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

January 24, 2017

KEYW Corporation
7767 Old Telegraph Rd.
Severn, MD 21144

Dear Ken O'Brien,

Enclosed is the EMC Wireless test report for compliance testing of the KEYW Corporation, MPBTS as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 22 Subpart H and Industry Canada RSS-132 Issue 3 for Cellular Devices, CC Part 24 Subpart E and Industry Canada RSS-133 Issue 6 for Broadband PCS Devices, and Part 27 and Industry Canada RSS-139 Issue 3 for Broadband Radio Service (BRS) 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: (\KEYW Corporation\EMC87554B-FCC22_24_27 Rev. 1)

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Electromagnetic Compatibility Criteria
Test Report

for the

KEYW Corporation
Model MPBTS

Tested under
FCC Certification Rules
Title 47 of the CFR,
Part 22 Subpart H and RSS-132 Issue 3 for Cellular Devices;
Part 24 Subpart E and RSS-133 Issue 6 for Broadband PCS Devices
& Part 27 and RSS-139 for BRS Service

MET Report: EMC87554B-FCC22_24_27 Rev. 1

January 24, 2017

Prepared For:

KEYW Corporation
7767 Old Telegraph Rd.
Severn, MD 21144

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

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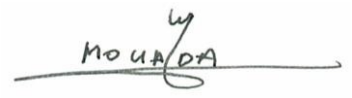

Djed Mouada
Project Engineer, Electromagnetic Compatibility Lab

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, Part 24 Subpart E, and Part 27 of the FCC Rules and Industry Canada standards RSS-132 Issue 3 January 2013, RSS-133 Issue 6 January 2013, and RSS-139 Issue 3 July 2015 under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	July 27, 2016	Initial Issue
1	January 24, 2017	Added MPE.

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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**er**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**er**z**
kPa	**k**ilo**pa**scal
kV	**k**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**micro**henry
µ	**micro**farad
µs	**micro**seconds
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 KEYW Corporation MPBTS, with the requirements of Part 22 Subpart H, Part 24 Subpart E, and Part 27. 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 MPBTS. KEYW Corporation should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the MPBTS, 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, Part 24 Subpart E, and Part 27, in accordance with KEYW Corporation, purchase order number B003491.

FCC Reference	IC Reference	Description	Compliance
§2.1049; §22.917; §24.232(d); §27.50(d)(5)	RSS-GEN Issue 4	Occupied Bandwidth	Compliant
§2.1049, §24.238; §27.54	RSS-132 Issue 3 (5.3) RSS-133 Issue 6 (6.3) RSS-139 Issue 3 (6.4)	Frequency stability	Compliant
§24.323 (d); §27.50(d)(5)	N/A	Peak to Average Ration	Compliant
§2.1051; §22.917, §24.238; §27.53(g)	RSS-132 Issue 3 (5.5) RSS-133 Issue 6 (6.5) RSS-139 Issue 3 (6.6)	Conducted Spurious Emissions at Antenna Terminals and Band Edge	Compliant
§2.1046; §22.913; §24.232; §27.50(d)	RSS-132 Issue 3 (5.4) RSS-133 Issue 6 (6.4) RSS-139 Issue 3 (6.5)	RF Power Output (EIRP)	Compliant
§2.1053; §22.917, §24.238; §27.53(g)	RSS-132 Issue 3 (5.5) RSS-133 Issue 6 (6.5) RSS-139 Issue 3 (6.6)	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 KEYW Corporation to perform testing on the MPBTS, under KEYW Corporation's purchase order number B003491.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the KEYW Corporation, MPBTS.

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

Model(s) Tested:	MPBTS				
Model(s) Covered:	MPBTS				
Filing Status:	Original				
EUT Specifications:	Primary Power: 120 VAC, 60 Hz				
	FCC ID: 2AFYU67287				
	Type of Modulations:	LTE			
	Equipment Code:	AMP			
	RF Power Output	Part 22 ERP(W): 41.78	Part 24 EIRP(W): 46.98	Part 27 ERP(W): 27.03	Part 27 EIRP(W): 15.17
	EUT Frequency Ranges:	869-894 MHz	1930-1990 MHz	734-746 MHz	2110-2155 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):	January 24, 2017				

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
CFR 47, Part 27	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 27: Rules and Regulations for Advanced Wireless 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-139 Issue 3 July 2015	Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz
RSS-GEN Issue 4 November 2014	General Requirements for Compliance of Radio Apparatus
ANSI C63.4:2014	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-D-2010	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 (MPBTS), Equipment Under Test (EUT), is a high-power, multi-protocol, multi-carrier capable base station that can be used for many cellular applications. The system is intended to be used in mobile environments installed in a vehicle with room mounted antenna, but can also function as a fixed base station.

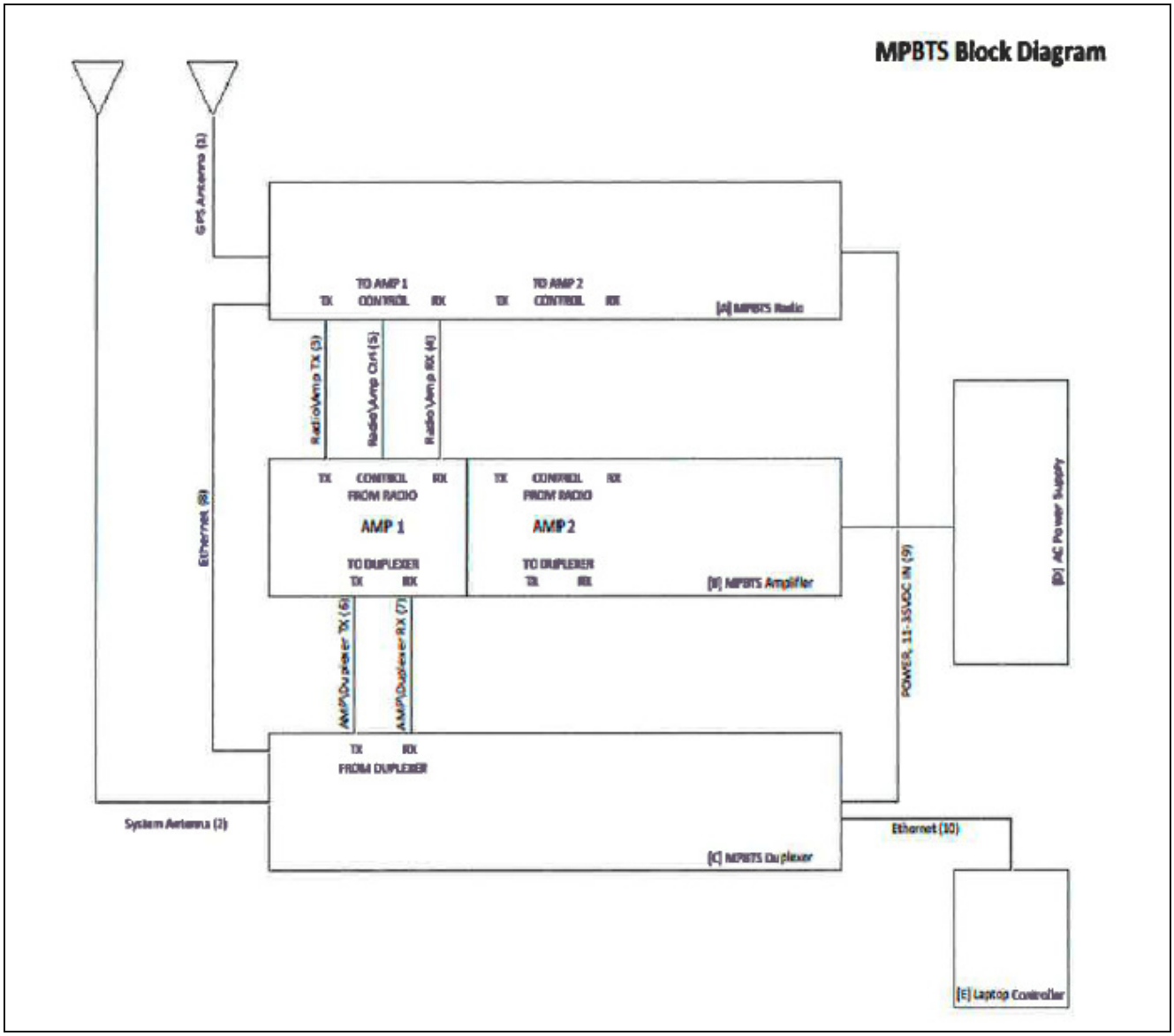


Figure 1. Block Diagram of Equipment Configuration

E. Equipment Configuration

Ref. ID	Name/Description	Model Number	Part Number	Serial Number
A	MPBTS Radio	TBD	--	TBD
B	MPBTS Amplifier	TBD	--	TBD
C	MPBTS Duplexer	TBD	--	TBD
D	Power Supply	TBD	--	TBD

Table 2. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
--	System/GPS Dual Feed Antenna	Huber Suhner	1399.99.0120	--
E	Laptop Controller	Dell	ATG	--

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	[A] GPS Antenna	LMR200	1	15’	Yes	GSP Antenna
2	[C] System Antenna	LMR400	1	<10’	Yes	System Antenna
3	[A] To Amp 1 TX	LMR400	1	<18”	Yes	[B] From Radio TX
4	[A] To Amp 1 RX	LMR400	1	<18”	Yes	[B] From Radio RX
5	[A] To Amp 1 Control	24AWG, 12 Conductor	1	<18”	Yes	[B] From Radio Control
6	[B] To Duplexer TX	LMR400	1	<18”	Yes	[C] From Amp TX
7	[B] to Duplexer RX	LMR400	1	<18”	Yes	[C] From Amp RX
8	[A] Ethernet	8 Conductor, CAT5	1	--	No	[C] Ethernet (Port 2)
9	[A,B,C] Power, 11-35VDC In	14AWG, 4 Conductor SJ Cable	3	--	No	AC Power Supply
10	[C] Ethernet	8 Conductor, CAT5	1	--	No	Laptop Controller

Table 4. Ports and Cabling Information

H. Mode of Operation

The MPBTS continuously transmits a broadcast signal as part of its normal operation. There is no special operating mode required for testing.

I. Method of Monitoring EUT Operation

1. A blinking green heartbeat indicator in the GUI and green LEDs on the radio and amplifier front panels indicate normal operation of the system.
2. Any other LED status or lack of the green heartbeat indicator indicates a problem with 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 KEYW Corporation. 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.

§27.50(d):

(2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

(3) A licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. Operations with power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers (75 miles) of the base or fixed station operating in this band: all Broadband Radio Service (BRS) licensees authorized under Part 27 in the 2155-2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110-2155 MHz band.

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 configured in accordance with the licensed measurement guidance procedure. 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.

RF power output measurement was made at the RF output terminal using a spectrum analyzer, with suitable attenuation where appropriate.

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

Test Engineer(s): Djed Mouada

Test Date(s): 12/21/15

Channel	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (W)	Limit (W)
Low	31.49	9	6.82	500
Mid	39.36	9	41.78	500
High	31.66	9	7.09	500

Table 5. ERP, Test Results, Part 22, 5 MHz

Channel	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (W)	Limit (W)
Low	29.38	9	4.19	500
Mid	39.35	9	41.68	500
High	29.84	9	4.66	500

Table 6. ERP, Test Results, Part 22, 10 MHz

Channel	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (W)	Limit (W)
Low	32.43	9	13.89	1640
Mid	37.72	9	46.98	1640
High	36.38	9	34.51	1640

Table 7. EIRP, Test Results, Part 24, 5 MHz

Channel	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (W)	Limit (W)
Low	32.67	9	14.68	1640
Mid	36.87	9	38.63	1640
High	32.49	9	14.09	1640

Table 8. EIRP, Test Results, Part 24, 10 MHz

Channel	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (W)	Limit (W)
Low	31.05	9	6.16595	1000
Mid	37.47	9	27.03958	1000
High	32.13	9	7.906786	1000

Table 9. EIRP, Test Results, Part 27, 5 MHz, LTE700

Channel	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (W)	Limit (W)
Low	30.09	9	8.10	1640
Mid	32.81	9	15.17	1640
High	32.54	9	14.25	1640

Table 10. EIRP, Test Results, Part 27, 5 MHz, LTE2100

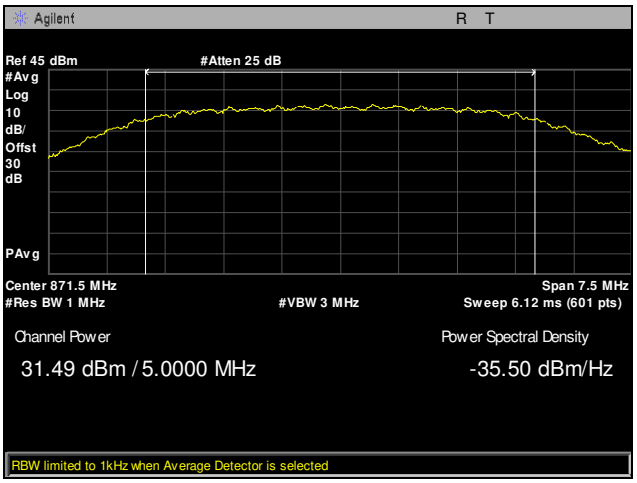
Channel	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (W)	Limit (W)
Low	29.92	9	4.75	1000
Mid	29.67	9	4.48	1000
High	29.65	9	4.46	1000

Table 11. EIRP, Test Results, Part 27, 10 MHz, LTE700

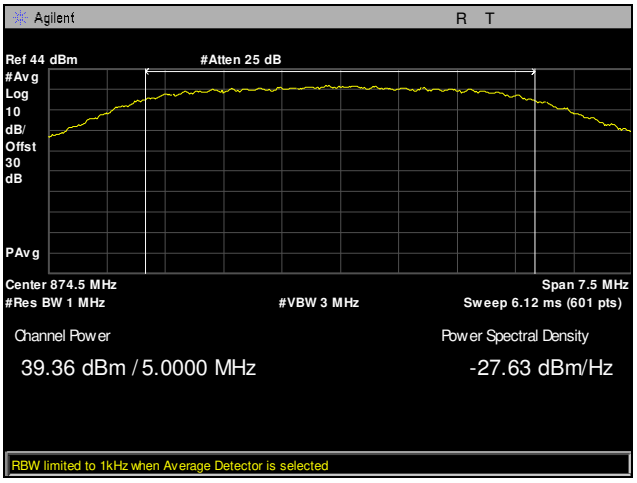
Channel	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (W)	Limit (W)
Low	30.54	9	8.99	1640
Mid	32.78	9	15.06	1640
High	31.72	9	11.80	1640

Table 12. EIRP, Test Results, Part 27, 10 MHz, LTE2100

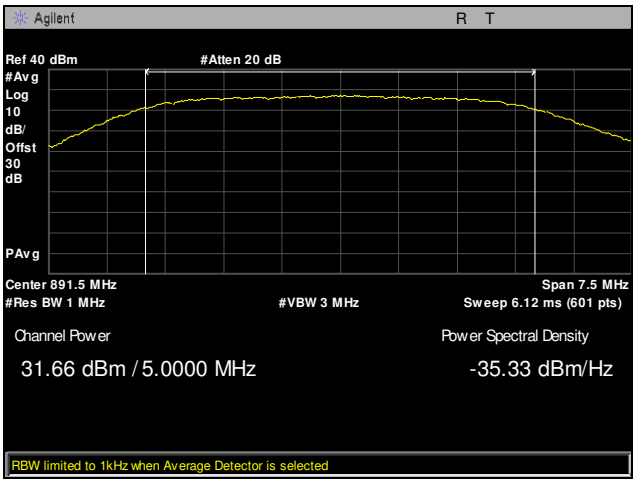
Part 22, ERP, 5 MHz



Plot 1. ERP, Channel 2425, Conducted Power, Part 22, 5 MHz

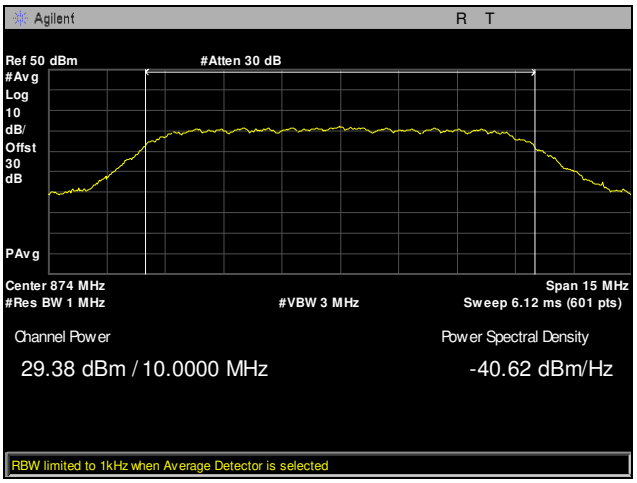


Plot 2. ERP, Channel 2455, Conducted Power, Part 22, 5 MHz

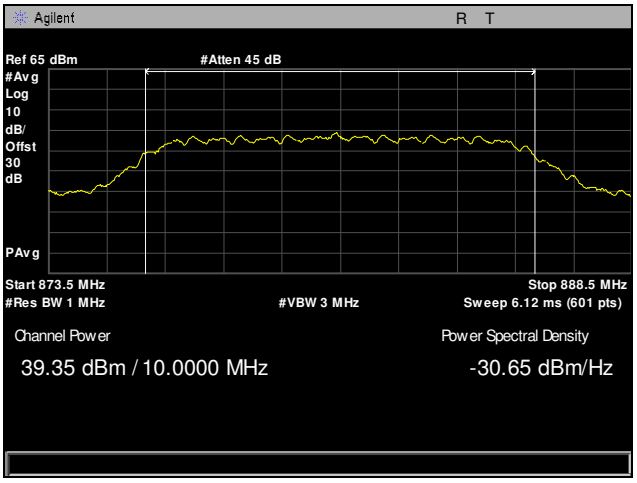


Plot 3. ERP, Channel 2625, Conducted Power, Part 22, 5 MHz

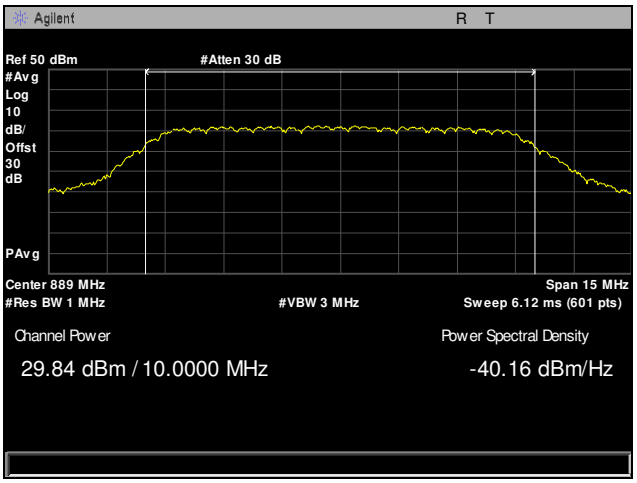
Part 22, ERP, 10 MHz



Plot 4. ERP, Channel 2450, Conducted Power, Part 22, 10 MHz

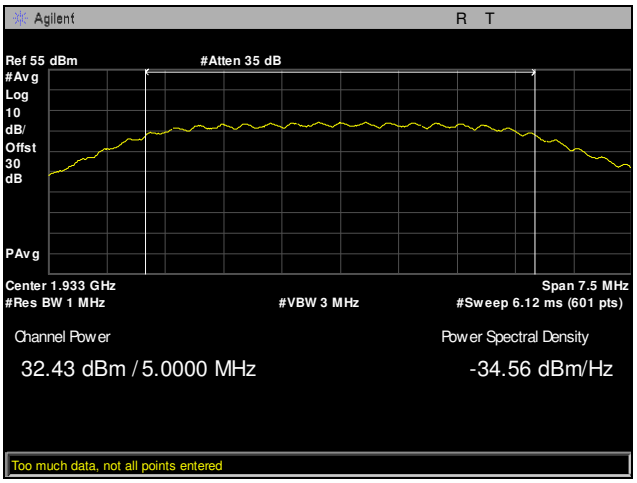


Plot 5. ERP, Channel 2520, Conducted Power, Part 22, 10 MHz

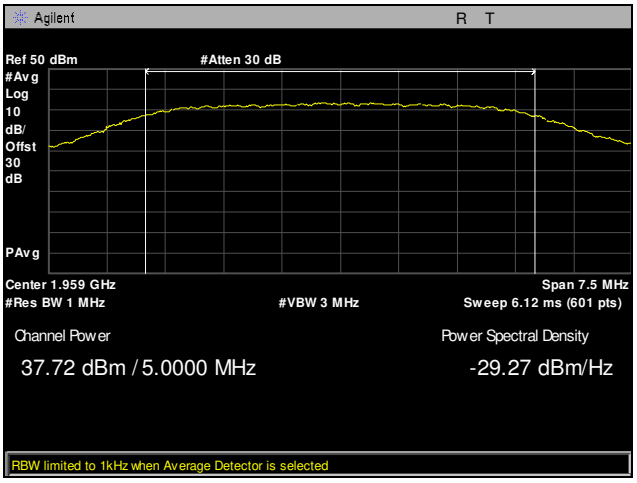


Plot 6. ERP, Channel 2600, Conducted Power, Part 22, 10 MHz

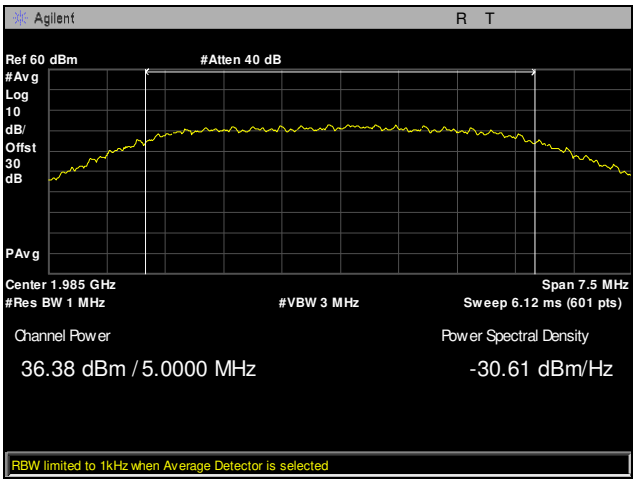
Part 24, EIRP, 5 MHz



Plot 7. EIRP, Channel 625, Conducted Power, Part 24, 5 MHz

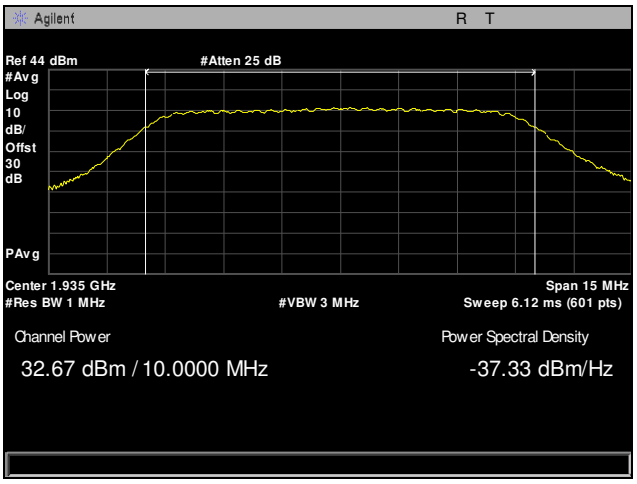


Plot 8. EIRP, Channel 890, Conducted Power, Part 24, 5 MHz

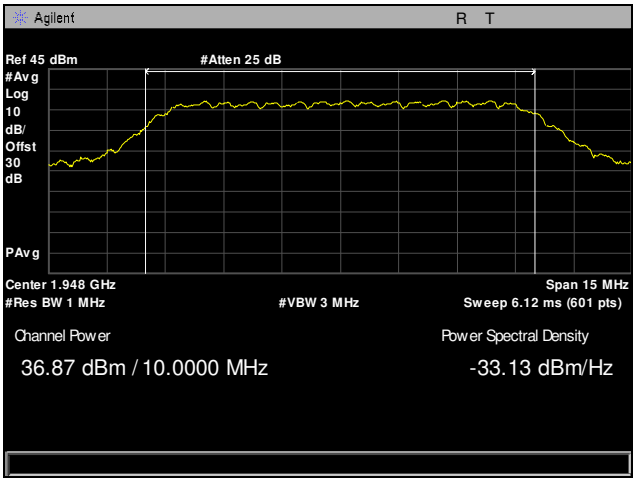


Plot 9. EIRP, Channel 1150, Conducted Power, Part 24, 5 MHz

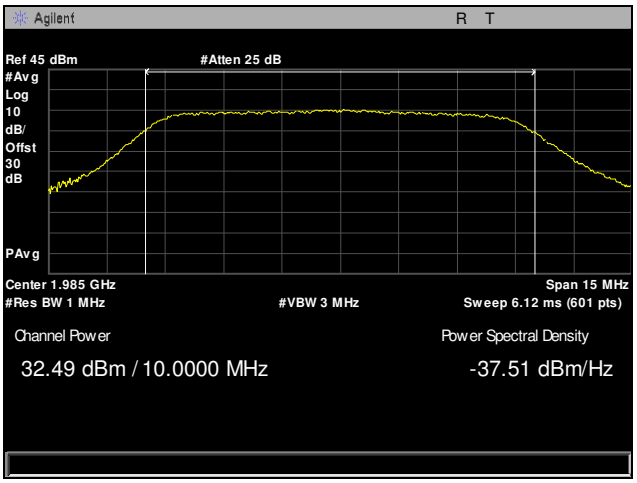
Part 24, EIRP, 10 MHz



Plot 10. EIRP, Channel 650, Conducted Power, Part 24, 10 MHz

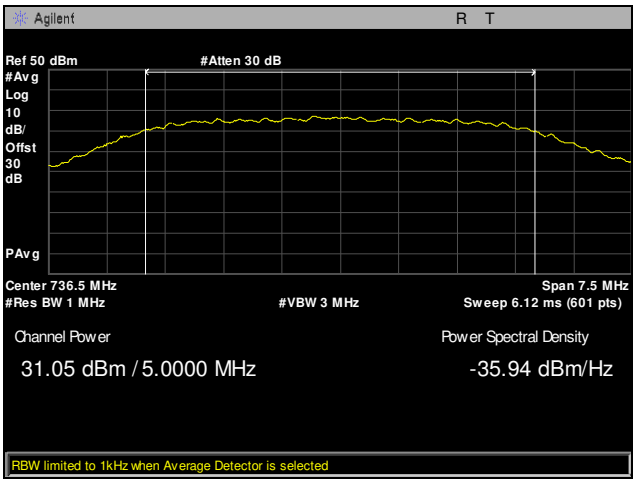


Plot 11. EIRP, Channel 780, Conducted Power, Part 24, 10 MHz

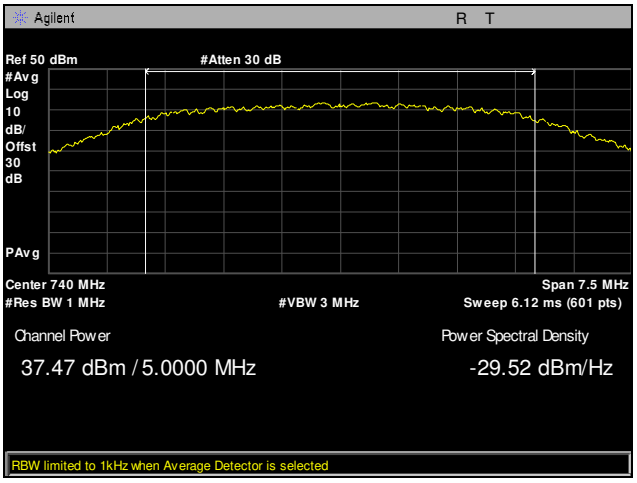


Plot 12. EIRP, Channel 1150, Conducted Power, Part 24, 10 MHz

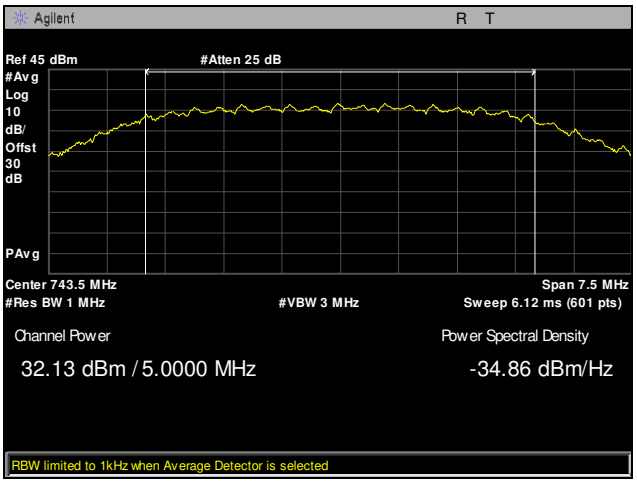
Part 27, EIRP, 5 MHz, LTE700



Plot 13. EIRP, Channel 5755, Conducted Power, Part 27, 5 MHz, LTE700

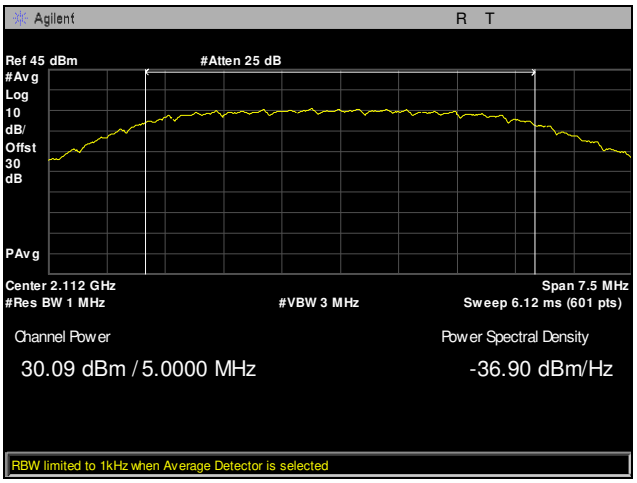


Plot 14. EIRP, Channel 5790, Conducted Power, Part 27, 5 MHz, LTE700

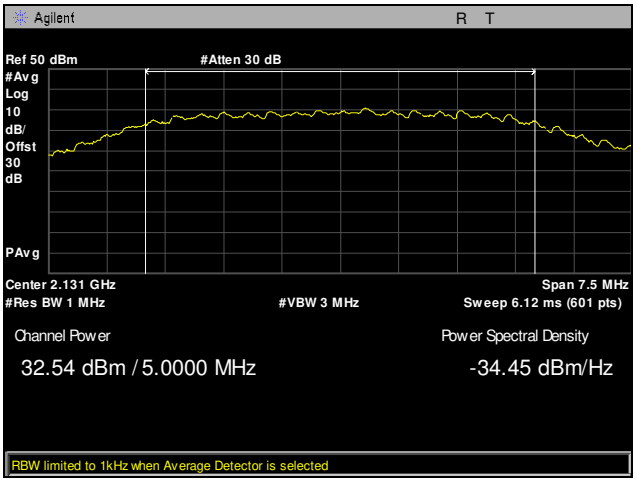


Plot 15. EIRP, Channel 5825, Conducted Power, Part 27, 5 MHz, LTE700

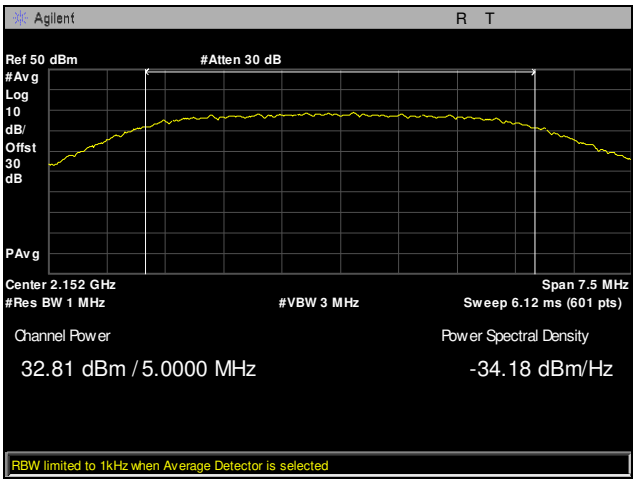
Part 27, EIRP, 5 MHz, LTE2100



Plot 16. EIRP, Channel 1975, Conducted Power, Part 27, 5 MHz, LTE2100

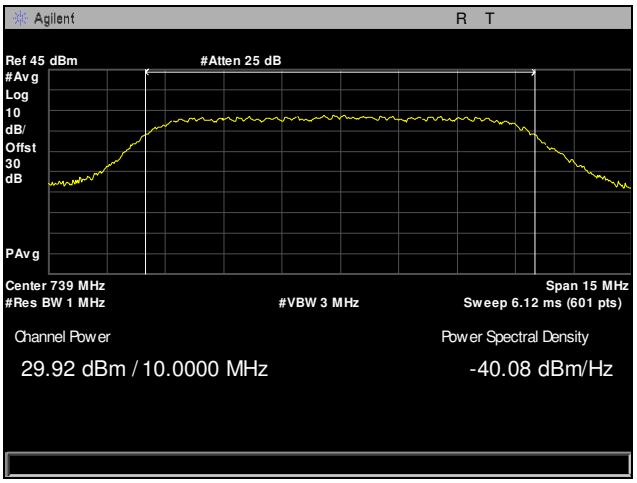


Plot 17. EIRP, Channel 2160, Conducted Power, Part 27, 5 MHz, LTE2100

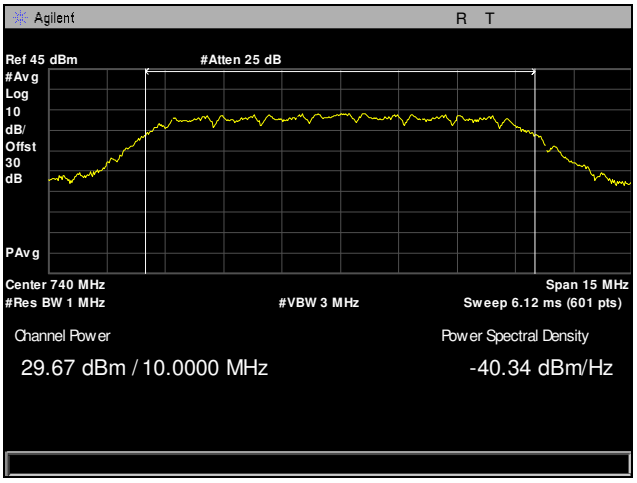


Plot 18. EIRP, Channel 2375, Conducted Power, Part 27, 5 MHz, LTE2100

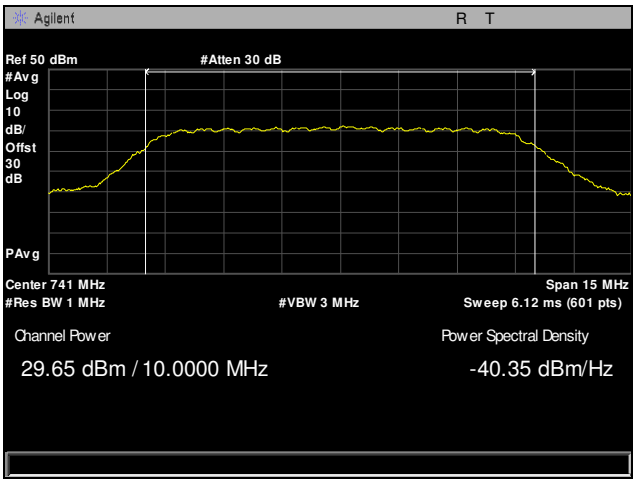
Part 27, EIRP, 10 MHz, LTE700



Plot 19. EIRP, Channel 5780, Conducted Power, Part 27, 10 MHz, LTE700

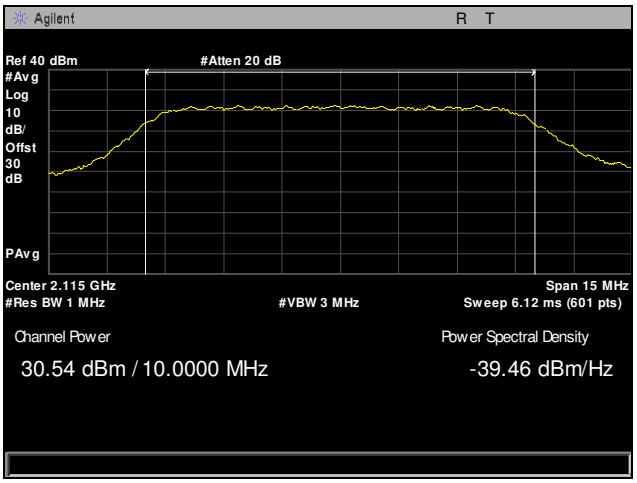


Plot 20. EIRP, Channel 5790, Conducted Power, Part 27, 10 MHz, LTE700

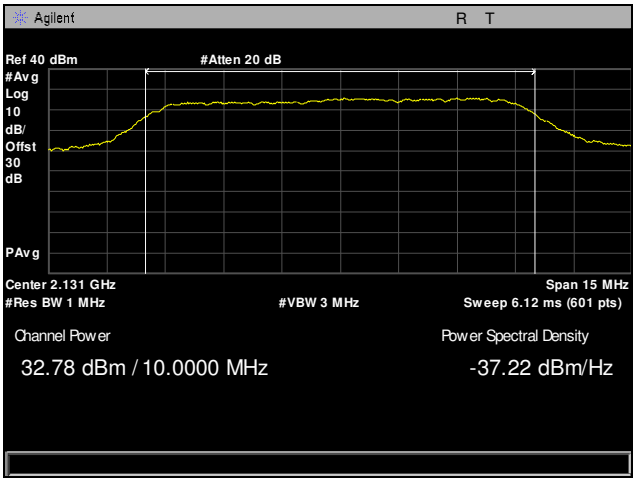


Plot 21. EIRP, Channel 5800, Conducted Power, Part 27, 10 MHz, LTE700

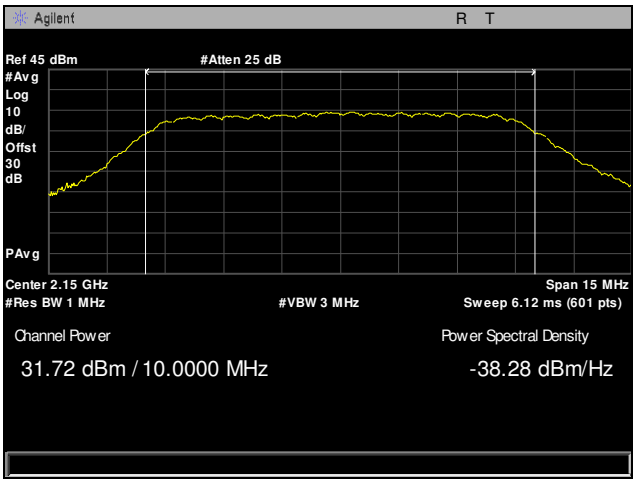
Part 27, EIRP, 10 MHz, LTE2100



Plot 22. EIRP, Channel 2000, Conducted Power, Part 27, 10 MHz, LTE2100



Plot 23. EIRP, Channel 2160, Conducted Power, Part 27, 10 MHz, LTE2100



Plot 24. EIRP, Channel 2350, Conducted Power, Part 27, 10 MHz, LTE2100

§ 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 spectrum analyzer was set in accordance with the licensed measurement procedure guidance. Measurements were carried out at the low, mid, and high channels of the TX band.

Occupied bandwidth measurements were made with a Spectrum Analyzer connected to the RF output of the amplifier, as well as the input to the amplifier.

The modulation characteristics of the base station were measured first at a maximum RF level prescribed by the OEM. The base station was then connected to the input of the amplifier and was operated at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

Test Results: Equipment complies with FCC requirements.

Test Engineer(s): Djed Mouada

Test Date(s): 11/25/15

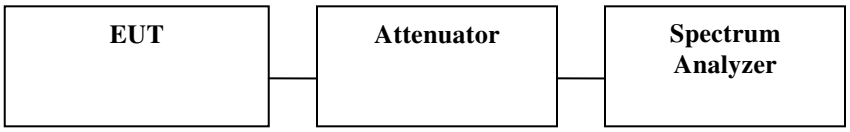
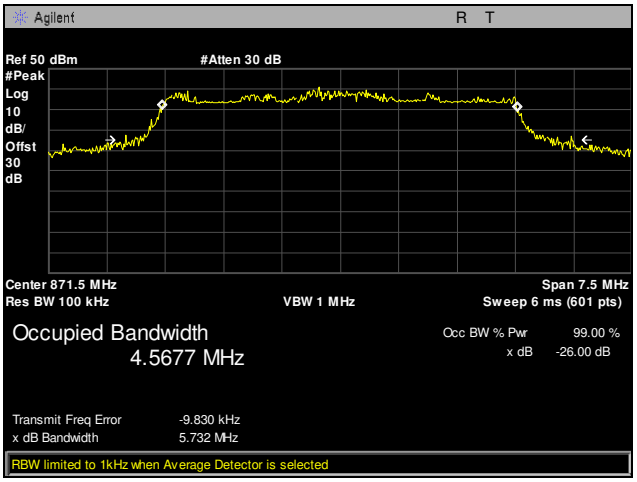
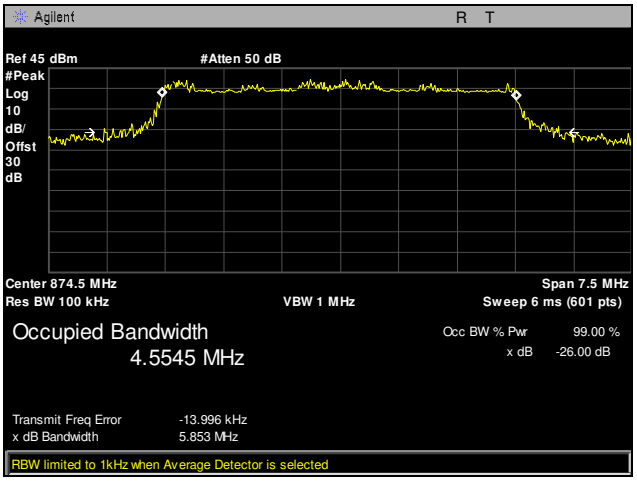


Figure 2. Occupied Bandwidth Test Setup

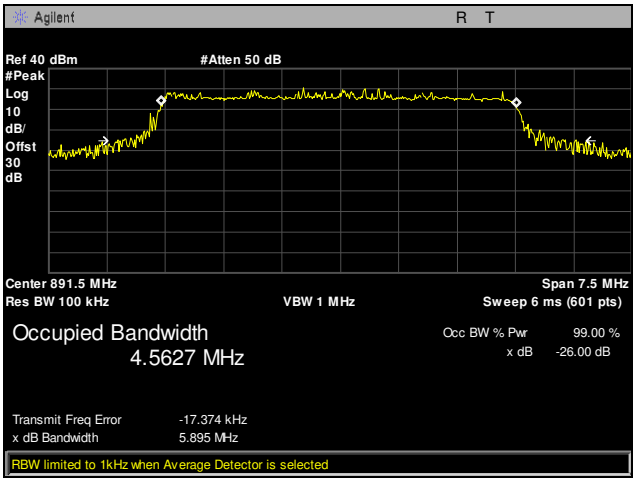
Part 22, 5 MHz



Plot 25. Occupied Bandwidth, Channel 2425, Part 22, 5 MHz

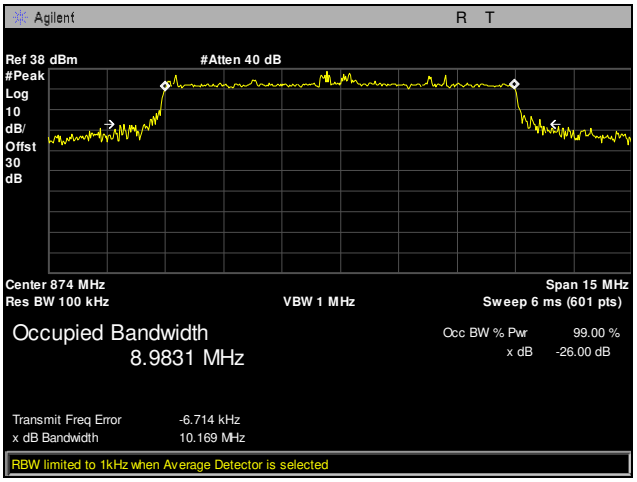


Plot 26. Occupied Bandwidth, Channel 2455, Part 22, 5 MHz

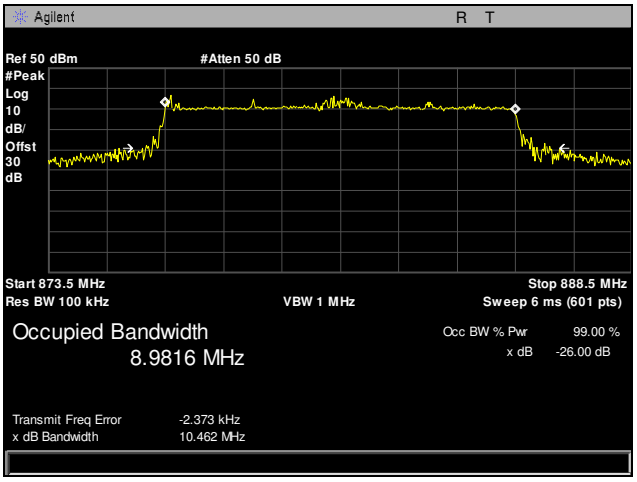


Plot 27. Occupied Bandwidth, Channel 2625, Part 22, 5 MHz

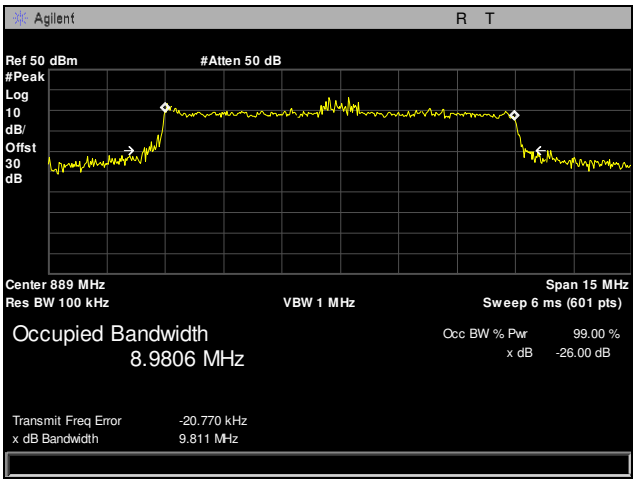
Part 22, 10 MHz



Plot 28. Occupied Bandwidth, Channel 2450, Part 22, 10 MHz

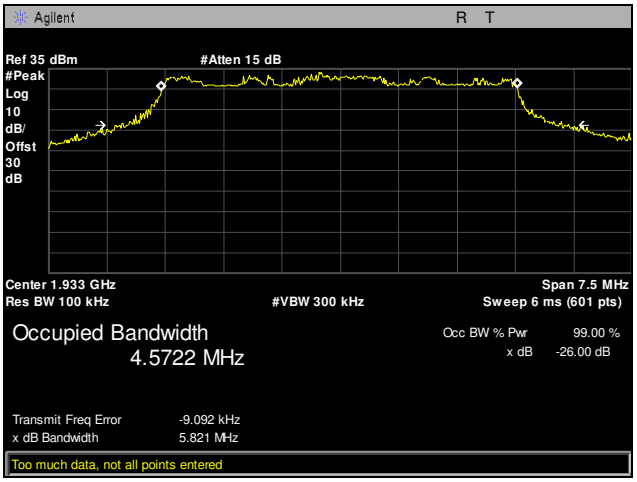


Plot 29. Occupied Bandwidth, Channel 2520, Part 22, 10 MHz

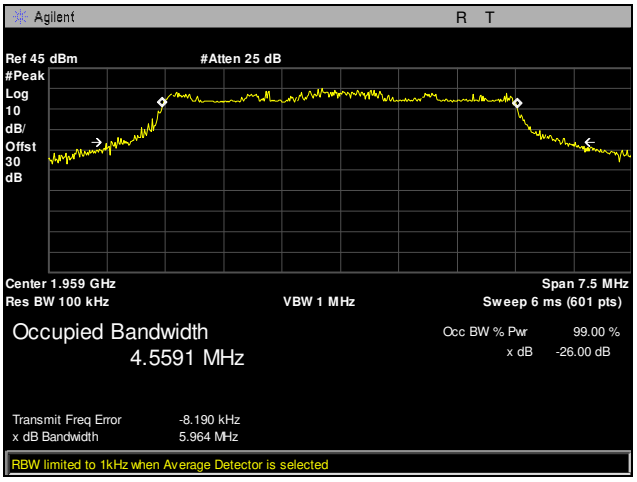


Plot 30. Occupied Bandwidth, Channel 2600, Part 22, 10 MHz

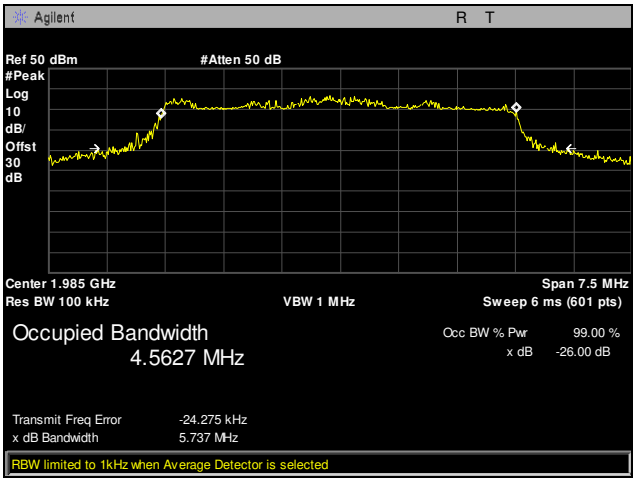
Part 24, 5 MHz



Plot 31. Occupied Bandwidth, Channel 625, Part 24, 5 MHz

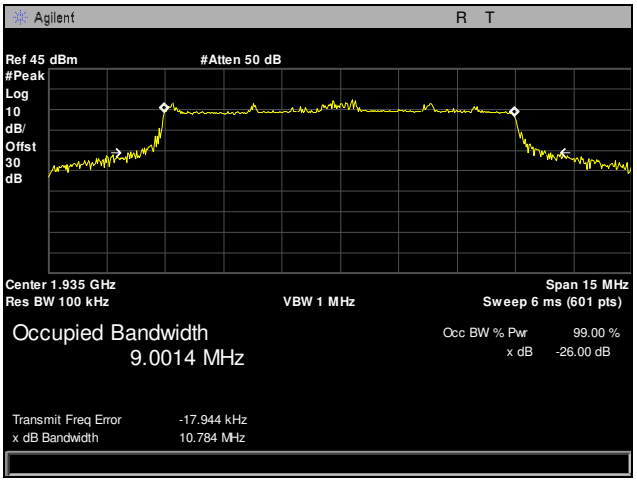


Plot 32. Occupied Bandwidth, Channel 890, Part 24, 5 MHz

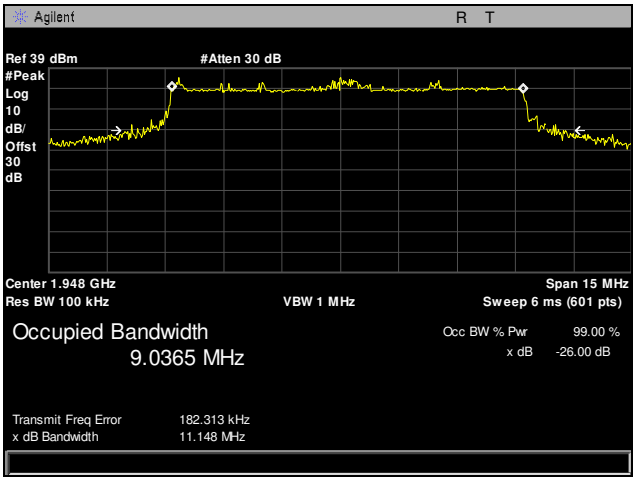


Plot 33. Occupied Bandwidth, Channel 1150, Part 24, 5 MHz

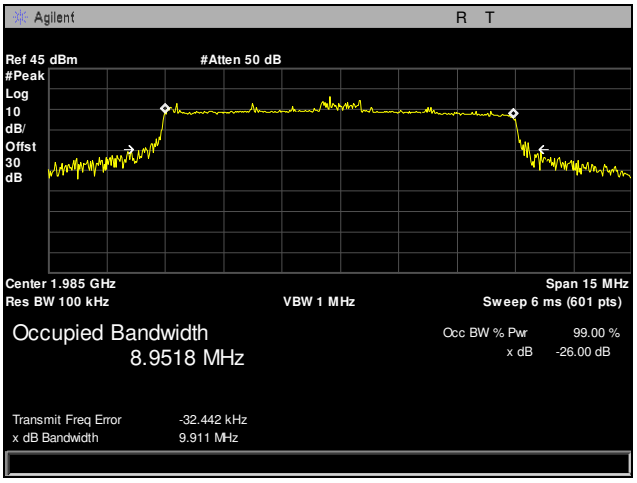
Part 24, 10 MHz



Plot 34. Occupied Bandwidth, Channel 650, Part 24, 10 MHz

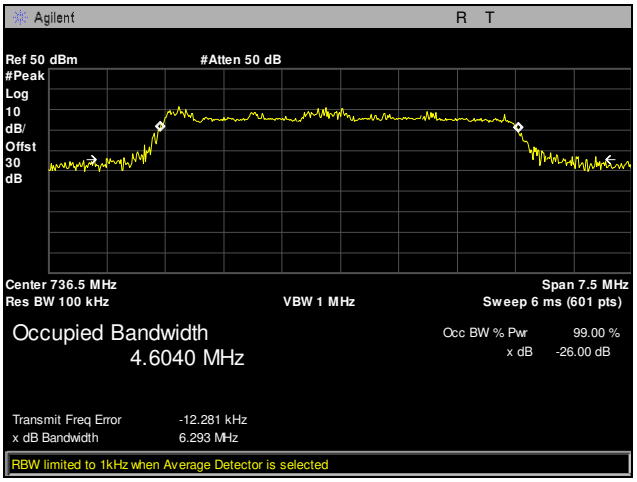


Plot 35. Occupied Bandwidth, Channel 780, Part 24, 10 MHz

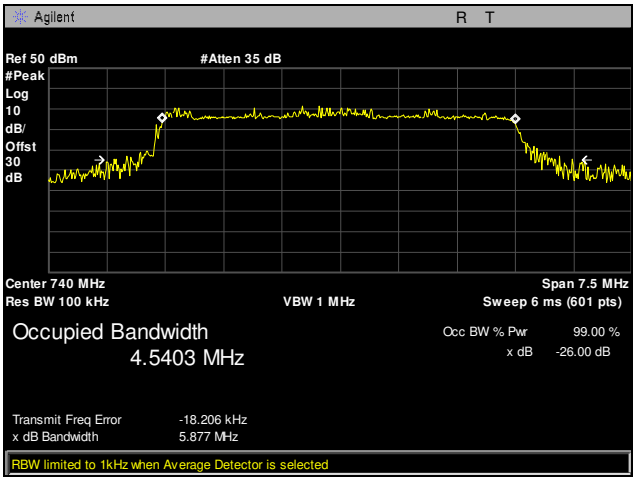


Plot 36. Occupied Bandwidth, Channel 1150, Part 24, 10 MHz

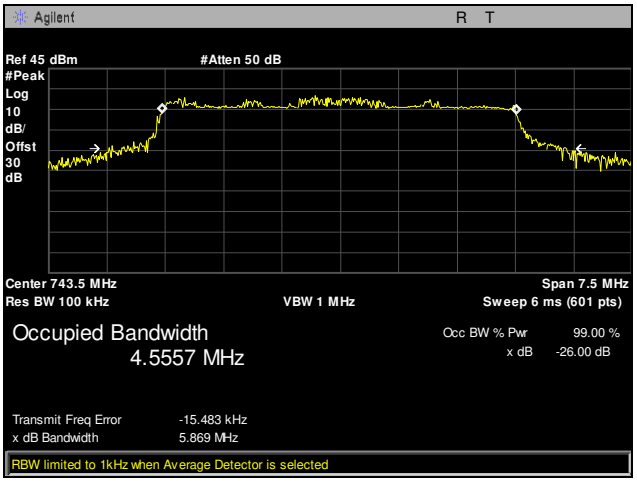
Part 27, 5 MHz, LTE700



Plot 37. Occupied Bandwidth, Channel 5755, Part 27, 5 MHz, LTE700

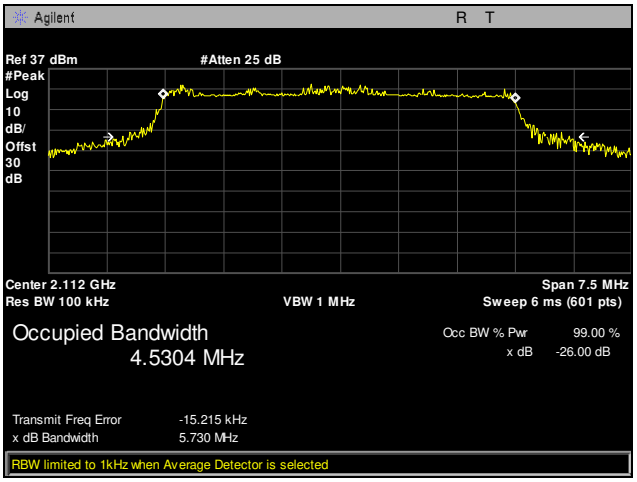


Plot 38. Occupied Bandwidth, Channel 5790, Part 27, 5 MHz, LTE700

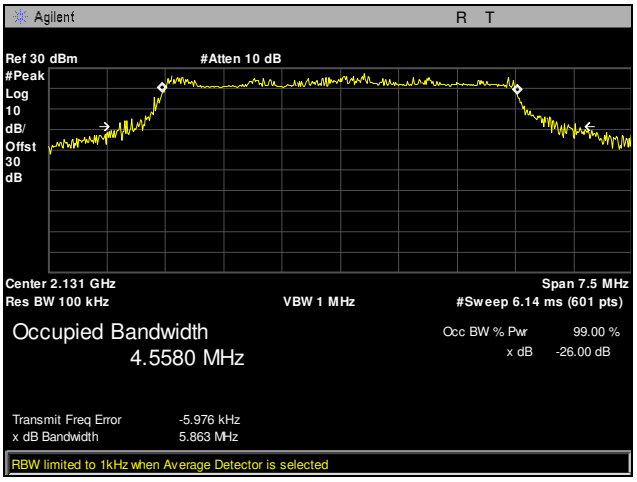


Plot 39. Occupied Bandwidth, Channel 5825, Part 27, 5 MHz, LTE700

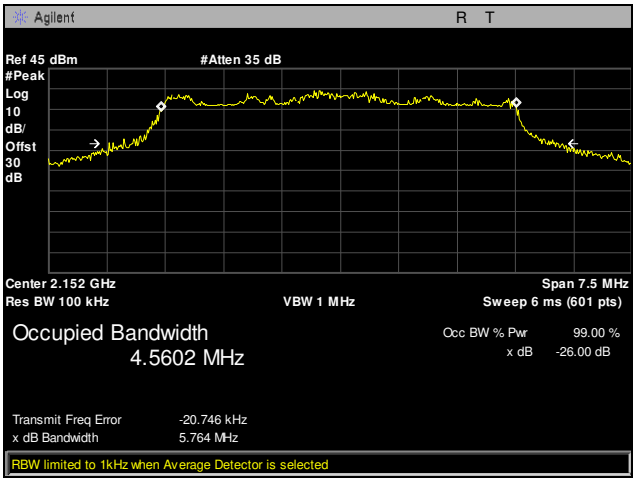
Part 27, 5 MHz, LTE2100



Plot 40. Occupied Bandwidth, Channel 1975, Part 27, 5 MHz, LTE2100

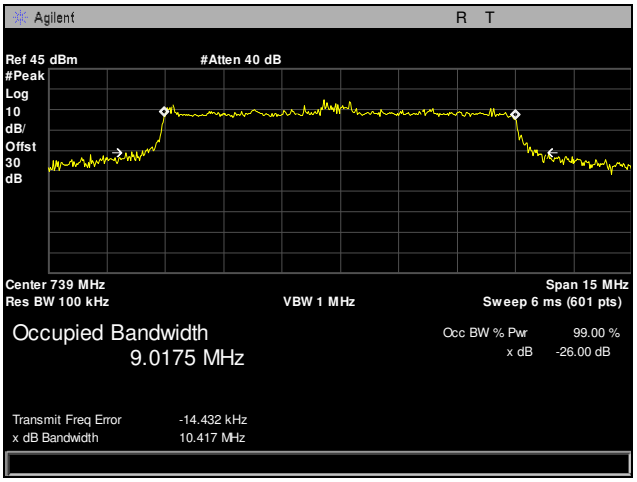


Plot 41. Occupied Bandwidth, Channel 2160, Part 27, 5 MHz, LTE2100

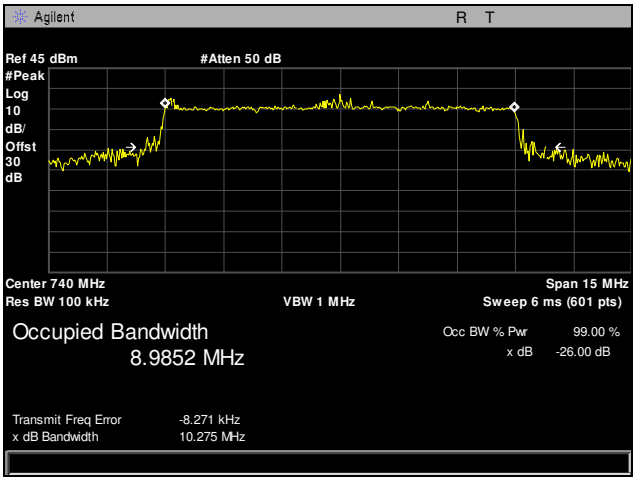


Plot 42. Occupied Bandwidth, Channel 2375, Part 27, 5 MHz, LTE2100

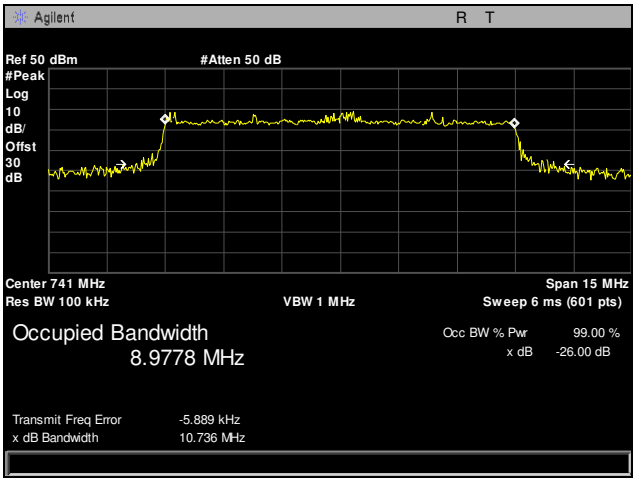
Part 27, 10 MHz, LTE700



Plot 43. Occupied Bandwidth, Channel 5780, Part 27, 10 MHz, LTE700

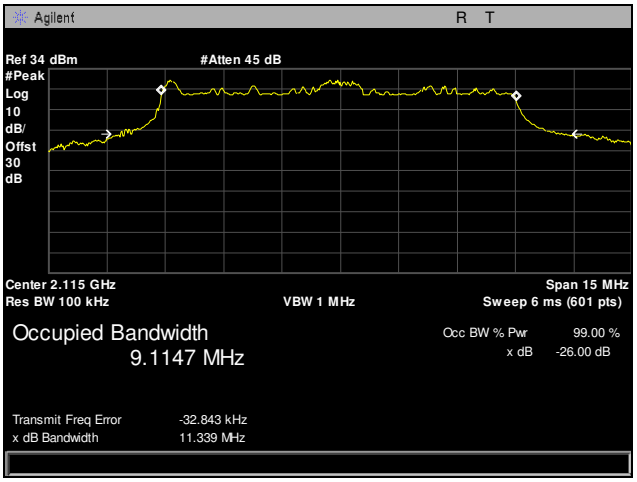


Plot 44. Occupied Bandwidth, Channel 5790, Part 27, 10 MHz, LTE700

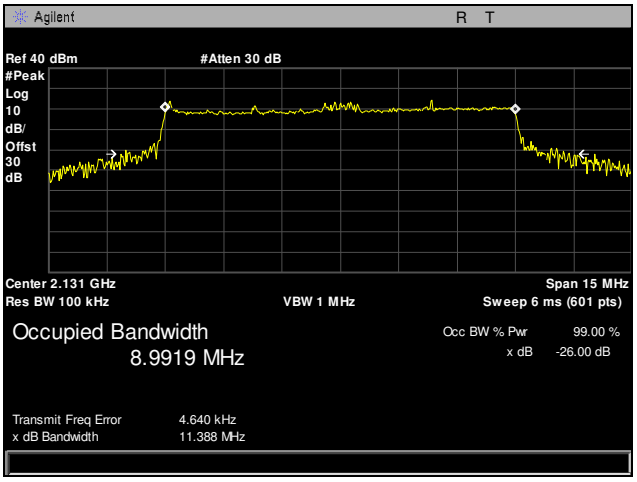


Plot 45. Occupied Bandwidth, Channel 5800, Part 27, 10 MHz, LTE700

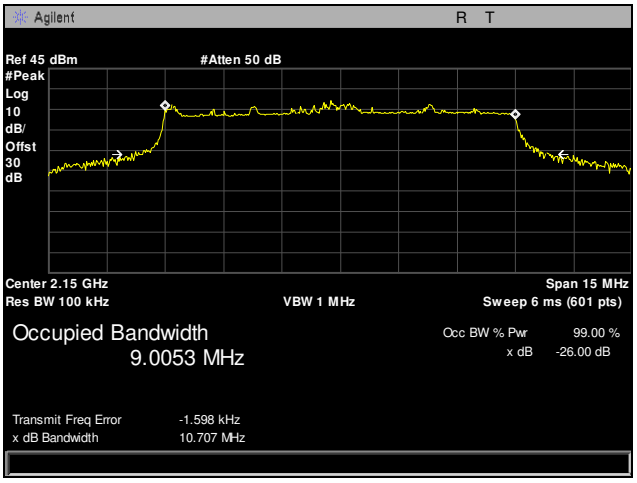
Part 27, 10 MHz, LTE2100



Plot 46. Occupied Bandwidth, Channel 2000, Part 27, 10 MHz, LTE2100



Plot 47. Occupied Bandwidth, Channel 2160, Part 27, 10 MHz, LTE2100



Plot 48. Occupied Bandwidth, Channel 2350, Part 27, 10 MHz, LTE2100

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).

27.53(h) Measurements required: Field strength of spurious radiation.

For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emissions outside a licensee's frequency block shall be attenuated below the transmitter power P by at least 43+10log(P).

Test Procedures:

As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* was made in accordance with the procedures of EIA/TIA-603-D-2010 "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 configured in accordance with the licensed measurement guidance, and as per rule Parts 22 and 27.

The distance between the EUT and the test antenna was 3 meters for below 1 GHz and 1m for frequencies above 1 GHz. The EUT's RF ports were connected to a dummy load. The intensities of the radiated emissions were maximized by rotating the turntable 360 degrees and varying the receive antenna from 1 to 4m. Measurements were made with the receive antenna in both horizontal and vertical polarizations.

Test Results:

Equipment complies with Section 2.1053. The limit for spurs is -13 dBm. Measurements revealed that no spurs came even close to this limit. Therefore, measurements using substitution method were not performed. Also, testing was performed using a CW signal. The following plots have been corrected.

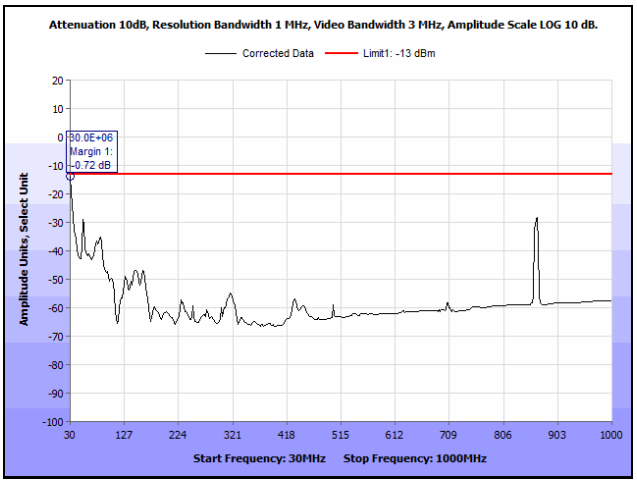
Test Engineer:

Djed Mouada

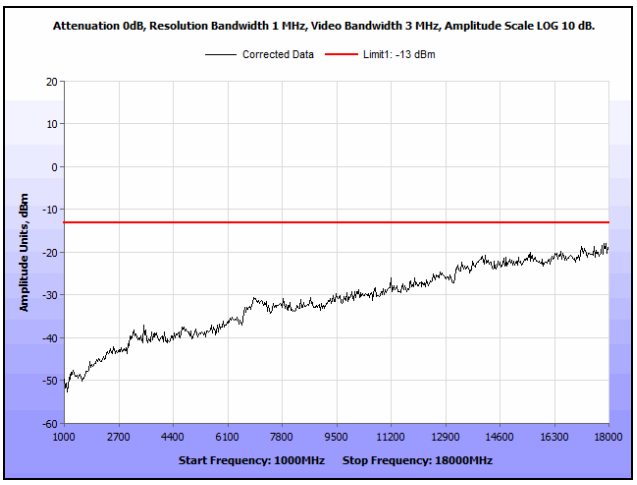
Test Date(s):

12/22/15

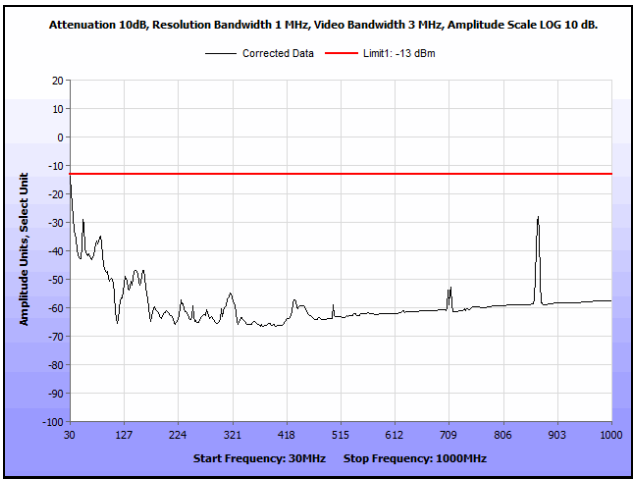
Radiated Spurious Emissions, Part 22, 5 MHz



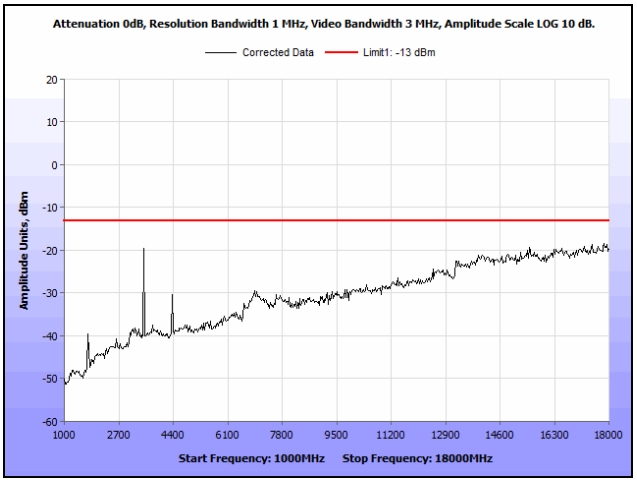
Plot 49. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 22, 5 MHz



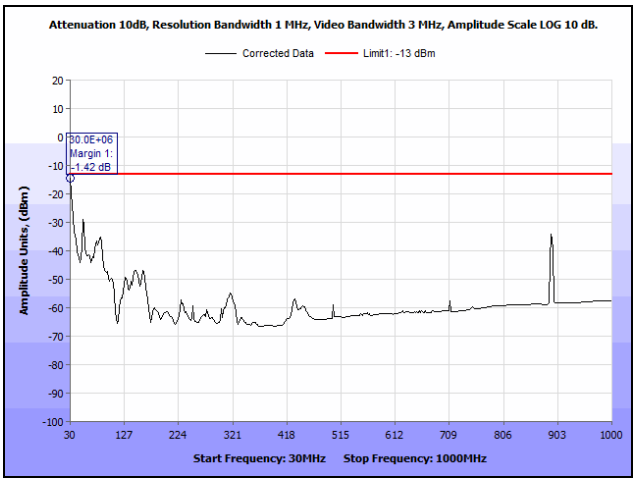
Plot 50. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 22, 5 MHz



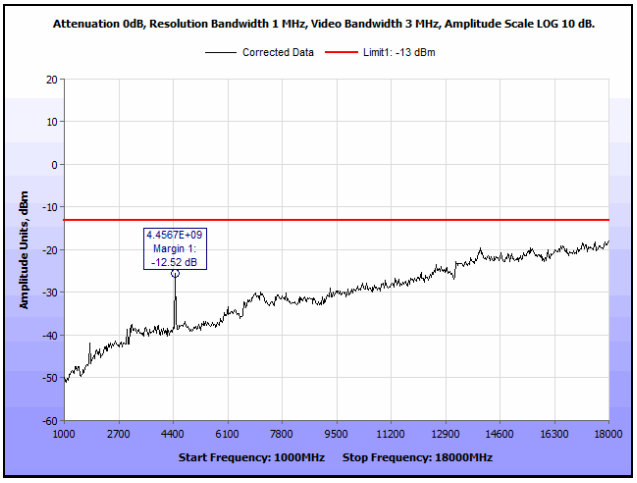
Plot 51. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 22, 5 MHz



Plot 52. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 22, 5 MHz

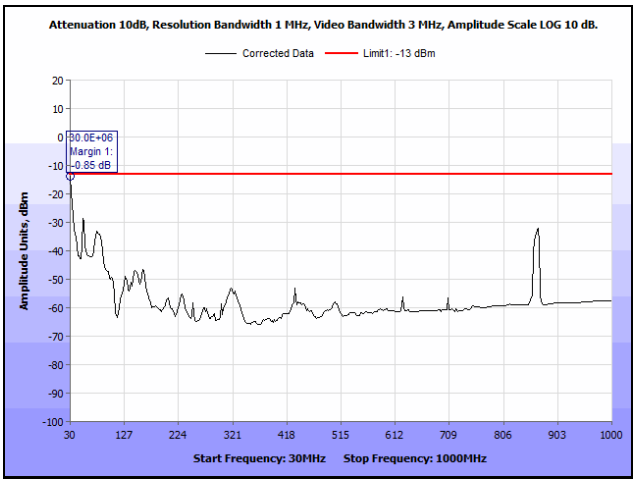


Plot 53. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 22, 5 MHz

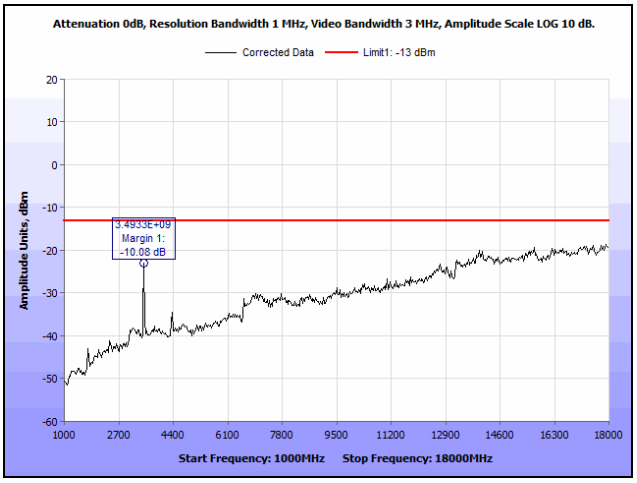


Plot 54. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 22, 5 MHz

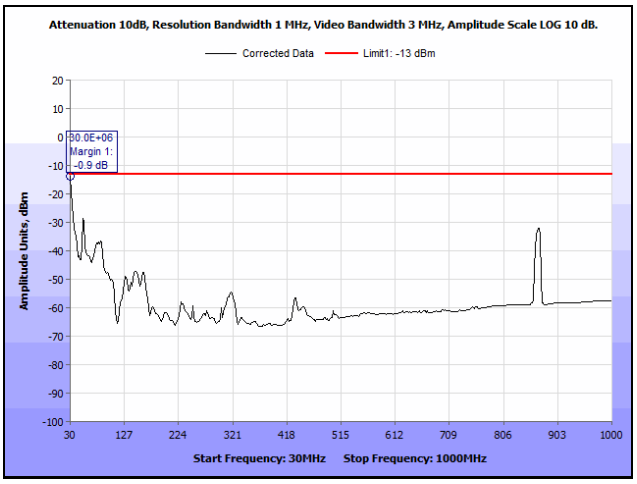
Radiated Spurious Emissions, Part 22, 10 MHz



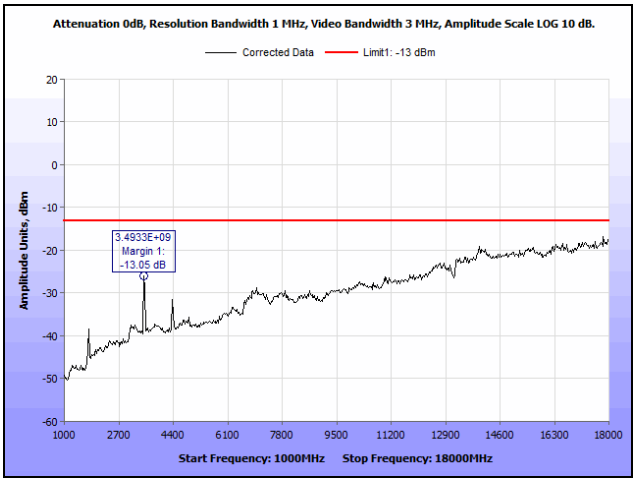
Plot 55. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 22, 10 MHz



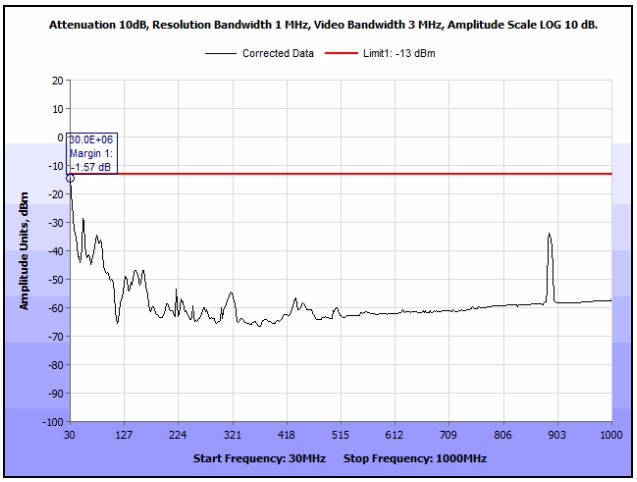
Plot 56. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 22, 10 MHz



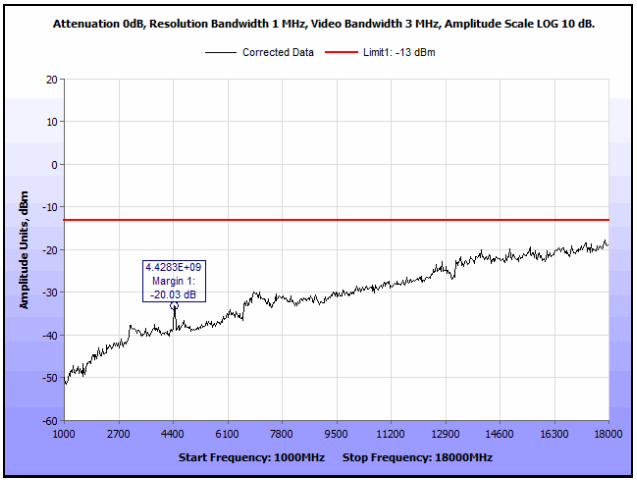
Plot 57. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 22, 10 MHz



Plot 58. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 22, 10 MHz

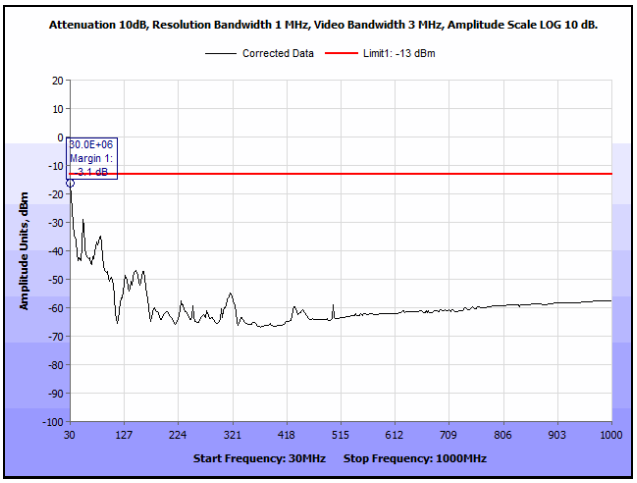


Plot 59. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 22, 10 MHz

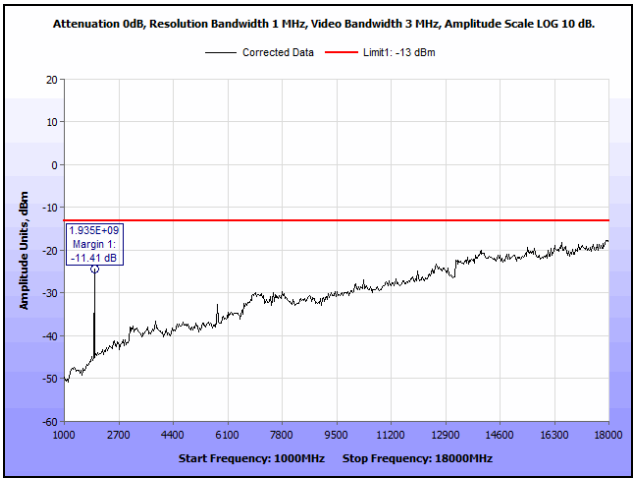


Plot 60. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 22, 10 MHz

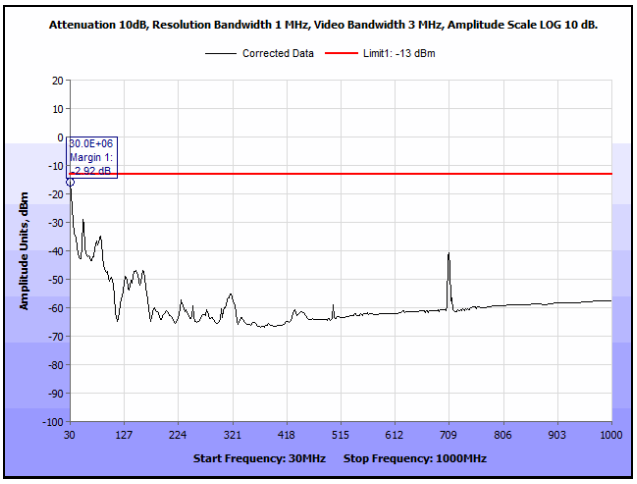
Radiated Spurious Emissions, Part 24, 5 MHz



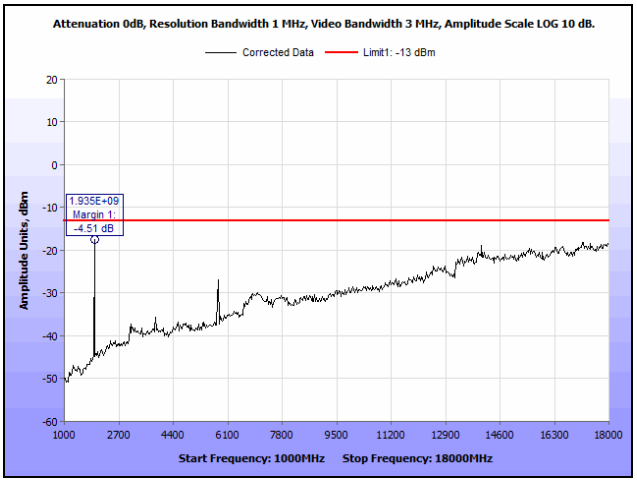
Plot 61. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 24, 5 MHz



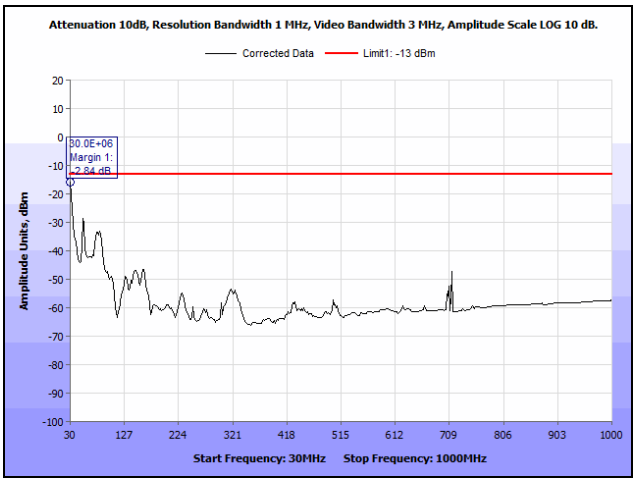
Plot 62. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 24, 5 MHz



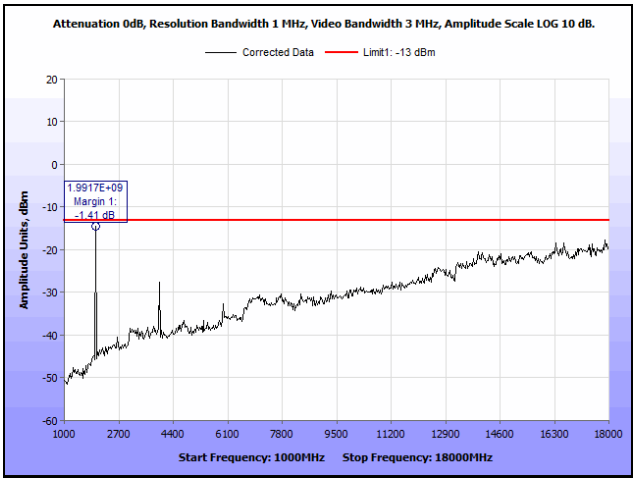
Plot 63. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 24, 5 MHz



Plot 64. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 24, 5 MHz

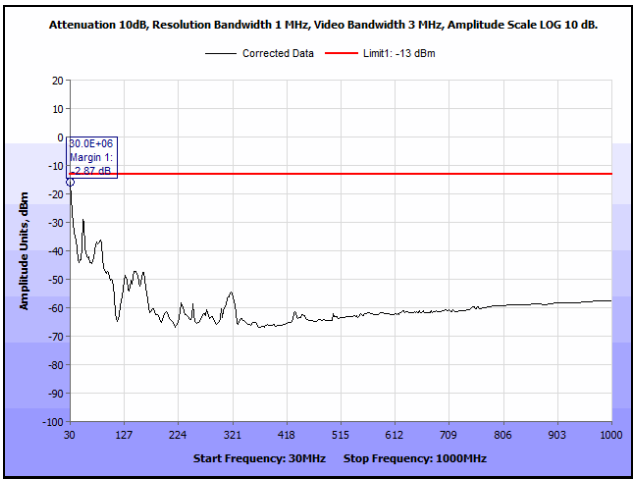


Plot 65. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 24, 5 MHz

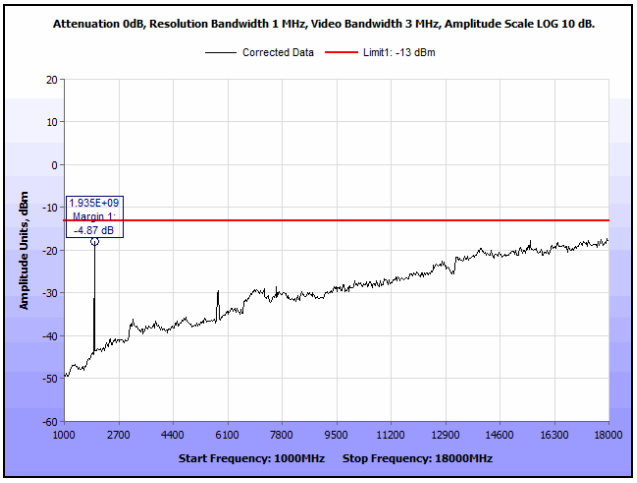


Plot 66. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 24, 5 MHz

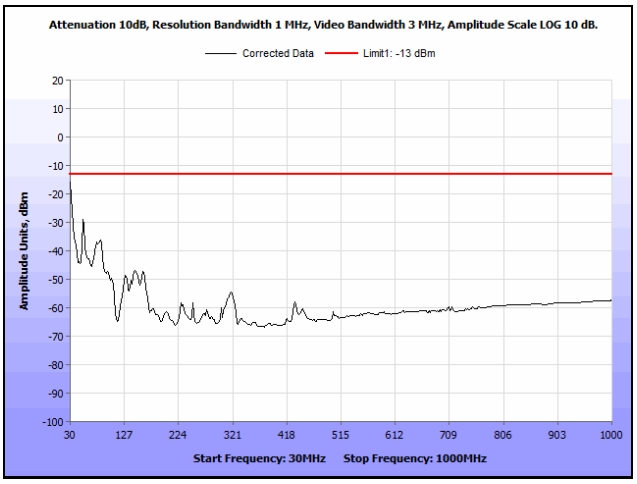
Radiated Spurious Emissions, Part 24, 10 MHz



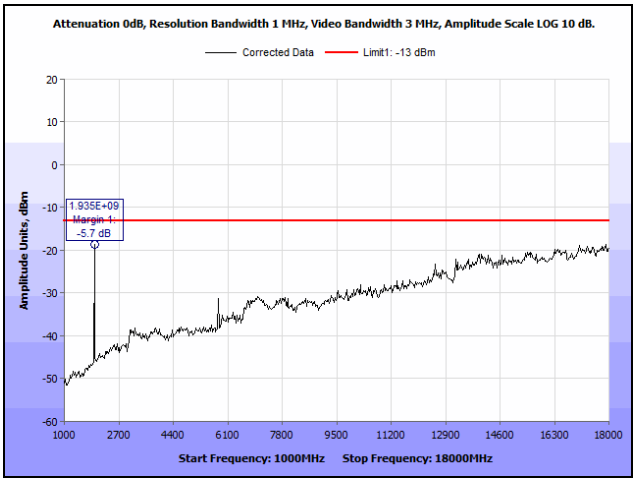
Plot 67. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 24, 10 MHz



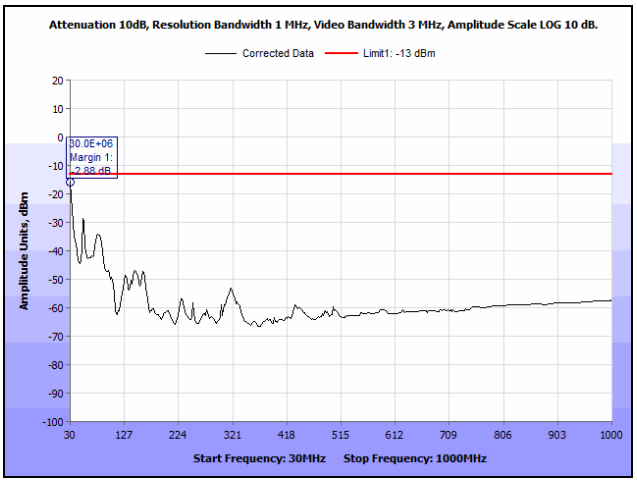
Plot 68. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 24, 10 MHz



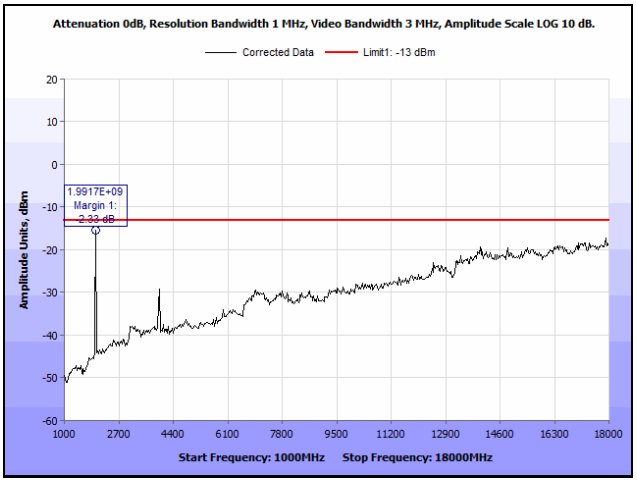
Plot 69. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 24, 10 MHz



Plot 70. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 24, 10 MHz

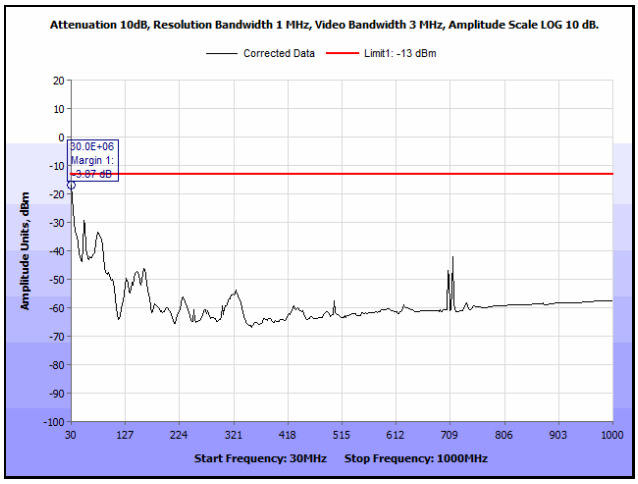


Plot 71. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 24, 10 MHz

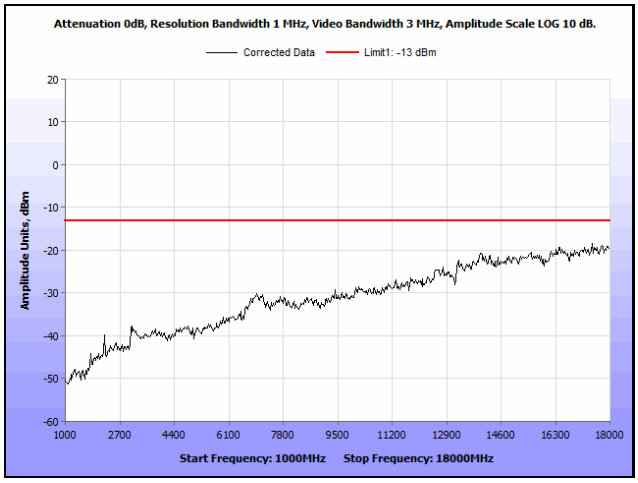


Plot 72. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 24, 10 MHz

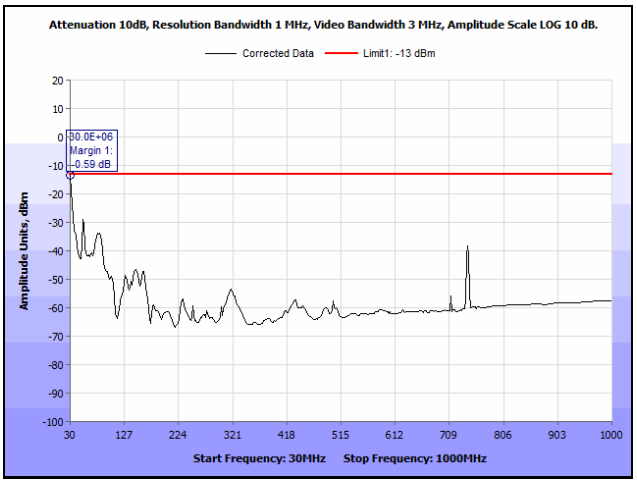
Radiated Spurious Emissions, Part 27, 5 MHz, LTE700



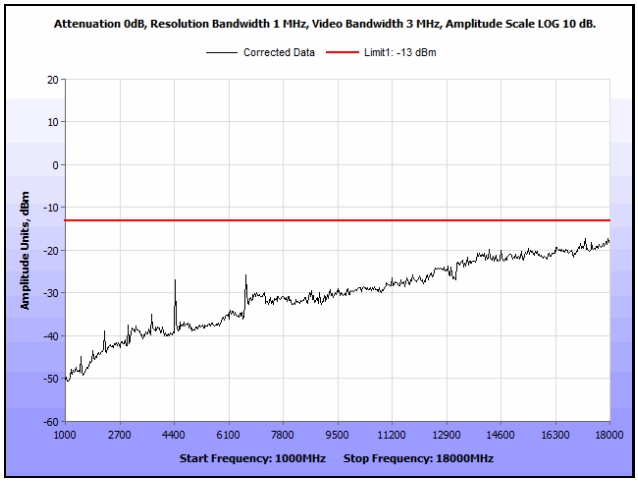
Plot 73. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE700



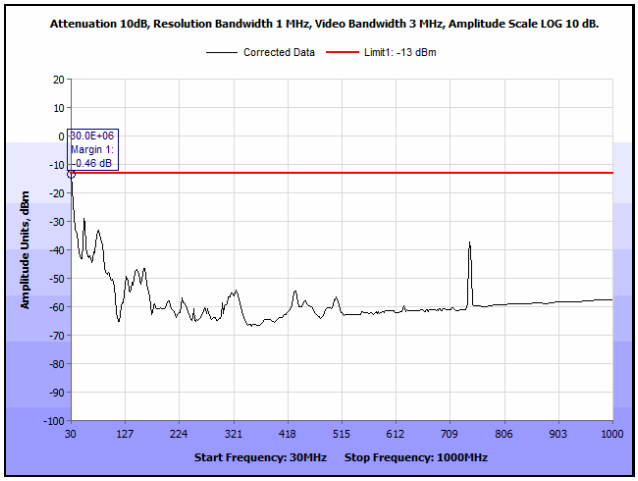
Plot 74. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 27, 5 MHz, LTE700



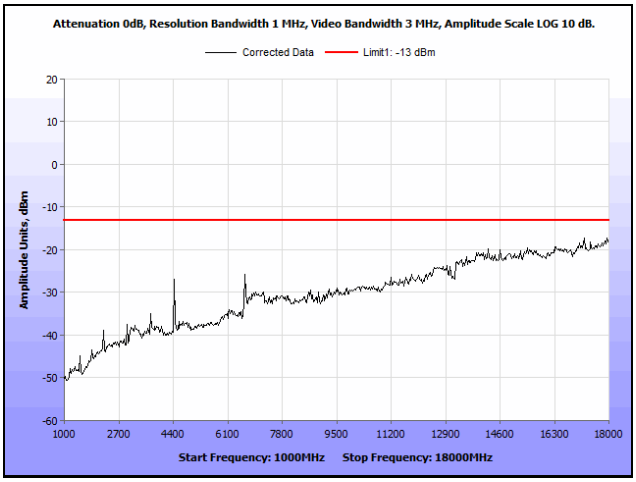
Plot 75. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE700



Plot 76. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 27, 5 MHz, LTE700

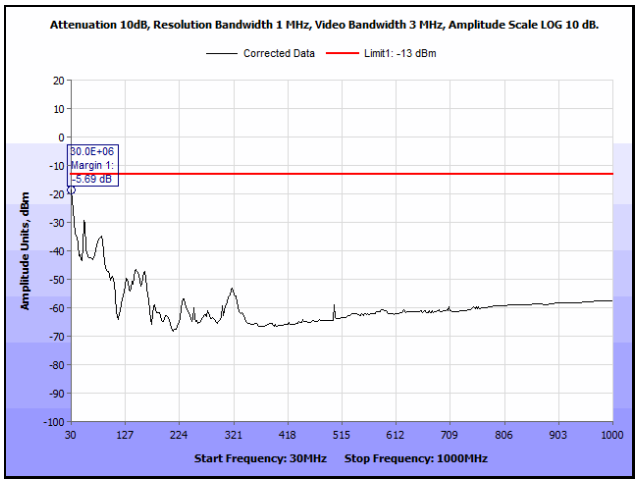


Plot 77. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE700

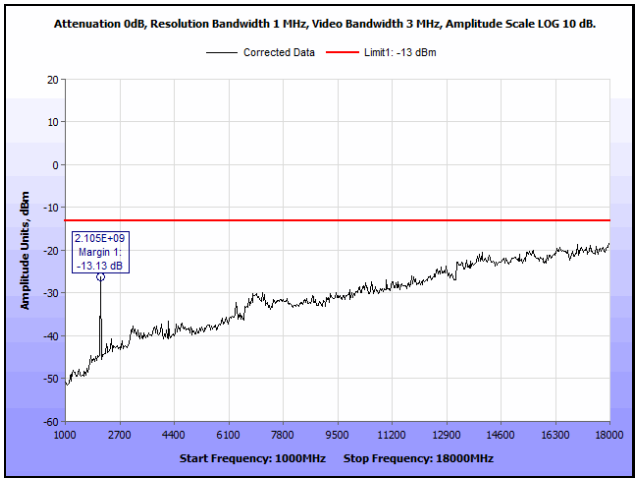


Plot 78. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 27, 5 MHz, LTE700

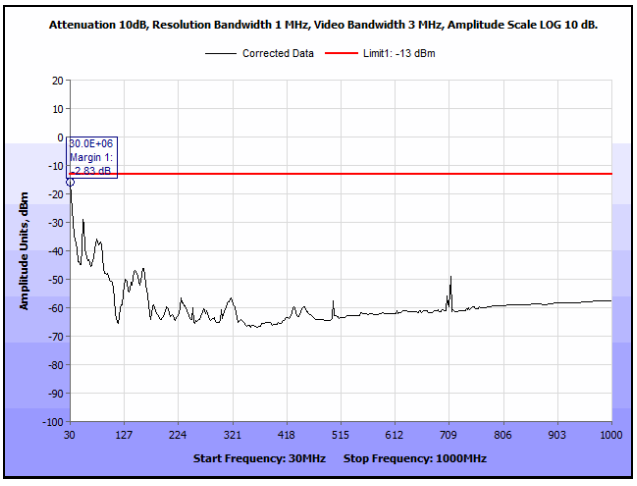
Radiated Spurious Emissions, Part 27, 5 MHz, LTE2100



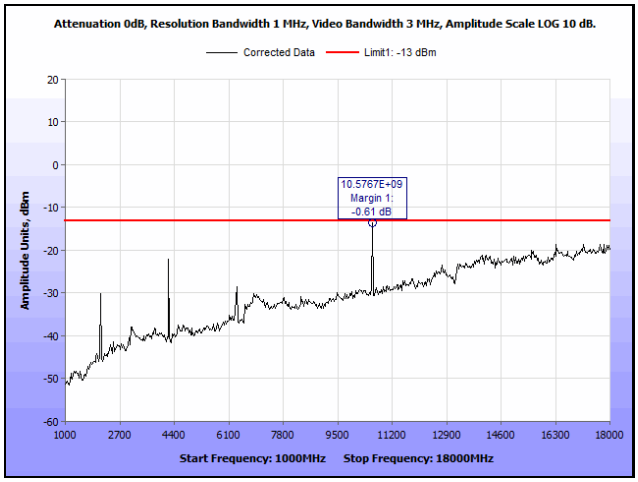
Plot 79. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE2100



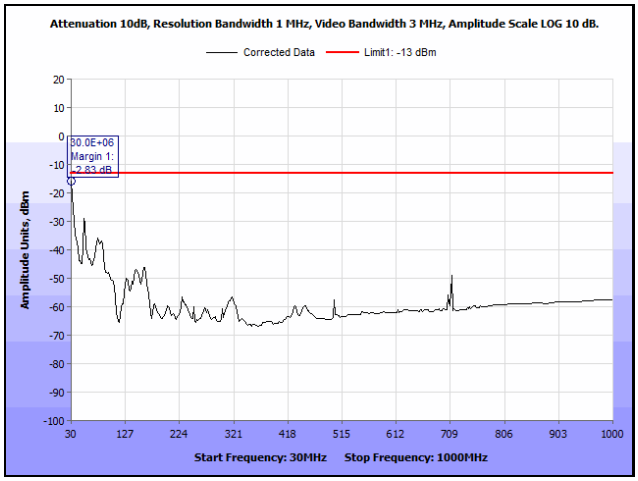
Plot 80. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 27, 5 MHz, LTE2100



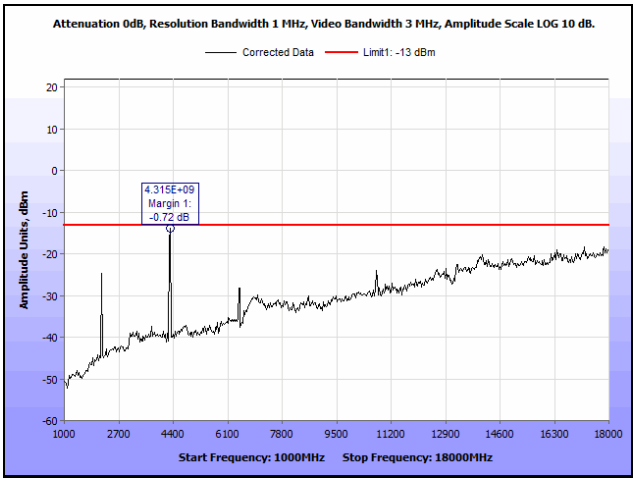
Plot 81. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE2100



Plot 82. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 27, 5 MHz, LTE2100

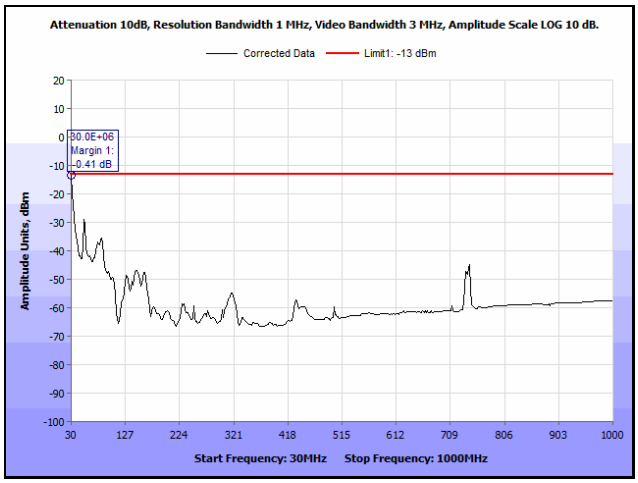


Plot 83. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE2100

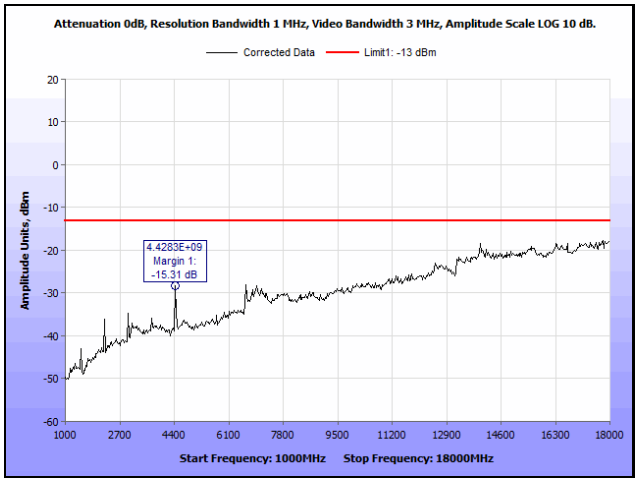


Plot 84. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 27, 5 MHz, LTE2100

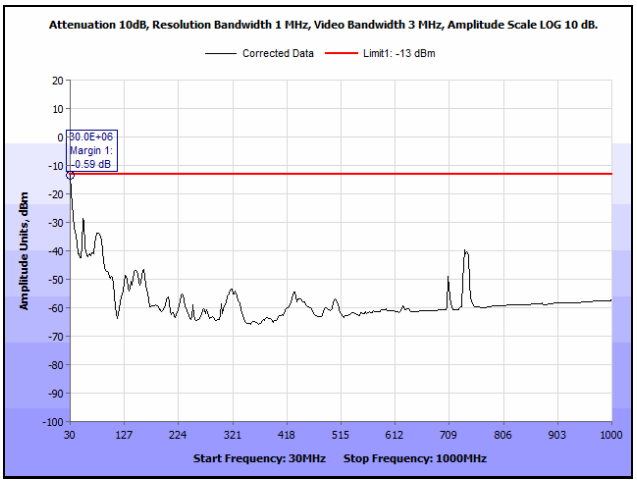
Radiated Spurious Emissions, Part 27, 10 MHz, LTE700



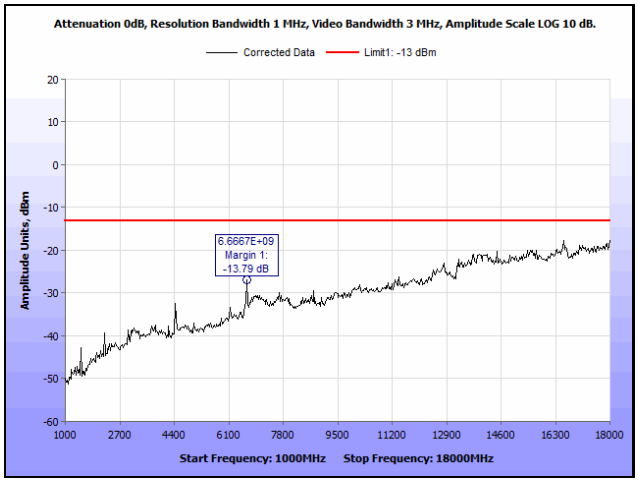
Plot 85. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE700



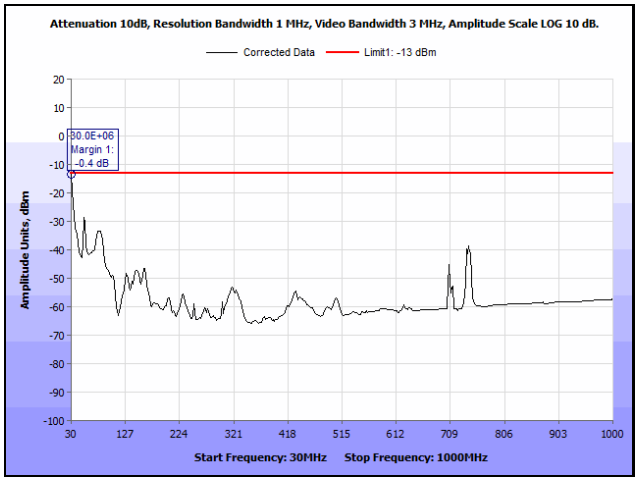
Plot 86. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 27, 10 MHz, LTE700



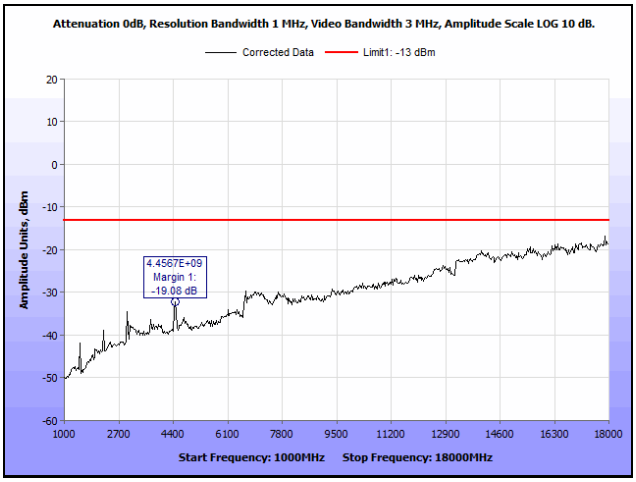
Plot 87. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE700



Plot 88. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 27, 10 MHz, LTE700

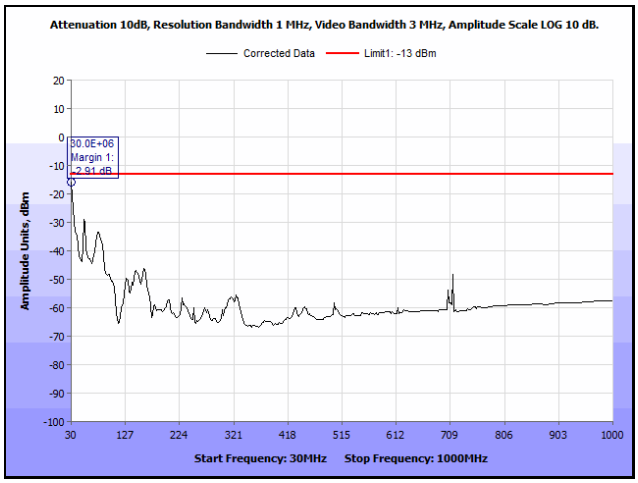


Plot 89. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE700

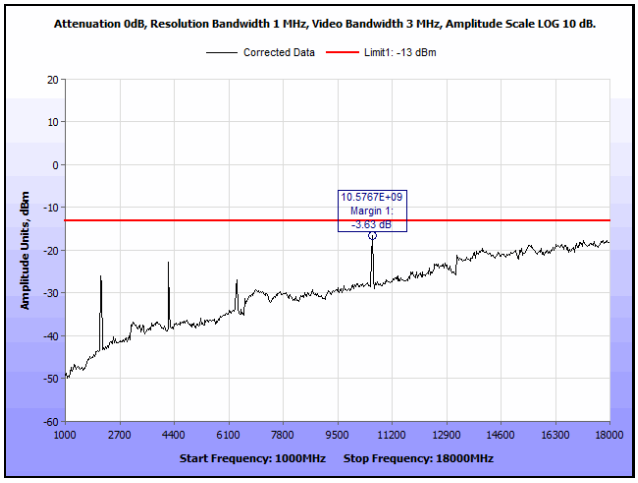


Plot 90. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 27, 10 MHz, LTE700

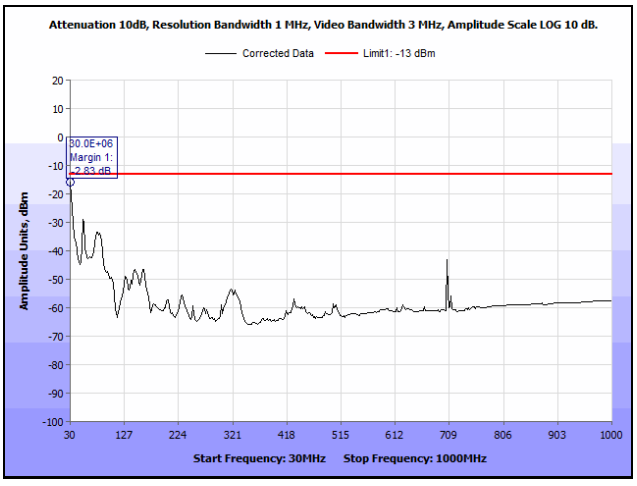
Radiated Spurious Emissions, Part 27, 10 MHz, LTE2100



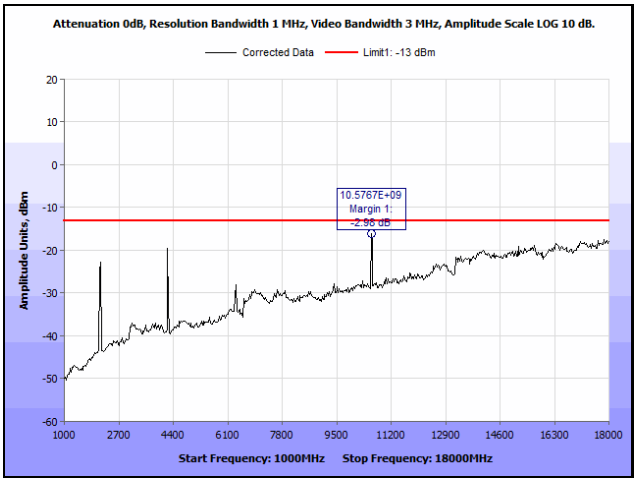
Plot 91. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE2100



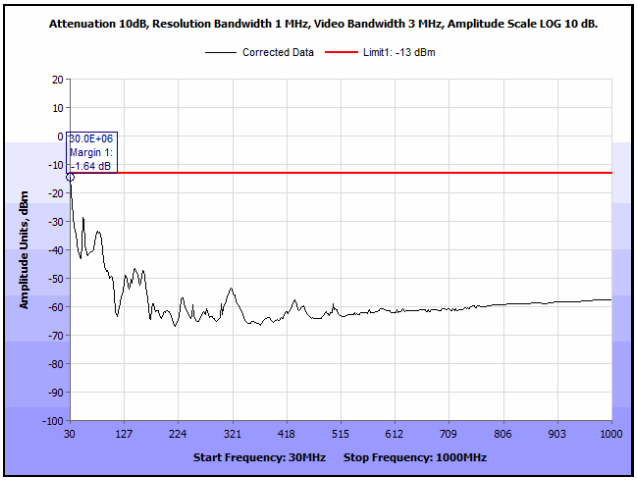
Plot 92. Radiated Spurious Emissions, Low Channel, 1 GHz – 18 GHz, Part 27, 10 MHz, LTE2100



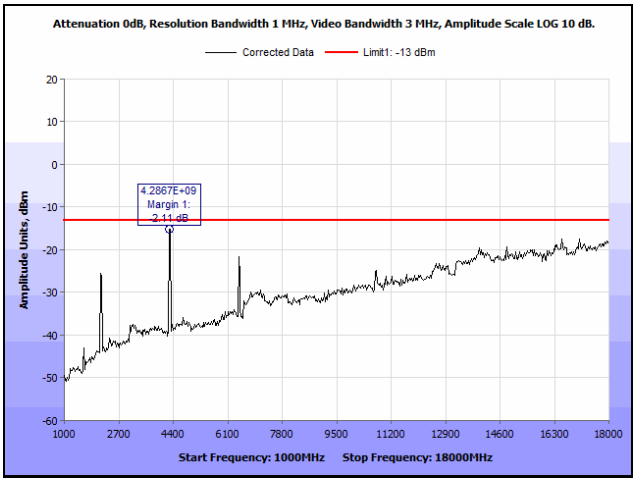
Plot 93. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE2100



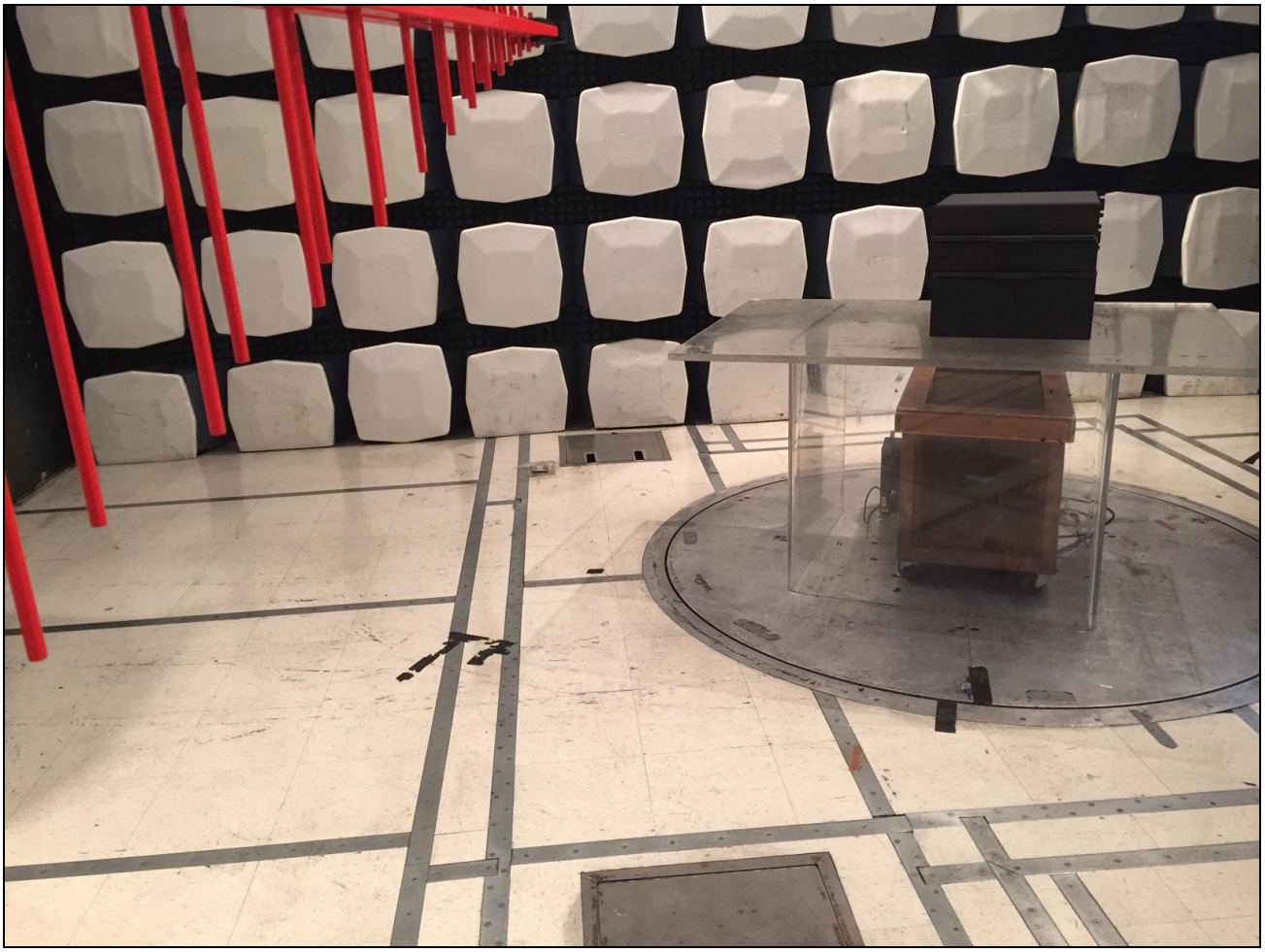
Plot 94. Radiated Spurious Emissions, Mid Channel, 1 GHz – 18 GHz, Part 27, 10 MHz, LTE2100



Plot 95. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE2100



Plot 96. Radiated Spurious Emissions, High Channel, 1 GHz – 18 GHz, Part 27, 10 MHz, LTE2100



Photograph 1. Radiated Spurious Emissions, Test Setup

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.

27.53(h): For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emissions outside a licensee's frequency block shall be attenuated below the transmitter power P by at least 43 + 10log (P).

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.

A modulated carrier generated by the base station was connected to RF input port at a maximum level as determined by the OEM. A spectrum analyzer was connected to either the RF output port for spurious emissions measurements. The spectrum was investigated from 30MHz to the 10th harmonic of the carrier.

The inter-modulation requirements were performed in a similar manner as described above. The spectrum analyzer was set to 100KHz RBW and 300KHz VBW. Two modulated carriers were injected into the EUT from the base station. The in band spurious emissions were investigated.
The filter response has also be measured and recorded.

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): 11/25/15

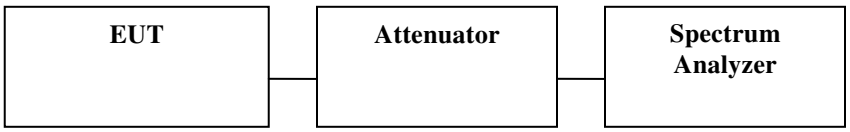
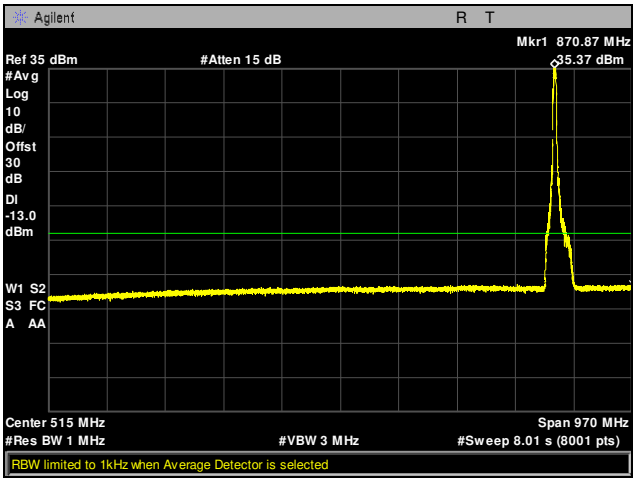
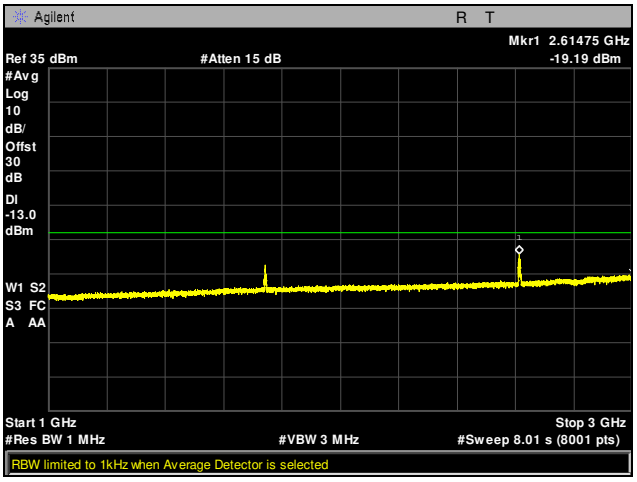


Figure 3. Spurious Emissions at Antenna Terminals Test Setup

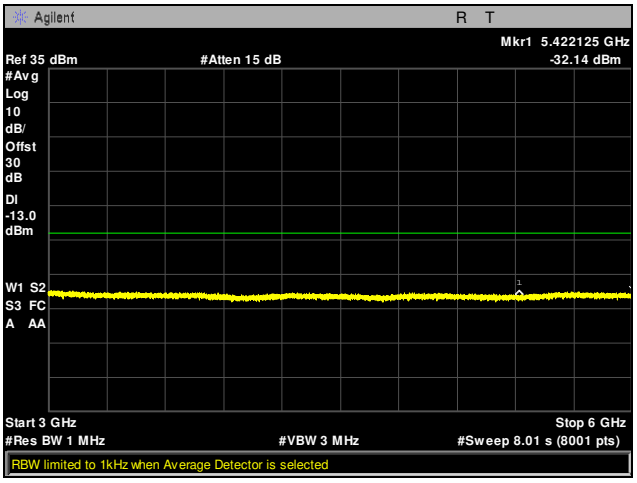
Part 22, 5 MHz



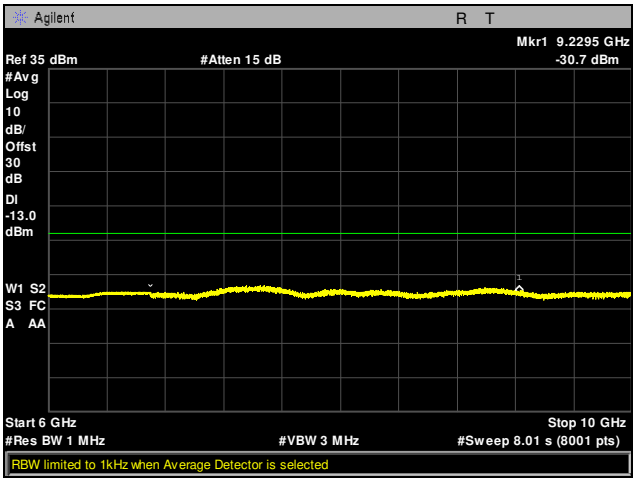
Plot 97. Conducted Spurious Emissions, Channel 2425, 30 MHz – 1 GHz, Part 22, 5 MHz



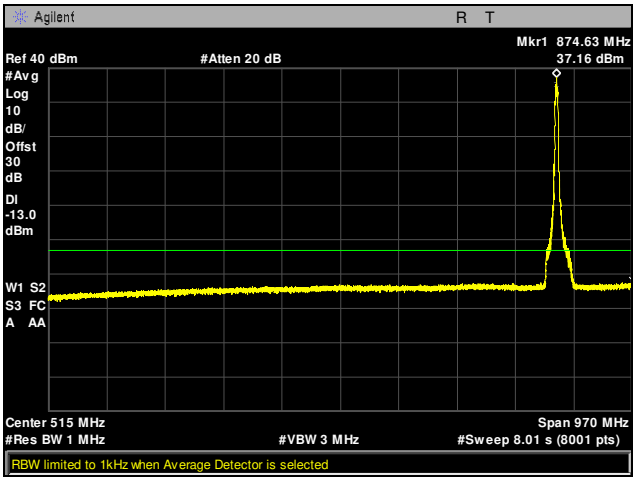
Plot 98. Conducted Spurious Emissions, Channel 2425, 1 GHz – 3 GHz, Part 22, 5 MHz



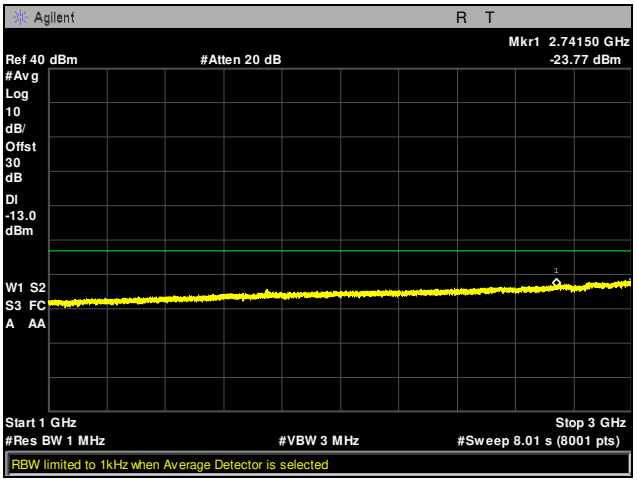
Plot 99. Conducted Spurious Emissions, Channel 2425, 3 GHz – 6 GHz, Part 22, 5 MHz



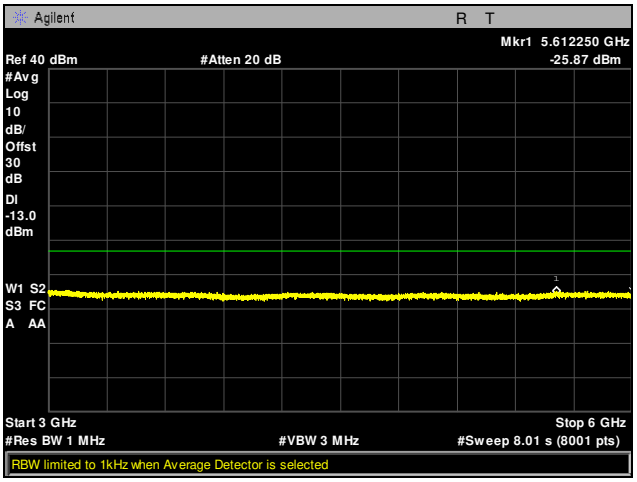
Plot 100. Conducted Spurious Emissions, Channel 2425, 6 GHz – 10 GHz, Part 22, 5 MHz



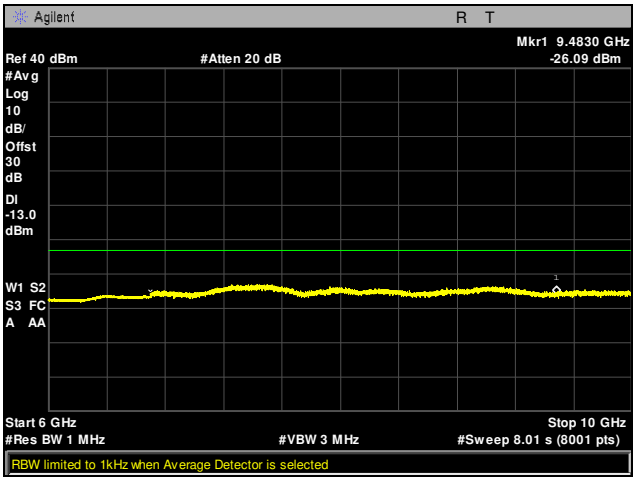
Plot 101. Conducted Spurious Emissions, Channel 2455, 30 MHz – 1 GHz, Part 22, 5 MHz



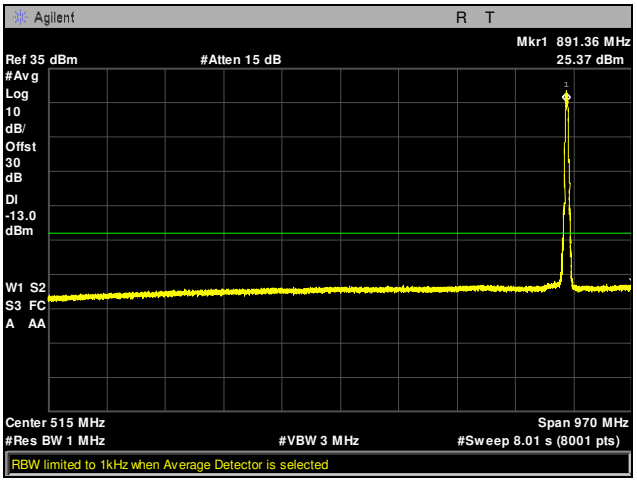
Plot 102. Conducted Spurious Emissions, Channel 2455, 1 GHz – 3 GHz, Part 22, 5 MHz



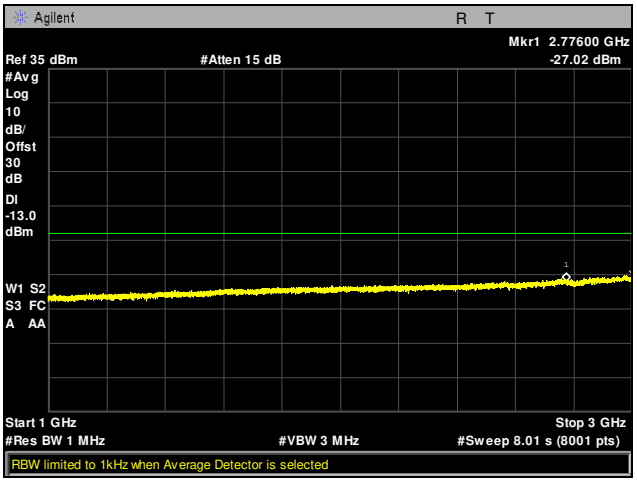
Plot 103. Conducted Spurious Emissions, Channel 2455, 3 GHz – 6 GHz, Part 22, 5 MHz



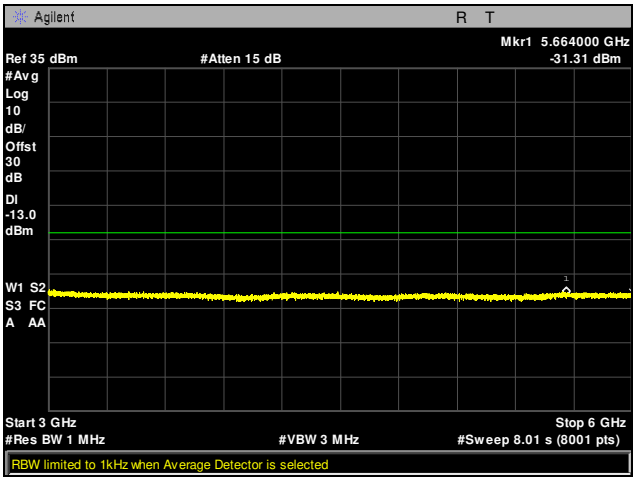
Plot 104. Conducted Spurious Emissions, Channel 2455, 6 GHz – 10 GHz, Part 22, 5 MHz



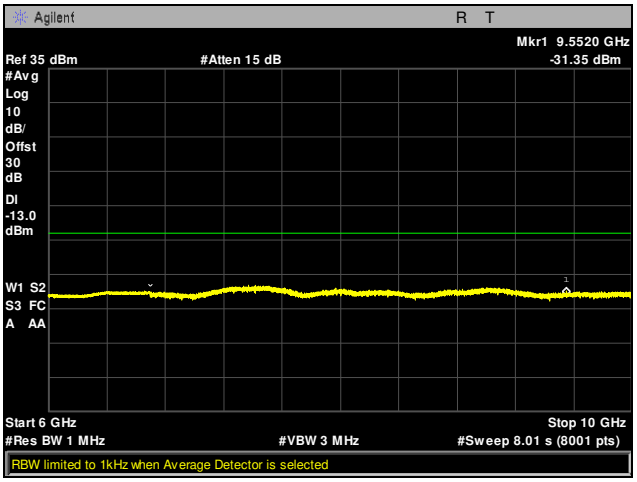
Plot 105. Conducted Spurious Emissions, Channel 2625, 30 MHz – 1 GHz, Part 22, 5 MHz



Plot 106. Conducted Spurious Emissions, Channel 2625, 1 GHz – 3 GHz, Part 22, 5 MHz

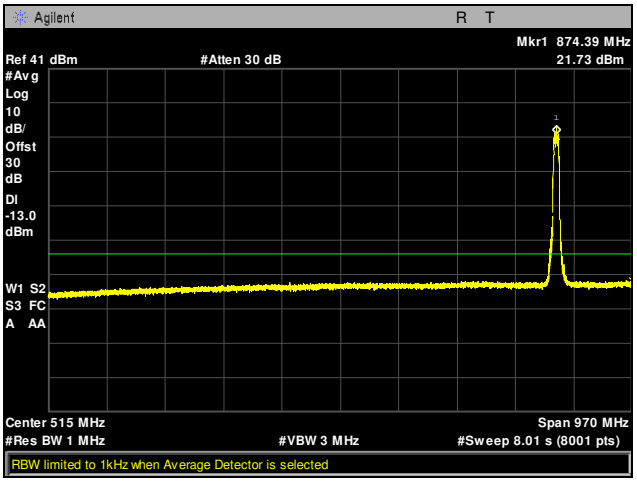


Plot 107. Conducted Spurious Emissions, Channel 2625, 3 GHz – 6 GHz, Part 22, 5 MHz

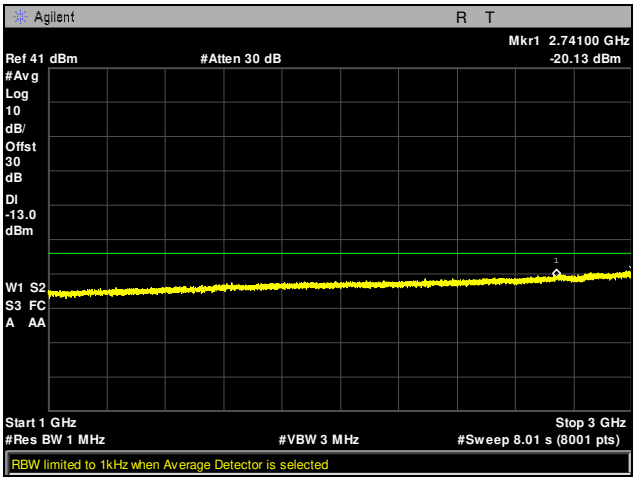


Plot 108. Conducted Spurious Emissions, Channel 2625, 6 GHz – 10 GHz, Part 22, 5 MHz

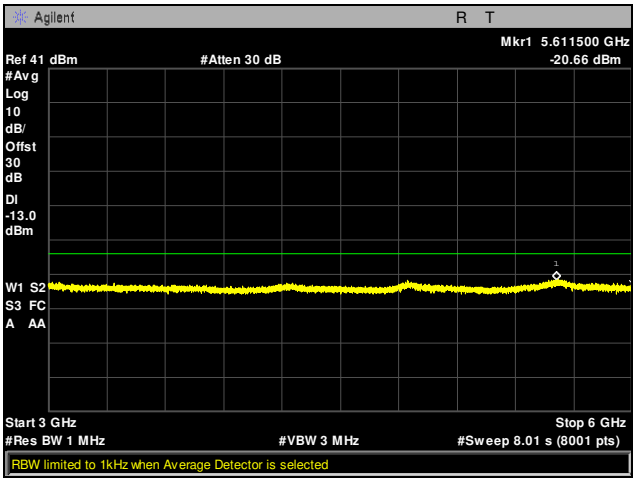
Part 22, 10 MHz



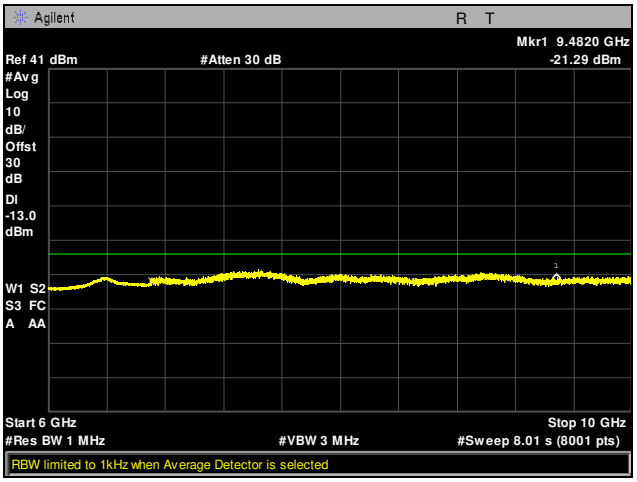
Plot 109. Conducted Spurious Emissions, Channel 2450, 30 MHz – 1 GHz, Part 22, 10 MHz



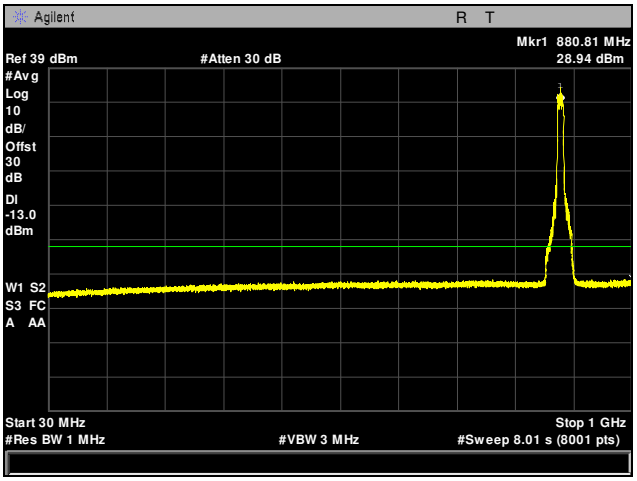
Plot 110. Conducted Spurious Emissions, Channel 2450, 1 GHz – 3 GHz, Part 22, 10 MHz



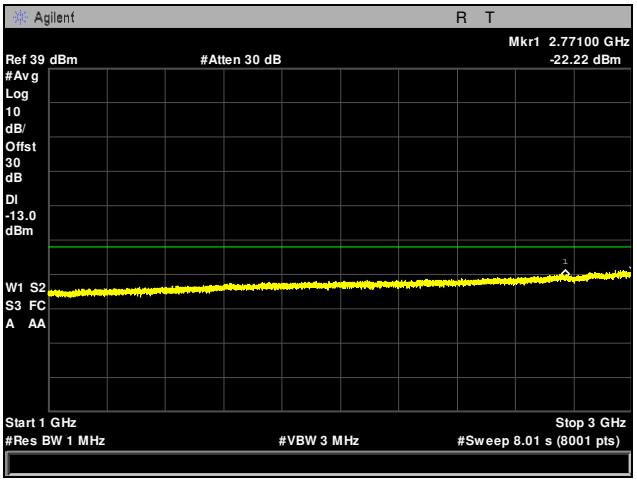
Plot 111. Conducted Spurious Emissions, Channel 2450, 3 GHz – 6 GHz, Part 22, 10 MHz



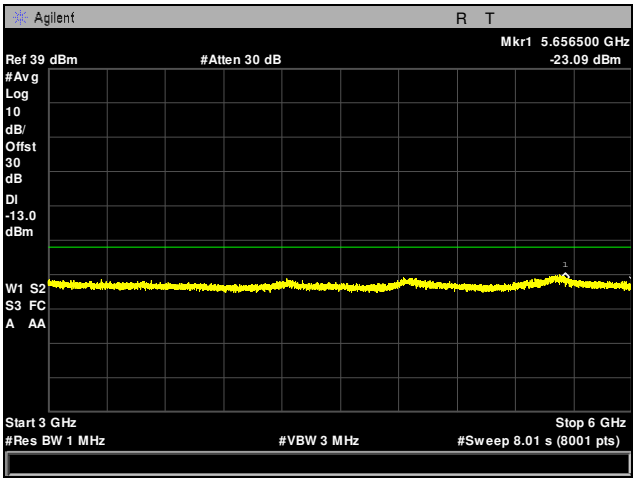
Plot 112. Conducted Spurious Emissions, Channel 2450, 6 GHz – 10 GHz, Part 22, 10 MHz



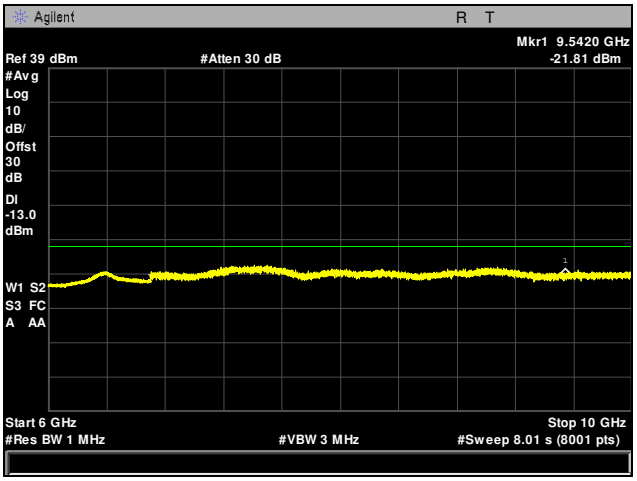
Plot 113. Conducted Spurious Emissions, Channel 2520, 30 MHz – 1 GHz, Part 22, 10 MHz



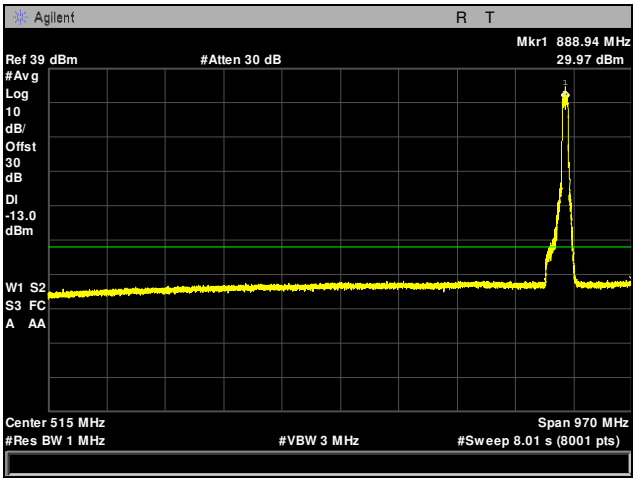
Plot 114. Conducted Spurious Emissions, Channel 2520, 1 GHz – 3 GHz, Part 22, 10 MHz



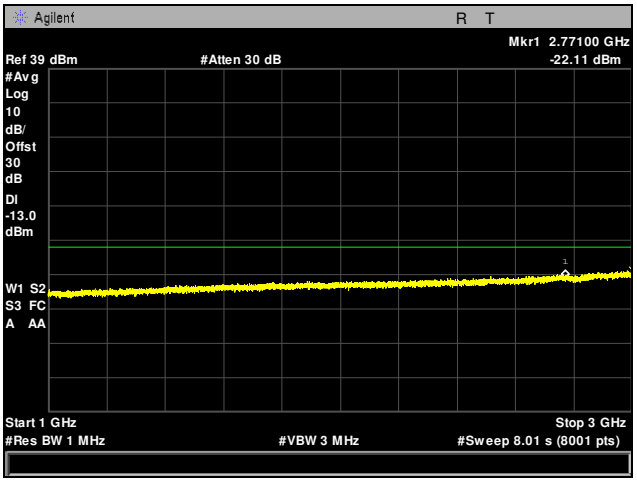
Plot 115. Conducted Spurious Emissions, Channel 2520, 3 GHz – 6 GHz, Part 22, 10 MHz



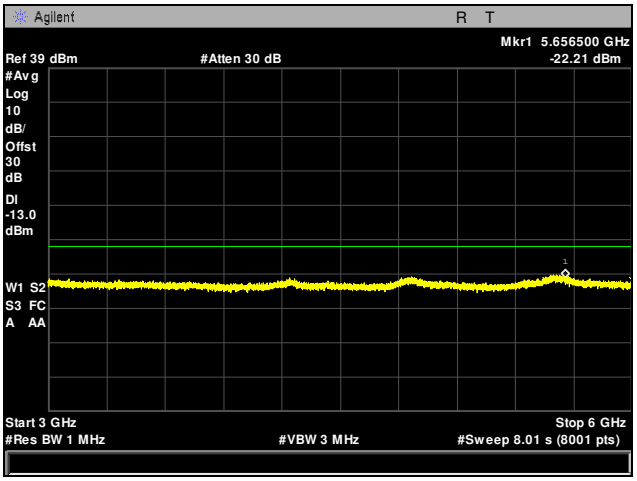
Plot 116. Conducted Spurious Emissions, Channel 2520, 6 GHz – 10 GHz, Part 22, 10 MHz



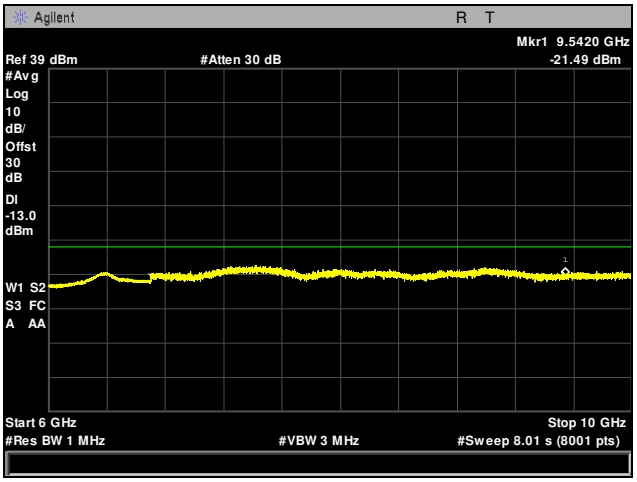
Plot 117. Conducted Spurious Emissions, Channel 2600, 30 MHz – 1 GHz, Part 22, 10 MHz



Plot 118. Conducted Spurious Emissions, Channel 2600, 1 GHz – 3 GHz, Part 22, 10 MHz

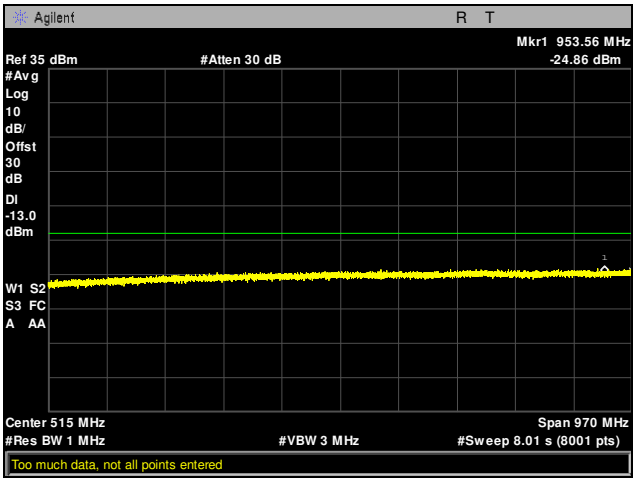


Plot 119. Conducted Spurious Emissions, Channel 2600, 3 GHz – 6 GHz, Part 22, 10 MHz

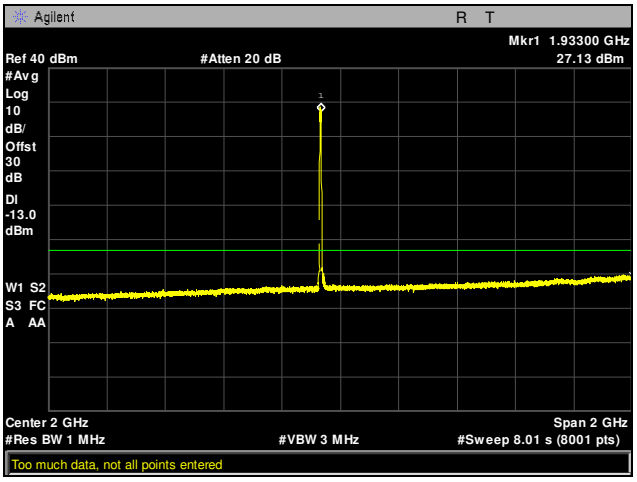


Plot 120. Conducted Spurious Emissions, Channel 2600, 6 GHz – 10 GHz, Part 22, 10 MHz

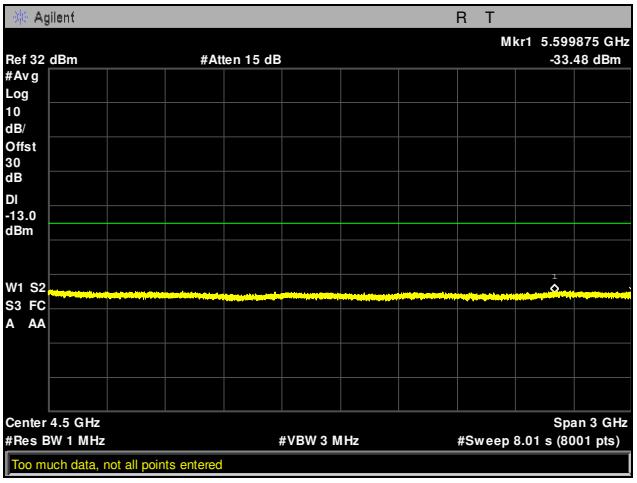
Part 24, 5 MHz



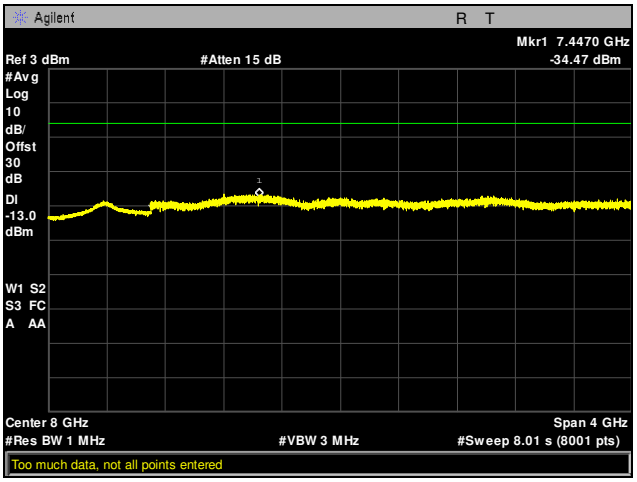
Plot 121. Conducted Spurious Emissions, Channel 625, 30 MHz – 1 GHz, Part 24, 5 MHz



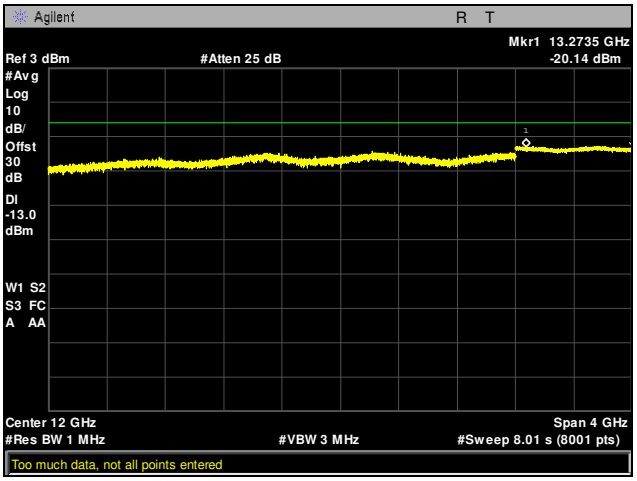
Plot 122. Conducted Spurious Emissions, Channel 625, 1 GHz – 3 GHz, Part 24, 5 MHz



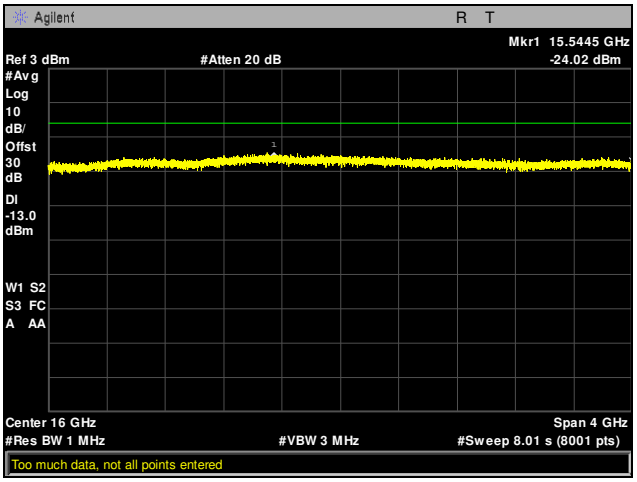
Plot 123. Conducted Spurious Emissions, Channel 625, 3 GHz – 6 GHz, Part 24, 5 MHz



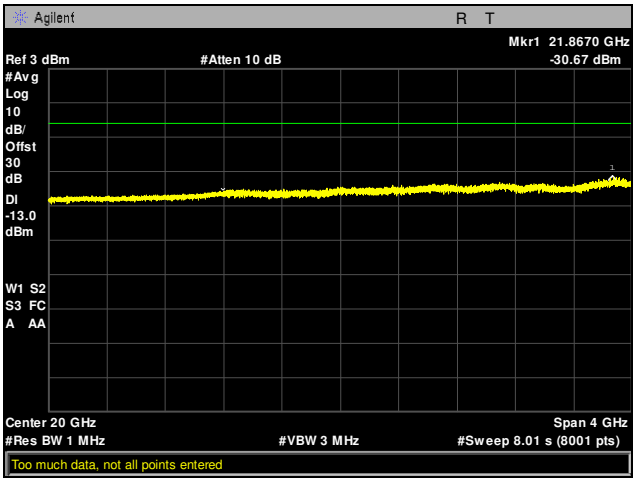
Plot 124. Conducted Spurious Emissions, Channel 625, 6 GHz – 10 GHz, Part 24, 5 MHz



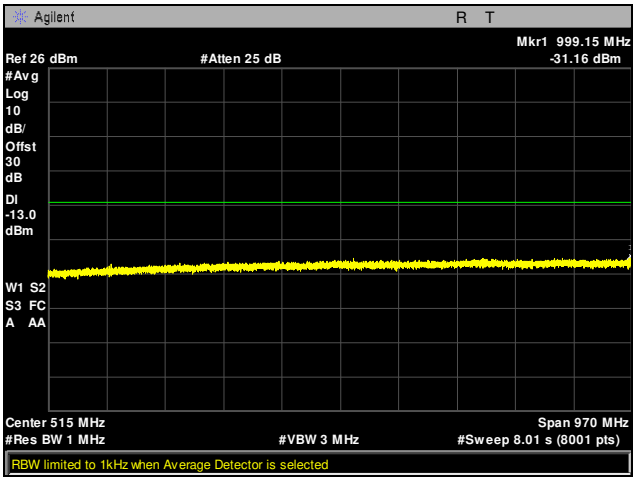
Plot 125. Conducted Spurious Emissions, Channel 625, 10 GHz – 14 GHz, Part 24, 5 MHz



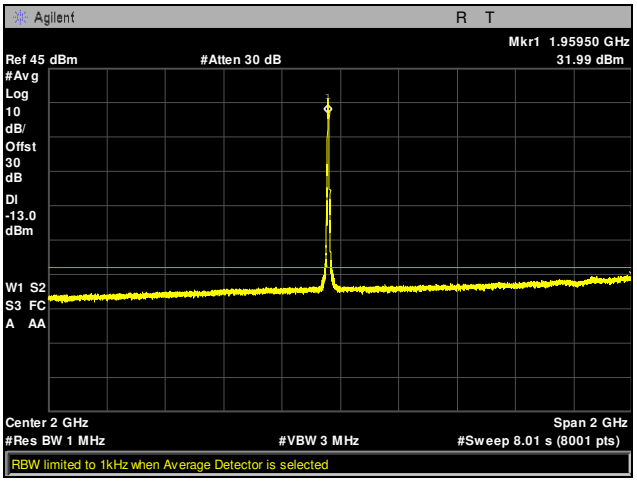
Plot 126. Conducted Spurious Emissions, Channel 625, 14 GHz – 18 GHz, Part 24, 5 MHz



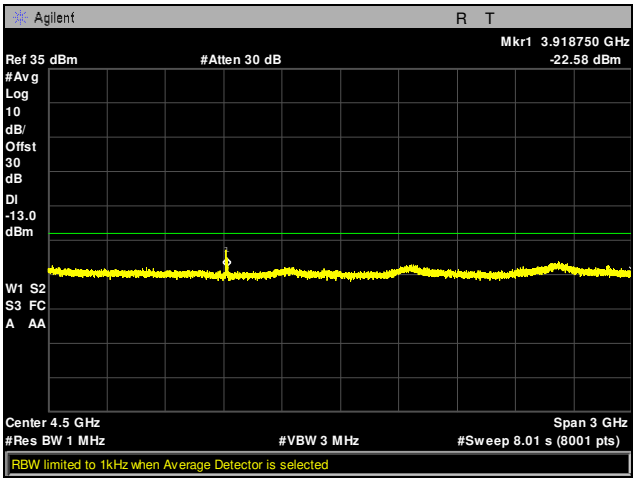
Plot 127. Conducted Spurious Emissions, Channel 625, 18 GHz – 22 GHz, Part 24, 5 MHz



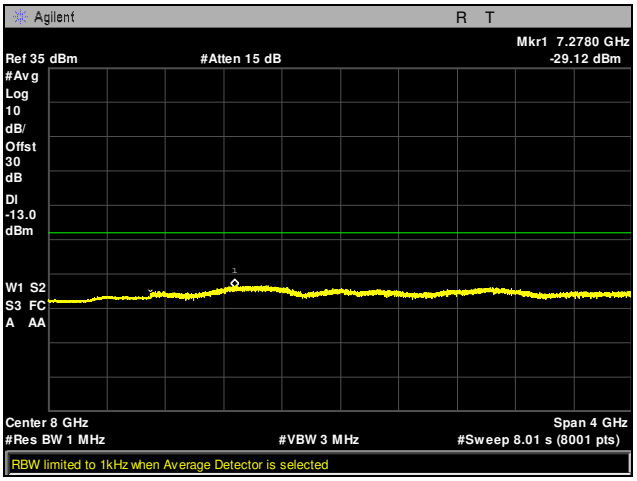
Plot 128. Conducted Spurious Emissions, Channel 890, 30 MHz – 1 GHz, Part 24, 5 MHz



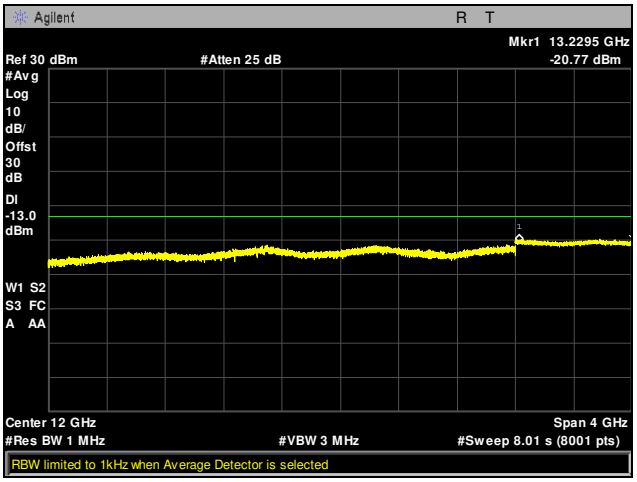
Plot 129. Conducted Spurious Emissions, Channel 890, 1 GHz – 3 GHz, Part 24, 5 MHz



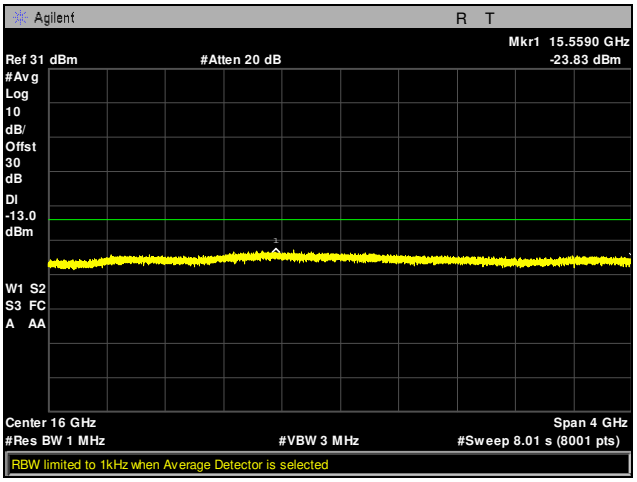
Plot 130. Conducted Spurious Emissions, Channel 890, 3 GHz – 6 GHz, Part 24, 5 MHz



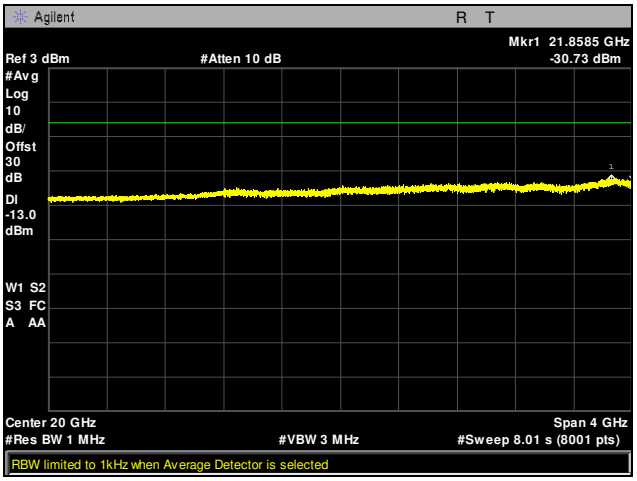
Plot 131. Conducted Spurious Emissions, Channel 890, 6 GHz – 10 GHz, Part 24, 5 MHz



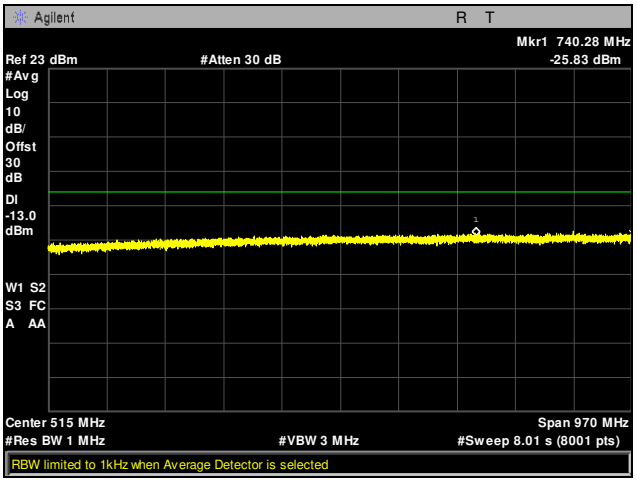
Plot 132. Conducted Spurious Emissions, Channel 890, 10 GHz – 14 GHz, Part 24, 5 MHz



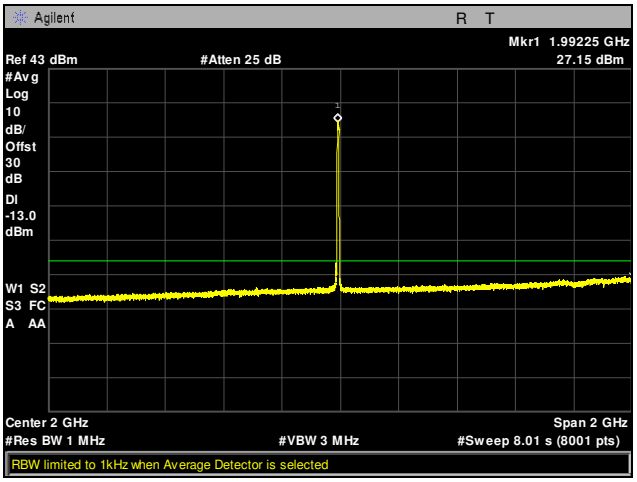
Plot 133. Conducted Spurious Emissions, Channel 890, 14 GHz – 18 GHz, Part 24, 5 MHz



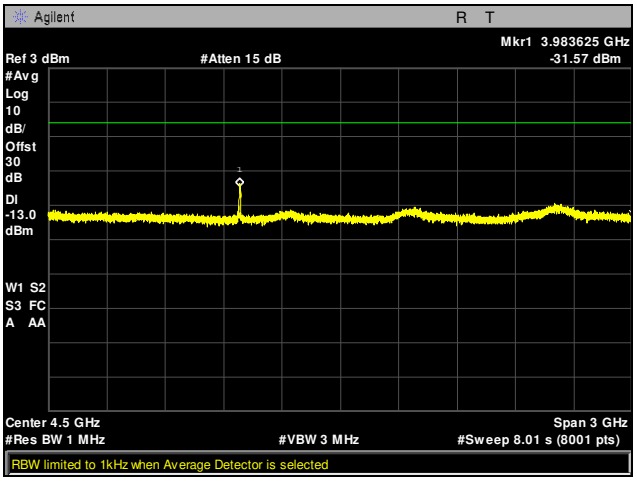
Plot 134. Conducted Spurious Emissions, Channel 890, 18 GHz – 22 GHz, Part 24, 5 MHz



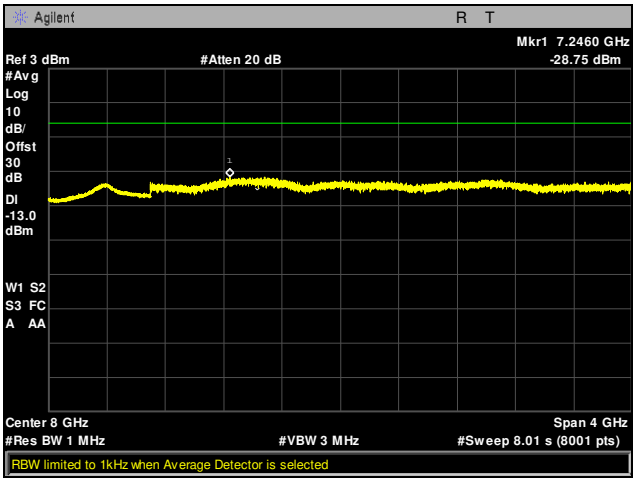
Plot 135. Conducted Spurious Emissions, Channel 1150, 30 MHz – 1 GHz, Part 24, 5 MHz



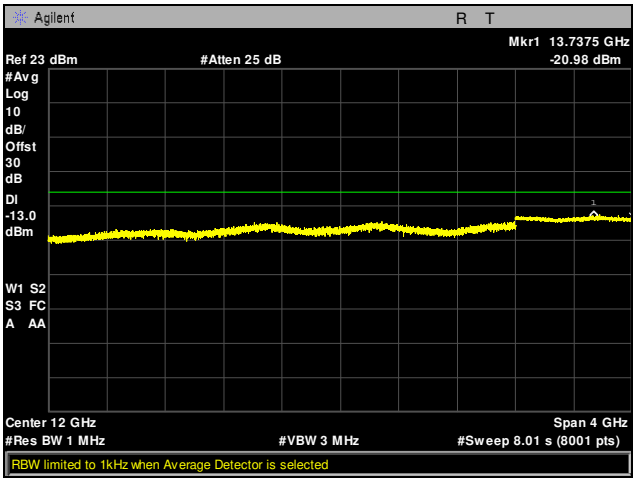
Plot 136. Conducted Spurious Emissions, Channel 1150, 1 GHz – 3 GHz, Part 24, 5 MHz



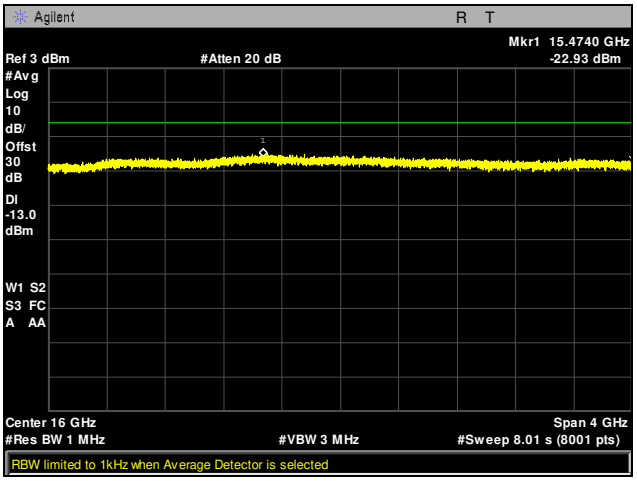
Plot 137. Conducted Spurious Emissions, Channel 1150, 3 GHz – 6 GHz, Part 24, 5 MHz



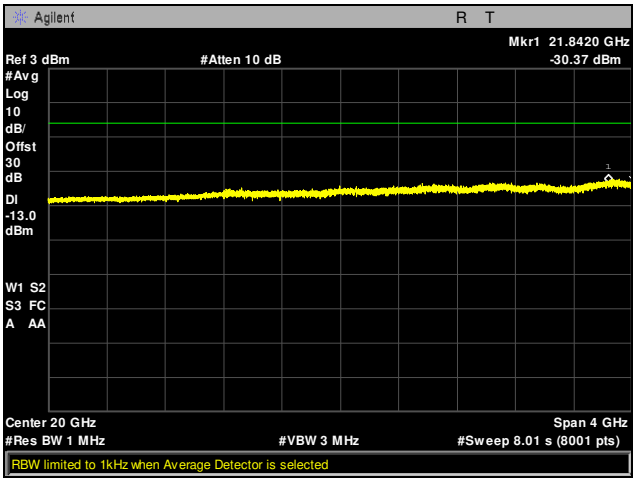
Plot 138. Conducted Spurious Emissions, Channel 1150, 6 GHz – 10 GHz, Part 24, 5 MHz



Plot 139. Conducted Spurious Emissions, Channel 1150, 10 GHz – 14 GHz, Part 24, 5 MHz

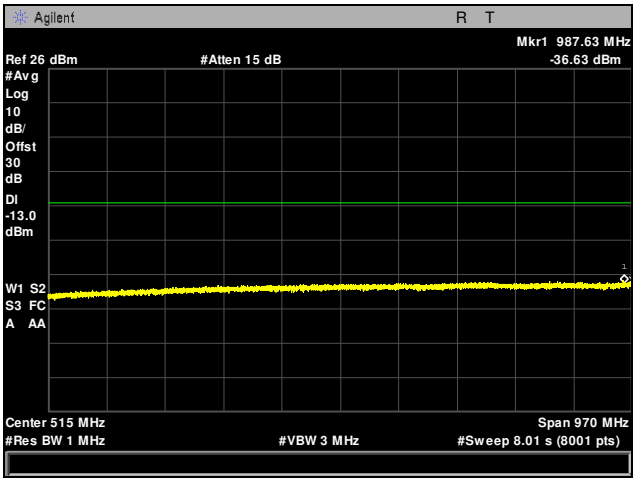


Plot 140. Conducted Spurious Emissions, Channel 1150, 14 GHz – 18 GHz, Part 24, 5 MHz

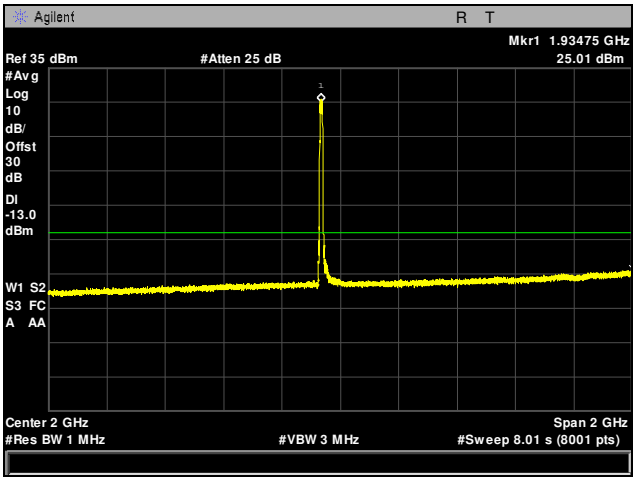


Plot 141. Conducted Spurious Emissions, Channel 1150, 18 GHz – 22 GHz, Part 24, 5 MHz

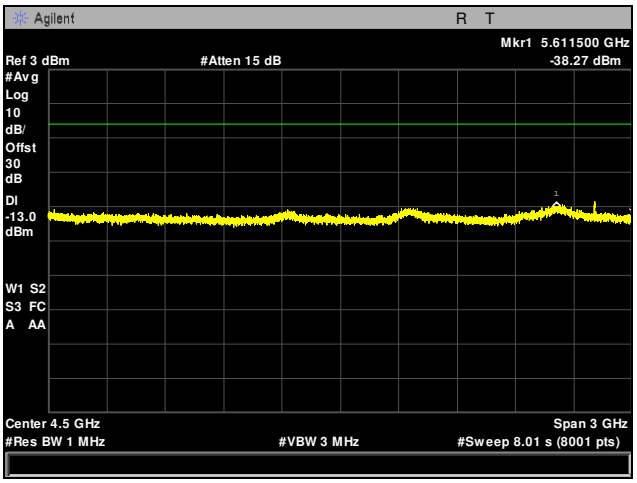
Part 24, 10 MHz



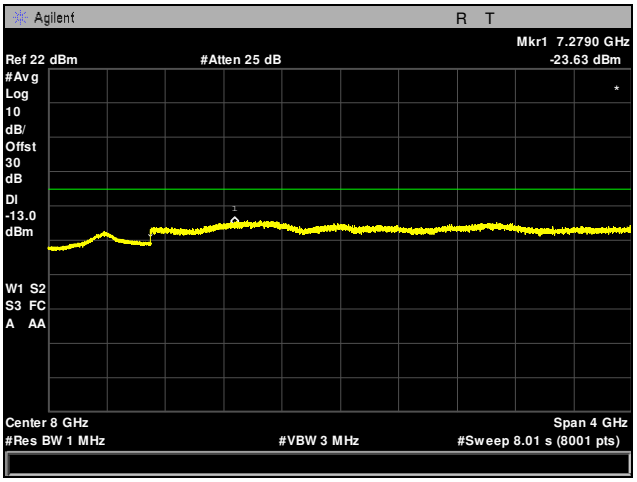
Plot 142. Conducted Spurious Emissions, Channel 650, 30 MHz – 1 GHz, Part 24, 10 MHz



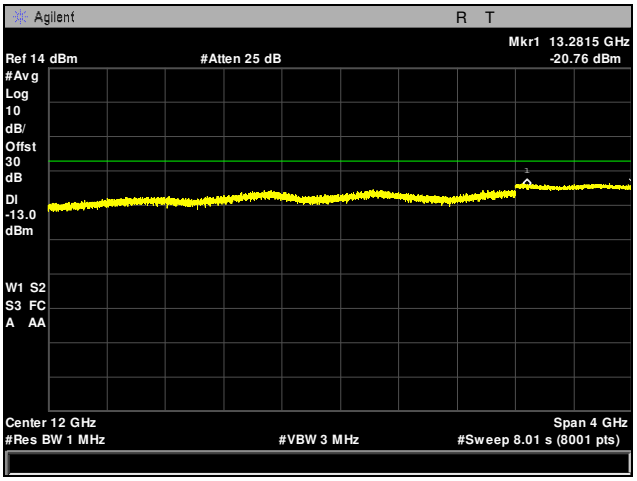
Plot 143. Conducted Spurious Emissions, Channel 650, 1 GHz – 3 GHz, Part 24, 10 MHz



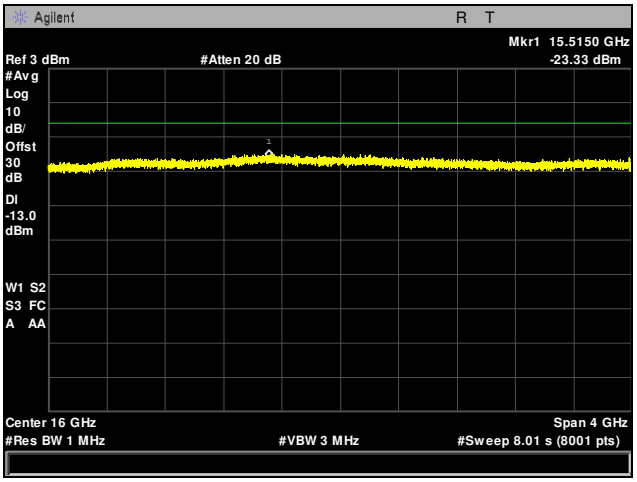
Plot 144. Conducted Spurious Emissions, Channel 650, 3 GHz – 6 GHz, Part 24, 10 MHz



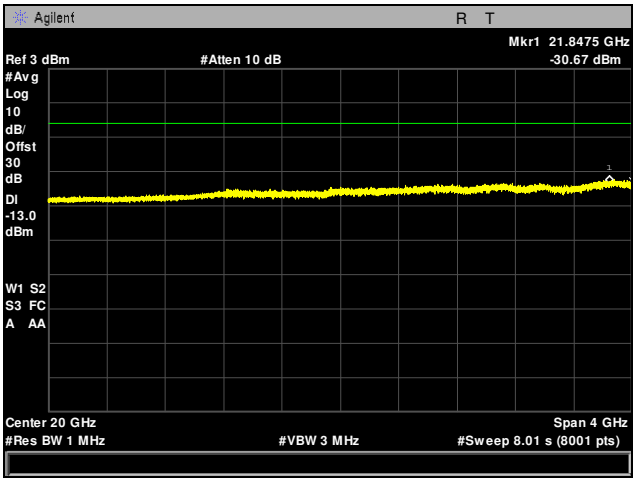
Plot 145. Conducted Spurious Emissions, Channel 650, 6 GHz – 10 GHz, Part 24, 10 MHz



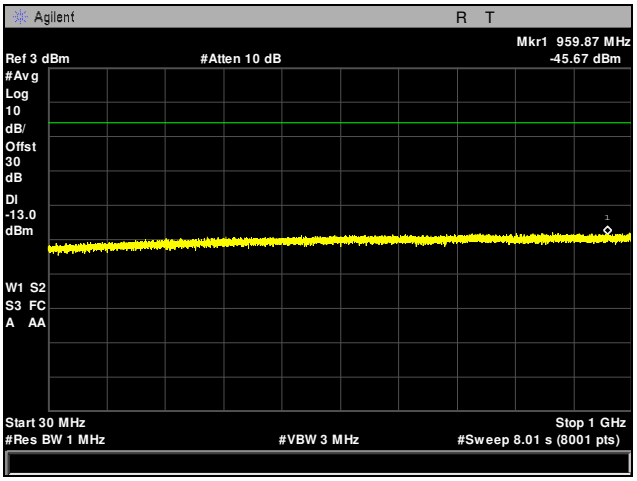
Plot 146. Conducted Spurious Emissions, Channel 650, 10 GHz – 14 GHz, Part 24, 10 MHz



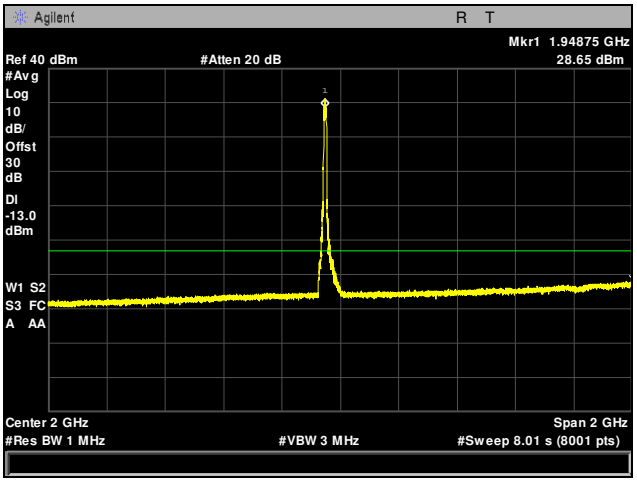
Plot 147. Conducted Spurious Emissions, Channel 650, 14 GHz – 18 GHz, Part 24, 10 MHz



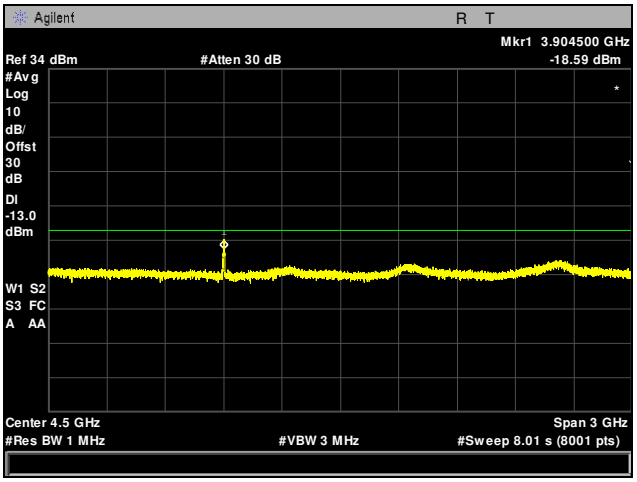
Plot 148. Conducted Spurious Emissions, Channel 650, 18 GHz – 22 GHz, Part 24, 10 MHz



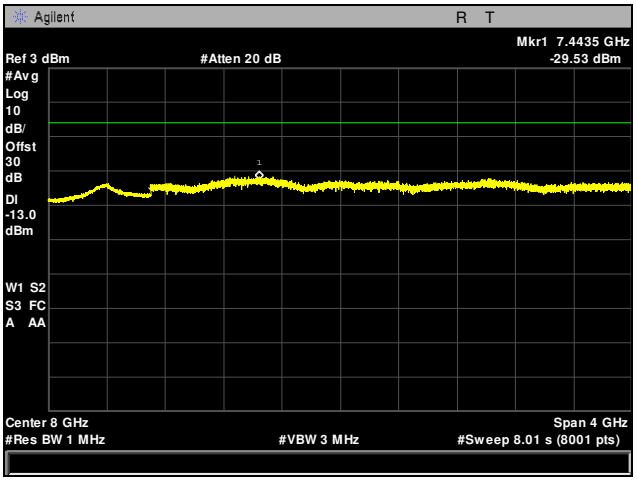
Plot 149. Conducted Spurious Emissions, Channel 780, 30 MHz – 1 GHz, Part 24, 10 MHz



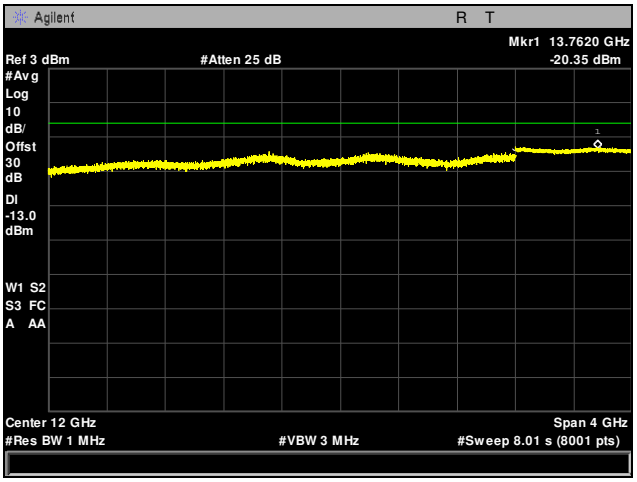
Plot 150. Conducted Spurious Emissions, Channel 780, 1 GHz – 3 GHz, Part 24, 10 MHz



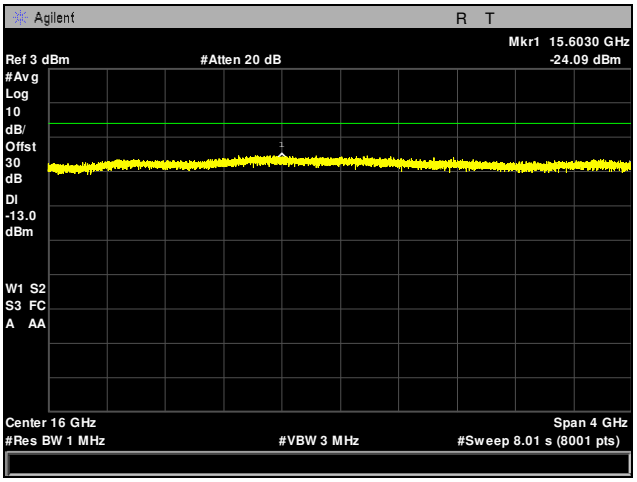
Plot 151. Conducted Spurious Emissions, Channel 780, 3 GHz – 6 GHz, Part 24, 10 MHz



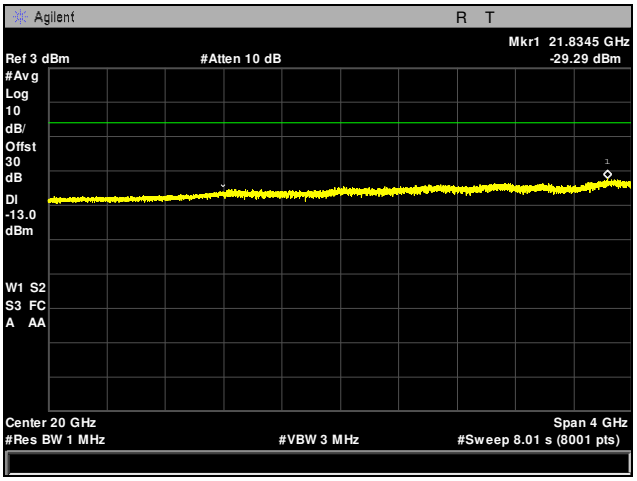
Plot 152. Conducted Spurious Emissions, Channel 780, 6 GHz – 10 GHz, Part 24, 10 MHz



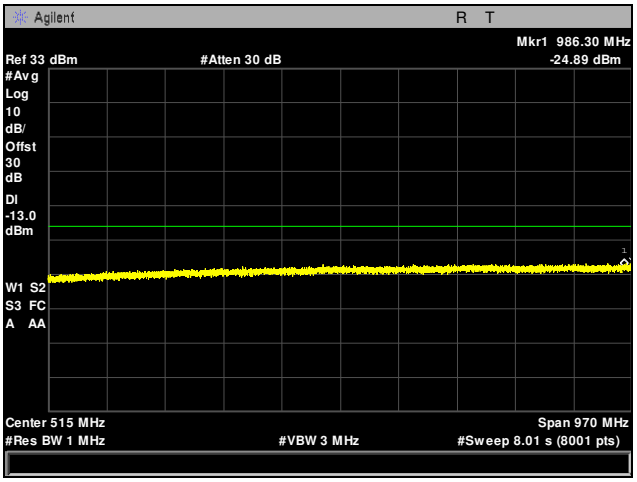
Plot 153. Conducted Spurious Emissions, Channel 780, 10 GHz – 14 GHz, Part 24, 10 MHz



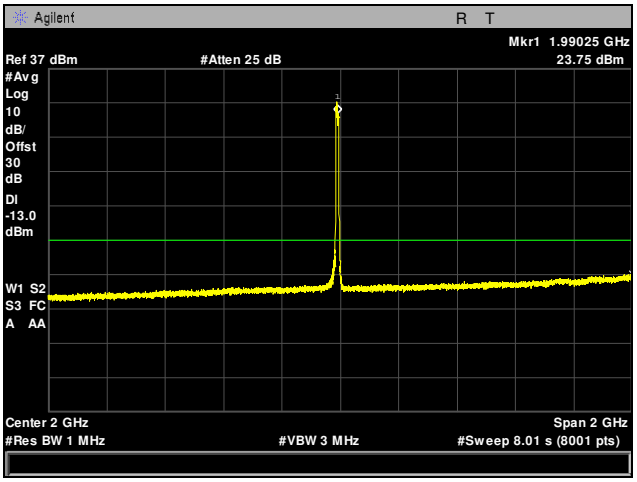
Plot 154. Conducted Spurious Emissions, Channel 780, 14 GHz – 18 GHz, Part 24, 10 MHz



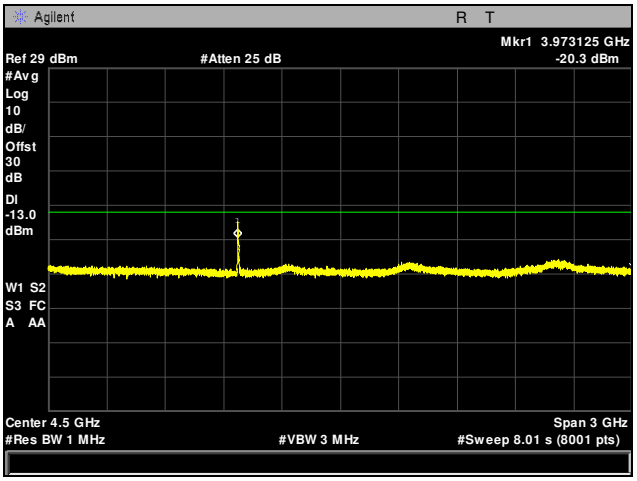
Plot 155. Conducted Spurious Emissions, Channel 780, 18 GHz – 22 GHz, Part 24, 10 MHz



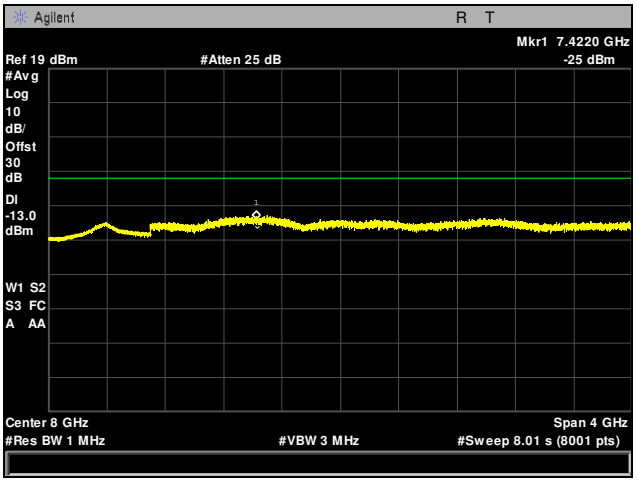
Plot 156. Conducted Spurious Emissions, Channel 1150, 30 MHz – 1 GHz, Part 24, 10 MHz



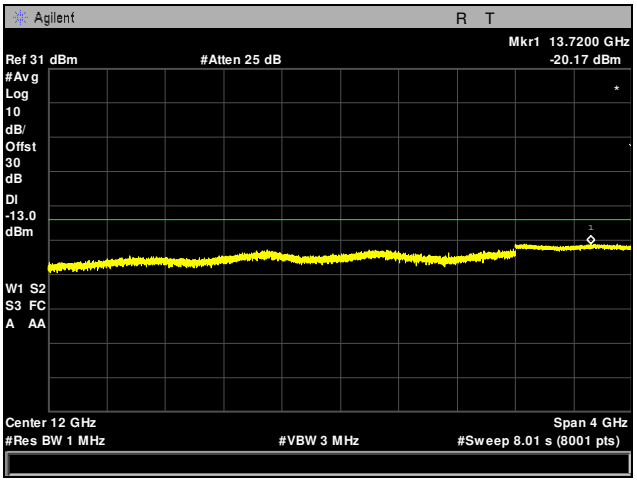
Plot 157. Conducted Spurious Emissions, Channel 1150, 1 GHz – 3 GHz, Part 24, 10 MHz



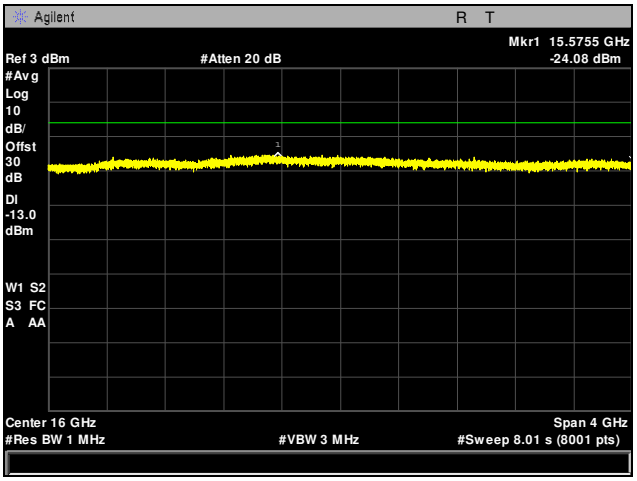
Plot 158. Conducted Spurious Emissions, Channel 1150, 3 GHz – 6 GHz, Part 24, 10 MHz



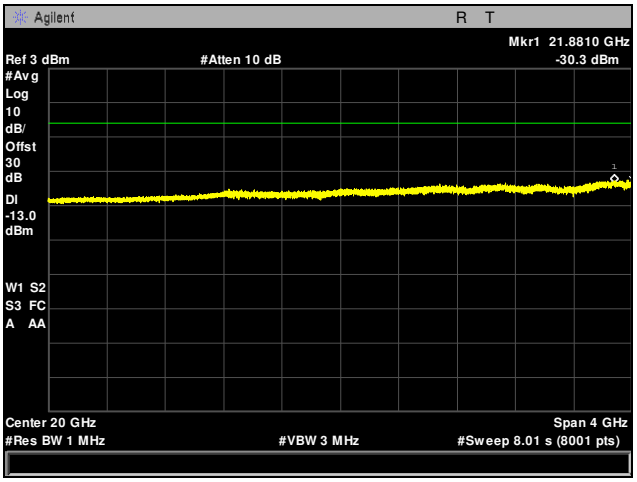
Plot 159. Conducted Spurious Emissions, Channel 1150, 6 GHz – 10 GHz, Part 24, 10 MHz



Plot 160. Conducted Spurious Emissions, Channel 1150, 10 GHz – 14 GHz, Part 24, 10 MHz

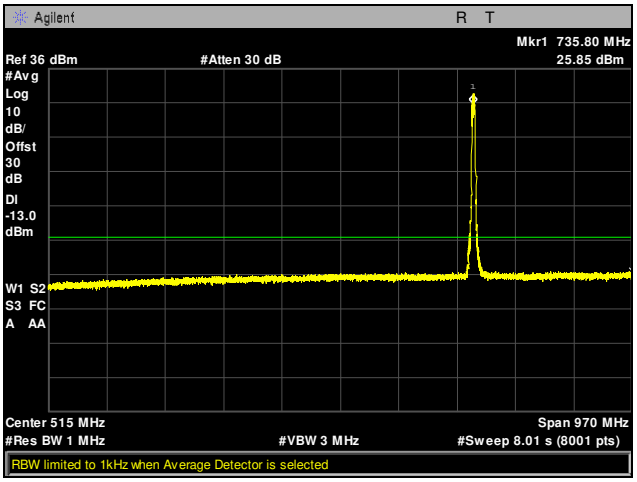


Plot 161. Conducted Spurious Emissions, Channel 1150, 14 GHz – 18 GHz, Part 24, 10 MHz

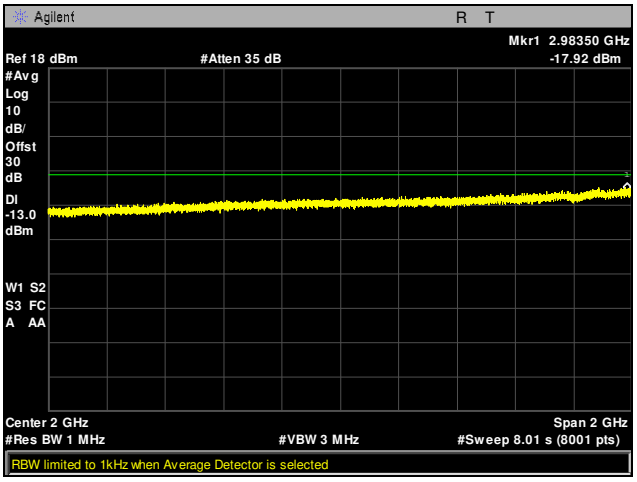


Plot 162. Conducted Spurious Emissions, Channel 1150, 18 GHz – 22 GHz, Part 24, 10 MHz

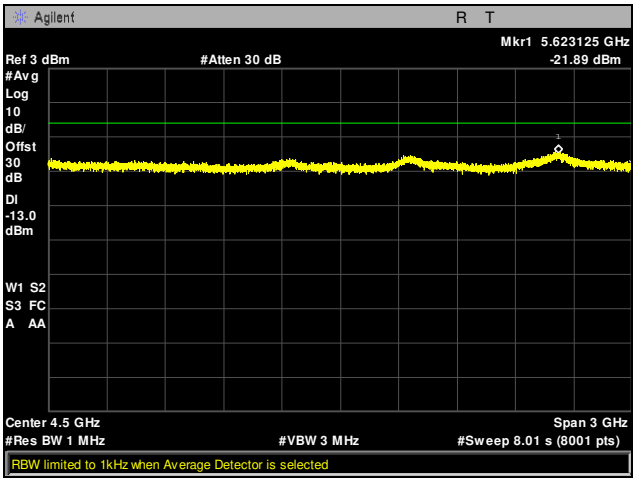
Part 27, 5 MHz, LTE700



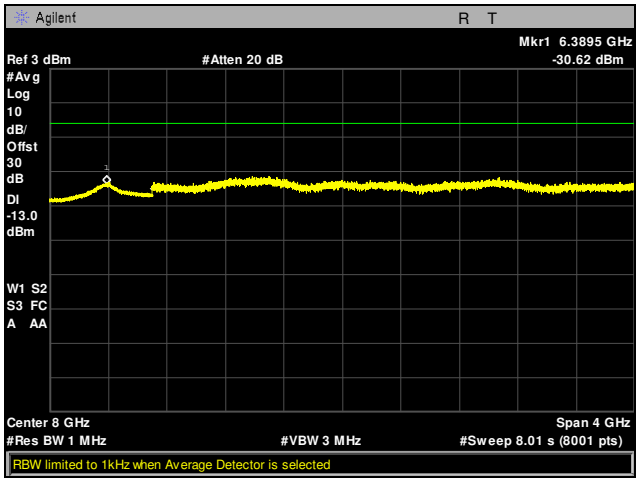
Plot 163. Conducted Spurious Emissions, Channel 5755, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE700



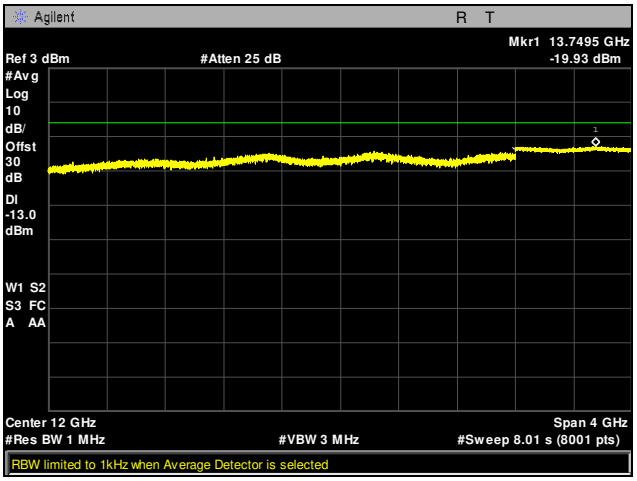
Plot 164. Conducted Spurious Emissions, Channel 5755, 1 GHz – 3 GHz, Part 27, 5 MHz, LTE700



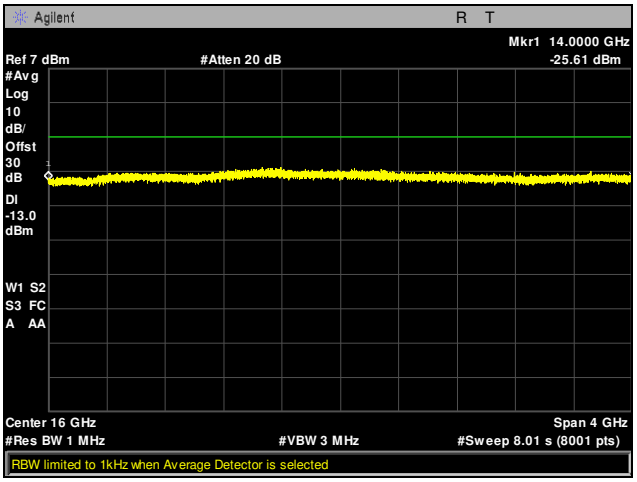
Plot 165. Conducted Spurious Emissions, Channel 5755, 3 GHz – 6 GHz, Part 27, 5 MHz, LTE700



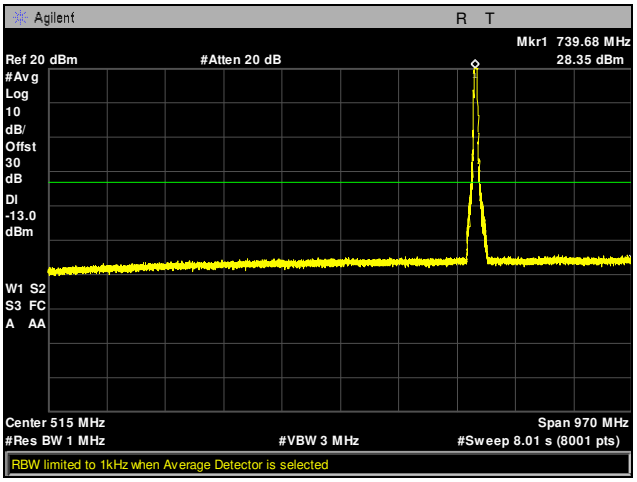
Plot 166. Conducted Spurious Emissions, Channel 5755, 6 GHz – 10 GHz, Part 27, 5 MHz, LTE700



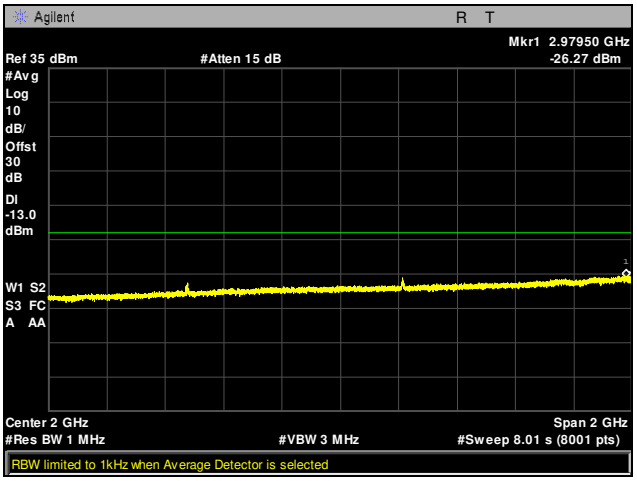
Plot 167. Conducted Spurious Emissions, Channel 5755, 10 GHz – 14 GHz, Part 27, 5 MHz, LTE700



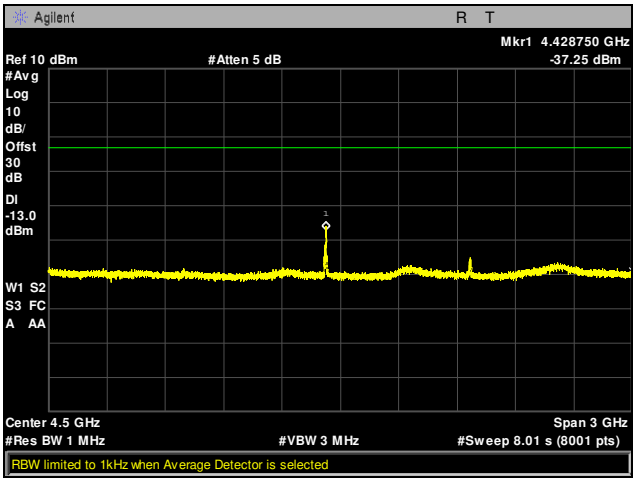
Plot 168. Conducted Spurious Emissions, Channel 5755, 14 GHz – 18 GHz, Part 27, 5 MHz, LTE700



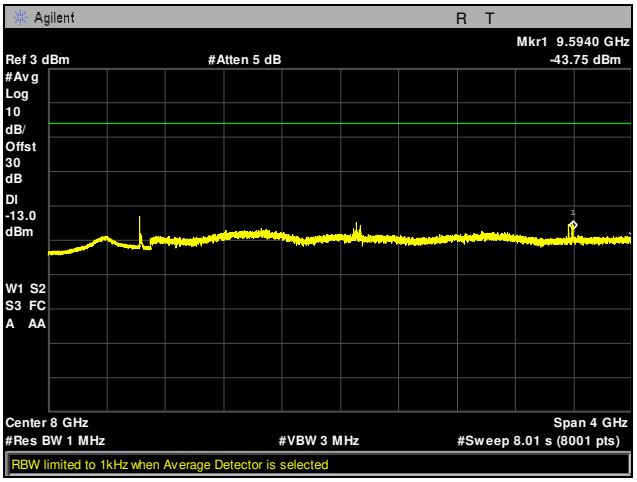
Plot 169. Conducted Spurious Emissions, Channel 5790, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE700



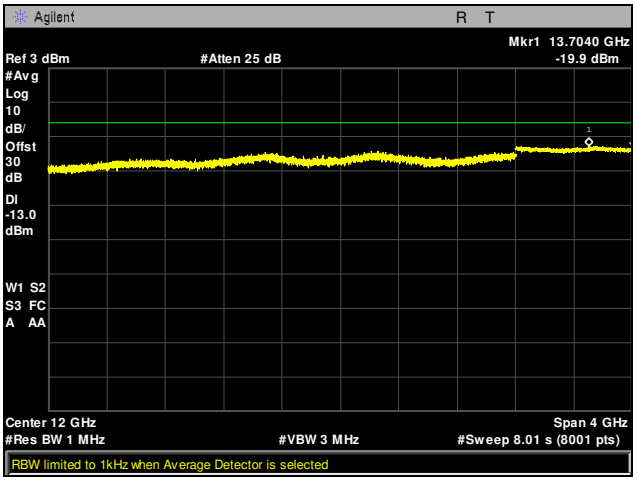
Plot 170. Conducted Spurious Emissions, Channel 5790, 1 GHz – 3 GHz, Part 27, 5 MHz, LTE700



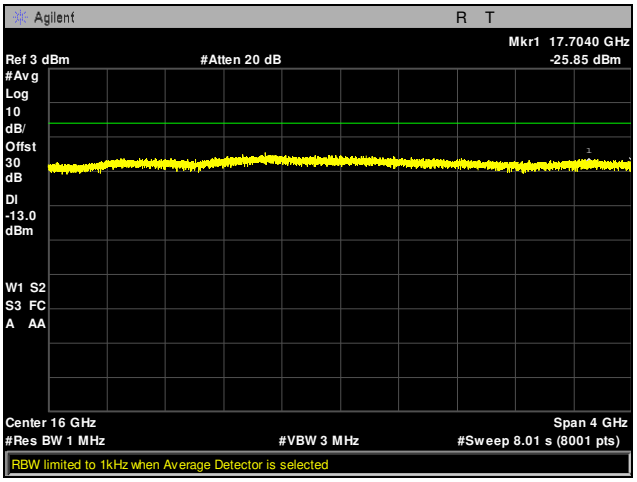
Plot 171. Conducted Spurious Emissions, Channel 5790, 3 GHz – 6 GHz, Part 27, 5 MHz, LTE700



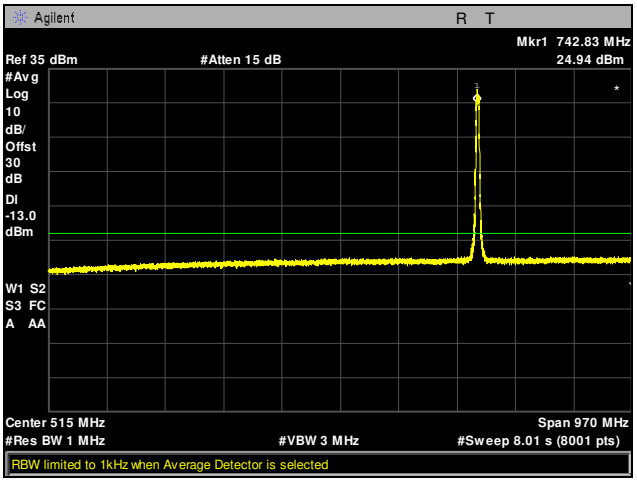
Plot 172. Conducted Spurious Emissions, Channel 5790, 6 GHz – 10 GHz, Part 27, 5 MHz, LTE700



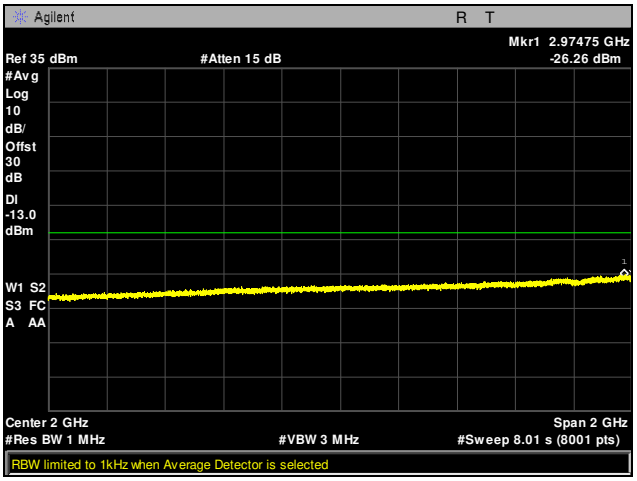
Plot 173. Conducted Spurious Emissions, Channel 5790, 10 GHz – 14 GHz, Part 27, 5 MHz, LTE700



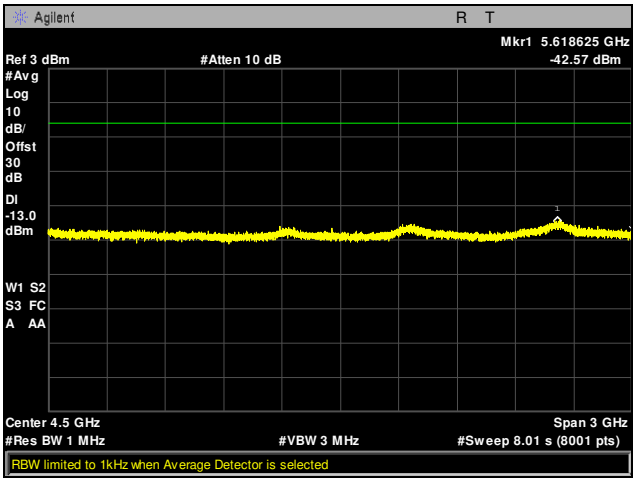
Plot 174. Conducted Spurious Emissions, Channel 5790, 14 GHz – 18 GHz, Part 27, 5 MHz, LTE700



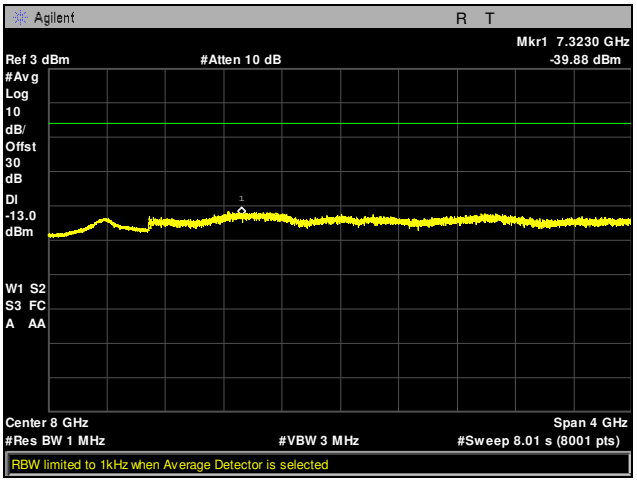
Plot 175. Conducted Spurious Emissions, Channel 5825, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE700



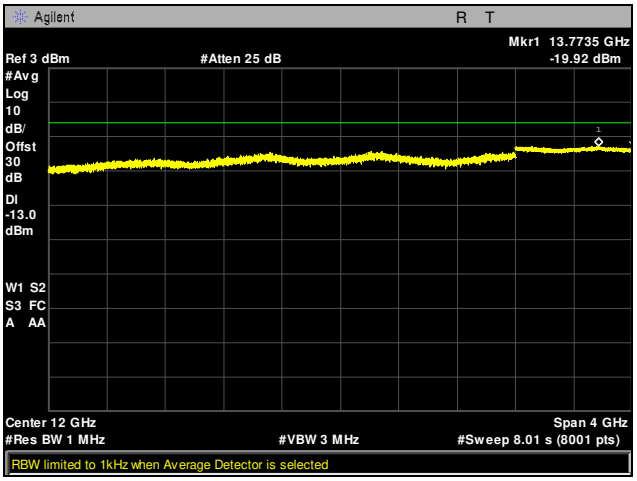
Plot 176. Conducted Spurious Emissions, Channel 5825, 1 GHz – 3 GHz, Part 27, 5 MHz, LTE700



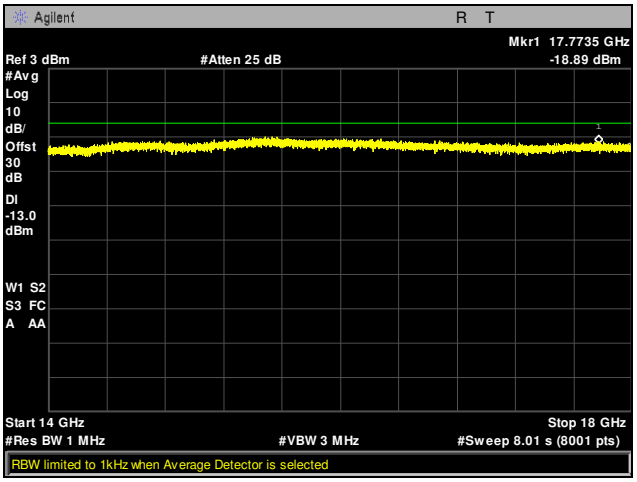
Plot 177. Conducted Spurious Emissions, Channel 5825, 3 GHz – 6 GHz, Part 27, 5 MHz, LTE700



Plot 178. Conducted Spurious Emissions, Channel 5825, 6 GHz – 10 GHz, Part 27, 5 MHz, LTE700

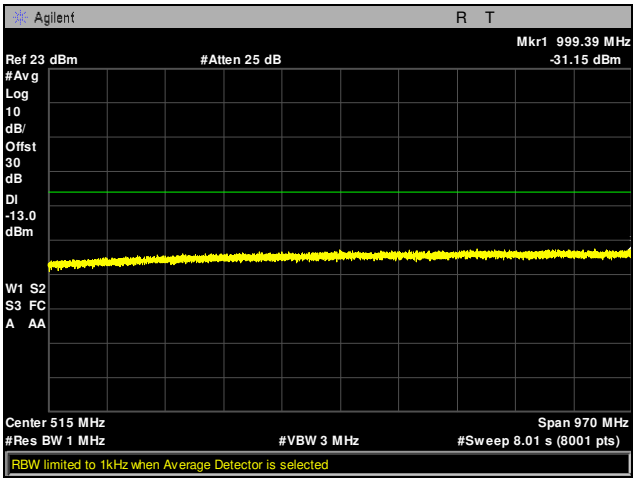


Plot 179. Conducted Spurious Emissions, Channel 5825, 10 GHz – 14 GHz, Part 27, 5 MHz, LTE700

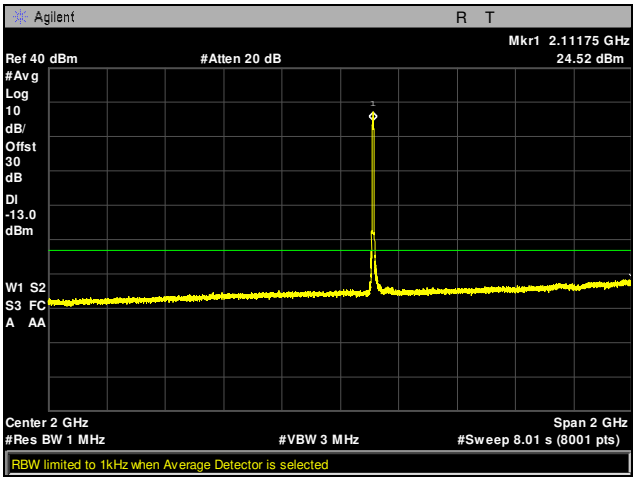


Plot 180. Conducted Spurious Emissions, Channel 5825, 14 GHz – 18 GHz, Part 27, 5 MHz, LTE700

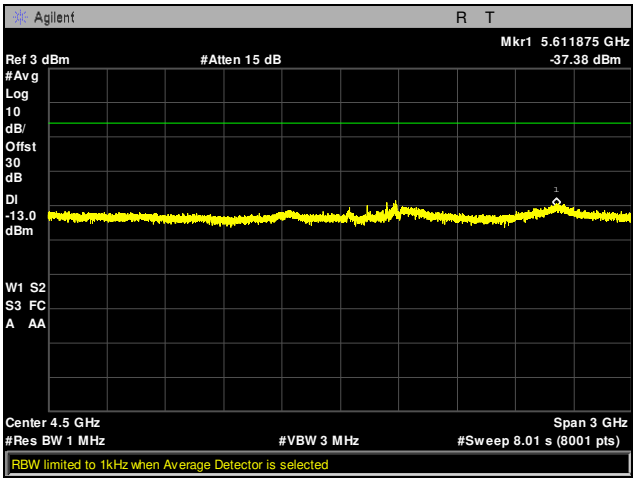
Part 27, 5 MHz, LTE2100



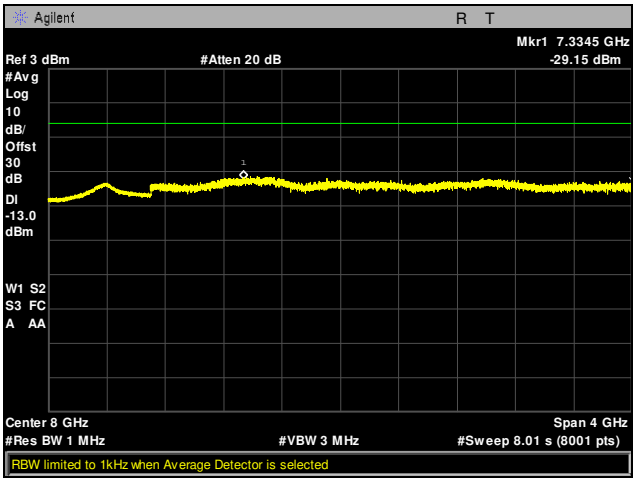
Plot 181. Conducted Spurious Emissions, Channel 1975, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE2100



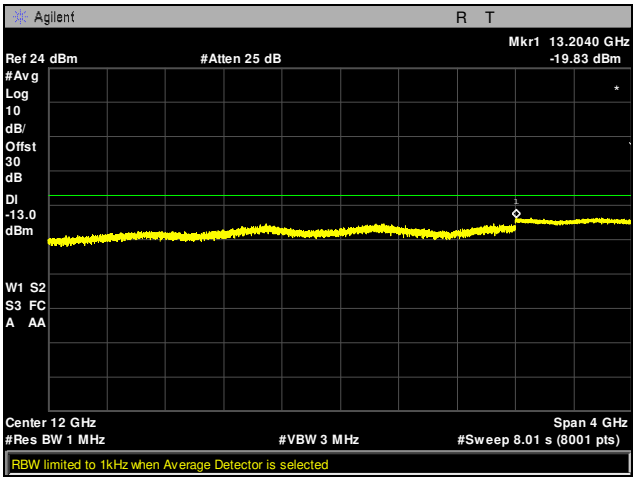
Plot 182. Conducted Spurious Emissions, Channel 1975, 1 GHz – 3 GHz, Part 27, 5 MHz, LTE2100



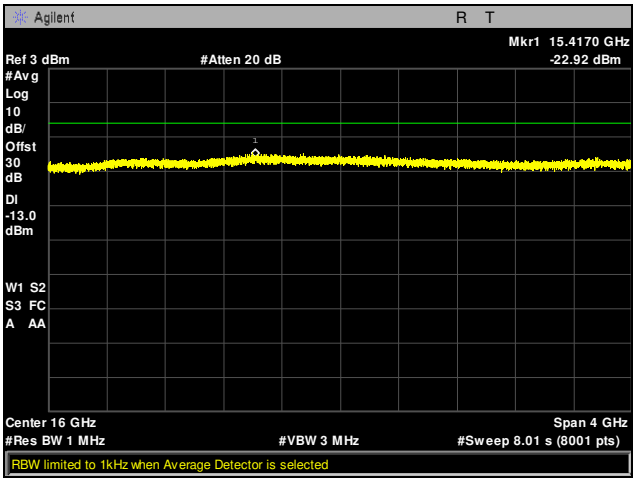
Plot 183. Conducted Spurious Emissions, Channel 1975, 3 GHz – 6 GHz, Part 27, 5 MHz, LTE2100



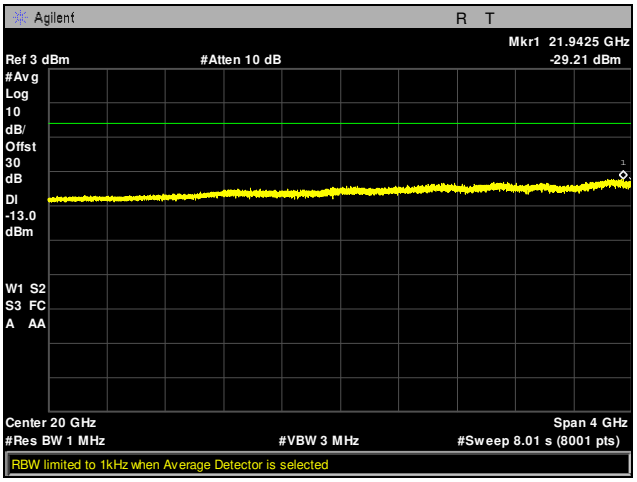
Plot 184. Conducted Spurious Emissions, Channel 1975, 6 GHz – 10 GHz, Part 27, 5 MHz, LTE2100



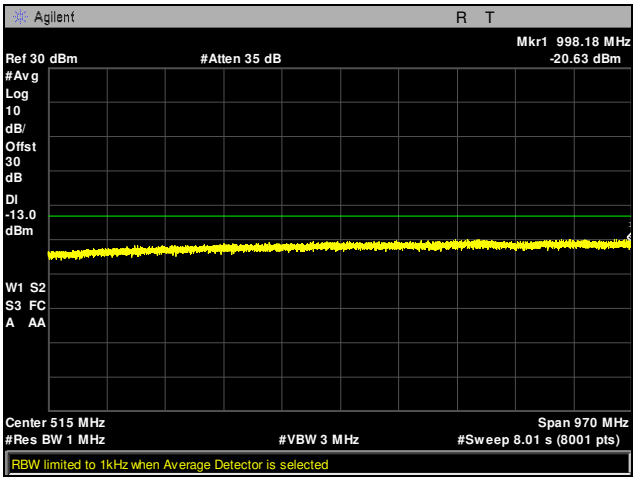
Plot 185. Conducted Spurious Emissions, Channel 1975, 10 GHz – 14 GHz, Part 27, 5 MHz, LTE2100



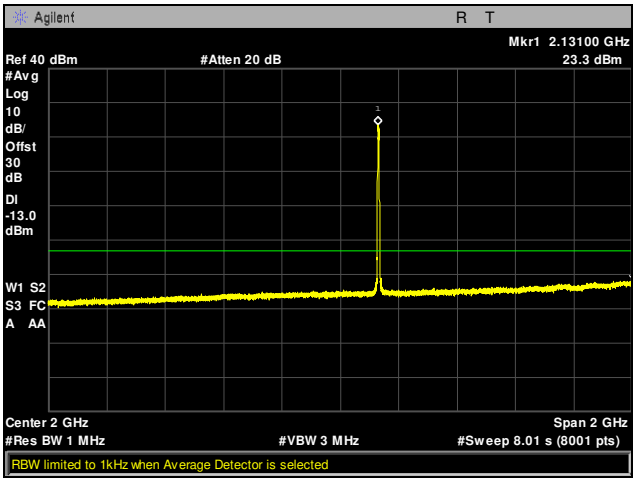
Plot 186. Conducted Spurious Emissions, Channel 1975, 14 GHz – 18 GHz, Part 27, 5 MHz, LTE2100



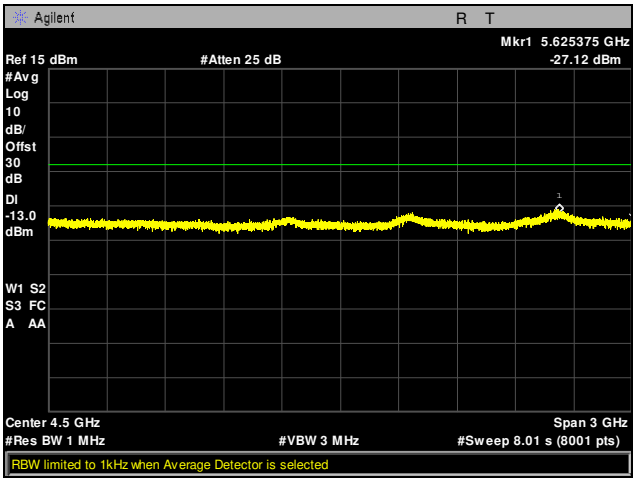
Plot 187. Conducted Spurious Emissions, Channel 1975, 18 GHz – 22 GHz, Part 27, 5 MHz, LTE2100



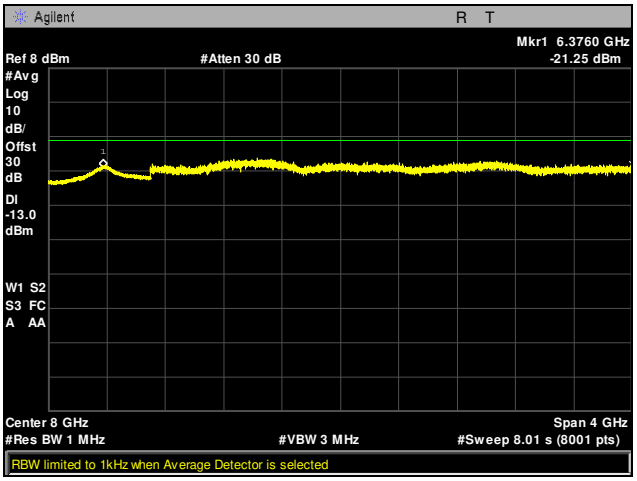
Plot 188. Conducted Spurious Emissions, Channel 2160, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE2100



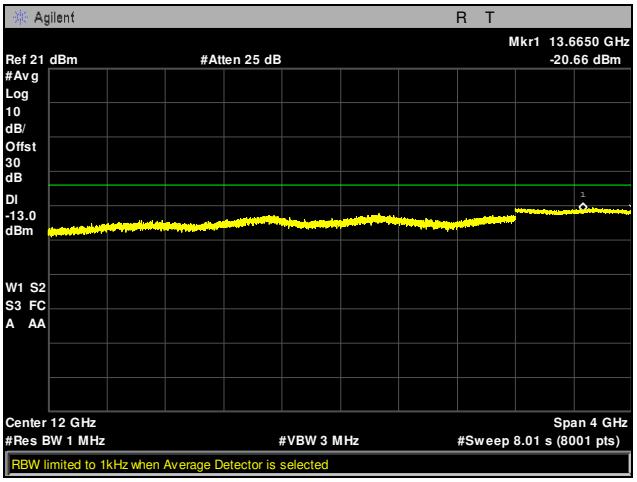
Plot 189. Conducted Spurious Emissions, Channel 2160, 1 GHz – 3 GHz, Part 27, 5 MHz, LTE2100



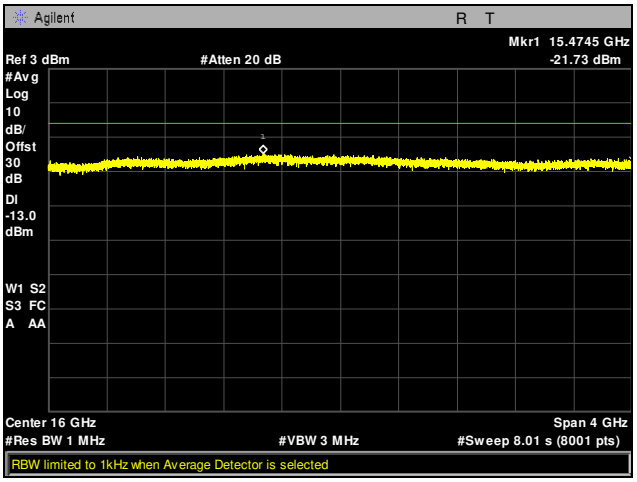
Plot 190. Conducted Spurious Emissions, Channel 2160, 3 GHz – 6 GHz, Part 27, 5 MHz, LTE2100



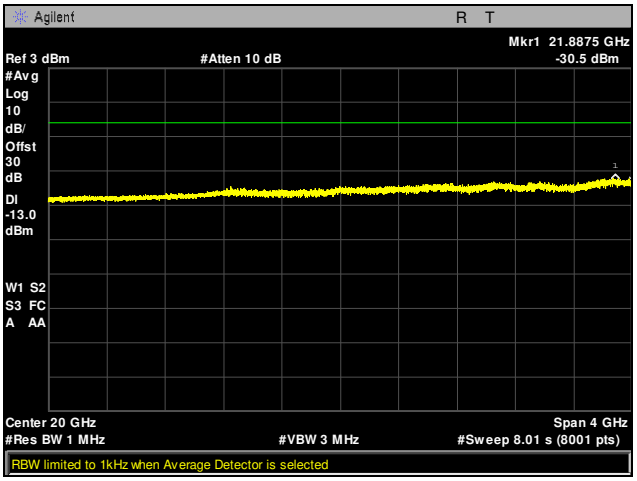
Plot 191. Conducted Spurious Emissions, Channel 2160, 6 GHz – 10 GHz, Part 27, 5 MHz, LTE2100



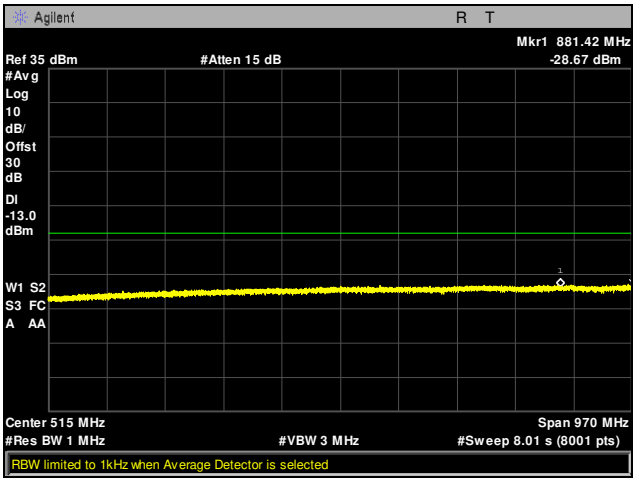
Plot 192. Conducted Spurious Emissions, Channel 2160, 10 GHz – 14 GHz, Part 27, 5 MHz, LTE2100



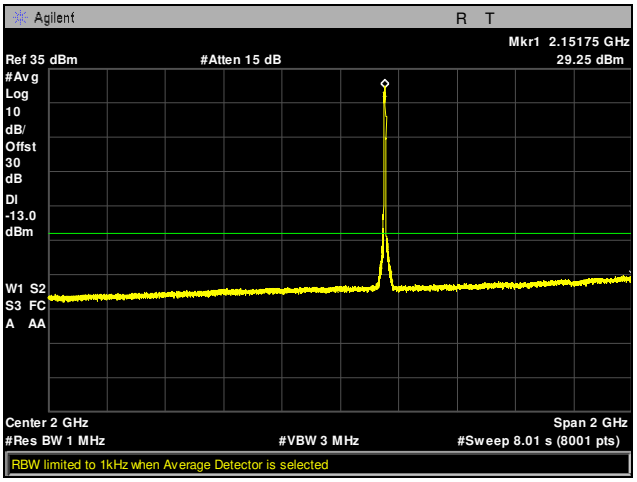
Plot 193. Conducted Spurious Emissions, Channel 2160, 14 GHz – 18 GHz, Part 27, 5 MHz, LTE2100



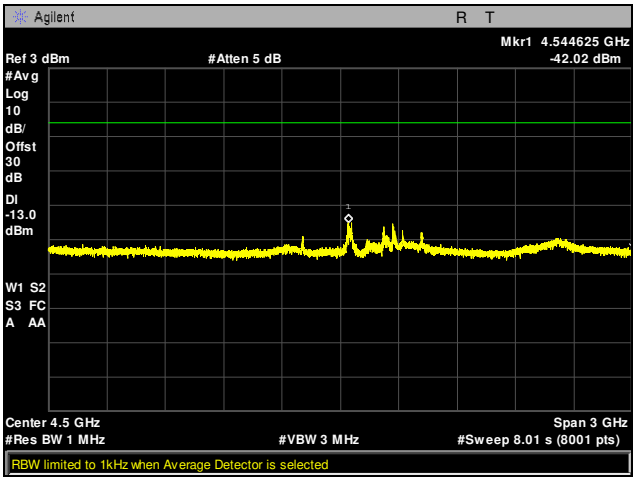
Plot 194. Conducted Spurious Emissions, Channel 2160, 18 GHz – 22 GHz, Part 27, 5 MHz, LTE2100



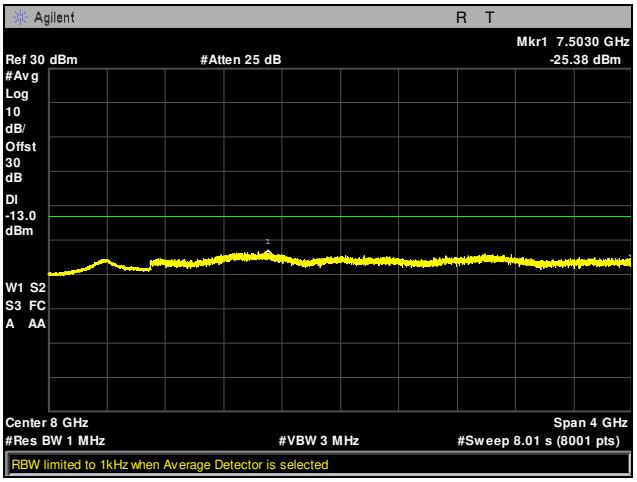
Plot 195. Conducted Spurious Emissions, Channel 2375, 30 MHz – 1 GHz, Part 27, 5 MHz, LTE2100



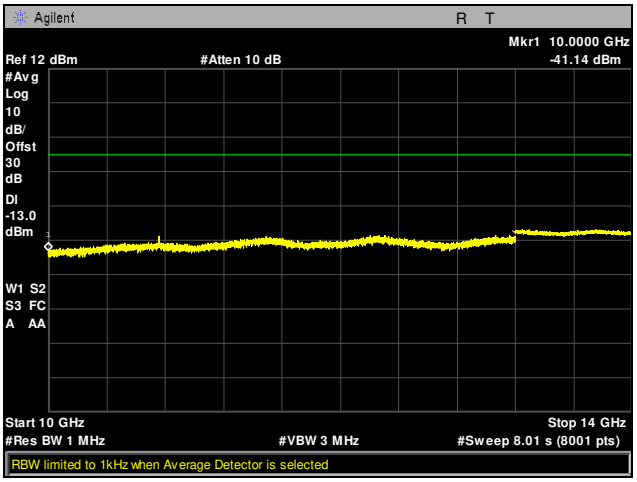
Plot 196. Conducted Spurious Emissions, Channel 2375, 1 GHz – 3 GHz, Part 27, 5 MHz, LTE2100



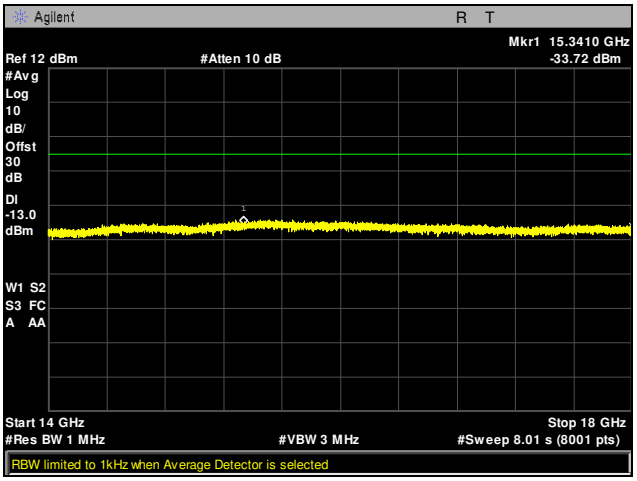
Plot 197. Conducted Spurious Emissions, Channel 2375, 3 GHz – 6 GHz, Part 27, 5 MHz, LTE2100



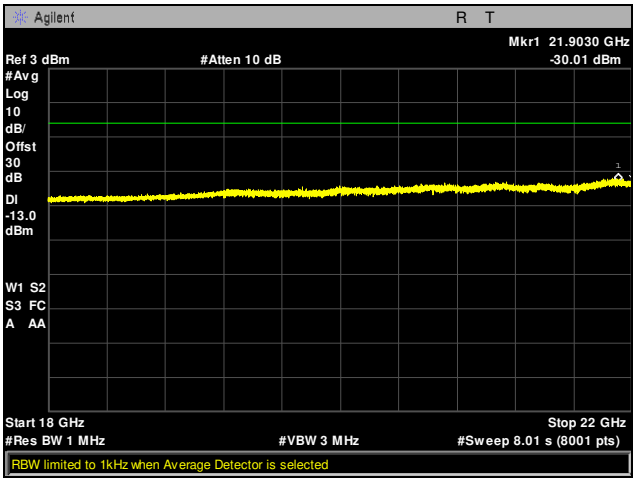
Plot 198. Conducted Spurious Emissions, Channel 2375, 6 GHz – 10 GHz, Part 27, 5 MHz, LTE2100



Plot 199. Conducted Spurious Emissions, Channel 2375, 10 GHz – 14 GHz, Part 27, 5 MHz, LTE2100

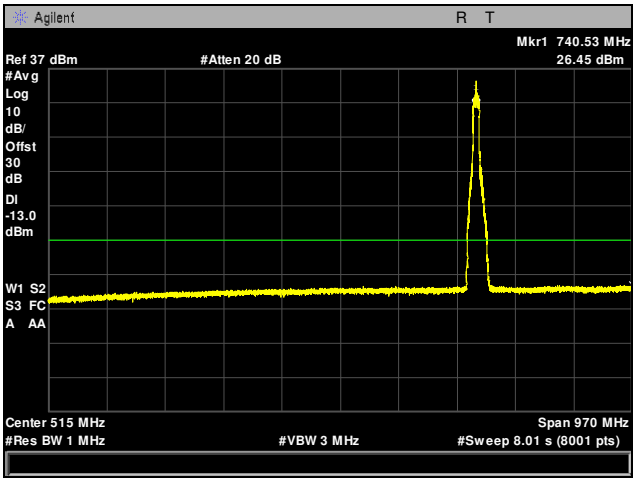


Plot 200. Conducted Spurious Emissions, Channel 2375, 14 GHz – 18 GHz, Part 27, 5 MHz, LTE2100

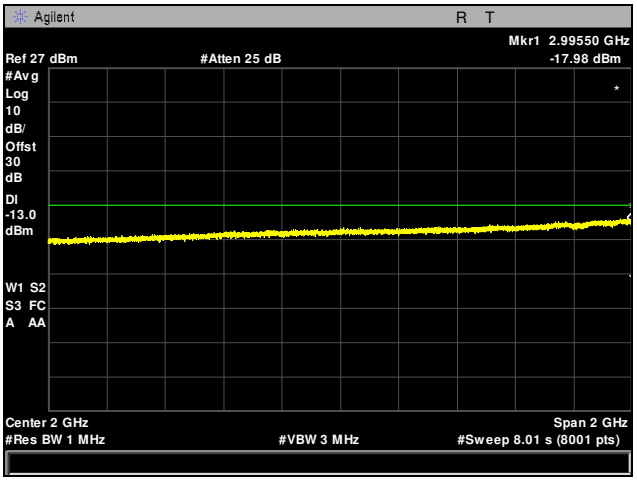


Plot 201. Conducted Spurious Emissions, Channel 2375, 18 GHz – 22 GHz, Part 27, 5 MHz, LTE2100

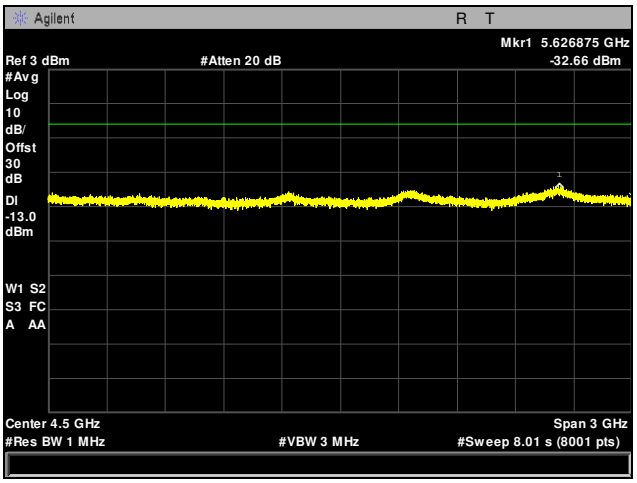
Part 27, 10 MHz, LTE700



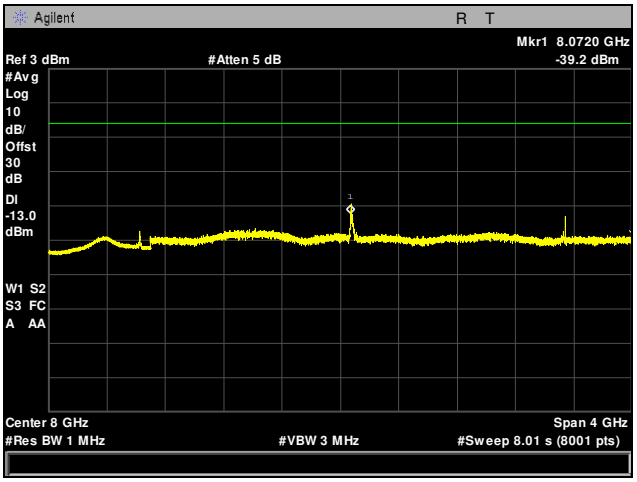
Plot 202. Conducted Spurious Emissions, Channel 5780, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE700



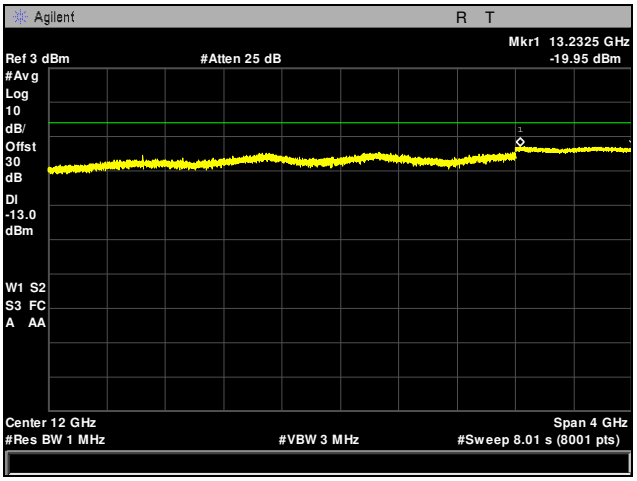
Plot 203. Conducted Spurious Emissions, Channel 5780, 1 GHz – 3 GHz, Part 27, 10 MHz, LTE700



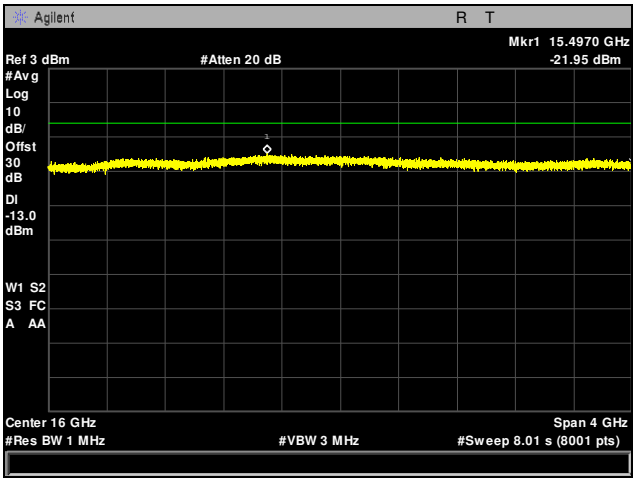
Plot 204. Conducted Spurious Emissions, Channel 5780, 3 GHz – 6 GHz, Part 27, 10 MHz, LTE700



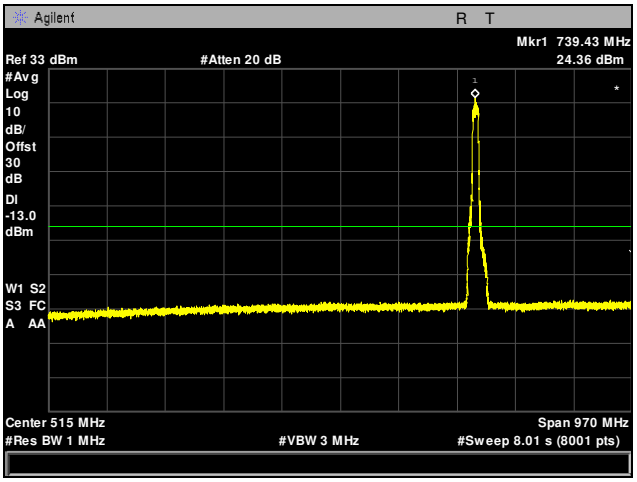
Plot 205. Conducted Spurious Emissions, Channel 5780, 6 GHz – 10 GHz, Part 27, 10 MHz, LTE700



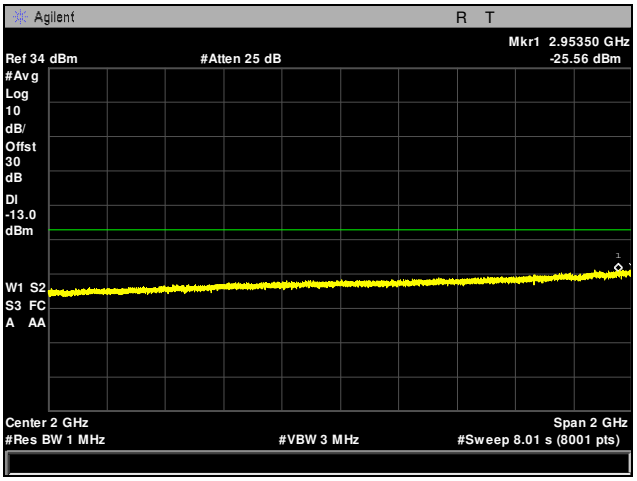
Plot 206. Conducted Spurious Emissions, Channel 5780, 10 GHz – 14 GHz, Part 27, 10 MHz, LTE700



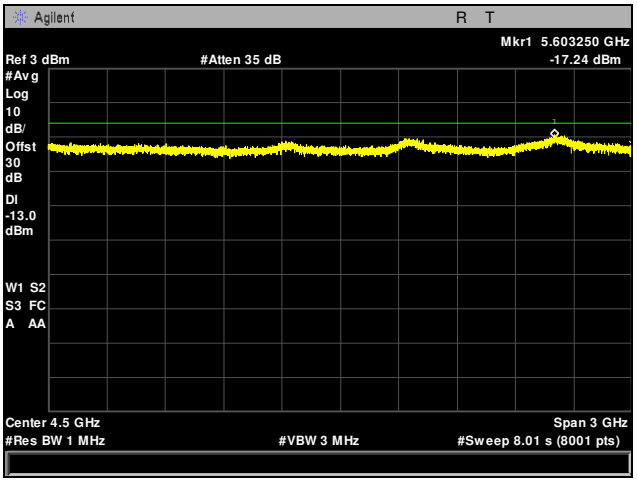
Plot 207. Conducted Spurious Emissions, Channel 5780, 14 GHz – 18 GHz, Part 27, 10 MHz, LTE700



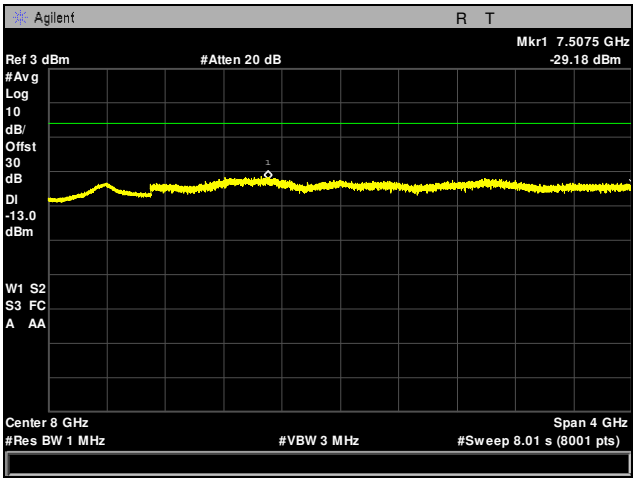
Plot 208. Conducted Spurious Emissions, Channel 5790, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE700



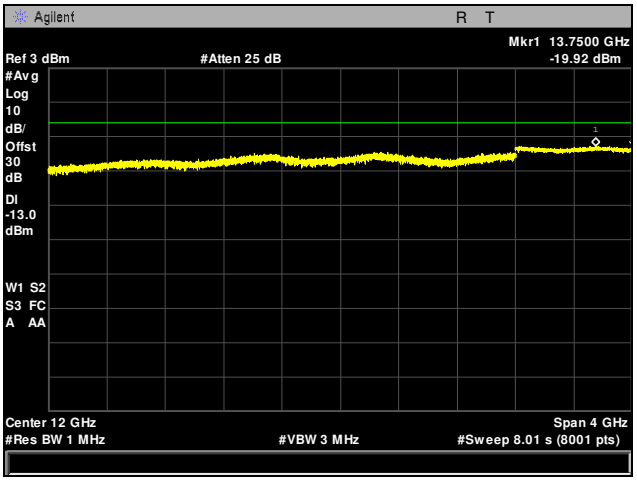
Plot 209. Conducted Spurious Emissions, Channel 5790, 1 GHz – 3 GHz, Part 27, 10 MHz, LTE700



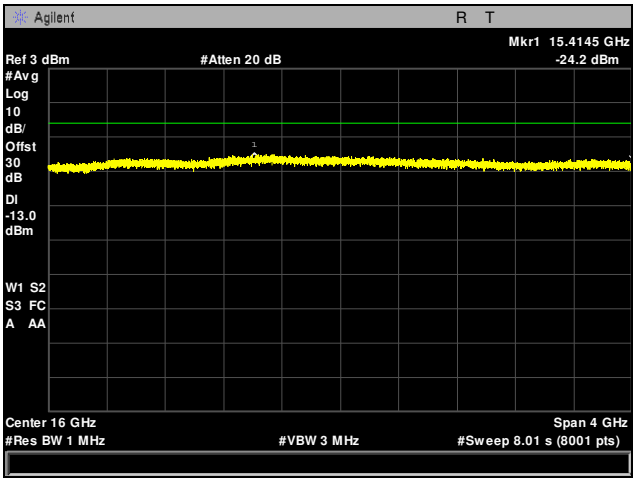
Plot 210. Conducted Spurious Emissions, Channel 5790, 3 GHz – 6 GHz, Part 27, 10 MHz, LTE700



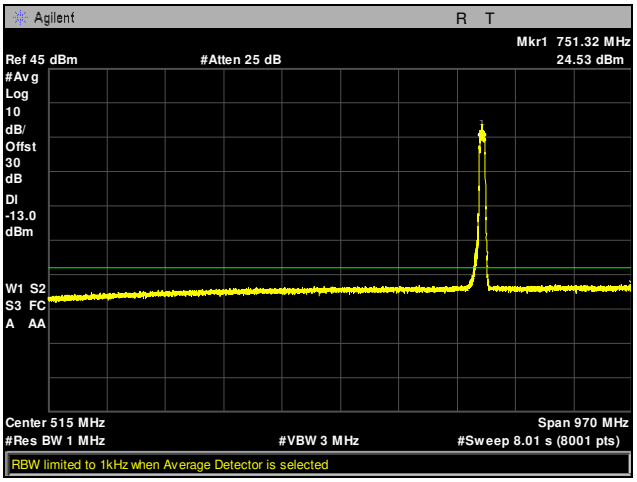
Plot 211. Conducted Spurious Emissions, Channel 5790, 6 GHz – 10 GHz, Part 27, 10 MHz, LTE700



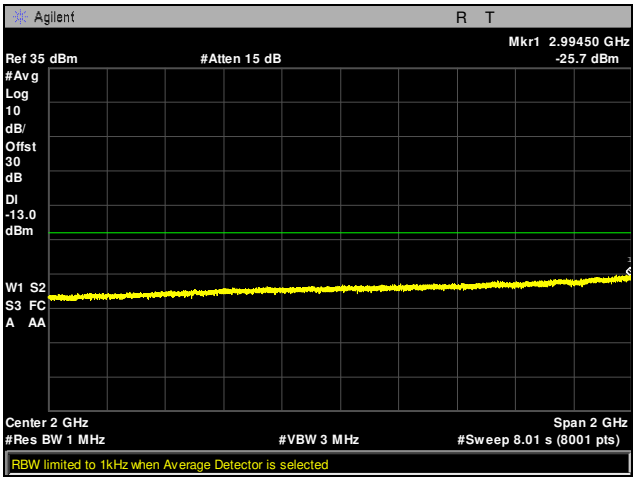
Plot 212. Conducted Spurious Emissions, Channel 5790, 10 GHz – 14 GHz, Part 27, 10 MHz, LTE700



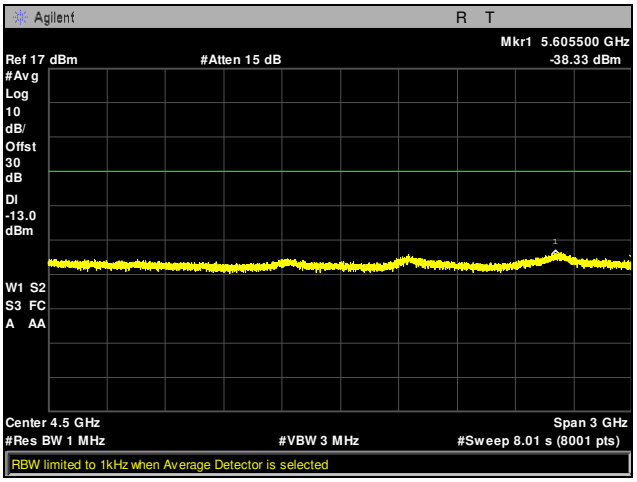
Plot 213. Conducted Spurious Emissions, Channel 5790, 14 GHz – 18 GHz, Part 27, 10 MHz, LTE700



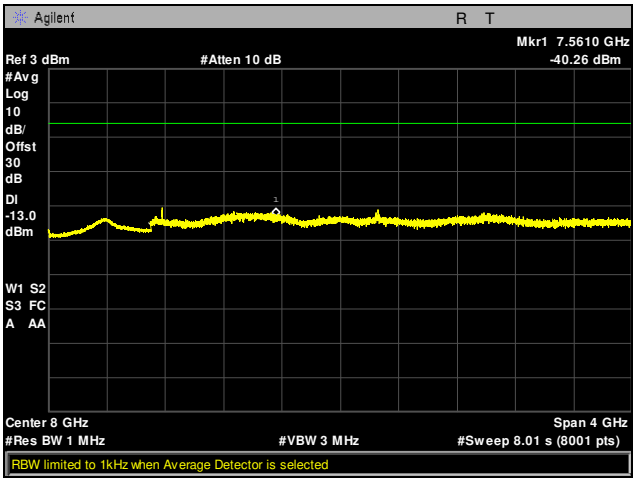
Plot 214. Conducted Spurious Emissions, Channel 5800, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE700



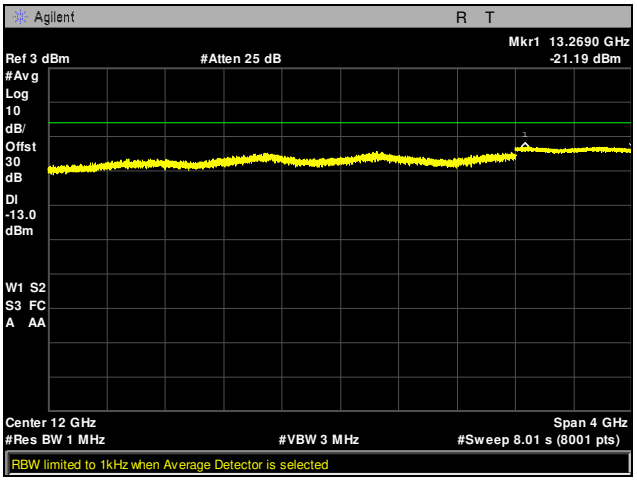
Plot 215. Conducted Spurious Emissions, Channel 5800, 1 GHz – 3 GHz, Part 27, 10 MHz, LTE700



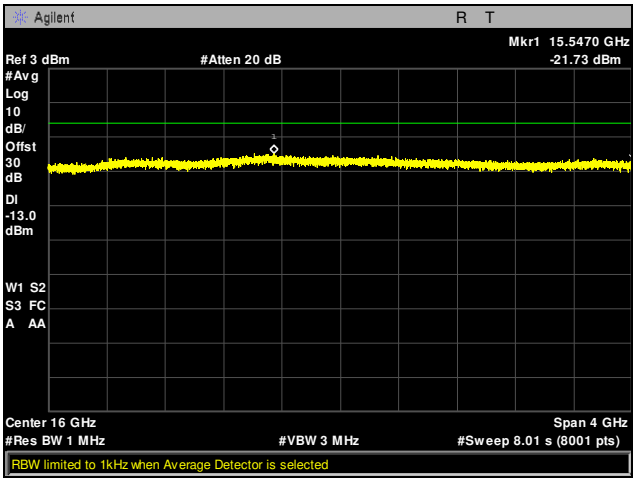
Plot 216. Conducted Spurious Emissions, Channel 5800, 3 GHz – 6 GHz, Part 27, 10 MHz, LTE700



Plot 217. Conducted Spurious Emissions, Channel 5800, 6 GHz – 10 GHz, Part 27, 10 MHz, LTE700

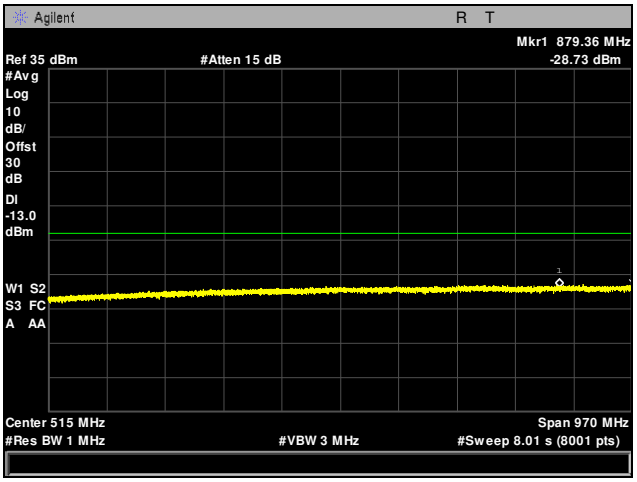


Plot 218. Conducted Spurious Emissions, Channel 5800, 10 GHz – 14 GHz, Part 27, 10 MHz, LTE700

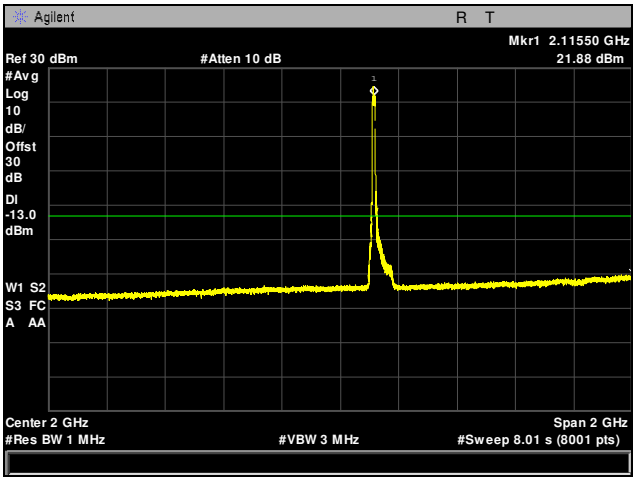


Plot 219. Conducted Spurious Emissions, Channel 5800, 14 GHz – 18 GHz, Part 27, 10 MHz, LTE700

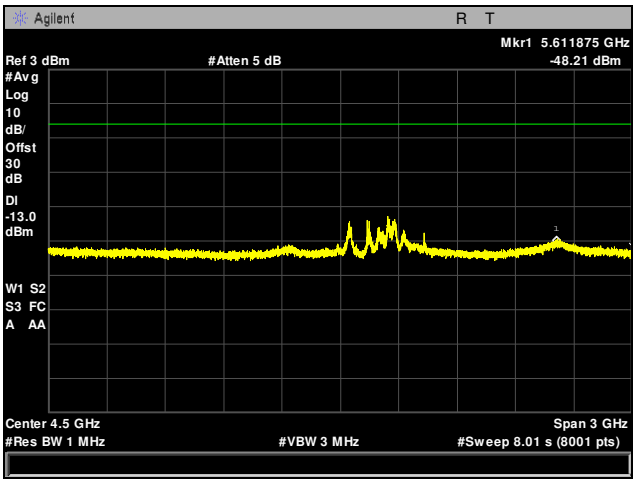
Part 27, 10 MHz, LTE2100



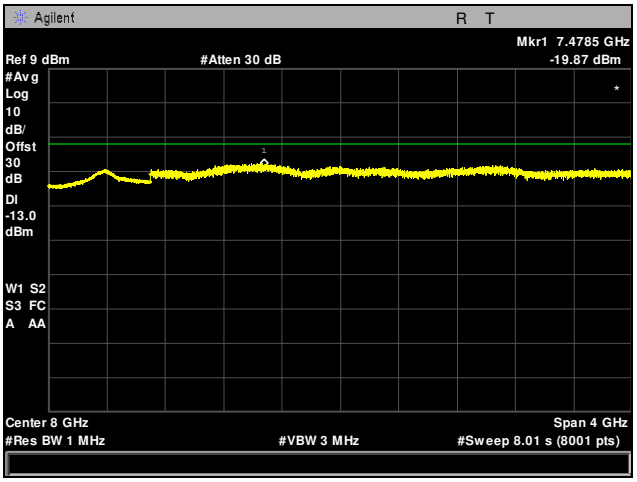
Plot 220. Conducted Spurious Emissions, Channel 2000, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE2100



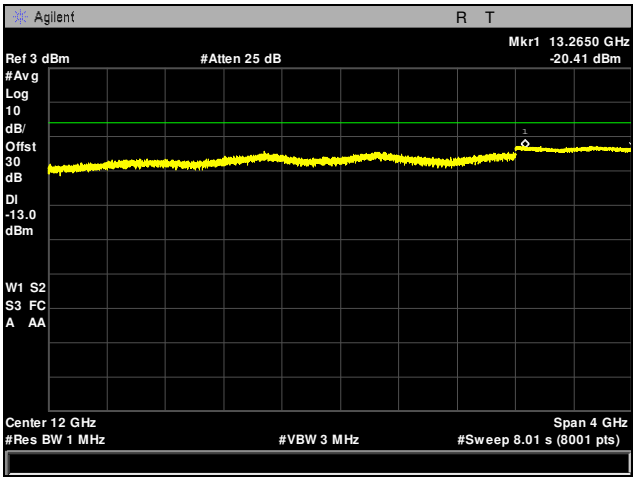
Plot 221. Conducted Spurious Emissions, Channel 2000, 1 GHz – 3 GHz, Part 27, 10 MHz, LTE2100



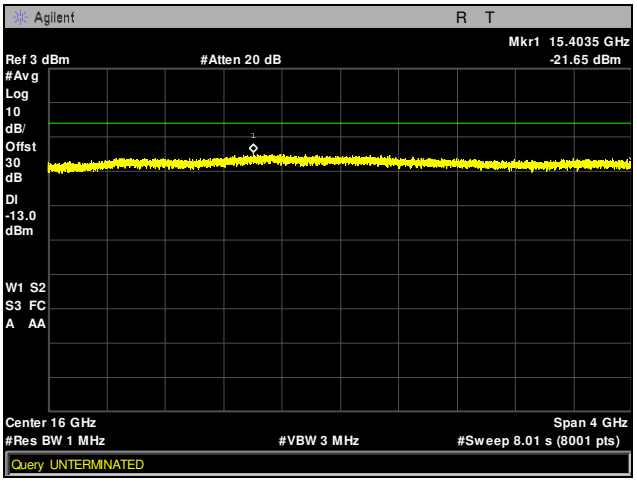
Plot 222. Conducted Spurious Emissions, Channel 2000, 3 GHz – 6 GHz, Part 27, 10 MHz, LTE2100



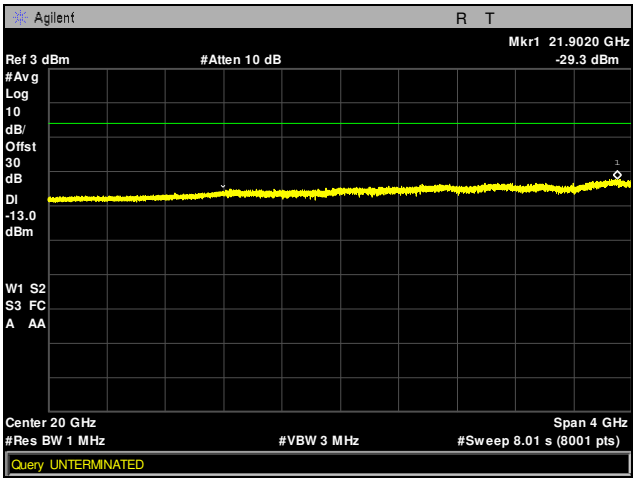
Plot 223. Conducted Spurious Emissions, Channel 2000, 6 GHz – 10 GHz, Part 27, 10 MHz, LTE2100



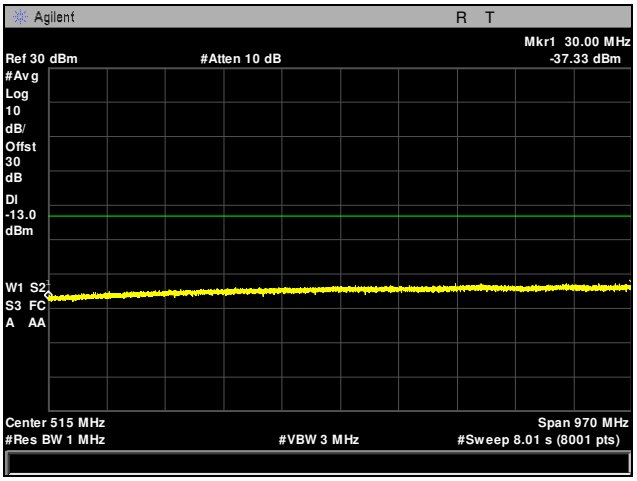
Plot 224. Conducted Spurious Emissions, Channel 2000, 10 GHz – 14 GHz, Part 27, 10 MHz, LTE2100



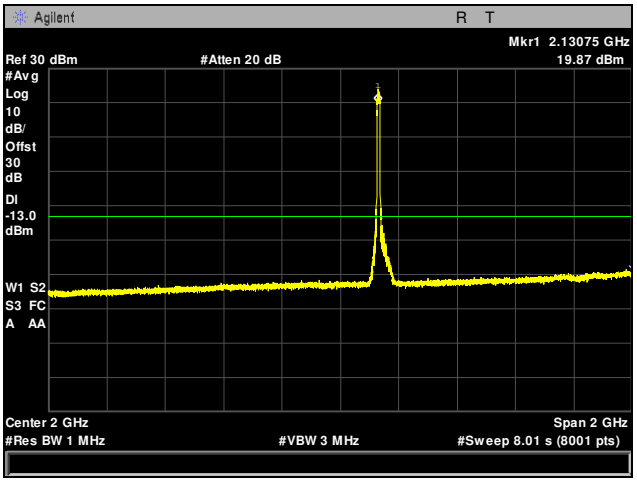
Plot 225. Conducted Spurious Emissions, Channel 2000, 14 GHz – 18 GHz, Part 27, 10 MHz, LTE2100



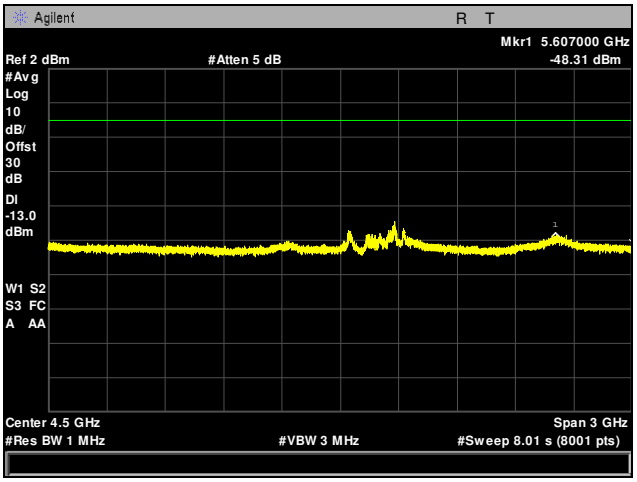
Plot 226. Conducted Spurious Emissions, Channel 2000, 18 GHz – 22 GHz, Part 27, 10 MHz, LTE2100



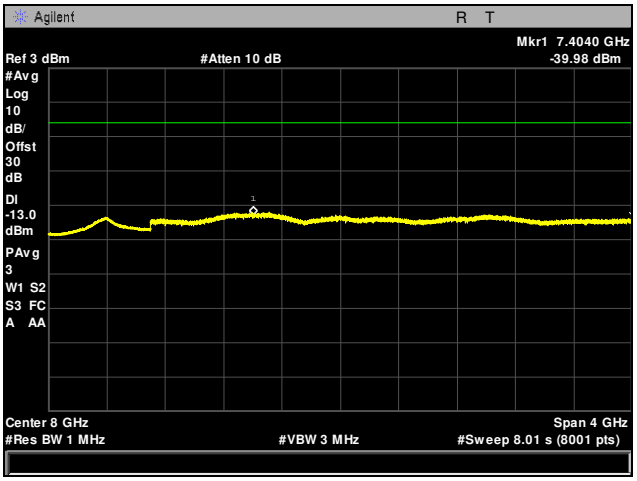
Plot 227. Conducted Spurious Emissions, Channel 2160, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE2100



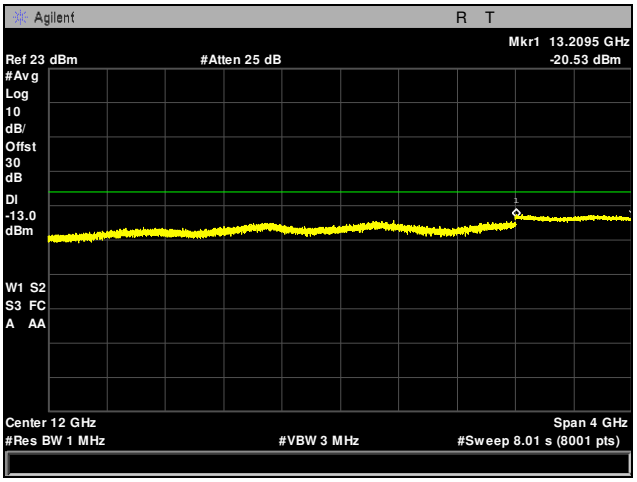
Plot 228. Conducted Spurious Emissions, Channel 2160, 1 GHz – 3 GHz, Part 27, 10 MHz, LTE2100



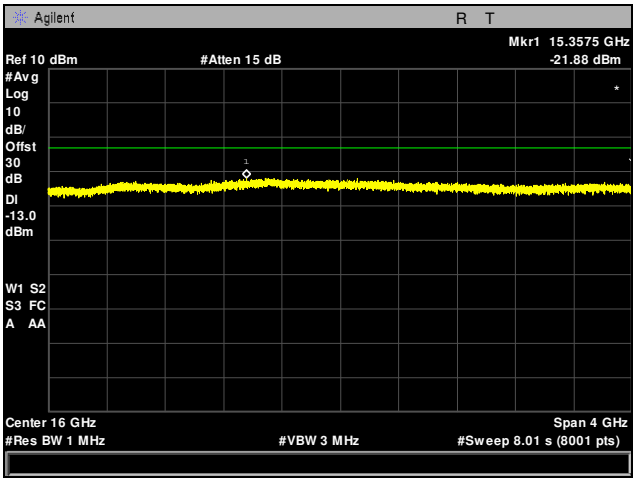
Plot 229. Conducted Spurious Emissions, Channel 2160, 3 GHz – 6 GHz, Part 27, 10 MHz, LTE2100



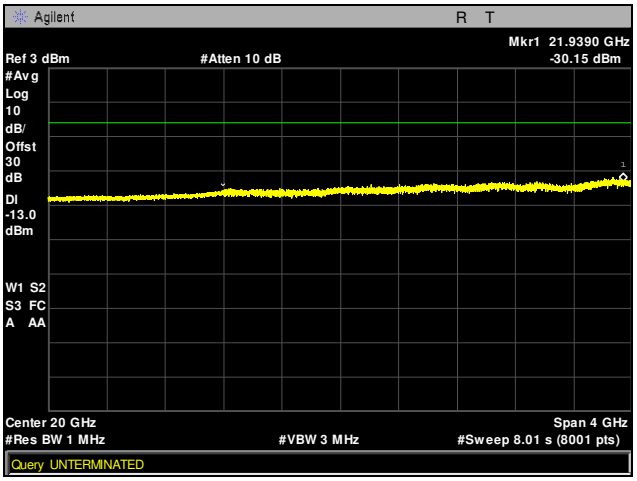
Plot 230. Conducted Spurious Emissions, Channel 2160, 6 GHz – 10 GHz, Part 27, 10 MHz, LTE2100



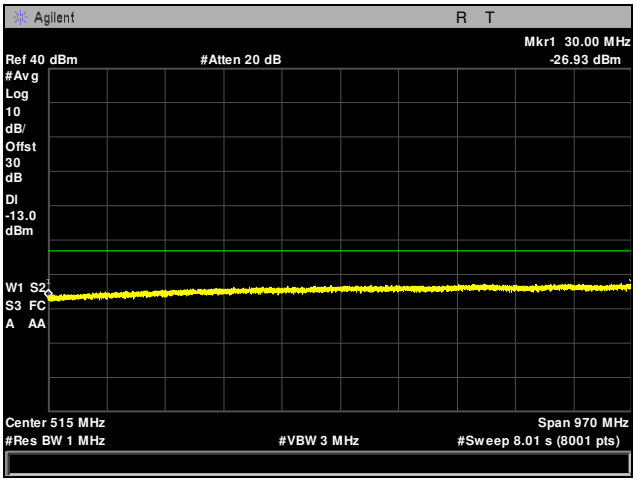
Plot 231. Conducted Spurious Emissions, Channel 2160, 10 GHz – 14 GHz, Part 27, 10 MHz, LTE2100



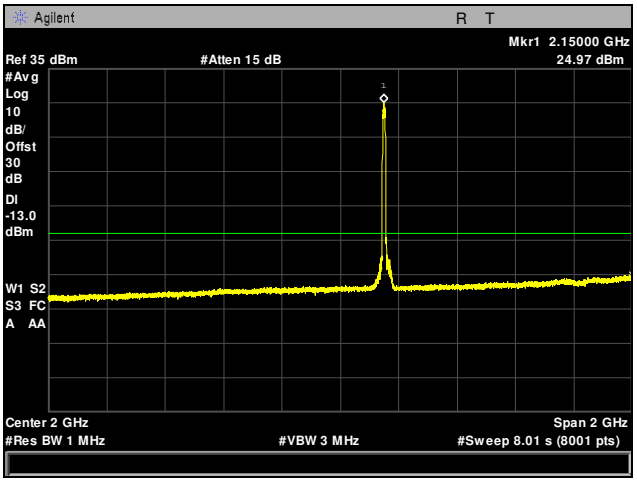
Plot 232. Conducted Spurious Emissions, Channel 2160, 14 GHz – 18 GHz, Part 27, 10 MHz, LTE2100



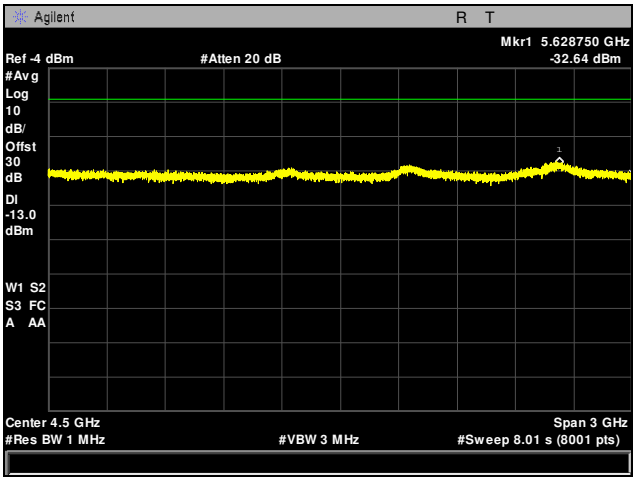
Plot 233. Conducted Spurious Emissions, Channel 2160, 18 GHz – 22 GHz, Part 27, 10 MHz, LTE2100



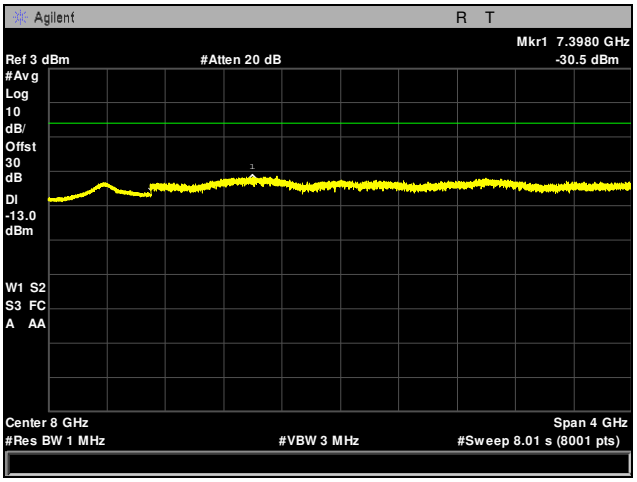
Plot 234. Conducted Spurious Emissions, Channel 2160, 30 MHz – 1 GHz, Part 27, 10 MHz, LTE2100



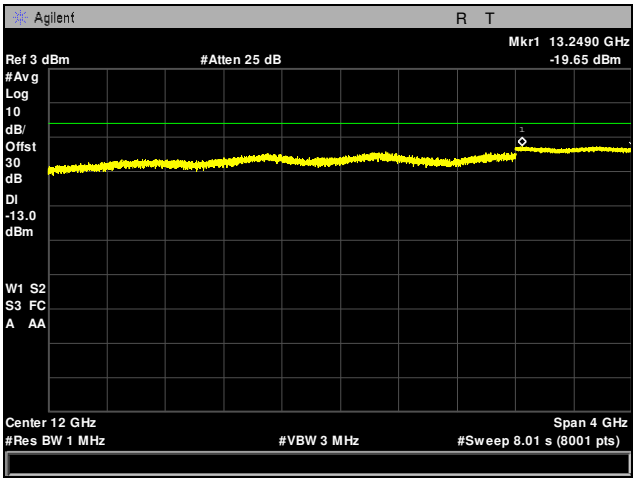
Plot 235. Conducted Spurious Emissions, Channel 2160, 1 GHz – 3 GHz, Part 27, 10 MHz, LTE2100



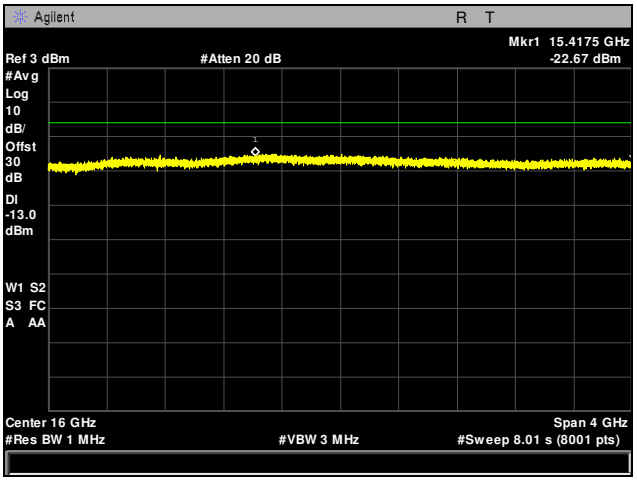
Plot 236. Conducted Spurious Emissions, Channel 2160, 3 GHz – 6 GHz, Part 27, 10 MHz, LTE2100



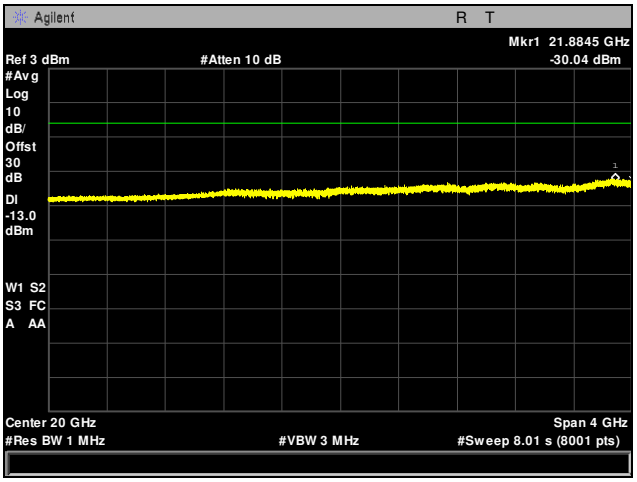
Plot 237. Conducted Spurious Emissions, Channel 2160, 6 GHz – 10 GHz, Part 27, 10 MHz, LTE2100



Plot 238. Conducted Spurious Emissions, Channel 2160, 10 GHz – 14 GHz, Part 27, 10 MHz, LTE2100

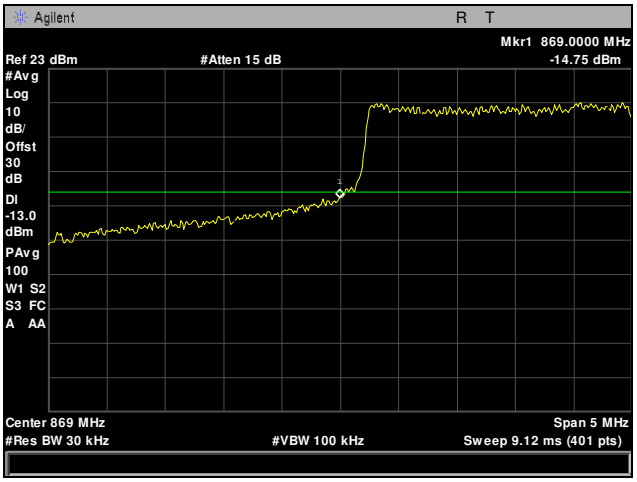


Plot 239. Conducted Spurious Emissions, Channel 2160, 14 GHz – 18 GHz, Part 27, 10 MHz, LTE2100

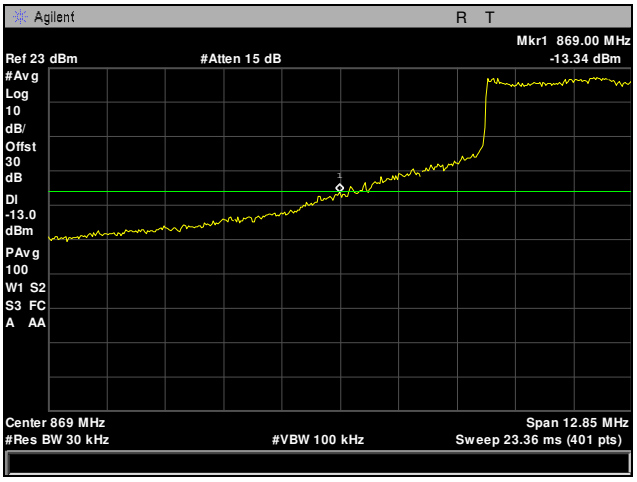


Plot 240. Conducted Spurious Emissions, Channel 2160, 18 GHz – 22 GHz, Part 27, 10 MHz, LTE2100

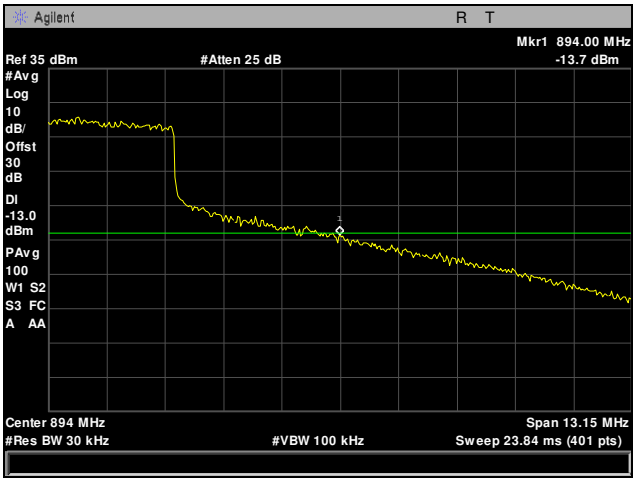
Band Edge, 5 MHz, Part 22



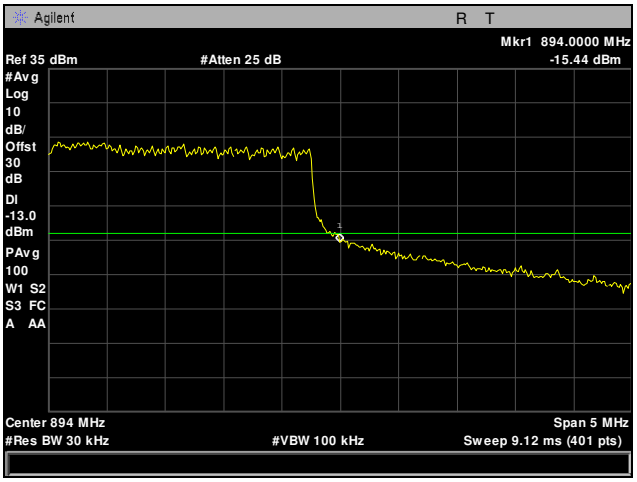
Plot 241. Conducted Band Edge, Channel 2425, 5 MHz, Part 22



Plot 242. Conducted Band Edge, Channel 2455 (Full Power), 5 MHz, Part 22

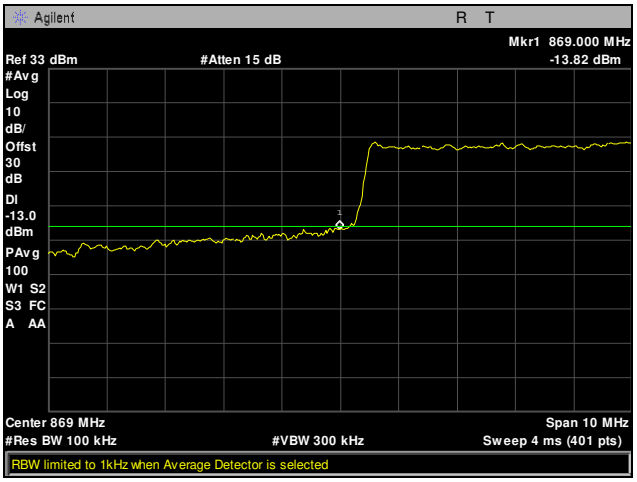


Plot 243. Conducted Band Edge, Channel 2590 (Full Power), 5 MHz, Part 22

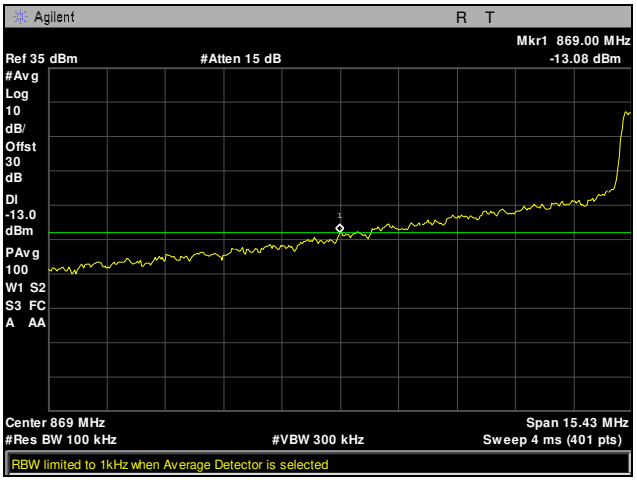


Plot 244. Conducted Band Edge, Channel 2625, 5 MHz, Part 22

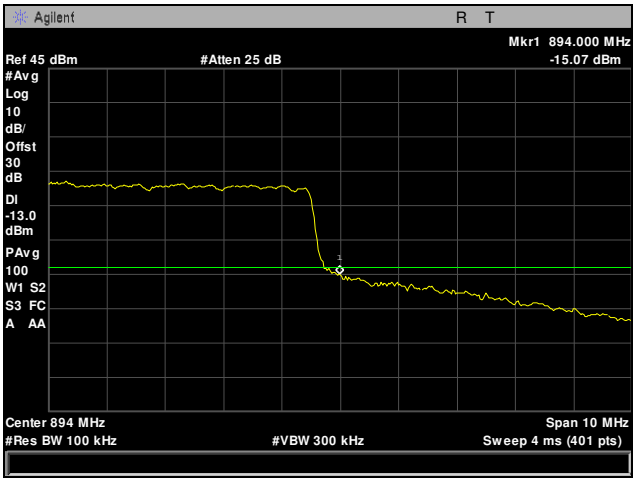
Band Edge, 10 MHz, Part 22



Plot 245. Conducted Band Edge, Channel 2450, 10 MHz, Part 22

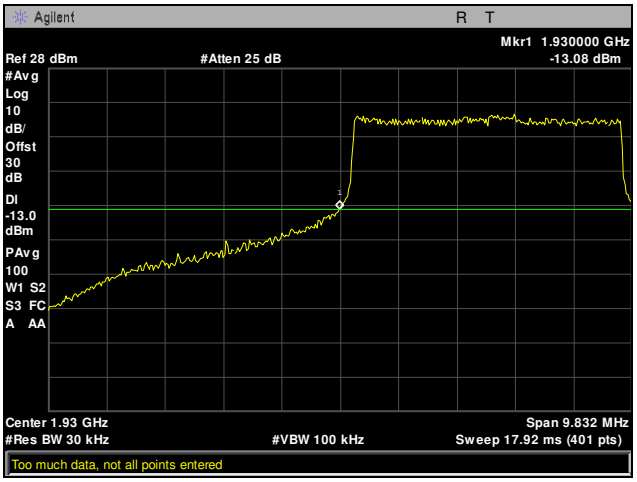


Plot 246. Conducted Band Edge, Channel 2520 (Full Power), 10 MHz, Part 22

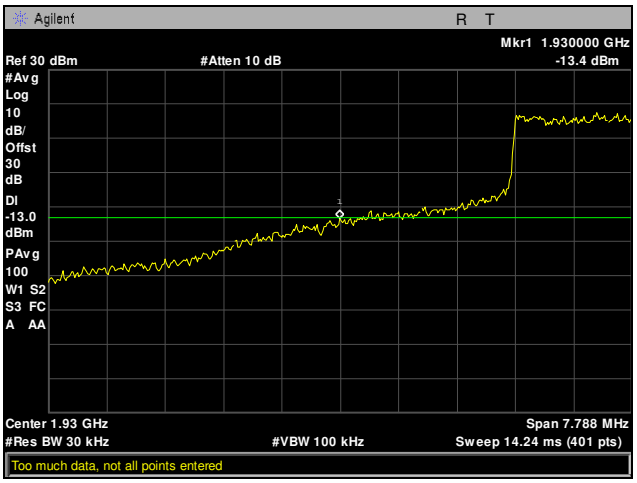


Plot 247. Conducted Band Edge, Channel 2600, 10 MHz, Part 22

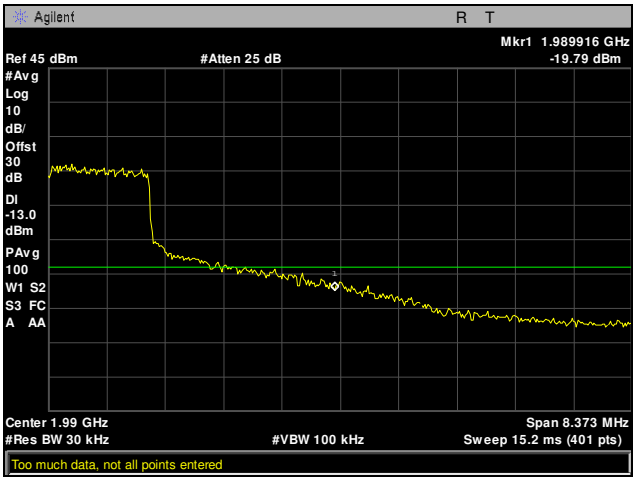
Band Edge, 5 MHz, Part 24



Plot 248. Conducted Band Edge, Channel 625, 5 MHz, Part 24

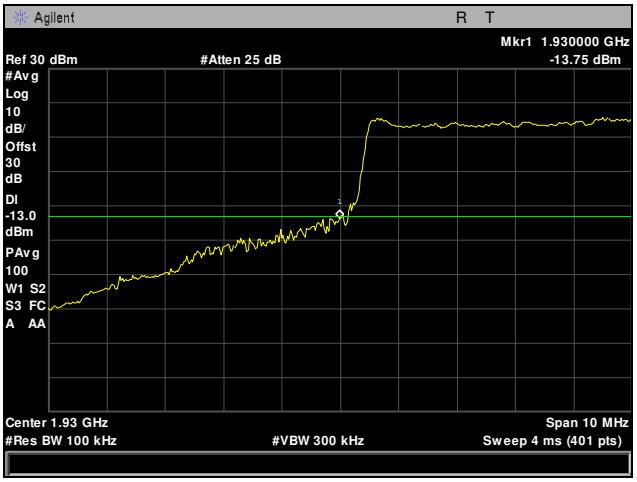


Plot 249. Conducted Band Edge, Channel 646 (Full Power), 5 MHz, Part 24

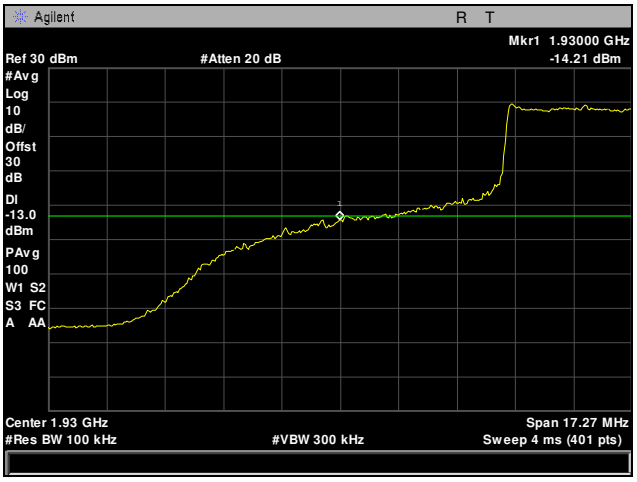


Plot 250. Conducted Band Edge, Channel 1150, 5 MHz, Part 24

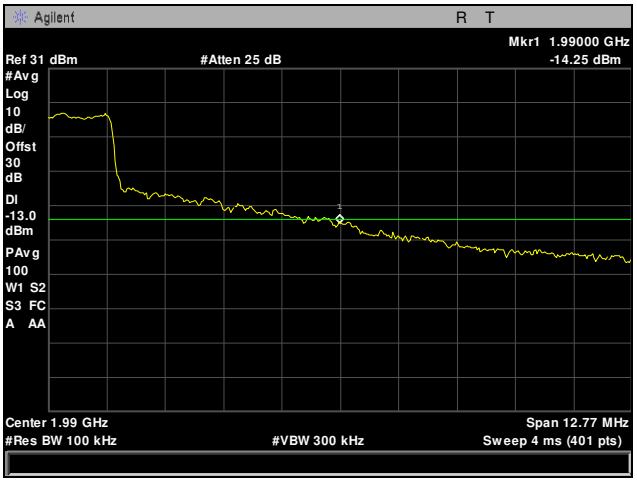
Band Edge, 10 MHz, Part 24



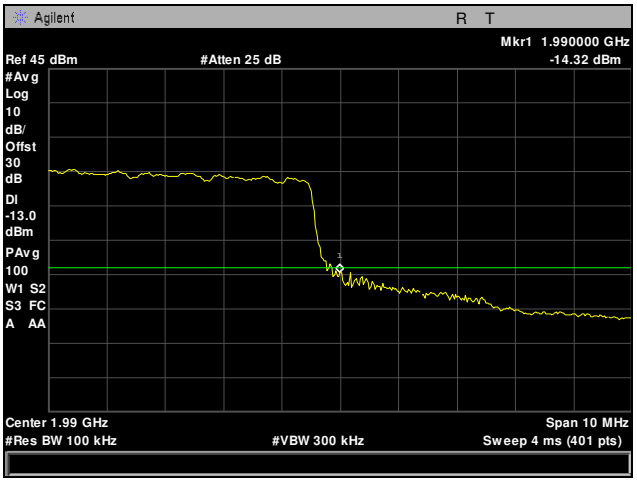
Plot 251. Conducted Band Edge, Channel 650, 10 MHz, Part 24



Plot 252. Conducted Band Edge, Channel 695 (Full Power), 10 MHz, Part 24

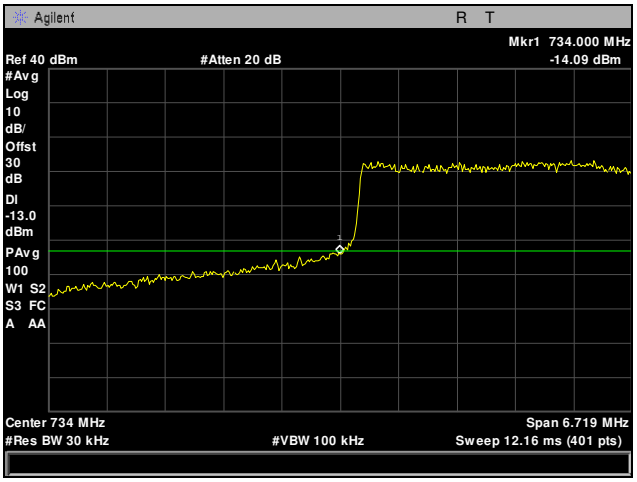


Plot 253. Conducted Band Edge, Channel 1105 (Full Power), 10 MHz, Part 24

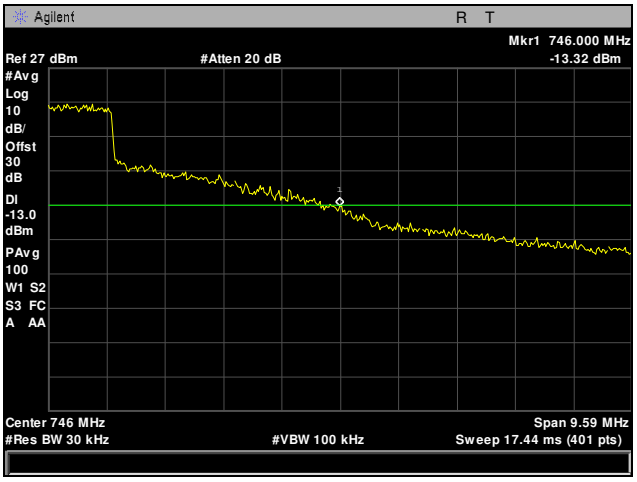


Plot 254. Conducted Band Edge, Channel 1150, 10 MHz, Part 24

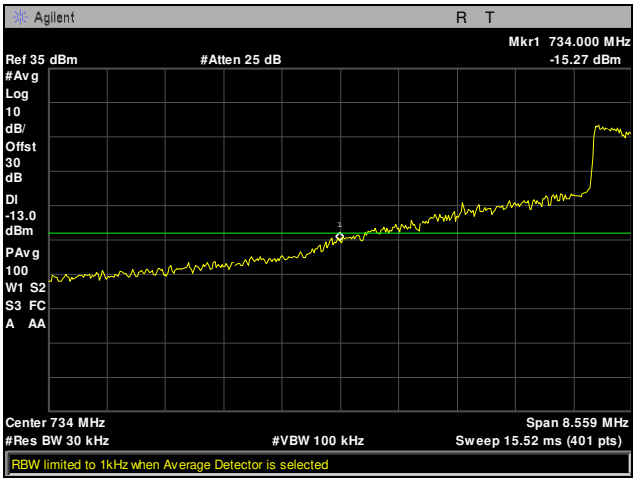
Band Edge, Part 27, 5 MHz, LTE700



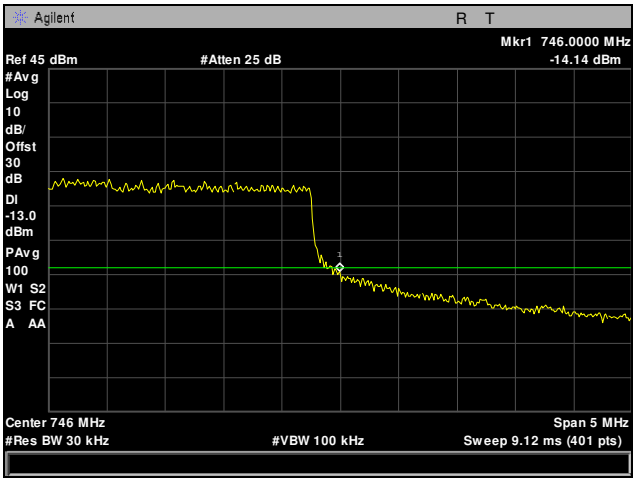
Plot 255. Conducted Band Edge, Channel 5755, Part 27, 5 MHz, LTE700



Plot 256. Conducted Band Edge, Channel 5790 (Full Power), Part 27, 5 MHz, LTE700

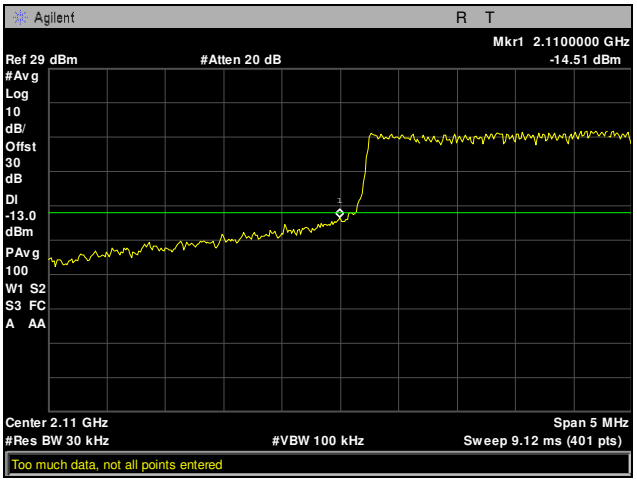


Plot 257. Conducted Band Edge, Channel 5790 (Full Power), Part 27, 5 MHz, LTE700

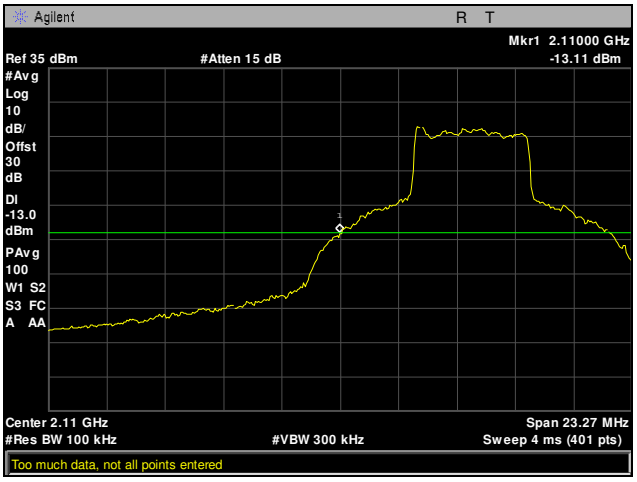


Plot 258. Conducted Band Edge, Channel 5825, Part 27, 5 MHz, LTE700

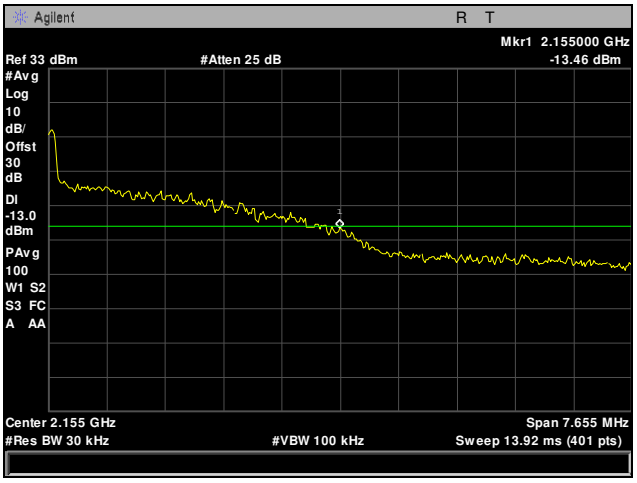
Band Edge, Part 27, 5 MHz, LTE2100



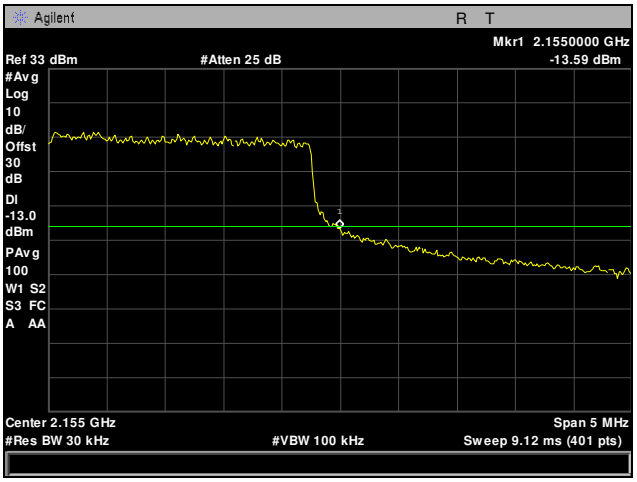
Plot 259. Conducted Band Edge, Channel 1975, Part 27, 5 MHz, LTE2100



Plot 260. Conducted Band Edge, Channel 2003 (Full Power), Part 27, 5 MHz, LTE2100

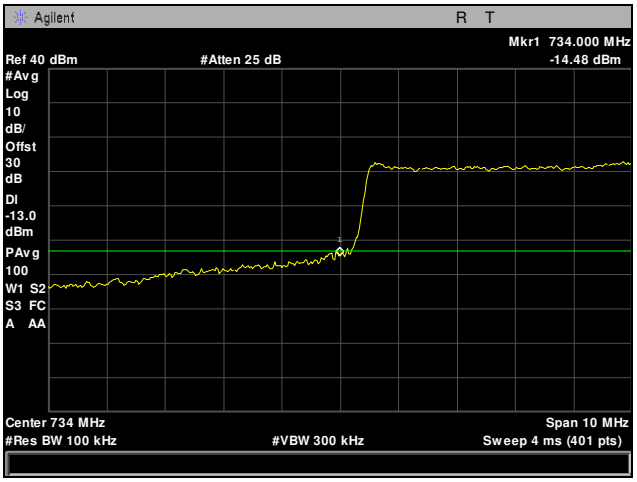


Plot 261. Conducted Band Edge, Channel 2340 (Full Power), Part 27, 5 MHz, LTE2100

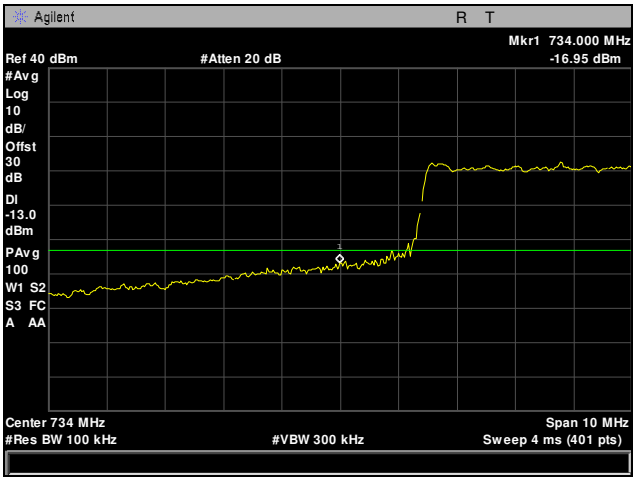


Plot 262. Conducted Band Edge, Channel 2375, Part 27, 5 MHz, LTE2100

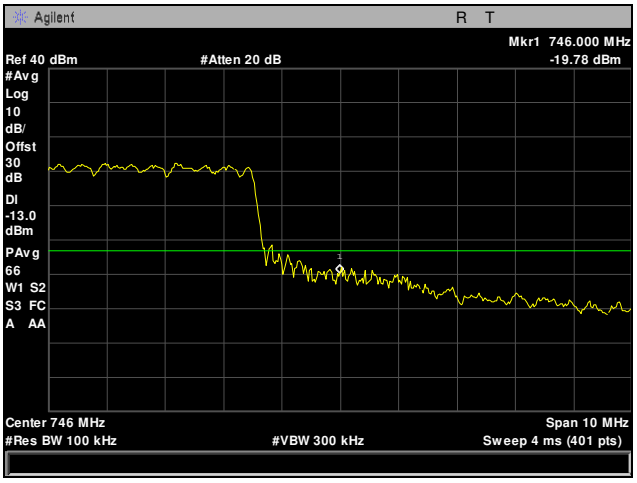
Band Edge, Part 27, 10 MHz, LTE700



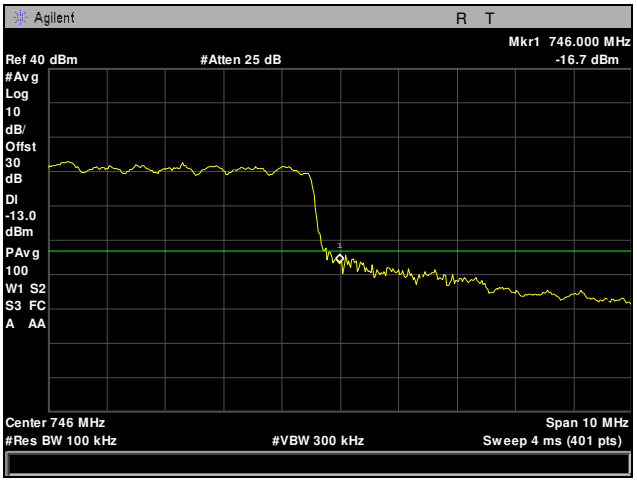
Plot 263. Conducted Band Edge, Channel 5780, Part 27, 10 MHz, LTE700



Plot 264. Conducted Band Edge, Channel 5790, Max 34, Part 27, 10 MHz, LTE700

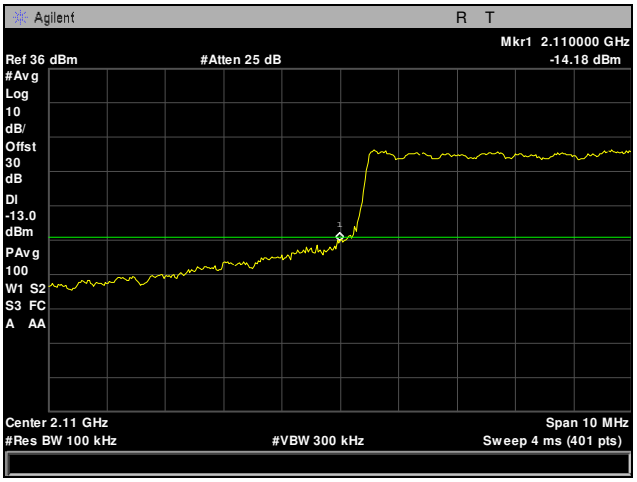


Plot 265. Conducted Band Edge, Channel 5790, High Band Edge, Max 24, Part 27, 10 MHz, LTE700

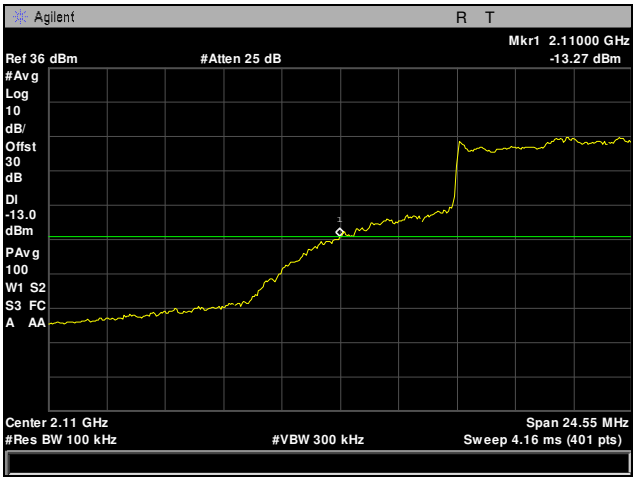


Plot 266. Conducted Band Edge, Channel 5800, Part 27, 10 MHz, LTE700

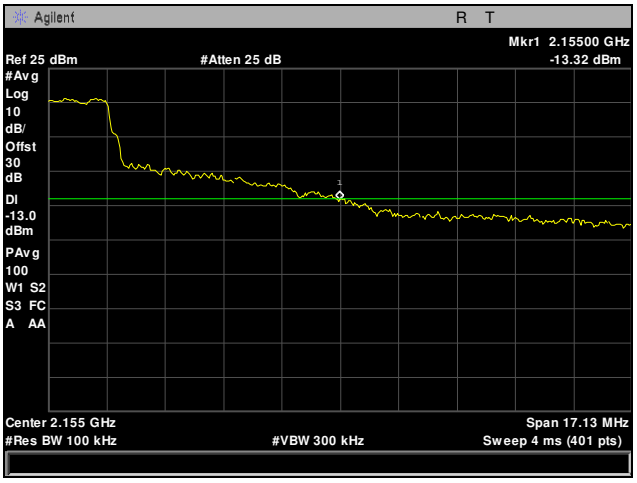
Band Edge, Part 27, 10 MHz, LTE2100



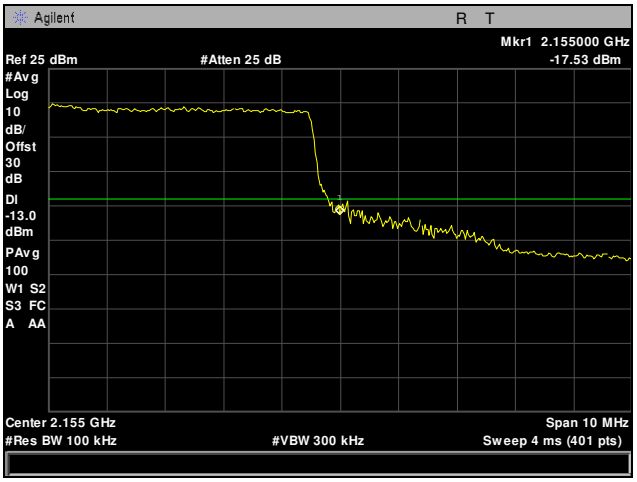
Plot 267. Conducted Band Edge, Channel 2000, Part 27, 10 MHz, LTE2100



Plot 268. Conducted Band Edge, Channel 2045 (Full Power), Part 27, 10 MHz, LTE2100



Plot 269. Conducted Band Edge, Channel 2287 (Full Power), Part 27, 10 MHz, LTE2100



Plot 270. Conducted Band Edge, Channel 2350, Part 27, 10 MHz, LTE2100

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): 12/22/15

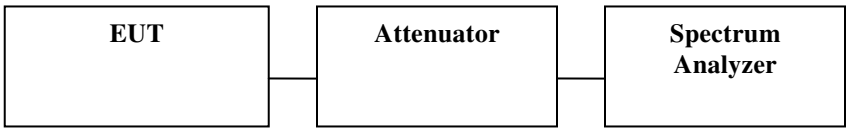


Figure 4. Spurious Emissions at Antenna Terminals Test Setup

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	37.34	31.49	5.85	13
Mid	45.178	39.36	5.818	13
High	38.17	31.66	6.51	13

Test Results, Part 22, 5 MHz

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	35.37	29.38	5.99	13
Mid	45.7	39.35	6.35	13
High	36.7	29.84	6.86	13

Test Results, Part 22, 10 MHz

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	38.75	32.43	6.32	13
Mid	43.24	37.72	5.52	13
High	42.28	36.38	5.9	13

Test Results, Part 24, 5 MHz

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	38.65	32.67	5.98	13
Mid	43.36	36.37	6.99	13
High	40.95	32.49	8.46	13

Test Results, Part 24, 10 MHz

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	37.45	30.09	7.36	13
Mid	42.16	37.47	4.69	13
High	38.14	32.13	6.01	13

Test Results, Part 27, 5 MHz, LTE700

Channel		Average Power (dBm)	Peak to Average ratio	Limit
Low	37.55	30.09	7.46	13
Mid	40.11	32.81	7.3	13
High	39.62	32.54	7.08	13

Test Results, Part 27, 5 MHz, LTE2100

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	36.18	29.92	6.26	13
Mid	35.92	29.67	6.25	13
High	35.75	29.65	6.1	13

Test Results, Part 27, 10 MHz, LTE700

Channel	Peak Power (dBm)	Average Power (dBm)	Peak to Average ratio	Limit
Low	36.53	30.54	5.99	13
Mid	39.89	32.78	7.11	13
High	38.77	31.72	7.05	13

Test Results, Part 27, 10 MHz, LTE2100

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.

Part 27 frequency stability test requires the -26 dB points of edge channels to be contained within the operating band at the same temperature and voltage conditions stated above.

Test Results: Equipment complies with this section.

Test Engineer(s): Djed Mouada

Test Date(s): 12/22/15

LTE (5MHz) 1900 Voltage (DC)	Temperature	Calculated Frequency	Δ Hz	Δ ppm	Limit
12	-30	1932.520	250	0.129	1
12	-20	1932.52	0	0	1
12	-10	1932.521	1500	0.77	1
12	0	1932.5205	500	0.26	1
12	10	1932.521	1000	0.52	1
12	20	1932.52	----		1
12	30	1932.52	0	0	1
12	40	1932.5205	500	0.26	1
12	50	1932.5205	500	0.26	1
10.2	20	1932.52	0	0	1
13.8	20	1932.52	0	0	1

Table 13. Frequency Stability, Test Results, Part 24, 5 MHz

LTE (10MHz) 1900 Voltage (DC)	Temperature	Calculated Frequency	Δ Hz	Δ ppm	Limit
12	-30	1934.9555	-1500	0.77	1
12	-20	1934.9575	500.00	0.26	1
12	-10	1934.958	1000	0.51	1
12	0	1934.9585	1500	0.78	1
12	10	1934.9555	-1500	0.78	1
12	20	1934.957	----	0	1
12	30	1934.956	-999.99	0.51	1
12	40	1934.957	0	0	1
12	50	1934.9575	500.00	0.26	1
10.2	20	1934.9555	-1500	0.77	1

Table 14. Frequency Stability, Test Results, Part 24, 10 MHz

LTE (5MHz) 700 Voltage (DC)	Temperature	High 26dB point	Band Edge	Low 26dB point	Band Edge
12	-30	745.47	746	734.15	734
12	-20	745.446	746	734.02	734
12	-10	745.439	746	734.11	734
12	0	745.428	746	734.25	734
12	10	745.431	746	734.12	734
12	20	745.7	746	734.156	734
12	30	745.21	746	734.05	734
12	40	745.55	746	734.23	734
12	50	745.2	746	734.29	734
10.2	20	745.6	746	734.15	734
13.8	20	745.6	746	734.15	734

Table 15. Frequency Stability, Test Results, Part 27, 5 MHz, LTE700

LTE (10MHz) 700 Voltage (DC)	Temperature	High 26dB point	Band Edge	Low 26dB point	Band Edge
12	-30	745.81	746	734.21	734
12	-20	745.01	746	734.11	734
12	-10	745.01	746	734.9	734
12	0	745.09	746	734.89	734
12	10	745.02	746	734.96	734
12	20	745.665	746	734.249	734
12	30	745.661	746	734.241	734
12	40	745.221	746	734.14	734
12	50	745.21	746	734.2	734
10.2	20	745.59	746	734.1	734
13.8	20	745.59	746	734.1	734

Table 16. Frequency Stability, Test Results, Part 27, 10 MHz, LTE700

LTE (5MHz) 2100 Voltage (DC)	Temperature	High 26dB point	Band Edge	Low 26dB point	Band Edge
12	-30	2154.597	2155	2110.235	2110
12	-20	2154.887	2155	2110.103	2110
12	-10	2154.847	2155	2110.108	2110
12	0	2154.839	2155	2110.09	2110
12	10	2154.836	2155	2110.12	2110
12	20	2154.766	2155	2110.241	2110
12	30	2154.054	2155	2110.214	2110
12	40	2154.021	2155	2110.21	2110
12	50	2154.121	2155	2110.15	2110
10.2	20	2154.1	2155	2110.1	2110
13.8	20	2154.1	2155	2110.1	2110

Table 17. Frequency Stability, Test Results, Part 27, 5 MHz, LTE2100

LTE (10MHz) 2100 Voltage (DC)	Temperature	High 26dB point	Band Edge	Low 26dB point	Band Edge
12	-30	2154.887	2155	2110.122	2110
12	-20	2154.885	2155	2110.207	2110
12	-10	2154.885	2155	2110.206	2110
12	0	2154.886	2155	2110.316	2110
12	10	2154.872	2155	2110.287	2110
12	20	2154.816	2155	2110.145	2110
12	30	2154.809	2155	2110.104	2110
12	40	2154.873	2155	2110.12	2110
12	50	2154.802	2155	2110.15	2110
10.2	20	2154.82	2155	2110.29	2110
13.8	20	5154.82	2155	2110.29	2110

Table 18. Frequency Stability, Test Results, Part 27, 10 MHz, LTE2100

Photograph 2. Frequency Stability, Test Setup

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 frequency @ 874.6 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:

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
874.6	39.36	8629.785	9.5	8.913	1	1	0	78.234	Pass

The safe distance where Power Density is less than the MPE Limit listed above was found to be 78.234 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
1T6658	SPECTRUM ANALYZER	AGILENT	E4407B	12/09/2015	12/09/2016
1T4497	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	E4432B	10/06/2014	04/06/2016
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	10/08/2015	04/08/2017
1T4771	PSA SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	11/25/2014	05/25/2016
1T4300B	SEMI-ANECHOIC 3M CHAMBER # 1 D (2043A-1) (IC)	EMC TEST SYSTEMS	NONE	01/11/2015	01/11/2018
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	10/29/2014	10/29/2016
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	07/29/2014	01/29/2016
331T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4859	DIGITAL BAROMETER, HYGROMETER, THERMOMETER	CONTROL COMPANY	15-078-198, FB70423, 245CD	12/19/2013	12/19/2015
2T5280	TEMPERATURE CHAMBER	THERMOTRON	F270-CH(V) 30-30/EVA	1/8/2015	1/8/2016

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

End of Report

