



PART 22 MEASUREMENT REPORT

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

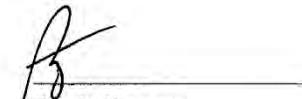
Date of Testing:
 4/27 - 7/1/2020
Test Site/Location:
 PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
 1M2004230076-02.ZNF

FCC ID:	ZNFG900VM
Applicant Name:	LG Electronics USA, Inc.

Application Type: Certification
Model: LM-G900VM
Additional Models: LMG900VM, G900VM, LM-G900QM6, LMG900QM6, G900QM6, LM-G902V, LMG902V, G902V
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part: 22
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



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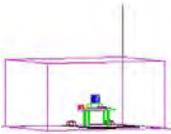
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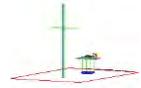
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
GSM/GPRS	N/A	GMSK	824.2 - 848.8	0.670	28.26	243KGXW
EDGE		8-PSK	824.2 - 848.8	0.159	22.01	245KG7W
WCDMA	N/A	Spread Spectrum	826.4 - 846.6	0.099	19.96	4M15F9W
CDMA	N/A	Spread Spectrum	824.70 - 848.31	0.047	16.74	1M29F9W
LTE Band 5	10 MHz	QPSK	829.0 - 844.0	0.080	19.04	8M98G7D
		16QAM	829.0 - 844.0	0.064	18.09	8M94W7D
		64QAM	829.0 - 844.0	0.054	17.31	8M96W7D
	5 MHz	QPSK	826.5 - 846.5	0.079	18.98	4M52G7D
		16QAM	826.5 - 846.5	0.065	18.10	4M52W7D
		64QAM	826.5 - 846.5	0.052	17.16	4M55W7D
	3 MHz	QPSK	825.5 - 847.5	0.092	19.66	2M71G7D
		16QAM	825.5 - 847.5	0.081	19.09	2M71W7D
		64QAM	825.5 - 847.5	0.061	17.84	2M72W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.105	20.20	1M10G7D
		16QAM	824.7 - 848.3	0.090	19.56	1M10W7D
		64QAM	824.7 - 848.3	0.070	18.45	1M10W7D
NR Band n5	20 MHz	$\pi/2$ BPSK	834.0 - 839.0	0.037	15.71	17M9G7D
		QPSK	834.0 - 839.0	0.038	15.76	18M0G7D
		16QAM	834.0 - 839.0	0.030	14.83	18M0W7D
		64QAM	834.0 - 839.0	0.021	13.32	18M0W7D
		256QAM	834.0 - 839.0	0.012	10.93	18M0W7D
	15 MHz	$\pi/2$ BPSK	831.5 - 841.5	0.039	15.86	13M6G7D
		QPSK	831.5 - 841.5	0.041	16.13	13M5G7D
		16QAM	831.5 - 841.5	0.033	15.13	13M5W7D
		64QAM	831.5 - 841.5	0.022	13.43	13M6W7D
		256QAM	831.5 - 841.5	0.013	11.08	13M6W7D
	10 MHz	$\pi/2$ BPSK	829.0 - 844.0	0.066	18.17	9M03G7D
		QPSK	829.0 - 844.0	0.069	18.42	9M02G7D
		16QAM	829.0 - 844.0	0.063	17.98	9M02W7D
		64QAM	829.0 - 844.0	0.042	16.19	9M01W7D
		256QAM	829.0 - 844.0	0.019	12.83	8M98W7D
	5 MHz	$\pi/2$ BPSK	826.5 - 846.5	0.070	18.42	4M52G7D
		QPSK	826.5 - 846.5	0.071	18.54	4M49G7D
		16QAM	826.5 - 846.5	0.065	18.16	4M52W7D
		64QAM	826.5 - 846.5	0.044	16.41	4M50W7D
		256QAM	826.5 - 846.5	0.021	13.12	4M53W7D

EUT Overview

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset	Page 3 of 108

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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 **LG Portable Handset FCC ID:ZNFG900VM**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 22.

Test Device Serial No.: 00367, 00375, 00458, 00474, 00318, 00326

2.2 Device Capabilities

This device contains the following capabilities:

CDMA, GSM/GPRS/EDGE, WCDMA/HSPA, LTE, NR, WLAN, UNII, BT (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 0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

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

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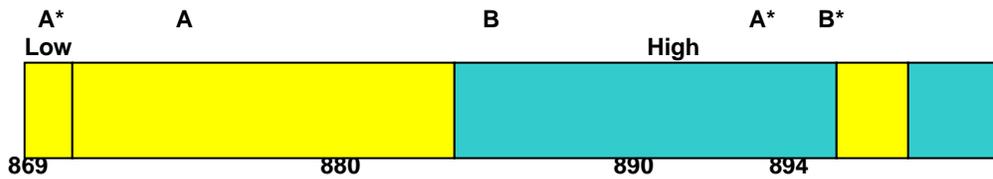
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the “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

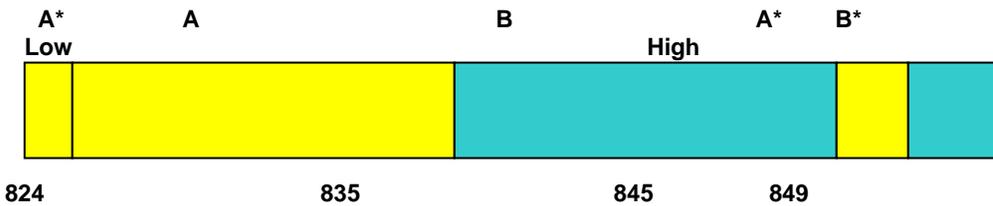
3.2 Cellular - Base Frequency Blocks



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

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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.

For radiated power measurements, substitution method is used per the guidance of ANSI/TIA-603-E-2016. A half-wave dipole is 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 $P_g [dBm] - \text{cable loss} [dB]$.

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

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$\text{EIRP}_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8; \text{ where } D \text{ is the measurement distance in meters.}$$

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

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

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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	10/30/2019	Annual	10/30/2020	LTX3
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Espec	ESX-2CA	Environmental Chamber	6/13/2019	Annual	6/13/2020	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Keysight Technologies	N9020A	MXA Signal Analyzer	4/29/2019	Annual	4/29/2020	MY54500644
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini Circuits	PWR-4GHS	USB Power Sensor	6/18/2020	Annual	6/18/2021	12001070013
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	5/6/2019	Annual	5/6/2020	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/11/2019	Annual	7/11/2020	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/8/2019	Annual	7/8/2020	102133
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	5/19/2018	Biennial	5/19/2020	A051107

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.

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6.0 SAMPLE CALCULATIONS

GSM Emission Designator

Emission Designator = 250KGXW

GSM 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)

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

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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.

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7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics USA, Inc.
 FCC ID: ZNFG900VM
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): NR/GSM/GPRS/WCDMA/CDMA/LTE

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	RSS-139(2.3)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 22.917(a)	RSS-132(5.5)	> 43 + 10log10(P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	RSS-132(5.4)	N/A	PASS	See RF Exposure Report
	Frequency Stability	2.1055, 22.355	RSS-132(5.3)	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	22.913(a)(5)	RSS-132(5.4)	< 7 Watts max. ERP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 22.917(a)	RSS-132(5.5)	> 43 + 10 log10 (P[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) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST 2G/3G Automation Version 4.5, LTE Automation Version 5.3.

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7.2 Conducted Power Output Data

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers is measured by means of a calibrated spectrum analyzer. All 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.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Detector = RMS
2. Trace mode = trace average for continuous emissions, max hold for pulse emissions
3. Sweep time = auto couple
4. The trace was allowed to stabilize
5. 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 7-1. Test Instrument & Measurement Setup

Test Notes

1. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.
2. Conducted power measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.
3. 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 and 1 MHz or greater for frequencies greater than 1 GHz.
4. All other conducted power measurements are contained in the RF exposure report for this filing.

Power State	Band	Bandwidth (PCC + SCC)	PCC				SCC				ULCA Tx. Power [dBm]				
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency		UL # RB	UL RB Offset		
Max	LTE B5	10MHz + 10MHz	QPSK	20450	829.0	1	49	QPSK	20549	838.9	1	0	25.79		
				20475	831.5	1	49		20574	841.4	1	0	25.76		
				20600	844.0	1	0		20501	834.1	1	49	15.06		
			QPSK	20450	829.0	50	0	QPSK	20549	838.9	50	0	23.83		
				16-QAM	20450	829.0	50		0	16-QAM	20549	838.9	50	0	22.91
				64-QAM	20450	829.0	50		0	64-QAM	20549	838.9	50	0	22.68

Table 7-2. Conducted Power Output Data (ULCA LTE Band 5)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset	Page 13 of 108

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7.3 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 x 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.

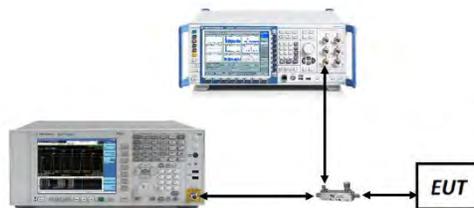


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

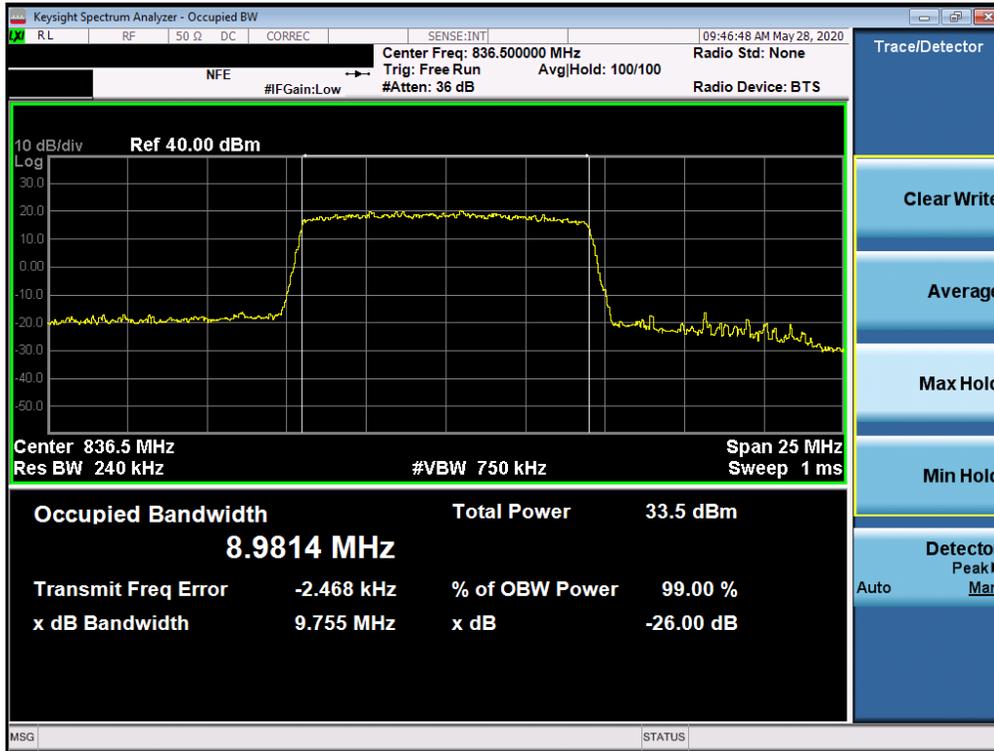
None.

FCC ID: ZNFG900VM	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	 LG	Approved by: Quality Manager
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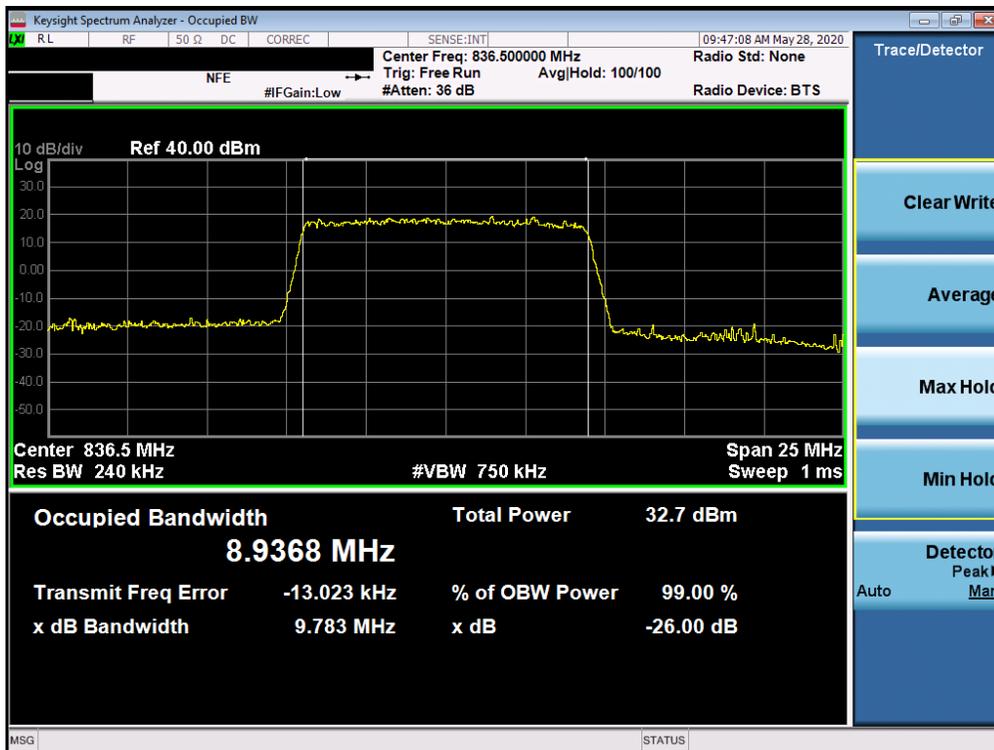
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LTE Band 5



Plot 7-1. Occupied Bandwidth Plot (LTE Band 5 - 10MHz QPSK - Full RB Configuration)

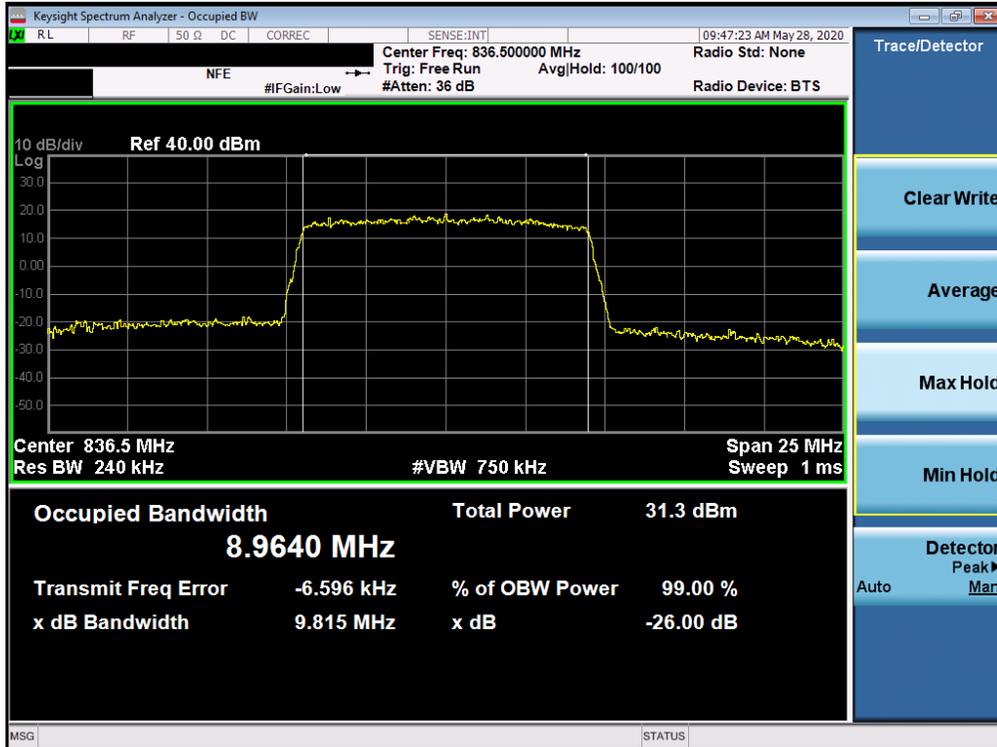


Plot 7-2. Occupied Bandwidth Plot (LTE Band 5 - 10MHz 16-QAM - Full RB Configuration)

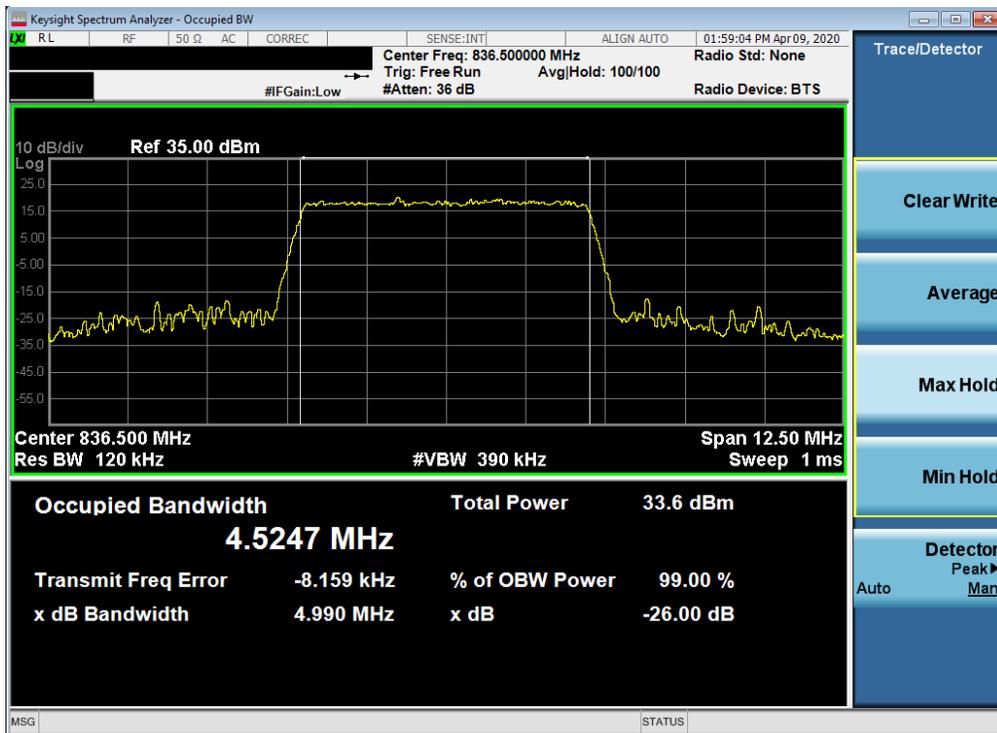
FCC ID: ZNFG900VM		PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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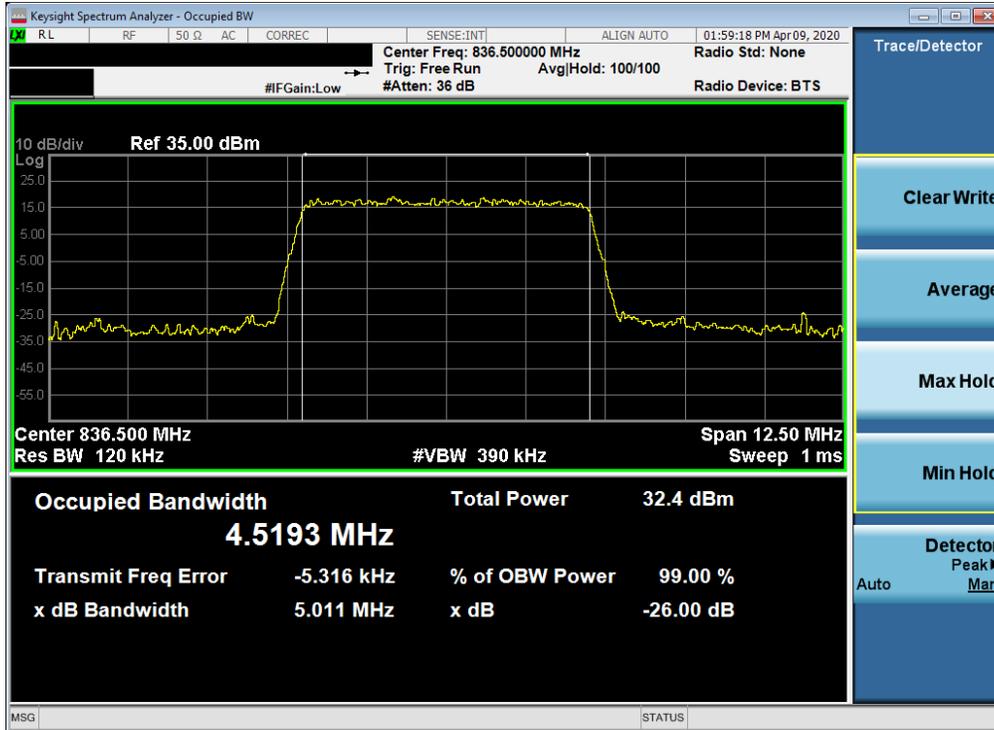


Plot 7-3. Occupied Bandwidth Plot (LTE Band 5 - 10MHz 64-QAM - Full RB Configuration)

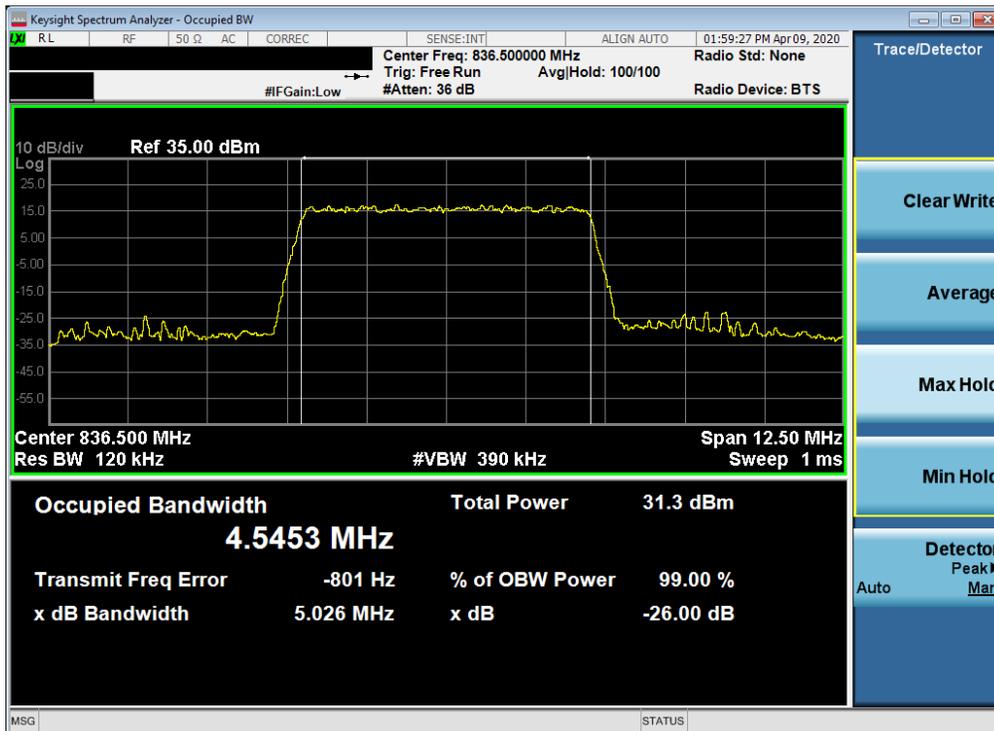


Plot 7-4. Occupied Bandwidth Plot (LTE Band 5 - 5MHz QPSK - Full RB Configuration)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT	 LG	Approved by: Quality Manager
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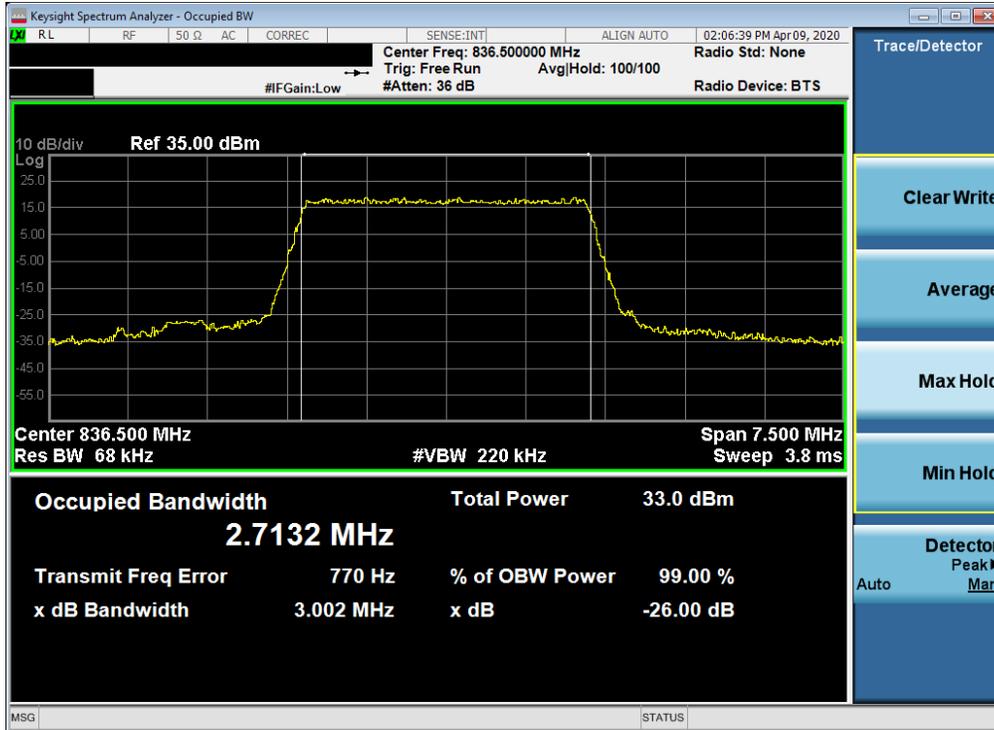


Plot 7-5. Occupied Bandwidth Plot (LTE Band 5 - 5MHz 16-QAM - Full RB Configuration)

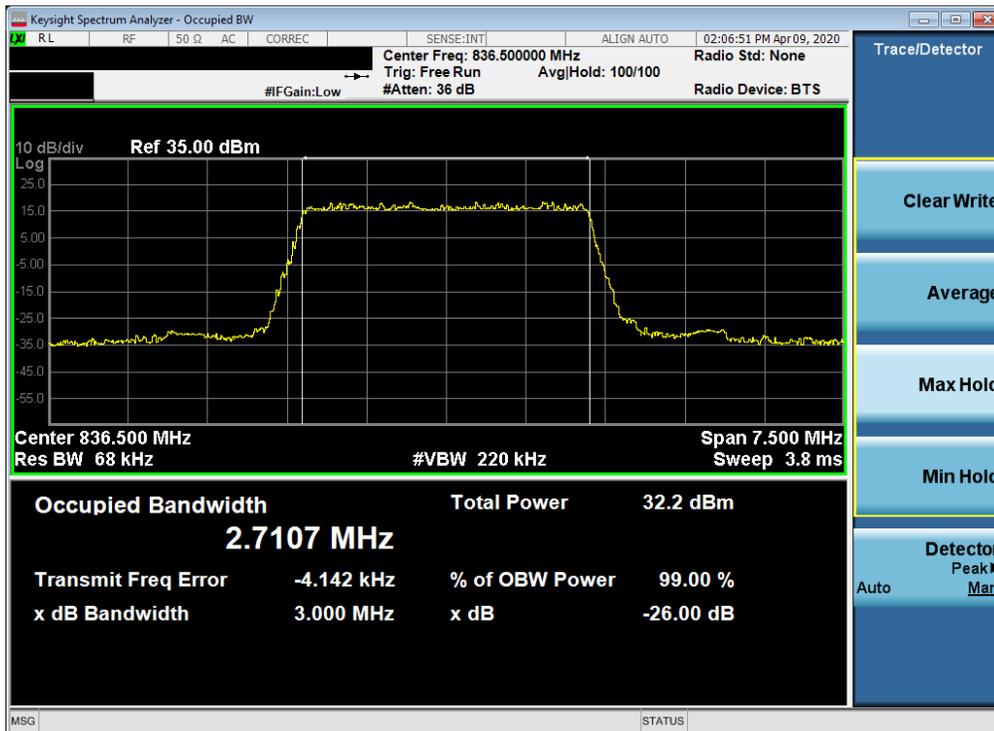


Plot 7-6. Occupied Bandwidth Plot (LTE Band 5 - 5MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFG900VM		PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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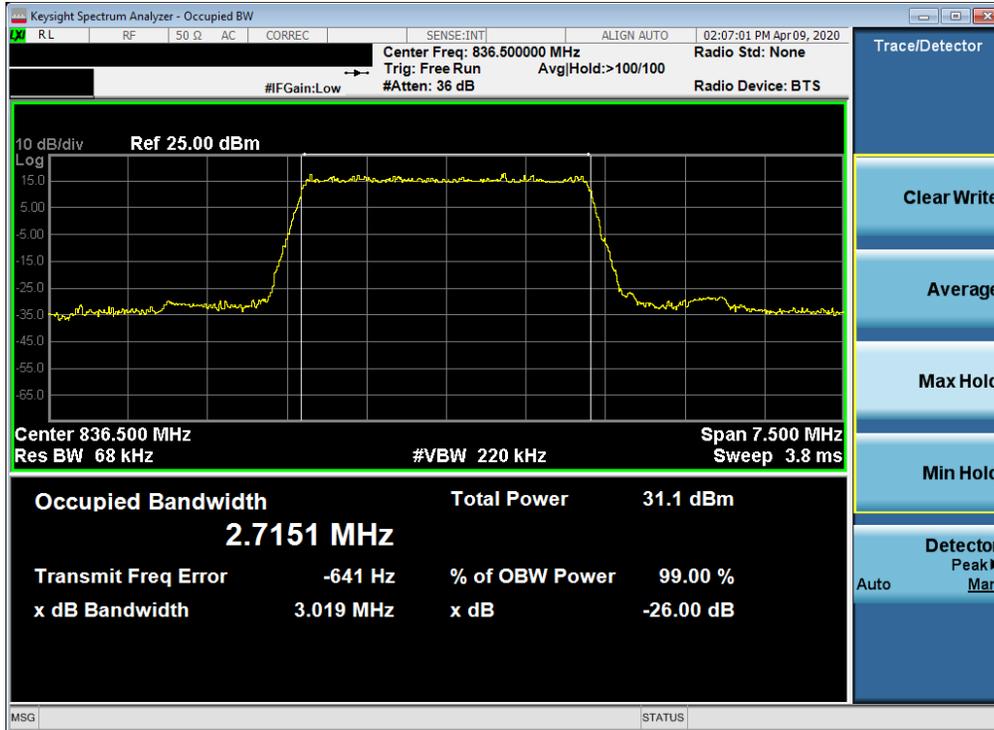


Plot 7-7. Occupied Bandwidth Plot (LTE Band 5 - 3MHz QPSK - Full RB Configuration)

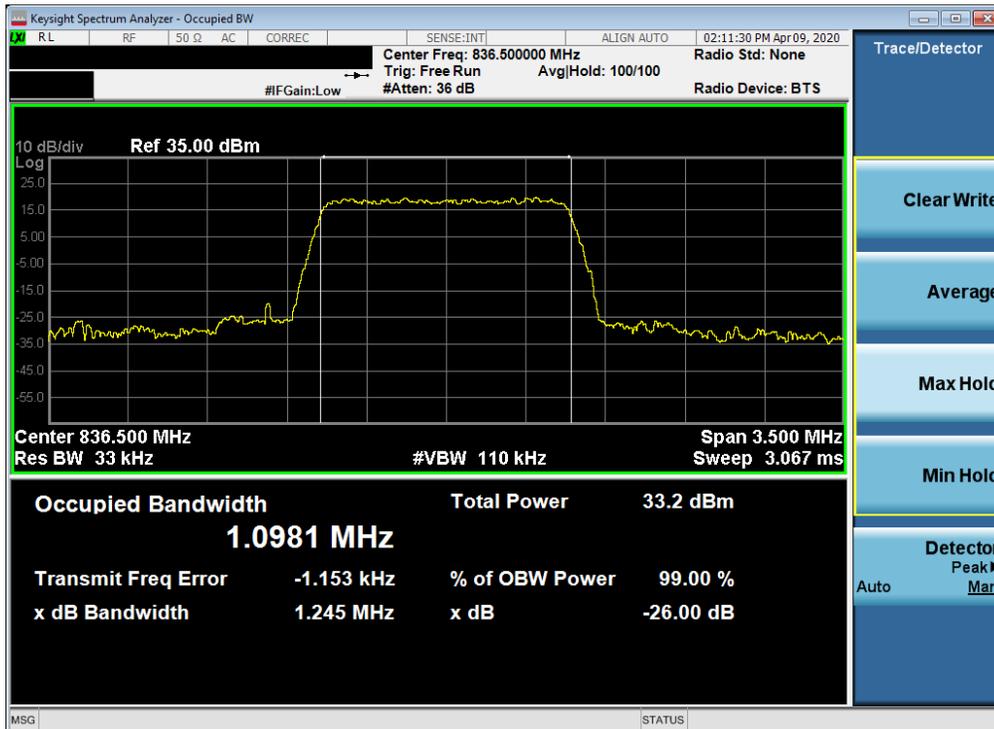


Plot 7-8. Occupied Bandwidth Plot (LTE Band 5 - 3MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-9. Occupied Bandwidth Plot (LTE Band 5 - 3MHz 64-QAM - Full RB Configuration)

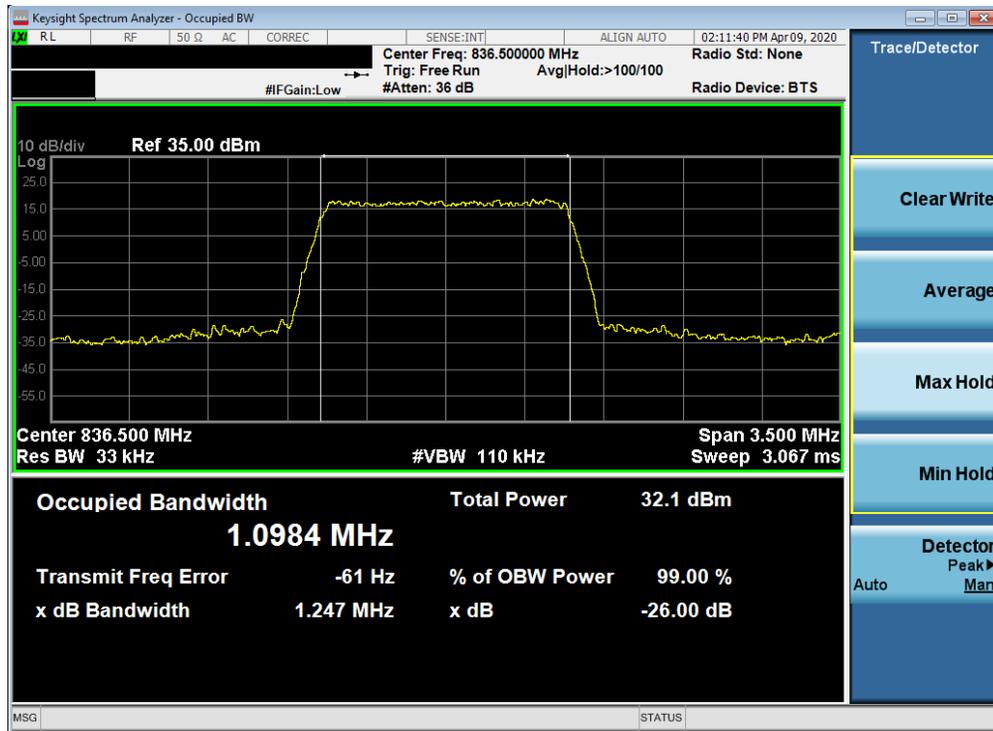


Plot 7-10. Occupied Bandwidth Plot (LTE Band 5 - 1.4MHz QPSK - Full RB Configuration)

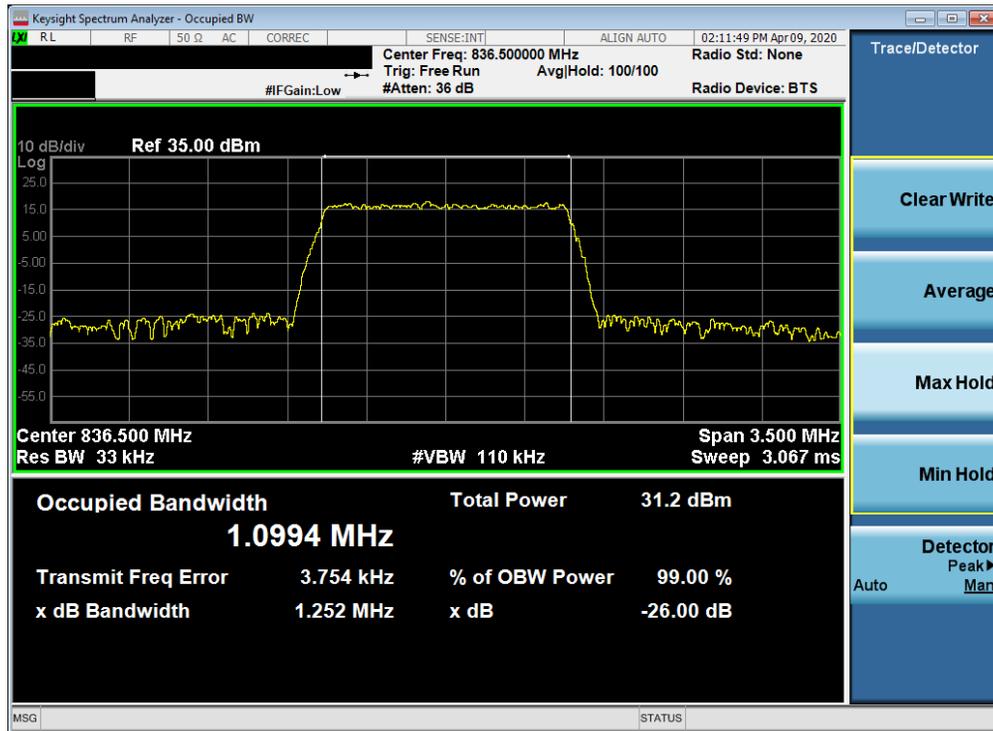
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-11. Occupied Bandwidth Plot (LTE Band 5 - 1.4MHz 16-QAM - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (LTE Band 5 - 1.4MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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NR Band n5

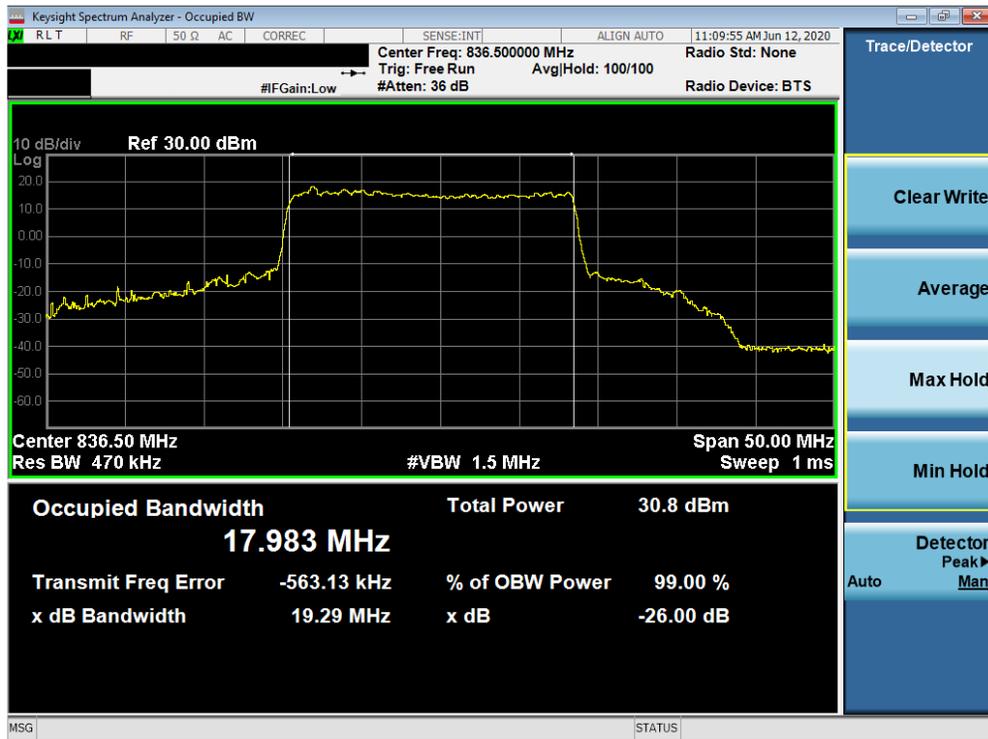


Plot 7-13. Occupied Bandwidth Plot (NR Band n5 - 20MHz $\pi/2$ BPSK DFT-s-OFDM - Full RB)

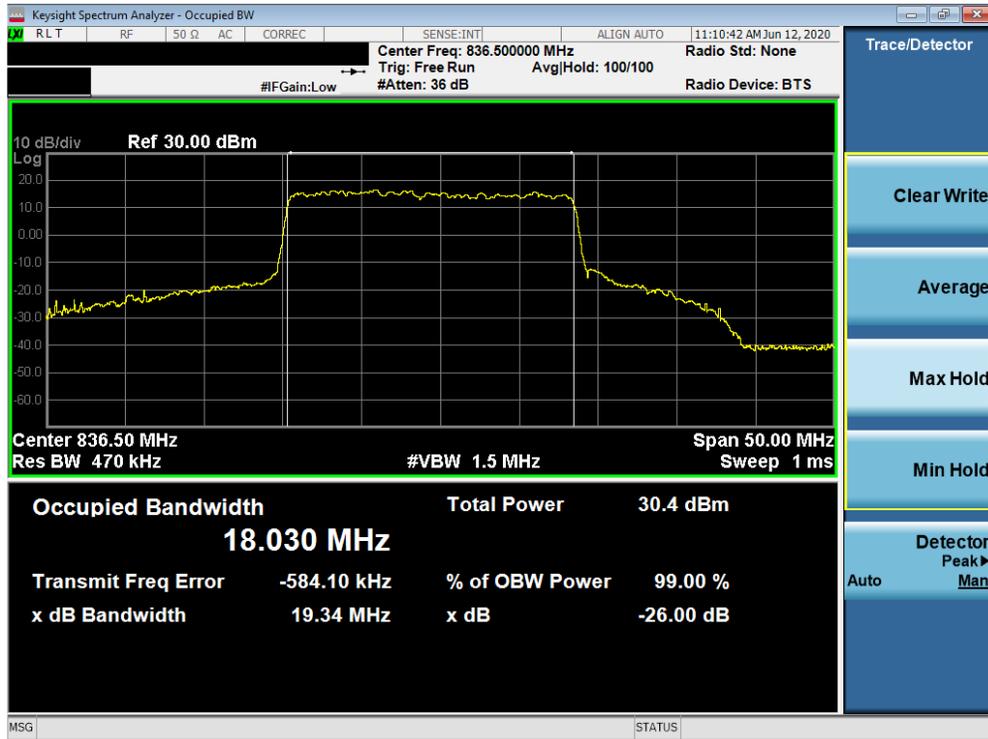


Plot 7-14. Occupied Bandwidth Plot (NR Band n5 - 20MHz QPSK CP-OFDM - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-15. Occupied Bandwidth Plot (NR Band n5 - 20MHz 16-QAM CP-OFDM - Full RB)



Plot 7-16. Occupied Bandwidth Plot (NR Band n5 - 20MHz 64-QAM CP-OFDM - Full RB)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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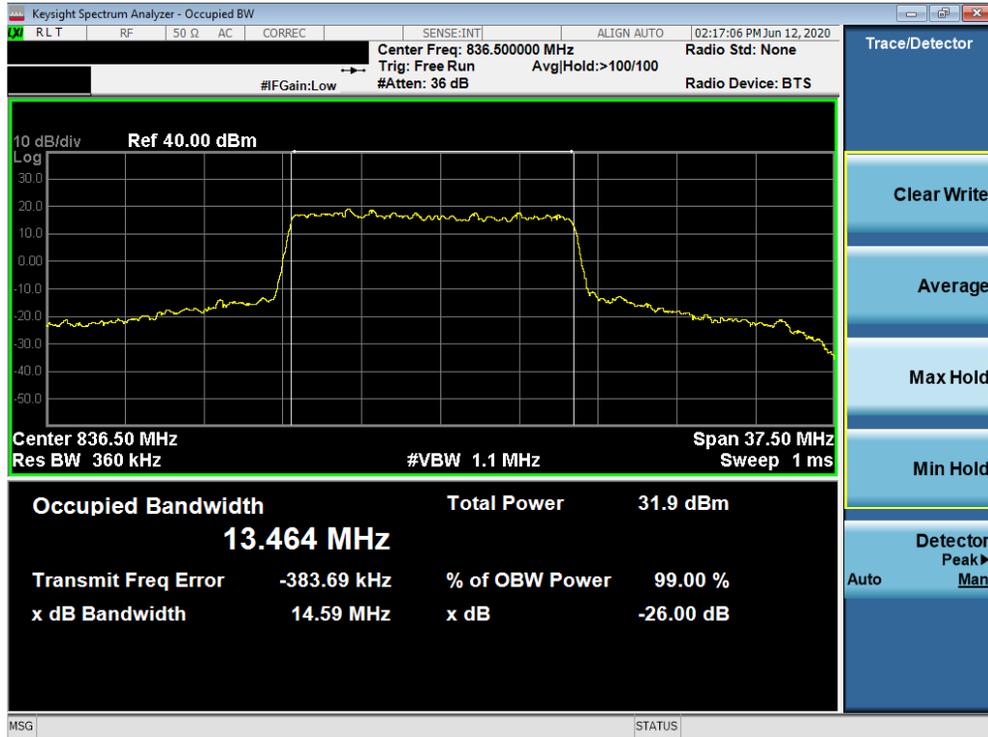


Plot 7-17. Occupied Bandwidth Plot (NR Band n5 - 20MHz 256-QAM CP-OFDM - Full RB)



Plot 7-18. Occupied Bandwidth Plot (NR Band n5 - 15MHz $\pi/2$ BPSK DFT-s-OFDM - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-19. Occupied Bandwidth Plot (NR Band n5 - 15MHz QPSK CP-OFDM - Full RB)



Plot 7-20. Occupied Bandwidth Plot (NR Band n5 - 15MHz 16-QAM CP-OFDM - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-21. Occupied Bandwidth Plot (NR Band n5 - 15MHz 64-QAM CP-OFDM - Full RB)

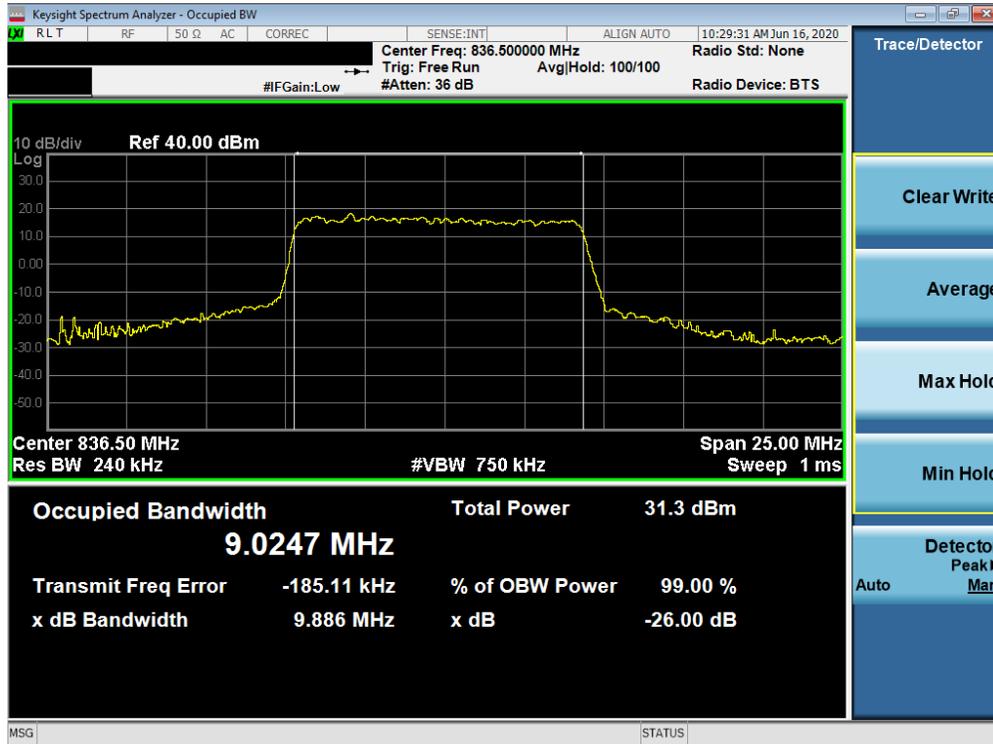


Plot 7-22. Occupied Bandwidth Plot (NR Band n5 - 15MHz 256-QAM CP-OFDM - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT	 LG	Approved by: Quality Manager
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Plot 7-23. Occupied Bandwidth Plot (NR Band n5 - 10MHz $\pi/2$ BPSK DFT-s-OFDM - Full RB)

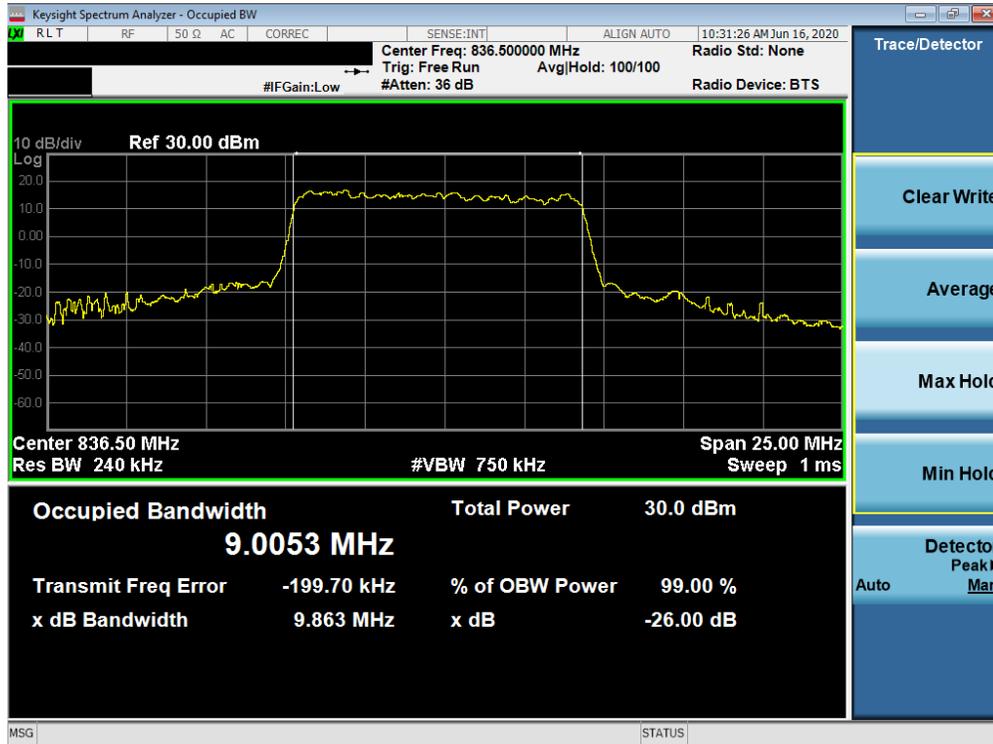


Plot 7-24. Occupied Bandwidth Plot (NR Band n5 - 10MHz QPSK CP-OFDM - Full RB)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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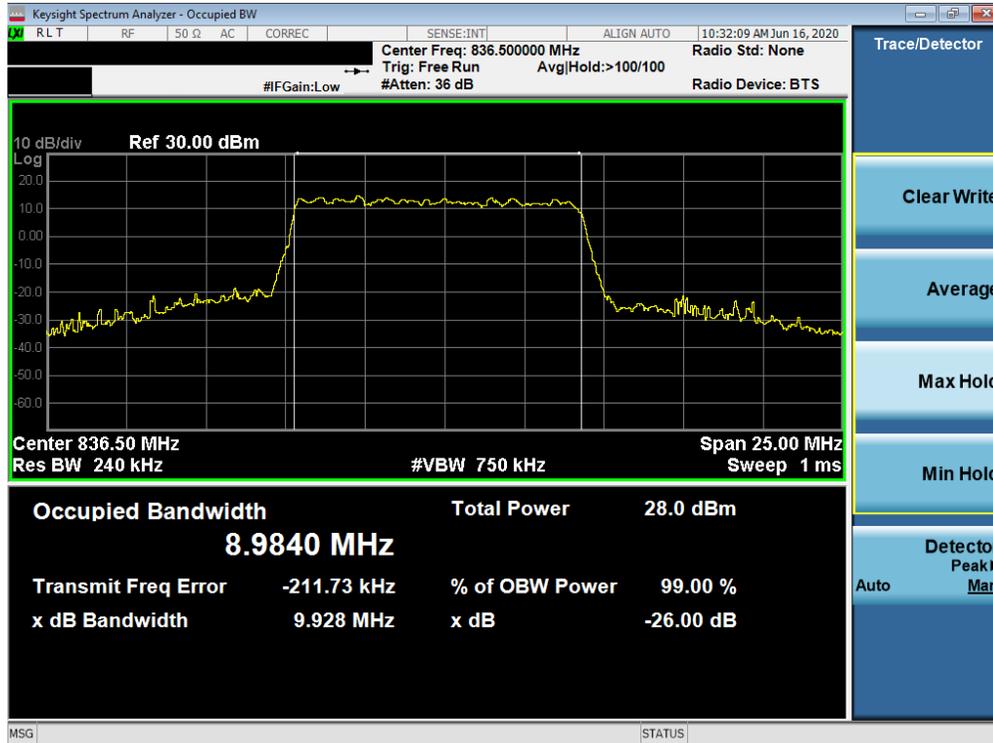


Plot 7-25. Occupied Bandwidth Plot (NR Band n5 - 10MHz 16-QAM CP-OFDM - Full RB)

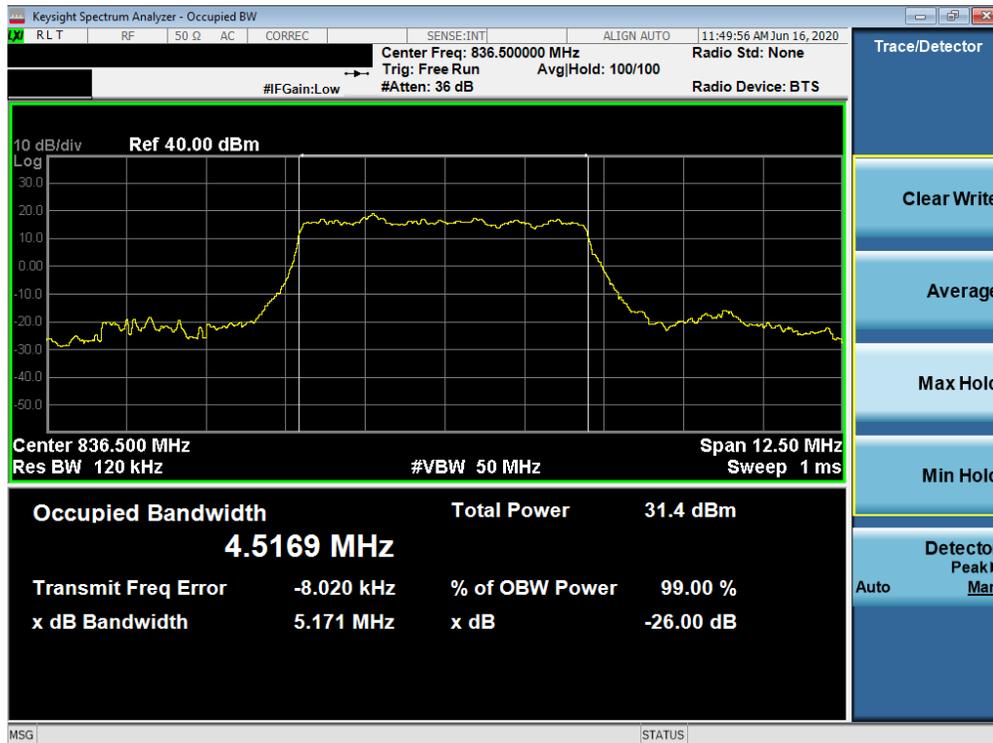


Plot 7-26. Occupied Bandwidth Plot (NR Band n5 - 10MHz 64-QAM CP-OFDM - Full RB)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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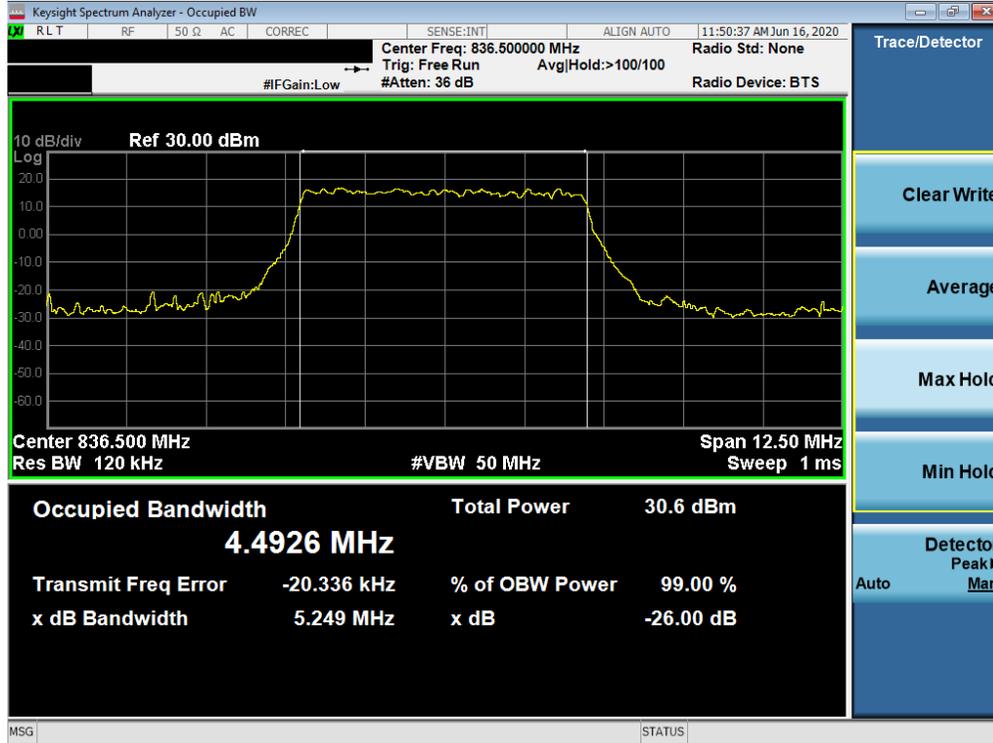


Plot 7-27. Occupied Bandwidth Plot (NR Band n5 - 10MHz 256-QAM CP-OFDM - Full RB)

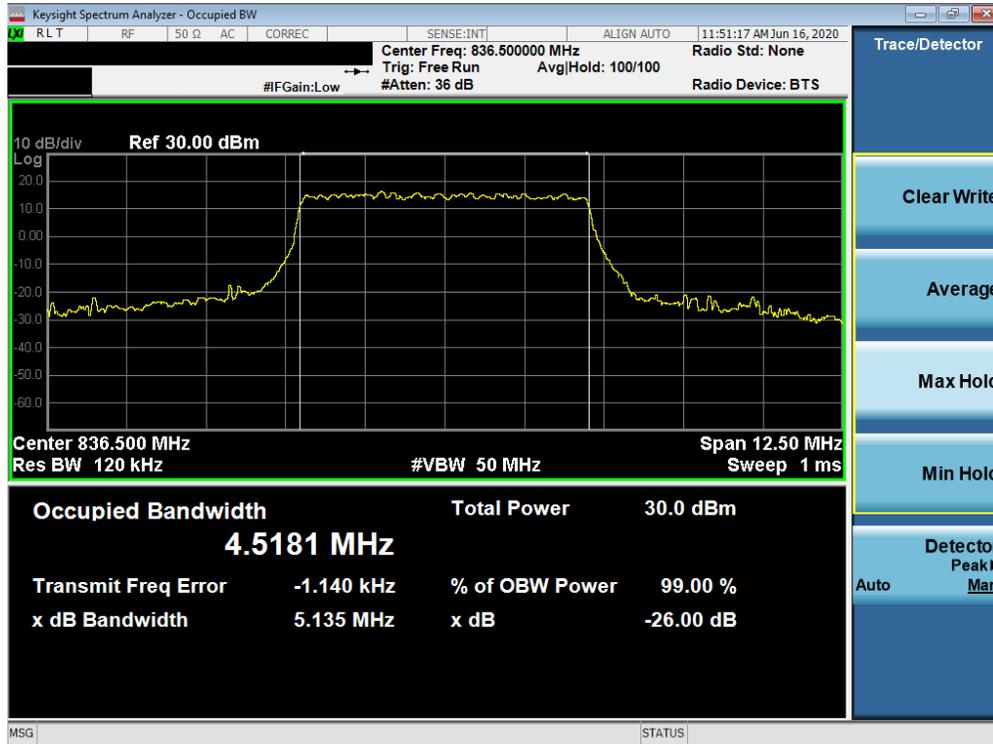


Plot 7-28. Occupied Bandwidth Plot (NR Band n5 - 5MHz $\pi/2$ BPSK DFT-s-OFDM - Full RB)

FCC ID: ZNFG900VM		PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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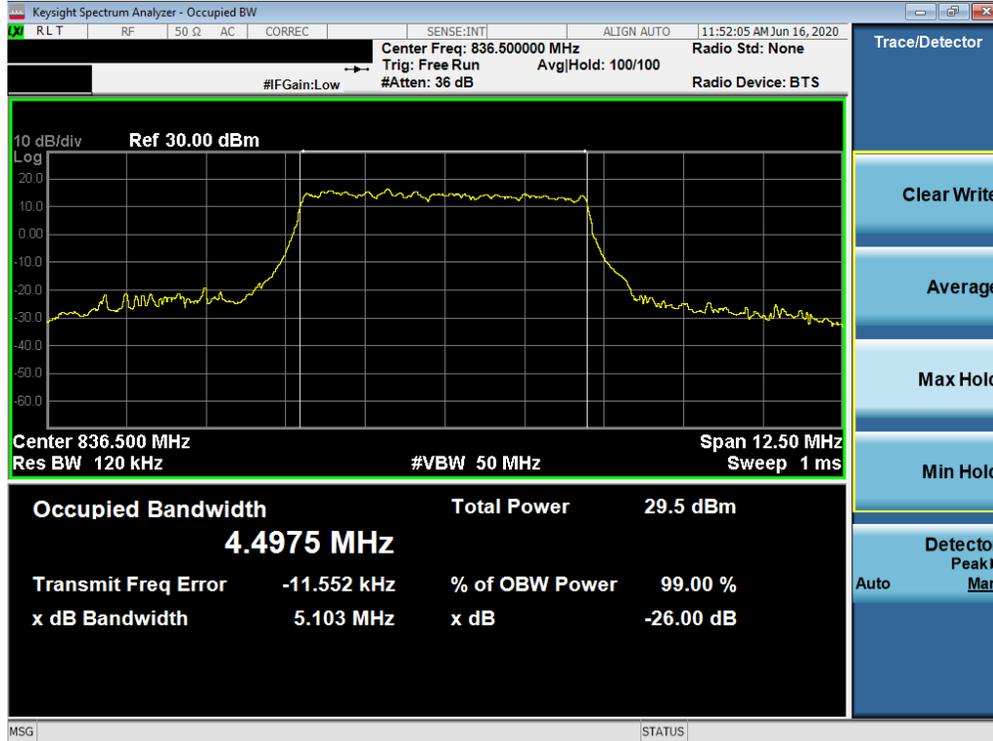


Plot 7-29. Occupied Bandwidth Plot (NR Band n5 - 5MHz QPSK DFT-s-OFDM - Full RB)

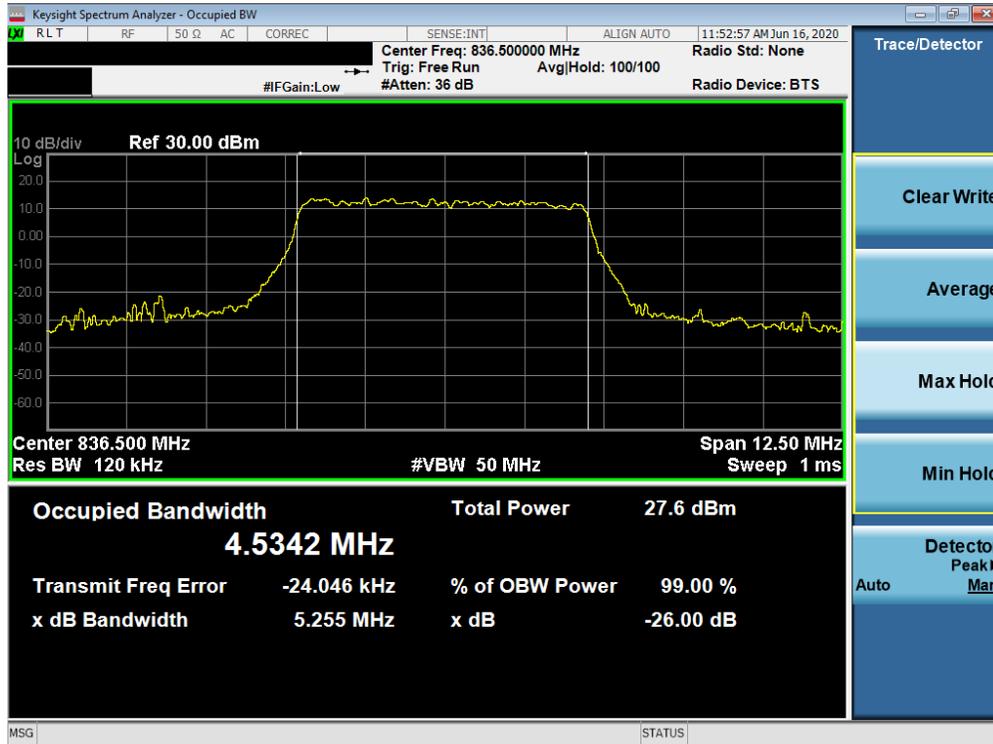


Plot 7-30. Occupied Bandwidth Plot (NR Band n5 - 5MHz 16-QAM DFT-s-OFDM - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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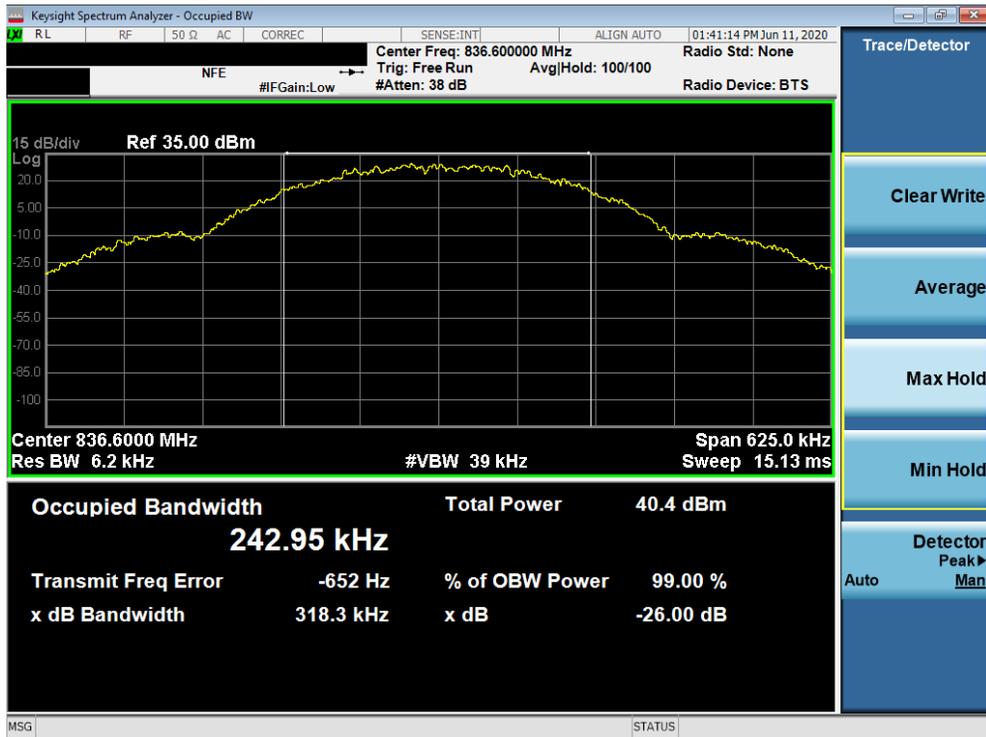
Plot 7-31. Occupied Bandwidth Plot (NR Band n5 - 5MHz 64-QAM DFT-s-OFDM - Full RB)



Plot 7-32. Occupied Bandwidth Plot (NR Band n5 - 5MHz 256-QAM DFT-s-OFDM - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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GPRS Cell



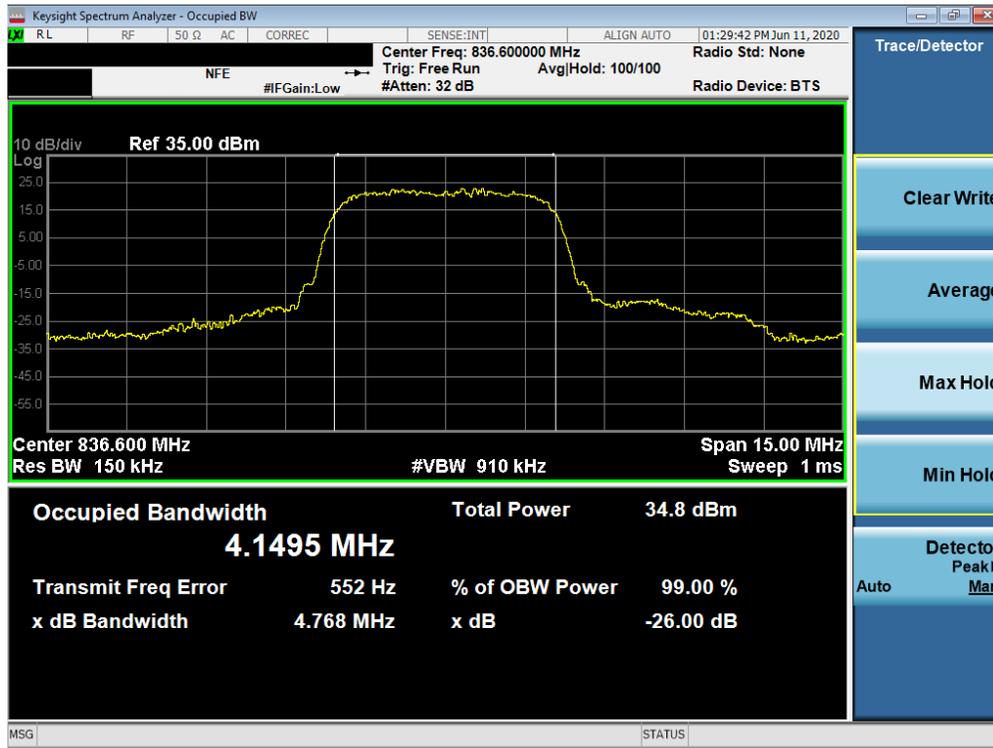
Plot 7-33. Occupied Bandwidth Plot (GPRS, Ch. 190)



Plot 7-34. Occupied Bandwidth Plot (EDGE, Ch. 190)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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WCDMA Cell



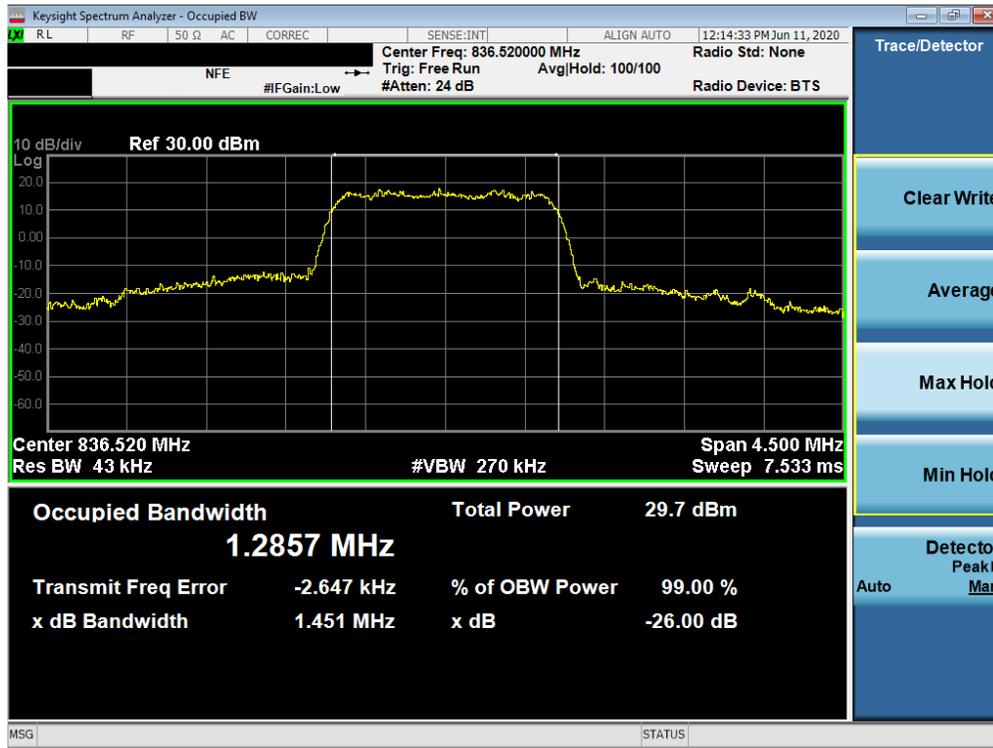
Plot 7-35. Occupied Bandwidth Plot (WCDMA, Ch. 4183)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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CDMA Cell



Plot 7-36. Occupied Bandwidth Plot (CDMA, Ch. 384)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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7.4 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 $43 + 10 \log_{10}(P_{[Watts]})$, 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 (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.

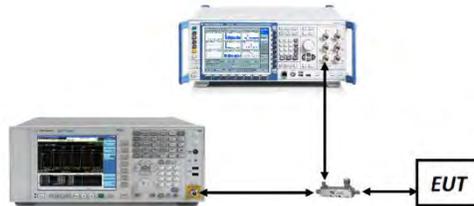


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

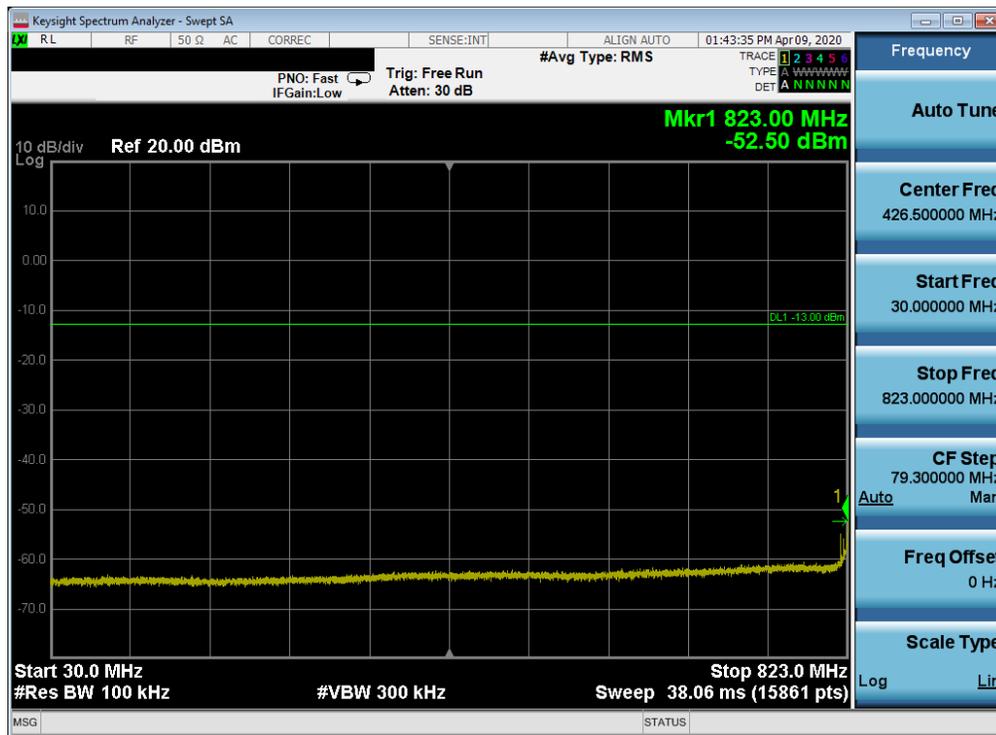
1. Per Part 22 and RSS-132, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth 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.
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT	 LG	Approved by: Quality Manager
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LTE Band 5



Plot 7-37. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

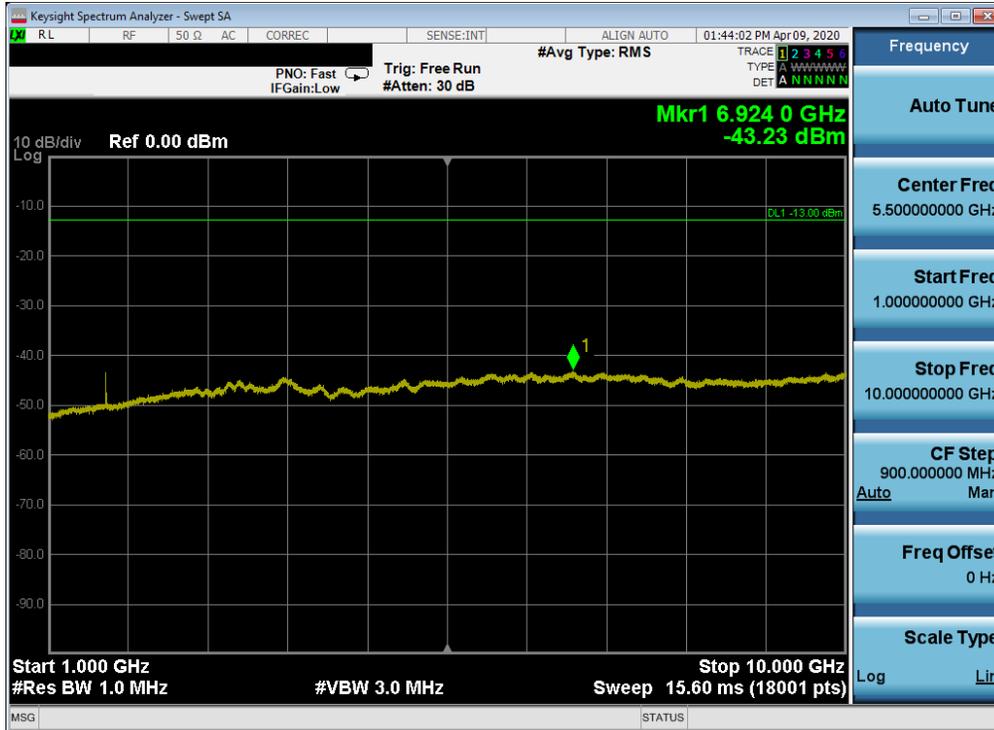


Plot 7-38. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

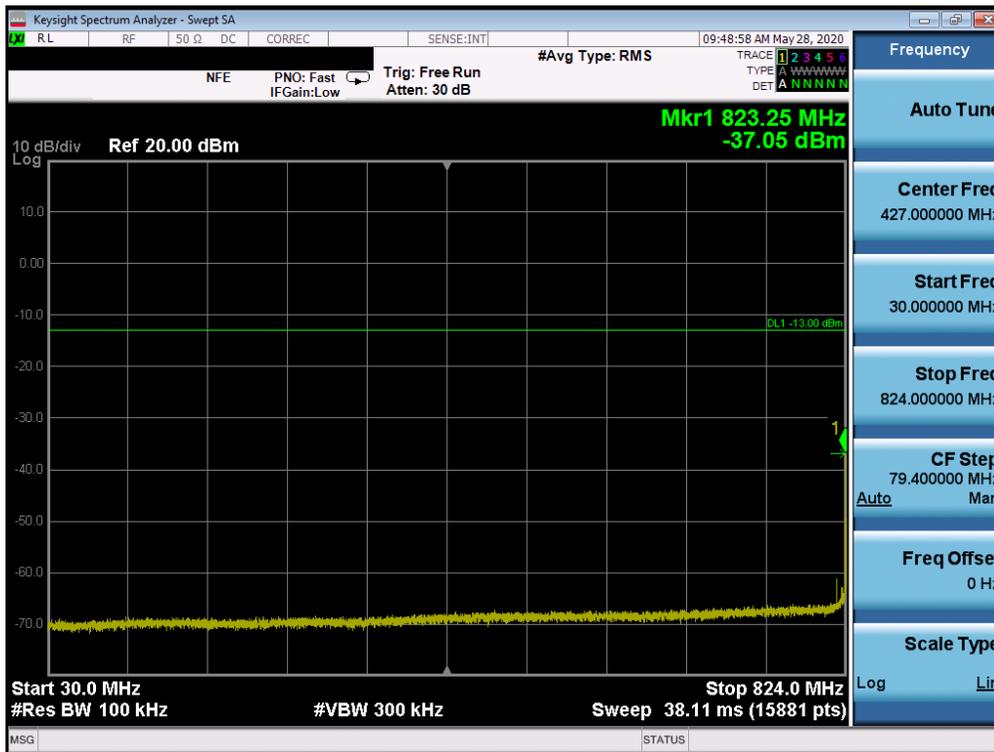
FCC ID: ZNFG900VM	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	LG	Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 35 of 108

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Plot 7-39. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

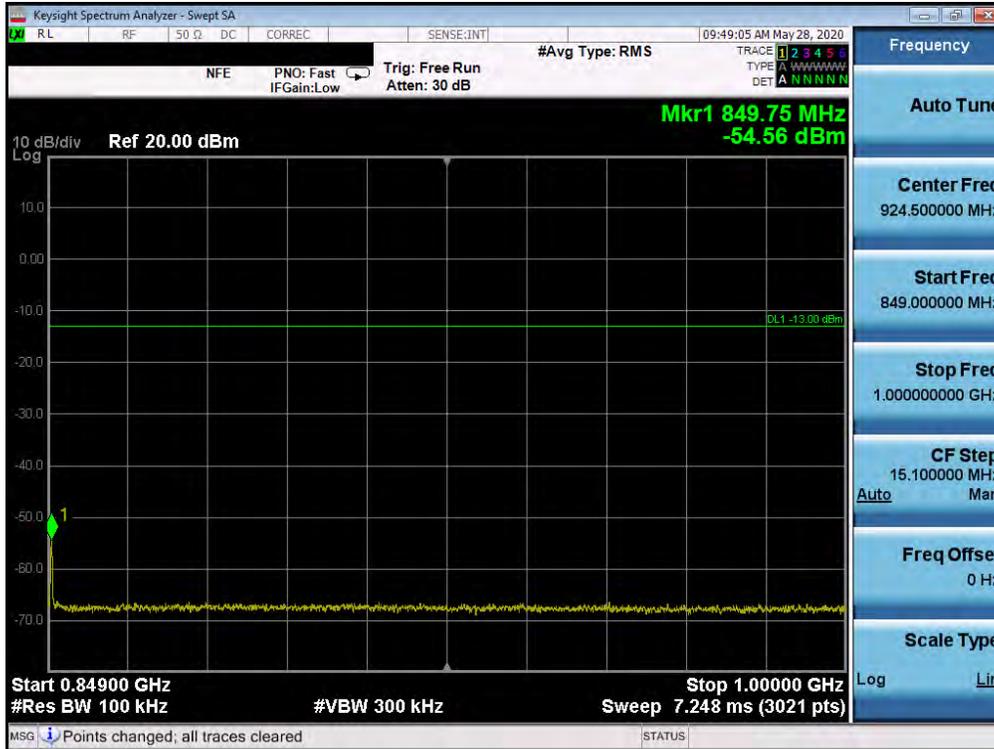


Plot 7-40. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

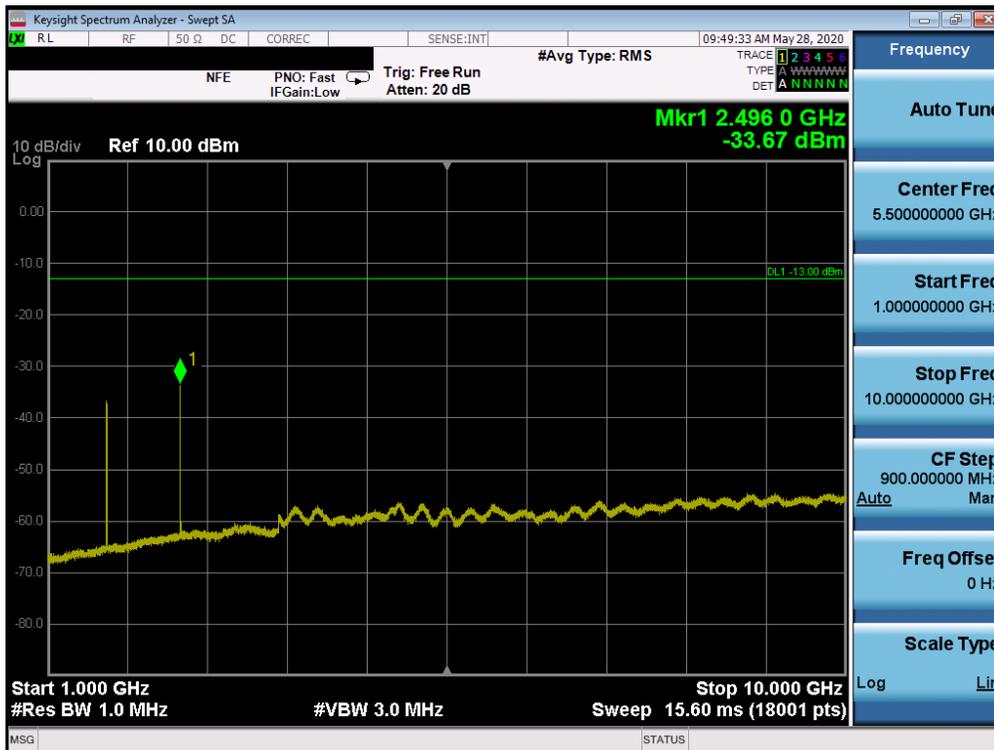
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 36 of 108

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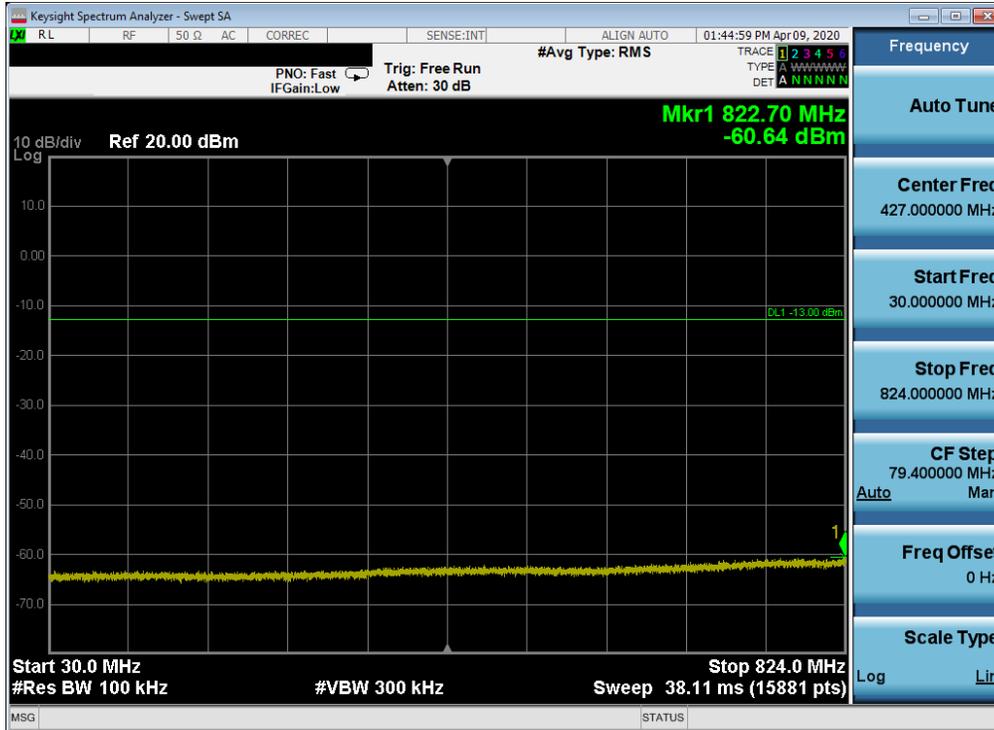


Plot 7-41. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

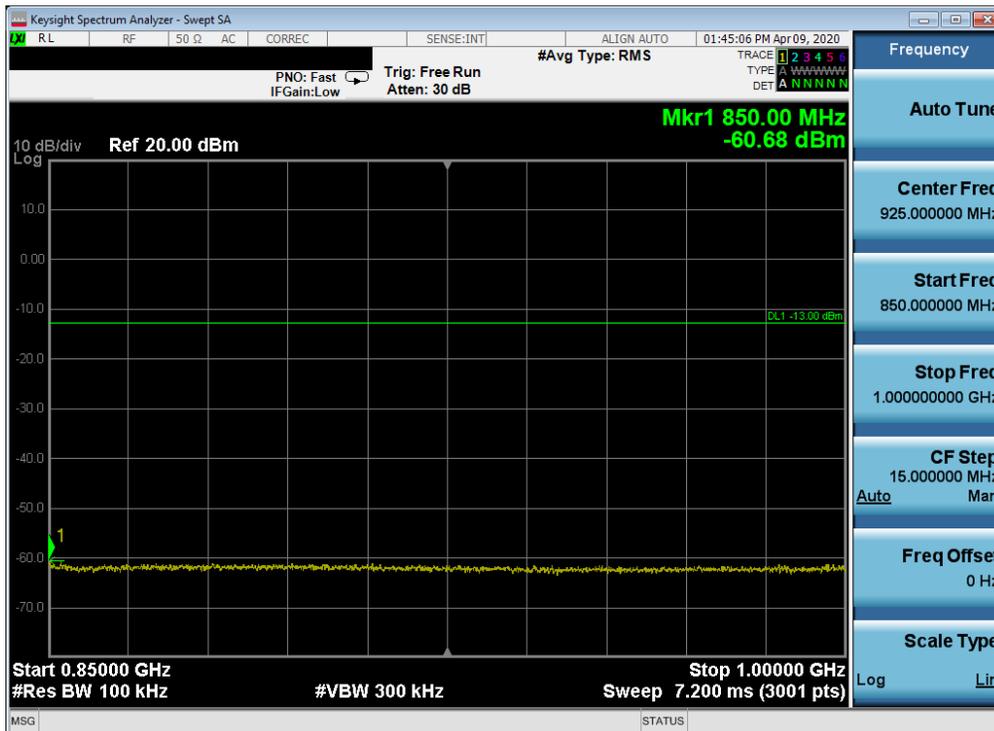


Plot 7-42. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-43. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

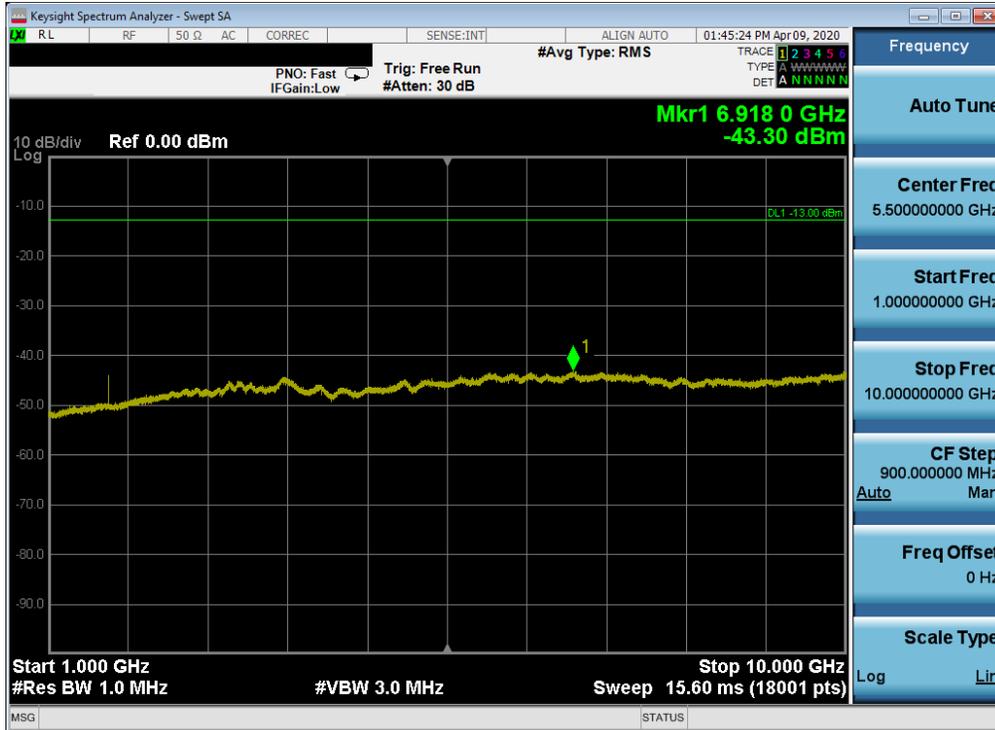


Plot 7-44. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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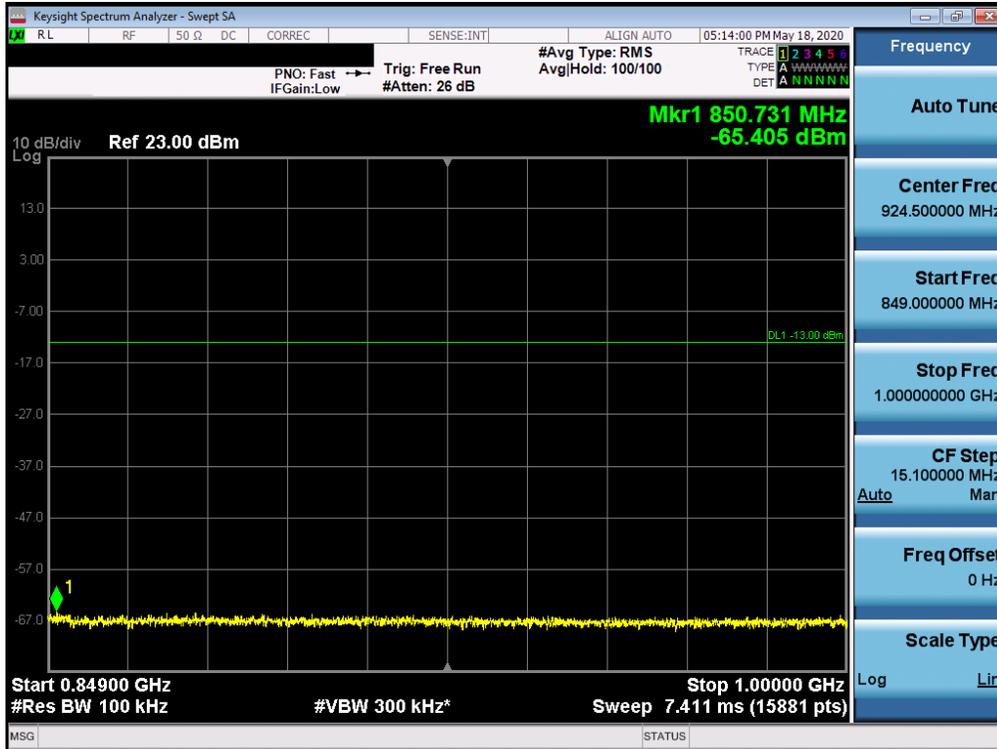


Plot 7-45. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

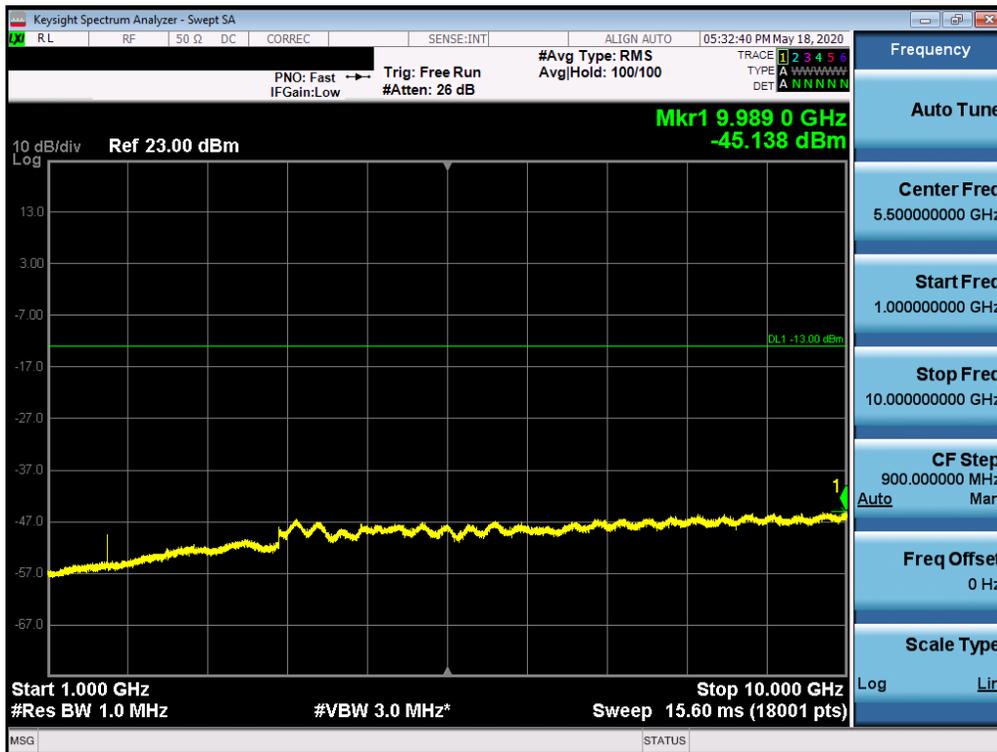
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 39 of 108

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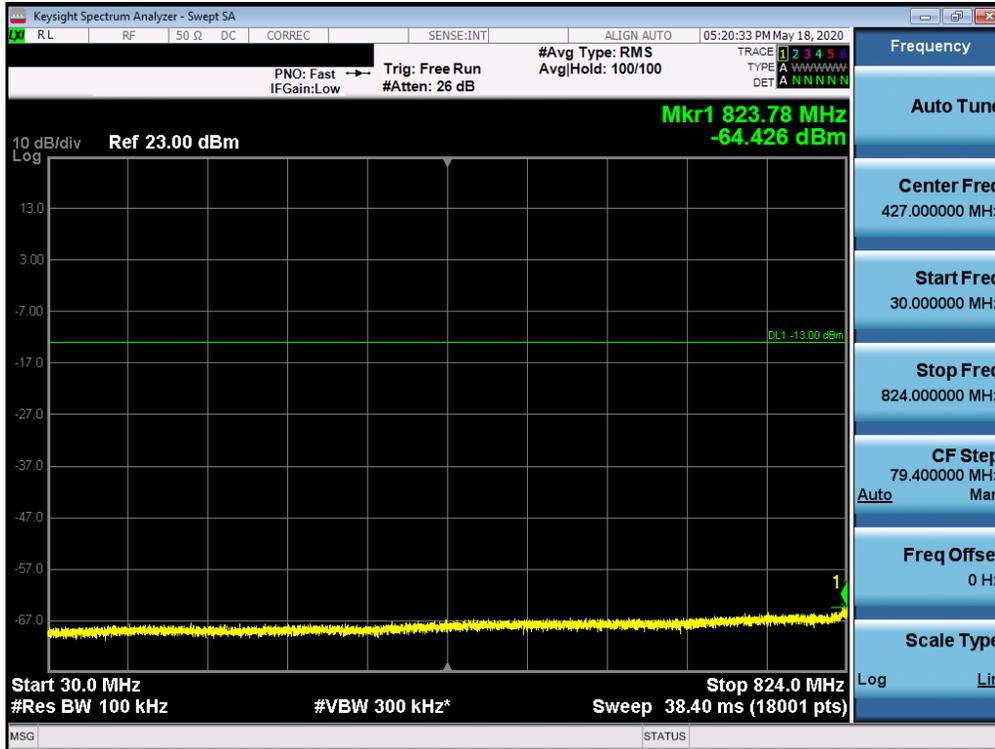


Plot 7-48. Conducted Spurious Plot (ULCA LTE Band 5 – (10 + 10)MHz QPSK – PCC 1/49 SCC 1/0 - Low Channel)



Plot 7-49. Conducted Spurious Plot (ULCA LTE Band 5 – (10 + 10)MHz QPSK – PCC 1/49 SCC 1/0 - Low Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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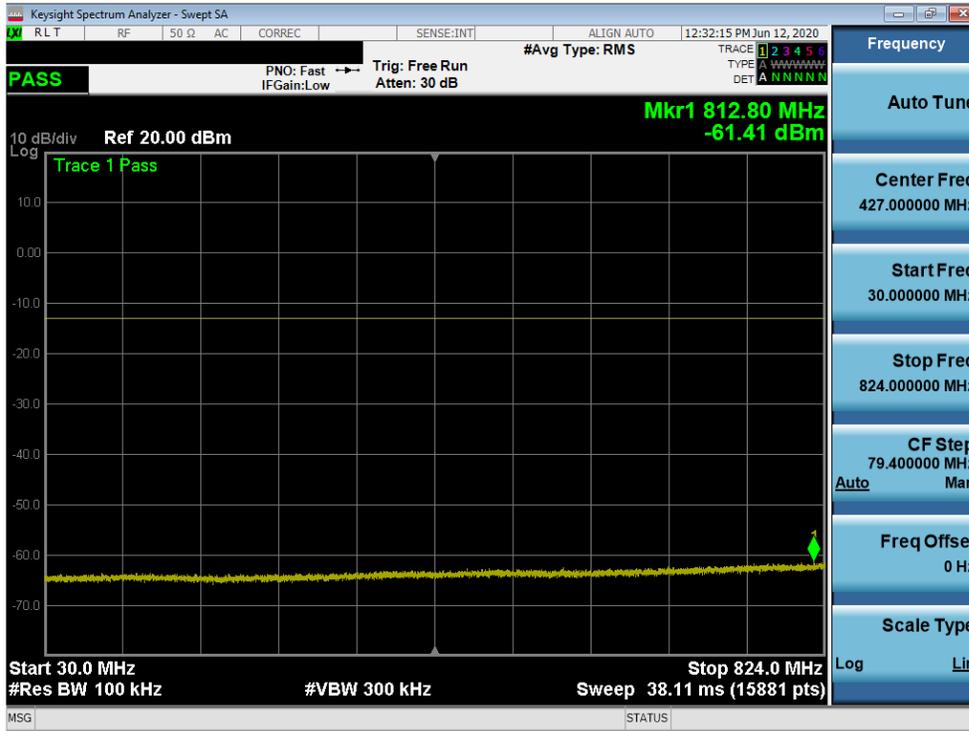
Plot 7-50. Conducted Spurious Plot (ULCA LTE Band 5 – (10 + 10)MHz QPSK – PCC 1/0 SCC 1/49 - High Channel)



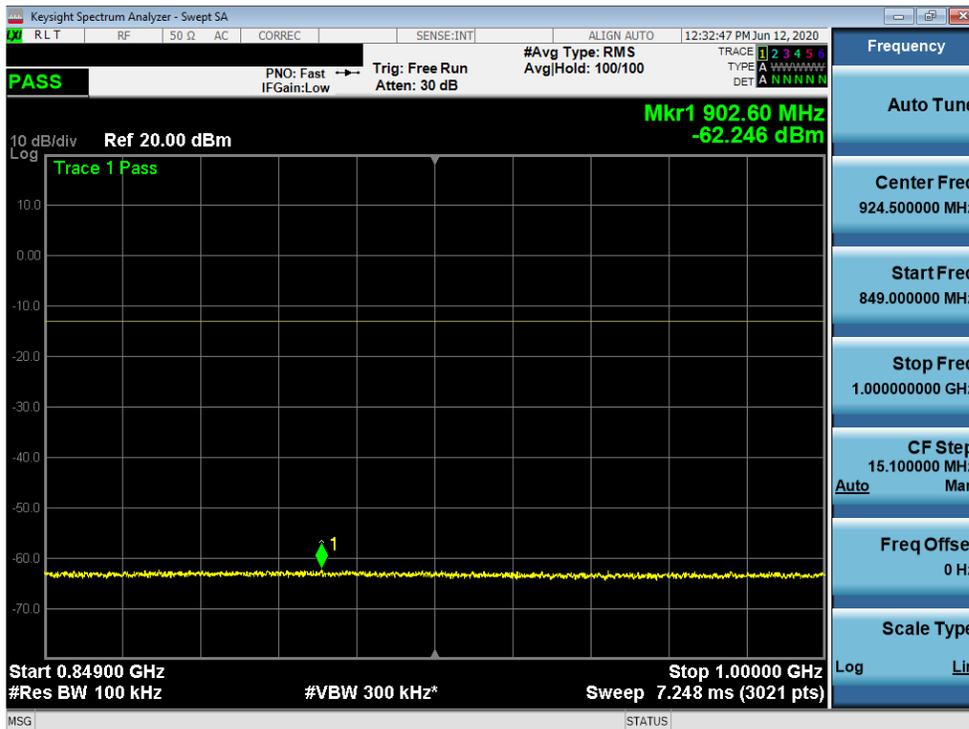
Plot 7-51. Conducted Spurious Plot (ULCA LTE Band 5 – (10 + 10)MHz QPSK – PCC 1/0 SCC 1/49 - High Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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NR Band n5



Plot 7-54. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - Low Channel)

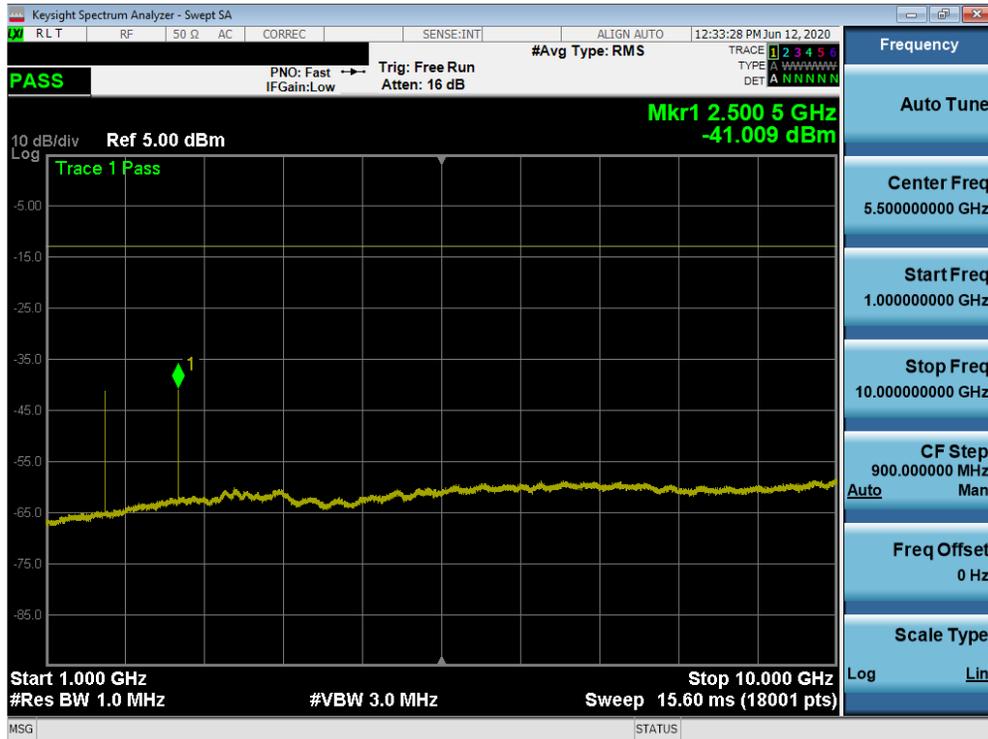


Plot 7-55. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - Low Channel)

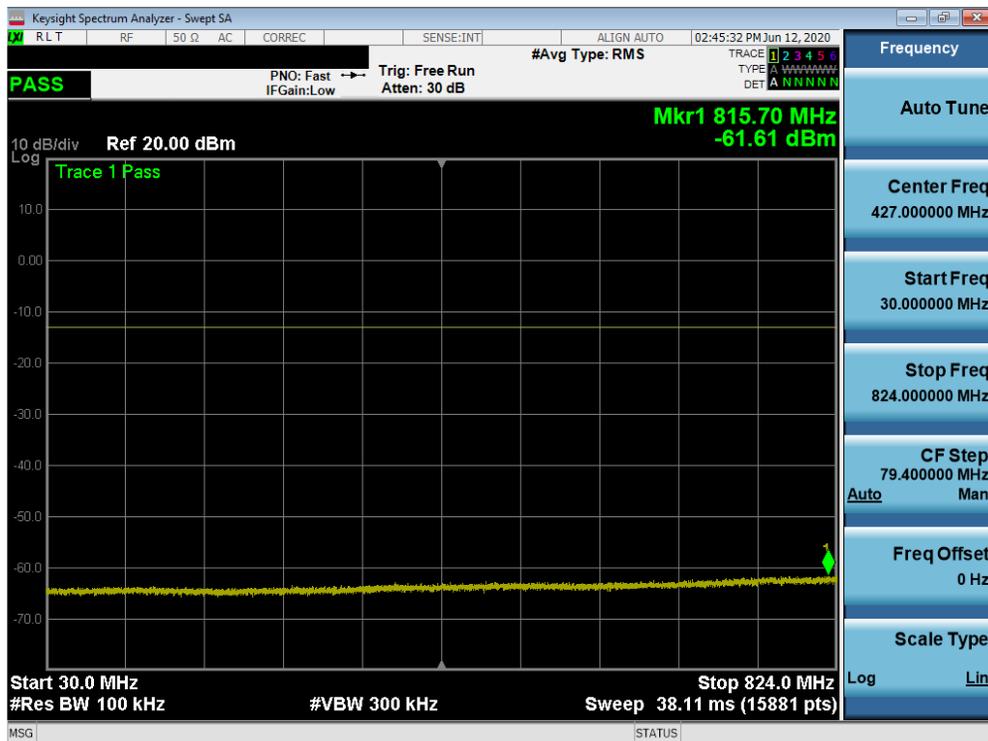
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 44 of 108

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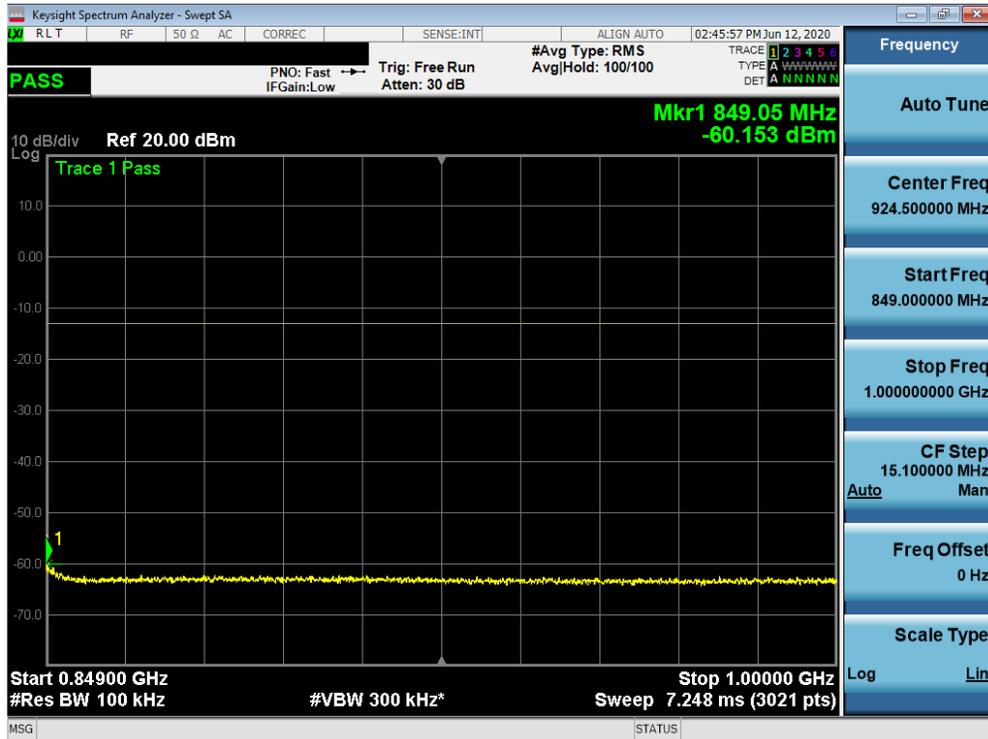


Plot 7-56. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - Low Channel)

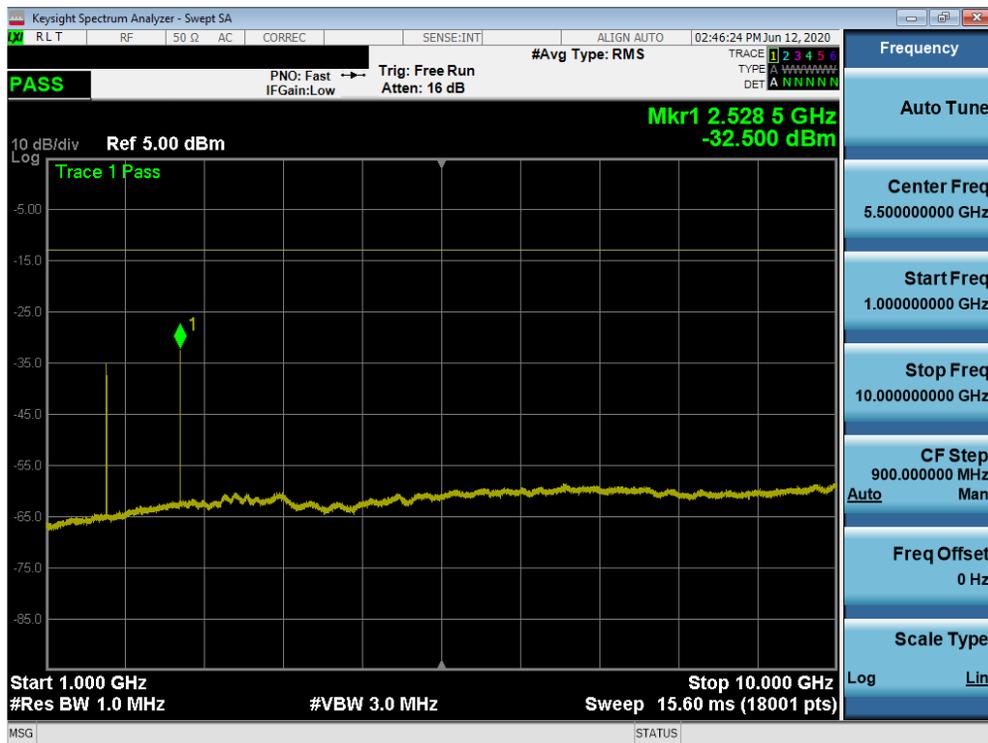


Plot 7-57. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 45 of 108

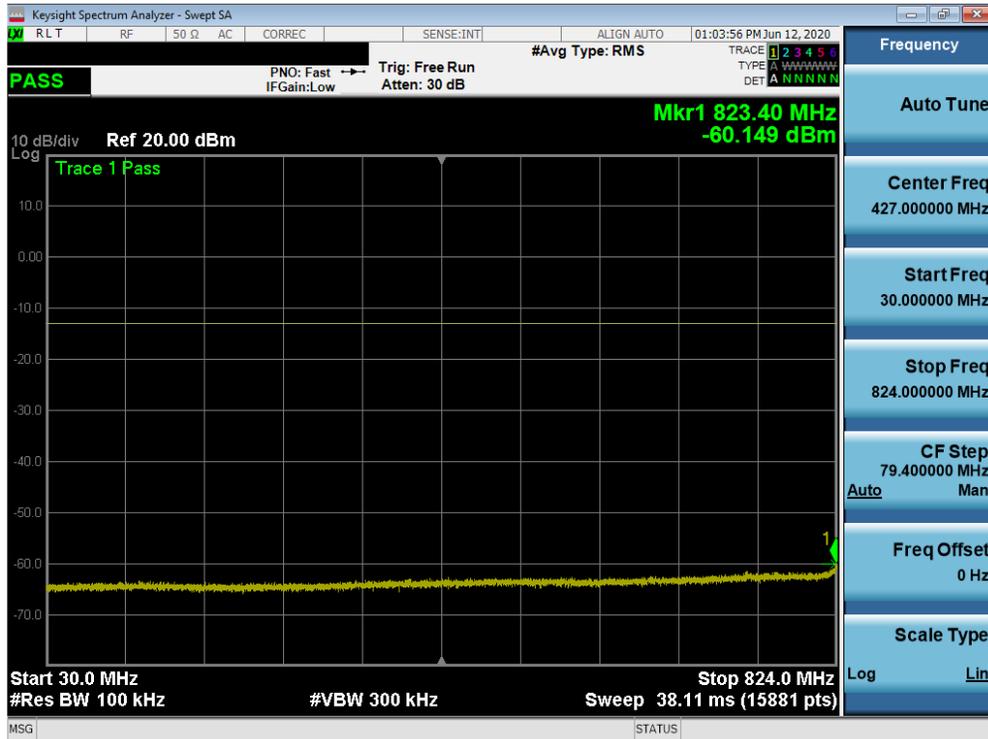


Plot 7-58. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - Mid Channel)

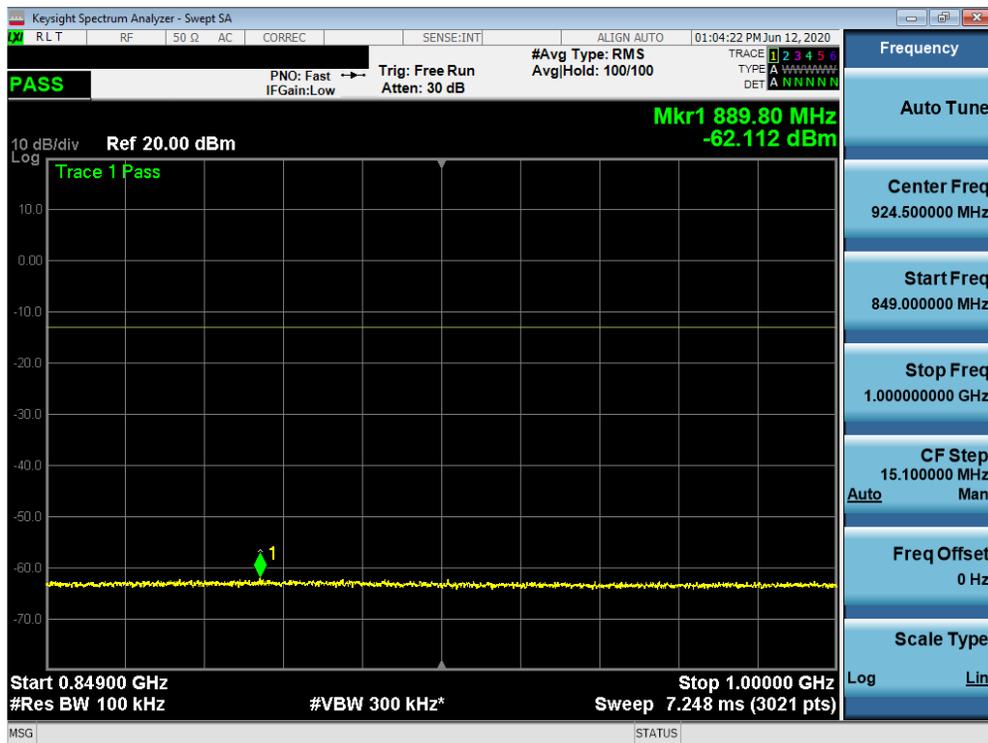


Plot 7-59. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 46 of 108

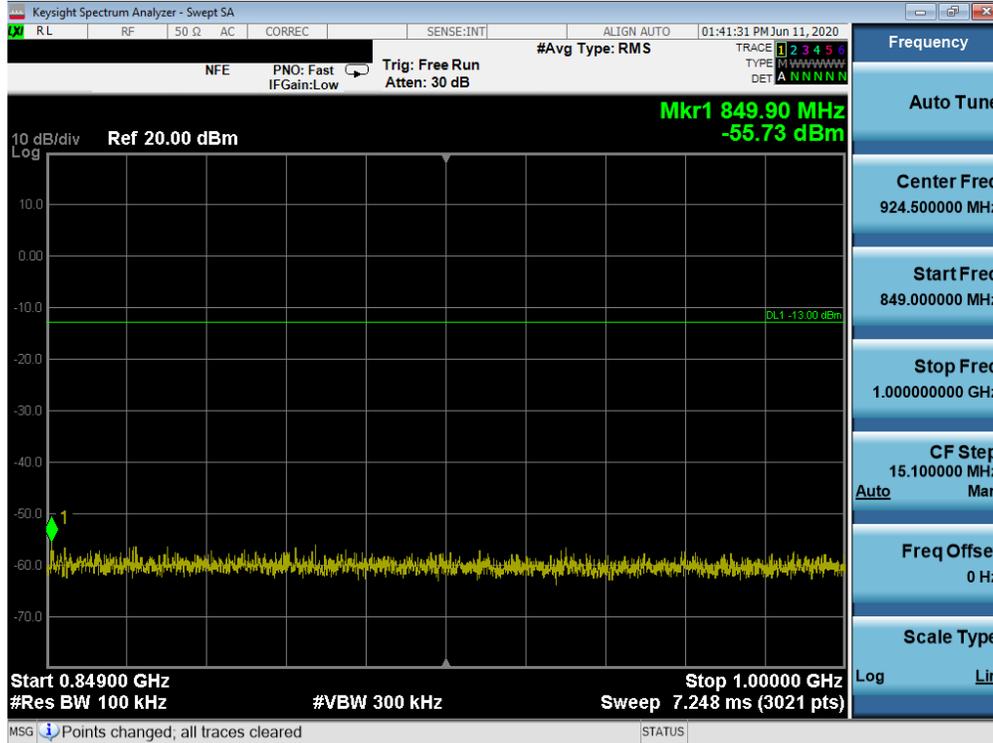


Plot 7-60. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - High Channel)

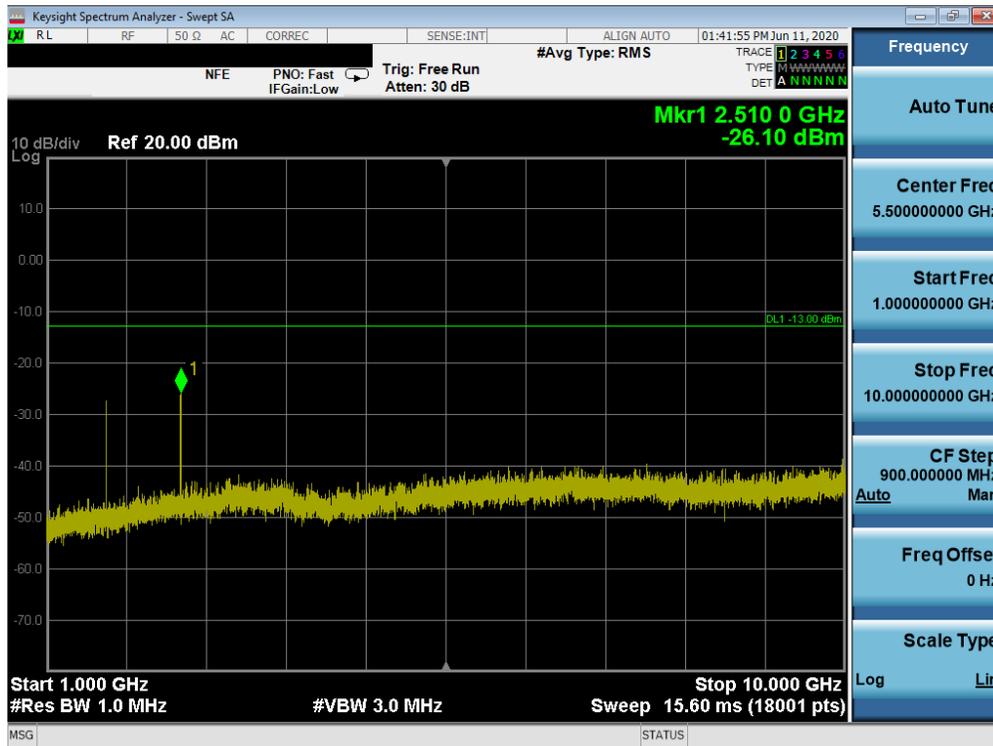


Plot 7-61. Conducted Spurious Plot (NR Band n5 - 20.0MHz - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFG900VM		PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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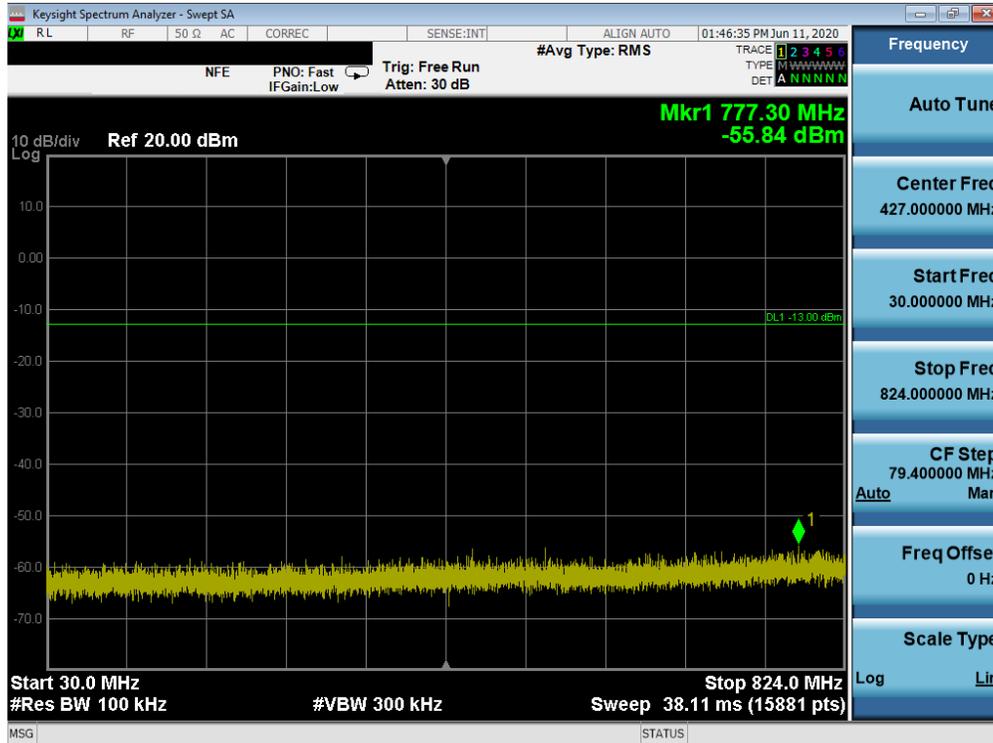


Plot 7-31. Conducted Spurious Plot (GPRS Ch. 190)

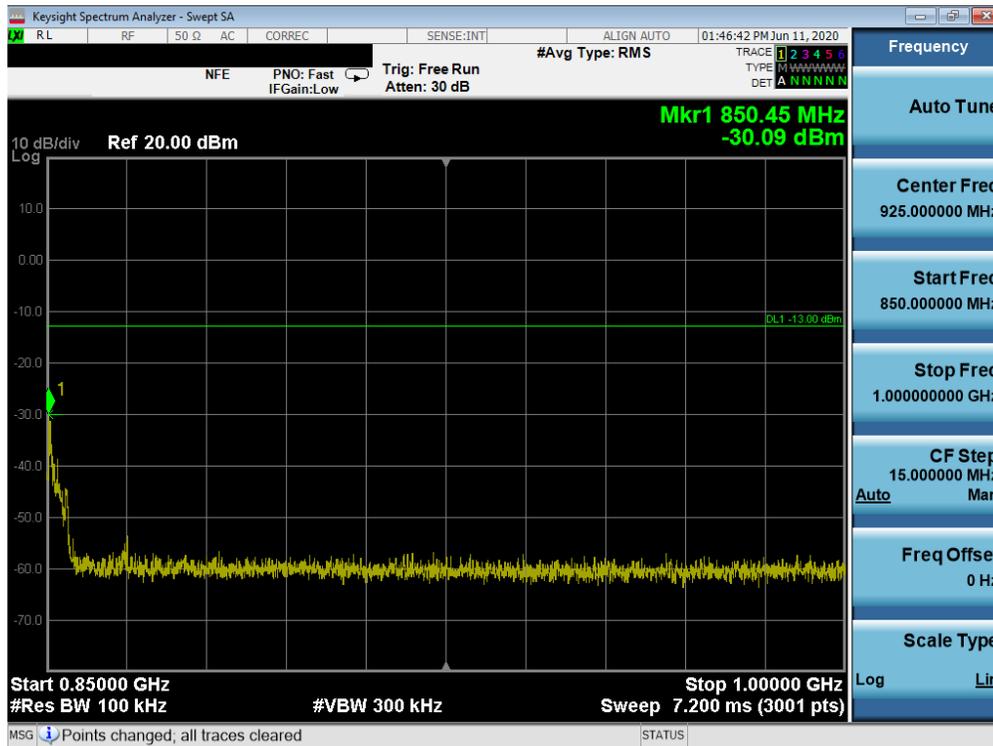


Plot 7-31. Conducted Spurious Plot (GPRS Ch. 190)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 51 of 108

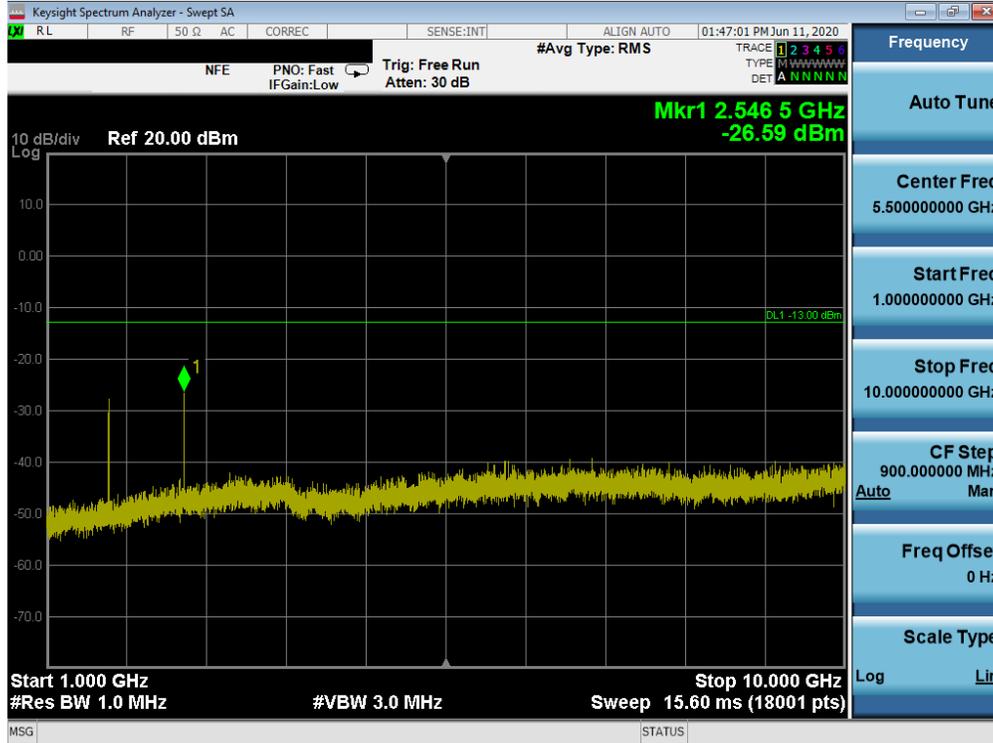


Plot 7-31. Conducted Spurious Plot (GPRS Ch. 251)



Plot 7-31. Conducted Spurious Plot (GPRS Ch. 251)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-31. Conducted Spurious Plot (GPRS Ch. 251)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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WCDMA Cell



Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4132)



Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4132)

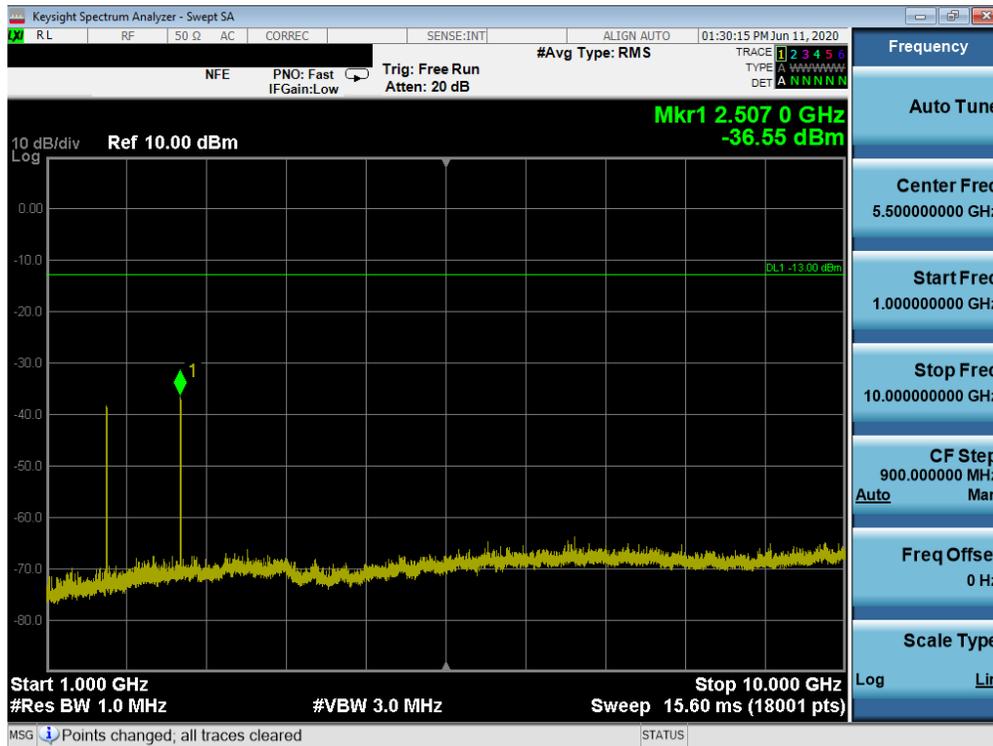
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 54 of 108

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Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4183)



Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4183)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4233)

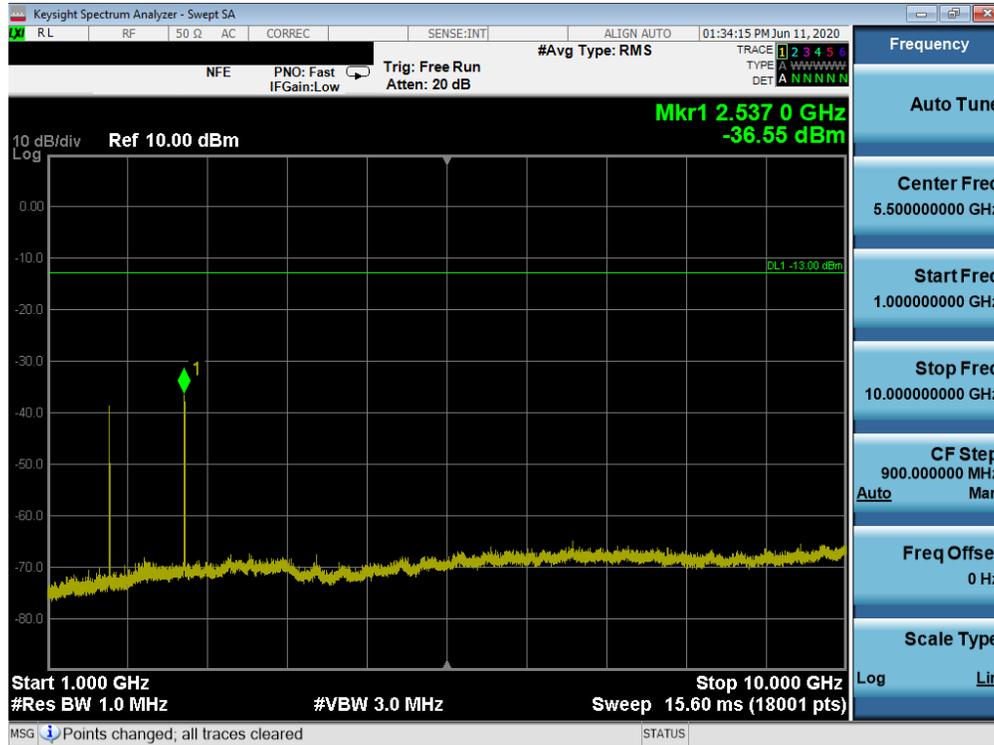


Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4233)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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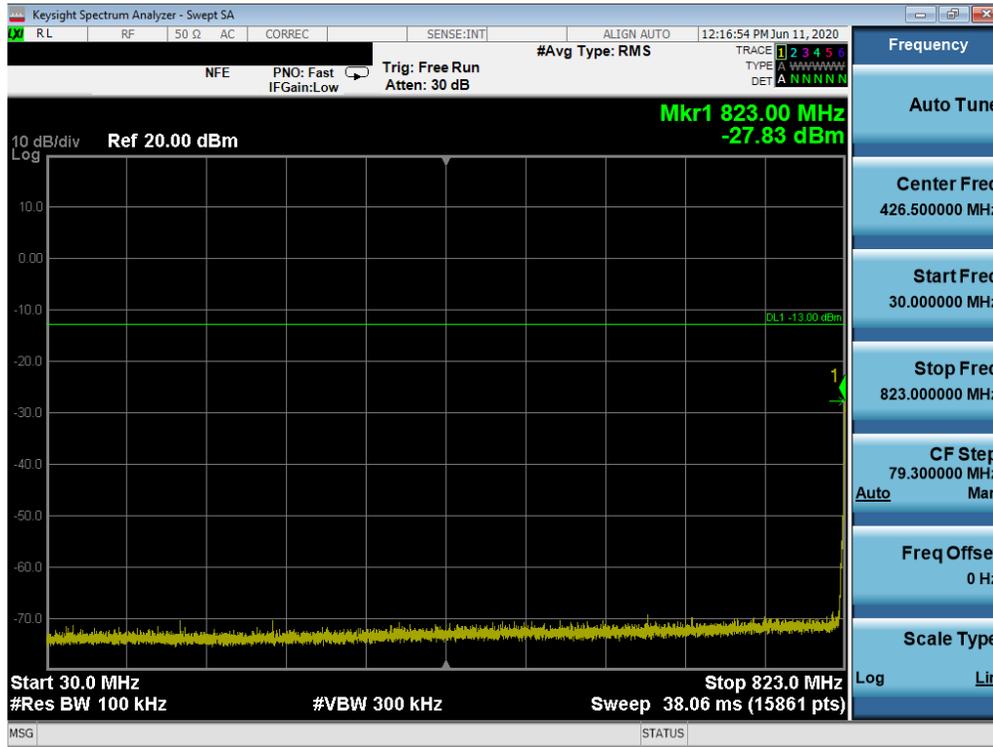
Plot 7-31. Conducted Spurious Plot (WCDMA Ch. 4233)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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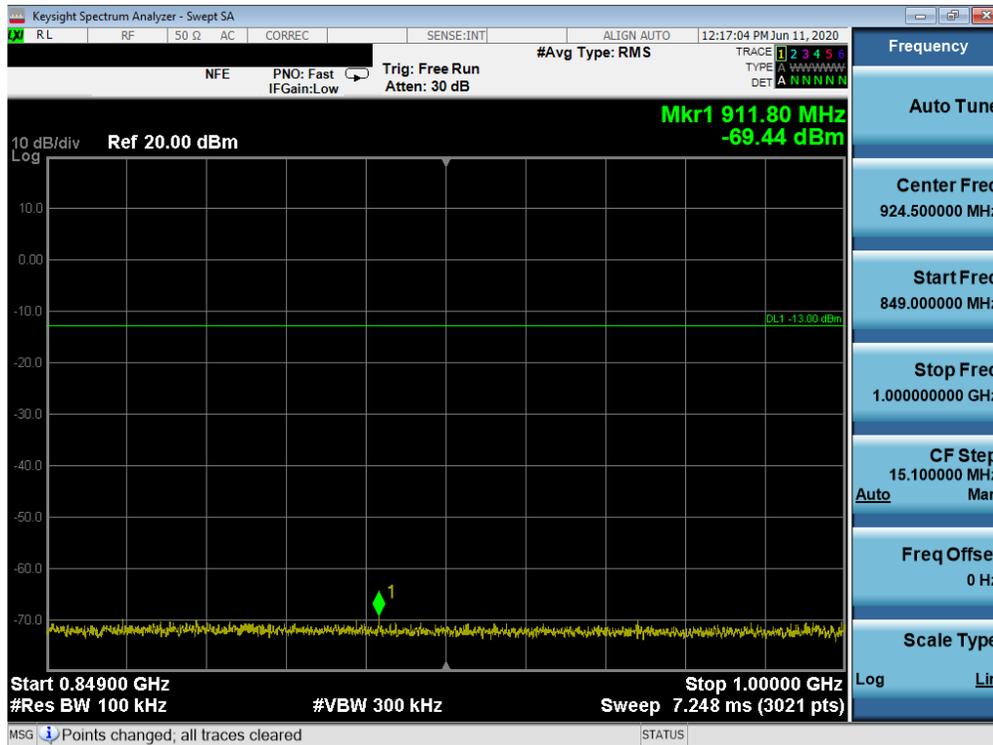
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CDMA Cell

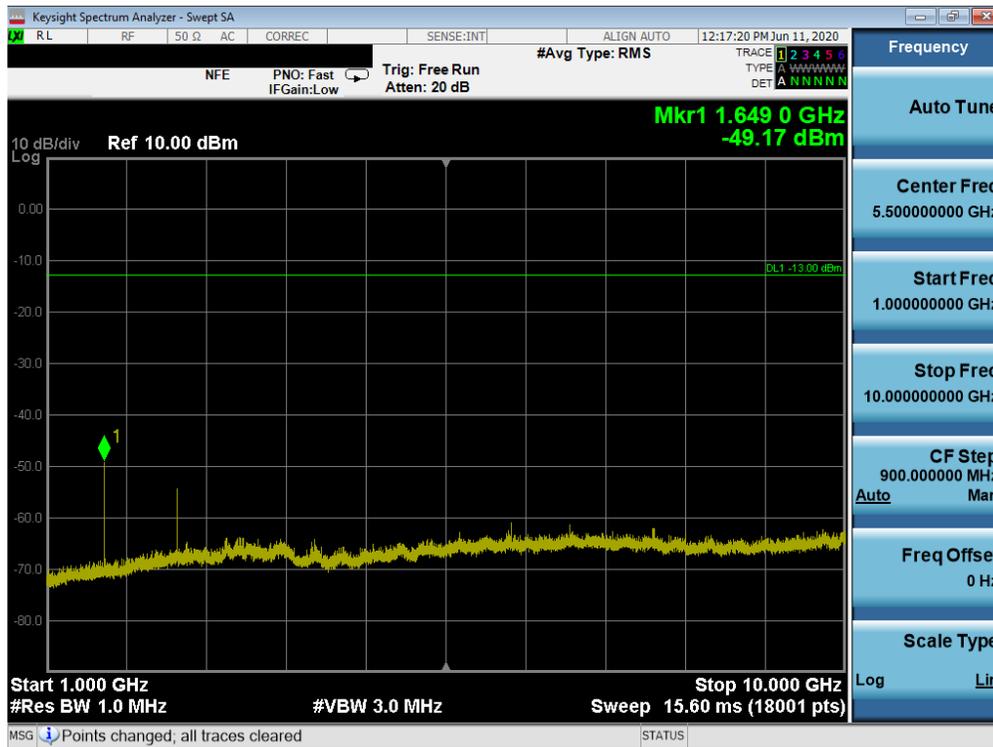


Plot 7-31. Conducted Spurious Plot (CDMA Ch. 1013)

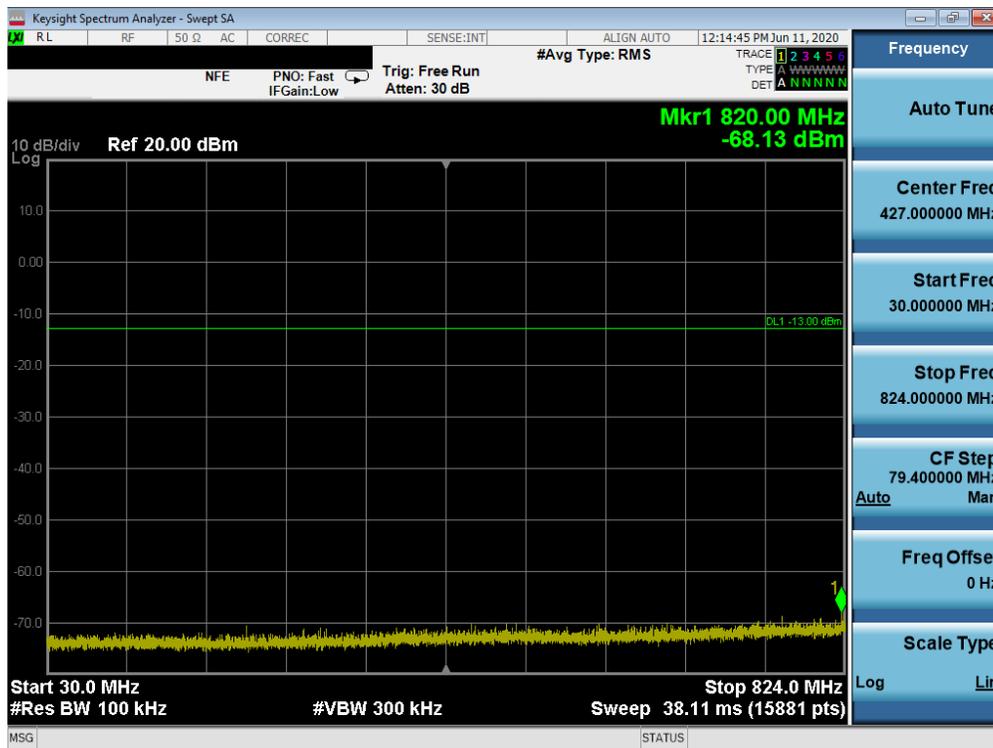


Plot 7-31. Conducted Spurious Plot (CDMA Ch. 1013)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-31. Conducted Spurious Plot (CDMA Ch. 1013)

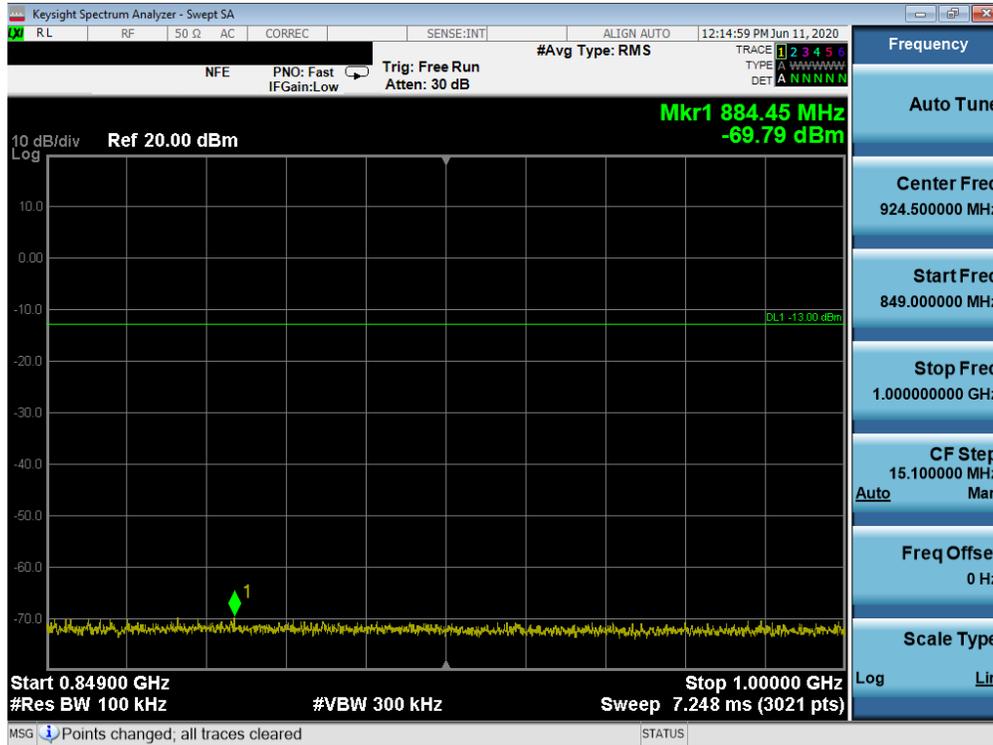


Plot 7-31. Conducted Spurious Plot (CDMA Ch. 384)

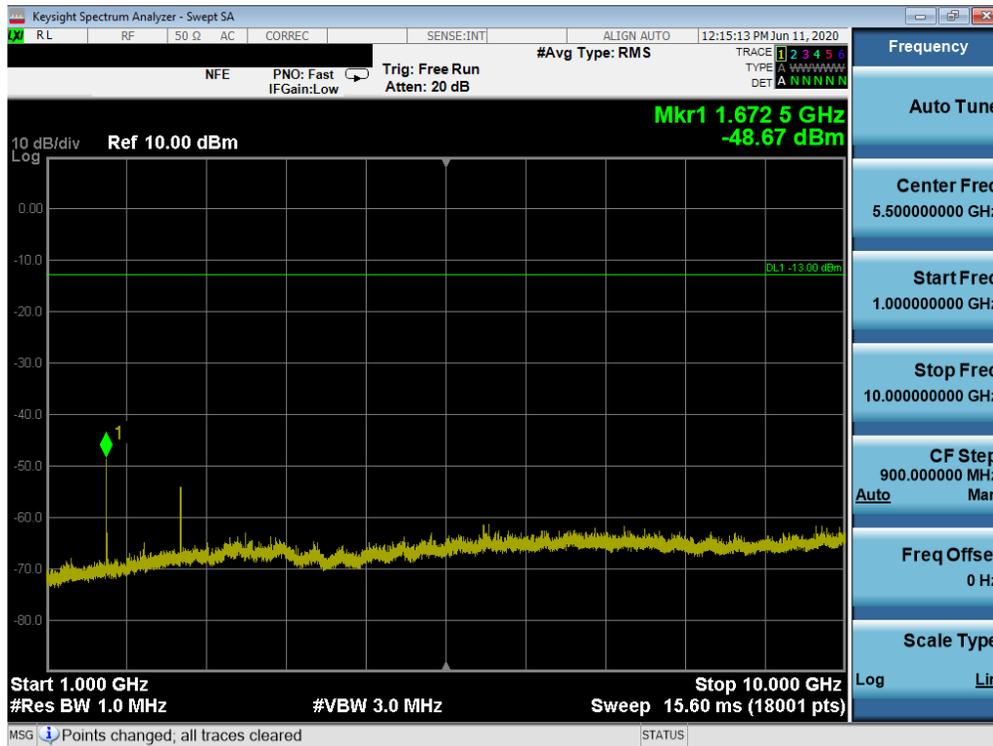
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 60 of 108

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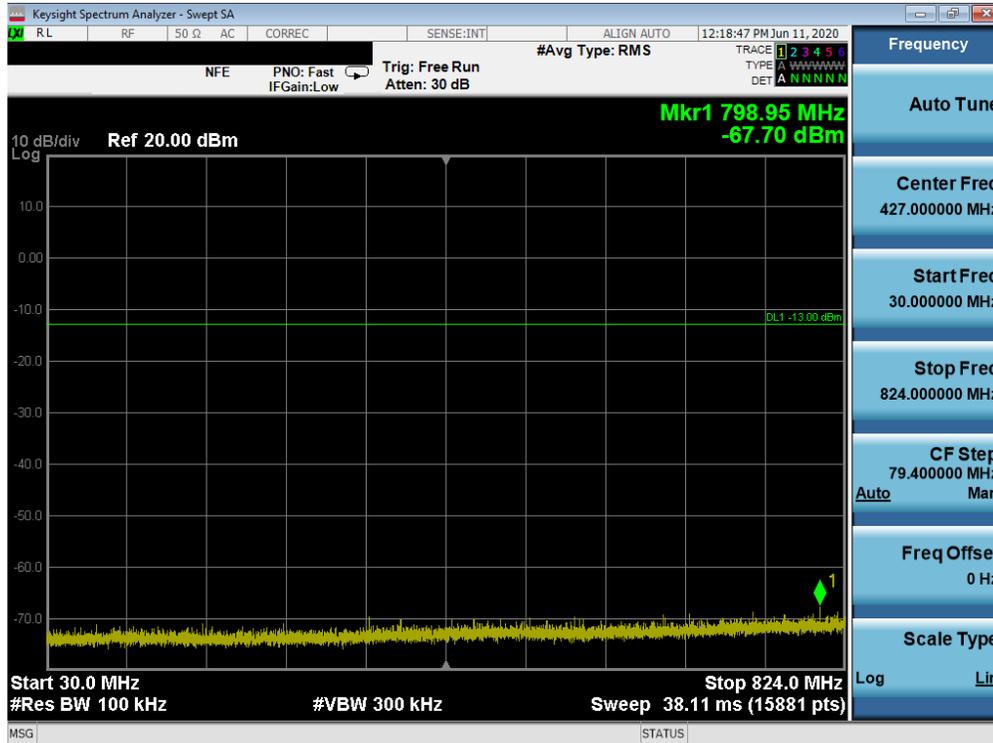


Plot 7-31. Conducted Spurious Plot (CDMA Ch. 384)

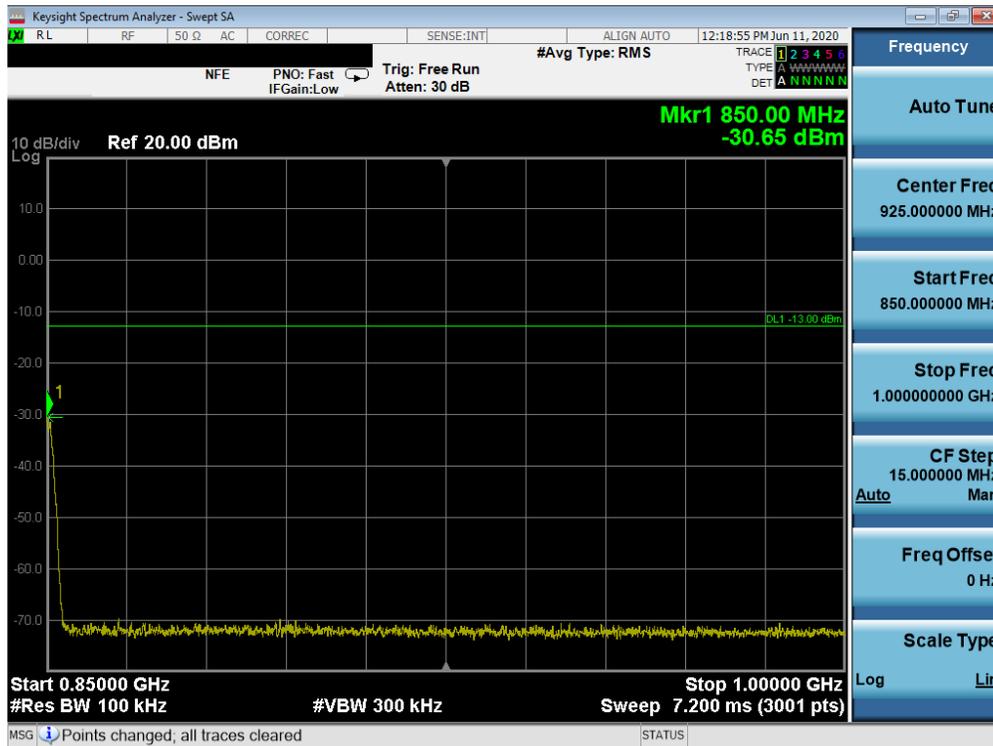


Plot 7-31. Conducted Spurious Plot (CDMA Ch. 384)

FCC ID: ZNFG900VM		PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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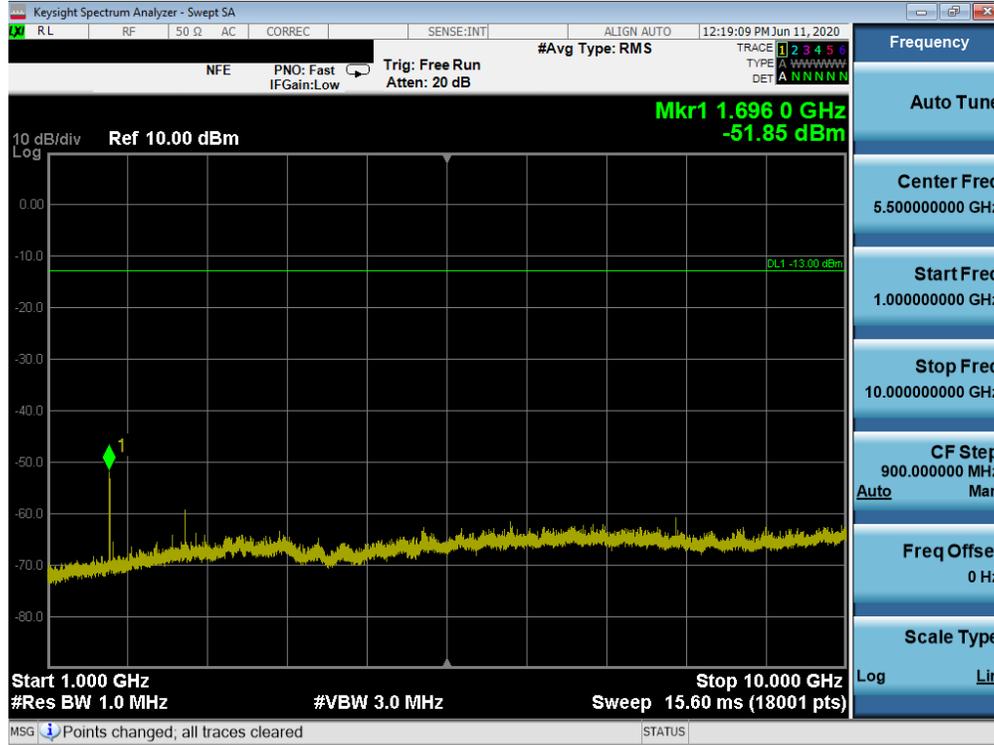


Plot 7-31. Conducted Spurious Plot (CDMA Ch. 777)



Plot 7-31. Conducted Spurious Plot (CDMA Ch. 777)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-31. Conducted Spurious Plot (CDMA Ch. 777)

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7.5 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 $43 + 10 \log_{10}(P_{\text{Watts}})$, 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.

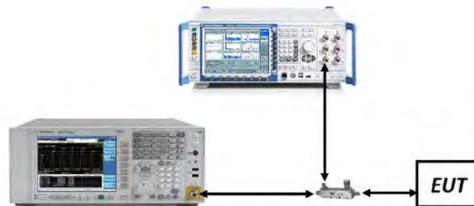


Figure 7-4. Test Instrument & Measurement Setup

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Test Notes

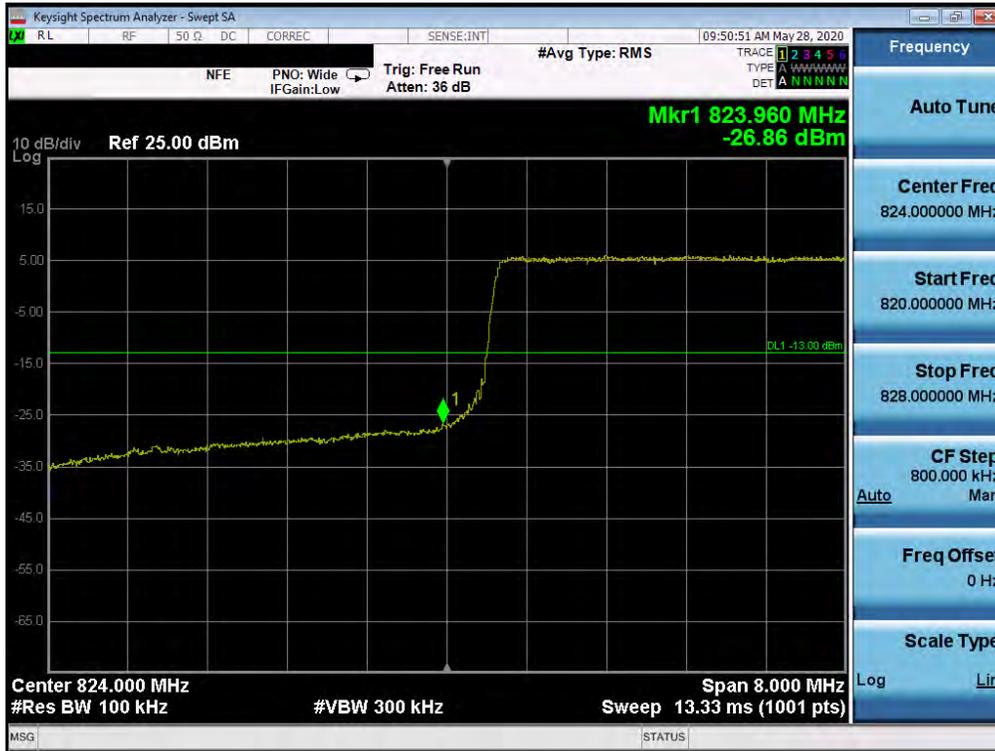
1. Per 22.917(b) and RSS-132(5.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions 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.
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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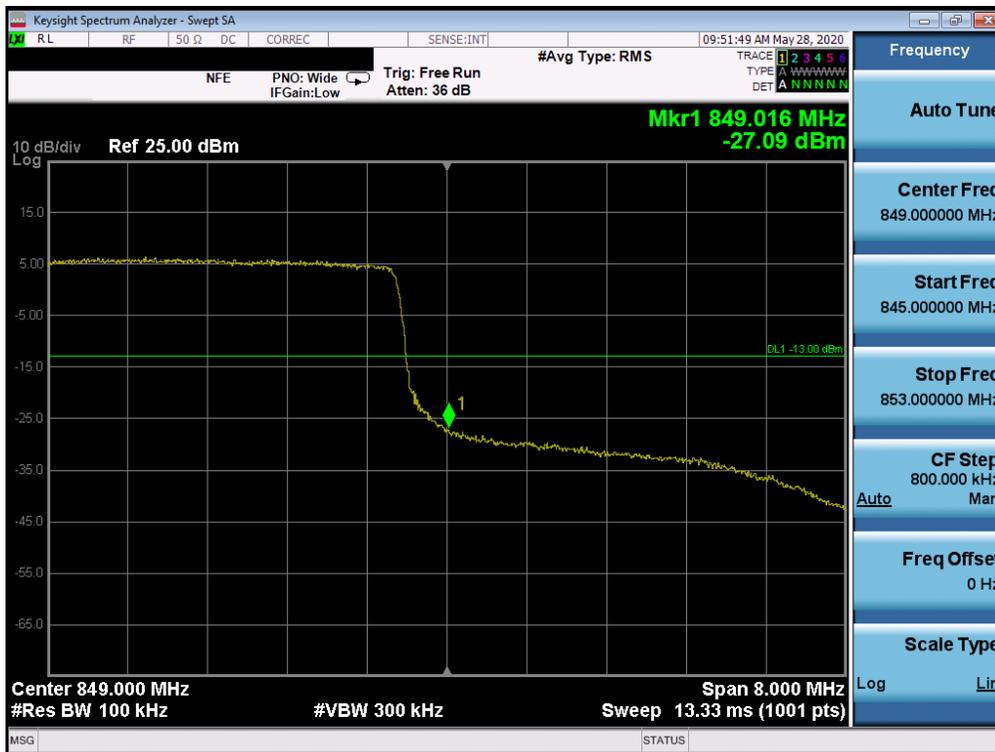
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LTE Band 5



Plot 7-63. Lower Band Edge Plot (LTE Band 5 - 10MHz QPSK – Full RB Configuration)

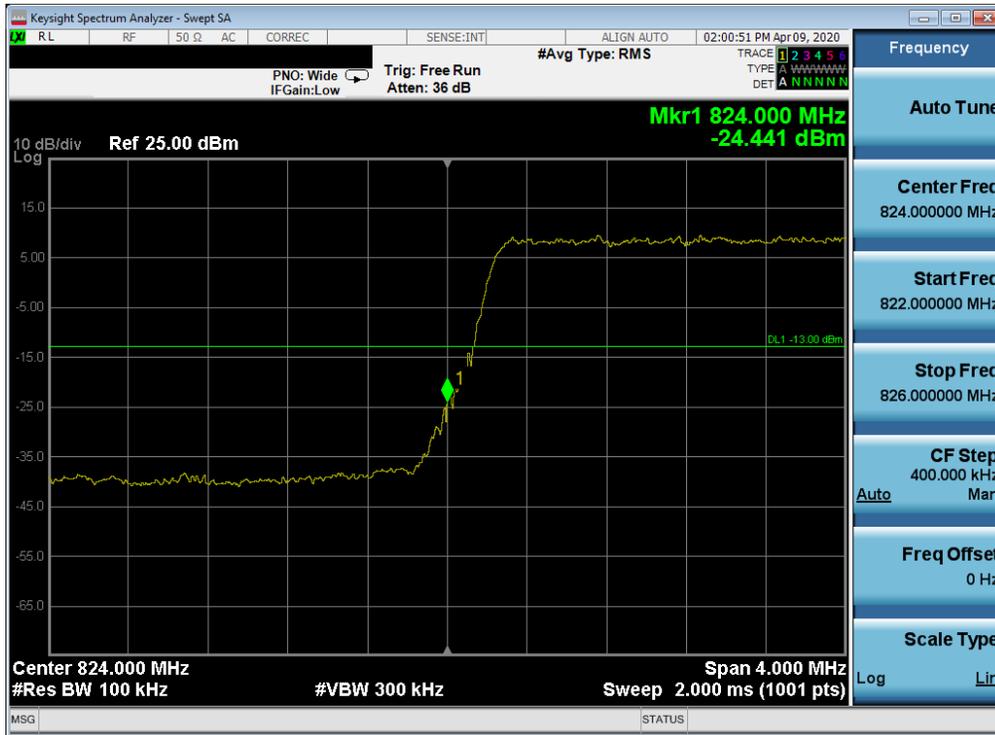


Plot 7-64. Upper Band Edge Plot (LTE Band 5 - 10MHz QPSK – Full RB Configuration)

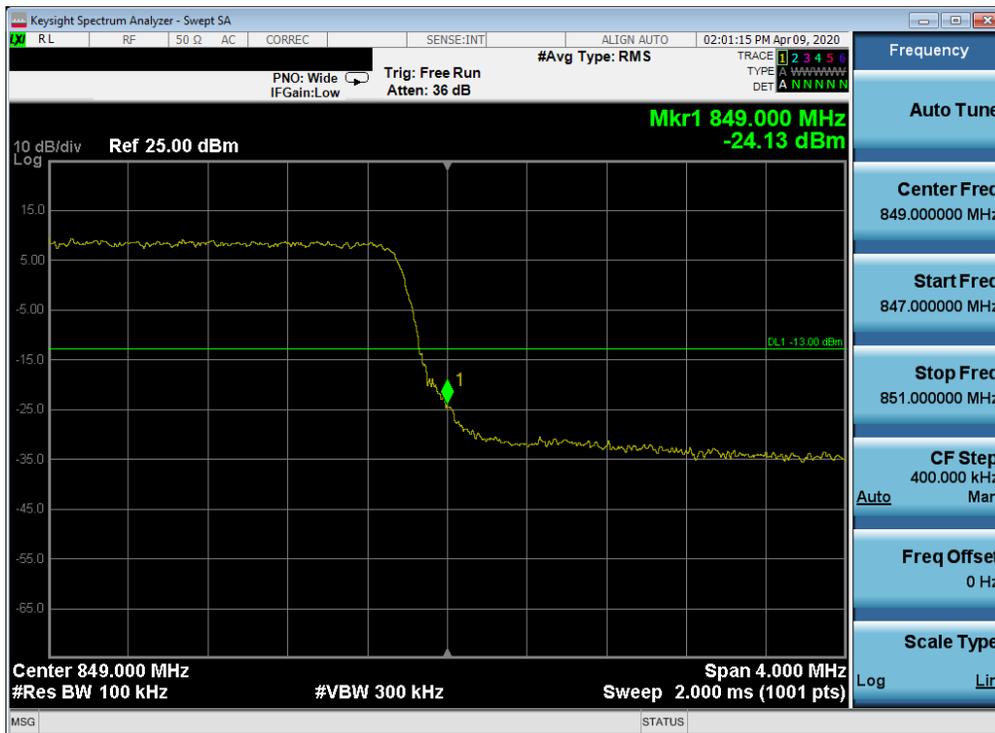
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 66 of 108

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Plot 7-65. Lower Band Edge Plot (LTE Band 5 - 5MHz QPSK – Full RB Configuration)



Plot 7-66. Upper Band Edge Plot (LTE Band 5 - 5MHz QPSK – Full RB Configuration)

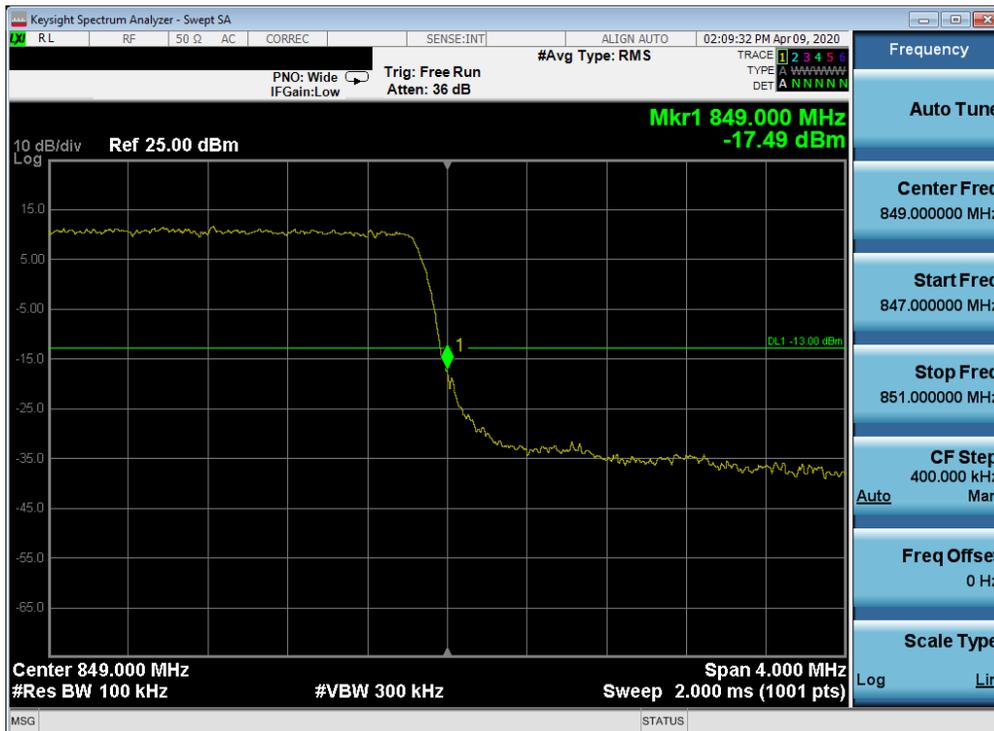
FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 67 of 108

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Plot 7-67. Lower Band Edge Plot (LTE Band 5 - 3MHz QPSK – Full RB Configuration)

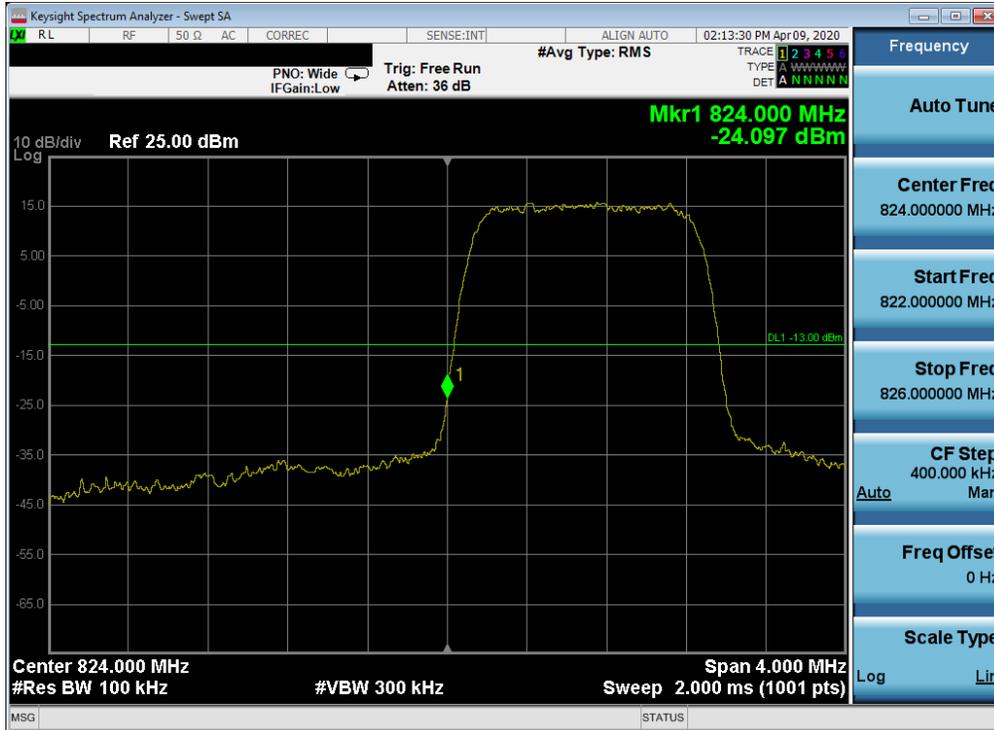


Plot 7-68. Upper Band Edge Plot (LTE Band 5 - 3MHz QPSK – Full RB Configuration)

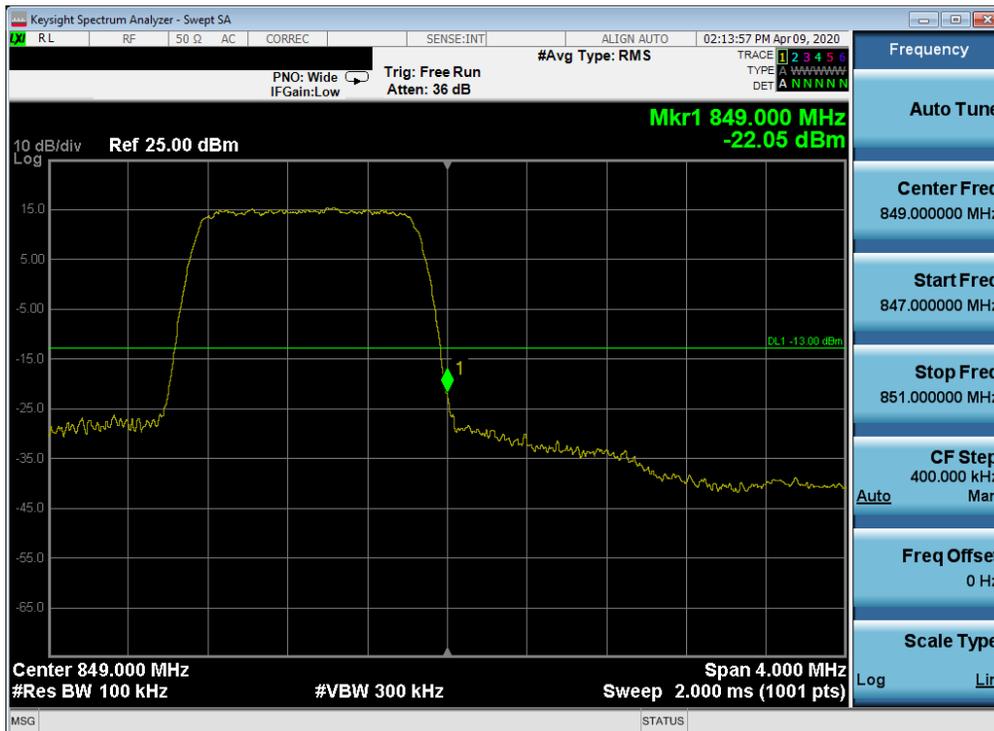
FCC ID: ZNFG900VM	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	LG	Approved by: Quality Manager
Test Report S/N: 1M2004230076-02.ZNF	Test Dates: 4/27 - 7/1/2020	EUT Type: Portable Handset		Page 68 of 108

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Plot 7-69. Lower Band Edge Plot (LTE Band 5 – 1.4MHz QPSK – Full RB Configuration)



Plot 7-70. Upper Band Edge Plot (LTE Band 5 – 1.4MHz QPSK – Full RB Configuration)

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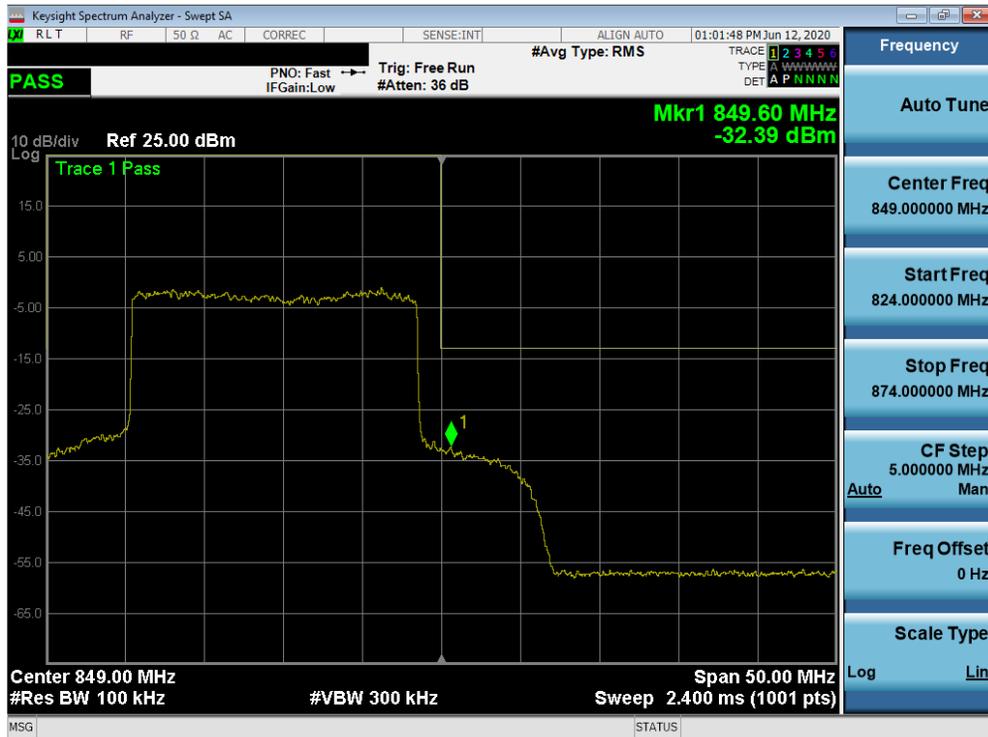
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NR Band n5



Plot 7-71. Lower Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)



Plot 7-72. Upper Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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Plot 7-75. Lower Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)



Plot 7-76. Upper Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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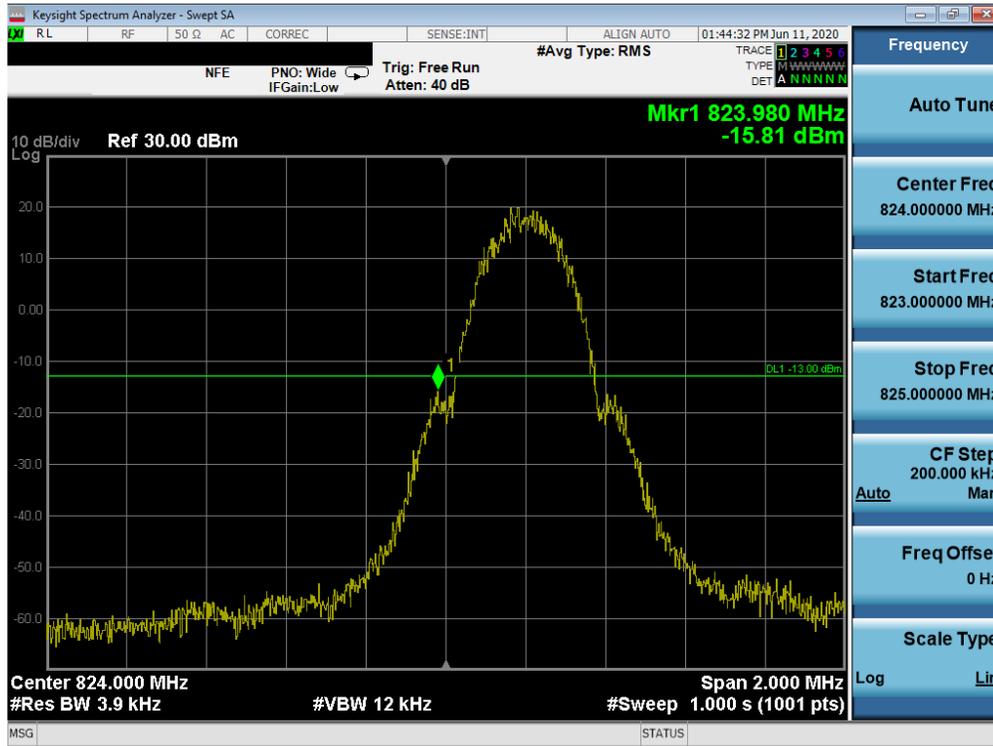
Plot 7-77. Lower Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)



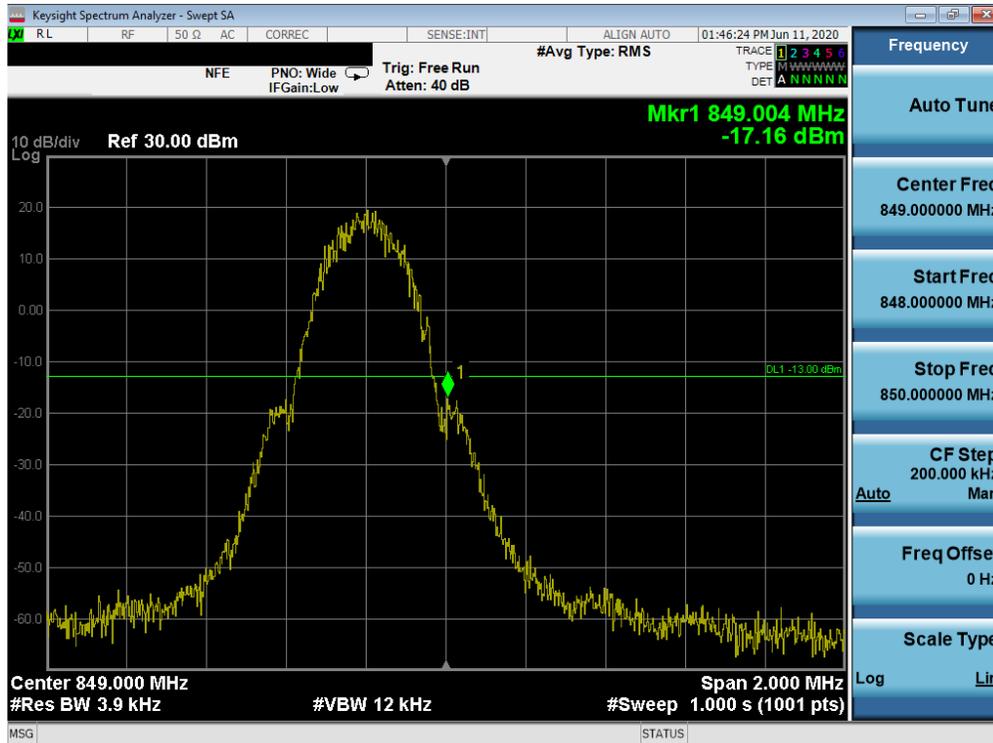
Plot 7-78. Upper Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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GSM/GPRS Cell



Plot 7-79. Lower Band Edge Plot (GPRS Cell – Ch. 128)



Plot 7-80. Upper Band Edge Plot (GPRS Cell – Ch. 251)

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CDMA Cell



Plot 7-83. Lower Band Edge Plot (CDMA Cell – Ch. 1013)



Plot 7-84. Upper Band Edge Plot (CDMA Cell – Ch. 777)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. 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

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Test Setup

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

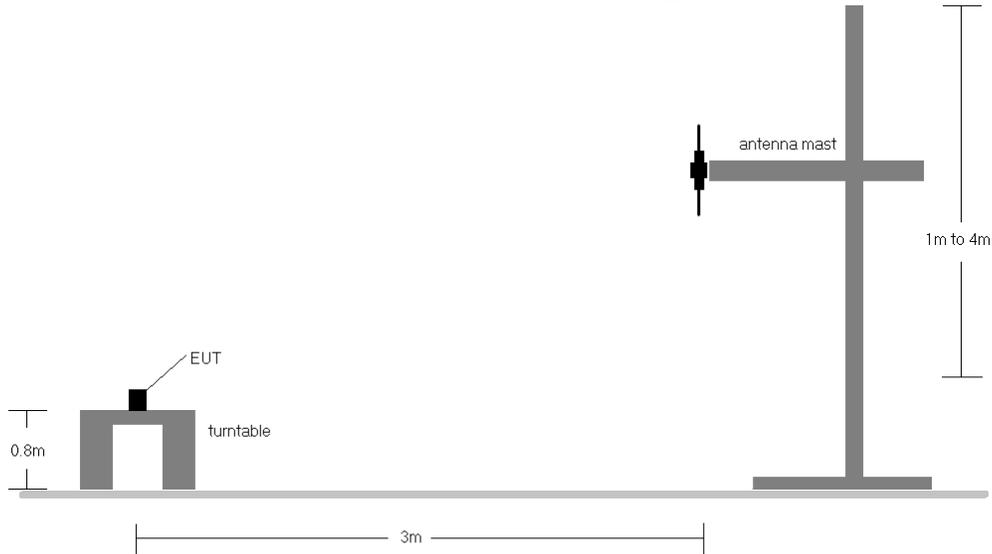


Figure 7-5. Radiated Test Setup <1GHz

Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC 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) 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.
- 5) This unit was tested with its standard battery.
- 6) 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.
- 7) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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Bandwidth	Modulation	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.00	V	153	104	1.27	1 / 49	19.41	18.53	38.45	-19.92
		836.50	V	137	113	1.31	1 / 49	19.88	19.04	38.45	-19.41
		844.00	V	159	119	1.35	1 / 25	19.61	18.81	38.45	-19.64
	16-QAM	836.50	V	137	113	1.31	1 / 49	18.93	18.09	38.45	-20.36
	64-QAM	836.50	V	137	113	1.31	1 / 49	18.15	17.31	38.45	-21.14
5 MHz	QPSK	829.0	V	151	116	1.27	1 / 12	19.70	18.82	38.45	-19.63
		836.5	V	162	116	1.31	1 / 12	19.26	18.42	38.45	-20.03
		844.0	V	139	114	1.35	1 / 12	19.78	18.98	38.45	-19.47
	16-QAM	844.0	V	139	114	1.35	1 / 12	18.90	18.10	38.45	-20.35
	64-QAM	844.0	V	139	114	1.35	1 / 12	17.96	17.16	38.45	-21.29
3 MHz	QPSK	829.0	V	165	107	1.27	1 / 14	18.90	18.02	38.45	-20.43
		836.5	V	162	101	1.31	1 / 14	19.25	18.41	38.45	-20.04
		844.0	V	159	92	1.35	1 / 14	20.46	19.66	38.45	-18.79
	16-QAM	844.0	V	159	92	1.35	1 / 14	19.89	19.09	38.45	-19.36
	64-QAM	844.0	V	159	92	1.35	1 / 14	18.64	17.84	38.45	-20.61
1.4 MHz	QPSK	829.0	V	158	76	1.27	1 / 3	19.41	18.53	38.45	-19.92
		836.5	V	150	93	1.31	1 / 3	19.59	18.75	38.45	-19.70
		844.0	V	143	89	1.35	1 / 3	21.00	20.20	38.45	-18.25
	16-QAM	844.0	V	143	89	1.35	1 / 3	20.36	19.56	38.45	-18.89
	64-QAM	844.0	V	143	89	1.35	1 / 3	19.25	18.45	38.45	-20.00
	Opposite Pol.	844.0	H	395	86	1.35	1 / 3	16.07	15.27	38.45	-23.18

Table 7-85. ERP Data (LTE Band 5)

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	834.0	H	203.0	335.0	6.75	1 / 50	11.11	15.71	0.037	38.45	-22.74
		836.5	H	203.0	335.0	6.68	1 / 50	9.72	14.25	0.027	38.45	-24.20
		839.0	H	136.0	345.0	6.70	1 / 50	9.36	13.91	0.025	38.45	-24.54
	QPSK	834.0	H	203.0	335.0	6.75	1 / 50	11.16	15.76	0.038	38.45	-22.69
		836.5	H	203.0	335.0	6.68	1 / 50	9.70	14.23	0.026	38.45	-24.22
		839.0	H	136.0	345.0	6.70	1 / 50	9.62	14.17	0.026	38.45	-24.28
	16-QAM	834.0	H	203.0	335.0	6.75	1 / 50	10.23	14.83	0.030	38.45	-23.62
64-QAM	834.0	H	203.0	335.0	6.75	1 / 50	8.72	13.32	0.021	38.45	-25.13	
256-QAM	834.0	H	203.0	335.0	6.75	1 / 50	6.33	10.93	0.012	38.45	-27.52	
15 MHz	π/2 BPSK	831.5	H	203.0	335.0	6.73	1 / 37	11.29	15.86	0.039	38.45	-22.59
		836.5	H	203.0	335.0	6.68	1 / 73	9.50	14.03	0.025	38.45	-24.42
		841.5	H	136.0	345.0	6.63	1 / 1	9.28	13.76	0.024	38.45	-24.69
	QPSK	831.5	H	203.0	335.0	6.73	1 / 37	11.55	16.13	0.041	38.45	-22.32
		836.5	H	203.0	335.0	6.68	1 / 73	9.68	14.21	0.026	38.45	-24.24
		841.5	H	136.0	345.0	6.63	1 / 73	9.00	13.48	0.022	38.45	-24.97
	16-QAM	831.5	H	203.0	335.0	6.73	1 / 37	10.56	15.13	0.033	38.45	-23.32
64-QAM	831.5	H	203.0	335.0	6.73	1 / 37	8.85	13.43	0.022	38.45	-25.02	
256-QAM	831.5	H	203.0	335.0	6.73	1 / 37	6.50	11.08	0.013	38.45	-27.37	
10 MHz	π/2 BPSK	829.0	H	203.0	335.0	6.80	1 / 25	13.52	18.17	0.066	38.45	-20.28
		836.5	H	203.0	335.0	6.68	1 / 48	9.45	13.98	0.025	38.45	-24.47
		844.0	H	136.0	345.0	6.66	1 / 25	11.95	16.45	0.044	38.45	-22.00
	QPSK	829.0	H	203.0	335.0	6.80	1 / 25	13.76	18.42	0.069	38.45	-20.04
		836.5	H	203.0	335.0	6.68	1 / 25	9.36	13.88	0.024	38.45	-24.57
		844.0	H	136.0	345.0	6.66	1 / 25	11.59	16.10	0.041	38.45	-22.35
	16-QAM	829.0	H	203.0	335.0	6.80	1 / 25	13.33	17.98	0.063	38.45	-20.47
64-QAM	829.0	H	203.0	335.0	6.80	1 / 1	11.54	16.19	0.042	38.45	-22.26	
256-QAM	829.0	H	203.0	335.0	6.80	50 / 0	8.18	12.83	0.019	38.45	-25.62	
5 MHz	π/2 BPSK	829.0	H	203.0	335.0	6.77	1 / 12	13.80	18.42	0.070	38.45	-20.03
		836.5	H	203.0	335.0	6.68	1 / 12	9.67	14.20	0.026	38.45	-24.25
		844.0	H	136.0	345.0	6.68	1 / 12	11.80	16.34	0.043	38.45	-22.12
	QPSK	829.0	H	203.0	335.0	6.77	1 / 12	13.92	18.54	0.071	38.45	-19.91
		836.5	H	203.0	335.0	6.68	1 / 12	8.92	13.45	0.022	38.45	-25.00
		844.0	H	136.0	345.0	6.68	1 / 12	10.80	15.34	0.034	38.45	-23.12
	16-QAM	829.0	H	203.0	335.0	6.77	1 / 12	13.54	18.16	0.065	38.45	-20.29
64-QAM	829.0	H	203.0	335.0	6.77	1 / 12	11.79	16.41	0.044	38.45	-22.04	
256-QAM	829.0	H	203.0	335.0	6.77	1 / 1	8.50	13.12	0.021	38.45	-25.33	
	QPSK (CP-OFDM)	834.0	H	203.0	335.0	6.68	1 / 50	7.24	13.92	0.025	38.45	-24.53
	QPSK (Opposite Pol.)	834.0	V	128.0	97.0	6.68	1 / 50	6.52	13.20	0.021	38.45	-25.25

Table 7-86. ERP Data (NR Band n5)

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]
824.20	GSM850	V	160	116	26.95	1.25	26.05	0.403	38.45	-12.40
836.60	GSM850	V	146	120	27.44	1.31	26.60	0.457	38.45	-11.85
848.80	GSM850	V	148	95	29.04	1.37	28.26	0.670	38.45	-10.19
848.80	GSM850	H	146	120	20.32	1.37	19.54	0.090	38.45	-18.91
848.80	EDGE850	V	148	95	22.79	1.37	22.01	0.159	38.45	-16.44
848.80	GSM850 (WCP)	H	201	73	17.72	6.38	21.95	0.157	38.45	-16.50

Table 7-87. ERP Data (GPRS Cell)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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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]
826.40	WCDMA850	V	130	130	18.58	1.26	17.69	0.059	38.45	-20.76
836.60	WCDMA850	V	137	87	19.89	1.31	19.05	0.080	38.45	-19.40
846.60	WCDMA850	V	137	97	20.75	1.36	19.96	0.099	38.45	-18.49
846.60	WCDMA850	H	394	72	13.27	1.36	12.48	0.018	38.45	-25.97
846.60	WCDMA850 (WCP)	H	196	208	12.46	6.38	16.69	0.047	38.45	-21.76

Table 7-88. ERP Data (WCDMA Cell)

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]
824.70	CDMA850	V	165	118	12.50	6.36	16.71	0.047	38.45	-21.75
836.52	CDMA850	V	160	122	12.51	6.38	16.74	0.047	38.45	-21.71
848.31	CDMA850	V	144	116	11.38	6.50	15.73	0.037	38.45	-22.72
836.52	CDMA850	H	388	157	7.81	6.38	12.04	0.016	38.45	-26.41
836.52	CDMA850 (WCP)	H	199	324	12.17	6.50	16.52	0.045	38.45	-21.93

Table 7-89. ERP Data (CDMA Cell)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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7.7 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

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

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Test Setup

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

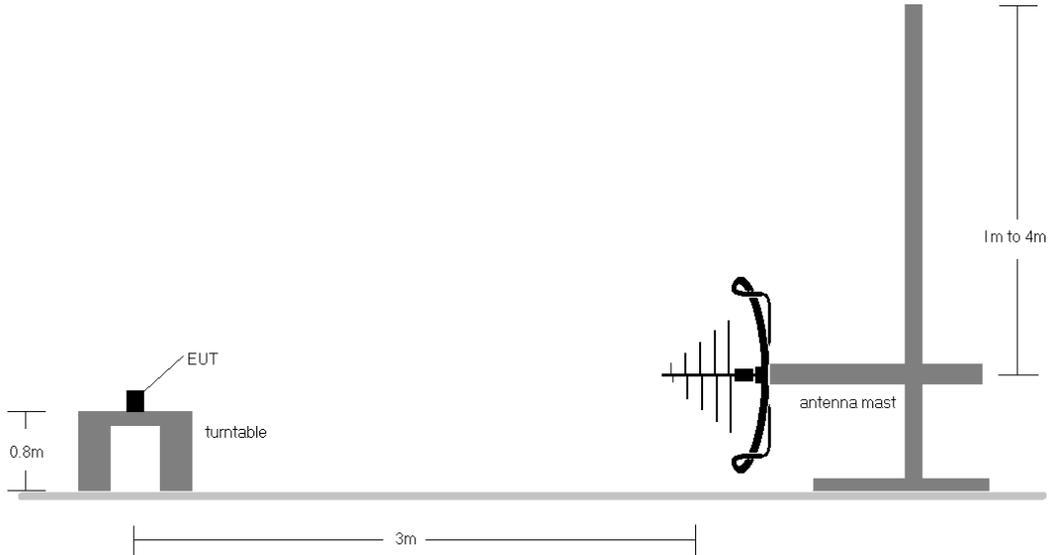


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

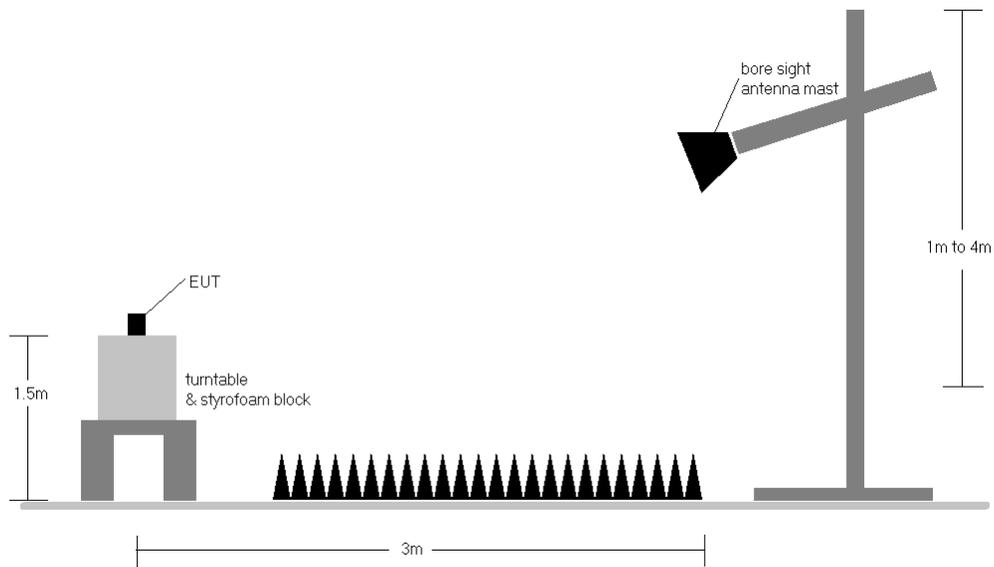


Figure 7-7. Test Instrument & Measurement Setup > 1GHz

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Test Notes

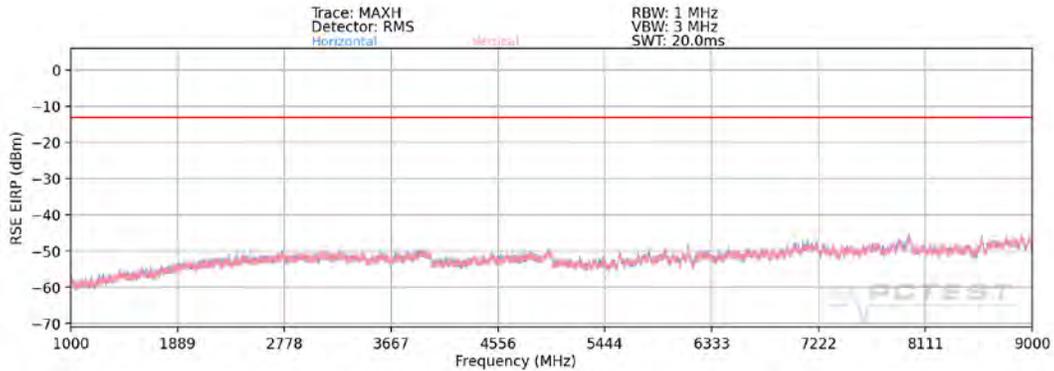
- 1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
 - b) $E(\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - d) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V}/\text{m}) + 20\log D - 104.8$; where D is the measurement distance in meters.
- 2) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.
- 3) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 4) For CDMA, 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.
- 5) 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.
- 6) This unit was tested with its standard battery.
- 7) 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.
- 8) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 9) 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.
- 10) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 11) ULCA spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.
- 12) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.
- 13) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device, is subject to the rules under which the NR carrier operates. Spurious emission caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

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LTE Band 5



Plot 7-90. Radiated Spurious Plot (LTE Band 5)

Bandwidth (MHz):	10
Frequency (MHz):	829.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.0	H	365	368	-73.90	-7.70	25.40	-69.86	-13.00	-56.86
2487.0	H	381	355	-59.09	-3.92	43.99	-51.27	-13.00	-38.27
3316.0	H	-	-	-74.68	-1.27	31.05	-64.21	-13.00	-51.21
4145.0	H	-	-	-75.44	1.31	32.87	-62.39	-13.00	-49.39

Table 7-3. Radiated Spurious Data (LTE Band 5 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	836.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.0	H	375	370	-72.85	-7.53	26.62	-68.64	-13.00	-55.64
2509.5	H	388	362	-58.02	-3.84	45.14	-50.12	-13.00	-37.12
3346.0	H	-	-	-74.82	-1.36	30.82	-64.44	-13.00	-51.44
4182.5	H	-	-	-75.14	0.69	32.55	-62.71	-13.00	-49.71

Table 7-4. Radiated Spurious Data (LTE Band 5 – Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	844.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.00	H	366	349	-73.91	-7.51	25.58	-69.68	-13.00	-56.68
2532.00	H	379	363	-56.77	-3.93	46.30	-48.96	-13.00	-35.96
3376.00	H	-	-	-74.80	-1.30	30.90	-64.36	-13.00	-51.36
4220.00	H	-	-	-74.95	0.50	32.55	-62.70	-13.00	-49.70

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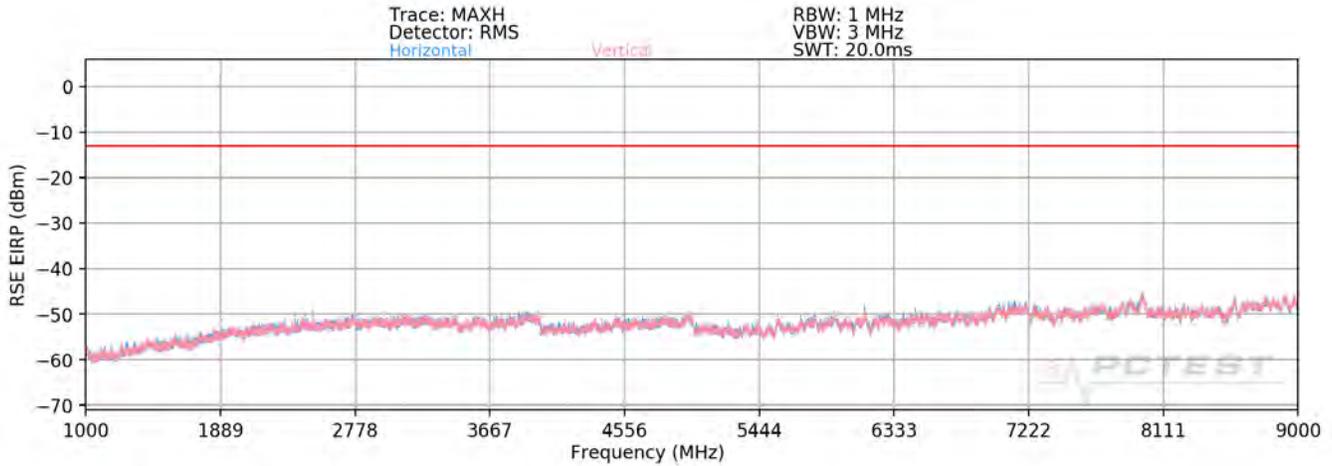
Table 7-5. Radiated Spurious Data (LTE Band 5 – High Channel)

FCC ID: ZNFG900VM	 <small>Proud to be part of element</small>	PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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ULCA LTE Band 5



Plot 7-91. Radiated Spurious Plot (ULCA LTE Band 5)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	829.0
PCC RB / Offset:	1 / 49
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	838.9
SCC RB / Offset:	1 / 0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1668.0	V	389	132	-67.84	-6.04	33.12	-62.14	-13.00	-49.14
2502.0	V	122	255	-70.14	-2.32	34.54	-60.71	-13.00	-47.71
3336.0	V	-	-	-72.81	0.86	35.05	-60.21	-13.00	-47.21

Table 7-6. Radiated Spurious Data (ULCA LTE Band 5 – Low Channel)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	831.5
PCC RB / Offset:	1 / 49
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	841.4
SCC RB / Offset:	1 / 0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.0	V	375	110	-71.43	-6.00	29.57	-65.69	-13.00	-52.69
2509.5	V	-	-	-73.40	-2.06	31.54	-63.71	-13.00	-50.71

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

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PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	844.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	834.1
SCC RB / Offset:	1 / 49

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1678.0	V	396	108	-70.33	-5.97	30.70	-64.55	-13.00	-51.55
2517.0	V	-	-	-73.31	-1.80	31.89	-63.37	-13.00	-50.37

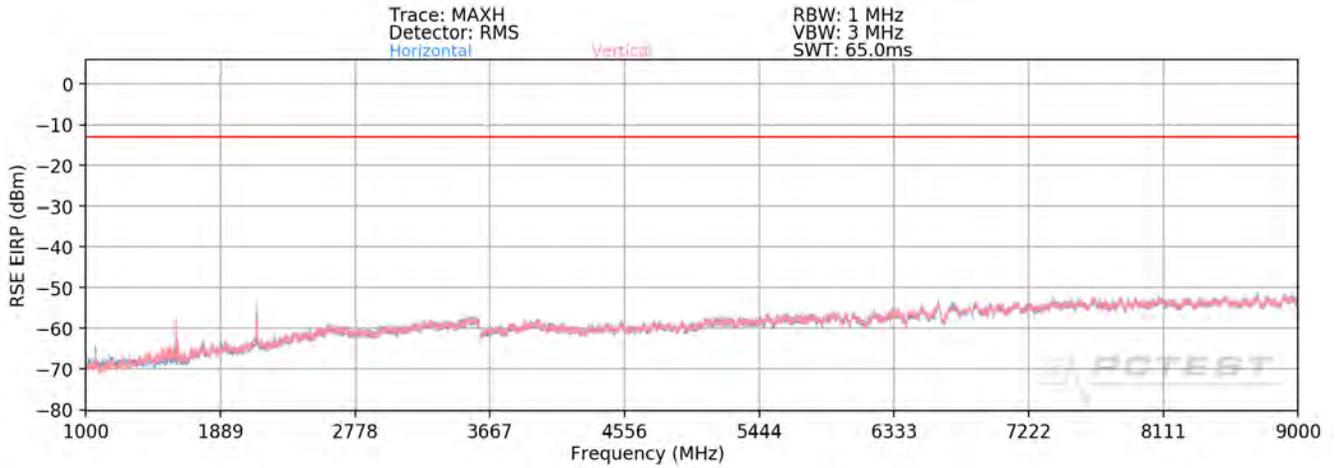
Table 7-8. Radiated Spurious Data (ULCA LTE Band 5 – High Channel)

FCC ID: ZNFG900VM	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	 LG	Approved by: Quality Manager
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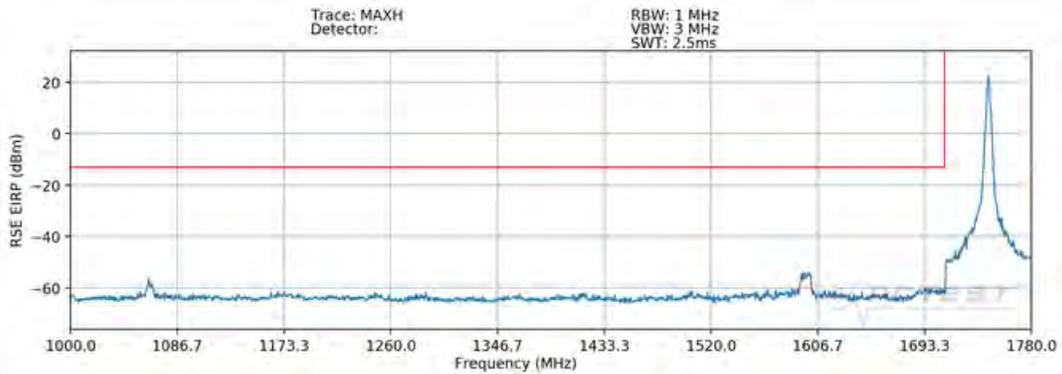
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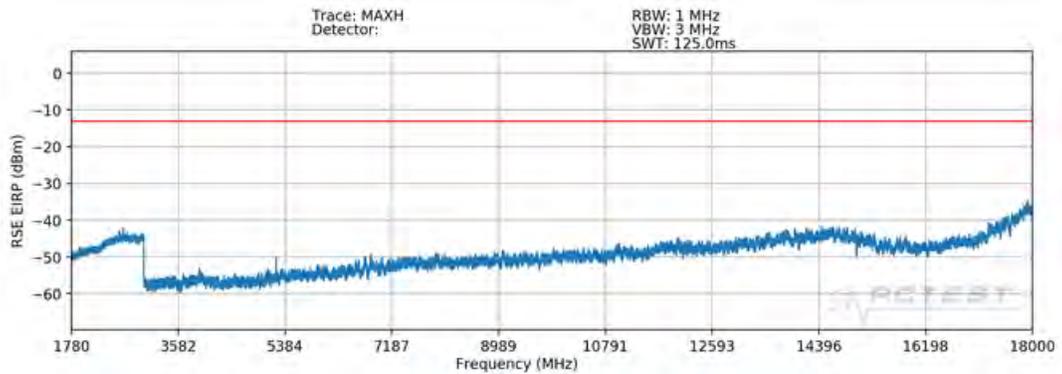
NR Band n5



Plot 7-92. Radiated Spurious Plot (NR Band n5 Stand Alone)



Plot 7-93. Radiated Spurious Plot (ENDC n5-LB66)



Plot 7-94. Radiated Spurious Plot (ENDC n5-LB66)

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Bandwidth (MHz):	20
Frequency (MHz):	834.0
RB / Offset:	1 / 50
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1668.0	H	304	70	-55.73	-6.04	45.23	-50.03	-13.00	-37.03
2502.0	H	-	-	-65.48	-2.32	39.20	-56.05	-13.00	-43.05
3336.0	H	-	-	-66.60	0.86	41.26	-54.00	-13.00	-41.00

Table 7-9. Radiated Spurious Data (NR Band n5 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / Offset:	1 / 50
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.0	H	393.82	100	-58.61	-6.00	42.39	-52.87	-13.00	-39.87
2509.5	H	-	-	-66.75	-2.06	38.19	-57.06	-13.00	-44.06
3346.0	H	-	-	-66.52	0.98	41.46	-53.79	-13.00	-40.79

Table 7-10. Radiated Spurious Data (NR Band n5 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	839.0
RB / Offset:	1 / 50
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1678.0	H	393	280	-59.00	-5.97	42.03	-53.22	-13.00	-40.22
2517.0	H	-	-	-65.76	-1.80	39.44	-55.82	-13.00	-42.82
3356.0	H	-	-	-66.12	1.10	41.98	-53.27	-13.00	-40.27

Table 7-11. Radiated Spurious Data (NR Band n5 – High Channel)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / Offset:	1 / 50
Mode:	EN-DC
Anchor Band:	LTE Band 66

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
2581.1	H	384	50	-76.94	27.61	57.67	-37.59	-13.00	-24.59
2654.1	H	309	55	-69.11	28.21	66.10	-29.15	-13.00	-16.15

Table 7-12. Radiated Spurious Data (ENDC n5-LB66)

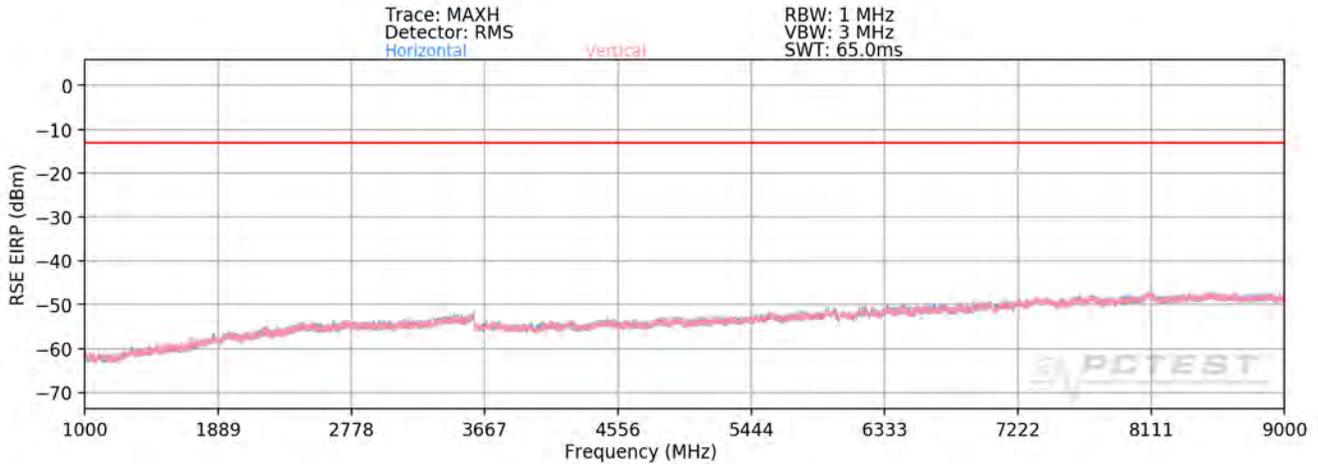
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GSM/GPRS Cell



Plot 7-95. Radiated Spurious Plot (GPRS Cell)

Mode:	GPRS 1 Tx Slot
Channel:	128
Frequency (MHz):	824.2

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1648.4	H	156	5	-62.77	-7.76	36.47	-58.79	-13.00	-45.79
2472.6	H	138	26	-43.93	-3.95	59.12	-36.14	-13.00	-23.14
3296.8	H	-	-	-71.24	-1.61	34.15	-61.10	-13.00	-48.10
4121.0	H	-	-	-71.02	1.02	37.00	-58.26	-13.00	-45.26
4945.2	H	-	-	-70.63	1.99	38.36	-56.90	-13.00	-43.90
5769.4	H	-	-	-69.94	4.52	41.58	-53.67	-13.00	-40.67

Table 7-13. Radiated Spurious Data (GPRS Cell – Low Channel)

Mode:	GPRS 1 Tx Slot
Channel:	190
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.2	H	146	16	-62.00	-7.53	37.47	-57.79	-13.00	-44.79
2509.8	H	144	13	-44.19	-3.84	58.97	-36.29	-13.00	-23.29
3346.4	H	-	-	-70.61	-1.36	35.03	-60.23	-13.00	-47.23
4183.0	H	142	16	-67.63	0.70	40.07	-55.19	-13.00	-42.19
5019.6	H	-	-	-70.73	1.72	37.99	-57.26	-13.00	-44.26
5856.2	H	-	-	-69.00	4.86	42.86	-52.39	-13.00	-39.39

Table 7-14. Radiated Spurious Data (GPRS Cell – Mid Channel)

FCC ID: ZNFG900VM	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	LG	Approved by: Quality Manager
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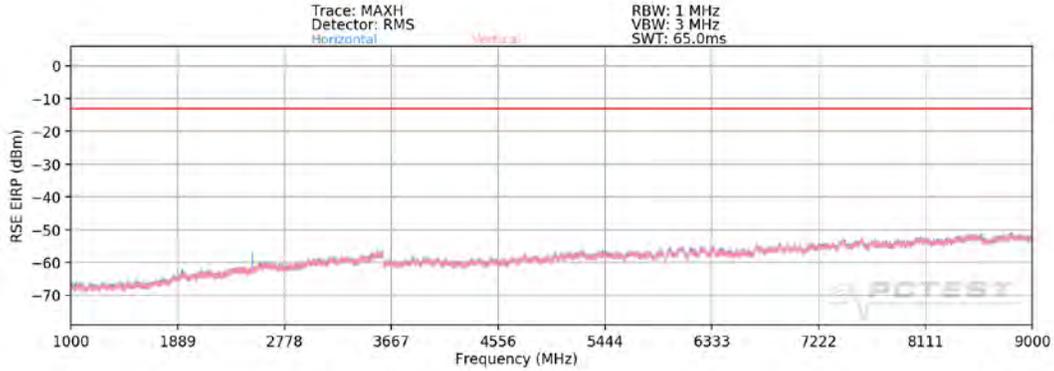
Mode:	GPRS 1 Tx Slot
Channel:	251
Frequency (MHz):	848.8

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1697.6	H	147	13	-63.21	-7.52	36.27	-58.99	-13.00	-45.99
2546.4	H	141	26	-43.76	-3.88	59.36	-35.89	-13.00	-22.89
3395.2	H	-	-	-72.69	-1.40	32.91	-62.34	-13.00	-49.34
4244.0	H	157	22	-68.16	0.59	39.43	-55.83	-13.00	-42.83
5092.8	H	-	-	-69.89	2.11	39.22	-56.04	-13.00	-43.04
5941.6	H	-	-	-71.51	4.72	40.21	-55.04	-13.00	-42.04

Table 7-15. Radiated Spurious Data (GPRS Cell – High Channel)

FCC ID: ZNFG900VM	 PART 22 MEASUREMENT REPORT		Approved by: Quality Manager
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WCDMA Cell



Plot 7-96. Radiated Spurious Plot (WCDMA Cell)

Mode:	WCDMA RMC
Channel:	4132
Frequency (MHz):	826.4

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1652.8	H	162	11	-74.22	-7.73	25.05	-70.21	-13.00	-57.21
2479.2	H	161	2	-69.80	-3.94	33.26	-62.00	-13.00	-49.00
3305.6	H	-	-	-75.63	-1.46	29.91	-65.34	-13.00	-52.34
4132.0	H	-	-	-76.25	1.09	31.84	-63.42	-13.00	-50.42

Table 7-16. Radiated Spurious Data (WCDMA Cell – Low Channel)

Mode:	WCDMA RMC
Channel:	4183
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.2	H	168	0	-73.31	-7.53	26.16	-69.10	-13.00	-56.10
2509.8	H	161	4	-69.17	-3.84	33.99	-61.27	-13.00	-48.27
3346.4	H	-	-	-75.47	-1.36	30.17	-65.09	-13.00	-52.09
4183.0	H	-	-	-75.98	0.70	31.72	-63.54	-13.00	-50.54

Table 7-17. Radiated Spurious Data (WCDMA Cell – Mid Channel)

Mode:	WCDMA RMC
Channel:	4233
Frequency (MHz):	846.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1693.2	H	154	14	-74.43	-7.53	25.04	-70.21	-13.00	-57.21
2539.8	H	167	16	-69.08	-3.94	33.98	-61.27	-13.00	-48.27
3386.4	H	-	-	-73.14	-1.32	32.54	-62.72	-13.00	-49.72
4233.0	H	-	-	-76.07	0.52	31.45	-63.81	-13.00	-50.81

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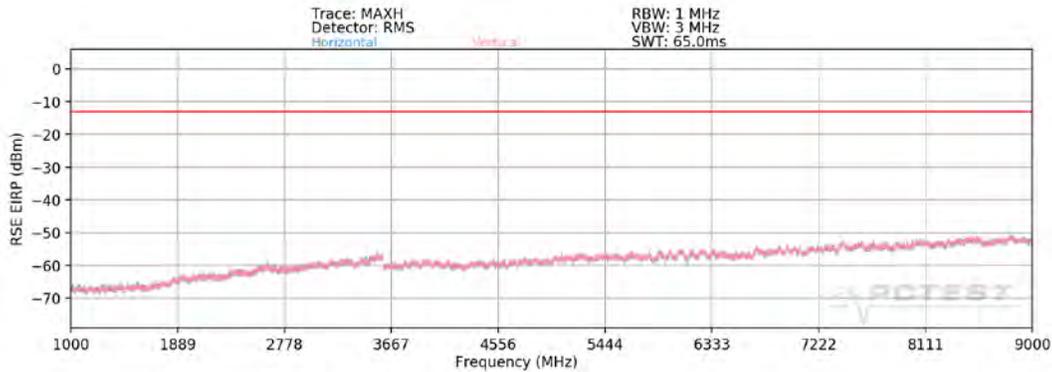
Table 7-18. Radiated Spurious Data (WCDMA Cell – High Channel)

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CDMA Cell



Plot 7-97. Radiated Spurious Plot (CDMA Cell)

Mode:	CDMA
Channel:	1013
Frequency (MHz):	824.7

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1649.40	H	-	-	-78.65	-0.40	27.95	-67.31	-13.00	-54.31
2474.10	H	-	-	-78.97	3.48	31.51	-63.75	-13.00	-50.75
3298.80	H	-	-	-80.38	4.43	31.05	-64.21	-13.00	-51.21

Table 7-19. Radiated Spurious Data (CDMA Cell – Low Channel)

Mode:	CDMA
Channel:	384
Frequency (MHz):	836.52

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.04	H	-	-	-78.71	-0.31	27.98	-67.27	-13.00	-54.27
2509.56	H	-	-	-79.78	3.46	30.68	-64.58	-13.00	-51.58
3346.08	H	-	-	-80.56	5.05	31.49	-63.77	-13.00	-50.77

Table 7-20. Radiated Spurious Data (CDMA Cell – Mid Channel)

Mode:	CDMA
Channel:	777
Frequency (MHz):	848.31

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1696.62	H	-	-	-78.60	-0.22	28.18	-67.08	-13.00	-54.08
2544.93	H	-	-	-79.42	3.37	30.95	-64.31	-13.00	-51.31
3393.24	H	-	-	-79.95	4.95	32.00	-63.25	-13.00	-50.25

Table 7-21. Radiated Spurious Data (CDMA Cell – High Channel)

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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 and RSS-132, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 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

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LTE Band 5

LTE Band 5					
Operating Frequency (Hz):		836,500,000			
Ref. Voltage (VDC):		3.85			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	836,499,769	-609	-0.0000728
		- 20	836,500,275	-103	-0.0000123
		- 10	836,499,523	-855	-0.0001022
		0	836,499,787	-591	-0.0000707
		+ 10	836,499,672	-706	-0.0000844
		+ 20 (Ref)	836,500,378	0	0.0000000
		+ 30	836,499,696	-682	-0.0000815
		+ 40	836,499,980	-398	-0.0000476
Battery Endpoint	2.96	+ 20	836,499,844	-534	-0.0000638

Table 7-9. LTE Band 5 Frequency Stability Data

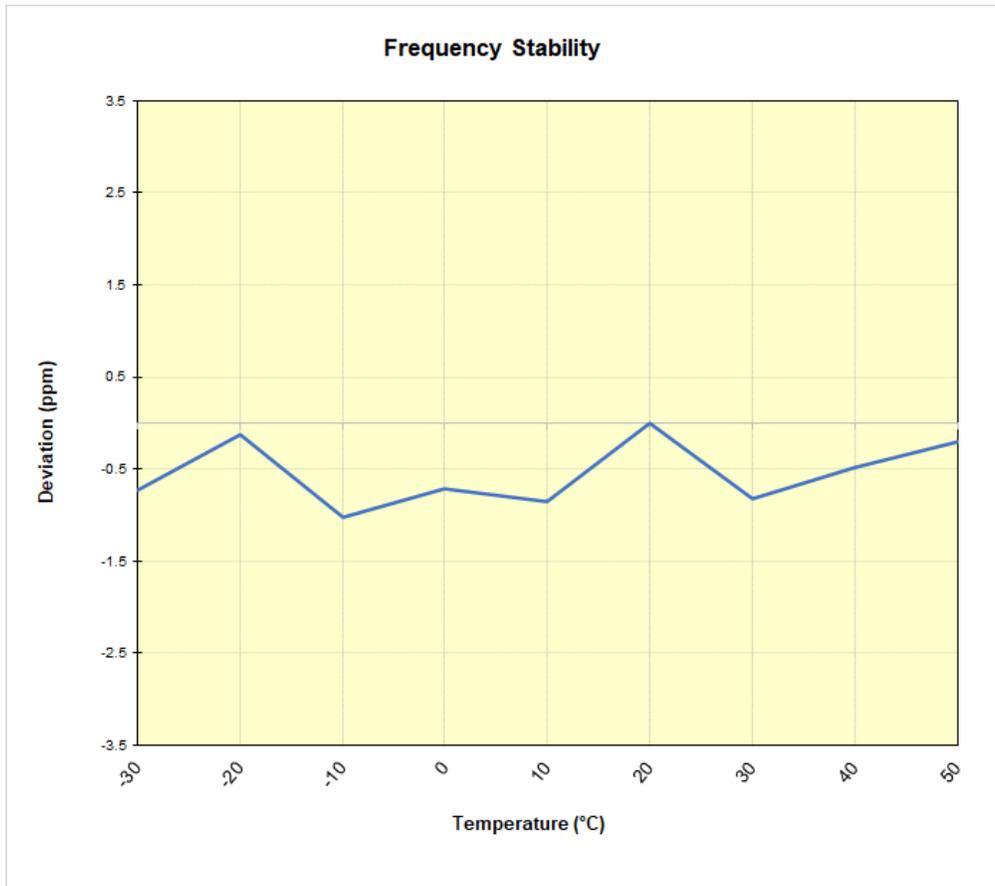


Table 7-9. LTE Band 5 Frequency Stability Chart

FCC ID: ZNFG900VM	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	 LG	Approved by: Quality Manager
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NR Band n5

NR Band n5					
Operating Frequency (Hz):		836,500,000			
Ref. Voltage (VDC):		3.85			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	836,499,577	-373	-0.0000446
		- 20	836,499,811	-139	-0.0000166
		- 10	836,499,581	-369	-0.0000441
		0	836,499,843	-107	-0.0000128
		+ 10	836,499,640	-310	-0.0000371
		+ 20 (Ref)	836,499,950	0	0.0000000
		+ 30	836,500,038	88	0.0000105
		+ 40	836,500,151	201	0.0000240
Battery Endpoint	2.96	+ 20	836,500,248	298	0.0000356

Table 7-9. NR Band n5 Frequency Stability Data

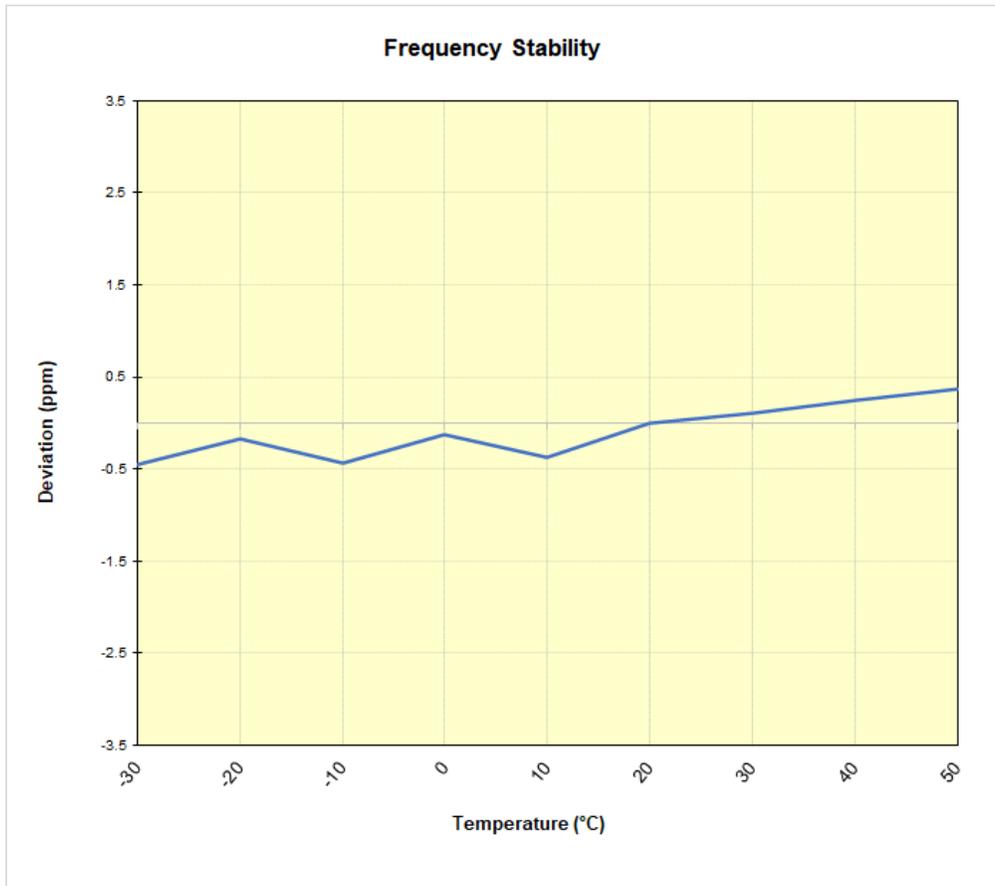


Table 7-9. NR Band n5 Frequency Stability Chart

FCC ID: ZNFG900VM	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	LG	Approved by: Quality Manager
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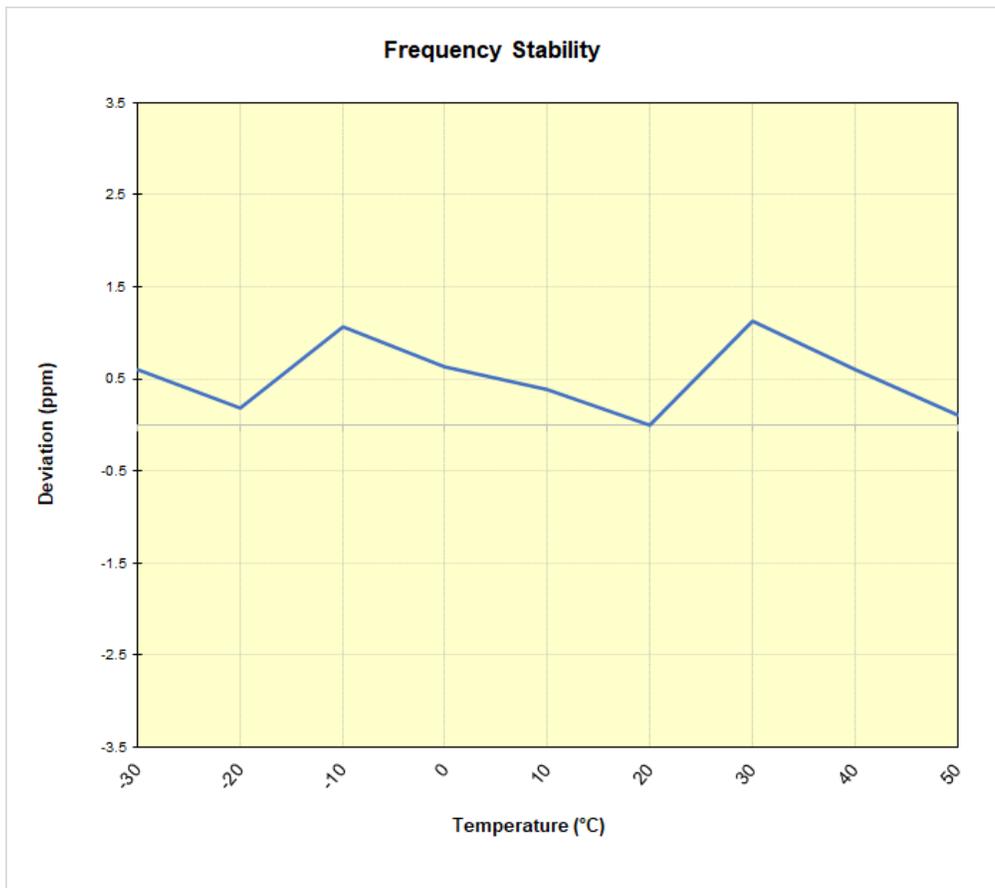
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GSM/GPRS Cell

GSM/GPRS Cellular					
Operating Frequency (Hz):		836,600,000			
Ref. Voltage (VDC):		3.85			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	836,600,063	511	0.0000611
		- 20	836,599,709	157	0.0000188
		- 10	836,600,447	895	0.0001070
		0	836,600,081	529	0.0000632
		+ 10	836,599,874	322	0.0000385
		+ 20 (Ref)	836,599,552	0	0.0000000
		+ 30	836,600,495	943	0.0001127
		+ 40	836,600,058	506	0.0000605
Battery Endpoint	2.96	+ 20	836,600,465	913	0.0001091

Table 7-9. GSM/GPRS Cell Frequency Stability Data



FCC ID: ZNFG900VM	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	LG	Approved by: Quality Manager
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Table 7-9. GSM/GPRS Cell Frequency Stability Chart

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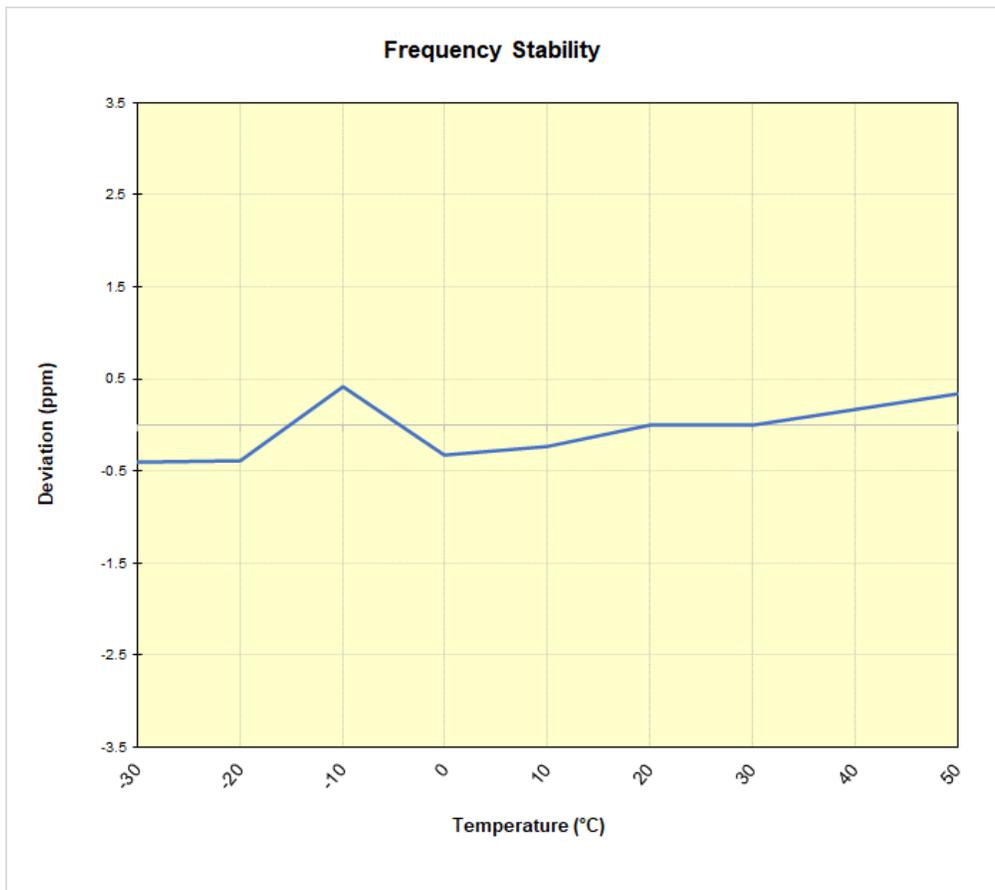
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WCDMA Cell

WCDMA Cellular					
Operating Frequency (Hz):		836,600,000			
Ref. Voltage (VDC):		3.85			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	836,599,520	-340	-0.0000406
		- 20	836,599,536	-324	-0.0000387
		- 10	836,600,212	352	0.0000421
		0	836,599,591	-269	-0.0000322
		+ 10	836,599,672	-188	-0.0000225
		+ 20 (Ref)	836,599,860	0	0.0000000
		+ 30	836,599,860	0	0.0000000
		+ 40	836,600,001	141	0.0000169
		+ 50	836,600,147	287	0.0000343
Battery Endpoint	2.96	+ 20	836,599,693	-167	-0.0000200

Table 7-9. WCDMA Cell Frequency Stability Data



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Table 7-9. WCDMA Cell Frequency Stability Chart

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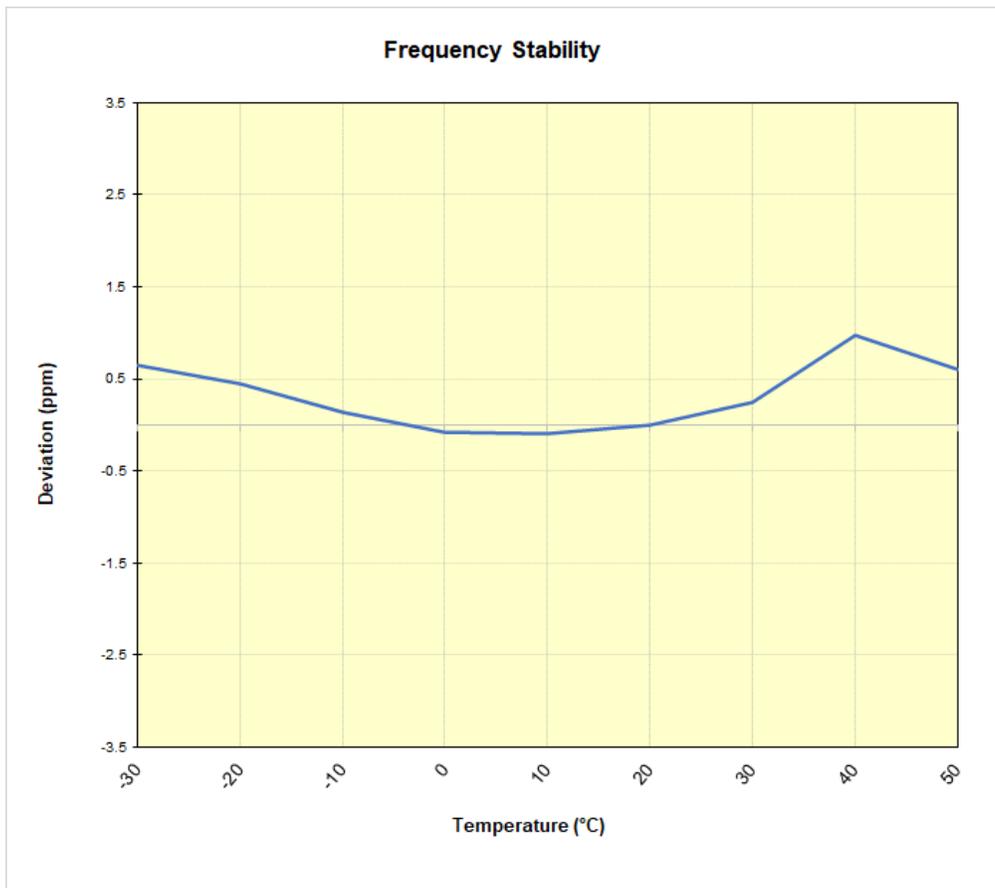
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CDMA Cell

CDMA Cellular					
Operating Frequency (Hz):		836,520,000			
Ref. Voltage (VDC):		3.85			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	836,520,221	538	0.0000643
		- 20	836,520,060	377	0.0000451
		- 10	836,519,796	113	0.0000135
		0	836,519,617	-66	-0.0000079
		+ 10	836,519,605	-78	-0.0000093
		+ 20 (Ref)	836,519,683	0	0.0000000
		+ 30	836,519,890	207	0.0000247
		+ 40	836,520,495	812	0.0000971
Battery Endpoint	2.96	+ 20	836,519,617	-66	-0.0000079

Table 7-9. CDMA Cell Frequency Stability Data



FCC ID: ZNFG900VM	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	LG	Approved by: Quality Manager
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Table 7-9. CDMA Cell Frequency Stability Chart

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG **Portable Handset** **FCC ID: ZNFG900VM** complies with all the requirements of Part 22 of the FCC rules.

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