

**MEASUREMENT REPORT  
LTE**

**Applicant Name:**  
LG Electronics MobileComm U.S.A  
1000 Sylvan Avenue  
Englewood Cliffs, NJ 07632  
United States

**Date of Testing:**  
2/5 - 2/14/2018  
**Test Site/Location:**  
PCTEST Lab. Columbia, MD, USA  
**Test Report Serial No.:**  
1M1802050015-03-R1.ZNF


<b>FCC ID:</b>	<b>ZNFV30A</b>
<b>APPLICANT:</b>	<b>LG Electronics MobileComm U.S.A</b>

**Application Type:** Class II Permissive Change  
**Model:** LG-H931  
**Additional Model(s):** LGH931, H931, LG-H933, LGH933, H933, LG-VS996, LGVS996, VS996, LG-US998, LGUS998, US998  
**EUT Type:** Portable Handset  
**FCC Classification:** PCS Licensed Transmitter Held to Ear (PCE)  
**FCC Rule Part(s):** 22  
**Test Procedure(s):** ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03, KDB 648474 D03 v01r04  
**Class II Permissive Change:** Please see FCC change document  
**Original Grant Date:** 9/1/2017



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

This revised Test Report (S/N: 1M1802050015-03-R1.ZNF) supersedes and replaces the previously issued test report (S/N: 1M1802050015-03.ZNF) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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


  
Randy Ortanez  
President

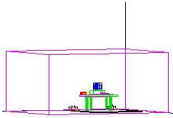


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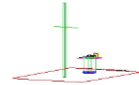
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## FCC Part 22



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)		
LTE Band 26	22H	824.7 - 848.3	0.045	16.53	0.074	18.68	1M10G7D	QPSK
LTE Band 26	22H	824.7 - 848.3	0.031	14.90	0.051	17.05	1M10W7D	16QAM
LTE Band 26	22H	824.7 - 848.3	0.024	13.89	0.040	16.04	1M10W7D	64QAM
LTE Band 26	22H	825.5 - 847.5	0.048	16.78	0.078	18.93	2M71G7D	QPSK
LTE Band 26	22H	825.5 - 847.5	0.033	15.22	0.055	17.37	2M71W7D	16QAM
LTE Band 26	22H	825.5 - 847.5	0.026	14.19	0.043	16.34	2M70W7D	64QAM
LTE Band 26	22H	826.5 - 846.5	0.051	17.11	0.084	19.26	4M52G7D	QPSK
LTE Band 26	22H	826.5 - 846.5	0.034	15.31	0.056	17.46	4M52W7D	16QAM
LTE Band 26	22H	826.5 - 846.5	0.027	14.35	0.045	16.50	4M52W7D	64QAM
LTE Band 26	22H	829 - 844	0.045	16.58	0.075	18.73	9M02G7D	QPSK
LTE Band 26	22H	829 - 844	0.031	14.98	0.052	17.13	8M97W7D	16QAM
LTE Band 26	22H	829 - 844	0.026	14.11	0.042	16.26	9M01W7D	64QAM
LTE Band 26	22H	831.5 - 841.5	0.046	16.65	0.076	18.80	13M5G7D	QPSK
LTE Band 26	22H	831.5 - 841.5	0.035	15.43	0.057	17.58	13M5W7D	16QAM
LTE Band 26	22H	831.5 - 841.5	0.026	14.15	0.043	16.30	13M5W7D	64QAM

### EUT Overview

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# 1.0 INTRODUCTION

## 1.1 Scope

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



## 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST 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 ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LGE Portable Handset FCC ID: ZNFV30A**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

**Test Device Serial No.:** 142023, 142023, 142026

### 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 v03. 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 a certified wireless charging pad (WCP) 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.

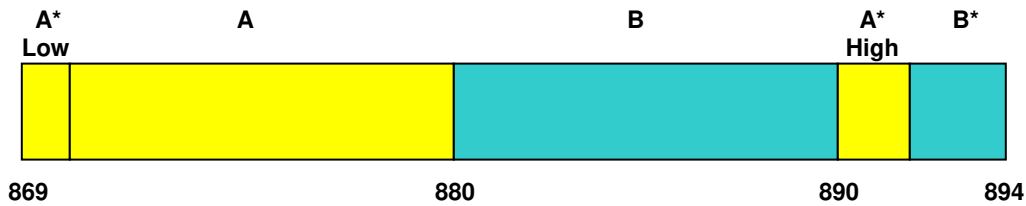
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## 3.0 DESCRIPTION OF TESTS

### 3.1 Measurement Procedure

The measurement procedures described in the document titled “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03) were used in the measurement of the EUT.

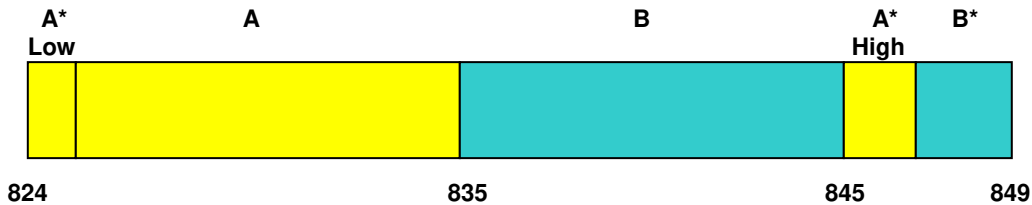
### 3.2 Cellular - Base Frequency Blocks



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

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

### 3.3 Cellular - Mobile Frequency Blocks





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

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

### 3.4 Radiated Power and Radiated Spurious Emissions

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

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

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level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

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

Where,  $P_d$  is the dipole equivalent power,  $P_g$  is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to  $P_g [dBm] - \text{cable loss} [dB]$ .



The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of  $43 + 10\log_{10}(\text{Power} [Watts])$ .

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## 4.0 MEASUREMENT UNCERTAINTY

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

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

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## 5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx3	Licensed Transmitter Cable Set	8/10/2017	Annual	8/10/2018	LTx3
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
Agilent	N9030A	PXA Signal Analyzer (44GHz)	3/27/2017	Annual	3/27/2018	MY52350166
Agilent	N9038A	MXE EMI Receiver	4/26/2017	Annual	4/26/2018	MY51210133
Anritsu	MT8820C	Radio Communication Analyzer	5/23/2017	Annual	5/23/2018	6201240328
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
Espec	ESX-2CA	Environmental Chamber	4/11/2017	Annual	4/11/2018	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	4/26/2016	Biennial	4/26/2018	128337
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/24/2017	Annual	3/24/2018	11401010036
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102135
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2017	Annual	5/22/2018	109892
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	CMW500	Radio Communication Tester	5/4/2017	Annual	5/4/2018	112347
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

**Table 5-1. Test Equipment**

**Notes:**

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

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## 6.0 SAMPLE CALCULATIONS

### Emission Designator

#### QPSK Modulation

**Emission Designator = 8M62G7D**

- LTE BW = 8.62 MHz
- G = Phase Modulation
- 7 = Quantized/Digital Info
- D = Data transmission, telemetry, telecommand

#### QAM Modulation



**Emission Designator = 8M45W7D**

- LTE BW = 8.45 MHz
- W = Amplitude/Angle Modulated
- 7 = Quantized/Digital Info
- D = Data transmission, telemetry, telecommand

### Spurious Radiated Emission – LTE Band

#### **Example: Middle Channel LTE Mode 2<sup>nd</sup> Harmonic (1564 MHz)**

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80).

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## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: LG Electronics MobileComm U.S.A  
 FCC ID: ZNFV30A  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): LTE

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	RSS-Gen(4.6.1)	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 2.917(a)	RSS-132(5.5)	Out of Band Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Section 7.3, 7.4
24.232(d)	RSS-132(5.4)	Peak-Average Ratio	< 13 dB		PASS	Section 7.5
2.1046	RSS-132(5.4)	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
2.1055 22.355	RSS-132(5.3)	Frequency Stability	< 2.5 ppm (Part 22)		PASS	Section 7.8

**Table 7-1. Summary of Conducted Test Results**



FCC ID: ZNFV30A	 <small>ENGINEERING LABORATORY, INC.</small>	<b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>		<b>Approved by:</b> Quality Manager
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FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5, 26)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.6
2.1053 22.917(a)	RSS-132(5.5)	Undesirable Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) for all out-of-band emissions		PASS	Section 7.7

**Table 7-2. Summary of Radiated 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 (Sections 7.2, 7.3, 7.4, 7.5) 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 "LTE Automation," Version 4.8.
- 5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

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## 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

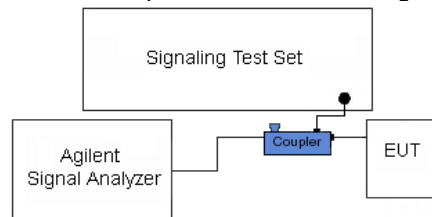
KDB 971168 D01 v03 – Section 4.2

### 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.



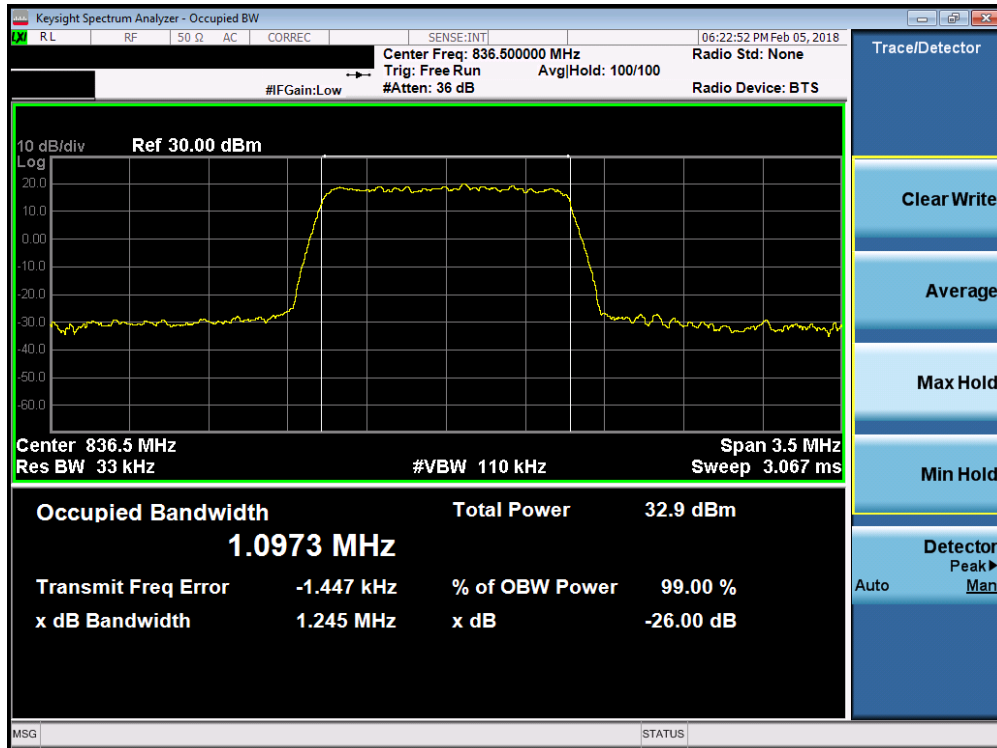
**Figure 7-1. Test Instrument & Measurement Setup**

### Test Notes

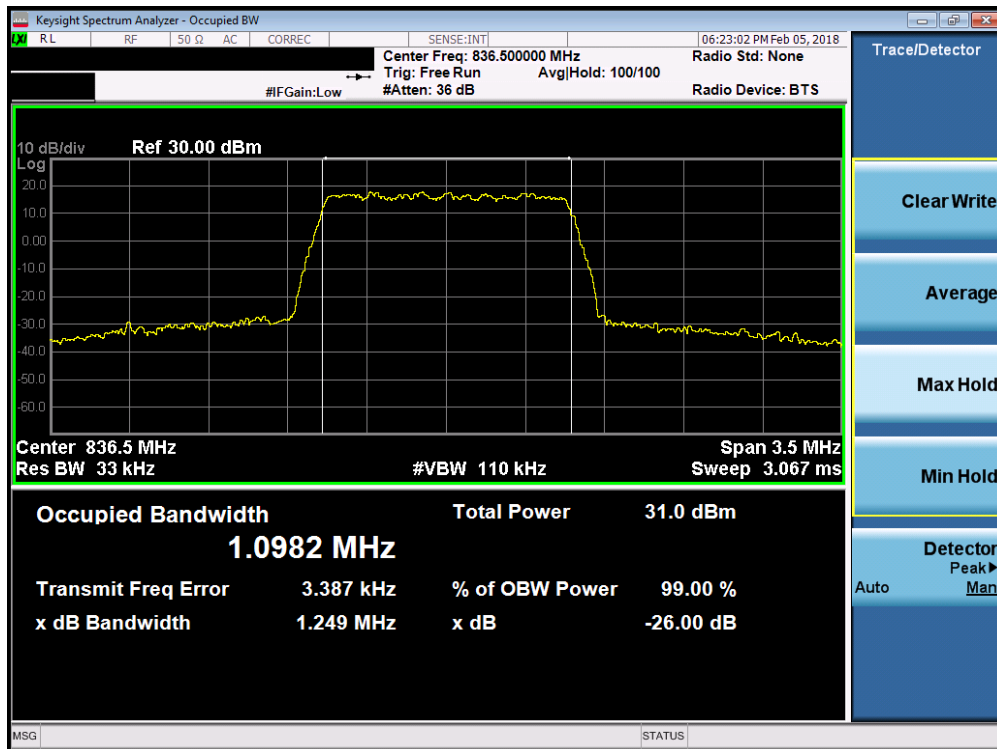
None.

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**Band 26**

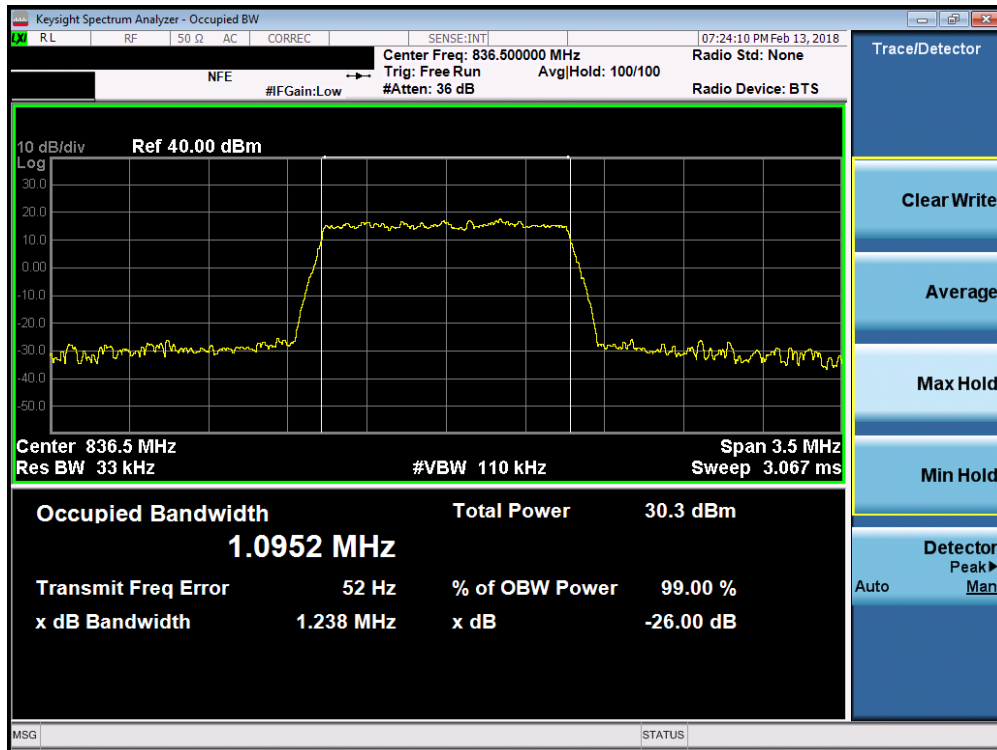


**Plot 7-1. Occupied Bandwidth Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)**

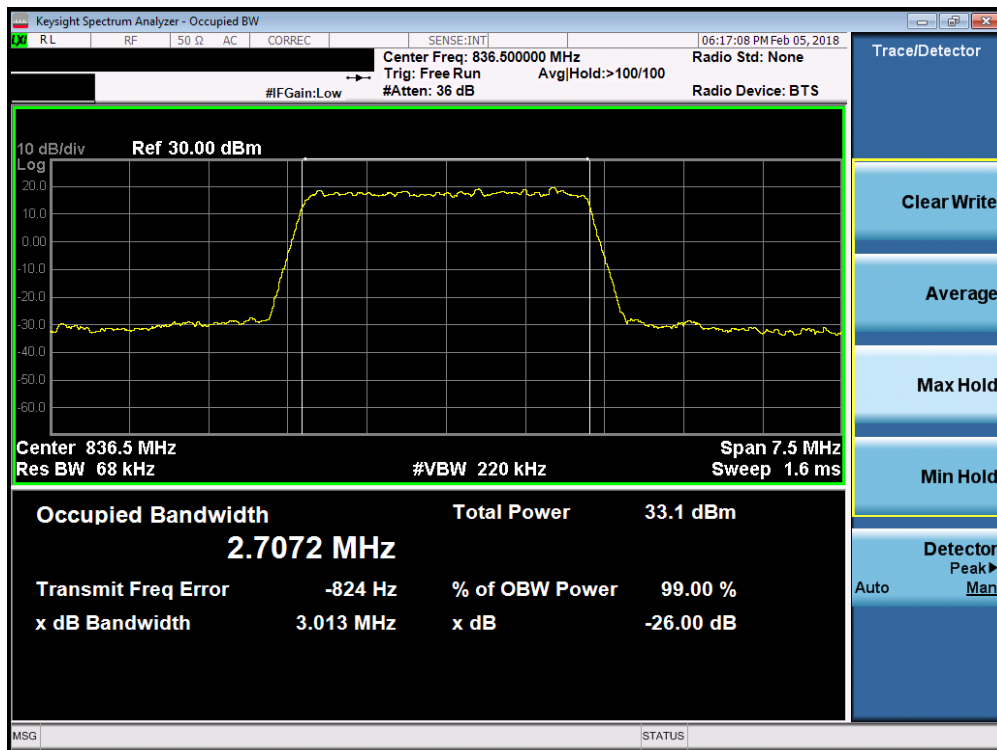


**Plot 7-2. Occupied Bandwidth Plot (Band 26 - 1.4MHz 16-QAM - Full RB Configuration)**

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 14 of 54

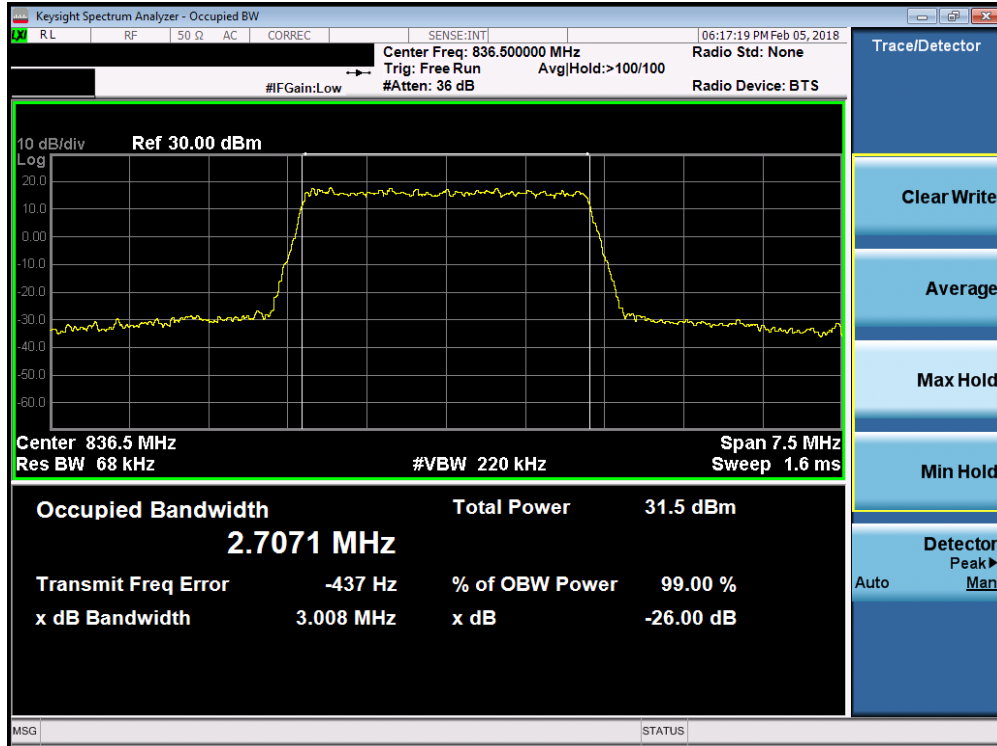


Plot 7-3. Occupied Bandwidth Plot (Band 26 - 1.4MHz 64-QAM - Full RB Configuration)

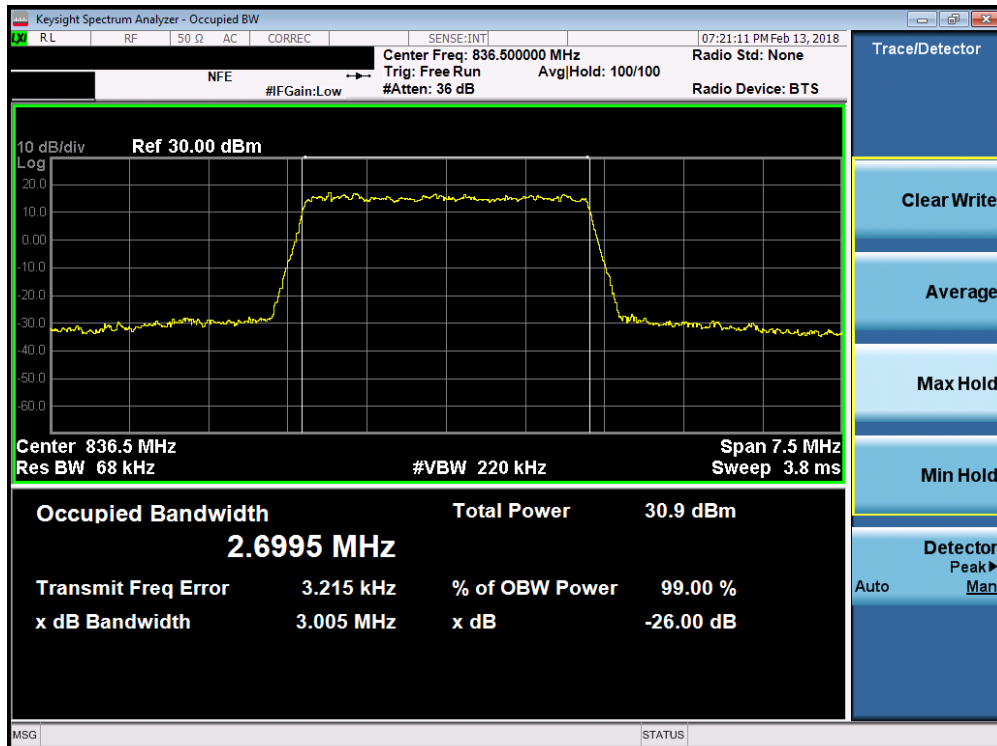


Plot 7-4. Occupied Bandwidth Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 15 of 54



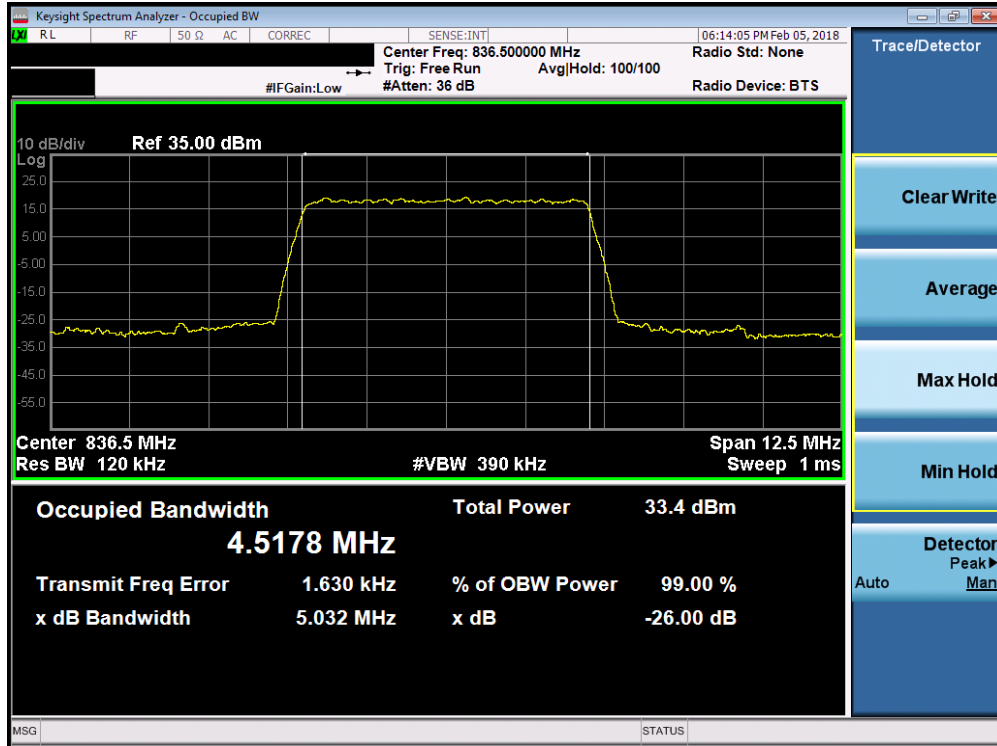
Plot 7-5. Occupied Bandwidth Plot (Band 26 - 3.0MHz 16-QAM - Full RB Configuration)



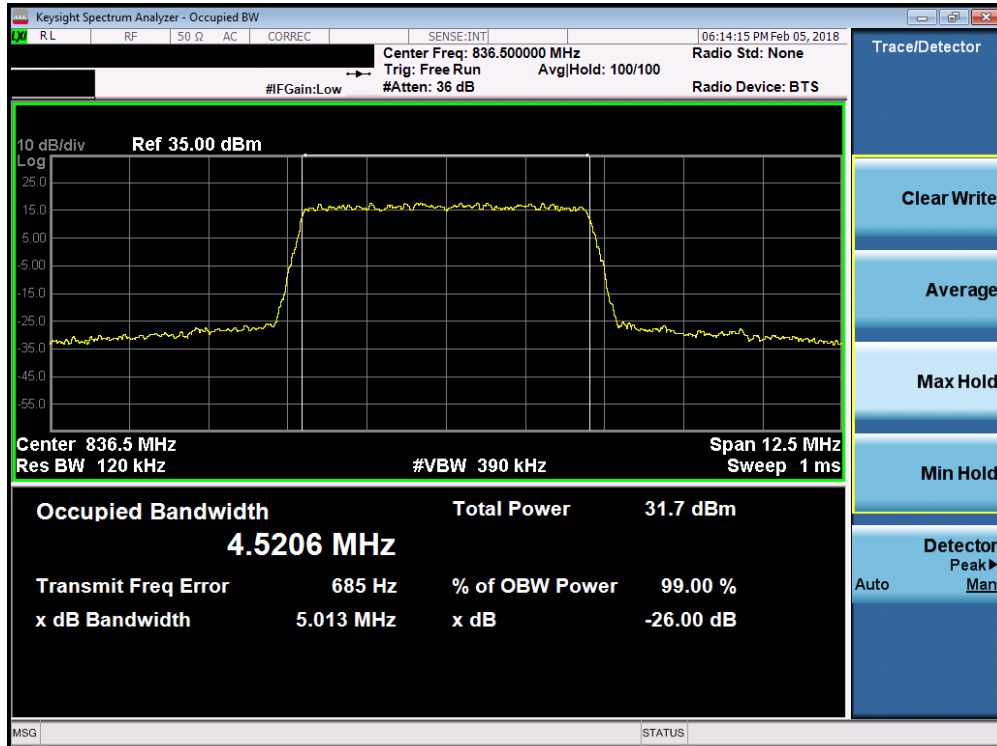
Plot 7-6. Occupied Bandwidth Plot (Band 26 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 16 of 54



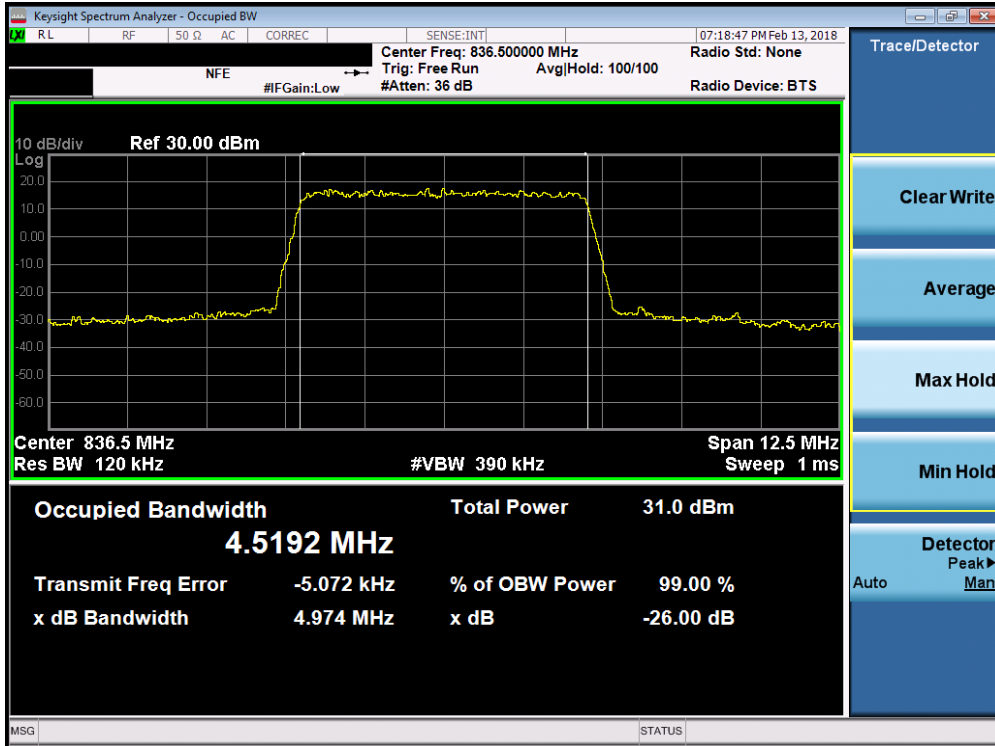


Plot 7-7. Occupied Bandwidth Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)

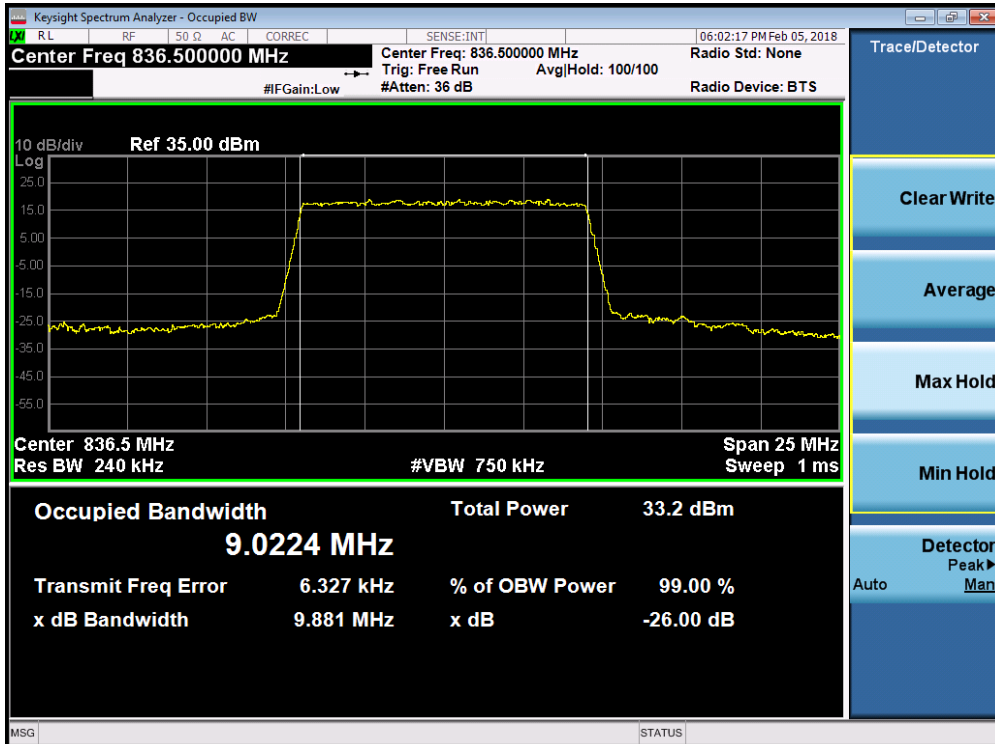


Plot 7-8. Occupied Bandwidth Plot (Band 26 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 17 of 54

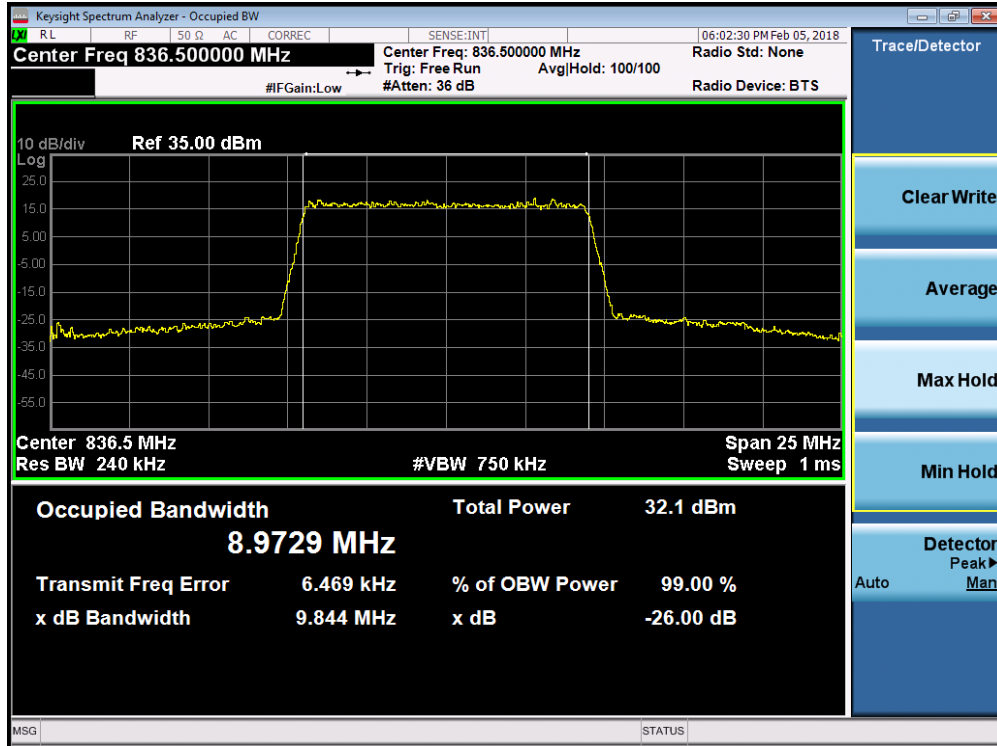


Plot 7-9. Occupied Bandwidth Plot (Band 26 - 5.0MHz 64-QAM - Full RB Configuration)

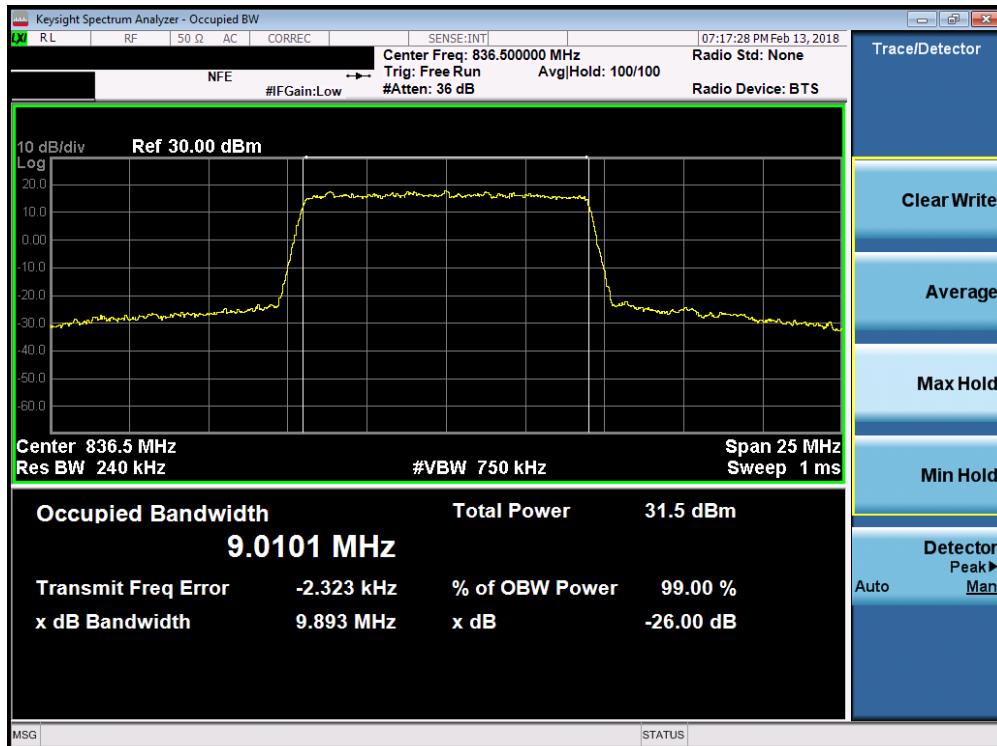


Plot 7-10. Occupied Bandwidth Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 18 of 54

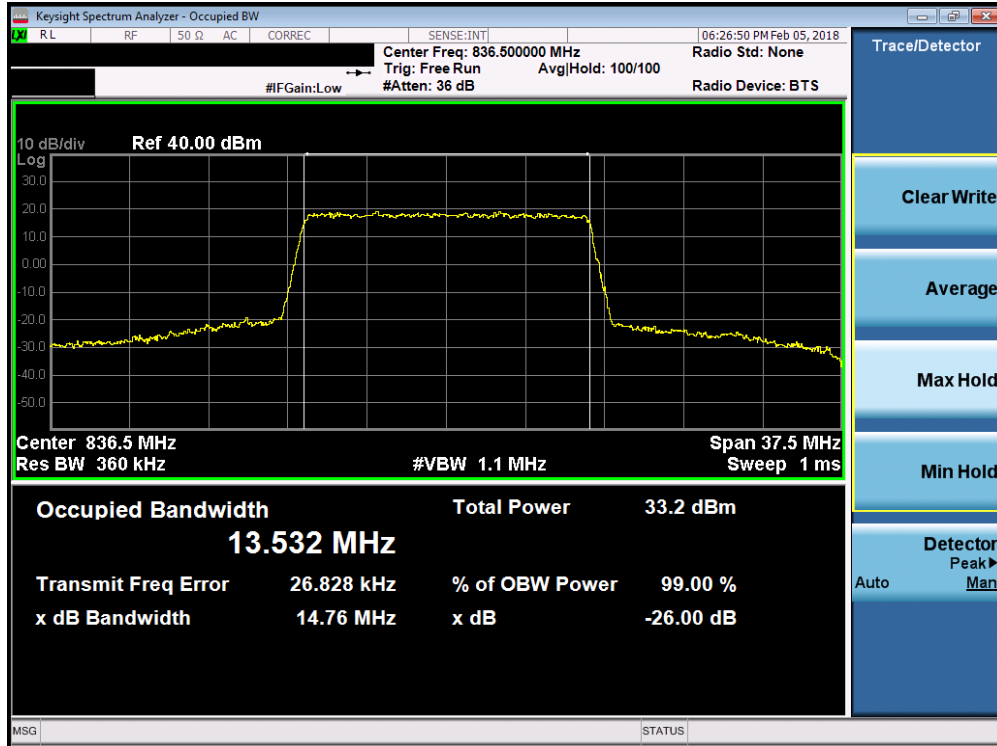


Plot 7-11. Occupied Bandwidth Plot (Band 26 - 10.0MHz 16-QAM - Full RB Configuration)

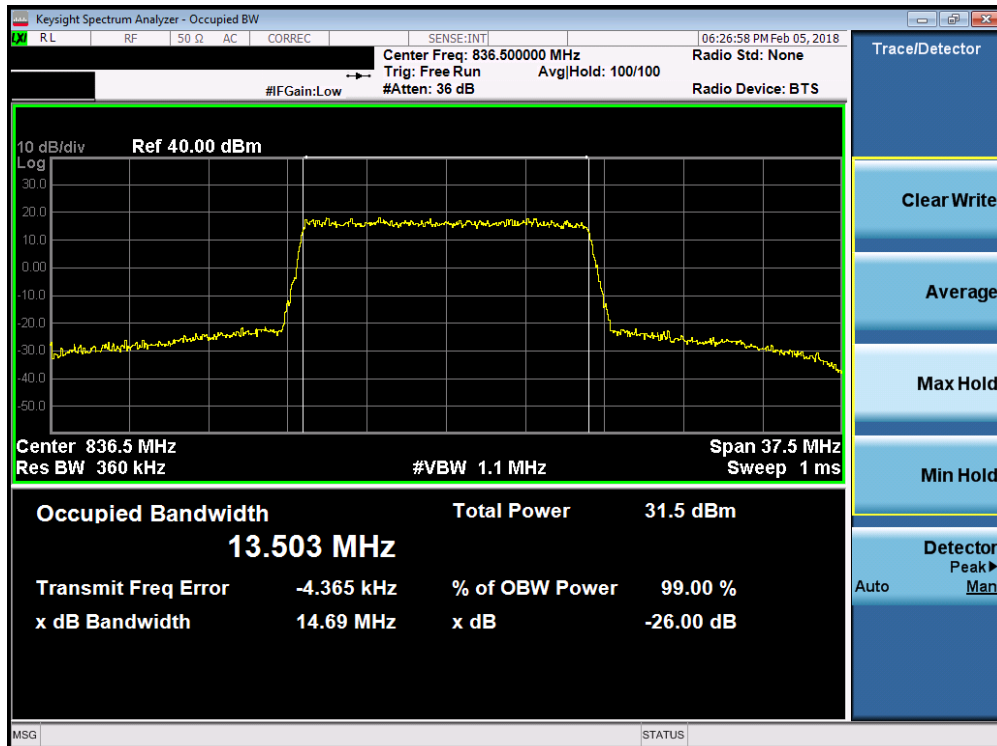


Plot 7-12. Occupied Bandwidth Plot (Band 26 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFV30A	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	<b>MEASUREMENT REPORT</b> (CLASS II PERMISSIVE CHANGE)	<b>LG</b>	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 19 of 54

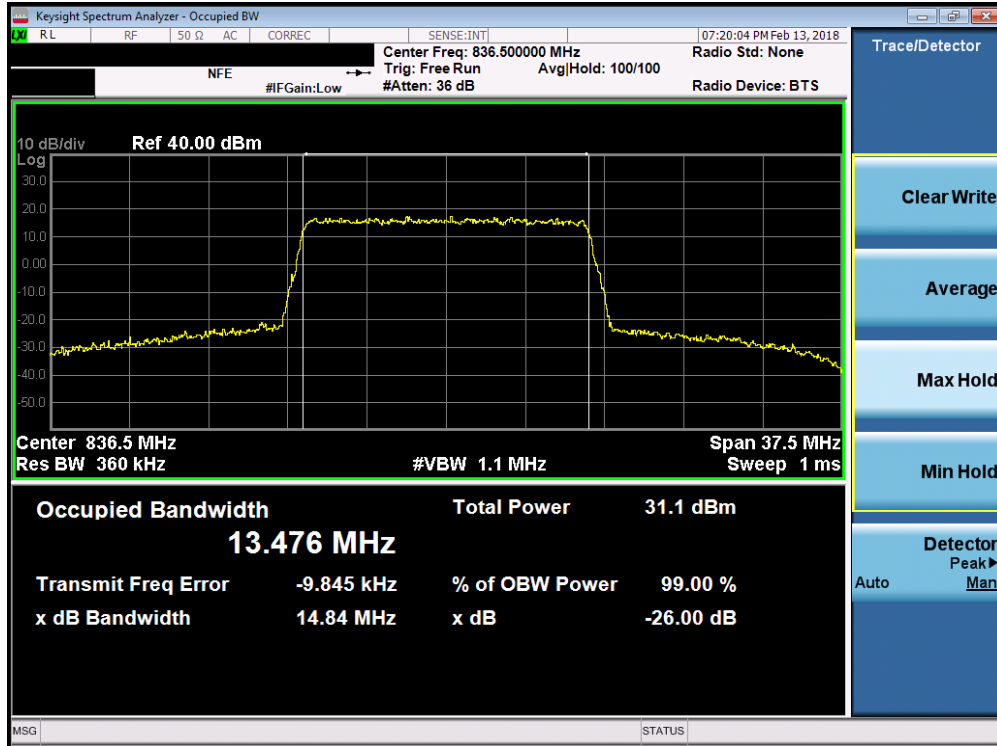


Plot 7-13. Occupied Bandwidth Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)





Plot 7-14. Occupied Bandwidth Plot (Band 26 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFV30A	<b>MEASUREMENT REPORT</b> (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 20 of 54



Plot 7-15. Occupied Bandwidth Plot (Band 26 - 15.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT</b> (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 21 of 54

### 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 10<sup>th</sup> 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 its maximum duty cycle, 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 v03 – Section 6.0

#### Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 \* the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average
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.

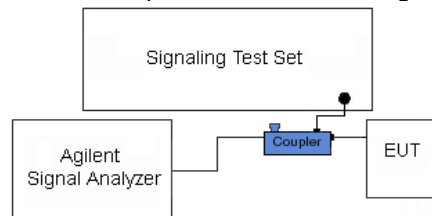




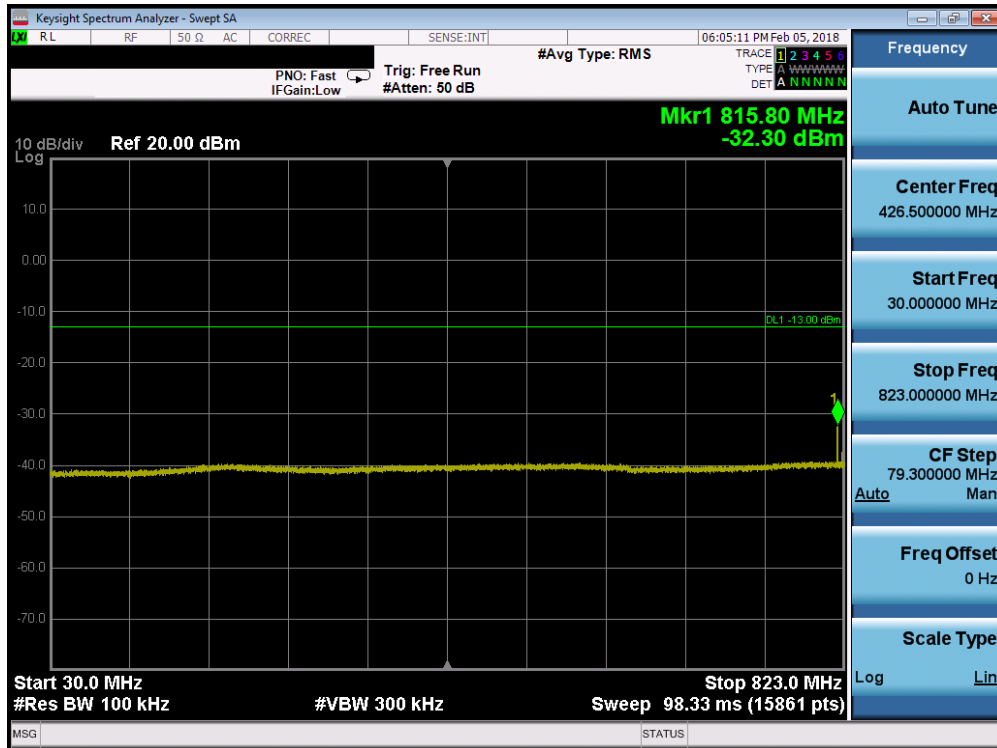
Figure 7-2. Test Instrument & Measurement Setup

#### Test Notes

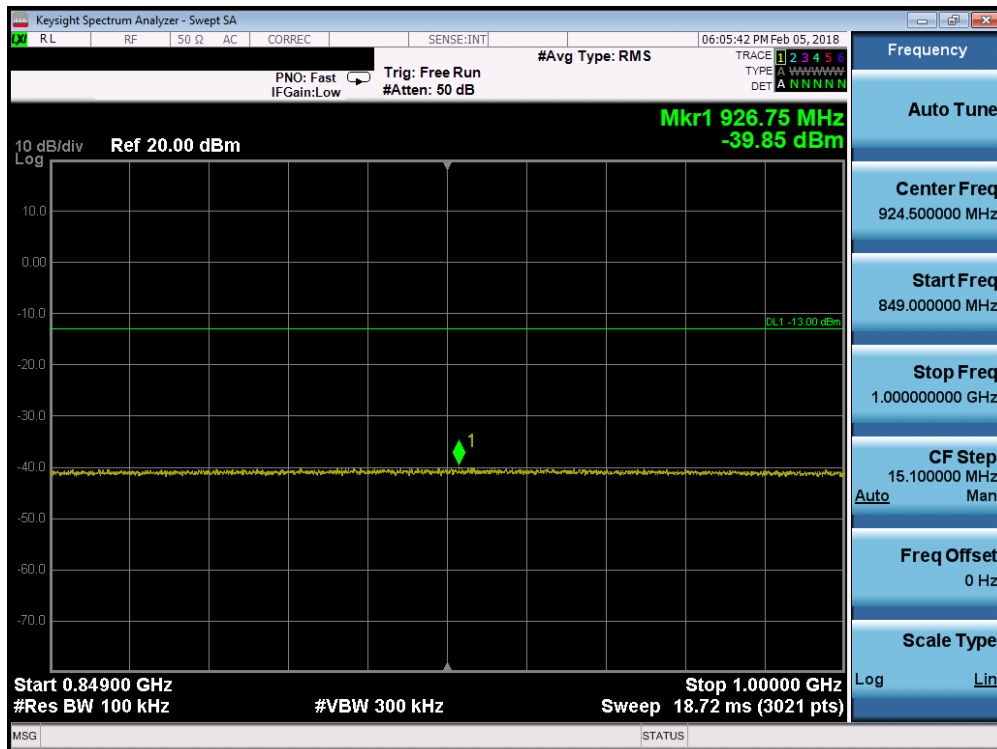
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent 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: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 22 of 54	

**Band 26**

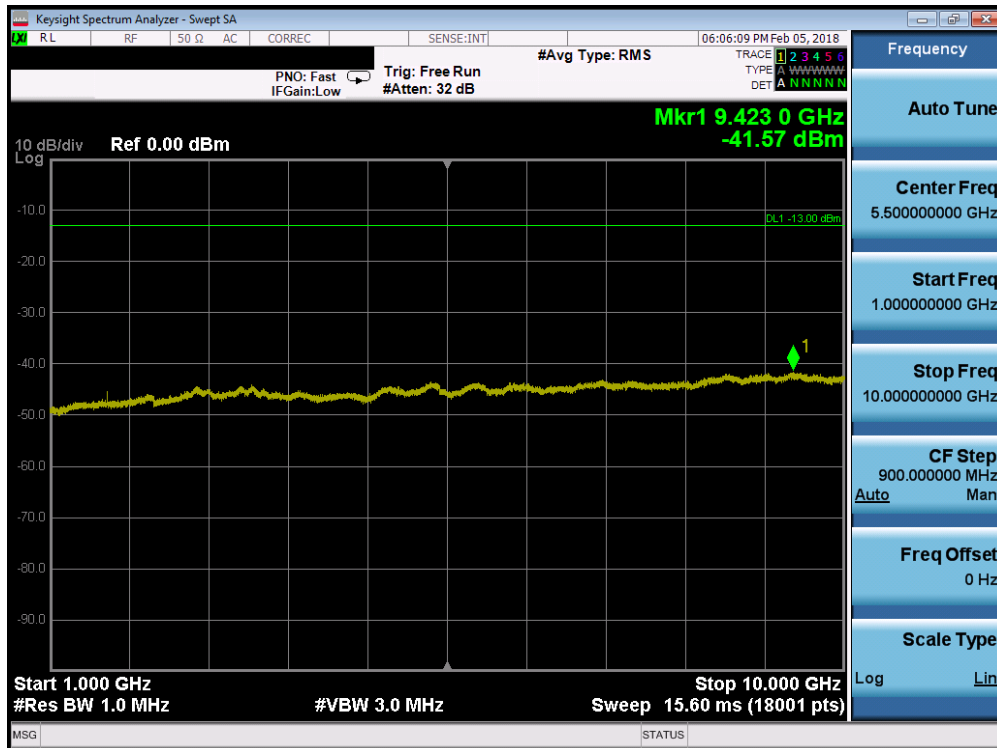


**Plot 7-16. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)**



**Plot 7-17. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)**

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 23 of 54



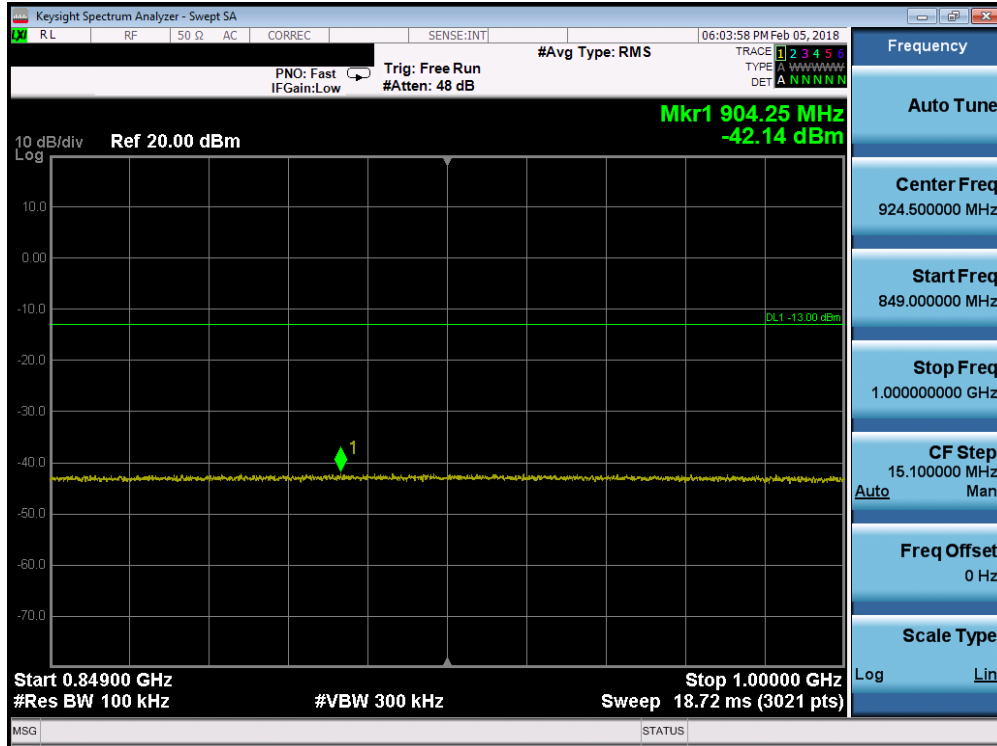
Plot 7-18. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



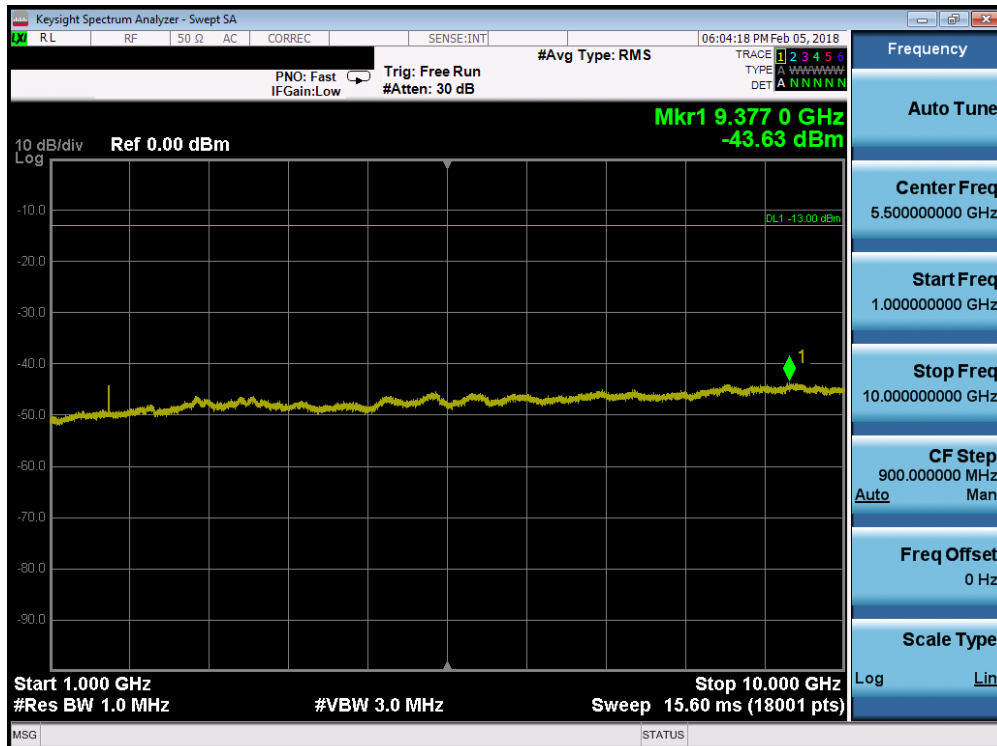
Plot 7-19. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1-ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 24 of 54







Plot 7-20. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

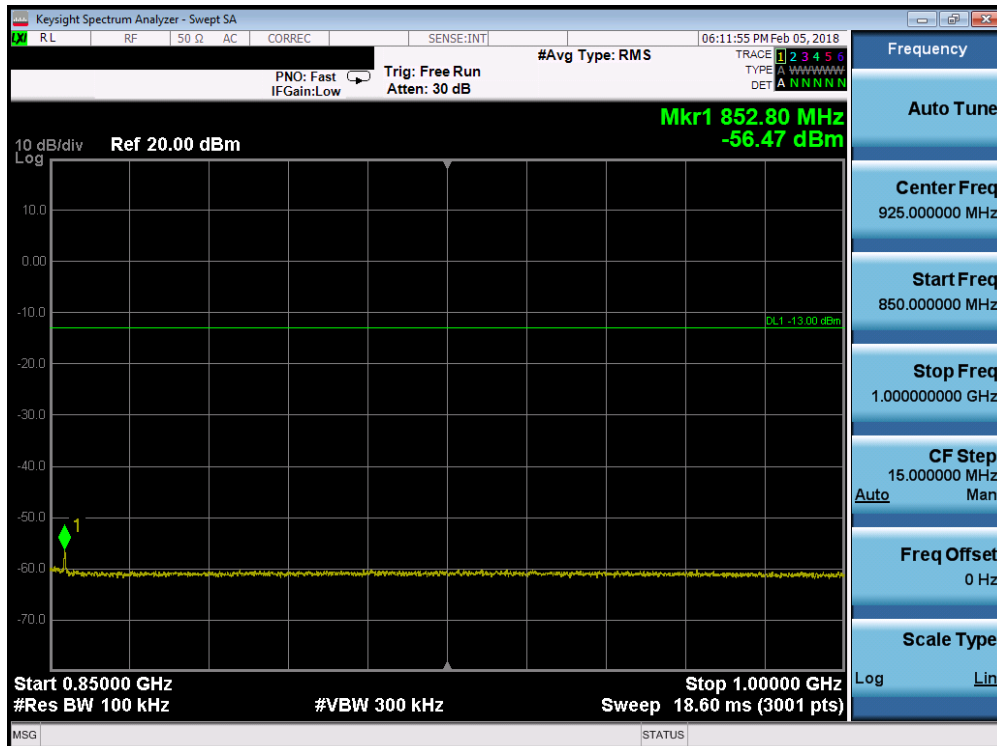


Plot 7-21. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT</b> (CLASS II PERMISSIVE CHANGE) 		Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset	Page 25 of 54

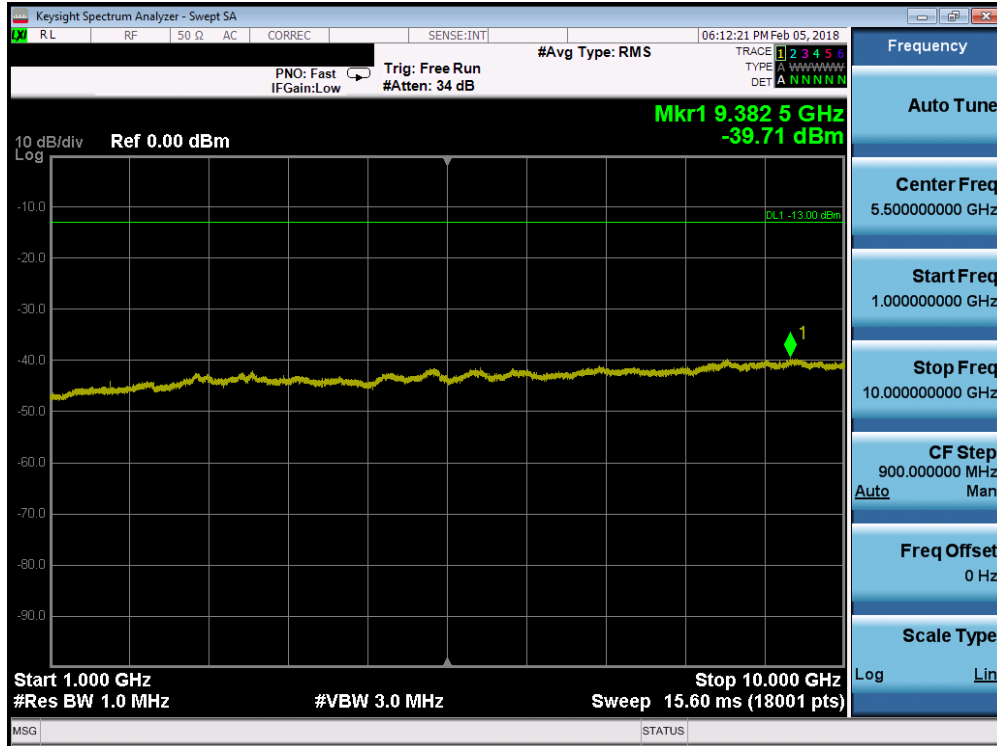


Plot 7-22. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)





Plot 7-23. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 26 of 54



Plot 7-24. Conducted Spurious Plot (Band 26 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1-ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 27 of 54	

## 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 its maximum duty cycle, 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 v03 – 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 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq$  2 x Span/RBW
7. Trace mode = trace average
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.

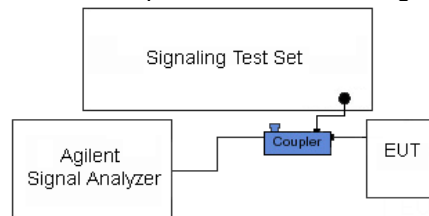




Figure 7-3. Test Instrument & Measurement Setup

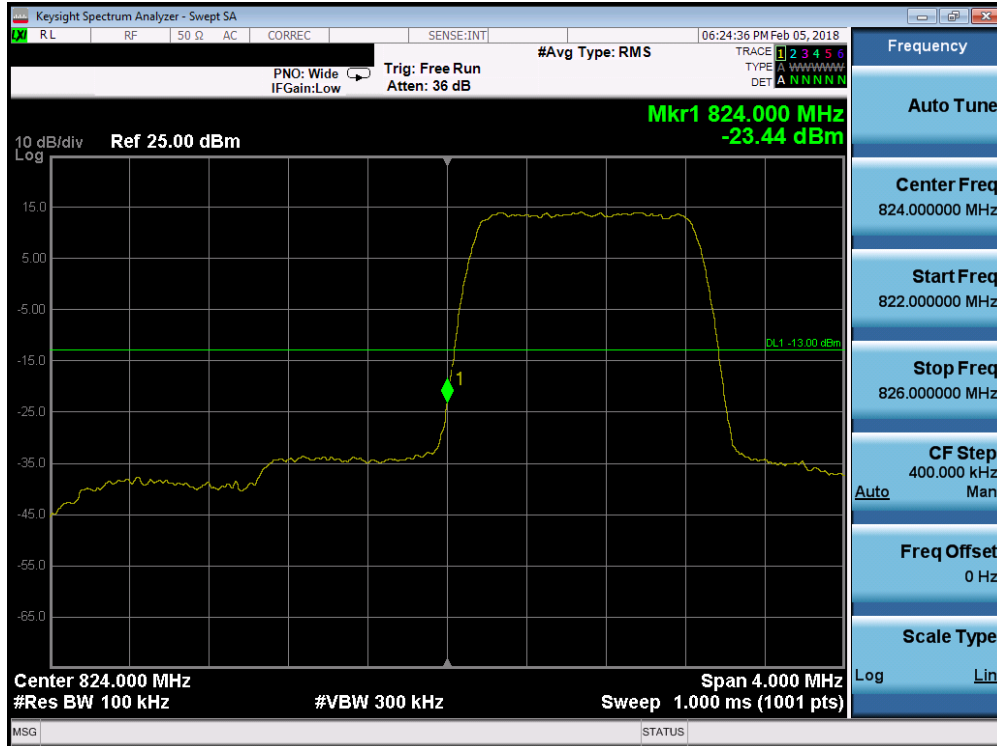
FCC ID: ZNFV30A		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1-ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 28 of 54

### Test Notes

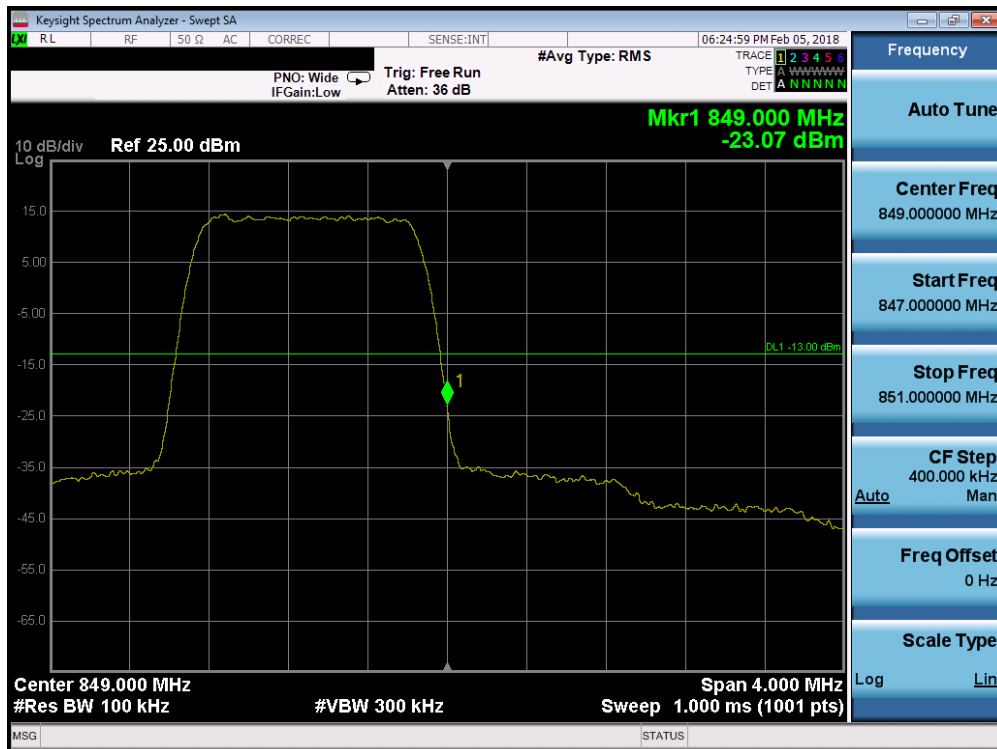
Per 22.917(b) RSS-132(5.5) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. 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: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>		 <b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 29 of 54

**Band 26**

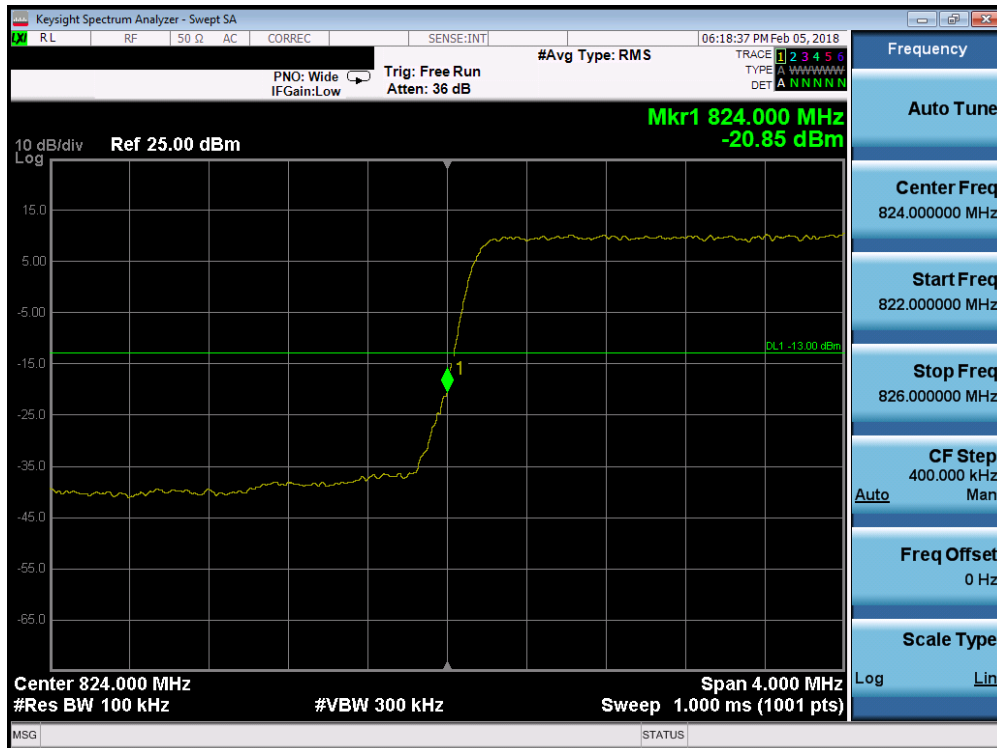


**Plot 7-25. Lower Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)**

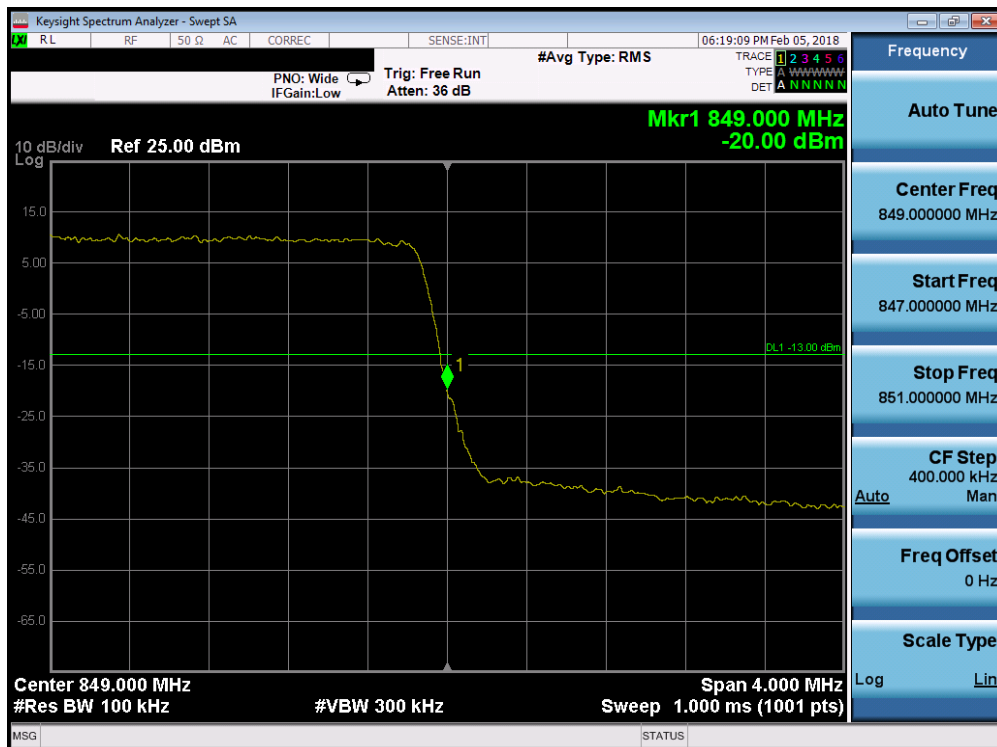


**Plot 7-26. Upper Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)**

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 30 of 54

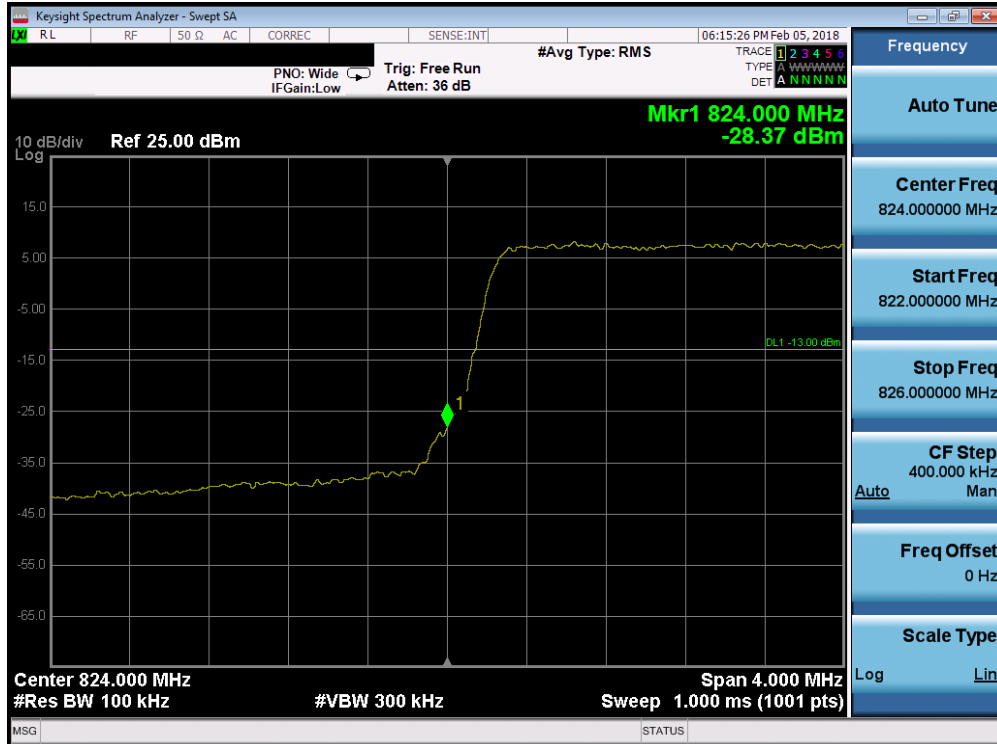


Plot 7-27. Lower Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-28. Upper Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 31 of 54



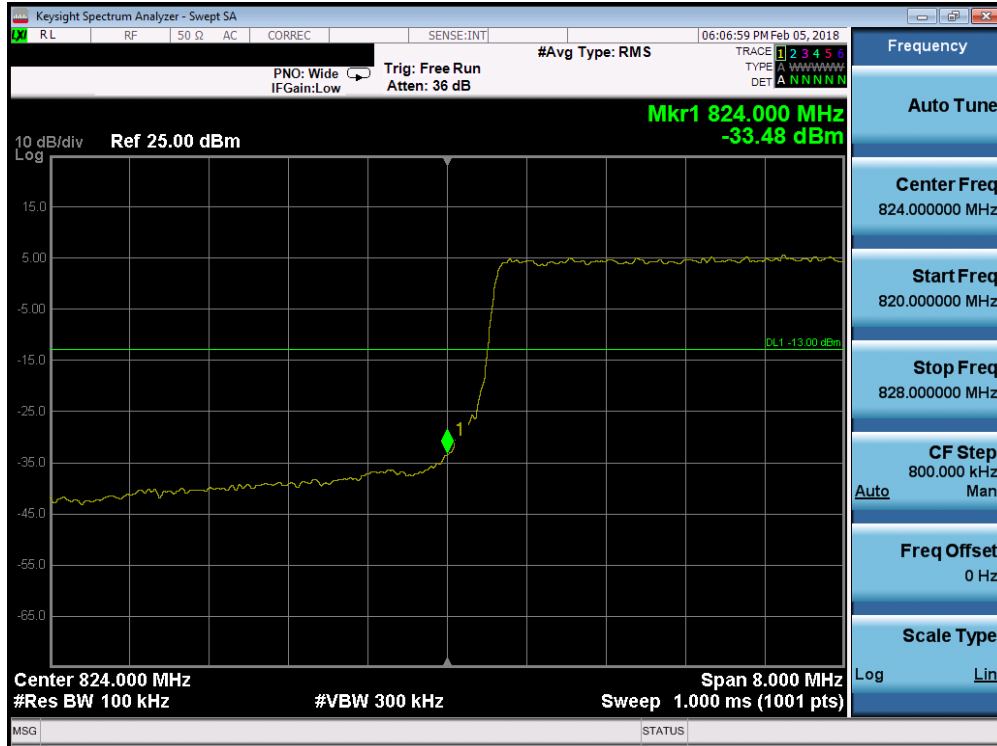
Plot 7-29. Lower Band Edge Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-30. Upper Band Edge Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 32 of 54



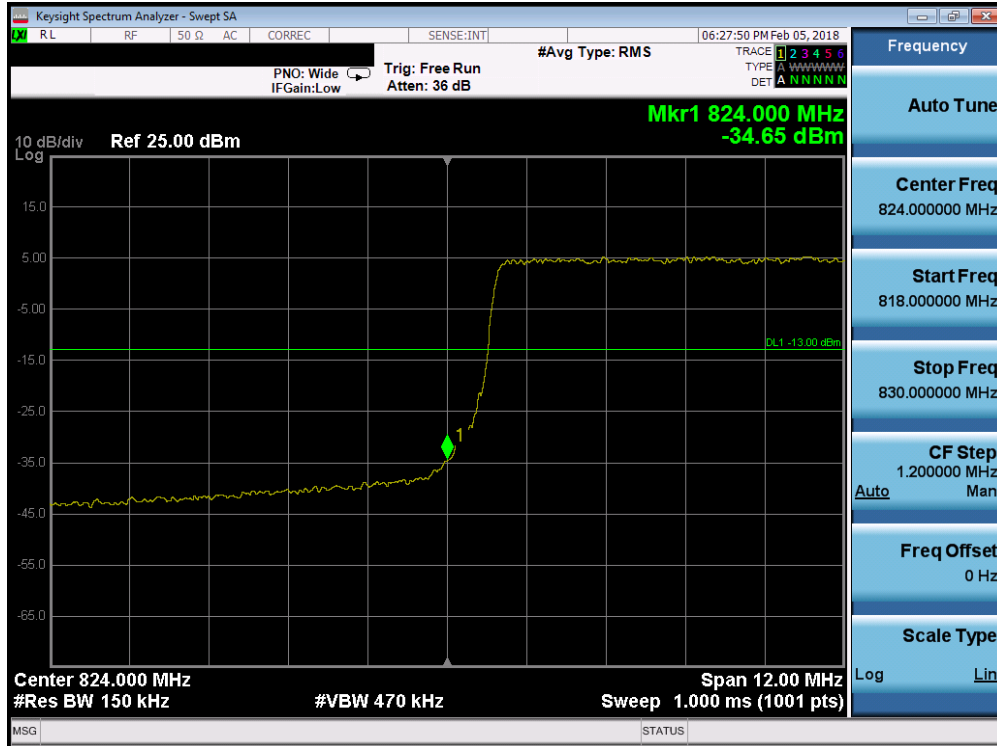


Plot 7-31. Lower Band Edge Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-32. Upper Band Edge Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 33 of 54



Plot 7-33. Lower Band Edge Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-34. Upper Band Edge Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 34 of 54

## 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

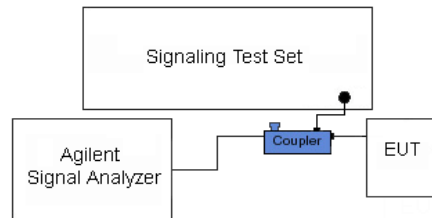
KDB 971168 D01 v03 – Section 5.7.1

### 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.

### Test Setup

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



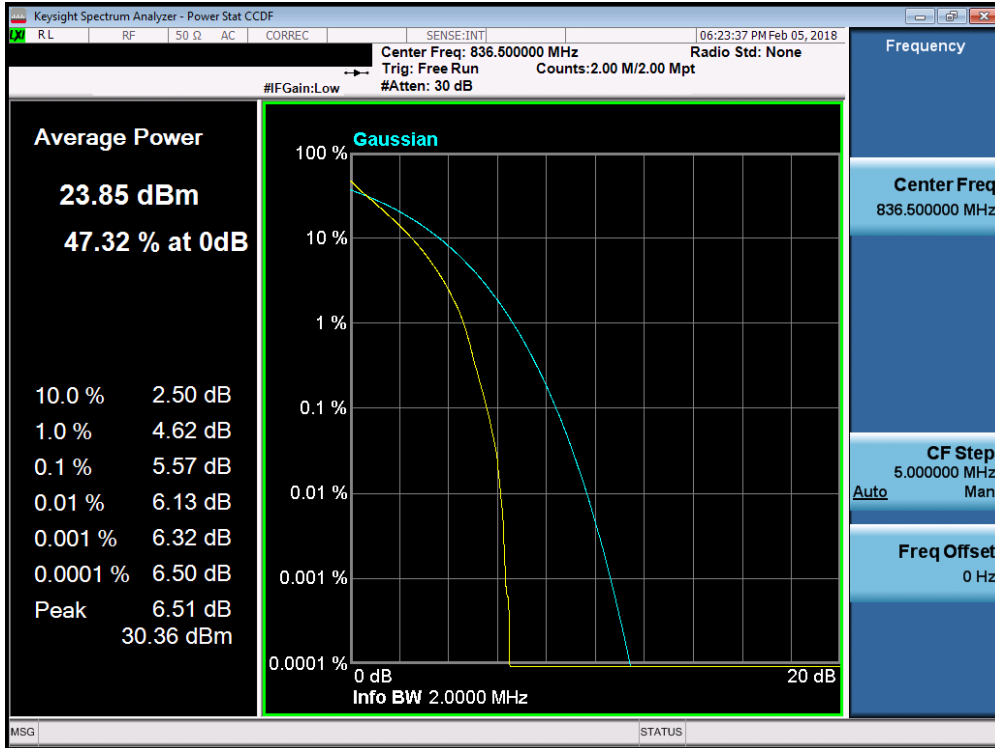
**Figure 7-4. Test Instrument & Measurement Setup**

### Test Notes

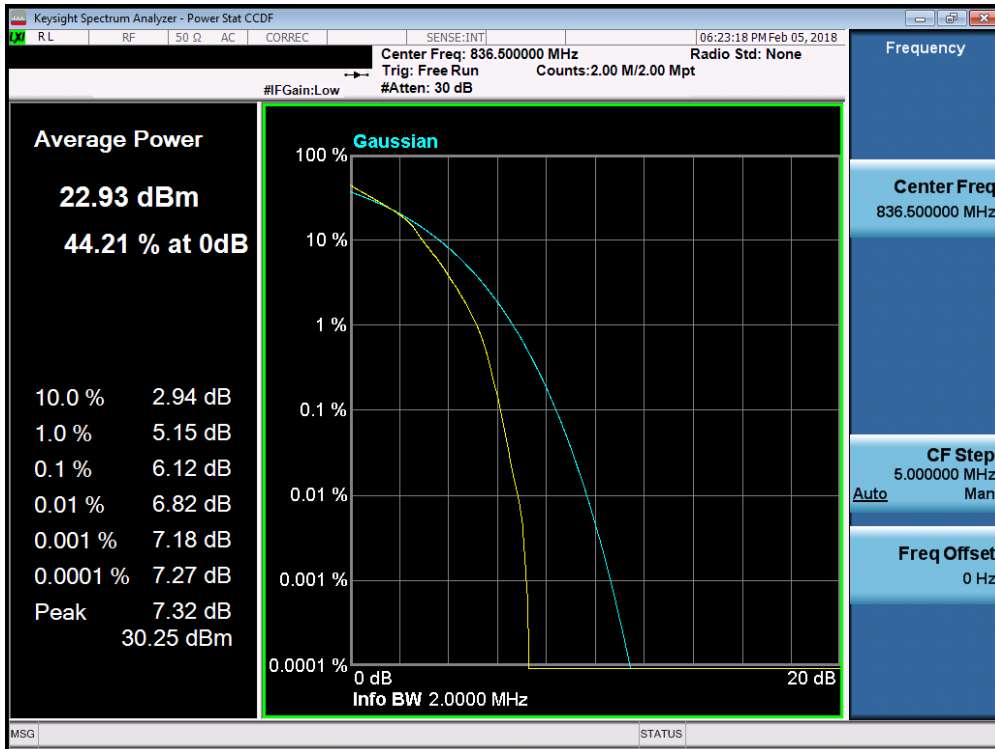
None.

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 35 of 54	

**Band 26**

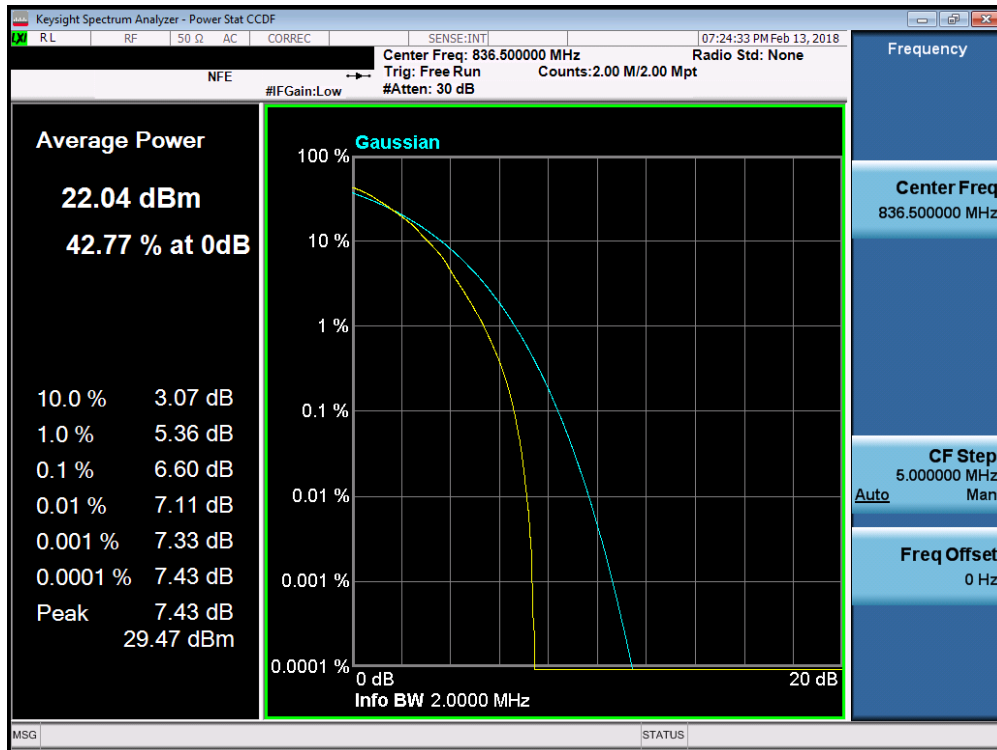


**Plot 7-35. PAR Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)**

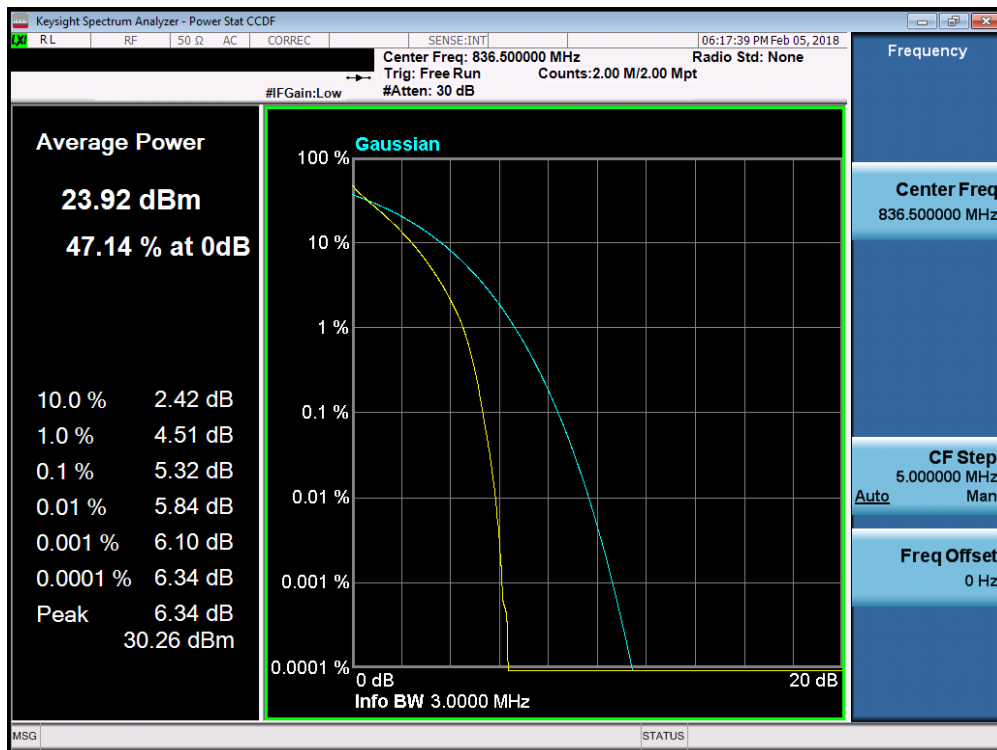


**Plot 7-36. PAR Plot (Band 26 - 1.4MHz 16-QAM - Full RB Configuration)**

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 36 of 54

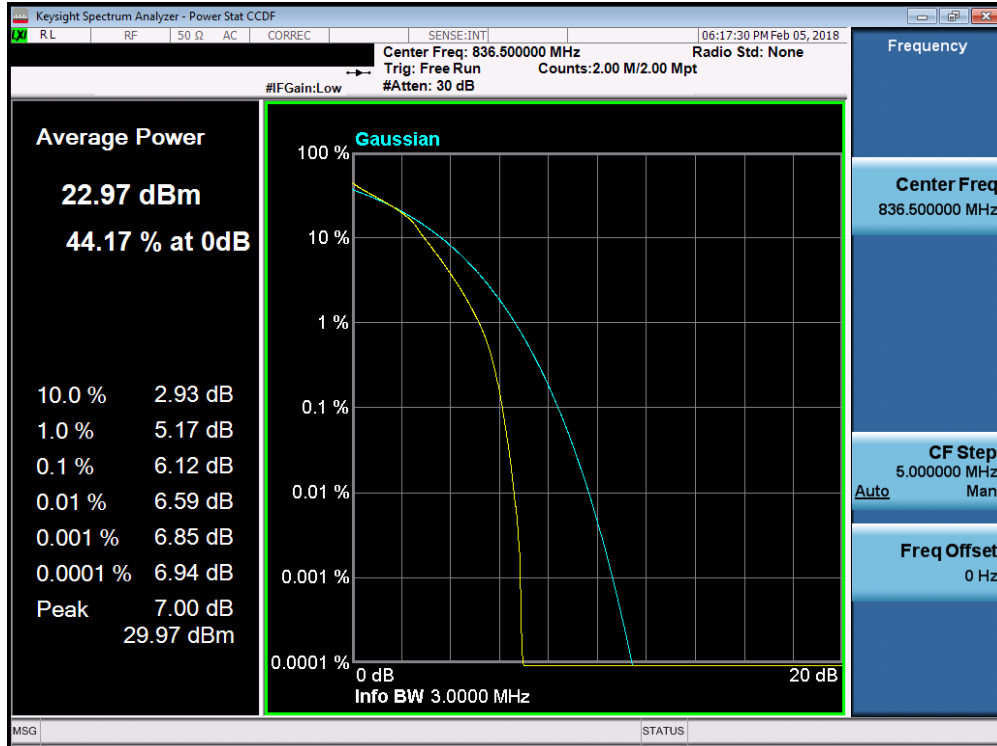


Plot 7-37. PAR Plot (Band 26 - 1.4MHz 64-QAM - Full RB Configuration)

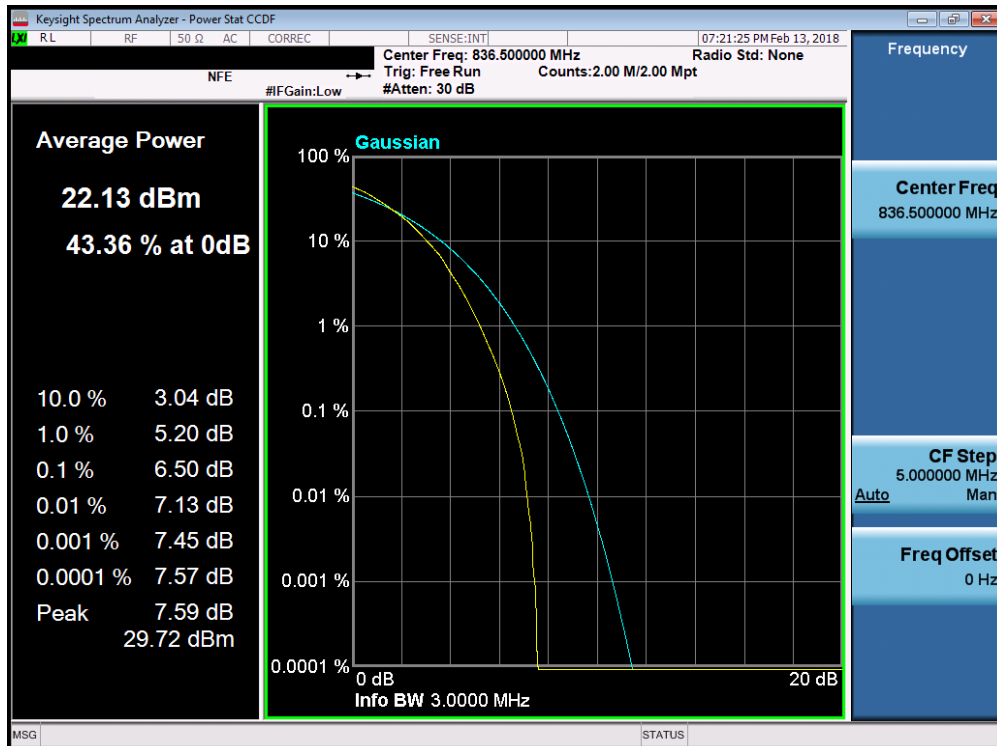


Plot 7-38. PAR Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 37 of 54

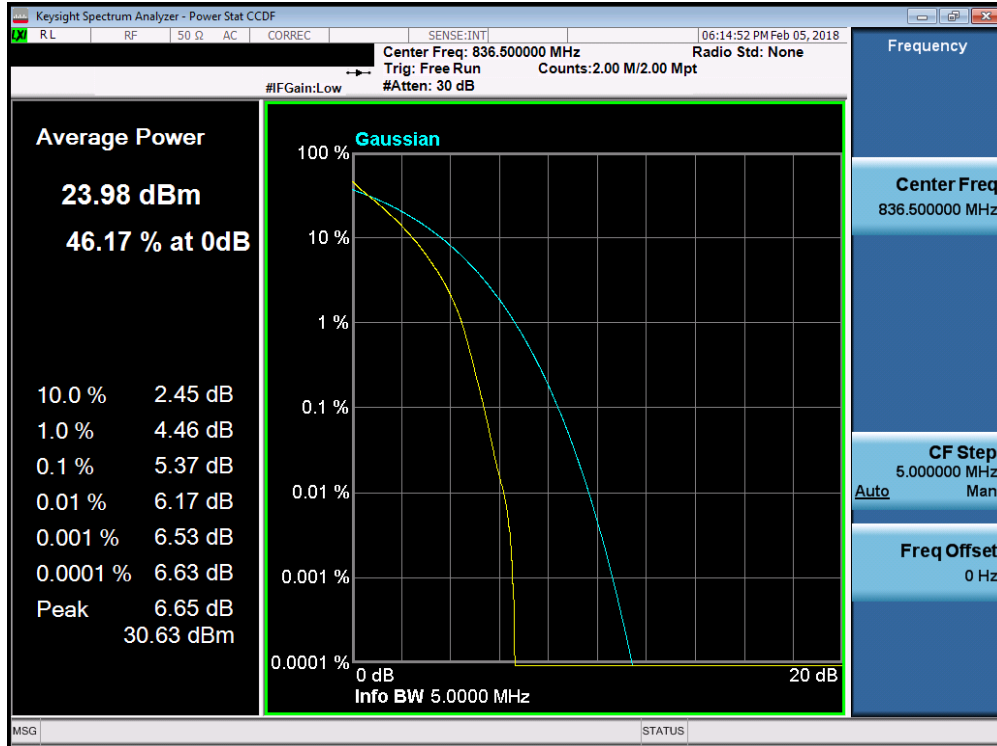


Plot 7-39. PAR Plot (Band 26 - 3.0MHz 16-QAM - Full RB Configuration)

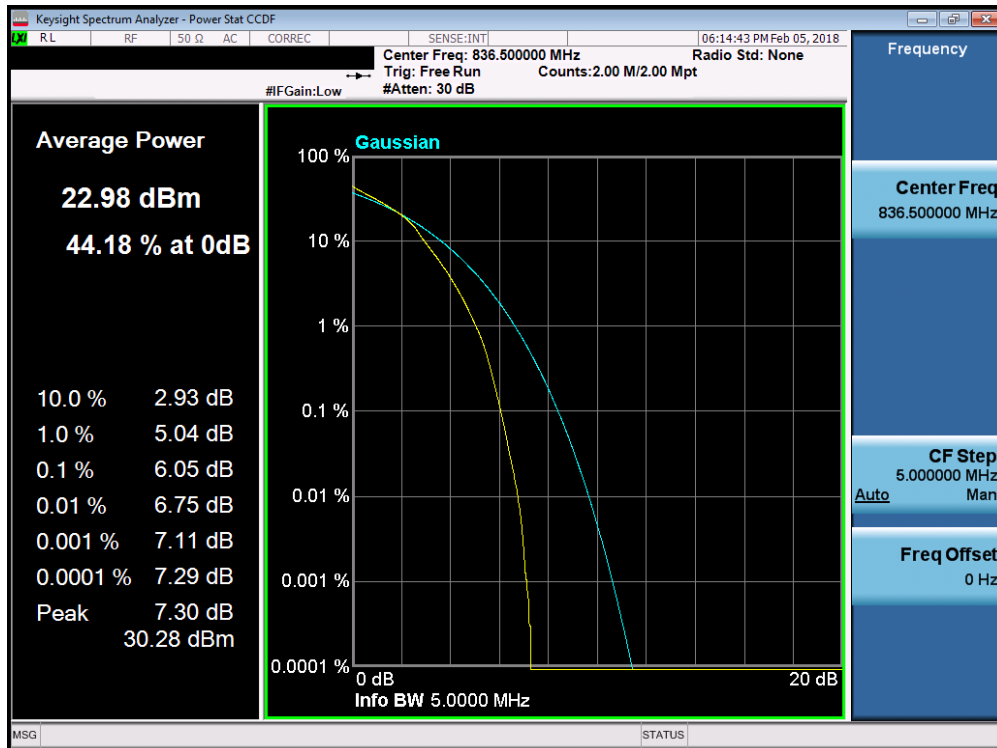


Plot 7-40. PAR Plot (Band 26 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 38 of 54

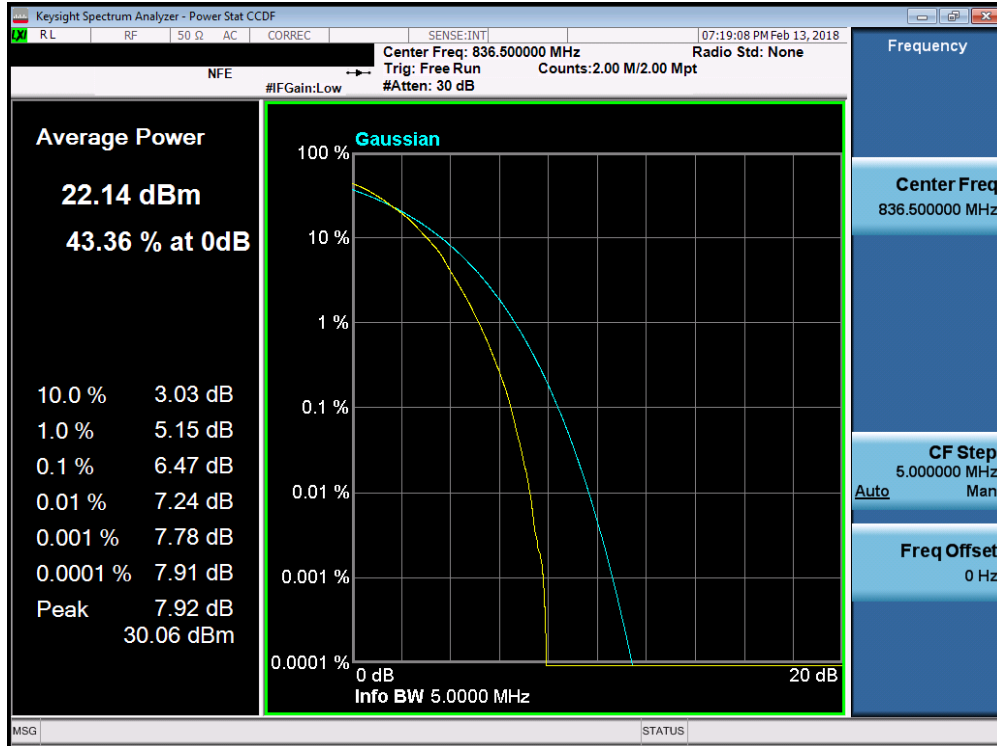


Plot 7-41. PAR Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)

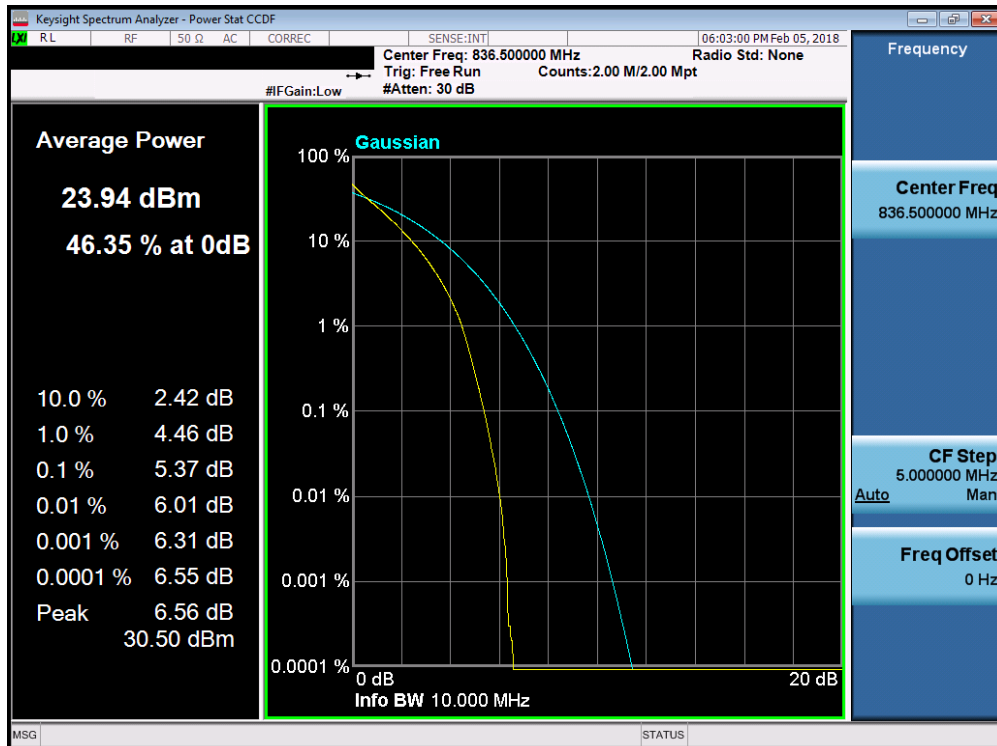


Plot 7-42. PAR Plot (Band 26 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 39 of 54



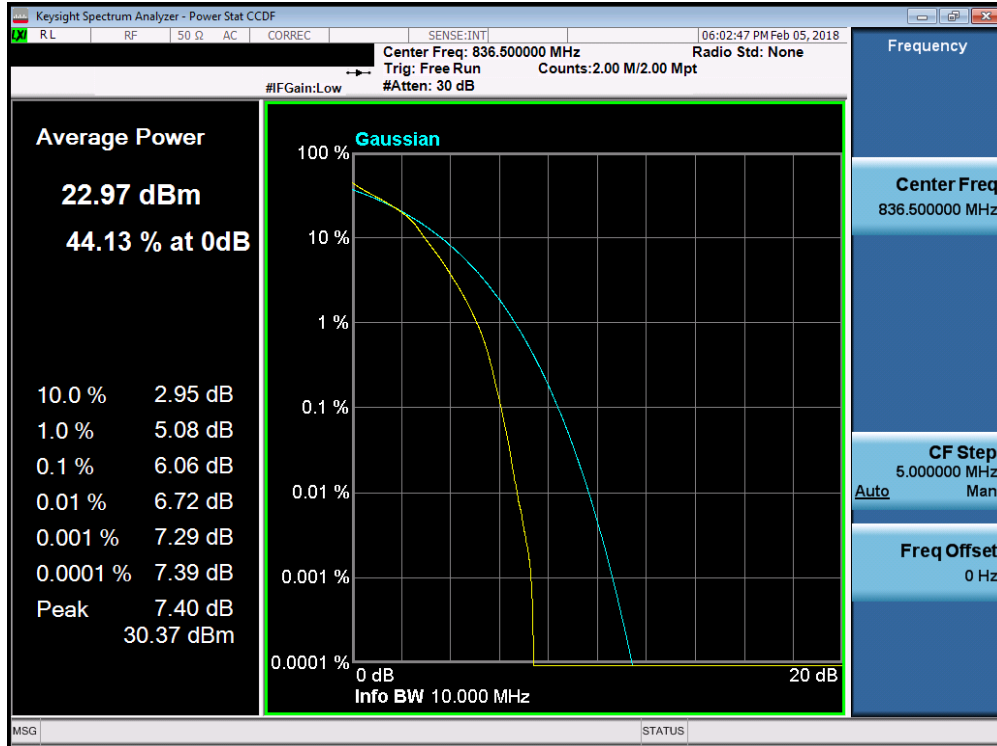
Plot 7-43. PAR Plot (Band 26 - 5.0MHz 64-QAM - Full RB Configuration)



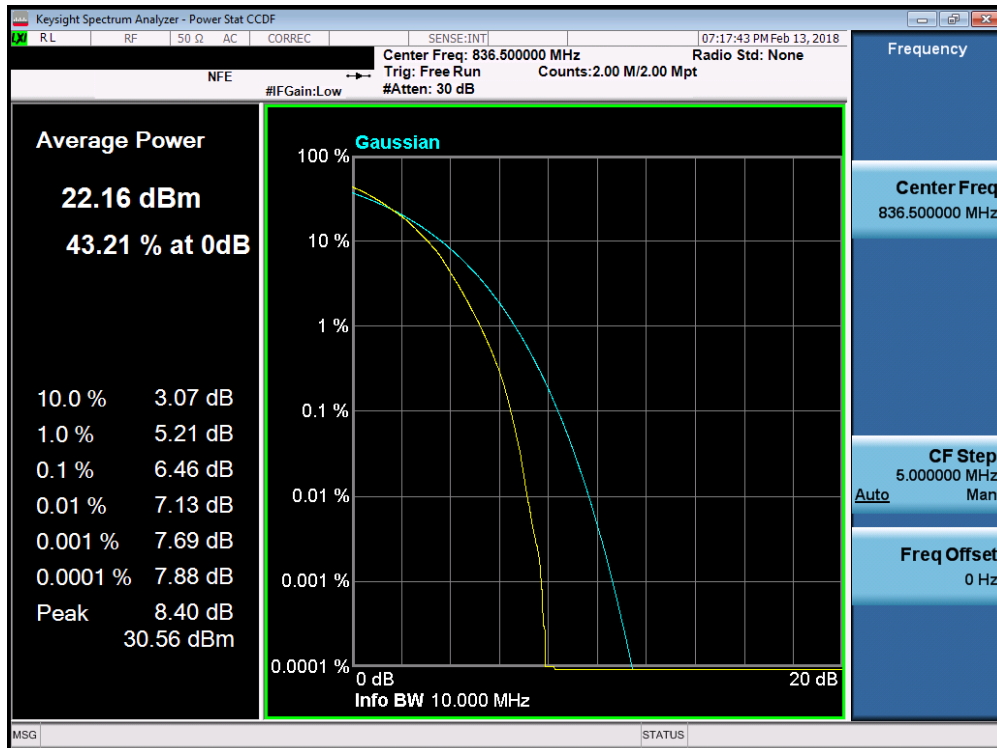
Plot 7-44. PAR Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 40 of 54



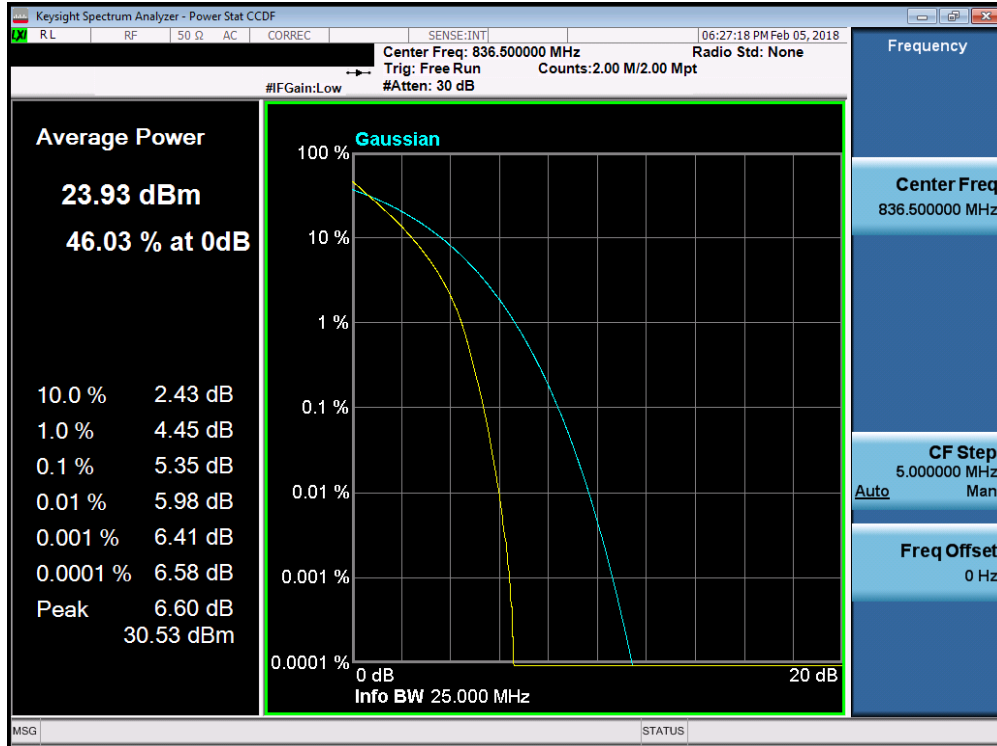


Plot 7-45. PAR Plot (Band 26 - 10.0MHz 16-QAM - Full RB Configuration)

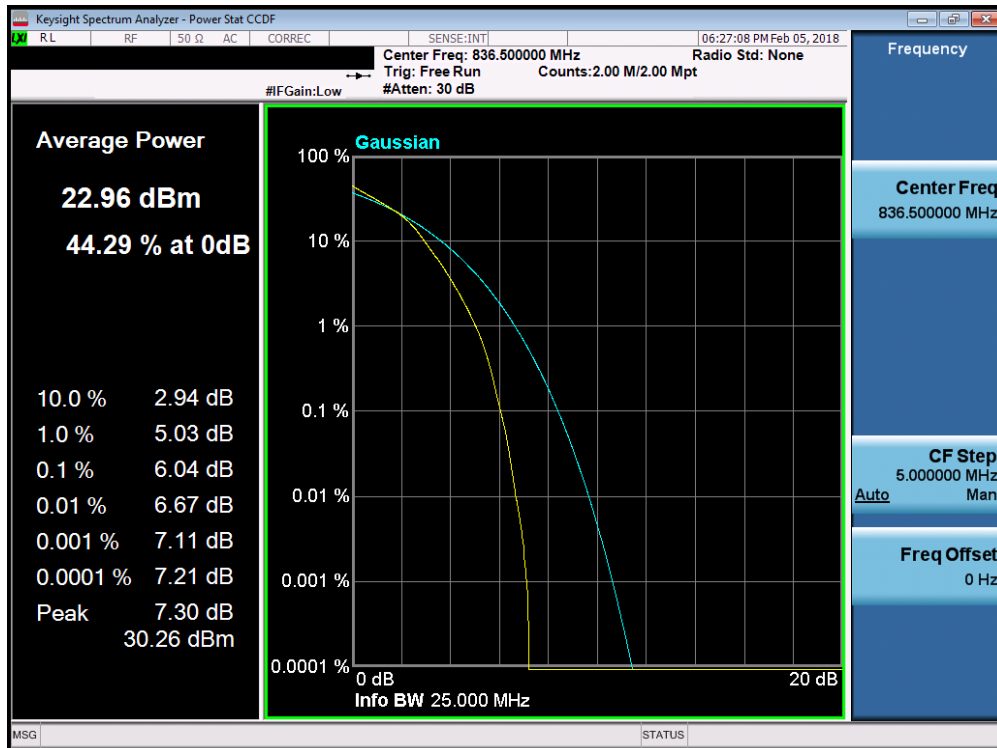


Plot 7-46. PAR Plot (Band 26 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 41 of 54

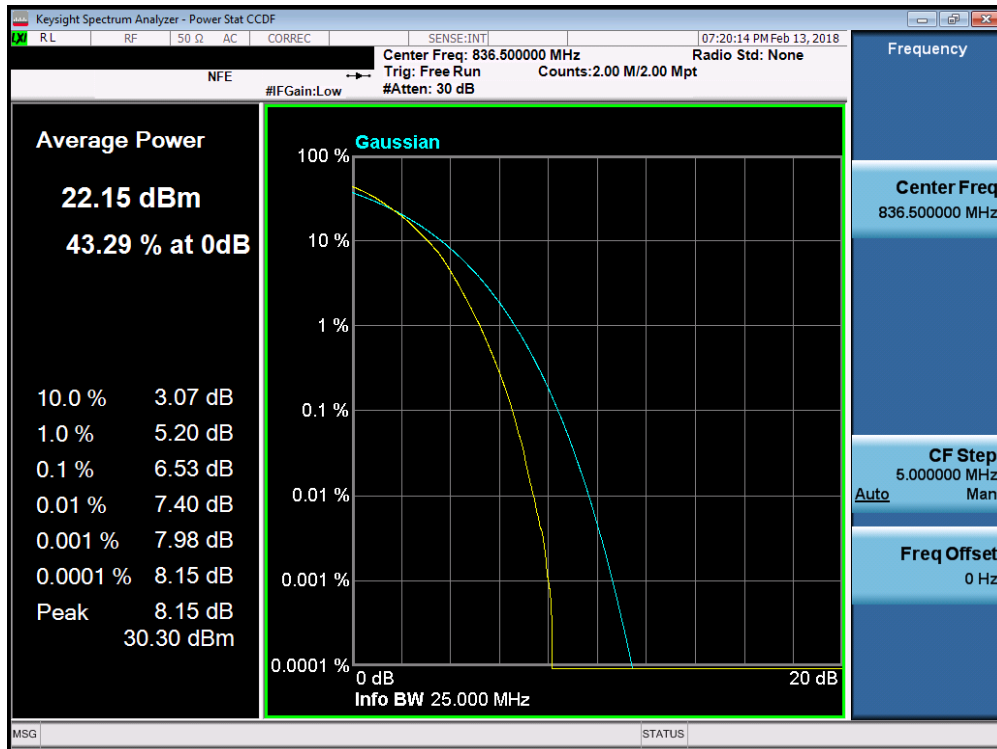


**Plot 7-47. PAR Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)**



**Plot 7-48. PAR Plot (Band 26 - 15.0MHz 16-QAM - Full RB Configuration)**

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 42 of 54



**Plot 7-49. PAR Plot (Band 26 - 15.0MHz 64-QAM - Full RB Configuration)**

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 43 of 54

## 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 its maximum duty cycle, at maximum power, and at the appropriate frequencies.

### Test Procedures Used

KDB 971168 D01 v03 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

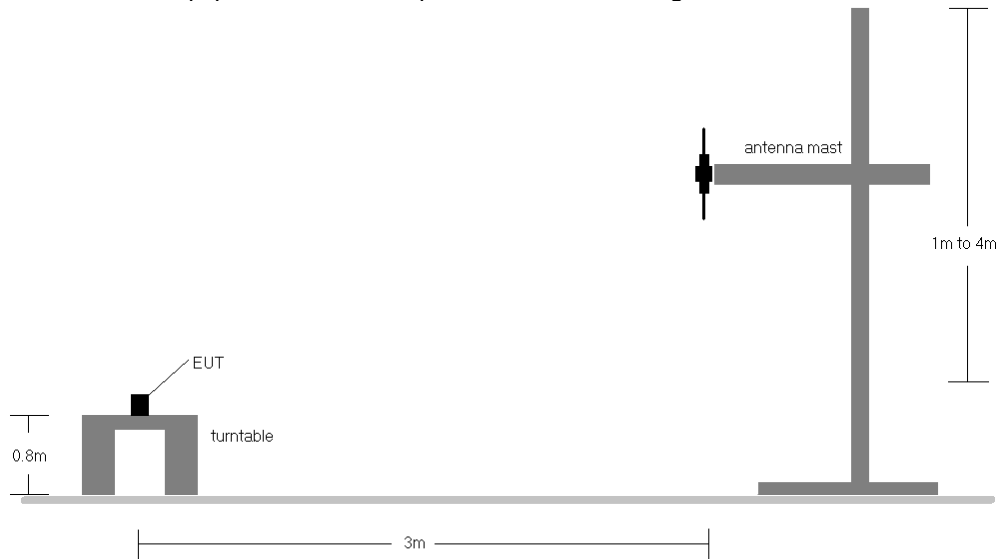
### Test Settings

1. Radiated power measurements are performed using the signal analyzer’s “channel power” measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW  $\geq$  3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points  $\geq$  2 x span / RBW
6. Detector = RMS
7. Trigger is set to “free run” for signals with continuous operation with the sweep times set to “auto”.
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

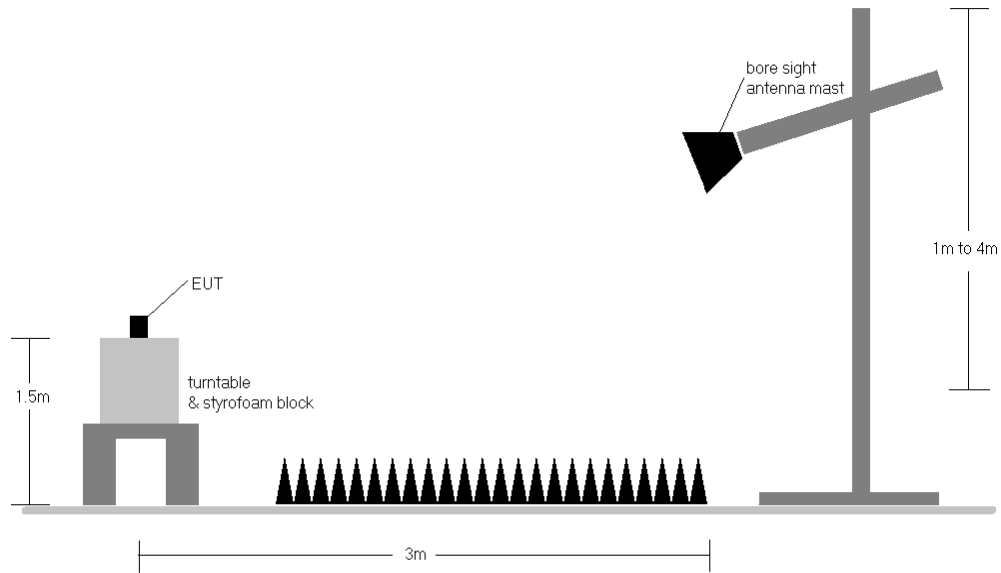
FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 44 of 54	

**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**



**Test Notes**

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 45 of 54

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	150	183	1 / 5	16.95	1.50	16.30	38.45	-22.15	18.45	40.61	-22.16
836.50	1.4	QPSK	H	150	158	1 / 5	17.18	1.50	<b>16.53</b>	38.45	-21.92	<b>18.68</b>	40.61	-21.93
848.30	1.4	QPSK	H	150	181	1 / 5	16.69	1.50	16.04	38.45	-22.41	18.19	40.61	-22.42
836.50	1.4	16-QAM	H	150	158	1 / 5	15.55	1.50	<b>14.90</b>	38.45	-23.55	<b>17.05</b>	40.61	-23.56
836.50	1.4	64-QAM	H	150	158	1 / 5	14.54	1.50	<b>13.89</b>	38.45	-24.56	<b>16.04</b>	40.61	-24.57
825.50	3	QPSK	H	150	182	1 / 0	17.23	1.50	16.58	38.45	-21.87	18.73	40.61	-21.88
836.50	3	QPSK	H	150	181	1 / 0	17.43	1.50	<b>16.78</b>	38.45	-21.67	<b>18.93</b>	40.61	-21.68
847.50	3	QPSK	H	150	180	1 / 0	17.01	1.50	16.36	38.45	-22.09	18.51	40.61	-22.10
836.50	3	16-QAM	H	150	181	1 / 0	15.87	1.50	<b>15.22</b>	38.45	-23.23	<b>17.37</b>	40.61	-23.24
836.50	3	64-QAM	H	150	181	1 / 0	14.84	1.50	<b>14.19</b>	38.45	-24.26	<b>16.34</b>	40.61	-24.27
826.50	5	QPSK	H	150	183	1 / 0	17.29	1.50	16.64	38.45	-21.81	18.79	40.61	-21.82
836.50	5	QPSK	H	150	181	1 / 0	17.76	1.50	<b>17.11</b>	38.45	-21.34	<b>19.26</b>	40.61	-21.35
846.50	5	QPSK	H	150	178	1 / 0	17.19	1.50	16.54	38.45	-21.91	18.69	40.61	-21.92
836.50	5	16-QAM	H	150	181	1 / 0	15.96	1.50	<b>15.31</b>	38.45	-23.14	<b>17.46</b>	40.61	-23.15
836.50	5	64-QAM	H	150	181	1 / 0	15.00	1.50	<b>14.35</b>	38.45	-24.10	<b>16.50</b>	40.61	-24.11
829.00	10	QPSK	H	150	187	1 / 0	17.10	1.50	16.45	38.45	-22.00	18.60	40.61	-22.01
836.50	10	QPSK	H	150	192	1 / 0	17.11	1.50	16.46	38.45	-21.99	18.61	40.61	-22.00
844.00	10	QPSK	H	150	185	1 / 0	17.23	1.50	<b>16.58</b>	38.45	-21.87	<b>18.73</b>	40.61	-21.88
844.00	10	16-QAM	H	150	185	1 / 0	15.63	1.50	<b>14.98</b>	38.45	-23.47	<b>17.13</b>	40.61	-23.48
844.00	10	64-QAM	H	150	185	1 / 0	14.43	1.50	13.78	38.45	-24.67	15.93	40.61	-24.68
831.50	15	QPSK	H	150	187	1 / 0	16.88	1.50	16.23	38.45	-22.22	18.38	40.61	-22.23
836.50	15	QPSK	H	150	179	1 / 0	17.30	1.50	<b>16.65</b>	38.45	-21.80	<b>18.80</b>	40.61	-21.81
841.50	15	QPSK	H	150	185	1 / 0	16.84	1.50	16.19	38.45	-22.26	18.34	40.61	-22.27
836.50	15	16-QAM	H	150	179	1 / 0	16.08	1.50	<b>15.43</b>	38.45	-23.02	<b>17.58</b>	40.61	-23.03
836.50	15	64-QAM	H	150	179	1 / 0	14.80	1.50	<b>14.15</b>	38.45	-24.30	<b>16.30</b>	40.61	-24.31
836.50	5	QPSK	V	150	154	1 / 0	17.60	1.50	16.95	38.45	-21.50	19.10	40.61	-21.51
836.50	5 (WCP)	QPSK	H	150	182	1 / 0	17.56	1.50	16.91	38.45	-21.54	19.06	40.61	-21.55

**Table 7-3. ERP/EIRP Data (Band 26)**

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 46 of 54	

## 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 vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

### Test Procedures Used

KDB 971168 D01 v03 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

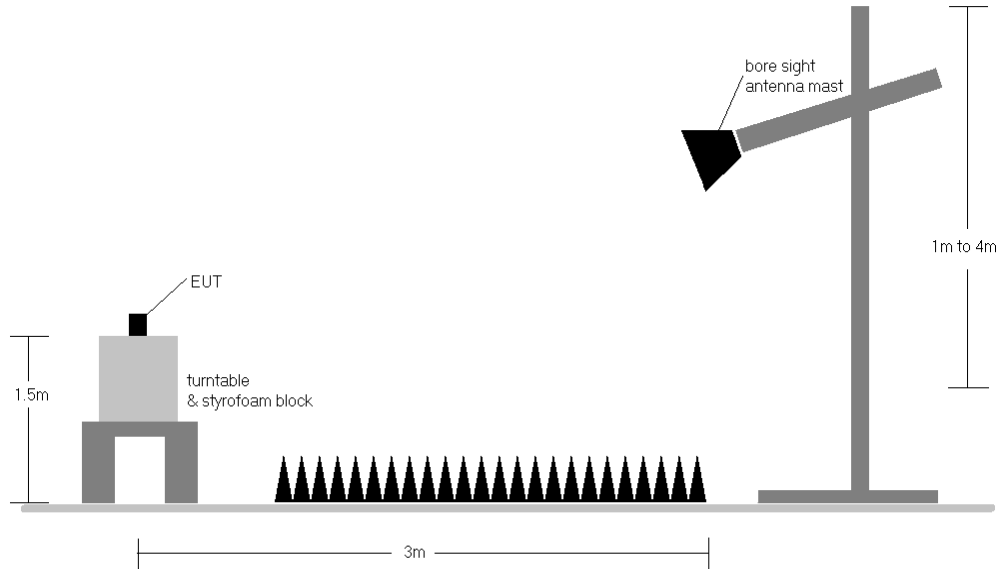
### Test Settings

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

FCC ID: ZNFV30A		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset	Page 47 of 54	

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

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 48 of 54	



### Band 26

OPERATING FREQUENCY: 826.50 MHz  
 CHANNEL: 26815  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1653.00	H	171	169	-70.40	8.96	-61.44	-48.4
2479.50	H	126	244	-66.55	9.13	-57.42	-44.4
3306.00	H	-	-	-74.87	9.36	-65.50	-52.5

**Table 7-4. Radiated Spurious Data (Band 26 – Low Channel)**

OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 26915  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	166	161	-58.05	8.85	-49.20	-36.2
2509.50	H	127	8	-66.13	9.17	-56.96	-44.0
3346.00	H	-	-	-73.78	9.36	-64.43	-51.4

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

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT</b> (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1.ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset	Page 49 of 54

OPERATING FREQUENCY: 846.50 MHz  
 CHANNEL: 27015  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1693.00	H	173	157	-68.98	8.74	-60.24	-47.2
2539.50	H	114	322	-67.94	9.24	-58.70	-45.7
3386.00	H	-	-	-74.55	9.42	-65.14	-52.1

**Table 7-6. Radiated Spurious Data (Band 26 – High Channel)**

OPERATING FREQUENCY: 836.50 MHz  
 CHANNEL: 26915  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	168	270	-72.30	8.85	-63.45	-50.5
2509.50	H	158	63	-65.73	9.17	-56.56	-43.6
3346.00	H	-	-	-73.82	9.36	-64.47	-51.5

**Table 7-7. Radiated Spurious Data with WCP (Band 26 – High Channel)**

FCC ID: ZNFV30A		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1802050015-03-R1-ZNF	Test Dates: 2/5 - 2/14/2018	EUT Type: Portable Handset		Page 50 of 54

## 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, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.***

### Test Procedure Used

ANSI/TIA-603-E-2016

### Test Settings

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

### Test Setup

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

### Test Notes

None



FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset	Page 51 of 54	

## Band 26 Frequency Stability Measurements

OPERATING FREQUENCY: 831,500,000 Hz  
 CHANNEL: 26865  
 REFERENCE VOLTAGE: 3.85 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	831,499,902	-98	-0.0000118
100 %		- 30	831,499,944	-56	-0.0000068
100 %		- 20	831,499,818	-182	-0.0000219
100 %		- 10	831,499,928	-72	-0.0000087
100 %		0	831,499,831	-169	-0.0000203
100 %		+ 10	831,499,864	-136	-0.0000163
100 %		+ 20	831,499,998	-2	-0.0000003
100 %		+ 30	831,499,850	-150	-0.0000180
100 %		+ 40	831,499,986	-14	-0.0000017
100 %		+ 50	831,499,880	-120	-0.0000145
BATT. ENDPOINT		3.45	+ 20	831,499,933	-67

Table 7-8. Frequency Stability Data (Band 26)

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1-ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset		Page 52 of 54

## Band 26 Frequency Stability Measurements

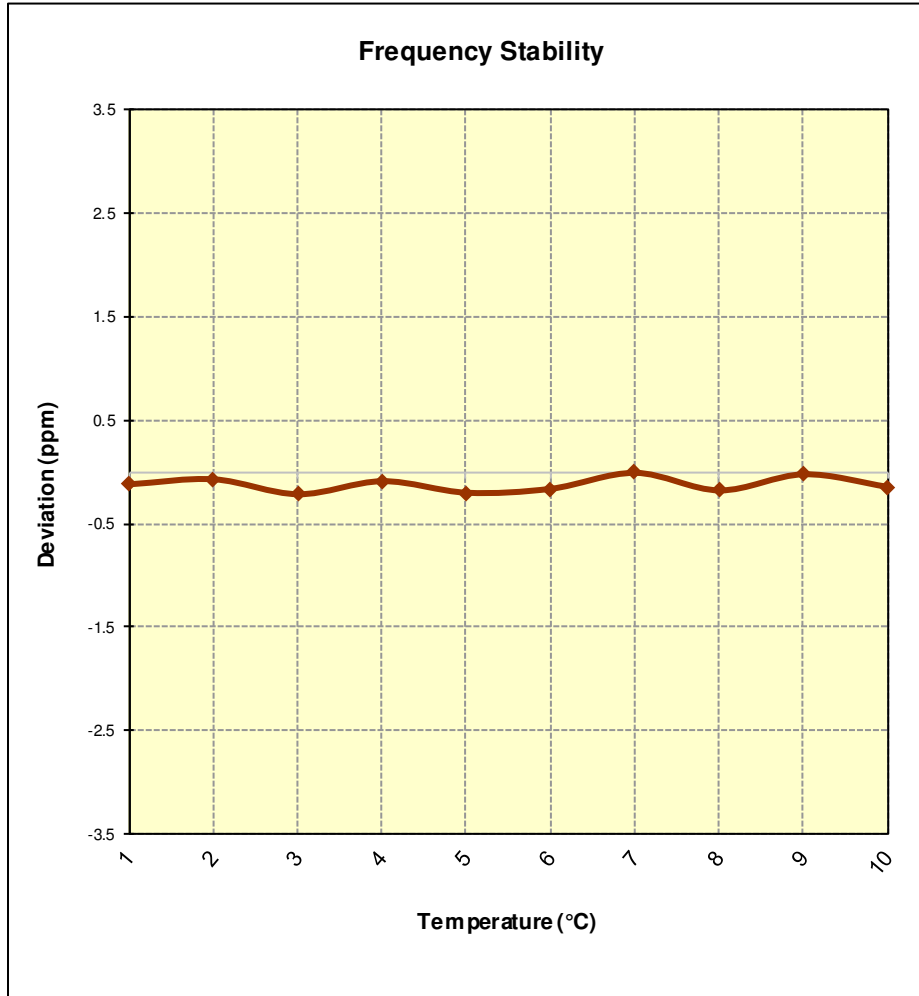




Figure 7-8. Frequency Stability Graph (Band 26)

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset		Page 53 of 54

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFV30A** complies with all the requirements of Part 22 of the FCC Rules for LTE operation only.

FCC ID: ZNFV30A	 <b>MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1802050015-03-R1.ZNF	<b>Test Dates:</b> 2/5 - 2/14/2018	<b>EUT Type:</b> Portable Handset		Page 54 of 54