MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313
33439 WESTERN AVENUE • UNION CITY, CALIFORNIA 94587 • PHONE (510) 489-6300 • FAX (510) 489-6372
3162 BELICK STREET • SANTA CLARA, CA 95054 • PHONE (408) 748-3585 • FAX (510) 489-6372
13501 MCCALLEN PASS • AUSTIN, TEXAS 78753 • PHONE (512) 287-2500 • FAX (512) 287-2513

September 14, 2016

CommScope
250 Apollo Drive
Chelmsford, MA 01824

Dear Kevin Craig,

Enclosed is the EMC Wireless test report for compliance testing of the CommScope, Small Cell/ Model S1000C as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 22 Subpart H for Cellular Devices and FCC Part 24 Subpart E for Broadband PCS Devices.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\CommScope\EMC88789-FCC22_24 Rev. 1)

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Electromagnetic Compatibility Criteria
Test Report

for the

CommScope
Small Cell/ Model S1000C

Tested under
FCC Certification Rules
Title 47 of the CFR,
Part 22 Subpart H for Cellular Devices
&
Part 24 Subpart E for Broadband PCS Devices

MET Report: EMC88789-FCC22_24 Rev. 1

September 14, 2016

Prepared For:

CommScope
250 Apollo Drive
Chelmsford, MA 01824

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave
Baltimore, MD 21230

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&
Part 24 Subpart E for Broadband PCS Devices

Djed Mouada
Project Engineer, Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 22 Subpart H and Part 24 Subpart E of the FCC Rules under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 9, 2016	Initial Issue.
1	September 14, 2016	Engineer corrections.

Table of Contents

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the CommScope Small Cell/ Model S1000C, with the requirements of Part 22 Subpart H and Part 24 Subpart E. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Small Cell/ Model S1000C. CommScope should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Small Cell/ Model S1000C, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 22 Subpart H and Part 24 Subpart E, in accordance with CommScope, purchase order number 60210.

FCC Reference	Description	Compliance
§2.1049; §22.917; §24.232(d)	Occupied Bandwidth	Compliant
§2.1049, §24.238	Frequency stability	Compliant
§24.323 (d)	Peak to Average Ration	Compliant
§2.1051; §22.917, §24.238	Conducted Spurious Emissions at Antenna Terminals and Band Edge	Compliant
§2.1046; §22.913; §24.232	RF Power Output (EIRP)	Compliant
§2.1053; §22.917, §24.238	Radiated Spurious Emissions from the Cabinet	Compliant

Table 1. Executive Summary of EMC ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by CommScope to perform testing on the Small Cell/ Model S1000C, under CommScope's purchase order number 60210.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the CommScope, Small Cell/ Model S1000C.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	Small Cell/ Model S1000C		
Model(s) Covered:	Small Cell/ Model S1000C		
Filing Status:	Original		
EUT Specifications:	Primary Power: 120VAC, 60Hz/12VDC		
	FCC ID: QHY-S1000C		
	Type of Modulations:	CDMA	
	Equipment Code:	AMP	
	RF Power Output	Part 22 ERP: 1.18 (mW)	Part 24 EIRP: 7.27 (mW)
	EUT Frequency Ranges:	869-894 MHz	1930-1990 MHz
Analysis:	The results obtained relate only to the item(s) tested.		
Environmental Test Conditions:	Temperature: 15-35º C		
	Relative Humidity: 30-60%		
	Barometric Pressure: 860-1060 mbar		
Evaluated by:	Djed Mouada		
Date(s):	September 14, 2016		

B. References

CFR 47, Part 22, Subpart H	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 22: Rules and Regulations for Cellular Devices.
CFR 47, Part 24, Subpart E	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 24: Rules and Regulations for Personal Communications Services
RSS-132 Issue 3 January 2013	Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz
RSS-133 Issue 6 January 2013	2 GHz Personal Communications Services
RSS-GEN Issue 4 November 2014	General Requirements for Compliance of Radio Apparatus
ANSI C63.4:20014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
EIA/TIA-603-A-2001	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

D. Description of Test Sample

The Multi-Protocol Base Transceiver Station (Small Cell/ Model S1000C), Equipment Under Test (EUT), is a CDMA/LTE/Wi-Fi Low Power Femto Base Station. It is intended to be use in the Small to Medium Business's to provide indoor voice and data coverage.

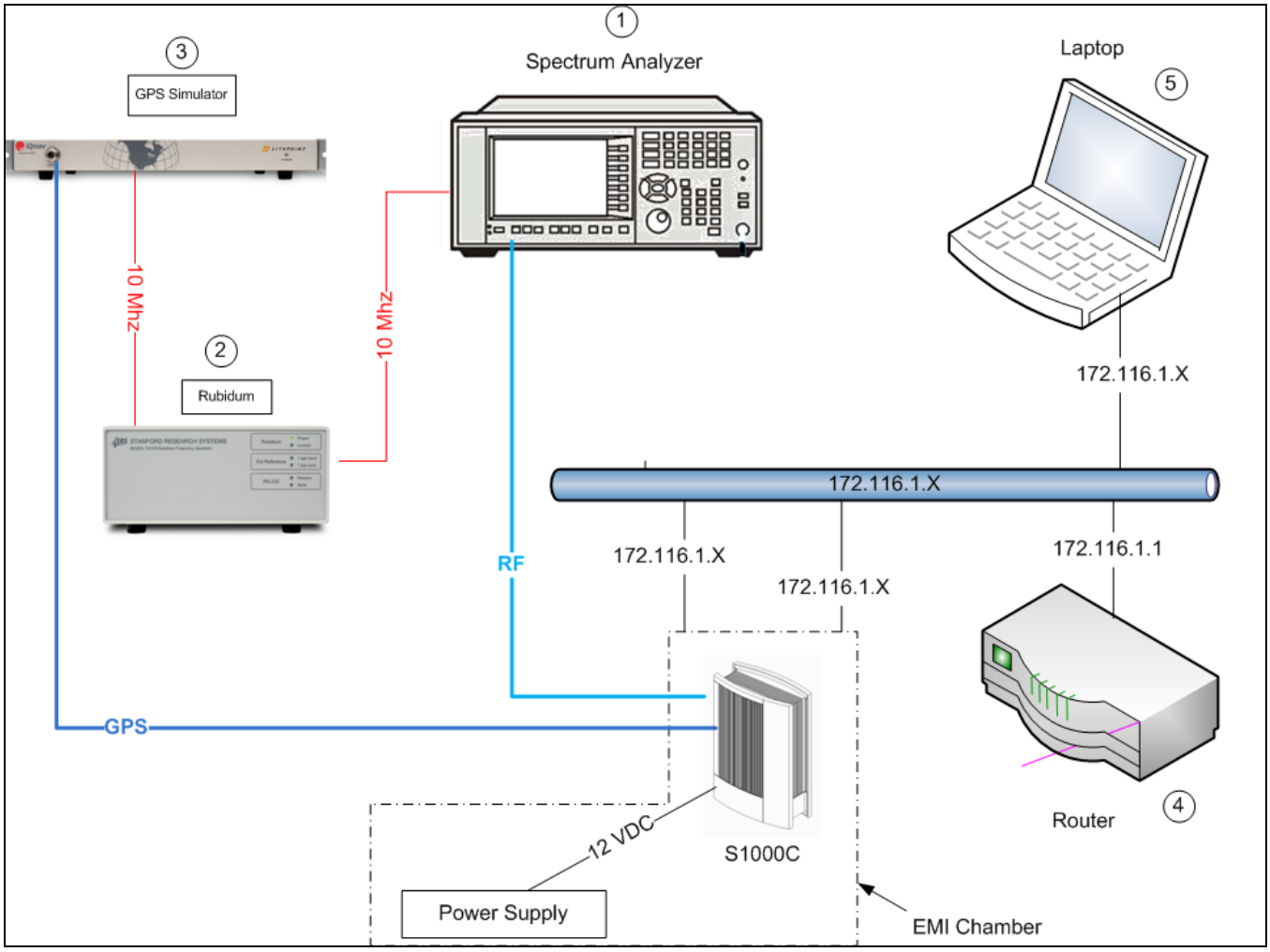


Figure 1. Block Diagram of Equipment Configuration

E. Equipment Configuration

Ref. ID	Name/Description	Model Number	Part Number	Serial Number
1	Femto Basestation	S1000C	800236	TBD
2	DYS Switching Mode Power Supply	DYS650-120400W-1	DYS650-120400-16419	TBD

Table 2. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
1	MXA Analyzer	Agilent	N9020A	10-14-2015
2	Rubidium	Stanford Research Systems	FS725	06-06-2016
3	GPS Simulator	LitePoint	IQNAV-6CH	not applicable
4	Wi-Fi Router	Linksys	EA2700	not applicable
5	Laptop	Dell	Latitude E6440	not applicable
6	USB Optical Mouse	Dell		not applicable
7	AC Adapter for Laptop	Dell		not applicable
8	Cat5 cables			not applicable
9	RF Test cables	Murata	MXHS83QE3000	not applicable
10	RF Terminators	Molex	0733910680	not applicable

Table 3. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description or Reason for No Cable	Qty.	Max Length	Shielded? (Y/N)	Termination Box ID & Port Name
1	Power	Part of AC Adapter	1	1.8	N	--
2	WAN - NSC	Cat5 Cable (8)	1	10	N	--
3	Console - CDMA	Cat5 Cable (8)	1	10	N	--
4	CDMA - RF – Beacon-BC1 J18	RF Test Cable (9)	1	0.3	Y	--
5	CDMA - RF – Beacon-BC0/10 J21	RF Test Cable (9)	1	0.3	Y	--
6	CDMA – EVDO - BC1 J15	RF Test Cable (9)	1	0.3	Y	--
7	CDMA – 1X - BC1 J17	RF Test Cable (9)	1	0.3	Y	--
8	NSC - LTE –BAND41 TX1 J4437	RF Test Cable (9)	1	0.3	Y	--
9	NSC - LTE –BAND41 TX2 J4438	RF Test Cable (9)	1	0.3	Y	--
10	CDMA - Console	Serial Cable	1	--	--	--
11	NSC – Console J1323				--	--

Table 4. Ports and Cabling Information

H. Mode of Operation

The Femto Base station will be operating in 3 modes, CDMA, LTE and Wi-Fi.

CDMA - The service radios, voice and data, transmit in CDMA Band 1. The beacon radio transmits in subsets of Band 0 & 10. Test mode uses system software with security disabled. Transmitters shall be at max power of +13dBm.

LTE - The service radio transmits in Band 41 (TDD). Test mode uses the chipset suppliers test software TMU in order to be able to provide a continuous transmit stream for EMC testing. Transmitters shall be at max power of +20dBm.

Wi-Fi – The Wi-Fi radios, 2.4 & 5 MHz, will be tested uses the chipset suppliers test software ART. Transmitters shall be at max power of +17dBm.

A laptop using telnet sessions and test scripts will be used to control the radio for CDMA, LTE and Wi-Fi during EMC testing.

A laptop using a serial connection and test scripts will be used during CDMA Radio & Safety testing.

I. Method of Monitoring EUT Operation

All radios can be monitored by the software indicating the state of the radio links via CLI. Also the DC power consumed is an indicator of the state of the system.

J. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to CommScope upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1046 RF Power Output

Test Requirements: **§ 2.1046 Measurements required: RF power output:**

§ 2.1046 (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8).The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§ 2.1046 (b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

§ 2.1046 (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 22.913 Power and antenna height limits.

§ 22.913(a): The Effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

§ 24.232 Power and antenna height limits.

§ 24.232 (a): **(**1**)** Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

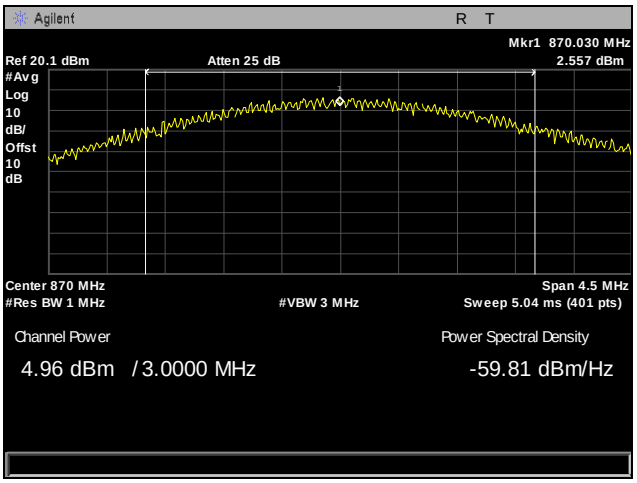
Test Procedures: As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. The spectrum analyzer was used in accordance with the licensed measurement guidance procedures. The "Channel Power" measurement feature of the spectrum analyzer was used. Measurements were taken in both high and low power modes, as permissible by compliance with Intermodulation requirements. Lower power mode must be used when operating in multi-channel mode.

Test Results: The EUT complies with the requirements of this section.

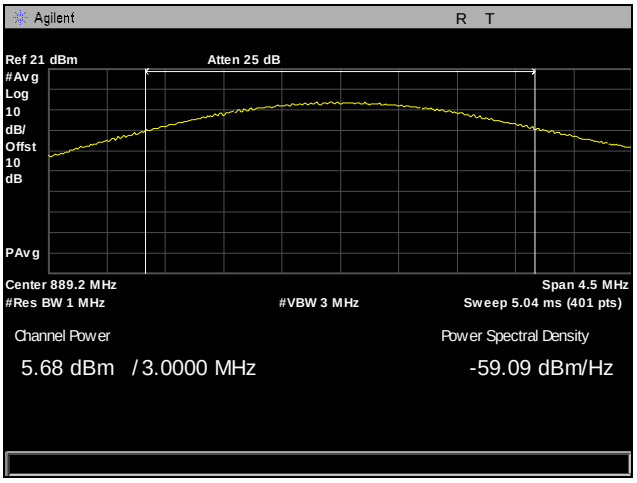
Test Engineer(s): Djed Mouada

Test Date(s): 07/27/16

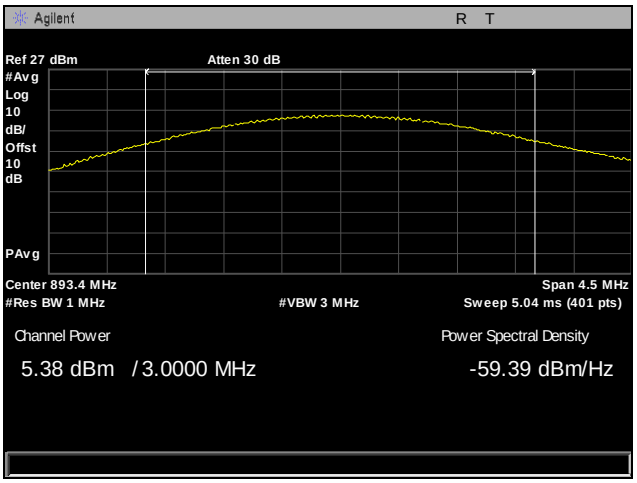
RF Power Output, Beacon Radio, BC0



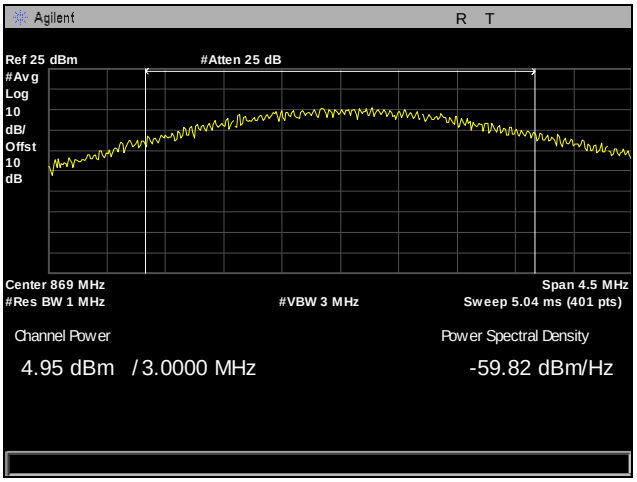
Plot 1. RF Output Power, Beacon Radio, BC0, Channel 1, Average



Plot 2. RF Output Power, Beacon Radio, BC0, Channel 640, Average

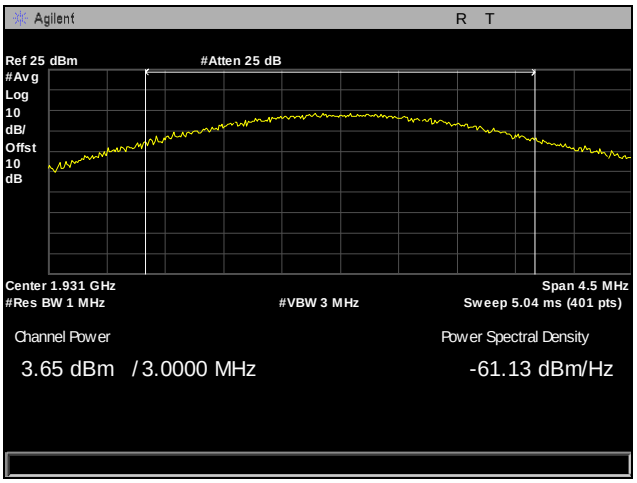


Plot 3. RF Output Power, Beacon Radio, BC0, Channel 779, Average

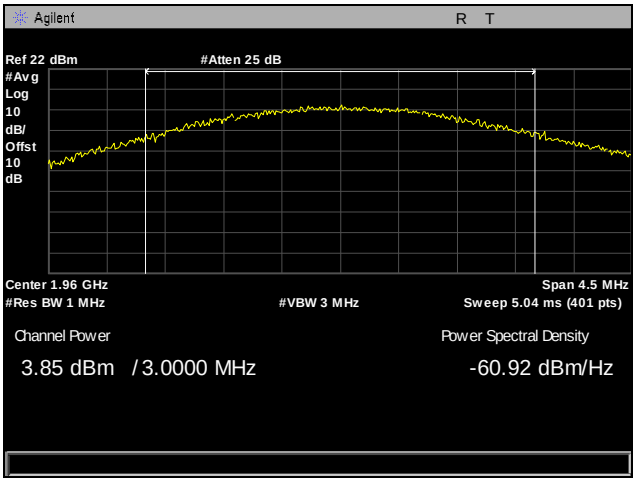


Plot 4. RF Output Power, Beacon Radio, BC0, Channel 991, Average

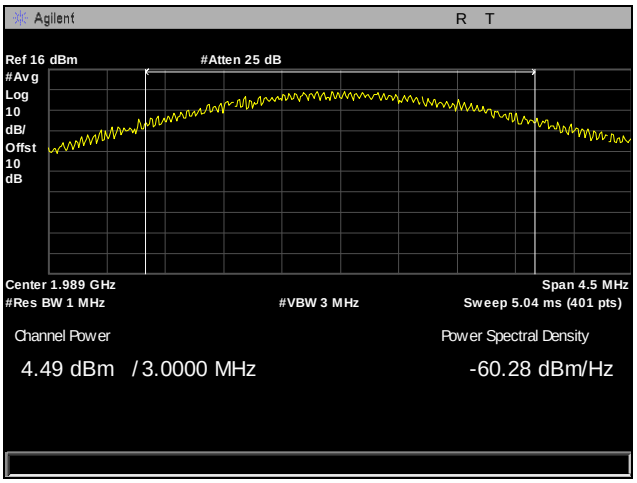
RF Power Output, Beacon Radio, BC1



Plot 5. RF Output Power, Beacon Radio, BC1, Channel 25, Average

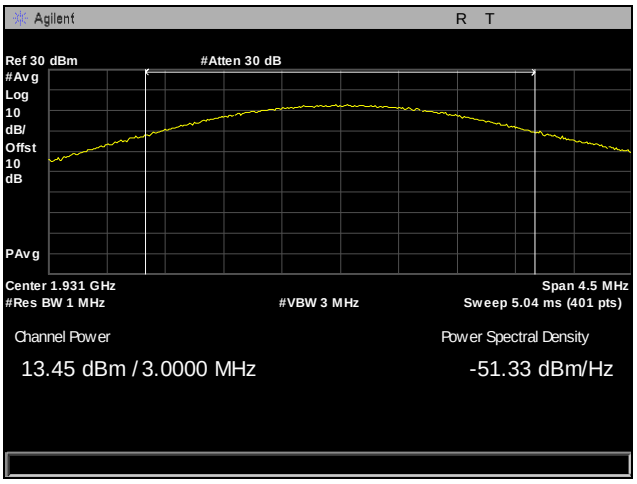


Plot 6. RF Output Power, Beacon Radio, BC1, Channel 600, Average

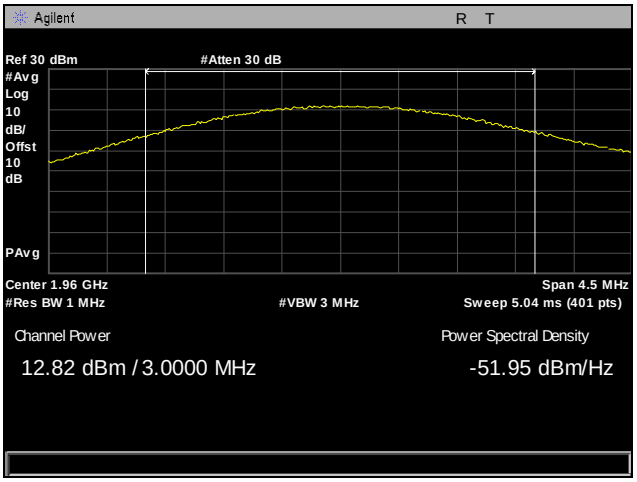


Plot 7. RF Output Power, Beacon Radio, BC1, Channel 1175, Average

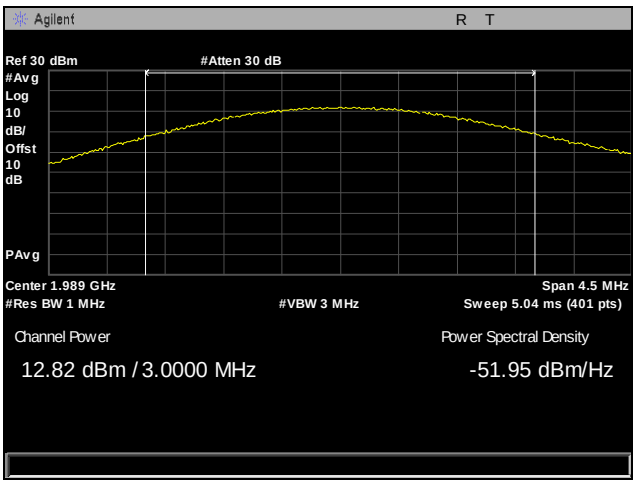
EVDO BC1



Plot 8. RF Output Power, EVDO Radio, BC1, Channel 25, Average

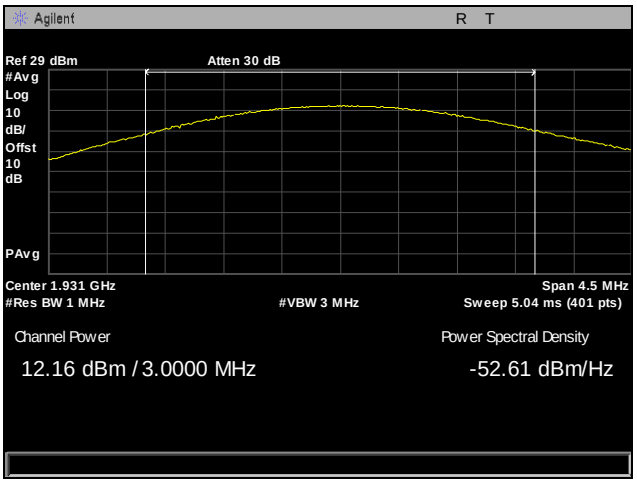


Plot 9. RF Output Power, EVDO Radio, BC1, Channel 600, Average

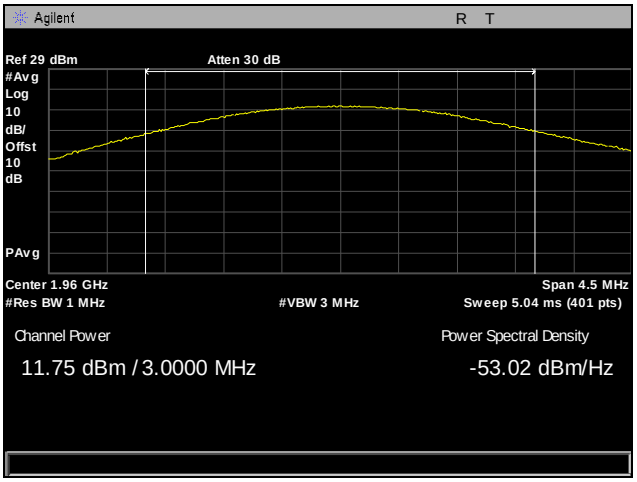


Plot 10. RF Output Power, EVDO Radio, BC1, Channel 1175, Average

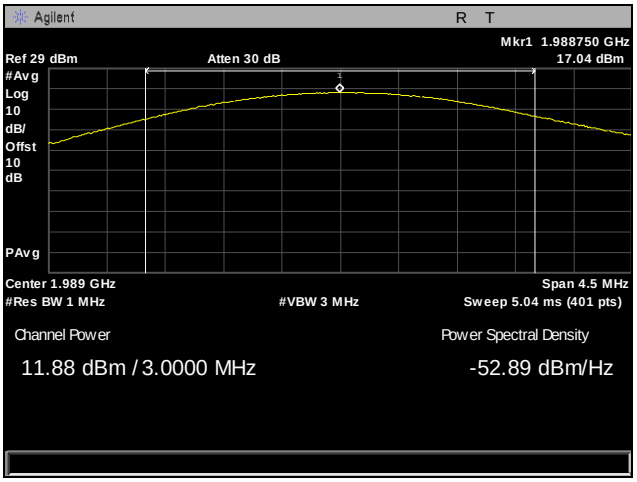
ONEX Radio



Plot 11. Plot RF Output Power, ONEx Radio, BC1, Channel 25, Average



Plot 12. Plot RF Output Power, ONEx Radio, BC1, Channel 600, Average



Plot 13. Plot RF Output Power, ONEx Radio, BC1, Channel 1175, Average

§ 2.1049 Occupied Bandwidth

Test Requirement(s): **§ 2.1049 Measurements required: Occupied bandwidth:** 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 under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made at the RF output terminals using a Spectrum Analyzer.

A laptop was connected to EUT to control the RF frequency channel. The EUT was connected to a Spectrum Analyzer via attenuator. The RBW of the Spectrum Analyzer was set in accordance with the licensed measurement guidance procedures. Measurements were carried out at the low, mid, and high channels of the TX band.

Test Results: Equipment complies with FCC requirements.

Test Engineer(s): Djed Mouada

Test Date(s): 07/26/16

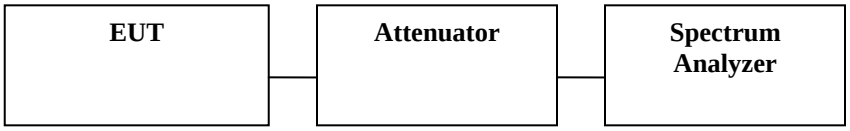
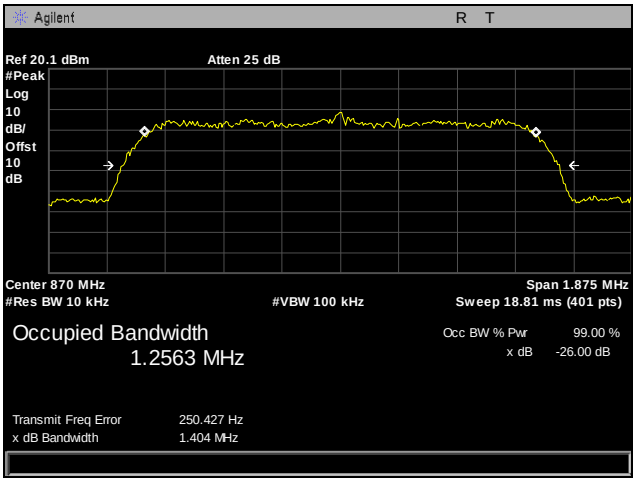
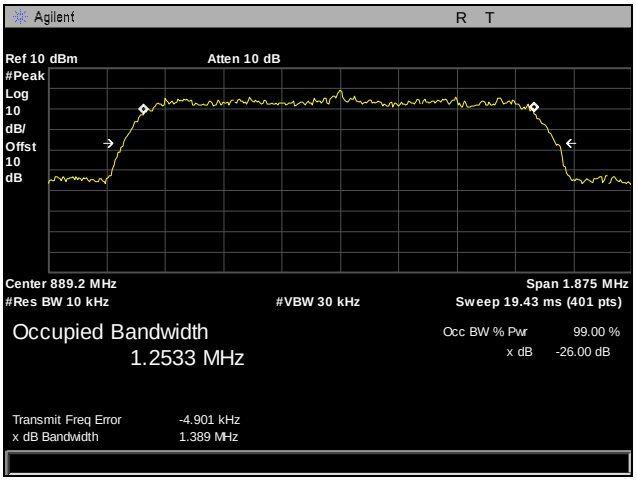


Figure 2. Occupied Bandwidth Test Setup

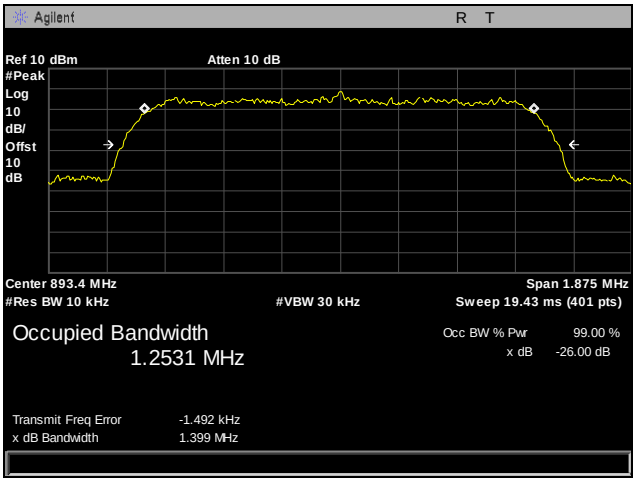
Occupied Bandwidth, Beacon Radio, BC0



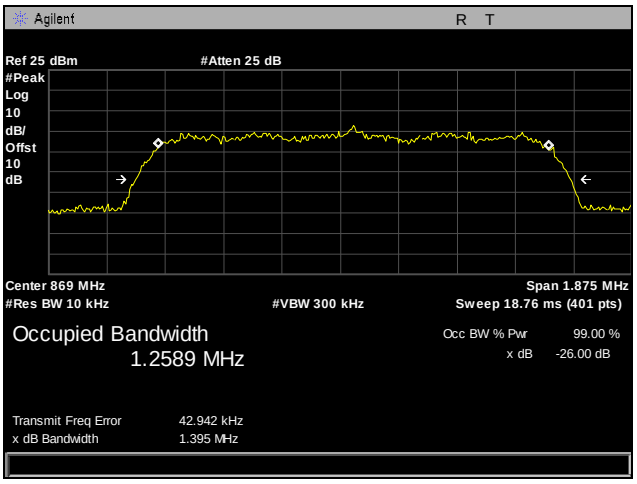
Plot 14. Occupied Bandwidth, Beacon Radio, BC0, Channel 1



Plot 15. Occupied Bandwidth, Beacon Radio, BC0, Channel 640

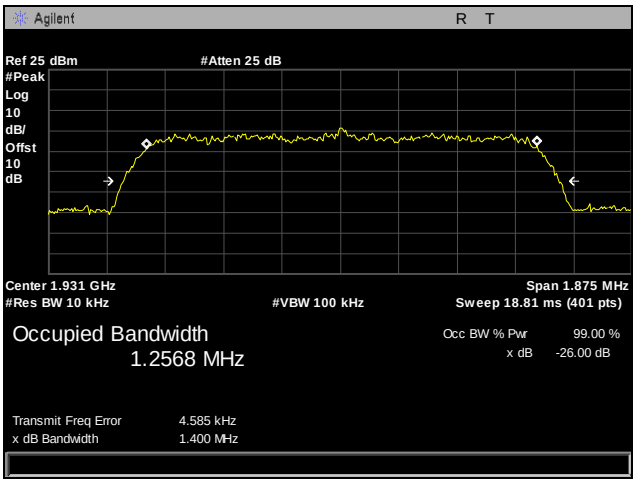


Plot 16. Occupied Bandwidth, Beacon Radio, BC0, Channel 779

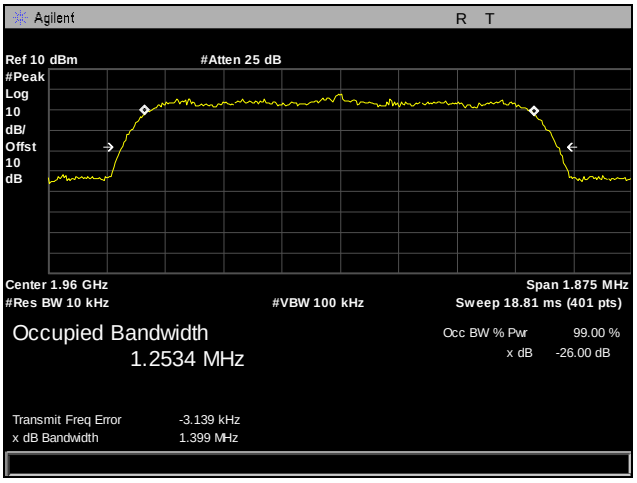


Plot 17. Occupied Bandwidth, Beacon Radio, BC0, Channel 991

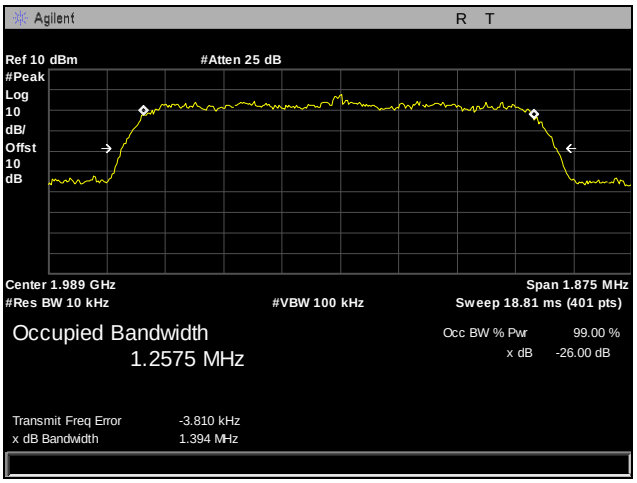
Occupied Bandwidth, Beacon Radio, BC1



Plot 18. Occupied Bandwidth, Beacon Radio, BC1, Channel 25

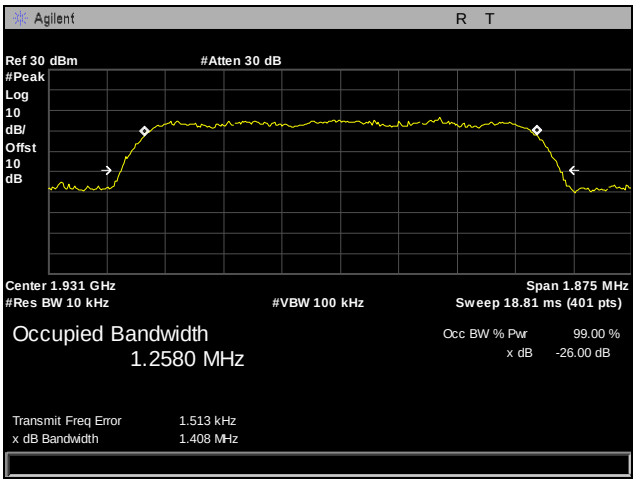


Plot 19. Occupied Bandwidth, Beacon Radio, BC1, Channel 600

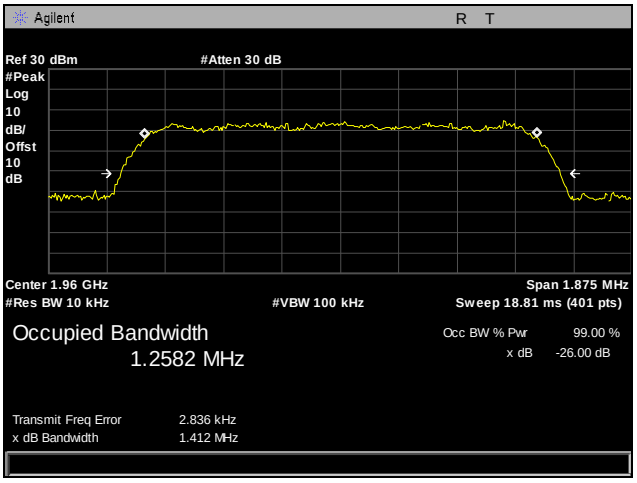


Plot 20. Occupied Bandwidth, Beacon Radio, BC1, Channel 1175

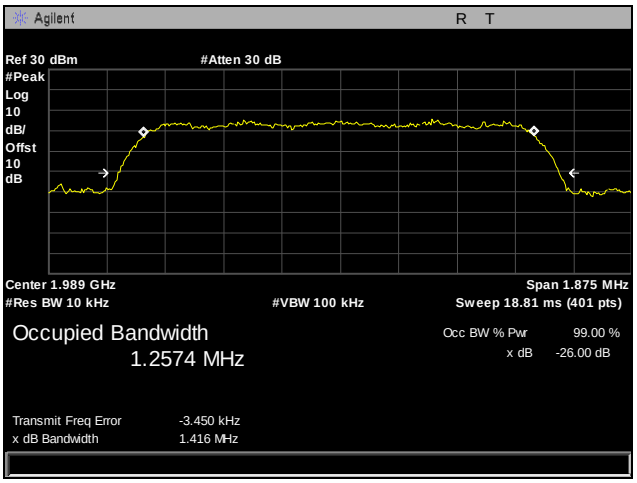
Occupied Bandwidth, EVDO Radio, BC1



Plot 21. Occupied Bandwidth, EVDO Radio, BC1, Channel 25

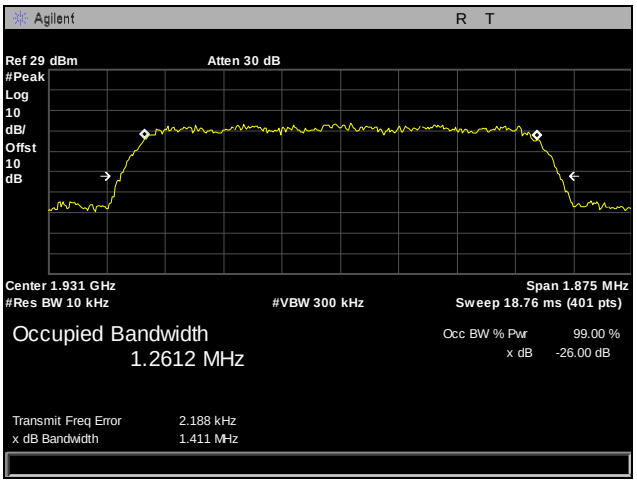


Plot 22. Occupied Bandwidth, EVDO Radio, BC1, Channel 600

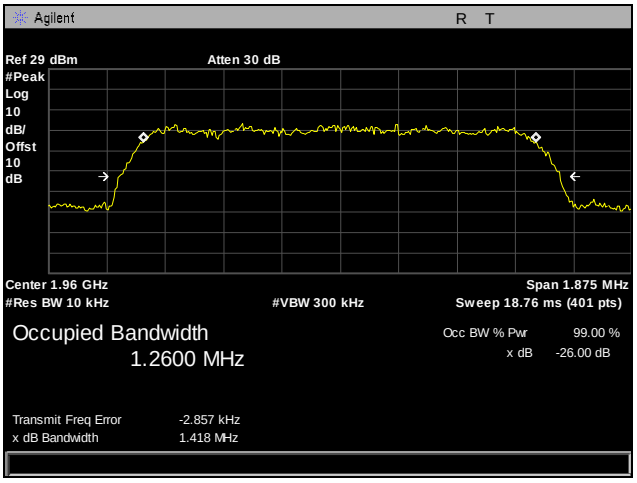


Plot 23. Occupied Bandwidth, EVDO Radio, BC1, Channel 1175

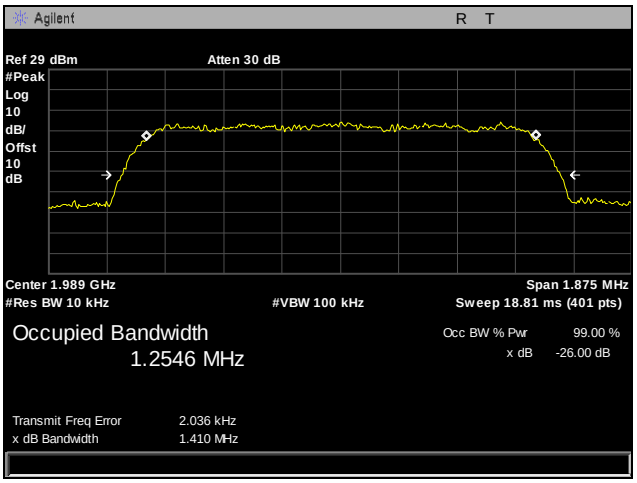
Occupied Bandwidth, OneX Radio, BC1



Plot 24. Occupied Bandwidth, OneX Radio, BC1, Channel 25



Plot 25. Occupied Bandwidth, OneX Radio, BC1, Channel 600



Plot 26. Occupied Bandwidth, OneX Radio, BC1, Channel 1175

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Radiated Spurious Emissions

Test Requirement(s): **§ 2.1053 Measurements required: Field strength of spurious radiation.**

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

§ 22.917 Emission limitations Cellular equipment: The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

§ 22.917 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P).

Test Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* was made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber. The EUT's RF ports were terminated to 50ohm load. The EUT was tested using both modulations and at the low, mid, and high channels. The EUT was rotated about 360^0 and the receiving antenna scanned from 1-4m in order to capture the maximum emission. The plots are corrected for cable loss, antenna correction factor, and distance correction. The field strength was mathematically corrected to an E.I.R.P. Harmonic emissions up to the 10^{th} or 40GHz, which ever was the lesser, were investigated.

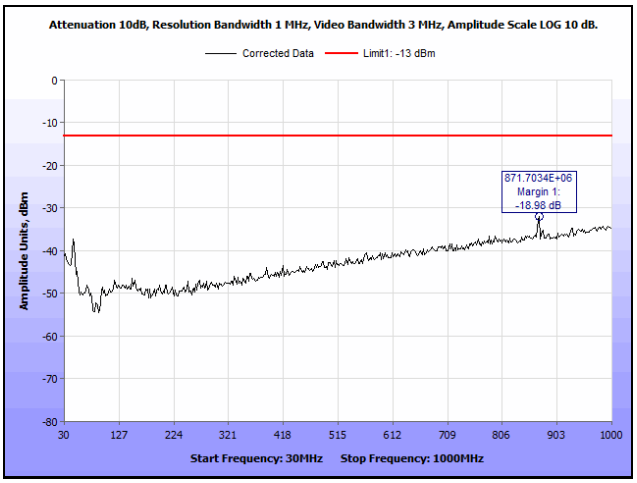
The spectrum analyzer was set to 1MHz RBW and 3MHz VBW. The spectrum was investigated from 30MHz to the 10^{th} harmonic of the carrier.

Test Results: The EUT complies with the requirements of this section.

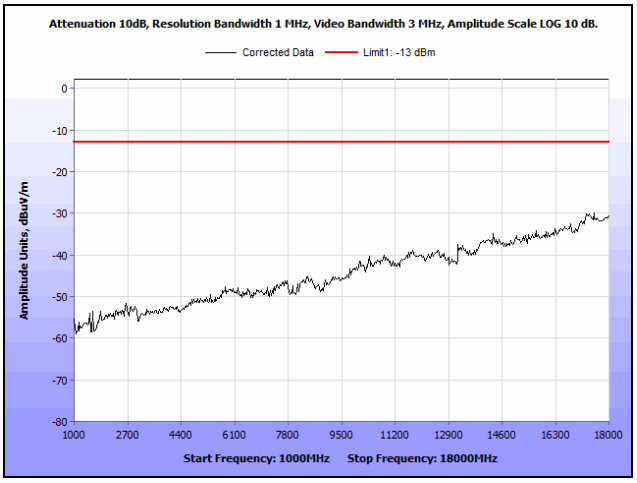
Test Engineer: Djed Mouada

Test Date(s): 07/26/16

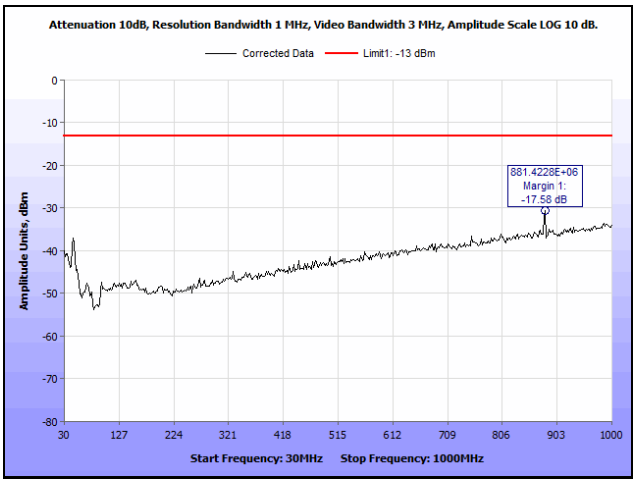
Radiated Spurious Emissions, Beacon Radio, BC0



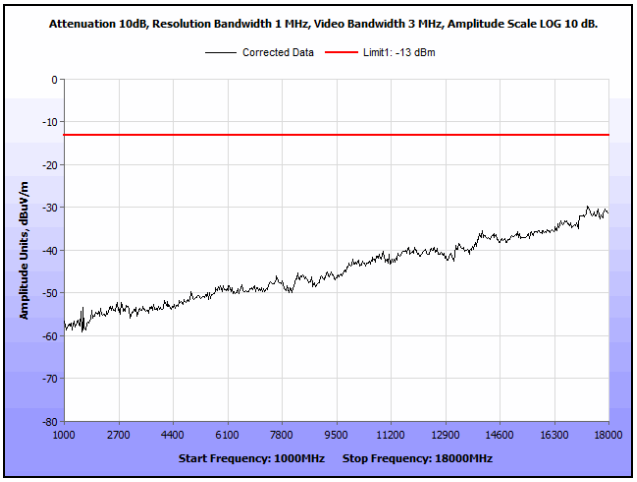
Plot 27. Radiated Spurious Emissions, Beacon Radio, BC0, Low Channel, 30 MHz – 1 GHz



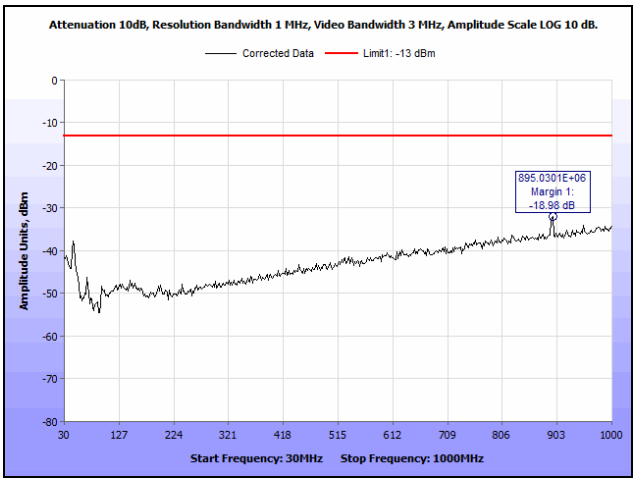
Plot 28. Radiated Spurious Emissions, Beacon Radio, BC0, Low Channel, 1 GHz – 18 GHz



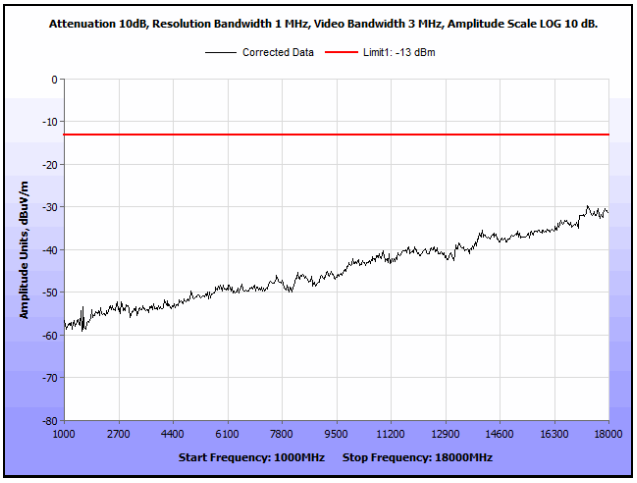
Plot 29. Radiated Spurious Emissions, Beacon Radio, BC0, Mid Channel, 30 MHz – 1 GHz



Plot 30. Radiated Spurious Emissions, Beacon Radio, BC0, Mid Channel, 1 GHz – 18 GHz

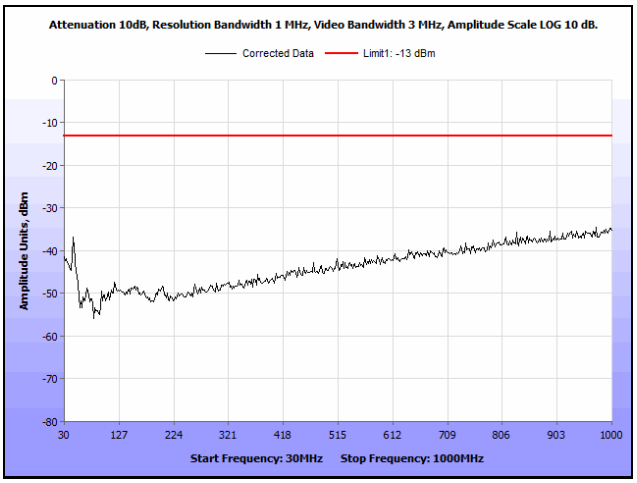


Plot 31. Radiated Spurious Emissions, Beacon Radio, BC0, High Channel, 30 MHz – 1 GHz

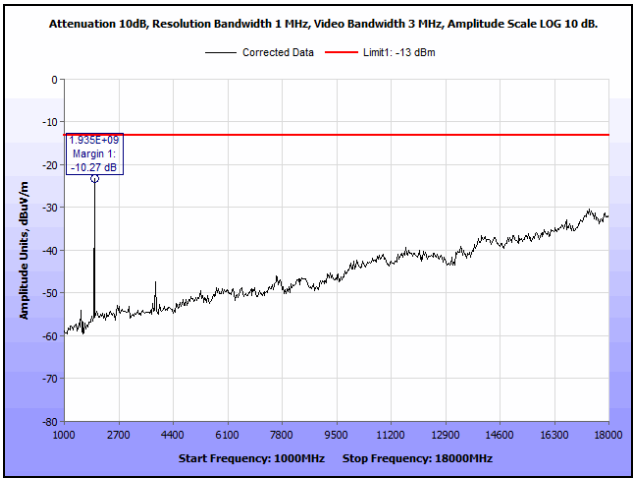


Plot 32. Radiated Spurious Emissions, Beacon Radio, BC0, High Channel, 1 GHz – 18 GHz

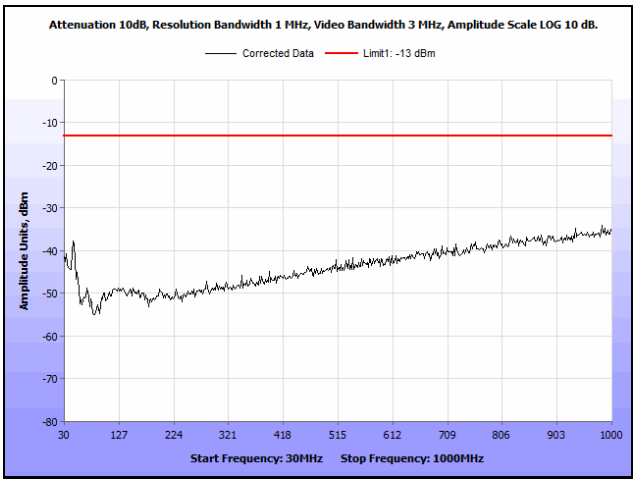
Radiated Spurious Emissions, Beacon Radio, BC1



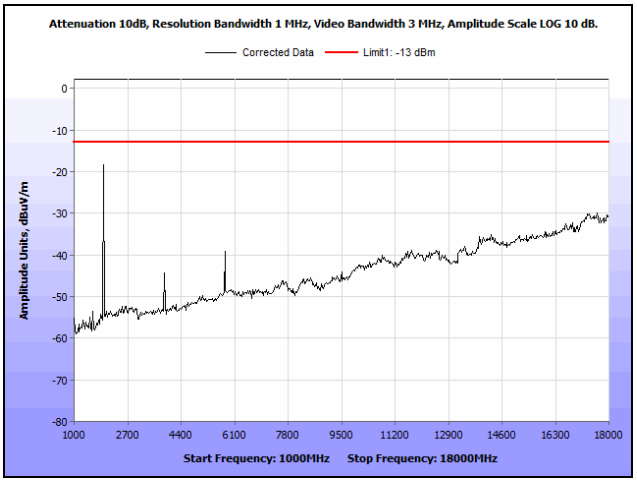
Plot 33. Radiated Spurious Emissions, Beacon Radio, BC1, Low Channel, 30 MHz – 1 GHz



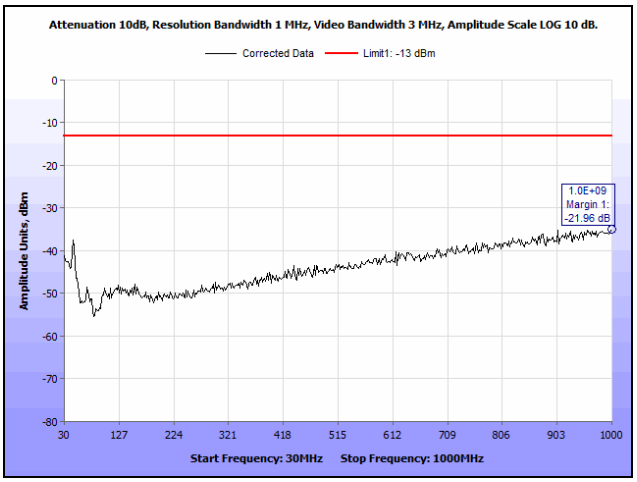
Plot 34. Radiated Spurious Emissions, Beacon Radio, BC1, Low Channel, 1 GHz – 18 GHz



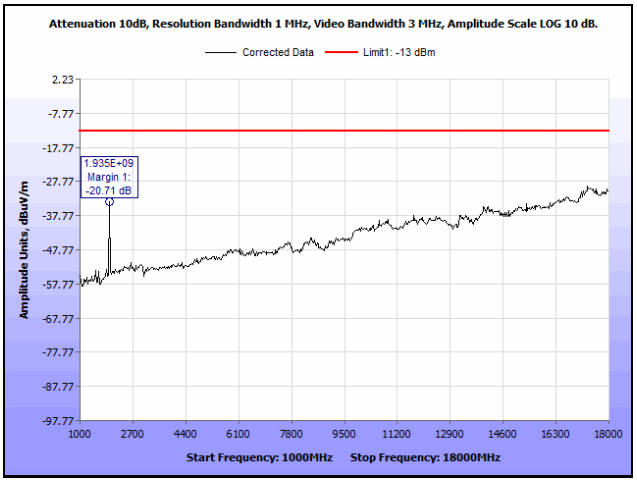
Plot 35. Radiated Spurious Emissions, Beacon Radio, BC1, Mid Channel, 30 MHz – 1 GHz



Plot 36. Radiated Spurious Emissions, Beacon Radio, BC1, Mid Channel, 1 GHz – 18 GHz

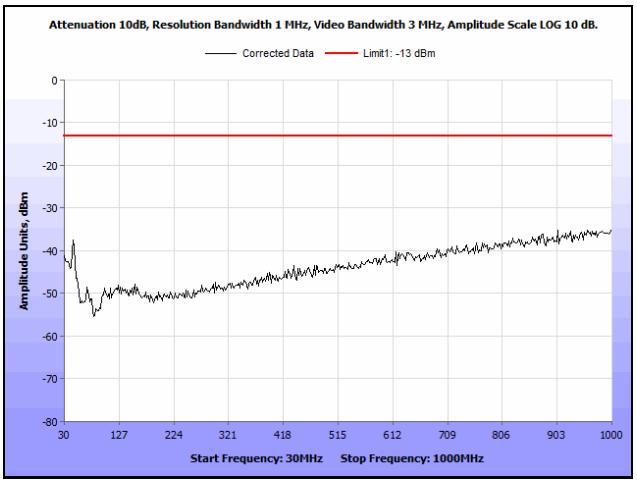


Plot 37. Radiated Spurious Emissions, Beacon Radio, BC1, High Channel, 30 MHz – 1 GHz

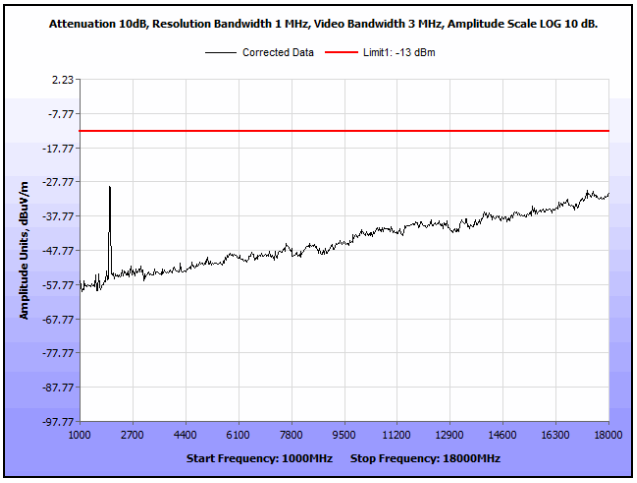


Plot 38. Radiated Spurious Emissions, Beacon Radio, BC1, High Channel, 1 GHz – 18 GHz

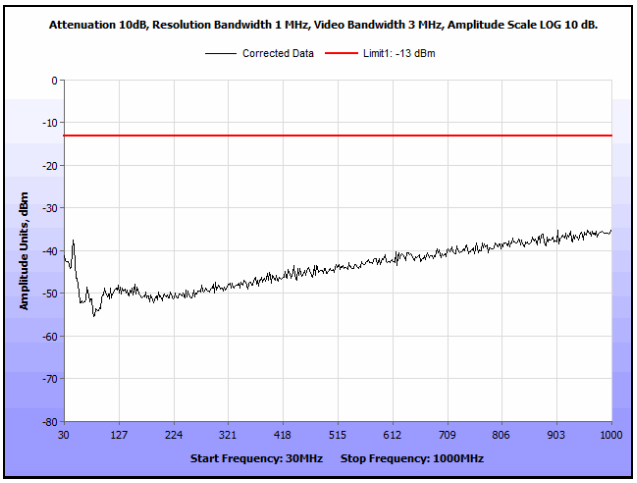
Radiated Spurious Emissions, EVDO Radio, BC1



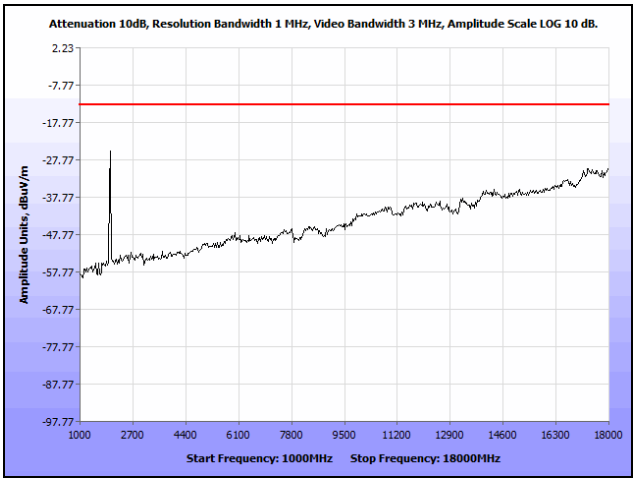
Plot 39. Radiated Spurious Emissions, EVDO Radio, BC1, Low Channel, 30 MHz – 1 GHz



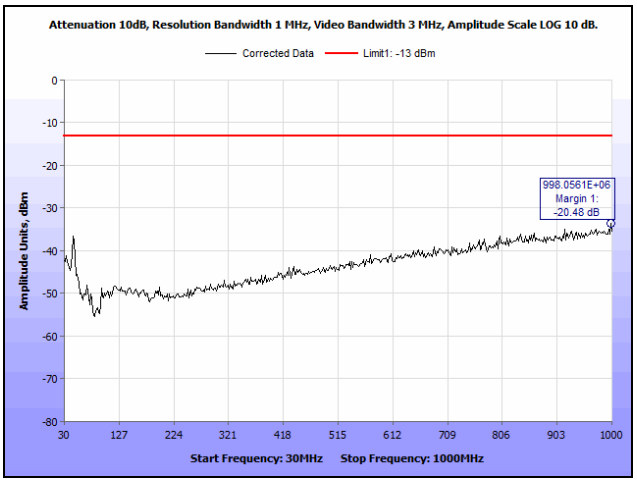
Plot 40. Radiated Spurious Emissions, EVDO Radio, BC1, Low Channel, 1 GHz – 18 GHz



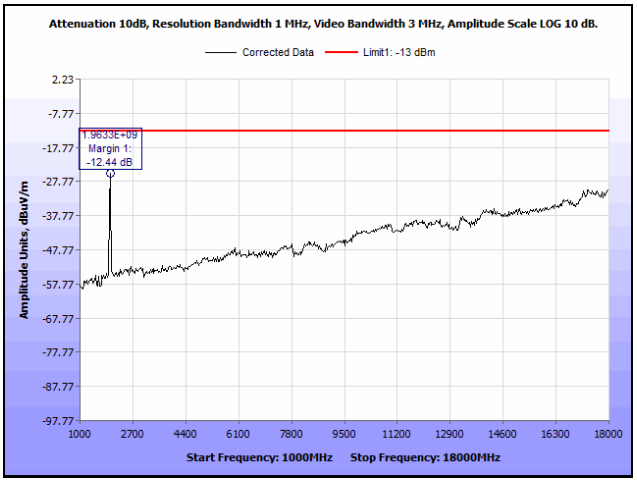
Plot 41. Radiated Spurious Emissions, EVDO Radio, BC1, Mid Channel, 30 MHz – 1 GHz



Plot 42. Radiated Spurious Emissions, EVDO Radio, BC1, Mid Channel, 1 GHz – 18 GHz

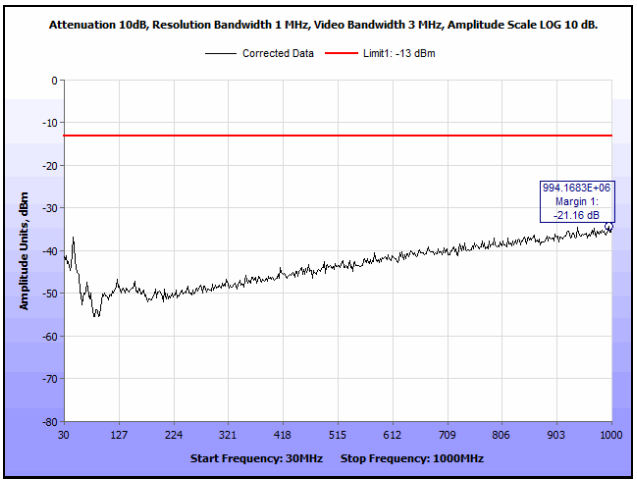


Plot 43. Radiated Spurious Emissions, EVDO Radio, BC1, High Channel, 30 MHz – 1 GHz

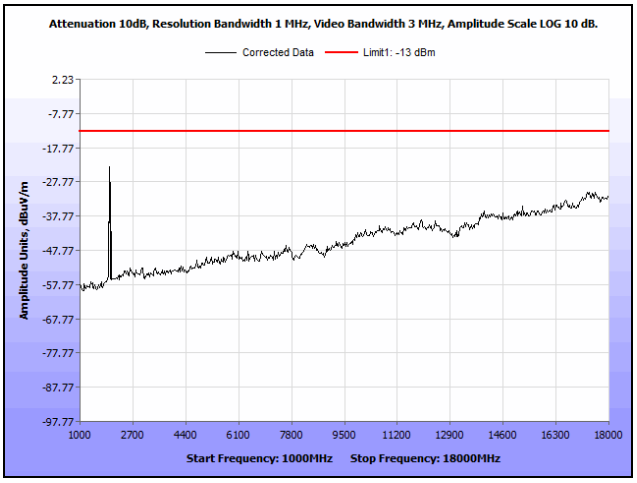


Plot 44. Radiated Spurious Emissions, EVDO Radio, BC1, High Channel, 1 GHz – 18 GHz

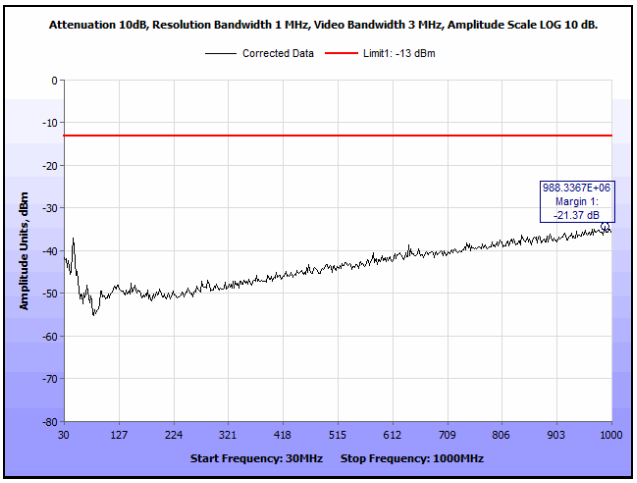
Radiated Spurious Emissions, OneX Radio, BC1



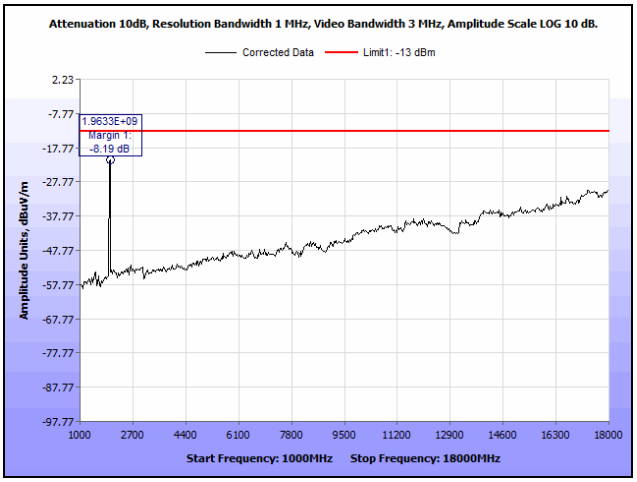
Plot 45. Radiated Spurious Emissions, OneX Radio, BC1, Low Channel, 30 MHz – 1 GHz



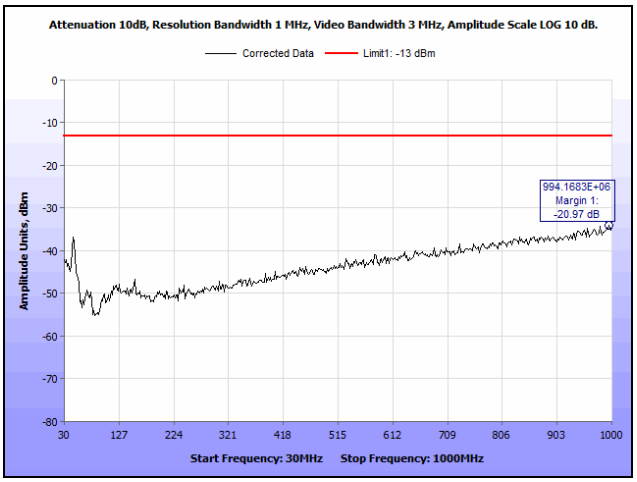
Plot 46. Radiated Spurious Emissions, OneX Radio, BC1, Low Channel, 1 GHz – 18 GHz



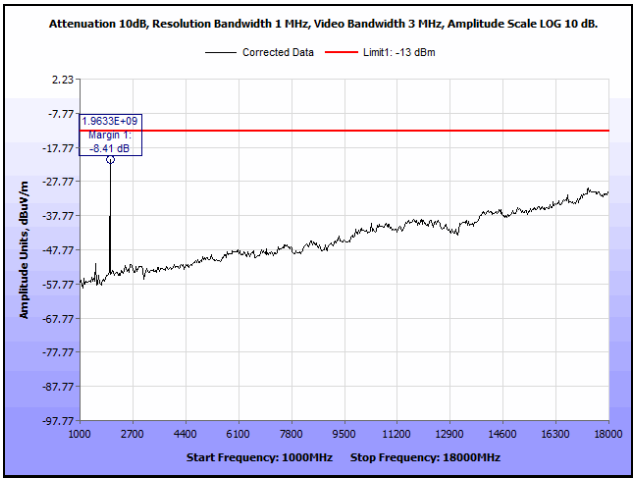
Plot 47. Radiated Spurious Emissions, OneX Radio, BC1, Mid Channel, 30 MHz – 1 GHz



Plot 48. Radiated Spurious Emissions, OneX Radio, BC1, Mid Channel, 1 GHz – 18 GHz



Plot 49. Radiated Spurious Emissions, OneX Radio, BC1, High Channel, 30 MHz – 1 GHz



Plot 50. Radiated Spurious Emissions, OneX Radio, BC1, High Channel, 1 GHz – 18 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1051 Spurious Emissions at Antenna Terminals

Test Requirement(s):

§ 2.1051 Measurements required: Spurious emissions at antenna terminals: The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 22.917 The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

§ 22.917 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

§ 22.917 (b) *Measurement procedure*. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy approved the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). 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 emissions are attenuated at least 26 dB below the transmitter power.

§24.238 Emission limitations for Broadband PCS equipment: The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

§ 24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

§ 24.238 (b) *Measurement procedure*. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). 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 emissions are attenuated at least 26 dB below the transmitter power.

Test Procedures: As required by 47 CFR §2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a Spectrum Analyzer.

A laptop was connected to EUT to control the RF power output and frequency channel. The EUT was connected to a Spectrum Analyzer through an attenuator. The Spectrum Analyzer was set to sweep 30 MHz and up to 10th harmonic of the fundamental or 40 GHz whichever is the lesser. Measurements were made in all applicable frequency bands.

Band Edge Plots: If a reduction of power was necessary for compliance at band edges, a second band edge plot was taken at the outermost channel that was compliant at the highest power. The channel number is noted in the caption of those plots.

Test Results: Equipment complies with these requirements.

Test Engineer(s): Djed Mouada

Test Date(s): 07/26/16

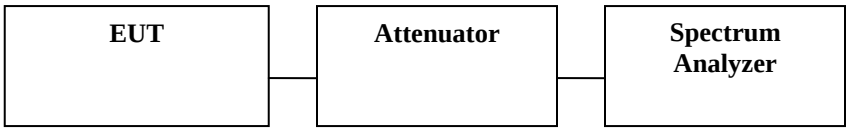
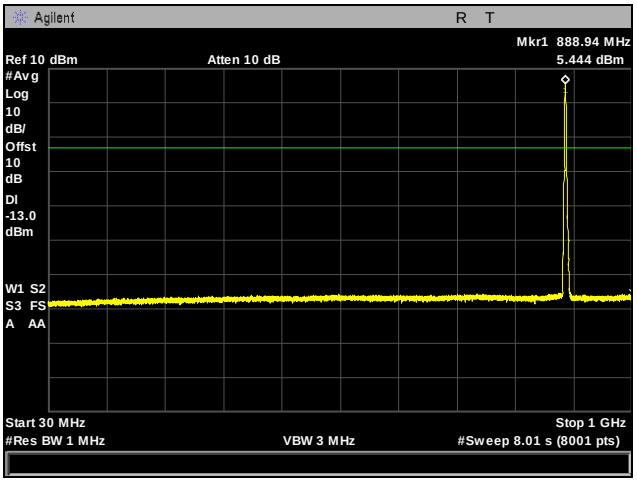
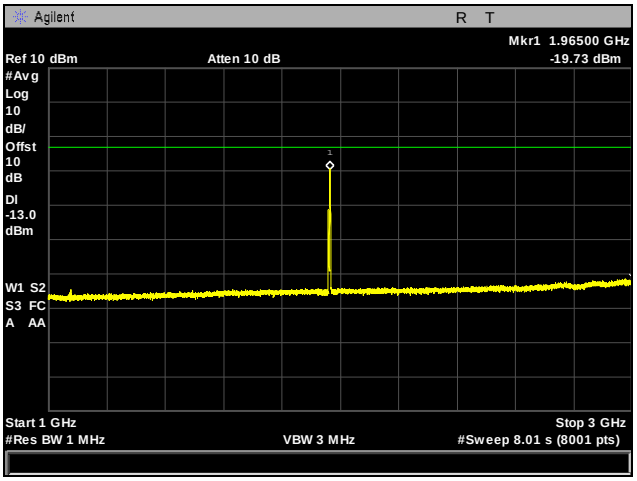


Figure 3. Spurious Emissions at Antenna Terminals Test Setup

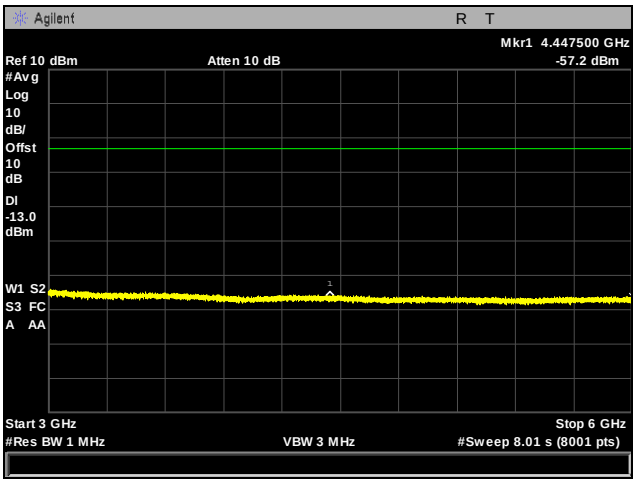
Conducted Spurious Emissions, Beacon Radio



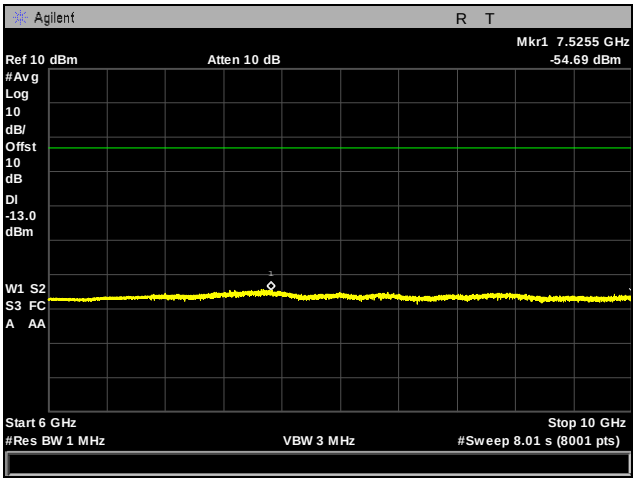
Plot 51. Conducted Spurious Emissions, Beacon Radio, Channel 640, 30 MHz – 1 GHz



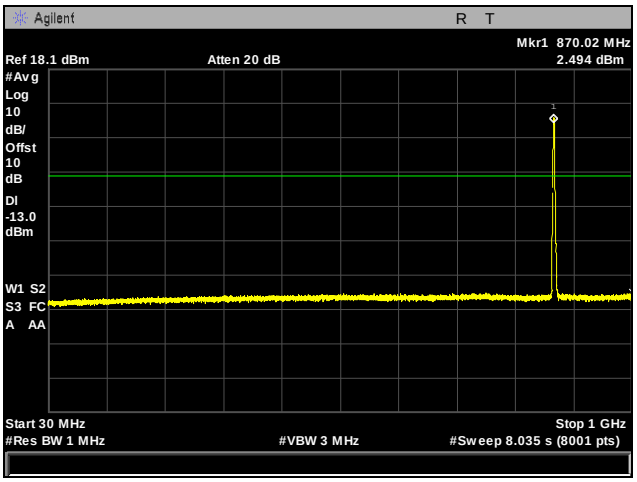
Plot 52. Conducted Spurious Emissions, Beacon Radio, Channel 640, 1 GHz – 3 GHz



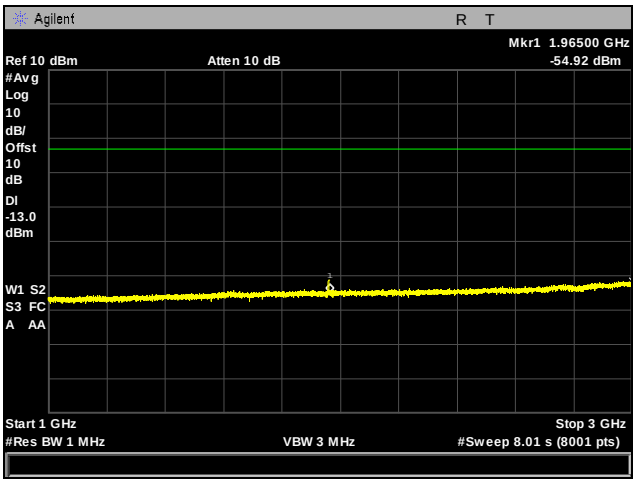
Plot 53. Conducted Spurious Emissions, Beacon Radio, Channel 640, 3 GHz – 6 GHz



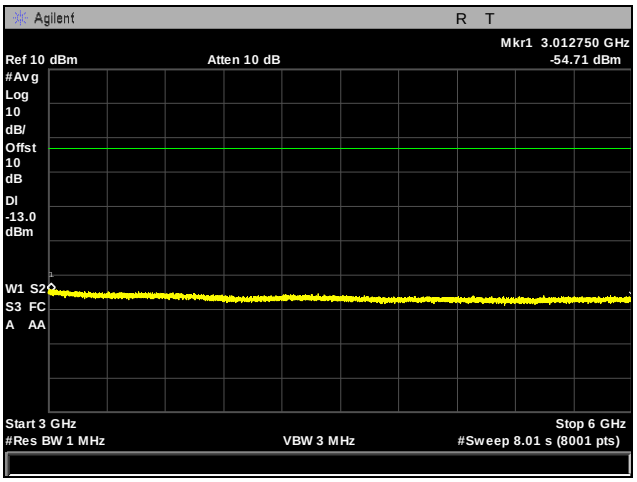
Plot 54. Conducted Spurious Emissions, Beacon Radio, Channel 640, 6 GHz – 10 GHz



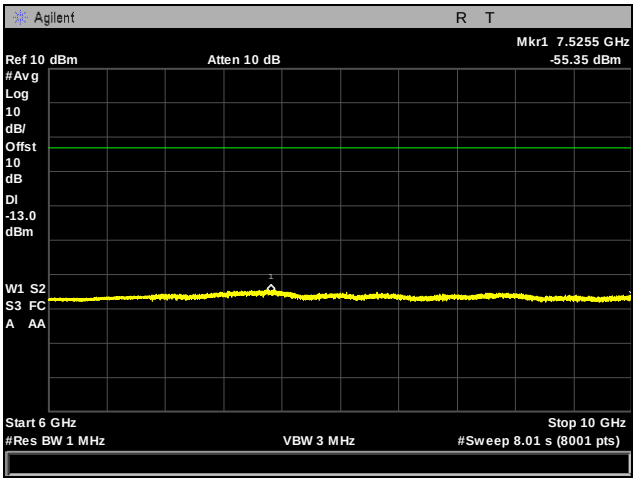
Plot 55. Conducted Spurious Emissions, Beacon Radio, Channel 779, 30 MHz – 1 GHz



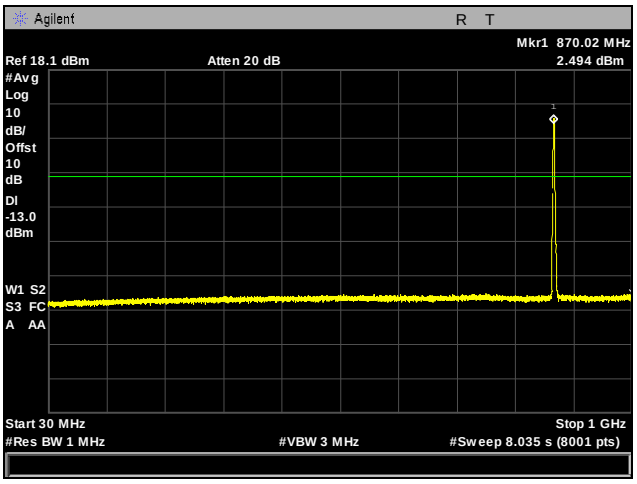
Plot 56. Conducted Spurious Emissions, Beacon Radio, Channel 779, 1 GHz – 3 GHz



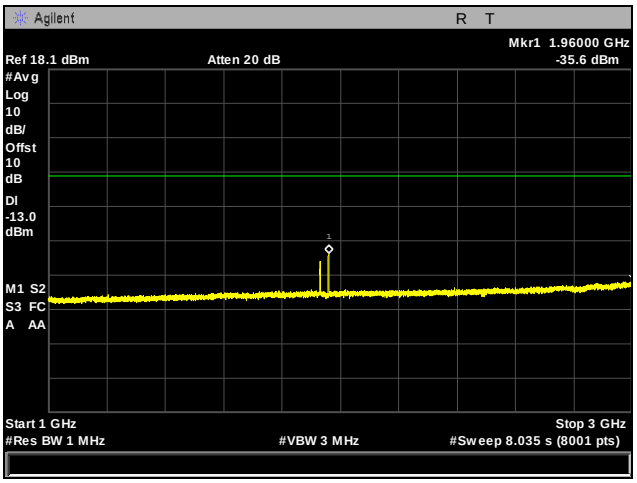
Plot 57. Conducted Spurious Emissions, Beacon Radio, Channel 779, 3 GHz – 6 GHz



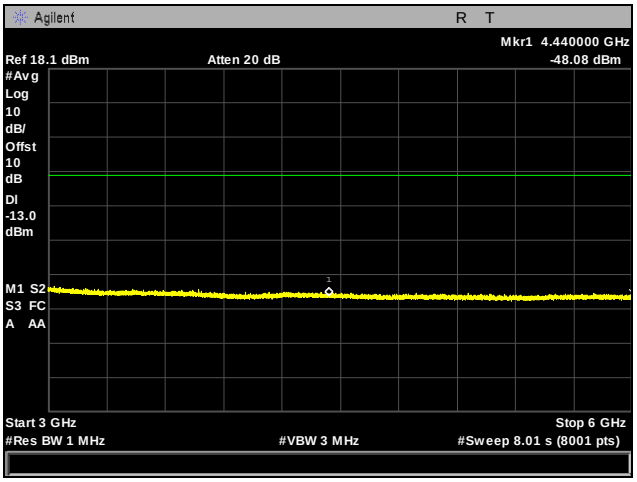
Plot 58. Conducted Spurious Emissions, Beacon Radio, Channel 779, 6 GHz – 10 GHz



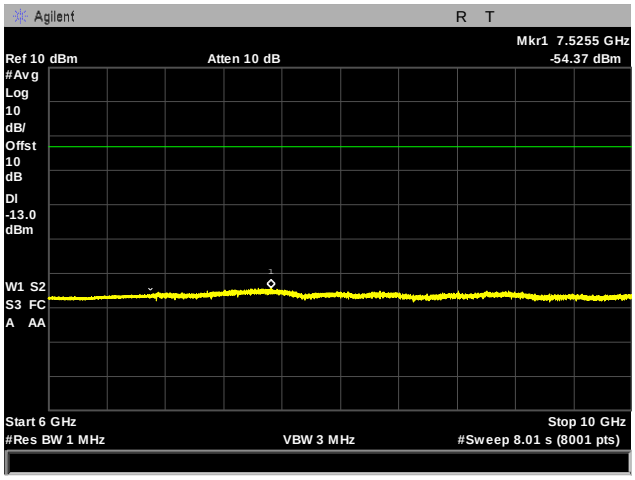
Plot 59. Conducted Spurious Emissions, Beacon Radio, Channel 991, 30 MHz – 1 GHz



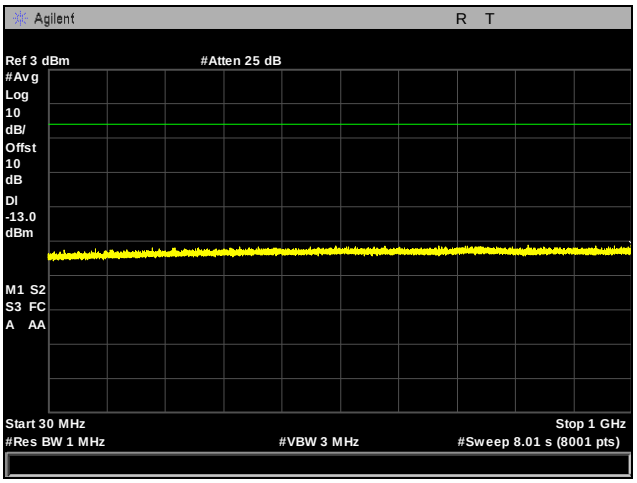
Plot 60. Conducted Spurious Emissions, Beacon Radio, Channel 991, 1 GHz – 3 GHz



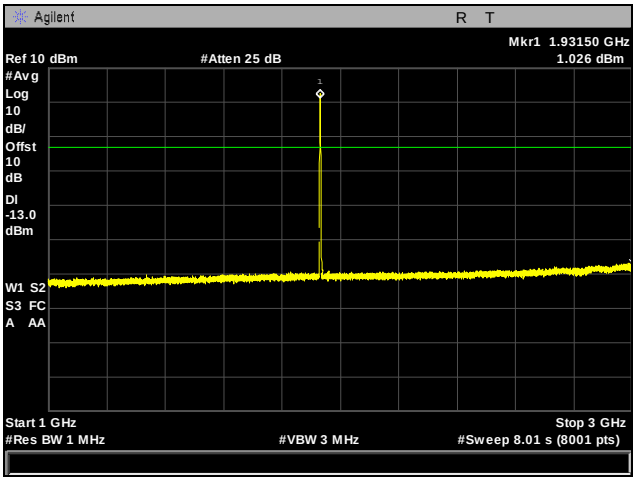
Plot 61. Conducted Spurious Emissions, Beacon Radio, Channel 991, 3 GHz – 6 GHz



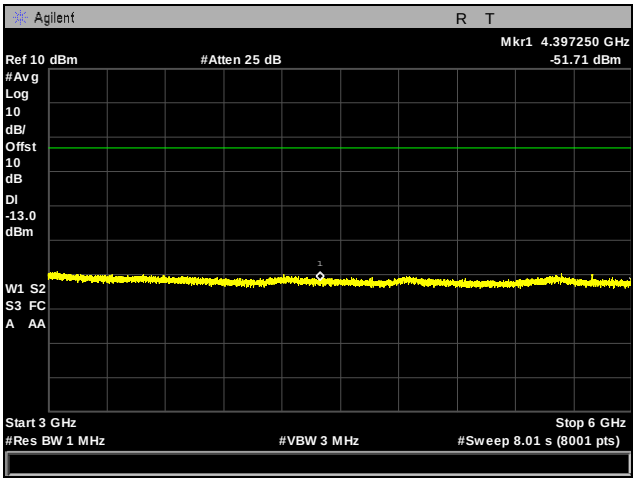
Plot 62. Conducted Spurious Emissions, Beacon Radio, Channel 991, 6 GHz – 10 GHz



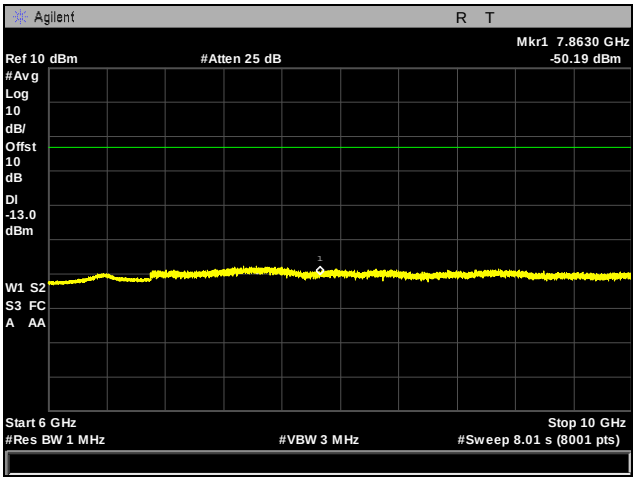
Plot 63. Conducted Spurious Emissions, Beacon Radio, Channel 25, 30 MHz – 1 GHz



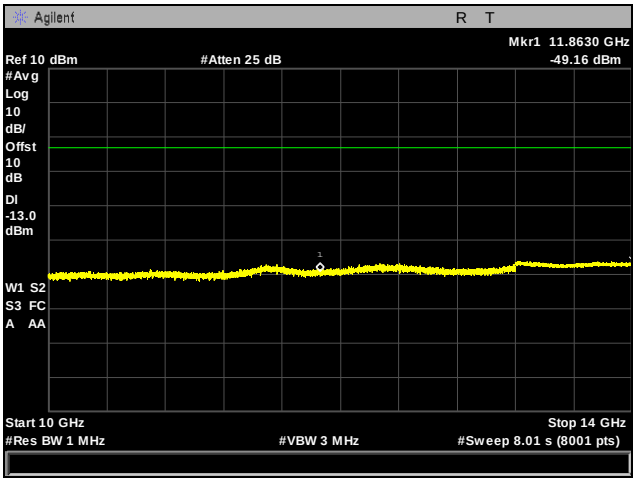
Plot 64. Conducted Spurious Emissions, Beacon Radio, Channel 25, 1 GHz – 3 GHz



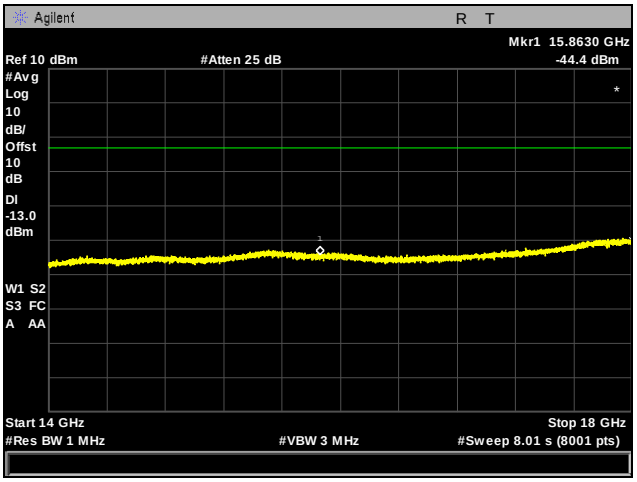
Plot 65. Conducted Spurious Emissions, Beacon Radio, Channel 25, 3 GHz – 6 GHz



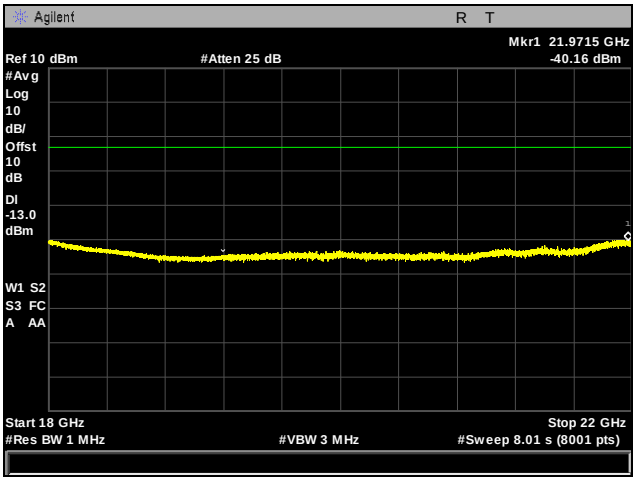
Plot 66. Conducted Spurious Emissions, Beacon Radio, Channel 25, 6 GHz – 10 GHz



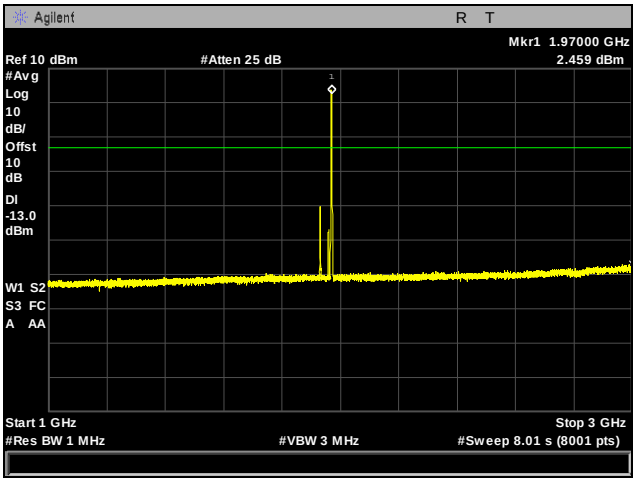
Plot 67. Conducted Spurious Emissions, Beacon Radio, Channel 25, 10 GHz – 14 GHz



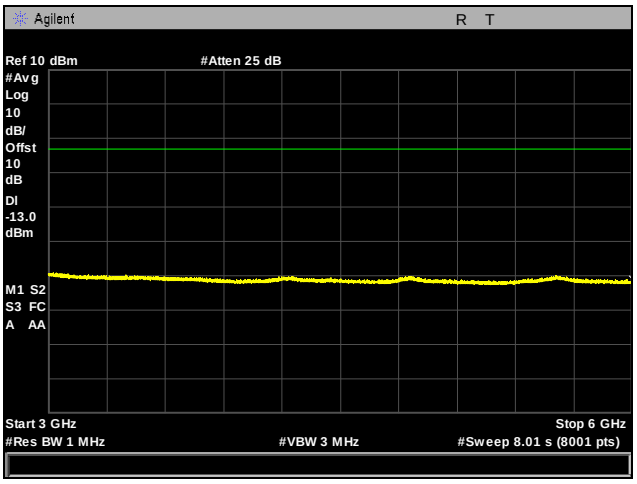
Plot 68. Conducted Spurious Emissions, Beacon Radio, Channel 25, 14 GHz – 18 GHz



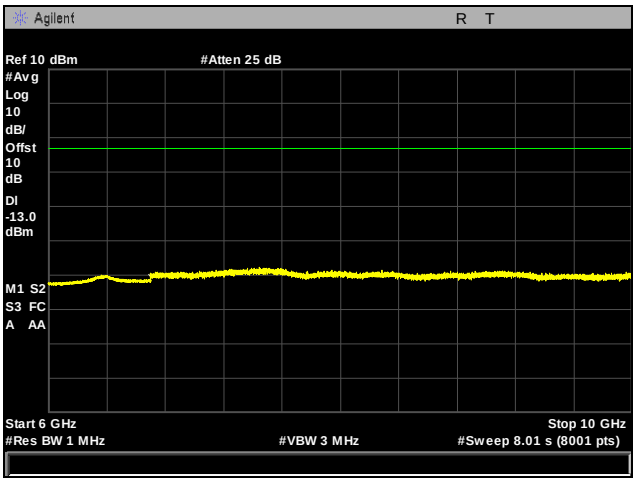
Plot 69. Conducted Spurious Emissions, Beacon Radio, Channel 25, 18 GHz – 22 GHz



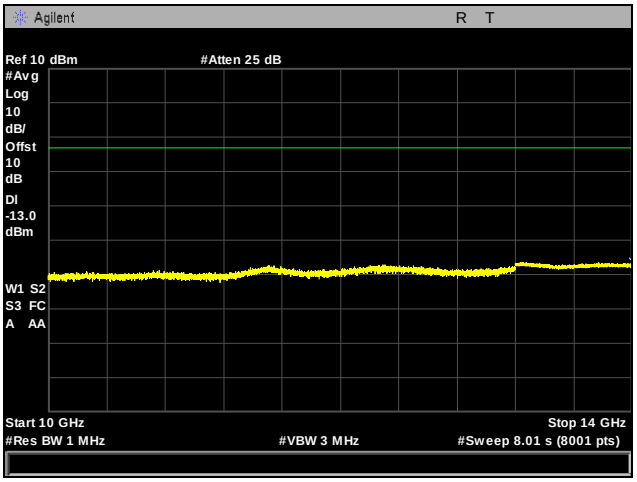
Plot 70. Conducted Spurious Emissions, Beacon Radio, Channel 600, 30 MHz – 1 GHz



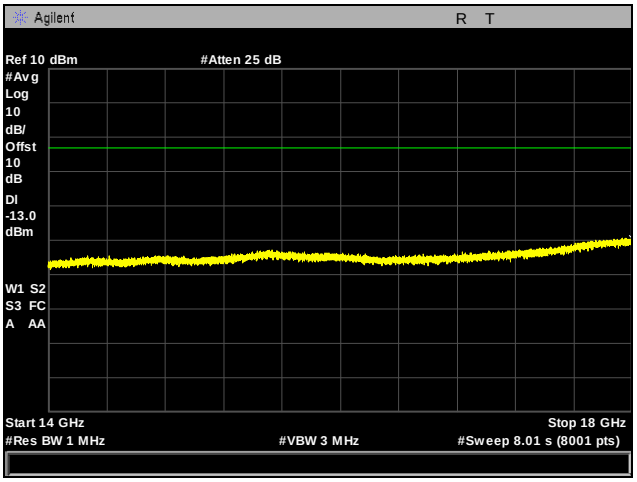
Plot 71. Conducted Spurious Emissions, Beacon Radio, Channel 600, 3 GHz – 6 GHz



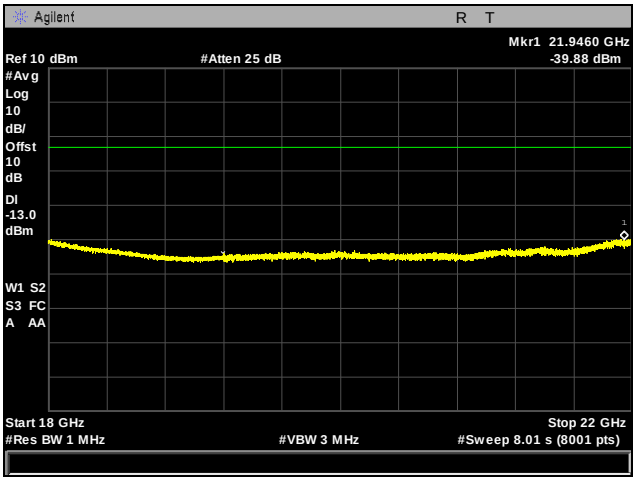
Plot 72. Conducted Spurious Emissions, Beacon Radio, Channel 600, 6 GHz – 10 GHz



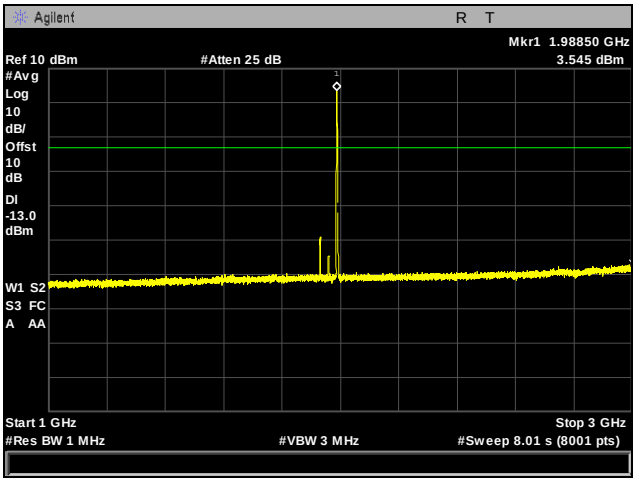
Plot 73. Conducted Spurious Emissions, Beacon Radio, Channel 600, 10 GHz – 14 GHz



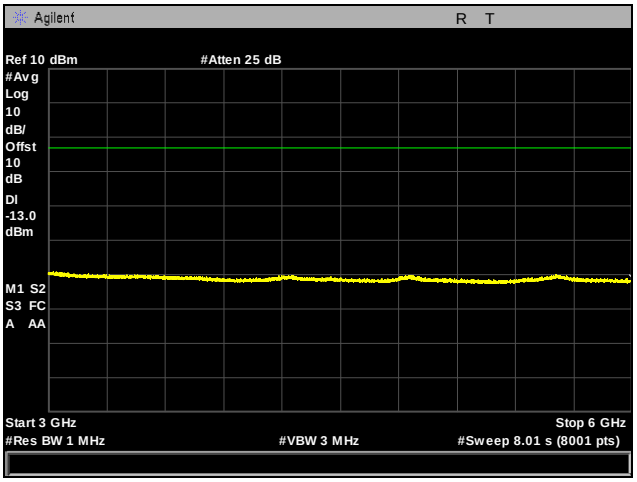
Plot 74. Conducted Spurious Emissions, Beacon Radio, Channel 600, 14 GHz – 18 GHz



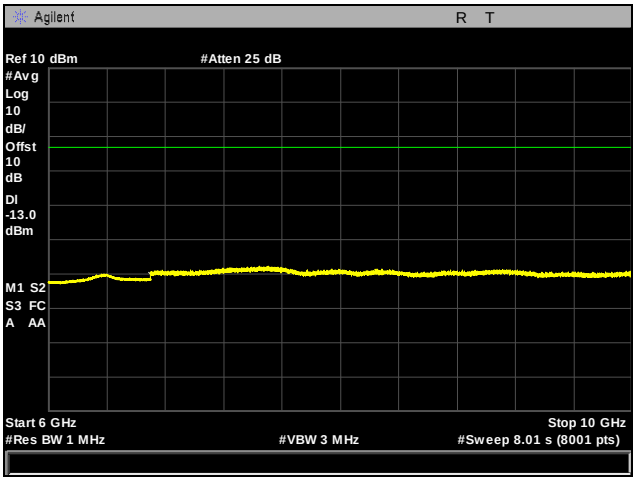
Plot 75. Conducted Spurious Emissions, Beacon Radio, Channel 600, 18 GHz – 22 GHz



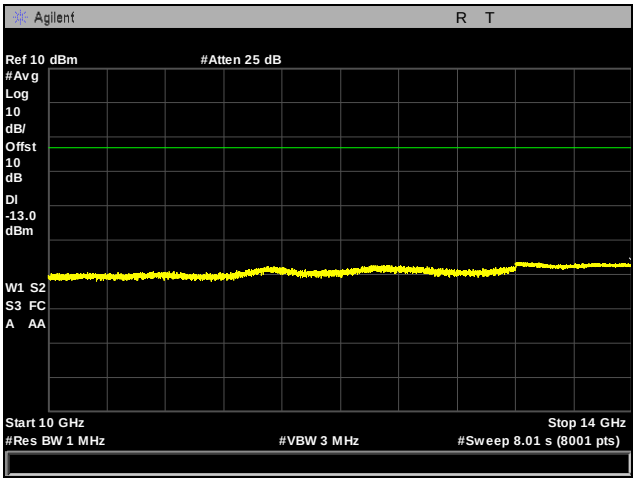
Plot 76. Conducted Spurious Emissions, Beacon Radio, Channel 1175, 30 MHz – 1 GHz



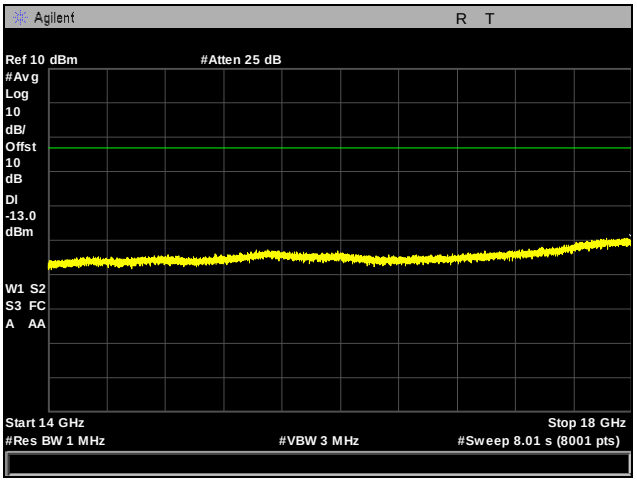
Plot 77. Conducted Spurious Emissions, Beacon Radio, Channel 1175, 3 GHz – 6 GHz



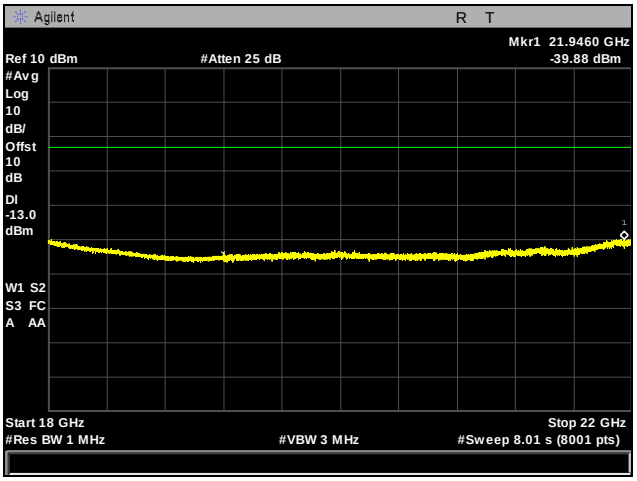
Plot 78. Conducted Spurious Emissions, Beacon Radio, Channel 1175, 6 GHz – 10 GHz



Plot 79. Conducted Spurious Emissions, Beacon Radio, Channel 1175, 10 GHz – 14 GHz

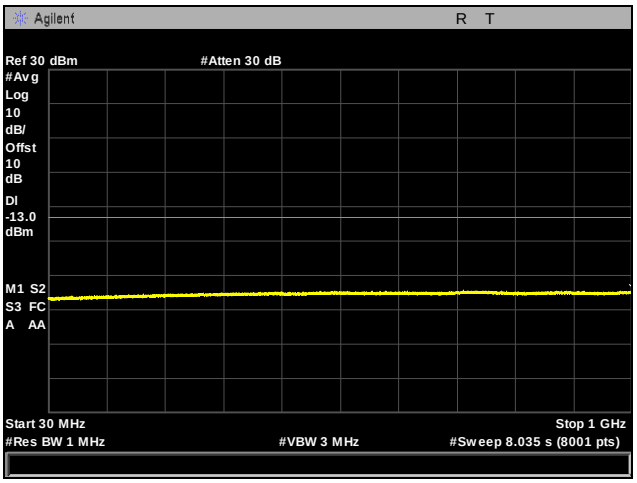


Plot 80. Conducted Spurious Emissions, Beacon Radio, Channel 1175, 14 GHz – 18 GHz

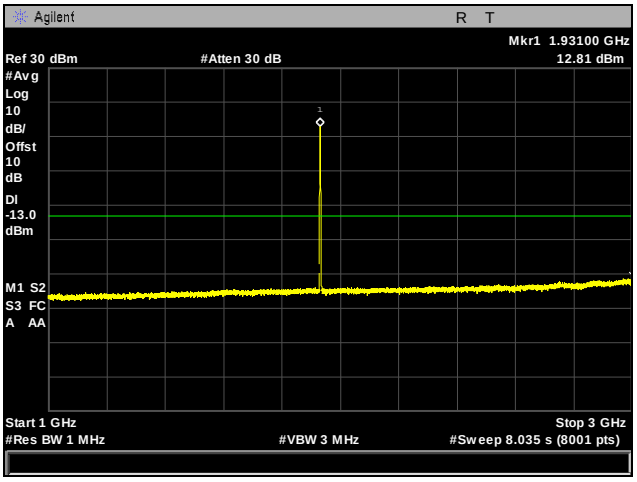


Plot 81. Conducted Spurious Emissions, Beacon Radio, Channel 1175, 18 GHz – 22 GHz

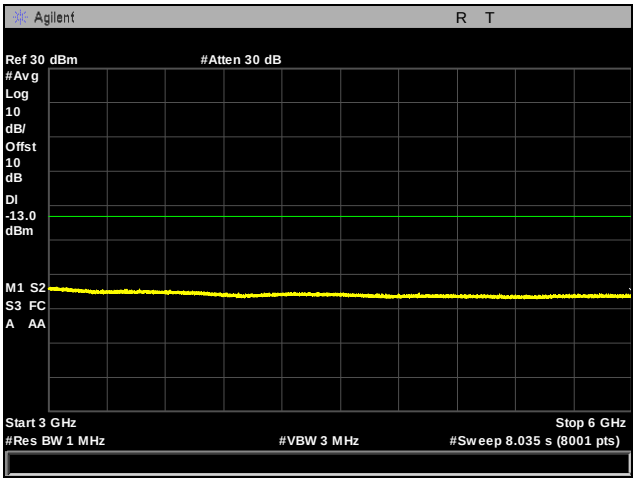
Conducted Spurious Emissions, EVDO Radio



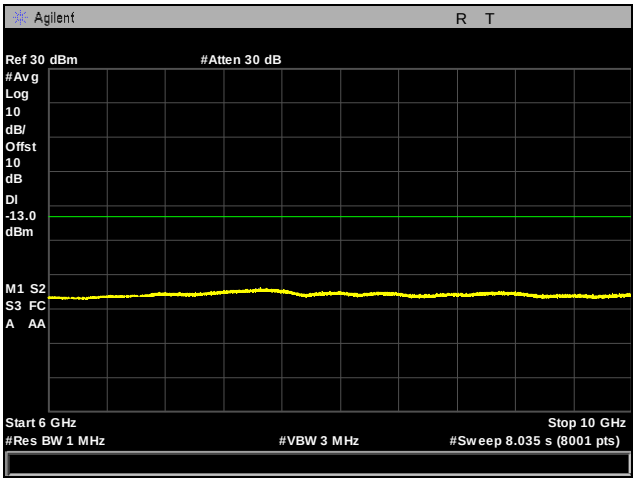
Plot 82. Conducted Spurious Emissions, EVDO Radio, Channel 25, 30 MHz – 1 GHz



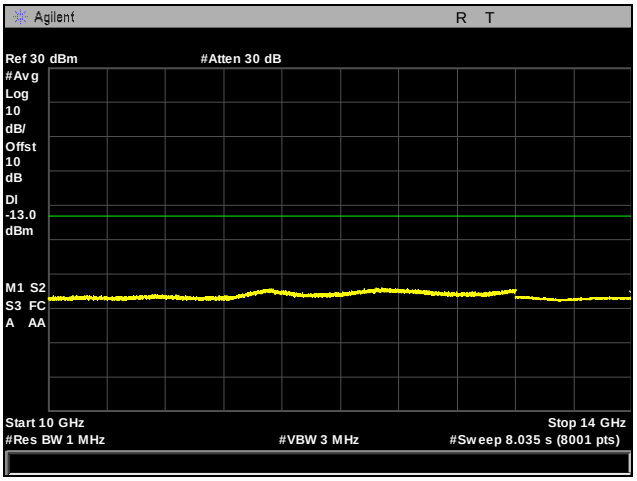
Plot 83. Conducted Spurious Emissions, EVDO Radio, Channel 25, 1 GHz – 3 GHz



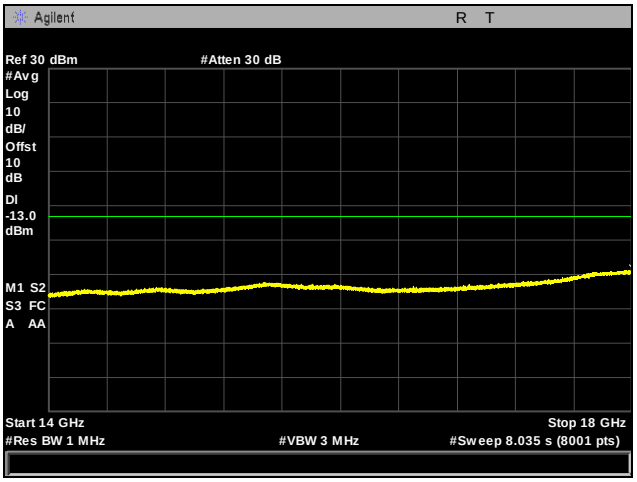
Plot 84. Conducted Spurious Emissions, EVDO Radio, Channel 25, 3 GHz – 6 GHz



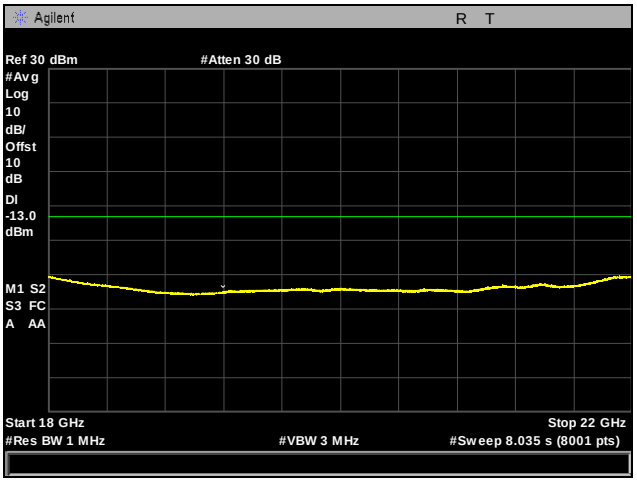
Plot 85. Conducted Spurious Emissions, EVDO Radio, Channel 25, 6 GHz – 10 GHz



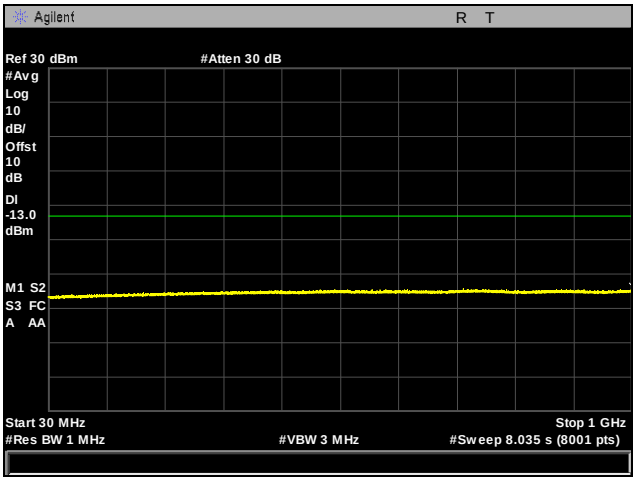
Plot 86. Conducted Spurious Emissions, EVDO Radio, Channel 25, 10 GHz – 14 GHz



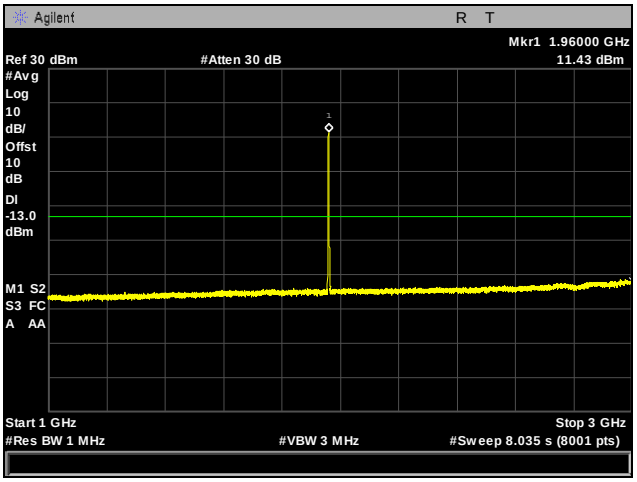
Plot 87. Conducted Spurious Emissions, EVDO Radio, Channel 25, 14 GHz – 18 GHz



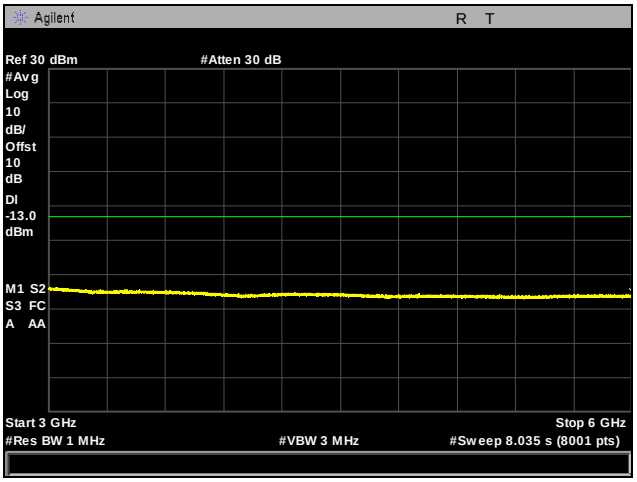
Plot 88. Conducted Spurious Emissions, EVDO Radio, Channel 25, 18 GHz – 22 GHz



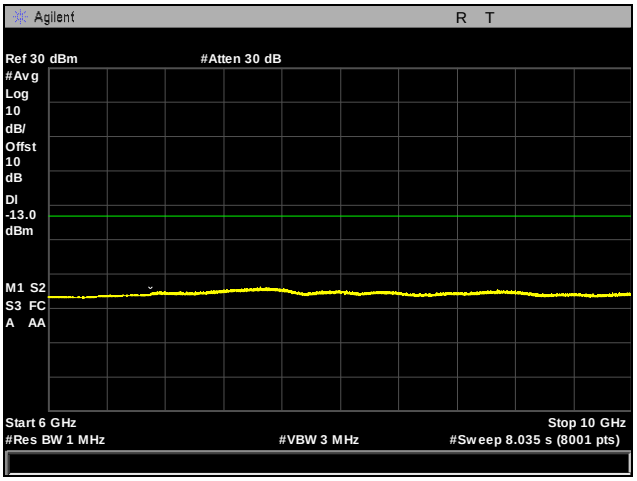
Plot 89. Conducted Spurious Emissions, EVDO Radio, Channel 600, 30 MHz – 1 GHz



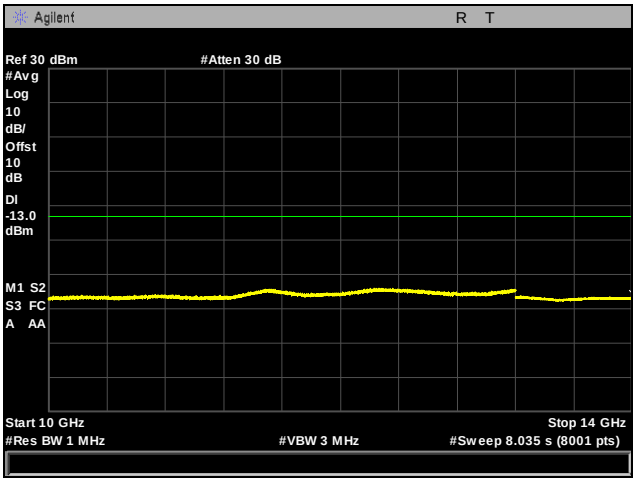
Plot 90. Conducted Spurious Emissions, EVDO Radio, Channel 600, 1 GHz – 3 GHz



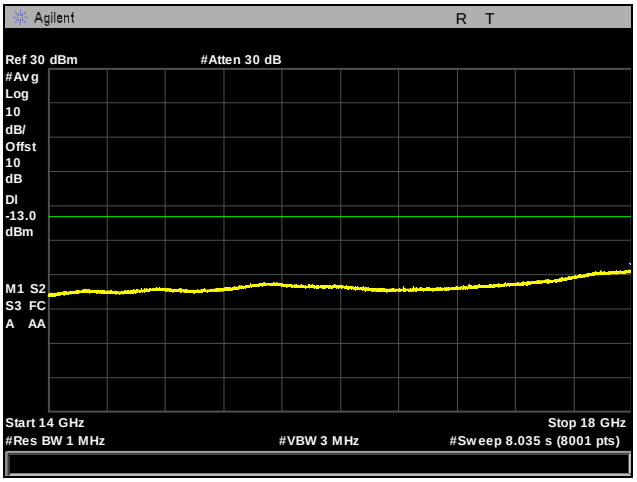
Plot 91. Conducted Spurious Emissions, EVDO Radio, Channel 600, 3 GHz – 6 GHz



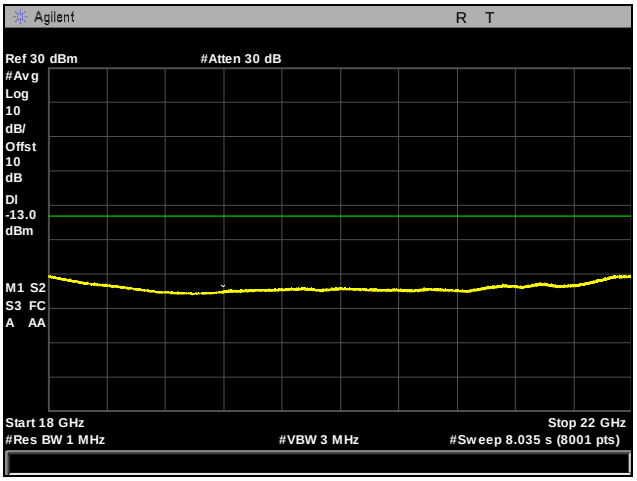
Plot 92. Conducted Spurious Emissions, EVDO Radio, Channel 600, 6 GHz – 10 GHz



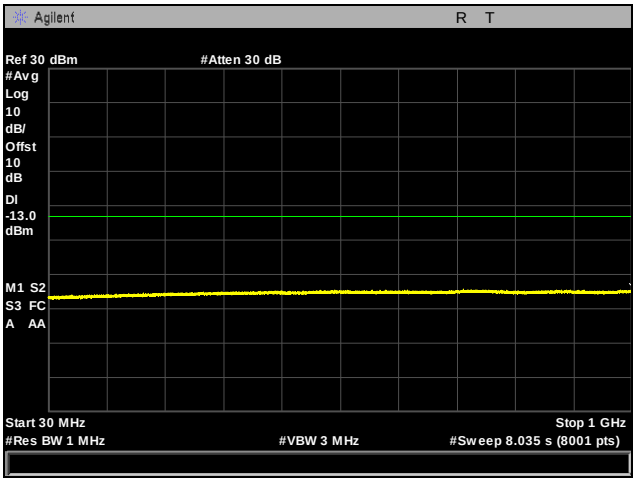
Plot 93. Conducted Spurious Emissions, EVDO Radio, Channel 600, 10 GHz – 14 GHz



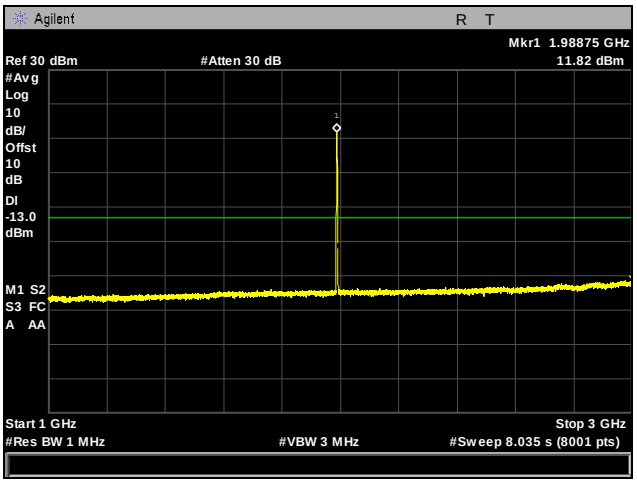
Plot 94. Conducted Spurious Emissions, EVDO Radio, Channel 600, 14 GHz – 18 GHz



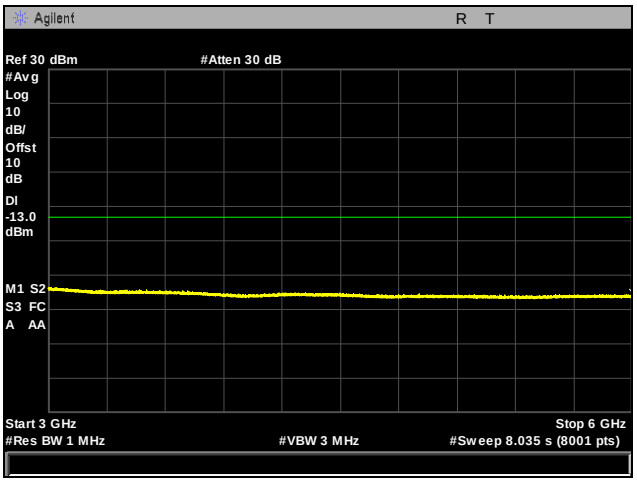
Plot 95. Conducted Spurious Emissions, EVDO Radio, Channel 600, 18 GHz – 22 GHz



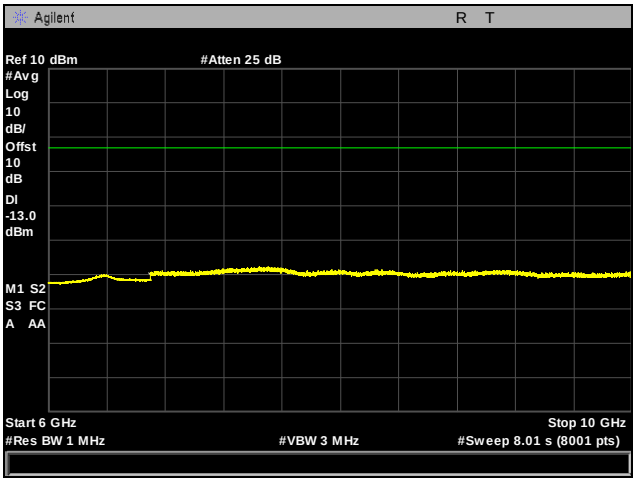
Plot 96. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 30 MHz – 1 GHz



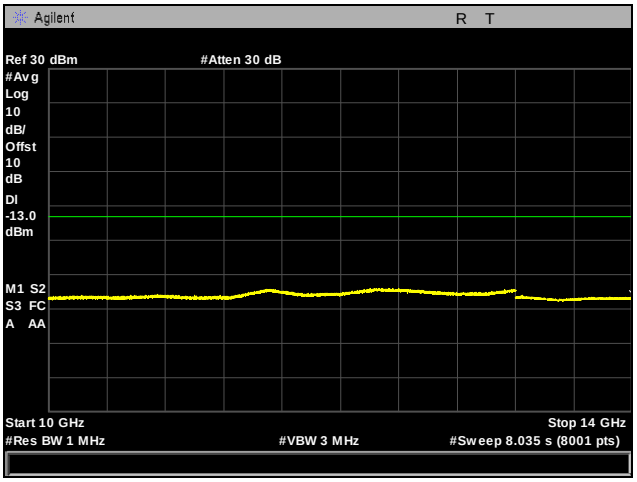
Plot 97. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 1 GHz – 3 GHz



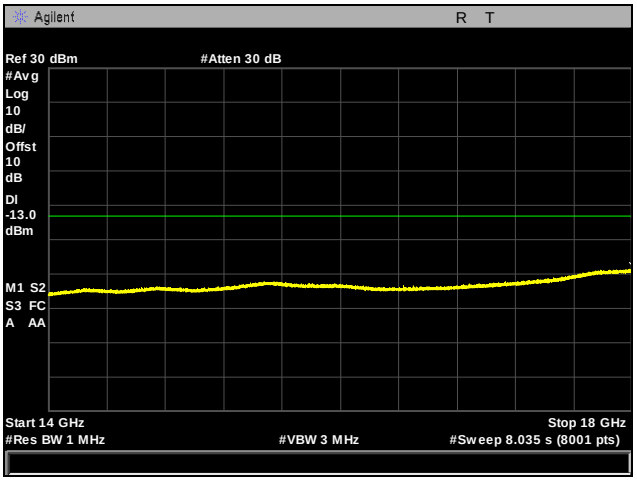
Plot 98. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 3 GHz – 6 GHz



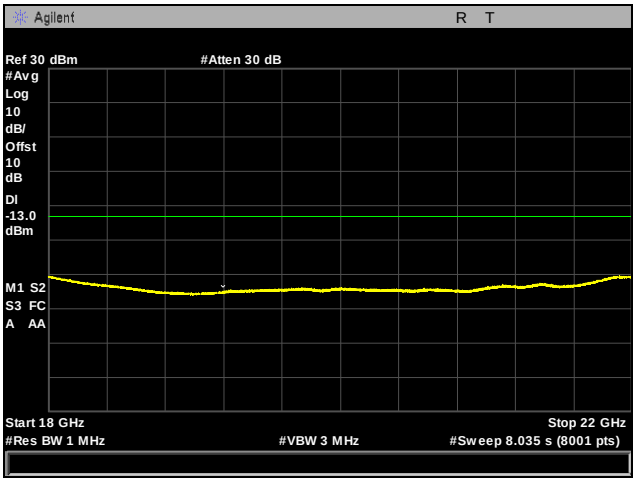
Plot 99. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 6 GHz – 10 GHz



Plot 100. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 10 GHz – 14 GHz

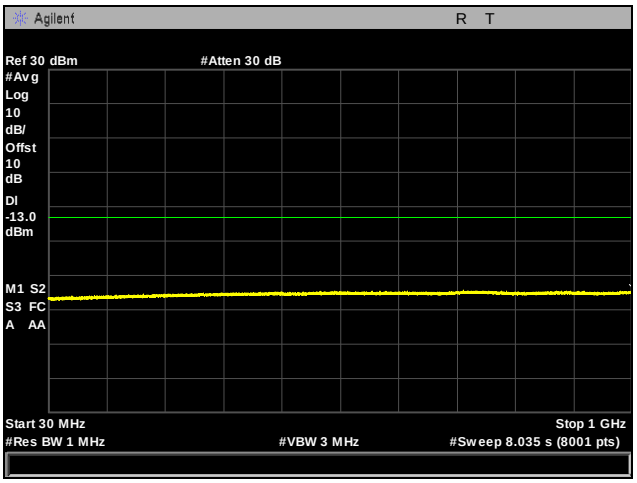


Plot 101. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 14 GHz – 18 GHz

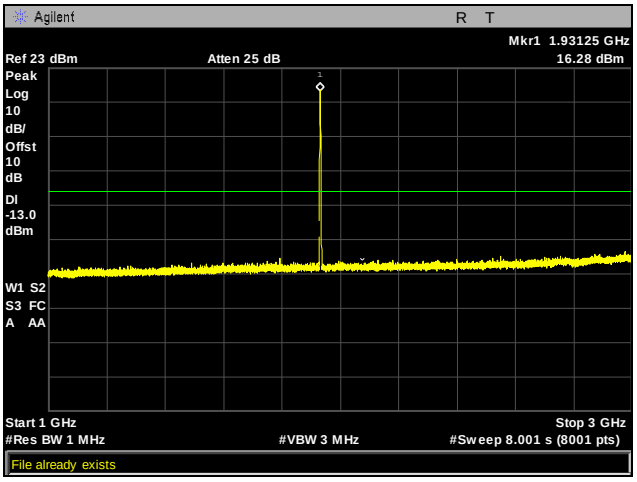


Plot 102. Conducted Spurious Emissions, EVDO Radio, Channel 1175, 18 GHz – 22 GHz

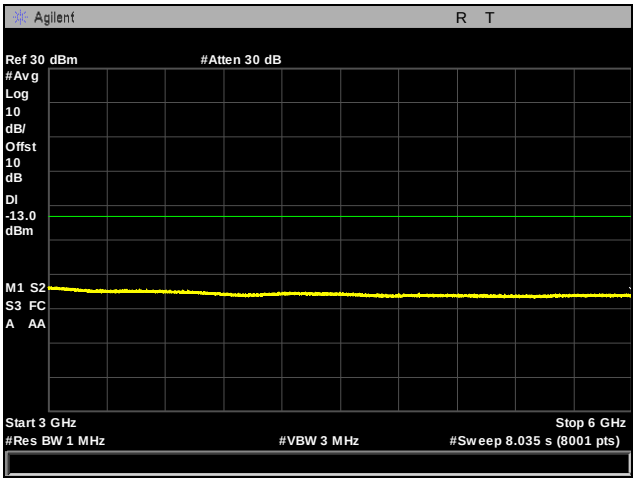
Conducted Spurious Emissions, OneX Radio



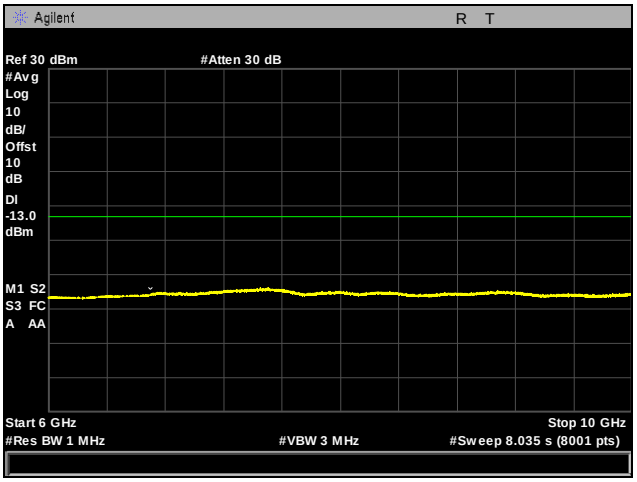
Plot 103. Conducted Spurious Emissions, OneX Radio, Channel 25, 30 MHz – 1 GHz



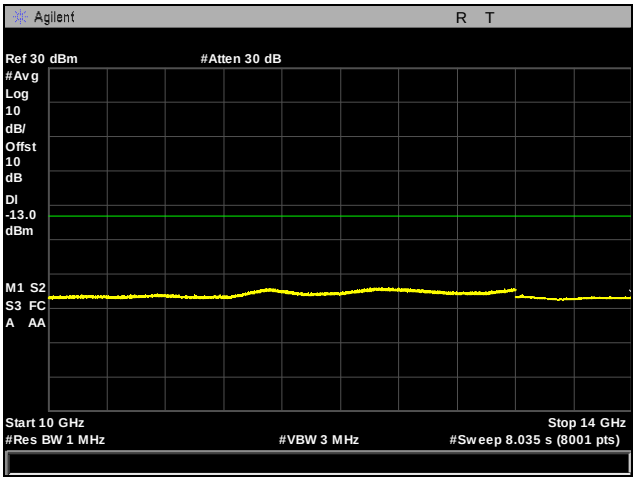
Plot 104. Conducted Spurious Emissions, OneX Radio, Channel 25, 1 GHz – 3 GHz



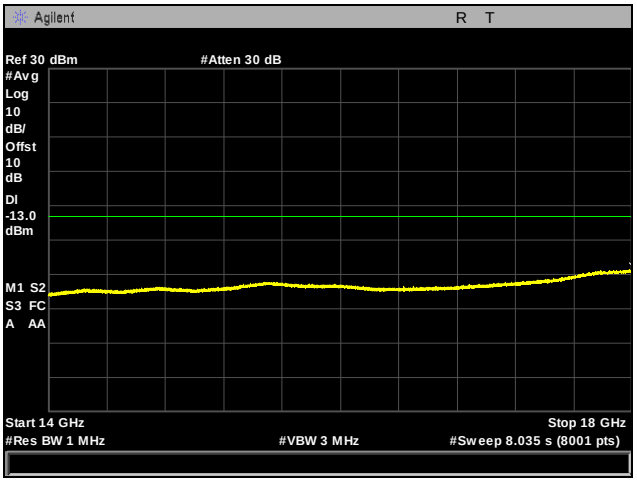
Plot 105. Conducted Spurious Emissions, OneX Radio, Channel 25, 3 GHz – 6 GHz



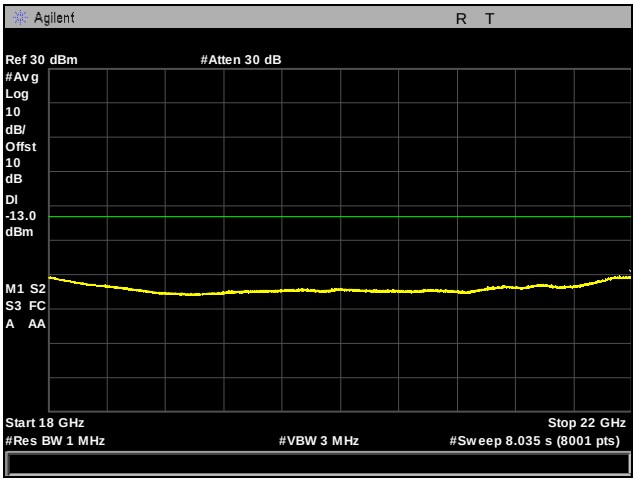
Plot 106. Conducted Spurious Emissions, OneX Radio, Channel 25, 6 GHz – 10 GHz



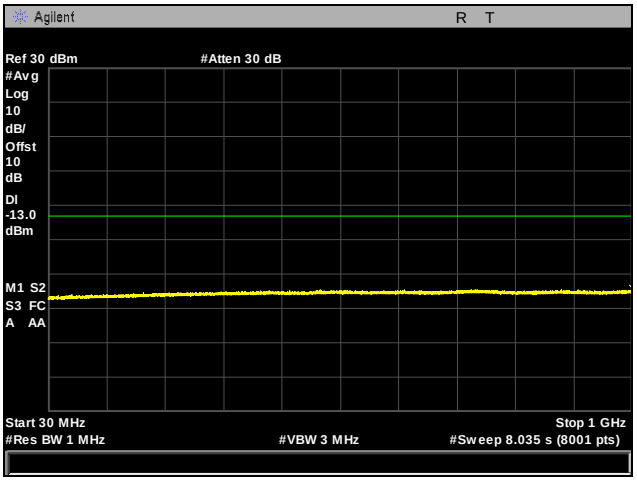
Plot 107. Conducted Spurious Emissions, OneX Radio, Channel 25, 10 GHz – 14 GHz



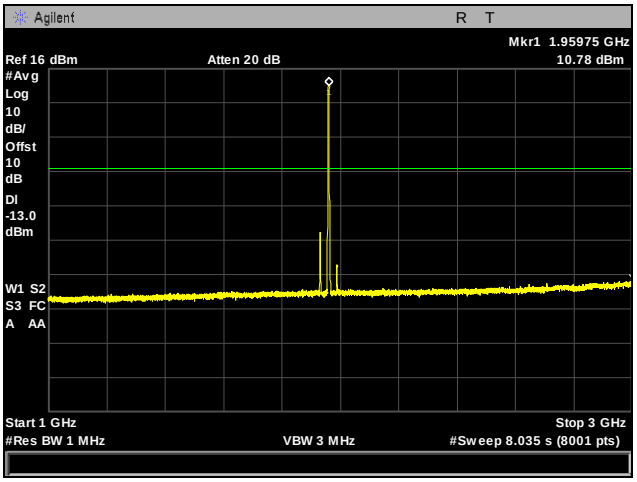
Plot 108. Conducted Spurious Emissions, OneX Radio, Channel 25, 14 GHz – 18 GHz



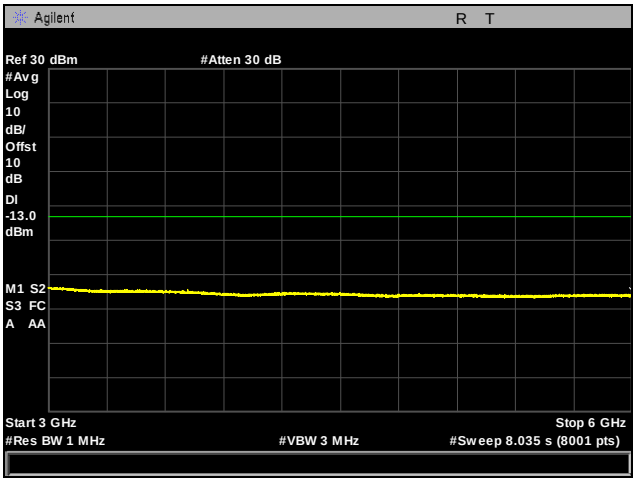
Plot 109. Conducted Spurious Emissions, OneX Radio, Channel 25, 18 GHz – 22 GHz



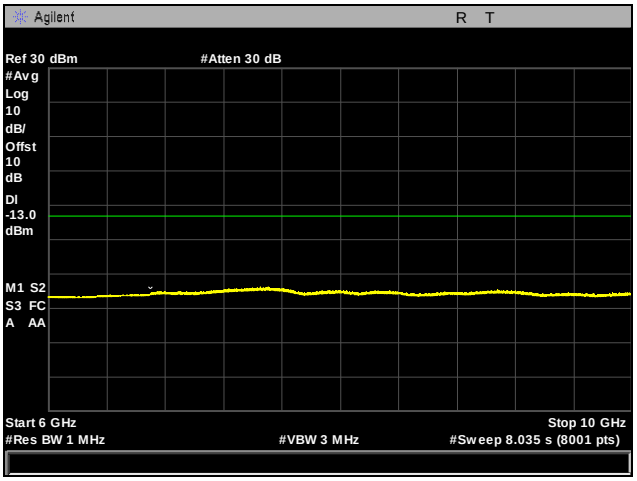
Plot 110. Conducted Spurious Emissions, OneX Radio, Channel 600, 30 MHz – 1 GHz



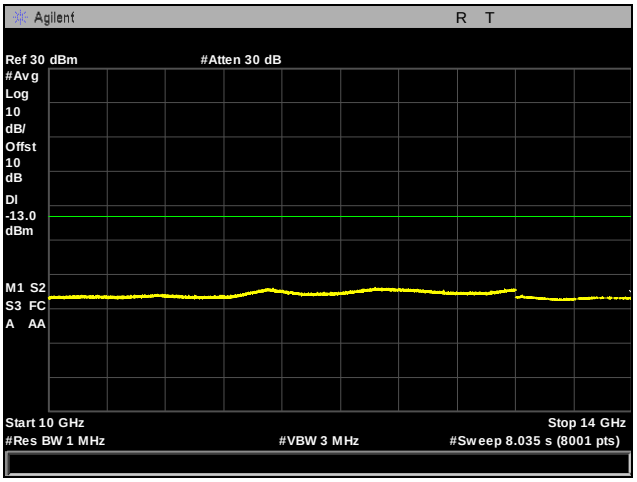
Plot 111. Conducted Spurious Emissions, OneX Radio, Channel 600, 1 GHz – 3 GHz



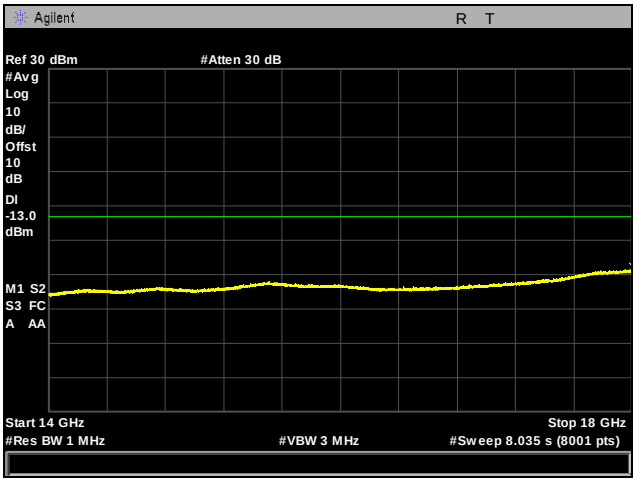
Plot 112. Conducted Spurious Emissions, OneX Radio, Channel 600, 3 GHz – 6 GHz



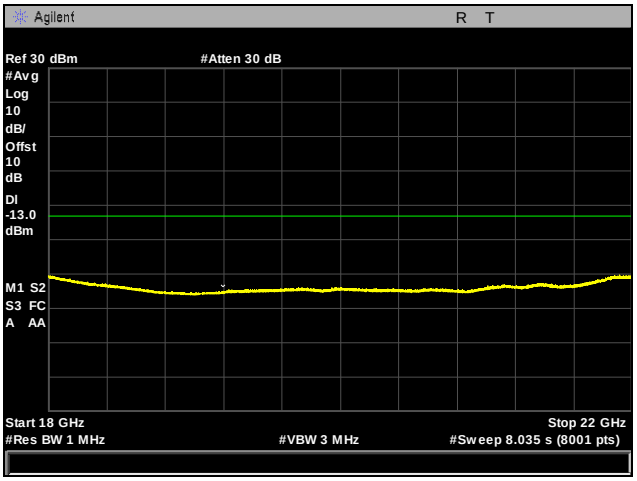
Plot 113. Conducted Spurious Emissions, OneX Radio, Channel 600, 6 GHz – 10 GHz



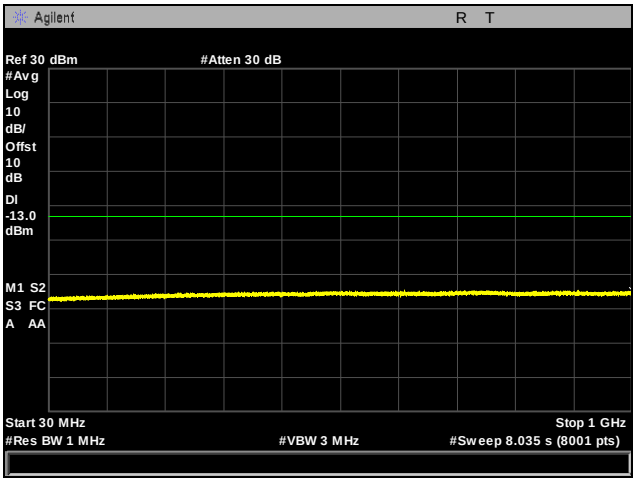
Plot 114. Conducted Spurious Emissions, OneX Radio, Channel 600, 10 GHz – 14 GHz



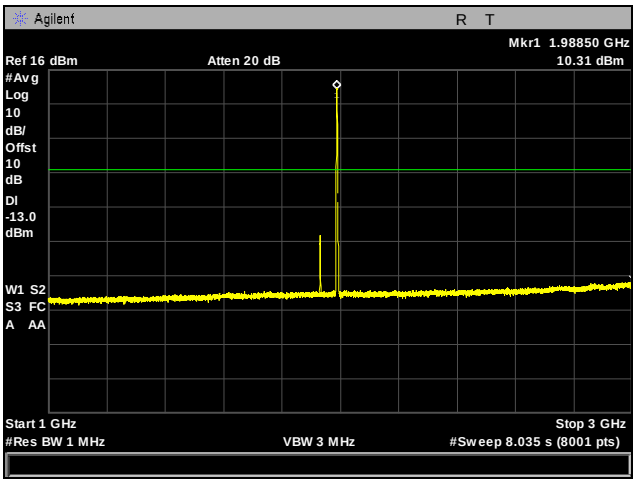
Plot 115. Conducted Spurious Emissions, OneX Radio, Channel 600, 14 GHz – 18 GHz



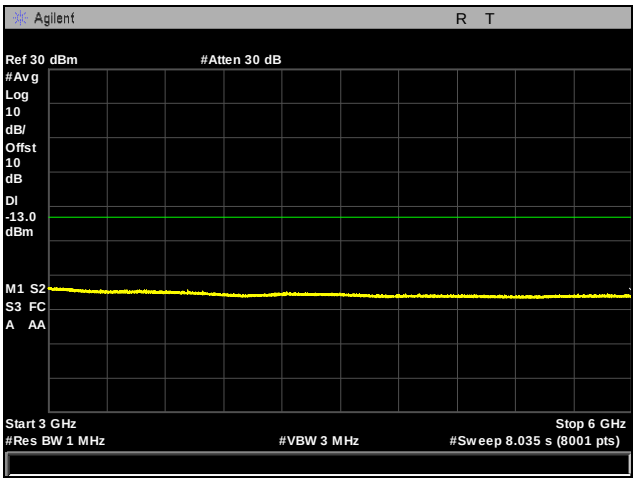
Plot 116. Conducted Spurious Emissions, OneX Radio, Channel 600, 18 GHz – 22 GHz



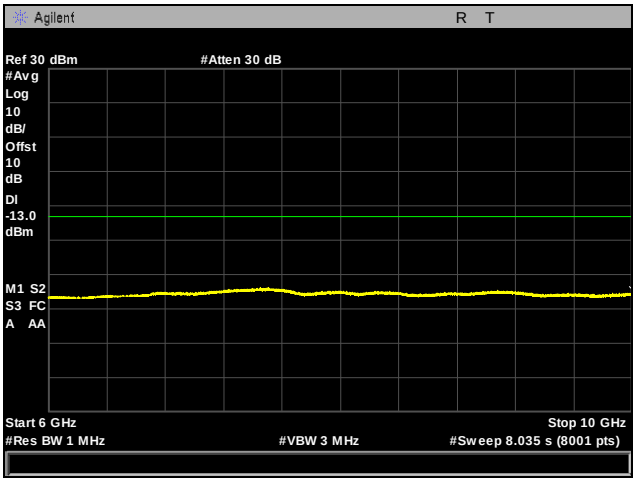
Plot 117. Conducted Spurious Emissions, OneX Radio, Channel 1175, 30 MHz – 1 GHz



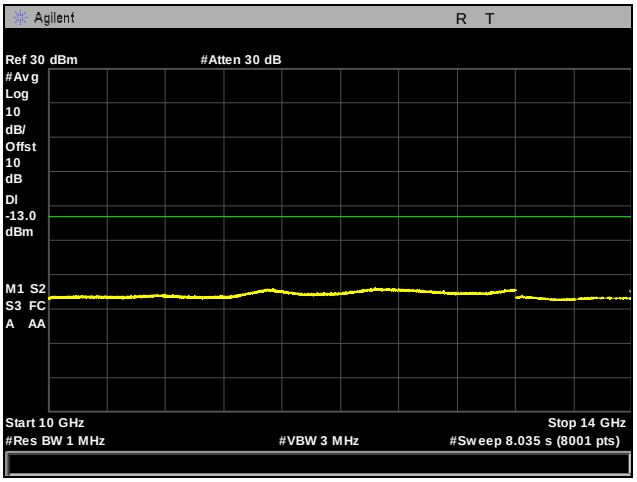
Plot 118. Conducted Spurious Emissions, OneX Radio, Channel 1175, 1 GHz – 3 GHz



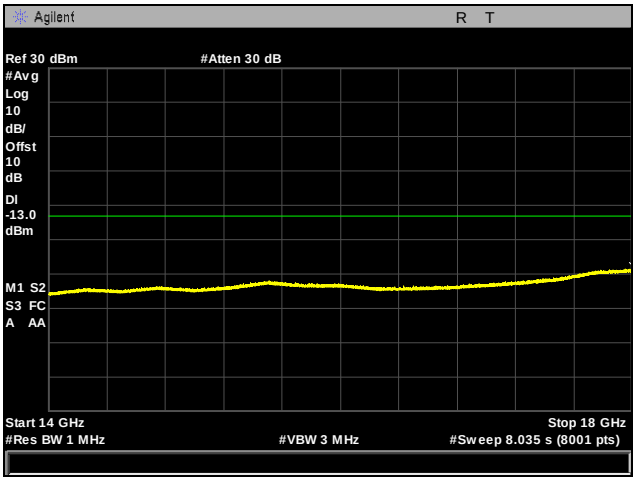
Plot 119. Conducted Spurious Emissions, OneX Radio, Channel 1175, 3 GHz – 6 GHz



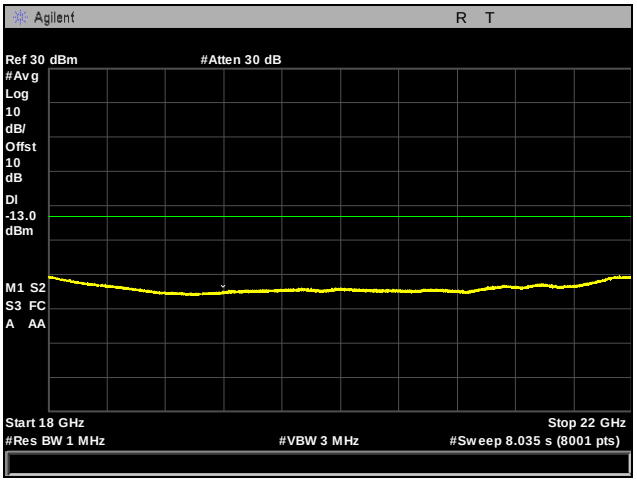
Plot 120. Conducted Spurious Emissions, OneX Radio, Channel 1175, 6 GHz – 10 GHz



Plot 121. Conducted Spurious Emissions, OneX Radio, Channel 1175, 10 GHz – 14 GHz

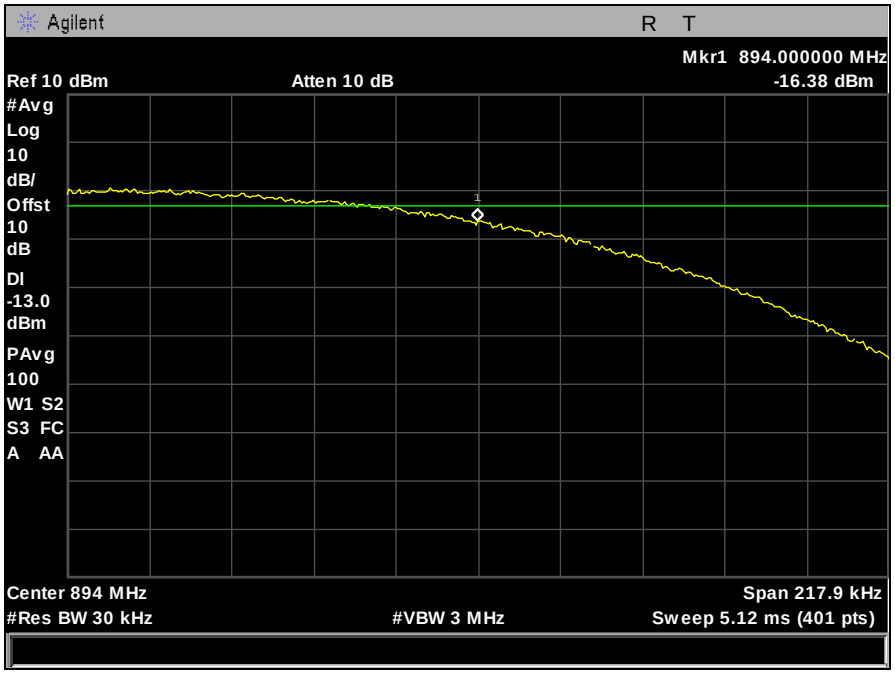


Plot 122. Conducted Spurious Emissions, OneX Radio, Channel 1175, 14 GHz – 18 GHz

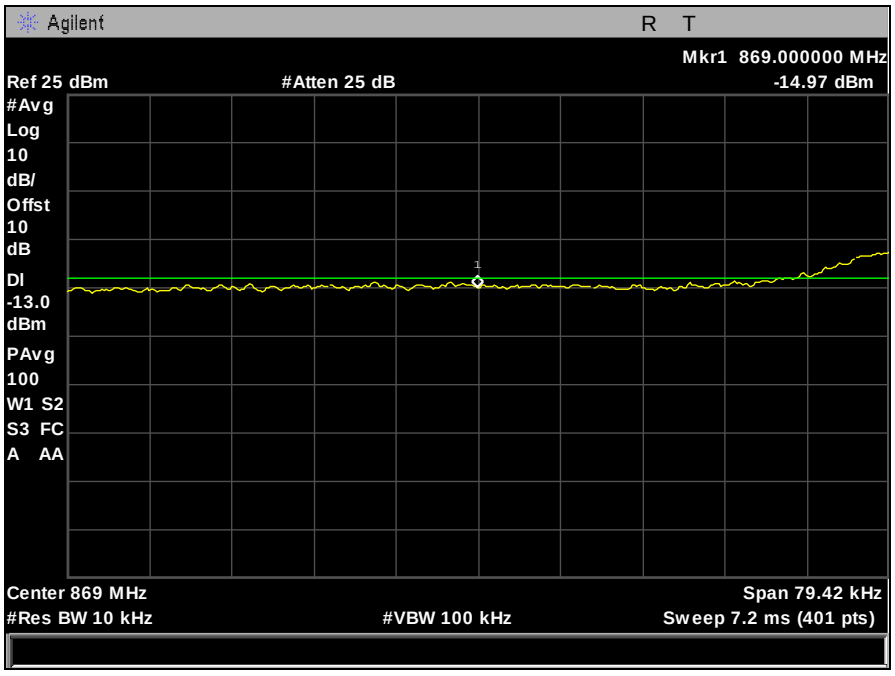


Plot 123. Conducted Spurious Emissions, OneX Radio, Channel 1175, 18 GHz – 22 GHz

Band Edge, Beacon Radio

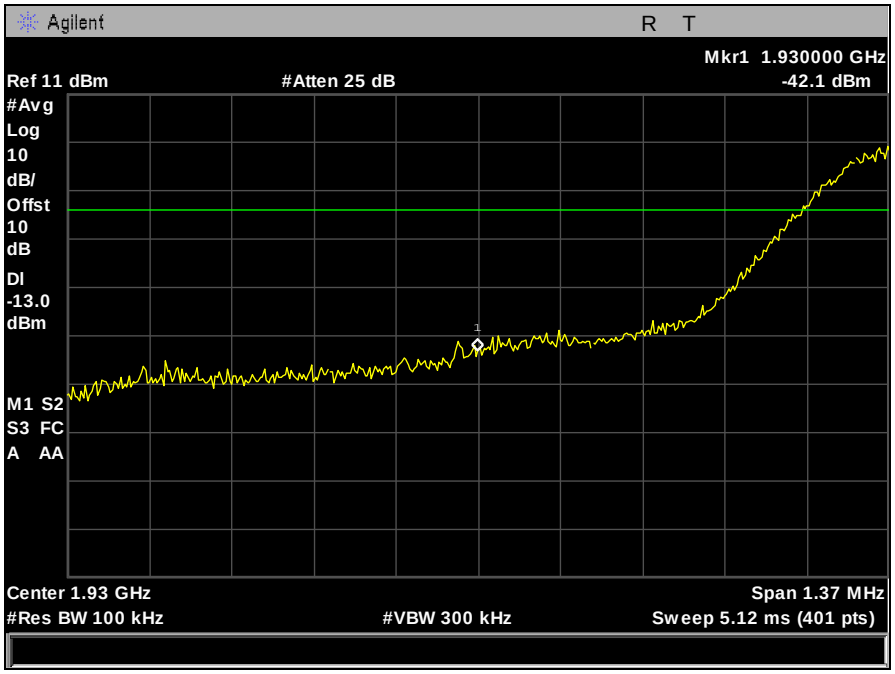


Plot 124. Conducted Band Edge, Beacon Radio, Channel 779

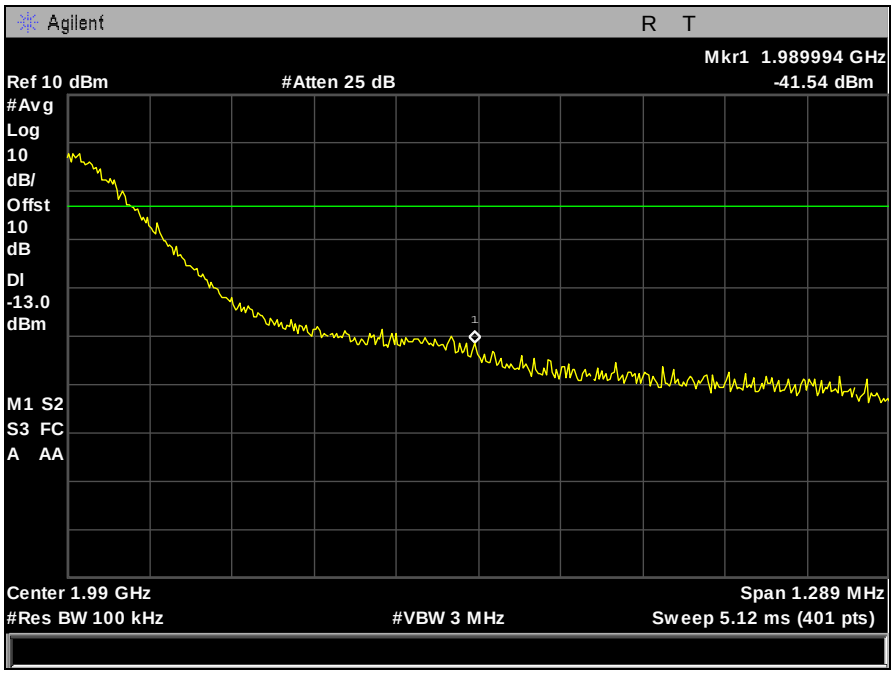


Plot 125. Conducted Band Edge, Beacon Radio, Channel 991

Band Edge, Beacon Radio, BC1

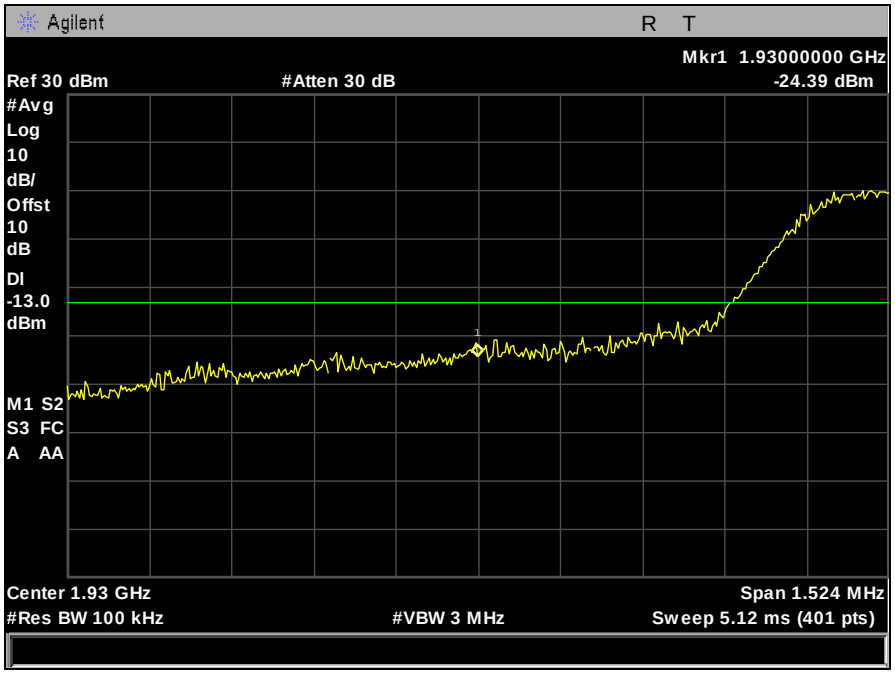


Plot 126. Conducted Band Edge, Beacon Radio, BC1, Channel 25

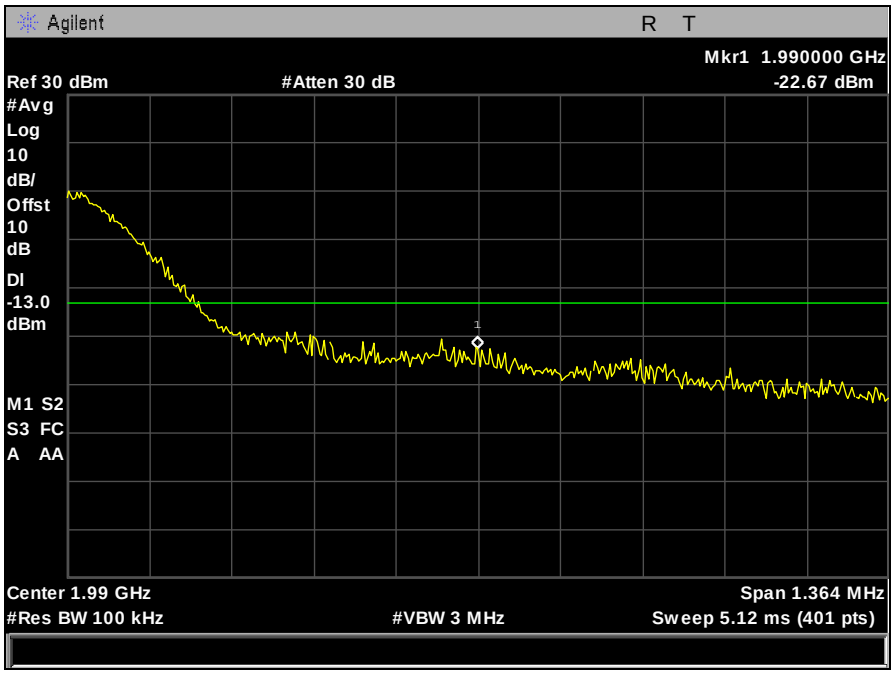


Plot 127. Conducted Band Edge, Beacon Radio, BC1, Channel 1175

Band Edge, EVDO Radio, BC1

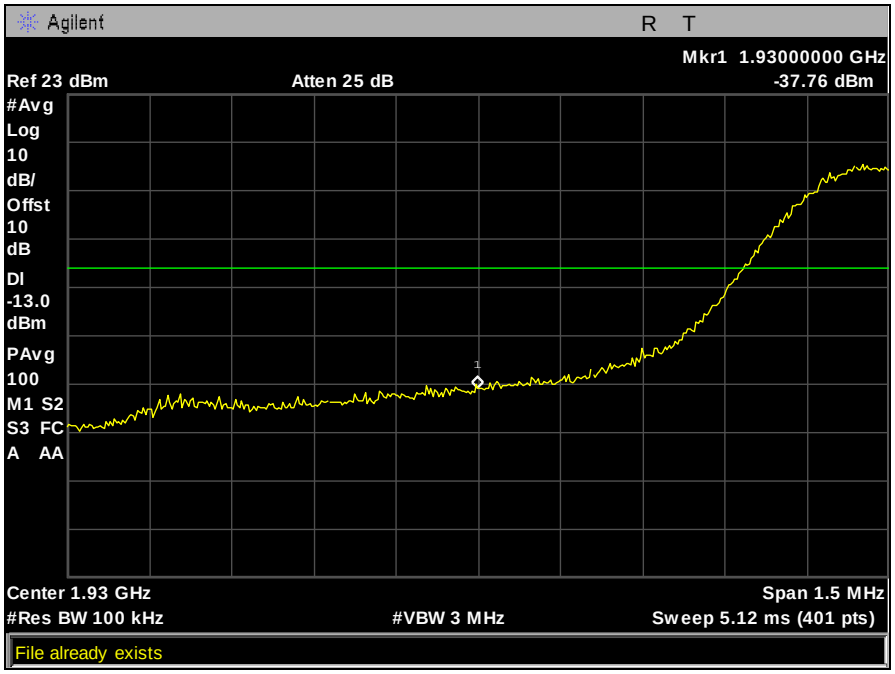


Plot 128. Conducted Band Edge, EVDO Radio, BC1, Channel 25

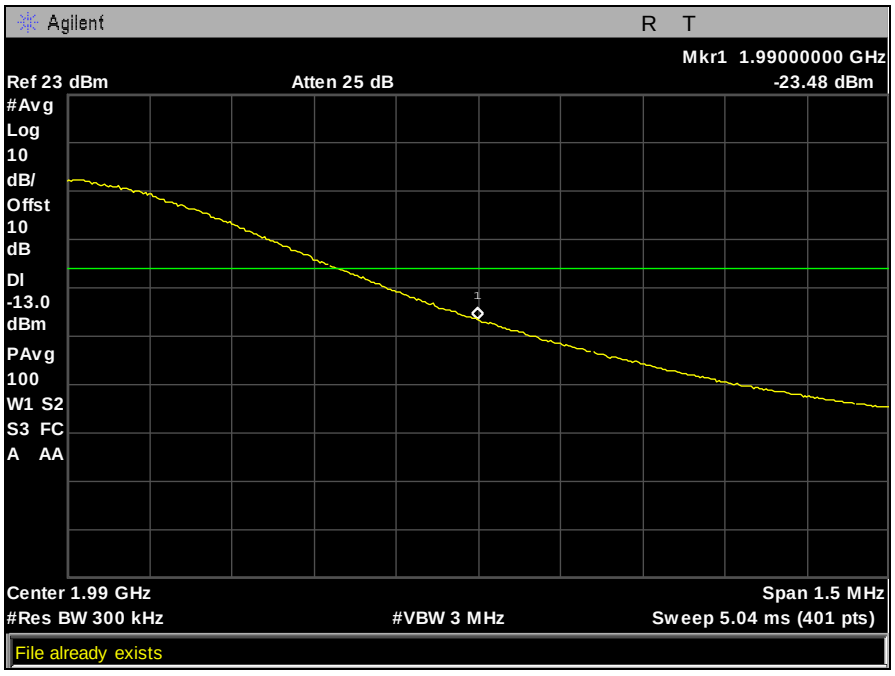


Plot 129. Conducted Band Edge, EVDO Radio, BC1, Channel 1175

Band Edge, OneX Radio, BC1



Plot 130. Conducted Band Edge, OneX Radio, BC1, Channel 25



Plot 131. Conducted Band Edge, OneX Radio, BC1, Channel 1175

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 24.232(d) Peak to Average Ratio

Test Requirement(s): **§ 24.232(d)** Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ration (PAR) of the transmission may not exceed 13 dB.

Test Procedures:

Test Results: Equipment complies with these requirements.

Test Engineer(s): Djed Mouada

Test Date(s): 07/26/16

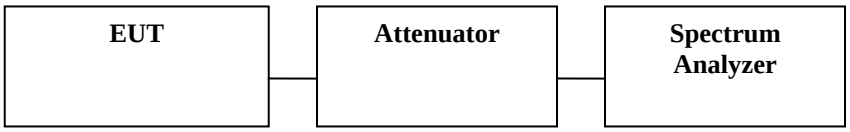


Figure 4. Spurious Emissions at Antenna Terminals Test Setup

Beacon Radio	BCO				
Channel	**Average Power(dBm)**	**Peak Power (dBm)**	**PAR**	**Limit**	**Margin**
Low	4.95	9.44	4.49	13	8.51
Mid	5.68	9.83	4.15	13	8.85
High	5.38	9.57	4.19	13	8.81

Table 5. Peak to Average Ratio, Test Results, Beacon Radio, BC0

Beacon Radio	BC1				
Channel	**Average Power(dBm)**	**Peak Power (dBm)**	**PAR**	**Limit**	**Margin**
Low	3.65	8.36	4.71	13	8.29
Mid	3.85	9.38	5.53	13	7.47
High	4.49	8.74	4.25	13	8.75

Table 6. Peak to Average Ratio, Test Results, Beacon Radio, BC1

EVDO Radio	BC1				
Channel	**Average Power(dBm)**	**Peak Power (dBm)**	**PAR**	**Limit**	**Margin**
Low	13.45	18.95	5.5	13	7.5
Mid	12.82	18.23	5.41	13	7.59
High	12.82	18.54	5.72	13	7.28

Table 7. Peak to Average Ratio, Test Results, EVDO Radio, BC1

OneX Radio	BC1				
Channel	**Average Power(dBm)**	**Peak Power (dBm)**	**PAR**	**Limit**	**Margin**
Low	**12.16**	**16.45**	4.29	13	8.71
Mid	**11.75**	**15.88**	4.13	13	8.87
High	**11.88**	**16.19**	4.31	13	8.69

Table 8. Peak to Average Ratio, Test Results, OneX Radio, BC1

Beacon Radio	BCO (Part22)				
Channel	**Average Power(dBm)**	**Antenna gain (dBi)**	**ERP (W)**	**Limit W**	**Margin**
Low	4.95	**0**	**0.001905**	500	499.9981
Mid	5.68	**0**	**0.002254**	500	499.9977
High	5.38	**0**	**0.002104**	500	499.9979

Table 9. ERP and EIRP, Test Results, Beacon Radio, BC0

Beacon Radio	BC1 (PART24)				
Chanel	**Average Power(dBm)**	**Antenna gain**	**EIRP (W)**	**Limit**	**Margin**
Low	3.65	**0**	**0.002317**	1640	1639.998
Mid	3.85	**0**	**0.002427**	1640	1639.998
High	4.49	**0**	**0.002812**	1640	1639.997

Table 10. ERP and EIRP, Test Results, Beacon Radio, BC1

EVDO Radio	BC1 (PART24)				
	Average Power(dBm)	**Antenna gain**	**EIRP (W)**	**Limit**	**Margin**
Low	13.45	**0**	**0.022131**	1640	1639.978
Mid	12.82	**0**	**0.019143**	1640	1639.981
High	12.82	**0**	**0.019143**	1640	1639.981

Table 11. ERP and EIRP, Test Results, EVDO Radio, BC1

OneX Radio	BC1 (PART24)				
	Average Power(dBm)	**Antenna gain**	**EIRP (W)**	**Limit**	**Margin**
Low	**12.16**	**0**	**0.016444**	1640	1639.984
Mid	**11.75**	**0**	**0.014962**	1640	1639.985
High	**11.88**	**0**	**0.015417**	1640	1639.985

Table 12. ERP and EIRP, Test Results, OneX Radio, BC1

Electromagnetic Compatibility Criteria for Intentional Radiators

§2.1049 Frequency Stability 2.1049

Test Requirement(s): §2.1049 §24.238

Test Procedures: The EUT was placed inside a temperature chamber and Frequency measurements were made at the extremes of the specified temperature range and at intervals of than 10° centigrade through the range. The operating voltage is varied to +/- 15 % of the nominal voltage at normal temperature. The frequency deviations are then compared to frequency of normal operation and shall not exceed 1ppm.

Test Results: Equipment complies with this section.

Test Engineer(s): Djed Mouada

Test Date(s): 07/26/16

Beacon BC1	200				
Voltage (DC)	**Temperature**	**Calculated Frequency**	**Δ Hz**	**Δ ppm**	**Limit**
120	-30	1940.001867	1867	0.962371	1
120	-20	1940	-0.5	0.000258	1
120	-10	1940.00015	150	0.07732	1
120	0	1940	0	0	1
120	10	1940	0	0	1
120	20	1940	----		1
120	30	1939.9985	-1500	0.773196	1
120	40	1939.99855	-1450	0.747423	1
120	50	1940.001805	1805	0.930412	1
102	20	1939.999215	-785.0000002	0.404639	1
138	20	1940	0	0	1

Table 13. Frequency Stability, Test Results, Beacon BC1

EVDO BC1	700				
Voltage (DC)	**Temperature**	**Calculated Frequency**	**Δ Hz**	**Δ ppm**	**Limit**
120	-30	1964.99825	-1750	0.902062	1
120	-20	1965.000256	255.5	0.131701	1
120	-10	1964.999	-1000	0.515464	1
120	0	1964.998575	-1425	0.734536	1
120	10	1964.99825	-1750	0.902062	1
120	20	1965	----		1
120	30	1964.998355	-1645	0.847938	1
120	40	1965.0019	1900	0.979381	1
120	50	1964.998288	-1712.5	0.882732	1
102	20	1964.99875	-1250	0.64433	1
138	20	1965	0	0	1

Table 14. Frequency Stability, Test Results, EVDO BC1

EVDO OneX	500				
Voltage (DC)	**Temperature**	**Calculated Frequency**	**Δ Hz**	**Δ ppm**	**Limit**
120	-30	1955.001903	1902.775	0.980812	1
120	-20	1955.001505	1504.525	0.775528	1
120	-10	1955.001006	1006.03	0.518572	1
120	0	1955.001505	1504.525	0.775528	1
120	10	1954.9986	-1400	0.721649	1
120	20	1955	----		1
120	30	1955.00025	250	0.128866	1
120	40	1955.00006	60	0.030928	1
120	50	1955.001011	1010.65	0.520954	1
102	20	1955.0017	1700	0.876289	1
138	20	1955	0	0	1

Table 15. Frequency Stability, Test Results, EVDO OneX

Maximum Permissible Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit: EUT's operating frequencies @ 869-894 MHz and 1930-1990 MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{(PG / 4\pi S)}$$

where, S = Power Density (mW/cm^2)
P = Power Input to antenna (mW)
G = Antenna Gain (numeric value)
R = Distance (cm)

Test Results:

FCC									
Frequency (MHz)	**Con. Pwr. (dBm)**	**Con. Pwr. (mW)**	**Ant. Gain (dBi)**	**Ant. Gain numeric**	**Pwr. Density (mW/cm^2)**	**Limit (mW/cm^2)**	**Margin**	**Distance (cm)**	**Result**
1931	12.16	16.444	0	1	0.00327	1	0.99673	20	Pass
1931	14.35	27.227	0	1	0.00542	1	0.99458	20	Pass
1989	4.49	2.812	0	1	0.00056	1	0.99944	20	Pass
889.2	5.68	3.698	0	1	0.00074	1	0.99926	20	Pass

The safe distance where Power Density is less than the MPE Limit listed above was found to be 20 cm.

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	10/08/2015	04/08/2017
1T4771	PSA SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	01/25/2015	07/25/2016
1T4149	HIGH-FREQUENCY ANECHOIC CHAMBER	RAY PROOF	81	NOT REQUIRED	
1T4300	SEMI-ANECHOIC CHAMBER # 1 (NSA)	EMC TEST SYSTEMS	NONE	02/06/2015	02/06/2018
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	02/26/2016	08/26/2017
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	10/29/2014	10/29/2016
1T4859	DIGITAL BAROMETER, HYGROMETER, THERMOMETER	CONTROL COMPANY	15-078-198, FB70423, 245CD	02/10/2016	02/10/2018
1T4505	TEMPERATURE CHAMBER	TESTEQUITY	115	2/11/2016	2/11/2017

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

End of Report

