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MEASUREMENT REPORT FCC Part 90

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

Date of Testing: 12/30/2020- 1/13/2021 Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.: 1M2012140197-06.ZNF

FCC ID: ZNFK330PM

APPLICANT: LG Electronics USA, Inc.

Application Type: Class II Permissive Change

Model: LM-K330PM

Additional Model(s): LM-K330TM, LM-K330MM, LG L460DL, LM-K330QM, LM-K330QM6,

LM-K330QN, LM-K330VM, LMK330PM, LMK330TM, LMK330MM, LGL460DL, LMK330QM, LMK330QM6, LMK330QN, LMK330VM, K330PM, K330TM, K330MM, L460DL, K330QM, K330QM6, K330QN,

K330VM

EUT Type: Portable Handset

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part: §2.1049, §22(H), §90(S)

Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

Class II Permissive Change: Please see FCC change document

Original Grant Date: 01/12/2021

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

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







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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 17025-2017 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: ZNFK330PM**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 22(H) and 90(S).

Test Device Serial No.: 21392, 21384

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, CDMA/EvDO Rev. 0/A 800/850/1900 (BC10/BC0/BC1), Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

assembly of contents thereof, please contact INFO@PCTEST.COM.

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, §90.635, §90(S)

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:

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 $P_{q [dBm]}$ – cable loss f_{dB} .

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

$$E[dB\mu V/m] = Measured amplitude level[dBm] + 107 + Cable Loss[dB] + Antenna Factor[dB/m] And
$$EIRP[dBm] = E[dB\mu V/m] + 20logD - 104.8; where D is the measurement distance in meters.$$$$

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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TEST EQUIPMENT CALIBRATION DATA 5.0

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
Anritsu	Anritsu MT8820C Radio Communication An		N/A			6201300731
Anritsu	MT8821C	Radio Communication Analyzer	Communication Analyzer N/A		6200901190	
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Keysight Technologies	N9020A	MXA Signal Analyzer	4/29/2019	Annual	8/14/2021	MY54500644
Mini-Circuits SSG-4000HP		Synthesized Signal Generator	N/A		11208010032	
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A		112347	
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134

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

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz F = Frequency Modulation 9 = Composite Digital Info

W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

Spurious Radiated Emission – BC10

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

The average spectrum analzyer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80) = 50.3 dBc.

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

assembly of contents thereof, please contact INFO@PCTEST.COM.

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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TEST RESULTS 7.0

7.1 Summary

Company Name: LG Electronics USA, Inc.

FCC ID: ZNFK330PM

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): CDMA / EvDO / LTE

Band: Band Class 10 / Band 26

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1046 90.635	Conducted Power	< 100 Watts		PASS	Section 7.2
22.913(a.2)	Effective Radiated Power (Band 26)	< 7 Watts max. ERP		PASS	Section 7.3
2.1053 90.691(a)	Radiated Spurious Emissions	> 43 + 10 log ₁₀ (P[Watts]) for all out-of-band emissions except > 50 + 10 log ₁₀ (P[Watts]) at Band Edge and for all out-of- band emissions within 37.5kHz of Block Edge	RADIATED	PASS	Section 7.4

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.
- 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.
- 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.

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Conducted Power Output Data 7.2 §2.1046 §90.635

Frequency [MHz]	Channel	Battery Type	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
817.90	476	Standard	25.26	0.336	50.00	-24.74
823.10	684	Standard	25.28	0.337	50.00	-24.72

Table 7-2. CDMA BC10 Conducted Power Output Data

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
	QPSK	26765	821.5	1 / 36	24.57	0.286	50.00	-25.43
15 MHz	16-QAM	26765	821.5	1 / 36	24.16	0.261	50.00	-25.84
	64-QAM	26765	821.5	1 / 36	22.71	0.187	50.00	-27.29
	QPSK	26740	819.0	1 / 25	24.62	0.290	50.00	-25.38
10 MHz	16-QAM	26740	819.0	1 / 25	23.99	0.251	50.00	-26.01
	64-QAM	26740	819.0	1 / 25	23.01	0.200	50.00	-26.99
	QPSK	26715	816.5	1 / 12	24.62	0.290	50.00	-25.38
	QFSK	26765	821.5	1 / 12	24.93	0.311	50.00	-25.07
5 MHz	16-QAM	26715	816.5	1 / 12	24.02	0.252	50.00	-25.98
3 IVITIZ	16-QAIVI	26765	821.5	1 / 12	24.35	0.272	50.00	-25.65
	64-QAM	26715	816.5	1 / 12	23.01	0.200	50.00	-26.99
	04-QAIVI	26765	821.5	1 / 12	23.30	0.214	50.00	-26.70
	QPSK	26705	815.5	1/7	24.63	0.290	50.00	-25.37
	QFSR	26775	822.5	1/7	24.95	0.313	50.00	-25.05
3 MHz	16-QAM	26705	815.5	1/7	24.03	0.253	50.00	-25.97
3 IVITIZ	10-QAIVI	26775	822.5	1 / 7	24.32	0.270	50.00	-25.68
	64-QAM	26705	815.5	1/7	23.04	0.201	50.00	-26.96
	04-QAM	26775	822.5	1/7	23.33	0.215	50.00	-26.67
	QPSK	26697	814.7	1/2	24.54	0.284	50.00	-25.46
	WF3N	26783	823.3	1/2	24.16	0.261	50.00	-25.84
1.4 MHz	16-QAM	26697	814.7	1/2	23.99	0.251	50.00	-26.01
1.4 1/11/12	IO-QAIVI	26783	823.3	1/2	23.56	0.227	50.00	-26.44
	64-QAM	26697	814.7	1/2	22.91	0.195	50.00	-27.09
	04-QAIVI	26783	823.3	1/2	22.57	0.181	50.00	-27.43

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

NOTES:

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

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7.3 Radiated Power (ERP) §22.913(a.2)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI/TIA-603-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 > 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 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

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Test Setup

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

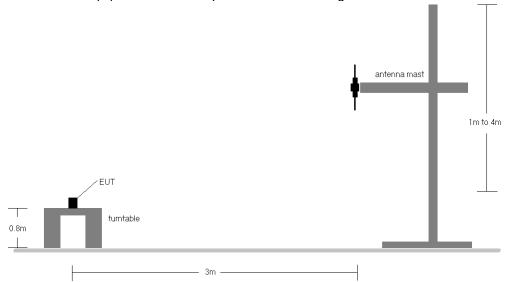


Figure 7-1. Radiated Test Setup <1GHz

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.

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
	QPSK	821.5	Н	219.0	304.0	6.72	1 / 37	16.14	20.71	0.118	38.45	-17.74
15 MHz	16-QAM	821.5	Н	219.0	304.0	6.72	1 / 37	15.12	19.69	0.093	38.45	-18.76
	64-QAM	821.5	Н	219.0	304.0	6.72	1 / 37	14.61	19.18	0.083	38.45	-19.27
15 MHz	QPSK	816.5	V	135.0	245.0	6.72	1 / 37	11.65	16.22	0.042	38.45	-22.23

Table 7-4. ERP Data (LTE Band 26)

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7.4 Radiated Spurious Emissions Measurements §2.1053 §90.691(a)

Test Overview

Radiated spurious emissions measurements are performed using the direct field strength calculation method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

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

Test Settings

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

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Test Setup

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

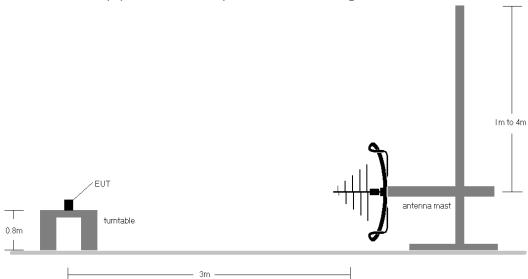


Figure 7-2. Test Instrument & Measurement Setup < 1GHz

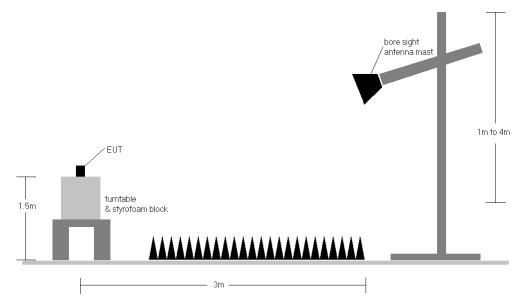


Figure 7-3. Test Instrument & Measurement Setup >1 GHz

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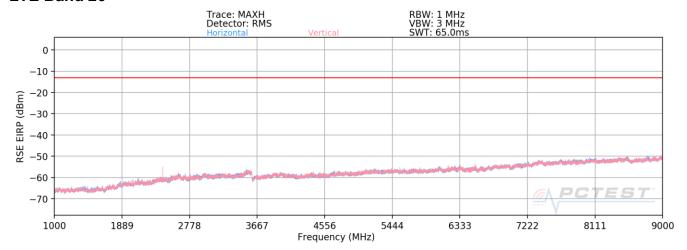
Test Notes

- 1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 2. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 3. This unit was tested with its standard battery.
- 4. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 5. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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LTE Band 26



Plot 7-1. Radiated Spurious Plot (Band 26)

Bandwidth (MHz):	10
Frequency (MHz):	819.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1638.0	V	185	361	-72.66	-6.38	27.96	-67.30	-13.00	-54.30
2457.0	V	296	200	-76.81	-2.01	28.18	-67.07	-13.00	-54.07
3276.0	V	-	-	-78.76	2.38	30.62	-64.64	-13.00	-51.64
4095.0	V	-	-	-78.87	4.98	33.11	-62.15	-13.00	-49.15
4914.0	V	-	-	-79.16	3.79	31.63	-63.63	-13.00	-50.63

Table 7-5. Radiated Spurious Data (LTE Band 26 - Mid Channel)

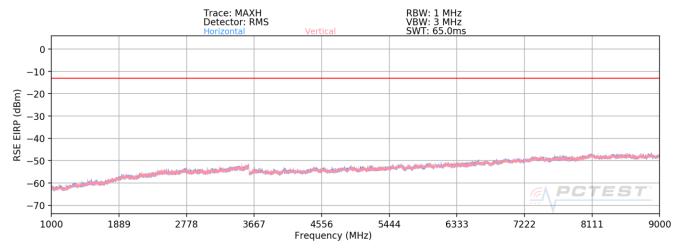
FCC ID: ZNFK330PM	Proud to be part of element	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	(LG	Approved by: Quality Manager
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CDMA BC10



Plot 7-2. Radiated Spurious Plot (CDMA BC10)

Frequency (MHz):	817.9		
Modulation:	CDMA BC10		

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1635.8	Н	100	184	-79.00	-0.84	27.16	-68.10	-13.00	-55.10
2453.7	Н	158	183	-75.81	3.35	34.54	-60.72	-13.00	-47.72
3271.6	Н	-	-	-80.07	4.53	31.46	-63.80	-13.00	-50.80
4089.5	Н	•	=	-81.65	5.72	31.07	-64.19	-13.00	-51.19
4907.4	Н	-	-	-81.52	6.74	32.22	-63.04	-13.00	-50.04

Table 7-6. CDMA BC10 Radiated Spurious Data (Ch. 476)

Frequency (MHz):	823.1
Modulation:	CDMA BC10

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1646.2	Н	194	180	-79.85	-0.73	26.42	-68.84	-13.00	-55.84
2469.3	Н	105	162	-79.37	3.38	31.01	-64.24	-13.00	-51.24
3292.4	Н	-	-	-81.27	4.45	30.18	-65.08	-13.00	-52.08
4115.5	Н	-	=	-81.53	5.75	31.22	-64.04	-13.00	-51.04
4938.6	Н	-	-	-81.68	7.43	32.75	-62.51	-13.00	-49.51

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

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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: ZNFK330PM** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

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