

PCTEST

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



MEASUREMENT REPORT FCC PART 15.247 / ISED RSS-247 Bluetooth (Low Energy)

Applicant Name:

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

Date of Testing:

02/12 - 03/13/2020 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M2002110017-07.ZNF

FCC ID:

IC:

ZNFQ630UM

Certification

2703C-Q630UM

APPLICANT:

LG Electronics USA, Inc.

Application Type: Model/HVIN: Additional Model(s)/HVIN(s): EUT Type: Max. RF Output Power: Frequency Range: FCC Classification: FCC Rule Part(s): ISED Specification: Test Procedure(s):

LM-Q630UM LMQ630UM, Q630UM Portable Handset 3.875 mW (5.88 dBm) Peak Conducted 2402 – 2480MHz Digital Transmission System (DTS) Part 15 Subpart C (15.247) RSS-247 Issue 2 ANSI C63.10-2013, KDB 558074 D01 v05r02

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 ANSI C63.10-2013 and KDB 558074 D01 v05r02. 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: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere 1 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 1 of 56
© 2020 PCTEST	-	•		V 9.0 02/01/2019



TABLE OF CONTENTS

1.0	INT	RODUCTION	3
	1.1	Scope	3
	1.2	PCTEST Test Location	3
	1.3	Test Facility / Accreditations	3
2.0	PRC	DUCT INFORMATION	4
	2.1	Equipment Description	4
	2.2	Device Capabilities	4
	1.1	Antenna Description	4
	2.3	Test Configuration	5
	2.4	EMI Suppression Device(s)/Modifications	5
3.0	DES	CRIPTION OF TESTS	6
	3.1	Evaluation Procedure	6
	3.2	AC Line Conducted Emissions	6
	3.3	Radiated Emissions	7
	3.4	Environmental Conditions	7
4.0	ANT	ENNA REQUIREMENTS	8
5.0	MEA	ASUREMENT UNCERTAINTY	9
6.0	TES	T EQUIPMENT CALIBRATION DATA	10
7.0	TES	T RESULTS	11
	7.1	Summary	.11
	7.2	6dB Bandwidth Measurement – Bluetooth (LE)	.12
	7.3	Output Power Measurement – Bluetooth (LE)	.21
	7.4	Power Spectral Density – Bluetooth (LE)	.29
	7.5	Conducted Emissions at the Band Edge	.37
	7.6	Conducted Spurious Emissions	.42
	7.7	Radiated Spurious Emission Measurements	.47
	7.8	Radiated Restricted Band Edge Measurements	.52
	7.9	Line-Conducted Test Data	.53
8.0	CON	ICLUSION	56

FCC ID: ZNFQ630UM	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 2 of 56
© 2020 PCTEST		•		V 9.0 02/01/2019



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.

	<i>╔</i> \ <i>PCTEST</i> °		Approved by:
FCC ID: ZNFQ630UM		(CERTIFICATION)	Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 2 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset	Page 3 of 56
© 2020 PCTEST			V 9.0 02/01/2019



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFQ630UM**. The data found in this test report was taken with the EUT operating in Bluetooth low energy mode. While in low energy mode, the Bluetooth transmitter hops pseudo-randomly between 40 channels, three of which are "advertising channels". When the transmitter is hopping only between the three advertising channels, the EUT does not fall under the category of a "hopper" as defined in 15.247(a)(iii) which states that a "frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels." As operation on only the advertising channels does not qualify the EUT as a hopper, the EUT is certified as a DTS device in this mode. The data found in this report is representative of the device when it transmits on its advertising channels. Typical Bluetooth operation is covered under the DSS report found with this application.

Test Device Serial No.: 02232, 02034, 02208

2.2 Device Capabilities

This device contains the following capabilities:

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

Ch.	Frequency (MHz)
0	2402
:	:
19	2440
:	:
39	2480

Table 2-1. Frequency / Channel Operations

1.1 Antenna Description

Following antenna was used for the testing.

Frequency [GHz]	Antenna Gain (dBi)
2.4	-1.25

Table 2-2. Antenna Peak Gain

Note: This device is capable of operating in hopping and non-hopping mode. The EUT can hop between 79 different channels in the 2400 – 2483.5MHz band.

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 4 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 4 of 56
© 2020 PCTEST	-	•		V 9.0 02/01/2019



2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, and 7.6 for antenna port conducted emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege E of EG
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 5 of 56
© 2020 PCTEST	·	·		V 9.0 02/01/2019



3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.9. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 6 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 6 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019



3.3 Radiated 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

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.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: ZNFQ630UM	<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:		Daga Z of EC
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 7 of 56
© 2020 PCTEST		·		V 9.0 02/01/2019



4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna(s) of the EUT are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 9 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 8 of 56
© 2020 PCTEST	·	·		V 9.0 02/01/2019



5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. 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
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: ZNFQ630UM	<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 0 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset	Page 9 of 56	
© 2020 PCTEST	•		V 9.0 02/01/2019	



6.0 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
-	WL25-1	Conducted Cable Set (25GHz)	10/30/2019	Annual	10/30/2020	WL25-1
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
COM-Power	AL-130R	Active Loop Antenna	8/22/2019	Annual	8/22/2020	121085
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
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Emco	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	00135427
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	6/18/2018	Biennial	6/18/2020	114451
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	6/3/2019	Annual	6/3/2020	NMLC-2
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/8/2019	Annual	7/8/2020	102133
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/11/2019	Annual	7/11/2020	102134
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 6-1. Annual Test Equipment Calibration Schedule

Note:

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.

FCC ID: ZNFQ630UM	<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:		Dega 10 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	020 Portable Handset Pa		Page 10 of 56
© 2020 PCTEST	÷	•		V 9.0 02/01/2019



7.0 TEST RESULTS

7.1 Summary

Company Name:	LG Electronics USA, Inc.
FCC ID:	ZNFQ630UM
FCC Classification:	Digital Transmission System (DTS)
Number of Channels:	<u>40</u>

FCC Part Section(s)	RSS Section(s)	ction(s) Test Description Test Limit		Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	> 500kHz		PASS	Section 7.2
15.247(b)(3)	RSS-247 [5.4(4)]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power < 8dBm / 3kHz Band		CONDUCTED	PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Sections 7.7, 7.8
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen[8.8])	LINE CONDUCTED	PASS	Section 7.9

 Table 7-1. Summary of Test Results

Notes:

- 1. All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
- 2. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer 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 and attenuators.
- 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 "Bluetooth LE Automation," Version 3.6.
- 5. For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.3.1.

FCC ID: ZNFQ630UM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 11 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 11 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019



7.2 6dB Bandwidth Measurement – Bluetooth (LE) §15.247(a.2); RSS-247 [5.2]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible 6dB bandwidth is 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 11.8.2 Option 2 KDB 558074 D01 v05r02 – Section 8.2

Test Settings

- The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100kHz
- 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

Test Setup

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





Test Notes

None

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 40 of 50	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 12 of 56	
© 2020 PCTEST		•		V 9.0 02/01/2019	



Frequency [MHz]	Data Rate	Channel No.	Bluetooth Mode	Measured Bandwidth [kHz]	Minimum Bandwidth [kHz]	Pass / Fail
2402	125 kbps	0	LE	691.3	500	Pass
2440	125 kbps	19	LE	692.5	500	Pass
2480	125 kbps	39	LE	694.3	500	Pass
2402	500 kbps	0	LE	665.3	500	Pass
2440	500 kbps	19	LE	665.3	500	Pass
2480	500 kbps	39	LE	663.2	500	Pass
2402	1 Mbps	0	LE	703.1	500	Pass
2440	1 Mbps	19	LE	707.8	500	Pass
2480	1 Mbps	39	LE	707.4	500	Pass
2402	2 Mbps	0	LE	1155.0	500	Pass
2440	2 Mbps	19	LE	1155.0	500	Pass
2480	2 Mbps	39	LE	1159.0	500	Pass

Table 7-2. Conducted Bandwidth Measurements

FCC ID: ZNFQ630UM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 12 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 13 of 56
© 2020 PCTEST				V 9.0 02/01/2019



Keysight Spectru	um Analyzer - Oc RF 50 Ω	DC	W CORREC		SENSE:INT enter Freq: 2.402 rig: Free Run	000000 GHz Avg Hold	: 100/100	04:28:29 Radio St	PM Mar 02, 2020 d: None	-	Detector
		NFE	#IFGain:		Atten: 30 dB			Radio De	evice: BTS		
10 dB/div	Ref 20.0	0 dBı	n								
0.00										с	lear Write
10.0			~~~								
30.0											Averag
40.0											
50.0											
70.0											Max Hol
Center 2.40 Res BW 1					#VBW 300	kHz		Sweep	pan 2 MHz 3.333 ms		Min Hol
Occupi	ed Band	wid	th		Total	Power	7.	30 dBm			
				3 MHz							Detecto
Transmi	t Freq Er	ror	3	.949 kHz	s % of C	DBW Powe	er	99.00 %		Auto	Ma
x dB Bar	ndwidth		6	91.3 kHz	x dB			6.00 dB			
G							STA	TUS			

Plot 7-1. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 0)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 14 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	/12 - 03/13/2020 Portable Handset		Page 14 of 56
© 2020 PCTEST				V 9.0 02/01/2019





Plot 7-2. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 19)



Plot 7-3. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps – Ch. 39)

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 15 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	20 Portable Handset		Page 15 of 56	
© 2020 PCTEST				V 9.0 02/01/2019	





Plot 7-4. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 0)



Plot 7-5. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 19)

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 16 of 56
1M2002110017-07.ZNF	F 02/12 - 03/13/2020 Portable Handset			Page 16 of 56
© 2020 PCTEST				V 9.0 02/01/2019









Plot 7-7. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps – Ch. 0)

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dava 47 - 650
1M2002110017-07.ZNF	-07.ZNF 02/12 - 03/13/2020 Portable Handset			Page 17 of 56
© 2020 PCTEST	•			V 9.0 02/01/2019



Keysight Spectrum Analyzer - Occupied I	BW					[
LXI RF 50 Ω DC	CORREC	SENSE:INT Center Freg: 2.44000	0000 GHz	04:34:08 P Radio Std	M Mar 02, 2020	Trace	/Detector
NFE	- -	Trig: Free Run	Avg Hold: 100/1	100			
	#IFGain:Low	#Atten: 30 dB		Radio Dev	vice: BTS		
10 dB/div Ref 20.00 dB	m						
10.0							
0.00						C	lear Write
-10.0							
-20.0							
-30.0							Average
-40.0							Aronago
-40.0							
-60.0							Max Hold
-70.0							
Center 2.44 GHz				Sp	an 2 MHz		
#Res BW 100 kHz		#VBW 300 k	Hz	Sweep	3.333 ms		Min Hold
O second and Deve devia	141-	Total P	011/05	11.8 dBm			
Occupied Bandwid			ower	T1.0 0Bm			
1	.0567 MH	Z					Detector
Transmit Freq Error	3.843 kl	Hz % of OE	3W Power	99.00 %		Auto	Peak▶ <u>Man</u>
x dB Bandwidth	707.8 ki	Hz x dB		-6.00 dB			
	707.0 KI			-0.00 UB			
MSG				STATUS			

Plot 7-8. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 19)



Plot 7-9. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps – Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 19 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	02/12 - 03/13/2020 Portable Handset		Page 18 of 56
© 2020 PCTEST	-	·		V 9.0 02/01/2019





Plot 7-10. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 0)



Plot 7-11. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps – Ch. 19)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 10 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	3/2020 Portable Handset		Page 19 of 56	
© 2020 PCTEST	·	·		V 9.0 02/01/2019	





Plot 7-12. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps – Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 56
1M2002110017-07.ZNF	ZNF 02/12 - 03/13/2020 Portable Handset			Page 20 of 56
© 2020 PCTEST	•	•		V 9.0 02/01/2019



7.3 Output Power Measurement – Bluetooth (LE) §15.247(b.3); RSS-247 [5.4(4)]

Test Overview and Limits

The transmitter antenna terminal of the EUT is connected to the input of a spectrum analyzer. Measurements are made while the EUT is operating at maximum power and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

ANSI C63.10-2013 – Section 11.9.1.1 KDB 558074 D01 v05r02 – Section 8.3.1.1

Test Settings

- 1. RBW = 3MHz
- 2. VBW = 50MHz
- 3. Span ≥ 3 x RBW
- 4. Sweep = auto couple
- 5. Detector = Peak
- 6. Trace mode = max hold
- 7. The trace was allowed to stabilize

Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 21 of 56	
© 2020 PCTEST		•		V 9.0 02/01/2019	



Frequency	Data Rate	Channel	Bluetooth	Peak Co Po\	
[MHz]	[Mbps]	No.	Mode	[dBm]	[mW]
2402	125 kbps	0	LE	4.74	2.975
2440	125 kbps	19	LE	5.84	3.836
2480	125 kbps	39	LE	4.79	3.012
2402	500 kbps	0	LE	4.74	2.977
2440	500 kbps	19	LE	5.85	3.846
2480	500 kbps	39	LE	4.79	3.013
2402	1 Mbps	0	LE	4.77	3.001
2440	1 Mbps	19	LE	5.87	3.859
2480	1 Mbps	39	LE	4.81	3.025
2402	2 Mbps	0	LE	4.80	3.018
2440	2 Mbps	19	LE	5.88	3.875
2480	2 Mbps	39	LE	4.87	3.068

Table 7-3. Conducted Output Power Measurements (Bluetooth (LE))

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	03/13/2020 Portable Handset		Page 22 of 56
© 2020 PCTEST	•	•		V 9.0 02/01/2019



🔤 Keysight Sp		yzer - Swept S									[- 6 - ×
<u>XI</u>	RF	50 Ω D		RREC NO: Fast ↔			#Avg Type	e: RMS	TRAC	M Feb 17, 2020 CE 1 2 3 4 5 6 PE M WWWW	Fre	equency
		NFE		Gain:Low	Atten: 30					P NNNNN		
10 dB/div	Ref 2	0.00 dBr	n					Mkr	1 2.402 4.7	24 GHz 35 dBm		Auto Tun
- ^{og}											C	enter Fre
10.0						_1_						000000 GH
						.						
0.00												Start Fre
10.0												000000 GH
10.0												
20.0												Stop Fre
- And										- And	2.407	000000 GH
30.0												
40.0												CF Ste
.0.0											1. Auto	000000 MH Ma
50.0												
											F	req Offs
50.0												0H
70.0												
											5	Scale Typ
Center 2.	402000	GH7							Span 1	0.00 MHz	Log	Li
Res BW				#VBV	V 50 MHz			Sweep 1	.000 ms ((1001 pts)		
ISG								STATUS				

Plot 7-13. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 0)



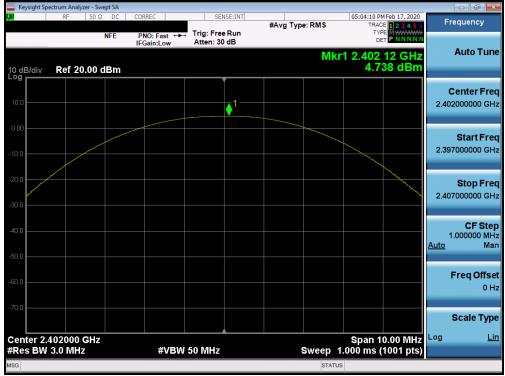
Plot 7-14. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 19)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 00 of 50
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 23 of 56
© 2020 PCTEST		·		V 9.0 02/01/2019





Plot 7-15. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 39)



Plot 7-16. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 0)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 24 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		
© 2020 PCTEST				V 9 0 02/01/2019



Keysight Sp	ectrum Analyzer -						
<u>xı</u>	RF 5	DΩ DC	CORREC	Trig: Free Run Atten: 30 dB	#Avg Type: RMS	05:05:38 PM Feb 17, 2020 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N	Frequency
10 dB/div	Ref 20.0	0 dBm	IFGain:Low	Atten: 30 dB	Mk	r1 2.440 11 GHz 5.850 dBm	Auto Tune
10.0				1			Center Fred 2.440000000 GH
0.00							Start Fre 2.435000000 GH
30.0							Stop Fre 2.445000000 GH
i0.0							CF Ste 1.000000 M⊢ <u>Auto</u> Ma
:0.0							Freq Offse 0 ⊢
70.0	440000 GH					Span 10.00 MHz	Scale Typ
	3.0 MHz		#VBW	/ 50 MHz	Sweep	1.000 ms (1001 pts)	

Plot 7-17. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 19)



Plot 7-18. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		D 05 (50	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 25 of 56	
© 2020 PCTEST	•	•		V 9.0 02/01/2019	



🚾 Keysight Sp	ectrum Analy											
<mark>XI</mark>	RF	50 Ω D	C CO	RREC	S	ENSE:INT	#Avg Type:		TRACE	Feb 17, 2020	Fr	equency
		NFE		NO: Fast Gain:Low	Atten: 3				DE			
10 dB/div	Ref 20).00 dBn	n					Mkr1 :	2.402 4.77	20 GHz 73 dBm		Auto Tun
- ^{og}												Center Fre
10.0						↓ 1−					2.40	2000000 GH
0.00												
10.0											2.39	Start Fre 7000000 GH
10.0												
20.0												Stop Fre
-30.0										`	2.40	7000000 GH
40.0												CF Ste
40.0											1 <u>Auto</u>	Ma 000000. Ma
50.0												
60.0											I	FreqOffse ∂⊢
70.0												•••
												Scale Typ
Center 2.						A			Span 10).00 MHz	Log	Li
Res BW	3.0 MH:	Z		#VE	SW 50 MHz		S	weep 1.00	00 ms (1	1001 pts)		

Plot 7-19. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 0)



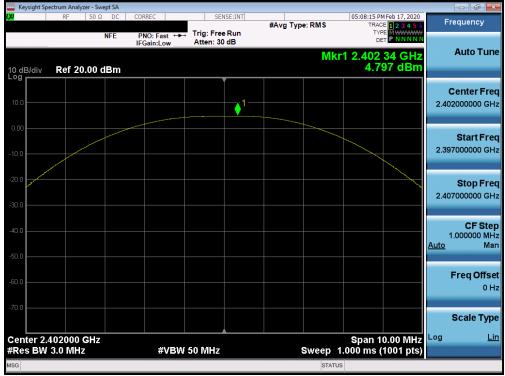
Plot 7-20. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 19)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 26 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset			
© 2020 PCTEST				V 9.0 02/01/2019	





Plot 7-21. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 39)



Plot 7-22. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 0)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 07 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset	Page 27 of 56	
© 2020 PCTEST				V 9 0 02/01/2019



🔤 Keysight Sp	pectrum Anal											_	
X	RF	50 Ω [E	ORREC PNO: Fa FGain:Lo	st ↔→	Trig: Fre Atten: 3		#Avg Typ	e: RMS	TRAC	M Feb 17, 2020 E 1 2 3 4 5 6 PE M WWWWW FT P N N N N N	F	requency
10 dB/div	Ref 2	0.00 dB		Guine					Mkr	1 2.439 5.8	84 GHz 83 dBm		Auto Tune
10.0							1						Center Fred
10.00												2.43	Start Free 5000000 GH
30.0												2.44	Stop Fre 5000000 GH
40.0												Auto	CF Ste 1.000000 MH Ma
50.0													Freq Offse 0 H
70.0												Log	Scale Type
Center 2. ≇Res BW				#	VBW	50 MHz			Sweep 1	Span 1 .000 ms (0.00 MHz 1001 pts)	LUg	<u>Lir</u>
ISG									STATUS	5			

Plot 7-23. Peak Power Plot (Bluetooth (LE), 2Mbps – Ch. 19)



Plot 7-24. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 39)

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 28 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset			
© 2020 PCTEST				V 9.0 02/01/2019	



7.4 Power Spectral Density – Bluetooth (LE) §15.247(e); RSS-247 [5.2]

Test Overview and Limit

The peak power density is 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.

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

Test Procedure Used

ANSI C63.10-2013 – Section 11.10.2 Method PKPSD KDB 558074 D01 v05r02 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission

Test Settings

- 1. Analyzer was set to the center frequency of the DTS channel under investigation
- 2. Span = 1.5 times the DTS channel bandwidth
- 3. RBW = 3kHz
- 4. VBW = 1MHz
- 5. Detector = peak
- 6. Sweep time = auto couple
- 7. Trace mode = max hold
- 8. 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

None

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 29 of 56	
© 2020 PCTEST	·	·		V 9.0 02/01/2019	



Frequency [MHz]	Data Rate [Mbps]	Channel No.	Bluetooth Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2402	125 kbps	0	LE	-1.94	8.0	-9.94
2440	125 kbps	19	LE	-0.77	8.0	-8.77
2480	125 kbps	39	LE	-1.74	8.0	-9.74
2402	500 kbps	0	LE	-2.12	8.0	-10.12
2440	500 kbps	19	LE	-0.88	8.0	-8.88
2480	500 kbps	39	LE	-1.84	8.0	-9.84
2402	1 Mbps	0	LE	-10.77	8.0	-18.77
2440	1 Mbps	19	LE	-9.56	8.0	-17.56
2480	1 Mbps	39	LE	-10.59	8.0	-18.59
2402	2 Mbps	0	LE	-13.37	8.0	-21.37
2440	2 Mbps	19	LE	-12.15	8.0	-20.15
2480	2 Mbps	39	LE	-13.16	8.0	-21.16

Table 7-4. Conducted Power Density Measurements

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 30 of 56	
© 2020 PCTEST				V 9.0 02/01/2019	



	ectrum Analyzer -										
<mark>XI</mark>	RF 50	Ω DC	CORREC		Run	#Avg Typ	e: RMS	TRAC	Mar 02, 2020 E 1 2 3 4 5 6 E M WWWWW	Fr	equency
		NFE	PNO: Wide ++ IFGain:Low	Atten: 30			Mkr1 2	DE 2.402 252	2 0 GHz		Auto Tun
0 dB/div	Ref 20.00) dBm					1	-1.9	37 dBm		
10.0							.1				Center Fre 2000000 GH
0.00				In other where	A. Marthy Marthal	= wilf 3				2.40	Start Fre 1481525 G⊦
20.0 Myy 30.0	LANN ANNA	Why	WWWWWWWWWWWWW	-γr -			Why Charle	JAN JANA	WWWWW	2.40	Stop Fre 2518475 G⊦
10.0										<u>Auto</u>	CF Ste 103.695 kH Ma
60.0										l	Freq Offs 0 H
70.0											Scale Typ
enter 2. Res BW	4020000 G	Hz	#\/B\A	1.0 MHz			Sween_1	Span 1. 1.733 ms (*	007 191112	Log	L
ISG	3.0 KHZ		#VDVV	1.0 10112			Sweep	-	roor pis)		

Plot 7-25. Power Spectral Density Plot (Bluetooth (LE), 125kbps - Ch. 0)

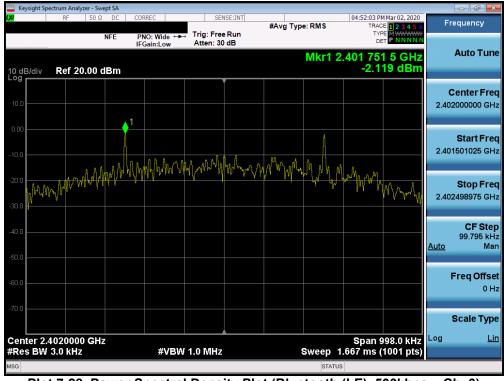


Plot 7-26. Power Spectral Density Plot (Bluetooth (LE), 125kbps – Ch. 19)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 31 of 56	
© 2020 PCTEST	·			V 9.0 02/01/2019	



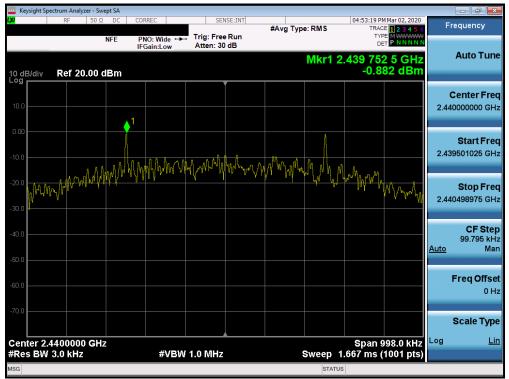




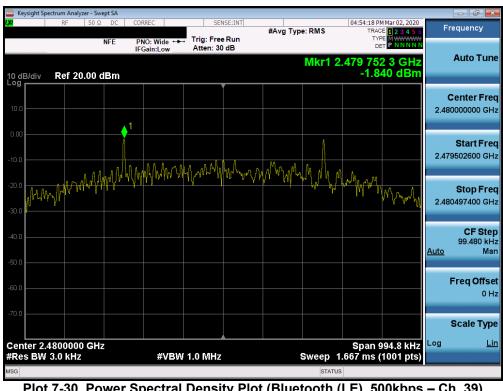
Plot 7-28. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 0)

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 32 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019





Plot 7-29. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 19)



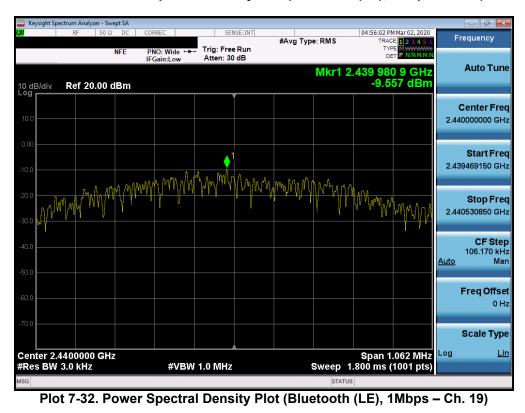
Plot 7-30. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: ZNFQ630UM	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 33 of 56
© 2020 PCTEST				V 9 0 02/01/2019



	ectrum Analyzer										
L <mark>XI</mark>	RF 5	NFE	CORREC		SE:INT	#Avg Typ	e: RMS	TRAC	M Mar 02, 2020 E 1 2 3 4 5 6 PE M WWWW T P N N N N N	F	requency
10 dB/div Log	Ref 20.0		IFGain:Low	Atten: 30	dB		Mkr1 2	401 98	1 0 GHz 68 dBm		Auto Tune
10.0											Center Fre 2000000 GH
-10.0				1 1. 100 0	Aan	10 ID				2.40	Start Fre 1472675 GH
-20.0	MMM			<u>h</u> wh				WWW		2.40	Stop Fre 2527325 GH
40.0 50.0										<u>Auto</u>	CF Ste 105.465 kH Ma
60.0											Freq Offs 0 H
70.0											Scale Typ
Center 2. Res BW	4020000 G 3.0 kHz	SHz	#VBW	1.0 MHz			Sweep 1	Span 1 800 ms (.055 MHz (1001 pts)	Log	L
ISG							STATUS	S			

Plot 7-31. Power Spectral Density Plot (Bluetooth (LE), 1Mbps - Ch. 0)

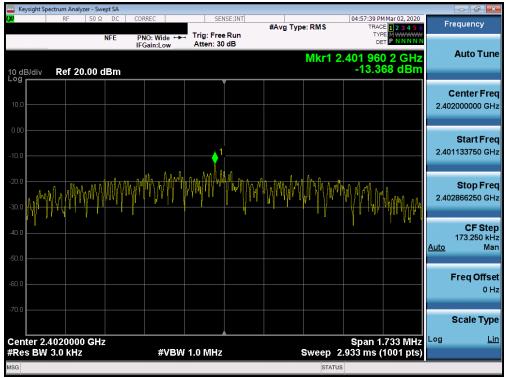


<u> PCTEST</u> Approved by: MEASUREMENT REPORT LG LG FCC ID: ZNFQ630UM (CERTIFICATION) Quality Manager EUT Type: Test Report S/N: Test Dates: Page 34 of 56 1M2002110017-07.ZNF 02/12 - 03/13/2020 Portable Handset © 2020 PCTEST V 9.0 02/01/2019



	ctrum Analyzer - Sw							_		_	
	RF 50 Ω	NFE F	PNO: Wide ↔ Gain:Low			#Avg Type	e: RMS	TRAC	M Mar 02, 2020 E 1 2 3 4 5 6 E M WWWWWW F P N N N N N	F	requency
0 dB/div	Ref 20.00 d	dBm					Mkr1 2	.479 98 -10.5	09 GHz 85 dBm		Auto Tur
10.0											Center Fre
0.0				1 4. a Annh n	A	A				2.47	Start Fr 9469450 GI
0.0 0.0 M				MALA				Wilmy	MMMM	2.48	Stop Fr 0530550 GI
										<u>Auto</u>	CF Ste 106.110 kl M
0.0											Freq Offs 01
0.0											Scale Ty
enter 2.4 Res BW	1800000 GHz 3.0 kHz	Z	#VBW	1.0 MHz		4	Sweep 1	Span 1 .800 ms (.061 MHz 1001 pts)	Log	L
G							STATUS				

Plot 7-33. Power Spectral Density Plot (Bluetooth (LE), 1Mbps – Ch. 39)



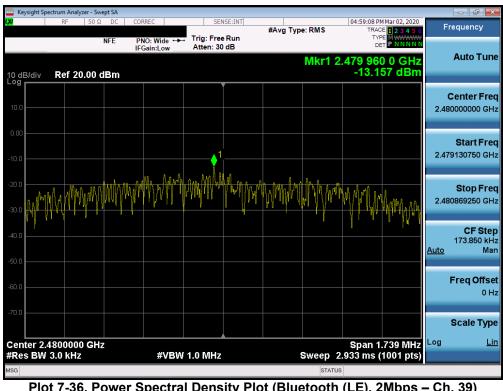
Plot 7-34. Power Spectral Density Plot (Bluetooth (LE), 2Mbps – Ch. 0)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 35 of 56
© 2020 PCTEST		•		V 9.0 02/01/2019



	ectrum Analy											
LXI	RF	50 Ω NF		REC	. Trig: Free		#Avg Typ	e:RMS	TRAC	M Mar 02, 2020 E 1 2 3 4 5 6 E M WWWWW F P N N N N N	F	requency
10 dB/div Log	Ref 20).00 dE	IF	Gain:Low	Atten: 30	dB		Mkr1 2	2.439 96			Auto Tune
10.0												Center Free 10000000 GH
-10.0					1						2.43	Start Fre 9133750 GH
-20.0 -30.0	WAN	¥ M					WWWWWW			NAMA AM	2.44	Stop Fre 10866250 GH
40.0											<u>Auto</u>	CF Ste 173.250 kH Ma
60.0												Freq Offs 0 ⊦
70.0												Scale Typ
Center 2. Res BW				#VBW	1.0 MHz			Sweep	Span 1 2.933 ms (.733 MHz (1001 pts)	Log	Li
ISG								STATL	JS			

Plot 7-35. Power Spectral Density Plot (Bluetooth (LE), 2Mbps - Ch. 19)



Plot 7-36. Power Spectral Density Plot (Bluetooth (LE), 2Mbps - Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 36 of 56
© 2020 PCTEST	-	·		V 9.0 02/01/2019



7.5 Conducted Emissions at the Band Edge §15.247(d); RSS-247 [5.5]

Test Overview and Limit

For the following out of band conducted spurious emissions plots at the band edge, the EUT was set to transmit at maximum power with the largest packet size available. These settings produced the worst-case emissions.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.7.2

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 = 100kHz
- 4. VBW = 300kHz
- 5. Detector = Peak
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = max hold
- 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.



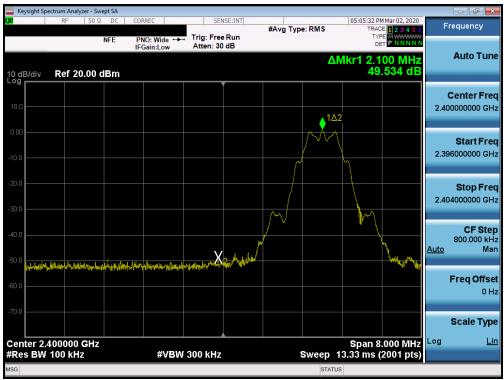
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

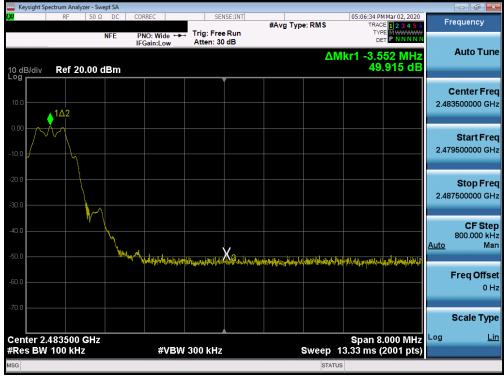
None

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 27 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 37 of 56
© 2020 PCTEST		•		V 9.0 02/01/2019





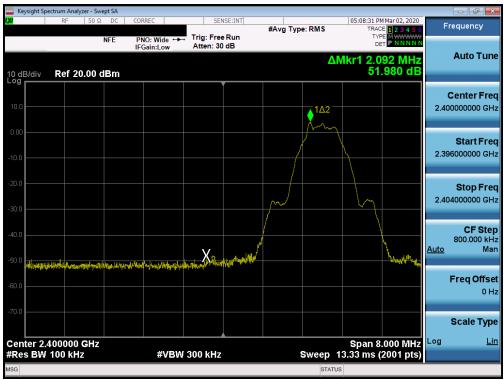
Plot 7-37. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 0)



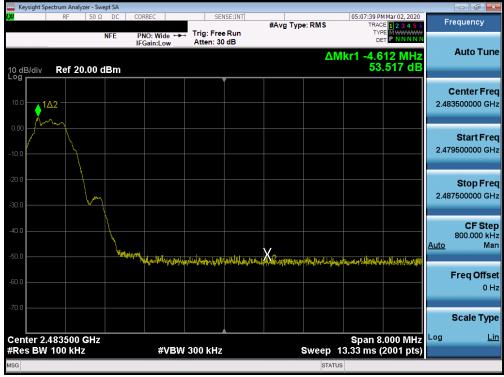
Plot 7-38. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of EG
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 38 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019





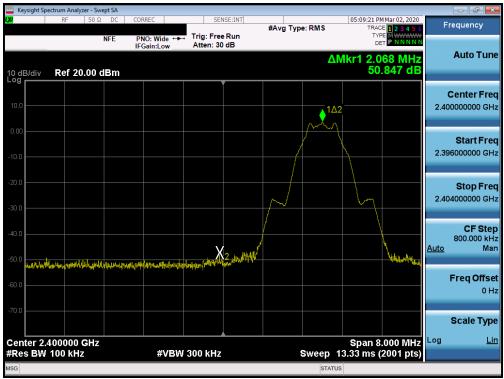
Plot 7-39. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 0)



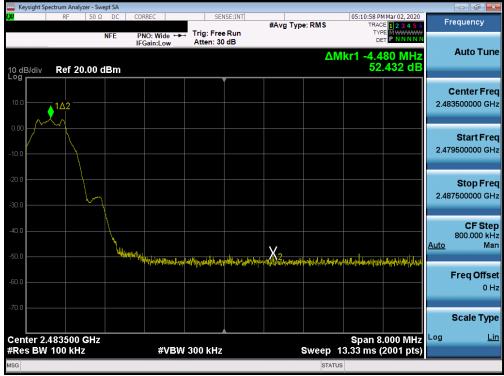
Plot 7-40. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: ZNFQ630UM	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of E6
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 39 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019





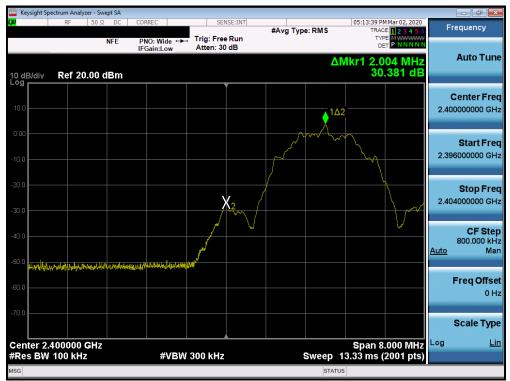
Plot 7-41. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 0)



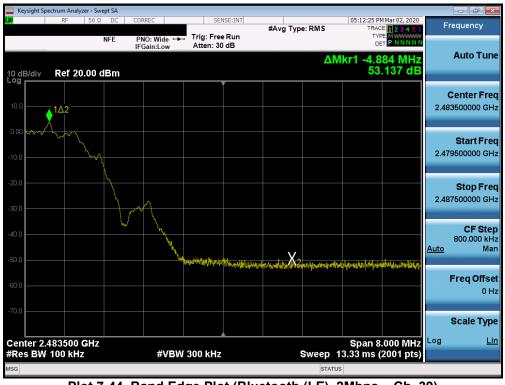
Plot 7-42. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 40 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 40 of 56
© 2020 PCTEST				V 9 0 02/01/2019





Plot 7-43. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 0)



Plot 7-44. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 41 of 56
© 2020 PCTEST				V 9.0 02/01/2019



7.6 Conducted Spurious Emissions §15.247(d); RSS-247 [5.5]

Test Overview and Limit

For the following out of band conducted spurious emissions plots, the EUT was set to transmit at maximum power with the largest packet size available. The worst case spurious emissions were found in this configuration.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the procedure in Section 8.5 of KDB 558074 D01 v05r02 and Section 11.11.3 of ANSI C63.10-2013.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.5

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = Peak
- 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 7-5. Test Instrument & Measurement Setup

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 42 of 56
© 2020 PCTEST	•	•		V 0 0 02/01/2010



Test Notes

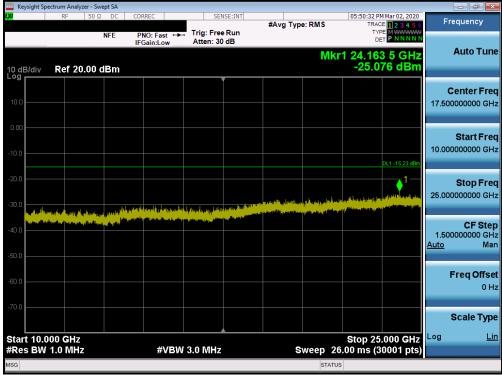
- 1. RBW was set to 1MHz rather than 100kHz in order to increase the measurement speed.
- 2. The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1MHz bandwidth.
- 3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

FCC ID: ZNFQ630UM	<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 42 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 43 of 56
© 2020 PCTEST	<u>.</u>			V 9.0 02/01/2019



SENSE:INT	#Avg Typ		TRAC TYI DI	MMar 02, 2020 C 1 2 3 4 5 6 PE P NNNNN 4 7 GHz 43 dBm DL1 -15 23 dBm	Auto Tu Center F 5.015000000 0 Start F 30.000000 M
: 30 dB		Mk	r1 9.22	4 7 GHz 43 dBm	Auto Tu Center F 5.015000000 0 Start F 30.000000 M
				DL1 -15 23 dBn	5.015000000 0 Start F 30.000000 M
				DL1 -15.23 dBm	30.000000 N
				1	Stop F 10.0000000000
			, jungani pangana sa ju		CF Si 997.000000 M <u>Auto</u> M
					Freq Off C
					Scale Ty
Hz	s	weep 18	Stop 10 .00 ms (3).000 GHz 30001 pts)	Log
	łz		Hz Sweep 18	Stop 10	Stop 10.000 GHz tz Sweep 18.00 ms (30001 pts)

Plot 7-45. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 0)



Plot 7-46. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 0)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 44 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 44 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019



Da RF 10 dB/div Ref 20 10 0	0.00 dBm	CORREC PNO: Fast ↔ IFGain:Low	SENSE:1	#Av	g Type: RMS	TRA TY C Mkr1 9.59	MMar 02, 2020 C 1 2 3 4 5 6 PE MANNAN 0 9 GHz 580 dBm	Frequence Auto ⁻ Center 5.015000000 Start 30.000000
Log 10.0 .0.0	0.00 dBm				· · · · · · · · · · · · · · · · · · ·	/kr1 9.59 -31.5	580 dBm	Center 5.015000000 Start
10.0 0.00 -10.0 -20.0 -30.0 -40.0							DL1 -14.14 dBm	5.015000000 Start
-10.0 -20.0 -30.0 -40.0							DL1 -14.14 dBm	
-30.0								
and the second se								Stop 10.00000000
								CF 997.000000 <u>Auto</u>
-60.0								Freq O
-70.0						Stop 10	0.000 GHz	Scale
#Res BW 1.0 MH						18.00 ms (

Plot 7-47. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 19)



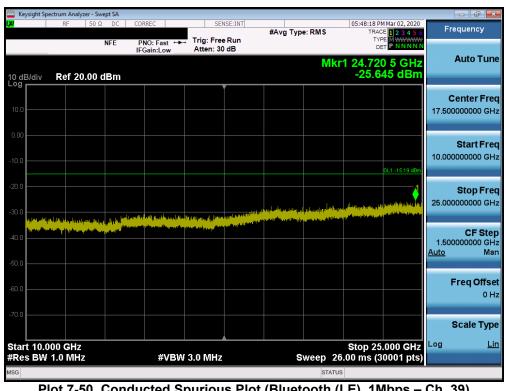
Plot 7-48. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 19)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 45 of 56
© 2020 PCTEST		•		V 9.0 02/01/2019



🔤 Keysight Sp		yzer - Swept S										
<mark>XI</mark>	RF	50Ω D		RREC		NSE:INT	#Avg Typ	e:RMS	TF	PM Mar 02, 2020 RACE 1 2 3 4 5 6	Freque	ency
		NFE		NO:Fast ← Gain:Low	Atten: 30					DET P NNNN	_	_
10 dB/div	Ref 2	0.00 dBr	n					N	/kr1 7.2 -33.	01 1 GHz 185 dBm	Aut	to Tun
						Ĭ					Cent	er Fre
10.0											5.015000	000 GH
0.00											Sta	art Free
10.0										DL1 -15.19 dBm	30.000	000 MH
20.0											Ct	op Fre
30.0								1			10.000000	
50.0						يقتن بأتب يتألب	الارساط با مطالع المالي	a shi sata sa	L.A. Datasettasiden	erit _{pe} ringeripaan ville		CF Ste
40.0	and the party of the second		an agama an			ŠŠŠ	14	in aller offered	<u>h.tesh</u> likin dalim tilike		997.000 <u>Auto</u>	
50.0 												
60.0											Free	Offse 0 H
70.0												UTI
											Sca	Іе Тур
Start 30 M Res BW		7		#\/P	W 3.0 MHz			ween	Stop 1	10.000 GHz (30001 pts)	Log	Li
ISG	NO WIN	4		#VD	W 3.0 WHZ			STA		(5000 Pits)		

Plot 7-49. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39)



Plot 7-50. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 46 of 56	
© 2020 PCTEST		•		V 9.0 02/01/2019	



7.7 Radiated Spurious Emission Measurements §15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-5 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-5. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3

KDB 558074 D01 v05r02 - Section 8.6, 8.7

Test Settings

Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3kHz > 1/T
- 4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
- 5. Detector = peak
- 6. Sweep time = auto
- 7. Trace mode = max hold
- 8. Trace was allowed to run for at least 50 times (1/duty cycle) traces

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕞 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	2 - 03/13/2020 Portable Handset		Page 47 of 56	
© 2020 PCTEST				V 9 0 02/01/2019	



Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW is set depending on measurement frequency, as specified in Table 7-6 below
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

Frequency	RBW
9 – 150kHz	200 – 300Hz
0.15 – 30MHz	9 – 10kHz
30 – 1000MHz	100 – 120kHz
> 1000MHz	1MHz

Table 7-6. RBW as a Function of Frequency

Test Setup

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

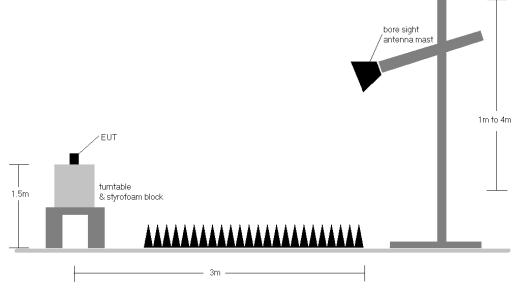


Figure 7-6. Radiated Test Setup >1GHz

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 40 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	020 Portable Handset		Page 48 of 56
© 2020 PCTEST		•		V 9.0 02/01/2019



Test Notes

- 1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
- 2. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-5.
- 3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- 4. This unit was tested with its standard battery.
- 5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 6. Average measurements were recorded using a VBW of 3kHz, per Section 4.1.4.2.3 of ANSI C63.10-2013, since 1/T is equal to just under 3kHz. This method was used because the EUT could not be configured to operate with a duty cycle > 98%. Both average and peak measurements were made using a peak detector
- 7. 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.
- 8. No significant radiated band edge emissions were found in the 2310 2390MHz restricted band.
- 9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

- \circ Field Strength Level [dBµV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- $\circ \quad \text{Margin}_{[dB]} = \text{Field Strength Level}_{[dB\mu V/m]} \text{Limit}_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

• The amplitude offset shown in the radiated restricted band edge plots in Section 7.8 was calculated using the formula:

Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

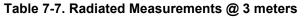
FCC ID: ZNFQ630UM	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 56	
1M2002110017-07.ZNF	02/12 - 03/13/2020	03/13/2020 Portable Handset		Page 49 of 56	
© 2020 PCTEST				V 9.0 02/01/2019	



Radiated Spurious Emission Measurements §15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2402MHz
Channel:	0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	V	152	58	-76.35	2.97	33.62	53.98	-20.36
4804.00	Peak	V	152	58	-65.61	2.97	44.36	73.98	-29.62
12010.00	Avg	V	-	-	-77.86	14.09	43.23	53.98	-10.75
12010.00	Peak	V	-	-	-66.73	14.09	54.36	73.98	-19.62



Bluetooth Mode: Distance of Measurements: **Operating Frequency:** Channel:

LE 3 Meters 2440MHz 19

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4880.00	Avg	V	154	356	-76.61	3.85	34.24	53.98	-19.74
4880.00	Peak	V	154	356	-65.83	3.85	45.02	73.98	-28.96
7320.00	Avg	V	-	-	-77.56	7.86	37.30	53.98	-16.68
7320.00	Peak	V	-	-	-66.64	7.86	48.22	73.98	-25.76
12200.00	Avg	V	-	-	-77.87	14.03	43.16	53.98	-10.82
12200.00	Peak	V	-	-	-66.96	14.03	54.07	73.98	-19.91

Table 7-8. Radiated Measurements @ 3 meters

FCC ID: ZNFQ630UM	<u>CAPCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 50 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 50 of 56
© 2020 PCTEST	•	·		V 9.0 02/01/2019

© 2020 PCTEST



Radiated Spurious Emission Measurements §15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2480MHz
Channel:	39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	V	178	90	-76.65	3.61	33.96	53.98	-20.02
4960.00	Peak	V	178	90	-65.14	3.61	45.47	73.98	-28.51
7440.00	Avg	V	-	-	-77.00	8.30	38.30	53.98	-15.68
7440.00	Peak	V	-	-	-65.59	8.30	49.71	73.98	-24.27
12400.00	Avg	V	-	-	-77.91	14.09	43.18	53.98	-10.80
12400.00	Peak	V	-	-	-67.19	14.09	53.90	73.98	-20.08

Table 7-9. Radiated Measurements @ 3 meters

FCC ID: ZNFQ630UM	<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:		Dege E1 of E6
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 51 of 56
© 2020 PCTEST				V 9.0 02/01/2019



7.8 Radiated Restricted Band Edge Measurements §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

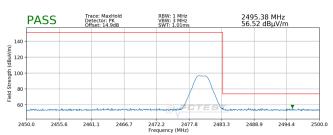
The amplitude offset shown in the following plots for average measurements was calculated using the formula:

Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

Bluetooth Mode:	LE
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	39



Plot 7-51. Radiated Restricted Upper Band Edge Measurement (Average)



Plot 7-52. Radiated Restricted Upper Band Edge Measurement (Peak)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 52 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 52 of 56
© 2020 PCTEST		÷		V 9 0 02/01/2019



7.9 Line-Conducted Test Data §15.207; RSS-Gen [8.8]

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below, per Section 15.207 and RSS-Gen (8.8).

Frequency of emission (MHz)	Conducted Limit (dBµV)		
	Quasi-peak	Average	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30	60	50	

Table 7-10. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

Average Field Strength Measurements

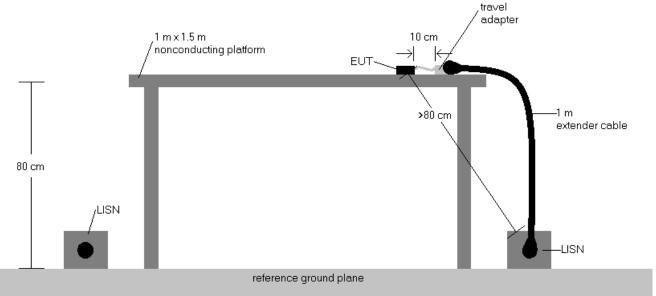
- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 56
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 53 of 56
© 2020 PCTEST	•	•		V 9 0 02/01/2019



Test Setup

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



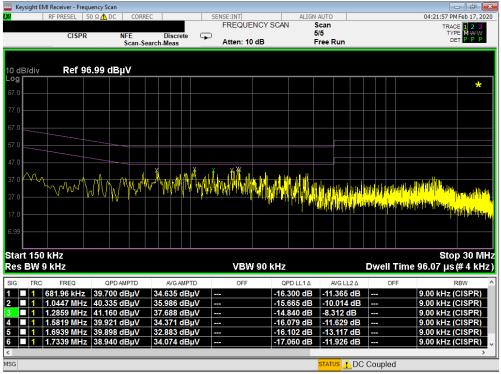


Test Notes

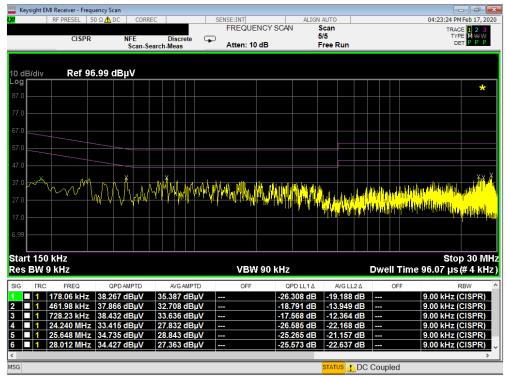
- All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in Part 15.207 and RSS-Gen (8.8).
- 3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- 4. QP/AV Level (dB μ V) = QP/AV Analyzer/Receiver Level (dB μ V) + Corr. (dB)
- 5. Margin (dB) = QP/AV Limit (dBµV) QP/AV Level (dBµV)
- 6. Traces shown in plot are made using a peak detector.
- 7. Deviations to the Specifications: None.

FCC ID: ZNFQ630UM	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage E4 of E6
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 54 of 56
© 2020 PCTEST		•		V 9.0 02/01/2019









Plot 7-54. Line Conducted Plot with Bluetooth LE (N)

FCC ID: ZNFQ630UM	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege EE of EG
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset		Page 55 of 56
© 2020 PCTEST		•		V 9 0 02/01/2019



8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFQ630UM** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

FCC ID: ZNFQ630UM	<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 FC of FC
1M2002110017-07.ZNF	02/12 - 03/13/2020	Portable Handset	Page 56 of 56
© 2020 PCTEST			V 9.0 02/01/2019