

**MEASUREMENT REPORT**
GSM / GPRS / CDMA / WCDMA**Applicant Name:**LG Electronics USA, Inc.
1000 Sylvan Avenue
Englewood Cliffs, NJ 07632
United States**Date of Testing:**

11/19/2018 – 1/17/2019

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1811230205-02.ZNF

FCC ID:**ZNFV450PM****APPLICANT:****LG Electronics USA, Inc.****Application Type:**

Certification

Model:

LM-V450PM

Additional Model(s):

LMV450PM, V450PM

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,
KDB 648474 D03 v01r04

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

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

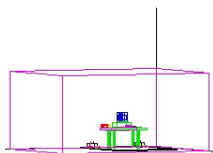

Randy Ortanez
President

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 1 of 107

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

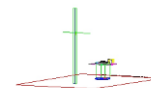
1.0	INTRODUCTION	4
1.1	Scope	4
1.2	PCTEST Test Location.....	4
1.3	Test Facility / Accreditations.....	4
2.0	PRODUCT INFORMATION.....	5
2.1	Equipment Description	5
2.2	Device Capabilities.....	5
2.3	Test Configuration	5
2.4	EMI Suppression Device(s)/Modifications	5
3.0	DESCRIPTION OF TESTS	6
3.1	Evaluation Procedure	6
3.2	Cellular - Base Frequency Blocks	6
3.3	Cellular - Mobile Frequency Blocks	6
3.4	PCS - Base Frequency Blocks	6
3.5	PCS - Mobile Frequency Blocks.....	7
3.6	AWS - Base Frequency Blocks	7
3.7	AWS - Mobile Frequency Blocks.....	7
3.8	Radiated Measurements	8
4.0	MEASUREMENT UNCERTAINTY	9
5.0	TEST EQUIPMENT CALIBRATION DATA	10
6.0	SAMPLE CALCULATIONS	11
7.0	TEST RESULTS.....	12
7.1	Summary.....	12
7.2	Occupied Bandwidth	13
7.3	Spurious and Harmonic Emissions at Antenna Terminal	19
7.4	Band Edge Emissions at Antenna Terminal	55
7.5	Peak-Average Ratio	68
7.6	Radiated Power (ERP/EIRP).....	71
7.7	Radiated Spurious Emissions Measurements.....	76
7.8	Frequency Stability / Temperature Variation	92
8.0	CONCLUSION.....	107

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 2 of 107



MEASUREMENT REPORT

GSM / GPRS / CDMA / WCDMA



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Emission Designator
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	
GPRS850	22H	824.2 - 848.8	0.425	26.28	0.697	28.43	246KGXW
EDGE850	22H	824.2 - 848.8	0.083	19.17	0.135	21.32	243KG7W
CDMA850	22H	824.70 - 848.31	0.061	17.88	0.101	20.03	1M28F9W
WCDMA850	22H	826.4 - 846.6	0.072	18.60	0.119	20.75	4M16F9W
WCDMA1700	27	1712.4 - 1752.6			0.229	23.59	4M17F9W
GPRS1900	24E	1850.2 - 1909.8			0.946	29.76	245KGXW
EDGE1900	24E	1850.2 - 1909.8			0.299	24.75	246KG7W
CDMA1900	24E	1851.25 - 1908.75			0.166	22.19	1M28F9W
WCDMA1900	24E	1852.4 - 1907.6			0.282	24.50	4M17F9W

EUT Overview

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 3 of 107

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.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 4 of 107

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFV450PM**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

Test Device Serial No.: 00083, 00055, 00054, 00084

2.2 Device Capabilities

This device contains the following capabilities:

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

2.3 Test Configuration

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

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) FCC ID: PWMA-W815A while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 5 of 107

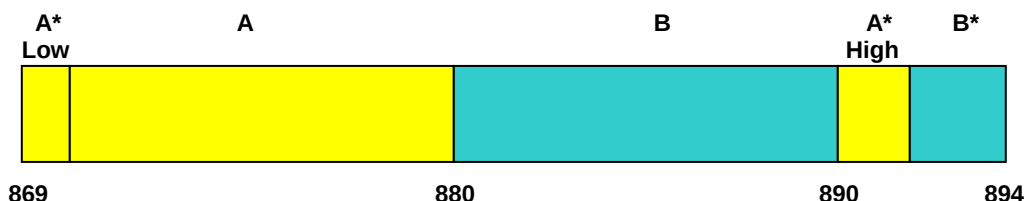
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

3.2 Cellular - Base Frequency Blocks



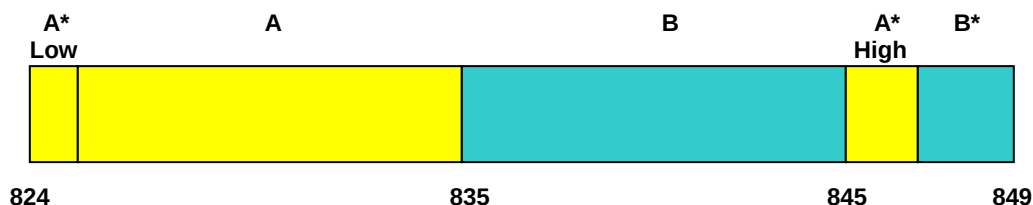
BLOCK 1: 869 – 880 MHz (A* Low + A)

BLOCK 3: 890 – 891.5 MHz (A* High)

BLOCK 2: 880 – 890 MHz (B)

BLOCK 4: 891.5 – 894 MHz (B*)

3.3 Cellular - Mobile Frequency Blocks



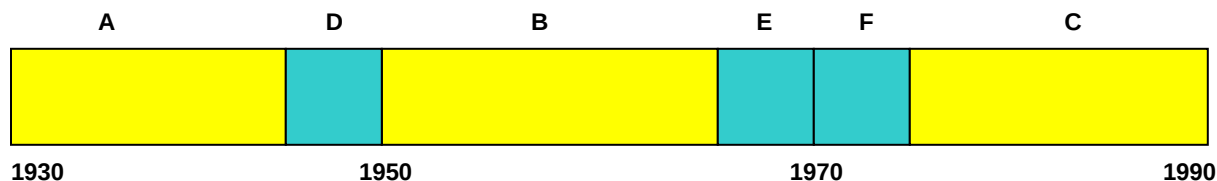
BLOCK 1: 824 – 835 MHz (A* Low + A)

BLOCK 3: 845 – 846.5 MHz (A* High)

BLOCK 2: 835 – 845 MHz (B)

BLOCK 4: 846.5 – 849 MHz (B*)

3.4 PCS - Base Frequency Blocks



BLOCK 1: 1930 – 1945 MHz (A)

BLOCK 4: 1965 – 1970 MHz (E)

BLOCK 2: 1945 – 1950 MHz (D)

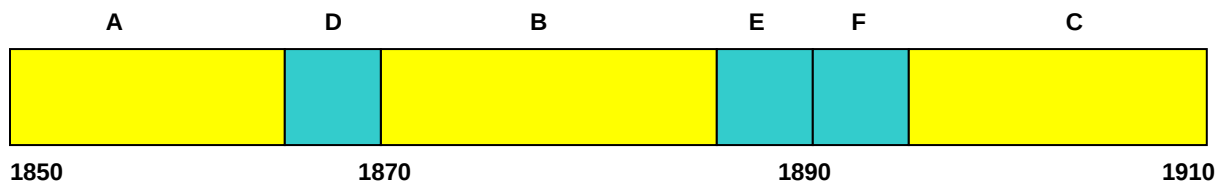
BLOCK 5: 1970 – 1975 MHz (F)

BLOCK 3: 1950 – 1965 MHz (B)

BLOCK 6: 1975 – 1990 MHz (C)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 6 of 107

3.5 PCS - Mobile Frequency Blocks



BLOCK 1: 1850 – 1865 MHz (A)

BLOCK 4: 1885 – 1890 MHz (E)

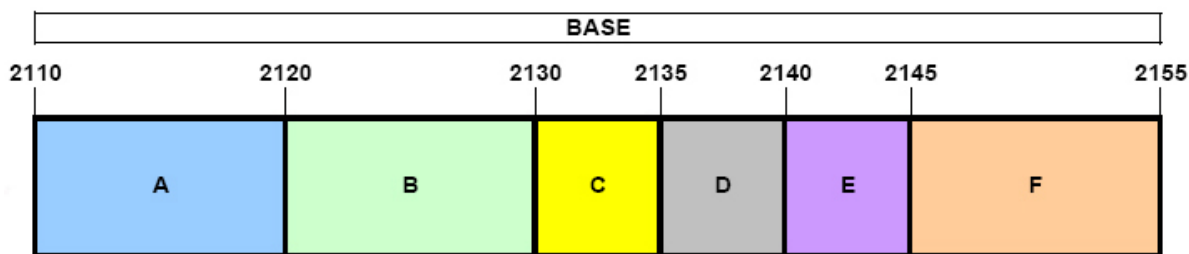
BLOCK 2: 1865 – 1870 MHz (D)

BLOCK 5: 1890 – 1895 MHz (F)

BLOCK 3: 1870 – 1885 MHz (B)

BLOCK 6: 1895 – 1910 MHz (C)

3.6 AWS - Base Frequency Blocks



BLOCK 1: 2110 – 2120 MHz (A)

BLOCK 4: 2135 – 2140 MHz (D)

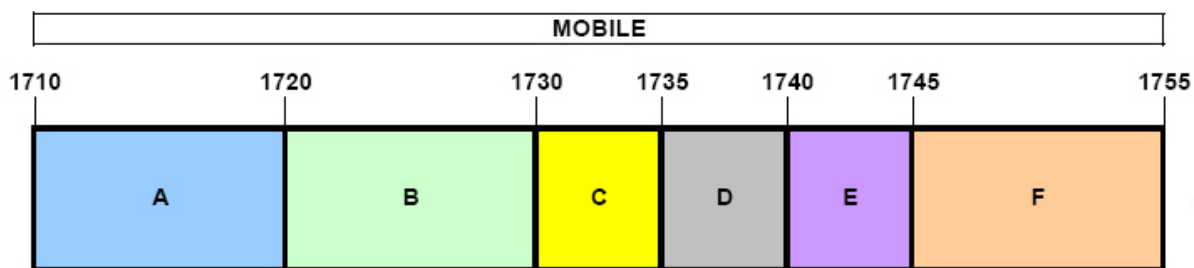
BLOCK 2: 2120 – 2130 MHz (B)

BLOCK 5: 2140 – 2145 MHz (E)

BLOCK 3: 2130 – 2135 MHz (C)

BLOCK 6: 2145 – 2155 MHz (F)

3.7 AWS - Mobile Frequency Blocks



BLOCK 1: 1710 – 1720 MHz (A)

BLOCK 4: 1735 – 1740 MHz (D)

BLOCK 2: 1720 – 1730 MHz (B)

BLOCK 5: 1740 – 1745 MHz (E)

BLOCK 3: 1730 – 1735 MHz (C)

BLOCK 6: 1745 – 1755 MHz (F)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 7 of 107

3.8 Radiated Measurements

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.

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:

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

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

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.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 8 of 107

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

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 9 of 107

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
-	LTx3	Licensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx3
Agilent	E5515C	Wireless Communications Test Set	1/29/2016	Triennial	1/29/2019	GB46310798
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	E5515C	Wireless Communications Test Set	3/4/2016	Triennial	3/4/2019	GB45360985
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Espec	ESX-2CA	Environmental Chamber	3/28/2018	Annual	3/28/2019	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	TVA-11-422	RF Power Amp	N/A		N/A	QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	3/30/2018	Annual	3/30/2019	11210140001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMU200	Base Station Simulator	5/18/2018	Annual	5/18/2019	109892
Rohde & Schwarz	CMW500	Radio Communication Tester	6/8/2018	Annual	6/8/2019	112347
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	4/30/2018	Biennial	4/30/2020	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	4/30/2018	Biennial	4/30/2020	9105-2403
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/11/2017	Biennial	8/11/2019	A042511

Table 5-1. Test Equipment

Notes:

- 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.
- Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 10 of 107

6.0 SAMPLE CALCULATIONS

GPRS Emission Designator

Emission Designator = 250KGXW

GPRS BW = 250 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 250KG7W

EDGE BW = 250 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

CDMA Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W

WCDMA BW = 4.16 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive 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 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm $- (-24.80) = 50.3$ dBc.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 11 of 107

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics USA, Inc.
 FCC ID: ZNFV450PM
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): GSM / GPRS / CDMA / WCDMA

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	RSS-Gen (4.6.1) RSS-133(2.3) RSS-139(2.3)	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Conducted Band Edge / Spurious Emissions	$> 43 + \log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions		PASS	Sections 7.3, 7.4
24.232(d)	RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)	Peak-Average Ratio	< 13 dB		PASS	Section 7.5
2.1046	RSS-132(5.4) RSS-133(4.1) RSS-139(4.1)	Transmitter Conducted Output Power	N/A		PASS	RF Exposure Report
2.1055 22.355 24.235 27.54	RSS-132(5.3) RSS-133(6.3) RSS-139(6.4)	Frequency Stability	< 2.5 ppm (Part 22) Emission must remain in band (Part 24, 27)		PASS	Section 7.8
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP	RADIATED	PASS	Section 7.6
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 7.6
27.50(d)(4)	RSS-139(6.5)	Equivalent Isotropic Radiated Power	< 1 Watts max. EIRP		PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	$> 43 + \log_{10}(P[\text{Watts}])$ for all out-of-band emissions		PASS	Section 7.7

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "2G/3G Automation," Version 3.9.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 12 of 107

7.2 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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

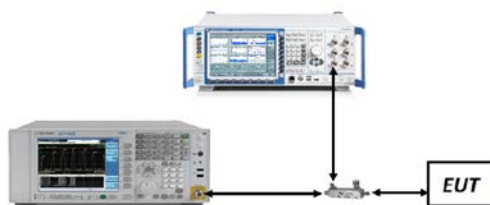
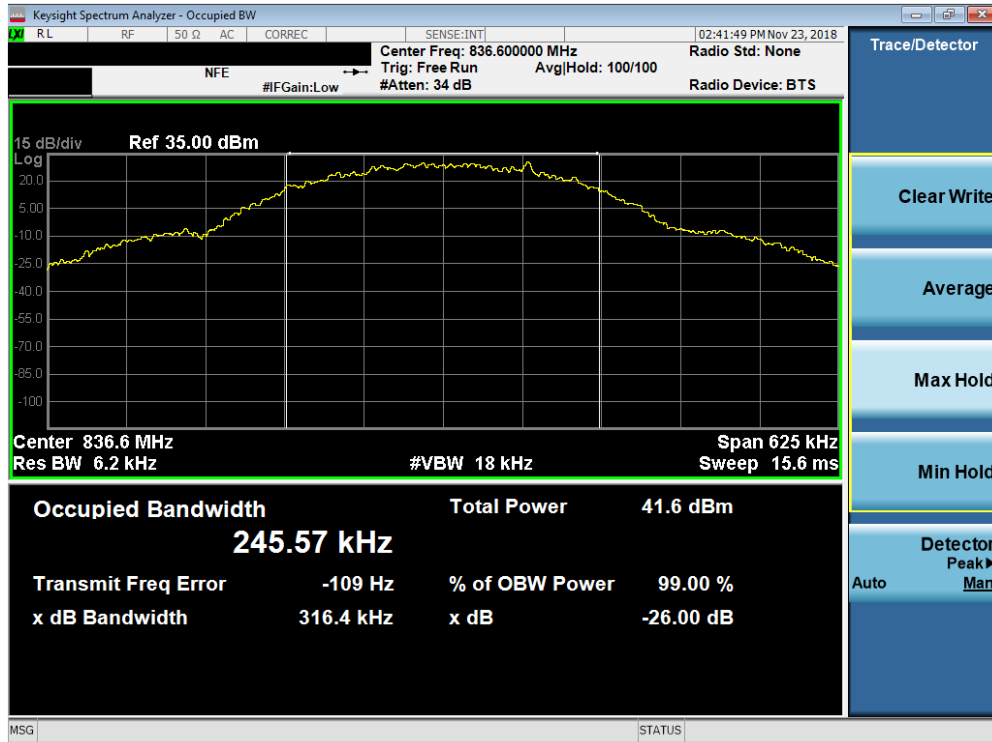


Figure 7-1. Test Instrument & Measurement Setup

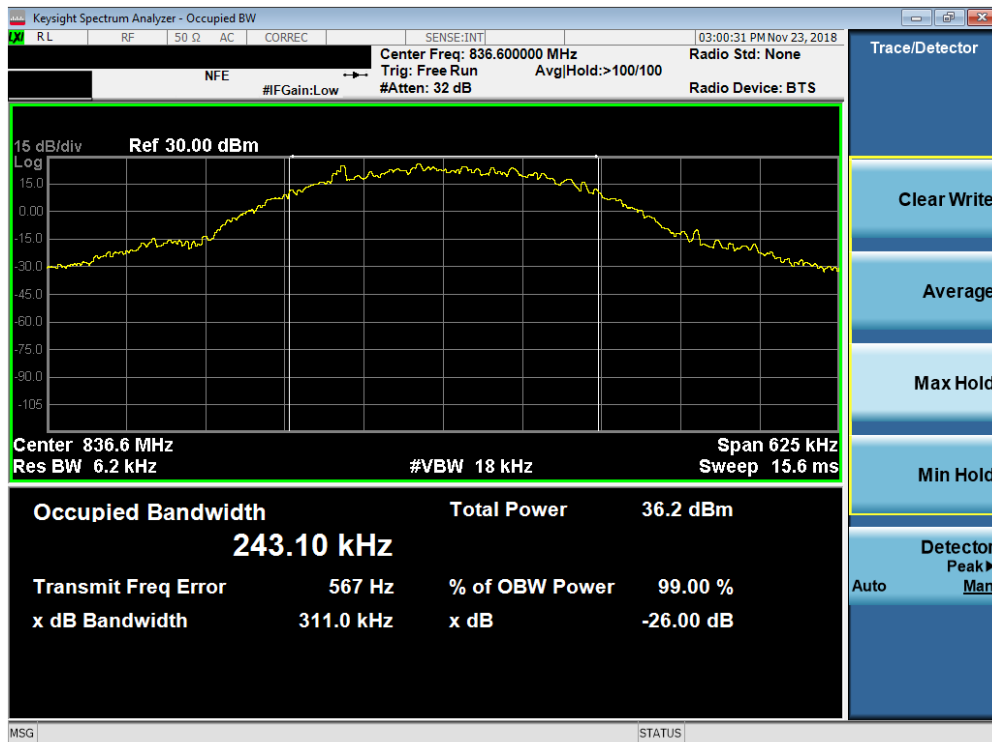
Test Notes

None.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 13 of 107

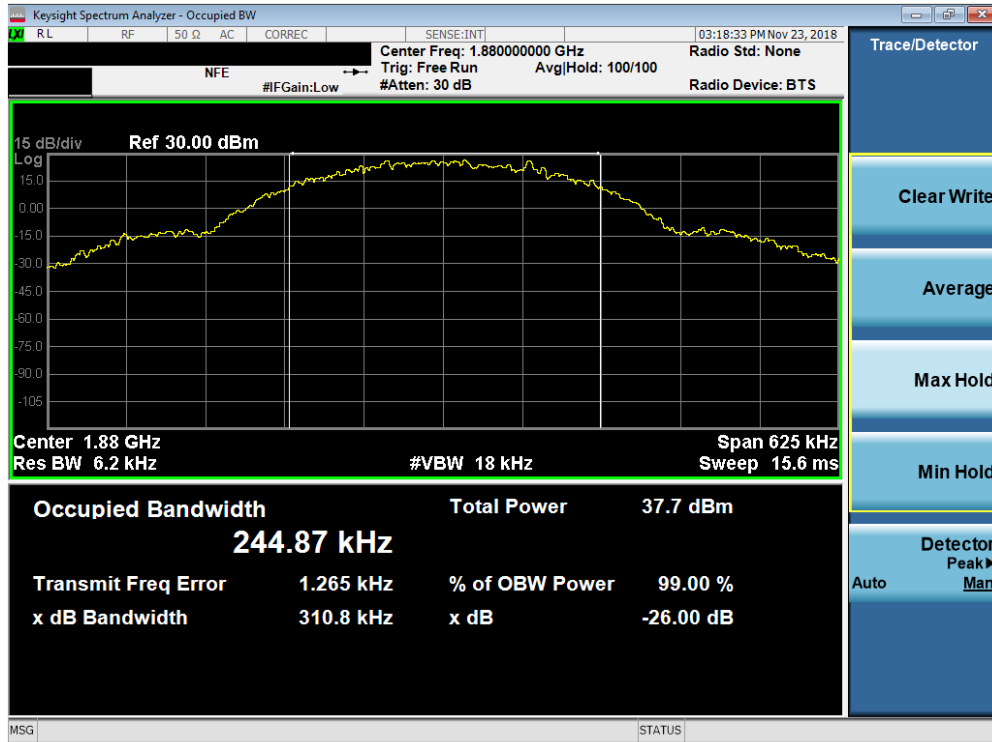


Plot 7-1. Occupied Bandwidth Plot (Cellular GPRS Mode)

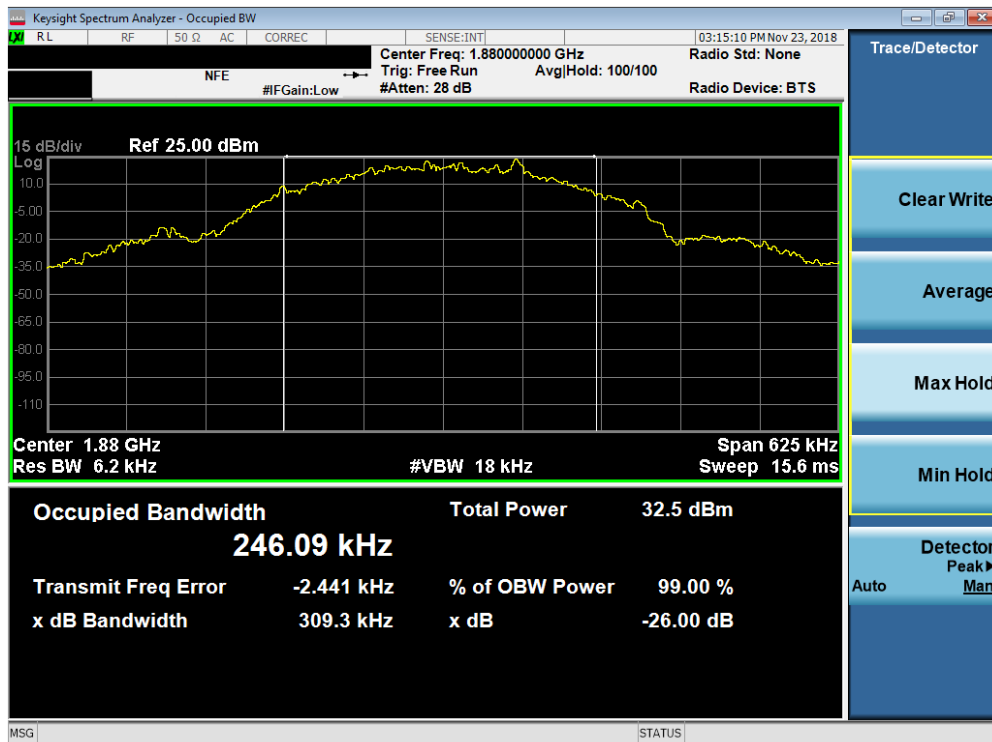


Plot 7-2. Occupied Bandwidth Plot (EDGE850 Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 14 of 107

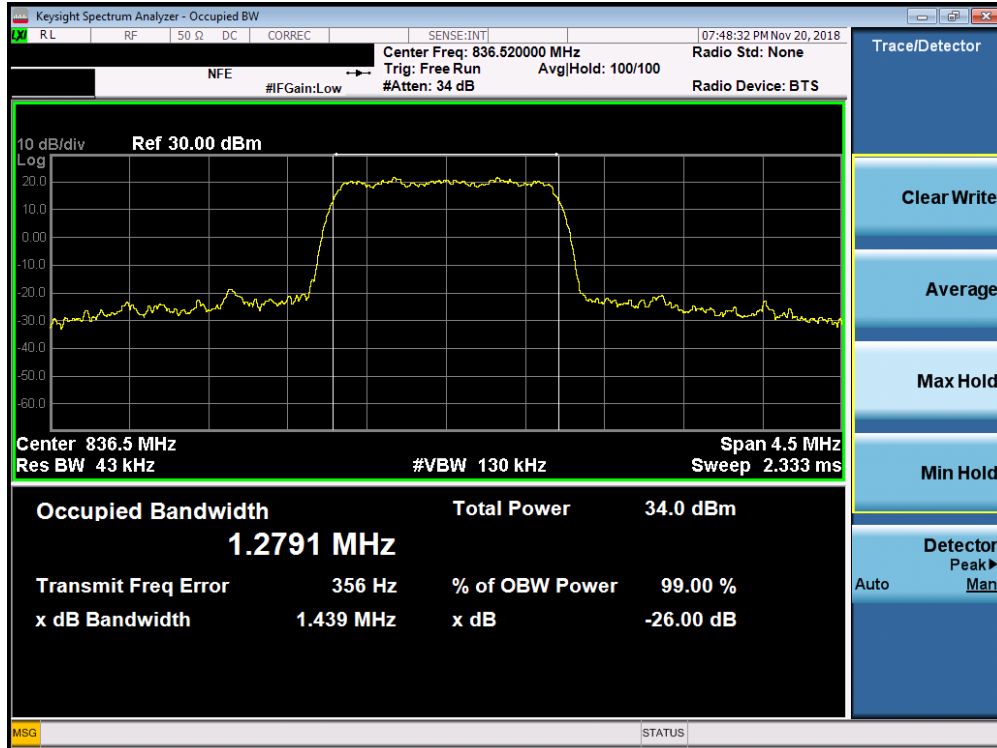


Plot 7-3. Occupied Bandwidth Plot (PCS GPRS Mode)

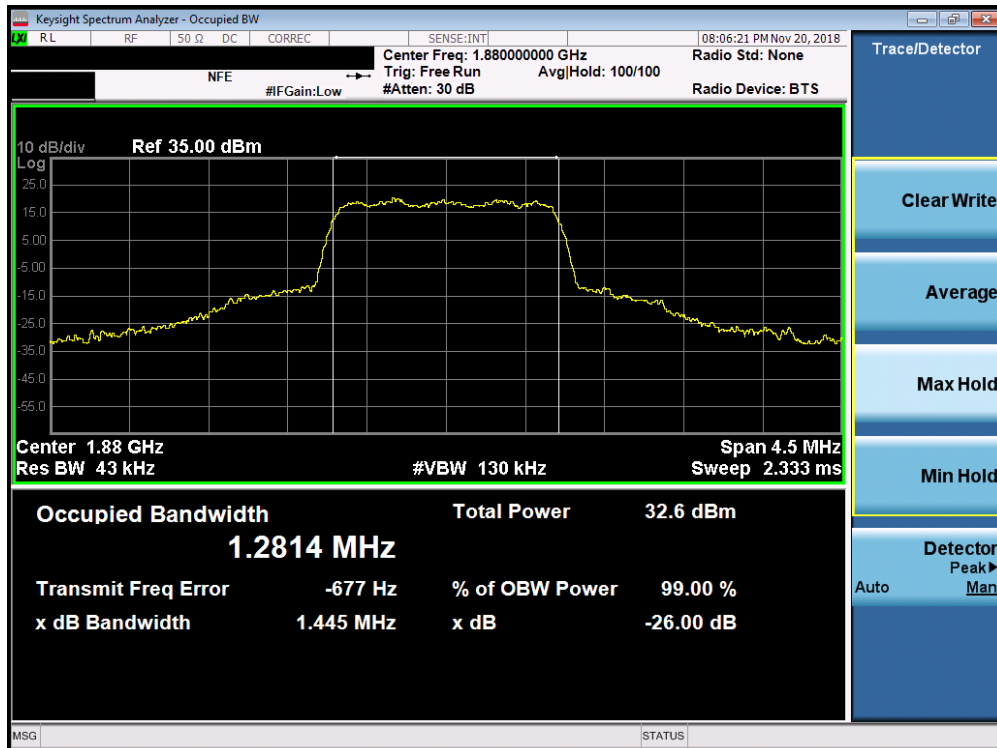


Plot 7-4. Occupied Bandwidth Plot (EDGE1900 Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 15 of 107

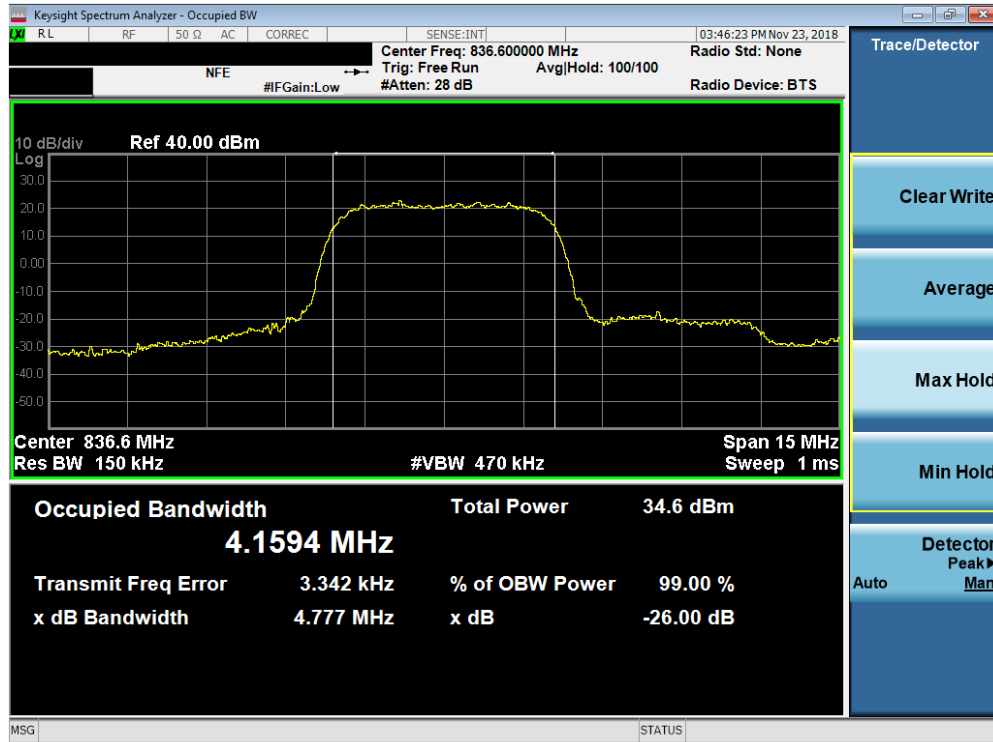


Plot 7-5. Occupied Bandwidth Plot (Cellular CDMA Mode)

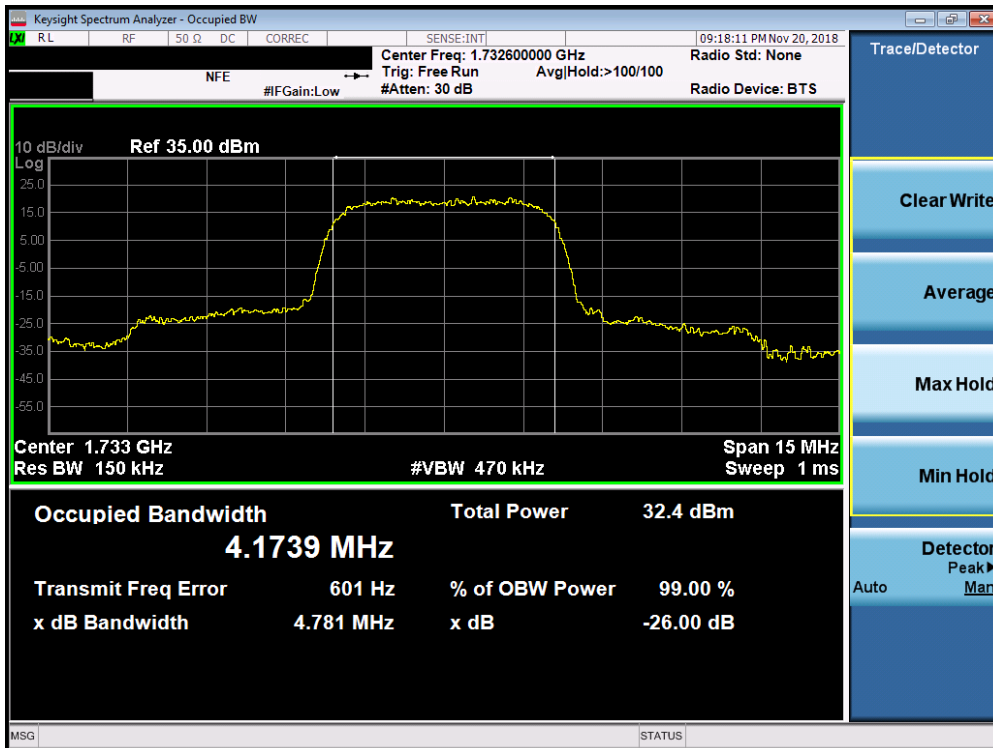


Plot 7-6. Occupied Bandwidth Plot (PCS CDMA Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 16 of 107

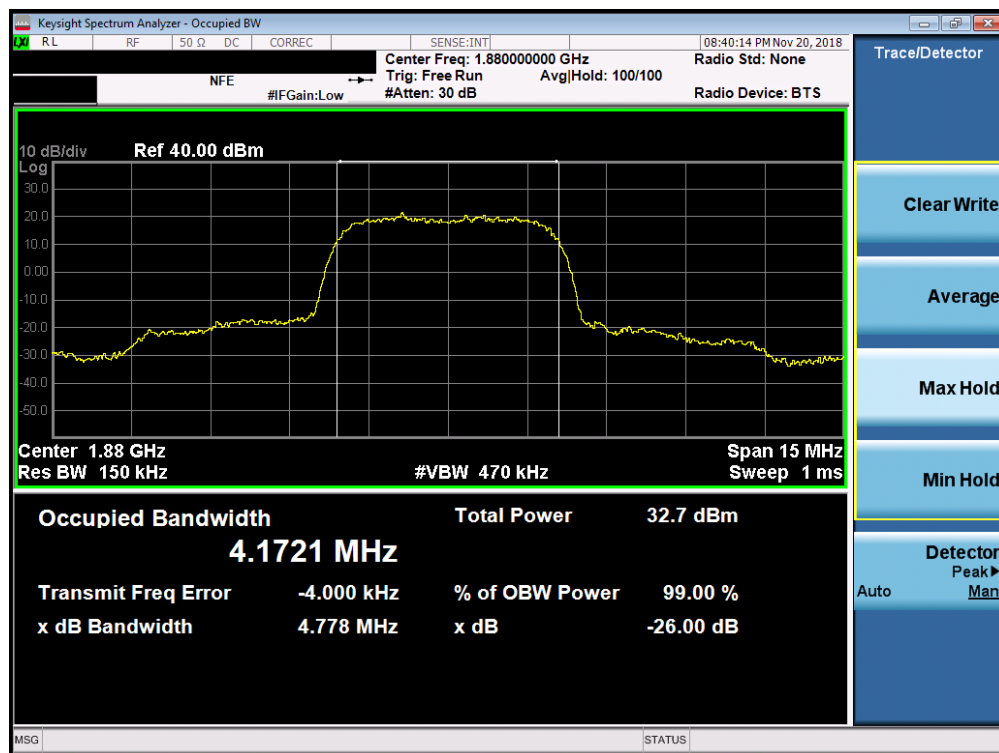


Plot 7-7. Occupied Bandwidth Plot (Cellular WCDMA Mode)



Plot 7-8. Occupied Bandwidth Plot (AWS WCDMA Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 17 of 107



Plot 7-9. Occupied Bandwidth Plot (PCS WCDMA Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 18 of 107

7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz for Cell, 20GHz for AWS, 20GHz for PCS (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

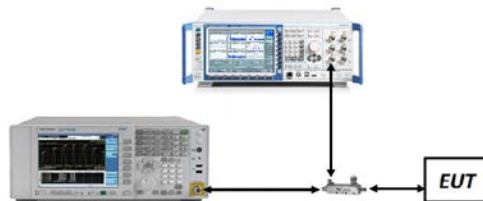


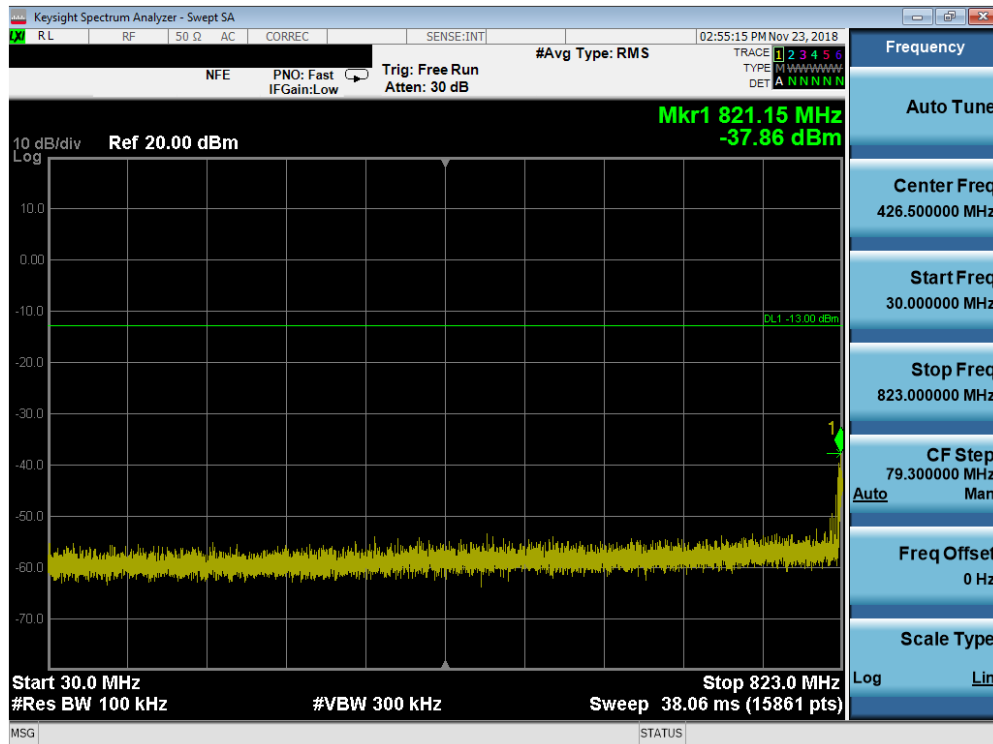
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

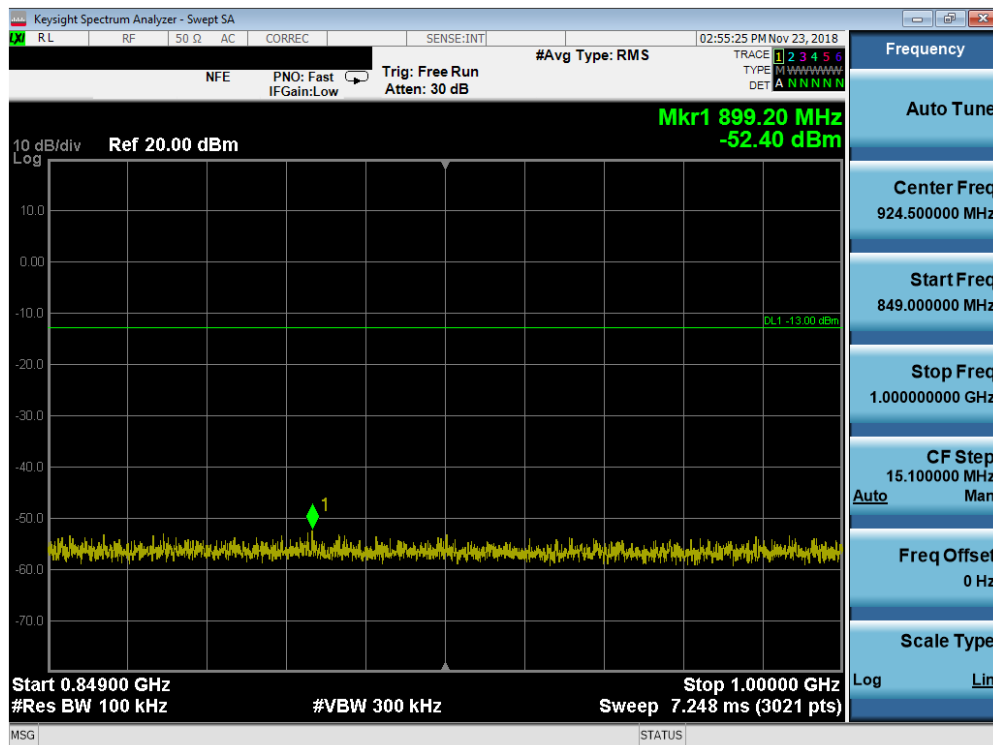
Per 24.238(b), 27.53(h)(3), and RSS-133(6.5), RSS-139(6.5), compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz, and 100 kHz or greater for Part 22 and RSS-132 measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 19 of 107

Cellular GPRS Mode

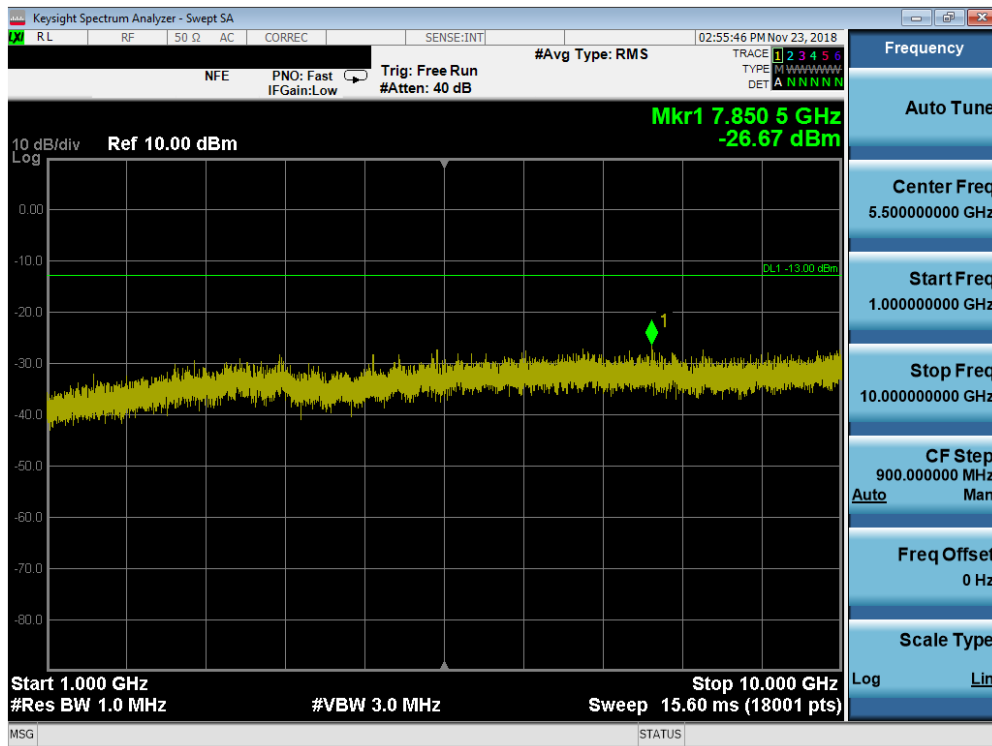


Plot 7-10. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

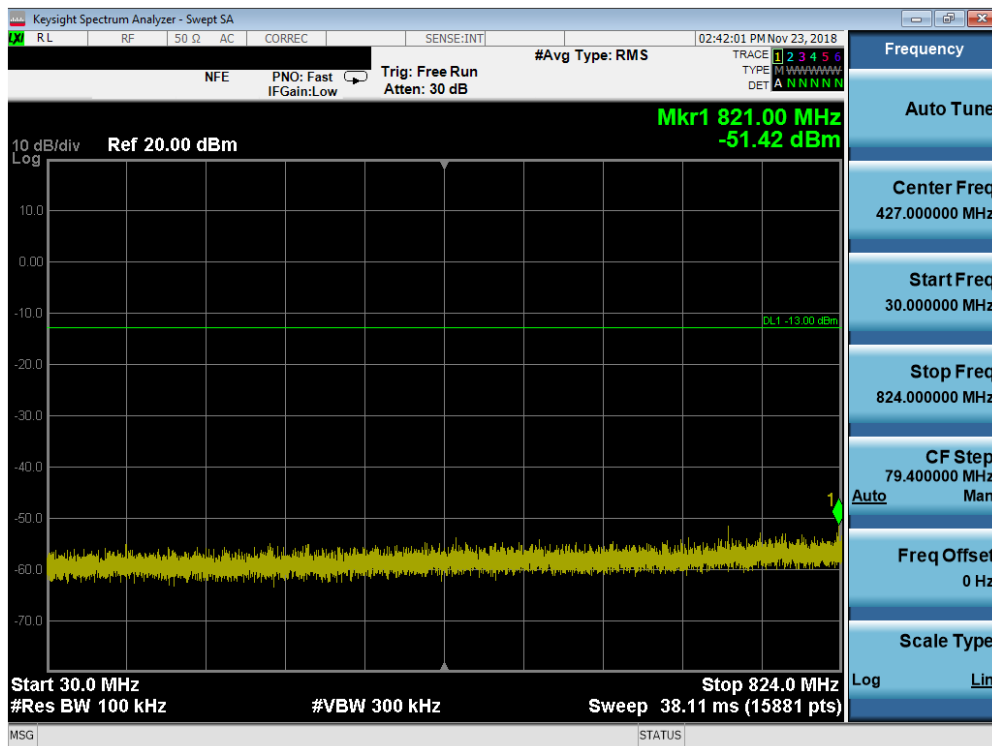


Plot 7-11. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 20 of 107

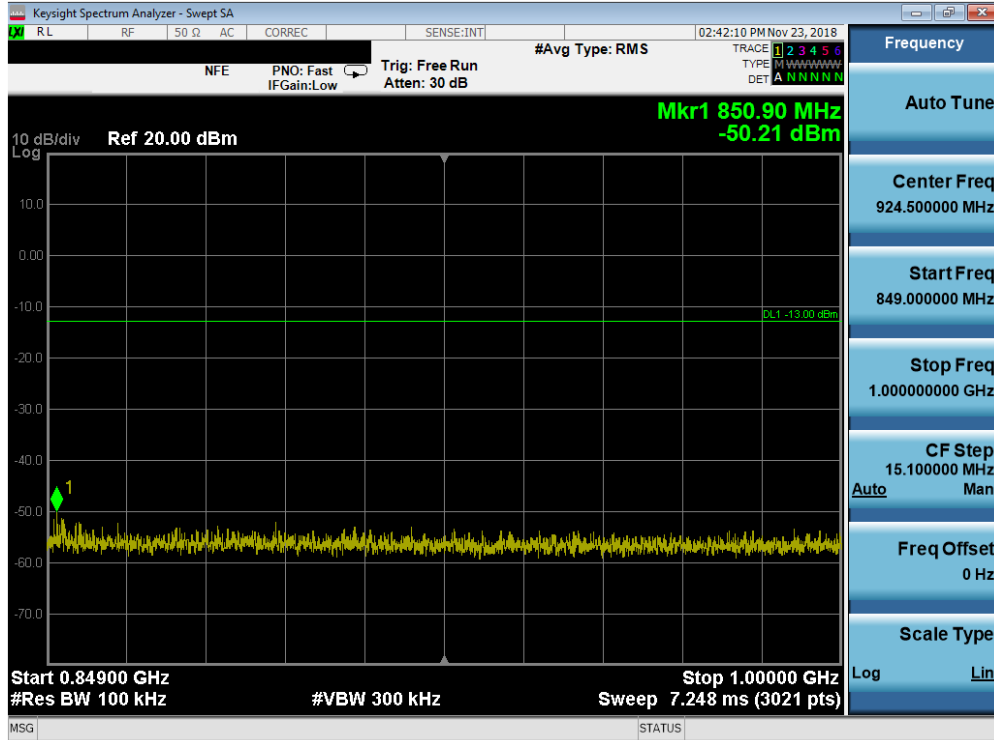


Plot 7-12. Conducted Spurious Plot (Cellular GPRS Mode - Low Channel)

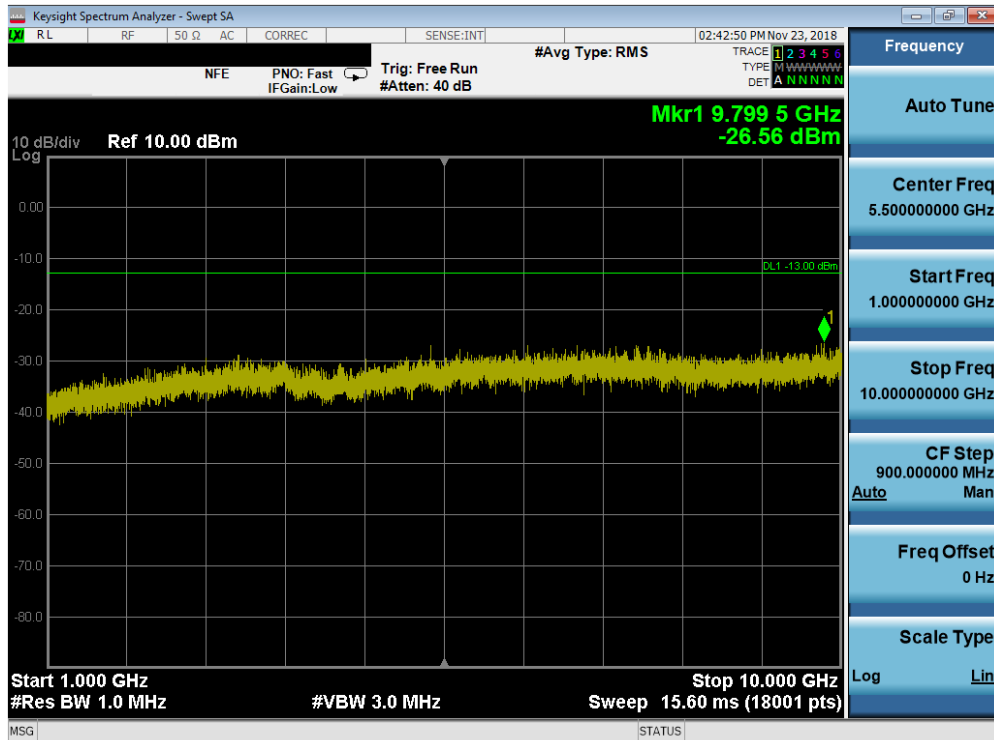


Plot 7-13. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 21 of 107

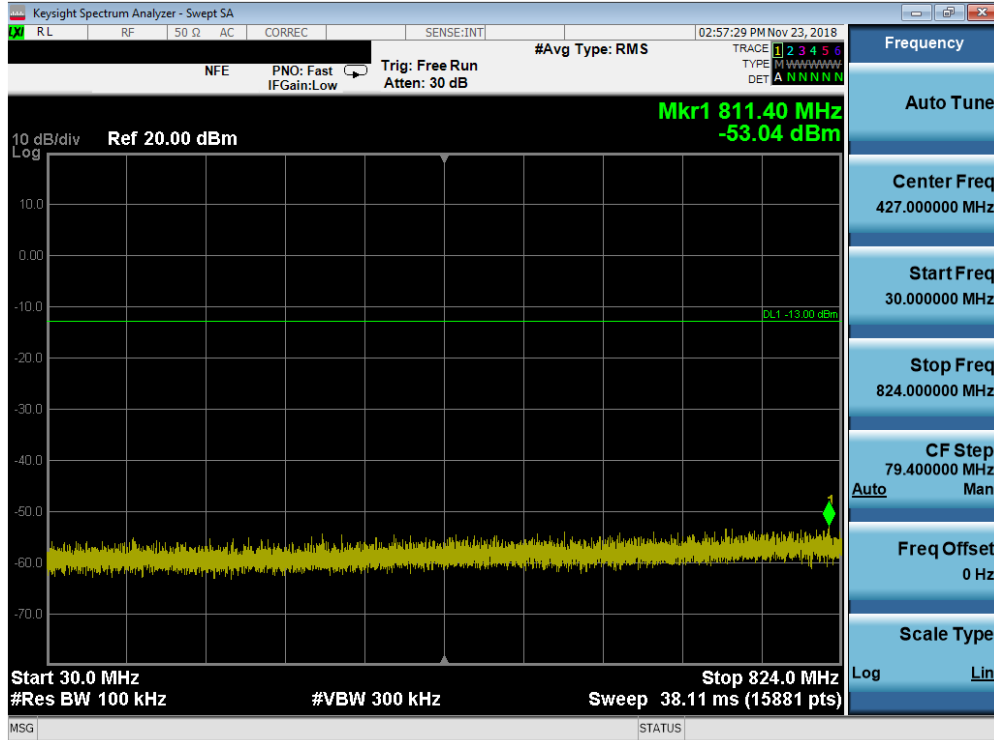


Plot 7-14. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

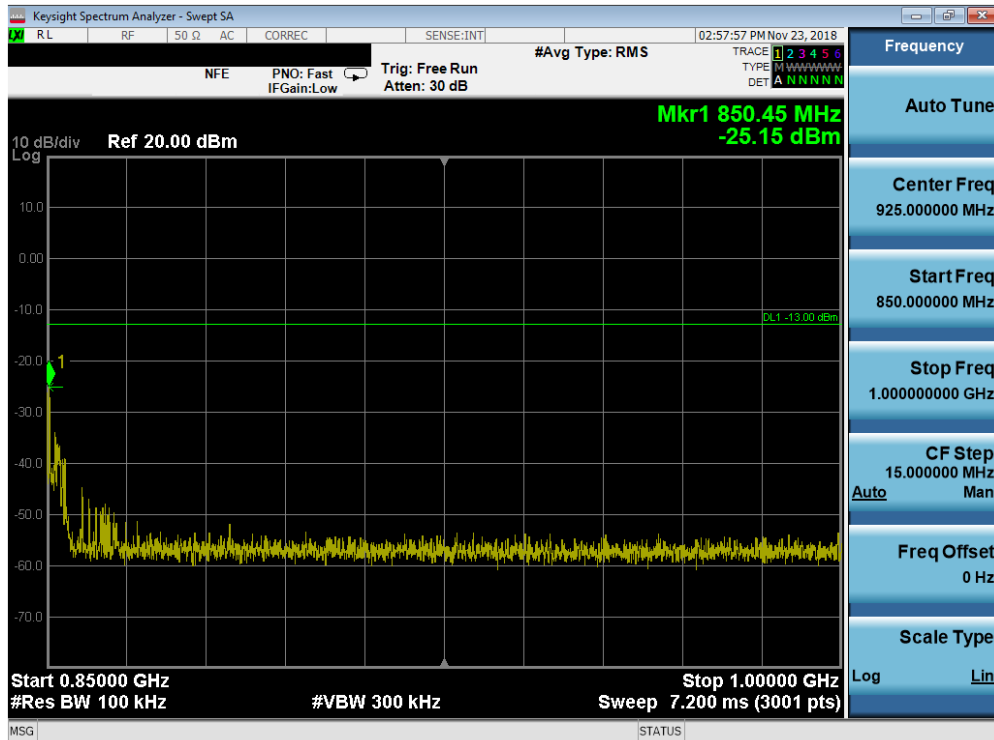


Plot 7-15. Conducted Spurious Plot (Cellular GPRS Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 22 of 107

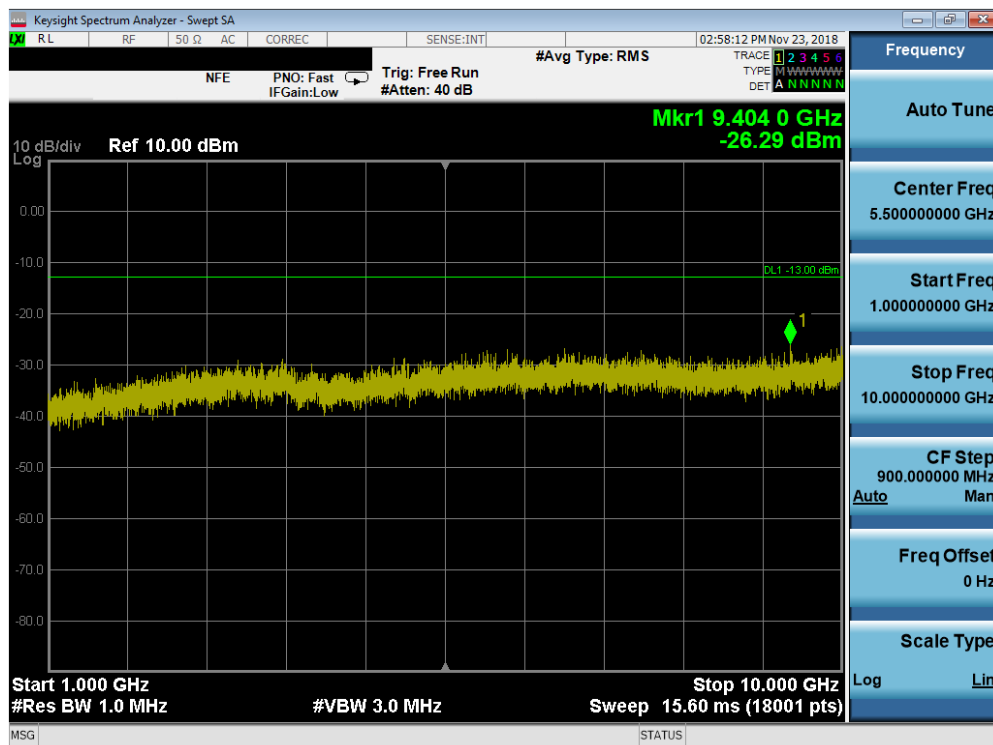


Plot 7-16. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)



Plot 7-17. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

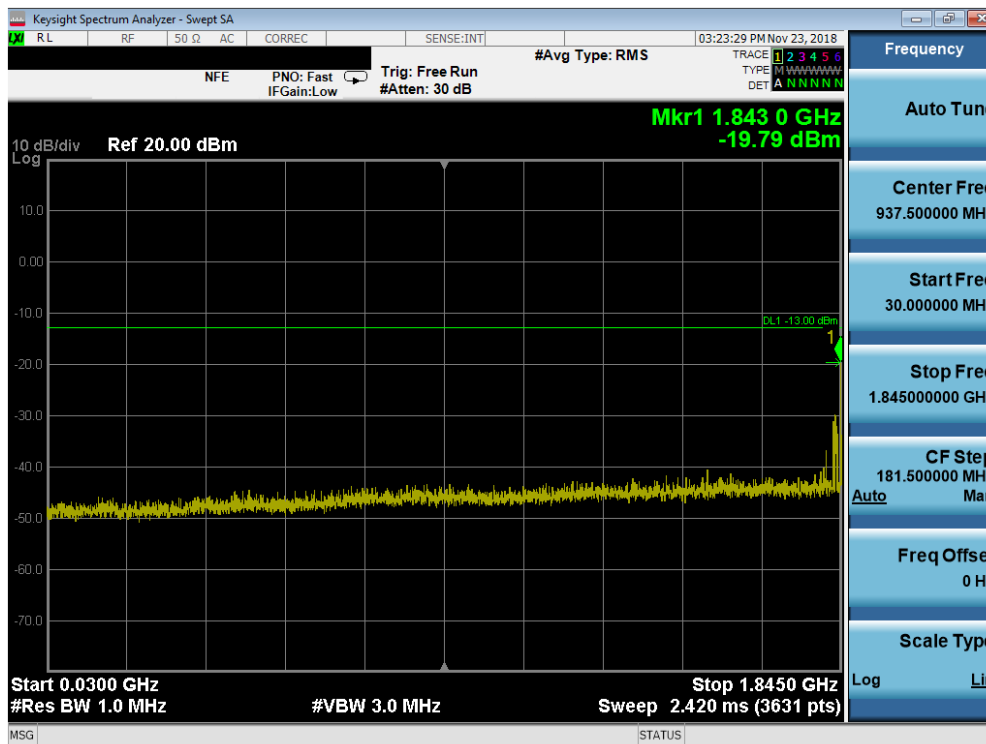
FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 23 of 107



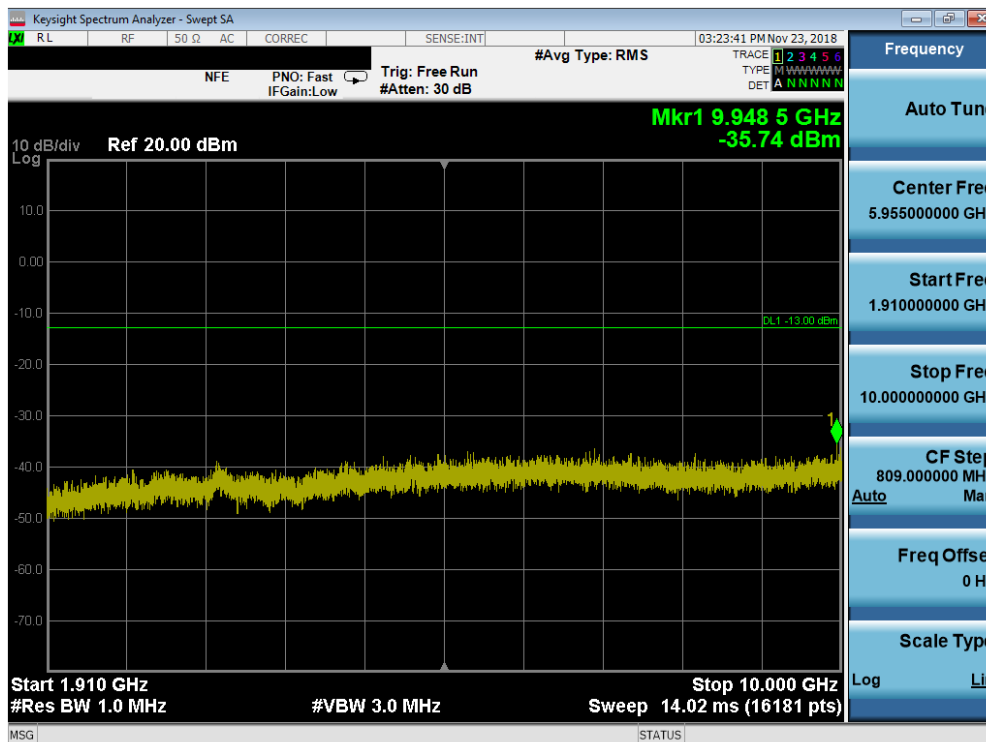
Plot 7-18. Conducted Spurious Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 24 of 107

PCS GPRS Mode

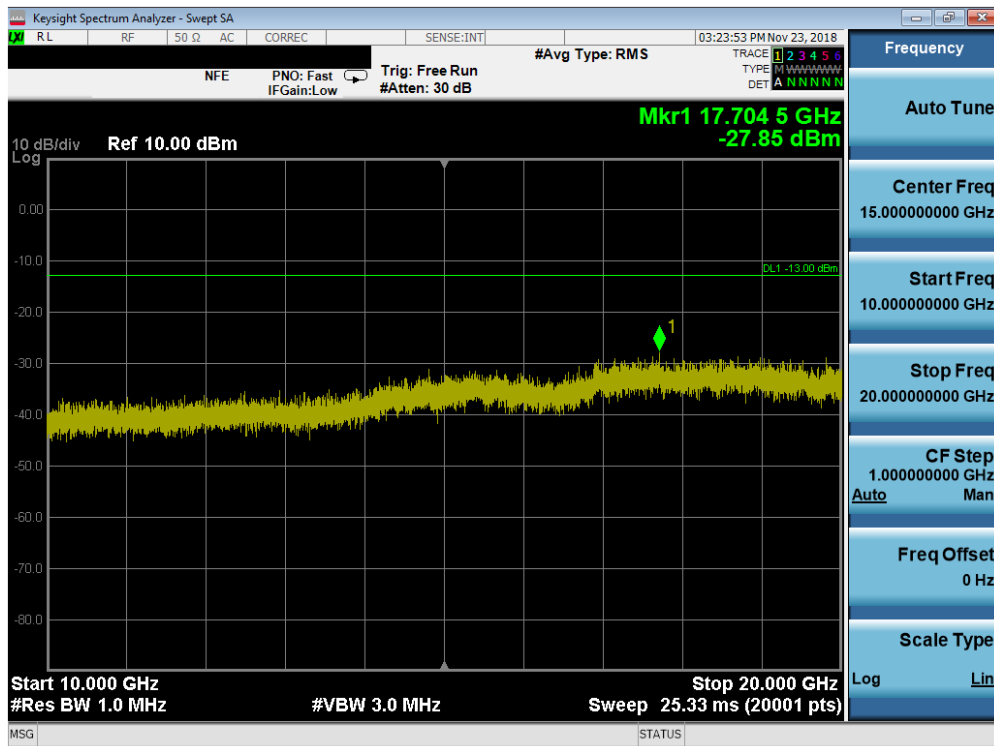


Plot 7-19. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

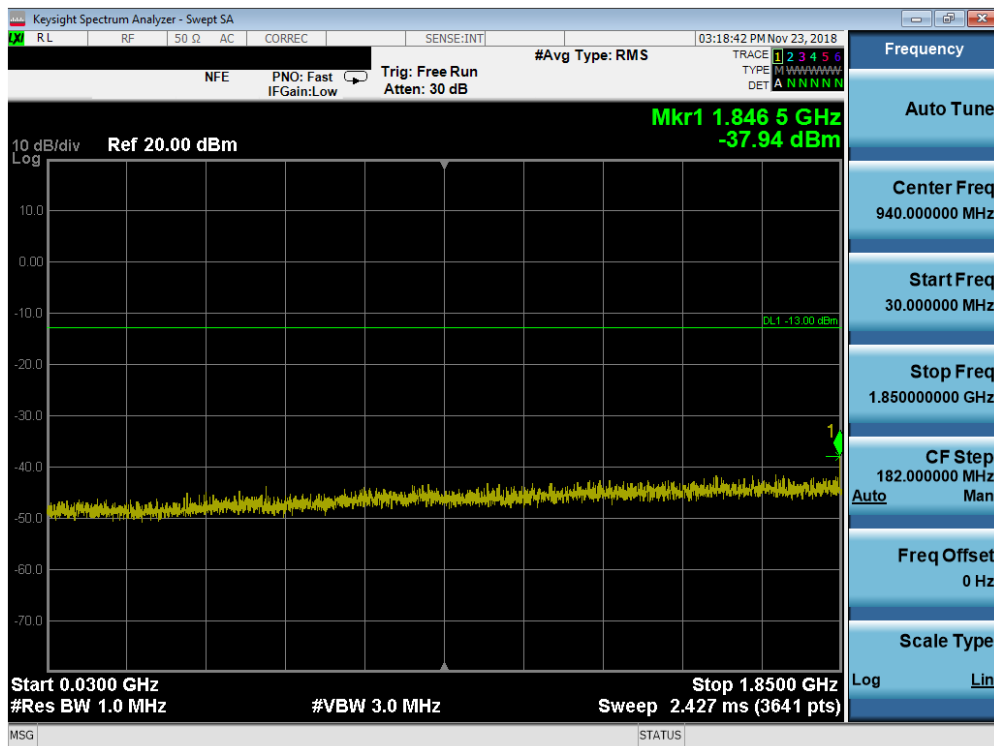


Plot 7-20. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 25 of 107

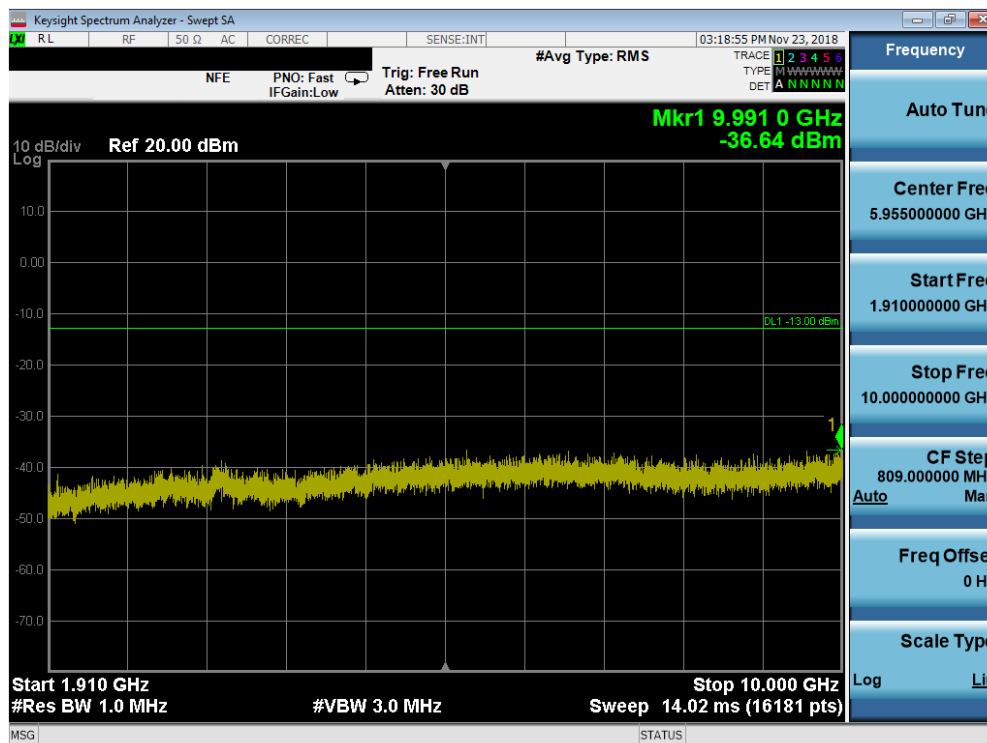


Plot 7-21. Conducted Spurious Plot (PCS GPRS Mode - Low Channel)

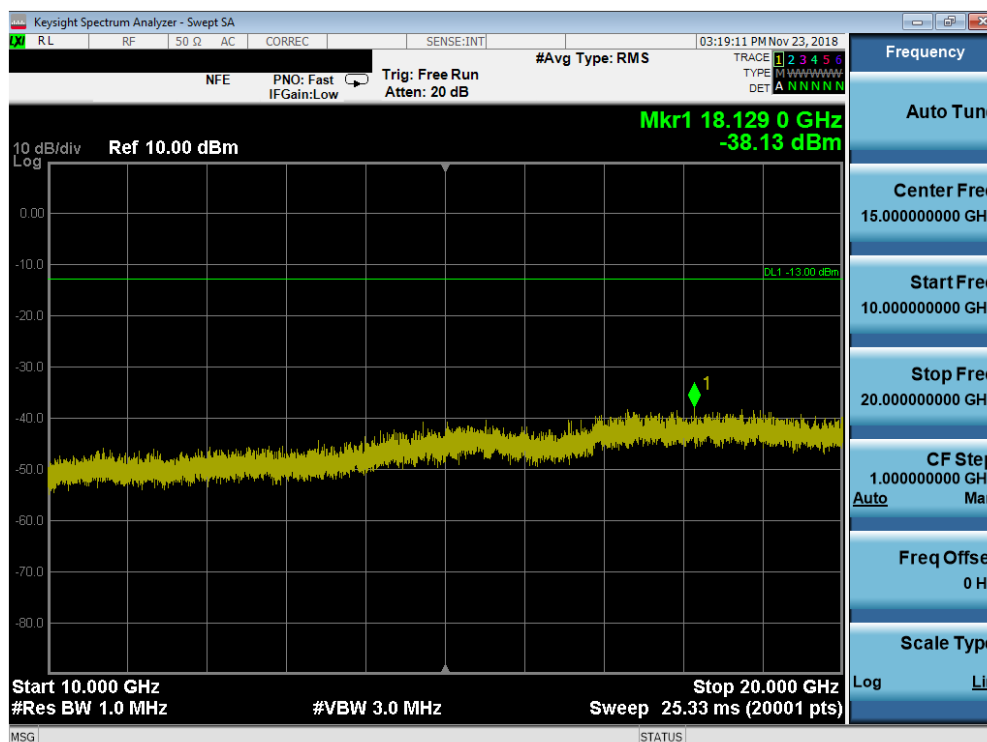


Plot 7-22. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 26 of 107

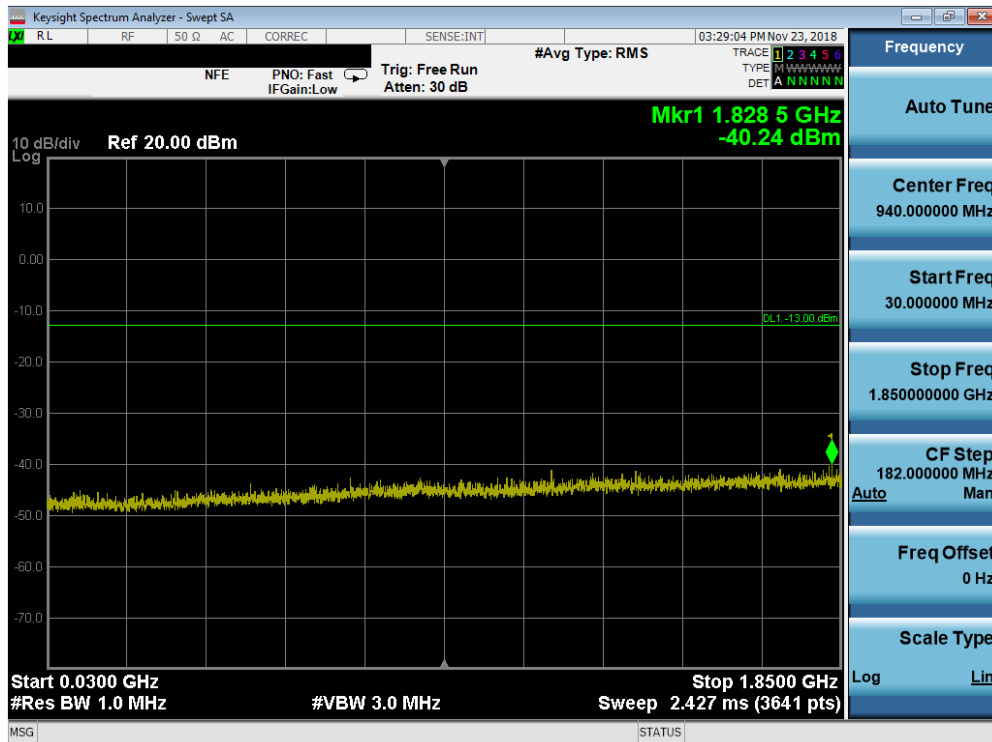


Plot 7-23. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

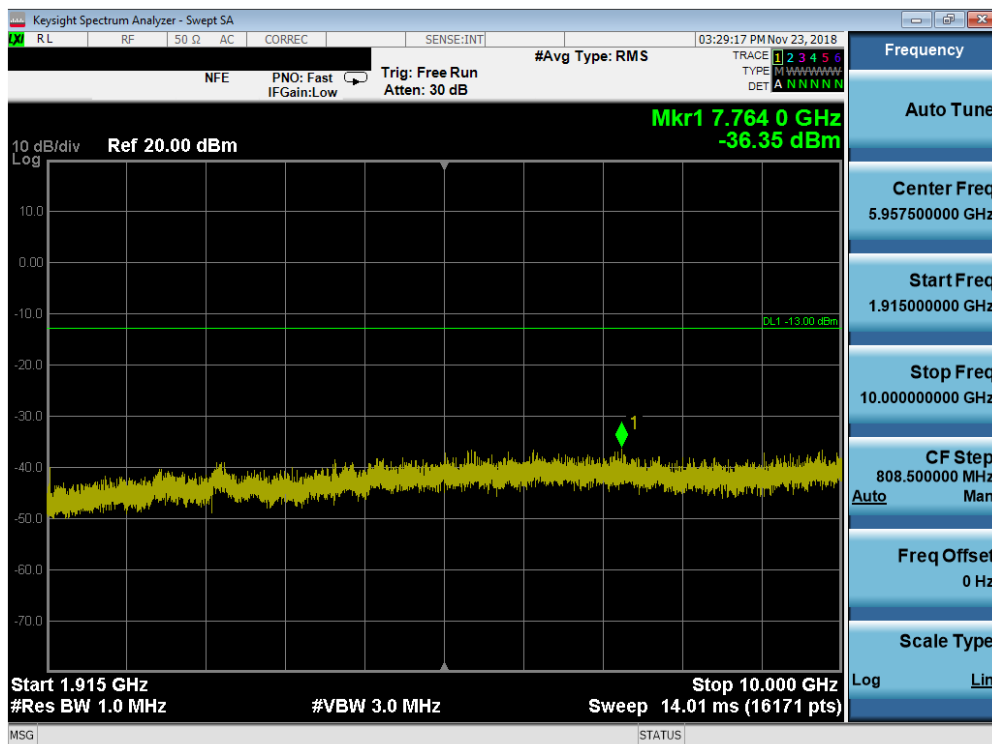


Plot 7-24. Conducted Spurious Plot (PCS GPRS Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 27 of 107

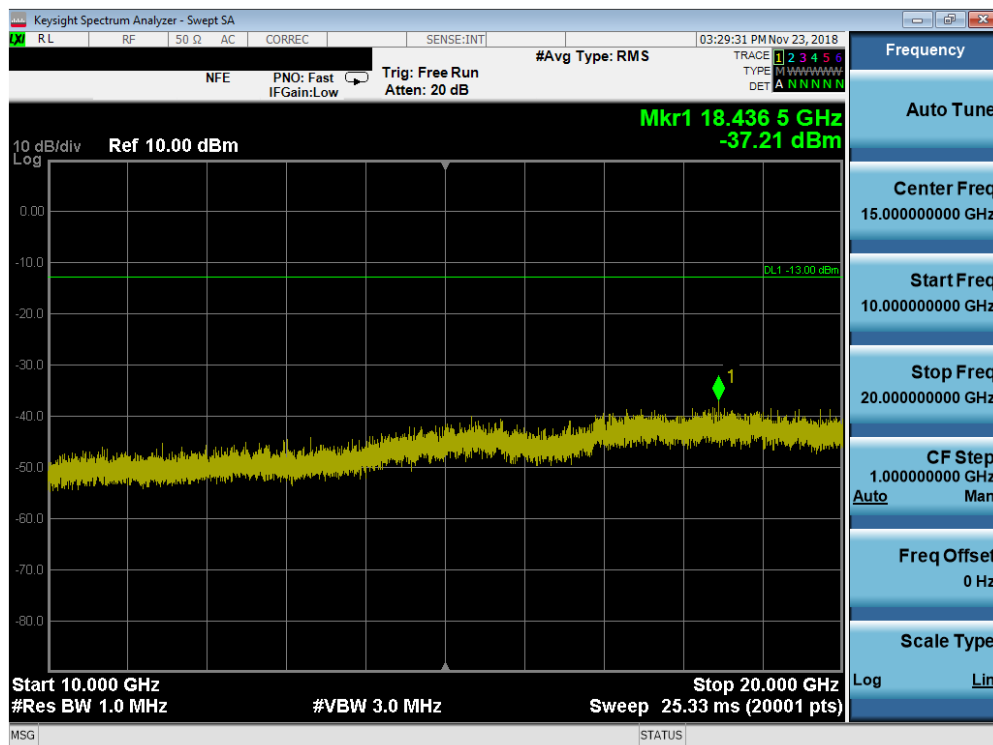


Plot 7-25. Conducted Spurious Plot (PCS GPRS Mode - High Channel)



Plot 7-26. Conducted Spurious Plot (PCS GPRS Mode - High Channel)

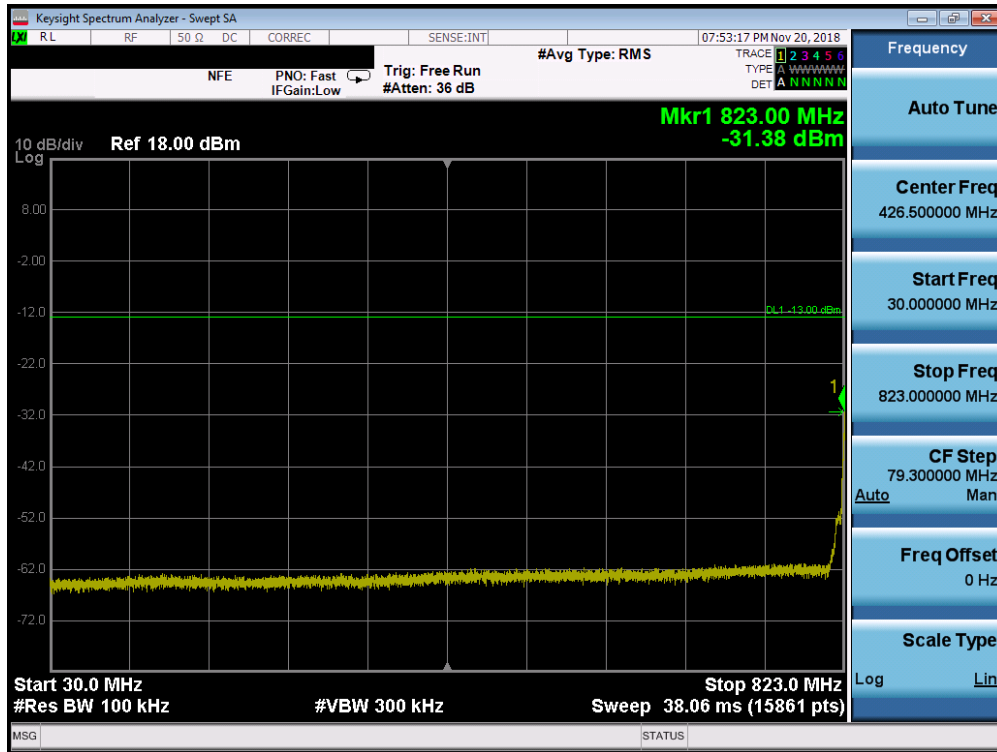
FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 28 of 107



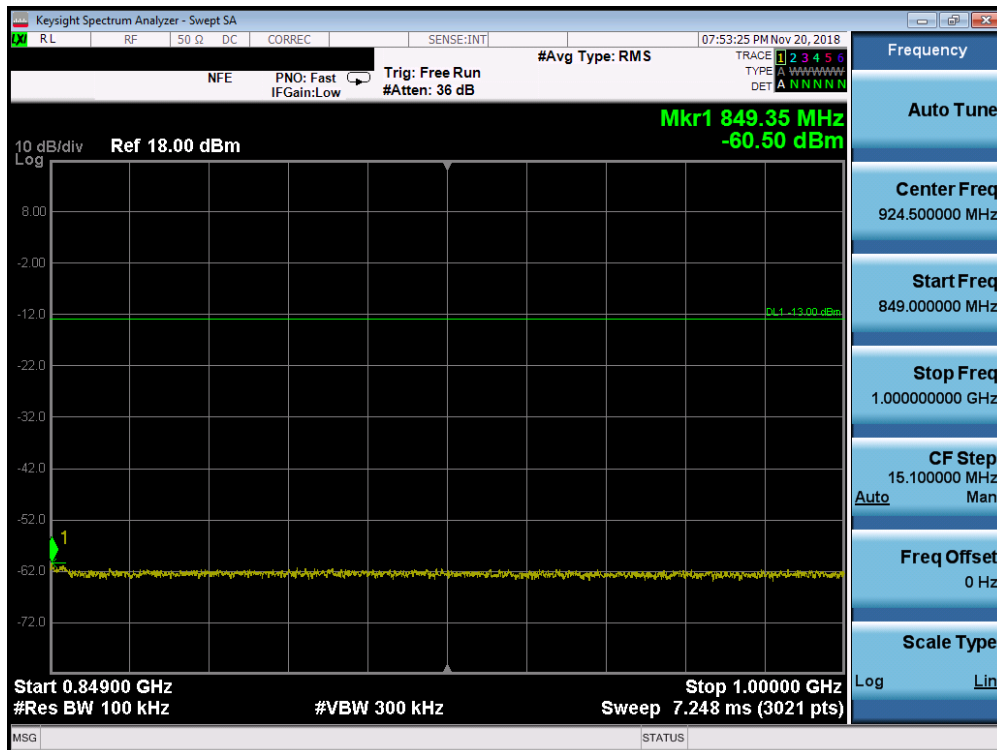
Plot 7-27. Conducted Spurious Plot (PCS GPRS Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 29 of 107

Cellular CDMA Mode

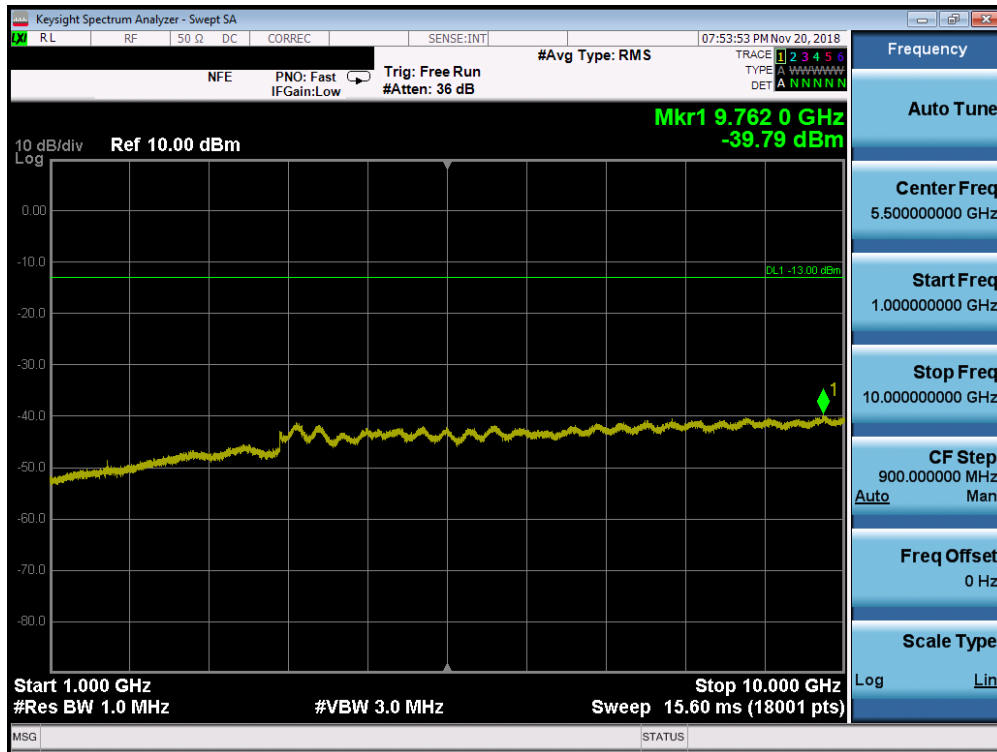


Plot 7-28. Conducted Spurious Plot (Cellular CDMA Mode - Low Channel)

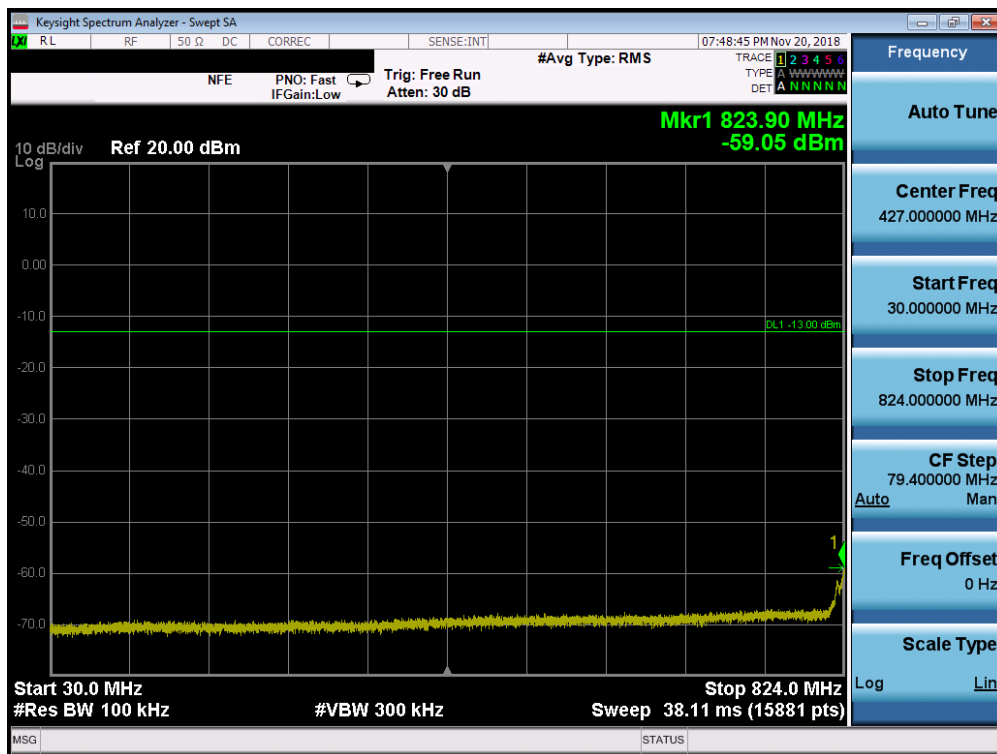


Plot 7-29. Conducted Spurious Plot (Cellular CDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 30 of 107

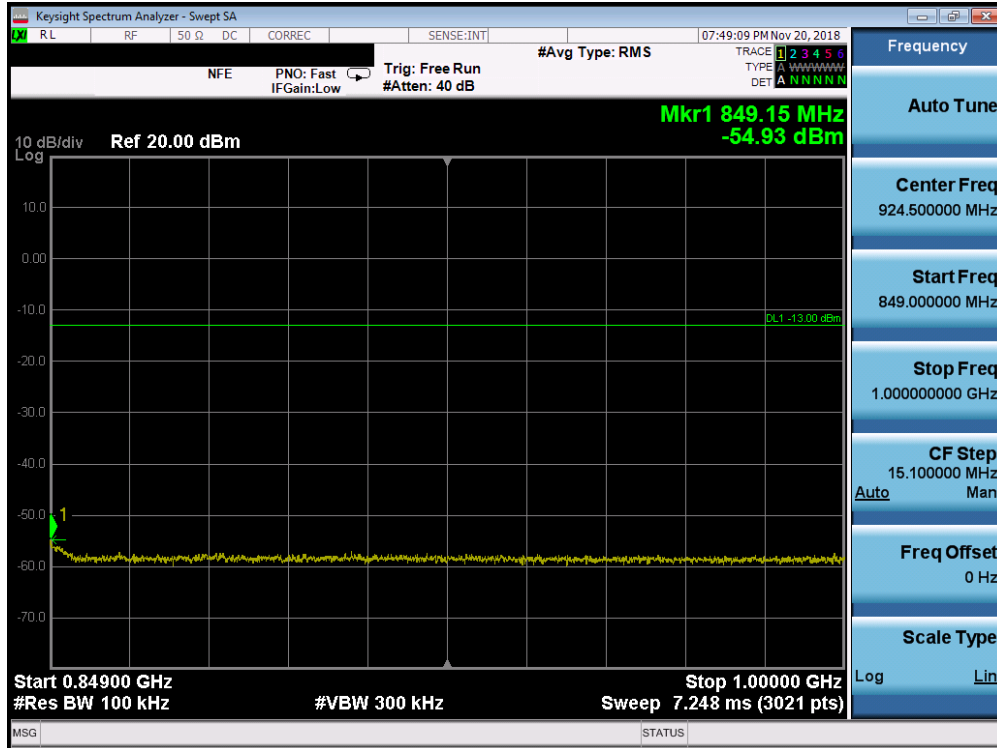


Plot 7-30. Conducted Spurious Plot (Cellular CDMA Mode - Low Channel)

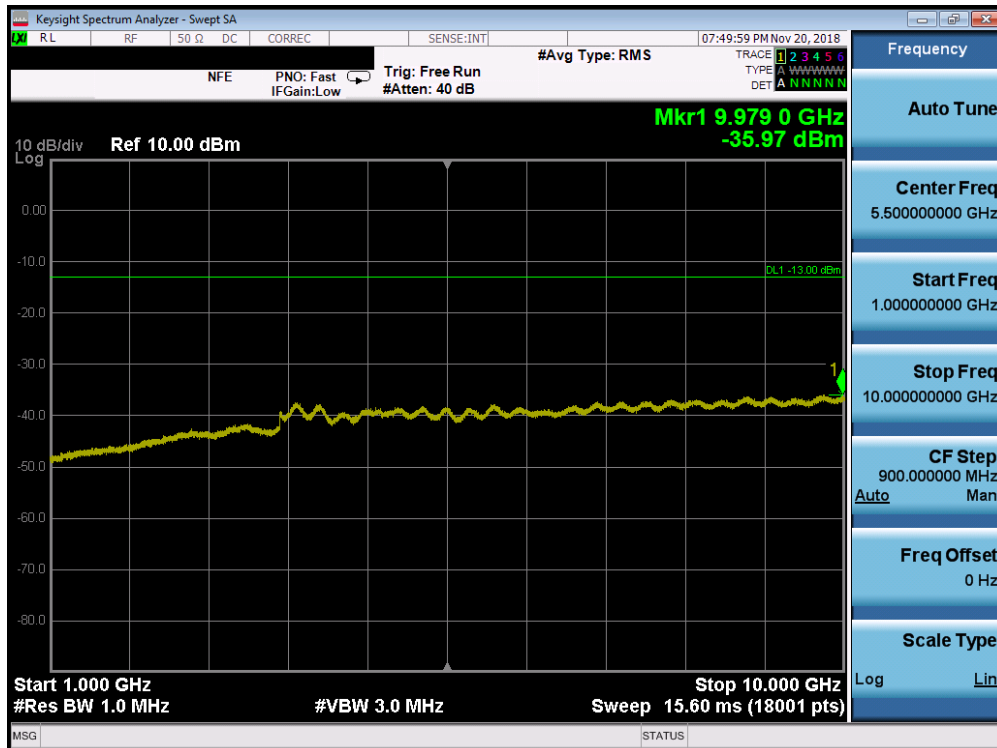


Plot 7-31. Conducted Spurious Plot (Cellular CDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 31 of 107

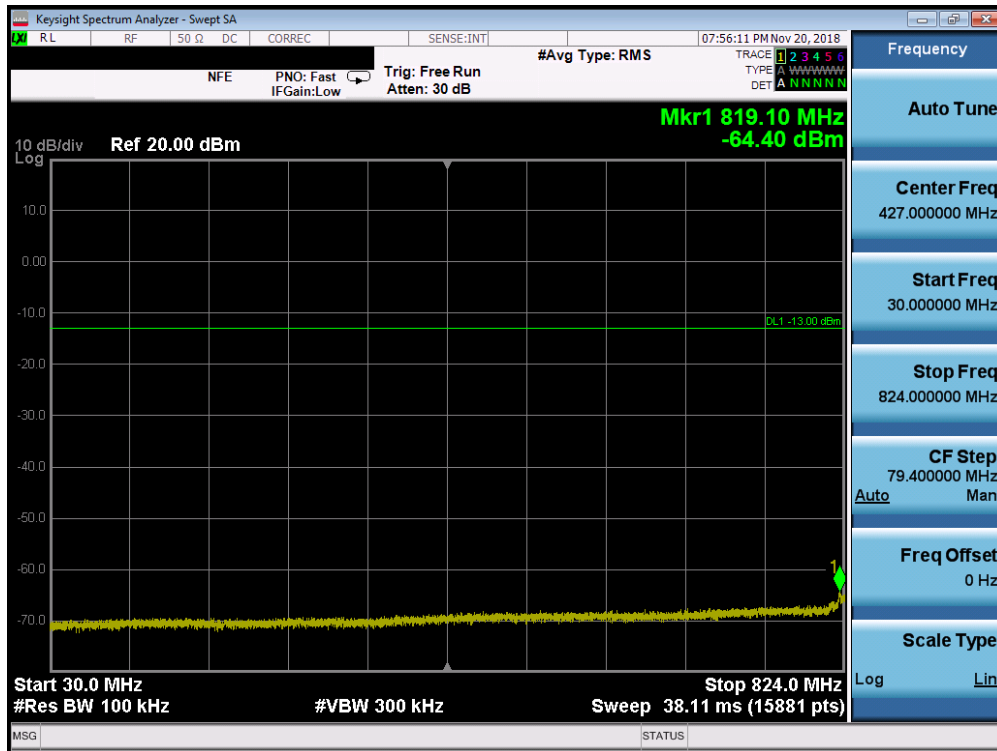


Plot 7-32. Conducted Spurious Plot (Cellular CDMA Mode - Mid Channel)

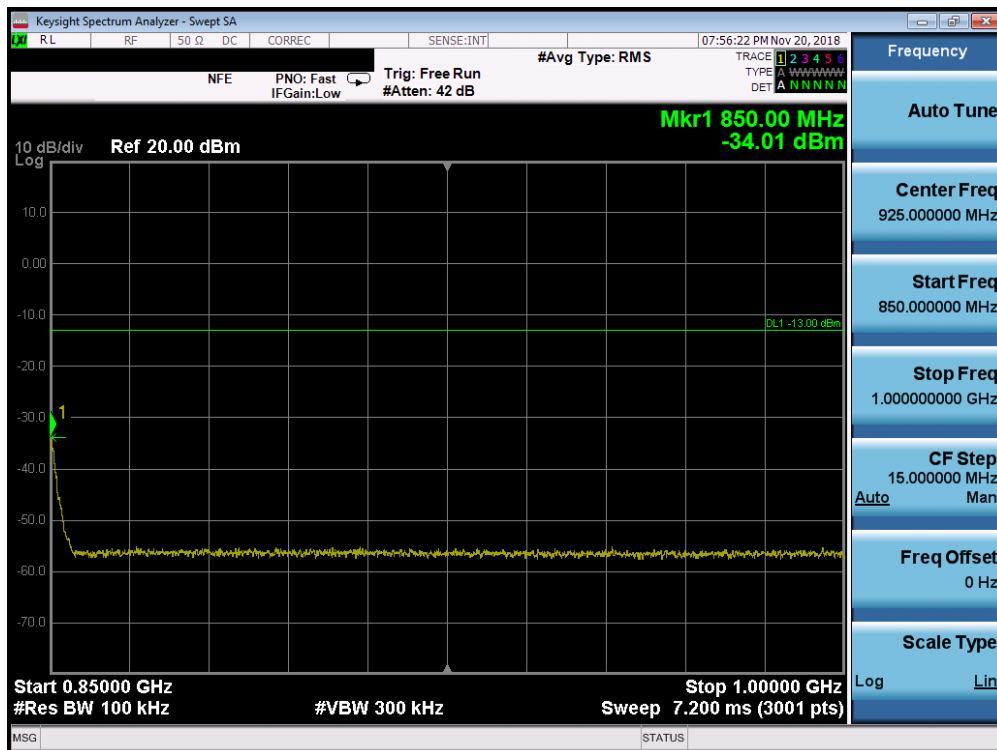


Plot 7-33. Conducted Spurious Plot (Cellular CDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 32 of 107

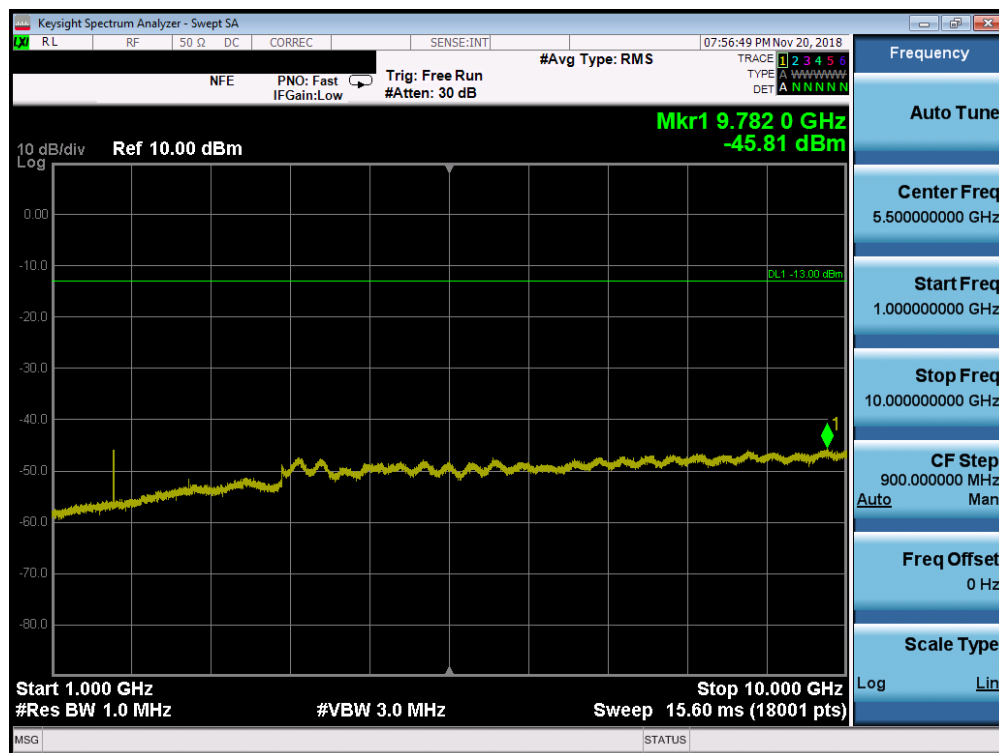


Plot 7-34. Conducted Spurious Plot (Cellular CDMA Mode - High Channel)



Plot 7-35. Conducted Spurious Plot (Cellular CDMA Mode - High Channel)

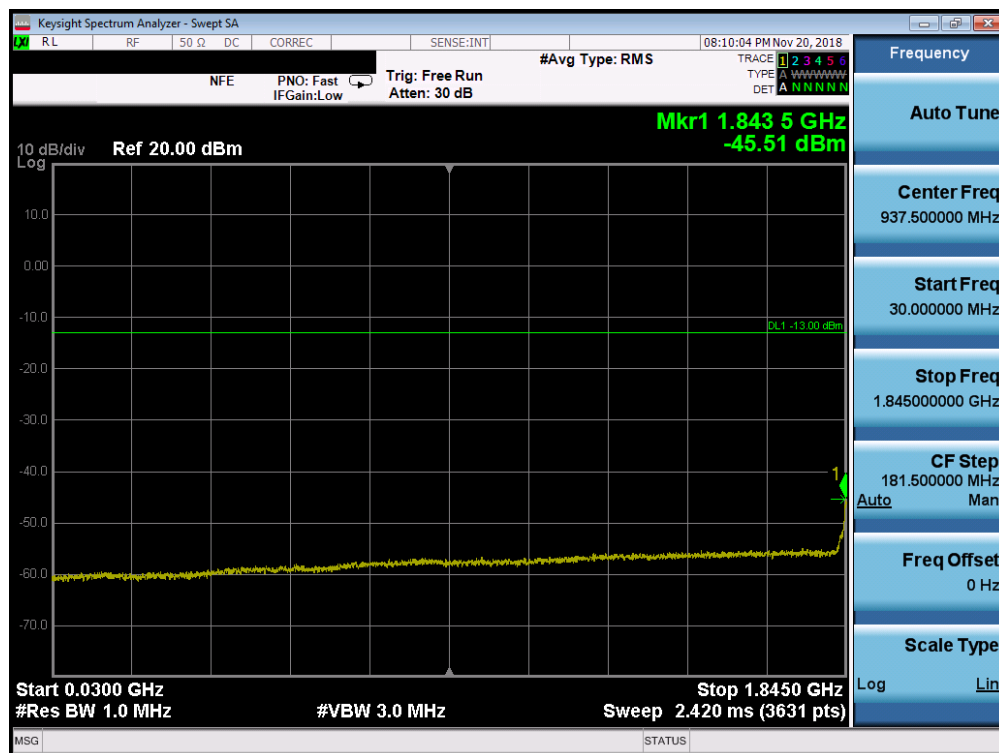
FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 33 of 107



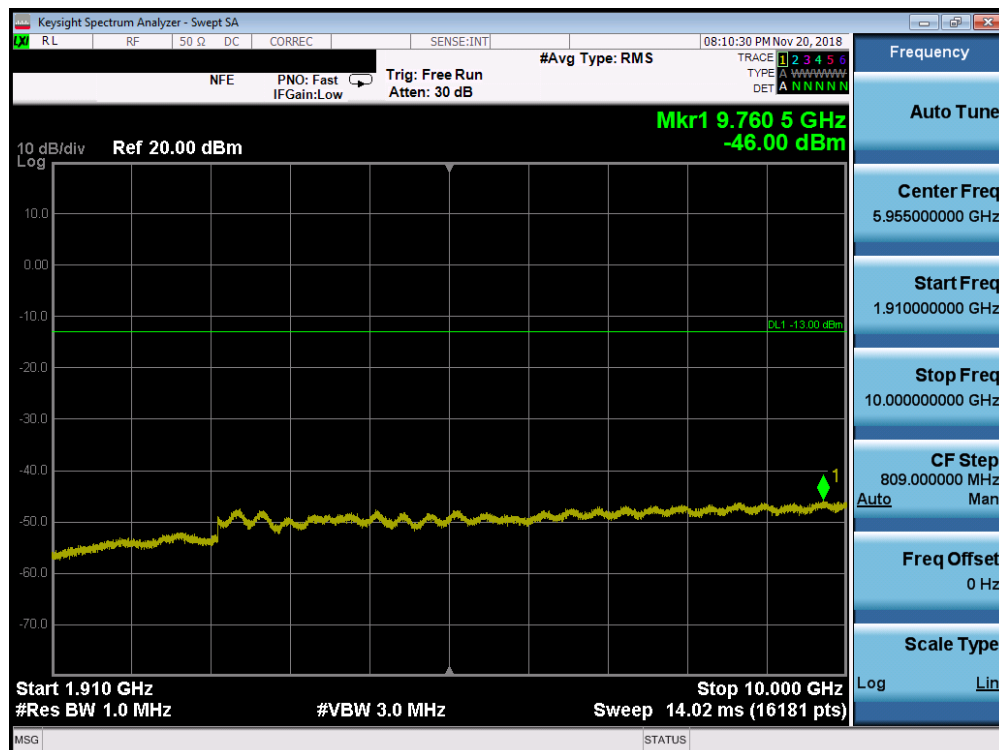
Plot 7-36. Conducted Spurious Plot (Cellular CDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 34 of 107

PCS CDMA Mode

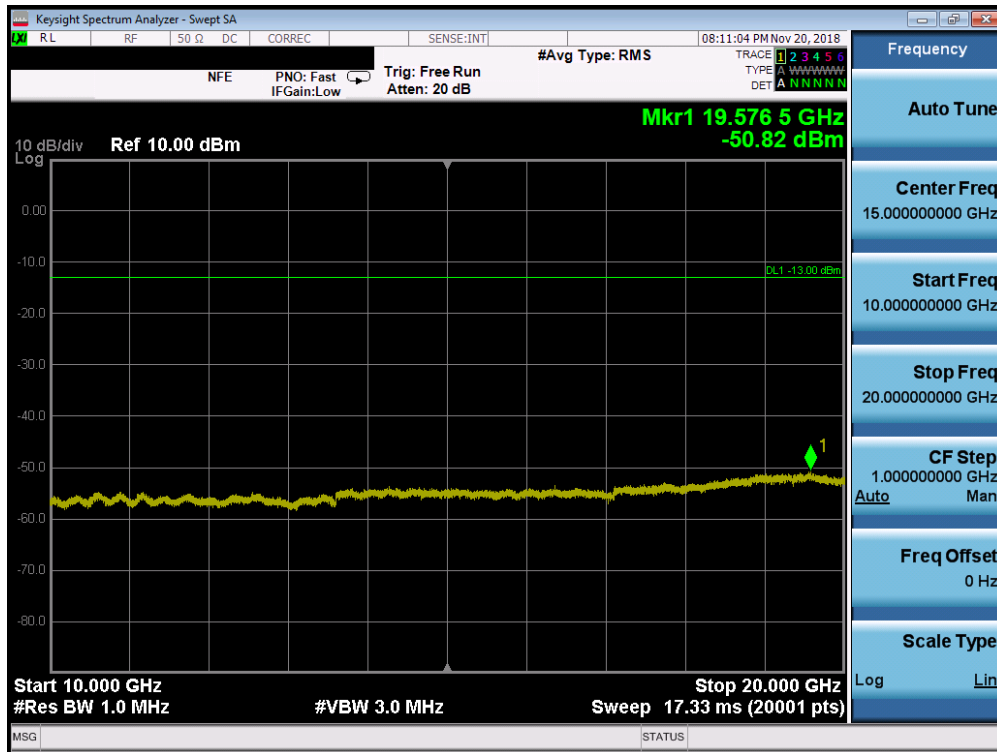


Plot 7-37. Conducted Spurious Plot (PCS CDMA Mode - Low Channel)

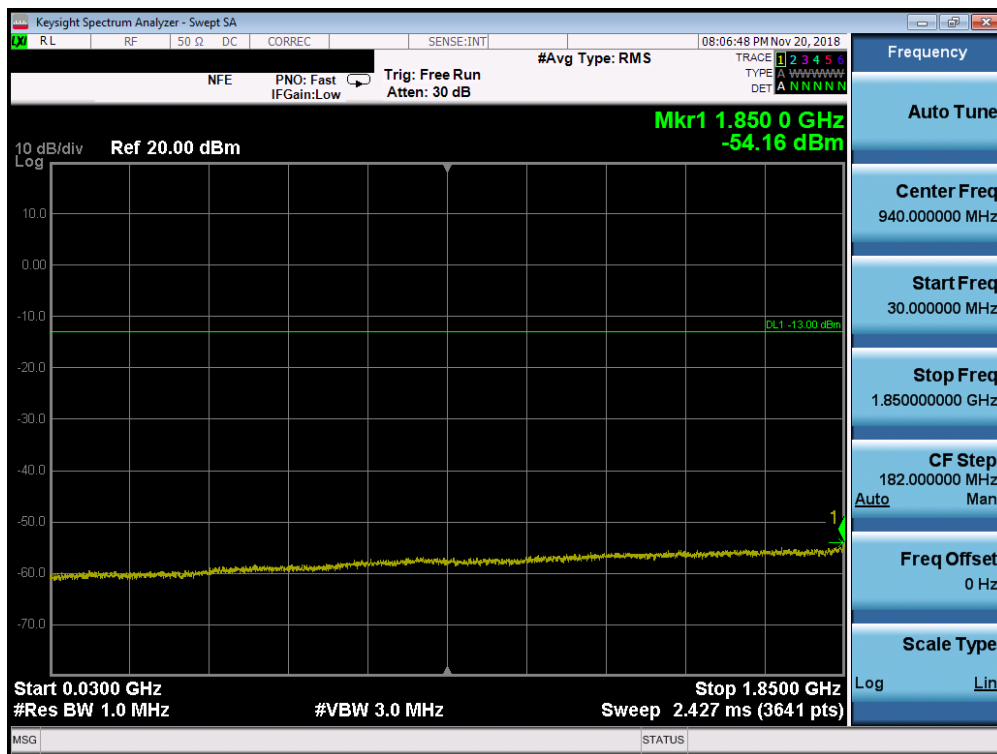


Plot 7-38. Conducted Spurious Plot (PCS CDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 35 of 107

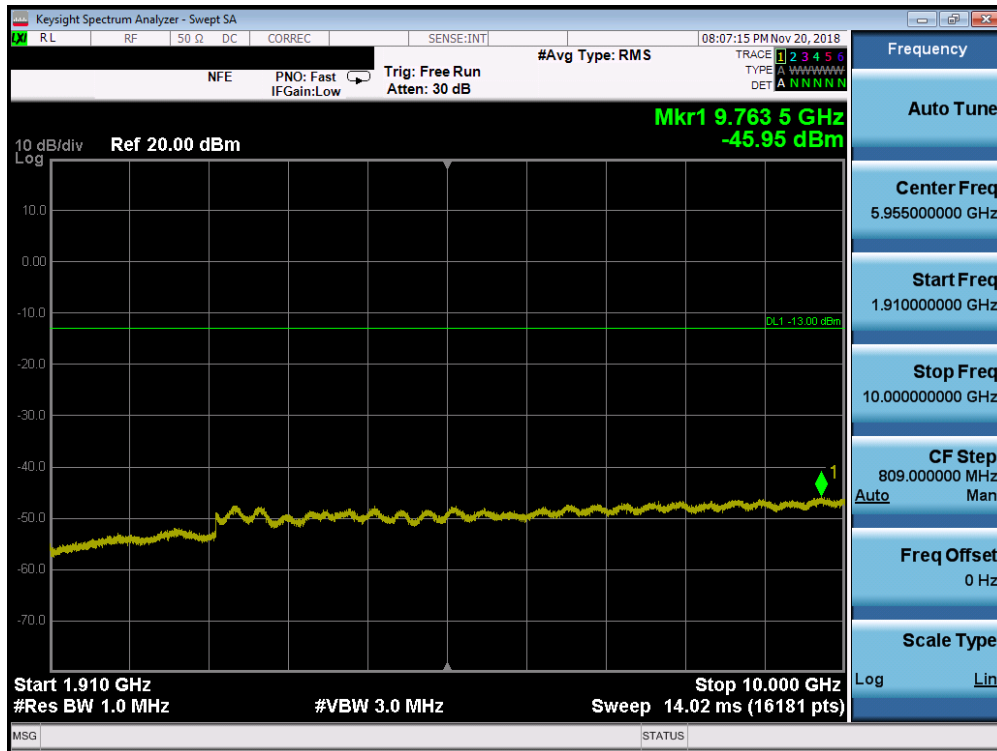


Plot 7-39. Conducted Spurious Plot (PCS CDMA Mode - Low Channel)

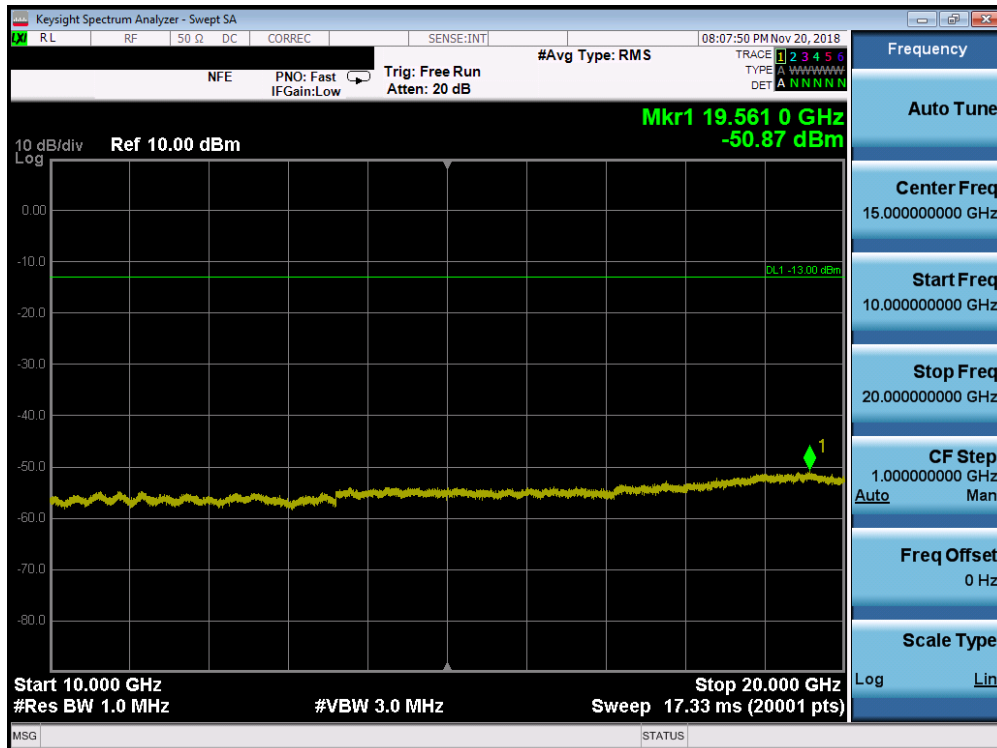


Plot 7-40. Conducted Spurious Plot (PCS CDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 36 of 107

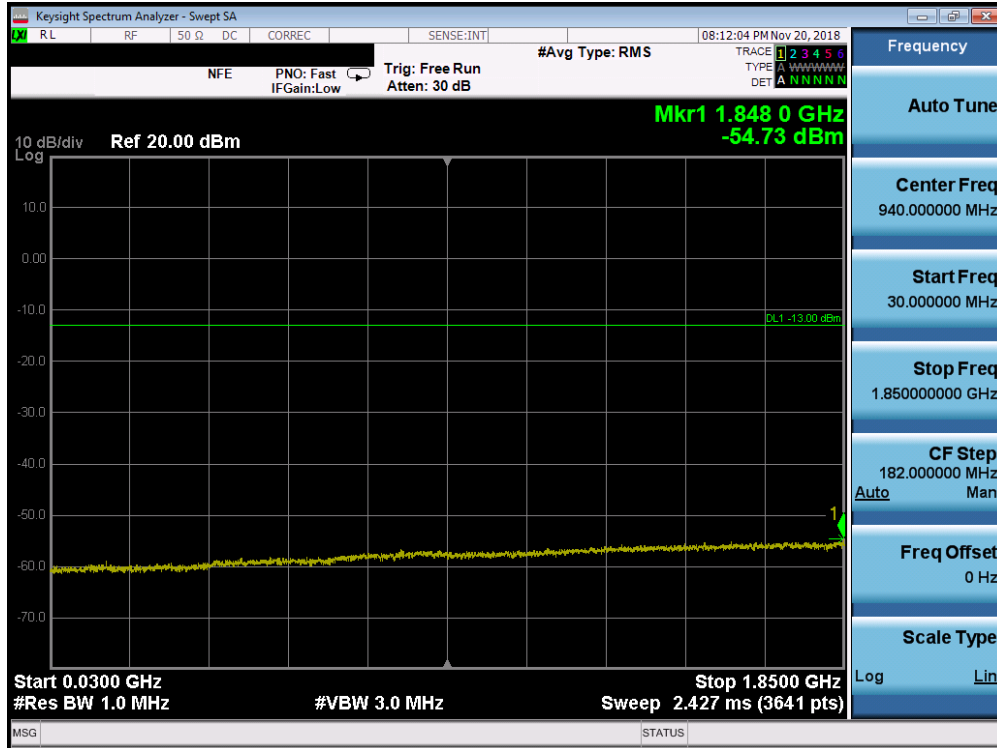


Plot 7-41. Conducted Spurious Plot (PCS CDMA Mode - Mid Channel)

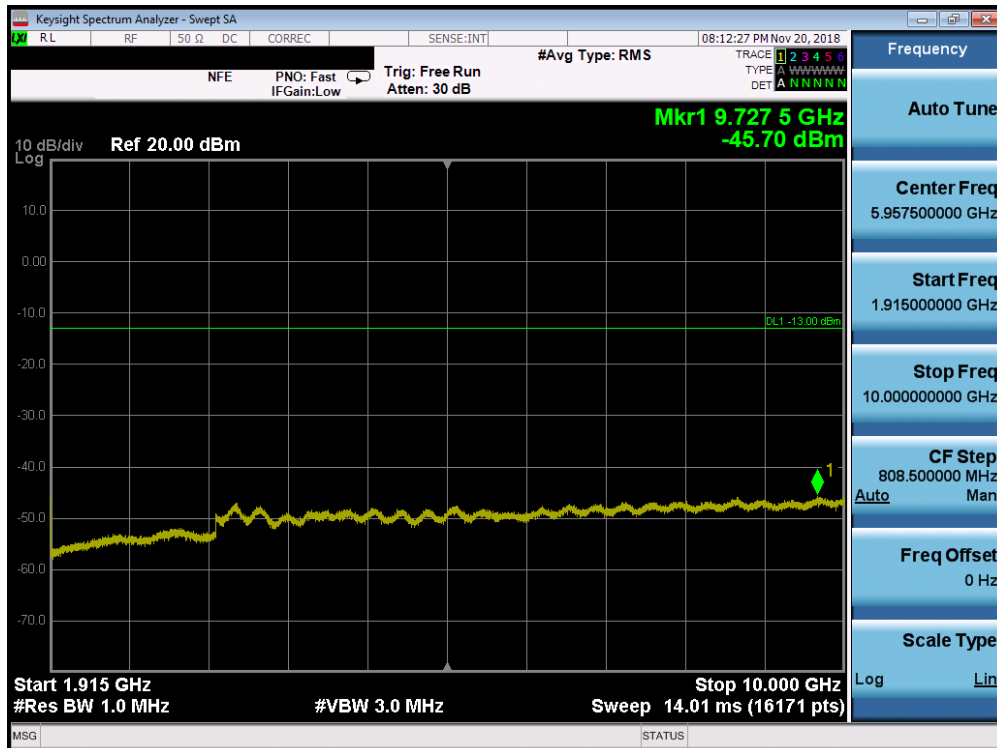


Plot 7-42. Conducted Spurious Plot (PCS CDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 37 of 107

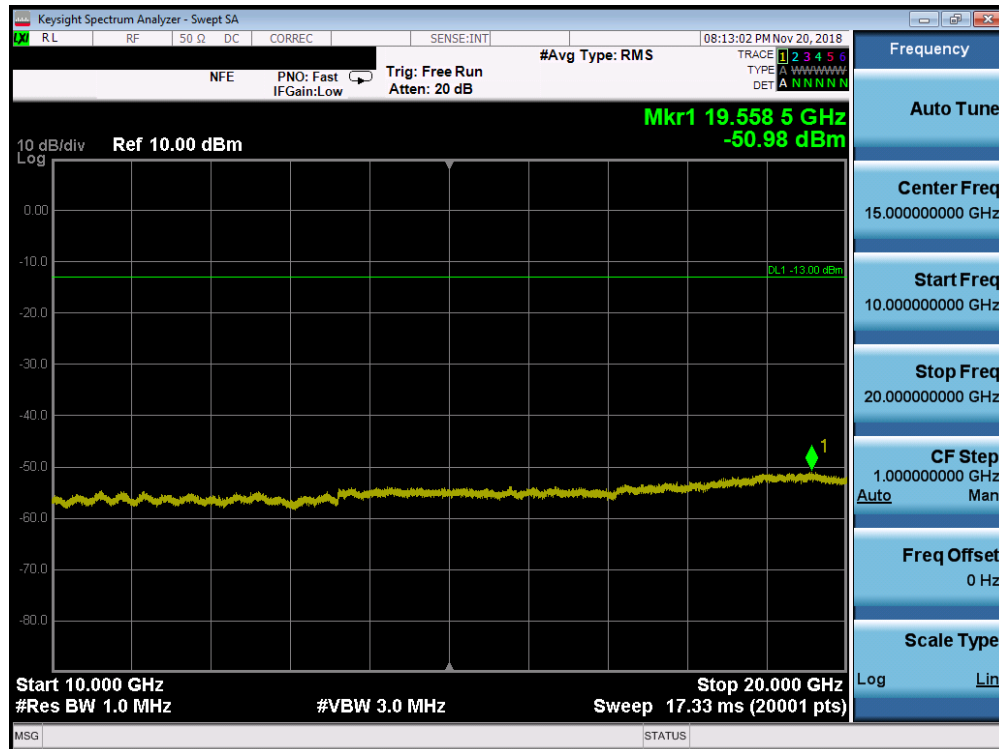


Plot 7-43. Conducted Spurious Plot (PCS CDMA Mode - High Channel)



Plot 7-44. Conducted Spurious Plot (PCS CDMA Mode - High Channel)

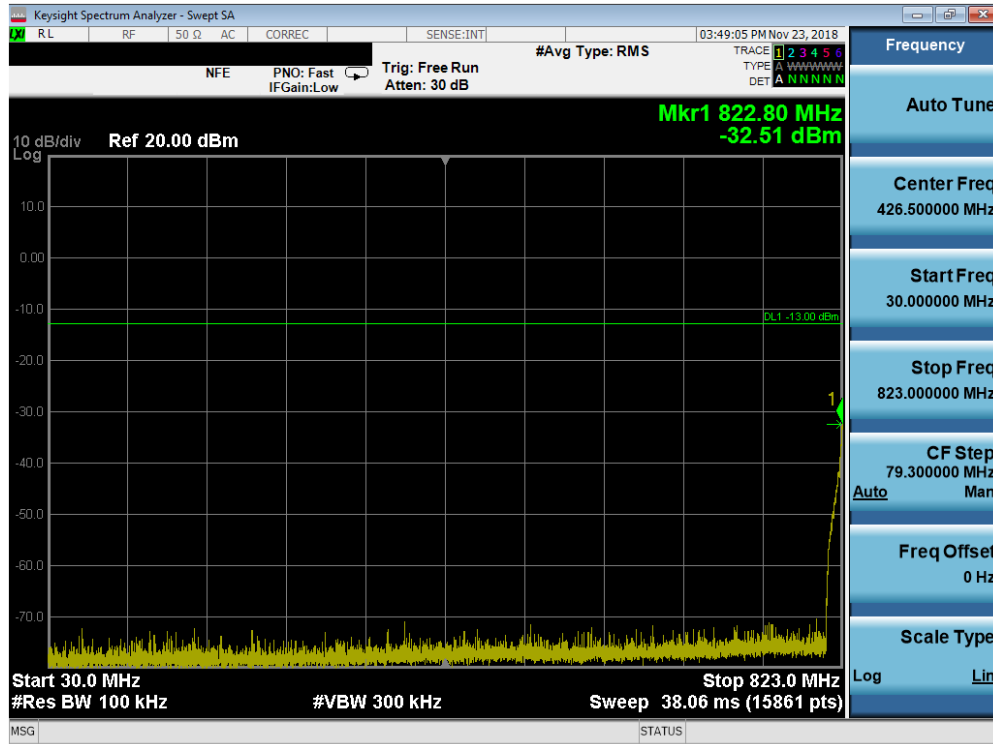
FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 38 of 107



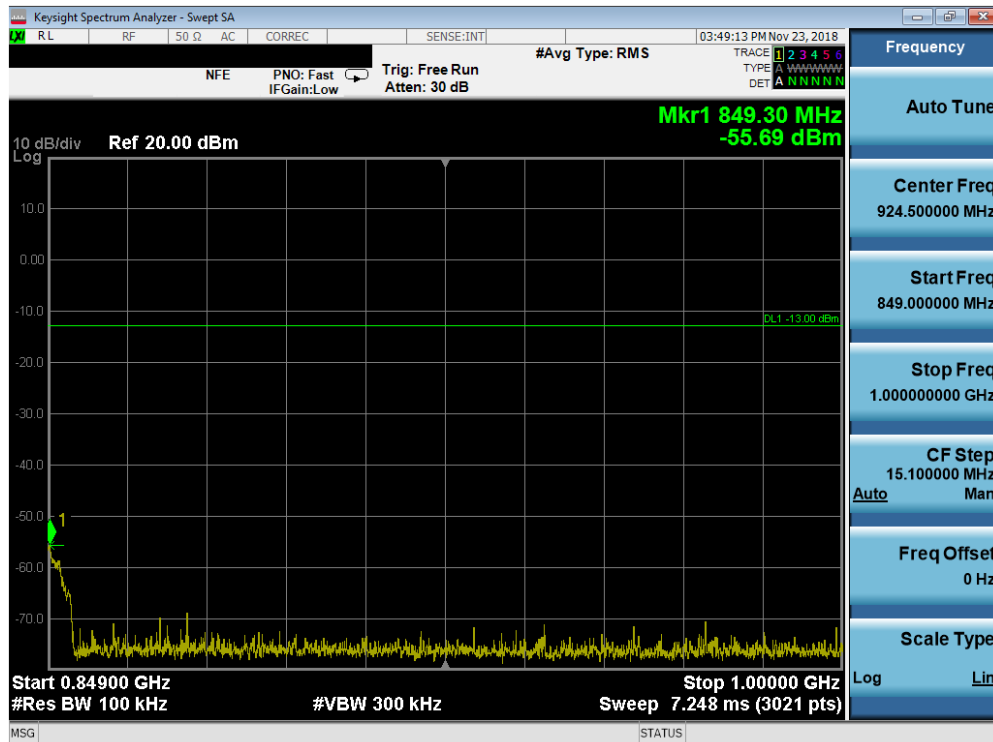
Plot 7-45. Conducted Spurious Plot (PCS CDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 39 of 107

Cellular WCDMA Mode

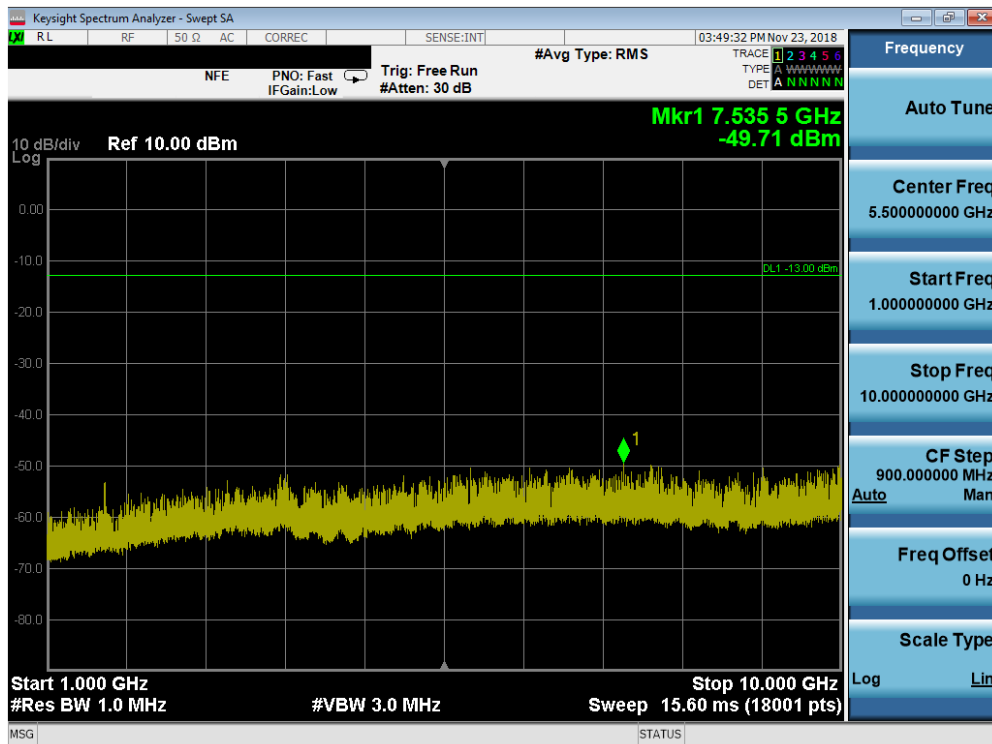


Plot 7-46. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

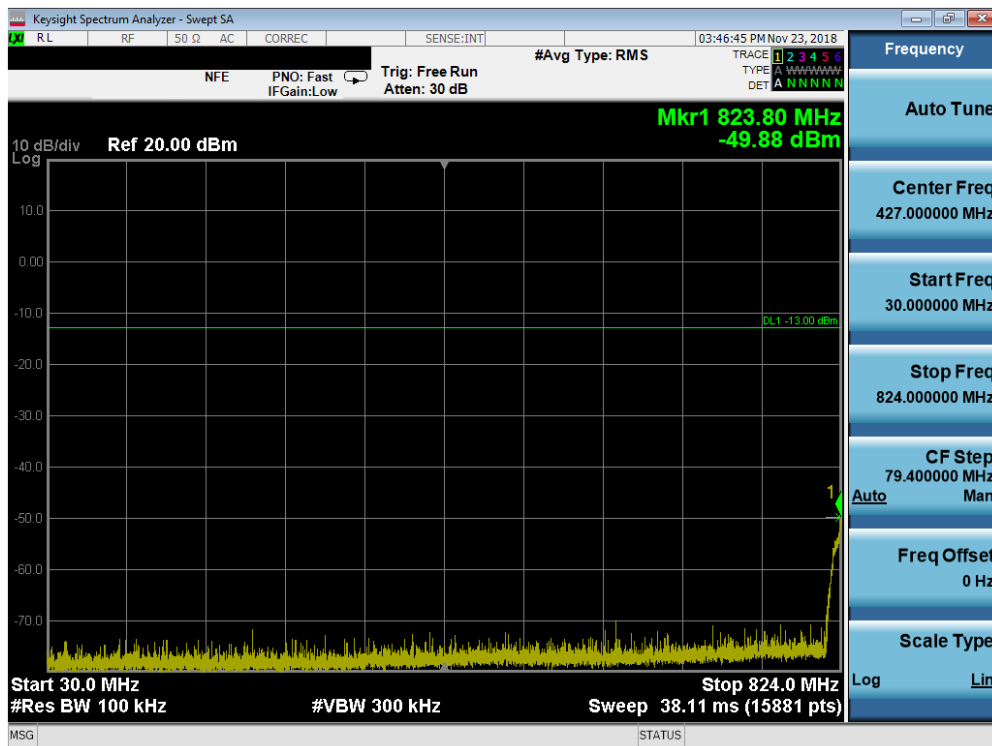


Plot 7-47. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 40 of 107

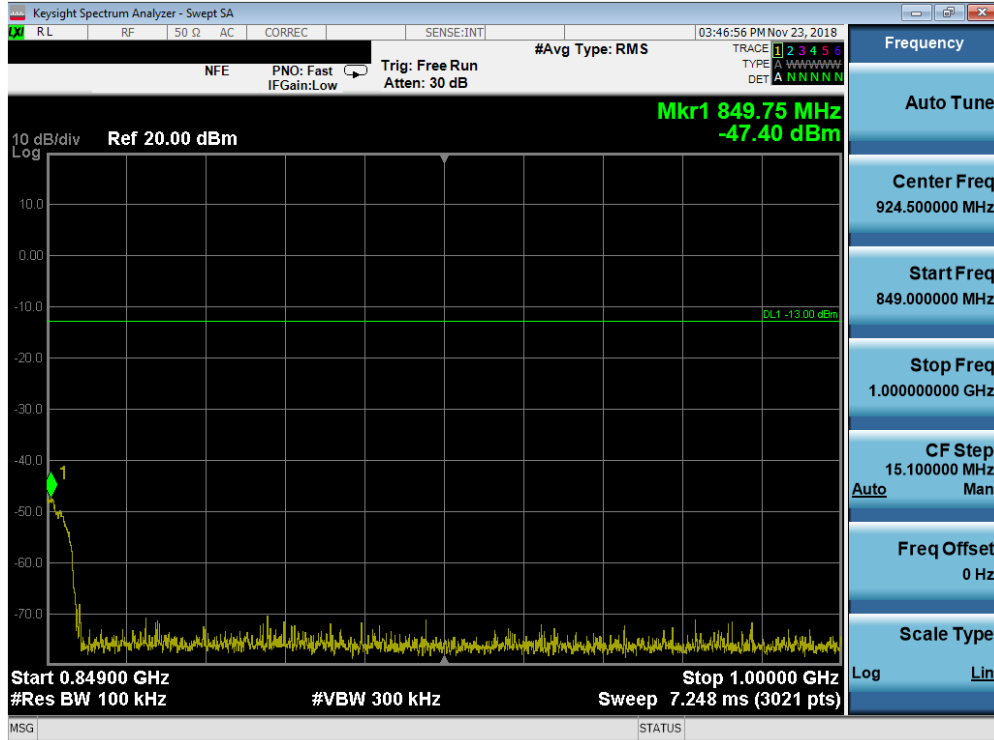


Plot 7-48. Conducted Spurious Plot (Cellular WCDMA Mode - Low Channel)

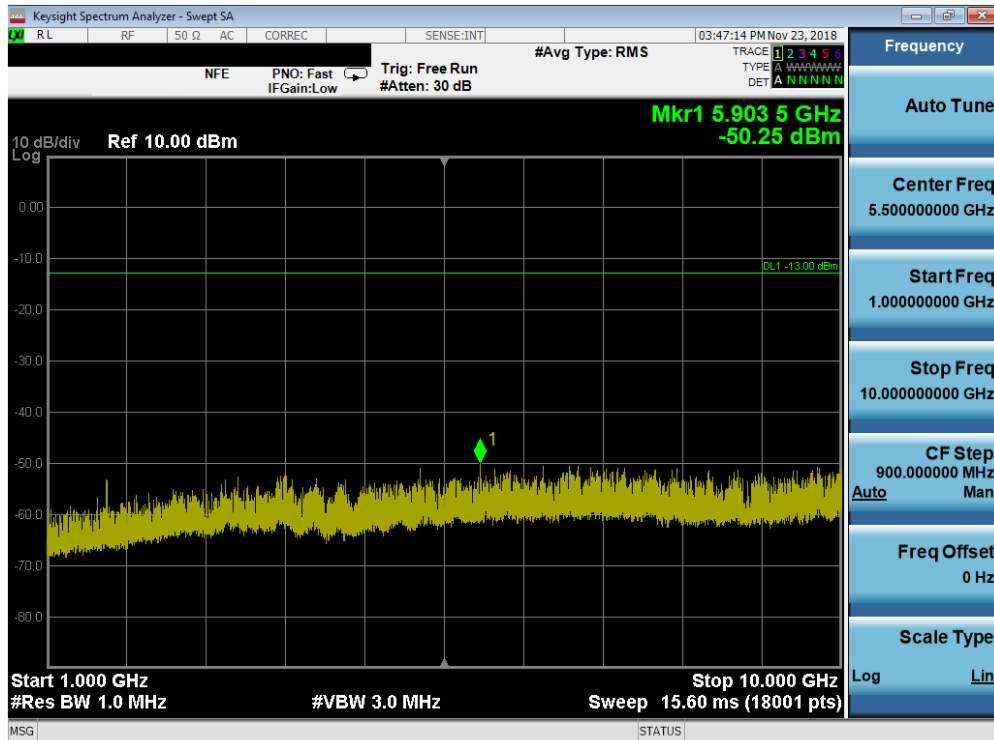


Plot 7-49. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 41 of 107

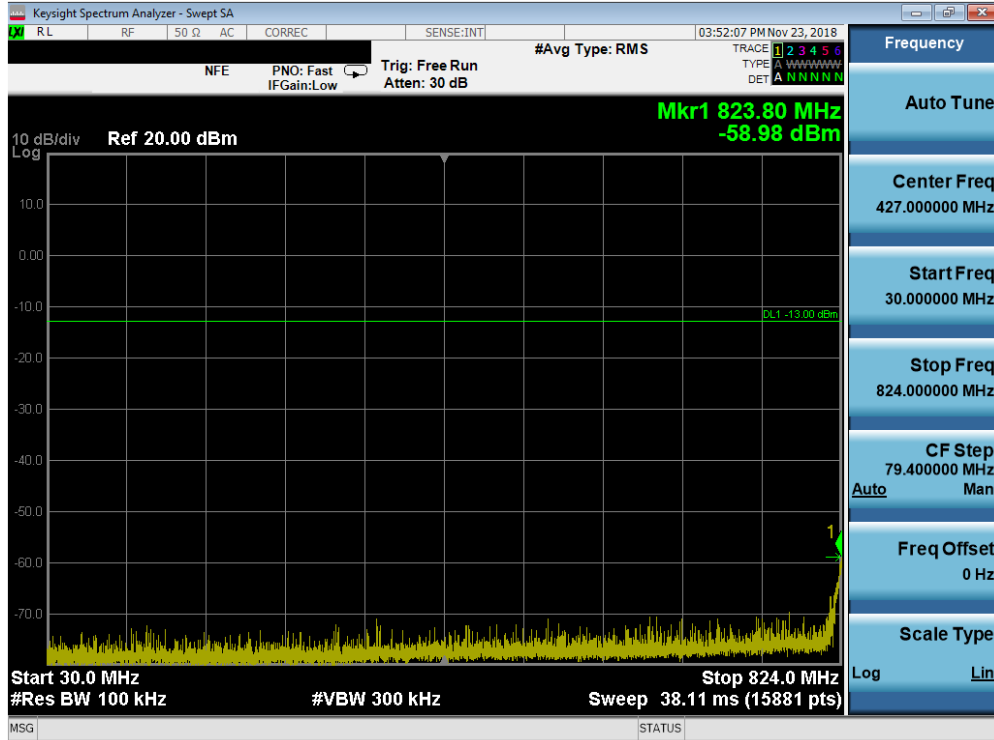


Plot 7-50. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)



Plot 7-51. Conducted Spurious Plot (Cellular WCDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 42 of 107

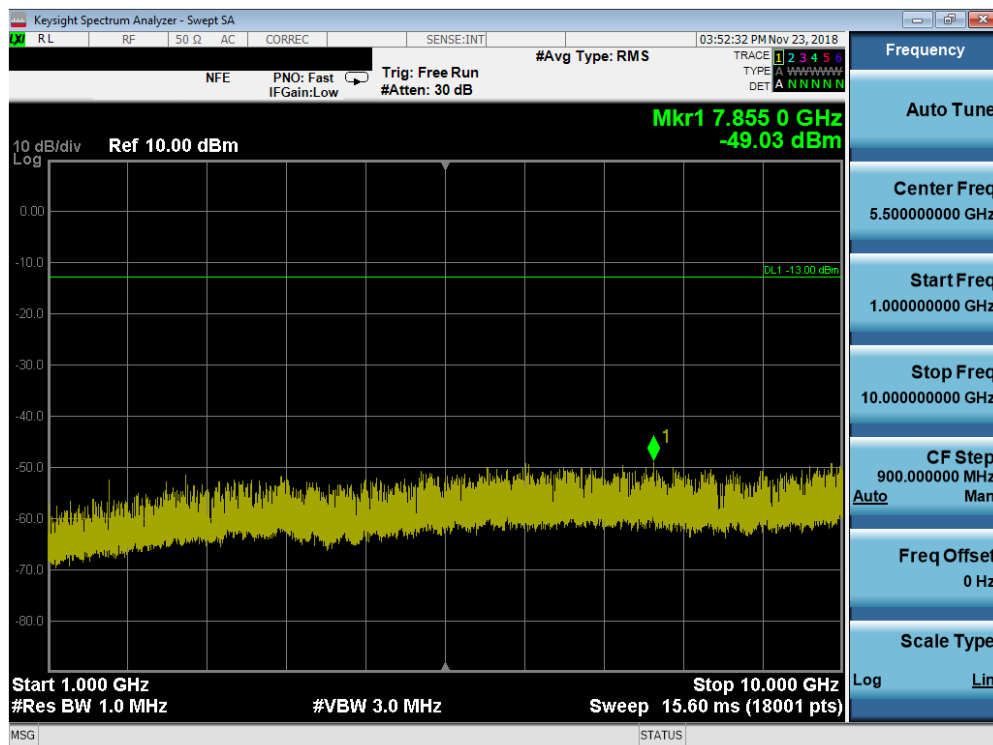


Plot 7-52. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)



Plot 7-53. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

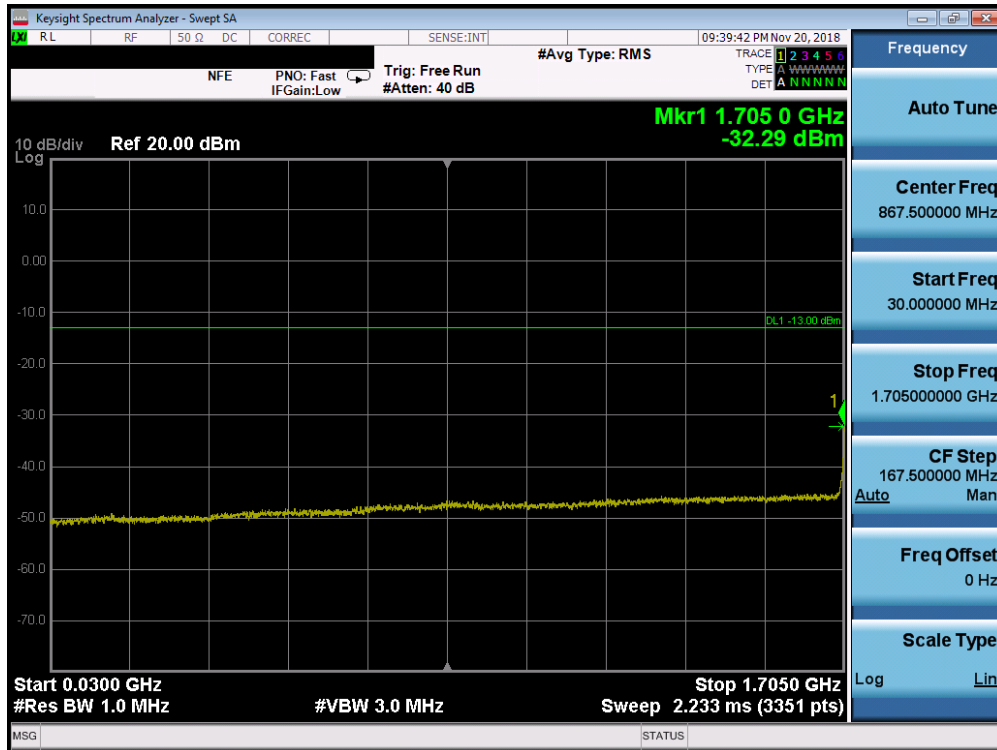
FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 43 of 107



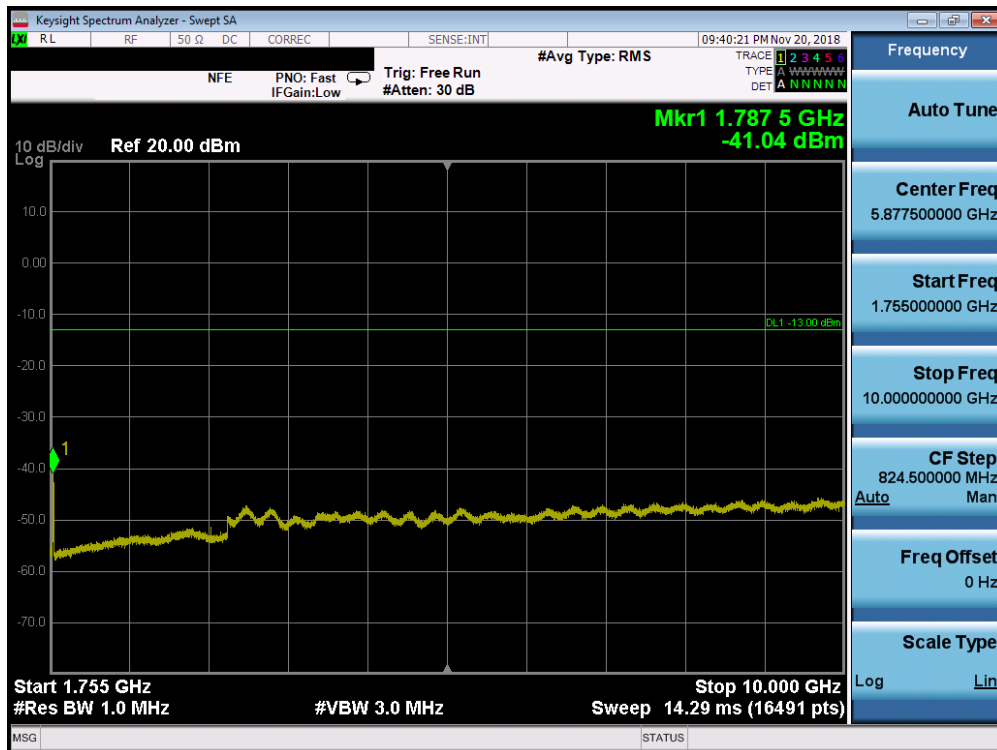
Plot 7-54. Conducted Spurious Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 44 of 107

AWS WCDMA Mode

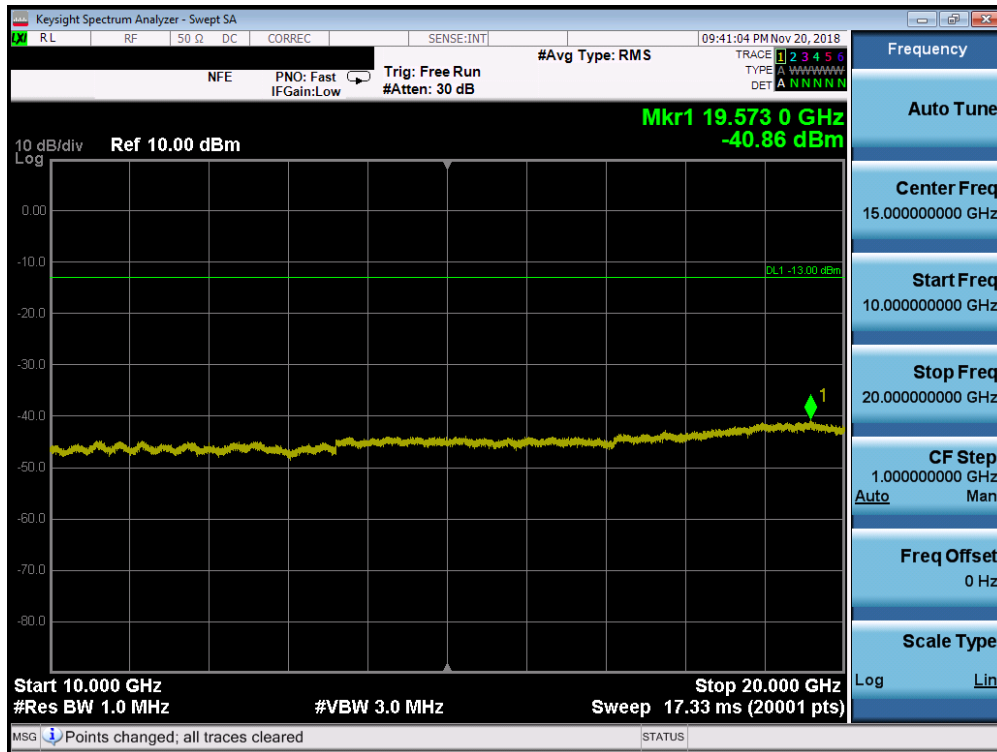


Plot 7-55. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)

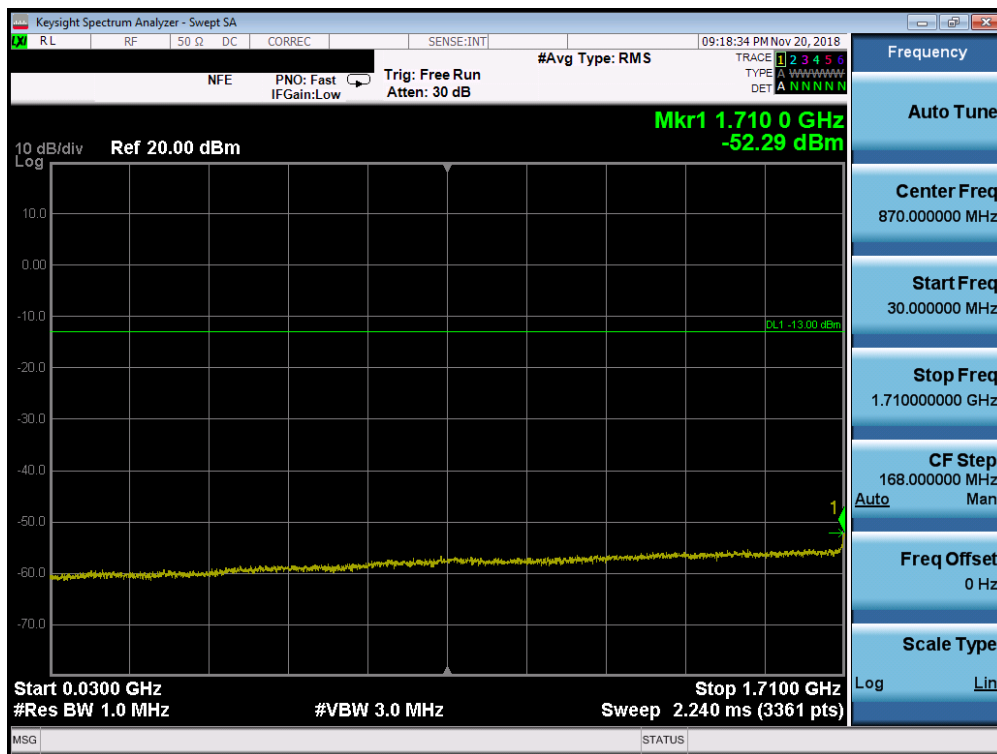


Plot 7-56. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 45 of 107

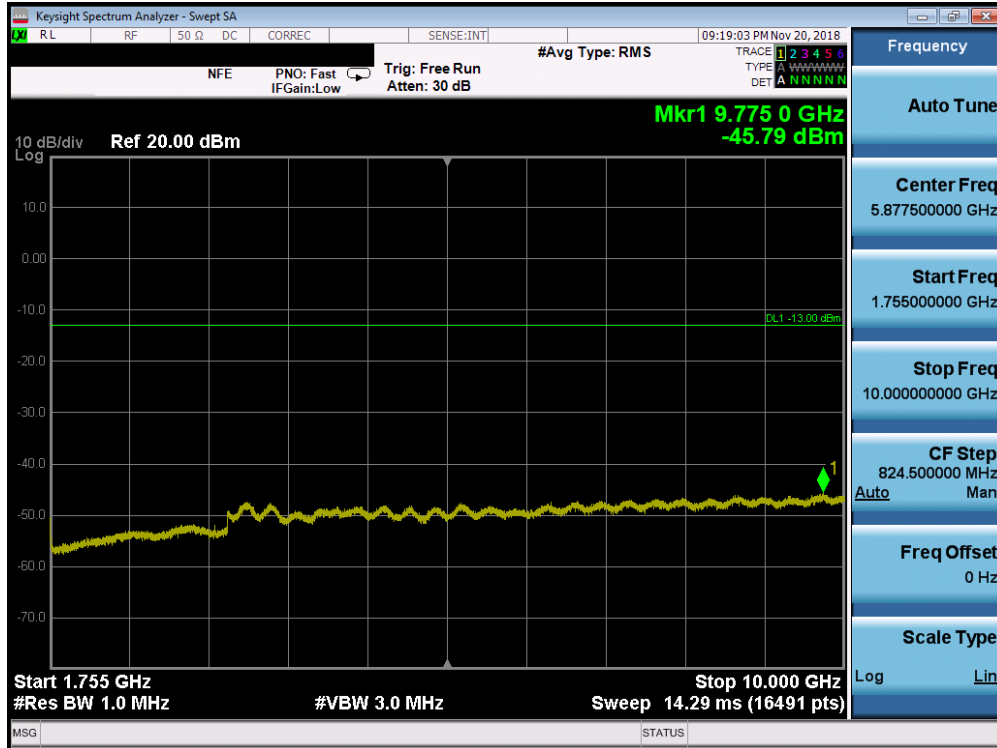


Plot 7-57. Conducted Spurious Plot (AWS WCDMA Mode - Low Channel)

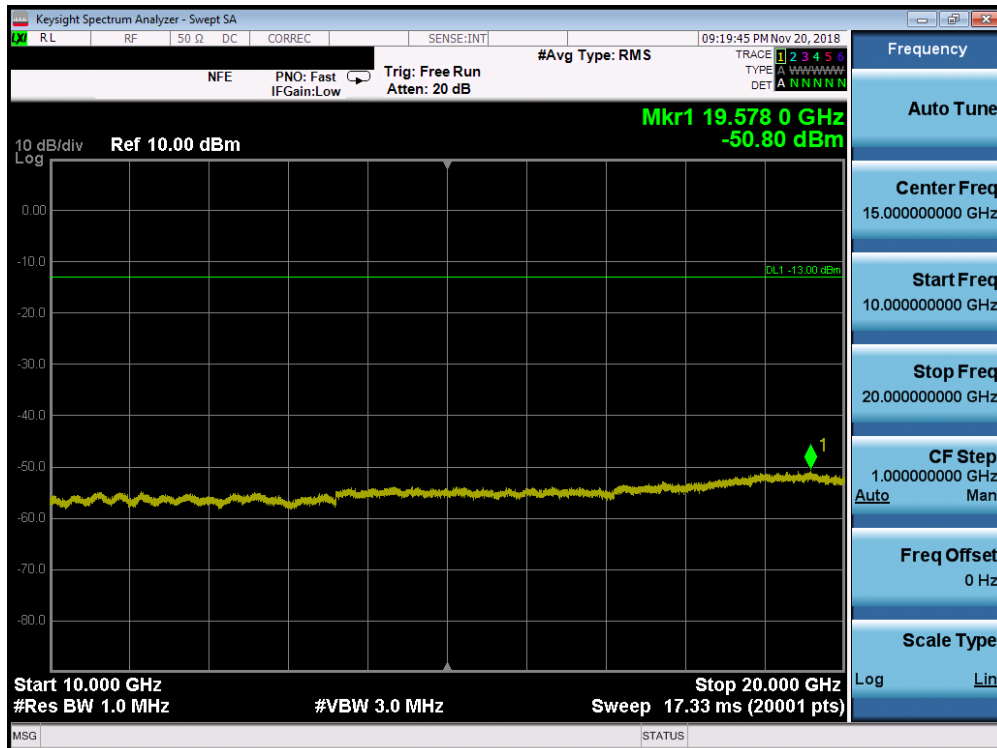


Plot 7-58. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 46 of 107

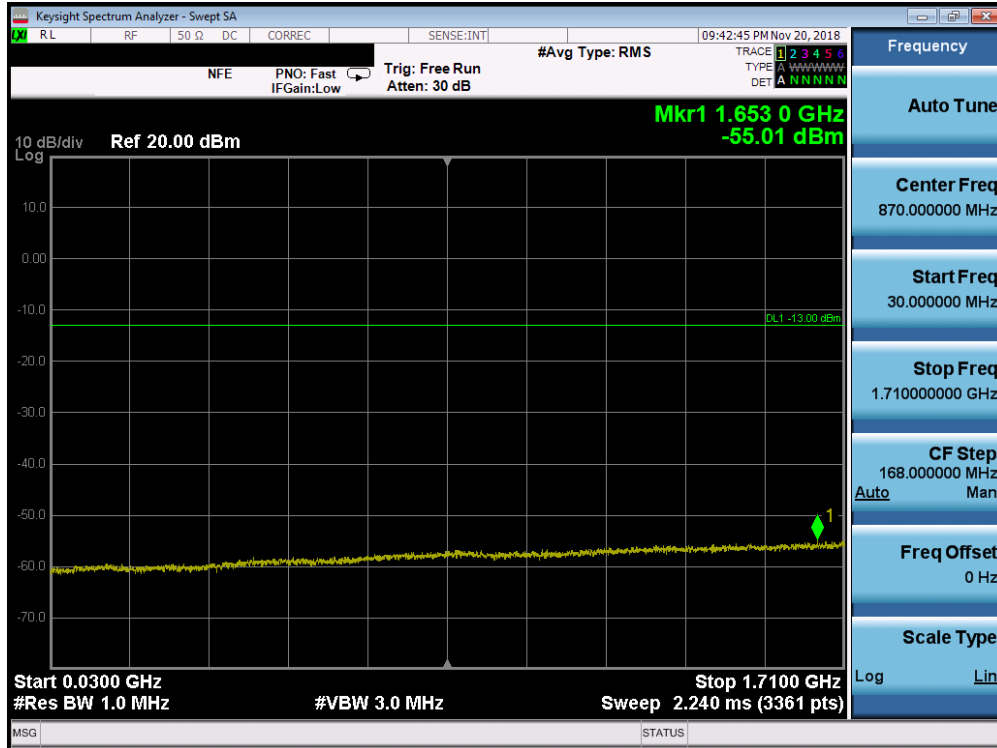


Plot 7-59. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

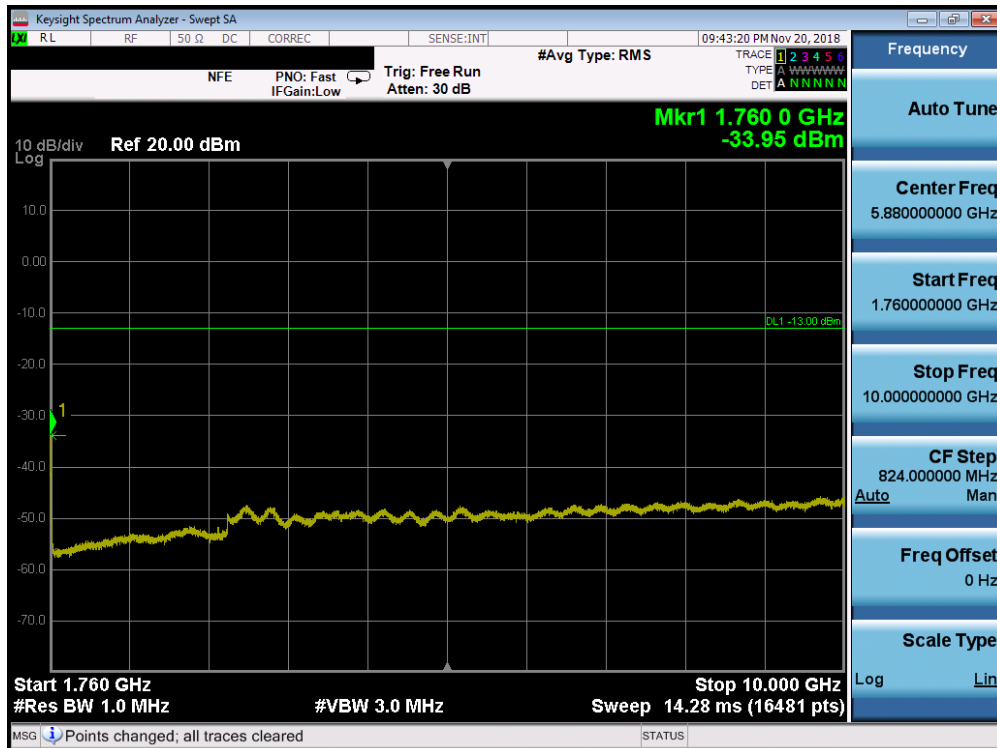


Plot 7-60. Conducted Spurious Plot (AWS WCDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 47 of 107

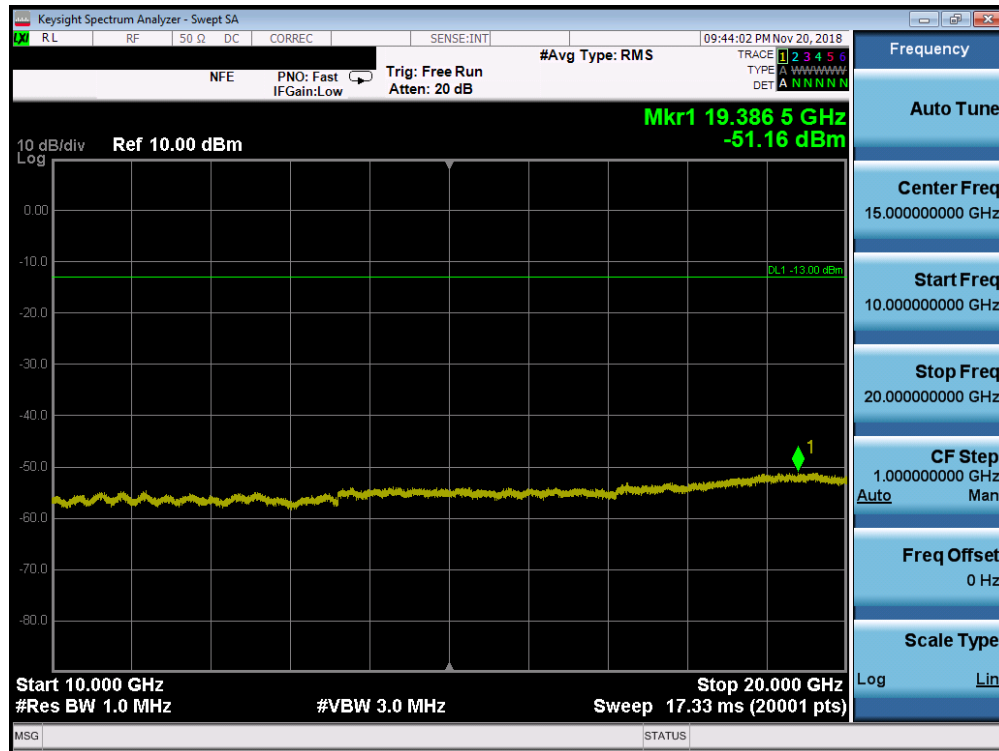


Plot 7-61. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)



Plot 7-62. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

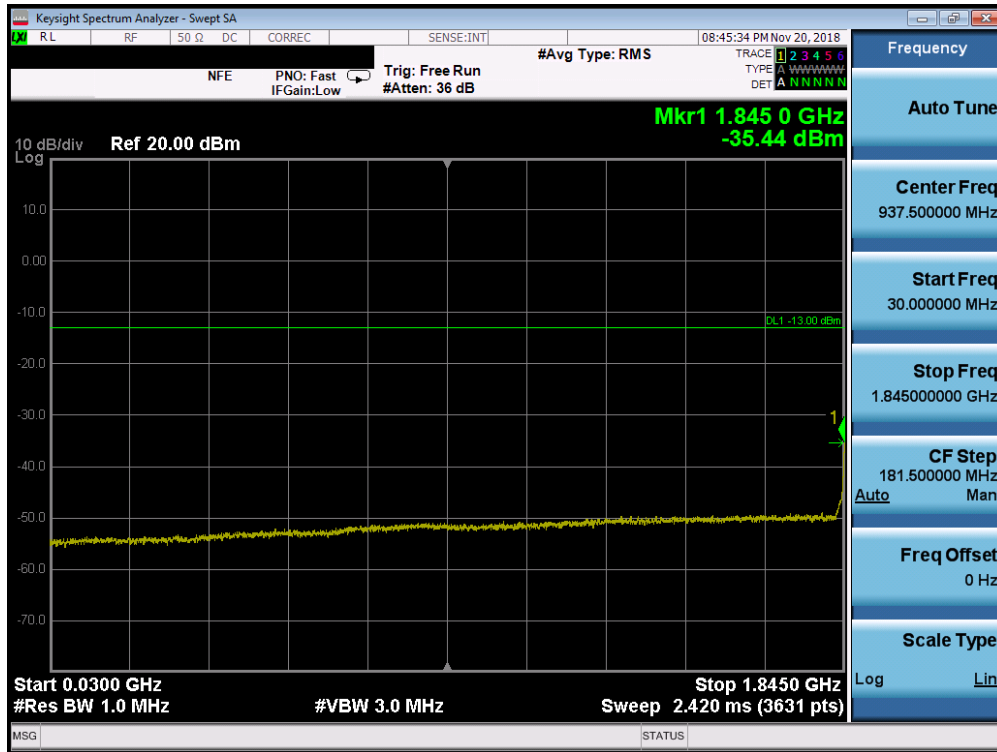
FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 48 of 107



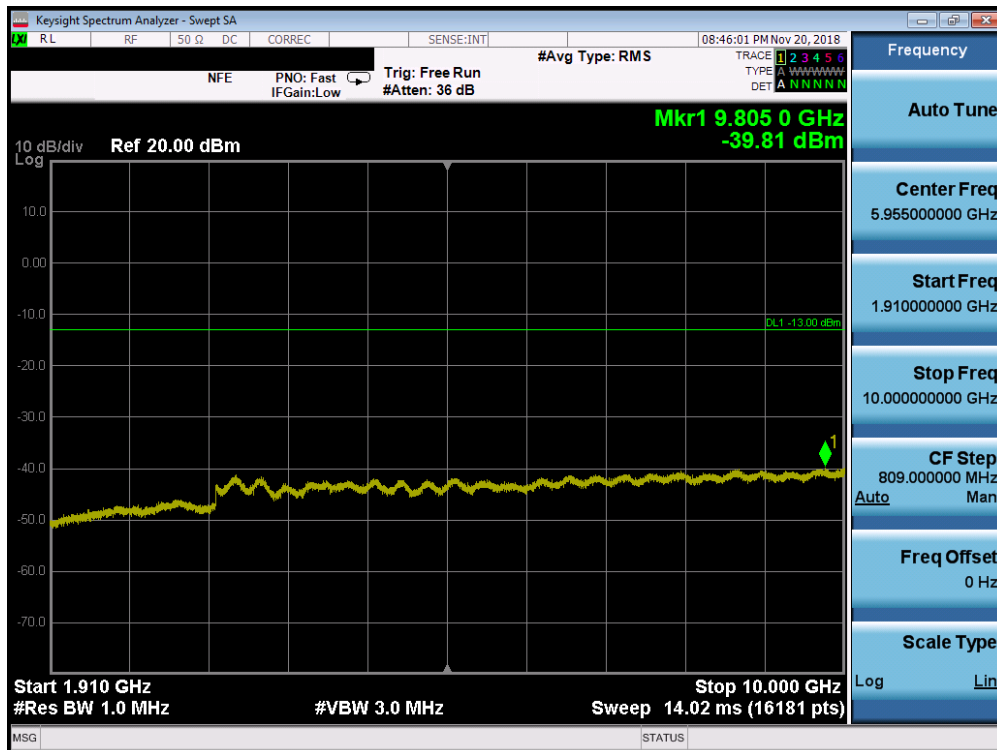
Plot 7-63. Conducted Spurious Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 49 of 107

PCS WCDMA Mode

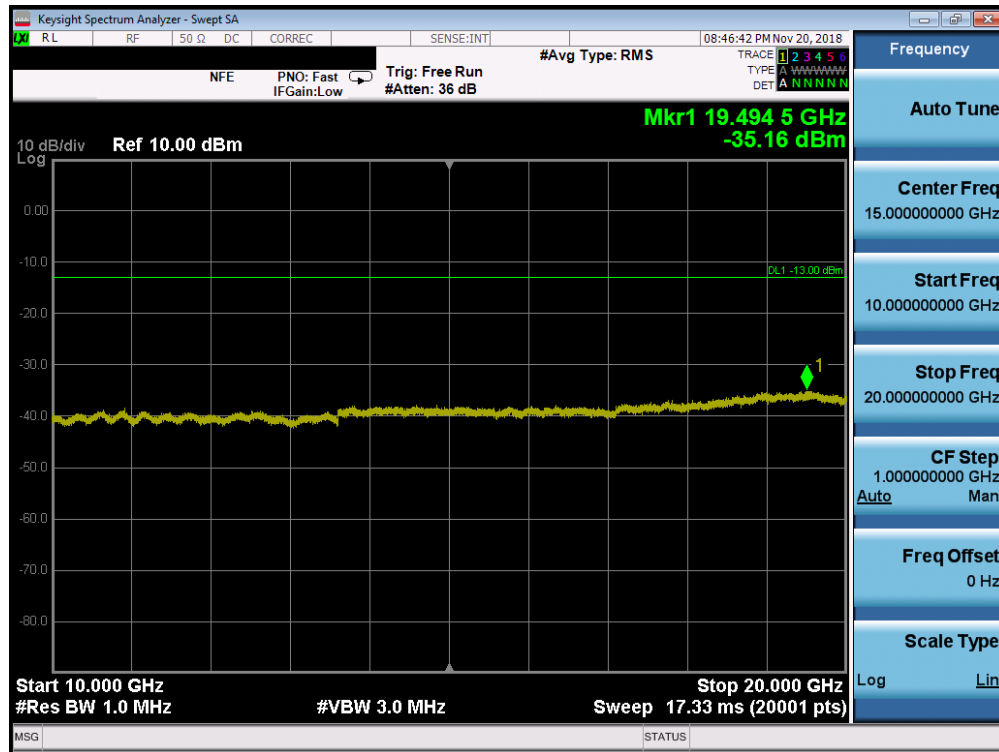


Plot 7-64. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)

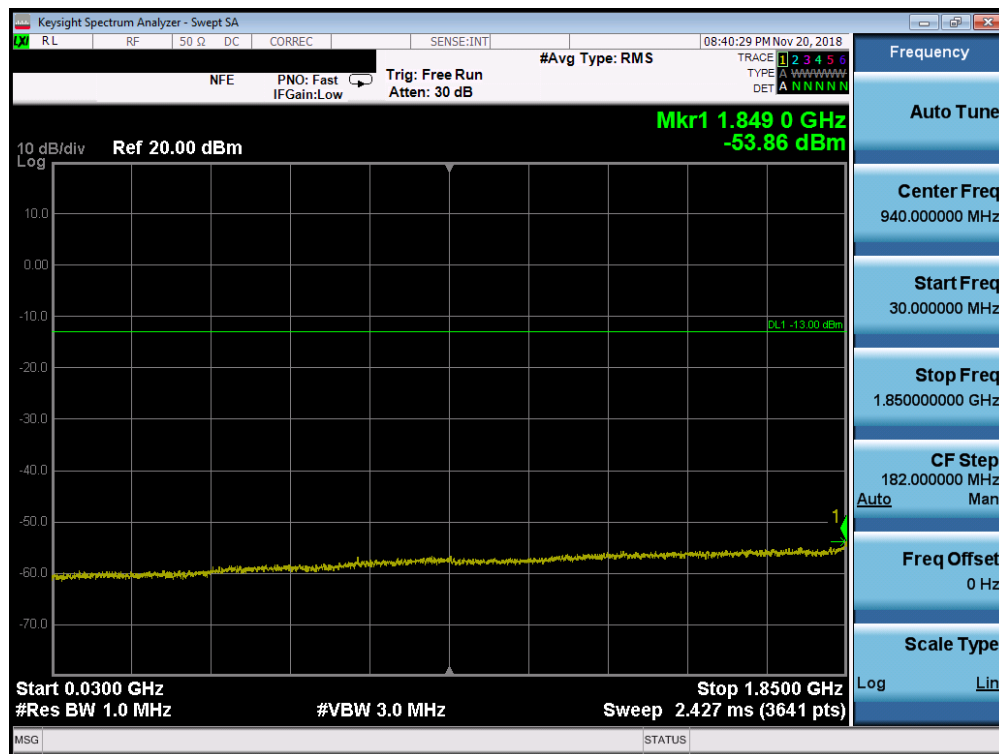


Plot 7-65. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 50 of 107

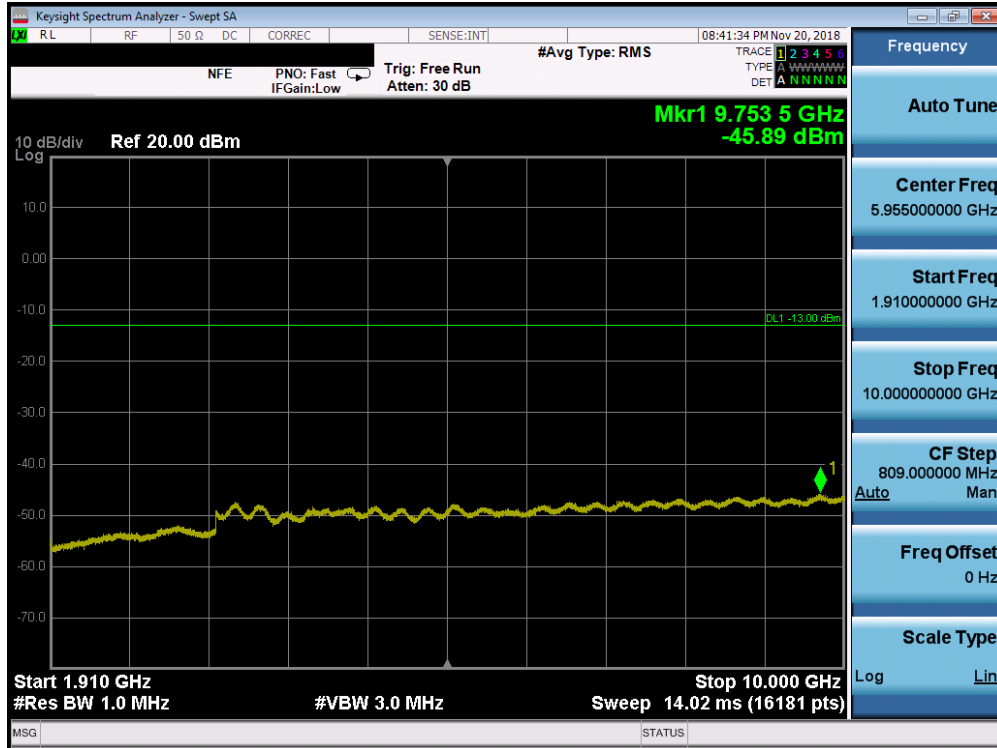


Plot 7-66. Conducted Spurious Plot (PCS WCDMA Mode - Low Channel)

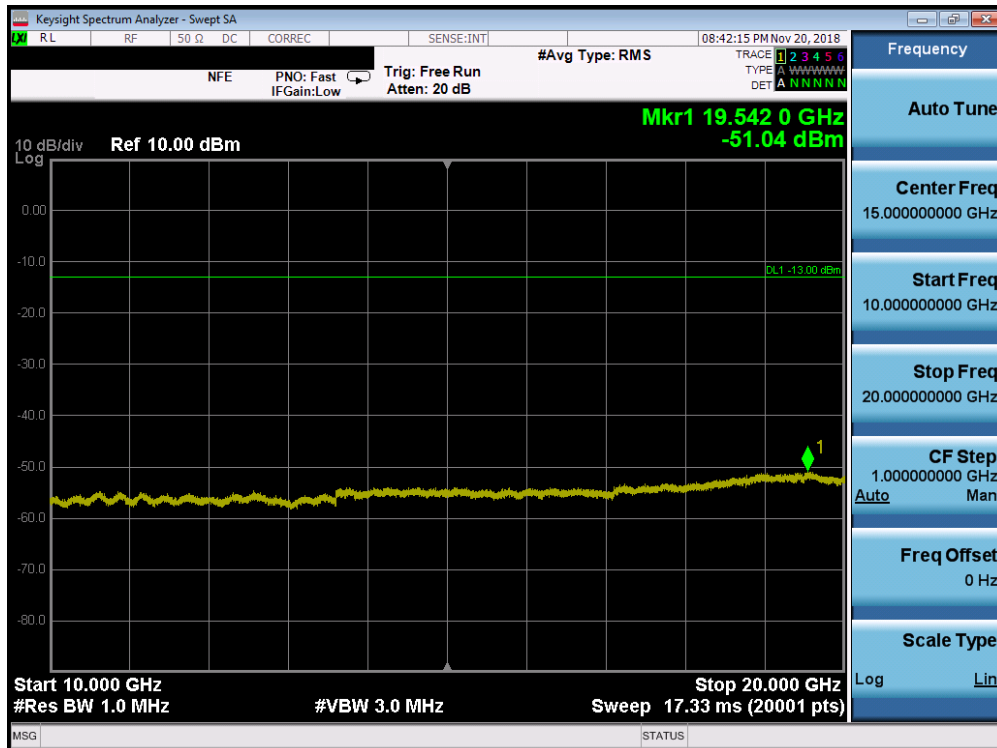


Plot 7-67. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 51 of 107

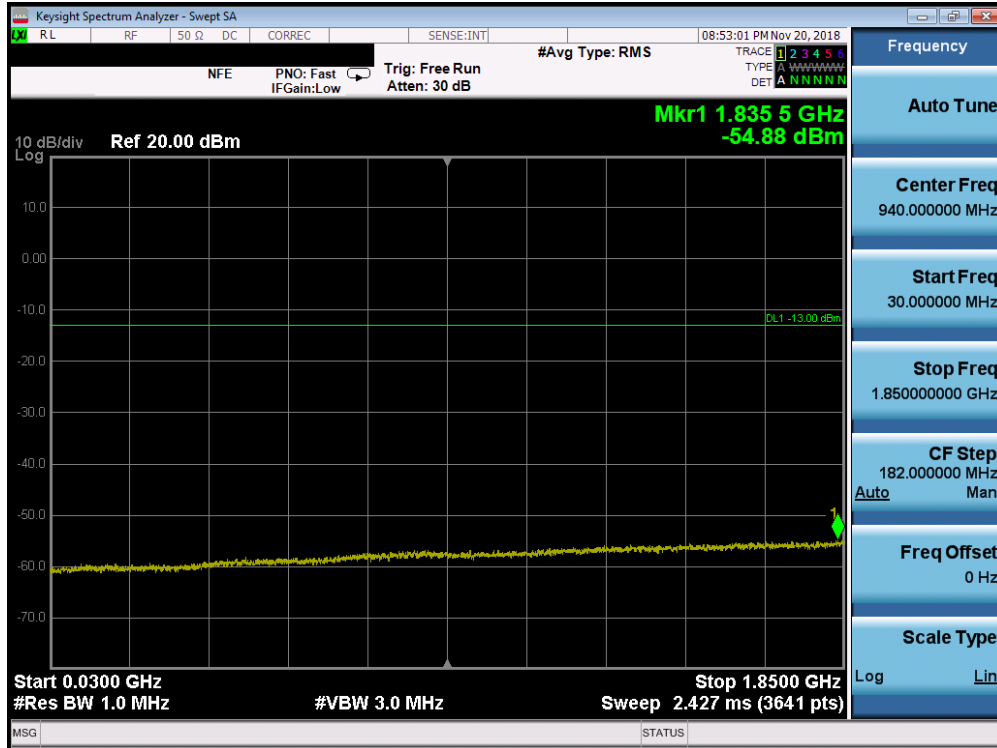


Plot 7-68. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

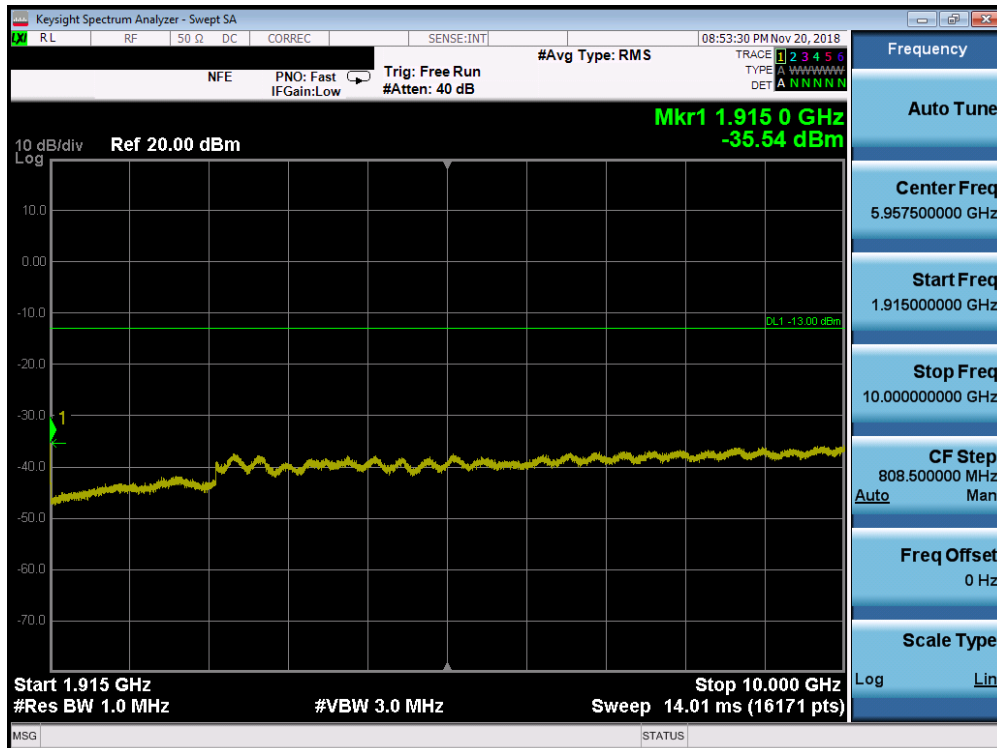


Plot 7-69. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 52 of 107

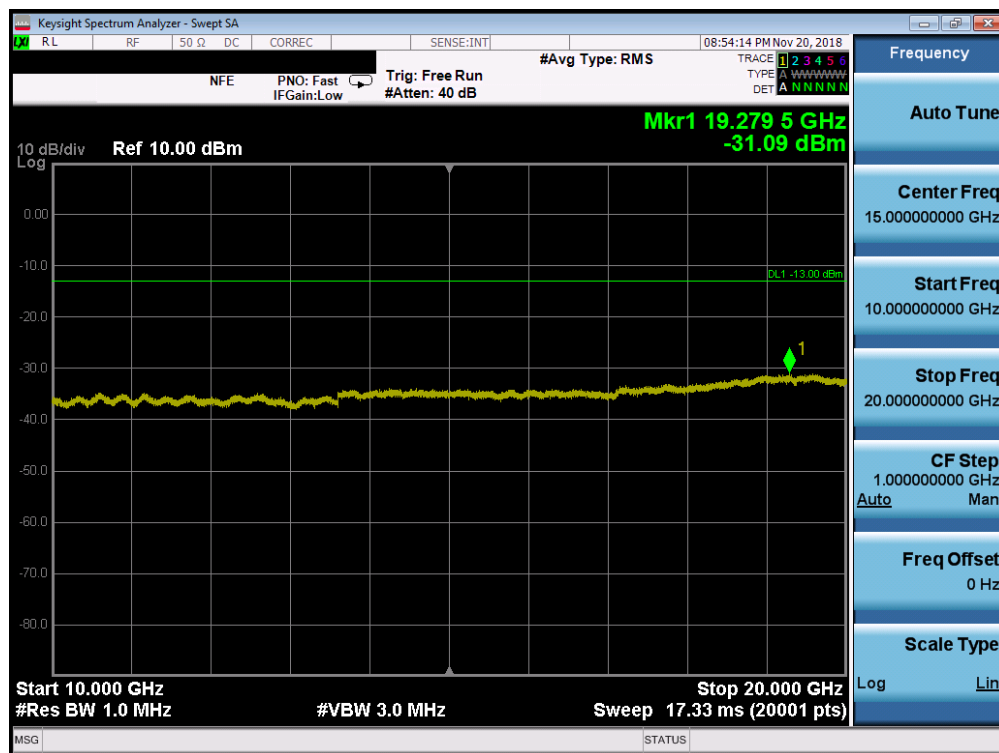


Plot 7-70. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)



Plot 7-71. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 53 of 107



Plot 7-72. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 54 of 107

7.4 Band Edge Emissions at Antenna Terminal

Test Overview

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

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{\text{Watts}})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. $RBW \geq 1\%$ of the emission bandwidth
4. $VBW \geq 3 \times RBW$
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span}/RBW$
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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



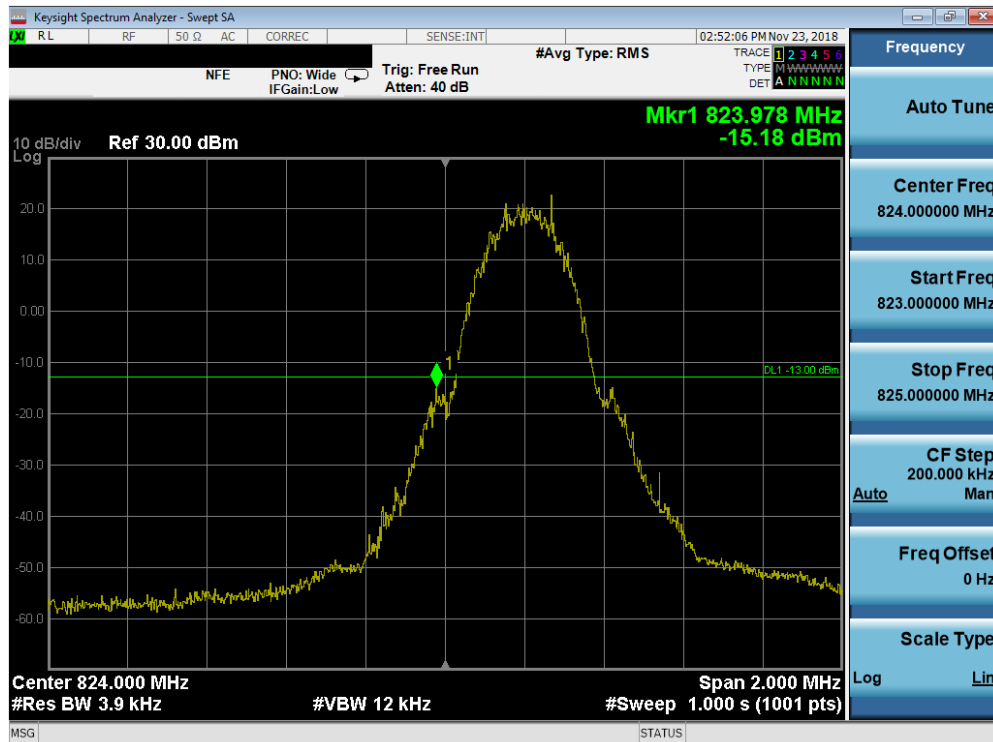
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

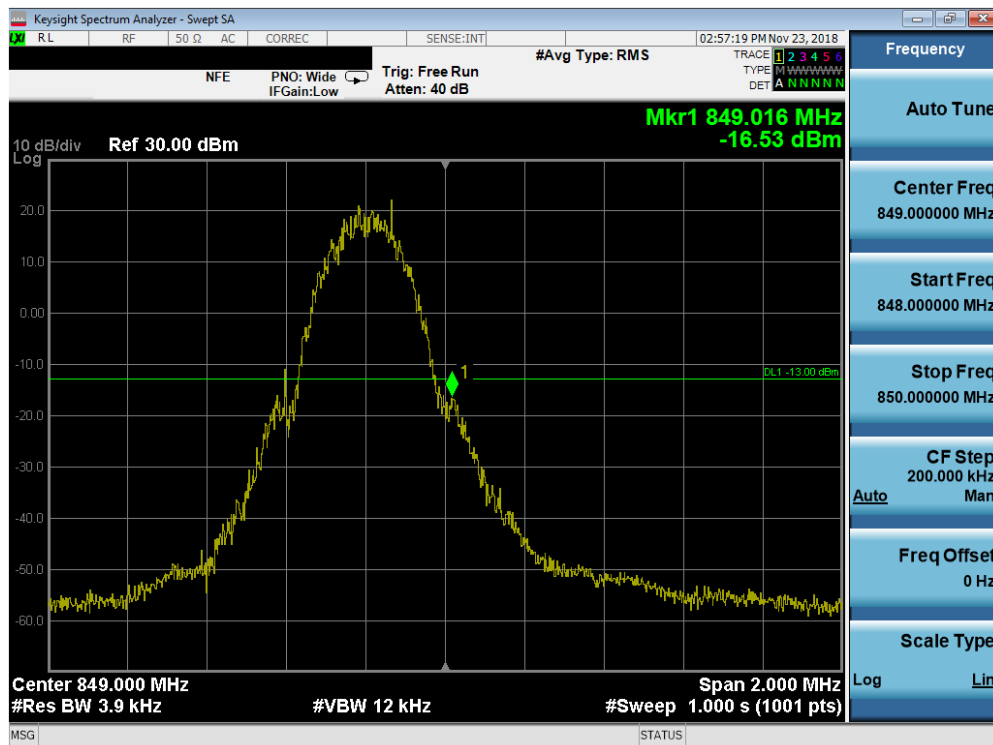
Per 22.917(b), 24.238(b), 27.53(h)(3), and RSS-132(5.5), RSS-133(6.5), RSS-139(6.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 55 of 107

Cellular GPRS Mode



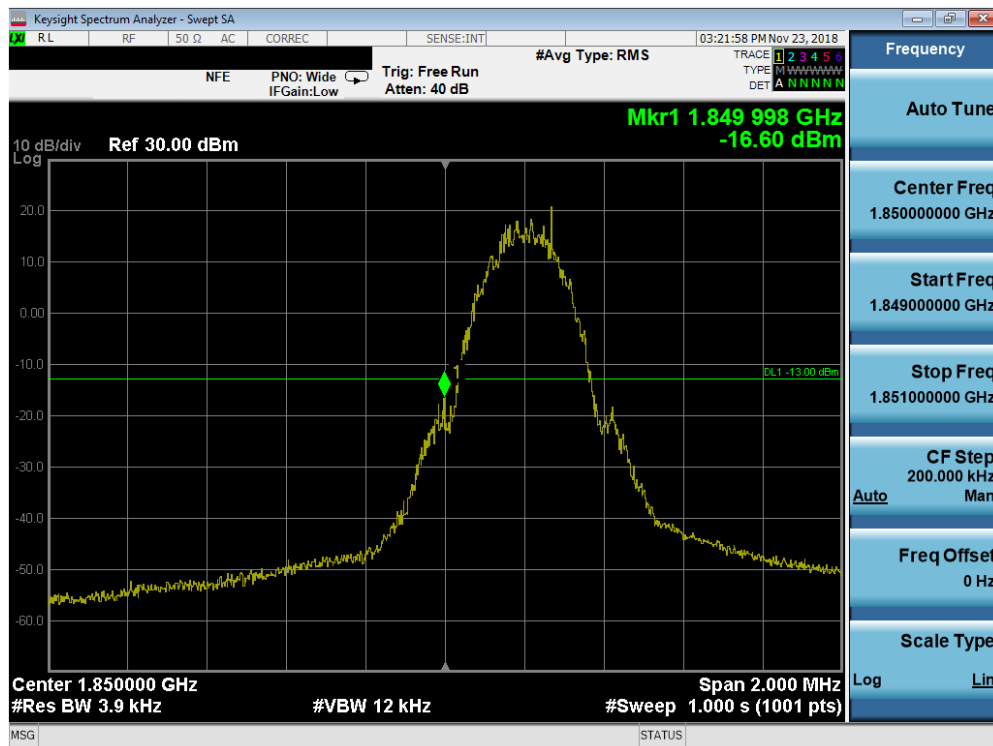
Plot 7-73. Band Edge Plot (Cellular GPRS Mode - Low Channel)



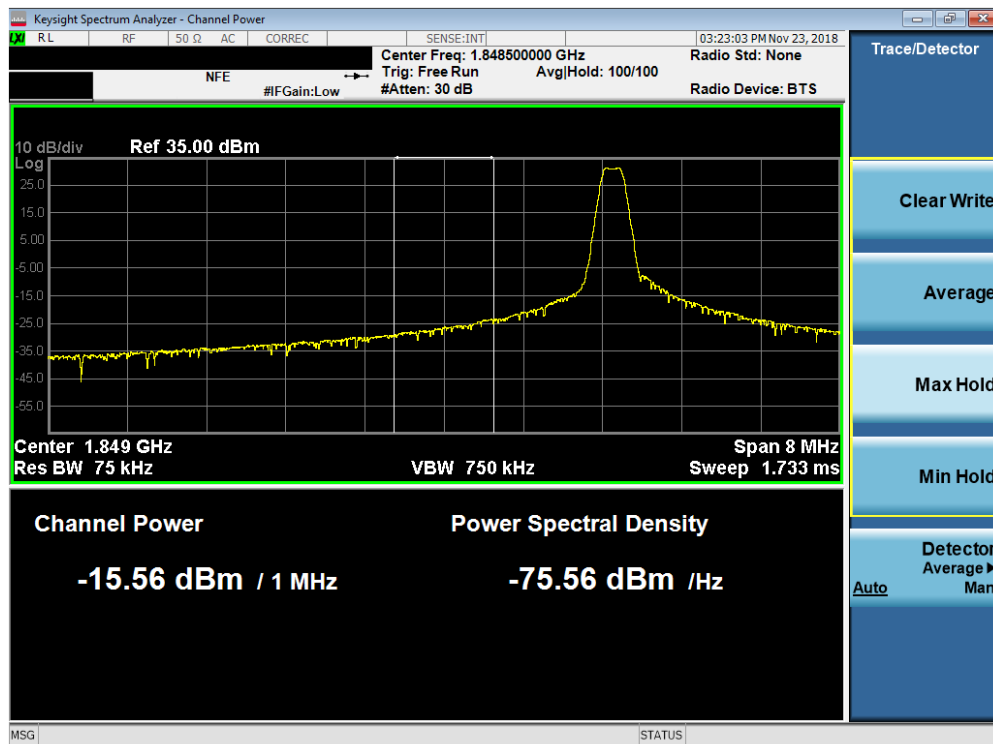
Plot 7-74. Band Edge Plot (Cellular GPRS Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 56 of 107

PCS GPRS Mode

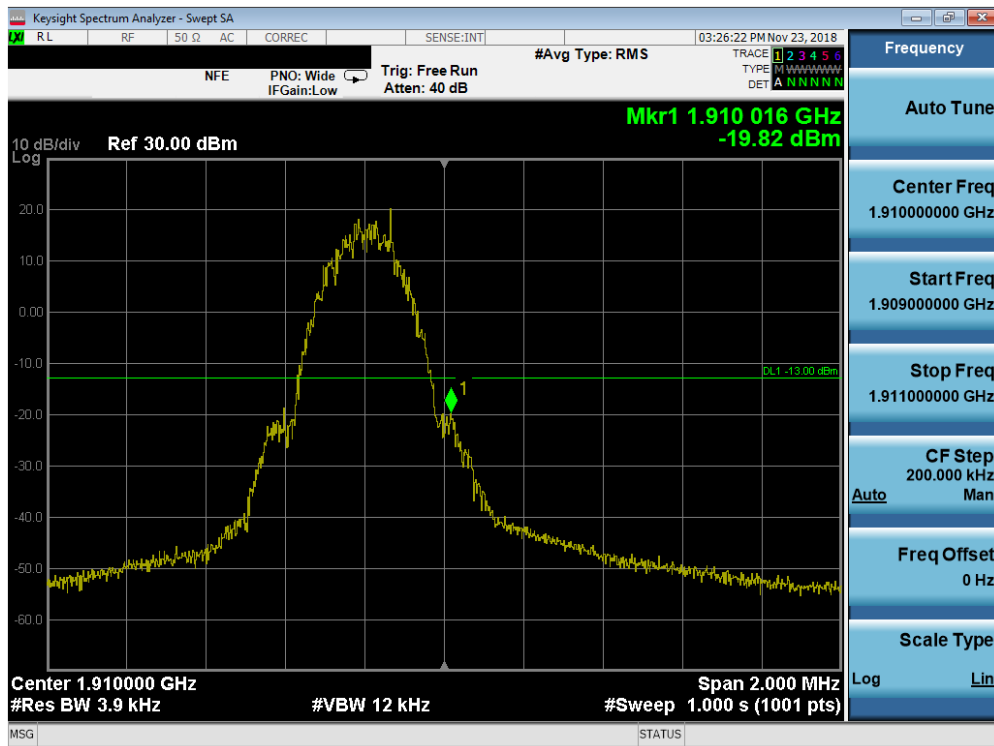


Plot 7-75. Band Edge Plot (PCS GPRS Mode - Low Channel)

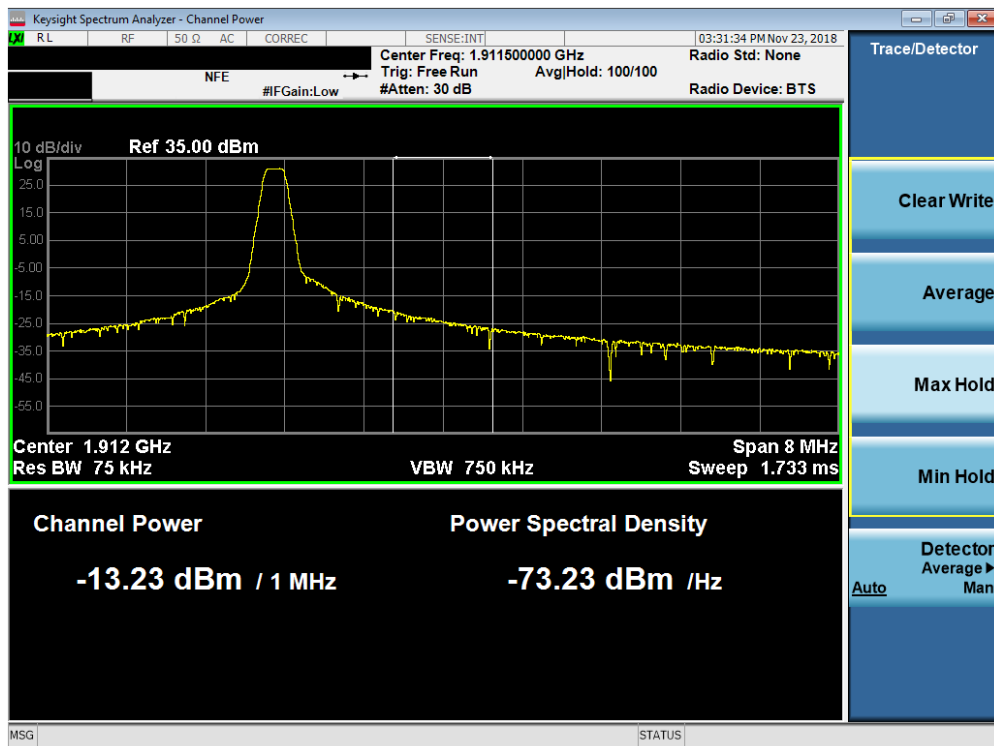


Plot 7-76. 4MHz Span Plot (PCS GPRS Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 57 of 107



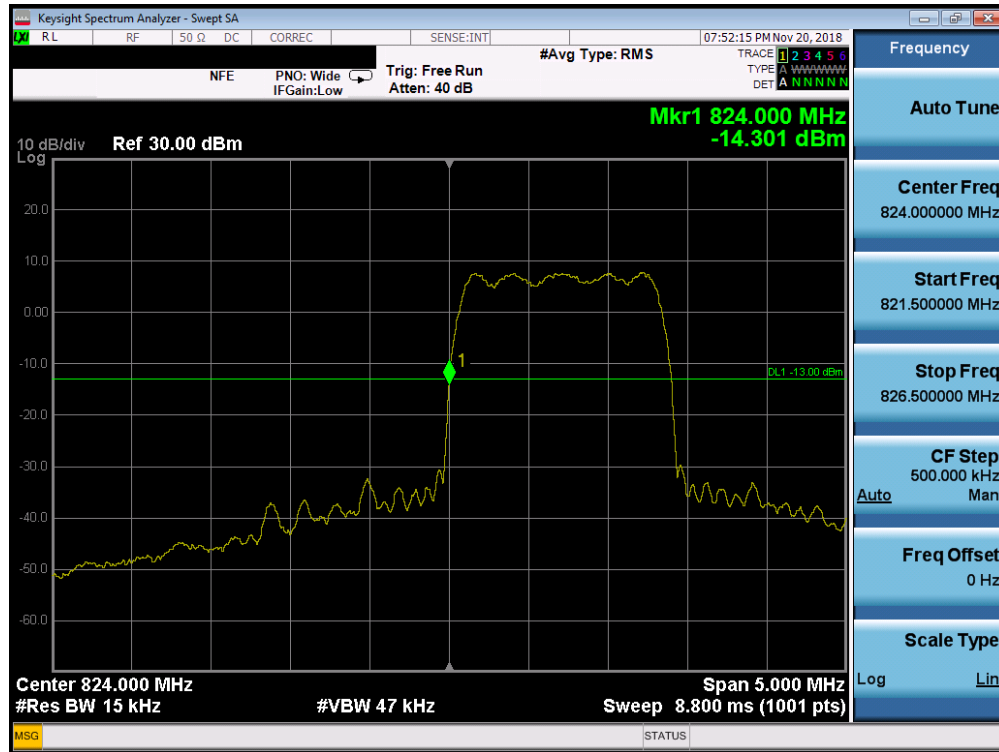
Plot 7-77. Band Edge Plot (PCS GPRS Mode - High Channel)



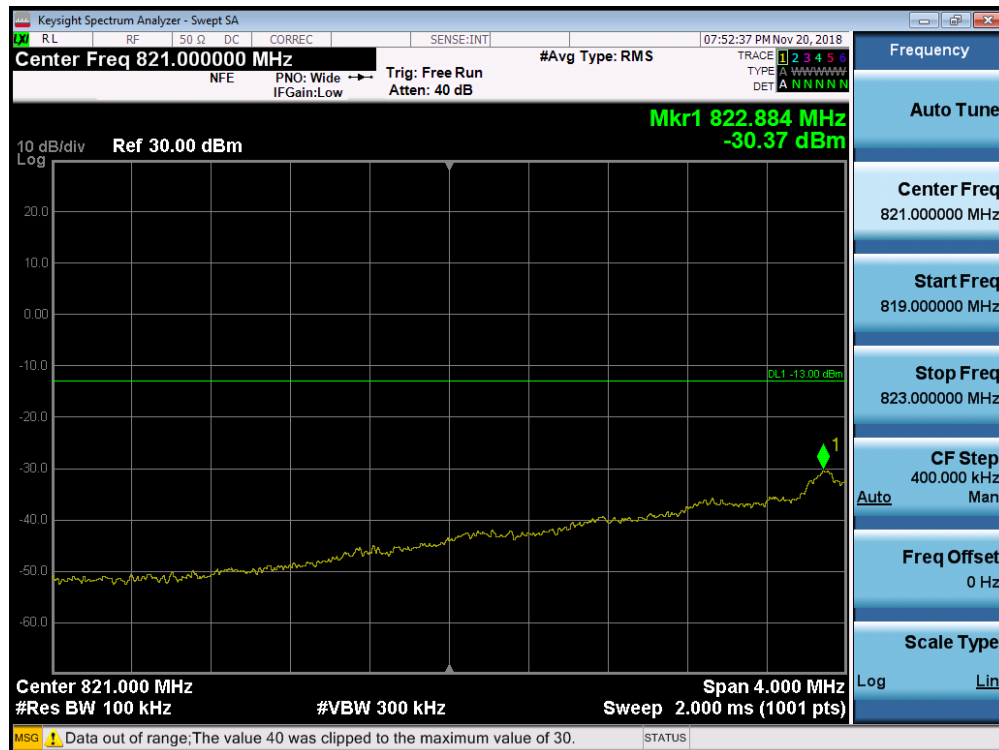
Plot 7-78. 4MHz Span Plot (PCS GPRS Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 58 of 107

Cellular CDMA Mode

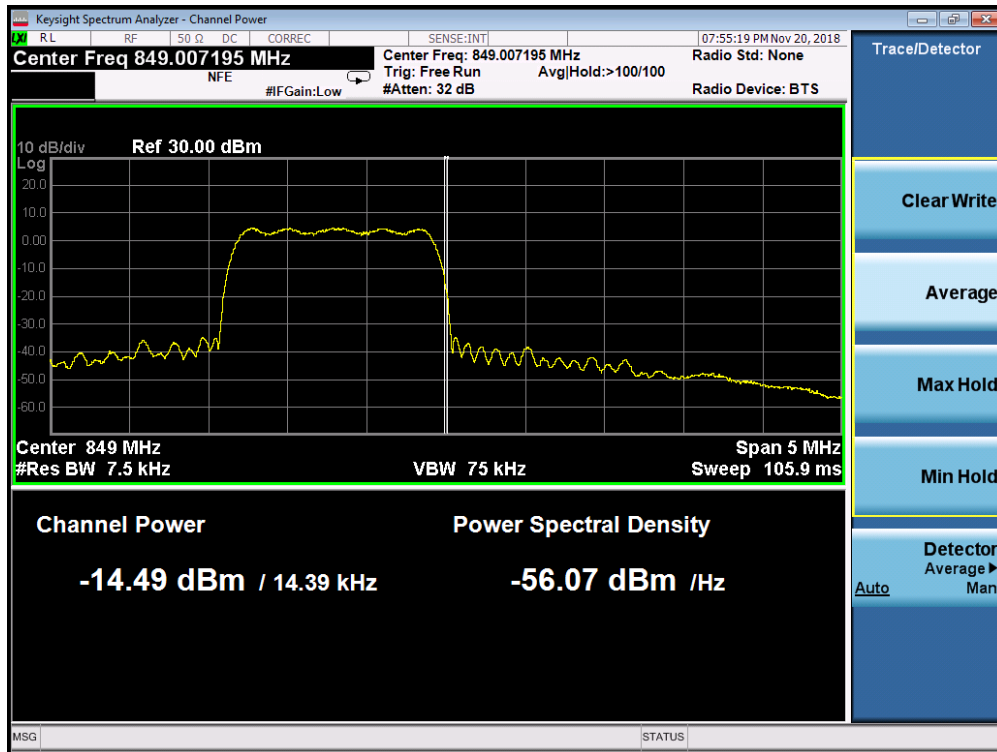


Plot 7-79. Band Edge Plot (Cellular CDMA Mode - Low Channel)



Plot 7-80. 4MHz Span Plot (Cellular CDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 59 of 107



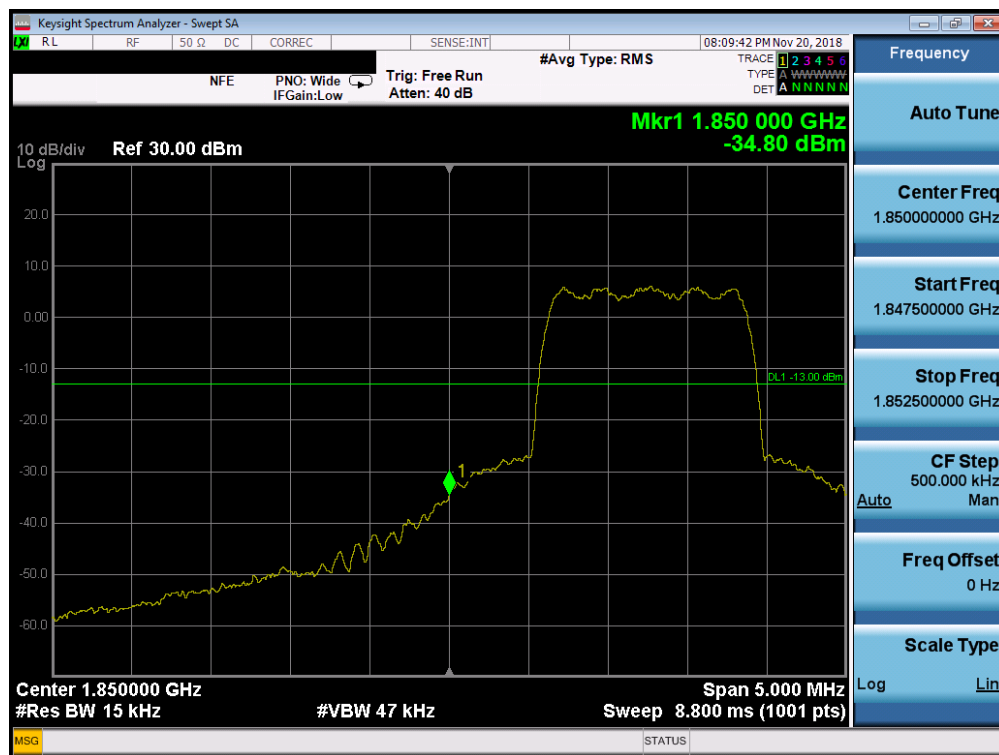
Plot 7-81. Band Edge Plot (Cellular CDMA Mode - High Channel)



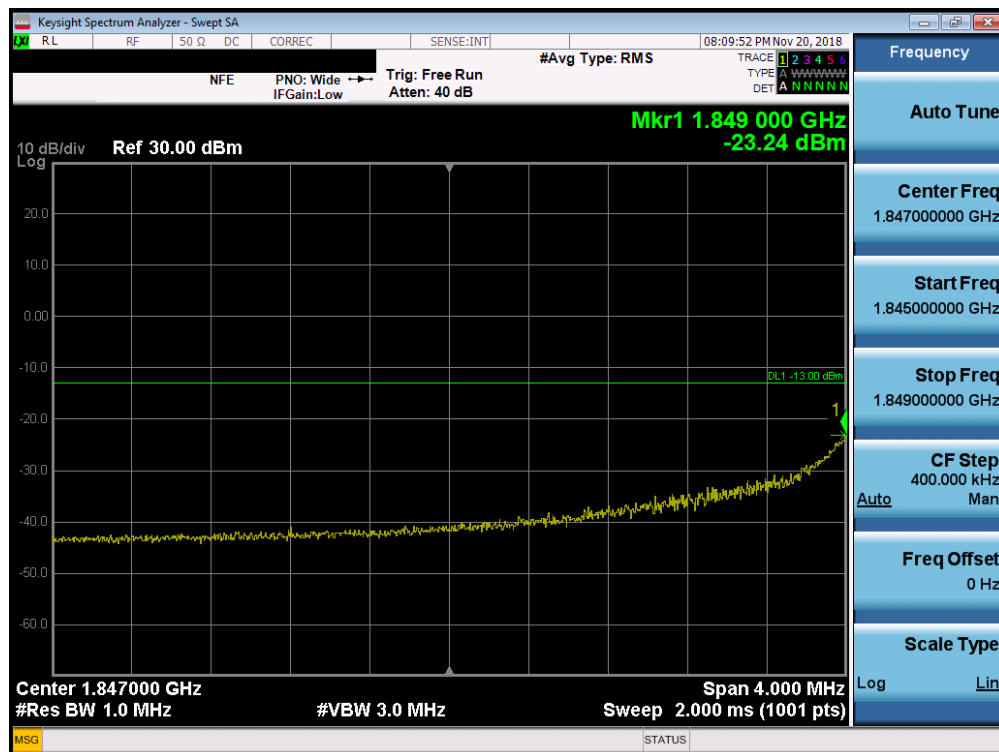
Plot 7-82. 4MHz Span Plot (Cellular CDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 60 of 107

PCS CDMA Mode



Plot 7-83. Band Edge Plot (PCS CDMA Mode - Low Channel)



Plot 7-84. 4MHz Span Plot (PCS CDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 61 of 107



Plot 7-85. Band Edge Plot (PCS CDMA Mode - High Channel)



Plot 7-86. 4MHz Span Plot (PCS CDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 62 of 107

Cellular WCDMA Mode



Plot 7-87. Band Edge Plot (Cellular WCDMA Mode - Low Channel)



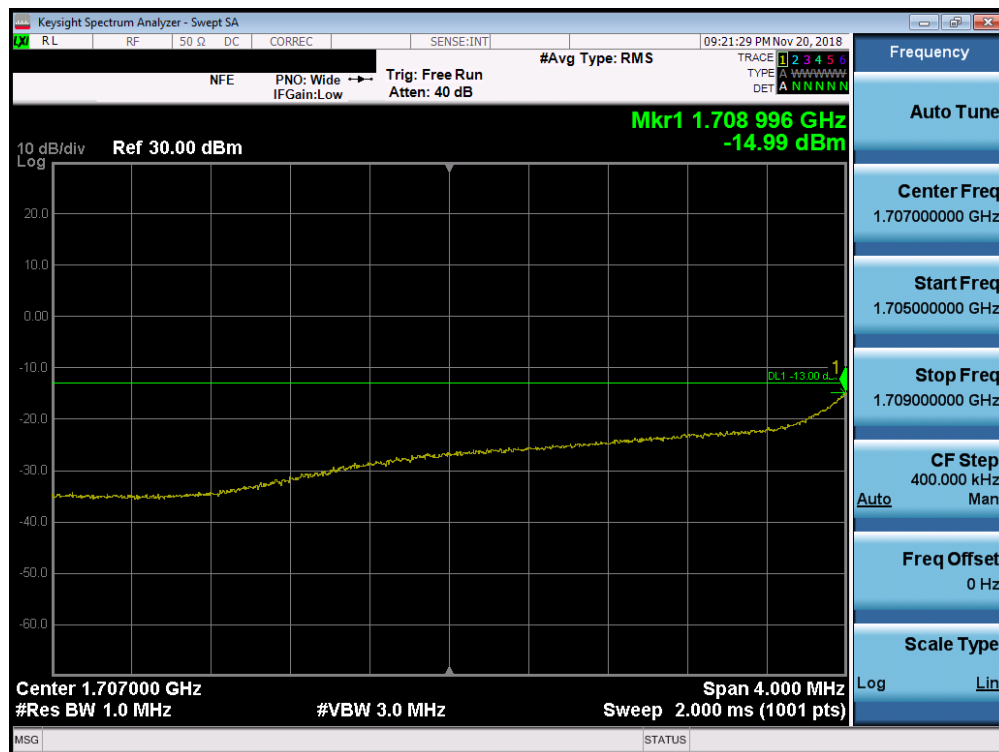
Plot 7-88. Band Edge Plot (Cellular WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 63 of 107

AWS WCDMA Mode

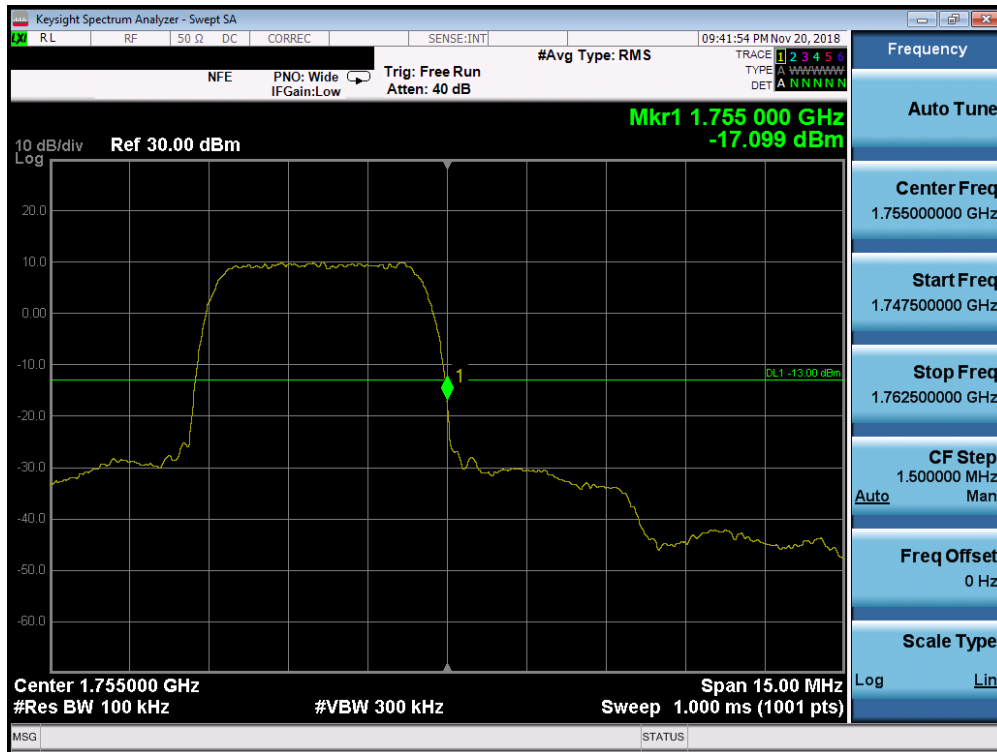


Plot 7-89. Band Edge Plot (AWS WCDMA Mode - Low Channel)



Plot 7-90. 4MHz Span Plot (AWS WCDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 64 of 107



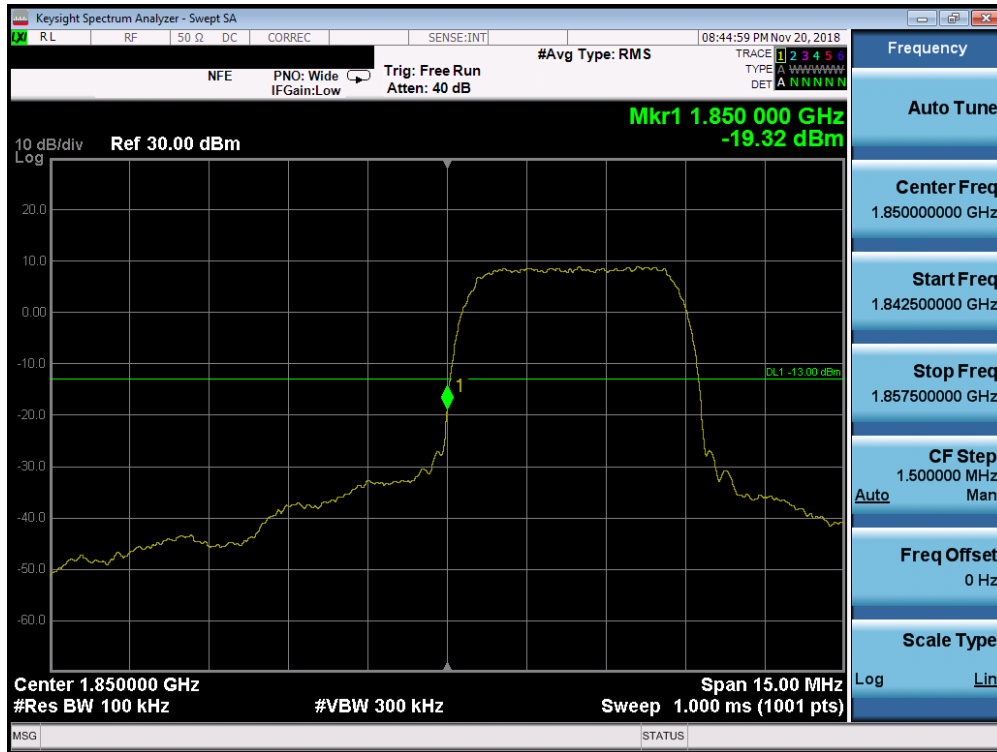
Plot 7-91. Band Edge Plot (AWS WCDMA Mode - High Channel)



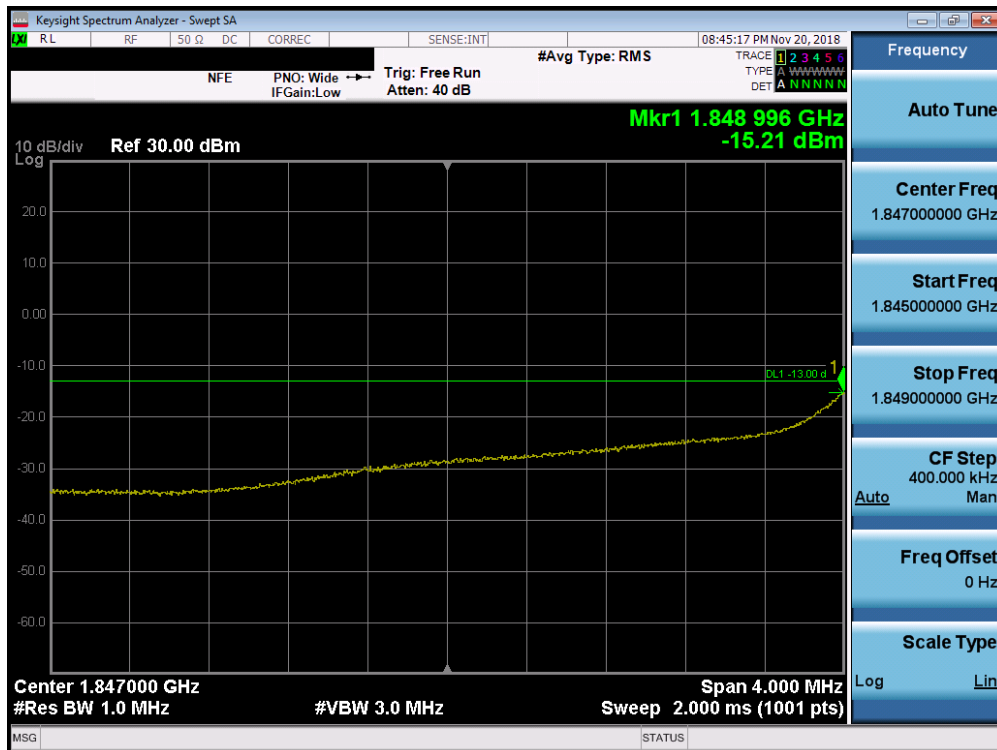
Plot 7-92. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 65 of 107

PCS WCDMA Mode



Plot 7-93. Band Edge Plot (PCS WCDMA Mode - Low Channel)



Plot 7-94. 4MHz Span Plot (PCS WCDMA Mode - Low Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 66 of 107



Plot 7-95. Band Edge Plot (PCS WCDMA Mode - High Channel)



Plot 7-96. 4MHz Span Plot (PCS WCDMA Mode - High Channel)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 67 of 107

7.5 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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

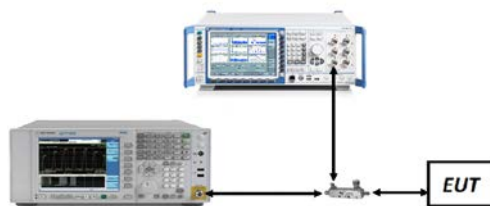
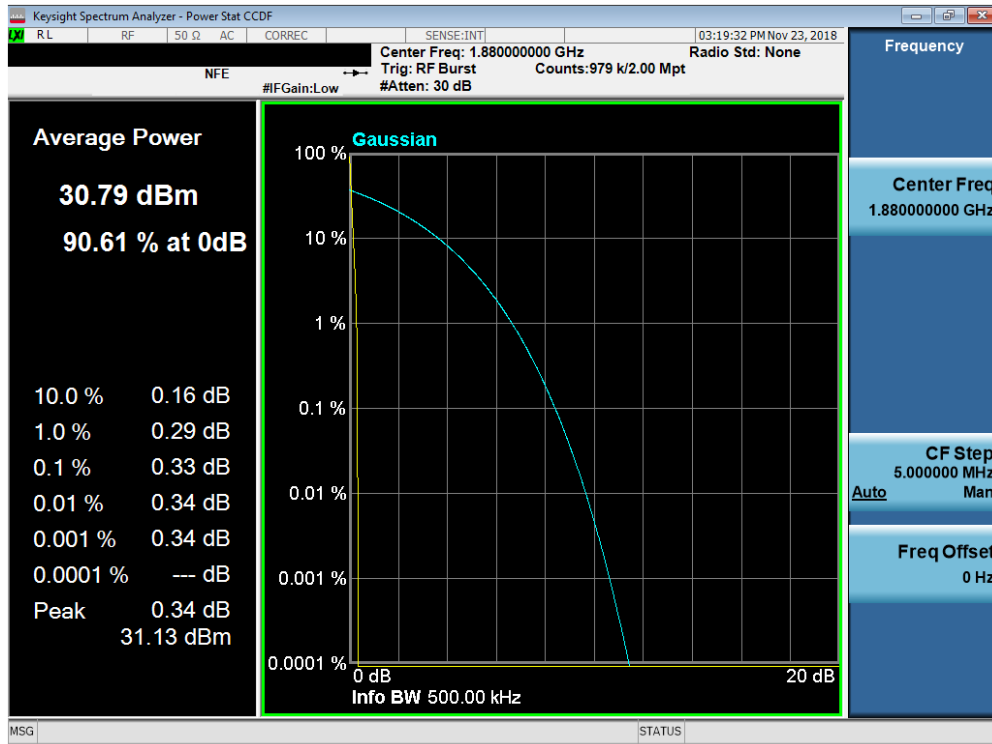


Figure 7-4. Test Instrument & Measurement Setup

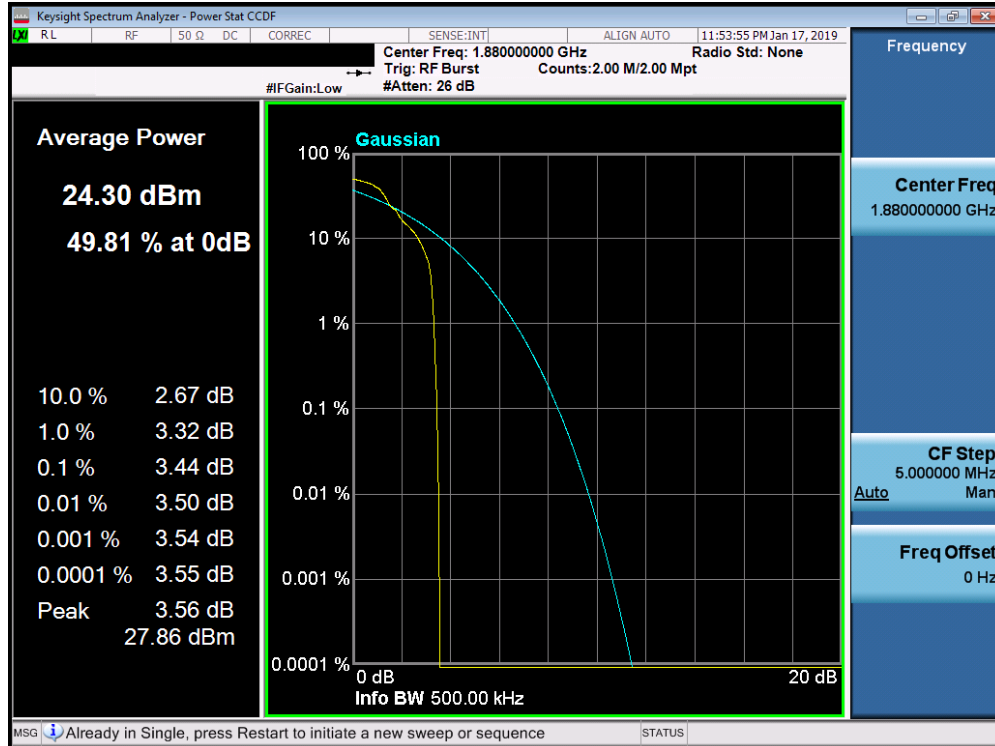
Test Notes

None

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 68 of 107

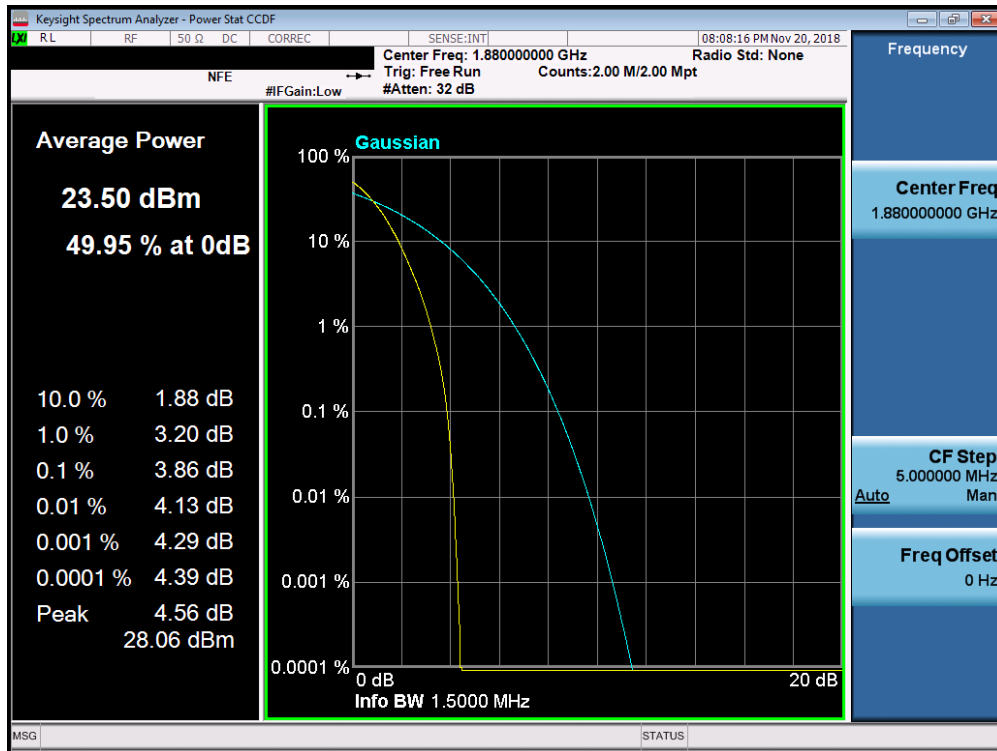


Plot 7-97. Peak-Average Ratio Plot (PCS GPRS Mode)

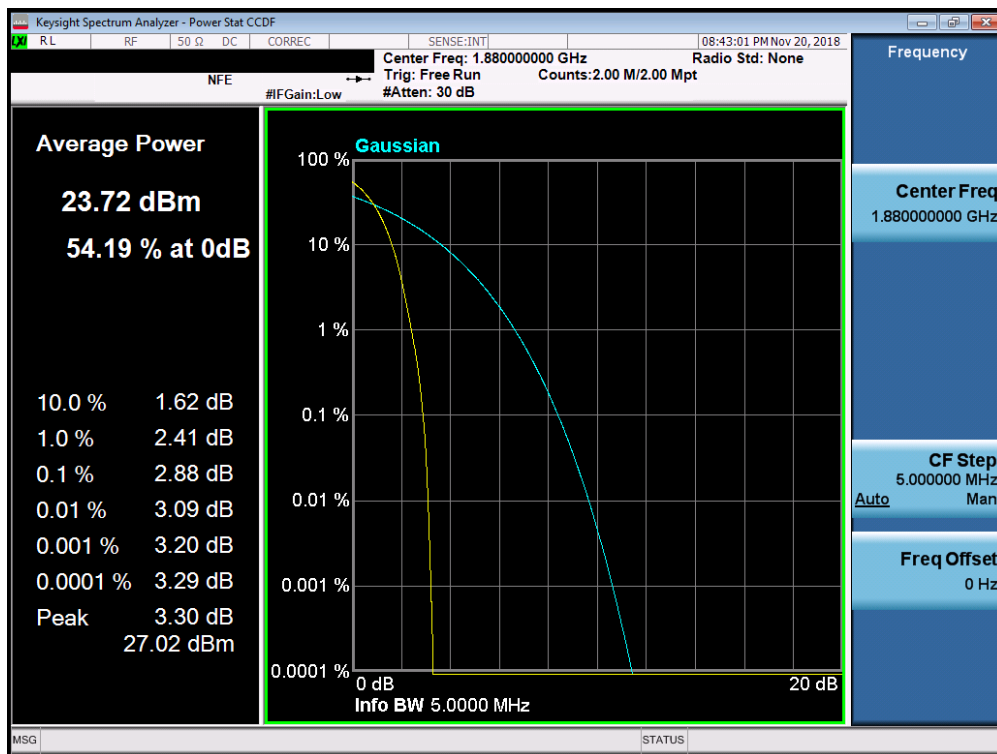


Plot 7-98. Peak-Average Ratio Plot (EDGE1900 Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 69 of 107



Plot 7-99. Peak-Average Ratio Plot (PCS CDMA Mode)



Plot 7-100. Peak-Average Ratio Plot (PCS WCDMA Mode)

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 70 of 107

7.6 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 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

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 71 of 107

Test Setup

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

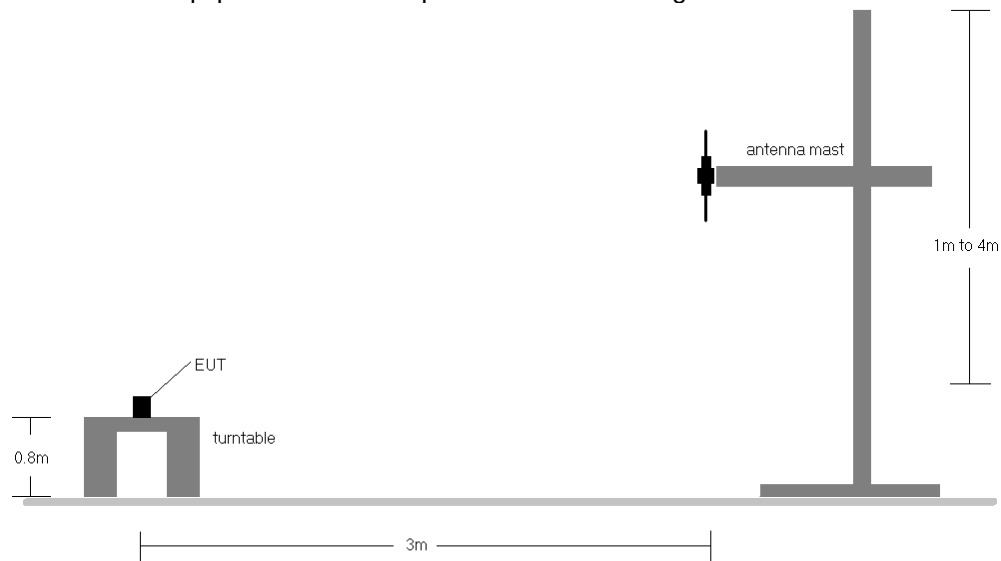


Figure 7-5. Radiated Test Setup <1GHz

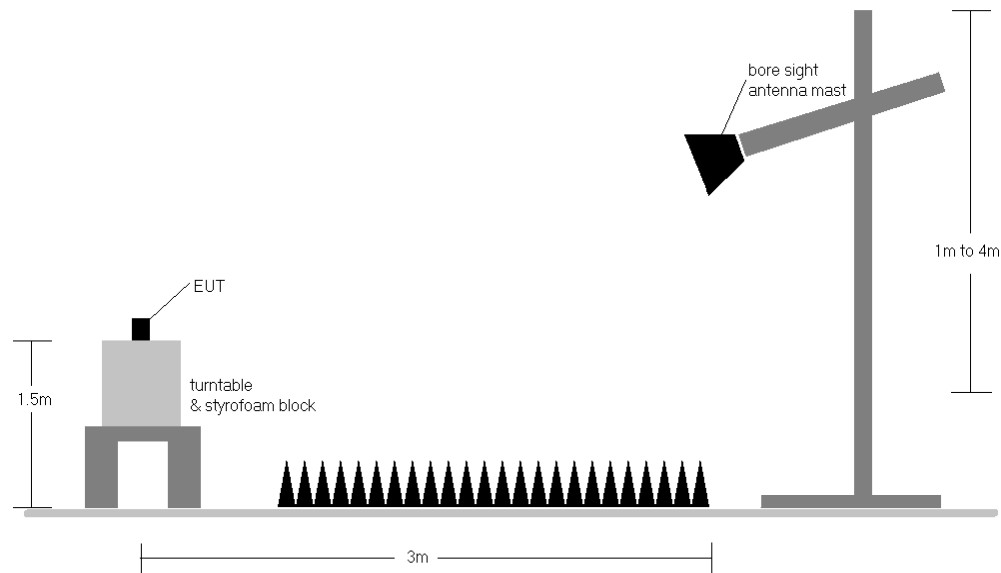


Figure 7-6. Radiated Test Setup >1GHz

FCC ID: ZNFV450PM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 72 of 107

Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 4) This unit was tested with its standard battery.
- 5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 73 of 107

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	H	172	291	24.92	1.65	24.42	38.45	-14.03	26.57	40.61	-14.04
836.60	GPRS850	H	100	44	25.81	1.57	25.23	38.45	-13.22	27.38	40.61	-13.22
848.80	GPRS850	H	100	34	26.93	1.50	26.28	38.45	-12.17	28.43	40.61	-12.18
848.80	GPRS850	V	120	9	26.69	1.50	26.04	38.45	-12.41	28.19	40.61	-12.42
848.80	EDGE850	H	100	34	19.82	1.50	19.17	38.45	-19.28	21.32	40.61	-19.29
848.80	GPRS850 (WCP)	H	100	57	26.34	1.50	25.69	38.45	-12.76	27.84	40.61	-12.77

Table 7-2. ERP/EIRP (Cellular GPRS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	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	CDMA850	H	188	28	13.06	6.75	17.66	0.058	38.45	-20.79	19.81	0.096	40.61	-20.80
836.52	CDMA850	H	117	356	13.25	6.78	17.88	0.061	38.45	-20.58	20.03	0.101	40.61	-20.58
848.31	CDMA850	H	125	14	12.56	6.80	17.21	0.053	38.45	-21.24	19.36	0.086	40.61	-21.25
836.52	CDMA850	V	227	140	11.08	6.78	15.71	0.037	38.45	-22.75	17.86	0.061	40.61	-22.75
836.52	CDMA850 (WCP)	H	138	33	12.76	6.78	17.39	0.055	38.45	-21.07	19.54	0.090	40.61	-21.07

Table 7-3. ERP/EIRP (Cellular CDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	H	172	187	18.76	1.50	18.11	38.45	-20.34	20.26	40.61	-20.35
836.60	WCDMA850	H	180	180	19.25	1.50	18.60	38.45	-19.85	20.75	40.61	-19.86
846.60	WCDMA850	H	3	190	18.85	1.50	18.20	38.45	-20.25	20.35	40.61	-20.26
836.60	WCDMA850	V	90	364	10.97	1.50	10.32	38.45	-28.13	12.47	40.61	-28.14
836.60	WCDMA850 (WCP)	H	144	357	19.23	1.50	18.58	38.45	-19.87	20.73	40.61	-19.88

Table 7-4. ERP/EIRP (Cellular WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	V	176	224	14.33	8.21	22.54	30.00	-7.46
1732.60	WCDMA1700	V	104	231	15.53	8.06	23.59	30.00	-6.41
1752.60	WCDMA1700	V	105	234	13.72	7.91	21.63	30.00	-8.37
1732.60	WCDMA1700	H	123	114	14.89	8.06	22.95	30.00	-7.05
1732.60	WCDMA1700 (WCP)	V	112	248	15.05	8.06	23.11	30.00	-6.89

Table 7-5. EIRP (AWS WCDMA)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 74 of 107

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	V	166	171	19.97	7.71	27.68	33.01	-5.33
1880.00	GPRS1900	V	158	72	21.96	7.80	29.76	33.01	-3.25
1909.80	GPRS1900	V	154	21	20.73	7.88	28.61	33.01	-4.40
1880.00	GPRS1900	H	145	310	21.46	7.80	29.26	33.01	-3.75
1880.00	EDGE1900	V	158	72	16.95	7.80	24.75	33.01	-8.26
1880.00	GPRS1900 (WCP)	V	170	55	21.90	7.80	29.70	33.01	-3.31

Table 7-6. EIRP (PCS GPRS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1851.25	CDMA1900	H	118	60	13.63	8.37	22.00	33.01	-11.01
1880.00	CDMA1900	H	146	40	13.78	8.41	22.19	33.01	-10.82
1908.75	CDMA1900	H	141	62	13.29	8.46	21.75	33.01	-11.26
1880.00	CDMA1900	V	256	287	12.43	8.41	20.84	33.01	-12.17
1880.00	CDMA1900 (WCP)	H	114	88	13.66	8.41	22.07	33.01	-10.94

Table 7-7. EIRP (PCS CDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	H	175	359	15.32	7.72	23.03	33.01	-9.98
1880.00	WCDMA1900	H	109	293	16.70	7.80	24.50	33.01	-8.51
1907.60	WCDMA1900	H	178	115	15.91	7.88	23.78	33.01	-9.23
1880.00	WCDMA1900	V	189	226	14.58	7.80	22.38	33.01	-10.63
1880.00	WCDMA1900 (WCP)	H	135	150	15.84	7.80	23.64	33.01	-9.37

Table 7-8. EIRP (PCS WCDMA)

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 75 of 107

7.7 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 horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ 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: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 76 of 107

Test Setup

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

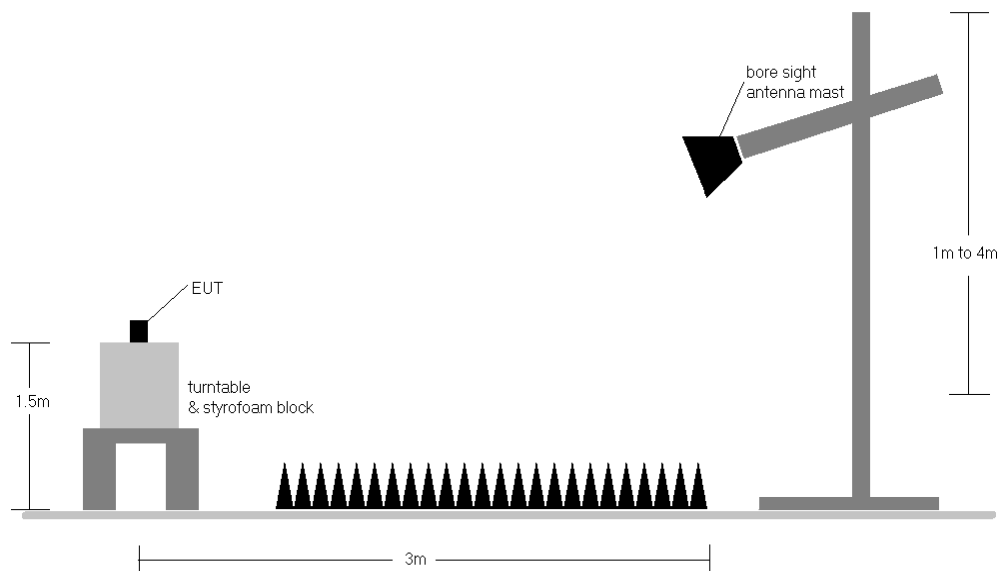


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 4) This unit was tested with its standard battery.
- 5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 6) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 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) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 77 of 107

Cellular GPRS Mode

OPERATING FREQUENCY: 824.20 MHz

MODULATION SIGNAL: GPRS (GMSK)

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]
1648.40	H	122	344	-67.30	8.94	-58.36	-45.4
2472.60	H	121	239	-25.75	9.64	-16.10	-3.1
3296.80	H	-	-	-69.97	9.57	-60.39	-47.4
4121.00	H	278	278	-39.36	10.17	-29.20	-16.2
4945.20	H	-	-	-71.21	10.90	-60.31	-47.3
5769.40	H	117	338	-71.46	11.47	-60.00	-47.0
6593.60	H	-	-	-71.57	12.12	-59.45	-46.5

Table 7-9. Radiated Spurious Data (Cellular GPRS Mode – Ch. 128)

OPERATING FREQUENCY: 836.60 MHz

MODULATION SIGNAL: GPRS (GMSK)

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]
1673.20	H	209	288	-66.72	8.95	-57.77	-44.8
2509.80	H	201	188	-29.00	9.75	-19.25	-6.2
3346.40	H	152	232	-65.08	9.60	-55.47	-42.5
4183.00	H	121	128	-38.39	10.35	-28.04	-15.0
5019.60	H	116	303	-70.39	10.88	-59.51	-46.5
5856.20	H	122	228	-47.04	11.52	-35.53	-22.5
6692.80	H	-	-	-70.18	11.76	-58.42	-45.4

Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 78 of 107

OPERATING FREQUENCY: 848.80 MHz
 MODULATION SIGNAL: GPRS (GMSK)
 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]
1697.60	H	210	2	-65.57	8.95	-56.61	-43.6
2546.40	H	126	296	-25.80	9.74	-16.06	-3.1
3395.20	H	177	329	-67.16	9.78	-57.38	-44.4
4244.00	H	134	240	-52.00	10.58	-41.43	-28.4
5092.80	H	155	225	-70.86	10.69	-60.17	-47.2
5941.60	H	125	226	-41.64	11.45	-30.18	-17.2
6790.40	H	-	-	-70.27	11.62	-58.65	-45.6

Table 7-11. Radiated Spurious Data (Cellular GPRS Mode – Ch. 251)

OPERATING FREQUENCY: 848.80 MHz
 MODULATION SIGNAL: GPRS (GMSK)
 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]
1697.60	H	117	35	-64.24	8.95	-55.28	-42.3
2546.40	H	110	338	-28.61	9.74	-18.87	-5.9
3395.20	H	205	348	-69.69	9.78	-59.91	-46.9
4244.00	H	112	227	-52.16	10.58	-41.59	-28.6
5092.80	H	140	355	-68.44	10.69	-57.75	-44.8
5941.60	H	117	84	-49.52	11.45	-38.06	-25.1
6790.40	H	-	-	-71.59	11.62	-59.97	-47.0

Table 7-12. Radiated Spurious Data with WCP (Cellular GPRS Mode – Ch. 251)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 79 of 107

Cellular CDMA Mode

OPERATING FREQUENCY: 824.70 MHz
 MODULATION SIGNAL: CDMA
 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]
1649.40	H	169	145	-70.05	8.08	-61.97	-49.0
2474.10	H	170	283	-64.77	7.90	-56.87	-43.9
3298.80	H	-	-	-65.99	7.00	-58.99	-46.0

Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 1013)

OPERATING FREQUENCY: 836.52 MHz
 MODULATION SIGNAL: CDMA
 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]
1673.04	H	181	152	-70.91	8.11	-62.79	-49.8
2509.56	H	119	279	-65.94	7.88	-58.06	-45.1
3346.08	H	-	-	-66.48	7.00	-59.48	-46.5

Table 7-14. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 80 of 107

OPERATING FREQUENCY: 848.31 MHz
 MODULATION SIGNAL: CDMA
 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]
1696.62	H	198	166	-69.31	8.14	-61.17	-48.2
2544.93	H	120	241	-65.05	7.81	-57.24	-44.2
3393.24	H	-	-	-66.99	7.00	-59.99	-47.0

Table 7-15. Radiated Spurious Data (Cellular CDMA Mode – Ch. 777)

OPERATING FREQUENCY: 824.70 MHz
 CHANNEL: 1013
 MODULATION SIGNAL: CDMA
 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]
1649.40	H	210	148	-71.35	8.08	-63.27	-50.3
2474.10	H	123	214	-66.81	7.90	-58.91	-45.9
3298.80	H	-	-	-65.51	7.00	-58.51	-45.5

Table 7-16. Radiated Spurious Data with WCP (Cellular CDMA Mode – Ch. 1013)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 81 of 107

Cellular WCDMA Mode

OPERATING FREQUENCY: 826.40 MHz
 MODULATION SIGNAL: WCDMA
 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]
1652.80	H	142	164	-62.41	8.09	-54.32	-41.3
2479.20	H	132	275	-52.18	7.90	-44.28	-31.3
3305.60	H	-	-	-55.18	7.00	-48.18	-35.2
4132.00	H	-	-	-51.19	5.68	-45.50	-32.5

Table 7-17. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

OPERATING FREQUENCY: 836.60 MHz
 MODULATION SIGNAL: WCDMA
 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]
1673.20	H	113	153	-60.44	8.11	-52.33	-39.3
2509.80	H	146	257	-49.91	7.88	-42.03	-29.0
3346.40	H	-	-	-55.12	7.00	-48.12	-35.1
4183.00	H	-	-	-51.22	5.86	-45.36	-32.4

Table 7-18. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 82 of 107

OPERATING FREQUENCY: 846.60 MHz
 MODULATION SIGNAL: WCDMA
 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]
1693.20	H	110	121	-60.27	8.14	-52.13	-39.1
2539.80	H	124	205	-55.06	7.82	-47.24	-34.2
3386.40	H	-	-	-54.53	7.00	-47.53	-34.5
4233.00	H	-	-	-51.24	6.04	-45.20	-32.2

Table 7-19. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

OPERATING FREQUENCY: 836.60 MHz
 CHANNEL: 4183
 MODULATION SIGNAL: WCDMA
 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]
1673.20	H	119	117	-61.80	8.11	-53.69	-40.7
2509.80	H	190	287	-59.63	7.88	-51.75	-38.7
3346.40	H	-	-	-56.54	7.00	-49.54	-36.5

Table 7-20. Radiated Spurious Data with WCP (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 83 of 107

AWS WCDMA Mode

OPERATING FREQUENCY: 1712.40 MHz
 MODULATION SIGNAL: WCDMA
 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]
3424.80	V	103	352	-39.98	8.83	-31.15	-18.1
5137.20	V	154	294	-42.02	10.63	-31.39	-18.4
6849.60	V	-	-	-49.41	10.24	-39.18	-26.2
8562.00	V	-	-	-48.67	11.48	-37.20	-24.2

Table 7-21. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1312)

OPERATING FREQUENCY: 1732.60 MHz
 MODULATION SIGNAL: WCDMA
 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]
3465.20	V	119	223	-43.84	8.88	-34.96	-22.0
5197.80	V	124	302	-44.89	10.33	-34.55	-21.6
6930.40	V	-	-	-50.21	10.53	-39.68	-26.7
8663.00	V	-	-	-48.20	11.35	-36.85	-23.8

Table 7-22. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 84 of 107

OPERATING FREQUENCY: 1752.60 MHz
 MODULATION SIGNAL: WCDMA
 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]
3505.20	V	109	198	-48.22	8.92	-39.30	-26.3
5257.80	V	122	308	-47.54	10.38	-37.16	-24.2
7010.40	V	-	-	-51.65	10.53	-41.11	-28.1
8763.00	V	-	-	-48.80	11.74	-37.05	-24.1

Table 7-23. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1513)

OPERATING FREQUENCY: 1712.40 MHz
 MODULATION SIGNAL: WCDMA
 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]
3424.80	H	103	352	-49.63	8.83	-40.80	-27.8
5137.20	H	154	294	-49.11	10.63	-38.48	-25.5
6849.60	H	-	-	-50.91	10.24	-40.68	-27.7

Table 7-24. Radiated Spurious Data with WCP (AWS WCDMA Mode – Ch. 1312)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 85 of 107

PCS GPRS Mode

OPERATING FREQUENCY: 1850.20 MHz
 MODULATION SIGNAL: GPRS (GMSK)
 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]
3700.40	V	103	352	-39.98	8.83	-31.15	-18.1
5550.60	V	154	294	-42.02	10.63	-31.39	-18.4
7400.80	V	-	-	-49.41	10.24	-39.18	-26.2
9251.00	V	-	-	-48.67	11.48	-37.20	-24.2

Table 7-25. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

OPERATING FREQUENCY: 1880.00 MHz
 MODULATION SIGNAL: GPRS (GMSK)
 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]
3760.00	V	119	223	-43.84	8.88	-34.96	-22.0
5640.00	V	124	302	-44.89	10.33	-34.55	-21.6
7520.00	V	-	-	-50.21	10.53	-39.68	-26.7
9400.00	V	-	-	-48.20	11.35	-36.85	-23.8

Table 7-26. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 86 of 107

OPERATING FREQUENCY: 1909.80 MHz
 MODULATION SIGNAL: GPRS (GMSK)
 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]
3819.60	V	109	198	-48.22	8.92	-39.30	-26.3
5729.40	V	122	308	-47.54	10.38	-37.16	-24.2
7639.20	V	-	-	-51.65	10.53	-41.11	-28.1
9549.00	V	-	-	-48.80	11.74	-37.05	-24.1

Table 7-27. Radiated Spurious Data (PCS GPRS Mode – Ch. 810)

OPERATING FREQUENCY: 1880.00 MHz
 MODULATION SIGNAL: GPRS (GMSK)
 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]
3760.00	H	110	227	-48.43	8.83	-39.60	-26.6
5640.00	H	197	349	-49.26	10.63	-38.63	-25.6
7520.00	H	-	-	-50.11	10.24	-39.88	-26.9

Table 7-28. Radiated Spurious Data with WCP (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 87 of 107

PCS CDMA Mode

OPERATING FREQUENCY: 1851.25 MHz
 MODULATION SIGNAL: CDMA
 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]
3702.50	H	110	355	-58.78	5.45	-53.33	-40.3
5553.75	H	-	-	-63.37	9.45	-53.92	-40.9

Table 7-29. Radiated Spurious Data (PCS CDMA Mode – Ch. 25)

OPERATING FREQUENCY: 1880.00 MHz
 MODULATION SIGNAL: CDMA
 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]
3760.00	H	117	351	-57.93	5.10	-52.82	-39.8
5640.00	H	-	-	-63.66	9.70	-53.96	-41.0

Table 7-30. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

OPERATING FREQUENCY: 1908.75 MHz
 MODULATION SIGNAL: CDMA
 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]
3817.50	H	125	14	-59.81	5.13	-54.68	-41.7
5726.25	H	-	-	-65.65	9.93	-55.72	-42.7

Table 7-31. Radiated Spurious Data (PCS CDMA Mode – Ch. 1175)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 88 of 107

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 600
 MODULATION SIGNAL: CDMA
 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]
3760.00	H	110	350	-60.45	5.10	-55.34	-42.3
5640.00	H	-	-	-65.12	9.70	-55.42	-42.4

Table 7-32. Radiated Spurious Data with WCP (PCS CDMA Mode – Ch. 600)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 89 of 107

PCS WCDMA Mode

OPERATING FREQUENCY: 1852.40 MHz
 MODULATION SIGNAL: WCDMA
 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]
3704.80	H	101	357	-53.49	8.80	-44.69	-31.7
5557.20	H	-	-	-52.93	10.49	-42.44	-29.4
7409.60	H	-	-	-49.01	10.41	-38.60	-25.6

Table 7-33. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

OPERATING FREQUENCY: 1880.00 MHz
 MODULATION SIGNAL: WCDMA
 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]
3760.00	H	102	205	-52.55	8.44	-44.11	-31.1
5640.00	H	-	-	-52.37	10.64	-41.73	-28.7
7520.00	H	-	-	-49.23	11.10	-38.13	-25.1

Table 7-34. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 90 of 107

OPERATING FREQUENCY: 1907.60 MHz
 MODULATION SIGNAL: WCDMA
 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]
3815.20	H	-	-	-53.79	8.21	-45.59	-32.6
5722.80	H	-	-	-53.48	10.40	-43.08	-30.1

Table 7-35. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

OPERATING FREQUENCY: 1880.00 MHz
 MODULATION SIGNAL: WCDMA
 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]
3760.00	H	121	266	-53.82	8.44	-45.38	-32.4
5640.00	H	-	-	-54.09	10.64	-43.45	-30.5

Table 7-36. Radiated Spurious Data with WCP (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 91 of 107

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, RSS-132, and RSS-133, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24, Part 27, and RSS-139, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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

Test Setup

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

Test Notes

None

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 92 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 836,600,000 Hz

CHANNEL: 190

REFERENCE VOLTAGE: 3.87 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	836,599,997	-3	-0.0000004
100 %		- 20	836,599,956	-44	-0.0000053
100 %		- 10	836,599,974	-26	-0.0000031
100 %		0	836,599,746	-254	-0.0000304
100 %		+ 10	836,599,809	-191	-0.0000228
100 %		+ 20	836,600,012	12	0.0000014
100 %		+ 30	836,599,778	-222	-0.0000265
100 %		+ 40	836,599,753	-247	-0.0000295
100 %		+ 50	836,599,923	-77	-0.0000092
BATT. ENDPOINT	3.19	+ 20	836,599,765	-235	-0.0000281

Table 7-37. Frequency Stability Data (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 93 of 107

Frequency Stability / Temperature Variation

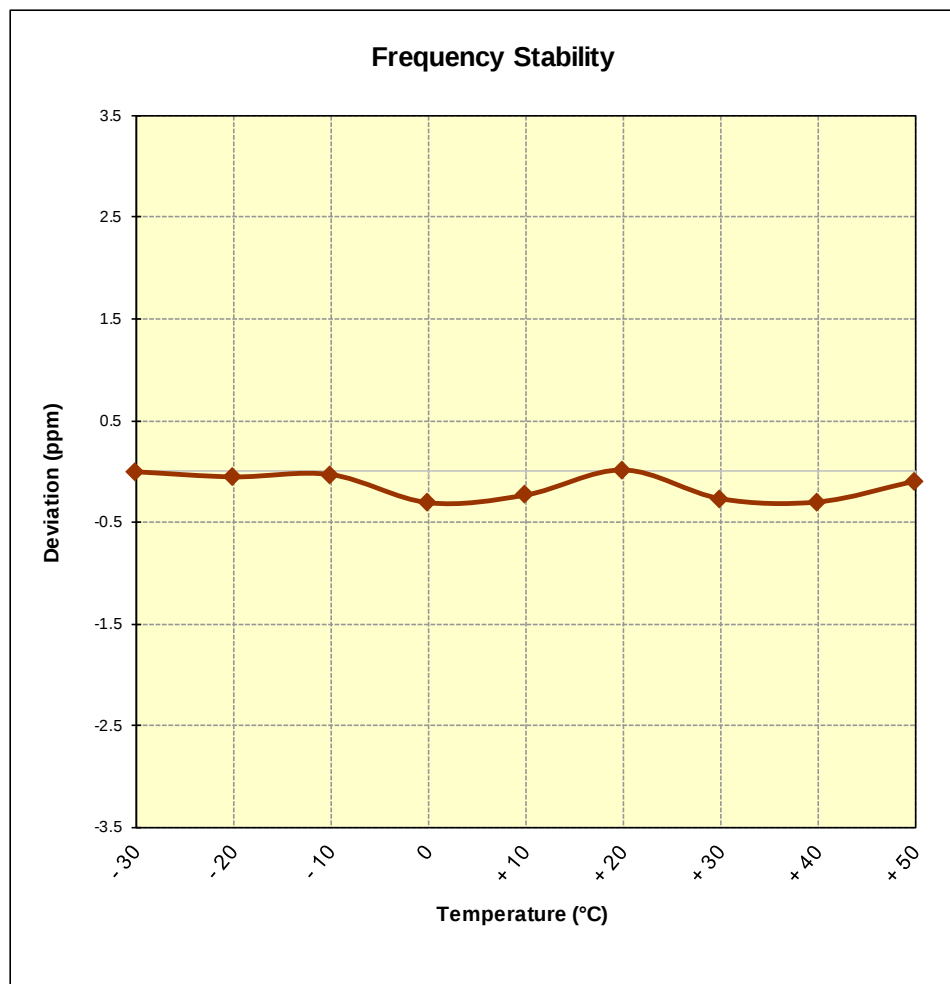


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 94 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 836,520,000 Hz

CHANNEL: 384

REFERENCE VOLTAGE: 3.87 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	836,520,129	129	0.0000154
100 %		- 20	836,520,241	241	0.0000288
100 %		- 10	836,520,209	209	0.0000250
100 %		0	836,520,116	116	0.0000139
100 %		+ 10	836,519,766	-234	-0.0000280
100 %		+ 20	836,520,210	210	0.0000251
100 %		+ 30	836,519,912	-88	-0.0000105
100 %		+ 40	836,519,974	-26	-0.0000031
100 %		+ 50	836,519,834	-166	-0.0000198
BATT. ENDPOINT	3.19	+ 20	836,520,067	67	0.0000080

Table 7-38. Frequency Stability Data (Cellular CDMA Mode – Ch. 384)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 95 of 107

Frequency Stability / Temperature Variation

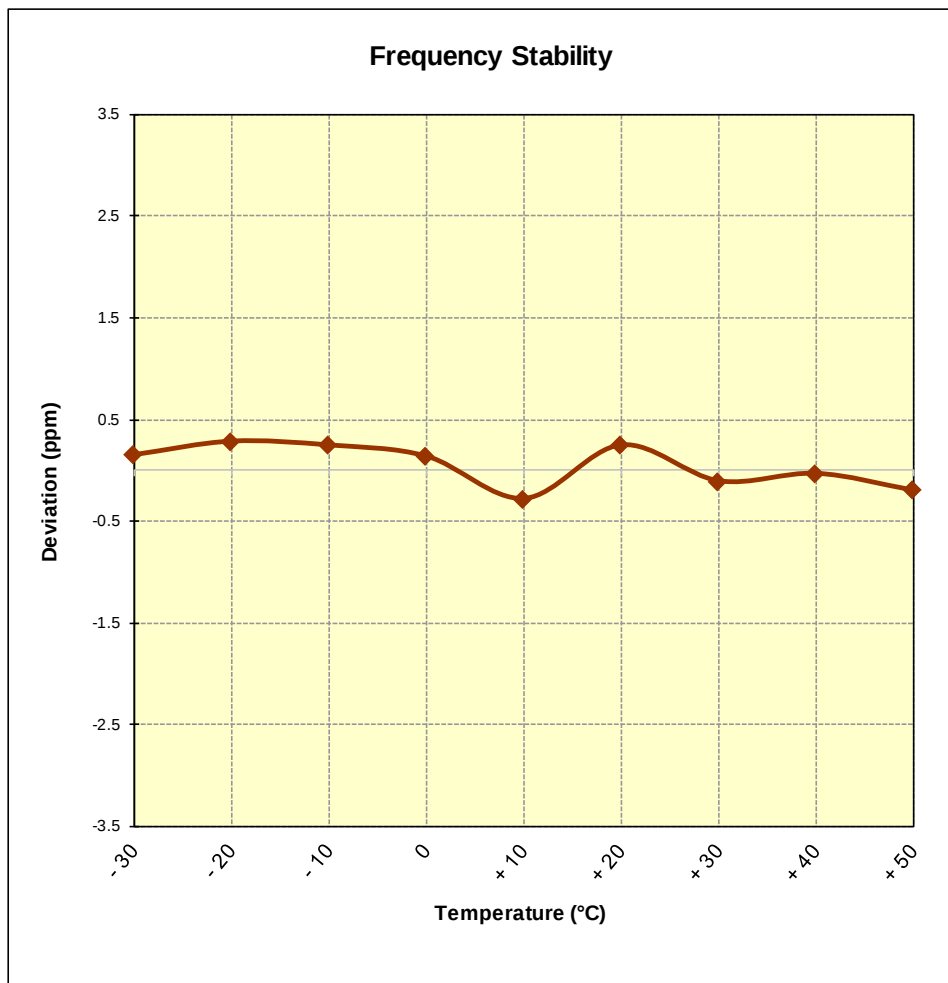


Figure 7-9. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 96 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 836,600,000 Hz
CHANNEL: 4183
REFERENCE VOLTAGE: 3.87 VDC
DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	836,600,026	26	0.0000031
100 %		- 20	836,599,938	-62	-0.0000074
100 %		- 10	836,599,977	-23	-0.0000027
100 %		0	836,599,862	-138	-0.0000165
100 %		+ 10	836,599,869	-131	-0.0000157
100 %		+ 20	836,599,808	-192	-0.0000230
100 %		+ 30	836,599,802	-198	-0.0000237
100 %		+ 40	836,599,636	-364	-0.0000435
100 %		+ 50	836,599,917	-83	-0.0000099
BATT. ENDPOINT	3.19	+ 20	836,599,947	-53	-0.0000063

Table 7-39. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 97 of 107

Frequency Stability / Temperature Variation

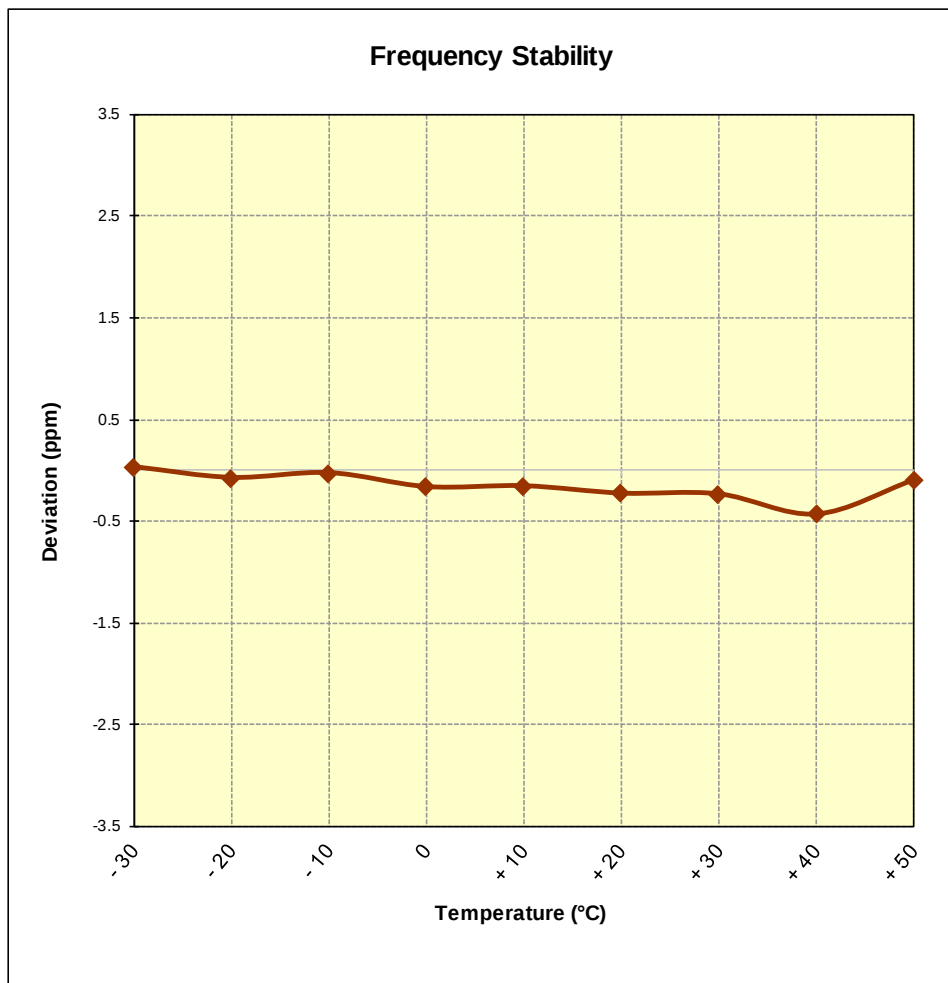


Figure 7-10. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 98 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 1,732,600,000 Hz
CHANNEL: 1413
REFERENCE VOLTAGE: 3.87 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	1,732,599,999	-1	-0.0000001
100 %		- 20	1,732,600,156	156	0.0000090
100 %		- 10	1,732,599,824	-176	-0.0000102
100 %		0	1,732,600,309	309	0.0000178
100 %		+ 10	1,732,599,800	-200	-0.0000115
100 %		+ 20	1,732,599,915	-85	-0.0000049
100 %		+ 30	1,732,600,228	228	0.0000132
100 %		+ 40	1,732,600,229	229	0.0000132
100 %		+ 50	1,732,600,209	209	0.0000121
BATT. ENDPOINT	3.19	+ 20	1,732,599,616	-384	-0.0000222

Table 7-40. Frequency Stability Data (AWS WCDMA Mode – Ch. 1413)

Note:

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

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 99 of 107

Frequency Stability / Temperature Variation

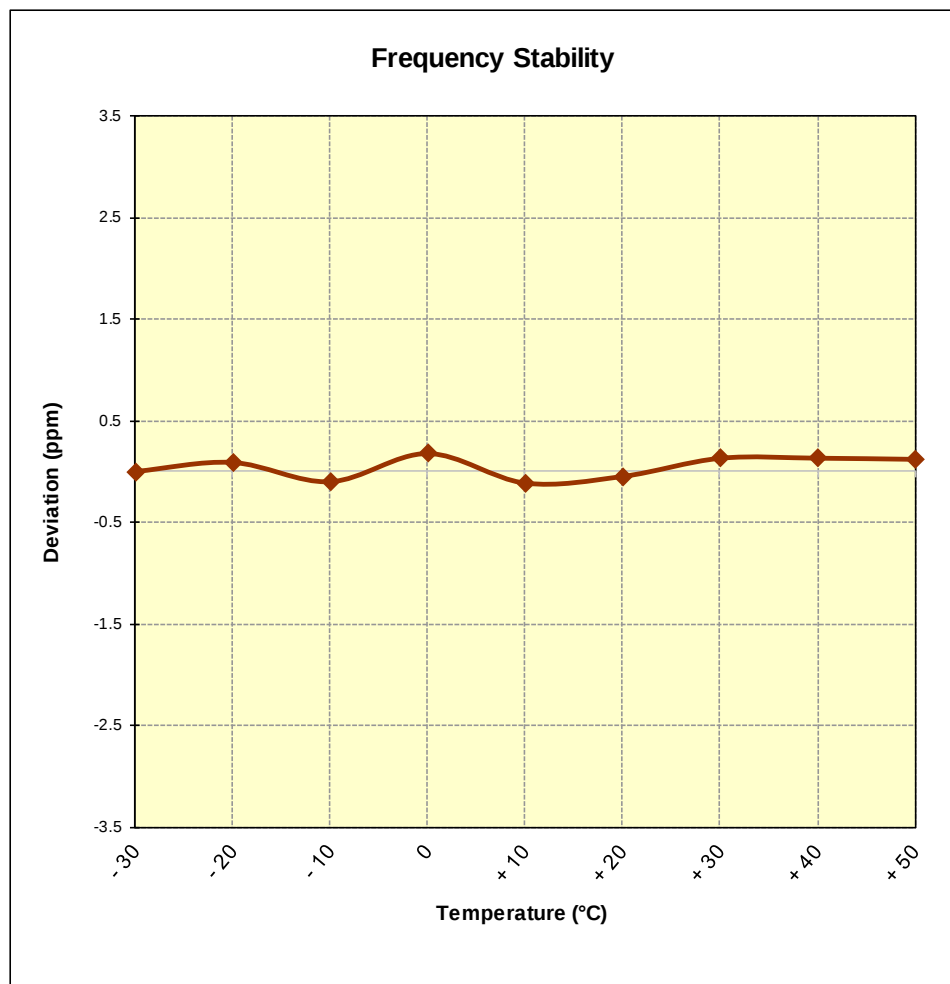


Figure 7-11. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

FCC ID: ZNFV450PM	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 100 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 661

REFERENCE VOLTAGE: 3.87 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	1,880,000,120	120	0.0000064
100 %		- 20	1,879,999,937	-63	-0.0000034
100 %		- 10	1,880,000,047	47	0.0000025
100 %		0	1,880,000,264	264	0.0000140
100 %		+ 10	1,880,000,226	226	0.0000120
100 %		+ 20	1,880,000,043	43	0.0000023
100 %		+ 30	1,879,999,894	-106	-0.0000056
100 %		+ 40	1,880,000,004	4	0.0000002
100 %		+ 50	1,879,999,991	-9	-0.0000005
BATT. ENDPOINT	3.19	+ 20	1,879,999,958	-42	-0.0000022

Table 7-41. Frequency Stability Data (PCS GPRS Mode – Ch. 661)

Note:

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

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 101 of 107

Frequency Stability / Temperature Variation

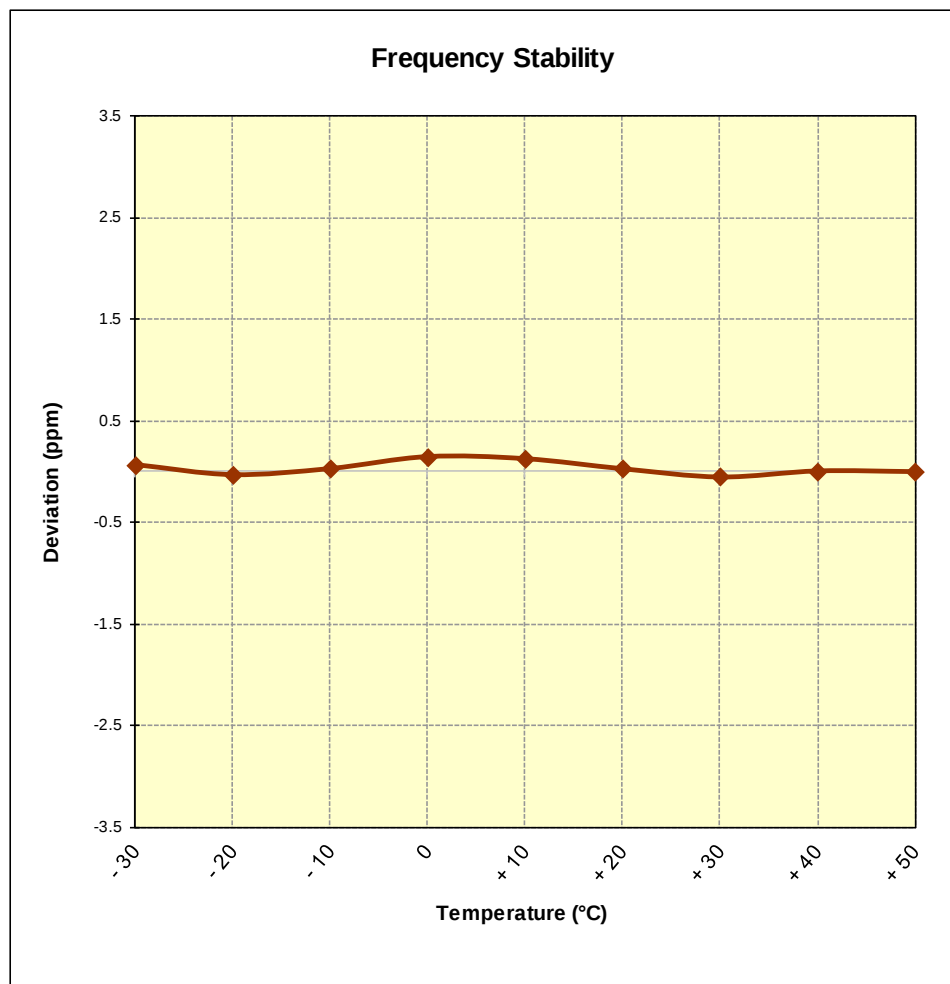


Figure 7-12. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

FCC ID: ZNFV450PM	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 102 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 600

REFERENCE VOLTAGE: 3.87 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	1,880,000,273	273	0.0000145
100 %		- 20	1,880,000,282	282	0.0000150
100 %		- 10	1,879,999,873	-127	-0.0000068
100 %		0	1,880,000,185	185	0.0000098
100 %		+ 10	1,879,999,930	-70	-0.0000037
100 %		+ 20	1,879,999,701	-299	-0.0000159
100 %		+ 30	1,880,000,067	67	0.0000036
100 %		+ 40	1,879,999,750	-250	-0.0000133
100 %		+ 50	1,879,999,988	-12	-0.0000006
BATT. ENDPOINT	3.19	+ 20	1,880,000,246	246	0.0000131

Table 7-42. Frequency Stability Data (PCS CDMA Mode – Ch. 600)

Note:

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

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 103 of 107

Frequency Stability / Temperature Variation

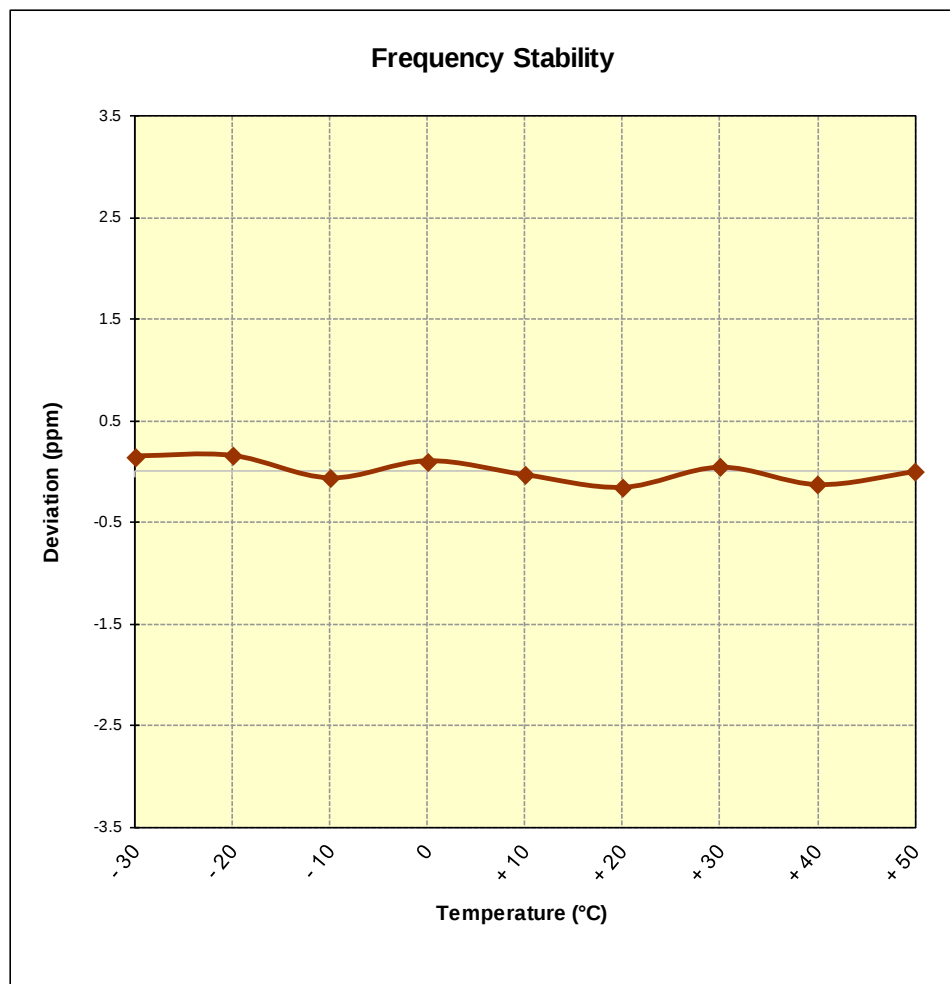


Figure 7-13. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 104 of 107

Frequency Stability / Temperature Variation

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 9400

REFERENCE VOLTAGE: 3.87 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.87	- 30	1,879,999,780	-220	-0.0000117
100 %		- 20	1,880,000,072	72	0.0000038
100 %		- 10	1,879,999,744	-256	-0.0000136
100 %		0	1,880,000,132	132	0.0000070
100 %		+ 10	1,880,000,352	352	0.0000187
100 %		+ 20	1,879,999,766	-234	-0.0000124
100 %		+ 30	1,879,999,832	-168	-0.0000089
100 %		+ 40	1,879,999,747	-253	-0.0000135
100 %		+ 50	1,879,999,825	-175	-0.0000093
BATT. ENDPOINT	3.19	+ 20	1,879,999,846	-154	-0.0000082

Table 7-43. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

Note:

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

FCC ID: ZNFV450PM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset	Page 105 of 107

Frequency Stability / Temperature Variation

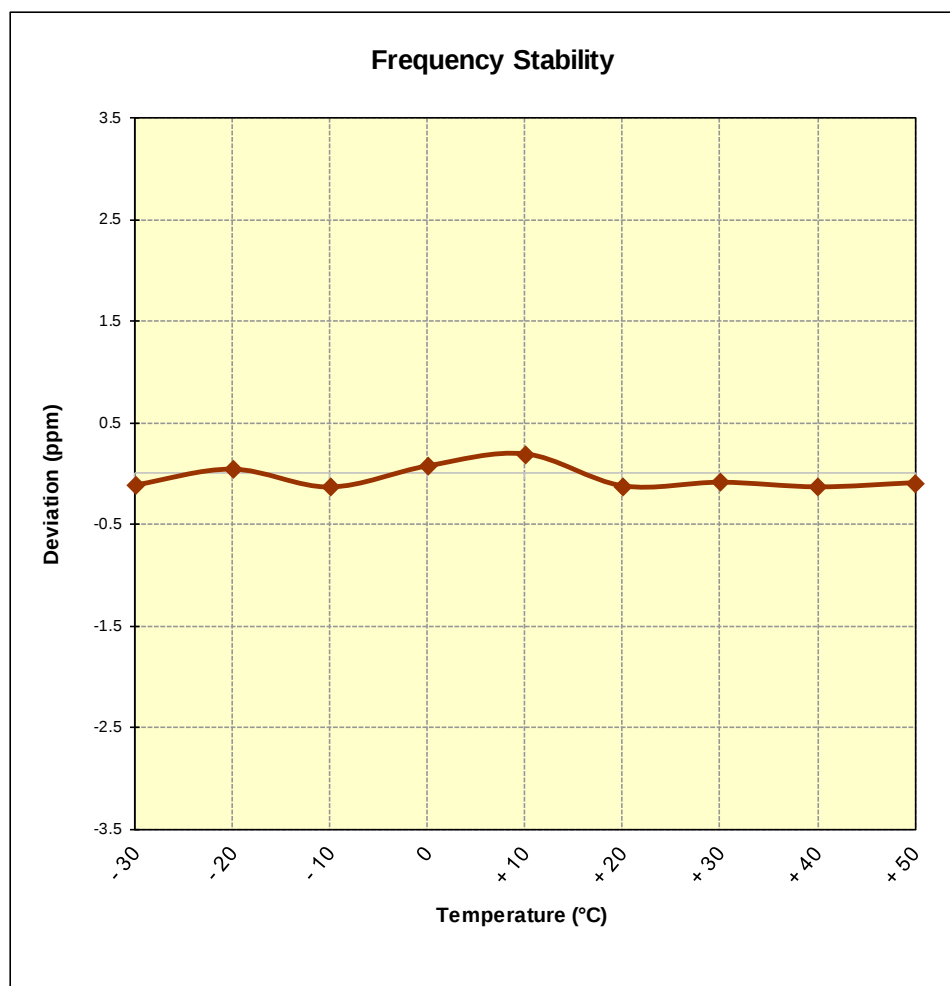


Figure 7-14. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 106 of 107

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFV450PM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.

FCC ID: ZNFV450PM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1811230205-02.ZNF	Test Dates: 11/19/2018 – 1/17/2019	EUT Type: Portable Handset		Page 107 of 107