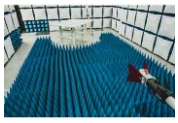
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



PART 22 MEASUREMENT REPORT

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

Date of Testing:
8/26/2020 - 10/30/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2009230153-11-R1.ZNF

FCC ID:	**ZNFK200QM**
Applicant Name:	**LG Electronics USA, Inc.**

Application Type:	Certification
Model:	LM-K200QM
Additional Model(s):	LMK200QM, K200QM
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

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

This revised Test report (S/N: 1M2009230153-11-R1.FCC Report SNs) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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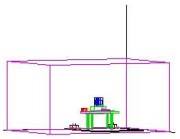
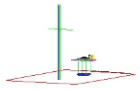


PART 22 MEASUREMENT REPORT



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
GSM/GPRS		GMSK	824.2 - 848.8	0.392	25.93	0.643	28.08	242KGXW
EDGE		8-PSK	824.2 - 848.8	0.124	20.92	0.203	23.07	238KG7W
WCDMA		Spread Spectrum	826.4 - 846.6	0.070	18.42	0.114	20.57	4M13F9W
CDMA		Spread Spectrum	824.70 - 848.31	0.158	21.99	0.259	24.14	1M28F9W
LTE Band 5	10 MHz	QPSK	829.0 - 844.0	0.100	20.00	0.164	22.15	9M01G7D
		16QAM	829.0 - 844.0	0.093	19.70	0.153	21.85	9M01W7D
		64QAM	829.0 - 844.0	0.069	18.38	0.113	20.53	9M01W7D
	5 MHz	QPSK	826.5 - 846.5	0.100	20.00	0.164	22.15	4M57G7D
		16QAM	826.5 - 846.5	0.104	20.16	0.170	22.31	4M57W7D
		64QAM	826.5 - 846.5	0.067	18.27	0.110	20.42	4M57W7D
	3 MHz	QPSK	825.5 - 847.5	0.106	20.26	0.174	22.41	2M71G7D
		16QAM	825.5 - 847.5	0.097	19.89	0.160	22.04	2M71W7D
		64QAM	825.5 - 847.5	0.062	17.94	0.102	20.09	2M72W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.101	20.05	0.166	22.20	1M11G7D
		16QAM	824.7 - 848.3	0.095	19.78	0.156	21.93	1M11W7D
		64QAM	824.7 - 848.3	0.062	17.91	0.101	20.06	1M10W7D

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.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFK200QM**. 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.: 00350, 00137, 00368,18852, 19322, 18860

2.2 Device Capabilities

This device contains the following capabilities:

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

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 3.2 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.

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 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 $P_{g\ [dBm]}$ – 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

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;$$ where D 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.

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 (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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
-	LTx2	Licensed Transmitter Cable Set	4/9/2020	Annual	4/9/2021	LTx2
-	LTx3	Licensed Transmitter Cable Set	10/30/2019	Annual	10/30/2020	LTx3
Anritsu	MT8821C	Radio Communication Analyzer	3/10/2020	Annual	3/10/2021	6200901190
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	2/14/2019	Biennial	2/14/2021	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/12/2020	Biennial	3/12/2022	150693
Hewlett-Packard	8648D	(9kHz-4GHz) Signal Generator	6/23/2020	Annual	6/23/2021	3613A00315
Keysight Technologies	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	US46470561
Keysight Technologies	N9038A	MXE EMI Receiver	8/11/2020	Annual	8/11/2021	MY51210133
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			107826
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	11/1/2019	Annual	11/1/2020	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	TC-TA18	Cross-Pol Antenna 400MHz-18GHz	7/8/2020	Biennial	7/8/2022	101058
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511
Sunol Science	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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

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

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.

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics USA, Inc.

FCC ID: ZNFK200QM

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): 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
	Peak-Average Ratio	24.232 (d)27.50 (d)(5)	RSS-132 (5.4)	< 13 dB	PASS	Section 7.5
	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.

7.2 Occupied Bandwidth

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 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.

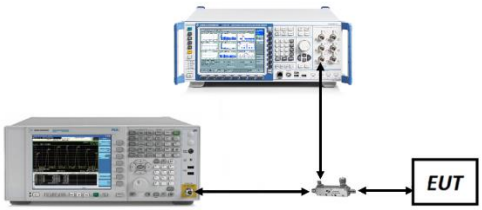


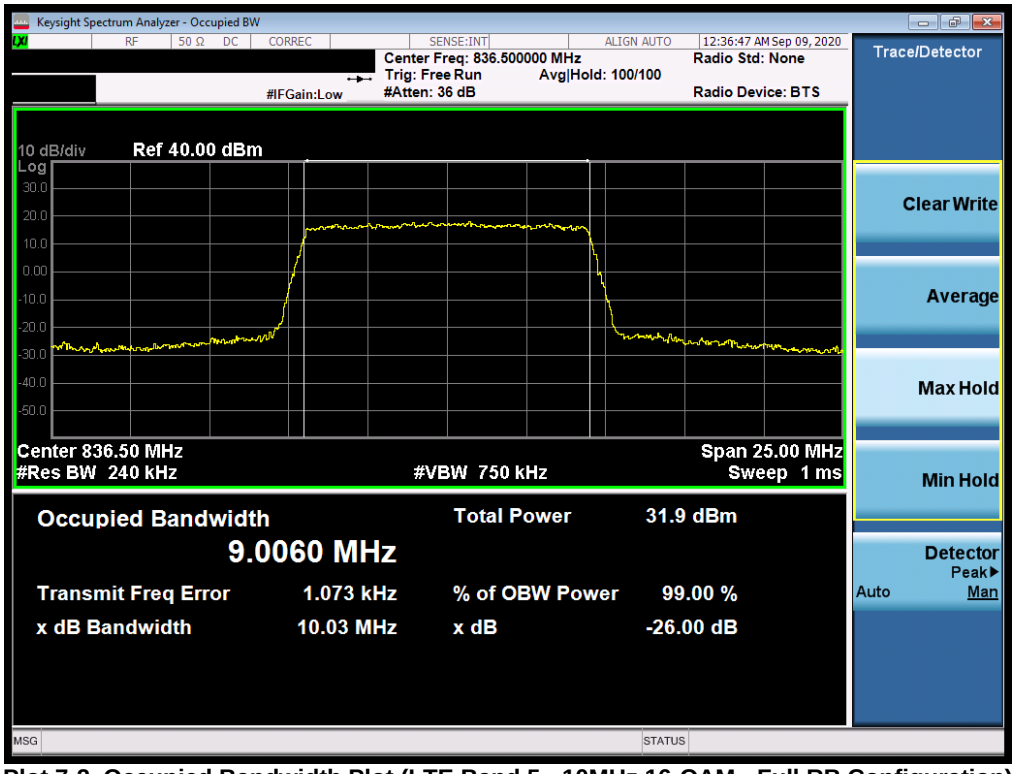
Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

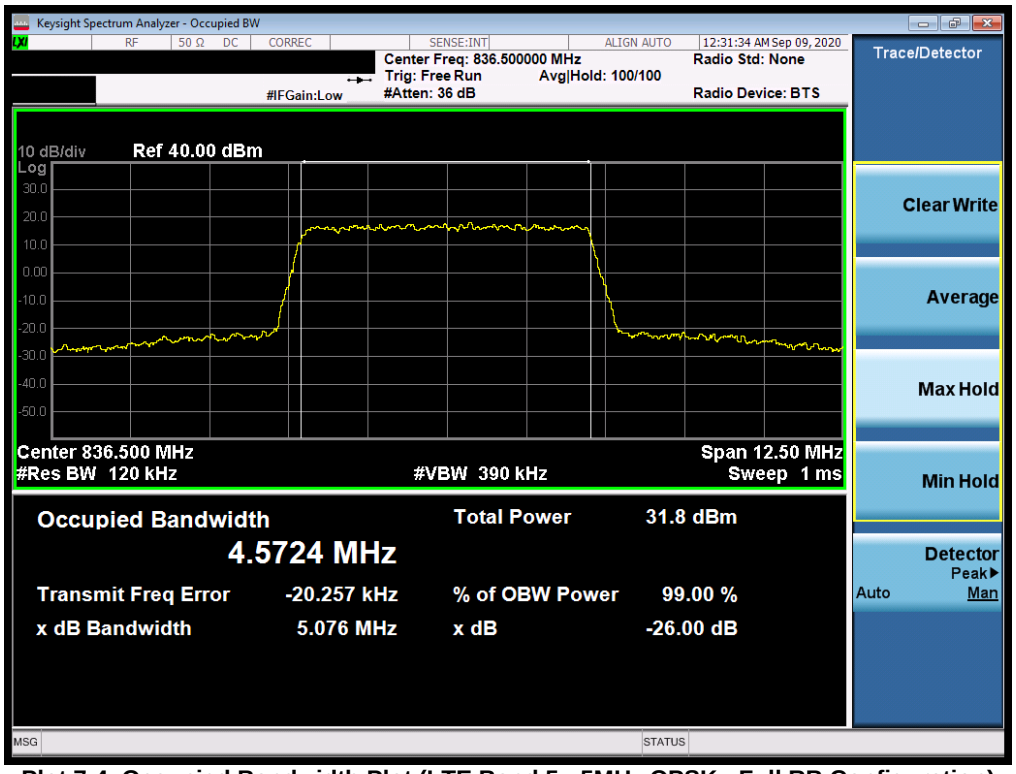
LTE Band 5

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

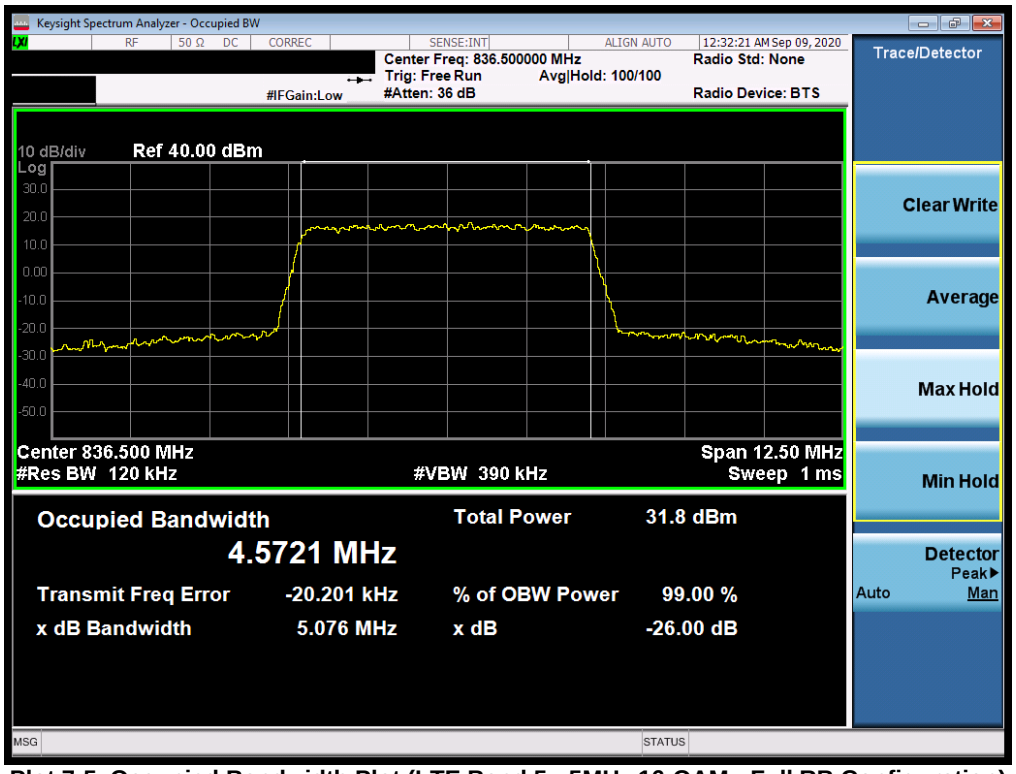


Plot 7-2. Occupied Bandwidth Plot (LTE Band 5 - 10MHz 16-QAM - Full RB Configuration)

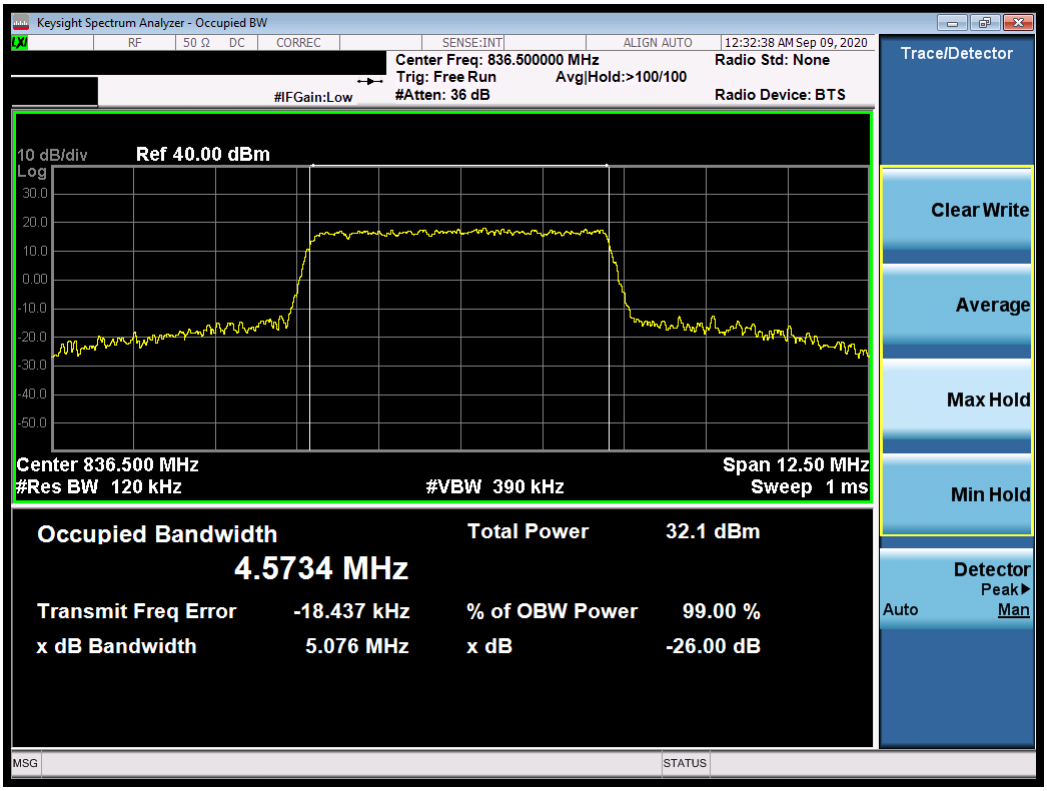
Plot 7-3. Occupied Bandwidth Plot (LTE Band 5 - 10MHz 64-QAM - Full RB Configuration



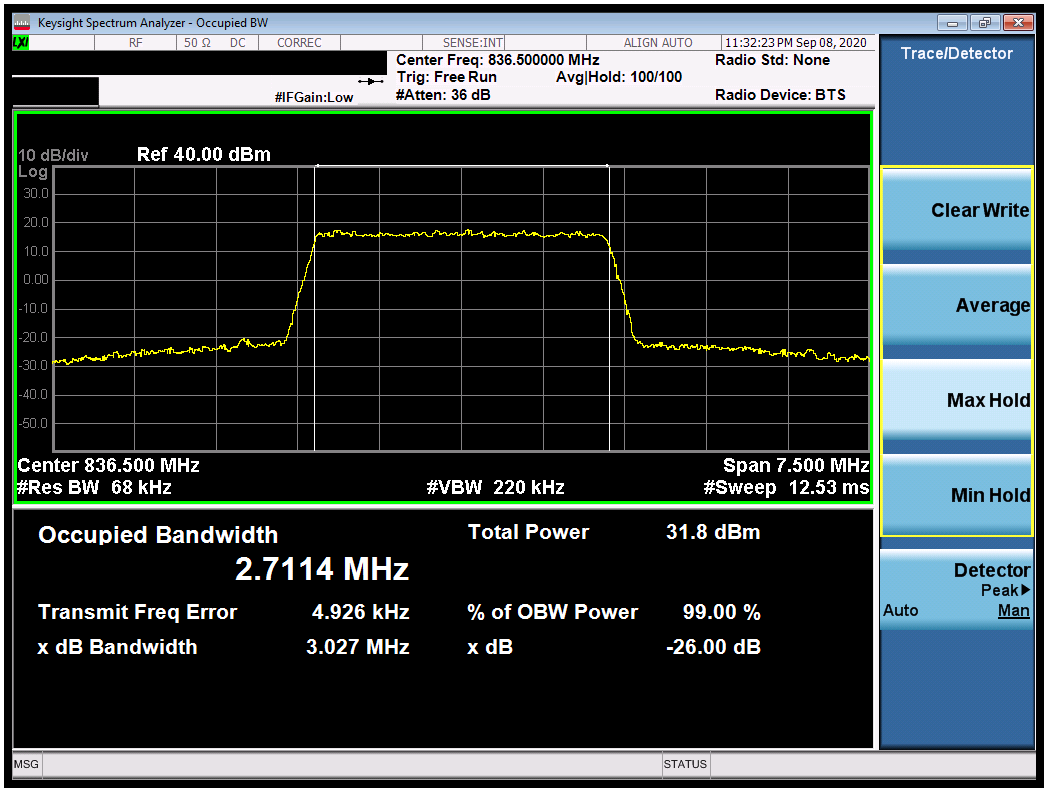
Plot 7-4. Occupied Bandwidth Plot (LTE Band 5 - 5MHz QPSK - Full RB Configuration)



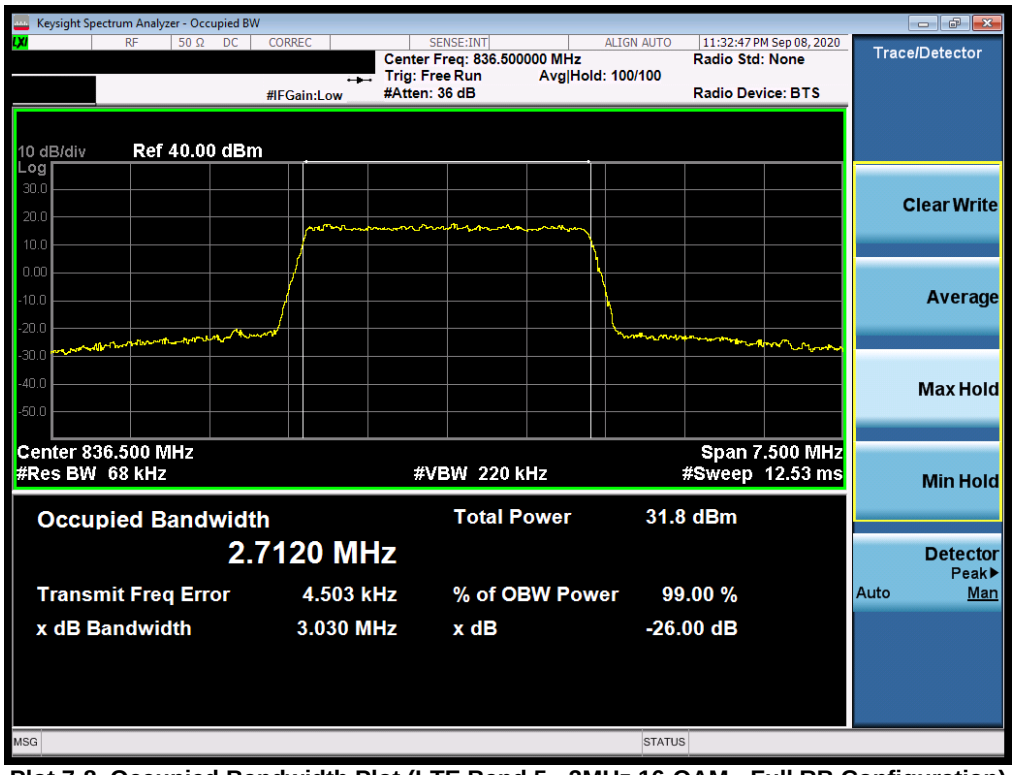
Plot 7-5. Occupied Bandwidth Plot (LTE Band 5 - 5MHz 16-QAM - Full RB Configuration)



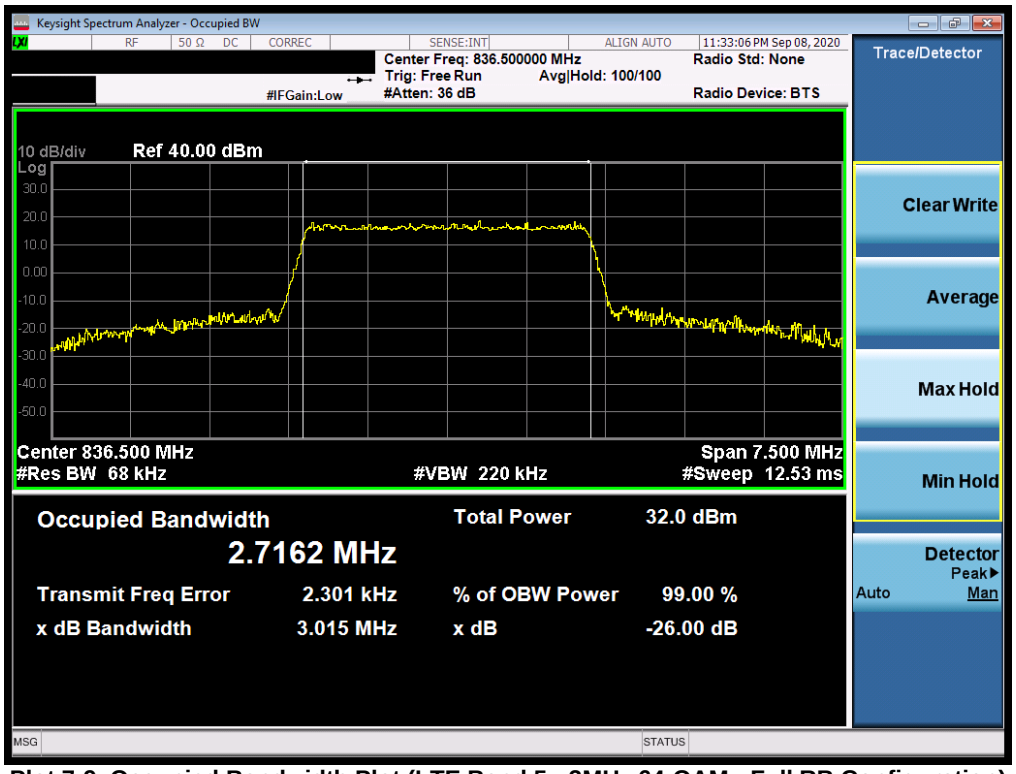
Plot 7-6. Occupied Bandwidth Plot (LTE Band 5 - 5MHz 64-QAM - Full RB Configuration)



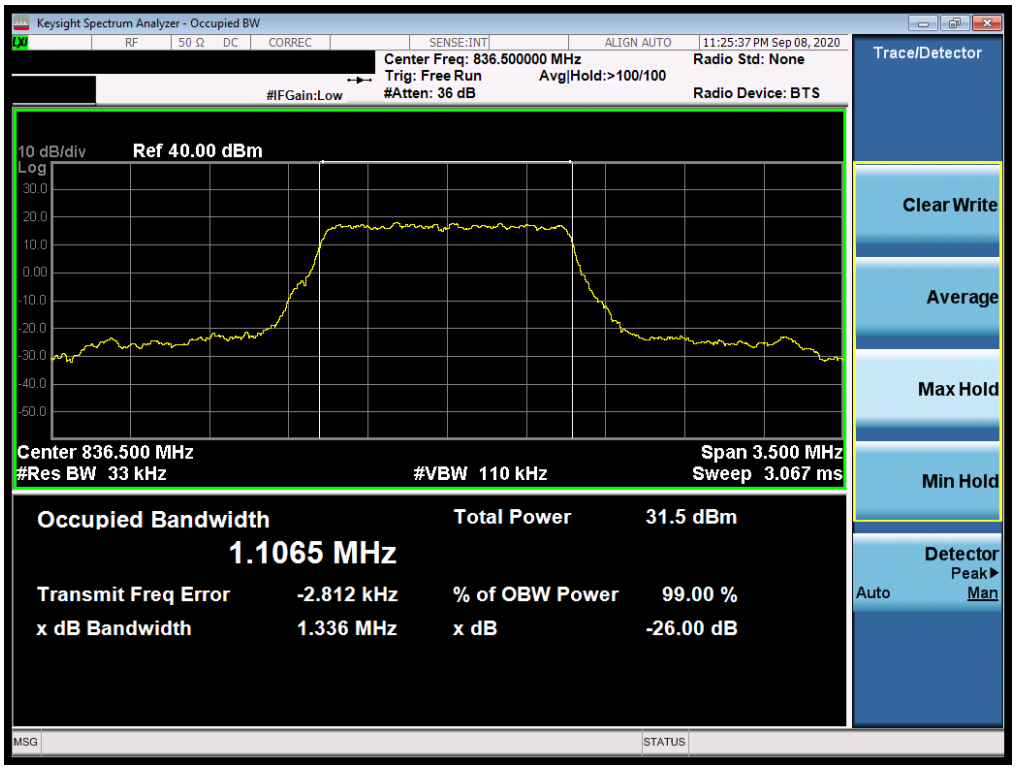
Plot 7-7. Occupied Bandwidth Plot (LTE Band 5 - 3MHz QPSK - Full RB Configuration)



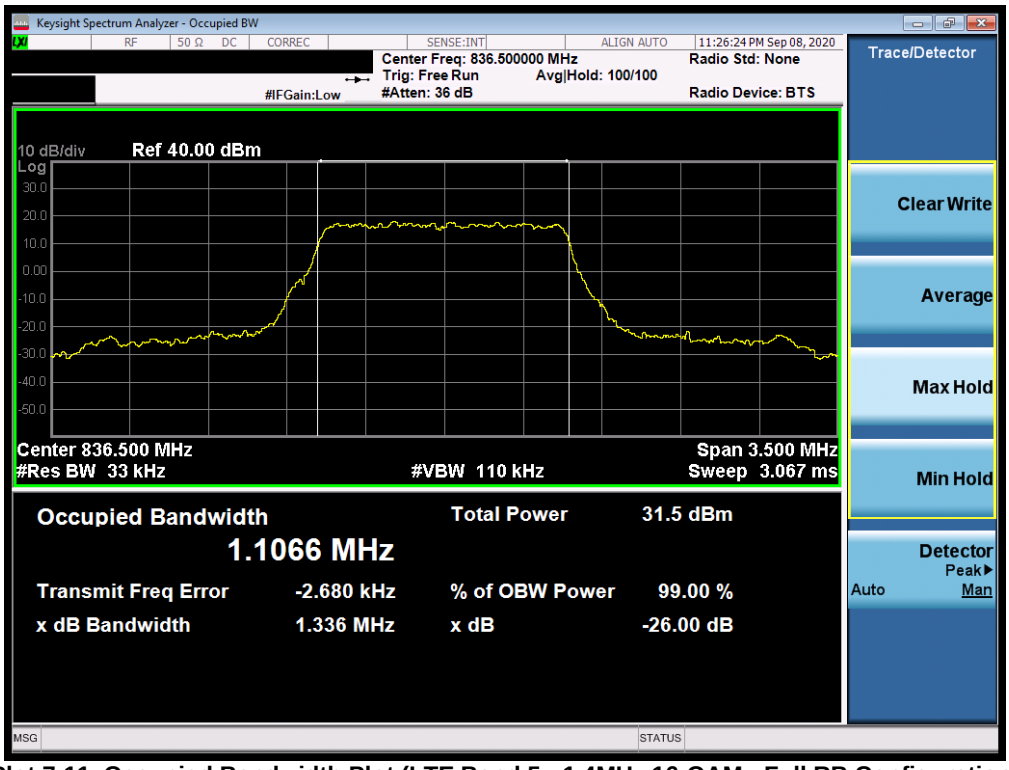
Plot 7-8. Occupied Bandwidth Plot (LTE Band 5 - 3MHz 16-QAM - Full RB Configuration)



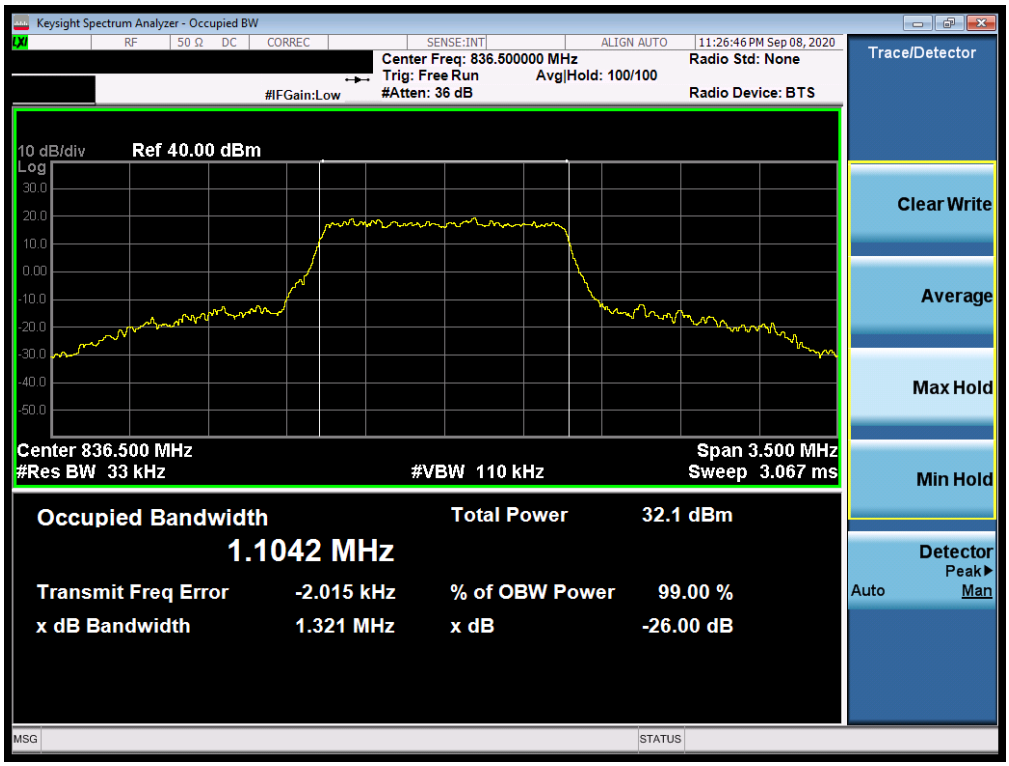
Plot 7-9. Occupied Bandwidth Plot (LTE Band 5 - 3MHz 64-QAM - Full RB Configuration)



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



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)

GPRS Cell

Plot 7-13. Occupied Bandwidth Plot (GPRS, Ch. 190)

Plot 7-14. Occupied Bandwidth Plot (EDGE, Ch. 190)

WCDMA Cell

Plot 7-15. Occupied Bandwidth Plot (WCDMA, Ch. 4183)

CDMA Cell

Plot 7-16. Occupied Bandwidth Plot (CDMA, Ch. 384)

7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

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

The minimum permissible attenuation level of any spurious emission is 43 + 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.

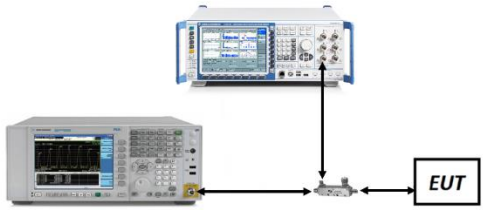
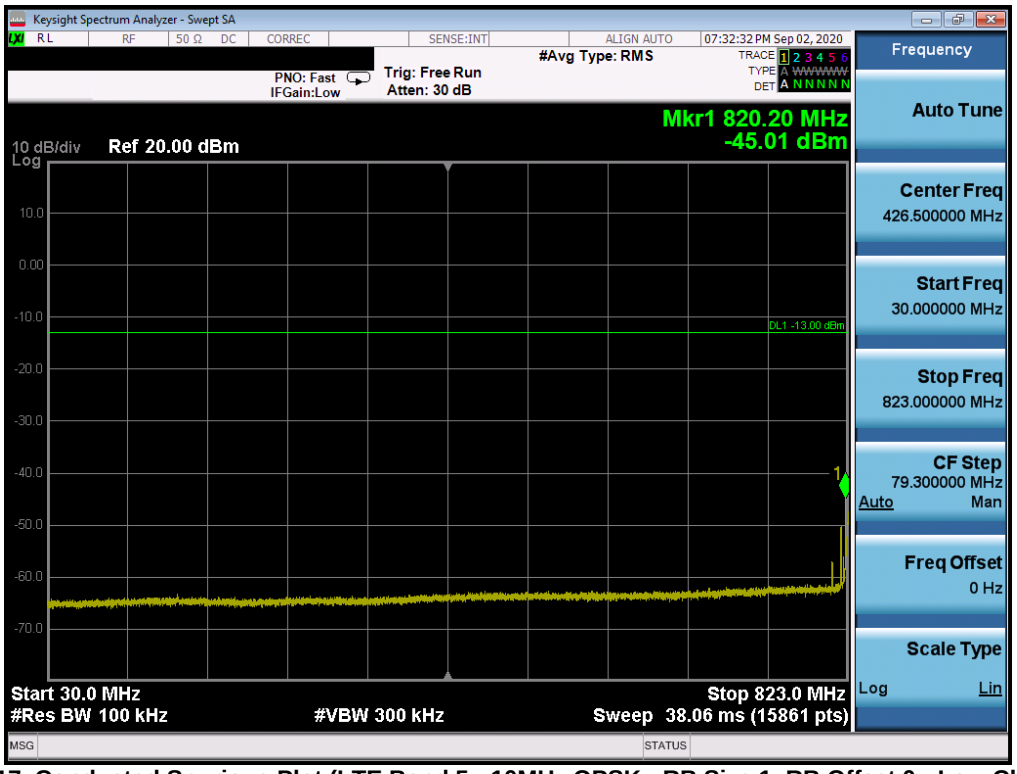


Figure 7-2. Test Instrument & Measurement Setup

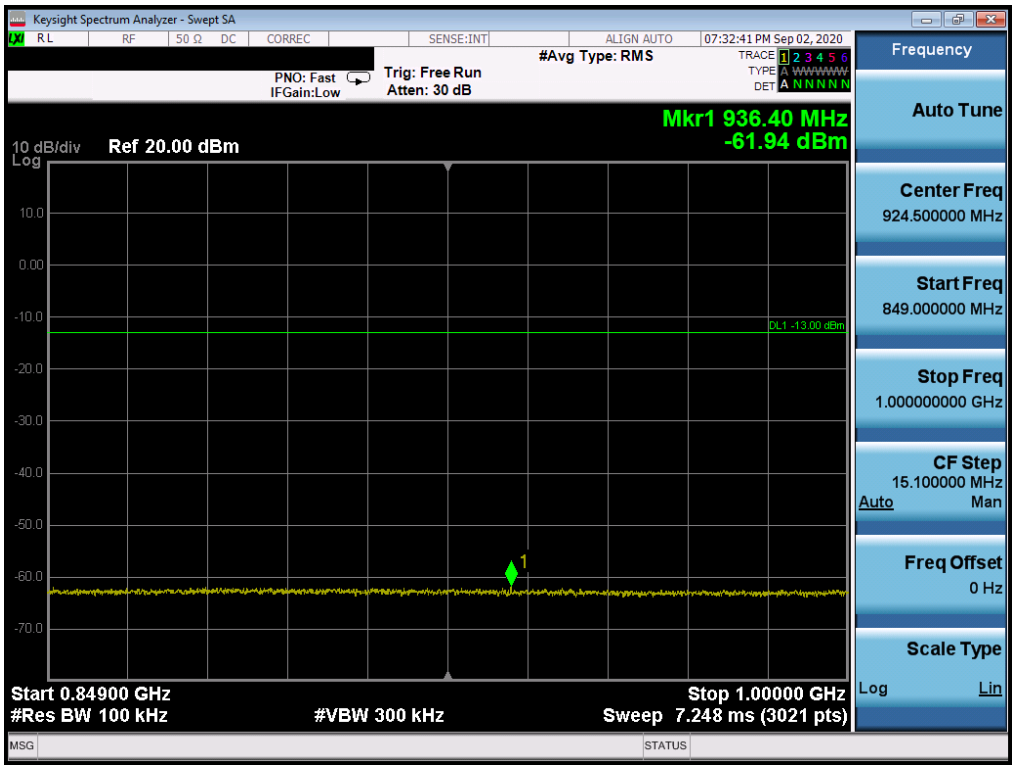
Test Notes

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.

LTE Band 5

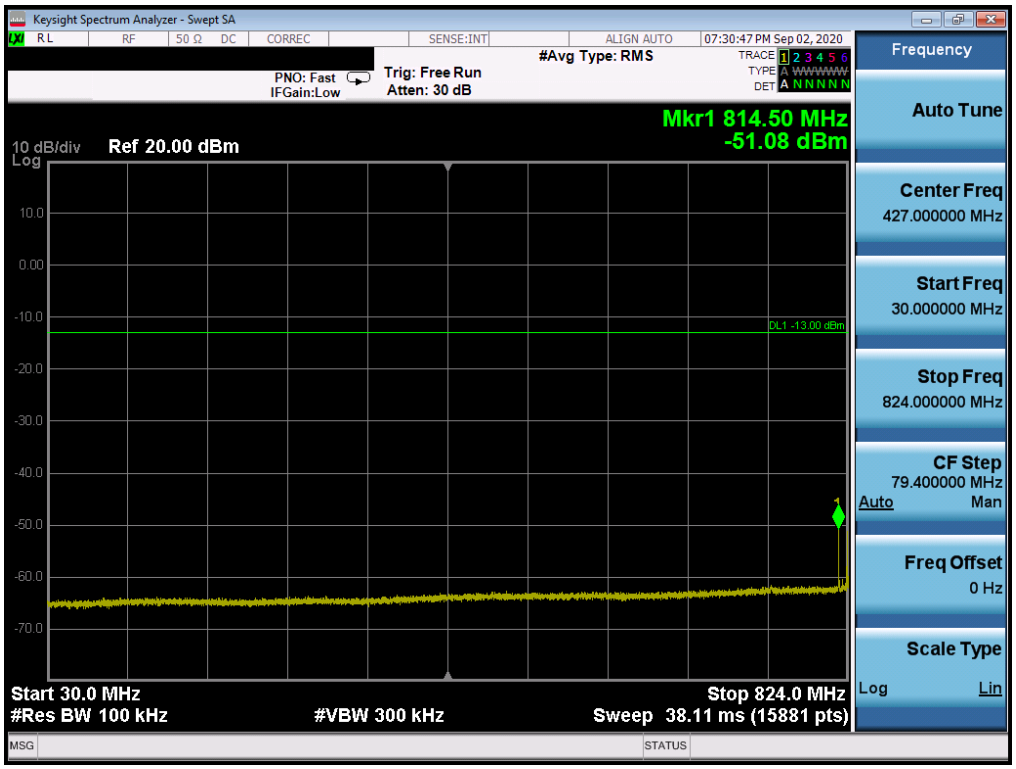


Plot 7-17. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

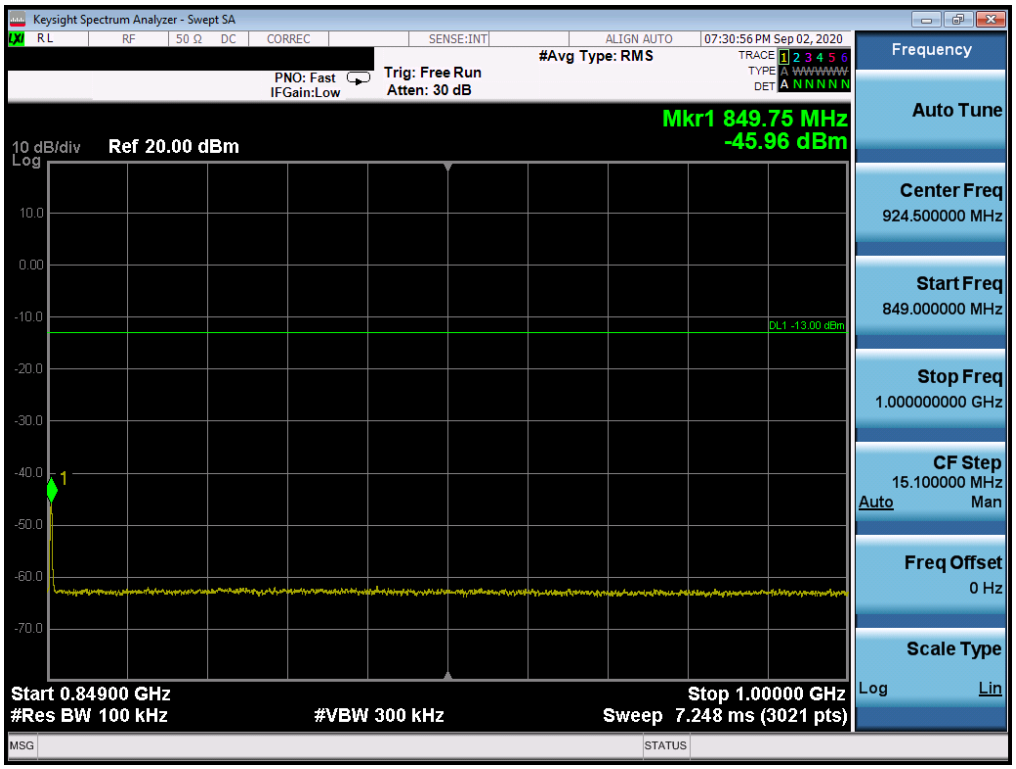


Plot 7-18. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-19. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

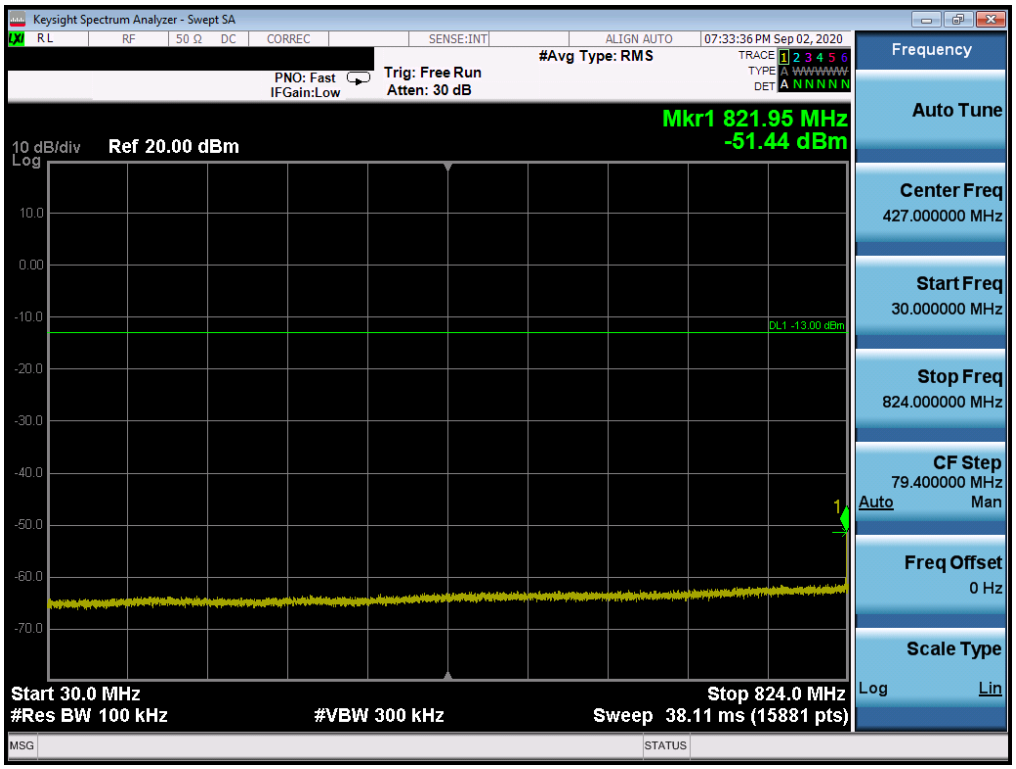


Plot 7-20. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

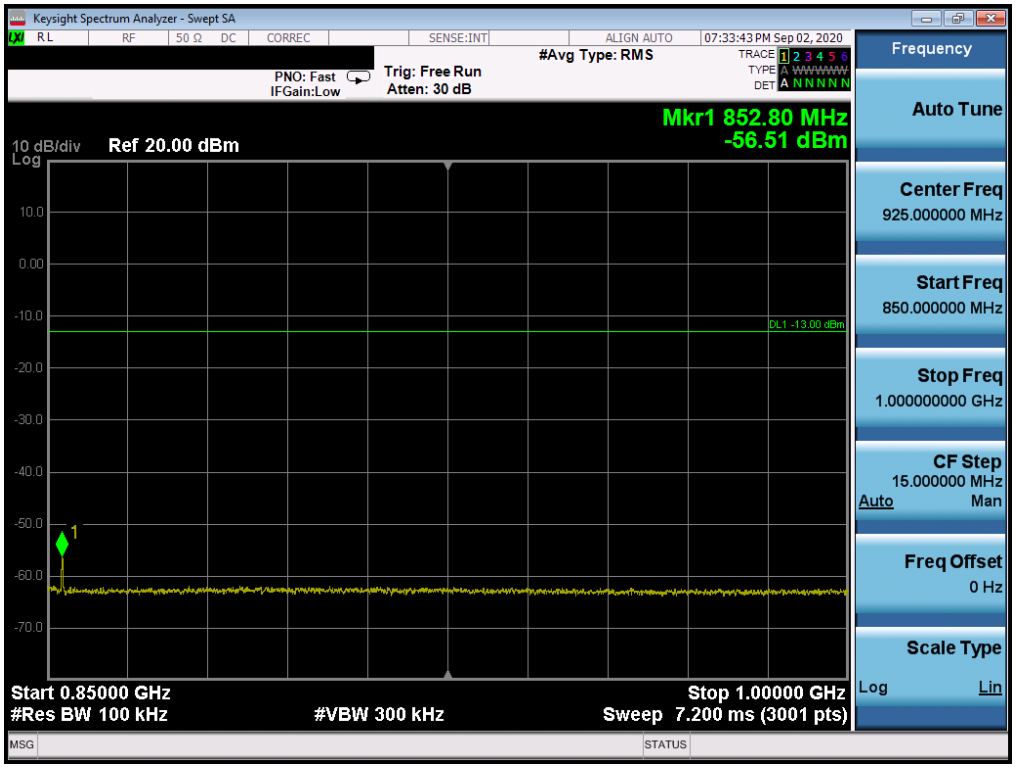


Plot 7-21. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

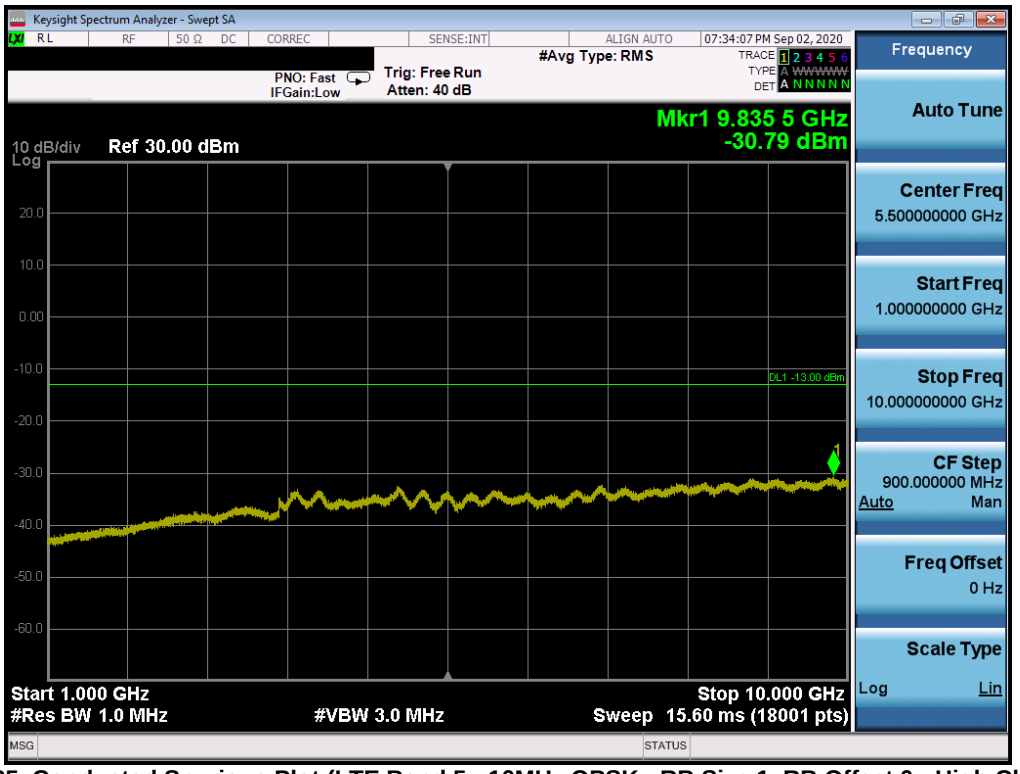
Plot 7-22. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



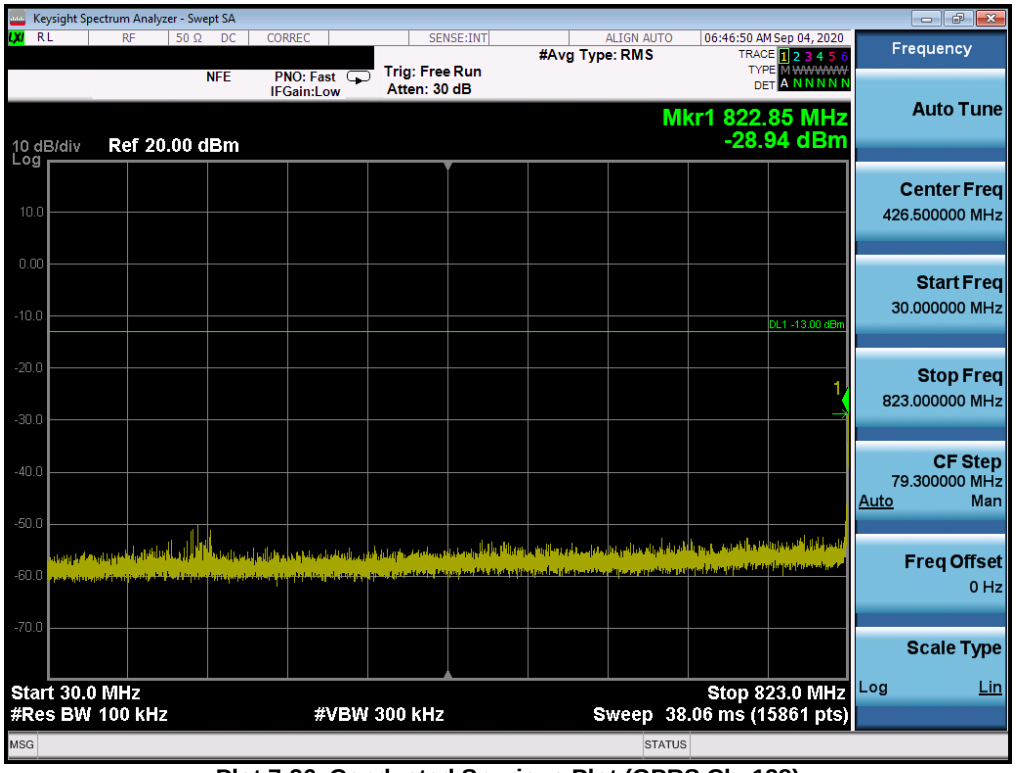
Plot 7-23. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



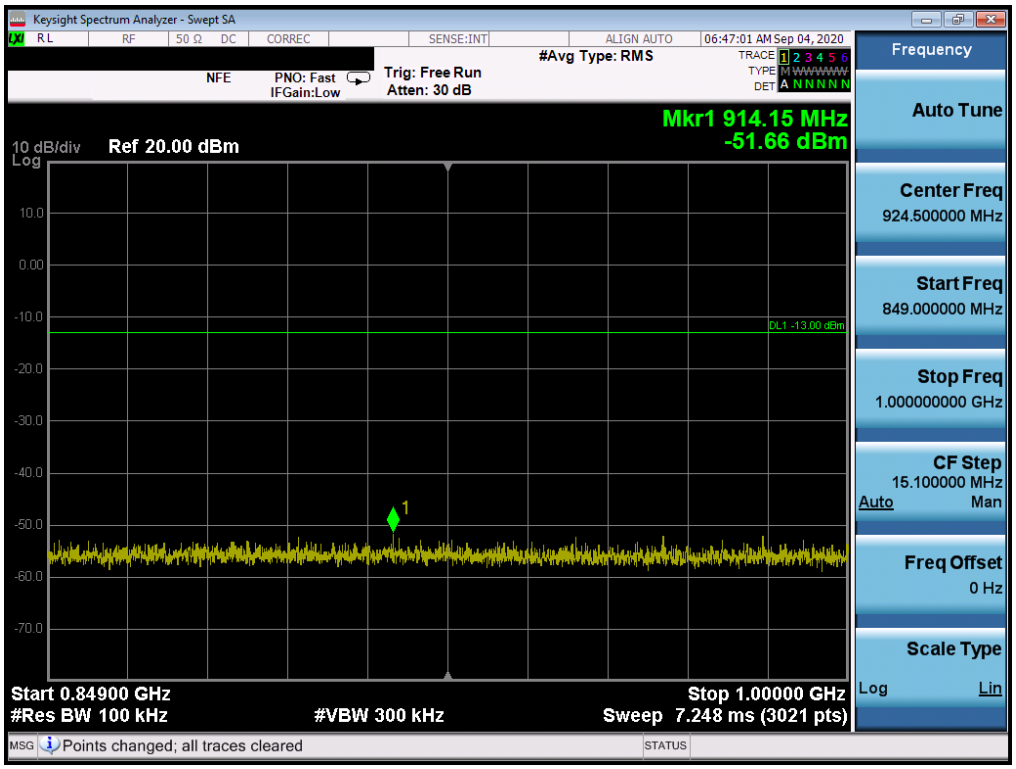
Plot 7-24. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



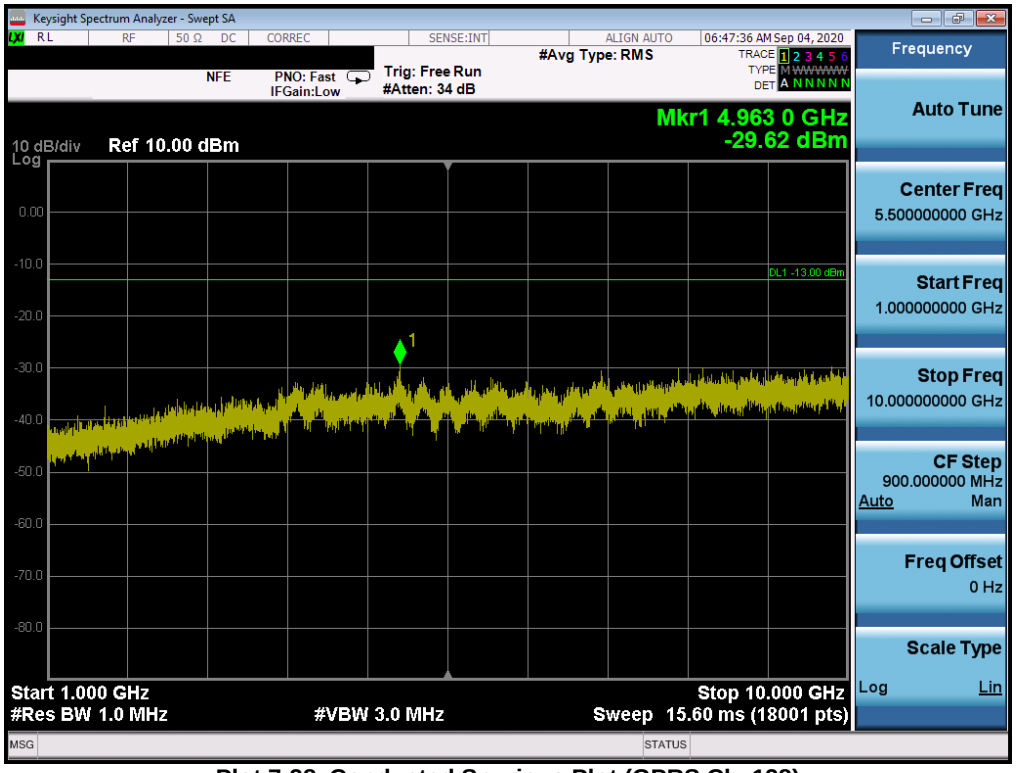
Plot 7-25. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



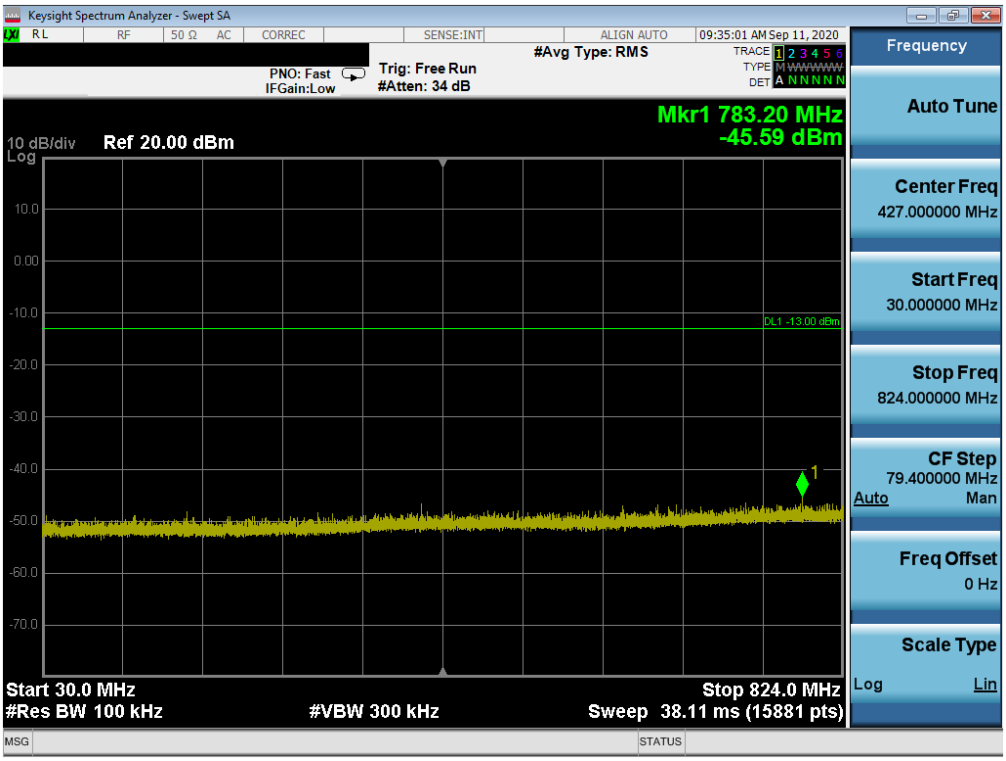
Plot 7-26. Conducted Spurious Plot (GPRS Ch. 128)



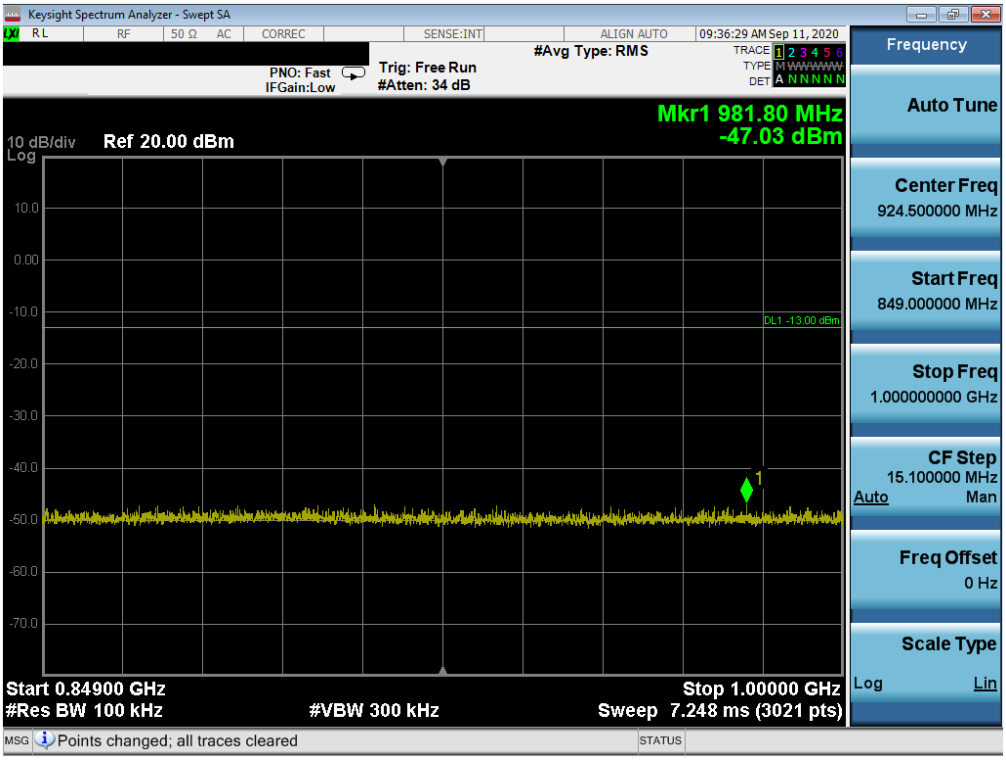
Plot 7-27. Conducted Spurious Plot (GPRS Ch. 128)



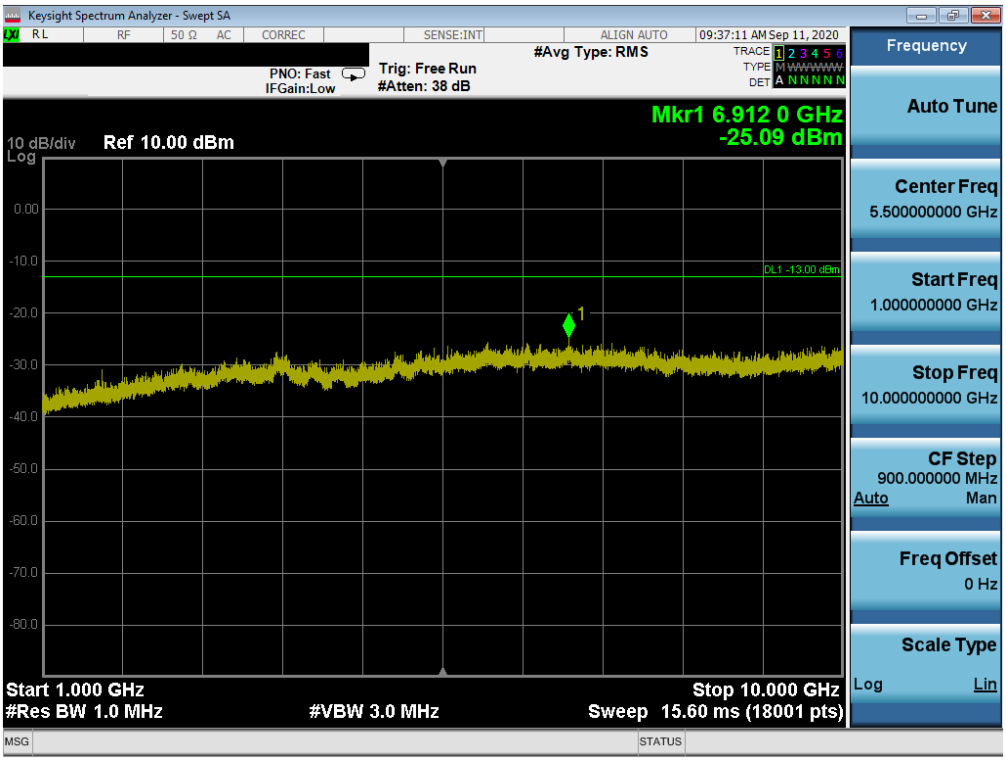
Plot 7-28. Conducted Spurious Plot (GPRS Ch. 128)



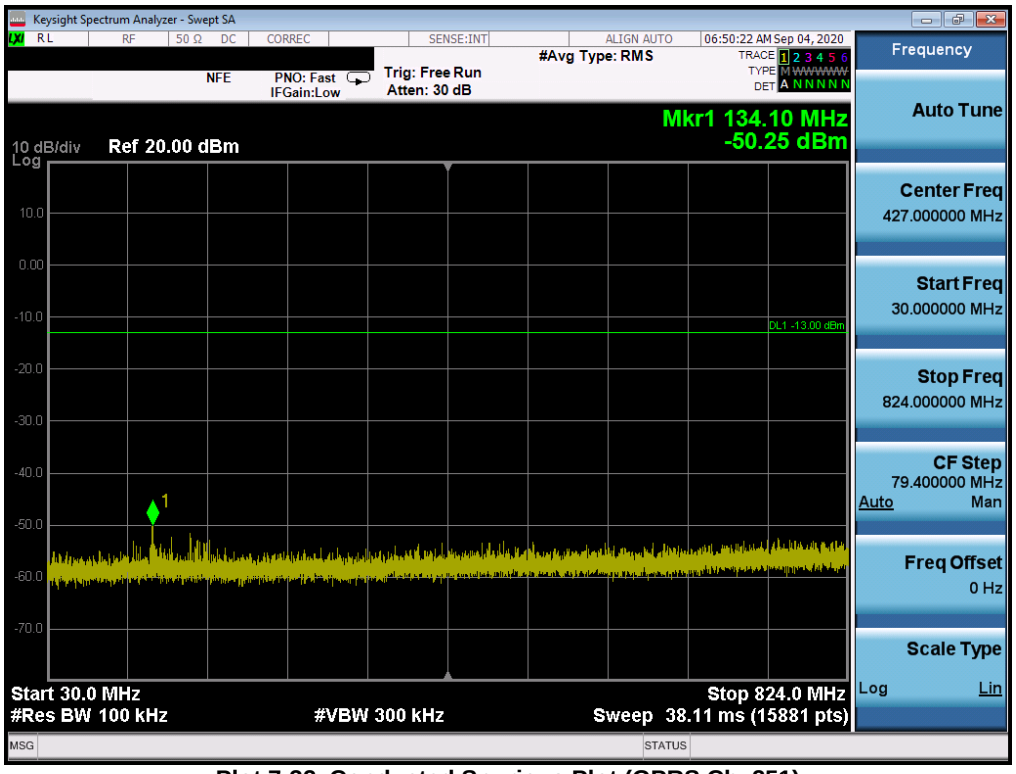
Plot 7-29. Conducted Spurious Plot (GPRS Ch. 190)



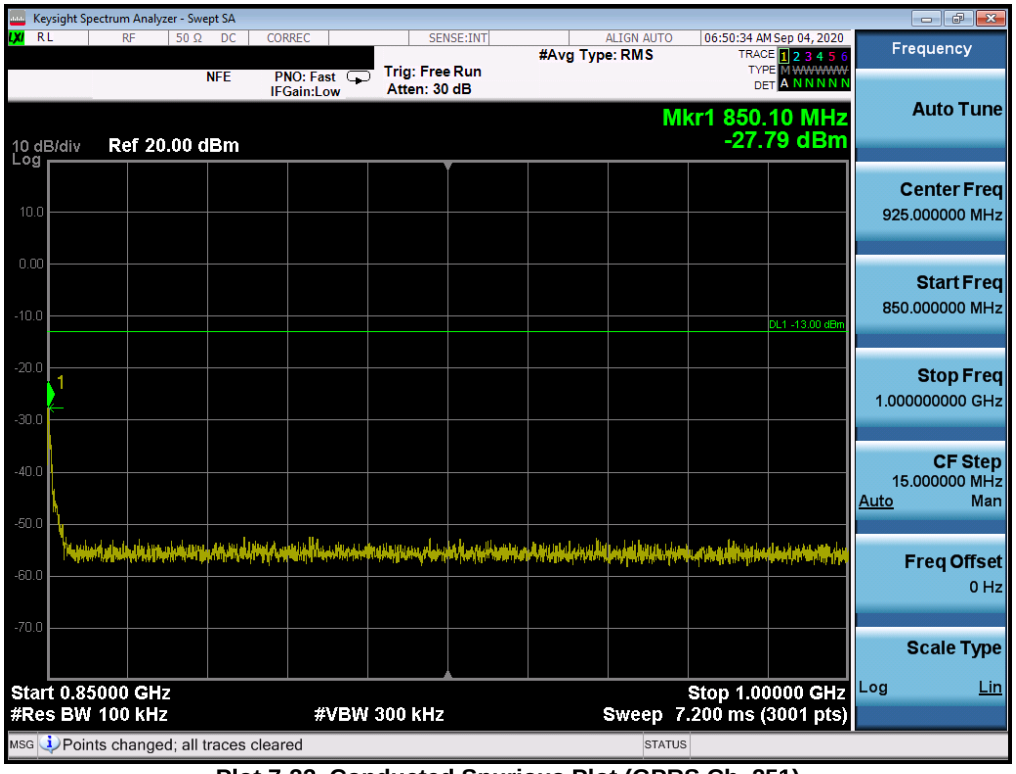
Plot 7-30. Conducted Spurious Plot (GPRS Ch. 190)



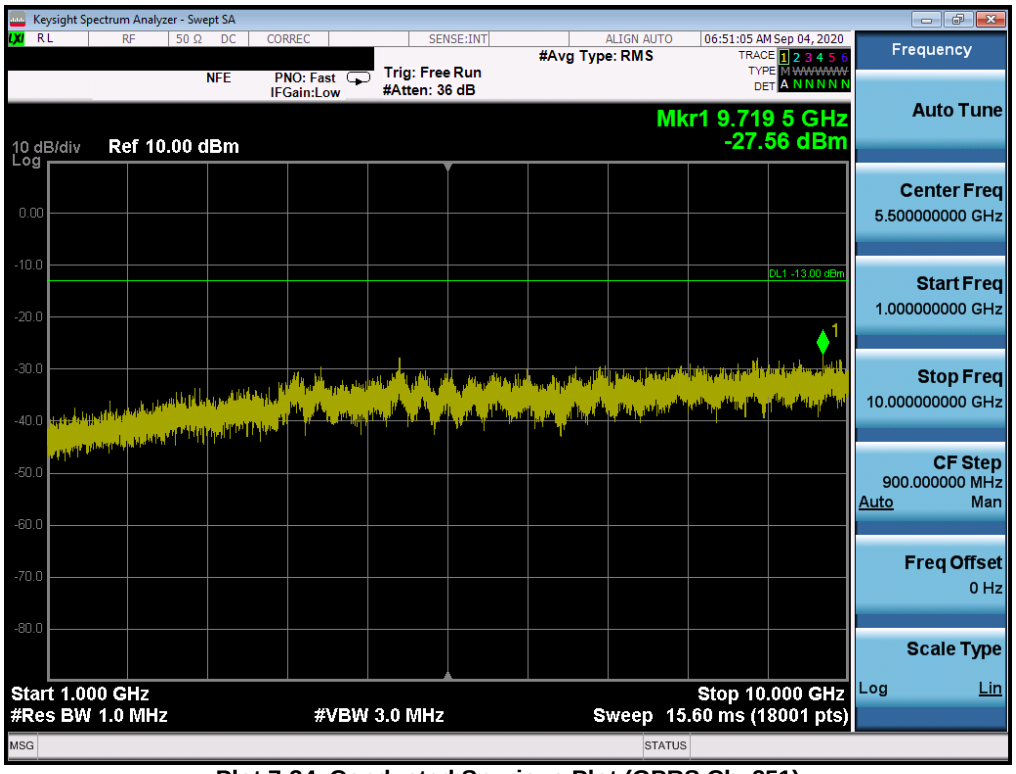
Plot 7-31. Conducted Spurious Plot (GPRS Ch. 190)



Plot 7-32. Conducted Spurious Plot (GPRS Ch. 251)

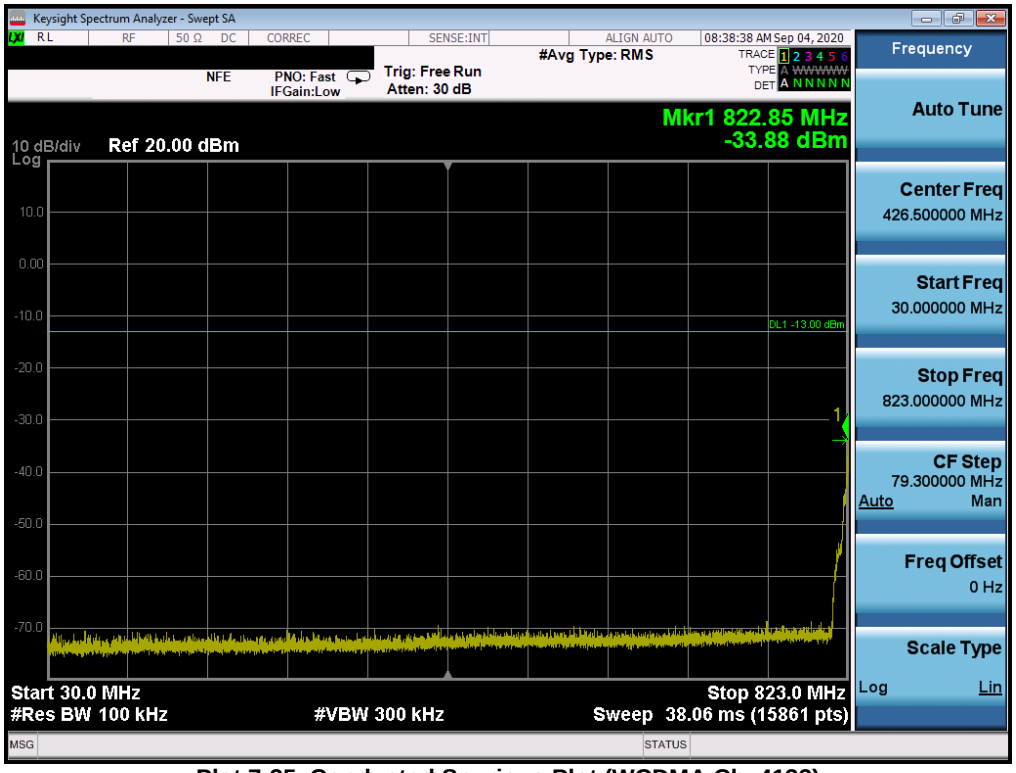


Plot 7-33. Conducted Spurious Plot (GPRS Ch. 251)

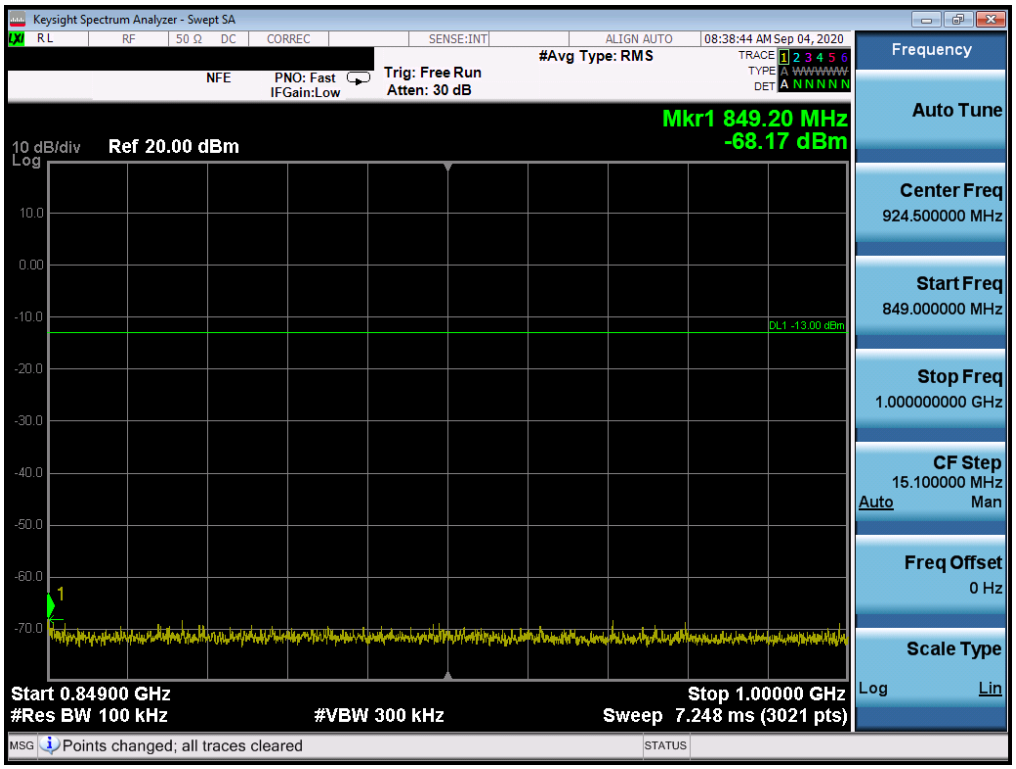


Plot 7-34. Conducted Spurious Plot (GPRS Ch. 251)

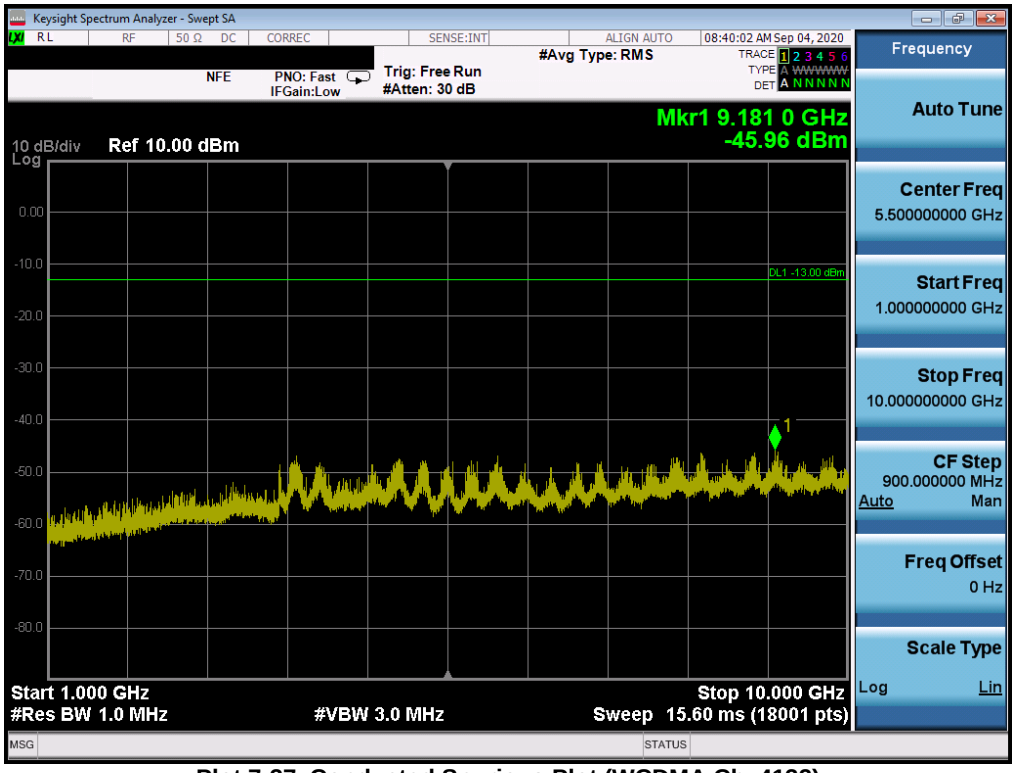
WCDMA Cell



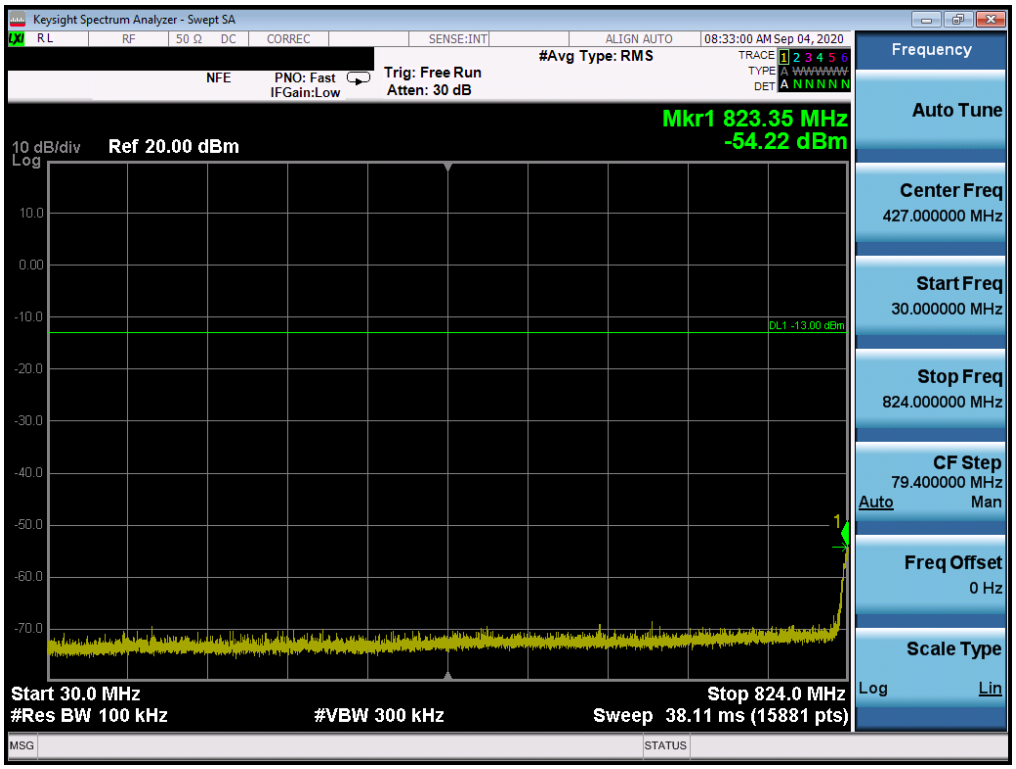
Plot 7-35. Conducted Spurious Plot (WCDMA Ch. 4132)



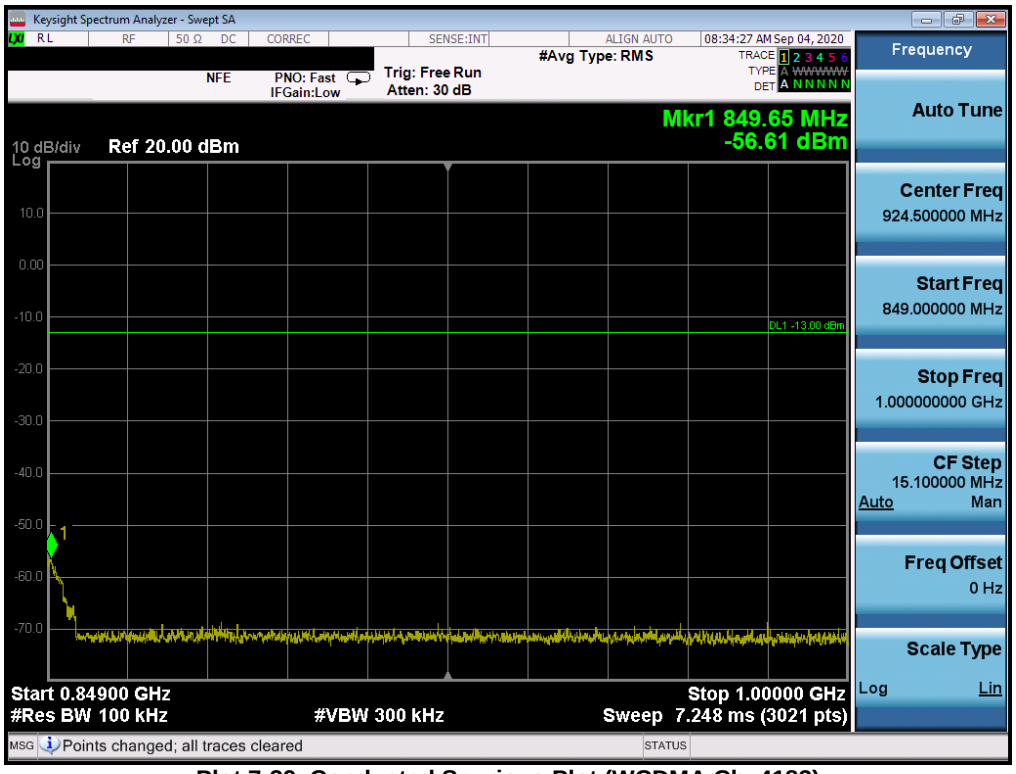
Plot 7-36. Conducted Spurious Plot (WCDMA Ch. 4132)



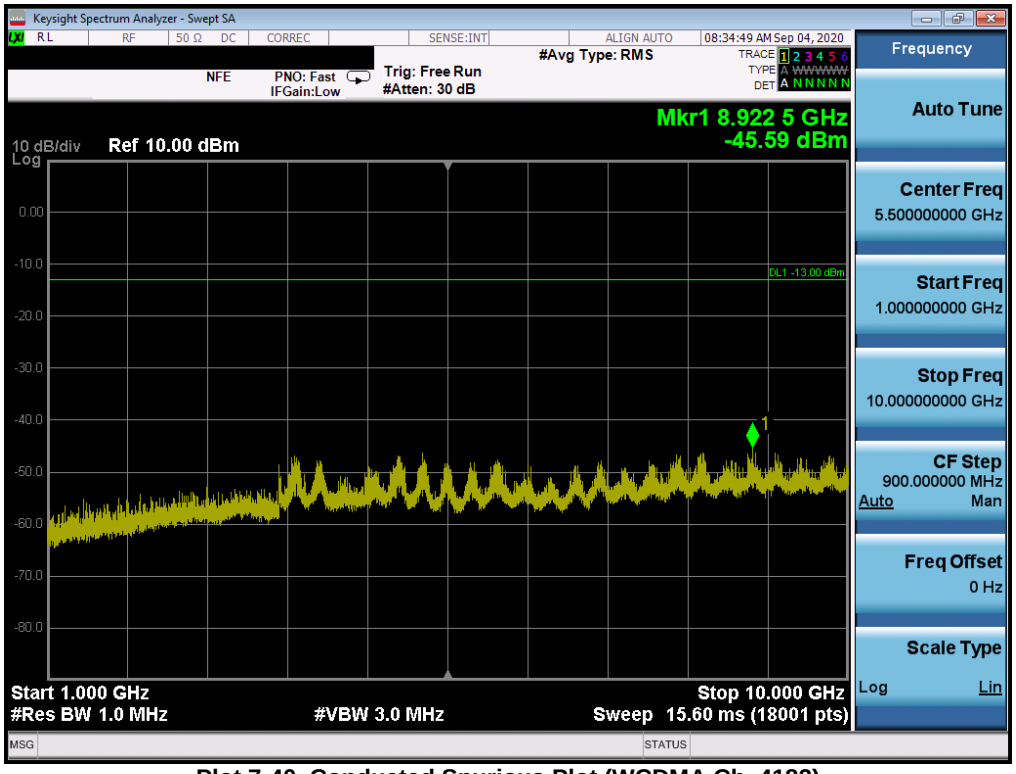
Plot 7-37. Conducted Spurious Plot (WCDMA Ch. 4132)



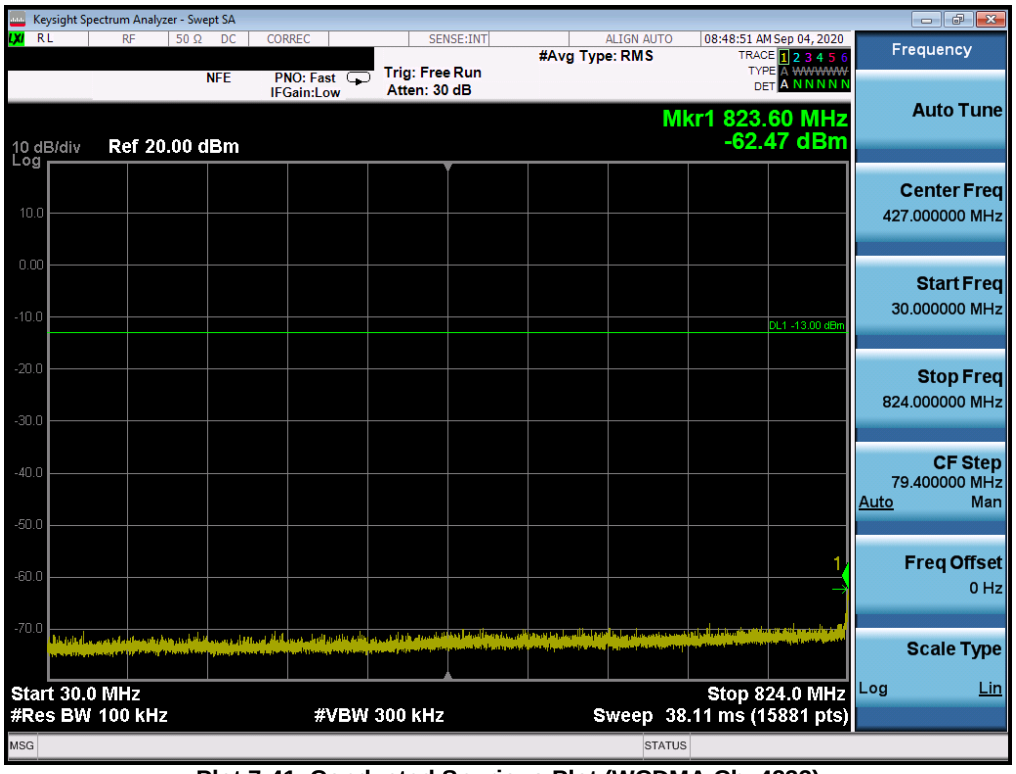
Plot 7-38. Conducted Spurious Plot (WCDMA Ch. 4183)



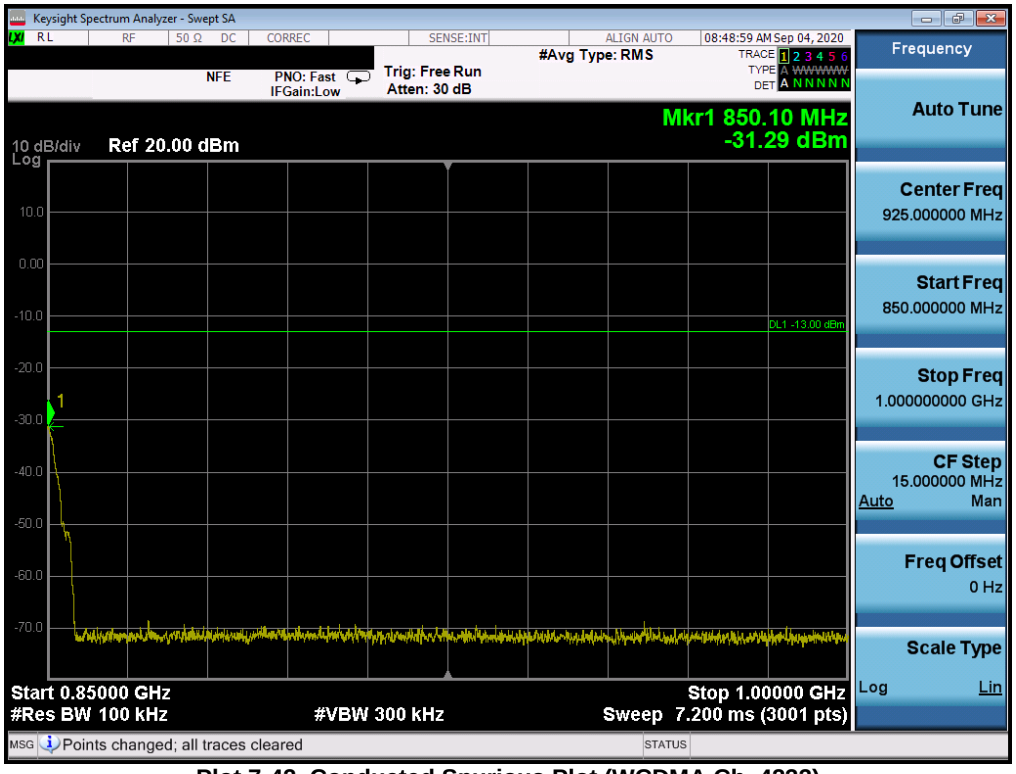
Plot 7-39. Conducted Spurious Plot (WCDMA Ch. 4183)



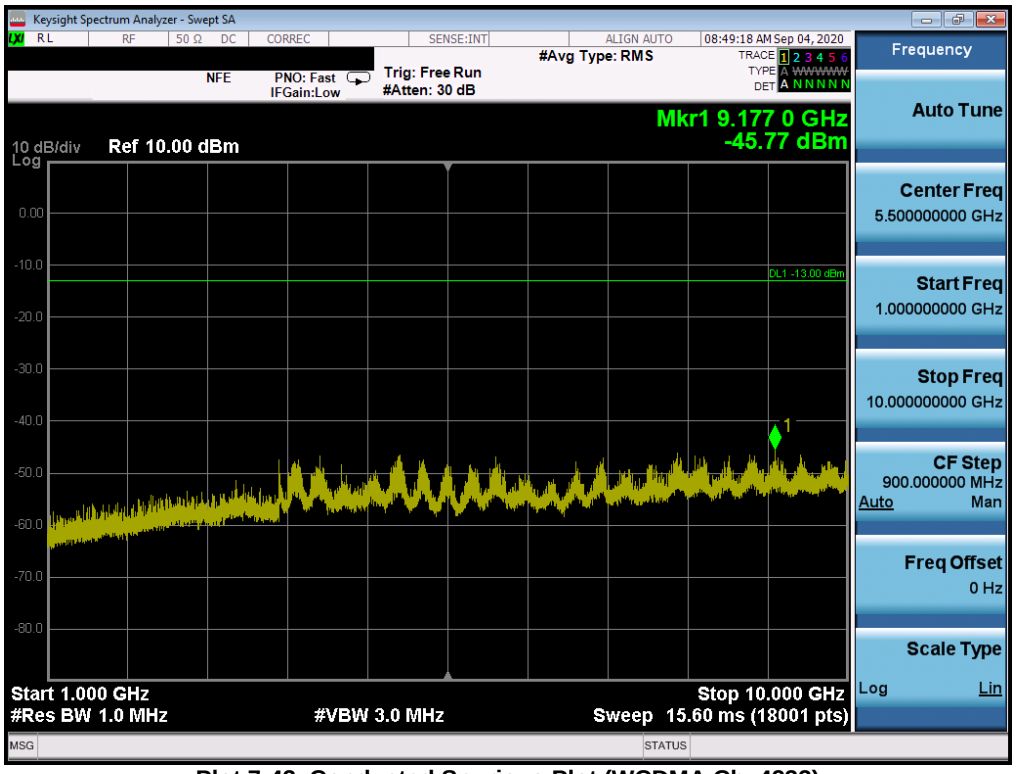
Plot 7-40. Conducted Spurious Plot (WCDMA Ch. 4183)



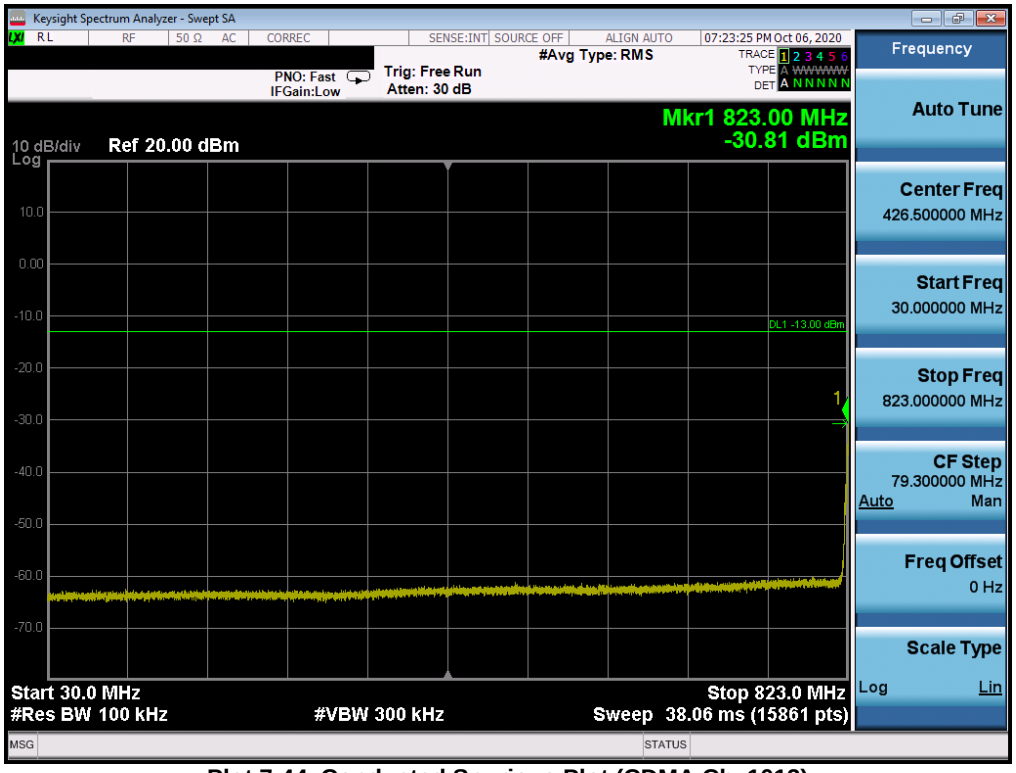
Plot 7-41. Conducted Spurious Plot (WCDMA Ch. 4233)



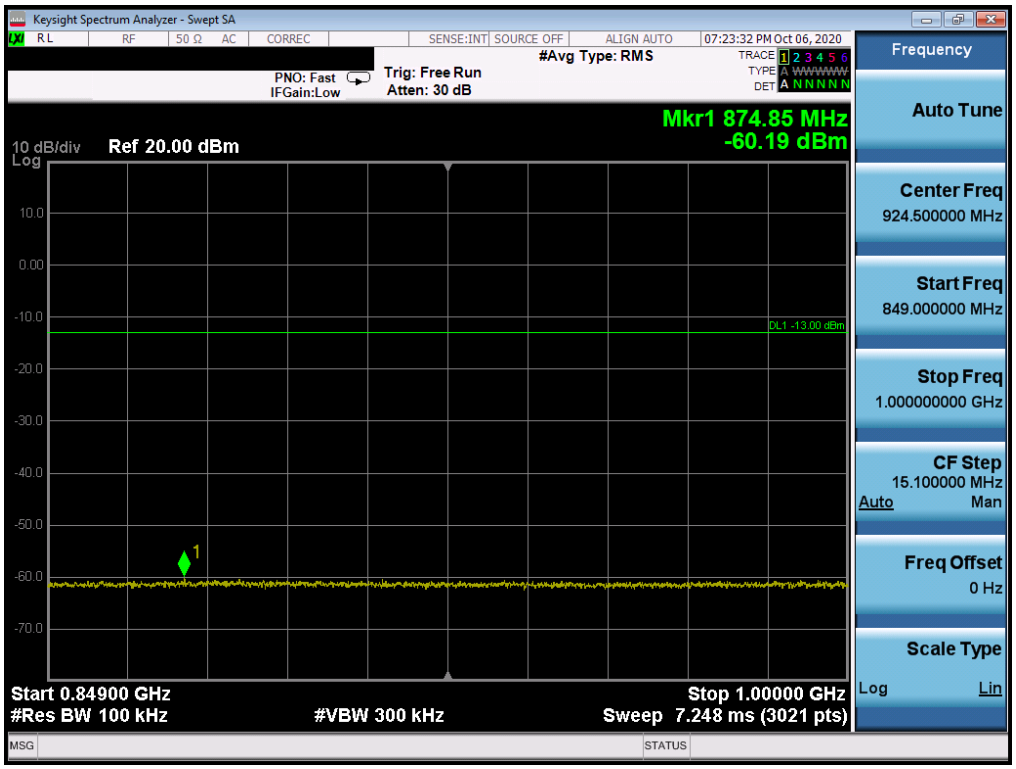
Plot 7-42. Conducted Spurious Plot (WCDMA Ch. 4233)



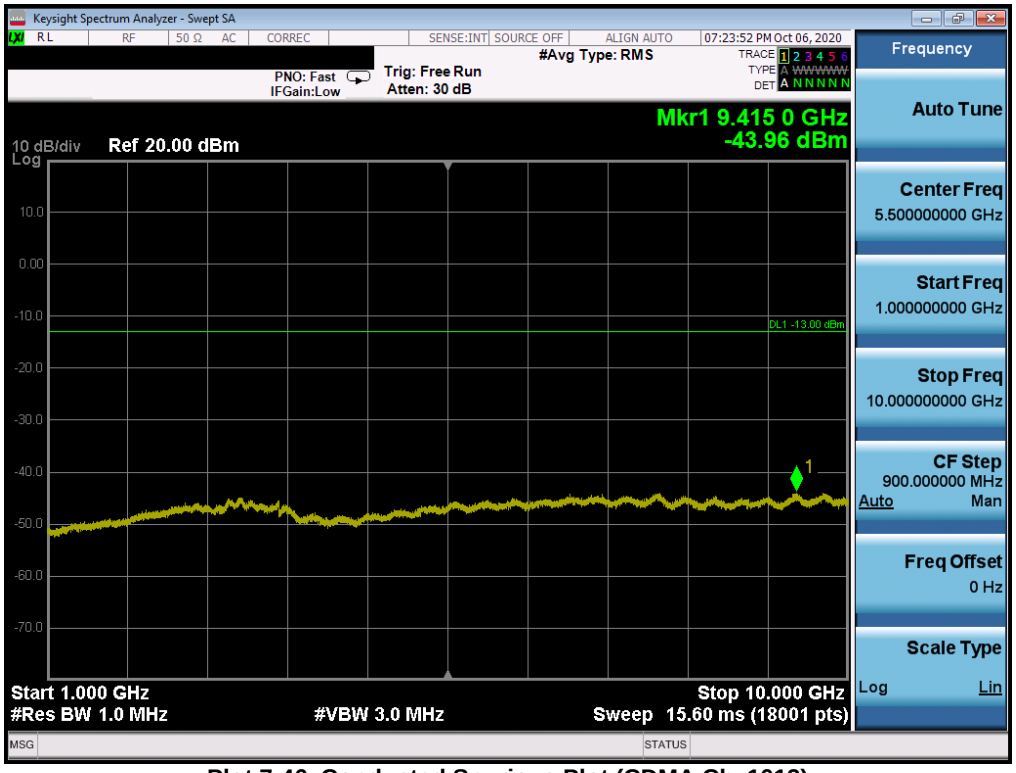
Plot 7-43. Conducted Spurious Plot (WCDMA Ch. 4233)



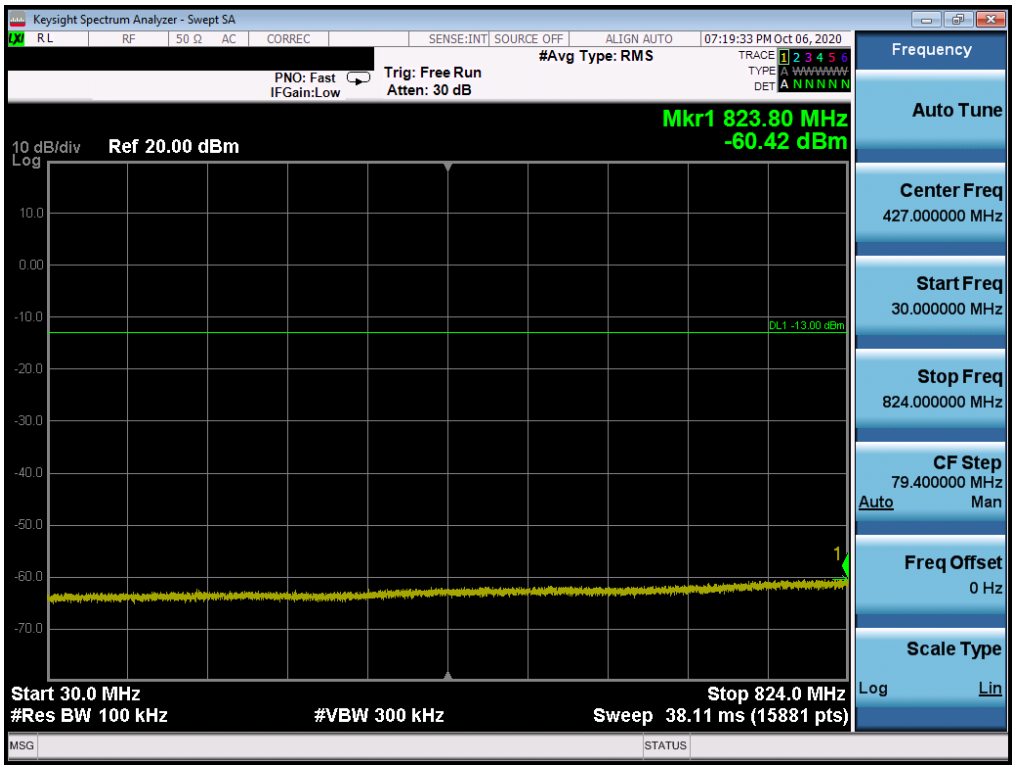
Plot 7-44. Conducted Spurious Plot (CDMA Ch. 1013)



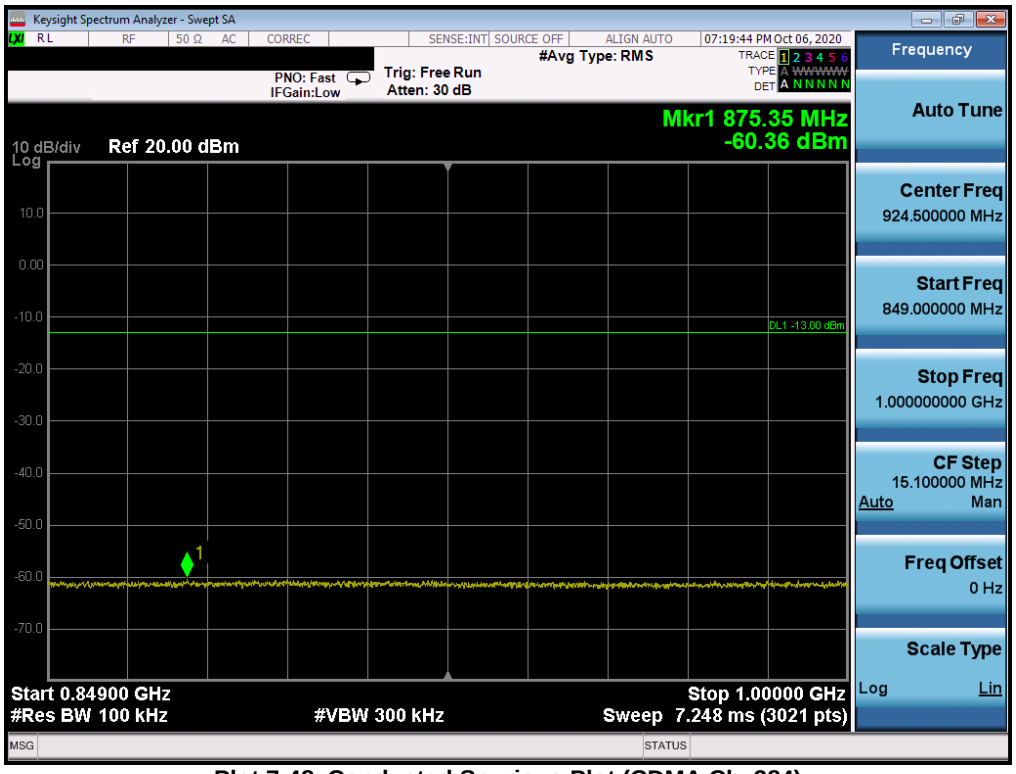
Plot 7-45. Conducted Spurious Plot (CDMA Ch. 1013)



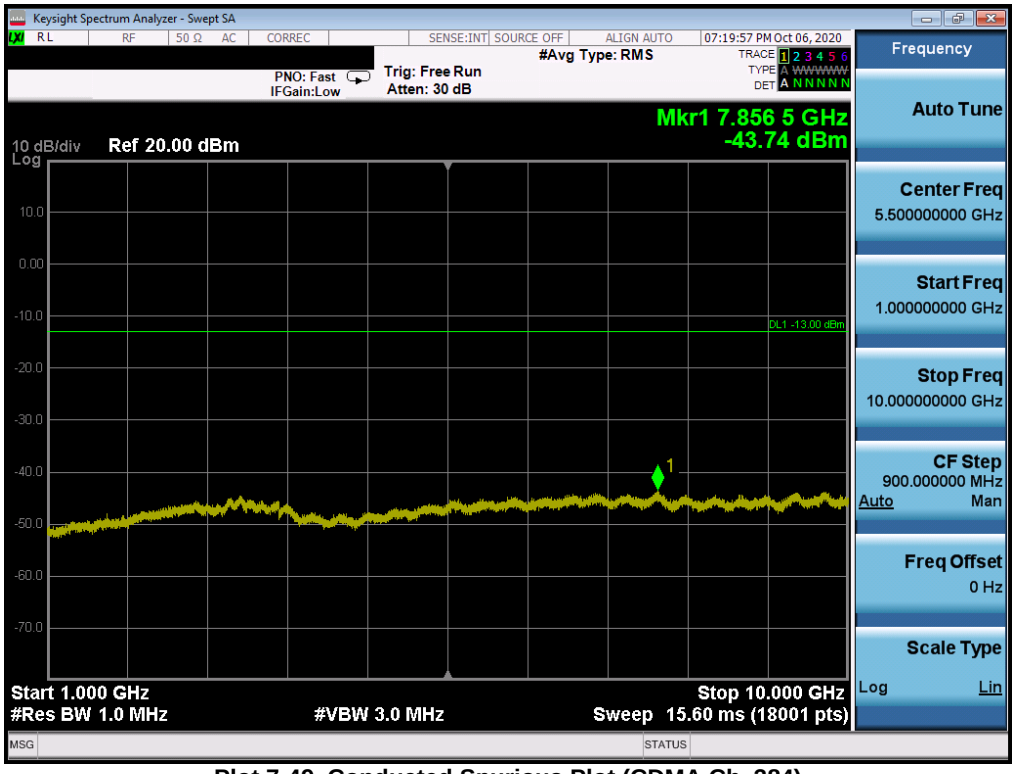
Plot 7-46. Conducted Spurious Plot (CDMA Ch. 1013)



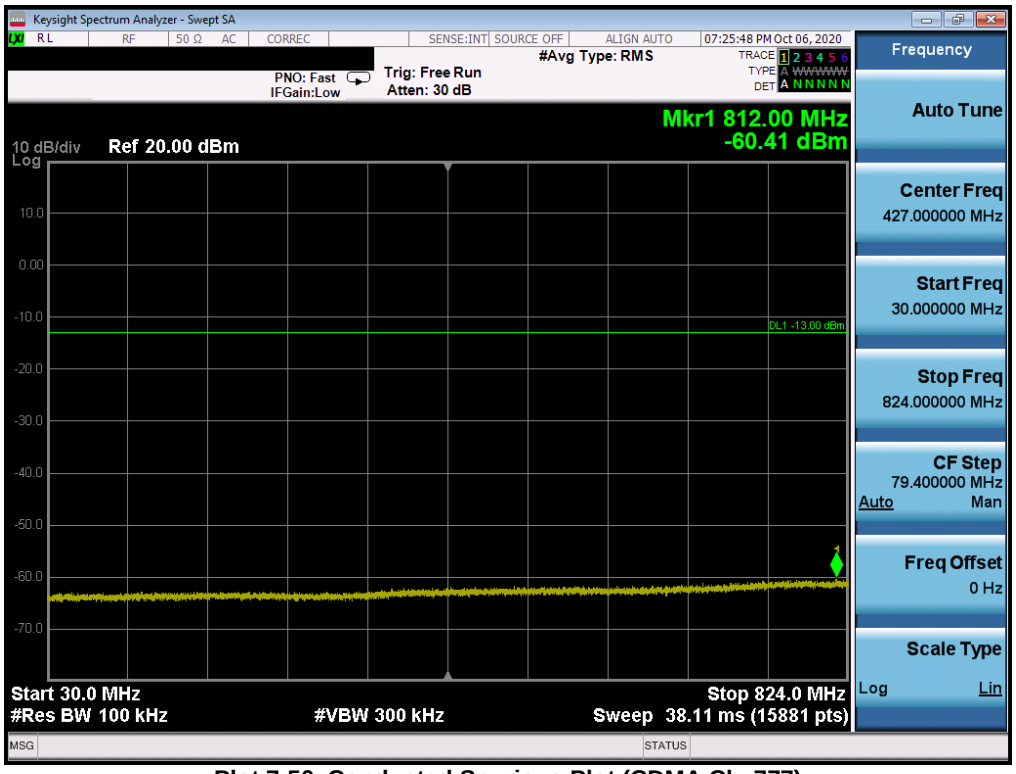
Plot 7-47. Conducted Spurious Plot (CDMA Ch. 384)



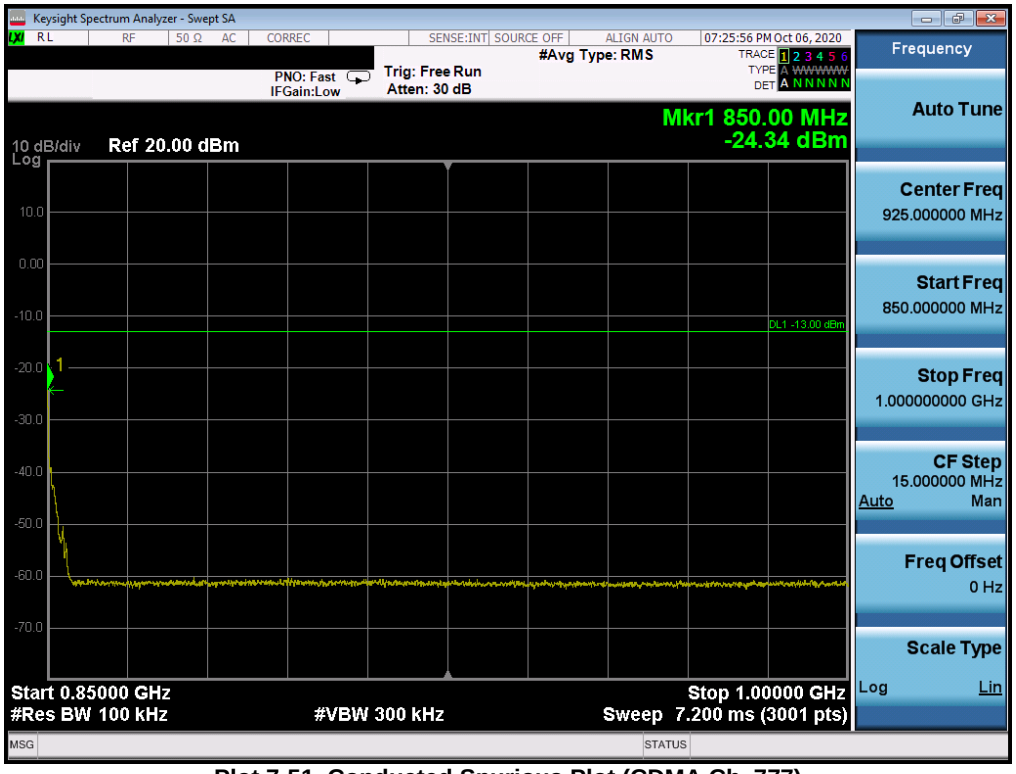
Plot 7-48. Conducted Spurious Plot (CDMA Ch. 384)



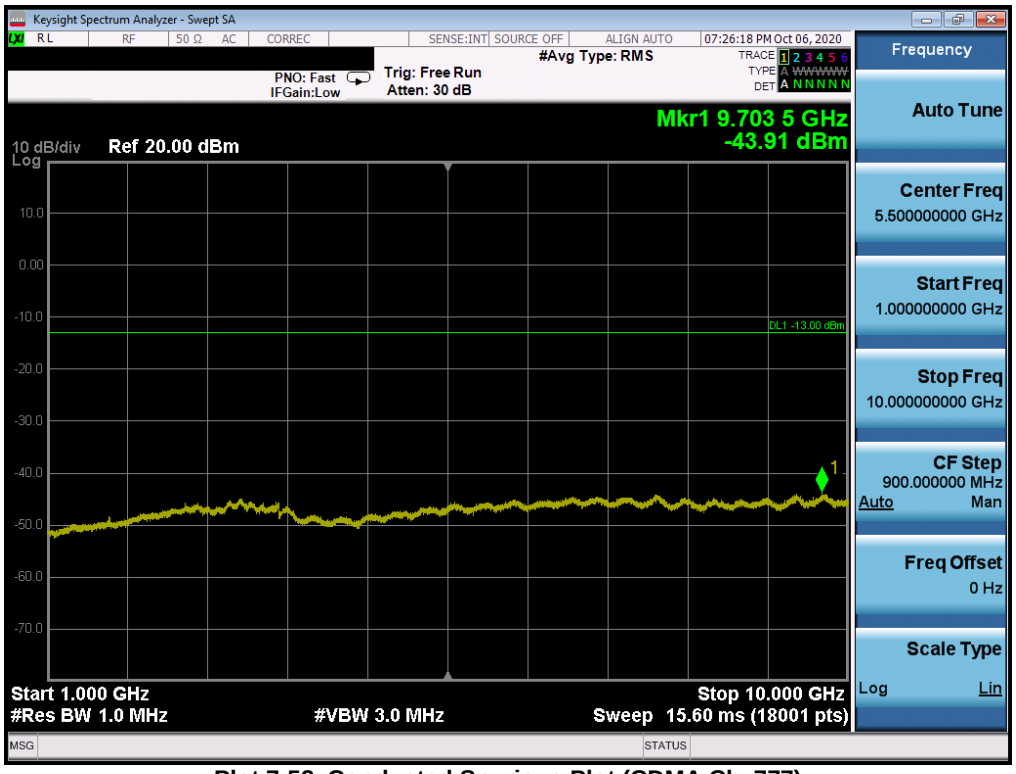
Plot 7-49. Conducted Spurious Plot (CDMA Ch. 384)



Plot 7-50. Conducted Spurious Plot (CDMA Ch. 777)



Plot 7-51. Conducted Spurious Plot (CDMA Ch. 777)



Plot 7-52. Conducted Spurious Plot (CDMA Ch. 777)

7.4 Band Edge Emissions at Antenna Terminal

Test Overview

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

The minimum permissible attenuation level of any spurious emission is 43 + 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 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 ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

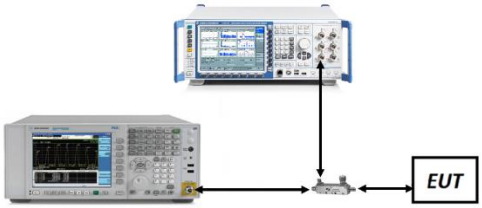
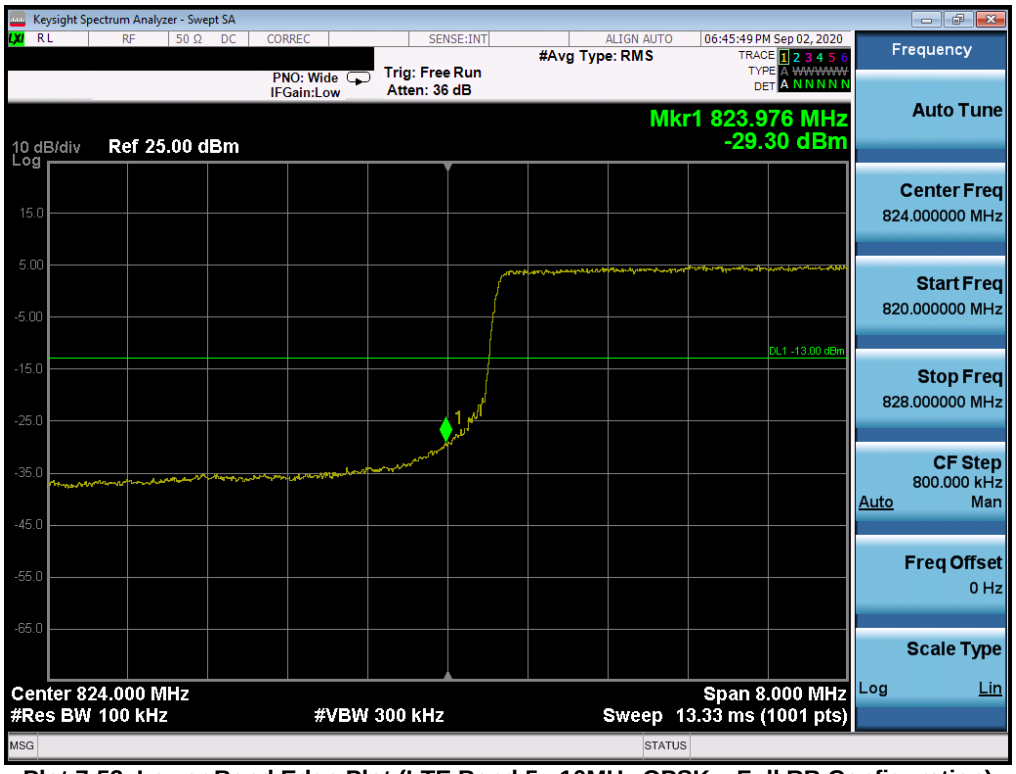


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

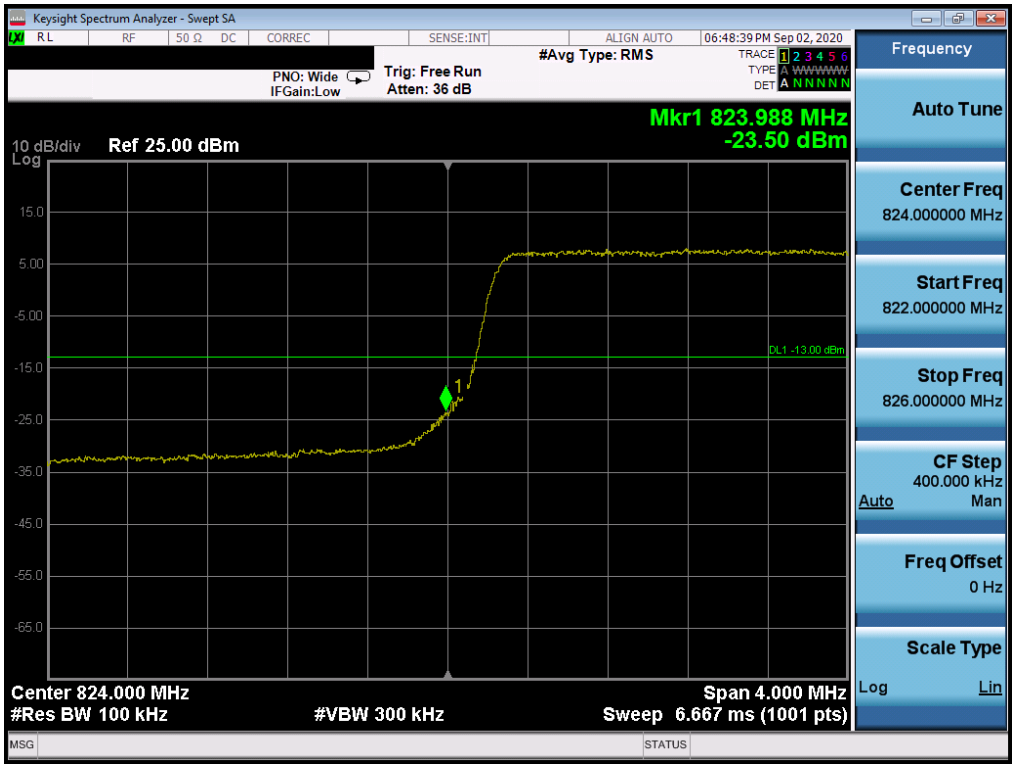
1. Per 22.917(b) and RSS-132(5.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions 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.

LTE Band 5



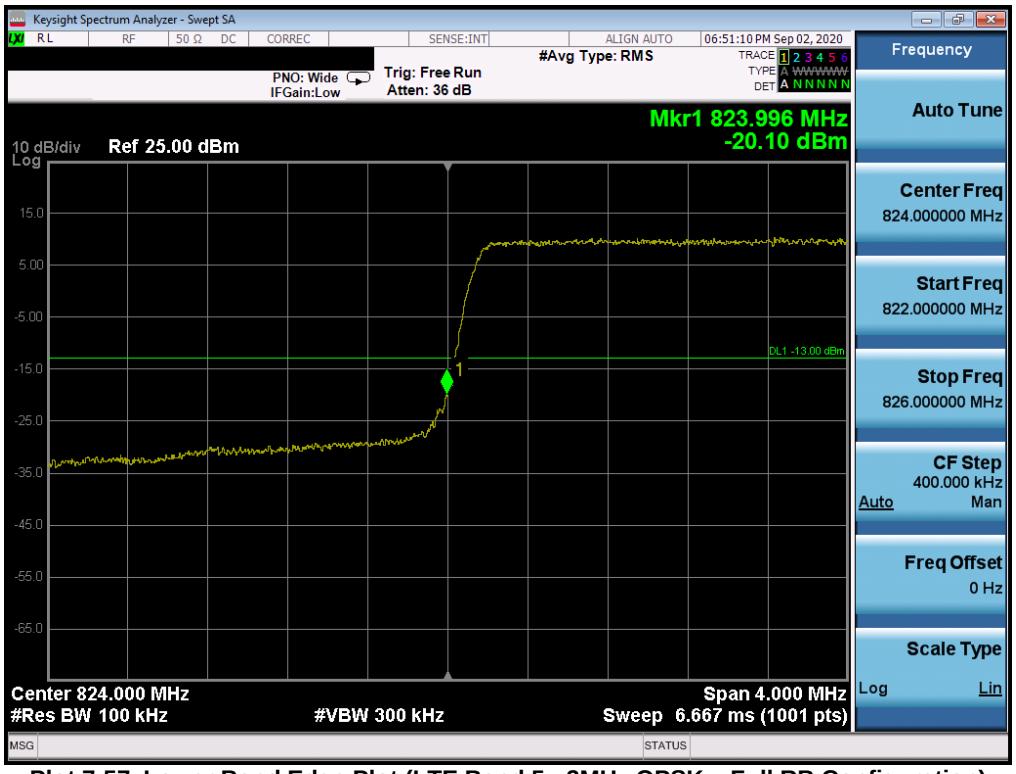
Plot 7-53. Lower Band Edge Plot (LTE Band 5 - 10MHz QPSK – Full RB Configuration)

Plot 7-54. Upper Band Edge Plot (LTE Band 5 - 10MHz QPSK – Full RB Configuration)



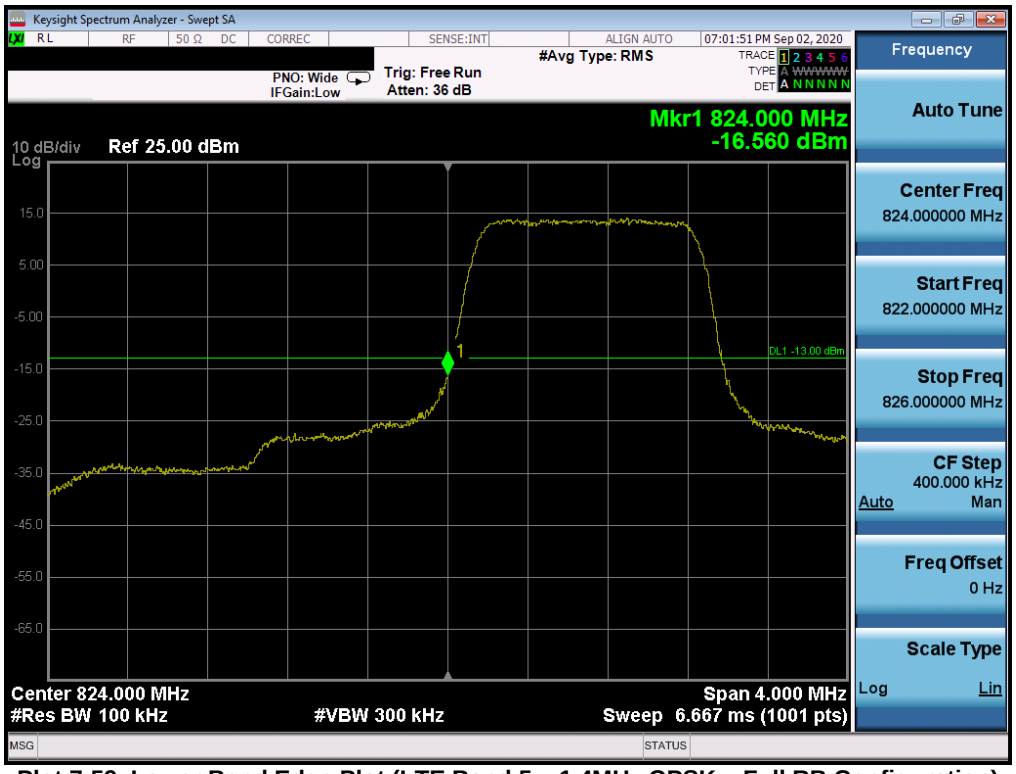
Plot 7-55. Lower Band Edge Plot (LTE Band 5 - 5MHz QPSK – Full RB Configuration)

Plot 7-56. Upper Band Edge Plot (LTE Band 5 - 5MHz QPSK – Full RB Configuration)



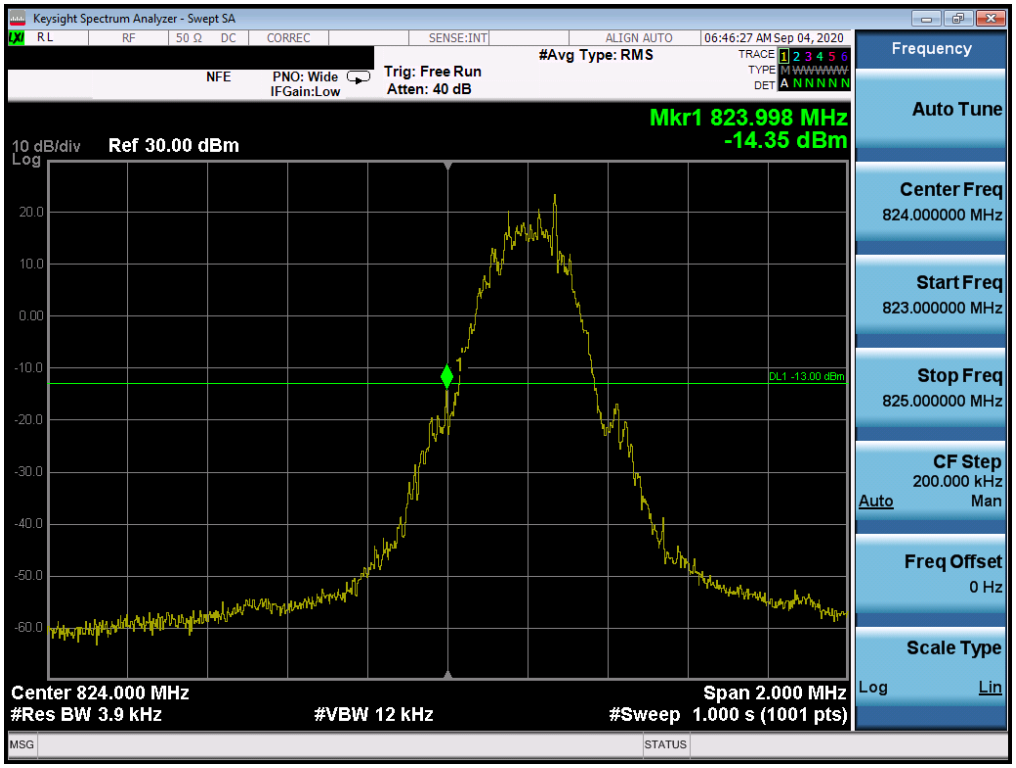
Plot 7-57. Lower Band Edge Plot (LTE Band 5 - 3MHz QPSK – Full RB Configuration)

Plot 7-58. Upper Band Edge Plot (LTE Band 5 - 3MHz QPSK – Full RB Configuration)

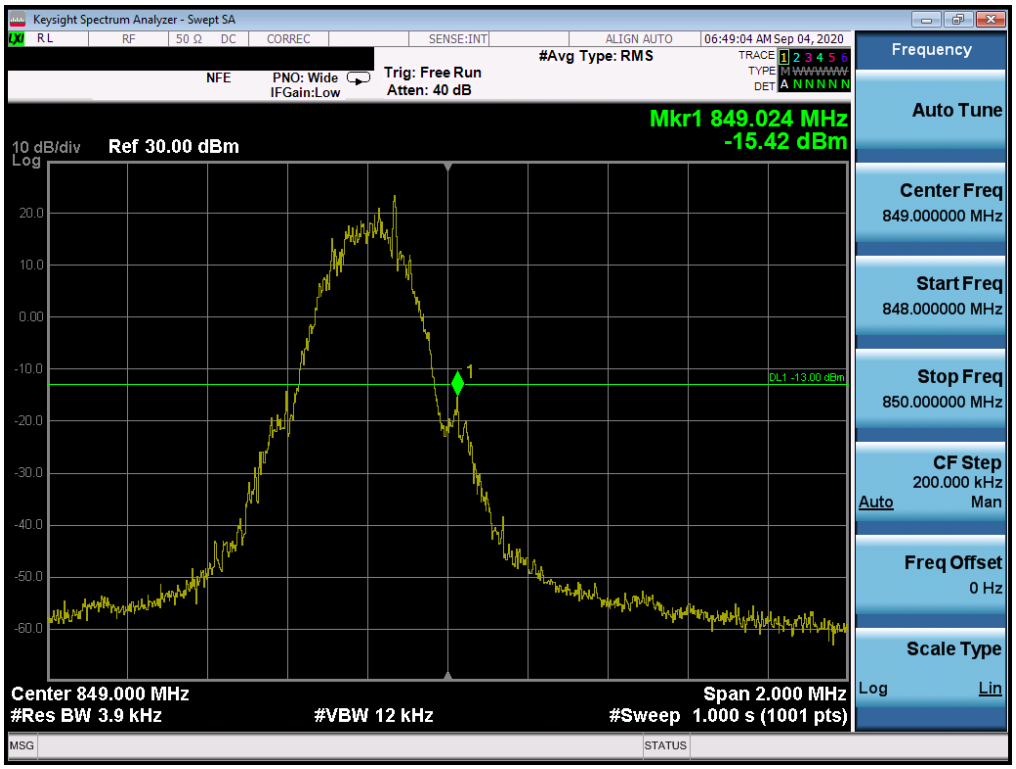


Plot 7-59. Lower Band Edge Plot (LTE Band 5 – 1.4MHz QPSK – Full RB Configuration)

Plot 7-60. Upper Band Edge Plot (LTE Band 5 – 1.4MHz QPSK – Full RB Configuration)



Plot 7-61. Lower Band Edge Plot (GSM Cell – Ch. 128)



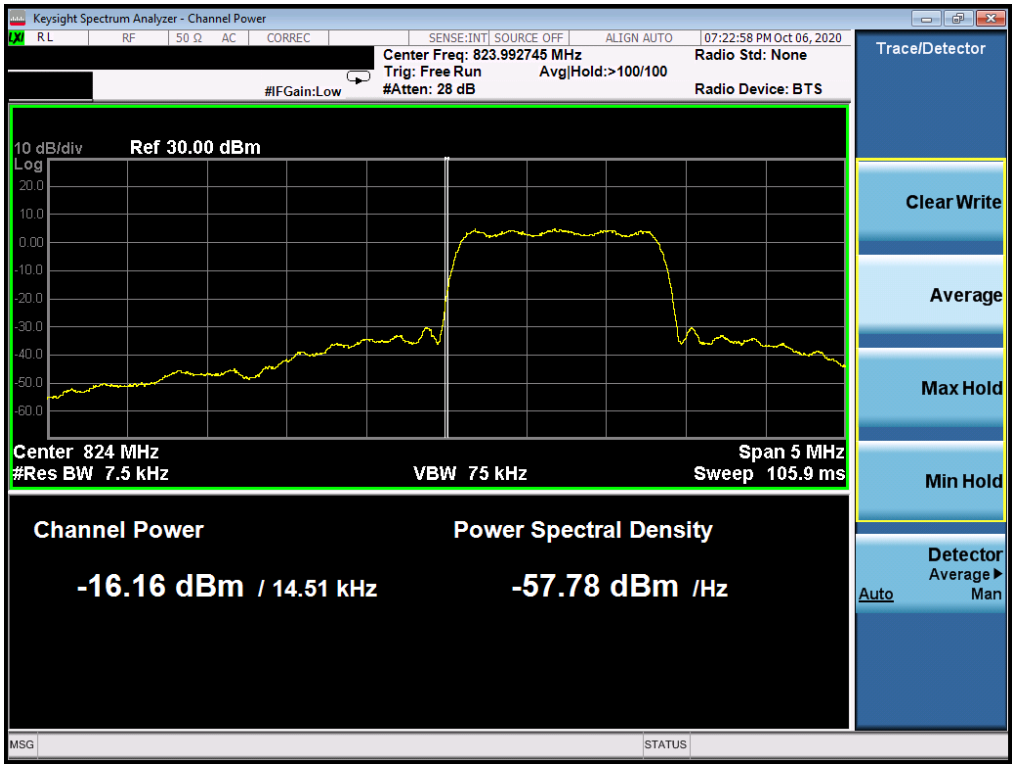
Plot 7-62. Upper Band Edge Plot (GSM Cell – Ch. 251)

WCDMA Cell

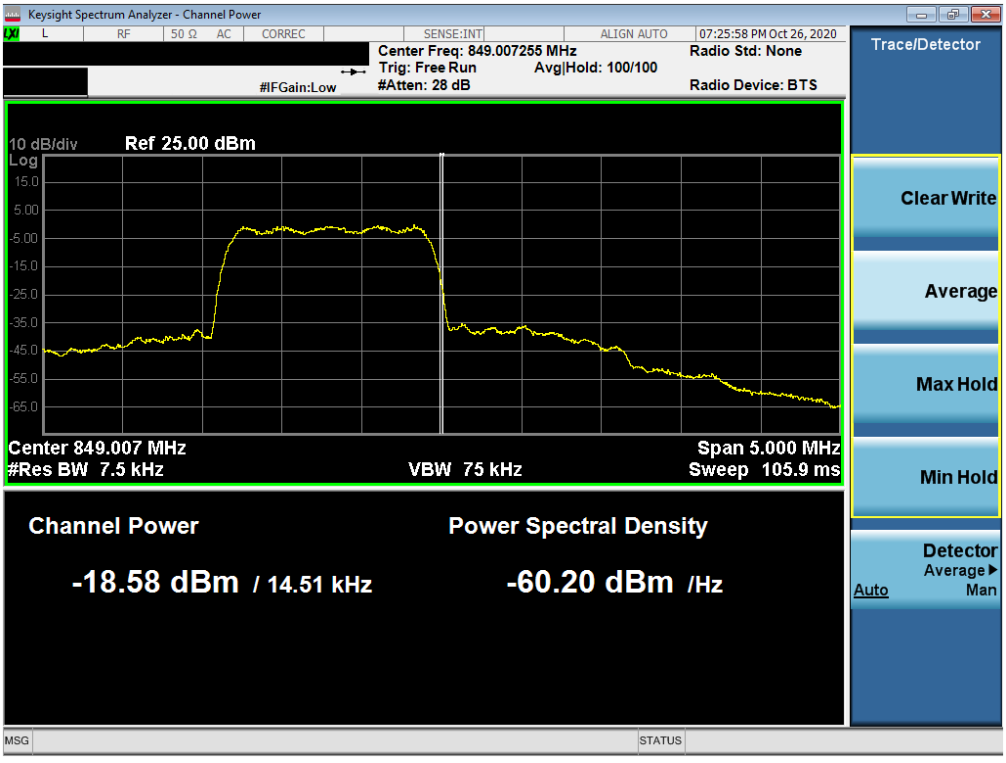
Plot 7-63. Lower Band Edge Plot (WCDMA Cell – Ch. 4132)

Plot 7-64. Upper Band Edge Plot (WCDMA Cell – Ch. 4233)

CDMA Cell



Plot 7-65. Lower Band Edge Plot (CDMA Cell – Ch. 1013)



Plot 7-66. Upper Band Edge Plot (CDMA Cell – Ch. 777)

7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

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

Test Setup

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

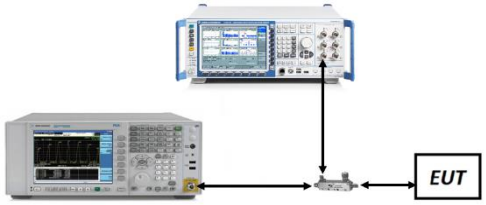
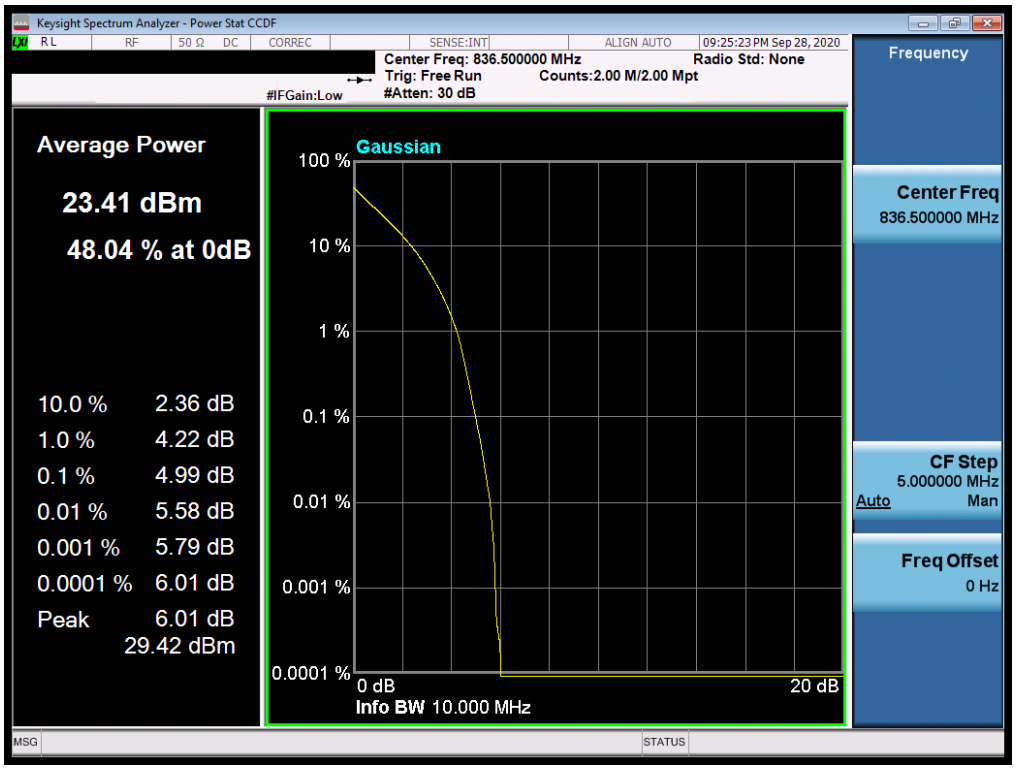


Figure 7-4. Test Instrument & Measurement Setup

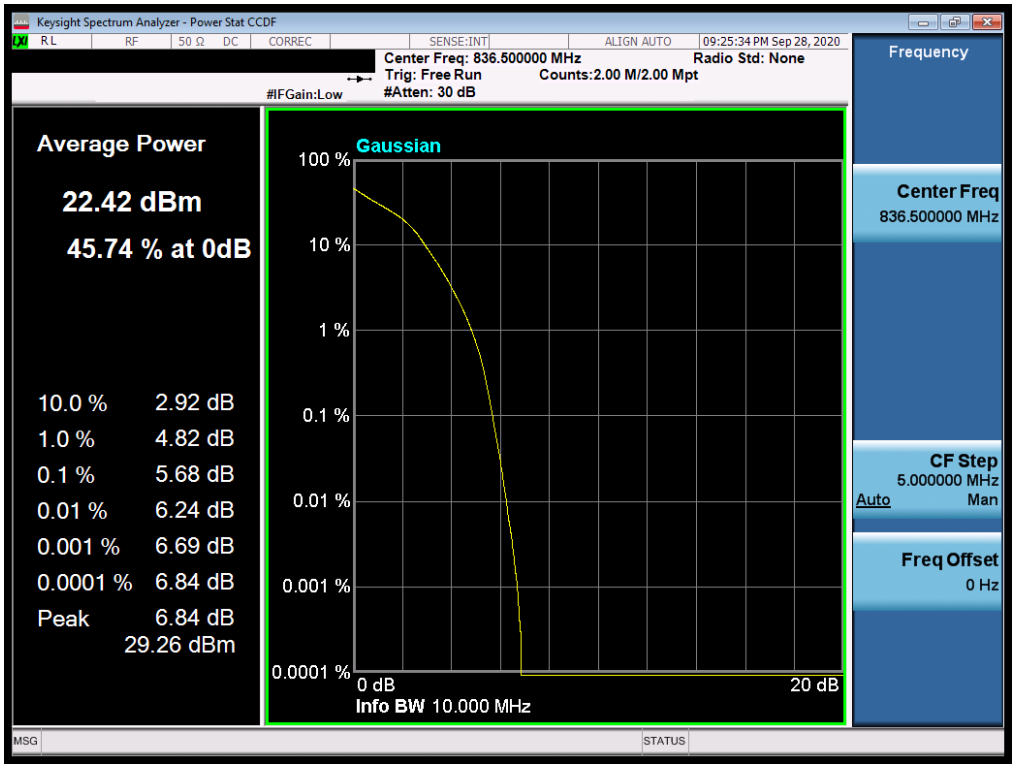
Test Notes

None.

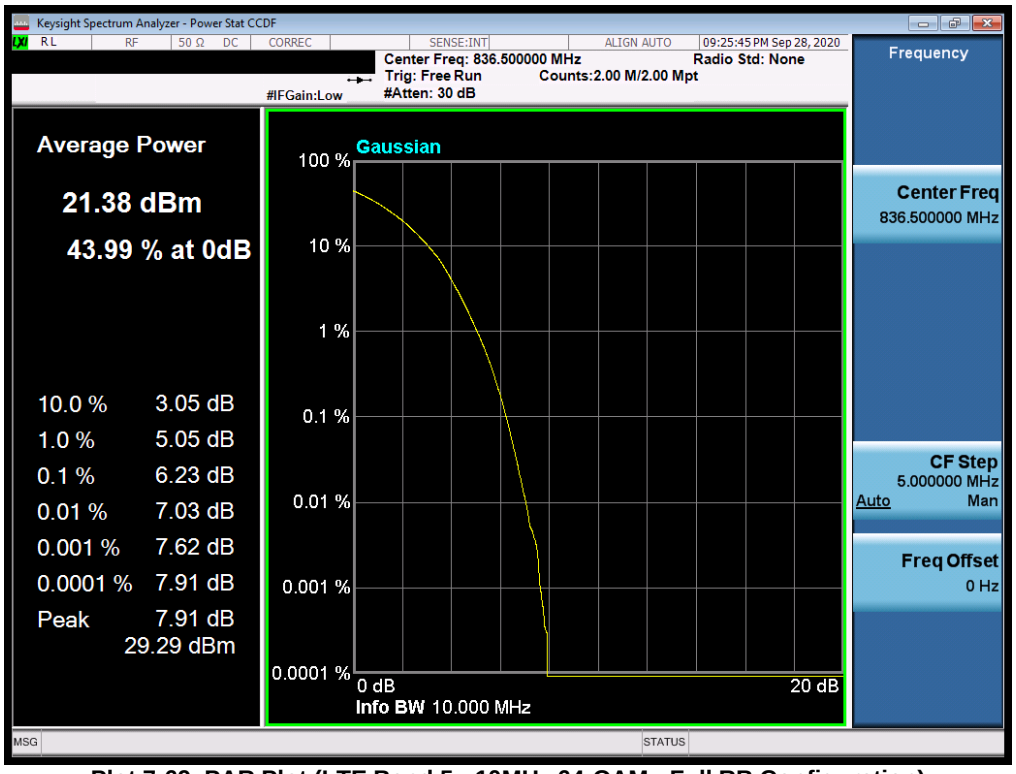
LTE Band 5



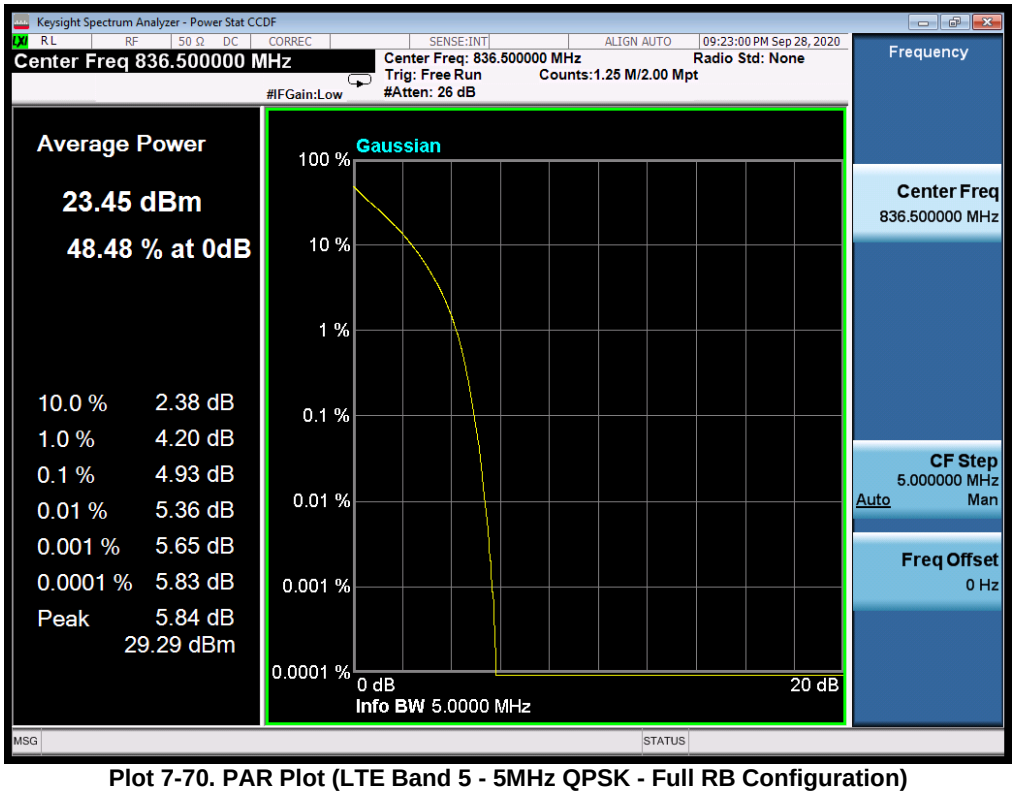
Plot 7-67. PAR Plot (LTE Band 5 - 10MHz QPSK - Full RB Configuration)



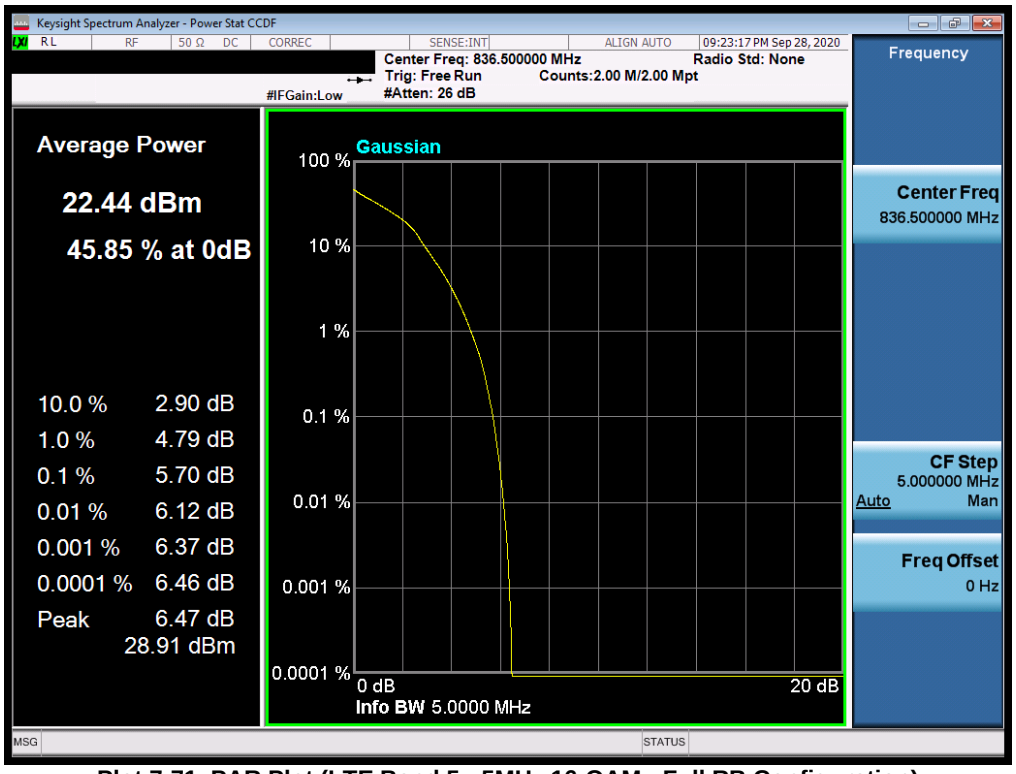
Plot 7-68. PAR Plot (LTE Band 5 - 10MHz 16-QAM - Full RB Configuration)



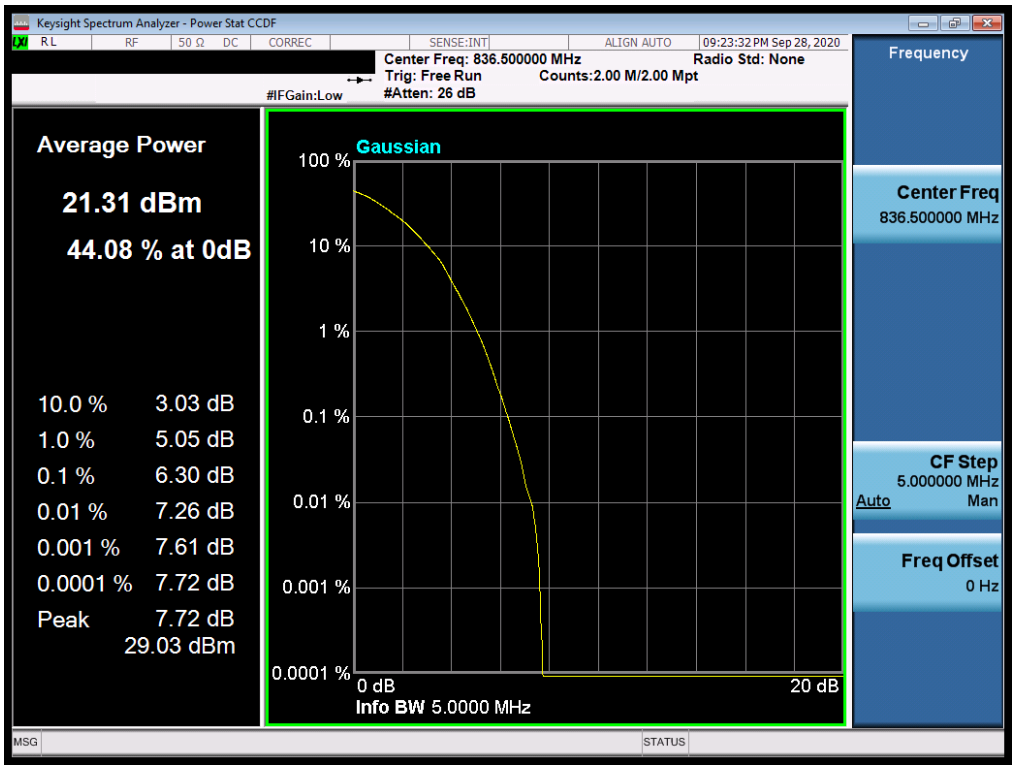
Plot 7-69. PAR Plot (LTE Band 5 - 10MHz 64-QAM - Full RB Configuration)



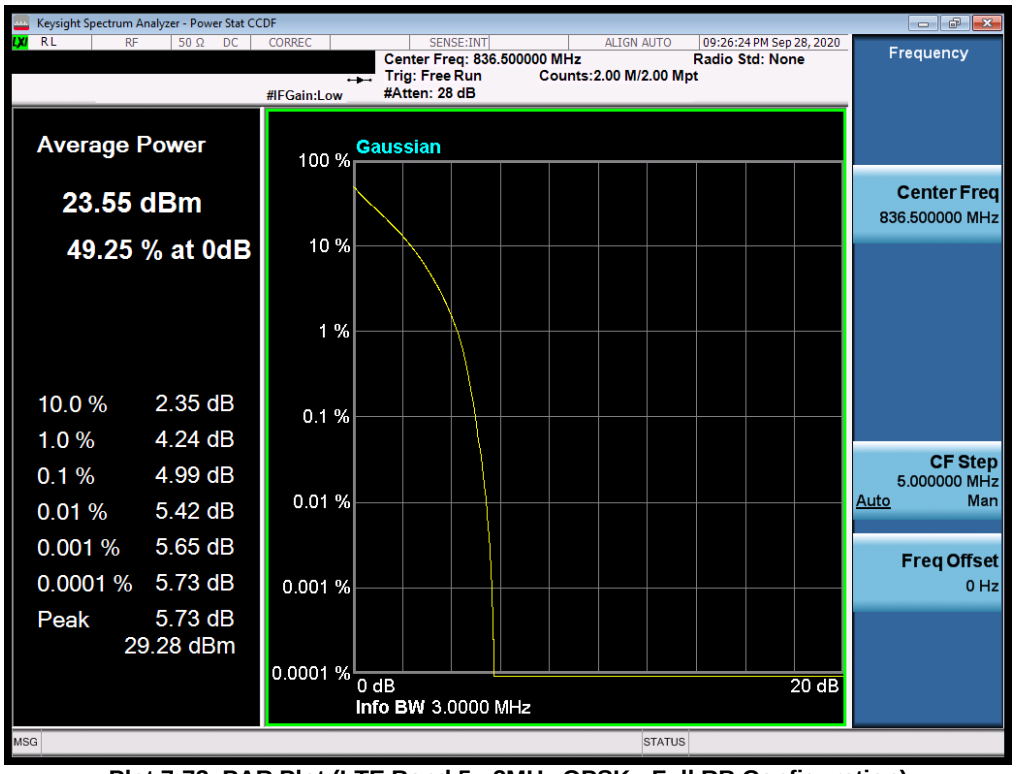
Plot 7-70. PAR Plot (LTE Band 5 - 5MHz QPSK - Full RB Configuration)



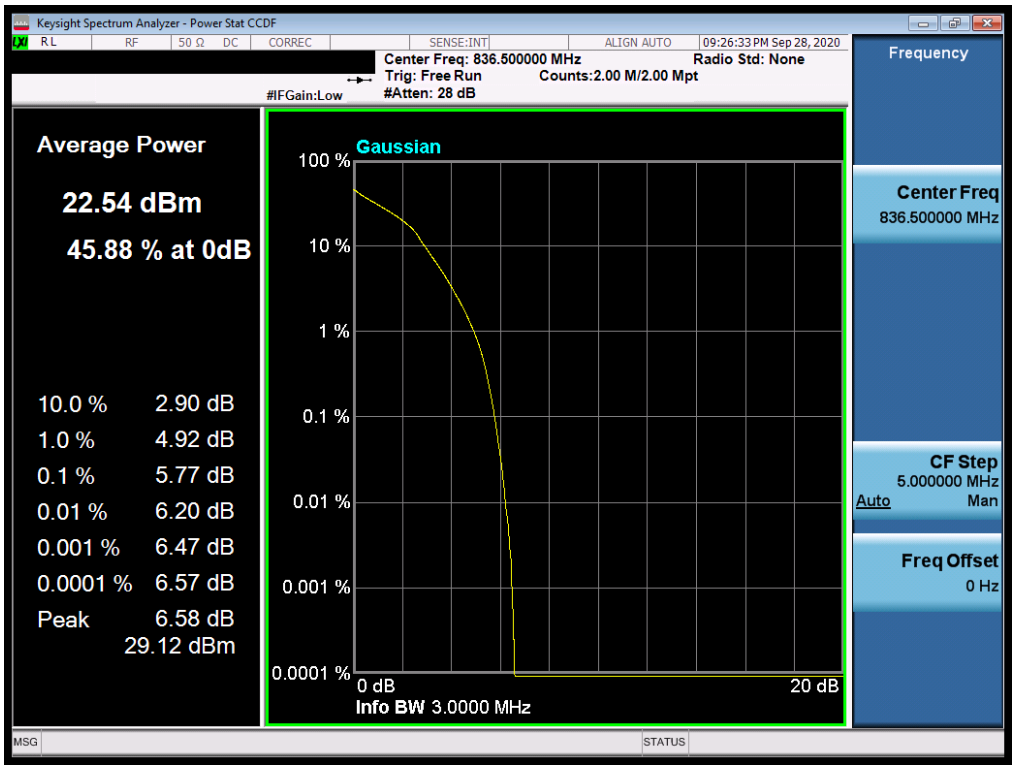
Plot 7-71. PAR Plot (LTE Band 5 - 5MHz 16-QAM - Full RB Configuration)



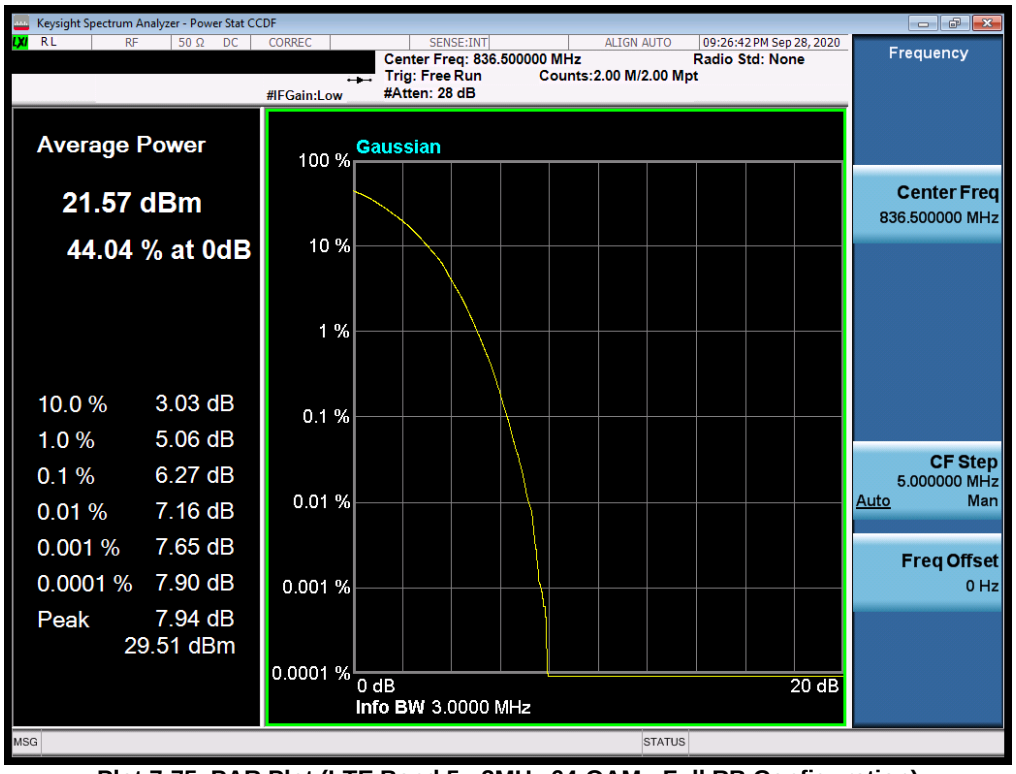
Plot 7-72. PAR Plot (LTE Band 5 - 5MHz 64-QAM - Full RB Configuration)



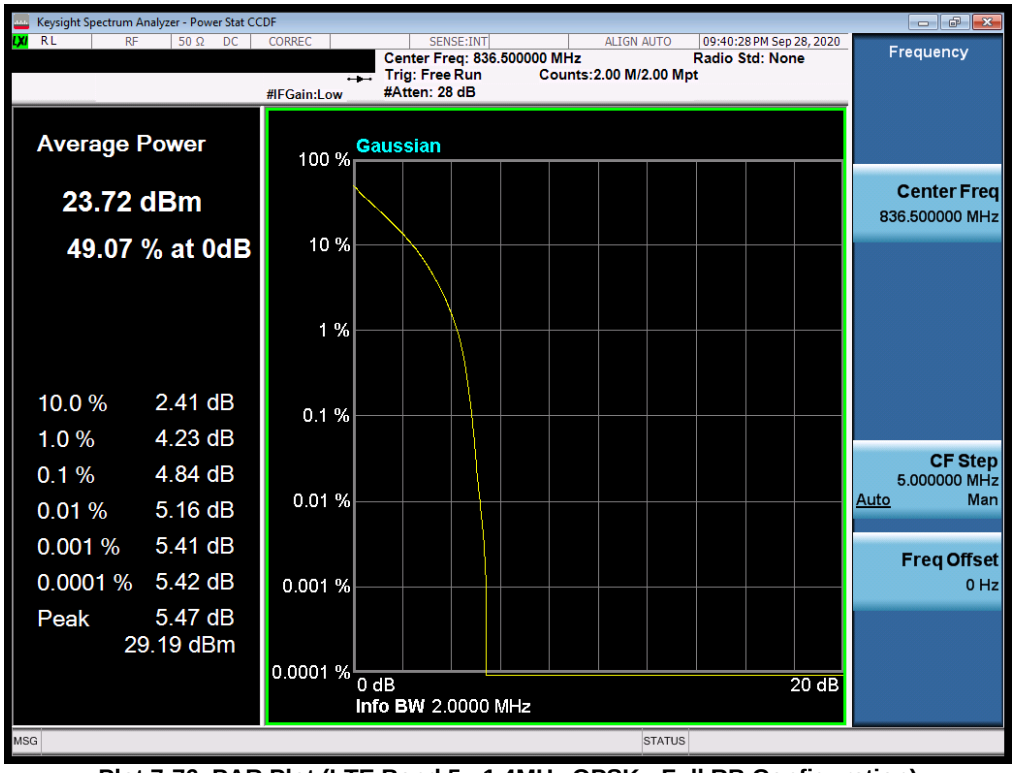
Plot 7-73. PAR Plot (LTE Band 5 - 3MHz QPSK - Full RB Configuration)



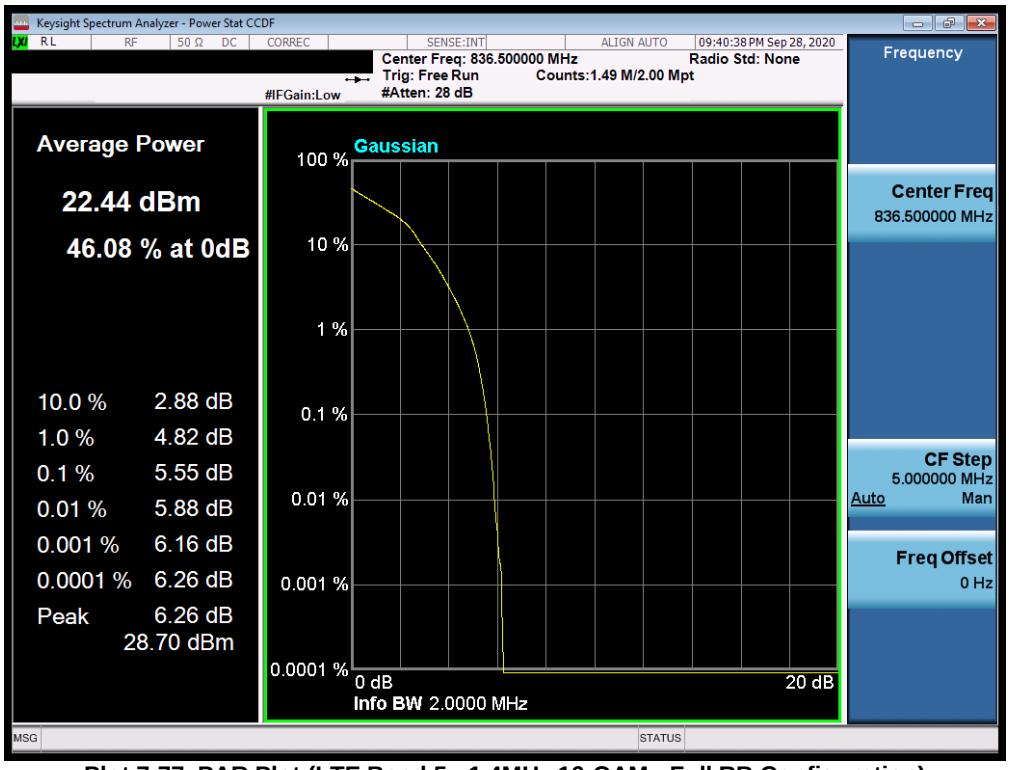
Plot 7-74. PAR Plot (LTE Band 5 - 3MHz 16-QAM - Full RB Configuration)



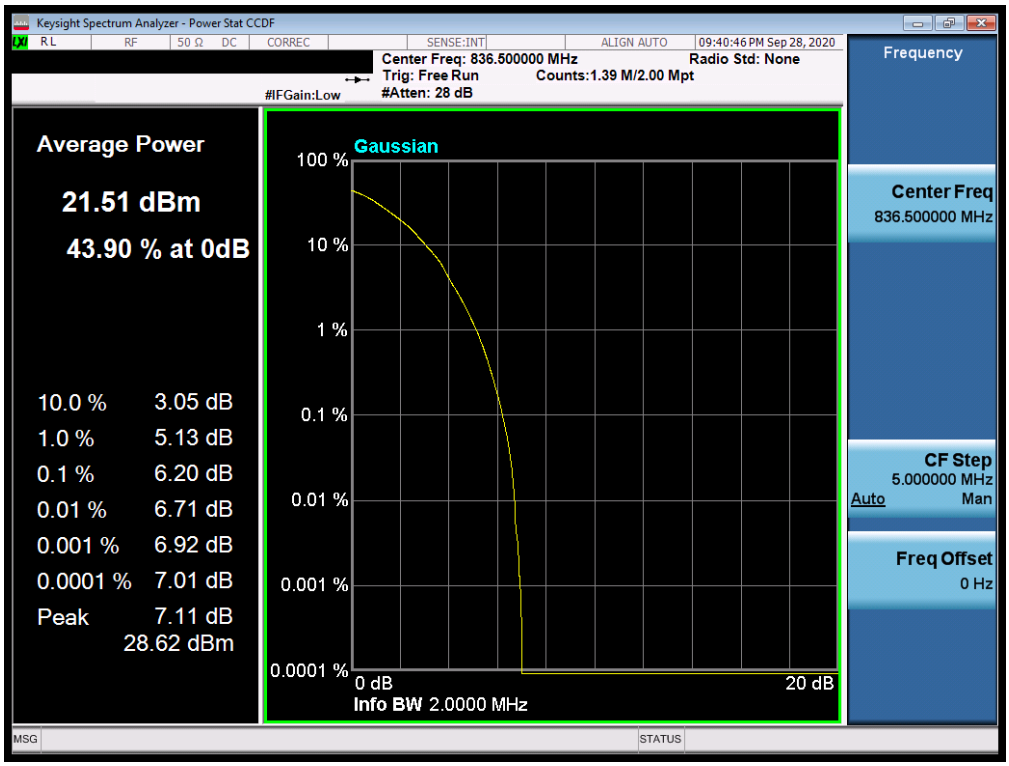
Plot 7-75. PAR Plot (LTE Band 5 - 3MHz 64-QAM - Full RB Configuration)



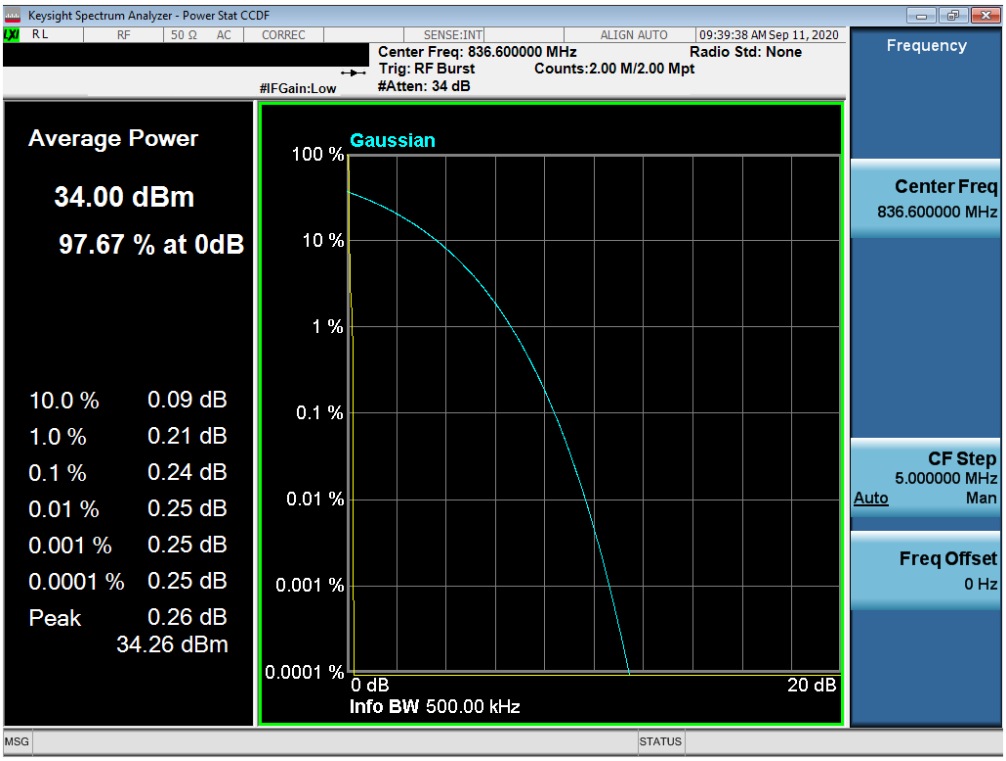
Plot 7-76. PAR Plot (LTE Band 5 - 1.4MHz QPSK - Full RB Configuration)



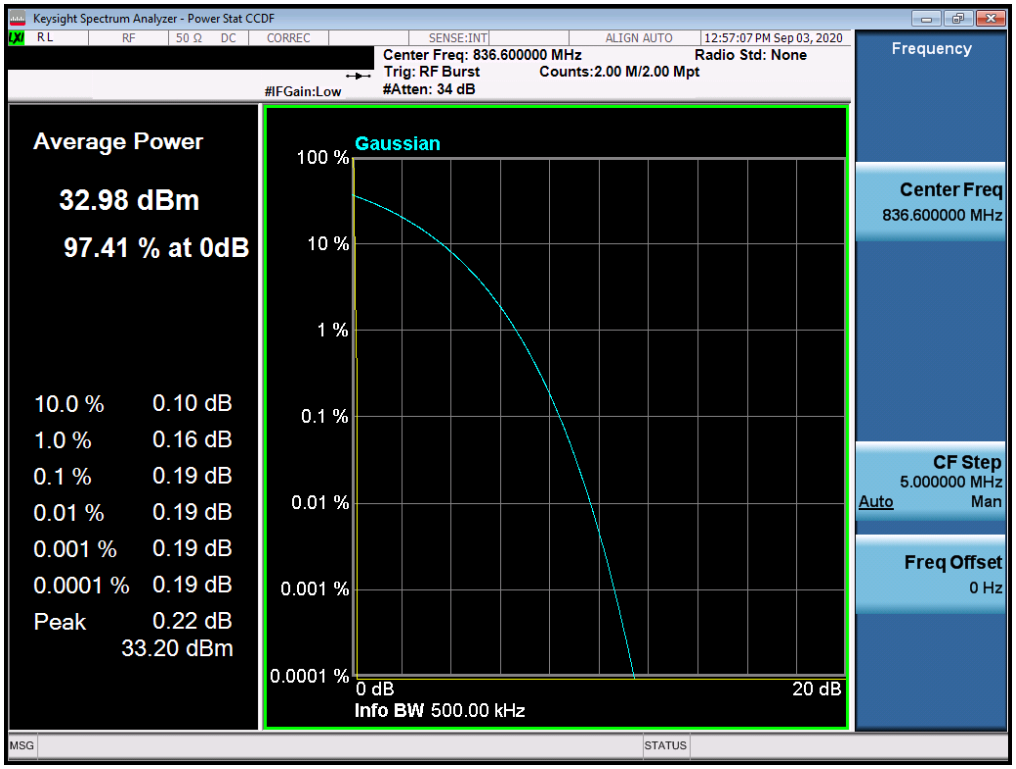
Plot 7-77. PAR Plot (LTE Band 5 - 1.4MHz 16-QAM - Full RB Configuration)



Plot 7-78. PAR Plot (LTE Band 5 - 1.4MHz 64-QAM - Full RB Configuration)

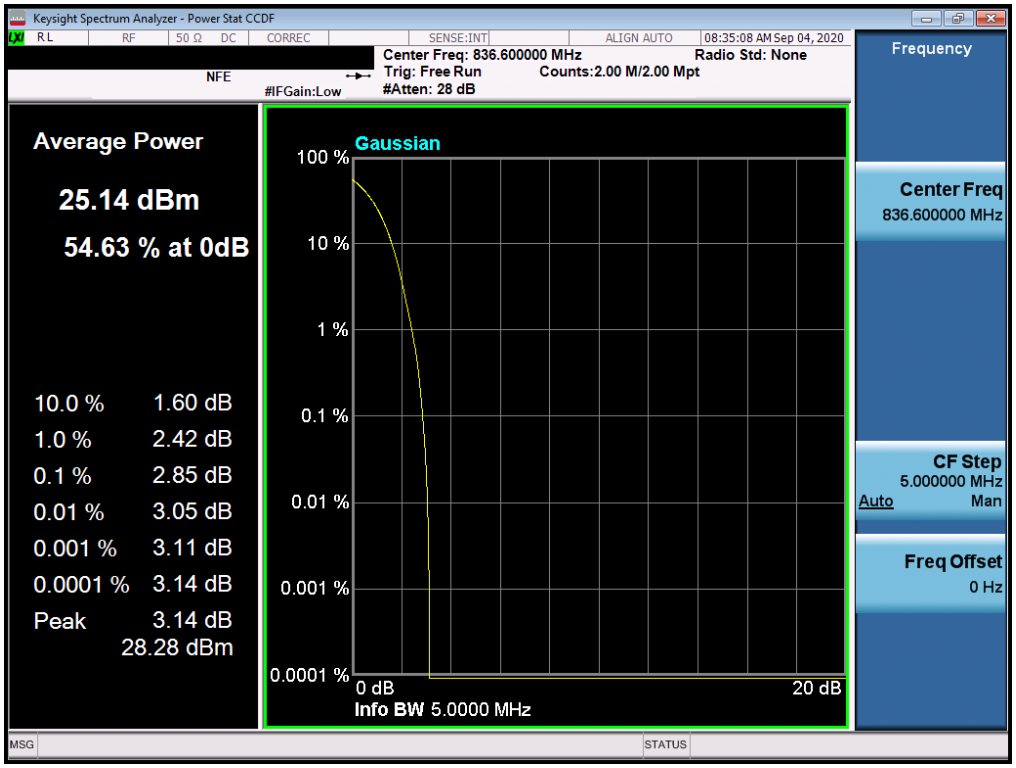


Plot 7-79. PAR Plot (GPRS, Ch. 190)



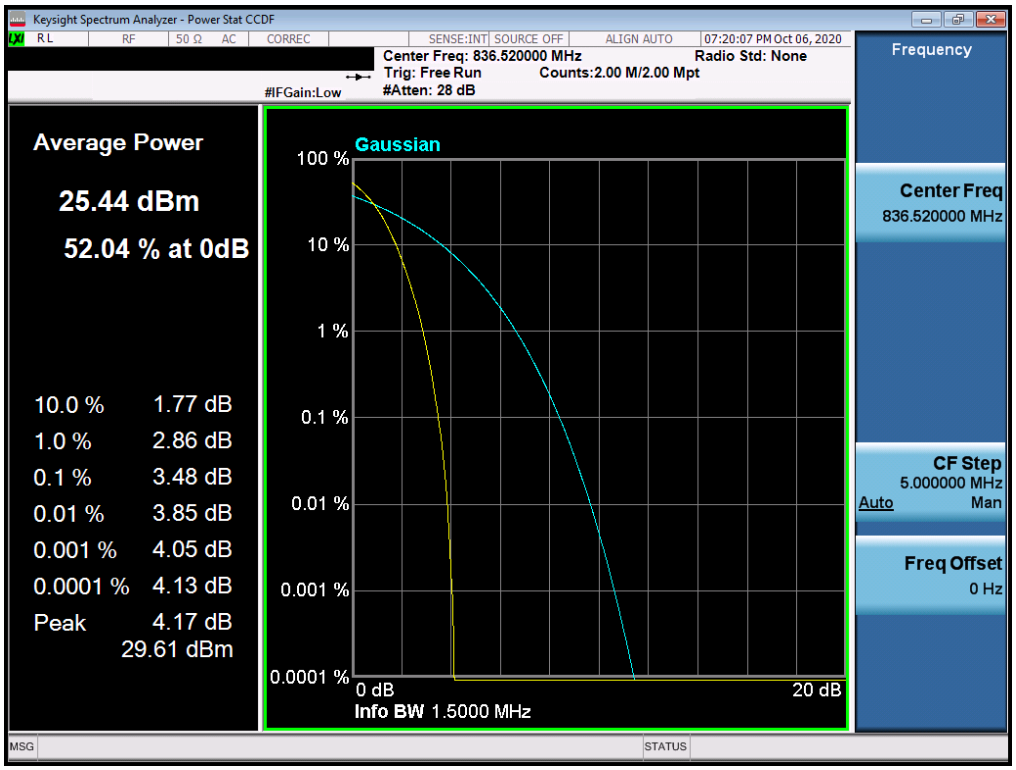
Plot 7-80. PAR Plot (EDGE, Ch. 190)

WCDMA Cell



Plot 7-81. PAR Plot (WCDMA, Ch. 4183)

CDMA Cell



Plot 7-82. PAR Plot (CDMA, Ch. 384)

7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". 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

Test Setup

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

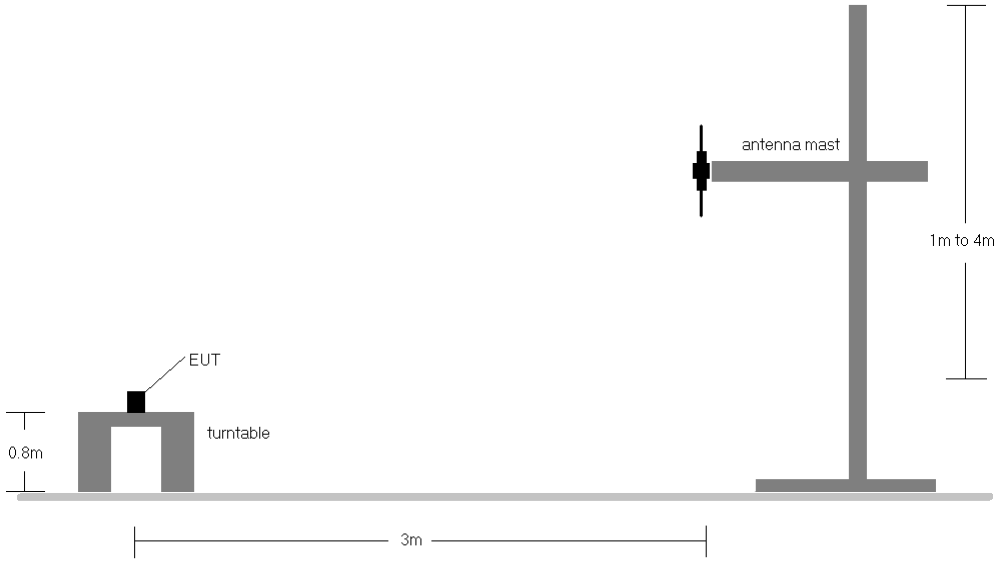


Figure 7-5. Radiated Test Setup <1GHz

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.

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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.0	H	219.0	310.0	6.80	1/25	15.35	**20.00**	0.100	38.45	-18.45	**22.15**	0.164	40.61	-18.46
		836.5	H	204.0	301.0	6.68	1/25	14.94	19.47	0.088	38.45	-18.98	21.62	0.145	40.61	-18.99
		844.0	H	205.0	315.0	6.66	1/25	14.82	19.33	0.086	38.45	-19.12	21.48	0.141	40.61	-19.13
	16-QAM	829.0	H	219.0	310.0	6.80	1/0	15.05	**19.70**	0.093	38.45	-18.75	**21.85**	0.153	40.61	-18.76
	64-QAM	844.0	H	205.0	315.0	6.66	1/25	13.87	**18.38**	0.069	38.45	-20.07	**20.53**	0.113	40.61	-20.08
5 MHz	QPSK	826.5	H	219.0	310.0	6.77	1/0	15.36	19.99	0.100	38.45	-18.46	22.14	0.164	40.61	-18.47
		836.5	H	204.0	301.0	6.68	1/12	15.47	**20.00**	0.100	38.45	-18.45	**22.15**	0.164	40.61	-18.46
		846.5	H	205.0	315.0	6.68	1/12	14.52	19.05	0.080	38.45	-19.40	21.20	0.132	40.61	-19.41
	16-QAM	826.5	H	219.0	310.0	6.77	1/12	15.53	**20.16**	0.104	38.45	-18.29	**22.31**	0.170	40.61	-18.30
	64-QAM	836.5	H	204.0	301.0	6.68	1/12	13.74	**18.27**	0.067	38.45	-20.18	**20.42**	0.110	40.61	-20.19
3 MHz	QPSK	825.5	H	219.0	310.0	6.76	1/7	15.64	**20.26**	0.106	38.45	-18.19	**22.41**	0.174	40.61	-18.20
		836.5	H	204.0	301.0	6.68	1/7	15.02	19.55	0.090	38.45	-18.90	21.70	0.148	40.61	-18.91
		847.5	H	205.0	315.0	6.69	1/7	14.83	19.37	0.087	38.45	-19.08	21.52	0.142	40.61	-19.09
	16-QAM	825.5	H	219.0	310.0	6.76	1/7	15.27	**19.89**	0.097	38.45	-18.56	**22.04**	0.160	40.61	-18.57
	64-QAM	825.5	H	219.0	310.0	6.76	1/7	13.32	**17.94**	0.062	38.45	-20.51	**20.09**	0.102	40.61	-20.52
1.4 MHz	QPSK	824.7	H	219.0	310.0	6.76	1/2	15.44	**20.05**	0.101	38.45	-18.40	**22.20**	0.166	40.61	-18.41
		836.5	H	204.0	301.0	6.68	1/2	14.66	19.19	0.083	38.45	-19.26	21.34	0.136	40.61	-19.27
		848.3	H	205.0	315.0	6.70	1/0	14.78	19.33	0.086	38.45	-19.12	21.48	0.141	40.61	-19.13
	16-QAM	824.7	H	219.0	310.0	6.76	1/5	15.17	**19.78**	0.095	38.45	-18.67	**21.93**	0.156	40.61	-18.68
	64-QAM	824.7	H	219.0	310.0	6.76	1/0	13.30	**17.91**	0.062	38.45	-20.54	**20.06**	0.101	40.61	-20.55
10 MHz	Opposite Pol.	836.5	V	231.0	324.0	6.43	1 / 0	9.21	15.64	0.037	38.45	-22.81	17.79	0.060	40.61	-22.82

Table 7-2. ERP Data (LTE Band 5)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	H	100	345	21.33	6.75	**25.93**	**0.392**	38.45	-12.52	**28.08**	**0.643**	40.61	-12.53
836.60	GPRS850	H	188	169	21.36	6.68	25.89	0.388	38.45	-12.56	28.04	0.637	40.61	-12.57
848.80	GPRS850	H	191	166	20.86	6.71	25.42	0.348	38.45	-13.04	27.57	0.571	40.61	-13.04
824.20	GPRS850	V	139	174	21.63	6.38	25.86	0.385	38.45	-12.59	28.01	0.632	40.61	-12.60
824.20	EDGE850	H	100	345	16.32	6.75	**20.92**	0.124	38.45	-17.53	**23.07**	**0.203**	40.61	-17.54

Table 7-3. ERP Data (GPRS 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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	H	202	72	13.80	6.77	**18.42**	**0.070**	38.45	-20.03	**20.57**	**0.114**	40.61	-20.03
836.60	WCDMA850	H	204	306	13.47	6.68	18.00	0.063	38.45	-20.45	20.15	0.104	40.61	-20.46
846.60	WCDMA850	H	204	75	12.24	6.68	16.77	0.048	38.45	-21.68	18.92	0.078	40.61	-21.68
826.40	WCDMA850	V	147	174	12.58	6.77	17.20	0.053	38.45	-21.25	19.35	0.086	40.61	-21.25

Table 7-4. 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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	CDMA850	H	201	172	17.38	6.76	**21.99**	**0.158**	38.45	-16.47	**24.14**	**0.259**	40.61	-16.47
836.52	CDMA850	H	187	171	16.79	6.68	21.32	0.135	38.45	-17.13	23.47	0.222	40.61	-17.14
848.31	CDMA850	H	183	171	15.15	6.70	19.70	0.093	38.45	-18.75	21.85	0.153	40.61	-18.76
824.70	CDMA850	V	140	195	17.34	6.36	21.55	0.143	38.45	-16.91	23.70	0.234	40.61	-16.91

Table 7-5. ERP Data (CDMA Cell)

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 ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

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

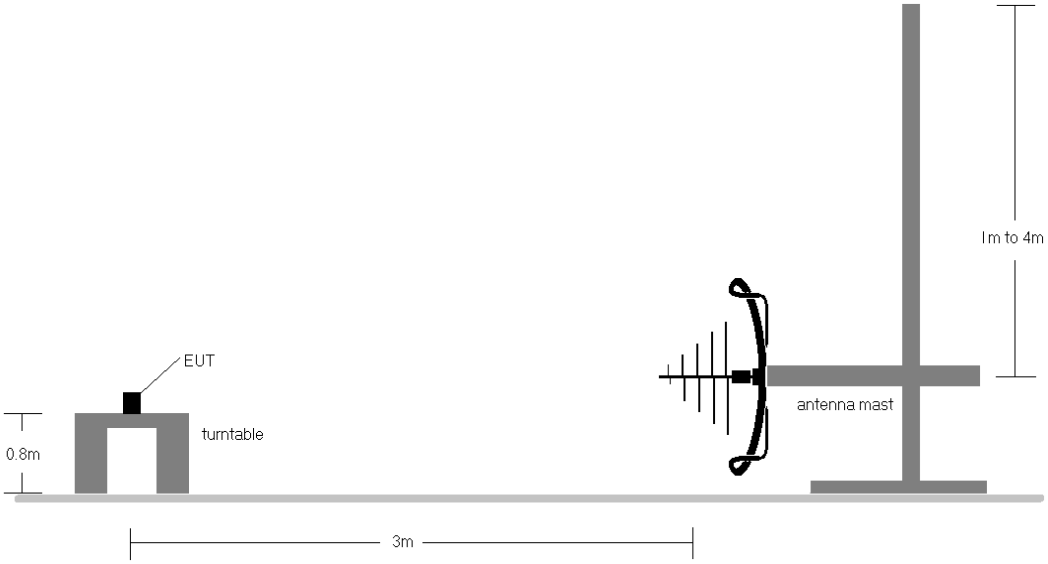


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

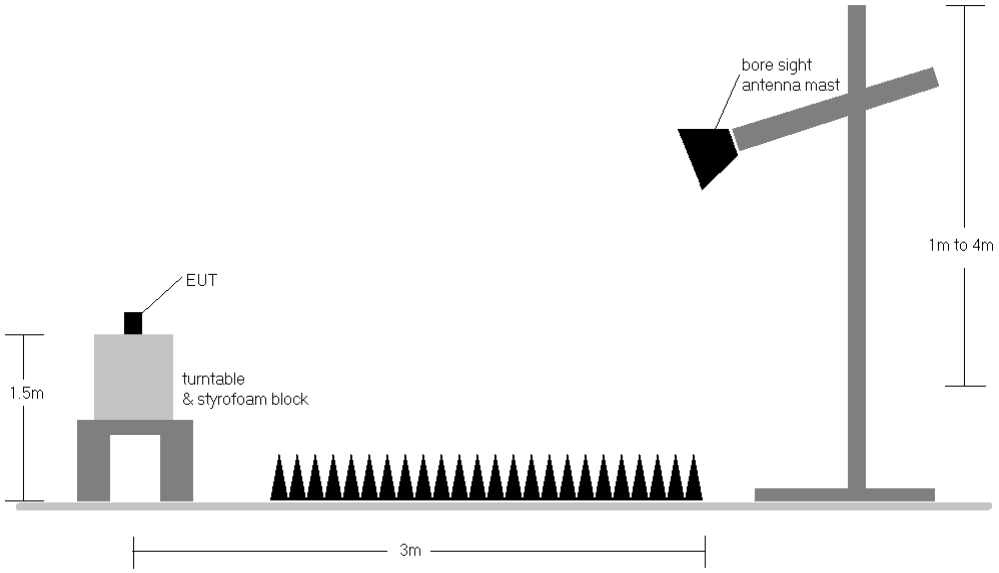


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   b) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   d) EIRP (dBm) = E(dBµV/m) + 20logD – 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.

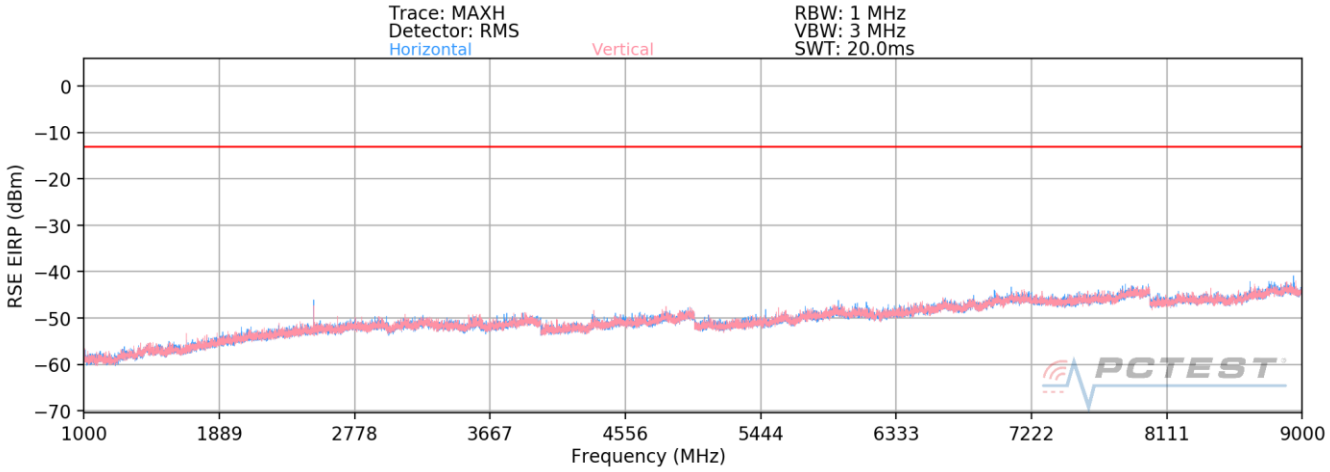
7) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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.

LTE Band 5



Plot 7-83. 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	V	100	324	-72.26	0.48	35.22	-60.03	-13.00	-47.03
2487.0	V	111	164	-70.88	4.93	41.05	-54.21	-13.00	-41.21
3316.0	V	-	-	-79.46	6.29	33.83	-61.42	-13.00	-48.42
4145.0	V	-	-	-80.51	7.95	34.44	-60.82	-13.00	-47.82
4974.0	V	-	-	-81.18	10.03	35.85	-59.40	-13.00	-46.40

Table 7-6. 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	V	137	136	-71.65	0.67	36.02	-59.24	-13.00	-46.24
2509.5	V	165	162	-65.79	5.01	46.22	-49.04	-13.00	-36.04
3346.0	V	-	-	-79.61	6.53	33.92	-61.33	-13.00	-48.33
4182.5	V	-	-	-80.46	8.35	34.89	-60.36	-13.00	-47.36
5019.0	V	-	-	-81.13	9.95	35.82	-59.44	-13.00	-46.44

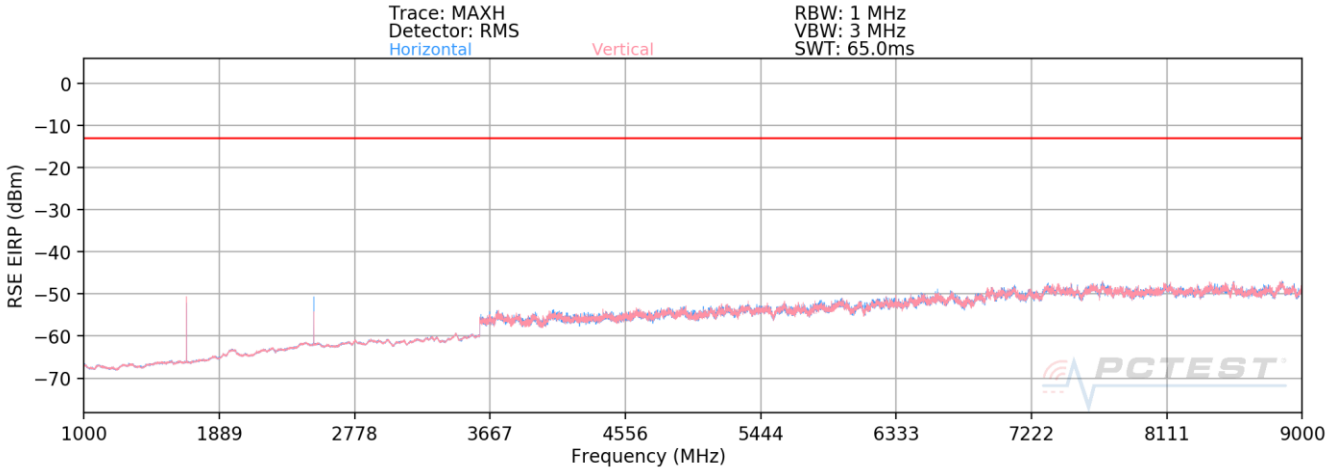
Table 7-7. Radiated Spurious Data (LTE Band 5 – Mid Channel)

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	V	103	149	-72.87	0.90	35.03	-60.23	-13.00	-47.23
2532.00	V	109	160	-69.09	5.35	43.26	-52.00	-13.00	-39.00
3376.00	V	-	-	-80.02	6.78	33.76	-61.50	-13.00	-48.50
4220.00	V	-	-	-80.50	8.12	34.62	-60.64	-13.00	-47.64
5064.00	V	-	-	-81.18	9.59	35.41	-59.85	-13.00	-46.85

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

GSM/GPRS Cell



Plot 7-84. 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	252	359	-59.14	-1.22	46.64	-48.62	-13.00	-35.62
2472.6	H	112	353	-56.49	3.00	53.51	-41.75	-13.00	-28.75
3296.8	H	-	-	-74.56	4.13	36.57	-58.69	-13.00	-45.69
4121.0	H	270	152	-72.65	6.34	40.69	-54.57	-13.00	-41.57
4945.2	H	-	-	-75.74	7.51	38.77	-56.49	-13.00	-43.49
5769.4	H	-	-	-76.42	8.54	39.12	-56.14	-13.00	-43.14
6593.6	H	-	-	-76.85	10.19	40.34	-54.92	-13.00	-41.92

Table 7-9. 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	166	354	-59.40	-1.15	46.45	-48.81	-13.00	-35.81
2509.8	H	147	362	-53.59	3.30	56.71	-38.55	-13.00	-25.55
3346.4	H	-	-	-74.47	5.04	37.57	-57.69	-13.00	-44.69
4183.0	H	160	33	-68.58	5.93	44.35	-50.90	-13.00	-37.90
5019.6	H	-	-	-75.34	6.86	38.52	-56.74	-13.00	-43.74
5856.2	H	-	-	-76.17	9.27	40.10	-55.16	-13.00	-42.16
6692.8	H	-	-	-75.85	10.73	41.88	-53.38	-13.00	-40.38

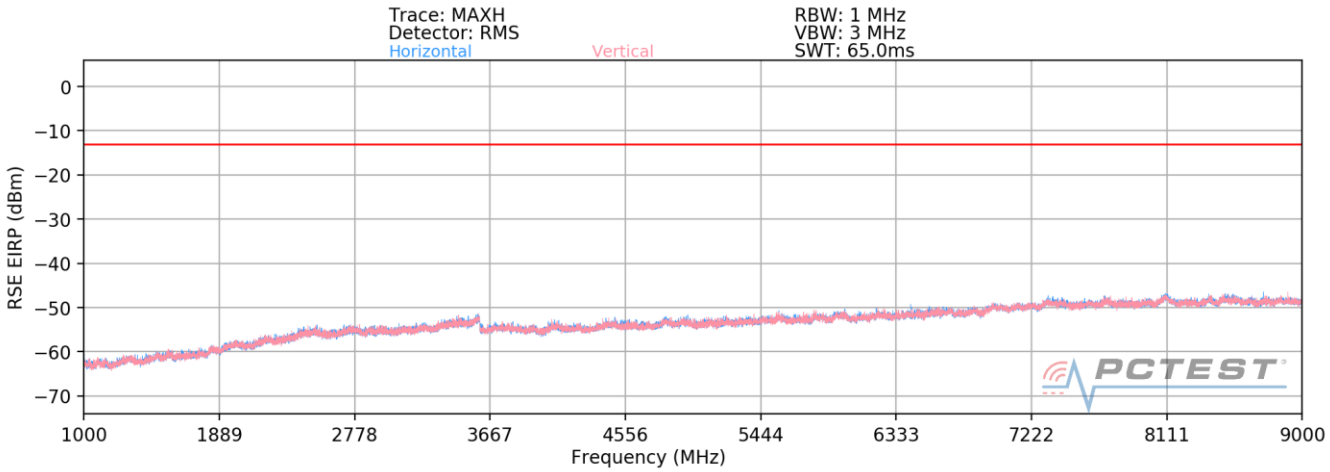
Table 7-10. Radiated Spurious Data (GPRS Cell – Mid Channel)

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	253	179	-61.39	-1.15	44.46	-50.80	-13.00	-37.80
2546.4	H	215	12	-53.66	3.01	56.35	-38.91	-13.00	-25.91
3395.2	H	-	-	-75.05	4.85	36.80	-58.46	-13.00	-45.46
4244.0	H	237	159	-69.37	5.87	43.50	-51.75	-13.00	-38.75
5092.8	H	-	-	-76.32	7.64	38.32	-56.94	-13.00	-43.94
5941.6	H	-	-	-76.94	9.91	39.97	-55.29	-13.00	-42.29
6790.4	H	-	-	-76.60	10.01	40.41	-54.85	-13.00	-41.85

Table 7-11. Radiated Spurious Data (GPRS Cell – High Channel)

WCDMA Cell



Plot 7-85. 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	V	117	351	-73.37	-5.23	28.40	-66.85	-13.00	-53.85
2479.2	V	117	29	-74.69	-2.46	29.85	-65.41	-13.00	-52.41
3305.6	V	-	-	-77.20	0.61	30.41	-64.85	-13.00	-51.85
4132.0	V	-	-	-78.04	2.08	31.04	-64.22	-13.00	-51.22
4958.4	V	-	-	-78.70	3.30	31.60	-63.65	-13.00	-50.65

Table 7-12. 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	V	207	290	-72.22	-5.23	29.55	-65.70	-13.00	-52.70
2509.8	V	120	158	-74.82	-2.32	29.86	-65.40	-13.00	-52.40
3346.4	V	-	-	-78.22	0.30	29.08	-66.18	-13.00	-53.18
4183.0	V	-	-	-78.48	2.04	30.56	-64.70	-13.00	-51.70
5019.6	V	-	-	-78.88	4.03	32.15	-63.11	-13.00	-50.11

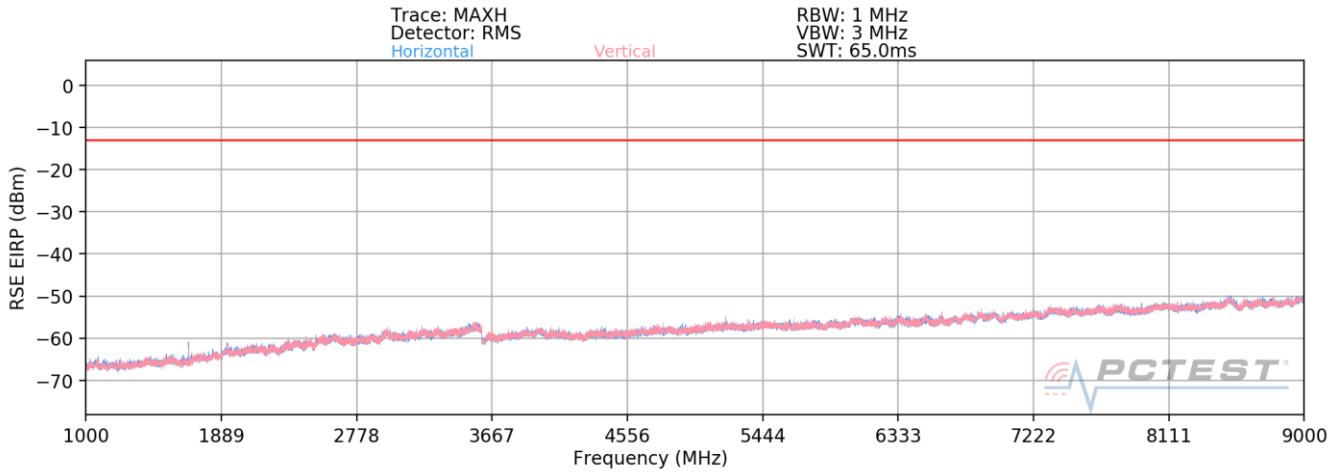
Table 7-13. Radiated Spurious Data (WCDMA Cell – Mid Channel)

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	V	116	41	-75.86	-5.17	25.97	-69.29	-13.00	-56.29
2539.8	V	119	214	-73.68	-1.69	31.63	-63.63	-13.00	-50.63
3386.4	V	-	-	-77.14	0.30	30.16	-65.10	-13.00	-52.10
4233.0	V	-	-	-78.39	2.01	30.62	-64.64	-13.00	-51.64
5079.6	V	-	-	-79.22	4.34	32.12	-63.13	-13.00	-50.13

Table 7-14. Radiated Spurious Data (WCDMA Cell – High Channel)

CDMA Cell



Plot 7-86. 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	216	237	-72.13	-5.23	29.64	-65.61	-13.00	-52.61
2474.10	H	117	71	-71.70	-2.22	33.08	-62.18	-13.00	-49.18
3298.80	H	-	-	-77.16	0.60	30.44	-64.81	-13.00	-51.81
4123.50	H	-	-	-78.24	2.24	31.00	-64.26	-13.00	-51.26
4948.20	H	-	-	-78.81	3.32	31.51	-63.75	-13.00	-50.75

Table 7-15. 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	279	212	-69.42	-5.23	32.35	-62.90	-13.00	-49.90
2509.56	H	155	66	-73.66	-2.33	31.01	-64.25	-13.00	-51.25
3346.08	H	-	-	-78.11	0.30	29.19	-66.06	-13.00	-53.06
4182.60	H	-	-	-78.71	2.03	30.32	-64.94	-13.00	-51.94
5019.12	H	-	-	-78.81	4.02	32.21	-63.05	-13.00	-50.05

Table 7-16. 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	196	311	-74.08	-5.14	27.78	-67.48	-13.00	-54.48
2544.93	H	125	170	-71.72	-1.67	33.61	-61.65	-13.00	-48.65
3393.24	H	-	-	-76.82	0.42	30.60	-64.66	-13.00	-51.66
4241.55	H	-	-	-77.78	1.95	31.17	-64.09	-13.00	-51.09
5089.86	H	-	-	-79.14	4.38	32.24	-63.02	-13.00	-50.02

Table 7-17. Radiated Spurious Data (CDMA Cell – High Channel)

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 ±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

LTE Band 5

LTE Band 5

Operating Frequency (Hz):	836,500,000
Ref. Voltage (VDC):	3.79
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.79	- 30	831,500,080	80	0.0000096
		- 20	831,499,902	-98	-0.0000118
		- 10	831,500,004	4	0.0000005
		0	831,500,144	144	0.0000173
		+ 10	831,500,279	279	0.0000336
		+ 20 (Ref)	831,500,375	375	0.0000451
		+ 30	831,499,945	-55	-0.0000066
		+ 40	831,500,172	172	0.0000207
		+ 50	831,500,064	64	0.0000077
Battery Endpoint	3.04	+ 20	831,500,368	368	0.0000443

Table 7-18. LTE Band 5 Frequency Stability Data

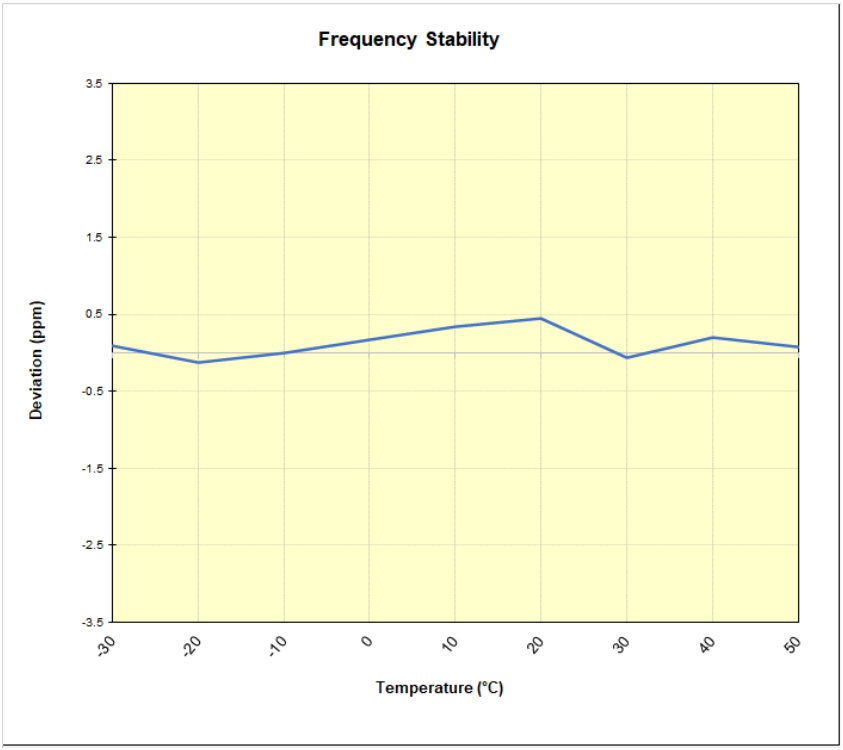


Table 7-19. LTE Band 5 Frequency Stability Chart

GSM/GPRS Cell

GSM/GPRS Cellular

Operating Frequency (Hz):	836,600,000
Ref. Voltage (VDC):	3.79
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.79	- 30	836,600,390	390	0.0000466
		- 20	836,599,952	-48	-0.0000057
		- 10	836,599,965	-35	-0.0000042
		0	836,600,098	98	0.0000117
		+ 10	836,600,010	10	0.0000012
		+ 20 (Ref)	836,599,919	-81	-0.0000097
		+ 30	836,600,178	178	0.0000213
		+ 40	836,600,037	37	0.0000044
		+ 50	836,599,821	-179	-0.0000214
Battery Endpoint	3.04	+ 20	836,600,075	75	0.0000090

Table 7-20. GSM/GPRS Cell Frequency Stability Data

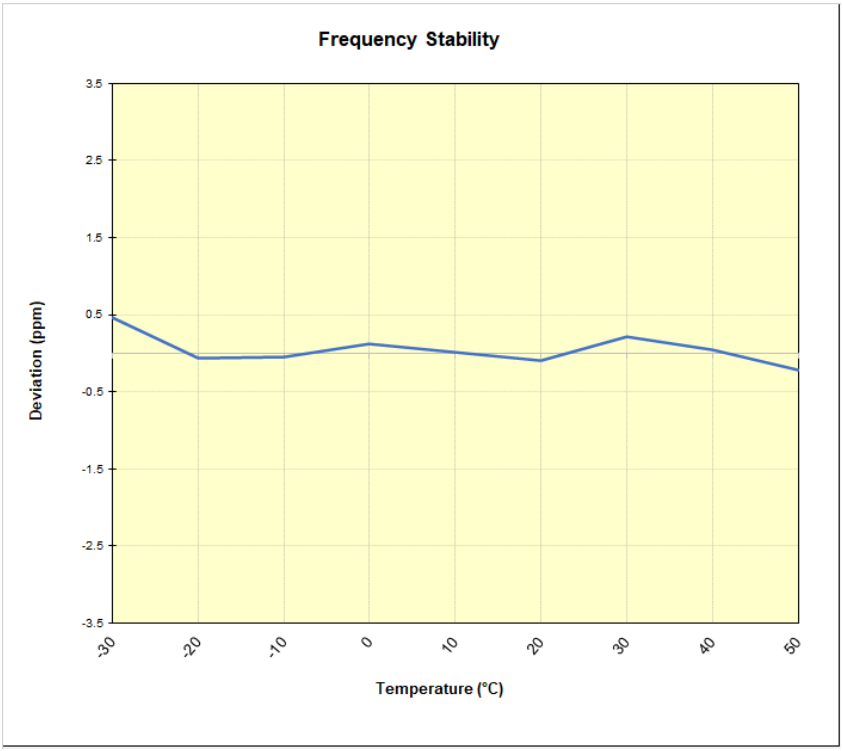


Table 7-21. GSM/GPRS Cell Frequency Stability Chart

WCDMA Cell

WCDMA Cellular

Operating Frequency (Hz):	836,600,000
Ref. Voltage (VDC):	3.79
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.79	- 30	836,599,971	-29	-0.0000035
		- 20	836,599,764	-236	-0.0000282
		- 10	836,600,155	155	0.0000185
		0	836,600,129	129	0.0000154
		+ 10	836,599,939	-61	-0.0000073
		+ 20 (Ref)	836,599,920	-80	-0.0000096
		+ 30	836,600,050	50	0.0000060
		+ 40	836,599,734	-266	-0.0000318
		+ 50	836,600,161	161	0.0000192
Battery Endpoint	3.04	+ 20	836,600,425	425	0.0000508

Table 7-22. WCDMA Cell Frequency Stability Data

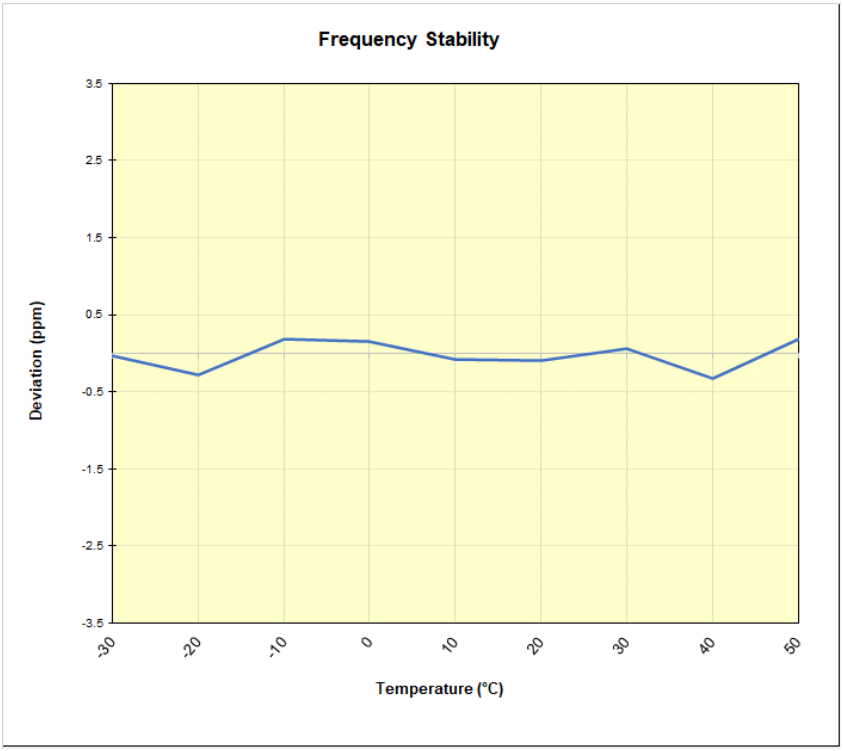


Table 7-23. WCDMA Cell Frequency Stability Chart

CDMA Cell

CDMA Cellular

Operating Frequency (Hz):	836,520,000
Ref. Voltage (VDC):	3.79
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.79	- 30	836,520,082	82	0.0000098
		- 20	836,519,767	-233	-0.0000279
		- 10	836,519,795	-205	-0.0000245
		0	836,520,244	244	0.0000292
		+ 10	836,520,235	235	0.0000281
		+ 20 (Ref)	836,520,109	109	0.0000130
		+ 30	836,519,909	-91	-0.0000109
		+ 40	836,519,834	-166	-0.0000198
		+ 50	836,520,125	125	0.0000149
Battery Endpoint	3.04	+ 20	836,519,730	-270	-0.0000323

Table 7-24. CDMA Cell Frequency Stability Data

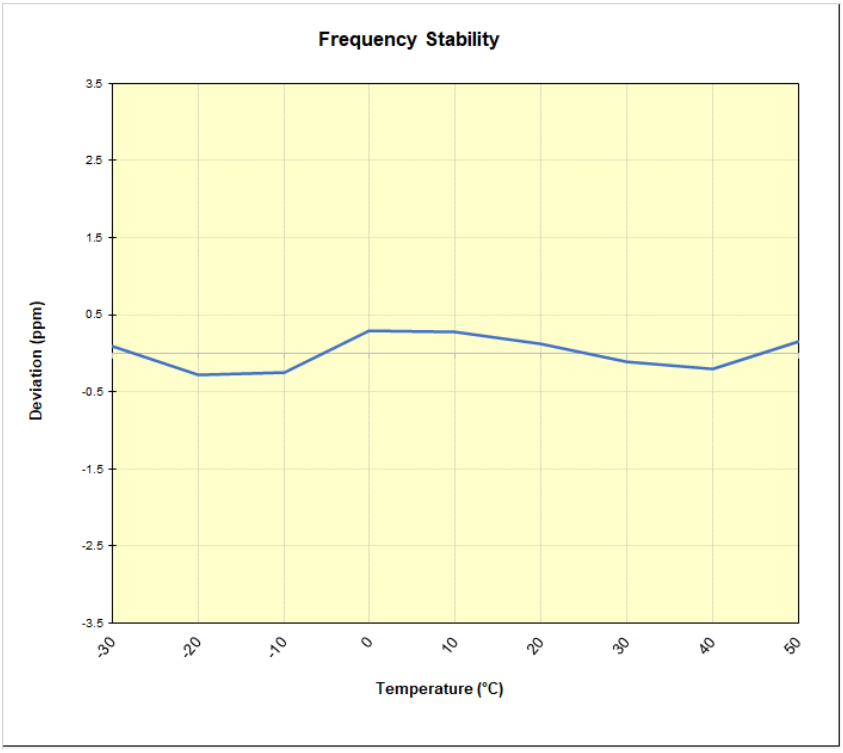


Table 7-25. CDMA Cell Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG **Portable Handset FCC ID: ZNFK200QM** complies with all the requirements of Part 22 of the FCC rules.