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HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

October 28, 2019

Trimble Jena GmbH
Carl-Zeiss-Promenade 10
Jena 07743, Germany

Dear Eyk Taege,

Enclosed is the EMC Wireless test report for compliance testing of the Trimble Comm Board Hurricane, tested to the requirements of Title 47 of the CFR Part 15.407 Subpart E for Intentional Radiators.

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

Sincerely yours,
Eurofins MET LABORATORIES, INC.

Mae Ramirez
Documentation Department

Reference: (\Virscient Limited\EMC102611-FCC407 UNII-2 Rev 2)

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Electromagnetic Compatibility Criteria
Test Report

For the

Trimble Comm Board Hurricane (V0013E)

Tested under
the FCC Certification Rules
contained in
15.407 Subpart E for Intentional Radiators

MET Report: EMC102611-FCC407 UNII-2 Rev. 2

October 28, 2019

Prepared For:

Trimble Jena GmbH
Carl-Zeiss-Promenade 10
Jena 07743 Germany

Prepared By:
MET Laboratories, Inc.
914 West Patapsco Avenue,
Baltimore, MD 21230

Electromagnetic Compatibility Criteria
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15.407 Subpart E for Intentional Radiators

Arsalan Hasan, Project Engineer
Electromagnetic Compatibility Lab

Mae Ramirez
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 Parts 15E, 15407, of the FCC Rules under normal use and maintenance.

Sandeep Brar
Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	October 29, 2019	Initial Issue.
1	February 4, 2020	TCB updates
2	February 10, 2020	TCB updates

Table of Contents

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	**Dec**i**b**els
dBµA	**Dec**i**b**els above one **micro**amp
dBµV	**Dec**i**b**els above one **micro**volt
dBµA/m	**Dec**i**b**els above one **micro**amp **per m**eter
dBµV/m	**Dec**i**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	**Hz**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ertz
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
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 Trimble Comm Board Hurricane V0013E, with the requirements of Part 15, §15.407. 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 V0013E. Trimble should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the V0013E, 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 15, §15.407, in accordance with Trimble Jena GmbH, purchase order number 20180075. All tests were conducted using measurement procedure ANSI C63.10-2013.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Compliant
§15.403(i)	26 dB Occupied Bandwidth	Compliant
§15.407 (a)(2)	Maximum Conducted Output Power	Compliant
§15.407 (a)(2)	Maximum Power Spectral Density	Compliant
§15.407 (b)(2 – 3)& (6 - 7)	Undesirable Emissions	Compliant
§15.407(b)(6)	Conducted Emission	Not Applicable
§15.407(f)	RF Exposure	Compliant
§15.407(g)	Frequency Stability	Compliant

Table 1. Executive Summary of EMC Part 15.407 ComplianceTesting

Note: Frequency stability is provided by the TCXO datasheet provided by the chip manufacturer.

II. Equipment Configuration

A. Overview

Eurofins MET Laboratories, Inc. was contracted by Trimble Jena GmbH to perform testing on the Trimble Comm Board Hurricane, under Trimble's purchase order number 20180075.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Trimble Comm Board Hurricane V0013E.

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

Model(s) Tested:	V0013E		
Model(s) Covered:	V0013E		
EUT Specifications:	Primary Power: 5 VDC		
	FCC ID: YK5-73350047		
	Type of Modulations:	BPSK, QPSK, 16QAM	
	Equipment Code:	NII	
	Peak RF Output Power:	19.06 dBm	5180 MHz – 5240 MHz
		19.34 dBm	5500 MHz – 5720 MHz
	Duty Cycle Tested:	100%	
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		
Type of Filing:	Original		
Evaluated by:	Arsalan Hasan		
Report Date(s):	October 20, 2019		

Table 2. EUT Summary

B. References

CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
789033 D02 General UNII Test Procedures New Rules v01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
905462 DO2 UNII DFS Compliance Procedures New Rules v01r02	Compliance Measurement Procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5250-5350 MHz and 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection
KDB 662911	Guidance for Measurement of Transmitters with Multiple Output, MIMO

Table 3. References

C. Test Site

All testing was performed at Eurofins MET Labs Inc, 3162 Belick St., Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Eurofins MET Labs is a ISO/IEC 17025 accredited site by A2LA, California #0591.02.
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D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Table 4. Measurement Uncertainty

E. Description of Test Sample

The Trimble Hurricane Communication Subsystem is an 802.11a/b/g/n/ac 2.4 GHz and 5 GHz dual-band Wi-Fi and Bluetooth module that acts as a communication controller/bridge for use with a long-range wireless scanner. The core chipset is a Qualcomm QCA9378-7 and a Qualcomm CSR8811.

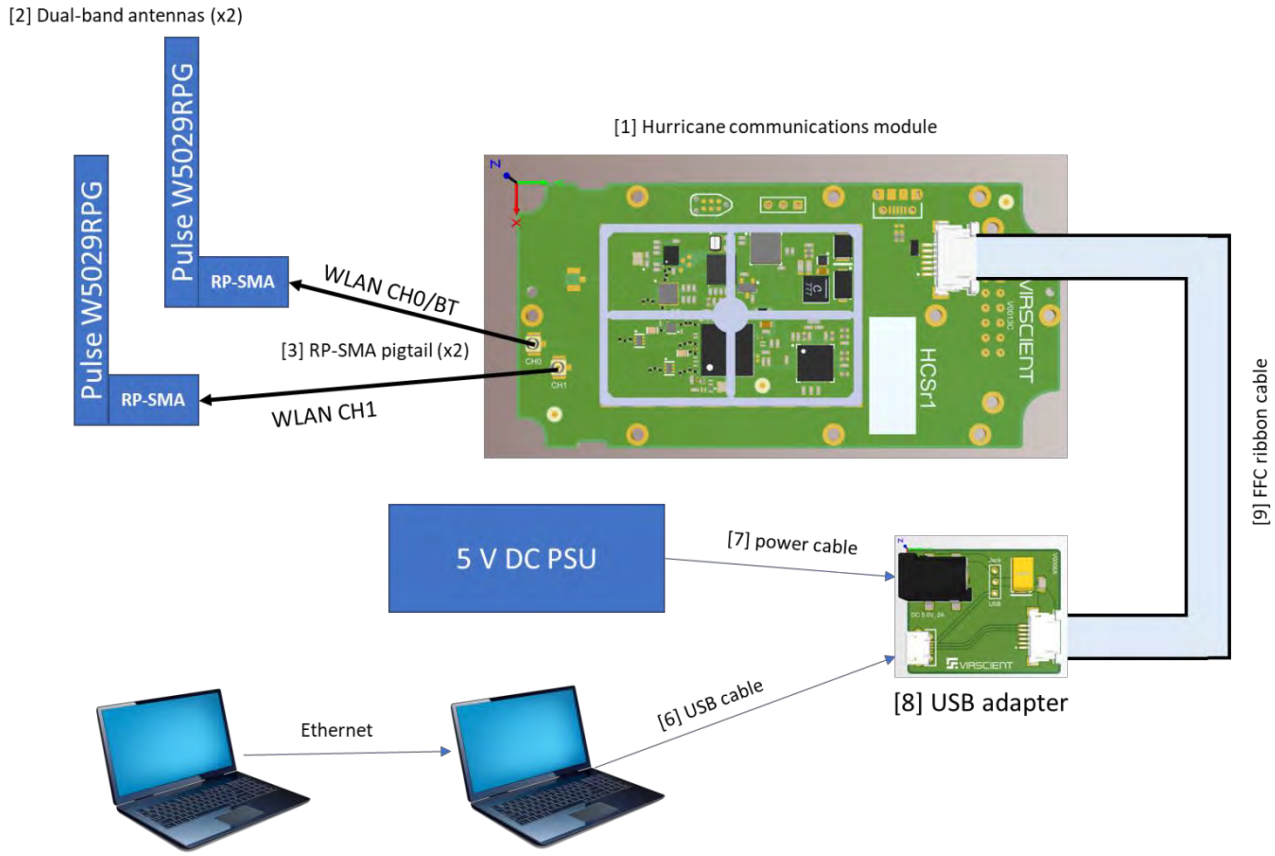


Figure 1. Block Diagram of Test Configuration

Note: EUT modified with antenna terminal only for test purposes. Otherwise, EUT will have permanent antenna.

F. Equipment Configuration

The RP-SMA pigtails and antennas shall be connected to the primary antenna ports of the EUT. The ribbon cable and USB adapter shall be connected to the EUT. The host system, simulated by a laptop, and a DC power supply capable of supplying 2 A shall be connected to the USB adapter.
Tests which require conducted measurements to be made shall be performed by removing the antennas and cabling onto the RP-SMA pigtails.

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Revision
1	N/A	Trimble Comm Board Hurricane	V0013E			A

Table 5. Equipment Configuration

G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	* Customer Supplied Calibration Data
4	Linux Laptop	Dell		Yes. fakeboar_fcc.bin and fakeboar_etsi.bin
5	Windows Laptop	Dell		
6	USB data cable	Unknown		Not applicable
7	Banana to jack power cable	Virscient		Not applicable
8	USB adapter	Virscient	V0006A	Not applicable
9	FFC ribbon cable	Molex	0982670211	Not applicable
The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.				

Table 6. Support Equipment

H. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Max Length	Shielded (Y/N)	Termination Point
1	Antenna port 0	RP-SMA pigtail	1	0.15	0.5	Yes	
2	Antenna port 1	RP-SMA pigtail	1	0.15	0.5	Yes	
3	Antenna port 3	Unused	1				
4	Ribbon connector	FFC ribbon	1	0.2	0.5	No	
5	USB micro B connector	Unused	1				

Table 7. Ports and Cabling Information

I. Mode of Operation

A factory test mode for both WLAN and Bluetooth will be provided for radio-level testing, and instructions on how to operate the device in its normal mode will be provided for WLAN DFS testing.

The factory test mode allows the operator to put the radio into a transmit-only or receive-only mode to aid in performing their measurements. The settings provided by the operator are the same as those used in normal operation, so any emissions will match those expected during normal operation – with the exception that normal mode will have a lower duty cycle. Once configured, the device will continue to operate in the specified manner until the operator disables the EUT.
The normal operating mode for Wi-Fi allows a video to be streamed to simulate real-world traffic. During this simulation, other parameters (such as the EUT's ability to respond to radar waveforms) may be validated. As the video has a fixed length, extended testing will require the video to be restarted every 12 minutes.

A software application called Qualcomm Radio Control Toolkit was used to control the EUT.

J. Method of Monitoring EUT Operation

In factory testing mode, both the WLAN and BT radios maintain communication with the host software and will display an error if the EUT stops working. During a transmit-only test, the output of the transmitter can be measured to confirm operational status.

In the normal operating mode, the EUT will act as a Wi-Fi AP. Using any other Wi-Fi device, one could scan for the AP to confirm the device is operational. Alternatively, the beacon frames may be measured at the antenna port.

K. 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.

L. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is compliant the criteria of §15.203.

Antennas are permanently attached.

Test Engineer(s): Arsalan Hasan

Test Date(s): September 5, 2019

Gain	Type	Model	Manufacturer
2.4 GHz 2.3 dBi 5.0 GHz 5 dBi	IP65 Stick Antenna (Omni) (WiFi)	W5029 RPG	Pulse Larsen

Table 8. Antenna List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 403(i) 26dB Bandwidth

Test Requirements: **§ 15.403(i):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 to 5.0 percent of the emission bandwidth of the device under measurement.

Test Procedure: The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% - 5 % of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded.

Test Results The 26 dB Bandwidth was compliant with the requirements of this section.

No anomalies detected.

Test Engineer(s): Arsalan Hasan

Test Date(s): August 10, 2019

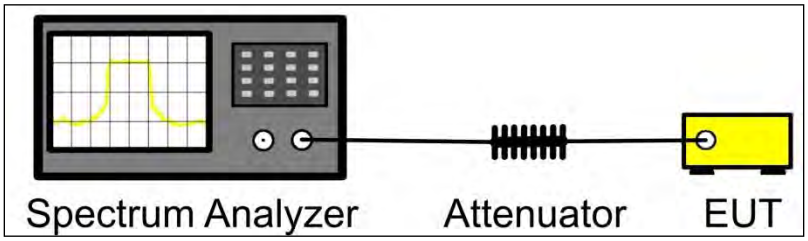
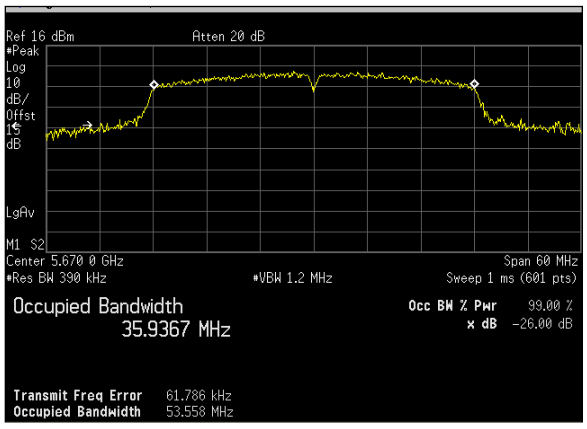


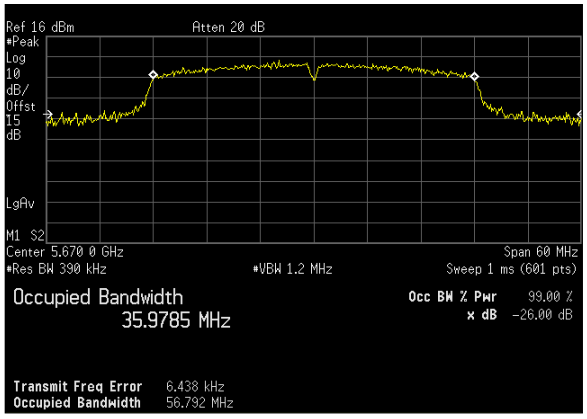
Figure 2. Block Diagram, Occupied Bandwidth Test Setup

Frequency (MHz)	Mode	Bandwidth (MHz)	26 dB Bandwidth (MHz) ANT 0	26 dB Bandwidth (MHz) ANT 1
5260	a	20	29.29	29.36
5280			28.41	28.60
5320			29.32	30.00
5500			29.87	30.00
5580			29.73	28.58
5700			29.87	29.62
5260	n		29.80	29.54
5280			29.77	29.69
5320			29.95	30.00
5500			28.79	29.57
5580			29.72	28.59
5700			30.00	30.00
5270		40	49.32	49.92
5310			54.57	54.83
5510			55.47	53.31
5550			54.18	52.35
5670			56.79	53.55
5290	ac	80	87.01	87.13
5530			86.49	86.51
5610			85.98	85.83
5690			85.91	85.93

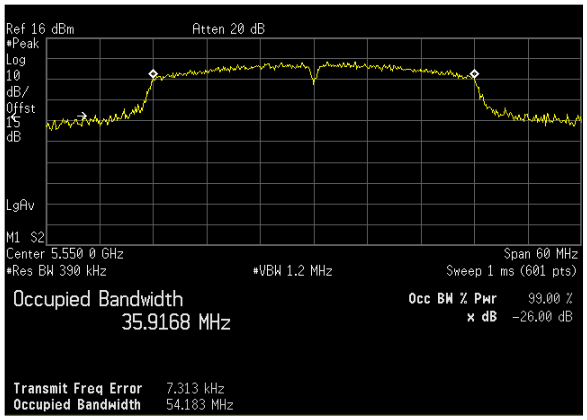
Table 9. 26 dB Occupied Bandwidth, Test Results



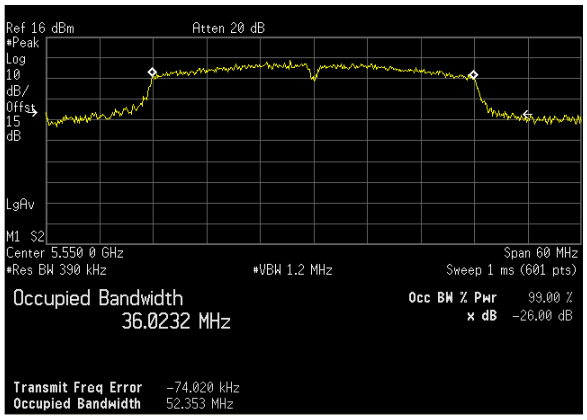
Plot 1. 26 dB Occupied Bandwidth, BW 40M, Ch 5670M, N Mode ANT 1



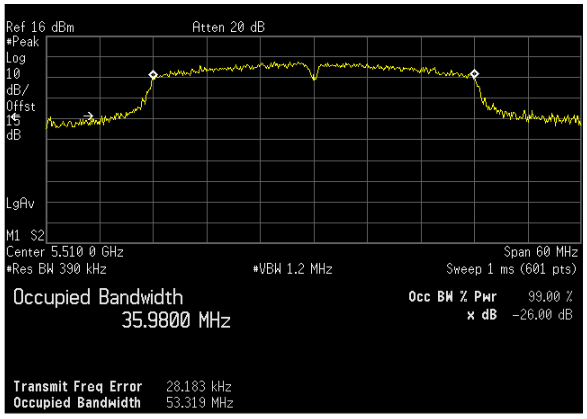
Plot 2. 26 dB Occupied Bandwidth, BW 40M, Ch 5670M, N Mode ANT 0



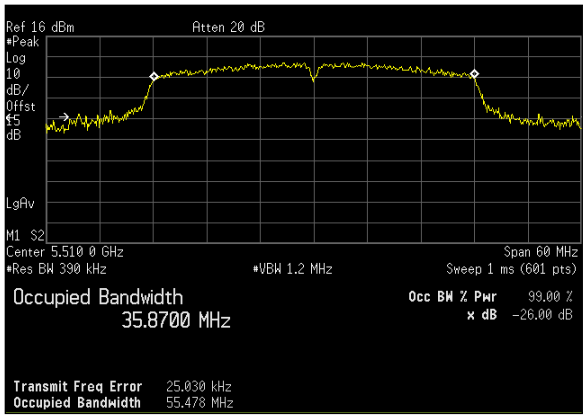
Plot 3. 26 dB Occupied Bandwidth, BW 40M, Ch 5550M, N Mode ANT 0



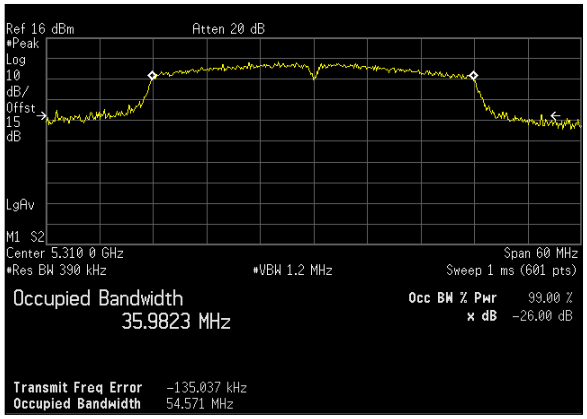
Plot 4. 26 dB Occupied Bandwidth, BW 40M, Ch 5550M, N Mode ANT 1



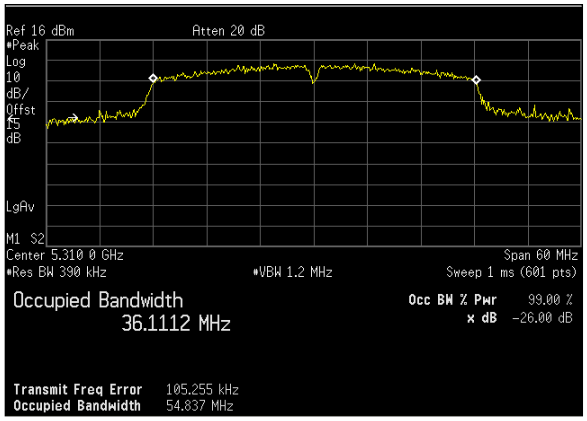
Plot 5. 26 dB Occupied Bandwidth, BW 40M, Ch 5510M, N Mode ANT 1



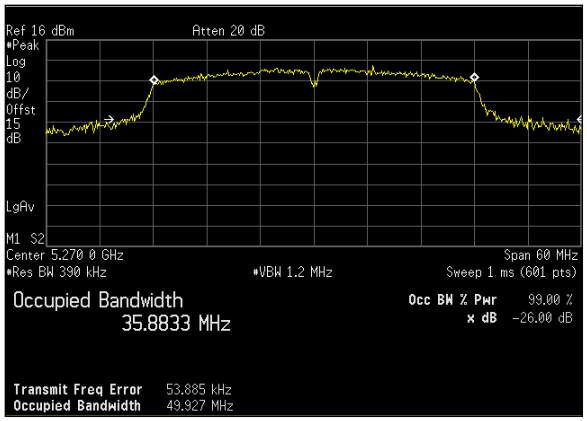
Plot 6. 26 dB Occupied Bandwidth, BW 40M, Ch 5510M, N Mode ANT 0



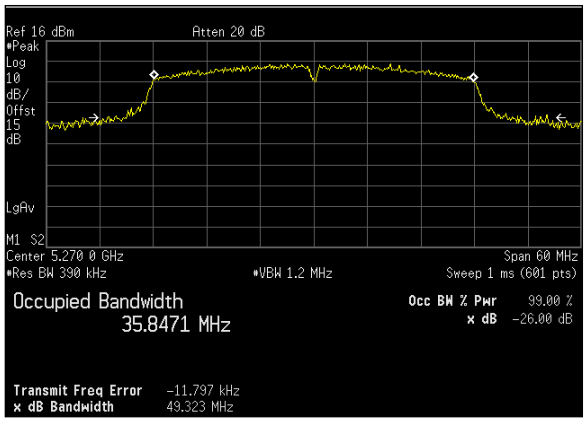
Plot 7. 26 dB Occupied Bandwidth, BW 40M, Ch 5310M, N Mode ANT 0



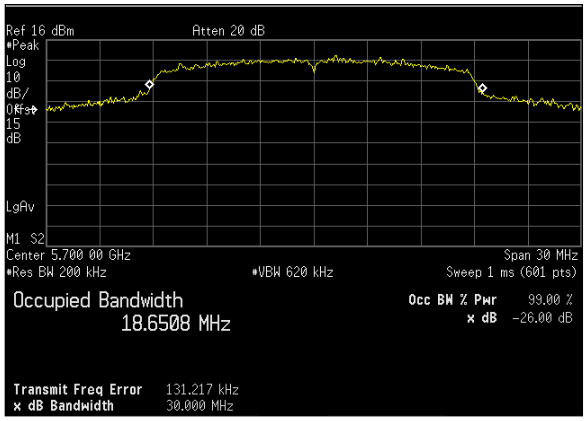
Plot 8. 26 dB Occupied Bandwidth, BW 40M, Ch 5310M, N Mode ANT 1



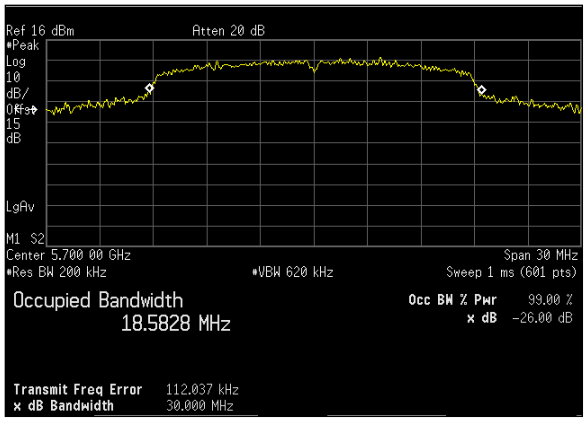
Plot 9. 26 dB Occupied Bandwidth, BW 40M, Ch 5270M, N Mode ANT 1



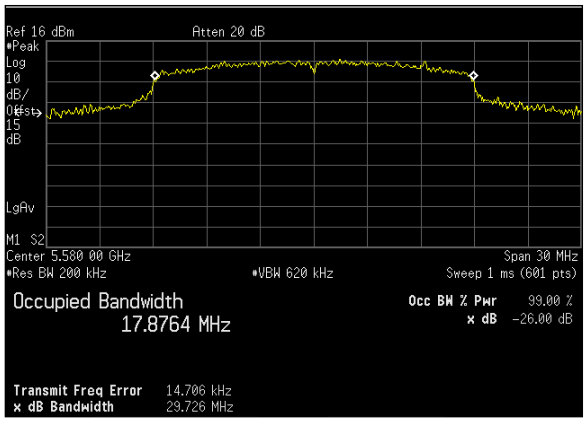
Plot 10. 26 dB Occupied Bandwidth, BW 40M, Ch 5270M, N Mode ANT 0



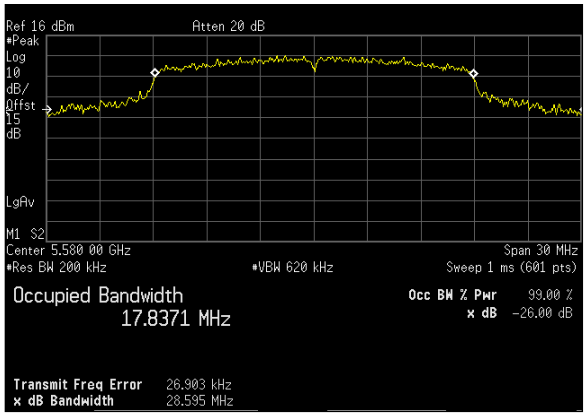
Plot 11. 26 dB Occupied Bandwidth, BW 20M, Ch 5700M, N Mode ANT 1



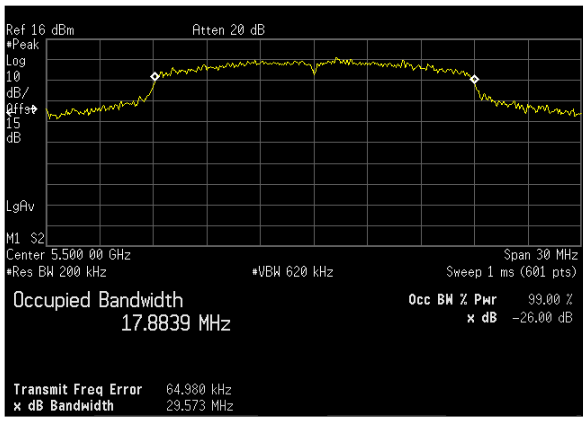
Plot 12. 26 dB Occupied Bandwidth, BW 20M, Ch 5700M, N Mode ANT 0



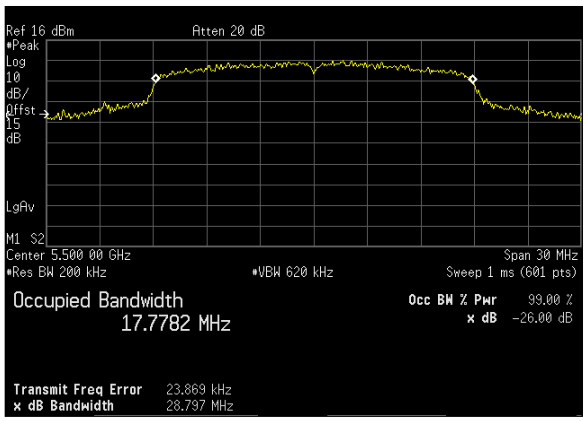
Plot 13. 26 dB Occupied Bandwidth, BW 20M, Ch 5580M, N Mode ANT 0



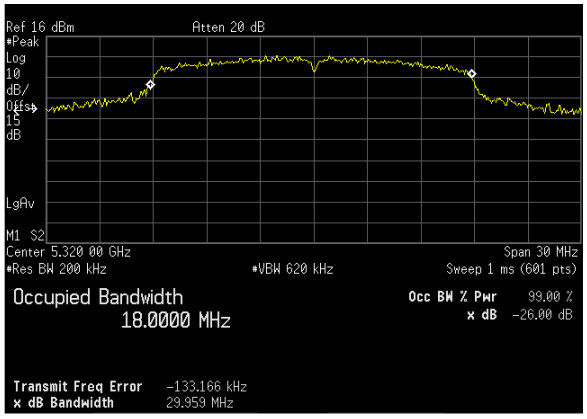
Plot 14. 26 dB Occupied Bandwidth, BW 20M, Ch 5580M, N Mode ANT 1



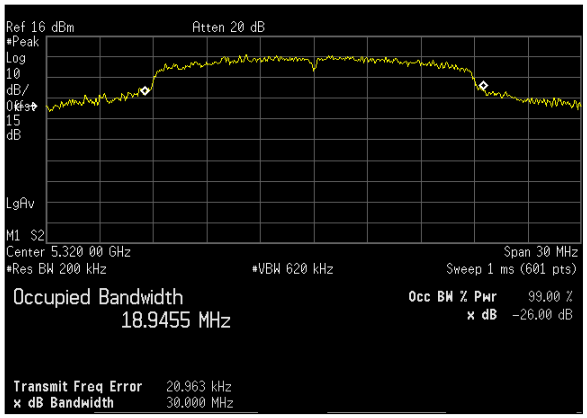
Plot 15. 26 dB Occupied Bandwidth, BW 20M, Ch 5500M, N Mode ANT 1



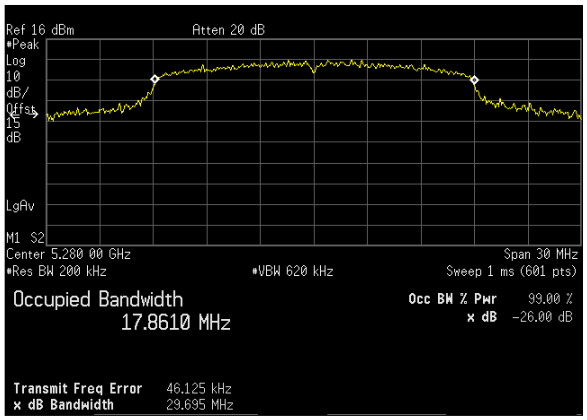
Plot 16. 26 dB Occupied Bandwidth, BW 20M, Ch 5500M, N Mode ANT 0



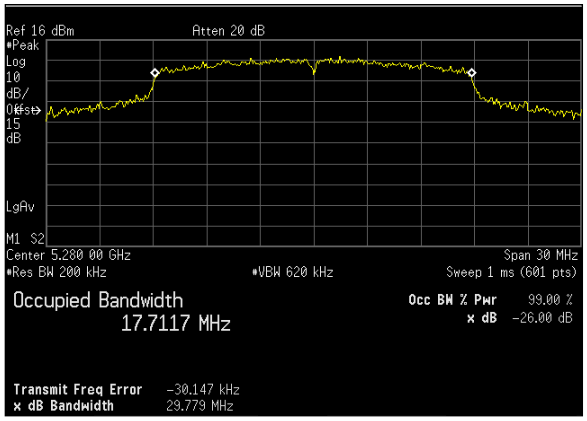
Plot 17. 26 dB Occupied Bandwidth, BW 20M, Ch 5320M, N Mode ANT 0



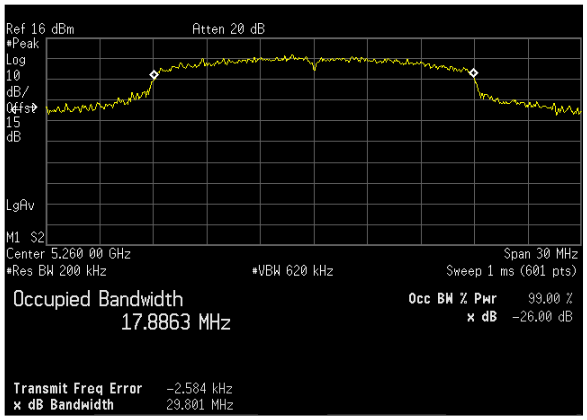
Plot 18. 26 dB Occupied Bandwidth, BW 20M, Ch 5320M, N Mode ANT 1



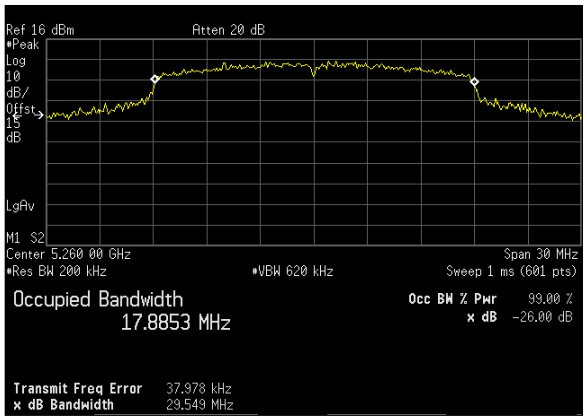
Plot 19. 26 dB Occupied Bandwidth, BW 20M, Ch 5280M, N Mode ANT 1



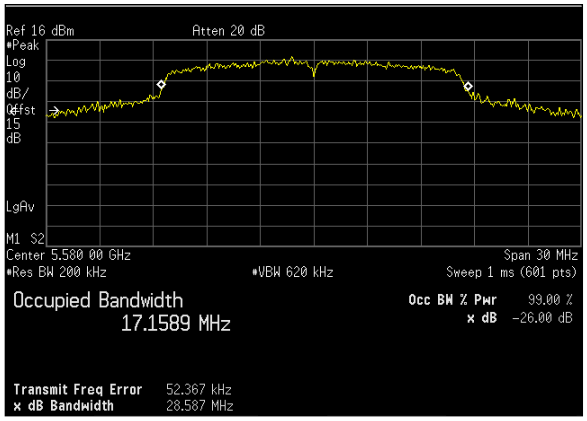
Plot 20. 26 dB Occupied Bandwidth, BW 20M, Ch 5280M, N Mode ANT 0



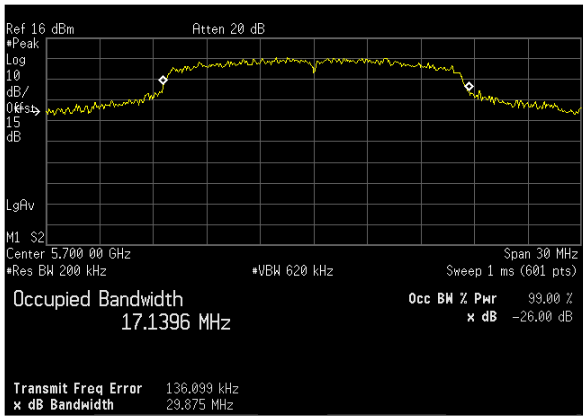
Plot 21. 26 dB Occupied Bandwidth, BW 20M, Ch 5260M, N Mode ANT 0



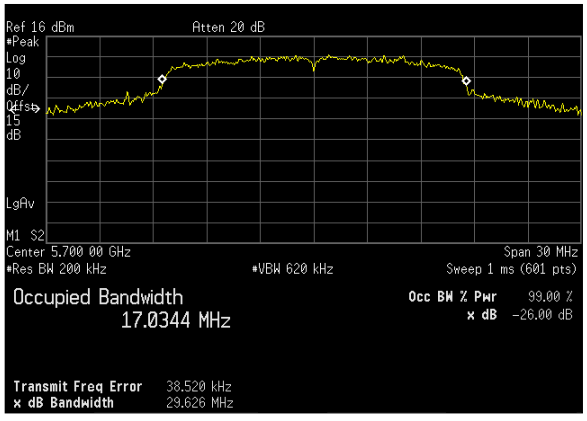
Plot 22. 26 dB Occupied Bandwidth, BW 20M, Ch 5260M, N Mode ANT 1



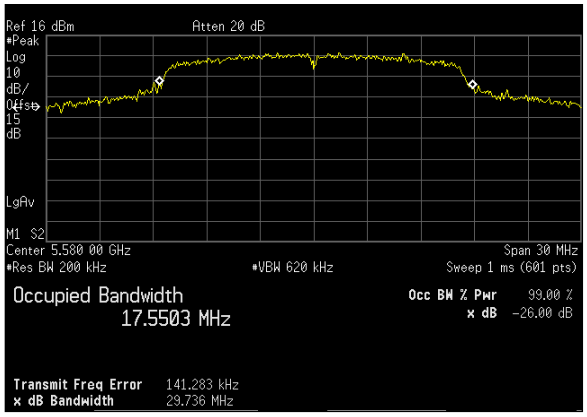
Plot 23. 26 dB Occupied Bandwidth, BW 20M, Ch 5580M, A Mode ANT 1



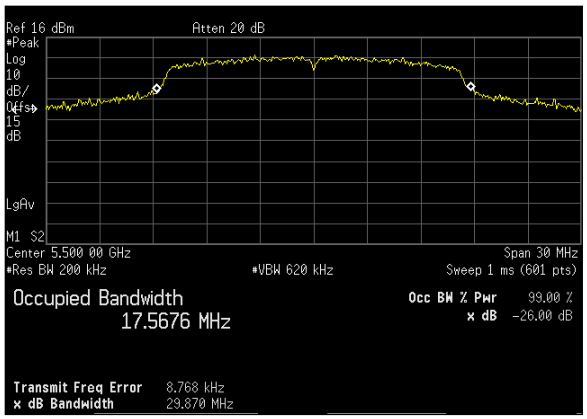
Plot 24. 26 dB Occupied Bandwidth, BW 20M, Ch 5700M, A Mode ANT 0



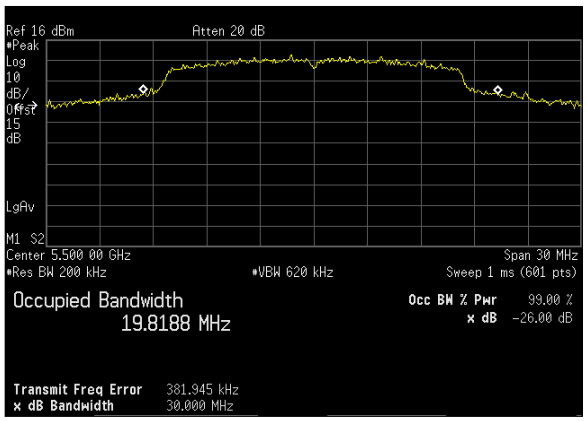
Plot 25. 26 dB Occupied Bandwidth, BW 20M, Ch 5700M, A Mode ANT 1



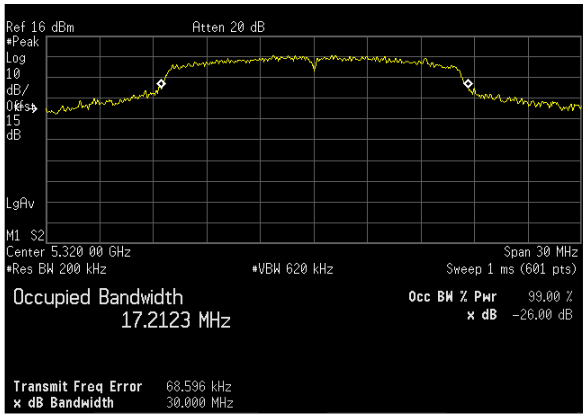
Plot 26. 26 dB Occupied Bandwidth, BW 20M, Ch 5580M, A Mode ANT 0



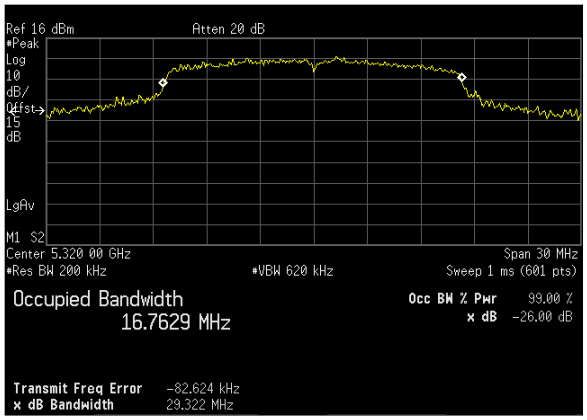
Plot 27. 26 dB Occupied Bandwidth, BW 20M, Ch 5500M, A Mode ANT 0



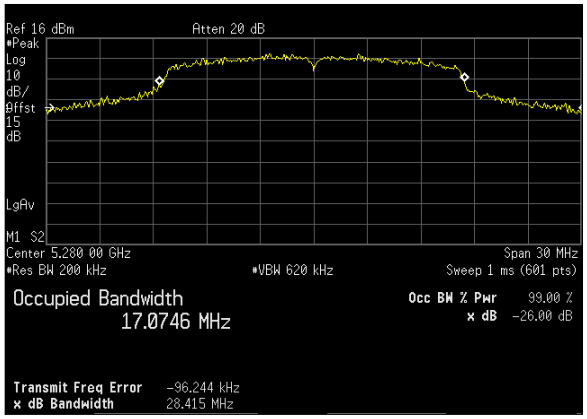
Plot 28. 26 dB Occupied Bandwidth, BW 20M, Ch 5500M, A Mode ANT 1



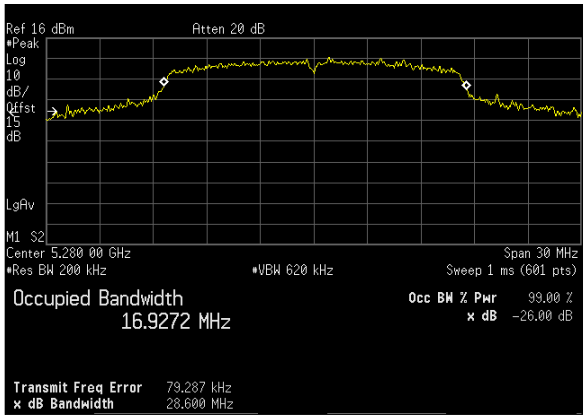
Plot 29. 26 dB Occupied Bandwidth, BW 20M, Ch 5320M, A Mode ANT 1



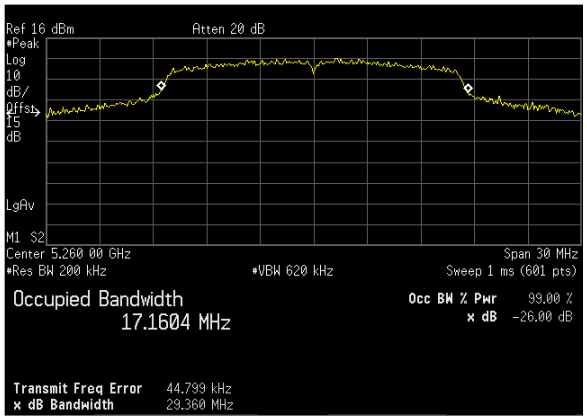
Plot 30. 26 dB Occupied Bandwidth, BW 20M, Ch 5320M, A Mode ANT 0



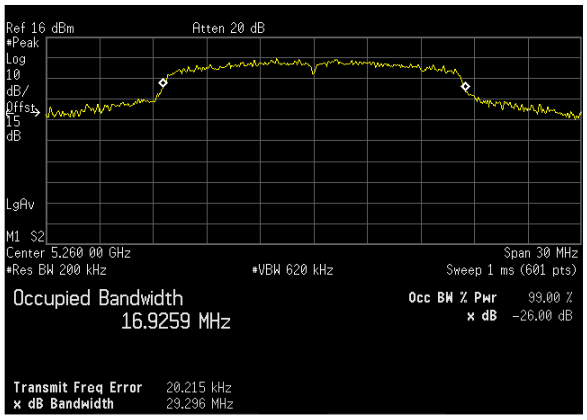
Plot 31. 26 dB Occupied Bandwidth, BW 20M, Ch 5280M, A Mode ANT 0



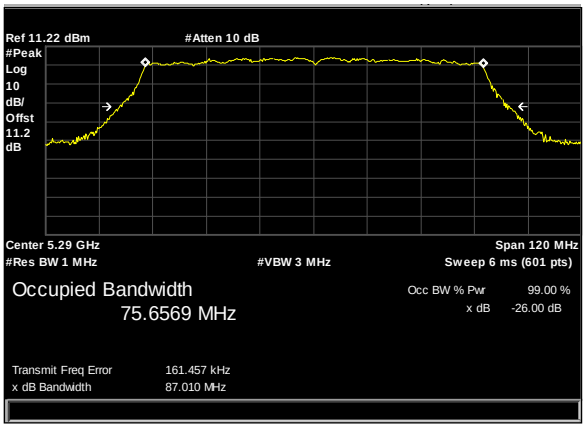
Plot 32. 26 dB Occupied Bandwidth, BW 20M, Ch 5280M, A Mode ANT 1



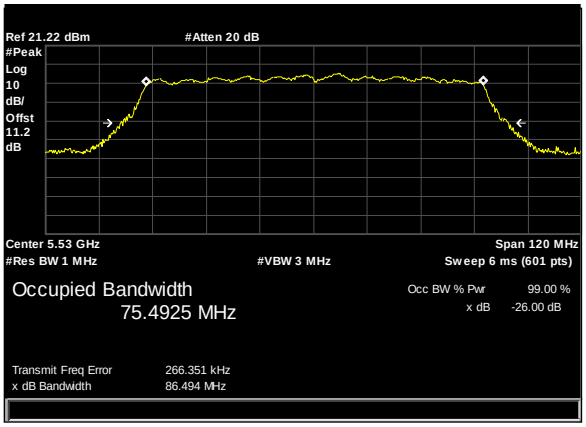
Plot 33. 26 dB Occupied Bandwidth, BW 20M, Ch 5260M, A Mode ANT 1



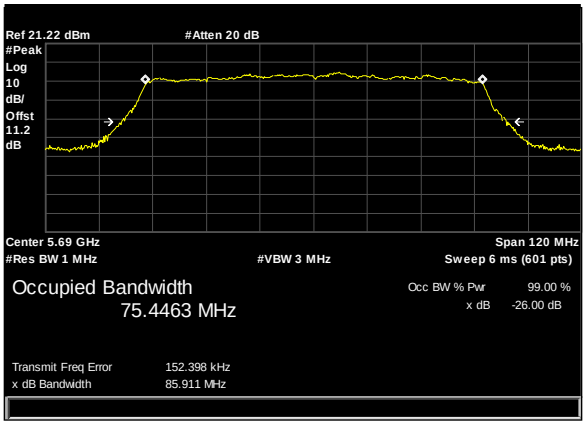
Plot 34. 26 dB Occupied Bandwidth, BW 20M, Ch 5260M, A Mode ANT 0



Plot 35. 26 dB Occupied Bandwidth, BW 80M, Ch 5290M, AC Mode ANT 0



Plot 36. 26 dB Occupied Bandwidth, BW 80M, Ch 5530M, AC Mode ANT 0



Plot 37. 26 dB Occupied Bandwidth, BW 80M, Ch 5690M, AC Mode ANT 0

Electromagnetic Compatibility Criteria for Intentional Radiators

§15. 407(a)(2) Maximum Conducted Output Power

Test Requirements: **§15.407(a)(2):** For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(h)(1): Transmit power control (TPC). U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit on its low, mid, and high channels. Its power was measured according to measurement method SA-2, as described in 789033 D02 General UNII Test Procedures v02.

Test Results: The EUT as tested is compliant with the requirements of this section.

No anomalies detected.

Test Engineer(s): Arsalan Hasan

Test Date(s): August 13, 2019

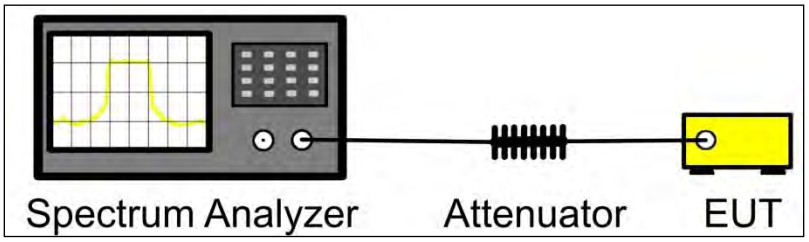
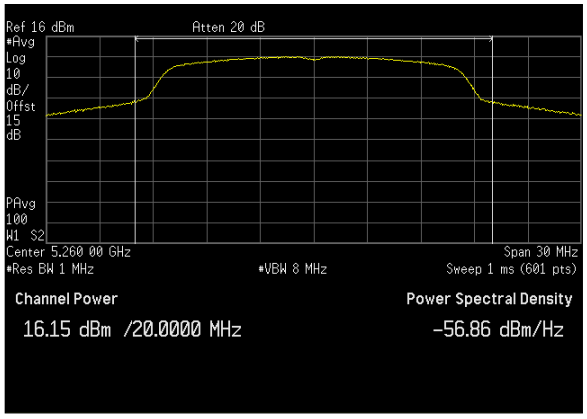


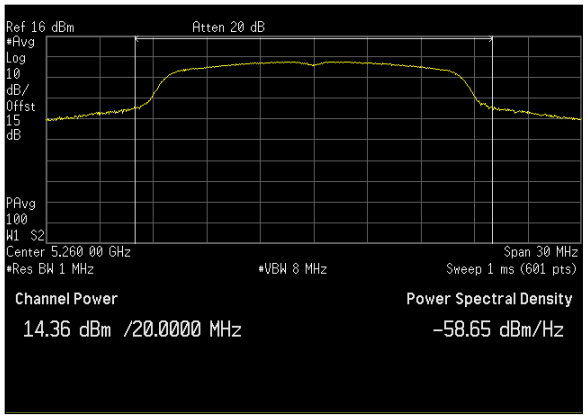
Figure 3. Peak Power Output Test Setup

Frequency (MHz)	Mode	Bandwidth (MHz)	Conducted Power (dBm) ANT 0	Conducted Power (dBm) ANT 1	Total Power (dBm)	Directional Gain (dBi)	Conducted Limit (dBm)	Power Margin (dB)
5260	a	20	16.15	14.36	18.36	5.0	24.00	-5.64
5280			16.82	15.12	19.06	5.0	24.00	-4.94
5320			15.4	15.96	18.70	5.0	24.00	-5.30
5500			16.11	16.53	19.34	5.0	24.00	-4.66
5580			15.57	15.54	18.57	5.0	24.00	-5.43
5700			15.21	15.33	18.28	5.0	24.00	-5.72
5260	n		16.54	13.64	18.34	5.0	24.00	-5.66
5280			16.43	14.67	18.65	5.0	24.00	-5.35
5320			15.12	15.64	18.40	5.0	24.00	-5.60
5500			16.07	15.29	18.71	5.0	24.00	-5.29
5580			15.62	15.67	18.66	5.0	24.00	-5.34
5700			15.53	15.16	18.36	5.0	24.00	-5.60
5270		40	15.06	12.68	17.04	5.0	24.00	-6.96
5310			14.51	14.08	17.31	5.0	24.00	-6.69
5510			13.67	13.65	16.67	5.0	24.00	-7.33
5550			14.02	13.71	16.88	5.0	24.00	-7.12
5670			14.01	14.1	17.07	5.0	24.00	-6.93
5290	ac	80	13.16	13.20	16.19	5.0	24.00	-7.81
5530			11.66	11.78	14.73	5.0	24.00	-9.27
5610			11.46	11.53	14.51	5.0	24.00	-9.49
5690			11.39	11.45	14.43	5.0	24.00	-9.57

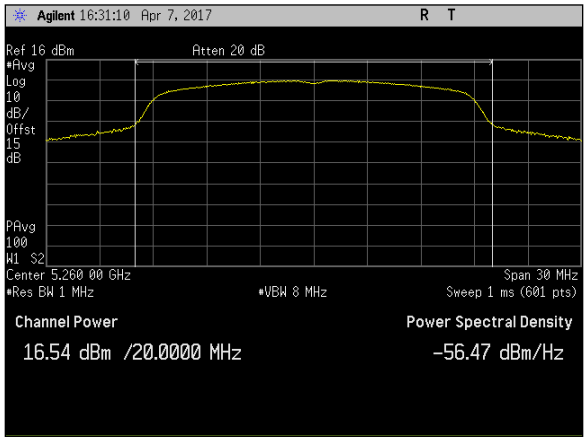
Table 10. Maximum Conducted Output Power, Test Results



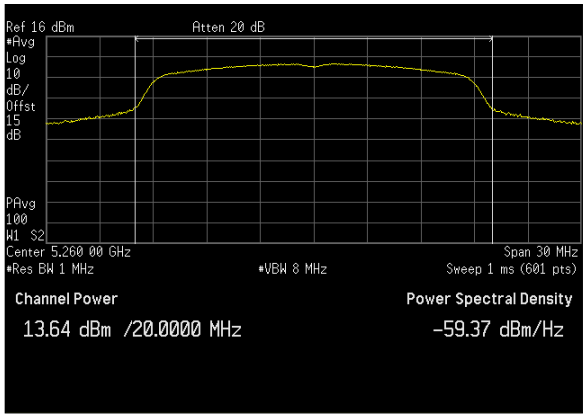
Plot 38. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5260M, A Mode ANT 0



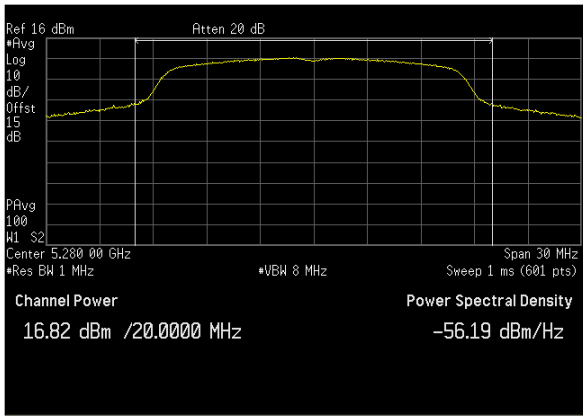
Plot 39. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5260M, A Mode ANT 1



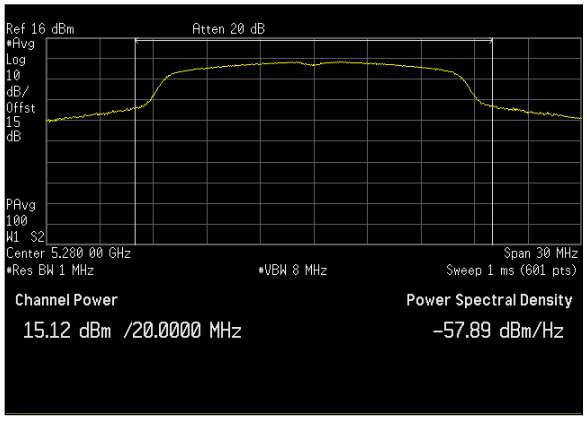
Plot 40. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5260M, N Mode ANT 0



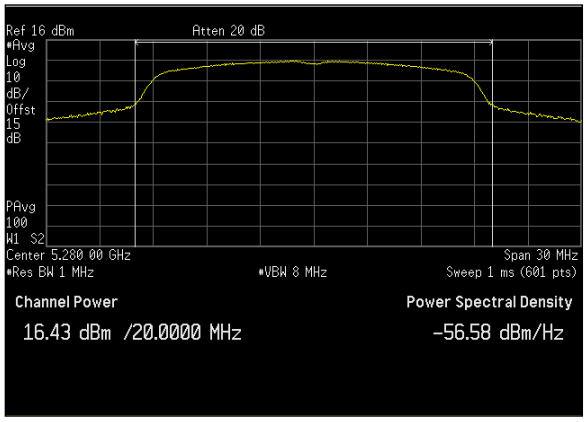
Plot 41 Maximum Conducted Transmitter Output Power, BW 20M, Ch 5260M, N Mode ANT 1



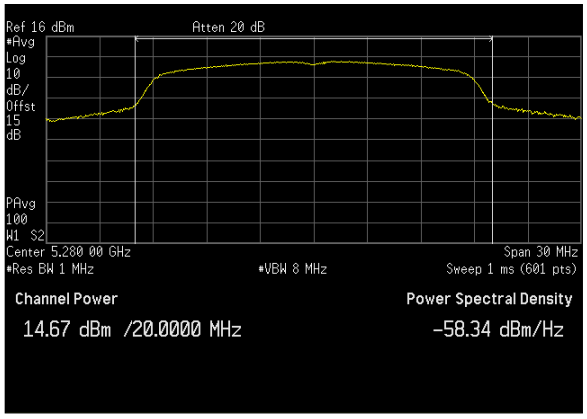
Plot 42. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5280M, A Mode ANT 0



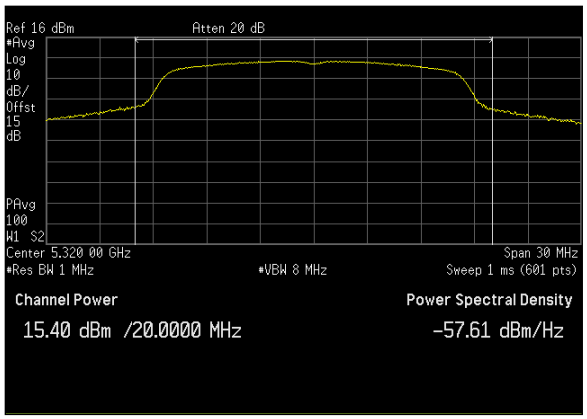
Plot 43. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5280M, A Mode ANT 1



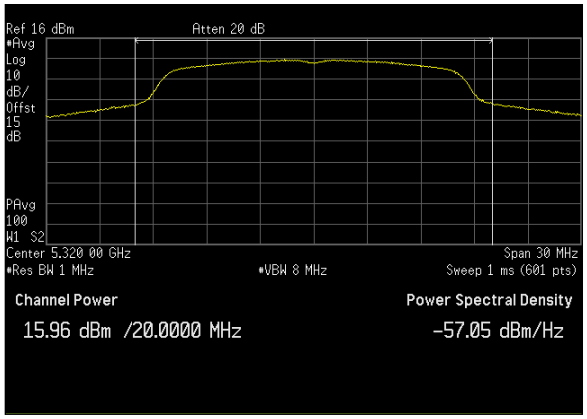
Plot 44. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5280M, N Mode ANT 0



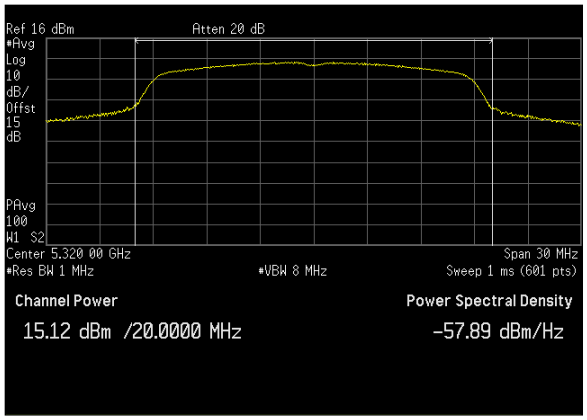
Plot 45. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5280M, N Mode ANT 1



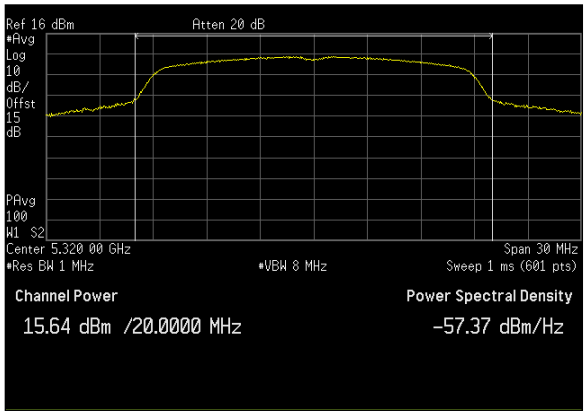
Plot 46. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5320M, A Mode ANT 0



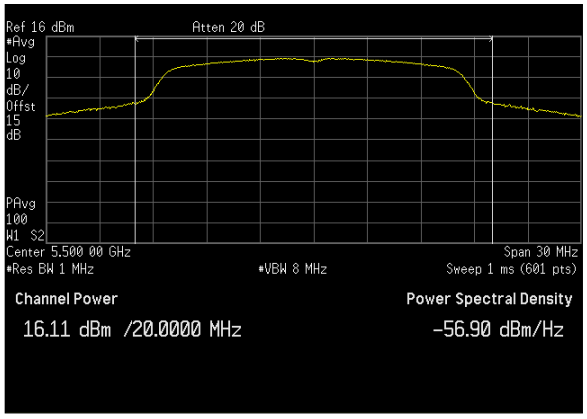
Plot 47. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5320M, A Mode ANT 1



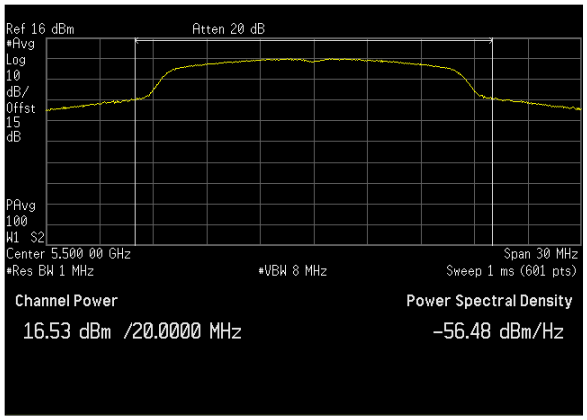
Plot 48. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5320M, N Mode ANT 0



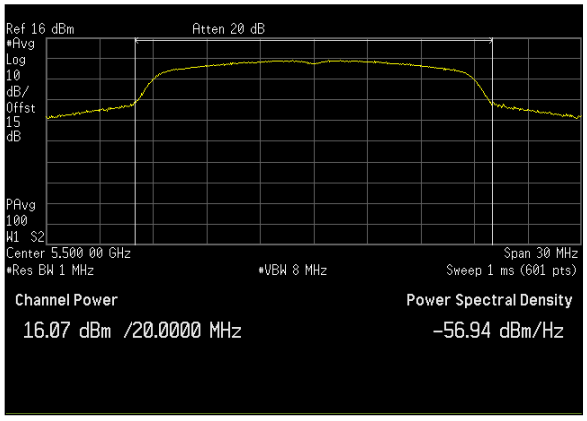
Plot 49. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5320M, N Mode ANT 1



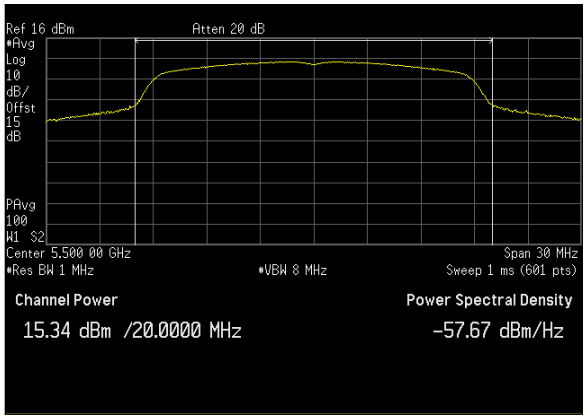
Plot 50. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5500M, A Mode ANT 0



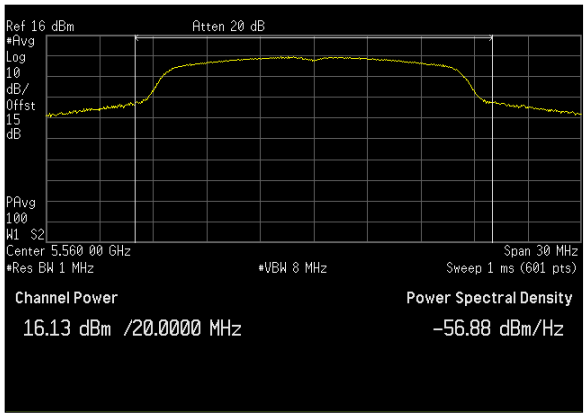
Plot 51. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5500M, A Mode ANT 1



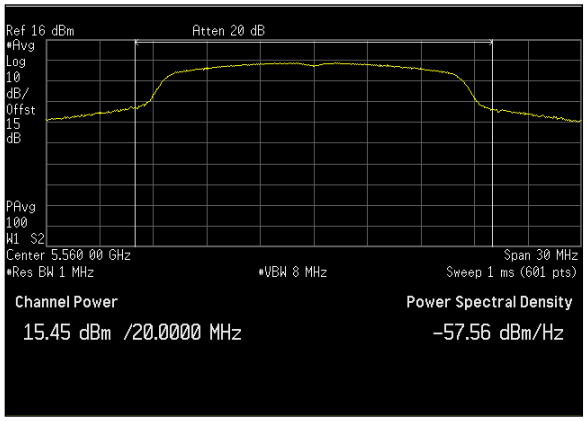
Plot 52. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5500M, N Mode ANT 0



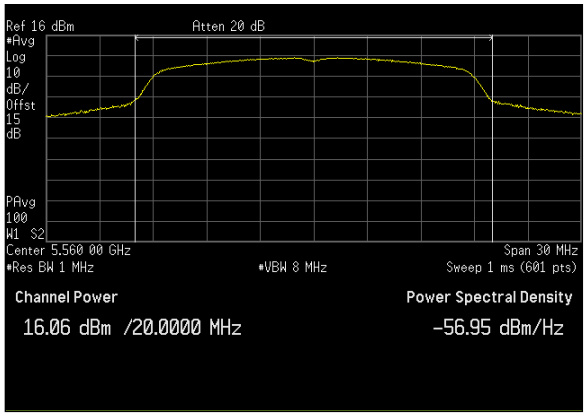
Plot 53. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5500M, N Mode ANT 1



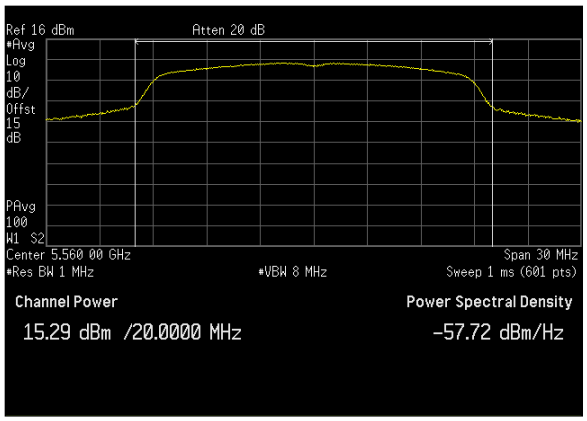
Plot 54. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5560M, A Mode ANT 0



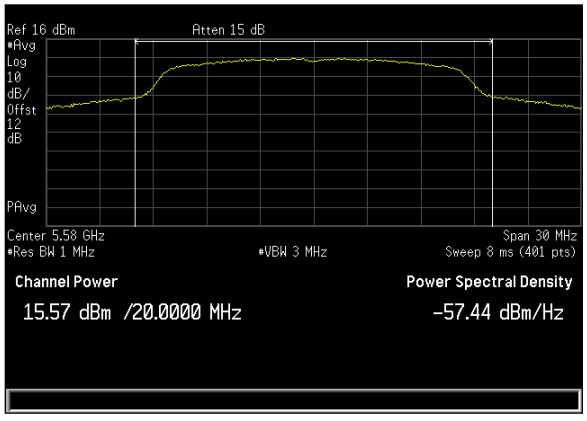
Plot 55. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5560M, A Mode ANT 1



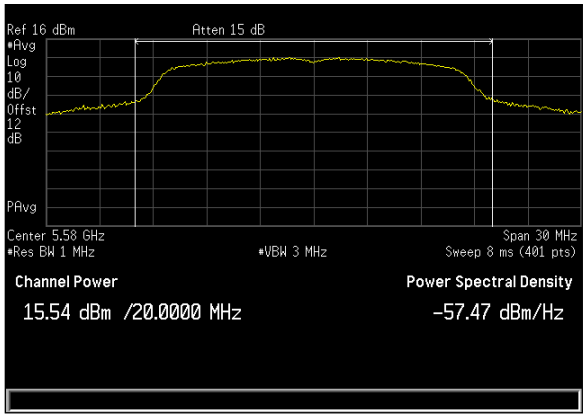
Plot 56. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5560M, N Mode ANT 0



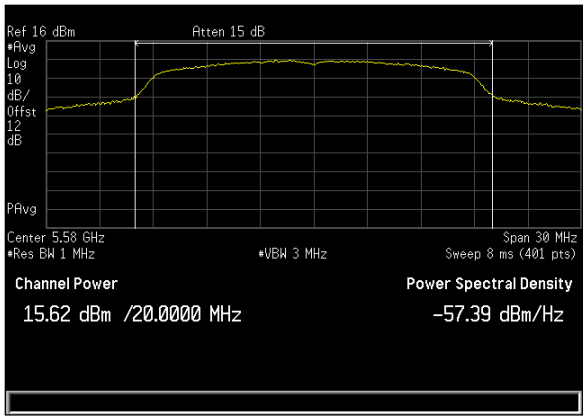
Plot 57. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5560M, N Mode ANT 1



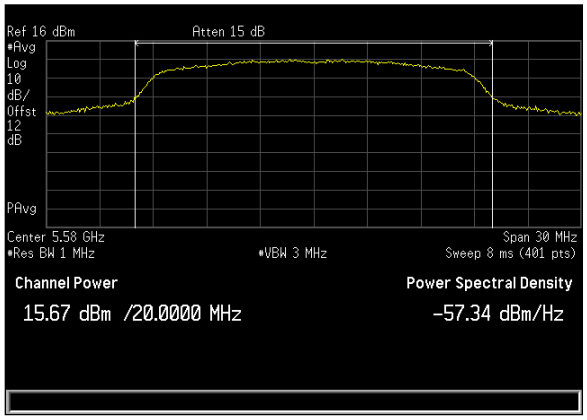
Plot 58. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5580M, A Mode ANT 0



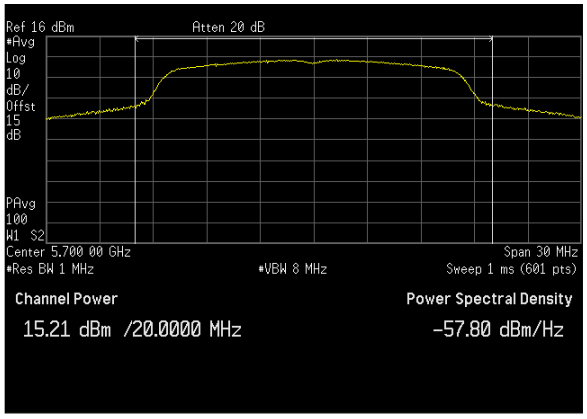
Plot 59. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5580M, A Mode ANT 1



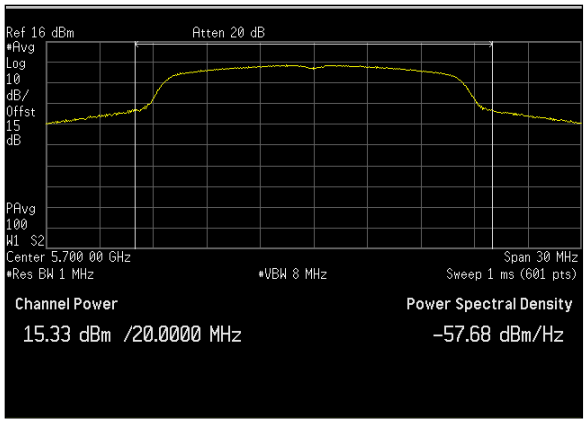
Plot 60. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5580M, N Mode ANT 0



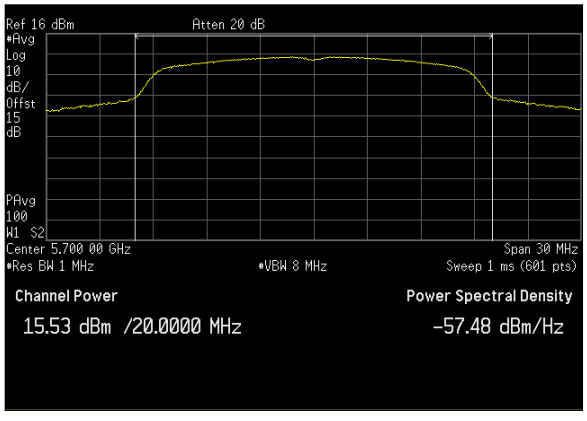
Plot 61. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5580M, N Mode ANT 1



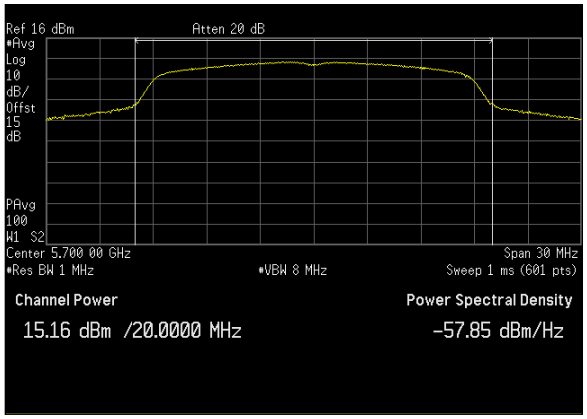
Plot 62. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5700M, A Mode ANT 0



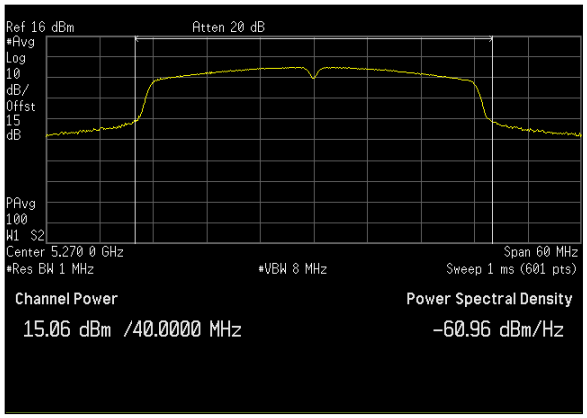
Plot 63. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5700M, A Mode ANT 1



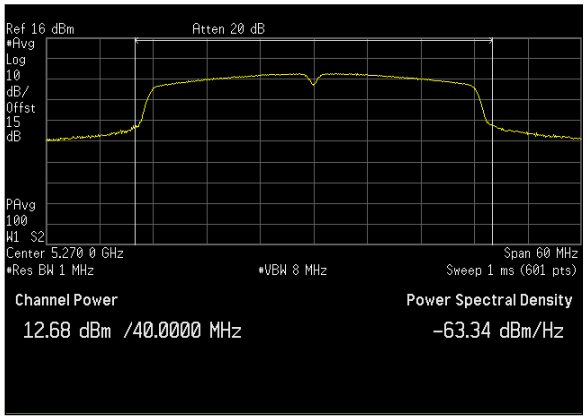
Plot 64. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5700M, N Mode ANT 0



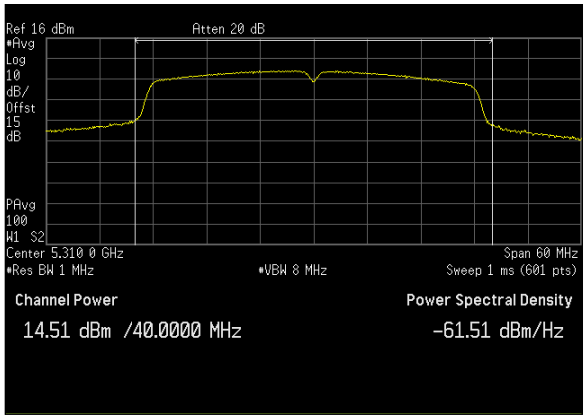
Plot 65. Maximum Conducted Transmitter Output Power, BW 20M, Ch 5700M, N Mode ANT 1



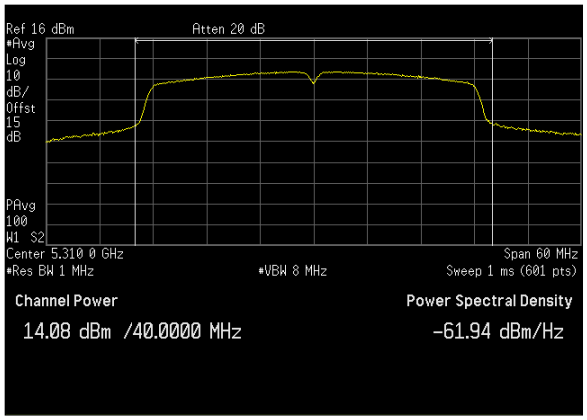
Plot 66. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5270M, N Mode ANT 0



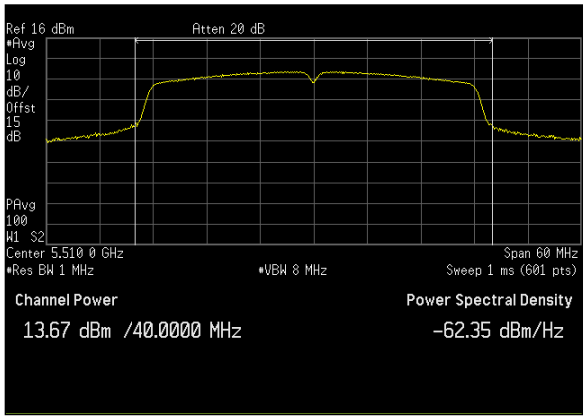
Plot 67. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5270M, N Mode ANT 1



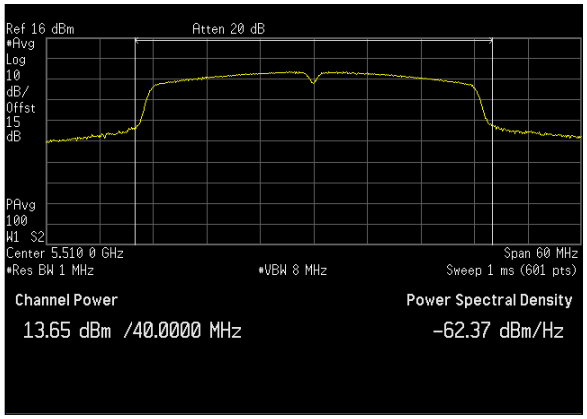
Plot 68. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5310M, N Mode ANT 0



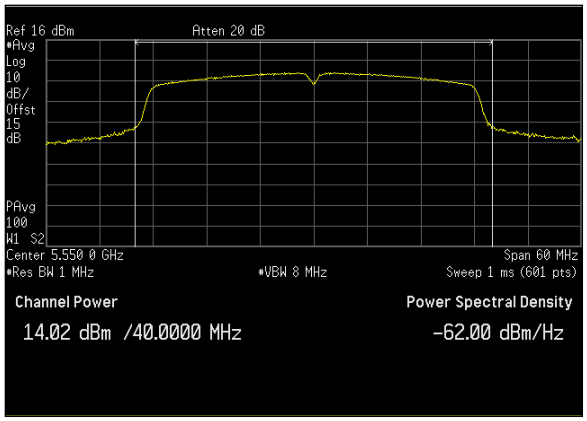
Plot 69. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5310M, N Mode ANT 1



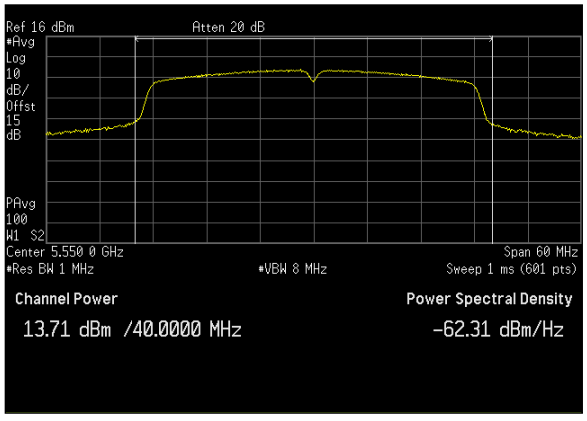
Plot 70. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5510M, N Mode ANT 0



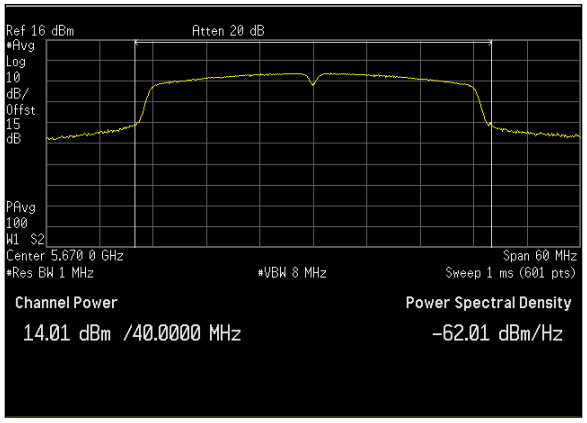
Plot 71. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5510M, N Mode ANT 1



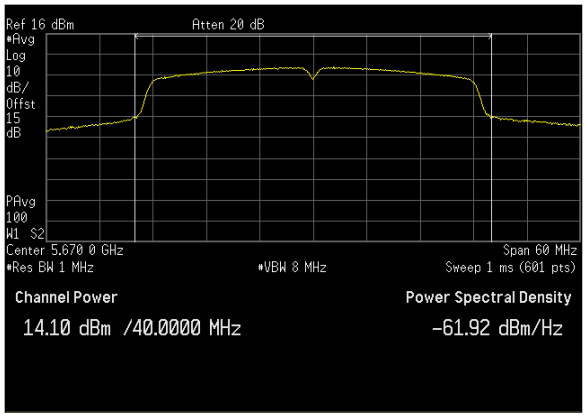
Plot 72. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5550M, N Mode ANT 0



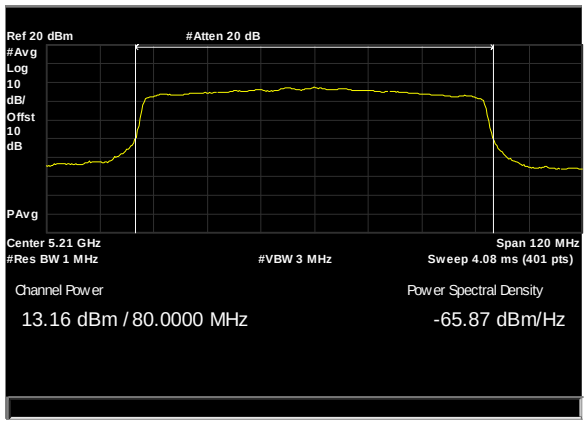
Plot 73. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5550M, N Mode ANT 1



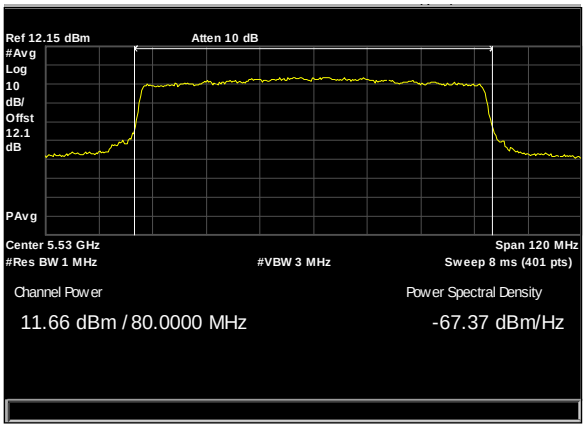
Plot 74. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5670M, N Mode ANT 0



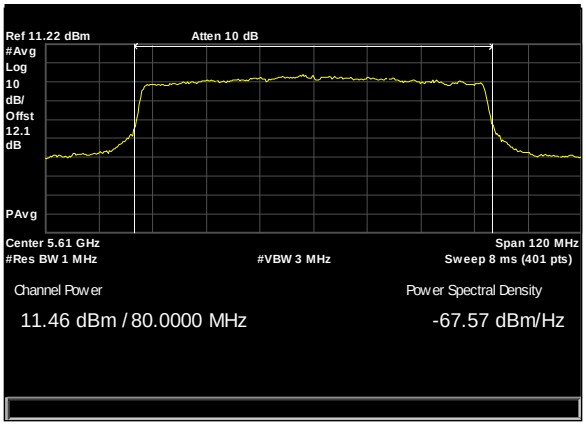
Plot 75. Maximum Conducted Transmitter Output Power, BW 40M, Ch 5670M, N Mode ANT 1



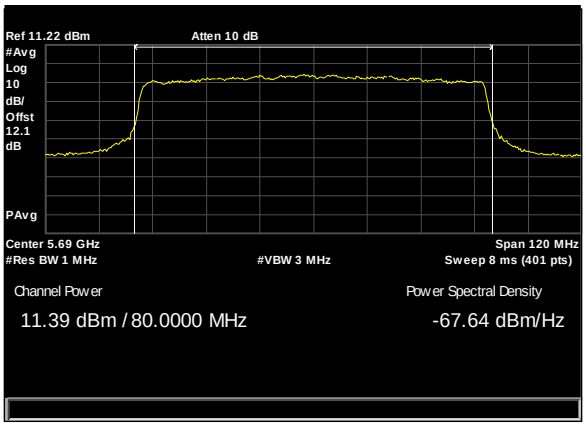
Plot 76. Maximum Conducted Transmitter Output Power, BW 80M, Ch 5210M, AC Mode ANT 0



Plot 77. Maximum Conducted Transmitter Output Power, BW 80M, Ch 5530M, AC Mode ANT 0



Plot 78. Maximum Conducted Transmitter Output Power, BW 80M, Ch 5610M, AC Mode ANT 0



Plot 79. Maximum Conducted Transmitter Output Power, BW 80M, Ch 5690M, AC Mode ANT 0

Electromagnetic Compatibility Criteria for Intentional Radiators

§15.407(a)(2) Maximum Power Spectral Density

Test Requirements: **§15.407(a)(2):** In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit on its low, mid, and high channels. Its power was measured according KDB 789033 D02 General UNII Test Procedures v02.

Test Results: The EUT as tested is compliant with the requirements of this section.

No anomalies detected.

Test Engineer(s): Arsalan Hasan

Test Date(s): August 18, 2019

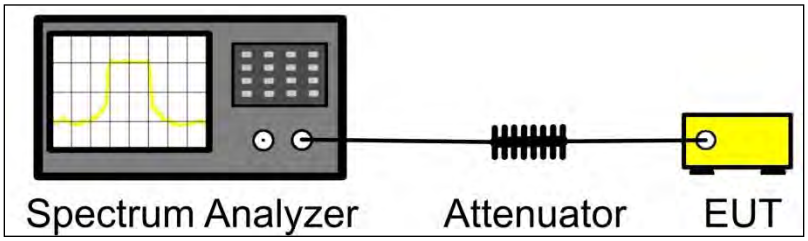
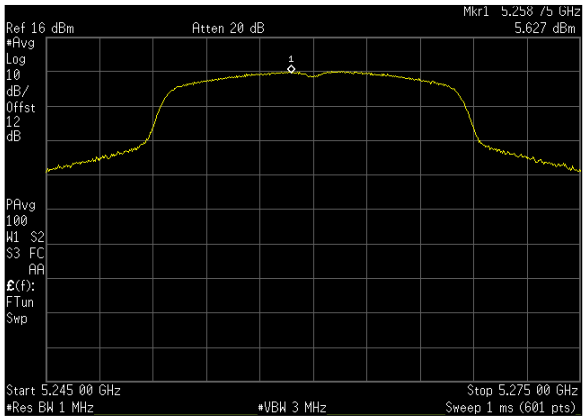


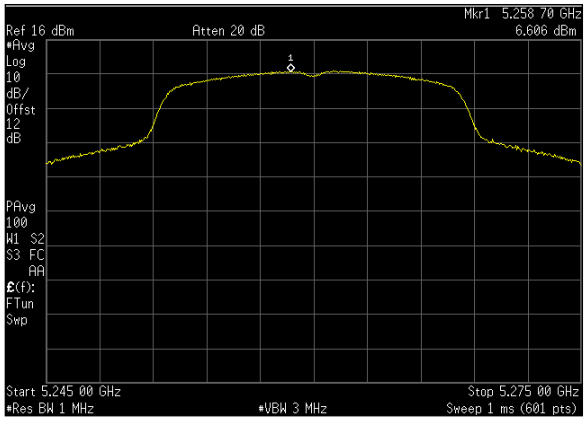
Figure 4. Block Diagram, Peak Power Spectral Density Test Setup

Frequency (MHz)	Mode	Bandwidth (MHz)	Power Spectral Density (dBm) ANT 0	Power Spectral Density (dBm) ANT 1	Total PSD (dBm)	Directional Gain (dBi)	PSD Limit (dBm)	PSD Margin (dB)
5260	a	20	5.627	6.606	9.15	5.0	11.00	-1.85
5280			6.396	7.635	10.07	5.0	11.00	-0.93
5320			6.945	7.416	10.20	5.0	11.00	-0.80
5500			5.865	6.462	9.18	5.0	11.00	-1.82
5580			6.182	6.631	9.42	5.0	11.00	-1.58
5700			5.73	5.503	8.63	5.0	11.00	-2.37
5260	n		4.511	5.303	7.94	5.0	11.00	-3.06
5280			4.138	6.838	8.70	5.0	11.00	-2.30
5320			5.155	5.719	8.46	5.0	11.00	-2.54
5500			6.199	5.124	8.70	5.0	11.00	-2.30
5580			5.256	6.385	8.87	5.0	11.00	-2.13
5700			5.347	4.57	7.99	5.0	11.00	-3.01
5270		40	1.499	1.103	4.32	5.0	11.00	-6.68
5310			0.009	0.261	3.15	5.0	11.00	-7.85
5510			1.892	0.239	4.15	5.0	11.00	-6.85
5550			1.206	1.844	4.55	5.0	11.00	-6.45
5670			0.878	0.153	3.54	5.0	11.00	-7.46
5290	ac	80	-5.262	-4.459	-1.83	5.0	11.00	-12.83
5530			-4.985	-4.78	-1.87	5.0	11.00	-12.87
5610			-6.092	-7.62	-3.78	5.0	11.00	-14.78
5690			-5.947	-5.14	-2.51	5.0	11.00	-13.51

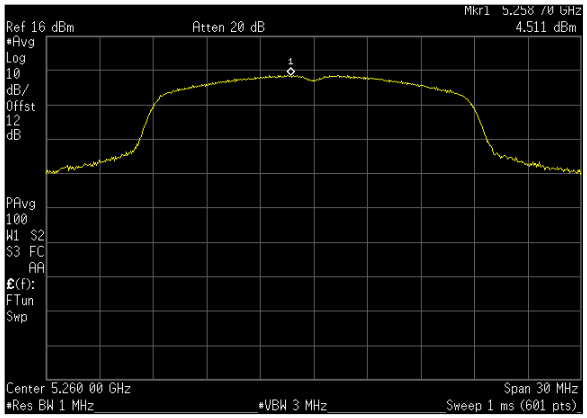
Table 11. Power Spectral Density, Test Results



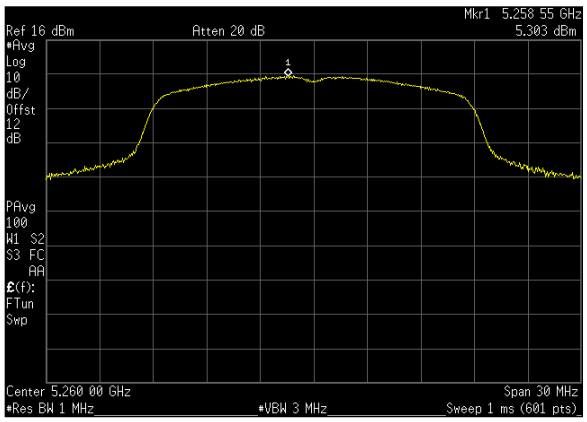
Plot 80. Power Spectral Density, BW 20M, Ch 5260M, A Mode ANT 0



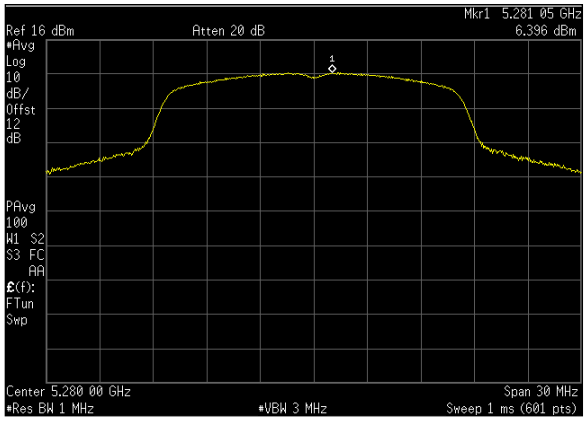
Plot 81. Power Spectral Density, BW 20M, Ch 5260M, A Mode Ant 1



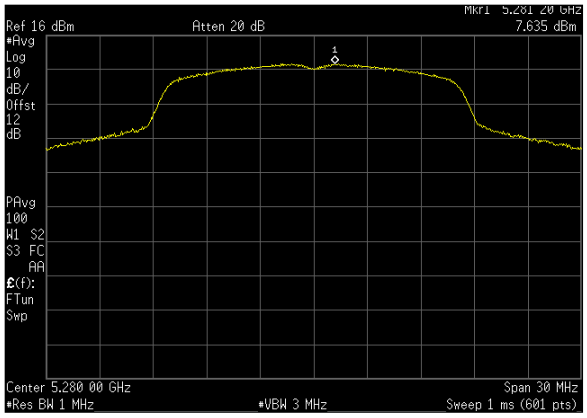
Plot 82. Power Spectral Density, BW 20M, Ch 5260M, N Mode ANT 0



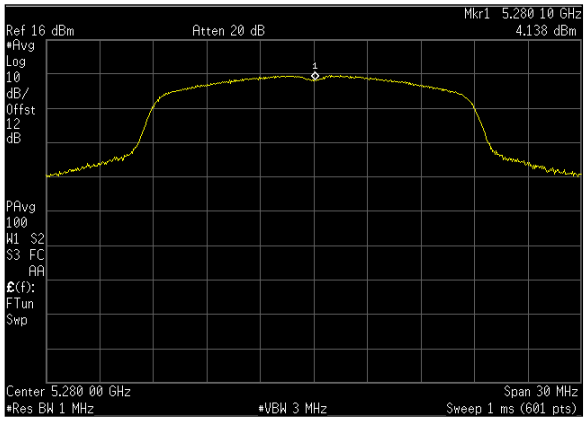
Plot 83. Power Spectral Density, BW 20M, Ch 5260M, N Mode Ant 1



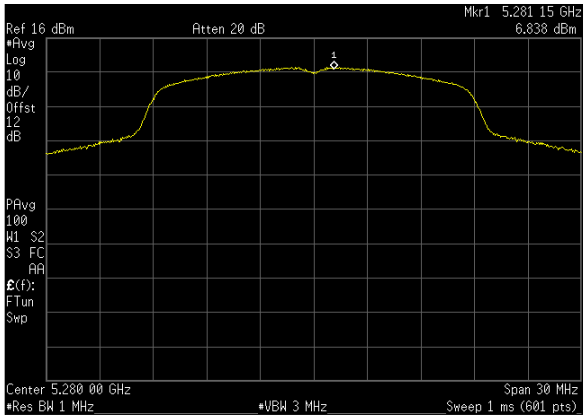
Plot 84. Power Spectral Density, BW 20M, Ch 5280M, A Mode ANT 0



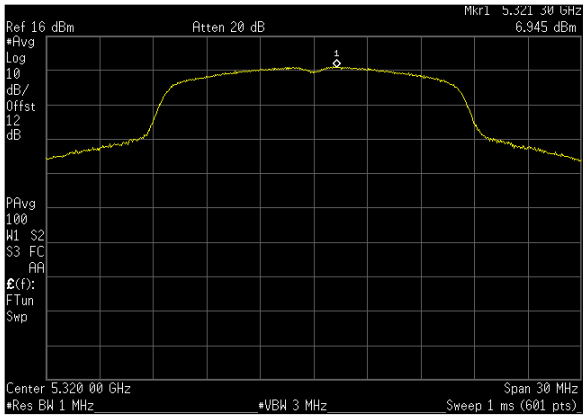
Plot 85. Power Spectral Density, BW 20M, Ch 5280M, A Mode Ant 1



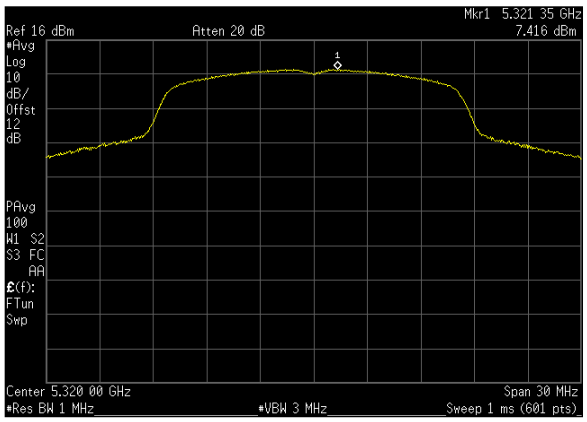
Plot 86. Power Spectral Density, BW 20M, Ch 5280M, N Mode ANT 0



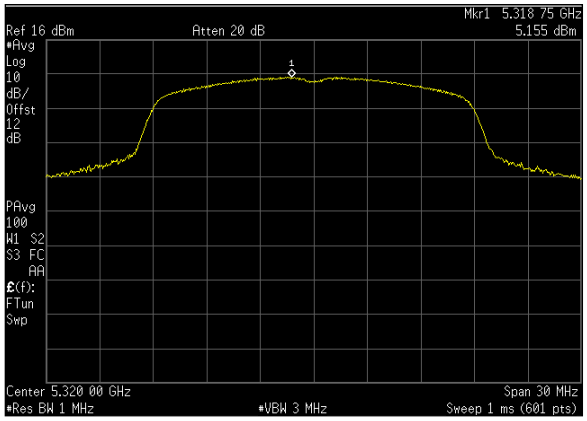
Plot 87. Power Spectral Density, BW 20M, Ch 5280M, N Mode Ant 1



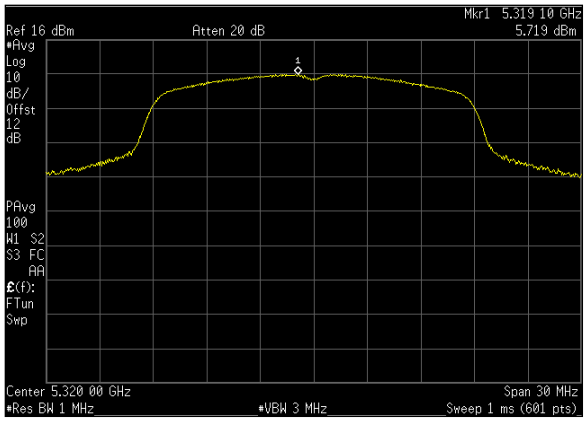
Plot 88. Power Spectral Density, BW 20M, Ch 5320M, A Mode ANT 0



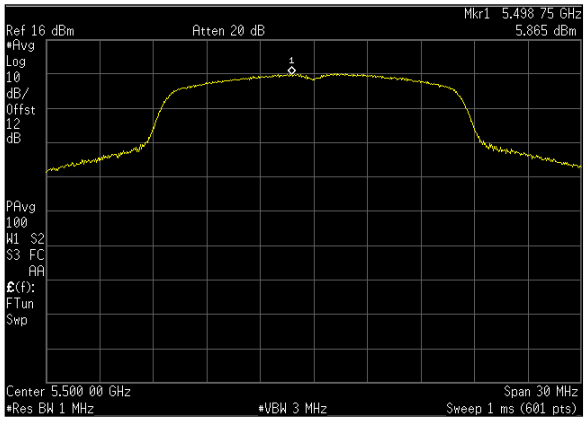
Plot 89. Power Spectral Density, BW 20M, Ch 5320M, A Mode Ant 1



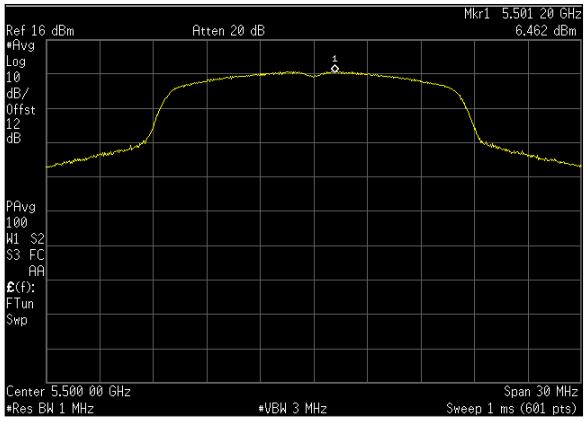
Plot 90. Power Spectral Density, BW 20M, Ch 5320M, N Mode ANT 0



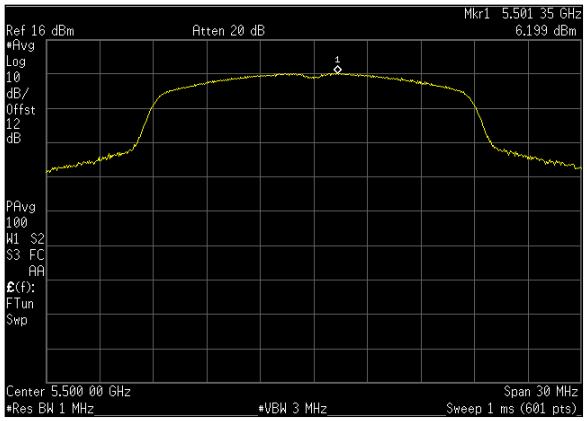
Plot 91. Power Spectral Density, BW 20M, Ch 5320M, N Mode Ant 1



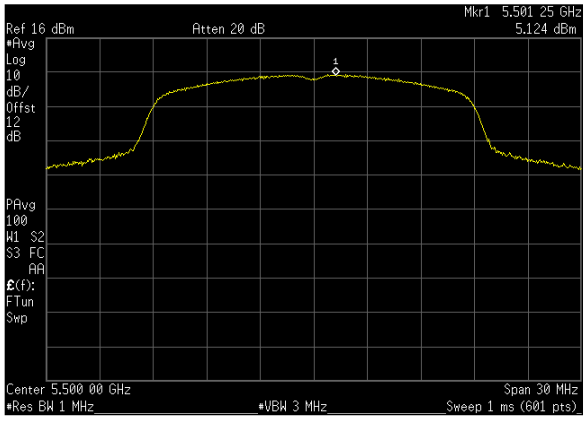
Plot 92. Power Spectral Density, BW 20M, Ch 5500M, A Mode ANT 0



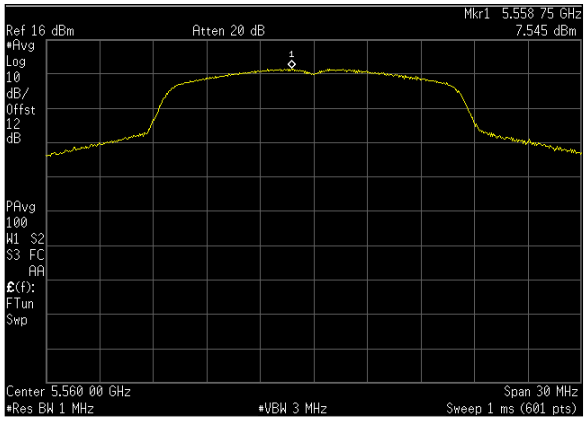
Plot 93. Power Spectral Density, BW 20M, Ch 5500M, A Mode Ant 1



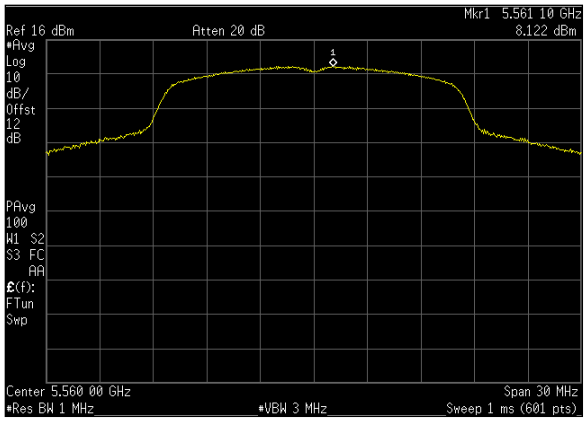
Plot 94. Power Spectral Density, BW 20M, Ch 5500M, N Mode ANT 0



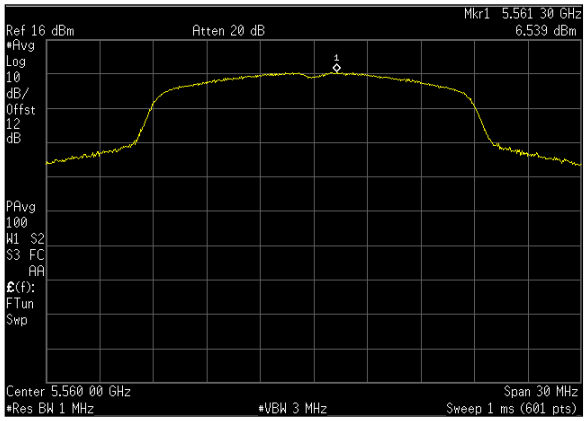
Plot 95. Power Spectral Density, BW 20M, Ch 5500M, N Mode Ant 1



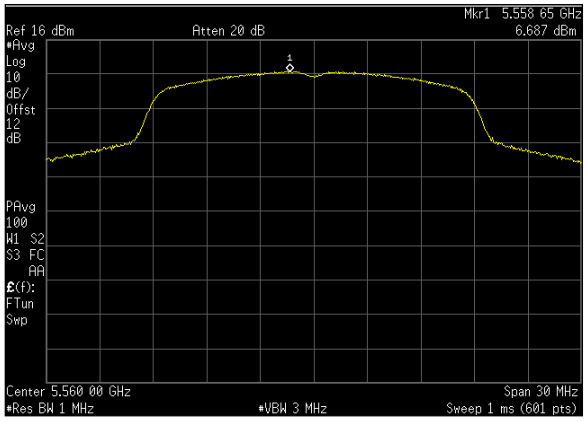
Plot 96. Power Spectral Density, BW 20M, Ch 5560M, A Mode ANT 0



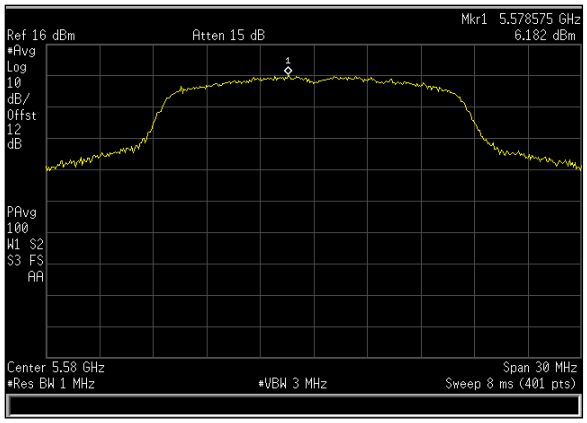
Plot 97 Power Spectral Density, BW 20M, Ch 5560M, A Mode Ant 1



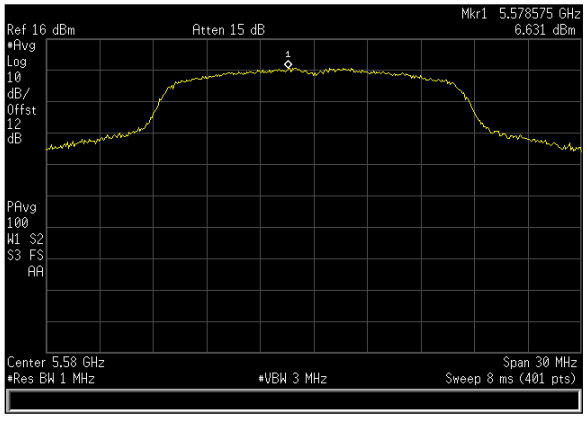
Plot 98. Power Spectral Density, BW 20M, Ch 5560M, N Mode ANT 0



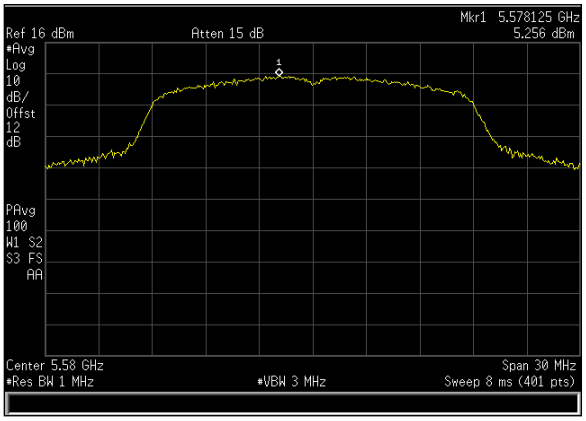
Plot 35. Power Spectral Density, BW 20M, Ch 5560M, N Mode Ant 1



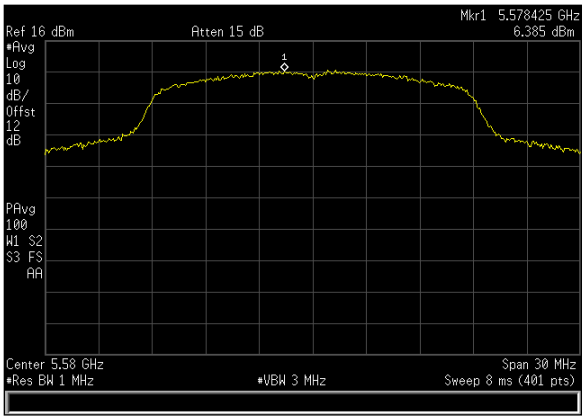
Plot 100. Power Spectral Density, BW 20M, Ch 5580M, A Mode ANT 0



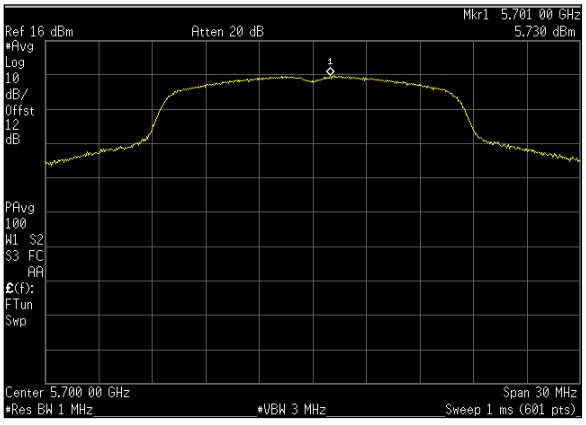
Plot 101. Power Spectral Density, BW 20M, Ch 5580M, A Mode Ant 1



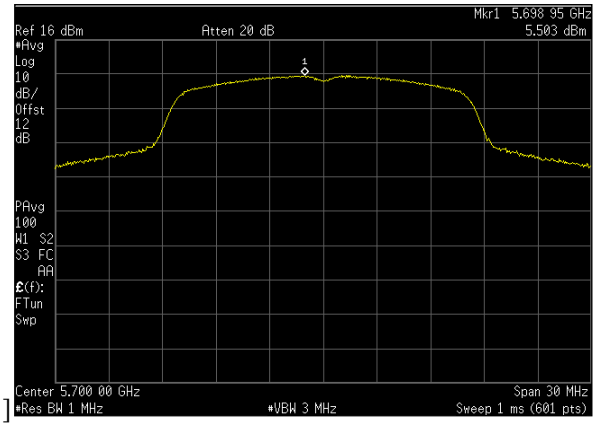
Plot 102. Power Spectral Density, BW 20M, Ch 5580M, N Mode ANT 0



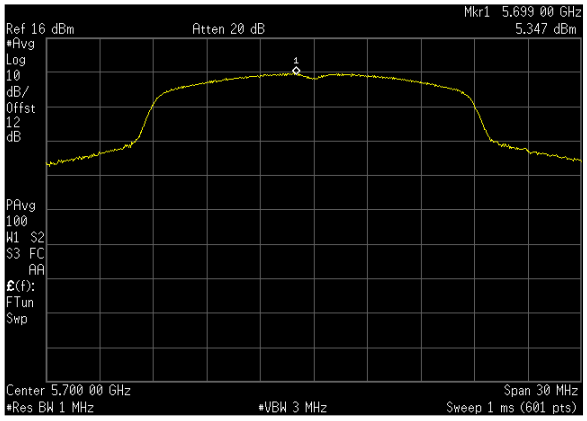
Plot 103. Power Spectral Density, BW 20M, Ch 5580M, N Mode Ant 1



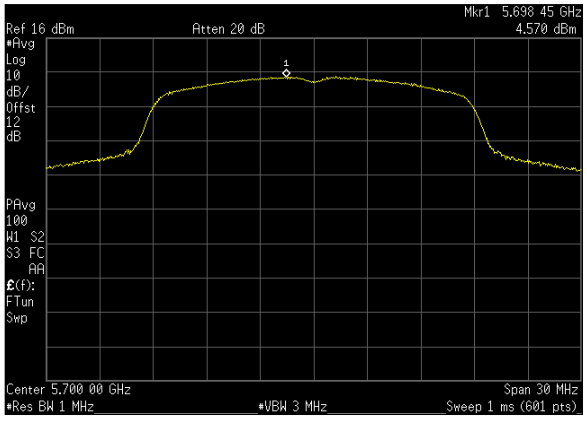
Plot 104. Power Spectral Density, BW 20M, Ch 5700M, A Mode ANT 0



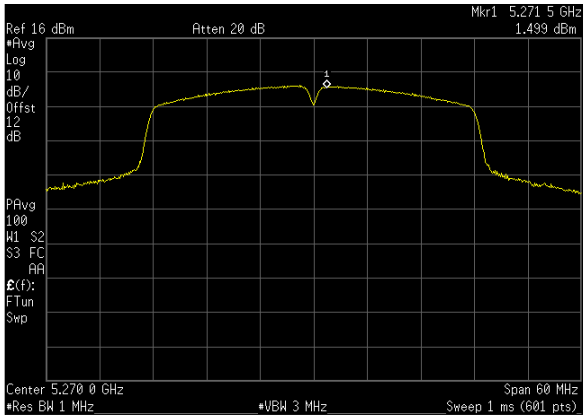
Plot 105. Power Spectral Density, BW 20M, Ch 5700M, A Mode Ant 1



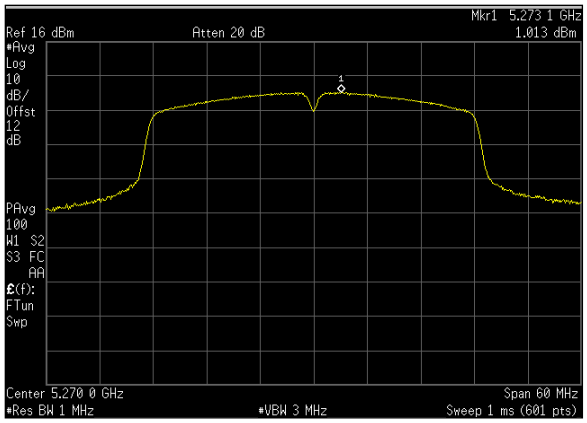
Plot 106. Power Spectral Density, BW 20M, Ch 5700M, N Mode ANT 0



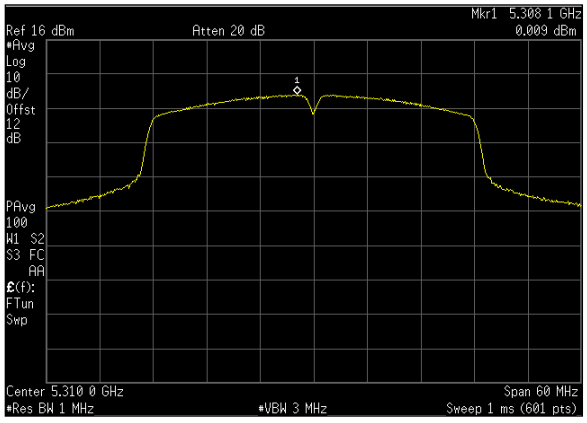
Plot 107. Power Spectral Density, BW 20M, Ch 5700M, N Mode Ant 1



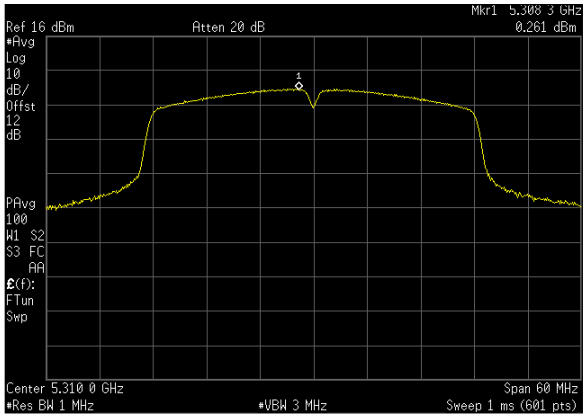
Plot 108. Power Spectral Density, BW 40M, Ch 5270M, N Mode ANT 0



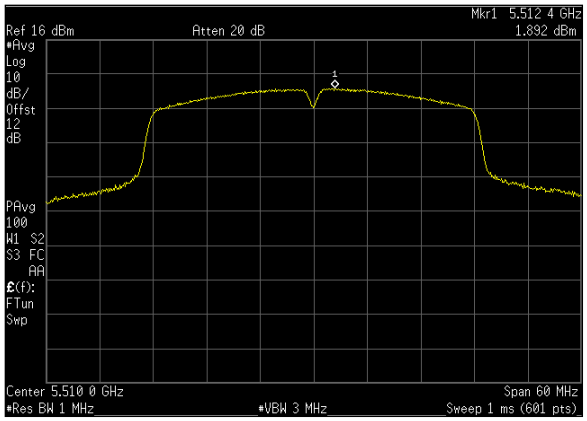
Plot 109. Power Spectral Density, BW 40M, Ch 5270M, N Mode Ant 1



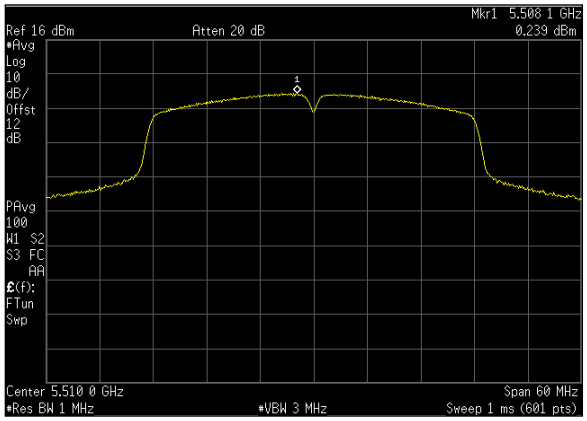
Plot 110. Power Spectral Density, BW 40M, Ch 5310M, N Mode ANT 0



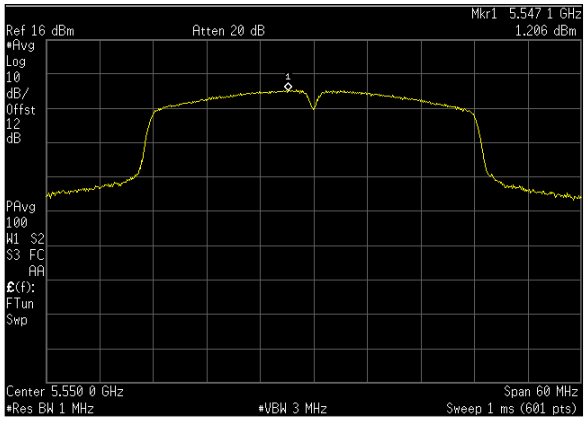
Plot 111. Power Spectral Density, BW 40M, Ch 5310M, N Mode Ant 1



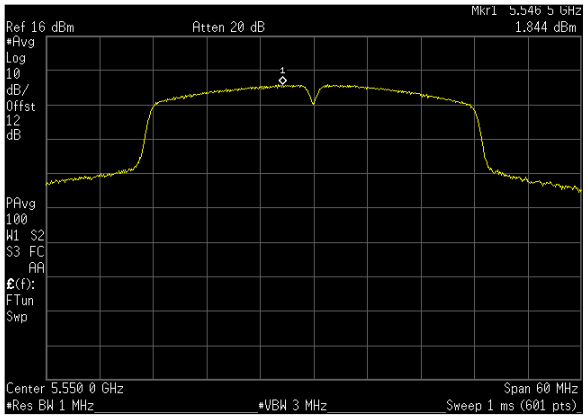
Plot 112. Power Spectral Density, BW 40M, Ch 5510M, N Mode ANT 0



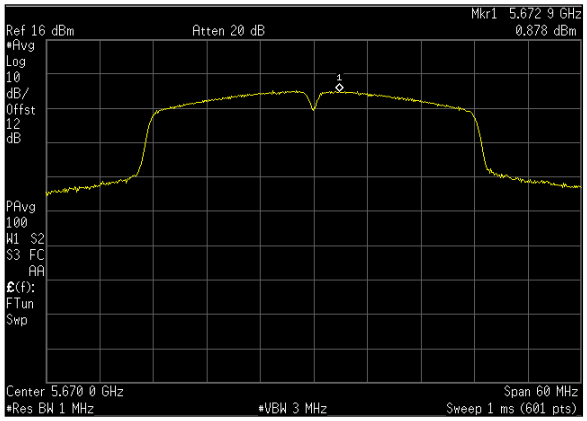
Plot 113. Power Spectral Density, BW 40M, Ch 5510M, N Mode Ant 1



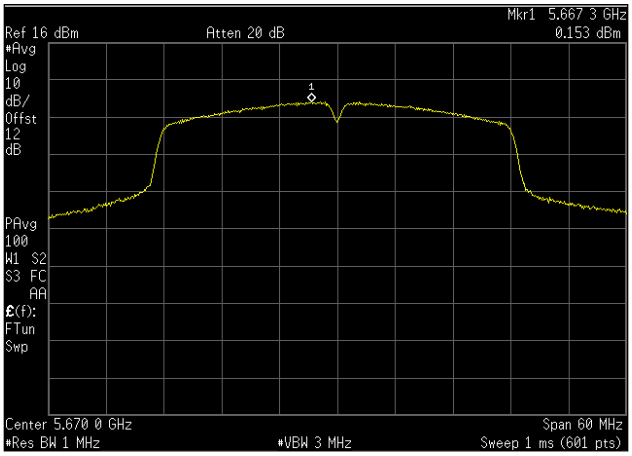
Plot 114. Power Spectral Density, BW 40M, Ch 5550M, N Mode ANT 0



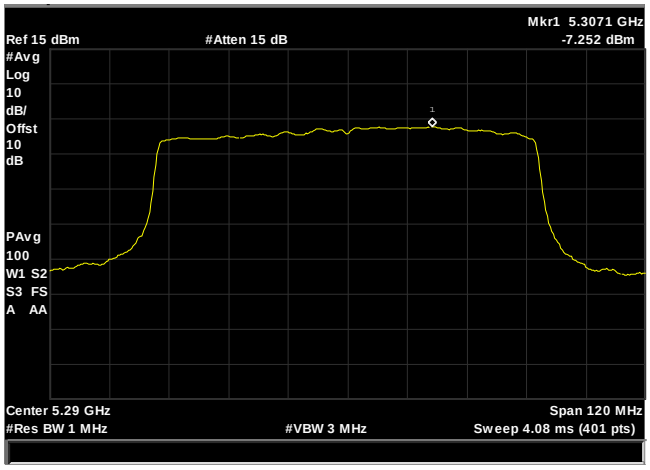
Plot 115. Power Spectral Density, BW 40M, Ch 5550M, N Mode Ant 1



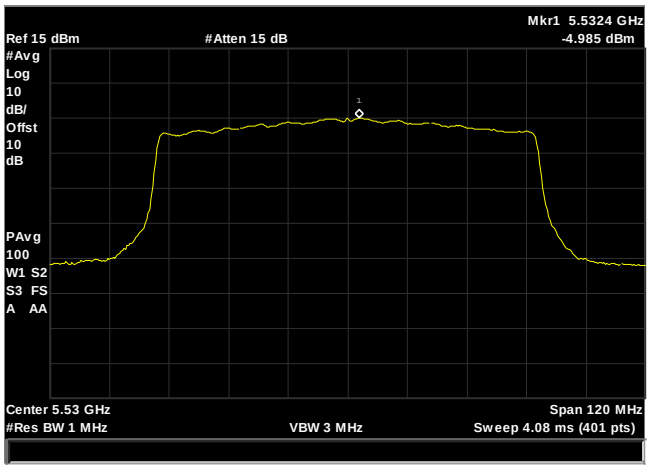
Plot 116. Power Spectral Density, BW 40M, Ch 5670M, N Mode ANT 0



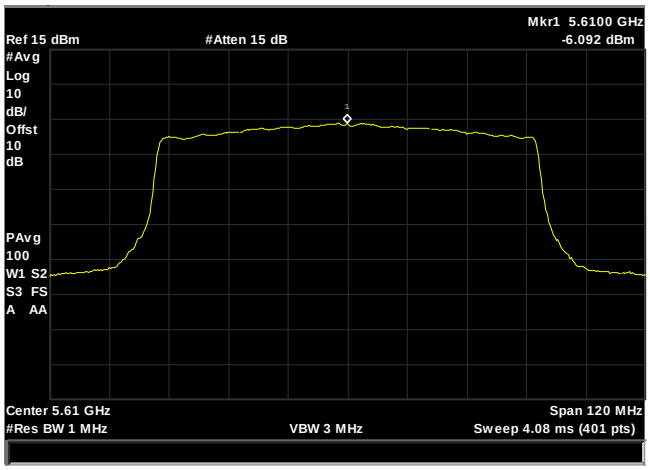
Plot 117. Power Spectral Density, BW 40M, Ch 5670M, N Mode ANT 1



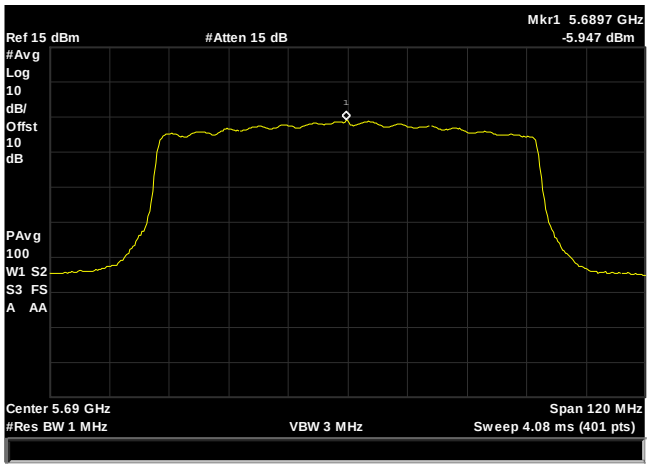
Plot 118. Power Spectral Density, BW 80M, Ch 5290M, AC Mode ANT 0



Plot 119. Power Spectral Density, BW 80M, Ch 5530M, AC Mode ANT 0



Plot 120. Power Spectral Density, BW 80M, Ch 5610M, AC Mode ANT 0



Plot 121. Power Spectral Density, BW 80M, Ch 5690M, AC Mode ANT 0

Electromagnetic Compatibility Criteria for Intentional Radiators

§15.407(b)(2 – 3) & (6 – 7) Undesirable Emissions

Test Requirements:

§ 15.407(b)(2): For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

§ 15.407(b)(3): For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

§ 15.407(b)(6): Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

§ 15.407(b)(7): The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Test Procedure:

The EUT was placed on a non-conducting stand on a turntable in a chamber. To find the maximum emission the EUT was set to transmit on low, mid, and high channels. Additionally, the turntable was rotated 360 degrees, the EUT was oriented through its three orthogonal axes, and the receive antenna height was varied in order to maximize emissions.

For frequencies from 30 MHz to 1 GHz, measurements were first made using a peak detector with a 100 kHz resolution bandwidth. Emissions which exceeded the limits were re-measured using a quasi-peak detector with a 120 kHz resolution bandwidth.

Above 1 GHz, measurements were made pursuant the method described in FCC KDB 789033 D02 General UNII Test Procedure New Rules v02. The equation, **EIRP= E + 20 log D – 104.8** was used to convert field strength to EIRP (**E** = field strength (dBµV/m) and **D** = Reference measurement distance**).**

For emissions above 1 GHz and in restricted bands, measurements of the field strength were made with a peak detector and an average detector and compared with the limits of 15.209.

As an alternative, according to FCC KDB 789033 D02 General UNII Test Procedure New Rules v02, all emissions above 1 GHz that comply with the peak and average limits of 15.209 satisfy the requirements of unwanted emissions in 15.407.

Test Results:

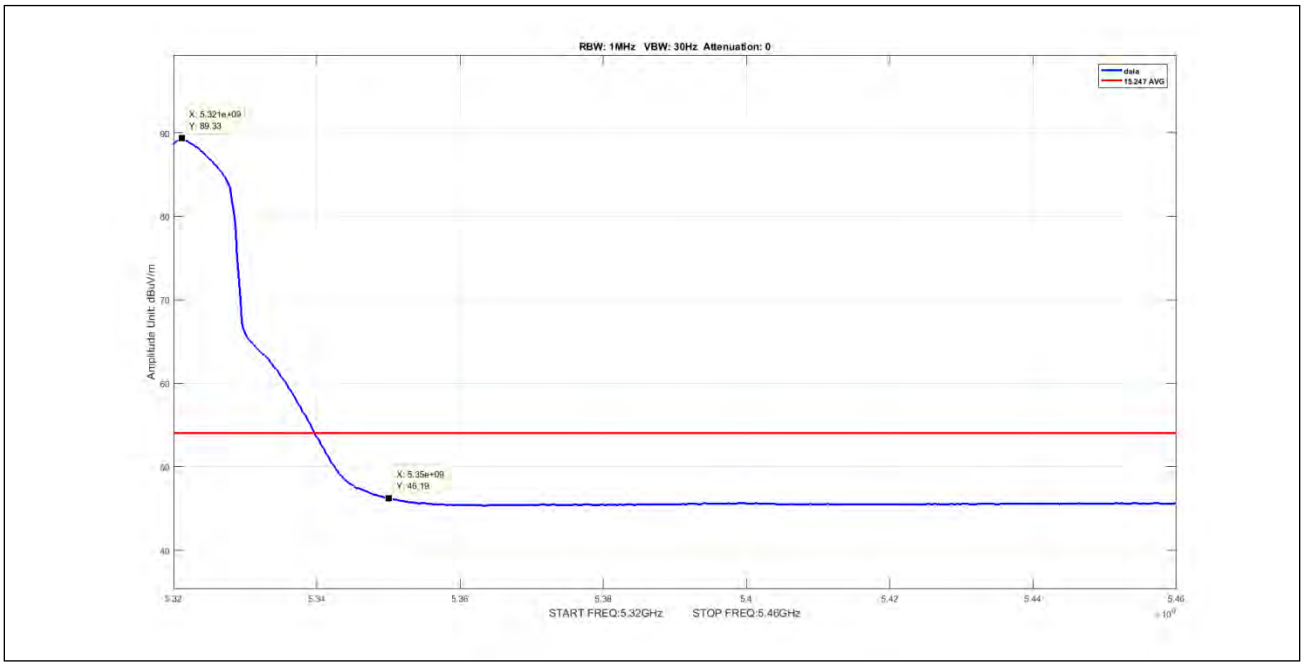
EUT was compliant with the requirements of this section. Only noise was observed above 18 GHz and below 30 MHz. Emissions were investigated up to 10th harmonics. Only worst data are presented in this report except band edges.

Measured emissions were within applicable limits.

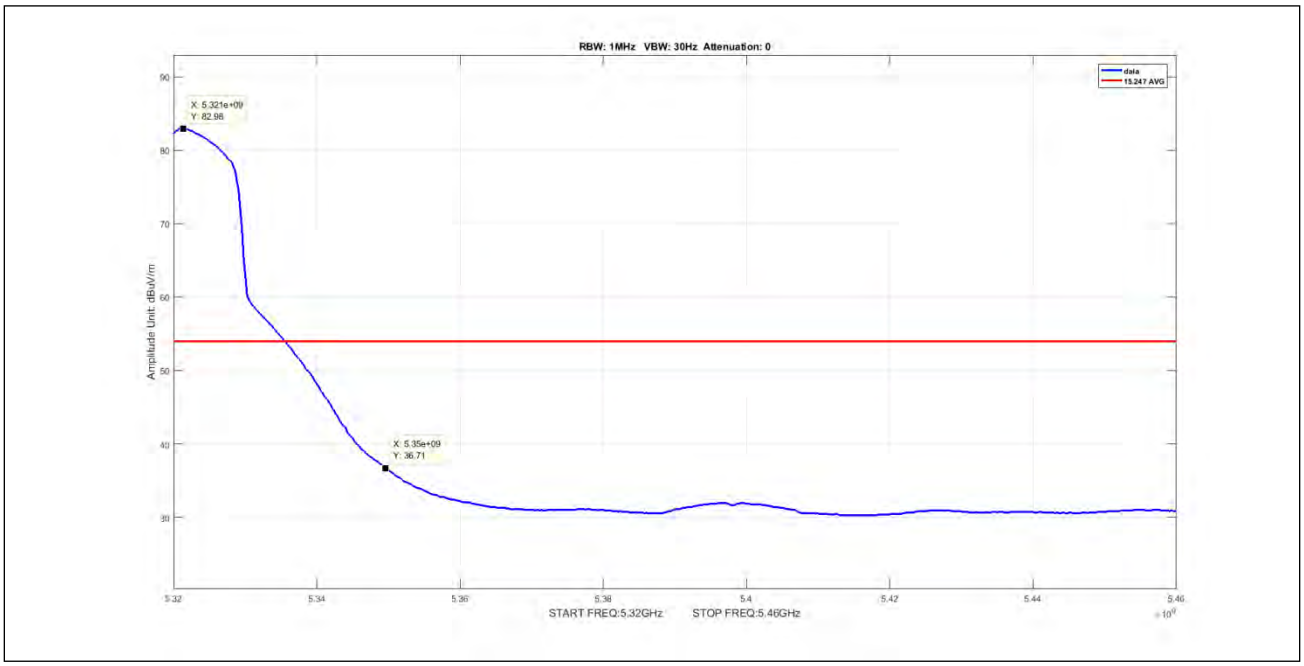
Test Engineer(s): Arsalan Hasan

Test Date(s): August 21, 2019

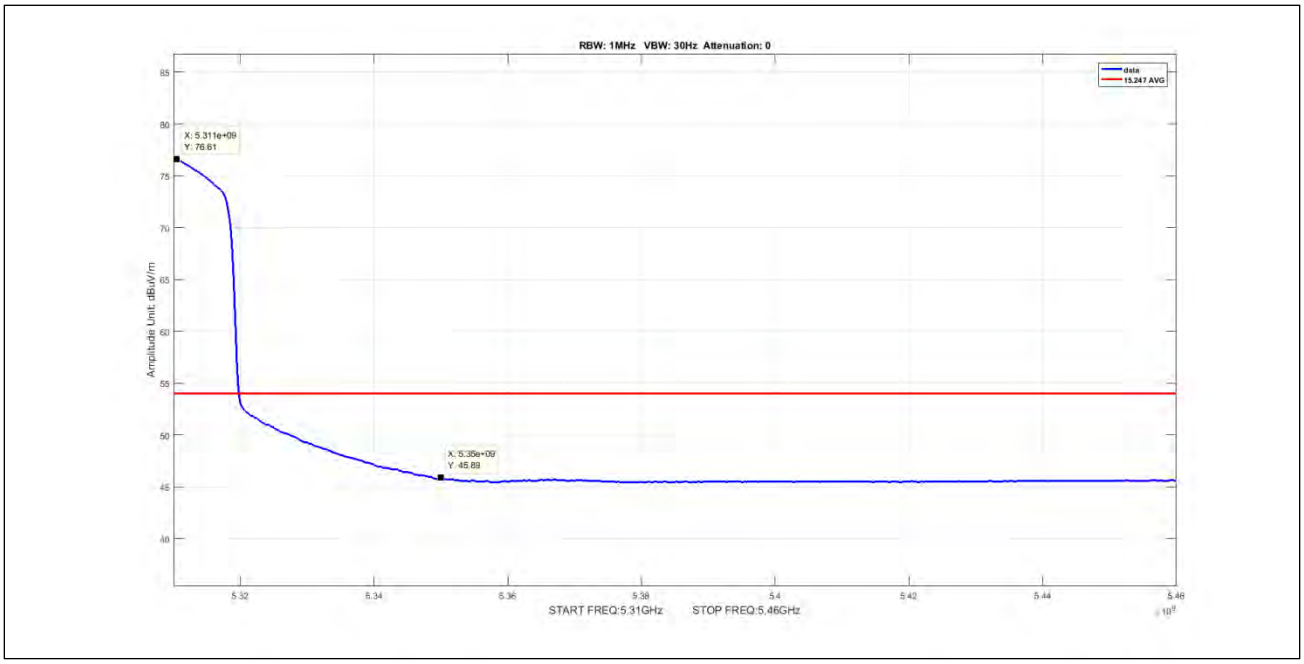
Radiated Band Edge



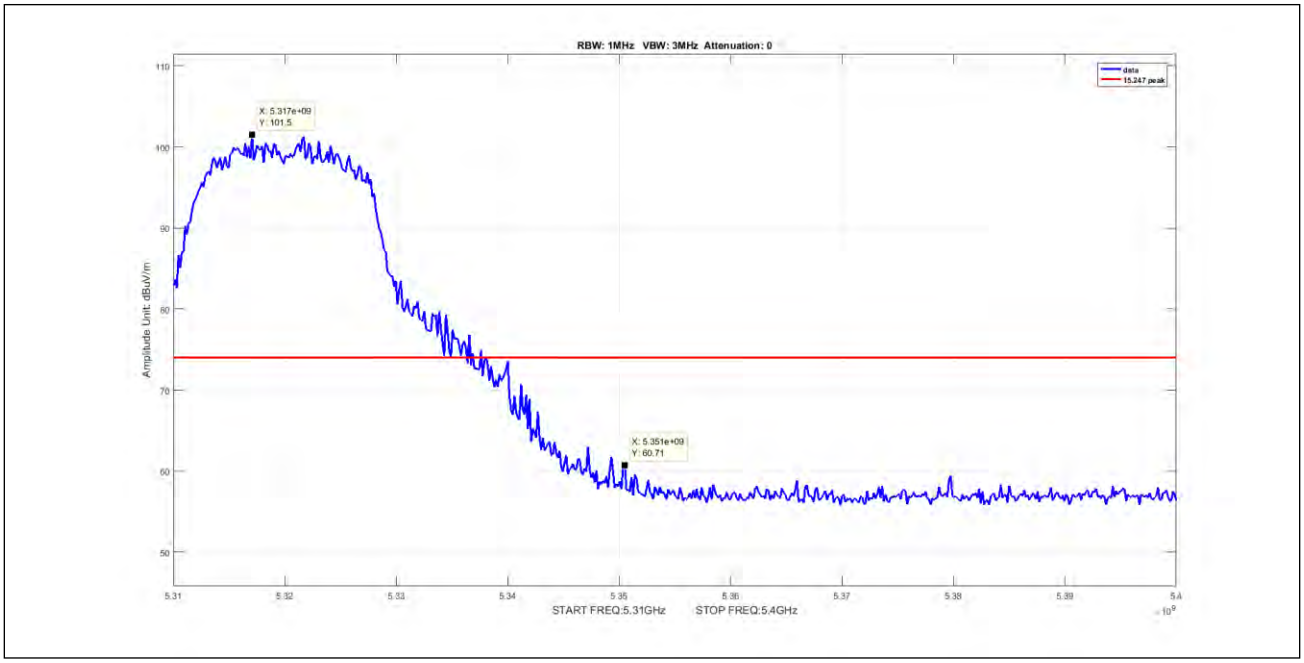
Plot 122. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5320M, A Mode ANT 0 (worst-case) V



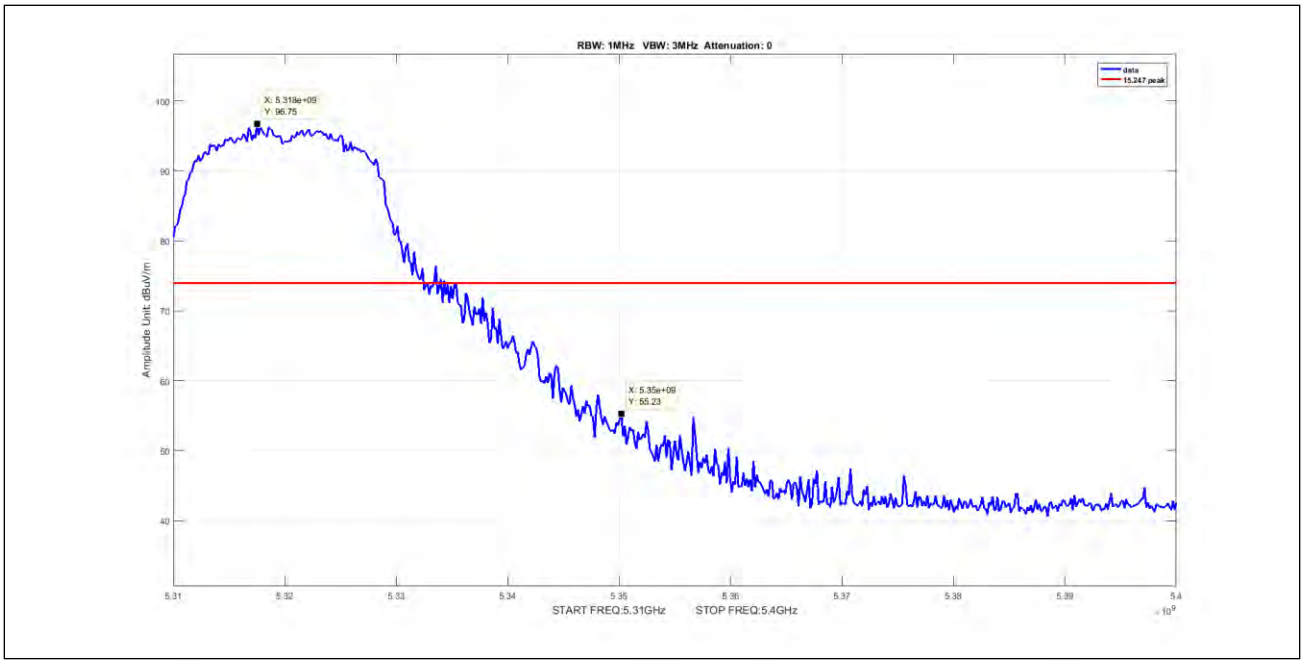
Plot 123. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5320M, N Mode ANT 0 (worst-case) V



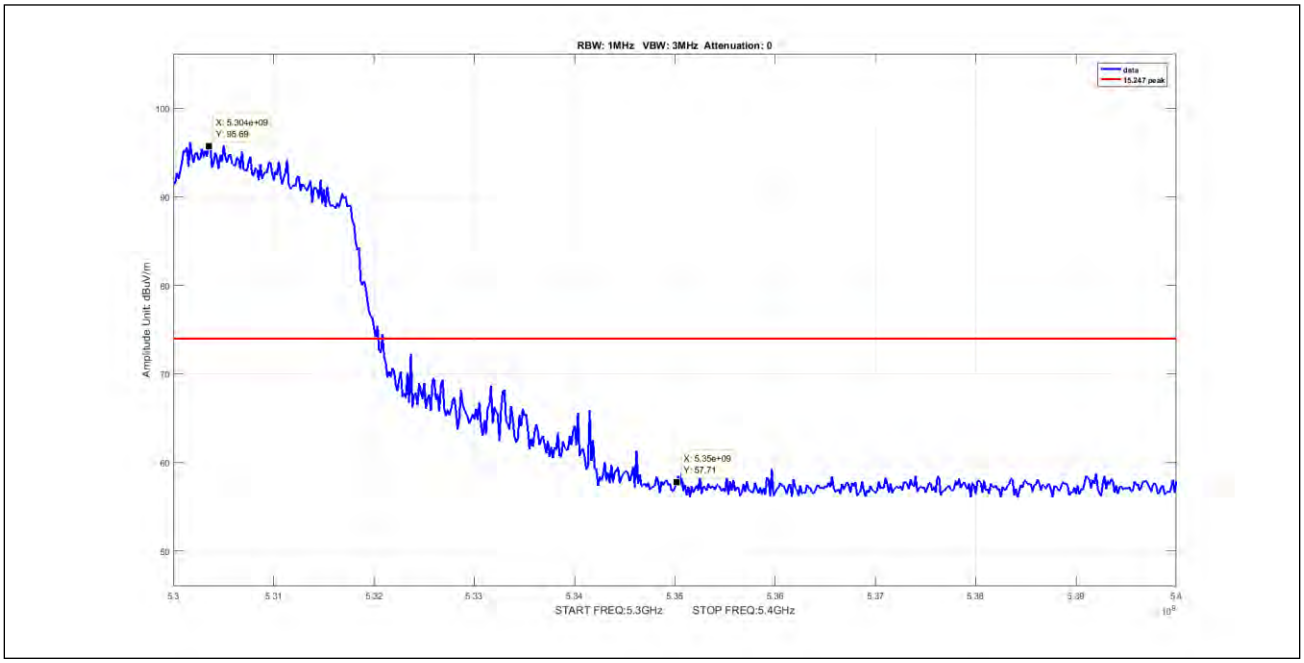
Plot 124. Undesirable Emissions, Average Band Edge Spurious, BW 40M, Ch 5310M, N Mode ANT 0 (worst-case) V



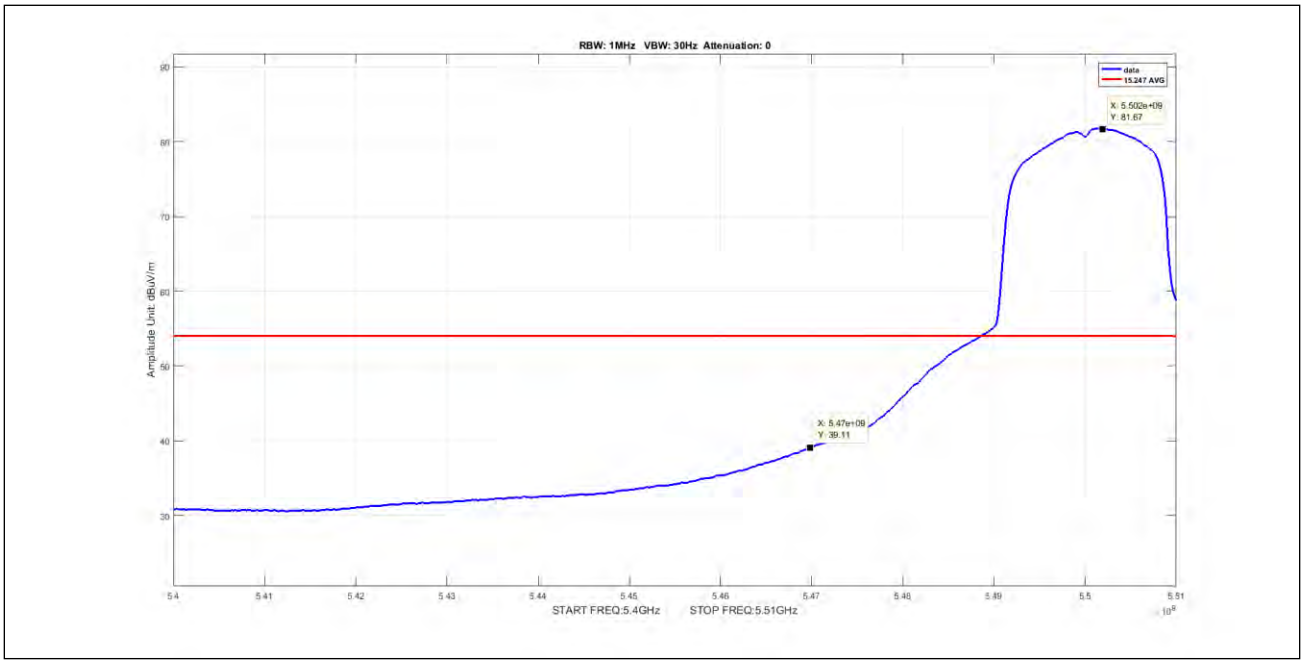
Plot 125. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5320M, A Mode ANT 0 (worst-case) V



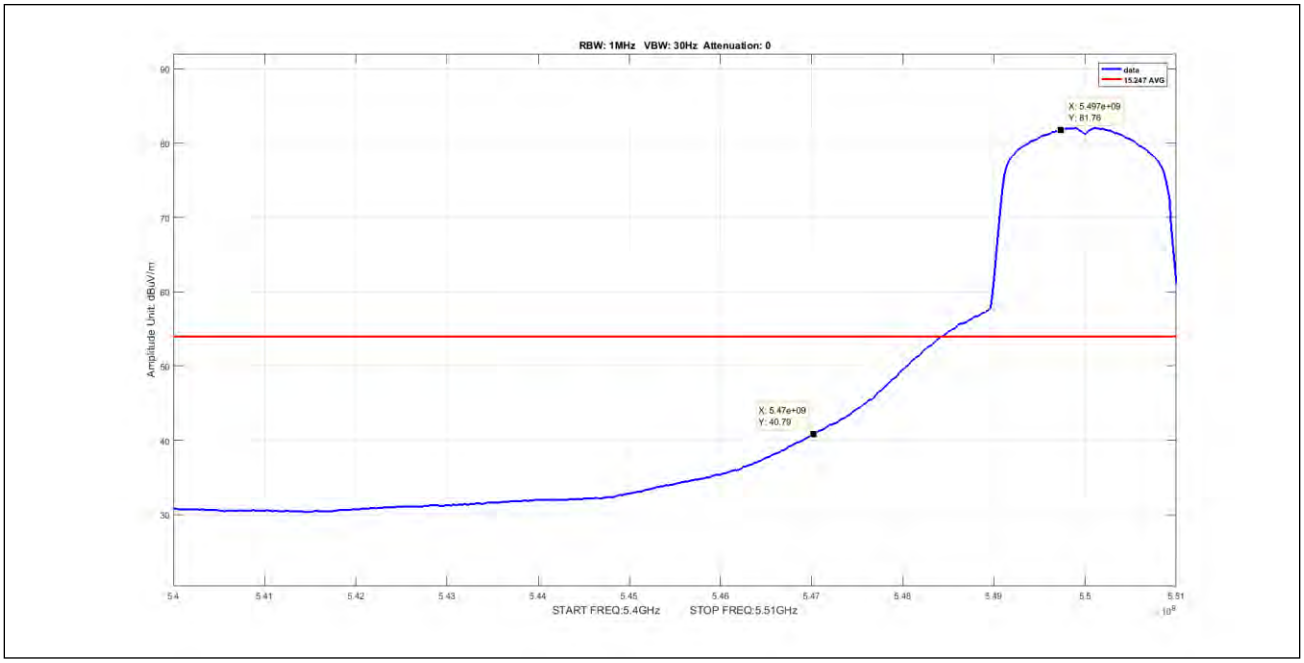
Plot 126. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5320M, N Mode ANT 0 (worst-case) V



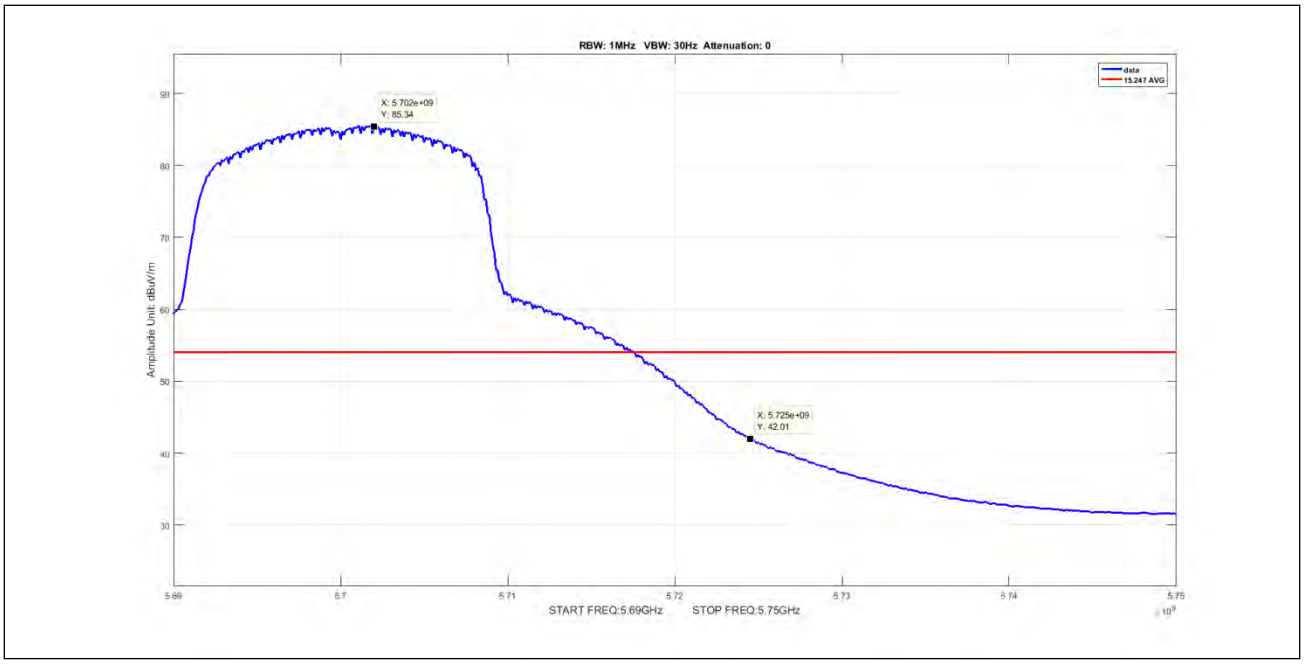
Plot 127. Undesirable Emissions, Peak Band Edge Spurious, BW 40M, Ch 5310M, N Mode ANT 0 (worst-case) V



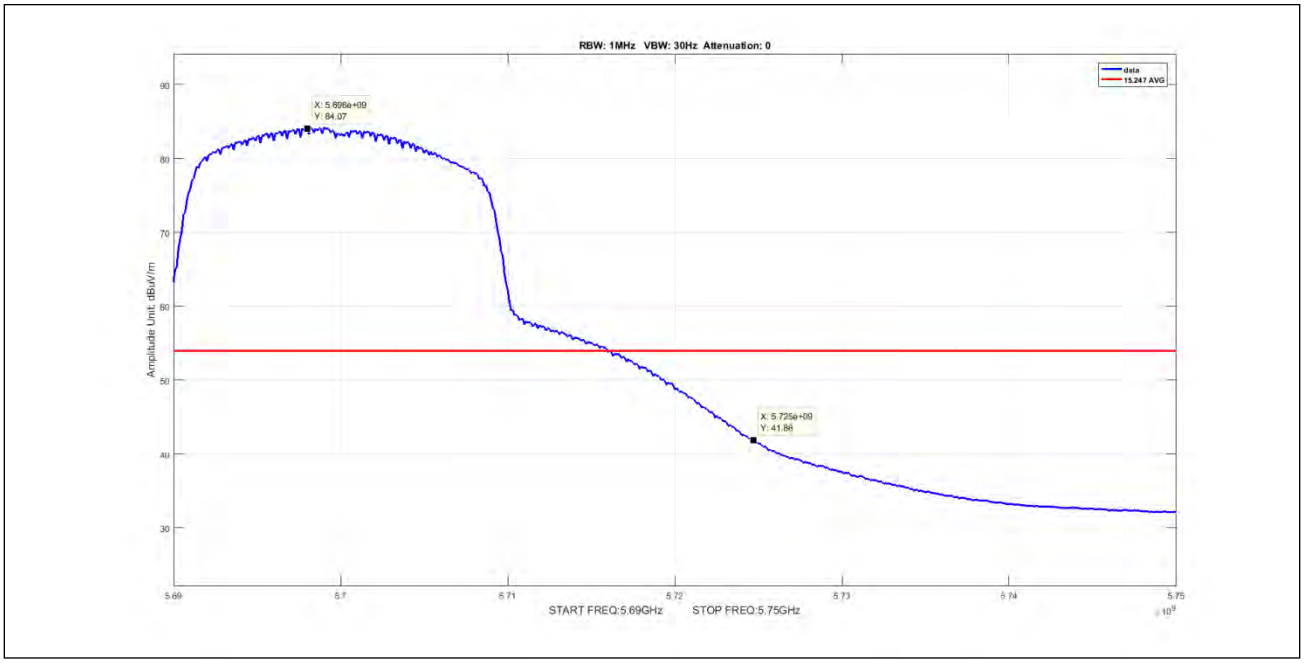
Plot 128. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5500M, A Mode ANT 0 (worst-case) V



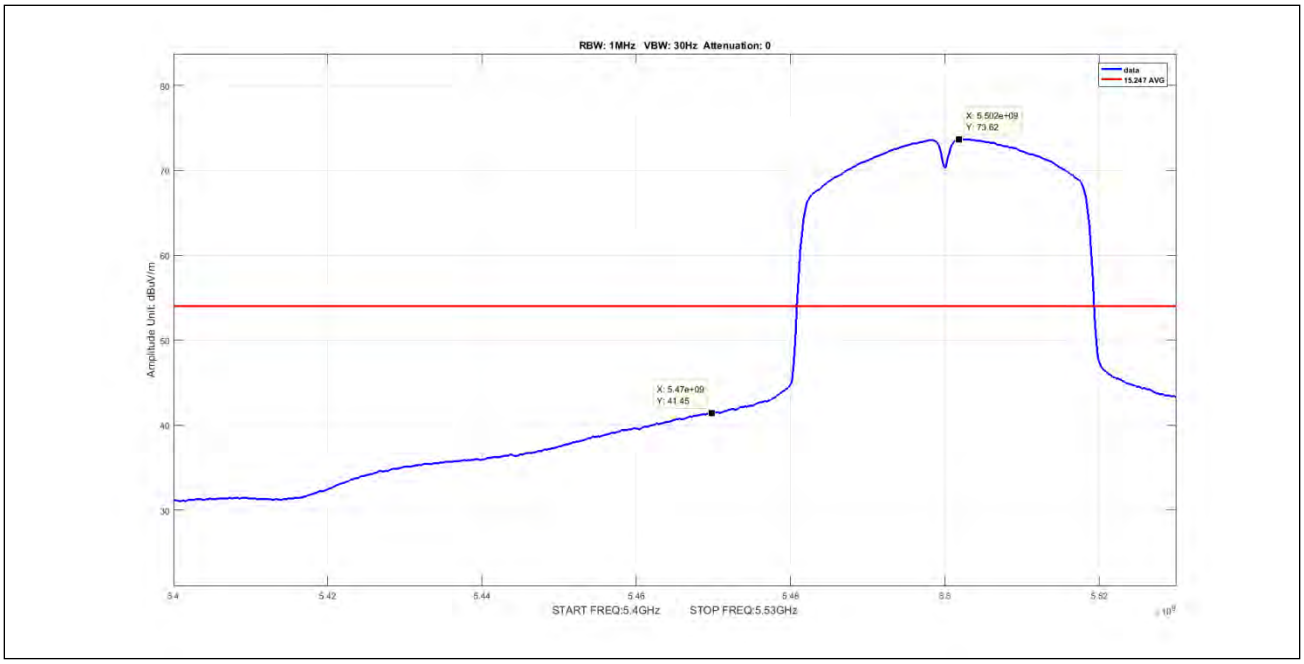
Plot 129. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5500M, N Mode ANT 0 (worst-case) V



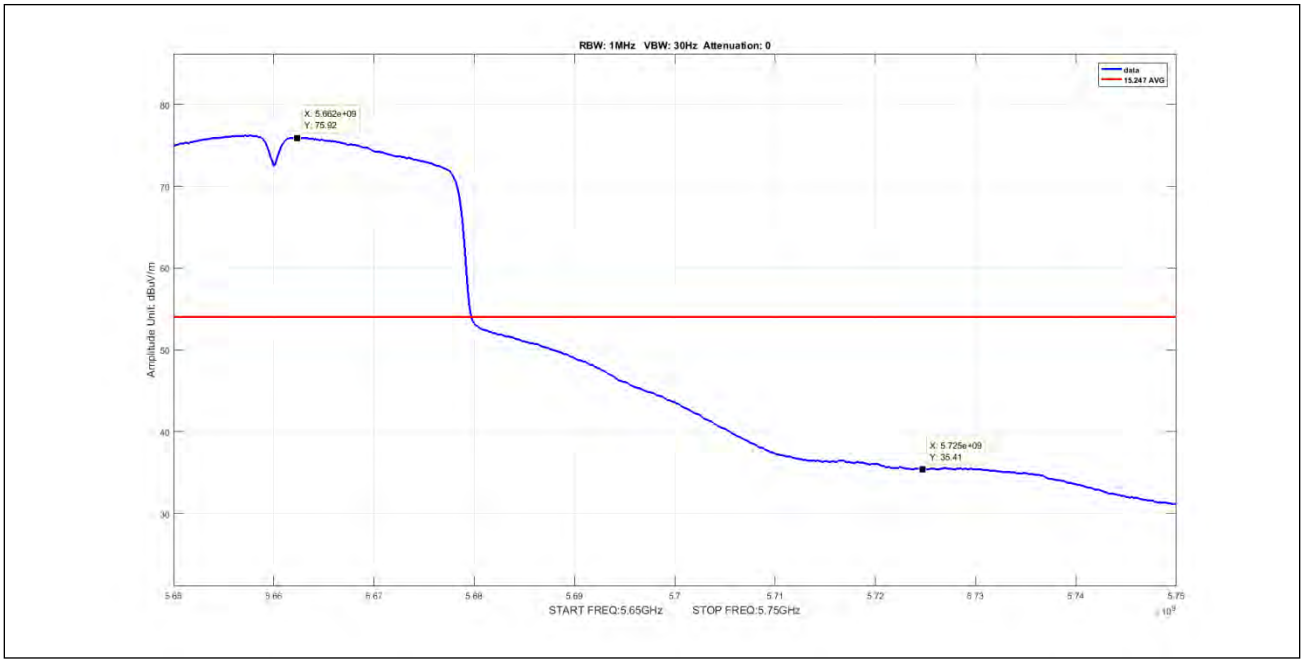
Plot 130. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5700M, A Mode ANT 0 (worst-case) V



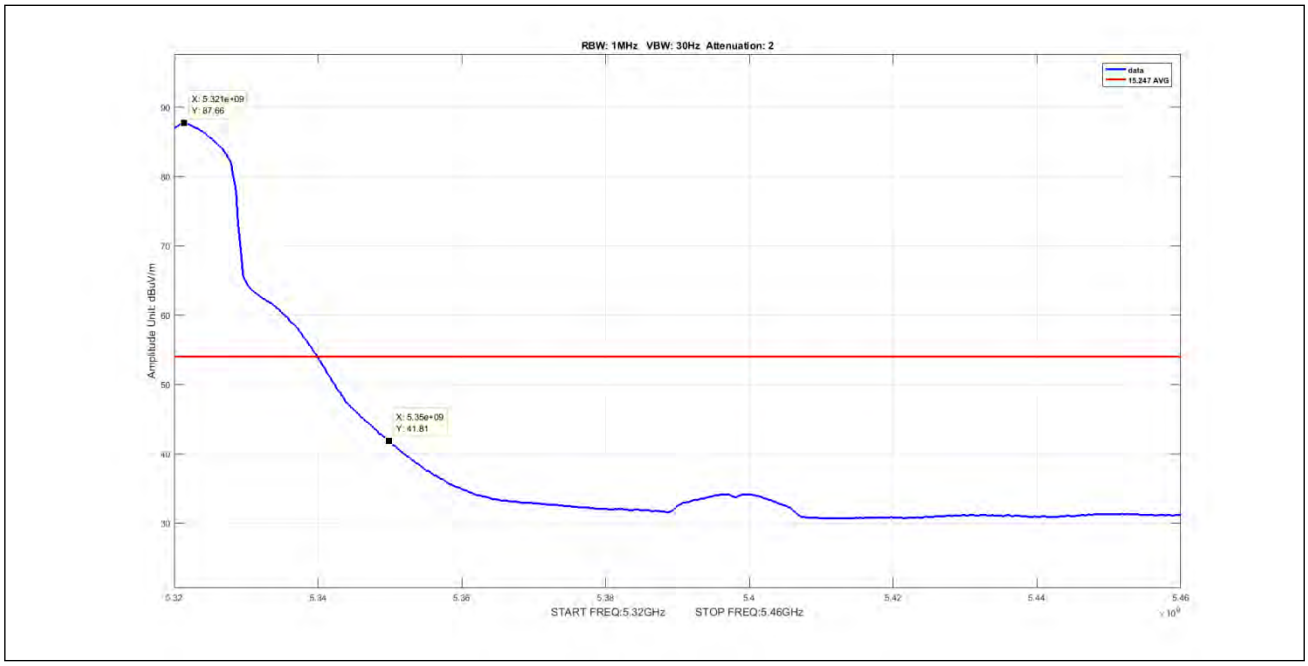
Plot 131. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5700M, N Mode ANT 0 (worst-case) V



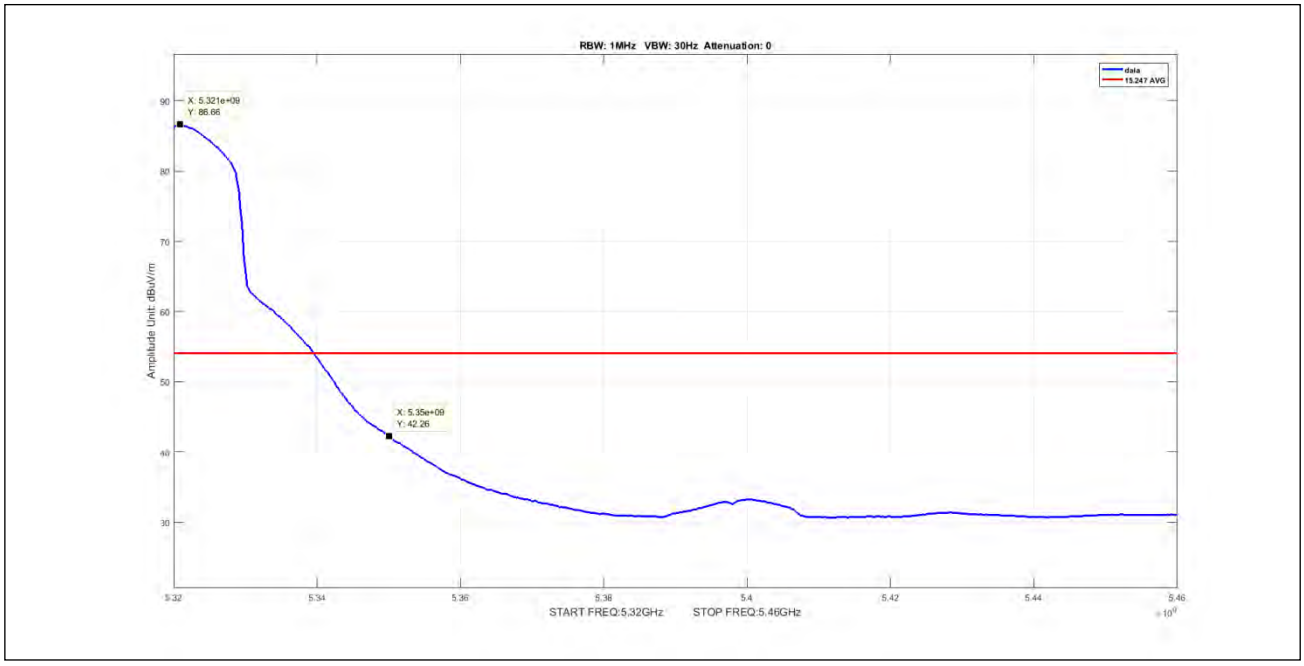
Plot 132. Undesirable Emissions, Average Band Edge Spurious, BW 40M, Ch 5510M, N Mode ANT 0 (worst-case) V



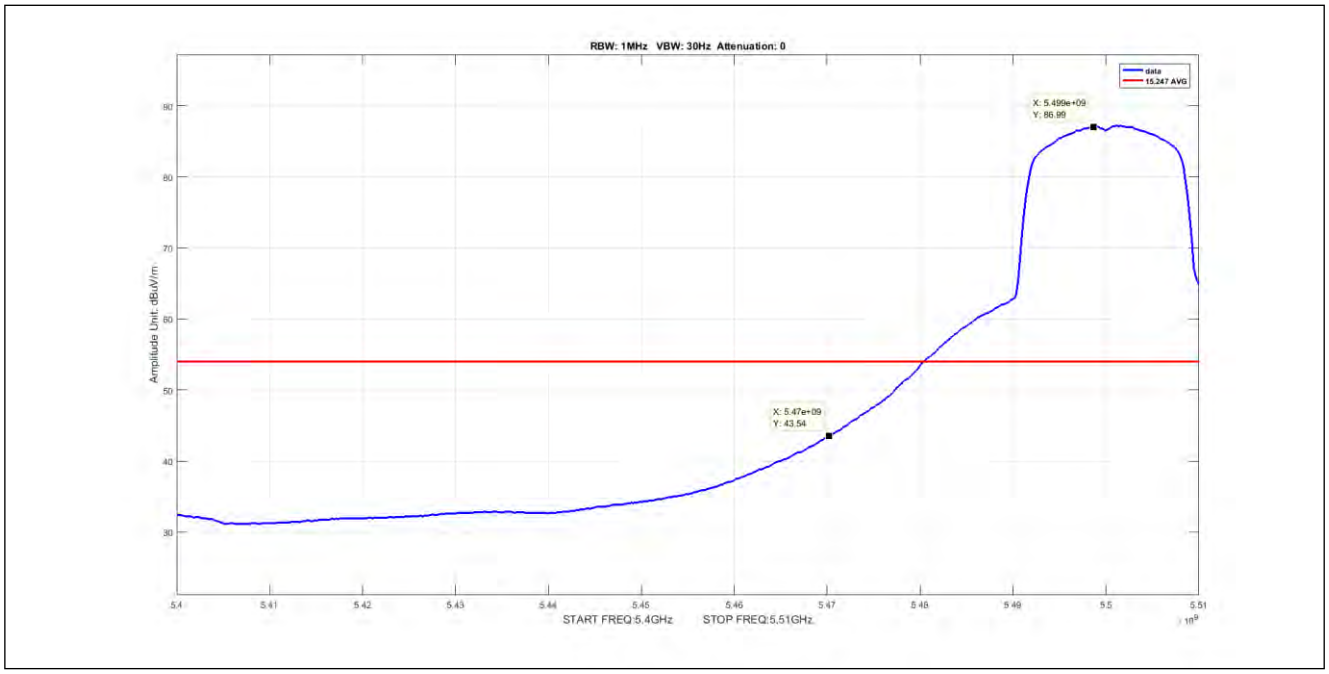
Plot 133. Undesirable Emissions, Average Band Edge Spurious, BW 40M, Ch 5670M, N Mode ANT 0 (worst-case) V



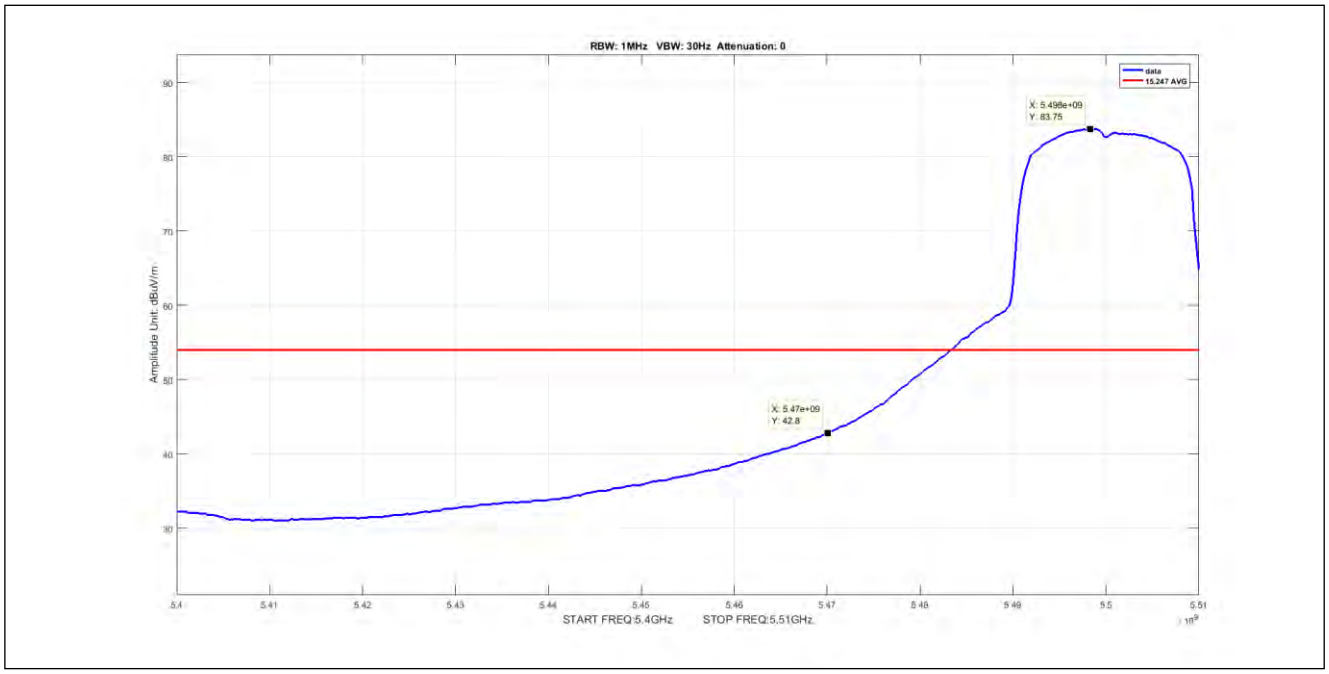
Plot 134. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5320M, A Mode ANT 1 (worst-case) V



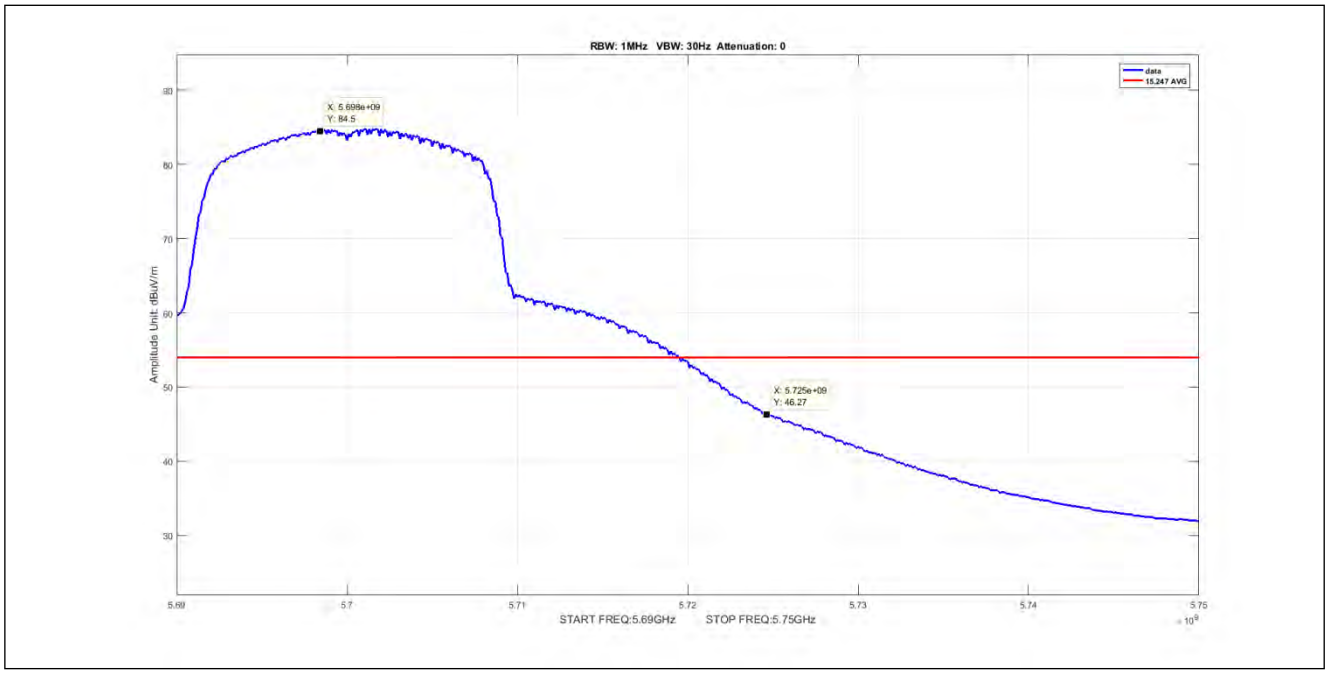
Plot 135. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5320M, N Mode ANT 1 (worst-case) V



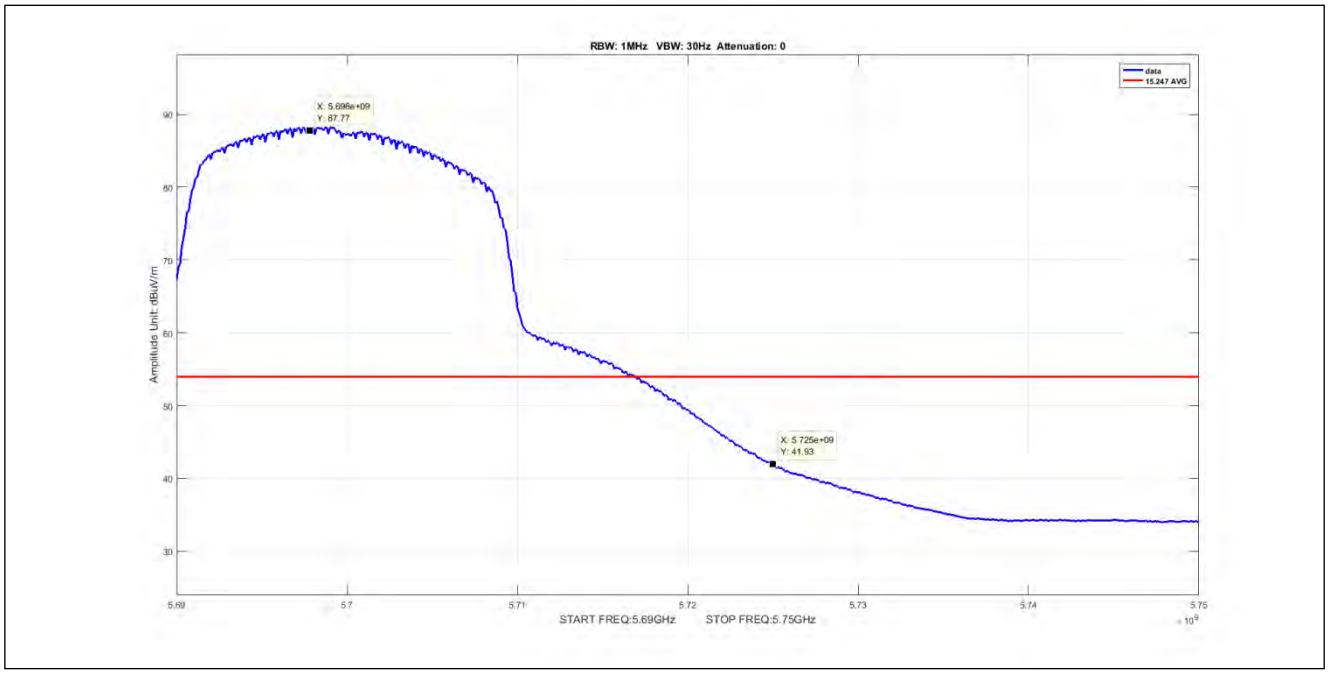
Plot 136. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5500M, A Mode ANT 1 (worst-case) V



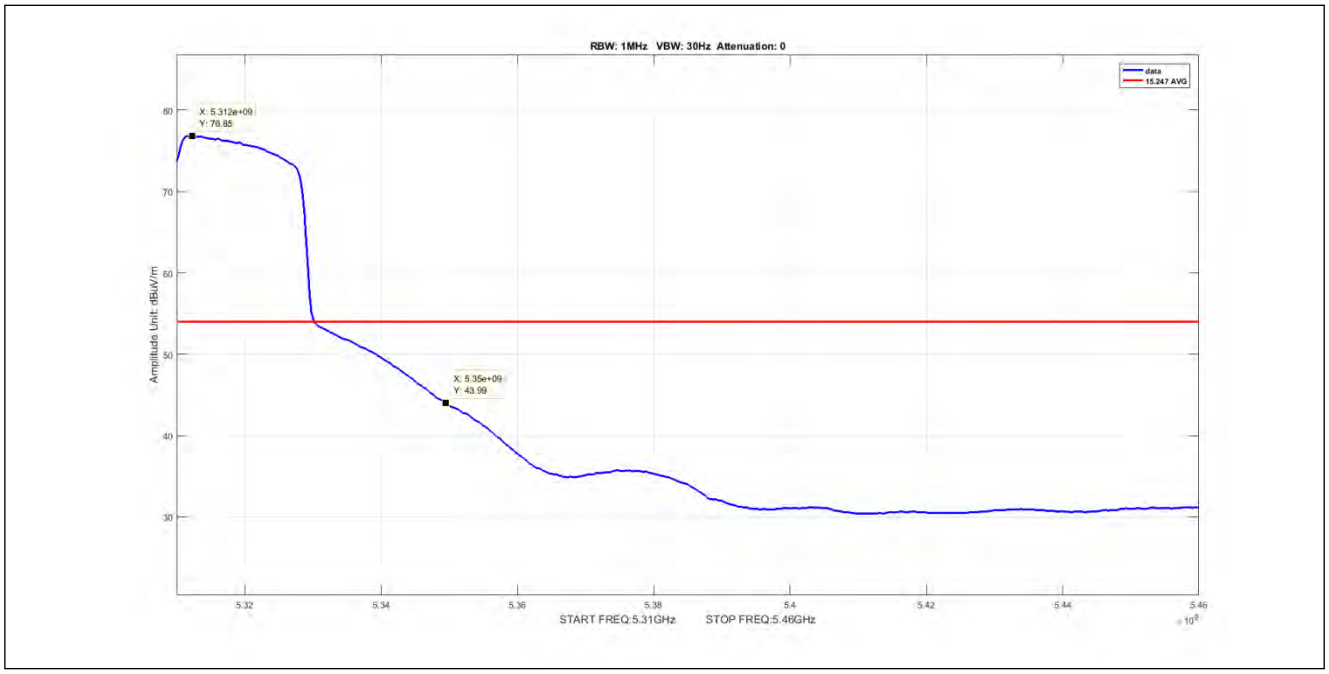
Plot 137. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5320M, N Mode ANT 1 (worst-case) V



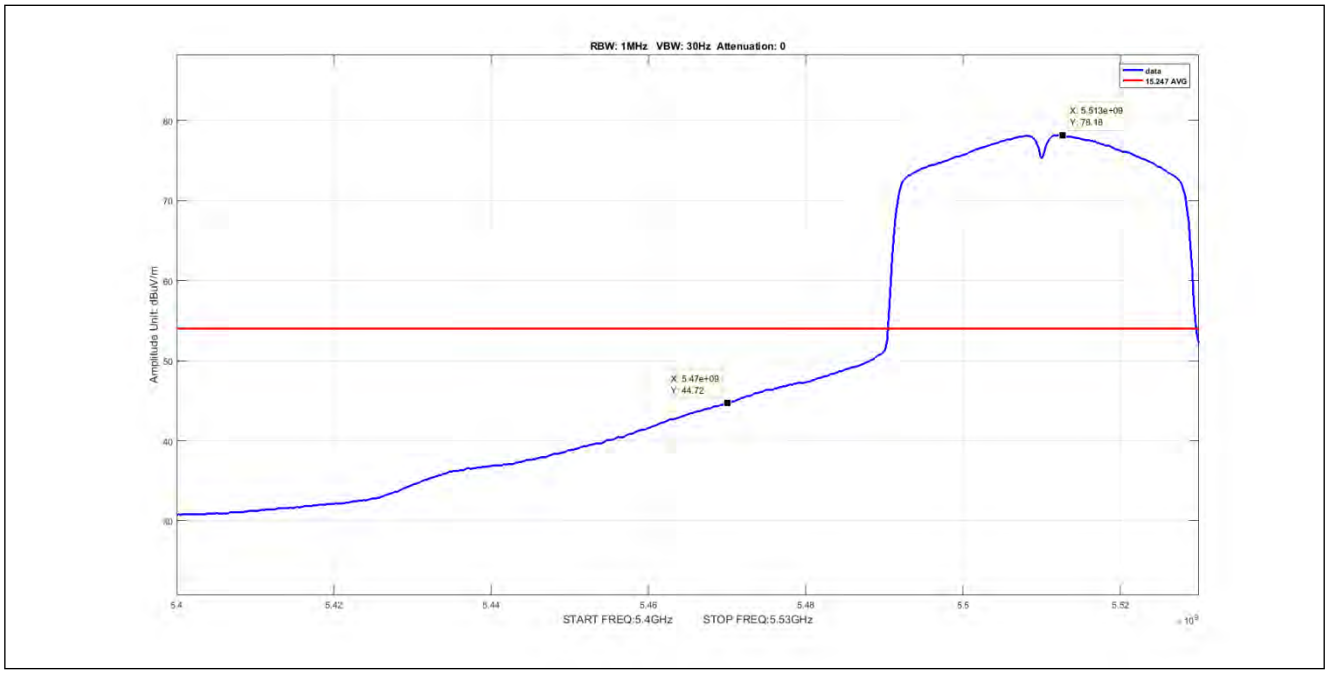
Plot 138. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5700M, A Mode ANT 1 (worst-case) V



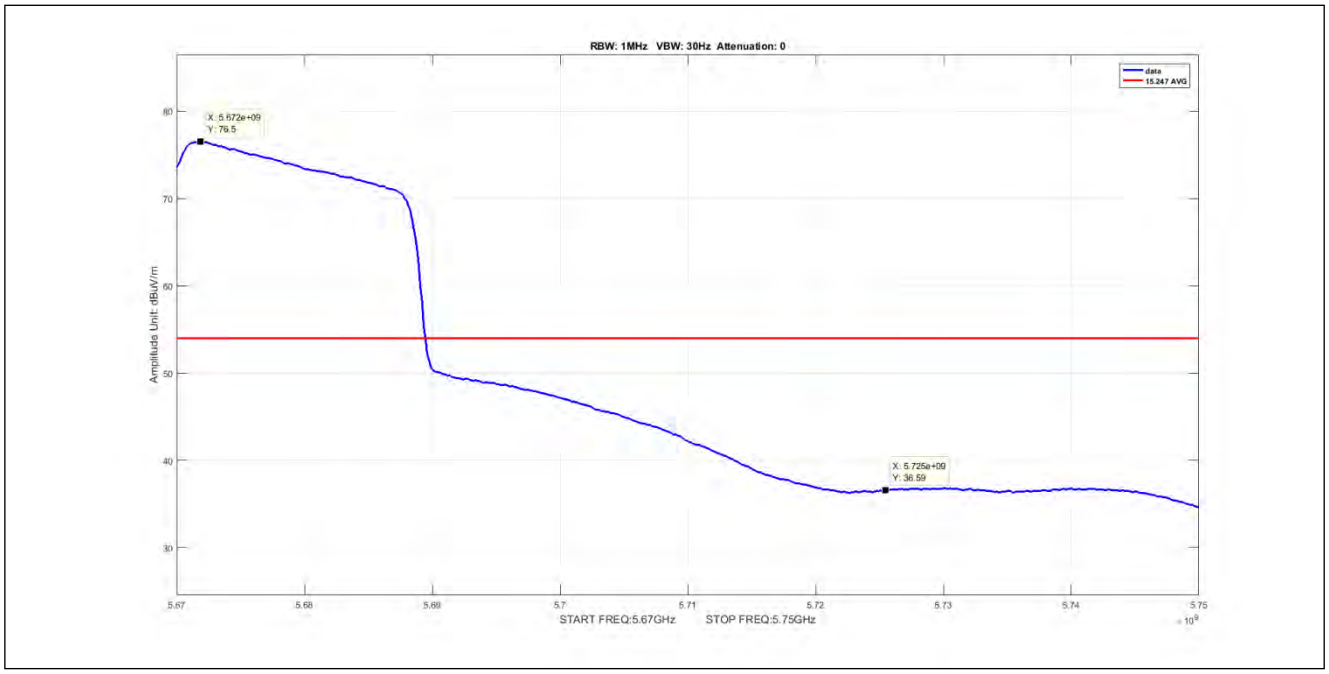
Plot 139. Undesirable Emissions, Average Band Edge Spurious, BW 20M, Ch 5700M, N Mode ANT 1 (worst-case) V



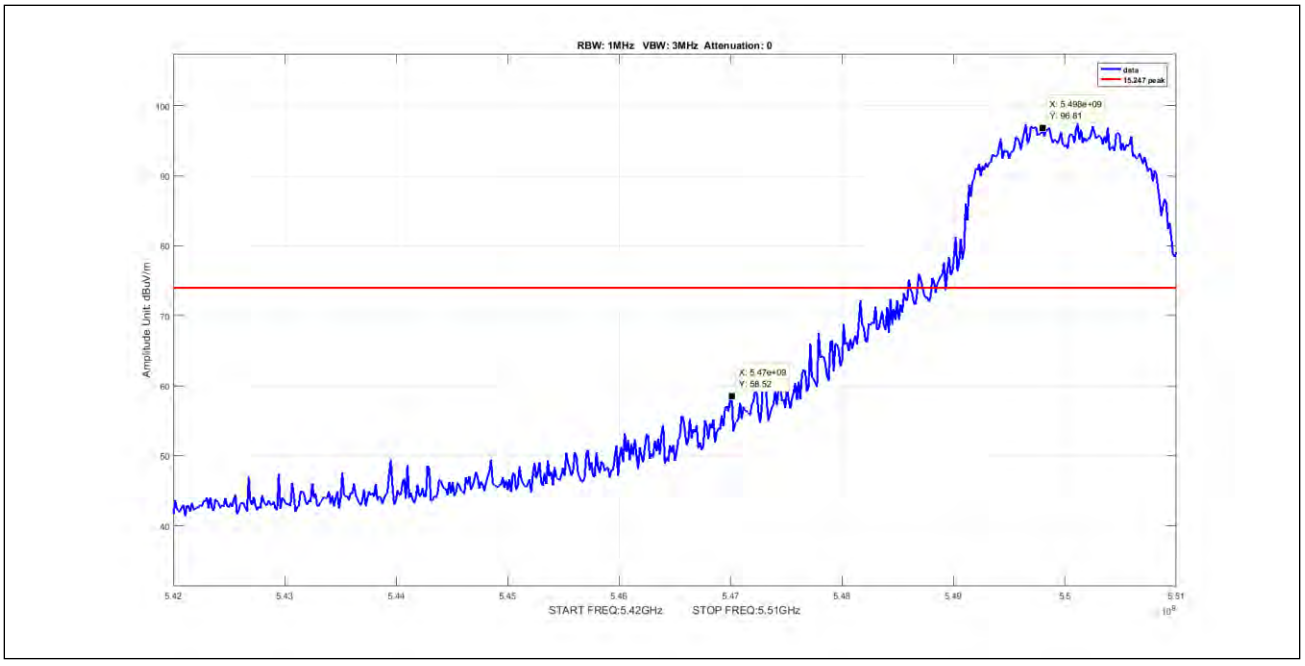
Plot 140. Undesirable Emissions, Average Band Edge Spurious, BW 40M, Ch 5310M, N Mode ANT 1 (worst-case) V



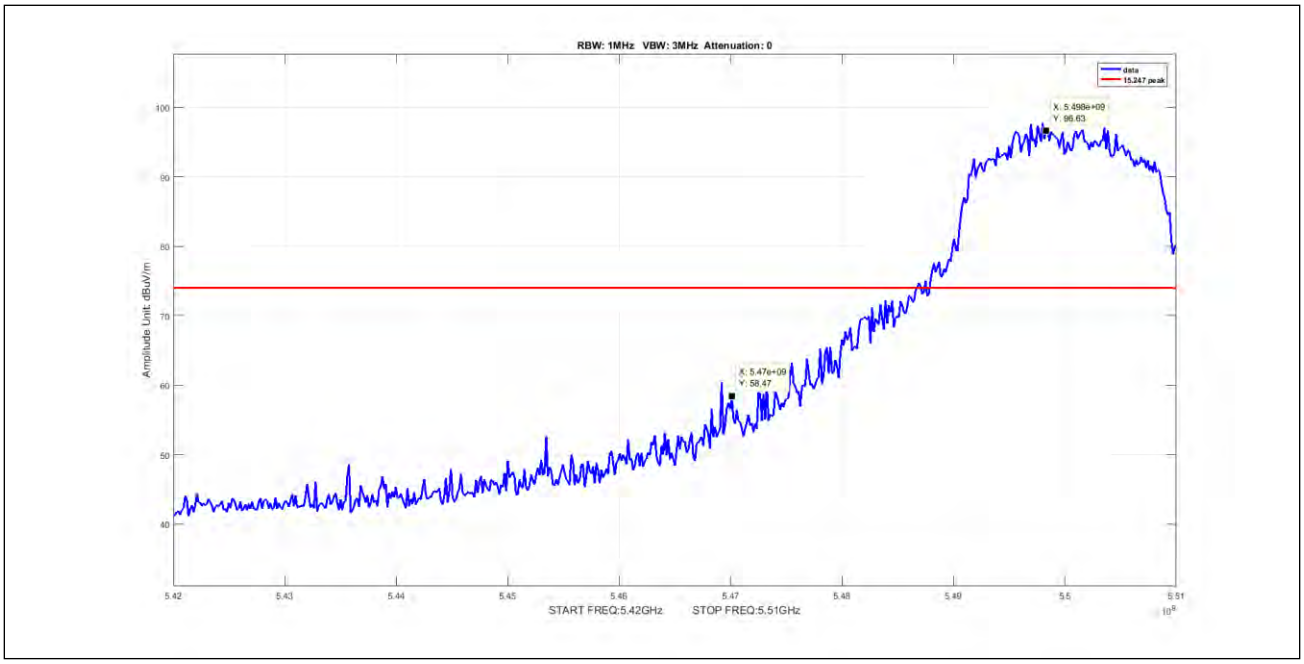
Plot 141. Undesirable Emissions, Average Band Edge Spurious, BW 40M, Ch 5510M, N Mode ANT 1 (worst-case) V



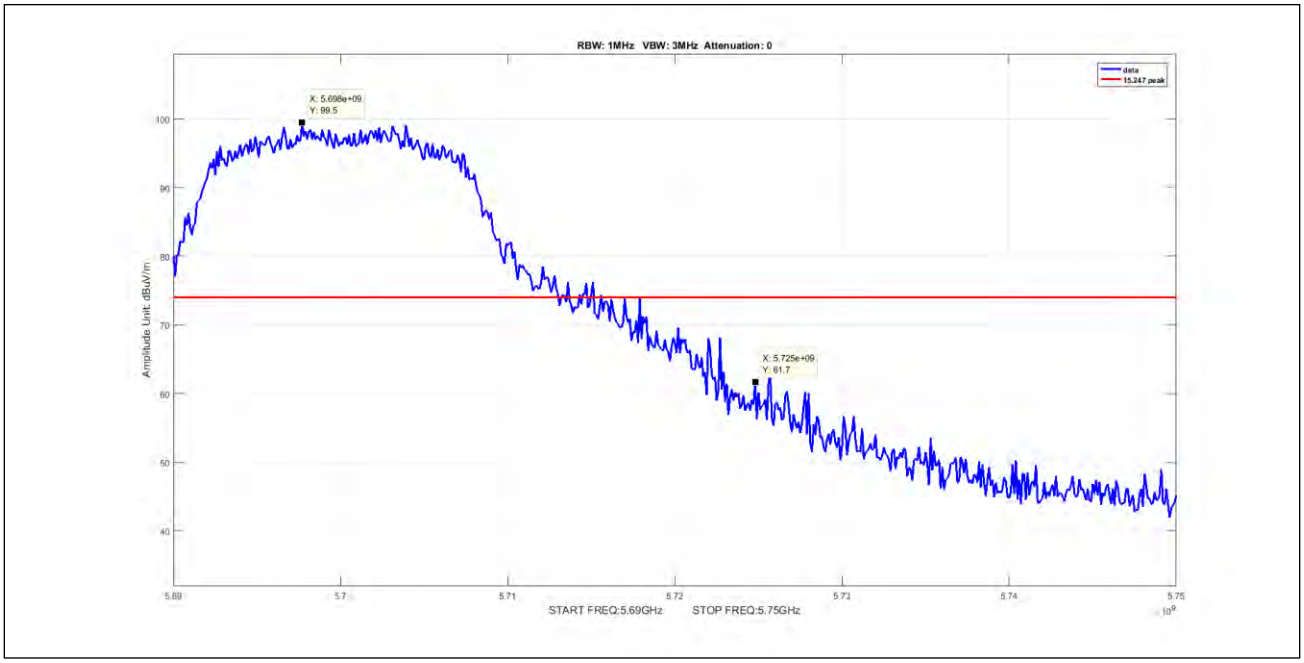
Plot 142. Undesirable Emissions, Average Band Edge Spurious, BW 40M, Ch 5670M, N Mode ANT 1 (worst-case) V



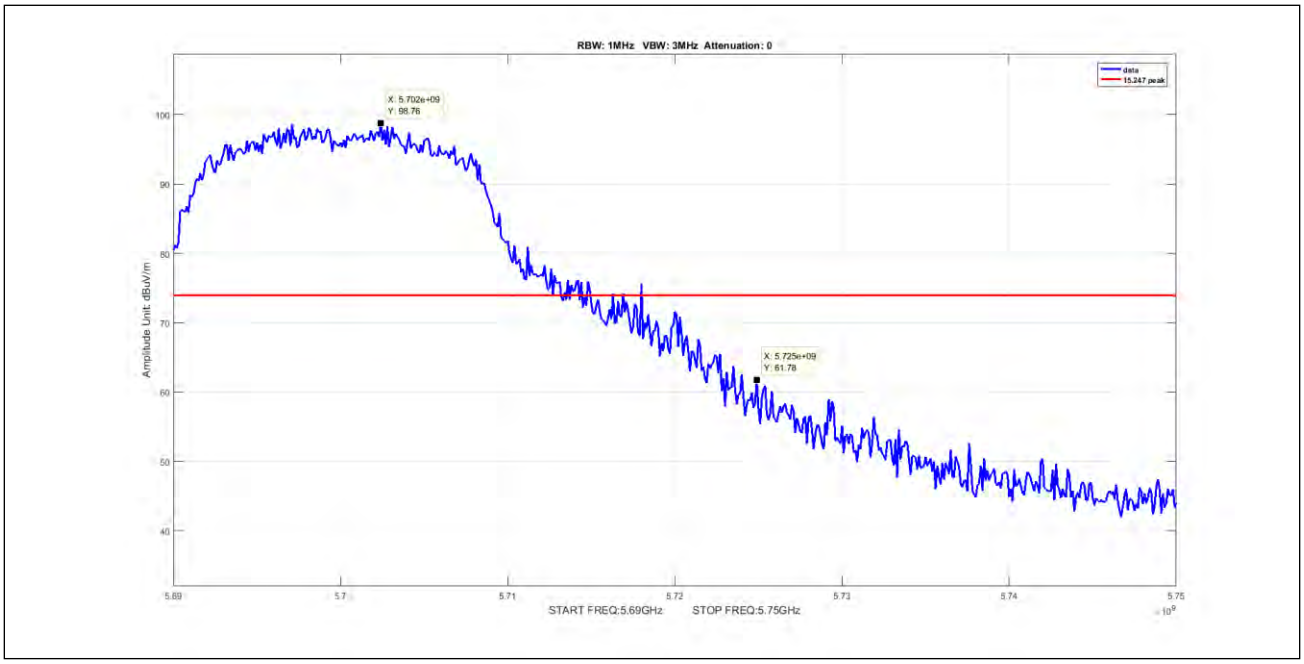
Plot 143. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5500M, A Mode ANT 0 (worst-case) V



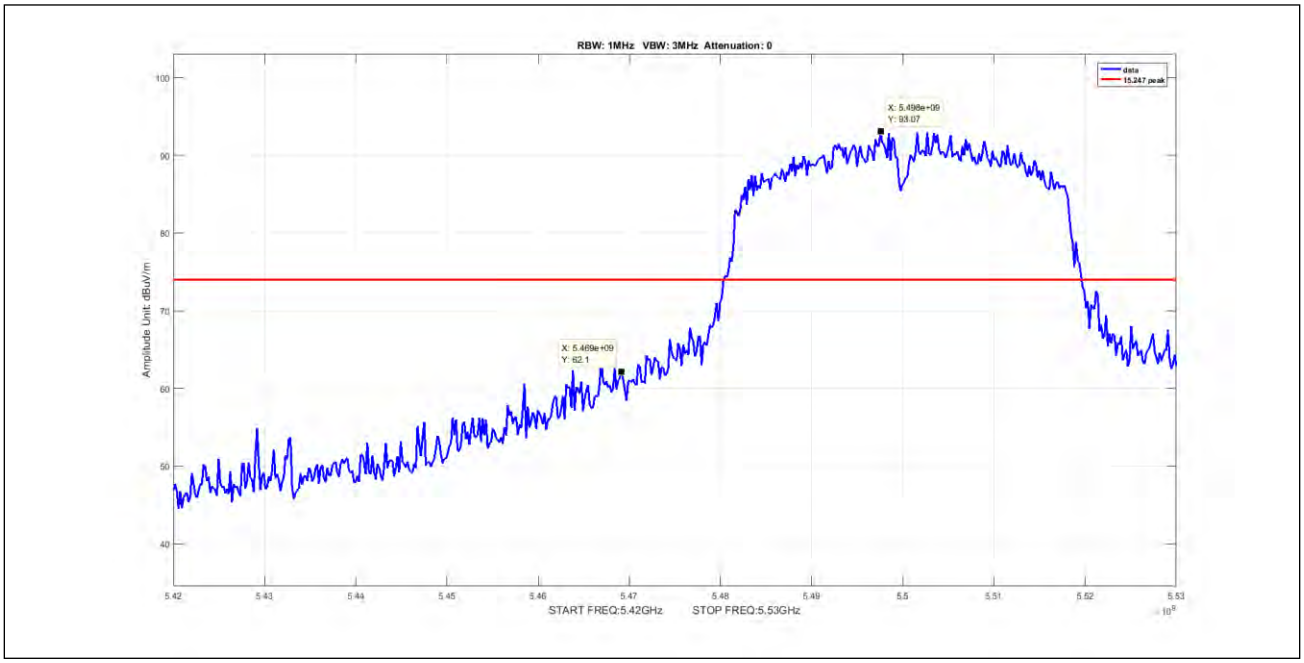
Plot 144. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5500M, N Mode ANT 0 (worst-case) V



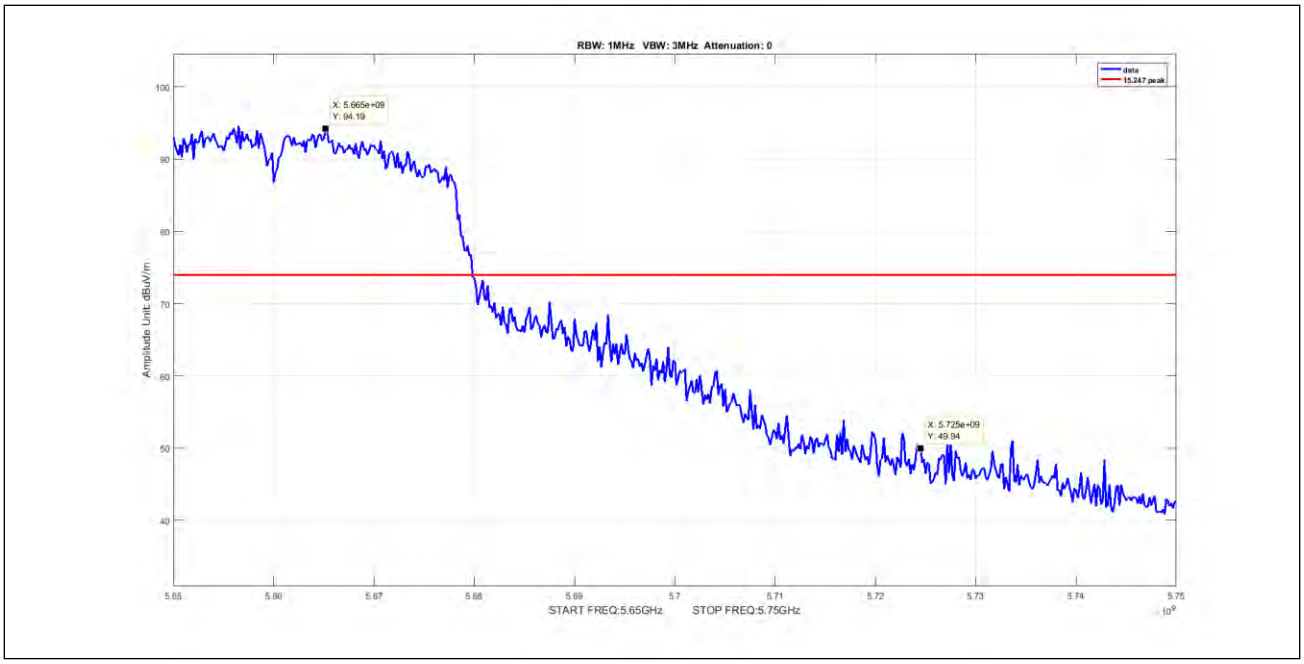
Plot 145. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5700M, A Mode ANT 0 (worst-case) V



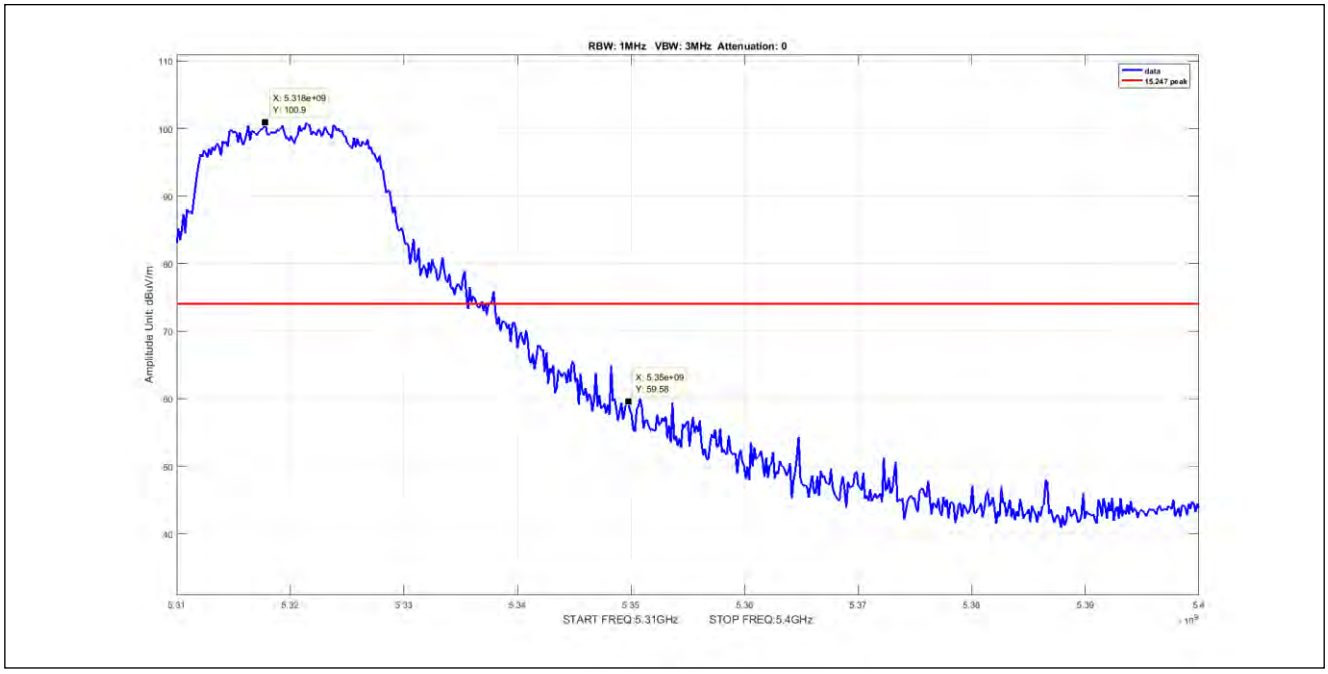
Plot 146. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5700M, N Mode ANT 0 (worst-case) V



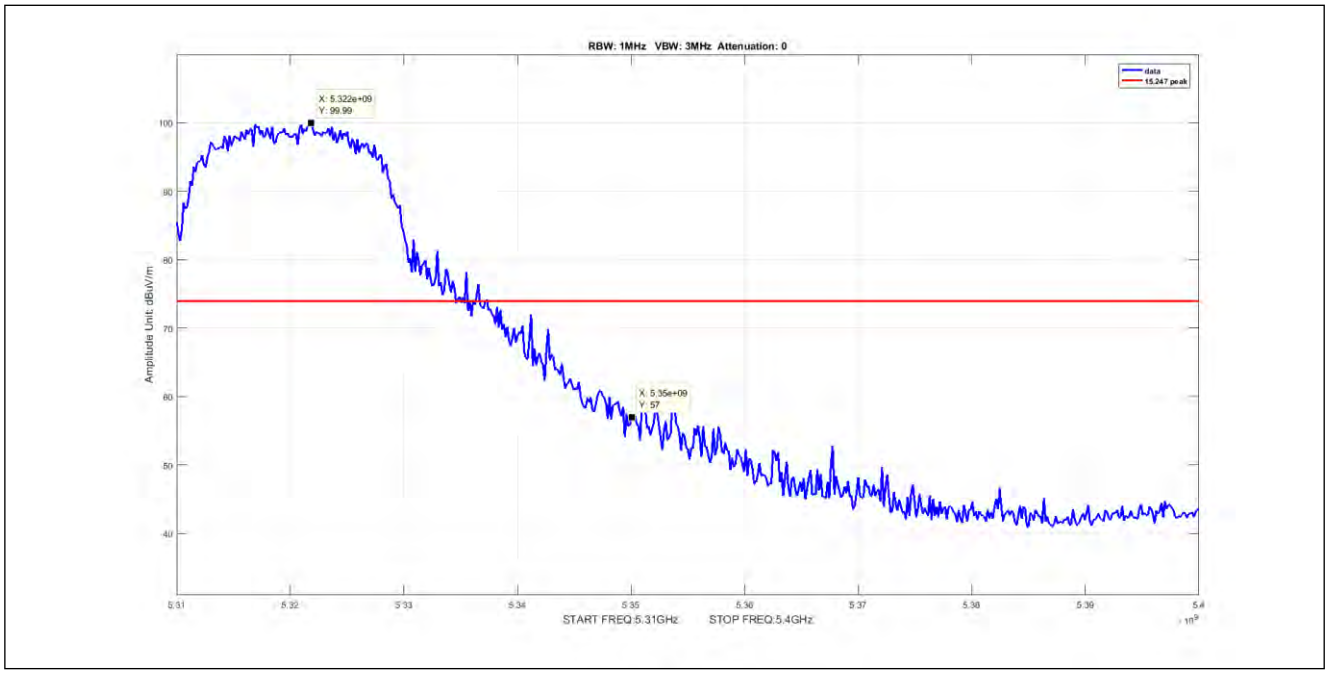
Plot 147. Undesirable Emissions, Peak Band Edge Spurious, BW 40M, Ch 5510M, N Mode ANT 0 (worst-case) V



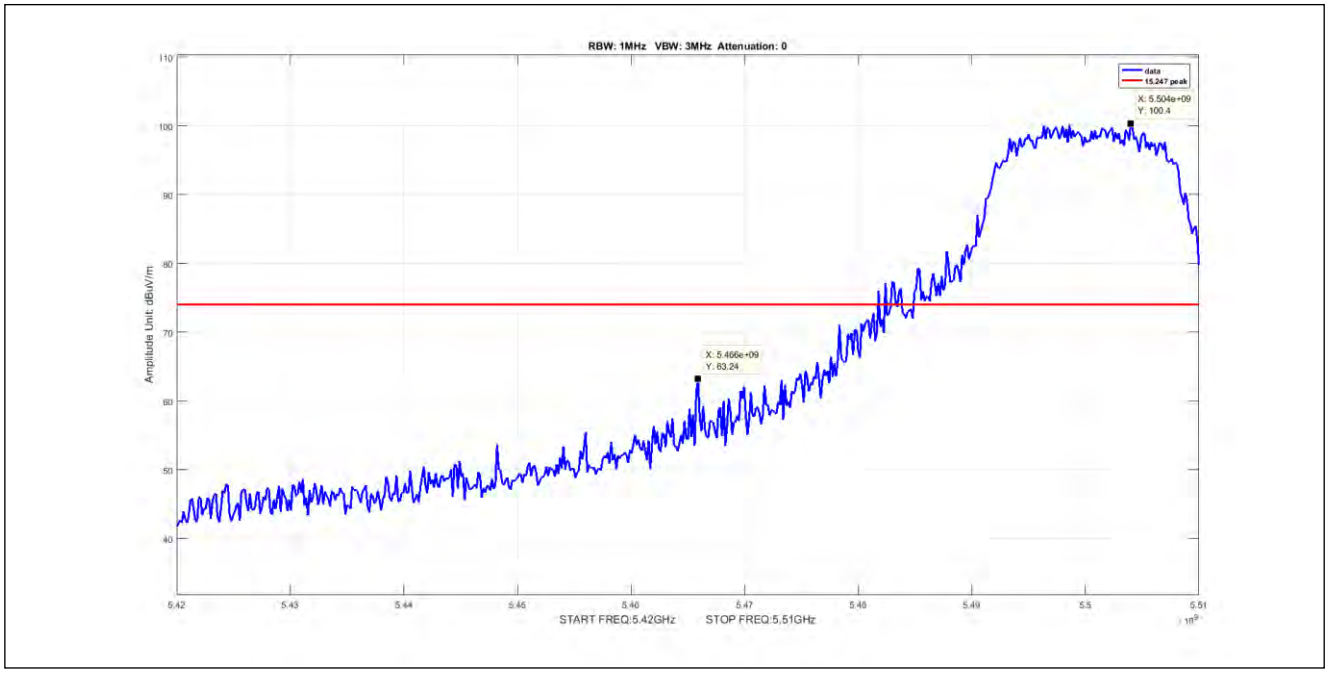
Plot 148. Undesirable Emissions, Peak Band Edge Spurious, BW 40M, Ch 5670M, N Mode ANT 0 (worst-case) V



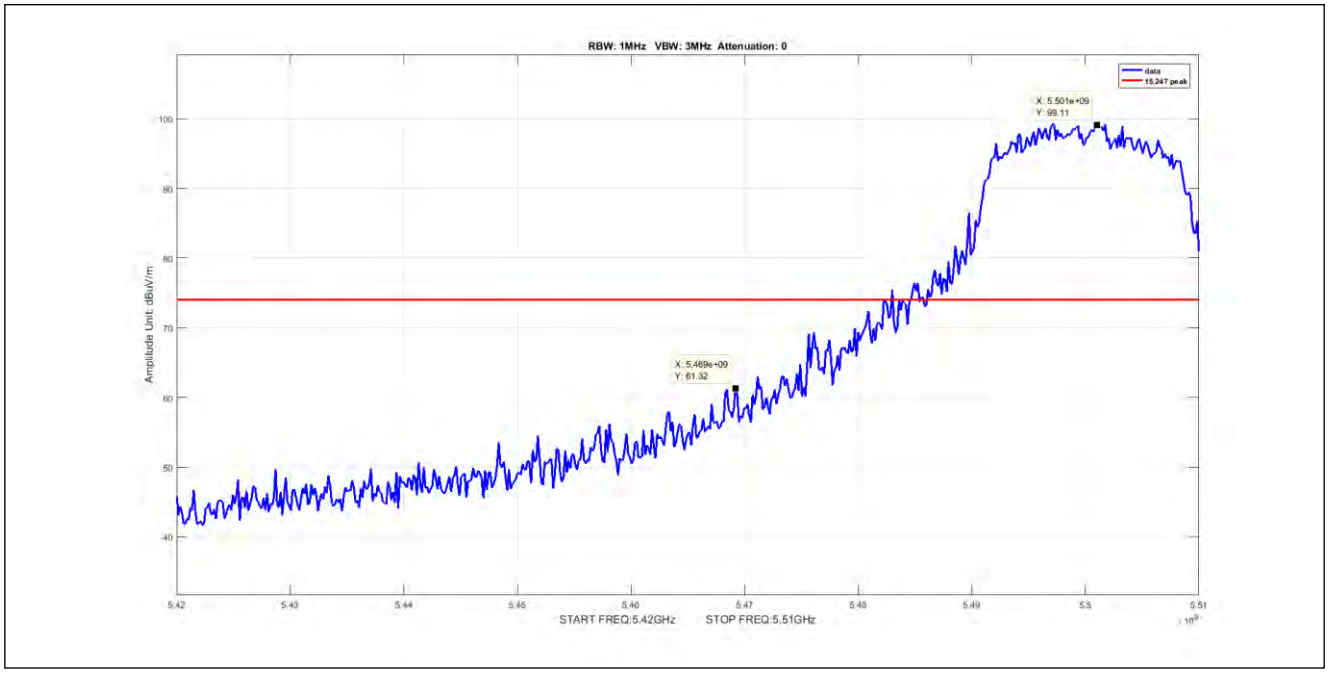
Plot 149. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5320M, A Mode ANT 1 (worst-case) V



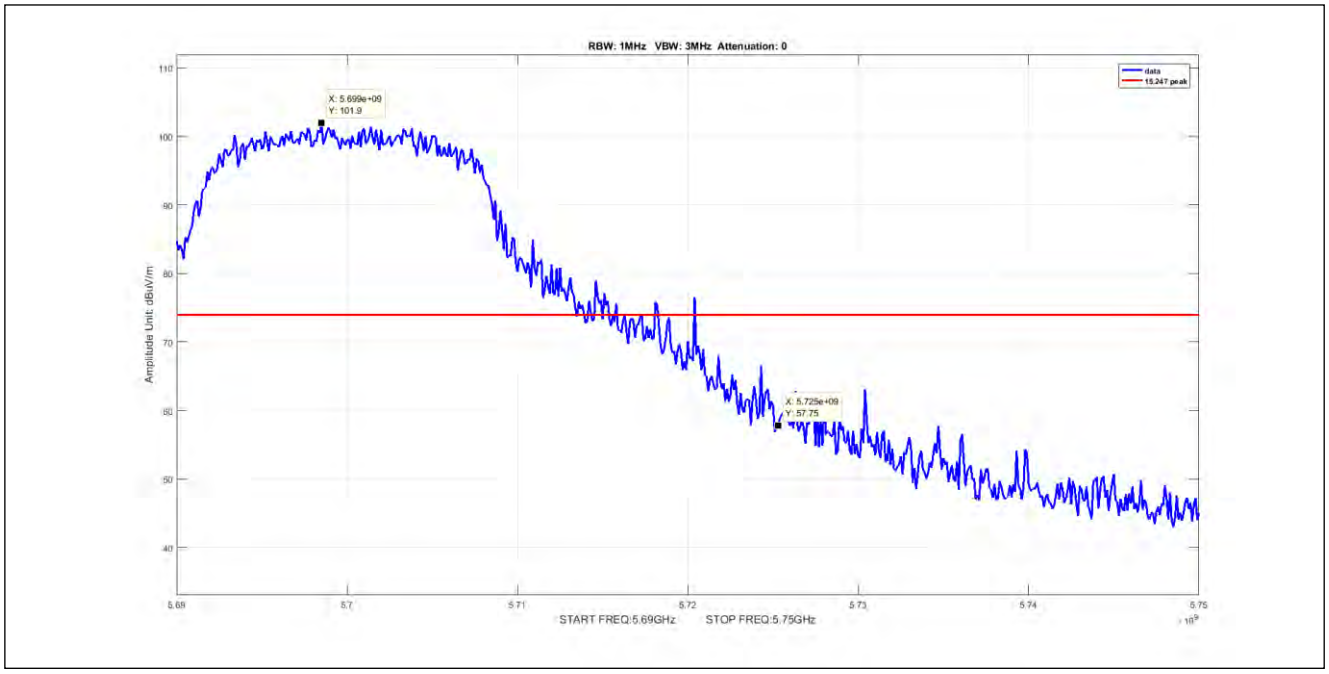
Plot 150. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5320M, N Mode ANT 1 (worst-case) V



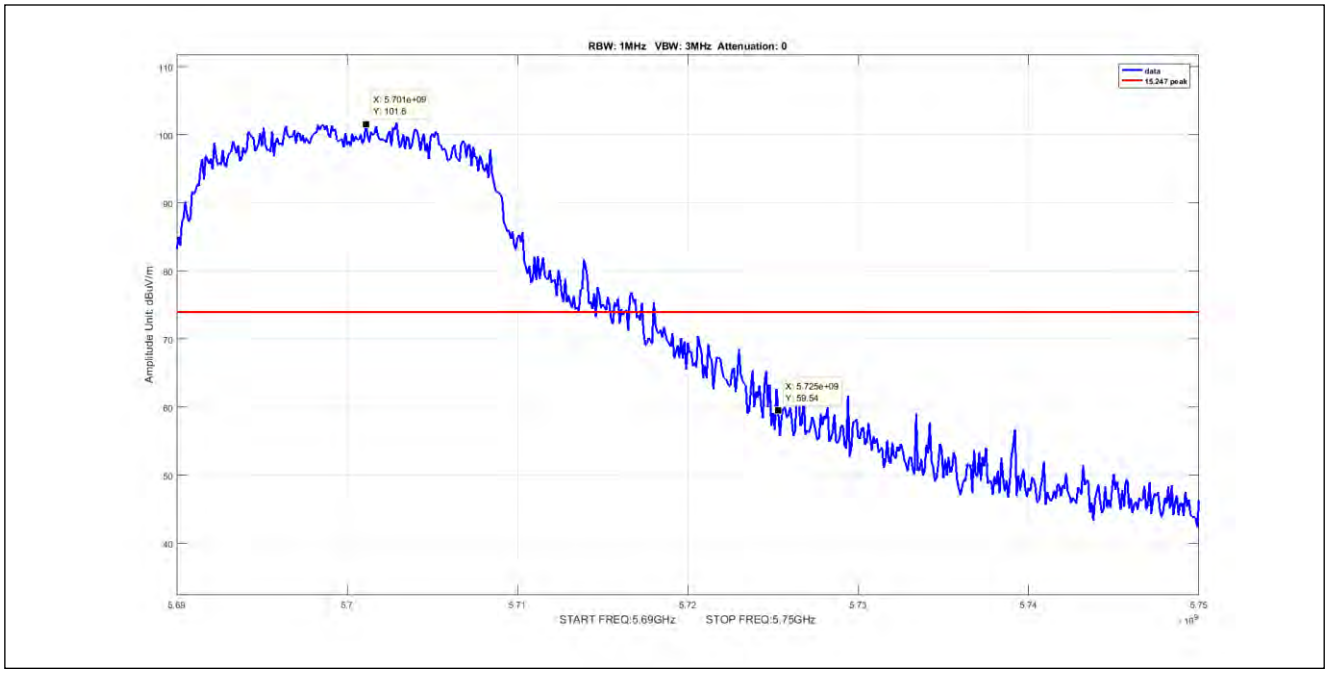
Plot 151. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5500M, A Mode ANT 1 (worst-case) V



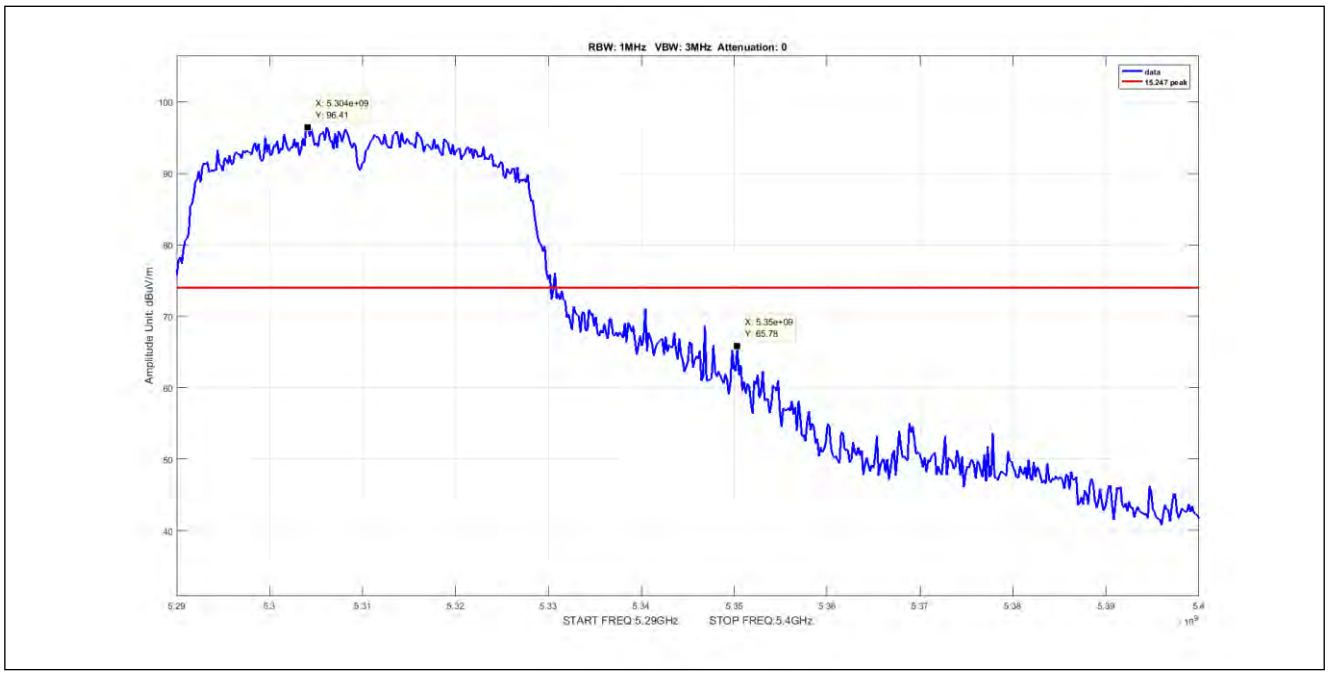
Plot 152. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5500M, N Mode ANT 1 (worst-case) V



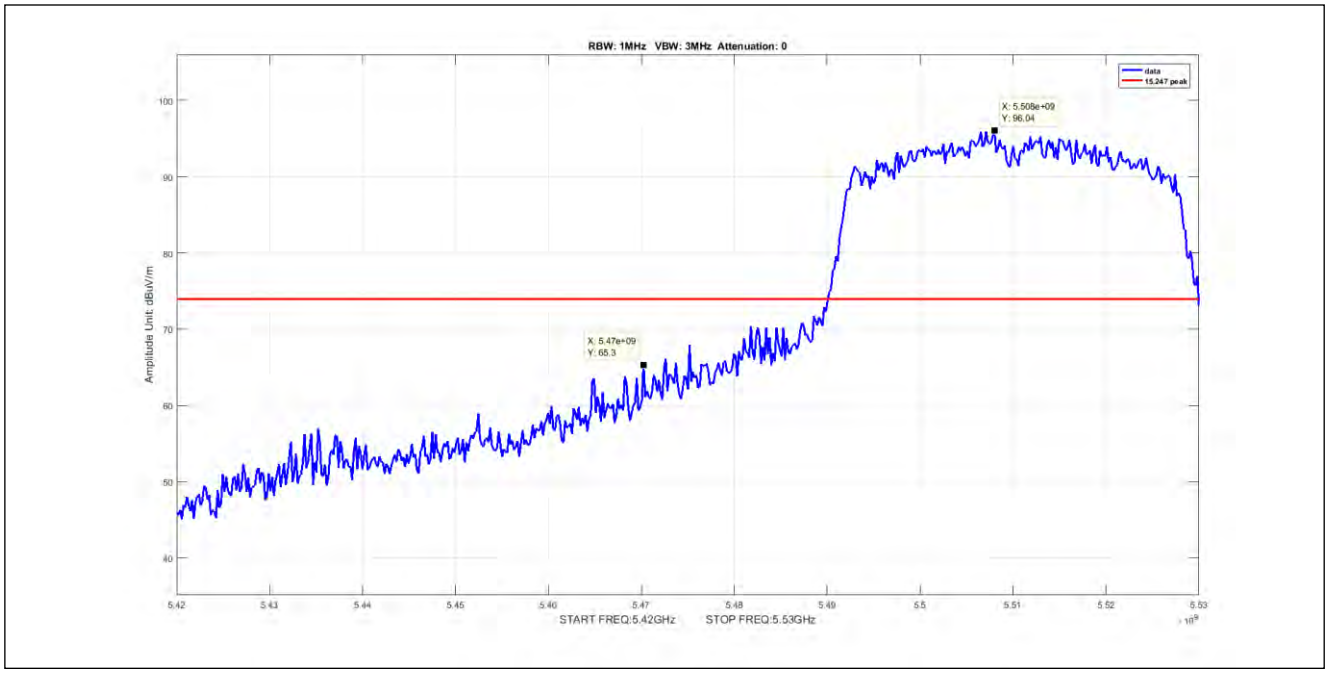
Plot 153. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5700M, A Mode ANT 1 (worst-case) V



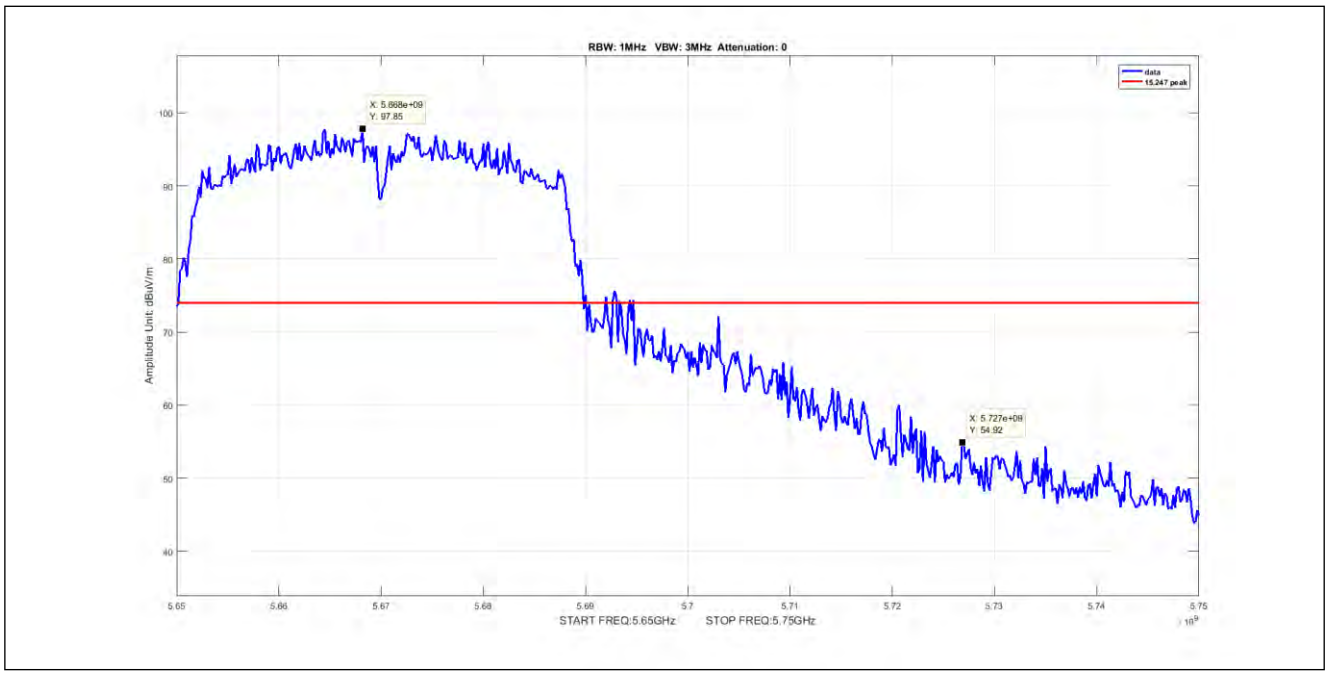
Plot 154. Undesirable Emissions, Peak Band Edge Spurious, BW 20M, Ch 5700M, N Mode ANT 1 (worst-case) V



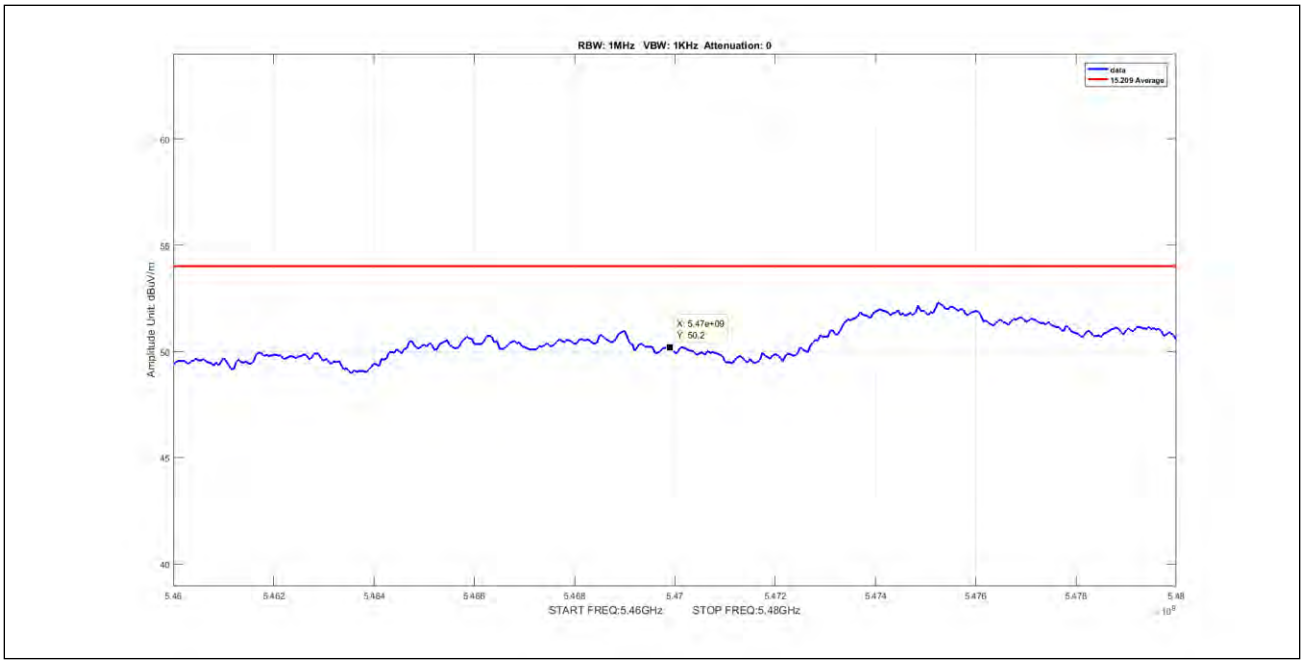
Plot 155. Undesirable Emissions, Peak Band Edge Spurious, BW 40M, Ch 5310M, N Mode ANT 1 (worst-case) V



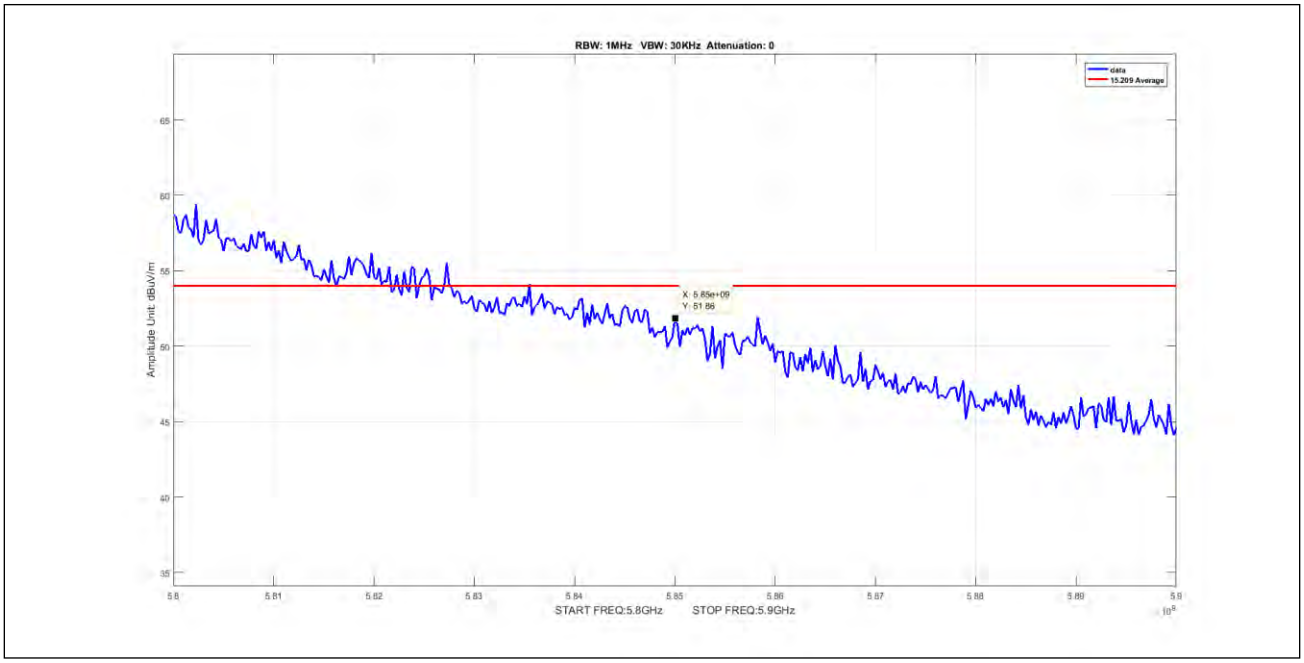
Plot 156. Undesirable Emissions, Peak Band Edge Spurious, BW 40M, Ch 5510M, N Mode ANT 1 (worst-case) V



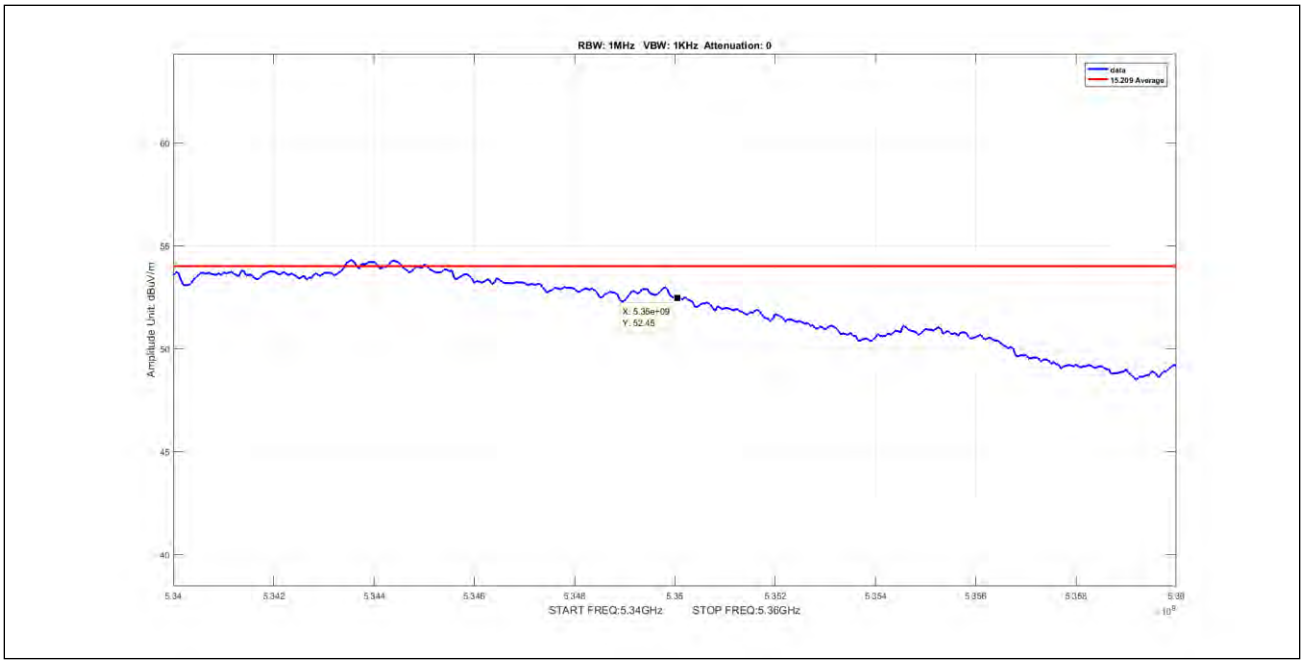
Plot 157. Undesirable Emissions, Peak Band Edge Spurious, BW 40M, Ch 5670M, N Mode ANT 1 (worst-case) V



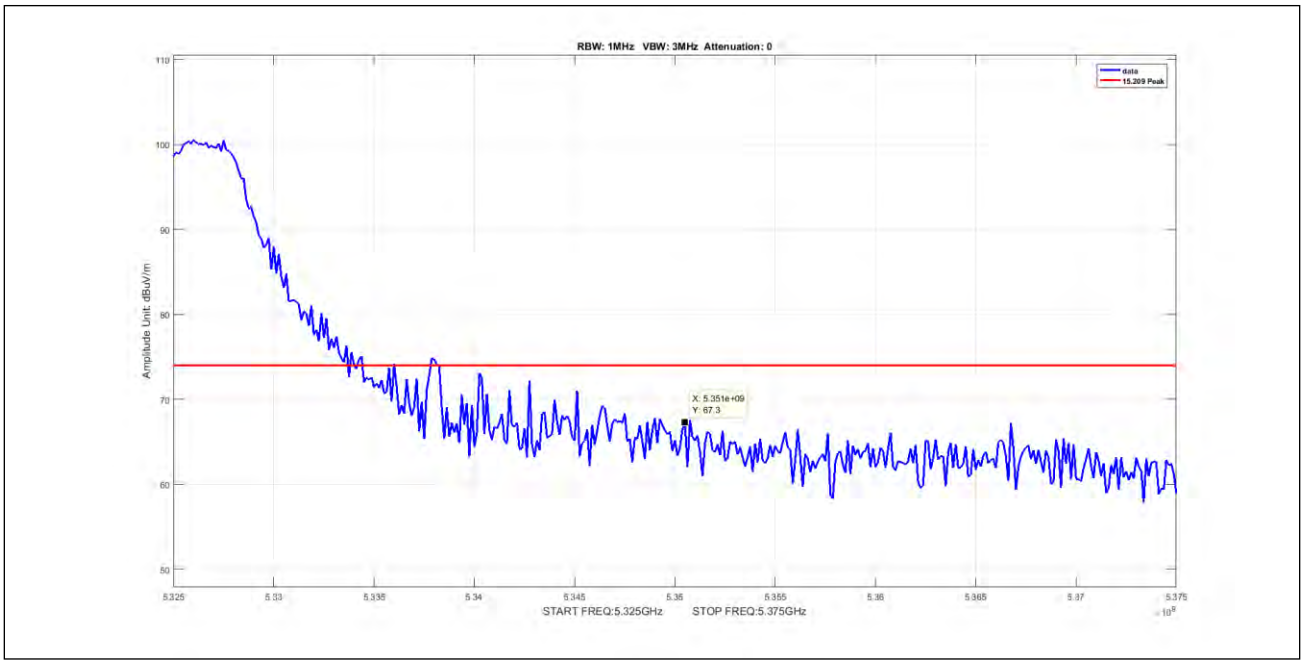
Plot 158. Undesirable Emissions, Peak Band Edge Spurious, BW 80M, Ch 5530M, AC Mode ANT 1 (worst-case) V



Plot 159. Undesirable Emissions, Peak Band Edge Spurious, BW 80M, Ch 5690M, AC Mode ANT 1 (worst-case) V

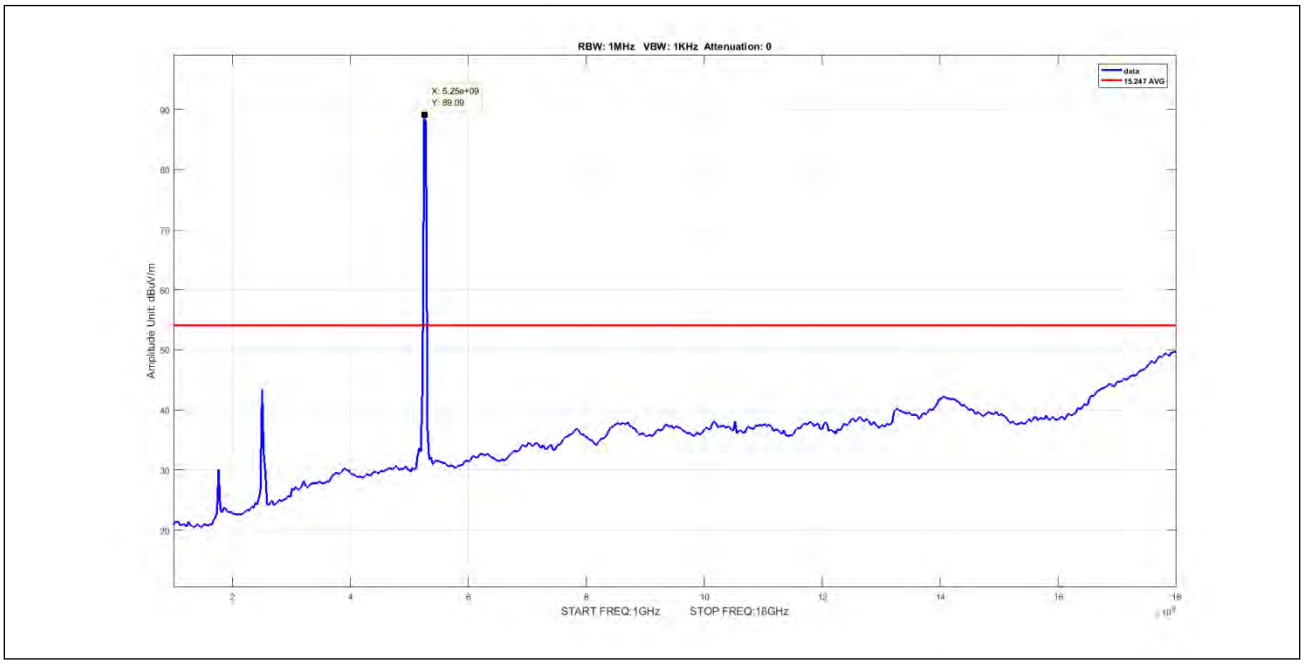


Plot 160. Undesirable Emissions, Peak Band Edge Spurious, BW 80M, Ch 5290M, AC Mode ANT 1 (worst-case) V

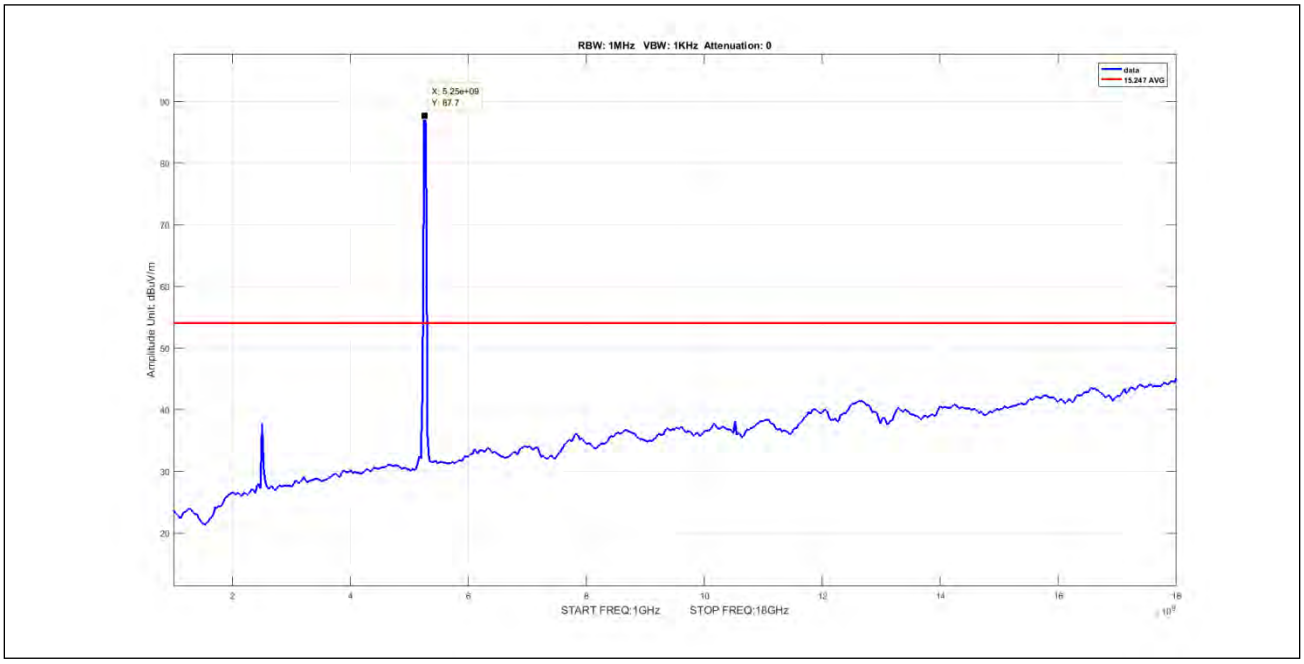


Plot 161. Undesirable Emissions, Peak Band Edge Spurious, BW 80M, Ch 5290M, AC Mode ANT 1 (worst-case) V

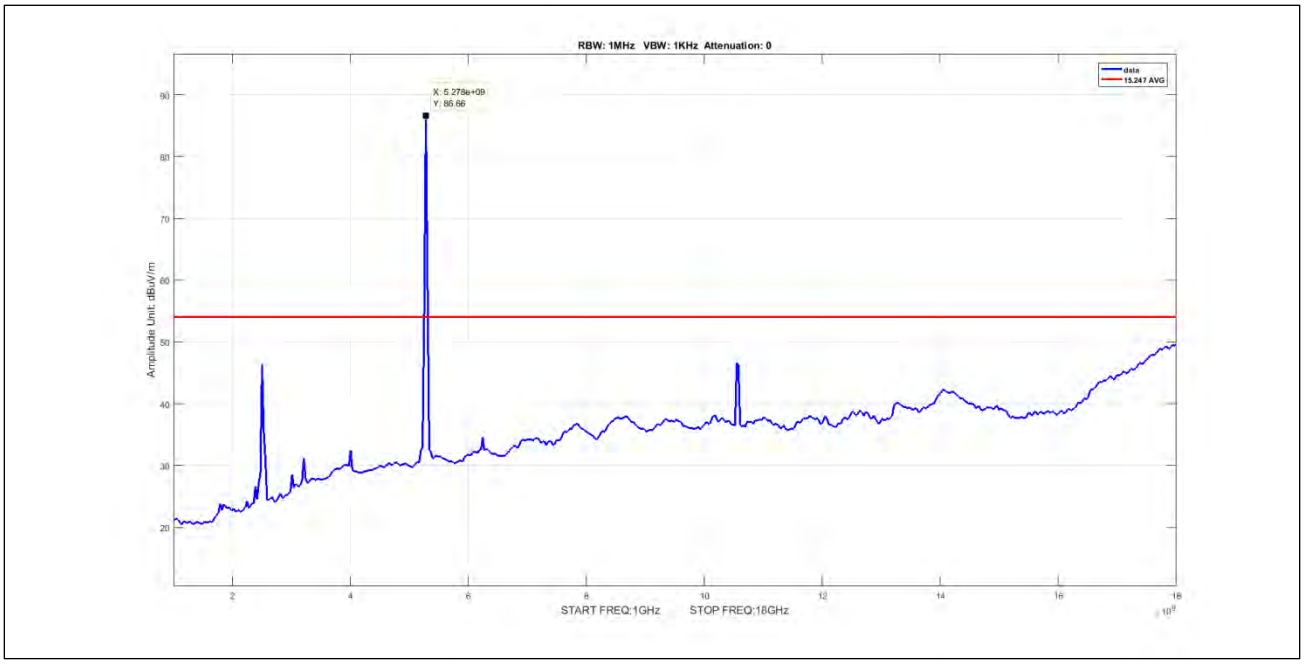
Spurious Emissions



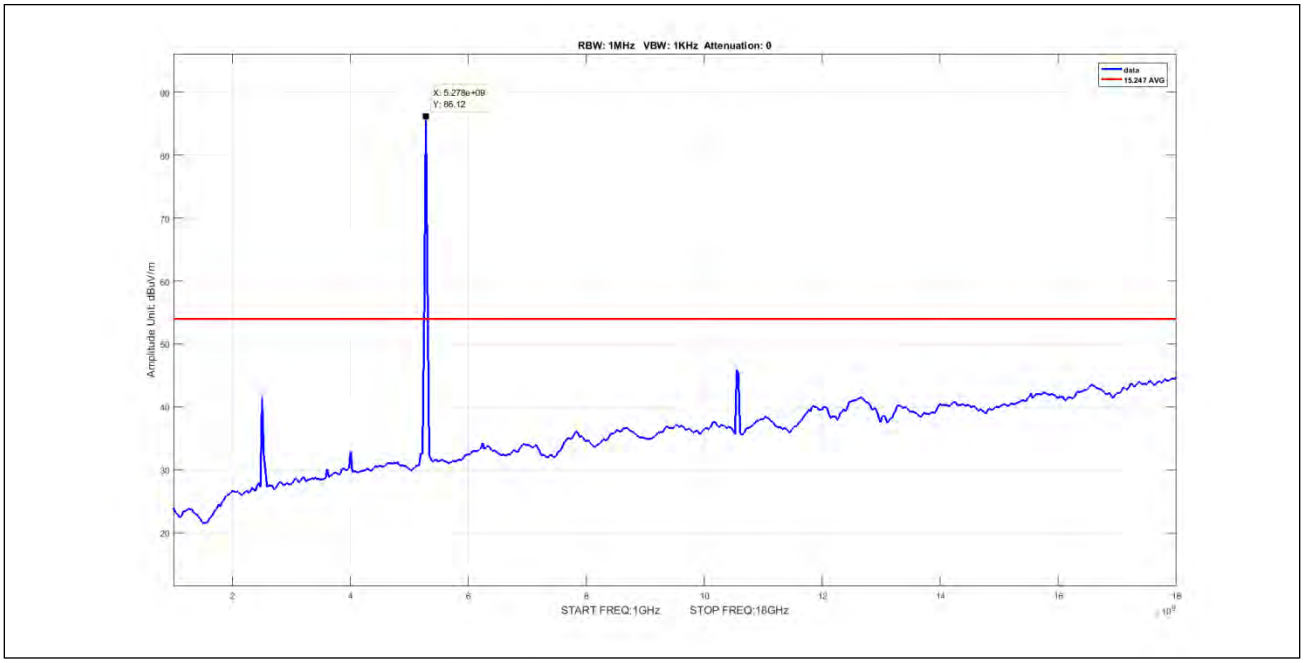
Plot 162. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5260M, A Mode ANT 0 (worst-case) V



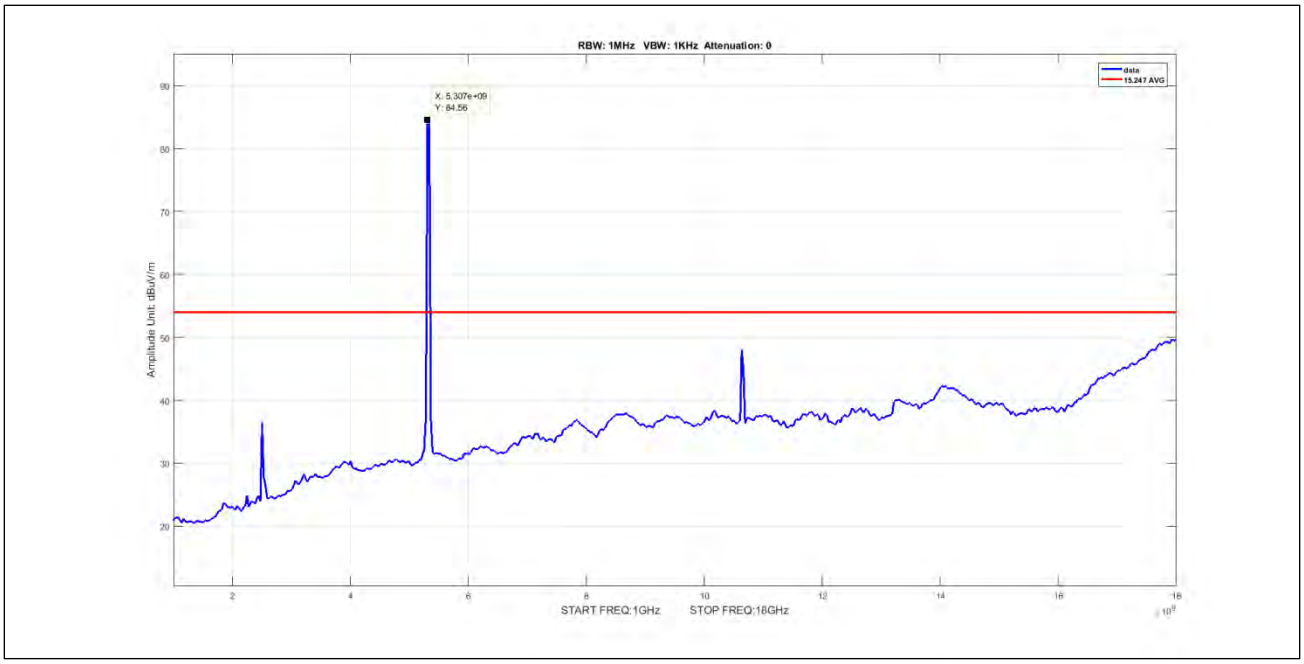
Plot 163. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5260M, N Mode ANT 0 (worst-case) V



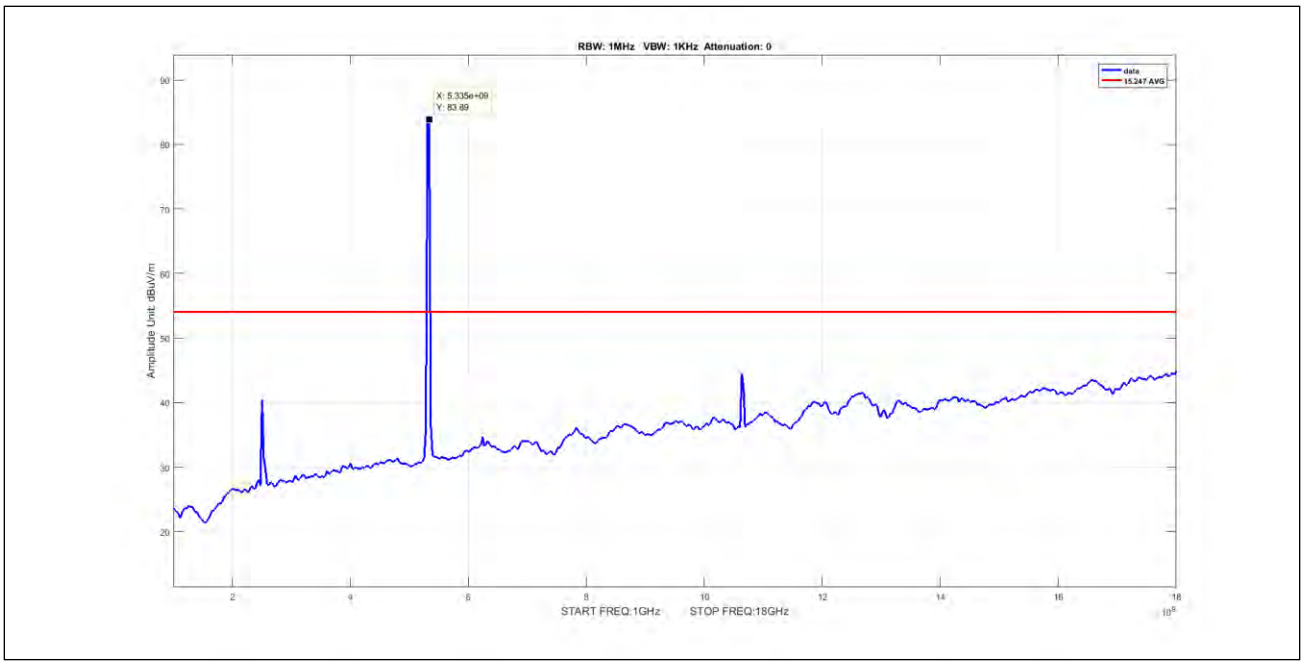
Plot 164. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5280M, A Mode ANT 0 (worst-case) V



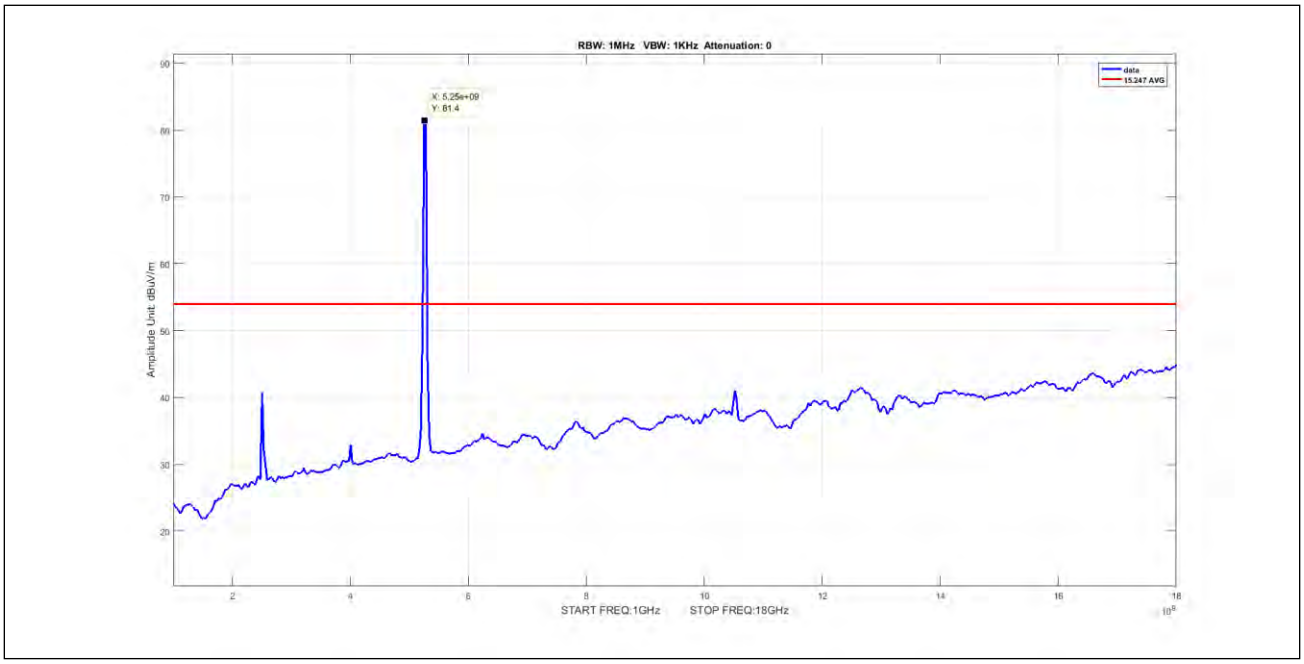
Plot 165. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5280M, N Mode ANT 0 (worst-case) V



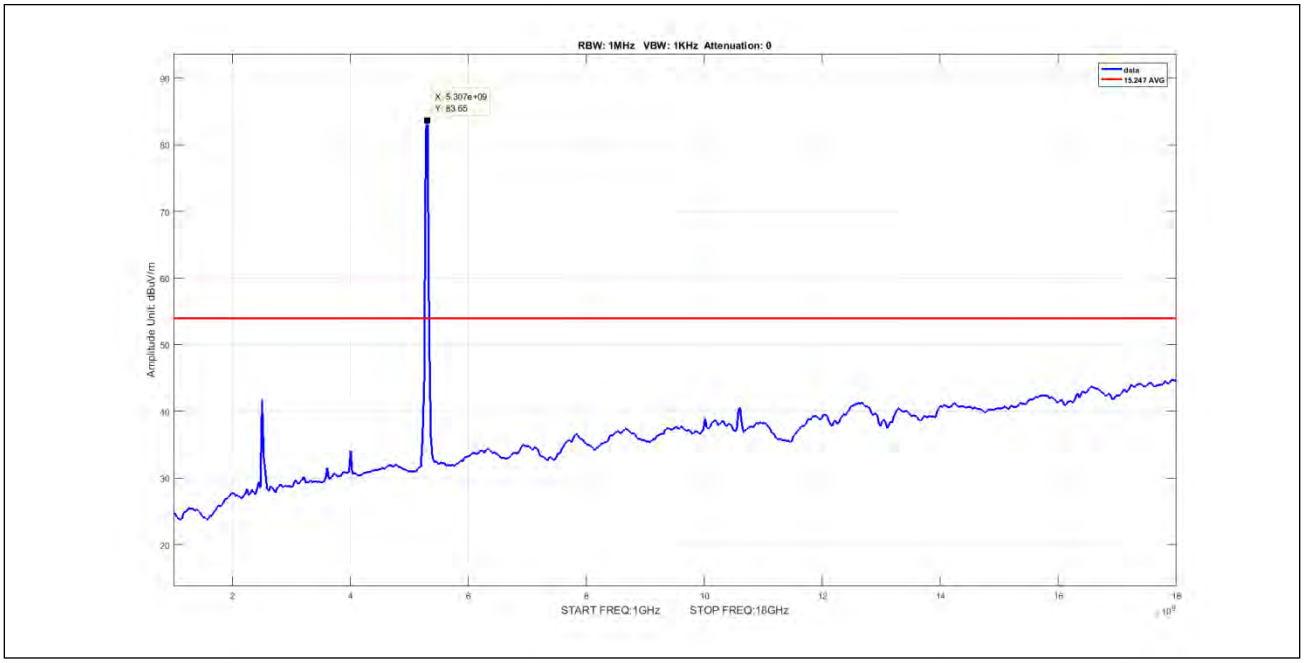
Plot 166. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5320M, A Mode ANT 0 (worst-case) V



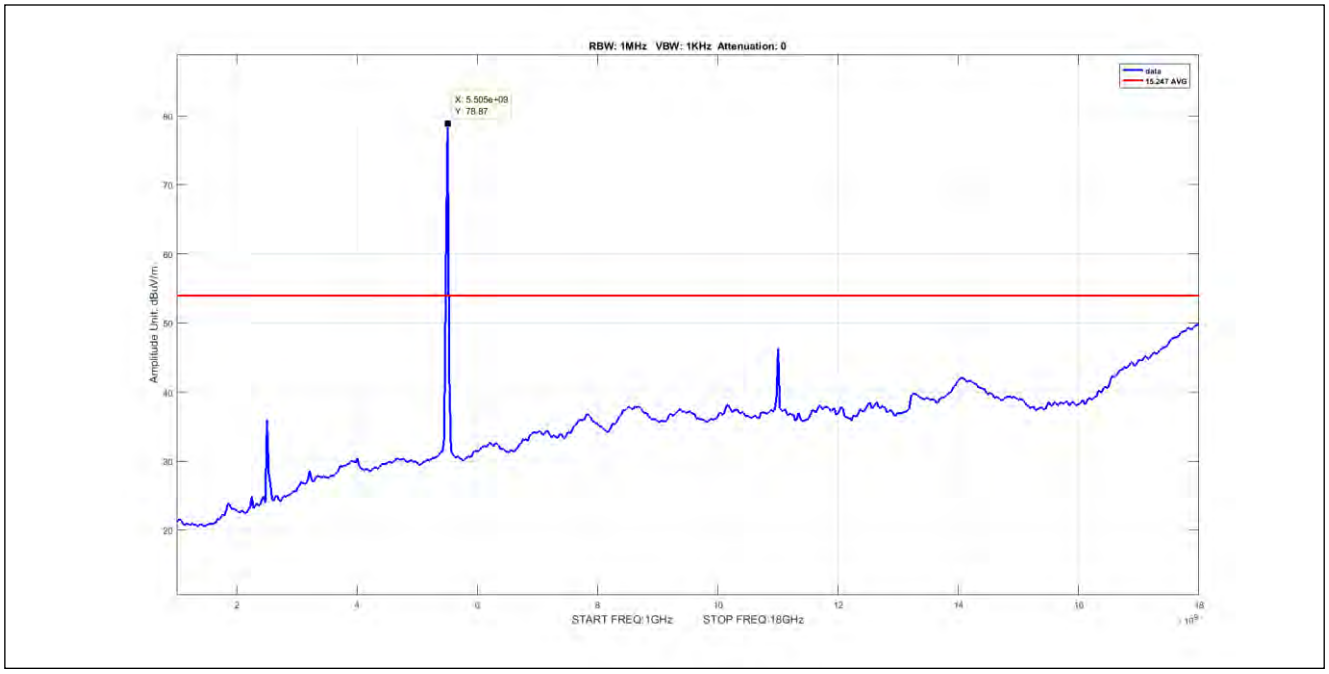
Plot 167.Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5320M, N Mode ANT 0 (worst-case) V



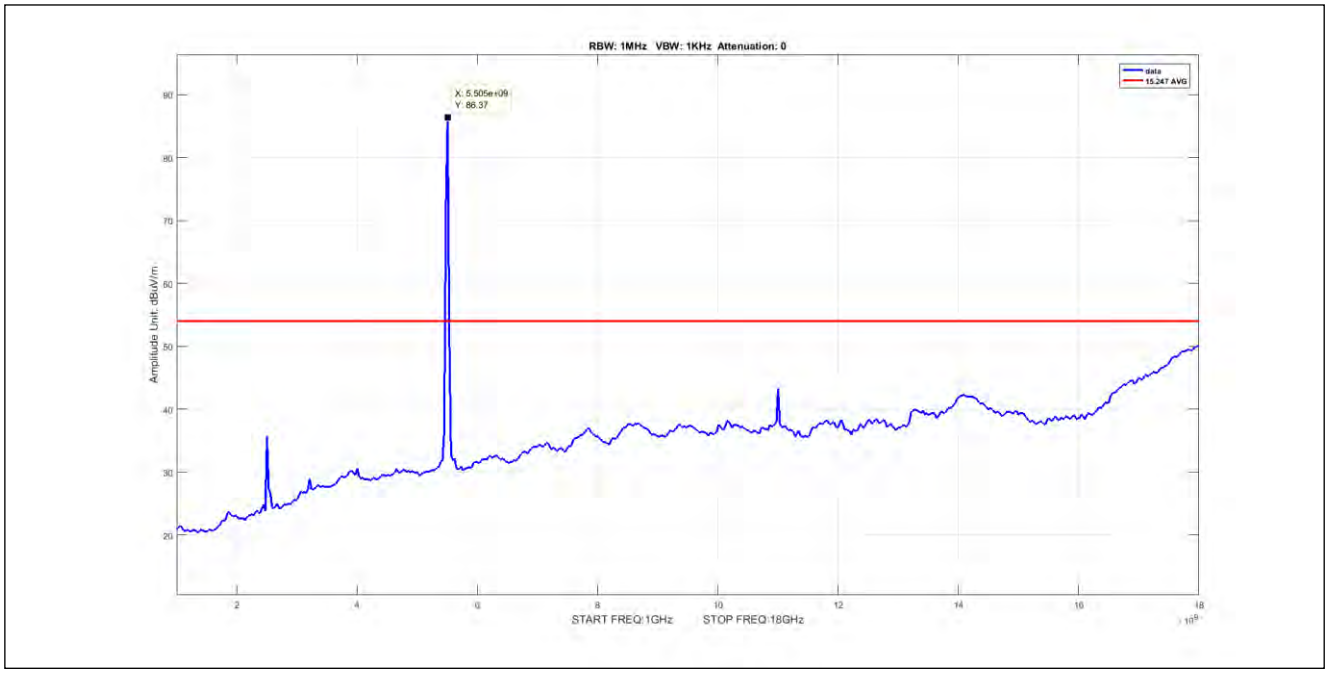
Plot 168. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5270M, N Mode ANT 0 (worst-case) V



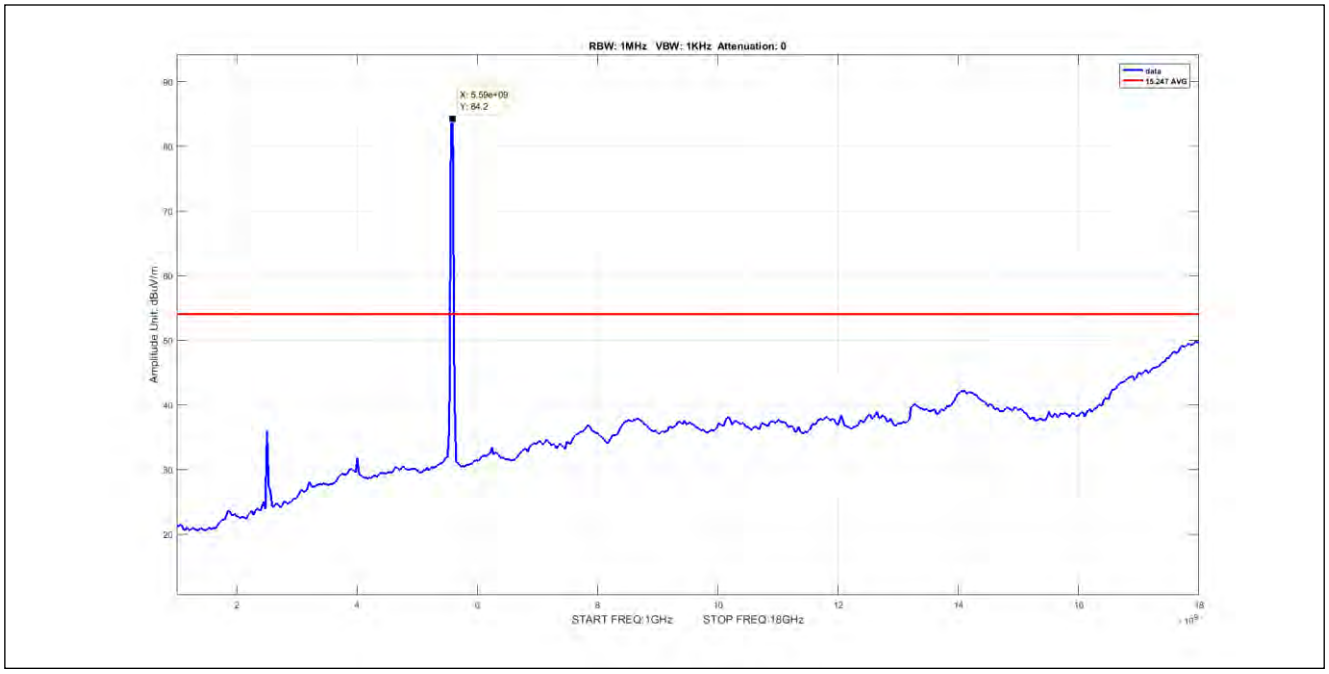
Plot 169. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5310M, N Mode ANT 0 (worst-case) V



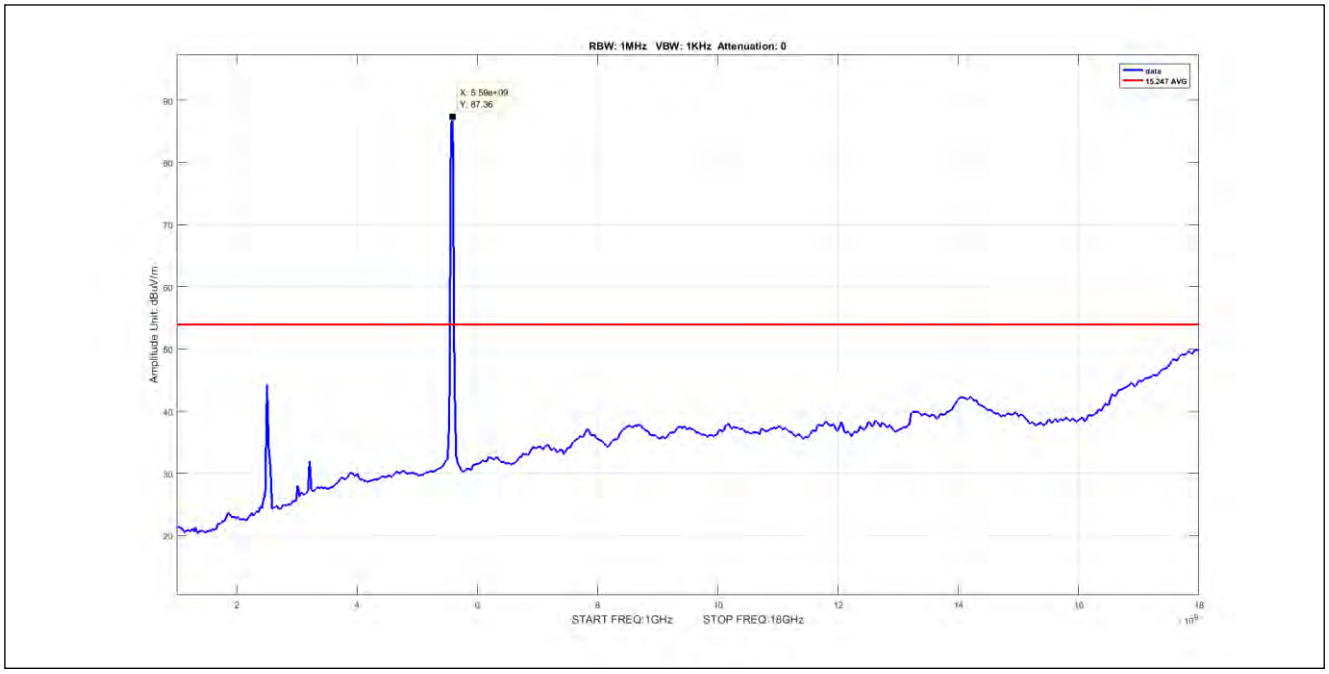
Plot 170. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5500M, A Mode ANT 0 (worst-case) V



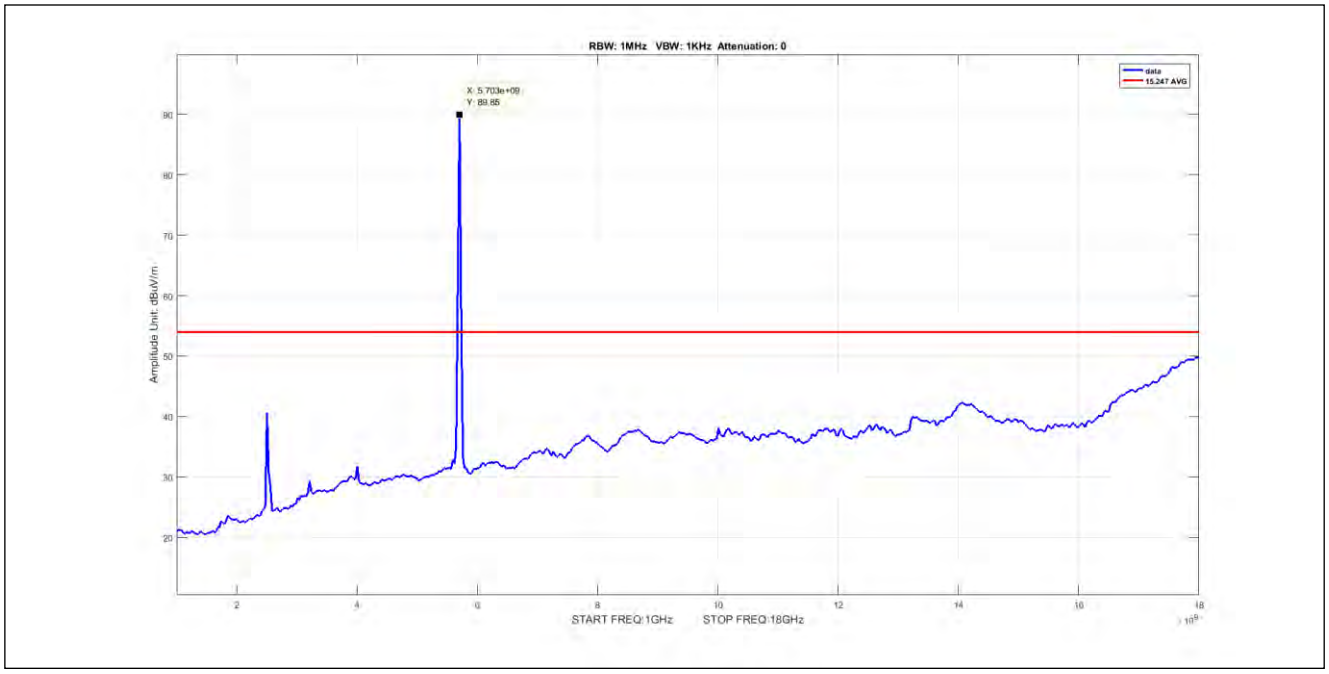
Plot 171. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5500M, N Mode ANT 0 (worst-case) V



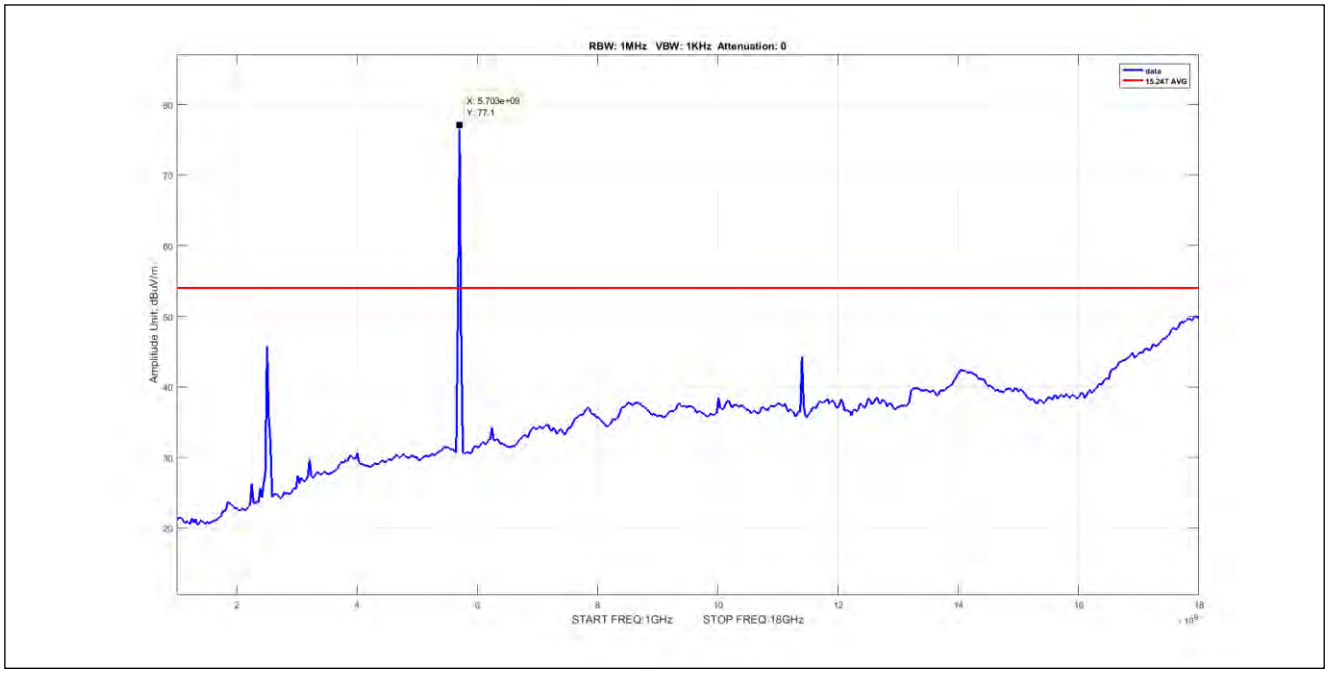
Plot 172. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5580M, A Mode ANT 0 (worst-case) V



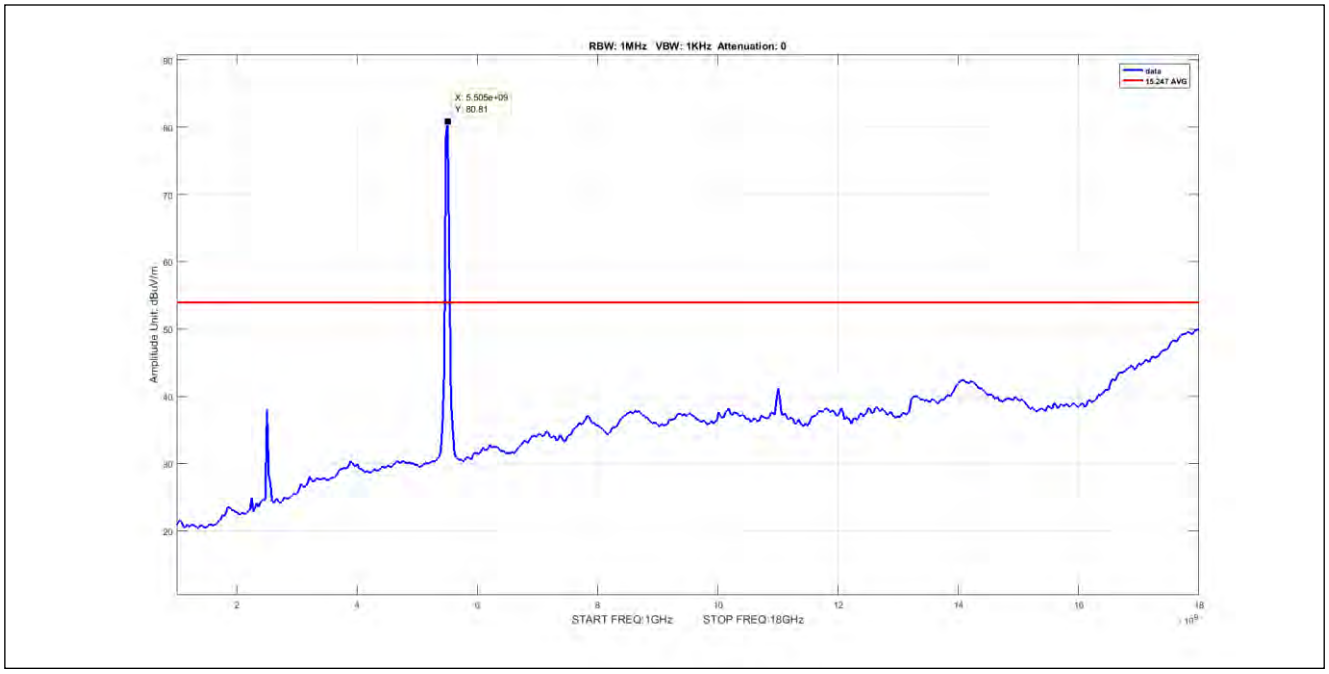
Plot 173. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5580M, N Mode ANT 0 (worst-case) V



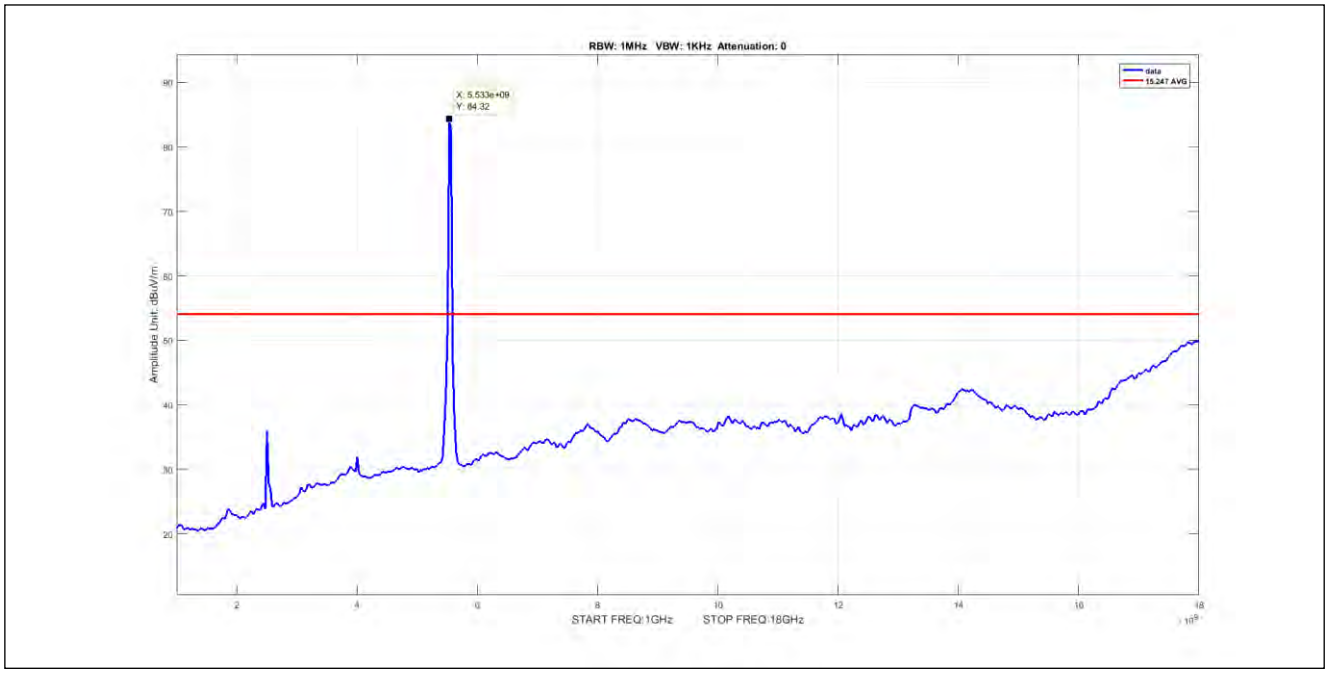
Plot 174. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5700M, A Mode ANT 0 (worst-case) V



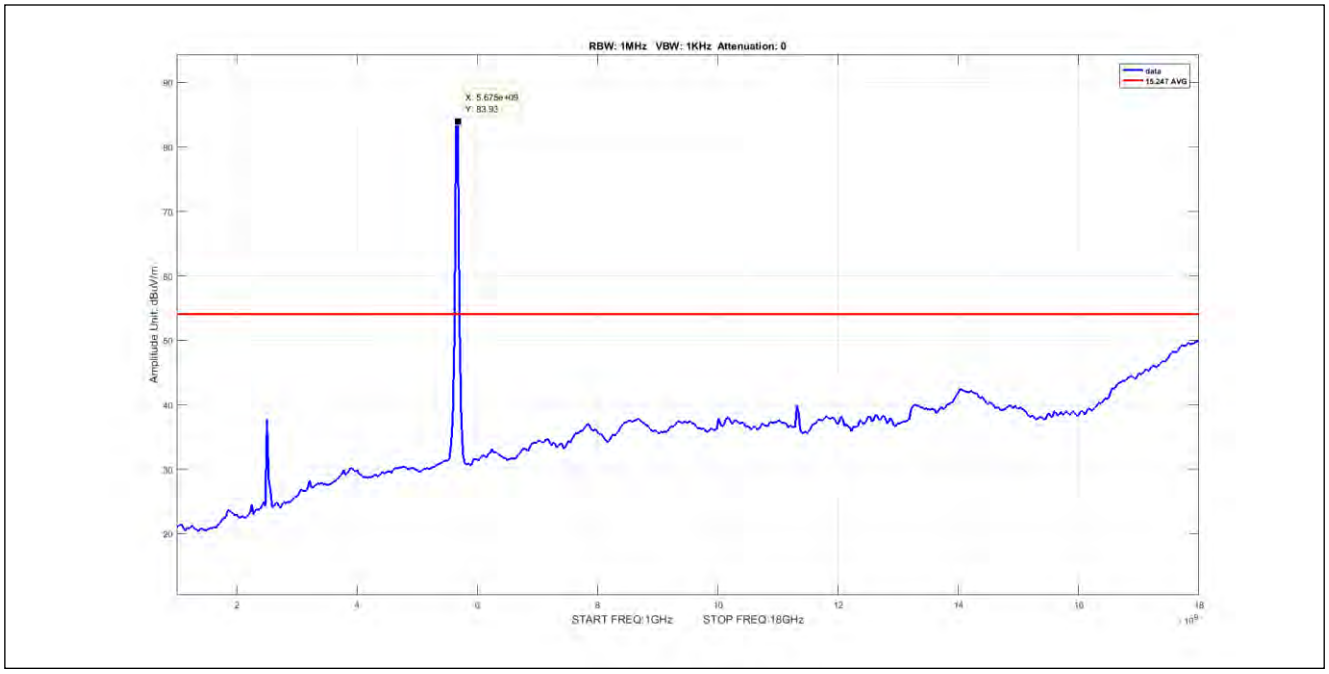
Plot 175. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5700M, N Mode ANT 0 (worst-case) V



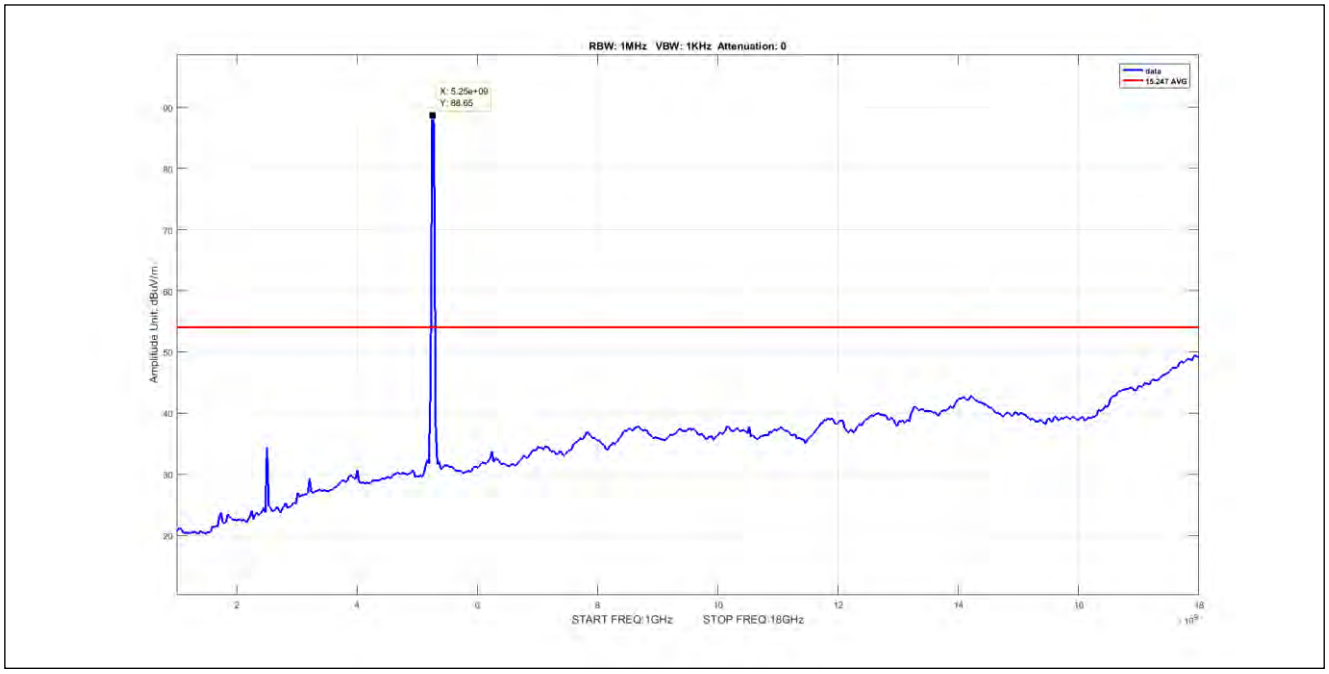
Plot 176. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5510M, N Mode ANT 0 (worst-case) V



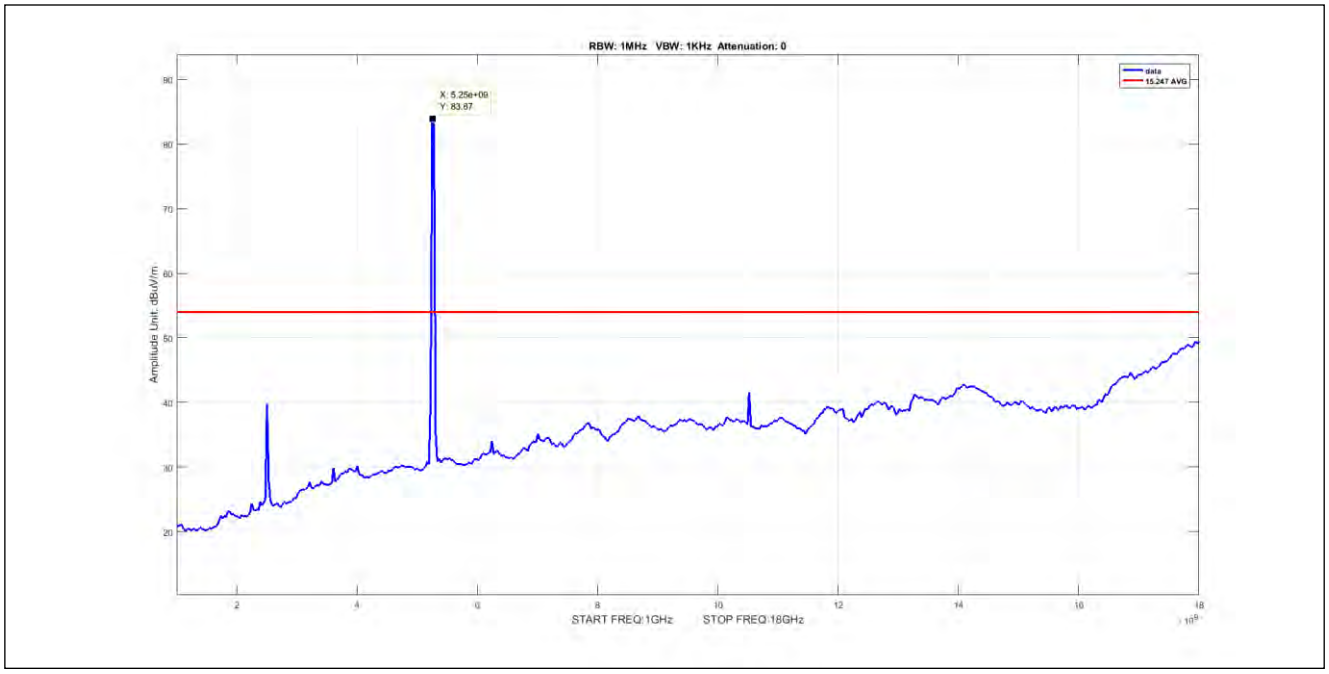
Plot 177. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5550M, N Mode ANT 0 (worst-case) V



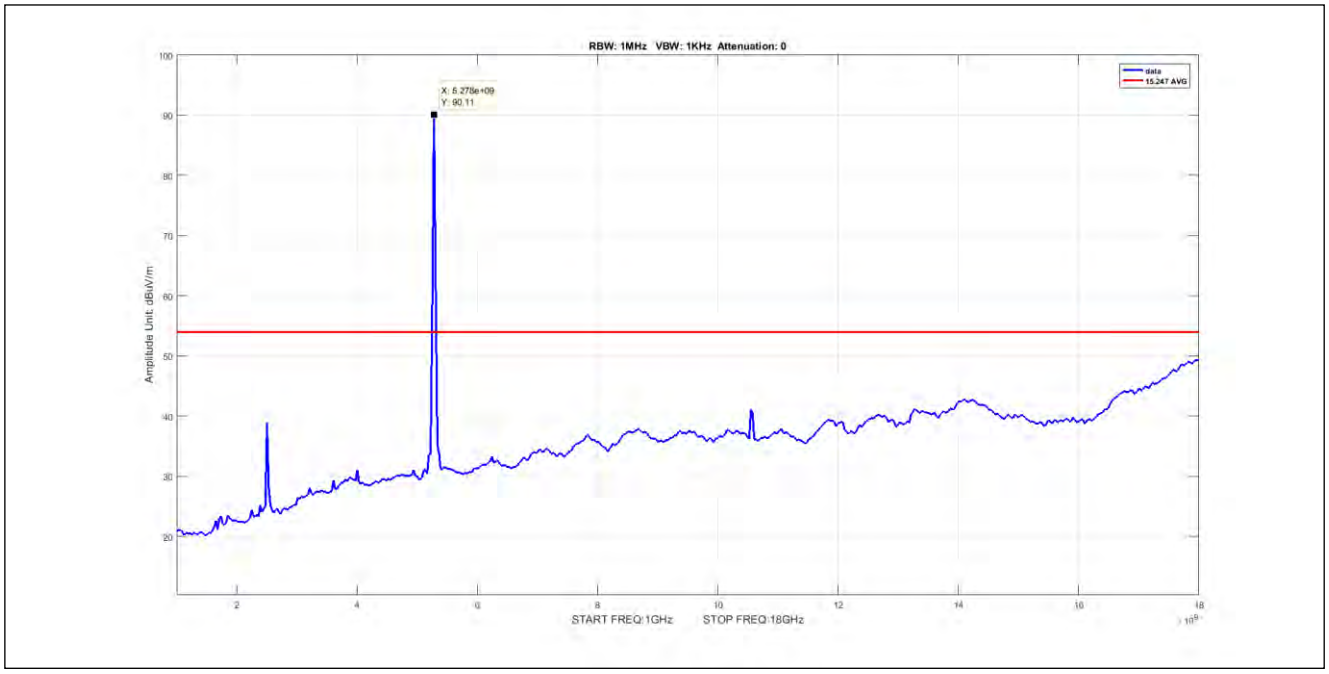
Plot 178. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5670M, N Mode ANT 0 (worst-case) V



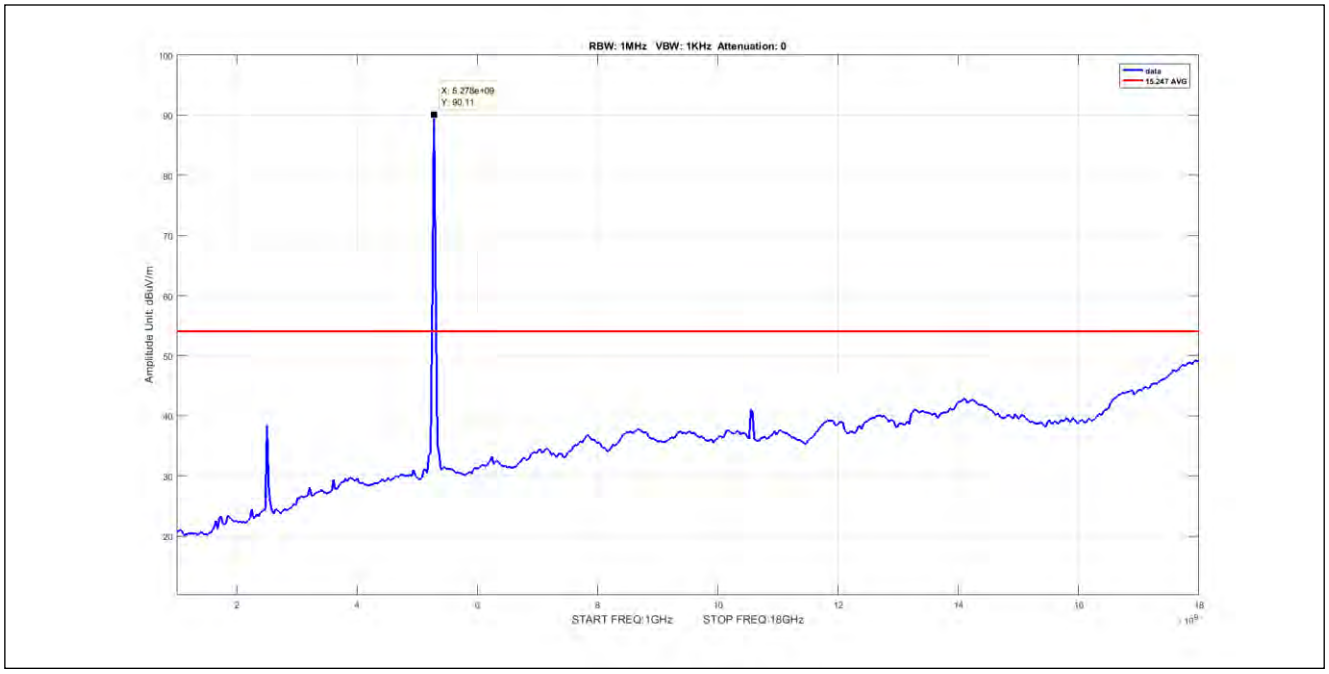
Plot 179. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5260M, A Mode ANT 1 (worst-case) V



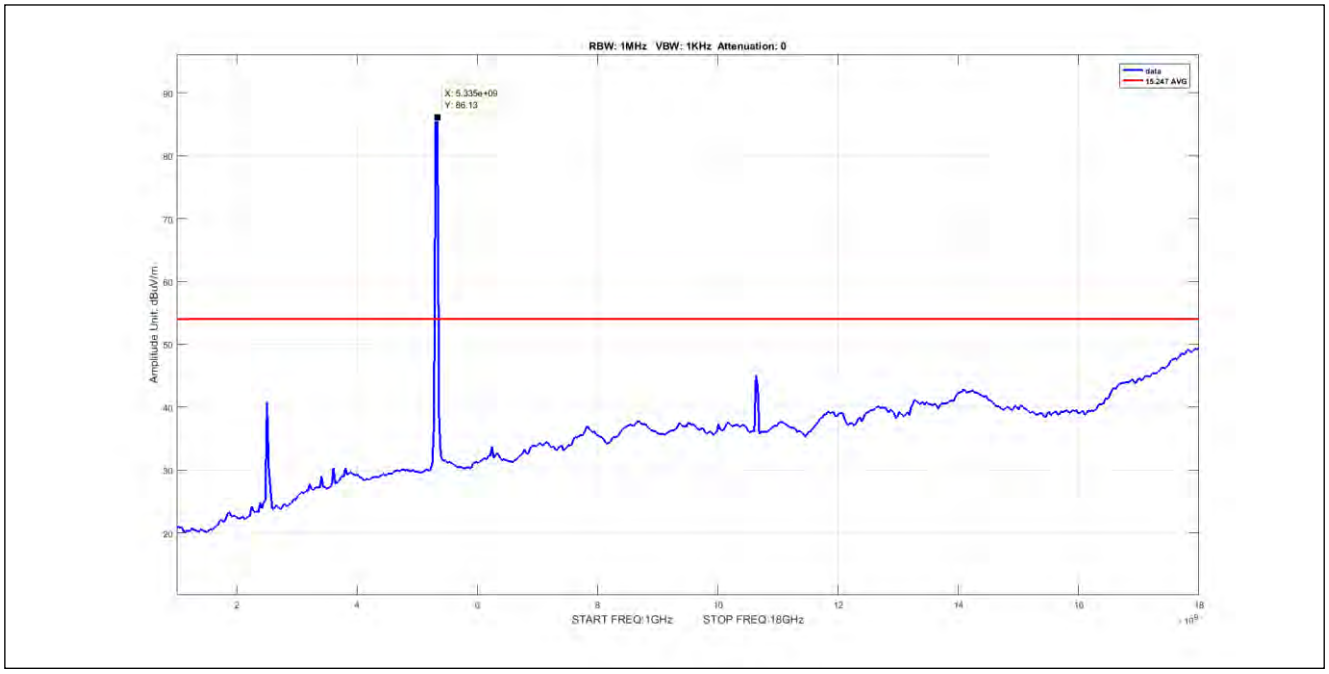
Plot 180. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5260M, N Mode ANT 1 (worst-case) V



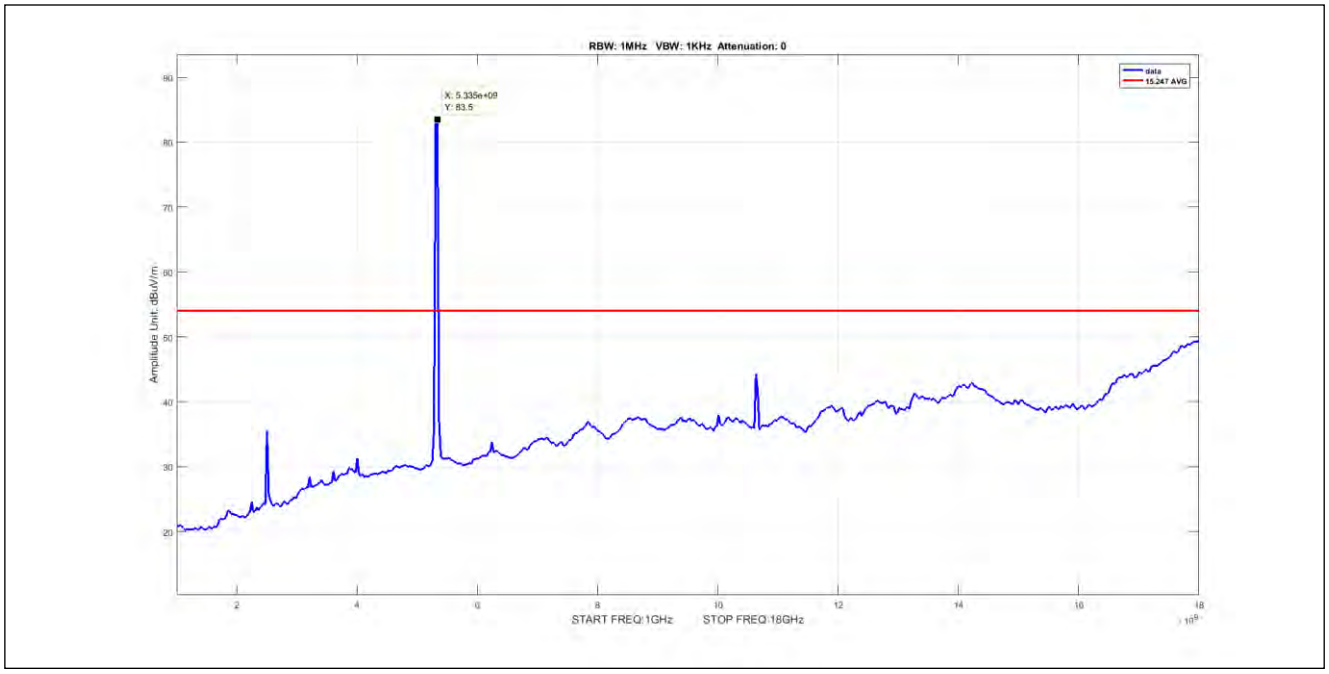
Plot 181. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5280M, A Mode ANT 1 (worst-case) V



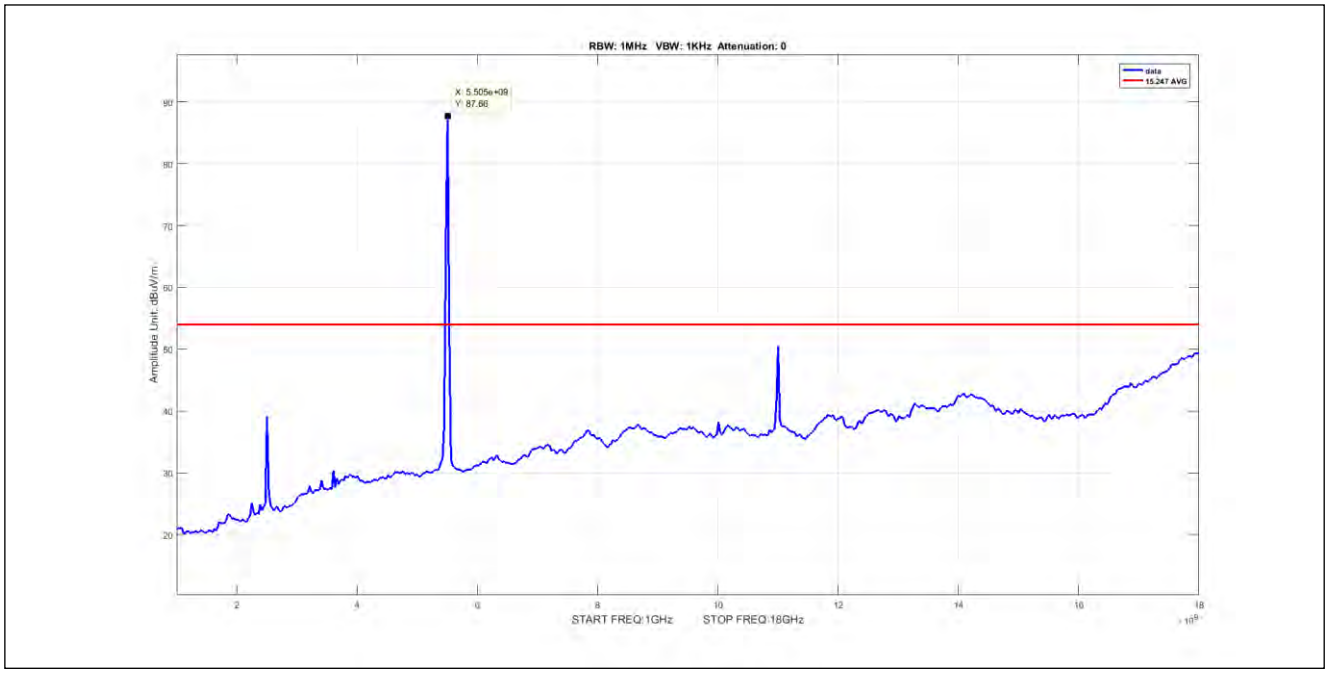
Plot 182. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5280M, N Mode ANT 1 (worst-case) V



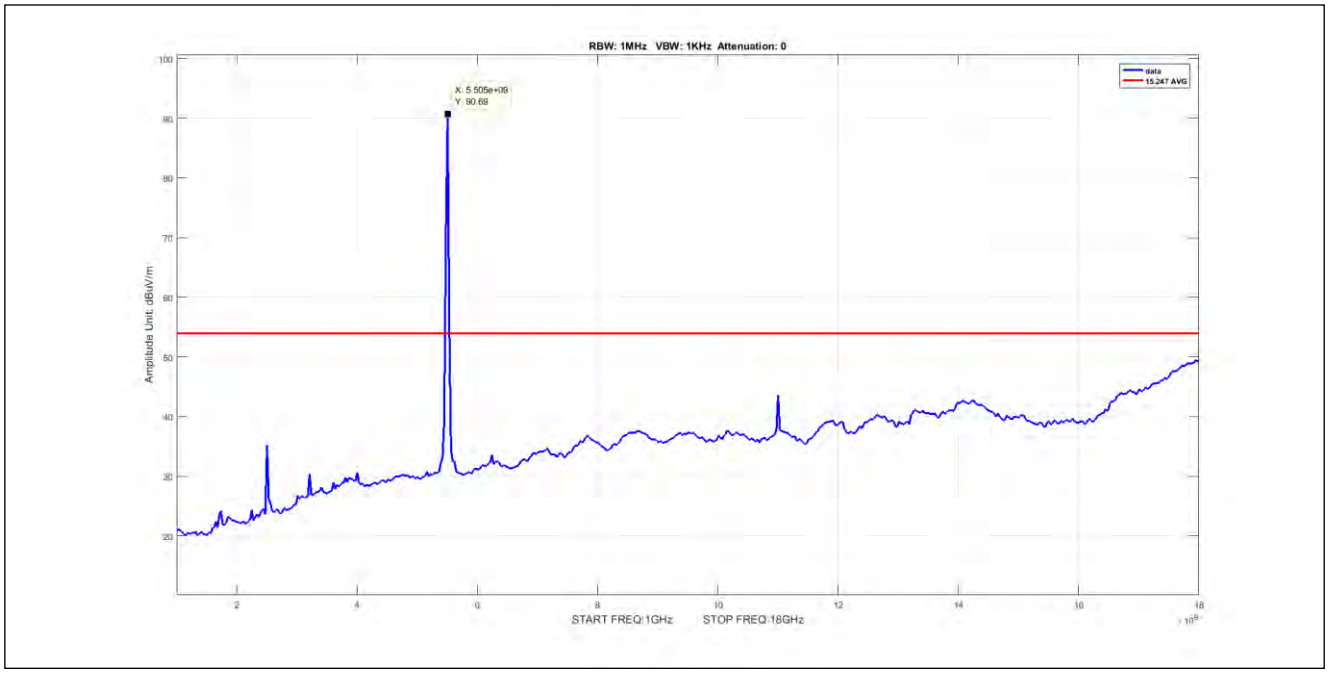
Plot 183. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5320M, A Mode ANT 1 (worst-case) V



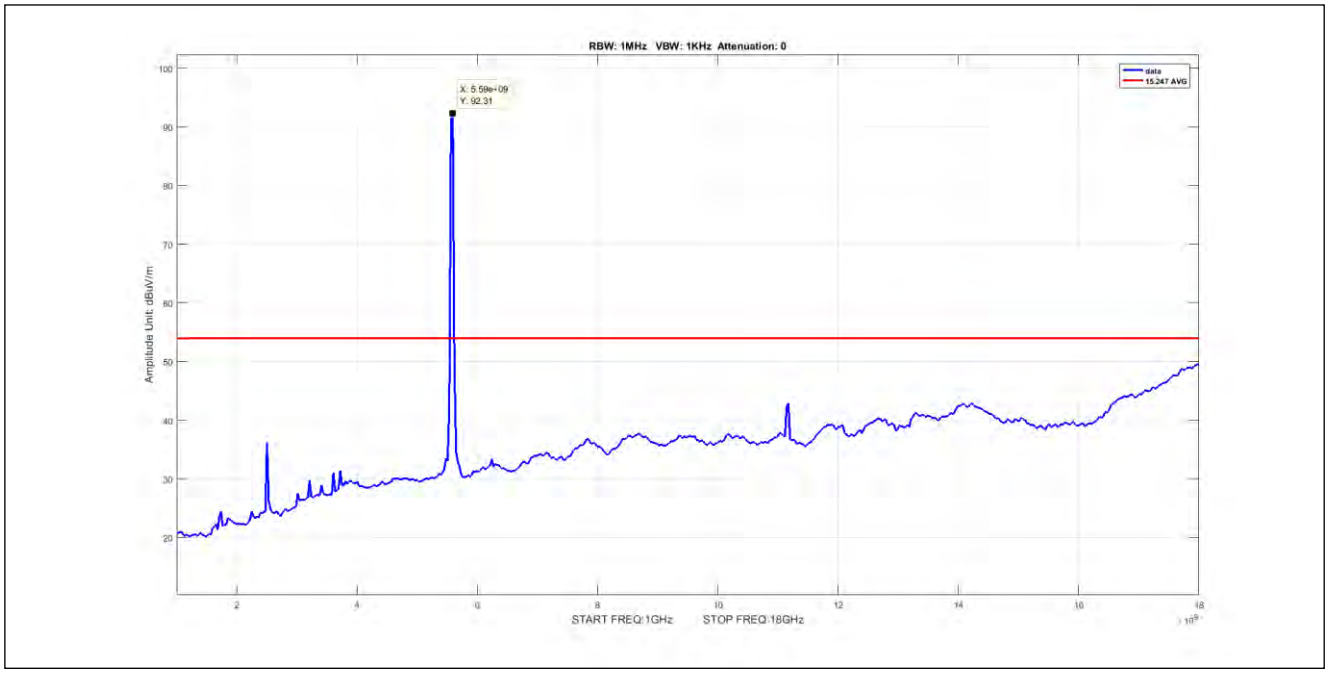
Plot 184. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5320M, N Mode ANT 1 (worst-case) V



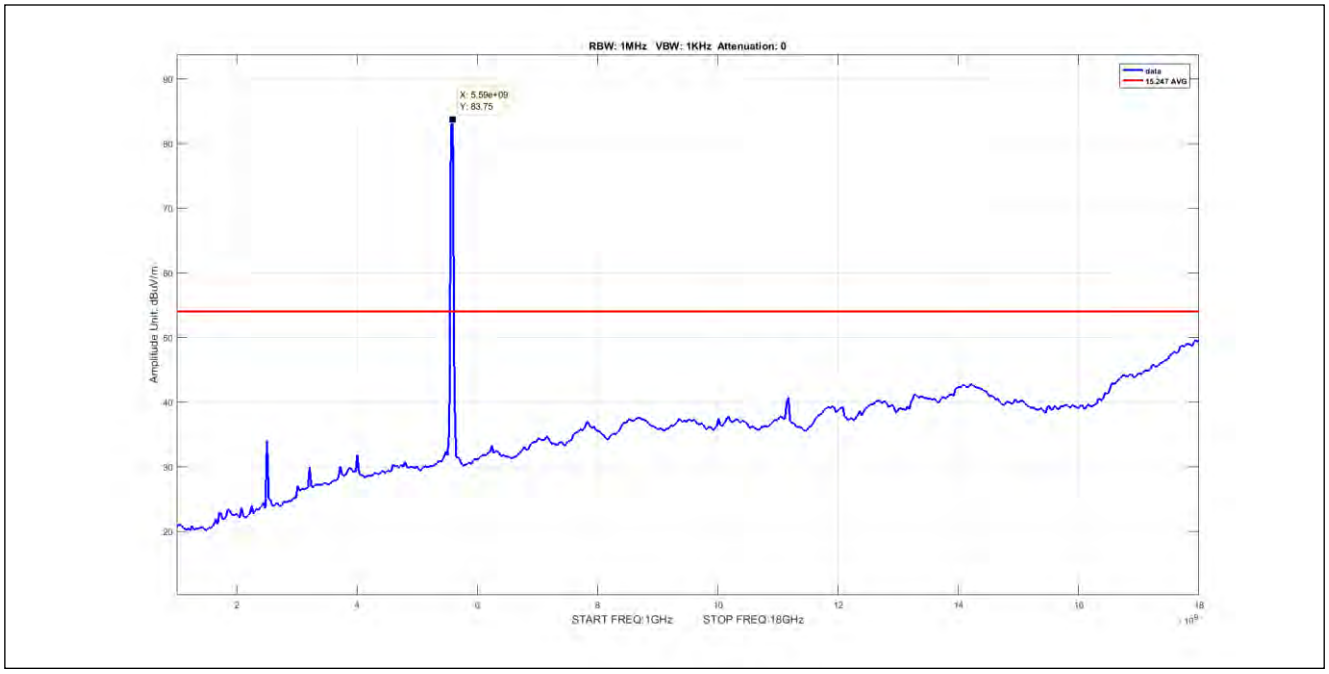
Plot 185. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5500M, A Mode ANT 1 (worst-case) V



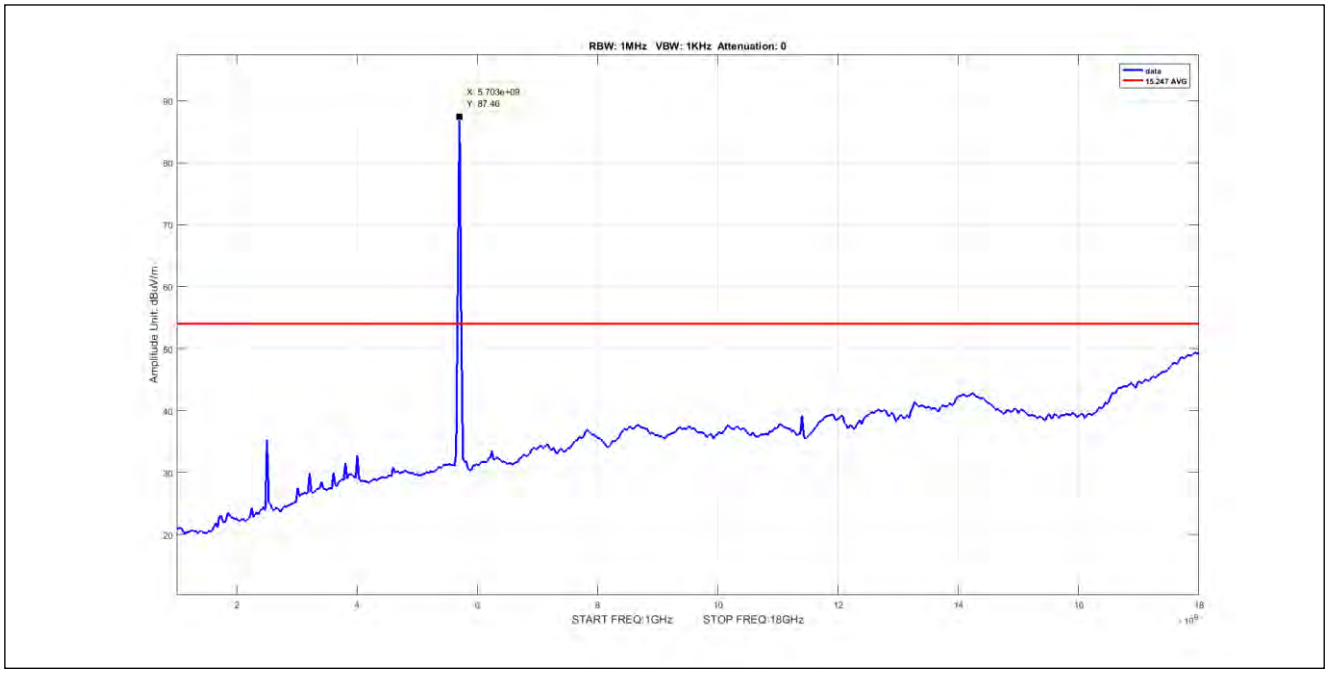
Plot 186. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5500M, N Mode ANT 1 (worst-case) V



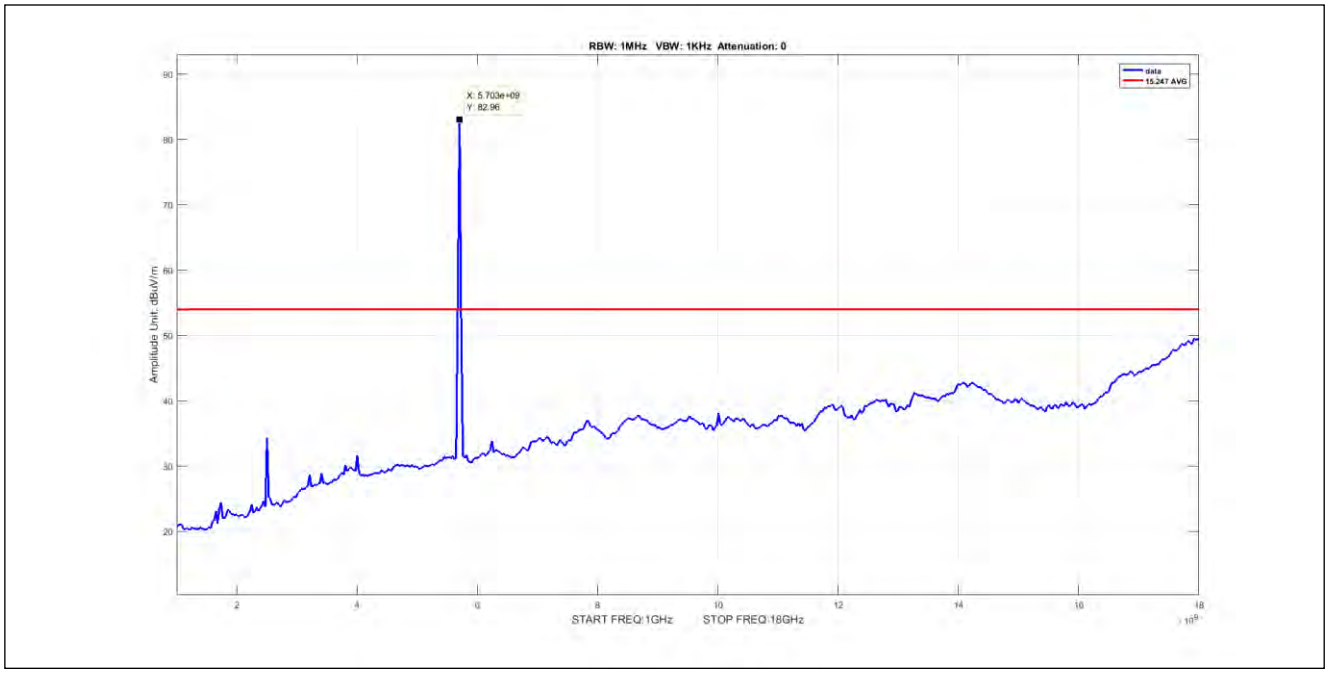
Plot 187. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5580M, A Mode ANT 1 (worst-case) V



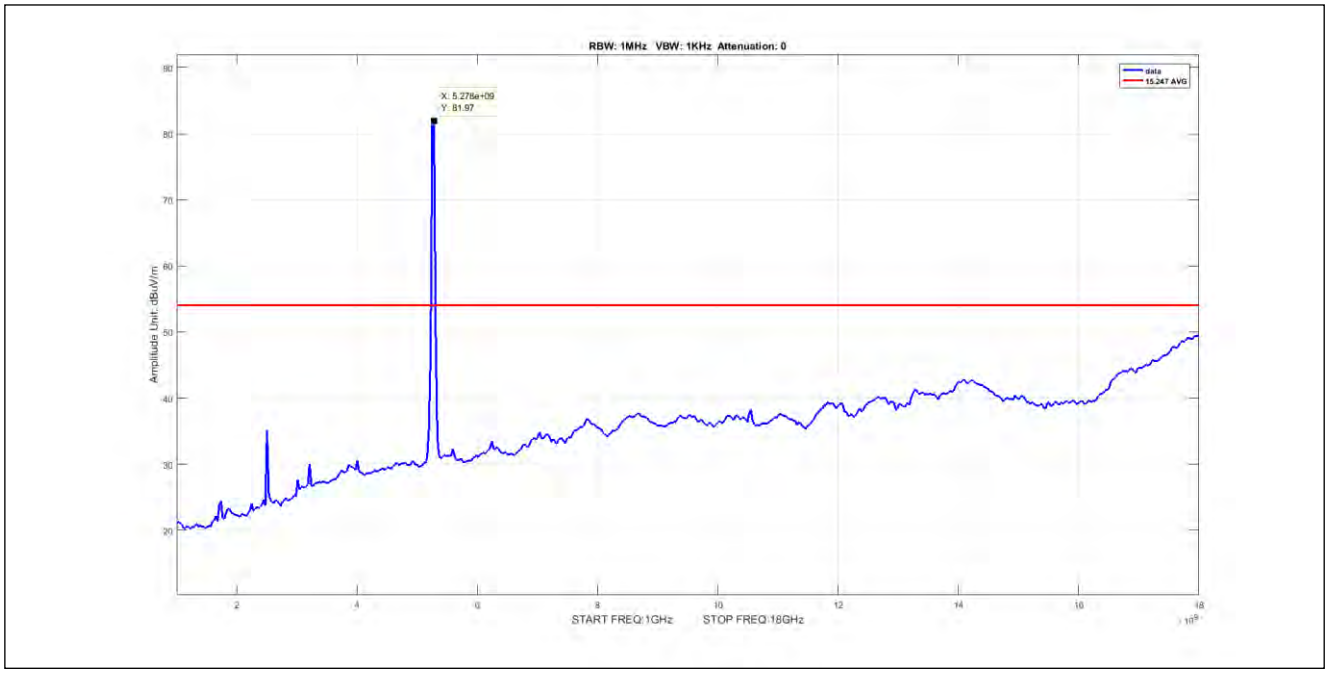
Plot 188. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5580M, N Mode ANT 1 (worst-case) V



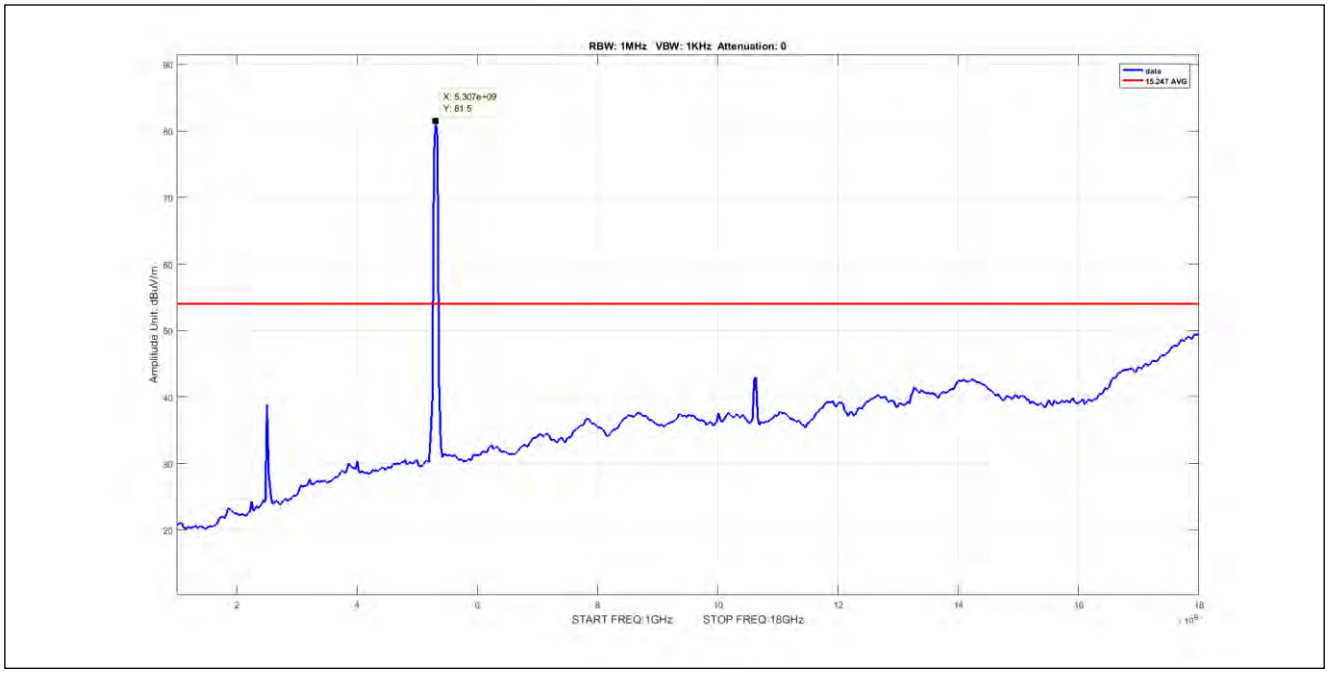
Plot 189. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5700M, A Mode ANT 1 (worst-case) V



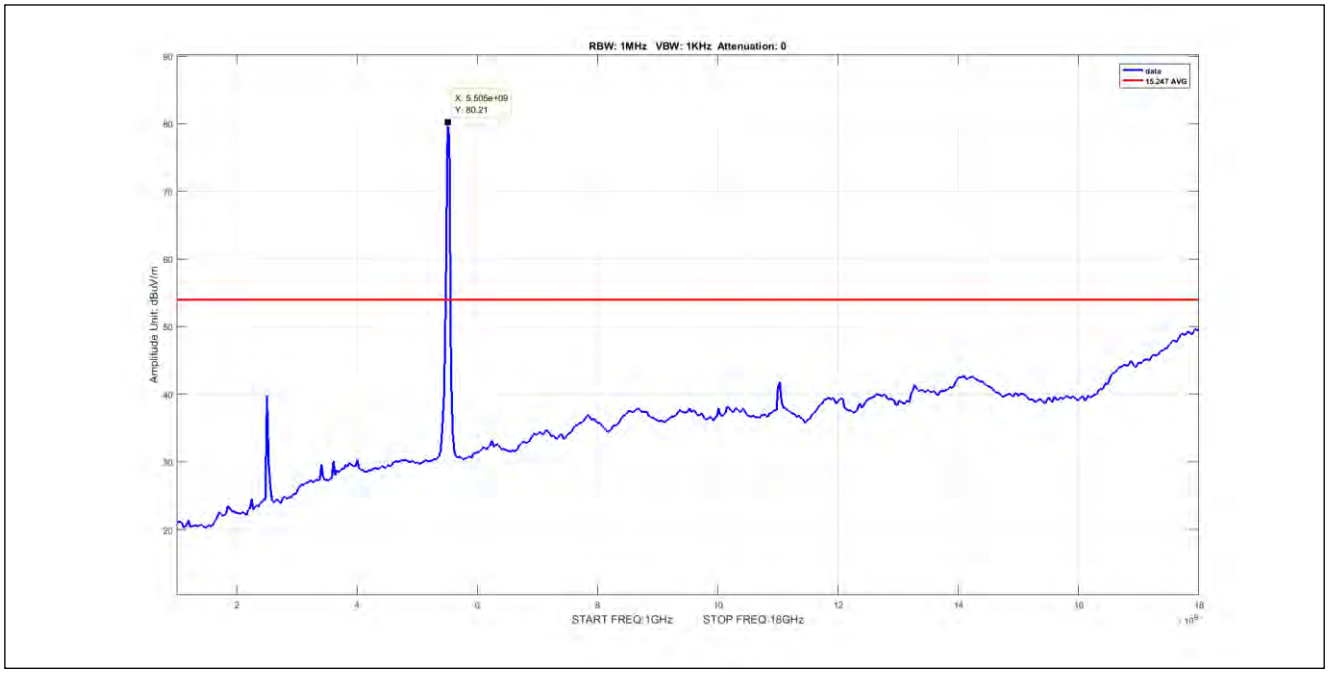
Plot 190. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 20M, Ch 5700M, N Mode ANT 1 (worst-case) V



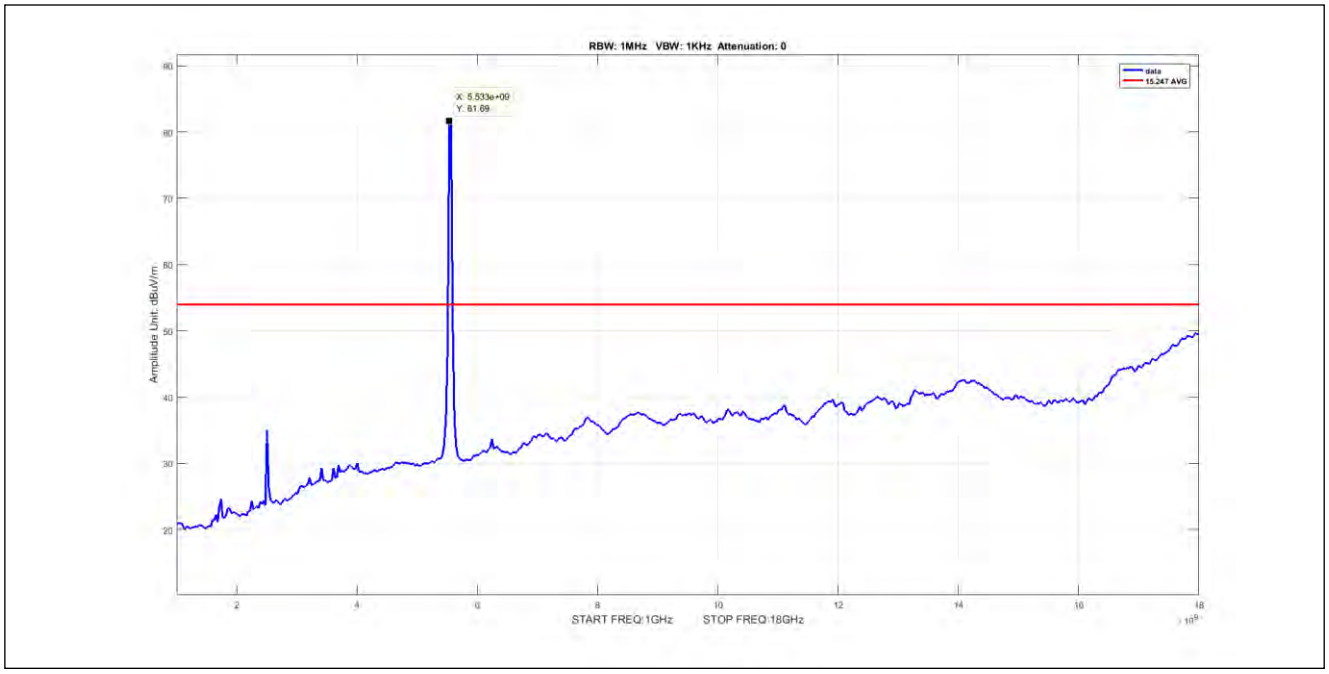
Plot 191. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5270M, N Mode ANT 1 (worst-case) V



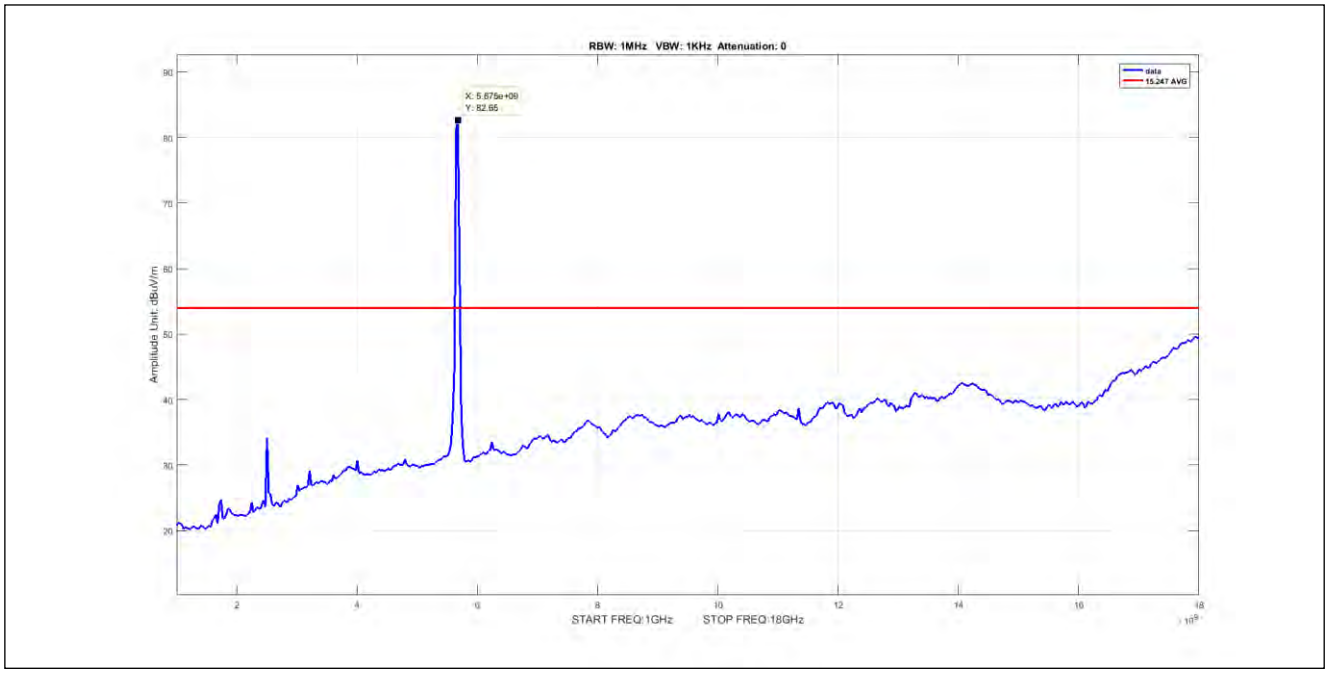
Plot 192. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5310M, N Mode ANT 1 (worst-case) V



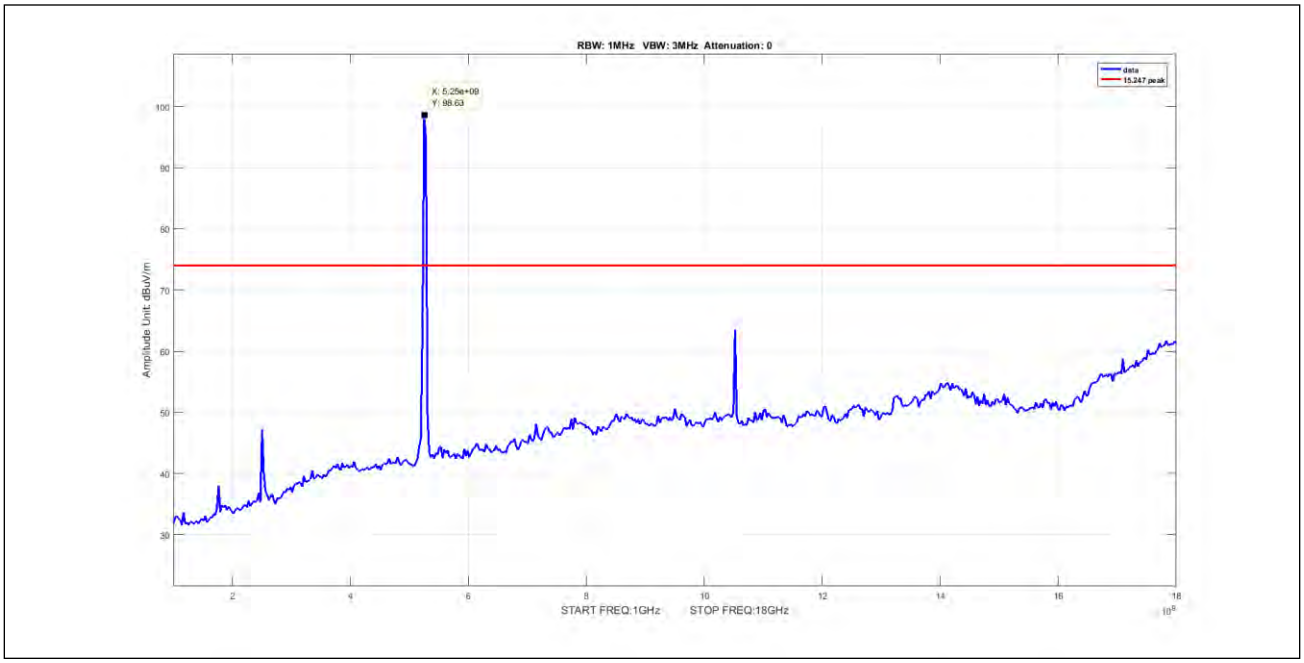
Plot 193. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5510M, N Mode ANT 1 (worst-case) V



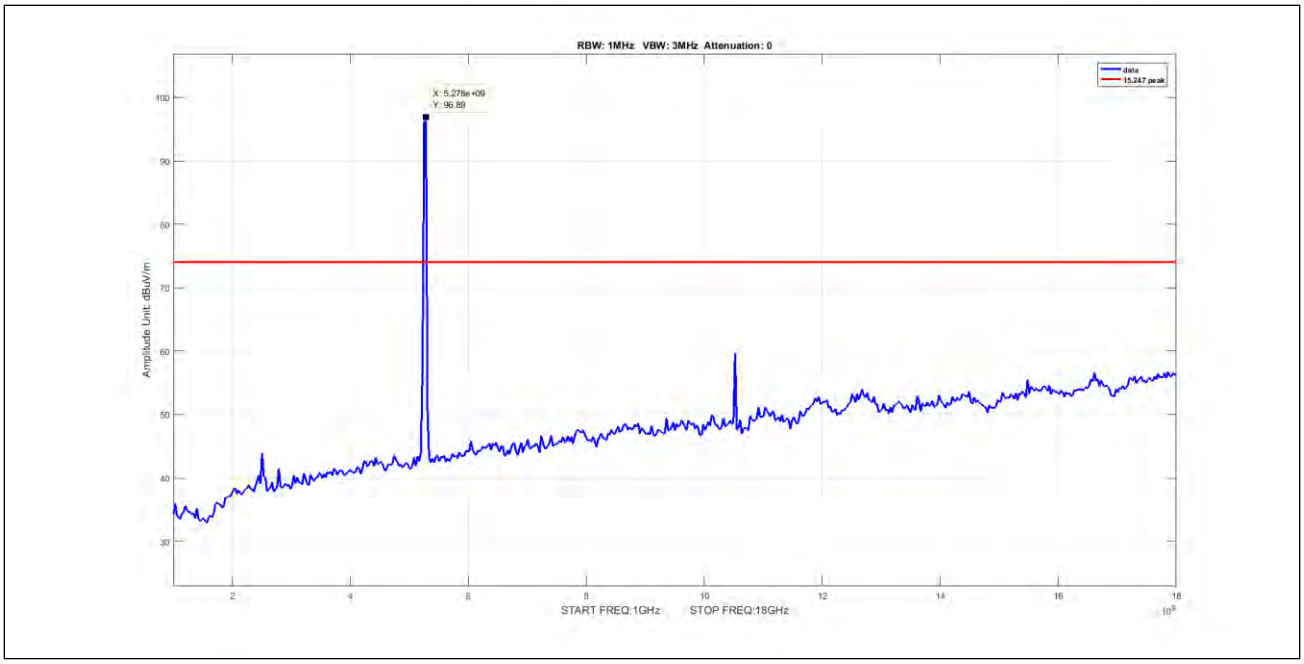
Plot 194. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5500M, N Mode ANT 1 (worst-case) V



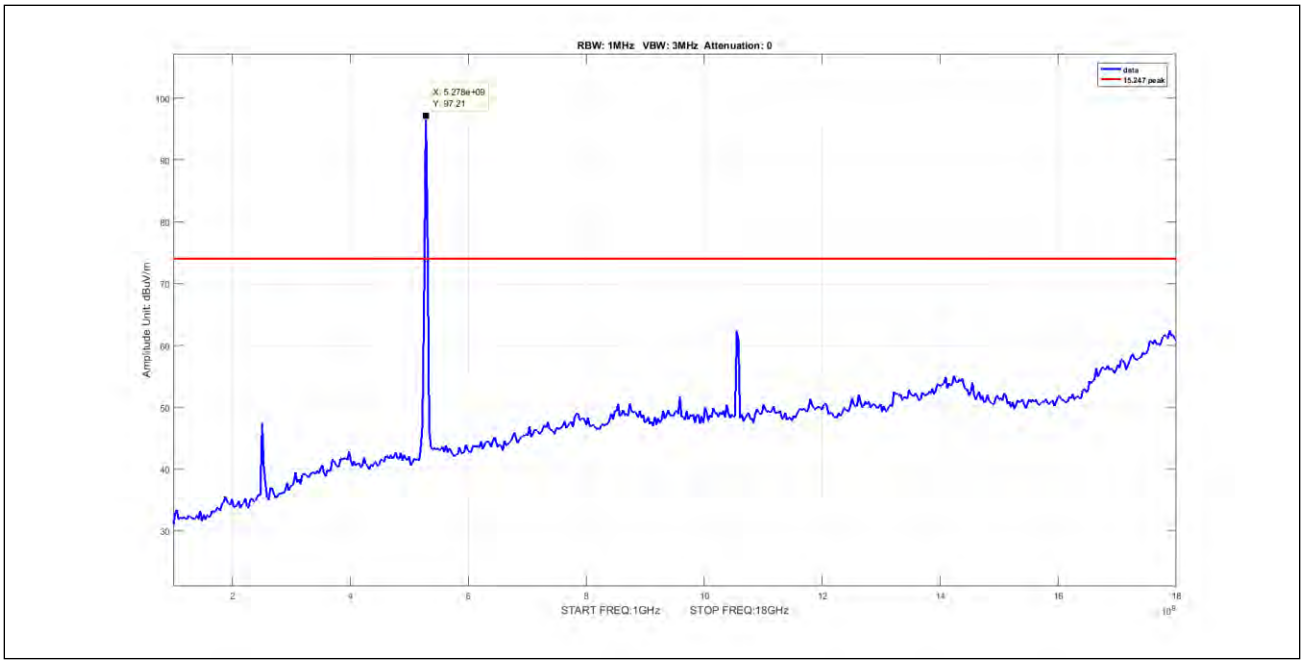
Plot 195. Undesirable Emissions, Average Spurious Emission 1-18GHz, BW 40M, Ch 5670M, N Mode ANT 1 (worst-case) V



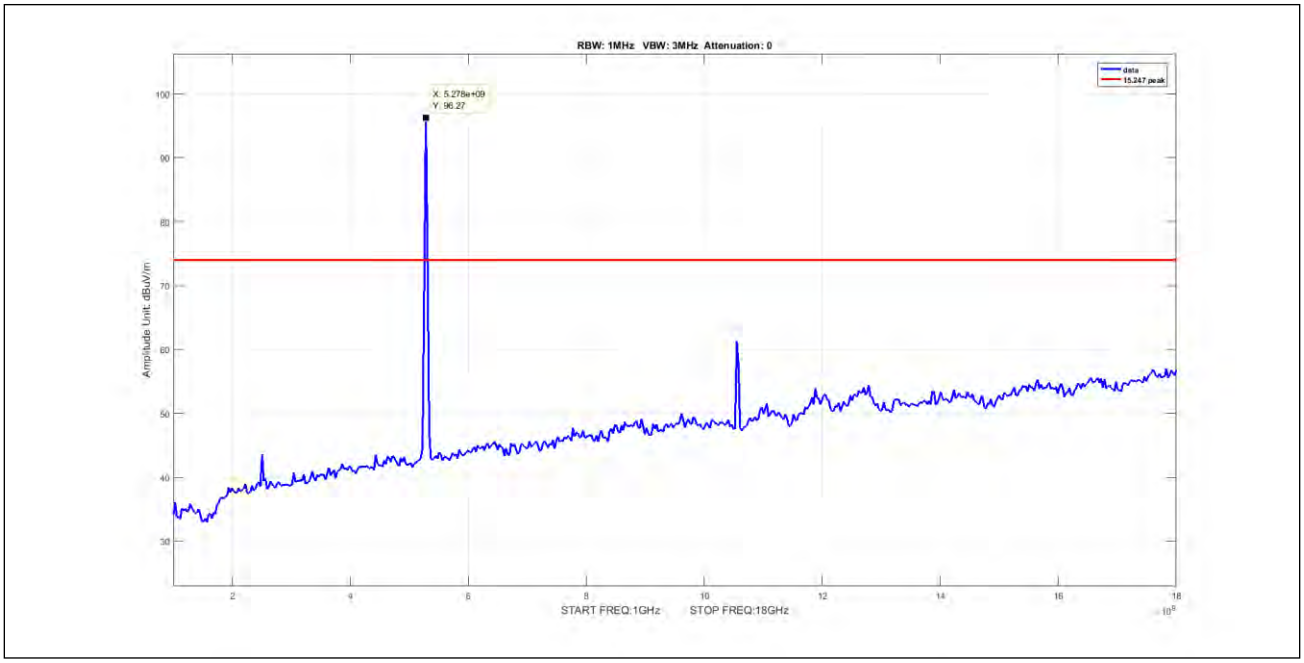
Plot 196. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5260M, A Mode ANT 0 (worst-case) V



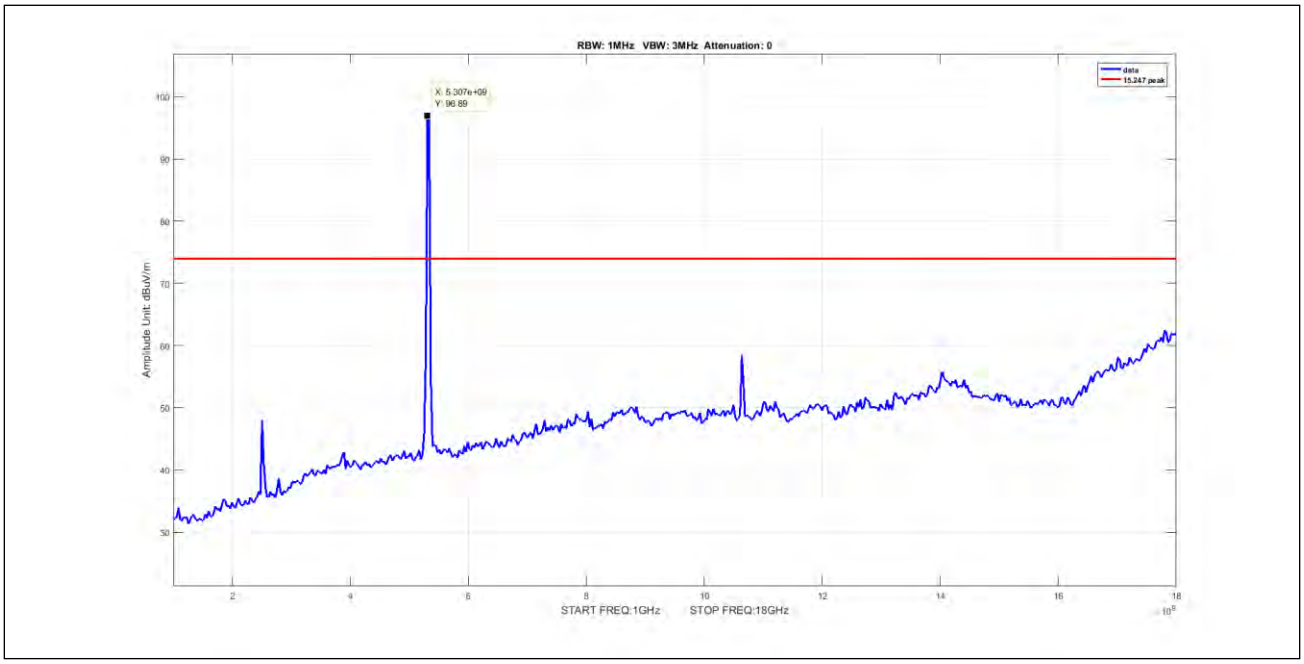
Plot 197. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5260M, N Mode ANT 0 (worst-case) V



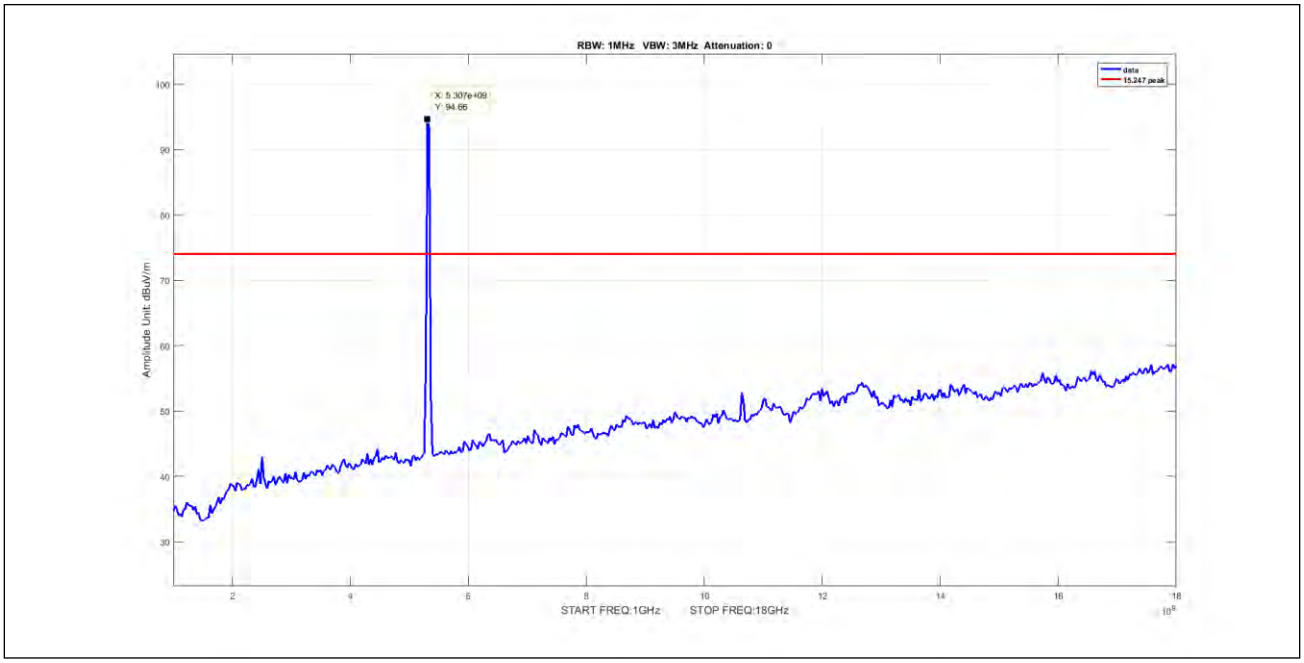
Plot 198. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5280M, A Mode ANT 0 (worst-case) V



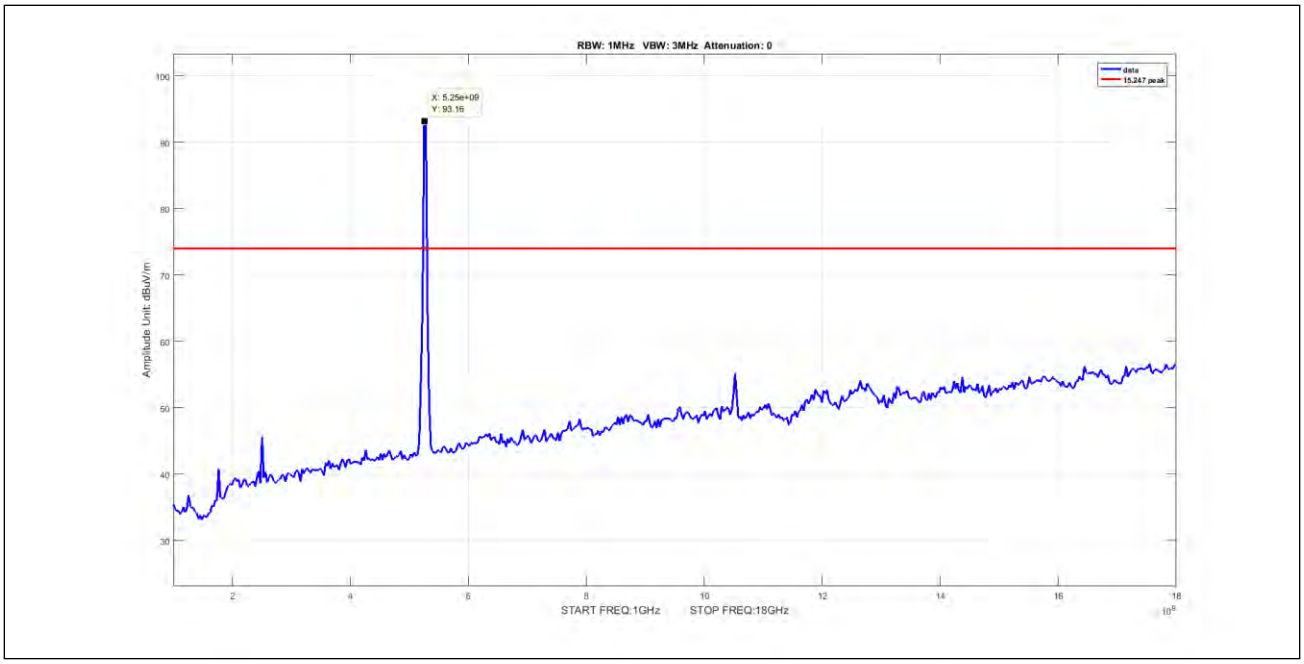
Plot 199. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5280M, N Mode ANT 0 (worst-case) V



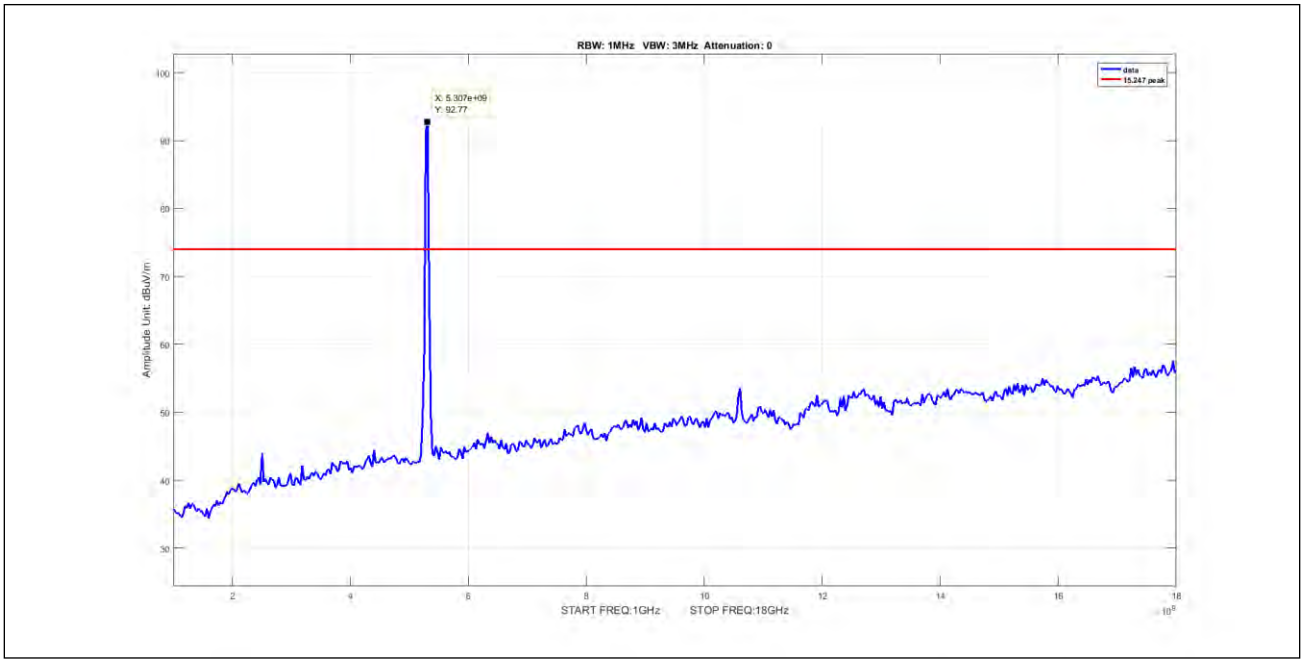
Plot 200. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5320M, A Mode ANT 0 (worst-case) V



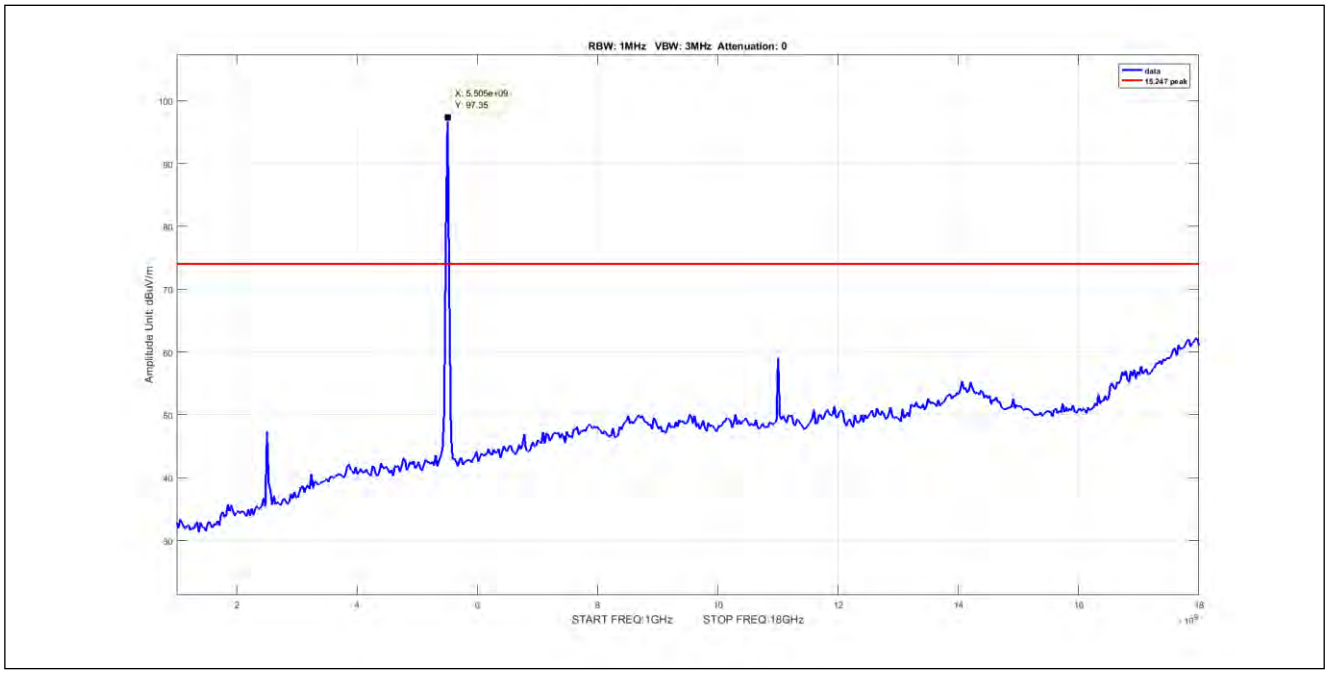
Plot 201. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5320M, N Mode ANT 0 (worst-case) V



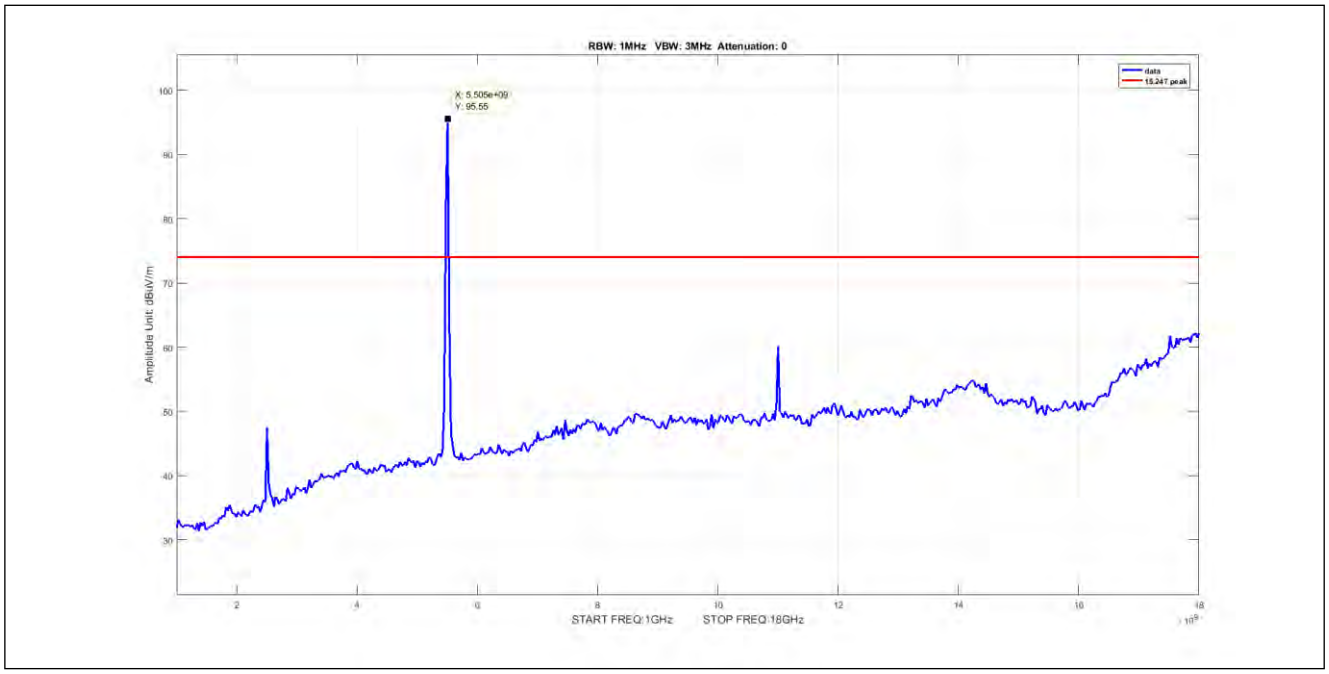
Plot 202. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 40M, Ch 5270M, N Mode ANT 0 (worst-case) V



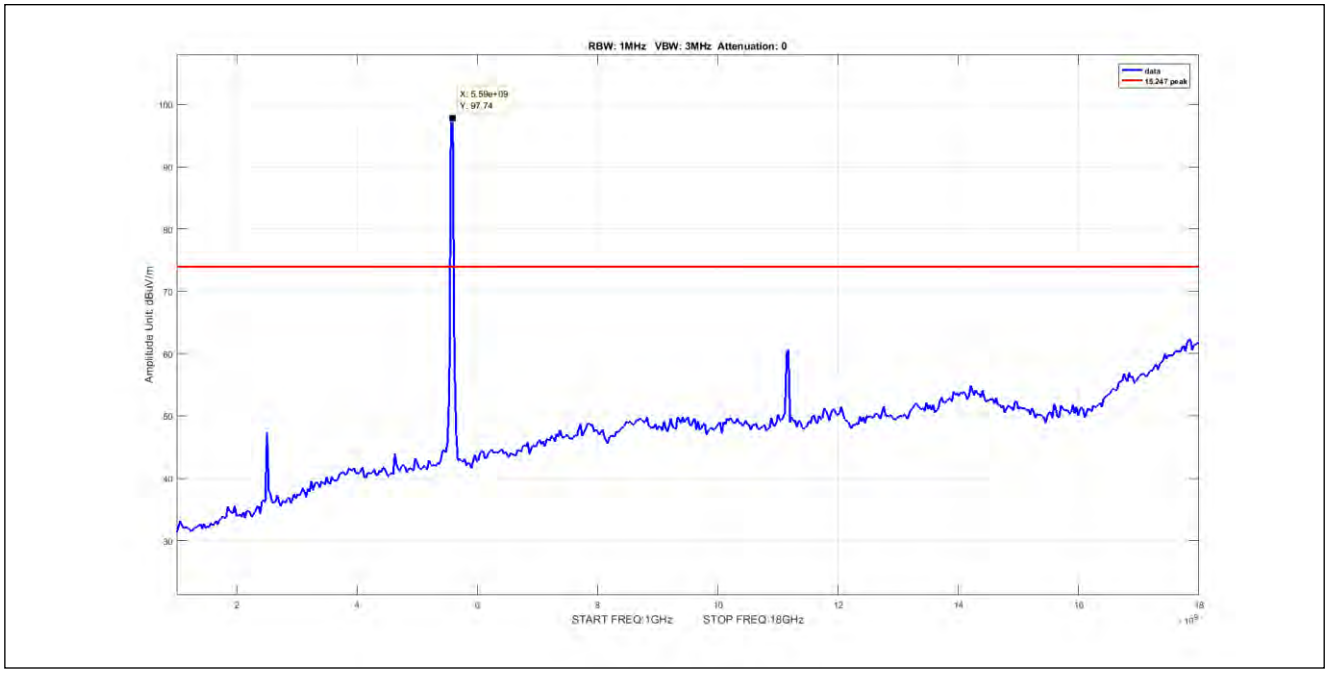
Plot 203. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 40M, Ch 5310M, N Mode ANT 0 (worst-case) V



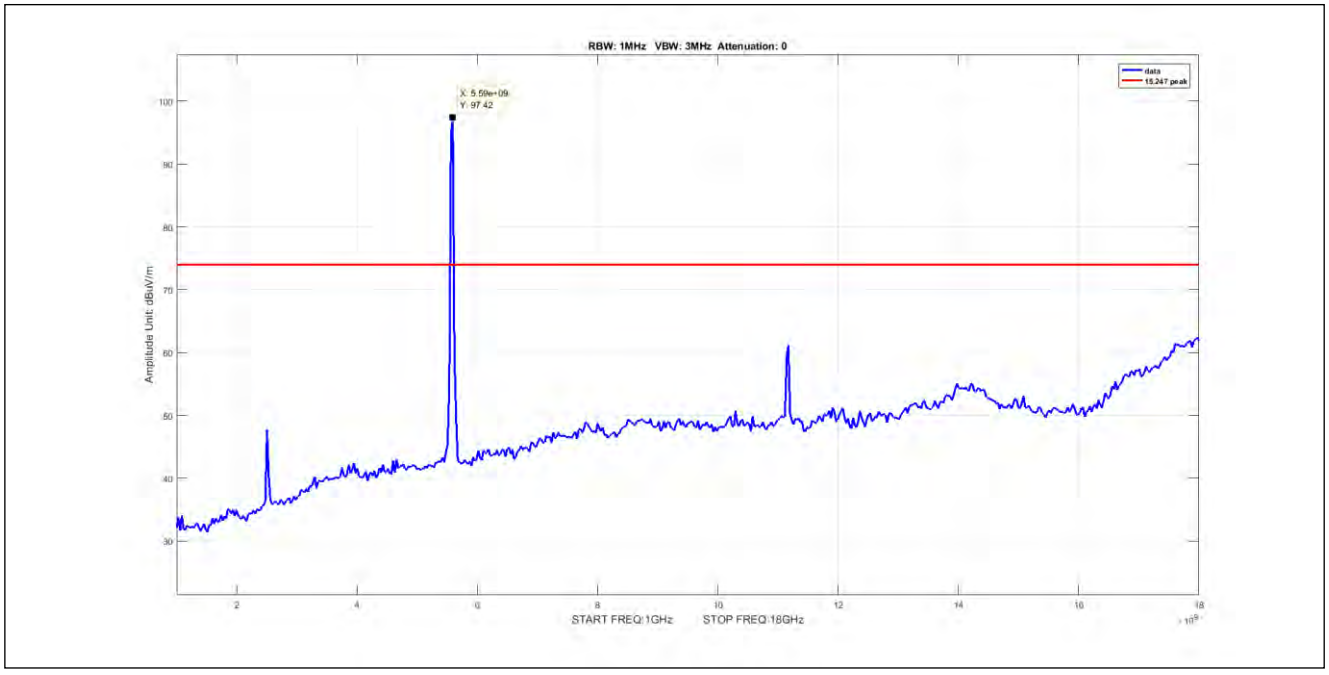
Plot 204. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5500M, A Mode ANT 0 (worst-case) V



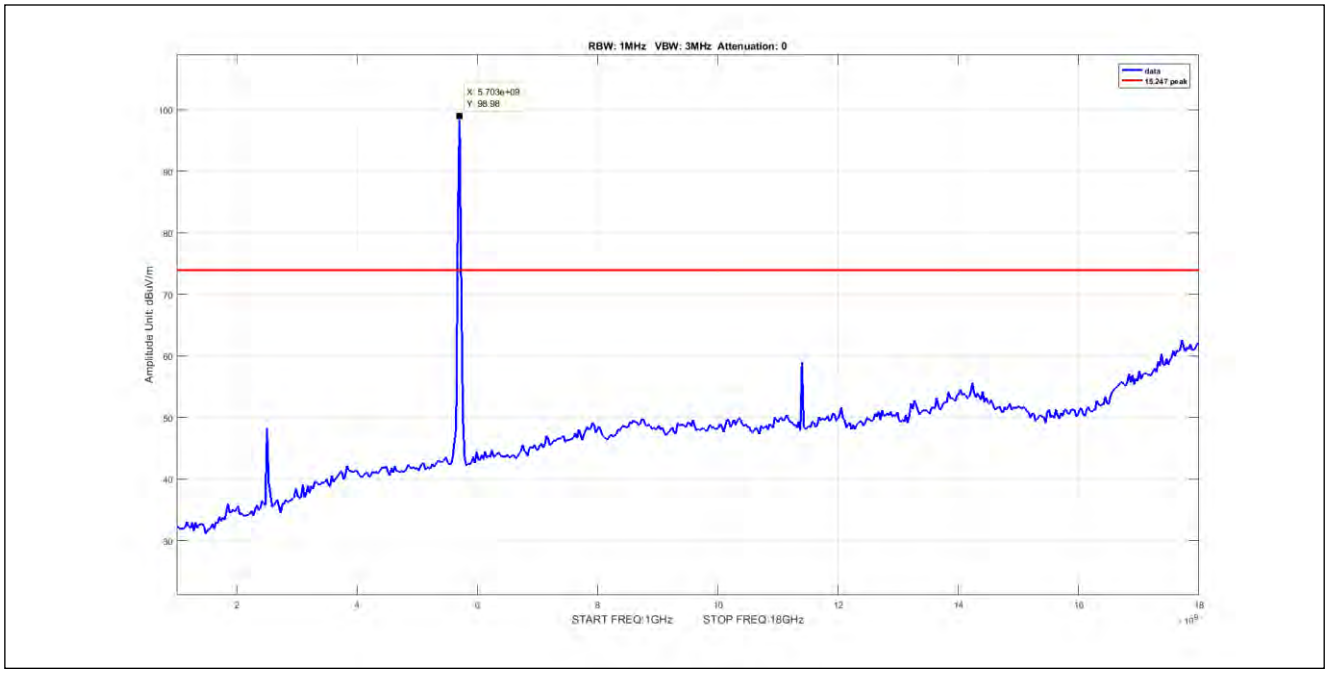
Plot 205. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5500M, N Mode ANT 0 (worst-case) V



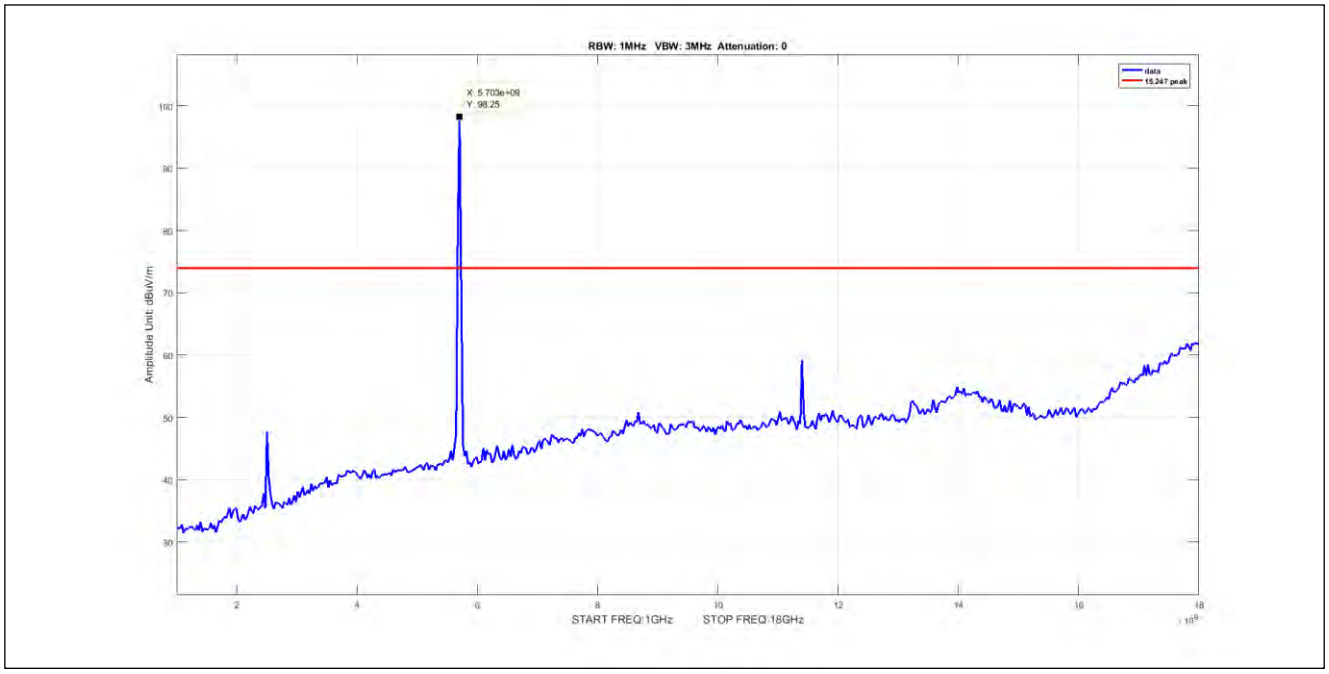
Plot 206. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5580M, A Mode ANT 0 (worst-case) V



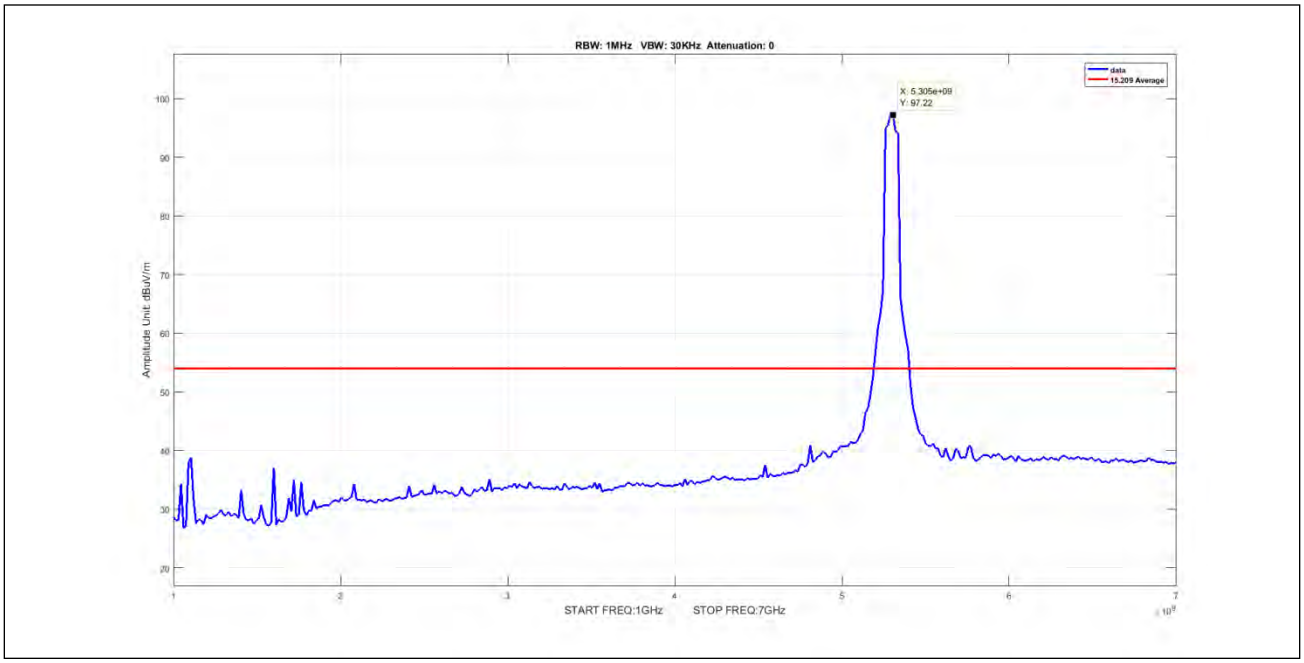
Plot 207. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5580M, N Mode ANT 0 (worst-case) V



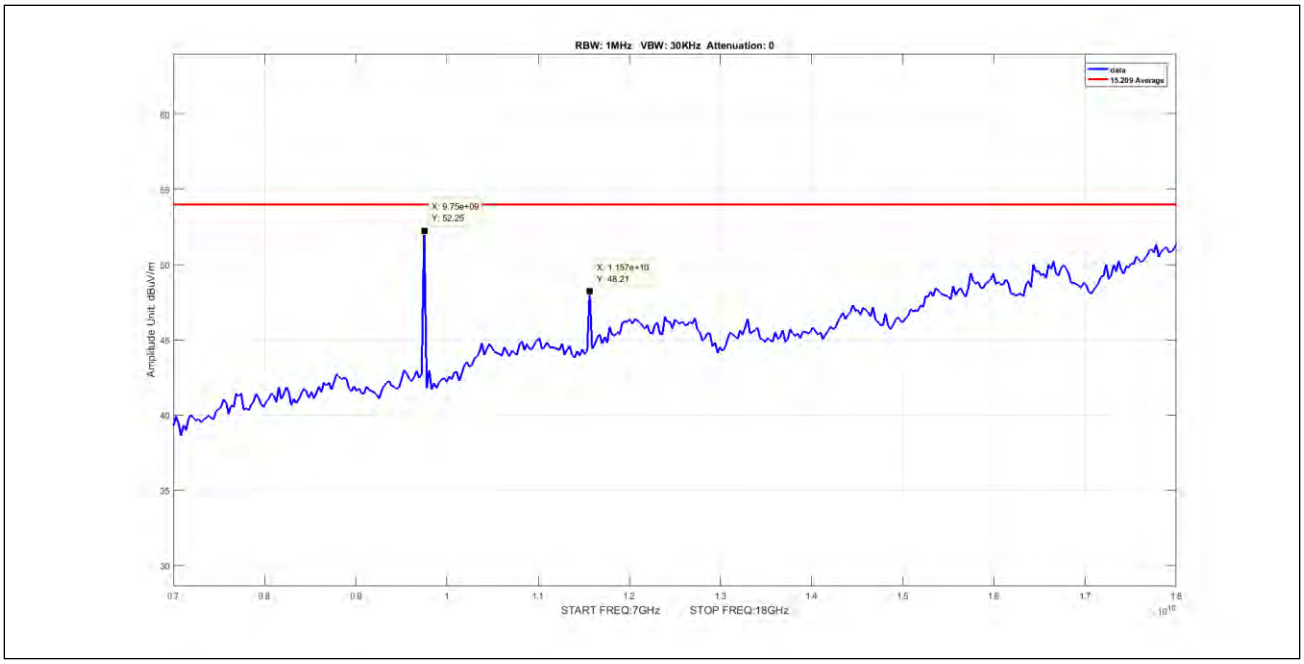
Plot 208. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5700M, A Mode ANT 0 (worst-case) V



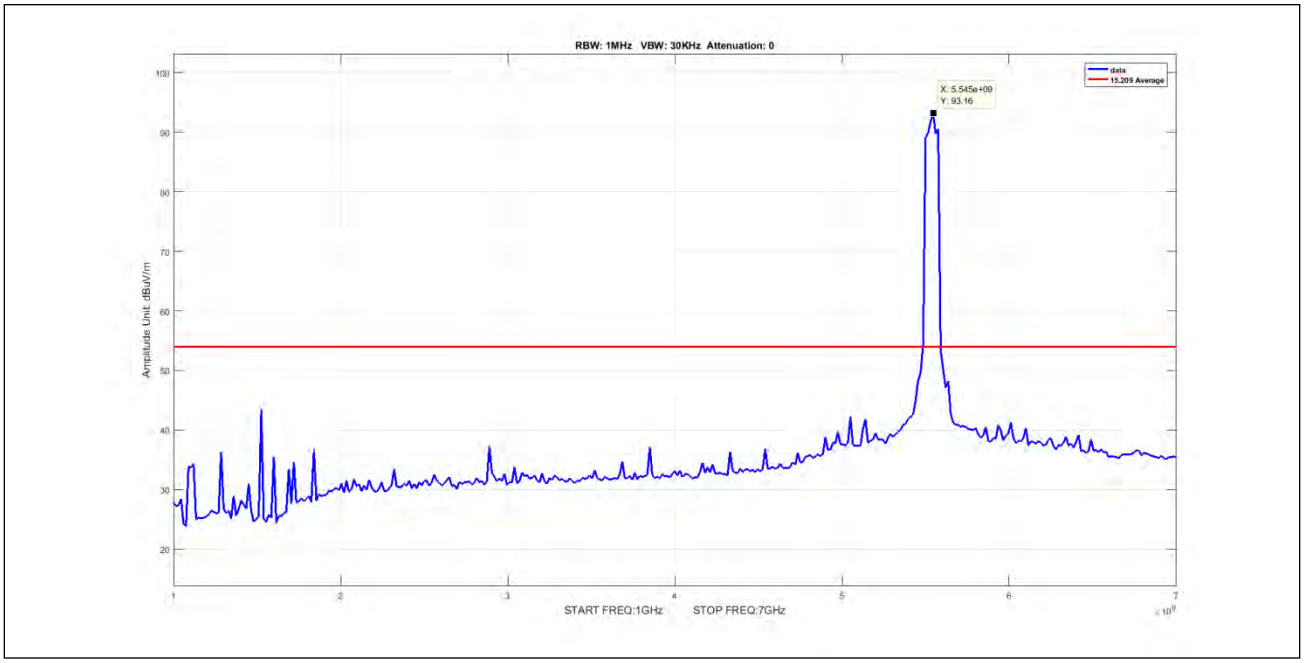
Plot 209. Undesirable Emissions, Peak Spurious Emission 1-18GHz, BW 20M, Ch 5700M, N Mode ANT 0 (worst-case) V



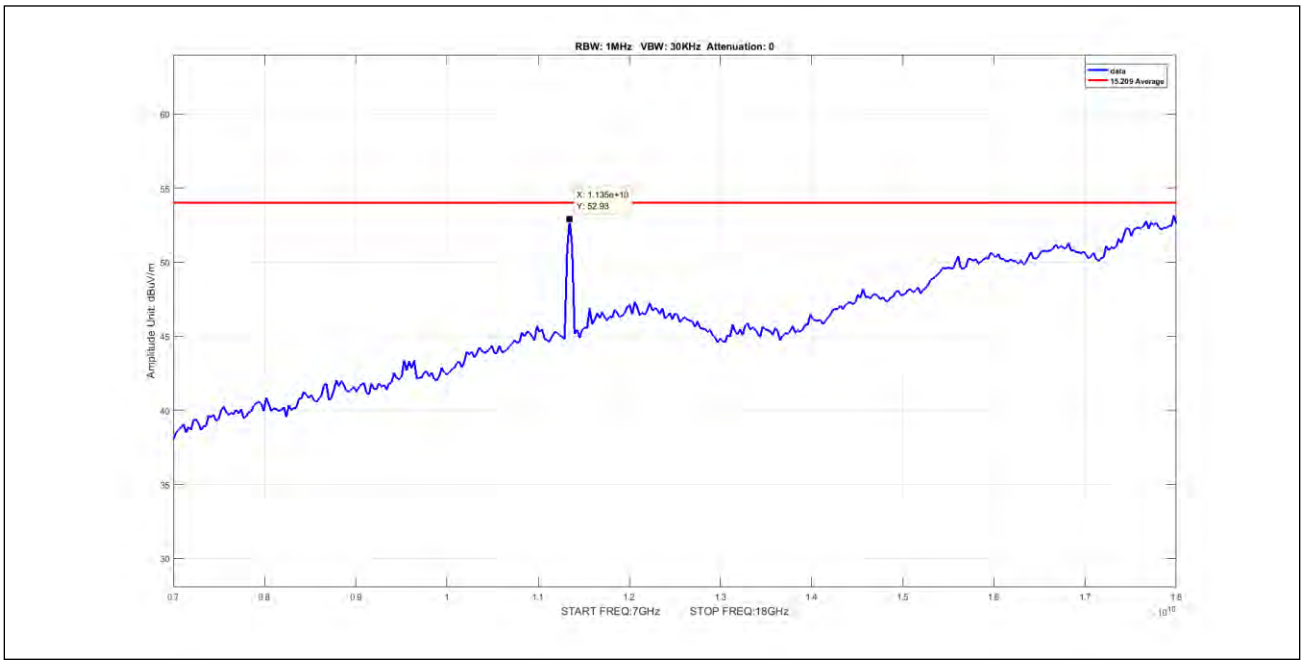
Plot 210. Undesirable Emissions, Peak Spurious Emission 1-7GHz, BW 80M, Ch 5290M, AC Mode ANT 0 (worst-case) V



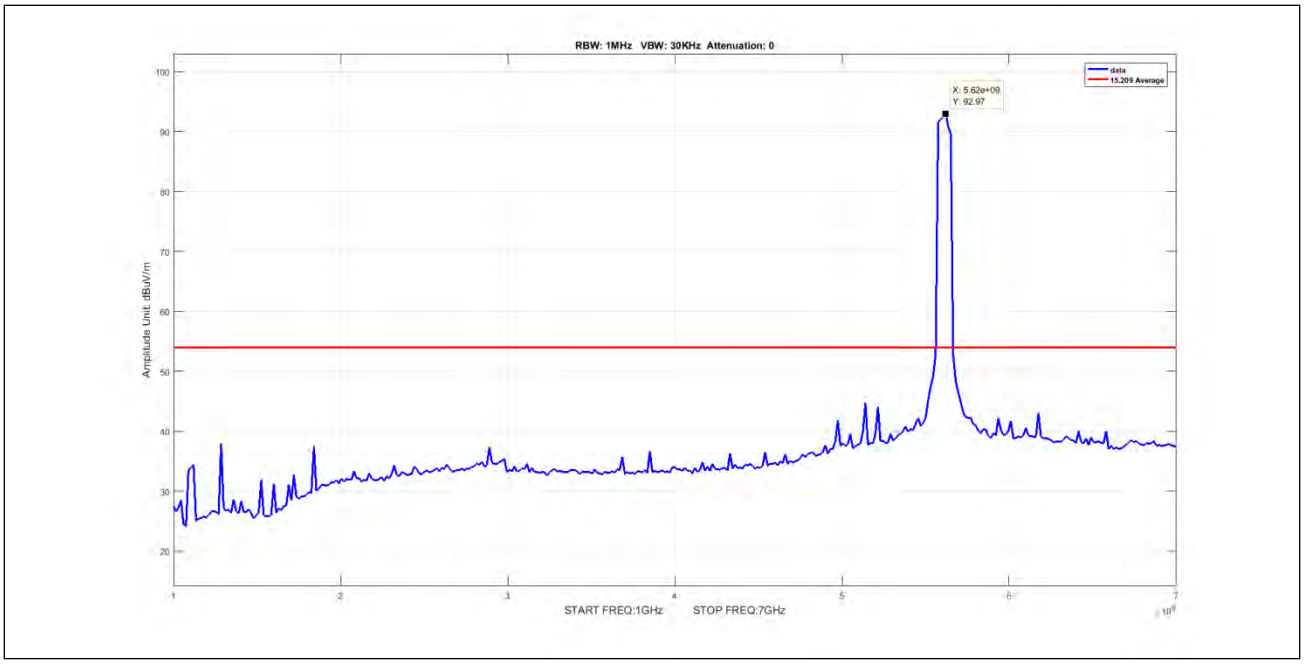
Plot 211. Undesirable Emissions, Peak Spurious Emission 7-18GHz, BW 80M, Ch 5290M, AC Mode ANT 0 (worst-case) V



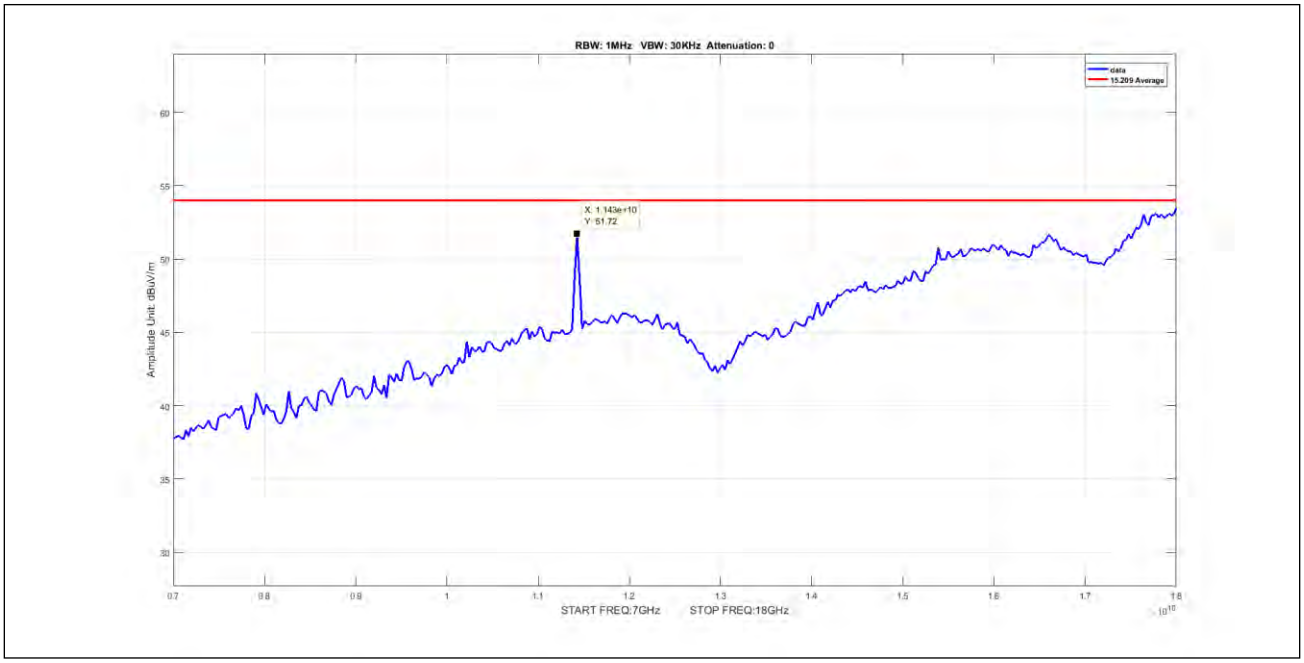
Plot 212. Undesirable Emissions, Peak Spurious Emission 1-7GHz, BW 80M, Ch 5530M, AC Mode ANT 0 (worst-case) V



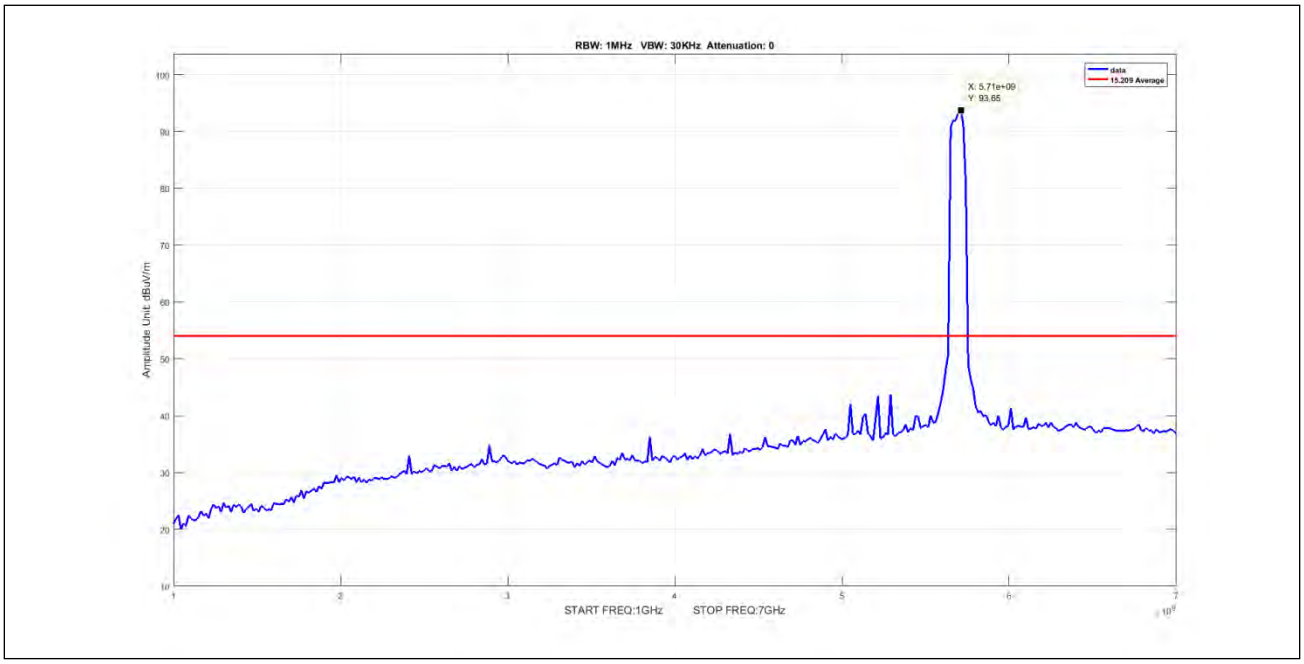
Plot 213. Undesirable Emissions, Peak Spurious Emission 7-18GHz, BW 80M, Ch 5530M, AC Mode ANT 0 (worst-case) V



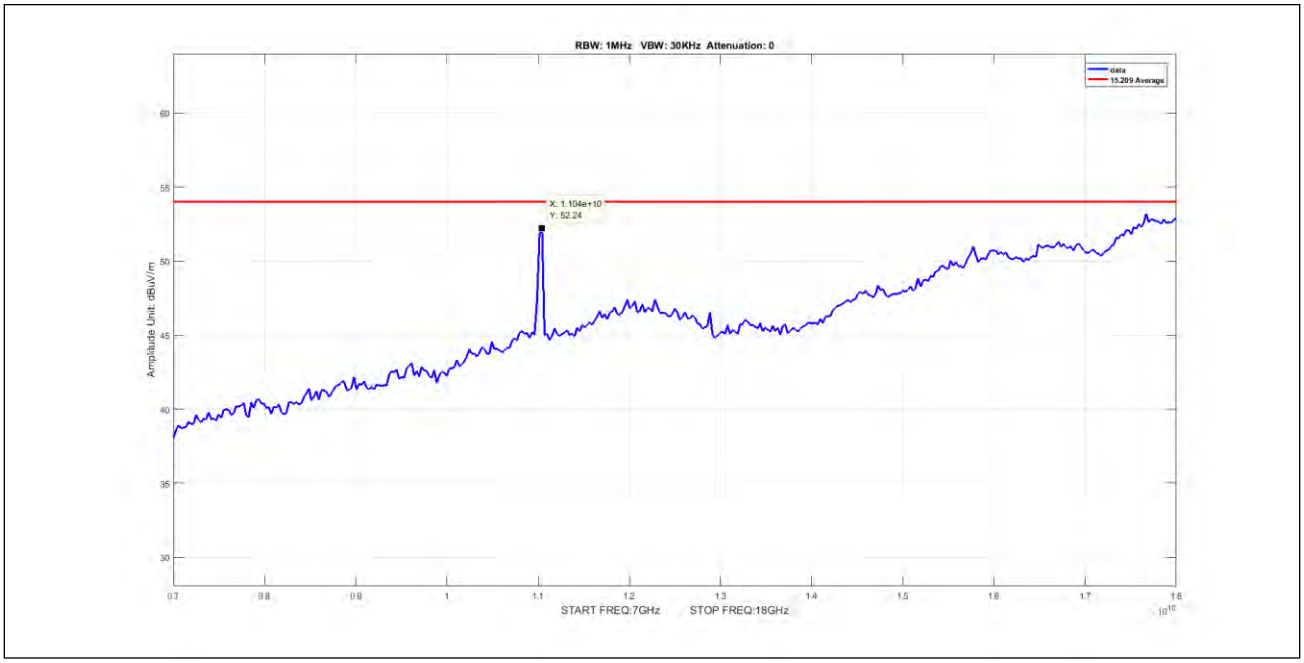
Plot 214. Undesirable Emissions, Peak Spurious Emission 1-7GHz, BW 80M, Ch 5610M, AC Mode ANT 0 (worst-case) V



Plot 215. Undesirable Emissions, Peak Spurious Emission 7-18GHz, BW 80M, Ch 5610M, AC Mode ANT 0 (worst-case) V



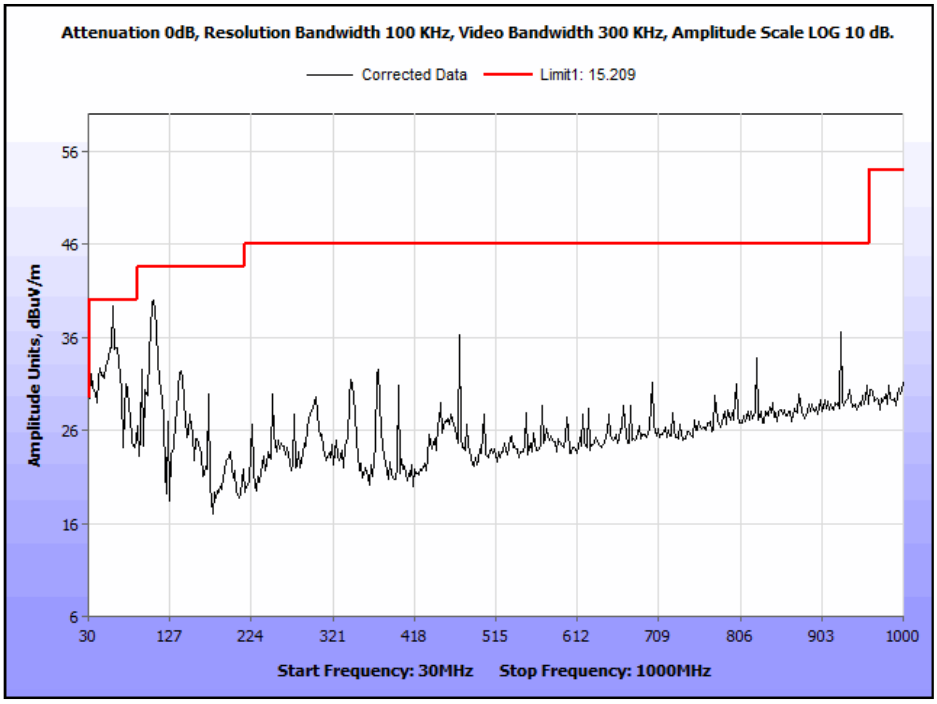
Plot 216. Undesirable Emissions, Peak Spurious Emission 1-7GHz, BW 80M, Ch 5690M, AC Mode ANT 0 (worst-case) V



Plot 217. Undesirable Emissions, Peak Spurious Emission 7-18GHz, BW 80M, Ch 5690M, AC Mode ANT 0 (worst-case) V

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected EMI Meter Reading (dBuV)	Antenna Correction Factor (dB/m) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
61.35	295	H	1.3	27.43	8.41	1.31	0.00	37.15	40.00	-2.85
341.68	264	V	1.6	11.85	16.32	2.91	0.00	31.08	46.00	-14.92
362.74	152	H	1.1	12.64	17.23	2.62	0.00	32.49	46.00	-13.51
385.75	326	V	1.7	10.03	17.93	2.84	0.00	30.80	46.00	-15.20
460.23	104	H	1.2	15.85	18.53	3.02	0.00	37.40	46.00	-8.60
923.43	210	V	1	9.34	23.21	4.23	0.00	36.78	46.00	-9.22

Table 12. Power Spectral Density, Test Results



Plot 218. Undesirable Emissions, 30 MHz - 1 GHz (worst-case)

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b)(6) Conducted Emissions

Test Requirement(s): **§ 15.407 (b)(6):** Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

§ 15.207 (a): For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μΩ/50 Σ line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 – 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 13. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a non-metallic table 80 cm tall inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013 " American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices "*. Scans were performed with the transmitter on.

Test Results: The EUT was not applicable with requirements of this section.

EUT utilizes DC power supply.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(f) Maximum Permissible Exposure

Test Requirement(s): **§15.407(f):** U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment.

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

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

MPE Limit: EUT's operating frequencies @ 5250-5350 MHz and 5470 – 5725 MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

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

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

For Antenna Gain → dBi = 10log(Numeric)

Test Results:

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Antenna Gain (dBi)	Antenna Gain (Numeric)	Power Density (mW/cm2)	Limit (mW/cm2)	Margin	Distance (cm)	Result
5500	19.34	85.901	5.0	3.162	0.054	1	0.945	20	Pass

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
1S2399	Turntable Controller	SUNOL SCIENCE	SC99V	See Note	
1S2600	Bilog Antenna	Teseq	CBL6112D	11/28/2018	11/28/2020
1S3835	PSA Spectrum Analyzer	Agilent Technologies	E4448A	04/19/2018	04/19/2020
1S2482A	5 Meter Chamber (FCC)	Panashield	5 Meter Semi-Anechoic Chamber	See Note	
1S2603	Double Ridged Waveguide Horn	ETS-Lindgren	3117	08/09/2018	08/09/2020
1U0258	Spectrum Analyzer	Agilent Technologies	E4407B	02/03/2018	02/03/2020
1S2121	Pre-Amplifier	Hewlett Packard	8449B	See Note	

Table 14. Test Equipment List

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

V. Certification & User's Manual Information

Certification & User's Manual Information

M. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

End of Report