MET Laboratories, Inc. ***Safety Certification - EMI - Telecom Environmental Simulation***

914 WEST PATAPSCO AVENUE ● BALTIMORE, MARYLAND 21230-3432 ● PHONE (410) 354-3300 ● FAX (410) 354-3313
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372
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13301 MCCALLEN PASS ● AUSTIN, TX 78753 ● PHONE (512) 287-2500 ● FAX (512) 287-2513

February 3, 2017

Vuzix Corporation
25 Hendrix Road
West Henrietta, NY 14586

Dear Devrin Talen,

Enclosed is the EMC Wireless test report for compliance testing of the Vuzix Corporation, M300 as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15.407, Subpart E (UNII 2).

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

Sincerely yours,
MET LABORATORIES, INC.

Donald Daniels
Documentation Department

Reference: (\Vuzix Corporation\EMC91667-FCC407 UNII 2 Rev. 4)

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Electromagnetic Compatibility Criteria
Test Report

for the

Vuzix Corporation
Model M300

Tested under
The FCC Certification Rules
contained in
Title 47 of the CFR
15.407 Subpart E

MET Report: EMC91667-FCC407 UNII 2 Rev. 4

February 3, 2017

Prepared For:

Vuzix Corporation
25 Hendrix Road
West Henrietta, NY 14586

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

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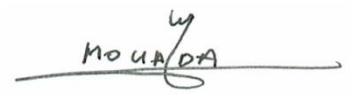

Djed Mouada, Project Engineer
Electromagnetic Compatibility Lab

Donald Daniels
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 15.407 of the FCC Rules under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	January 6, 2017	Initial Issue.
1	January 11, 2017	Addition of FCC ID
2	January 25, 2017	Engineer corrections.
3	February 2, 2017	Engineer corrections.
4	February 3, 2017	Plots added.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
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 Vuzix Corporation M300, 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 M300. Vuzix Corporation should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the M300, 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 Vuzix Corporation, purchase order number 507684. All tests were conducted using measurement procedure ANSI C63.4-2014.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Complaint
§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
15.40 (h)(2)	U-NII DFS Client tests	Compliant
§15.407(f)	RF Exposure	Compliant

Table 1. Executive Summary of EMC Part 15.407 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Vuzix Corporation to perform testing on the M300, under Vuzix Corporation's purchase order number 507684.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Vuzix Corporation M300.

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

Model(s) Tested:	M300	
Model(s) Covered:	M300	
EUT Specifications:	Primary Power: DC Battery	
	FCC ID: 2AA9D-446	
	Type of Modulations:	OFDM
	Equipment Code:	NII
	Peak RF Output Power:	23.06
	EUT Frequency Ranges:	5250-5350MHz 5500-5720MHz
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:	Djed Mouada	
Report Date(s):	February 3, 2017	

Table 2. EUT Summary

B. References

CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
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

Table 3. References

C. Test Site

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

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

D. Description of Test Sample

The Vuzix Corporation M300, Equipment Under Test (EUT), is a smart glasses device that is worn on the head. The device includes a display, processor, camera, speaker, and wireless connectivity, and runs the Android operating system. The user runs applications on the device that assist them in their job or provide environmental information.
The M300 must always be connected to an external battery pack. The connection is a custom 8-pin cable designed by Vuzix that connects the M300 to custom battery packs. The default battery pack is an 860 mAh cell with onboard electronics to monitor state of charge and provide battery charging over USB.

E. Equipment Configuration

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
A		Smart Glasses	M300	446MA0101	TBD	3
B		Vuzix Power Cable		446CA0002	N/A	1
C		Glasses Battery Pack		446MA0116	TBD	2
D		Glasses Frames		446MA0123	N/A	1

Table 4. Equipment Configuration

F. 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
E	USB Cable			Not Applicable
F	Laptop	Lenovo		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 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded ? (Y/N)	Termination Box ID & Port Name
1	8-pin Connector	Vuzix 8-pin Cable	1	30"		Yes	8-pin Connector on Battery
2	USB Micro A/B	USB A to Micro-B	1	2	2	Yes	Laptop

Table 6. Ports and Cabling Information

H. Mode of Operation

Non-wireless test mode: The M300 will enable all peripherals, including the camera, flash, display, orientation sensors, proximity sensors, battery charging and communication with the battery pack. The M300 will stay in this mode until explicitly disabled.

Bluetooth test mode: The M300 will be configured to continuously transmit either in normal or hop mode via a test application.

WiFi test mode: The M300 will be configured to continuously transmit with modulation applied with the ability to change channels as well as changing between B, G, N, and AC modes via a test application.

I. Method of Monitoring EUT Operation

1: The unit will continue to display the camera feed and show the sensor readouts in the display.
2: Any other condition or sensor readout will say FAIL.

J. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Vuzix Corporation 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. EUT has integral Antennas

Test Engineer(s): Djed Mouada

Test Date(s): December 19 to December 23, 2016

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 403(i) 26dB Bandwidth

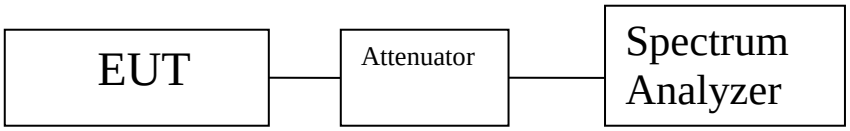
Test Requirements: **§ 15.403(i):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of 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 percent of the emission bandwidth of the device under measurement.

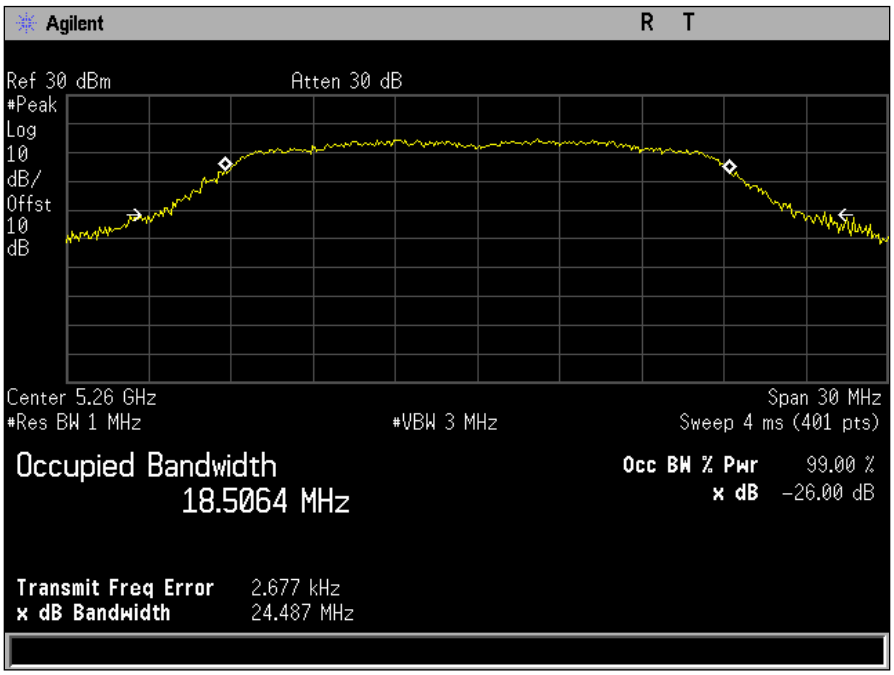
Test Procedure: The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the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

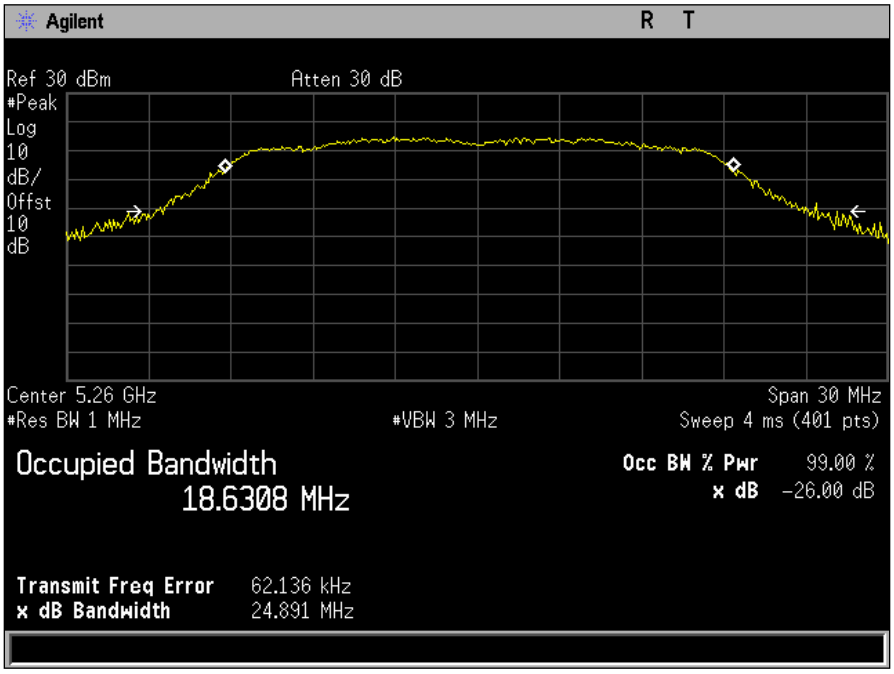
Test Engineer(s): Djed Mouada

Test Date(s): December 19 to December 23, 2016

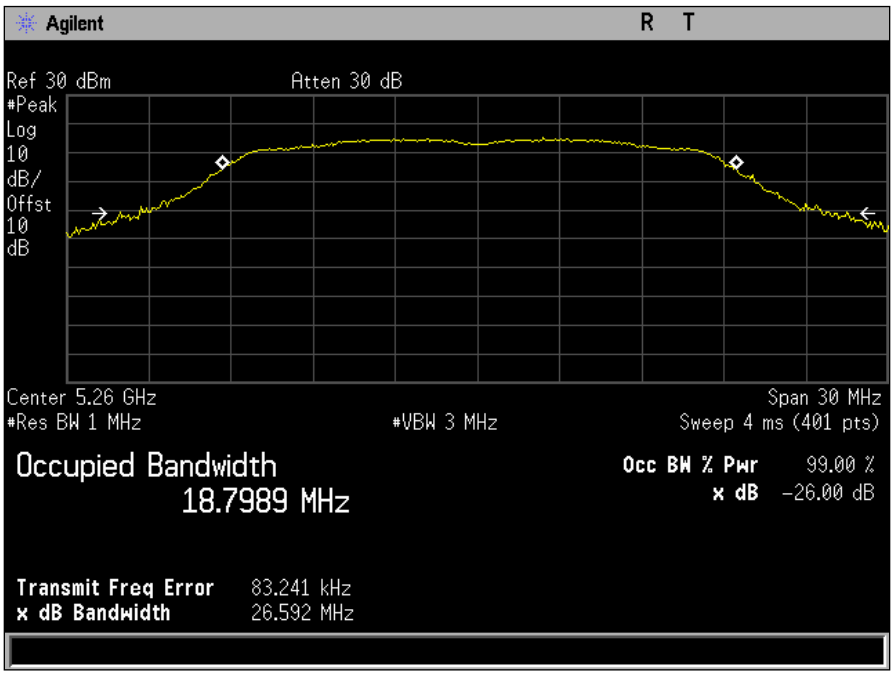




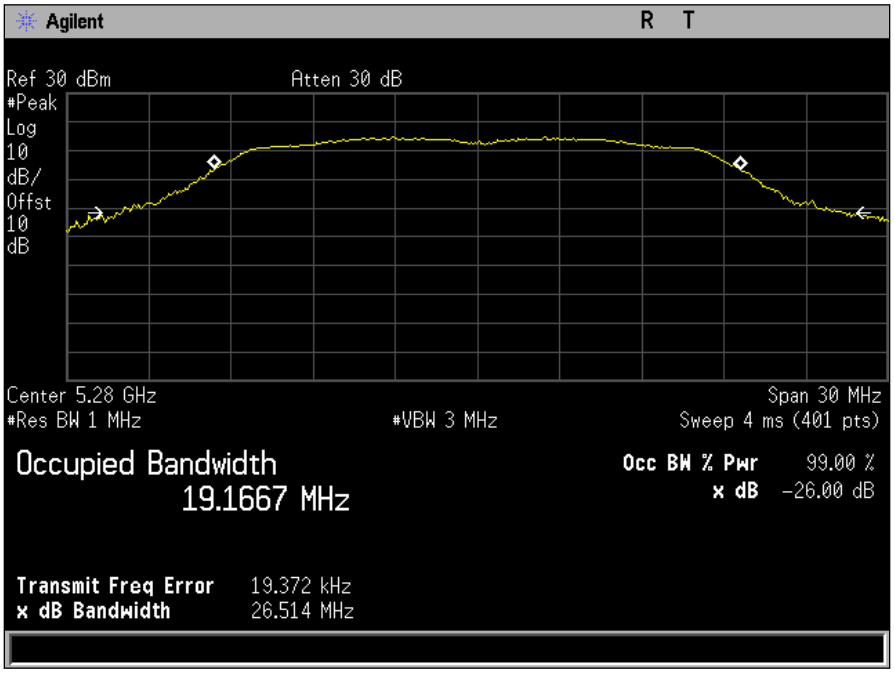
Plot 1. Occupied Bandwidth, OBW, -26dB, BW 20M, Ch 5260M, A Mode



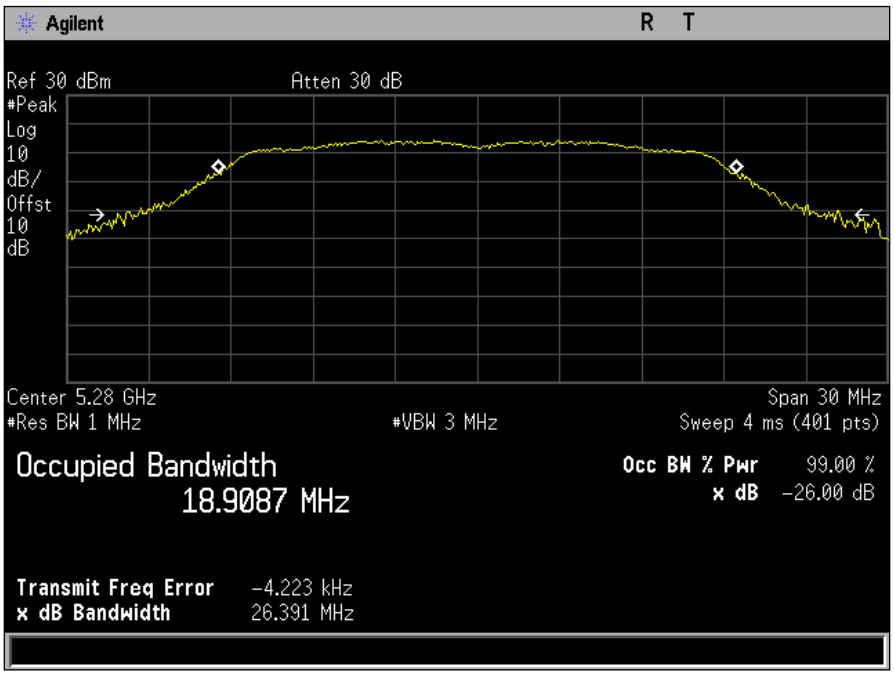
Plot 2. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5260M, AC Mode



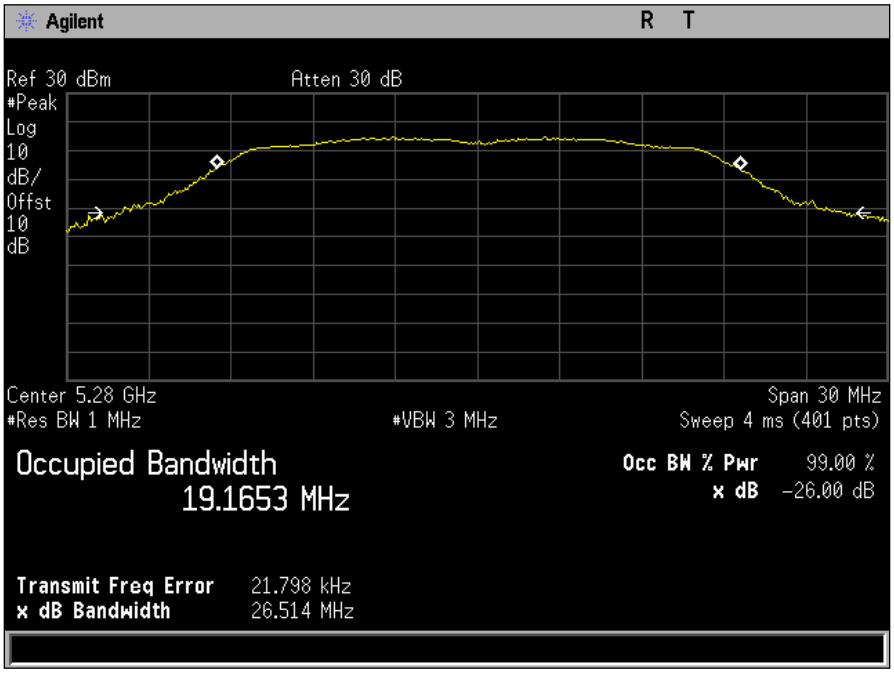
Plot 3. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5260M, N Mode



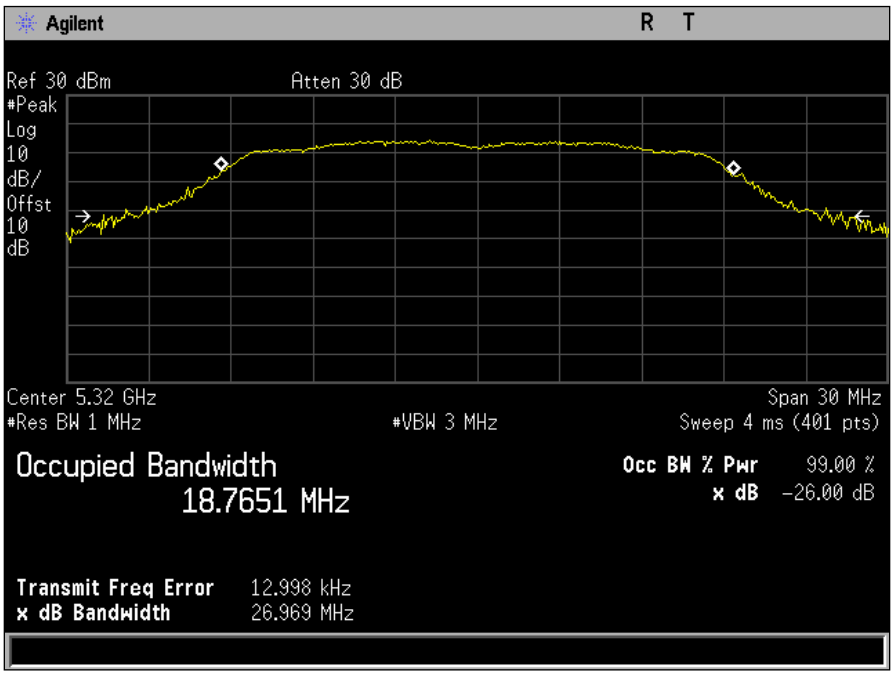
Plot 4. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5280M, A Mode



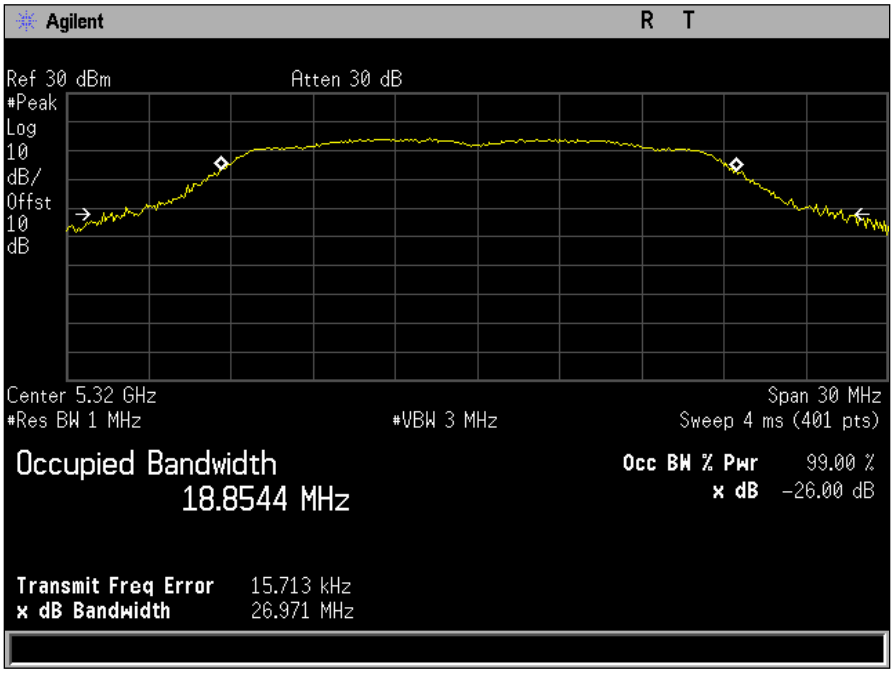
Plot 5. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5280M, AC Mode



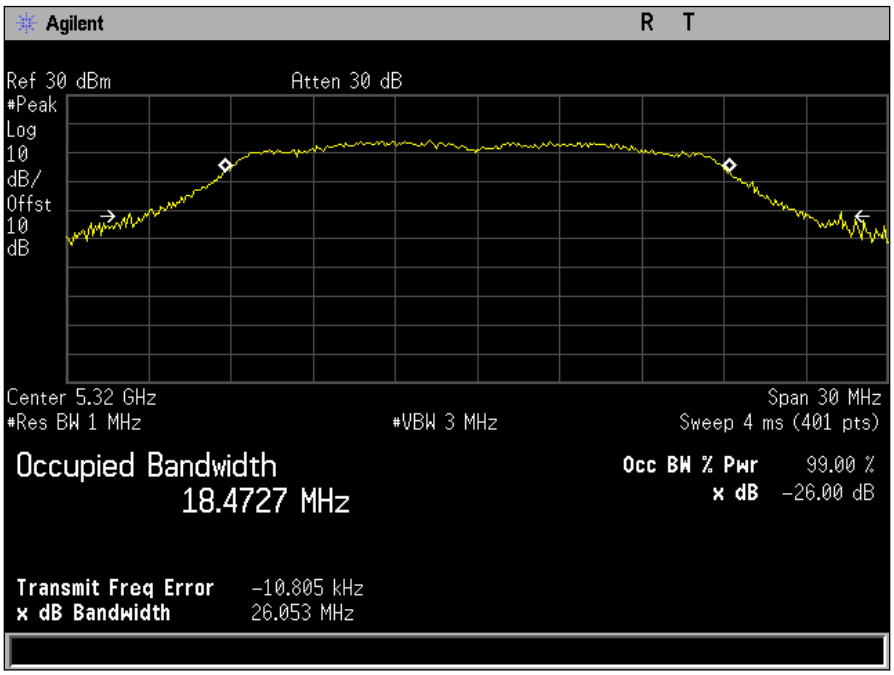
Plot 6. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5280M, N Mode



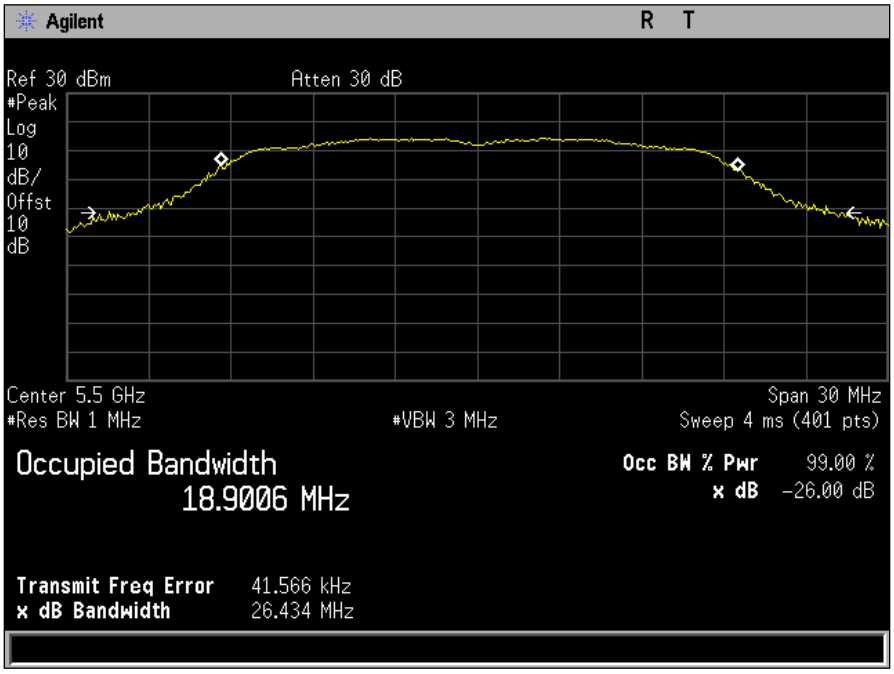
Plot 7. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5320M, A Mode



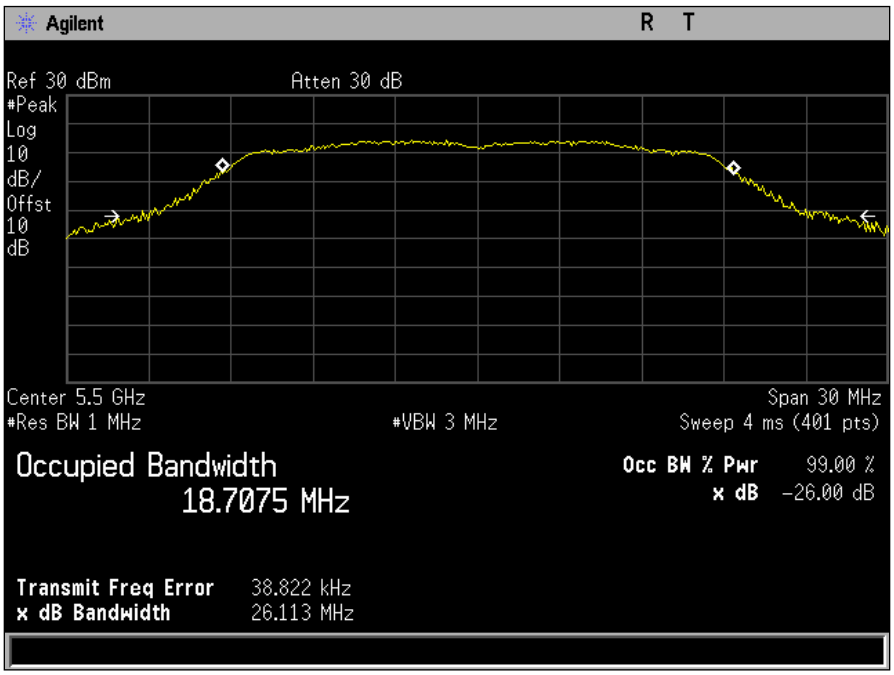
Plot 8. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5320M, AC Mode



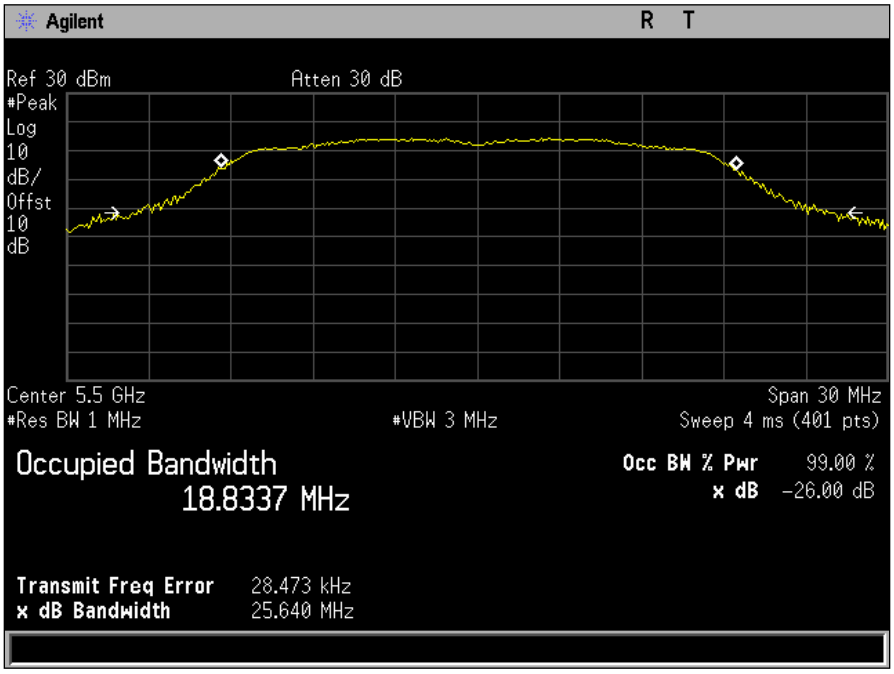
Plot 9. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5320M, N Mode



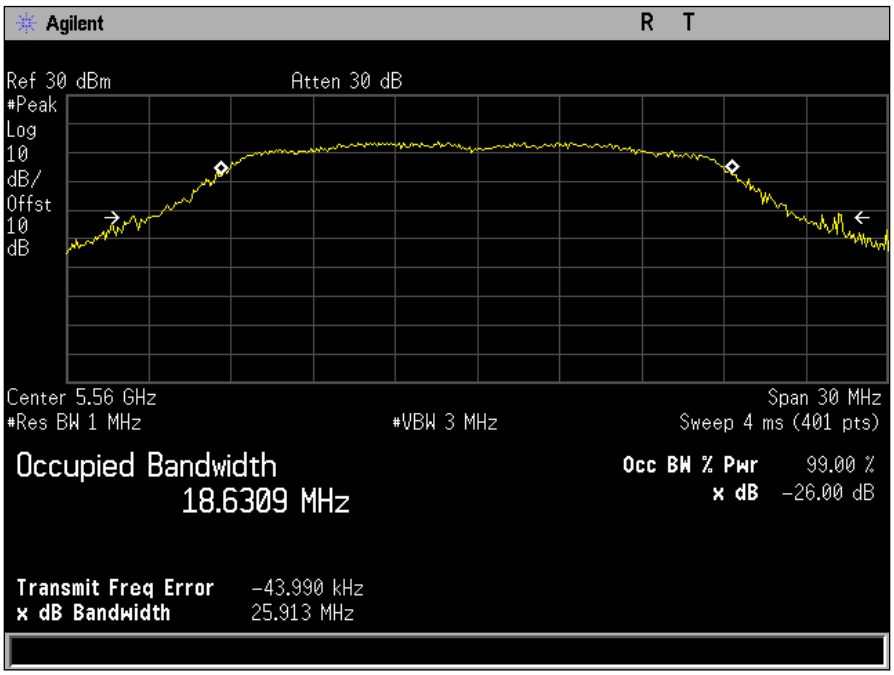
Plot 10. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5500M, A Mode



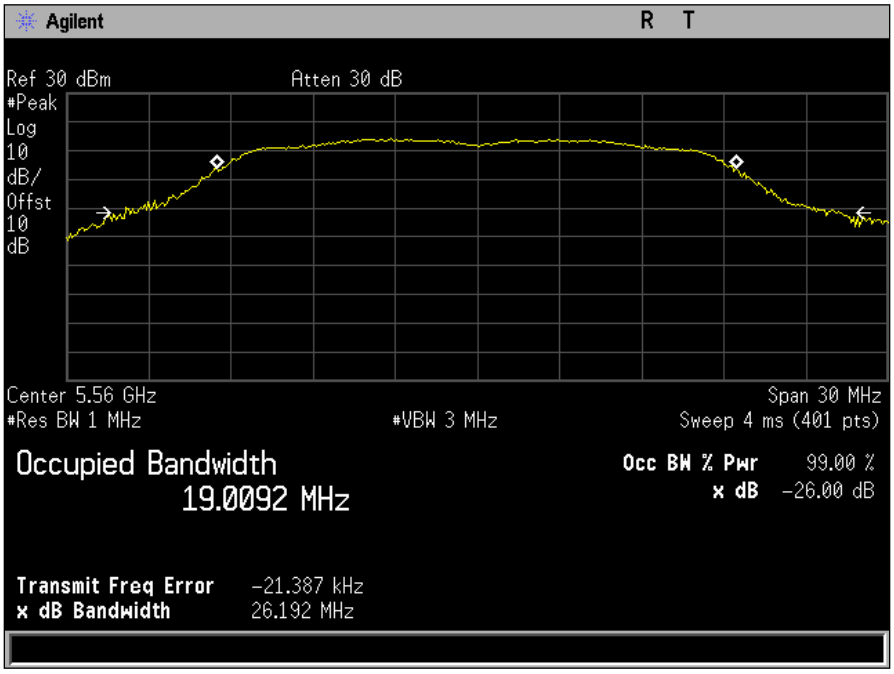
Plot 11. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5500M, AC Mode



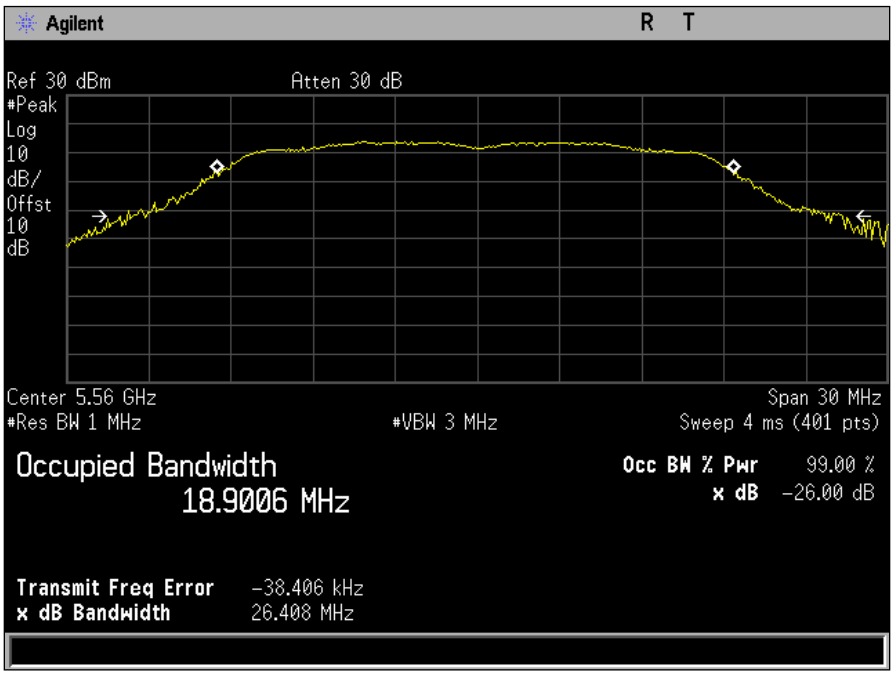
Plot 12. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5500M, N Mode



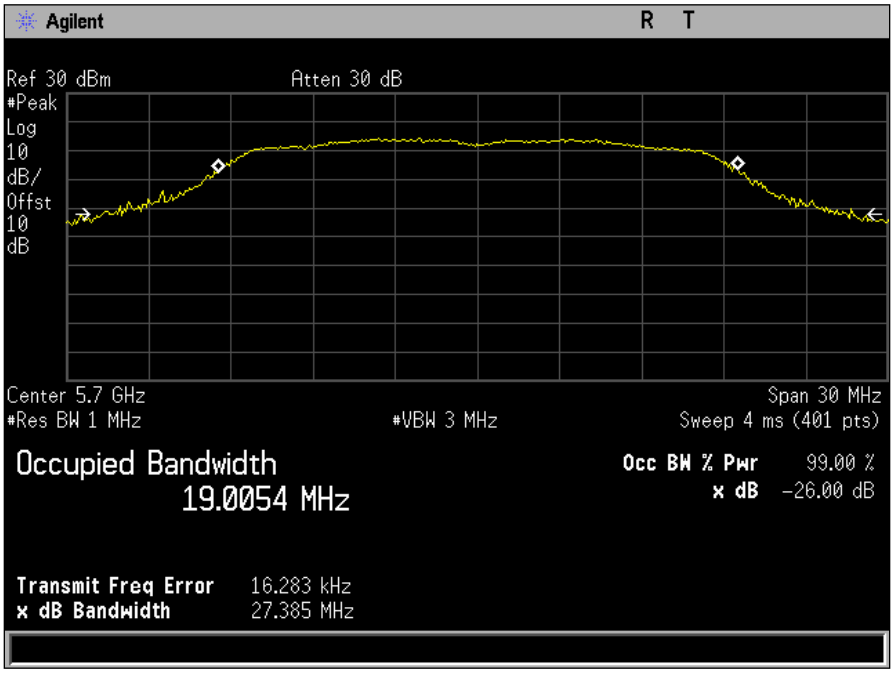
Plot 13. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5560M, A Mode



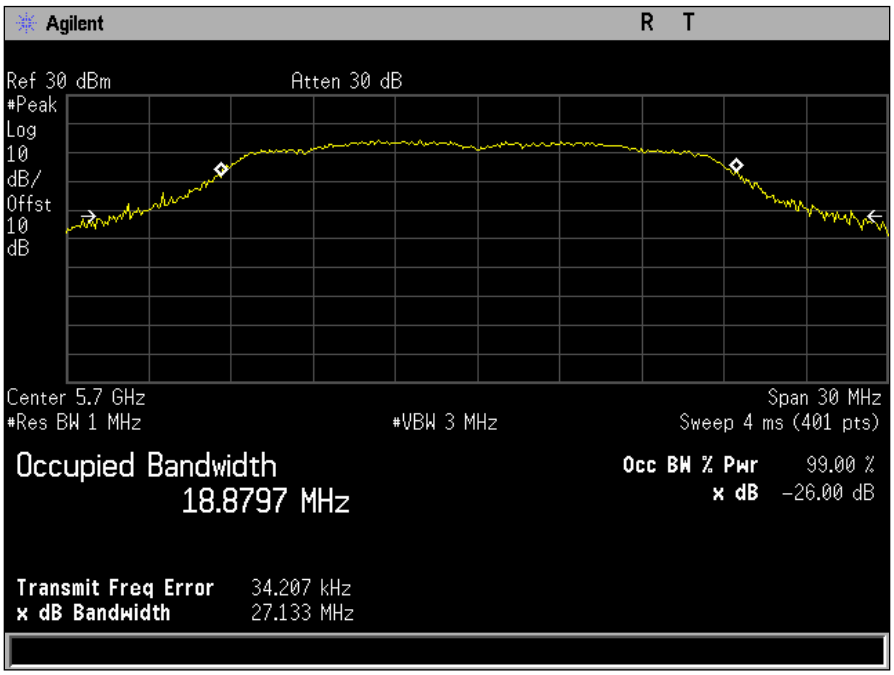
Plot 14. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5560M, AC Mode



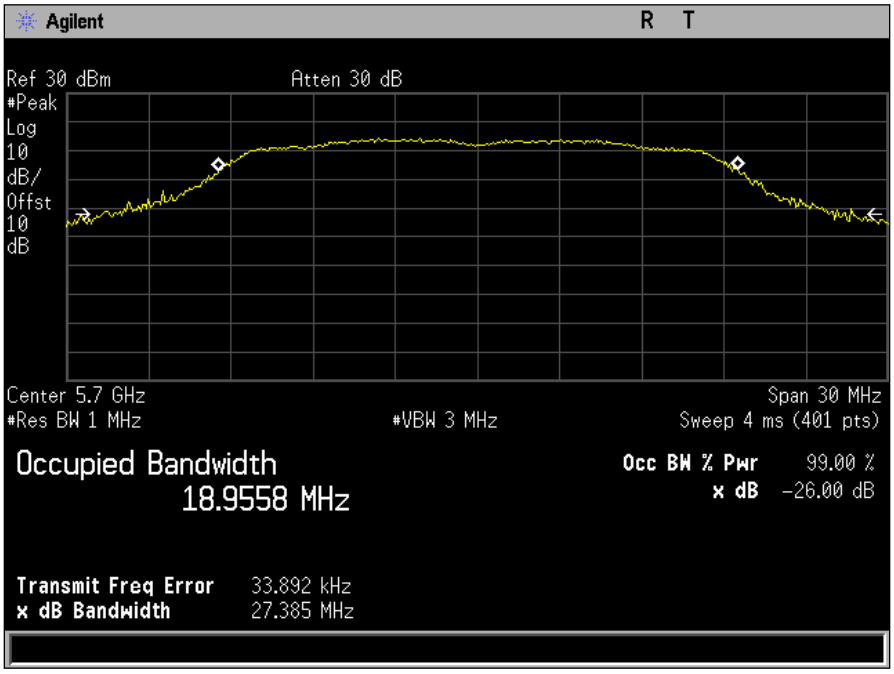
Plot 15. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5560M, N Mode



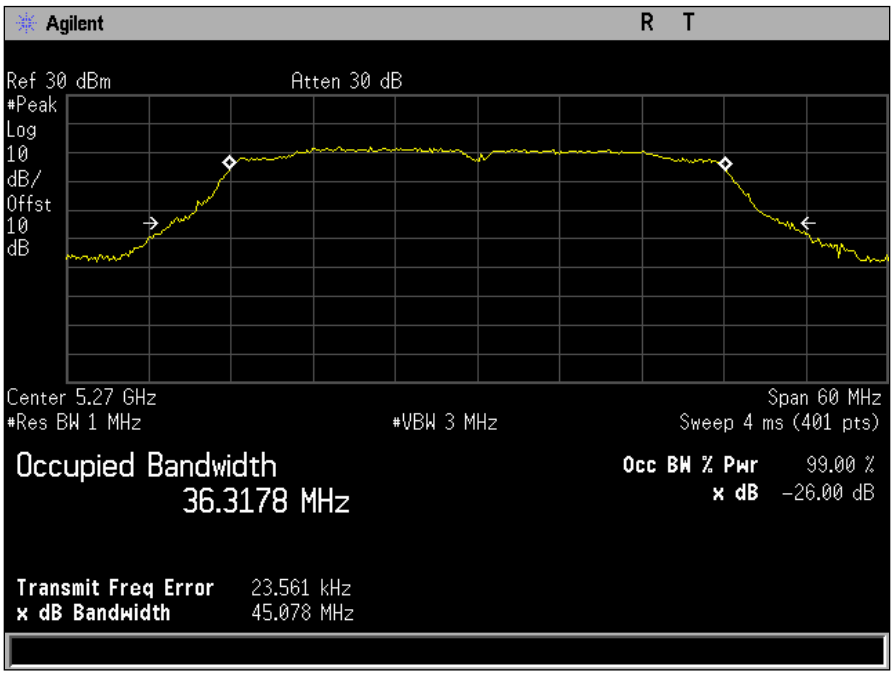
Plot 16. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5700M, A Mode



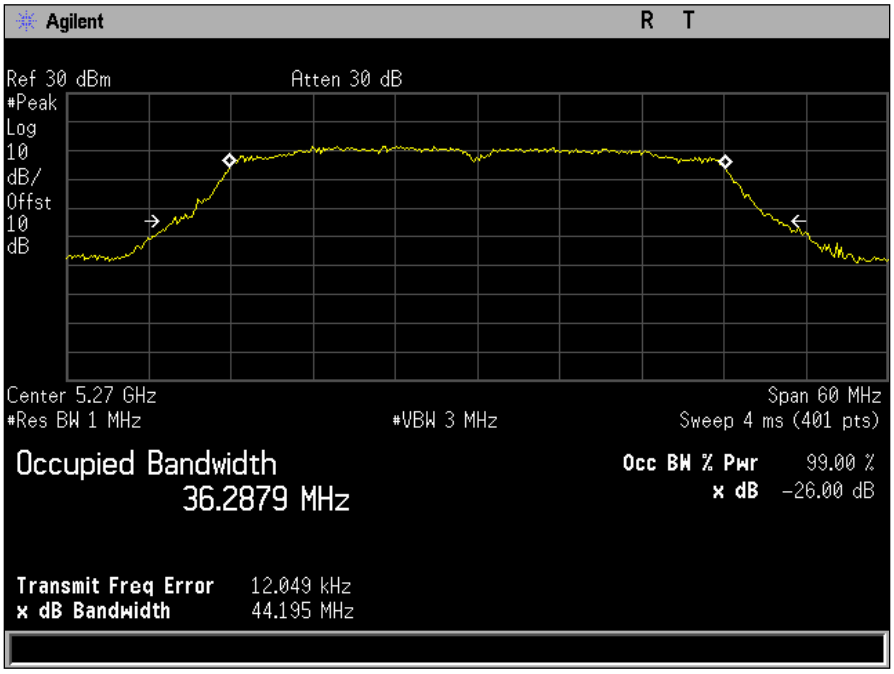
Plot 17. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5700M, AC Mode



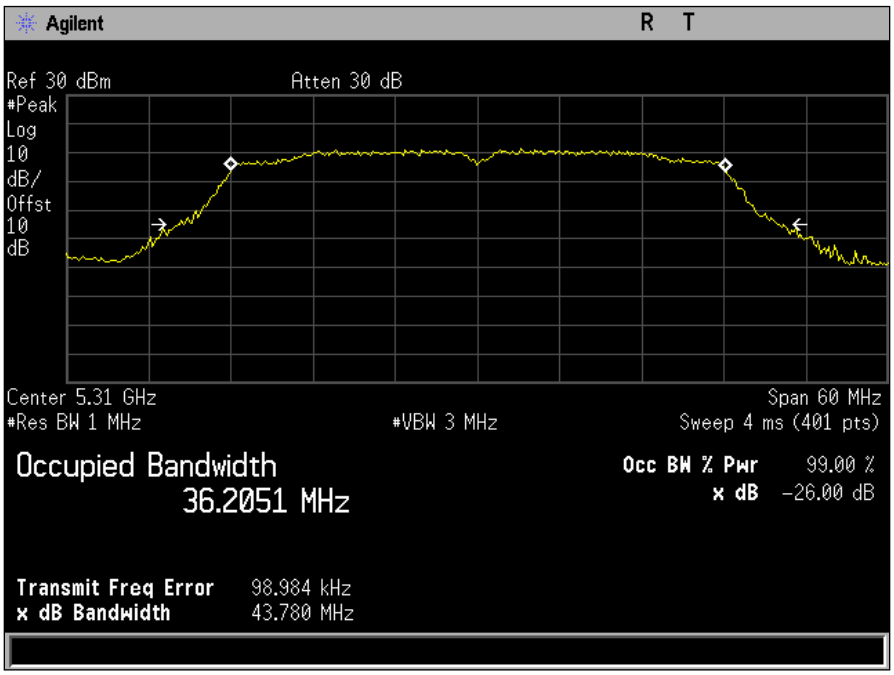
Plot 18. Occupied Bandwidth, OBW, 26dB, BW 20M, Ch 5700M, N Mode



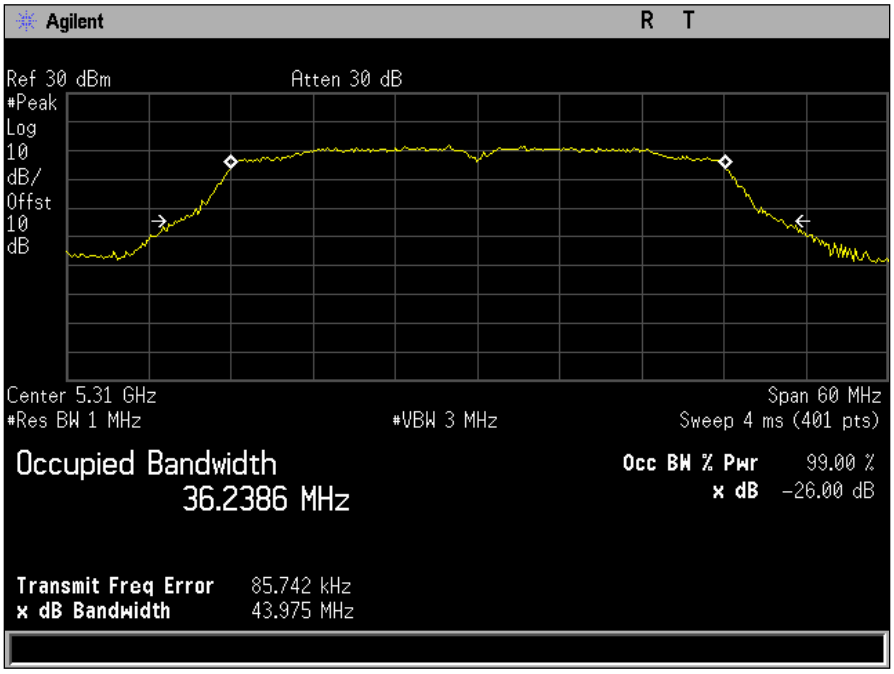
Plot 19. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5270M, AC Mode



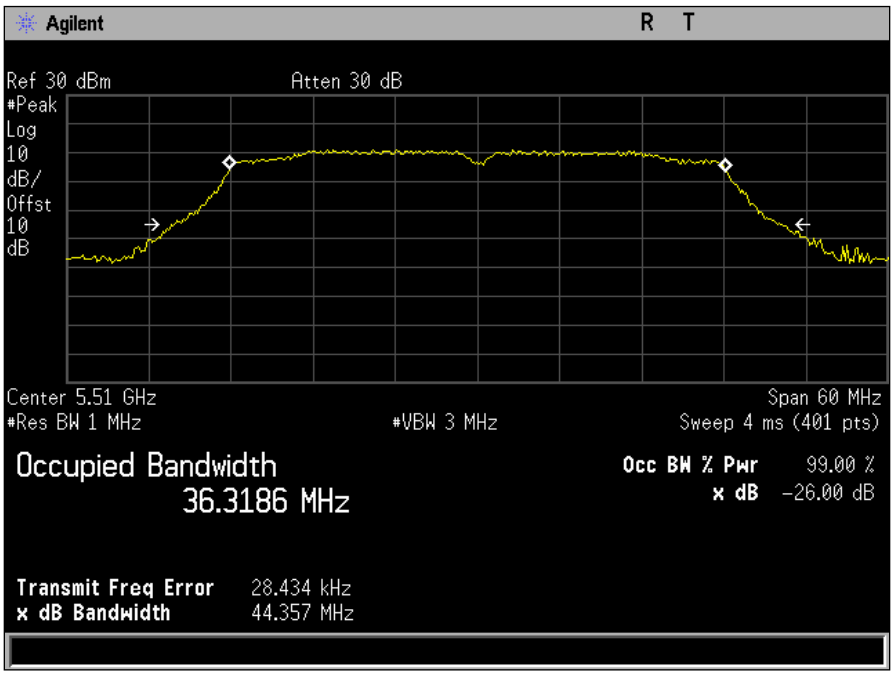
Plot 20. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5270M, N Mode



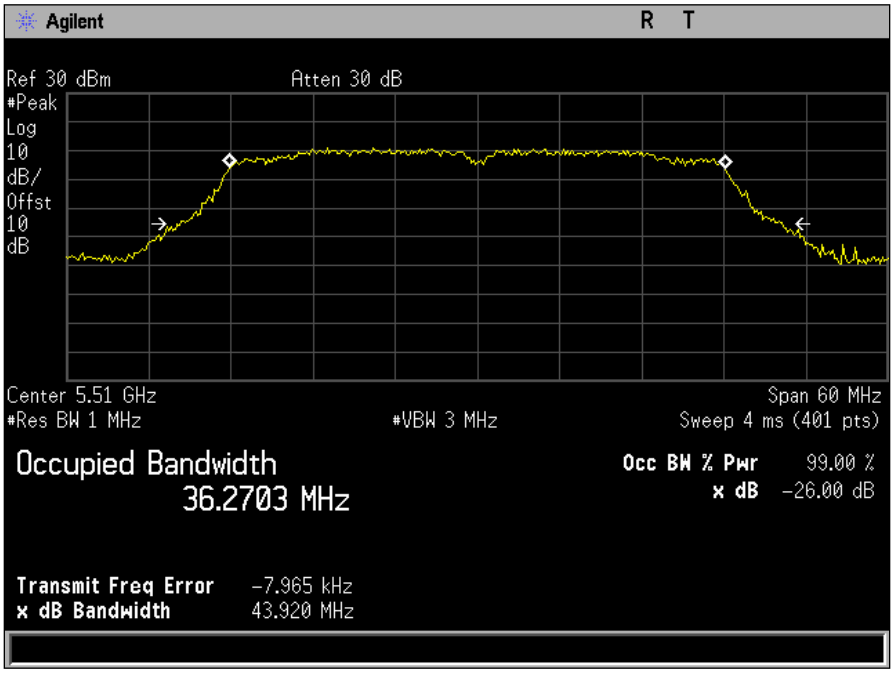
Plot 21. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5310M, AC Mode



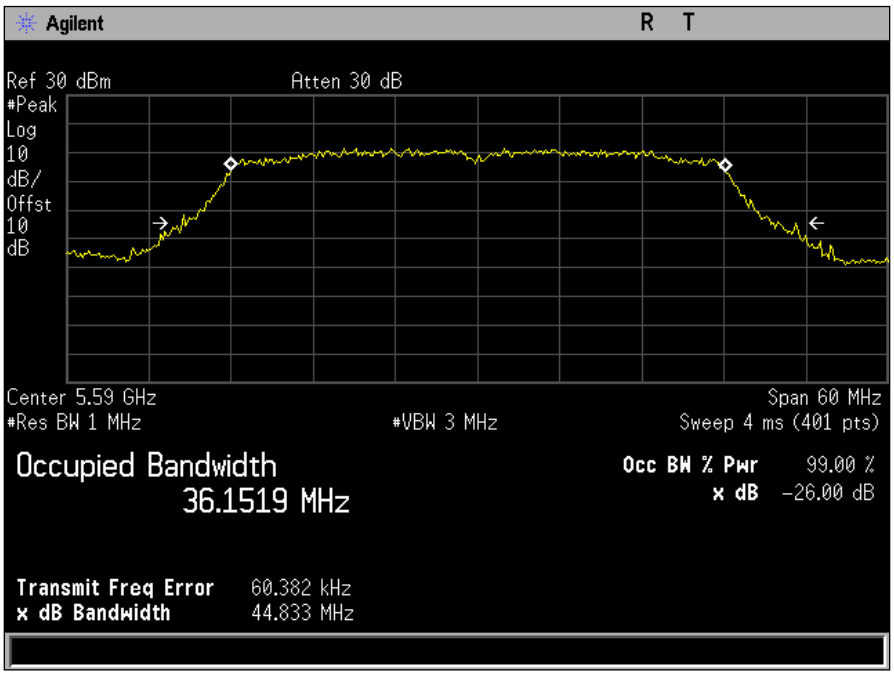
Plot 22. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5310M, N Mode



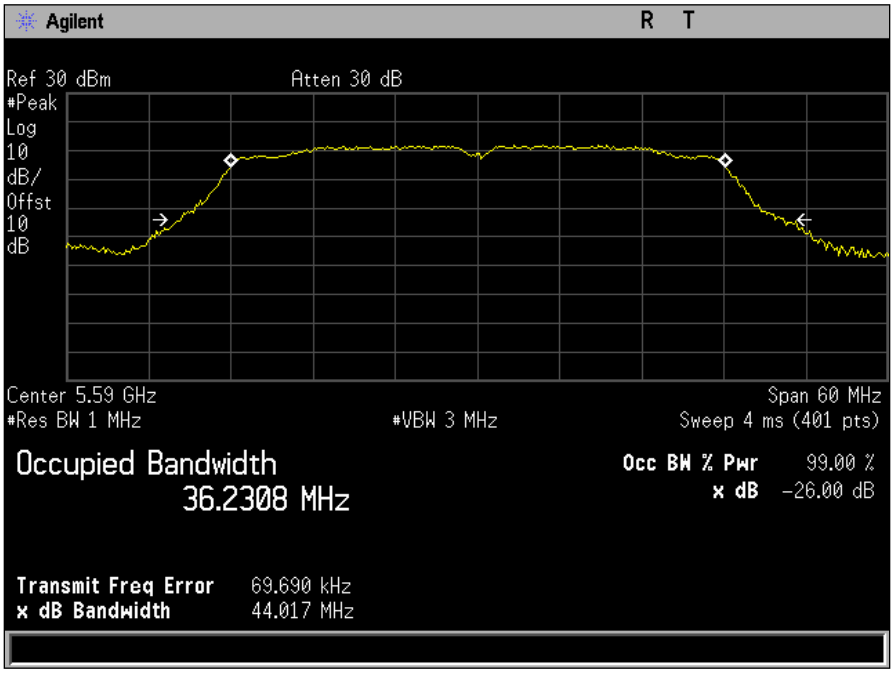
Plot 23. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5510M, AC Mode



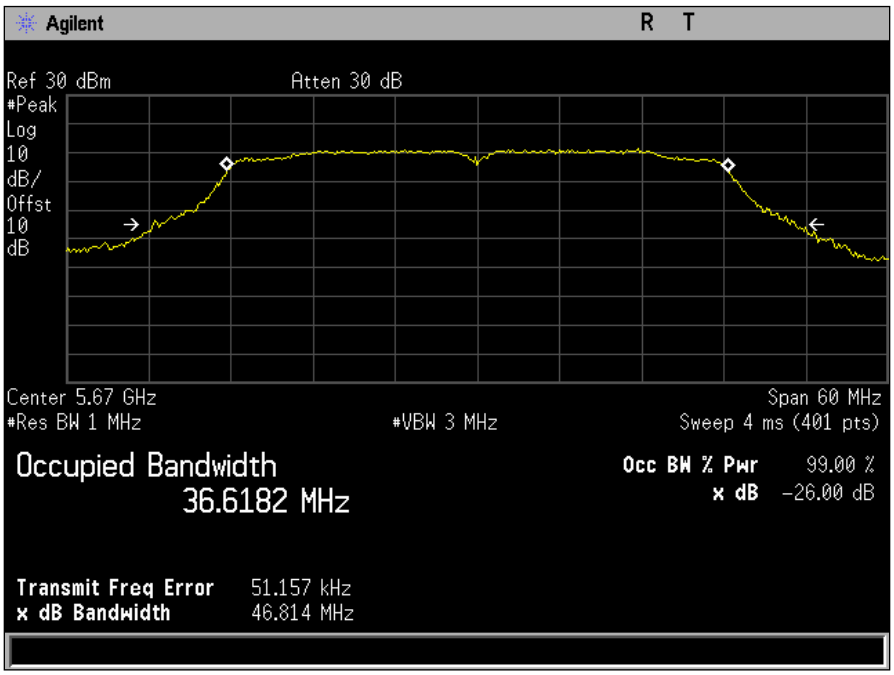
Plot 24. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5510M, N Mode



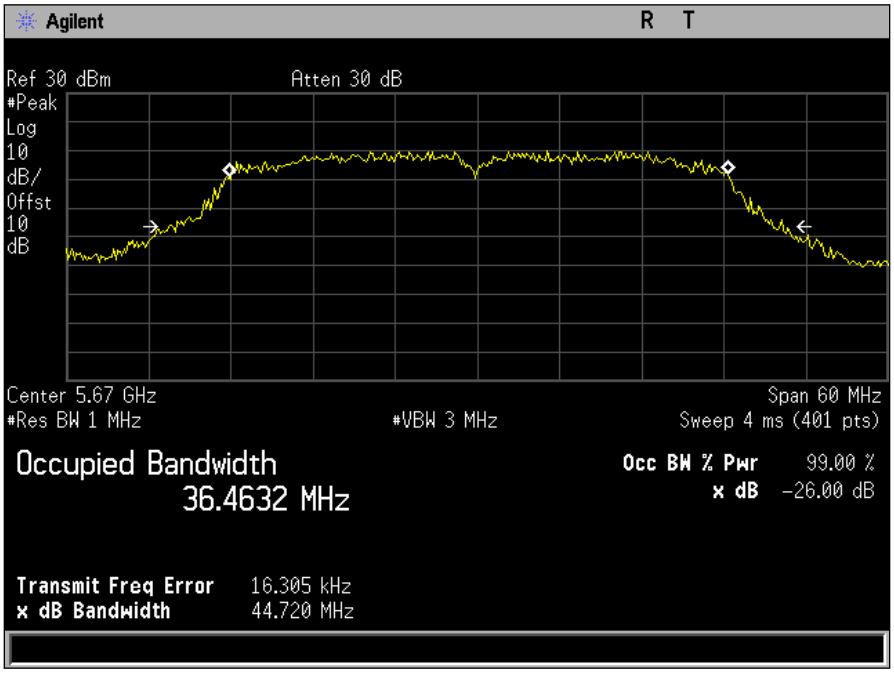
Plot 25. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5590M, AC Mode



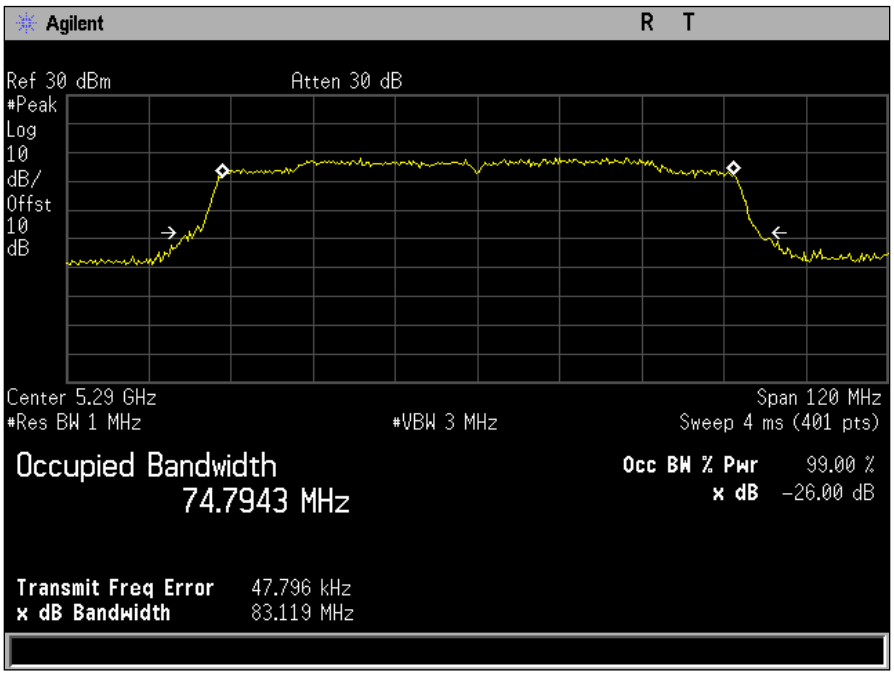
Plot 26. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5590M, N Mode



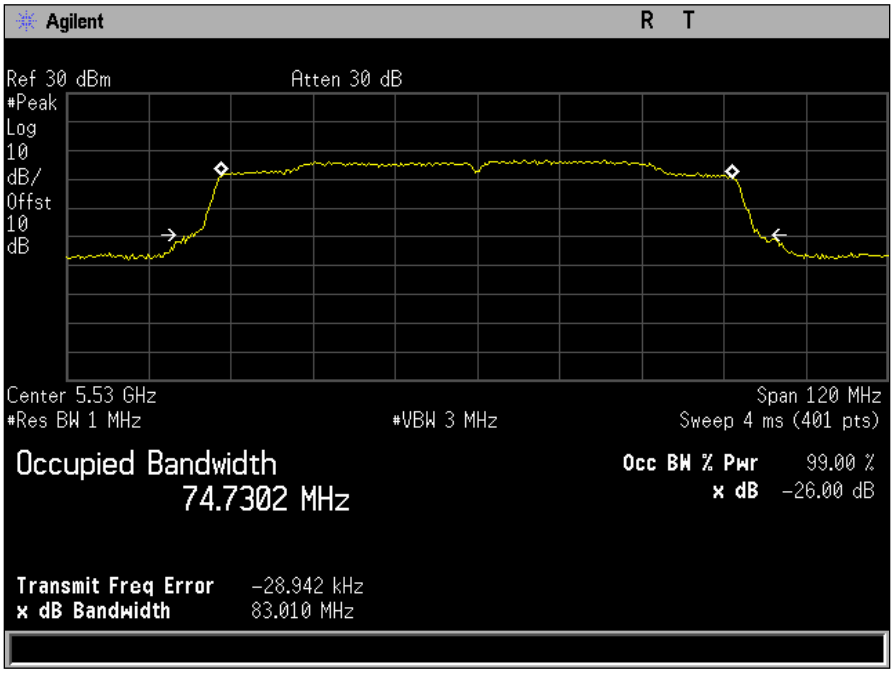
Plot 27. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5670M, AC Mode



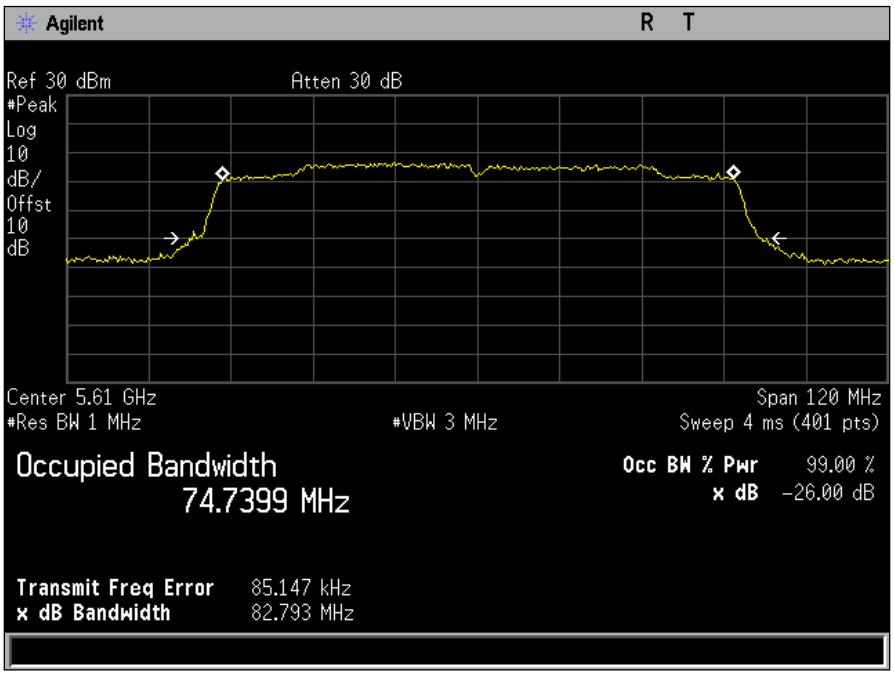
Plot 28. Occupied Bandwidth, OBW, 26dB, BW 40M, Ch 5670M, N Mode



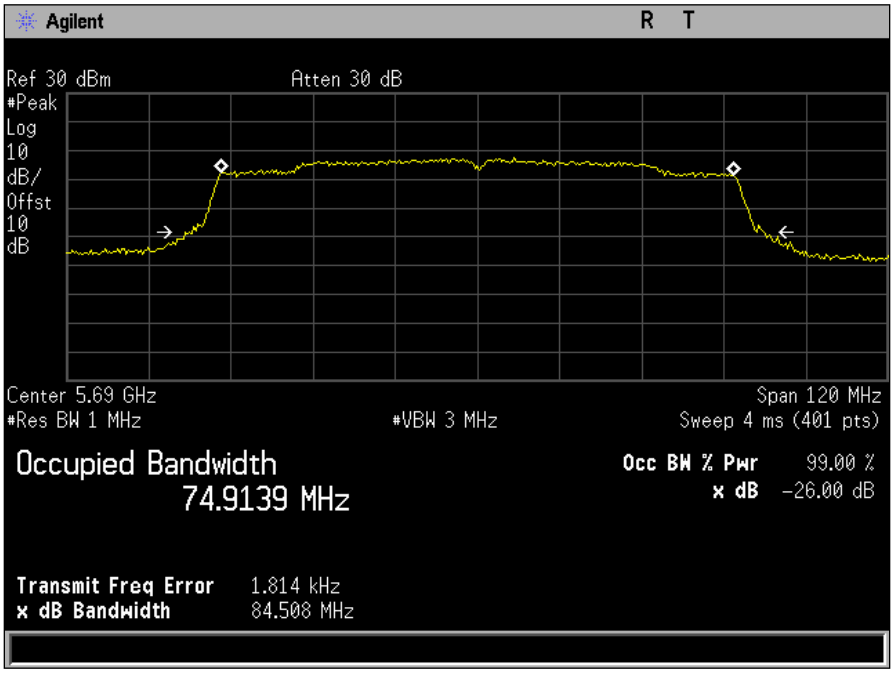
Plot 29. Occupied Bandwidth, OBW, 26dB, BW 80M, Ch 5290M, AC Mode



Plot 30. Occupied Bandwidth, OBW, 26dB, BW 80M, Ch 5530M, AC Mode



Plot 31. Occupied Bandwidth, OBW, 26dB, BW 80M, Ch 5610M, AC Mode



Plot 32. Occupied Bandwidth, OBW, 26dB, BW 80M, Ch 5690M, AC Mode

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.

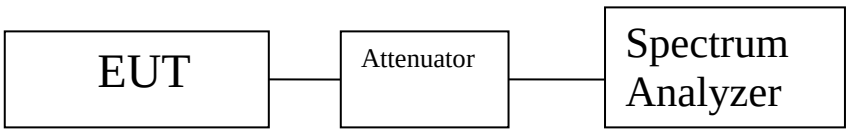
Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according to measurement method SA-1, as described in 789033 D02 General UNII Test Procedures v01.

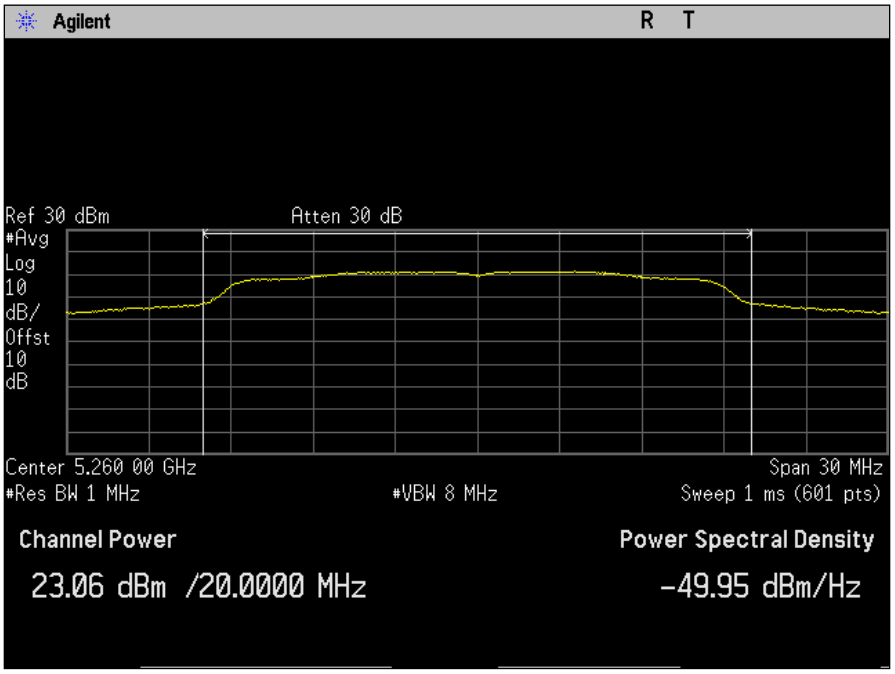
To verify the TPC requirement of the rule part, observations using the same measurement method were made with the EUT set to a lower power setting.

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

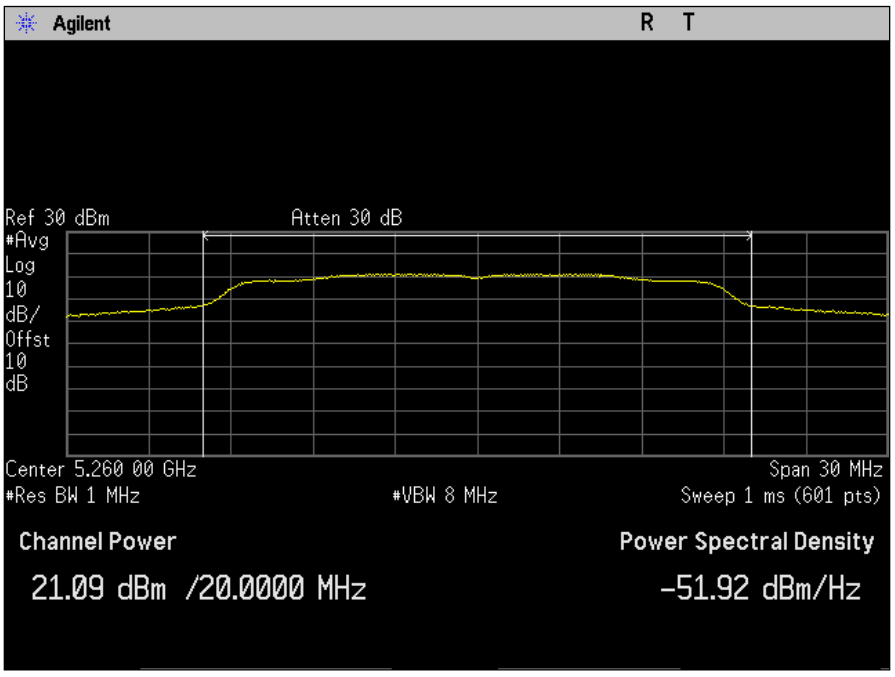
Test Engineer(s): Djed Mouada

Test Date(s): December 19 to December 19, 2016

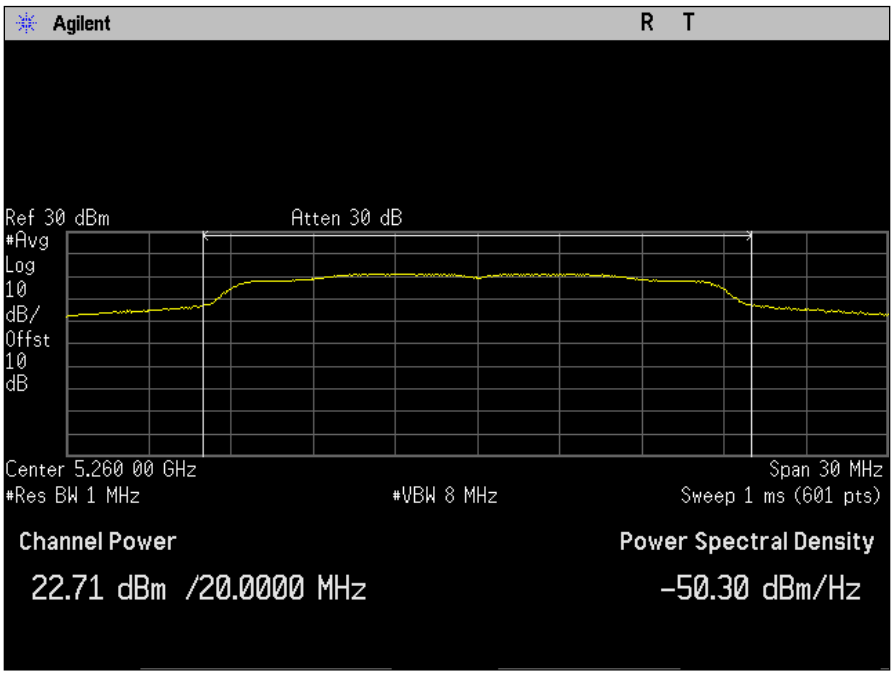




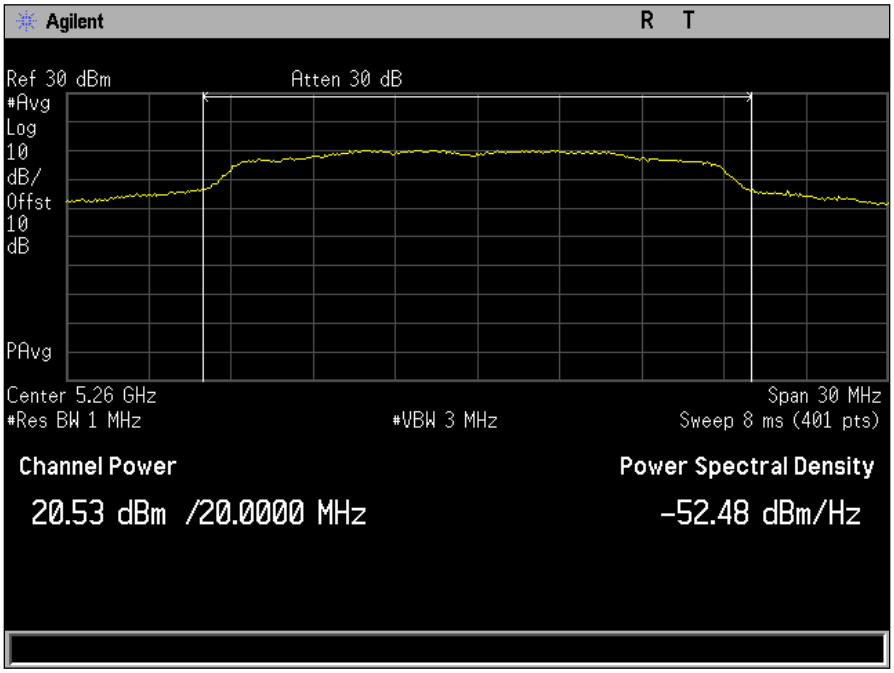
Plot 33. Maximum Conducted Output Power, BW 20M, Ch 5260M, A Mode, Port B



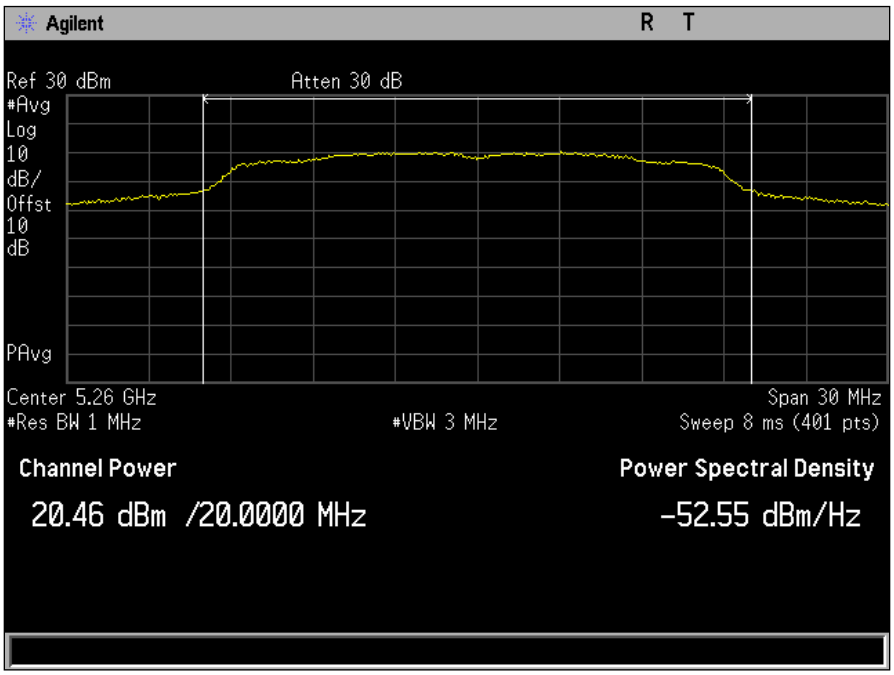
Plot 34. Maximum Conducted Output Power, BW 20M, Ch 5260M, AC Mode, Port B



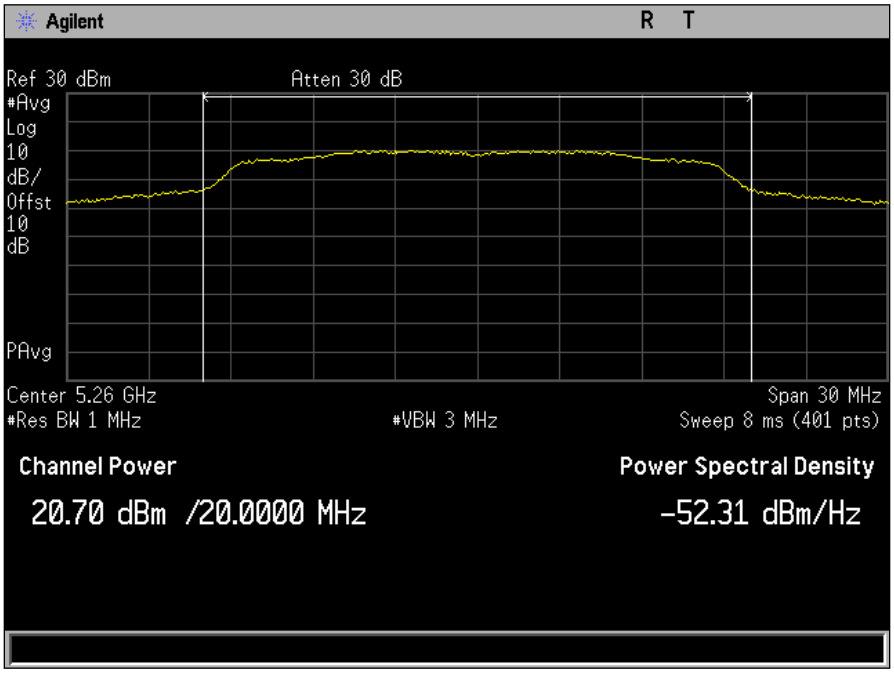
Plot 35. Maximum Conducted Output Power, BW 20M, Ch 5260M, N Mode, Port B



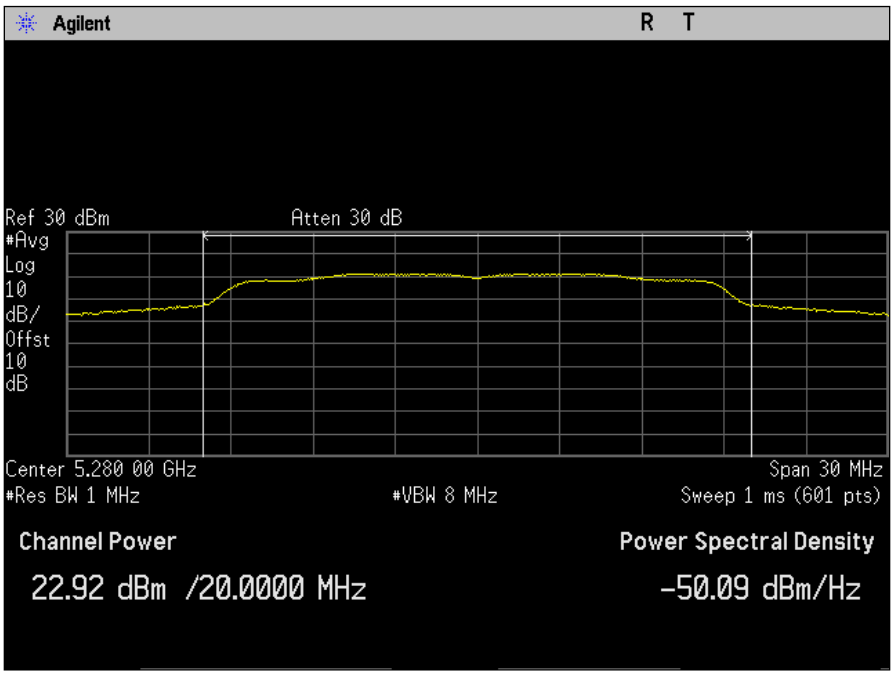
Plot 36. Maximum Conducted Output Power, BW 20M, Ch 5260M, A Mode, Port A



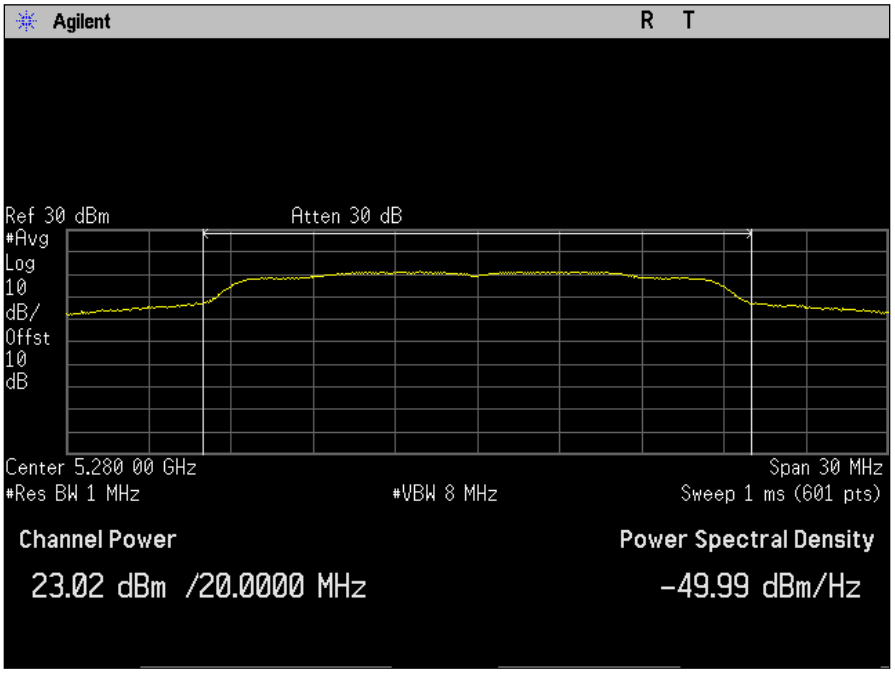
Plot 37. Maximum Conducted Output Power, BW 20M, Ch 5260M, AC Mode, Port A



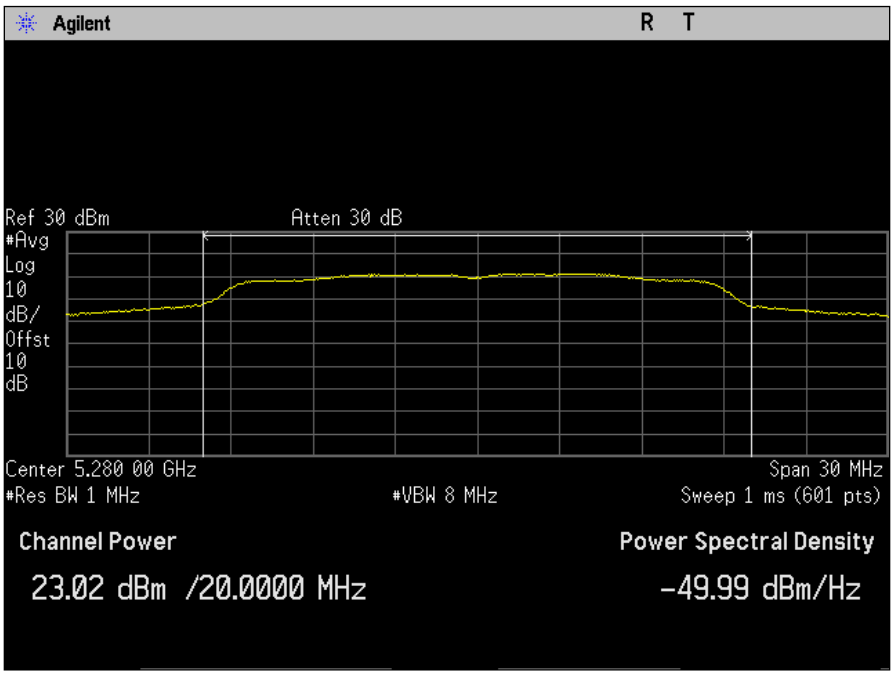
Plot 38. Maximum Conducted Output Power, BW 20M, Ch 5260M, N Mode, Port A



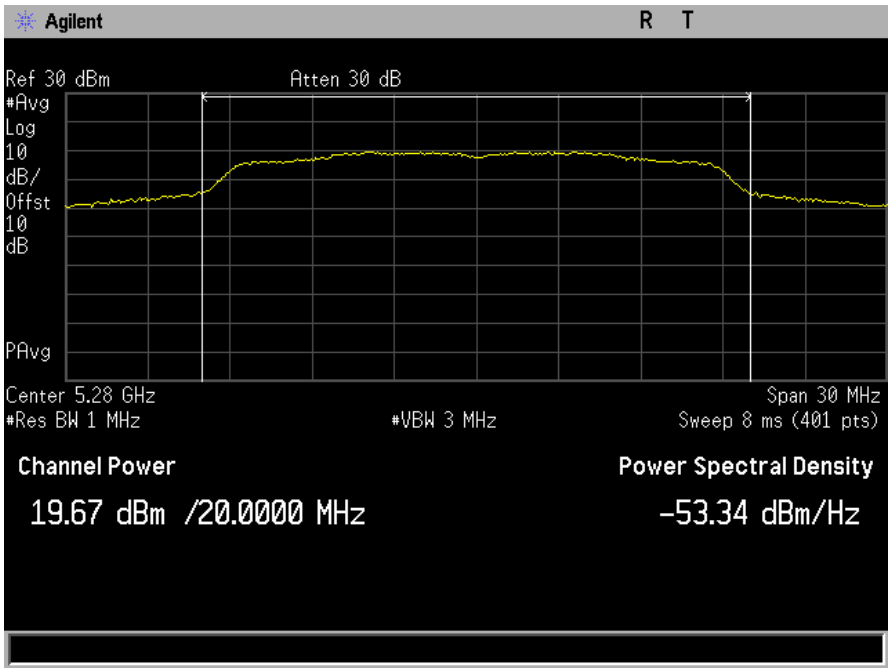
Plot 39. Maximum Conducted Output Power, BW 20M, Ch 5280M, A Mode, Port B



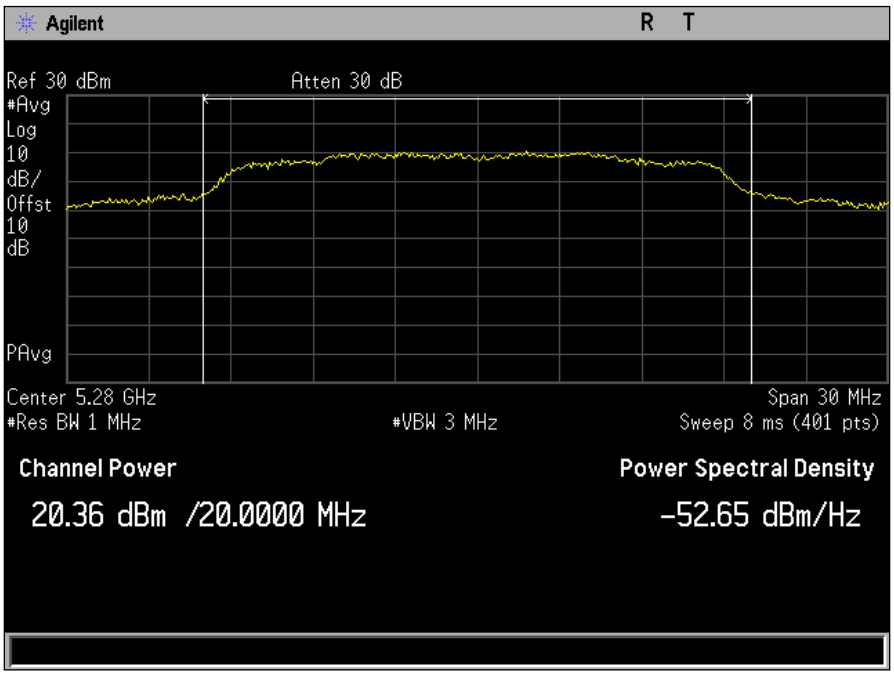
Plot 40. Maximum Conducted Output Power, BW 20M, Ch 5280M, AC Mode, Port B



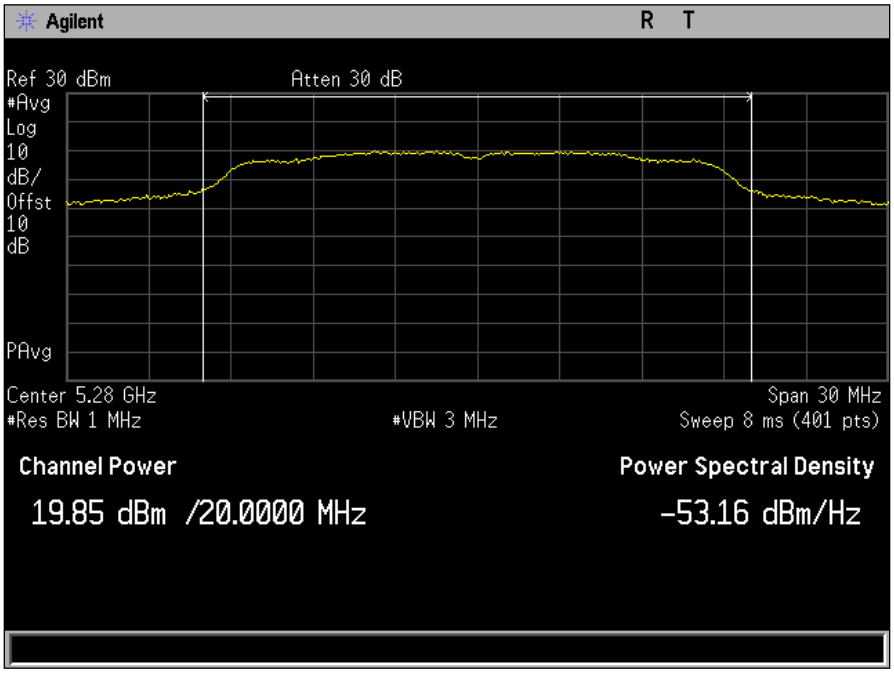
Plot 41. Maximum Conducted Output Power, BW 20M, Ch 5280M, N Mode, Port B



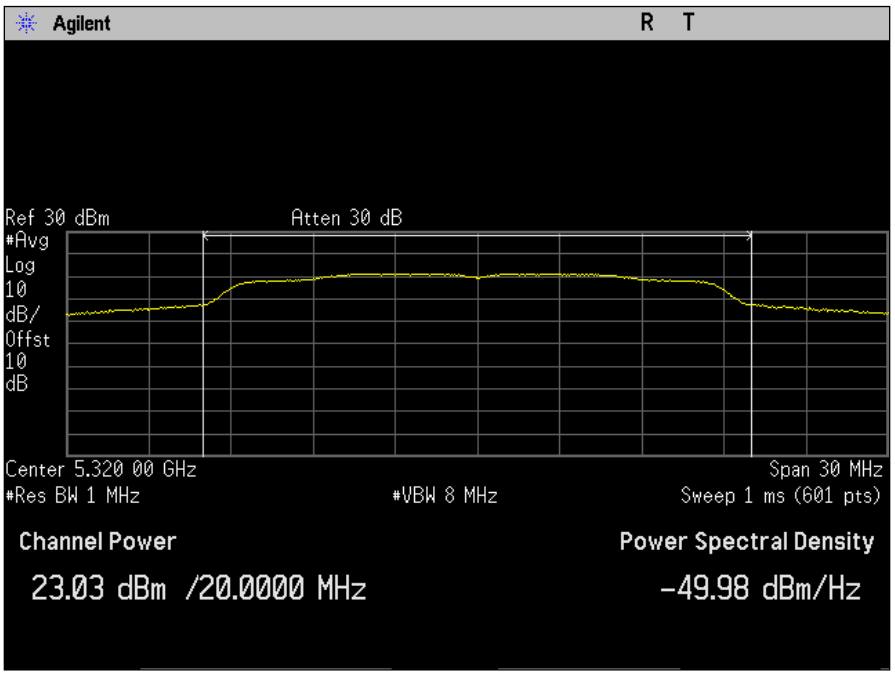
Plot 42. Maximum Conducted Output Power, BW 20M, Ch 5280M, A Mode, Port A



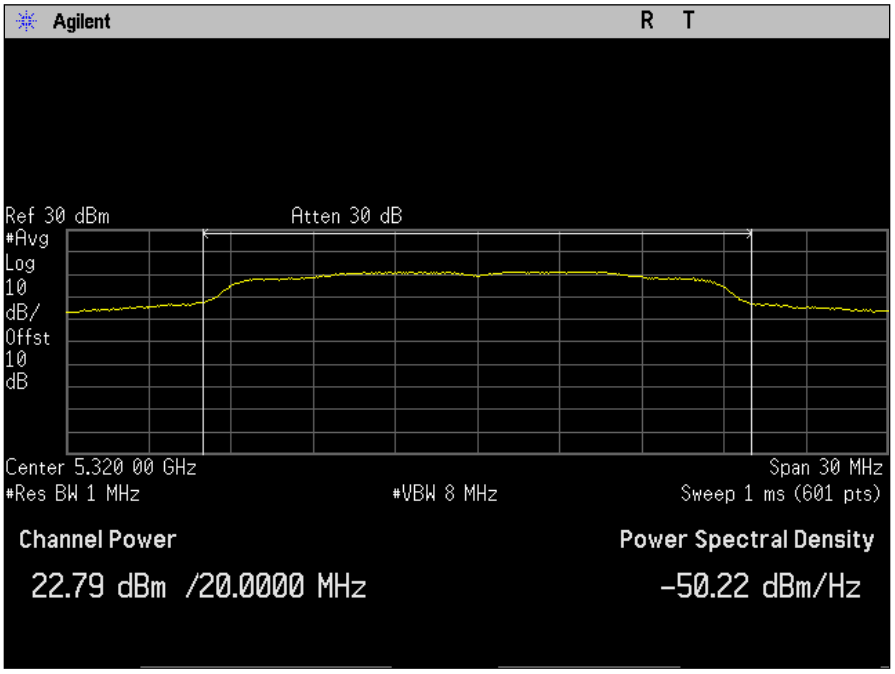
Plot 43. Maximum Conducted Output Power, BW 20M, Ch 5280M, AC Mode, Port A



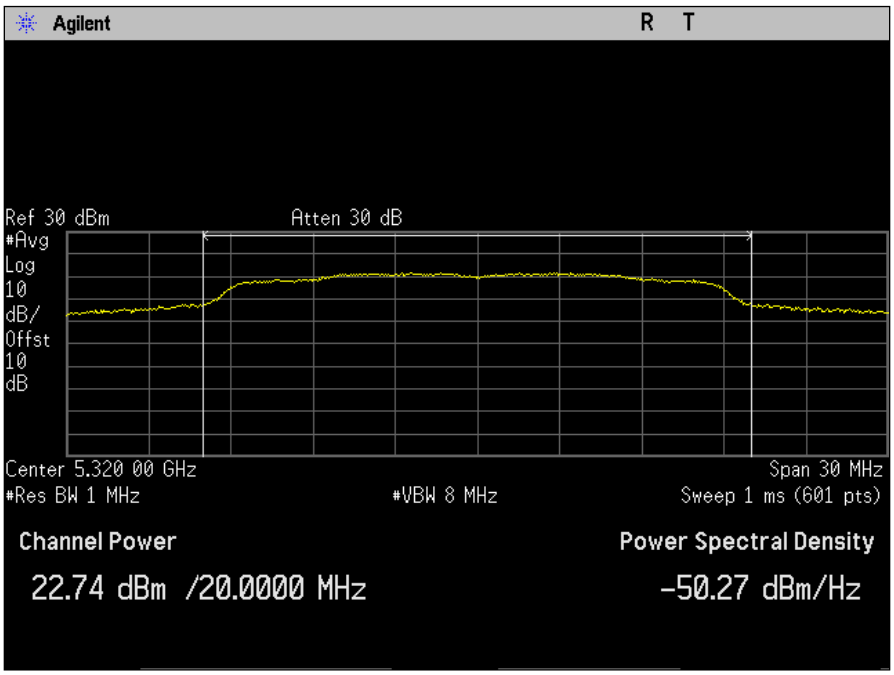
Plot 44. Maximum Conducted Output Power, BW 20M, Ch 5280M, N Mode, Port A



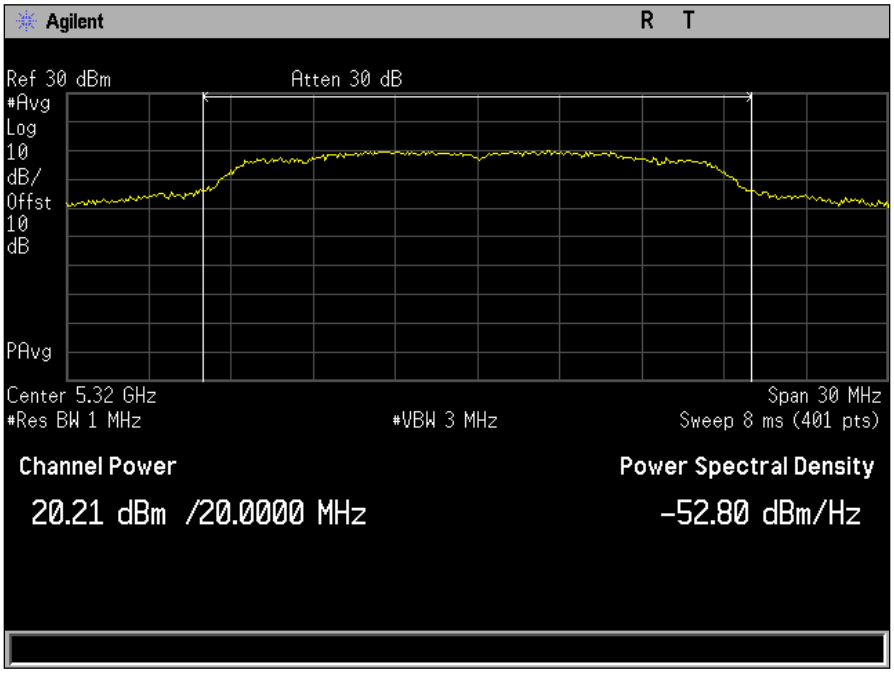
Plot 45. Maximum Conducted Output Power, BW 20M, Ch 5320M, A Mode, Port B



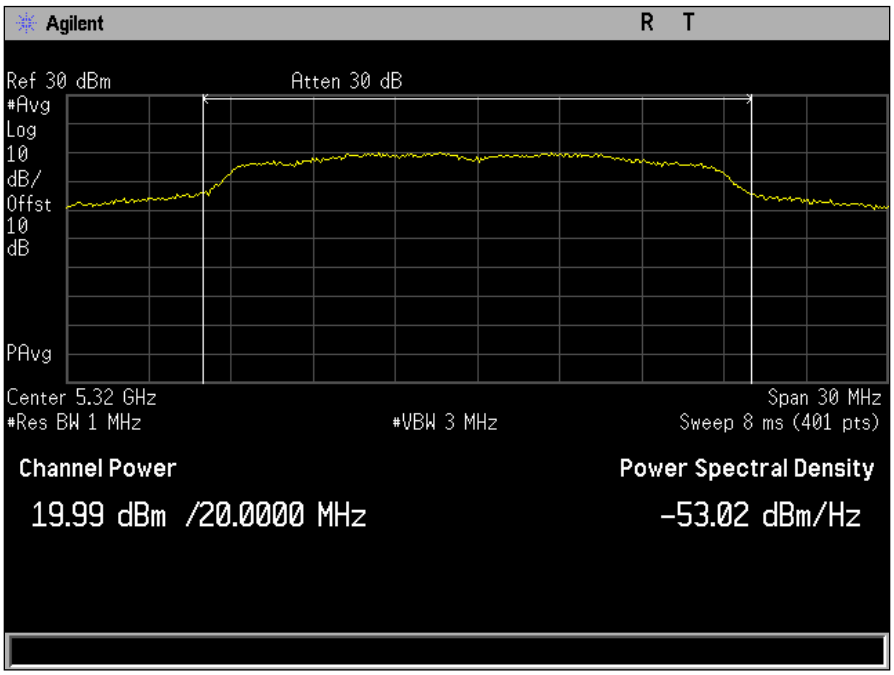
Plot 46. Maximum Conducted Output Power, BW 20M, Ch 5320M, AC Mode, Port B



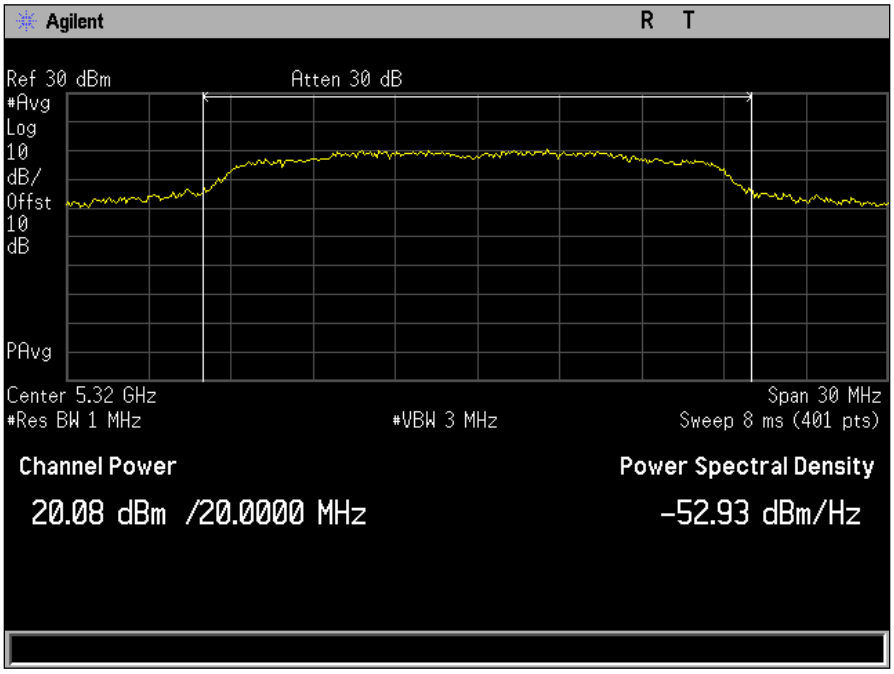
Plot 47. Maximum Conducted Output Power, BW 20M, Ch 5320M, N Mode, Port B



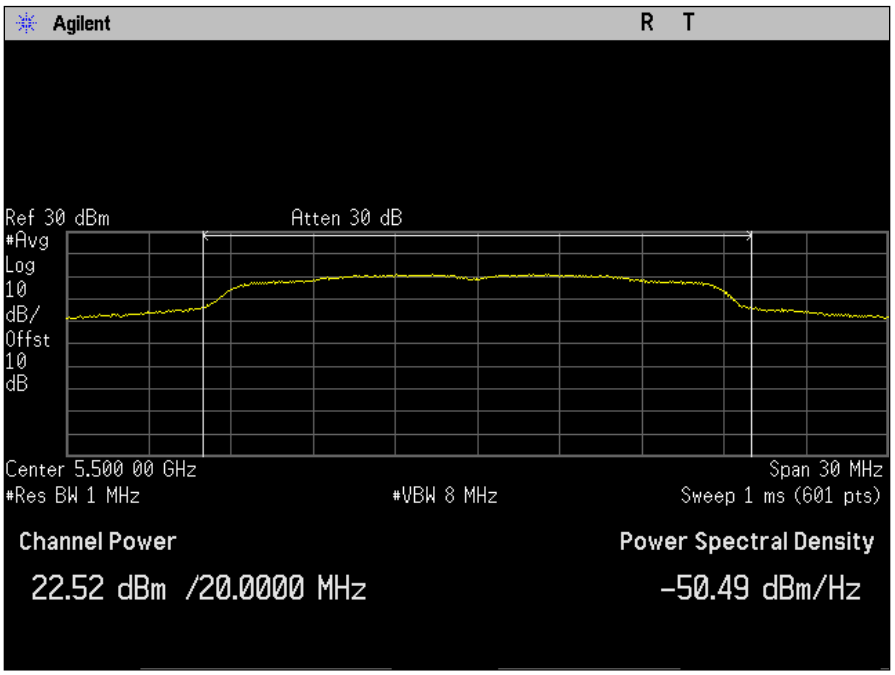
Plot 48. Maximum Conducted Output Power, BW 20M, Ch 5320M, A Mode, Port A



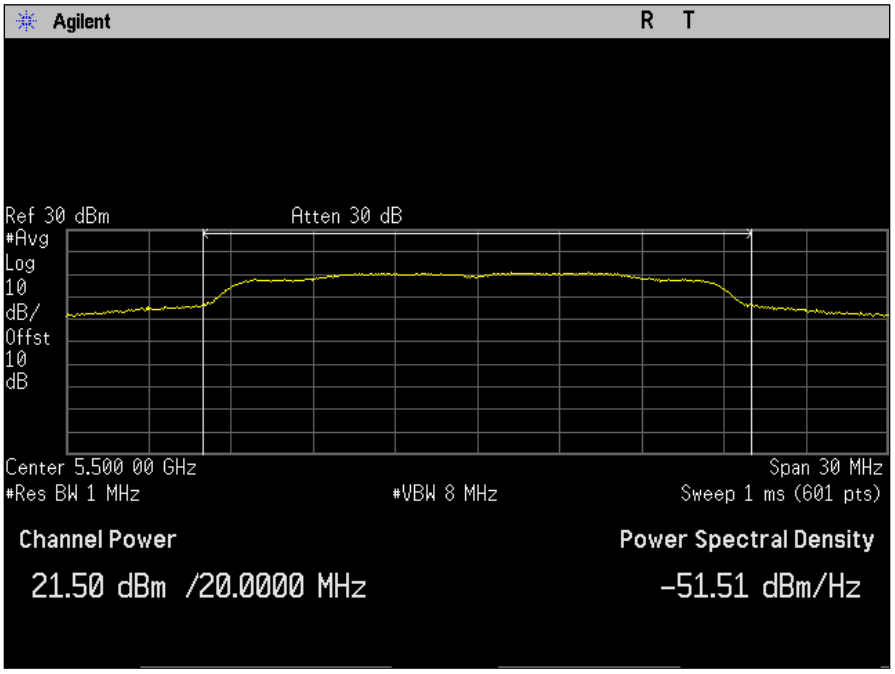
Plot 49. Maximum Conducted Output Power, BW 20M, Ch 5320M, AC Mode, Port A



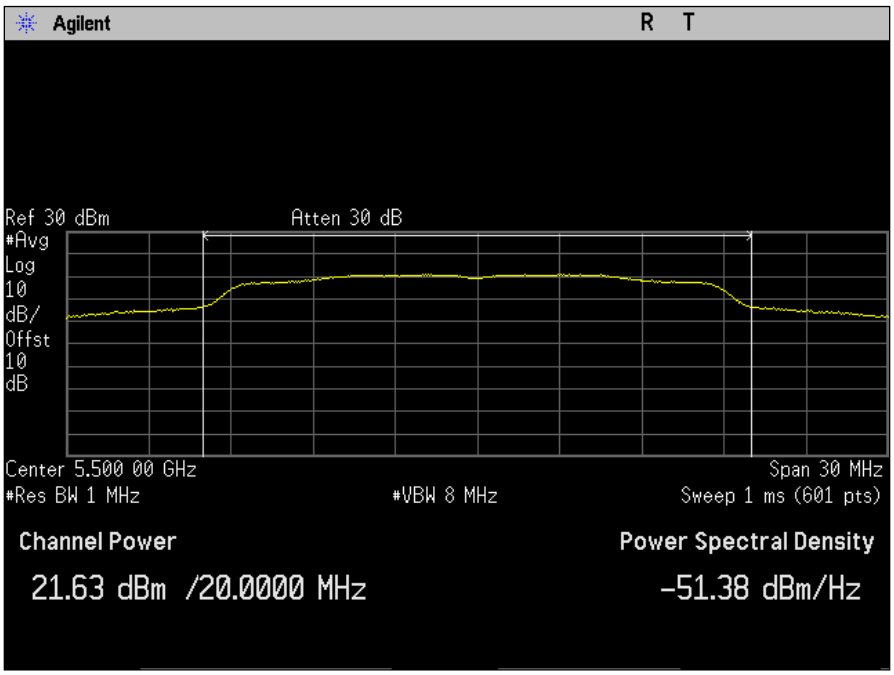
Plot 50. Maximum Conducted Output Power, BW 20M, Ch 5320M, N Mode, Port A



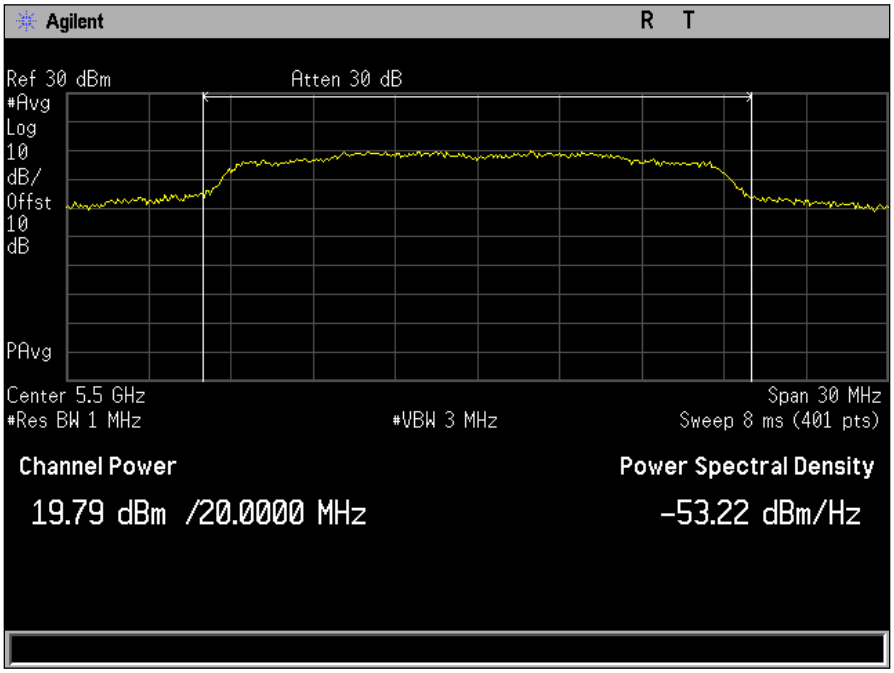
Plot 51. Maximum Conducted Output Power, BW 20M, Ch 5500M, A Mode, Port B



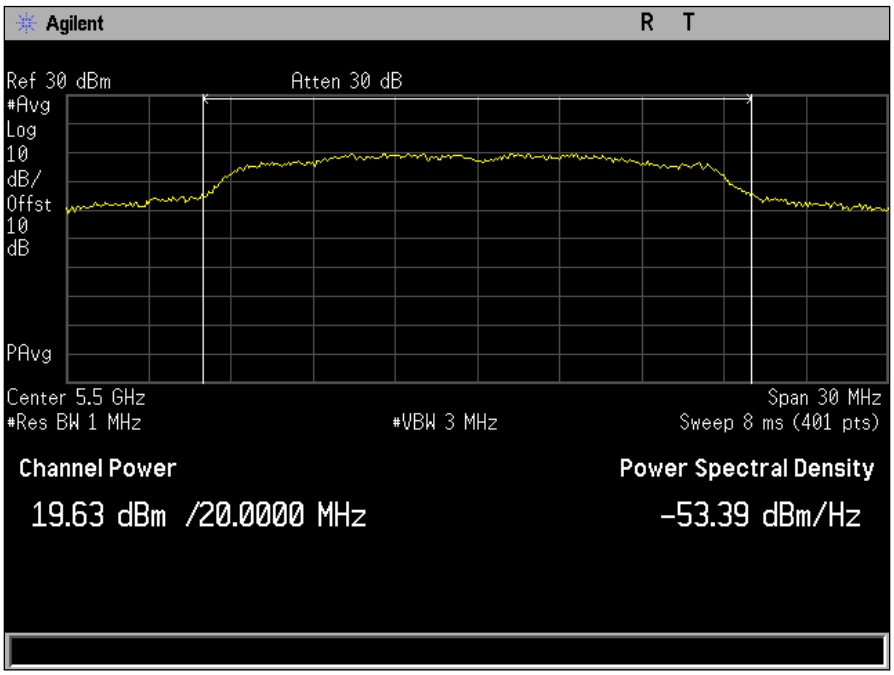
Plot 52. Maximum Conducted Output Power, BW 20M, Ch 5500M, AC Mode, Port B



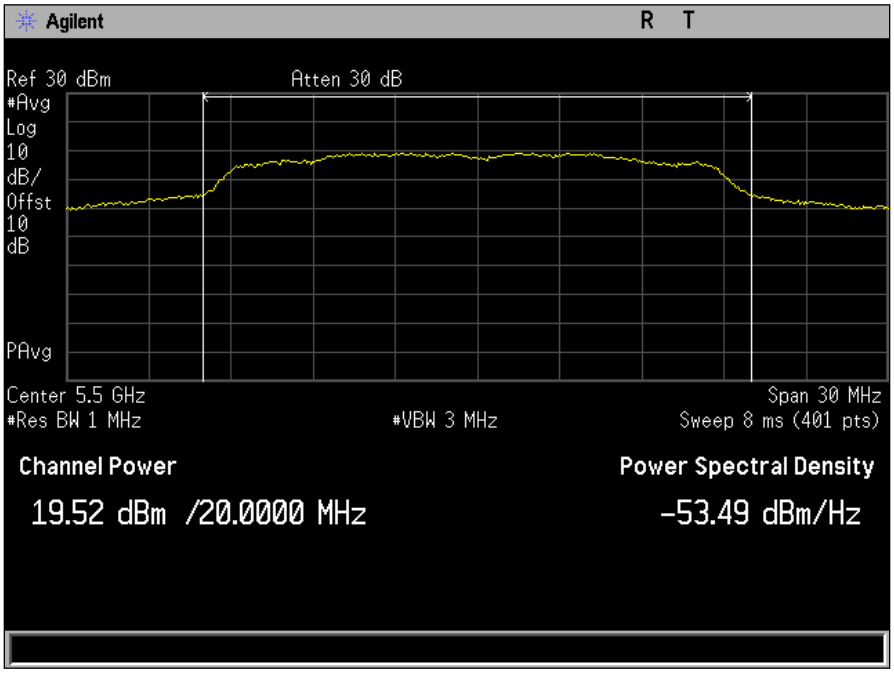
Plot 53. Maximum Conducted Output Power, BW 20M, Ch 5500M, N Mode, Port B



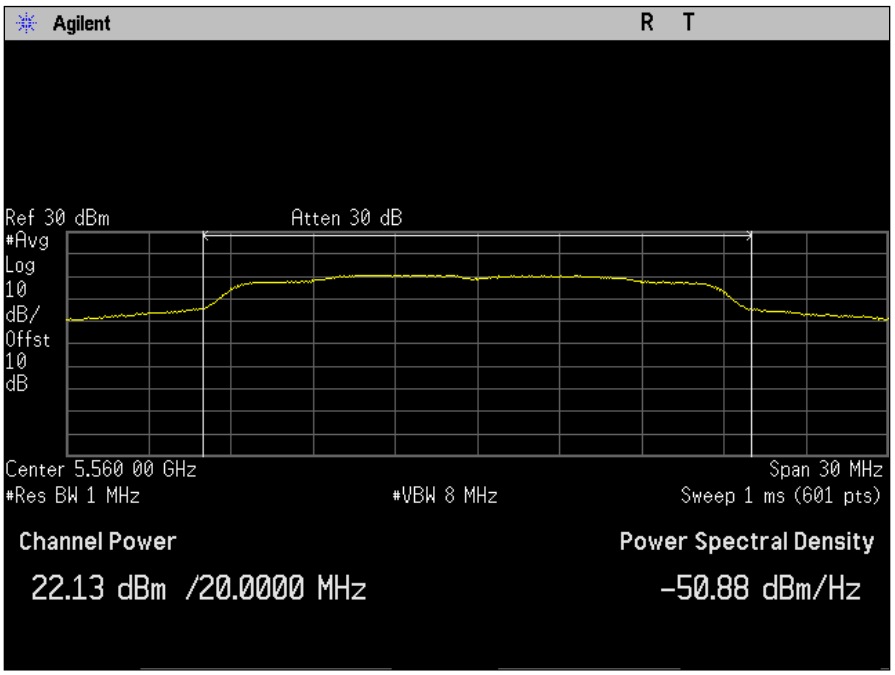
Plot 54. Maximum Conducted Output Power, BW 20M, Ch 5500M, A Mode, Port A



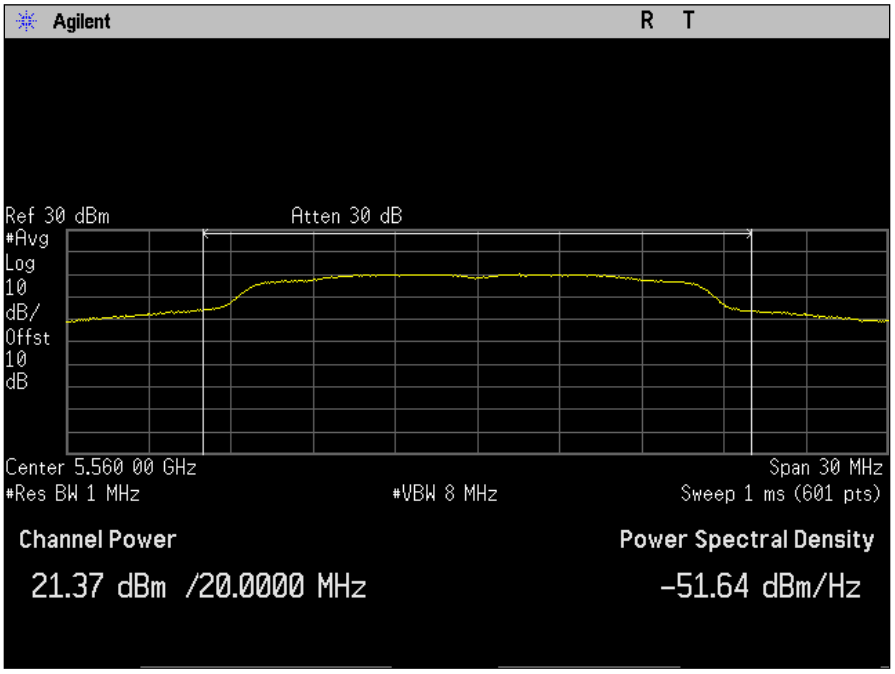
Plot 55. Maximum Conducted Output Power, BW 20M, Ch 5500M, AC Mode, Port A



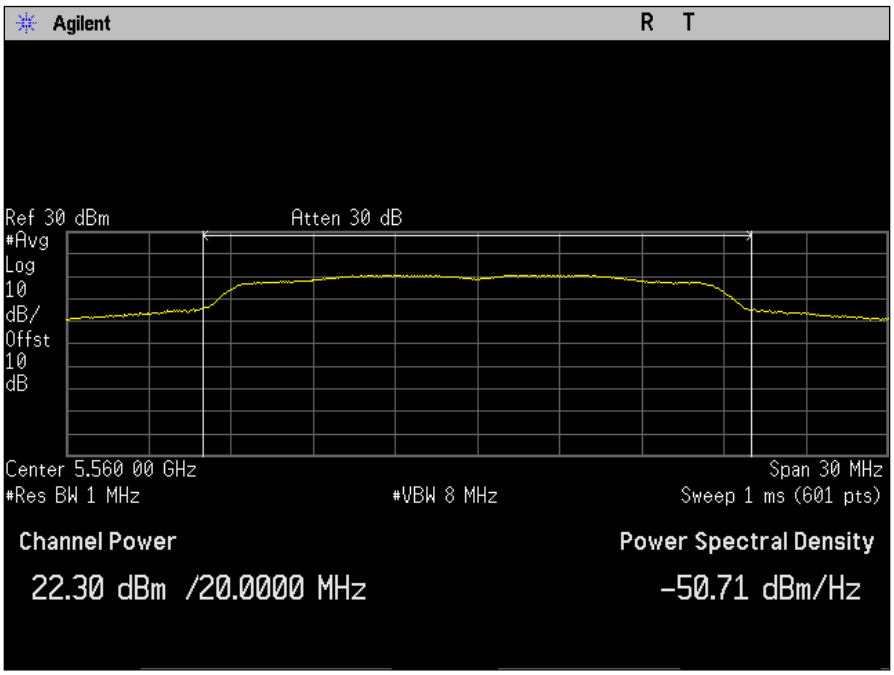
Plot 56. Maximum Conducted Output Power, BW 20M, Ch 5500M, N Mode, Port A



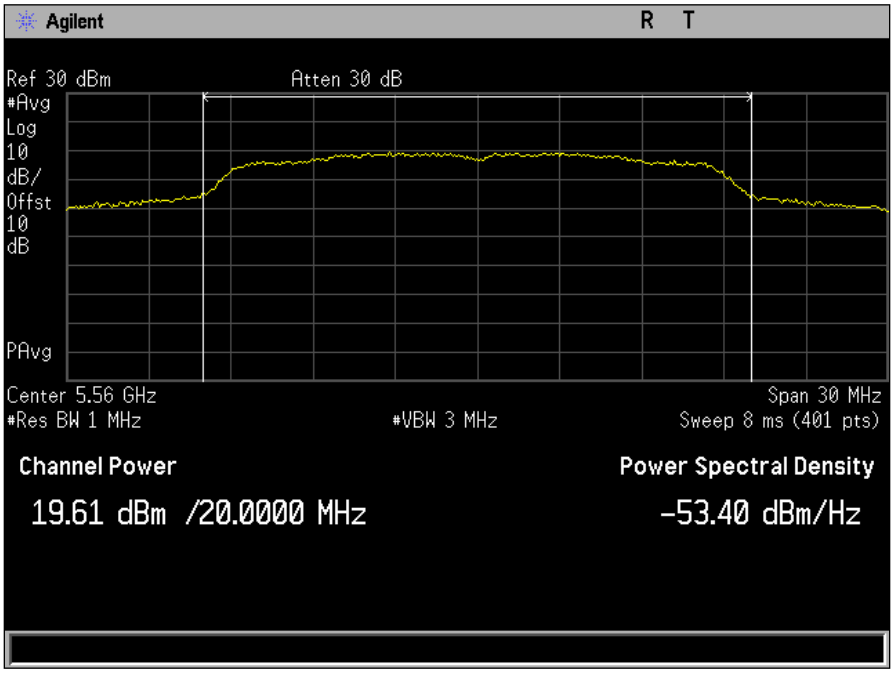
Plot 57. Maximum Conducted Output Power, BW 20M, Ch 5560M, A Mode, Port B



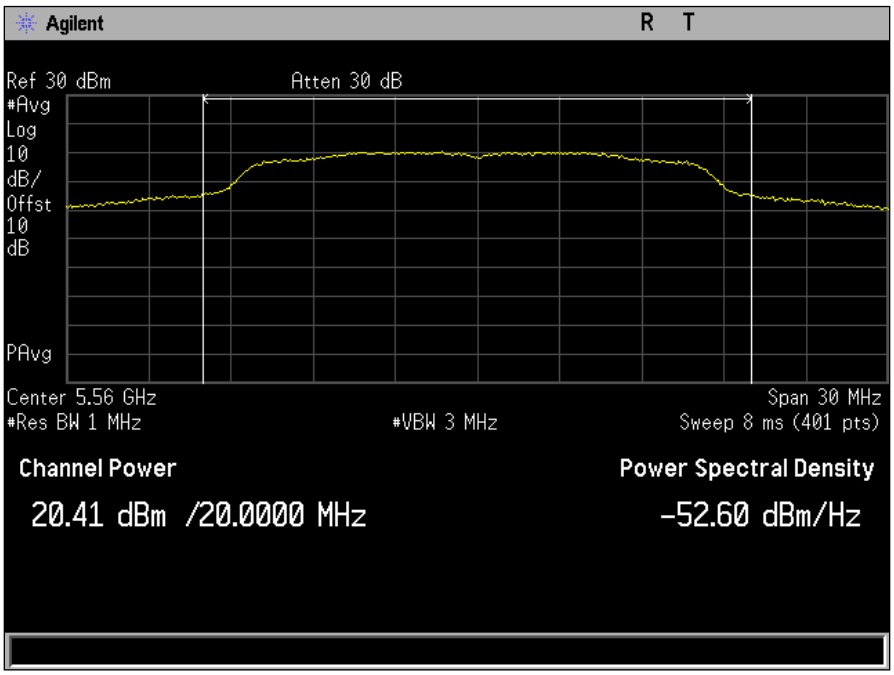
Plot 58. Maximum Conducted Output Power, BW 20M, Ch 5560M, AC Mode, Port B



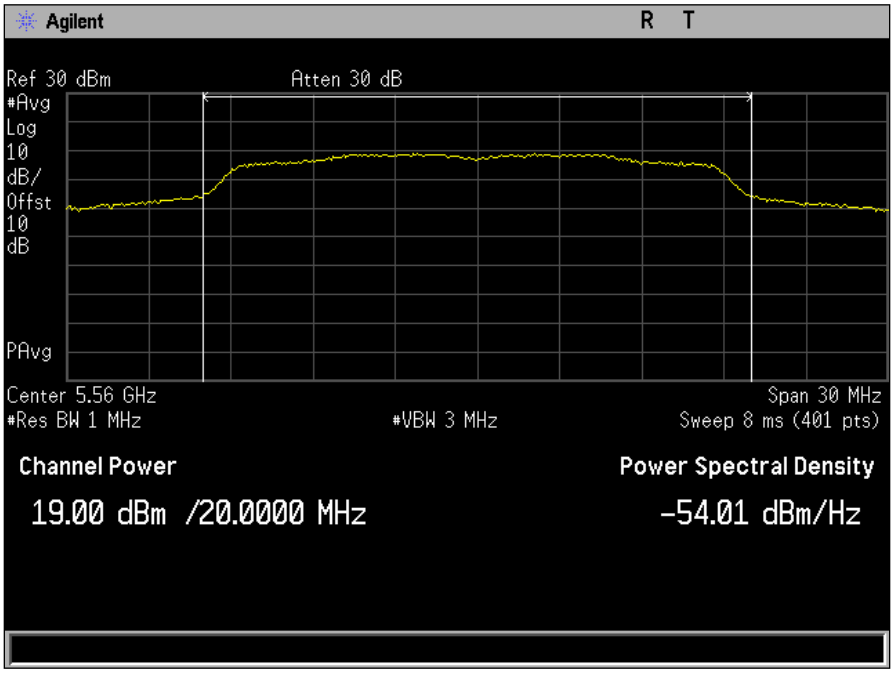
Plot 59. Maximum Conducted Output Power, BW 20M, Ch 5560M, N Mode, Port B



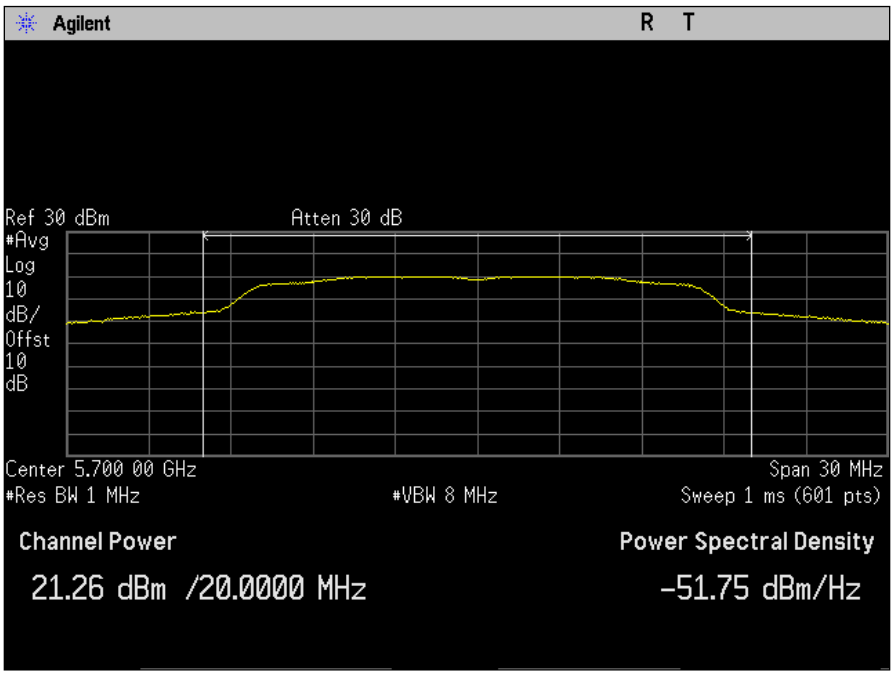
Plot 60. Maximum Conducted Output Power, BW 20M, Ch 5560M, A Mode, Port A



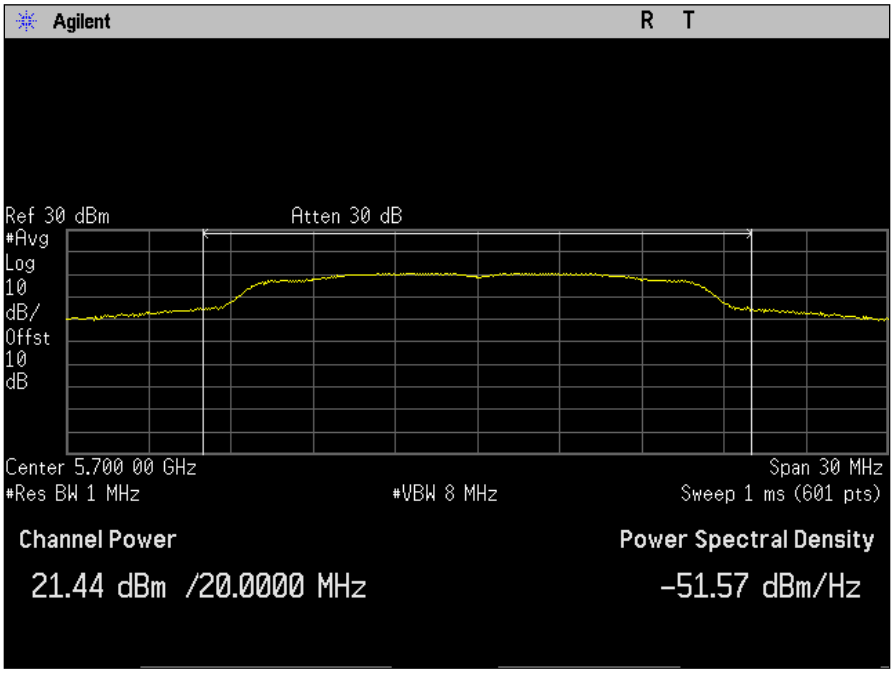
Plot 61. Maximum Conducted Output Power, BW 20M, Ch 5560M, AC Mode, Port A



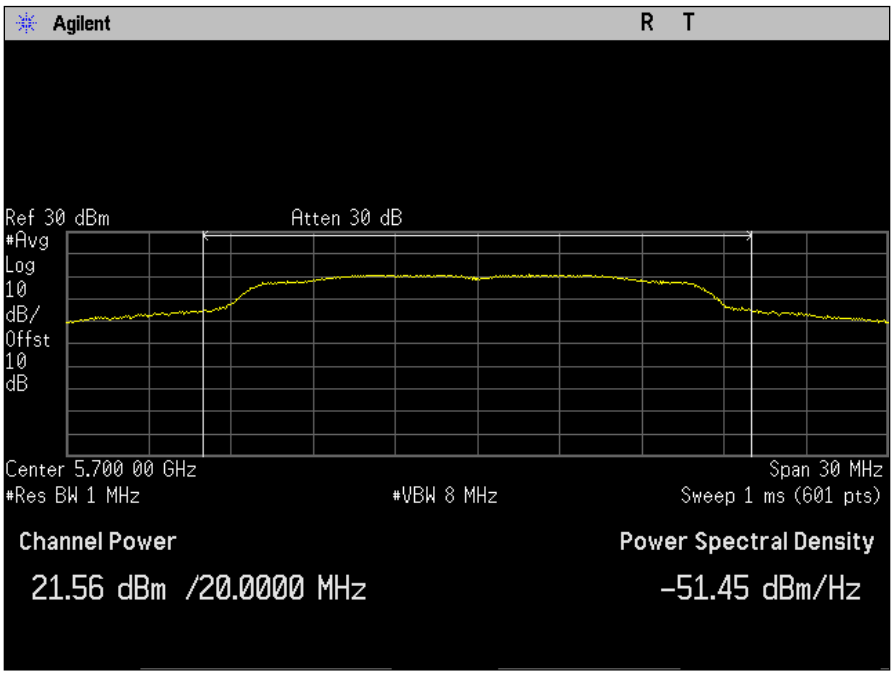
Plot 62. Maximum Conducted Output Power, BW 20M, Ch 5560M, N Mode, Port A



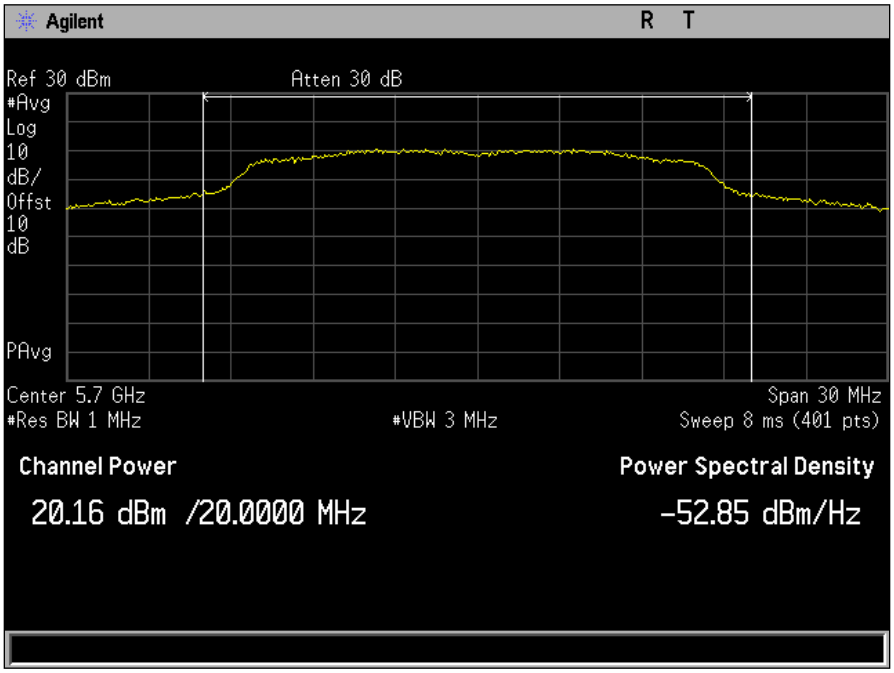
Plot 63. Maximum Conducted Output Power, BW 20M, Ch 5700M, A Mode, Port B



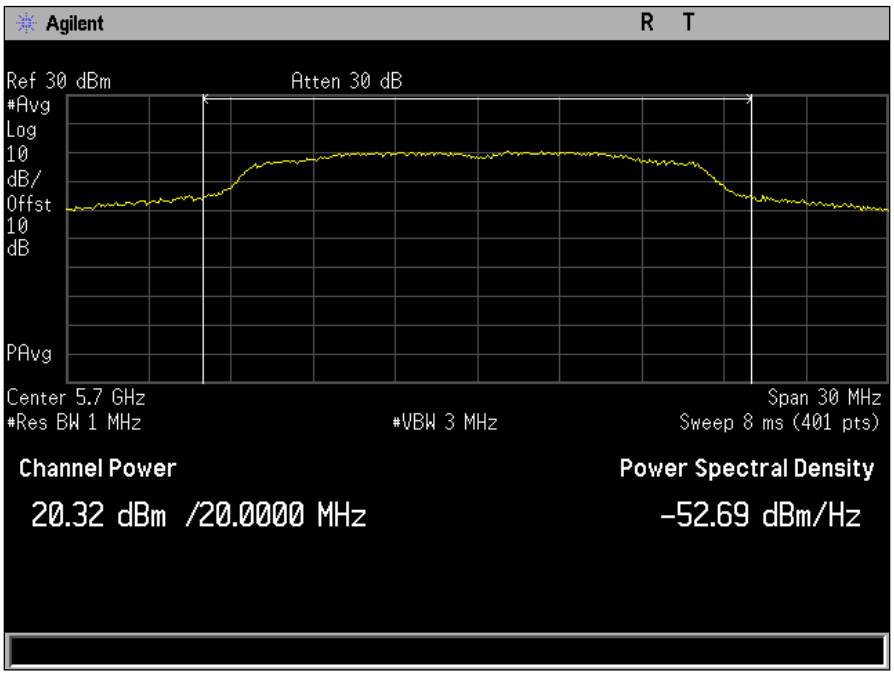
Plot 64. Maximum Conducted Output Power, BW 20M, Ch 5700M, AC Mode, Port B



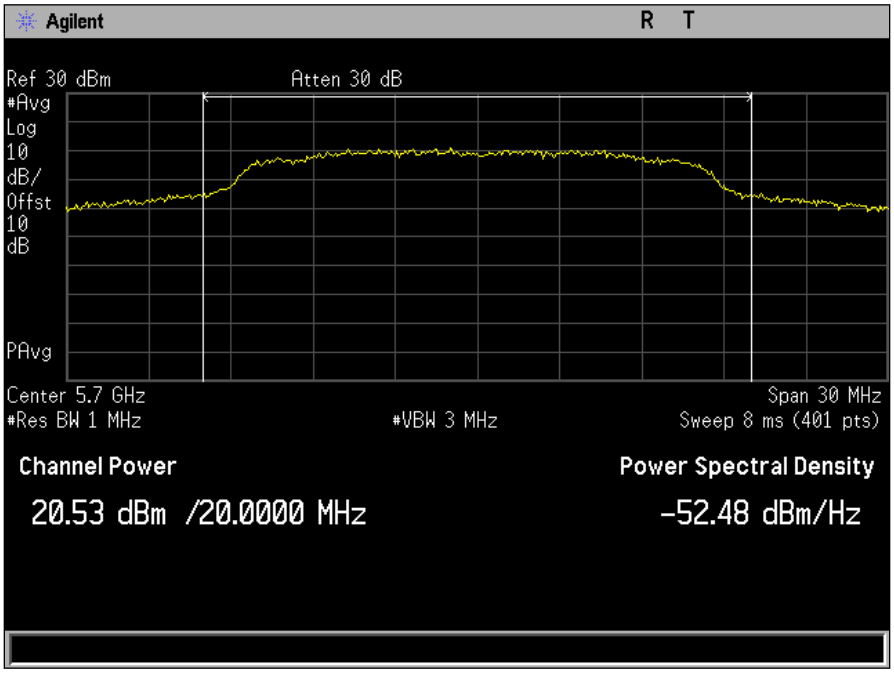
Plot 65. Maximum Conducted Output Power, BW 20M, Ch 5700M, N Mode, Port B



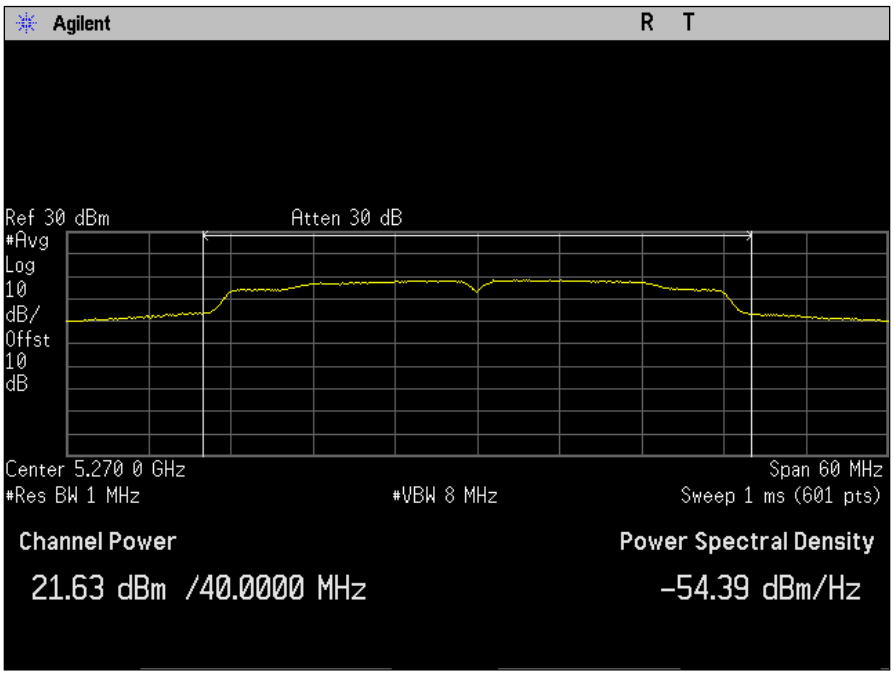
Plot 66. Maximum Conducted Output Power, BW 20M, Ch 5700M, A Mode, Port A



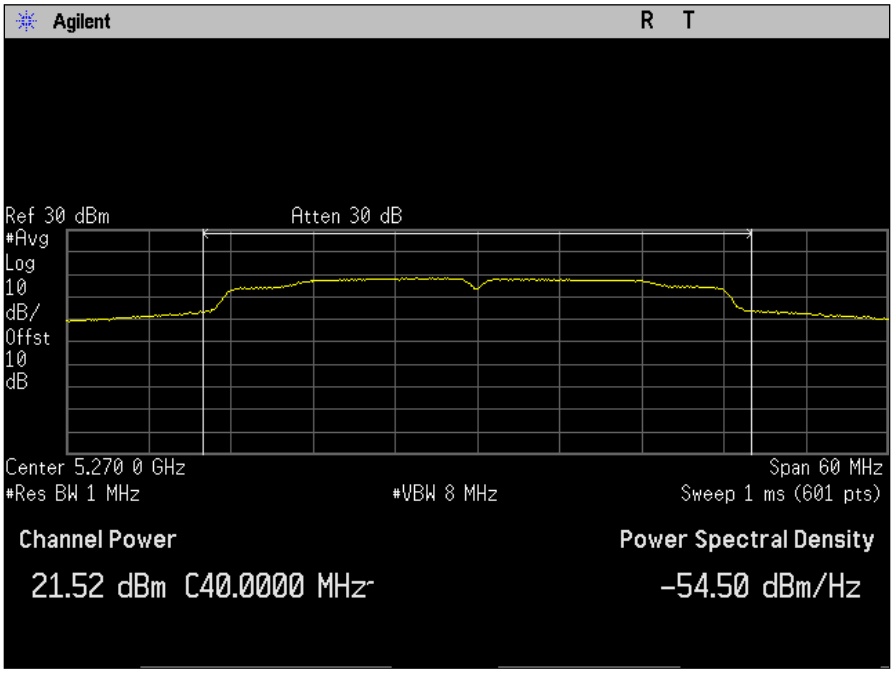
Plot 67. Maximum Conducted Output Power, BW 20M, Ch 5700M, AC Mode, Port A



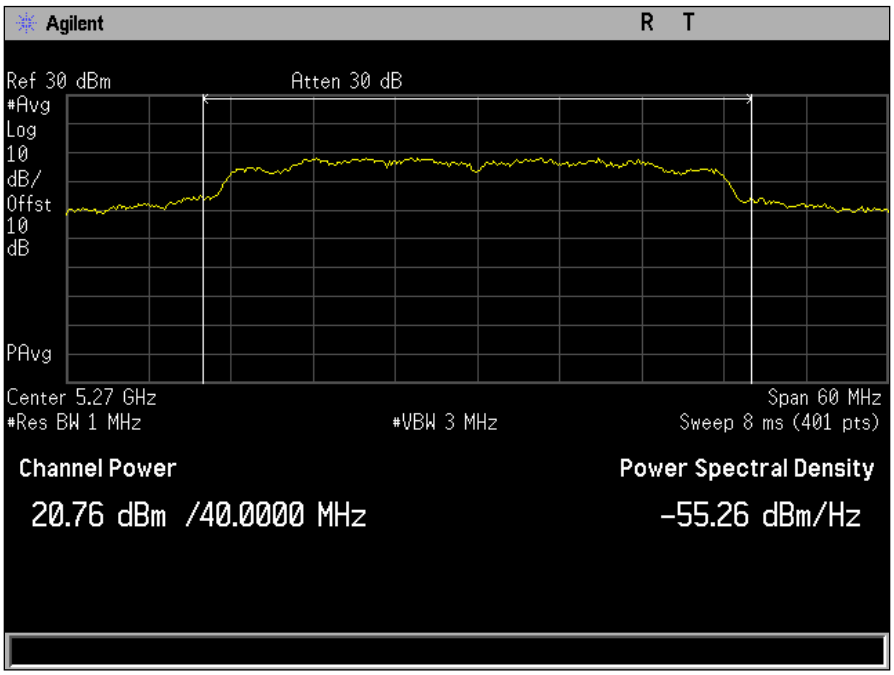
Plot 68. Maximum Conducted Output Power, BW 20M, Ch 5700M, N Mode, Port A



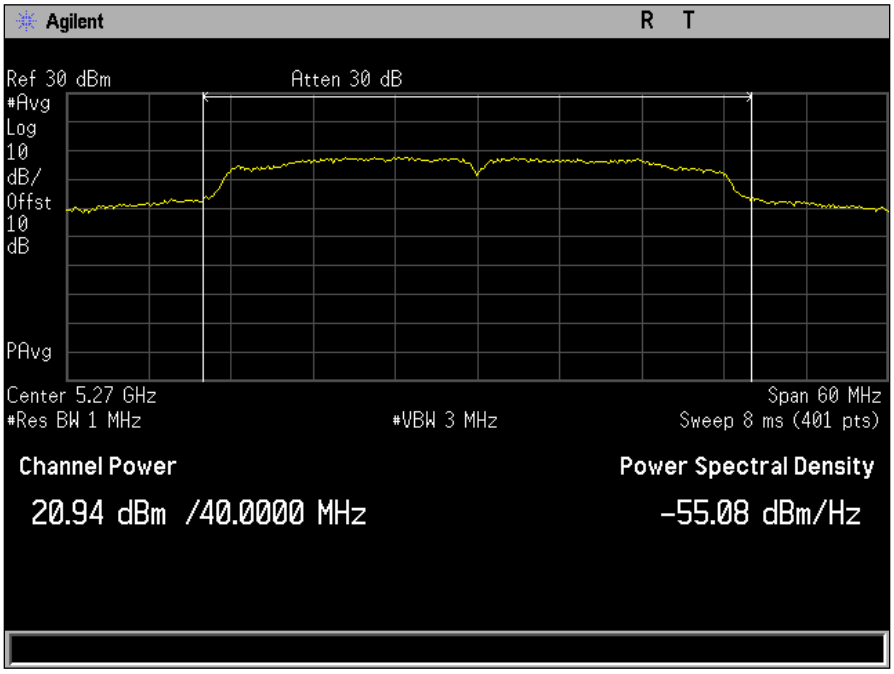
Plot 69. Maximum Conducted Output Power, BW 40M, Ch 5270M, AC Mode, Port B



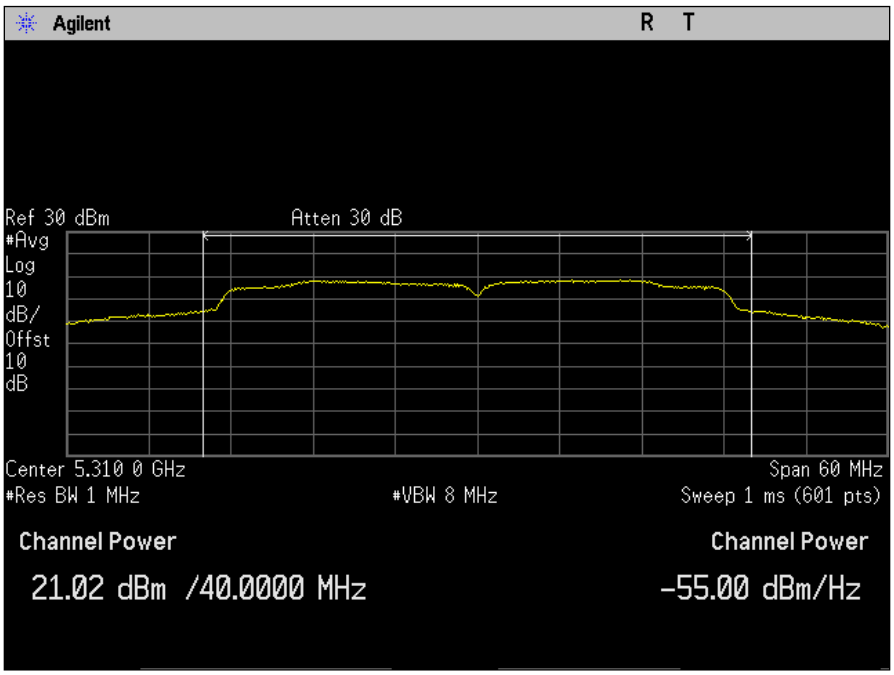
Plot 70. Maximum Conducted Output Power, BW 40M, Ch 5270M, N Mode, Port B



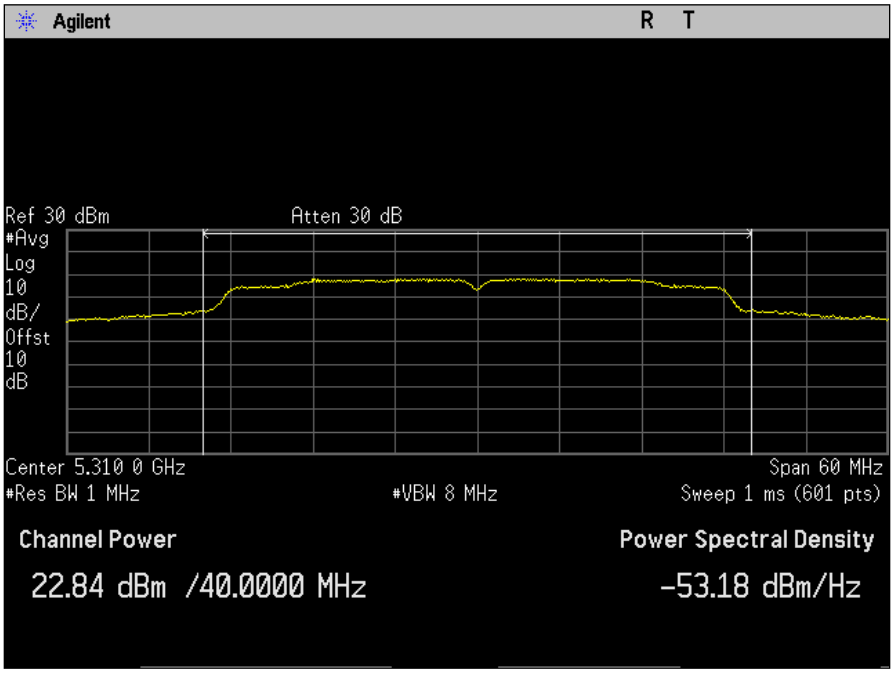
Plot 71. Maximum Conducted Output Power, BW 40M, Ch 5270M, AC Mode, Port A



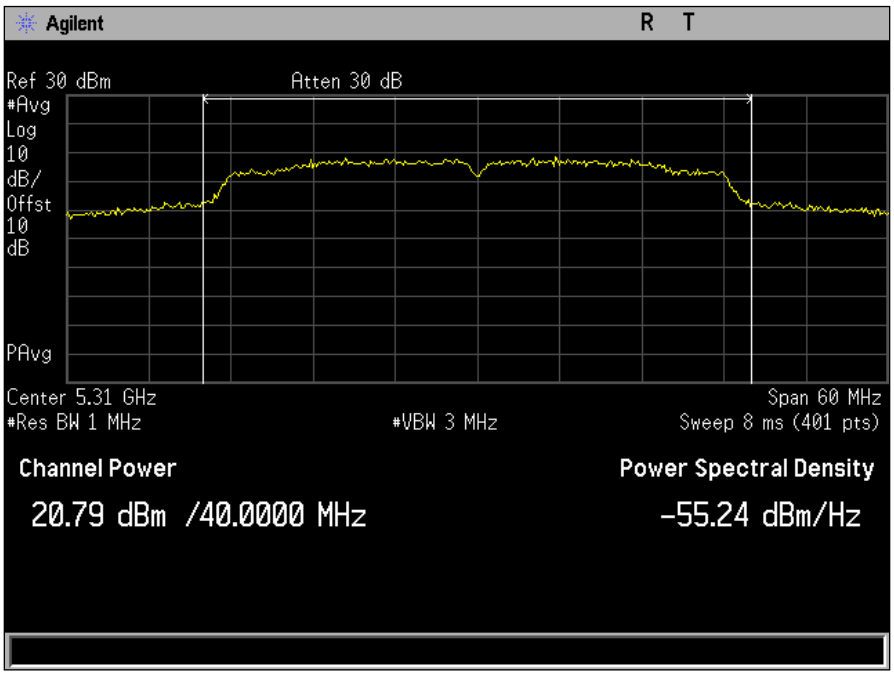
Plot 72. Maximum Conducted Output Power, BW 40M, Ch 5270M, N Mode, Port A



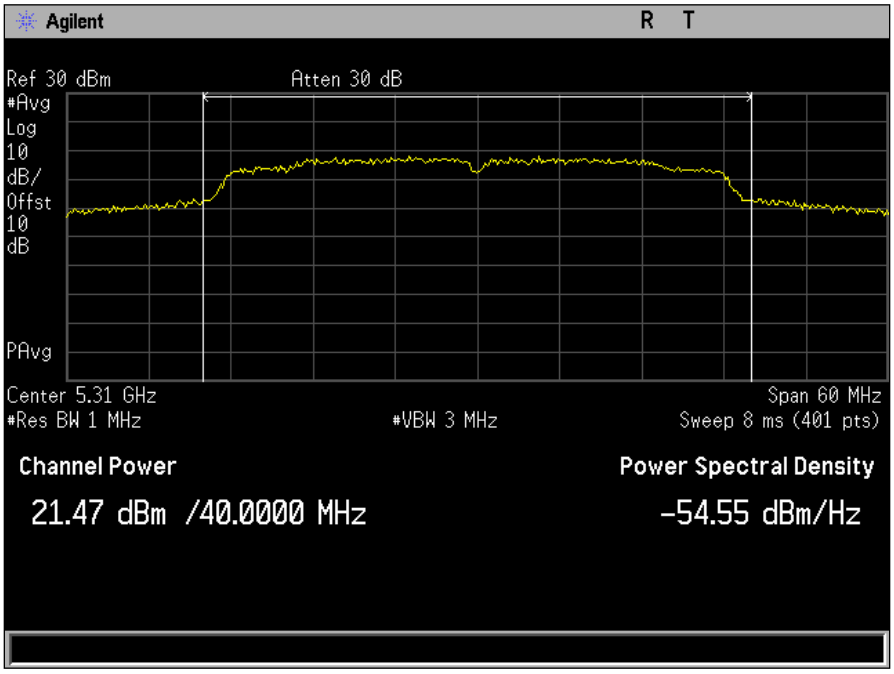
Plot 73. Maximum Conducted Output Power, BW 40M, Ch 5310M, AC Mode, Port B



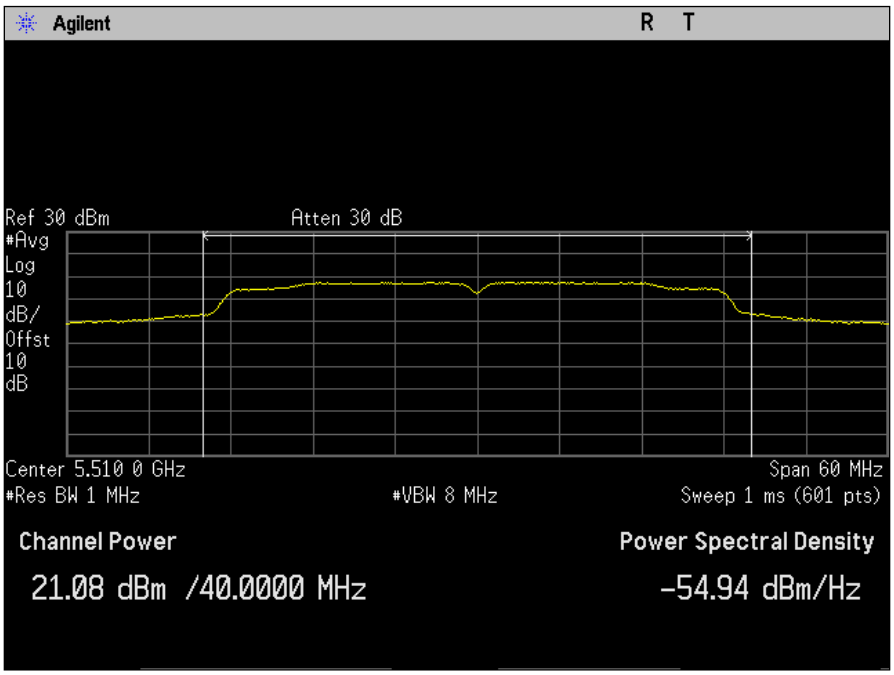
Plot 74. Maximum Conducted Output Power, BW 40M, Ch 5310M, N Mode, Port B



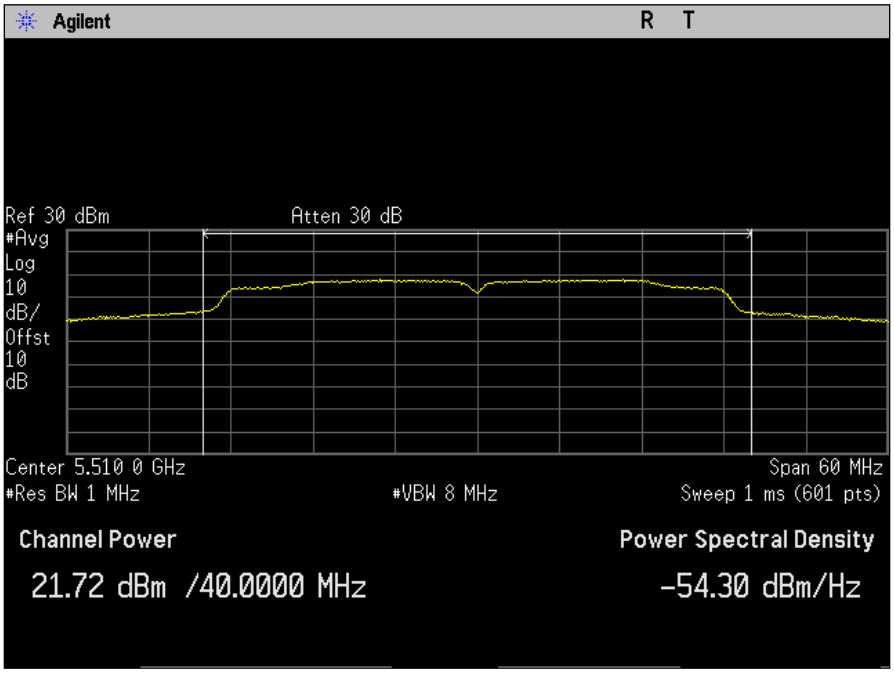
Plot 75. Maximum Conducted Output Power, BW 40M, Ch 5310M, AC Mode, Port A



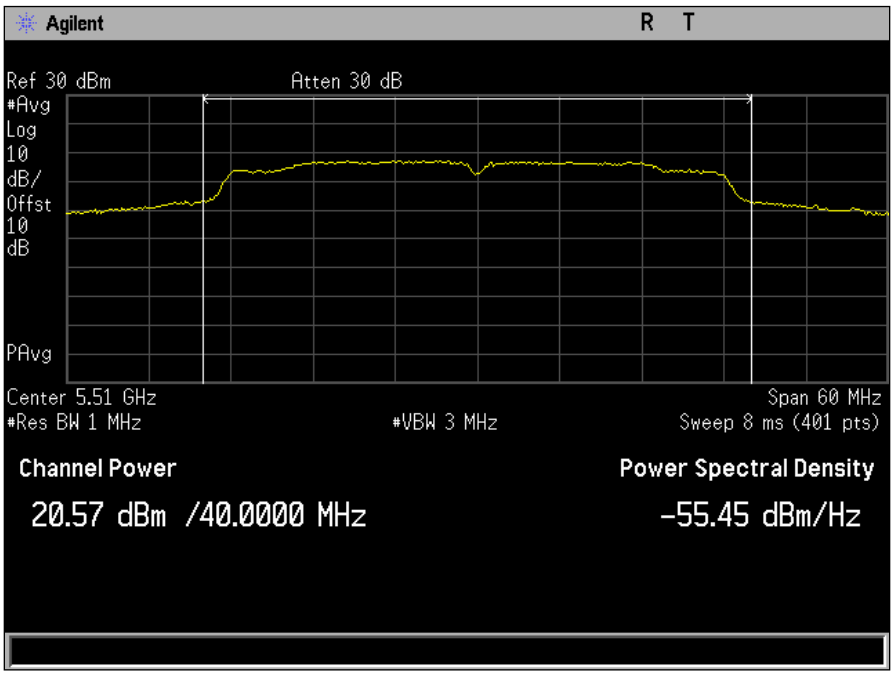
Plot 76. Maximum Conducted Output Power, BW 40M, Ch 5310M, N Mode, Port A



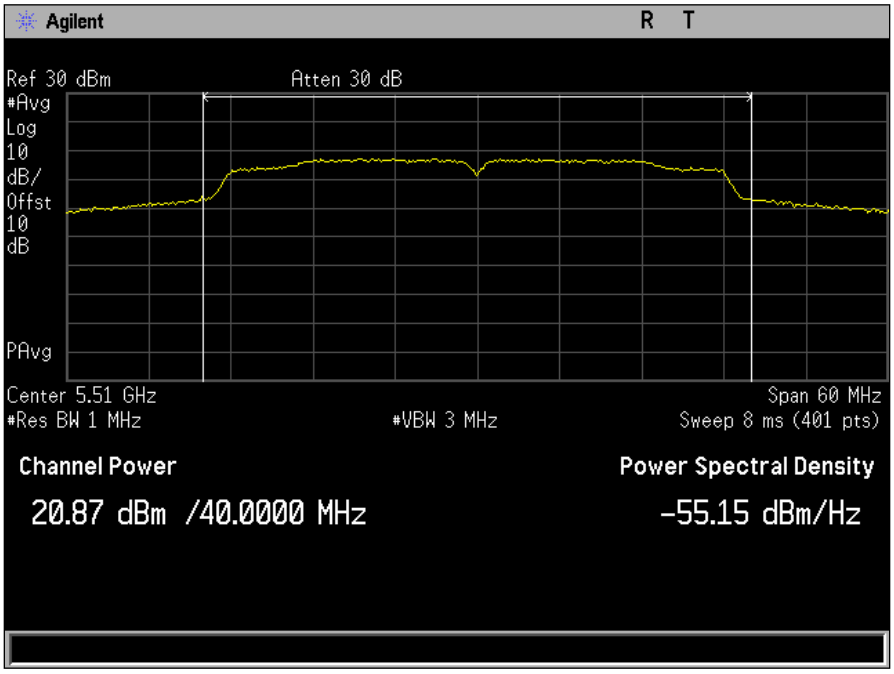
Plot 77. Maximum Conducted Output Power, BW 40M, Ch 5510M, AC Mode, Port B



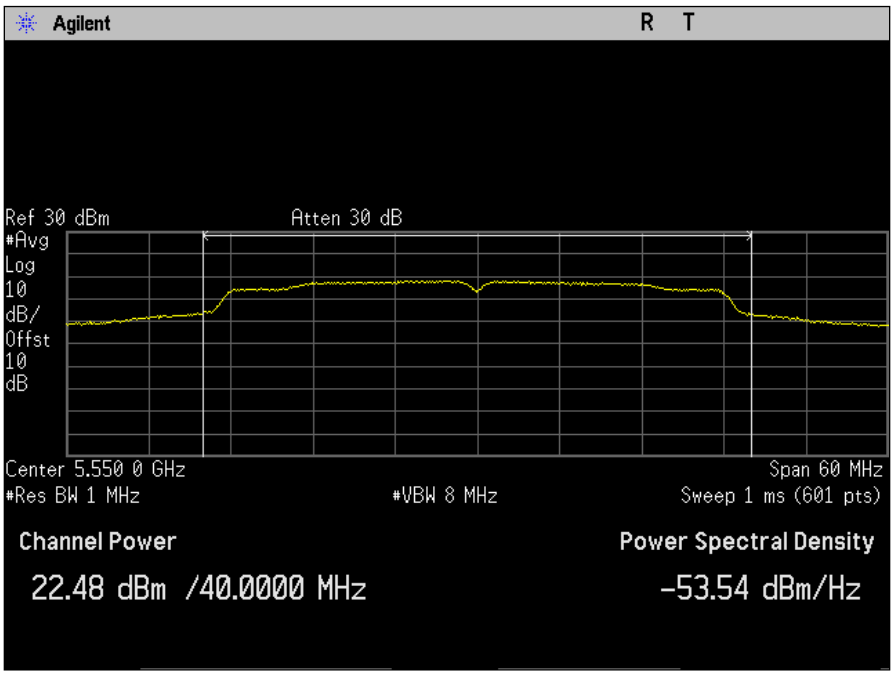
Plot 78. Maximum Conducted Output Power, BW 40M, Ch 5510M, N Mode, Port B



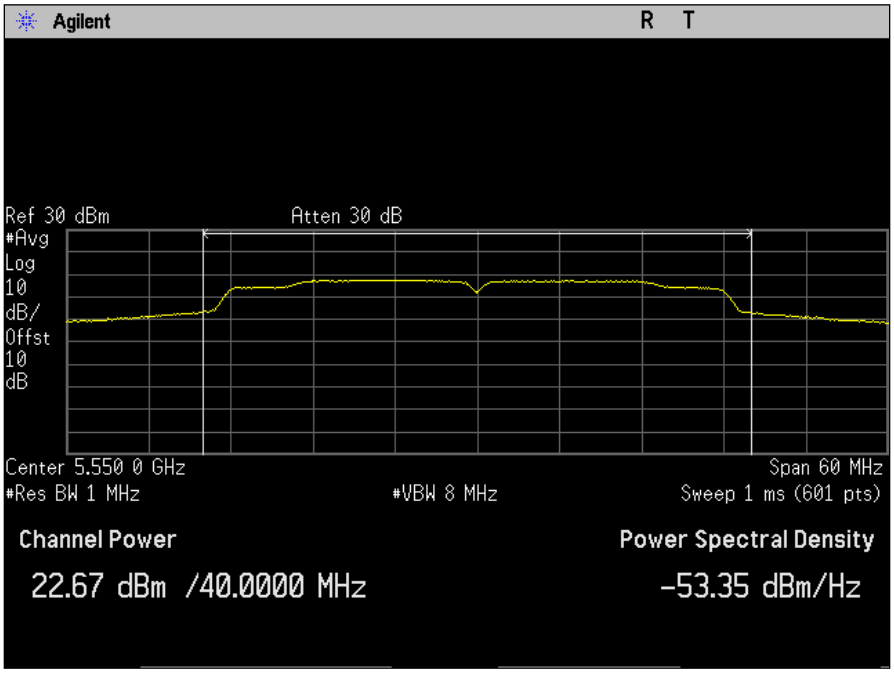
Plot 79. Maximum Conducted Output Power, BW 40M, Ch 5510M, AC Mode, Port A



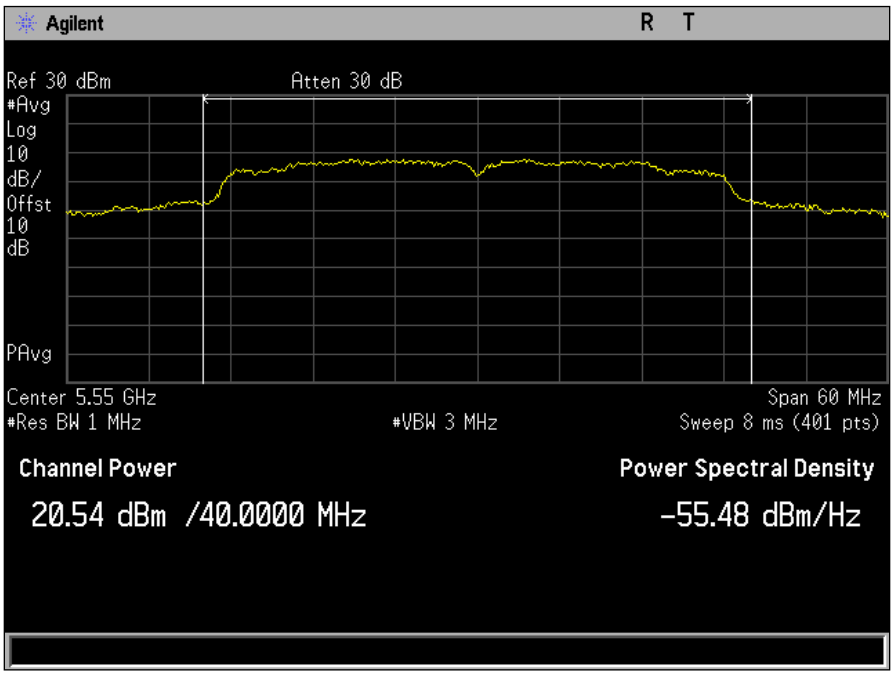
Plot 80. Maximum Conducted Output Power, BW 40M, Ch 5510M, N Mode, Port A



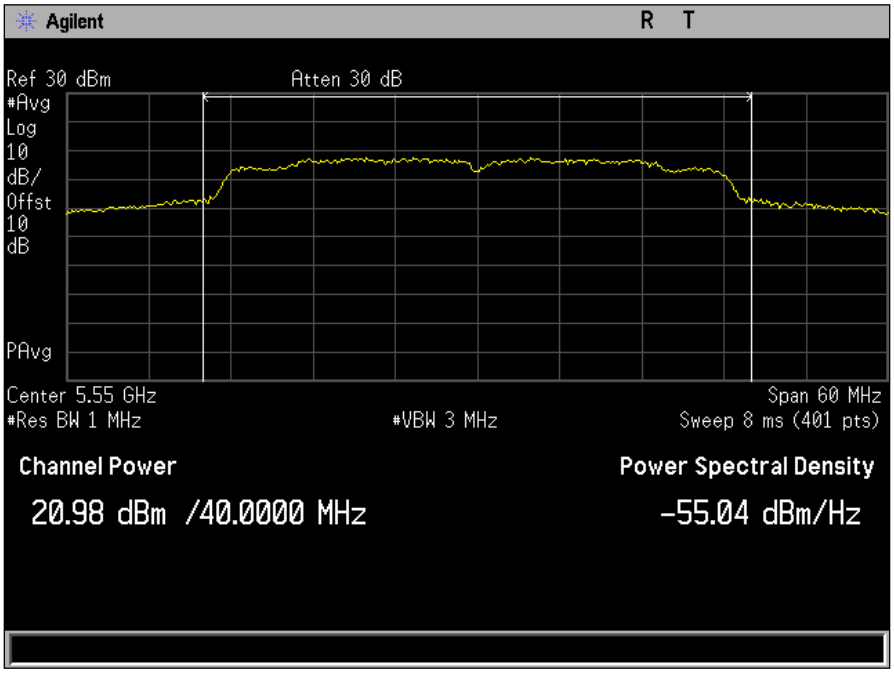
Plot 81. Maximum Conducted Output Power, BW 40M, Ch 5550M, AC Mode, Port B



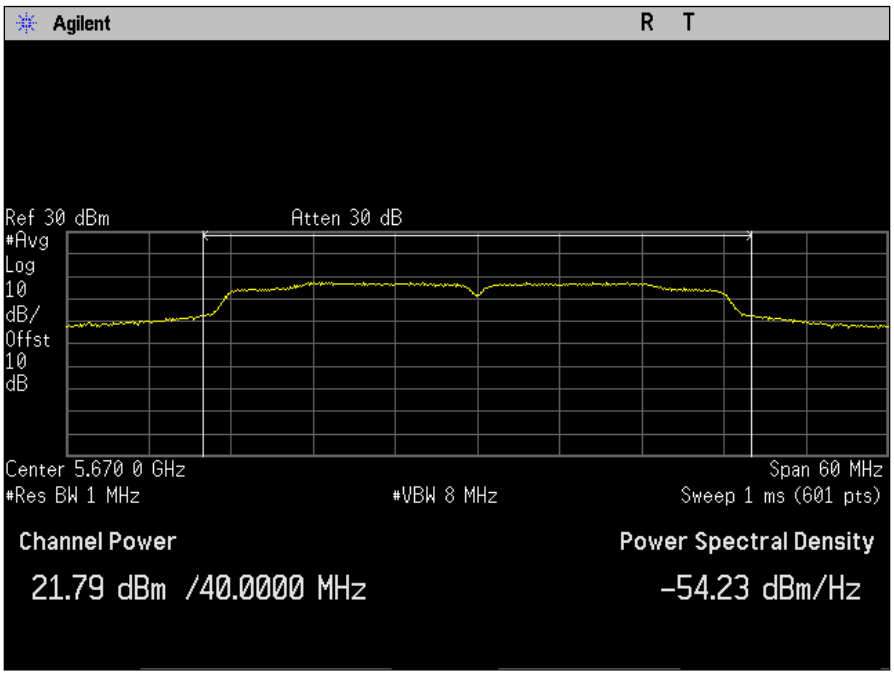
Plot 82. Maximum Conducted Output Power, BW 40M, Ch 5550M, N Mode, Port B



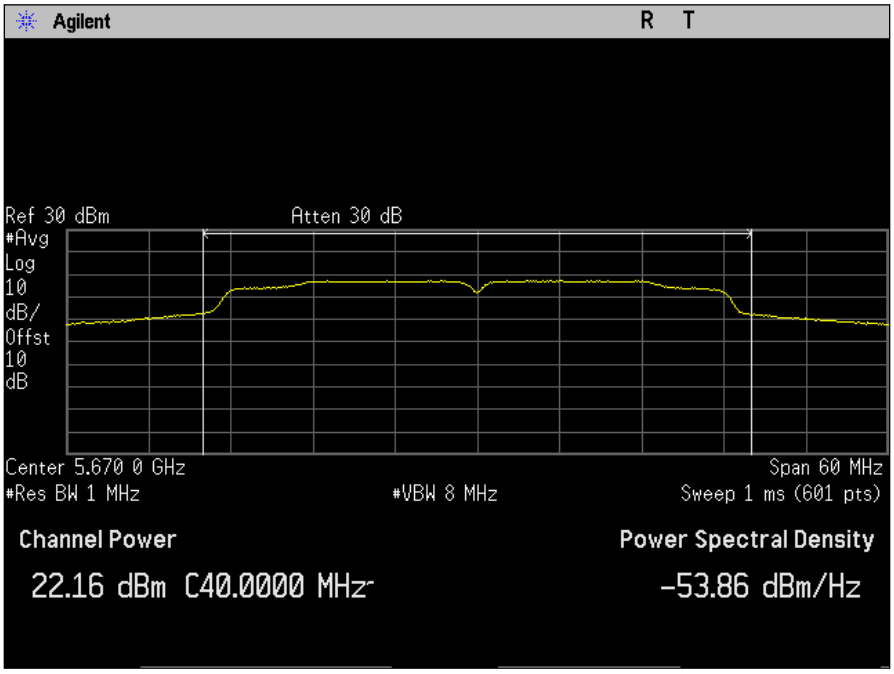
Plot 83. Maximum Conducted Output Power, BW 40M, Ch 5550M, AC Mode, Port A



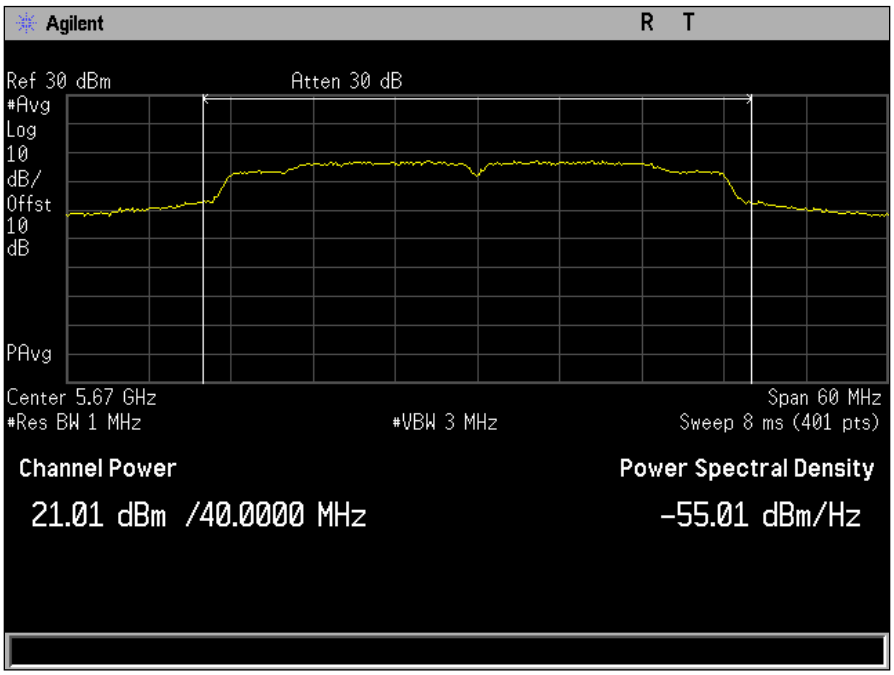
Plot 84. Maximum Conducted Output Power, BW 40M, Ch 5550M, N Mode, Port A



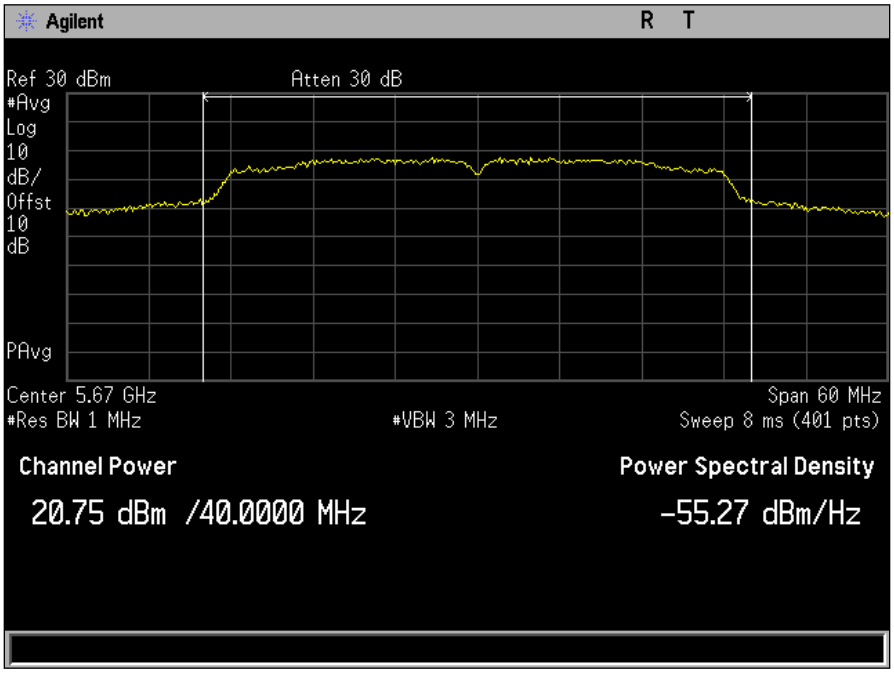
Plot 85. Maximum Conducted Output Power, BW 40M, Ch 5670M, AC Mode, Port B



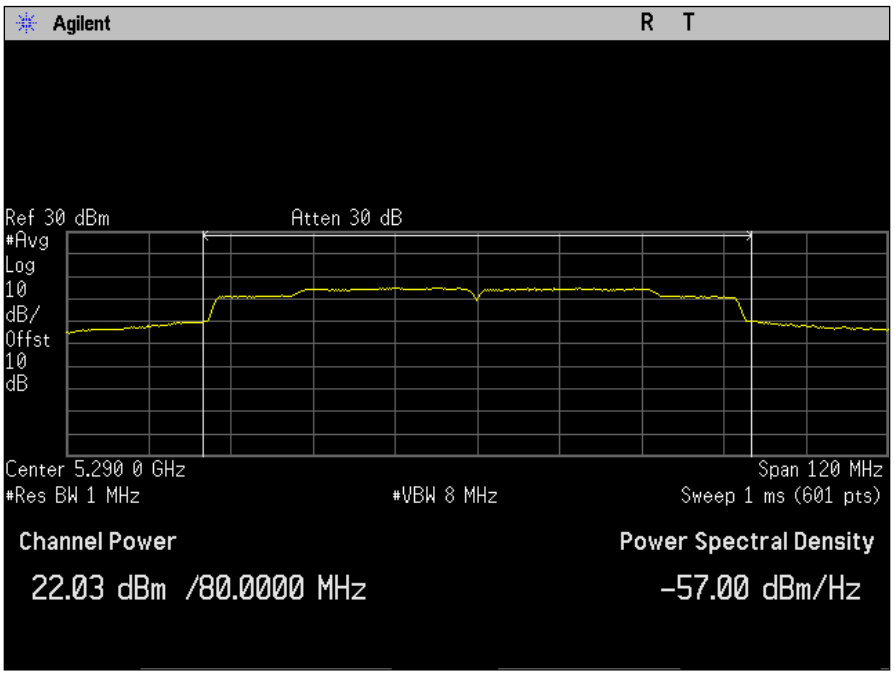
Plot 86. Maximum Conducted Output Power, BW 40M, Ch 5670M, N Mode, Port B



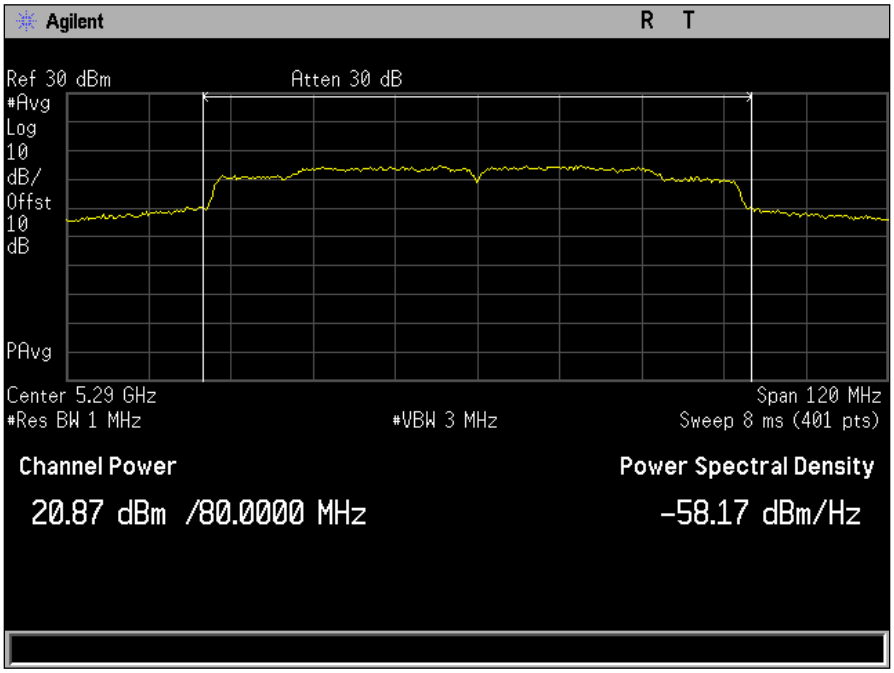
Plot 87. Maximum Conducted Output Power, BW 40M, Ch 5670M, AC Mode, Port A



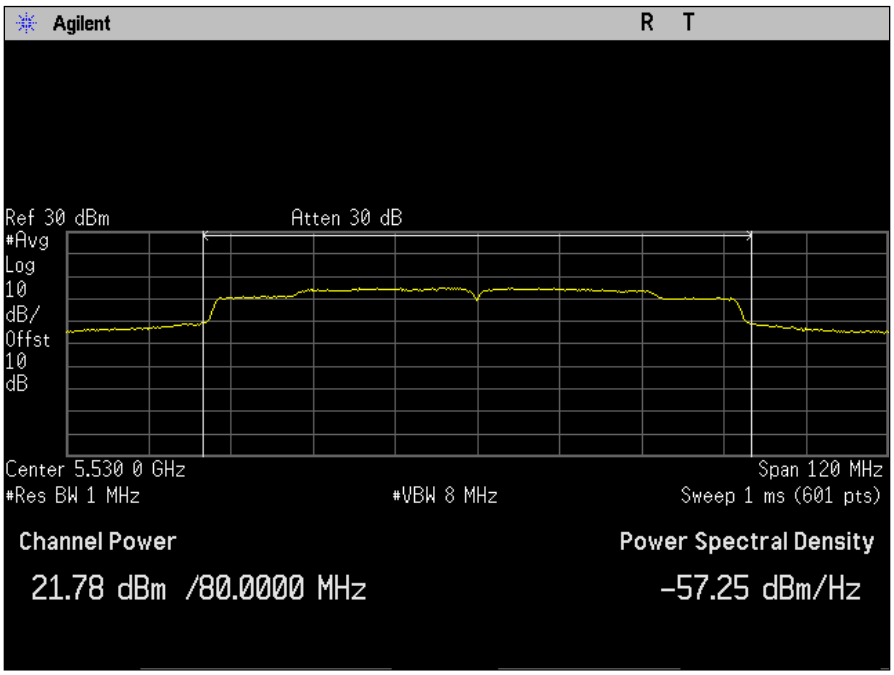
Plot 88. Maximum Conducted Output Power, BW 40M, Ch 5670M, N Mode, Port A



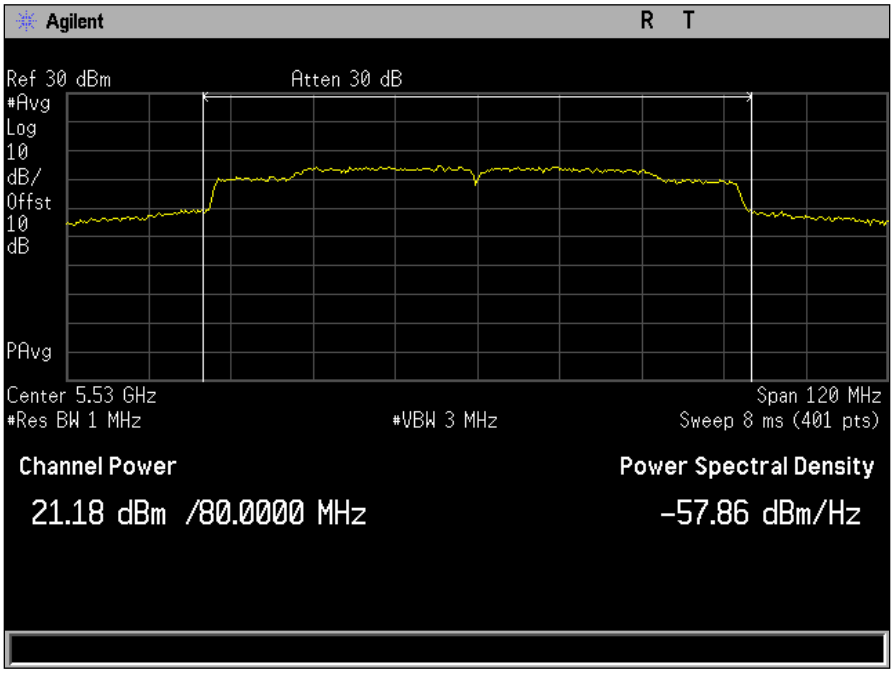
Plot 89. Maximum Conducted Output Power, BW 80M, Ch 5290M, AC Mode, Port B



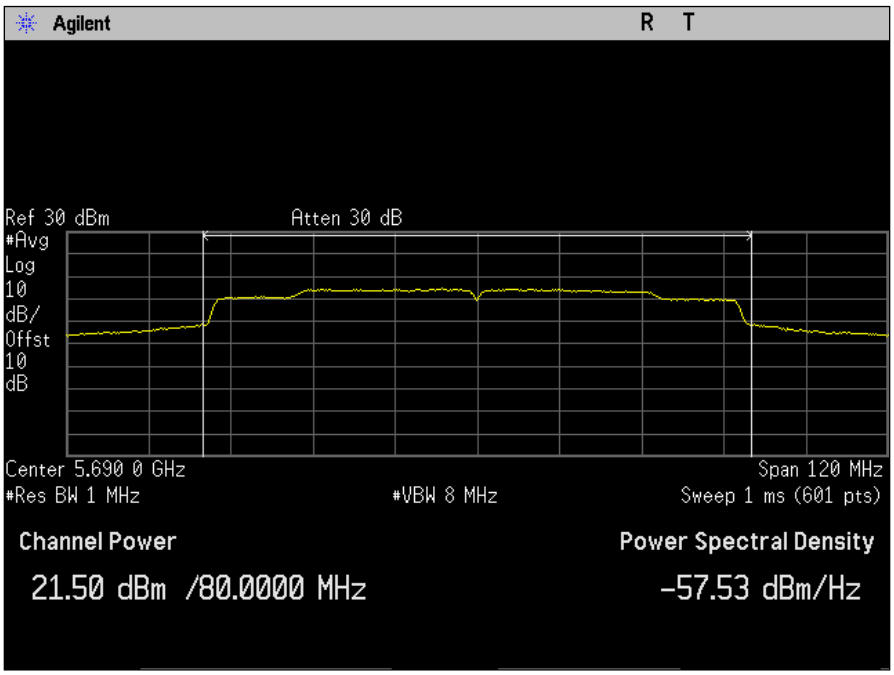
Plot 90. Maximum Conducted Output Power, BW 80M, Ch 5290M, AC Mode, Port A



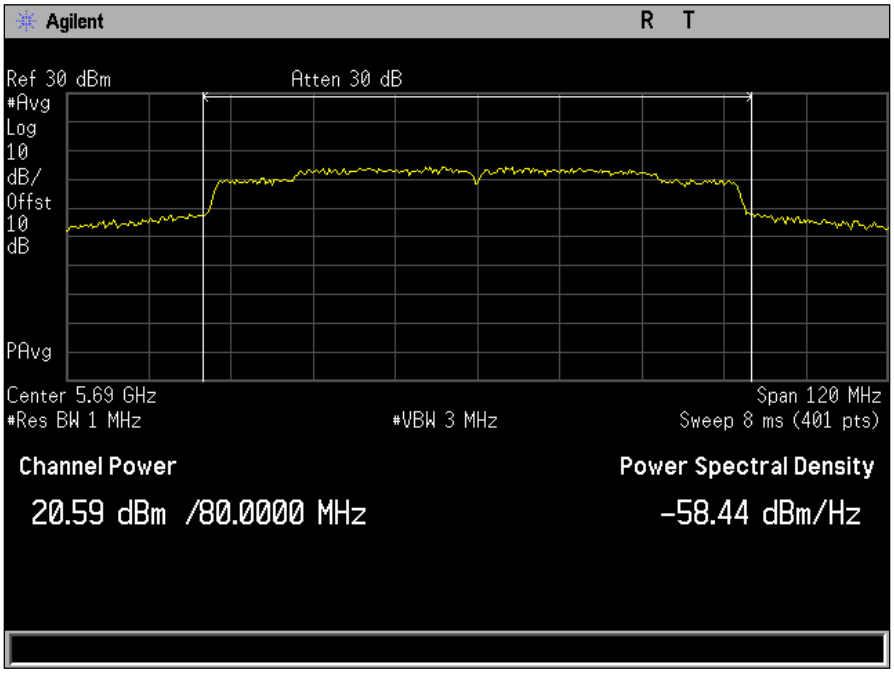
Plot 91. Maximum Conducted Output Power, BW 80M, Ch 5530M, AC Mode, Port B



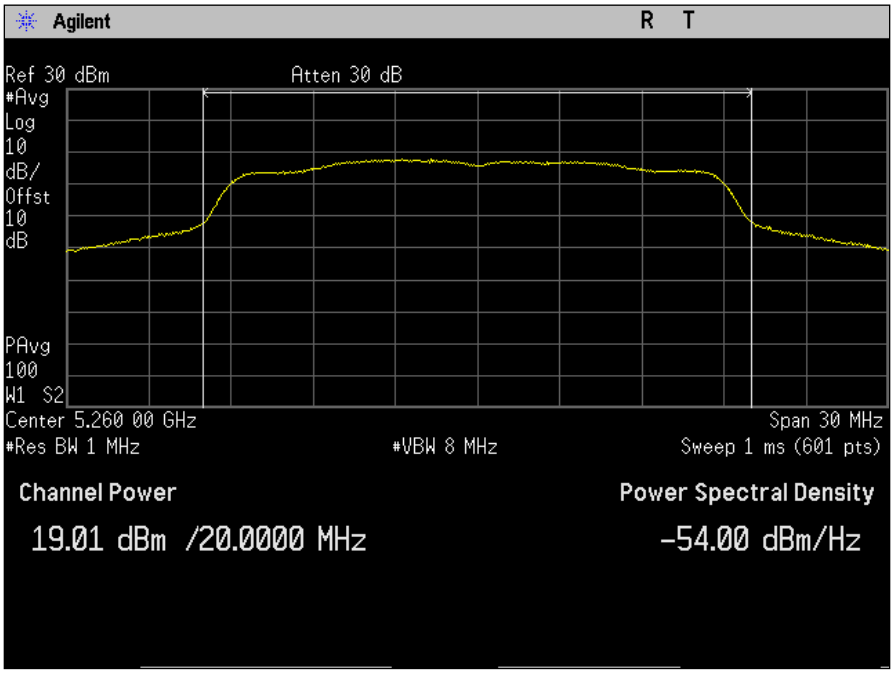
Plot 92. Maximum Conducted Output Power, BW 80M, Ch 5530M, AC Mode, Port A



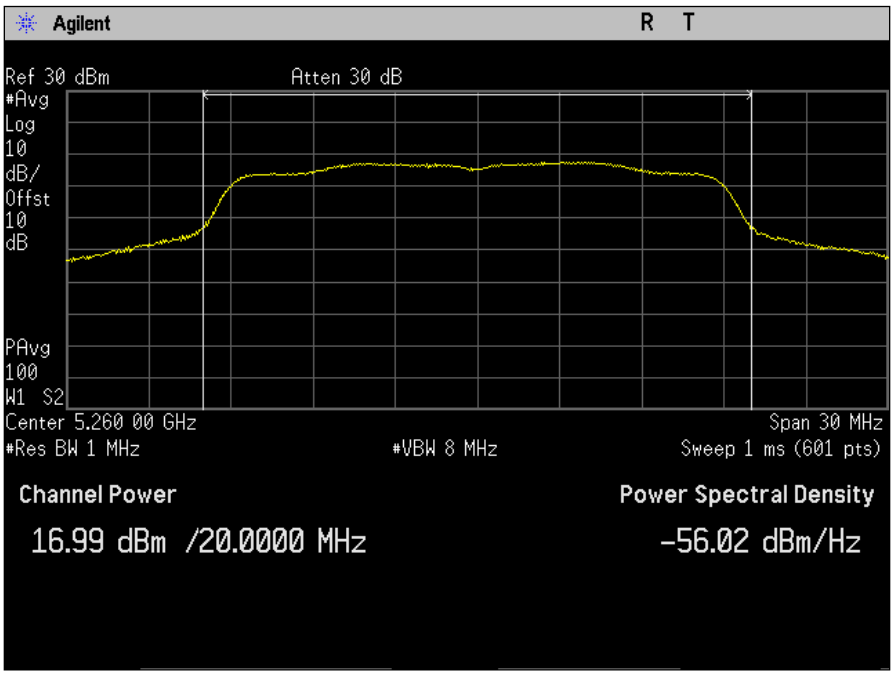
Plot 93. Maximum Conducted Output Power, BW 80M, Ch 5690M, AC Mode, Port B



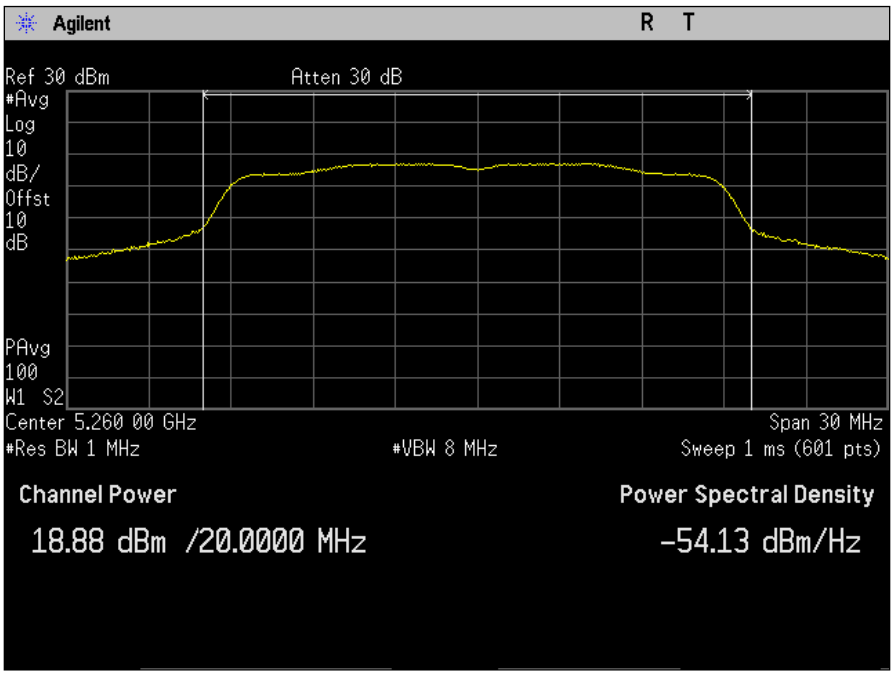
Plot 94. Maximum Conducted Output Power, BW 80M, Ch 5690M, AC Mode, Port A



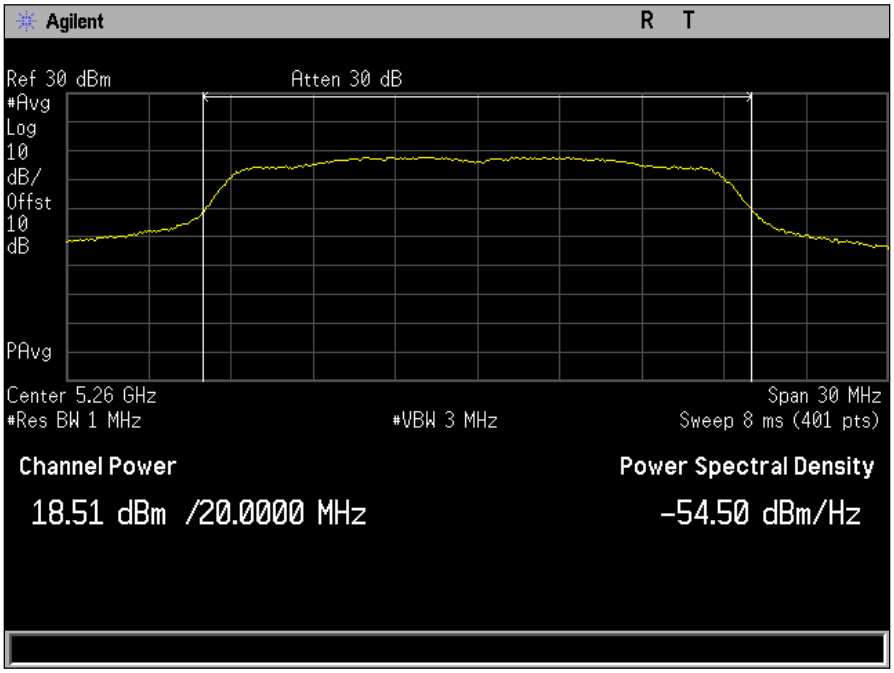
Plot 95. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5260M, A Mode, Port B



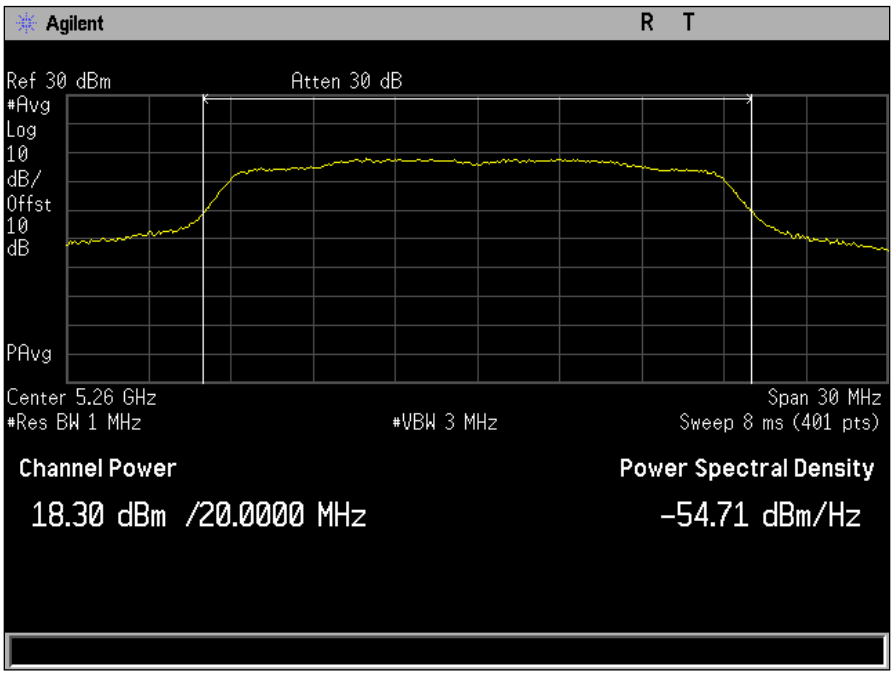
Plot 96. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5260M, AC Mode, Port B



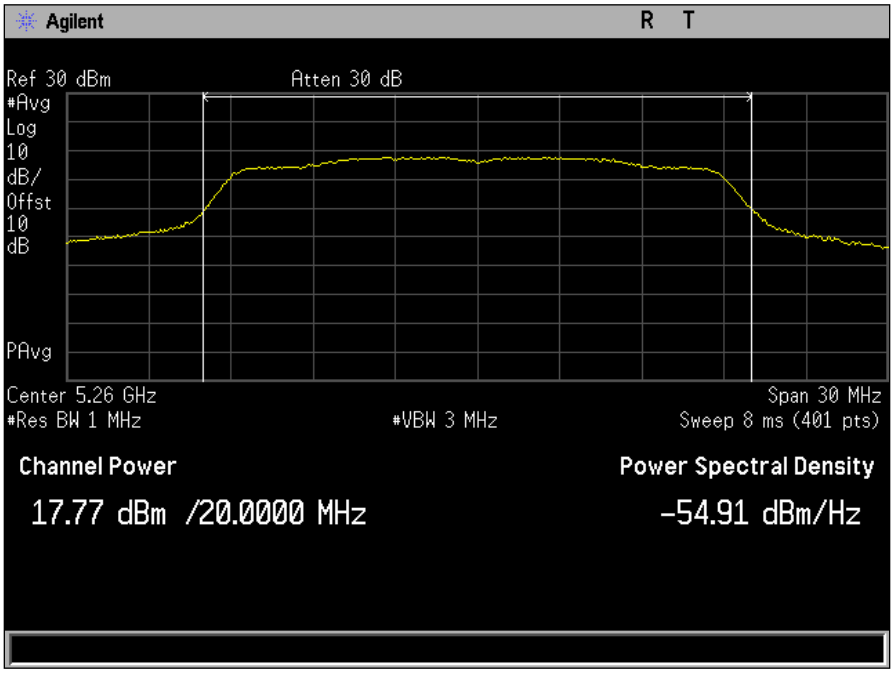
Plot 97. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5260M, N Mode, Port B



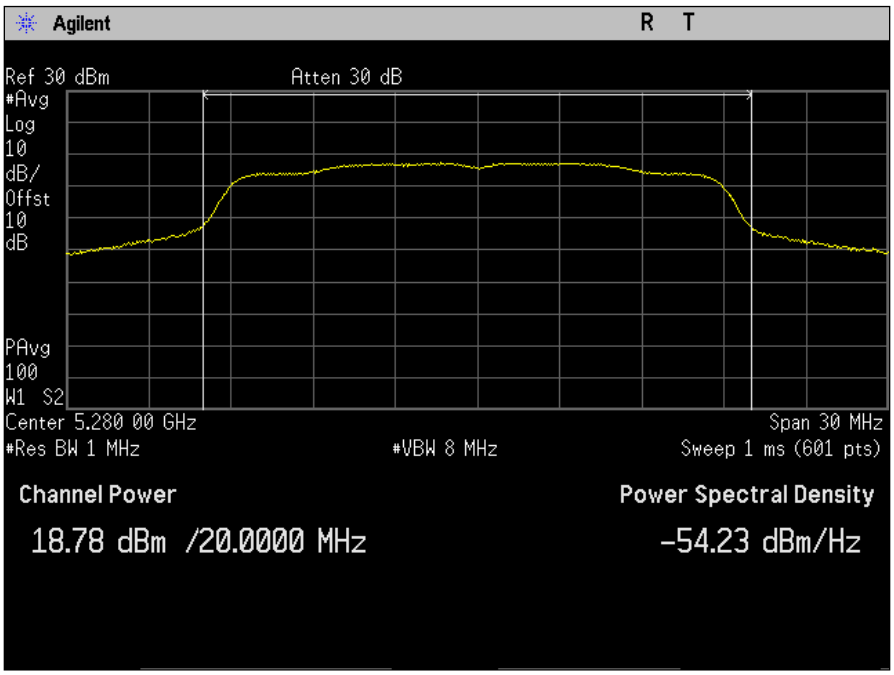
Plot 98. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5260M, A Mode, Port A



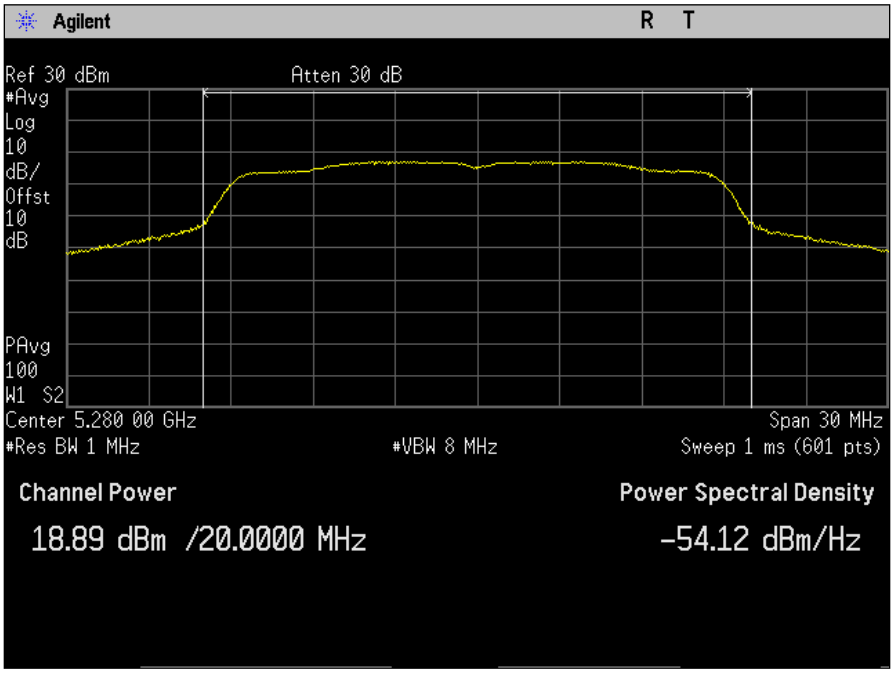
Plot 99. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5260M, AC Mode, Port A



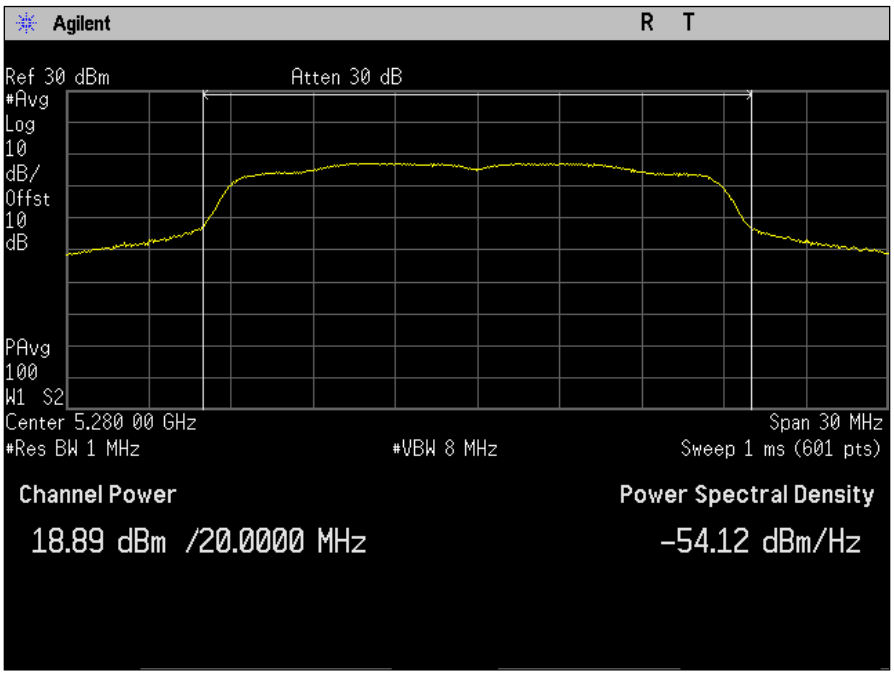
Plot 100. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5260M, N Mode, Port A



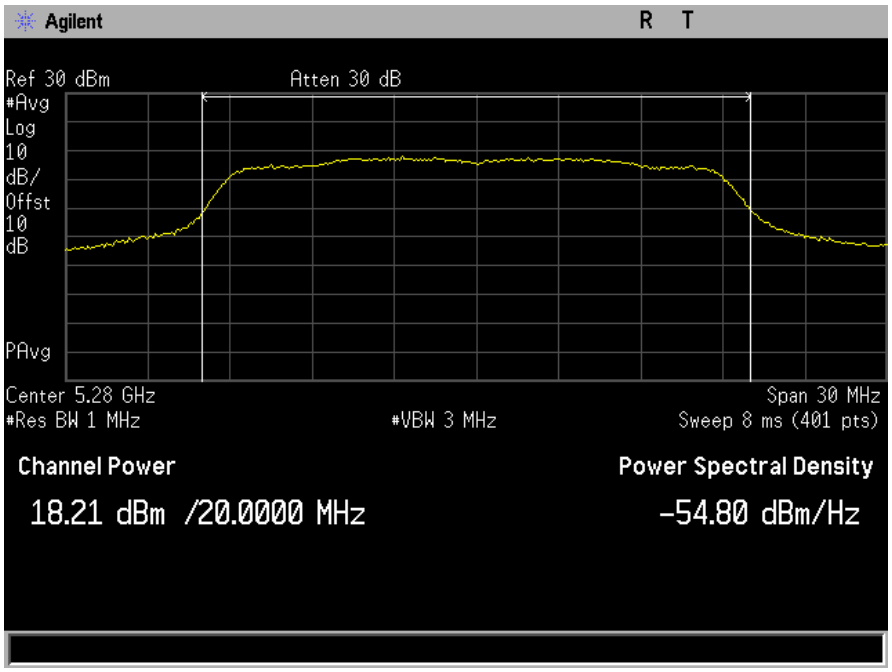
Plot 101. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5280M, A Mode, Port B



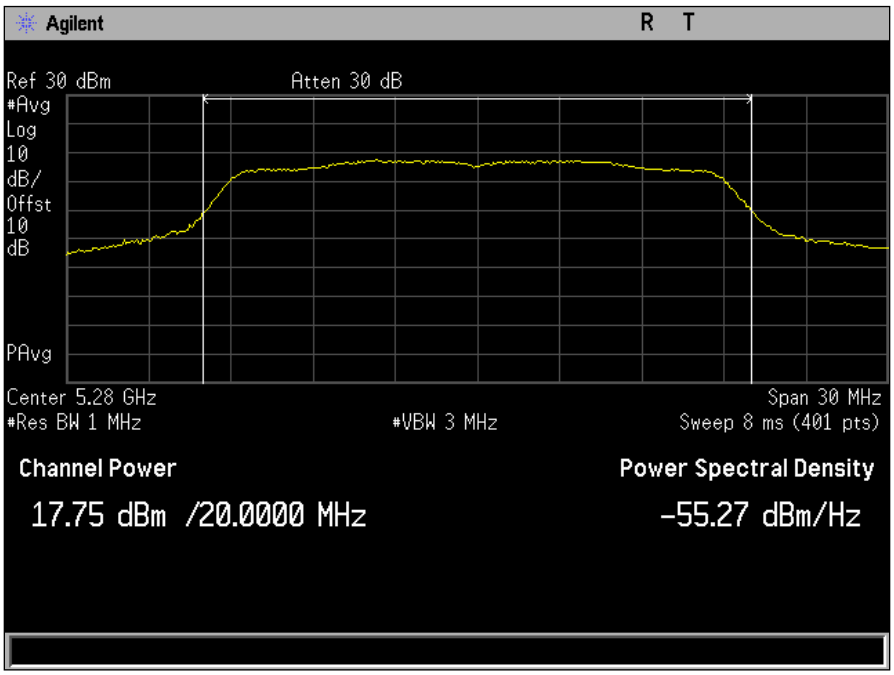
Plot 102. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5280M, AC Mode, Port B



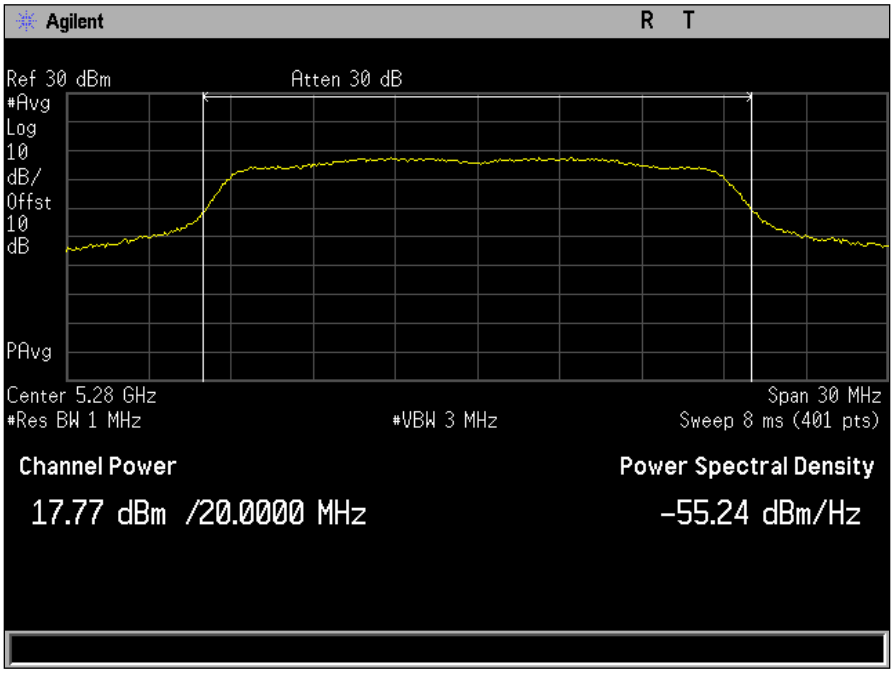
Plot 103. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5280M, N Mode, Port B



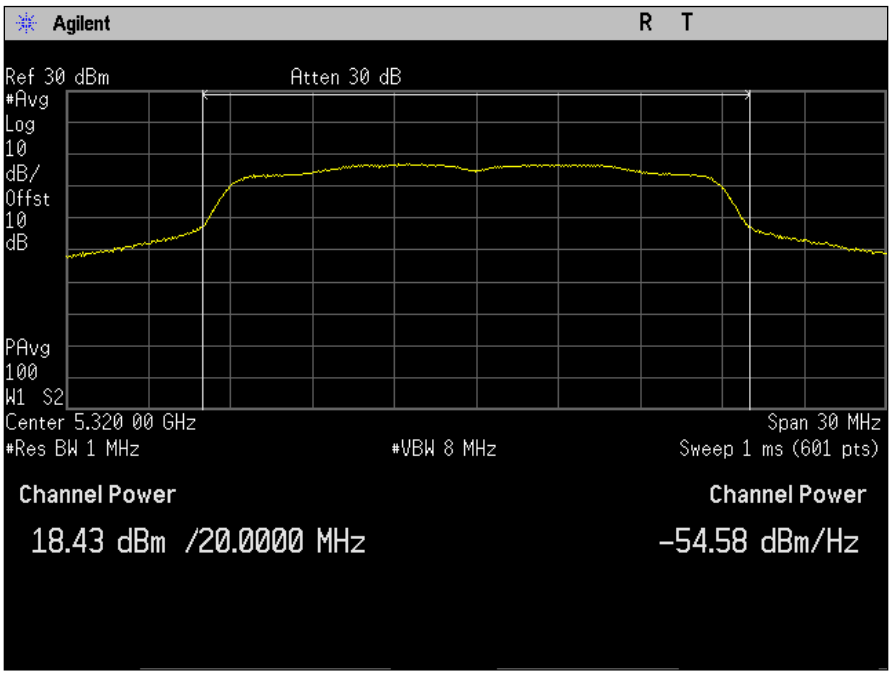
Plot 104. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5280M, A Mode, Port A



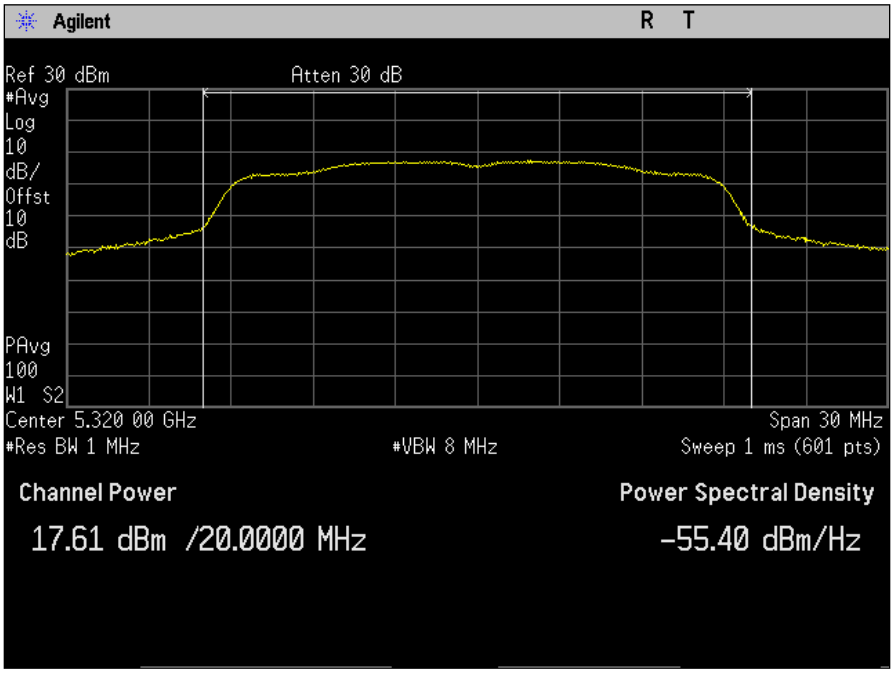
Plot 105. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5280M, AC Mode, Port A



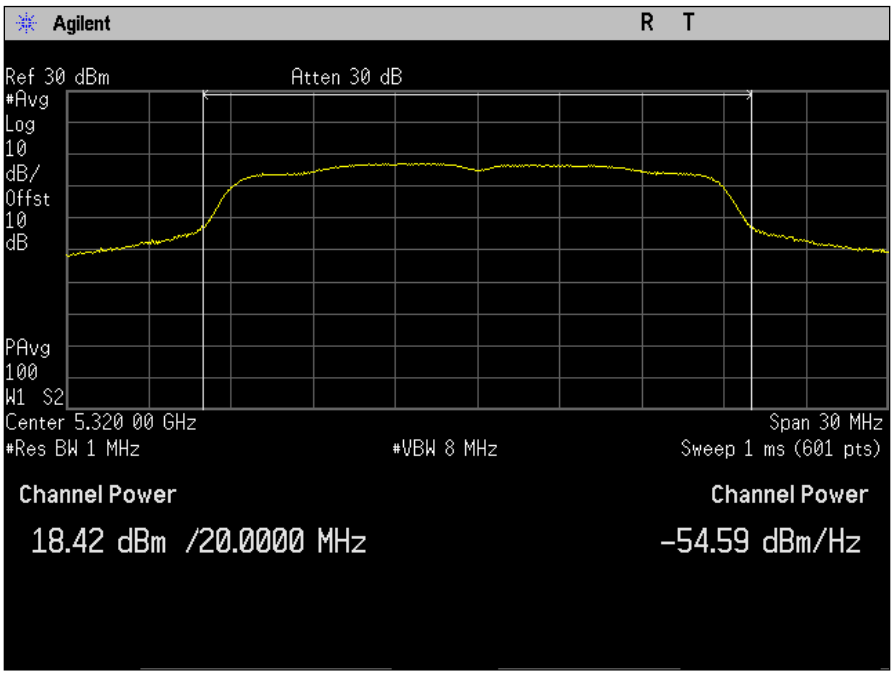
Plot 106. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5280M, N Mode, Port A



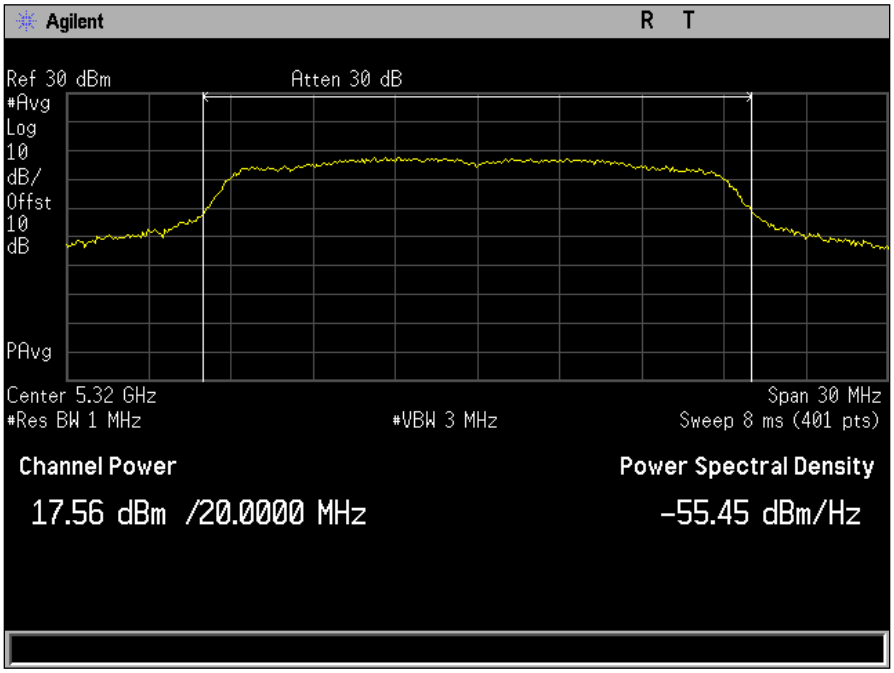
Plot 107. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5320M, A Mode, Port B



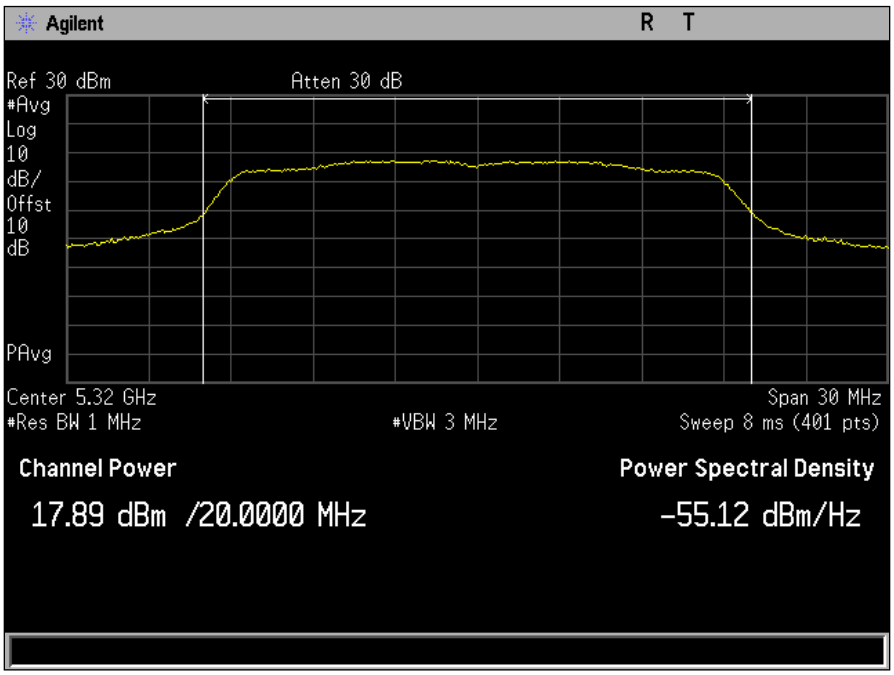
Plot 108. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5320M, AC Mode, Port B



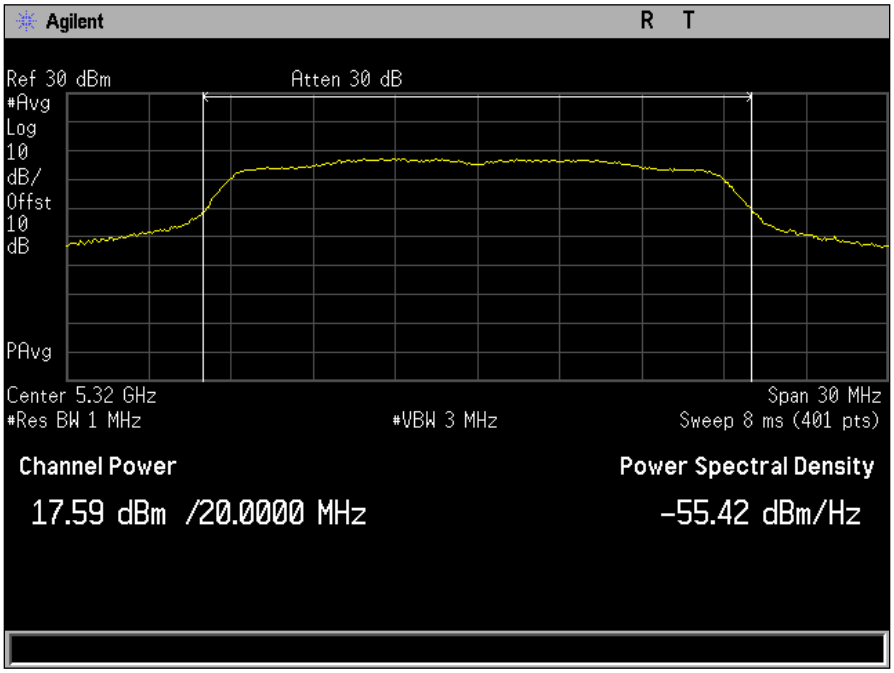
Plot 109. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5320M, N Mode, Port B



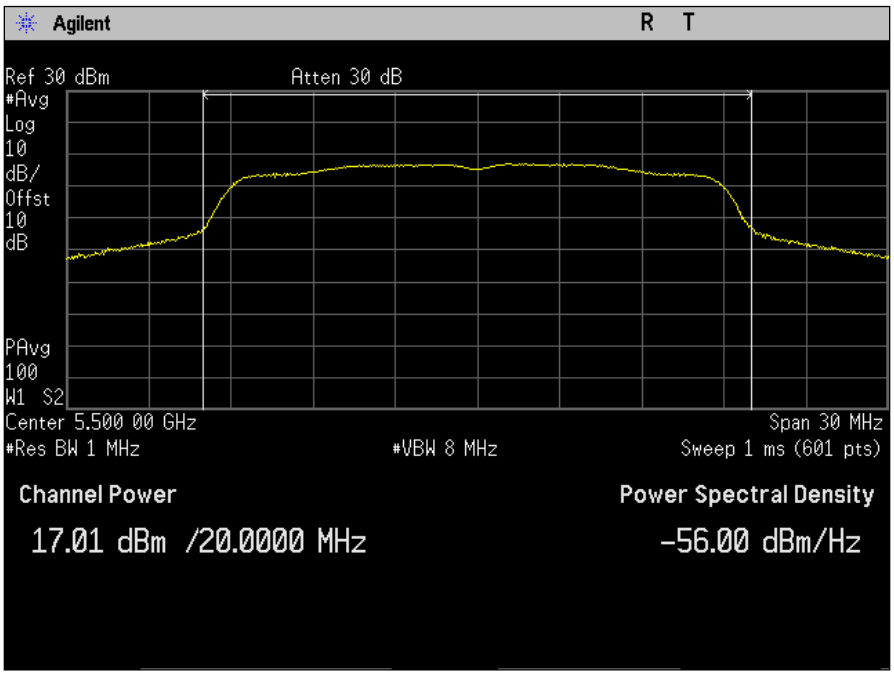
Plot 110. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5320M, A Mode, Port A



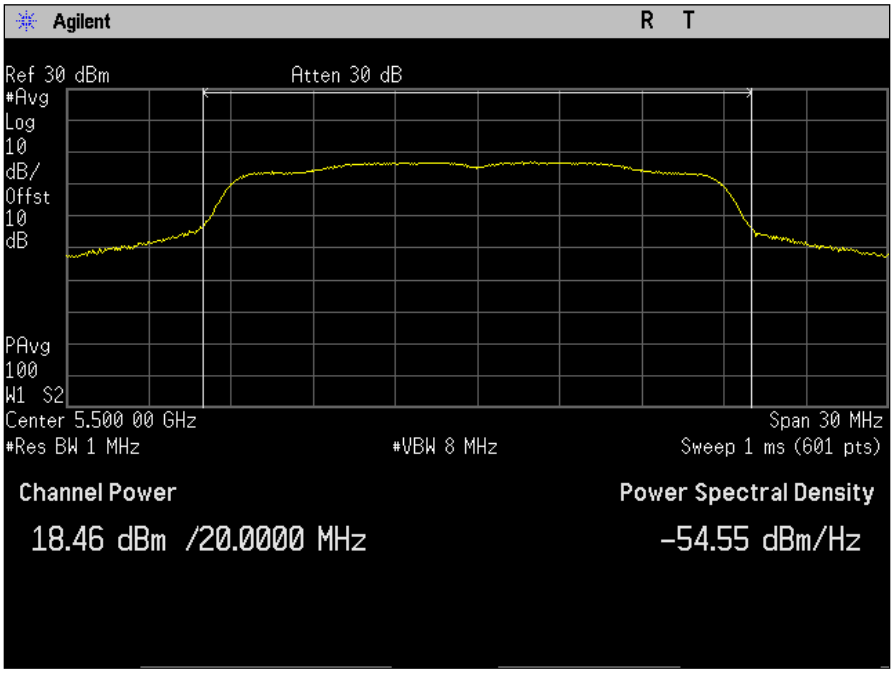
Plot 111. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5320M, AC Mode, Port A



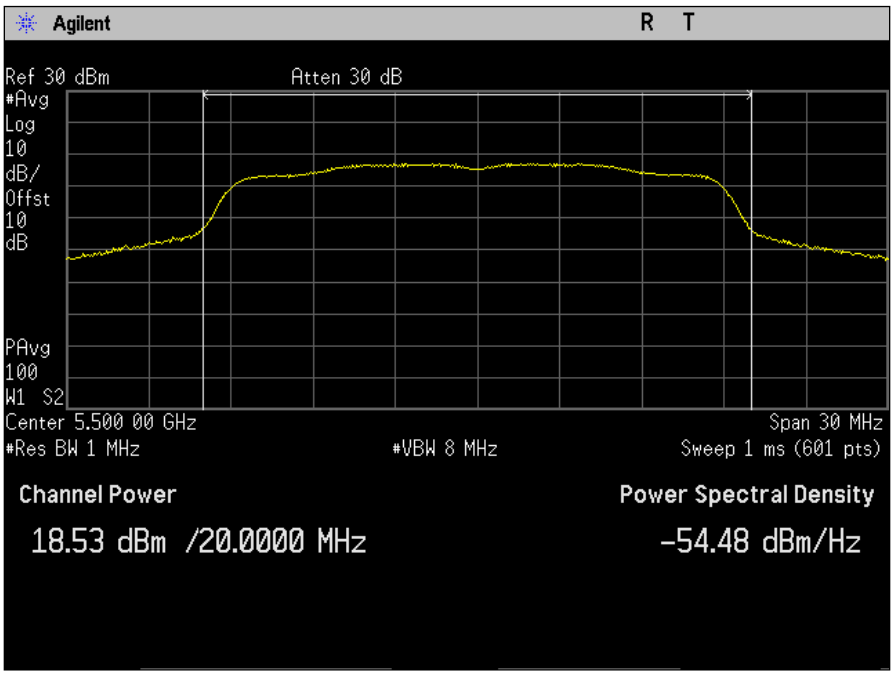
Plot 112. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5320M, N Mode, Port A



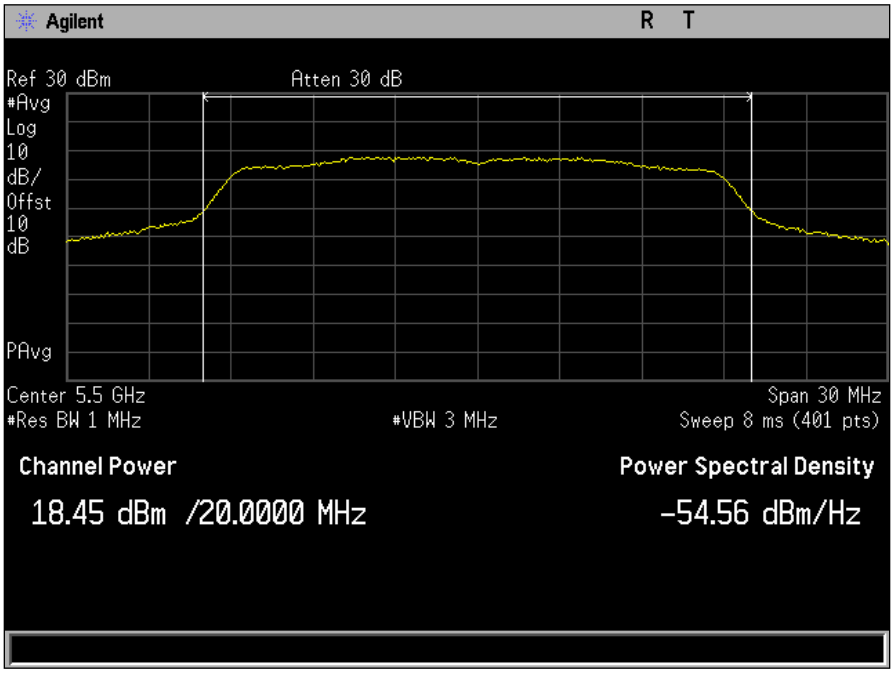
Plot 113. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5500M, A Mode, Port B



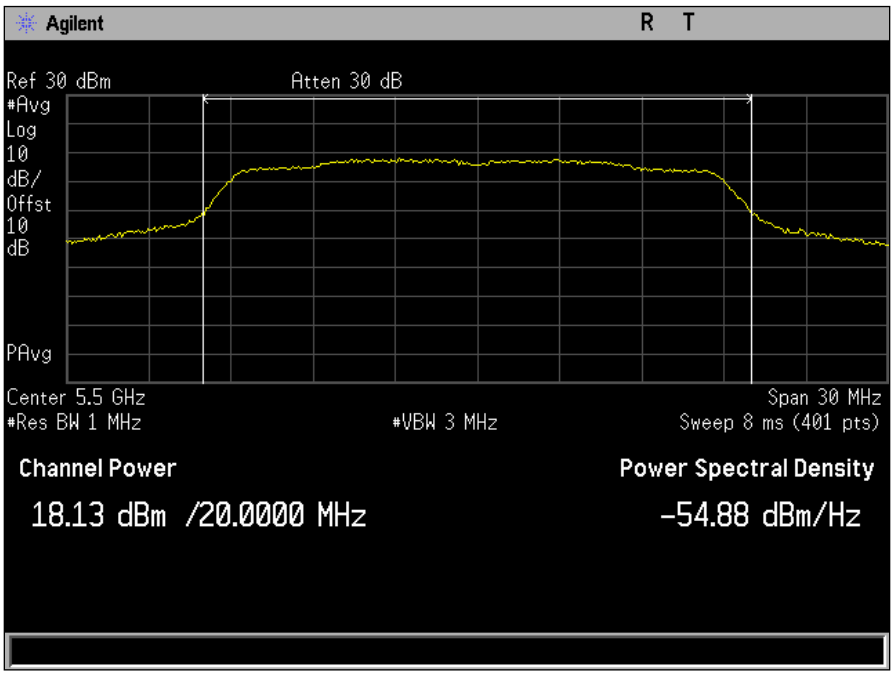
Plot 114. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5500M, AC Mode, Port B



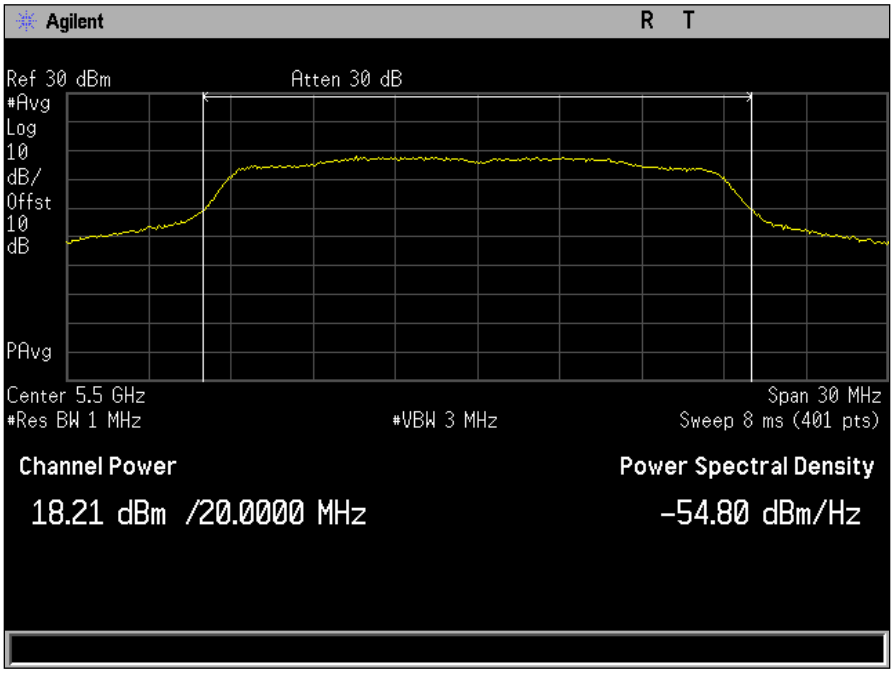
Plot 115. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5500M, N Mode, Port B



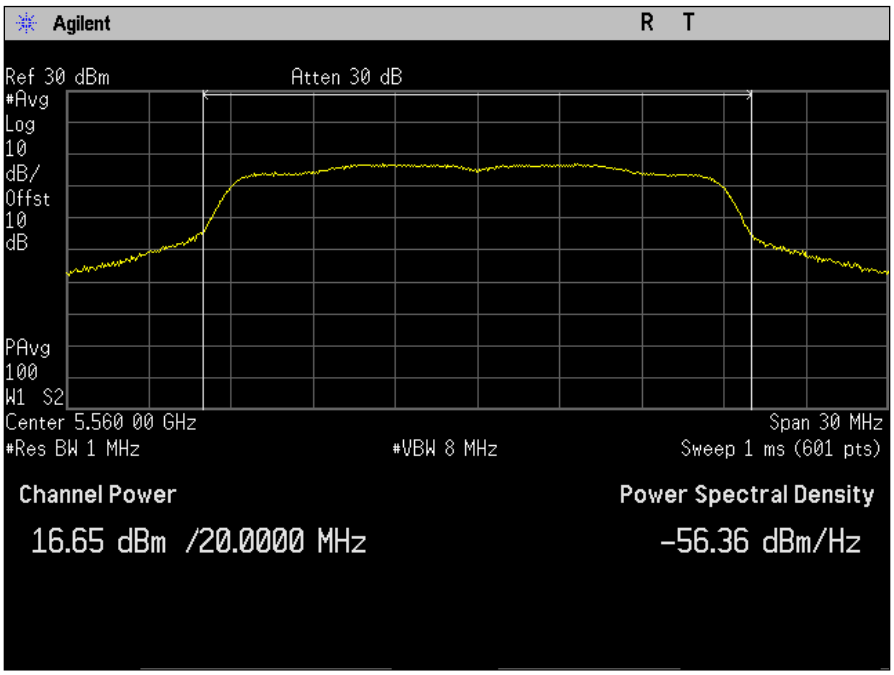
Plot 116. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5500M, A Mode, Port A



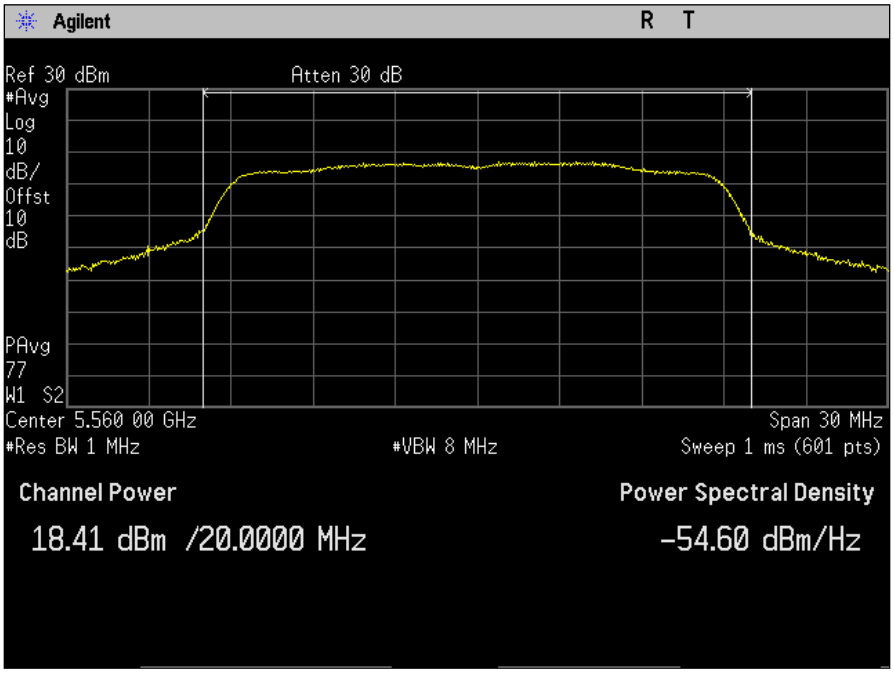
Plot 117. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5500M, AC Mode, Port A



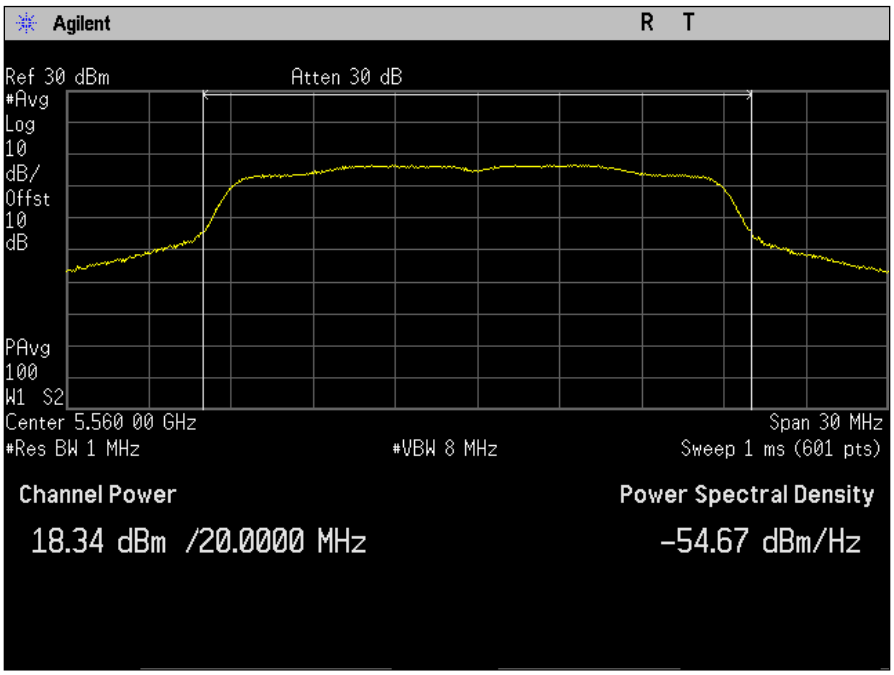
Plot 118. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5500M, N Mode, Port A



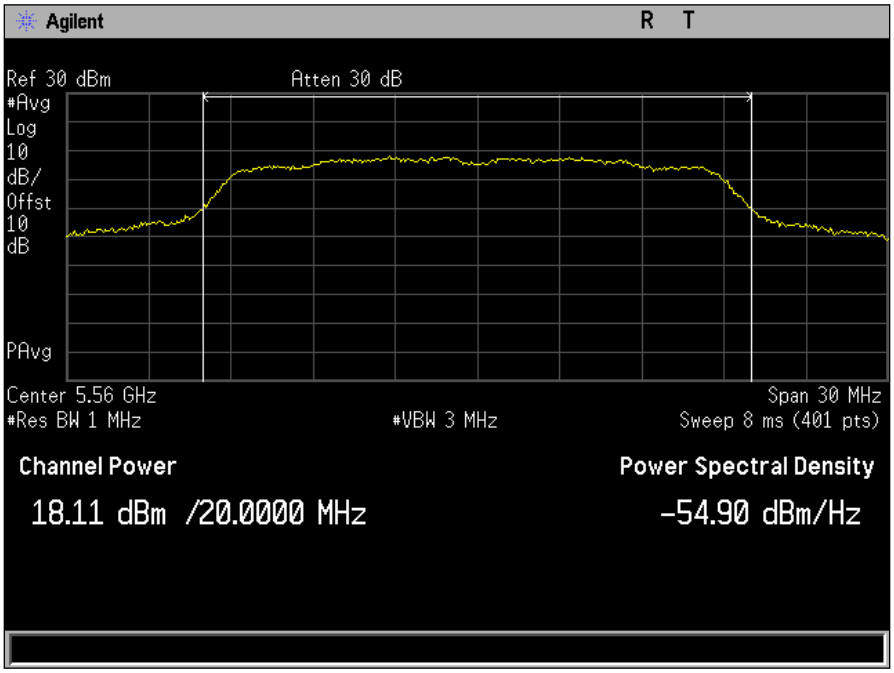
Plot 119. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5560M, A Mode, Port B



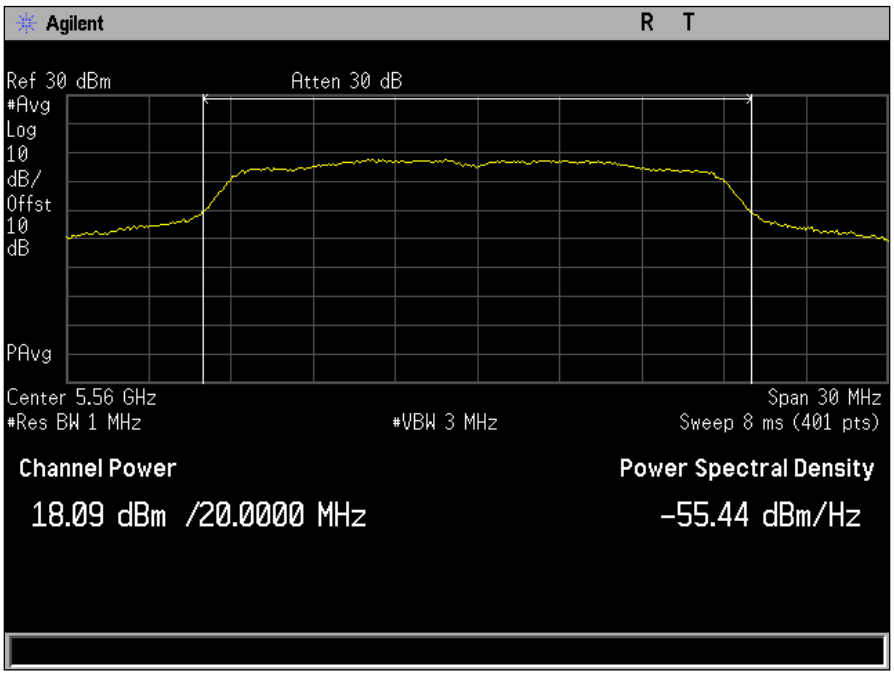
Plot 120. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5560M, AC Mode, Port B



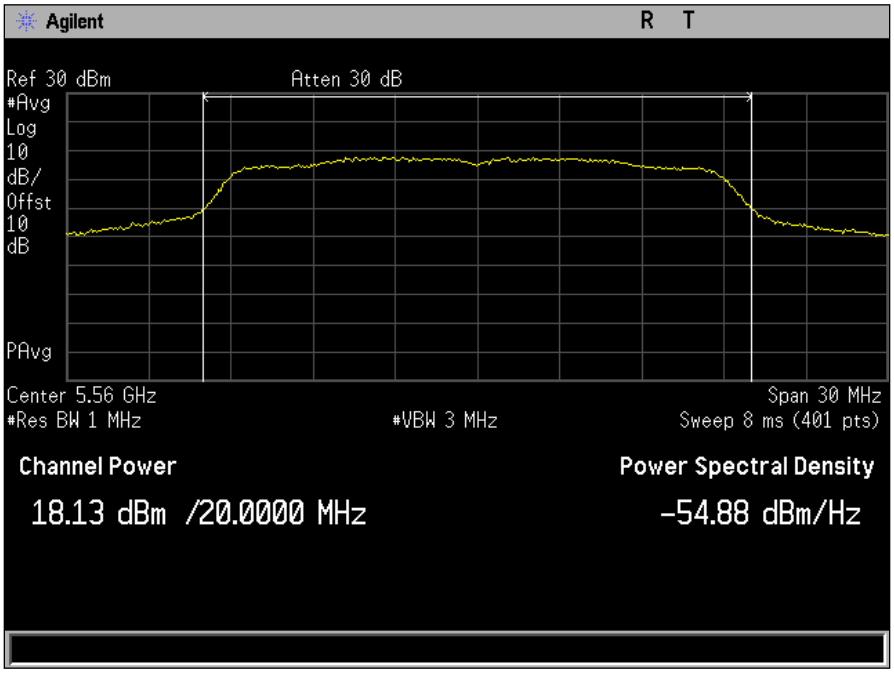
Plot 121. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5560M, N Mode, Port B



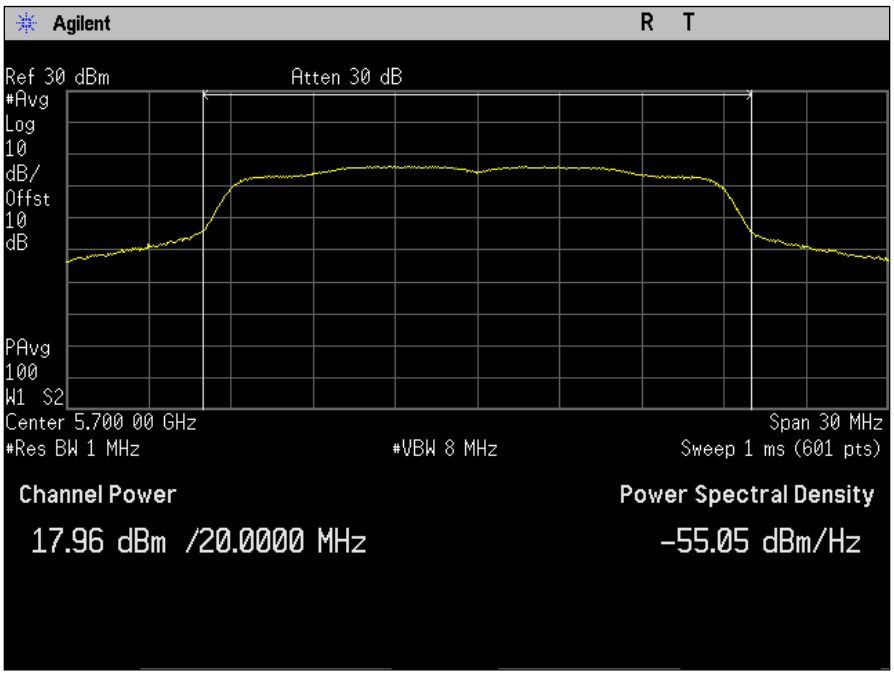
Plot 122. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5560M, A Mode, Port A



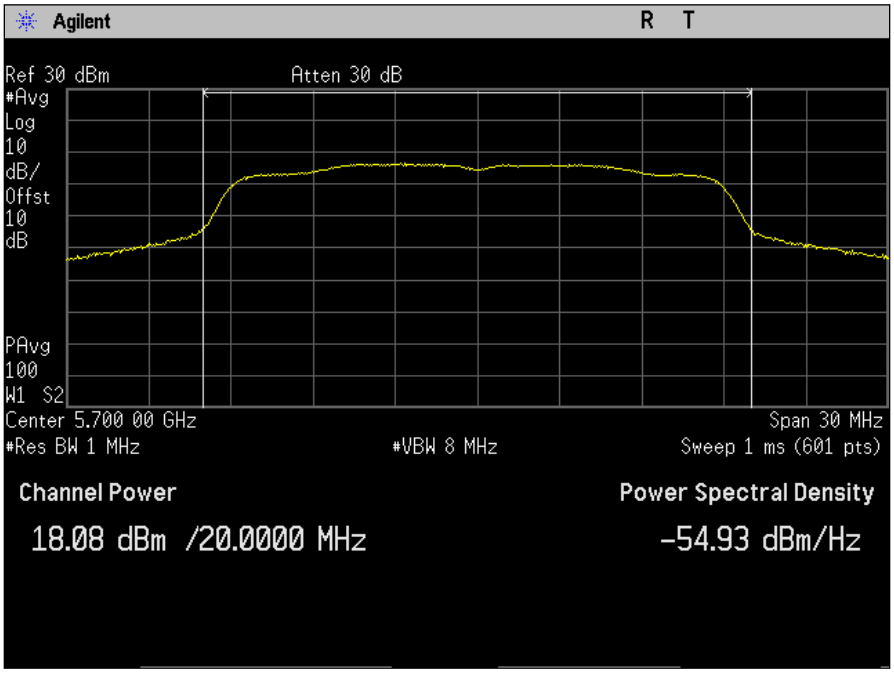
Plot 123. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5560M, AC Mode, Port A



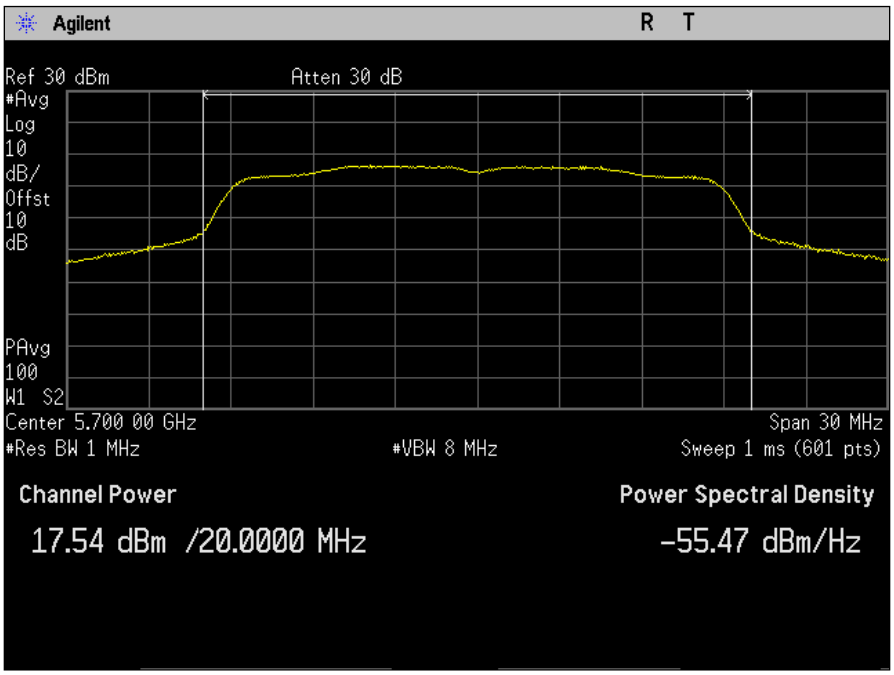
Plot 124. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5560M, N Mode, Port A



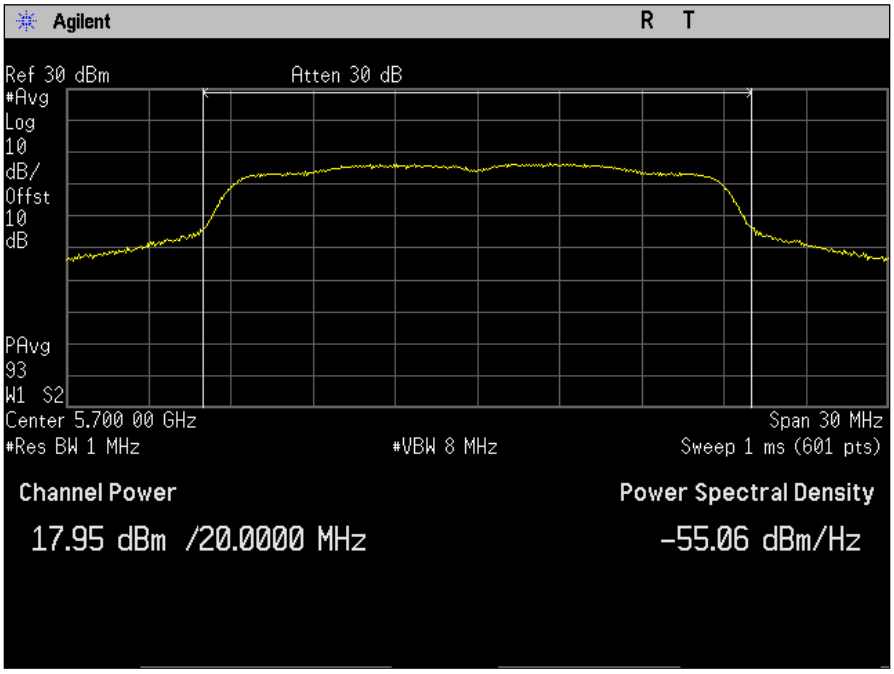
Plot 125. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5700M, A Mode, Port A



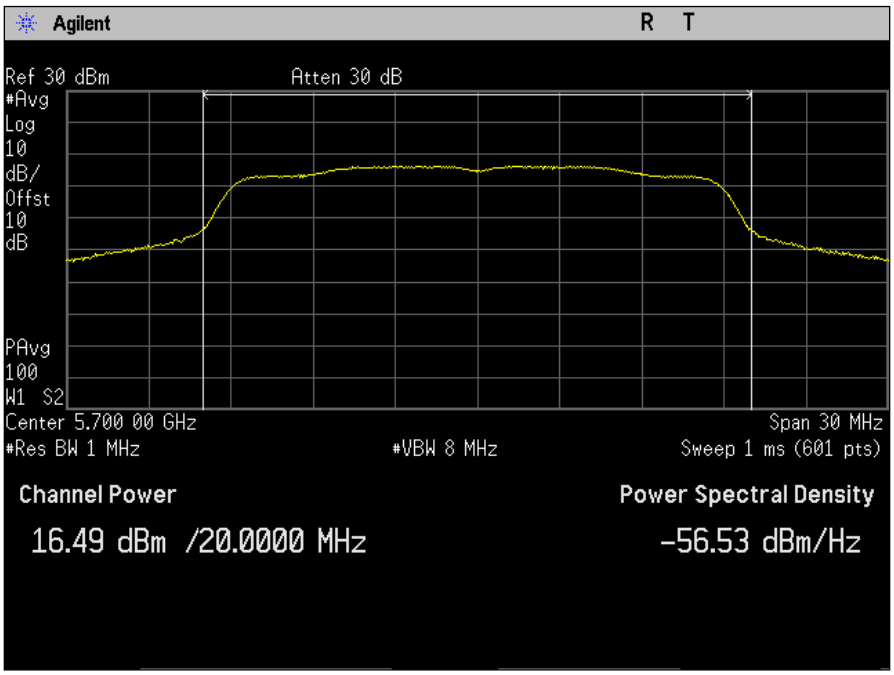
Plot 126. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5700M, A Mode, Port B



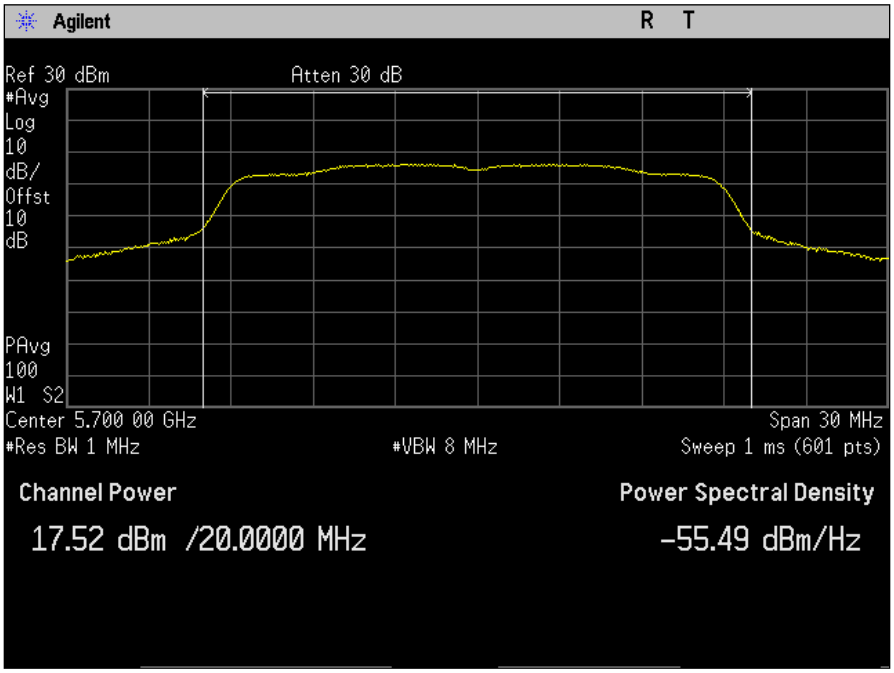
Plot 127. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5700M, AC Mode, Port A



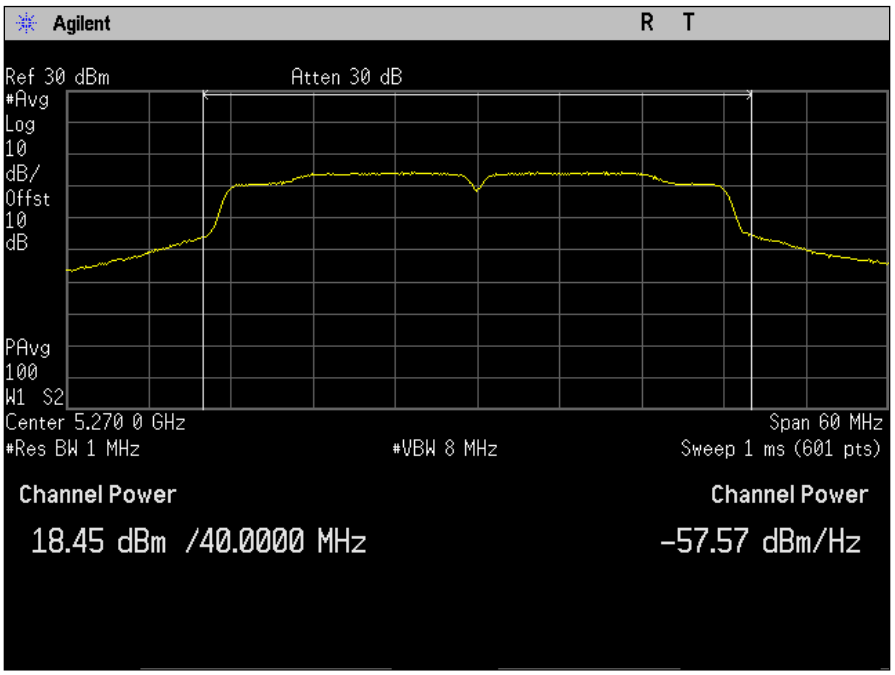
Plot 128. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5700M, AC Mode, Port B



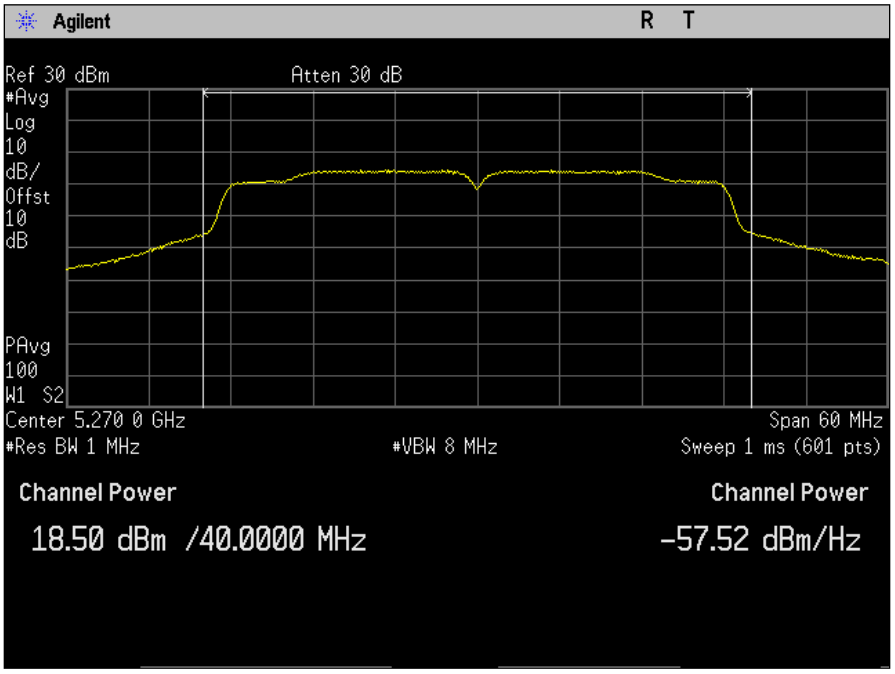
Plot 129. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5700M, N Mode, Port A



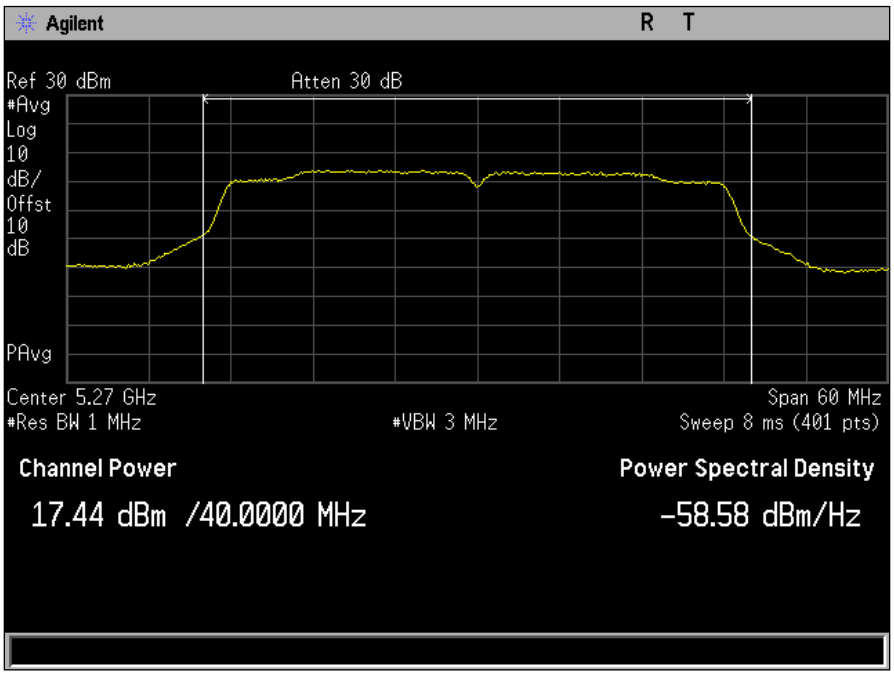
Plot 130. Maximum Conducted Output Power, MIMO, BW 20M, Ch 5700M, N Mode, Port B



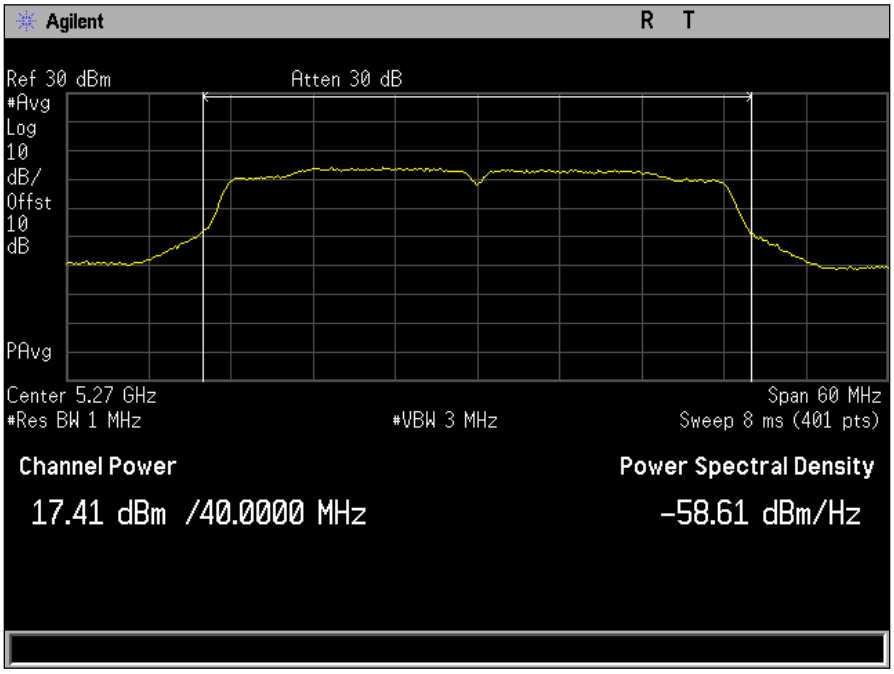
Plot 131. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5270M, AC Mode, Port B



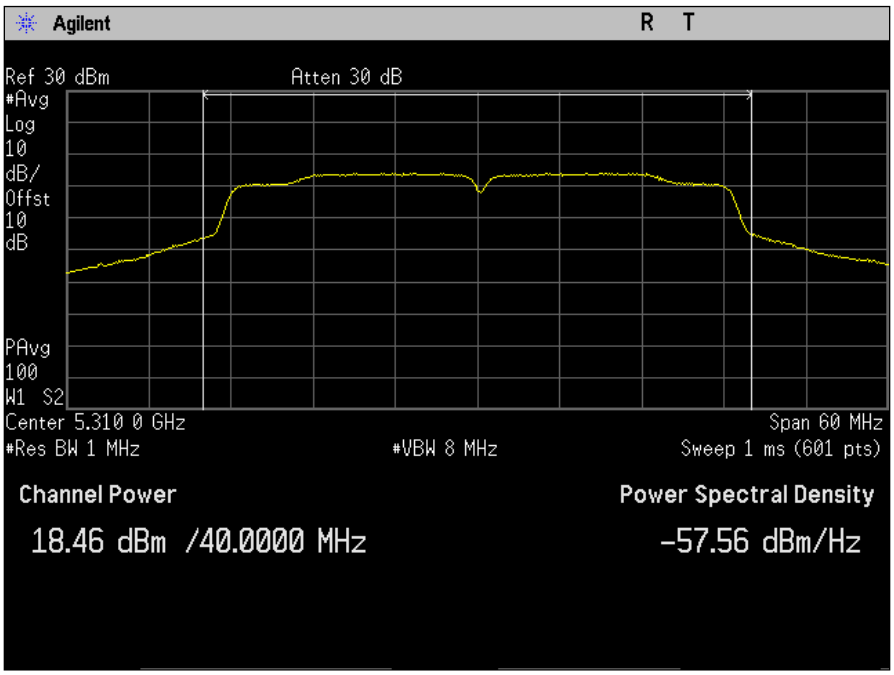
Plot 132. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5270M, N Mode, Port B



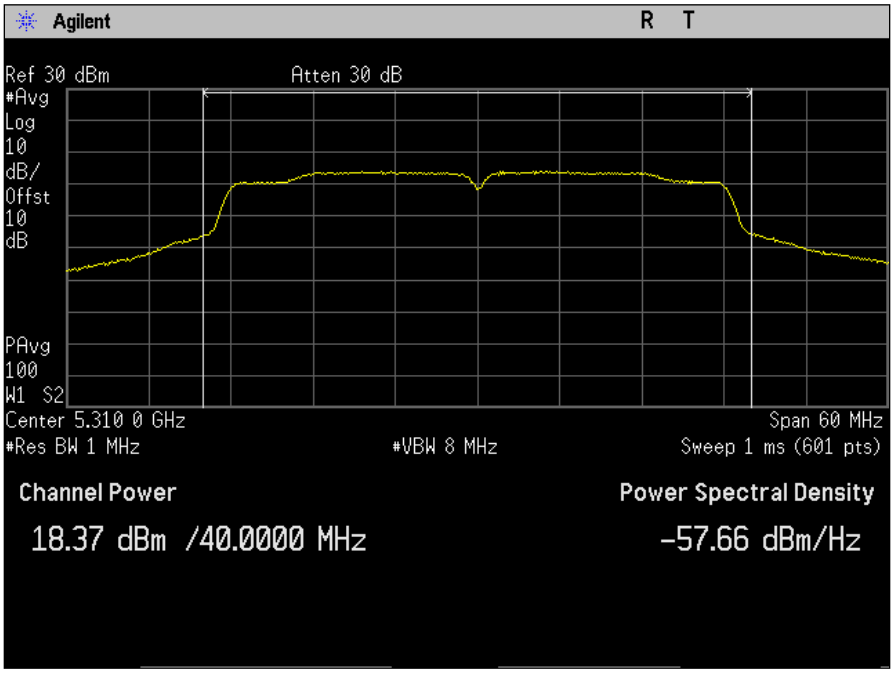
Plot 133. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5270M, AC Mode, Port A



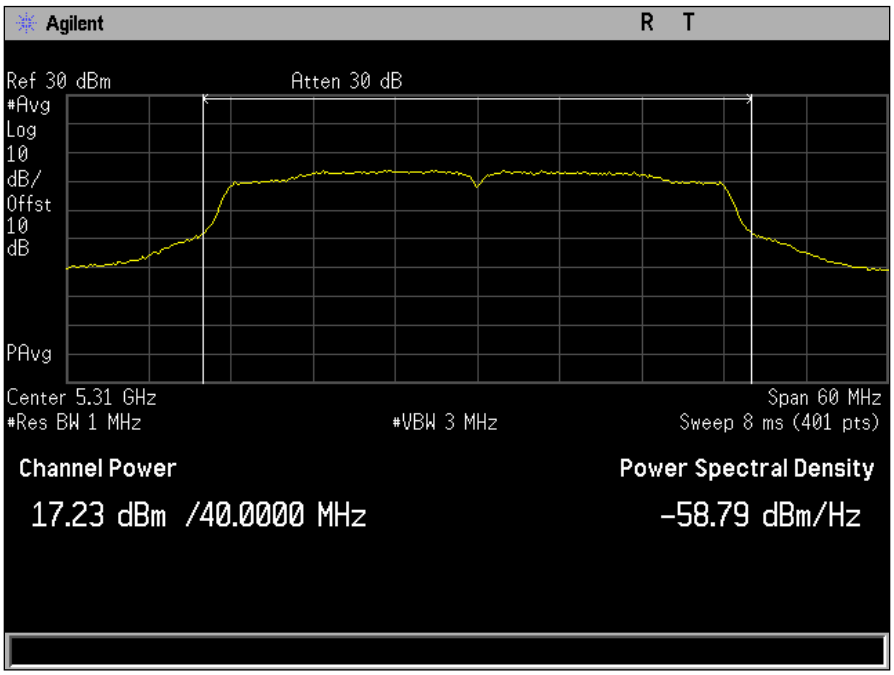
Plot 134. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5270M, N Mode, Port A



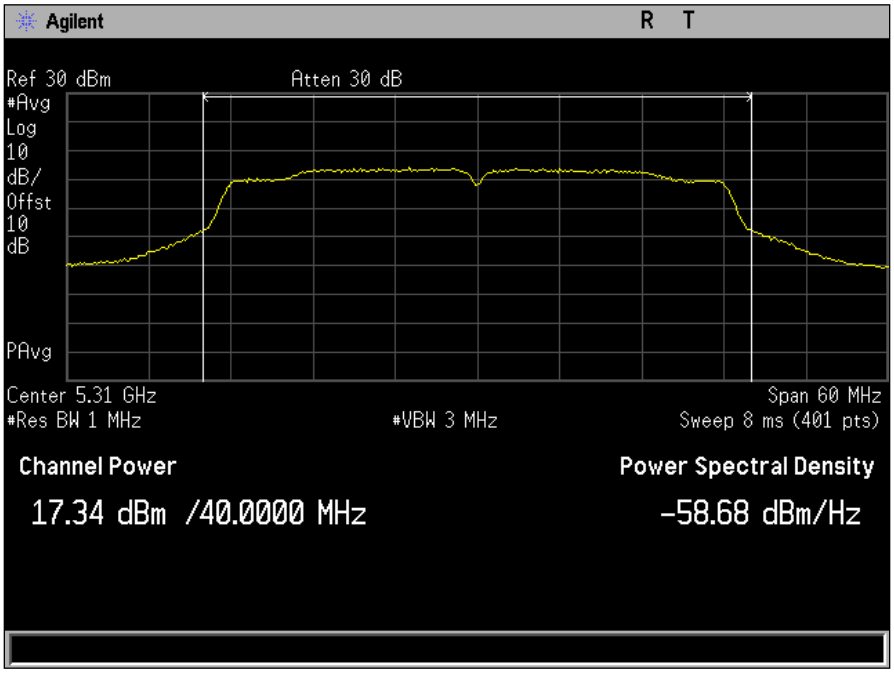
Plot 135. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5310M, AC Mode, Port B



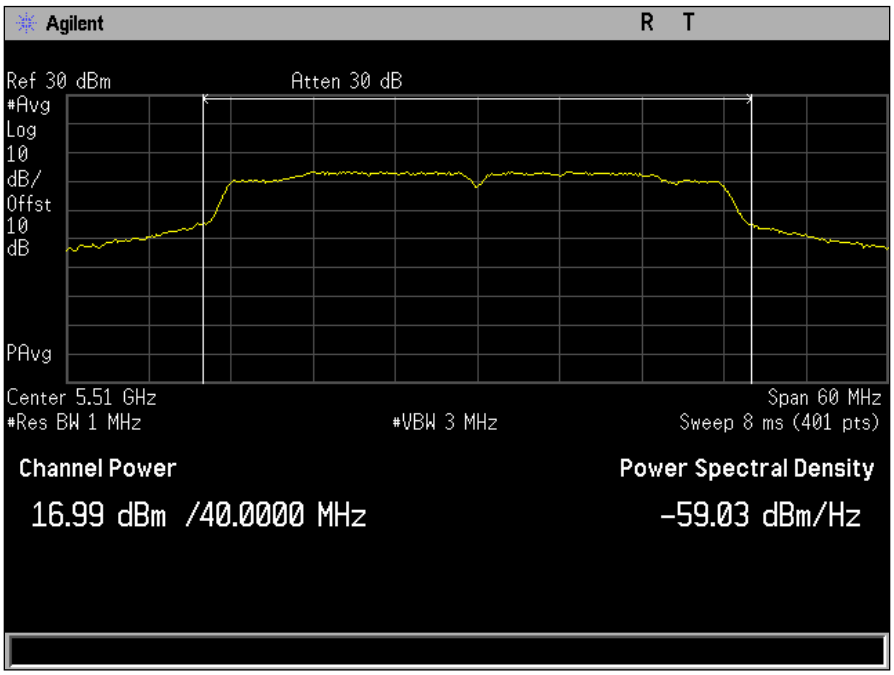
Plot 136. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5310M, N Mode, Port B



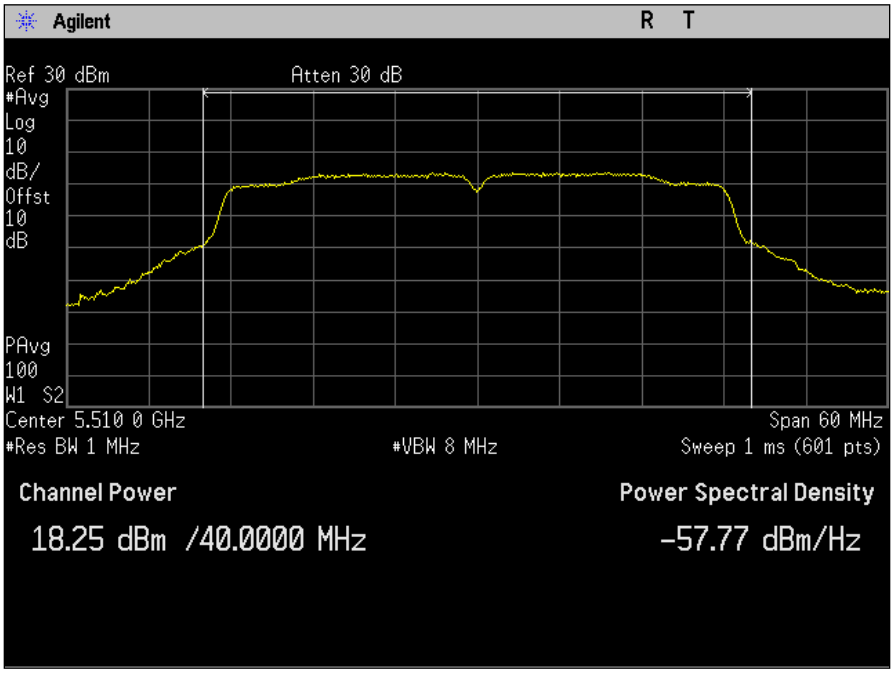
Plot 137. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5310M, AC Mode, Port A



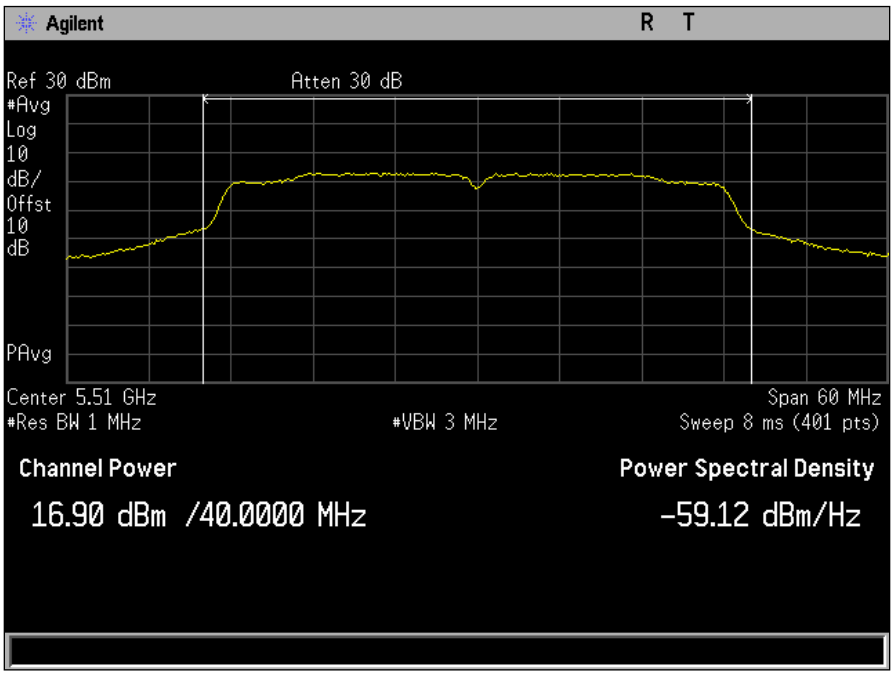
Plot 138. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5310M, N Mode, Port A



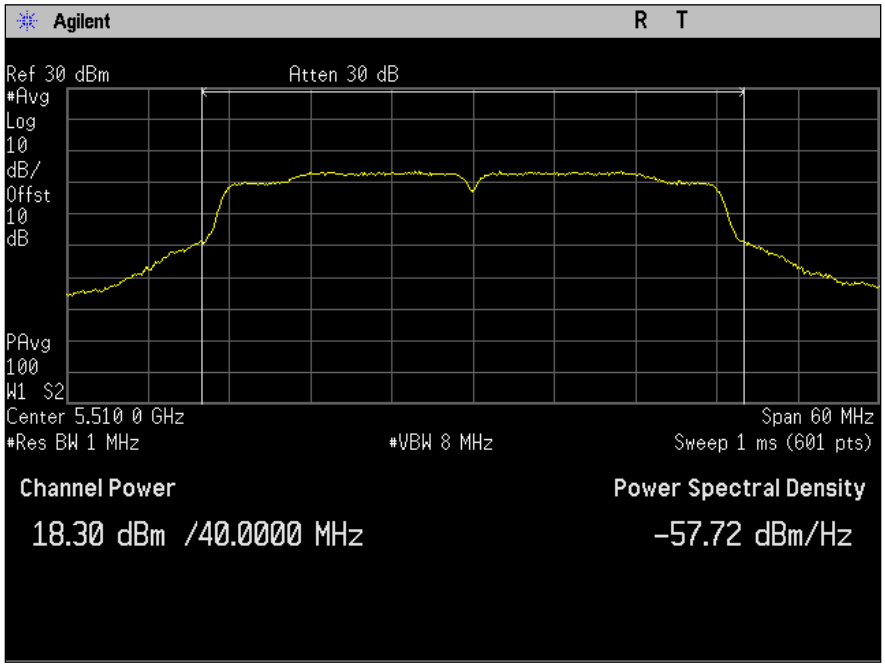
Plot 139. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5510M, AC Mode, Port A



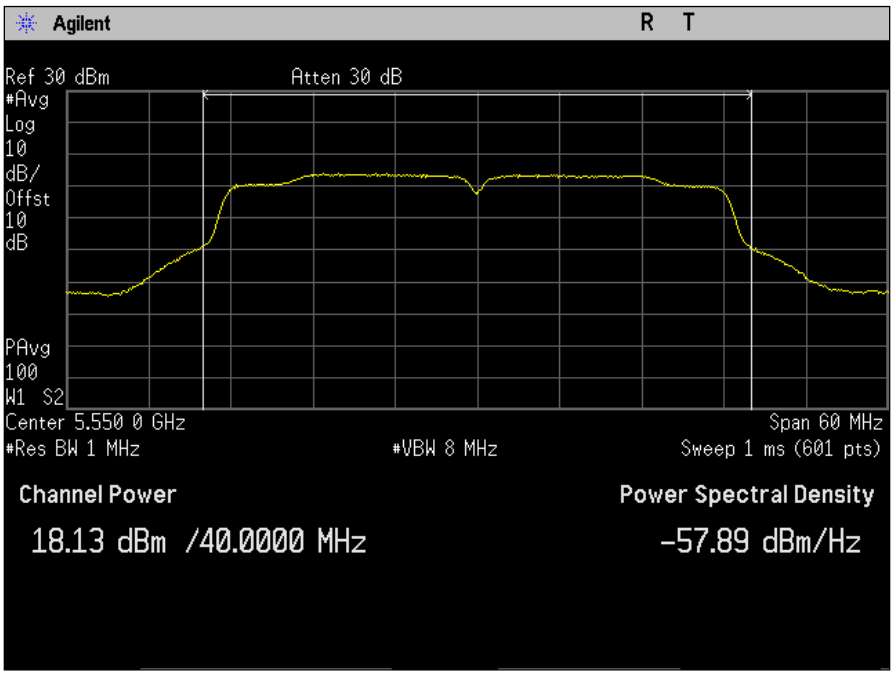
Plot 140. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5510M, AC Mode, Port B



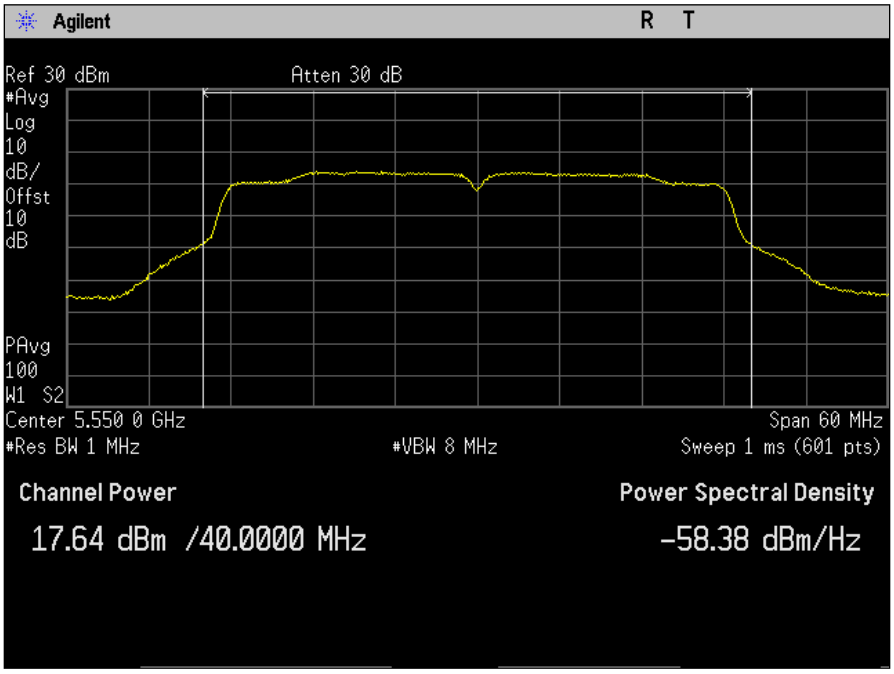
Plot 141. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5510M, N Mode, Port A



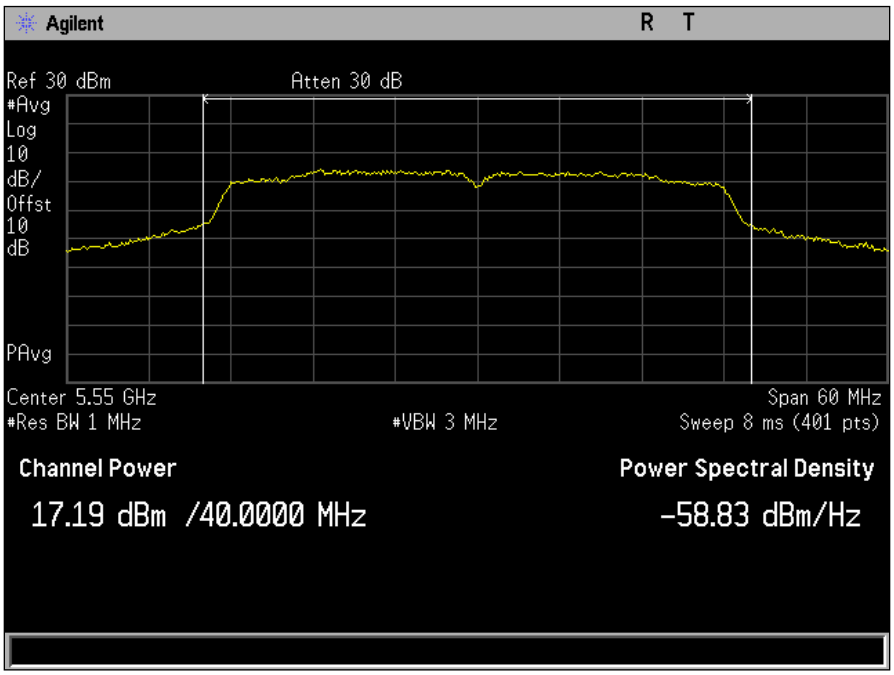
Plot 142. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5510M, N Mode, Port B



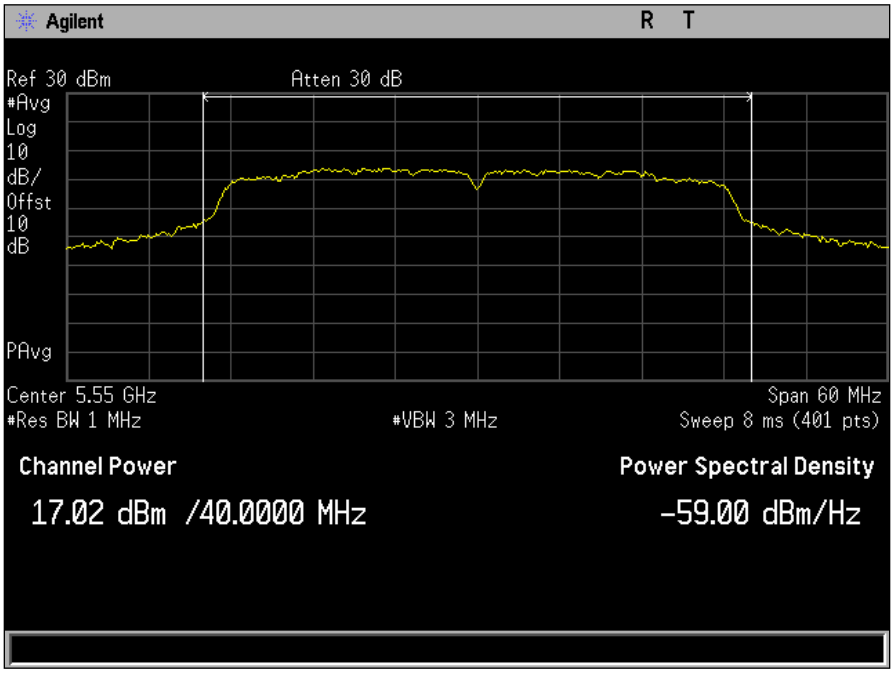
Plot 143. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5550M, AC Mode, Port B



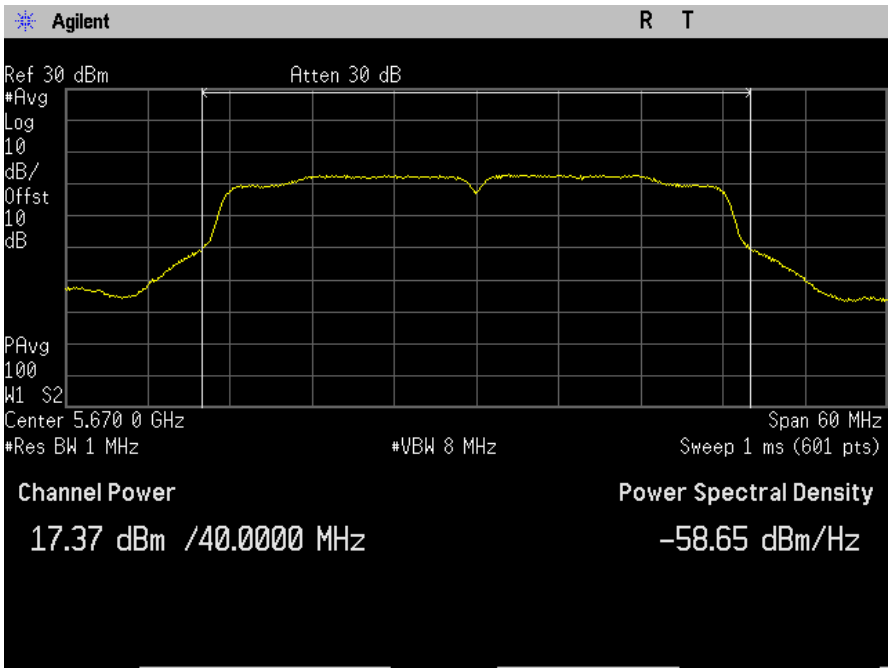
Plot 144. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5550M, N Mode, Port B



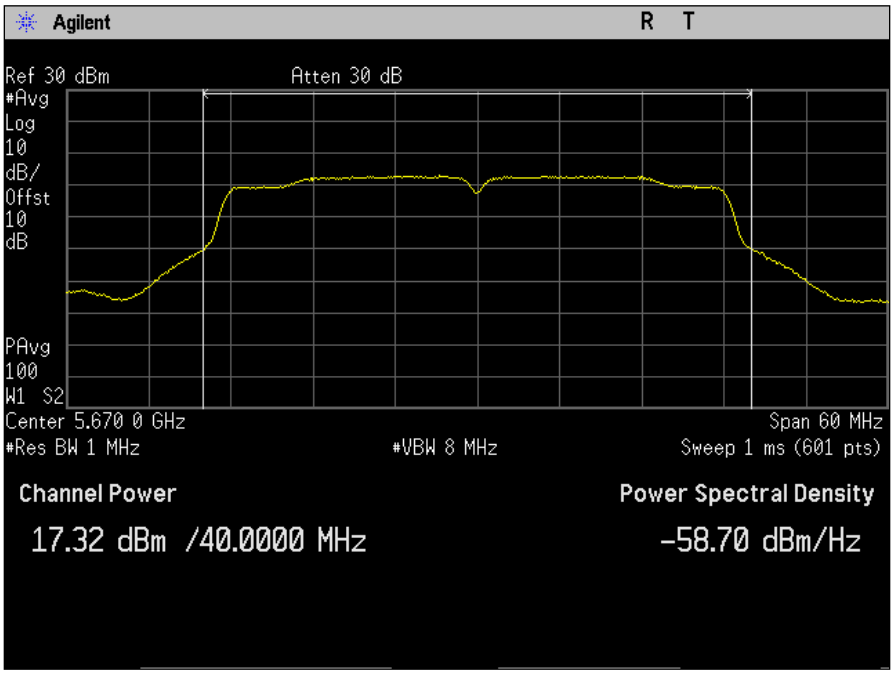
Plot 145. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5550M, AC Mode, Port A



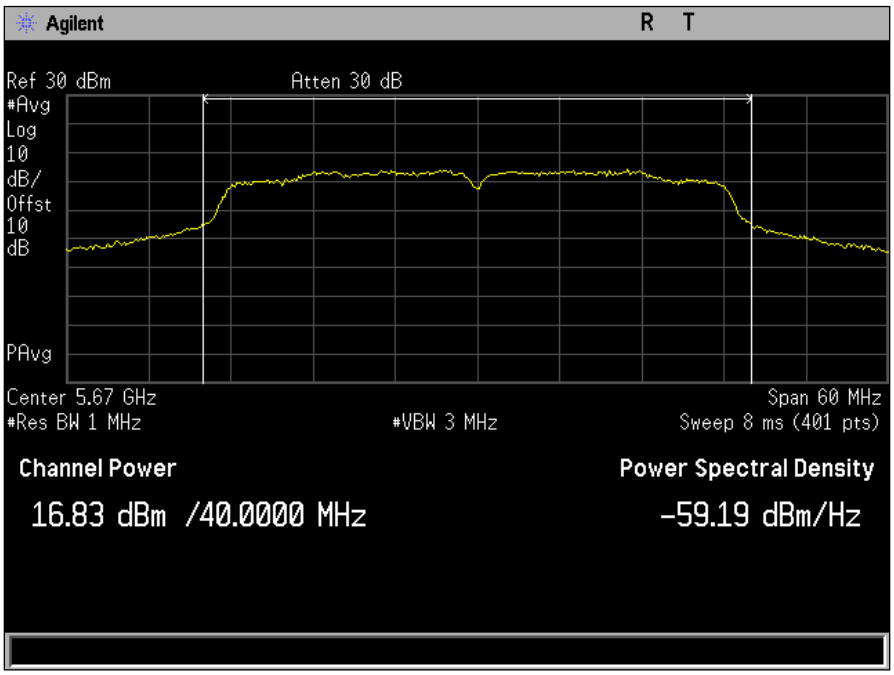
Plot 146. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5550M, N Mode, Port A



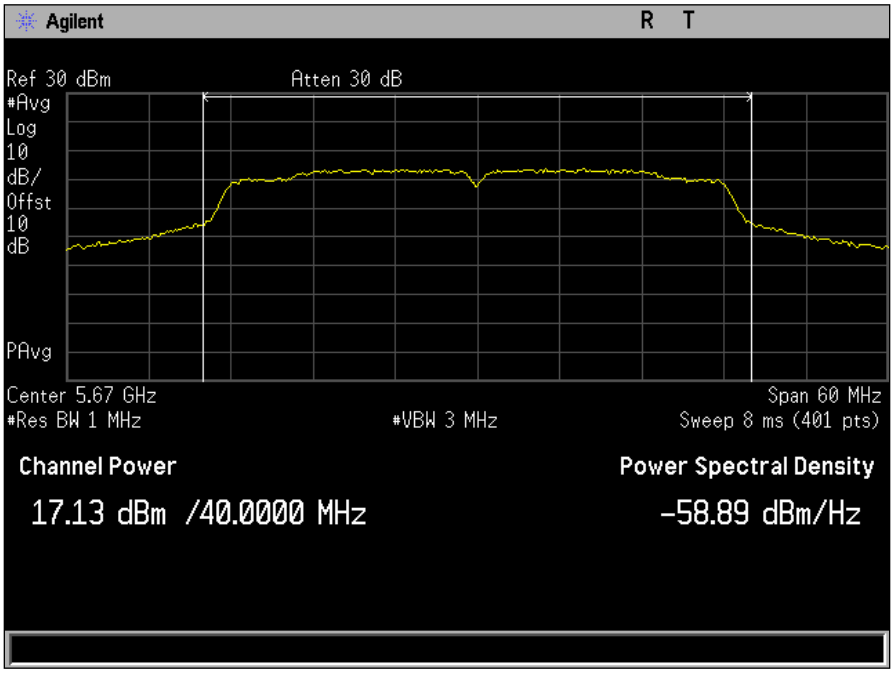
Plot 147. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5670M, AC Mode, Port B



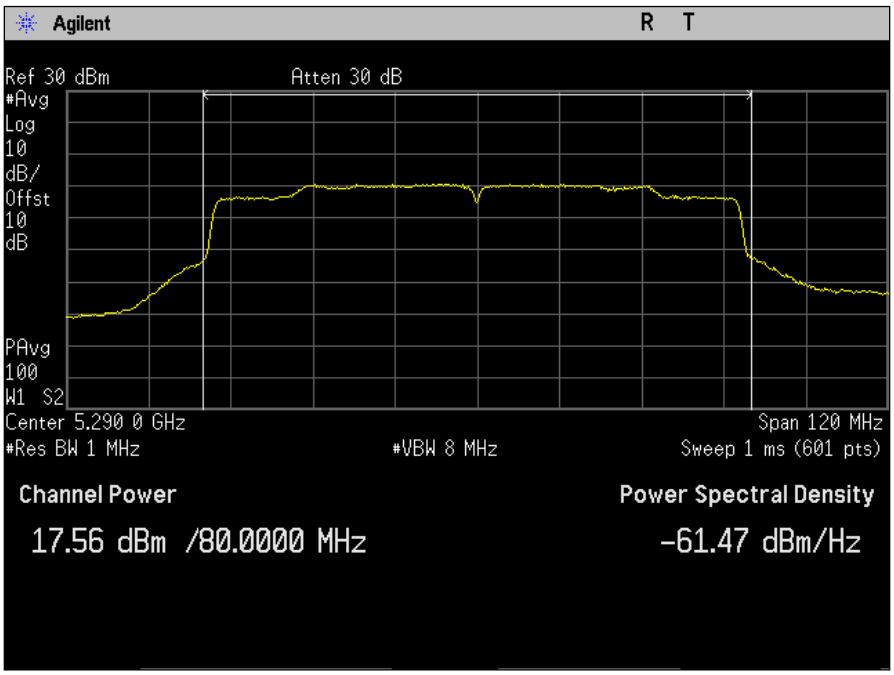
Plot 148. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5670M, N Mode, Port B



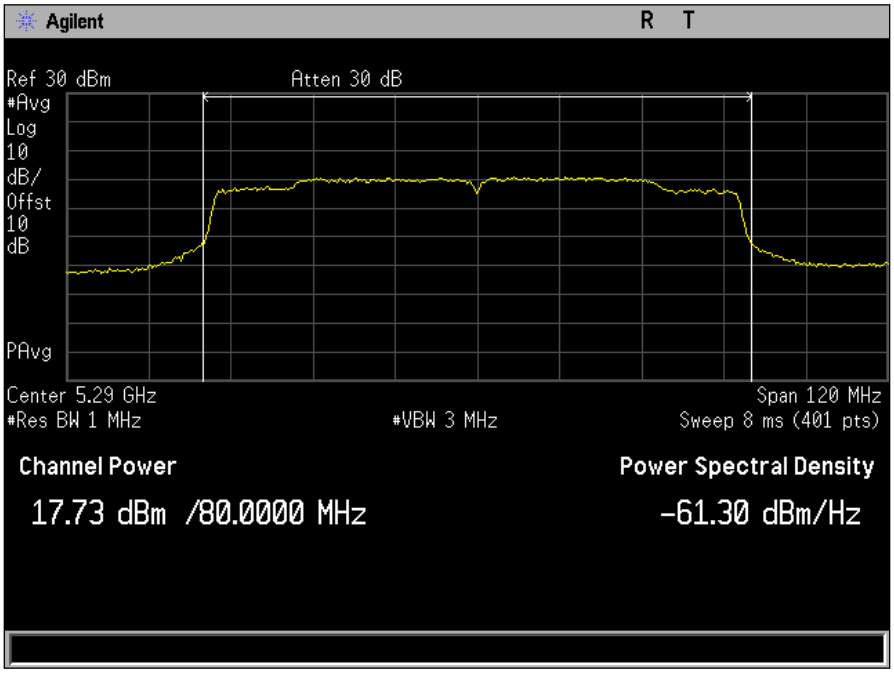
Plot 149. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5670M, AC Mode, Port A



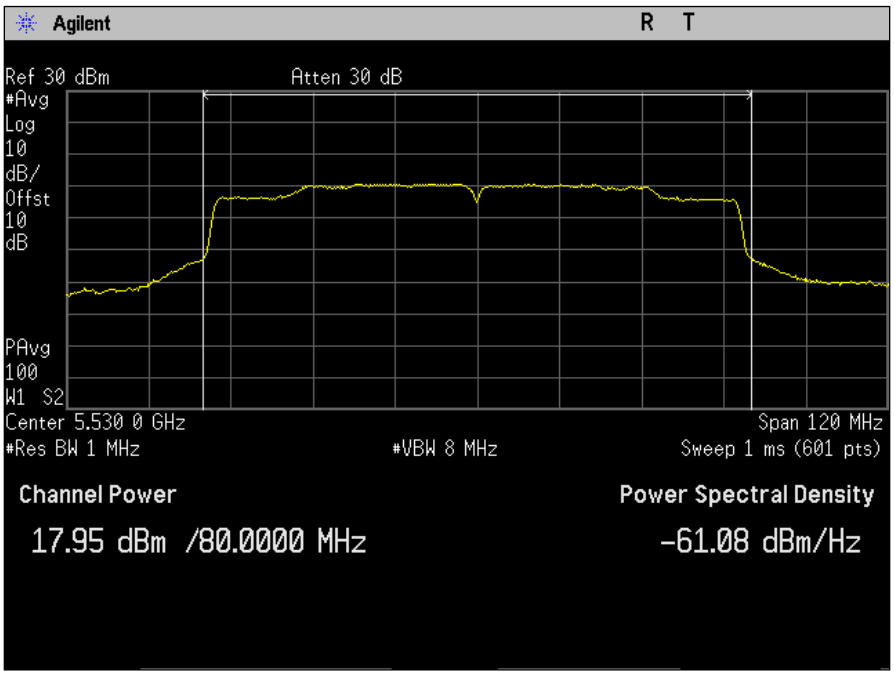
Plot 150. Maximum Conducted Output Power, MIMO, BW 40M, Ch 5670M, N Mode, Port A



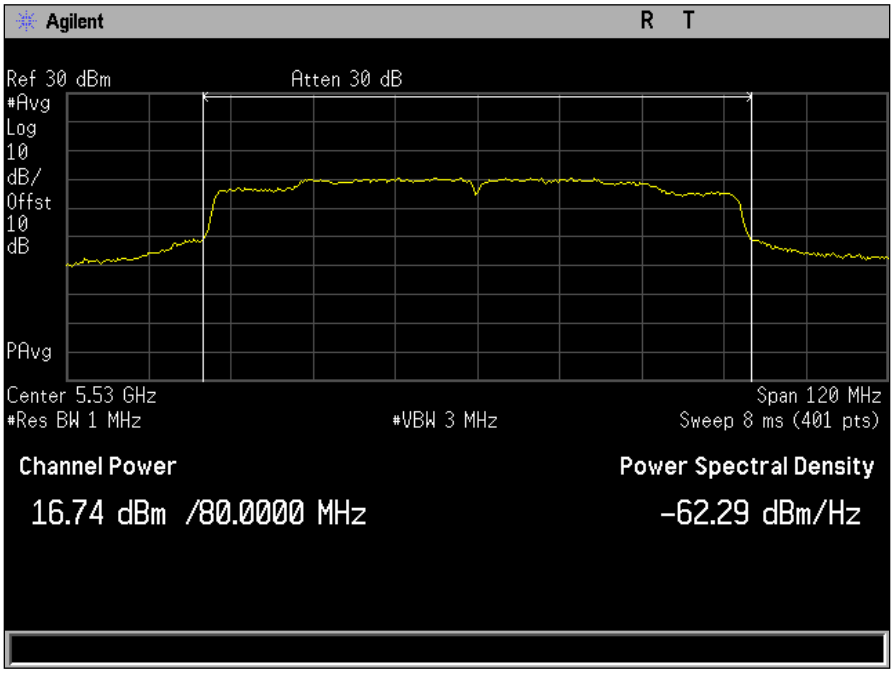
Plot 151. Maximum Conducted Output Power, MIMO, BW 80M, Ch 5290M, AC Mode, Port B



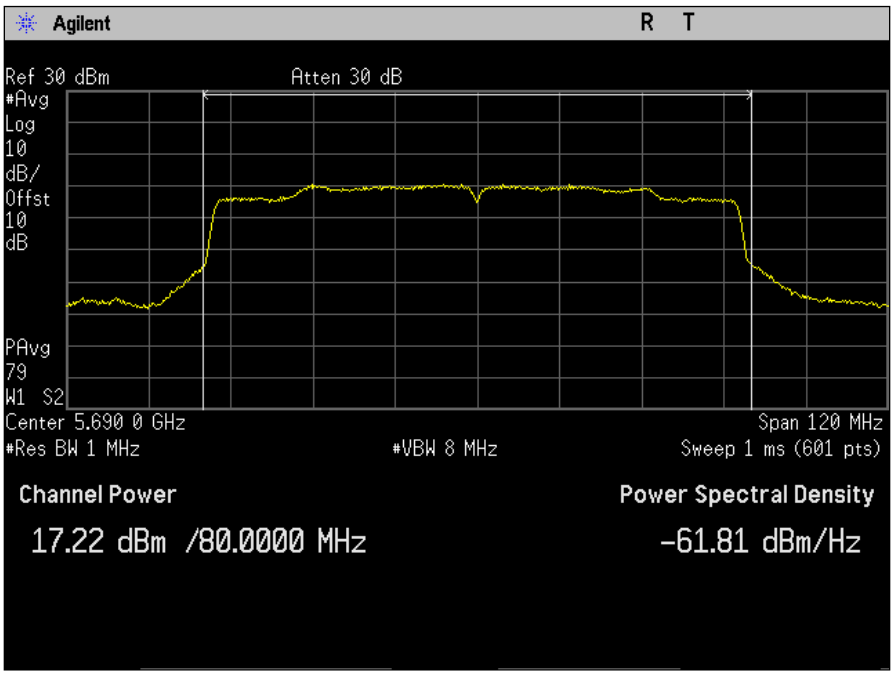
Plot 152. Maximum Conducted Output Power, MIMO, BW 80M, Ch 5290M, AC Mode, Port A



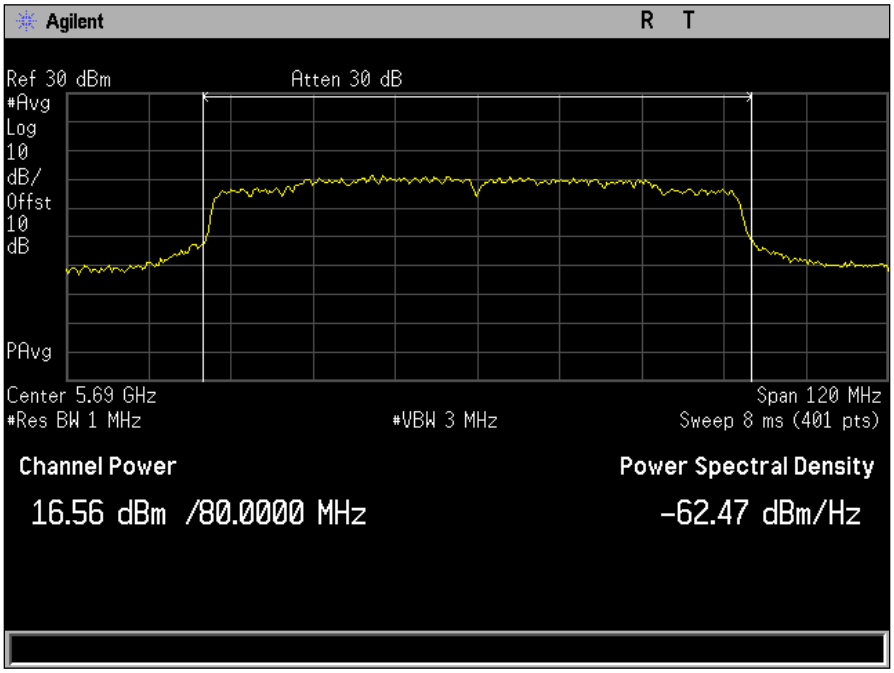
Plot 153. Maximum Conducted Output Power, MIMO, BW 80M, Ch 5530M, AC Mode, Port B



Plot 154. Maximum Conducted Output Power, MIMO, BW 80M, Ch 5530M, AC Mode, Port A



Plot 155. Maximum Conducted Output Power, MIMO, BW 80M, Ch 5690M, AC Mode, Port B



Plot 156. Maximum Conducted Output Power, MIMO, BW 80M, Ch 5690M, AC Mode, Port A

Channel	Port A(dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin
BW 20M_Ch 5260M_a_Mode	20.53	0	24	3.47
BW 20M_Ch 5260M_n_Mode	20.7	0	24	3.3
BW 20M_Ch 5260M_ac_Mode	20.46	0	24	3.54
BW 20M_Ch 5280M_a_Mode	19.67	0	24	4.33
BW 20M_Ch 5280M_n_Mode	19.85	0	24	4.15
BW 20M_Ch 5280M_ac_Mode	20.36	0	24	3.64
BW 20M_Ch 5320M_a_Mode	20.21	0	24	3.79
BW 20M_Ch 5320M_n_Mode	20.08	0	24	3.92
BW 20M_Ch 5320M_ac_Mode	19.99	0	24	4.01
BW 40M_Ch 5270M_n_Mode	20.94	0	24	3.06
BW 40M_Ch 5270M_ac_Mode	20.76	0	24	3.24
BW 40M_Ch 5310M_n_Mode	20.87	0	24	3.13
BW 40M_Ch 5310M_ac_Mode	20.57	0	24	3.43
BW 80M_Ch 529010M_ac_Mode	20.87	0	24	3.13
BW 20M_Ch 5500M_a_Mode	19.79	0	24	4.21
BW 20M_Ch 5500M_n_Mode	19.52	0	24	4.48
BW 20M_Ch 5500M_ac_Mode	19.63	0	24	4.37
BW 20M_Ch 5560M_a_Mode	19.61	0	24	4.39
BW 20M_Ch 5560M_n_Mode	19	0	24	5
BW 20M_Ch 5560M_ac_Mode	20.41	0	24	3.59
BW 20M_Ch 5700M_a_Mode	20.16	0	24	3.84
BW 20M_Ch 5700M_n_Mode	20.53	0	24	3.47
BW 20M_Ch 5700M_ac_Mode	20.32	0	24	3.68
BW 40M_Ch 5510M_n_Mode	20.87	0	24	3.13
BW 40M_Ch 5510M_ac_Mode	20.57	0	24	3.43
BW 40M_Ch 5550M_n_Mode	20.98	0	24	3.02
BW 40M_Ch 5550M_ac_Mode	20.54	0	24	3.46
BW 40M_Ch 5670M_n_Mode	21.75	0	24	2.25
BW 40M_Ch 5670M_ac_Mode	20.01	0	24	3.99
BW 80M_Ch 5530M_ac_Mode	21.18	0	24	2.82
BW 80M_Ch 5690M_ac_Mode	20.59	0	24	3.41

Table 7. Power Table Port A (SISO)

Channel	Port B (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin
BW 20M_Ch 5260M_a_Mode	23.06	0	24	0.94
BW 20M_Ch 5260M_n_Mode	22.71	0	24	1.29
BW 20M_Ch 5260M_ac_Mode	21.09	0	24	2.91
BW 20M_Ch 5280M_a_Mode	22.92	0	24	1.08
BW 20M_Ch 5280M_n_Mode	23.02	0	24	0.98
BW 20M_Ch 5280M_ac_Mode	23.02	0	24	0.98
BW 20M_Ch 5320M_a_Mode	23.03	0	24	0.97
BW 20M_Ch 5320M_n_Mode	22.74	0	24	1.26
BW 20M_Ch 5320M_ac_Mode	22.79	0	24	1.21
BW 40M_Ch 5270M_n_Mode	21.52	0	24	2.48
BW 40M_Ch 5270M_ac_Mode	21.63	0	24	2.37
BW 40M_Ch 5310M_n_Mode	22.84	0	24	1.16
BW 40M_Ch 5310M_ac_Mode	21.02	0	24	2.98
BW 80M_Ch 529010M_ac_Mode	22.03	0	24	1.97
BW 20M_Ch 5500M_a_Mode	22.52	0	24	1.48
BW 20M_Ch 5500M_n_Mode	21.63	0	24	2.37
BW 20M_Ch 5500M_ac_Mode	21.5	0	24	2.5
BW 20M_Ch 5560M_a_Mode	22.13	0	24	1.87
BW 20M_Ch 5560M_n_Mode	22.3	0	24	1.7
BW 20M_Ch 5560M_ac_Mode	21.37	0	24	2.63
BW 20M_Ch 5700M_a_Mode	21.26	0	24	2.74
BW 20M_Ch 5700M_n_Mode	21.56	0	24	2.44
BW 20M_Ch 5700M_ac_Mode	21.44	0	24	2.56
BW 40M_Ch 5510M_n_Mode	21.27	0	24	2.73
BW 40M_Ch 5510M_ac_Mode	21.08	0	24	2.92
BW 40M_Ch 5550M_n_Mode	22.67	0	24	1.33
BW 40M_Ch 5550M_ac_Mode	22.48	0	24	1.52
BW 40M_Ch 5670M_n_Mode	22.16	0	24	1.84
BW 40M_Ch 5670M_ac_Mode	21.79	0	24	2.21
BW 80M_Ch 5530M_ac_Mode	21.78	0	24	2.22
BW 80M_Ch 5690M_ac_Mode	21.5	0	24	2.5

Table 8. Power Table Port B (SISO)

Channel	Port 1 (dBm)	Port 2 (dBm)	Antenna Gain (dBi)	Sum (dBm)	Limit (dBm)	Margin
BW 20M_Ch 5260M_a_Mode	18.51	19.01	0	21.777	24	2.223
BW 20M_Ch 5260M_n_Mode	17.77	18.88	0	21.371	24	2.629
BW 20M_Ch 5260M_ac_Mode	18.3	16.99	0	20.705	24	3.295
BW 20M_Ch 5280M_a_Mode	18.21	18.78	0	21.515	24	2.485
BW 20M_Ch 5280M_n_Mode	17.85	18.7	0	21.306	24	2.694
BW 20M_Ch 5280M_ac_Mode	17.77	18.89	0	21.376	24	2.624
BW 20M_Ch 5320M_a_Mode	17.56	18.43	0	21.027	24	2.973
BW 20M_Ch 5320M_n_Mode	17.59	18.42	0	21.035	24	2.965
BW 20M_Ch 5320M_ac_Mode	17.89	17.61	0	20.763	24	3.237
BW 40M_Ch 5270M_n_Mode	17.66	18.5	0	21.111	24	2.889
BW 40M_Ch 5270M_ac_Mode	17.44	18.45	0	20.985	24	3.015
BW 40M_Ch 5310M_n_Mode	17.34	18.37	0	20.896	24	3.104
BW 40M_Ch 5310M_ac_Mode	17.23	18.17	0	20.736	24	3.264
BW 80M_Ch 529010M_ac_Mode	17.73	17.56	0	20.656	24	3.344
BW 20M_Ch 5500M_a_Mode	18.45	17.01	0	20.8	24	3.2
BW 20M_Ch 5500M_n_Mode	18.21	18.53	0	21.383	24	2.617
BW 20M_Ch 5500M_ac_Mode	18.13	18.46	0	21.308	24	2.692
BW 20M_Ch 5560M_a_Mode	18.11	16.65	0	20.451	24	3.549
BW 20M_Ch 5560M_n_Mode	18.13	18.34	0	21.247	24	2.753
BW 20M_Ch 5560M_ac_Mode	18.09	18.41	0	21.263	24	2.737
BW 20M_Ch 5700M_a_Mode	17.96	18.08	0	21.031	24	2.969
BW 20M_Ch 5700M_n_Mode	16.49	17.52	0	20.046	24	3.954
BW 20M_Ch 5700M_ac_Mode	17.54	17.95	0	20.76	24	3.24
BW 40M_Ch 5510M_n_Mode	16.9	18.3	0	20.666	24	3.334
BW 40M_Ch 5510M_ac_Mode	16.99	16.95	0	19.98	24	4.02
BW 40M_Ch 5550M_n_Mode	17.02	17.64	0	20.351	24	3.649
BW 40M_Ch 5550M_ac_Mode	17.19	18.13	0	20.696	24	3.304
BW 40M_Ch 5670M_n_Mode	17.13	17.32	0	20.236	24	3.764
BW 40M_Ch 5670M_ac_Mode	16.83	17.37	0	20.119	24	3.881
BW 80M_Ch 5530M_ac_Mode	16.74	17.95	0	20.397	24	3.603
BW 80M_Ch 5690M_ac_Mode	16.56	17.22	0	19.913	24	4.087

Table 9. Power Table MIMO

Electromagnetic Compatibility Criteria for Intentional Radiators

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

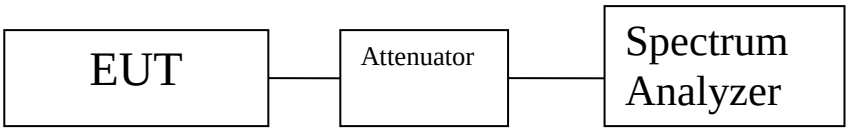
Test Requirements: **§15.407(a)(2):** In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced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

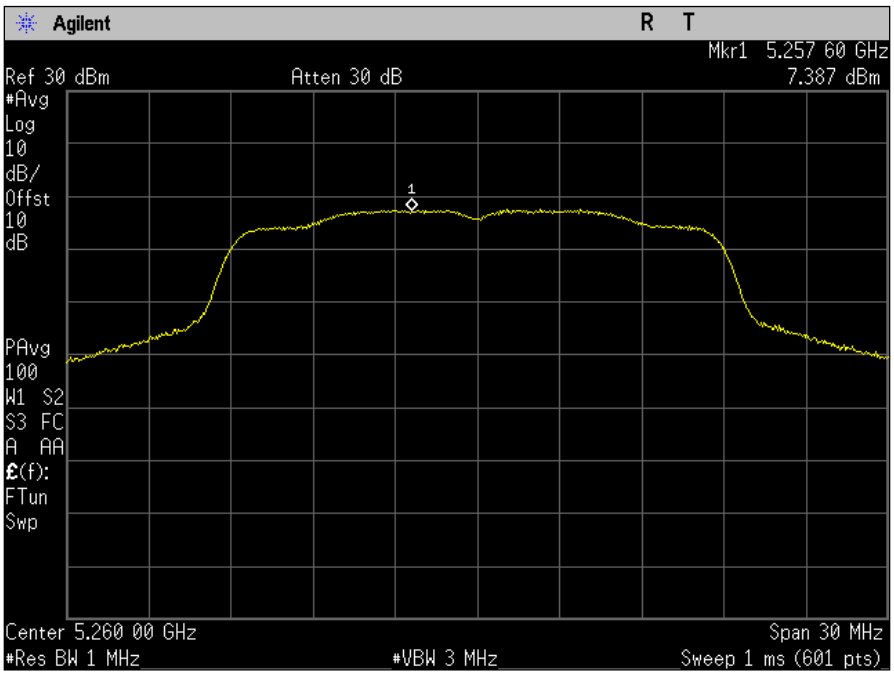
Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according KDB 789033 D02 General UNII Test Procedures v01.

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

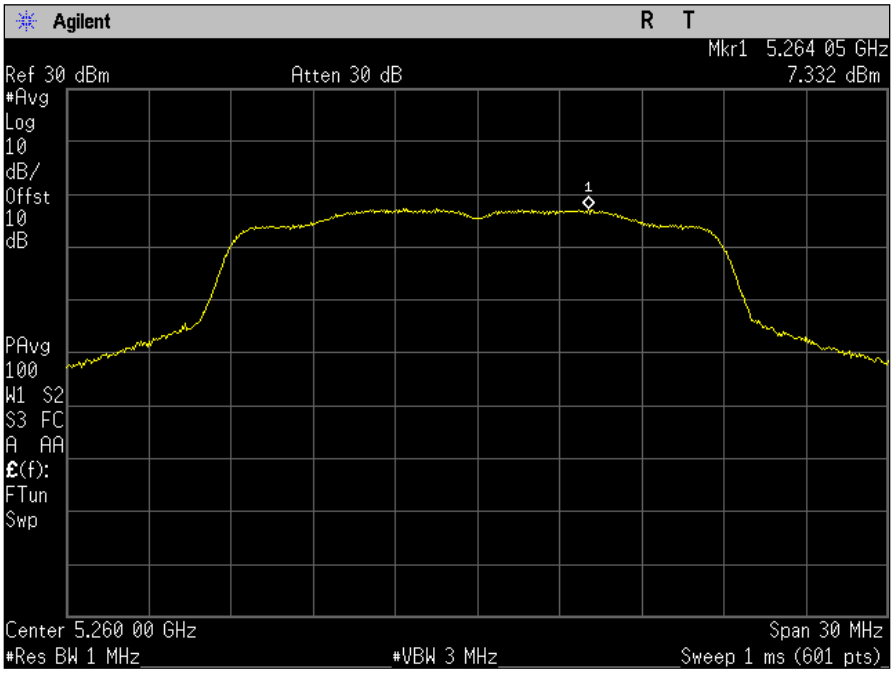
Test Engineer(s): Djed Mouada

Test Date(s): December 19 to December 23 and December 27, 2016

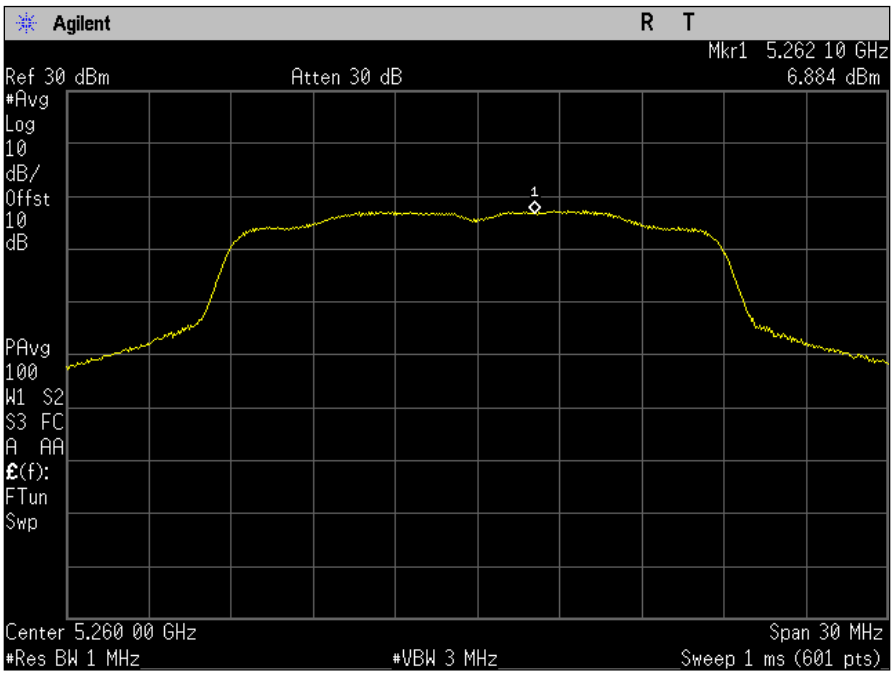




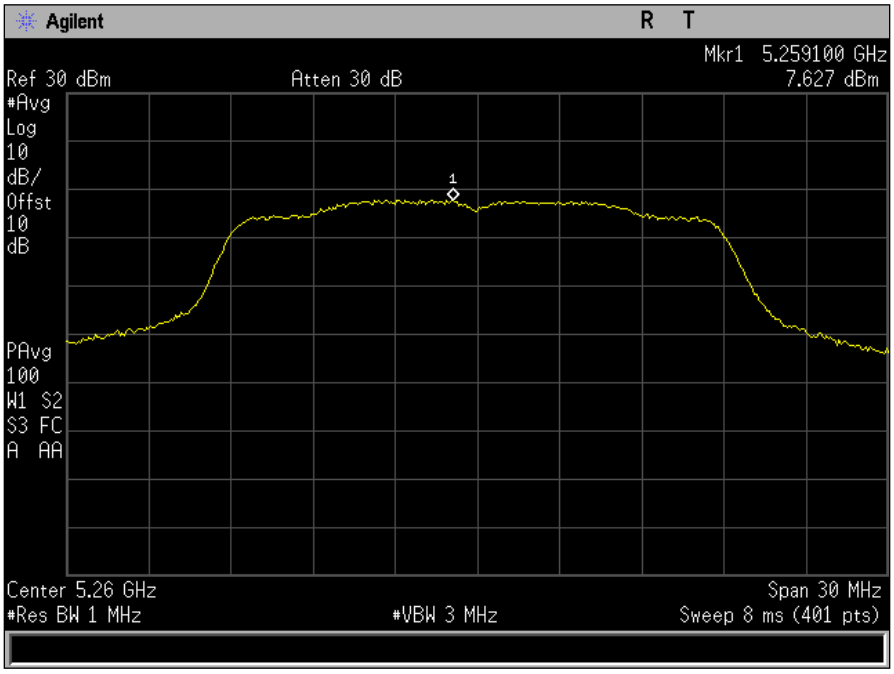
Plot 157. Power Spectral, MIMO, BW 20M, Ch 5260M, A Mode, Port B



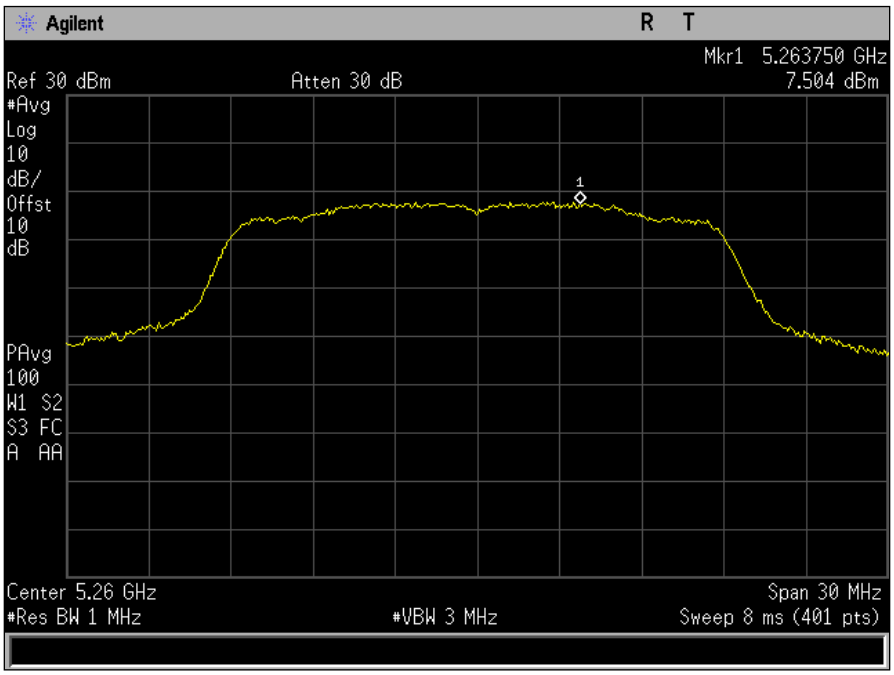
Plot 158. Power Spectral, MIMO, BW 20M, Ch 5260M, AC Mode, Port B



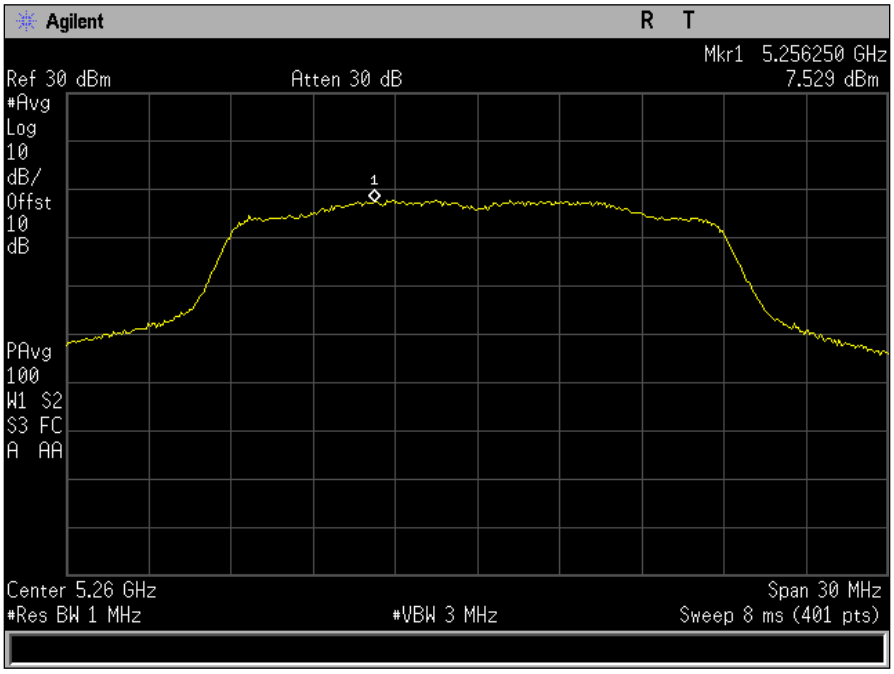
Plot 159. Power Spectral, MIMO, BW 20M, Ch 5260M, N Mode, Port B



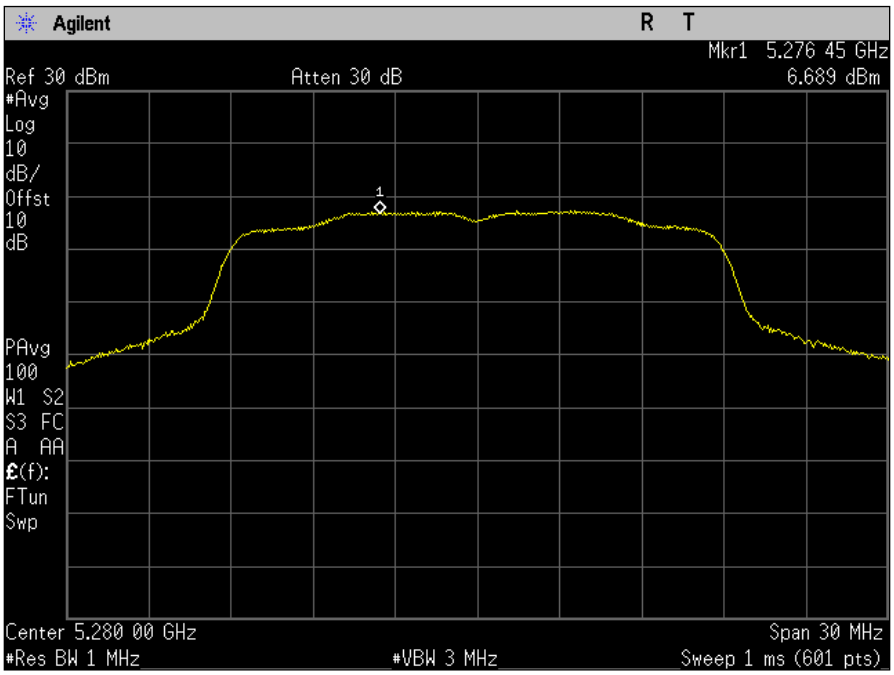
Plot 160. Power Spectral, MIMO, BW 20M, Ch 5260M, A Mode, Port A



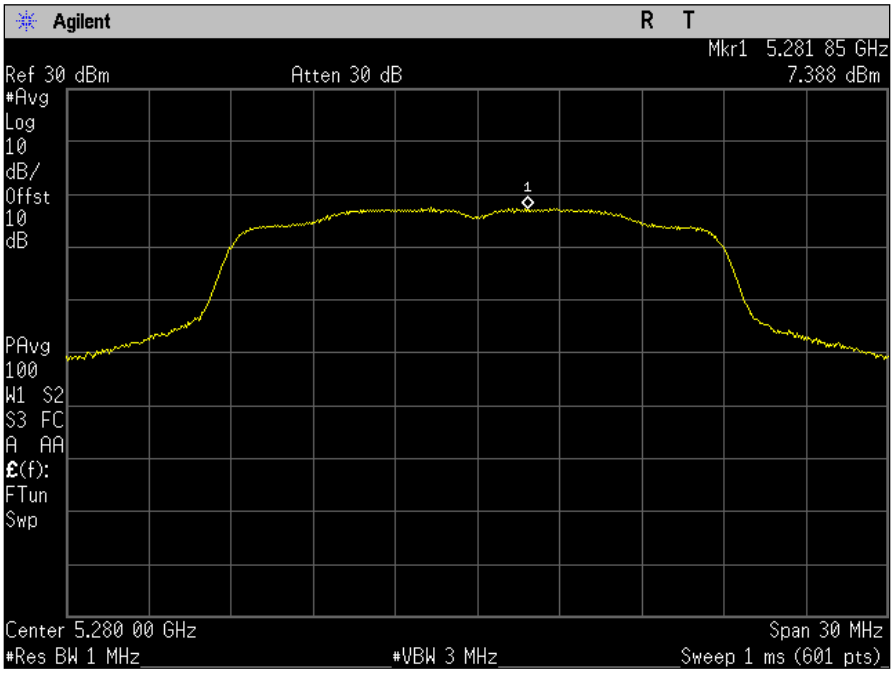
Plot 161. Power Spectral, MIMO, BW 20M, Ch 5260M, AC Mode, Port A



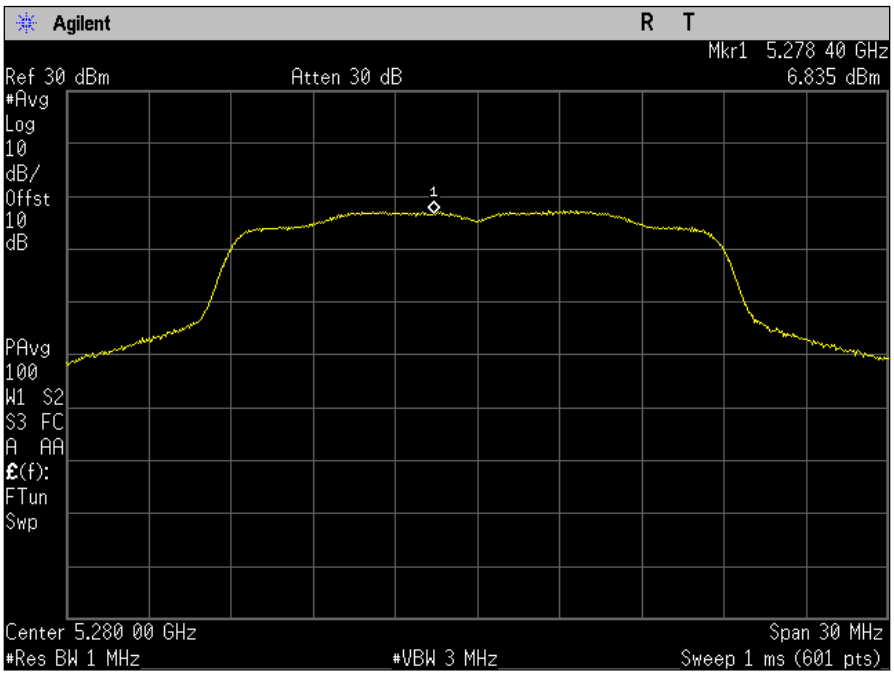
Plot 162. Power Spectral, MIMO, BW 20M, Ch 5260M, N Mode, Port A



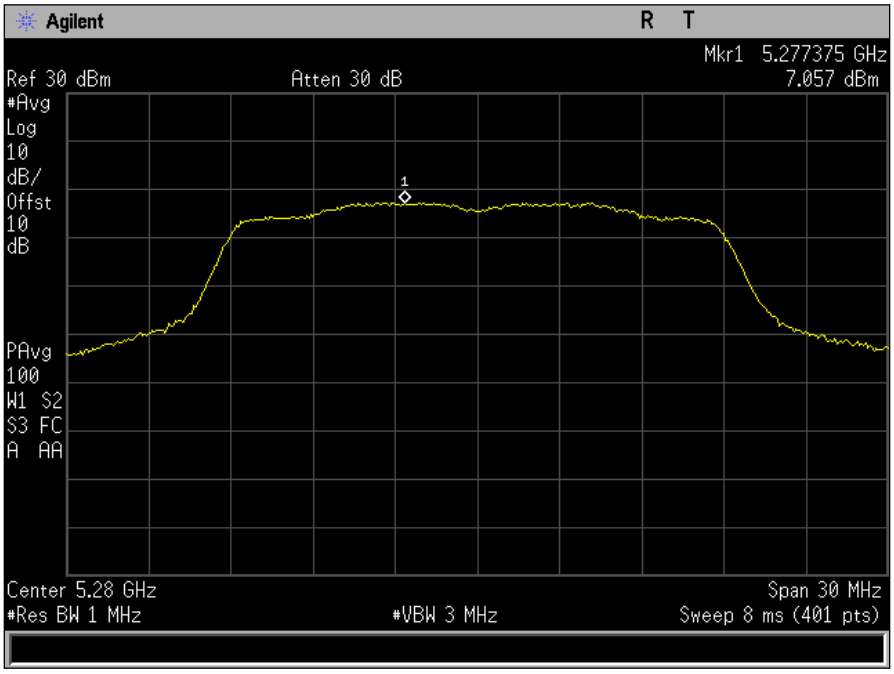
Plot 163. Power Spectral, MIMO, BW 20M, Ch 5280M, A Mode, Port B



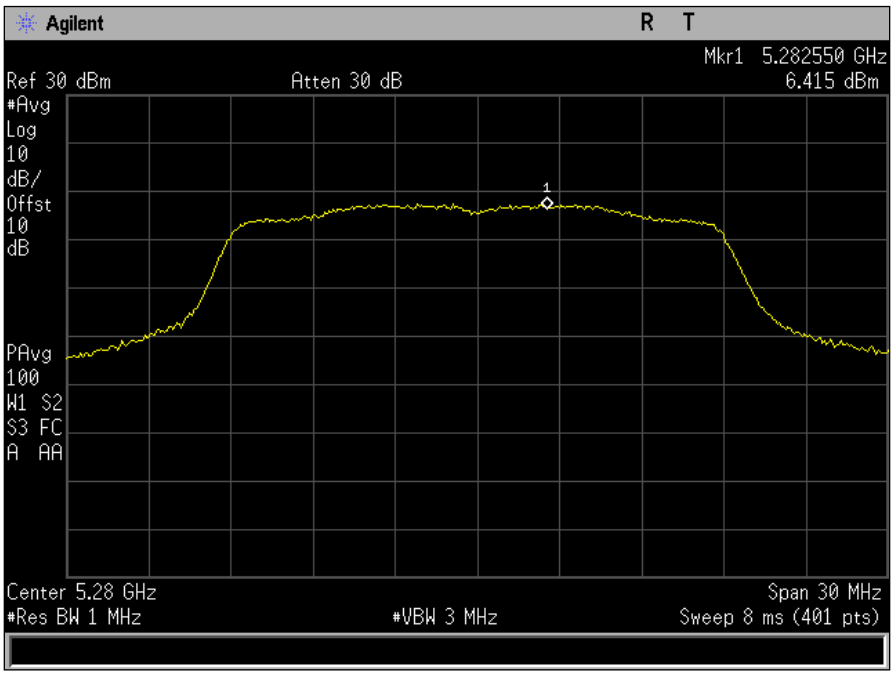
Plot 164. Power Spectral, MIMO, BW 20M, Ch 5280M, AC Mode, Port B



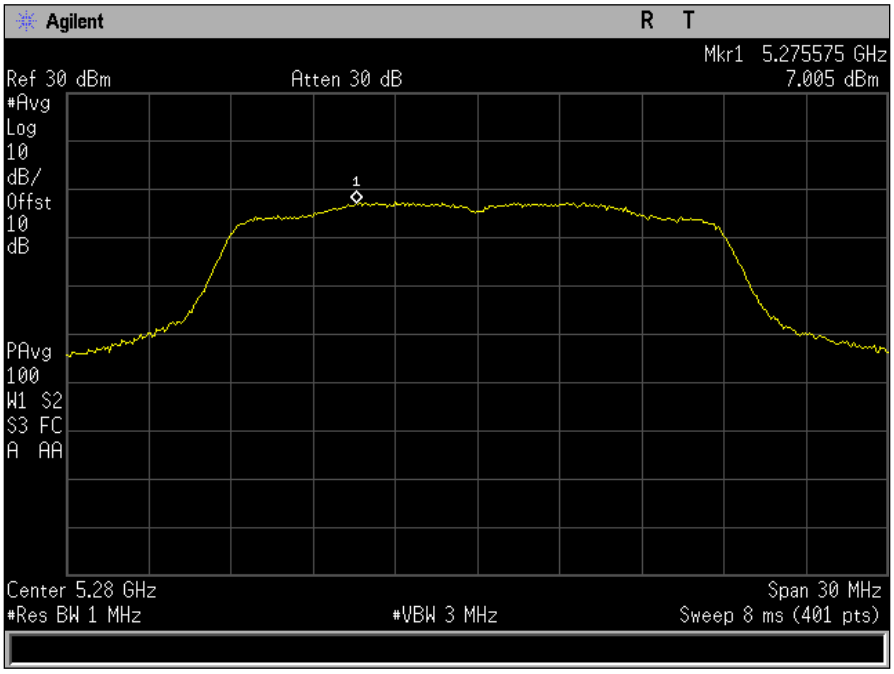
Plot 165. Power Spectral, MIMO, BW 20M, Ch 5280M, N Mode, Port B



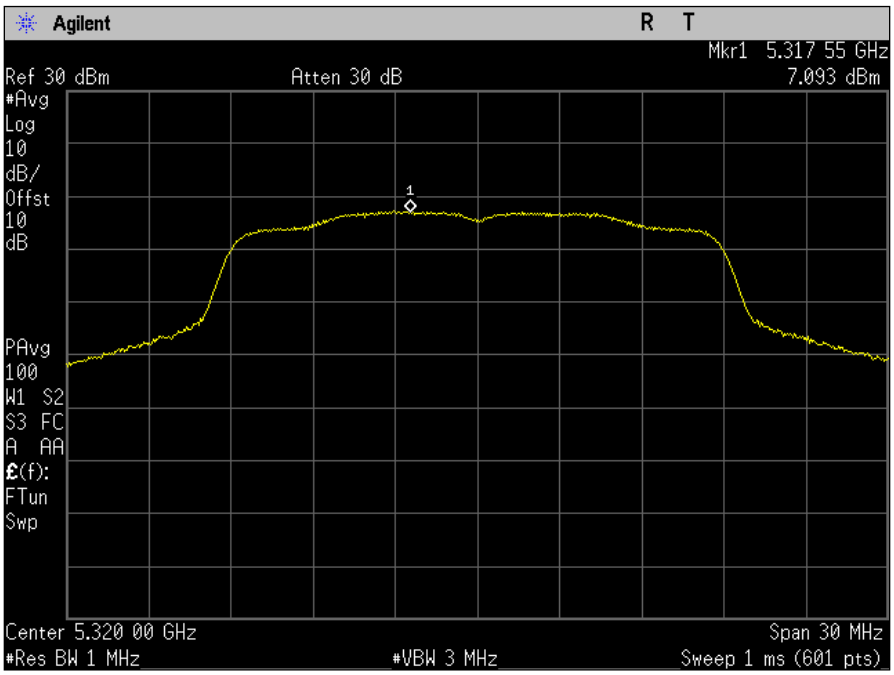
Plot 166. Power Spectral, MIMO, BW 20M, Ch 5280M, A Mode, Port A



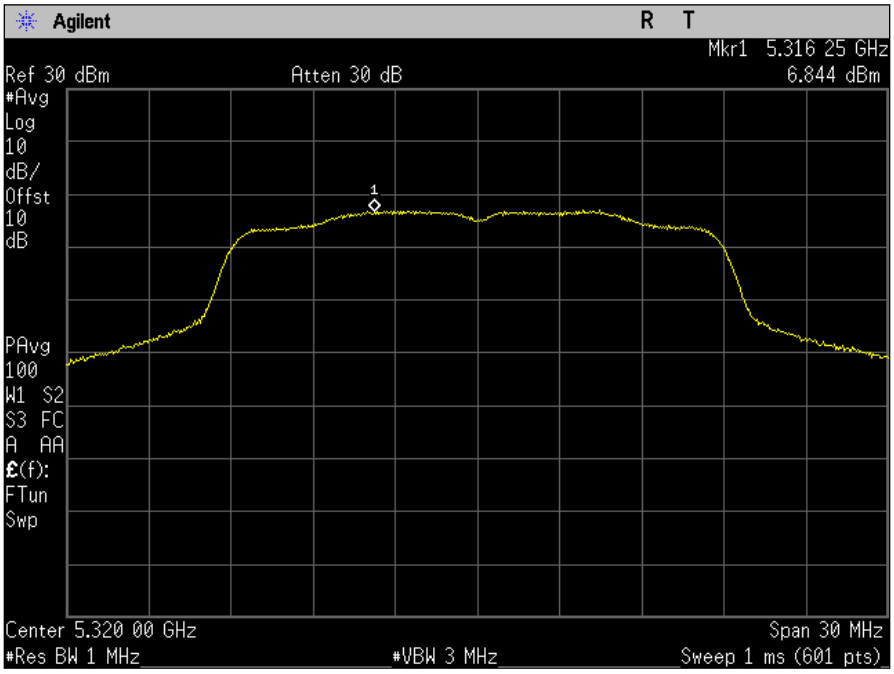
Plot 167. Power Spectral, MIMO, BW 20M, Ch 5280M, AC Mode, Port A



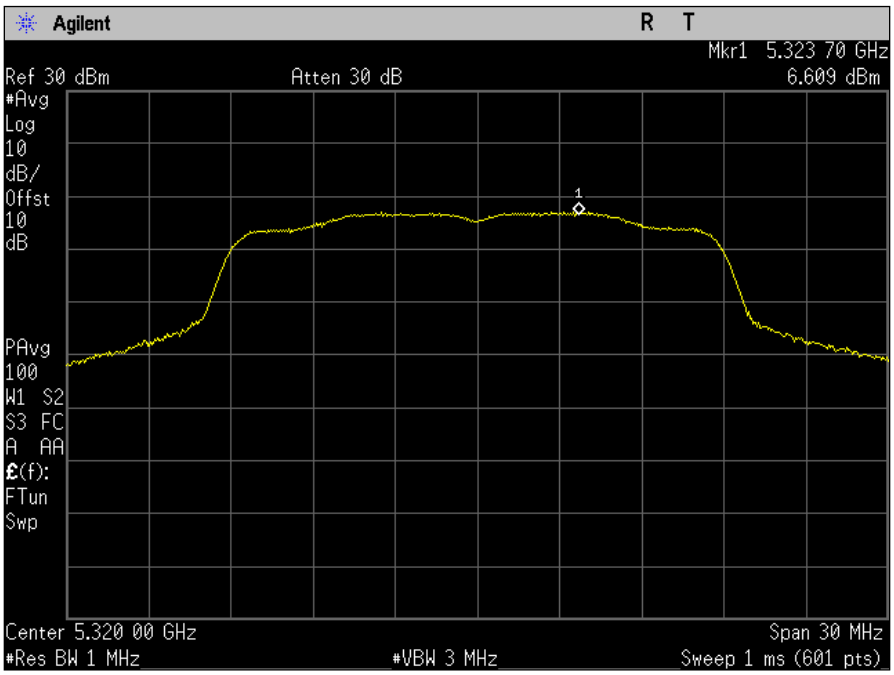
Plot 168. Power Spectral, MIMO, BW 20M, Ch 5280M, N Mode, Port A



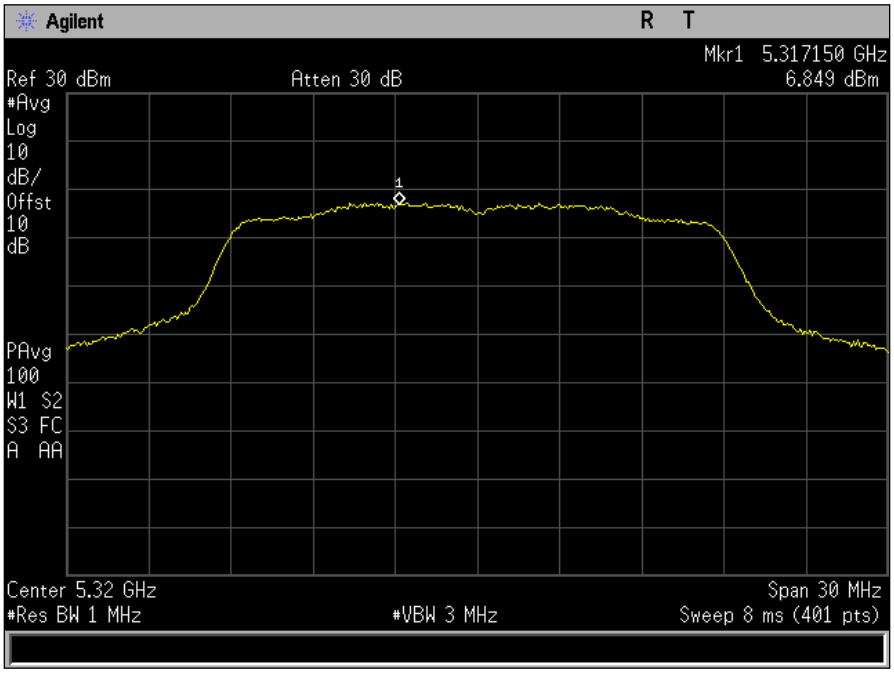
Plot 169. Power Spectral, MIMO, BW 20M, Ch 5320M, A Mode, Port B



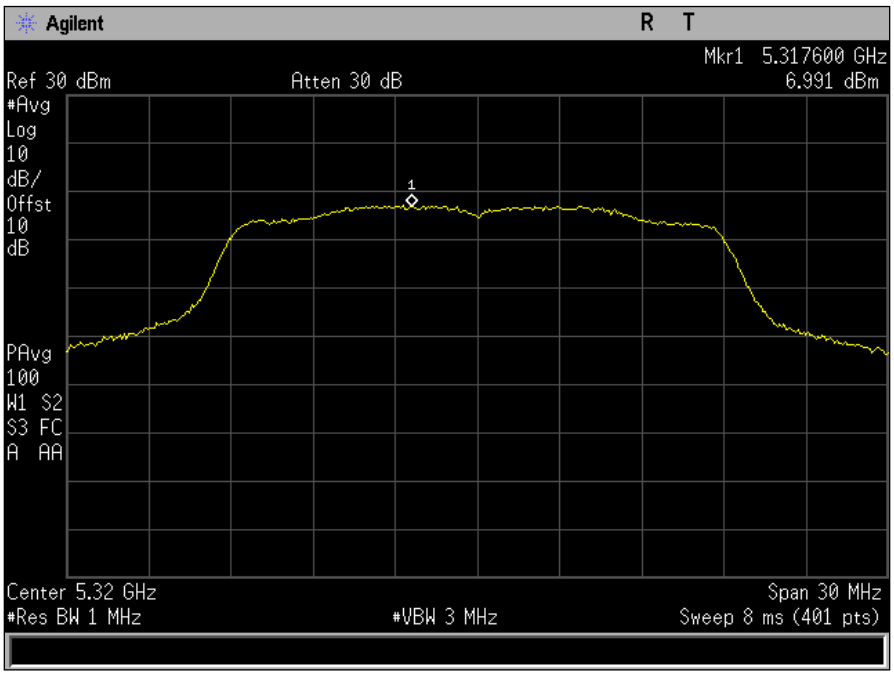
Plot 170. Power Spectral, MIMO, BW 20M, Ch 5320M, AC Mode, Port B



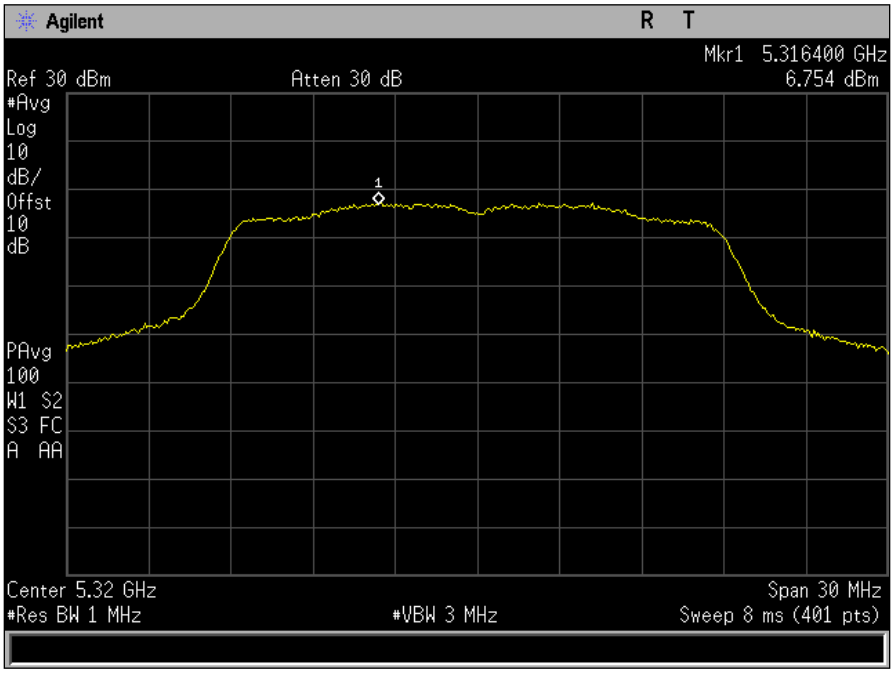
Plot 171. Power Spectral, MIMO, BW 20M, Ch 5320M, N Mode, Port B



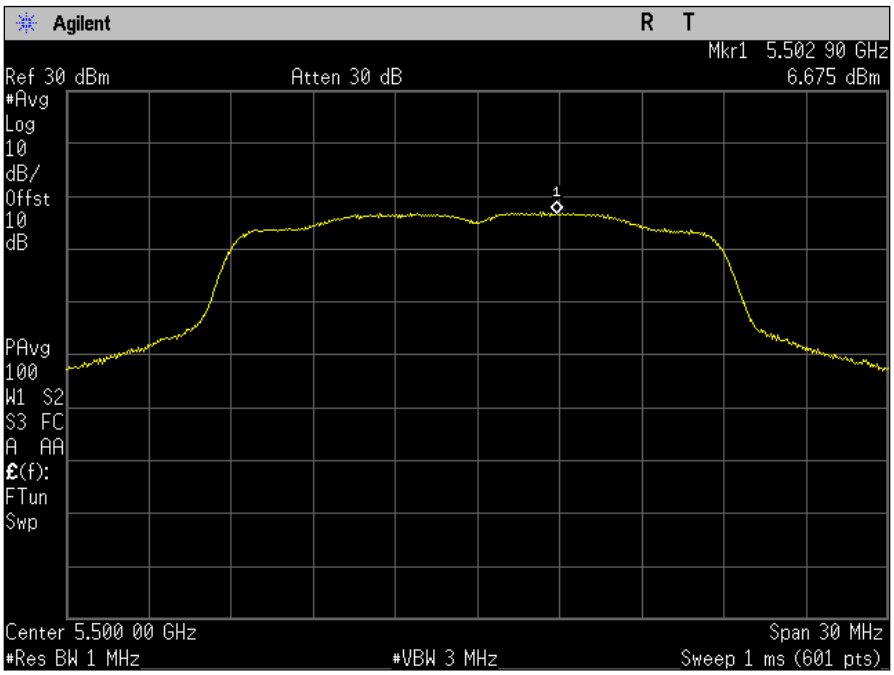
Plot 172. Power Spectral, MIMO, BW 20M, Ch 5320M,A Mode, Port A



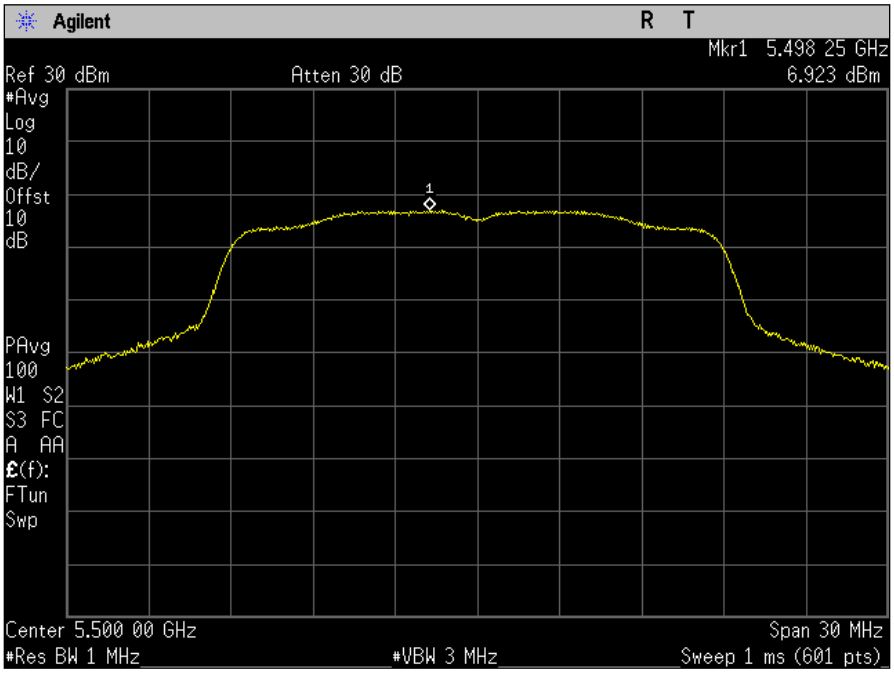
Plot 173. Power Spectral, MIMO, BW 20M, Ch 5320M, AC Mode, Port A



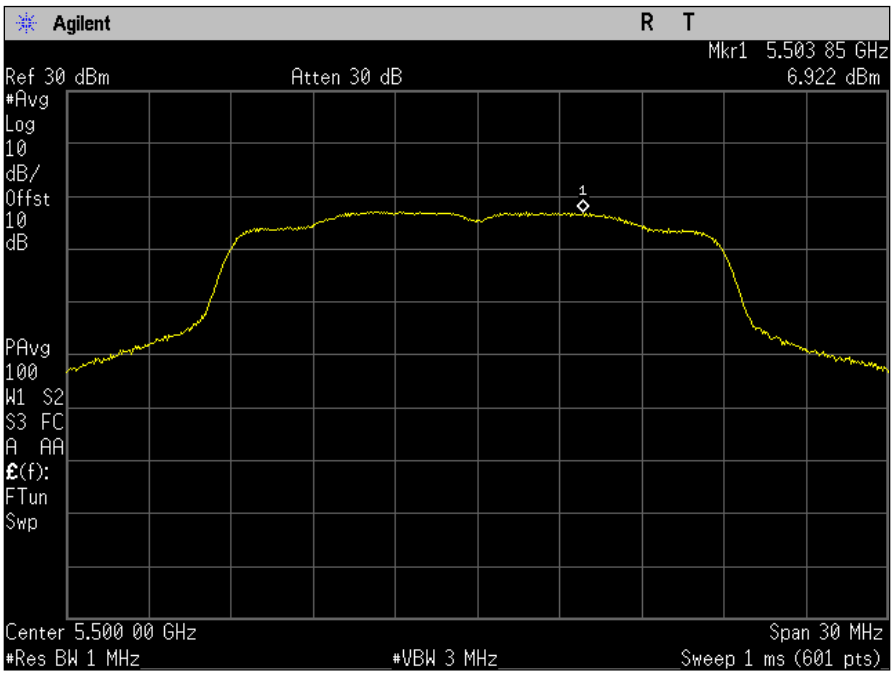
Plot 174. Power Spectral, MIMO, BW 20M, Ch 5320M, N Mode, Port A



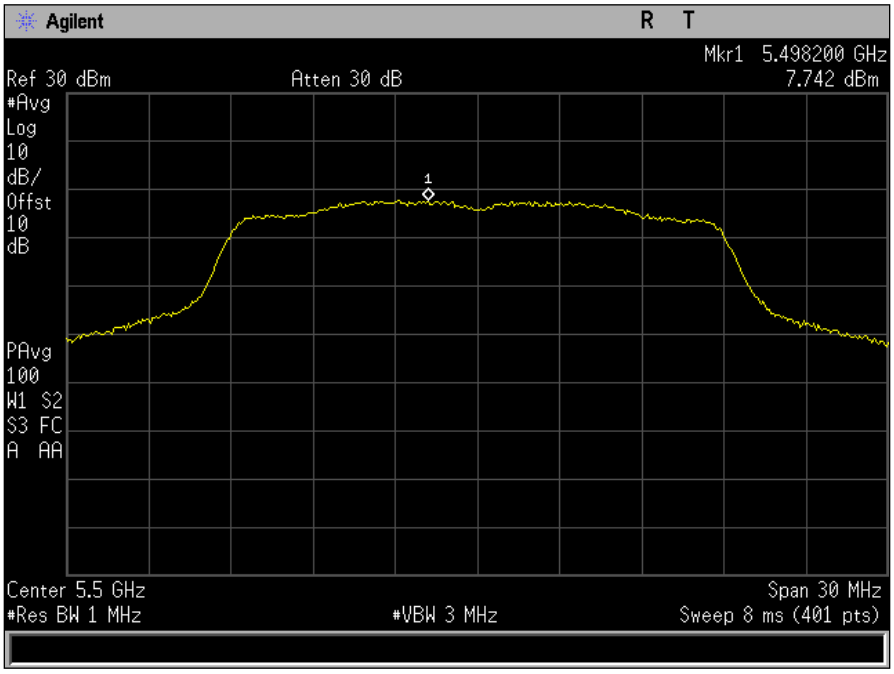
Plot 175. Power Spectral, MIMO, BW 20M, Ch 5500M, A Mode, Port B



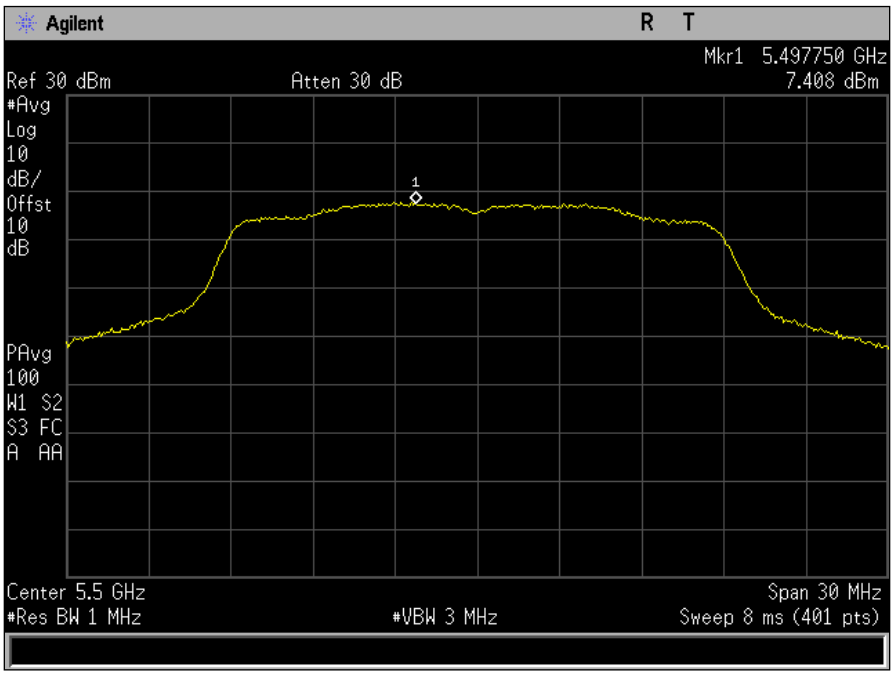
Plot 176. Power Spectral, MIMO, BW 20M, Ch 5500M, AC Mode, Port B



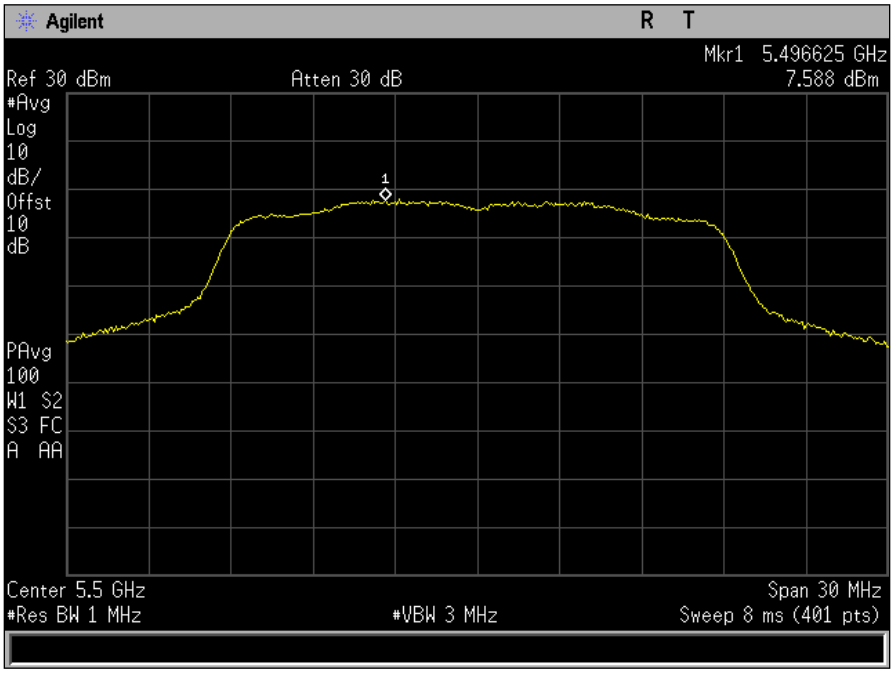
Plot 177. Power Spectral, MIMO, BW 20M, Ch 5500M, N Mode, Port B



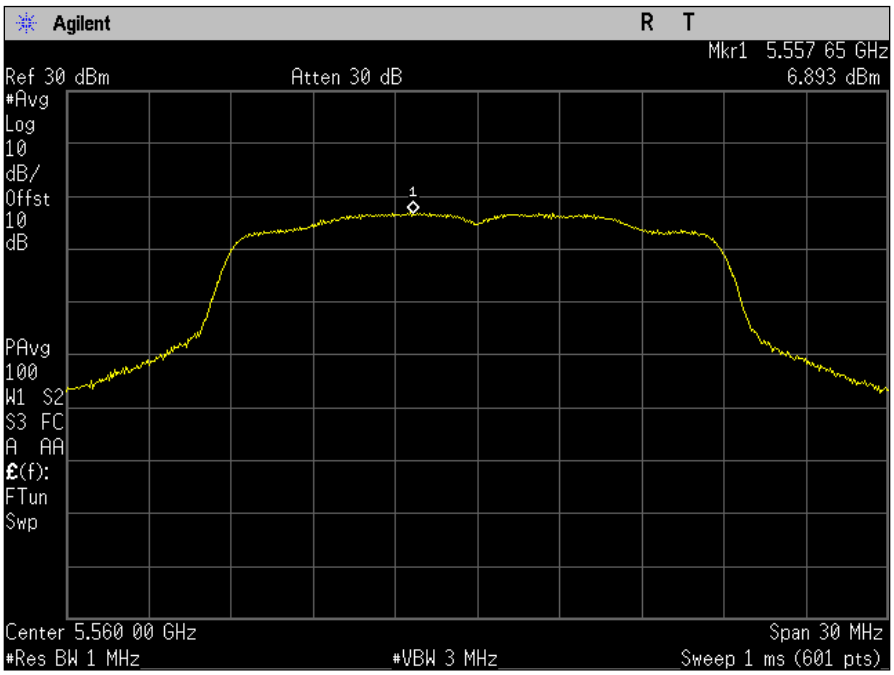
Plot 178. Power Spectral, MIMO, BW 20M, Ch 5500M, A Mode, Port A



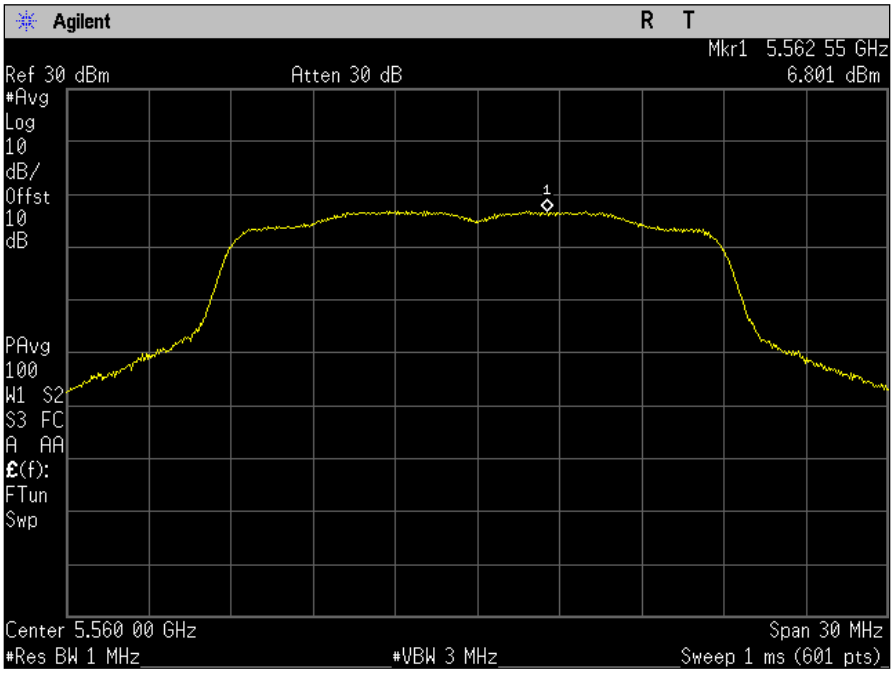
Plot 179. Power Spectral, MIMO, BW 20M, Ch 5500M, AC Mode, Port A



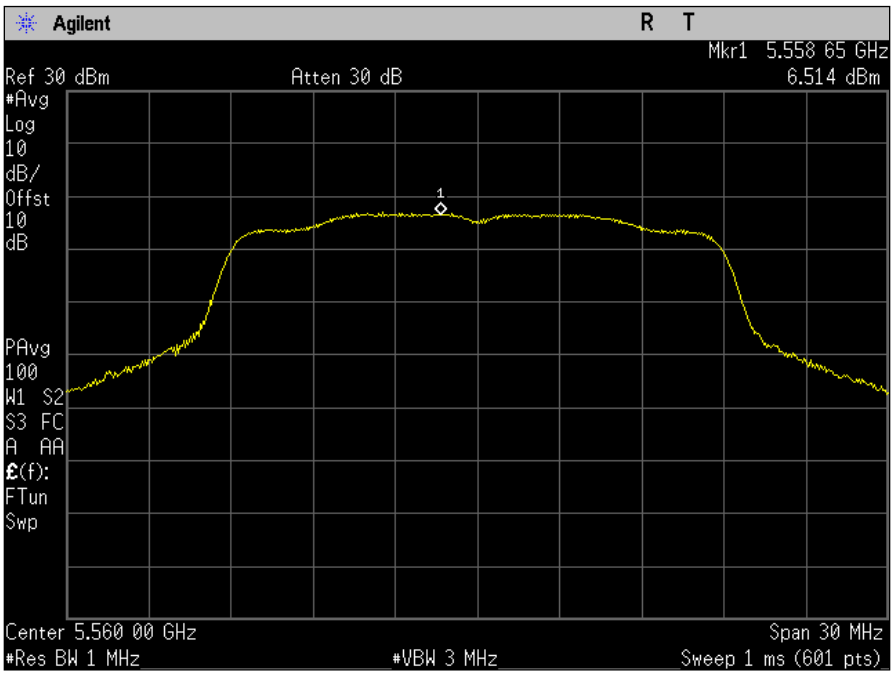
Plot 180. Power Spectral, MIMO, BW 20M, Ch 5500M, N Mode, Port A



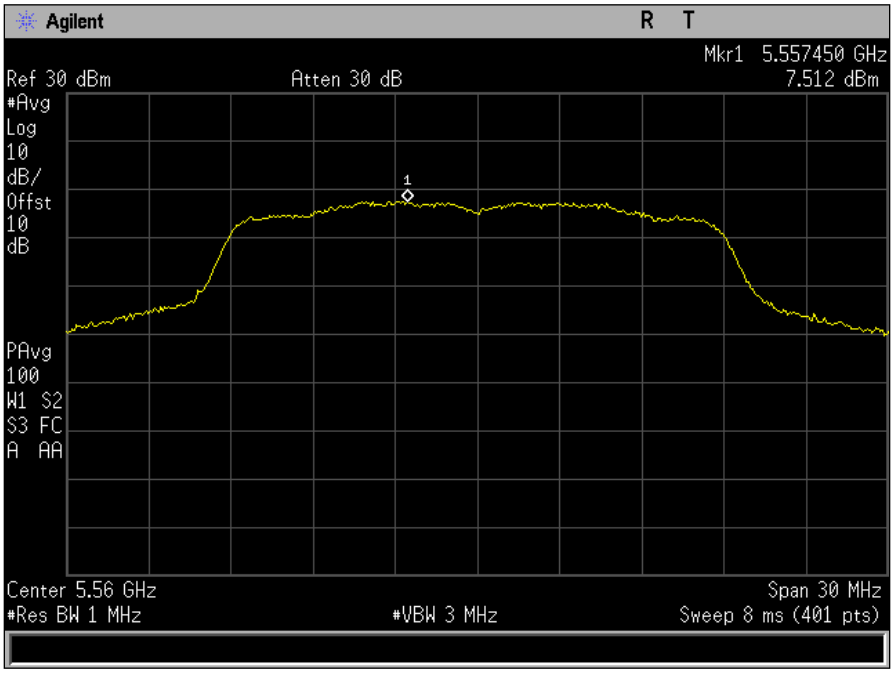
Plot 181. Power Spectral, MIMO, BW 20M, Ch 5560M, A Mode, Port B



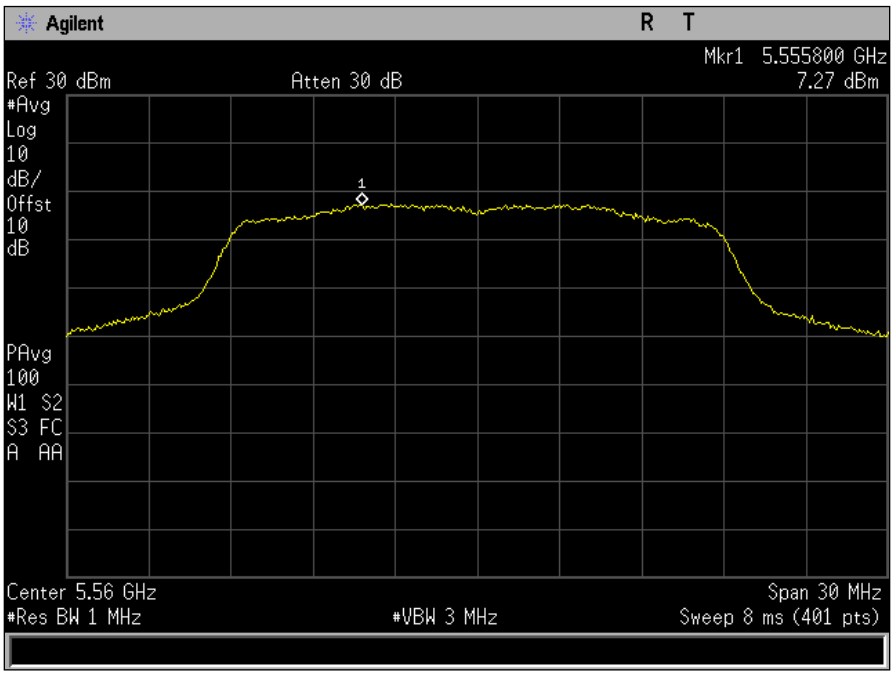
Plot 182. Power Spectral, MIMO, BW 20M, Ch 5560M, AC Mode, Port B



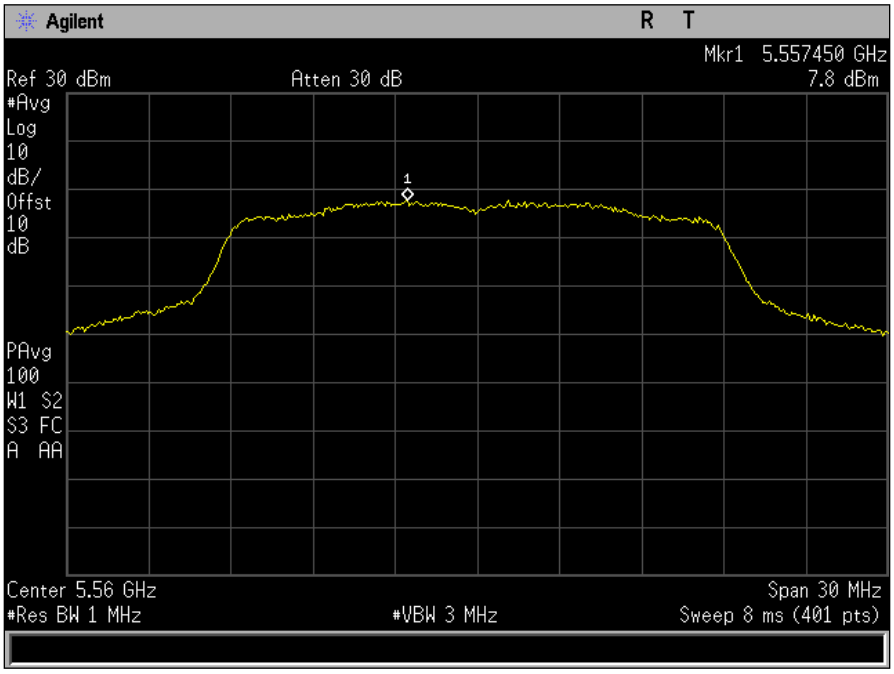
Plot 183. Power Spectral, MIMO, BW 20M, Ch 5560M, N Mode, Port B



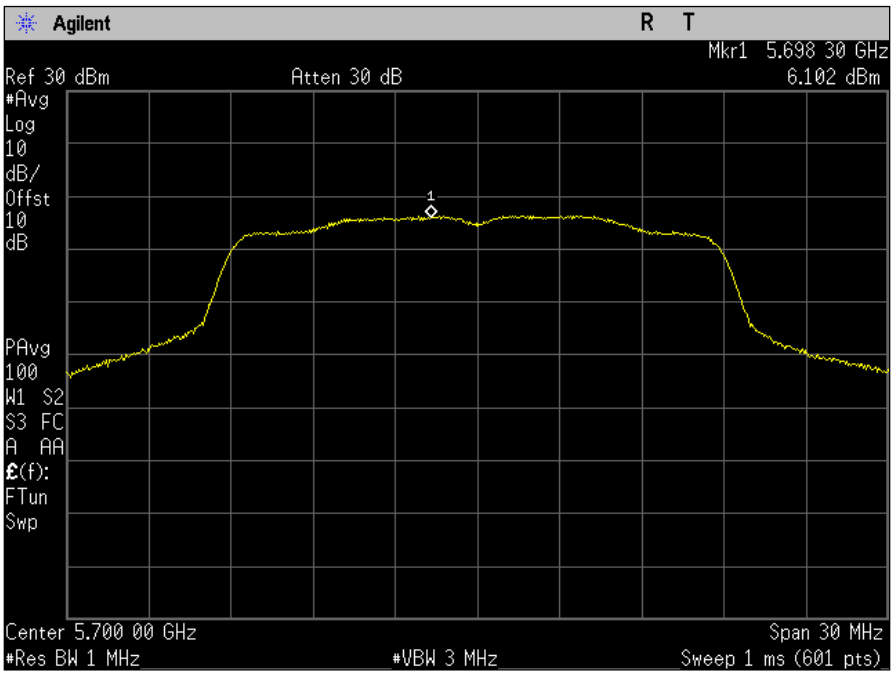
Plot 184. Power Spectral, MIMO, BW 20M, Ch 5560M, A Mode, Port A



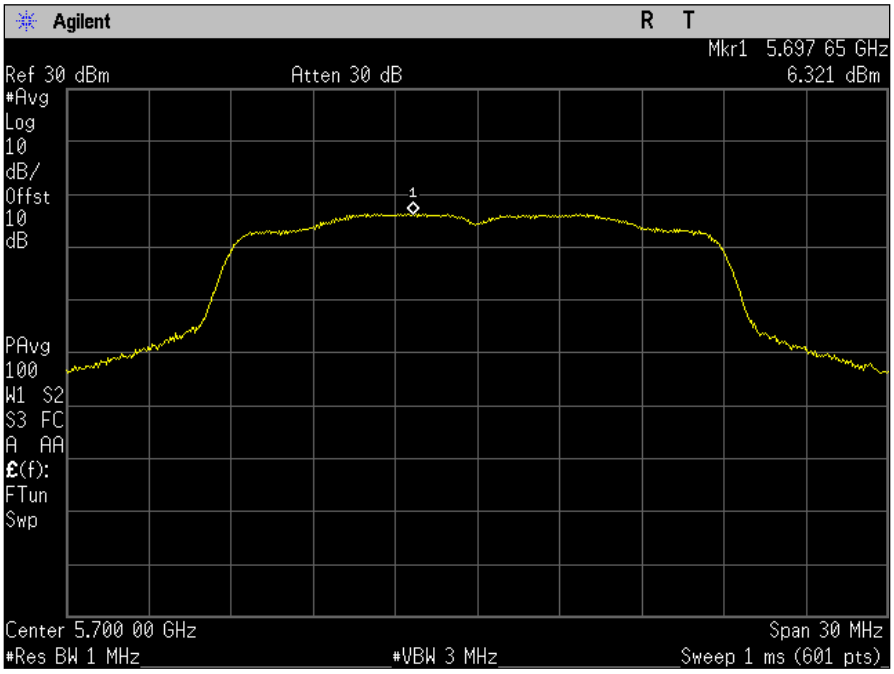
Plot 185. Power Spectral, MIMO, BW 20M, Ch 5560M, AC Mode, Port A



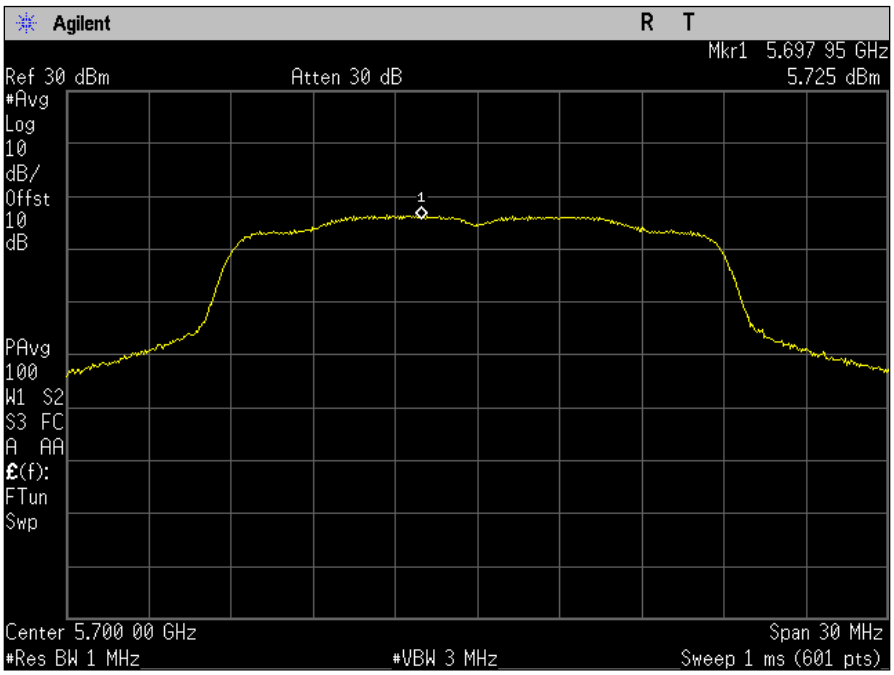
Plot 186. Power Spectral, MIMO, BW 20M, Ch 5560M, N Mode, Port A



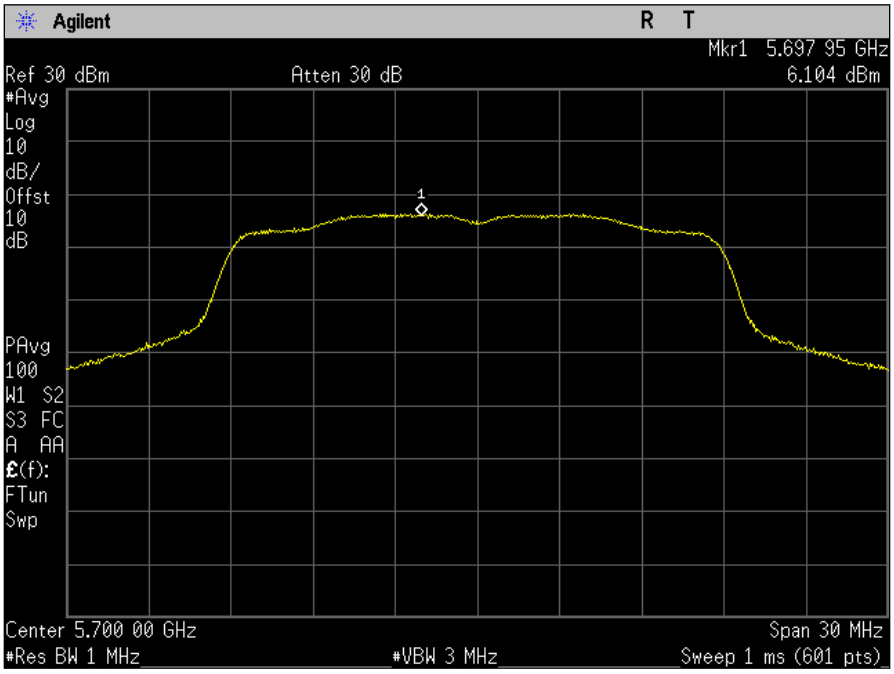
Plot 187. Power Spectral, MIMO, BW 20M, Ch 5700M, A Mode, Port A



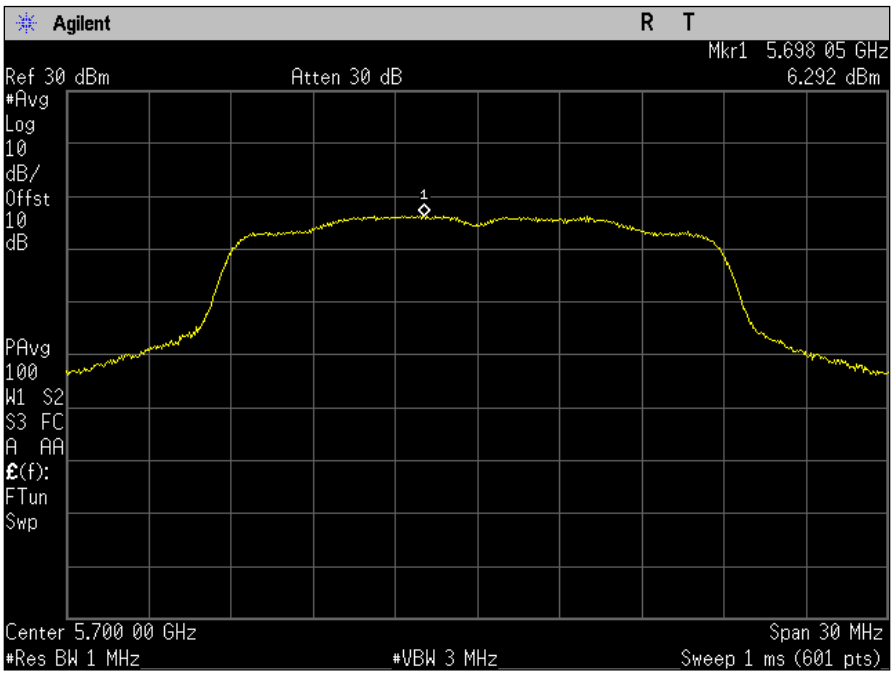
Plot 188. Power Spectral, MIMO, BW 20M, Ch 5700M, A Mode, Port B



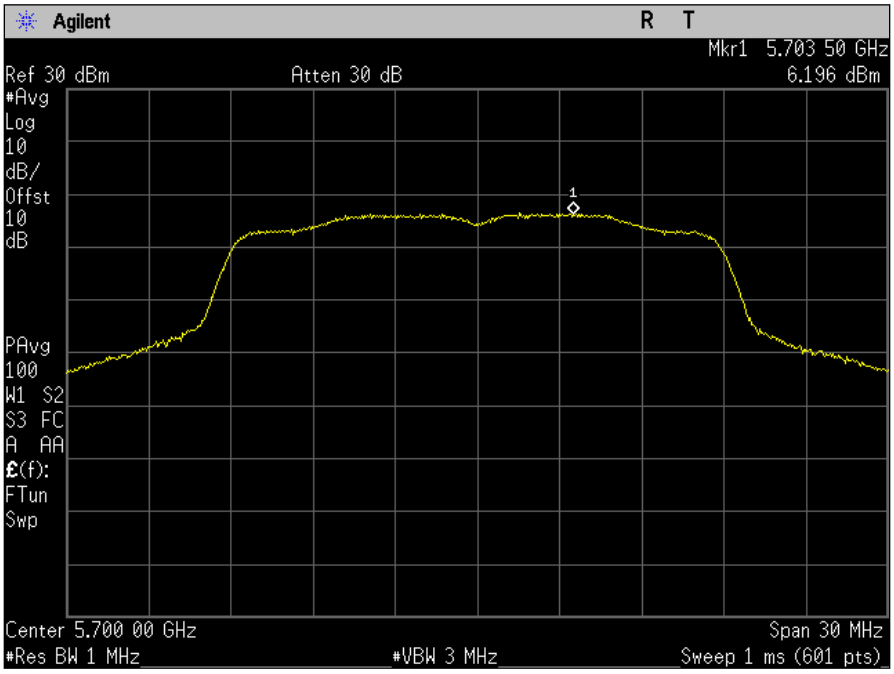
Plot 189. Power Spectral, MIMO, BW 20M, Ch 5700M, AC Mode, Port A



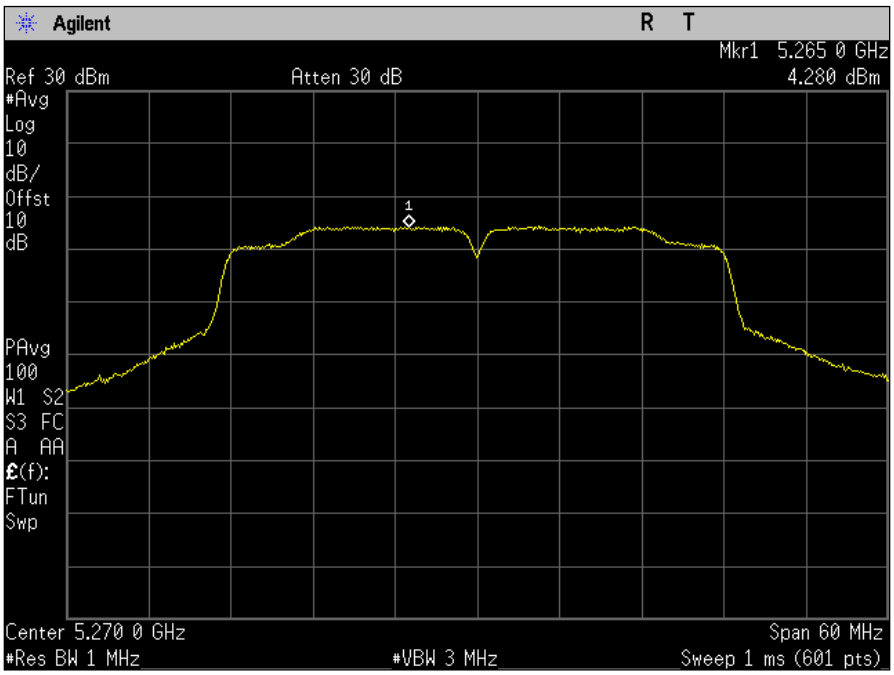
Plot 190. Power Spectral, MIMO, BW 20M, Ch 5700M, AC Mode, Port B



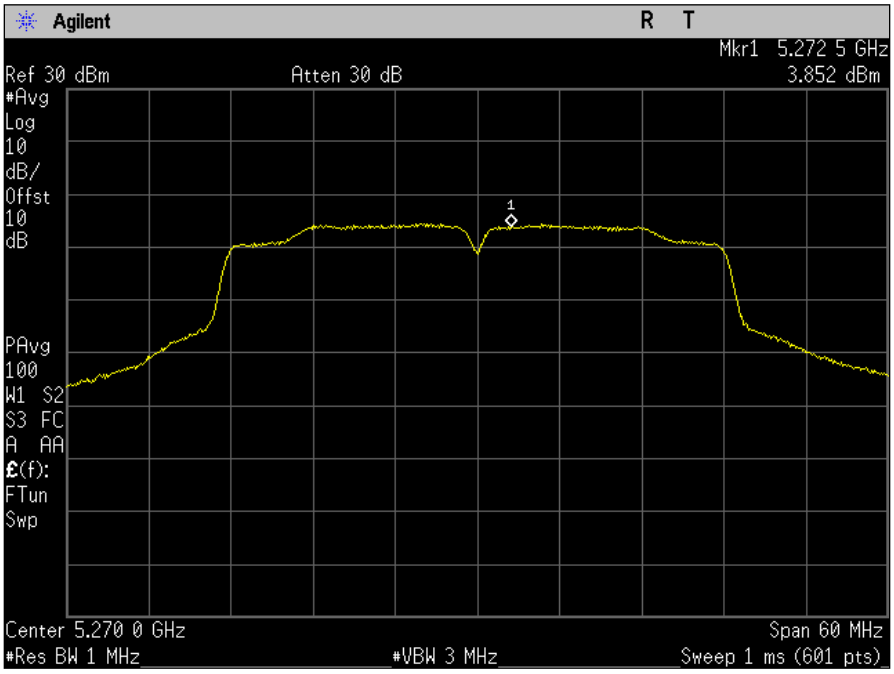
Plot 191. Power Spectral, MIMO, BW 20M, Ch 5700M, N Mode, Port A



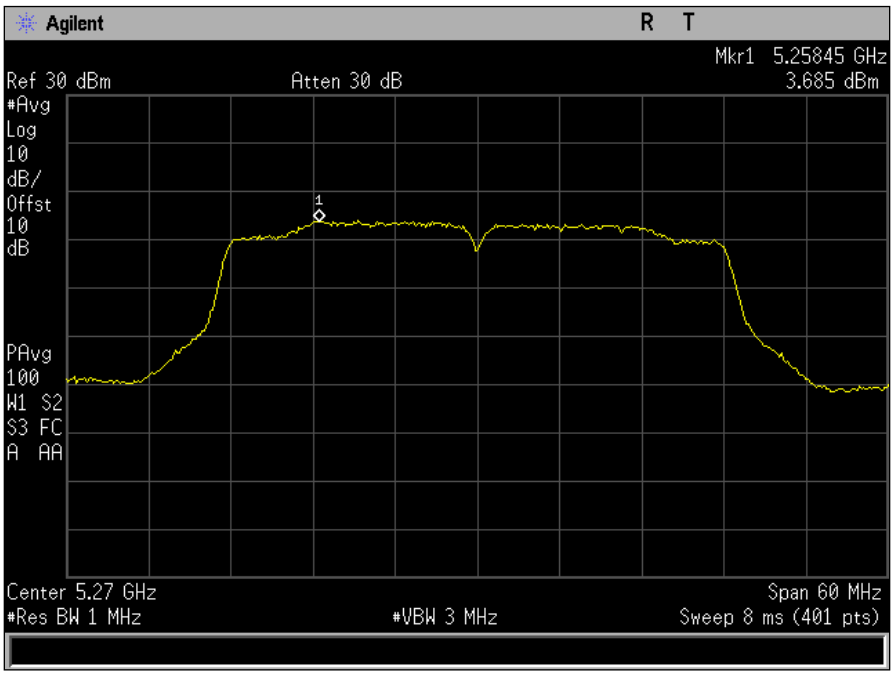
Plot 192. Power Spectral, MIMO, BW 20M, Ch 5700M, N Mode, Port B



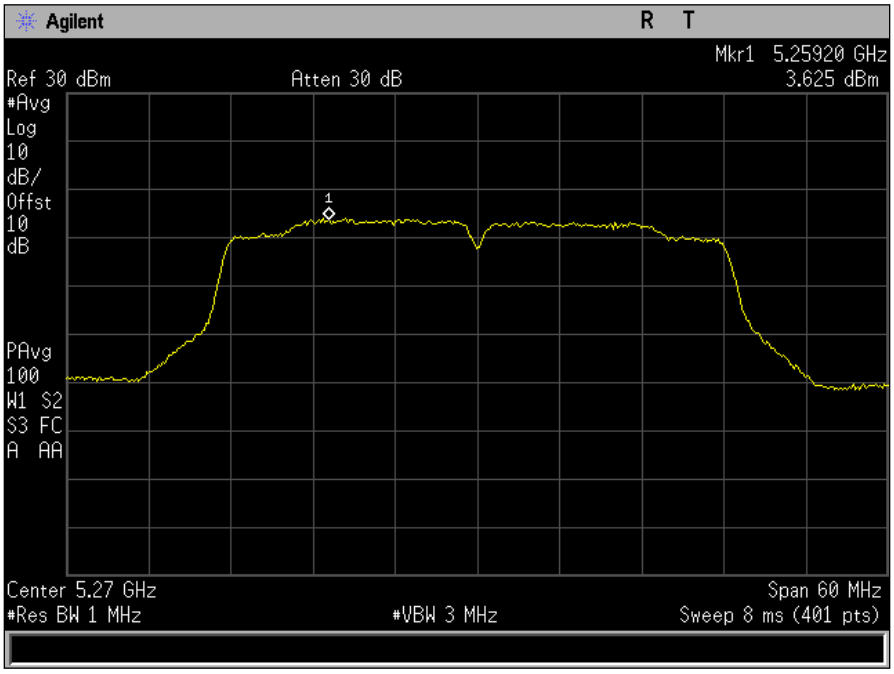
Plot 193. Power Spectral, MIMO, BW 40M, Ch 5270M, AC Mode, Port B



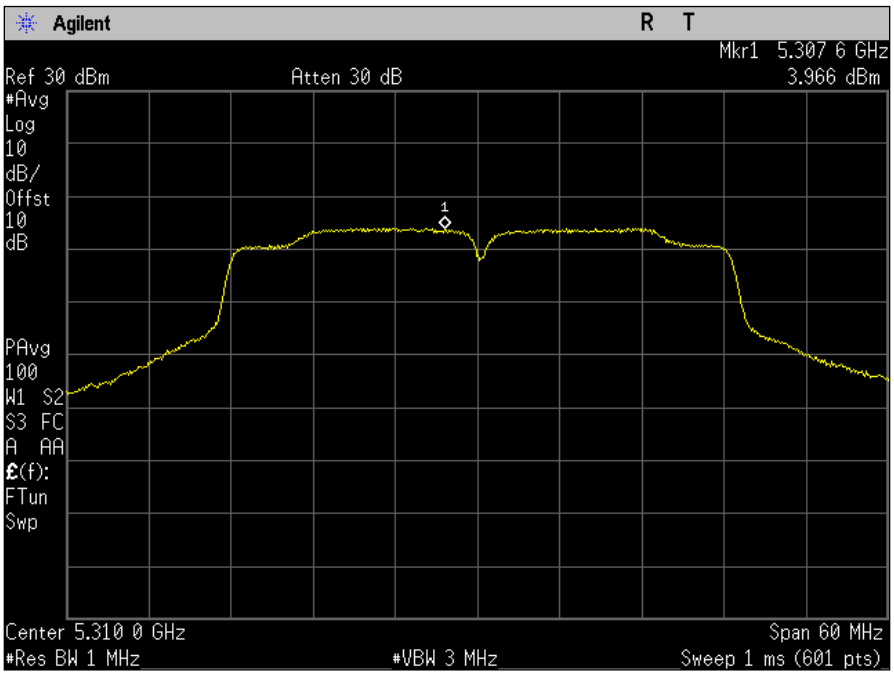
Plot 194. Power Spectral, MIMO, BW 40M, Ch 5270M, N Mode, Port B



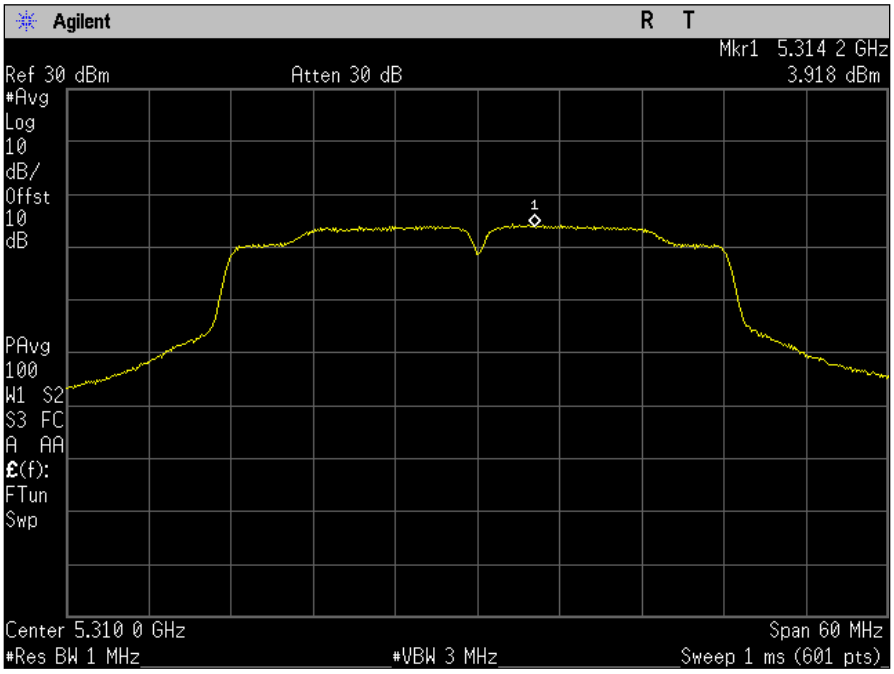
Plot 195. Power Spectral, MIMO, BW 40M, Ch 5270M, AC Mode, Port A



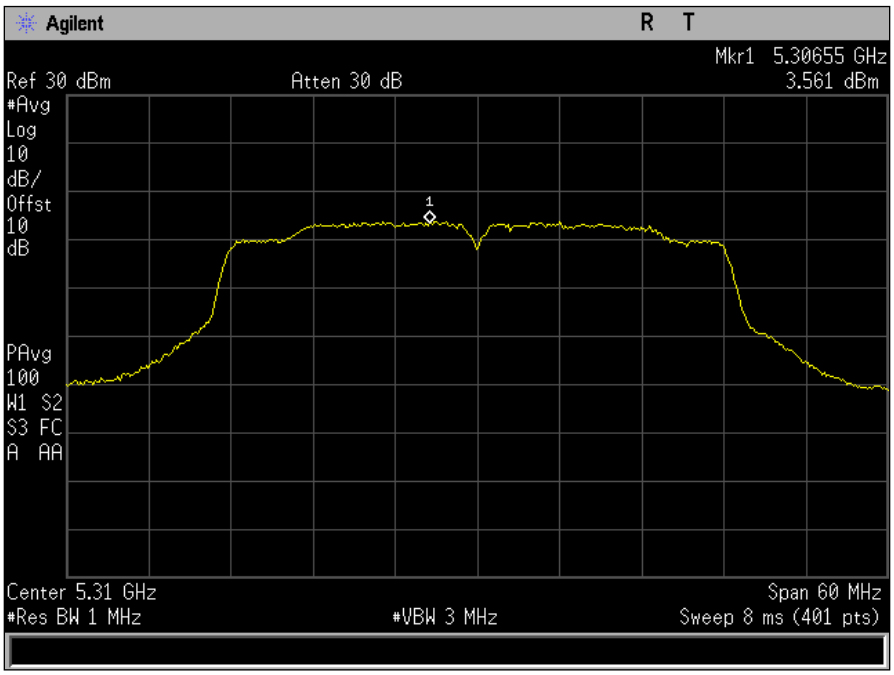
Plot 196. Power Spectral, MIMO, BW 40M, Ch 5270M, N Mode, Port A



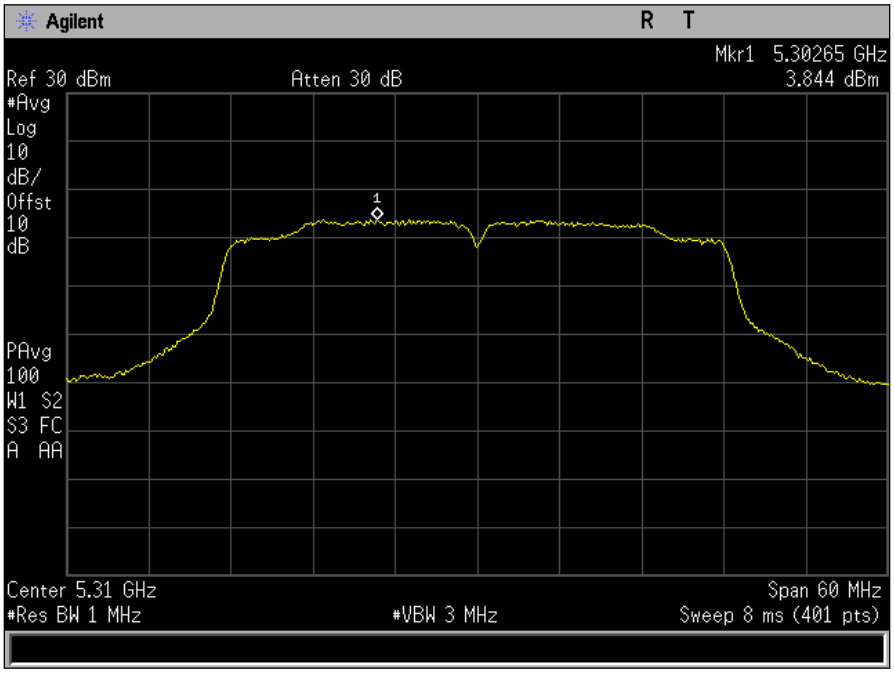
Plot 197. Power Spectral, MIMO, BW 40M, Ch 5310M, AC Mode, Port B



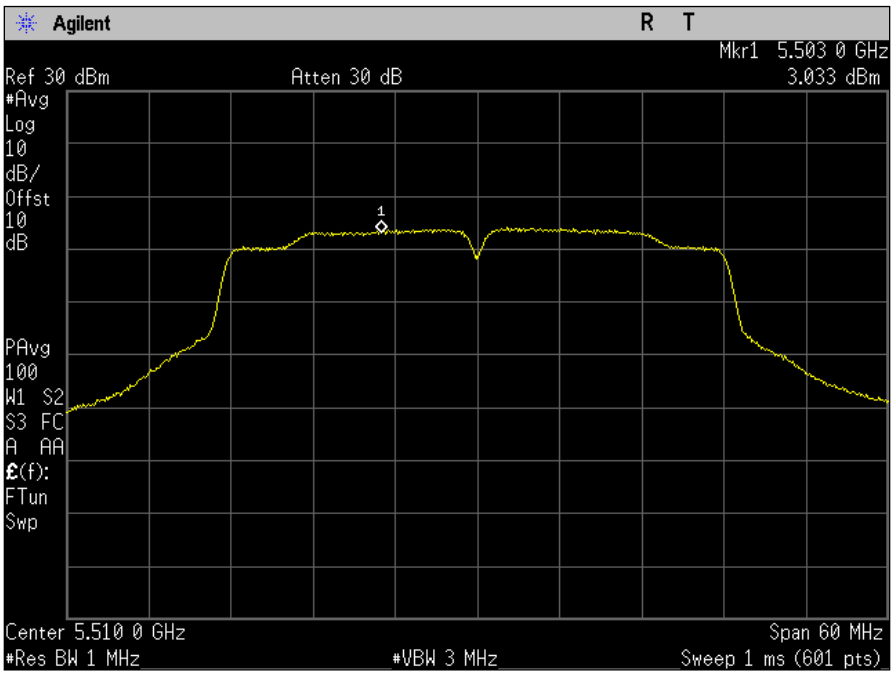
Plot 198. Power Spectral, MIMO, BW 40M, Ch 5310M, N Mode, Port B



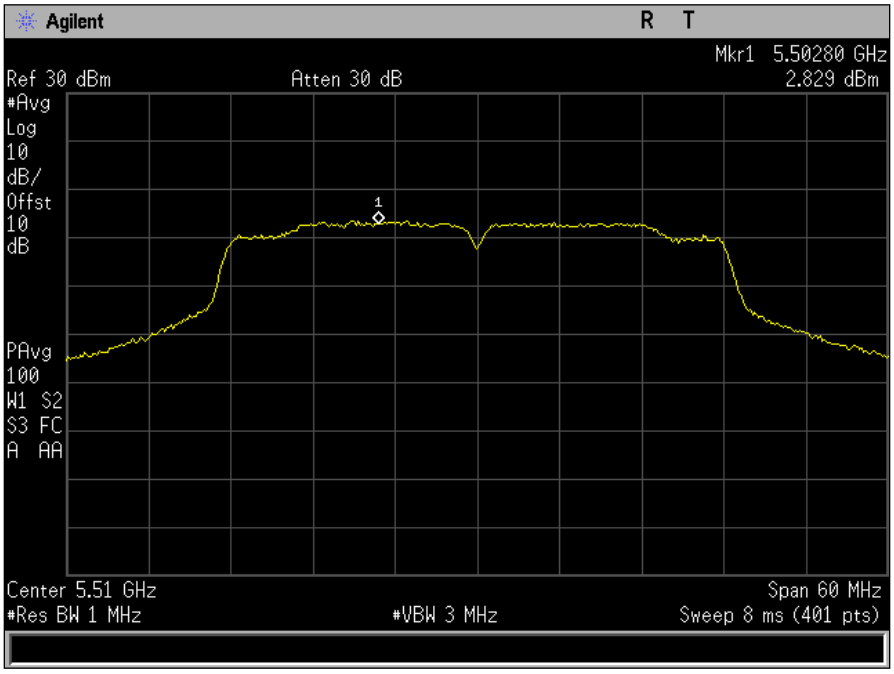
Plot 199. Power Spectral, MIMO, BW 40M, Ch 5310M, AC Mode, Port A



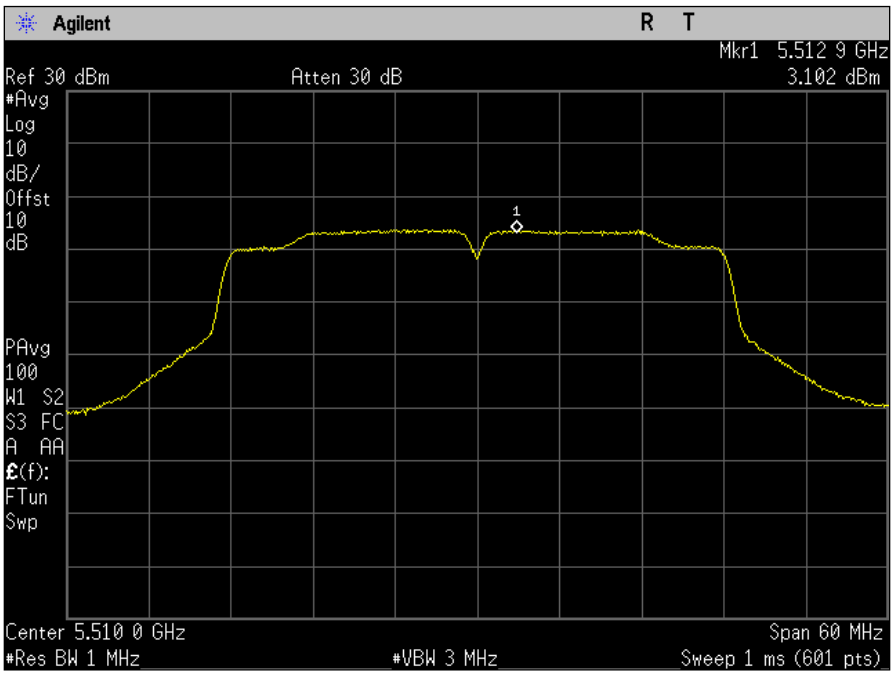
Plot 200. Power Spectral, MIMO, BW 40M, Ch 5310M, N Mode, Port A



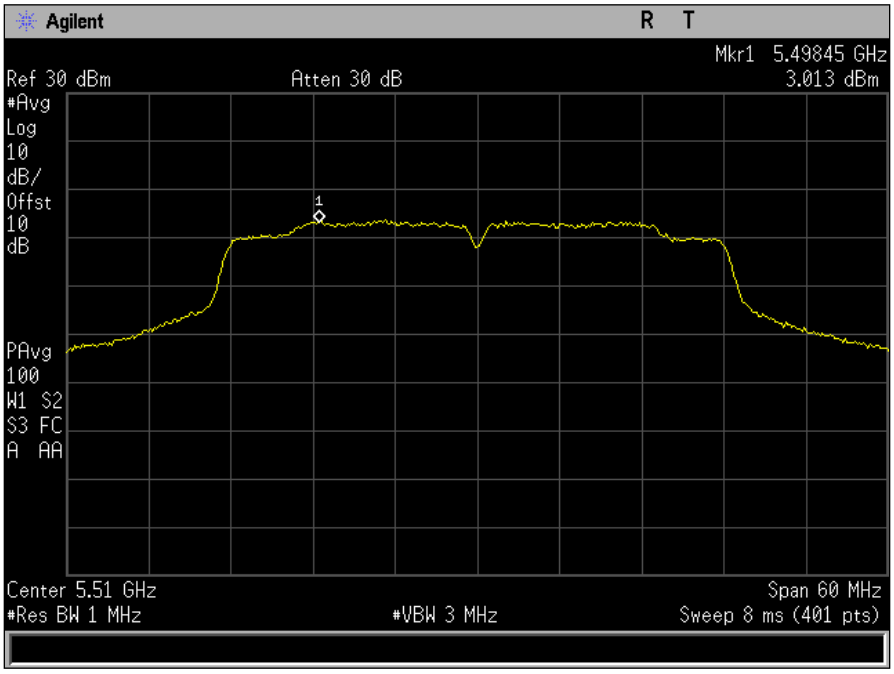
Plot 201. Power Spectral, MIMO, BW 40M, Ch 5510M, N Mode, Port B



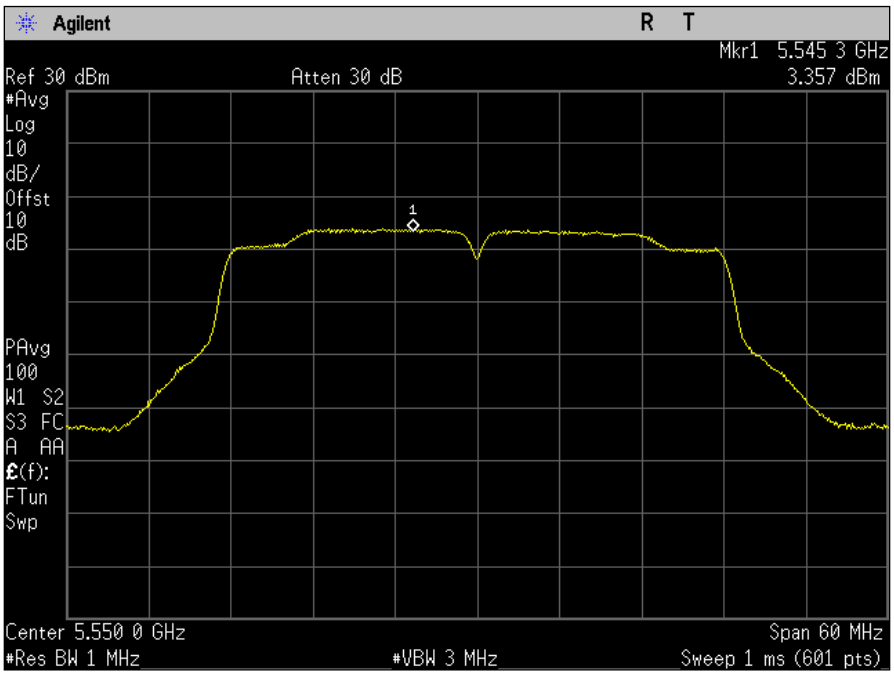
Plot 202. Power Spectral, MIMO, BW 40M, Ch 5510M, AC Mode, Port A



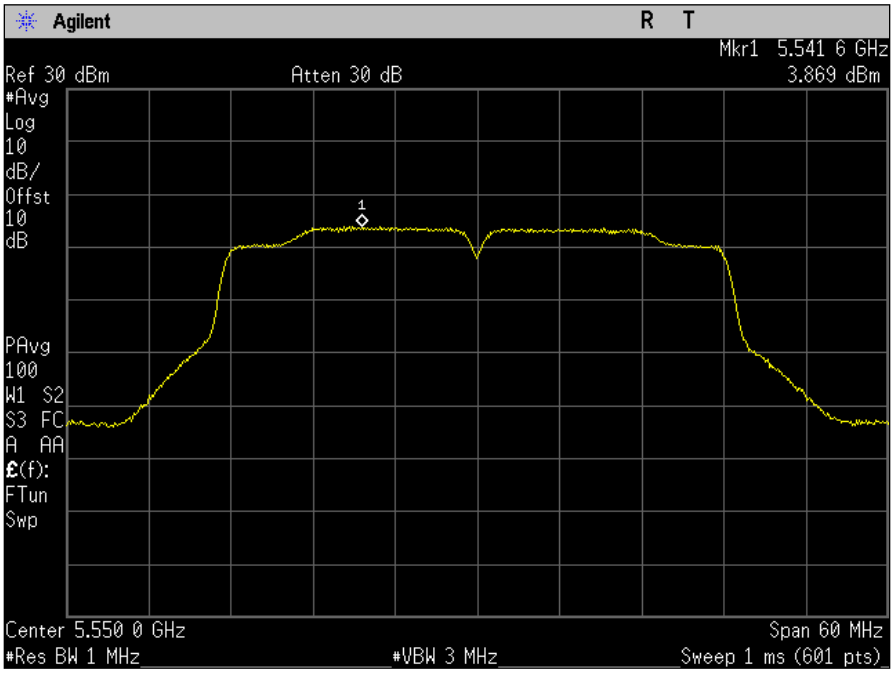
Plot 203. Power Spectral, MIMO, BW 40M, Ch 5510M, AC Mode, Port B



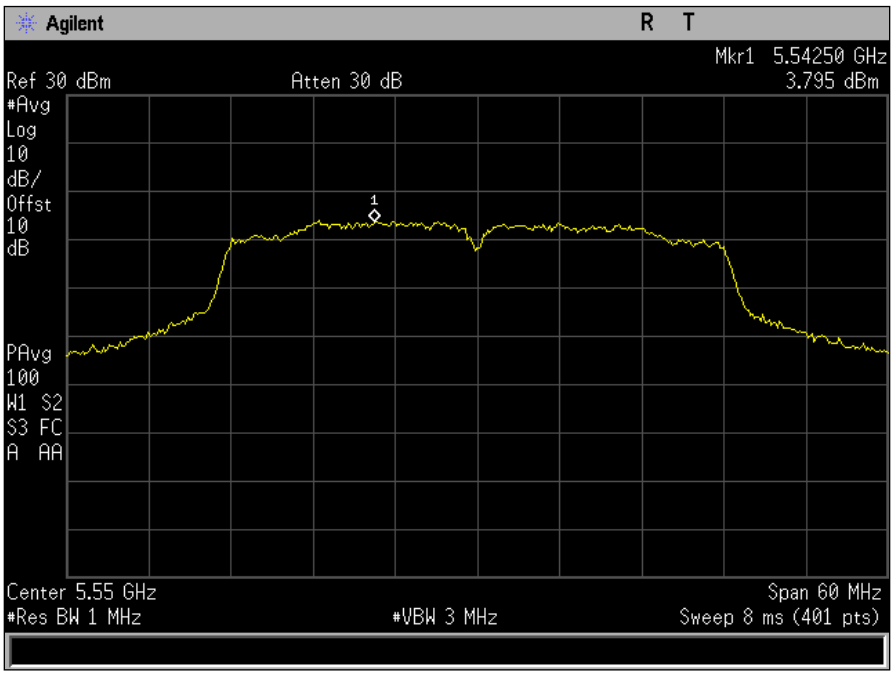
Plot 204. Power Spectral, MIMO, BW 40M, Ch 5510M, N Mode, Port A



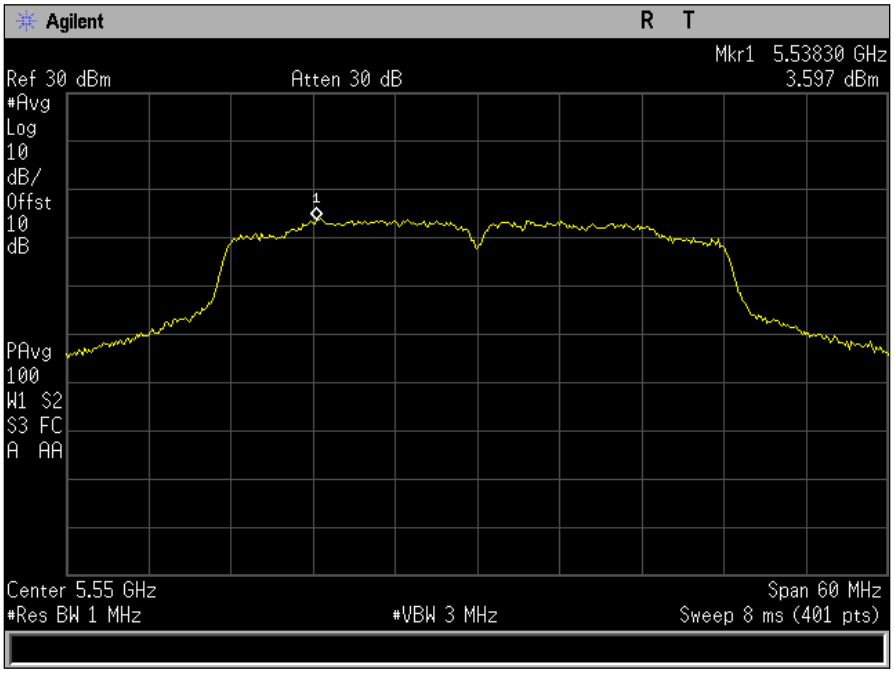
Plot 205. Power Spectral, MIMO, BW 40M, Ch 5550M, AC Mode, Port B



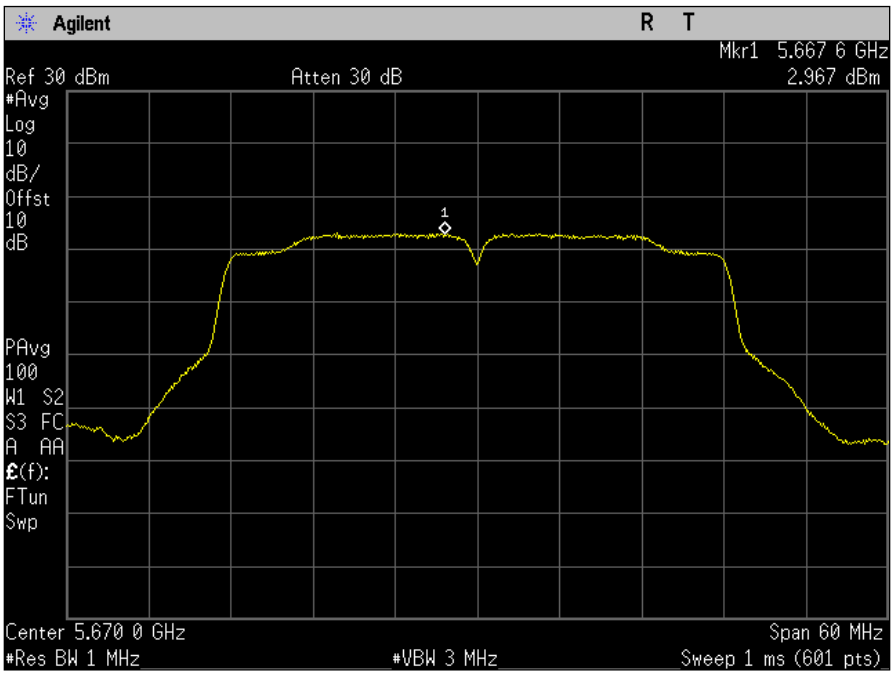
Plot 206. Power Spectral, MIMO, BW 40M, Ch 5550M, N Mode, Port B



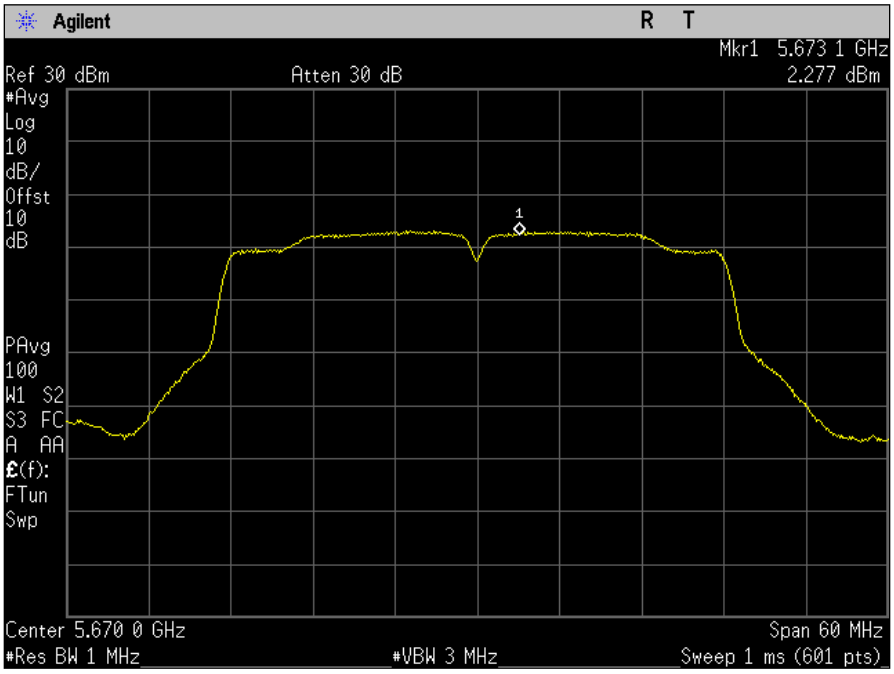
Plot 207. Power Spectral, MIMO, BW 40M, Ch 5550M, AC Mode, Port A



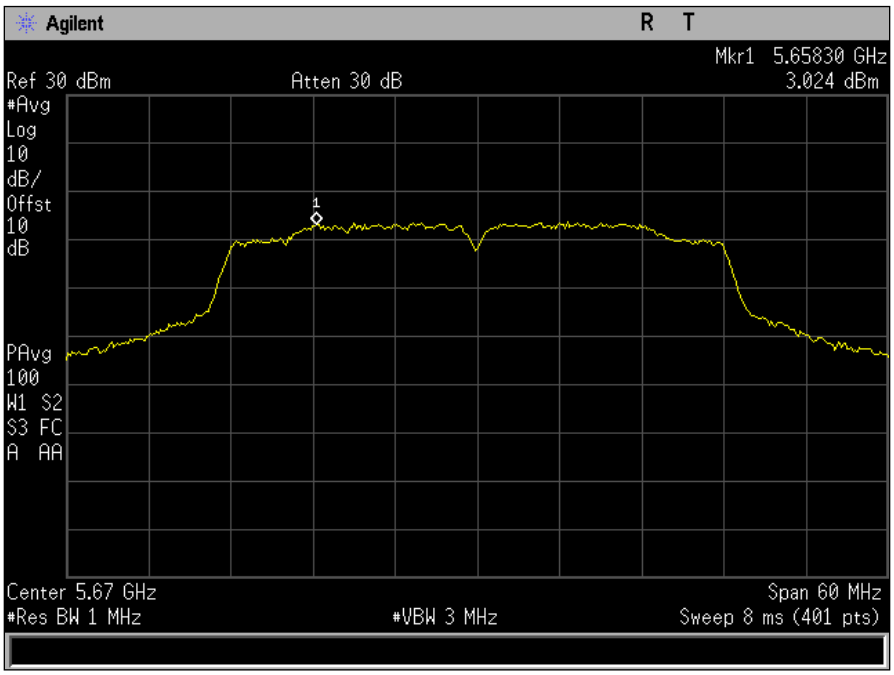
Plot 208. Power Spectral, MIMO, BW 40M, Ch 5550M, N Mode, Port A



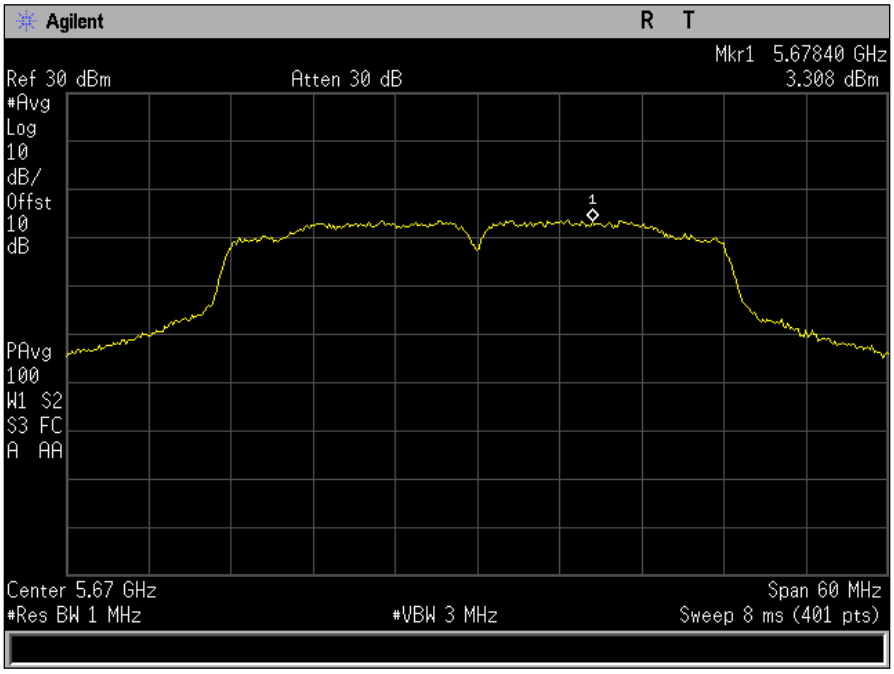
Plot 209. Power Spectral, MIMO, BW 40M, Ch 5670M, AC Mode, Port B



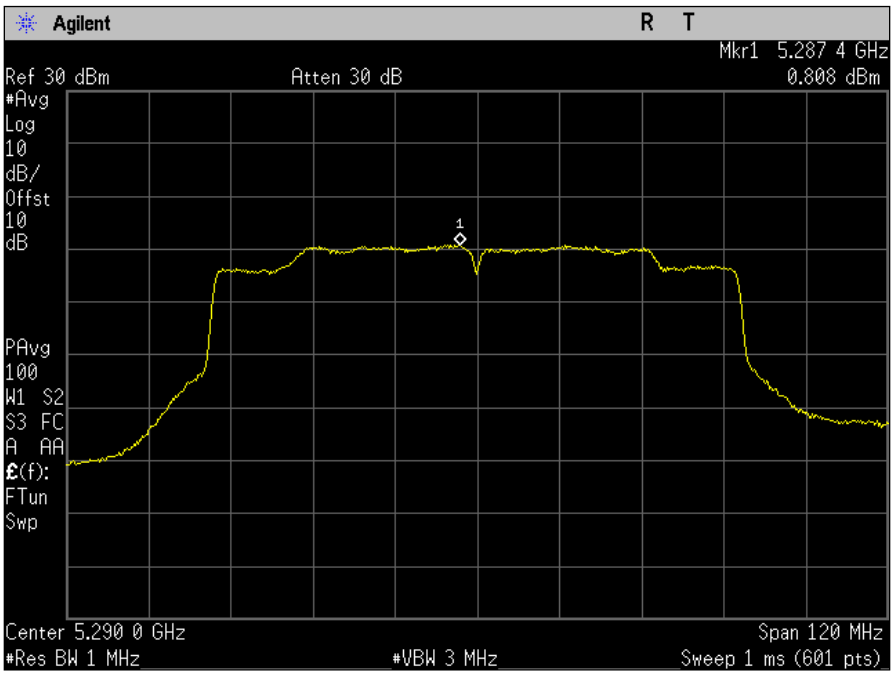
Plot 210. Power Spectral, MIMO, BW 40M, Ch 5670M, N Mode, Port B



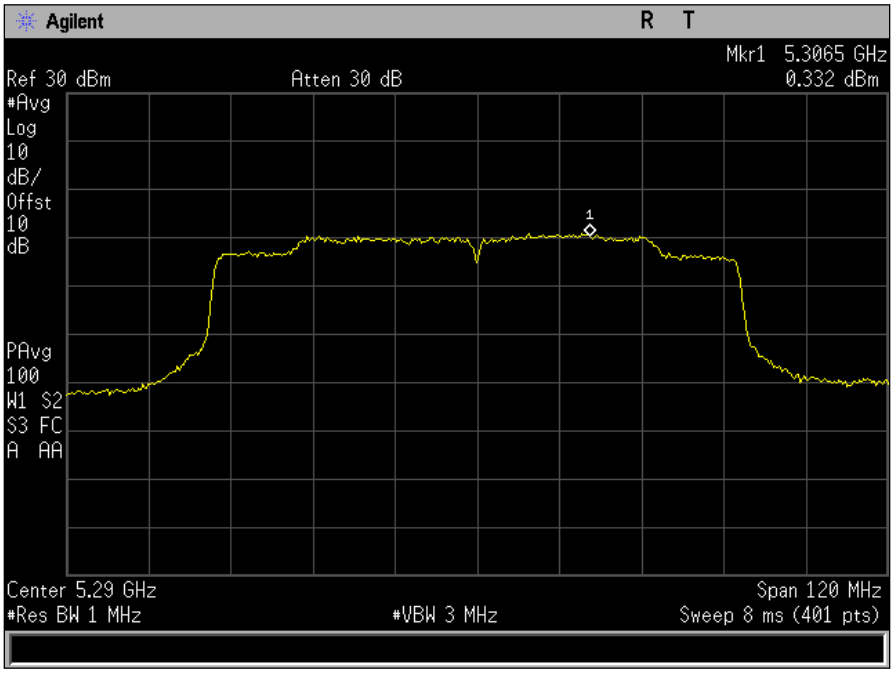
Plot 211. Power Spectral, MIMO, BW 40M, Ch 5670M, AC Mode, Port A



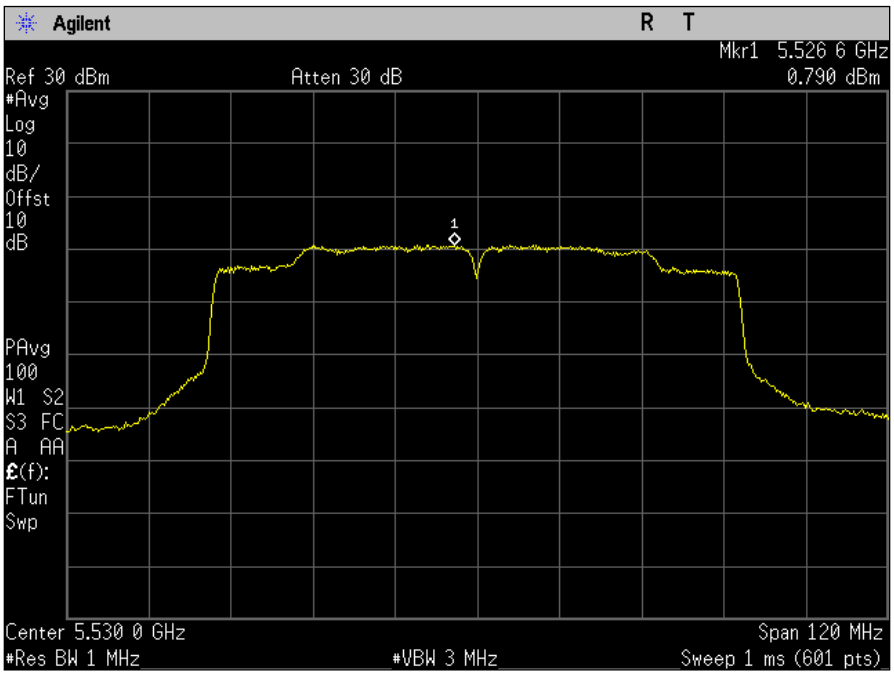
Plot 212. Power Spectral, MIMO, BW 40M, Ch 5670M, N Mode, Port A



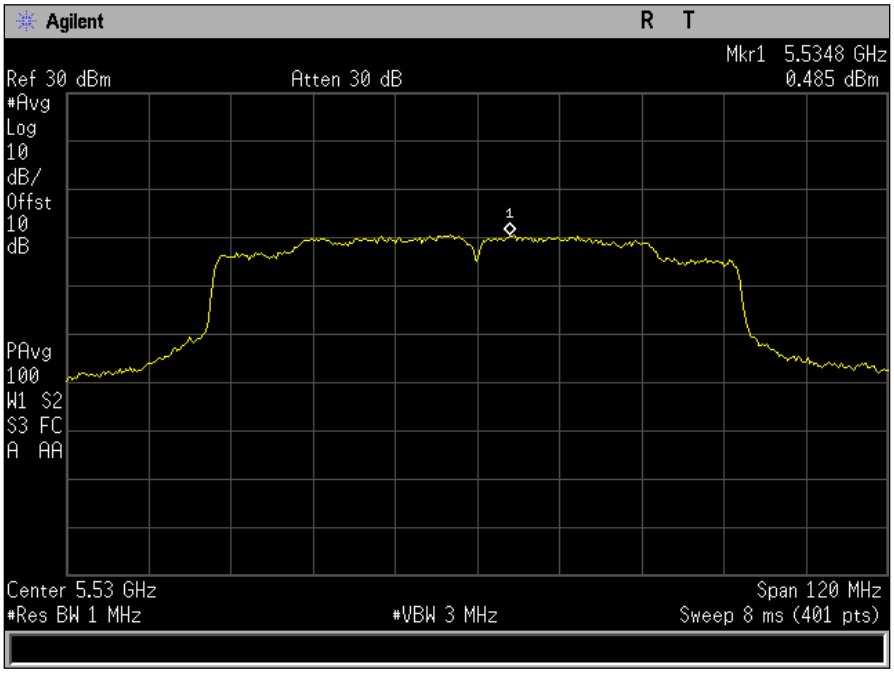
Plot 213. Power Spectral, MIMO, BW 80M, Ch 5290M, AC Mode, Port B



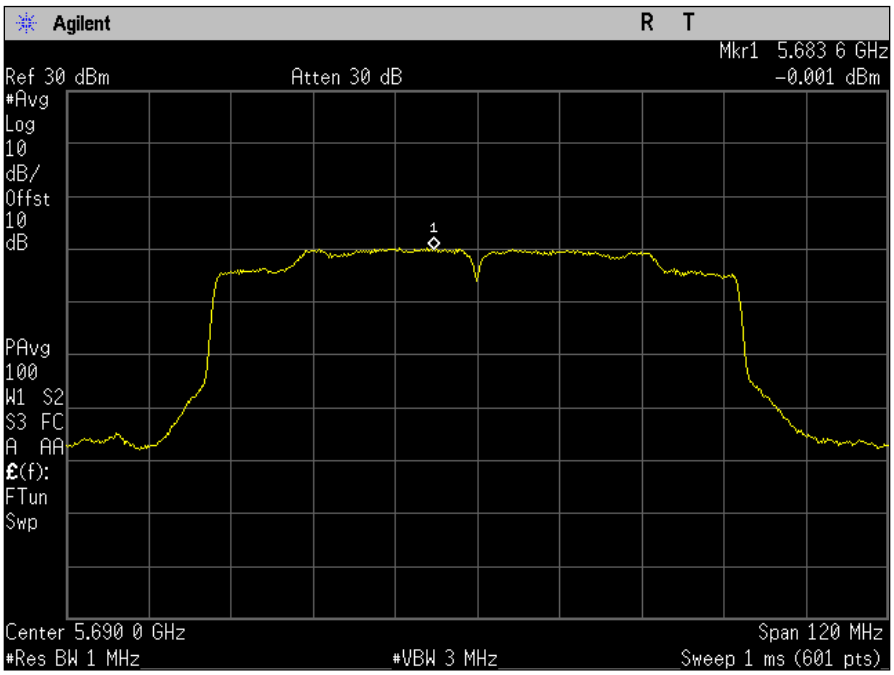
Plot 214. Power Spectral, MIMO, BW 80M, Ch 5290M, AC Mode, Port A



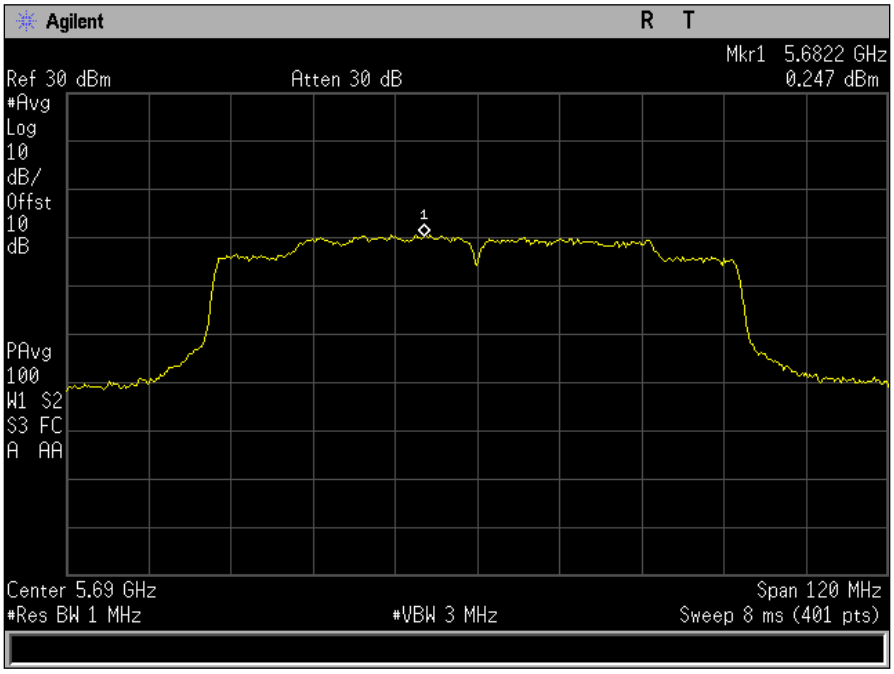
Plot 215. Power Spectral, MIMO, BW 80M, Ch 5530M, AC Mode, Port B



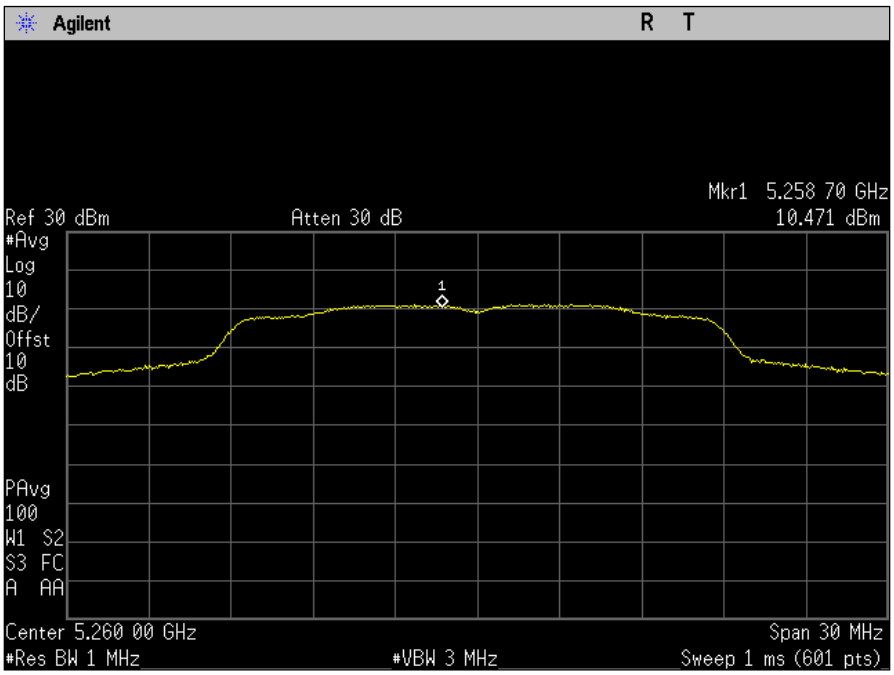
Plot 216. Power Spectral, MIMO, BW 80M, Ch 5530M, AC Mode, Port A



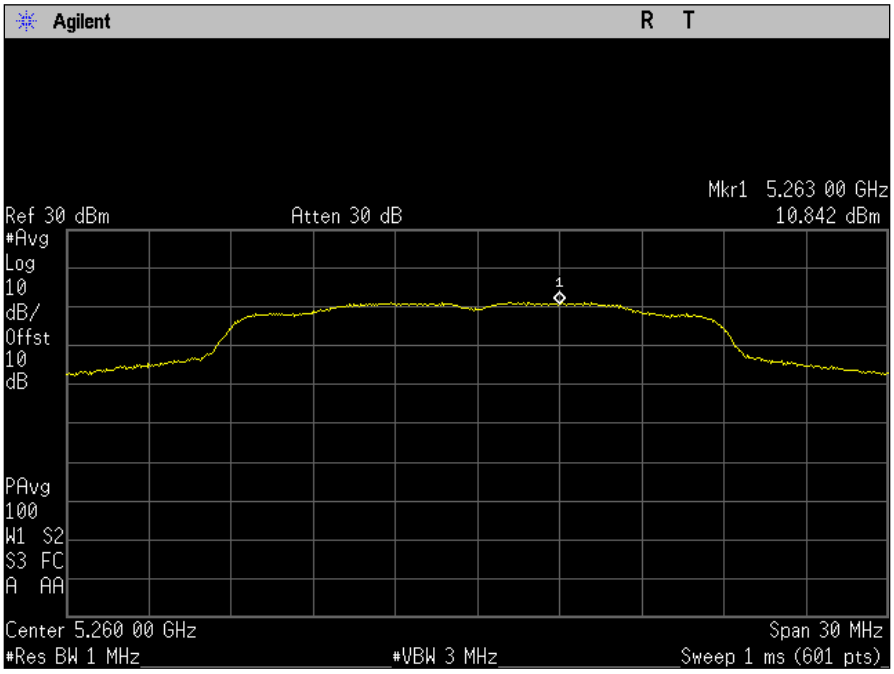
Plot 217. Power Spectral, MIMO, BW 80M, Ch 5690M, AC Mode, Port B



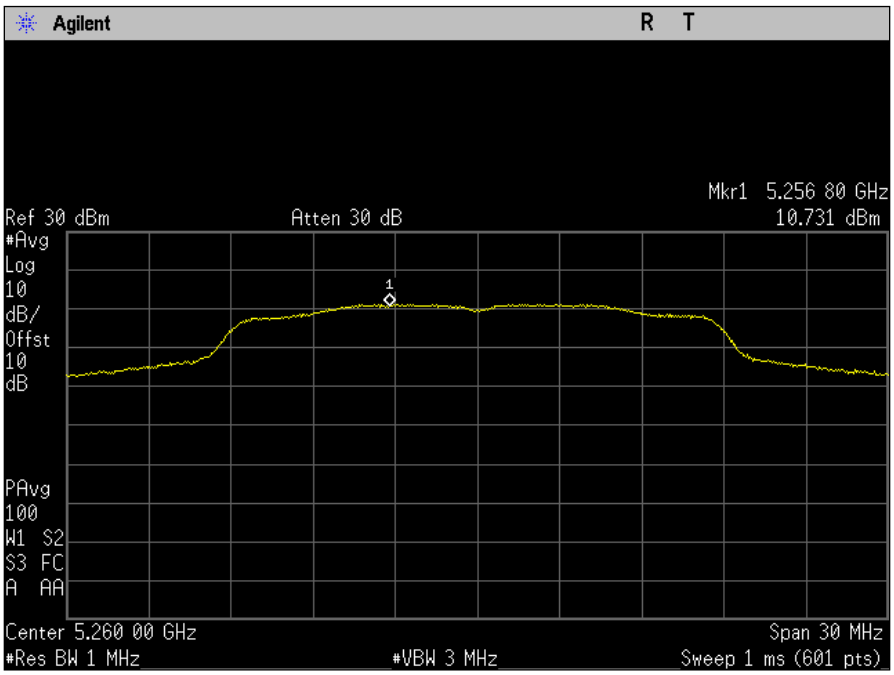
Plot 218. Power Spectral, MIMO, BW 80M, Ch 5690M, AC Mode, Port A



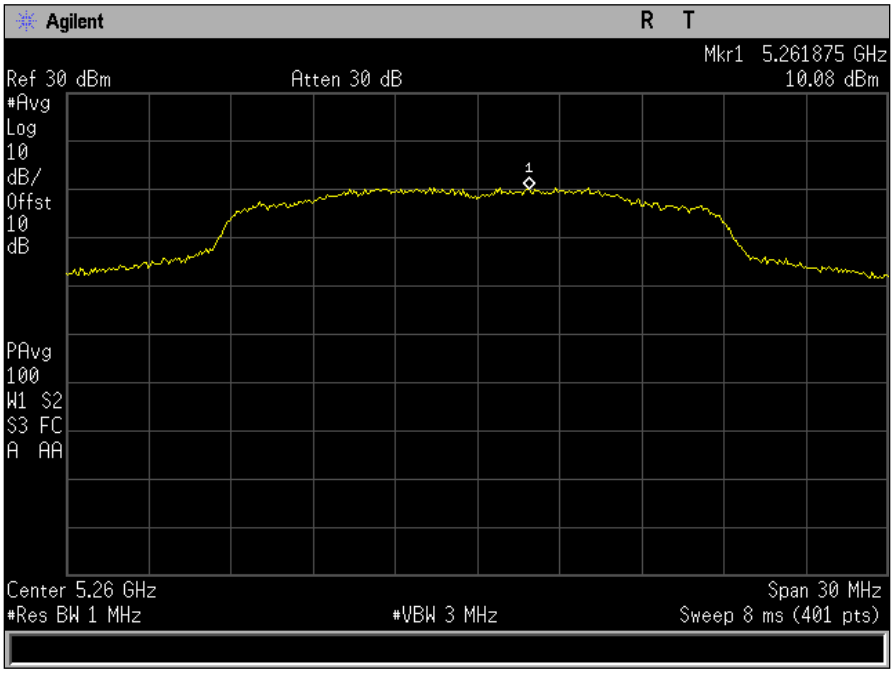
Plot 219. Power Spectral, BW 20M, Ch 5260M, A Mode, Port B



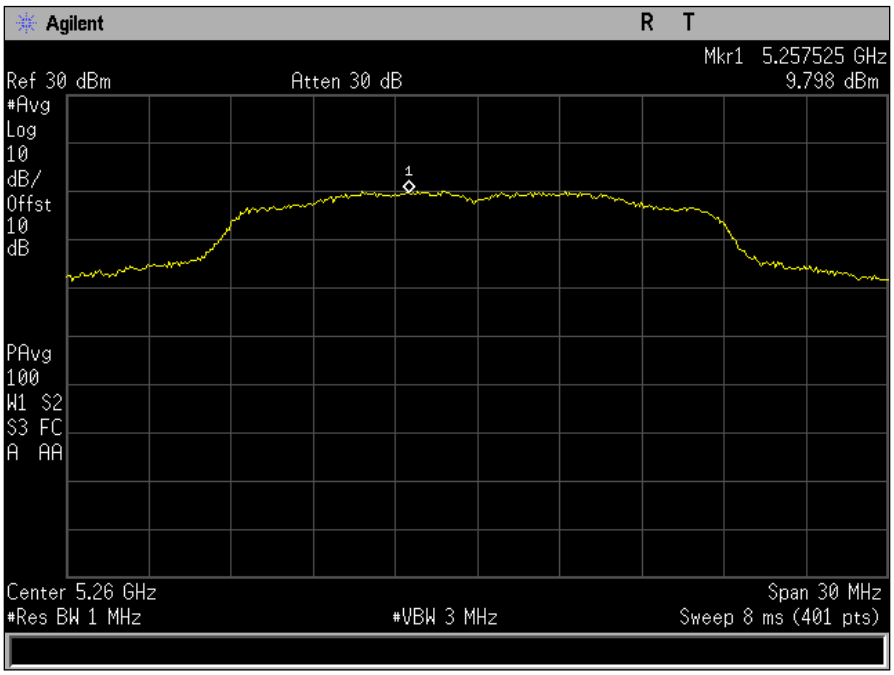
Plot 220. Power Spectral, BW 20M, Ch 5260M, AC Mode, Port B



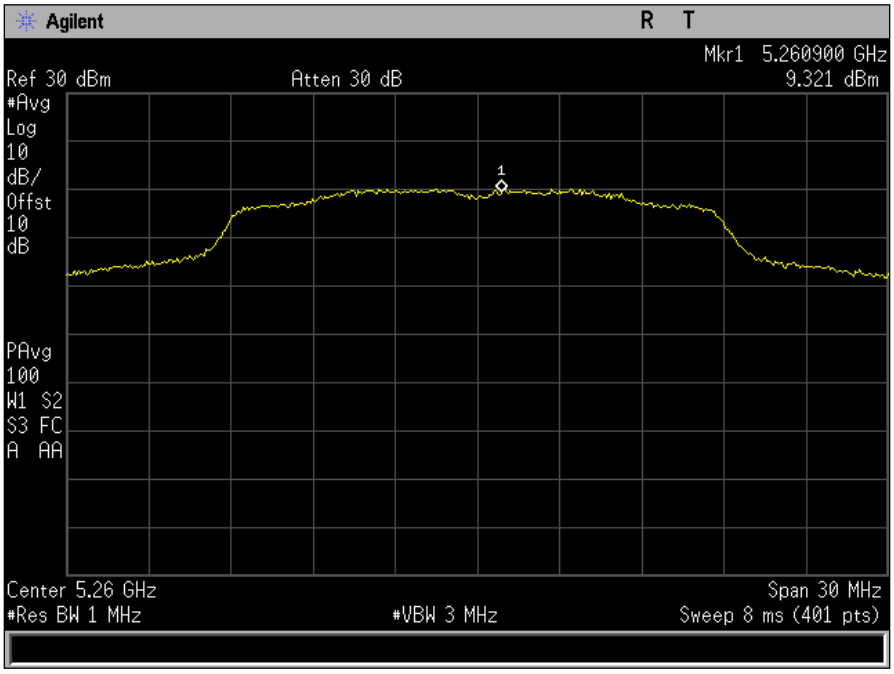
Plot 221. Power Spectral, BW 20M, Ch 5260M, N Mode, Port B



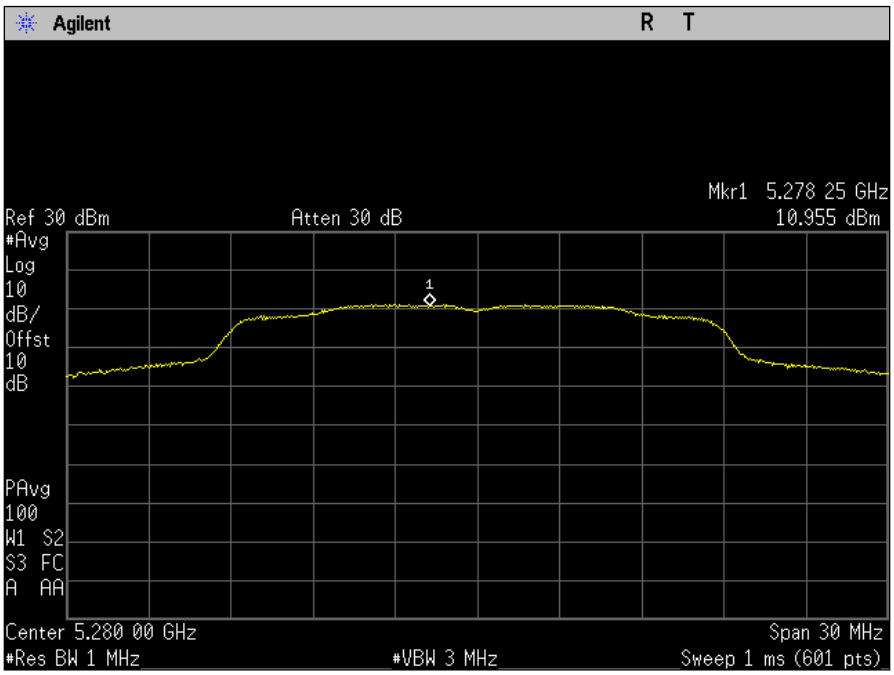
Plot 222. Power Spectral, BW 20M, Ch 5260M, A Mode, Port A



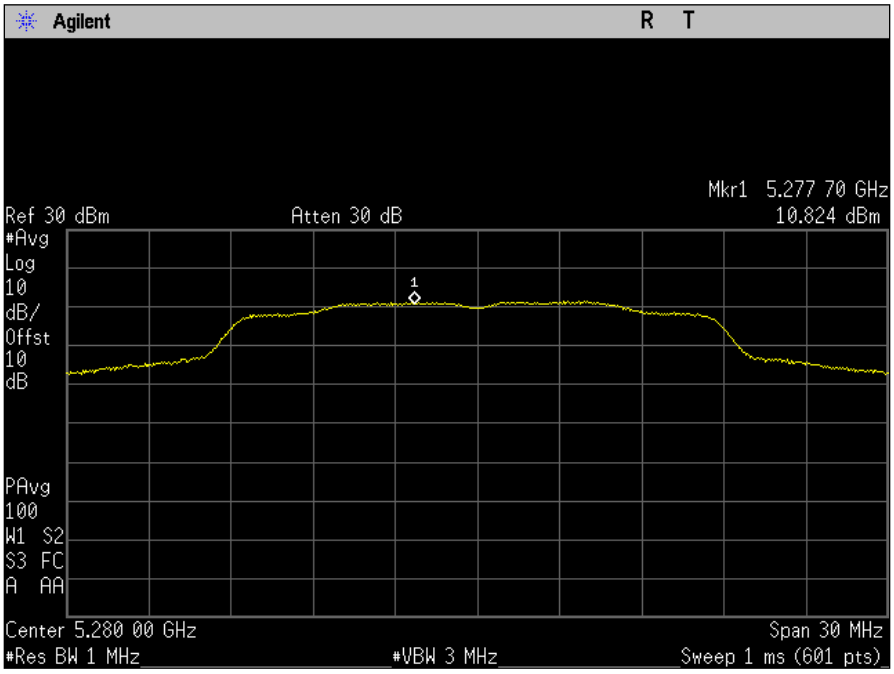
Plot 223. Power Spectral, BW 20M, Ch 5260M, AC Mode, Port A



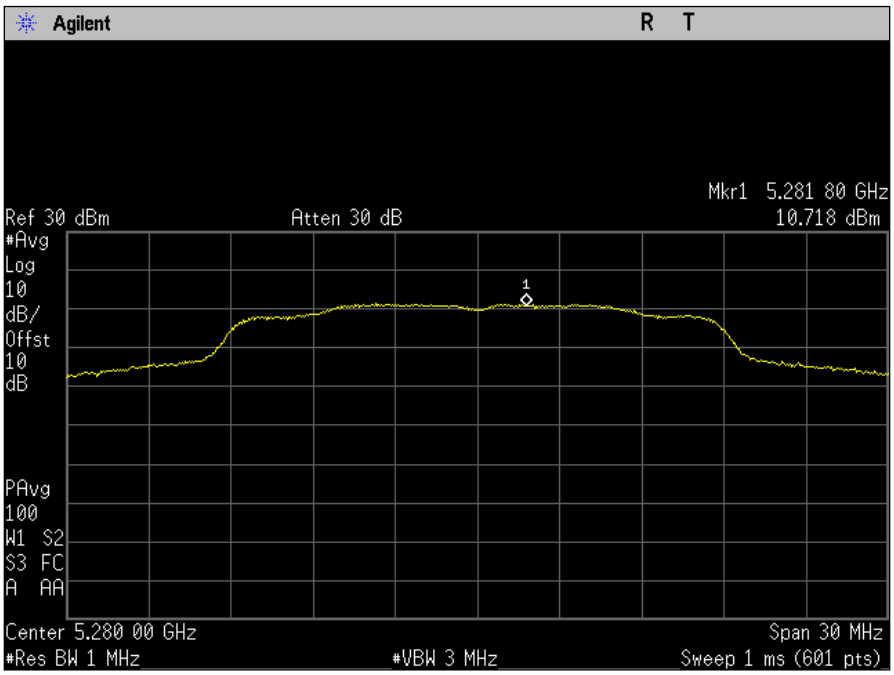
Plot 224. Power Spectral, BW 20M, Ch 5260M, N Mode, Port A



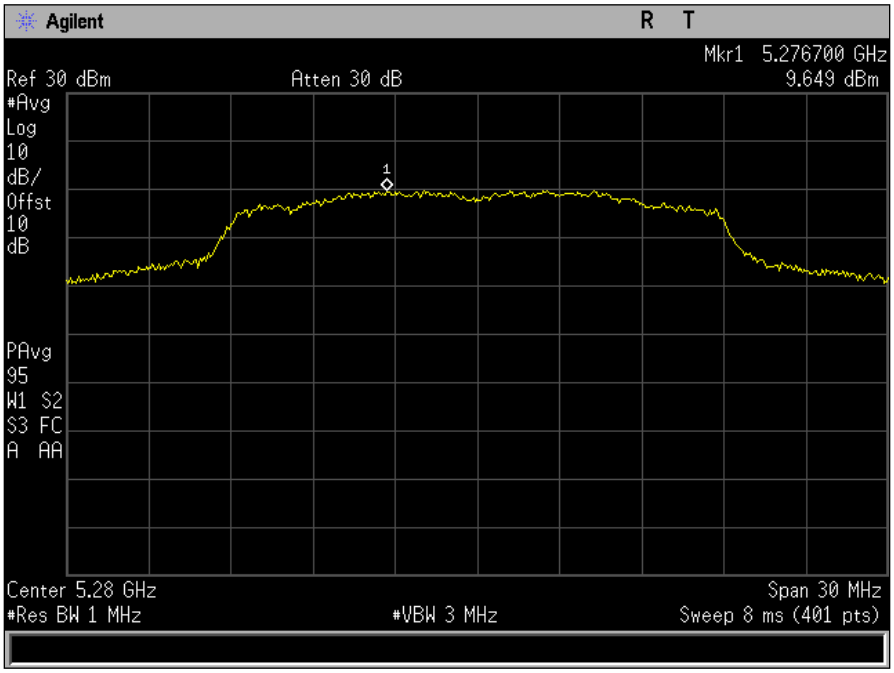
Plot 225. Power Spectral, BW 20M, Ch 5280M, A Mode, Port B



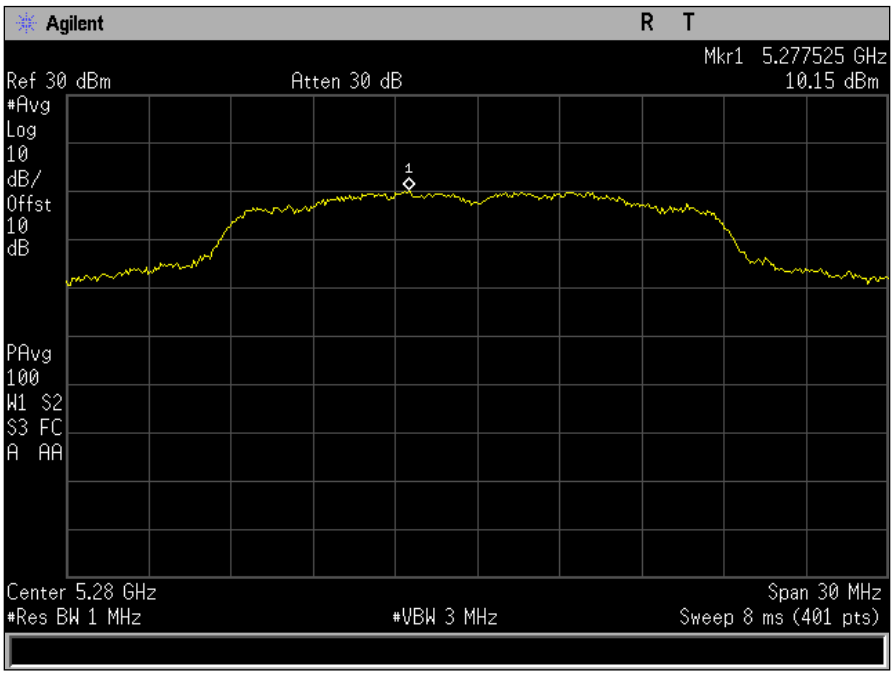
Plot 226. Power Spectral, BW 20M, Ch 5280M, AC Mode, Port B



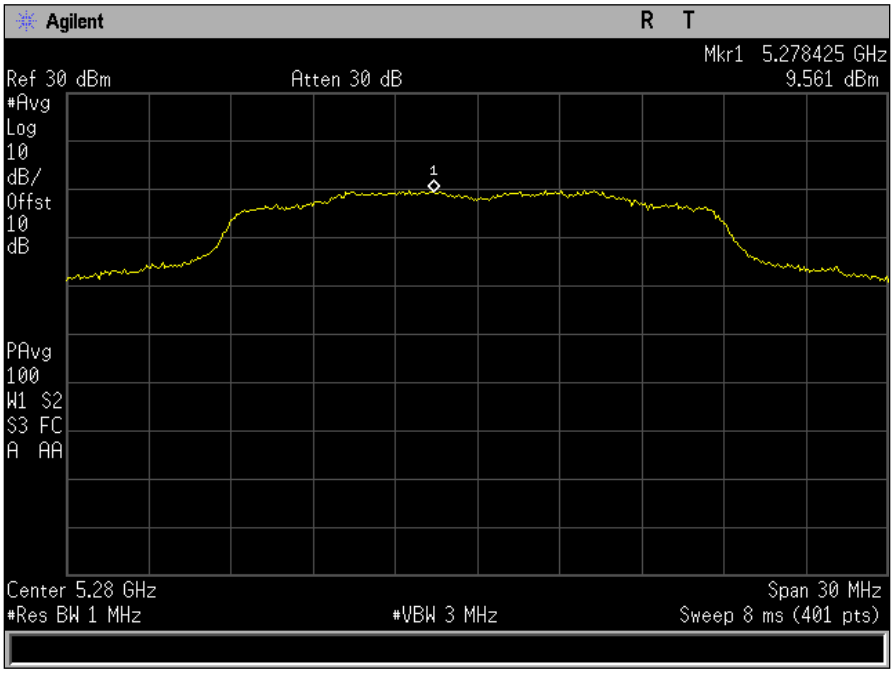
Plot 227. Power Spectral, BW 20M, Ch 5280M, N Mode, Port B



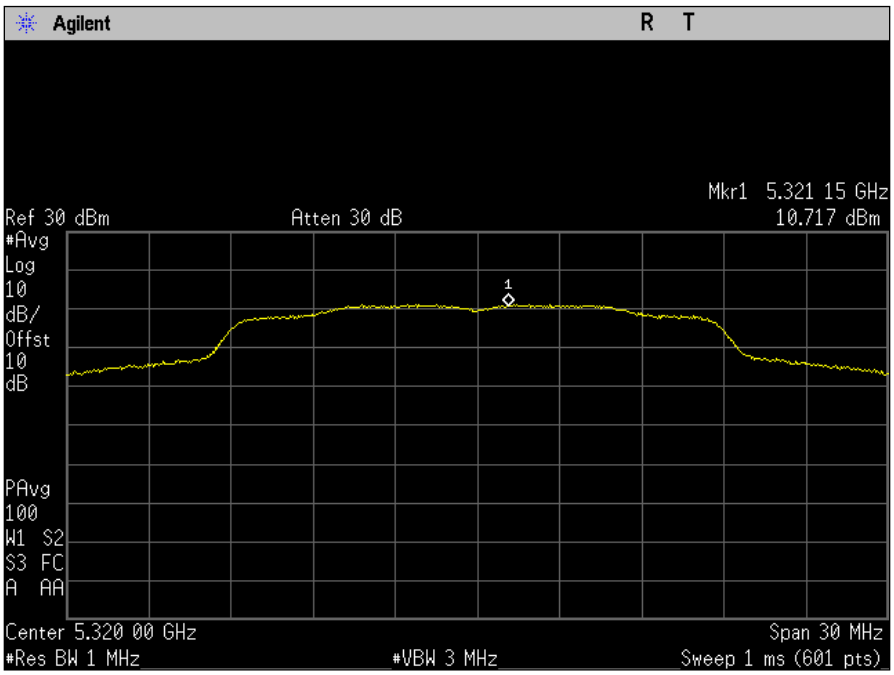
Plot 228. Power Spectral, BW 20M, Ch 5280M, A Mode, Port A



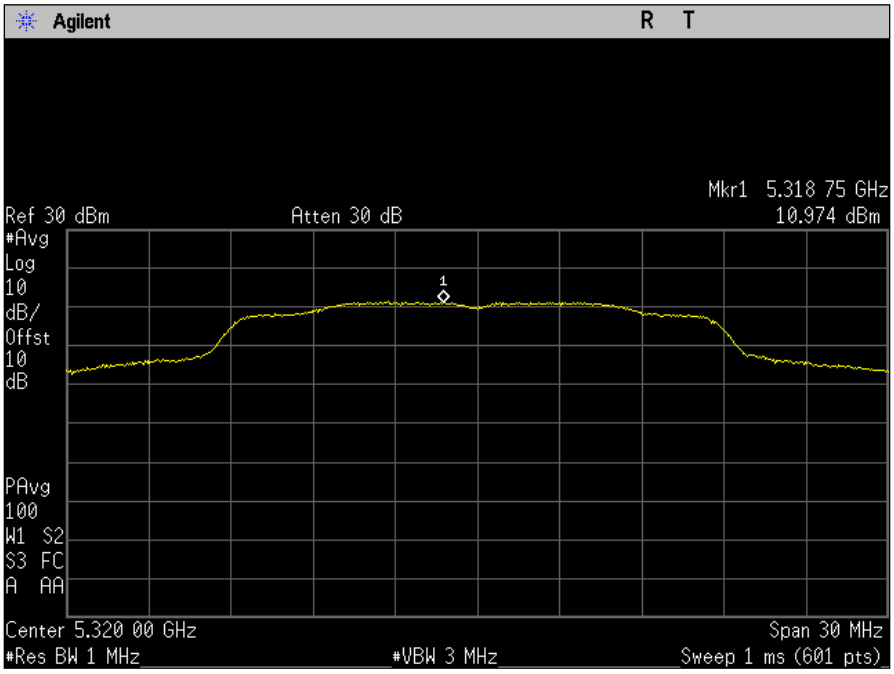
Plot 229. Power Spectral, BW 20M, Ch 5280M, AC Mode, Port A



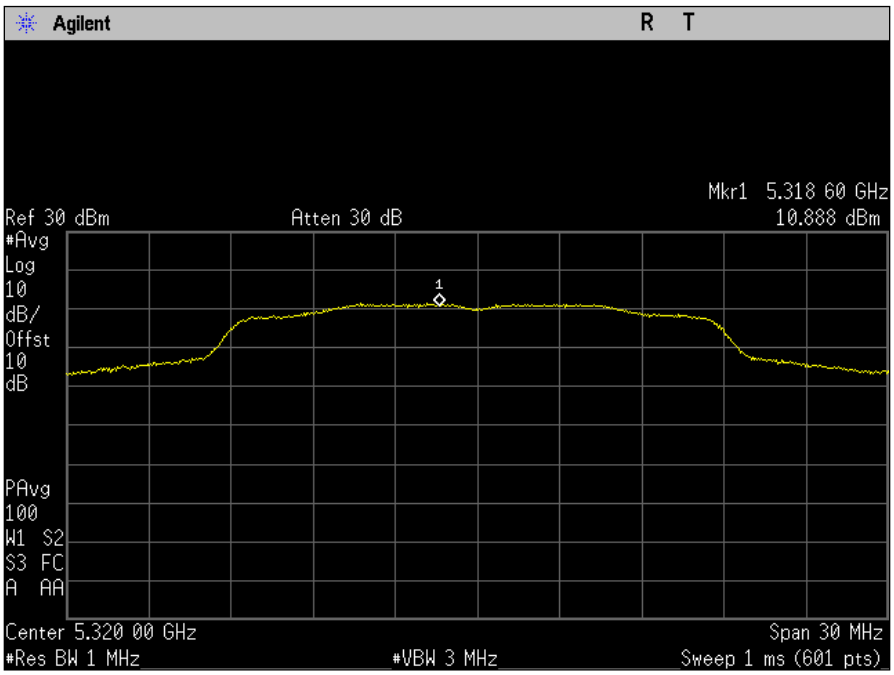
Plot 230. Power Spectral, BW 20M, Ch 5280M, N Mode, Port A



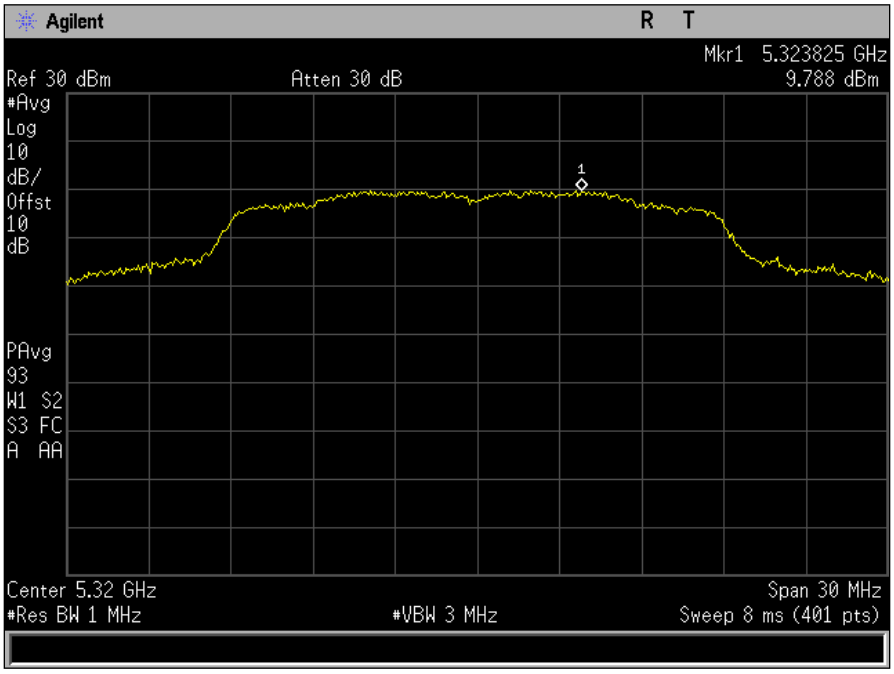
Plot 231. Power Spectral, BW 20M, Ch 5320M, A Mode, Port B



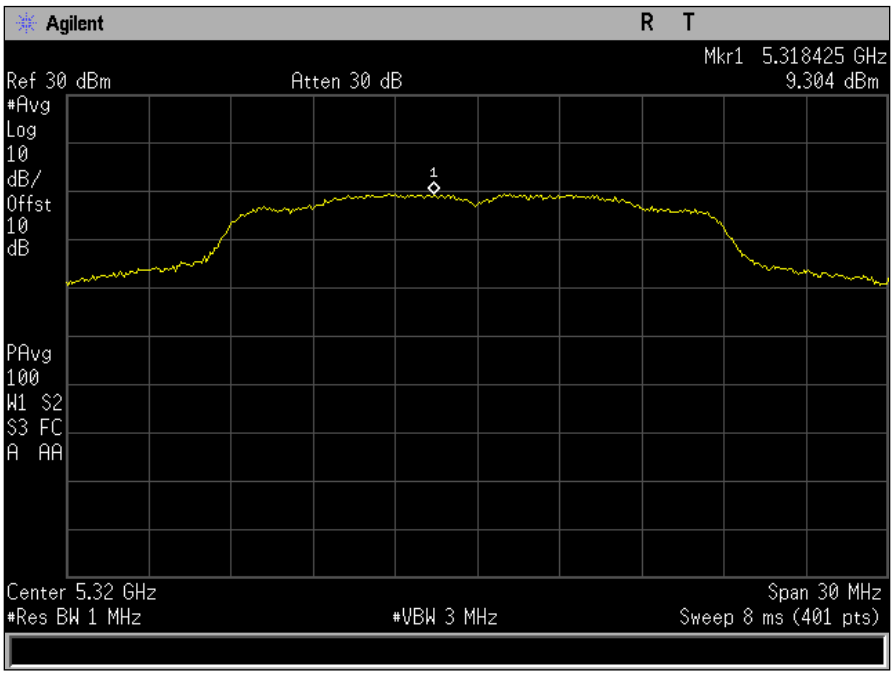
Plot 232. Power Spectral, BW 20M, Ch 5320M, AC Mode, Port B



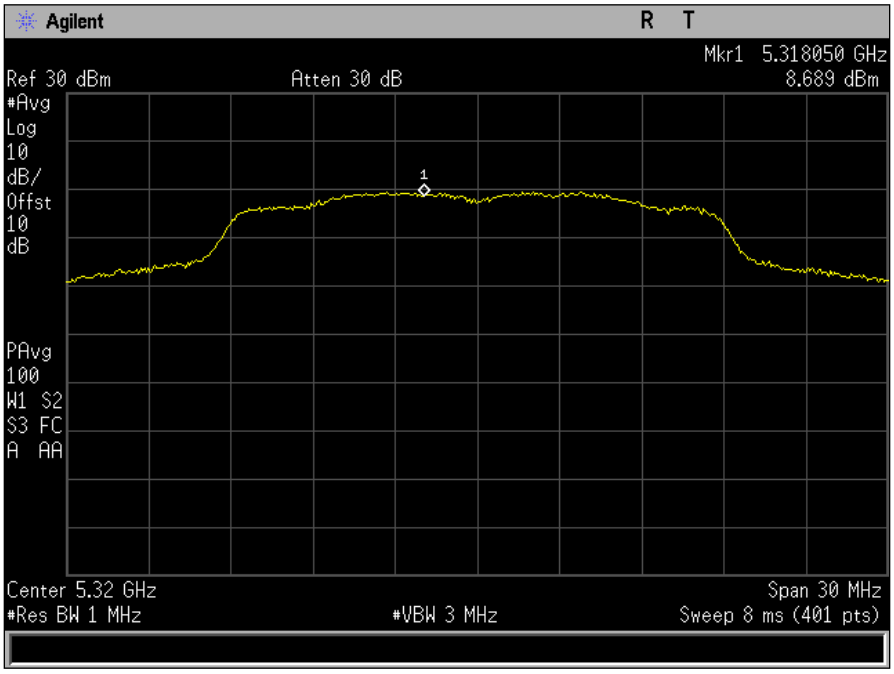
Plot 233. Power Spectral, BW 20M, Ch 5320M, N Mode, Port B



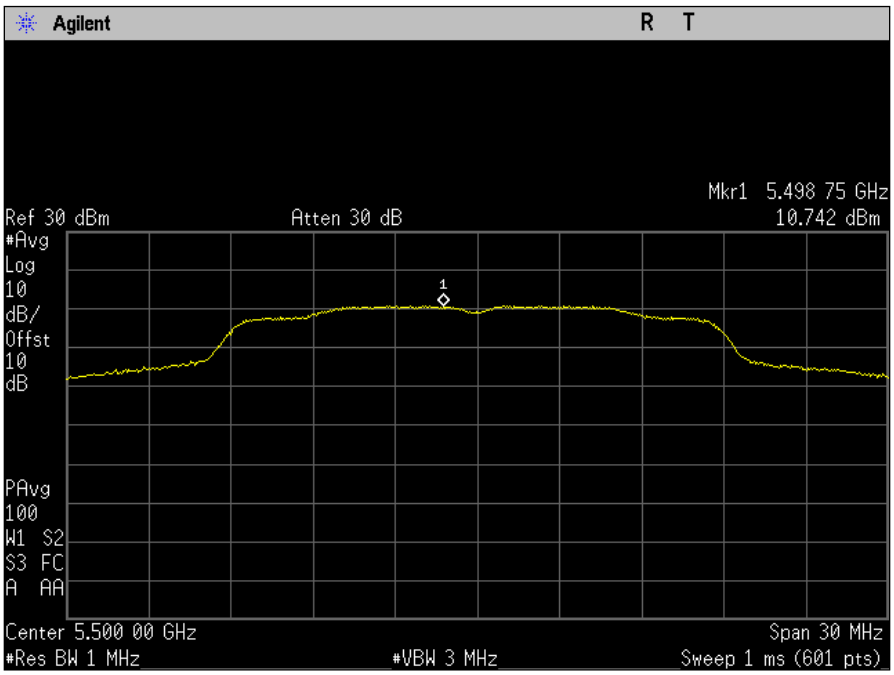
Plot 234. Power Spectral, BW 20M, Ch 5320M, A Mode, Port A



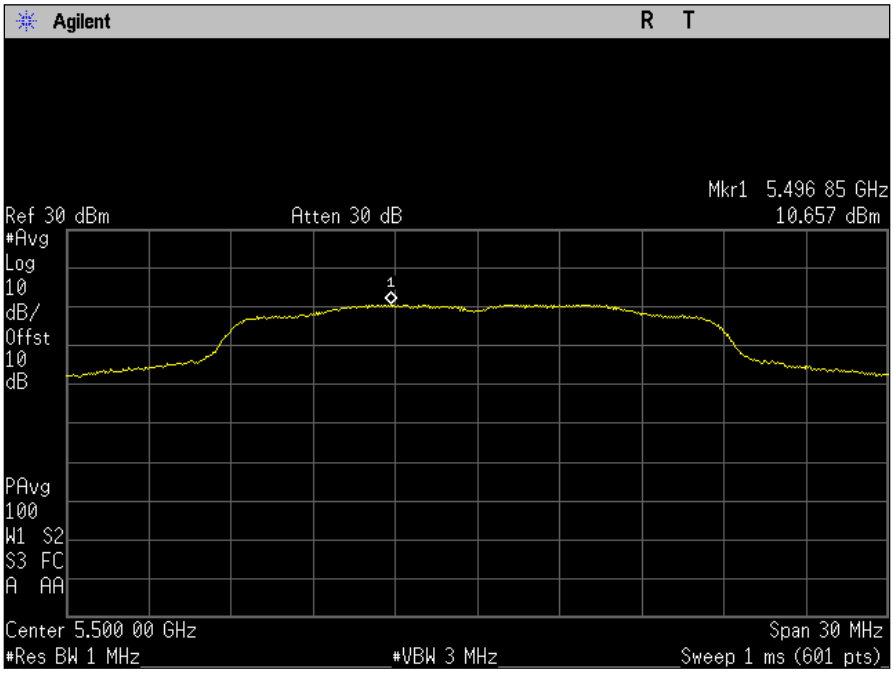
Plot 235. Power Spectral, BW 20M, Ch 5320M, AC Mode, Port A



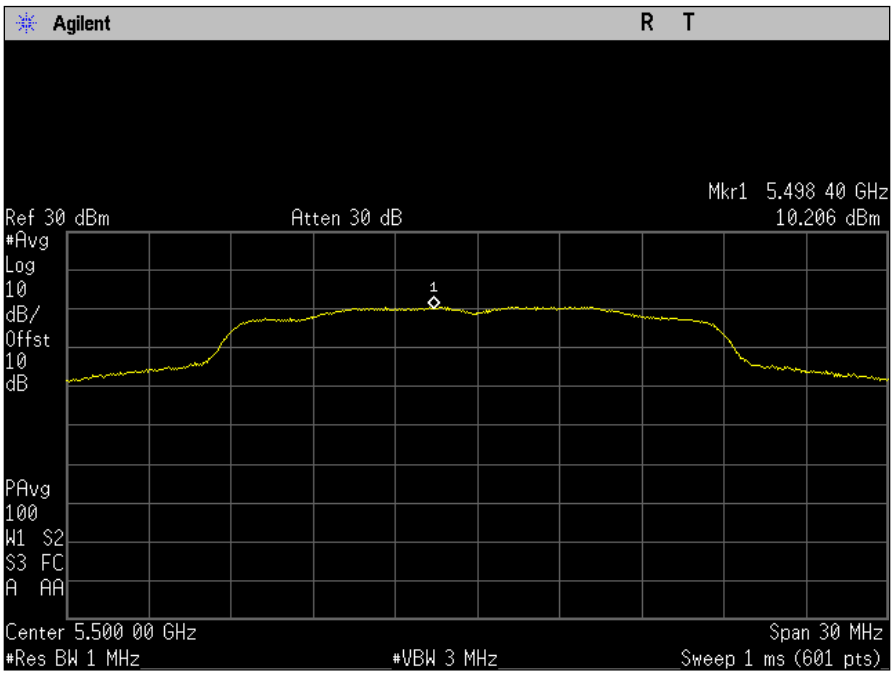
Plot 236. Power Spectral, BW 20M, Ch 5320M,N Mode, Port A



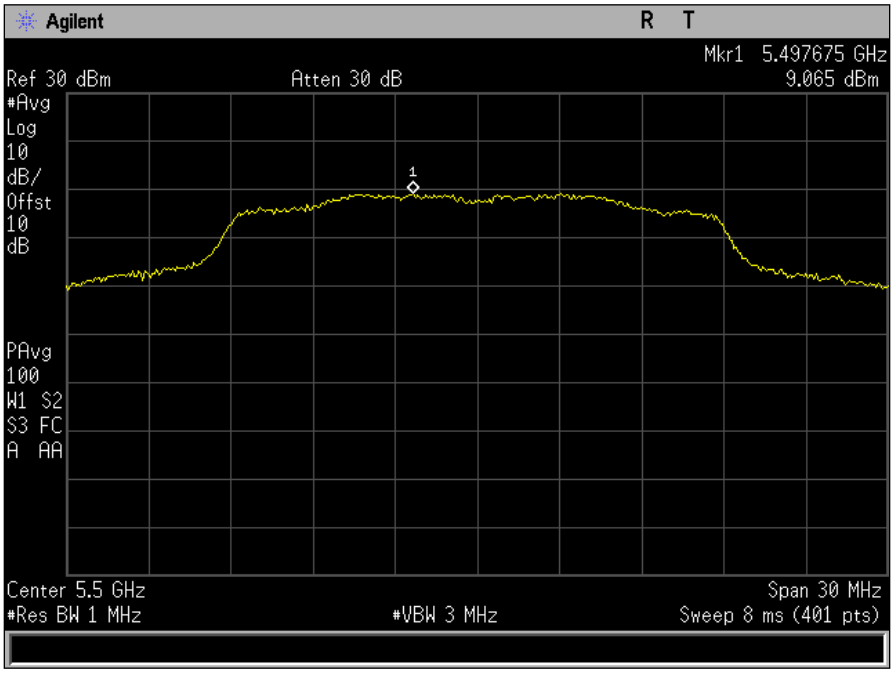
Plot 237. Power Spectral, BW 20M, Ch 5500M, A Mode, Port B



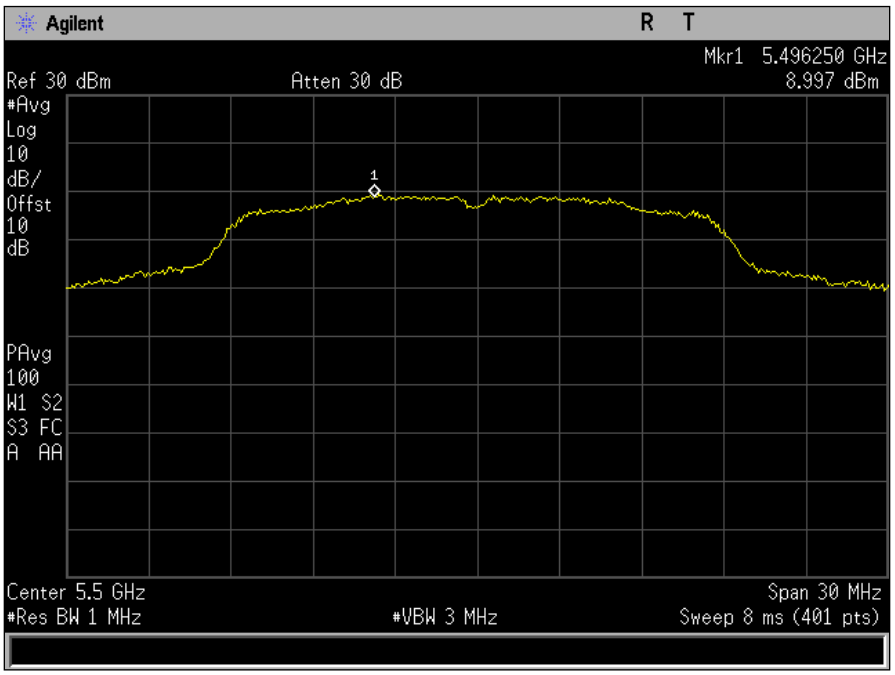
Plot 238. Power Spectral, BW 20M, Ch 5500M, AC Mode, Port B



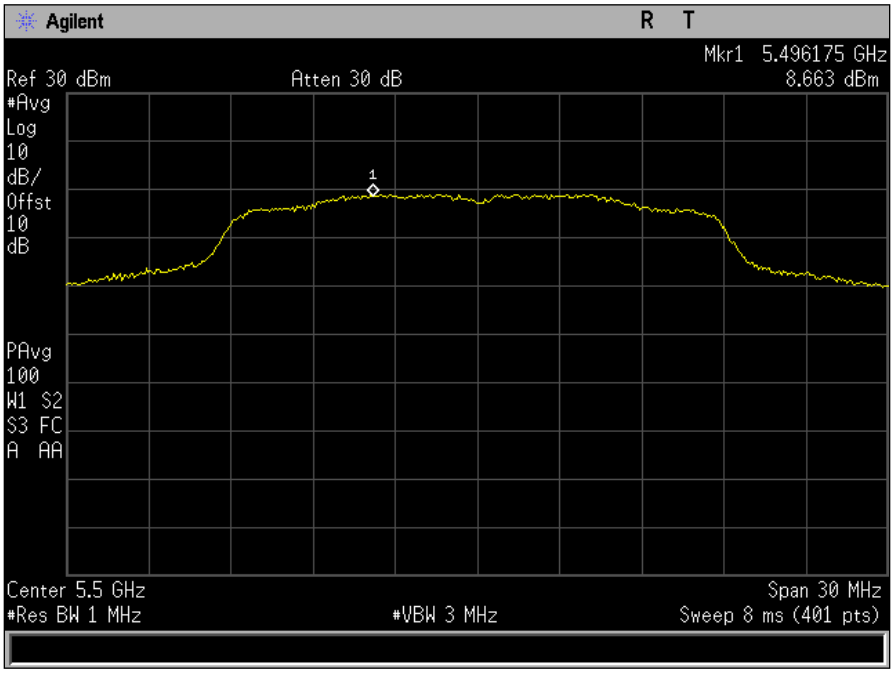
Plot 239. Power Spectral, BW 20M, Ch 5500M, N Mode, Port B



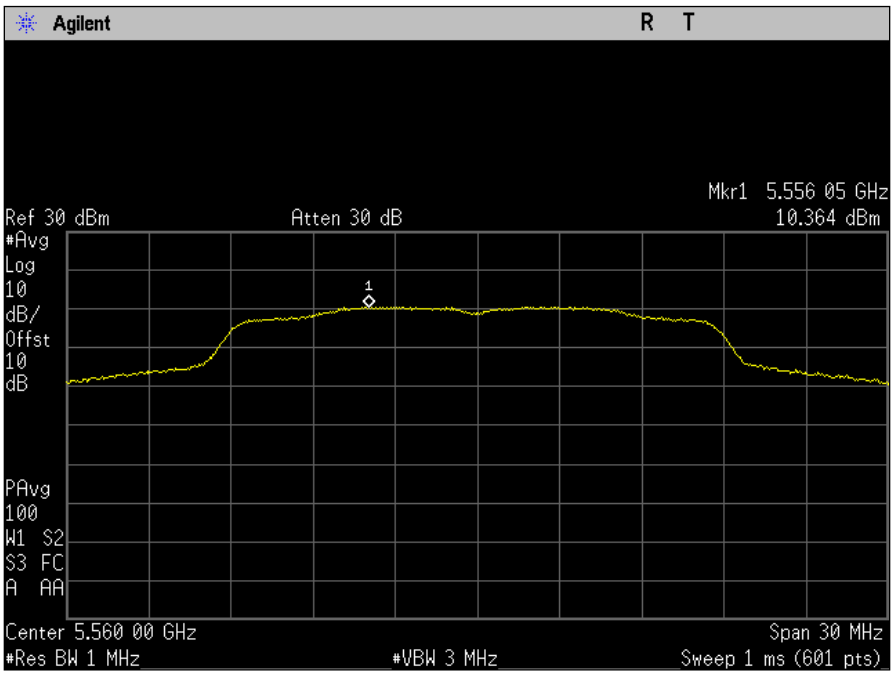
Plot 240. Power Spectral, BW 20M, Ch 5500M, A Mode, Port A



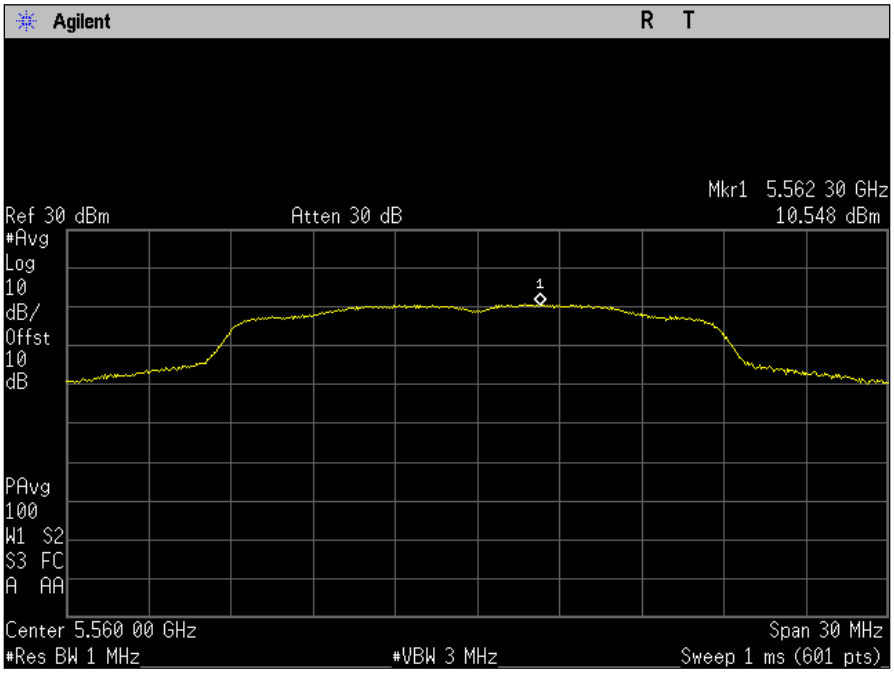
Plot 241. Power Spectral, BW 20M, Ch 5500M, AC Mode, Port A



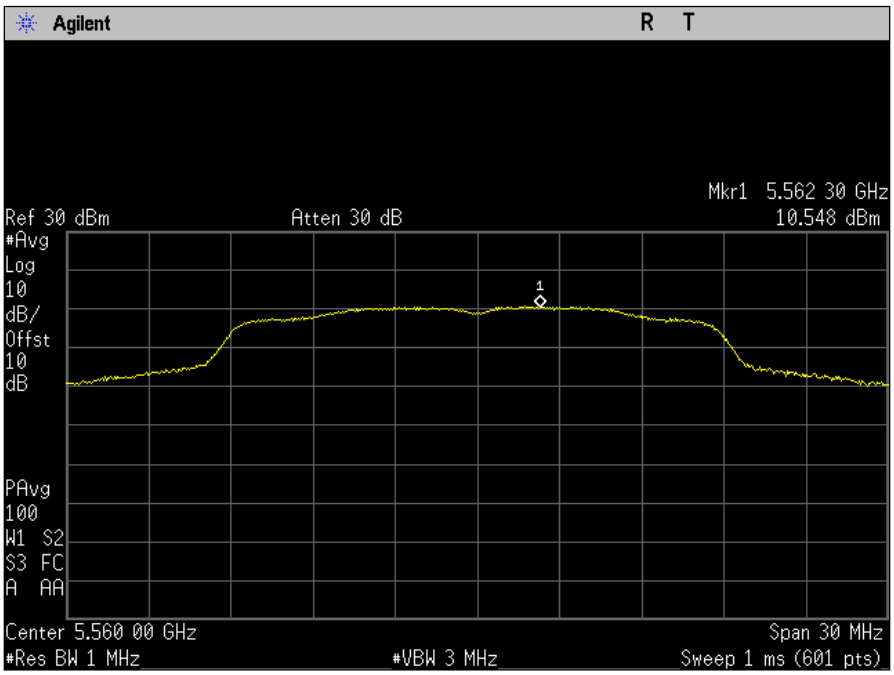
Plot 242. Power Spectral, BW 20M, Ch 5500M, N Mode, Port A



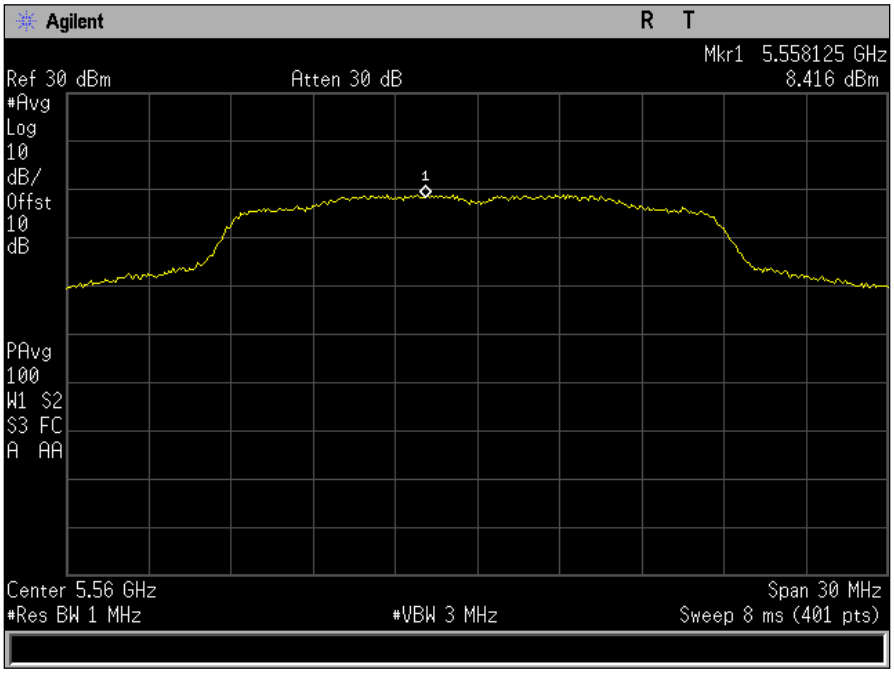
Plot 243. Power Spectral, BW 20M, Ch 5560M, A Mode, Port B



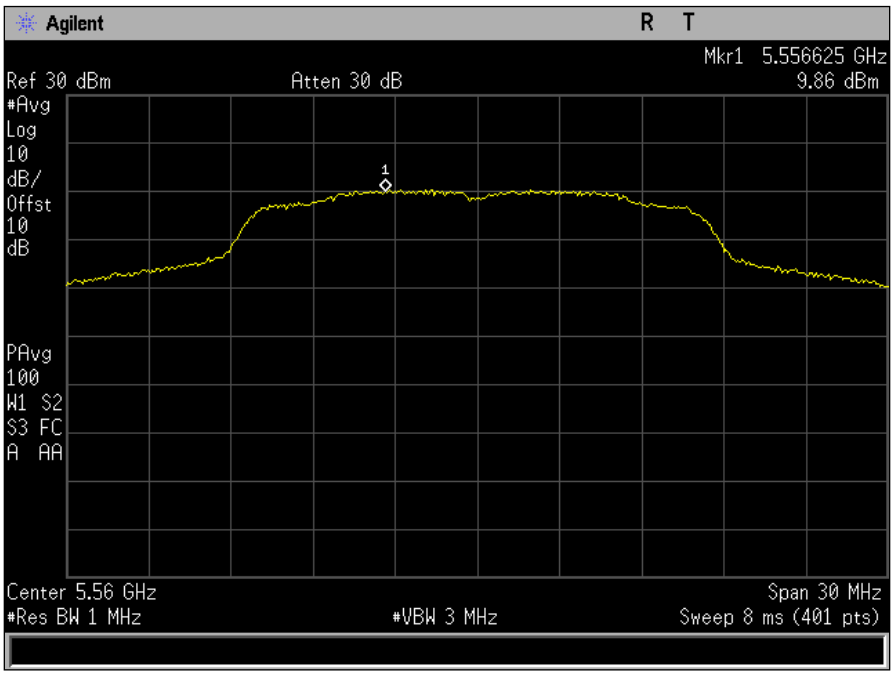
Plot 244. Power Spectral, BW 20M, Ch 5560M, AC Mode, Port B



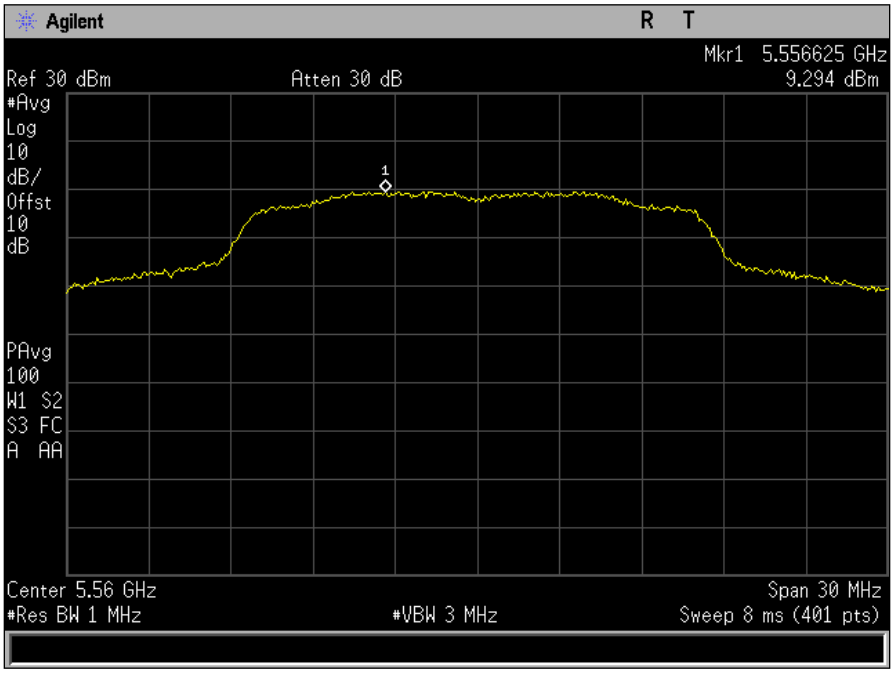
Plot 245. Power Spectral, BW 20M, Ch 5560M, N Mode, Port B



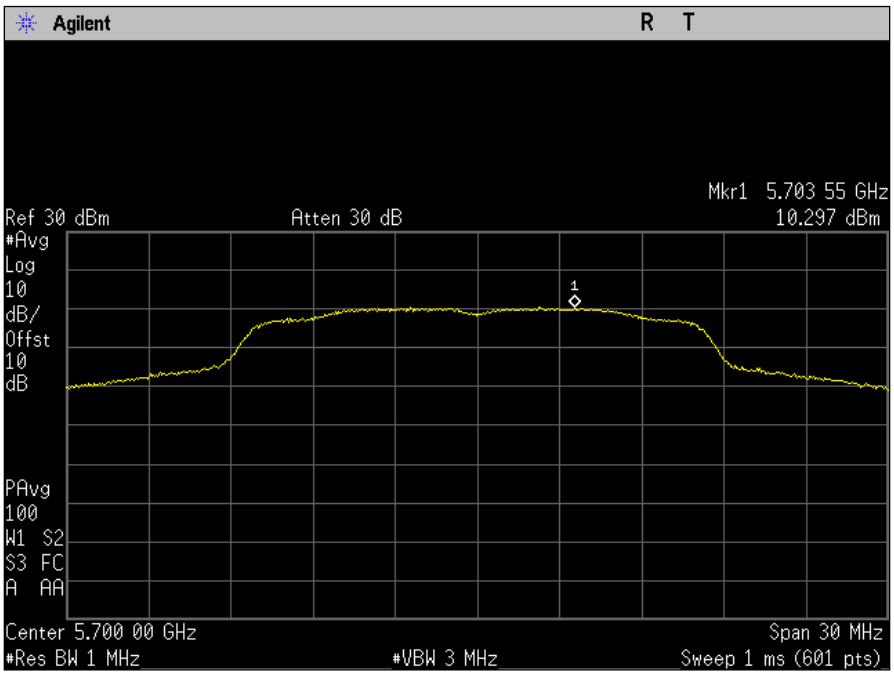
Plot 246. Power Spectral, BW 20M, Ch 5560M, A Mode, Port A



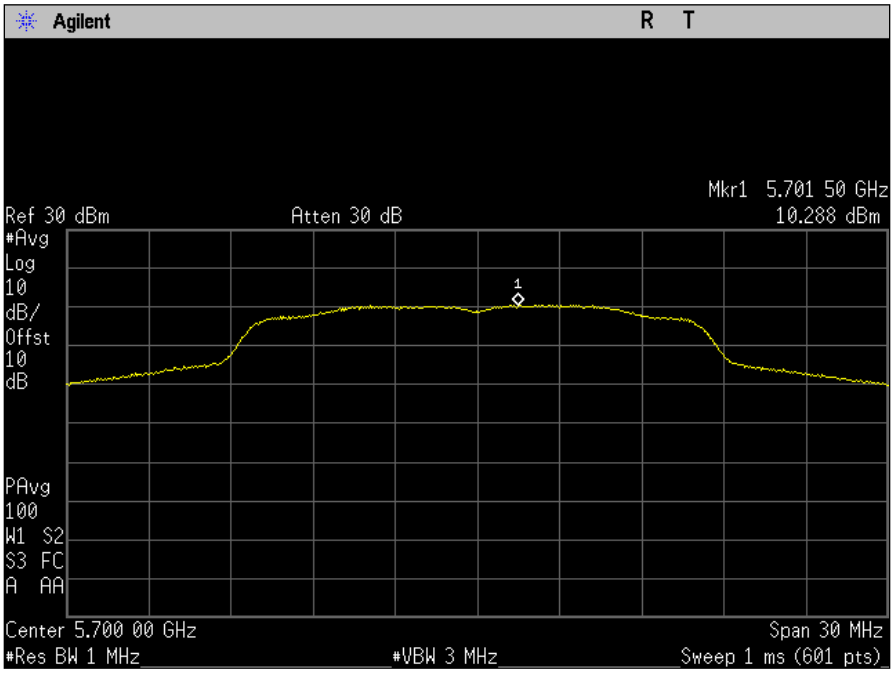
Plot 247. Power Spectral, BW 20M, Ch 5560M, AC Mode, Port A



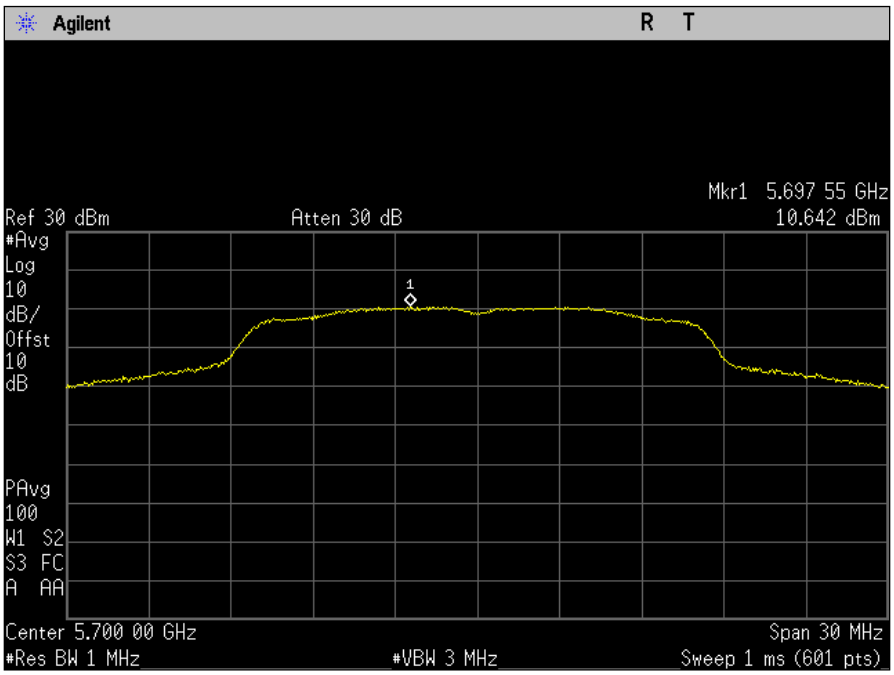
Plot 248. Power Spectral, BW 20M, Ch 5560M, N Mode, Port A



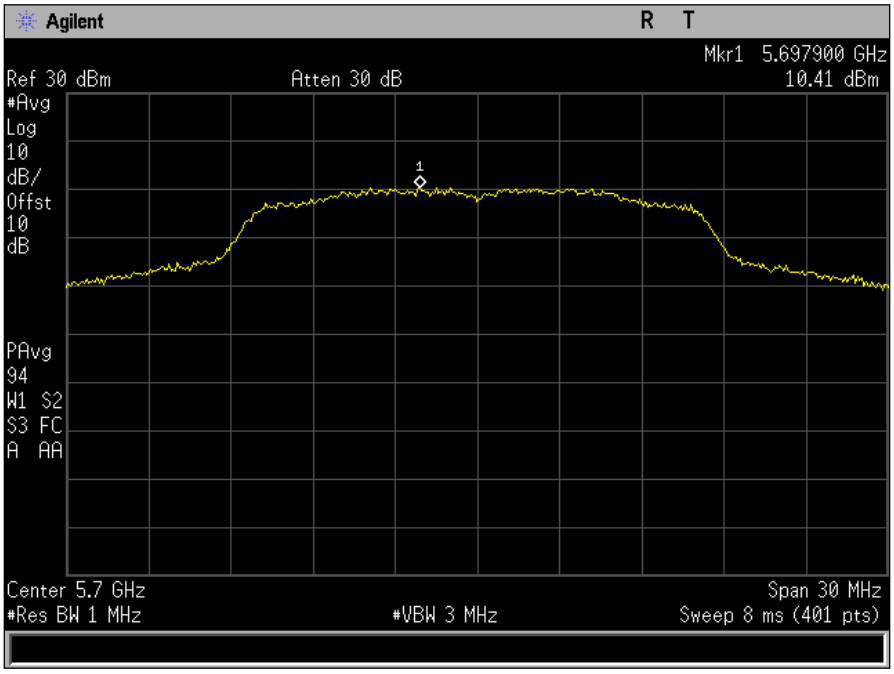
Plot 249. Power Spectral, BW 20M, Ch 5700M, A Mode, Port B



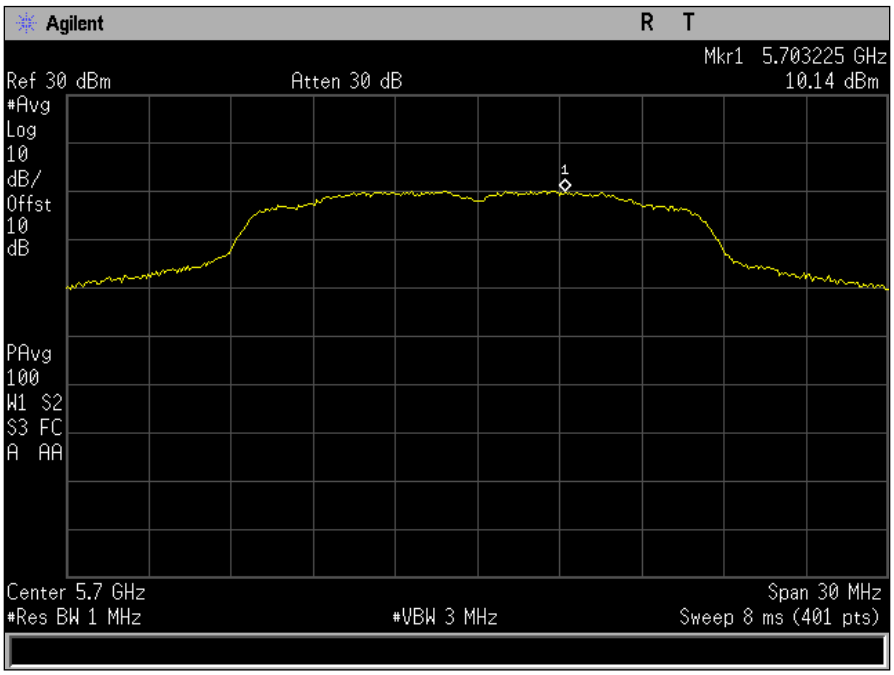
Plot 250. Power Spectral, BW 20M, Ch 5700M, AC Mode, Port B



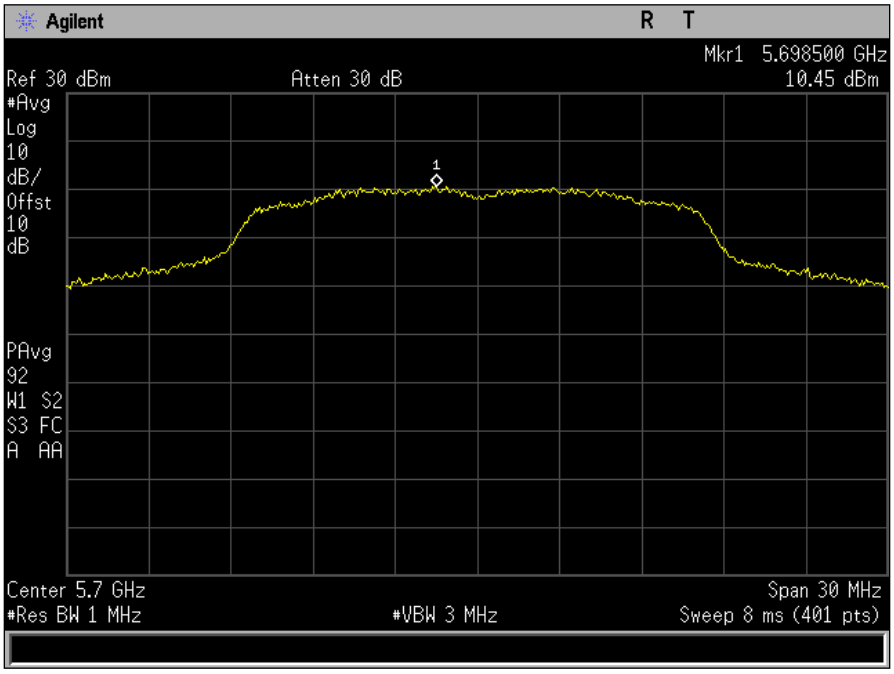
Plot 251. Power Spectral, BW 20M, Ch 5700M, N Mode, Port B



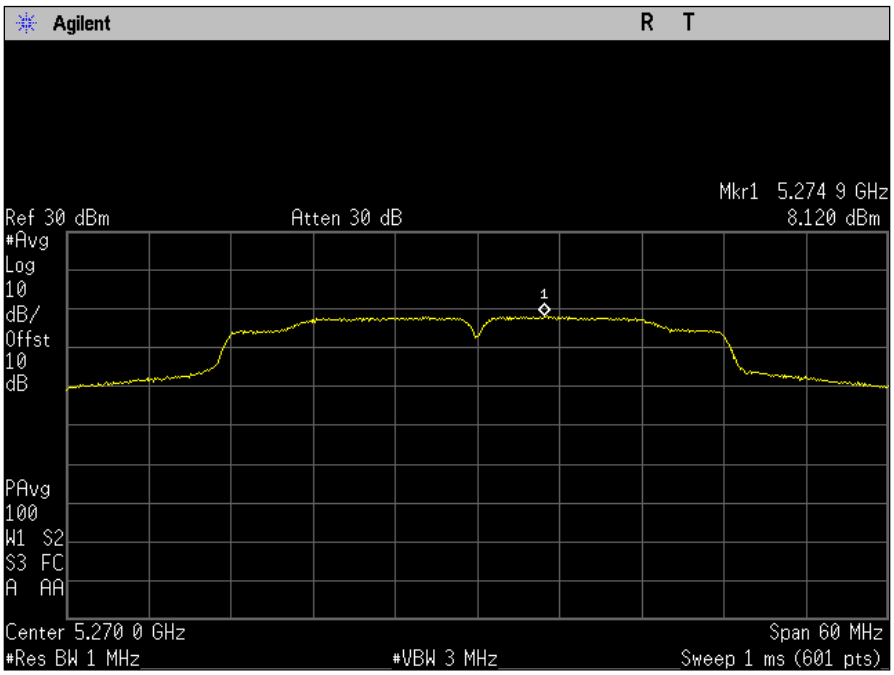
Plot 252. Power Spectral, BW 20M, Ch 5700M, A Mode, Port A



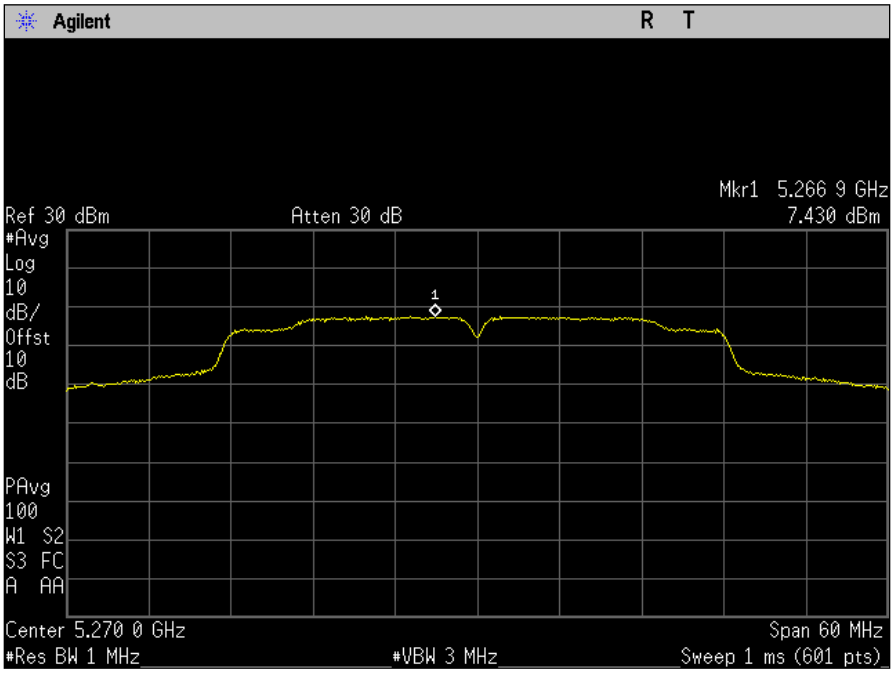
Plot 253. Power Spectral, BW 20M, Ch 5700M, AC Mode, Port A



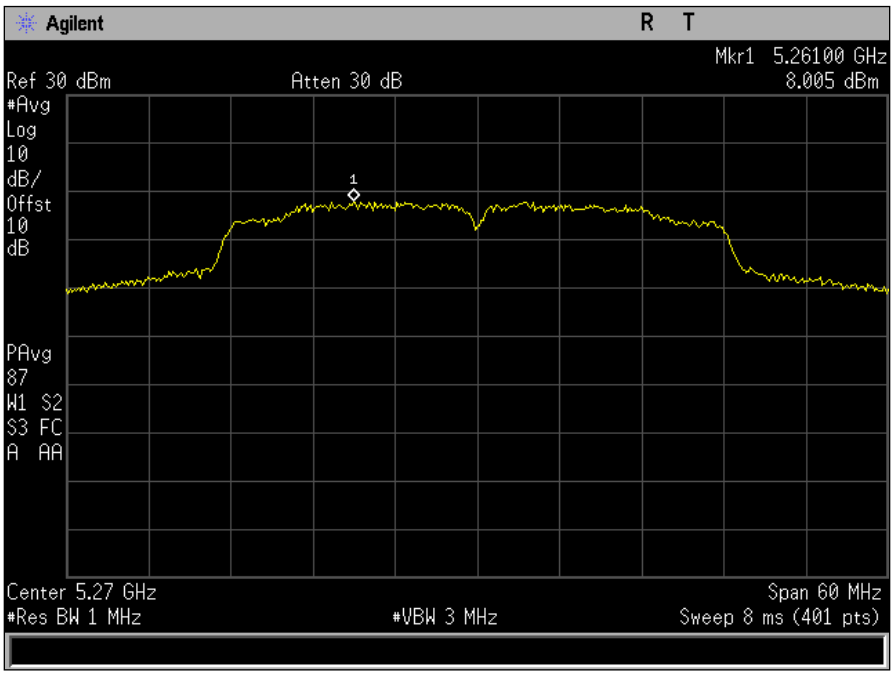
Plot 254. Power Spectral, BW 20M, Ch 5700M, N Mode, Port A



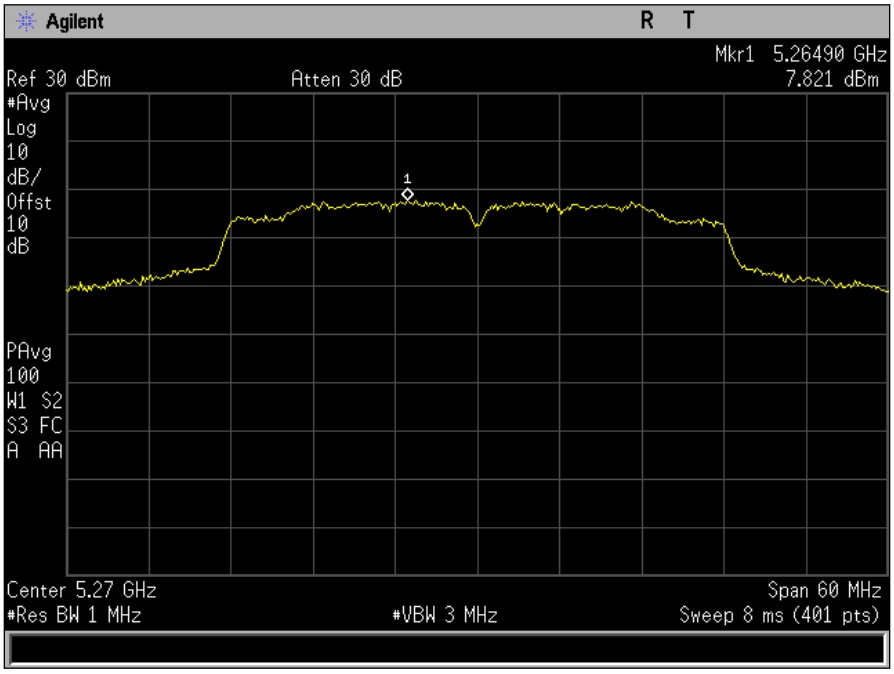
Plot 255. Power Spectral, BW 40M, Ch 5270M, AC Mode, Port B



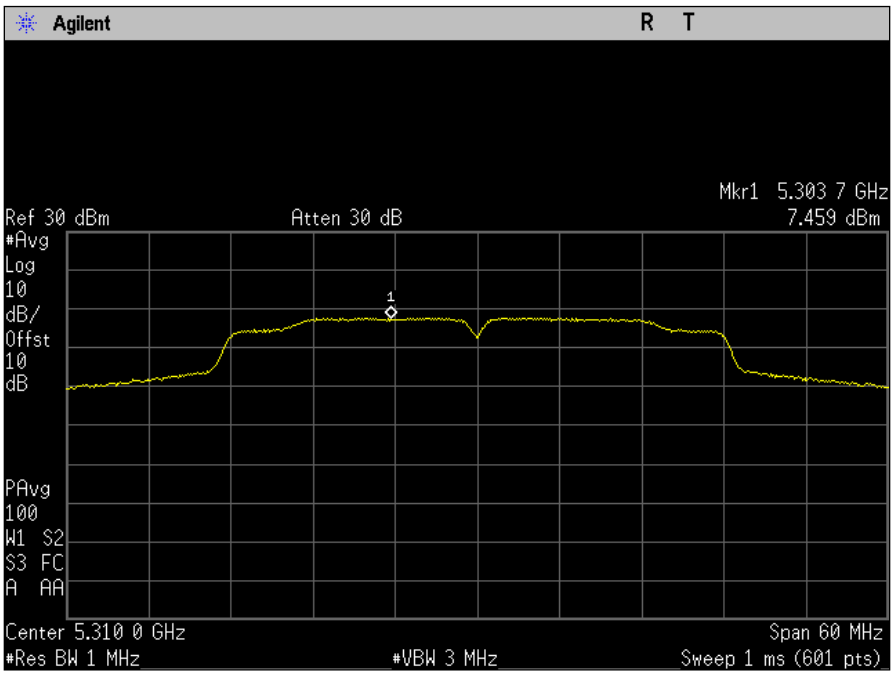
Plot 256. Power Spectral, BW 40M, Ch 5270M, N Mode, Port B



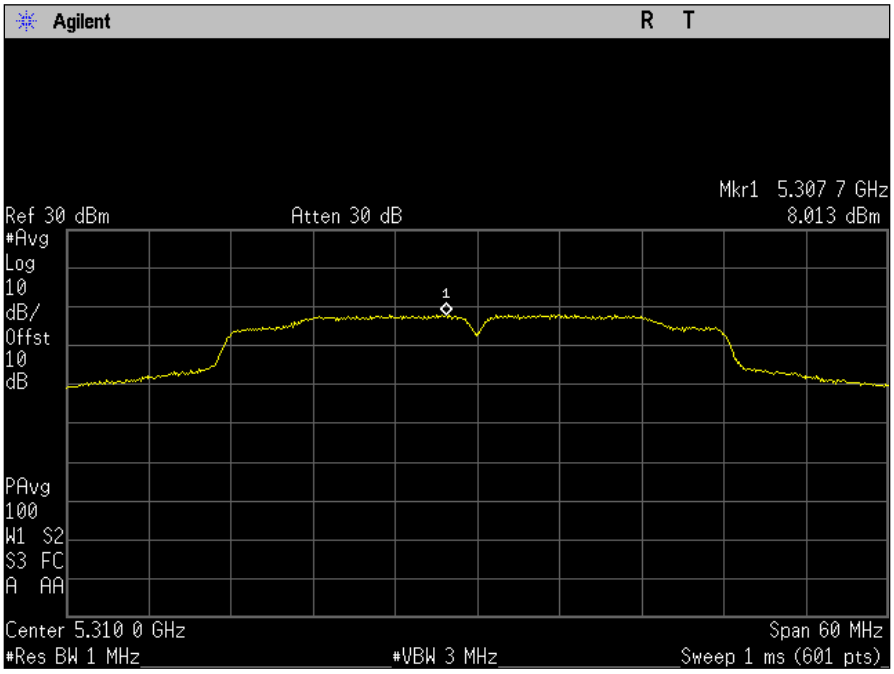
Plot 257. Power Spectral, BW 40M, Ch 5270M,AC Mode, Port A



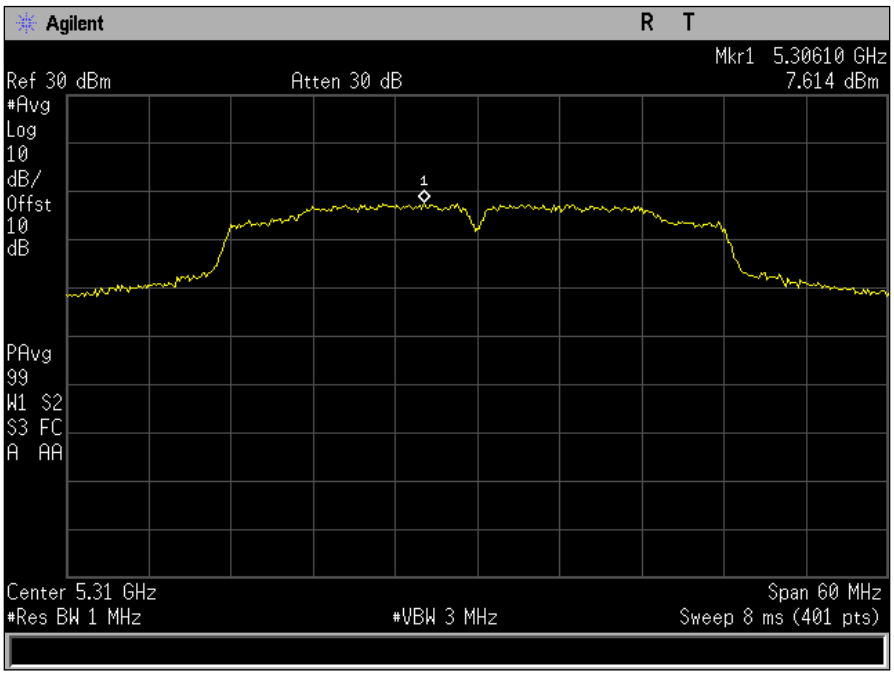
Plot 258. Power Spectral, BW 40M, Ch 5270M, N Mode, Port A



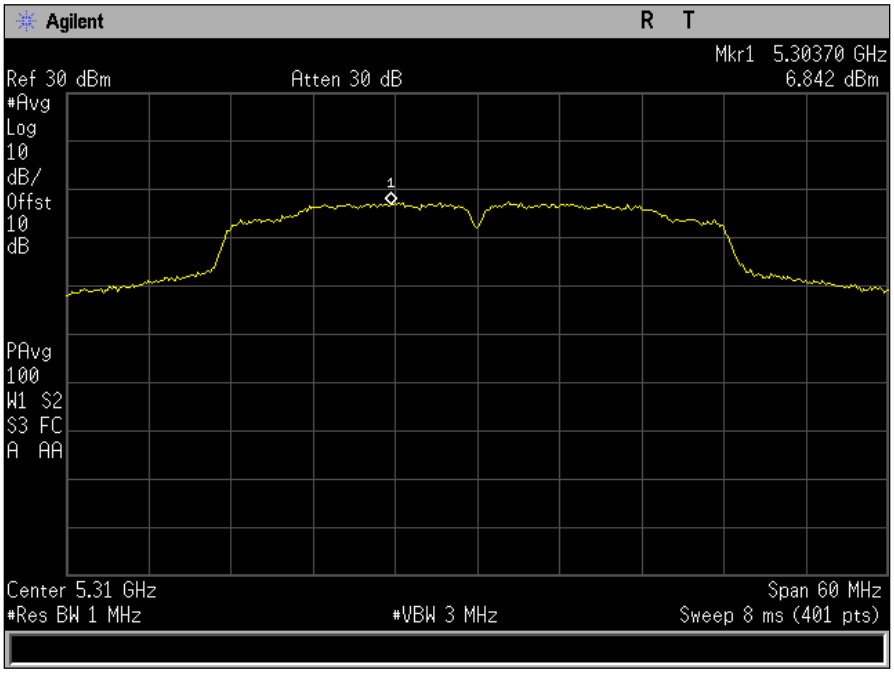
Plot 259. Power Spectral, BW 40M, Ch 5310M, AC Mode, Port B



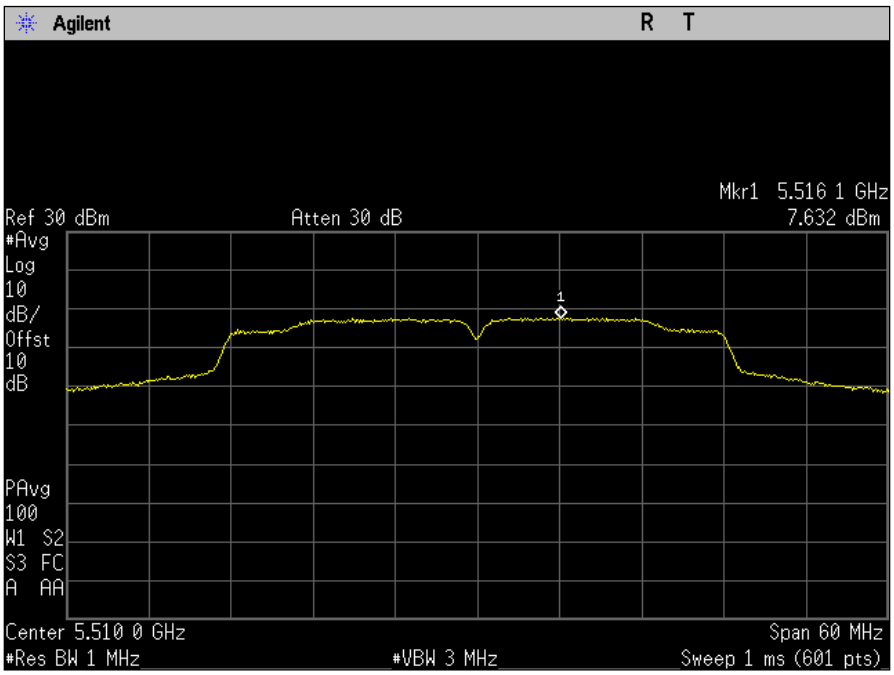
Plot 260. Power Spectral, BW 40M, Ch 5310M, N Mode, Port B



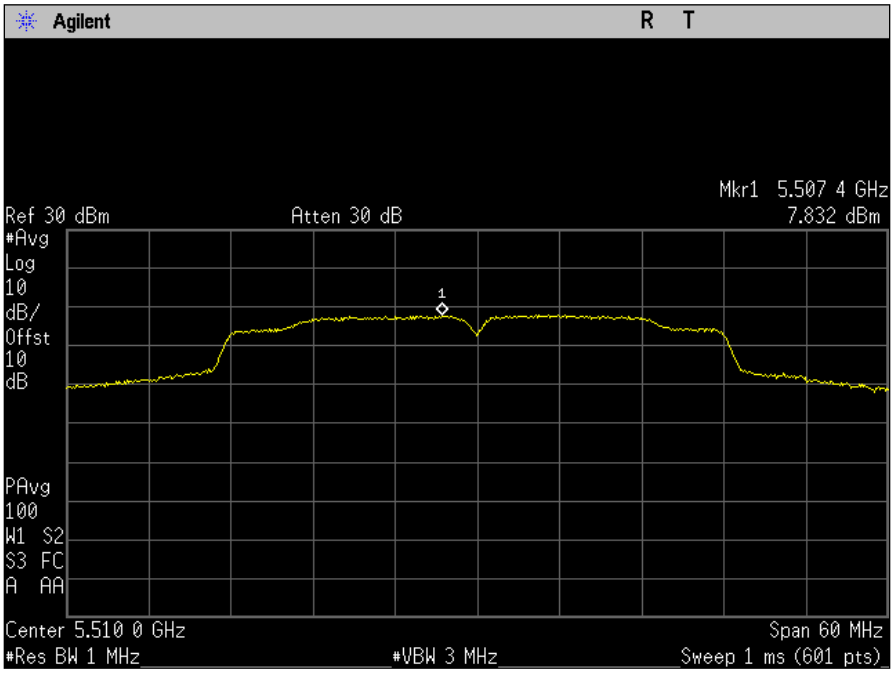
Plot 261. Power Spectral, BW 40M, Ch 5310M, AC Mode, Port A



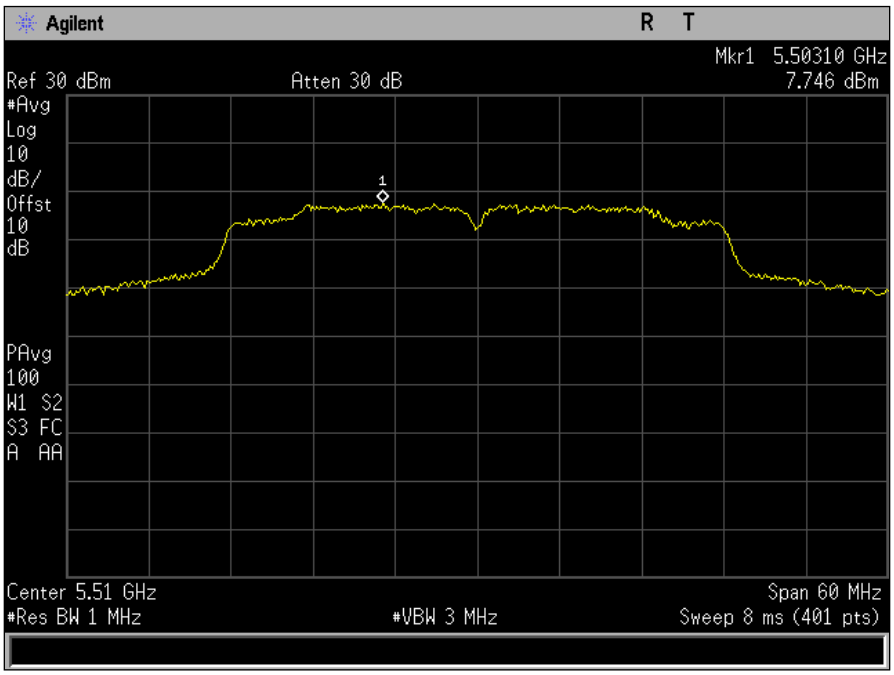
Plot 262. Power Spectral, BW 40M, Ch 5310M, N Mode, Port A



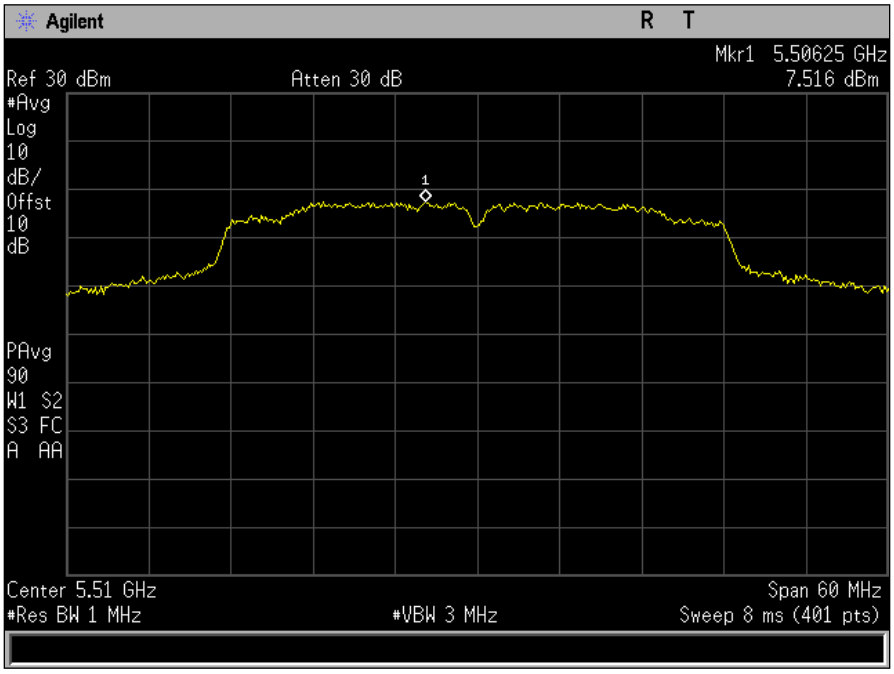
Plot 263. Power Spectral, BW 40M, Ch 5510M, AC Mode, Port B



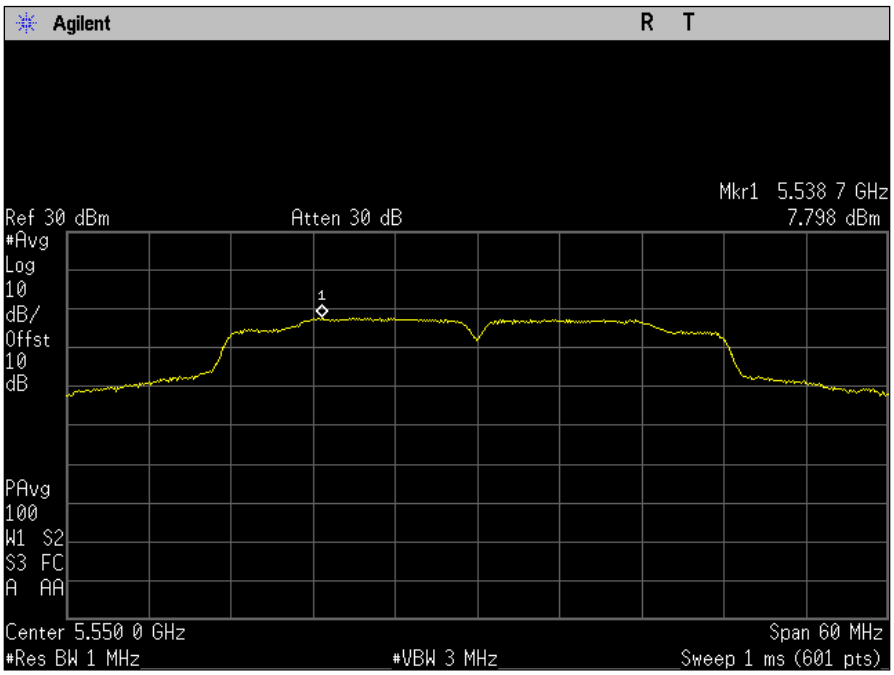
Plot 264. Power Spectral, BW 40M, Ch 5510M, N Mode, Port B



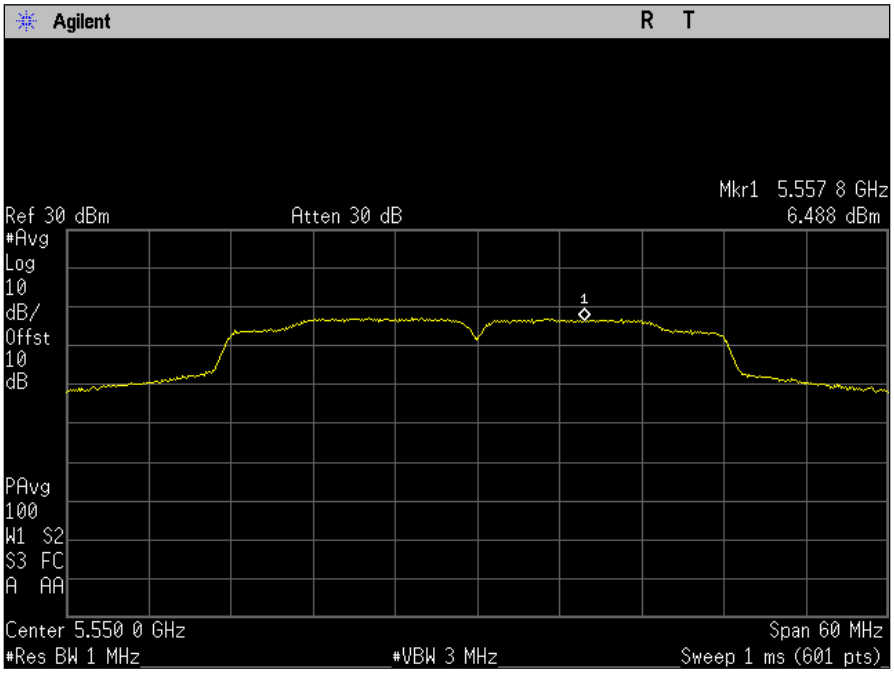
Plot 265. Power Spectral, BW 40M, Ch 5510M, AC Mode, Port A



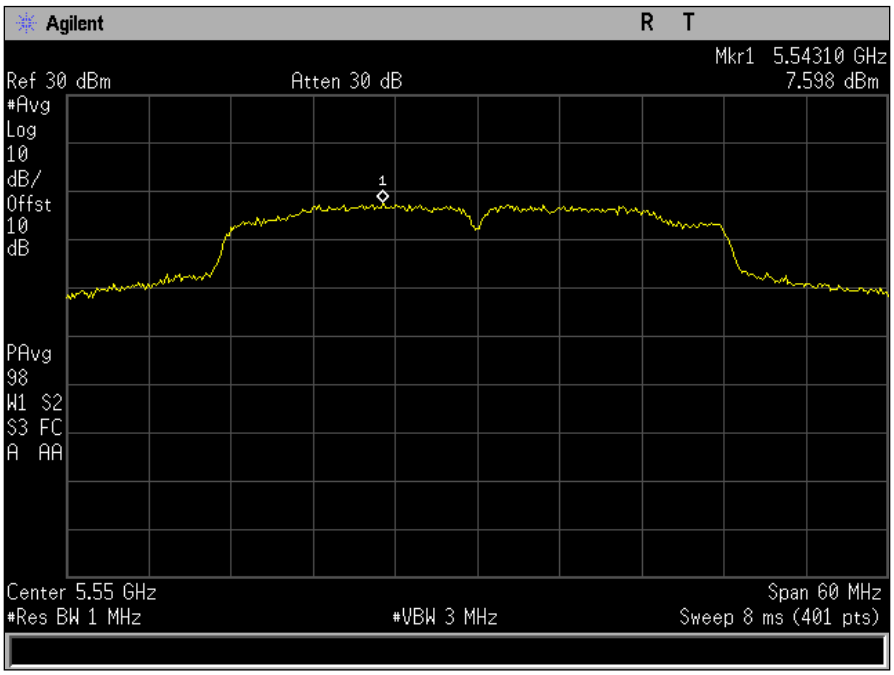
Plot 266. Power Spectral, BW 40M, Ch 5510M, N Mode, Port A



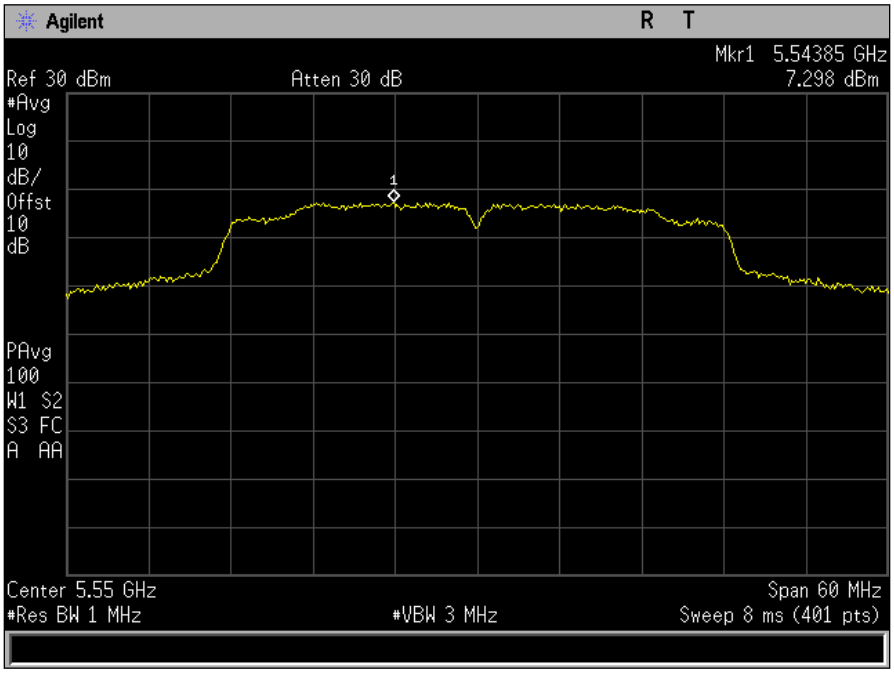
Plot 267. Power Spectral, BW 40M, Ch 5550M, AC Mode, Port B



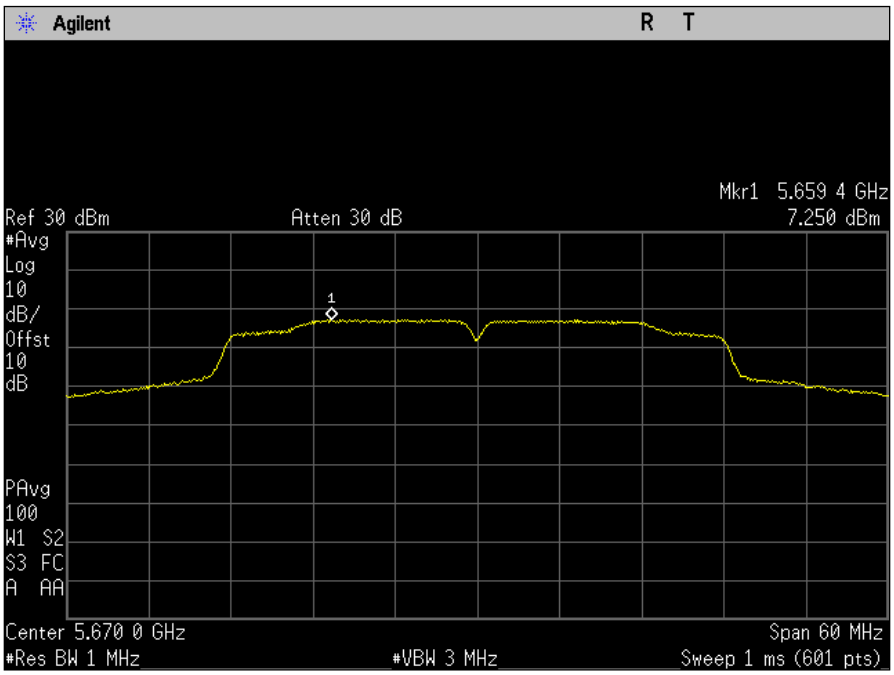
Plot 268. Power Spectral, BW 40M, Ch 5550M, N Mode, Port B



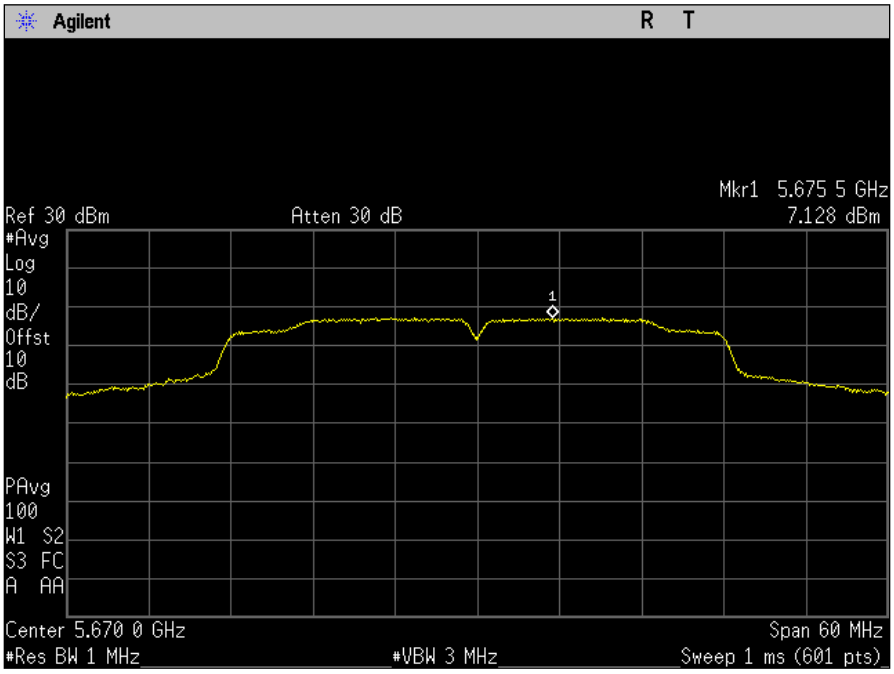
Plot 269. Power Spectral, BW 40M, Ch 5550M, AC Mode, Port A



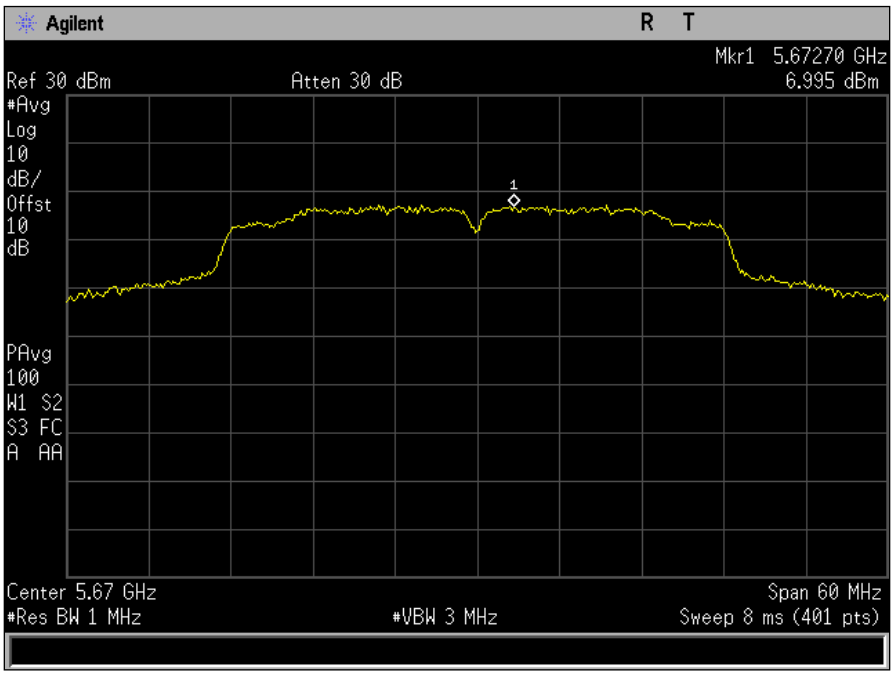
Plot 270. Power Spectral, BW 40M, Ch 5550M, N Mode, Port A



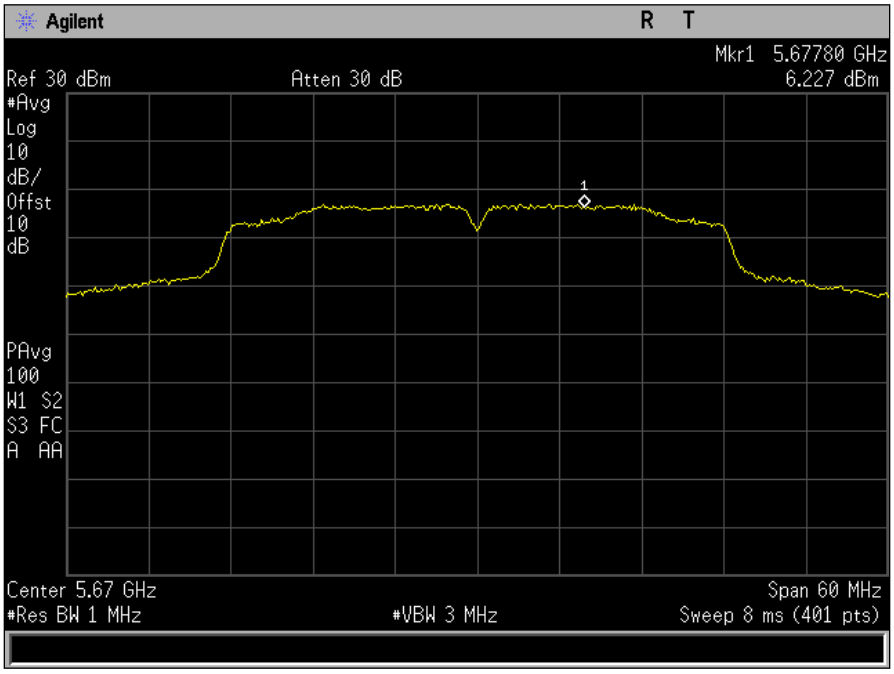
Plot 271. Power Spectral, BW 40M, Ch 5670M, AC Mode, Port B



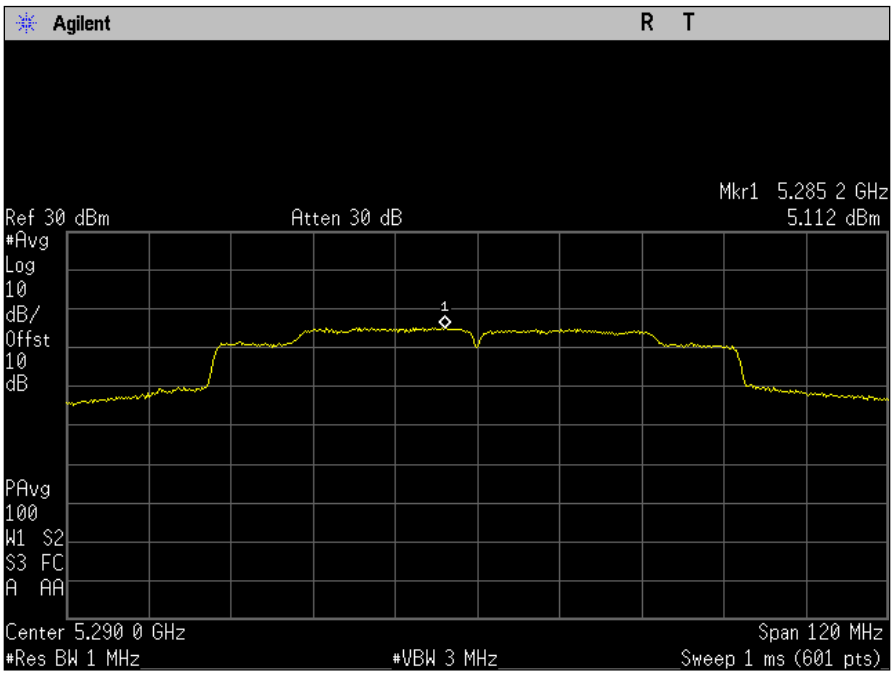
Plot 272. Power Spectral, BW 40M, Ch 5670M, N Mode, Port B



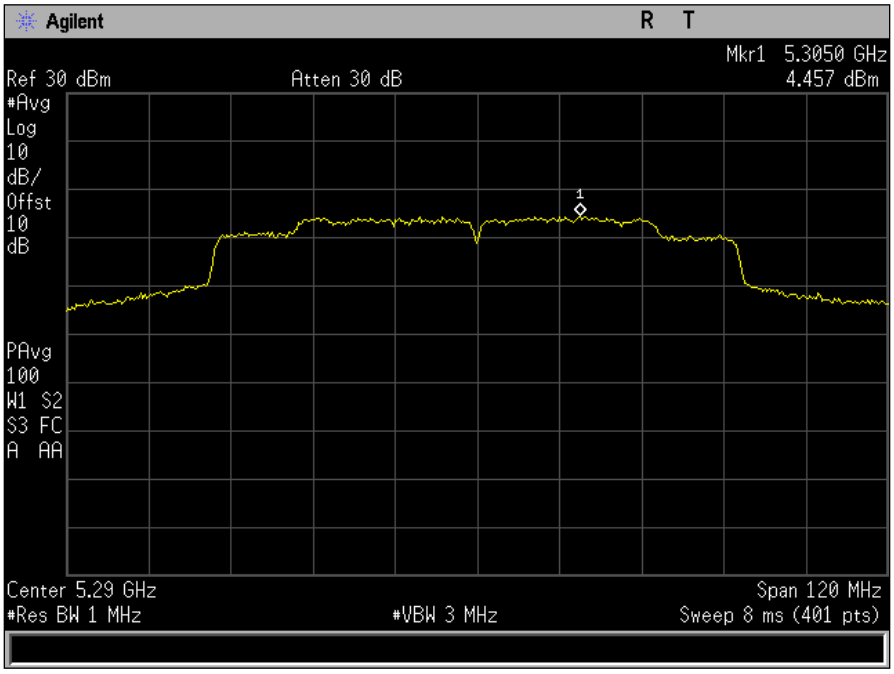
Plot 273. Power Spectral, BW 40M, Ch 5670M, AC Mode, Port A



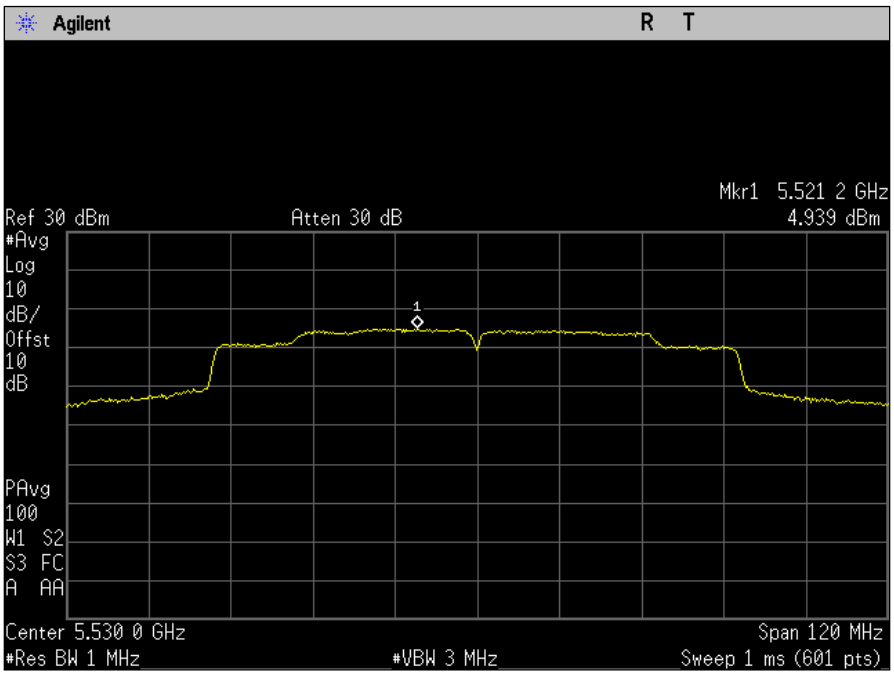
Plot 274. Power Spectral, BW 40M, Ch 5670M, N Mode, Port A



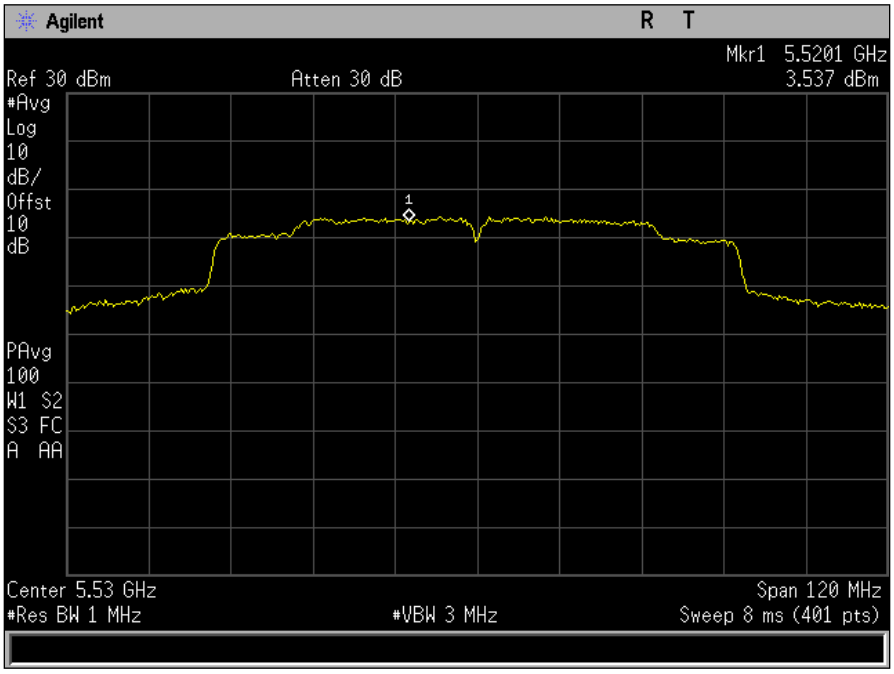
Plot 275. Power Spectral, BW 80M, Ch 5290M, AC Mode, Port B



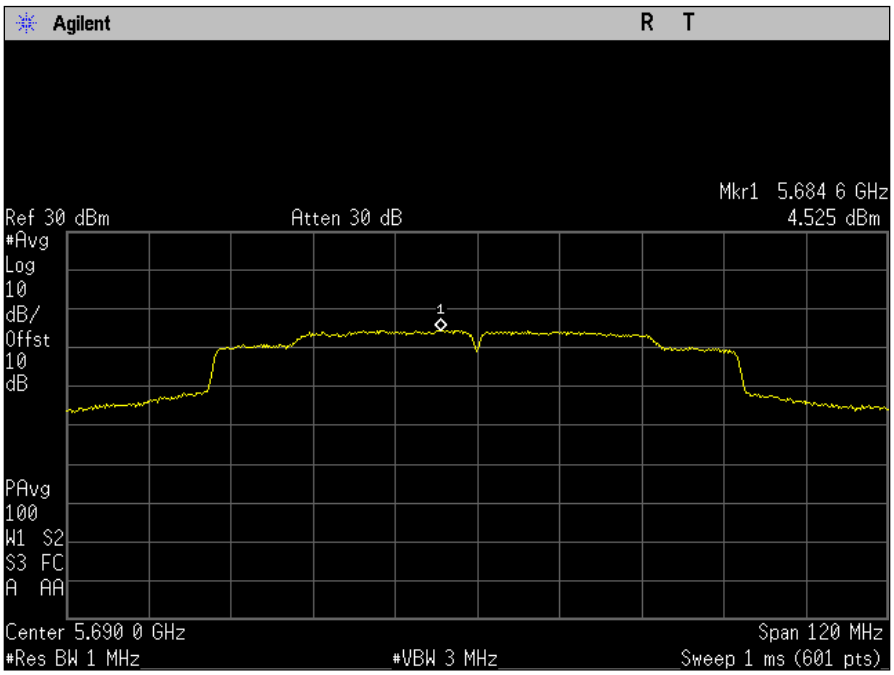
Plot 276. Power Spectral, BW 80M, Ch 5290M, AC Mode, Port A



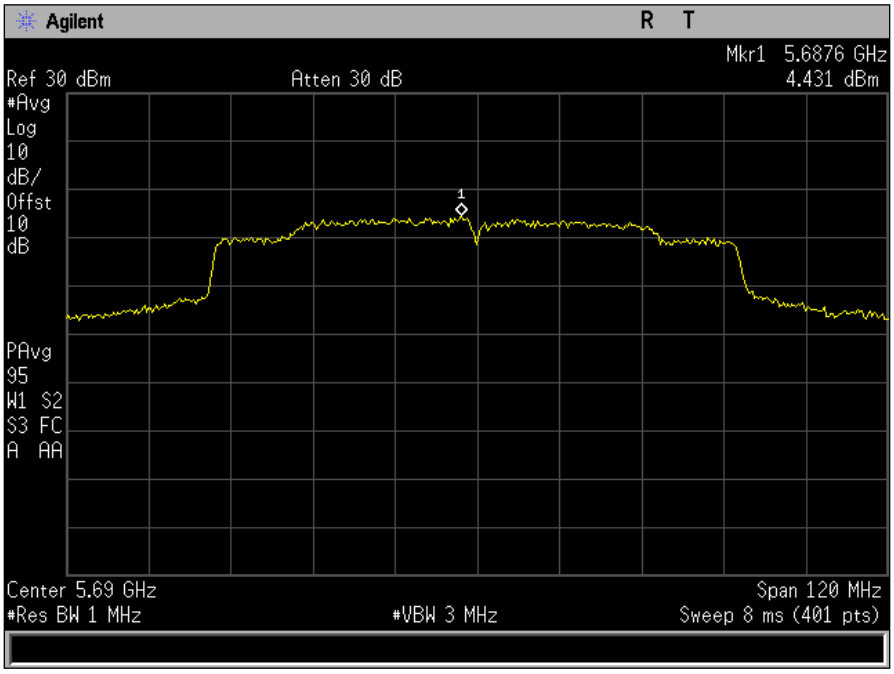
Plot 277. Power Spectral, BW 80M, Ch 5530M, AC Mode, Port B



Plot 278. Power Spectral, BW 80M, Ch 5530M, AC Mode, Port A



Plot 279. Power Spectral, BW 80M, Ch 5690M, AC Mode, Port B



Plot 280. Power Spectral, BW 80M, Ch 5690M, AC Mode, Port A

Channel	Port A (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin
BW 20M_Ch 5260M_a_Mode	10.08	0	11	0.92
BW 20M_Ch 5260M_n_Mode	9.321	0	11	1.679
BW 20M_Ch 5260M_ac_Mode	9.798	0	11	1.202
BW 20M_Ch 5280M_a_Mode	9.649	0	11	1.351
BW 20M_Ch 5280M_n_Mode	10.15	0	11	0.85
BW 20M_Ch 5280M_ac_Mode	9.561	0	11	1.439
BW 20M_Ch 5320M_a_Mode	9.788	0	11	1.212
BW 20M_Ch 5320M_n_Mode	8.689	0	11	2.311
BW 20M_Ch 5320M_ac_Mode	9.304	0	11	1.696
BW 40M_Ch 5270M_n_Mode	7.821	0	11	3.179
BW 40M_Ch 5270M_ac_Mode	8.005	0	11	2.995
BW 40M_Ch 5310M_n_Mode	6.842	0	11	4.158
BW 40M_Ch 5310M_ac_Mode	7.614	0	11	3.386
BW 80M_Ch 529010M_ac_Mode	4.457	0	11	6.543
BW 20M_Ch 5500M_a_Mode	9.065	0	11	1.935
BW 20M_Ch 5500M_n_Mode	8.663	0	11	2.337
BW 20M_Ch 5500M_ac_Mode	8.997	0	11	2.003
BW 20M_Ch 5560M_a_Mode	8.416	0	11	2.584
BW 20M_Ch 5560M_n_Mode	9.294	0	11	1.706
BW 20M_Ch 5560M_ac_Mode	9.86	0	11	1.14
BW 20M_Ch 5700M_a_Mode	10.41	0	11	0.59
BW 20M_Ch 5700M_n_Mode	10.45	0	11	0.55
BW 20M_Ch 5700M_ac_Mode	10.14	0	11	0.86
BW 40M_Ch 5510M_n_Mode	7.516	0	11	3.484

BW 40M_Ch 5510M_ac_Mode	7.746	0	11	3.254
BW 40M_Ch 5550M_n_Mode	7.298	0	11	3.702
BW 40M_Ch 5550M_ac_Mode	7.598	0	11	3.402
BW 40M_Ch 5670M_n_Mode	6.227	0	11	4.773
BW 40M_Ch 5670M_ac_Mode	6.995	0	11	4.005
BW 80M_Ch 5530M_ac_Mode	3.537	0	11	7.463
BW 80M_Ch 5690M_ac_Mode	4.431	0	11	6.569

Table 10. PSD Table Port A (SISO)

Channel	Port B (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin
BW 20M_Ch 5260M_a_Mode	10.471	0	11	0.529
BW 20M_Ch 5260M_n_Mode	10.731	0	11	0.269
BW 20M_Ch 5260M_ac_Mode	10.842	0	11	0.158
BW 20M_Ch 5280M_a_Mode	10.955	0	11	0.045
BW 20M_Ch 5280M_n_Mode	10.718	0	11	0.282
BW 20M_Ch 5280M_ac_Mode	10.824	0	11	0.176
BW 20M_Ch 5320M_a_Mode	10.717	0	11	0.283
BW 20M_Ch 5320M_n_Mode	10.888	0	11	0.112
BW 20M_Ch 5320M_ac_Mode	10.974	0	11	0.026
BW 40M_Ch 5270M_n_Mode	7.43	0	11	3.57
BW 40M_Ch 5270M_ac_Mode	8.12	0	11	2.88
BW 40M_Ch 5310M_n_Mode	8.13	0	11	2.87
BW 40M_Ch 5310M_ac_Mode	7.459	0	11	3.541
BW 80M_Ch 529010M_ac_Mode	5.112	0	11	5.888
BW 20M_Ch 5500M_a_Mode	10.742	0	11	0.258
BW 20M_Ch 5500M_n_Mode	10.206	0	11	0.794
BW 20M_Ch 5500M_ac_Mode	10.657	0	11	0.343
BW 20M_Ch 5560M_a_Mode	10.364	0	11	0.636
BW 20M_Ch 5560M_n_Mode	10.548	0	11	0.452
BW 20M_Ch 5560M_ac_Mode	9.86	0	11	1.14
BW 20M_Ch 5700M_a_Mode	10.297	0	11	0.703
BW 20M_Ch 5700M_n_Mode	10.642	0	11	0.358
BW 20M_Ch 5700M_ac_Mode	10.288	0	11	0.712
BW 40M_Ch 5510M_n_Mode	7.832	0	11	3.168

BW 40M_Ch 5510M_ac_Mode	7.746	0	11	3.254
BW 40M_Ch 5550M_n_Mode	6.488	0	11	4.512
BW 40M_Ch 5550M_ac_Mode	7.598	0	11	3.402
BW 40M_Ch 5670M_n_Mode	7.128	0	11	3.872
BW 40M_Ch 5670M_ac_Mode	7.25	0	11	3.75
BW 80M_Ch 5530M_ac_Mode	4.939	0	11	6.061
BW 80M_Ch 5690M_ac_Mode	4.525	0	11	6.475

Table 11. PSD Table Port B (SISO)

Channel	Port 1 (dBm)	Port 2 (dBm)	Antenna Gain (dBi)	Sum (dBm)	Limit (dBm)	Margin
BW 20M_Ch 5260M_a_Mode	7.627	7.387	0	10.519	11	0.481
BW 20M_Ch 5260M_n_Mode	7.517	6.884	0	10.222	11	0.778
BW 20M_Ch 5260M_ac_Mode	7.504	7.733	0	10.63	11	0.37
BW 20M_Ch 5280M_a_Mode	7.057	6.689	0	9.887	11	1.113
BW 20M_Ch 5280M_n_Mode	7.005	7.185	0	10.106	11	0.894
BW 20M_Ch 5280M_ac_Mode	6.415	7.388	0	9.939	11	1.061
BW 20M_Ch 5320M_a_Mode	6.849	7.093	0	9.983	11	1.017
BW 20M_Ch 5320M_n_Mode	6.754	6.905	0	9.84	11	1.16
BW 20M_Ch 5320M_ac_Mode	6.991	6.844	0	9.928	11	1.072
BW 40M_Ch 5270M_n_Mode	3.658	3.852	0	6.766	11	4.234
BW 40M_Ch 5270M_ac_Mode	3.625	4.28	0	6.975	11	4.025
BW 40M_Ch 5310M_n_Mode	3.844	3.918	0	6.891	11	4.109
BW 40M_Ch 5310M_ac_Mode	3.561	3.966	0	6.779	11	4.221
BW 80M_Ch 529010M_ac_Mode	0.332	0.808	0	3.587	11	7.413
BW 20M_Ch 5500M_a_Mode	7.742	6.675	0	10.251	11	0.749
BW 20M_Ch 5500M_n_Mode	7.588	6.922	0	10.278	11	0.722
BW 20M_Ch 5500M_ac_Mode	7.408	6.923	0	10.183	11	0.817
BW 20M_Ch 5560M_a_Mode	7.512	6.893	0	10.224	11	0.776
BW 20M_Ch 5560M_n_Mode	7.8	6.514	0	10.215	11	0.785
BW 20M_Ch 5560M_ac_Mode	7.27	6.801	0	10.052	11	0.948
BW 20M_Ch 5700M_a_Mode	6.102	6.321	0	9.223	11	1.777
BW 20M_Ch 5700M_n_Mode	6.292	6.196	0	9.255	11	1.745
BW 20M_Ch 5700M_ac_Mode	5.725	6.104	0	8.929	11	2.071
BW 40M_Ch 5510M_n_Mode	3.013	3.03	0	6.032	11	4.968
BW 40M_Ch 5510M_ac_Mode	2.892	3.102	0	6.009	11	4.991

BW 40M_Ch 5550M_n_Mode	3.597	3.869	0	6.745	11	4.255
BW 40M_Ch 5550M_ac_Mode	3.795	3.357	0	6.592	11	4.408
BW 40M_Ch 5670M_n_Mode	3.308	2.277	0	5.833	11	5.167
BW 40M_Ch 5670M_ac_Mode	3.024	2.967	0	6.006	11	4.994
BW 80M_Ch 5530M_ac_Mode	0.485	0.79	0	3.65	11	7.35
BW 80M_Ch 5690M_ac_Mode	0.24	-0.001	0	3.01	11	7.99

Table 12. PSD table (MIMO)

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 100 kHz resolution bandwidth.

Above 1 GHz, measurements were made pursuant the method described in FCC KDB 789033 D02 General UNII Test Procedure New Rules v01. 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 v01, 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.

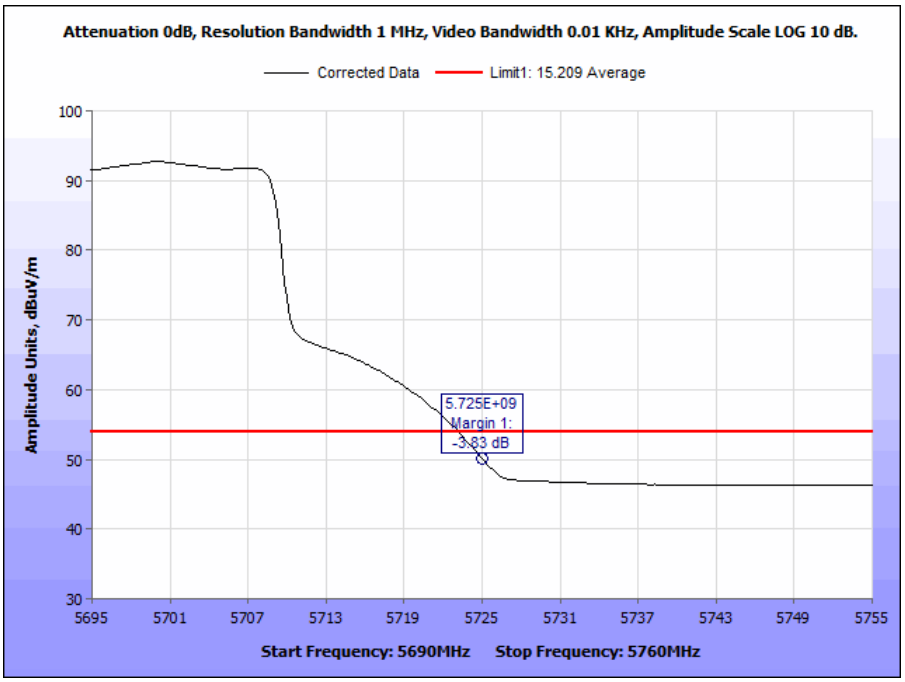
Test Results:

For below 1 GHz, the EUT was compliant with the requirements of this section. Emissions that appear to exceed the limits below 1GHz were investigated with a QP detector and found to be blow the required limits.

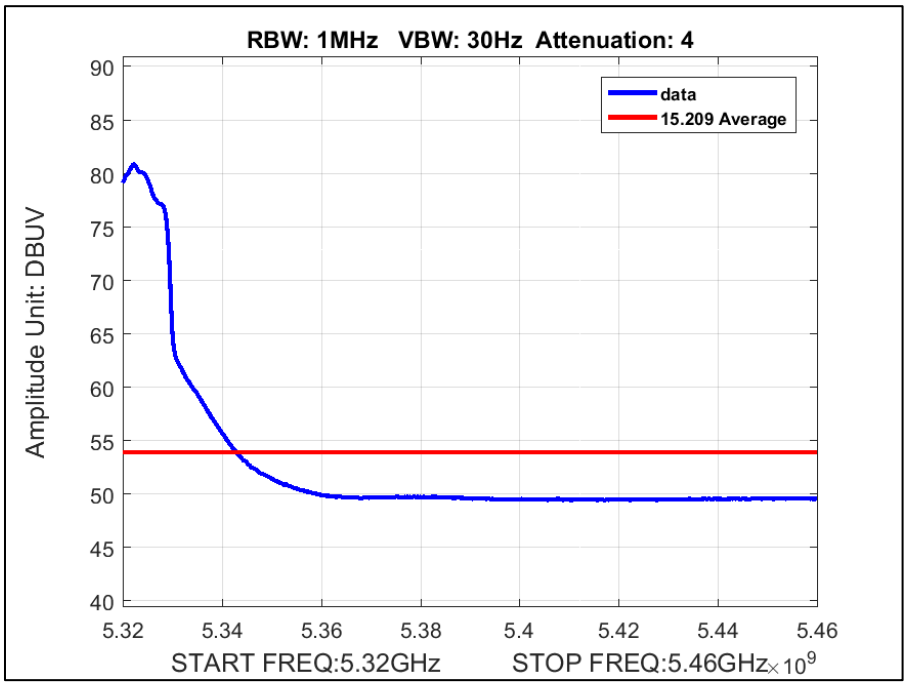
For above 1 GHz, the EUT was compliant with the requirements of this section. Emissions above 18 GHz where checked and only noise floor was observed.

Test Engineer(s): Djed Mouada

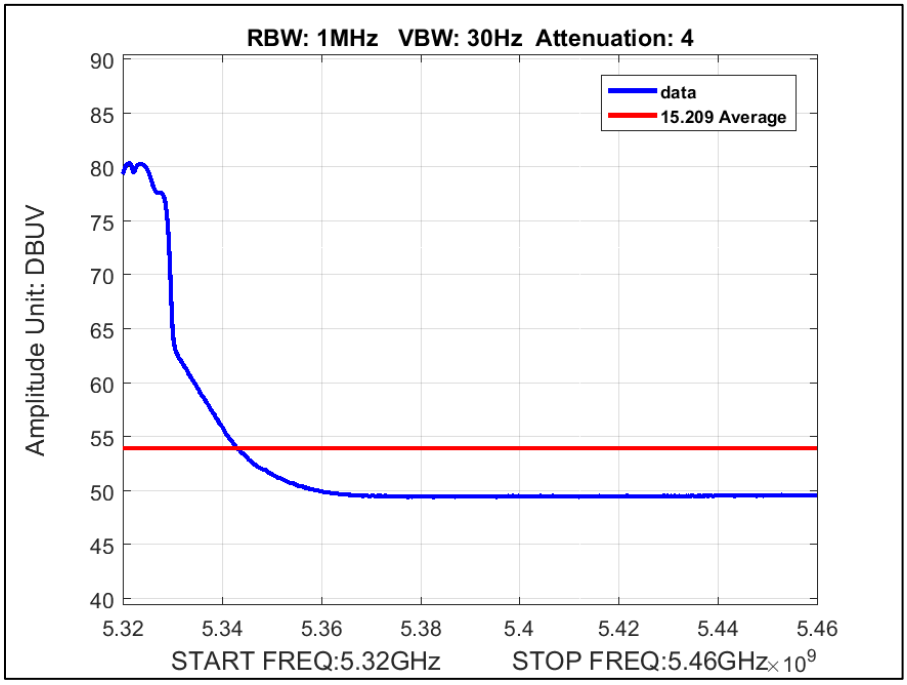
Test Date(s): December 19 to December 23, 2016



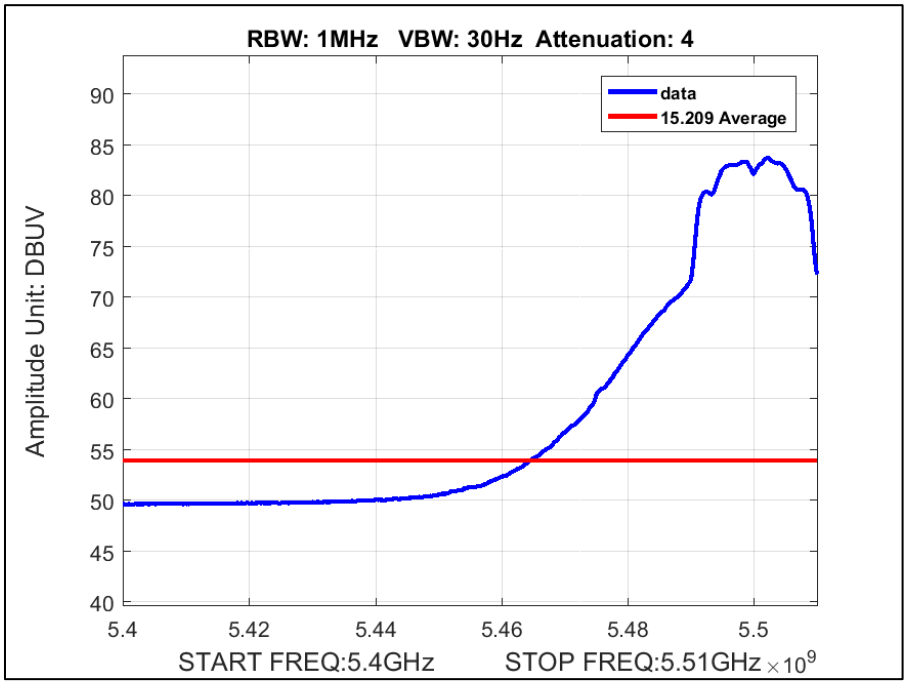
Plot 281. Undesirable Emissions, Average Band Edge BW 20M – CH 5320M A Mode



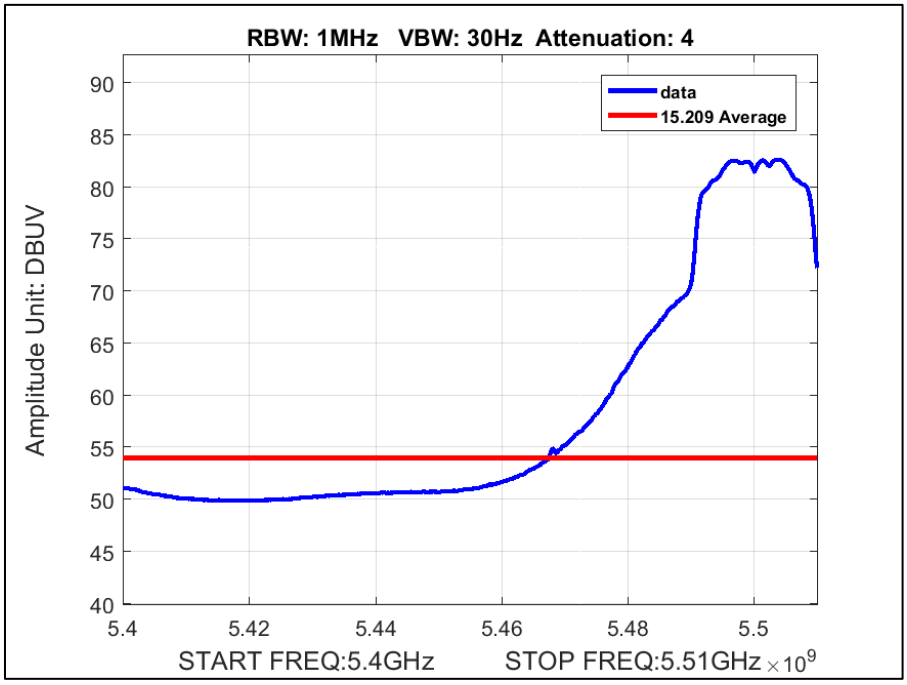
Plot 282. Undesirable Emissions, Average Band Edge BW 20M – CH 5320M AC Mode



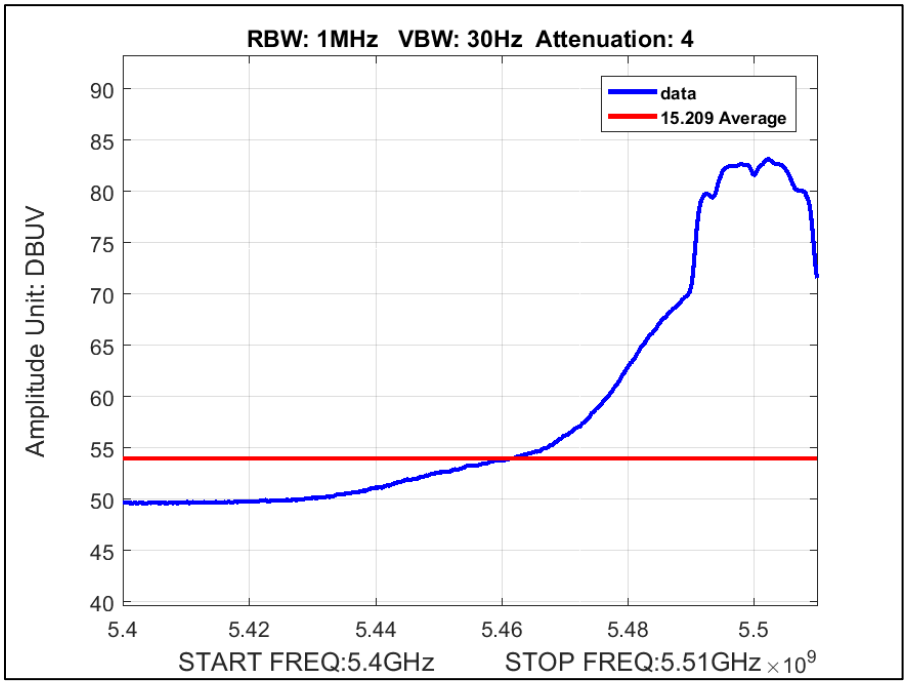
Plot 283. Undesirable Emissions, Average Band Edge BW 20M – CH 5320M N Mode



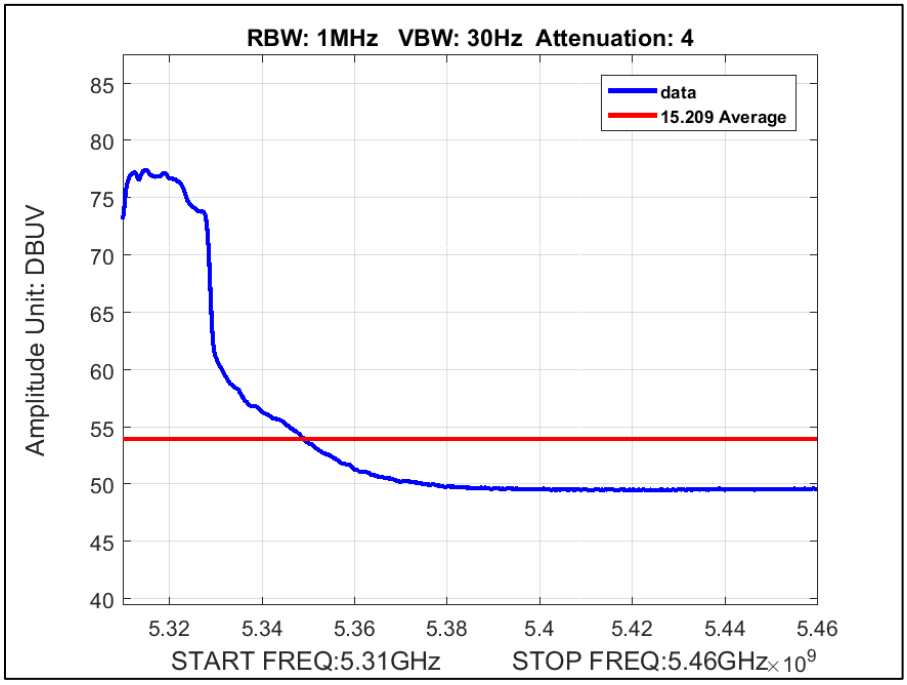
Plot 284. Undesirable Emissions, Average Band Edge BW 20M – CH 5500M A Mode



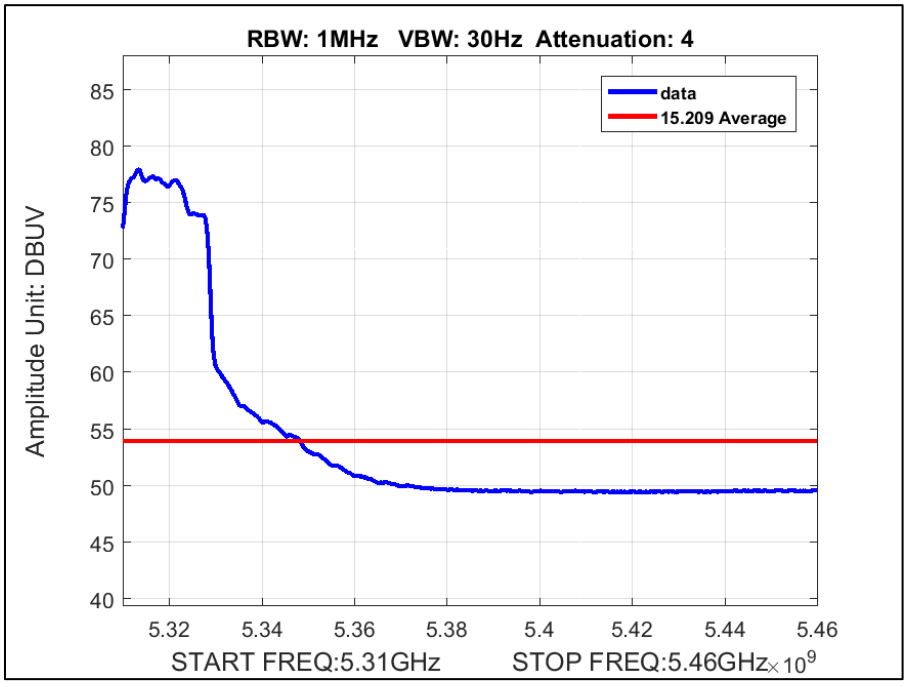
Plot 285. Undesirable Emissions, Average Band Edge BW 20M – CH 5500M AC Mode



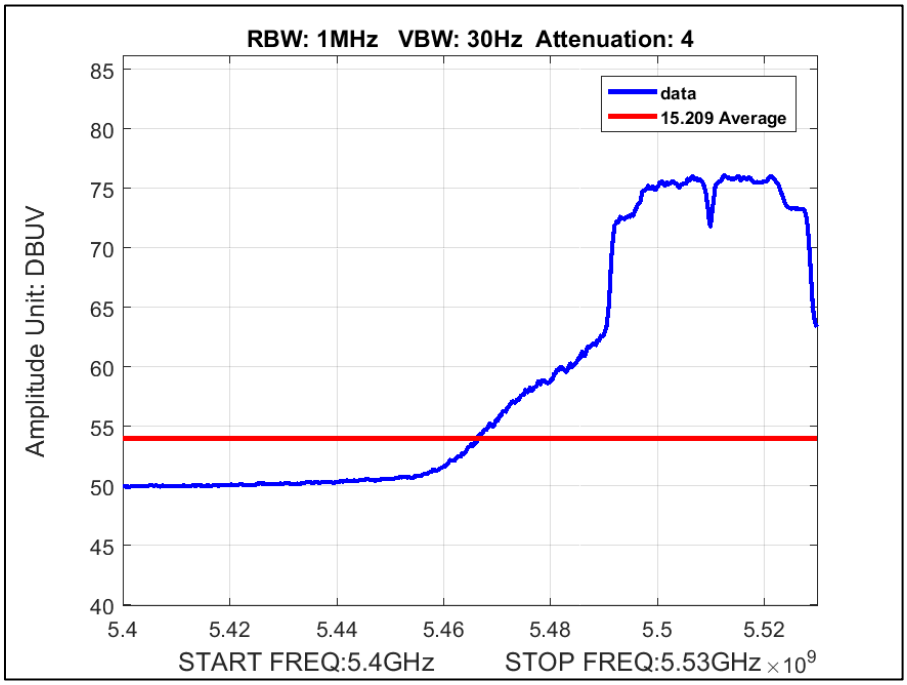
Plot 286. Undesirable Emissions, Average Band Edge BW 20M – CH 5500M N Mode



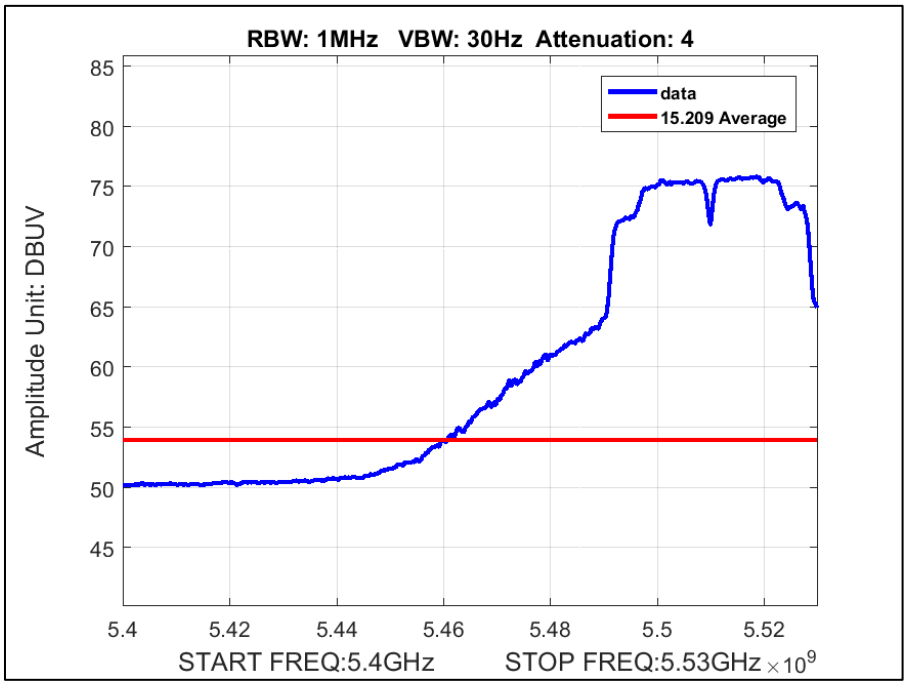
Plot 287. Undesirable Emissions, Average Band Edge BW 40M – CH 5310M AC Mode



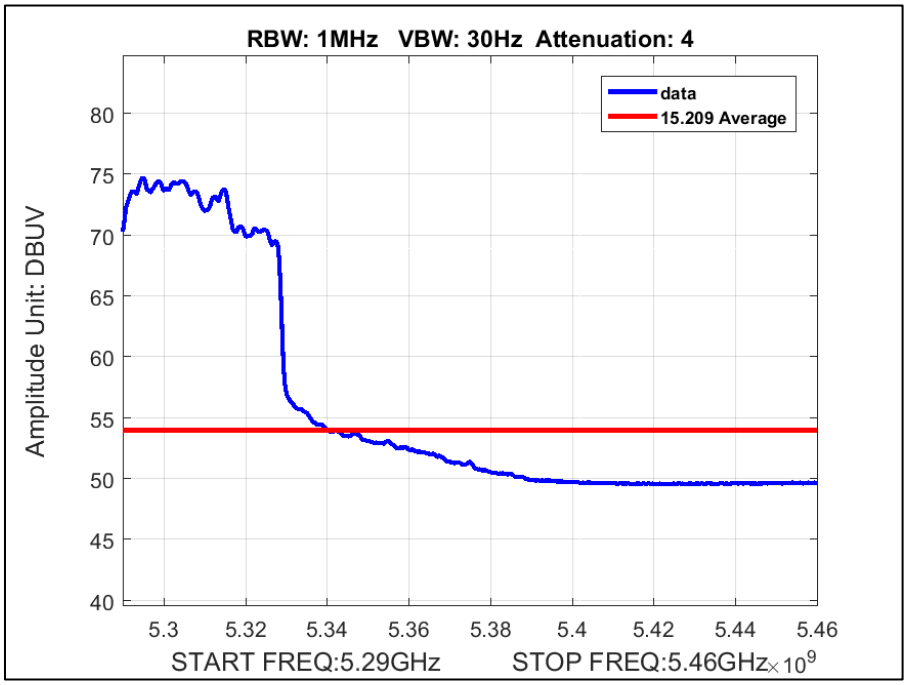
Plot 288. Undesirable Emissions, Average Band Edge BW 40M – CH 5310M N Mode



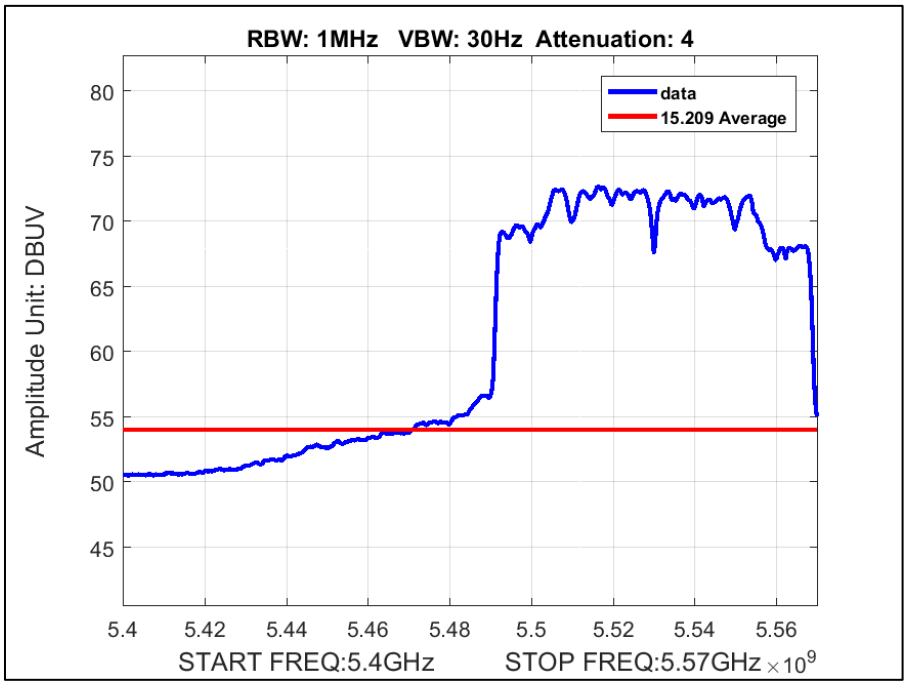
Plot 289. Undesirable Emissions, Average Band Edge BW 40M – CH 5510M AC Mode



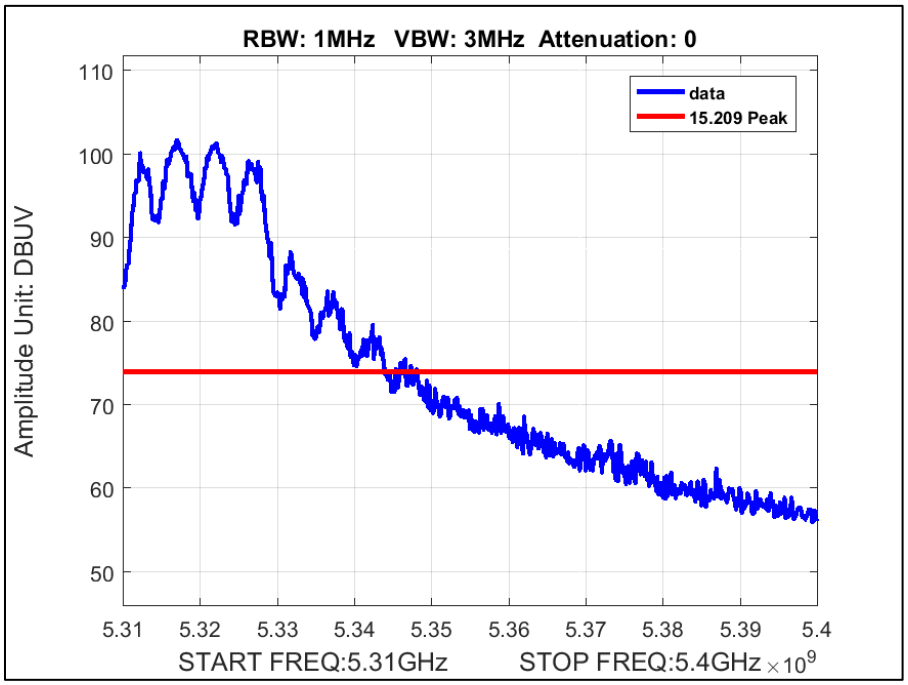
Plot 290. Undesirable Emissions, Average Band Edge BW 40M – CH 5510M N Mode



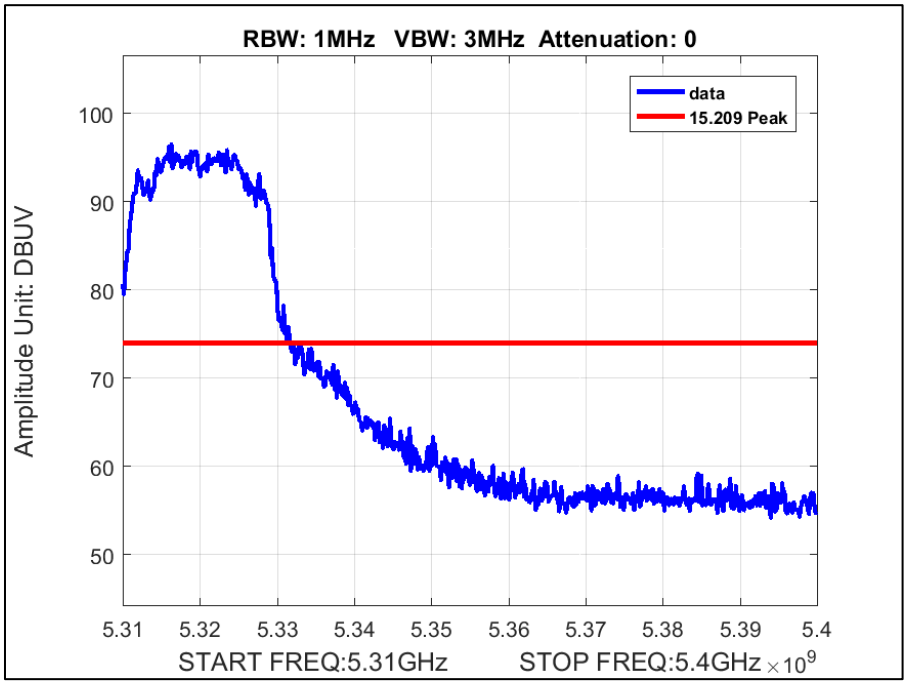
Plot 291. Undesirable Emissions, Average Band Edge BW 80M – CH 5290M AC Mode



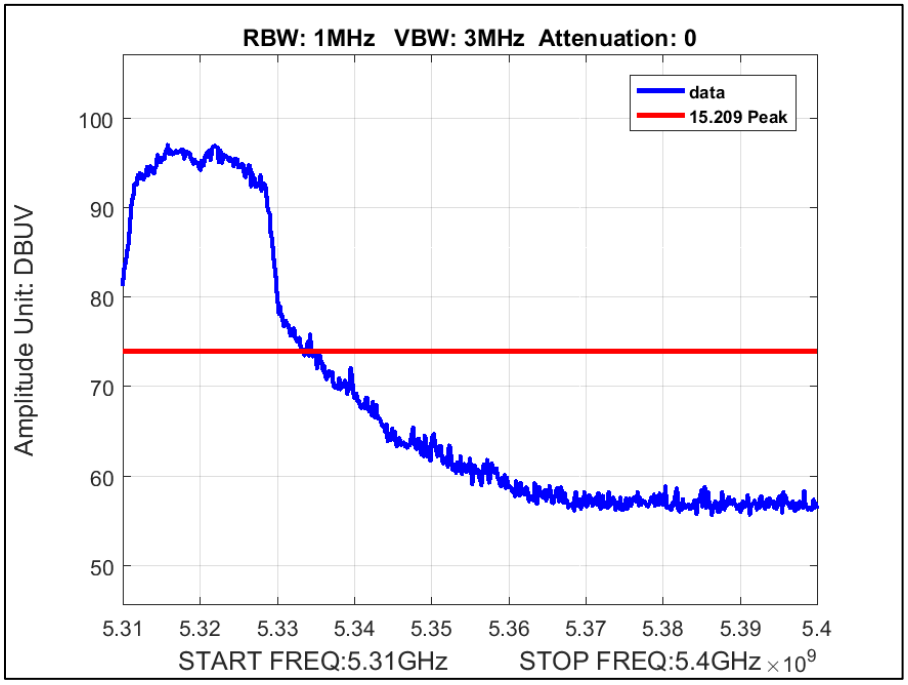
Plot 292. Undesirable Emissions, Average Band Edge BW 80M – CH 5530M AC Mode



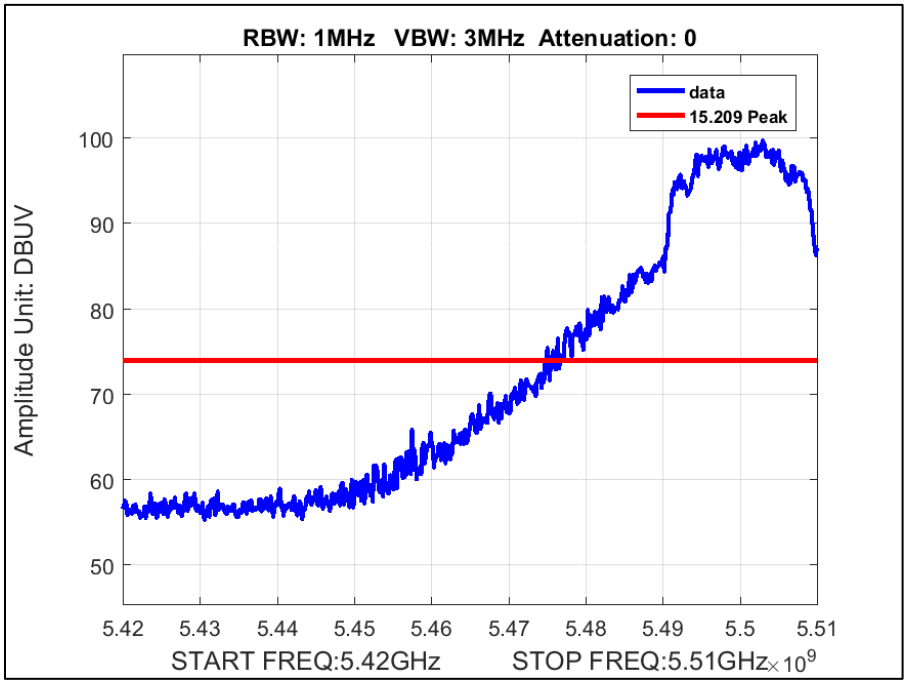
Plot 293. Undesirable Emissions, Peak Band Edge BW 20M – CH 5320M A Mode



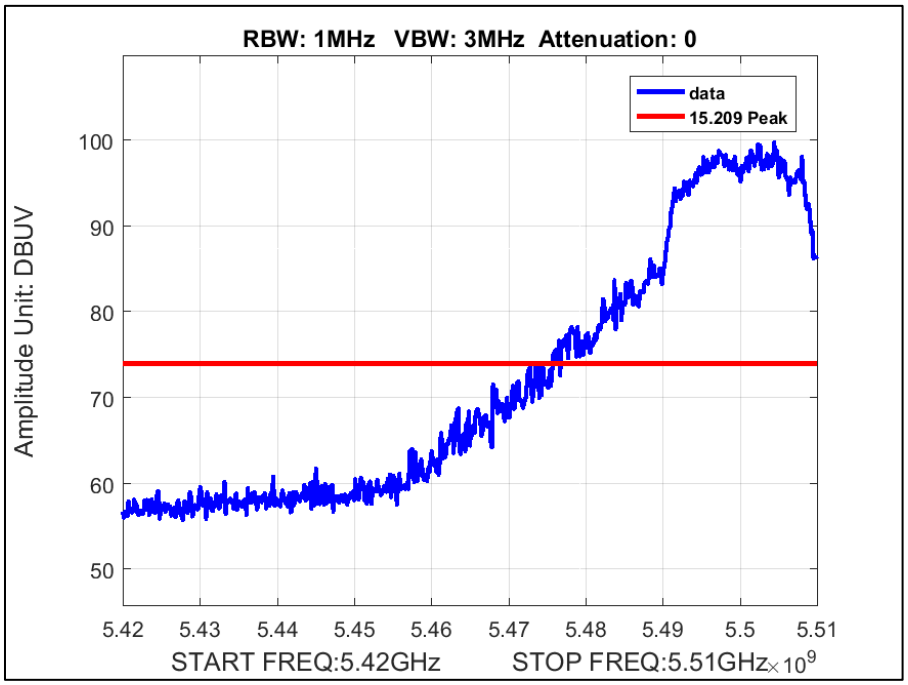
Plot 294. Undesirable Emissions, Peak Band Edge BW 20M – CH 5320M AC Mode



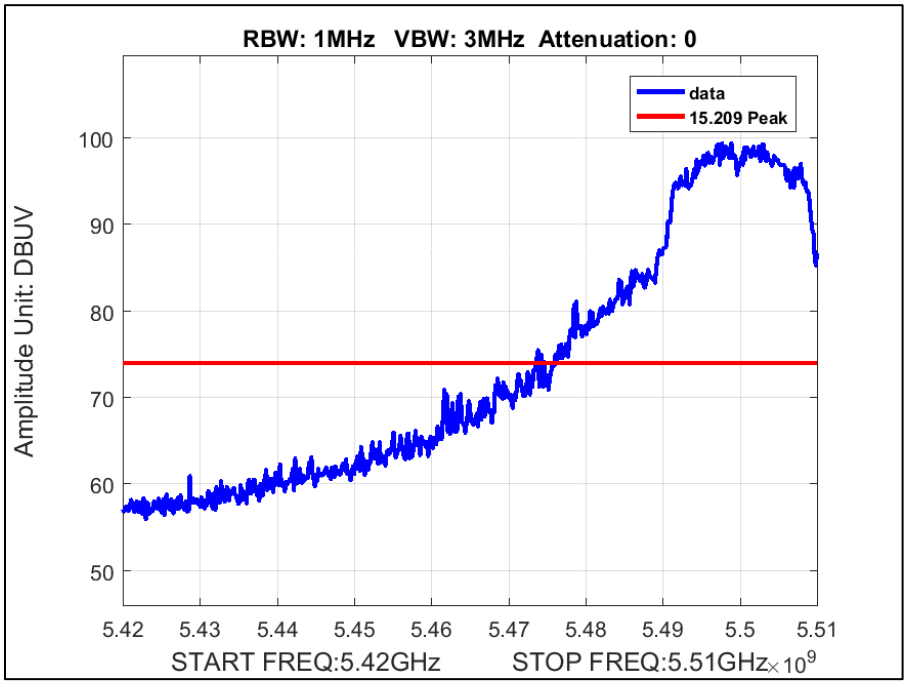
Plot 295. Undesirable Emissions, Peak Band Edge BW 20M – CH 5320M N Mode



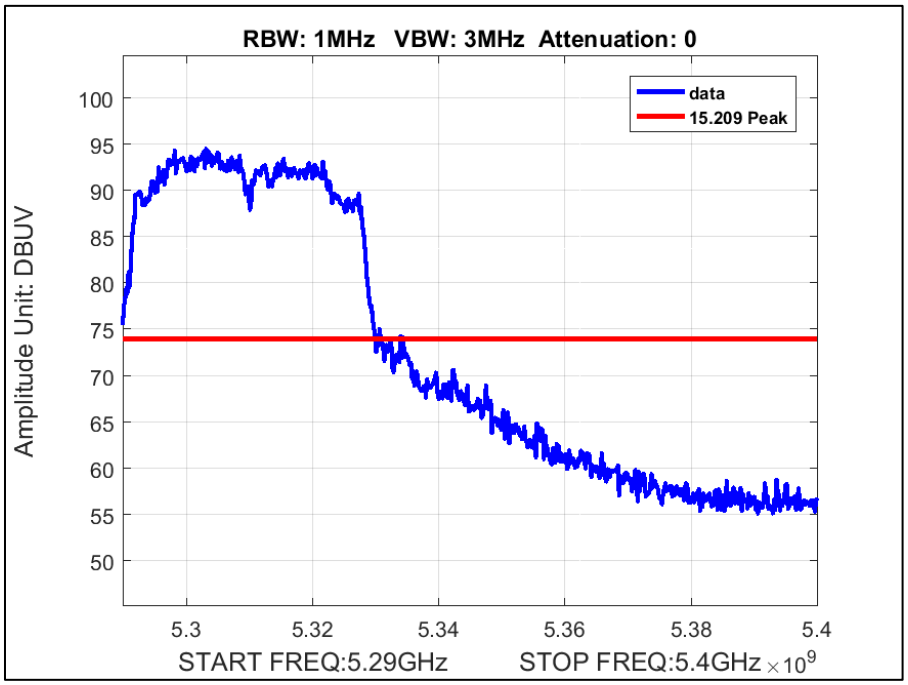
Plot 296. Undesirable Emissions, Peak Band Edge BW 20M – CH 5500M A Mode



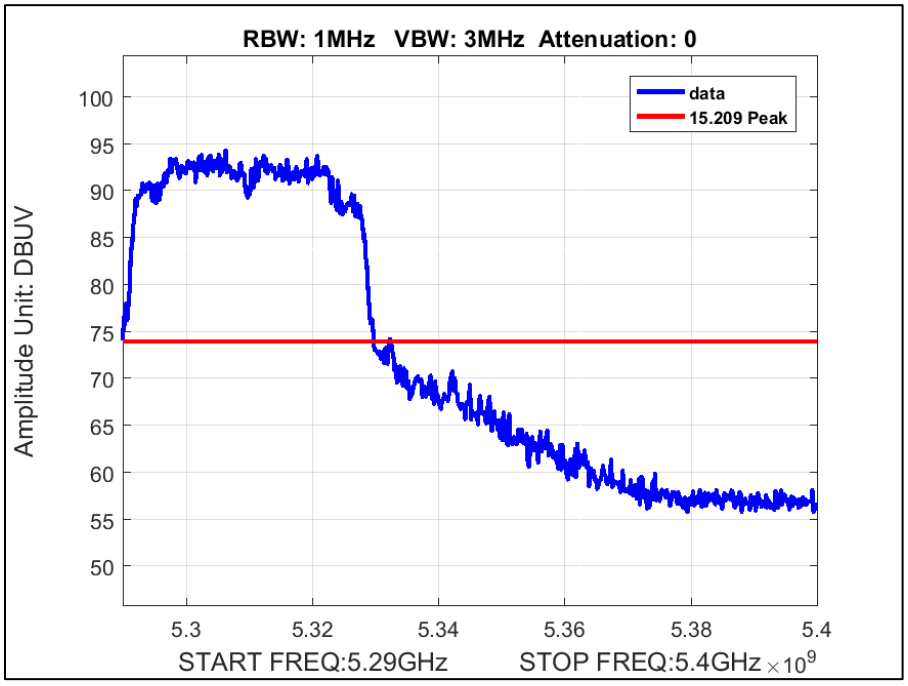
Plot 297. Undesirable Emissions, Peak Band Edge BW 20M – CH 5500M AC Mode



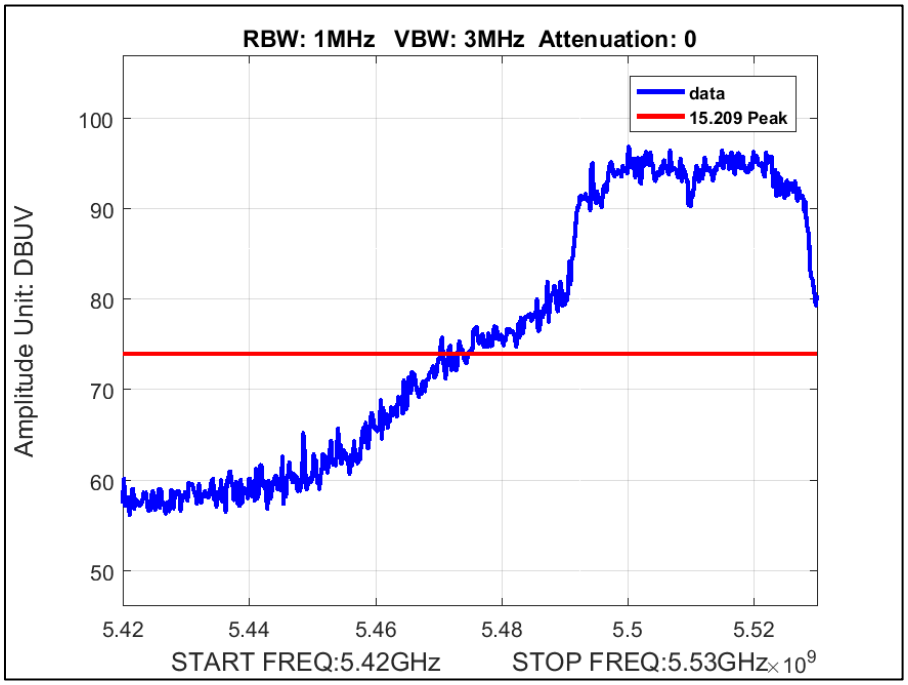
Plot 298. Undesirable Emissions, Peak Band Edge BW 20M – CH 5500M N Mode



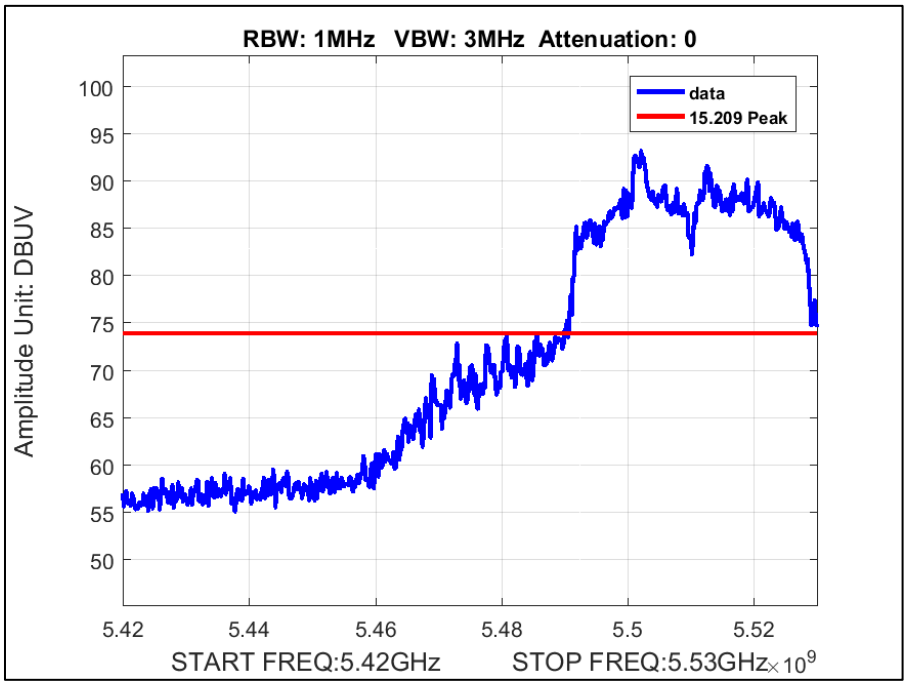
Plot 299. Undesirable Emissions, Peak Band Edge BW 40M – CH 5310M AC Mode



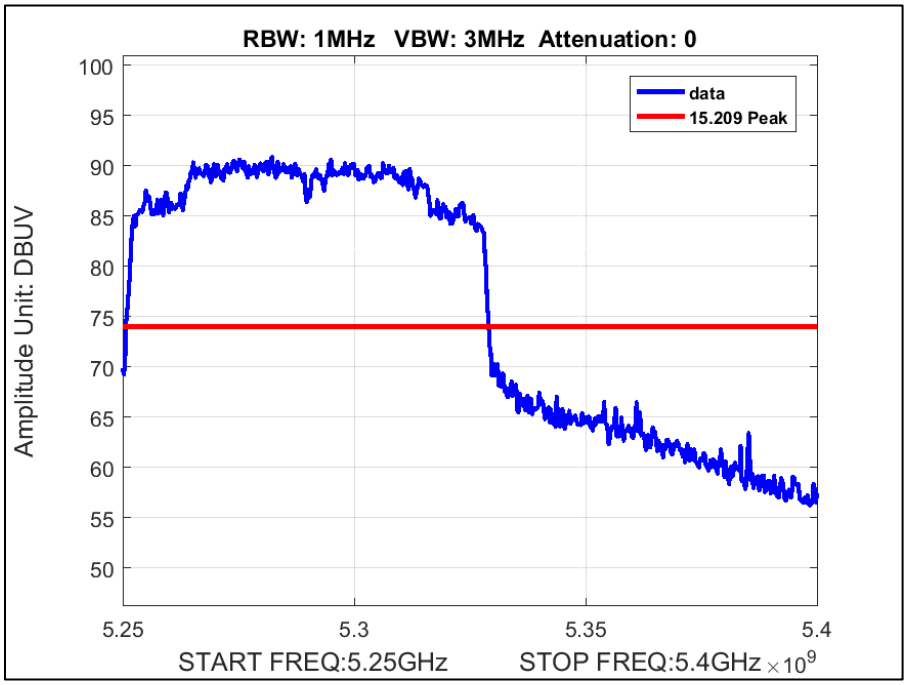
Plot 300. Undesirable Emissions, Peak Band Edge BW 40M – CH 5310M N Mode



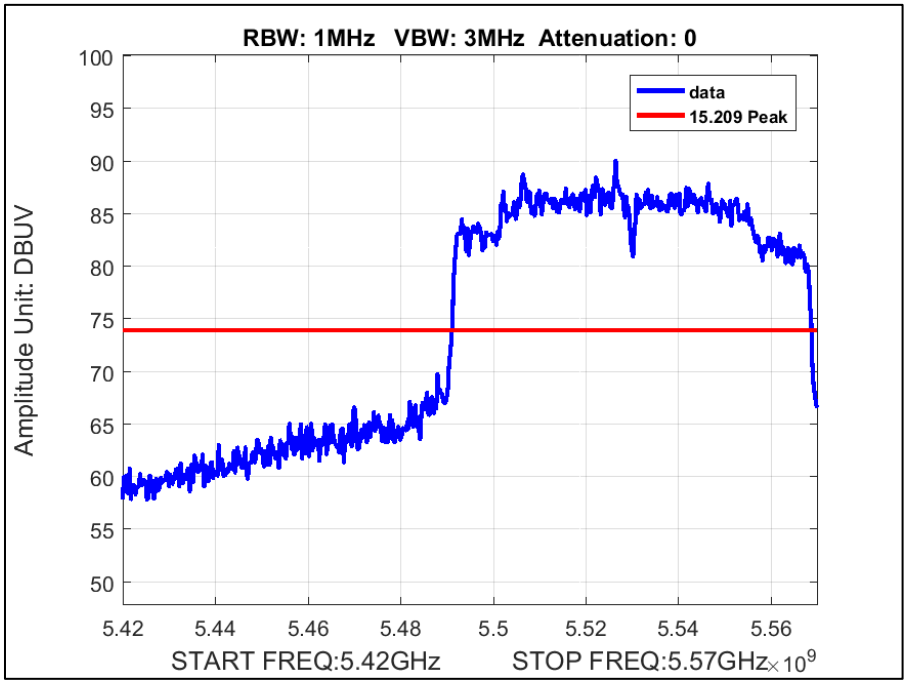
Plot 301. Undesirable Emissions, Peak Band Edge BW 40M – CH 5510M AC Mode



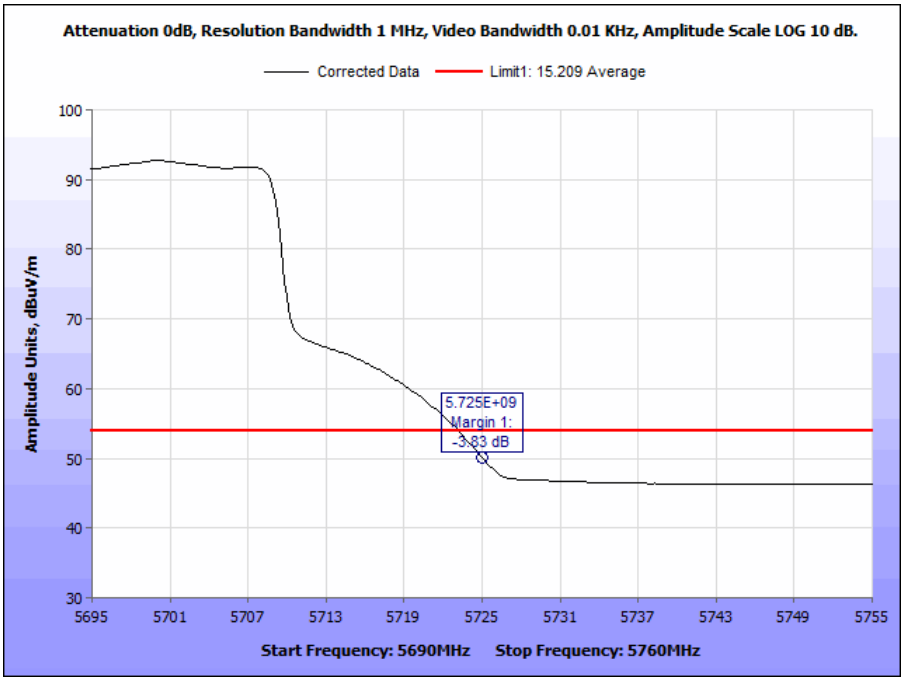
Plot 302. Undesirable Emissions, Peak Band Edge BW 40M – CH 5510M N Mode



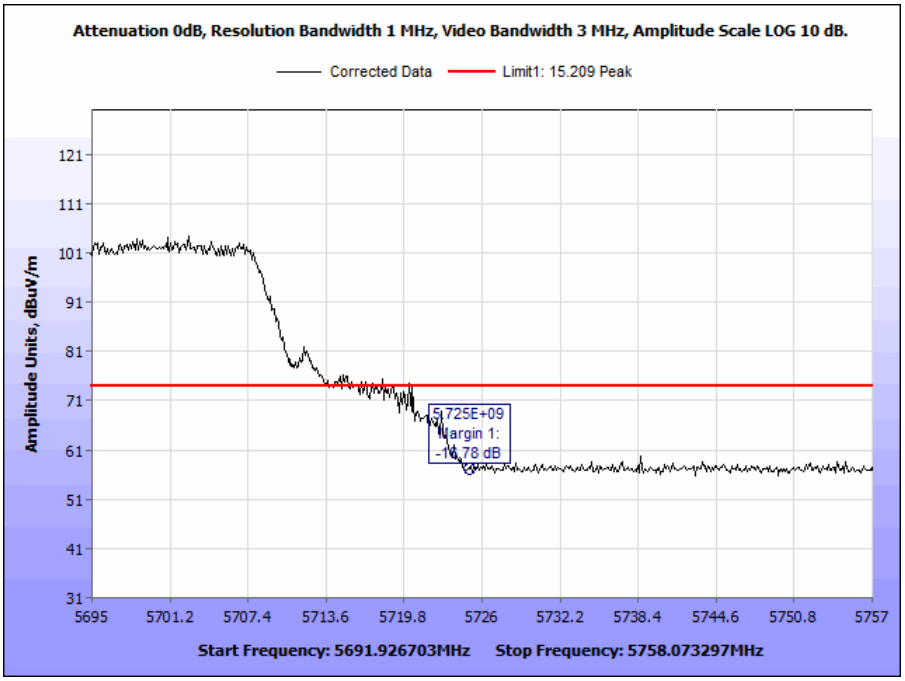
Plot 303. Undesirable Emissions, Peak Band Edge BW 80M – CH 5290M AC Mode



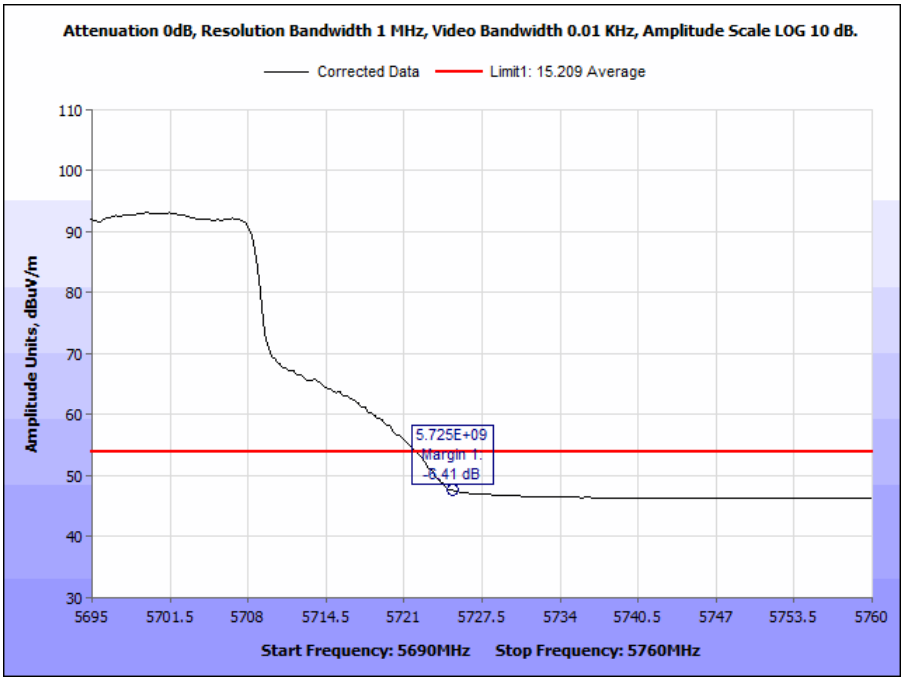
Plot 304. Undesirable Emissions, Peak Band Edge BW 80M – CH 5530M AC Mode



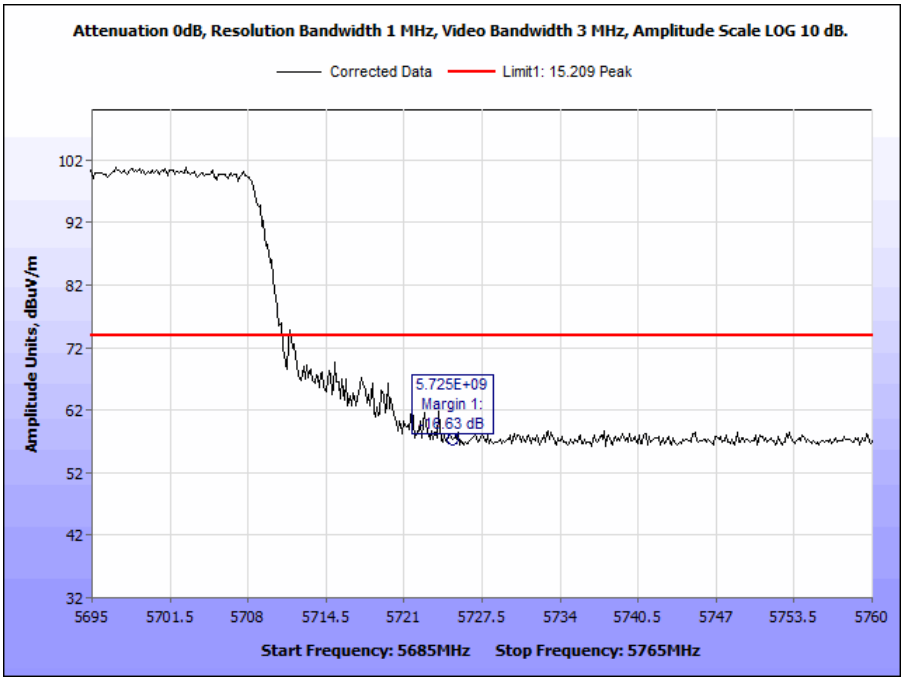
Plot 305. Undesirable Emissions, Average Band Edge, 20Mz – 5725, A Mode



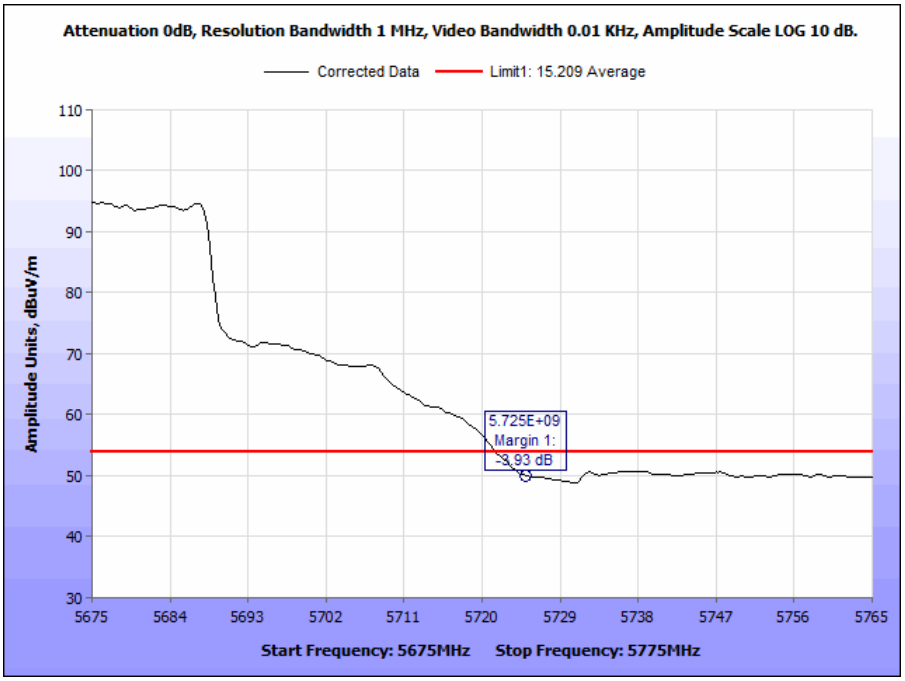
Plot 306. Undesirable Emissions, Peak Band Edge, 20Mz – 5725, A Mode



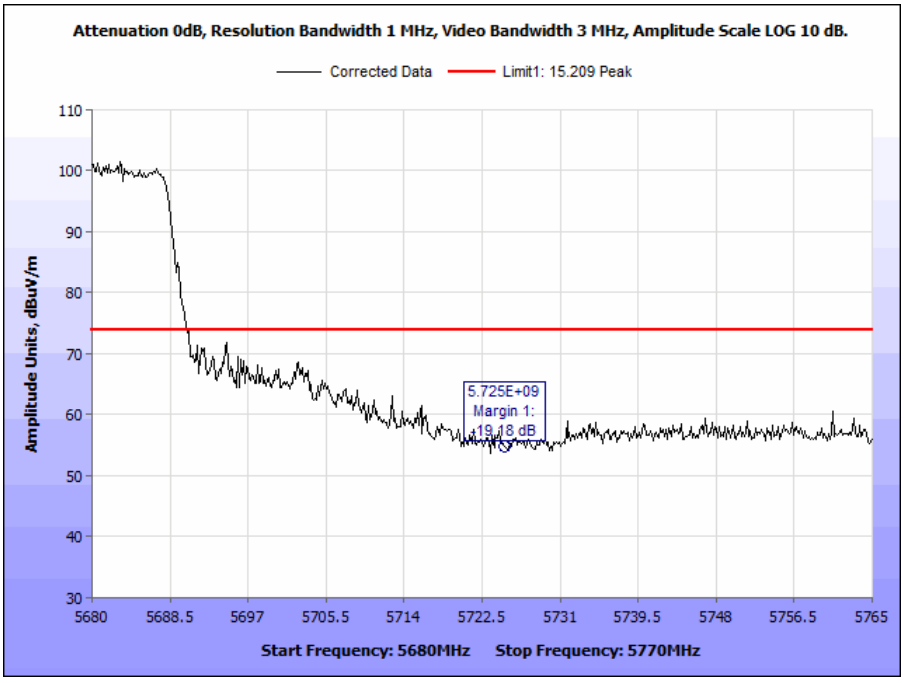
Plot 307. Undesirable Emissions, Average Band Edge, 20Mz – 5725, AC Mode



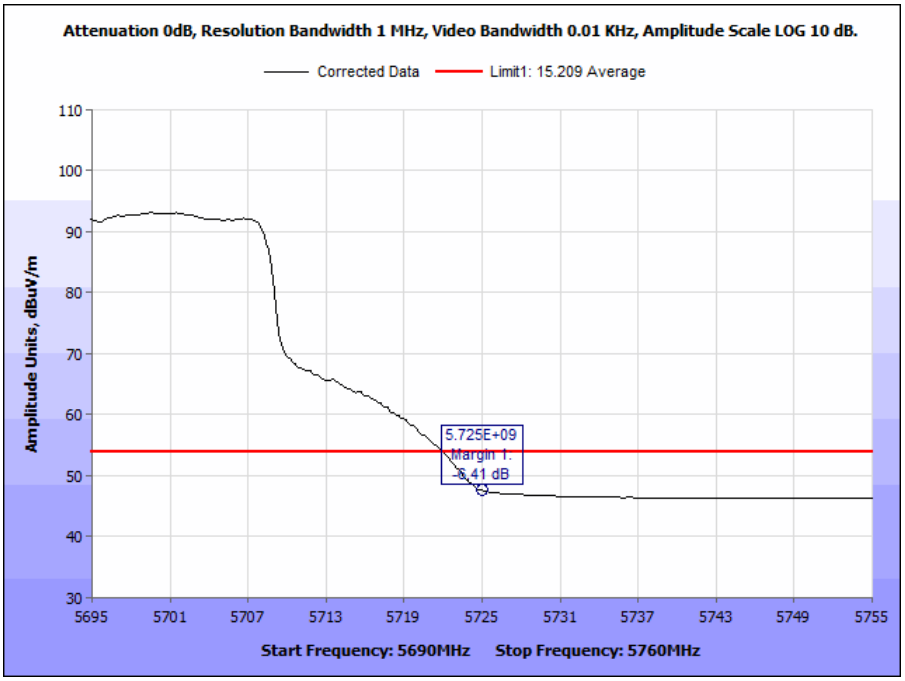
Plot 308. Undesirable Emissions, Peak Band Edge, 20Mz – 5725, AC Mode



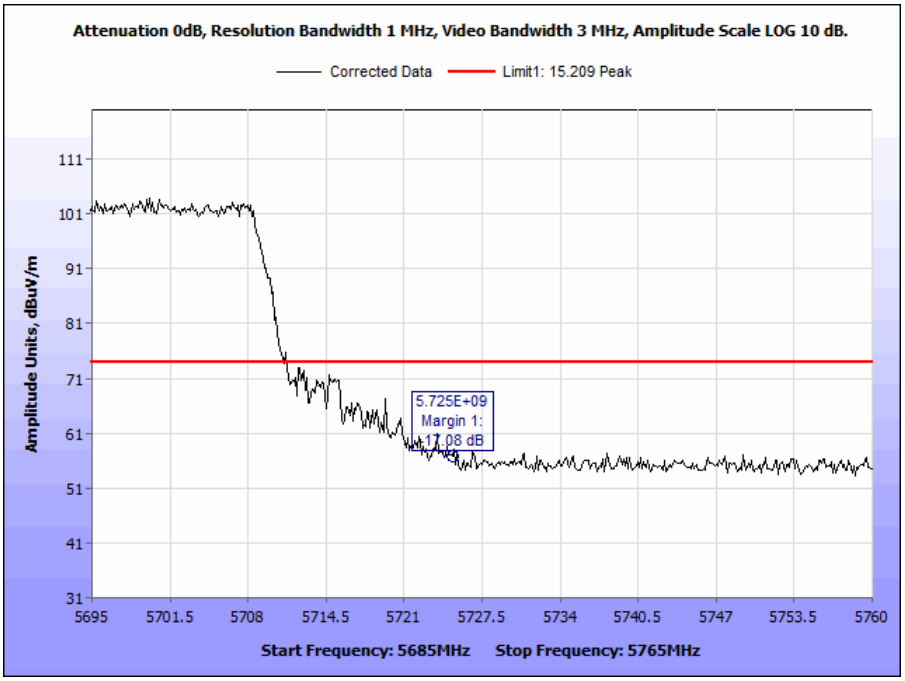
Plot 309. Undesirable Emissions, Average Band Edge, 40Mz – 5725, AC Mode



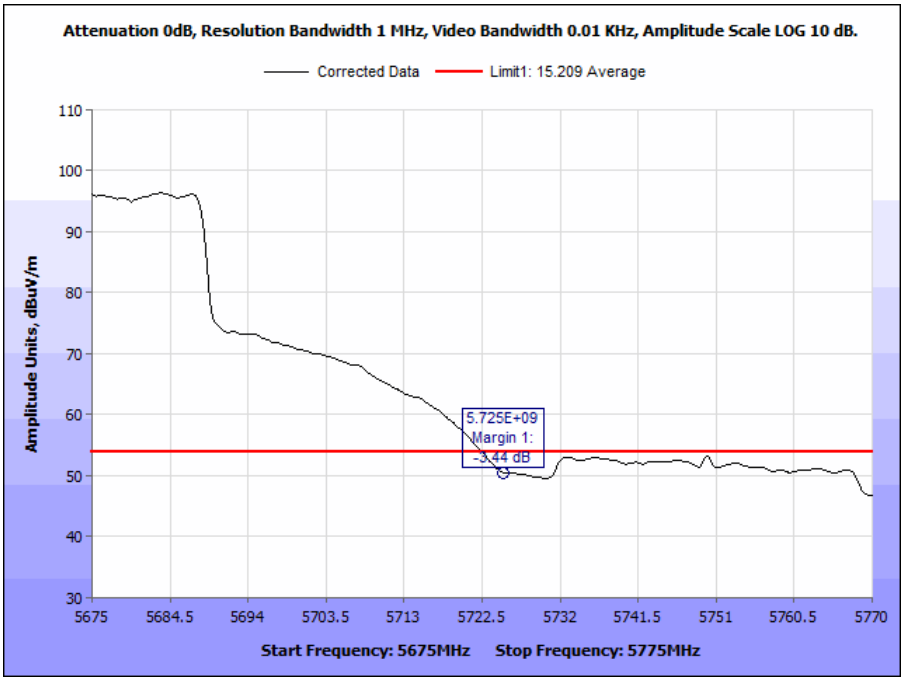
Plot 310. Undesirable Emissions, Peak Band Edge, 40Mz – 5725, AC Mode



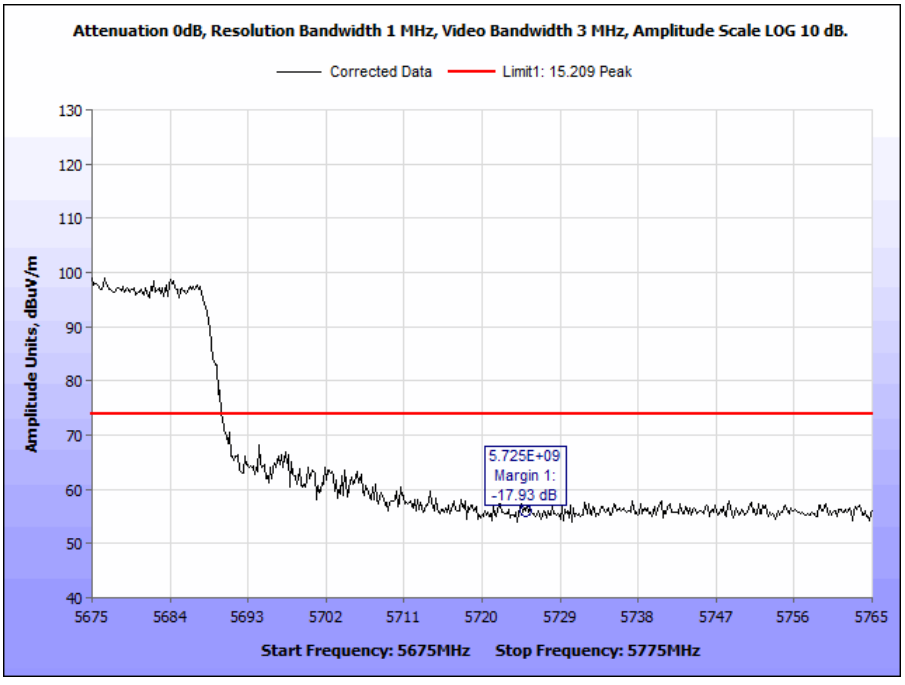
Plot 311. Undesirable Emissions, Average Band Edge, 20Mz – 5725, N Mode



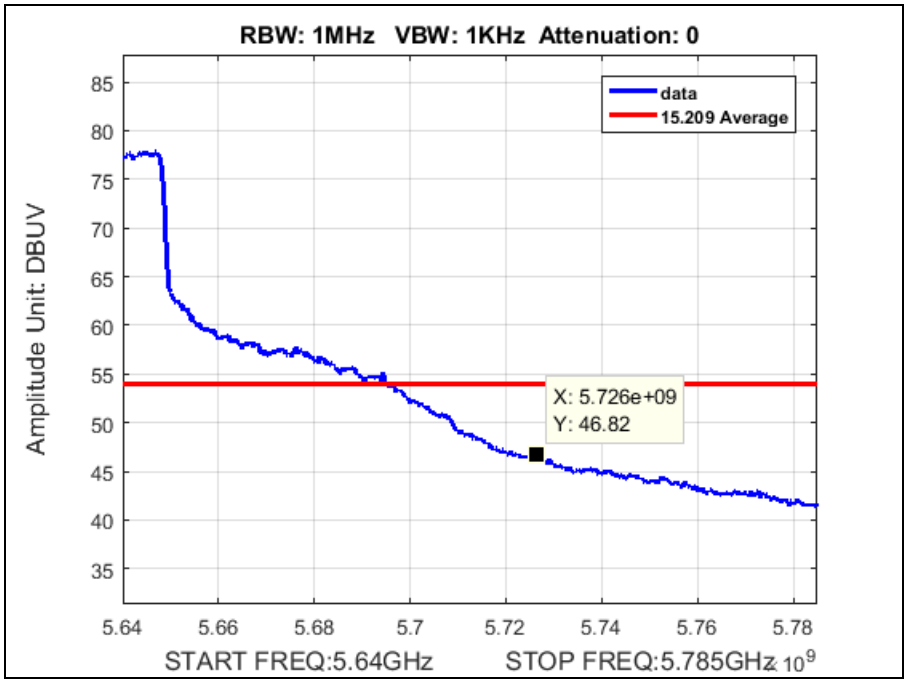
Plot 312. Undesirable Emissions, Peak Band Edge, 20Mz – 5725, N Mode



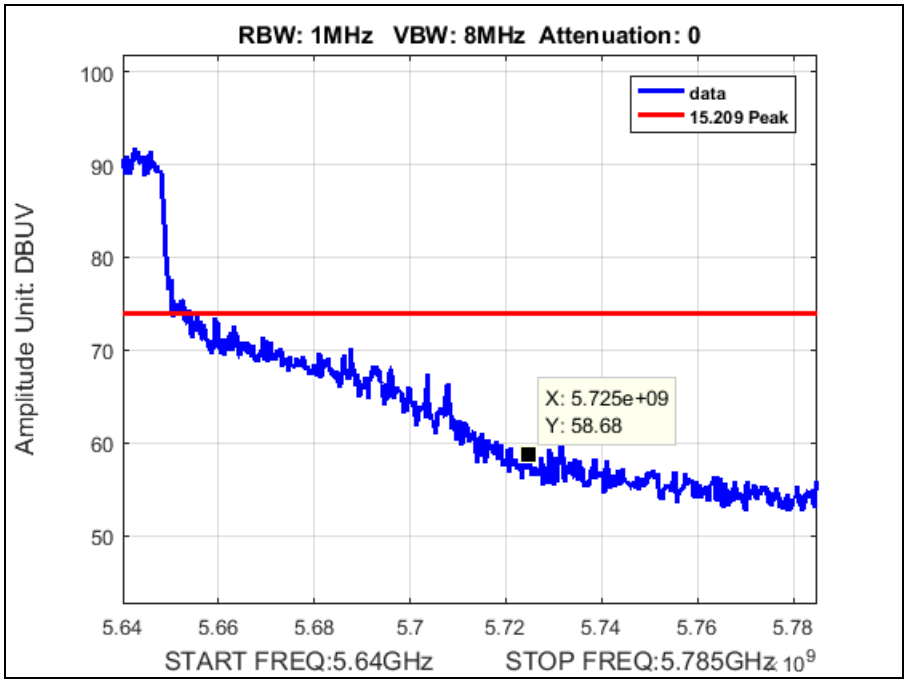
Plot 313. Undesirable Emissions, Average Band Edge, 40Mz – 5725, N Mode



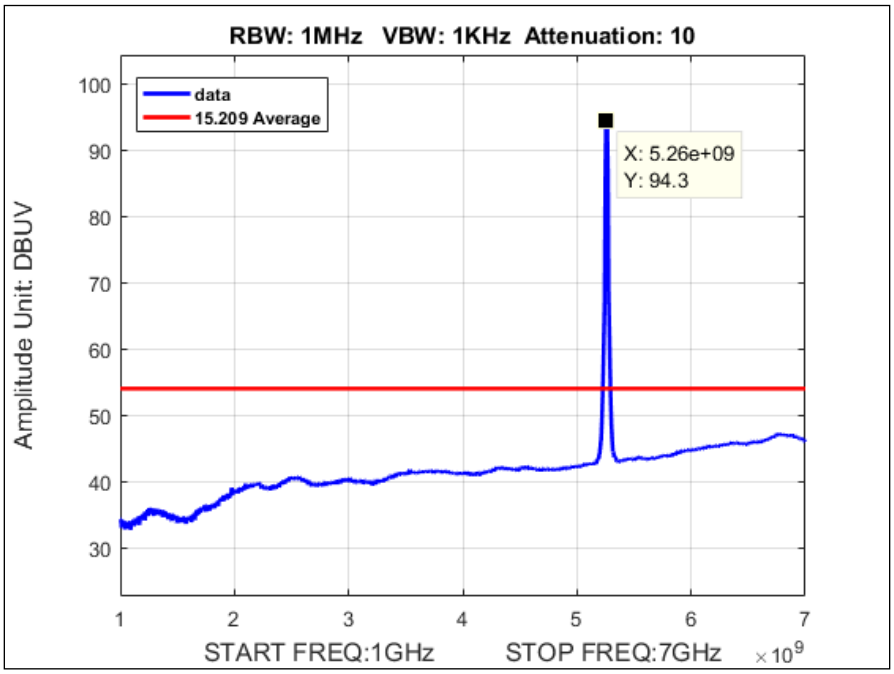
Plot 314. Undesirable Emissions, Peak Band Edge, 40Mz – 5725, N Mode



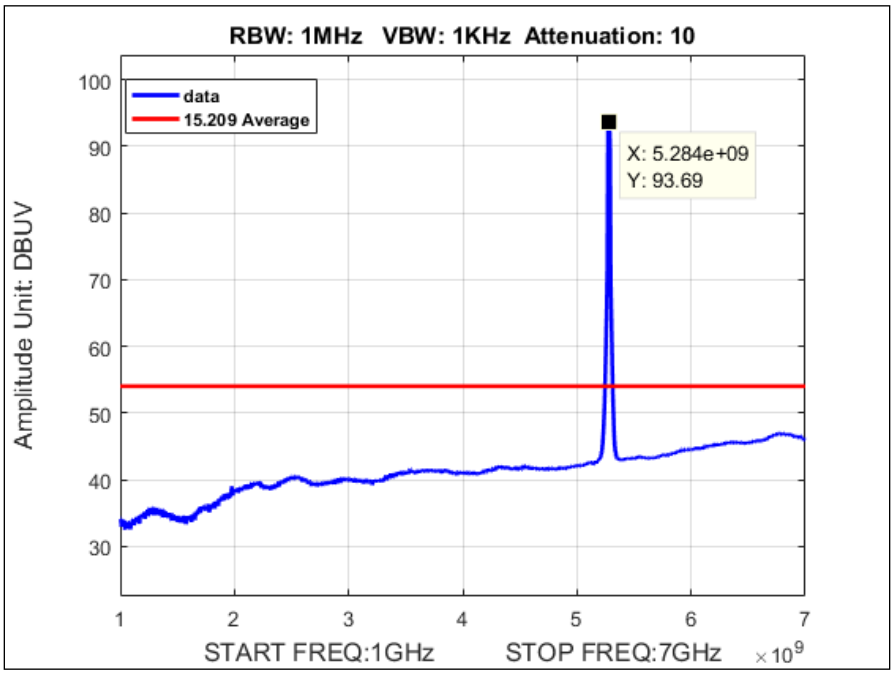
Plot 315. Undesirable Emissions, Average Band Edge, BW 80M CH 5725M, AC Mode



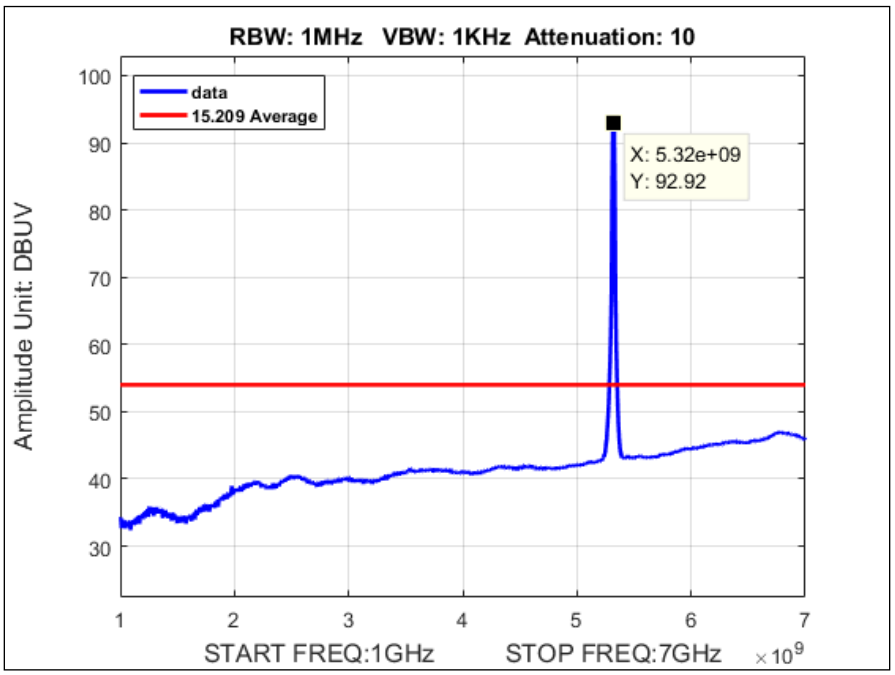
Plot 316. Undesirable Emissions, Peak Band Edge, BW 80M CH 5725M, AC Mode



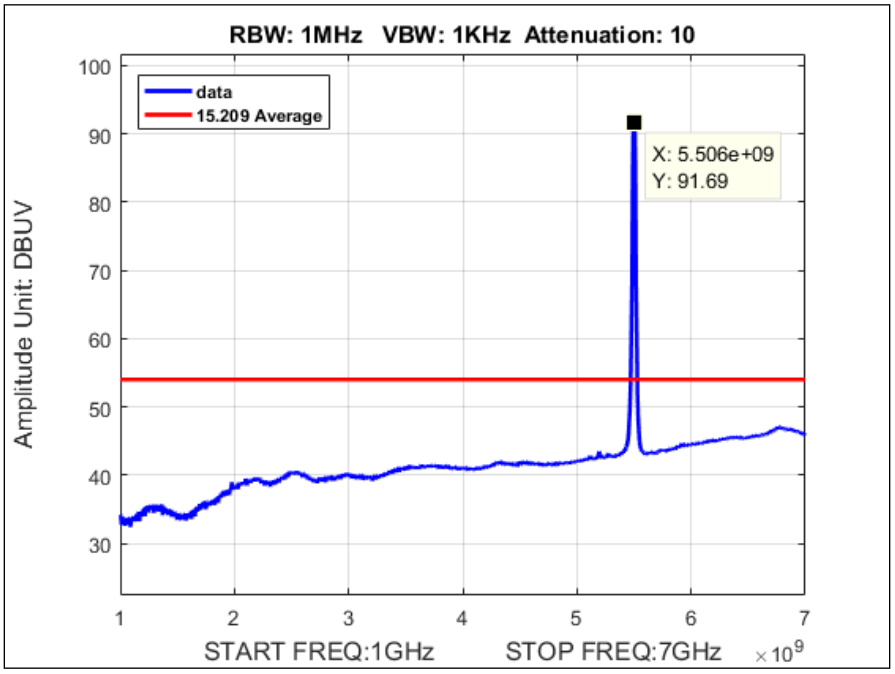
Plot 317. Undesirable Emissions, Average A, 20M, 5260, 1-7GHz



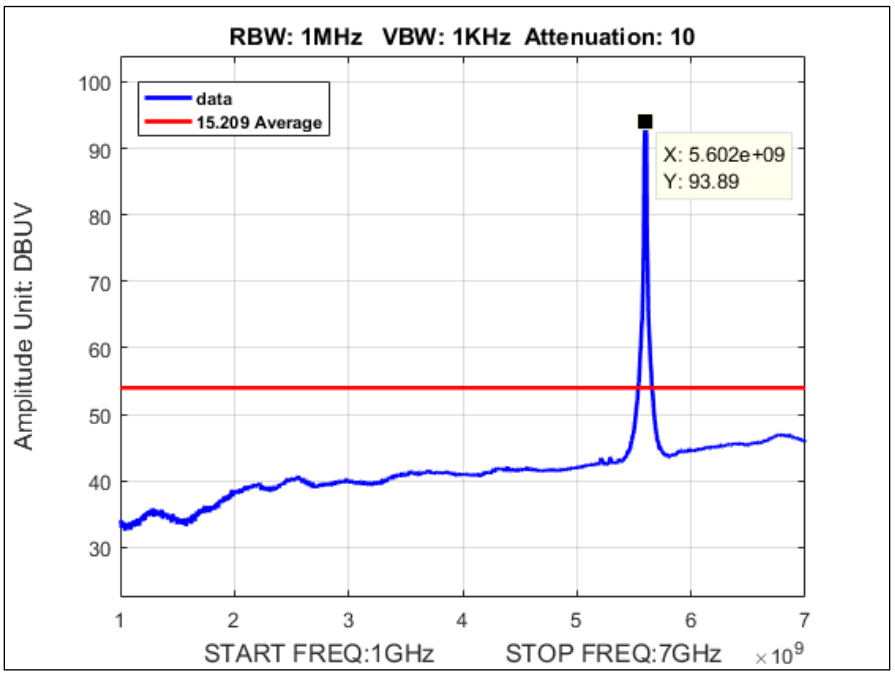
Plot 318. Undesirable Emissions, Average A, 20M, 5280, 1-7GHz



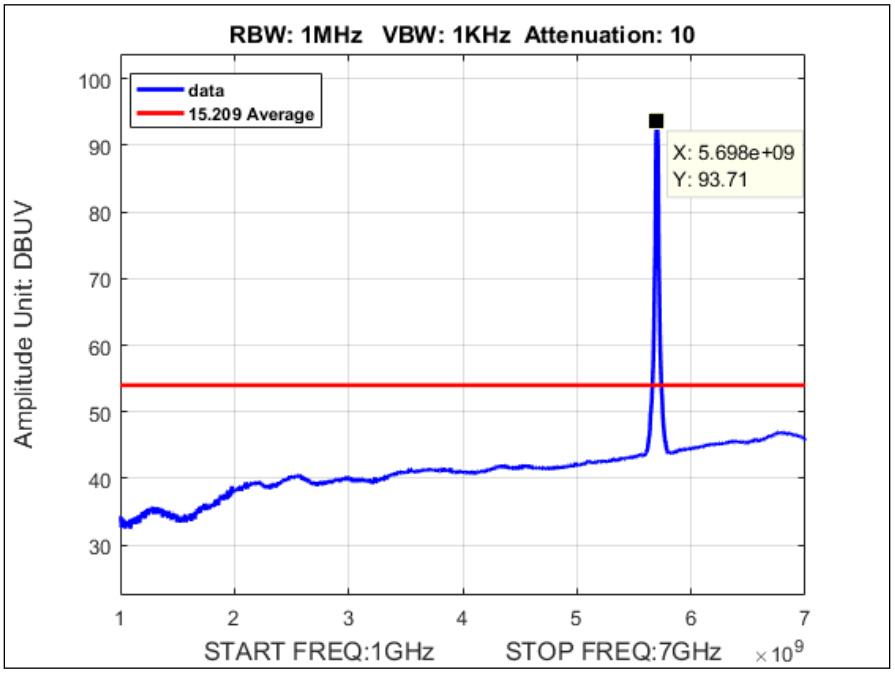
Plot 319. Undesirable Emissions, Average A, 20M, 5320, 1-7GHz



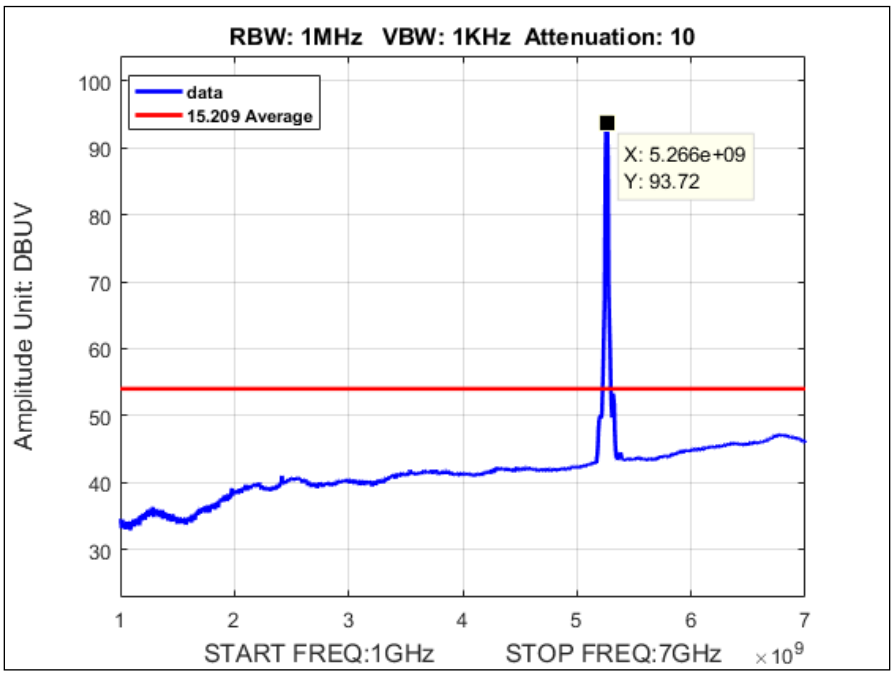
Plot 320. Undesirable Emissions, Average A, 20M, 5500, 1-7GHz



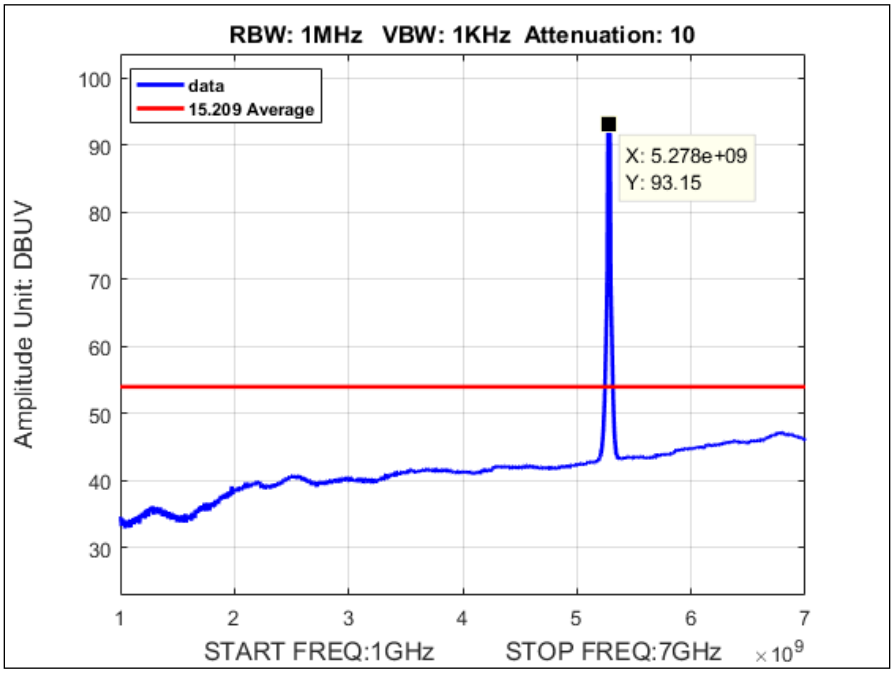
Plot 321. Undesirable Emissions, Average A, 20M, 5600, 1-7GHz



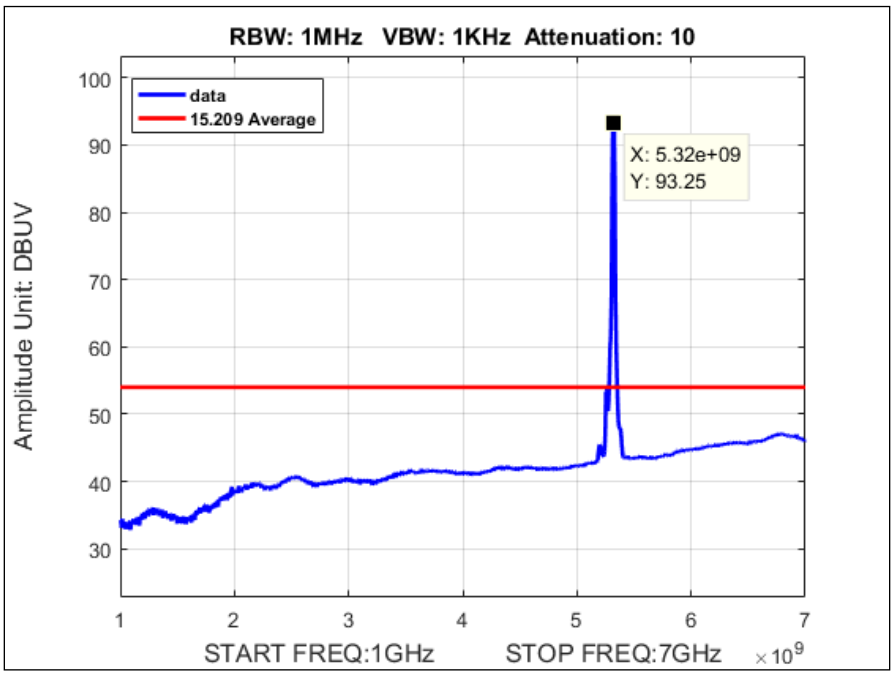
Plot 322. Undesirable Emissions, Average A, 20M, 5700, 1-7GHz



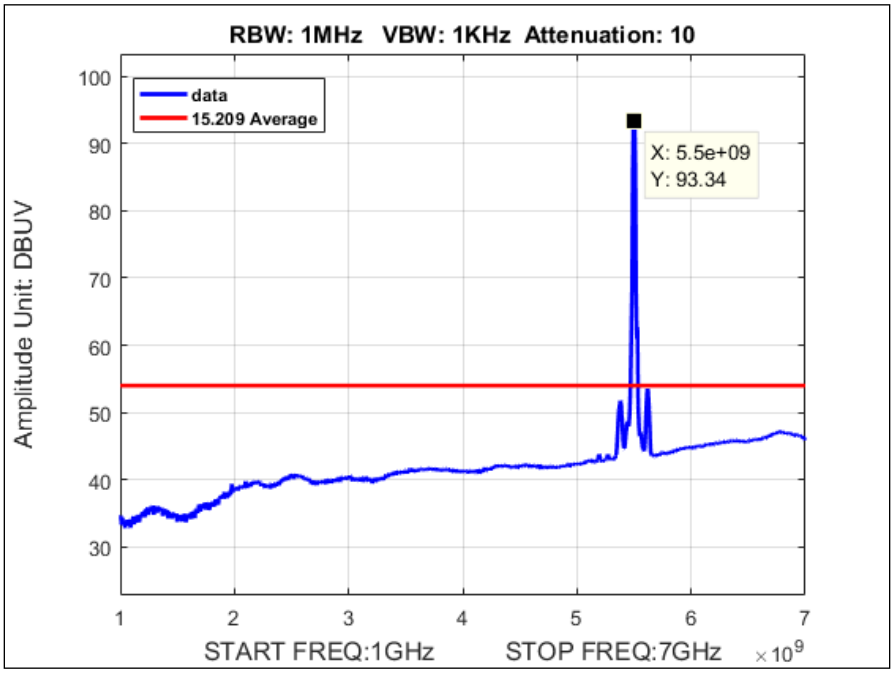
Plot 323. Undesirable Emissions, Average AC, 20M, 5260, 1-7GHz



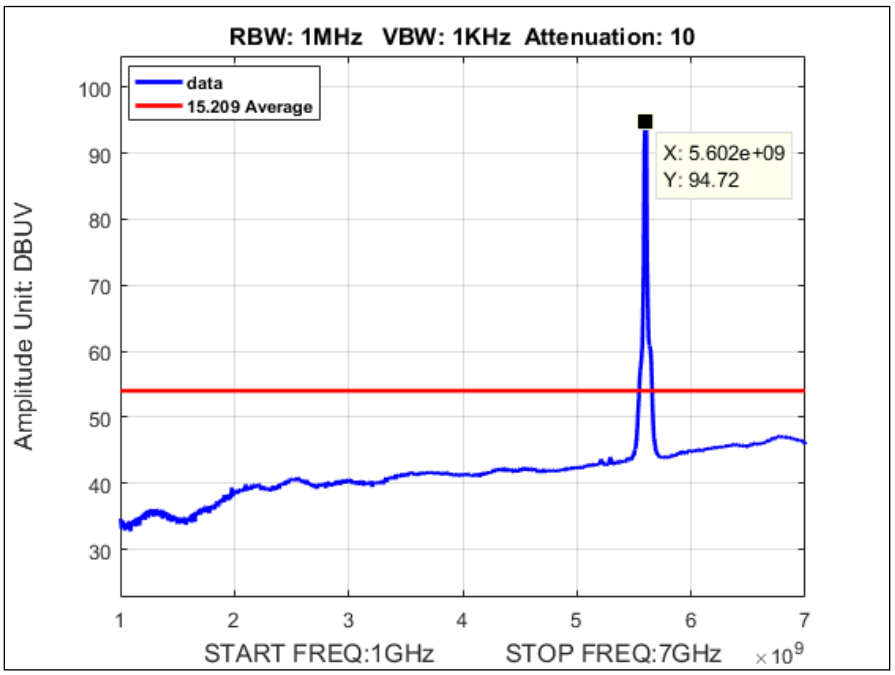
Plot 324. Undesirable Emissions, Average AC, 20M, 5280, 1-7GHz



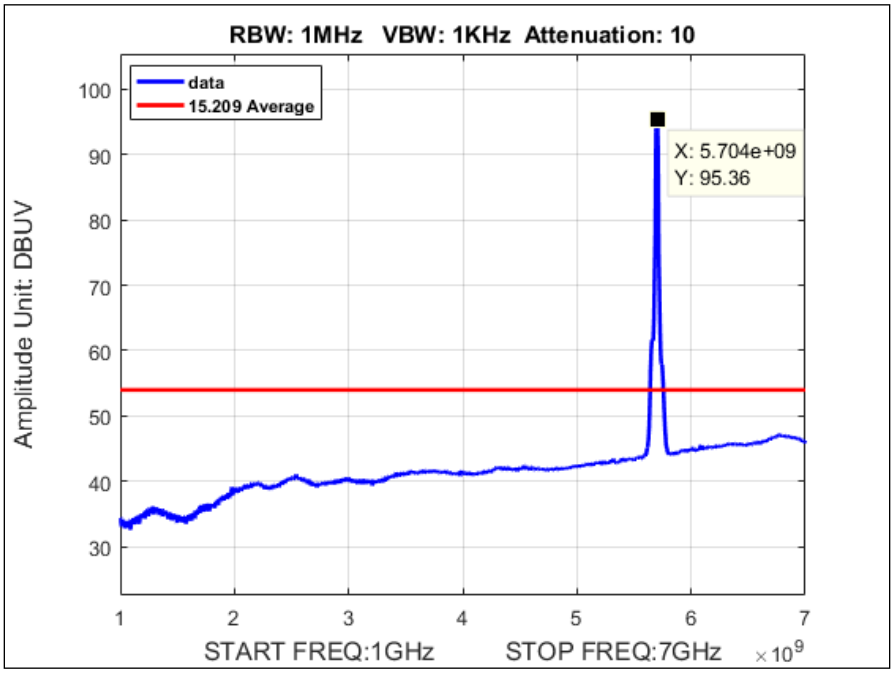
Plot 325. Undesirable Emissions, Average AC, 20M, 5320, 1-7GHz



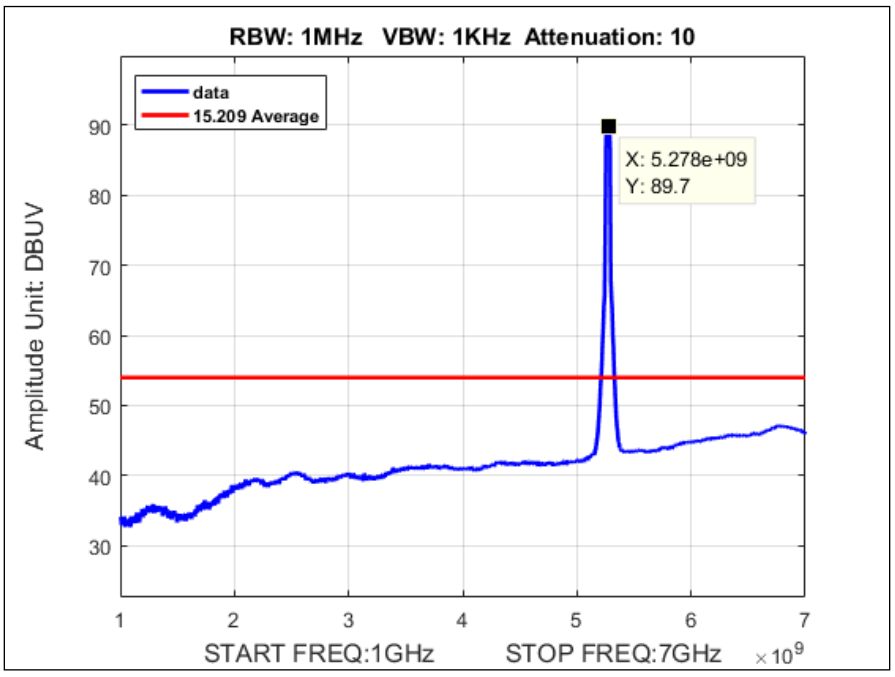
Plot 326. Undesirable Emissions, Average AC, 20M, 5500, 1-7GHz



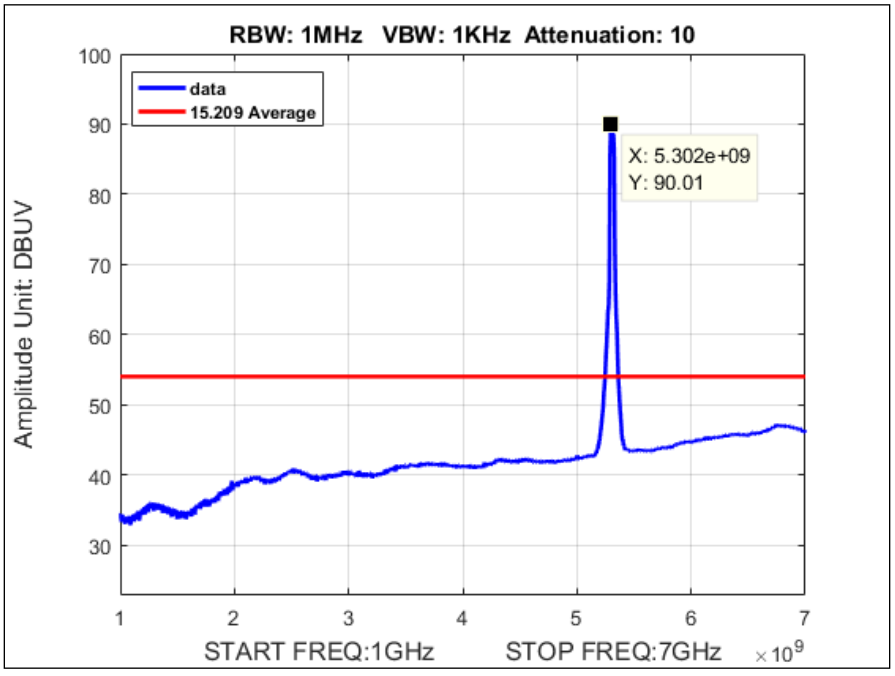
Plot 327. Undesirable Emissions, Average AC, 20M, 5600, 1-7GHz



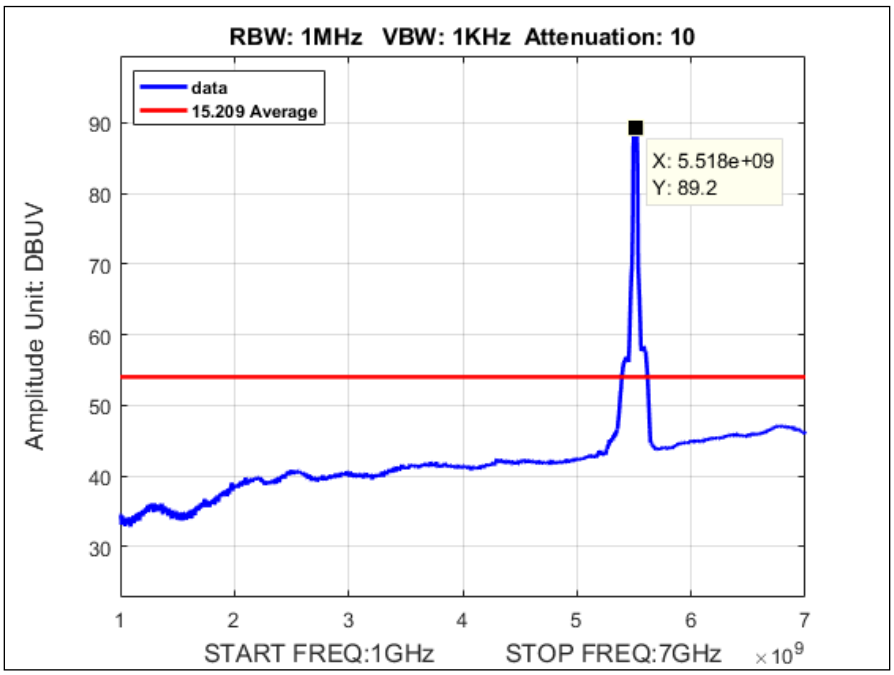
Plot 328. Undesirable Emissions, Average AC, 20M, 5700, 1-7GHz



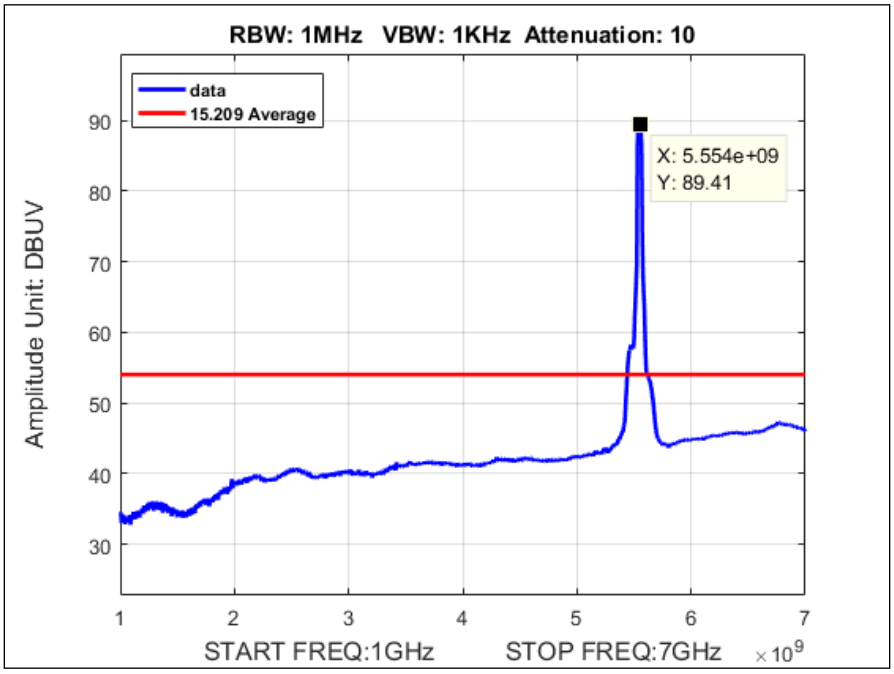
Plot 329. Undesirable Emissions, Average AC, 40M, 5270, 1-7GHz



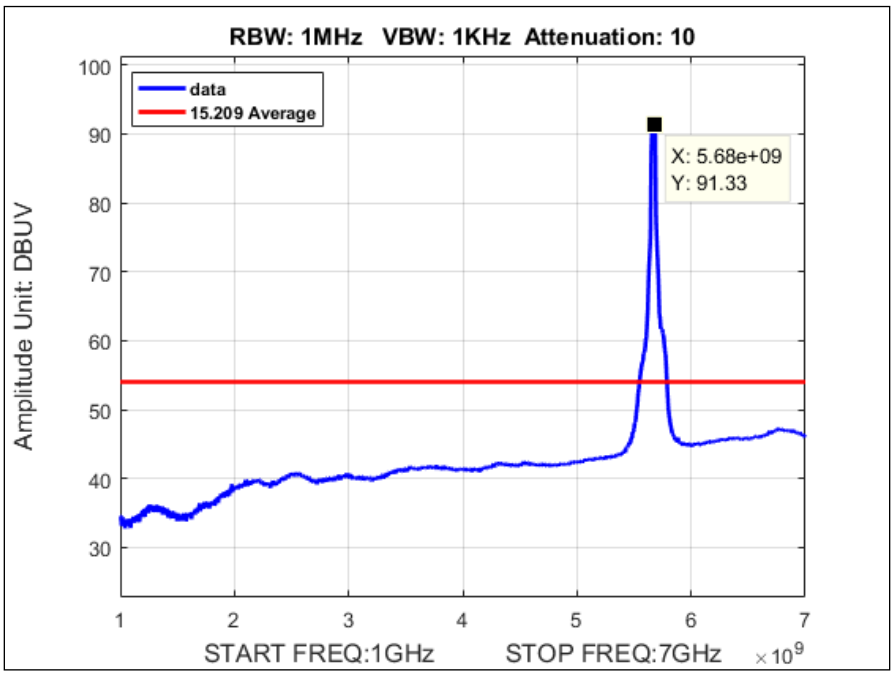
Plot 330. Undesirable Emissions, Average AC, 40M, 5310, 1-7GHz



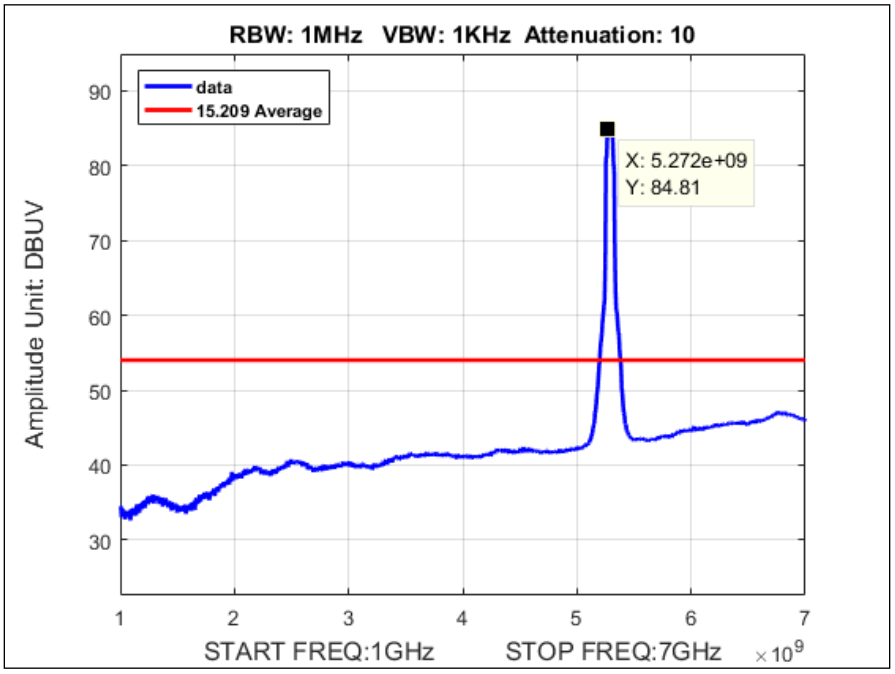
Plot 331. Undesirable Emissions, Average AC, 40M, 5510, 1-7GHz



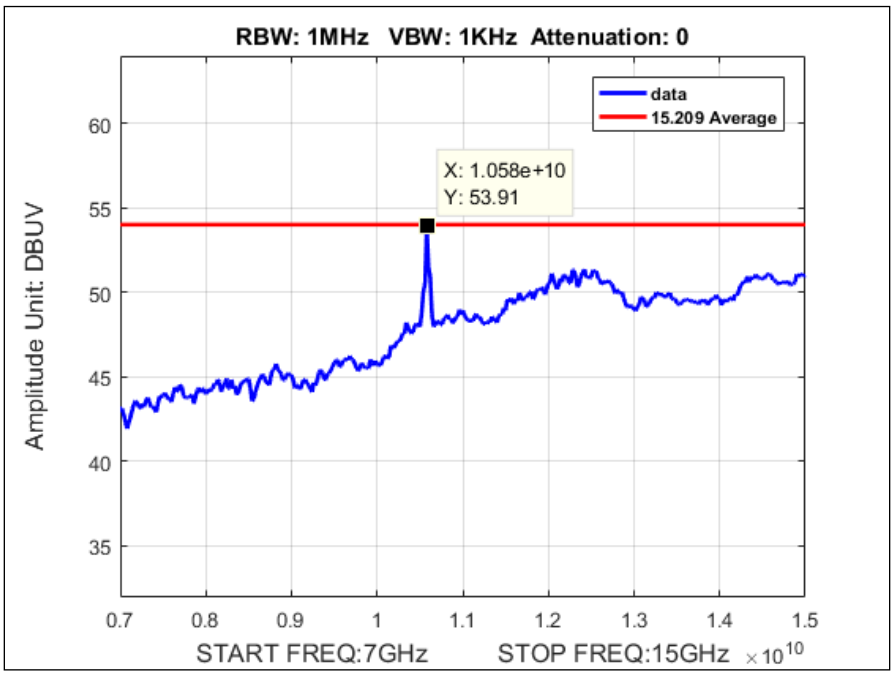
Plot 332. Undesirable Emissions, Average AC, 40M, 5550, 1-7GHz



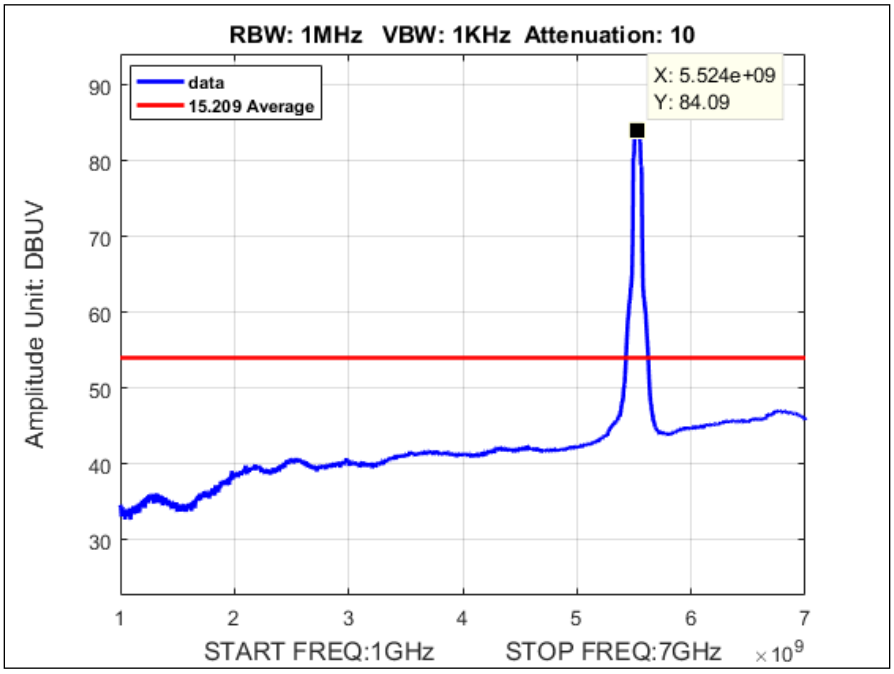
Plot 333. Undesirable Emissions, Average AC, 40M, 5670, 1-7GHz



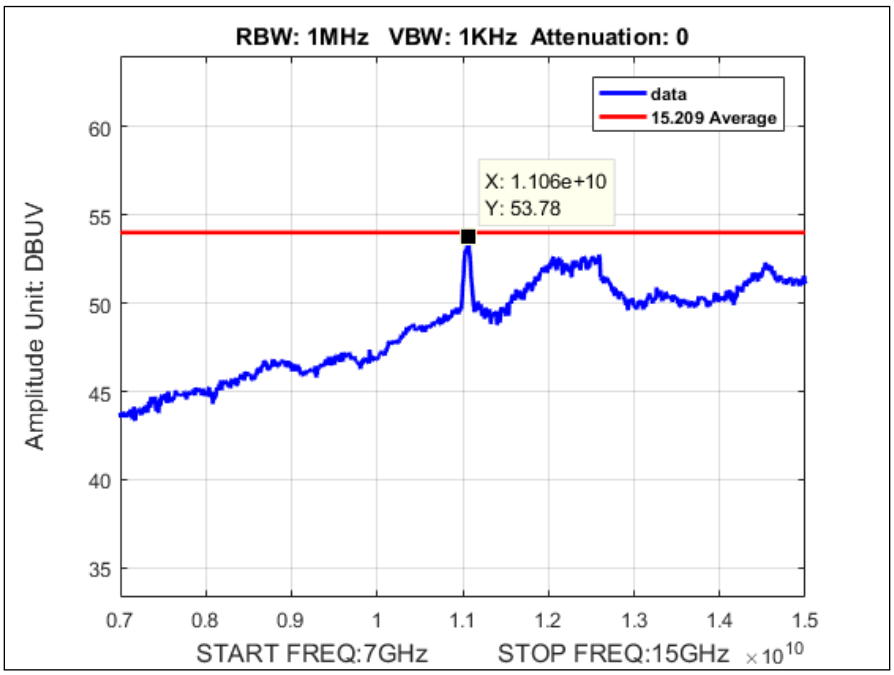
Plot 334. Undesirable Emissions, Average AC, 80M, 5290, 1-7GHz



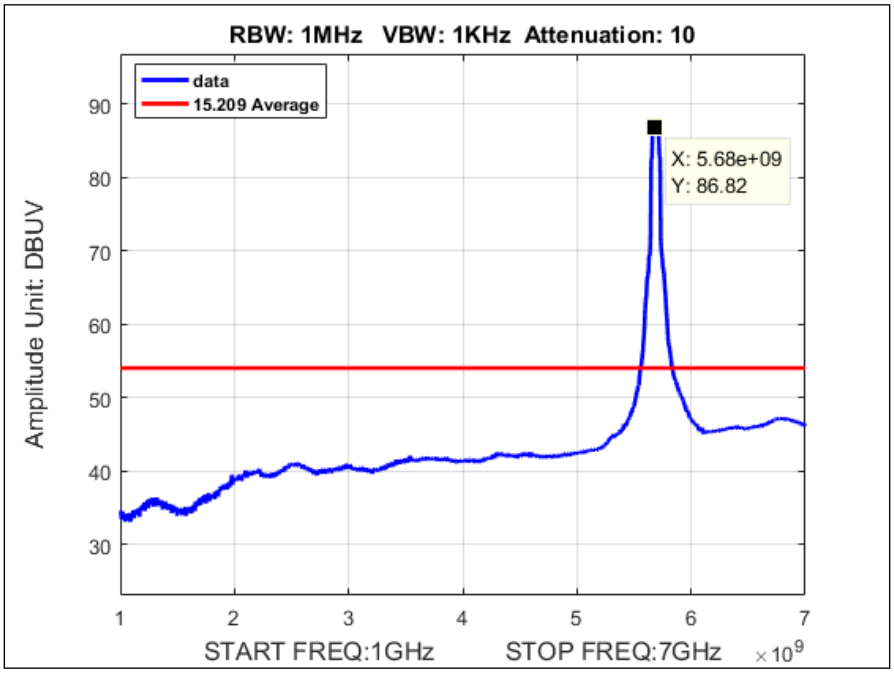
Plot 335. Undesirable Emissions, Average AC, 80M, 5290, 7-18GHz



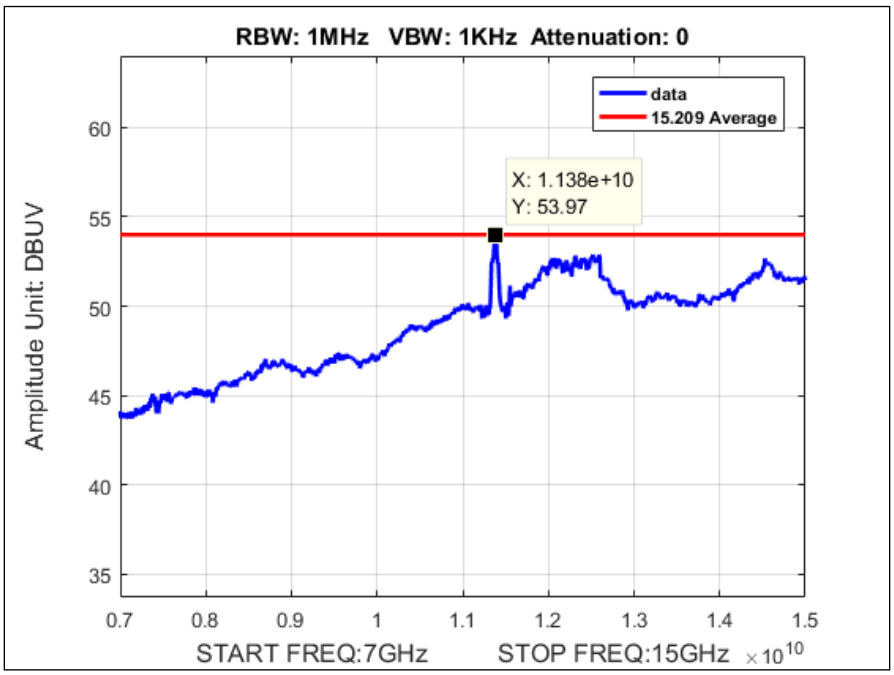
Plot 336. Undesirable Emissions, Average AC, 80M, 5530, 1-7GHz



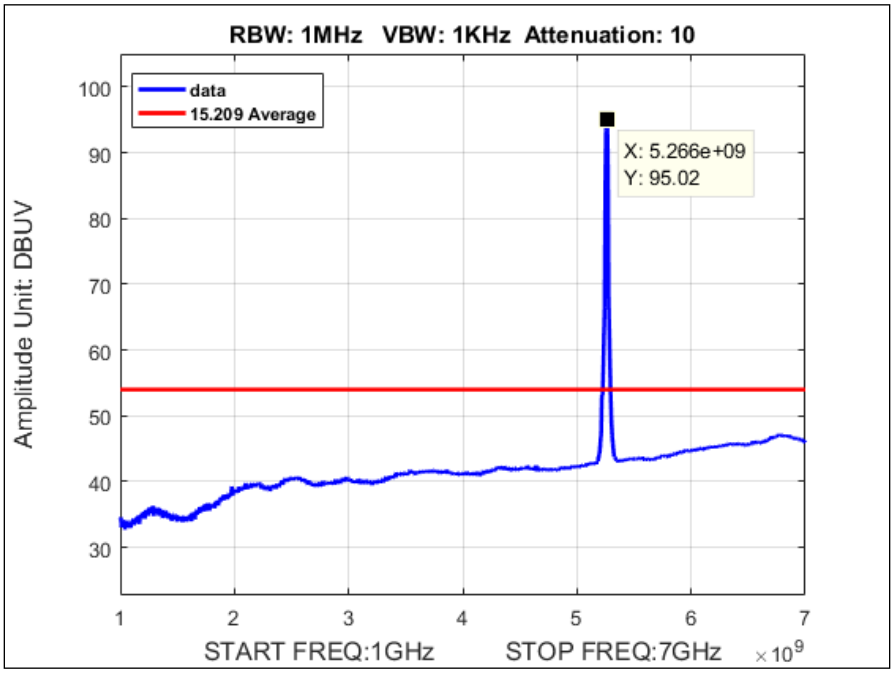
Plot 337. Undesirable Emissions, Average AC, 80M, 5530, 7-18GHz



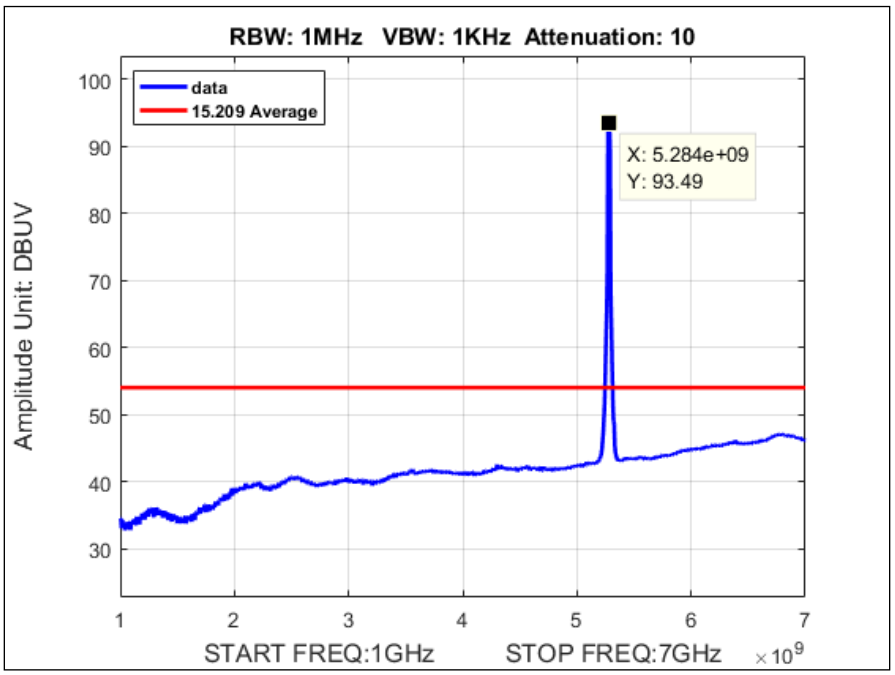
Plot 338. Undesirable Emissions, Average AC, 80M, 5690, 1-7GHz



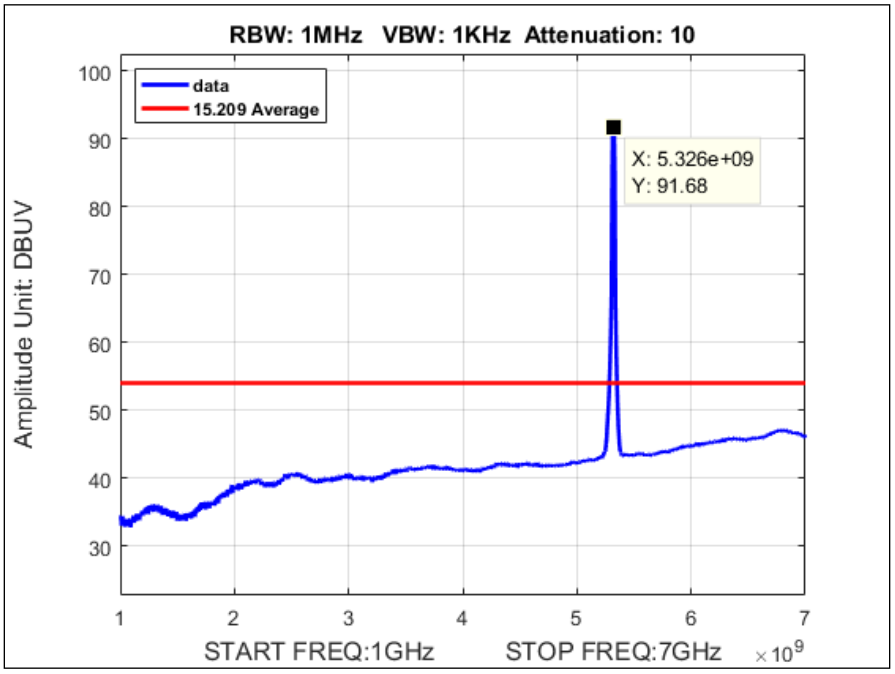
Plot 339. Undesirable Emissions, Average AC, 80M, 5690, 7-15GHz



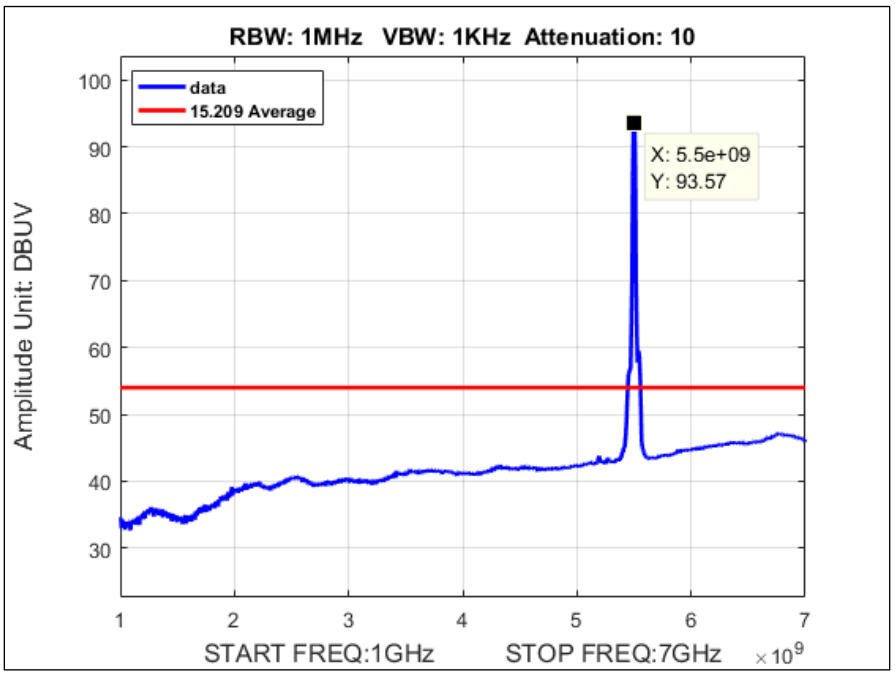
Plot 340. Undesirable Emissions, AverageN, 20M, 5260, 1-7GHz



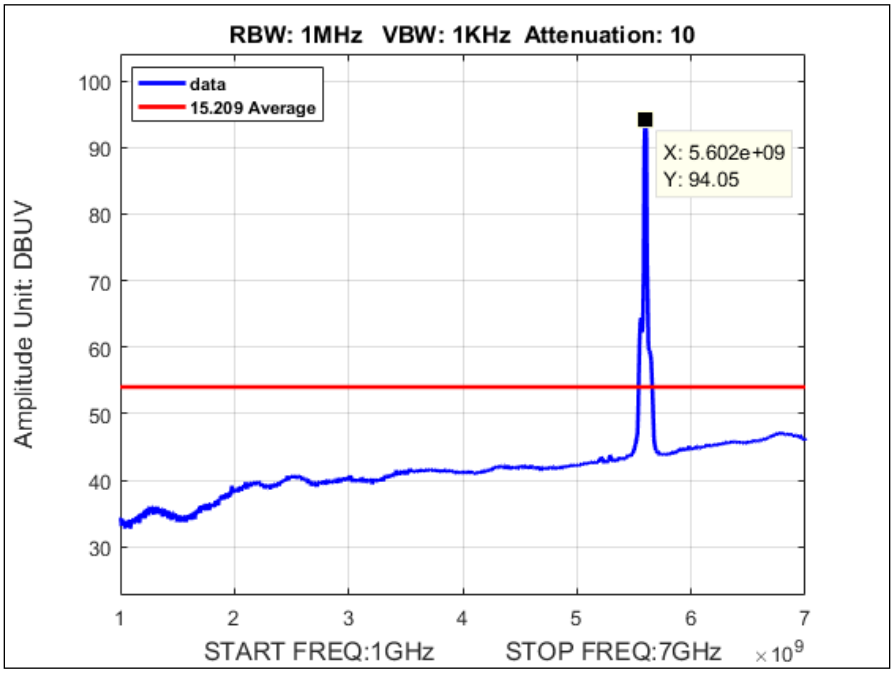
Plot 341. Undesirable Emissions, Average N, 20M, 5280, 1-7GHz



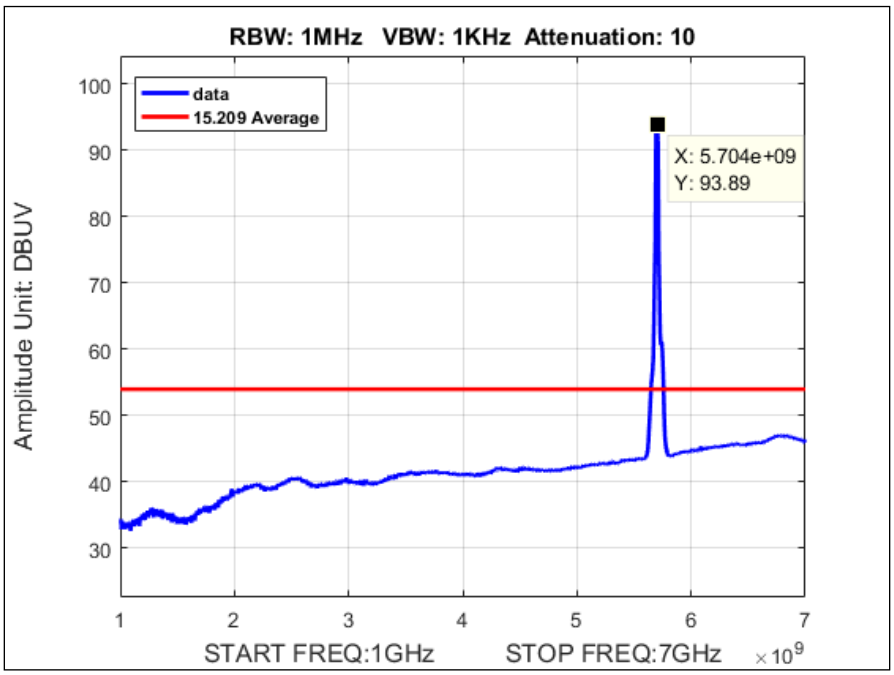
Plot 342. Undesirable Emissions, Average N, 20M, 5320, 1-7GHz



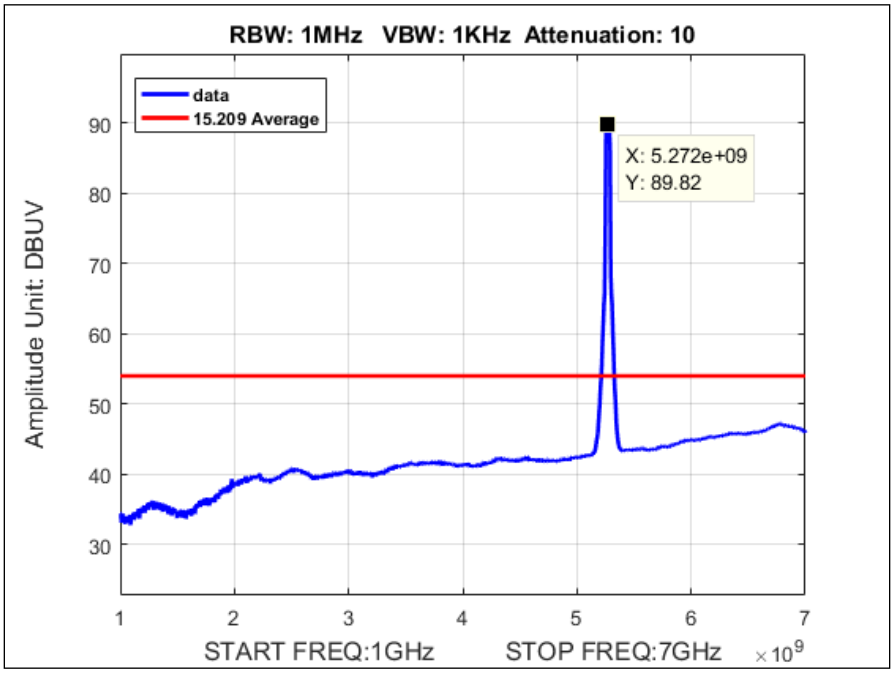
Plot 343. Undesirable Emissions, Average N, 20M, 5500, 1-7GHz



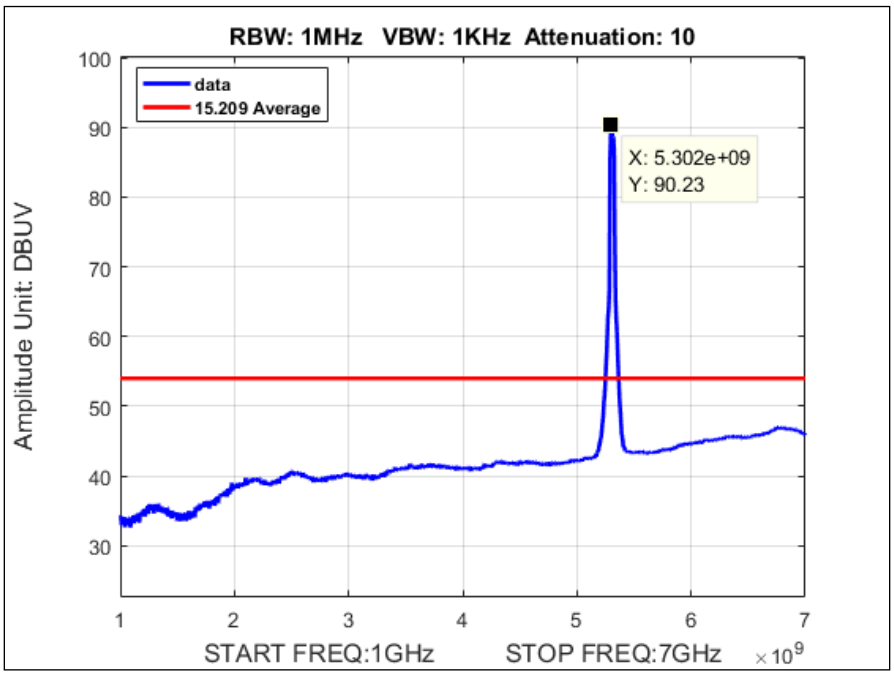
Plot 344. Undesirable Emissions, Average N, 20M, 5600, 1-7GHz



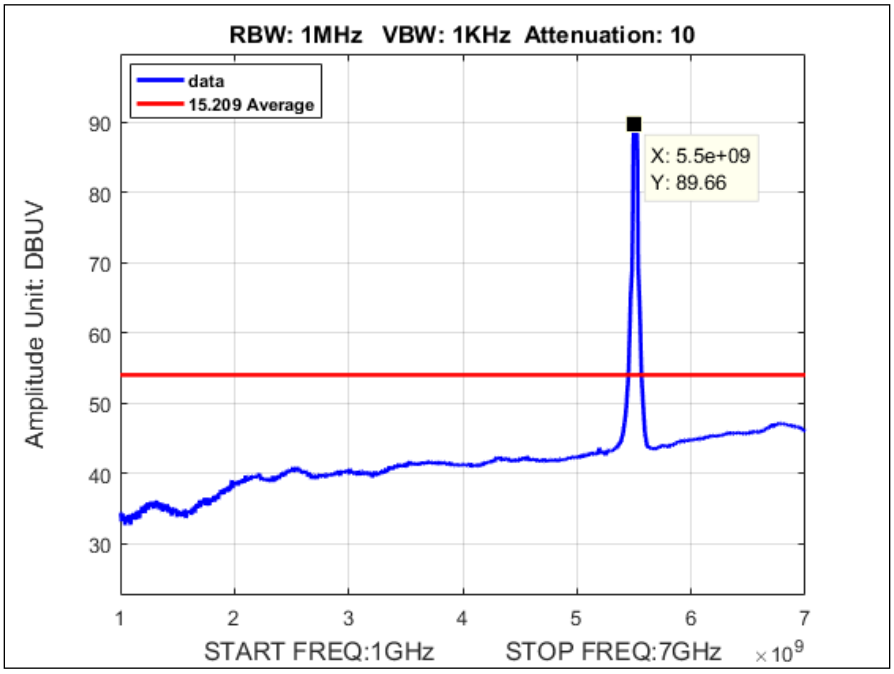
Plot 345. Undesirable Emissions, Average N, 20M, 5700, 1-7GHz



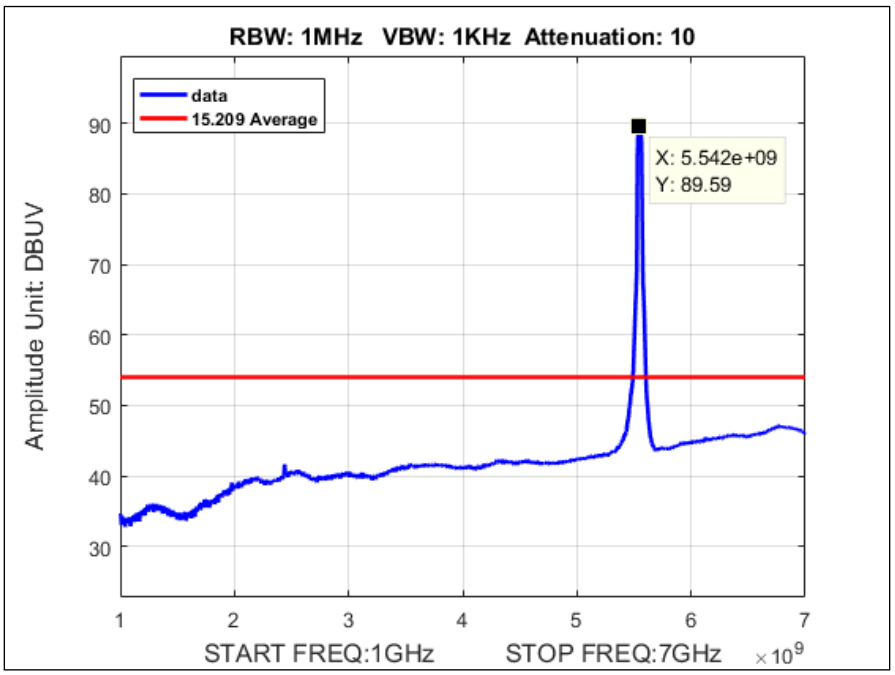
Plot 346. Undesirable Emissions, Average N, 40M, 5270, 1-7GHz



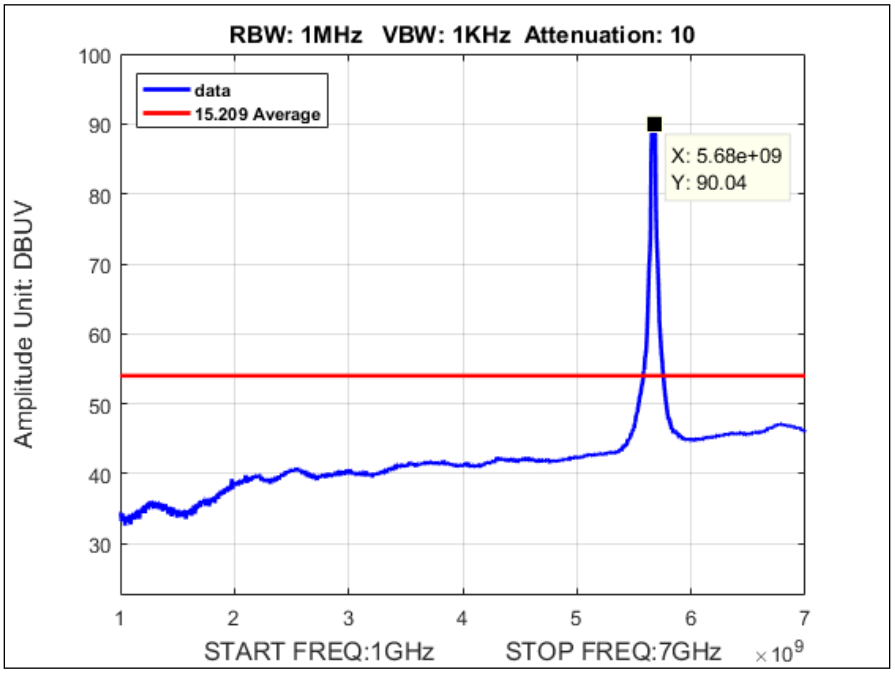
Plot 347. Undesirable Emissions, Average N, 40M, 5310, 1-7GHz



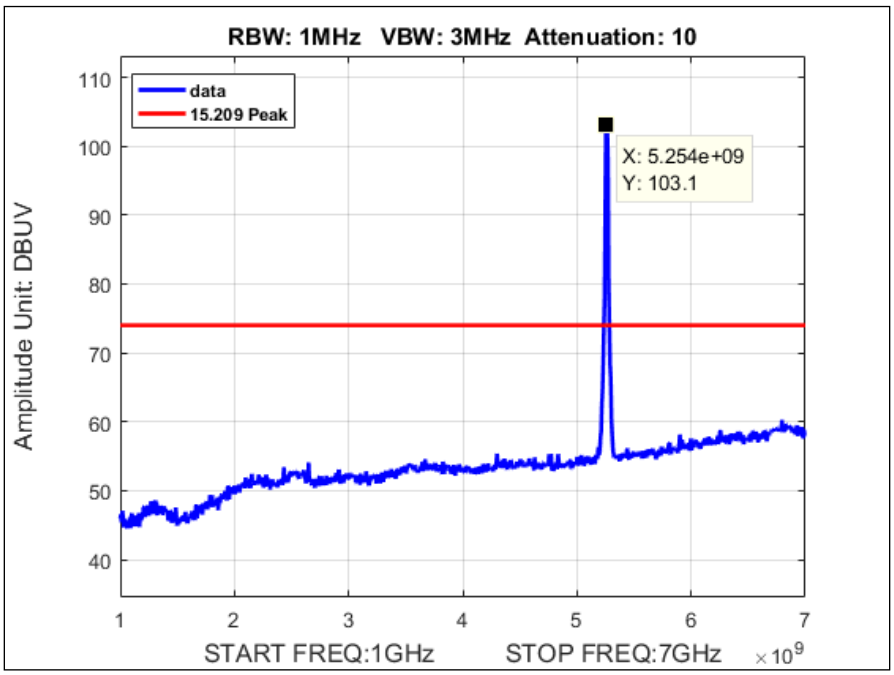
Plot 348. Undesirable Emissions, Average N, 40M, 5510, 1-7GHz



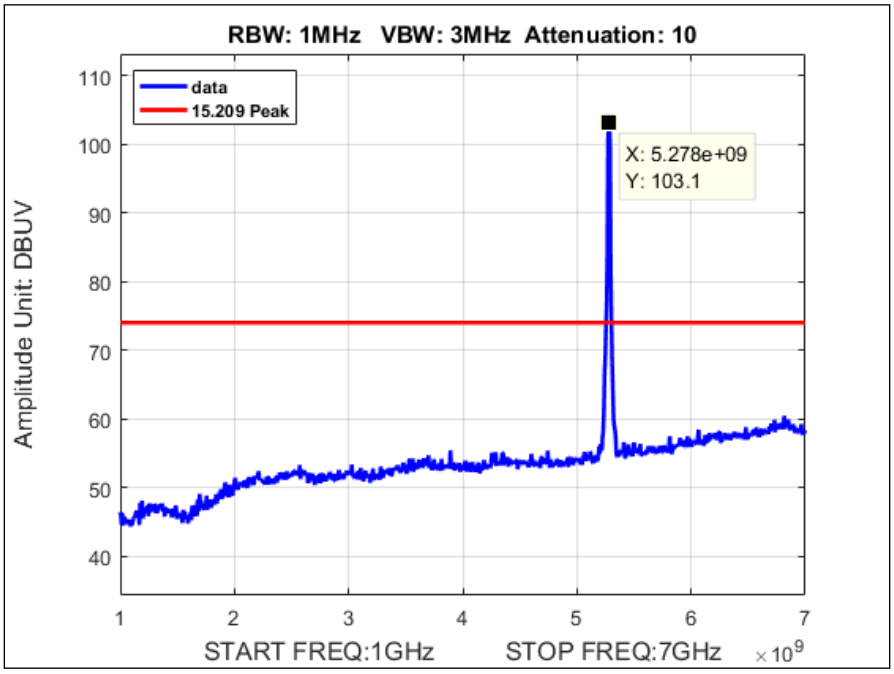
Plot 349. Undesirable Emissions, Average N, 40M, 5550, 1-7GHz



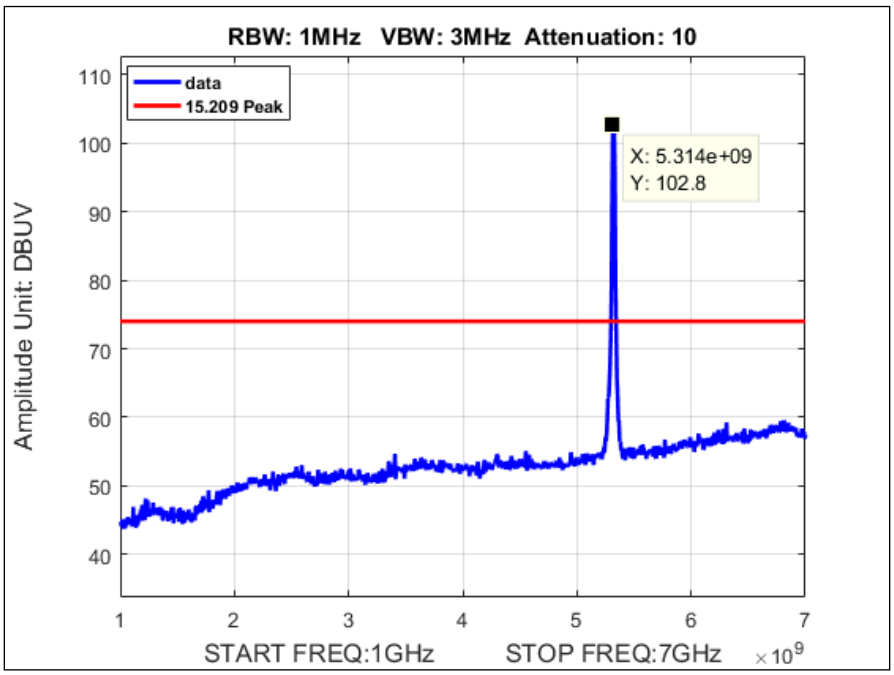
Plot 350. Undesirable Emissions, Average N, 40M, 5670, 1-7GHz



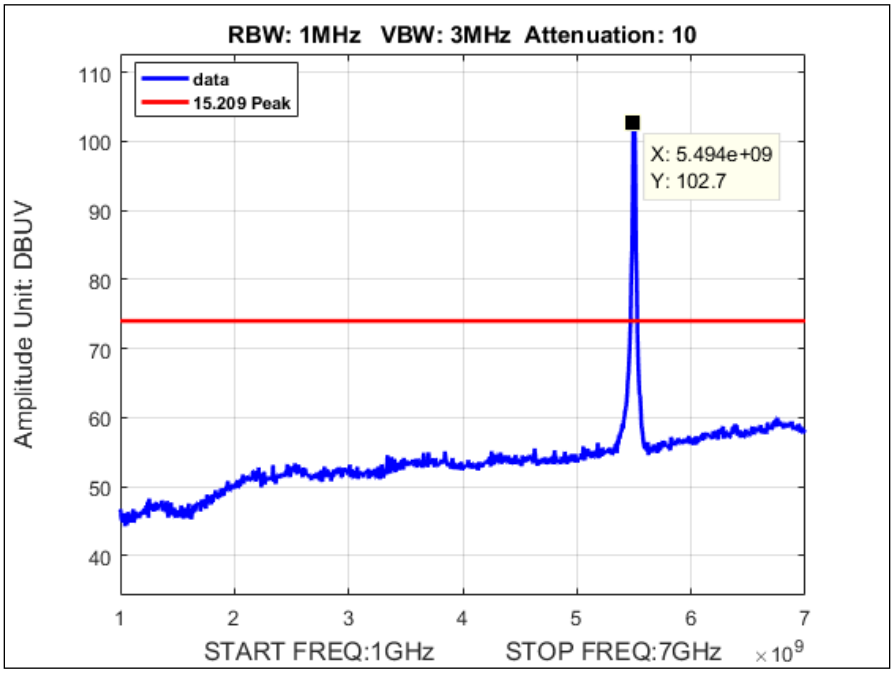
Plot 351. Undesirable Emissions, Peak A, 20M, 5260, 1-7GHz



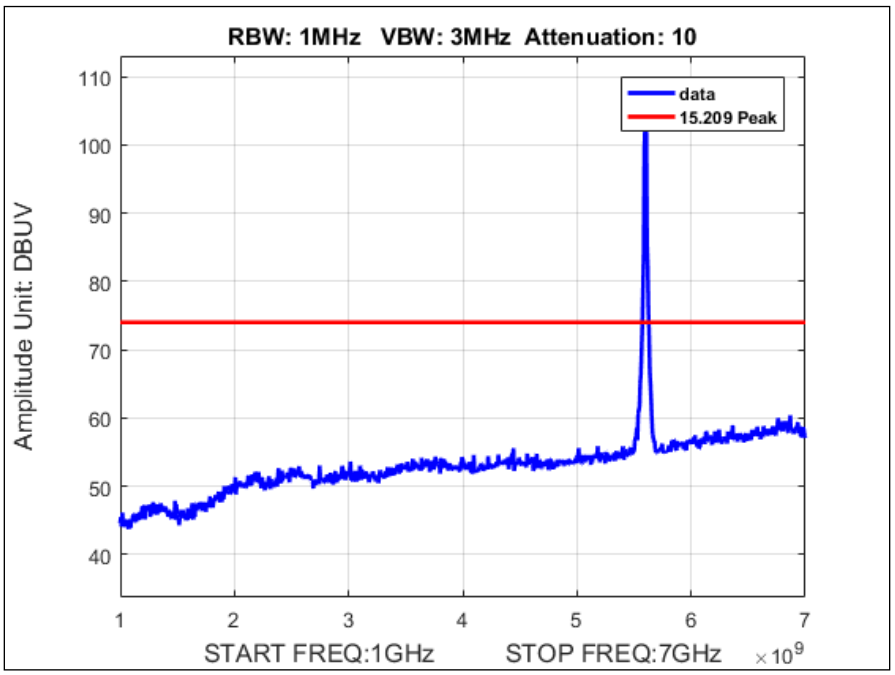
Plot 352. Undesirable Emissions, Peak A, 20M, 5280, 1-7GHz



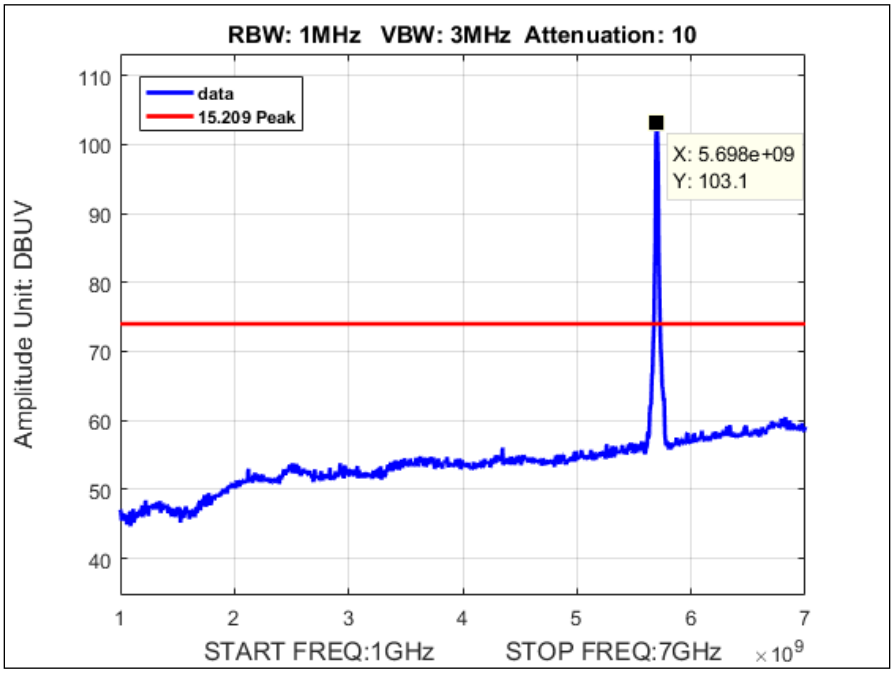
Plot 353. Undesirable Emissions, Peak A, 20M, 5320, 1-7GHz



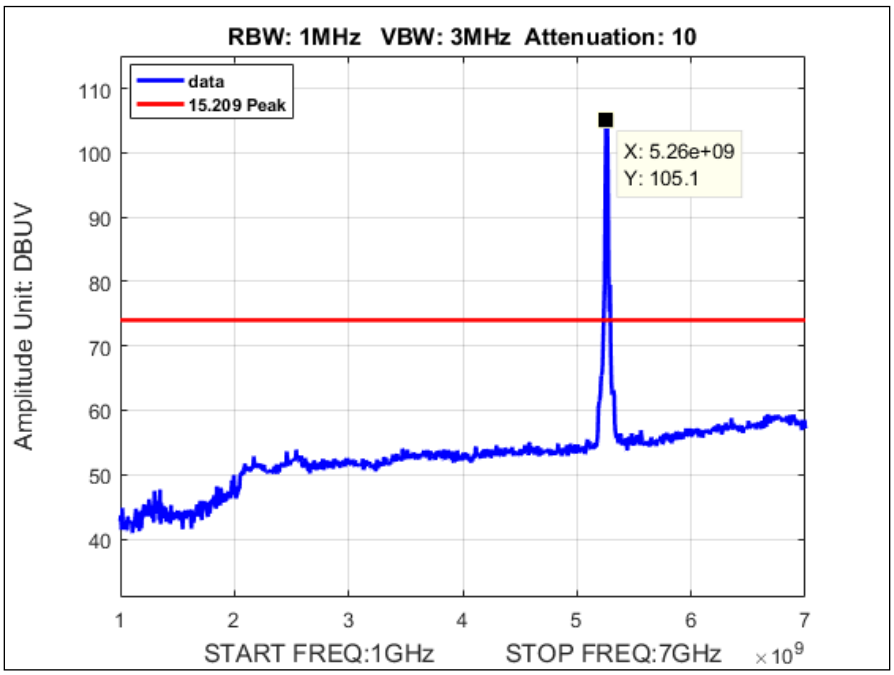
Plot 354. Undesirable Emissions, Peak A, 20M, 5500, 1-7GHz



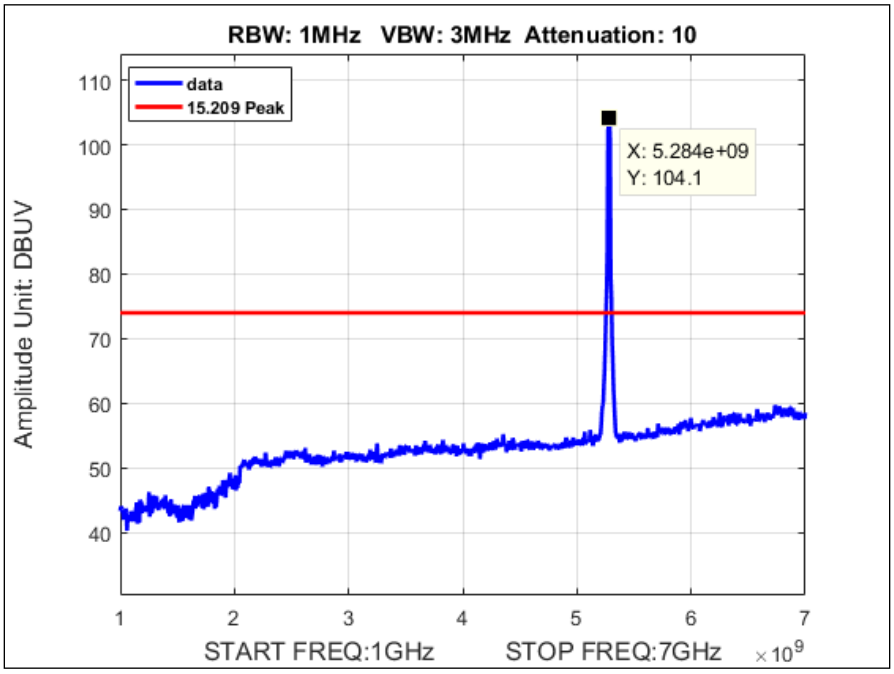
Plot 355. Undesirable Emissions, Peak A, 20M, 5600, 1-7GHz



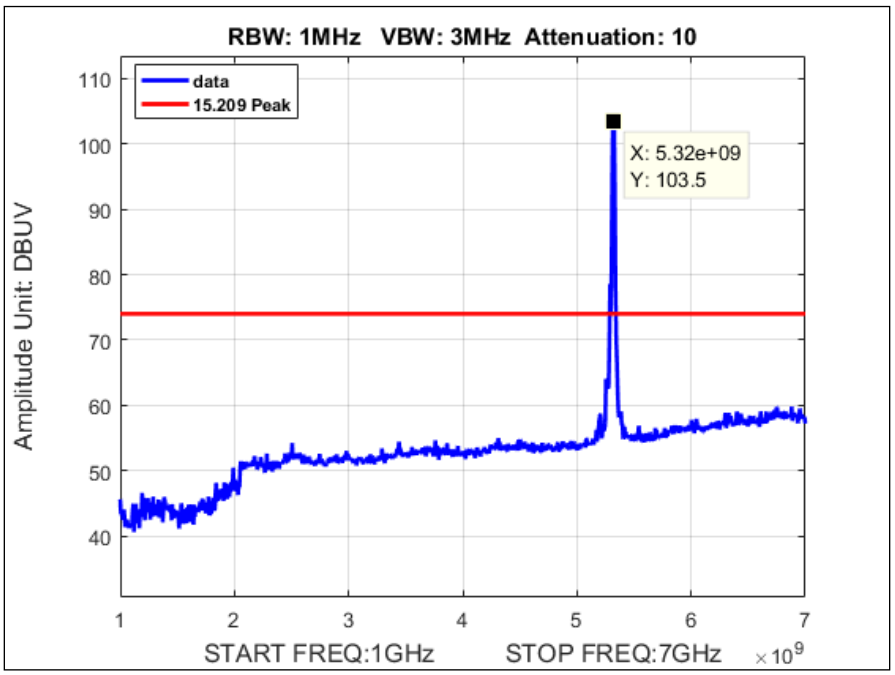
Plot 356. Undesirable Emissions, Peak A, 20M, 5700, 1-7GHz



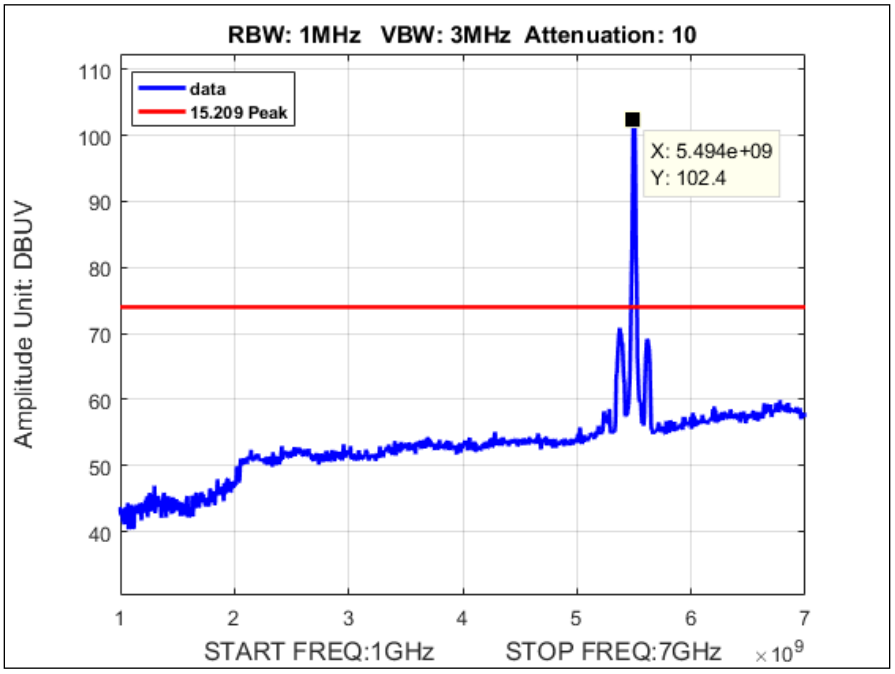
Plot 357. Undesirable Emissions, Peak AC, 20M, 5260, 1-7GHz



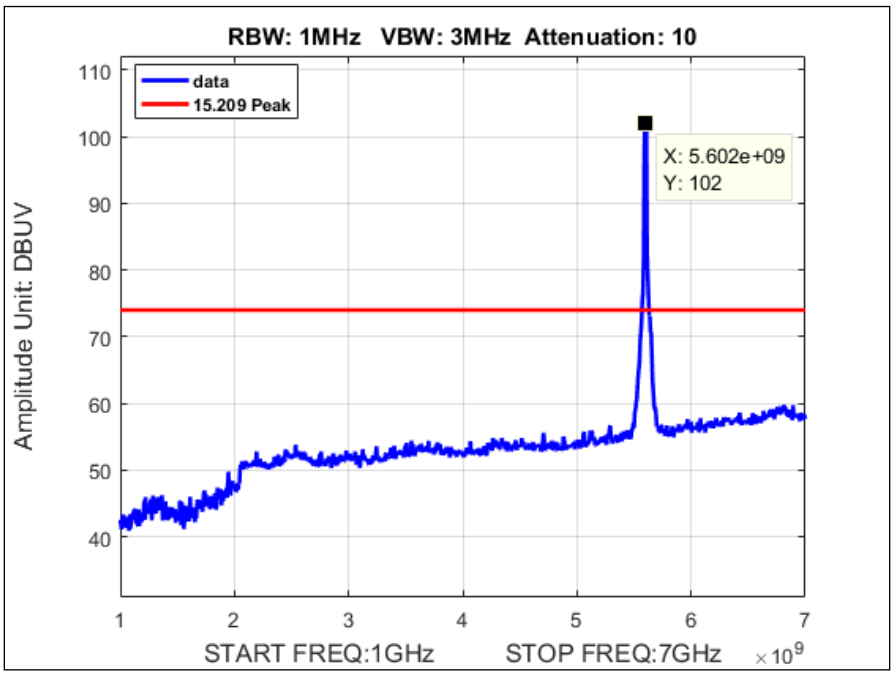
Plot 358. Undesirable Emissions, Peak AC, 20M, 5280, 1-7GHz



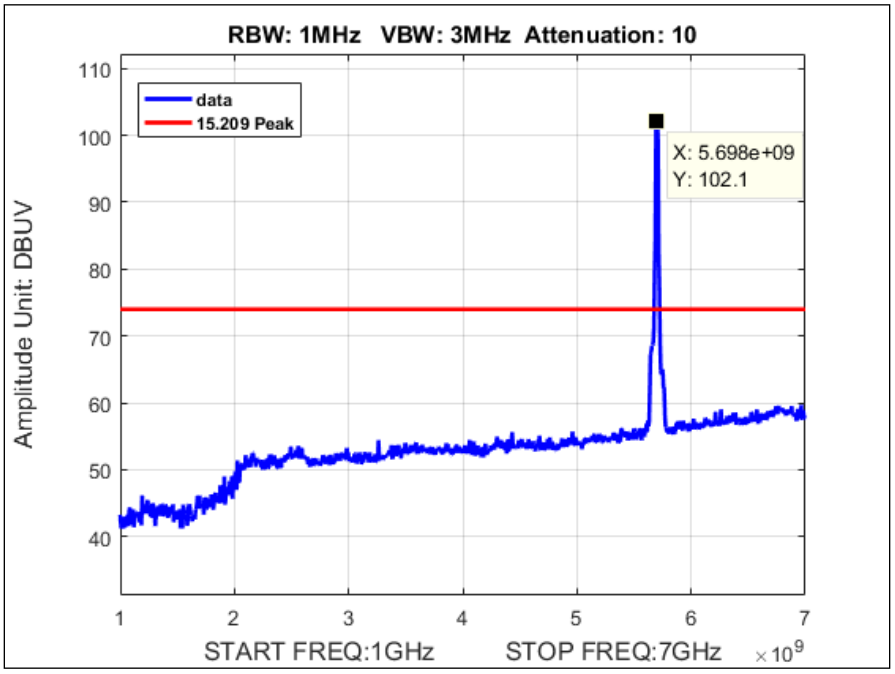
Plot 359. Undesirable Emissions, Peak AC, 20M, 5320, 1-7GHz



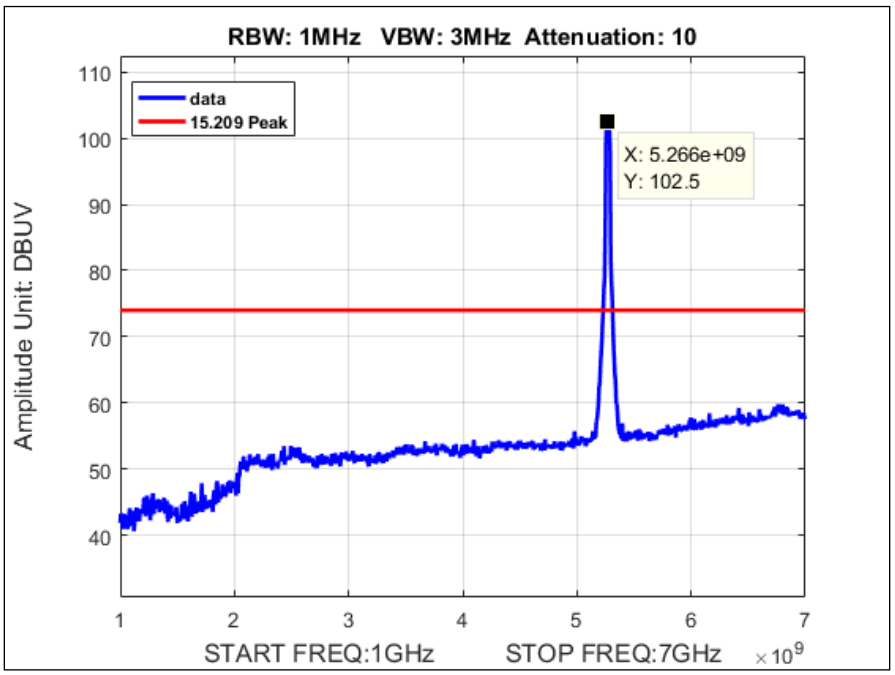
Plot 360. Undesirable Emissions, Peak AC, 20M, 5500, 1-7GHz



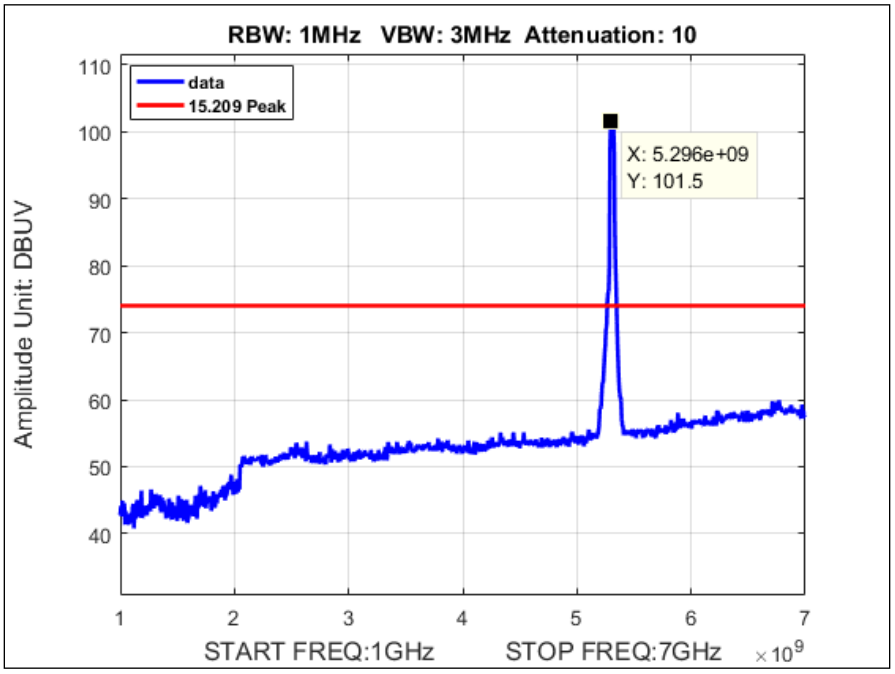
Plot 361. Undesirable Emissions, Peak AC, 20M, 5600, 1-7GHz



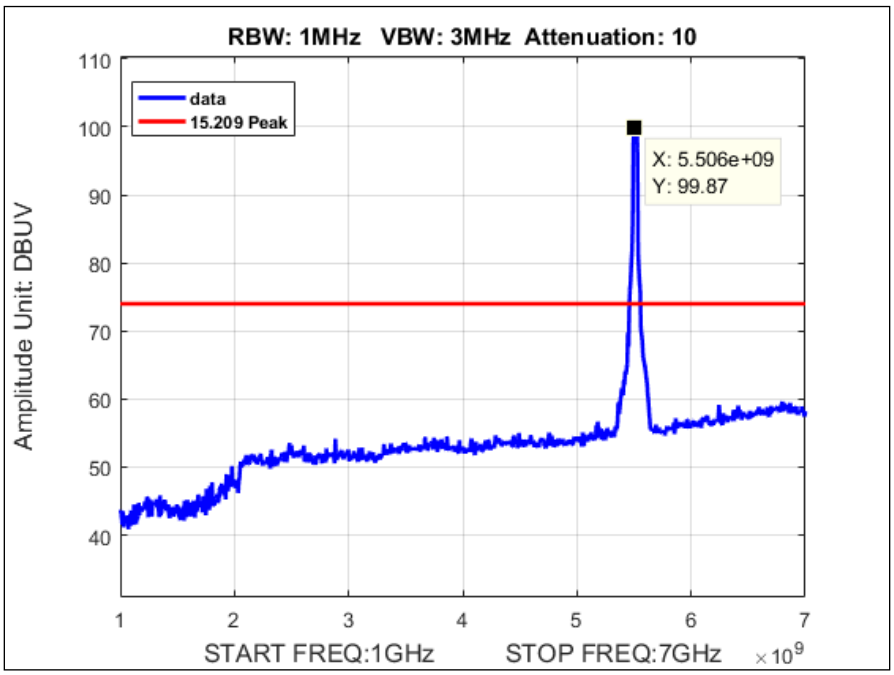
Plot 362. Undesirable Emissions, Peak AC, 20M, 5700, 1-7GHz



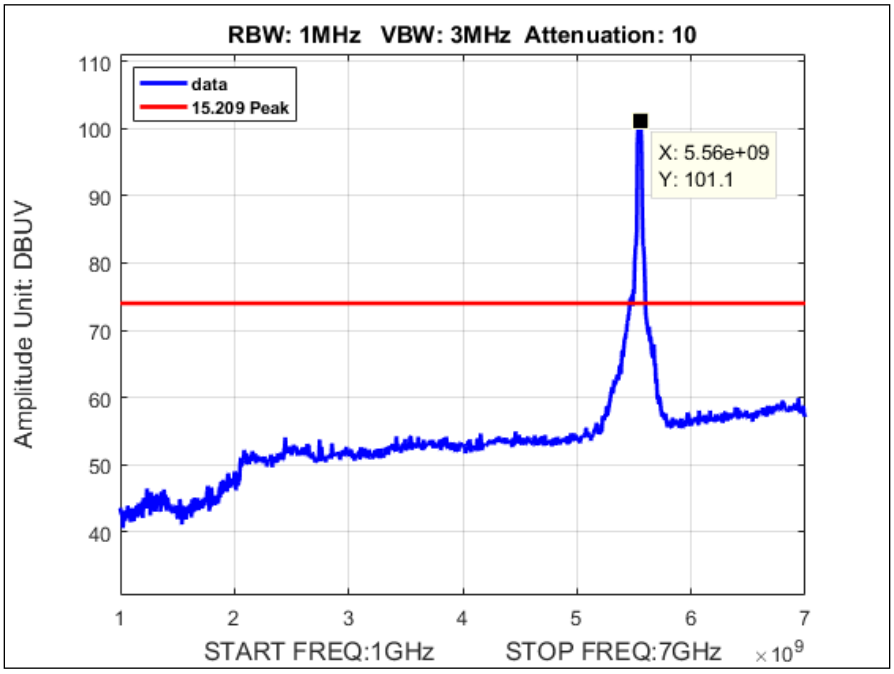
Plot 363. Undesirable Emissions, Peak AC, 40M, 5270, 1-7GHz



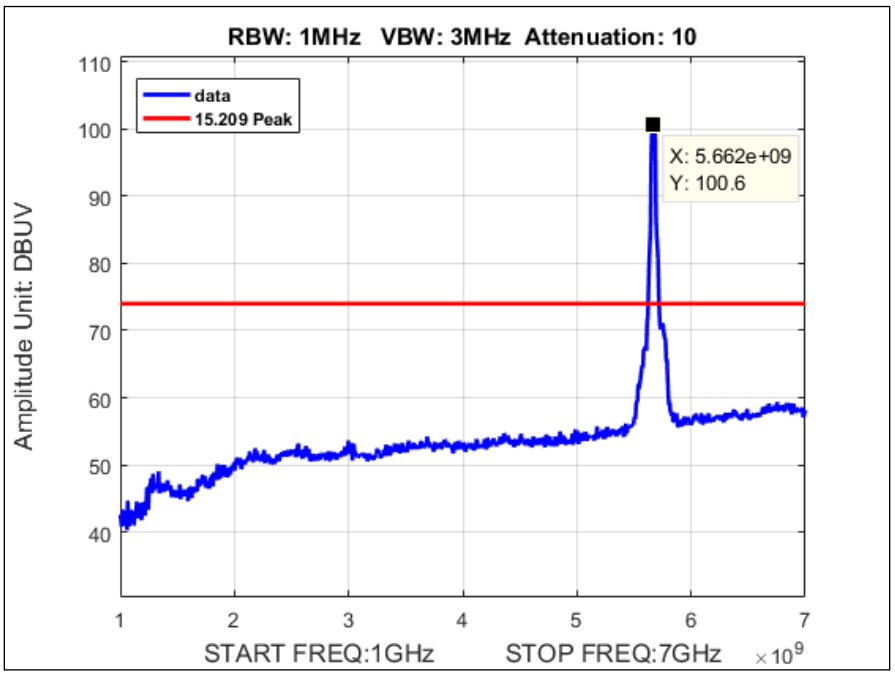
Plot 364. Undesirable Emissions, Peak AC, 40M, 5310, 1-7GHz



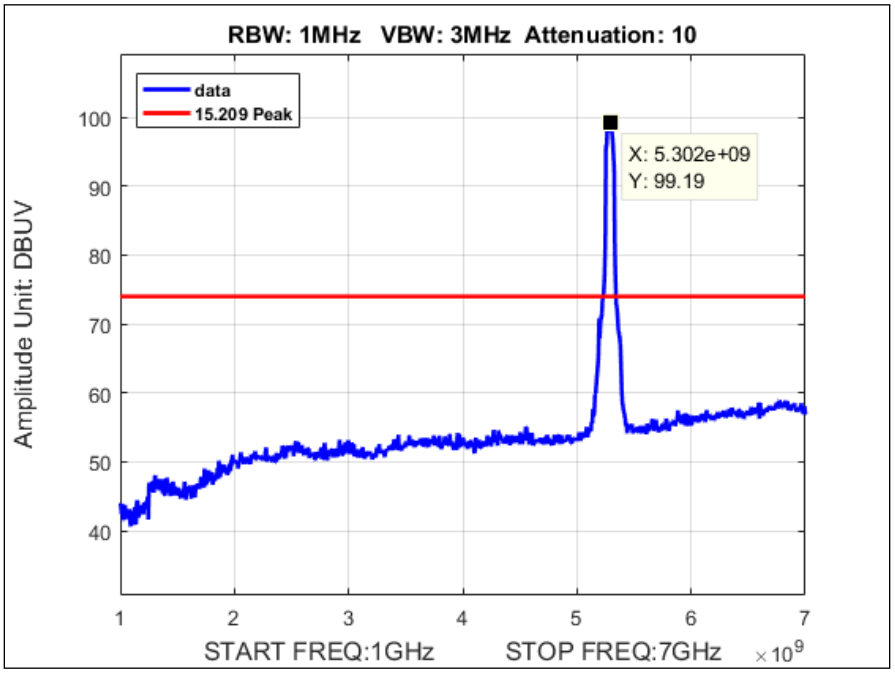
Plot 365. Undesirable Emissions, Peak AC, 40M, 5510, 1-7GHz



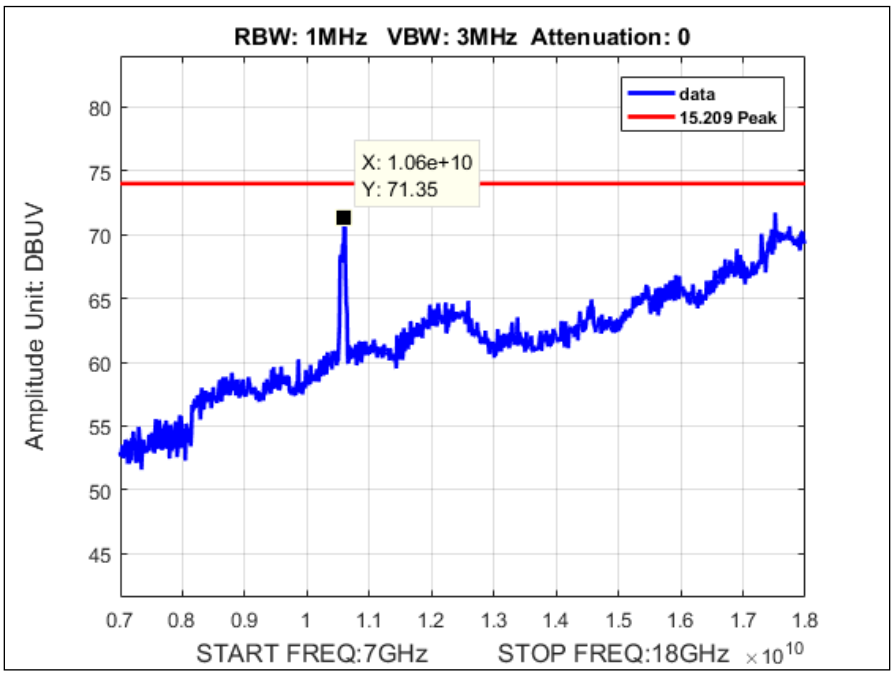
Plot 366. Undesirable Emissions, Peak AC, 40M, 5550, 1-7GHz



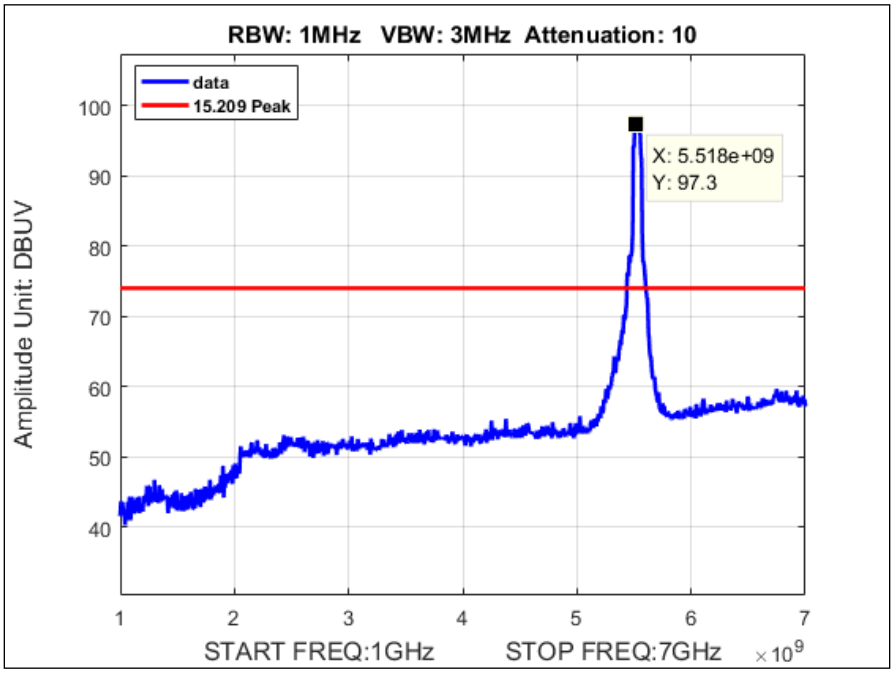
Plot 367. Undesirable Emissions, Peak AC, 40M, 5670, 1-7GHz



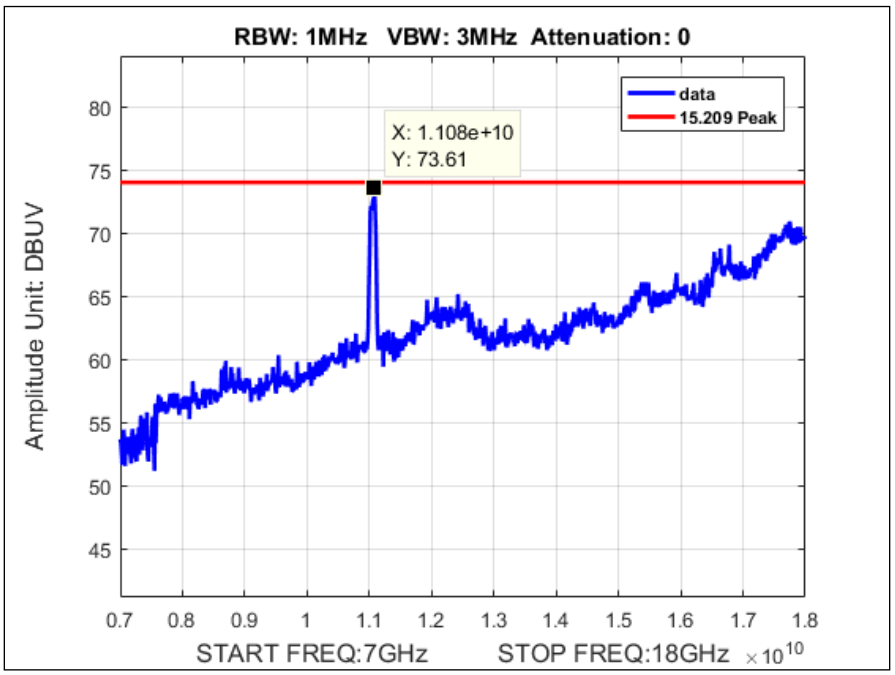
Plot 368. Undesirable Emissions, Peak AC, 80M, 5290, 1-7GHz



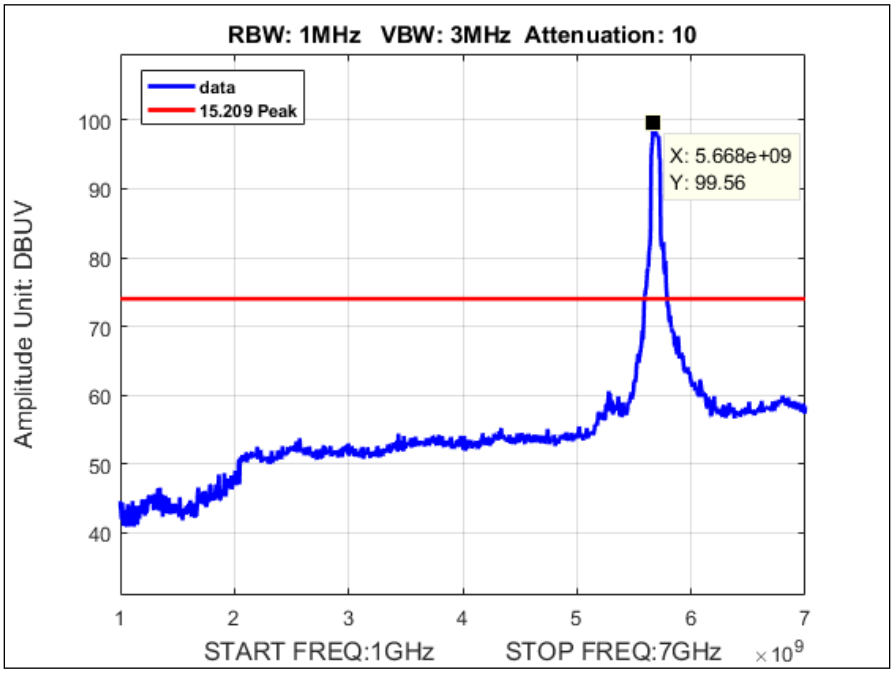
Plot 369. Undesirable Emissions, Peak AC, 80M, 5290, 7-18GHz



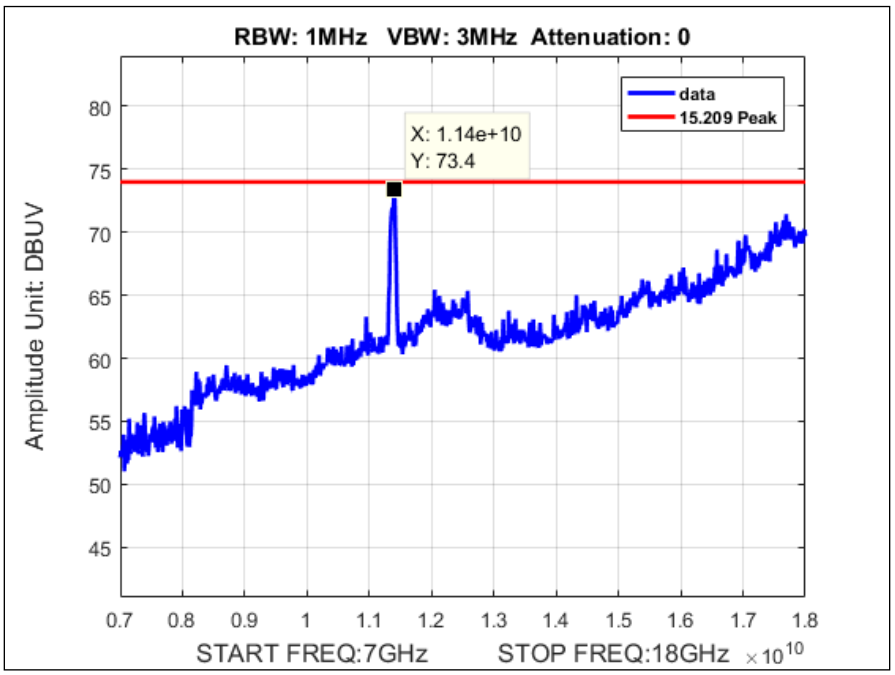
Plot 370. Undesirable Emissions, Peak AC, 80M, 5530, 1-7GHz



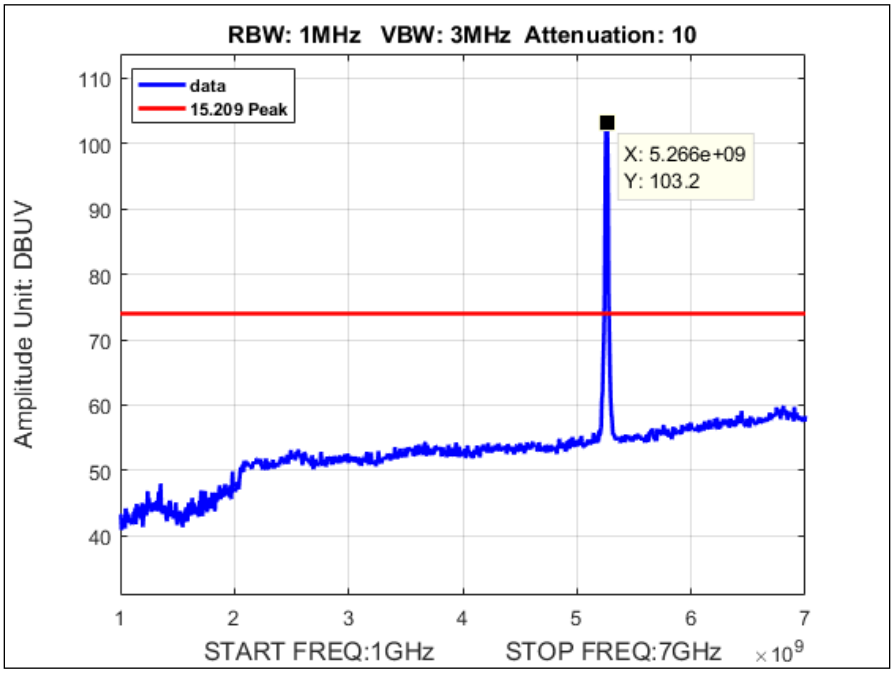
Plot 371. Undesirable Emissions, Peak AC, 80M, 5530, 7-18GHz



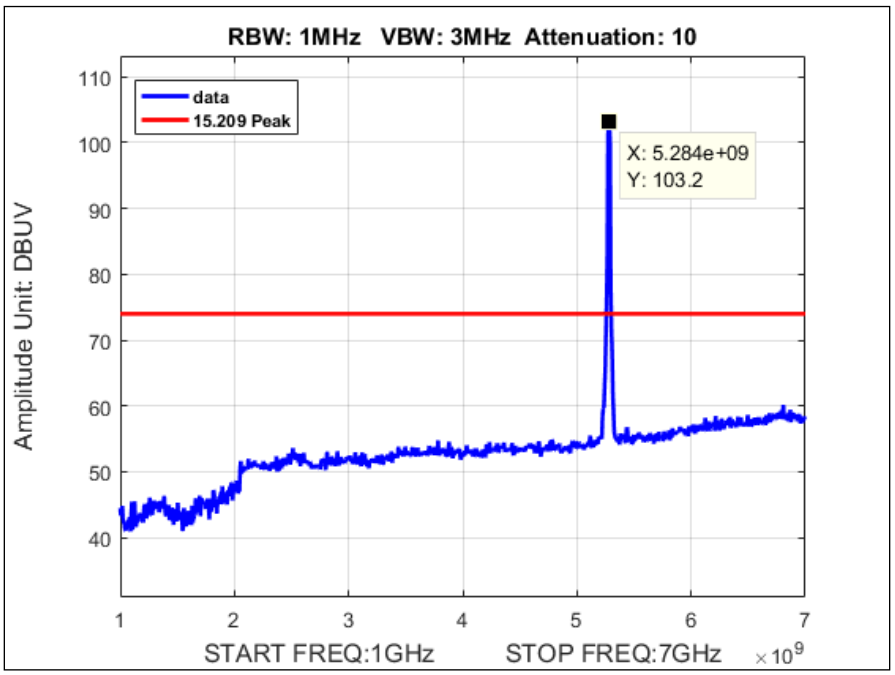
Plot 372. Undesirable Emissions, Peak AC, 80M, 5690, 1-7GHz



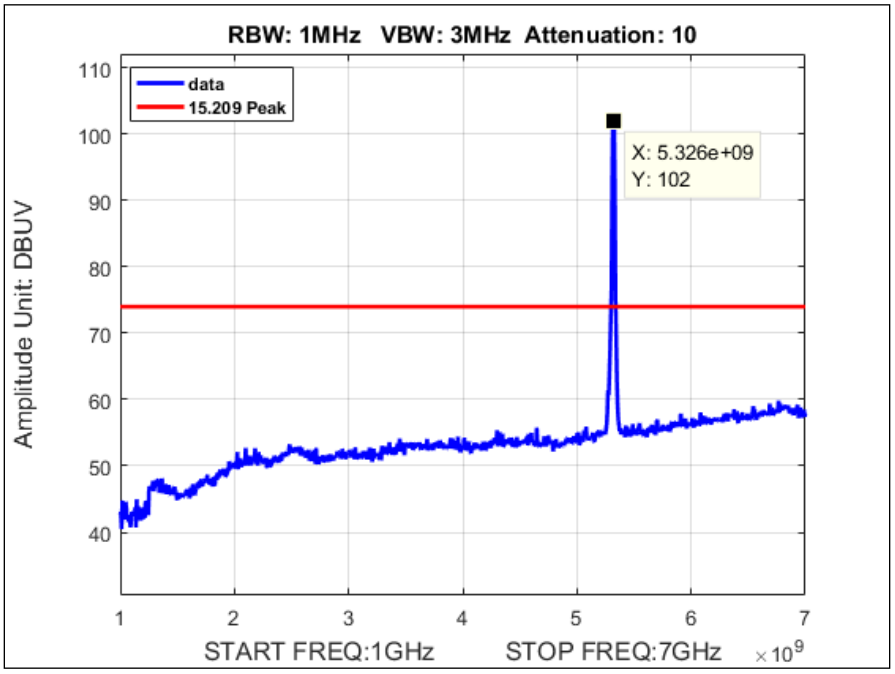
Plot 373. Undesirable Emissions, Peak AC, 80M, 5690, 7-18GHz



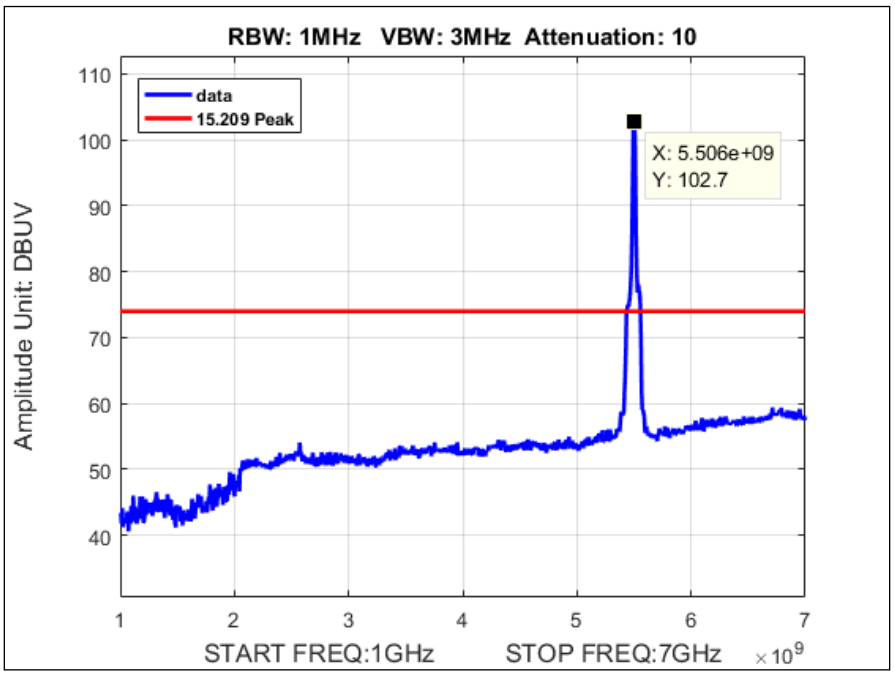
Plot 374. Undesirable Emissions, Peak N, 20M, 5260, 1-7GHz



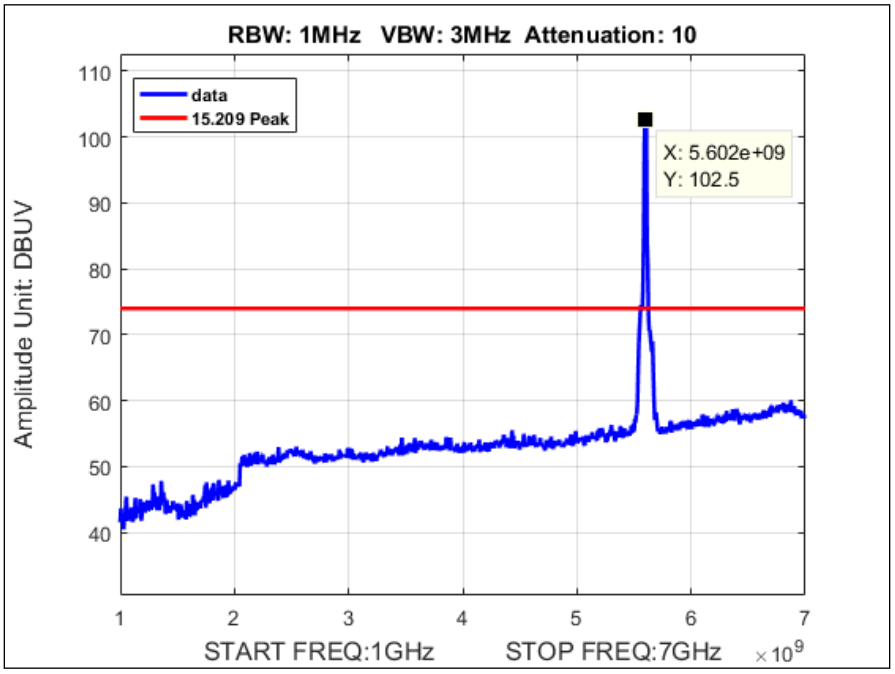
Plot 375. Undesirable Emissions, Peak N, 20M, 5280, 1-7GHz



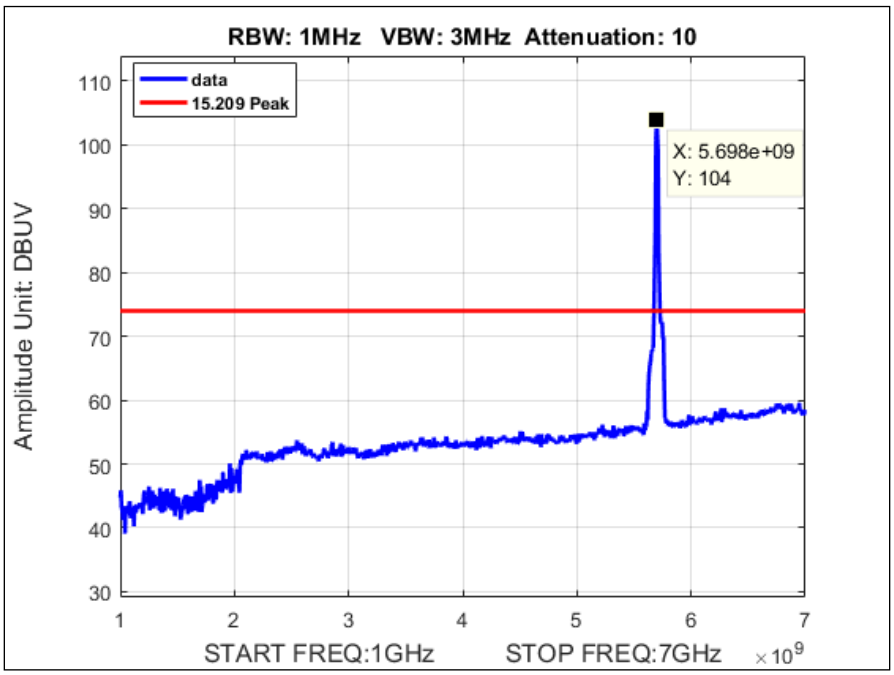
Plot 376. Undesirable Emissions, Peak N, 20M, 5320, 1-7GHz



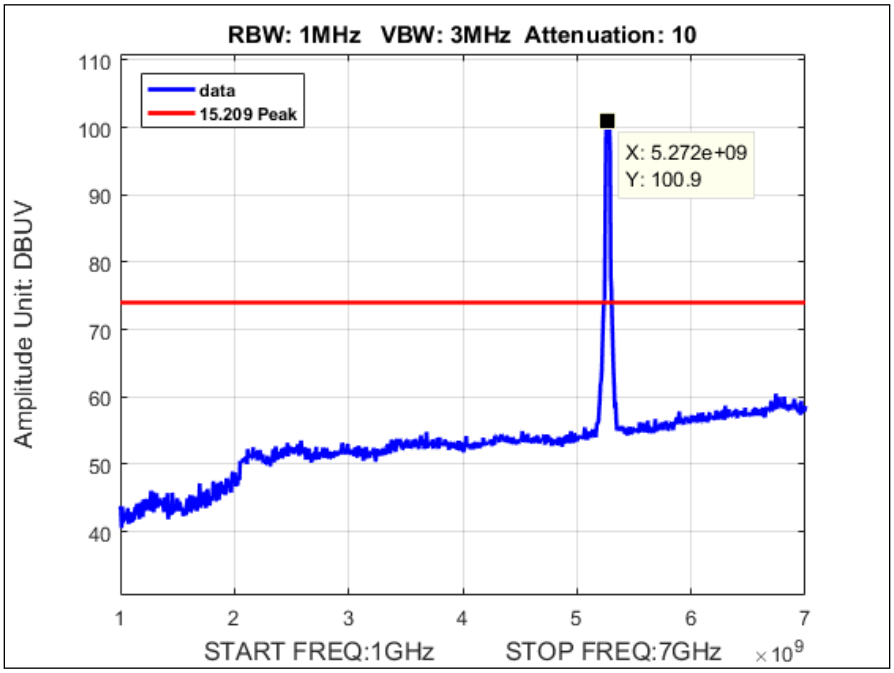
Plot 377. Undesirable Emissions, Peak N, 20M, 5500, 1-7GHz



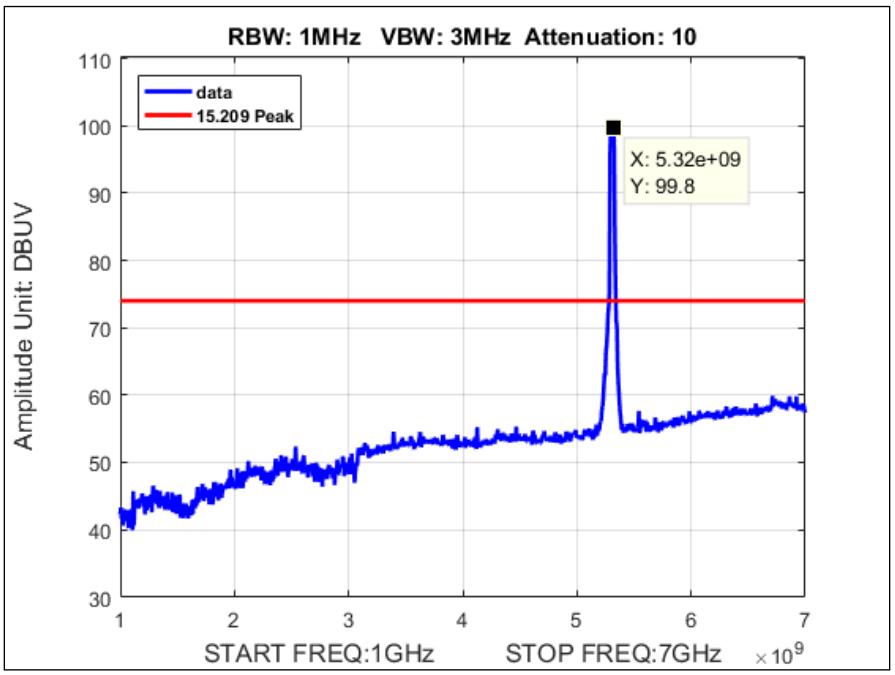
Plot 378. Undesirable Emissions, Peak N, 20M, 5600, 1-7GHz



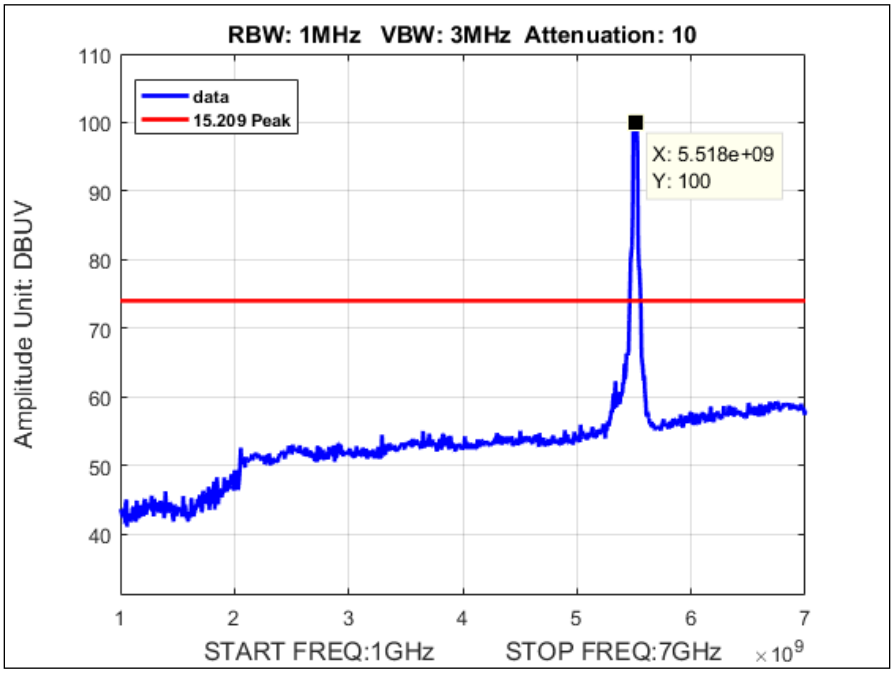
Plot 379. Undesirable Emissions, Peak N, 20M, 5700, 1-7GHz



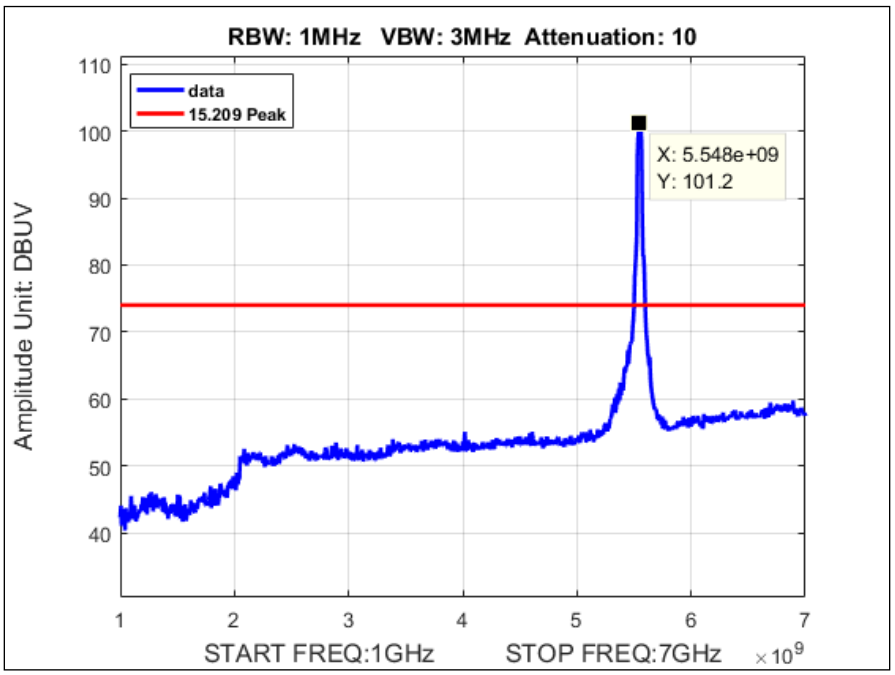
Plot 380. Undesirable Emissions, Peak N, 40M, 5270, 1-7GHz



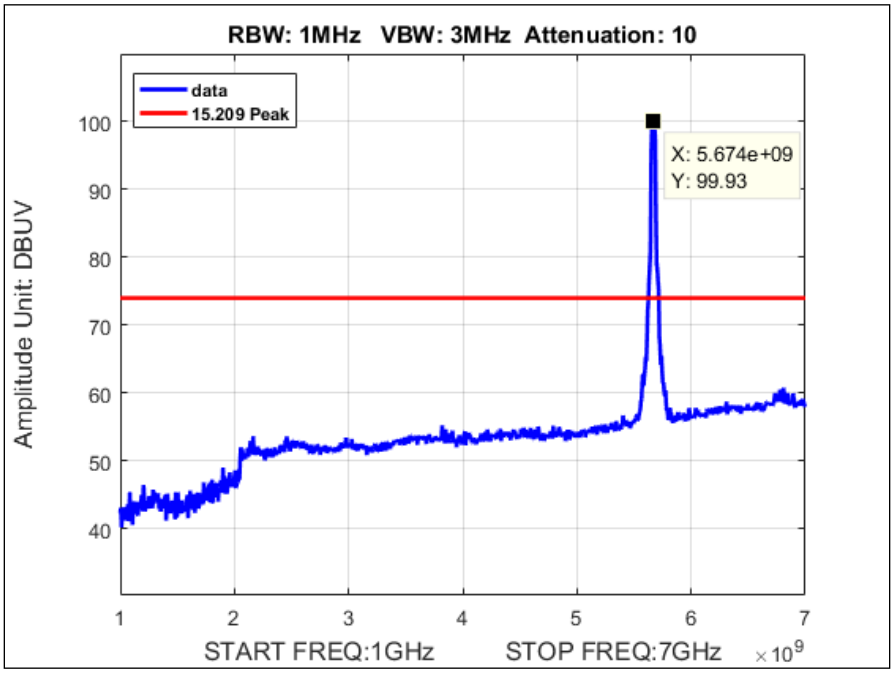
Plot 381. Undesirable Emissions, Peak N, 40M, 5310, 1-7GHz



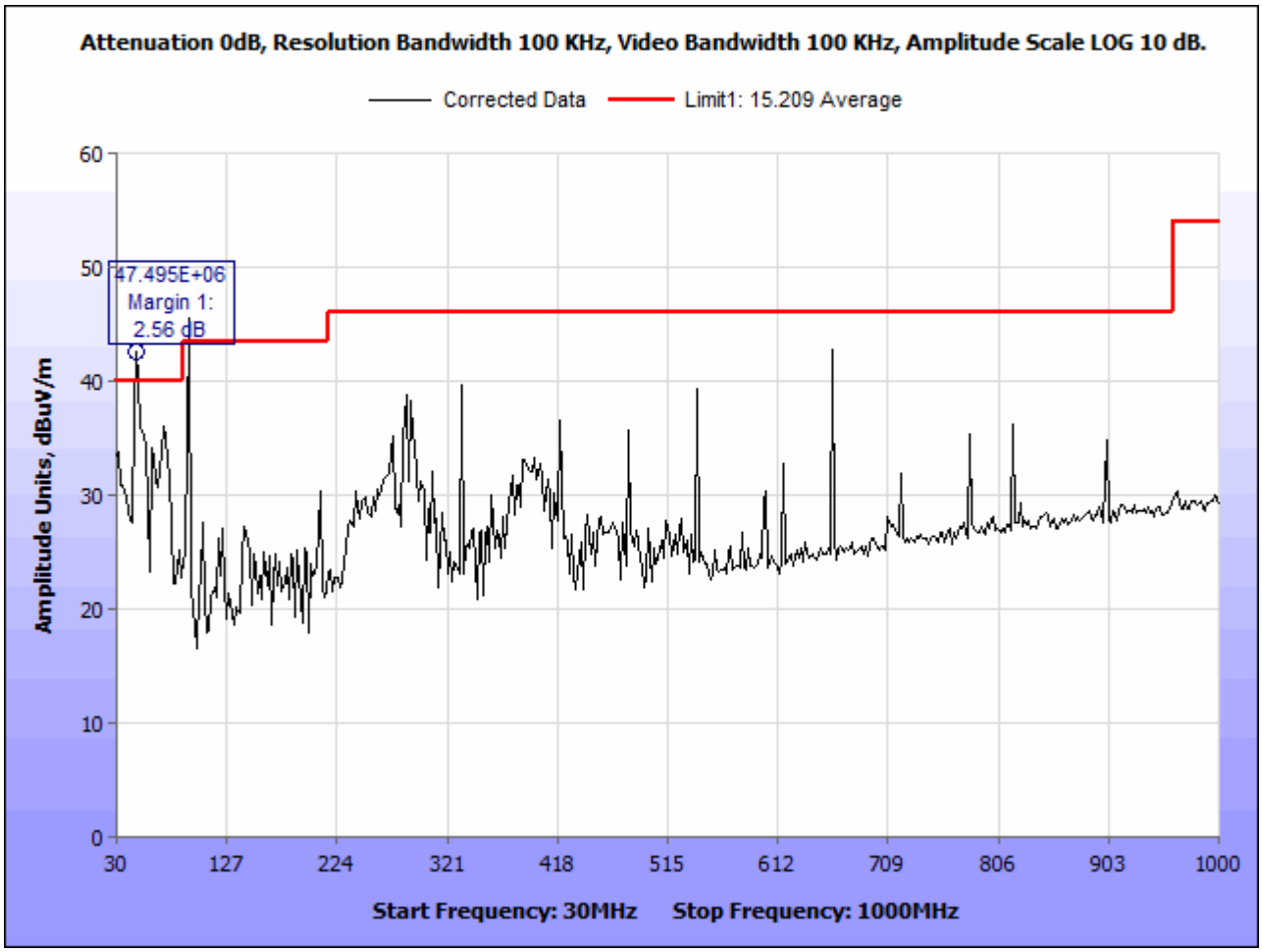
Plot 382. Undesirable Emissions, Peak N, 40M, 5510, 1-7GHz



Plot 383. Undesirable Emissions, Peak N, 40M, 5550, 1-7GHz



Plot 384. Undesirable Emissions, Peak N, 40M, 5670, 1-7GHz



Plot 385. Undesirable Emissions, UNII2, Below, 1GHz

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 μH/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

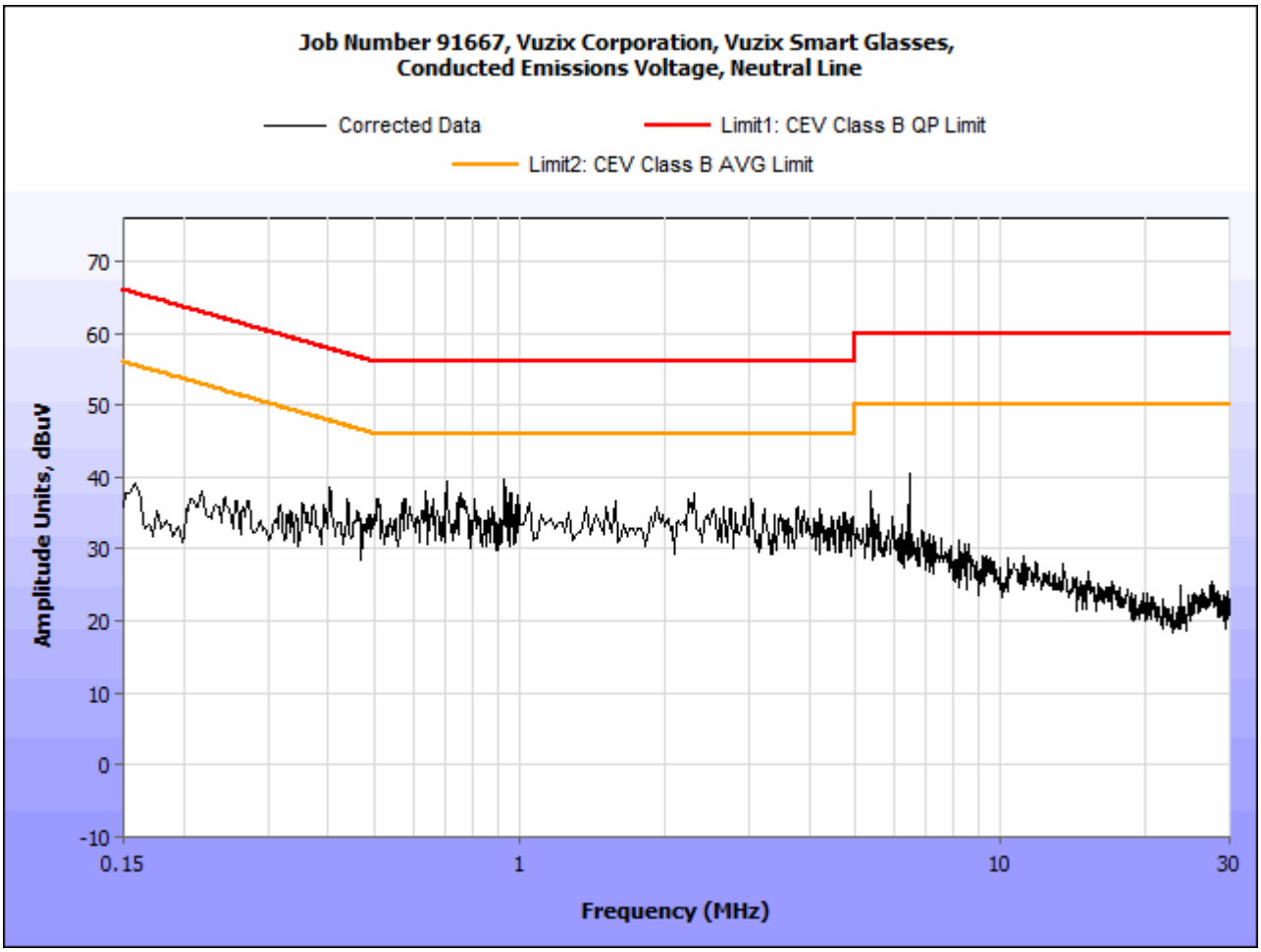
Table 13. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a non-metallic table 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 C63.4-2014 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. Scans were performed with the transmitter on.

Test Results: The EUT was compliant with requirements of this section. Measured emissions were within applicable limits.

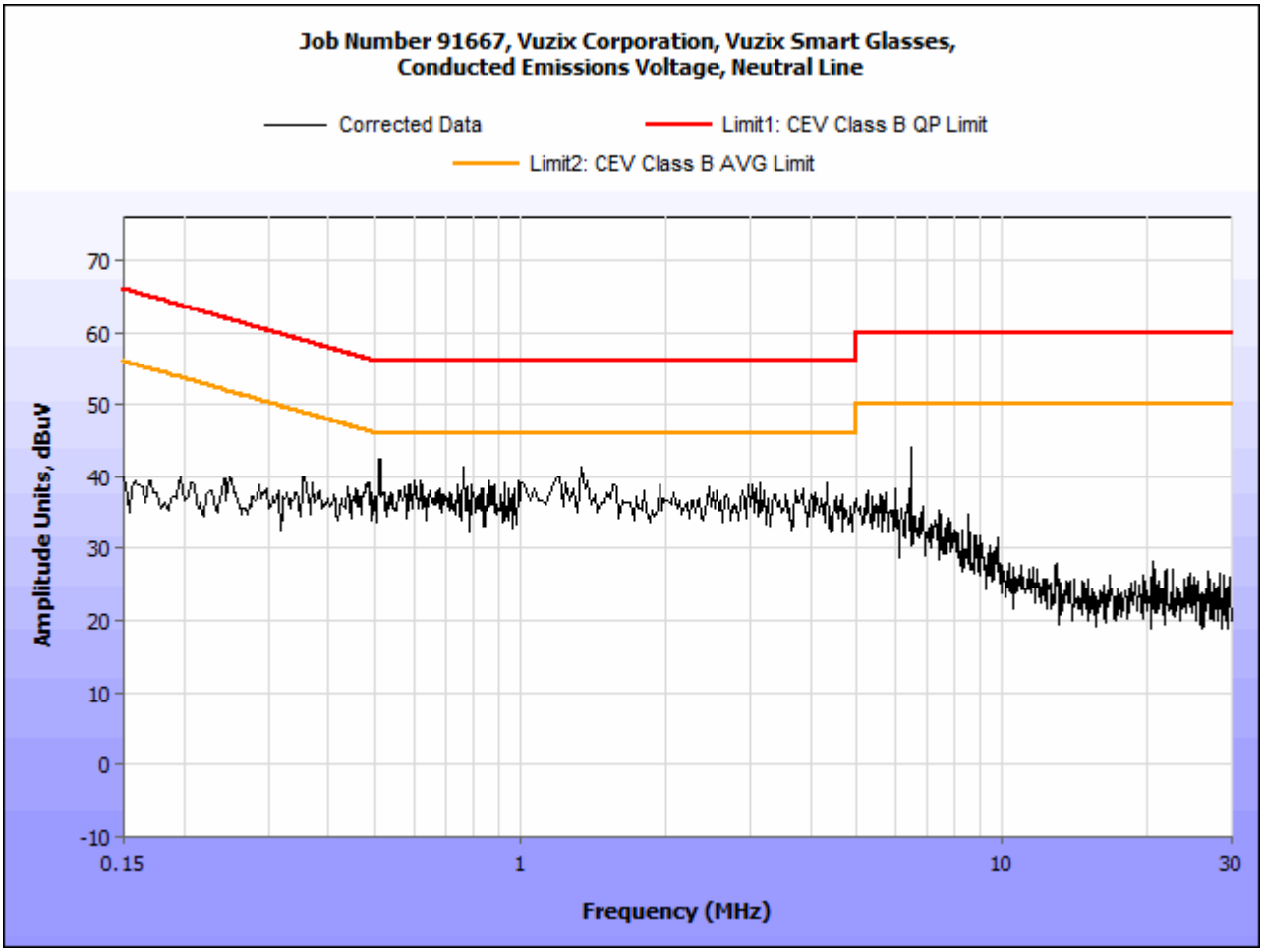
Test Engineer(s): Djed Mouada

Test Date(s): December 19, 2016



Plot 386. Conducted Emissions, 15.207(a), Phase Line

15.207(a) Conducted Emissions Test Results



Plot 387. Conducted Emissions, 15.207(a), Neutral Line

IV. DFS Requirements and Radar Waveform Description & Calibration

A. DFS Requirements

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 14. Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Table 15. Applicability of DFS Requirements During Normal Operation

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. **Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table 16. DFS Detection Thresholds for Master or Client Devices Incorporating DFS

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. **Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. **Note 3:** During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

Table 17. DFS Response Requirement Values

B. Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 18. Pulse Repetition Intervals Values for Test A

Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per Bursts	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen independently.

A representative example of a Long Pulse radar test waveform:

1) The total test signal length is 12 seconds.
2) 8 Bursts are randomly generated for the Burst_Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).

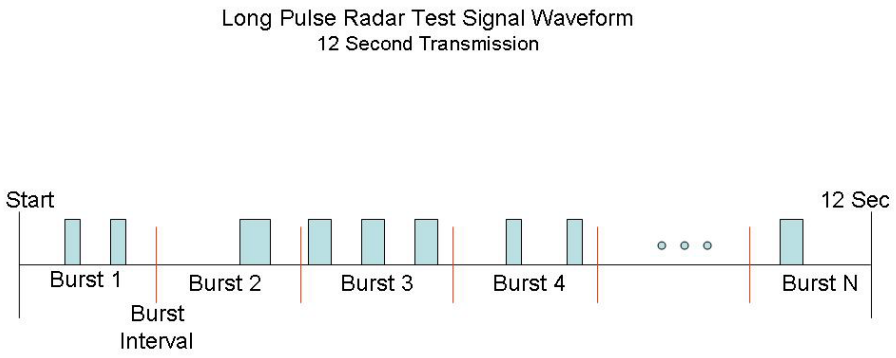


Figure 1. Long Pulse Radar Test Signal Waveform

Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	.333	300	70%	30

For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected1 from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

C. Radar Waveform Calibration

Calibration of the DFS test was done using a radiated method. A signal generator capable of producing all radar pulse types (0-6) was connected to a transmitting antenna. A receive antenna, through an external pre-amp was connected to a spectrum analyzer. The spectrum analyzer was set to a zero span with a peak detector and an RBW and VBW of 3 MHz. The transmit and receive antennas were vertically polarized during this calibration.

With the signal generator and spectrum analyzer tuned to the test frequency, each radar pulse was triggered and observed on the spectrum analyzer. The DFS Detection Threshold was verified for each radar pulse type (0-6).

During this process there were no transmissions by either the Master or Client Device.

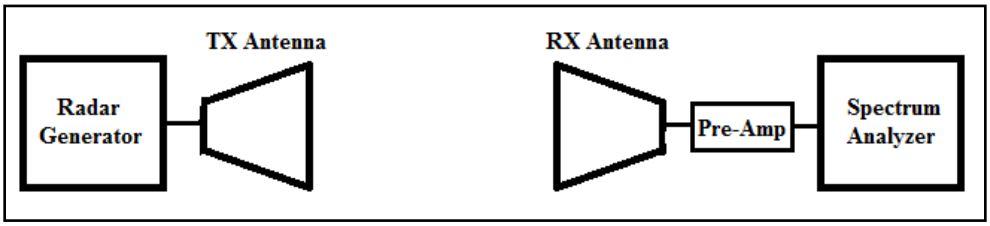
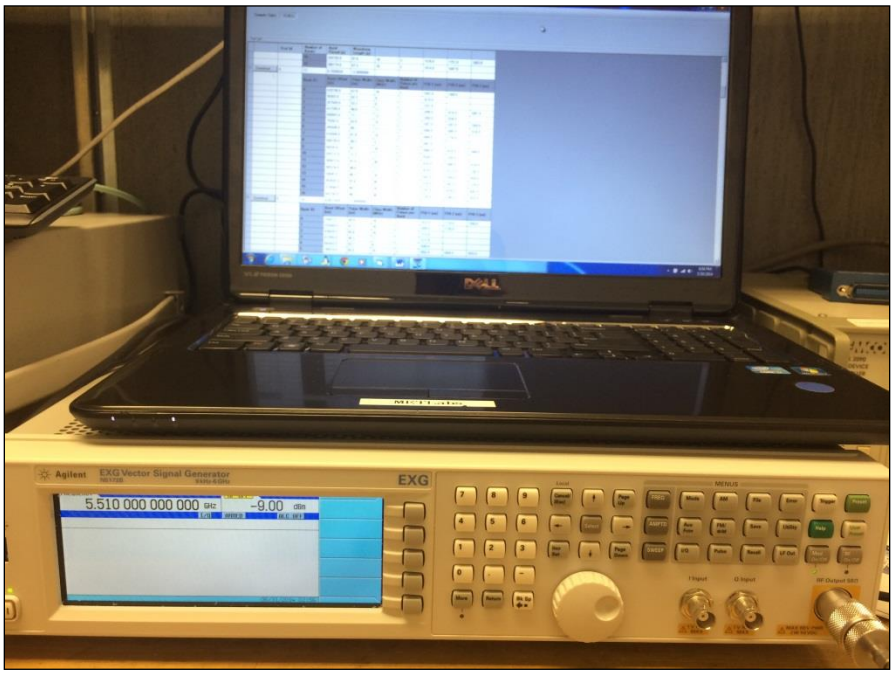
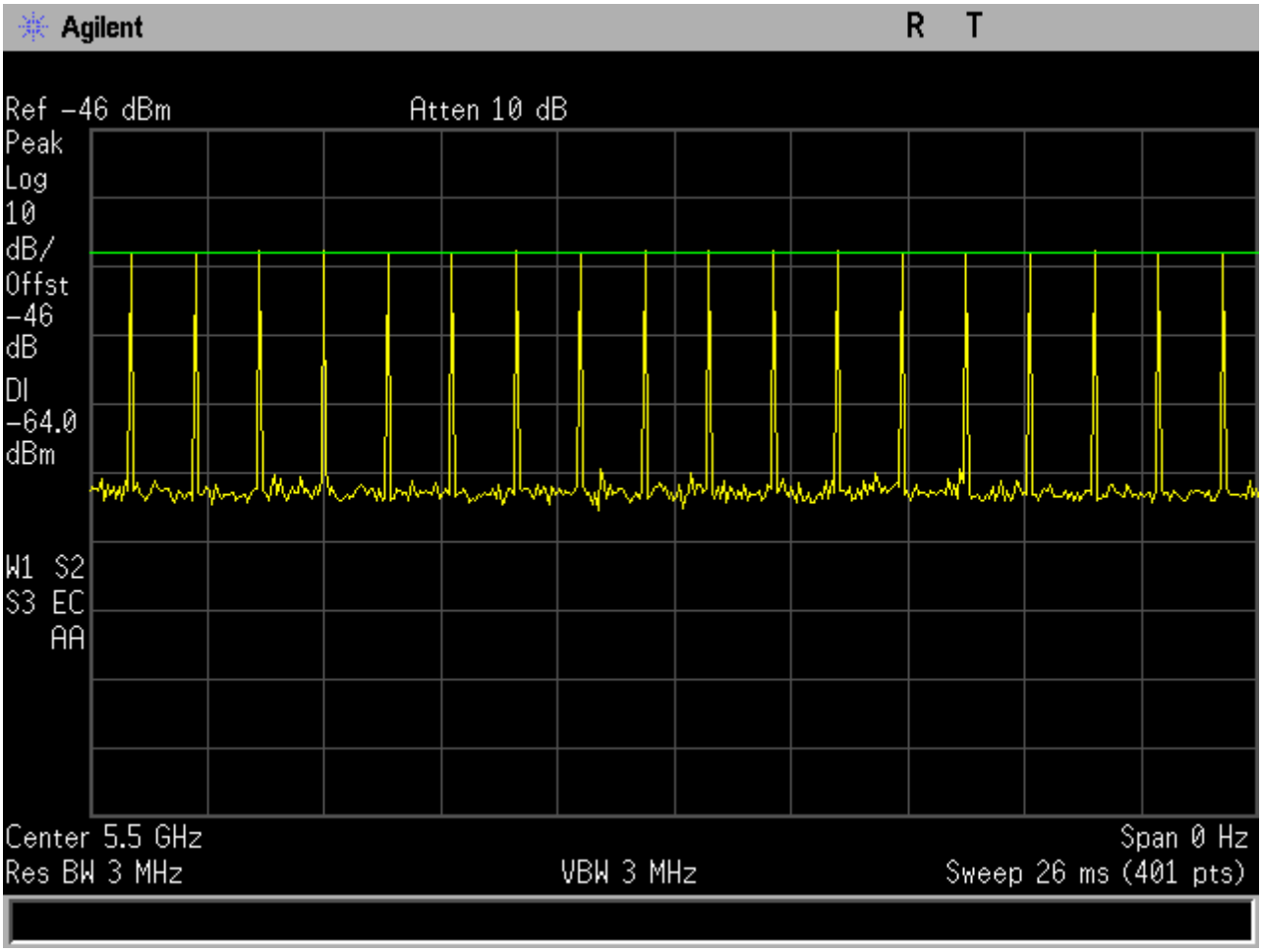


Figure 2. Radiated DFS Calibration Block Diagram



Photograph 1. DFS Radar Test Signal Generator

Radar Waveform Calibration



V. DFS Test Procedure and Test Results

A. DFS Test Setup

1. A spectrum analyzer is used as a monitor to verify that the Unit Under Test (EUT) has vacated the Channel within the Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and subsequent Channel move. It is also used to monitor EUT transmissions during the Channel Availability Check Time.
2. The test setup, which consists of test equipment and equipment under test (EUT), is diagrammed in Figure 3.

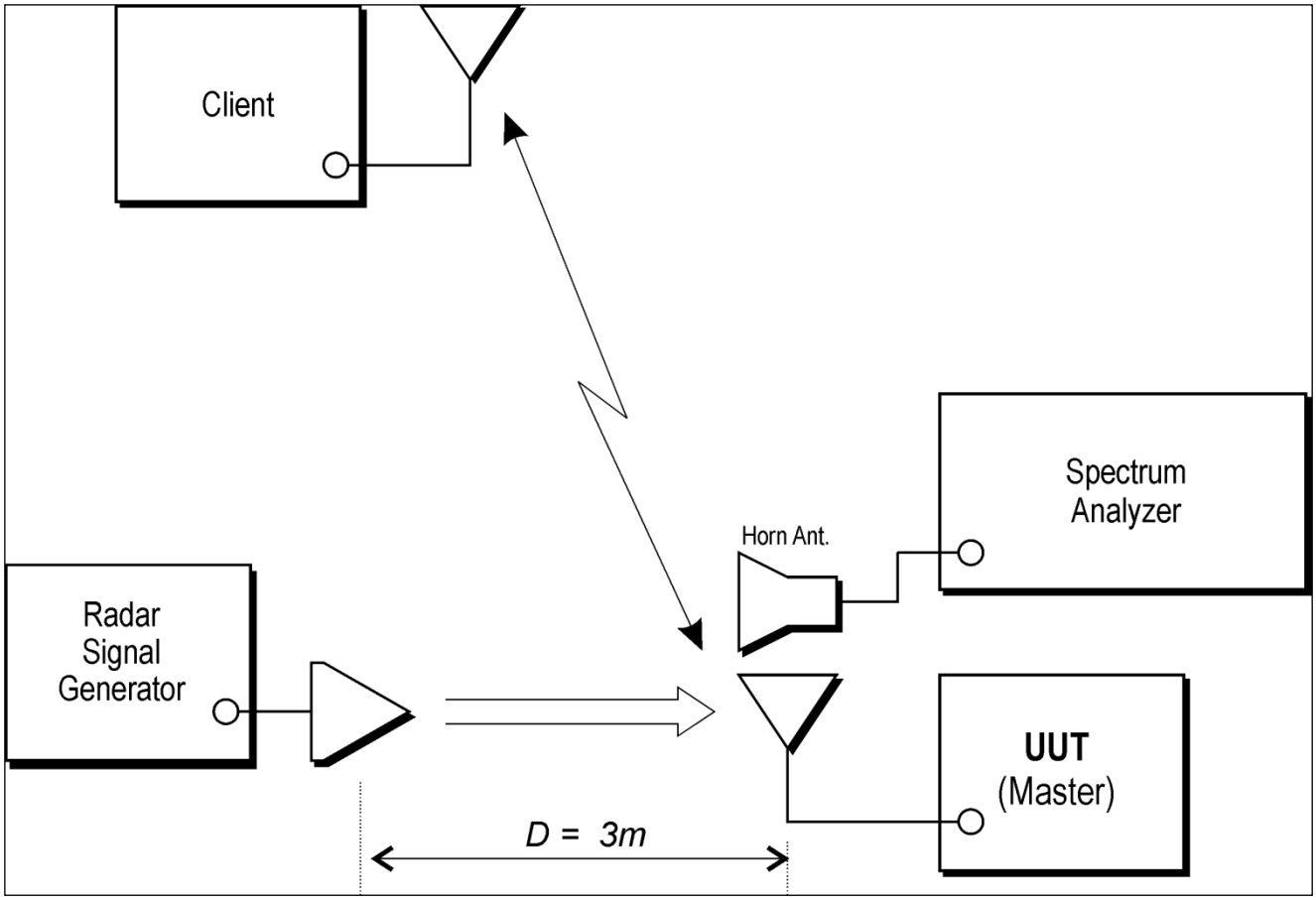


Figure 3. Test Setup Diagram

B. In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time, and Non-Occupancy Period

Test Requirements: **§15.407(h)(2)(iii)** Channel Move Time. After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

§15.407(h)(2)(iv) Non-occupancy Period. A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.

KDB 905462 §5.1 Test using widest BW mode available.

Test Procedure: The EUT was setup as a client device and associated with a master device. A test file was streamed from the Master device to the Client device for the entire period of the test. A Radar Burst of type 0 with a level equal to the DFS Detection Threshold + 1 dB was used.

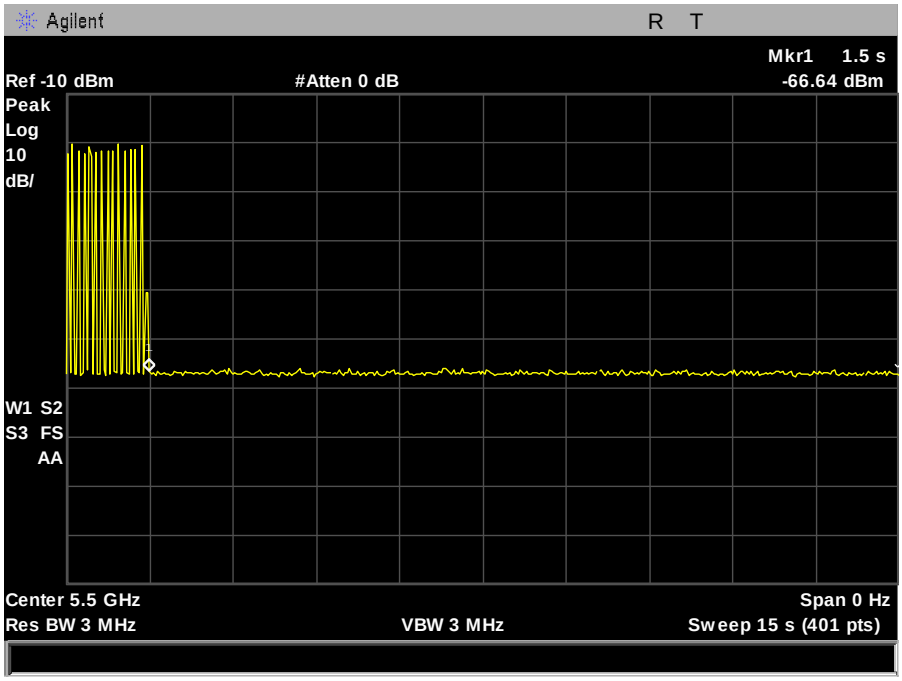
A radar pulse was generated while the EUT was transmitting. A spectrum analyzer set to a zero span was used to observe the transmission of the EUT at the end of the burst.

Test Results: The EUT was compliant with the requirements of this section. The channel move time was determined to be compliant by adding the the burst time values (the aggregate value is less than 250ms)

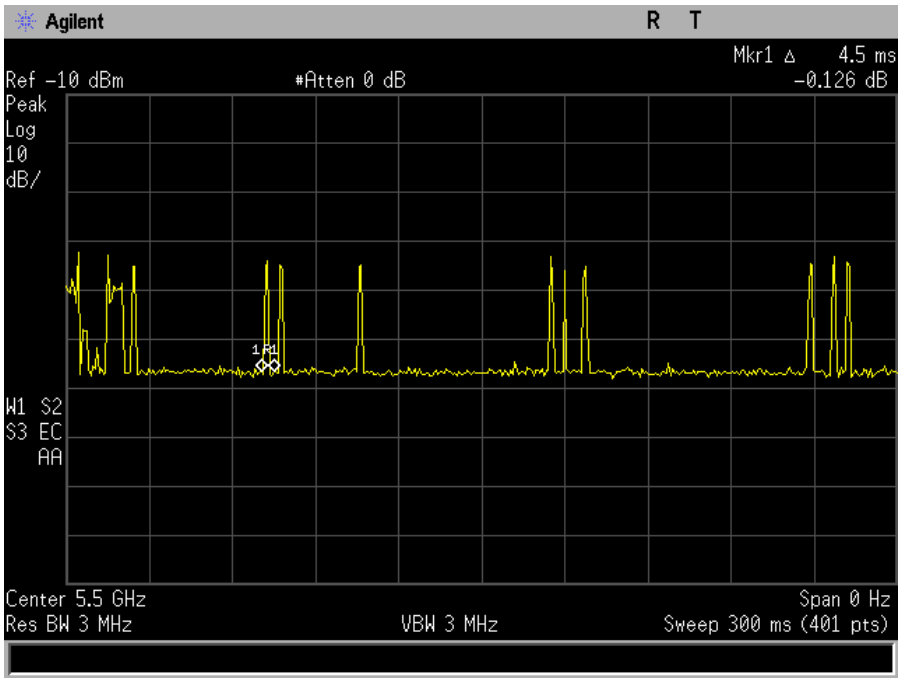
Test Engineer(s): Djed Mouada

Test Date(s): 12/19/16

Test Date(s): 07/19/16



Channel Move Time



Channel Close

VI. 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
1T871	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	N5172B	9/03/2016	08/04/2017
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	10/08/2015	04/08/2017
1T4771	PSA SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	8/10/2016	2/10/2018
1T4300B	SEMI-ANECHOIC 3M CHAMBER # 1 D (2043A-1) (IC)	EMC TEST SYSTEMS	NONE	01/11/2015	01/11/2018
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	12/7/2016	12/7/2018
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	2/26/2016	8/26/2017
331T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	

Table 19. Test Equipment List

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

VII. Certification & User's Manual Information

Certification & User's Manual Information

L. 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 users 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

