.0000024
100 %		+ 40	793,000,051	51	0.0000064
100 %		+ 50	792,999,767	-233	-0.0000294
BATT. ENDPOINT	3.29	+ 20	793,000,052	52	0.000066

Table 7-5. LTE Band 14 Frequency Stability Data

FCC ID: ZNFK300AM	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 29 of 20
1M2001200008-10.ZNF	01/12/2020 - 02/14/2020	Portable Handset	Page 28 of 30
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Frequency Stability / Temperature Variation §2.1055, §90.213

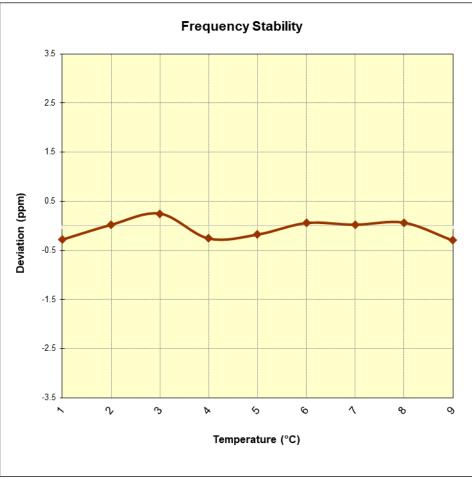


Figure 7-6. LTE Band 14 Frequency Stability Chart

FCC ID: ZNFK300AM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 00 at 00
1M2001200008-10.ZNF	01/12/2020 - 02/14/2020	Portable Handset	Page 29 of 30
© 2020 PCTEST			V 9.0 02/01/2019



8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG Portable Handset FCC ID: ZNFK300AM complies with all the requirements of Parts 90 of the FCC rules.

FCC ID: ZNFK300AM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dege 20 of 20
1M2001200008-10.ZNF	01/12/2020 - 02/14/2020	Portable Handset	Page 30 of 30
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