



MEASUREMENT REPORT LTE

Applicant Name:

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

Date of Testing:

12/30/2019 - 1/8/2020

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1911290211-03-R1.ZNF

FCC ID:

ZNFL455DL

APPLICANT:

LG Electronics USA, Inc.

Application Type:

Class II Permissive Change

Model:

LG L455DL

Additional Model(s):

LG-L455DL, LM-K400UM, LM-K400MM, LM-K400QM,
LM-K400VPP, LM-K400QM5, LM-K400QM6, LGL455DL,
LMK400UM, LMK400MM, LMK400QM, LMK400QM5, LMK400QM6,
LMK400VPP, L455DL, K400UM, K400MM, K400QM, K400QM5,
K400QM6, K400VPP

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part(s):

22, 24, & 27

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:

12/23/2019

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.

This revised Test Report (S/N: 1M1911290211-03-R1.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

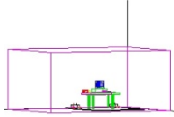


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T A B L E O F C O N T E N T S

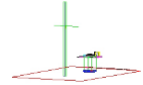
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FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	
LTE Band 71	27	665.5 - 695.5	0.090	19.55			QPSK
LTE Band 71	27	665.5 - 695.5	0.070	18.43			16QAM
LTE Band 71	27	665.5 - 695.5	0.055	17.37			64QAM
LTE Band 71	27	668 - 693	0.088	19.46			QPSK
LTE Band 71	27	668 - 693	0.072	18.57			16QAM
LTE Band 71	27	668 - 693	0.057	17.56			64QAM
LTE Band 71	27	670.5 - 690.5	0.086	19.35			QPSK
LTE Band 71	27	670.5 - 690.5	0.071	18.54			16QAM
LTE Band 71	27	670.5 - 690.5	0.056	17.48			64QAM
LTE Band 71	27	673 - 688	0.114	20.55			QPSK
LTE Band 71	27	673 - 688	0.096	19.82			16QAM
LTE Band 71	27	673 - 688	0.071	18.53			64QAM
LTE Band 12	27	699.7 - 715.3	0.139	21.44	0.229	23.59	QPSK
LTE Band 12	27	699.7 - 715.3	0.110	20.43	0.181	22.58	16QAM
LTE Band 12	27	699.7 - 715.3	0.085	19.28	0.139	21.43	64QAM
LTE Band 12	27	700.5 - 714.5	0.140	21.45	0.229	23.60	QPSK
LTE Band 12	27	700.5 - 714.5	0.110	20.41	0.180	22.56	16QAM
LTE Band 12	27	700.5 - 714.5	0.086	19.34	0.141	21.49	64QAM
LTE Band 12	27	701.5 - 713.5	0.139	21.44	0.229	23.59	QPSK
LTE Band 12	27	701.5 - 713.5	0.108	20.35	0.178	22.50	16QAM
LTE Band 12	27	701.5 - 713.5	0.088	19.45	0.145	21.60	64QAM
LTE Band 12	27	704 - 711	0.134	21.26	0.219	23.41	QPSK
LTE Band 12	27	704 - 711	0.108	20.34	0.177	22.49	16QAM
LTE Band 12	27	704 - 711	0.089	19.48	0.146	21.63	64QAM
LTE Band 13	27	779.5 - 784.5	0.150	21.77	0.247	23.92	QPSK
LTE Band 13	27	779.5 - 784.5	0.128	21.06	0.209	23.21	16QAM
LTE Band 13	27	779.5 - 784.5	0.098	19.90	0.160	22.05	64QAM
LTE Band 13	27	782	0.137	21.37	0.225	23.52	QPSK
LTE Band 13	27	782	0.109	20.38	0.179	22.53	16QAM
LTE Band 13	27	782	0.086	19.34	0.141	21.49	64QAM
LTE Band 26/5	22H	824.7 - 848.3	0.109	20.38	0.179	22.53	QPSK
LTE Band 26/5	22H	824.7 - 848.3	0.090	19.52	0.147	21.67	16QAM
LTE Band 26/5	22H	824.7 - 848.3	0.072	18.60	0.119	20.75	64QAM
LTE Band 26/5	22H	825.5 - 847.5	0.110	20.41	0.180	22.56	QPSK
LTE Band 26/5	22H	825.5 - 847.5	0.092	19.63	0.151	21.78	16QAM
LTE Band 26/5	22H	825.5 - 847.5	0.071	18.51	0.116	20.66	64QAM
LTE Band 26/5	22H	826.5 - 846.5	0.112	20.49	0.184	22.64	QPSK
LTE Band 26/5	22H	826.5 - 846.5	0.092	19.63	0.151	21.78	16QAM
LTE Band 26/5	22H	826.5 - 846.5	0.072	18.55	0.117	20.70	64QAM
LTE Band 26/5	22H	829 - 844	0.106	20.27	0.175	22.42	QPSK
LTE Band 26/5	22H	829 - 844	0.085	19.27	0.139	21.42	16QAM
LTE Band 26/5	22H	829 - 844	0.069	18.40	0.114	20.55	64QAM
LTE Band 26	22H	831.5 - 841.5	0.115	20.62	0.189	22.77	QPSK
LTE Band 26	22H	831.5 - 841.5	0.091	19.58	0.149	21.73	16QAM
LTE Band 26	22H	831.5 - 841.5	0.070	18.44	0.115	20.59	64QAM

EUT Overview (<1 GHz)

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Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 66/4	27	1710.7 - 1779.3	0.289	24.60	QPSK
LTE Band 66/4	27	1710.7 - 1779.3	0.237	23.74	16QAM
LTE Band 66/4	27	1710.7 - 1779.3	0.181	22.57	64QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.299	24.75	QPSK
LTE Band 66/4	27	1711.5 - 1778.5	0.246	23.91	16QAM
LTE Band 66/4	27	1711.5 - 1778.5	0.186	22.70	64QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.304	24.83	QPSK
LTE Band 66/4	27	1712.5 - 1777.5	0.253	24.02	16QAM
LTE Band 66/4	27	1712.5 - 1777.5	0.196	22.92	64QAM
LTE Band 66/4	27	1715 - 1775	0.307	24.86	QPSK
LTE Band 66/4	27	1715 - 1775	0.257	24.10	16QAM
LTE Band 66/4	27	1715 - 1775	0.202	23.05	64QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.298	24.74	QPSK
LTE Band 66/4	27	1717.5 - 1772.5	0.256	24.08	16QAM
LTE Band 66/4	27	1717.5 - 1772.5	0.191	22.81	64QAM
LTE Band 66/4	27	1720 - 1770	0.282	24.50	QPSK
LTE Band 66/4	27	1720 - 1770	0.234	23.68	16QAM
LTE Band 66/4	27	1720 - 1770	0.172	22.36	64QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.355	25.50	QPSK
LTE Band 25/2	24E	1850.7 - 1914.3	0.283	24.52	16QAM
LTE Band 25/2	24E	1850.7 - 1914.3	0.216	23.34	64QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.354	25.49	QPSK
LTE Band 25/2	24E	1851.5 - 1913.5	0.286	24.56	16QAM
LTE Band 25/2	24E	1851.5 - 1913.5	0.221	23.45	64QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.361	25.57	QPSK
LTE Band 25/2	24E	1852.5 - 1912.5	0.277	24.42	16QAM
LTE Band 25/2	24E	1852.5 - 1912.5	0.223	23.49	64QAM
LTE Band 25/2	24E	1855 - 1910	0.355	25.50	QPSK
LTE Band 25/2	24E	1855 - 1910	0.285	24.55	16QAM
LTE Band 25/2	24E	1855 - 1910	0.223	23.48	64QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.345	25.38	QPSK
LTE Band 25/2	24E	1857.5 - 1907.5	0.271	24.33	16QAM
LTE Band 25/2	24E	1857.5 - 1907.5	0.208	23.19	64QAM
LTE Band 25/2	24E	1860 - 1905	0.343	25.35	QPSK
LTE Band 25/2	24E	1860 - 1905	0.277	24.43	16QAM
LTE Band 25/2	24E	1860 - 1905	0.216	23.34	64QAM

EUT Overview (Mid Bands)

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Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.348	25.41	QPSK
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.278	24.44	16QAM
LTE Band 41 (PC2)	27	2498.5 - 2687.5	0.223	23.47	64QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.349	25.42	QPSK
LTE Band 41 (PC2)	27	2501 - 2685	0.288	24.59	16QAM
LTE Band 41 (PC2)	27	2501 - 2685	0.218	23.38	64QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.351	25.45	QPSK
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.309	24.89	16QAM
LTE Band 41 (PC2)	27	2503.5 - 2682.5	0.240	23.79	64QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.392	25.93	QPSK
LTE Band 41 (PC2)	27	2506 - 2680	0.296	24.71	16QAM
LTE Band 41 (PC2)	27	2506 - 2680	0.227	23.56	64QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.197	22.93	QPSK
LTE Band 41 (PC3)	27	2506 - 2680	0.151	21.79	16QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.123	20.91	64QAM

EUT Overview (High Bands)

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

1.3 Test Facility / Accreditations

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

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

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFL455DL**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 05599, 05581

2.2 Device Capabilities

This device contains the following capabilities:

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

LTE Band 26 (814.7 – 849 MHz) overlaps the entire frequency range of LTE Band 5 (824 – 849 MHz). Therefore, test data provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

LTE Band 25 (1850 - 1915 MHz) overlaps the entire frequency range of LTE Band 2 (1850 - 1910 MHz). Therefore, test data provided in this report covers Band 2 as well as Band 25.

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 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

3.2 Block C Frequency Range

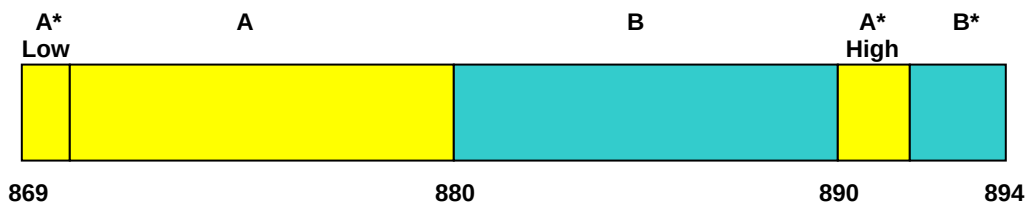
Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

3.3 Block A Frequency Range

698-746 MHz band. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz;
Block B: 704-710 MHz and 734-740 MHz; and
Block C: 710-716 MHz and 740-746 MHz.

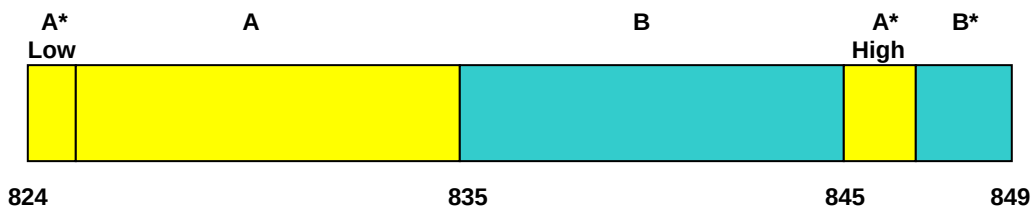
3.4 Cellular - Base Frequency Blocks



BLOCK 1: 869 – 880 MHz (A* Low + A)
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)
BLOCK 4: 891.5 – 894 MHz (B*)

3.5 Cellular - Mobile Frequency Blocks

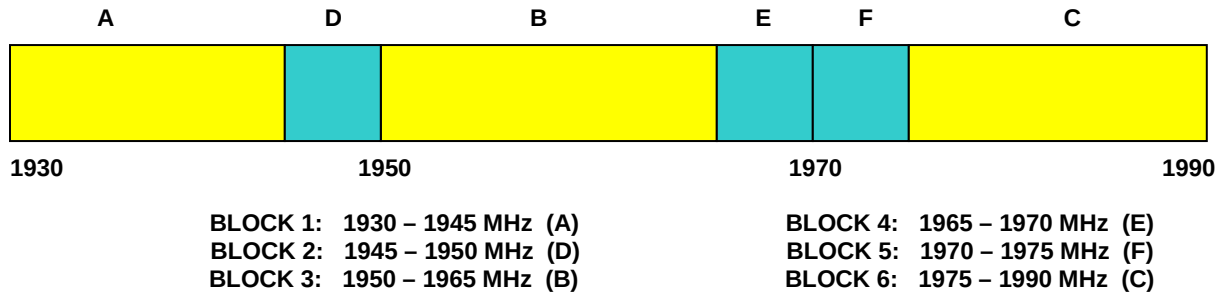


BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

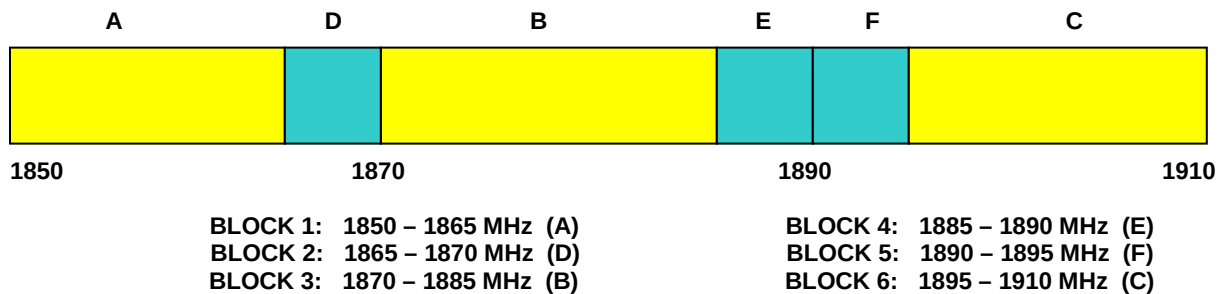
BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

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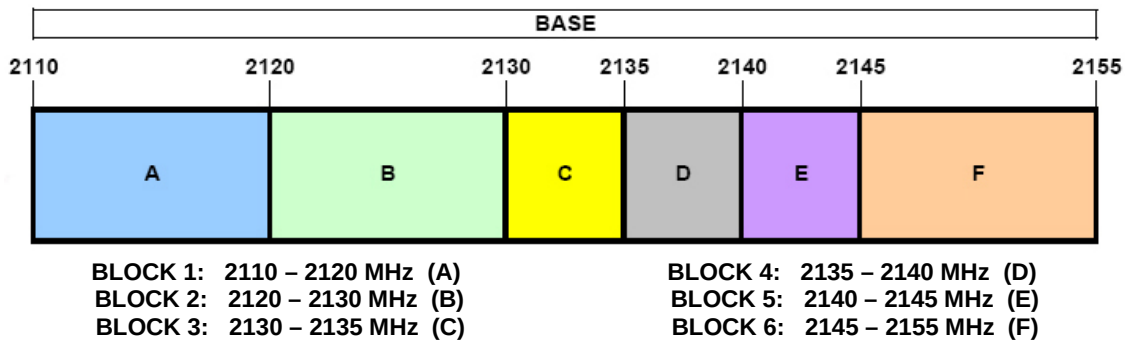
3.6 PCS - Base Frequency Blocks



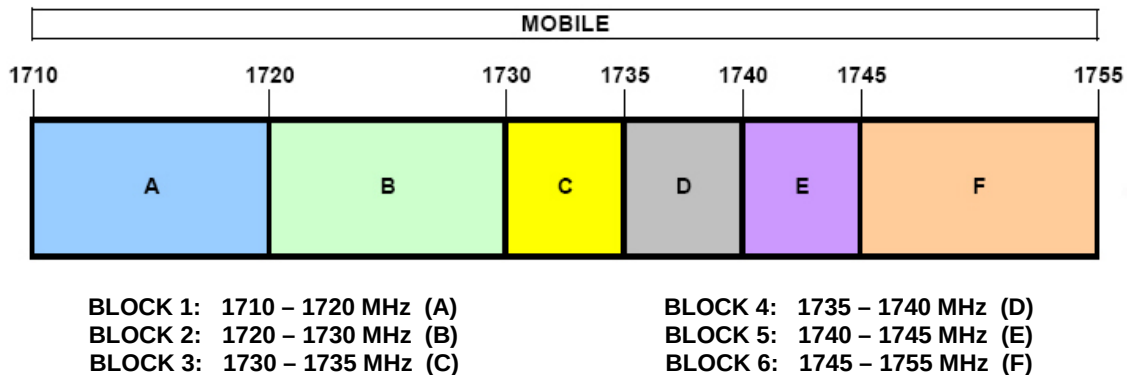
3.7 PCS - Mobile Frequency Blocks



3.8 AWS - Base Frequency Blocks



3.9 AWS - Mobile Frequency Blocks



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3.10 WCS – Mobile/Base Frequency Blocks

The following frequencies are available for WCS in the 2305-2320 MHz and 2345-2360 MHz bands:

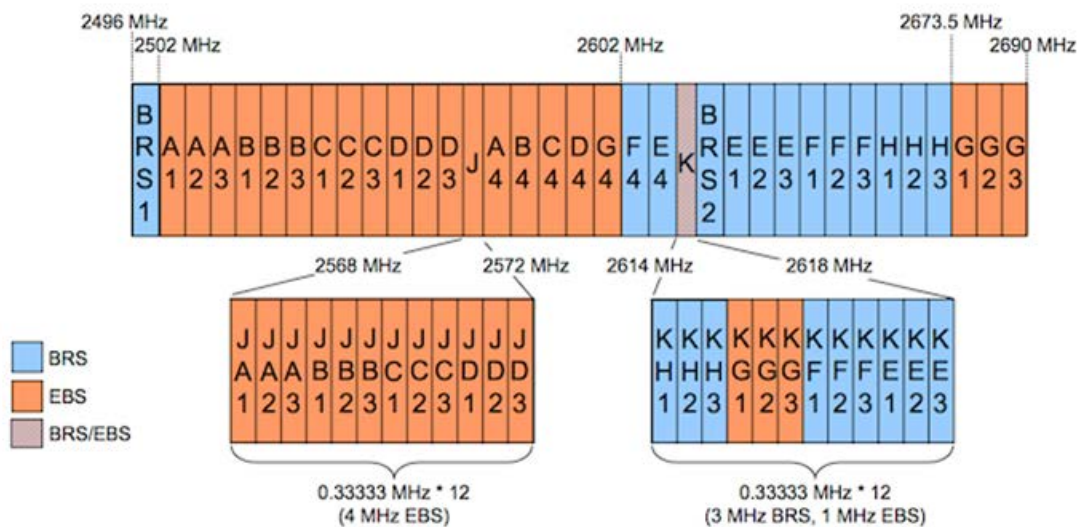
BLOCK 1: 2305-2310 and 2350-2355 MHz (A)

BLOCK 2: 2310-2315 and 2355-236 MHz (B)

BLOCK 3: 2315-2320 MHz (C)

BLOCK 4: 2345-2350 MHz (D)

3.11 BRS/EBS Frequency Block



3.12 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also

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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:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

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 $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10 \log_{10}(\text{Power}_{\text{[Watts]}})$. For Band 41, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of $55 + 10 \log_{10}(\text{Power}_{\text{[Watts]}})$. For Band 30, the calculated P_d levels are compared to the absolute spurious emission limit of -40dBm which is equivalent to the required minimum attenuation of $70 + 10 \log_{10}(\text{Power}_{\text{[Watts]}})$.

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 ($\pm$ 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
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
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/19/2019	Annual	4/19/2020	11401010036
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	4/20/2019	Annual	4/20/2020	11210140001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
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

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: ZNFL455DL
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 26/5)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.2
27.50(b)(10) 27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 71, 12, 13)	< 3 Watts max. ERP			Section 7.2
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 25/2, 71, 41)	< 2 Watts max. EIRP			Section 7.2
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66/4)	< 1 Watts max. EIRP			Section 7.2
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions (Band 12, 26/5, 66/4, 25/2)	> 43 + 10 log ₁₀ (P[Watts]) for all out-of-band emissions			Section 7.3
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz			Section 7.3
27.53(m)	Undesirable Emissions (Band 41)	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3
27.53(m)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3

Table 7-1. Summary of Radiated Test Results

Notes:

All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

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7.2 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. 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. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
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.

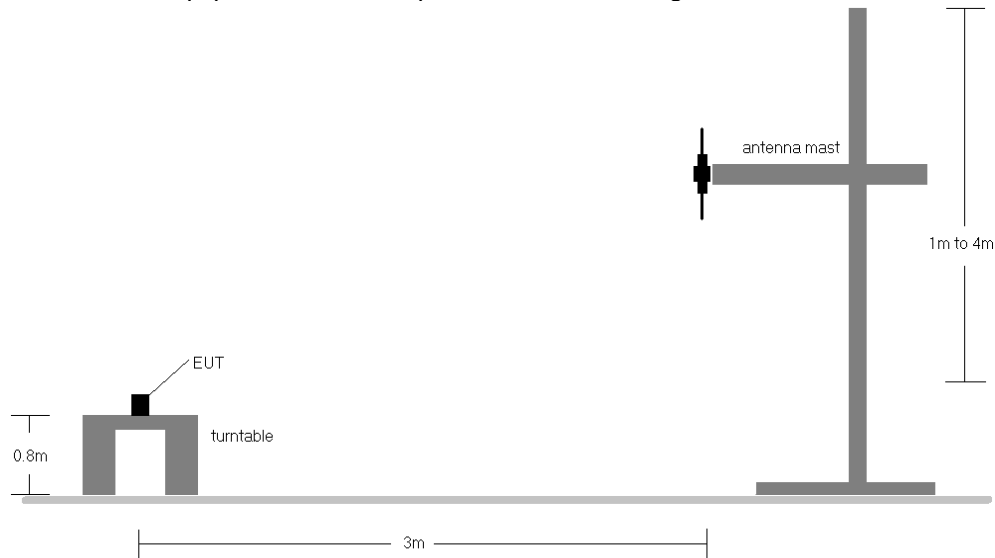


Figure 7-1. Radiated Test Setup <1GHz

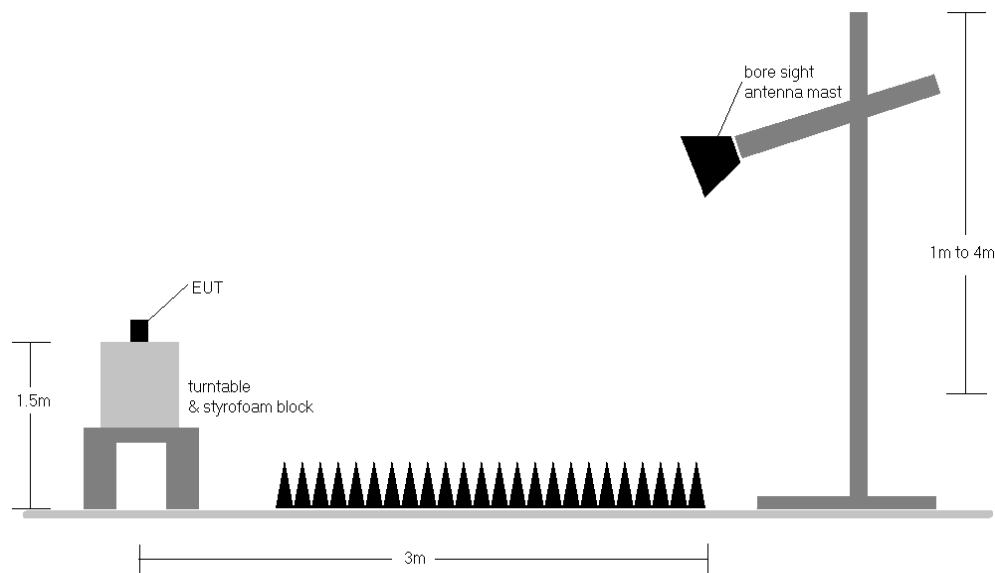


Figure 7-2. Radiated Test Setup >1GHz

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.

FCC ID: ZNFL455DL	PCTEST	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
665.50	5	QPSK	V	172	336	1 / 24	17.94	3.75	19.54	0.090	34.77	-15.23
680.50	5	QPSK	V	182	337	1 / 12	17.45	4.20	19.50	0.089	34.77	-15.27
695.50	5	QPSK	V	158	340	1 / 24	17.20	4.50	19.55	0.090	34.77	-15.22
695.50	5	16-QAM	V	158	340	1 / 24	16.08	4.50	18.43	0.070	34.77	-16.34
695.50	5	64-QAM	V	158	340	1 / 24	15.02	4.50	17.37	0.055	34.77	-17.40
668.00	10	QPSK	V	172	336	1 / 25	17.81	3.80	19.46	0.088	34.77	-15.31
680.50	10	QPSK	V	182	337	1 / 25	17.36	4.20	19.41	0.087	34.77	-15.36
693.00	10	QPSK	V	158	340	1 / 25	17.17	4.40	19.42	0.087	34.77	-15.35
668.00	10	16-QAM	V	172	336	1 / 25	16.92	3.80	18.57	0.072	34.77	-16.20
668.00	10	64-QAM	V	172	336	1 / 25	15.91	3.80	17.56	0.057	34.77	-17.21
670.50	15	QPSK	V	172	336	1 / 74	17.46	3.90	19.21	0.083	34.77	-15.56
680.50	15	QPSK	V	182	337	1 / 36	17.30	4.20	19.35	0.086	34.77	-15.42
690.50	15	QPSK	V	158	340	1 / 0	17.08	4.40	19.33	0.086	34.77	-15.44
680.50	15	16-QAM	V	182	337	1 / 36	16.49	4.20	18.54	0.071	34.77	-16.23
680.50	15	64-QAM	V	182	337	1 / 36	15.43	4.20	17.48	0.056	34.77	-17.29
673.00	20	QPSK	V	172	336	1 / 99	17.18	4.00	19.03	0.080	34.77	-15.74
680.50	20	QPSK	V	182	337	1 / 99	17.42	4.20	19.47	0.089	34.77	-15.30
688.00	20	QPSK	V	158	340	1 / 99	18.30	4.40	20.55	0.114	34.77	-14.22
688.00	20	16-QAM	V	158	340	1 / 99	17.57	4.40	19.82	0.096	34.77	-14.95
688.00	20	64-QAM	V	158	340	1 / 99	16.28	4.40	18.53	0.071	34.77	-16.24
688.00	20	QPSK	H	100	29	1 / 99	17.24	3.30	18.39	0.069	34.77	-16.38

Table 7-2. ERP Data (Band 71)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	160	328	1 / 2	19.09	4.50	21.44	0.139	34.77	-13.33	23.59	0.229	36.99	-13.40
707.50	1.4	QPSK	V	163	326	1 / 2	18.96	4.60	21.41	0.138	34.77	-13.36	23.56	0.227	36.99	-13.43
715.30	1.4	QPSK	V	156	322	1 / 2	18.82	4.63	21.30	0.135	34.77	-13.47	23.45	0.221	36.99	-13.54
699.70	1.4	16-QAM	V	160	328	1 / 2	18.08	4.50	20.43	0.110	34.77	-14.34	22.58	0.181	36.99	-14.41
699.70	1.4	64-QAM	V	160	328	1 / 2	16.93	4.50	19.28	0.085	34.77	-15.49	21.43	0.139	36.99	-15.56
700.50	3	QPSK	V	160	328	1 / 7	19.03	4.55	21.43	0.139	34.77	-13.34	23.58	0.228	36.99	-13.41
707.50	3	QPSK	V	163	326	1 / 7	18.99	4.60	21.44	0.139	34.77	-13.33	23.59	0.229	36.99	-13.40
714.50	3	QPSK	V	156	322	1 / 7	19.00	4.60	21.45	0.140	34.77	-13.32	23.60	0.229	36.99	-13.39
714.50	3	16-QAM	V	156	322	1 / 7	17.96	4.60	20.41	0.110	34.77	-14.36	22.56	0.180	36.99	-14.43
714.50	3	64-QAM	V	156	322	1 / 7	16.89	4.60	19.34	0.086	34.77	-15.43	21.49	0.141	36.99	-15.50
701.50	5	QPSK	V	160	328	1 / 12	18.96	4.60	21.41	0.138	34.77	-13.36	23.56	0.227	36.99	-13.43
707.50	5	QPSK	V	163	326	1 / 12	18.99	4.60	21.44	0.139	34.77	-13.33	23.59	0.229	36.99	-13.40
713.50	5	QPSK	V	156	322	1 / 12	18.97	4.60	21.42	0.139	34.77	-13.35	23.57	0.228	36.99	-13.42
707.50	5	16-QAM	V	163	326	1 / 12	17.90	4.60	20.35	0.108	34.77	-14.42	22.50	0.178	36.99	-14.49
707.50	5	64-QAM	V	163	326	1 / 12	17.00	4.60	19.45	0.088	34.77	-15.32	21.60	0.145	36.99	-15.39
704.00	10	QPSK	V	160	328	1 / 0	18.74	4.50	21.09	0.129	34.77	-13.68	23.24	0.211	36.99	-13.75
707.50	10	QPSK	V	163	326	1 / 0	18.81	4.60	21.26	0.134	34.77	-13.51	23.41	0.219	36.99	-13.58
711.00	10	QPSK	V	156	322	1 / 0	18.25	4.60	20.70	0.117	34.77	-14.07	22.85	0.193	36.99	-14.14
707.50	10	16-QAM	V	163	326	1 / 0	17.89	4.60	20.34	0.108	34.77	-14.43	22.49	0.177	36.99	-14.50
707.50	10	64-QAM	V	163	326	1 / 0	17.03	4.60	19.48	0.089	34.77	-15.29	21.63	0.146	36.99	-15.36
714.50	3	QPSK	H	263	27	1 / 7	17.75	3.65	19.25	0.084	34.77	-15.52	21.40	0.138	36.99	-15.59

Table 7-3. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	100	81	1 / 12	17.89	5.80	21.54	0.143	34.77	-13.23	23.69	0.234	36.99	-13.30
782.00	5	QPSK	H	100	81	1 / 12	18.12	5.80	21.77	0.150	34.77	-13.00	23.92	0.247	36.99	-13.07
784.50	5	QPSK	H	100	81	1 / 12	17.75	5.90	21.50	0.141	34.77	-13.27	23.65	0.232	36.99	-13.34
782.00	5	16-QAM	H	100	81	1 / 12	17.41	5.80	21.06	0.128	34.77	-13.71	23.21	0.209	36.99	-13.78
782.00	5	64-QAM	H	100	81	1 / 12	16.25	5.80	19.90	0.098	34.77	-14.87	22.05	0.160	36.99	-14.94
782.00	10	QPSK	H	100	81	1 / 49	17.72	5.80	21.37	0.137	34.77	-13.40	23.52	0.225	36.99	-13.47
782.00	10	16-QAM	H	100	81	1 / 49	16.73	5.80	20.38	0.109	34.77	-14.39	22.53	0.179	36.99	-14.46
782.00	10	64-QAM	H	100	81	1 / 49	15.69	5.80	19.34	0.086	34.77	-15.43	21.49	0.141	36.99	-15.50
782.00	5	QPSK	V	156	185	1 / 12	16.16	5.80	19.81	0.096	34.77	-14.96	21.96	0.157	36.99	-15.03

Table 7-4. ERP Data (Band 13)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	139	172	1 / 2	16.23	6.30	20.38	0.109	38.45	-18.07	22.53	0.179	40.61	-18.08
836.50	1.4	QPSK	V	145	174	1 / 2	16.09	6.40	20.34	0.108	38.45	-18.11	22.49	0.177	40.61	-18.12
848.30	1.4	QPSK	V	149	170	1 / 2	15.97	6.50	20.32	0.108	38.45	-18.13	22.47	0.177	40.61	-18.14
824.70	1.4	16-QAM	V	139	172	1 / 2	15.37	6.30	19.52	0.090	38.45	-18.93	21.67	0.147	40.61	-18.94
824.70	1.4	64-QAM	V	139	172	1 / 2	14.45	6.30	18.60	0.072	38.45	-19.85	20.75	0.119	40.61	-19.86
825.50	3	QPSK	V	139	172	1 / 7	16.20	6.30	20.35	0.108	38.45	-18.10	22.50	0.178	40.61	-18.11
836.50	3	QPSK	V	145	174	1 / 7	16.16	6.40	20.41	0.110	38.45	-18.04	22.56	0.180	40.61	-18.05
847.50	3	QPSK	V	149	170	1 / 7	16.05	6.50	20.40	0.110	38.45	-18.05	22.55	0.180	40.61	-18.06
836.50	3	16-QAM	V	145	174	1 / 7	15.38	6.40	19.63	0.092	38.45	-18.82	21.78	0.151	40.61	-18.83
836.50	3	64-QAM	V	145	174	1 / 7	14.26	6.40	18.51	0.071	38.45	-19.94	20.66	0.116	40.61	-19.95
826.50	5	QPSK	V	139	172	1 / 12	16.23	6.30	20.38	0.109	38.45	-18.07	22.53	0.179	40.61	-18.08
836.50	5	QPSK	V	145	174	1 / 12	16.24	6.40	20.49	0.112	38.45	-17.96	22.64	0.184	40.61	-17.97
846.50	5	QPSK	V	149	170	1 / 12	16.10	6.50	20.45	0.111	38.45	-18.00	22.60	0.182	40.61	-18.01
836.50	5	16-QAM	V	145	174	1 / 12	15.38	6.40	19.63	0.092	38.45	-18.82	21.78	0.151	40.61	-18.83
836.50	5	64-QAM	V	145	174	1 / 12	14.30	6.40	18.55	0.072	38.45	-19.90	20.70	0.117	40.61	-19.91
829.00	10	QPSK	V	139	172	1 / 0	14.67	6.30	18.82	0.076	38.45	-19.63	20.97	0.125	40.61	-19.64
836.50	10	QPSK	V	145	174	1 / 49	15.01	6.40	19.26	0.084	38.45	-19.19	21.41	0.138	40.61	-19.20
844.00	10	QPSK	V	149	170	1 / 49	16.02	6.40	20.27	0.106	38.45	-18.18	22.42	0.175	40.61	-18.19
844.00	10	16-QAM	V	149	170	1 / 49	15.02	6.40	19.27	0.085	38.45	-19.18	21.42	0.139	40.61	-19.19
844.00	10	64-QAM	V	149	170	1 / 49	14.15	6.40	18.40	0.069	38.45	-20.05	20.55	0.114	40.61	-20.06
836.50	5	QPSK	H	183	14	1 / 12	15.07	6.60	19.52	0.090	38.45	-18.93	21.67	0.147	40.61	-18.94

Table 7-5. ERP Data (Band 26/5)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
831.50	15	QPSK	V	139	172	1 / 36	16.42	6.35	20.62	0.115	38.45	-17.83	22.77	0.189	40.61	-17.84
836.50	15	QPSK	V	145	174	1 / 36	16.05	6.40	20.30	0.107	38.45	-18.15	22.45	0.176	40.61	-18.16
841.50	15	QPSK	V	149	170	1 / 36	16.02	6.40	20.27	0.106	38.45	-18.18	22.42	0.175	40.61	-18.19
831.50	15	16-QAM	V	139	172	1 / 36	15.38	6.35	19.58	0.091	38.45	-18.87	21.73	0.149	40.61	-18.88
831.50	15	64-QAM	V	139	172	1 / 36	14.24	6.35	18.44	0.070	38.45	-20.01	20.59	0.115	40.61	-20.02

Table 7-6. ERP Data (Band 26)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset	Page 20 of 45	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	101	22	1 / 2	15.16	9.44	24.60	0.289	30.00	-5.40
1745.00	1.4	QPSK	H	100	14	1 / 2	15.36	9.23	24.59	0.288	30.00	-5.41
1779.30	1.4	QPSK	H	128	29	1 / 2	15.25	9.26	24.50	0.282	30.00	-5.50
1710.70	1.4	16-QAM	H	101	22	1 / 2	14.30	9.44	23.74	0.237	30.00	-6.26
1710.70	1.4	64-QAM	H	101	22	1 / 2	13.13	9.44	22.57	0.181	30.00	-7.43
1711.50	3	QPSK	H	101	22	1 / 7	15.32	9.44	24.75	0.299	30.00	-5.25
1745.00	3	QPSK	H	100	14	1 / 7	15.41	9.23	24.64	0.291	30.00	-5.36
1778.50	3	QPSK	H	128	29	1 / 7	15.41	9.26	24.66	0.293	30.00	-5.34
1711.50	3	16-QAM	H	101	22	1 / 7	14.48	9.44	23.91	0.246	30.00	-6.09
1711.50	3	64-QAM	H	101	22	1 / 7	13.27	9.44	22.70	0.186	30.00	-7.30
1712.50	5	QPSK	H	101	22	1 / 12	15.40	9.43	24.83	0.304	30.00	-5.17
1745.00	5	QPSK	H	100	14	1 / 12	15.38	9.23	24.61	0.289	30.00	-5.39
1777.50	5	QPSK	H	128	29	1 / 12	15.45	9.26	24.70	0.295	30.00	-5.30
1712.50	5	16-QAM	H	101	22	1 / 12	14.59	9.43	24.02	0.253	30.00	-5.98
1712.50	5	64-QAM	H	101	22	1 / 12	13.49	9.43	22.92	0.196	30.00	-7.08
1715.00	10	QPSK	H	101	22	1 / 25	15.45	9.42	24.86	0.307	30.00	-5.14
1745.00	10	QPSK	H	100	14	1 / 25	15.59	9.23	24.82	0.304	30.00	-5.18
1775.00	10	QPSK	H	128	29	1 / 25	15.55	9.25	24.80	0.302	30.00	-5.20
1715.00	10	16-QAM	H	101	22	1 / 25	14.69	9.42	24.10	0.257	30.00	-5.90
1715.00	10	64-QAM	H	101	22	1 / 25	13.64	9.42	23.05	0.202	30.00	-6.95
1717.50	15	QPSK	H	101	22	1 / 36	15.34	9.40	24.74	0.298	30.00	-5.26
1745.00	15	QPSK	H	100	14	1 / 36	15.49	9.23	24.72	0.297	30.00	-5.28
1772.50	15	QPSK	H	128	29	1 / 36	15.45	9.25	24.69	0.295	30.00	-5.31
1717.50	15	16-QAM	H	101	22	1 / 36	14.68	9.40	24.08	0.256	30.00	-5.92
1717.50	15	64-QAM	H	101	22	1 / 36	13.41	9.40	22.81	0.191	30.00	-7.19
1720.00	20	QPSK	H	101	22	1 / 99	15.12	9.38	24.50	0.282	30.00	-5.50
1745.00	20	QPSK	H	100	14	1 / 0	14.97	9.23	24.20	0.263	30.00	-5.80
1770.00	20	QPSK	H	128	29	1 / 99	14.37	9.24	23.61	0.230	30.00	-6.39
1720.00	20	16-QAM	H	101	22	1 / 99	14.30	9.38	23.68	0.234	30.00	-6.32
1720.00	20	64-QAM	H	101	22	1 / 99	12.98	9.38	22.36	0.172	30.00	-7.64
1715.00	10	QPSK	V	126	55	1 / 25	14.85	9.28	24.13	0.259	30.00	-5.87

Table 7-7. EIRP Data (Band 66/4)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1-ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 21 of 45

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	126	2	1 / 2	15.43	9.48	24.92	0.310	33.01	-8.09
1882.50	1.4	QPSK	H	117	12	1 / 2	15.20	9.94	25.14	0.326	33.01	-7.88
1914.30	1.4	QPSK	H	111	14	1 / 2	15.21	10.29	25.50	0.355	33.01	-7.51
1914.30	1.4	16-QAM	H	111	14	1 / 2	14.23	10.29	24.52	0.283	33.01	-8.49
1914.30	1.4	64-QAM	H	111	14	1 / 2	13.05	10.29	23.34	0.216	33.01	-9.67
1851.50	3	QPSK	H	126	2	1 / 7	15.51	9.50	25.01	0.317	33.01	-8.00
1882.50	3	QPSK	H	117	12	1 / 7	15.21	9.94	25.15	0.327	33.01	-7.87
1913.50	3	QPSK	H	111	14	1 / 7	15.20	10.29	25.49	0.354	33.01	-7.52
1913.50	3	16-QAM	H	111	14	1 / 7	14.27	10.29	24.56	0.286	33.01	-8.45
1913.50	3	64-QAM	H	111	14	1 / 7	13.16	10.29	23.45	0.221	33.01	-9.56
1852.50	5	QPSK	H	126	2	1 / 12	15.57	9.51	25.08	0.322	33.01	-7.93
1882.50	5	QPSK	H	117	12	1 / 12	15.25	9.94	25.19	0.330	33.01	-7.83
1912.50	5	QPSK	H	111	14	1 / 12	15.29	10.28	25.57	0.361	33.01	-7.44
1912.50	5	16-QAM	H	111	14	1 / 12	14.14	10.28	24.42	0.277	33.01	-8.59
1912.50	5	64-QAM	H	111	14	1 / 12	13.21	10.28	23.49	0.223	33.01	-9.52
1855.00	10	QPSK	H	126	2	1 / 24	15.46	9.55	25.01	0.317	33.01	-8.00
1882.50	10	QPSK	H	117	12	1 / 24	15.20	9.94	25.14	0.326	33.01	-7.88
1910.00	10	QPSK	H	111	14	1 / 24	15.24	10.26	25.50	0.355	33.01	-7.51
1910.00	10	16-QAM	H	111	14	1 / 24	14.29	10.26	24.55	0.285	33.01	-8.46
1910.00	10	64-QAM	H	111	14	1 / 24	13.22	10.26	23.48	0.223	33.01	-9.53
1857.50	15	QPSK	H	126	2	1 / 36	15.26	9.58	24.84	0.305	33.01	-8.17
1882.50	15	QPSK	H	117	12	1 / 36	15.17	9.94	25.11	0.324	33.01	-7.91
1907.50	15	QPSK	H	111	14	1 / 74	15.14	10.24	25.38	0.345	33.01	-7.63
1907.50	15	16-QAM	H	111	14	1 / 74	14.09	10.24	24.33	0.271	33.01	-8.68
1907.50	15	64-QAM	H	111	14	1 / 74	12.95	10.24	23.19	0.208	33.01	-9.82
1860.00	20	QPSK	H	126	2	1 / 0	15.05	9.62	24.67	0.293	33.01	-8.34
1882.50	20	QPSK	H	117	12	1 / 0	15.12	9.94	25.06	0.320	33.01	-7.96
1905.00	20	QPSK	H	111	14	1 / 0	15.13	10.22	25.35	0.343	33.01	-7.66
1905.00	20	16-QAM	H	111	14	1 / 0	14.21	10.22	24.43	0.277	33.01	-8.58
1905.00	20	64-QAM	H	111	14	1 / 0	13.12	10.22	23.34	0.216	33.01	-9.67
1912.50	5	QPSK	V	130	57	1 / 12	14.88	10.28	25.16	0.328	33.01	-7.85

Table 7-8. EIRP Data (Band 25/2)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1-ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 22 of 45

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	142	228	1 / 24	15.13	9.43	24.56	0.286	33.01	-8.45
2593.00	5	QPSK	H	137	232	1 / 12	15.86	9.55	25.41	0.348	33.01	-7.60
2687.50	5	QPSK	H	155	234	1 / 12	14.88	9.82	24.69	0.295	33.01	-8.32
2593.00	5	16-QAM	H	137	232	1 / 12	14.89	9.55	24.44	0.278	33.01	-8.57
2593.00	5	64-QAM	H	137	232	1 / 12	13.92	9.55	23.47	0.223	33.01	-9.54
2501.00	10	QPSK	H	142	228	1 / 25	15.29	9.43	24.72	0.297	33.01	-8.29
2593.00	10	QPSK	H	137	232	1 / 25	15.87	9.55	25.42	0.349	33.01	-7.59
2685.00	10	QPSK	H	155	234	1 / 25	15.07	9.82	24.89	0.309	33.01	-8.12
2593.00	10	16-QAM	H	137	232	1 / 25	15.04	9.55	24.59	0.288	33.01	-8.42
2593.00	10	64-QAM	H	137	232	1 / 25	13.83	9.55	23.38	0.218	33.01	-9.63
2503.50	15	QPSK	H	142	228	1 / 36	15.21	9.43	24.63	0.291	33.01	-8.38
2593.00	15	QPSK	H	137	232	1 / 36	15.90	9.55	25.45	0.351	33.01	-7.56
2682.50	15	QPSK	H	155	234	1 / 36	14.94	9.83	24.76	0.300	33.01	-8.25
2593.00	15	16-QAM	H	137	232	1 / 36	15.34	9.55	24.89	0.309	33.01	-8.12
2593.00	15	64-QAM	H	137	232	1 / 36	14.24	9.55	23.79	0.240	33.01	-9.22
2506.00	20	QPSK	H	142	228	1 / 50	15.35	9.42	24.77	0.300	33.01	-8.24
2593.00	20	QPSK	H	137	232	1 / 50	16.38	9.55	25.93	0.392	33.01	-7.08
2680.00	20	QPSK	H	155	234	1 / 0	14.87	9.83	24.70	0.295	33.01	-8.31
2593.00	20	16-QAM	H	137	232	1 / 50	15.16	9.55	24.71	0.296	33.01	-8.30
2593.00	20	64-QAM	H	137	232	1 / 50	14.01	9.55	23.56	0.227	33.01	-9.45
2593.00	20	QPSK	V	124	41	1 / 50	14.05	9.56	23.61	0.230	33.01	-9.40

Table 7-9. EIRP Data (Band 41 – PC2)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2593.00	20	QPSK	H	113	228	1 / 50	13.38	9.55	22.93	0.197	33.01	-10.08
2593.00	20	16-QAM	H	113	228	1 / 50	12.24	9.55	21.79	0.151	33.01	-11.22
2593.00	20	64-QAM	H	113	228	1 / 50	11.36	9.55	20.91	0.123	33.01	-12.10
2593.00	20	QPSK	V	122	43	1 / 50	11.70	9.56	21.26	0.134	33.01	-11.75

Table 7-10. EIRP Data (Band 41 – PC3)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1-ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset	Page 23 of 45	

7.3 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

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

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 24 of 45

Test Setup

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

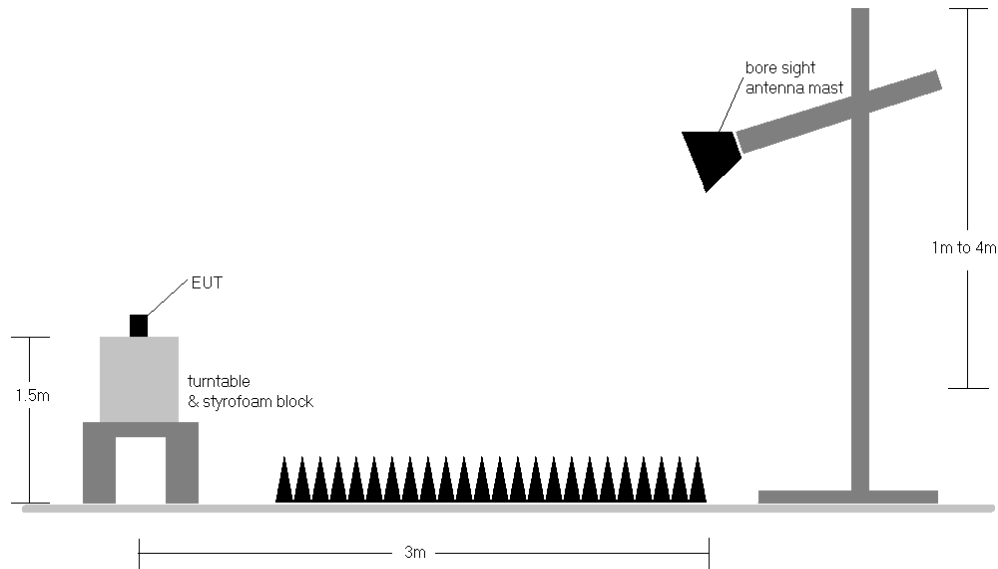


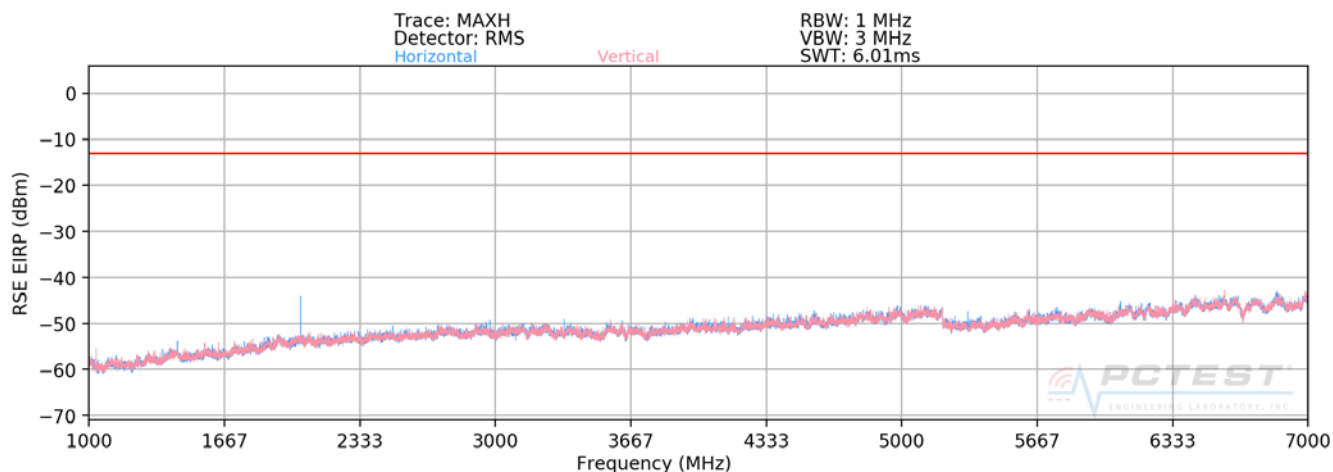
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: ZNFL455DL	PCTEST	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
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Band 71



Plot 7-1. Radiated Spurious Plot above 1GHz (Band 71)

OPERATING FREQUENCY: 673.00 MHz

MODULATION SIGNAL: QPSK

BANDWIDTH: 20.0 MHz

DISTANCE: 3 meters

LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1346.00	H	322	10	-69.75	2.91	-66.84	-53.8
2019.00	H	138	228	-50.49	2.82	-47.67	-34.7
2692.00	H	-	-	-66.98	4.53	-62.45	-49.4
3365.00	H	-	-	-67.87	6.10	-61.77	-48.8

Table 7-11. Radiated Spurious Data (Band 71 – Low Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 26 of 45

OPERATING FREQUENCY: 680.50 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1361.00	H	159	212	-64.44	2.88	-61.57	-48.6
2041.50	H	115	229	-48.23	2.73	-45.51	-32.5
2722.00	H	-	-	-66.79	4.63	-62.16	-49.2
3402.50	H	-	-	-68.41	6.26	-62.15	-49.2

Table 7-12. Radiated Spurious Data (Band 71 – Mid Channel)

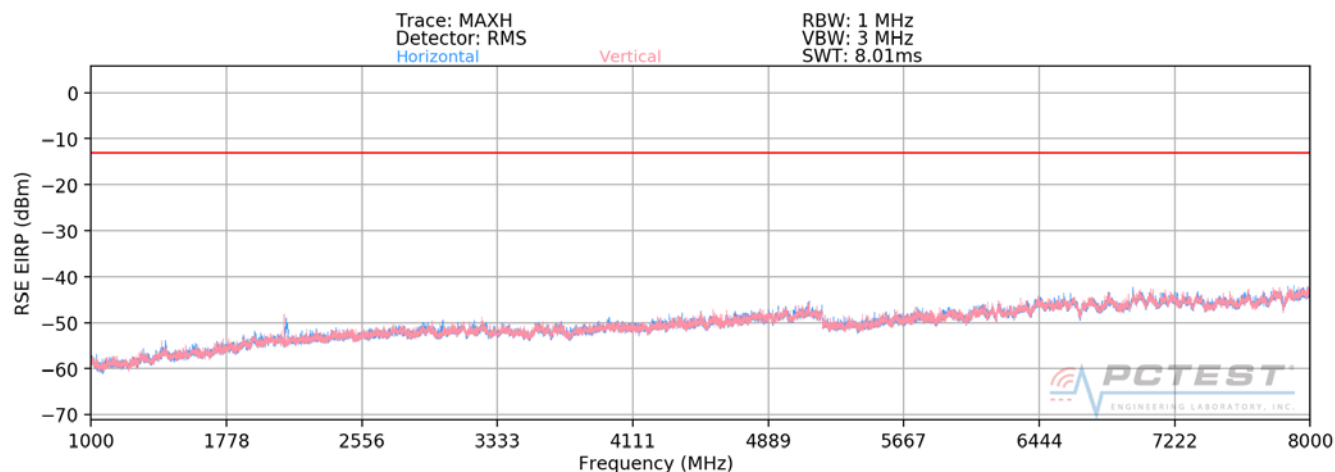
OPERATING FREQUENCY: 688.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1376.00	H	172	204	-61.13	2.64	-58.49	-45.5
2064.00	H	130	224	-50.25	2.82	-47.43	-34.4
2752.00	H	-	-	-66.87	4.60	-62.27	-49.3
3440.00	H	-	-	-68.19	6.28	-61.91	-48.9

Table 7-13. Radiated Spurious Data (Band 71 – High Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 27 of 45

Band 12



Plot 7-2. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY: 704.00 MHz

MODULATION SIGNAL: QPSK

BANDWIDTH: 10.0 MHz

DISTANCE: 3 meters

LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1408.00	H	152	326	-61.42	2.30	-59.11	-46.1
2112.00	H	100	220	-50.56	3.12	-47.43	-34.4
2816.00	H	-	-	-67.24	4.82	-62.42	-49.4
3520.00	H	-	-	-68.95	6.48	-62.47	-49.5

Table 7-14. Radiated Spurious Data (Band 12 – Low Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 28 of 45

OPERATING FREQUENCY: 707.50 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	100	323	-63.66	2.39	-61.27	-48.3
2122.50	H	103	230	-48.36	3.14	-45.22	-32.2
2830.00	H	-	-	-67.50	4.87	-62.63	-49.6
3537.50	H	-	-	-68.62	6.45	-62.17	-49.2

Table 7-15. Radiated Spurious Data (Band 12 – Mid Channel)

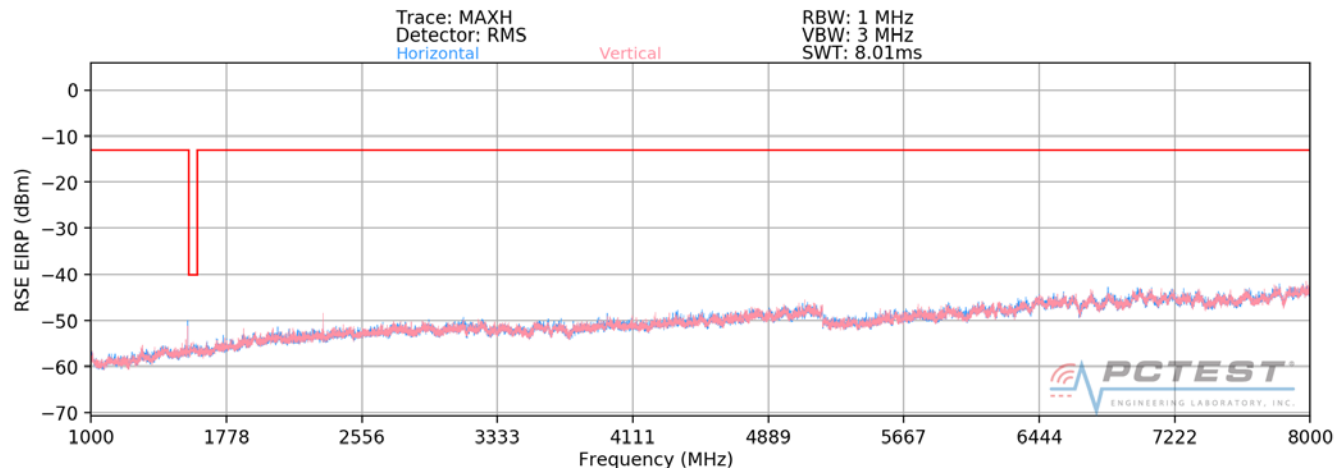
OPERATING FREQUENCY: 711.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1422.00	H	100	133	-60.13	2.53	-57.61	-44.6
2133.00	H	102	231	-51.66	3.11	-48.55	-35.6
2844.00	H	-	-	-67.68	4.91	-62.77	-49.8
3555.00	H	-	-	-67.48	6.46	-61.03	-48.0

Table 7-16. Radiated Spurious Data (Band 12 – High Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 29 of 45

Band 13



Plot 7-3. Radiated Spurious Plot above 1GHz (Band 13)

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]
1564.00	H	182	24	-60.35	2.93	-57.42	-17.4

Table 7-17. Radiated Spurious Data (Band 13 –Wide Band Mid Channel)

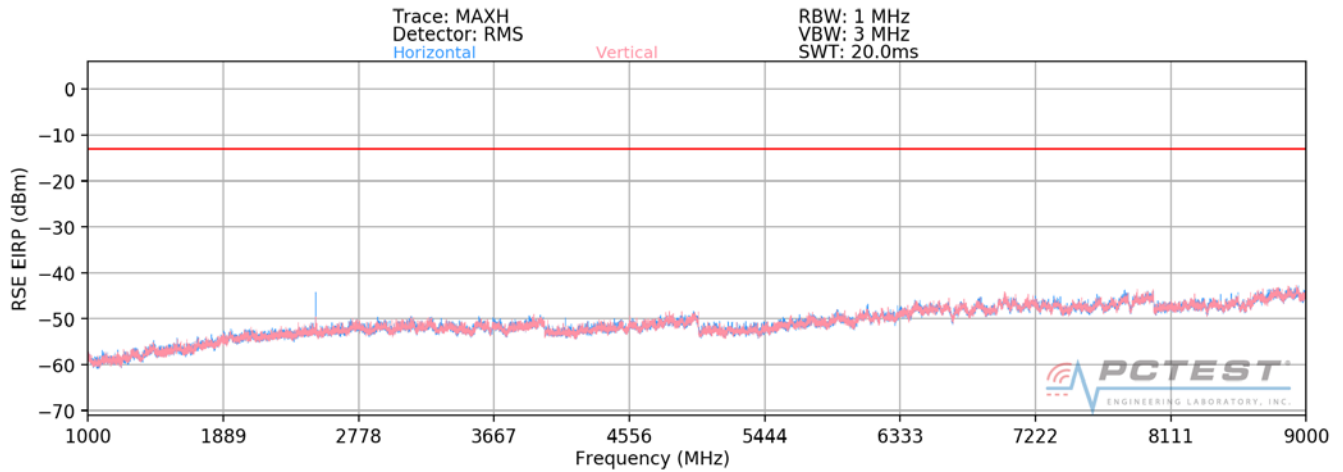
OPERATING FREQUENCY: 782.00 MHz
MODULATION SIGNAL: QPSK
BANDWIDTH: 10.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	H	159	40	-59.00	3.64	-55.37	-42.4
3128.00	H	-	-	-67.36	5.73	-61.62	-48.6
3910.00	H	-	-	-68.77	7.25	-61.52	-48.5

Table 7-18. Radiated Spurious Data (Band 13 – Mid Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1-ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 30 of 45

Band 26/5



Plot 7-4. Radiated Spurious Plot above 1GHz (Band 26/5)

OPERATING FREQUENCY: 829.00 MHz

MODULATION SIGNAL: QPSK

BANDWIDTH: 10.0 MHz

DISTANCE: 3 meters

LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	H	253	212	-66.29	3.12	-63.17	-50.2
2487.00	H	161	327	-50.02	3.87	-46.15	-33.2
3316.00	H	-	-	-68.10	6.01	-62.09	-49.1
4145.00	H	-	-	-69.84	7.77	-62.07	-49.1

Table 7-19. Radiated Spurious Data (Band 26/5 – Low Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 31 of 45

OPERATING FREQUENCY: 836.50 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	290	180	-61.75	3.10	-58.65	-45.7
2509.50	H	147	311	-57.11	4.02	-53.09	-40.1
3346.00	H	-	-	-68.22	6.03	-62.20	-49.2
4182.50	H	123	50	-64.91	7.79	-57.12	-44.1
5019.00	H	-	-	-69.69	8.78	-60.91	-47.9
5855.50	H	-	-	-69.59	9.18	-60.41	-47.4

Table 7-20. Radiated Spurious Data (Band 26/5 – Mid Channel)

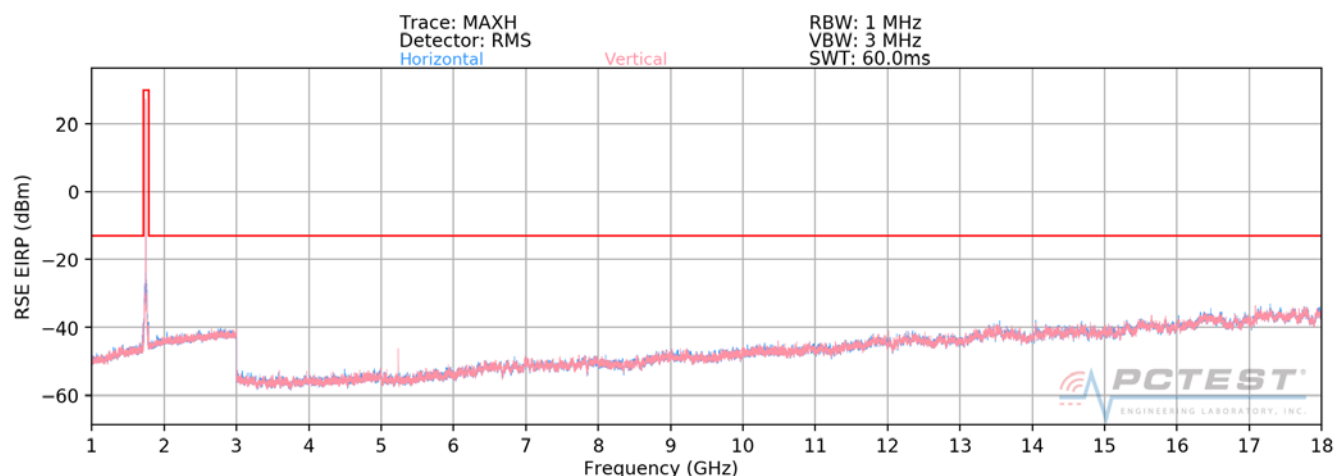
OPERATING FREQUENCY: 844.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	H	235	179	-66.57	3.18	-63.39	-50.4
2532.00	H	101	165	-49.17	4.10	-45.07	-32.1
3376.00	H	-	-	-67.98	6.15	-61.83	-48.8
4220.00	H	101	47	-68.95	7.88	-61.07	-48.1
5064.00	H	-	-	-69.84	8.89	-60.95	-47.9
5908.00	H	-	-	-68.73	9.26	-59.47	-46.5

Table 7-21. Radiated Spurious Data (Band 26/5 – High Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 32 of 45

Band 66/4



Plot 7-5. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY: 1720.00 MHz

MODULATION SIGNAL: QPSK

BANDWIDTH: 20.0 MHz

DISTANCE: 3 meters

LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	V	114	224	-57.76	6.28	-51.48	-38.5
5160.00	V	139	290	-53.95	8.98	-44.97	-32.0
6880.00	V	103	284	-65.00	9.42	-55.58	-42.6
8600.00	V	-	-	-66.81	9.62	-57.19	-44.2
10320.00	V	-	-	-63.12	9.56	-53.55	-40.6

Table 7-22. Radiated Spurious Data (Band 66/4 – Low Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 33 of 45

OPERATING FREQUENCY: 1745.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	V	101	347	-62.46	6.47	-55.99	-43.0
5235.00	V	107	305	-52.83	8.97	-43.86	-30.9
6980.00	V	101	310	-63.52	9.23	-54.30	-41.3
8725.00	V	-	-	-65.41	9.59	-55.82	-42.8
10470.00	V	-	-	-63.53	9.43	-54.11	-41.1

Table 7-23. Radiated Spurious Data (Band 66/4 – Mid Channel)

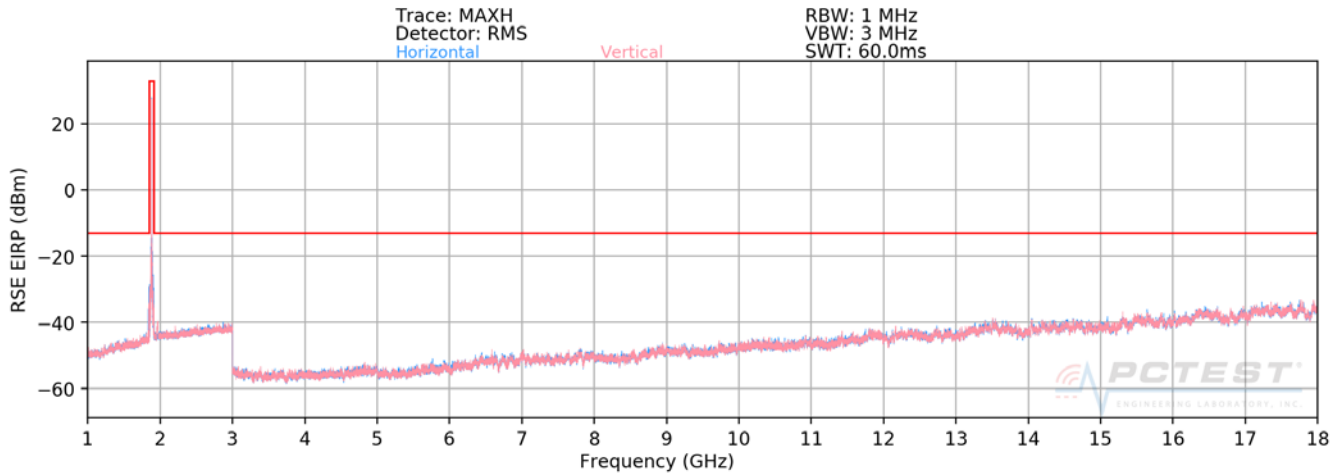
OPERATING FREQUENCY: 1770.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	V	104	10	-58.14	6.45	-51.69	-38.7
5310.00	V	102	170	-52.86	9.09	-43.77	-30.8
7080.00	V	101	310	-62.67	9.17	-53.50	-40.5
8850.00	V	-	-	-65.46	9.57	-55.90	-42.9
10620.00	V	-	-	-63.77	9.55	-54.21	-41.2

Table 7-24. Radiated Spurious Data (Band 66/4 – High Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 34 of 45

Band 25/2



Plot 7-6. Radiated Spurious Plot above 1GHz (Band 25/2)

OPERATING FREQUENCY: 1860.00 MHz

MODULATION SIGNAL: QPSK

BANDWIDTH: 20.0 MHz

DISTANCE: 3 meters

LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	H	119	59	-66.47	6.78	-59.69	-46.7
5580.00	H	119	307	-57.89	8.45	-49.45	-36.4
7440.00	H	-	-	-66.90	8.33	-58.57	-45.6

Table 7-25. Radiated Spurious Data (Band 25/2 – Low Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 35 of 45

OPERATING FREQUENCY: 1882.50 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3765.00	H	301	54	-67.75	6.85	-60.90	-47.9
5647.50	H	118	307	-50.81	8.53	-42.28	-29.3
7530.00	H	-	-	-66.66	8.45	-58.21	-45.2

Table 7-26. Radiated Spurious Data (Band 25/2 – Mid Channel)

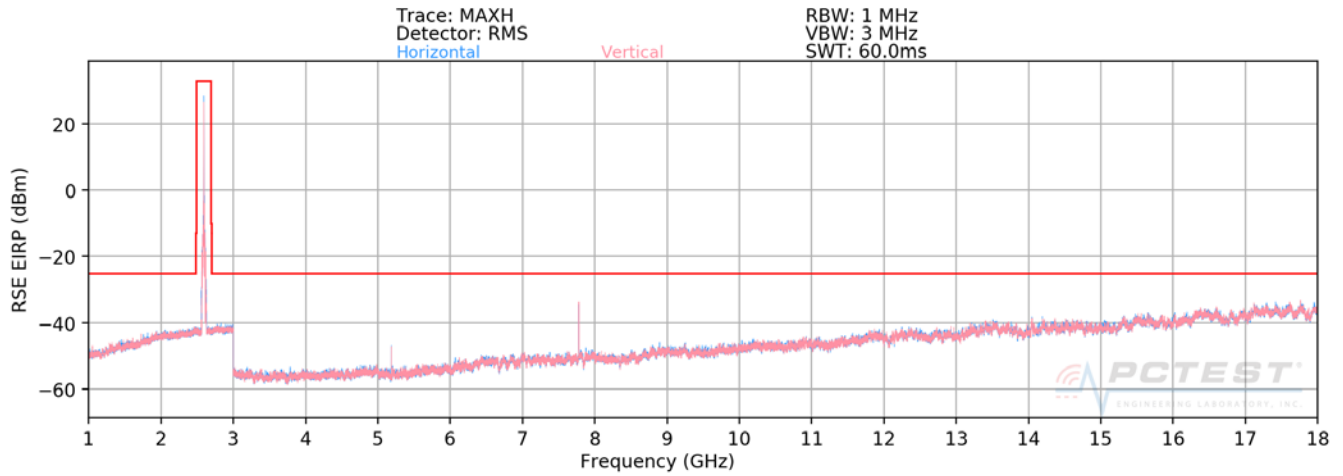
OPERATING FREQUENCY: 1905.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3810.00	H	108	285	-67.58	7.07	-60.51	-47.5
5715.00	H	110	353	-62.72	9.04	-53.68	-40.7
7620.00	H	252	352	-64.25	9.27	-54.98	-42.0
9525.00	H	-	-	-64.85	9.46	-55.40	-42.4
11430.00	H	268	359	-58.70	9.49	-49.21	-36.2
13335.00	H	-	-	-58.19	8.76	-49.43	-36.4

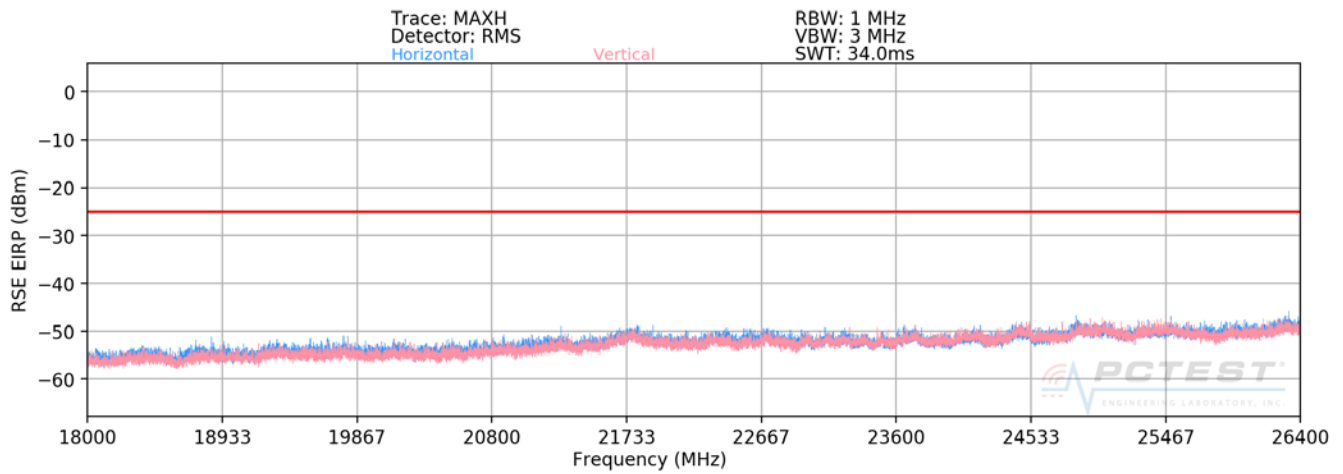
Table 7-27. Radiated Spurious Data (Band 25/2 – High Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 36 of 45

Band 41 (PC2)



Plot 7-7. Radiated Spurious Plot 1GHz - 18GHz (Band 41)



Plot 7-8. Radiated Spurious Plot 18GHz - 26.5GHz (Band 41)

FCC ID: ZNFL455DL	PCTEST	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 37 of 45

OPERATING FREQUENCY: 2506.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5012.00	V	113	346	-58.29	8.75	-49.54	-24.5
7518.00	V	104	284	-44.05	9.32	-34.73	-9.7
10024.00	V	100	285	-52.91	9.80	-43.11	-18.1
12530.00	V	-	-	-51.19	8.87	-42.32	-17.3
15036.00	V	-	-	-48.79	8.84	-39.95	-14.9

Table 7-28. Radiated Spurious Data (Band 41 (PC2) – Low Channel)

OPERATING FREQUENCY: 2593.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	101	98	-53.55	9.03	-44.52	-19.5
7779.00	V	114	17	-40.14	9.29	-30.85	-5.8
10372.00	V	100	323	-52.59	9.50	-43.09	-18.1
12965.00	V	-	-	-51.16	8.75	-42.40	-17.4
15558.00	V	-	-	-45.67	8.47	-37.21	-12.2

Table 7-29. Radiated Spurious Data (Band 41 (PC2) – Mid Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 38 of 45

OPERATING FREQUENCY: 2680.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	V	100	133	-52.51	8.99	-43.52	-18.5
8040.00	V	123	286	-46.04	9.35	-36.68	-11.7
10720.00	V	102	285	-50.59	9.39	-41.20	-16.2
13400.00	V	-	-	-48.47	8.67	-39.80	-14.8
16080.00	V	-	-	-46.23	8.46	-37.78	-12.8

Table 7-30. Radiated Spurious Data (Band 41 (PC2) – High Channel)

OPERATING FREQUENCY: 2593.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	129	249	-59.61	9.03	-50.58	-25.6
7766.00	V	110	287	-46.10	9.29	-36.81	-11.8
10346.00	V	100	301	-53.75	9.50	-44.25	-19.3
12926.00	V	-	-	-50.56	8.75	-41.80	-16.8
15506.00	V	-	-	-45.92	8.47	-37.46	-12.5

Table 7-31. Radiated Spurious Data (Band 41 (PC3) – Mid Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 39 of 45

7.4 Uplink Carrier Aggregation Radiated Measurements

§2.1053, §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally 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 its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. No. of sweep points $\geq 2 \times$ span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. The trace was allowed to stabilize

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 40 of 45

Test Setup

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

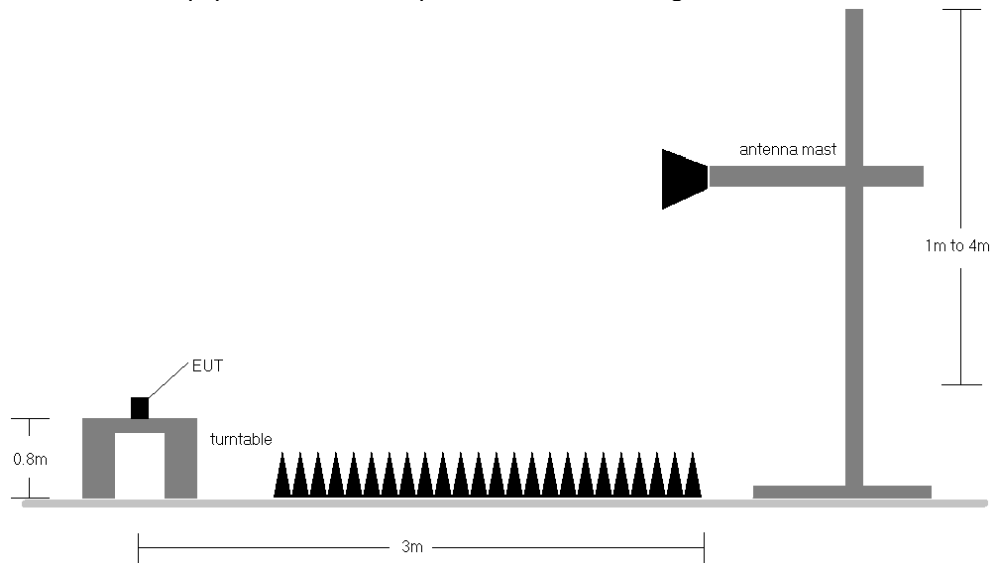
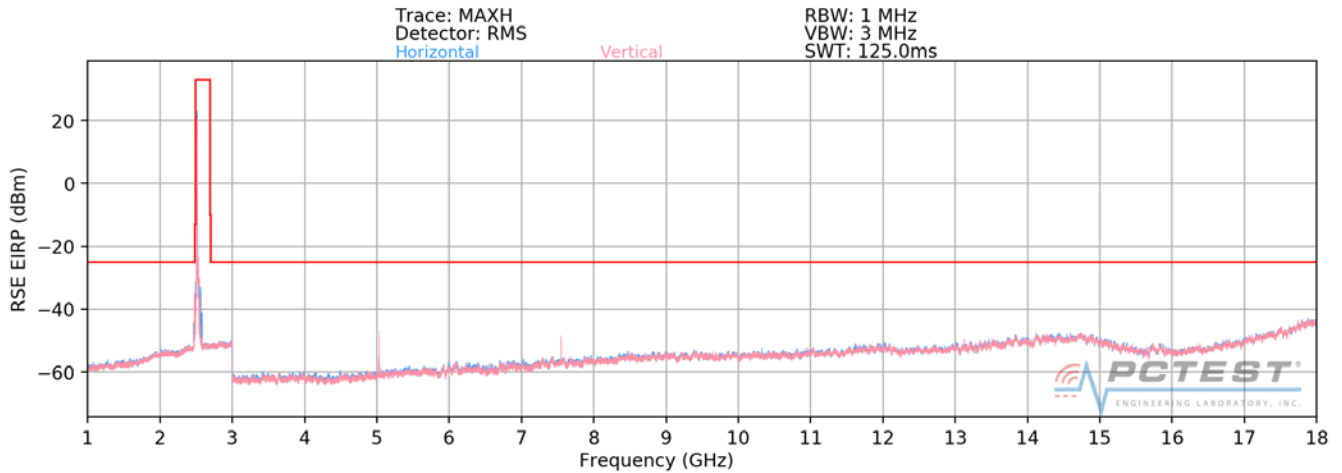


Figure 7-4. Test Instrument & Measurement Setup

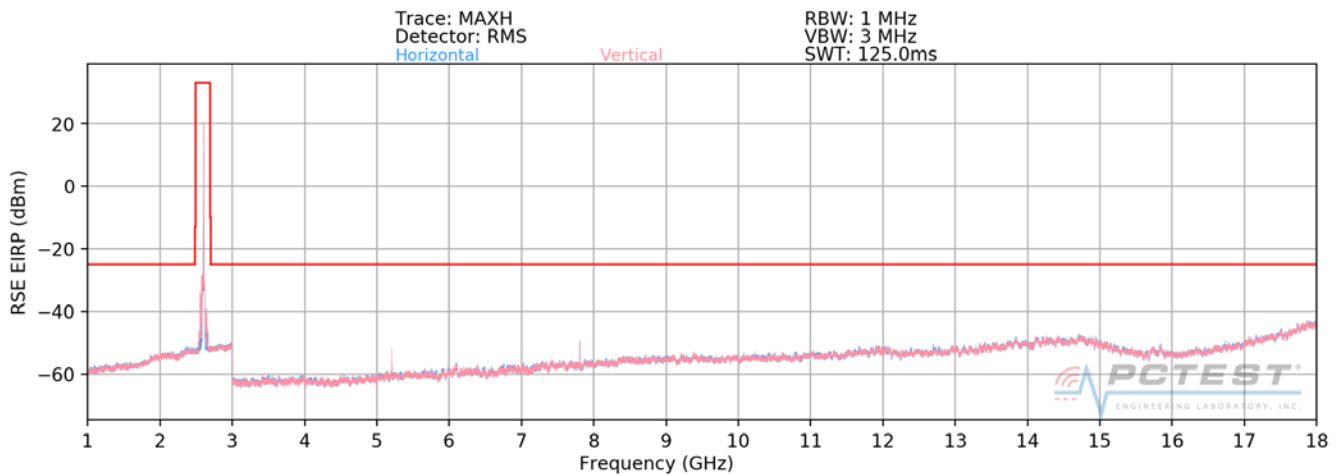
Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) 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.
- 6) No significant emissions were found as a result of two uplink carriers operating contiguously.

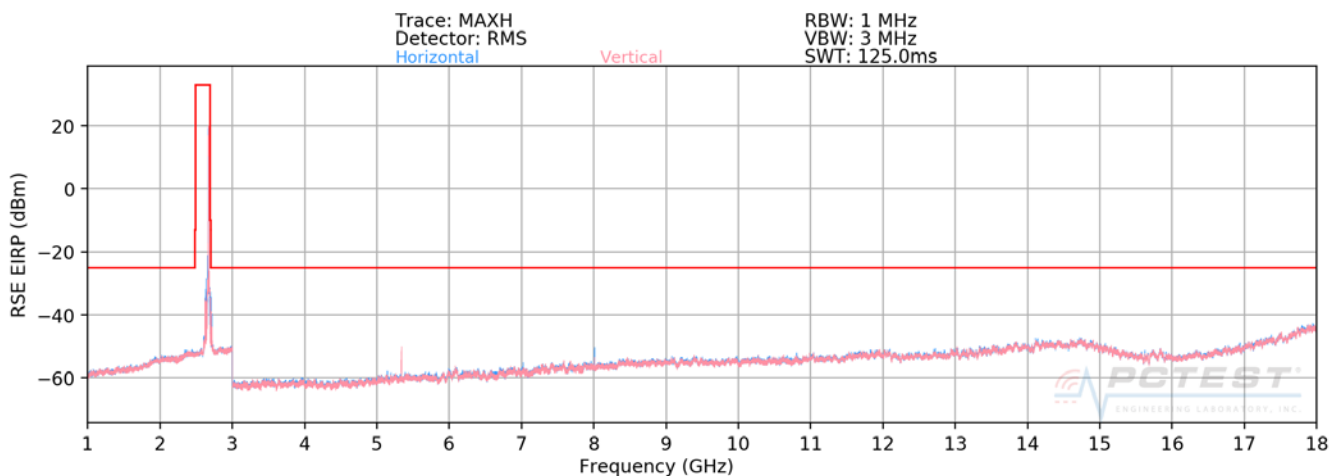
FCC ID: ZNFL455DL	PCTEST	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 41 of 45



Plot 7-9. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) Low Channel - PCC/SCC: 1RB)

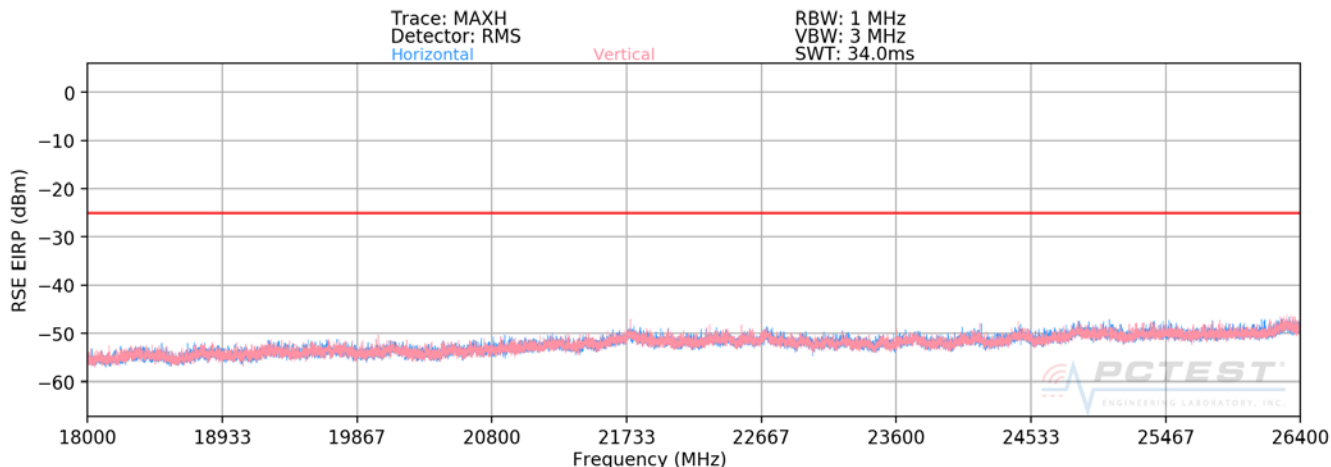


Plot 7-10. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) Mid Channel - PCC/SCC: 1RB)



Plot 7-11. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) High Channel - PCC/SCC: 1RB)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1-ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 42 of 45



Plot 7-12. Radiated Spurious Plot 18GHz – 26.5GHz (ULCA Band 41 (PC2))

OPERATING FREQUENCY (PCC): 2506.00 MHz
 OPERATING FREQUENCY (SCC): 2525.80 MHz
 CHANNEL (PCC): 39750
 CHANNEL (SCC): 39948
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5012.00	V	143	363	-54.62	10.90	-43.72	-18.7
7518.00	V	338	19	-55.04	11.11	-43.93	-18.9
10024.00	V	116	41	-64.18	11.99	-52.18	-27.2
12530.00	V	-	-	-68.52	13.56	-54.96	-30.0
15036.00	V	-	-	-66.45	13.51	-52.95	-27.9

Table 7-32. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 43 of 45

OPERATING FREQUENCY (PCC): 2593.00 MHz
 OPERATING FREQUENCY (SCC): 2612.80 MHz
 CHANNEL (PCC): 40620
 CHANNEL (SCC): 40818
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	126	364	-57.36	10.74	-46.62	-21.6
7779.00	V	396	16	-55.92	11.44	-44.48	-19.5
10372.00	V	114	13	-65.10	12.42	-52.68	-27.7
12965.00	V	-	-	-67.00	13.29	-53.70	-28.7
15558.00	V	-	-	-71.29	16.33	-54.96	-30.0

Table 7-33. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

OPERATING FREQUENCY (PCC): 2680.00 MHz
 OPERATING FREQUENCY (SCC): 2660.20 MHz
 CHANNEL (PCC): 41490
 CHANNEL (SCC): 41292
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	V	118	8	-54.19	10.70	-43.49	-18.5
8040.00	V	118	21	-58.23	11.16	-47.07	-22.1
10720.00	V	114	2	-65.26	12.59	-52.67	-27.7
13400.00	V	-	-	-65.73	12.59	-53.13	-28.1
16080.00	V	-	-	-72.17	16.68	-55.49	-30.5

Table 7-34. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 44 of 45

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFL455DL** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-03-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 45 of 45