



SHURE

ELECTROMAGNETIC COMPATIBILITY LABORATORY

TEST REPORT

TEST REPORT TITLE: Electromagnetic Compatibility tests for a Shure AD1 Bodypack Transmitter

TEST ITEM DESCRIPTION:

AD1 is a digital wireless bodypack transmitter intended for use in mid-tier presentation, installed, and performance markets. The system operates in the UHF TV and STL bands (470 to 960 MHz) wherever permitted. Regionally dependent 2mW, 10mW, 20mW and 35mW output power modes are available. The AD1 transmitter is capable of operating with AA alkaline batteries or Shure rechargeable battery packs.

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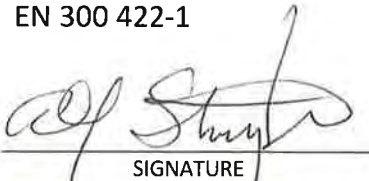
Project ID Number: SEL-023

Date Tested: October 19, 2016 – May 10, 2017

Test Personnel: Alex Stelmazczyk, Alex Mishinger, Russell Smith,
Tom Braxton, Craig Kozokar, Mudassar Khan

Test Specification: FCC "Code of Federal Regulations" Title 47 Part 74
ISED Canada RSS-210
ISED Canada RSS-Gen
EN 300 422-1

TEST REPORT BY:


SIGNATURE

SENIOR ENGINEER, GC
POSITION

6-9-17
DATE

APPROVED BY:


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Project Engineer, EMC
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6/9/17
DATE

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LIST OF APPENDICIES

APPENDIX	TEST DESCRIPTION
A	RF POWER OUTPUT MEASUREMENTS
B	MODULATION CHARACTERISTICS
C	FREQUENCY STABILITY
D	OCCUPIED BANDWIDTH MEASUREMENTS
E	FIELD STRENGTH OF SPURIOUS EMISSIONS

**REPORT REVISION HISTORY**

Revision	Date	Description
0	<u>3/31/2017</u>	Initial Release
<u>1</u>	<u>6/8/2017</u>	<u>Revised Throughout:</u> Added Spurious Matching Data for FCC and ISED, Revised Spurious Limits Throughout, Added EU Spurious Test Data To Support ISED Certification, Updated Reference Documents, Minor Corrections Throughout

Report Title:

1. INTRODUCTION

1.1. Scope of Tests

This document presents the results of a series of electromagnetic compatibility (EMC) tests performed on the Shure AD1 bodypack transmitter. The test items were manufactured and submitted for testing by Shure Incorporated located in Niles, IL. The data was taken following the measurement methods as described in the test specifications listed in the individual appendices of this document. Provided is the data for the test samples which also includes a summary of the measurements made and a description of the measurement setup. The EUT contained a transmitter that was designed to transmit in the following UHF and STL frequency bands using an external, removable whip antenna:

Group	Band	Frequency (MHz)	Output Power (mW)
A	G55	470-636	2, 10, 35
B	K53	606-698	2, 10, 35
C	X55*	941-960	2, 10, 35
D	G57*	470-607 @ 35mW 614-616 @ 20mW	2, 10, 20, 35
E	K54*	606-607 @ 35mW 614-616 and 653-662 @ 20mW	2, 10, 20, 35

*US FCC only

1.2. Purpose

This series of tests was performed to determine if the test item would meet the conducted and radiated RF emission specifications of the FCC "Code of Federal Regulations" Title 47 Part 74, Subpart H, Section 74.861. The test series was also performed to determine if the test items meet the radiated and conducted RF emission specifications of ISED Canada RSS-210, Issue 9, Annex G. Testing was performed in accordance with ANSI C63.4-2014 and RSS-GEN.

1.3. Deviations, Additions and Exclusions

Additional test data was taken to represent the bands G57 and K54 at 615MHz at an output power level 20mW for the US only per the requirements of the 2017 FCC 600MHz Incentive Auction.

G57 is the same hardware as G55. It has been software adjusted to operate at 20mw from 614MHz to 616MHz in addition to the frequency range represented by the testing for G55. The original G55 frequency range of 470MHz to 636MHz has also been software limited to 616MHz for G57.

K54 is the same hardware as K53. It has been software adjusted to operate at 20mw from 614MHz to 616MHz and 653MHz to 662MHz in addition to the frequency range represented by the testing for K53. The original K53 frequency range of 606MHz to 698MHz has also been software limited to 662MHz for K54.

Additional test data was also taken on the bands G56 and K55 per EN 300 422 specifications for the purpose of representing the bands G55 and K53 for Canadian certification. G55 and G56 share the same hardware as do K53 and K55. The only difference between the two "band family" versions is software limited tuning range.

1.4. EMC Laboratory Identification

The electromagnetic compatibility tests were performed at the Shure Electromagnetic Laboratory, Shure Incorporated, 5800 West Touhy Ave, Niles, Illinois 60714-4608. This laboratory is registered with ISED Canada as Site # 616A-1. The Shure Electromagnetic Laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). The NVLAP Lab Code is: 200946-0.

1.5. Summary of Tests Performed

The following electromagnetic compatibility tests (Table 1) were performed on the EUT in accordance with FCC "Code of Federal Regulations" Title 47 Part 74 and ISED Canada RSS-210 specifications:

Table 1: Summary of tests performed

Test Spec (STD)	Description	Tested Range	Described in Appendix	Test Results
FCC Part 74 (74.861) RSS-210, Table G1	Conducted RF Power Output	470 – 960MHz	A	PASS
FCC Part 74 (74.861) RSS-210, G3.5	Modulation Characteristics	470 – 960MHz	B	N/A
FCC Part 74 (74.861) RSS-210, Table G1	Frequency Stability	470 – 960MHz -30 deg C to 50C	C	PASS
FCC Part 74 (74.861) RSS-210, G3.2	Occupied Bandwidth & Necessary Bandwidth	470 – 960MHz	D	PASS
FCC Part 74 (74.861) RSS-210, G3.4	Spurious Emissions	30MHz – 10GHz	E	PASS

2. APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 74, dated 1 October 2010
- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 2, dated 1 October 2010
- European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08).
- European Telecommunications Institute Standard ETSI EN 300 422-1 v2.1.1 (2016-09).
- RSS-210, "Spectrum Management and Telecommunications Radio Standards Specification Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment" Issue 9, August 2016

- RSS-Gen, "Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment", Issue 3, December 2010
- ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- TIA-603-C-2004, "Land Mobile FM or PM Communications Equipment Measurement and Performance Standard"

3. EUT SET-UP AND OPERATION

3.1. General Description

The EUT is a wireless bodepack transmitter, model no. AD1. The EUT arrangement in which the testing was conducted can be found in the individual appendices.

3.2. Test Samples

The following product samples were tested:

Model	Band	Frequency (MHz)	Serial #	Sample #
AD1	G55	470-636	TU162070085	45
AD1	K53	606-698	TU162050041	142
AD1	X55*	941-960	TU162050175	243
AD1	G57*	470 -616	TU163350379	17
AD1	K54*	606 - 662	TU163380075	103
AD1	G56**	470 - 636	TU162040097	80
AD1	K55***	606 - 694	TU162050094	175

*US FCC only

**Representing G55 Hardware for Canada

***Representing K53 Hardware for Canada

3.3. Test Setup

3.3.1. Power Input

The EUT was powered with 3VDC from 2 internal "AA" batteries or 3.7VDC from a rechargeable battery. The input power source is noted in the individual appendices.

3.3.2. Signal Input /Output Leads

The microphone port of the EUT was terminated with a Shure WL93 Subminiature Lavalier microphone via a 1.2 meter long, 3 conductor cable for all radiated emissions tests. The antenna port was terminated with a Shure 95G9043 whip antenna for all radiated emissions tests.

3.3.3. Test Frequency Range

Per CFR Title 47, Section 2, part 1057 and RSS-210, Annex G, section G3.4 (sections 8.3 and 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08)) for spurious radiated emissions measurements, the

frequency spectrum shall be investigated up to at least the tenth harmonic of the highest fundamental frequency. The highest fundamental frequency internally generated by the EUT is 960MHz. Therefore, radiated emissions measurements were performed up to 10GHz.

3.3.4. Grounding Considerations

The EUT was not grounded during testing.

3.4. Operational Mode

Frequency and Power Output:

All emissions tests were performed separately in the following transmit frequency and output power modes:

G55

Tx @ 470.125MHz, 2mW; Tx @ 470.125MHz, 35mW (Low)
Tx @ 553.000MHz, 2mW; Tx @ 553.000MHz, 35mW (Mid)
Tx @ 635.875MHz, 2mW; Tx @ 635.875MHz, 35mW (High)

K53

Tx @ 606.125MHz, 2mW; Tx @ 606.125MHz, 35mW (Low)
Tx @ 652.000MHz, 2mW; Tx @ 652.000MHz, 35mW (Mid)
Tx @ 697.875MHz, 2mW; Tx @ 697.875MHz, 35mW (High)

X55*

Tx @ 941.625MHz, 2mW; Tx @ 941.625MHz, 35mW (Low)
Tx @ 950.500MHz, 2mW; Tx @ 950.500MHz, 35mW (Mid)
Tx @ 959.725MHz, 2mW; Tx @ 959.725MHz, 35mW (High)

G57*

Tx @ 615.000MHz, 2mW; Tx @ 615.000MHz, 20mW (Mid)

K54*

Tx @ 615.000MHz, 2mW; Tx @ 615.000MHz, 20mW (Mid)

G56**

Tx @ 470.125MHz, 2mW; Tx @ 470.125MHz, 35mW (Low)
Tx @ 553.000MHz, 2mW; Tx @ 553.000MHz, 35mW (Mid)
Tx @ 635.875MHz, 2mW; Tx @ 635.875MHz, 35mW (High)

K55**

Tx @ 606.125MHz, 2mW; Tx @ 606.125MHz, 35mW (Low)
Tx @ 652.000MHz, 2mW; Tx @ 652.000MHz, 35mW (Mid)
Tx @ 693.875MHz, 2mW; Tx @ 693.875MHz, 35mW (High)

*US FCC only

**Canada ISED only

4. TEST INSTRUMENTATION

A list of the test equipment used can be found in table 10-1. All equipment used was within calibration terms during and throughout the duration of the tests. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

5. TEST PROCEDURES

The specific test procedures are presented in the individual appendices.

6. OTHER TEST CONDITIONS

6.1. Test Personnel

All EMC tests were performed by qualified personnel from the Shure EMC Laboratory.

6.2. Disposition of the EUT

The EUTs and all associated equipment were returned to Shure Incorporated upon completion of the tests.

7. RESULTS OF TESTS

The results are presented in the individual test appendices. In general, it was found that the Shure Incorporated AD1 met the radiated and conducted RF emission specifications of the FCC "Code of Federal Regulations" Title 47, Part 74, Subpart H, Section 74.861. It was also found that the AD1 met the radiated and conducted RF emissions specifications of ISED Canada RSS-210, Issue 9, Annex G.

8. CONCLUSIONS

It was determined that the Shure Incorporated AD1 did fully comply with the radiated and conducted RF emissions requirements of both the FCC "Code of Federal Regulations" Title 47 Part 74, Subpart H, Section 74.861 and ISED Canada RSS-210, Issue 9, Annex G.

9. CERTIFICATION

Shure EMC Laboratory certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the EUTs at the test date. Any electrical or mechanical modification made to the EUTs subsequent to the specified test date will serve to invalidate the data and void this certification.

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

10. EQUIPMENT LIST

Table 10-1: Test Equipment

L# or ID	Description	Manufacturer	Model #	Serial #	Range	Cal Date	Due Date
L23-011-01	3 meter RF Chamber	ETS Lindgren	FACT-3	AJ640	25MHz - 18GHz	8/8/2016	8/8/2017
L23-011-02	Electric Powered Turntable	ETS Lindgren	2088	N/A	N/A	N/A	N/A
L23-011-08	Controller	EMCO	2090	29799	N/A	N/A	N/A
L23-020-04	Antenna Positioner	ETS Lindgren	2171B	118617	N/A	N/A	N/A

L# or ID	Description	Manufacturer	Model #	Serial #	Range	Cal Date	Due Date
L23-011-15	BiConiLog Antenna	ETS Lindgren	3142C	34790	25MHz-3GHz	6/3/2016	6/3/2017
L23-011-54	EMI Test Receiver	Rohde & Schwarz	ESR26	101347	9kHz - 26.5GHz	5/19/2016	5/19/2017
L23-011-31	EMI/EMS Test Software	Rohde & Schwarz	EMC32	V.9.21 0S200319	20Hz - 40GHz	N/A	N/A
L23-022-01	Spectrum Analyzer	R&S	FSU 1166.1660. K26	201043	20Hz – 26.5GHz	7/13/2016	7/13/2017
L23-040-03	20dB Attenuator	Mini Circuits	BW-N20W5+	0952	DC-18GHz	5/20/2016	5/20/2017
L23-031-01	Power Meter	AR	PM2003	0335363	10kHz – 40GHz	12/20/2016	12/06/2017
L23-032-01	Power Head	AR	PH2008	336213	100 kHz - 18GHz -40 to +33 dBm	12/20/2016	12/06/2017
L19-06-01	Temp. Chamber	ESPEC	SU-24	91004211	-40C - +130C	4/12/2016	4/12/2017
L23-034-08	Type K/J Thermometer	Extech	TM100 & TP870	13018733, TE701576	-50C – +538C	10/21/2016	10/21/2017
L23-24-01	Frequency Counter / Timer	Agilent	53220A	MY500064 85	N/A	06/06/2016	06/06/2017
L23-026-01	Tunable Notch Filter	Trilithic	3VNF500/1 000-50-AA	200908026	500 – 1000MHz	3/1/2016	3/1/2017
L23-027-01	Tunable Notch Filter	Trilithic	3VNF300/6 00-50-AA	201004053	300 – 600MHz	3/3/2016	3/3/2017
L23-027-02	Tunable Notch Filter	Trilithic	3VNF300/6 00-50-AA	201004054	300 – 600MHz	12/15/2015	12/15/2016
L23-011-57	High Pass Filter	K&L	11SH10- 940/X10000 -O/O	3	940 – 10000MHz	NEW	7/20/2017
L23-011-38	High Pass Filter	K&L	11SH10- 1340/X1000 0-O/O	1	1340 – 10000MHz	4/22/2016	4/22/2017
L23-011-55	Waveguide Horn Antenna with Pre-Amp	ETS Lindgren	3117-PA	206583	1GHz-18GHz	3/24/2016	3/24/2017
L23-011-36D	Tuned Dipole Antenna	ETS Lindgren	312D-DB-4	123695	400-1000MHz	5/5/2016	5/5/2017
L23-011-41	Waveguide Horn Antenna	ETS Lindgren	3117	123511	1GHz -18GHz	3/7/2017	3/7/2018
L23-022-02	Spectrum Analyzer	Rohde & Schwarz	FSW26	103788	2Hz – 26.5GHz	3/28/2017	3/28/2018
L23-011-16	Waveguide Horn Antenna	ETS Lindgren	3115	29851	1GHz -18GHz	12/8/2016	12/8/2017
RENT	RF Signal Generator	Agilent	E4428C	94730	250kHz – 6GHz	1/5/2017	1/5/2019

A. RF POWER OUTPUT MEASUREMENTS

A.1. PURPOSE:

This test was performed to determine if the EUT meets the RF power output requirements of FCC Part 74 over the EUT operating frequency ranges of 470 to 608MHz, 614 to 806MHz and 941 to 960MHz as well as the RSS-210, Issue 9, Annex G specifications.

A.2. REQUIREMENTS:

As stated in paragraph 74.861(e)(1)(ii), for low power auxiliary stations operating in the bands allocated for TV broadcasting, the power of the measured unmodulated carrier power at the output of the transmitter power amplifier (antenna input power) may not exceed 250 milliwatts in the 470-608 and 614-806MHz bands. Per the requirements set out in section G3.1, Table 1 of ISED Canada RSS-210, Issue 9, Annex G, the RF power output shall not exceed 250mW average power.

A.3. MEASUREMENT UNCERTAINTY

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence):

Measurement Type	U_{lab}
RF Power Output	0.354 dB

U_{lab} = Determined for Shure EMC Laboratory

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- Non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

A.4. TEST SETUP AND INSTRUMENTATION:

Photographs of the test setup are shown as Figure A-1. The test instrumentation can be determined from Table 10-1.

A.5. EUT OPERATION:

The EUT was powered up and the transmit frequency and power output level of the transmitter was selected using the front panel controls. The EUT was powered at 3.7VDC by a Shure SB900 rechargeable battery. The EUT was checked for proper operation after it was setup for the test. Testing was conducted with the EUT set to transmit at output power levels of 2mW, 10mW, 20mW and 35mW at low, mid and high frequencies for each band.

A.6. TEST PROCEDURES:

- a. The EUT was connected to an RF power meter through a calibrated power head.
- b. The frequency of the power meter was set to the operating frequency of the EUT.

Appendix A

- c. The RF power meter was allowed to stabilize and then the output power measurement was recorded.

A.7. RESULTS:

The output power measurement data is presented below on pages 12 - 13. As shown by the test data, the power output of the EUT is within the requirements of Part 74.861 and RSS-210.



Figure A-1 - Test Setup for RF Power Output

Test Information

EUT Name: AD1 Bands G55, K53, X55*
 Serial Number: TU162070085 (G55), TU162050041 (K53), TU162050175 (X55)
 Test Description: FCC pt.74 and RSS-210 RF Power Output – Antenna Conducted
 Operating Conditions: Low, Mid and High Frequencies at 2mW, 10mW and 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: PM2003 Power Meter and PH2008 Power Head
 Test Date: January 3, 2017

EUT Name: AD1 Bands G57*, K54*
 Serial Number: TU163350379 (G57), TU163380075 (K54)
 Test Description: **FCC pt.74 Only** – Antenna Conducted
 Operating Conditions: 615MHz (Mid Frequency) at 2mW, 10mW and 20mW
 Operator Name: Alex Stelmaszczyk
 Comment: PM2003 Power Meter and PH2008 Power Head
 Test Date: March 10 & 21, 2017

*US FCC only

Appendix A

Frequency (MHz)	Nominal Power (mW)	Measured Power (dBm)	Measured Power (mW)	Limit (mW)
470.125	2	3.18	2.08	250
470.125	10	10.40	10.96	250
470.125	35	16.33	42.95	250
553.000	2	3.23	2.10	250
553.000	10	10.43	11.04	250
553.000	35	16.54	45.08	250
635.875	2	3.24	2.11	250
635.875	10	10.51	11.25	250
635.875	35	16.13	41.02	250
615.000	2	3.37	2.17	250
615.000	10	10.72	11.80	250
615.000	20	14.75	29.85	250
Frequency (MHz)	Nominal Power (mW)	Measured Power (dBm)	Measured Power (mW)	Limit (mW)
606.125	2	3.06	2.02	250
606.125	10	10.35	10.84	250
606.125	35	16.15	41.21	250
652.000	2	3.13	2.06	250
652.000	10	10.18	10.42	250
652.000	35	15.57	36.06	250
697.875	2	3.08	2.03	250
697.875	10	10.53	11.30	250
697.875	35	15.34	34.20	250
615.000	2	2.92	1.96	250
615.000	10	10.19	10.45	250
615.000	20	13.89	24.49	250
Frequency (MHz)	Nominal Power (mW)	Measured Power (dBm)	Measured Power (mW)	Limit (mW)
941.625	2	3.38	2.18	250
941.625	10	10.88	12.25	250
941.625	35	16.42	43.85	250
950.500	2	3.30	2.14	250
950.500	10	10.72	11.80	250
950.500	35	16.13	41.02	250
959.725	2	3.23	2.10	250
959.725	10	10.69	11.72	250
959.725	35	15.97	39.54	250

B. MODULATION CHARACTERISTICS

B.1. REQUIREMENTS:

As stated in paragraph 74.861(e)(3) and Annex G, section G3.5 of RSS-210, for low power auxiliary stations operating in the bands allocated for TV broadcasting, any form of modulation may be used.

B.2 TEST PROCEDURES:

Since the EUT employs digital modulation, no modulation characteristics tests were performed.

C. FREQUENCY STABILITY

C.1. PURPOSE:

This test was performed to determine if the EUT meets the frequency stability requirements of the FCC Part 74.861(e)(4) and the Annex G, section G3.1 of RSS-210, Table G1 specifications over the EUTs operating frequency range.

C.2. REQUIREMENTS:

As stated in paragraph 74.861(e)(4) and section G3.1 of RSS-210, Table G1, for low power auxiliary stations operating in the UHF bands, the frequency tolerance of the transmitter shall be 0.005 percent. All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence):

Measurement Type	U_{lab}
Frequency Error (Stability)	56.47 Hz

U_{lab} = Determined for Shure EMC Laboratory

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- Non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

C.4. TEST SETUP AND INSTRUMENTATION:

The EUT was heated and cooled in an ESPEC temperature chamber over a temperature range of -30C to +50C. The temperature around the EUT was measured and monitored by a K-Type thermocouple connected to an Extech Type K/J Thermometer. The EUTs frequency was measured with an Agilent Universal Frequency Counter/Timer set to measure frequency to 7 decimal places. The operational frequency of the transmitter under test was set to a low, mid or high frequency within its operating range. Photographs of the test setup are shown as Figure C-1. The test instrumentation can be determined from Table 10-1.

C.5. EUT OPERATION:

The antenna port of the EUT was connected to the 50 Ohm input of the frequency counter/timer. The EUT was set at its lowest power output setting (2mW) as representative of the worst case operational condition for this test.

C.6. TEST PROCEDURES:

- a. The temperature chamber was set to -30C with the EUT inside and powered off.
- b. The EUT was allowed to soak for ~15 minutes after the temperature chamber reached the set temperature.
- c. The EUT was then powered on and allowed to stabilize for ~ 1 minute.
- d. The measured frequency of the transmitter was recorded with the Universal Frequency Counter/Timer.
- e. Steps a. through d. were repeated at -20C through +50C in ten degree increments for representative low, mid and high frequencies within each EUTs operational band.

C.7 RESULTS:

The frequency stability measurements are presented in table C-1 on pages 17 - 21. As shown by the test data, the test frequency deviation was within the 0.005 percent limit set out in the FCC Part 74.861 and the RSS-210 Annex G specifications.



Figure C-1 - Test Setup for Frequency Stability

Test Information

EUT Name: AD1 Band G55 #45
Serial Number: TU162070085
Test Description: FCC Part 74.861 and RSS-210 Frequency Stability
Operating Conditions: Low, Mid and High Frequencies at 2mW, -30C to +50C
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer and ESPEC Temp Chamber
Test Date: December 6 - 12, 2016

Temp °C	Nominal Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	Frequency Stability (%)	Deviation (Hz)	Frequency Stability (Hz)	Pass Or Fail
-30	470.125	470.1261927	0.0002537	0.005	1193	23506.25	PASS
-20	470.125	470.1255599	0.0001191	0.005	560	23506.25	PASS
-10	470.125	470.1251907	0.0000406	0.005	191	23506.25	PASS
0	470.125	470.1249919	-0.0000017	0.005	-8	23506.25	PASS
10	470.125	470.1249323	-0.0000144	0.005	-68	23506.25	PASS
20	470.125	470.1250926	0.0000197	0.005	93	23506.25	PASS
30	470.125	470.1251906	0.0000405	0.005	191	23506.25	PASS
40	470.125	470.1251621	0.0000345	0.005	162	23506.25	PASS
50	470.125	470.1251136	0.0000242	0.005	114	23506.25	PASS
-30	553.000	553.0014008	0.0002533	0.005	1401	27650	PASS
-20	553.000	553.0006700	0.0001212	0.005	670	27650	PASS
-10	553.000	553.0002254	0.0000408	0.005	225	27650	PASS
0	553.000	552.9999880	-0.0000022	0.005	-12	27650	PASS
10	553.000	552.9999216	-0.0000142	0.005	-78	27650	PASS
20	553.000	553.0001068	0.0000193	0.005	107	27650	PASS
30	553.000	553.0002242	0.0000405	0.005	224	27650	PASS
40	553.000	553.0001947	0.0000352	0.005	195	27650	PASS
50	553.000	553.0001304	0.0000236	0.005	130	27650	PASS
-30	635.875	635.8766161	0.0002542	0.005	1616	31793.75	PASS
-20	635.875	635.8758159	0.0001283	0.005	816	31793.75	PASS
-10	635.875	635.8752651	0.0000417	0.005	265	31793.75	PASS
0	635.875	635.8749846	-0.0000024	0.005	-15	31793.75	PASS
10	635.875	635.8749101	-0.0000141	0.005	-90	31793.75	PASS
20	635.875	635.8751162	0.0000183	0.005	116	31793.75	PASS
30	635.875	635.8752566	0.0000403	0.005	257	31793.75	PASS
40	635.875	635.8752254	0.0000354	0.005	225	31793.75	PASS
50	635.875	635.8751465	0.0000230	0.005	146	31793.75	PASS



Appendix C

Test Information

EUT Name: AD1 Band K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Frequency Stability
Operating Conditions: Low, Mid and High Frequencies at 2mW, -30C to +50C
Operator Name: Alex Stelmasczyk
Comment: R & S FSU Spectrum Analyzer and ESPEC Temp Chamber
Test Date: December 6 - 12, 2016

Temp °C	Nominal Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	Frequency Stability (%)	Deviation (Hz)	Frequency Stability (Hz)	Pass Or Fail
-30	606.125	606.1257551	0.0001246	0.005	755	30306.25	PASS
-20	606.125	606.1267607	0.0002905	0.005	1761	30306.25	PASS
-10	606.125	606.1257001	0.0001155	0.005	700	30306.25	PASS
0	606.125	606.1251716	0.0000283	0.005	172	30306.25	PASS
10	606.125	606.1253807	0.0000628	0.005	381	30306.25	PASS
20	606.125	606.1254620	0.0000762	0.005	462	30306.25	PASS
30	606.125	606.1256512	0.0001074	0.005	651	30306.25	PASS
40	606.125	606.1255909	0.0000975	0.005	591	30306.25	PASS
50	606.125	606.1254539	0.0000749	0.005	454	30306.25	PASS
-30	652.000	652.0008449	0.0001296	0.005	845	32600	PASS
-20	652.000	652.0008232	0.0001263	0.005	823	32600	PASS
-10	652.000	652.0007443	0.0001142	0.005	744	32600	PASS
0	652.000	652.0001823	0.0000280	0.005	182	32600	PASS
10	652.000	652.0004101	0.0000629	0.005	410	32600	PASS
20	652.000	652.0004959	0.0000761	0.005	496	32600	PASS
30	652.000	652.0007013	0.0001076	0.005	701	32600	PASS
40	652.000	652.0006289	0.0000965	0.005	629	32600	PASS
50	652.000	652.0004951	0.0000759	0.005	495	32600	PASS
-30	697.875	697.8759096	0.0001303	0.005	910	34893.75	PASS
-20	697.875	697.8758630	0.0001237	0.005	863	34893.75	PASS
-10	697.875	697.8757786	0.0001116	0.005	779	34893.75	PASS
0	697.875	697.8751930	0.0000277	0.005	193	34893.75	PASS
10	697.875	697.8754349	0.0000623	0.005	435	34893.75	PASS
20	697.875	697.8755288	0.0000758	0.005	529	34893.75	PASS
30	697.875	697.8757514	0.0001077	0.005	751	34893.75	PASS
40	697.875	697.8756651	0.0000953	0.005	665	34893.75	PASS
50	697.875	697.8755374	0.0000770	0.005	537	34893.75	PASS

Test Information

EUT Name: AD1 Band X55 #243
 Serial Number: TU162050175
 Test Description: FCC Part 74.861 Frequency Stability
 Operating Conditions: Low, Mid and High Frequencies at 2mW, -30C to +50C
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer and ESPEC Temp Chamber
 Test Date: December 6 – 12 2016 & February 13 - 15, 2017

Temp °C	Nominal Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	Frequency Stability (%)	Deviation (Hz)	Frequency Stability (Hz)	Pass Or Fail
-30	941.625	941.6262532	0.0001331	0.005	1253	47081.25	PASS
-20	941.625	941.6257979	0.0000847	0.005	798	47081.25	PASS
-10	941.625	941.6257895	0.0000838	0.005	789	47081.25	PASS
0	941.625	941.6257738	0.0000822	0.005	774	47081.25	PASS
10	941.625	941.6256406	0.0000680	0.005	641	47081.25	PASS
20	941.625	941.6256922	0.0000735	0.005	692	47081.25	PASS
30	941.625	941.6256373	0.0000677	0.005	637	47081.25	PASS
40	941.625	941.6254482	0.0000476	0.005	448	47081.25	PASS
50	941.625	941.6252033	0.0000216	0.005	203	47081.25	PASS
-30	950.500	950.5011261	0.0001185	0.005	1126	47525	PASS
-20	950.500	950.5008762	0.0000922	0.005	876	47525	PASS
-10	950.500	950.5005352	0.0000563	0.005	535	47525	PASS
0	950.500	950.5002426	0.0000255	0.005	243	47525	PASS
10	950.500	950.5001955	0.0000206	0.005	196	47525	PASS
20	950.500	950.5003885	0.0000409	0.005	388	47525	PASS
30	950.500	950.5006385	0.0000672	0.005	638	47525	PASS
40	950.500	950.5004008	0.0000422	0.005	401	47525	PASS
50	950.500	950.5001999	0.0000210	0.005	200	47525	PASS
-30	959.725	959.7263294	0.0001385	0.005	1329	47986.25	PASS
-20	959.725	959.7258671	0.0000903	0.005	867	47986.25	PASS
-10	959.725	959.7262843	0.0001338	0.005	1284	47986.25	PASS
0	959.725	959.7257998	0.0000833	0.005	800	47986.25	PASS
10	959.725	959.7256500	0.0000677	0.005	650	47986.25	PASS
20	959.725	959.7257045	0.0000734	0.005	705	47986.25	PASS
30	959.725	959.7256492	0.0000676	0.005	649	47986.25	PASS
40	959.725	959.7254511	0.0000470	0.005	451	47986.25	PASS
50	959.725	959.7252200	0.0000229	0.005	220	47986.25	PASS



Test Information

EUT Name: AD1 Band G57* #17
Serial Number: TU163350379
Test Description: FCC Part 74.861 Frequency Stability
Operating Conditions: 615MHz (Mid Frequency) @ 2mW, -30C to +50C
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer and ESPEC Temp Chamber
Test Date: March 10 and 21, 2017

*US FCC only

Temp °C	Nominal Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	Frequency Stability (%)	Deviation (Hz)	Frequency Stability (Hz)	Pass Or Fail
-30	615.000	615.0003851	0.0000626	0.005	385	30750	PASS
-20	615.000	615.0004683	0.0000762	0.005	468	30750	PASS
-10	615.000	615.0003332	0.0000542	0.005	333	30750	PASS
0	615.000	615.0002461	0.0000400	0.005	246	30750	PASS
10	615.000	615.0000719	0.0000117	0.005	72	30750	PASS
20	615.000	615.0002260	0.0000367	0.005	226	30750	PASS
30	615.000	615.0001638	0.0000266	0.005	164	30750	PASS
40	615.000	615.0002279	0.0000371	0.005	228	30750	PASS
50	615.000	615.0002846	0.0000463	0.005	285	30750	PASS

Test Information

EUT Name: AD1 Band K54* #103
Serial Number: TU163380075
Test Description: FCC Part 74.861 Frequency Stability
Operating Conditions: 615MHz (Mid Frequency) @ 2mW, -30C to +50C
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer and ESPEC Temp Chamber
Test Date: March 10 and 21, 2017

*US FCC only

Temp °C	Nominal Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	Frequency Stability (%)	Deviation (Hz)	Frequency Stability (Hz)
-30	615.000	615.0003204	0.0000521	0.005	320	30750
-20	615.000	615.0002384	0.0000388	0.005	238	30750
-10	615.000	614.9999452	-0.0000089	0.005	-55	30750
0	615.000	614.9992583	-0.0001206	0.005	-742	30750
10	615.000	615.0040546	0.0006593	0.005	4055	30750
20	615.000	615.0006175	0.0001004	0.005	618	30750
30	615.000	615.0029964	0.0004872	0.005	2996	30750
40	615.000	615.0003973	0.0000646	0.005	397	30750
50	615.000	615.0002907	0.0000473	0.005	291	30750

D. OCCUPIED BANDWIDTH MEASUREMENTS

D.1. PURPOSE:

This test was performed to determine if the EUT meets the occupied bandwidth requirements of the FCC Part 74.861(e)(4) and the RSS-210, Annex G, section G3.2 specifications over the EUT's operating frequency range.

D.2. REQUIREMENTS:

As stated in paragraph 74.861(e)(5) and (6), for low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

- a) The operating bandwidth shall not exceed 200 kHz.
- b) The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:
 - i. On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;
 - ii. On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;
 - iii. On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}$ (mean output power in watts) dB.

Per the specifications set out in the RSS-210, Issue 9, Annex G, Section G3.2 and Table G1 specifications, the following technical requirements apply:

- a) The authorized bandwidth shall not exceed 200kHz.
- b) The power of unwanted emissions (measured with a resolution bandwidth of 1kHz) shall be contained within the mask prescribed for digital systems operating below 2GHz as described in section 8.3.2 of ETSI EN 300 422-1 v1.4.2 (2011-08).

D.3. TEST SETUP AND INSTRUMENTATION:

Photographs of the test setup are shown as Figure D-1. The test instrumentation can be determined from Table 10-1.

D.4. EUT OPERATION:

The EUT was powered up and the transmit frequency and power output level of the transmitter were selected using the front panel controls. The EUT was powered at 3VDC by 2 "AA" alkaline batteries. The EUT was checked for proper operation after it was setup for the test. Testing was conducted with the EUT set to transmit at a low, mid and high frequency within each band at an output power level of 35mW. Testing was

Appendix D

also performed at an output power level of 2mW in normal channel bandwidth mode and high density channel bandwidth mode to demonstrate compliance to the occupied bandwidth requirements stated in section D.2.

D.5. TEST PROCEDURES:

- a) The EUT was connected to the 50 ohm input of a spectrum analyzer through 20dB of attenuation.
- c) The bandwidth of the spectrum analyzer was set to 1MHz.
- d) The peak output power was measured and used to set the reference level on the spectrum analyzer.
- e) The EUT was then modulated with a typical digital modulation.
- f) The bandwidth of the spectrum analyzer was set to 2kHz (1% of Authorized BW), or 1kHz for RSS-210.

D.6. RESULTS:

The occupied bandwidth measurement data is presented on page 25 – page 104. As shown by the test data, the occupied bandwidth of the EUT meets the requirements set out in FCC Part 74.861 and RSS-210.

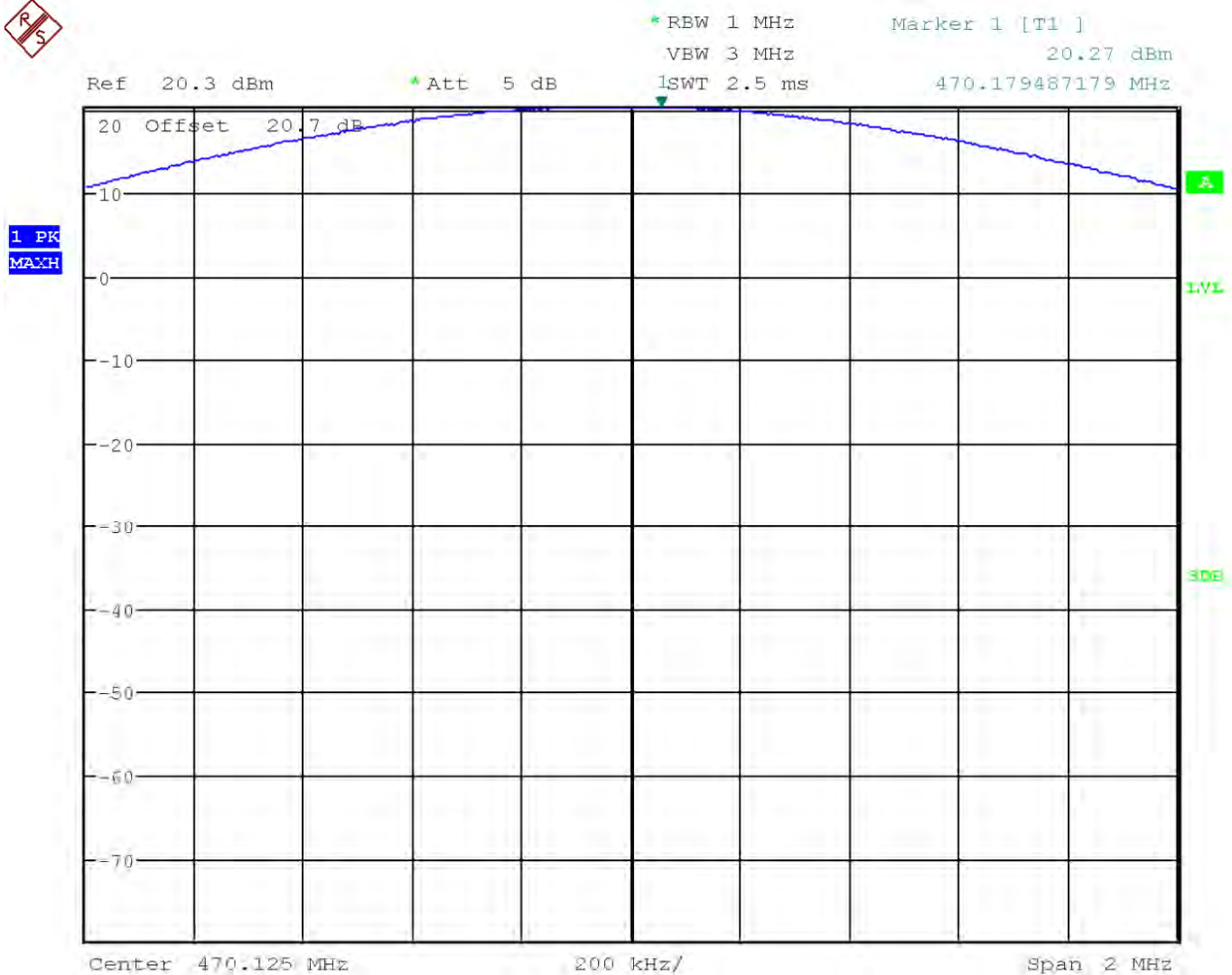
The maximum ISED Canada 99% bandwidth measurement was 183kHz.



Figure D-1 - Test Setup for Occupied Bandwidth

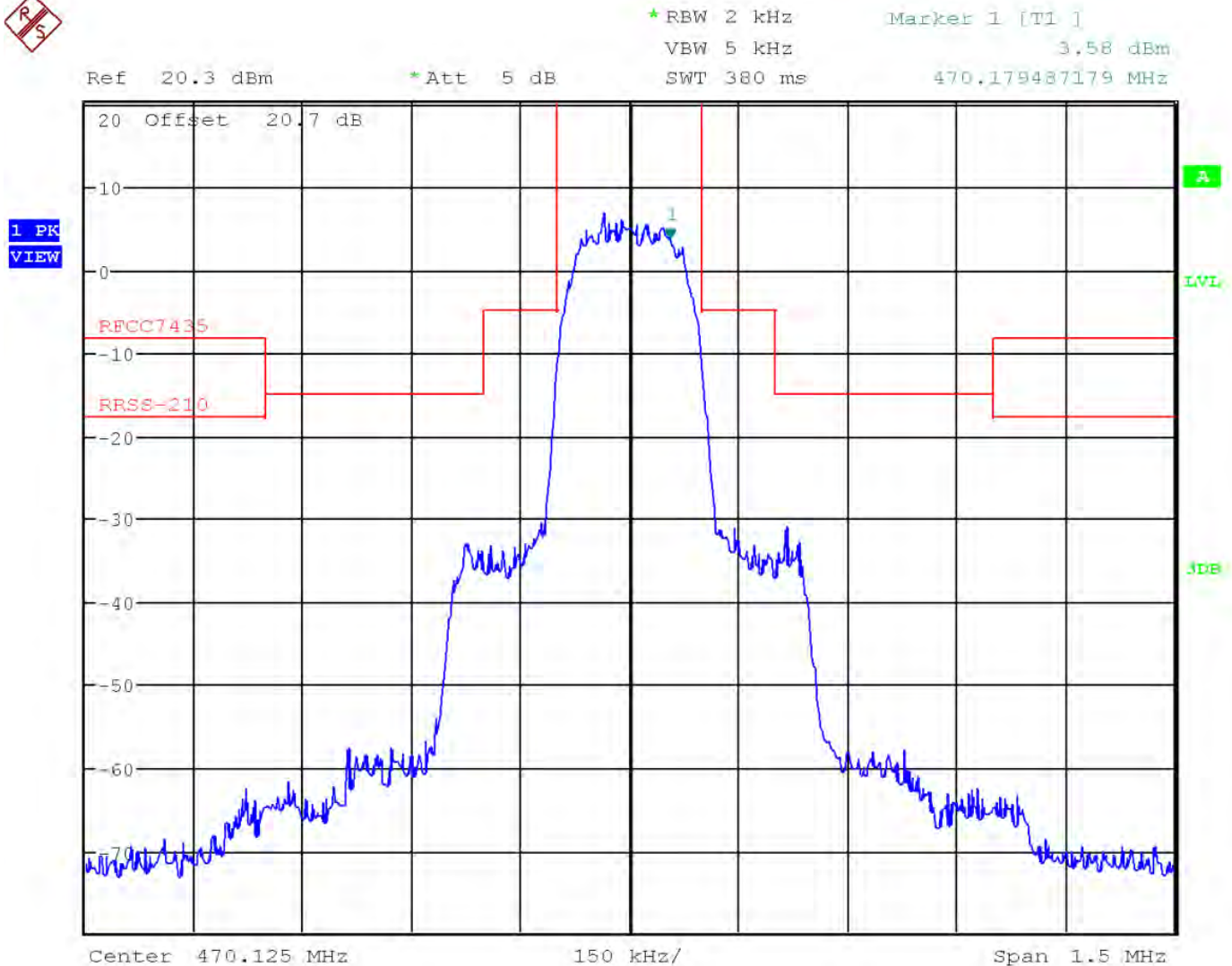
Test Information

EUT Name: AD1 G55 #45
 Serial Number: TU162070085
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Output Power Reference
 Low Frequency (470.125MHz) at 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 12:50:05 PM



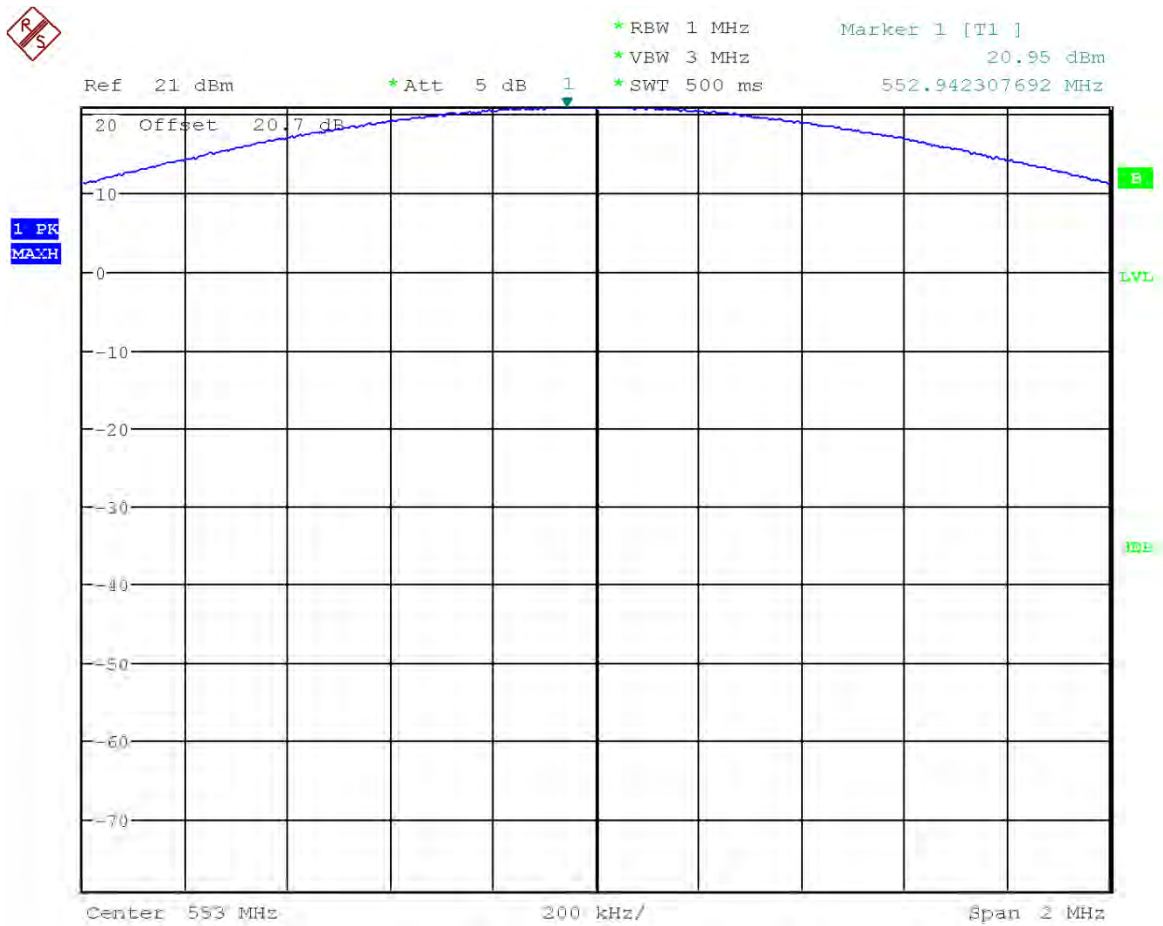
Test Information

EUT Name:	AD1 G55 #45
Serial Number:	TU162070085
Test Description:	FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions:	Low Frequency (470.125MHz) at 35mW
Operator Name:	Alex Stelmaszczyk
Comment:	R & S FSU Spectrum Analyzer
Test Date:	October 19, 2016 14:50:30 PM



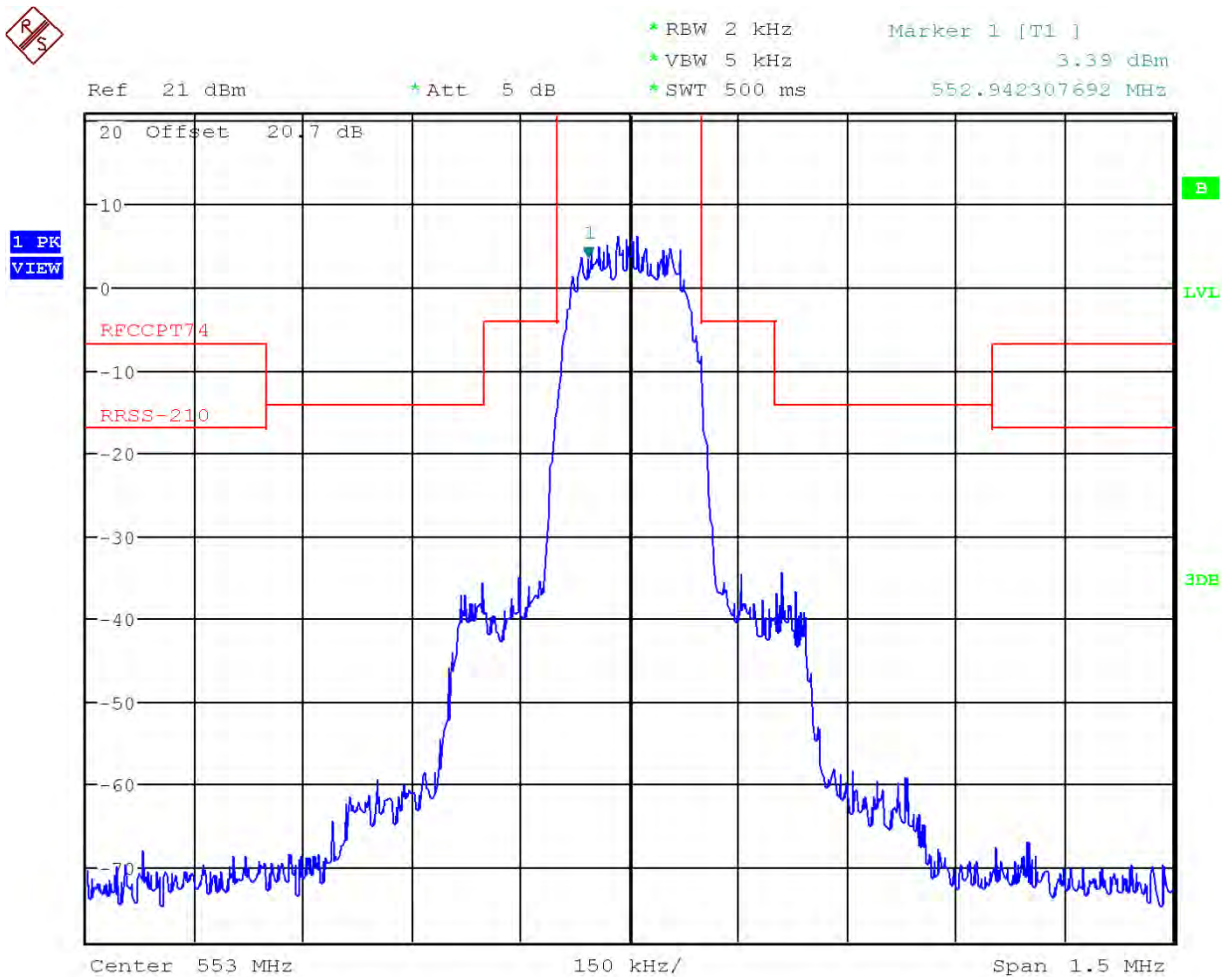
Test Information

EUT Name: AD1 G55 #45
Serial Number: TU162070085
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
Mid Frequency (553.000MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 16:46:00 PM



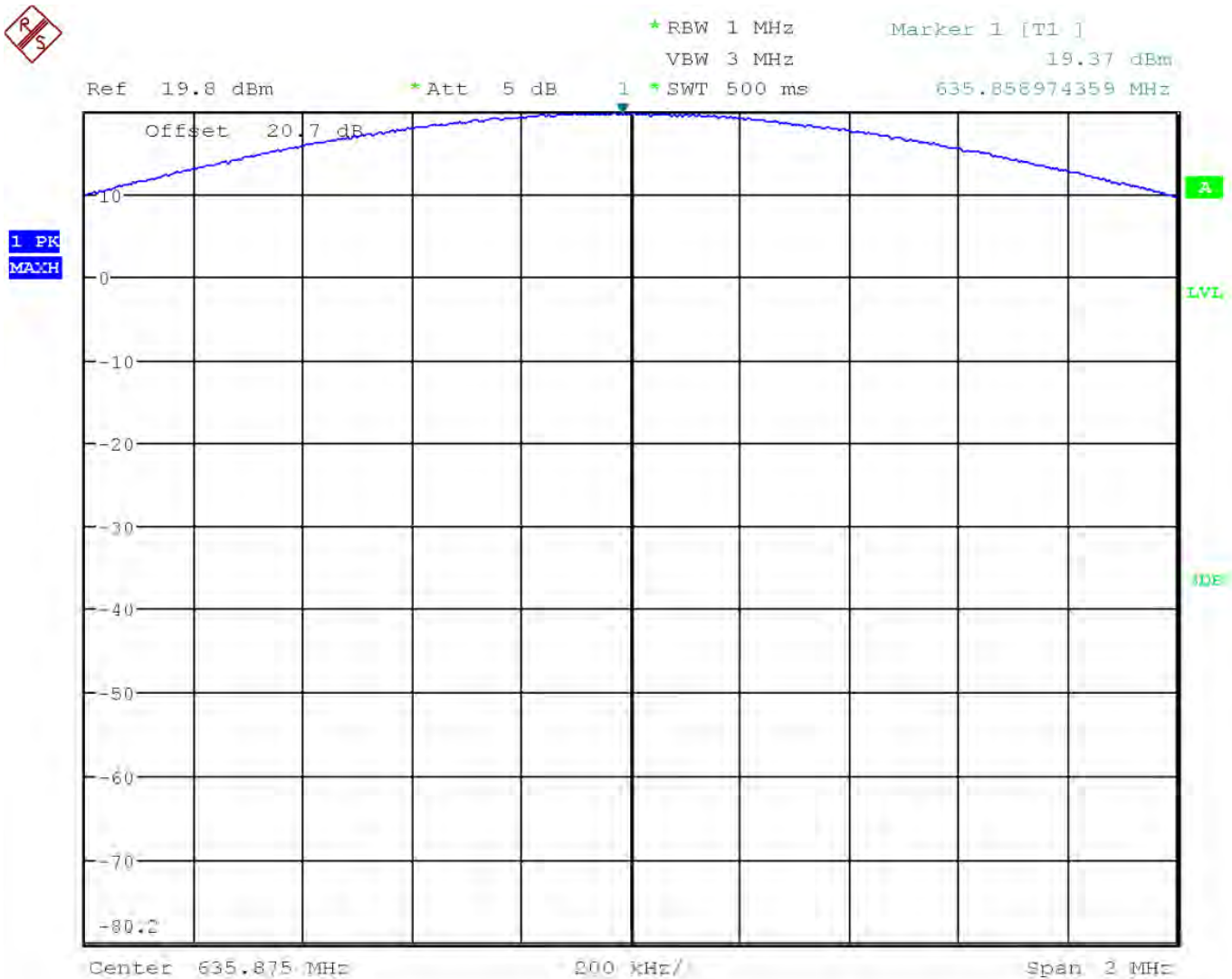
Test Information

EUT Name: AD1 G55 #45
 Serial Number: TU162070085
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Mid Frequency (553.000MHz) at 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: February 3, 2017 16:46:57 PM



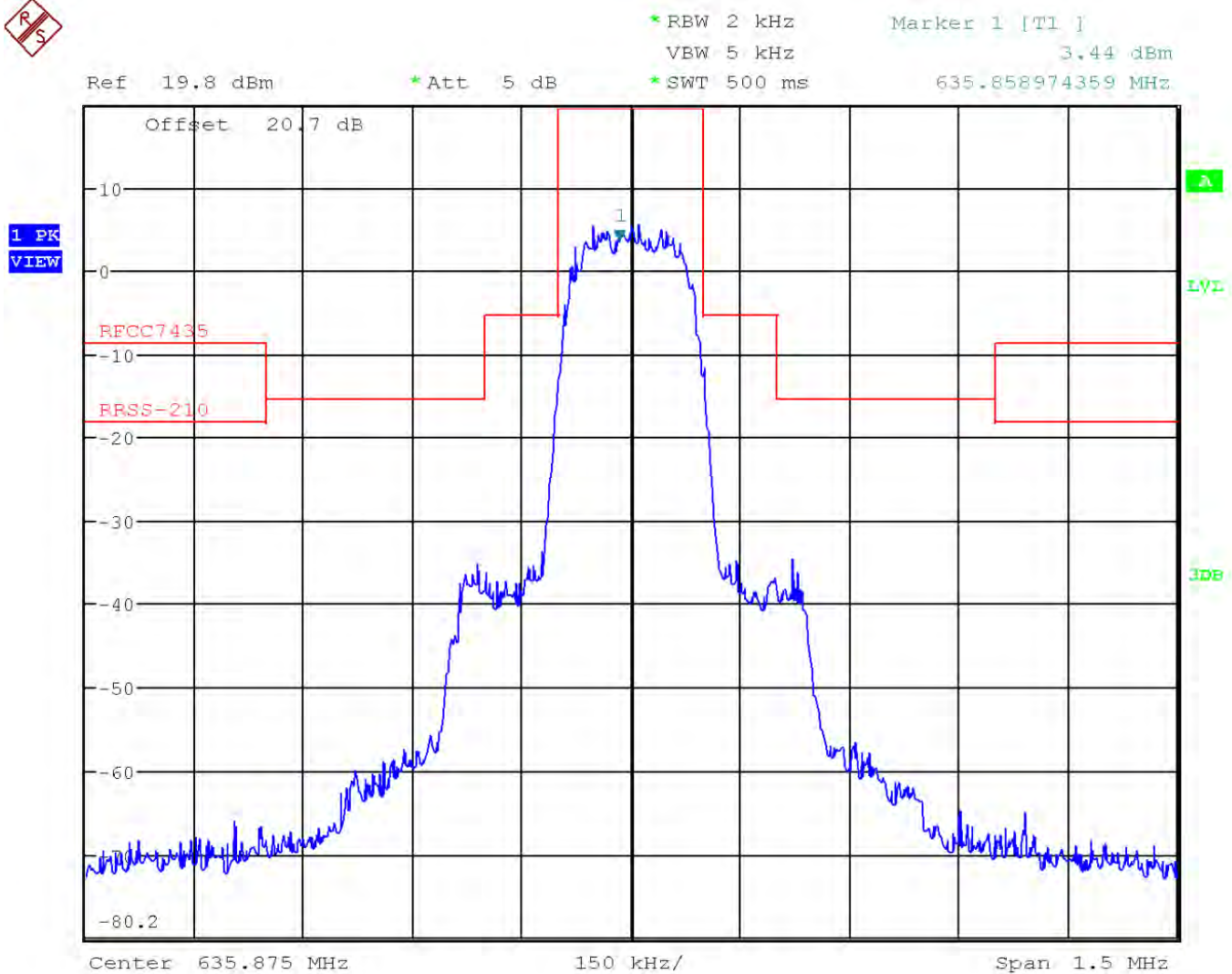
Test Information

EUT Name: AD1 G55 #45
Serial Number: TU162070085
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
High Frequency (635.875MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 15:05:15 PM



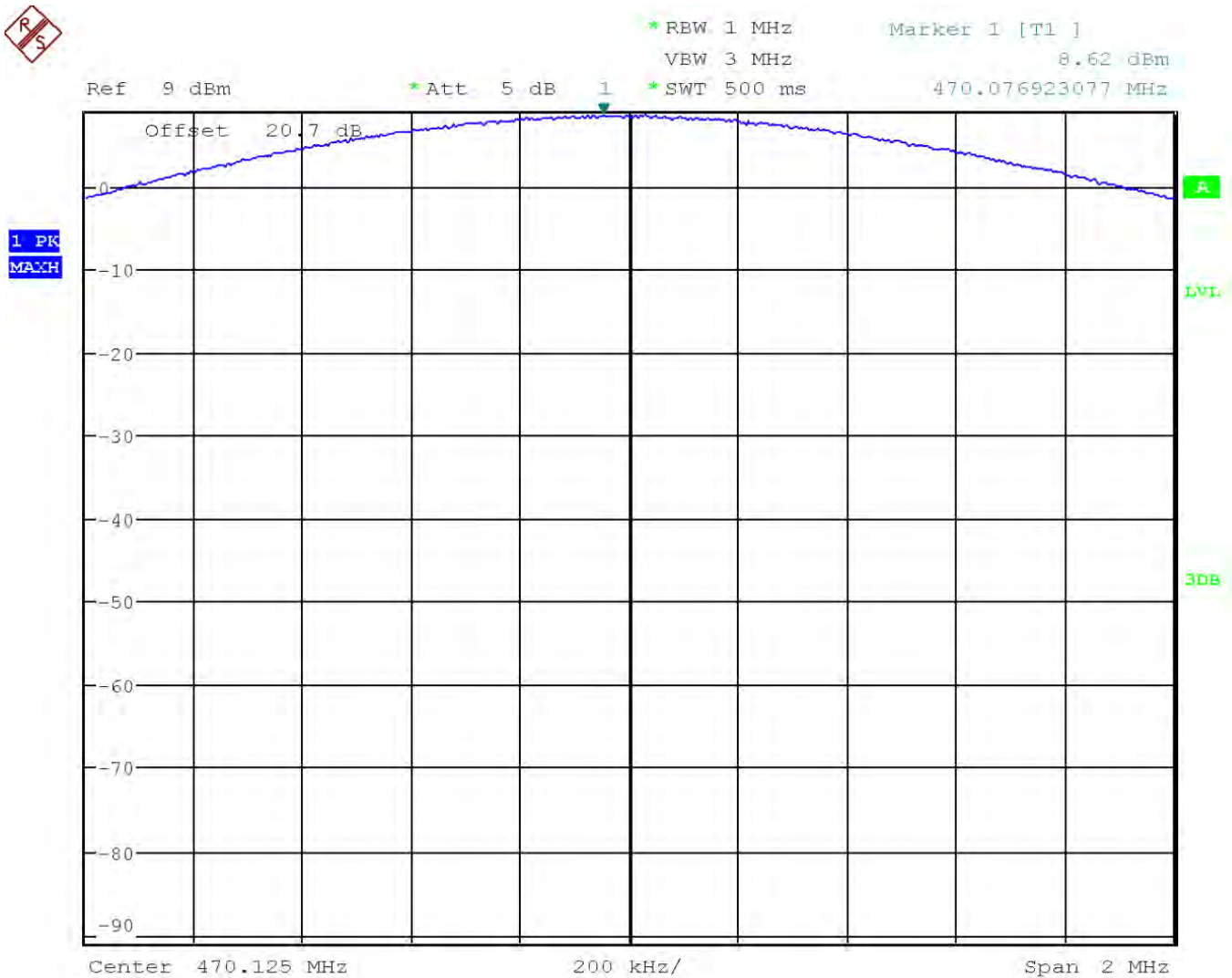
Test Information

EUT Name:	AD1 G55 #45
Serial Number:	TU162070085
Test Description:	FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions:	High Frequency (635.875MHz) at 35mW
Operator Name:	Alex Stelmaszczyk
Comment:	R & S FSU Spectrum Analyzer
Test Date:	October 19, 2016 15:08:23 PM



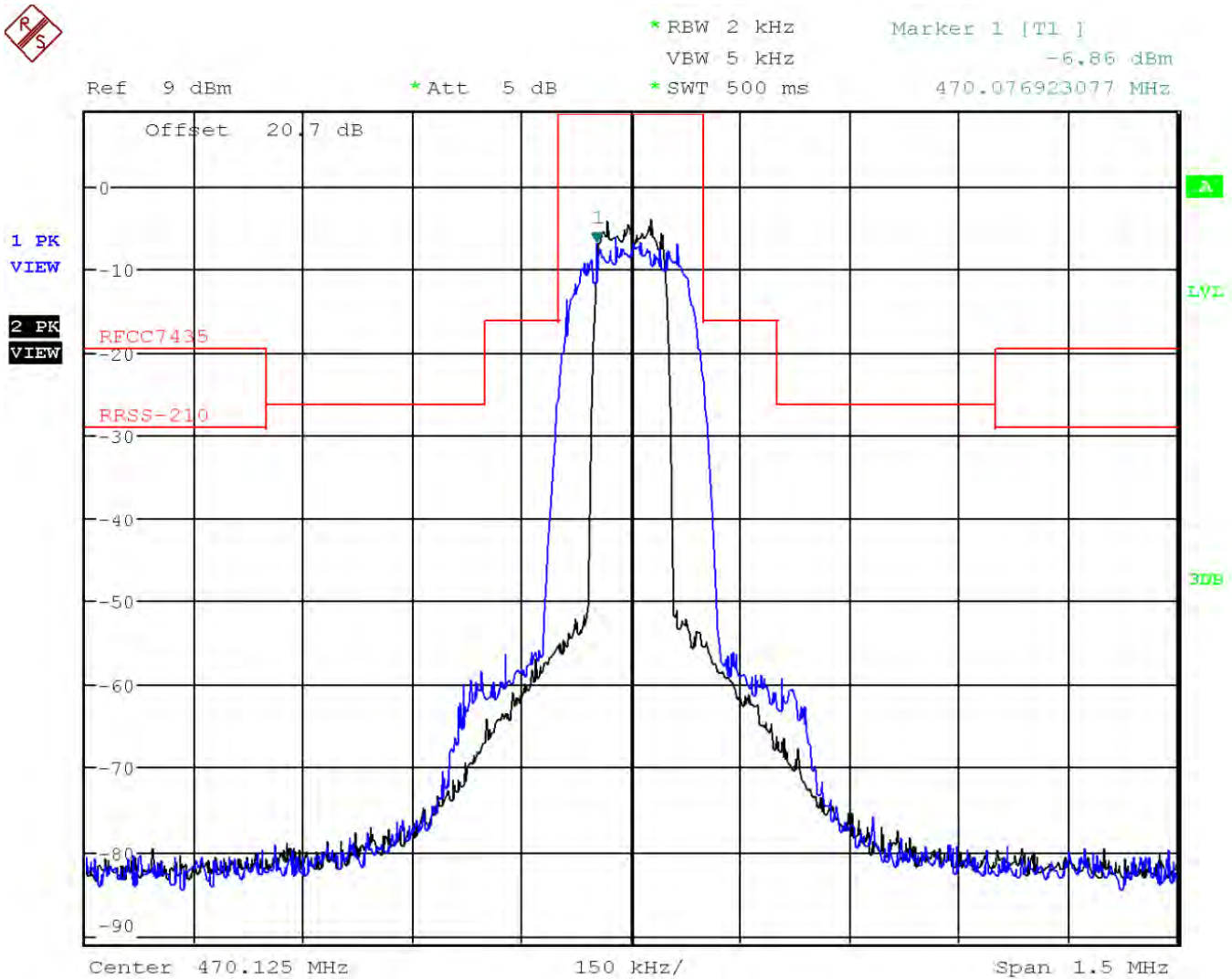
Test Information

EUT Name: AD1 G55 #45
 Serial Number: TU162070085
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Output Power Reference
 Low Frequency (470.125MHz) at 2mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 16:45:47 PM



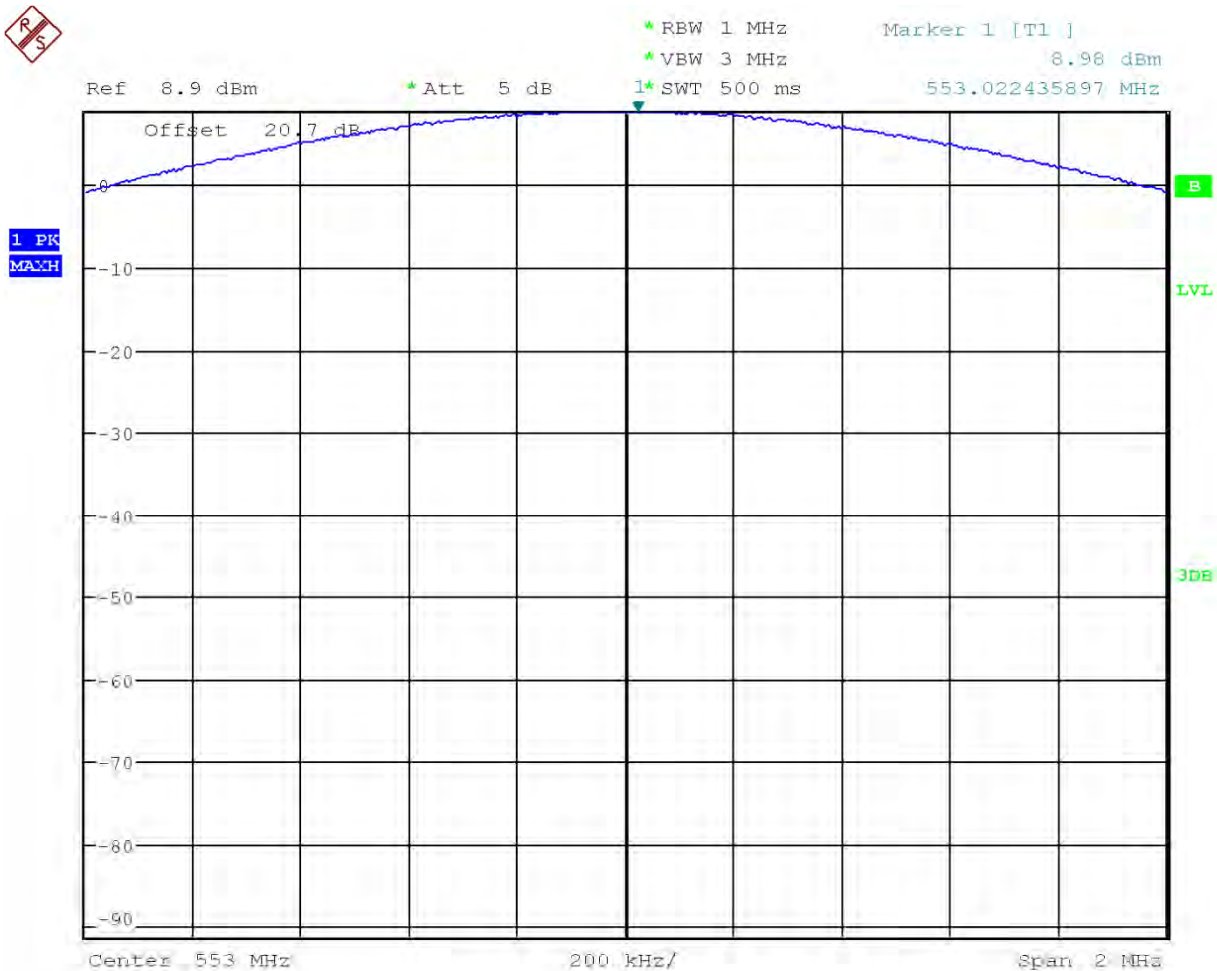
Test Information

EUT Name: AD1 G55 #45
 Serial Number: TU162070085
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Low Frequency (470.125MHz) at 2mW in Normal Mode
 (Blue Trace) and High Density Mode (Black Trace)
 (Channel Bandwidth Options)
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 16:48:54 PM



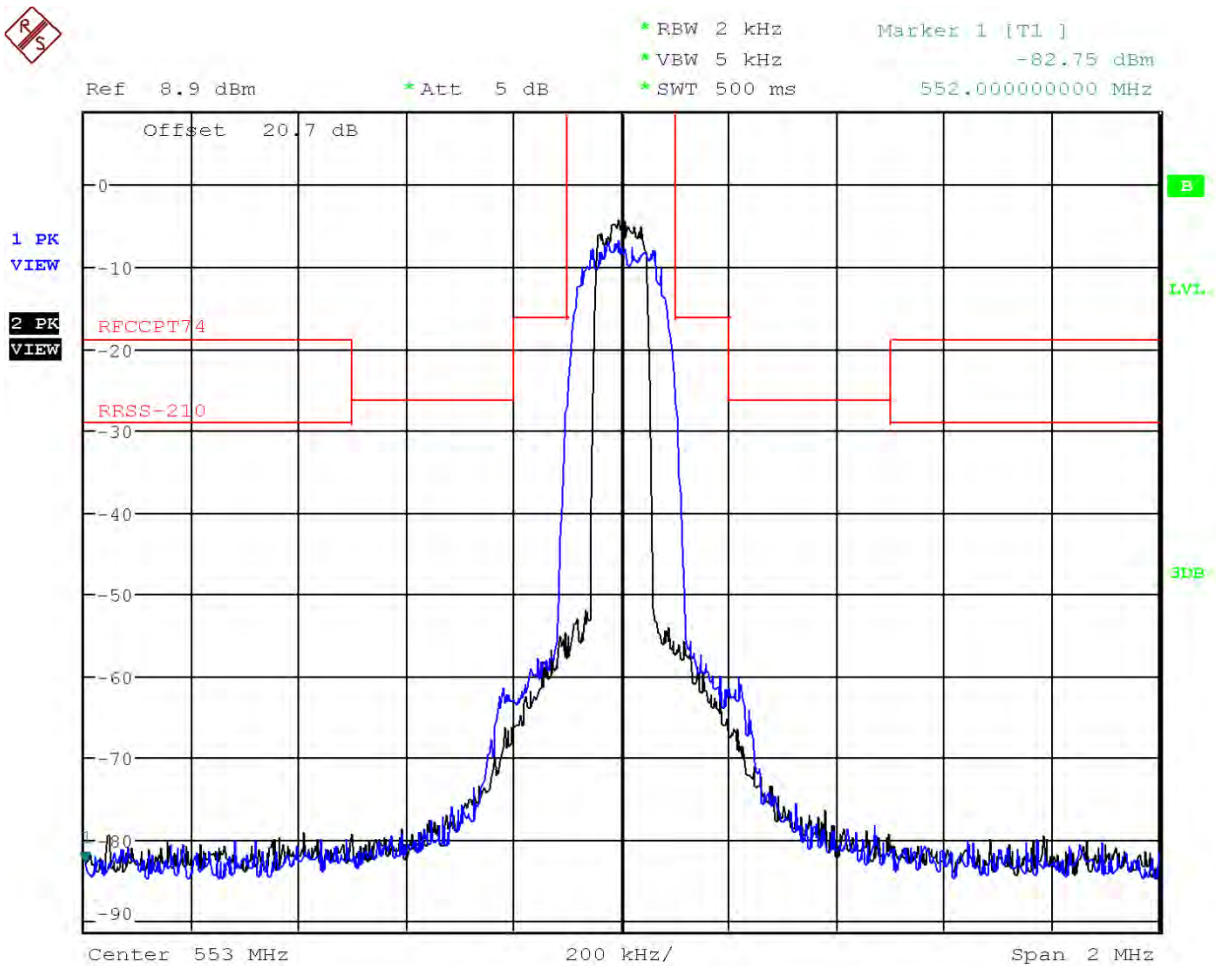
Test Information

EUT Name: AD1 G55 #45
 Serial Number: TU162070085
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Output Power Reference
 Mid Frequency (553.000MHz) at 2mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: February 3, 2017 16:54:00 PM



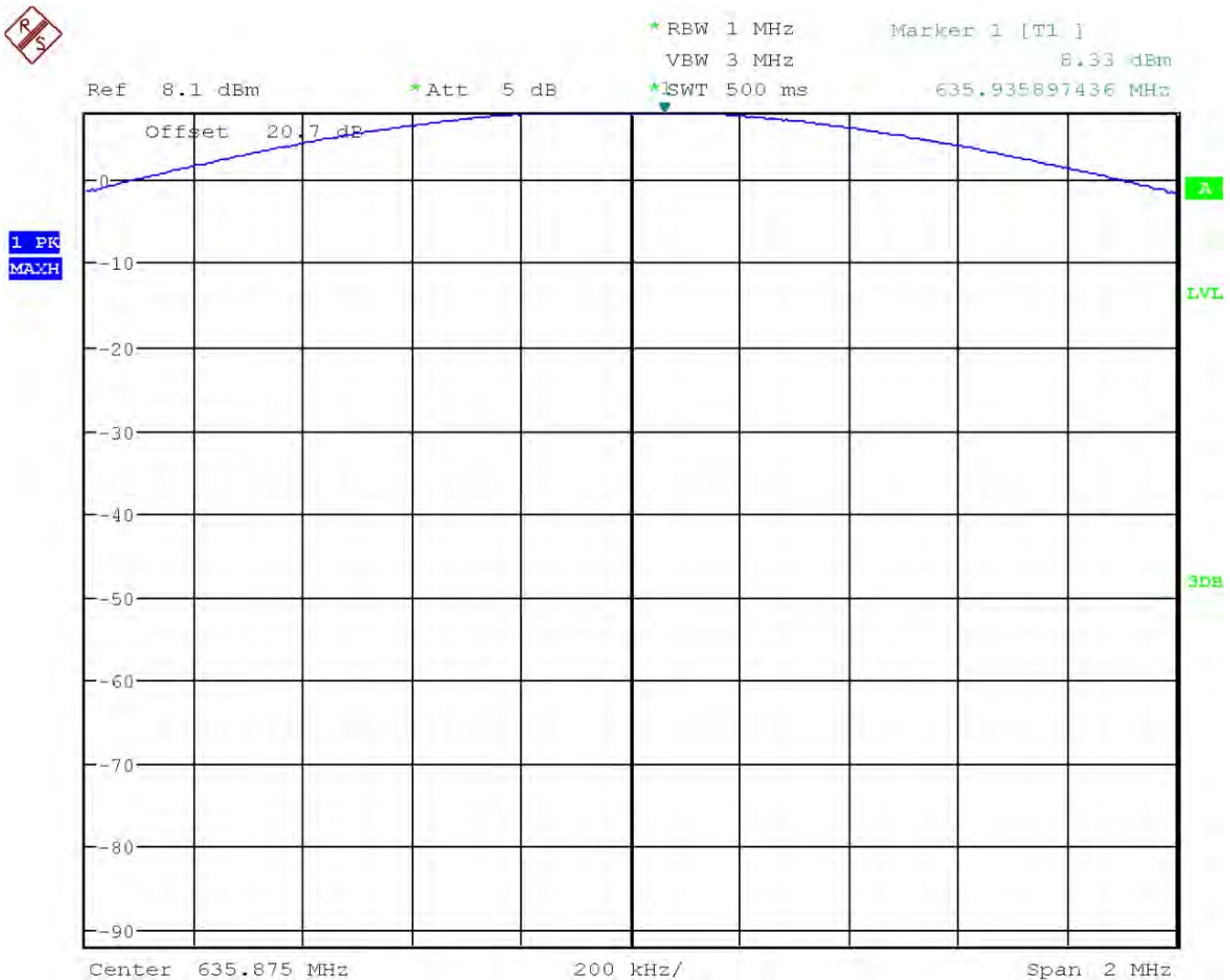
Test Information

EUT Name: AD1 G55 #45
Serial Number: TU162070085
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Mid Frequency (553.000MHz) at 2mW in Normal Mode
(Blue Trace) and High Density Mode (Black Trace)
(Channel Bandwidth Options)
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 17:02:50 PM



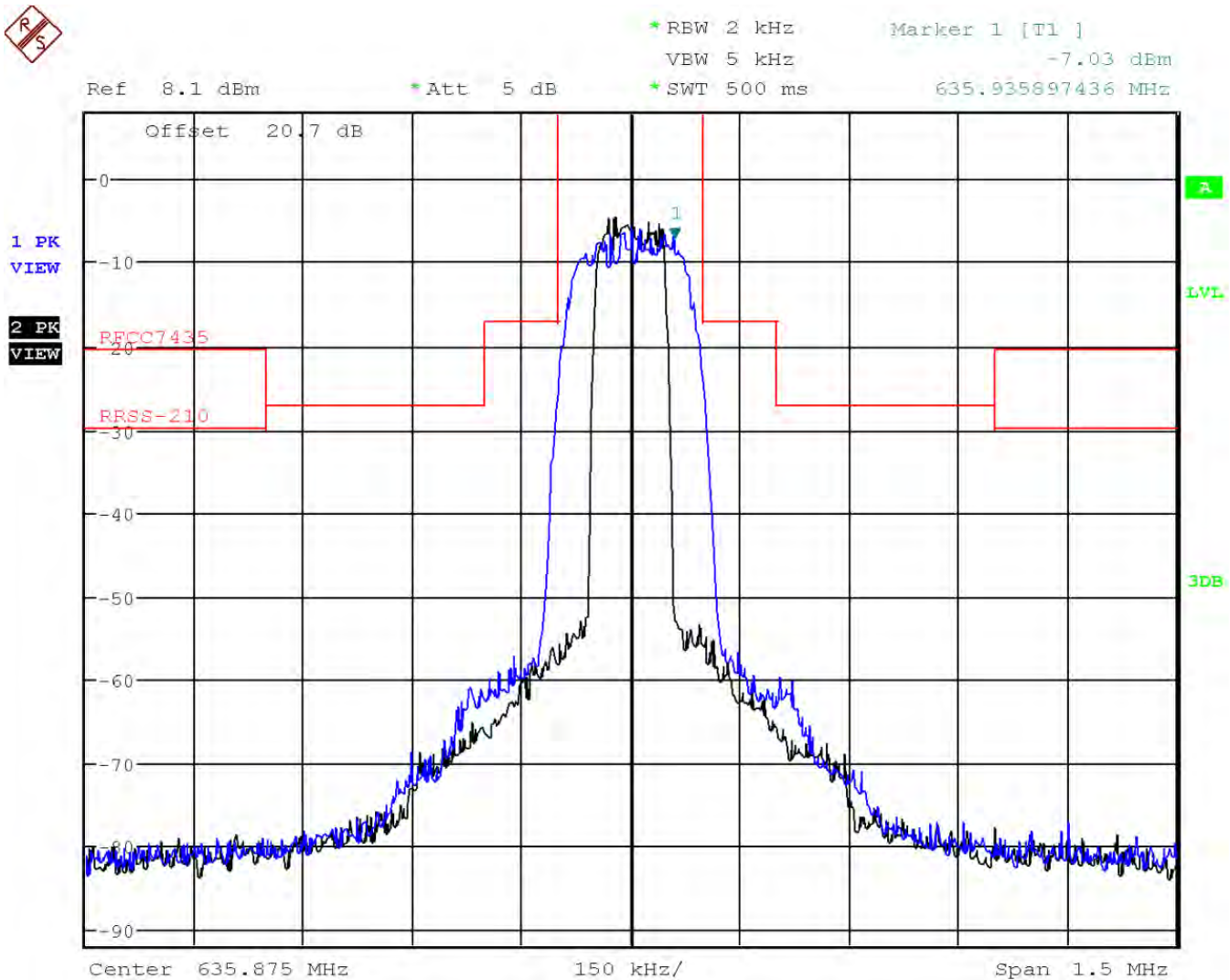
Test Information

EUT Name: AD1 G55 #45
Serial Number: TU162070085
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
High Frequency (635.875MHz) at 2mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 15:27:34 PM



Test Information

EUT Name: AD1 G55 #45
 Serial Number: TU162070085
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: High Frequency (635.875MHz) at 2mW in Normal Mode
 (Blue Trace) and High Density Mode (Black Trace)
 (Channel Bandwidth Options)
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 16:28:34 PM



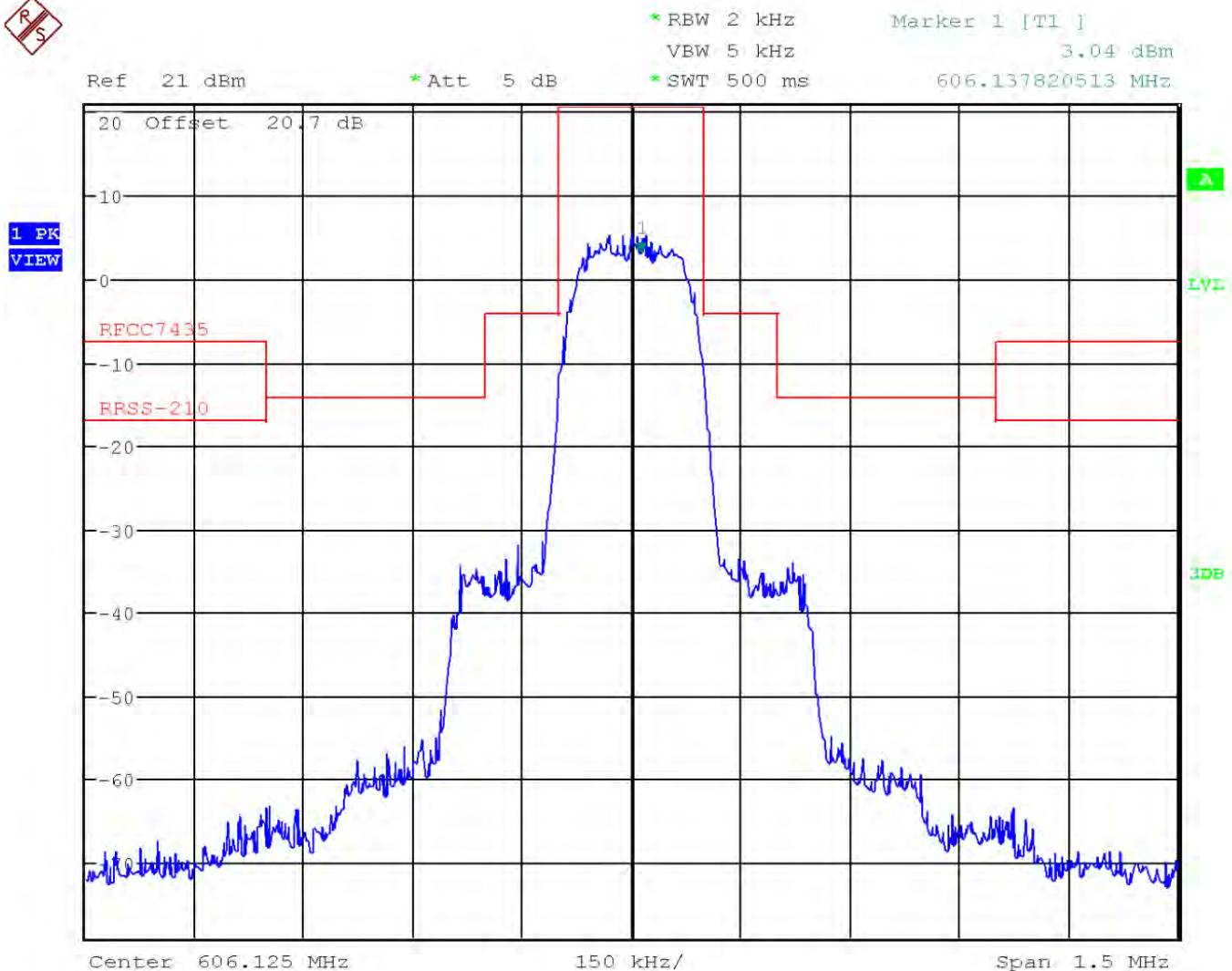
Test Information

EUT Name: AD1 K53 #142
 Serial Number: TU162050041
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Output Power Reference
 Low Frequency (606.125MHz) at 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 17:32:14 PM



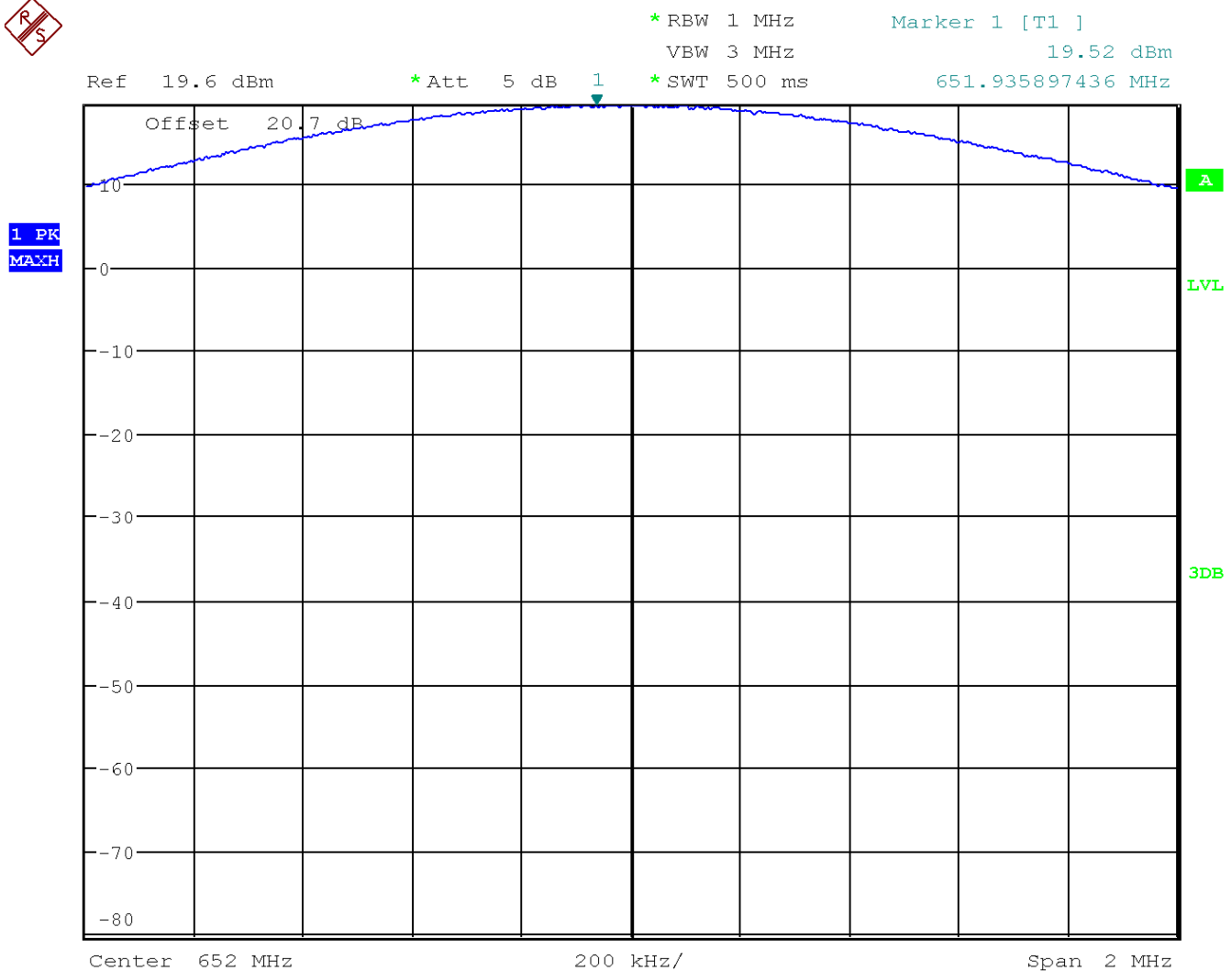
Test Information

EUT Name: AD1 K53 #142
 Serial Number: TU162050041
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Low Frequency (606.125MHz) at 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 17:34:25 PM



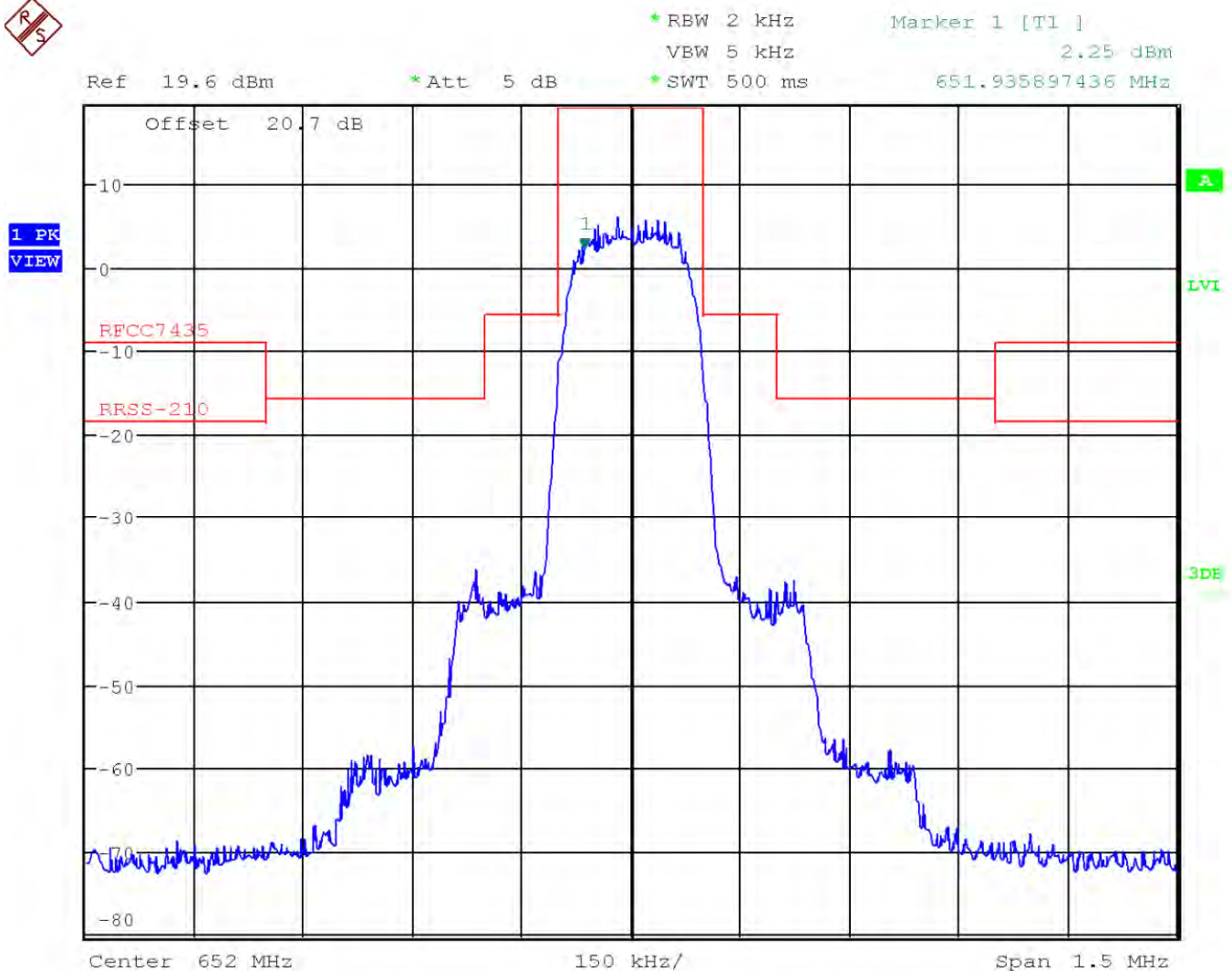
Test Information

EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
Mid Frequency (652.000MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 17:26:13 PM



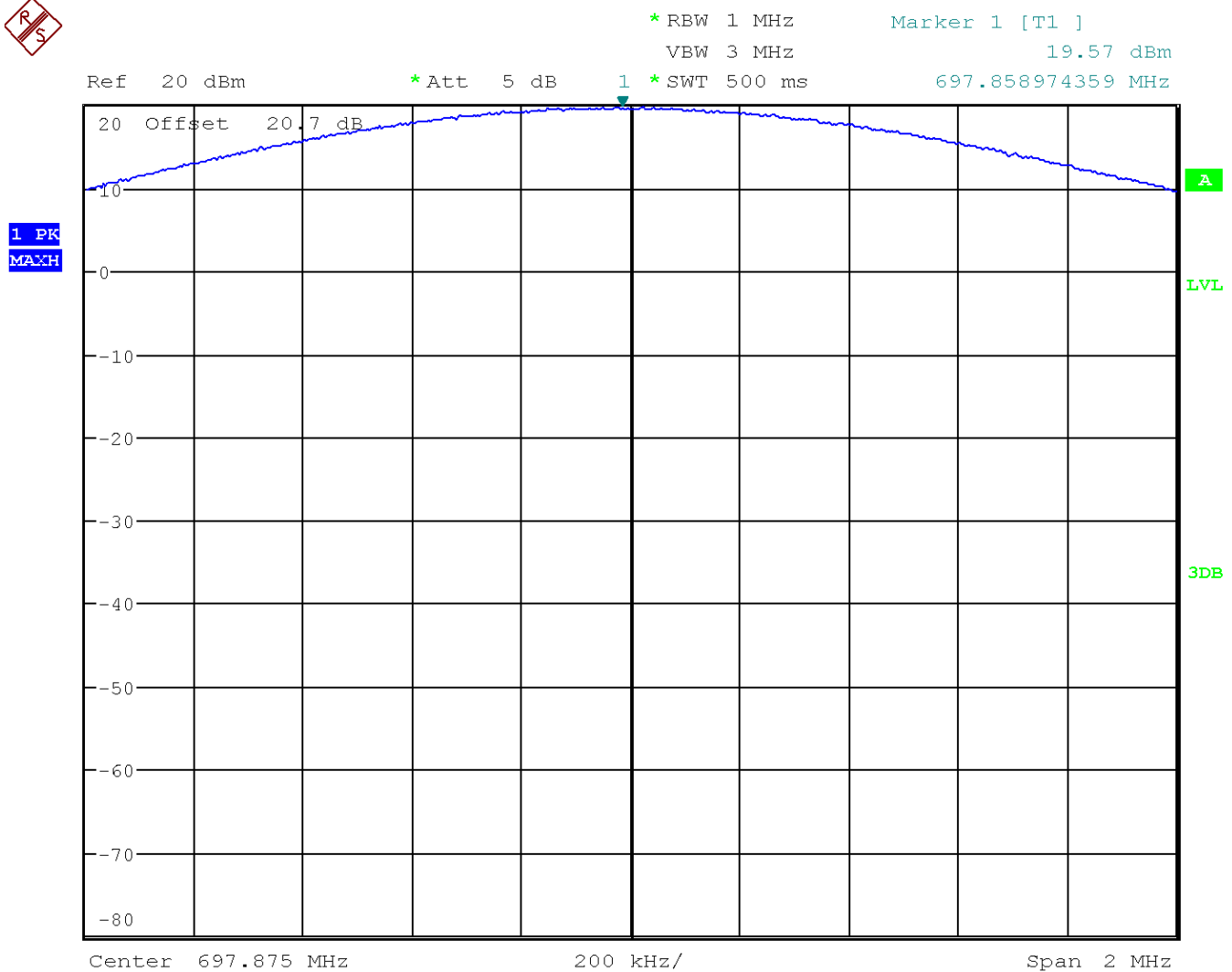
Test Information

EUT Name: AD1 K53 #142
 Serial Number: TU162050041
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: Mid Frequency (652.000MHz) at 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 17:28:56 PM



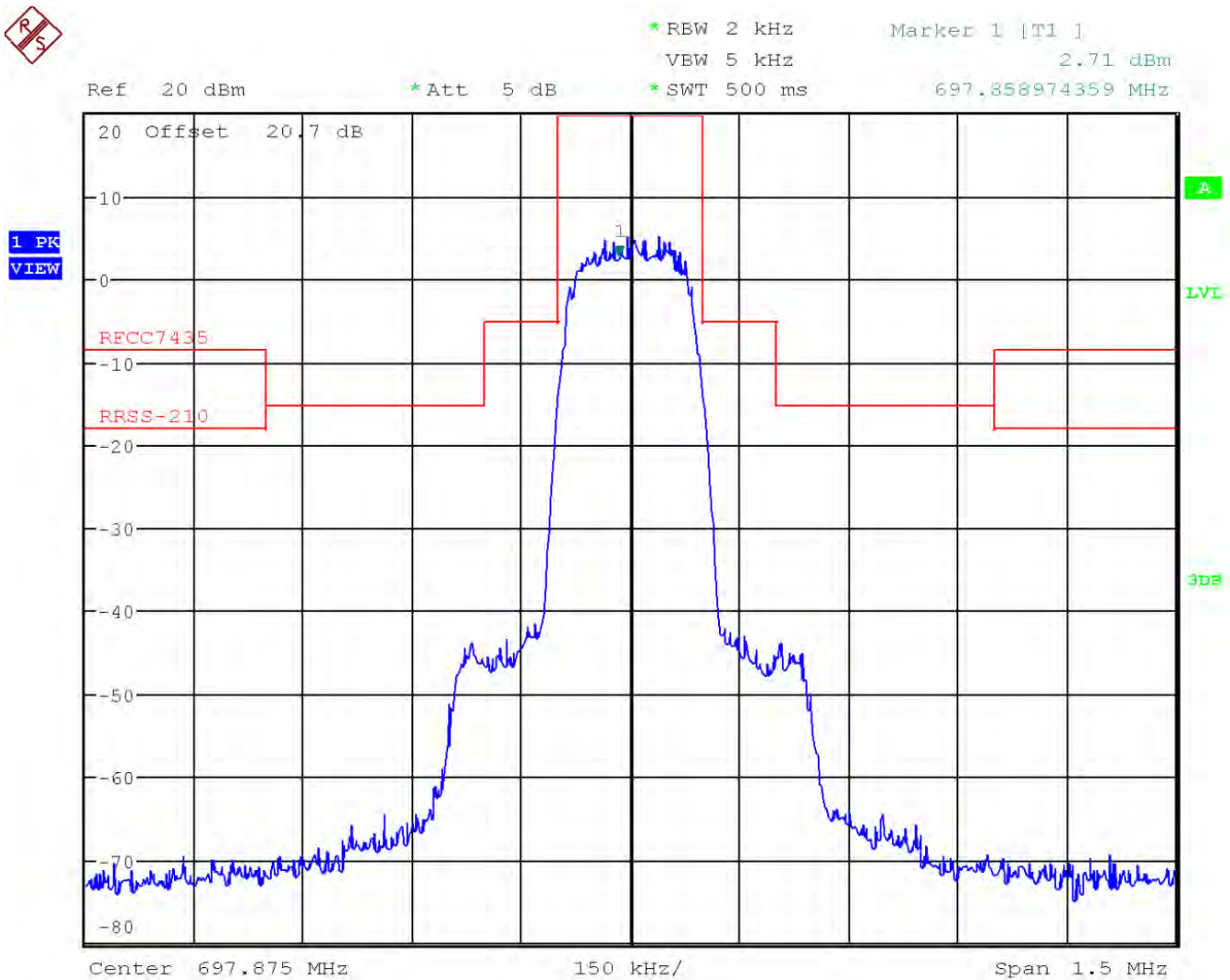
Test Information

EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
High Frequency (697.875MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 17:18:51 PM



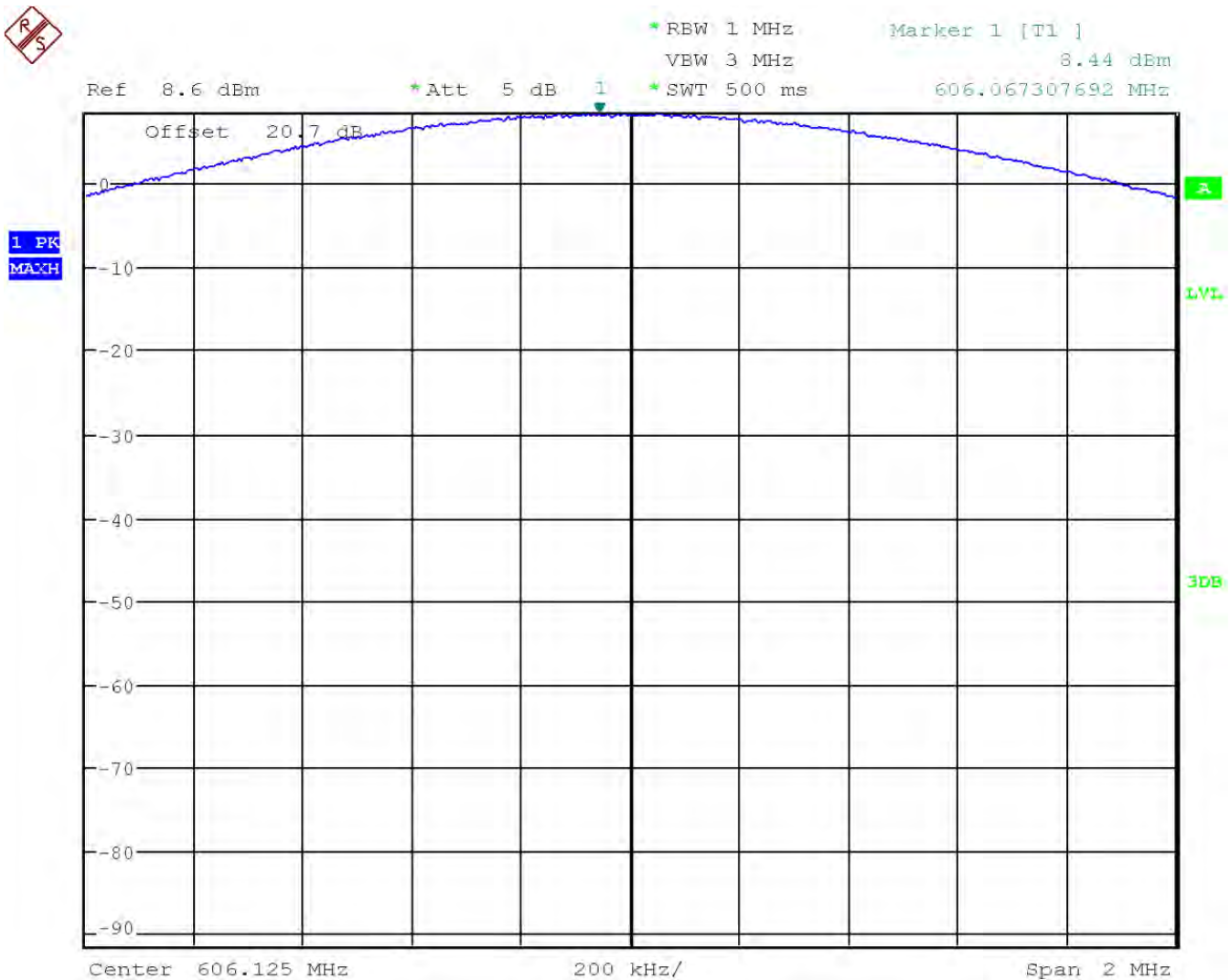
Test Information

EUT Name:	AD1 K53 #142
Serial Number:	TU162050041
Test Description:	FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions:	High Frequency (697.875MHz) at 35mW
Operator Name:	Alex Stelmaszczyk
Comment:	R & S FSU Spectrum Analyzer
Test Date:	October 19, 2016 17:21:03 PM



Test Information

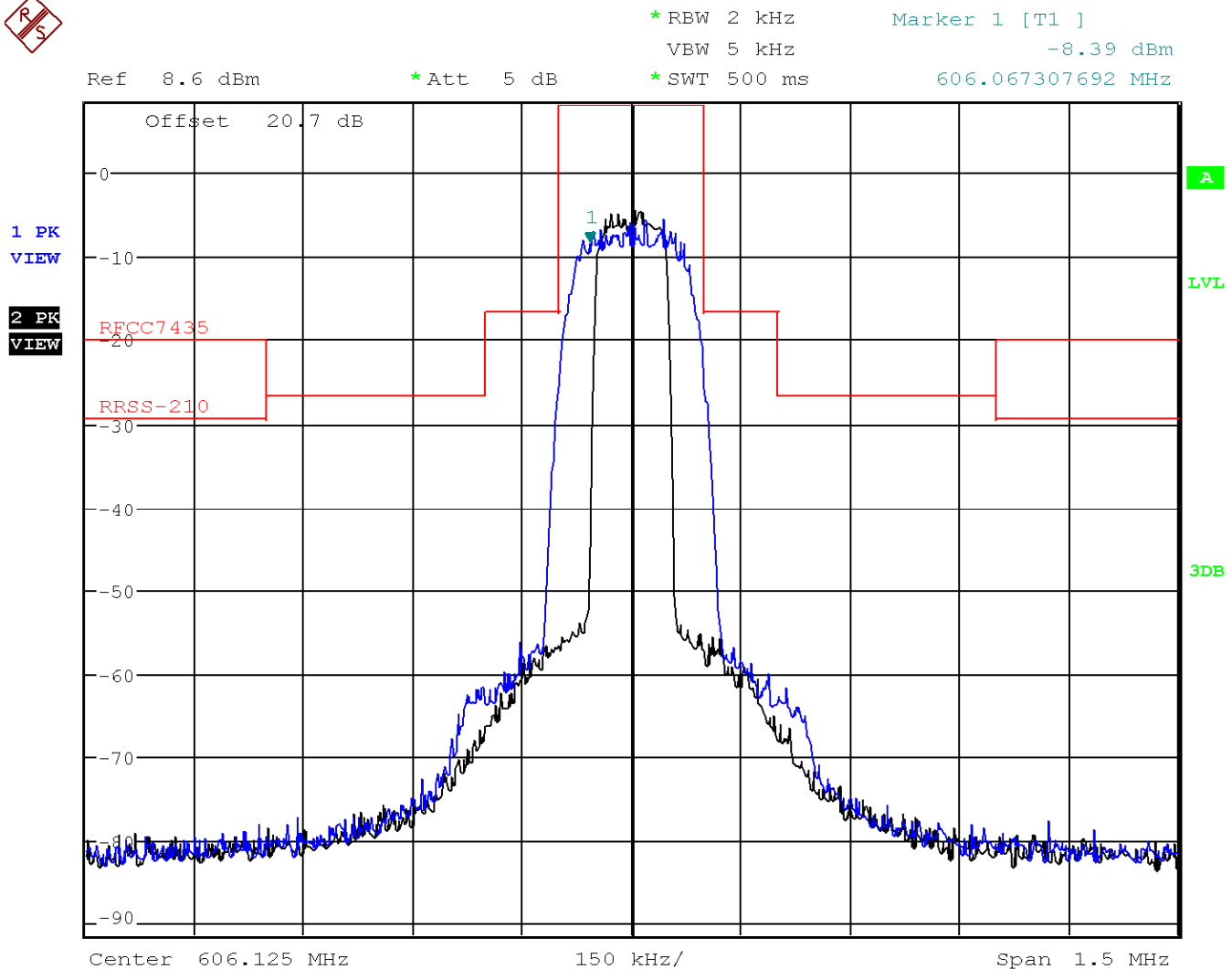
EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
Low Frequency (606.125MHz) at 2mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 18:05:13 PM



Test Information

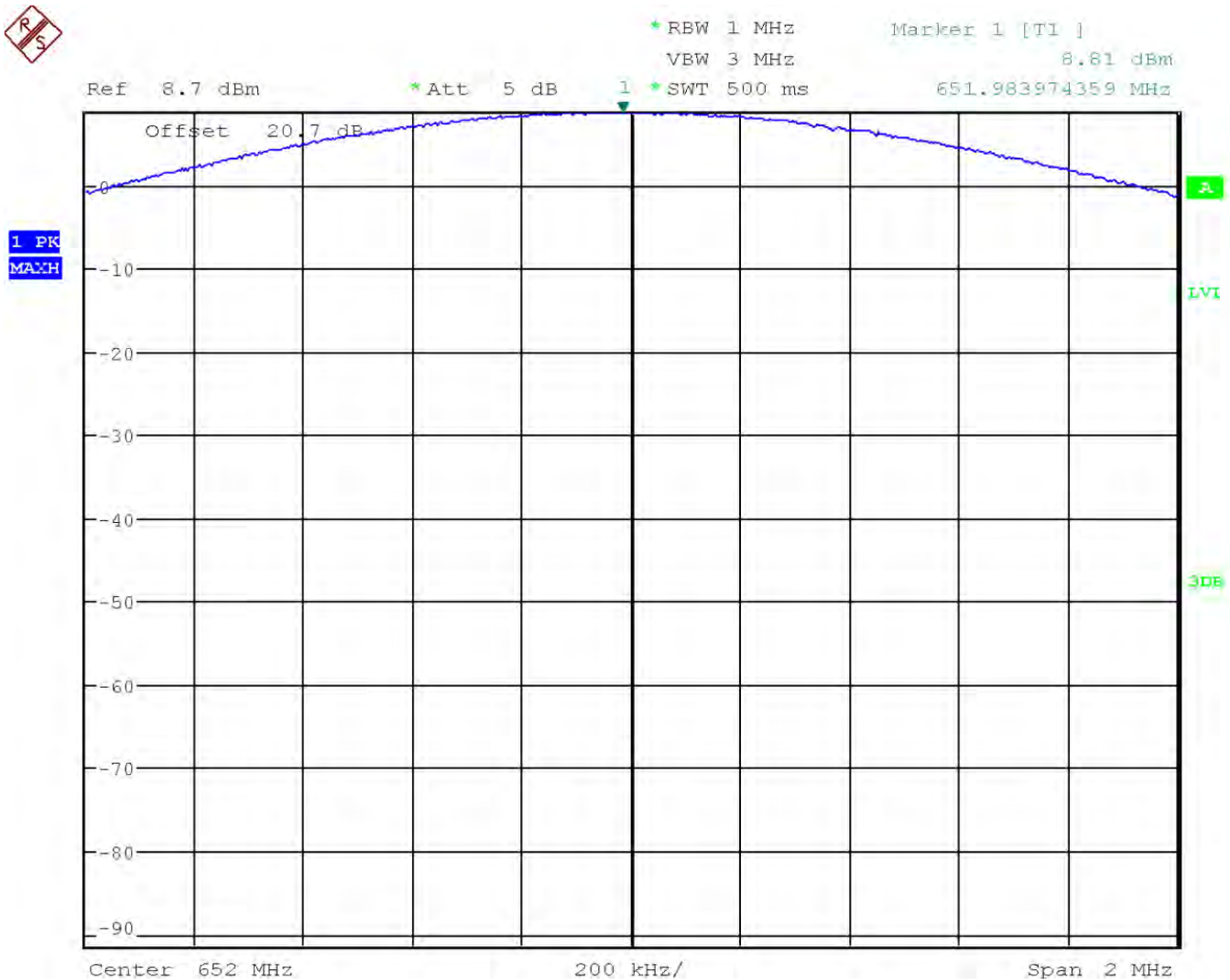
EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Low Frequency (606.125MHz) at 2mW in Normal Mode
(Blue Trace) and High Density Mode (Black Trace)
(Channel Bandwidth Options)

Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 18:08:17 PM



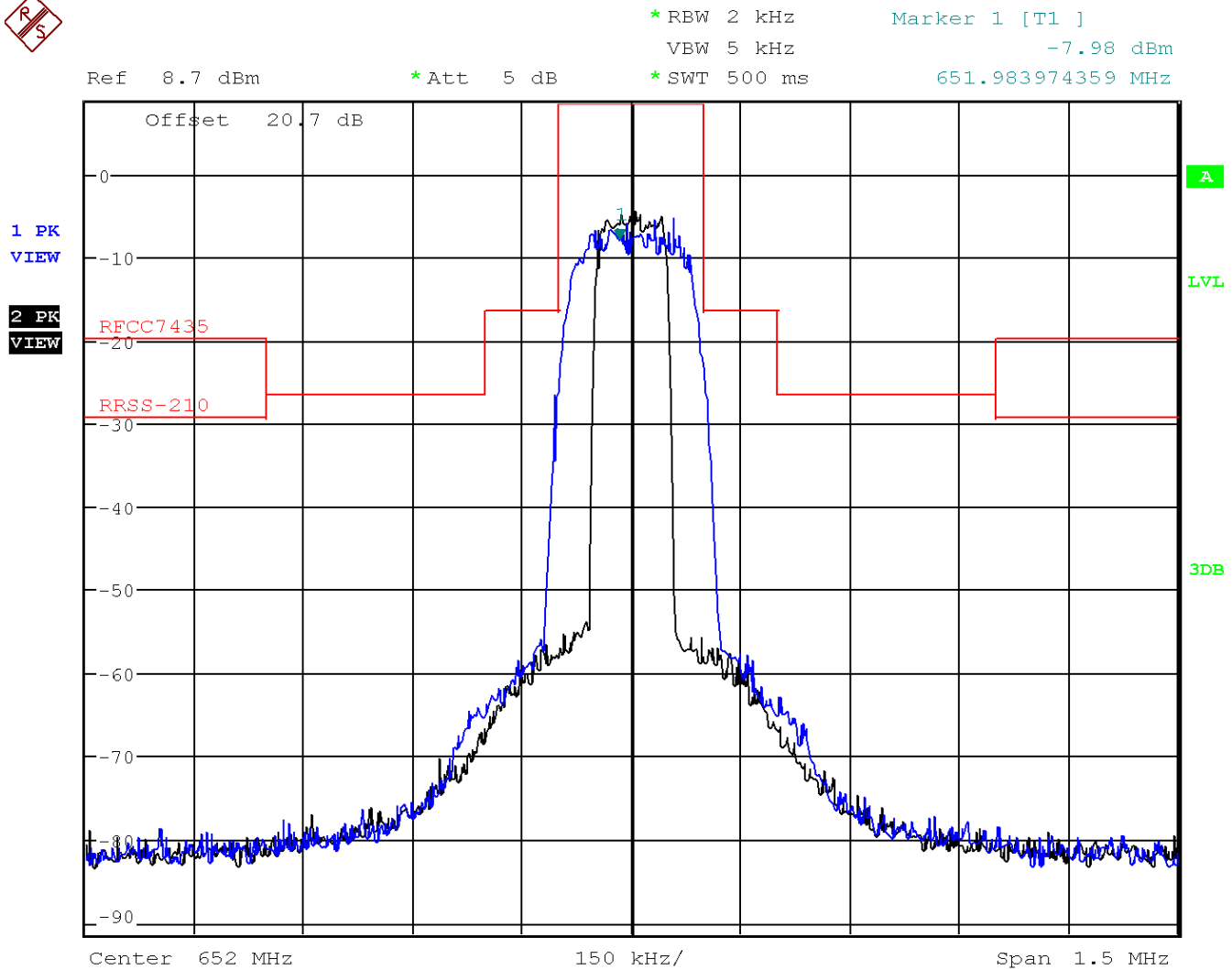
Test Information

EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
Mid Frequency (652.000MHz) at 2mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 17:57:29 PM



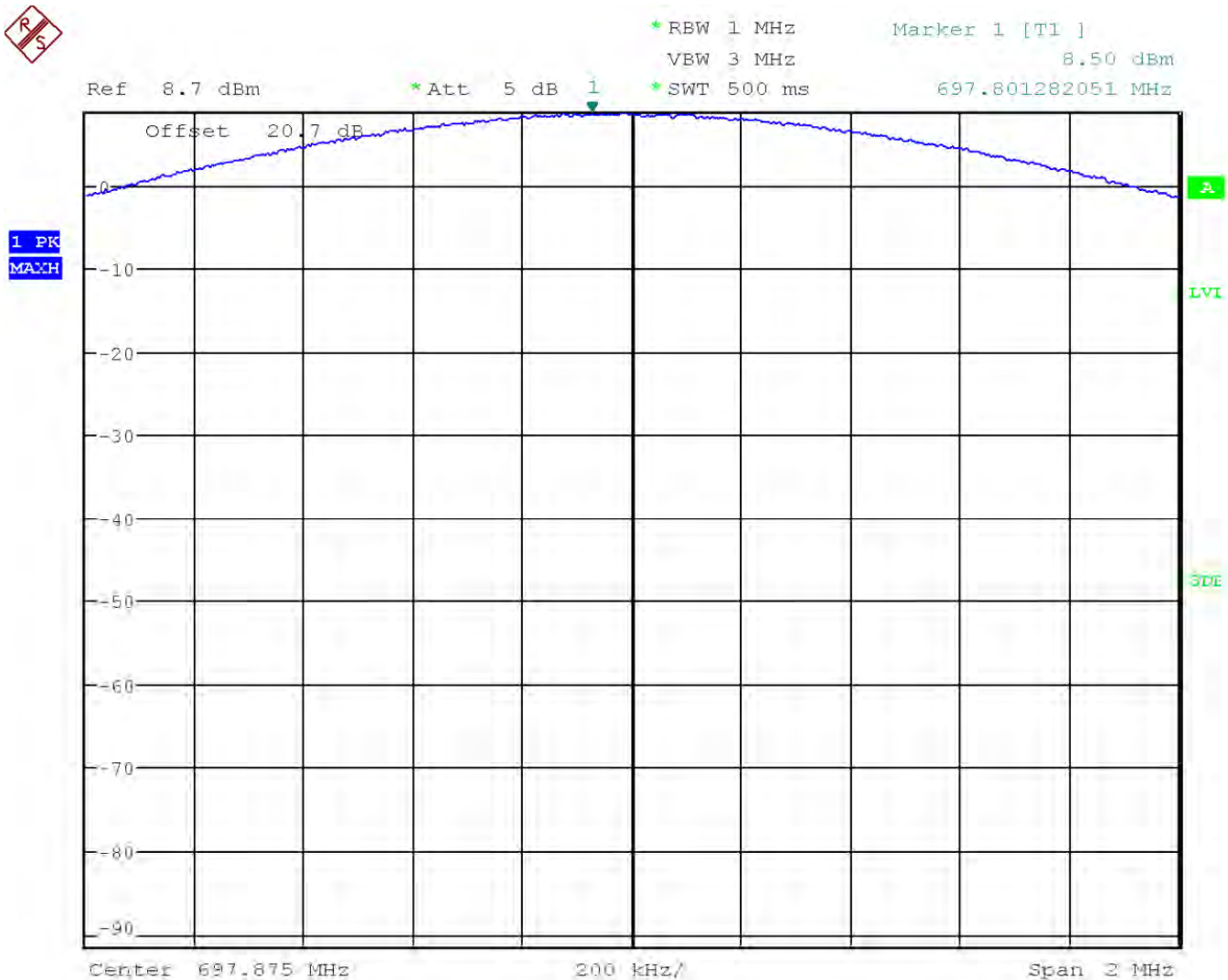
Test Information

EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Mid Frequency (652.000MHz) at 2mW in Normal Mode
(Blue Trace) and High Density Mode (Black Trace)
(Channel Bandwidth Options)
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 18:01:05 PM



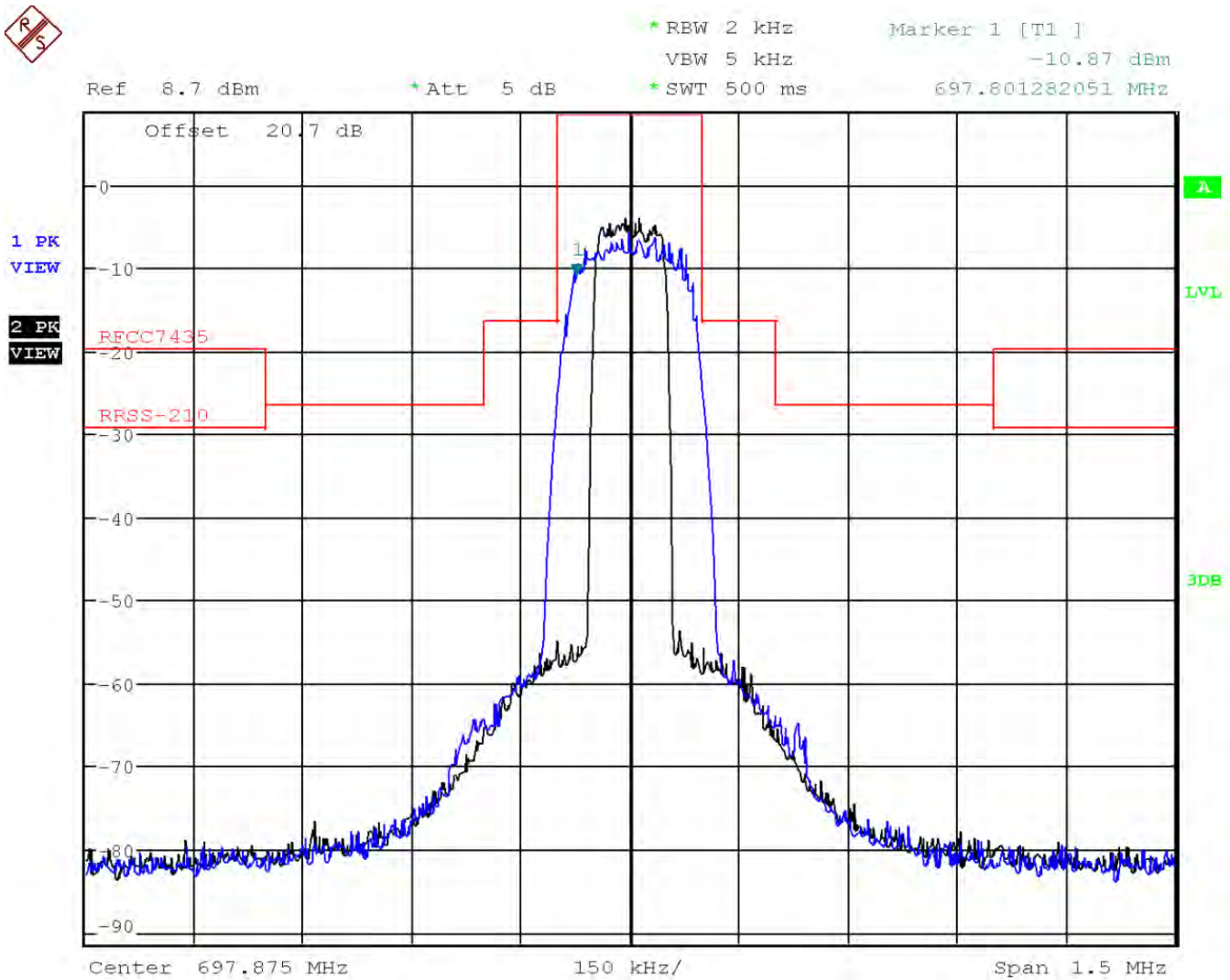
Test Information

EUT Name: AD1 K53 #142
Serial Number: TU162050041
Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
Operating Conditions: Output Power Reference
High Frequency (697.875MHz) at 2mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: October 19, 2016 17:47:48 PM



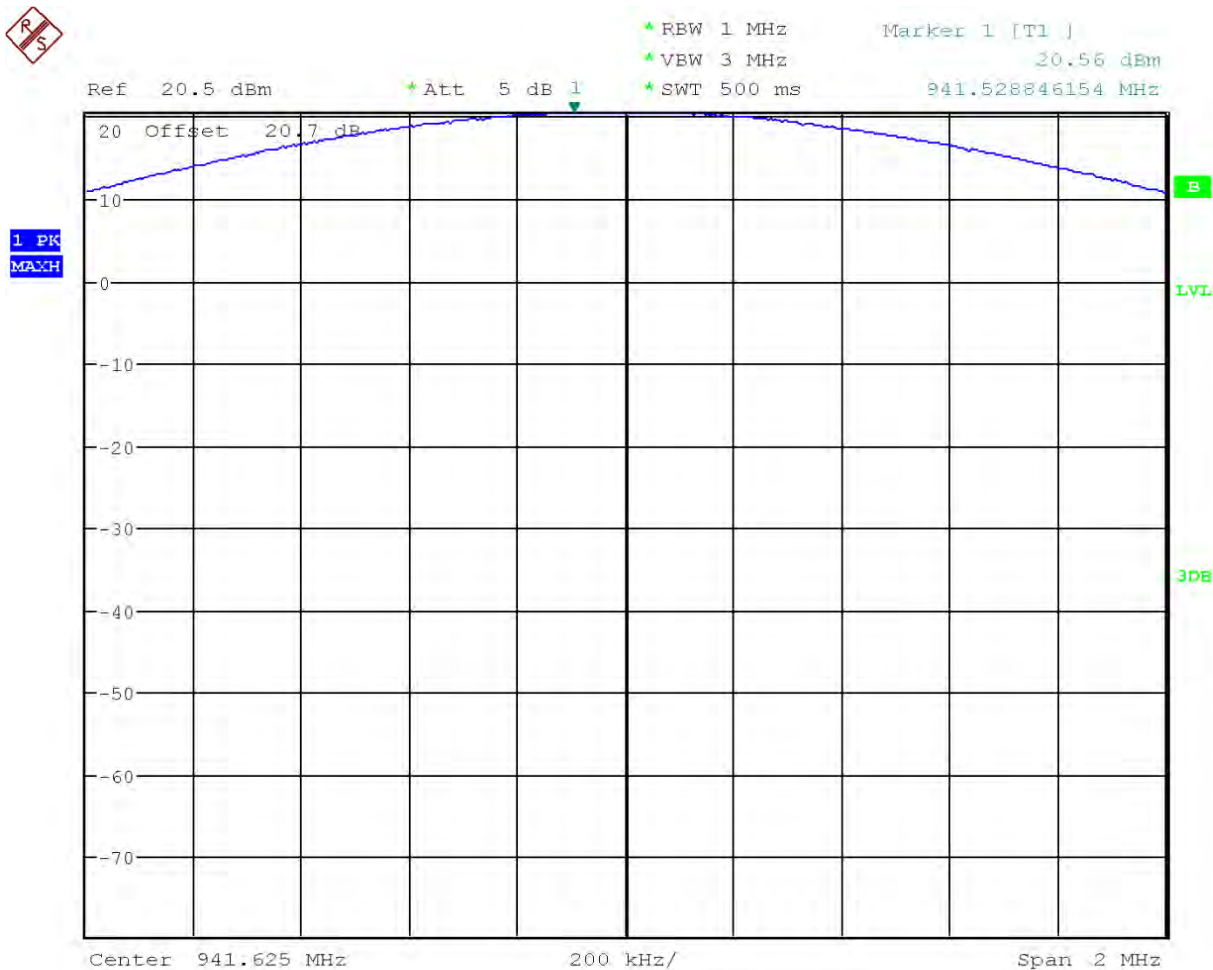
Test Information

EUT Name: AD1 K53 #142
 Serial Number: TU162050041
 Test Description: FCC Part 74.861 and RSS-210 Occupied Bandwidth
 Operating Conditions: High Frequency (697.875MHz) at 2mW in Normal Mode (Blue Trace) and High Density Mode (Black Trace) (Channel Bandwidth Options)
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: October 19, 2016 17:52:50 PM



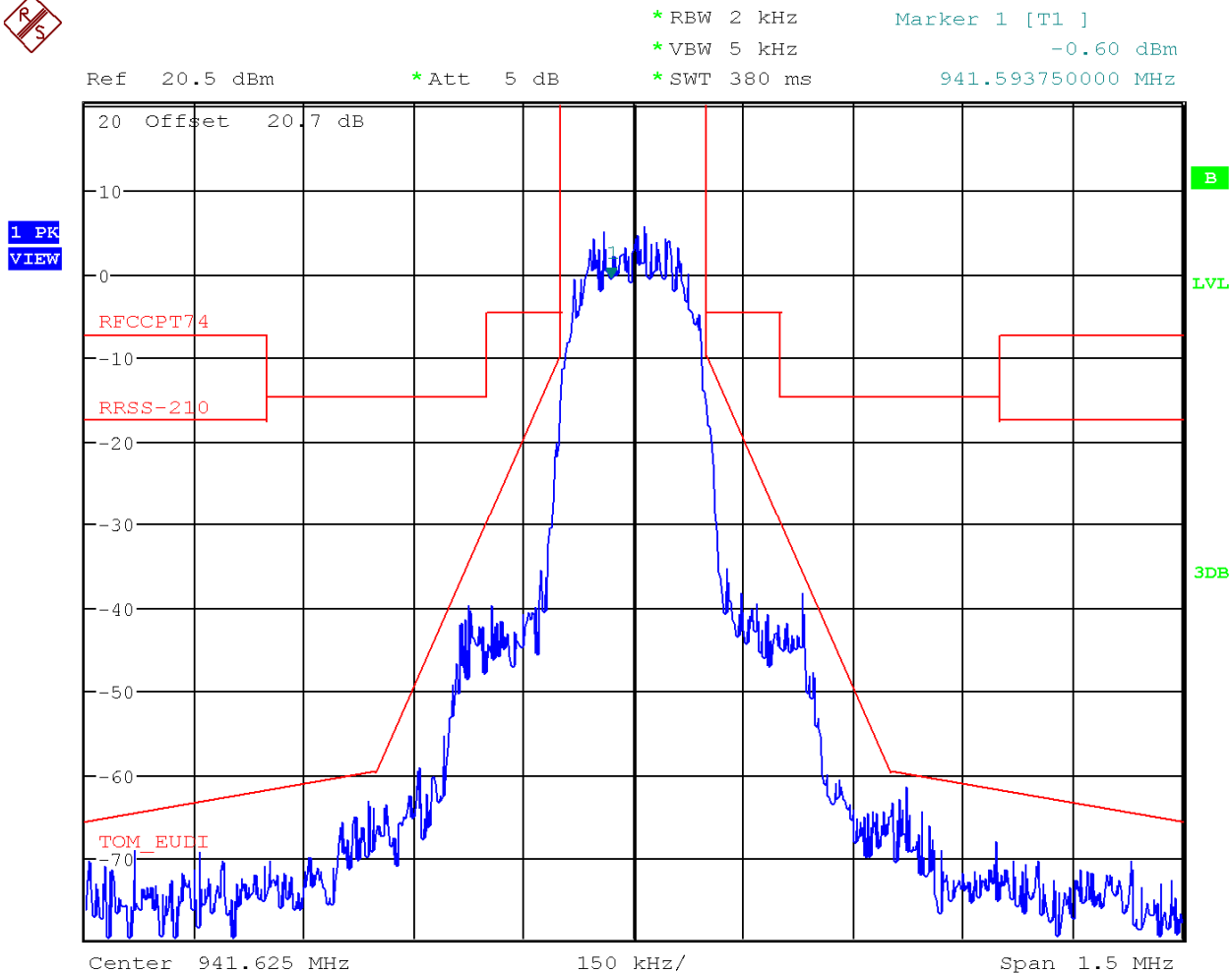
Test Information

EUT Name: AD1 X55 #243
 Serial Number: TU162050175
 Test Description: FCC Part 74.861 Occupied Bandwidth
 EN300 422 Necessary Bandwidth
 Output Power Reference
 Operating Conditions: Low Frequency (941.625MHz) at 35mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: February 3, 2017 15:47:54 PM



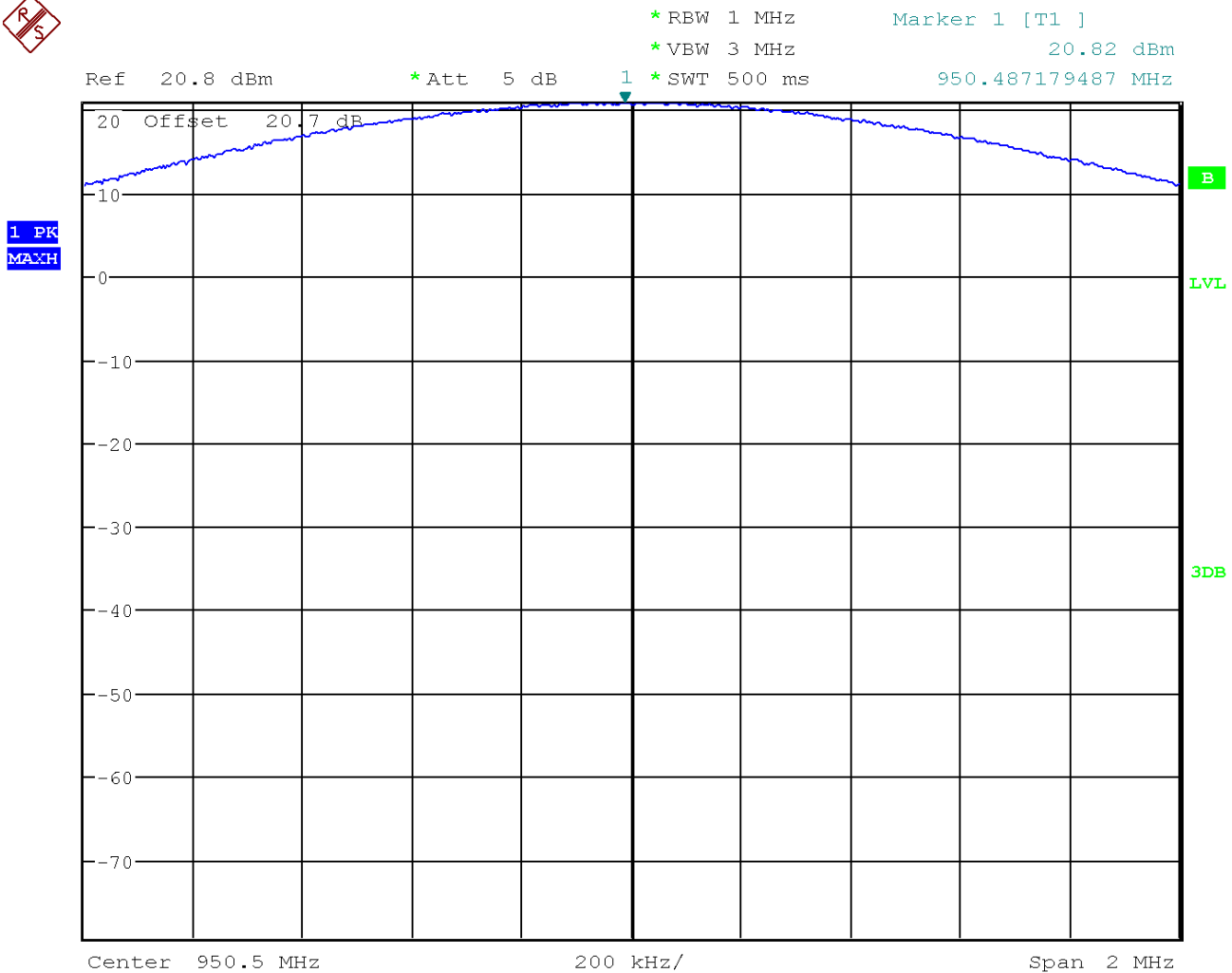
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Operating Conditions: Low Frequency (941.625MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 15:50:17 PM



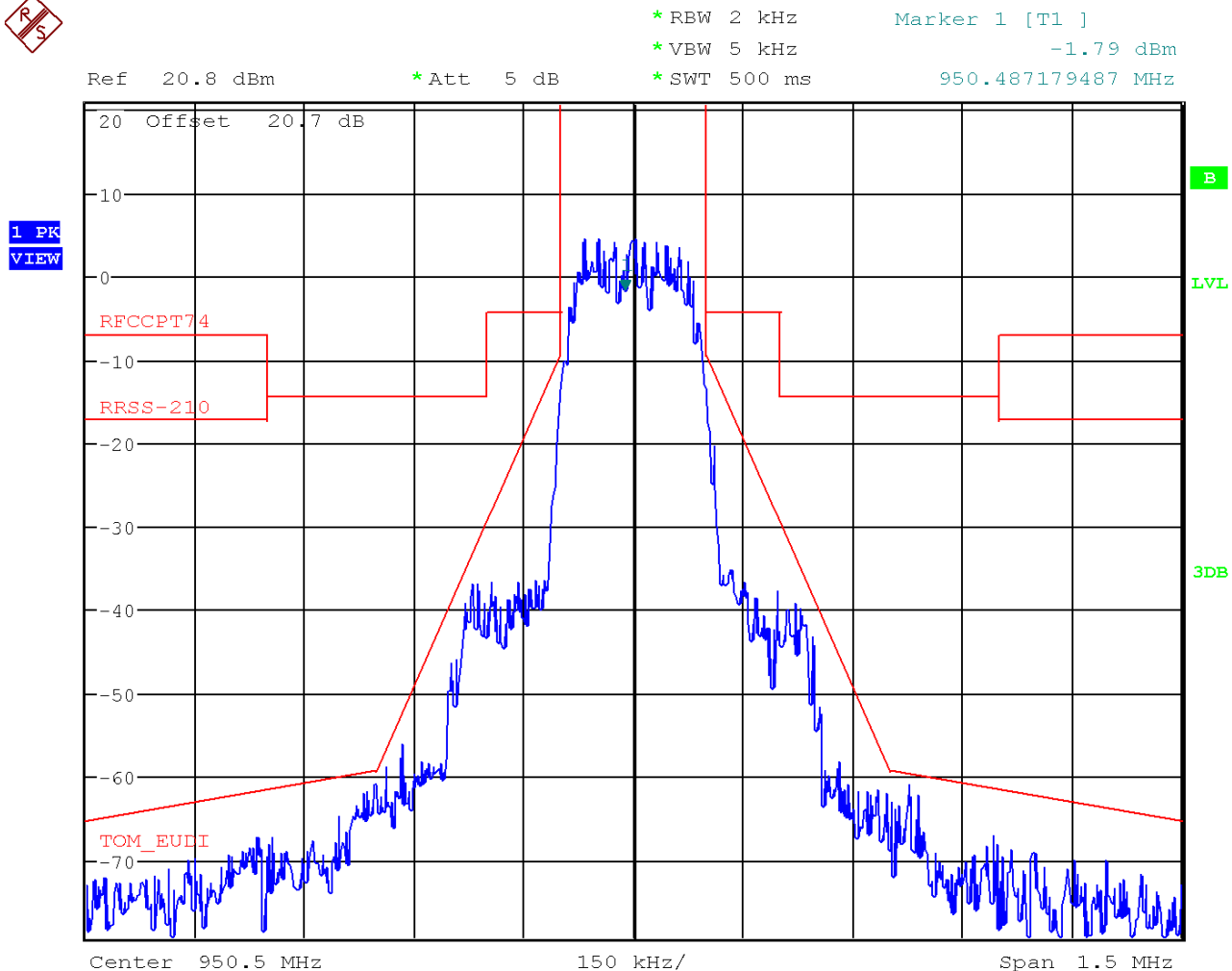
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Output Power Reference
Mid Frequency (950.500MHz) at 35mW
Operating Conditions:
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 9, 2017 17:28:32 PM



Test Information

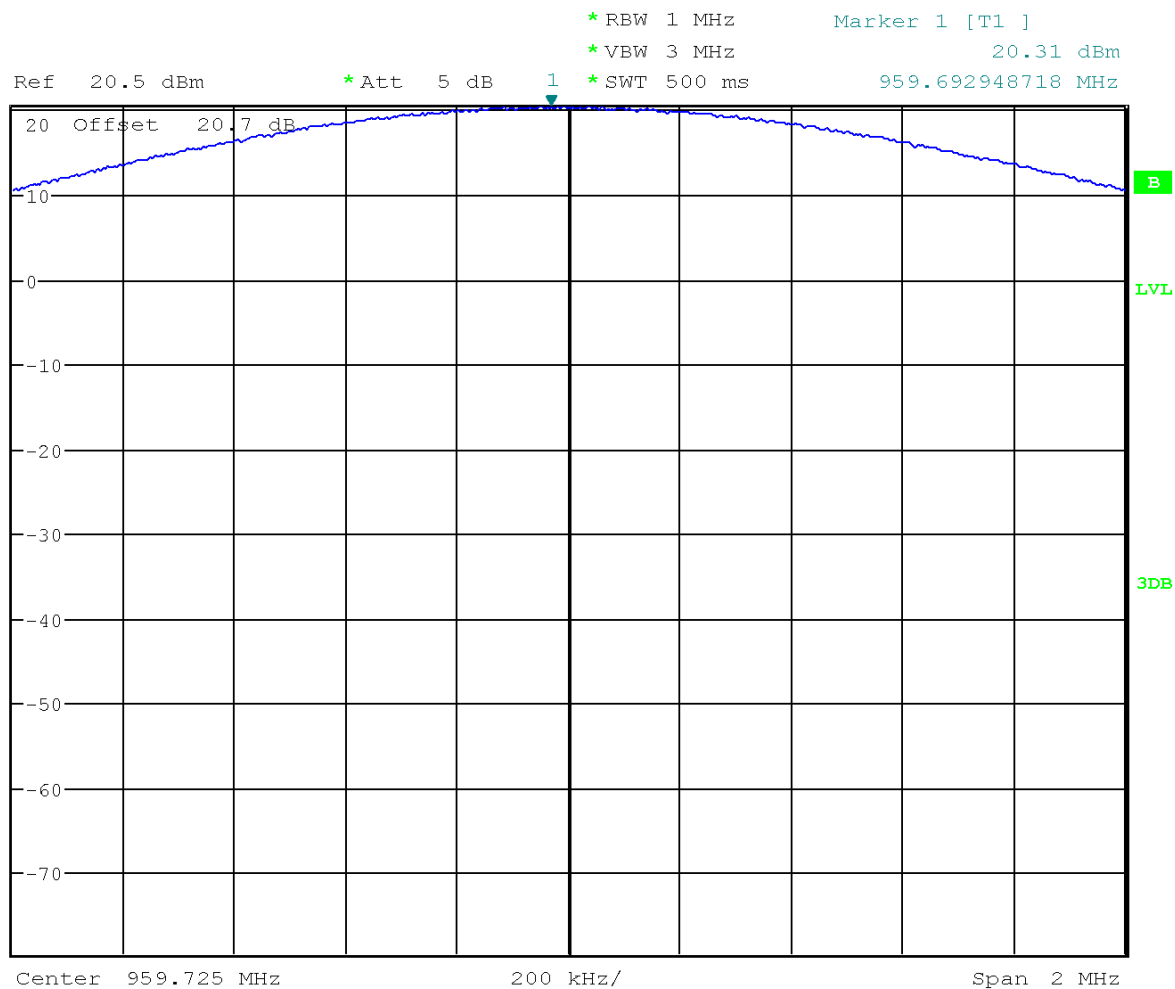
EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Operating Conditions: Mid Frequency (950.500MHz) at 35mW
Operator Name: Alex Stelmasczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 9, 2017 17:39:10 PM





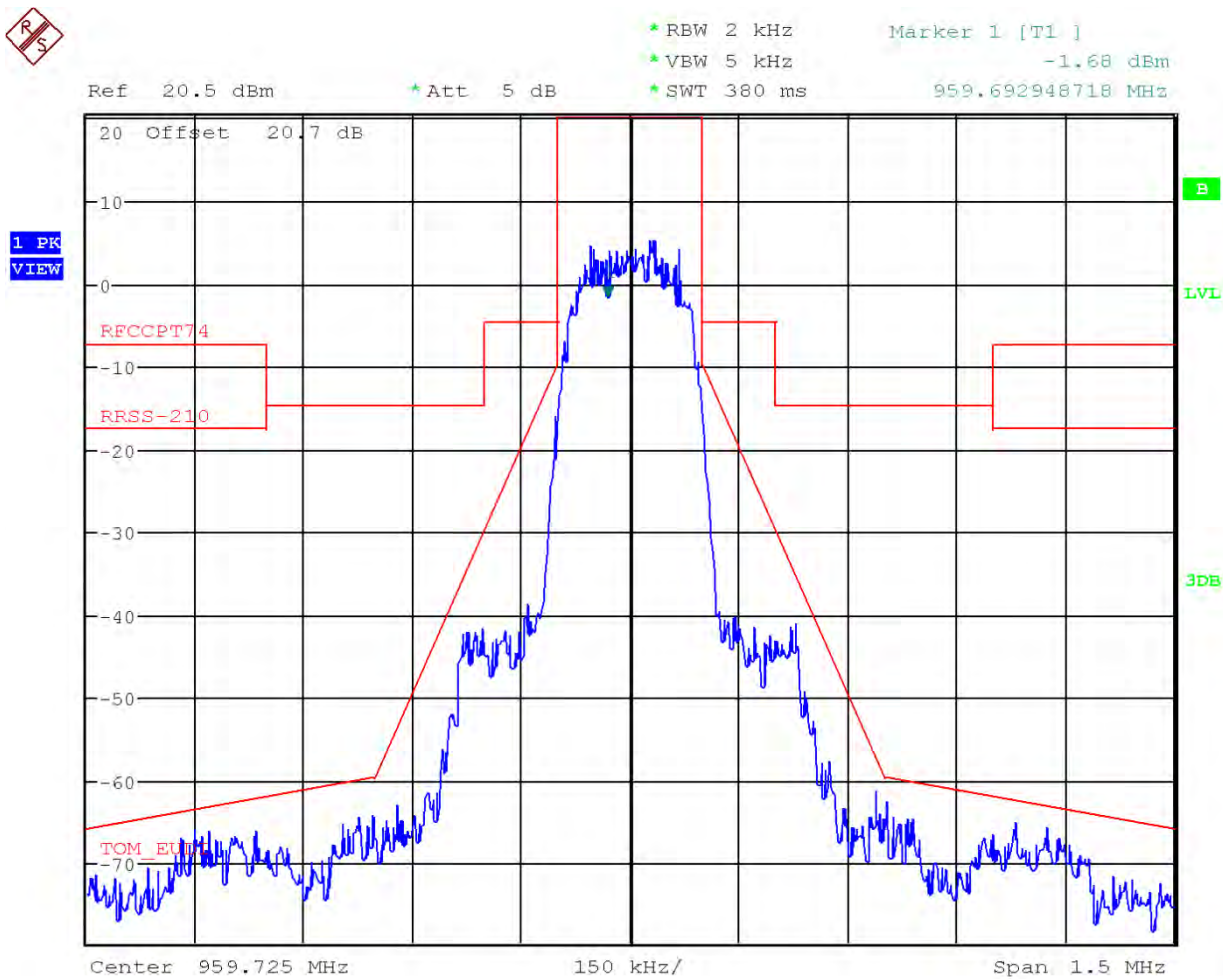
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Output Power Reference
Operating Conditions: High Frequency (959.725MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 15:53:44 PM



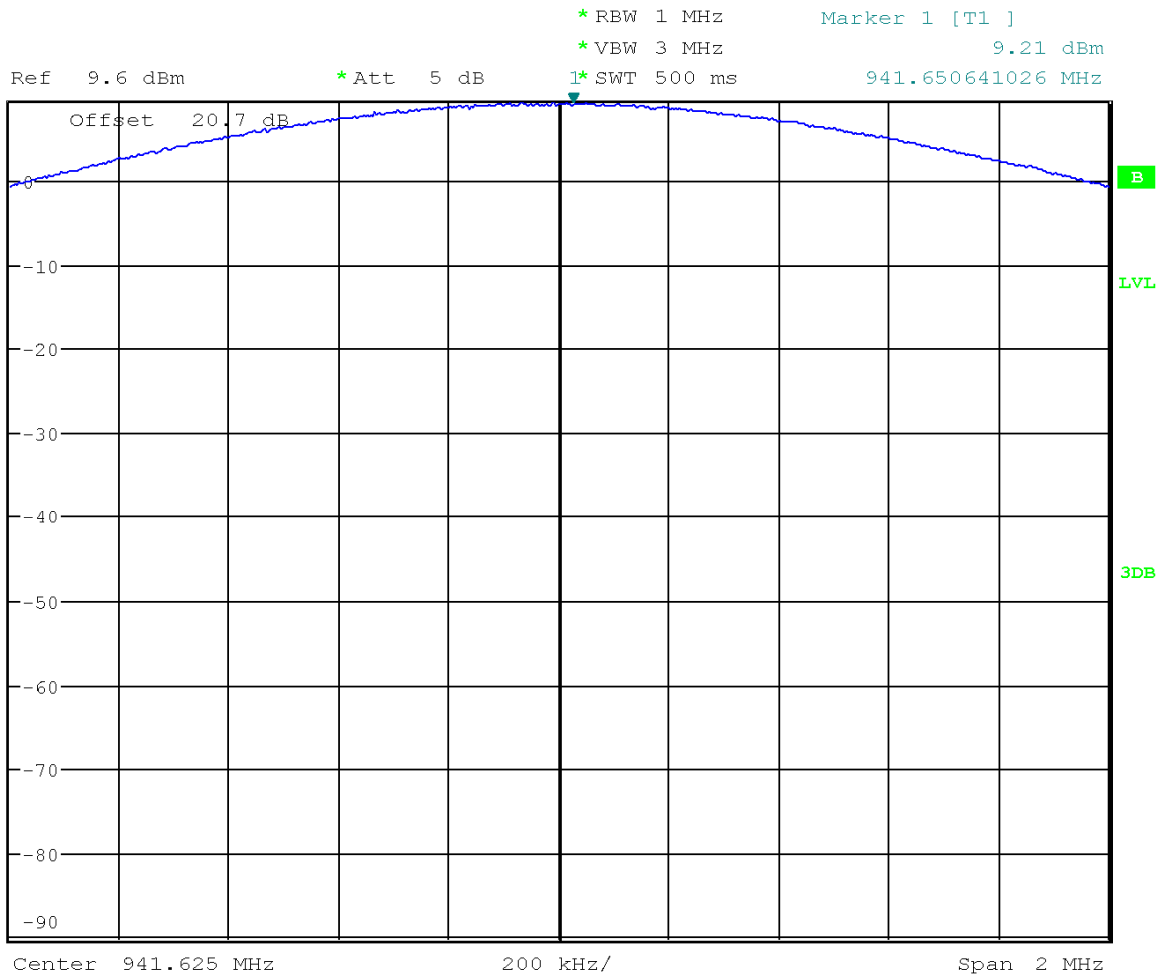
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Operating Conditions: High Frequency (959.725MHz) at 35mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 15:57:10 PM



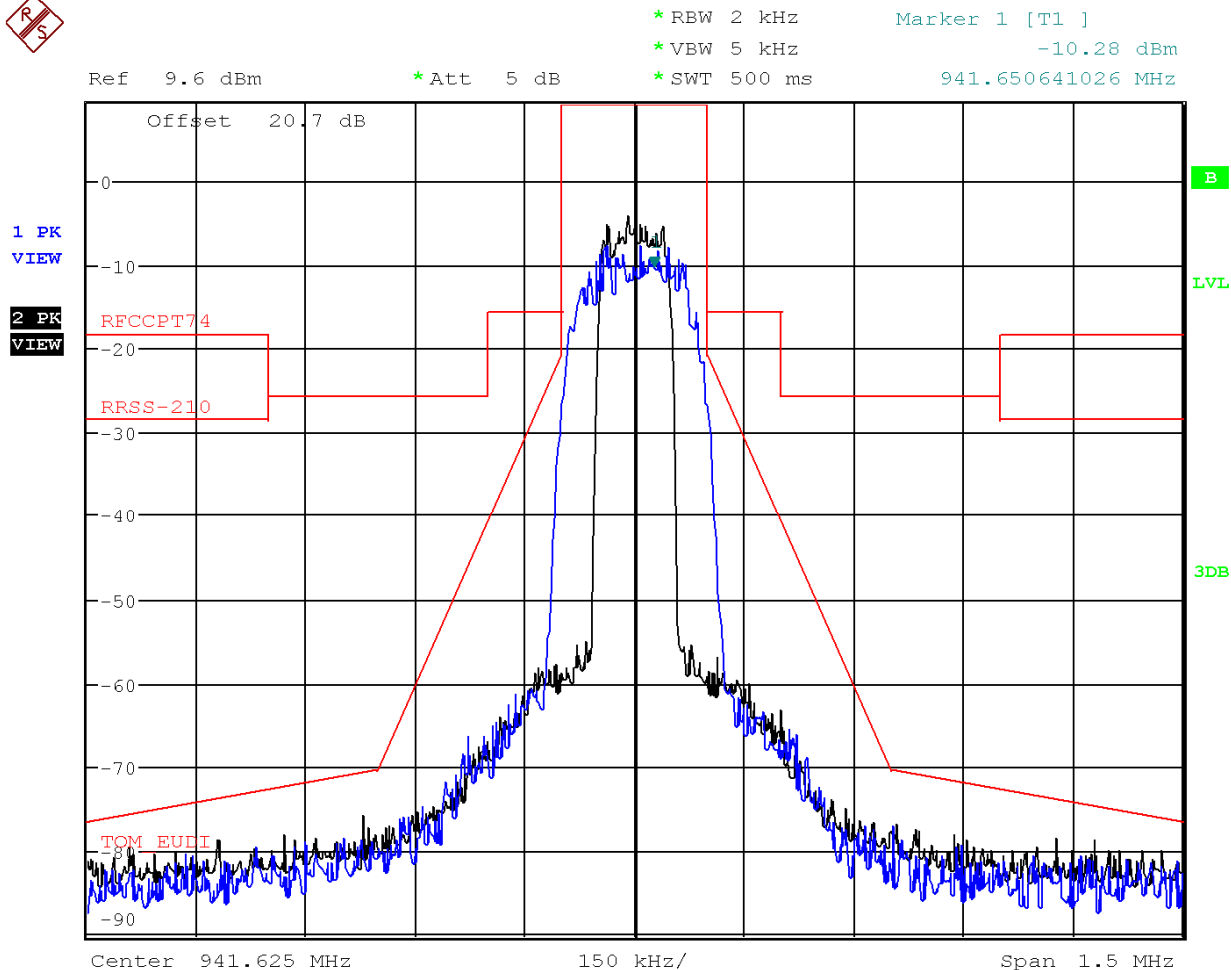
Test Information

EUT Name: AD1 X55 #243
 Serial Number: TU162050175
 Test Description: FCC Part 74.861 Occupied Bandwidth
 EN300 422 Necessary Bandwidth
 Output Power Reference
 Operating Conditions: Low Frequency (941.625MHz) at 2mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: February 3, 2017 16:24:48 PM



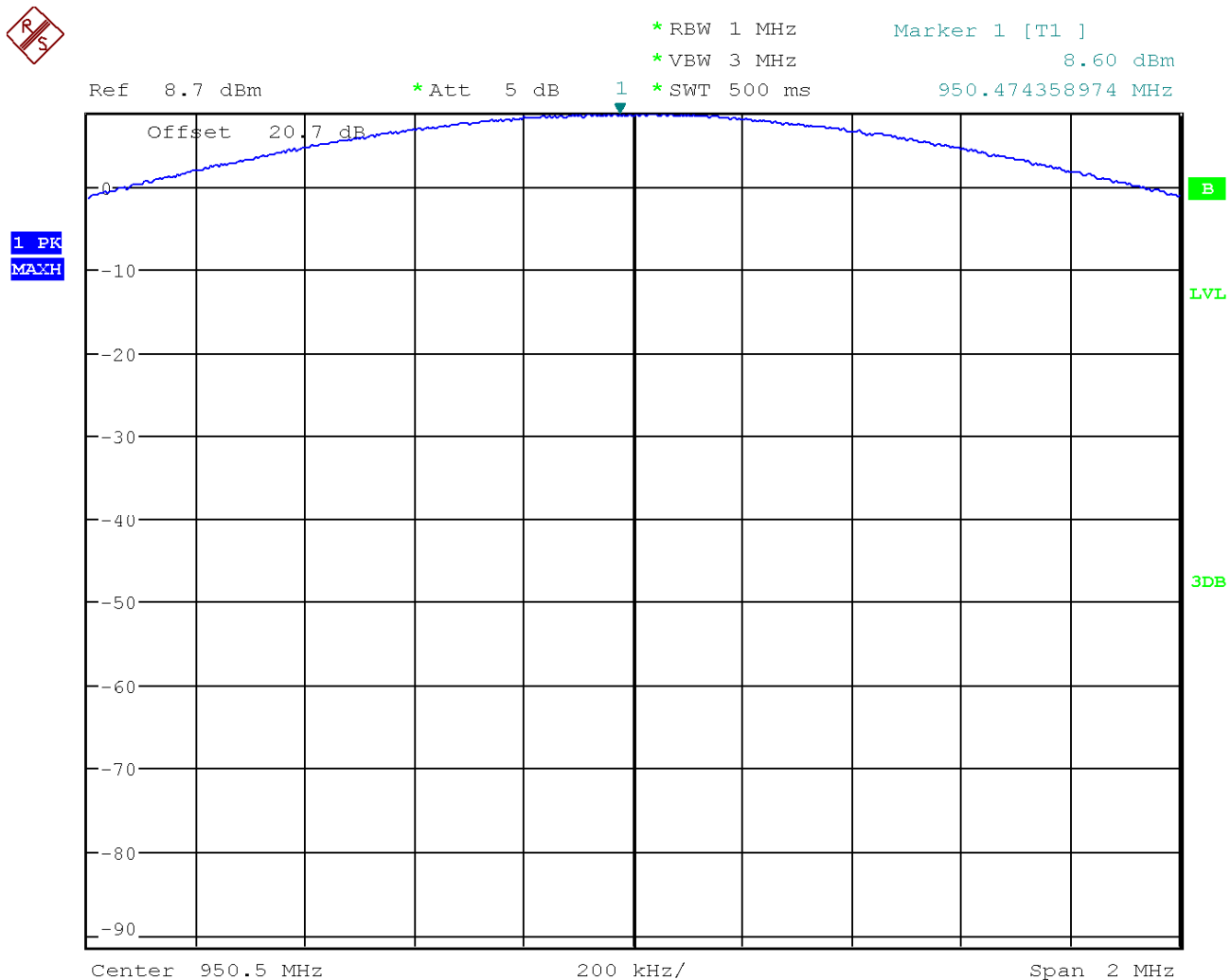
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Operating Conditions: Low Frequency (941.625MHz) at 2mW in Normal Mode
(Blue Trace) and High Density Mode (Black Trace)
(Channel Bandwidth Options)
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 16:28:38 PM



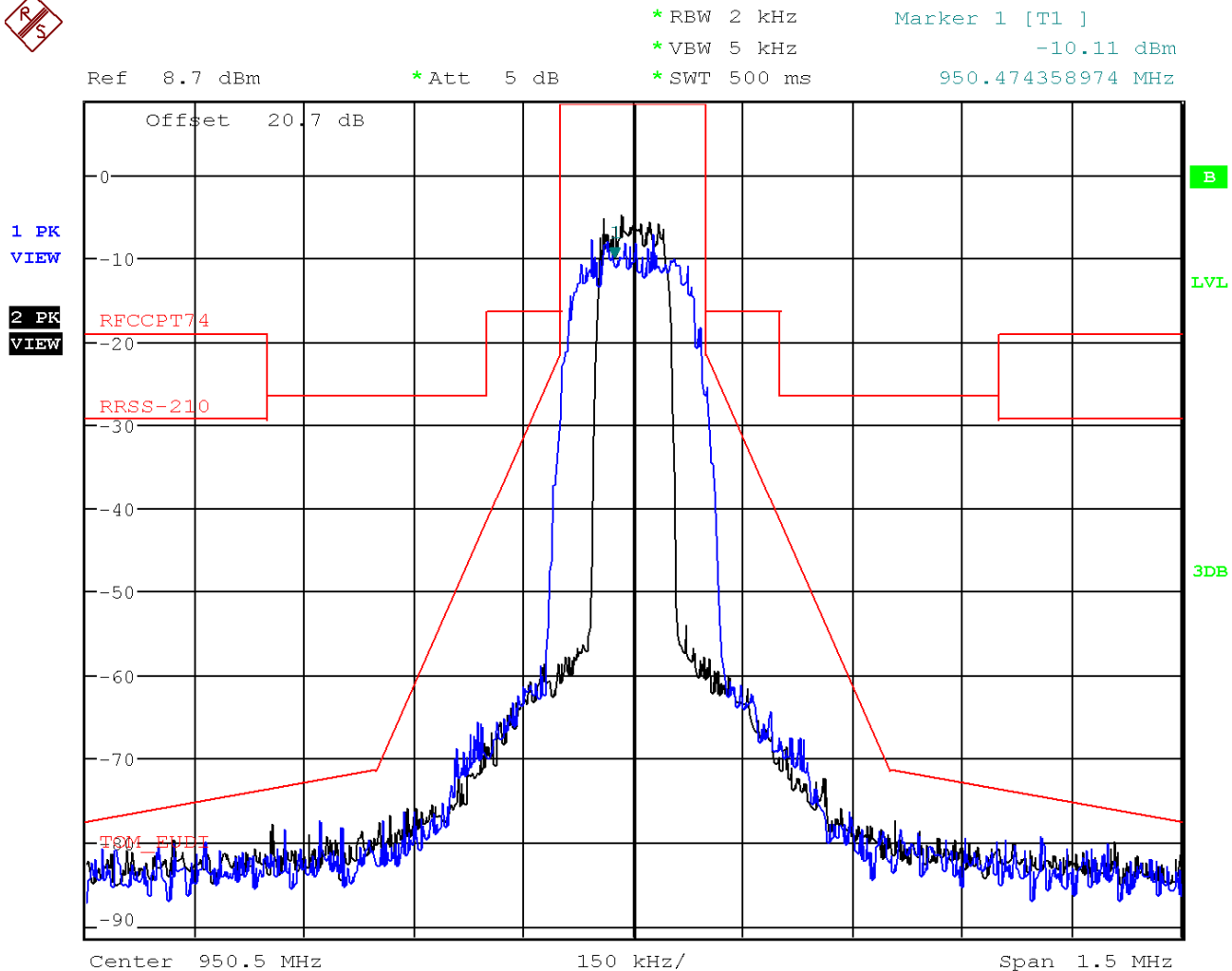
Test Information

EUT Name:	AD1 X55 #243
Serial Number:	TU162050175
Test Description:	FCC Part 74.861 Occupied Bandwidth EN300 422 Necessary Bandwidth Output Power Reference
Operating Conditions:	Mid Frequency (950.500MHz) at 2mW
Operator Name:	Alex Stelmasczyk
Comment:	R & S FSU Spectrum Analyzer
Test Date:	February 9, 2017 17:41:52 PM



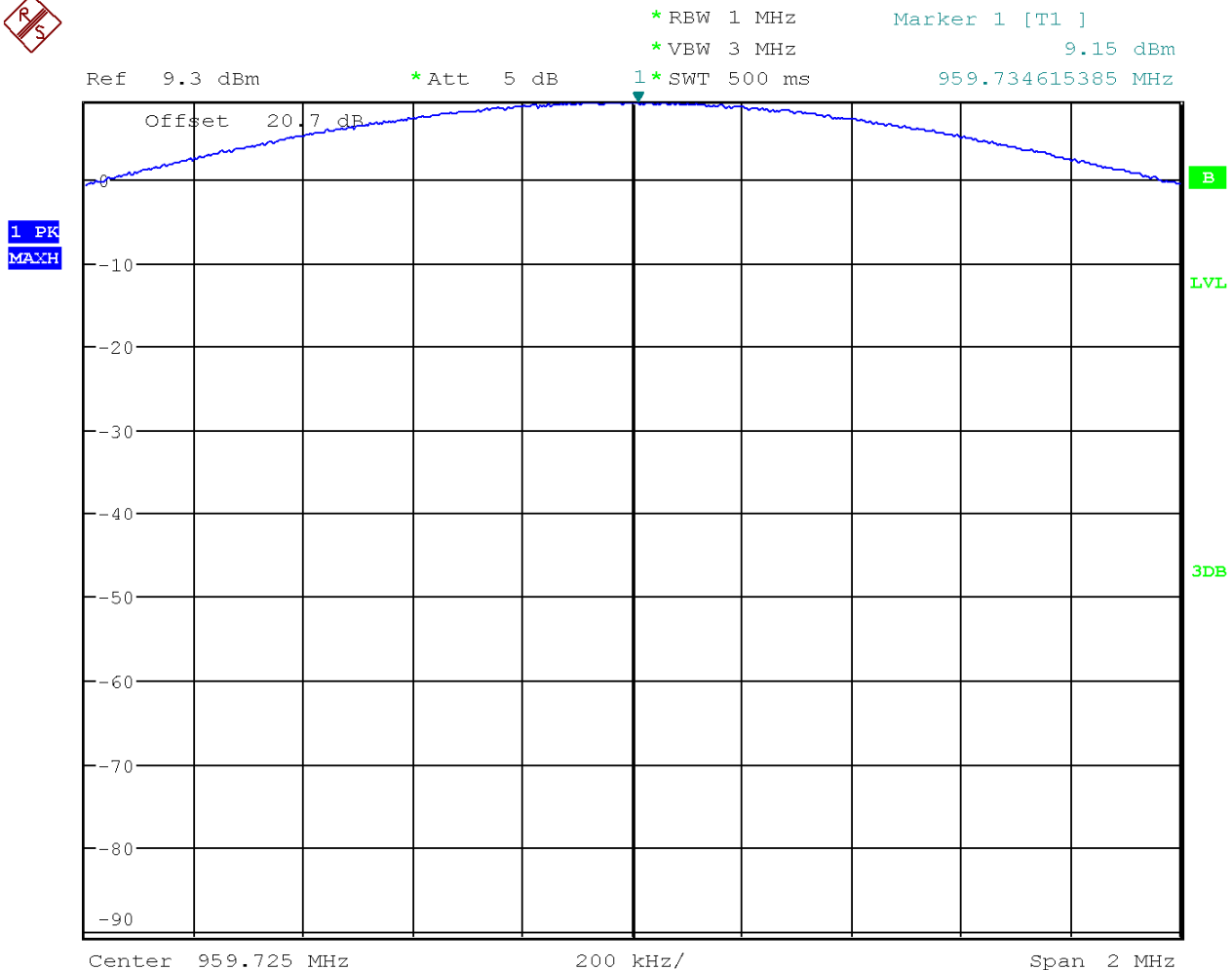
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Operating Conditions: Mid Frequency (950.500MHz) at 2mW in Normal Mode
(Blue Trace) and High Density Mode (Black Trace)
(Channel Bandwidth Options)
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 9, 2017 17:45:04 PM



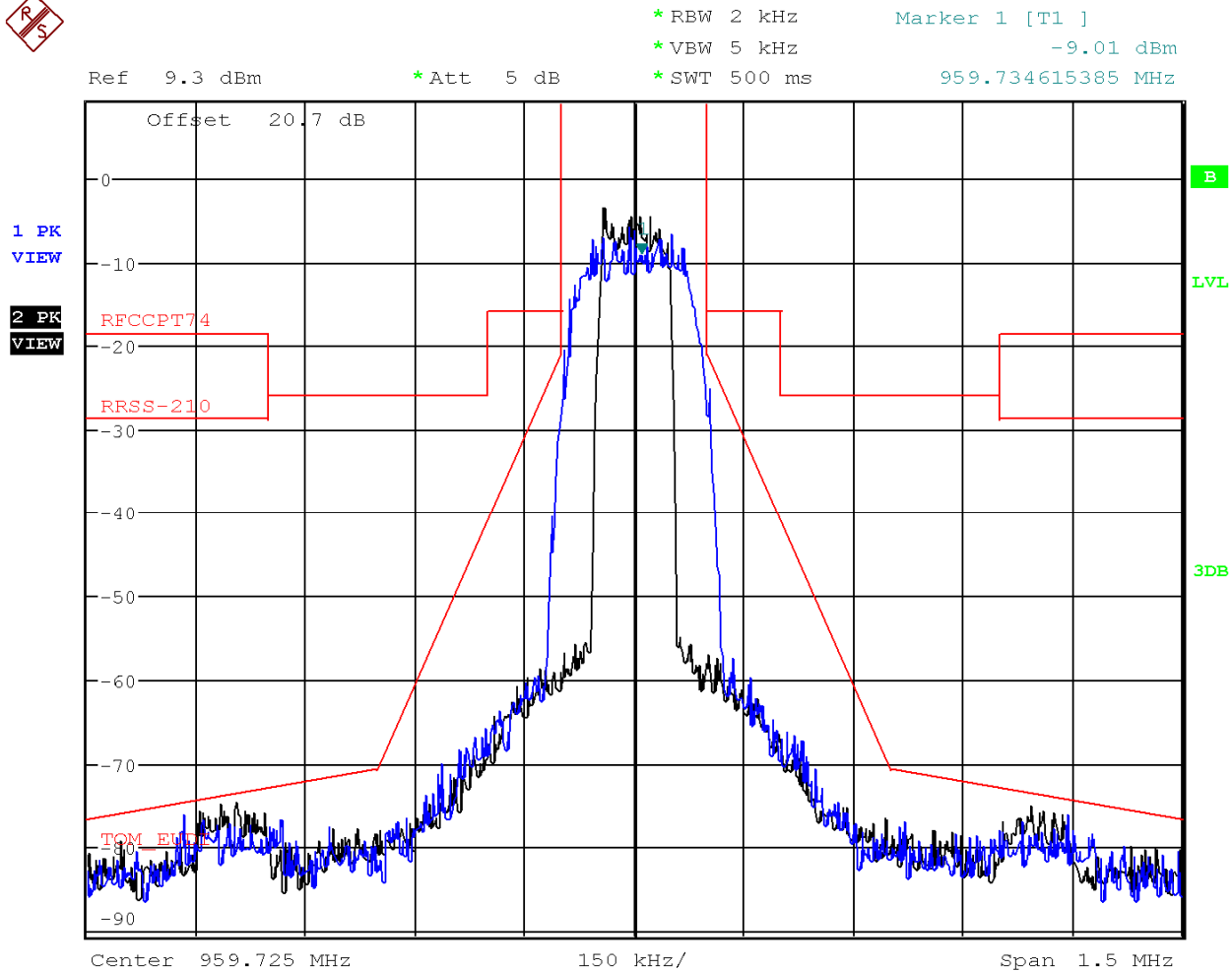
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Output Power Reference
High Frequency (959.725MHz) at 2mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 16:08:15 PM



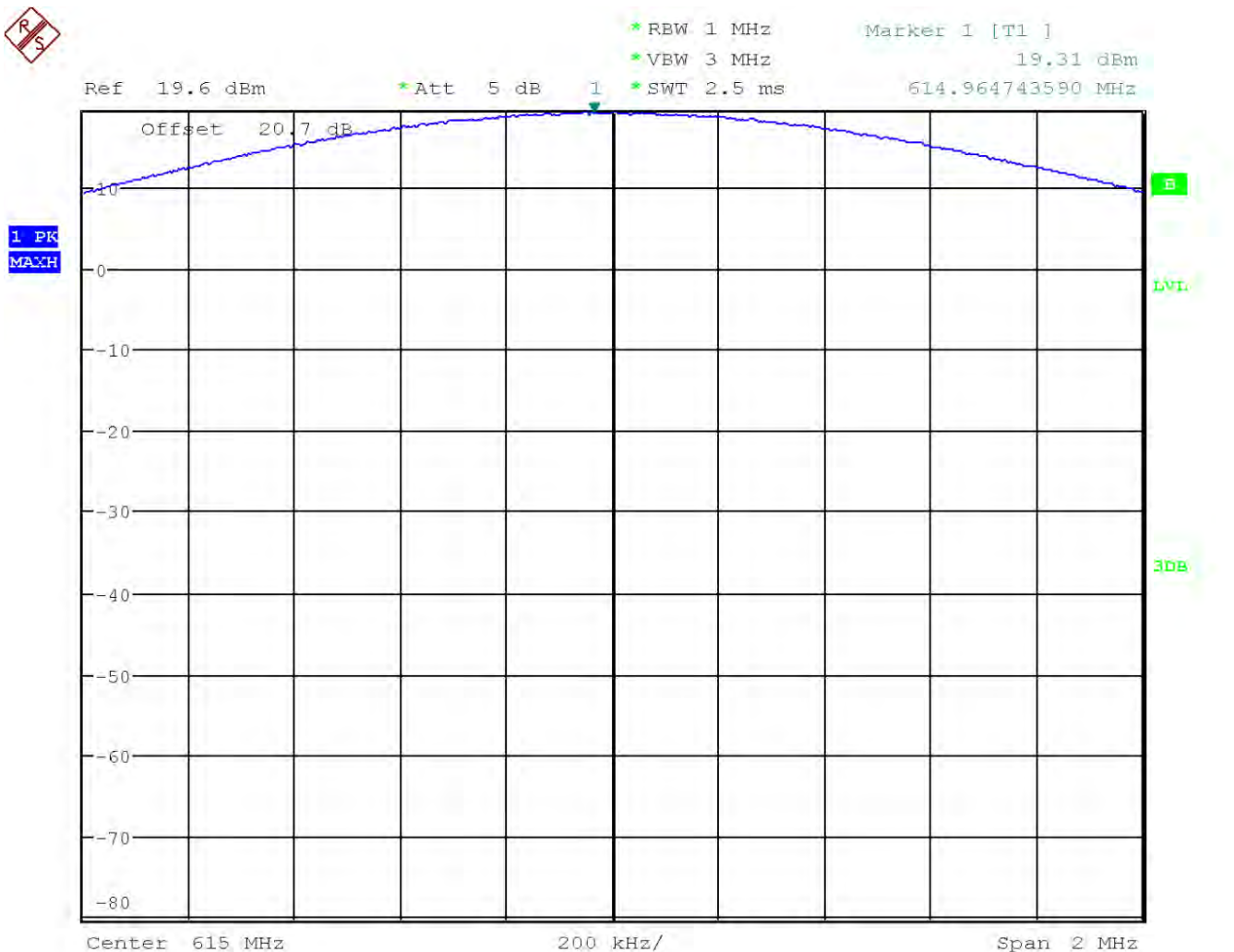
Test Information

EUT Name: AD1 X55 #243
Serial Number: TU162050175
Test Description: FCC Part 74.861 Occupied Bandwidth
EN300 422 Necessary Bandwidth
Operating Conditions: High Frequency (959.725MHz) at 2mW in Normal Mode
(Blue Trace) and High Density Mode (Black Trace)
(Channel Bandwidth Options)
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: February 3, 2017 16:19:31 PM



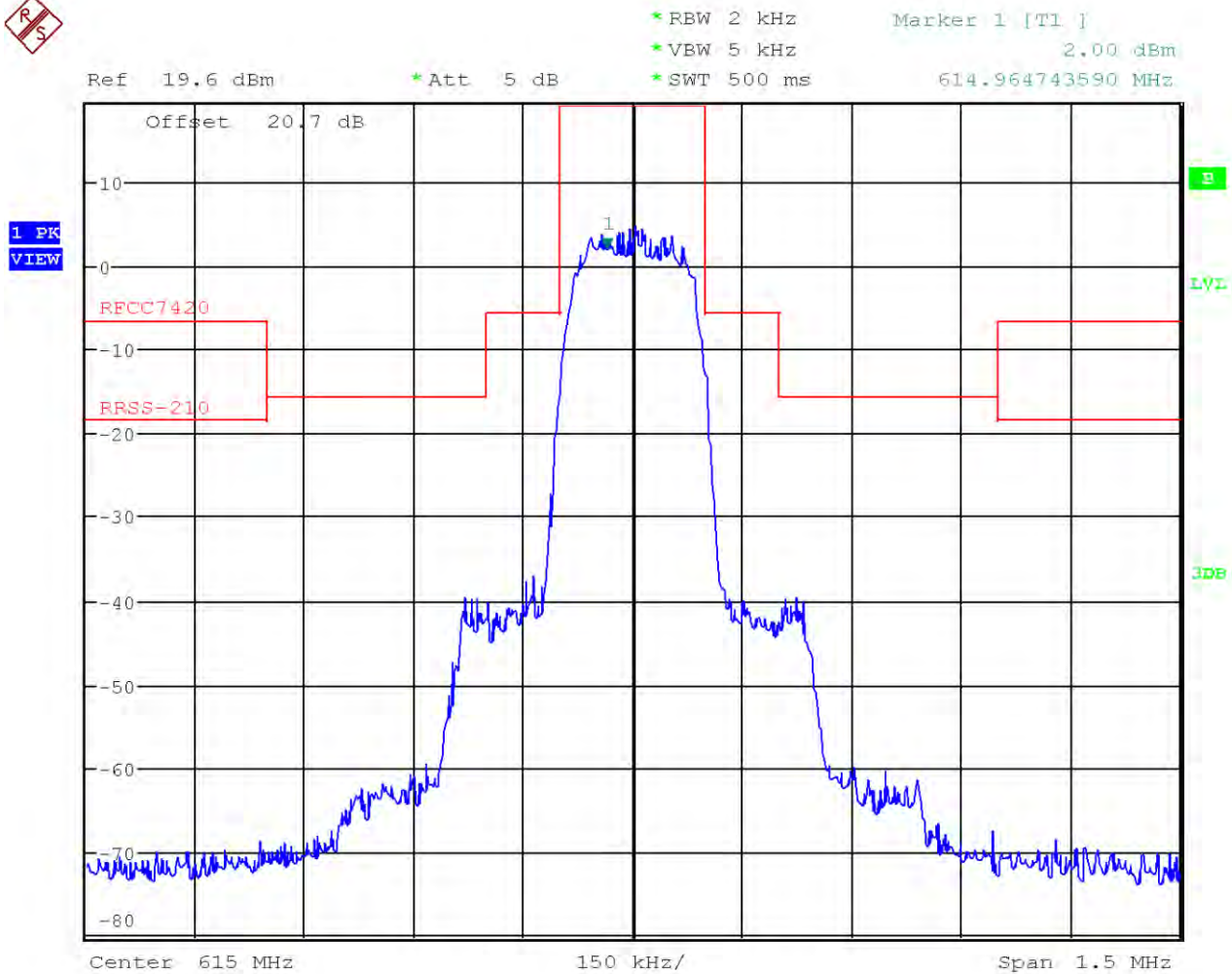
Test Information

EUT Name: AD1 G57 #17
 Serial Number: TU163350379
 Test Description: FCC Part 74.861 Occupied Bandwidth
 Operating Conditions: Output Power Reference
 615MHz (Mid Frequency) at 20mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: March 9, 2017 16:15:22 PM



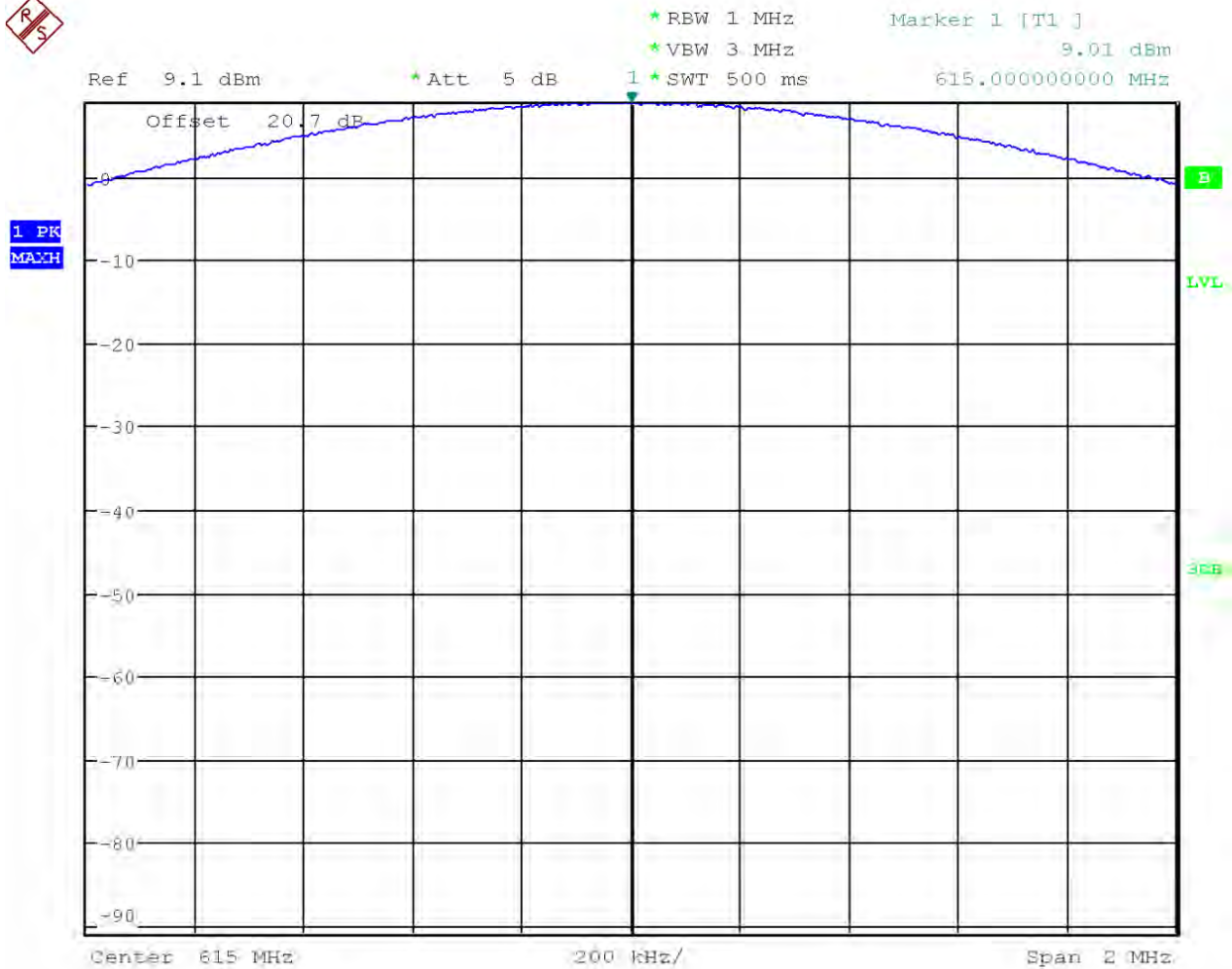
Test Information

EUT Name:	AD1 G57 #17
Serial Number:	TU163350379
Test Description:	FCC Part 74.861 Occupied Bandwidth
Operating Conditions:	615MHz (Mid Frequency) at 20mW
Operator Name:	Alex Stelmaszczyk
Comment:	R & S FSU Spectrum Analyzer
Test Date:	March 9, 2017 16:24:48 PM



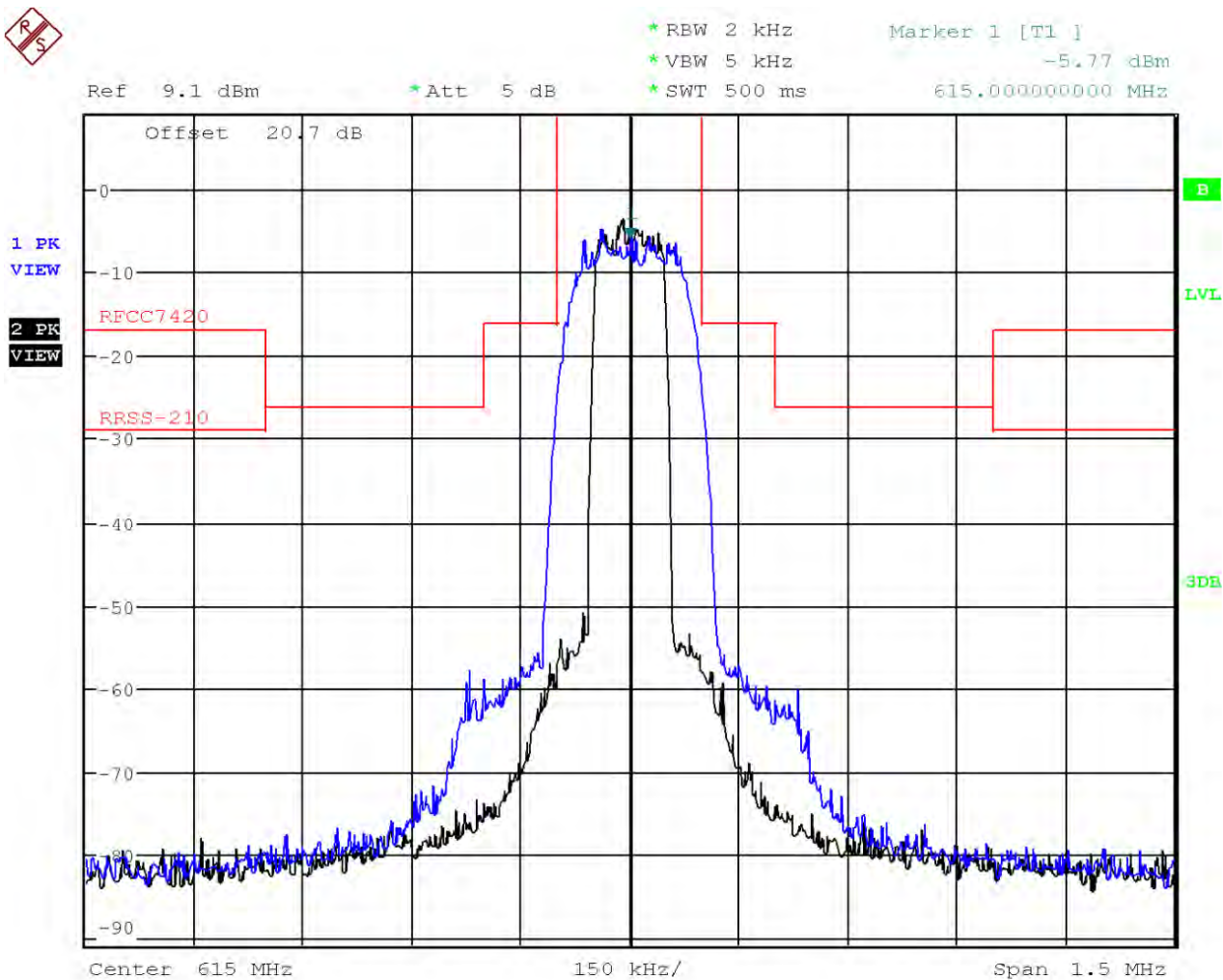
Test Information

EUT Name: AD1 G57 #17
Serial Number: TU163350379
Test Description: FCC Part 74.861 Occupied Bandwidth
Operating Conditions: Output Power Reference
615MHz (Mid Frequency) at 2mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: March 9, 2017 16:27:38 PM



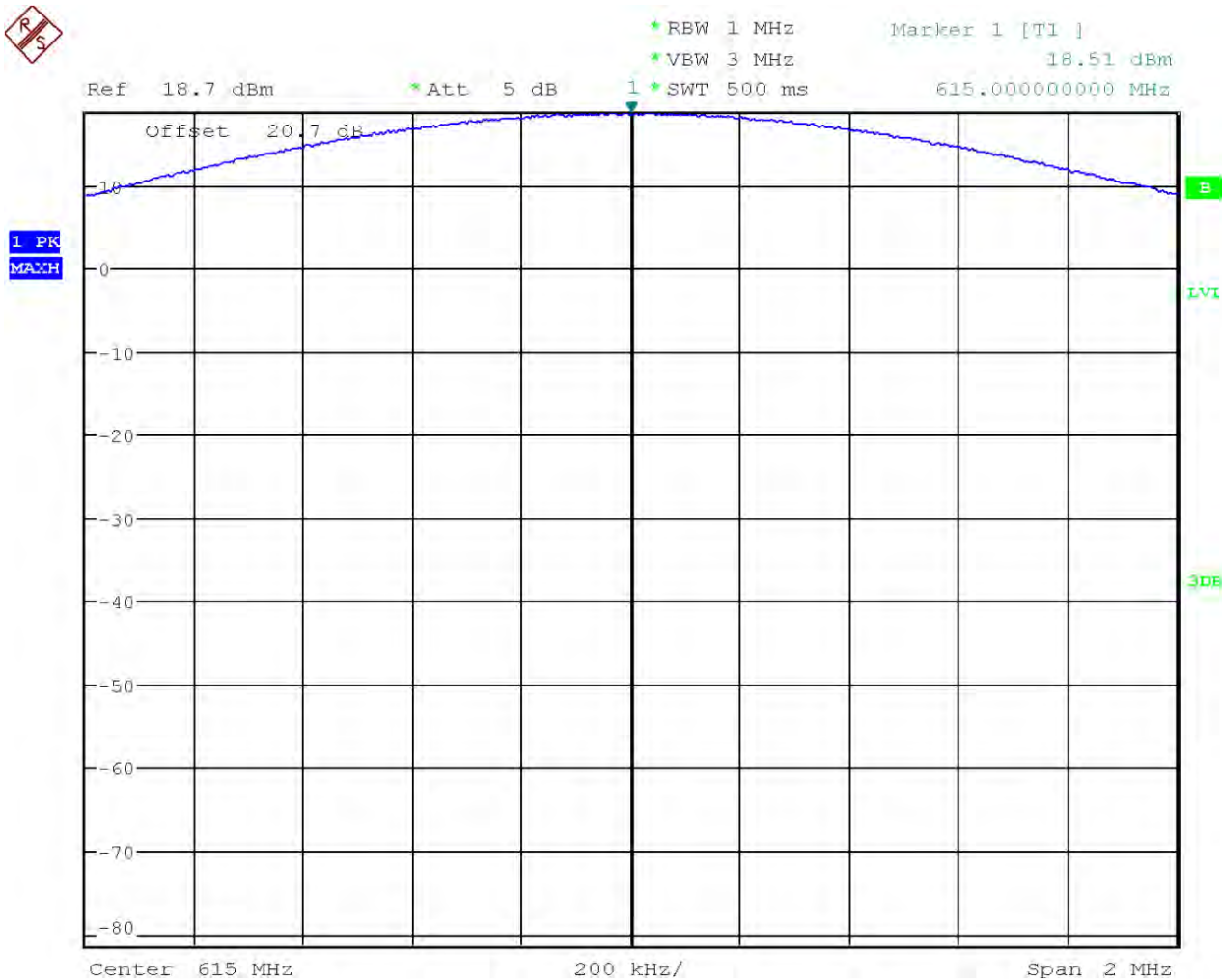
Test Information

EUT Name: AD1 G57 #17
 Serial Number: TU163350379
 Test Description: FCC Part 74.861 Occupied Bandwidth
 Operating Conditions: 615MHz (Mid Frequency) at 2mW in Normal Mode
 (Blue Trace) and High Density Mode (Black Trace)
 (Channel Bandwidth Options)
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: March 9, 2017 17:11:15 PM



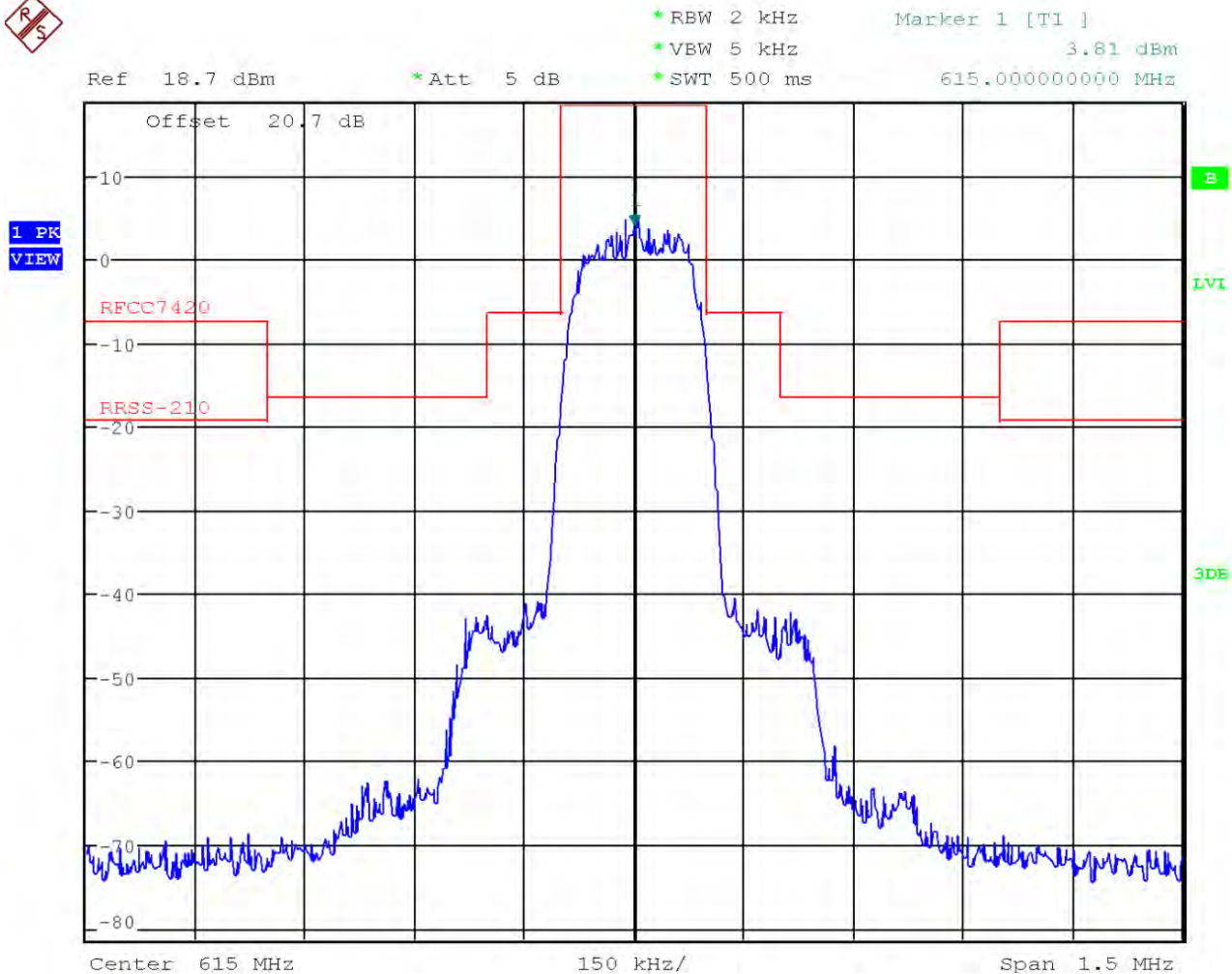
Test Information

EUT Name: AD1 K54 #103
Serial Number: TU163380075
Test Description: FCC Part 74.861 Occupied Bandwidth
Operating Conditions: Output Power Reference
615MHz (Mid Frequency) at 20mW
Operator Name: Alex Stelmaszczyk
Comment: R & S FSU Spectrum Analyzer
Test Date: March 9, 2017 18:07:25 PM



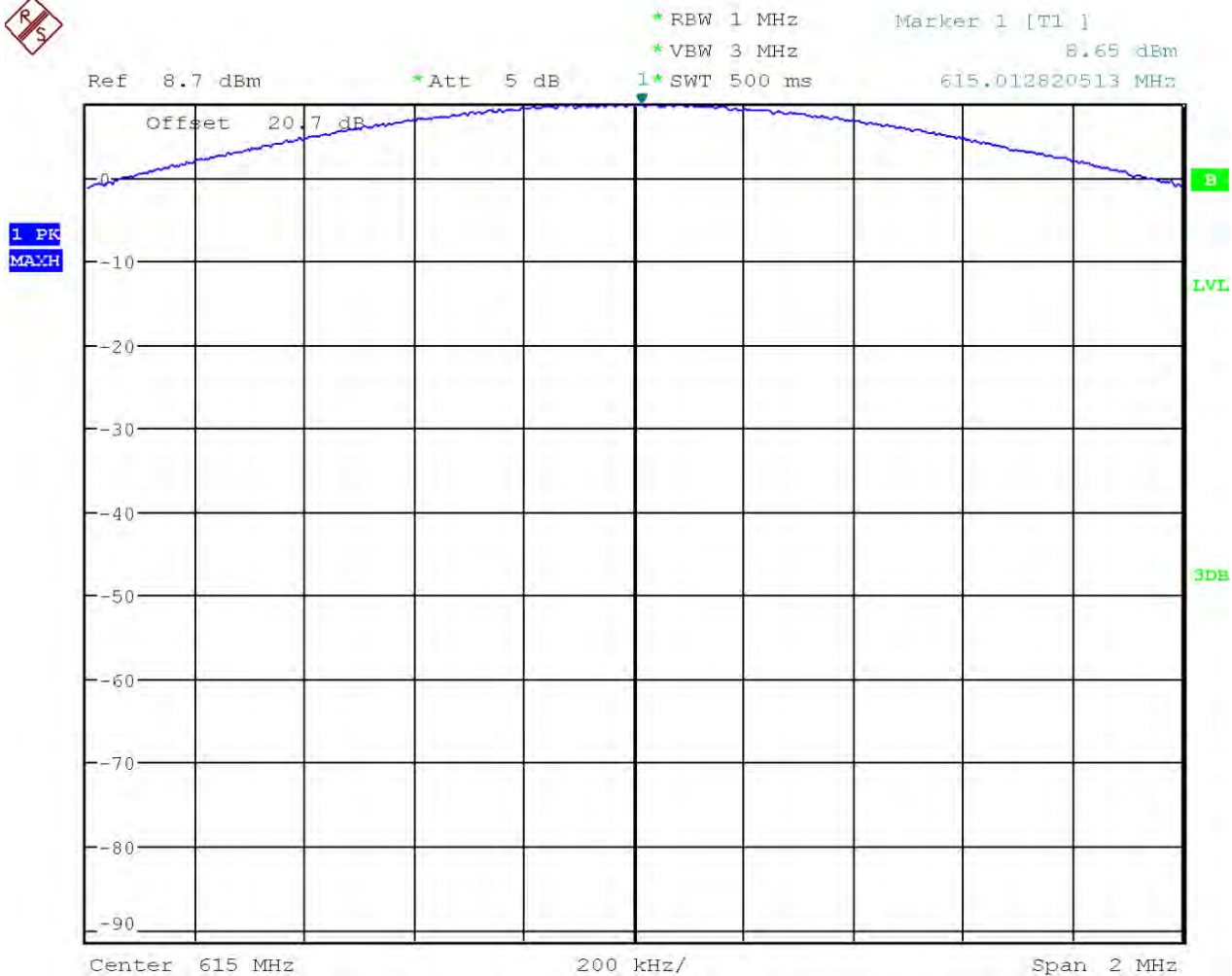
Test Information

EUT Name: AD1 K54 #103
 Serial Number: TU163380075
 Test Description: FCC Part 74.861 Occupied Bandwidth
 Operating Conditions: 615MHz (Mid Frequency) at 20mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: March 9, 2017 18:10:29 PM



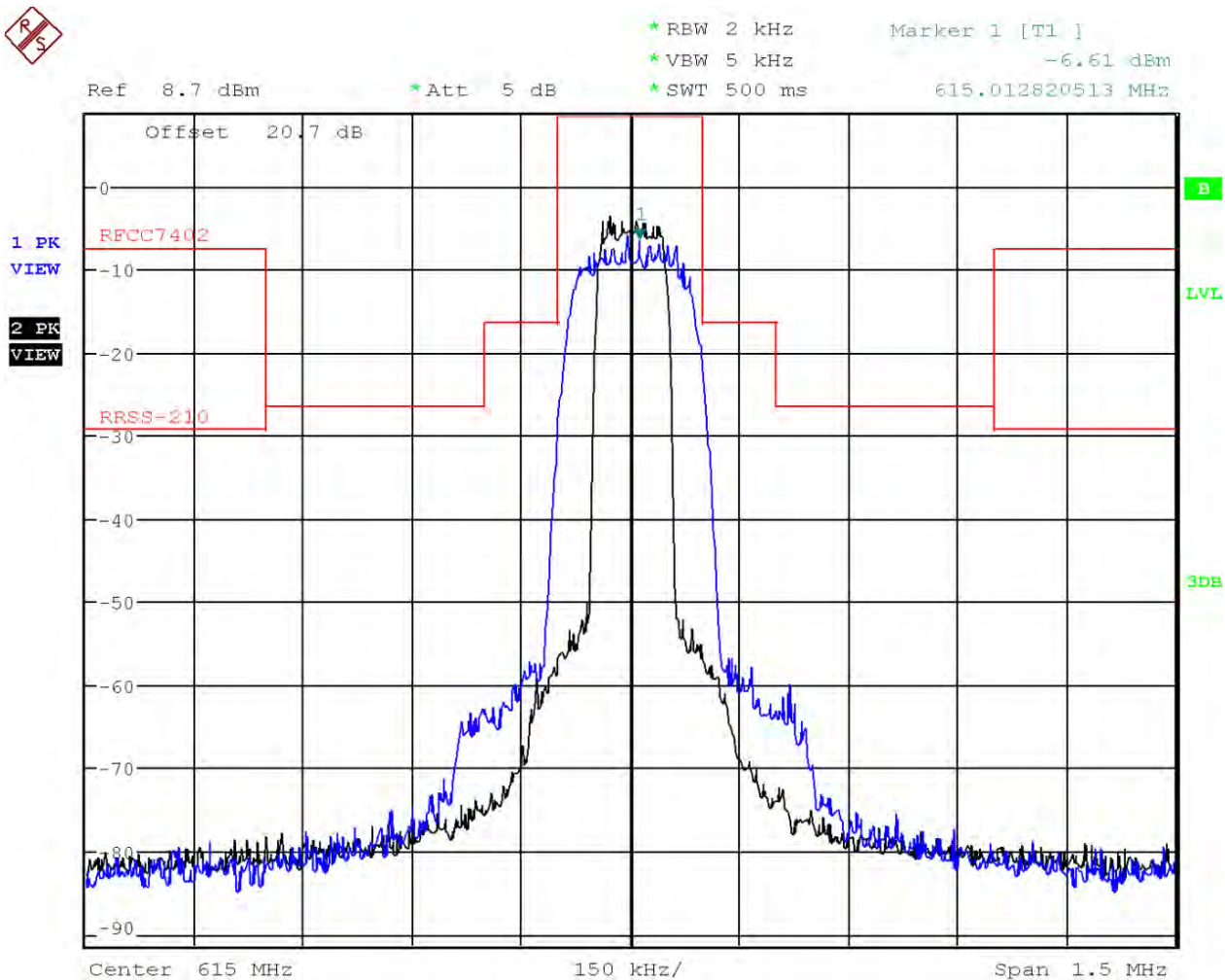
Test Information

EUT Name: AD1 K54 #103
 Serial Number: TU163380075
 Test Description: FCC Part 74.861 Occupied Bandwidth
 Operating Conditions: Output Power Reference
 615MHz (Mid Frequency) at 2mW
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: March 9, 2017 18:12:32 PM



Test Information

EUT Name: AD1 K54 #103
 Serial Number: TU163380075
 Test Description: FCC Part 74.861 Occupied Bandwidth
 Operating Conditions: 615MHz (Mid Frequency) at 2mW in Normal Mode
 (Blue Trace) and High Density Mode (Black Trace)
 (Channel Bandwidth Options)
 Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: March 9, 2017 18:17:14 PM



Test Information

EUT Name: AD1 G56 #80 (For G55 Band)
 Serial Number: TU162040097
 Test Description: RSS-210 Annex G Necessary Bandwidth
 Carrier Power Reference
 Operating Conditions: 470.125MHz (Low Frequency) at 35mW in Normal Mode

Operator Name: Alex Stelmaszczyk
 Comment: R & S FSU Spectrum Analyzer
 Test Date: November 14, 2016 15:31:19 PM

