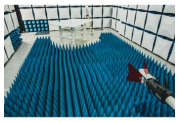
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



MEASUREMENT REPORT
FCC Part 90

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
6/11 - 8/07/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2005200087-04.A3L

FCC ID:	**A3LSMF916U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-F916U
Additional Model(s):	SM-F916U1, SM-F916U1, SM-F916W
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	§2.1049, §22(H), §90(S), §90(R)
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

ACCREDITED
CERT #2041.01

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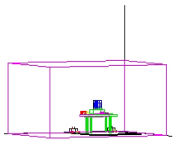
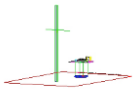


MEASUREMENT REPORT
FCC Part 22(H) & 90



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Measurement	Max. Power [W]	Max. Power [dBm]	Emission Designator
LTE Band 26	15 MHz	QPSK	821.5	ERP	0.066	18.20	13M5G7D
		16QAM	821.5	ERP	0.055	17.41	13M5W7D
		64QAM	821.5	ERP	0.044	16.48	13M4W7D
		256QAM	821.5	ERP	0.024	13.72	13M4W7D
	15 MHz	QPSK	821.5	Conducted	0.297	24.73	13M5G7D
		16QAM	821.5	Conducted	0.237	23.75	13M5W7D
		64QAM	821.5	Conducted	0.200	23.02	13M4W7D
		256QAM	821.5	Conducted	0.102	20.10	13M4W7D
	10 MHz	QPSK	819.0	Conducted	0.282	24.51	8M95G7D
		16QAM	819.0	Conducted	0.261	24.16	8M93W7D
		64QAM	819.0	Conducted	0.207	23.17	8M96W7D
		256QAM	819.0	Conducted	0.097	19.85	8M94W7D
	5 MHz	QPSK	816.5 - 821.5	Conducted	0.285	24.55	4M50G7D
		16QAM	816.5 - 821.5	Conducted	0.272	24.34	4M50W7D
		64QAM	816.5 - 821.5	Conducted	0.192	22.84	4M50W7D
		256QAM	816.5 - 821.5	Conducted	0.104	20.19	4M50W7D
	3 MHz	QPSK	815.5 - 822.5	Conducted	0.277	24.42	2M69G7D
		16QAM	815.5 - 822.5	Conducted	0.258	24.11	2M69W7D
		64QAM	815.5 - 822.5	Conducted	0.203	23.07	2M68W7D
		256QAM	815.5 - 822.5	Conducted	0.097	19.88	2M70W7D
	1.4 MHz	QPSK	814.7 - 823.3	Conducted	0.270	24.31	1M08G7D
		16QAM	814.7 - 823.3	Conducted	0.254	24.04	1M08W7D
		64QAM	814.7 - 823.3	Conducted	0.195	22.91	1M08W7D
		256QAM	814.7 - 823.3	Conducted	0.097	19.85	1M08W7D
LTE Band 14	10 MHz	QPSK	793.0	ERP	0.075	18.76	9M03G7D
		16QAM	793.0	ERP	0.061	17.84	9M00W7D
		64QAM	793.0	ERP	0.049	16.93	9M02W7D
		256QAM	793.0	ERP	0.033	15.21	9M01W7D
	5 MHz	QPSK	790.5 - 795.5	ERP	0.073	18.62	4M53G7D
		16QAM	790.5 - 795.5	ERP	0.062	17.91	4M53W7D
		64QAM	790.5 - 795.5	ERP	0.049	16.88	4M52W7D
		256QAM	790.5 - 795.5	ERP	0.032	15.11	4M53W7D
CDMA BC10	N/A	CDMA	817.9 - 823.1	Conducted	0.324	25.10	1M27F9W

EUT Overview

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 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 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 **Samsung Portable Handset FCC ID: A3LSMF916U**. 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 90(R), 22(H) and 90(S).

Test Device Serial No.: 0848M, 0855M, 0854M, 0777M

2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900, WCDMA/HSPA, Multi-band LTE, 5G NR (n5, n71, n41, n66, n2/n25, n260, n261), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

2.3 Test Configuration

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

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

The EUT is capable of operating in folded closed and unfolded open configurations. The worst-case configuration for radiated emissions was determined from open and closed configurations in X, Y, and Z orientations for horizontal and vertical antenna polarizations. The worst case radiated emissions data is shown in this report.

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

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

3.2 Radiated Power and Radiated Spurious Emissions

§2.1053, §90.635, §90(S), §90(R)

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 wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

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

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]}$$

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 $_{[dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10 $\log_{10}$(Power $_{[Watts]}$) specified in 90(S).

For fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.

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.

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
Anritsu	MS46322A	Vector Network Analyzer	8/19/2019	Annual	8/19/2020	1521001
Anritsu	MT8821C	Radio Communication Analyzer	6/15/2020	Annual	6/15/2021	6201381794
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Espec	ESX-2CA	Environmental Chamber	8/13/2019	Annual	8/13/2020	17620
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	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/12/2020	Biennial	3/12/2022	150693
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	CMW500	Radio Communication Tester	8/26/2019	Annual	8/26/2020	100976
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	11/1/2019	Annual	11/1/2020	100040
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
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

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

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

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

QAM Modulation

Emission Designator = 8M45W7D

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

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

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

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMF916U

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

Mode(s): LTE, CDMA

Band: Band 26 / Band 14 / BC10

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 90(S).691(a) 90(R).543(a)	Conducted Band Edge / Spurious Emissions	On all frequencies between 769-775 MHz and 799-805 MHz, attenuation by a factor not less than 65 + 10 log(P) dB in a 6.25 kHz band segment, for mobile and portable stations. On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least 43 + 10 log(P) dB.(Band 14) > 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions except > 50 + 10 $\log_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge (Band 26)		PASS	Sections 7.3, 7.4
2.1055 90.213	Frequency Stability	< 2.5 ppm		PASS	Section 7.8
2.1046 90.635	Conducted Power	< 100 Watts		PASS	Section 7.5
22.913(a.2)	Effective Radiated Power (Band 26)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.6
90.542(a)(7)	Effective Radiated Power (Band 14)	< 3 Watts max. ERP		PASS	Section 7.6
2.1053 90(S).691(a) 90(R).543(e)	Radiated Spurious Emissions	> 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions except > 50 + 10 $\log_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge		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 shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "2G/3G Automation," Version 4.5.
5) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "LTE Automation," Version 5.3.

7.2 Occupied Bandwidth

§2.1049

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.

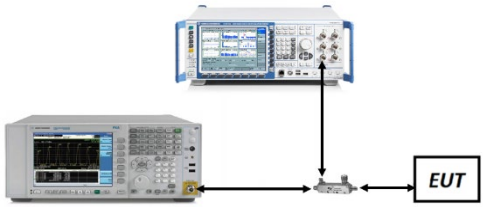
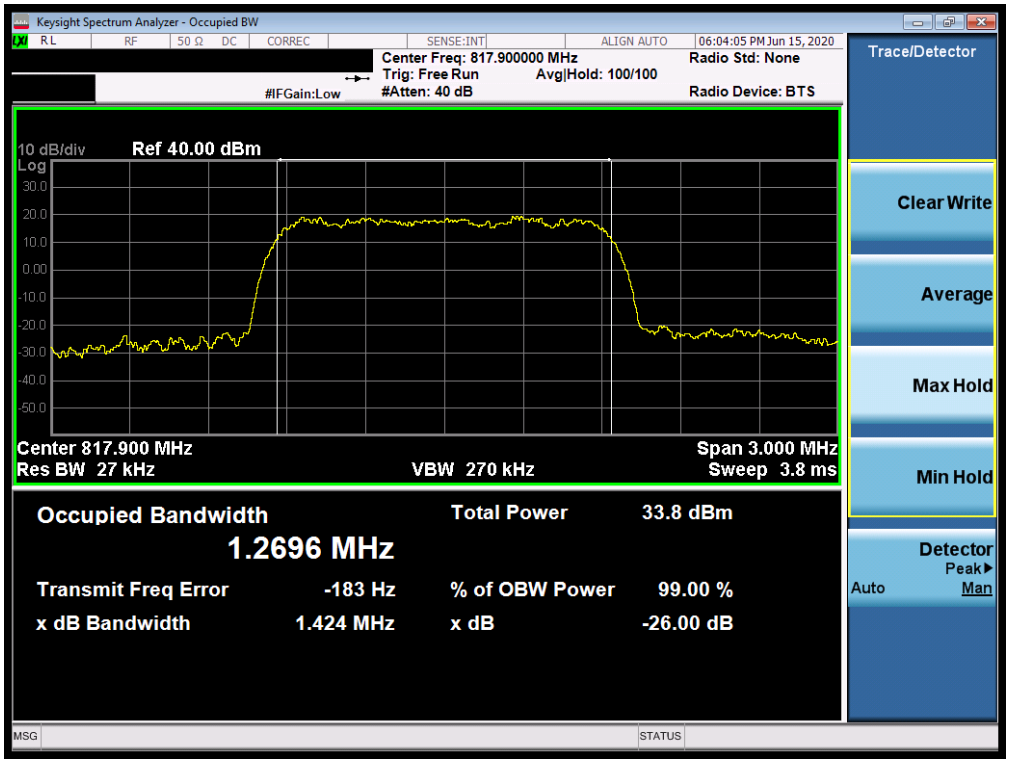


Figure 7-1. Test Instrument & Measurement Setup

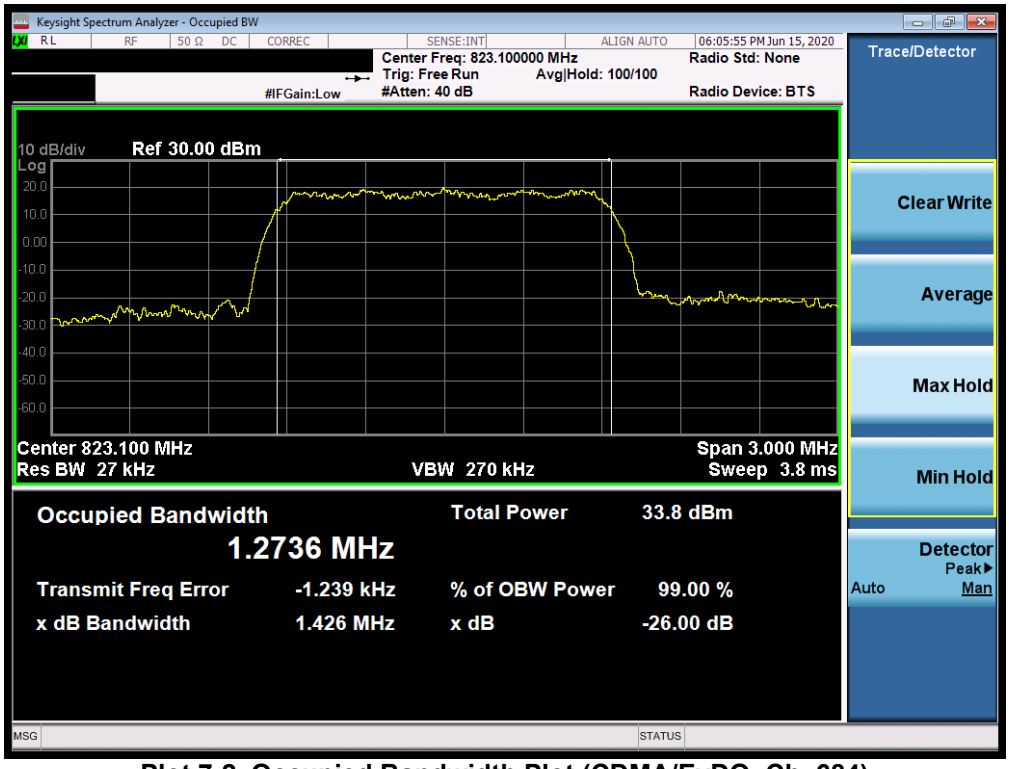
Test Notes

None.

CDMA BC10

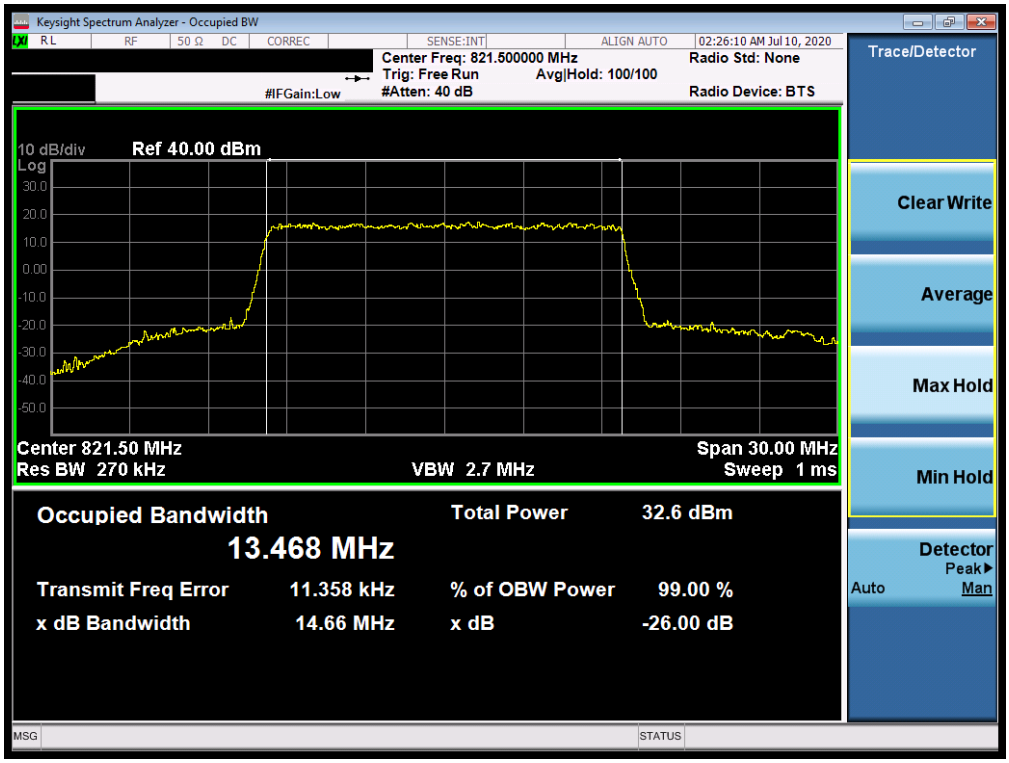


Plot 7-1. Occupied Bandwidth Plot (CDMA/EvDO, Ch. 476)

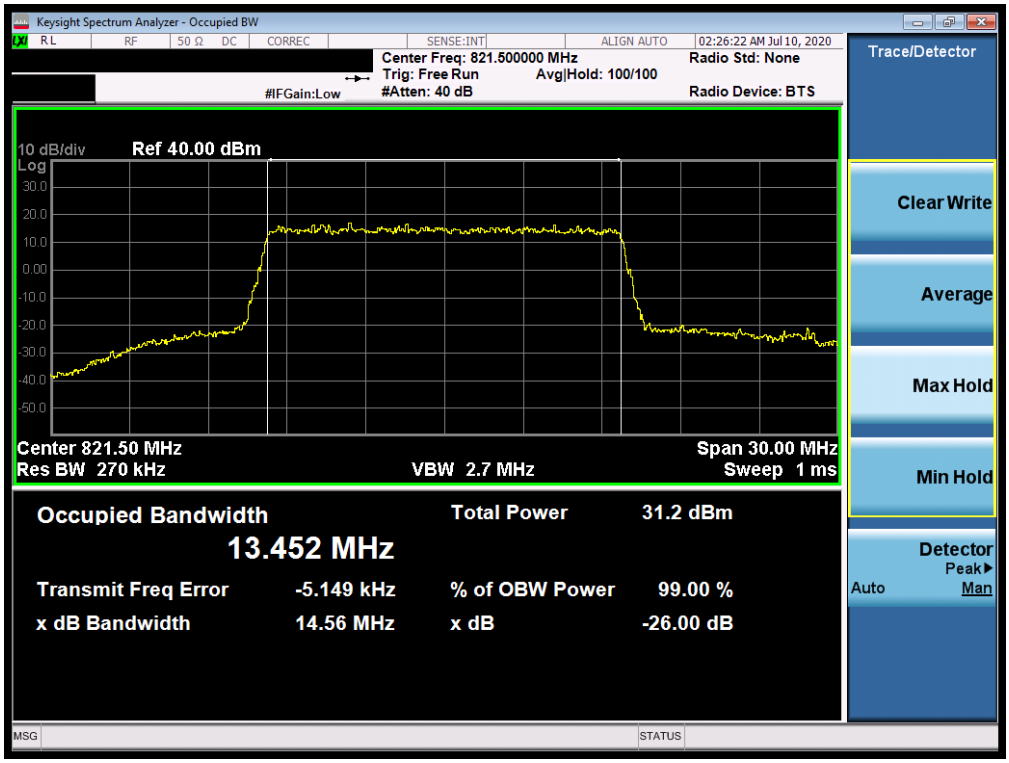


Plot 7-2. Occupied Bandwidth Plot (CDMA/EvDO, Ch. 684)

LTE Band 26

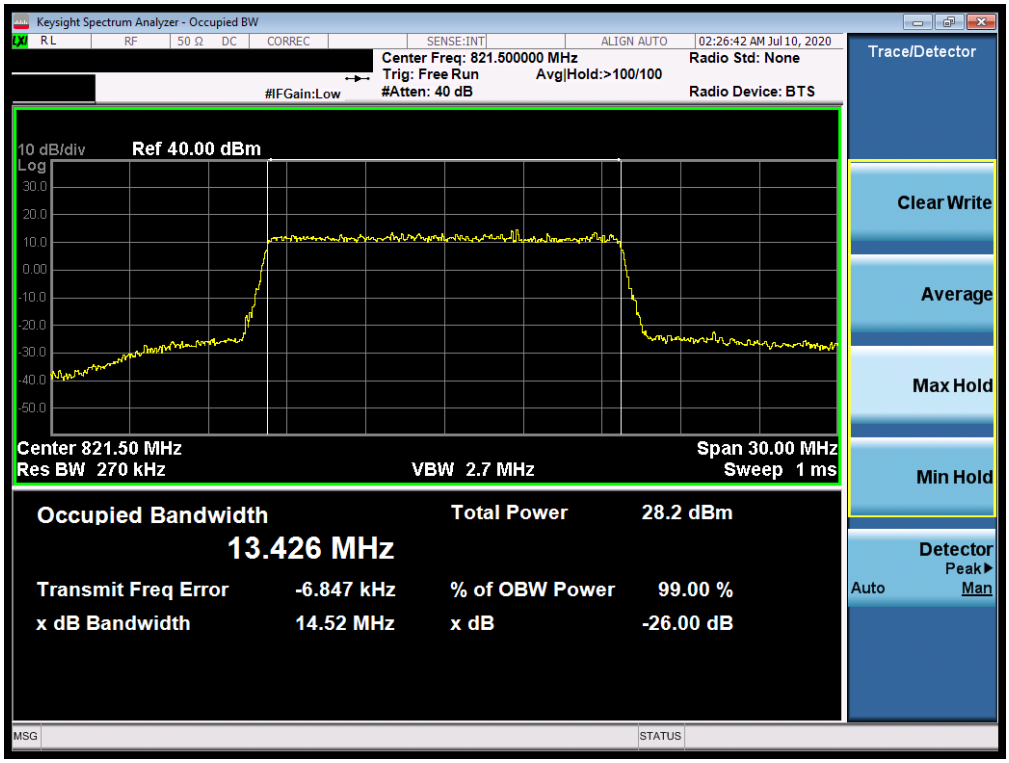


Plot 7-3. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB Configuration)

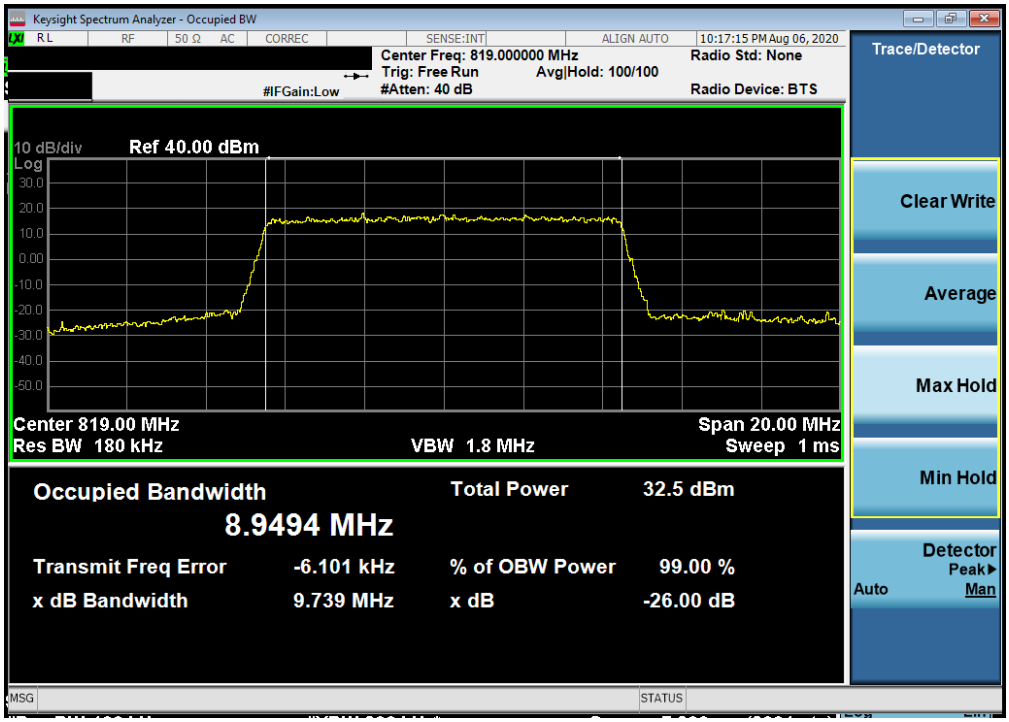


Plot 7-4. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB Configuration)

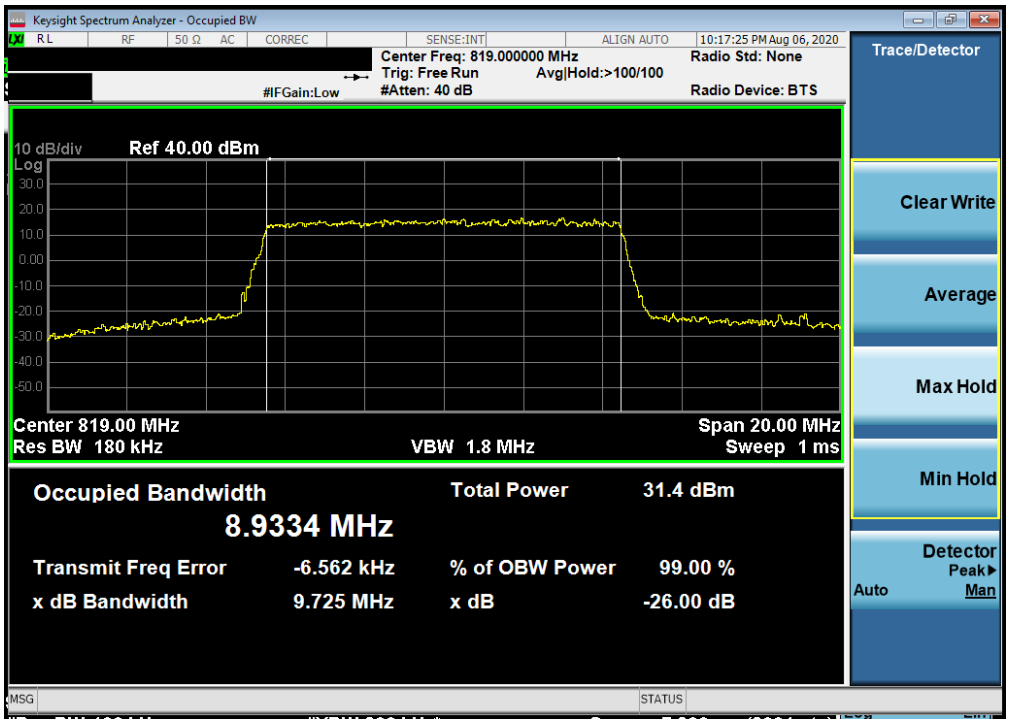
Plot 7-5. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 64-QAM - Full RB Configuration)



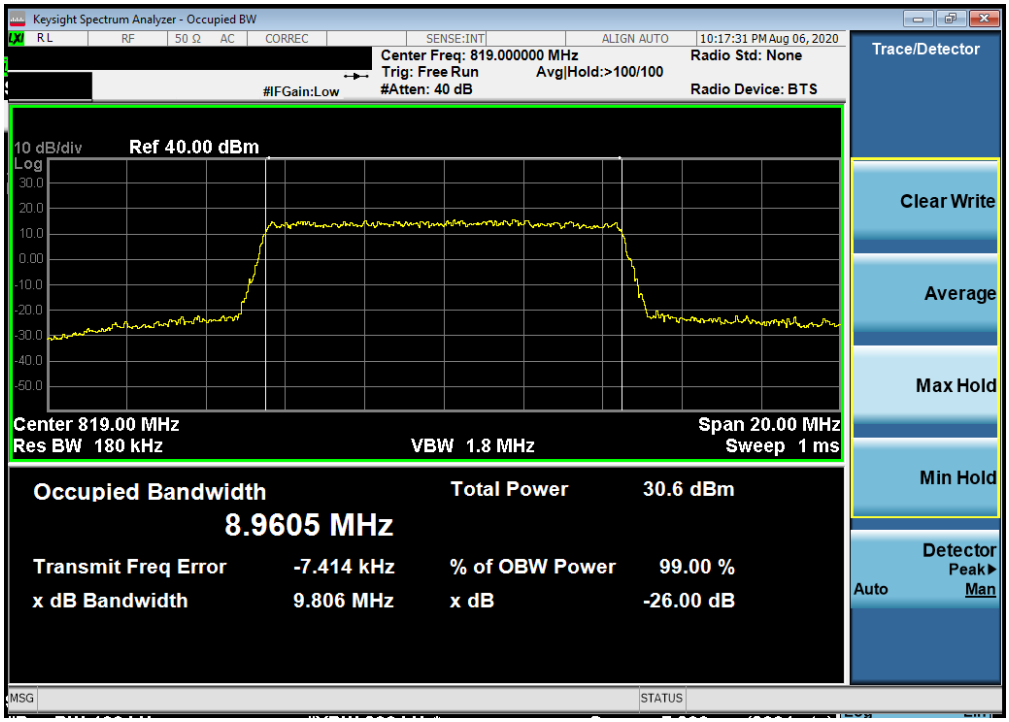
Plot 7-6. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 256-QAM - Full RB Configuration)



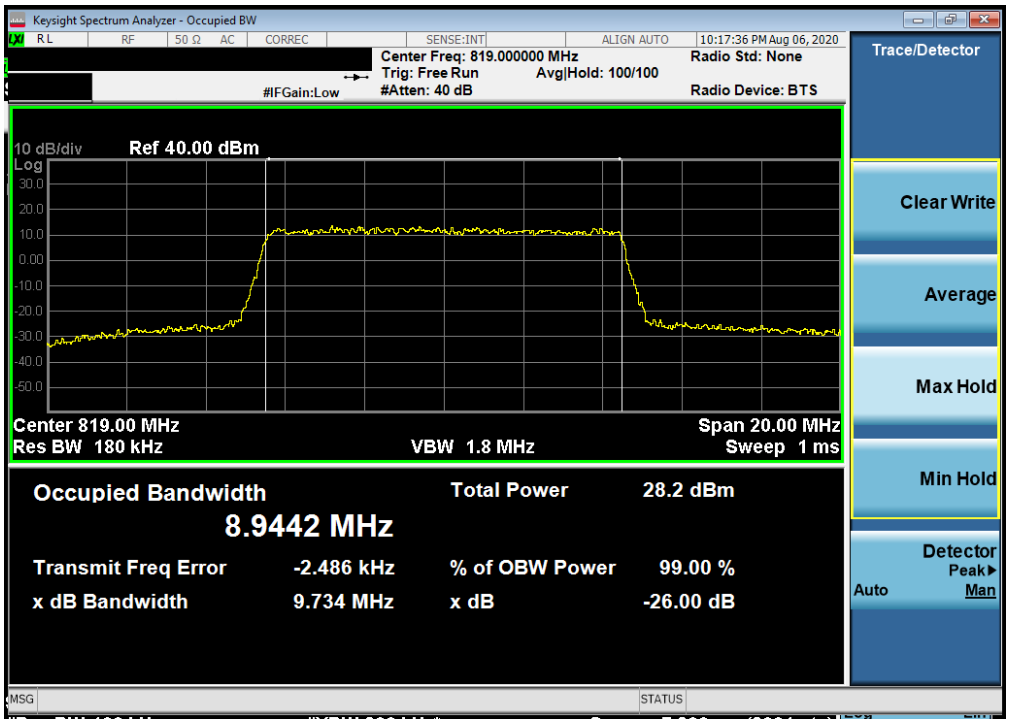
Plot 7-7. Occupied Bandwidth Plot (LTE Band 26 - 10MHz QPSK - Full RB Configuration)



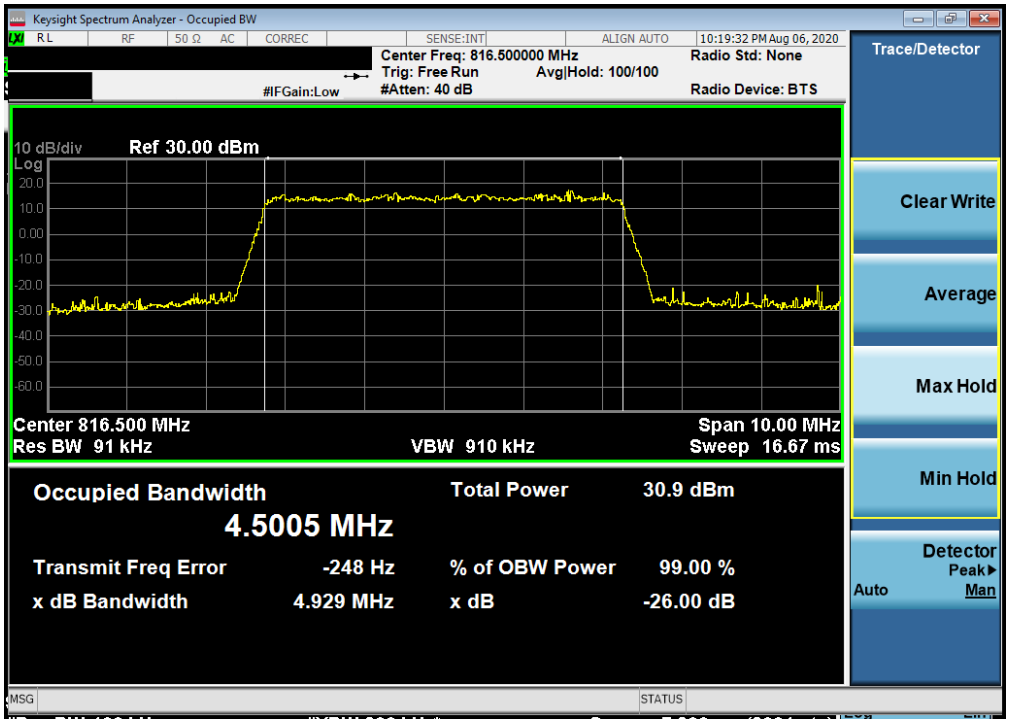
Plot 7-8. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 16-QAM - Full RB Configuration)



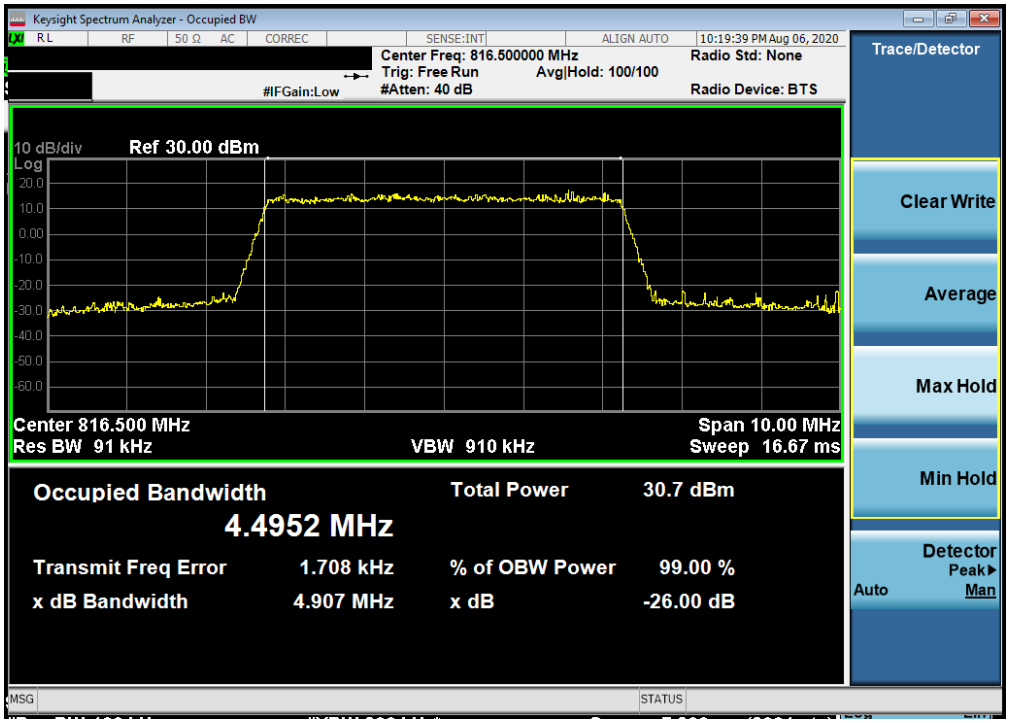
Plot 7-9. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 64-QAM - Full RB Configuration)



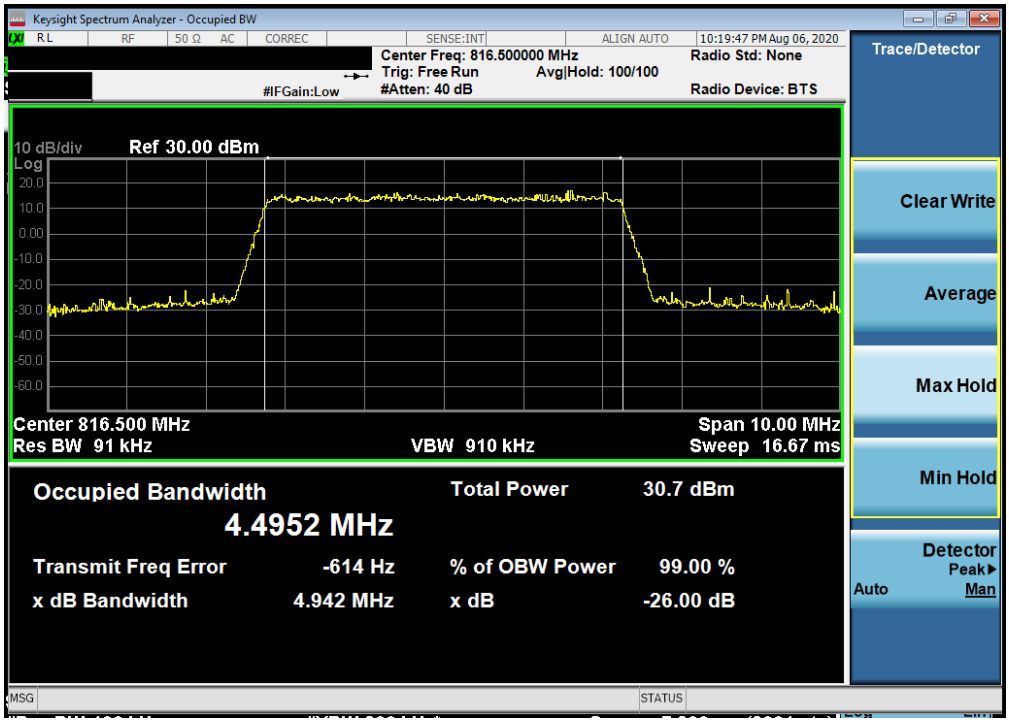
Plot 7-10. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 256-QAM - Full RB Configuration)



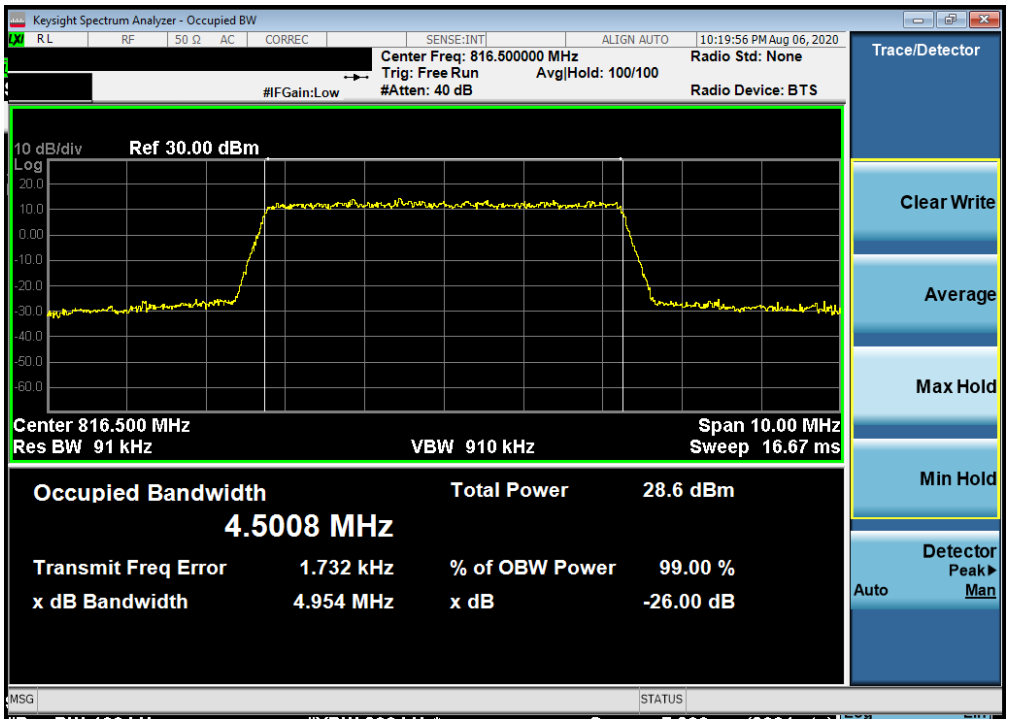
Plot 7-11. Occupied Bandwidth Plot (LTE Band 26 - 5MHz QPSK - Full RB Configuration)



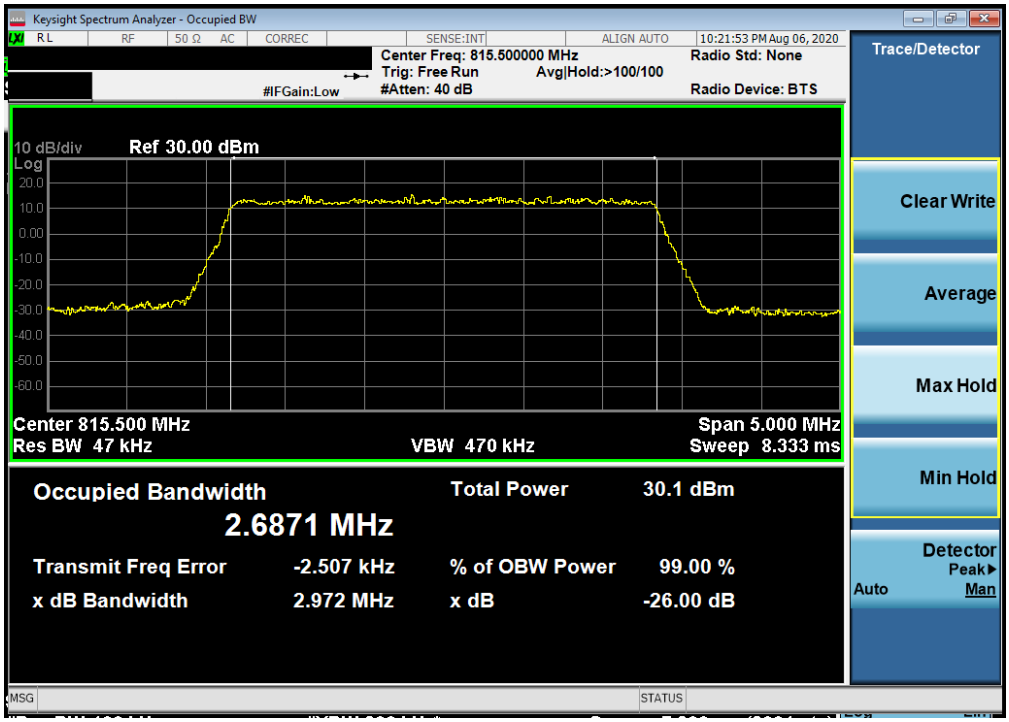
Plot 7-12. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 16-QAM - Full RB Configuration)



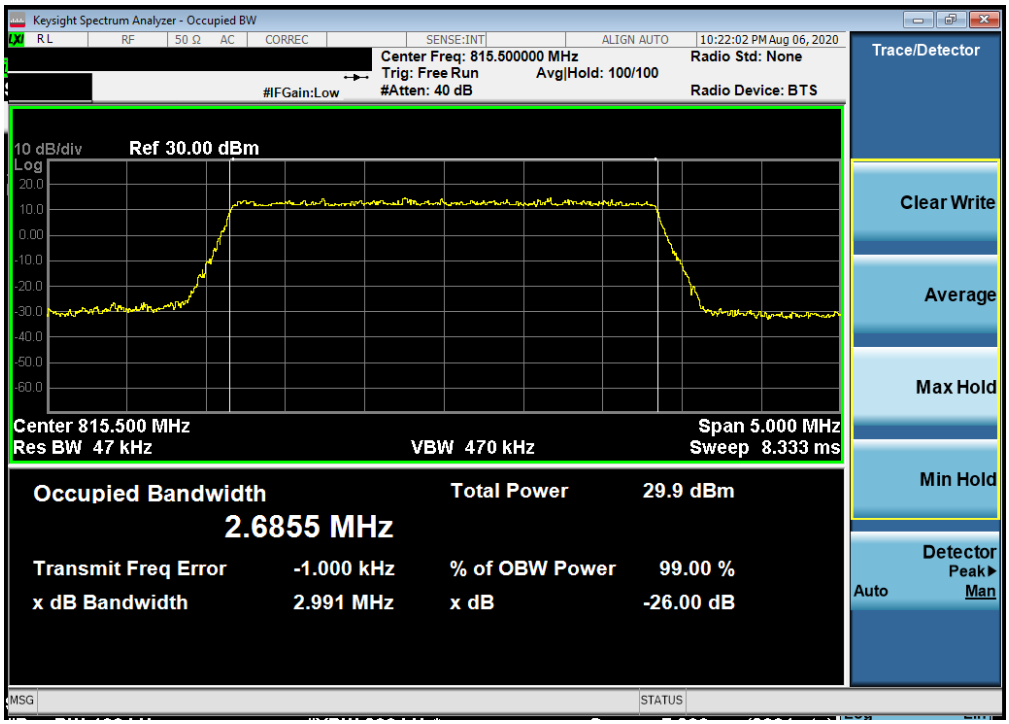
Plot 7-13. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 64-QAM - Full RB Configuration)



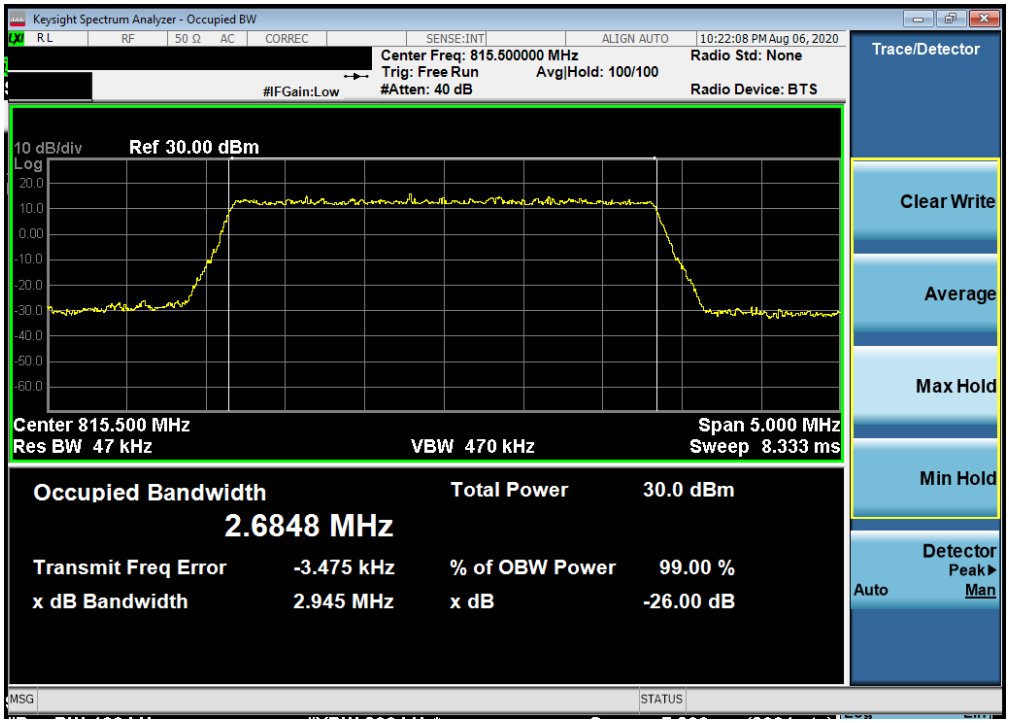
Plot 7-14. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 256-QAM - Full RB Configuration)



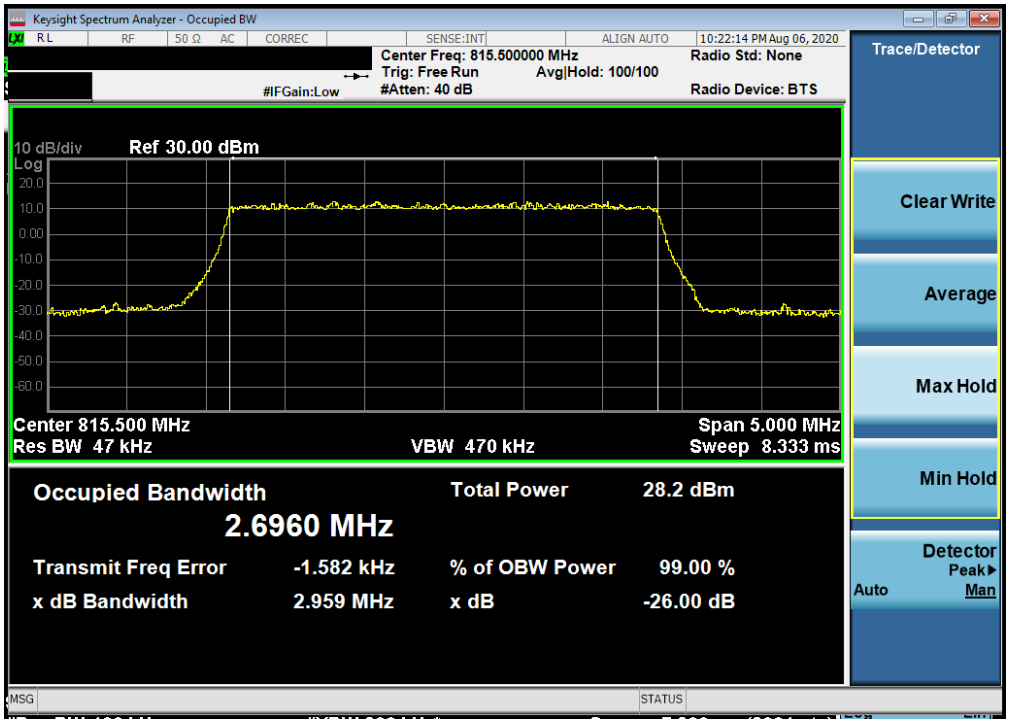
Plot 7-15. Occupied Bandwidth Plot (LTE Band 26 - 3MHz QPSK - Full RB Configuration)



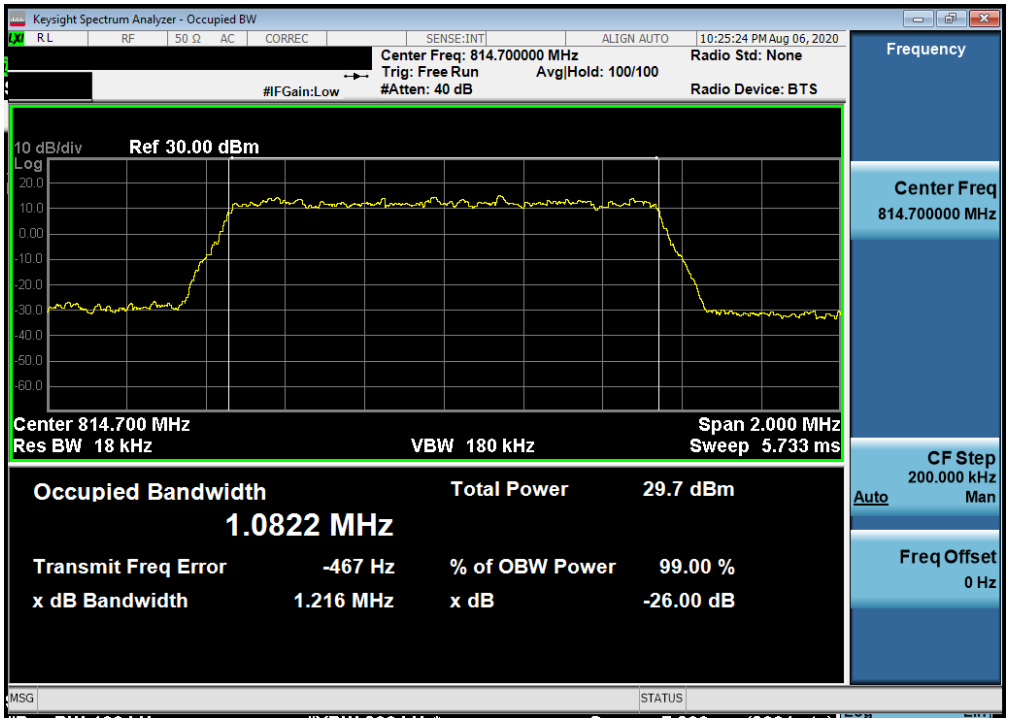
Plot 7-16. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 16-QAM - Full RB Configuration)



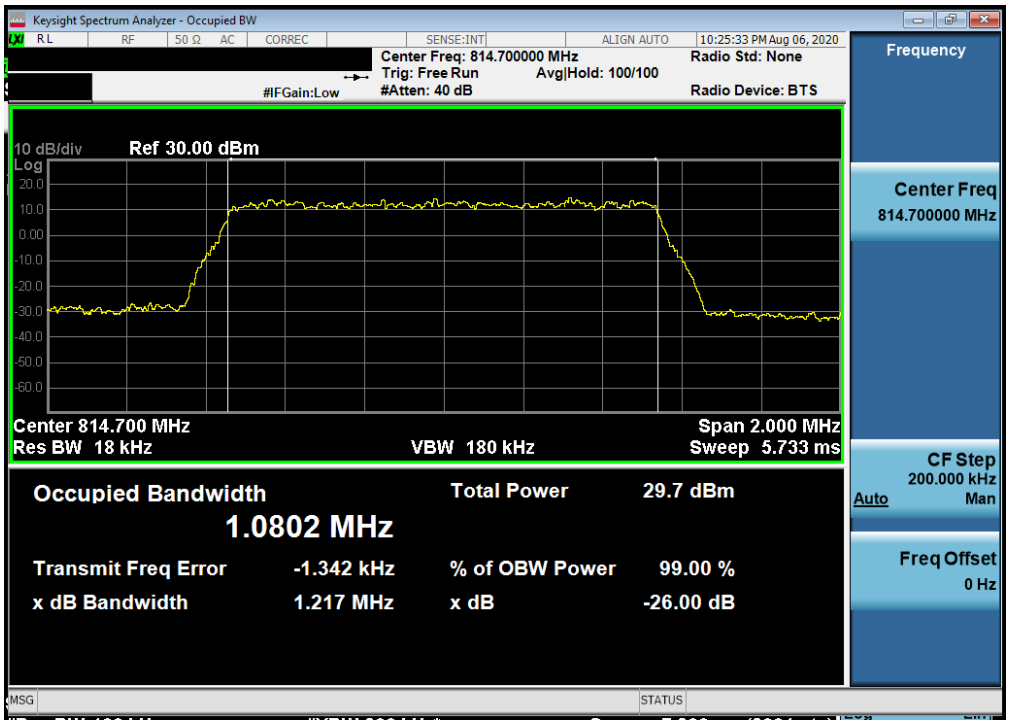
Plot 7-17. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 64-QAM - Full RB Configuration)



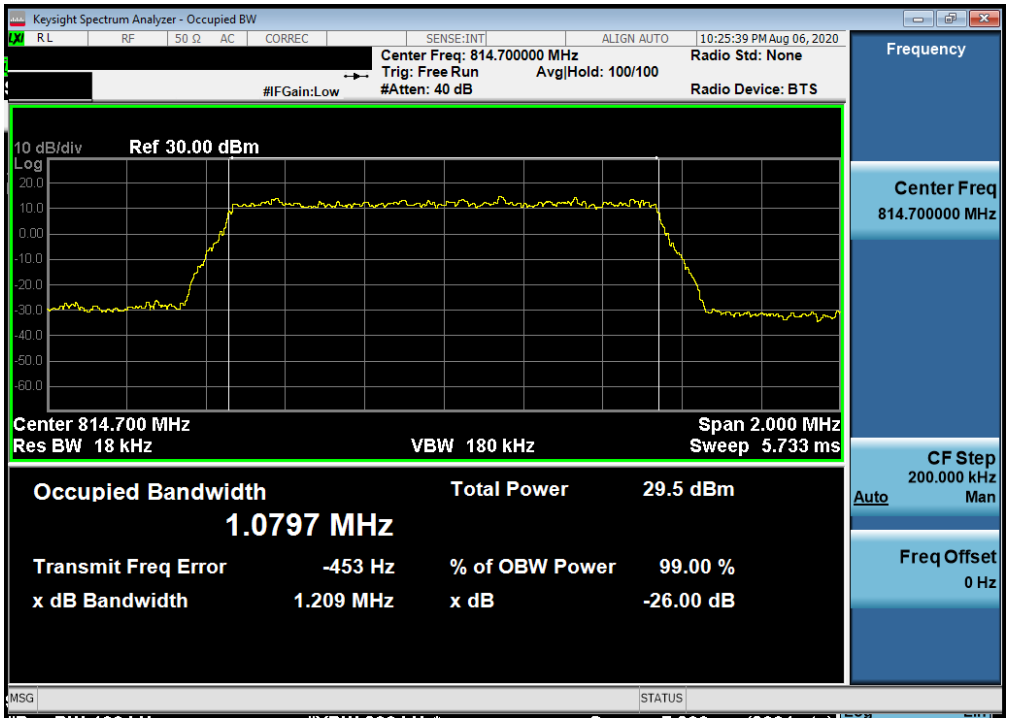
Plot 7-18. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 256-QAM - Full RB Configuration)



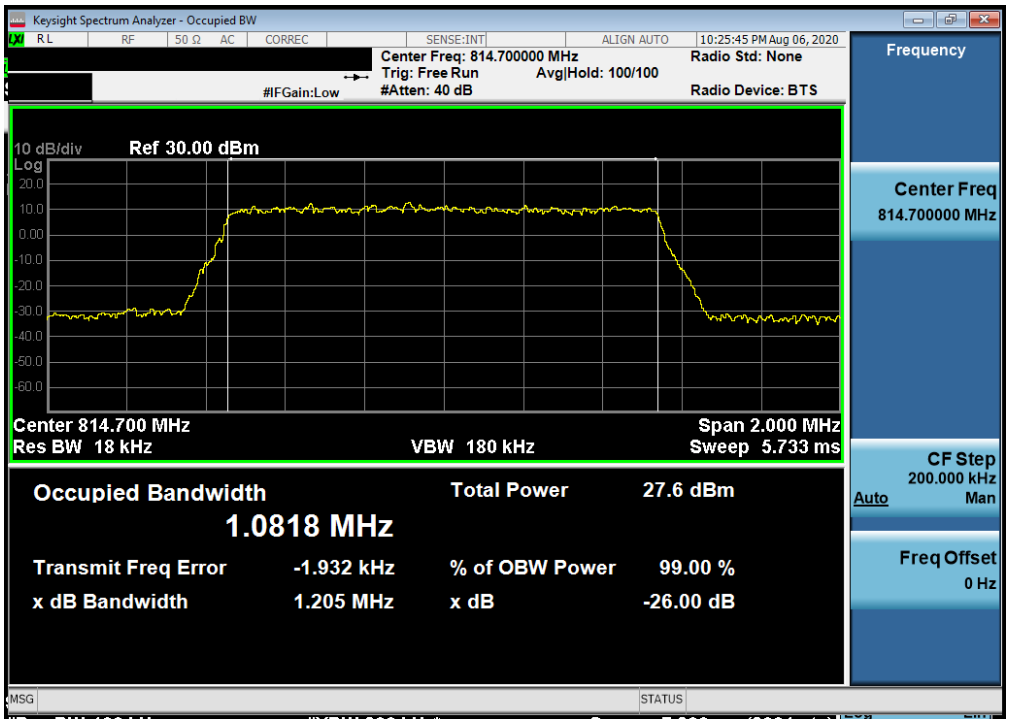
Plot 7-19. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-20. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 16-QAM - Full RB Configuration)

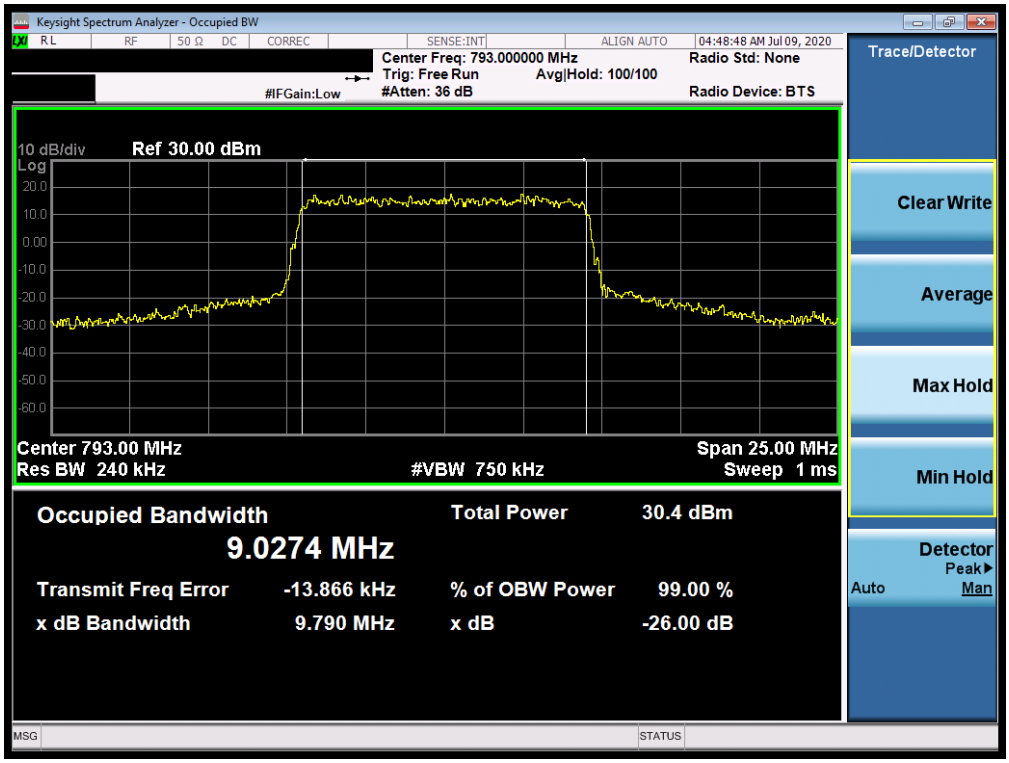


Plot 7-21. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-22. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 256-QAM - Full RB Configuration)

LTE Band 14

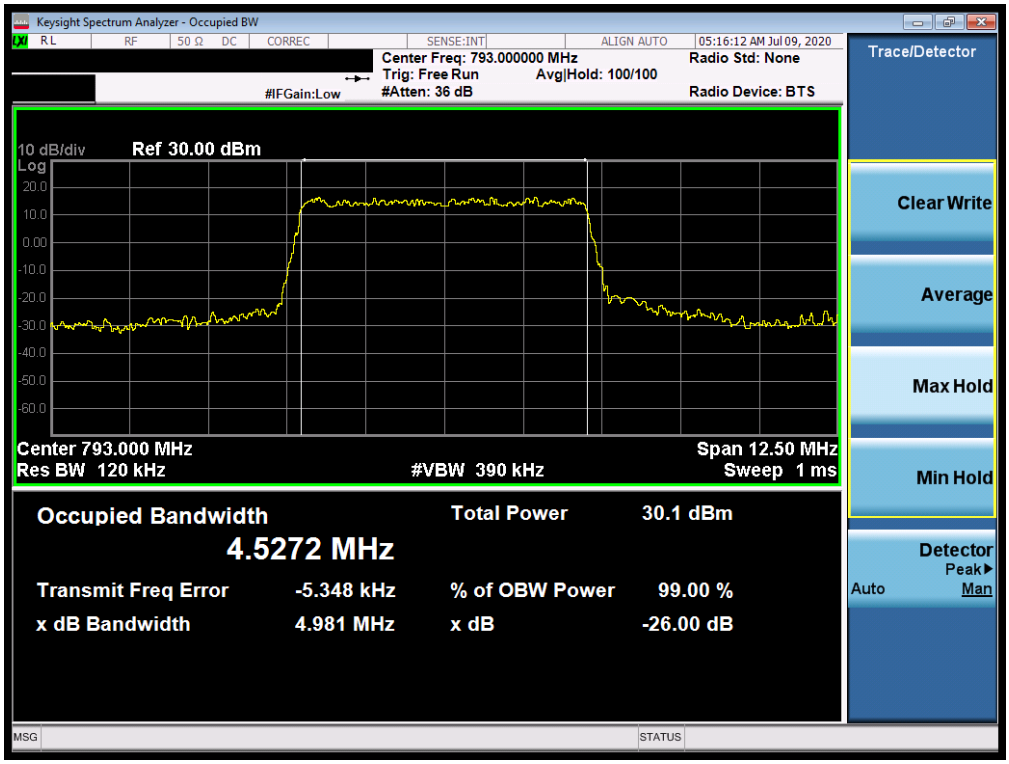


Plot 7-23. Occupied Bandwidth Plot (LTE Band 14 - 10MHz QPSK - Full RB Configuration)

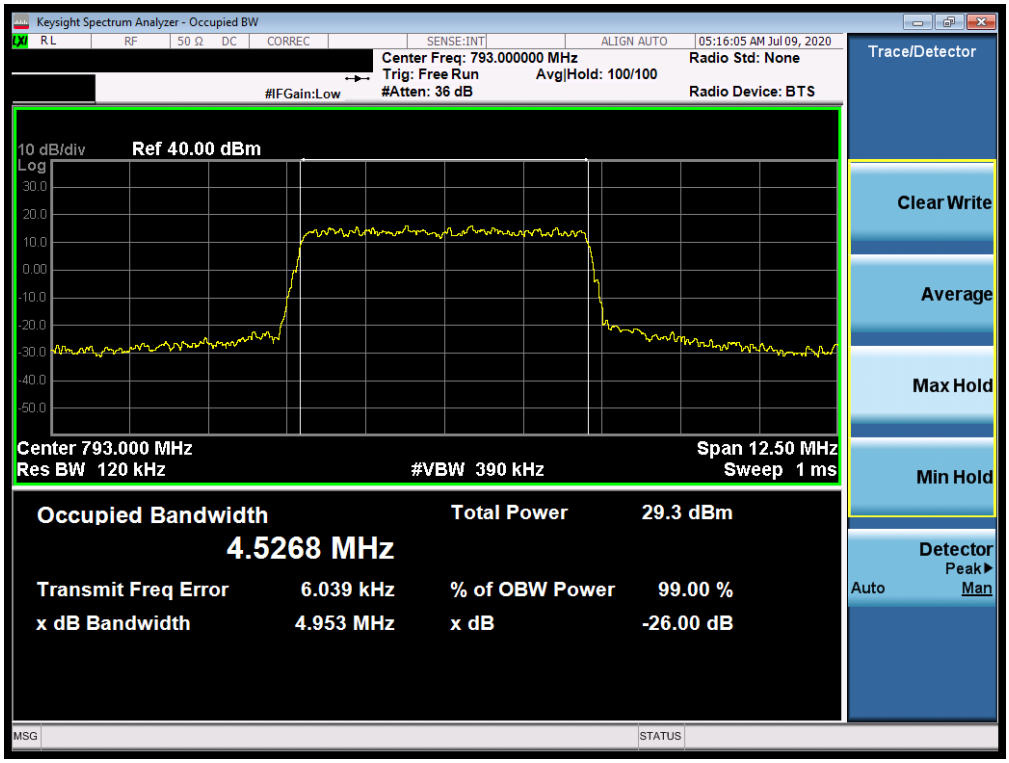
Plot 7-24. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 16-QAM - Full RB Configuration)

Plot 7-25. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 64-QAM - Full RB Configuration)

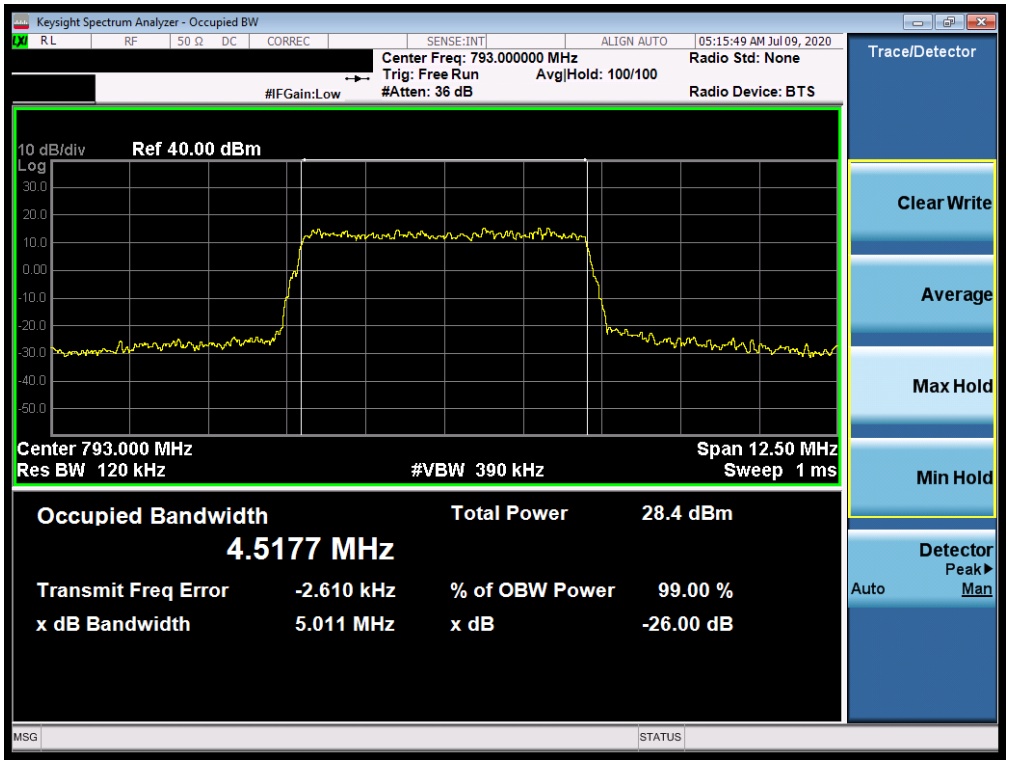
Plot 7-26. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 256-QAM - Full RB Configuration)



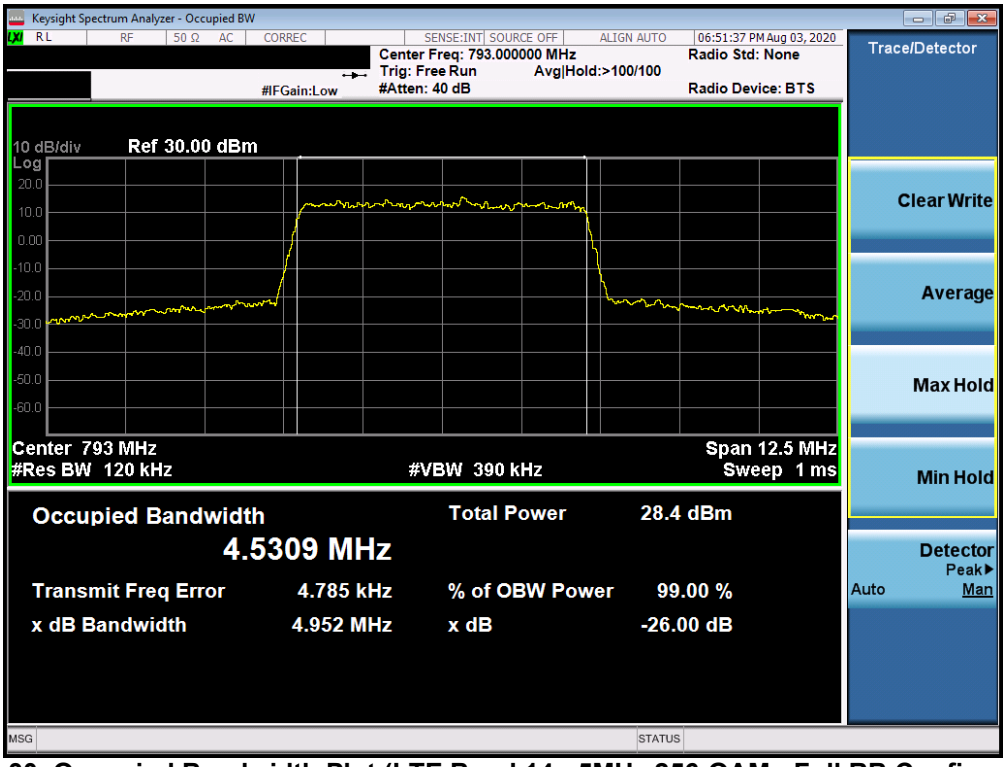
Plot 7-27. Occupied Bandwidth Plot (LTE Band 14 - 5MHz QPSK - Full RB Configuration)



Plot 7-28. Occupied Bandwidth Plot (LTE Band 14 - 5MHz 16-QAM - Full RB Configuration)



Plot 7-29. Occupied Bandwidth Plot (LTE Band 14 - 5MHz 64-QAM - Full RB Configuration)



Plot 7-30. Occupied Bandwidth Plot (LTE Band 14 - 5MHz 256-QAM - Full RB Configuration)

7.3 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §90(S).691(a) §90(R).543(e)

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. RBW ≥ 100kHz
3. VBW ≥ 3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

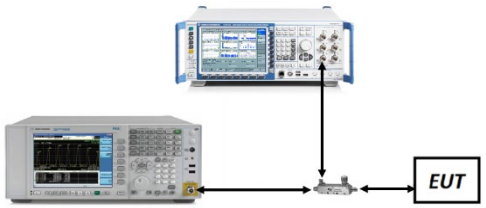
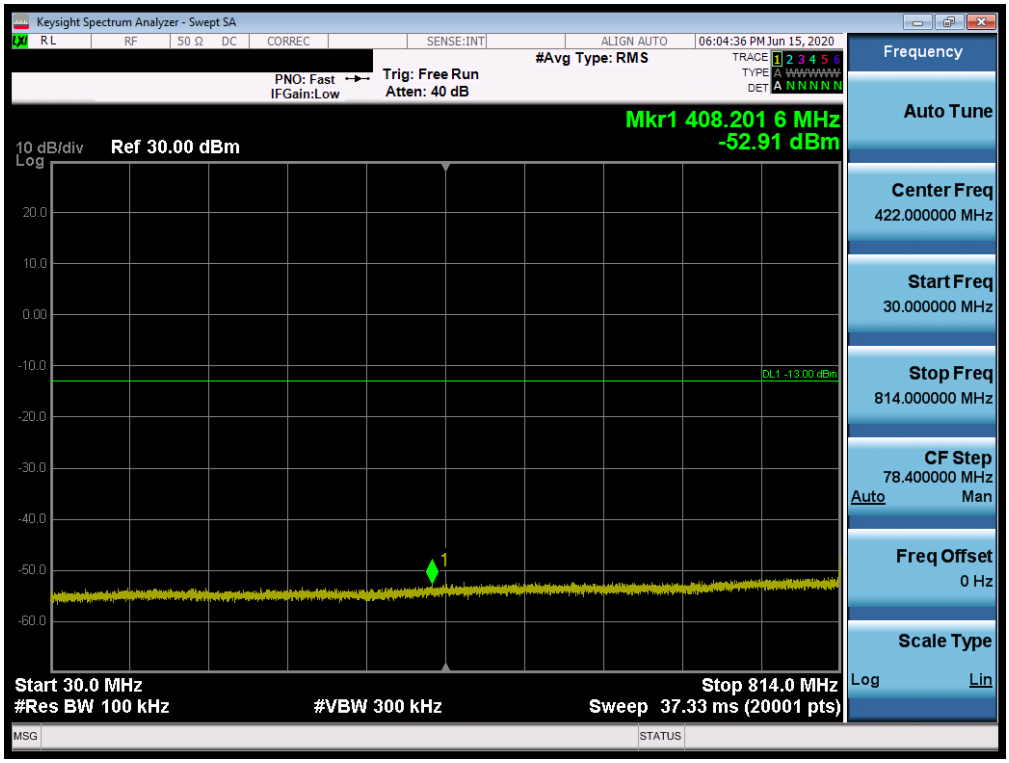


Figure 7-2. Test Instrument & Measurement Setup

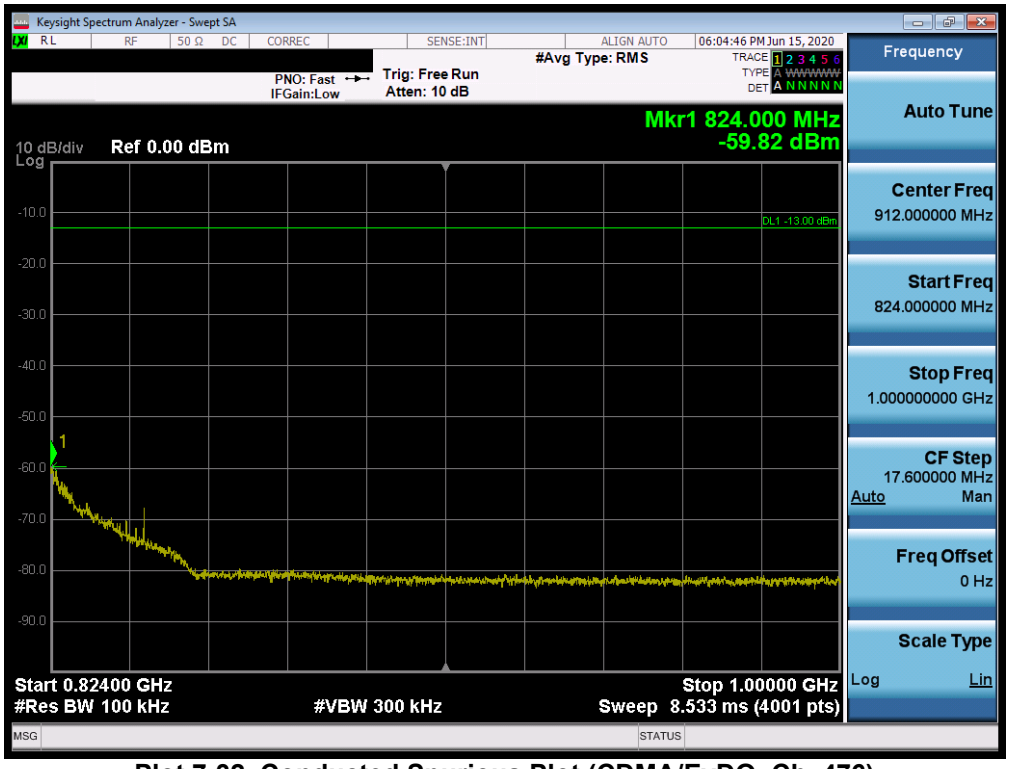
Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22. 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.

CDMA BC10

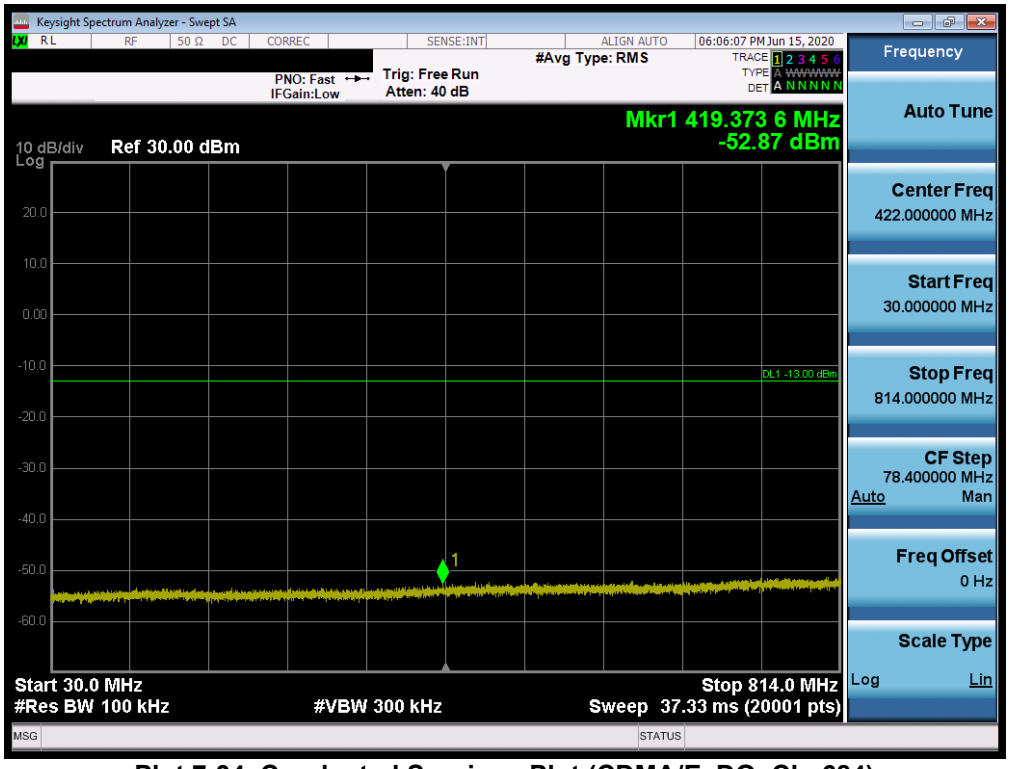


Plot 7-31. Conducted Spurious Plot (CDMA/EvDO, Ch. 476)

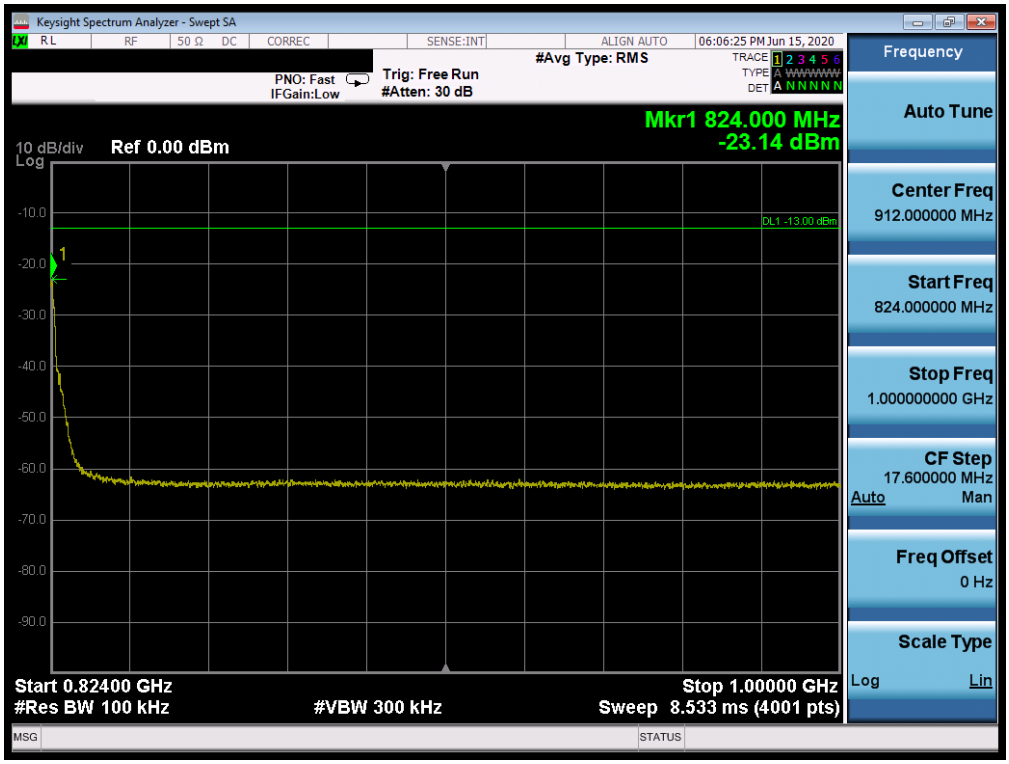


Plot 7-32. Conducted Spurious Plot (CDMA/EvDO, Ch. 476)

Plot 7-33. Conducted Spurious Plot (CDMA/EvDO, Ch. 476)



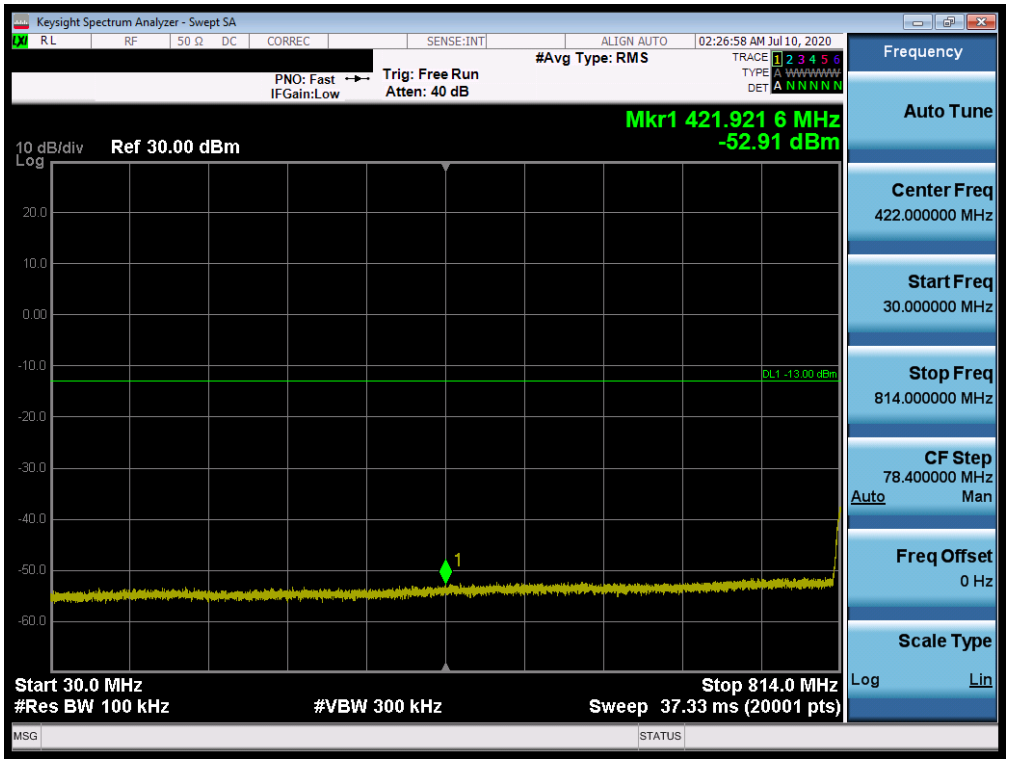
Plot 7-34. Conducted Spurious Plot (CDMA/EvDO, Ch. 684)



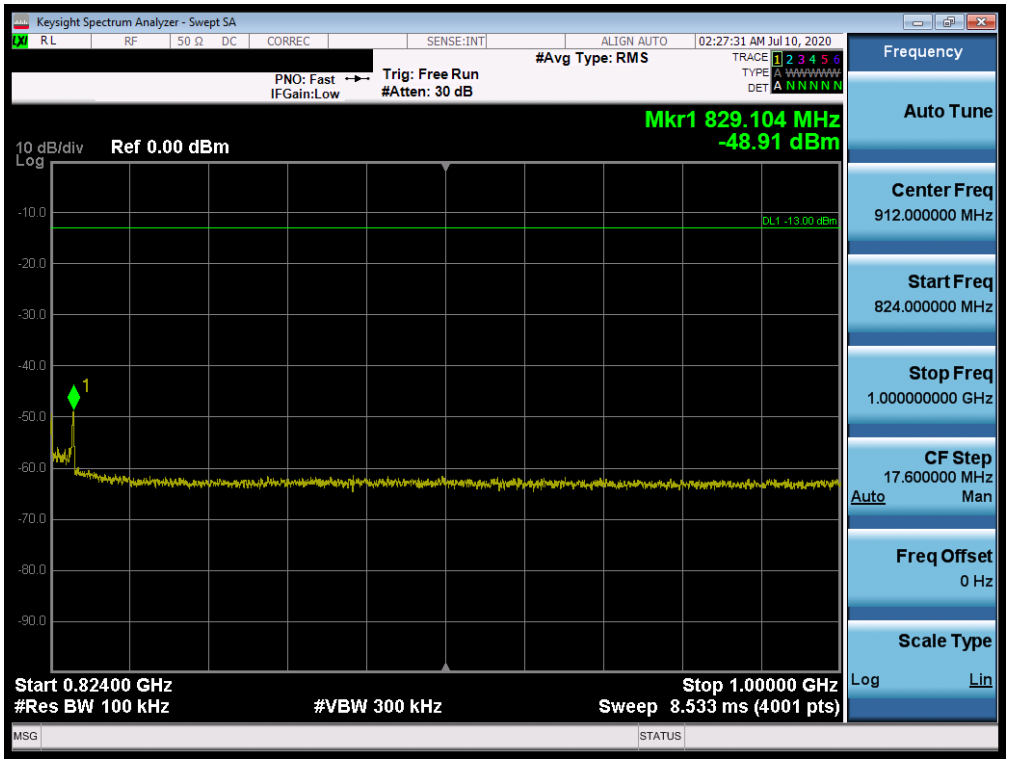
Plot 7-35. Conducted Spurious Plot (CDMA/EvDO, Ch. 684)

Plot 7-36. Conducted Spurious Plot (CDMA/EvDO, Ch. 684)

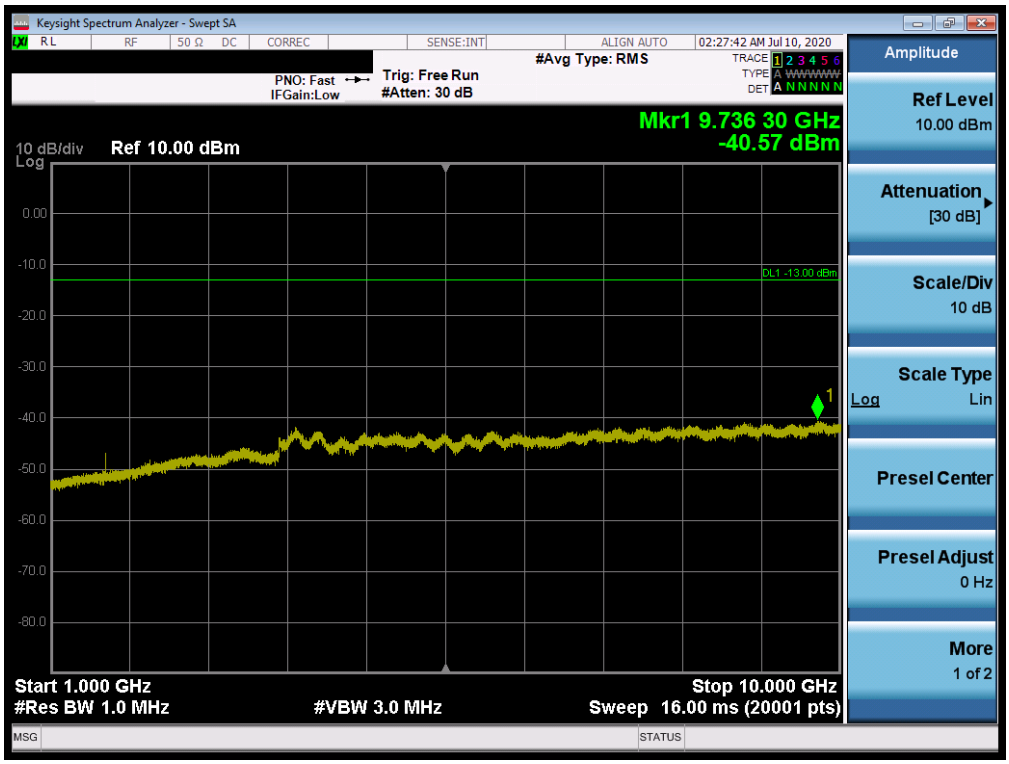
LTE Band 26



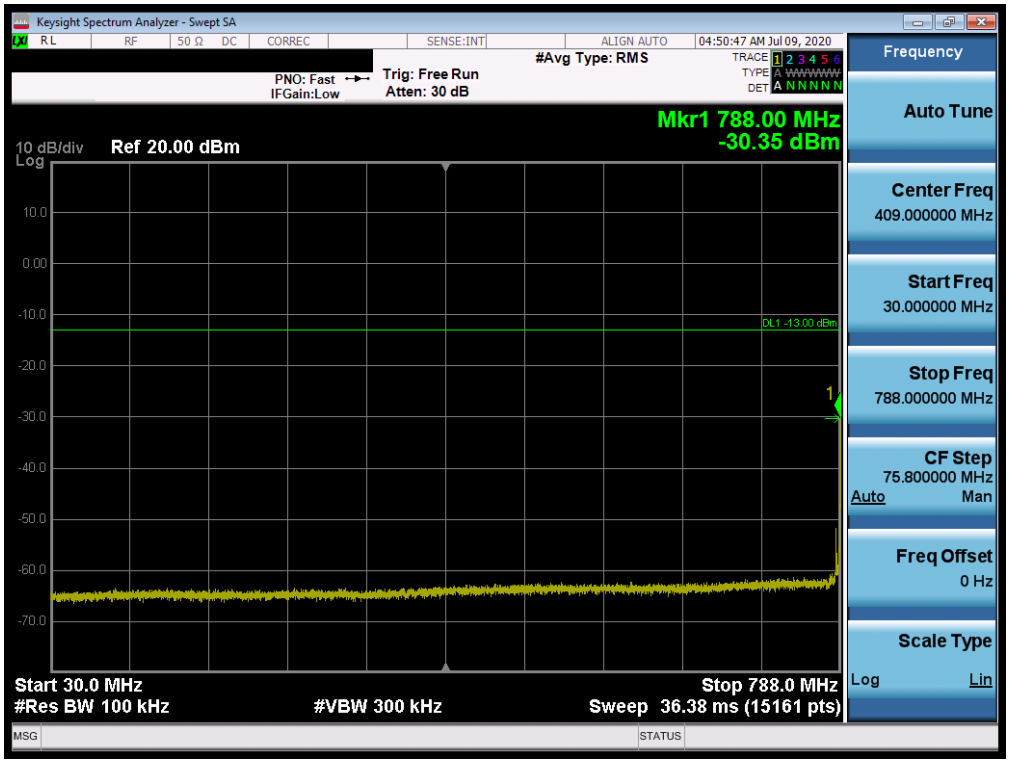
Plot 7-37. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



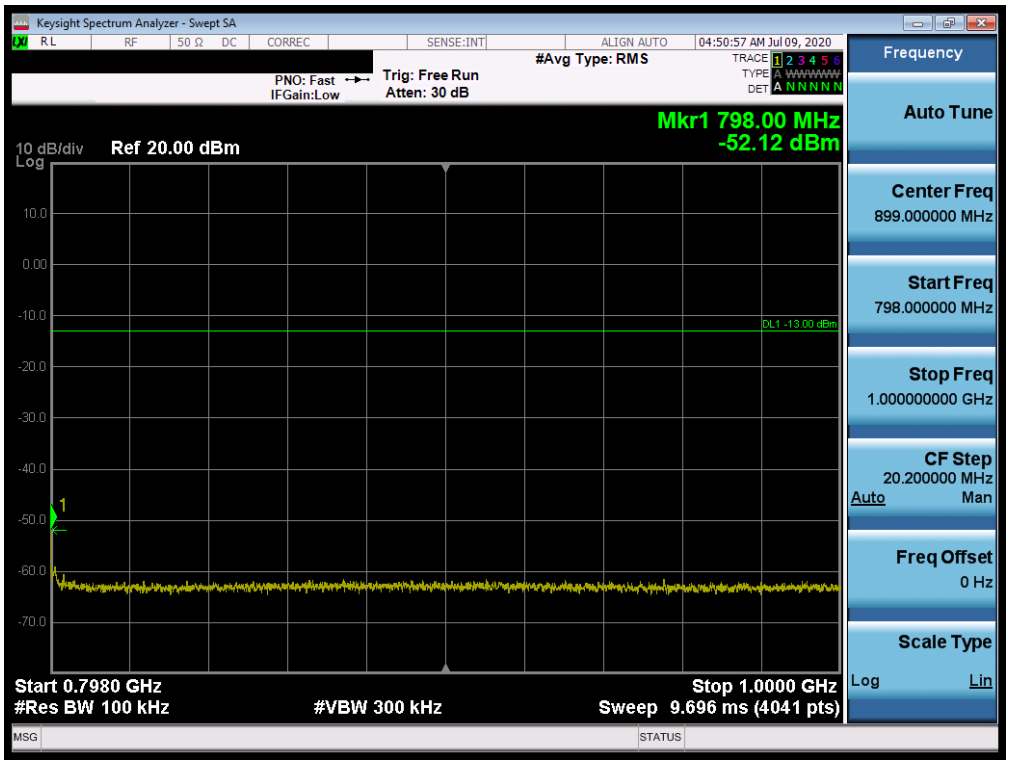
Plot 7-38. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



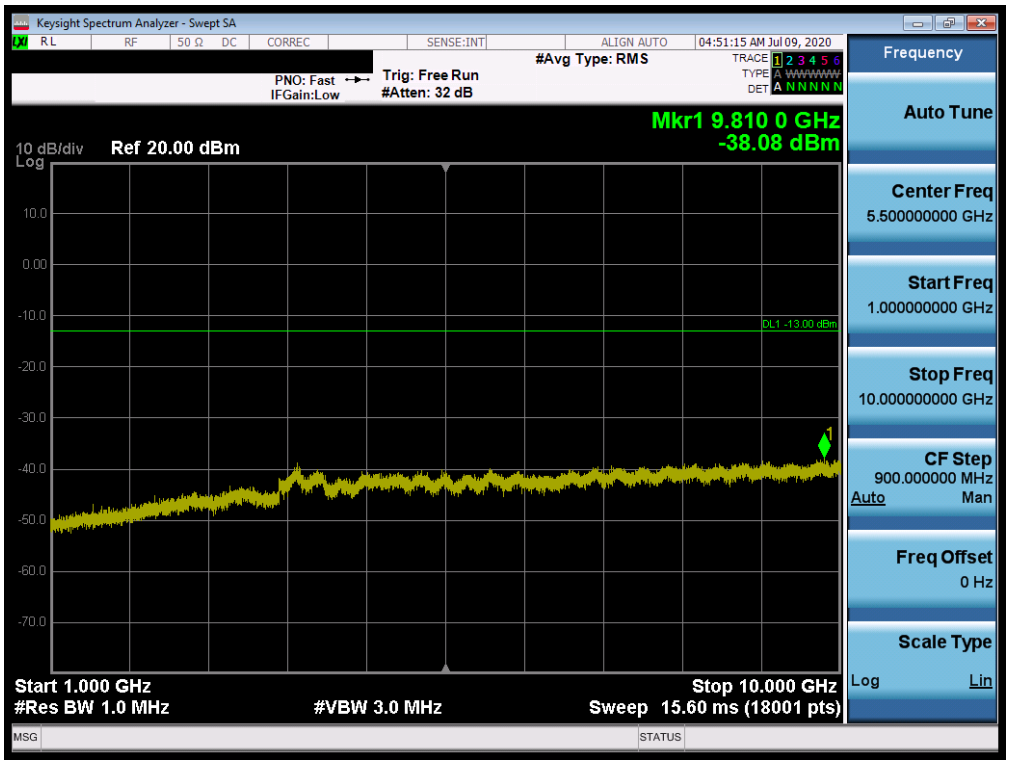
Plot 7-39. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-40. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-41. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-42. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §90(S).691(a) §90(R).543(e)

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.

For LTE B26 operation under Part 90.691, the minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by greater than 37.5 kHz is 43 + 10log$_{10}$(P$_{[Watts]}$), where P is the transmitter power in Watts. The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is 50 + 10log$_{10}$(P$_{[Watts]}$), where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Span was set large enough so as to capture all out of band emissions near the band edge
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Detector = RMS
5. Trace mode = trace average
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

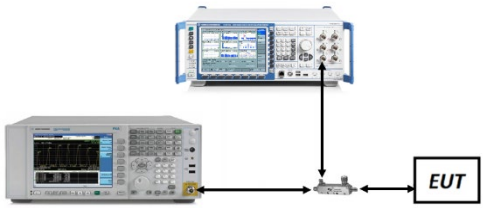


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

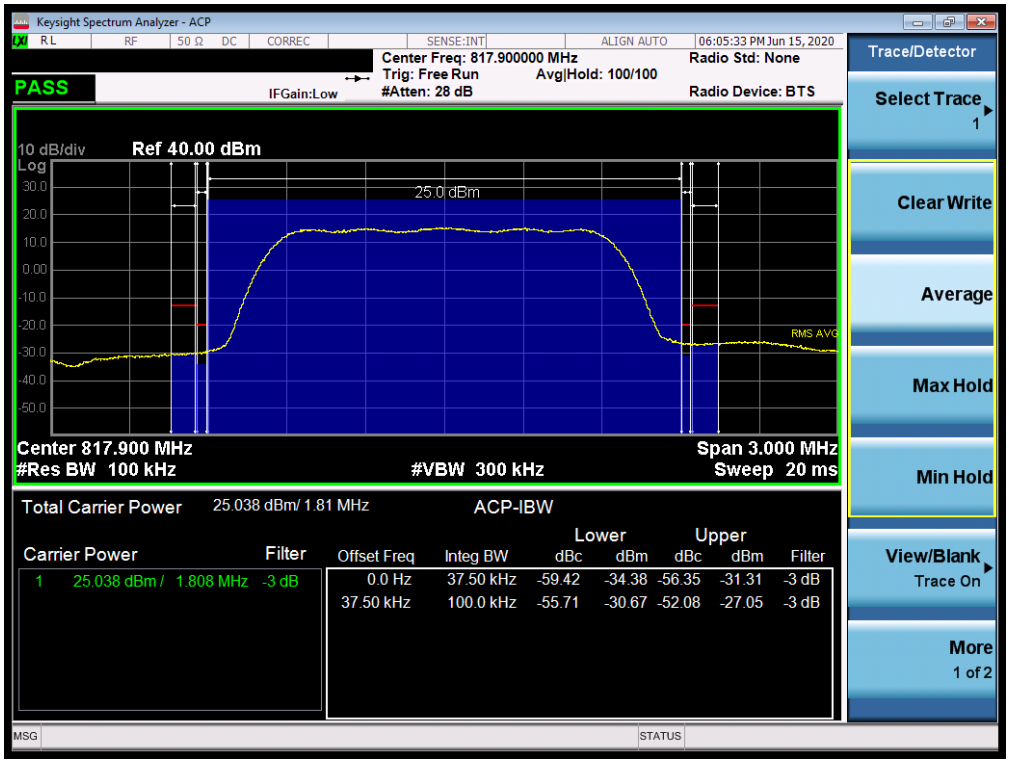
For channel edge emission, the signal analyzer's "ACP" measurement capability is used.

Per 22.917(b) 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.

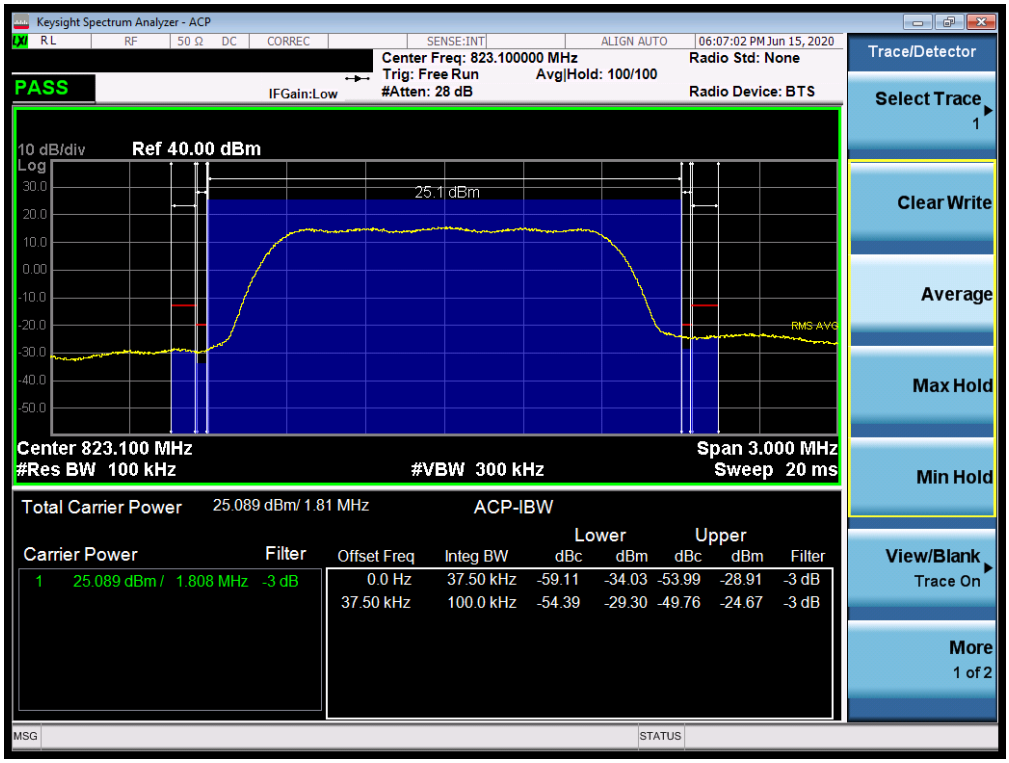
For LTE Band 14 operation under Part 90.543, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

Additionally, for LTE Band 14 operation, on all frequencies between 769-775 MHz and 799-805 MHz, the power of any emission shall be attenuated by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

CDMA BC10

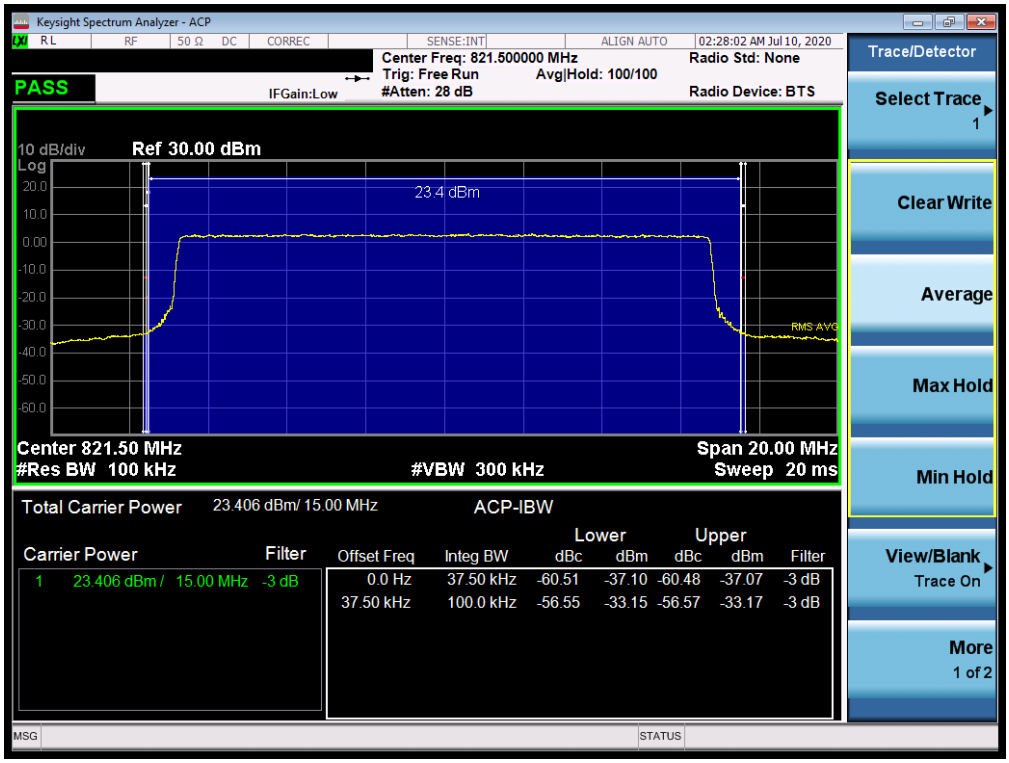


Plot 7-43. Channel Edge Plot (CDMA BC10 - Ch. 476)

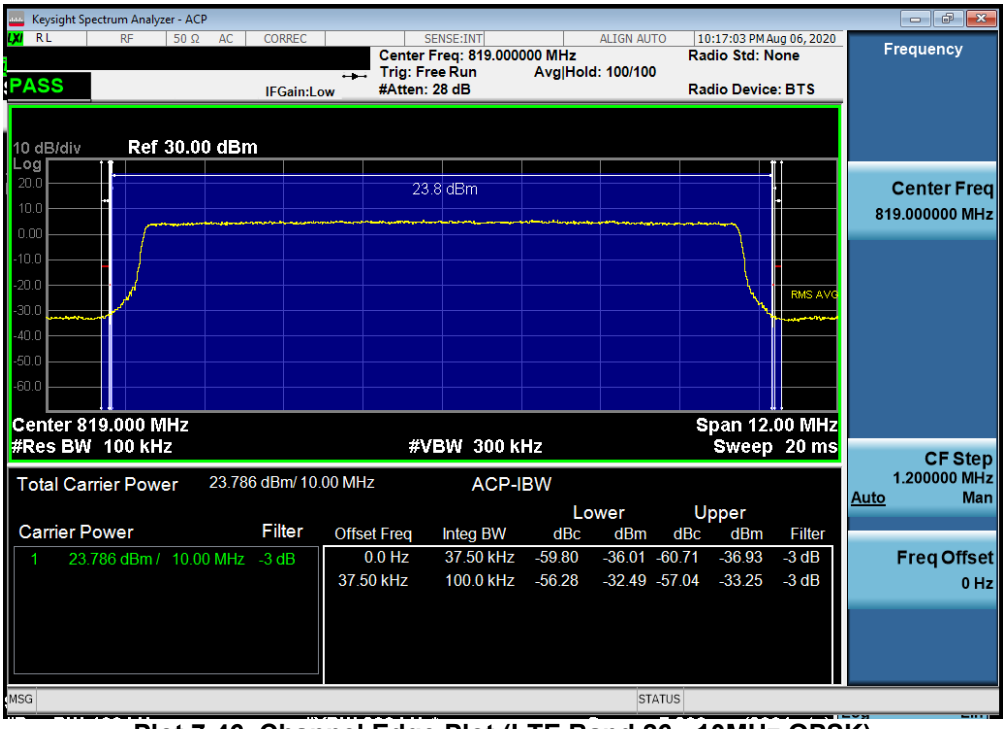


Plot 7-44. Channel Edge Plot (CDMA BC10 - Ch. 684)

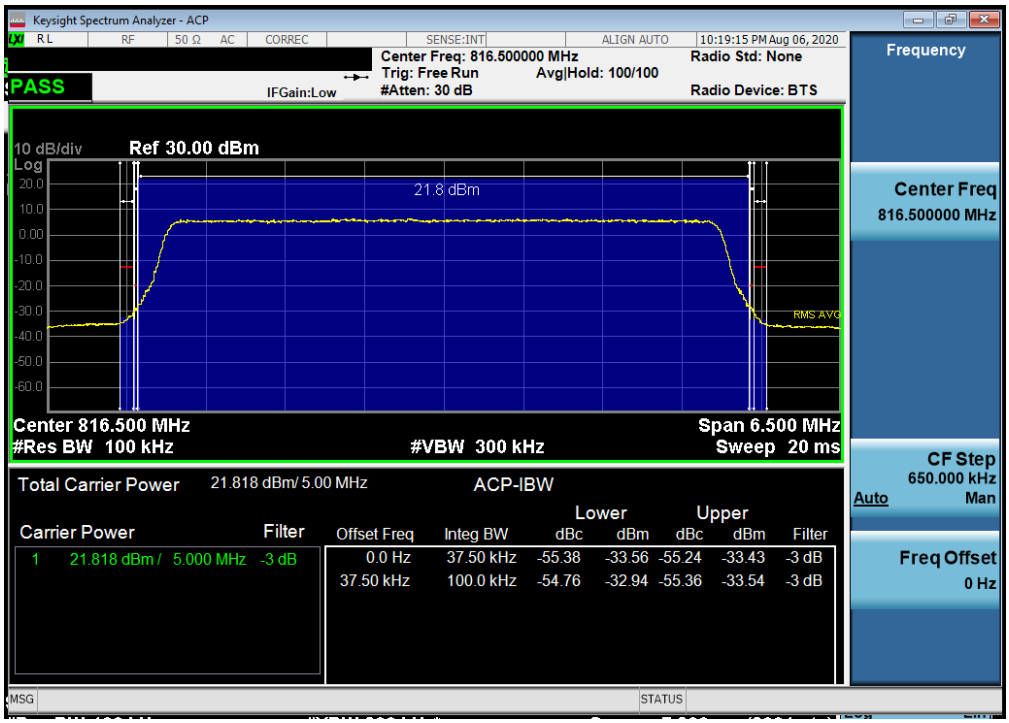
LTE Band 26



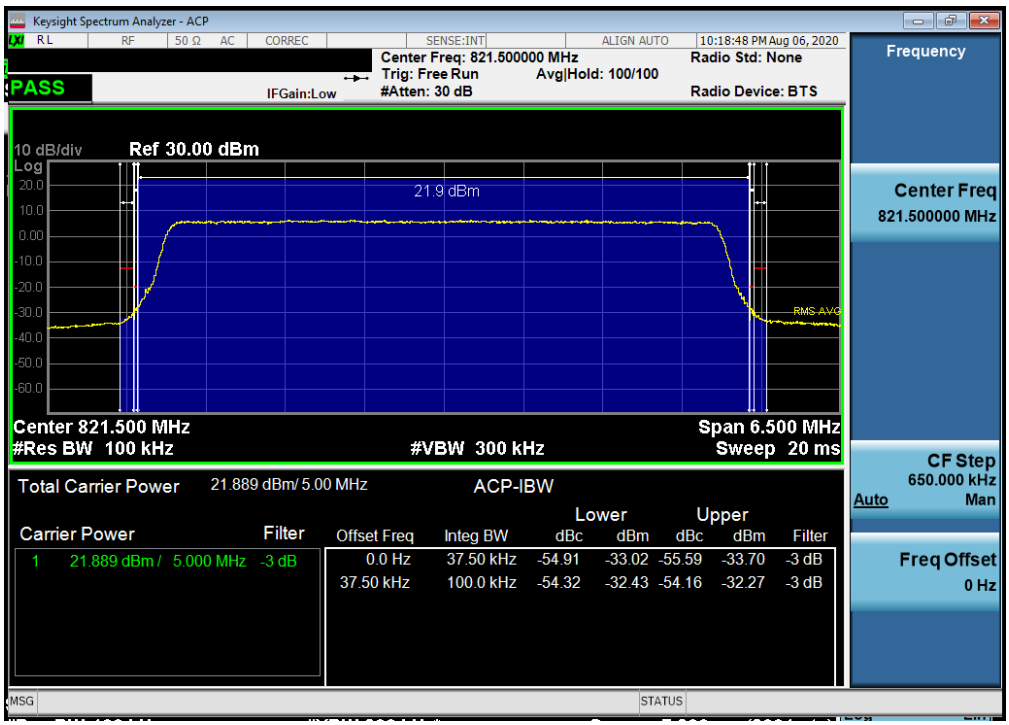
Plot 7-45. Channel Edge Plot (LTE Band 26 - 15MHz QPSK)



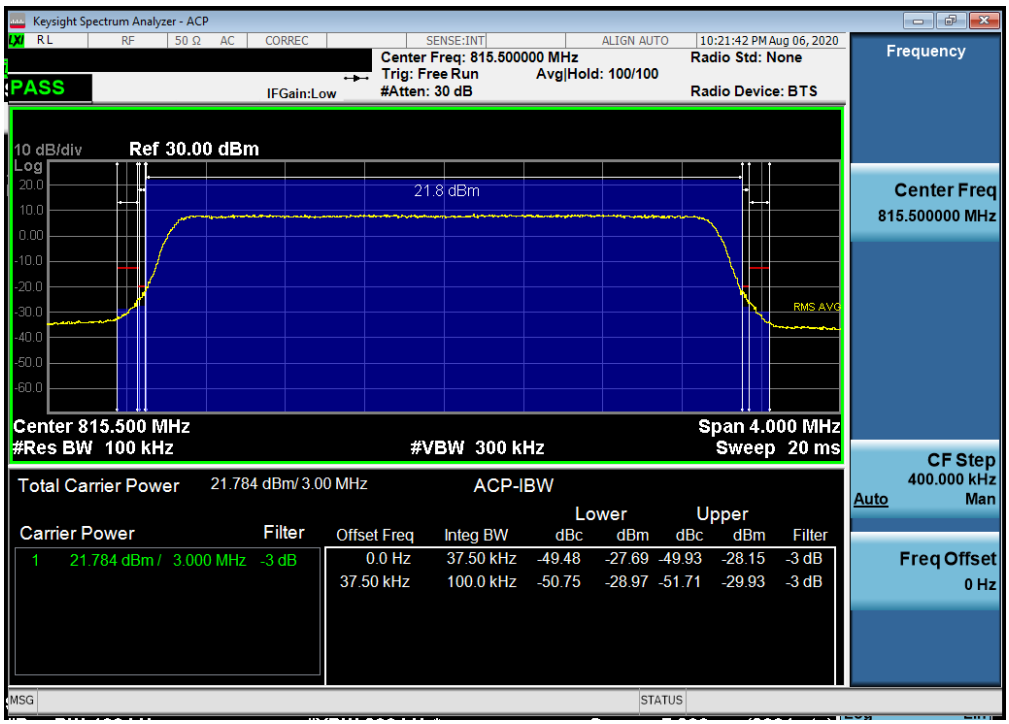
Plot 7-46. Channel Edge Plot (LTE Band 26 - 10MHz QPSK)



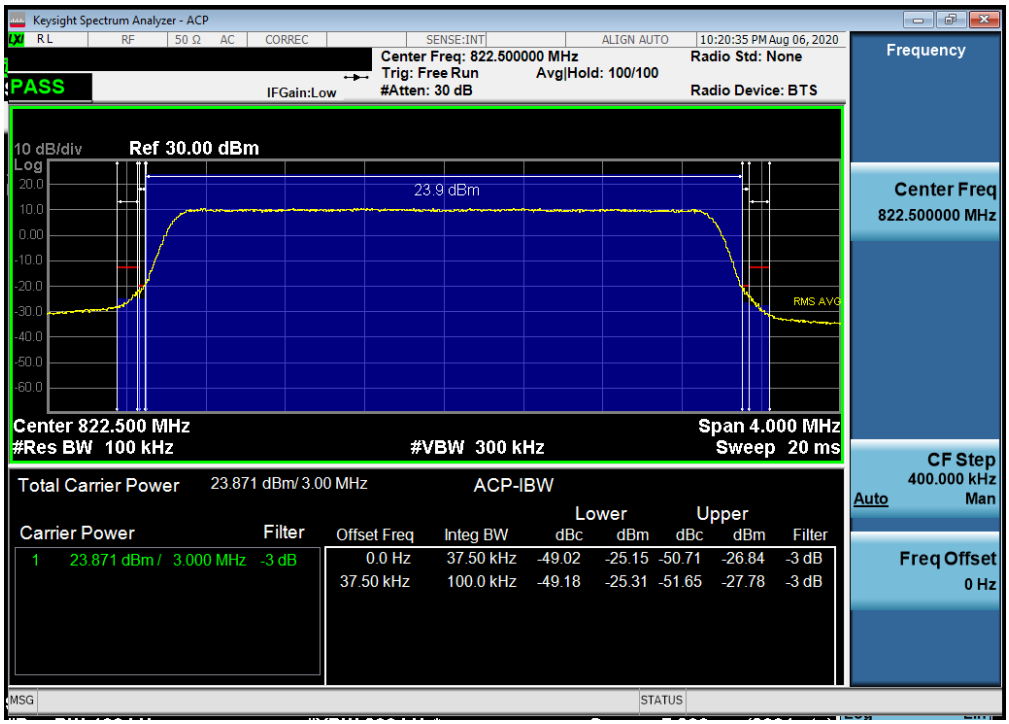
Plot 7-47. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - Low Channel)



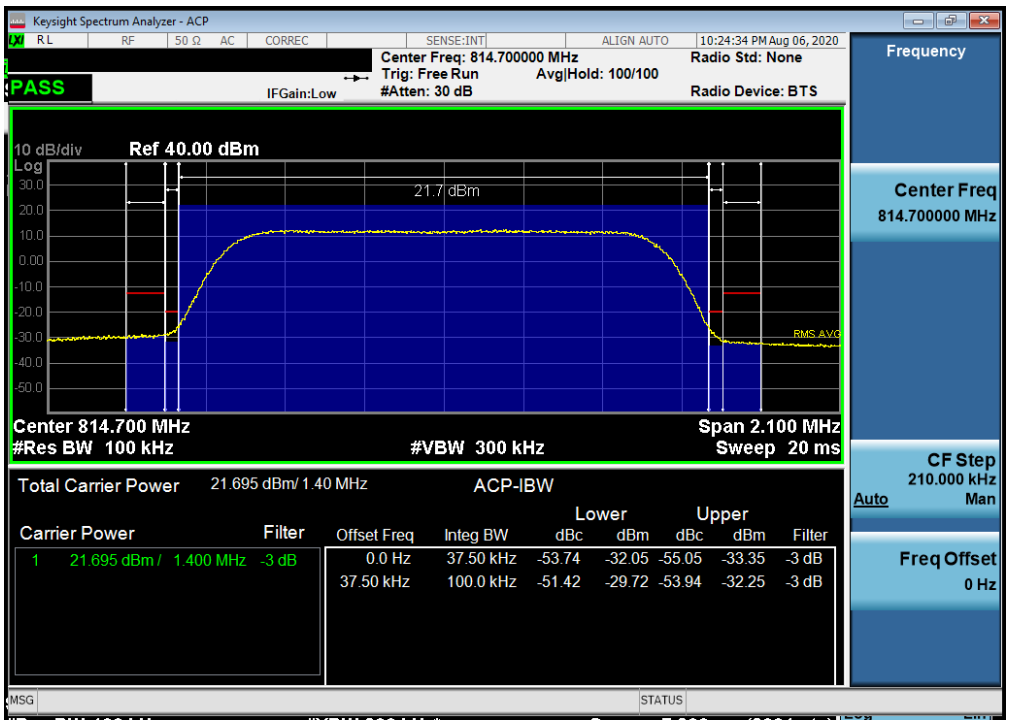
Plot 7-48. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - High Channel)



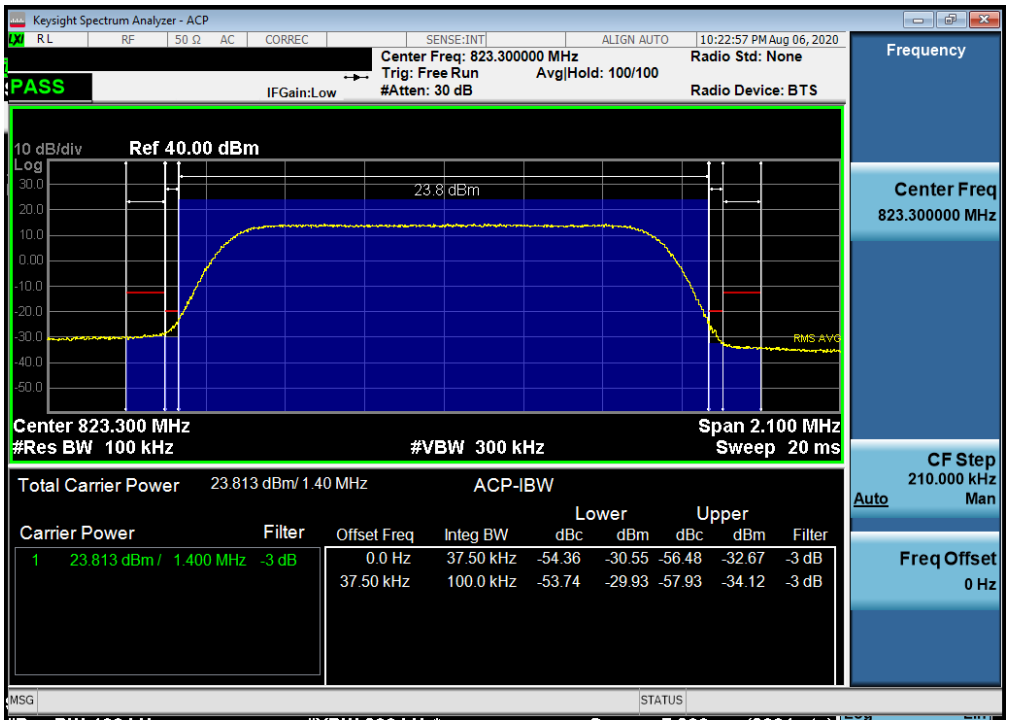
Plot 7-49. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - Low Channel)



Plot 7-50. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - High Channel)

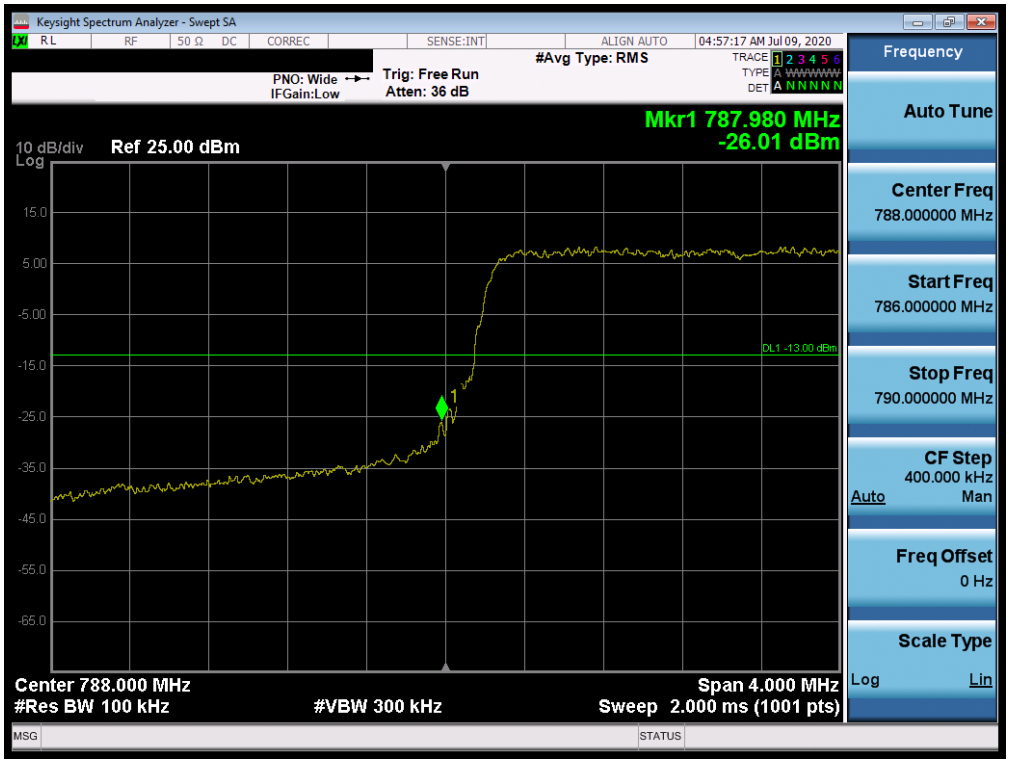


Plot 7-51. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - Low Channel)

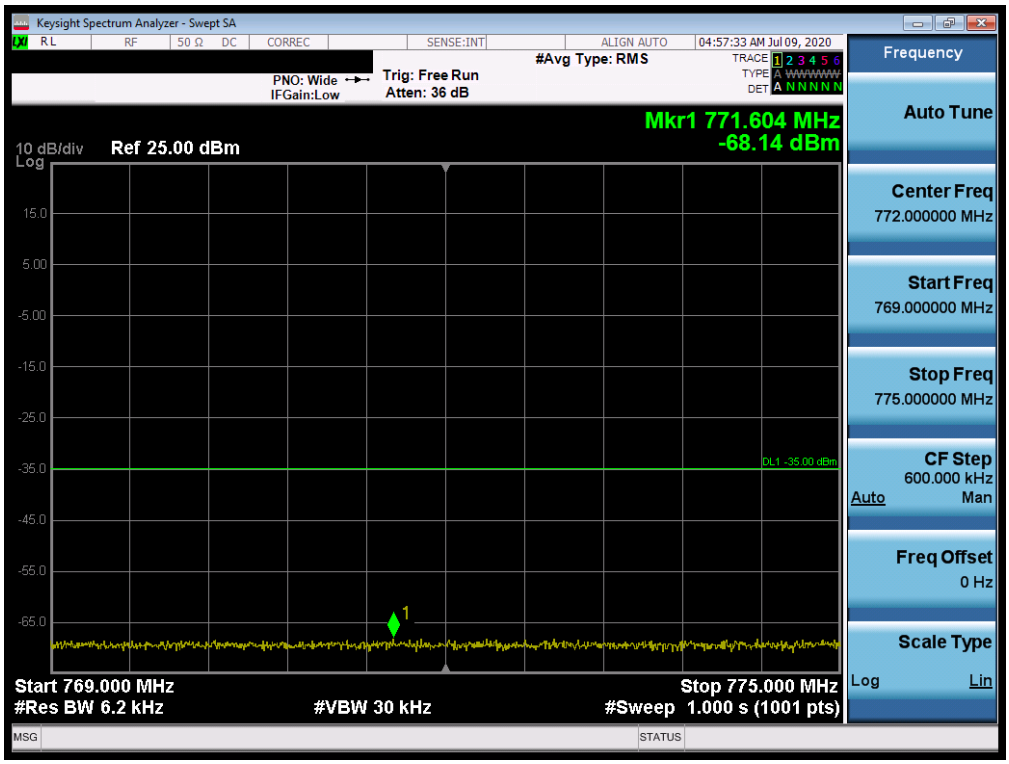


Plot 7-52. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - High Channel)

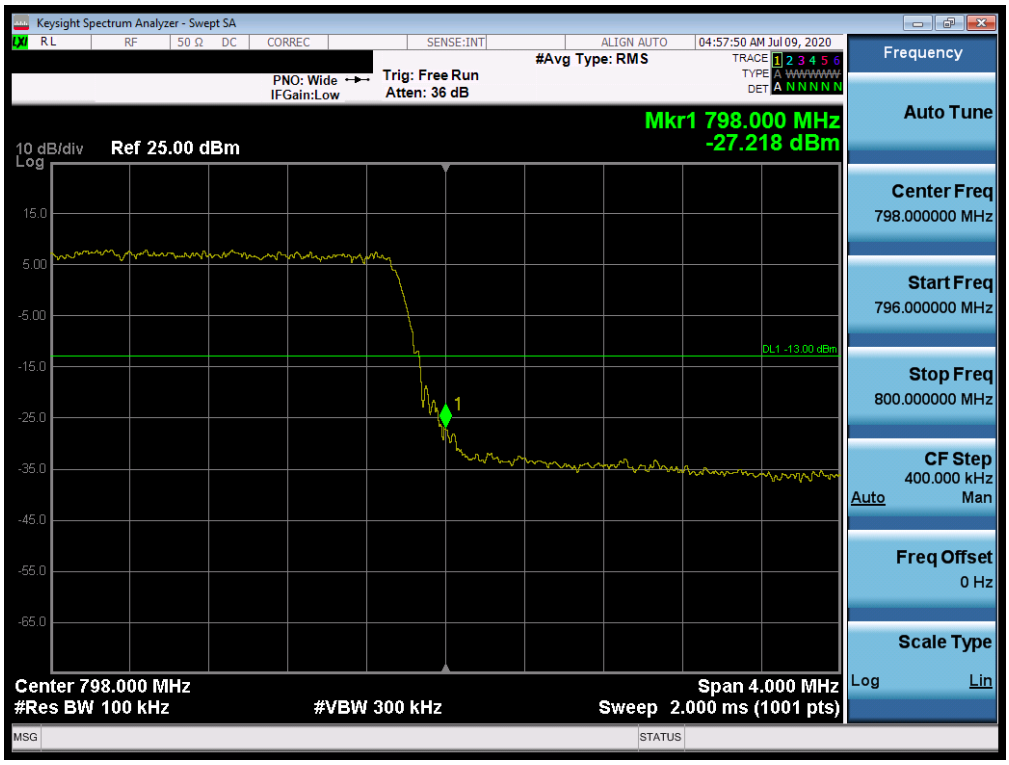
LTE Band 14



Plot 7-53. Lower Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

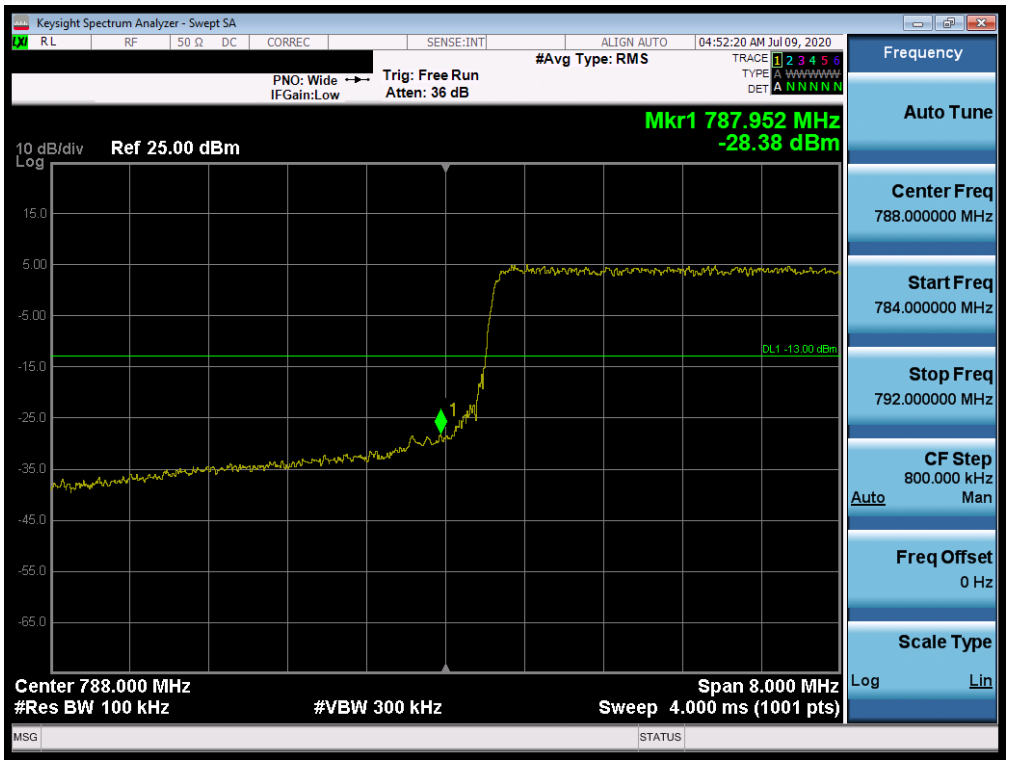


Plot 7-54. Lower Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

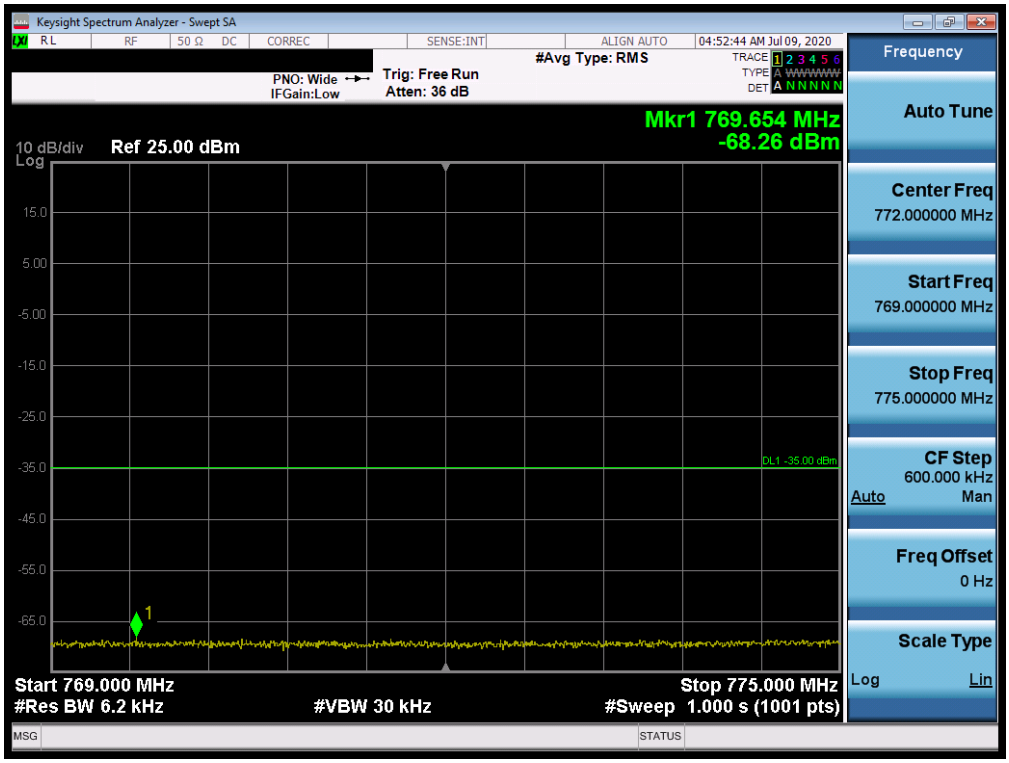


Plot 7-55. Upper Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

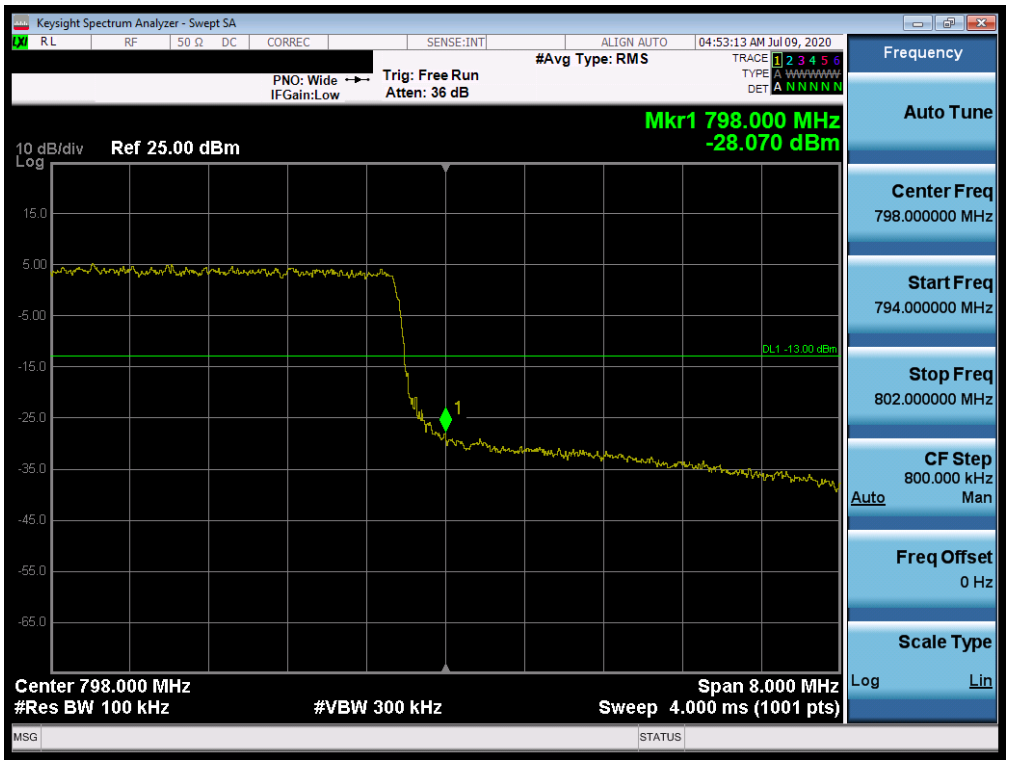
Plot 7-56. Upper Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)



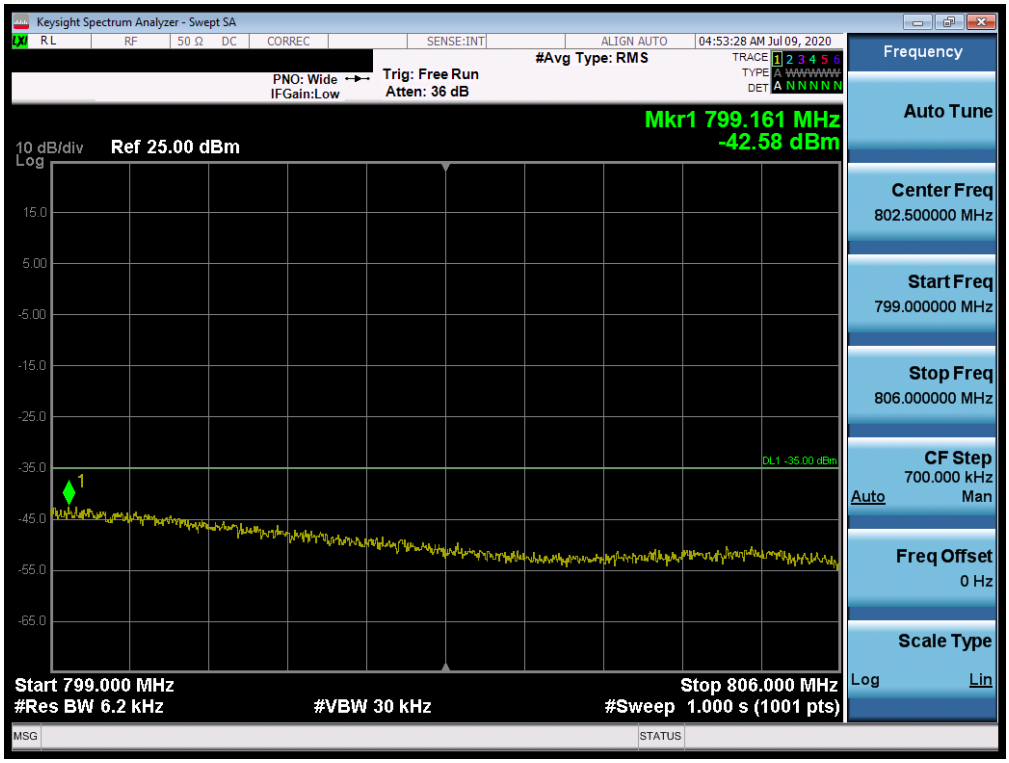
Plot 7-57. Lower Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



Plot 7-58. Lower Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



Plot 7-59. Upper Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



Plot 7-60. Upper Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

7.5 Conducted Power Output Data

§2.1046 §90.635

Frequency [MHz]	Channel	Battery Type	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
817.90	476	Standard	25.06	0.321	50.00	-24.94
823.10	684	Standard	25.10	0.324	50.00	-24.90

Table 7-2. CDMA BC10 Conducted Power Output Data

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
15 MHz	QPSK	26765	821.5	1 / 37	24.73	0.297	50.00	-25.27
	16-QAM	26765	821.5	1 / 37	23.75	0.237	50.00	-26.25
	64-QAM	26765	821.5	1 / 37	23.02	0.200	50.00	-26.98
	256-QAM	26765	821.5	1 / 37	20.10	0.102	50.00	-29.90
10 MHz	QPSK	26740	819.0	1 / 25	24.51	0.282	50.00	-25.49
	16-QAM	26740	819.0	1 / 25	24.16	0.261	50.00	-25.84
	64-QAM	26740	819.0	1 / 25	23.17	0.207	50.00	-26.83
	256-QAM	26740	819.0	1 / 25	19.85	0.097	50.00	-30.15
5 MHz	QPSK	26715	816.5	1 / 12	24.55	0.285	50.00	-25.45
		26765	821.5	1 / 12	24.48	0.281	50.00	-25.52
	16-QAM	26715	816.5	1 / 12	24.34	0.272	50.00	-25.66
		26765	821.5	1 / 12	24.08	0.256	50.00	-25.92
	64-QAM	26715	816.5	1 / 12	22.84	0.192	50.00	-27.16
		26765	821.5	1 / 12	22.80	0.191	50.00	-27.20
	256-QAM	26715	816.5	1 / 12	20.19	0.104	50.00	-29.81
		26765	821.5	1 / 12	20.01	0.100	50.00	-29.99
3 MHz	QPSK	26705	815.5	1 / 7	24.42	0.277	50.00	-25.58
		26775	822.5	1 / 7	24.42	0.277	50.00	-25.58
	16-QAM	26705	815.5	1 / 7	24.07	0.255	50.00	-25.93
		26775	822.5	1 / 7	24.11	0.258	50.00	-25.89
	64-QAM	26705	815.5	1 / 7	22.99	0.199	50.00	-27.01
		26775	822.5	1 / 7	23.07	0.203	50.00	-26.93
	256-QAM	26705	815.5	1 / 7	19.84	0.096	50.00	-30.16
		26775	822.5	1 / 7	19.88	0.097	50.00	-30.12
1.4 MHz	QPSK	26697	814.7	1 / 2	24.31	0.270	50.00	-25.69
		26783	823.3	1 / 2	24.31	0.270	50.00	-25.69
	16-QAM	26697	814.7	1 / 2	24.04	0.254	50.00	-25.96
		26783	823.3	1 / 2	24.02	0.252	50.00	-25.98
	64-QAM	26697	814.7	1 / 2	22.88	0.194	50.00	-27.12
		26783	823.3	1 / 2	22.91	0.195	50.00	-27.09
	256-QAM	26697	814.7	1 / 2	19.85	0.097	50.00	-30.15
		26783	823.3	1 / 2	19.78	0.095	50.00	-30.22

Table 7-3. LTE Band 26 Conducted Power Output Data

NOTES:

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.

2. This unit was tested with its standard battery.

7.6 Radiated Power (ERP)

§22.913(a.2) §90.542(a)(7)

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. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

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

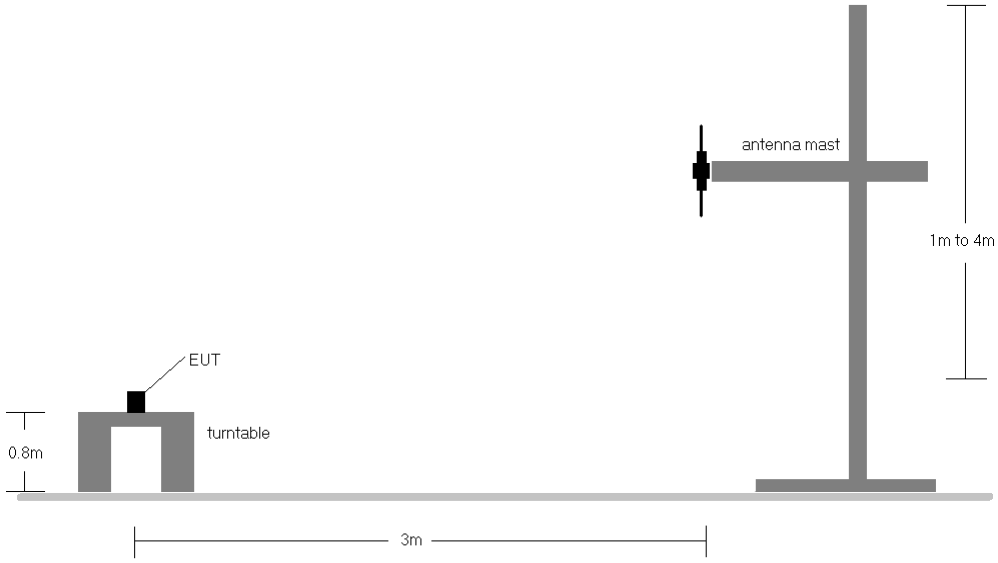


Figure 7-4. Radiated Test Setup <1GHz

Test Notes

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

2) This unit was tested with its standard battery.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
821.50	15	QPSK	V	181	51	1 / 37	14.03	6.32	**18.20**	**0.066**	38.45	-20.25
821.50	15	16-QAM	V	181	51	1 / 37	13.24	6.32	**17.41**	0.055	38.45	-21.04
821.50	15	64-QAM	V	181	51	1 / 37	12.31	6.32	**16.48**	0.044	38.45	-21.97
821.50	15	256-QAM	V	181	51	1 / 37	9.55	6.32	**13.72**	**0.024**	38.45	-24.73
821.50	15 (WCP)	QPSK	V	133	229	1 / 37	10.29	6.32	14.46	0.028	38.45	-23.99

Table 7-4 ERP Data (Band 26)

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]
10 MHz	QPSK	793.0	V	163.0	147.0	5.91	1 / 0	15.00	18.76	0.075	38.45	-19.69
	16-QAM	793.0	V	163.0	147.0	5.91	1 / 0	14.08	17.84	0.061	38.45	-20.61
	64-QAM	793.0	V	163.0	147.0	5.91	1 / 0	13.17	16.93	0.049	38.45	-21.52
	256-QAM	793.0	V	163.0	147.0	5.91	1 / 0	11.45	15.21	0.033	38.45	-23.24
5 MHz	QPSK	790.5	V	163.0	147.0	5.89	1 / 0	14.49	18.23	0.066	38.45	-20.22
		793.0	V	163.0	147.0	5.91	1 / 0	14.86	18.62	0.073	38.45	-19.83
		795.5	V	163.0	147.0	5.94	1 / 0	14.74	18.53	0.071	38.45	-19.92
	16-QAM	790.5	V	163.0	147.0	5.89	1 / 0	13.88	17.62	0.058	38.45	-20.83
		793.0	V	163.0	147.0	5.91	1 / 0	14.12	17.88	0.061	38.45	-20.57
		795.5	V	163.0	147.0	5.94	1 / 0	14.12	17.91	0.062	38.45	-20.54
	64-QAM	790.5	V	163.0	147.0	5.89	1 / 0	12.68	16.42	0.044	38.45	-22.03
		793.0	V	163.0	147.0	5.91	1 / 0	13.08	16.84	0.048	38.45	-21.61
		795.5	V	163.0	147.0	5.94	1 / 0	13.09	16.88	0.049	38.45	-21.57
	256-QAM	790.5	V	163.0	147.0	5.89	1 / 0	11.26	15.00	0.032	38.45	-23.45
		793.0	V	163.0	147.0	5.91	1 / 0	11.35	15.11	0.032	38.45	-23.34
		795.5	V	163.0	147.0	5.94	1 / 0	11.32	15.11	0.032	38.45	-23.34
	QPSK	795.5	H	241.00	119.00	5.91	1 / 0	14.21	17.97	0.063	38.45	-20.48
	QPSK (WCP)	790.5	V	269.00	201.00	5.91	1 / 0	14.15	17.91	0.062	38.45	-20.54

Table 7-5. ERP Data (Band 14) – ANT 0

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]
10 MHz	QPSK	793.0	H	152.0	287.0	5.91	1 / 0	12.95	16.71	0.047	38.45	-21.74
	16-QAM	793.0	H	152.0	287.0	5.91	1 / 0	11.73	15.49	0.035	38.45	-22.96
	64-QAM	793.0	H	152.0	287.0	5.91	1 / 0	10.52	14.28	0.027	38.45	-24.17
	256-QAM	793.0	H	152.0	287.0	5.91	1 / 0	8.52	12.28	0.017	38.45	-26.17
5 MHz	QPSK	790.5	H	152.0	287.0	5.89	1 / 0	12.43	16.17	0.041	38.45	-22.28
		793.0	H	152.0	287.0	5.91	1 / 0	12.72	16.48	0.045	38.45	-21.97
		795.5	H	152.0	287.0	5.94	1 / 0	12.80	16.59	0.046	38.45	-21.86
	16-QAM	790.5	H	152.0	287.0	5.89	1 / 0	11.81	15.55	0.036	38.45	-22.90
		793.0	H	152.0	287.0	5.91	1 / 0	12.06	15.82	0.038	38.45	-22.63
		795.5	H	152.0	287.0	5.94	1 / 0	11.98	15.77	0.038	38.45	-22.68
	64-QAM	790.5	H	152.0	287.0	5.89	1 / 0	10.74	14.48	0.028	38.45	-23.97
		793.0	H	152.0	287.0	5.91	1 / 0	11.01	14.77	0.030	38.45	-23.68
		795.5	H	152.0	287.0	5.94	1 / 0	11.03	14.82	0.030	38.45	-23.63
	256-QAM	790.5	H	152.0	287.0	5.89	1 / 0	9.12	12.86	0.019	38.45	-25.59
		793.0	H	152.0	287.0	5.91	1 / 0	9.41	13.17	0.021	38.45	-25.28
		795.5	H	152.0	287.0	5.94	1 / 0	9.25	13.04	0.020	38.45	-25.41
	QPSK	795.5	V	241.00	119.00	5.91	1 / 0	12.15	15.91	0.039	38.45	-22.54
	QPSK (WCP)	790.5	V	269.00	201.00	5.91	1 / 0	12.01	15.77	0.038	38.45	-22.68

Table 7-6. ERP Data (Band 14) – ANT 1

7.7 Radiated Spurious Emissions Measurements

§2.1053 §90(S).691(a) §90(R).543(e)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 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.

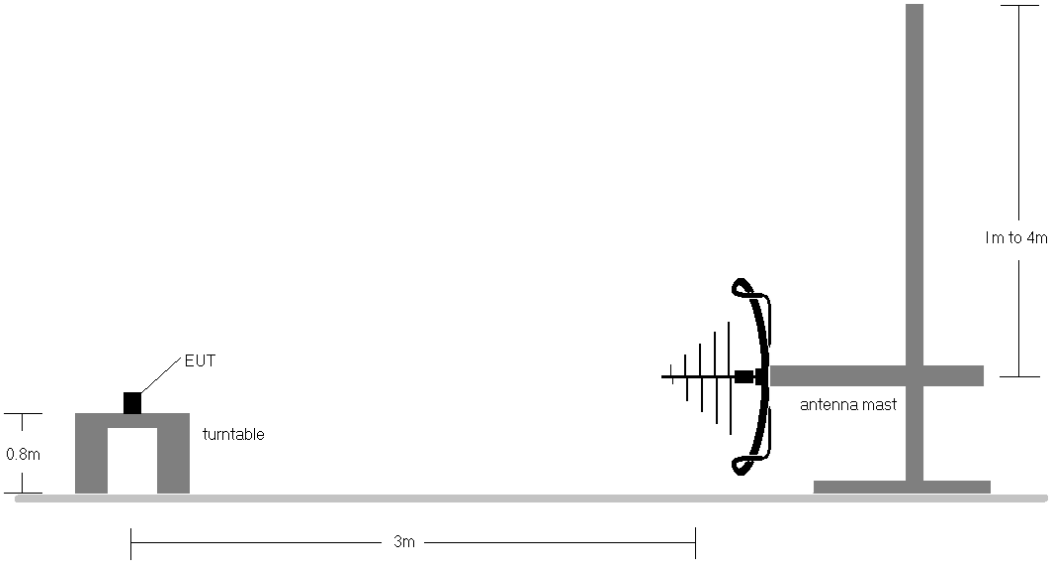


Figure 7-5. Test Instrument & Measurement Setup < 1GHz

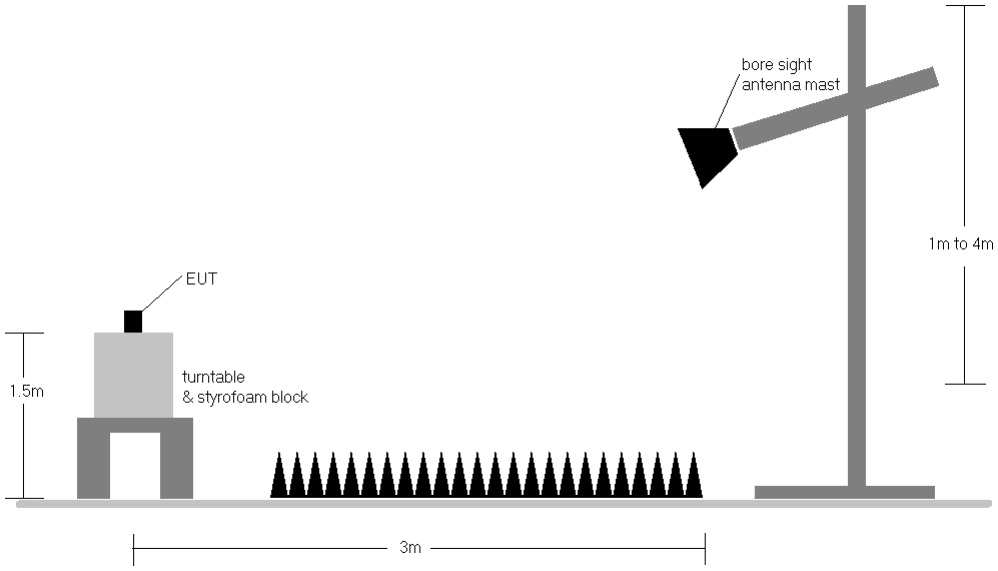


Figure 7-6. Test Instrument & Measurement Setup >1 GHz

Test Notes

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.

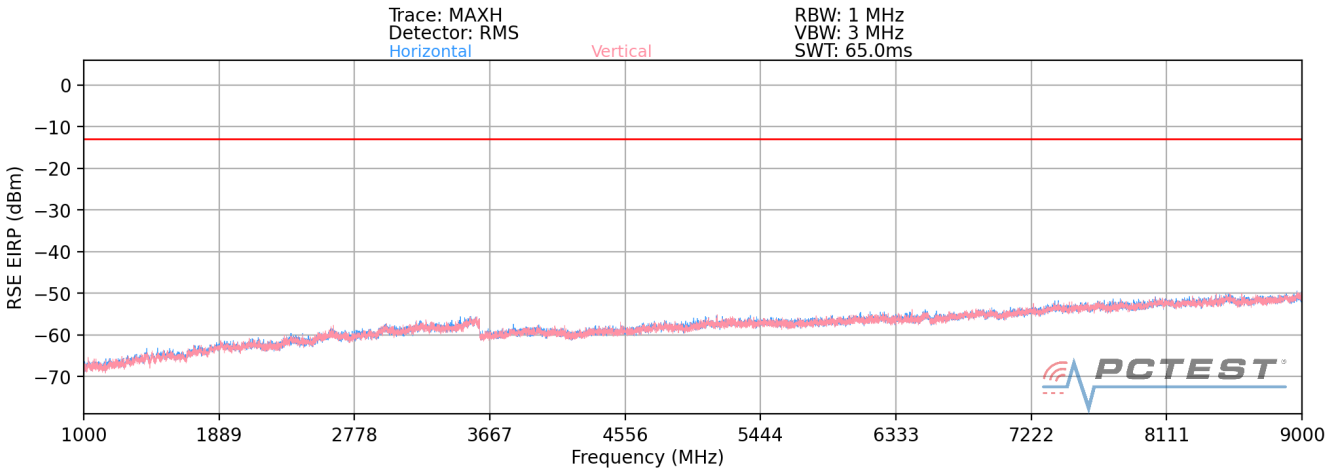
2. This unit was tested with its standard battery.

3. 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.

4. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

5. Per 90(R)(f), emissions in the 1559 – 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals. These emission measurements are shown in this section below.

CDMA BC10



Plot 7-61. Radiated Spurious Plot (CDMA BC10)

Frequency (MHz):	817.9
Modulation:	CDMA BC10

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]
1635.8	V	-	-	-70.42	-3.59	32.99	-62.27	-13.00	-49.27
2453.7	V	-	-	-71.66	-1.67	33.67	-61.58	-13.00	-48.58
3271.6	V	-	-	-70.44	2.03	38.59	-56.67	-13.00	-43.67

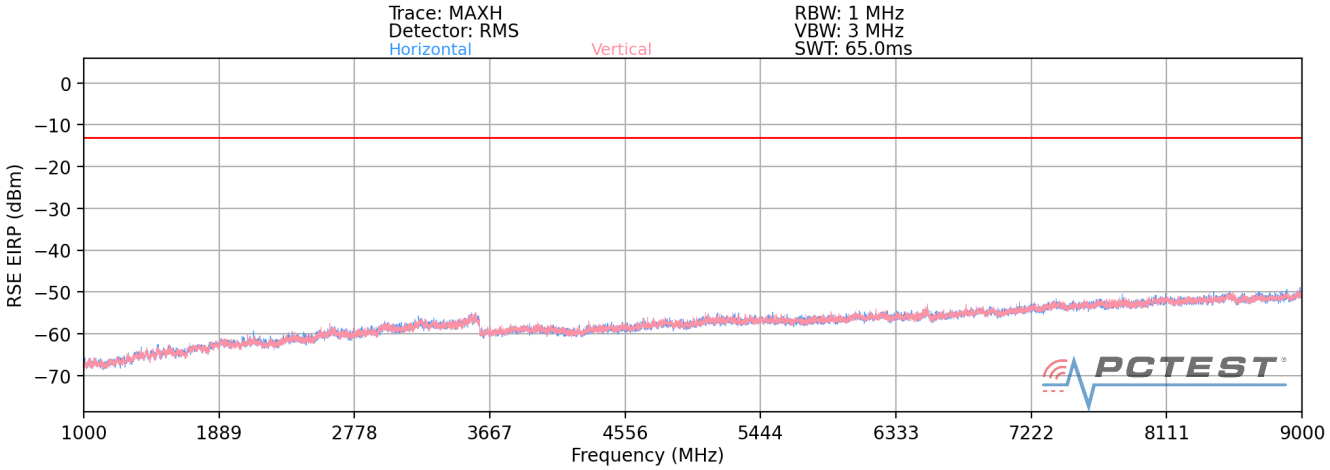
Table 7-7. CDMA BC10 Radiated Spurious Data (Ch. 476)

Frequency (MHz):	823.1
Modulation:	CDMA BC10

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]
1646.2	V	-	-	-70.55	-3.28	33.17	-62.09	-13.00	-49.09
2469.3	V	-	-	-70.89	-1.78	34.33	-60.93	-13.00	-47.93
3292.4	V	-	-	-70.21	2.32	39.11	-56.14	-13.00	-43.14

Table 7-8. CDMA BC10 Radiated Spurious Data (Ch. 684)

LTE Band 26



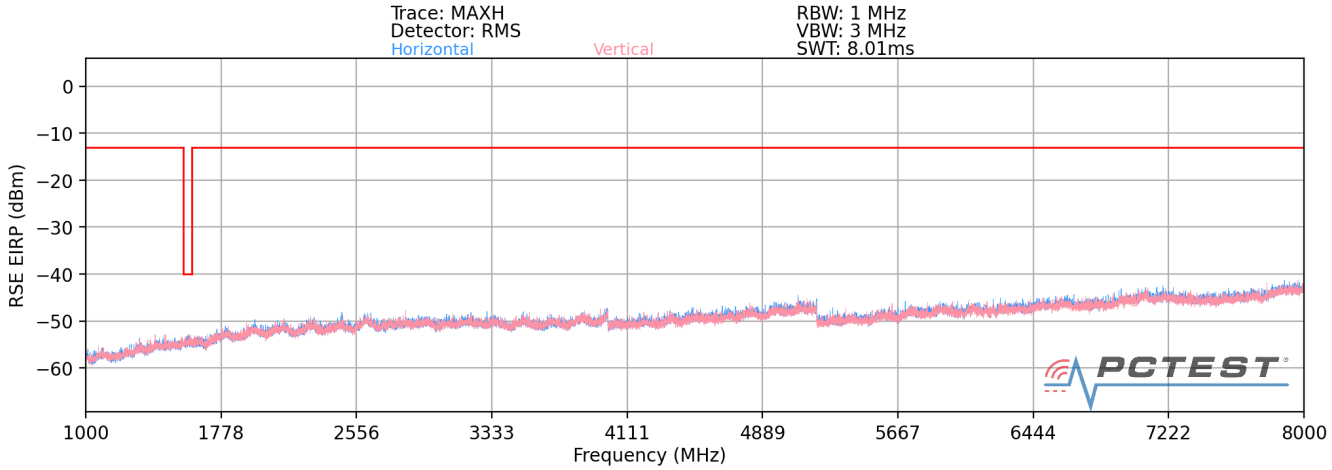
Plot 7-62. Radiated Spurious Plot (Band 26)

Bandwidth (MHz):	10
Frequency (MHz):	819.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 25

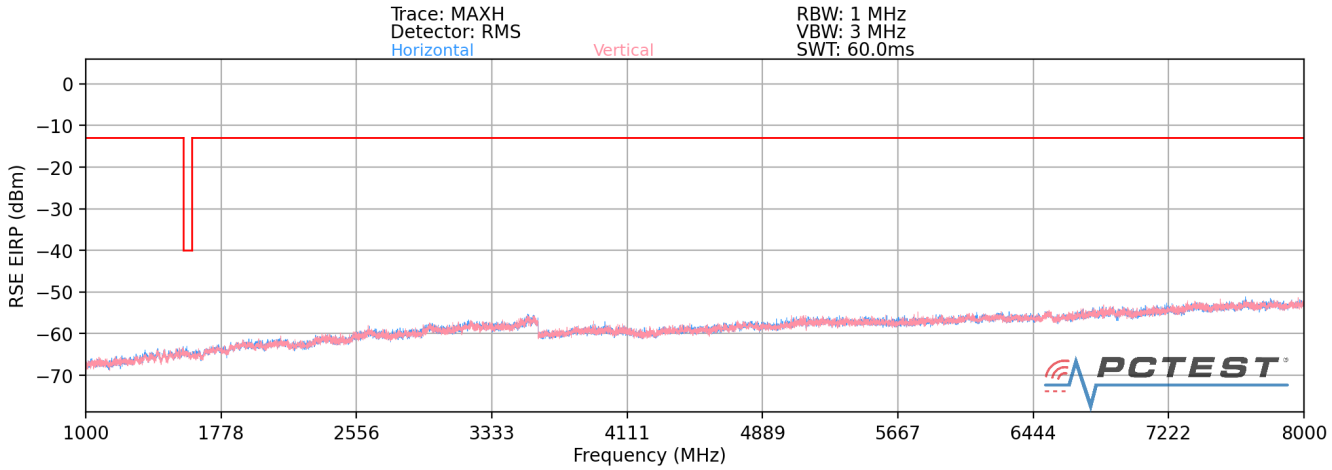
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1638.0	V	271	105	-68.70	-4.47	33.83	-61.43	-13.00	-48.43
2457.0	V	118	308	-65.67	-1.63	39.70	-55.56	-13.00	-42.56
3276.0	V	-	-	-69.50	3.87	41.37	-53.89	-13.00	-40.89
4095.0	V	-	-	-75.05	5.99	37.94	-57.32	-13.00	-44.32
4914.0	V	-	-	-76.25	5.28	36.03	-59.23	-13.00	-46.23

Table 7-9. Radiated Spurious Data (LTE Band 26)

LTE Band 14



Plot 7-63. Radiated Spurious Plot (Band 14) – ANT 0



Plot 7-64. Radiated Spurious Plot (Band 14) – ANT 1

Bandwidth (MHz):	5
Frequency (MHz):	790.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

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]
1581.0	V	302	134	-66.58	2.95	43.37	-51.89	-40.00	-11.89
2371.5	V	314	141	-67.64	5.59	44.95	-50.31	-13.00	-37.31
3162.0	V	-	-	-68.52	7.32	45.80	-49.46	-13.00	-36.46
3952.5	V	-	-	-69.34	8.20	45.86	-49.39	-13.00	-36.39

Table 7-10. Radiated Spurious Data (LTE Band 14 – Low Channel – ANT 0)

Bandwidth (MHz):	5
Frequency (MHz):	793.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

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]
1586.0	V	303	125	-66.05	3.03	43.98	-51.28	-40.00	-11.28
2379.0	V	-	-	-67.26	5.85	45.59	-49.67	-13.00	-36.67
3172.0	V	-	-	-68.57	7.40	45.83	-49.43	-13.00	-36.43
3965.0	V	-	-	-69.77	8.55	45.78	-49.48	-13.00	-36.48

Table 7-11. Radiated Spurious Data (LTE Band 14 – Mid Channel – ANT 0)

Bandwidth (MHz):	5
Frequency (MHz):	795.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

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]
1591.0	V	308	154	-65.59	3.09	44.50	-50.75	-40.00	-10.75
2386.5	V	321	152	-68.23	5.98	44.75	-50.51	-13.00	-37.51
3182.0	V	-	-	-68.77	7.52	45.75	-49.51	-13.00	-36.51
3977.5	V	-	-	-68.88	8.89	47.01	-48.24	-13.00	-35.24

Table 7-12. Radiated Spurious Data (LTE Band 14 – High Channel – ANT 0)

7.8 Frequency Stability / Temperature Variation

§2.1055 §90.213

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.

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

Frequency Stability / Temperature Variation

§2.1055, §90.213

Operating Frequency (Hz):	817,900,000
Ref. Voltage (VDC):	4.36
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	817,900,123	123	0.0000150
		- 20	817,899,963	-37	-0.0000045
		- 10	817,899,663	-337	-0.0000412
		0	817,900,215	215	0.0000263
		+ 10	817,900,329	329	0.0000402
		+ 20 (Ref)	817,900,008	8	0.0000010
		+ 30	817,899,782	-218	-0.0000267
		+ 40	817,899,683	-317	-0.0000388
		+ 50	817,900,053	53	0.0000065
Battery Endpoint	2.87	+ 20	817,900,066	66	0.0000081

Table 7-13. CDMA BC10 Frequency Stability Data

Frequency Stability / Temperature Variation

§2.1055, §90.213

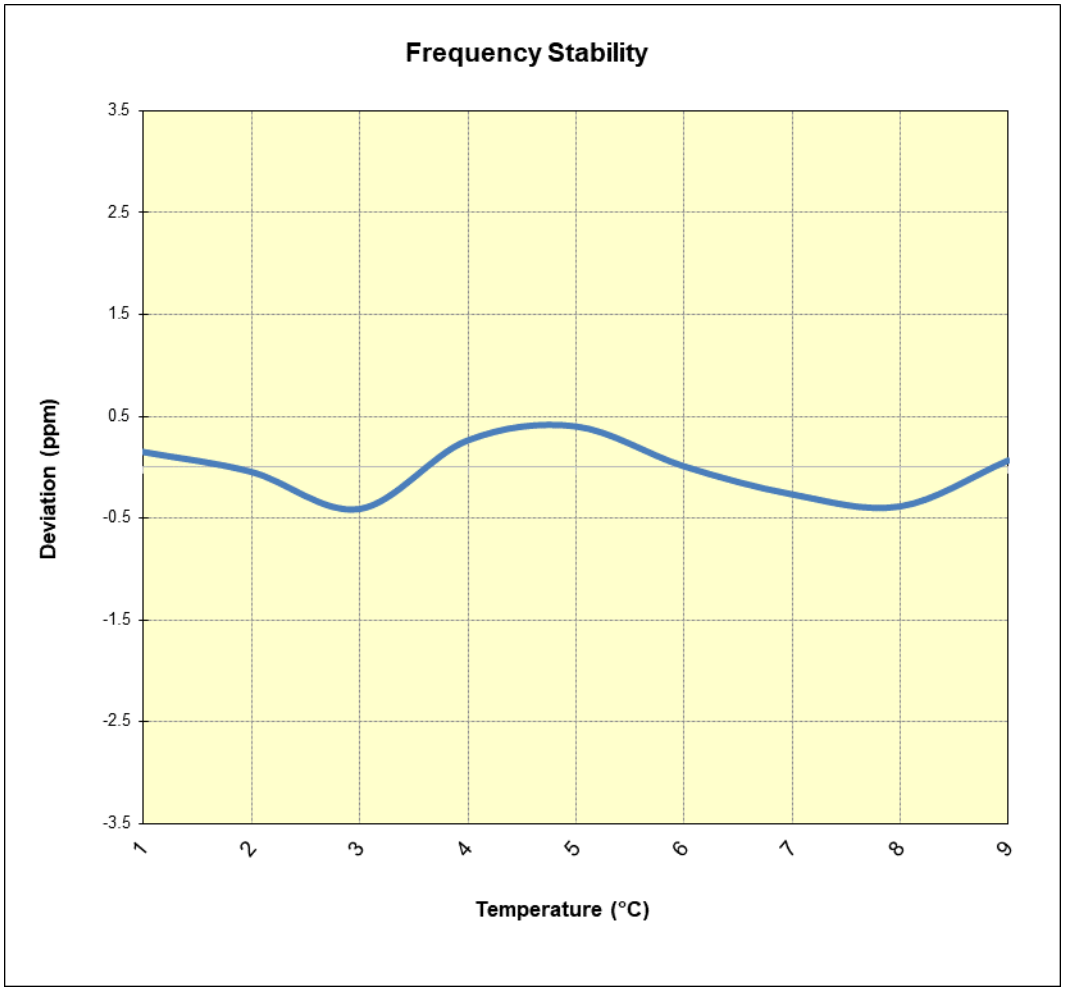


Figure 7-7. CDMA BC10 Frequency Stability Chart

Frequency Stability / Temperature Variation

§2.1055, §90.213

Operating Frequency (Hz):	819,000,000
Ref. Voltage (VDC):	4.36
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	819,000,205	205	0.0000250
		- 20	819,000,152	152	0.0000186
		- 10	818,999,635	-365	-0.0000446
		0	818,999,908	-92	-0.0000112
		+ 10	819,000,062	62	0.0000076
		+ 20 (Ref)	818,999,991	-9	-0.0000011
		+ 30	819,000,085	85	0.0000104
		+ 40	819,000,164	164	0.0000200
		+ 50	818,999,930	-70	-0.0000085
Battery Endpoint	2.87	+ 20	819,000,045	45	0.0000055

Table 7-14. LTE Band 26 Frequency Stability Data

Frequency Stability / Temperature Variation
§2.1055, §90.213

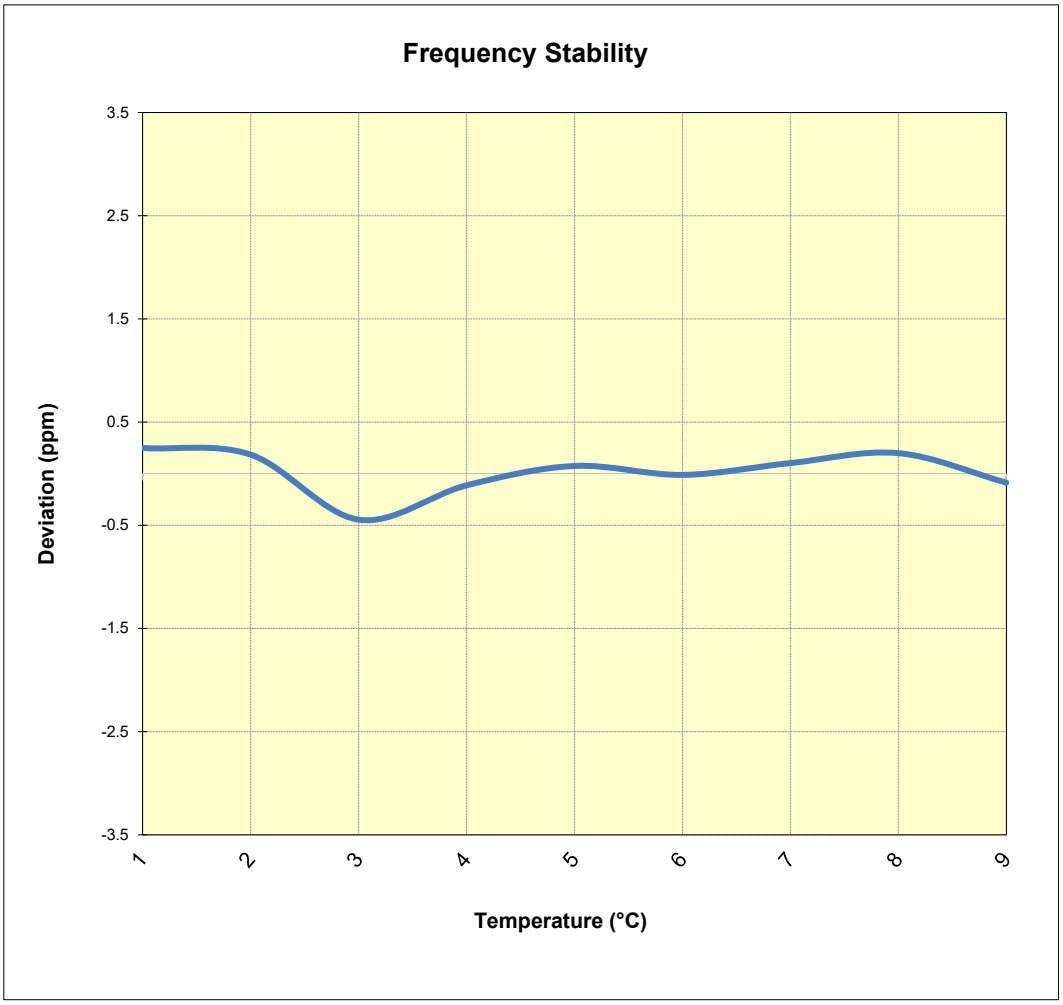


Table 7-15. LTE Band 26 Frequency Stability Chart

Frequency Stability / Temperature Variation

§2.1055, §90.213

Operating Frequency (Hz):	793,000,000
Ref. Voltage (VDC):	4.36

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	792,999,936	-64	-0.0000081
		- 20	792,999,697	-303	-0.0000382
		- 10	792,999,932	-68	-0.0000086
		0	793,000,074	74	0.0000093
		+ 10	792,999,834	-166	-0.0000209
		+ 20 (Ref)	792,999,813	-187	-0.0000236
		+ 30	793,000,033	33	0.0000042
		+ 40	793,000,166	166	0.0000209
		+ 50	792,999,802	-198	-0.0000250
Battery Endpoint	2.87	+ 20	793,000,048	48	0.0000061

Table 7-16. LTE Band 14 Frequency Stability Data

Frequency Stability / Temperature Variation

§2.1055, §90.213

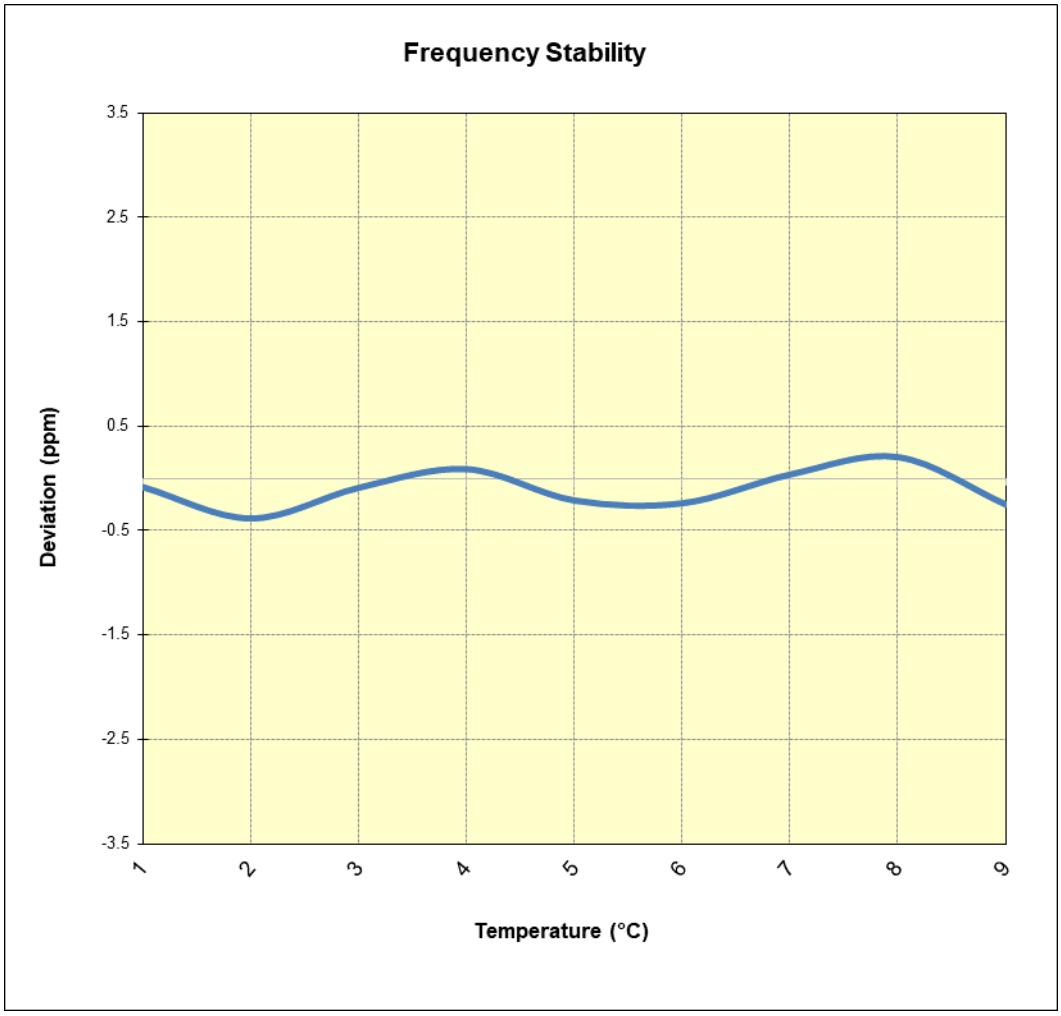


Table 7-17. LTE Band 14 Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF916U** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.