REV	Δ	DESCRIPTION	SHEET EFFECTED	DATE	DRAWN	CHECKED
A				12.11.2015	M. Reuben	S. Cohen
B		Updated as per ACB comments		01.02.2016	M. Reuben	S. Cohen
C		Updated as per ACB comments		21.03.2016	M. Reuben	S. Cohen

EMC Laboratory

WipAir 8000-2.5 GHz

Manufactured by WaveIP LTD.

FCC ID: QQ2-WA8K25X

EMC Test Report

According to FCC CFR 47 Part 27

	Fonction/Title	Name	Signature	Date
Prepared by:	Technical Writer	M. Reuben		11.11.2015
Checked by:	Test Engineer	I. Arbitman		11.11.2015
Approved By:	EMC Lab. Manager	S. Cohen		15-Nov-15

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1. ADMINISTRATIVE DATA

1.1. Scope

This document describes the measurement procedures and tests for Radiated and conducted emission testing of the WipAir 8000 2.5 GHz manufactured by WaveIP Ltd.

2. GENERAL INFORMATION

2.1. Description of equipment Under Test

Equipment Under Test	WipAir 8000-2.5 GHz
FCCID	QQ2-WA8K25X
Manufacturer	WaveIP Ltd.
Serial Numbers	041A0400157E
Mode of Operation	Tranceiver MODE
Transceiver operating frequency	2496 MHz – 2690 MHz
Year of Manufacture	2015

2.2. Applicant Information:

Applicant	WaveIP Ltd
Applicant Address	Teradion Indistrial park, Misgav 20179, Israel
Telephone	+972-4-9027000
FAX	+972-4-9990324
The testing was observed by	AMIT ARAZI

2.3. Test Performance:

Dates of testing	November 2015
Test Laboratory Location	Elbit Systems Land and C^{4}I Ltd., EMC LAB, Hashoftim 26 Holon 58102 ISRAEL Tel: 972-3-5574476 Fax: 972-3-5575320
Applicable EMC Specification	Federal Communication Commission (FCC), FCC 47 CFR Part 27

3. TEST SUMMARY AND SIGNATURES.

Elbit Systems Land and C4I Ltd., EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC 47 CFR 2.1046 - 2.1055.

The E.U.T was found to comply with the requirements of the FCC Part 27 Regulations given below

Test	Test Description	Section	Pass/Fail
1	Occupied bandwidth	2.1049, 27.53(m)	Pass
2	Maximum output power and Peak power spectral density	2.1046, 27.50(h)	Pass
3	Band Edge	2.1051, 27.53(m)	Pass
4	Conducted spurious emissions	2.1051, 27.53(m)	Pass
6	Radiated spurious emissions	2.1053, 27.53(m)	Pass
7	Frequency Stability Temperature	2.1055(a)(1), 27.54	Pass
8	Frequency Stability voltage	2.1055(d), 27.54	Pass

3.1. Test performed by:

I. Arbitman

3.2. Test Report prepared by:

M. Reuben

3.3. Test Report Approved by:

Mr. Samuel Cohen EMC Lab. Manager

4. E.U.T INFORMATION

4.1. E.U.T description

WipAir 8000-2.5 GHz is WaveIP's wireless point-to-point and point to multi point broadband wireless communication system. The system uses dual or single radio channels, (defined by software) in the 2.5 GHz licensed band, utilizing 5, 10 14 & 20 MHz channels, OFDM modulation, and TDD Spectrum Management.

The total conducted output power is up to 1Watt (sum of both channels), with dynamic range of ~ 40 dB.

EUT was tested in MIMO mode (duel channel)

EUT Technical characteristics

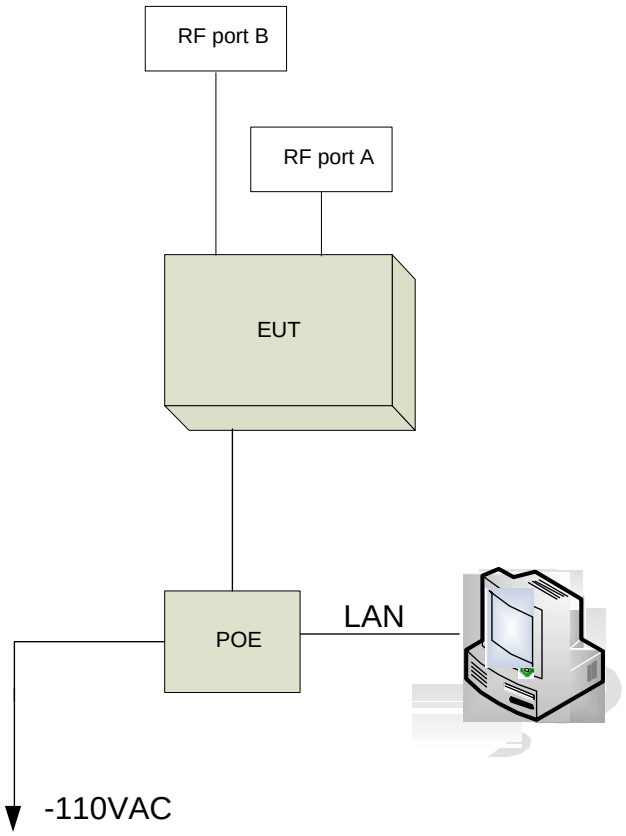
Transmitter characteristics		Notes
Assigned frequency	2496 MHz – 2690 MHz	
Operating Frequency range	2500-2687MHZ	5MHz Channel
	2501-2685MHZ	10MHz Channel
	2503-2682MHZ	14MHz Channel
	2506-2680MHZ	20MHz Channel
Antenna Ports	TNC	For detached option only
Modulations type	QPSK, 4QAM, 16QAM, 64QAM	
Multiplexing type	OFDM	
Modulating Test Signal	PRBS 100% duty cycle MAX power.	

Antenna type

Antenna Type	Model	Gain 2.5 GHz (dBi)	Dimension
Flat panel	DA-24-135D-045	13.5	200x200x15
Flat panel	DA-24-160D-020	16	305x305x15
Flat panel	DP-24-175D-020	17.5	371x371x40
Flat panel	SDP-24-150D-060	15	430x165x35
Flat panel	SDP-24-140D-090	14	430x165x35
Flat panel	SDP-24-160D-090	16	700×133×57
Flat panel	SDP-24-150D-120	15	700×133×57
Flat panel	SA-24-150V-060	15	450x165x35
Flat panel	SA-24-140V-090	14	450x165x35
Flat panel	SA-24-130V-120	13	450x165x35
Flat panel	SA-24-180V-060	18	1000×160×60
Flat panel	SA-24-170V-090	17	1000×160×60
Flat panel	SA-24-160V-120	16	1000×160×60
Grid	DA-24-240D-011	24	600x300
Dish	DP-24-220D-011	22	2ft
Dish	DP-24-270D-006	27	4ft

4.2. E.U.T Test Configuration

E.UT. test configuration is shown in figure below:



4.3. E.U.T Mode of Operation description

2496 MHz – 2690 MHz TRANCEIVER

4.4. "Preliminary tests were performed to ascertain the worst case modulation and TX power. The EUT automatically reduces the TX power in order to meet amplifiers linearity requirements at 16QAM and 64 QAM. All measurements were performed at worst case 100% duty cycle, setting to maximum transmit output power 30dBm PRBS data, QPSK modulation."

5. OCCUPIED BANDWIDTH

Equipment Under Test	WipAir 8000-2.5 GHz
Test Method	According to FCC §2.1049, 27.53(m)
Date	08.11.2015
Relative Humidity	40%
Ambient Temperature	25^0 C
Air Pressure	1010 hPa
Test Setup	Figure 1

Testing Engineer: I. Arbitman  **Date** 08.11.2015

5.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Bandwidth of the emission fundamental frequency requirement.

5.2. Limits of bandwidth

The test unit shall meet the limits of Table 1

Table 1: Bandwidth Limits

Assigned Frequency (MHz)	Channel Bandwidth (MHz)	Maximum Allowed Bandwidth (MHz) (The carrier frequency shall be within the frequency block edges)
2496– 2690	5	5
	10	10
	14	14
	20	20

5.3. Test Instrumentation and Equipment

Table 2: Test Instrumentation and Equipment

Item	Model	P/N	Manufacturer	Next Date Calibration
Spectrum Analyzer	N9020A	20041738908	Agilent	14.09.2016
30 dB Attenuator	769-30		Narda	21.05.2016

5.4. Test Procedure

As per 47 CFR, Section 2.1049

The EUT was set up as shown in Figure 1. The EUT was started and sufficient time for stabilization was allowed.

The transmitter occupied 99% bandwidth was measured with spectrum analyzer and are shown in the Tables Nos. 3-10

5.5. Test Setup

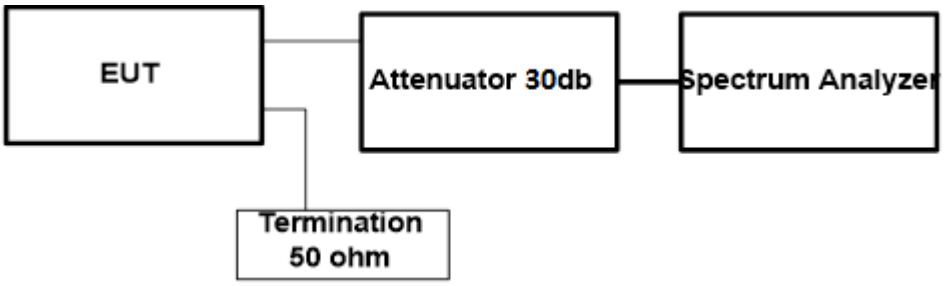


Figure 1: Occupied Bandwidth Test Setup

5.6. Results for Port A

Table 3: 5 MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2500	4.4668	5	0.5332	*1*	Pass
Middle – 2593	4.5327	5	0.4673	*2*	Pass
High - 2687	4.7171	5	0.2829	*3*	Pass

Table 4: 10 MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2501	8.8643	10	1.1357	*4*	Pass
Middle – 2593	9.0410	10	0.959	*5*	Pass
High - 2685	9.1493	10	0.8507	*6*	Pass

Table 5: 14 MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2503	12.079	14	1.921	*7*	Pass
Middle – 2593	12.172	14	1.828	*8*	Pass
High - 2682	12.323	14	1.677	*9*	Pass

Table 6: 20 MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2506	17.942	20	2.058	*10*	Pass
Middle – 2593	18.147	20	1.853	*11*	Pass
High - 2608	18.525	20	1.475	*12*	Pass

5.7. Results for Port B

Table 7: 5 MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2500	4.5077	5	0.4923	*13*	Pass
Middle – 2593	4.5299	5	0.4701	*14*	Pass
High - 2687	4.6951	5	0.3049	*15*	Pass

Table 8: 10 MHz Bandwidth Test Result

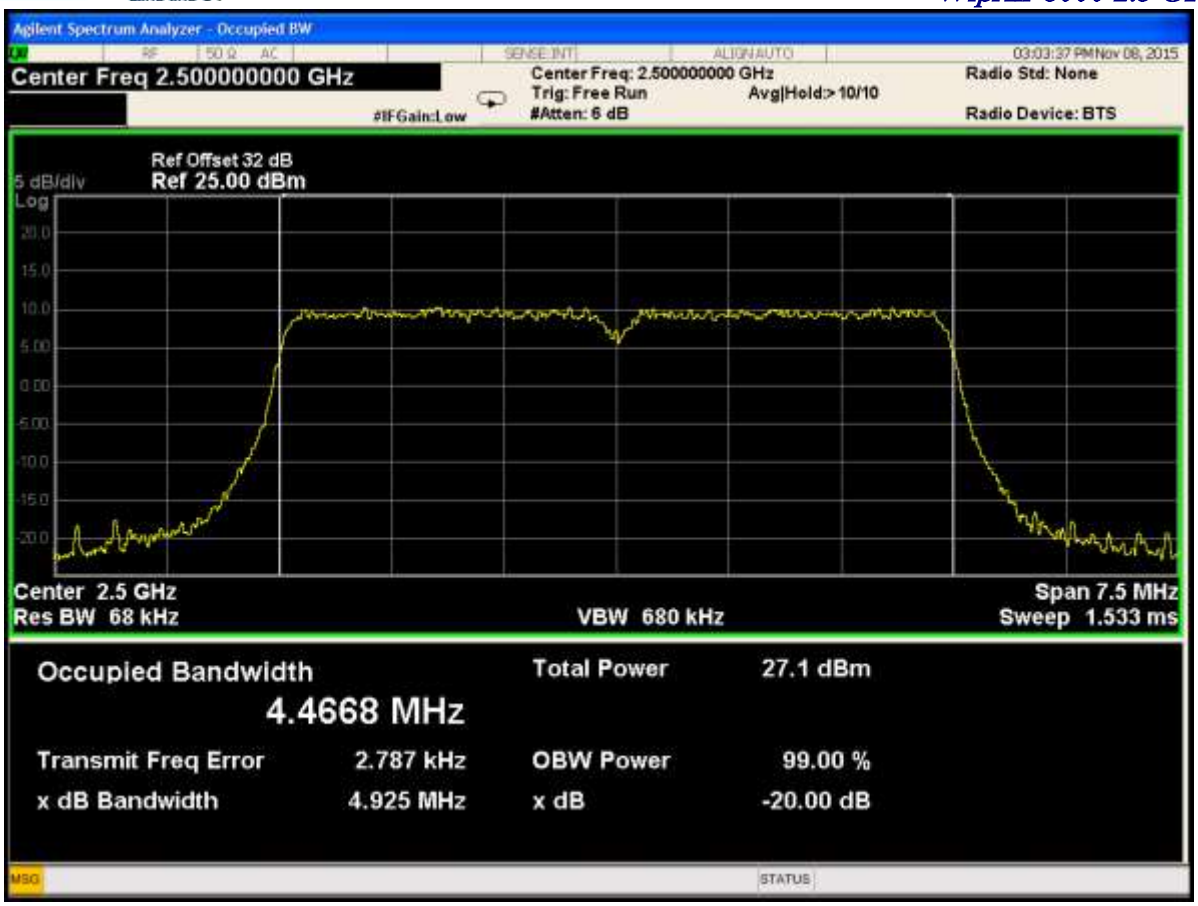
Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2501	8.858	10	1.142	*16*	Pass
Middle – 2593	9.003	10	0.997	*17*	Pass
High - 2685	9.0696	10	0.9304	*18*	Pass

Table 9: 14MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2503	12.090	14	1.91	*19*	Pass
Middle – 2593	12.136	14	1.864	*20*	Pass
High - 2682	12.348	14	1.652	*21*	Pass

Table 10: 20MHz Bandwidth Test Result

Frequency (MHz)	Bandwidth (MHz)	Limits (MHz)	Margin (MHz)	Plot No	PASS/FAIL
Low - 2506	17.950	20	2.05	*22*	Pass
Middle – 2593	18.151	20	1.849	*23*	Pass
High - 2608	18.515	20	1.485	*24*	Pass



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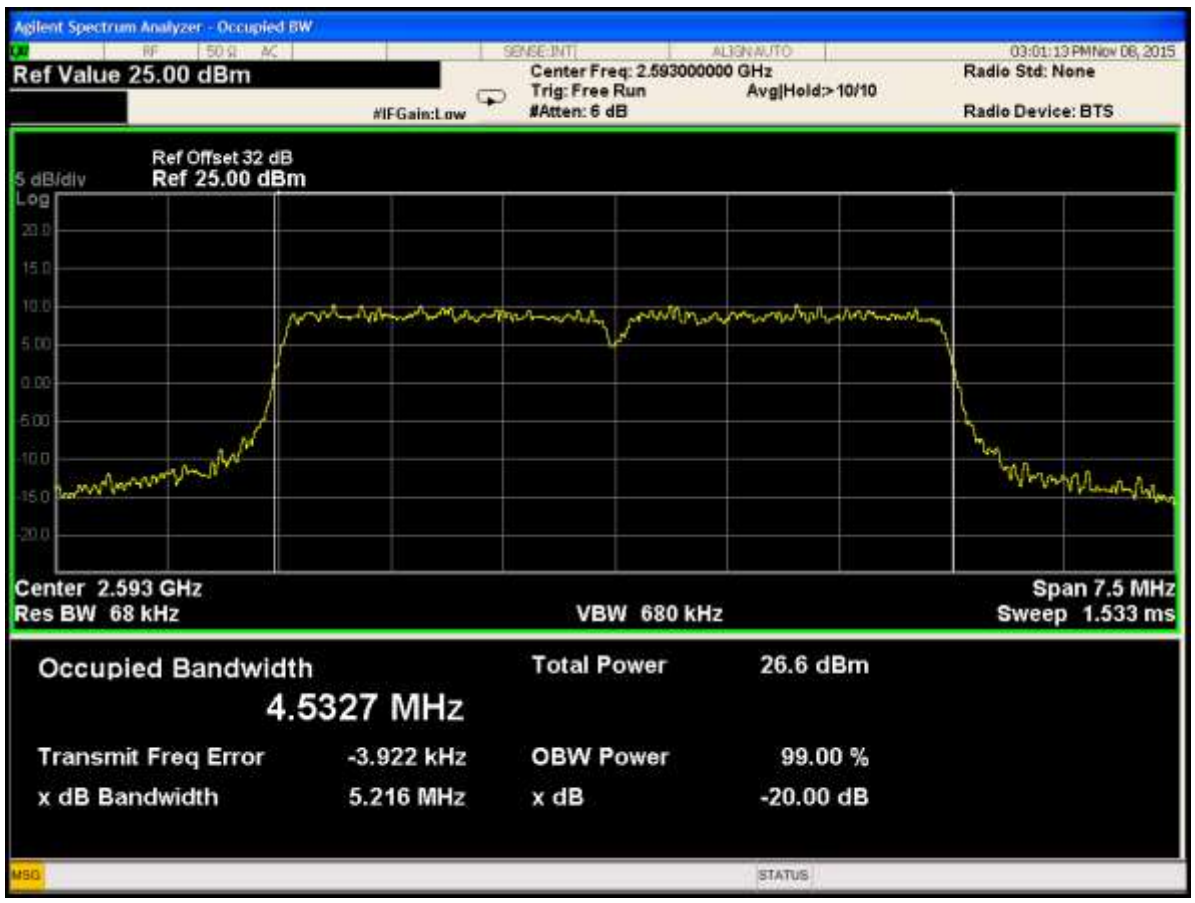

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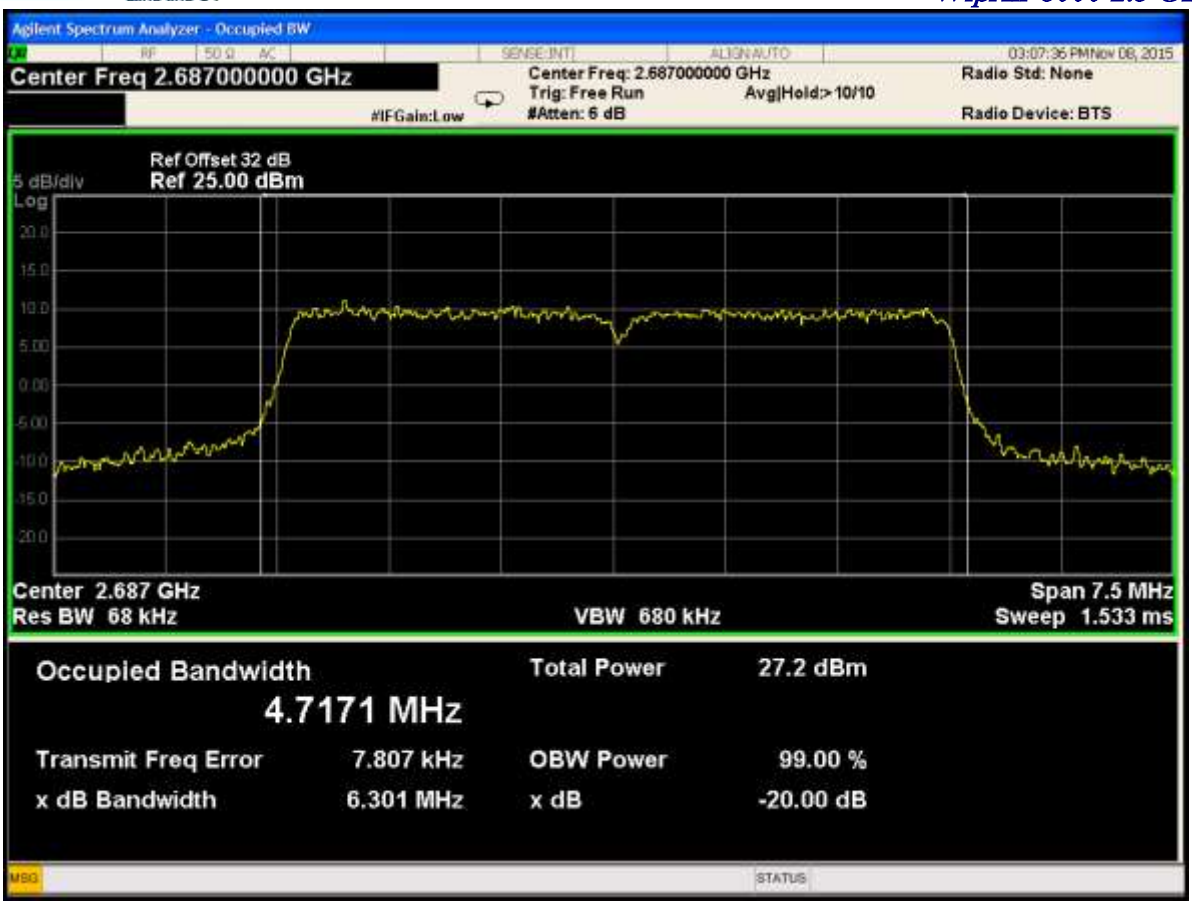

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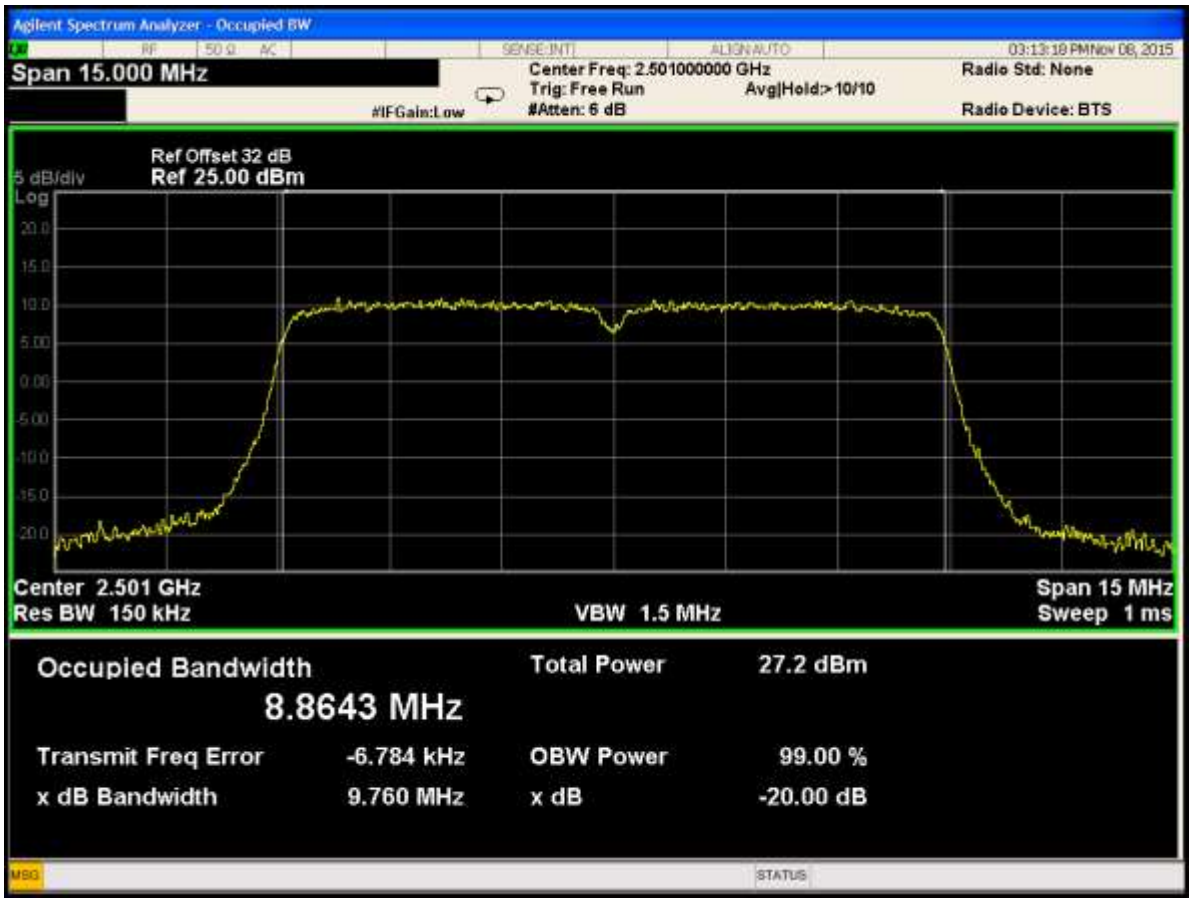

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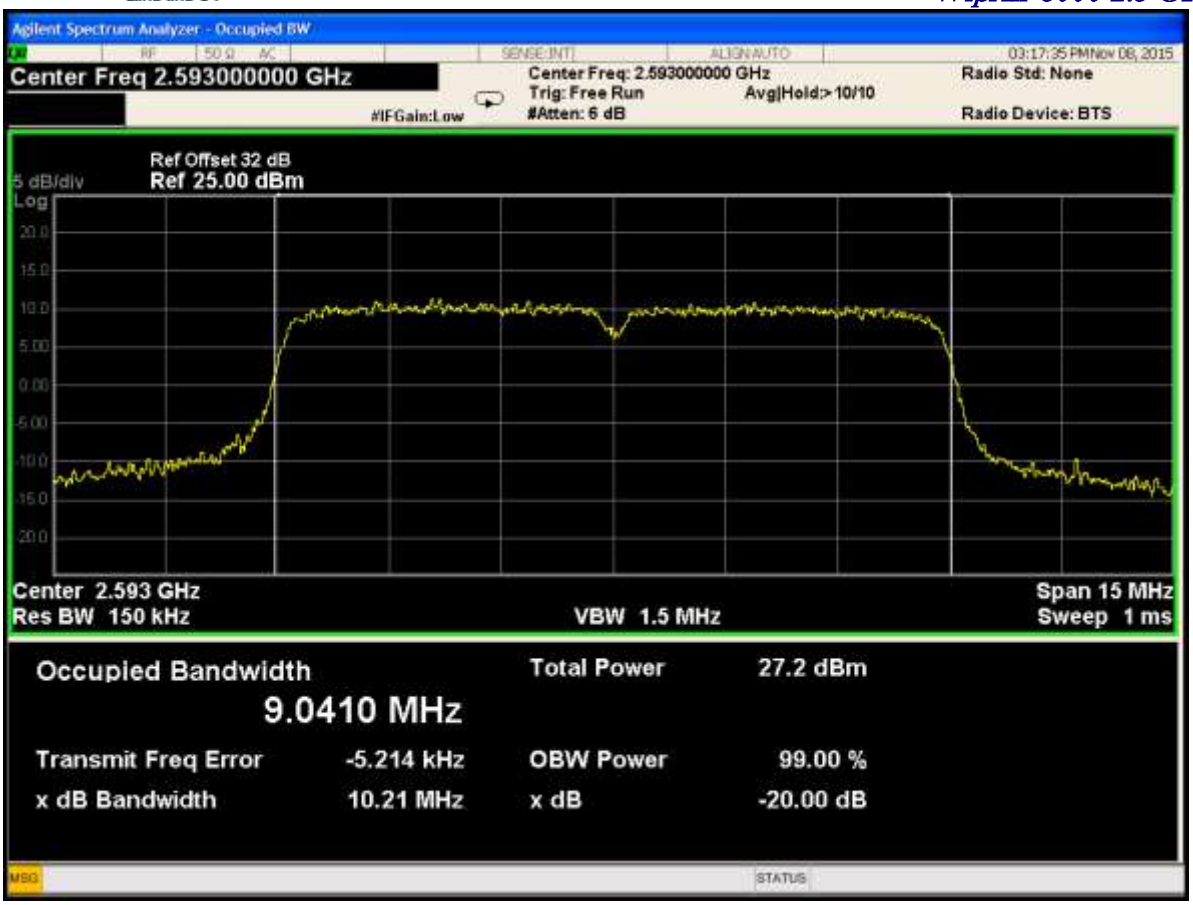

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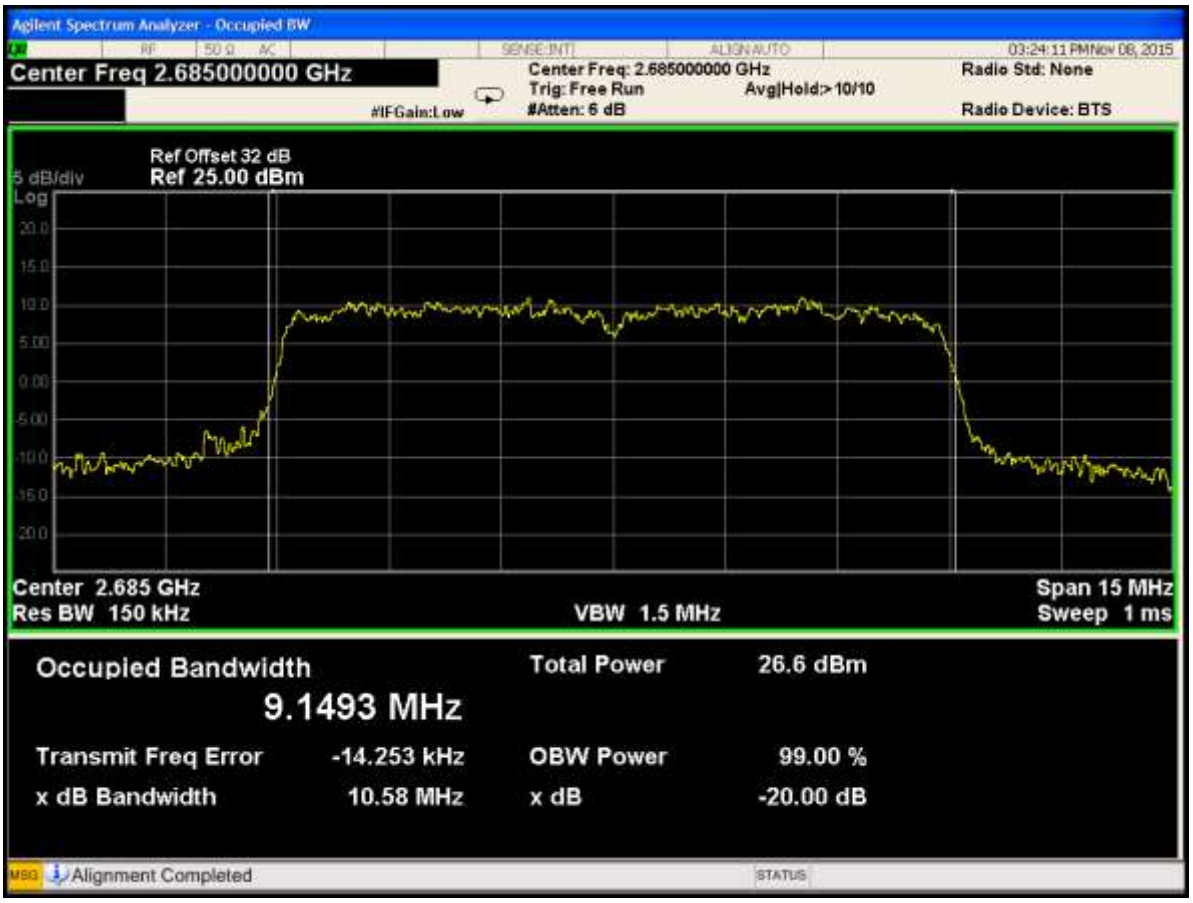

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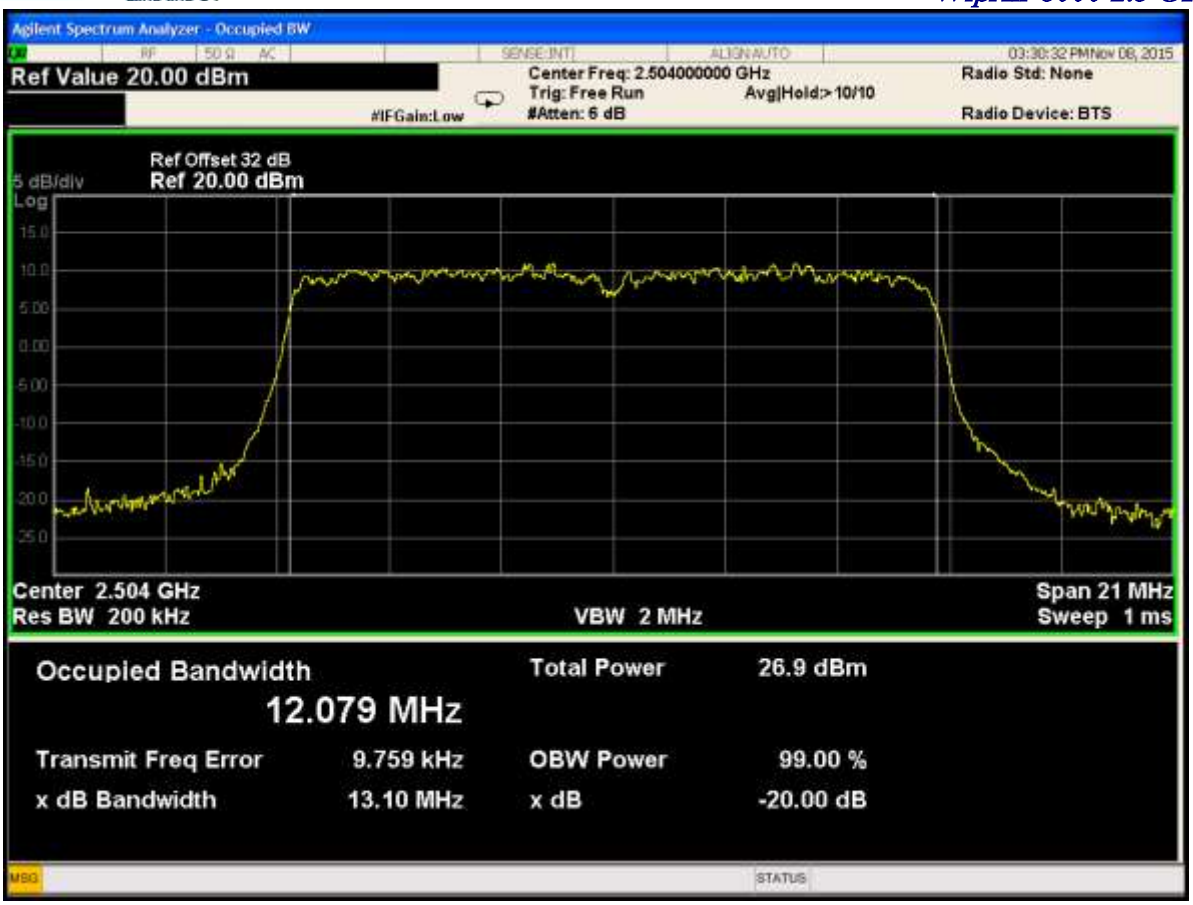

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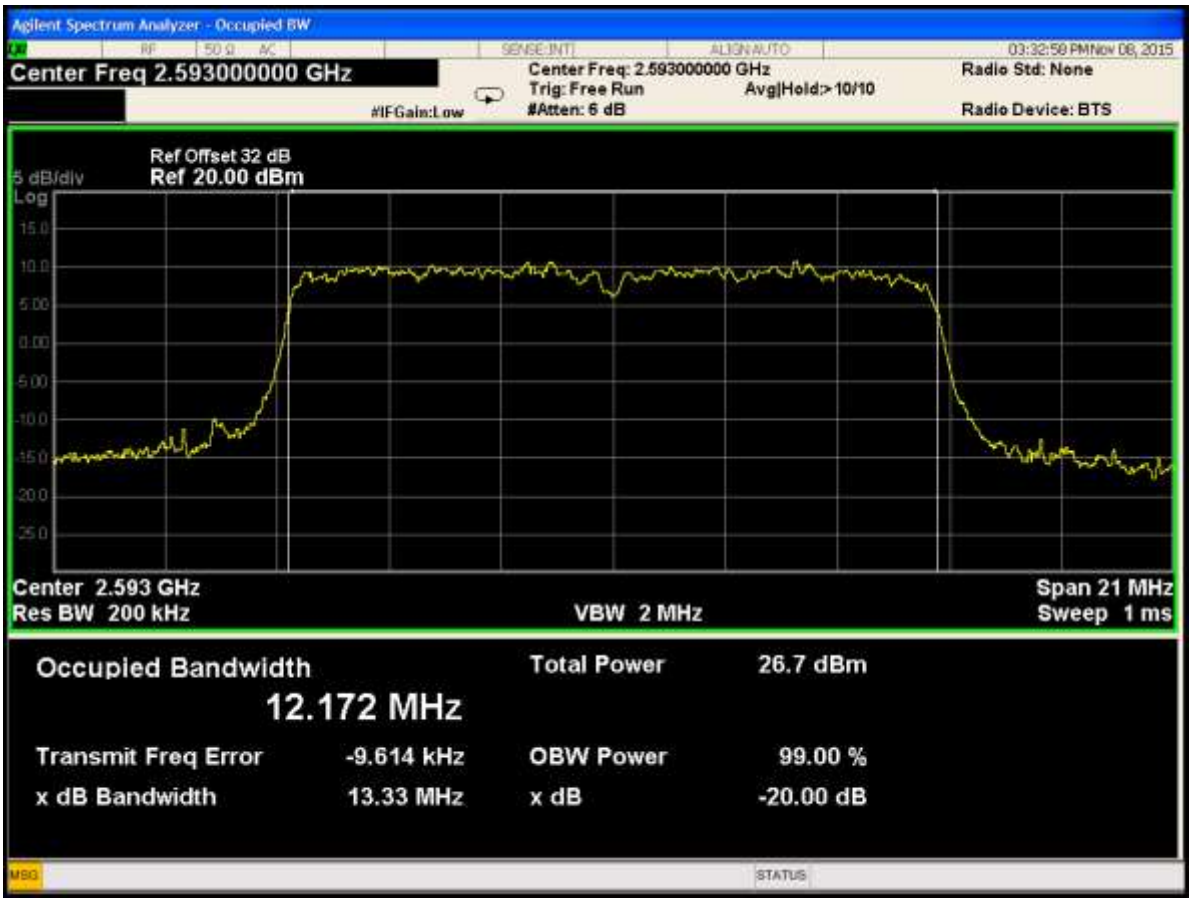

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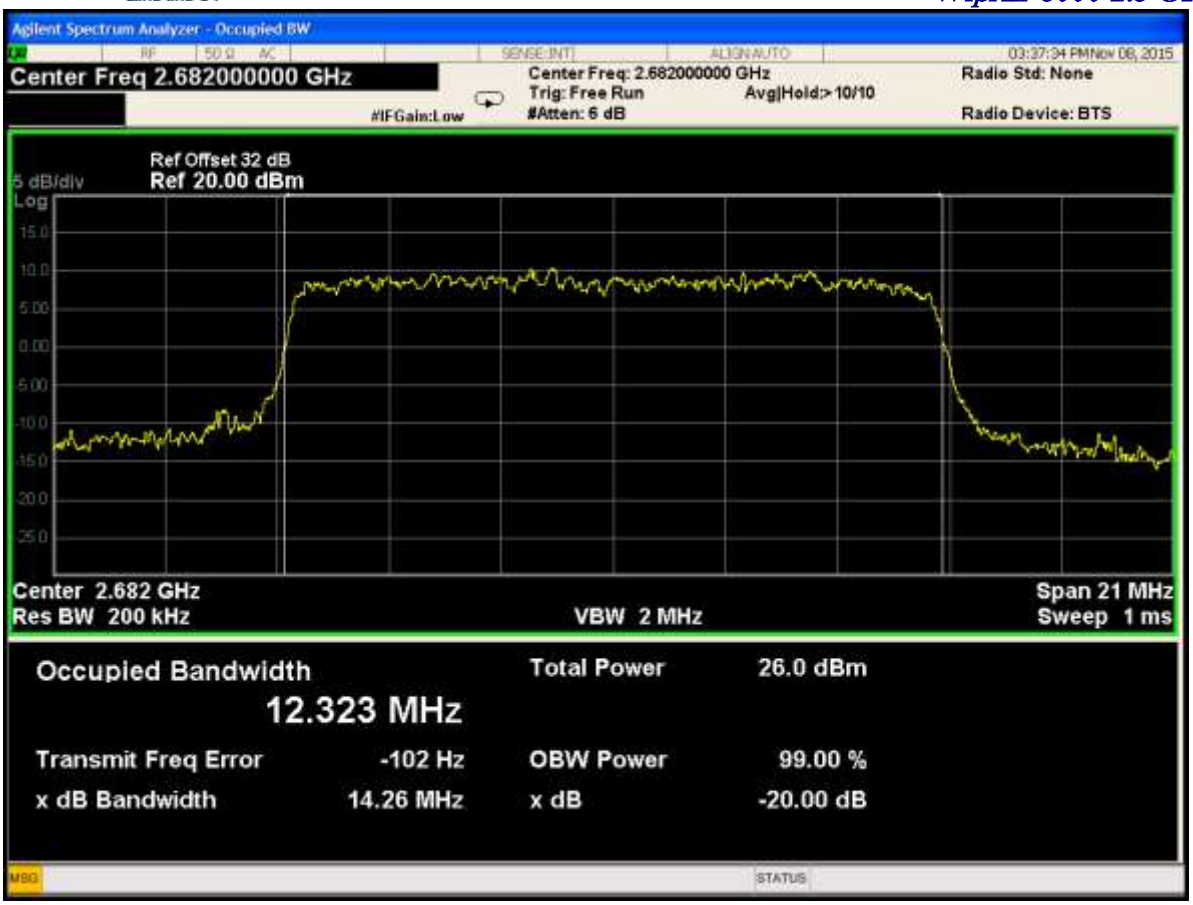

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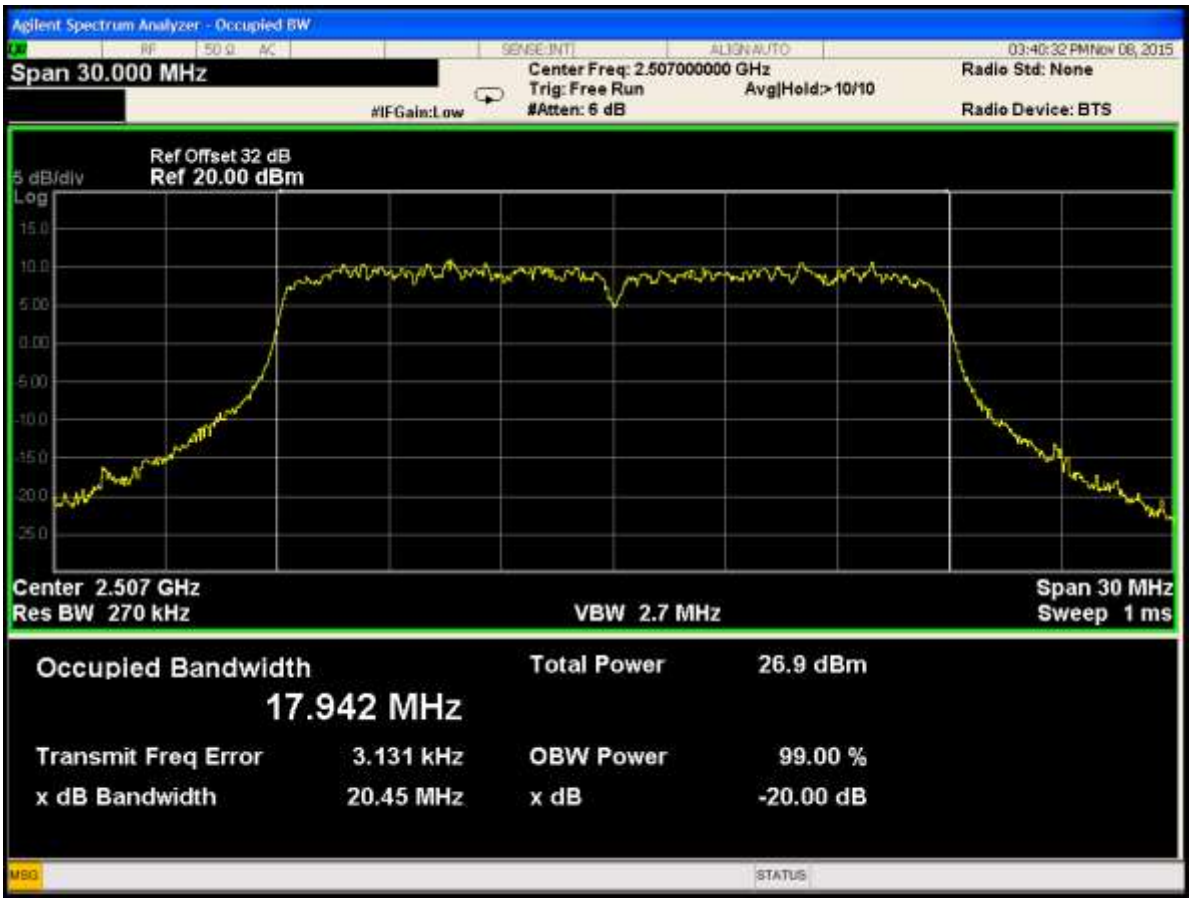

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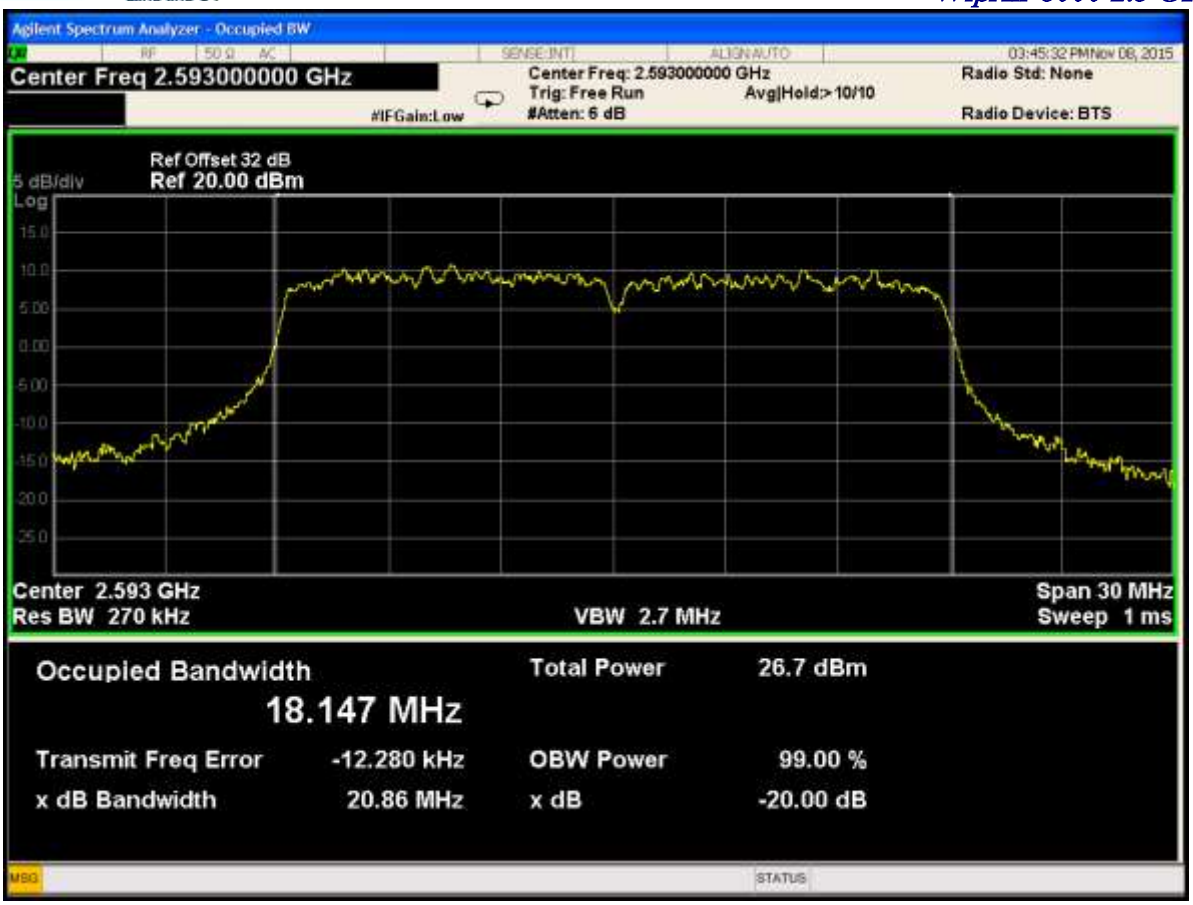

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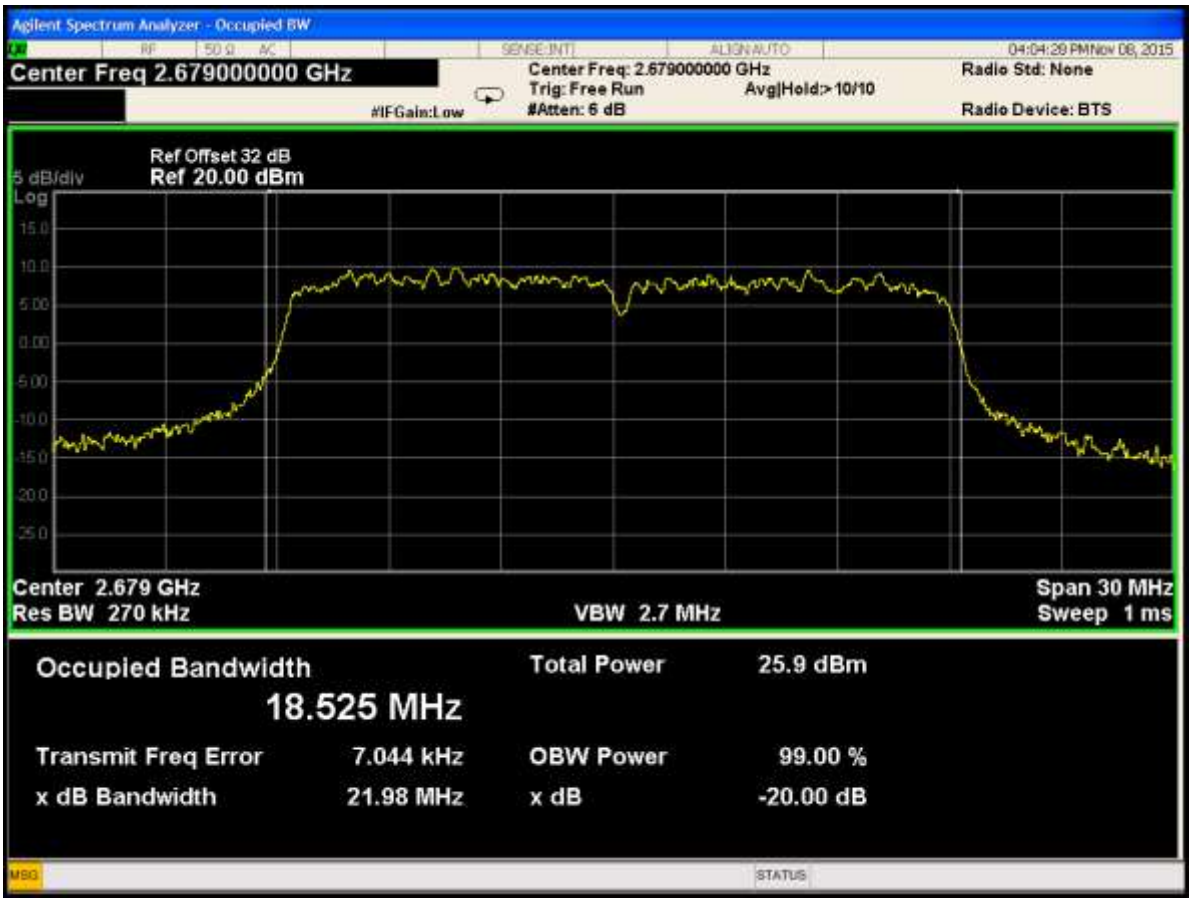

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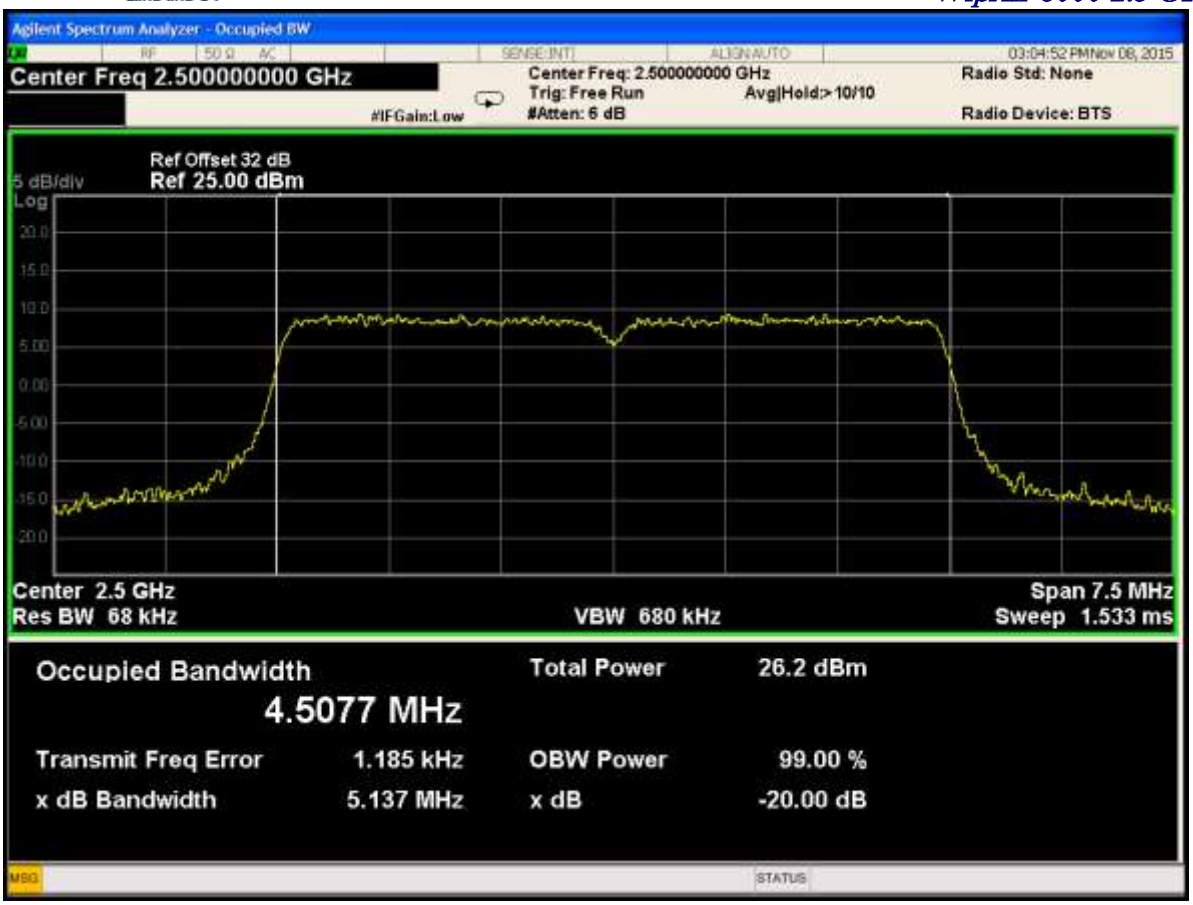

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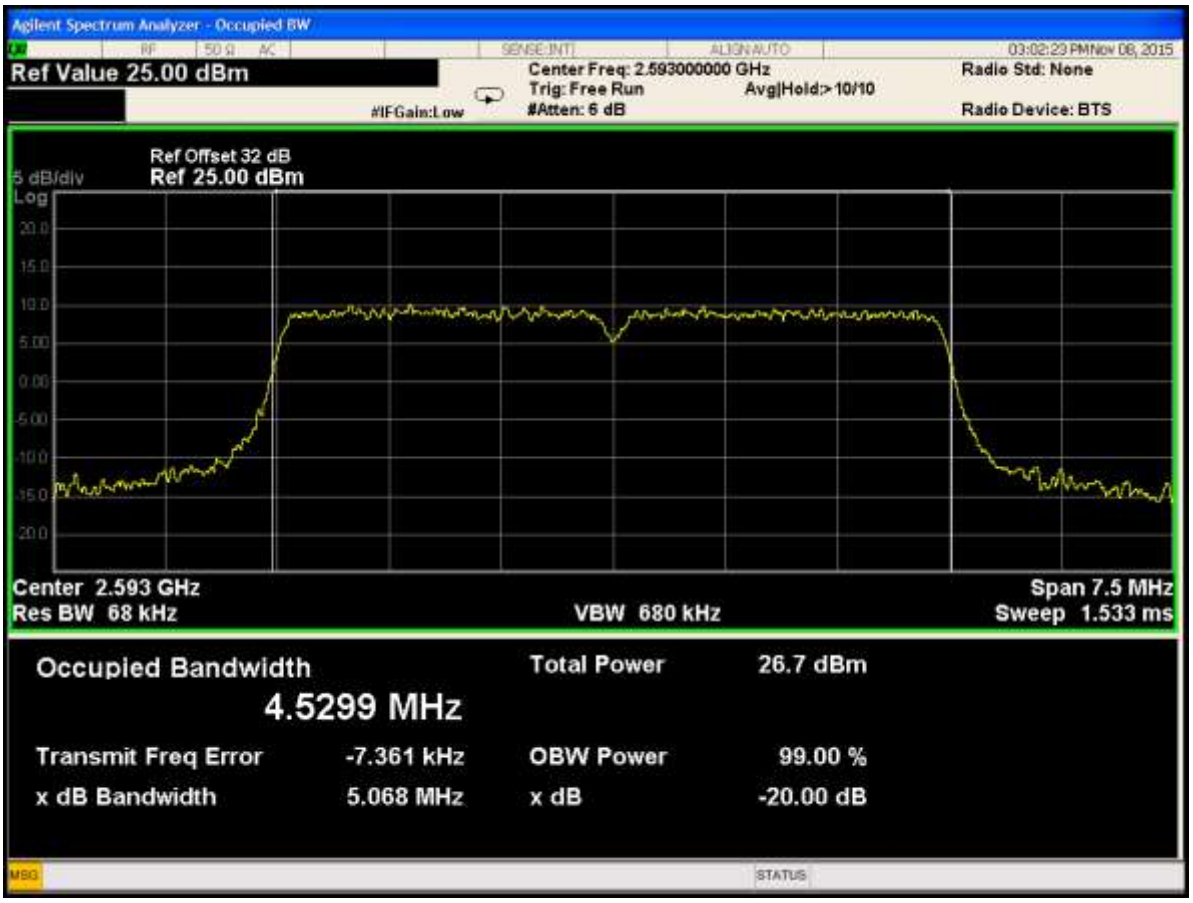

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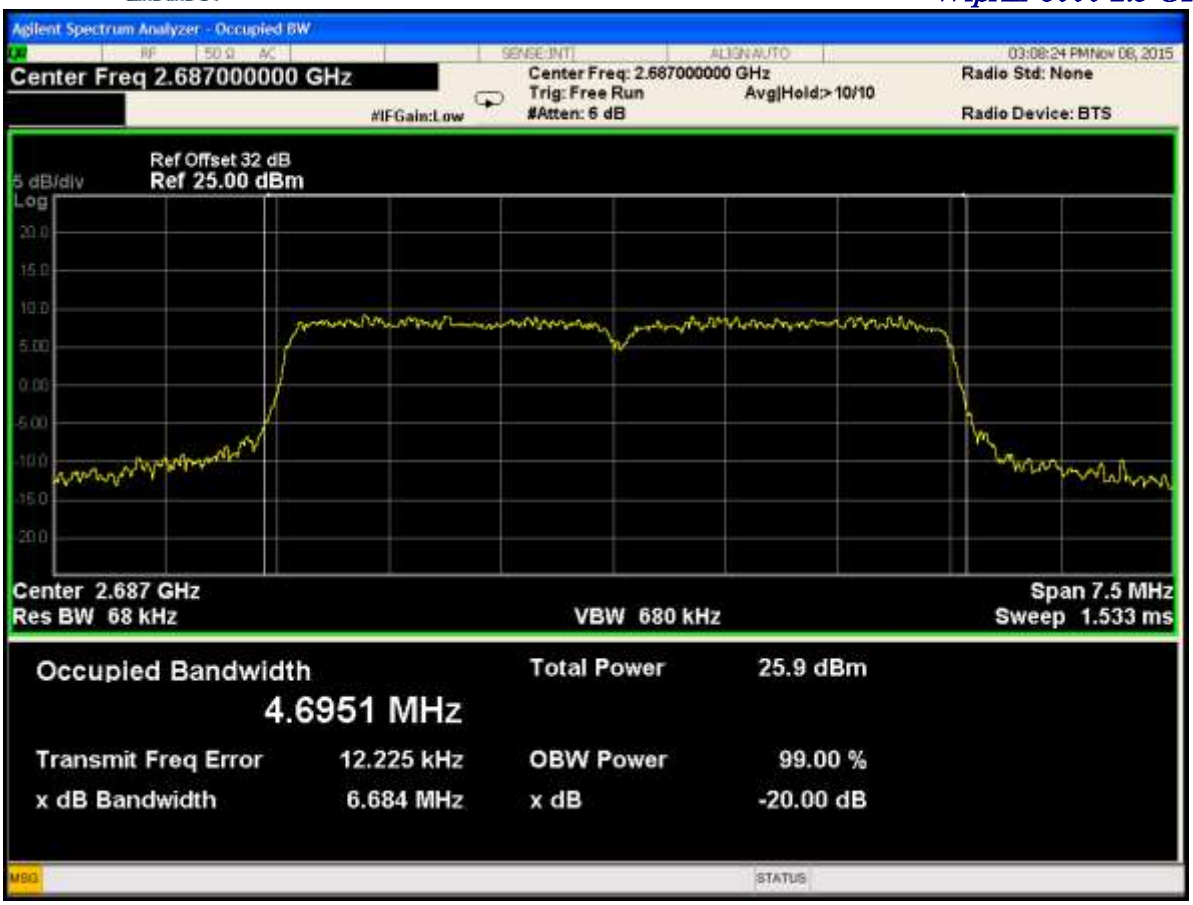

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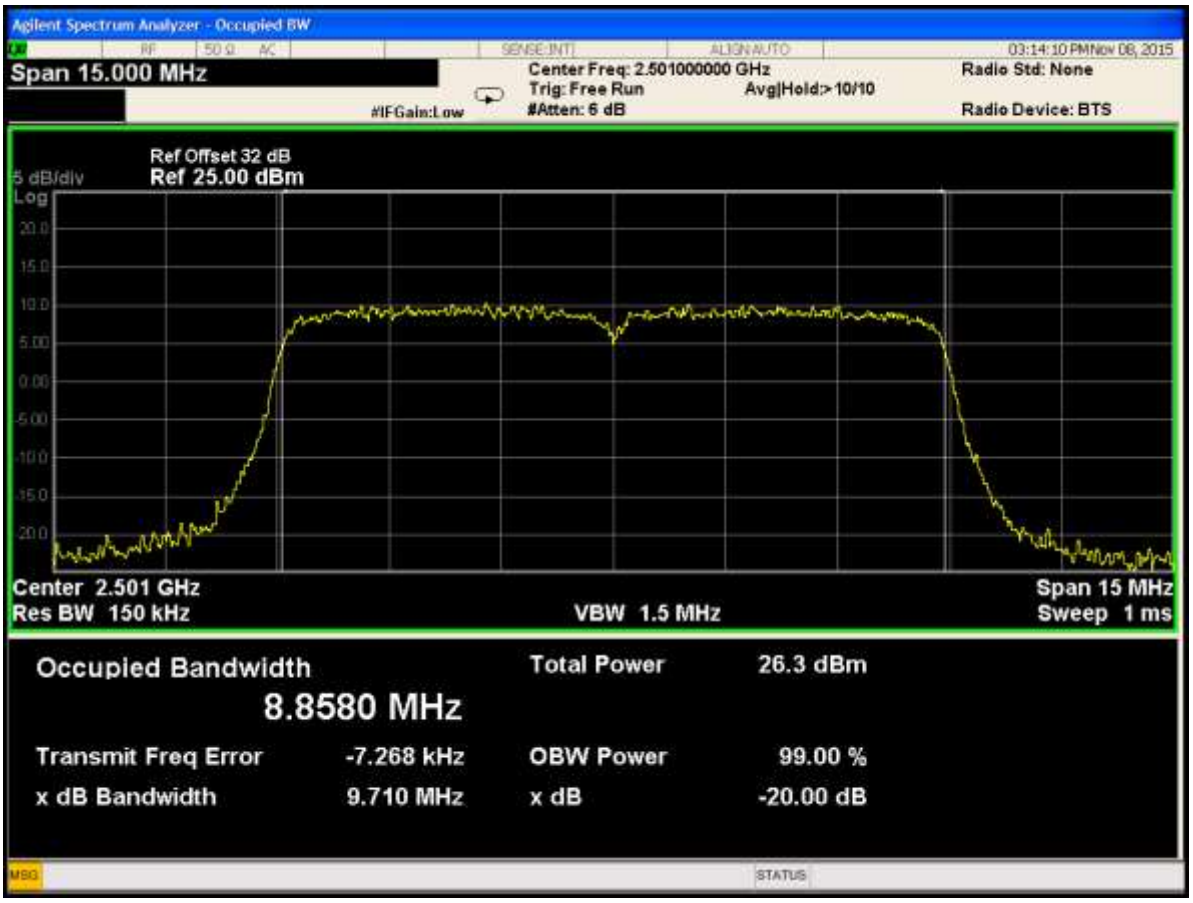

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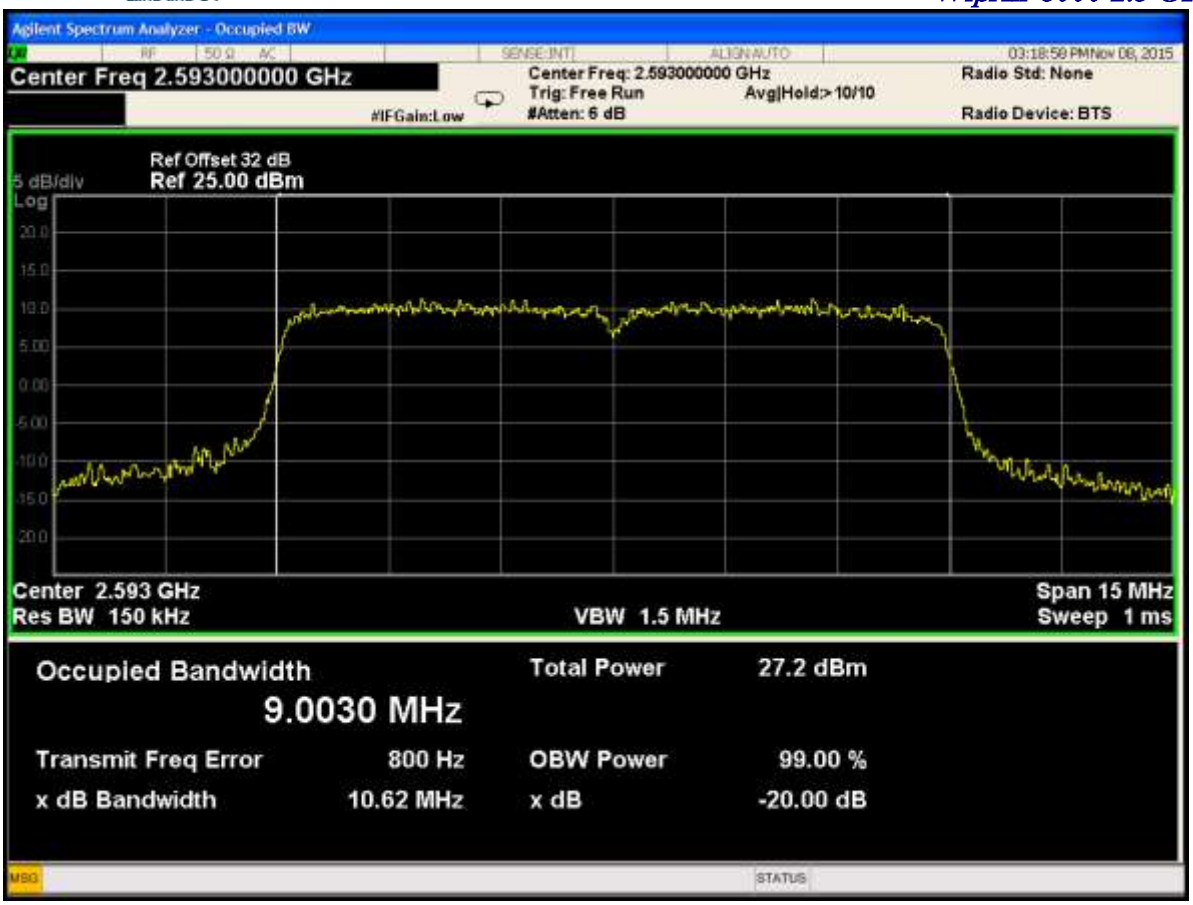
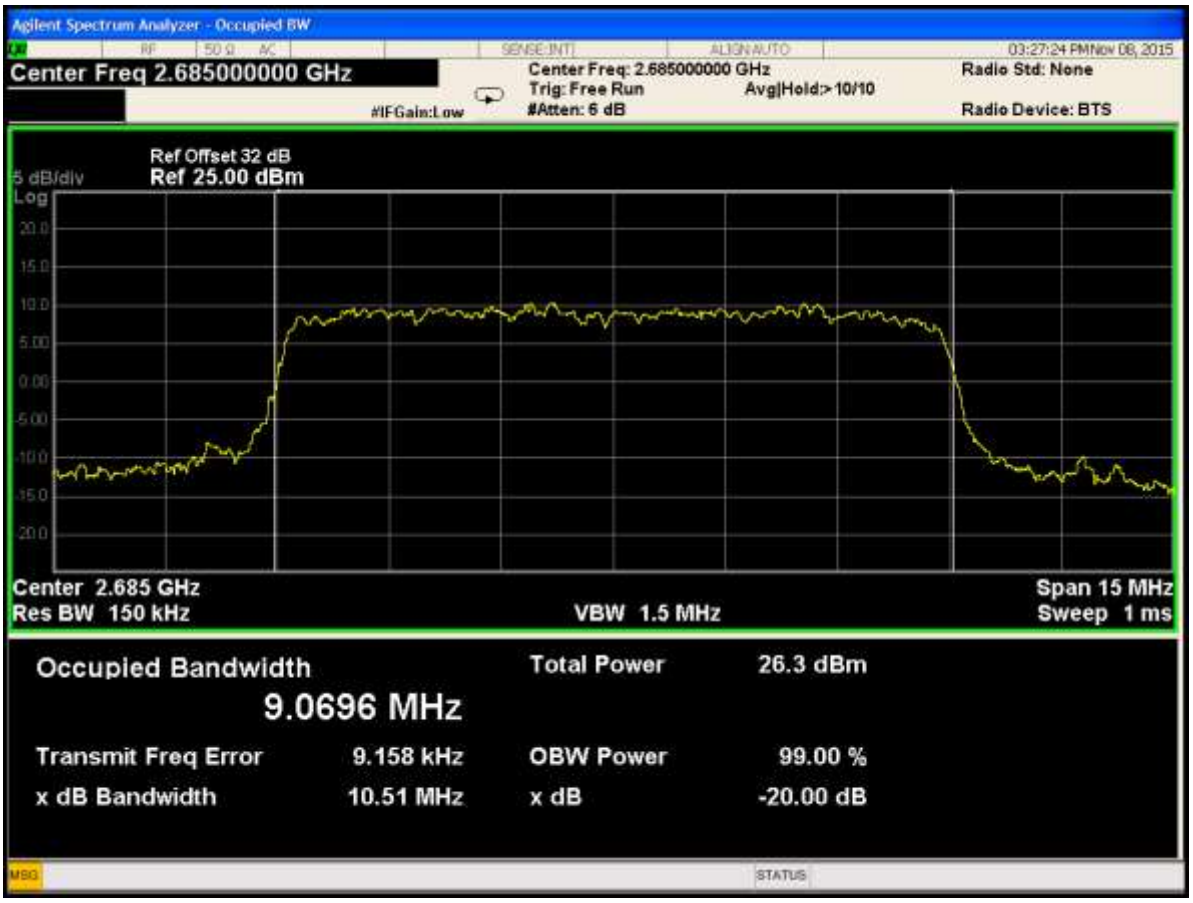
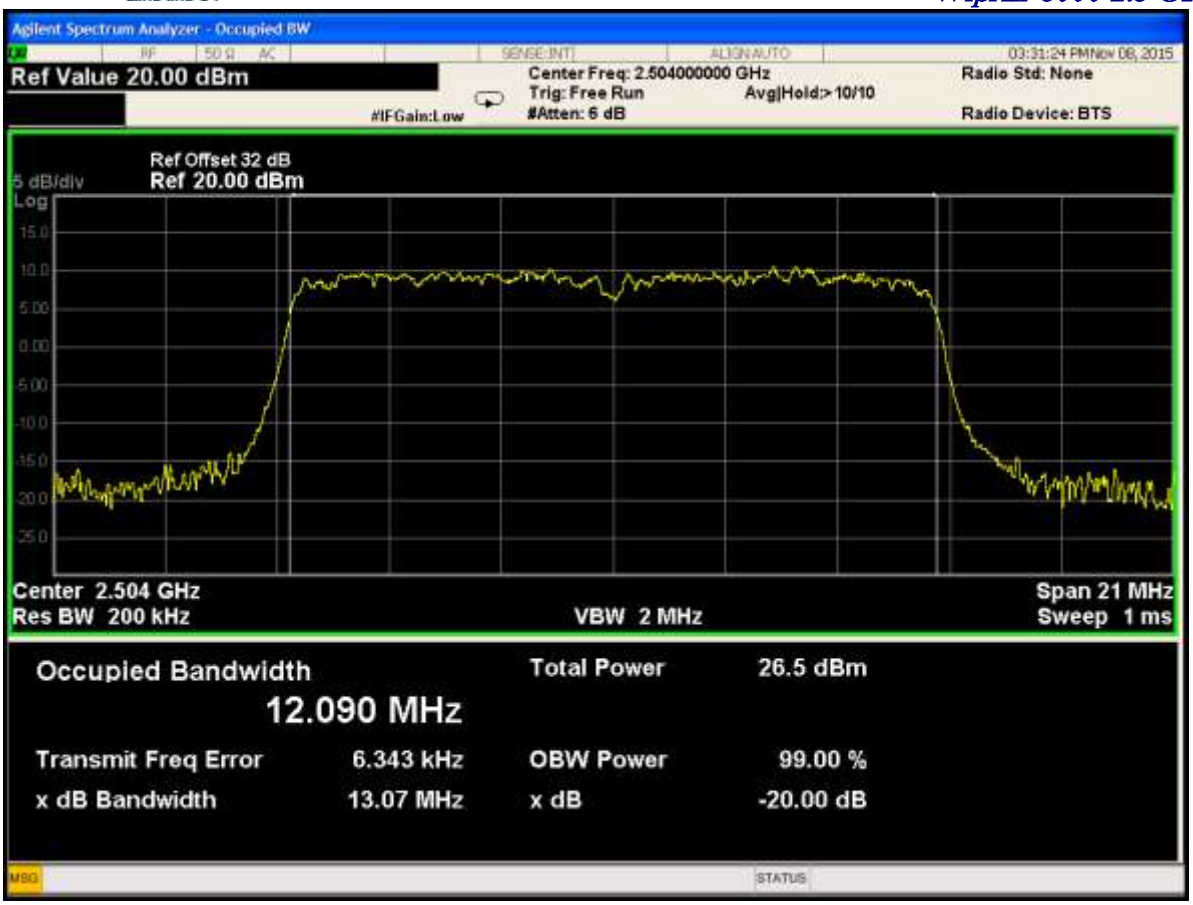


Plot Occupied BW 99% / 17



Plot Occupied BW 99% / 18



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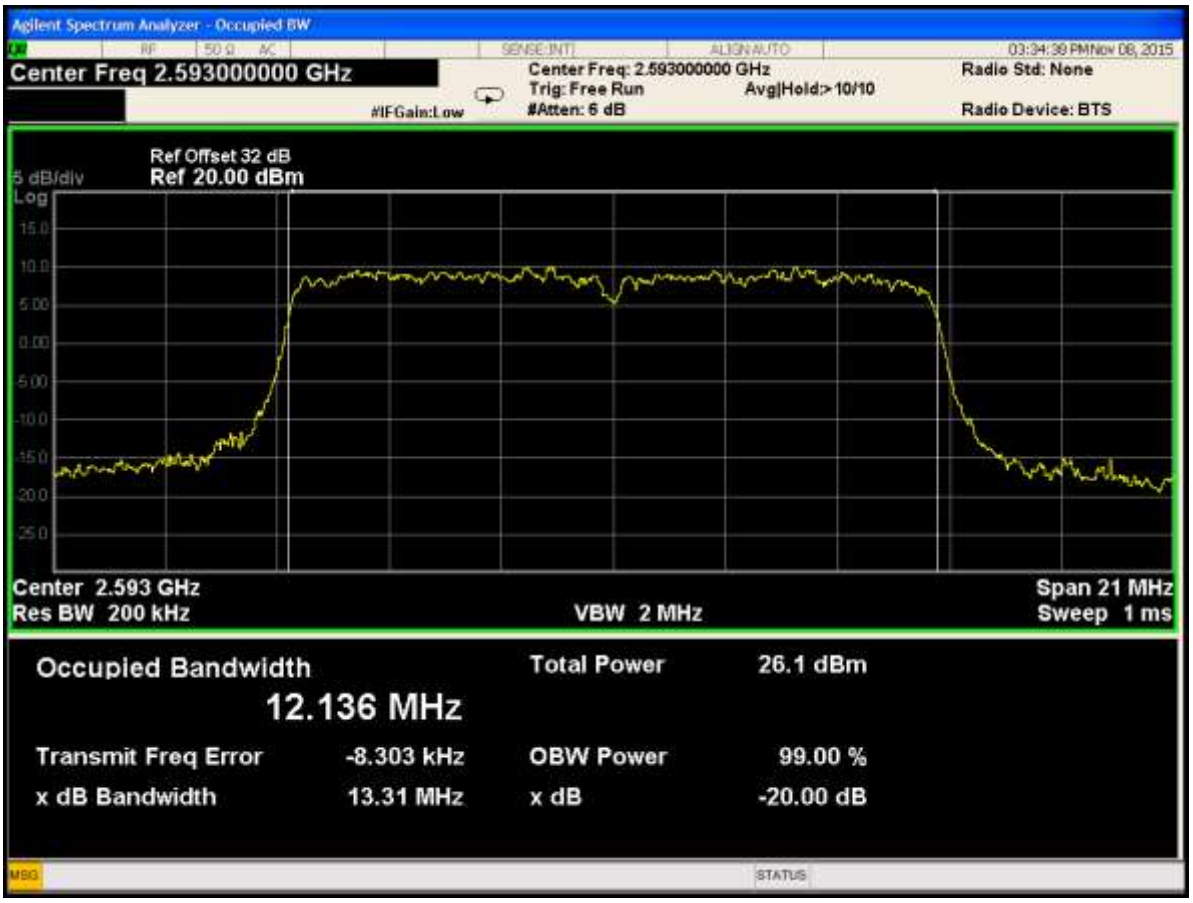

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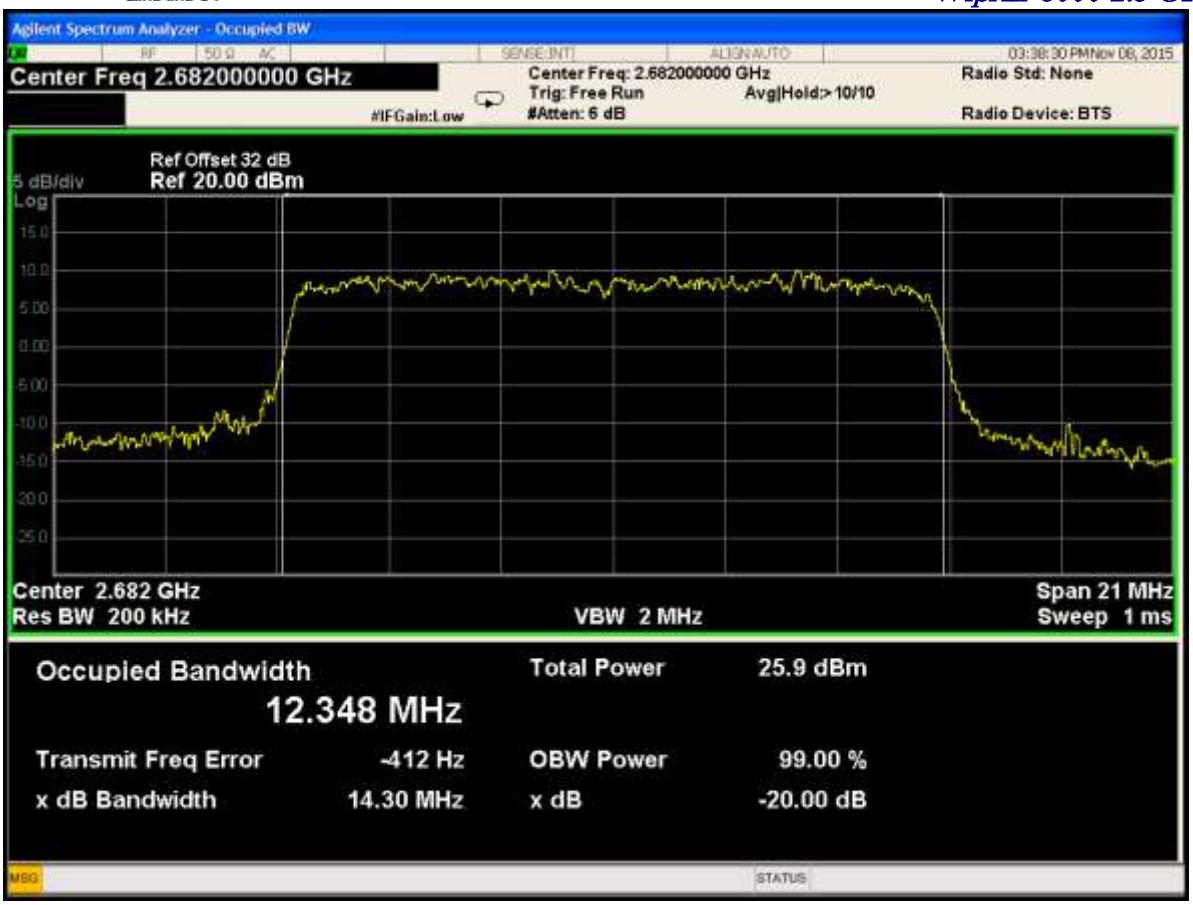

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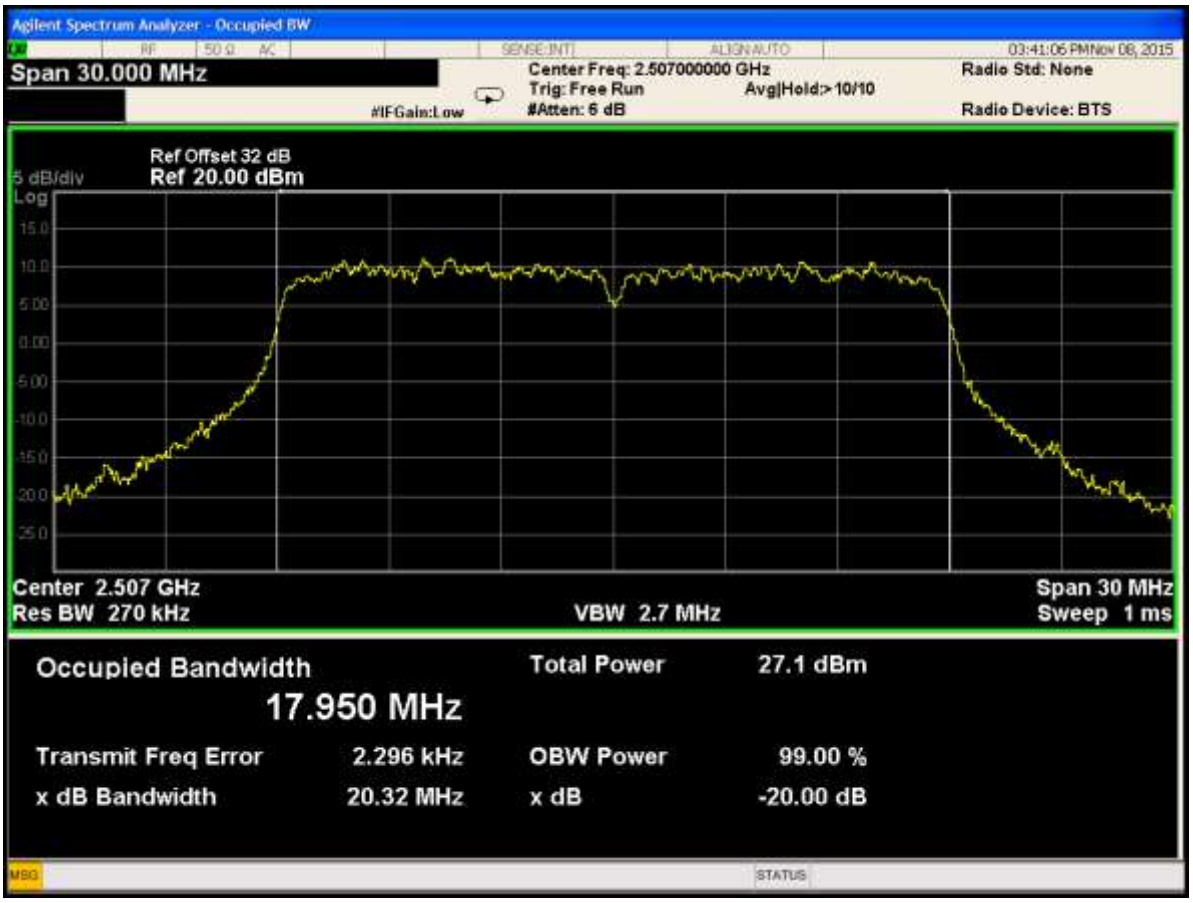

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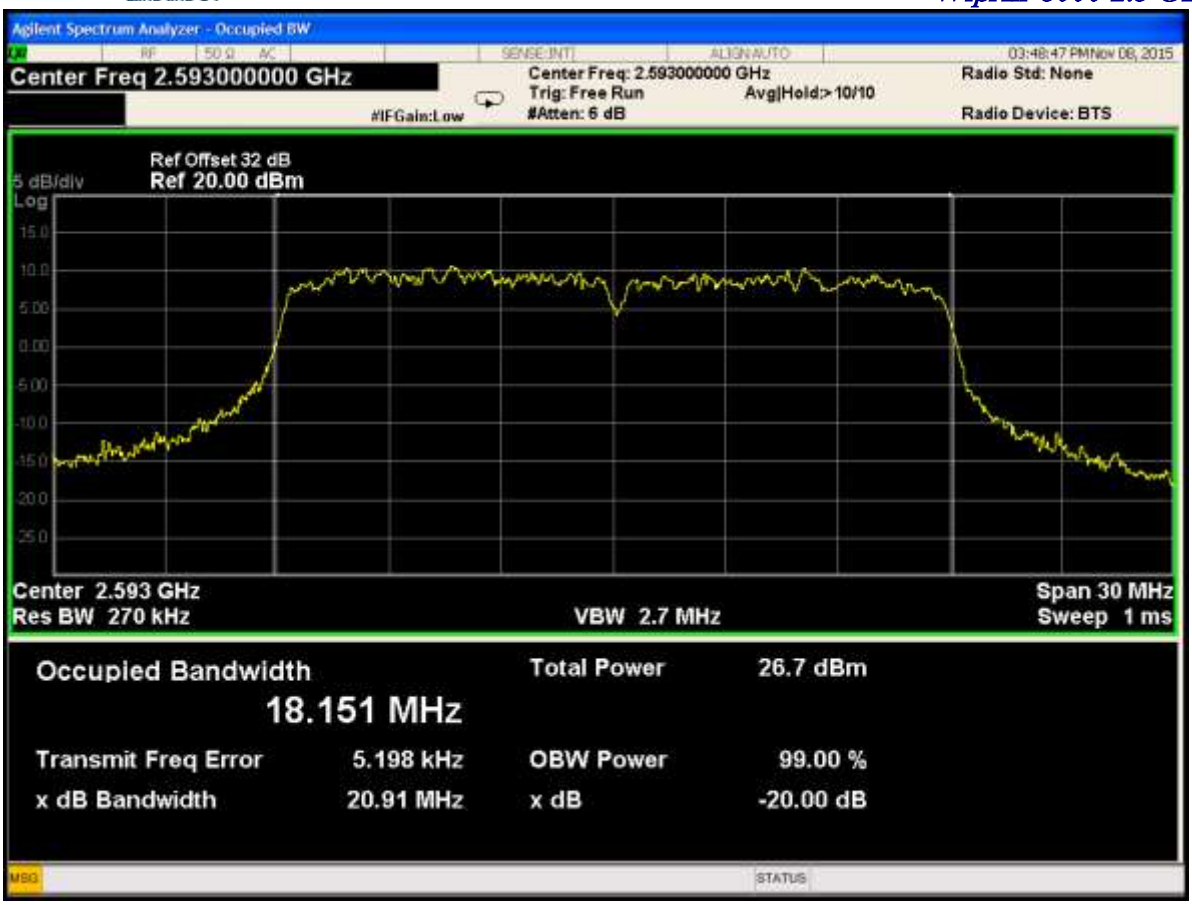

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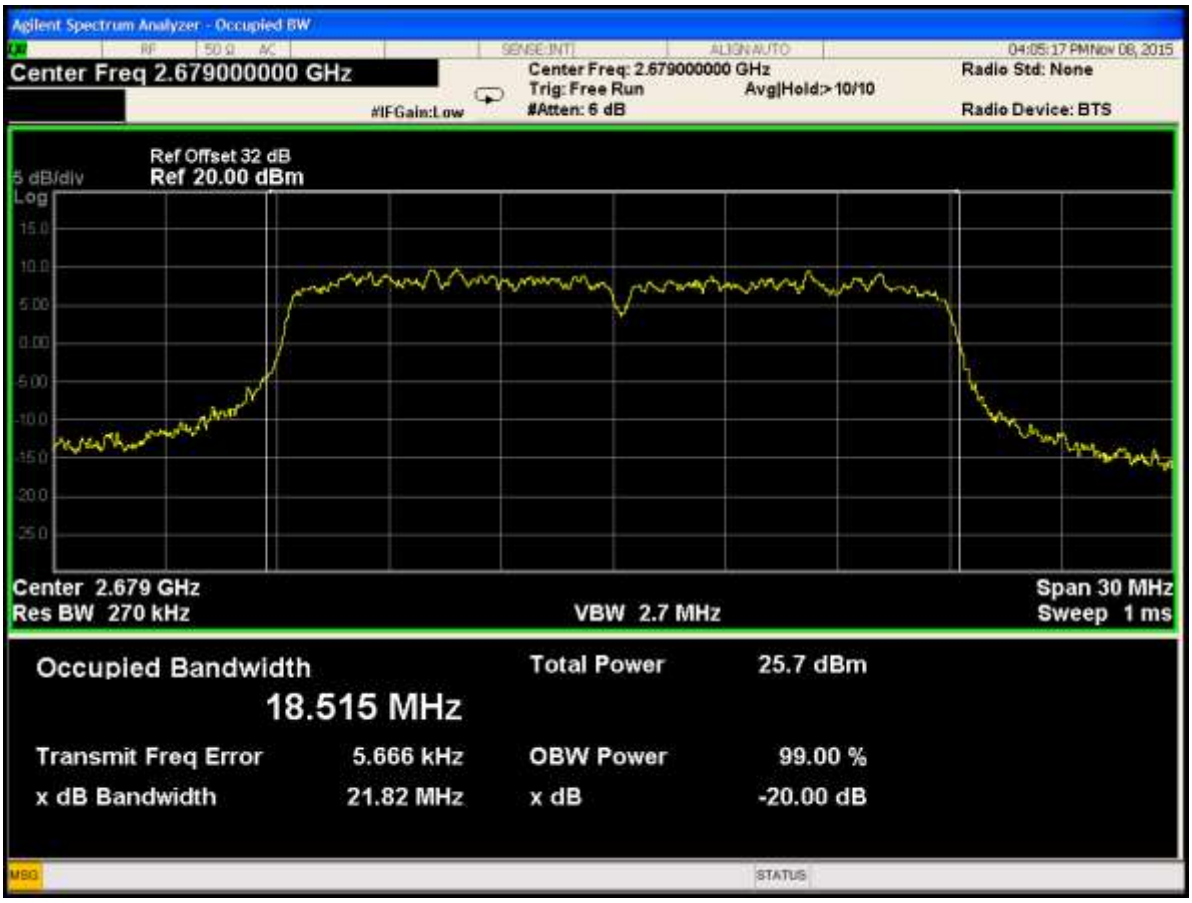


Plot Occupied BW 99% / 24

6. PEAK OUTPUT POWER

Equipment Under Test	WipAir 8000-2.5 GHz
Test limit	According to FCC §2.1046, 27.50(h)
Date	08.11.2015
Relative Humidity	40%
Ambient Temperature	25^0 C
Air Pressure	1010 hPa
Test Setup	Figure 2

Testing Engineer: I. Arbitman **Date** 08.11.2015

6.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Peak Output Power requirements

6.2. Limits of Peak Output Power according FCC Part 27, Sub Part C 27.5 (h) (1)

The tests shall meet the limits of Table 6.

Table 11: Limits for Peak Output Power and Spectral Density

Assigned Frequency (MHz)	Channel Bandwidth (MHz)	Maximum Peak Output Power 63dBm+10log(CBW/6)
		dBm
2496 - 2590	5	62.2
	10	65.2
	14	66.67
	20	68.2

6.3. Test Instrumentation and Equipment

Table 12: Test Instrumentation and Equipment

Item	Model	P/N	Manufacturer	Next Date Calibration
Spectrum Analyzer	N9020A	20041738908	Agilent	14.09.2016
30 dB Attenuator	769-30		Narda	21.05.2016

6.4. Test Procedure

As per 47 CFR, Section 2.1046 TIA/EIA-603-C, Section 2.2.1

The test setup is shown in Figure 2

The EUT was set to transmit at 100% duty cycle, at highest transmitting power and sufficient time for stabilization was allowed.

Power measurements were performed for top, middle and bottom frequencies, for each channel, BW 5, 10, 14and 20 MHz.

According to FCC §2.1046 & 27.50(h); (i) The maximum EIRP of a main, booster or base station shall not exceed 33dBW + 10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

The EUT was connected to the spectrum analyzer through an appropriate attenuator and accounted for cable loss in the settings.

Note: The 30dB attenuator has been considered in the measurements results.

Total output power was calculated as a sum of 'Peak output power Channel A + Peak output power Channel B'.

6.5. Test Setup

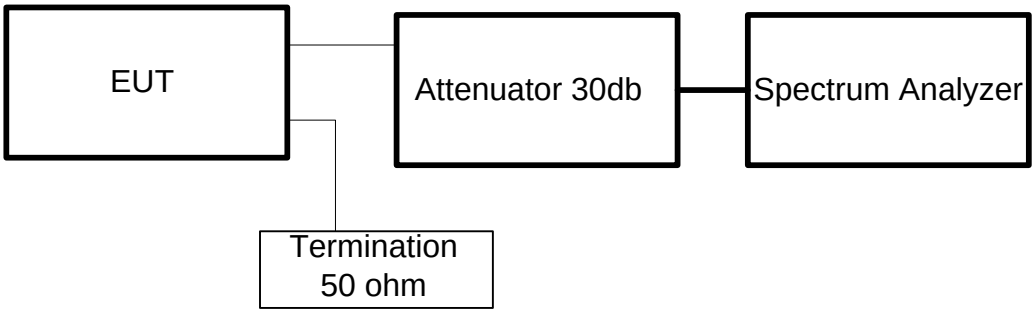


Figure 2: Field strength of fundamental test setup

6.6. Output Power Test Results for Port A

Table 13: 5 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2500	27.39	62.2	34.81	*1*	Pass
Middle – 2593	27.26	62.2	34.94	*2*	Pass
High - 2687	27.58	62.2	34.62	*3*	Pass

Table 14: 10 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2501	27.65	65.2	37.55	*4*	Pass
Middle – 2593	27.70	65.2	37.5	*5*	Pass
High - 2685	27.34	65.2	37.86	*6*	Pass

Table 15: 14 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2503	27.15	66.67	39.52	*7*	Pass
Middle – 2593	27.04	66.67	39.63	*8*	Pass
High - 2682	26.33	66.67	40.34	*9*	Pass

Table 16: 20 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2506	27.04	68.2	41.16	*10*	Pass
Middle – 2593	27.07	68.2	41.13	*11*	Pass
High - 2680	26.95	68.2	41.25	*12*	Pass

6.7. Output Power Test Results for Port B

Table 17: 5 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2500	26.69	62.2	35.51	*13*	Pass
Middle – 2593	27.01	62.2	35.19	*14*	Pass
High - 2687	26.43	62.2	35.77	*15*	Pass

Table 18: 10 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2501	26.28	65.2	38.92	*16*	Pass
Middle – 2593	27.00	65.2	38.2	*17*	Pass
High - 2685	26.32	65.2	38.88	*18*	Pass

Table 19: 14 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2503	26.89	66.67	39.78	*19*	Pass
Middle – 2593	26.80	66.67	39.87	*20*	Pass
High - 2682	26.32	66.67	40.35	*21*	Pass

Table 20: 20 MHz BW Test Results

Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (dBm)	Margin (dBm)	Plot Reference	Pass/ Fail
Low - 2506	27.00	68.2	41.2	*22*	Pass
Middle – 2593	26.87	68.2	41.33	*23*	Pass
High - 2680	26.53	68.2	41.67	*24*	Pass

6.8. Peak Output Power Calculated Results for both ports

- RF output power = SA reading at outputs summed in linear terms;
  = 10 log [10^ (P_{ant1}/10) + 10^ (P_{ant2}/10)]

Table 21: 5 MHz BW Test Results

Frequency (MHz)	Peak Output Power (dBm)		Calculated Peak Output Power (dBm)	Limit (dBm)	Pass/ Fail
	Port A	Port B			
Low - 2500	27.39	26.69	30.064	62.2	Pass
Middle – 2593	27.26	27.01	30.147	62.2	Pass
High - 2687	27.58	26.43	30.053	62.2	Pass

Table 22: 10 MHz BW Test Results

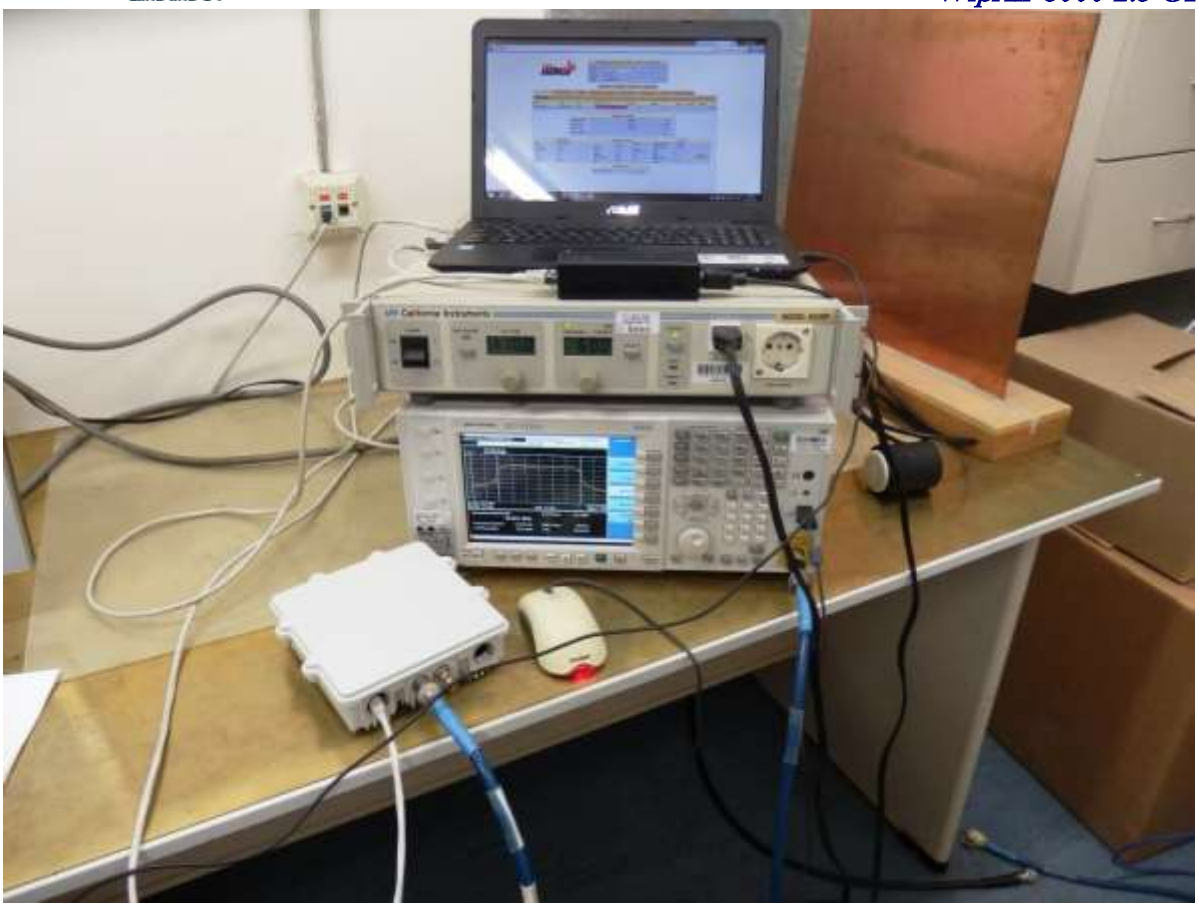
Frequency (MHz)	Peak Output Power (dBm)		Calculated Peak Output Power (dBm)	Limit (dBm)	Pass/ Fail
	Port A	Port B			
Low - 2501	27.65	26.28	30.029	65.2	Pass
Middle – 2593	27.70	27.00	30.374	65.2	Pass
High - 2685	27.34	26.32	29.870	65.2	Pass

Table 23: 14 MHz BW Test Results

Frequency (MHz)	Peak Output Power (dBm)		Calculated Peak Output Power (dBm)	Limit (dBm)	Pass/ Fail
	Port A	Port B			
Low - 2503	27.15	26.89	30.032	66.67	Pass
Middle – 2593	27.04	26.80	29.931	66.67	Pass
High - 2682	26.33	26.32	29.335	66.67	Pass

Table 24: 20 MHz BW Test Results

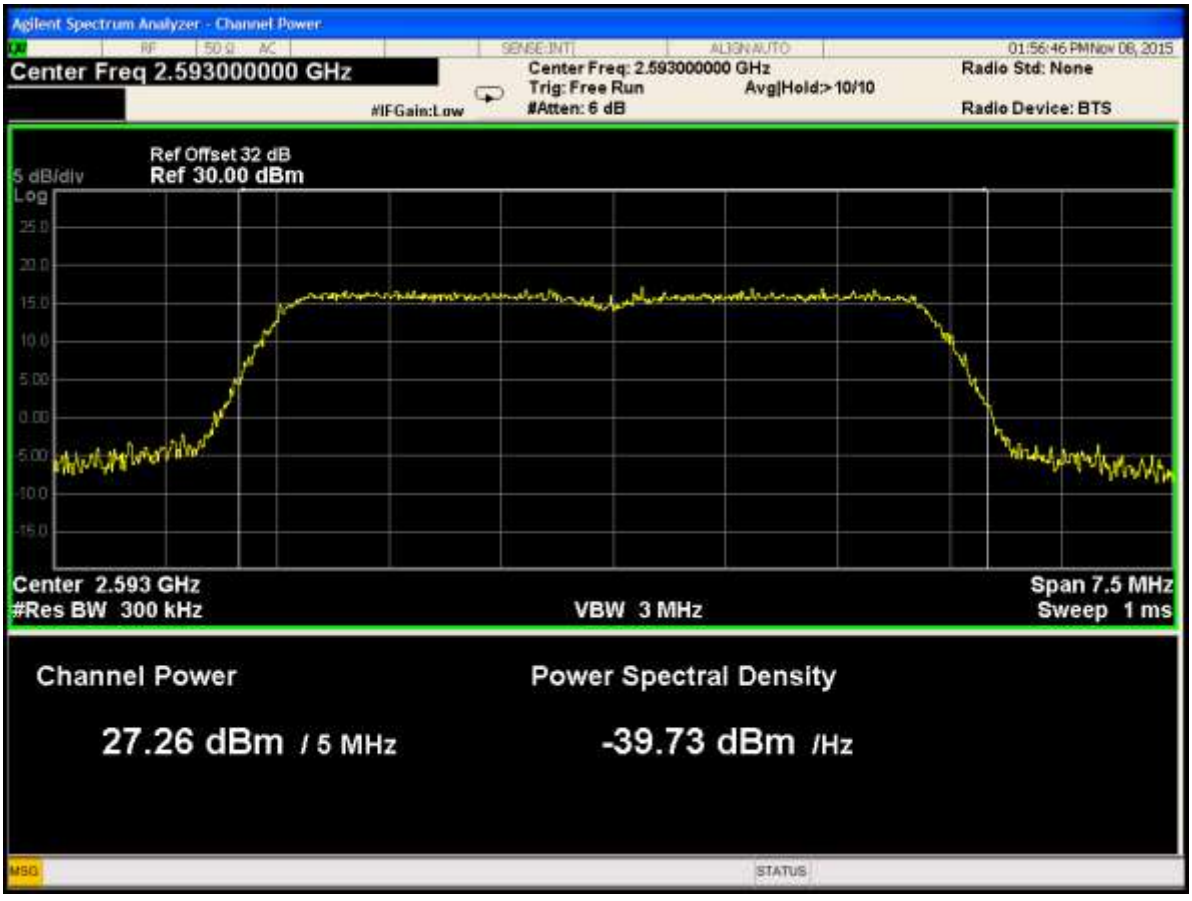
Frequency (MHz)	Peak Output Power (dBm)		Calculated Peak Output Power (dBm)	Limit (dBm)	Pass/ Fail
	Port A	Port B			
Low - 2503	27.04	27.00	30.030	68.2	Pass
Middle – 2593	27.07	26.87	29.981	68.2	Pass
High - 2682	26.95	26.53	29.755	68.2	Pass



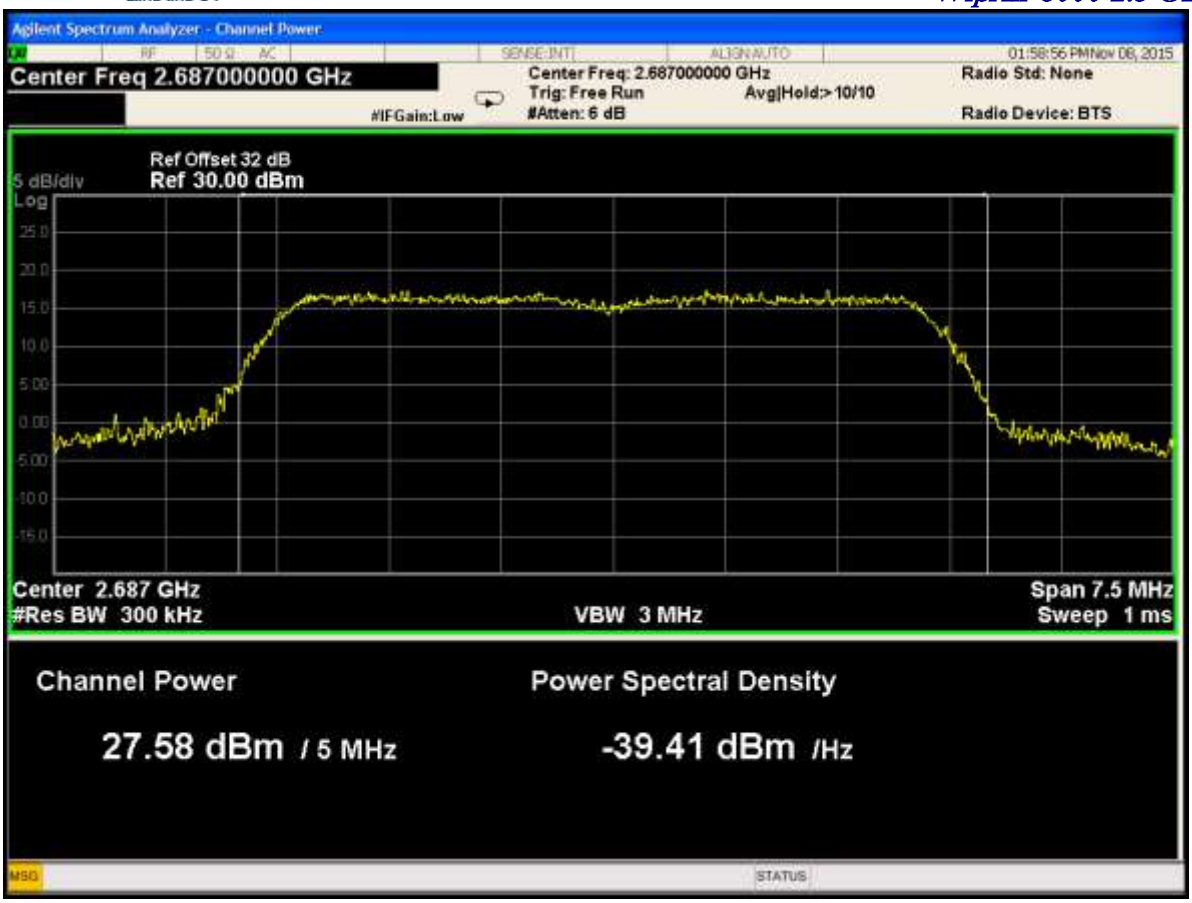
Photograph for Conducted Measurement Test Setup/ 1

Photograph for Conducted Measurement Test Setup/ 2

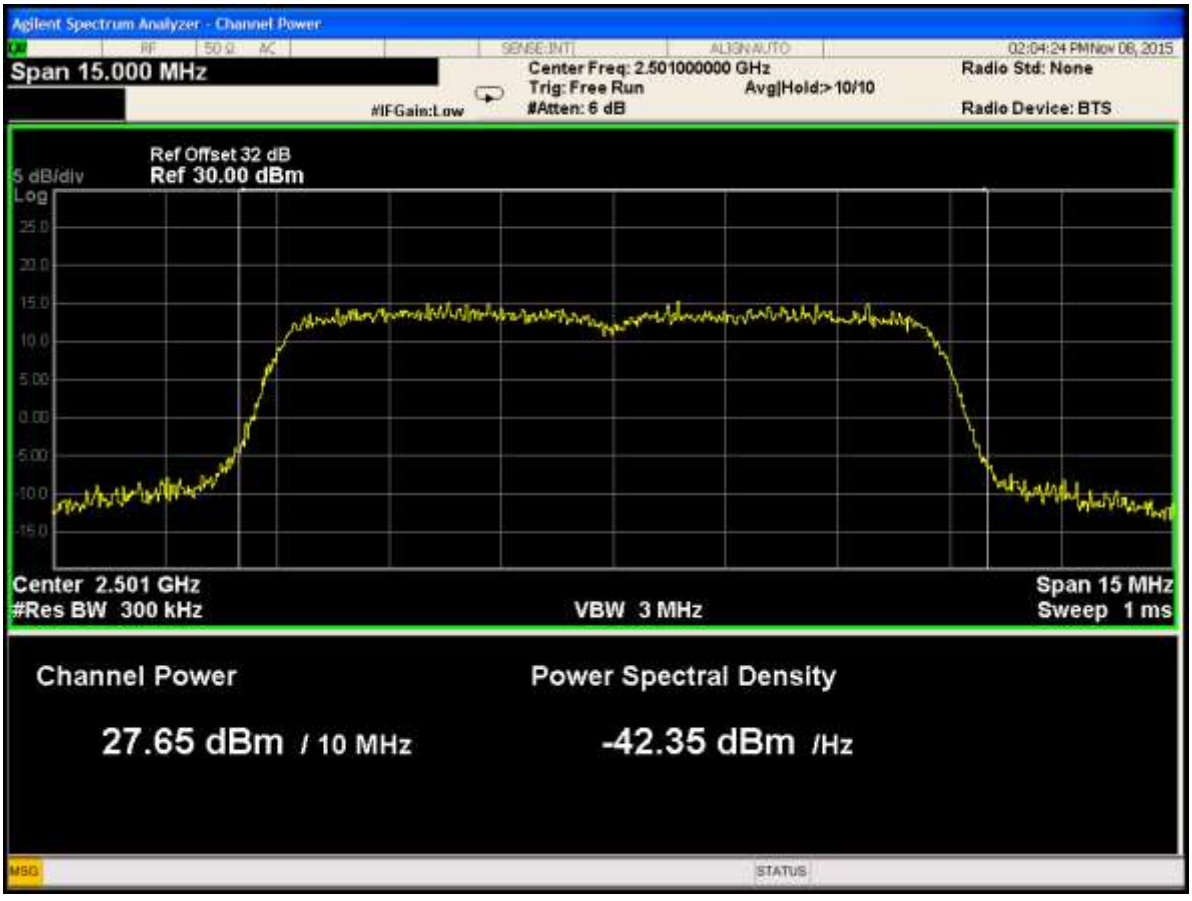
Plot Peak Output Power/ 1



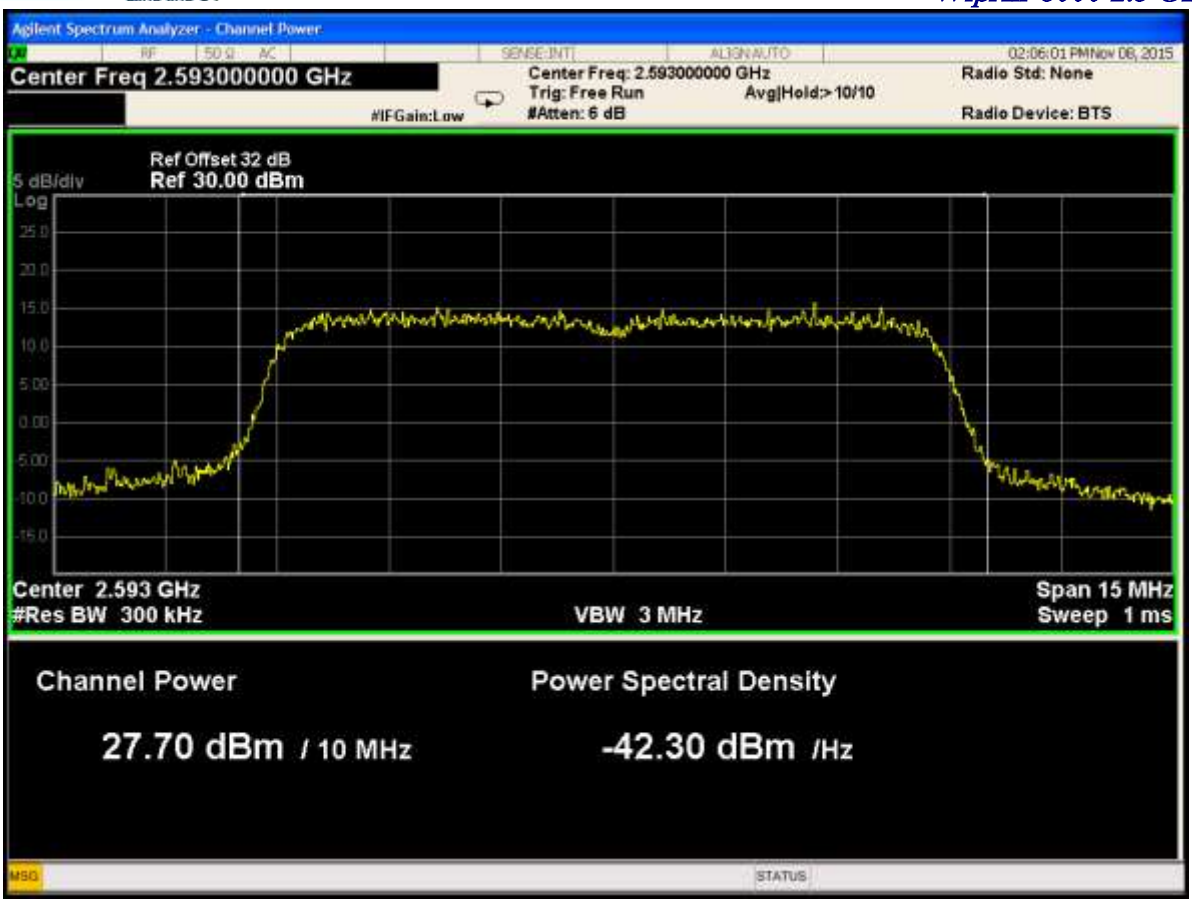
Plot Peak Output Power/ 2



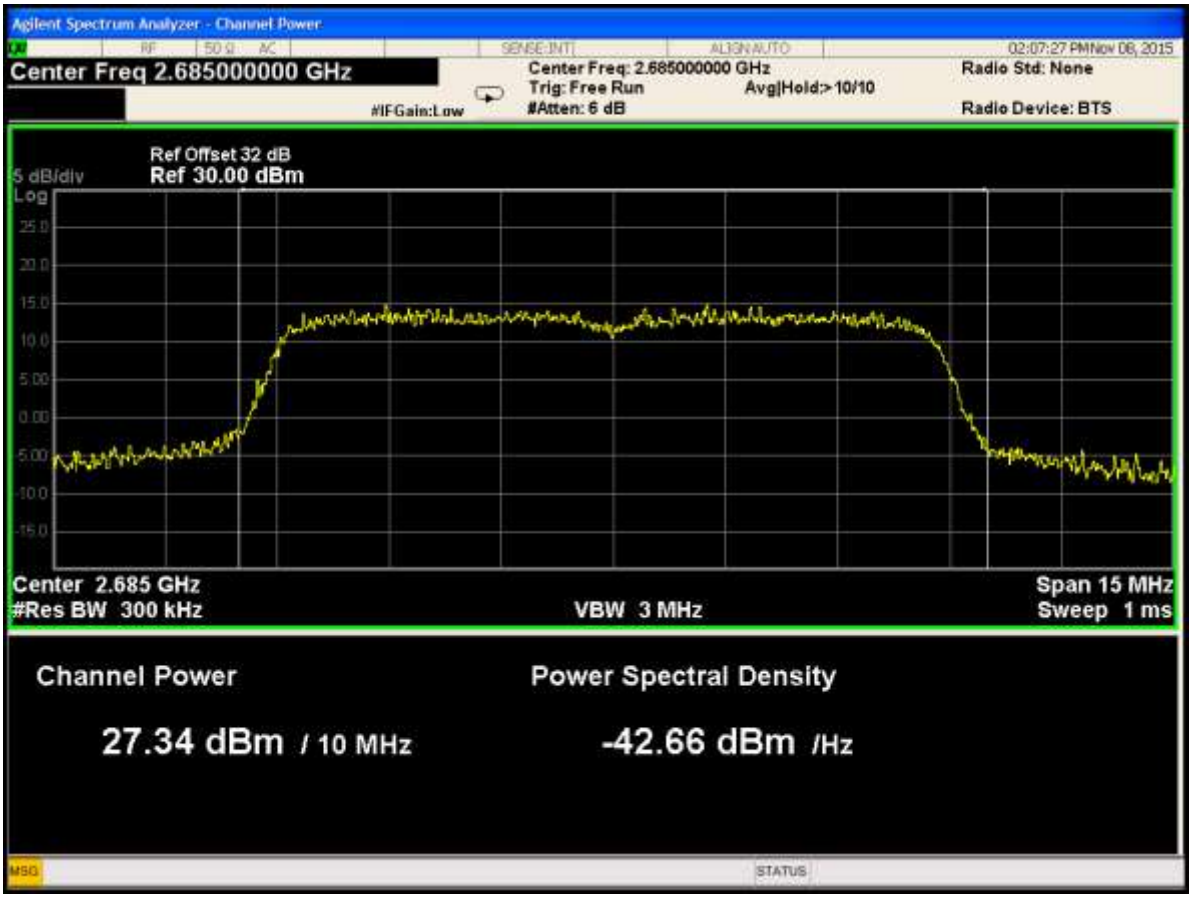
Plot Peak Output Power/ 3



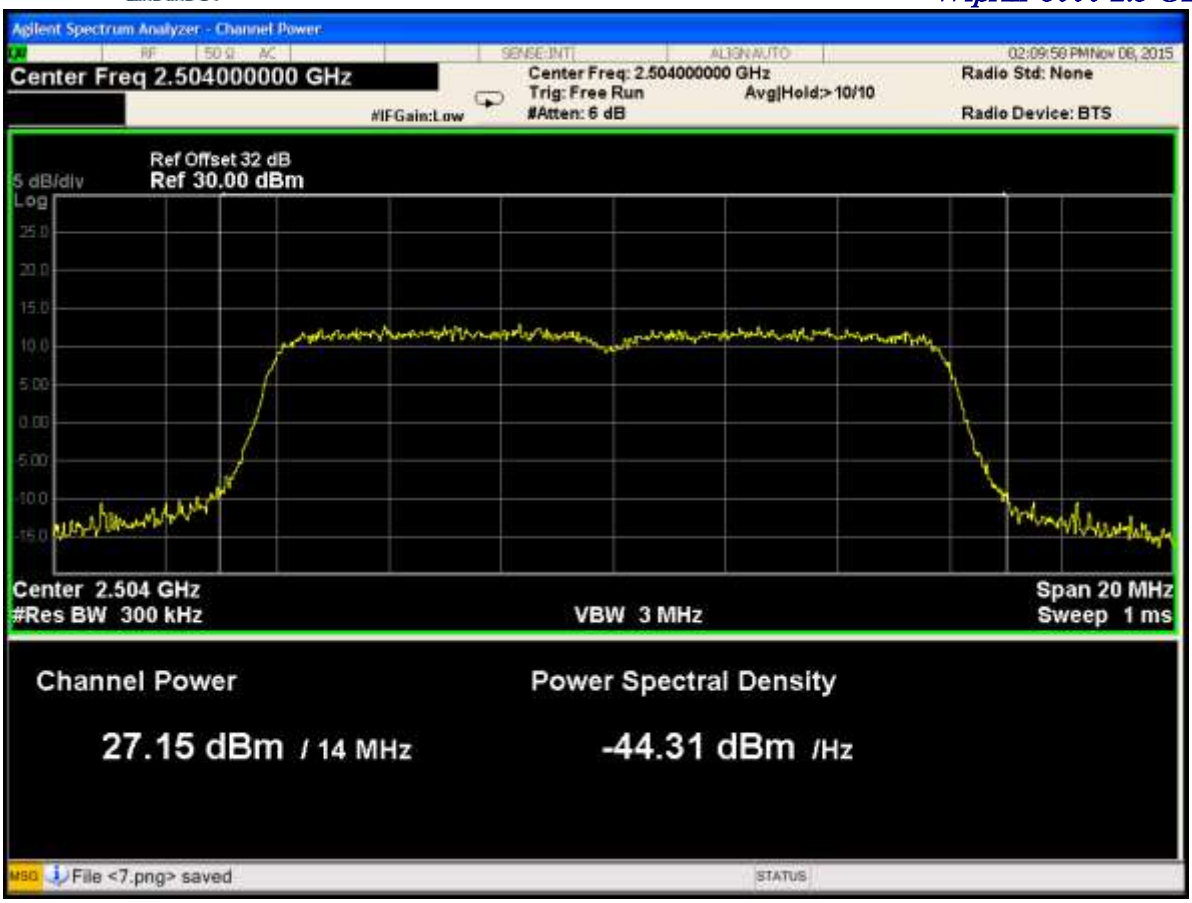
Plot Peak Output Power/ 4



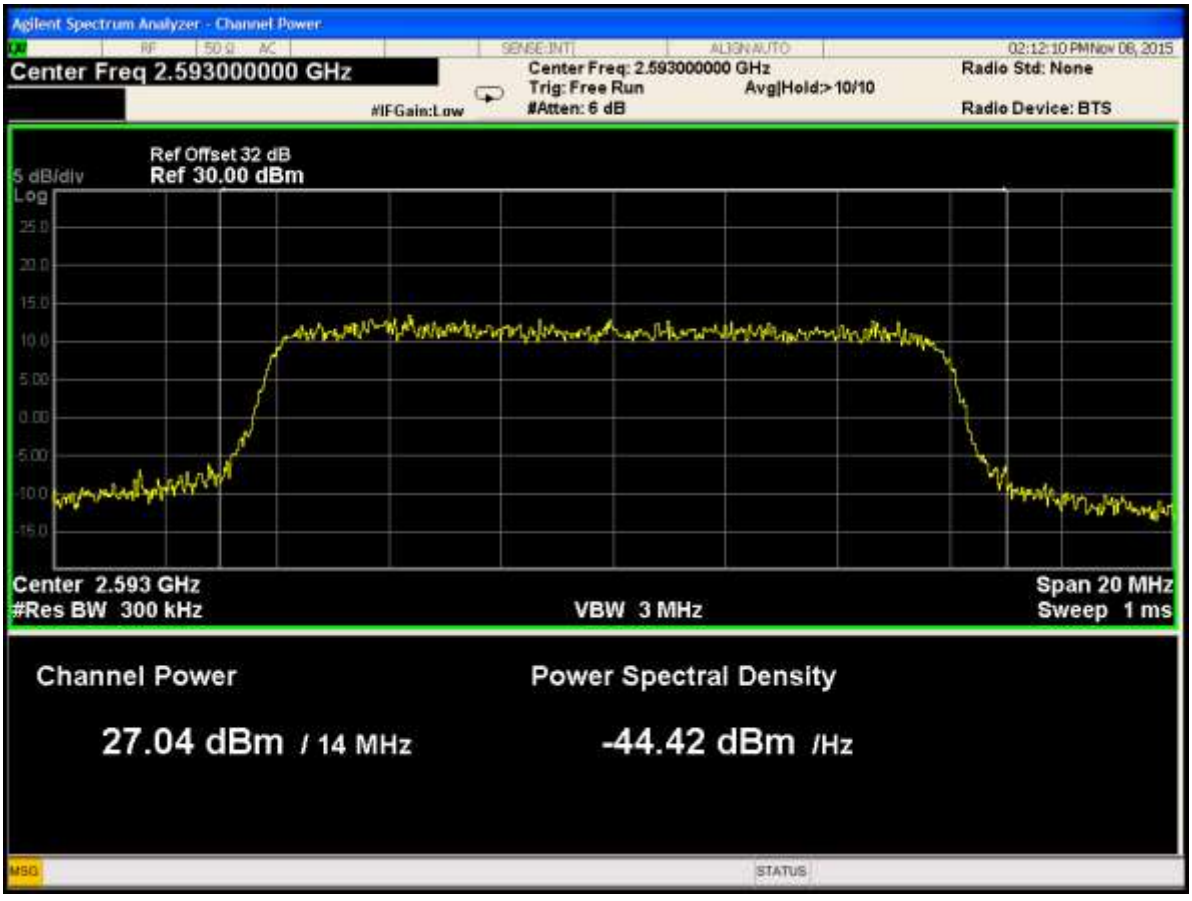
Plot Peak Output Power/ 5



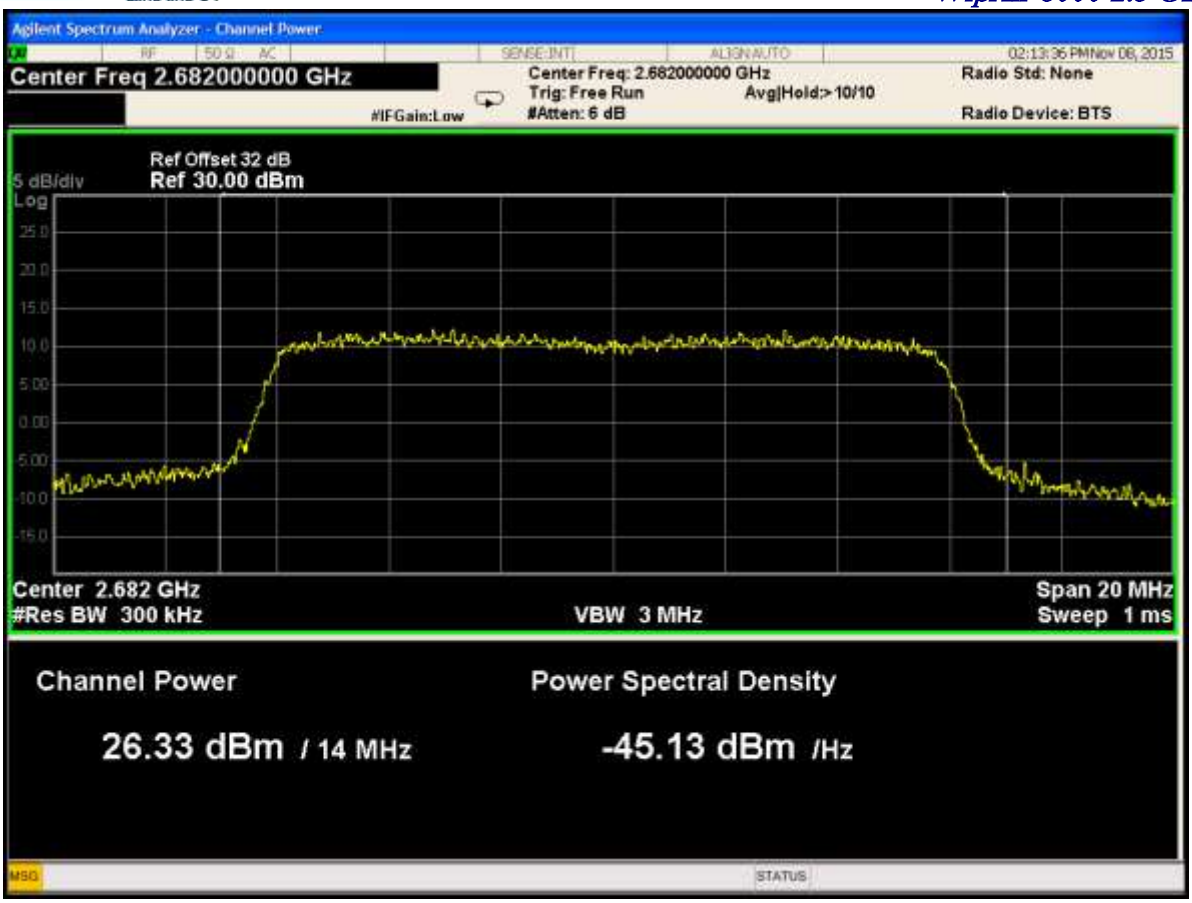
Plot Peak Output Power/ 6



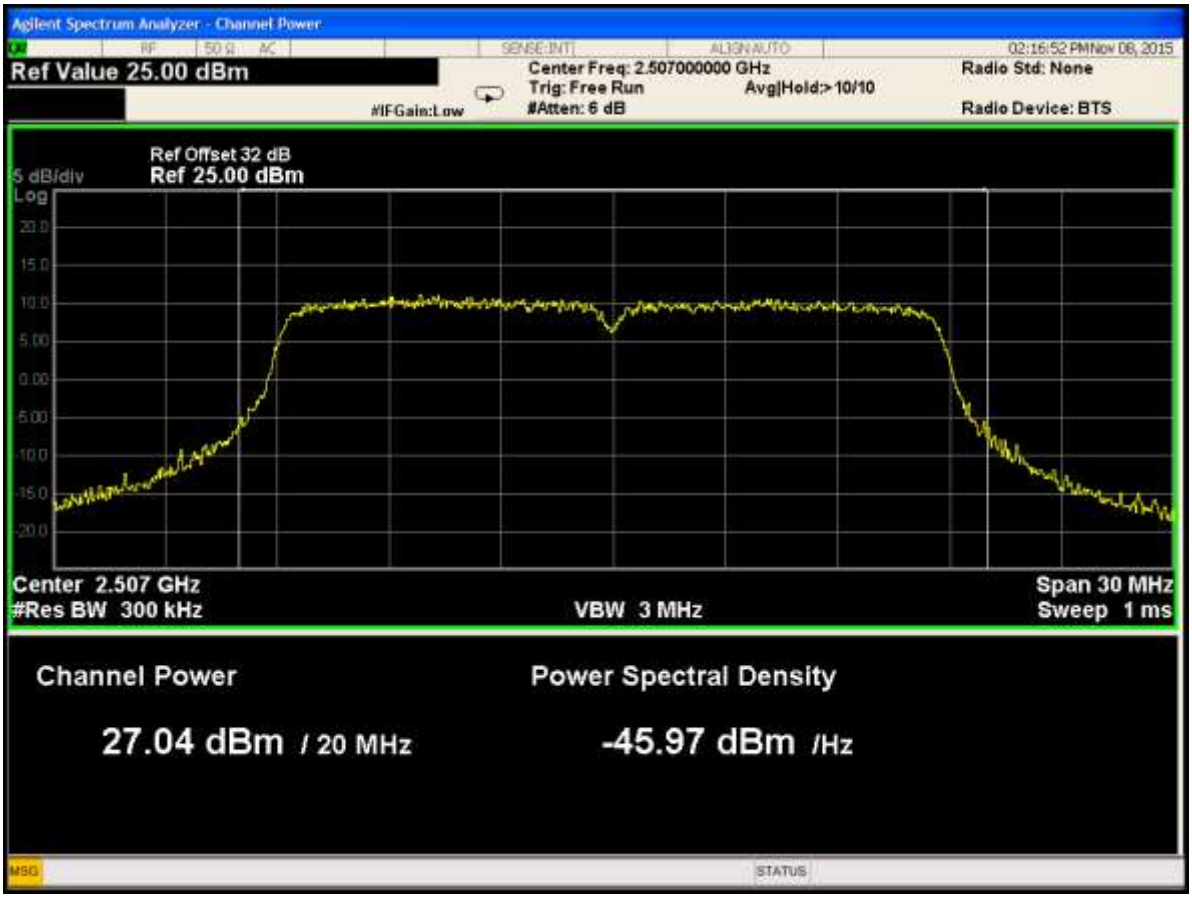
Plot Peak Output Power/ 7



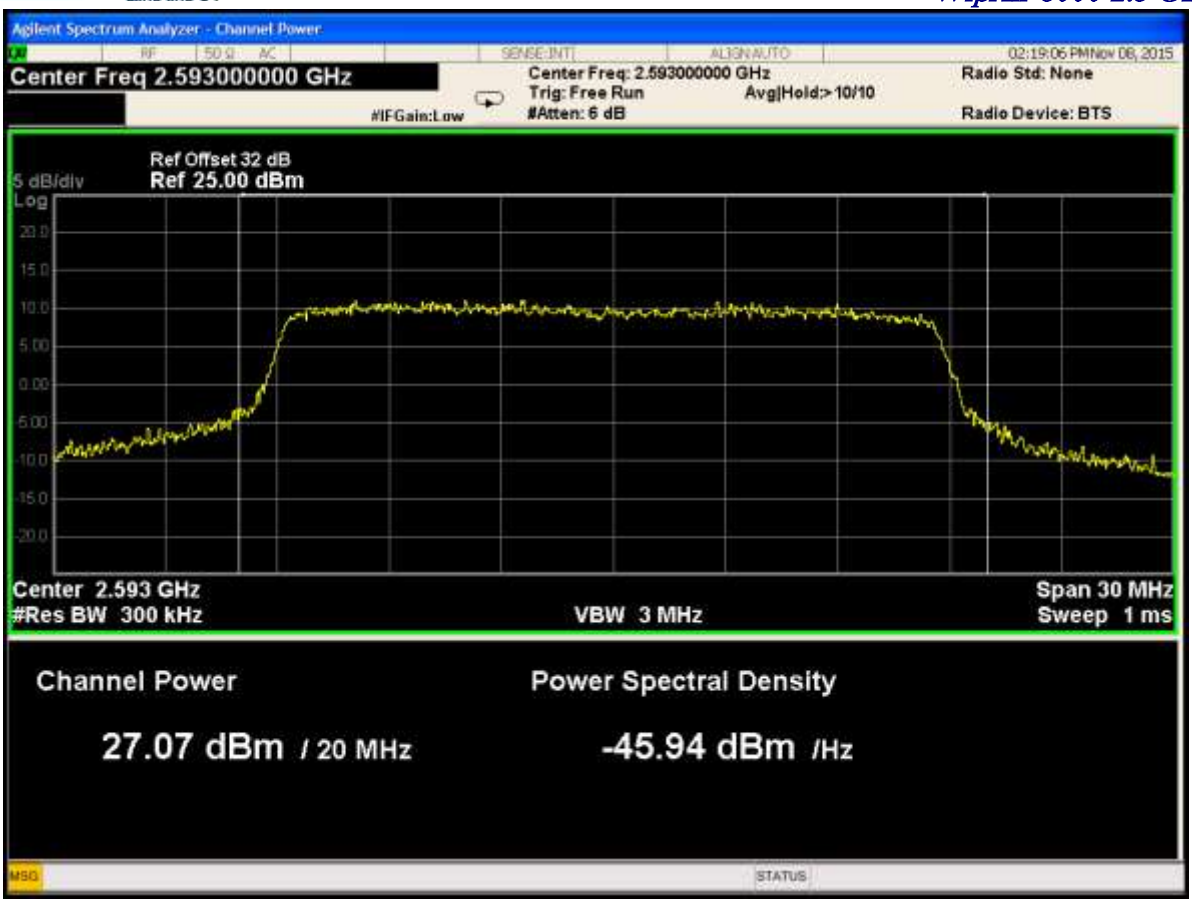
Plot Peak Output Power/ 8



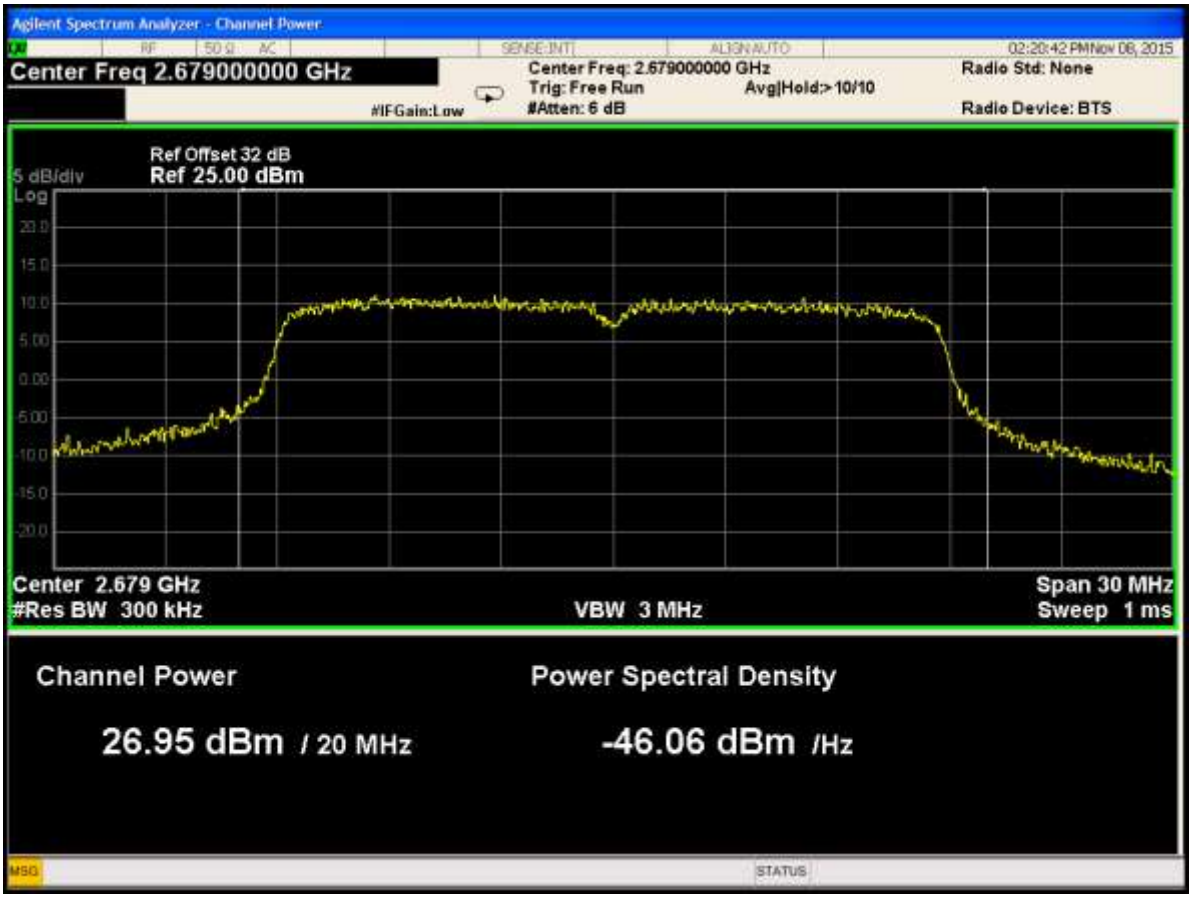
Plot Peak Output Power/ 9



Plot Peak Output Power/ 10

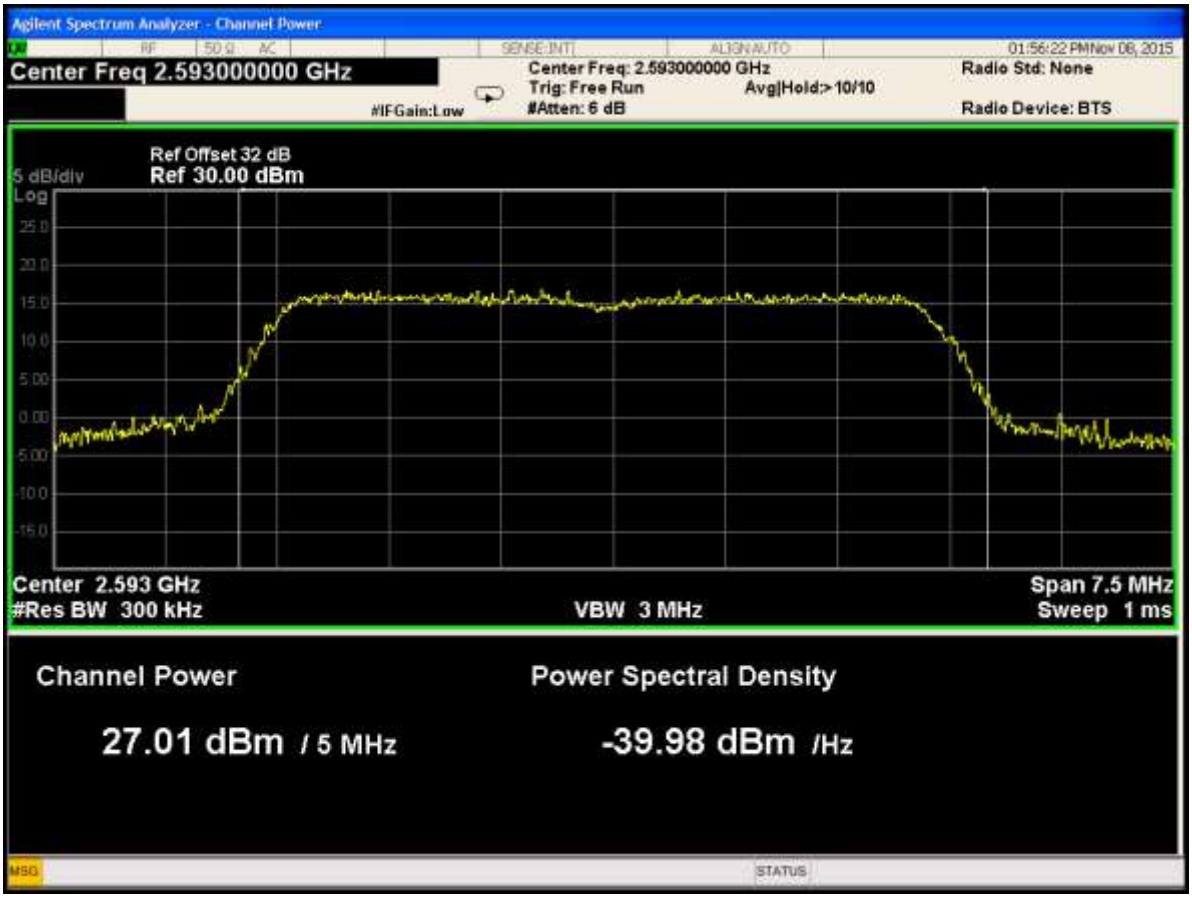


Plot Peak Output Power/ 11

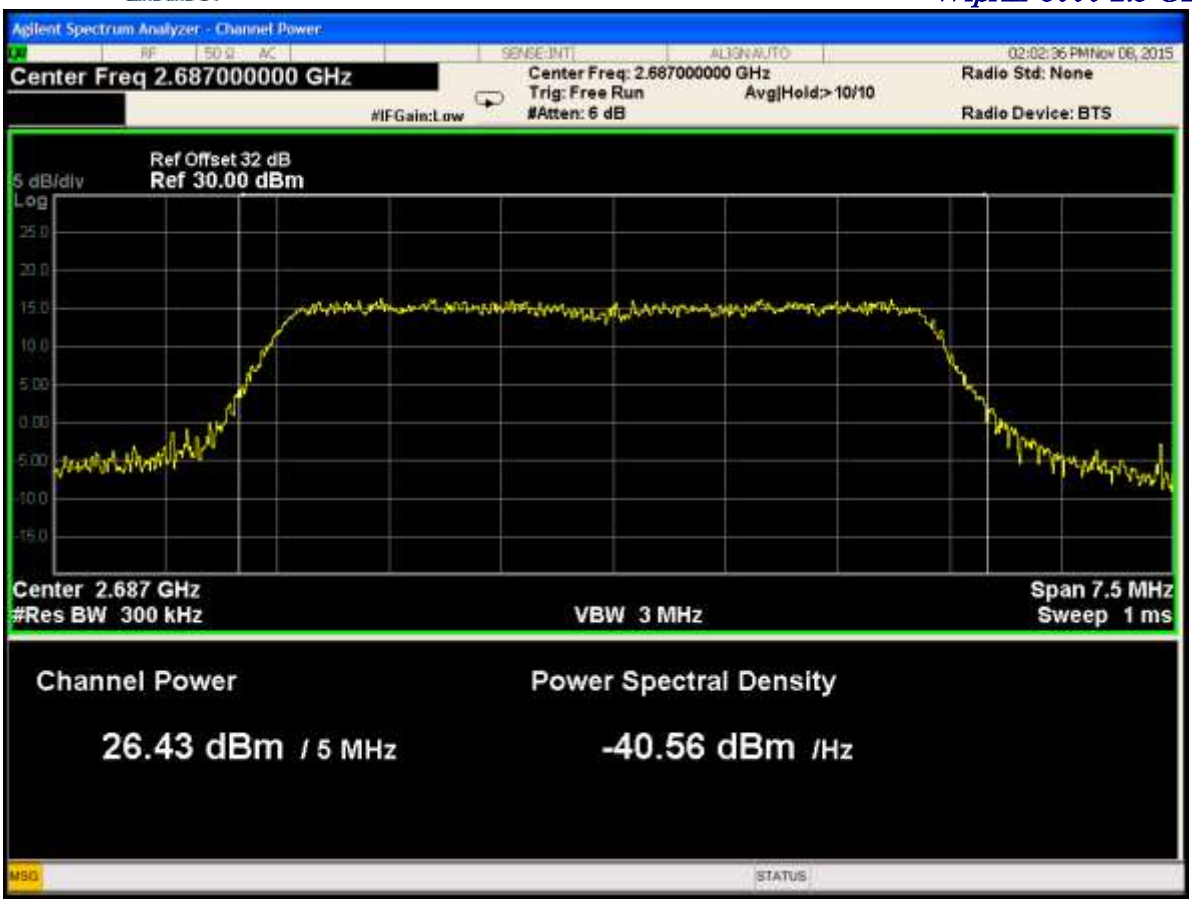


Plot Peak Output Power/ 12

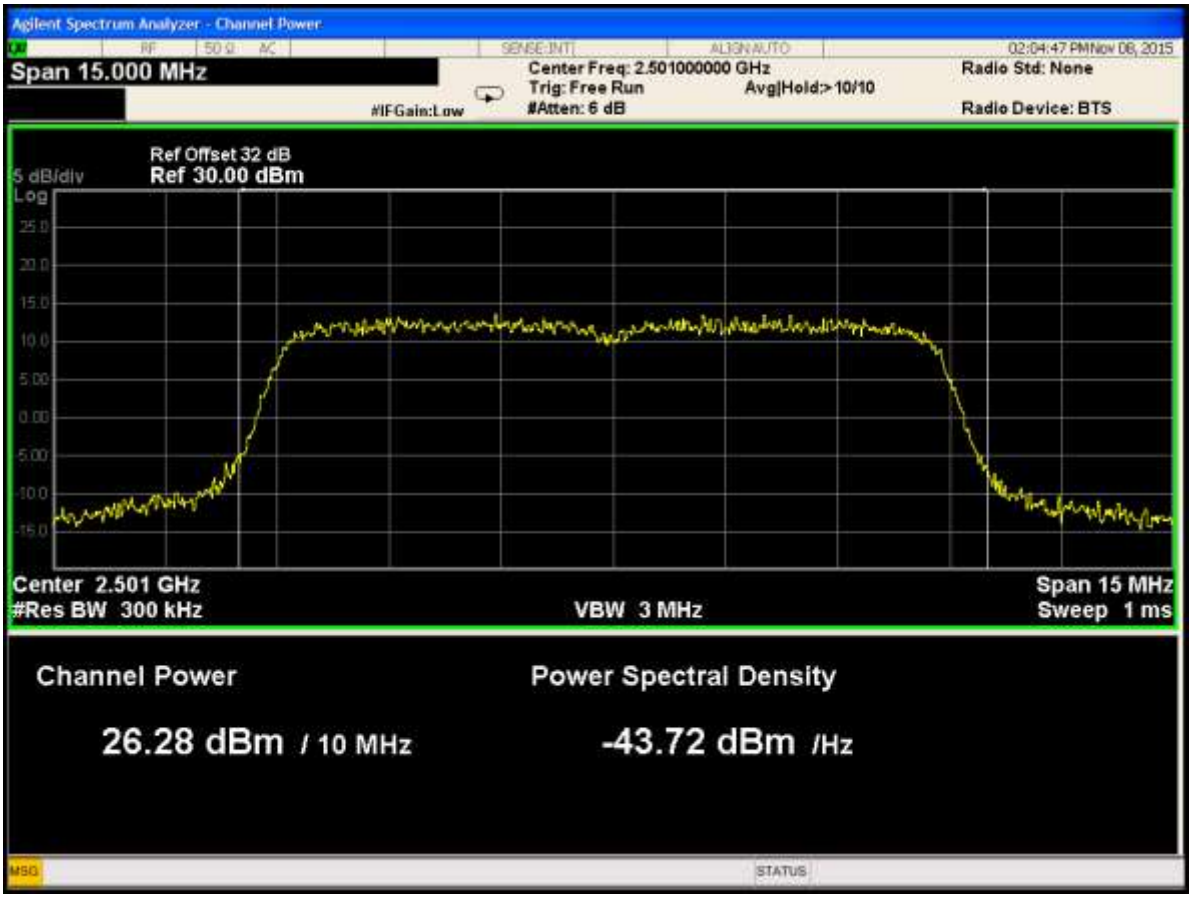
Plot Peak Output Power/ 13



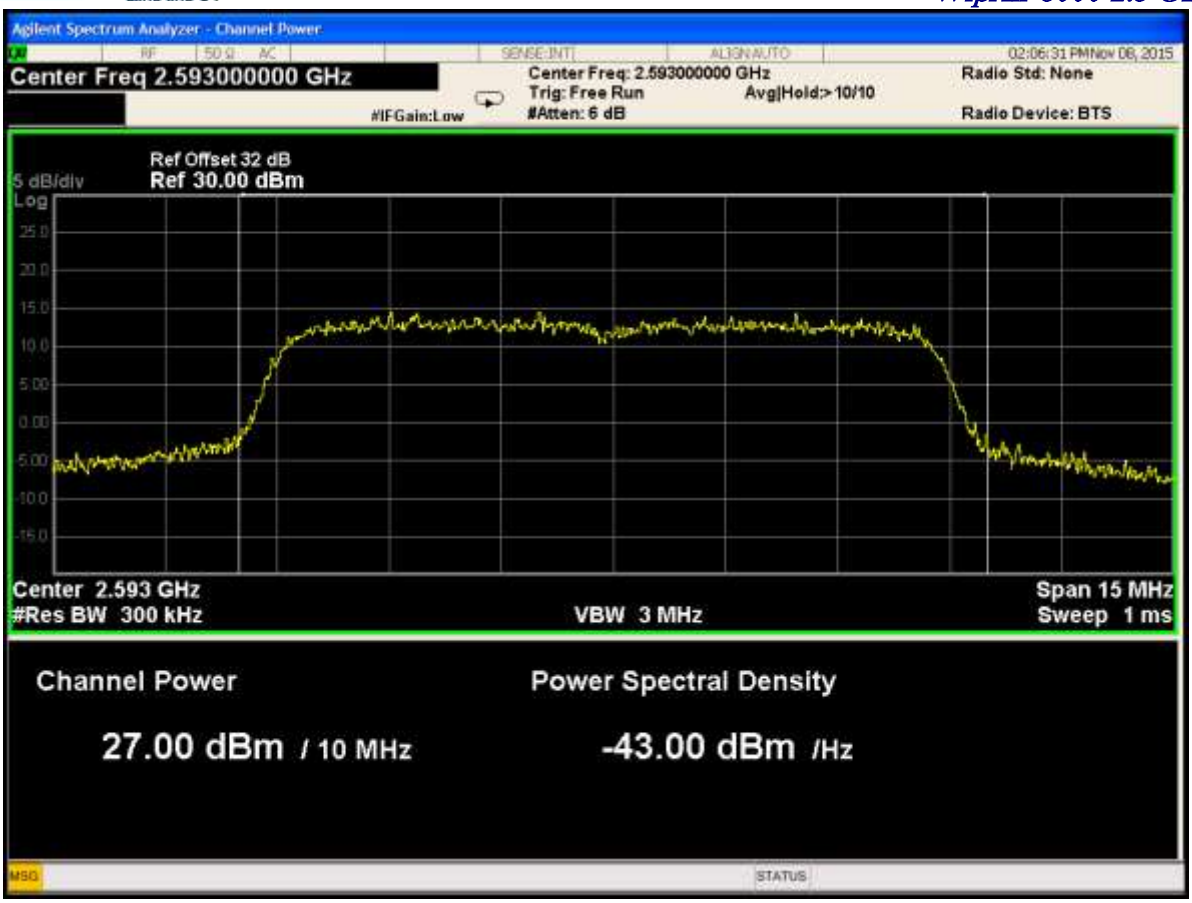
Plot Peak Output Power/ 14



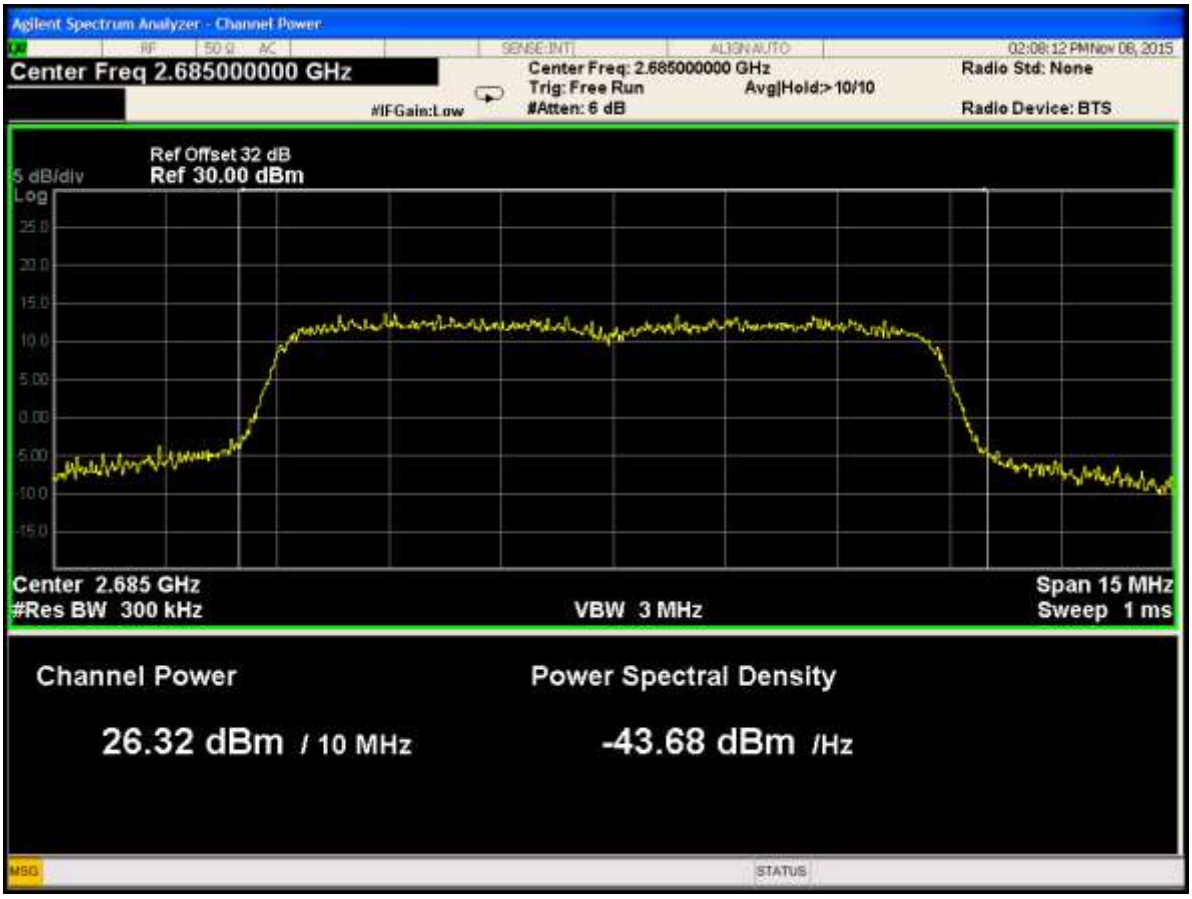
Plot Peak Output Power/ 15



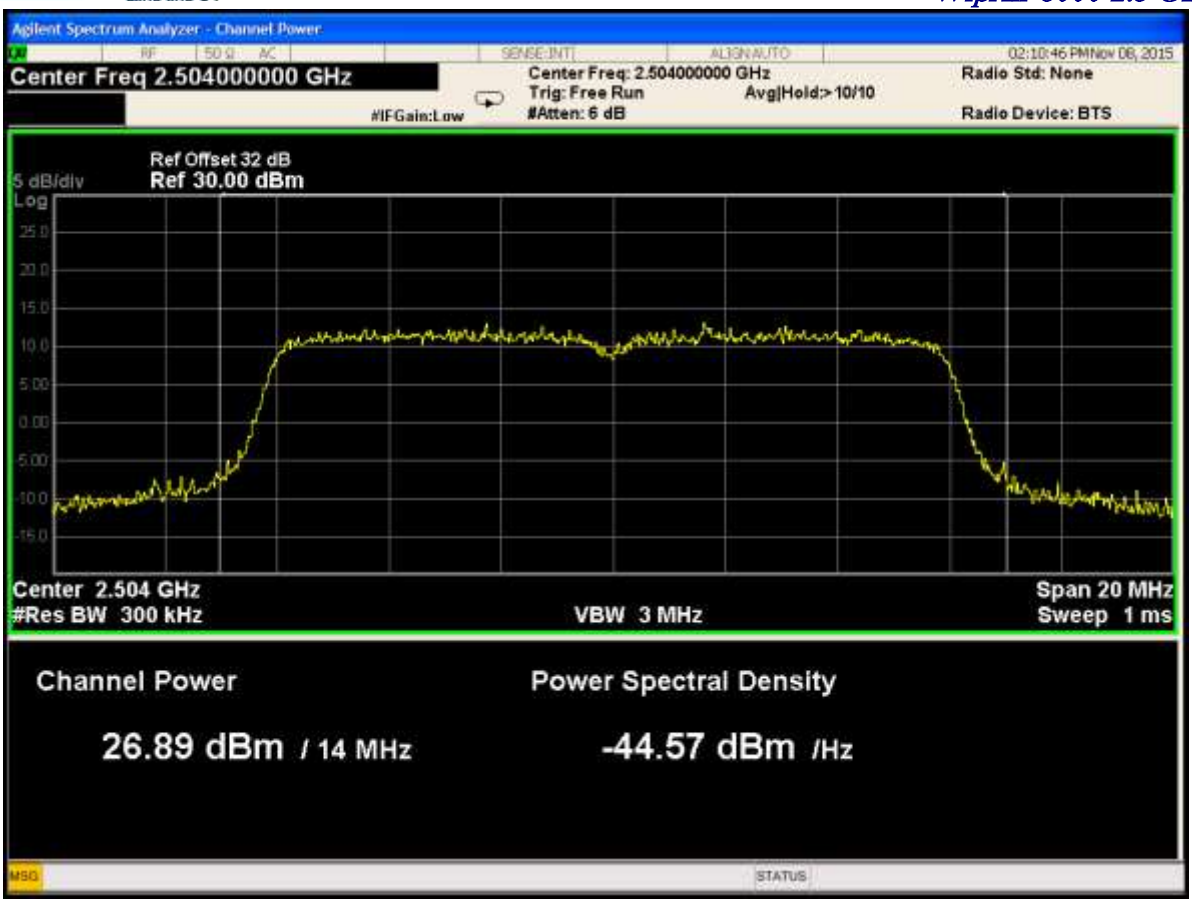
Plot Peak Output Power/ 16



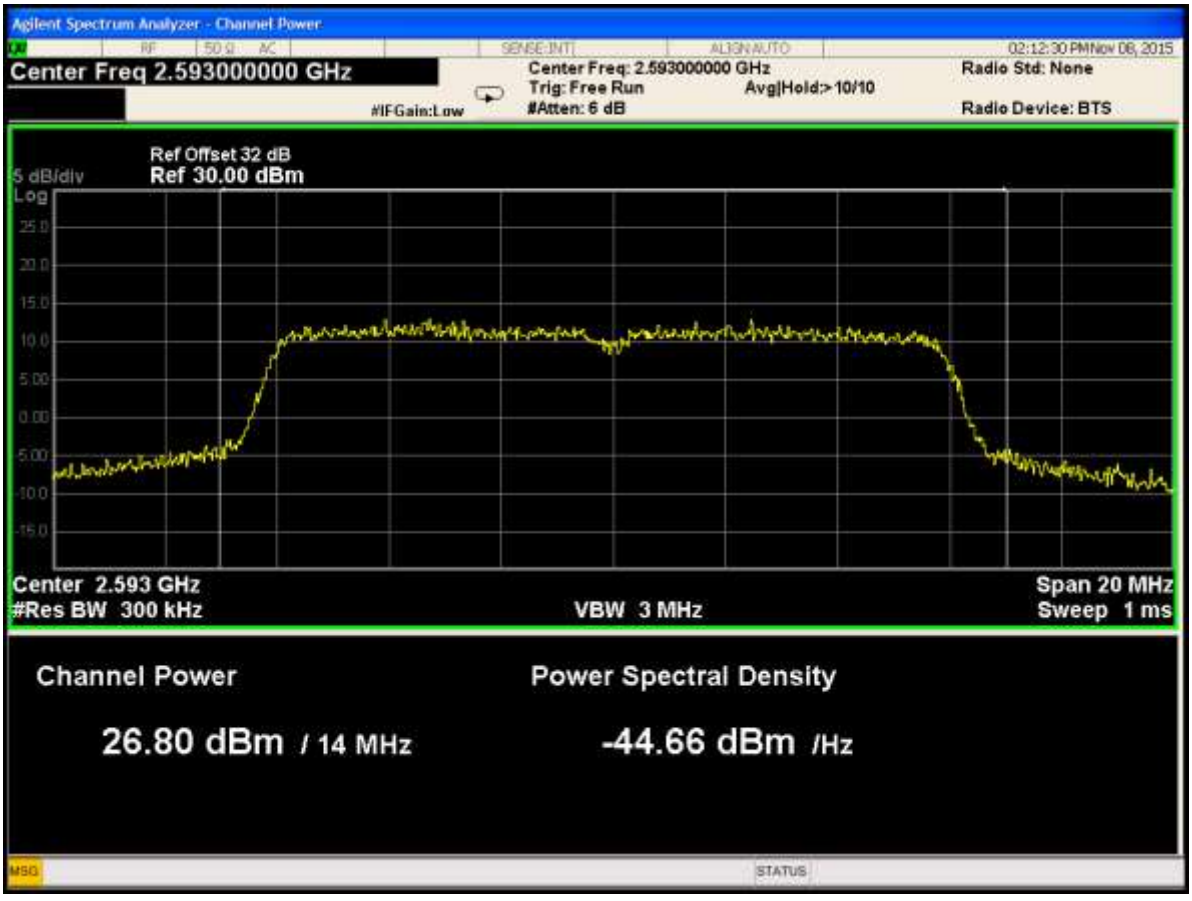
Plot Peak Output Power/ 17



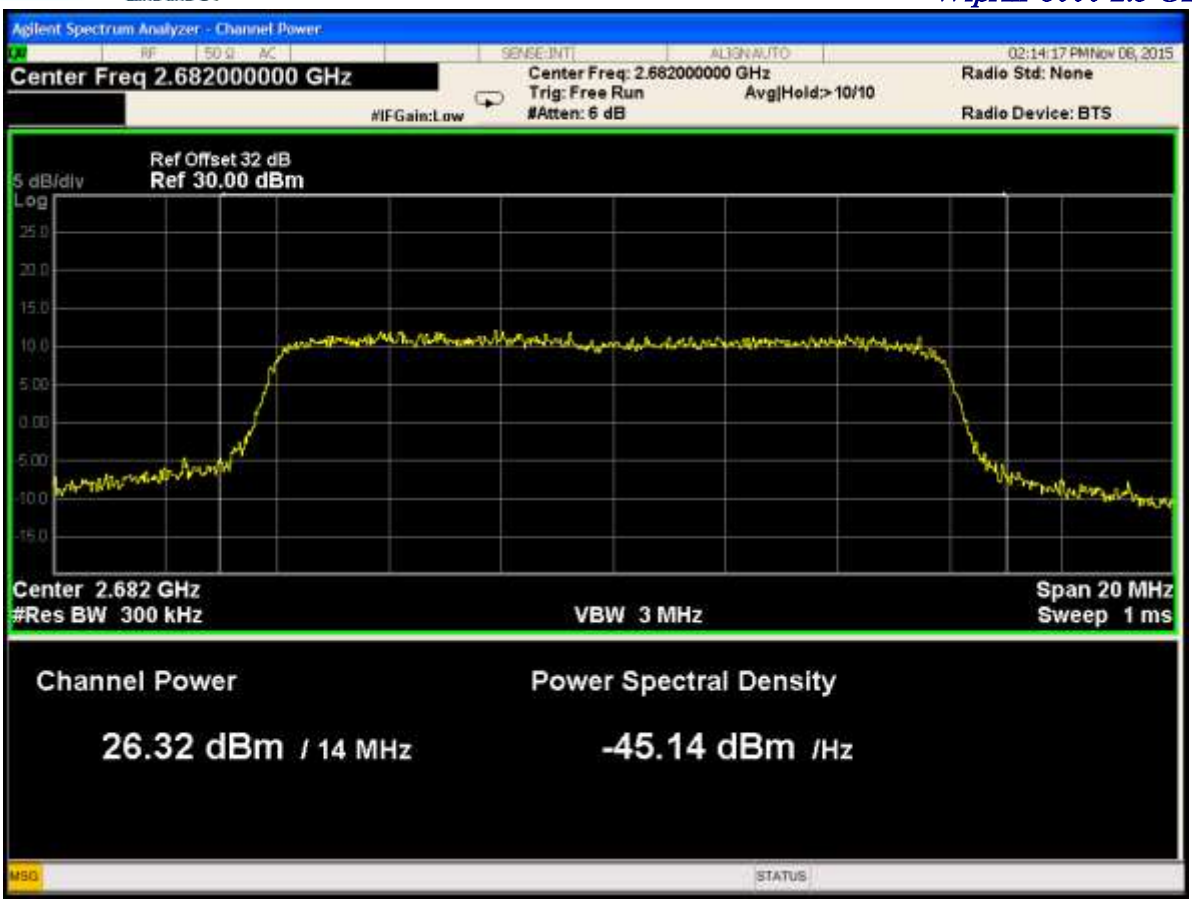
Plot Peak Output Power/ 18



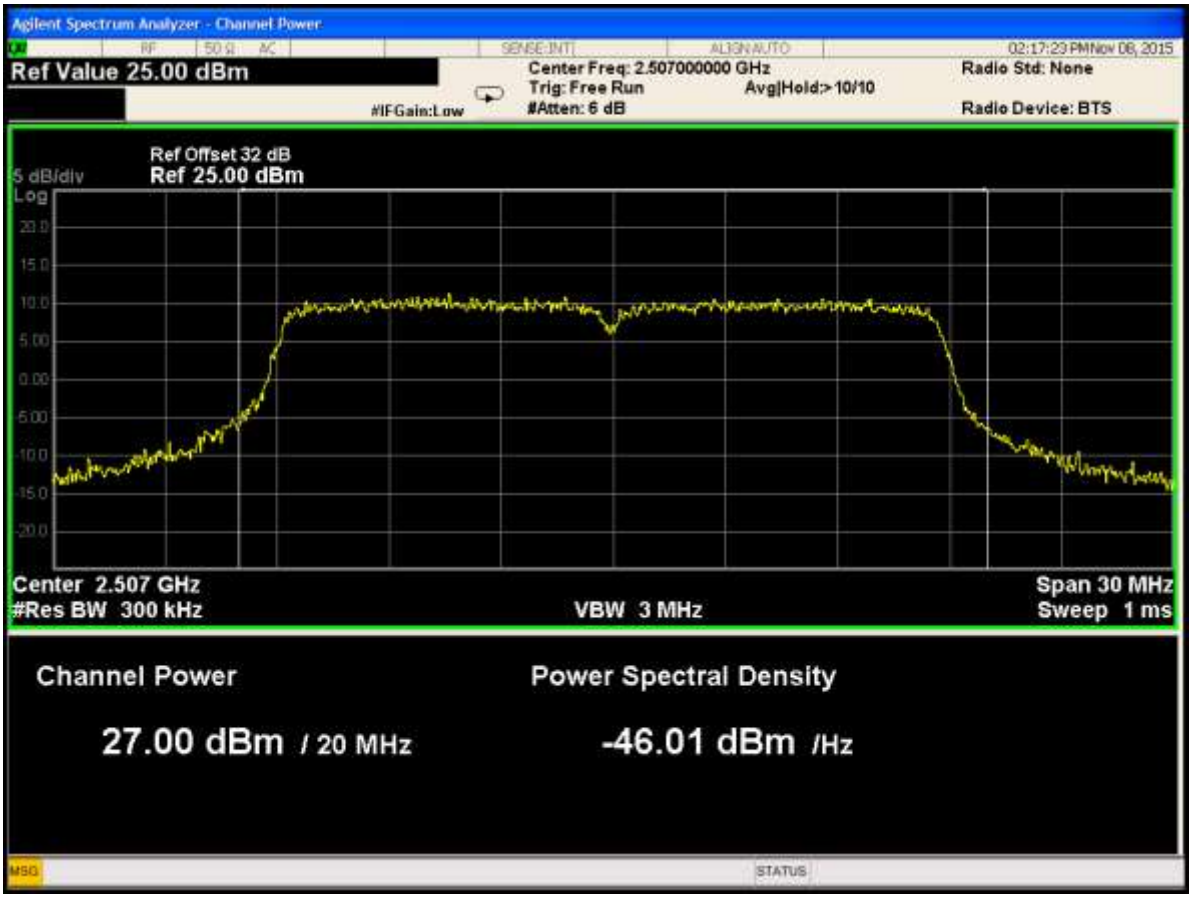
Plot Peak Output Power/ 19



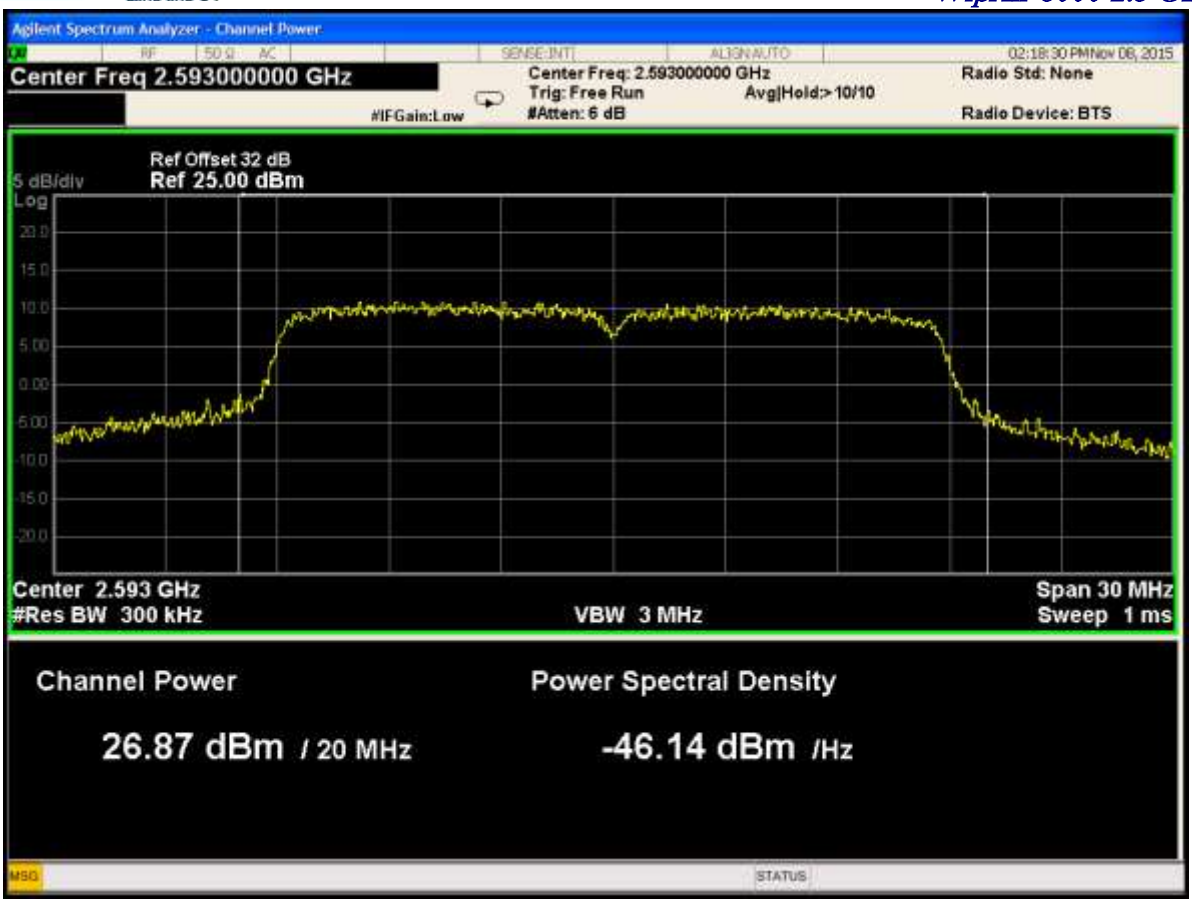
Plot Peak Output Power/ 20



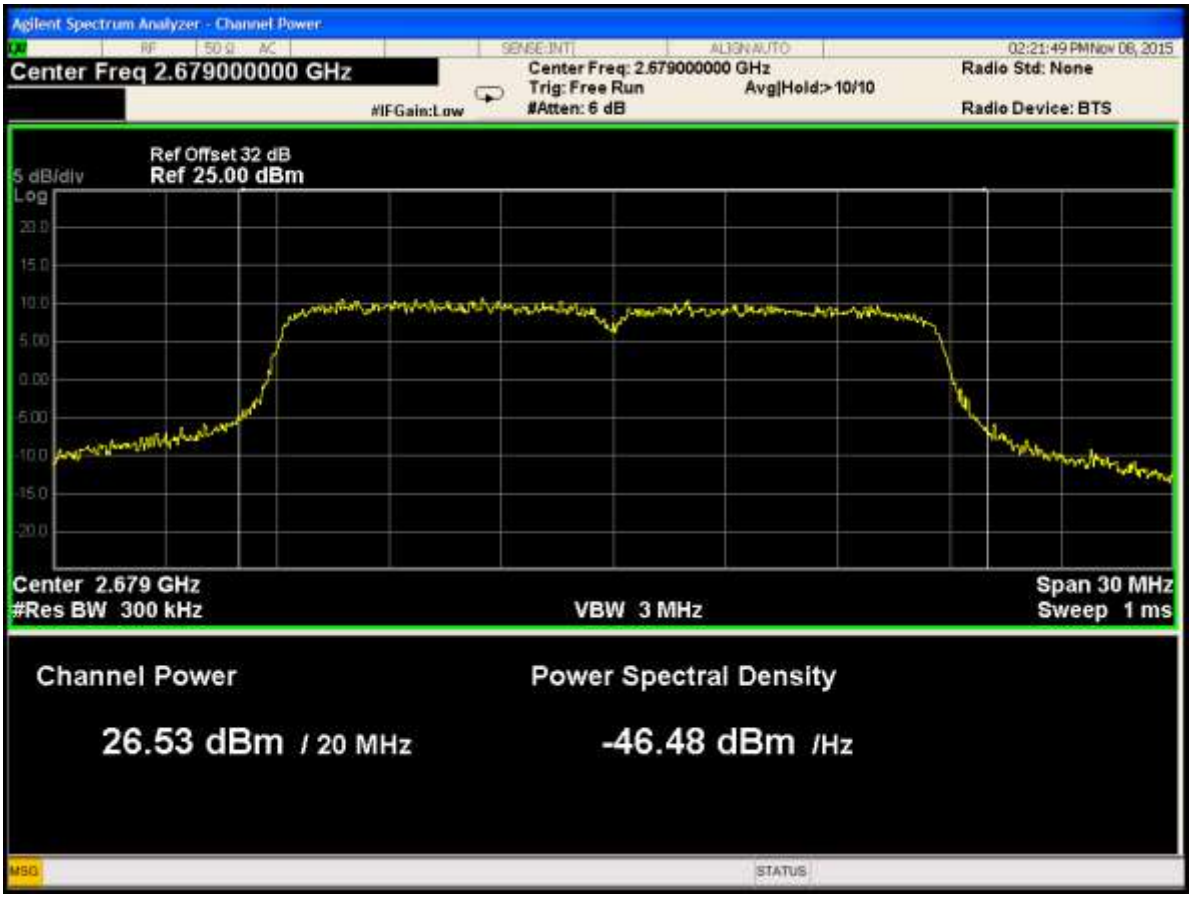
Plot Peak Output Power/ 21



Plot Peak Output Power/ 22



Plot Peak Output Power/ 23



Plot Peak Output Power/ 24

7. Band Edge

Equipment Under Test	WipAir 8000-2.5 GHz
Test Method	According to FCC §2.1051, 27.53(m)
Date	08.11.2015
Relative Humidity	40%
Ambient Temperature	25^0 C
Air Pressure	1010 hPa
Test Setup	Figure 2

Testing Engineer: I. Arbitman Date : 08.11.2015

7.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with FCC §2.1051, 27.53(m) Band Edge limits

7.2. Limits of Conducted Emission at Antenna Terminals

According to Part 27C, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

7.3. Test Instrumentation and Equipment

Table 25: Test Instrumentation and Equipment

Item	Model	P/N	Manufacturer	Next Date Calibration
Spectrum Analyzer	N9020A	20041738908	Agilent	14.09.2016
30 dB Attenuator	769-30		Narda	21.05.2016

7.4. Test Procedure

As per 47 CFR, Section 2.1051, 2.1047 and 27.53(m)

The test was performed to measure the Band Edge emission at RF antenna connector.

The EUT was set up as shown in Figure 3. The EUT was started and sufficient time for stabilization was allowed.

The emission mask was measured using the spectrum analyzer.

Measurements were done for top and bottom frequencies, for each channel BW 5, 10, 14 and 20 MHz

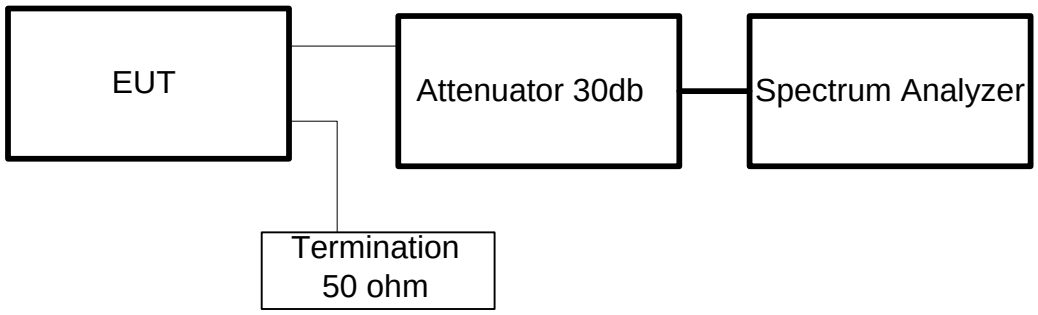


Figure 3: Test Setup for Emission Mask

7.5. Test Results for Port A

Table 26: 5 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2500	-13	*1*	Pass
High - 2687		*2*	Pass

Table 27: 10 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2501	-13	*3*	Pass
High - 2685		*4*	Pass

Table 28: 14 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2503	-13	*5*	Pass
High - 2682		*6*	Pass

Table 29: 20 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2506	-13	*7*	Pass
High - 2680		*8*	Pass

7.6. Test Results for Port B

Table 30: 5 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2500	-13	*9*	Pass
High - 2687		*10*	Pass

Table 31: 10 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2501	-13	*11*	Pass
High - 2685		*12*	Pass

Table 32: 14 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2503	-13	*13*	Pass
High - 2682		*14*	Pass

Table 33: 20 MHz BW Test Results

Frequency (MHz)	Limit (dBm)	Plot Reference	Pass/ Fail
Low - 2506	-13	*15*	Pass
High - 2680		*16*	Pass

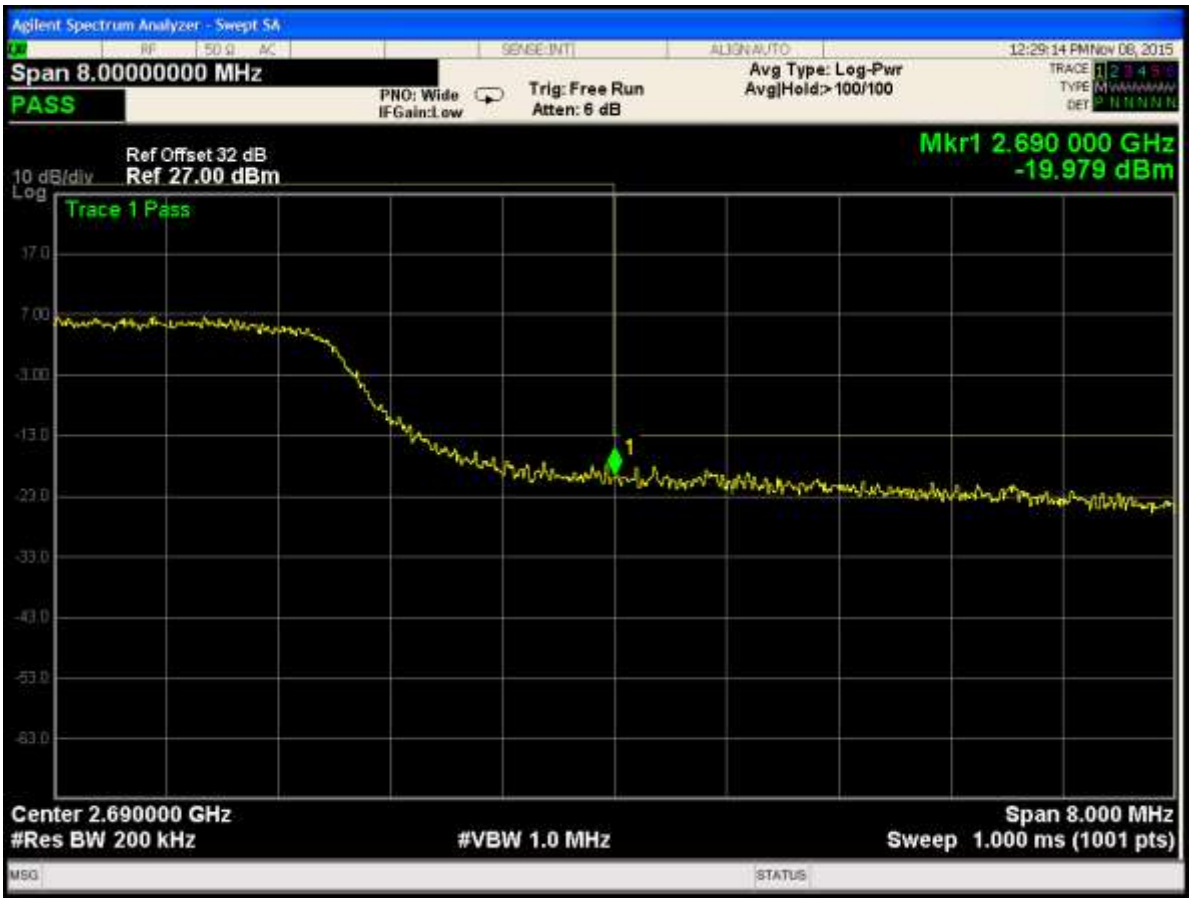
Plot Band Edge/ 1

Plot Band Edge/ 2

Plot Band Edge/ 3

Plot Band Edge/ 4

Plot Band Edge/ 5



Plot Band Edge/ 6

Plot Band Edge/ 7

Plot Band Edge/ 8

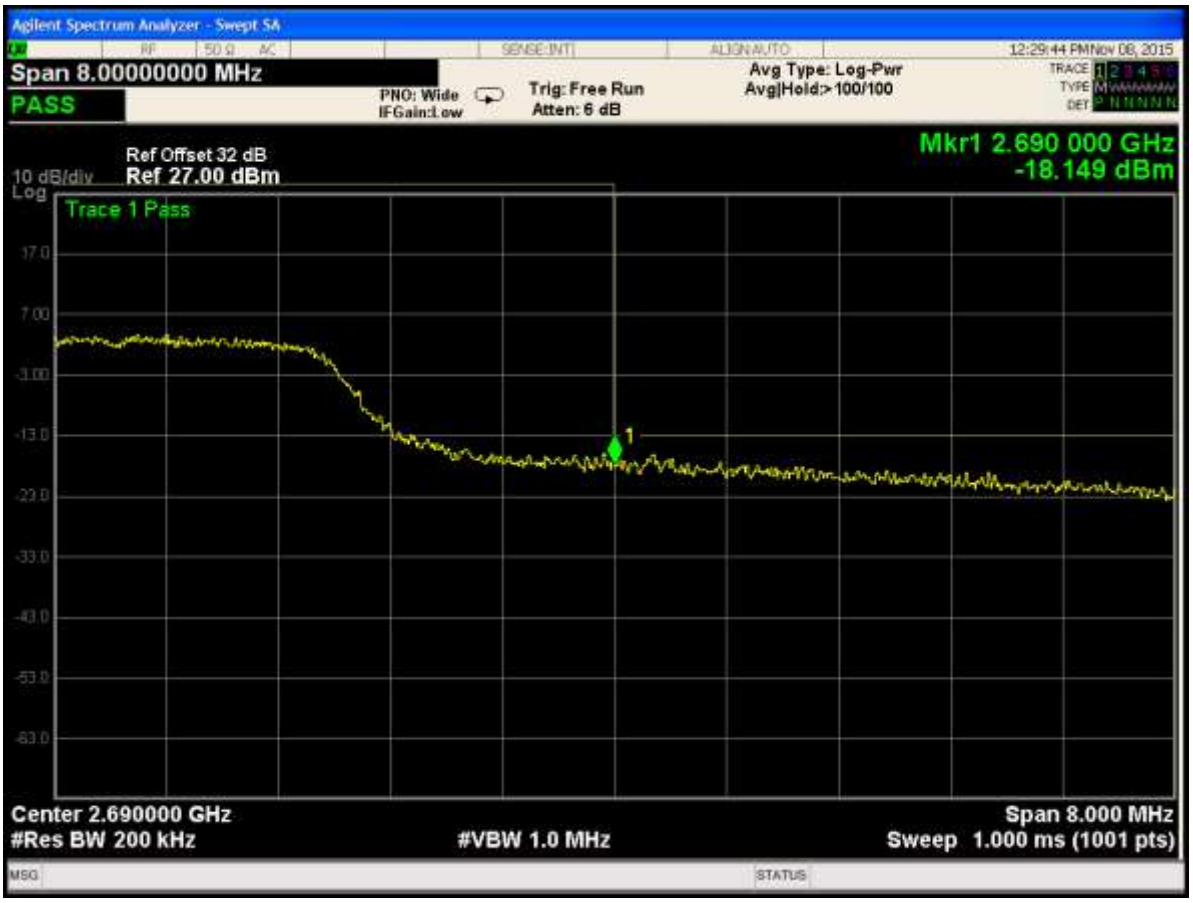
Plot Band Edge/ 9

Plot Band Edge/ 10

Plot Band Edge/ 11

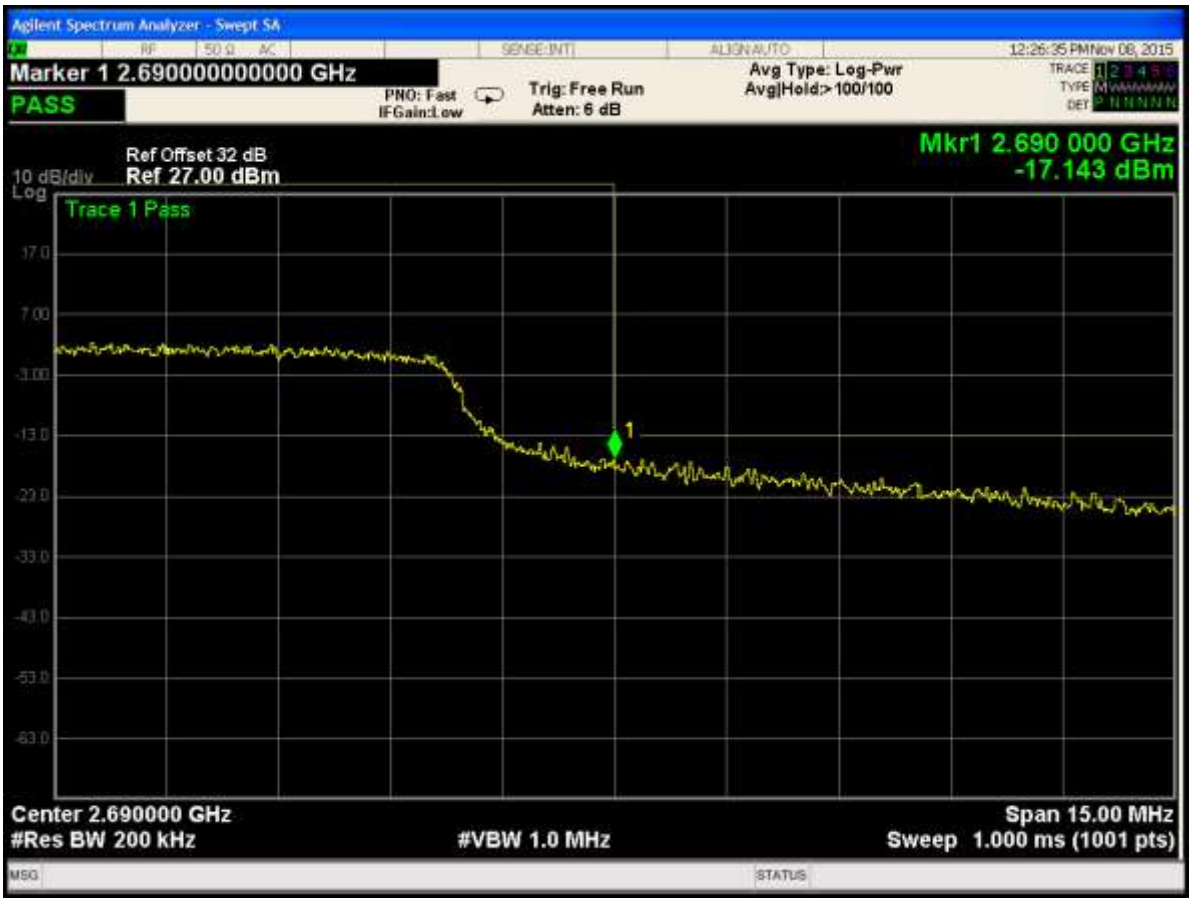
Plot Band Edge/ 12

Plot Band Edge/ 13



Plot Band Edge/ 14

Plot Band Edge/ 15



Plot Band Edge/ 16

8. CONDUCTED SPURIOUS EMISSIONS

Equipment Under Test	WipAir 8000-2.5 GHz
Test Method	According to FCC §2.1051, 27.53(m)
Date	08.11.2015
Relative Humidity	40%
Ambient Temperature	25^0 C
Air Pressure	1010 hPa
Test Setup	Figure 2

Testing Engineer: I. Arbitman Date : 08.11.2015

8.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with §2.1051, 27.53(m) Conducted Spurious Emissions limits

8.2. Limits of Conducted Emission at Antenna Terminals

According to Part 27C, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

8.3. Test Instrumentation and Equipment

Table 34: Test Instrumentation and Equipment

Item	Model	P/N	Manufacturer	Next Date Calibration
Spectrum Analyzer	N9020A	20041738908	Agilent	14.09.2016
10 dB Attenuator	355D		HP	24.05.2016
Splitter	11667A		Agilent	22.10.2016

8.4. Test Procedure

As per 47 CFR, Sections 2.1051, 27.53(m)

8.4.1. Test Procedure for Combined TX chain testing

The EUT was started and set in Tx mode. Sufficient time for stabilization was allowed.

The EUT was adjusted to produce maximum available to end user RF output power and the highest emission level within the authorized band was measured.

Measurements were done for top, middle and bottom frequencies, for worst case highest output power utilizing 5, 10, 14 & 20 MHz channel band width using Spectrum Analyzer.

The test set up is shown in Figure 4 below.

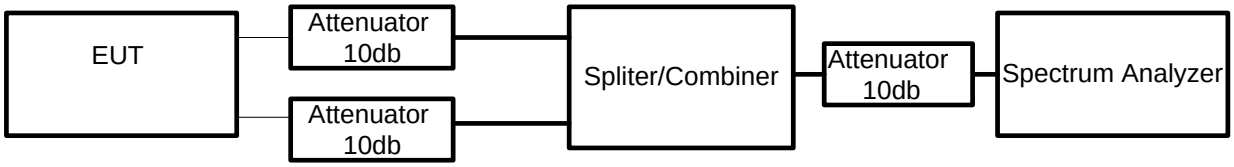


Figure 4: Test Setup for Spurious Emission Test – Combined TX Chains Measurements

Table 35: Test Results for Combined TX Chain 5MHz

Frequency Range (MHz)	Frequency (MHz)	Limit	Highest Spurious Emission (dBm)	Plot Reference	Pass/ Fail
30 – 26,500	Low - 2500	*-13dBm*	*N/A*	*1*	Pass
	Mid - 2593		*N/A*	*2*	Pass
	High - 2687		*N/A*	*3*	Pass

Table 36: Test Results for Combined TX Chain 10MHz

Frequency Range (MHz)	Frequency (MHz)	Limit	Highest Spurious Emission (dBm)	Plot Reference	Pass/ Fail
0.15 – 26,500	Low - 2501	*-13dBm*	*N/A*	*4*	Pass
	Mid - 2593		*N/A*	*5*	Pass
	High - 2685		*N/A*	*6*	Pass

Table 37: Test Results for Combined TX Chain 14MHz

Frequency Range (MHz)	Frequency (MHz)	Limit	Highest Spurious Emission (dBm)	Plot Reference	Pass/ Fail
0.15 – 26,500	Low - 2503	*-13dBm*	*N/A*	*7*	Pass
	Mid - 2593		*N/A*	*8*	Pass
	High - 2682		*N/A*	*9*	Pass

Table 38: Test Results for Combined TX Chain 20MHz

Frequency Range (MHz)	Frequency (MHz)	Limit	Highest Spurious Emission (dBm)	Plot Reference	Pass/ Fail
0.15 – 26,500	Low - 2506	*-13dBm*	*N/A*	*10*	Pass
	Mid - 2593		*N/A*	*11*	Pass
	High - 2680		*N/A*	*12*	Pass

Plot Conducted Spurious Emissions/ 1

Plot Conducted Spurious Emissions/ 2

Plot Conducted Spurious Emissions/ 3

Plot Conducted Spurious Emissions/ 4

Plot Conducted Spurious Emissions/ 5

Plot Conducted Spurious Emissions/ 6

Plot Conducted Spurious Emissions/ 7

Plot Conducted Spurious Emissions/ 8

Plot Conducted Spurious Emissions/ 9

Plot Conducted Spurious Emissions/ 10

Plot Conducted Spurious Emissions/ 11

Plot Conducted Spurious Emissions/ 12

9. RADIATED EMISSION

Equipment Under Test	WipAir 8000-2.5 GHz
Test Method	According to FCC § 2.1053, 27.53(m)
Date	10.11.2015
Relative Humidity	40%
Ambient Temperature	25^0 C
Air Pressure	1010 hPa
Test Setup	Figure 1

Testing Engineer: I. Arbitman  **Date** 10.11.2015

9.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with 27.53 (m) for Radiated Emission requirements.

No spurious or harmonic emissions found 40dBc below limits. No substitution was required.

9.2. Limits of Radiated Interference Field Strength according 27.53 (m)

43 + 10 log (P) dBc, equates to -13.0dBm.

Table 39: Limits For 27.53

Frequency MHz	Attenuation below Carrier dBc	ERP of Spurious, dBm*	Equivalent Field Strength Limit @ 3m dB (µV/m)**
0.009 – 10^{th} harmony	43 + 10 log (P)	-13	82.23

43 + 10 log (P) dBc, equates to -13.0dBm

**: Equivalent field strength limit was calculated from the maximum allowed ERP of spurious as follows:
E = sqrt (30*P*1.64) /r, where P is ERP in Watts; 1.64 is the numeric gain of ideal dipole antenna and r is distance in meters to EUT.

9.3. Test Instrumentation and Equipment

Table 40: Test Instrumentation and Equipment

Item	Model	P/N	Manufacturer	Next Date Calibration
Spectrum Analyzer	N9020A	20041738908	Agilent	14.09.2016
Broadband Antenna	BTA-L		Frankonia	05.01.2017
Guide Antenna (1-40 GHz)				
Double Ridge Guide Antenna(18-40GHz)	DRG-1840/A	20043114501	ARA	21.07.2016
Low Noise Amplifier (0-1GHz)	AM-1300-N	20042213104	MITEQ	25.08.2016
Low Noise Amplifier (1-18 GHz)	PE 2-38-218-3R5	20042214702	Planer	25.08.2016
Low Noise Amplifier (10 k – 1 GHz)	AM-1300-N	20042213104	MITEQ	
Low Noise Amplifier (18-26GHz)	PTB-33-18G-26G	20042214102	Planar	25.08.2016
Signal Generator	NSS183A	20041156615	Agilent	18.09.2016
Substitution antenna	DRG-118/A	20043115807	ARA	05.09.2017

9.4. Test Procedure

As per 47 CFR, Sections 2.1053 and 27.53 (g);

The radiated emissions measurements were on the 3m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The maximum radiated emission was recorded. No spurious or harmonic emissions found 40dBs below limits. No substitution was required.

9.5. Radiated Test Setup

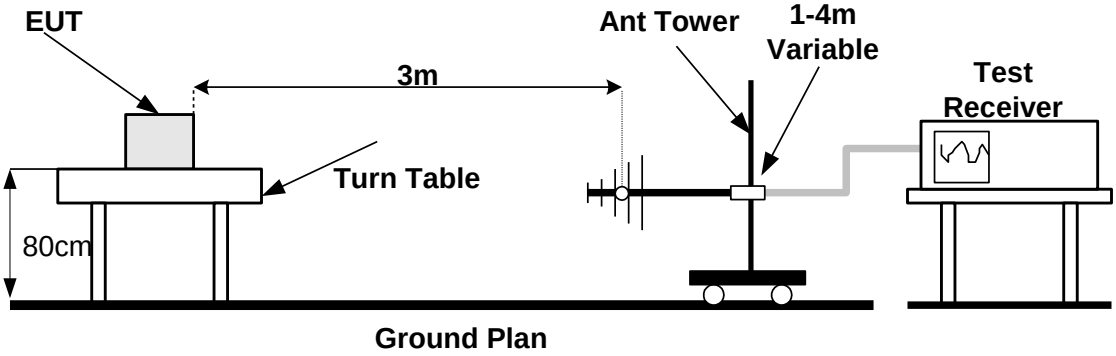


Figure 4: Radiated Emission Test Configuration

9.6. Test Results

9.6.1. 30 MHz-1 GHz

Table 41: 5 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2500	Horizontal & Vertical	120	*1*	Pass
Middle - 2593			*2*	Pass
High - 2687			*3*	Pass

- 50 Ohm termination for both RF ports

Table 42: 10 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2501	Horizontal & Vertical	120	*4*	Pass
Middle - 2593			*5*	Pass
High - 2685			*6*	Pass

- 50 Ohm termination for both RF ports

Table 43: 14 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2504	Horizontal & Vertical	120	*7*	Pass
Middle - 2593			*8*	Pass
High - 2682			*9*	Pass

- 50 Ohm termination for both RF ports

Table 44: 20 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2507	Horizontal & Vertical	120	*10*	Pass
Middle - 2593			*11*	Pass
High - 2679			*12*	Pass

- 50 Ohm termination for both RF ports

9.6.2. 1-18 GHz

Table 45: 5 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2500	Horizontal & Vertical	1000	*13*	Pass
Middle - 2593			*14*	Pass
High - 2687			*15*	Pass

- 50 Ohm termination for both RF ports

Table 46: 10 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2501	Horizontal & Vertical	1000	*16*	Pass
Middle - 2593			*17*	Pass
High - 2685			*18*	Pass

- 50 Ohm termination for both RF ports

Table 47: 14 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2504	Horizontal & Vertical	1000	*19*	Pass
Middle - 2593			*20*	Pass
High - 2682			*21*	Pass

- 50 Ohm termination for both RF ports

Table 48: 20 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2507	Horizontal & Vertical	1000	*22*	Pass
Middle - 2593			*23*	Pass
High - 2679			*24*	Pass

- 50 Ohm termination for both RF ports

9.6.3. 18-26.5 GHz

Table 49: 5 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2500	Horizontal & Vertical	1000	*25*	Pass
Middle - 2593			*26*	Pass
High - 2687			*27*	Pass

- 50 Ohm termination for both RF ports

Table 50: 10 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2501	Horizontal & Vertical	1000	*28*	Pass
Middle - 2593			*29*	Pass
High - 2685			*30*	Pass

- 50 Ohm termination for both RF ports

Table 51: 14 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2504	Horizontal & Vertical	1000	*31*	Pass
Middle - 2593			*32*	Pass
High - 2682			*33*	Pass

- 50 Ohm termination for both RF ports

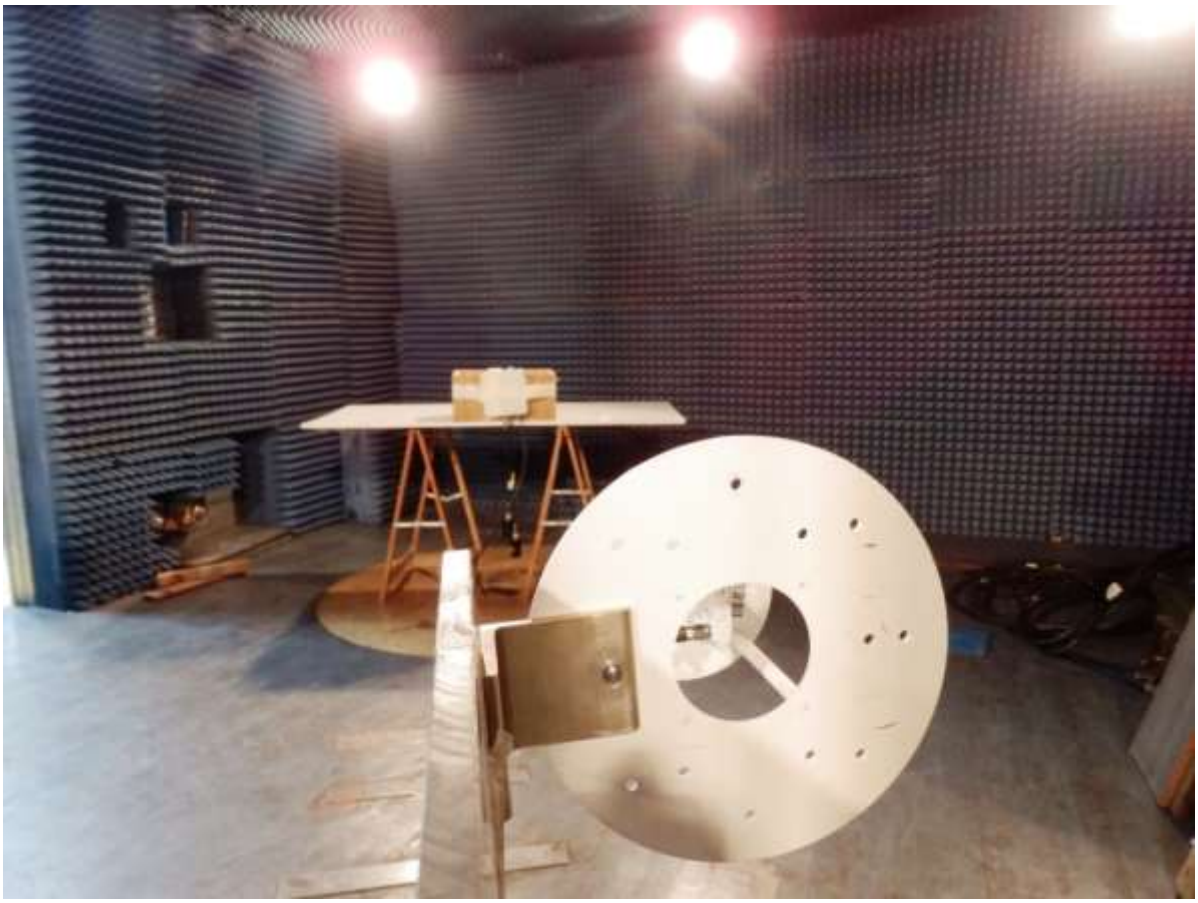
Table 52: 20 MHz Bandwidth Test Result

Frequency (MHz)	Polarization	Res. BW (kHz)	Plot No.	PASS/FAIL
Low - 2507	Horizontal & Vertical	1000	*34*	Pass
Middle - 2593			*35*	Pass
High - 2679			*36*	Pass

- 50 Ohm termination for both RF ports

Photograph for Radiated Emission Test Setup/ 1

Photograph for Radiated Emission Test Setup/ 2



Photograph for Radiated Emission Test Setup/ 3

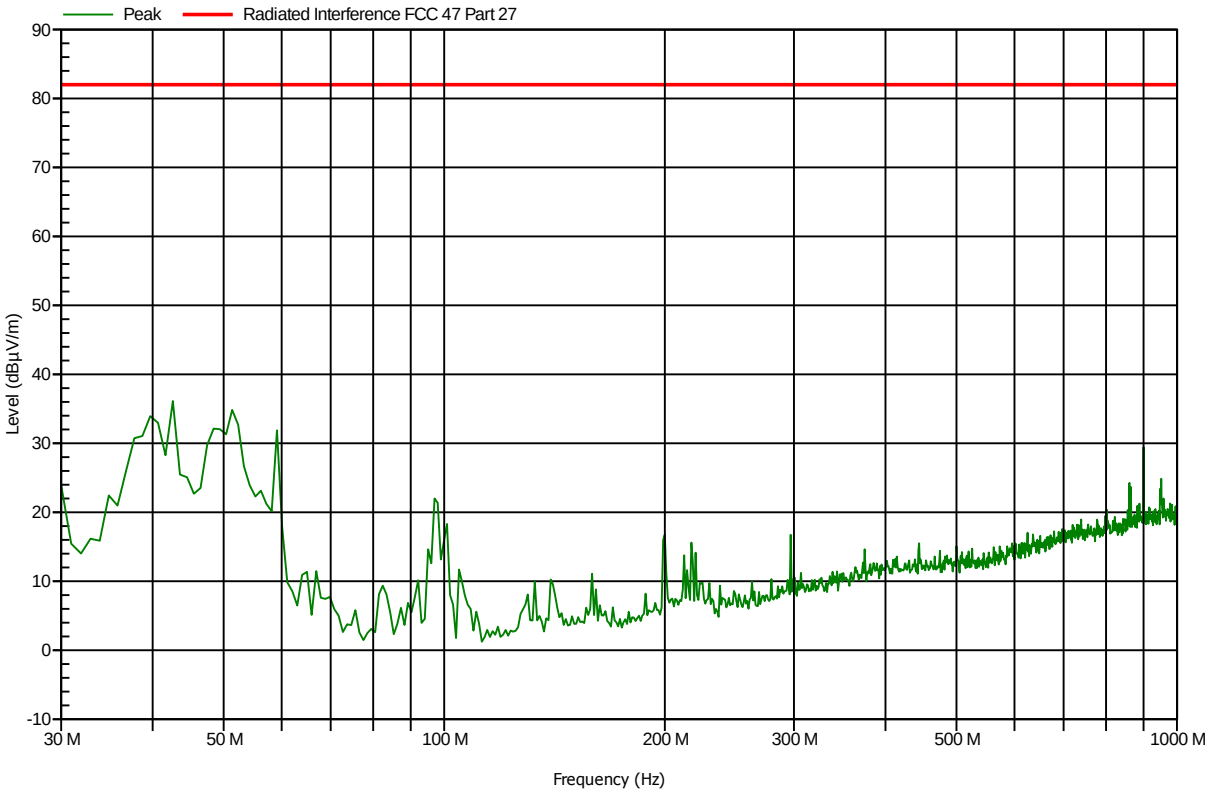
Test Results Plot No 1

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

5 MHz low 2500 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

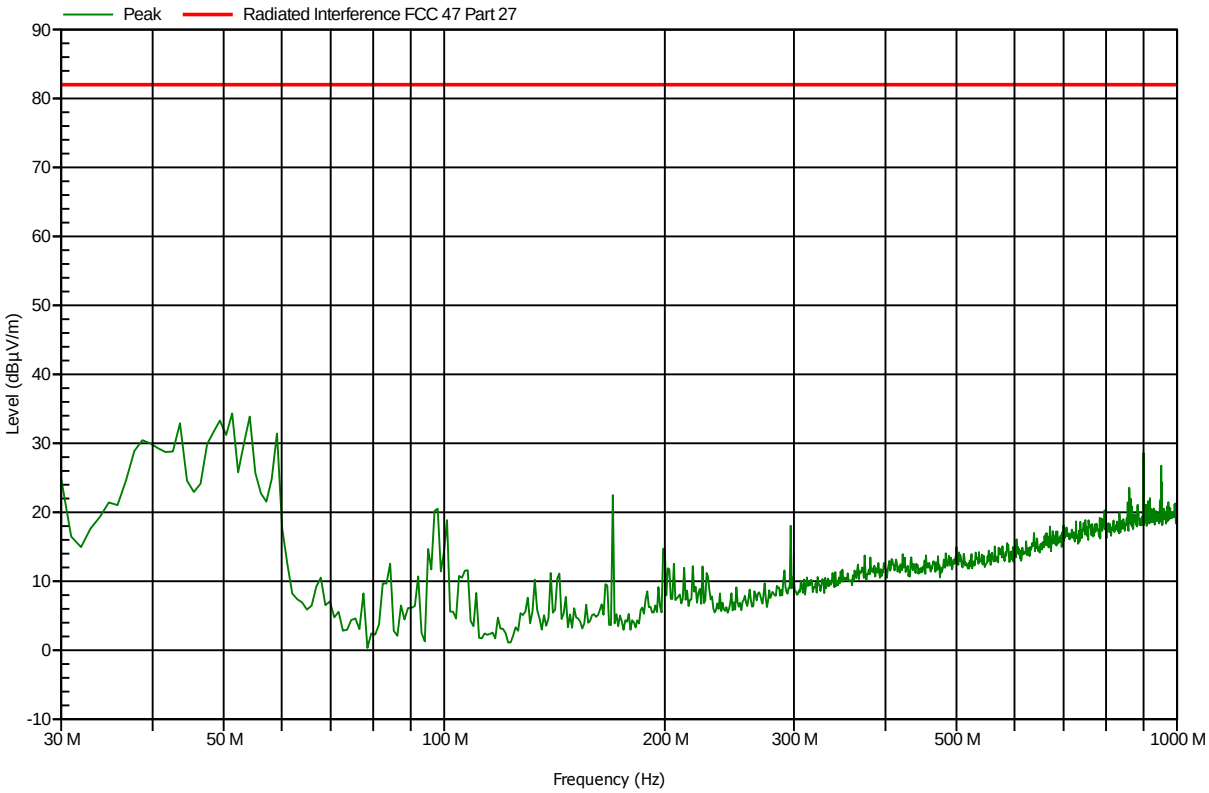
Test Results Plot No 2

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

5 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

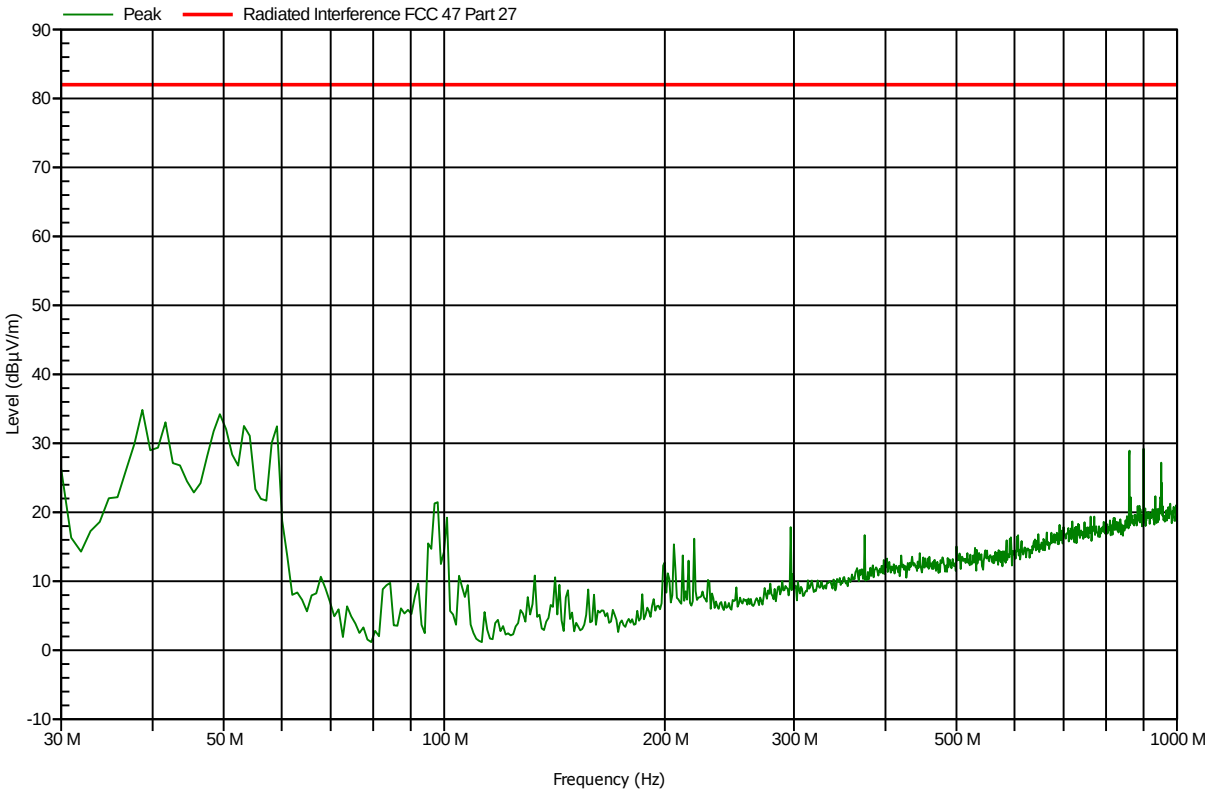
Test Results Plot No 3

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

5 MHz high 2687 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

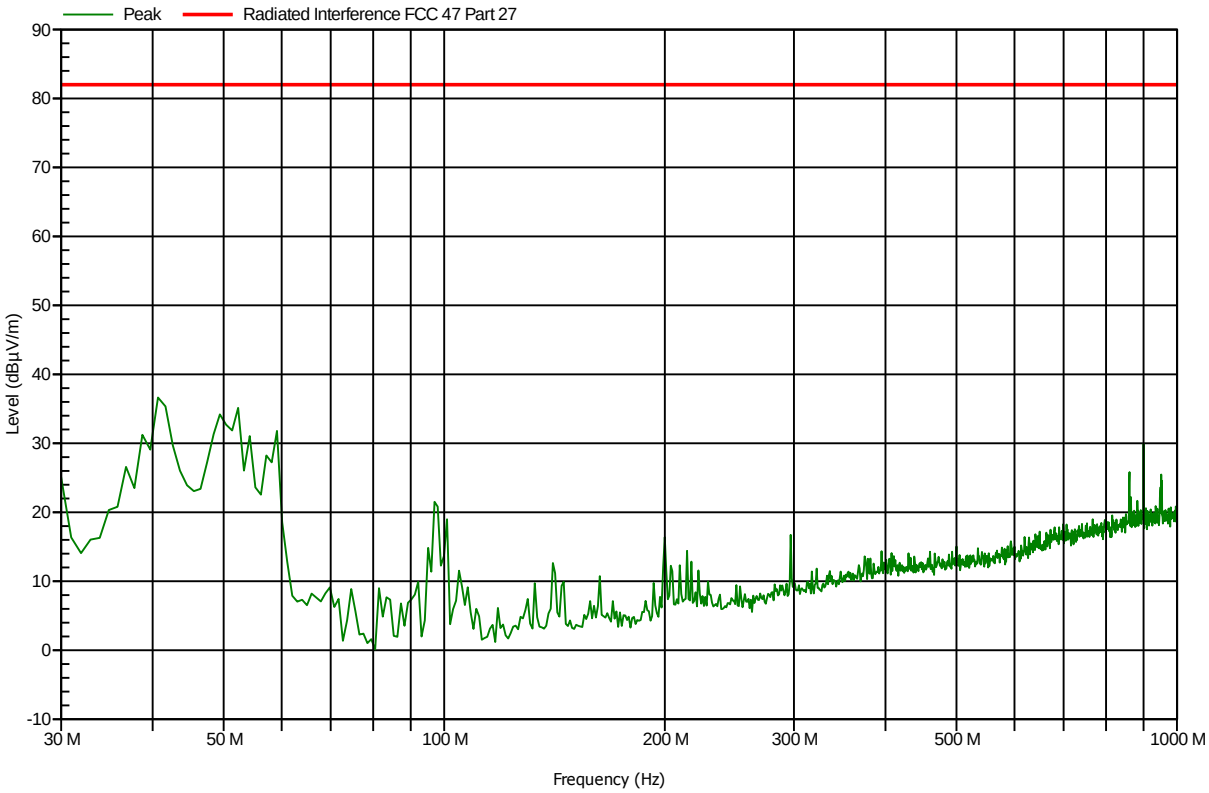
Test Results Plot No 4

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

10 MHz low 2501 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

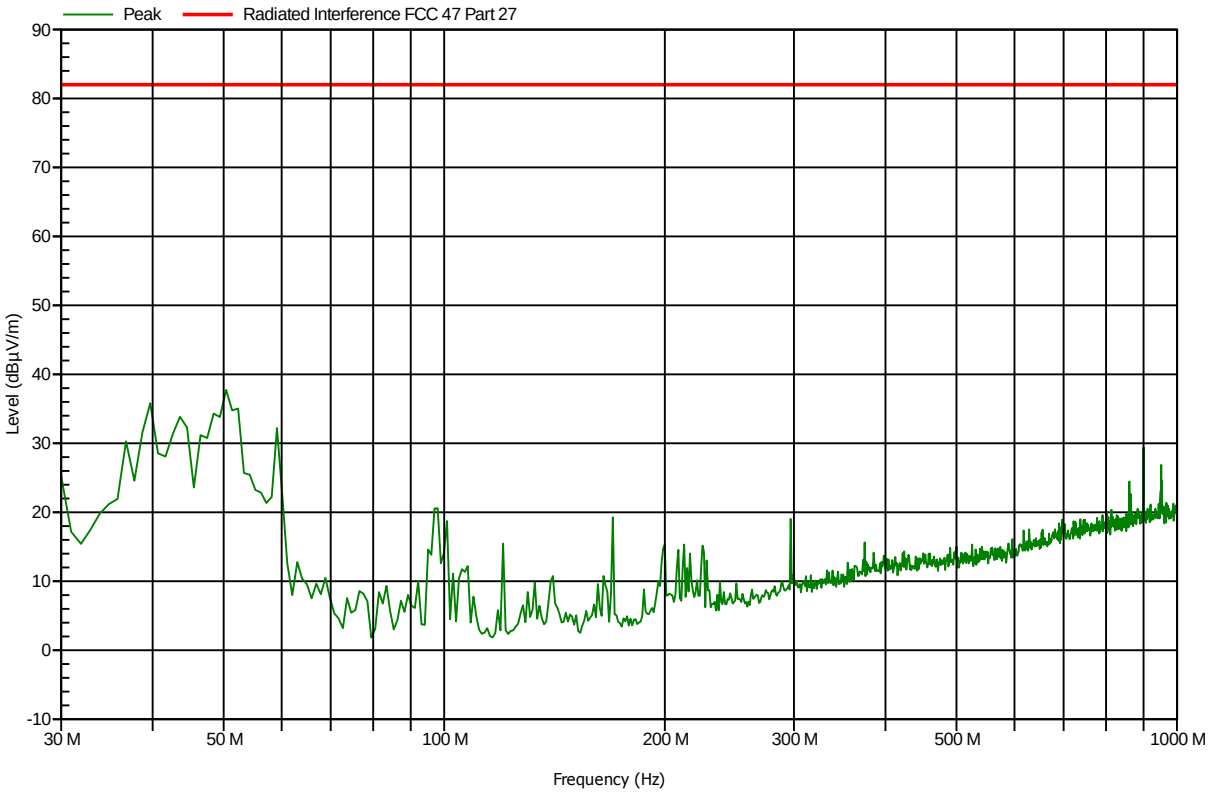
Test Results Plot No 5

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

10 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

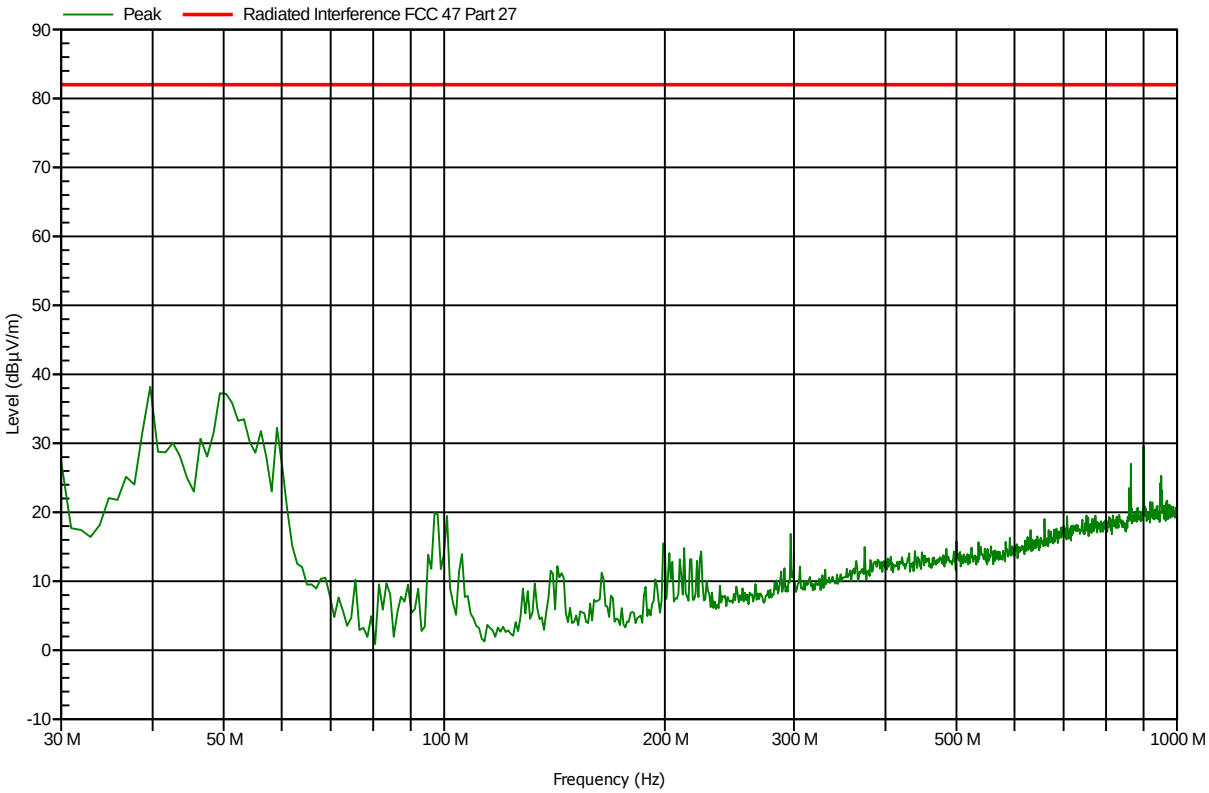
Test Results Plot No 6

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

10 MHz high 2685 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

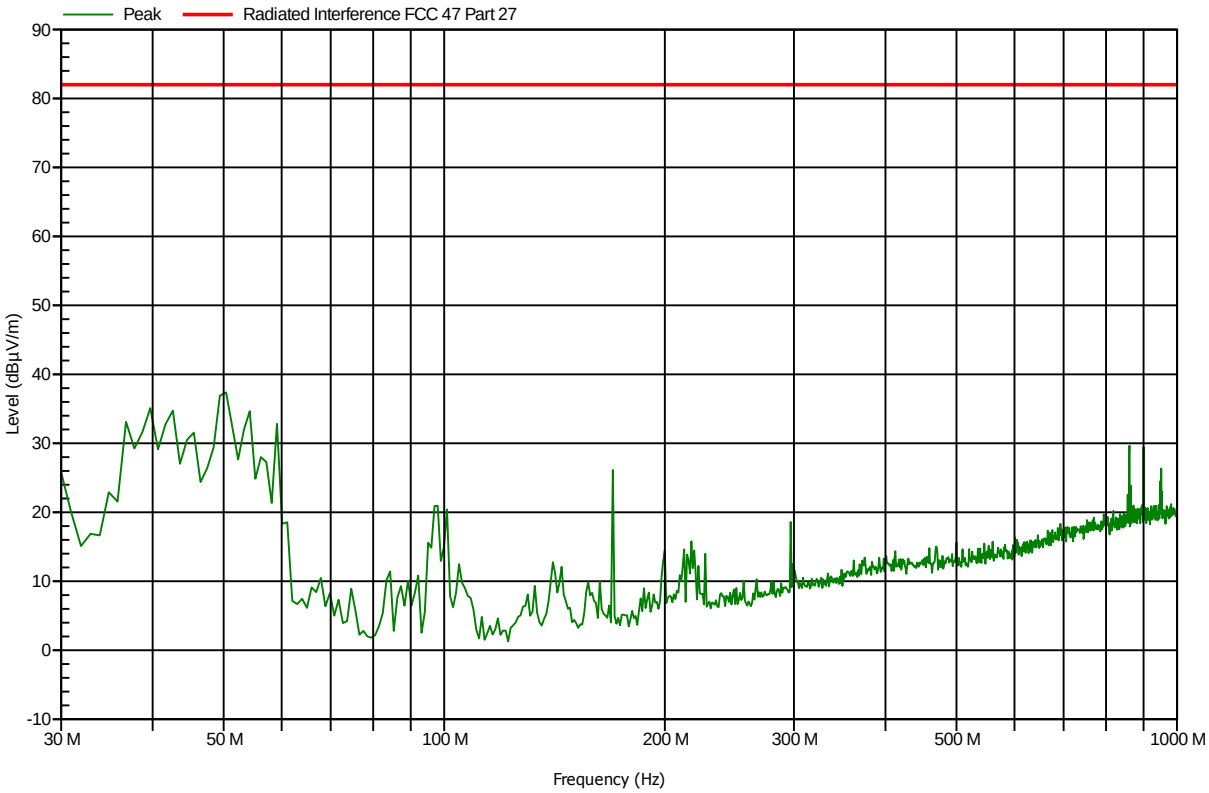
Test Results Plot No 7

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

14 MHz low 2504 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

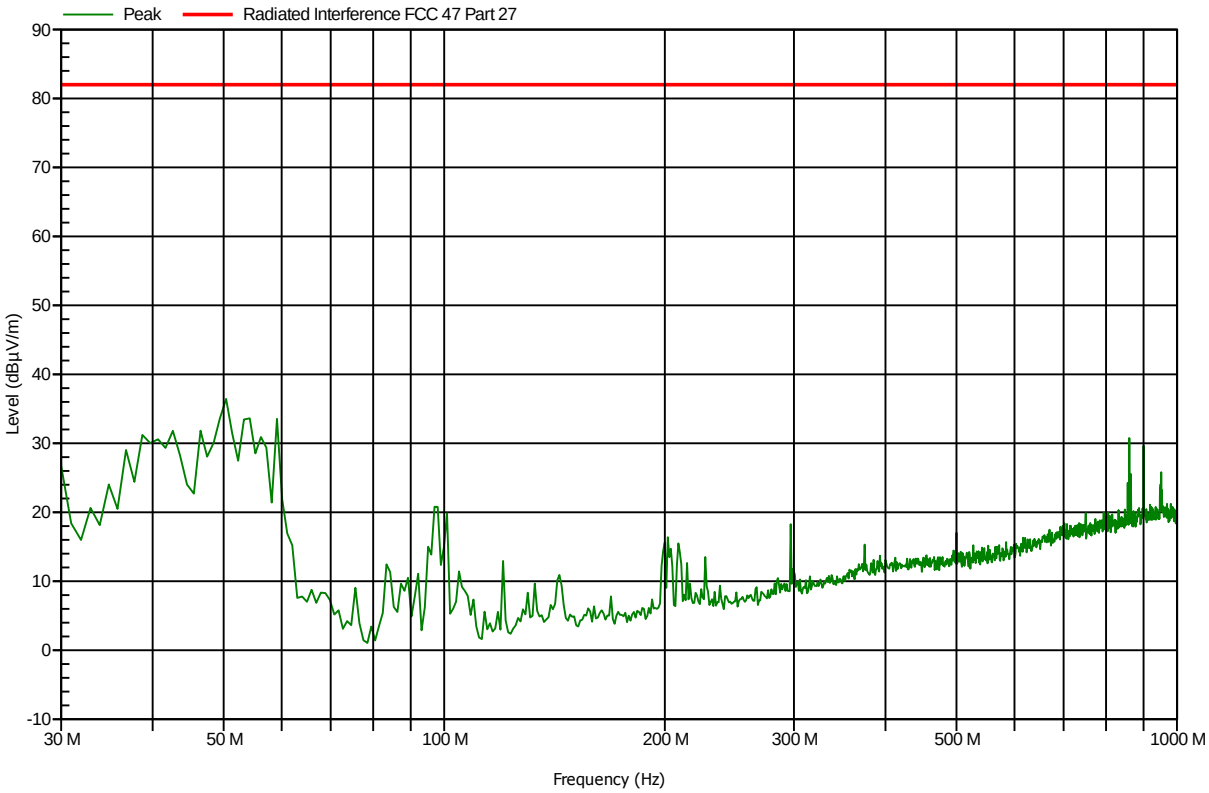
Test Results Plot No 8

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

14 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

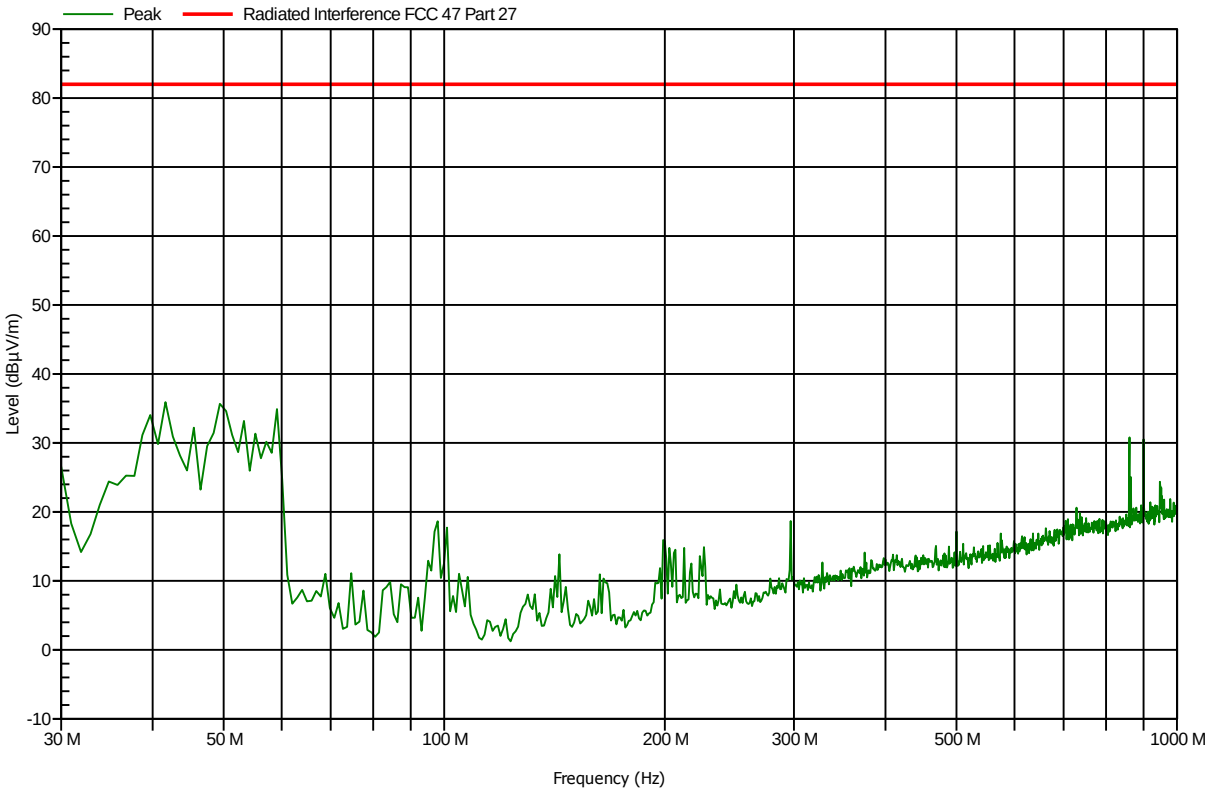
Test Results Plot No 9

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

14 MHz high 2682 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

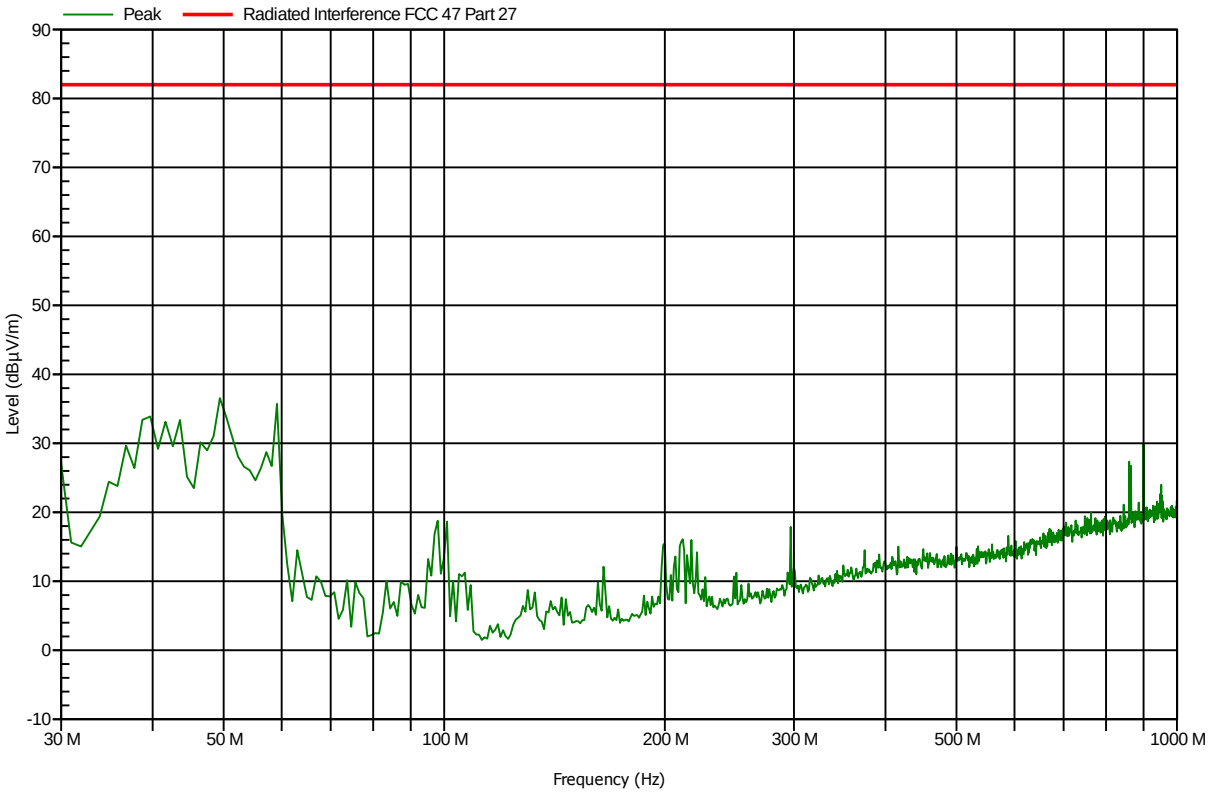
Test Results Plot No 10

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

20 MHz low 2507 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

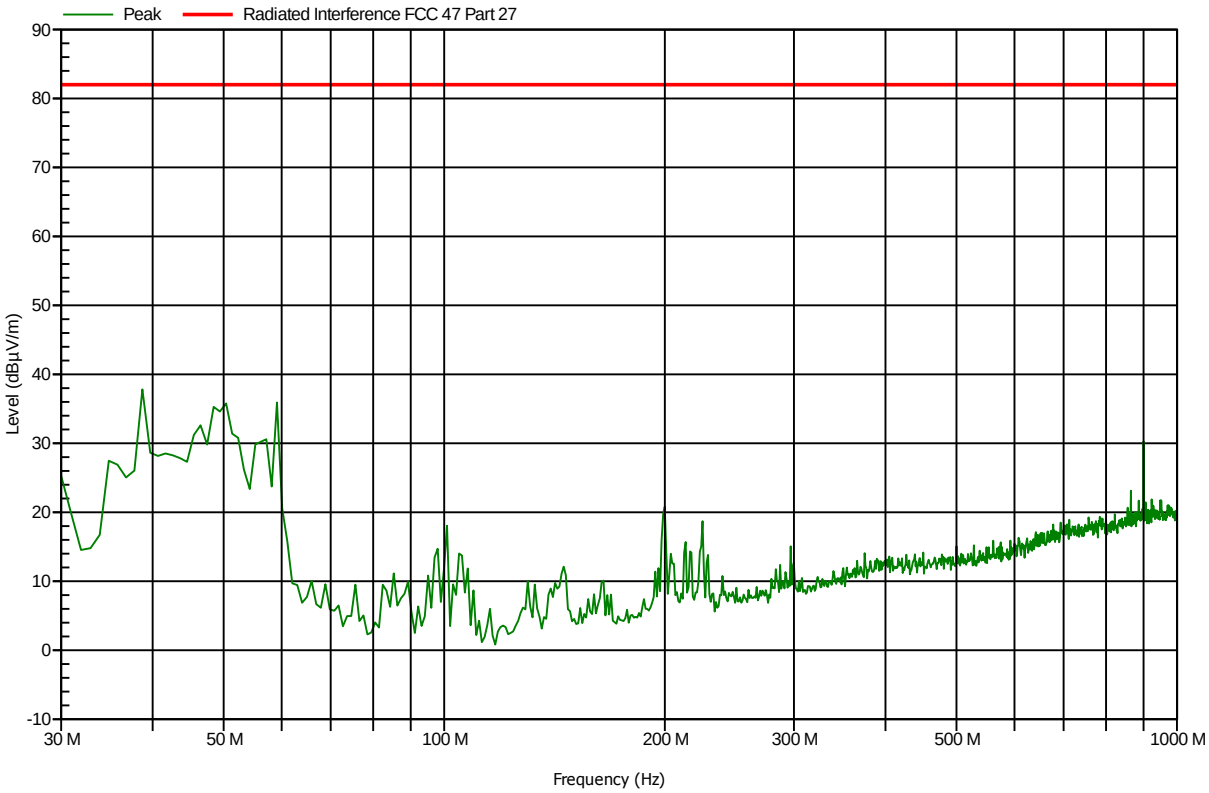
Test Results Plot No 11

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

20 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

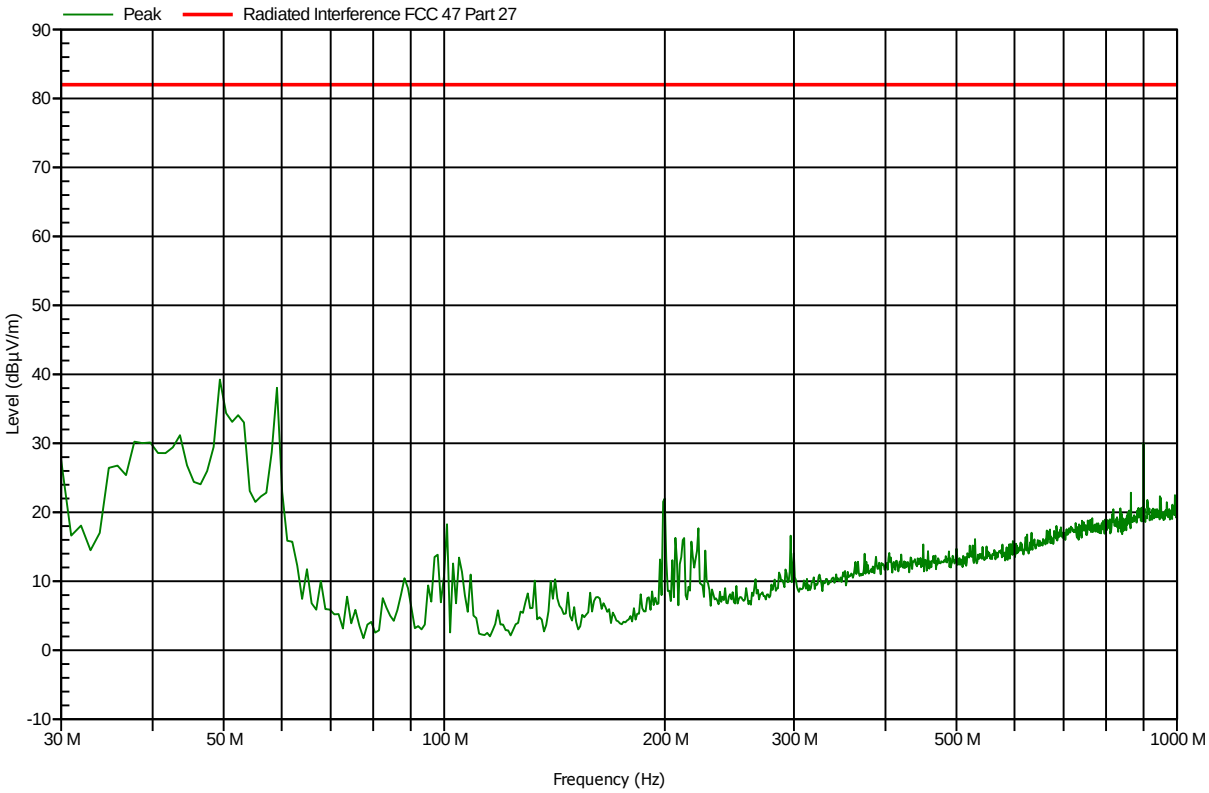
Test Results Plot No 12

FCC 47.27: 0.3-1 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	300 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [694.64 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 10 kHz-1 GHz 30 dB

TEST REMARKS: Tuesday, November 10, 2015

20 MHz high 267 9MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

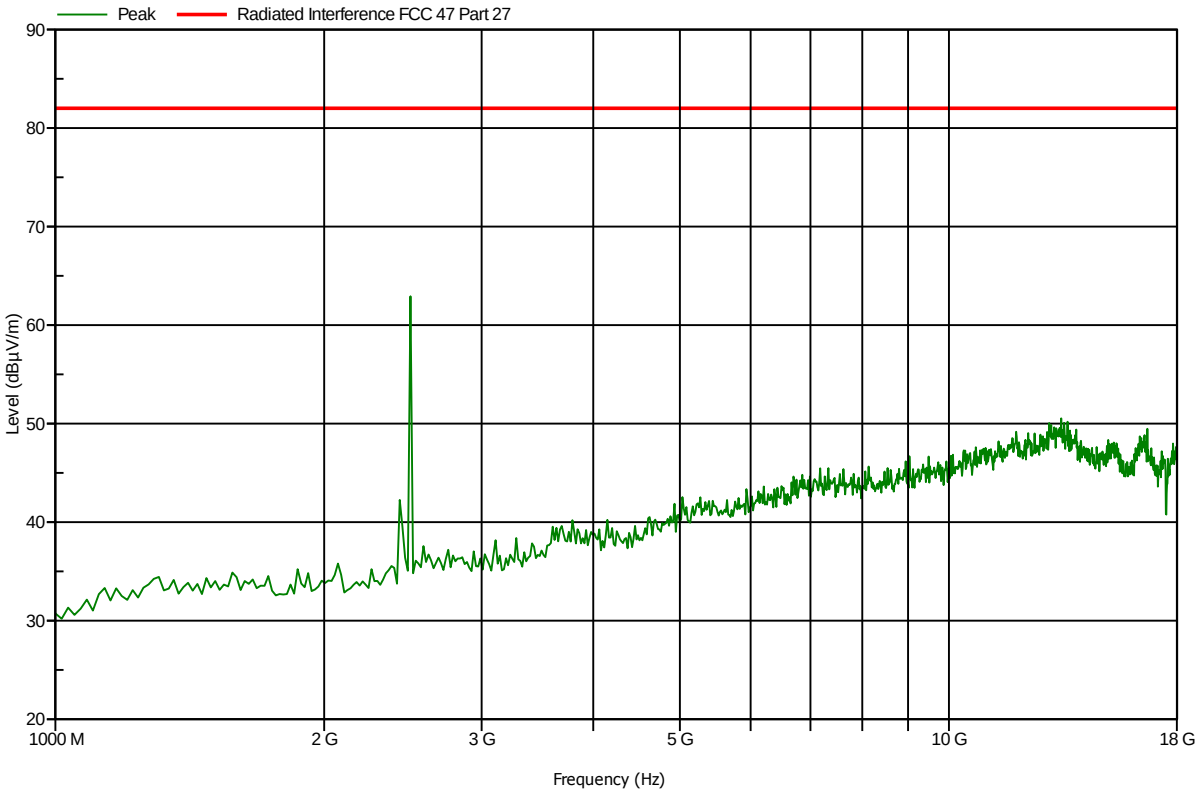
Test Results Plot No 13

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

5 MHz Low 2500 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

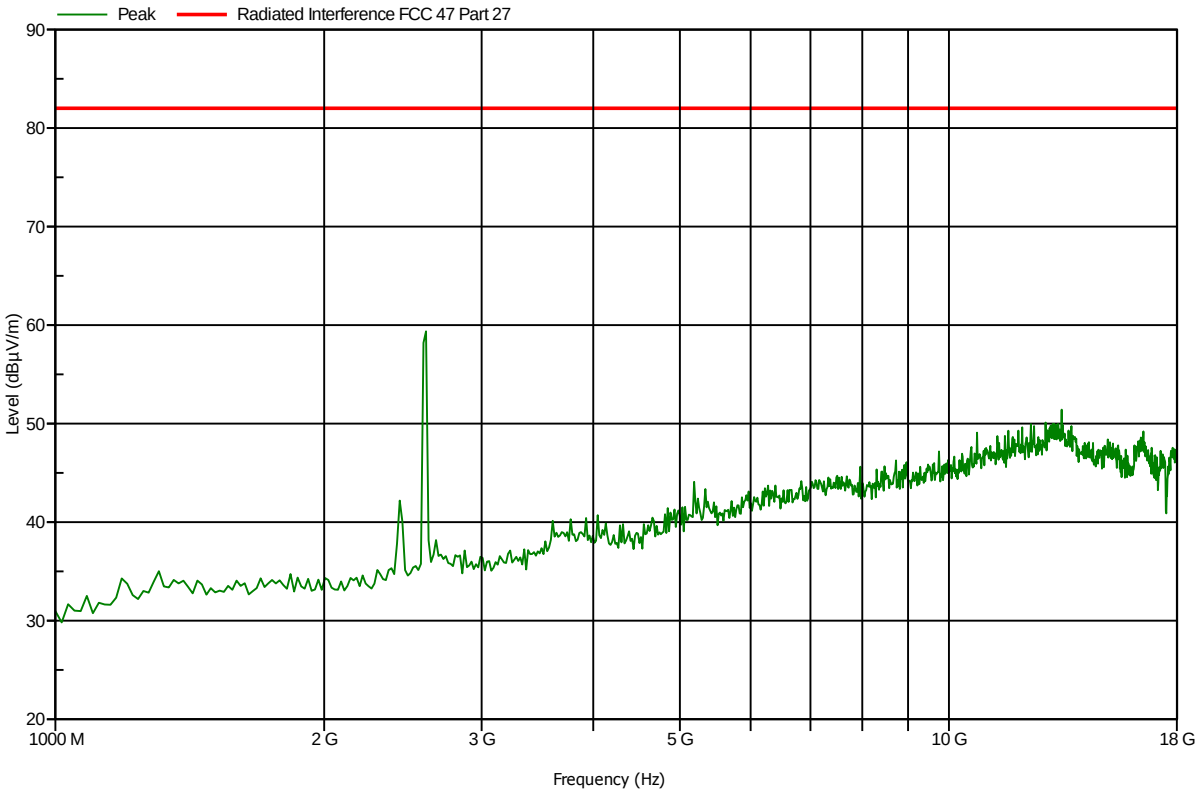
Test Results Plot No 14

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

5 MHz Mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

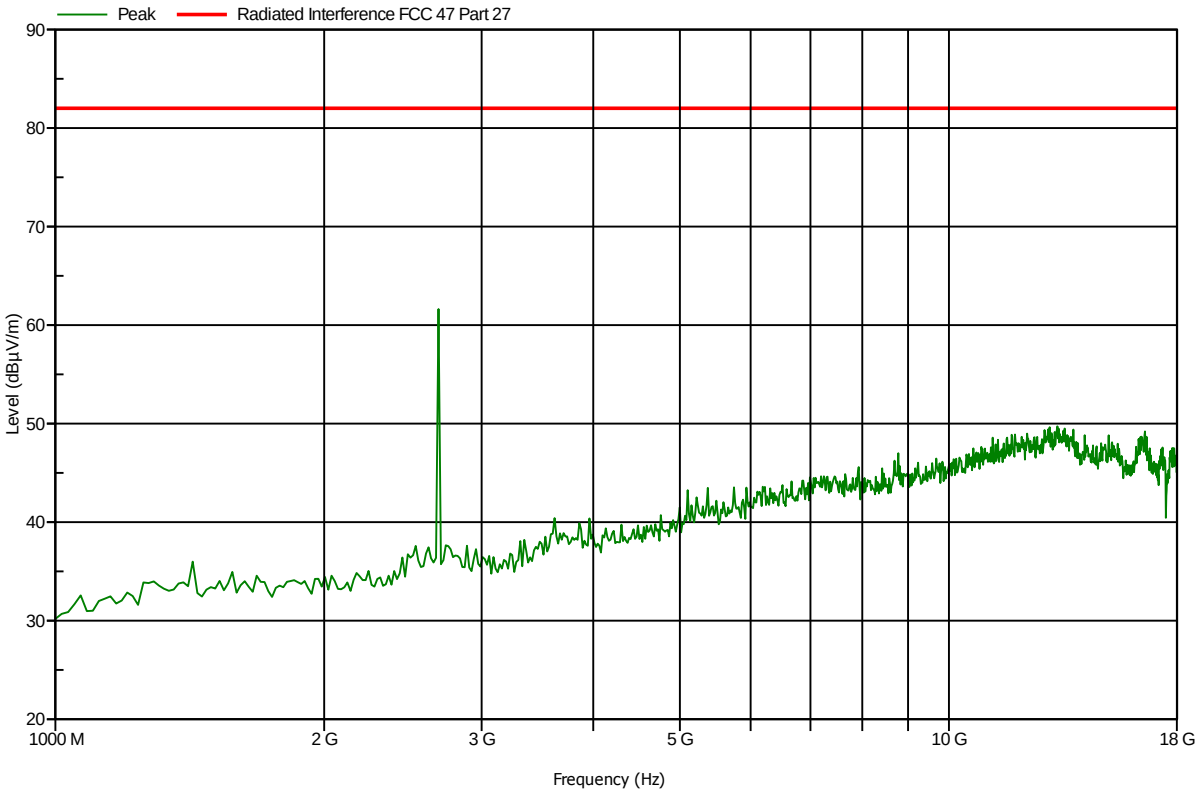
Test Results Plot No 15

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

5 MHz high 2687 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

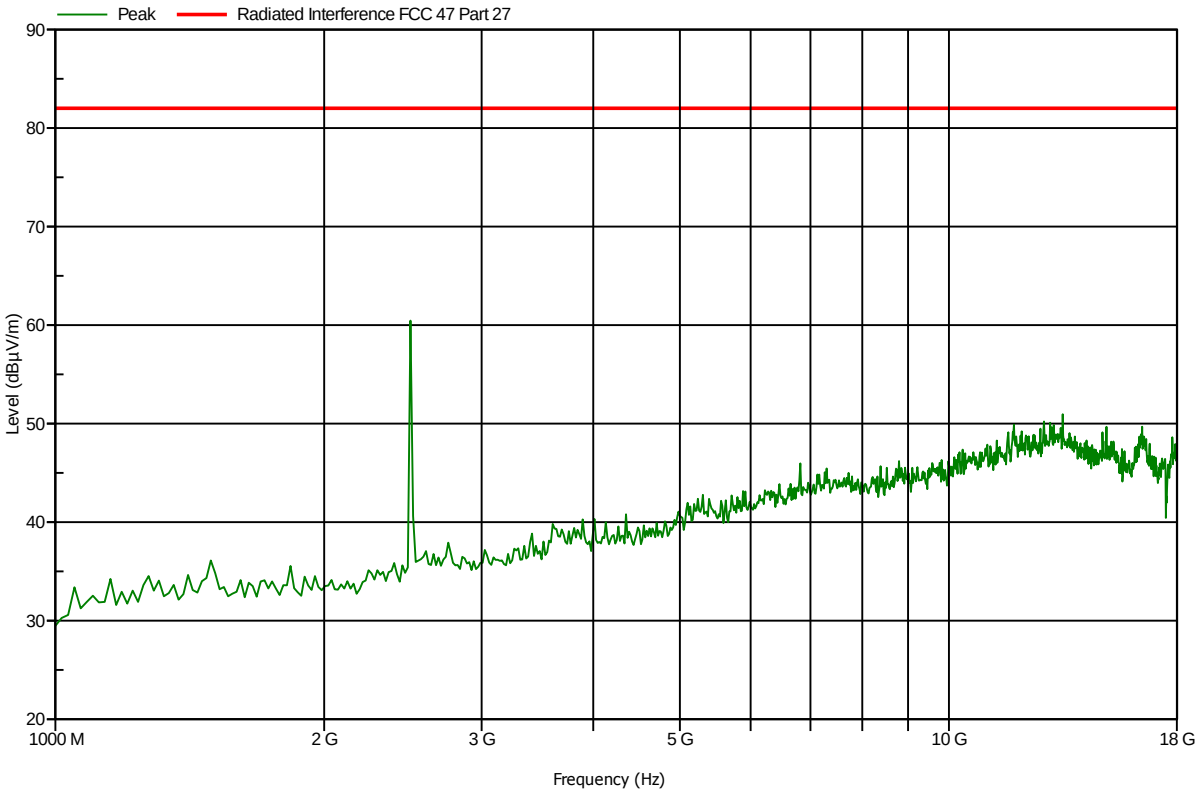
Test Results Plot No 16

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

10 MHz low 2501 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

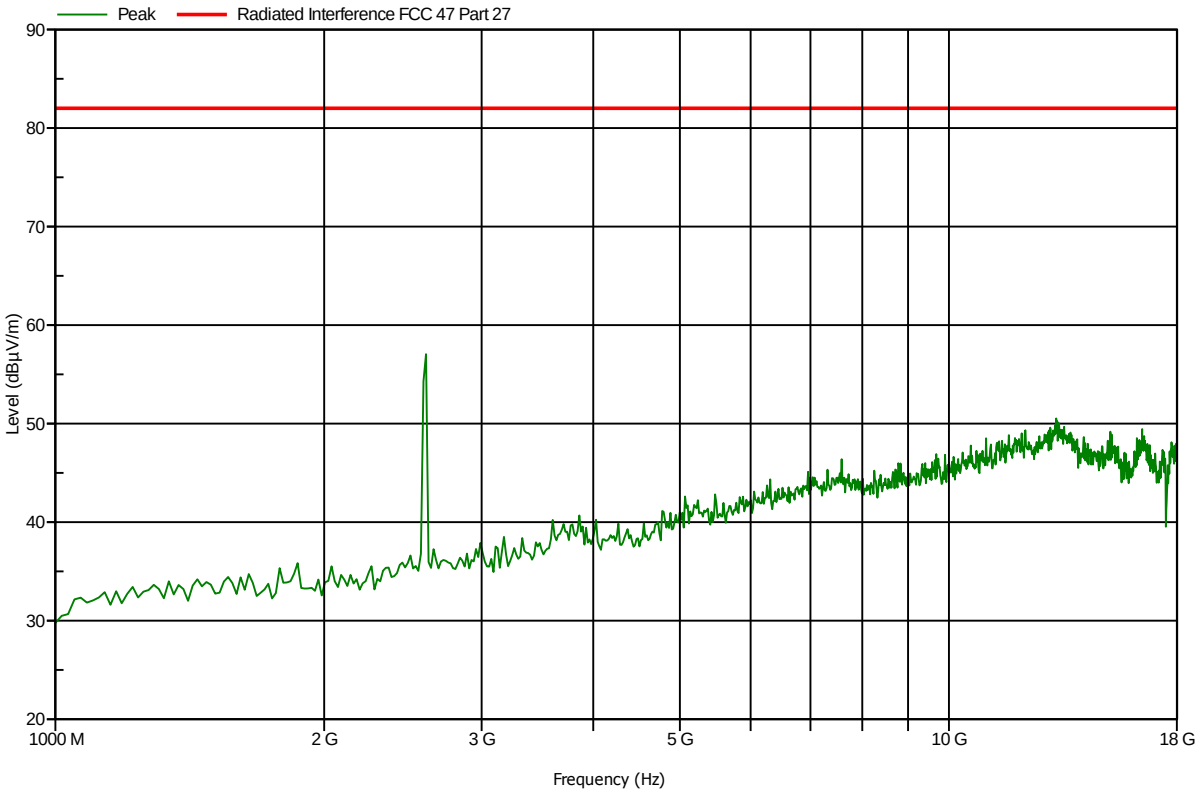
Test Results Plot No 17

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

10 MHz Mid 2593 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

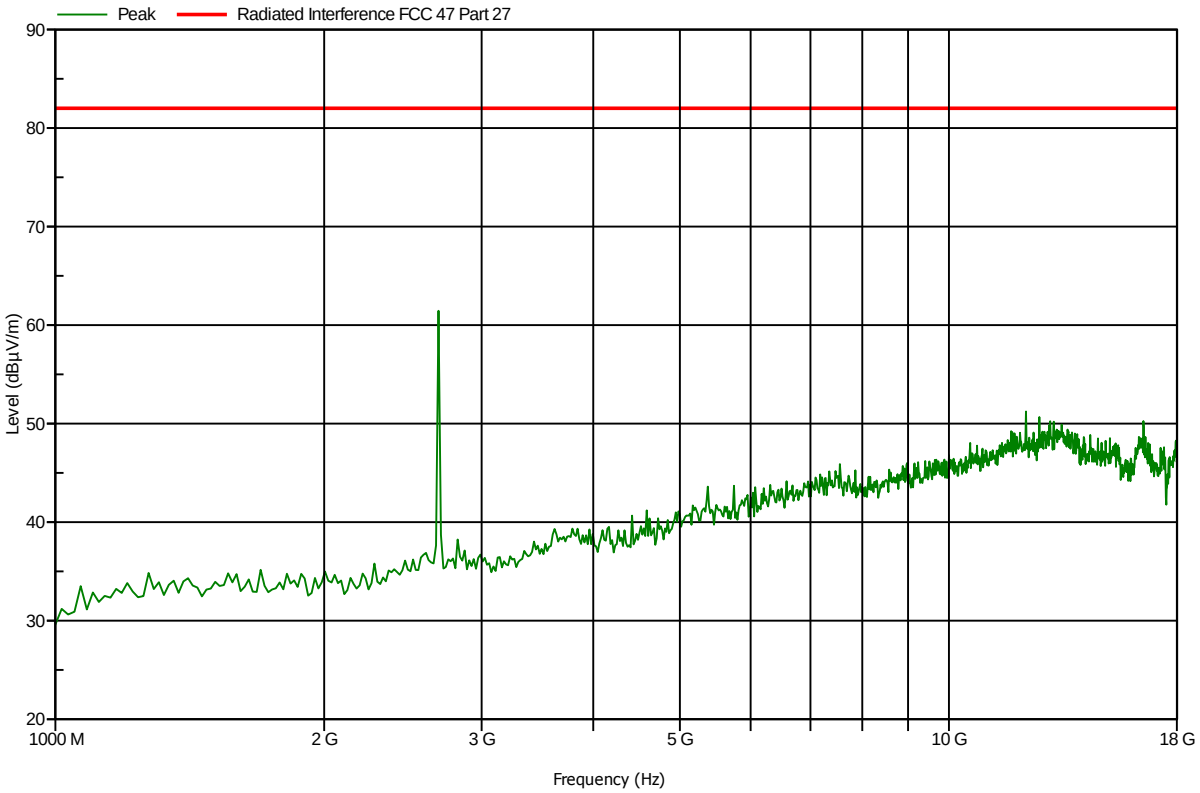
Test Results Plot No 18

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

10 MHz high 2685 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

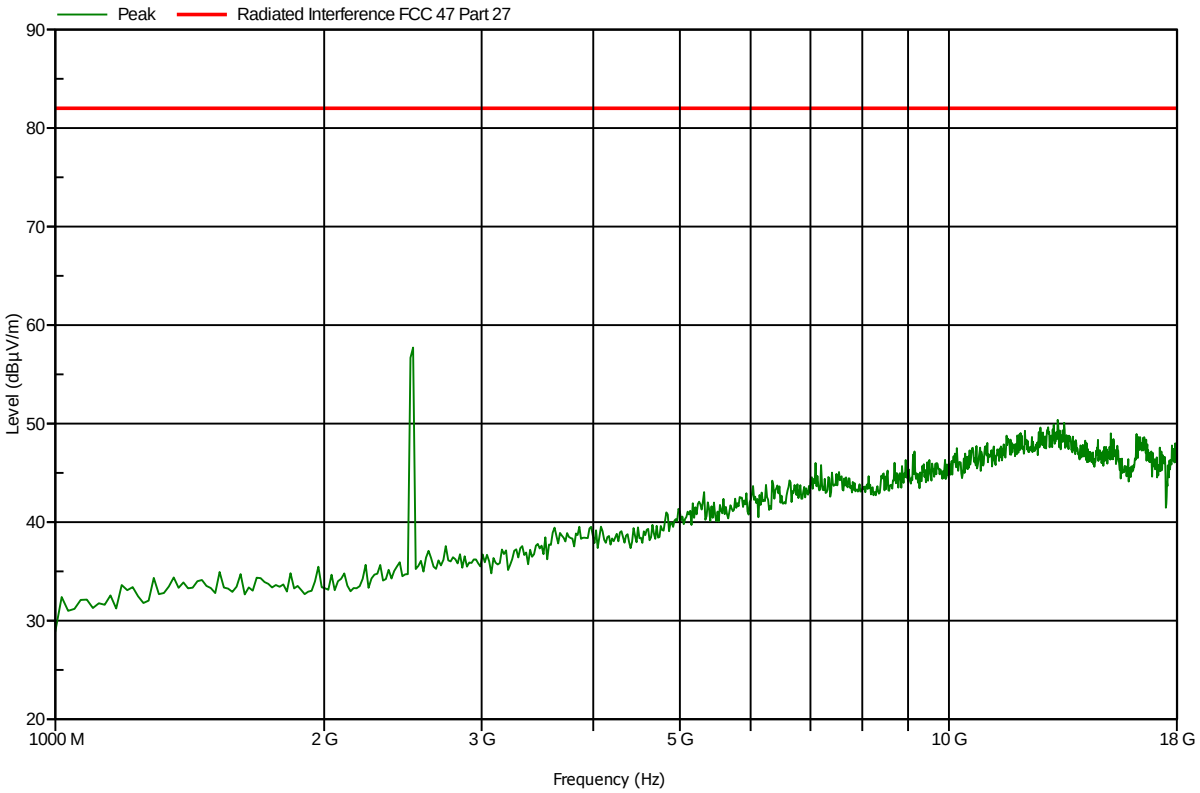
Test Results Plot No 19

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

14 MHz low 2504 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

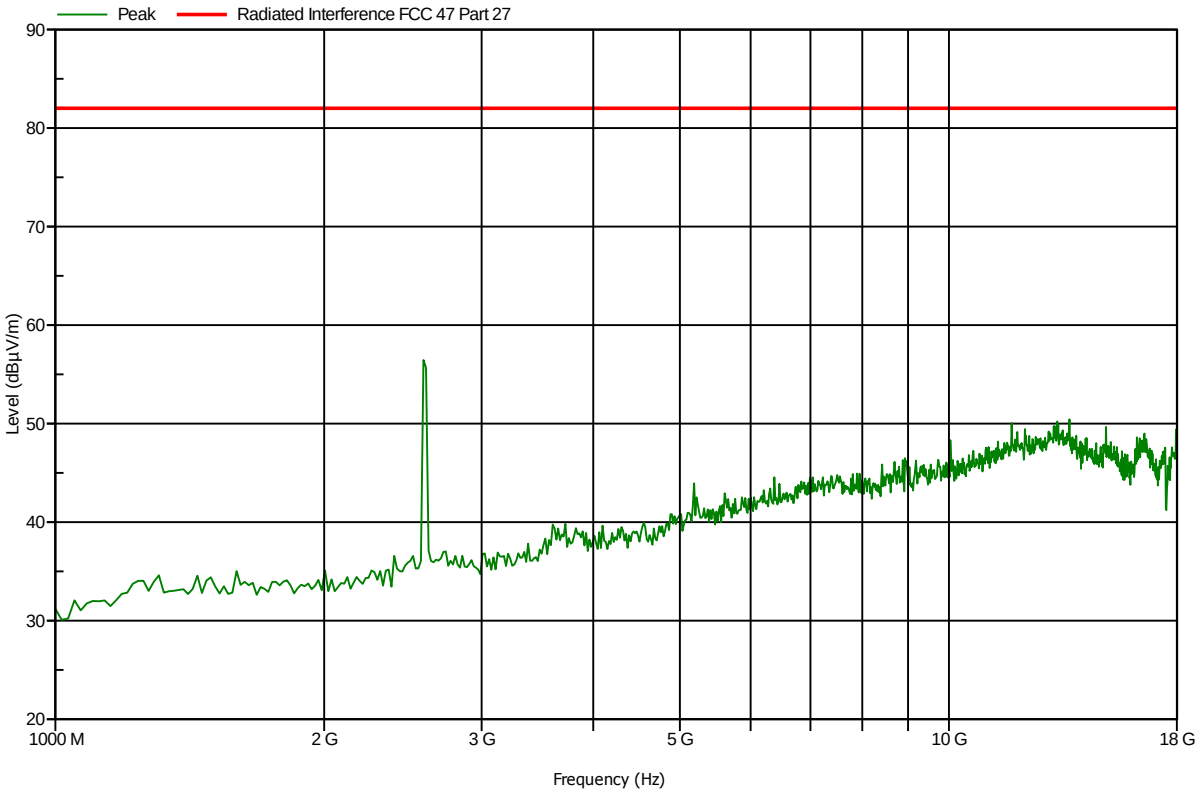
Test Results Plot No 20

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

14 MHz Mid 2593 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

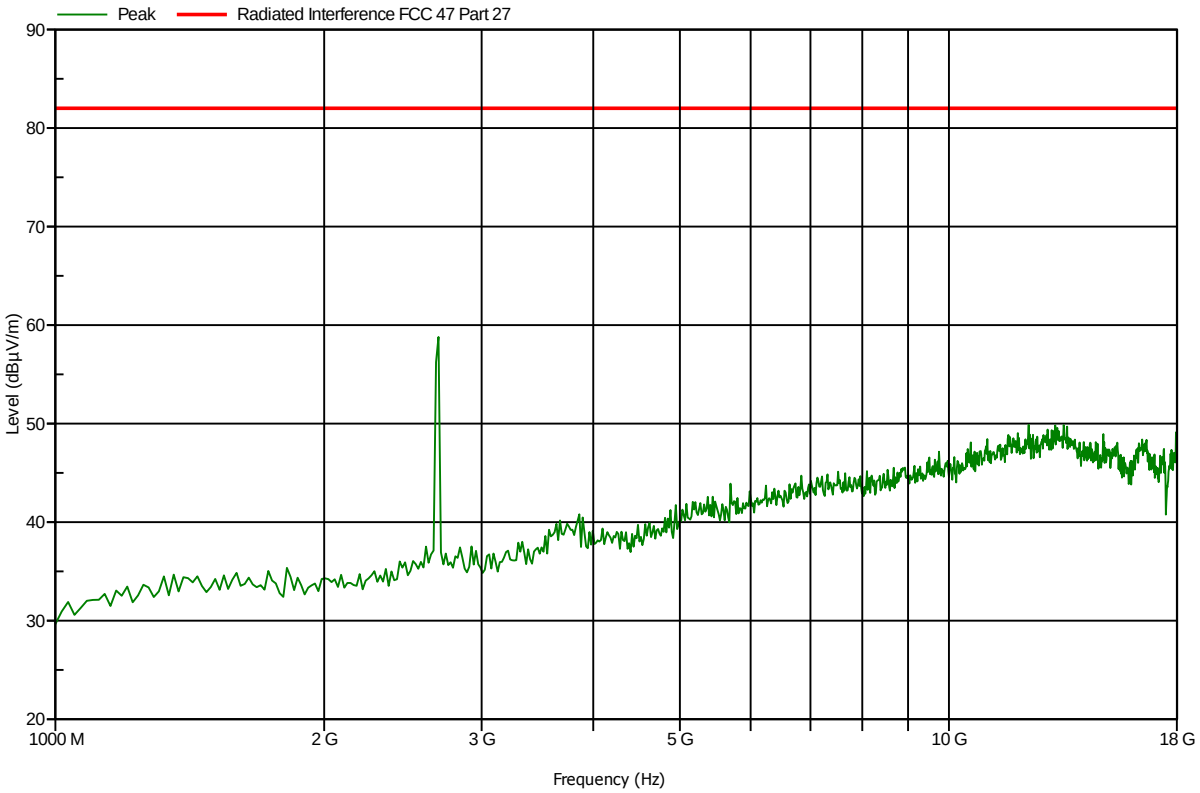
Test Results Plot No 21

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

14 MHz high 2682 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

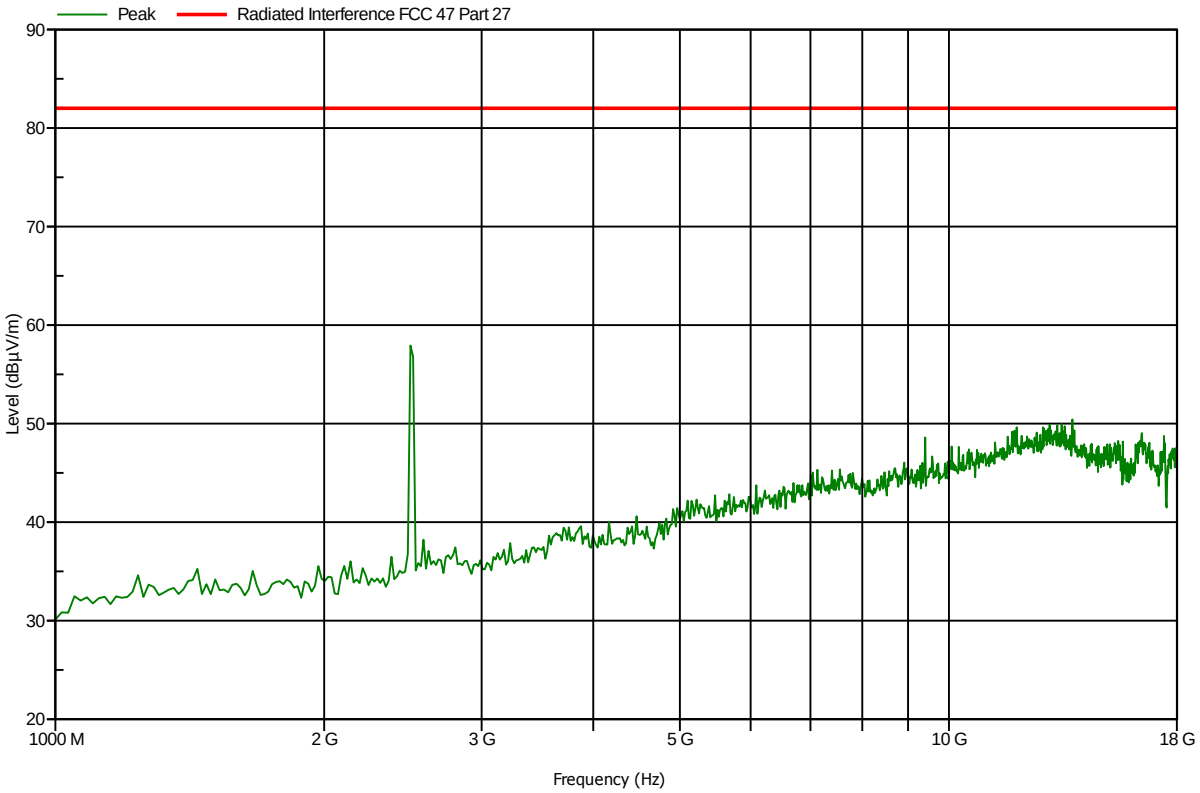
Test Results Plot No 22

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

20 MHz low 2507 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

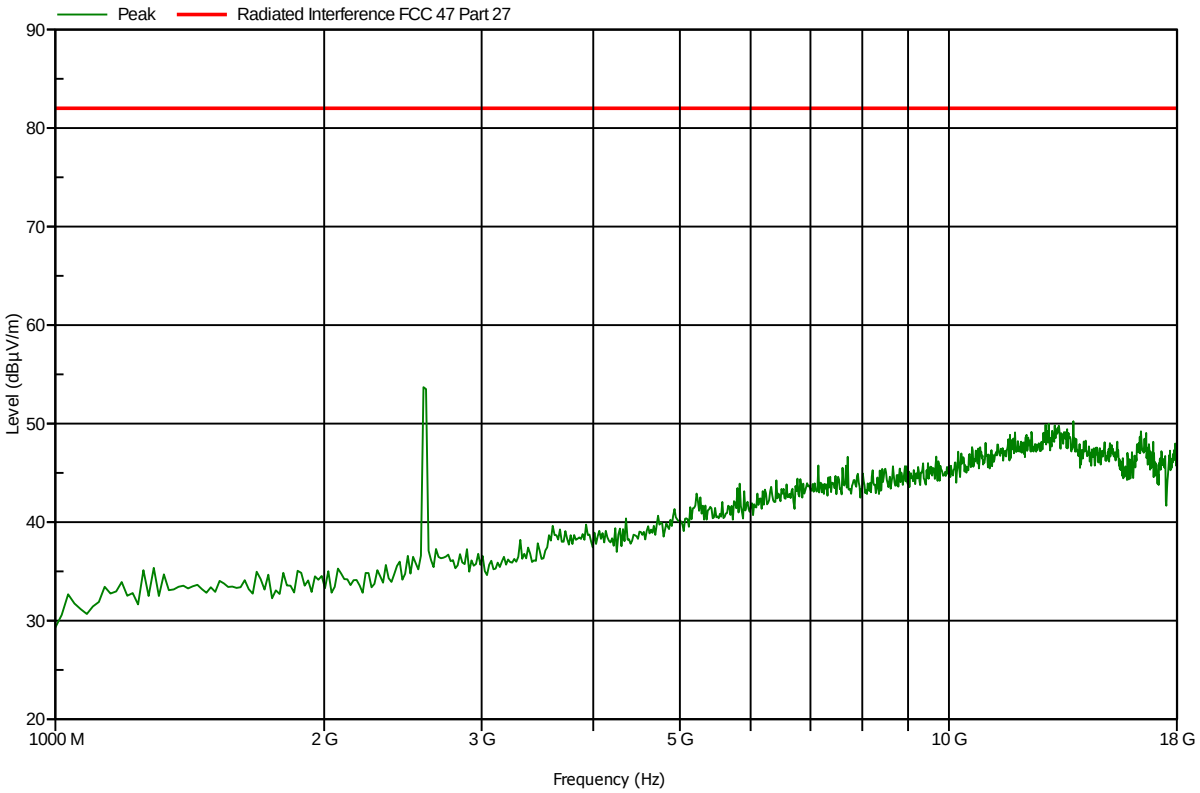
Test Results Plot No 23

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

20 MHz Mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

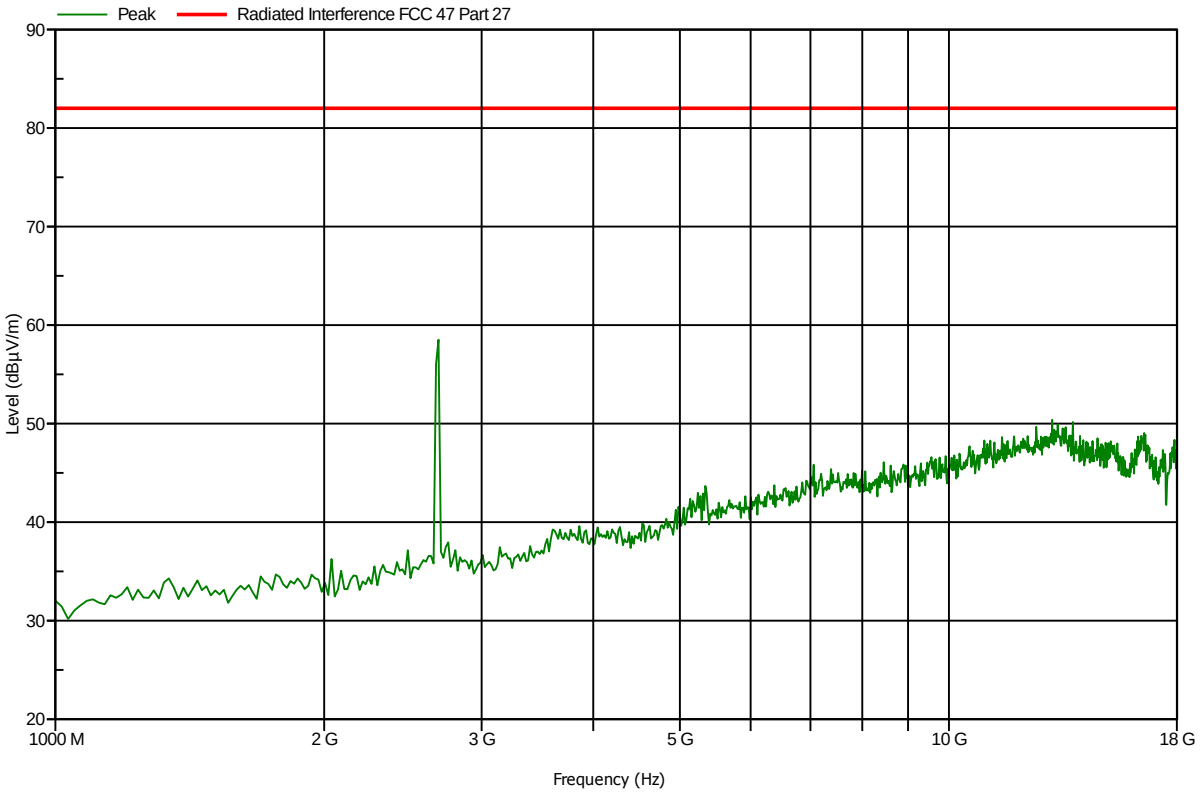
Test Results Plot No 24

FCC 47.27: 1-18 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118/A 1-18 GHz 1319	Sweep Time:	Auto [170.03 ms]
Polarization:	Horizontal	Pre Amplifier	pre amp 1 GHz-18 GHz

TEST REMARKS: Tuesday, November 10, 2015

20 MHz high 2679 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

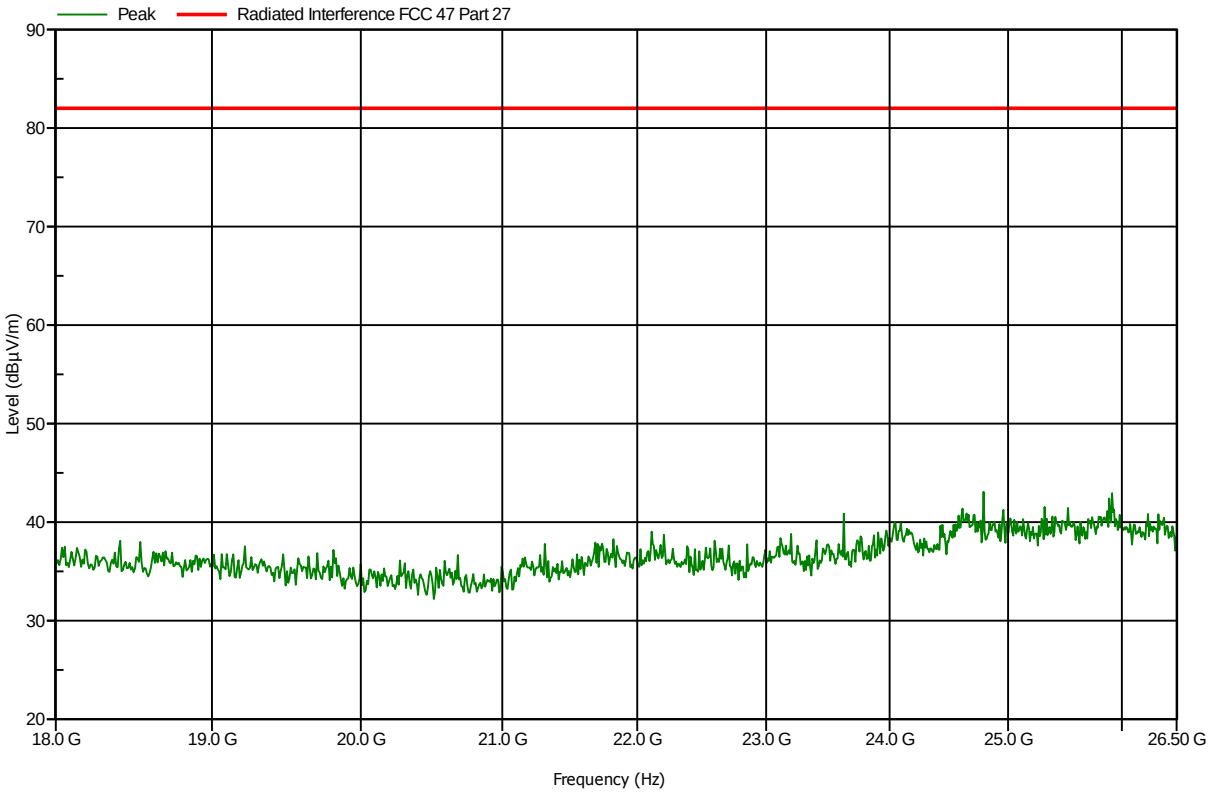
Test Results Plot No 25

FCC 47.27 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

5 MHz low 2500 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

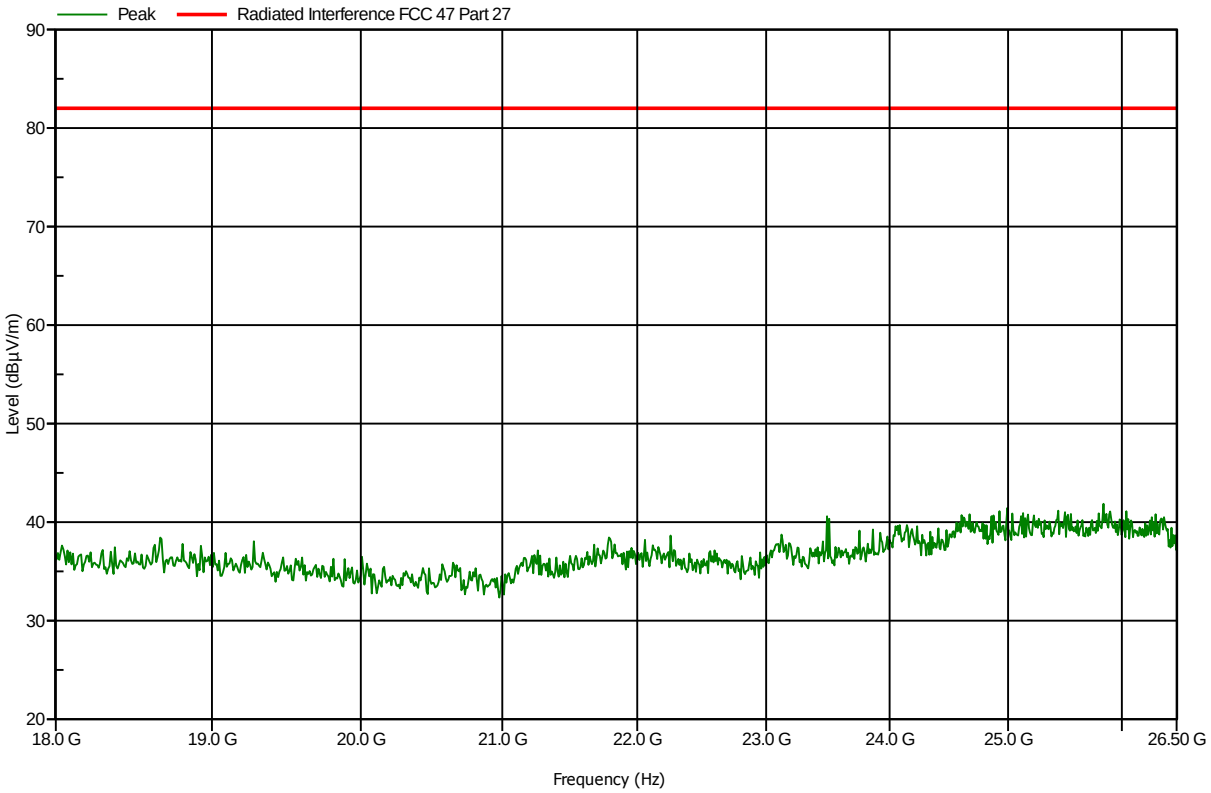
Test Results Plot No 26

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

5 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

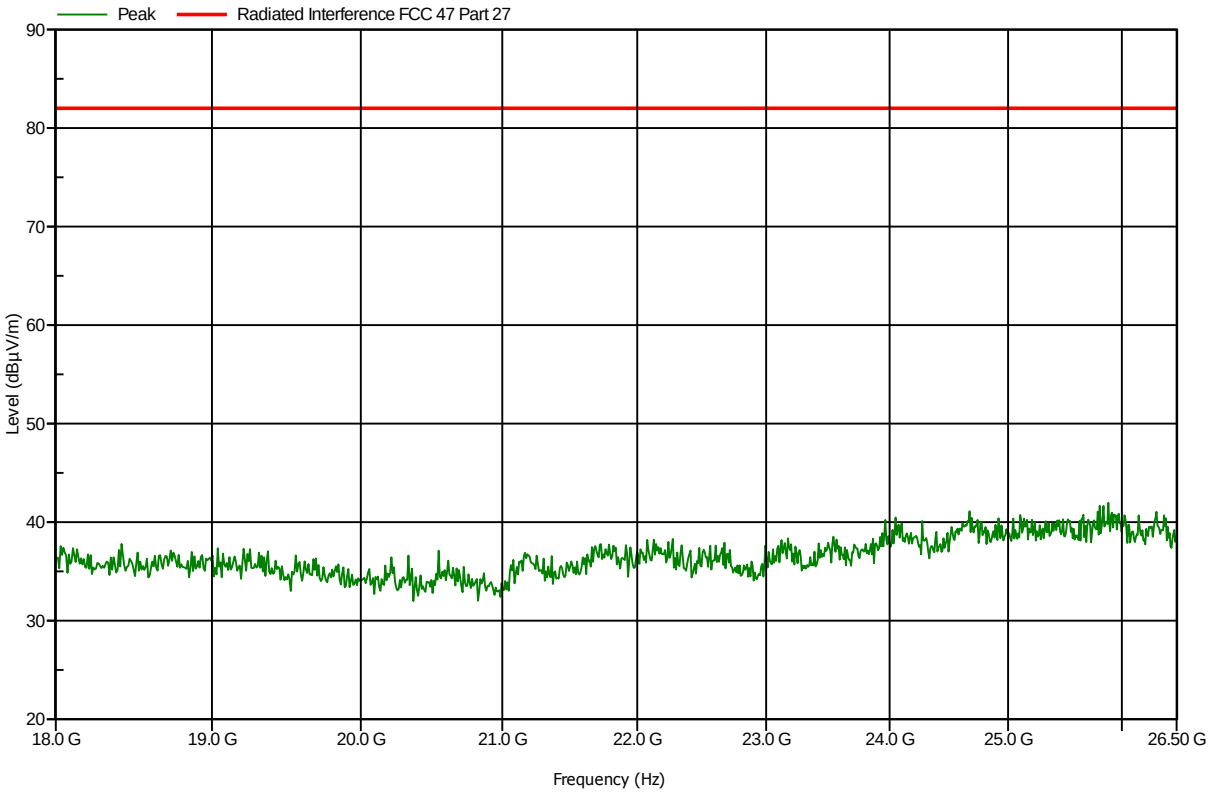
Test Results Plot No 27

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

5 MHz high 2687 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

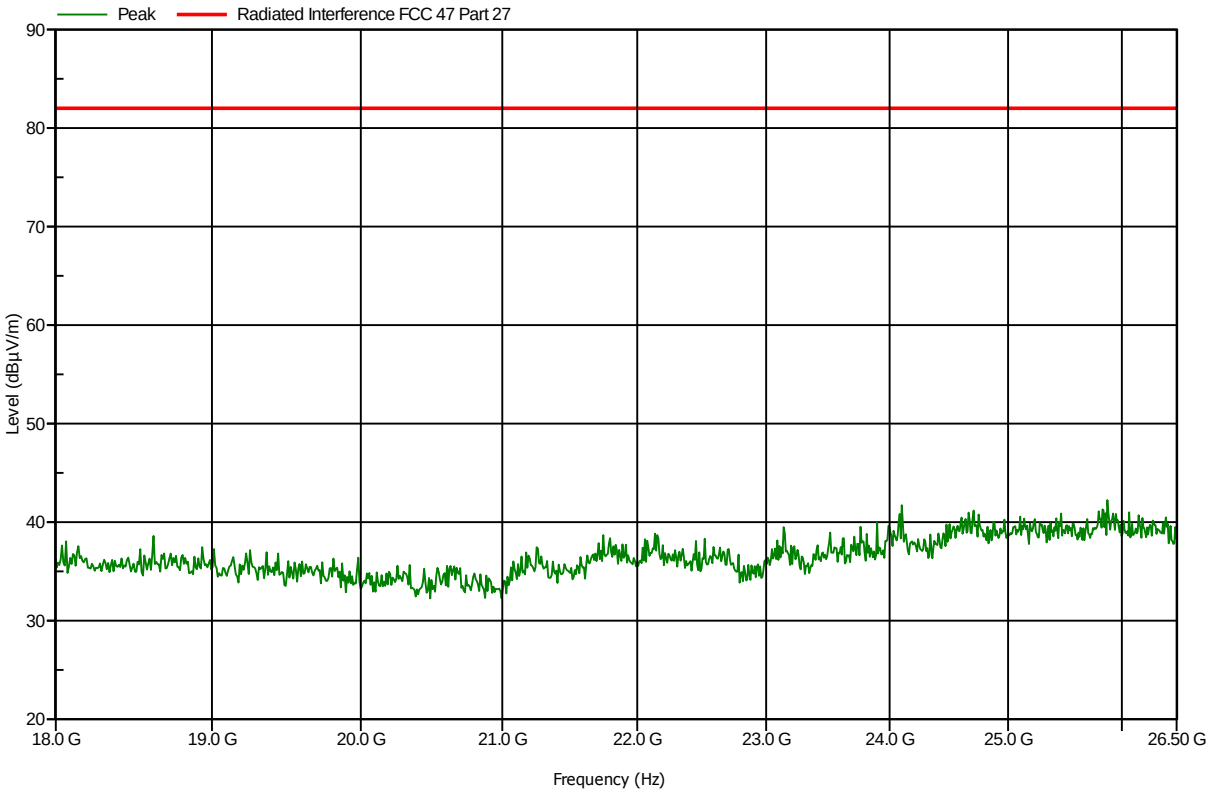
Test Results Plot No 28

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

10 MHz low 2501 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

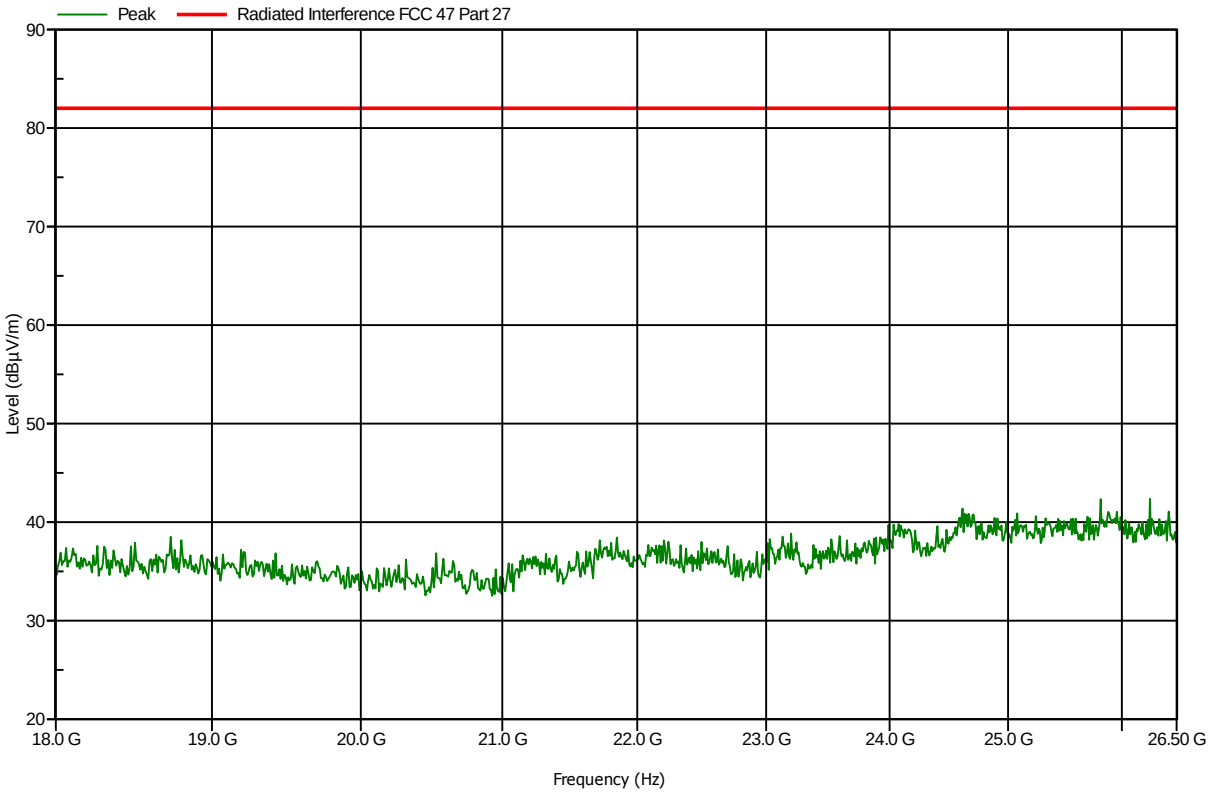
Test Results Plot No 29

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

10 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

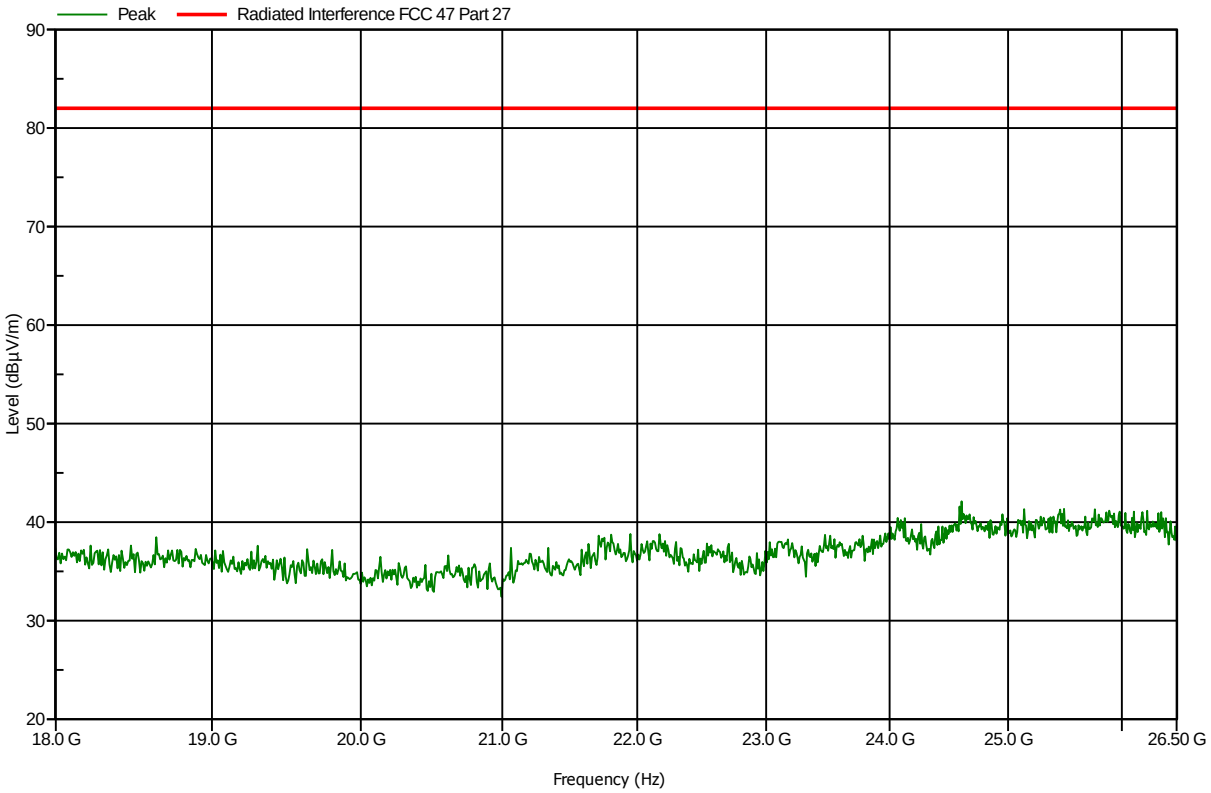
Test Results Plot No 30

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

10 MHz high 2685 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

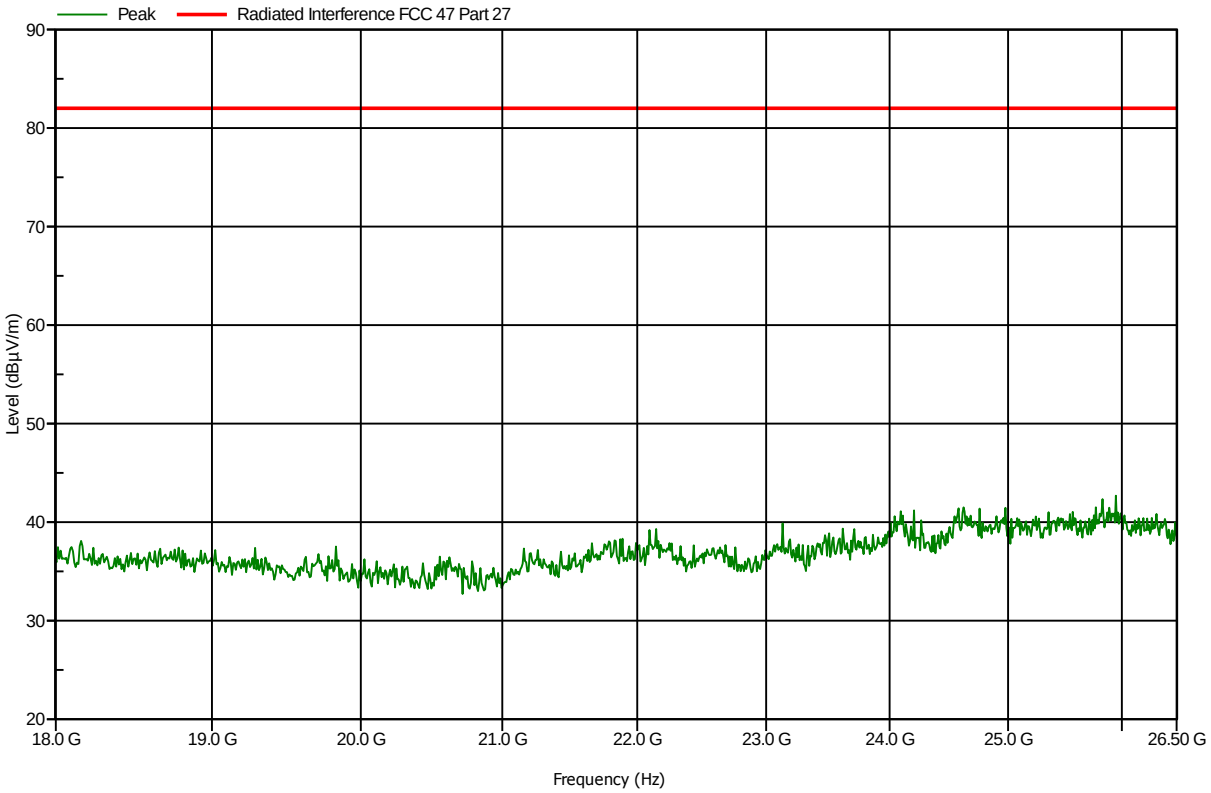
Test Results Plot No 31

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

14 MHz low 2504 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

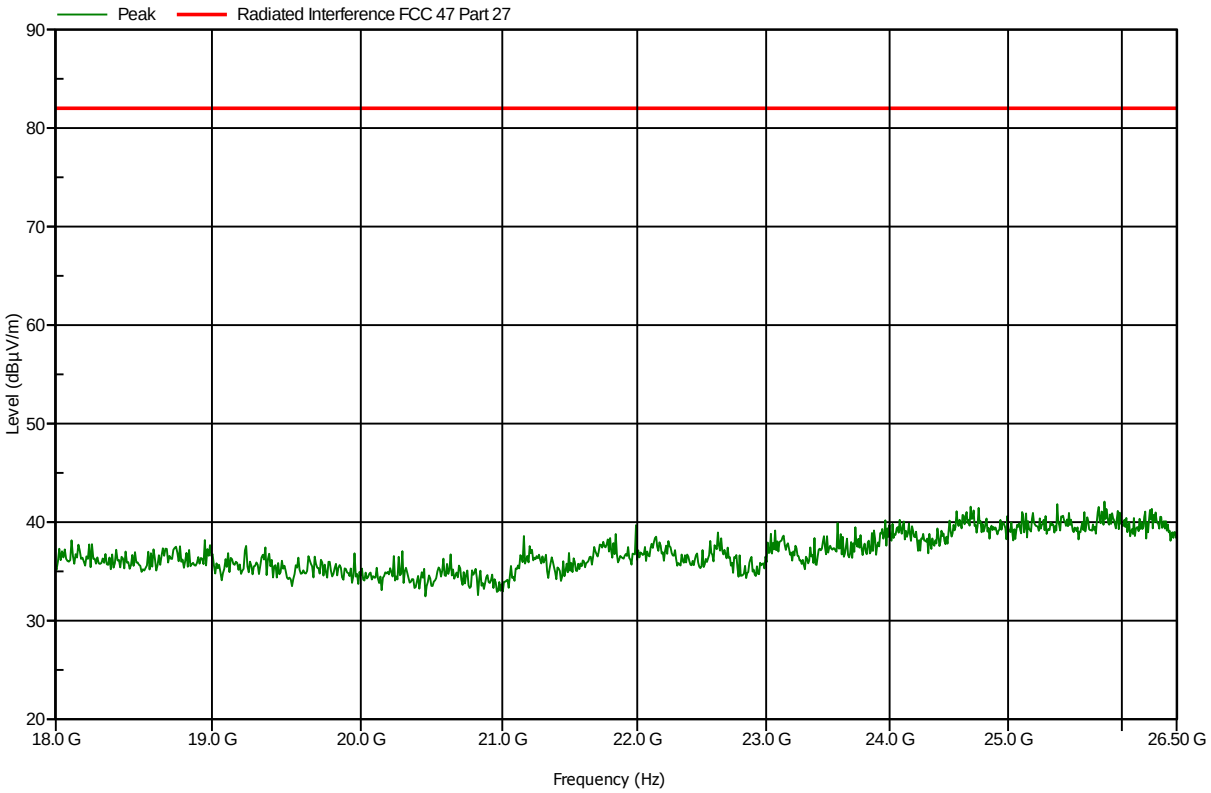
Test Results Plot No 32

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

14 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

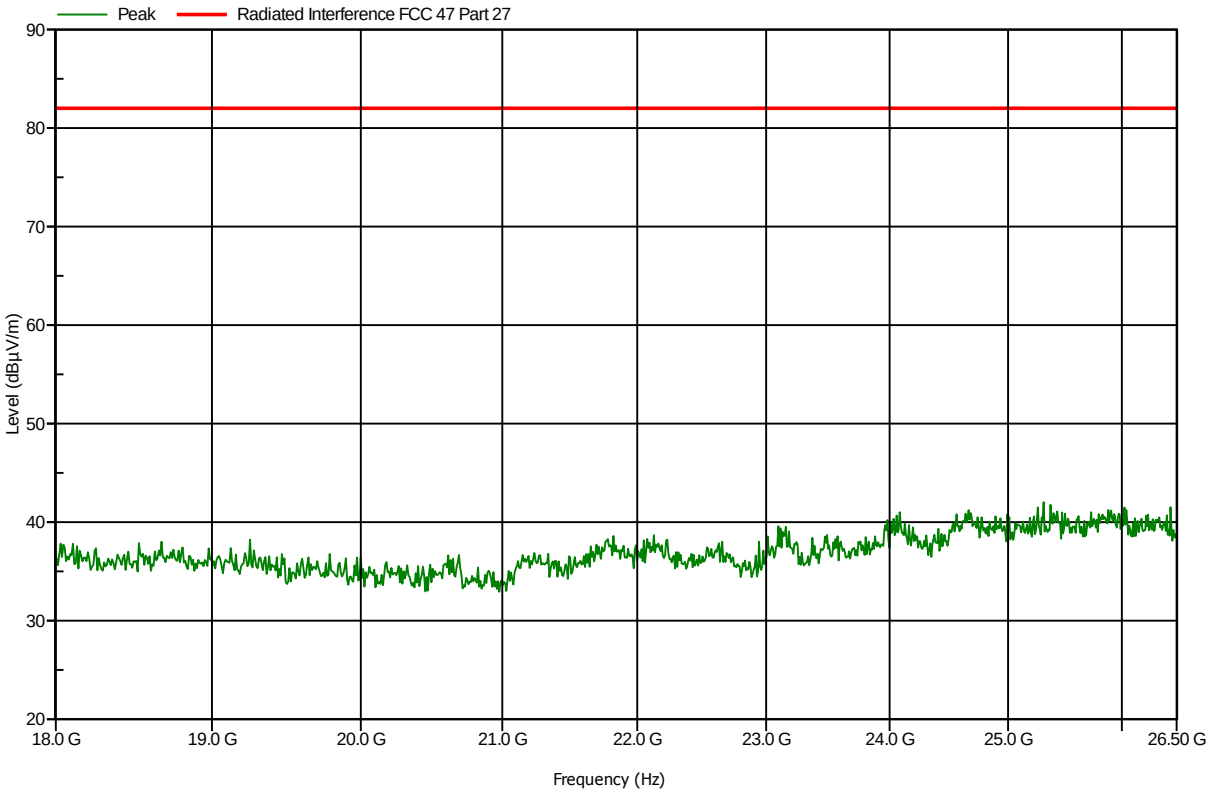
Test Results Plot No 33

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

14 MHz high 2682 MHz



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

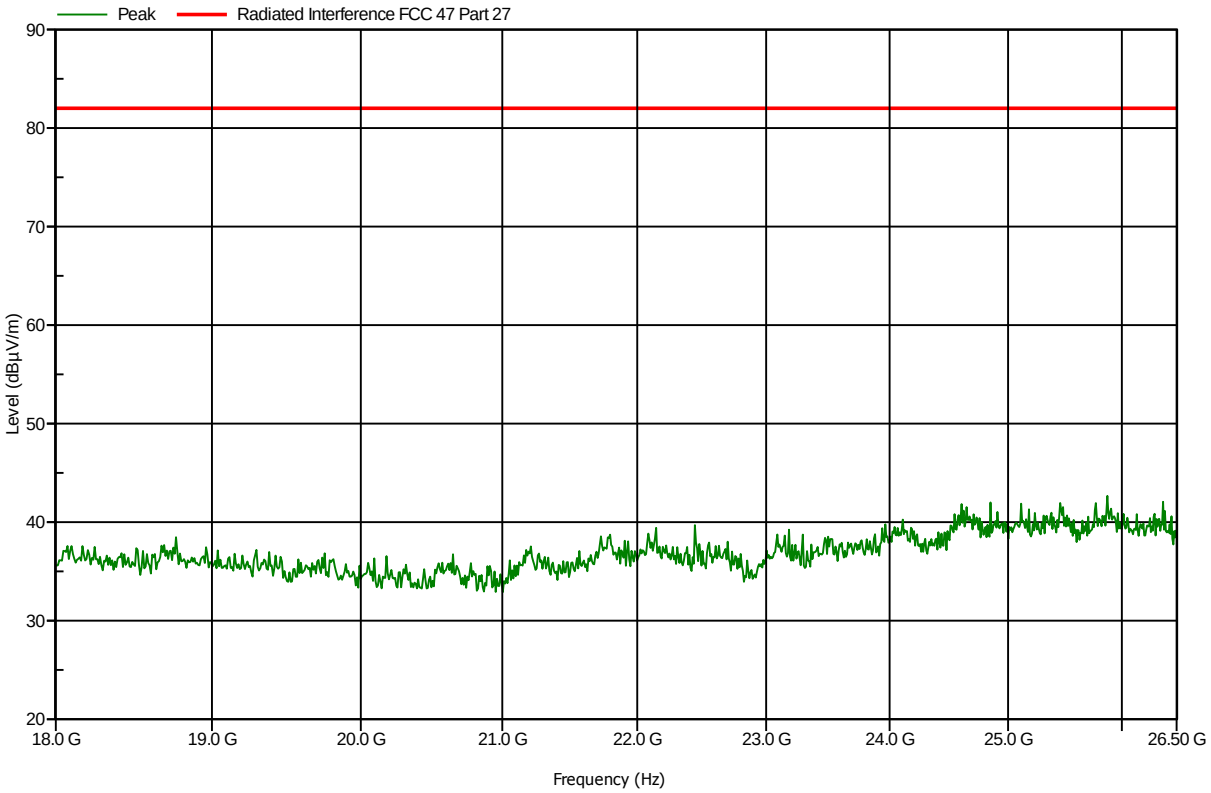
Test Results Plot No 34

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

20 MHz low 2507 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

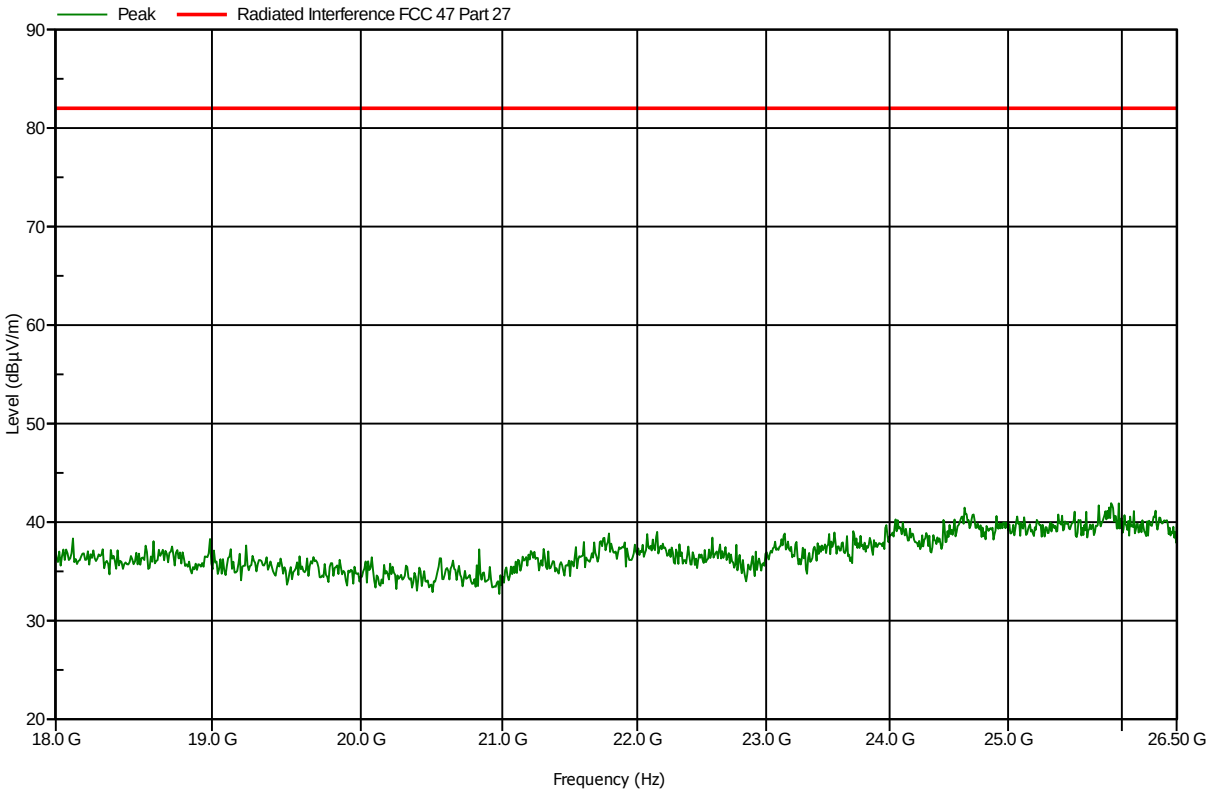
Test Results Plot No 35

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

20 MHz mid 2593 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

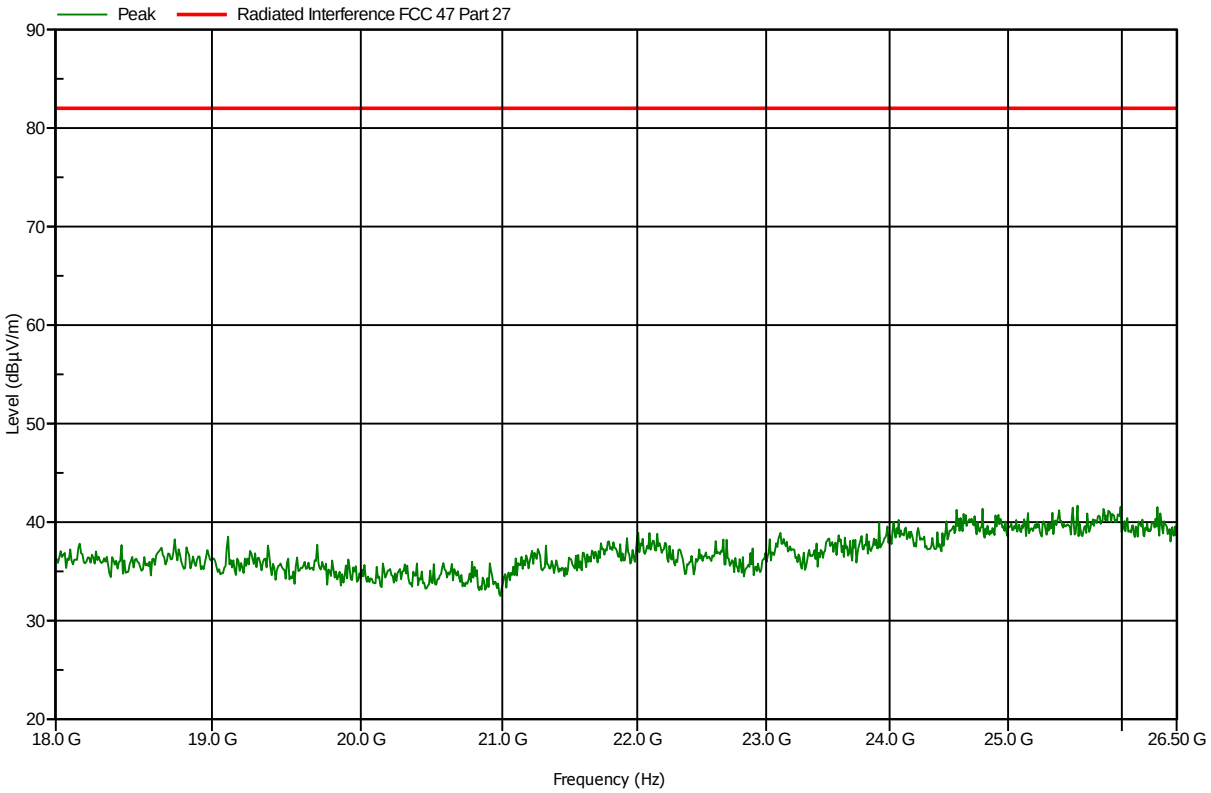
Test Results Plot No 36

FCC 47.27: 18-26.5 GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	WipAir 8000-2.5 GHz	Spect Analyzer	Agilent Technologies N9020A
S/N:	041A0400157E	Ref. Level:	80 dBµV
Date of Test:	10.11.2015	RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG1840 18-40 GHz SER-1058	Sweep Time:	Auto [85.05 ms]
Polarization:	Horizontal and Vertical	Pre Amplifier	18-26.5 GHz Pre Amplifier

TEST REMARKS: Tuesday, November 10, 2015

20 MHz high 2679 MHz



MAXIMUM RESULT DEVIATION:
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

10. FREQUENCY STABILITY WITH TEMPERATURE AND VOLTAGE VARIATION

Equipment Under Test	WipAir 8000-2.5 GHz
Test Method	According to FCC § 2.1055(a)(1), 27.54
Date	08.11.2016
Relative Humidity	40%
Ambient Temperature	25^0 C
Air Pressure	1010 hPa
Test Setup	Figure 1

Testing Engineer: I. Arbitman **Date** 08.11.2015

10.1. Test Procedure:

The EUT output was connected to the spectrum analyzer through 30db attenuator.

10.1.1. Voltage variation measurements:
The voltage to the EUT was set to +/-15% of the nominal voltage.
The output frequency was measured using spectrum analyzer and recorded in Table 53.

10.1.2. Temperature variation measurements:
The environmental chamber's temperature was reduced to -30 °C and then allows sufficient time to stabilize (approximately 20 min after chamber reaches the assigned temperature).
The temperature in the chamber was raised by 10 °C step from -30 °C to +50 °C.
The output frequency was measured using spectrum analyzer and recorded in table 53.

10.2. **Limit**

Within the Authorized Frequency block

Table 53: 20 MHz Bandwidth Test Result

		5MHz band width		10MHz band width		14MHz band width		20MHz band width	
Temperature °C	Voltage (VAC)	Frequency (MHZ)	Frequency (MHZ)	Frequency (MHZ)	Frequency (MHZ)	Frequency (MHZ)	Frequency (MHZ)	Frequency (MHZ)	Frequency (MHZ)
Nominal Frequency		2500.000	2687.000	2501.000	2685.000	2504.000	2682.000	2507.000	2679.000
25	93.5	2500.003	2687.008	2500.993	2684.986	2504.010	2682.000	2507.003	2679.007
25	110	2500.003	2687.008	2500.993	2684.986	2504.010	2682.000	2507.003	2679.007
25	126.5	2500.003	2687.008	2500.993	2684.986	2504.010	2682.000	2507.003	2679.007
-30	110	2500.011	2687.015	2500.002	2684.995	2504.017	2682.007	2507.011	2679.013
-20	110	2500.008	2687.012	2500.998	2684.992	2504.015	2682.005	2507.009	2679.011
-10	110	2500.007	2687.011	2500.996	2684.990	2504.015	2682.004	2507.006	2679.010
0	110	2500.006	2687.010	2500.996	2684.987	2504.012	2682.003	2507.003	2679.009
10	110	2500.004	2687.009	2500.993	2684.986	2504.010	2682.003	2507.003	2679.008
20	110	2500.003	2687.007	2500.994	2684.986	2504.012	2682.001	2507.001	2679.009
30	110	2500.001	2687.005	2500.992	2684.983	2504.009	2681.999	2507.002	2679.007
40	110	2500.000	2687.002	2500.990	2684.983	2504.009	2681.998	2507.001	2679.005
50	110	2500.000	2687.002	2500.988	2684.981	2504.007	2681.997	2507.000	2679.003