

Produkte
Products

Prüfbericht - Nr.:		19660380 001		Seite 1 von 39	
<i>Test Report No.:</i>				<i>Page 1 of 39</i>	
Auftraggeber:		The Kroger Co.			
<i>Client:</i>		11450 Grooms Rd., Blue Ash, OH 45242, United States			
Gegenstand der Prüfung:		Gen 3 Zooter			
<i>Test item:</i>					
Bezeichnung:		SRG3APWC	Serien-Nr.:		Engineering Sample
<i>Identification:</i>			<i>Serial No.</i>		
Wareneingangs-Nr.:		1803307436	Eingangsdatum:		16.03.2018
<i>Receipt No.:</i>			<i>Date of receipt:</i>		
Prüfart:		Refer Page 5 of 39 for test facilities			
<i>Testing location:</i>					
Prüfgrundlage:		FCC Part 15 Subpart E 15.407			
<i>Test specification:</i>		ANSI C63.10-2013			
Prüfresultat:		Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).			
<i>Test Result:</i>		<i>The test items passed the test specification(s).</i>			
Prüflaboratorium:		TÜV Rheinland (India) Pvt. Ltd.			
<i>Testing Laboratory:</i>		27/B, 2nd corss, Electronic City Phase 1 Bangalore – 560 100. India FCC Test Site Registration no.: 496599			
geprüft / tested by:			kontrolliert / reviewed by:		
16.03.2018	Girish Kumar G Engineer 		04.06.2018	Saibaba Siddapur Assistant Manager 	
Datum	Name/Stellung	Unterschrift	Datum	Name/Stellung	Unterschrift
<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>	<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>
Sonstiges / Other Aspects:		FCC ID :PBR-SZG3APWC, On receipt the equipment was in good condition			
Abkürzungen:		P(ass) = entspricht Prüfgrundlage		Abbreviations:	
F(ail) = entspricht nicht Prüfgrundlage		N/A = nicht anwendbar		P(ass) = passed	
N/T = nicht getestet				F(ail) = failed	
				N/A = not applicable	
				N/T = not tested	
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.					
<i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					

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 IndiaTel.: +9180 6723 3500 · Fax: +9180 6723 3542 · Web: <https://www.tuv.com>

TEST SUMMARY

Section	Test item	Result	Remarks
15.407 (a)	Emission Bandwidth	Pass	Gen 3 Zooter contains both FCC certified and uncertified radio modules, hence antenna port measurements of certified modules are excluded. Refer FCC ID of the radio modules listed in the below table.
15.407 (a)	Maximum conducted output power	Pass	
15.407 (a)	Maximum Power spectral density	Pass	
15.407 (b) / (15.205 &15.209)	Restricted bands of emission and Restricted bands of operation	Pass	
15.207	Conducted emission on A.C power lines	NA	

NA -> Not Applicable, as DUT will power on over PoE

Gen 3 Zooter has integrated with following certified radio modules:

SI No.	Radio Protocol	FCC ID	Tested By	Report Number
1	ZigBee	PBR-SZMDLNR1	TUV Rheinland India	01200091 001
2	ZigBee	PBR-SZMDLM3BR1	TUV Rheinland India	19660372 001
3	ZigBee	PBR-SZMDLM3BR1	TUV Rheinland India	19660372 001
4	BLE	PBR-SZMDLBTNR1	TUV Rheinland India	19660372 001

Table of Contents

1	GENERAL REMARKS	4
1.1	Complimentary Materials.....	4
2	TEST SITES	5
2.1	Testing Facilities.....	5
2.2	List of Test and Measurement Instruments.....	5
3	GENERAL PRODUCT INFORMATION	6
3.1	Product Function and Intended Use.....	6
3.2	Ratings and System Details	6
3.3	Measurement Uncertainty:	6
4	TEST SET-UP AND OPERATION MODE	7
4.1	Principle of Configuration Selection	7
4.2	Test Operation and Test Software	7
4.3	Special Accessories and Auxiliary Equipment	7
4.4	Countermeasures to achieve EMC Compliance	7
4.5	Test modes – data rates and modulations	7
4.6	List of Frequencies and Frequency bands	7
5	RADIATED TEST METHODOLOGY	8
5.1	Radiated Emission Test	8
5.1.1	Test Setup Configuration	8
6	TEST RESULTS	11
6.1	Emission Bandwidth	11
6.2	Maximum Conducted Output Power	22
6.3	Maximum Power Spectral density	28
6.4	Restricted bands of emissions & restricted bands of operation	34
7	LIST OF TABLES	39
8	LIST OF FIGURES	39

1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report.

APPENDIX 1: TEST SETUP PHOTOS

APPENDIX 2: EUT EXTERNAL PHOTOS

APPENDIX 3: EUT INTERNAL PHOTOS

APPENDIX 4: FCC LABEL AND LABEL LOCATION

APPENDIX 5: BLOCK DIAGRAM

APPENDIX 6: SPECIFICATION OF EUT

APPENDIX 7: SCHEMATIC DIAGRAM

APPENDIX 8: BILL OF MATERIAL

APPENDIX 9: USER MANUAL

APPENDIX 10: MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

2 TEST SITES

2.1 Testing Facilities

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

2.2 List of Test and Measurement Instruments

Table 1: Test and measurements instrument used

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
Signal Analyser	Rohde & Schwarz	FSV7	101644	15.12.2018	Yearly	Antenna - Port Measurements
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	24-10-2018	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	15-01-2019	Yearly	
Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	9124-656	09-01-2019	Yearly	
Log-Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP-9111B	9111B-111	16-01-2019	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	16-09-2018	Yearly	
Emission Horn Antenna	ETS Lindgren	116706	00107323	22-06-2018	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Gen 3 Zooter (SRG3APWC) has cameras integrated in the product, which will be used for the displaying 360-degree view through LAN port/server. SRG3APWC also has three ZigBee modules mounted on it. These ZigBee Modules are used for wireless data communication with other ZigBee device. SRG3APWC also has BLE module mounted on it which can be used to communicate to the other BLE devices. Apart from all these, SRG3APWC also contains Wi-Fi modules. It has two Wi-Fi modules mounted on it supporting a, b, and g mode. These two Wi-Fi modules are capable of communicating over six channels simultaneously, creating a high speed/throughput Wireless connectivity network. SRG3APWC is used as a camera and wireless access point.

Note: This product supports simultaneous transmission operation.

3.2 Ratings and System Details

Table 2: Ratings and System Details

Operating frequency range	5150 MHz – 5250 MHz
Radio Protocol	Wi-Fi (802.11a)
Verified Power	15.71 dBm
Channel Spacing	20 MHz
Modulation	OFDM
Number of antennas	2
Antenna type	PCB
Antenna gain	4.32 dBi (Tx) 4.60 dBi (Rx)
Supply Voltage to Product	+56 VDC, 4 pair Power over Ethernet
Environmental conditions	Temp: 5°C to 40°C Humidity: 20%-80% RH

3.3 Measurement Uncertainty:

Table 3: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 °C
Supply Voltages	±3 %
Time	±5 %

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle transmission on low, mid and high channels to obtain maximum emissions.

4.2 Test Operation and Test Software

Testing software was used to enable the continuous transmission on low/mid/high channels for Wi-Fi.

Test Software, Software Version, Hardware Version used:

Protocol	Software used for TX	Software Version	Hardware Version
Wi-Fi	RTP Utility	1	1

4.3 Special Accessories and Auxiliary Equipment

- None

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 Test modes – data rates and modulations

For Radiated spurious emissions only the worst case results are reported in this report

4.6 List of Frequencies and Frequency bands

Protocol	Frequency Band (MHz)	Channel Number	Channel Frequency
802.11a (5GHz a mode)	U-NII-1 5.15 – 5.25 GHz	36	5180
		38	5190
		40	5200
		42	5210
		44	5220

Table 4: List of Wi-Fi Center Frequencies

Note:

- The test was performed with +16 dBm power settings during transmission.
- Testing was performed on the sample with the TUV Identification Number : 1803307436-1-1-1

5 RADIATED TEST METHODOLOGY

5.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and mesurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

5.1.1 Test Setup Configuration

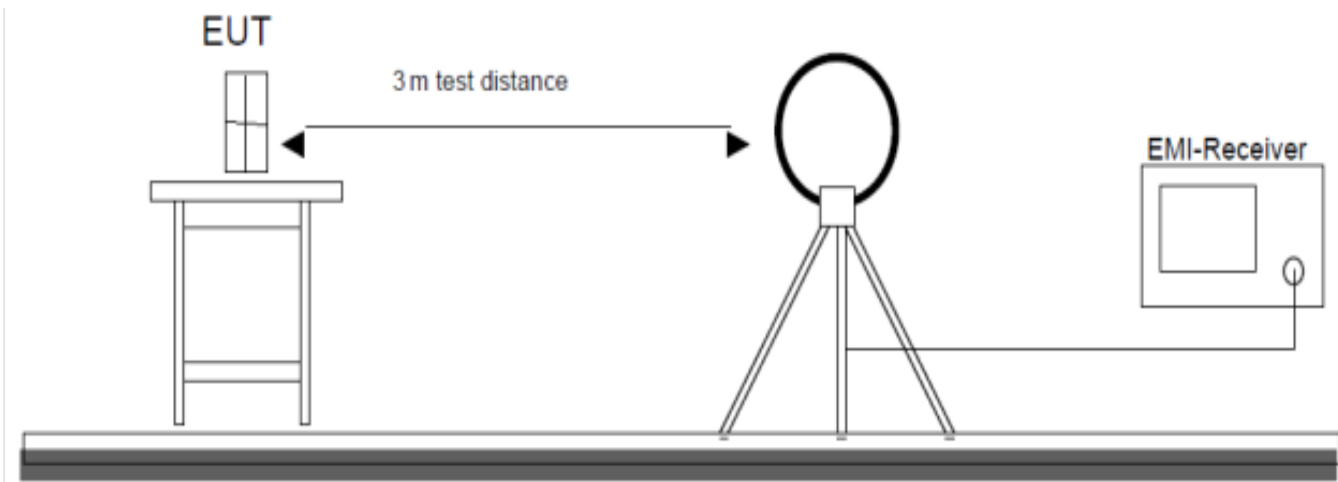


Figure 1: Frequency Range 9 kHz- 30 MHz

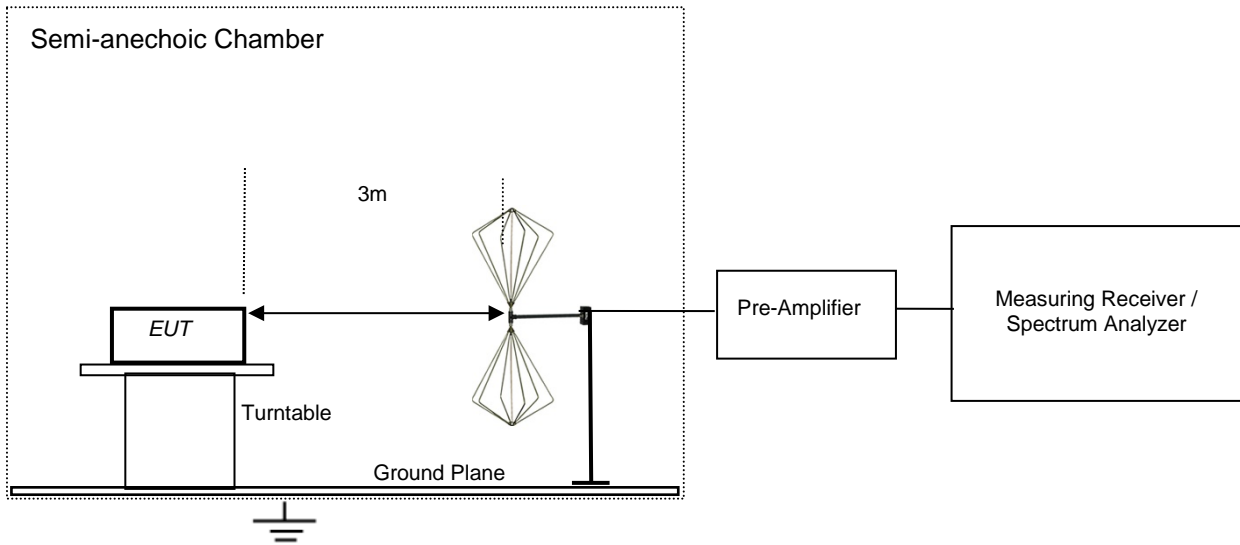


Figure 2: Frequency Range 30 MHz – 200 MHz

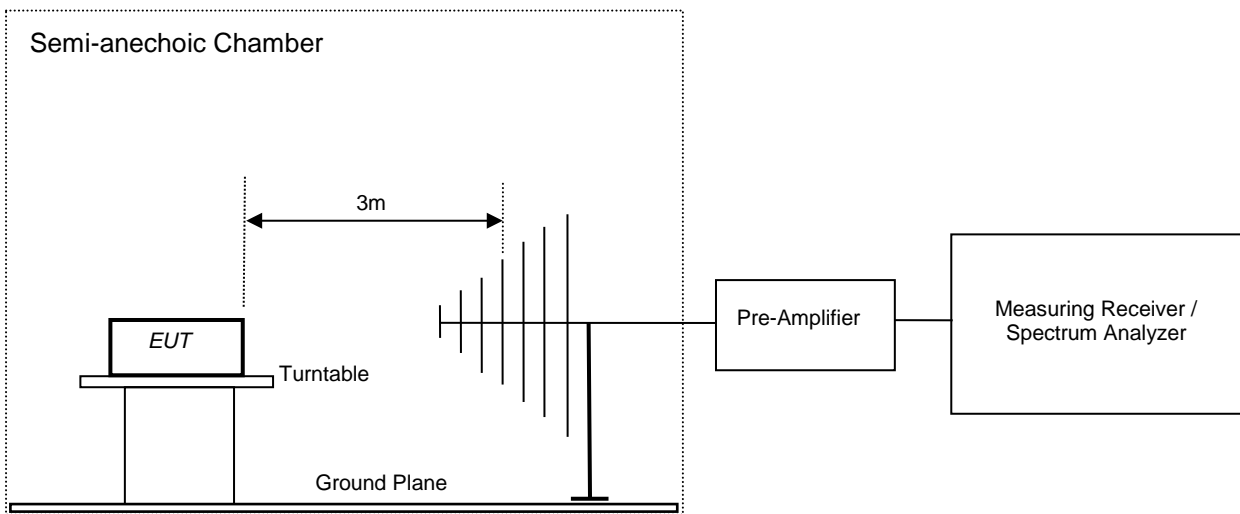


Figure 3: Frequency Range 200 MHz - 1GHz

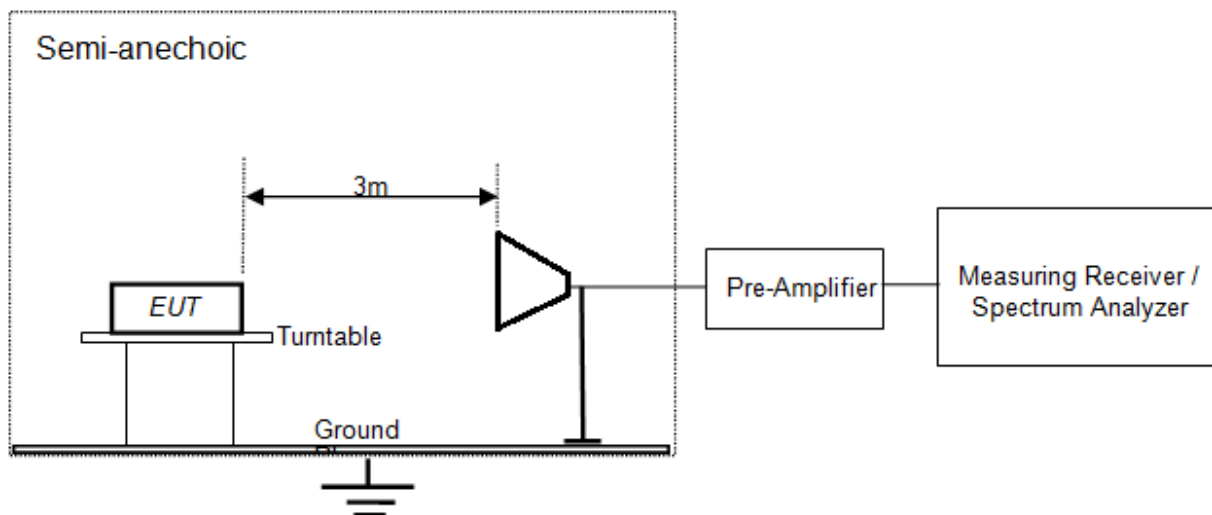


Figure 4: Frequency Range above 1 GHz

6 Test Results

6.1 Emission Bandwidth

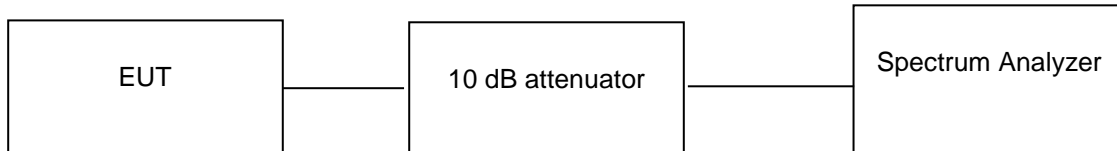
Section 15.407(a)

Result

Pass

Test Specification FCC part 15 Subpart C 15.407 (a)
Measurement Bandwidth 300kHz/1 MHz

Test Method:



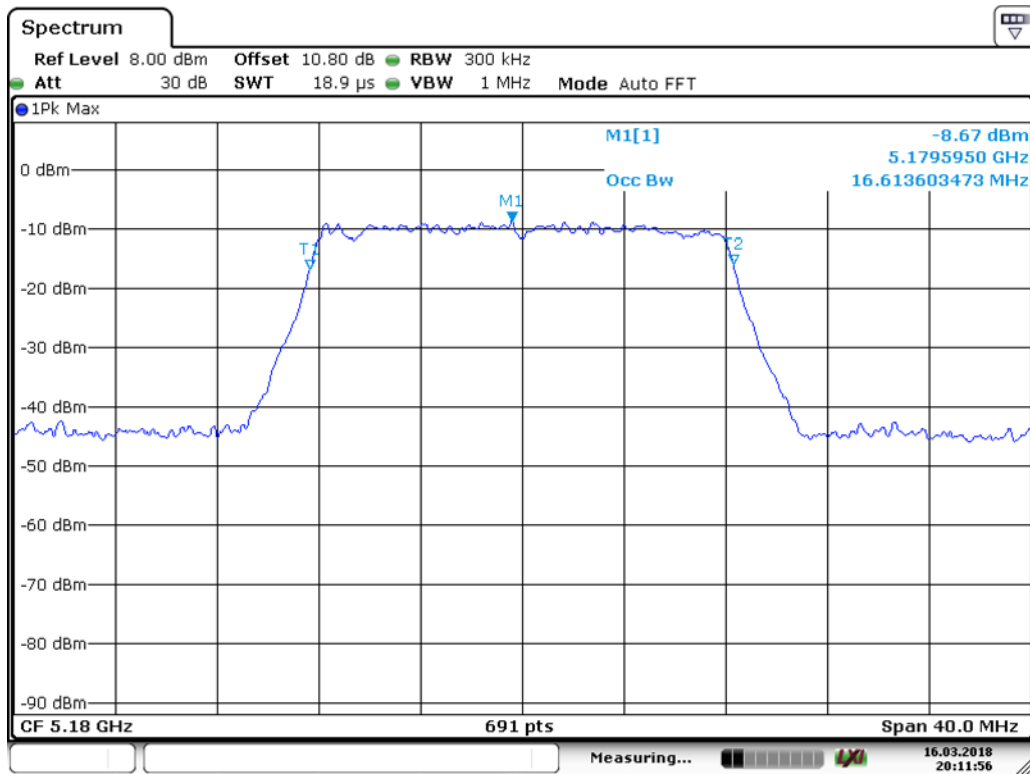
Test Results:

10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

Note: Measurements were made as per section C in KDB 789033 D02 General UNII Test Procedures New Rules v02r01

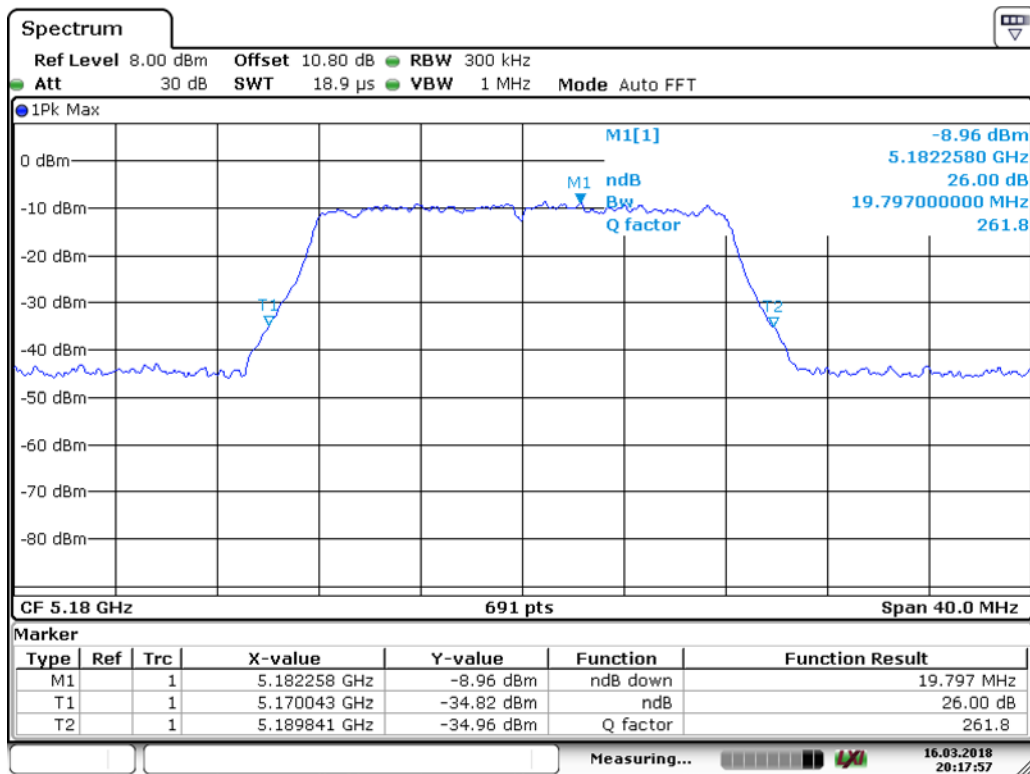
Protocol: 802.11a

Data Rate (Mbps)	Channel. No	Frequency (MHz)	EBW (MHz)	OBW (MHz)
6	36	5180	19.797	16.613
	40	5200	19.740	16.613
	44	5220	19.797	16.555
24	36	5180	19.508	16.555
	40	5200	19.624	16.497
	44	5220	19.566	16.555
54	36	5180	19.276	16.555
	40	5200	19.161	16.555
	44	5220	19.450	16.555



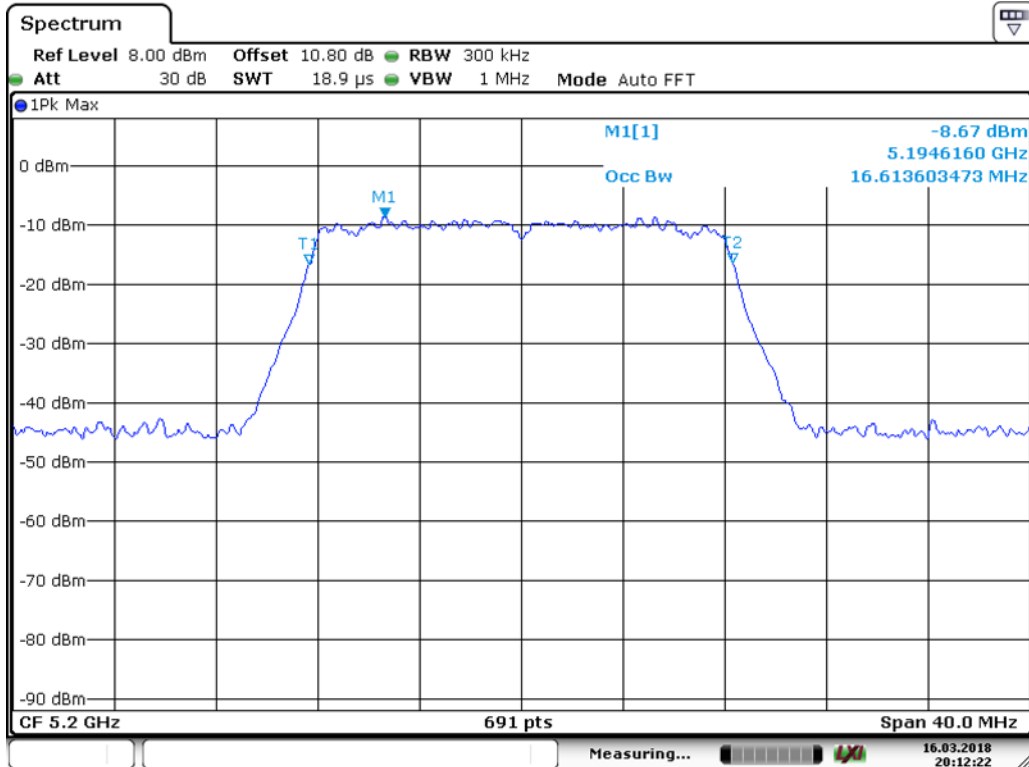
6 Mbps Channel low – 5180 MHz

OBW



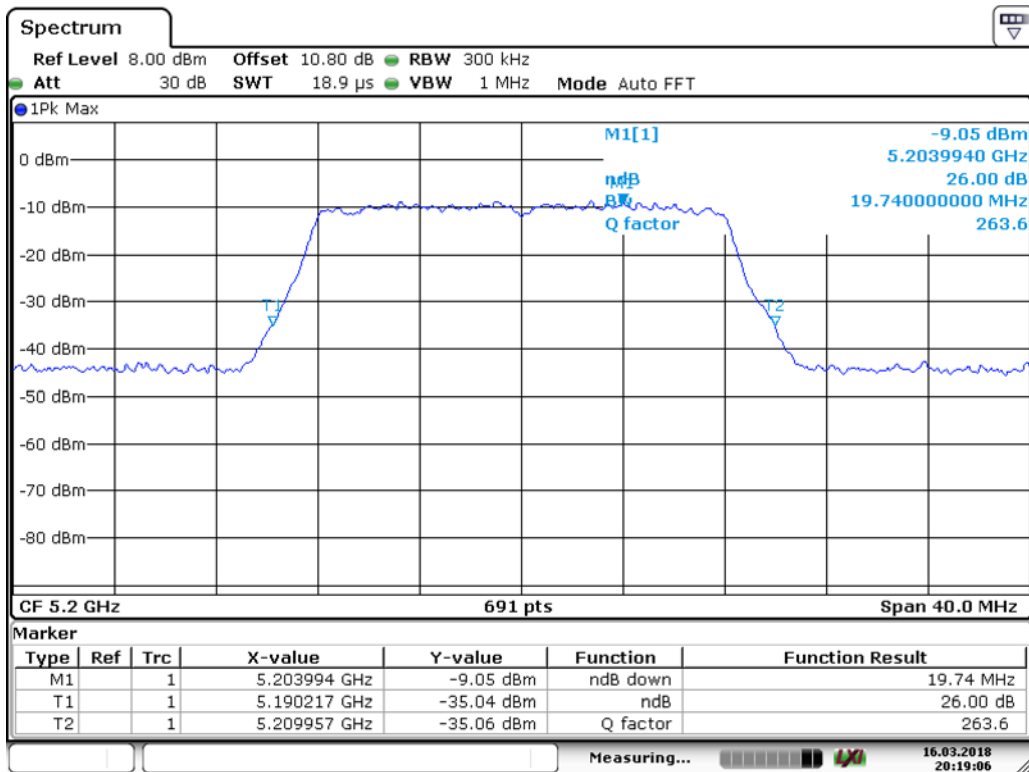
6 Mbps Channel low – 5180 MHz

26 dB Bandwidth



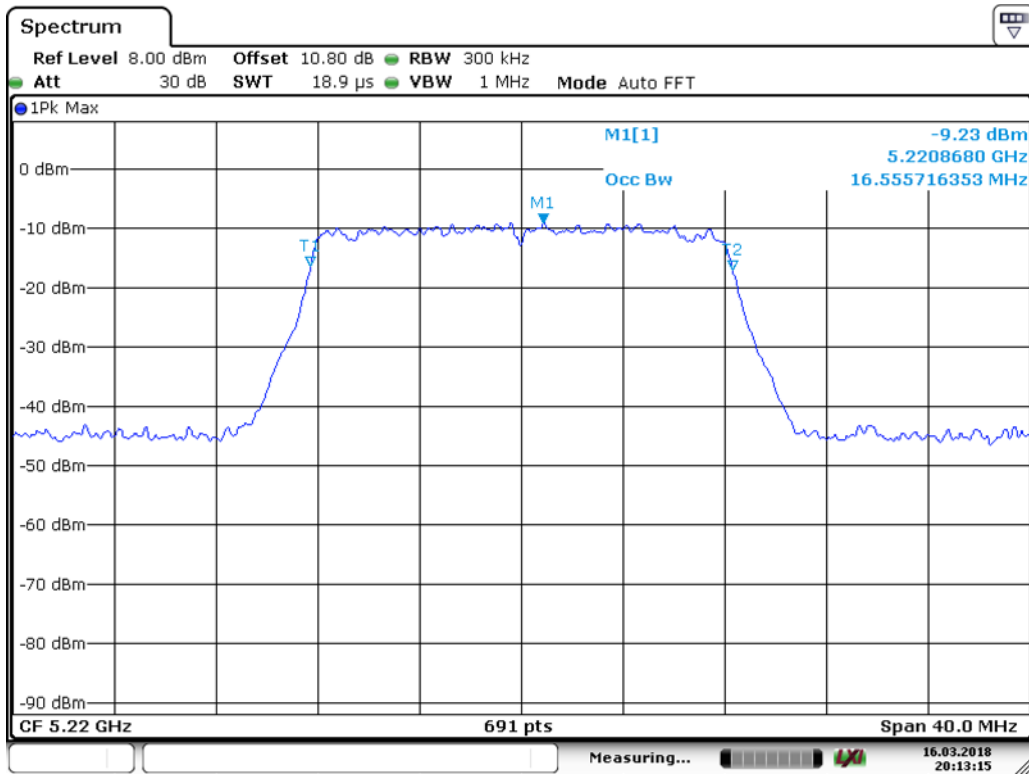
6 Mbps Channel mid – 5200 MHz

OBW



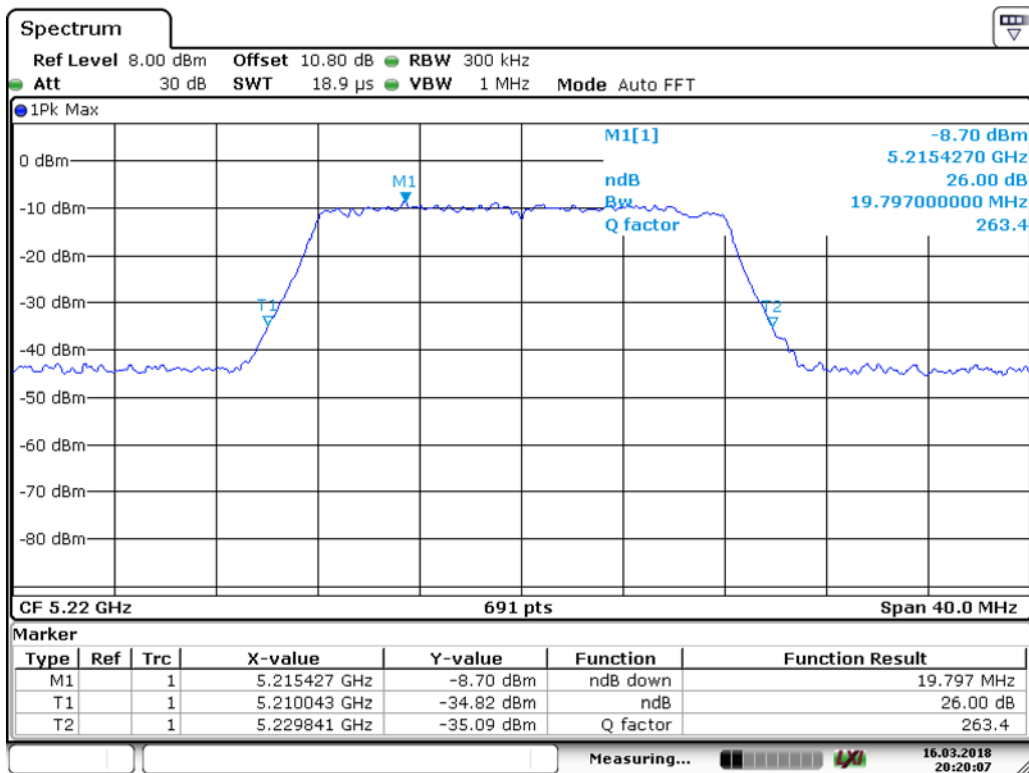
6 Mbps Channel mid – 5200 MHz

26 dB Bandwidth



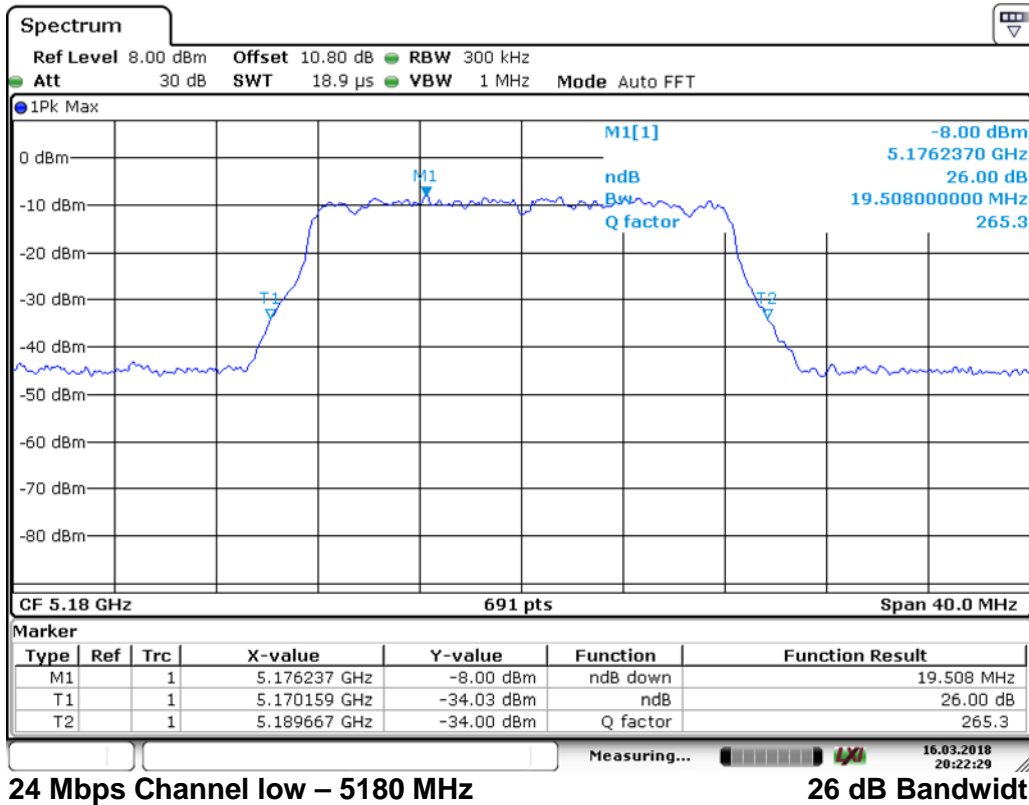
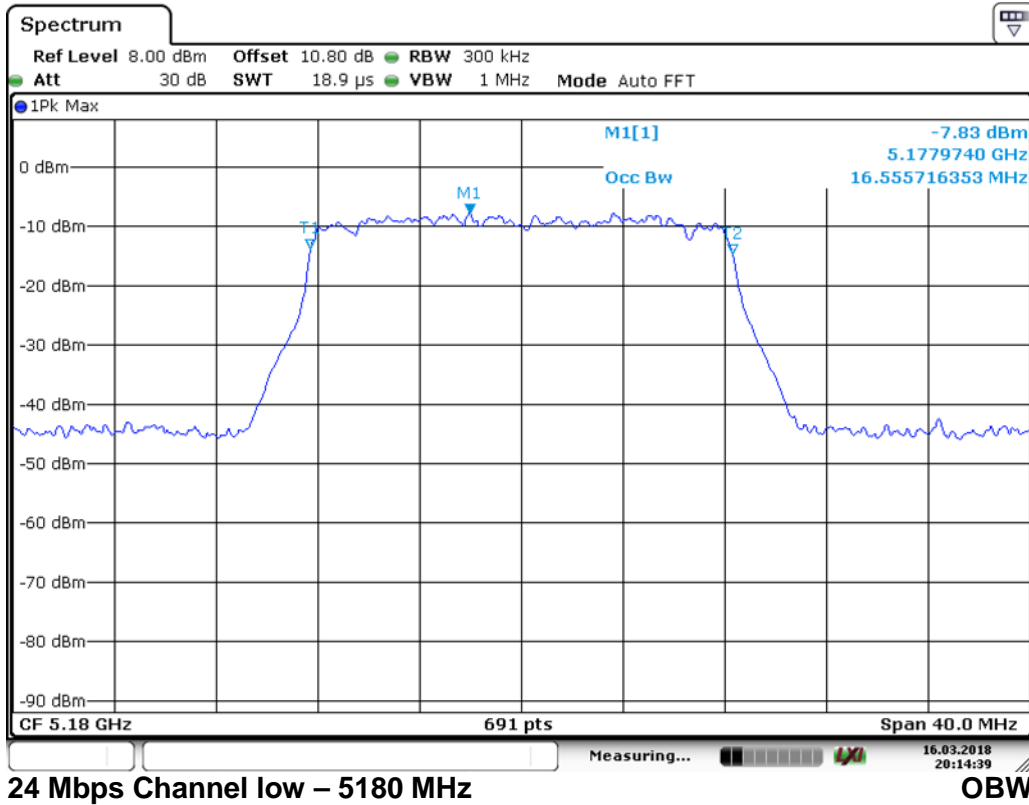
6 Mbps Channel High – 5220 MHz

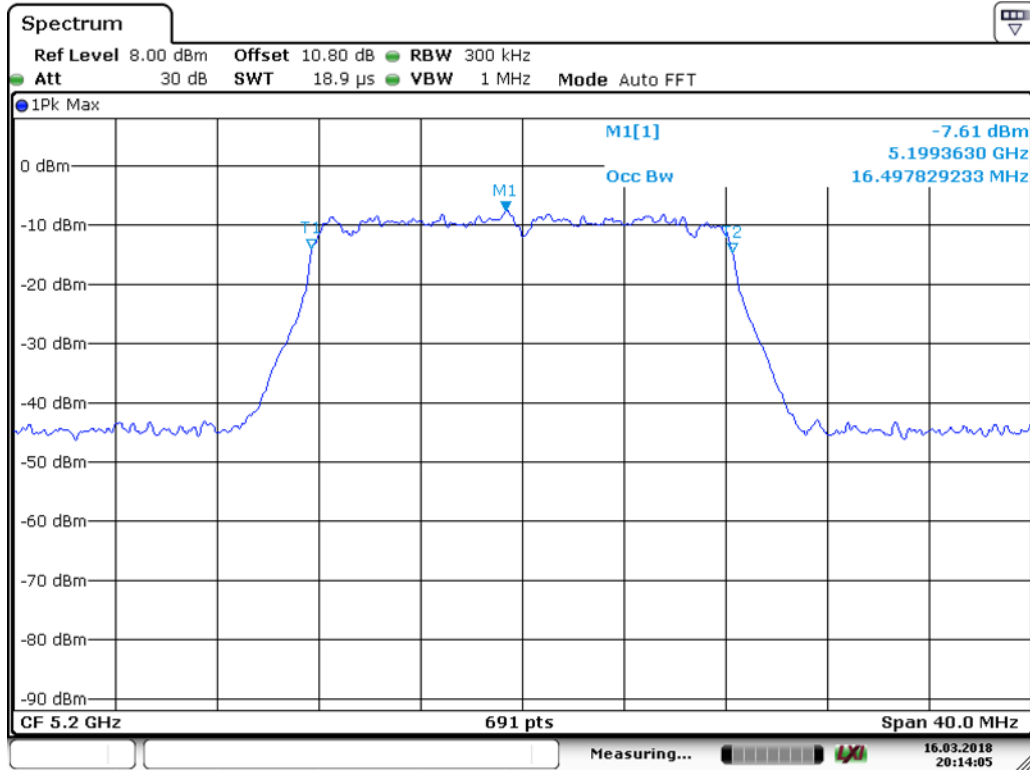
OBW



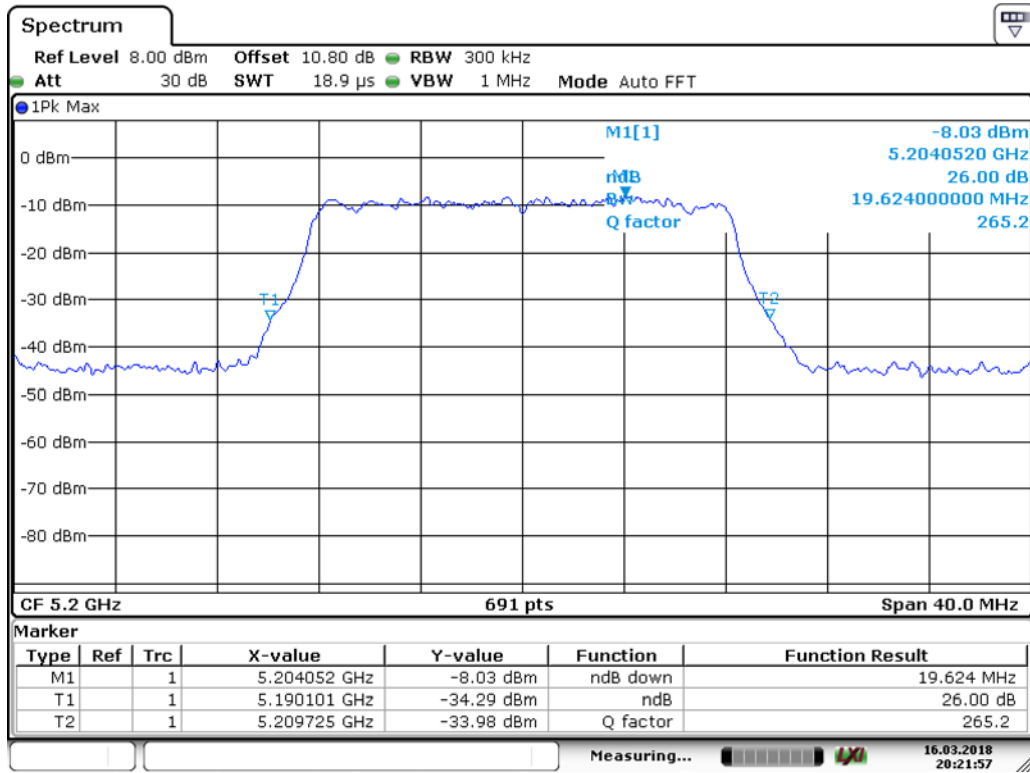
6 Mbps Channel High – 5220 MHz

26 dB Bandwidth

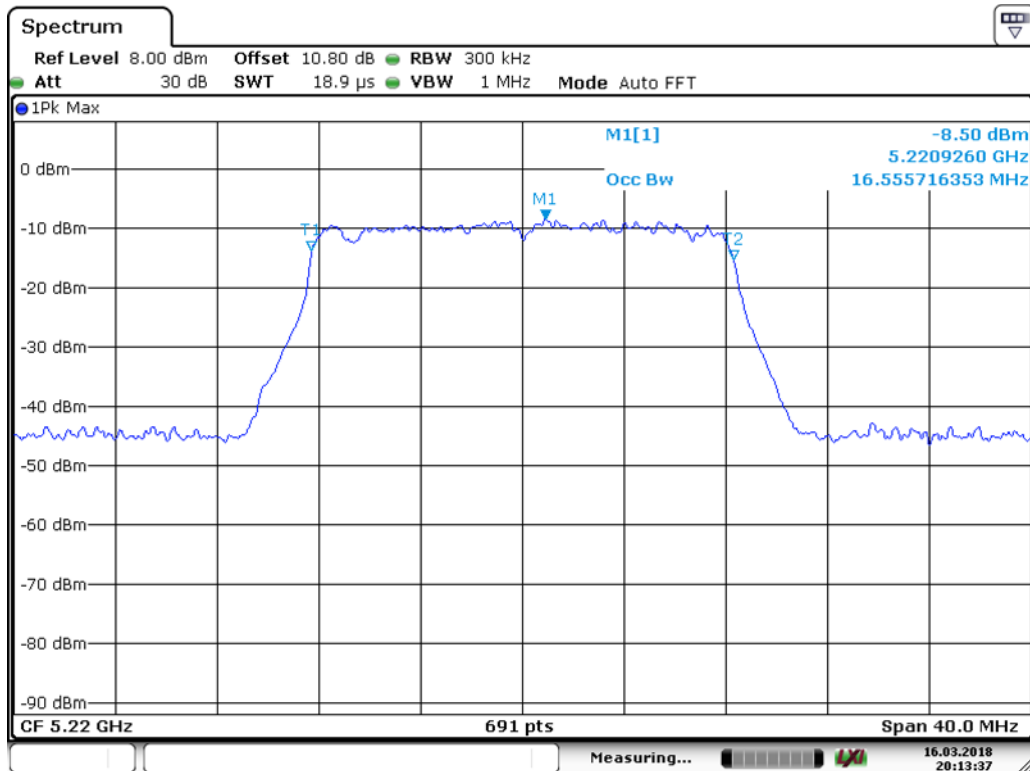




OBW

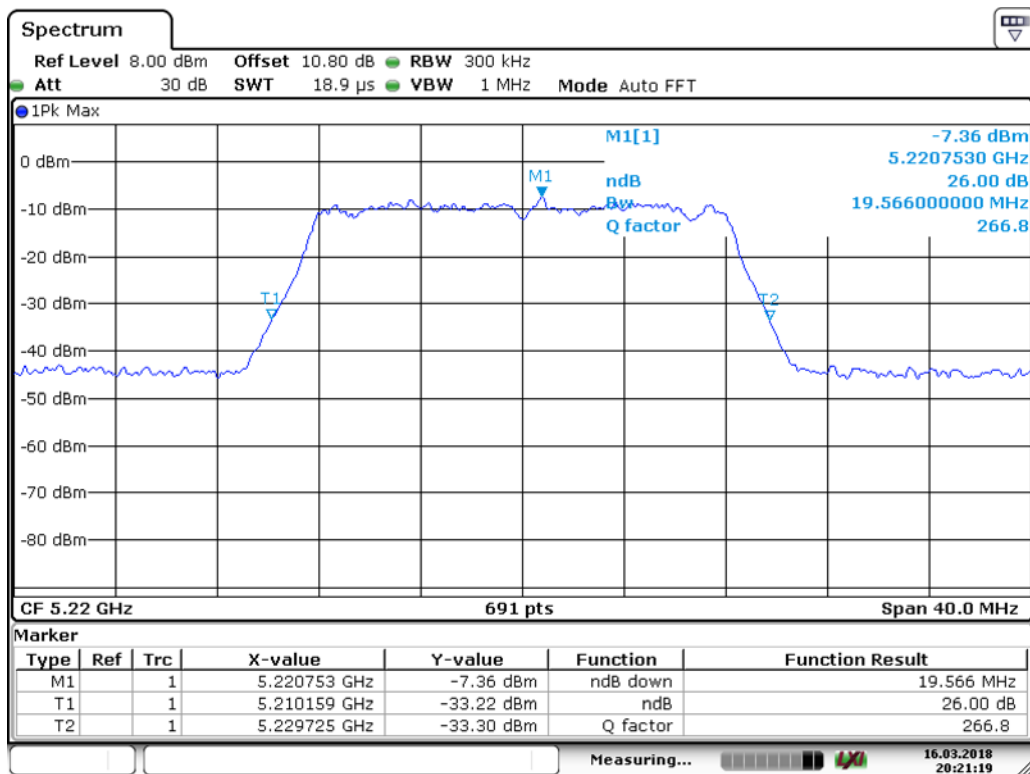


26 dB Bandwidth



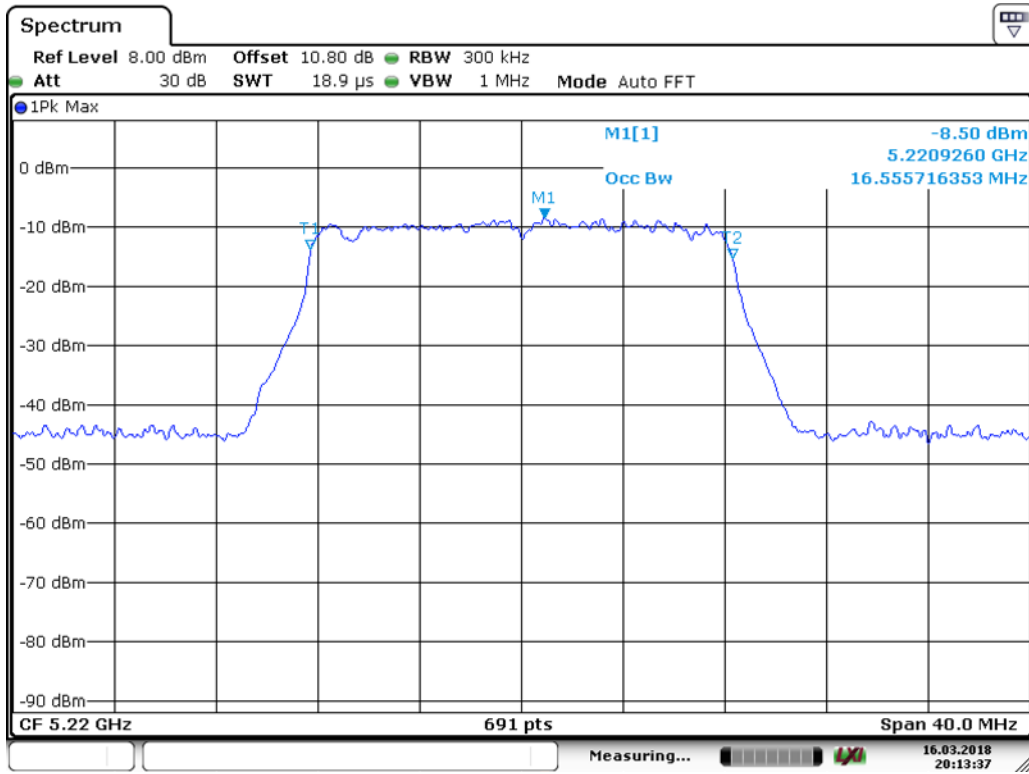
24 Mbps Channel mid – 5220 MHz

OBW



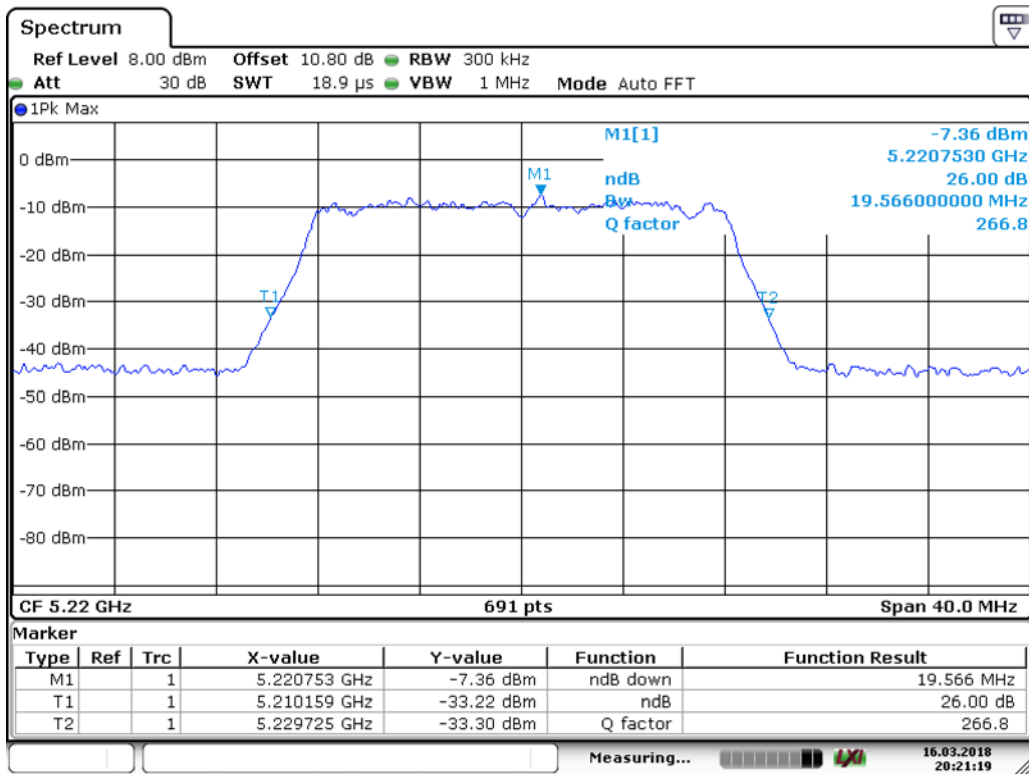
24 Mbps Channel mid – 5200 MHz

26 dB Bandwidth



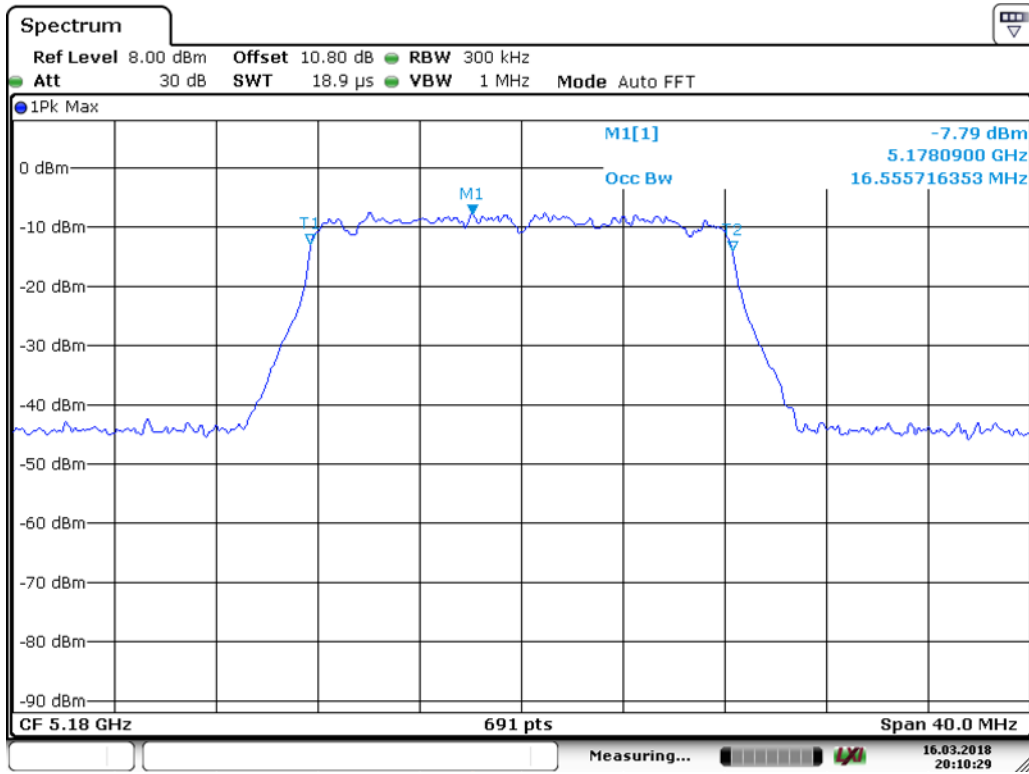
24 Mbps Channel High – 5220 MHz

OBW



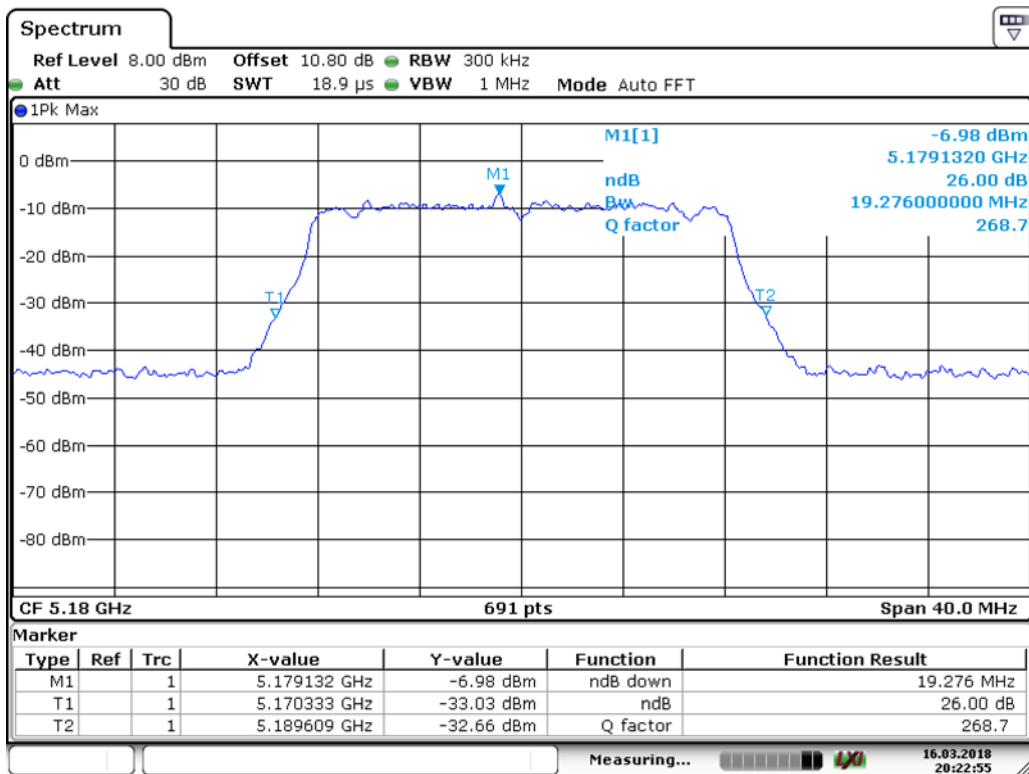
24 Mbps Channel High – 5220 MHz

26 dB Bandwidth



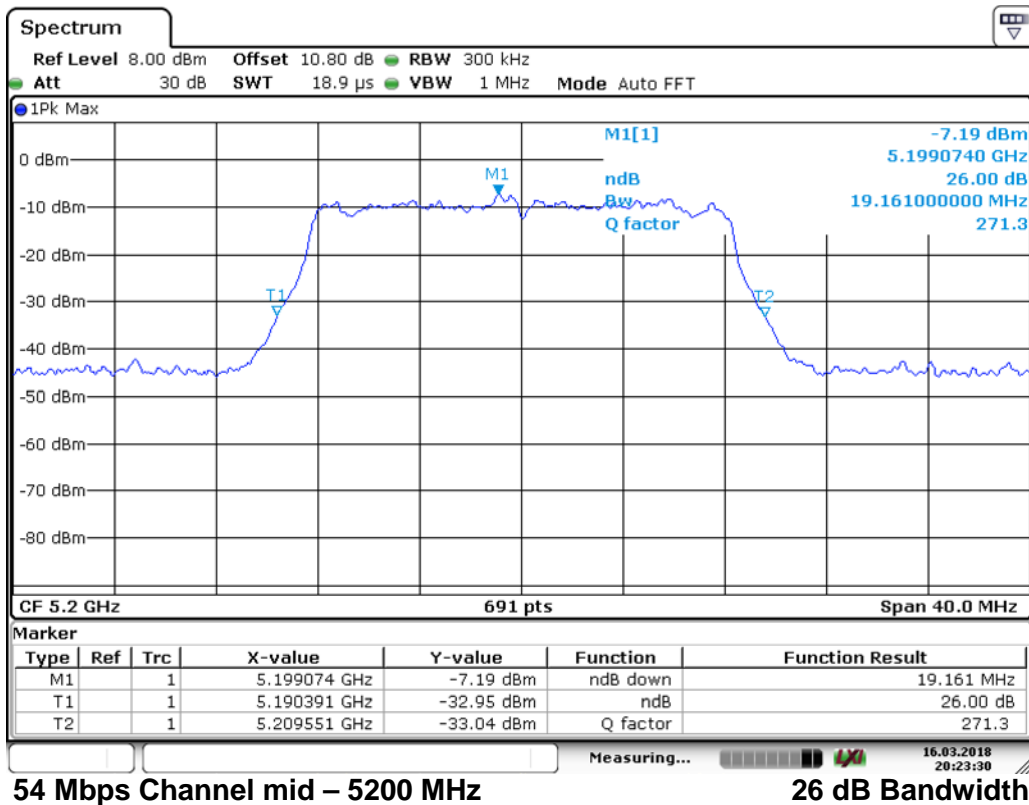
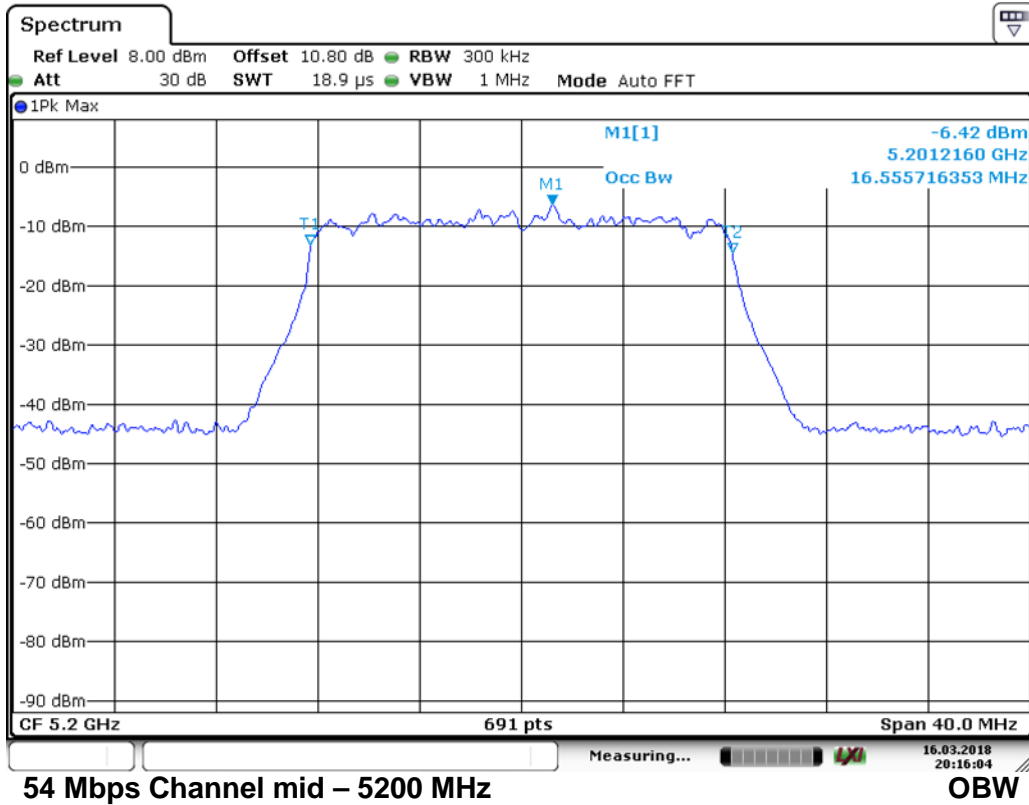
54 Mbps Channel Low – 5180 MHz

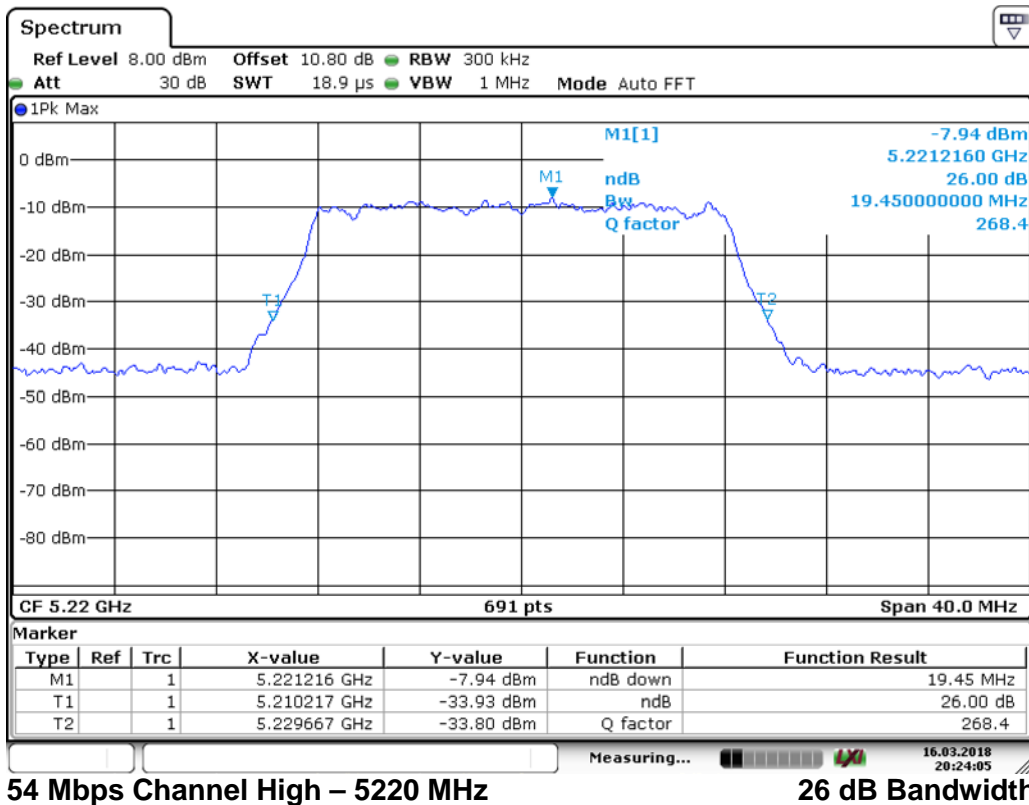
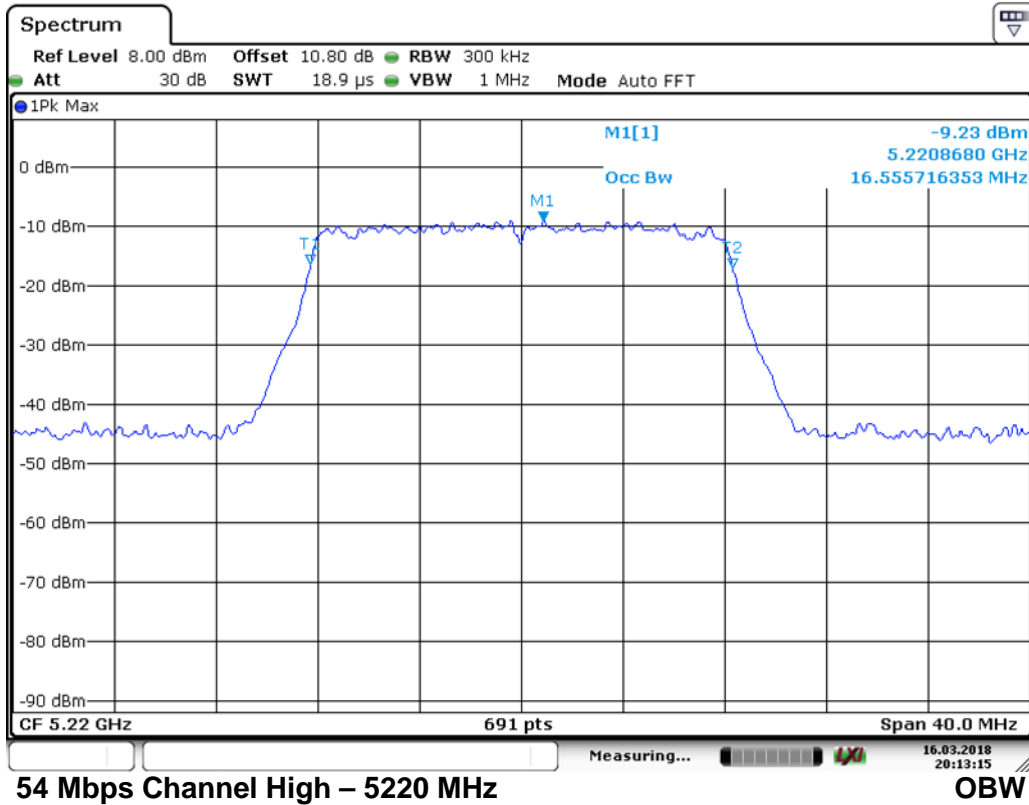
OBW



54 Mbps Channel Low – 5180 MHz

26 dB Bandwidth





6.2 Maximum Conducted Output Power

Section 15.407(a)

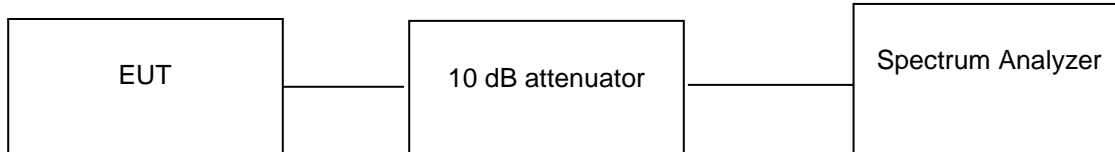
Result

Pass

Test Specification
Measurement Bandwidth
Requirement

FCC Part 15 Subpart E
1 MHz
For the band 5150 - 5350 MHz, 5470 – 5725 MHz, 5725 – 5850 MHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4dBm + 10log B, where B is the 26- dB emission bandwidth in MHz

Test Method:



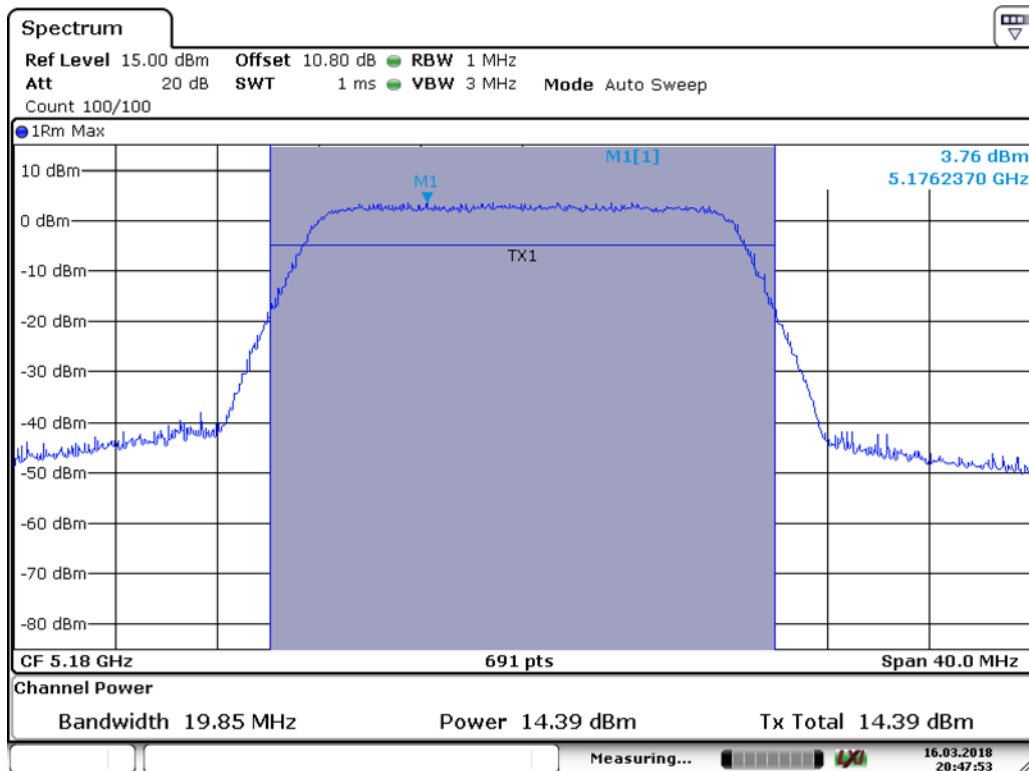
Test results:

10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

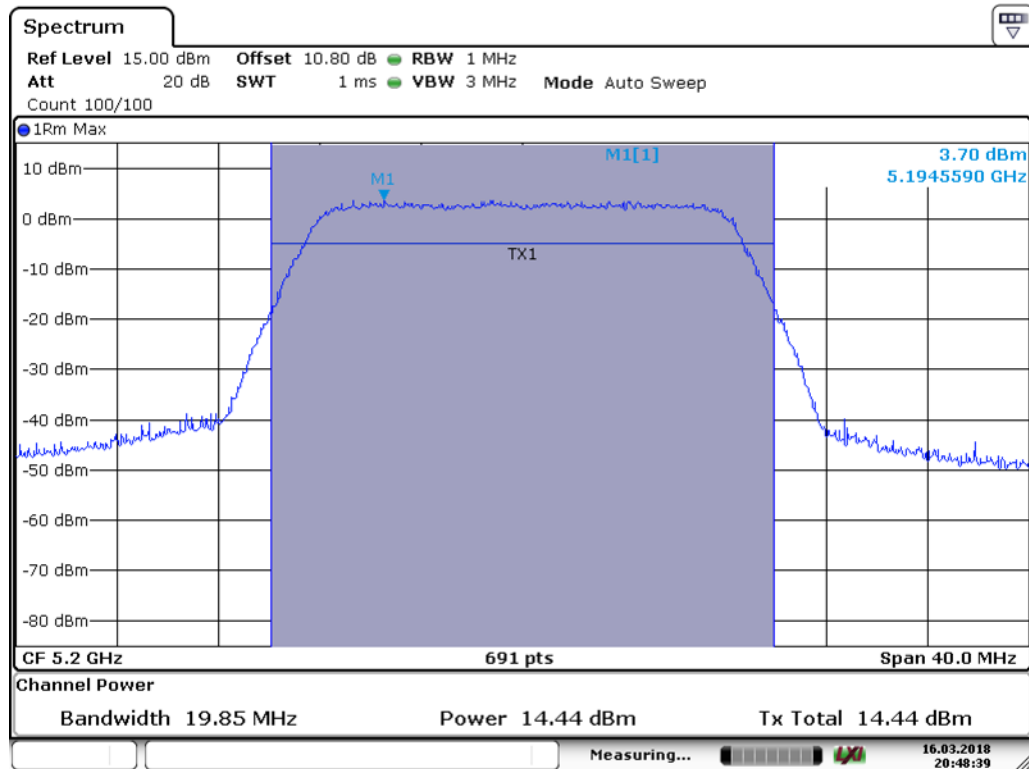
Note: Measurements were made as per section E (2) (b) in KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Modulation: 802.11a

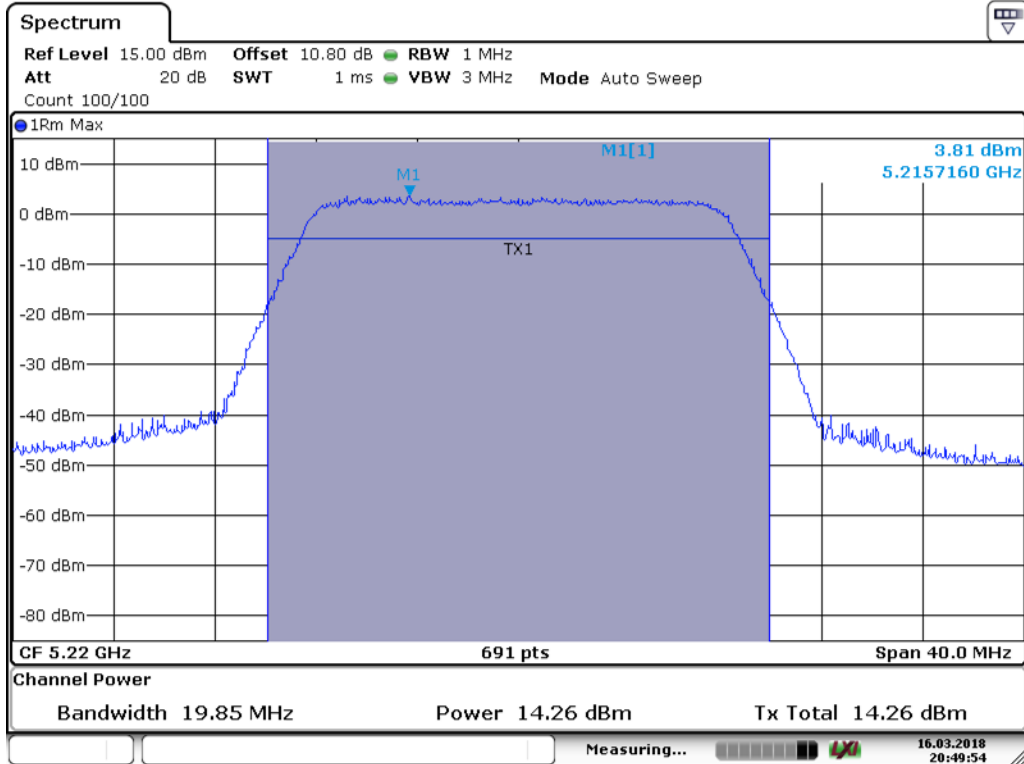
Data Rate (Mbps)	Channel No.	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
6	36	5180	14.39	30	-8.61
	40	5200	14.44	30	-8.56
	44	5220	14.26	30	-8.74
24	36	5180	15.28	30	-7.72
	40	5200	15.43	30	-7.57
	44	5220	15.33	30	-7.67
54	36	5180	15.57	30	-7.43
	40	5200	15.71	30	-7.29
	44	5220	15.19	30	-7.81



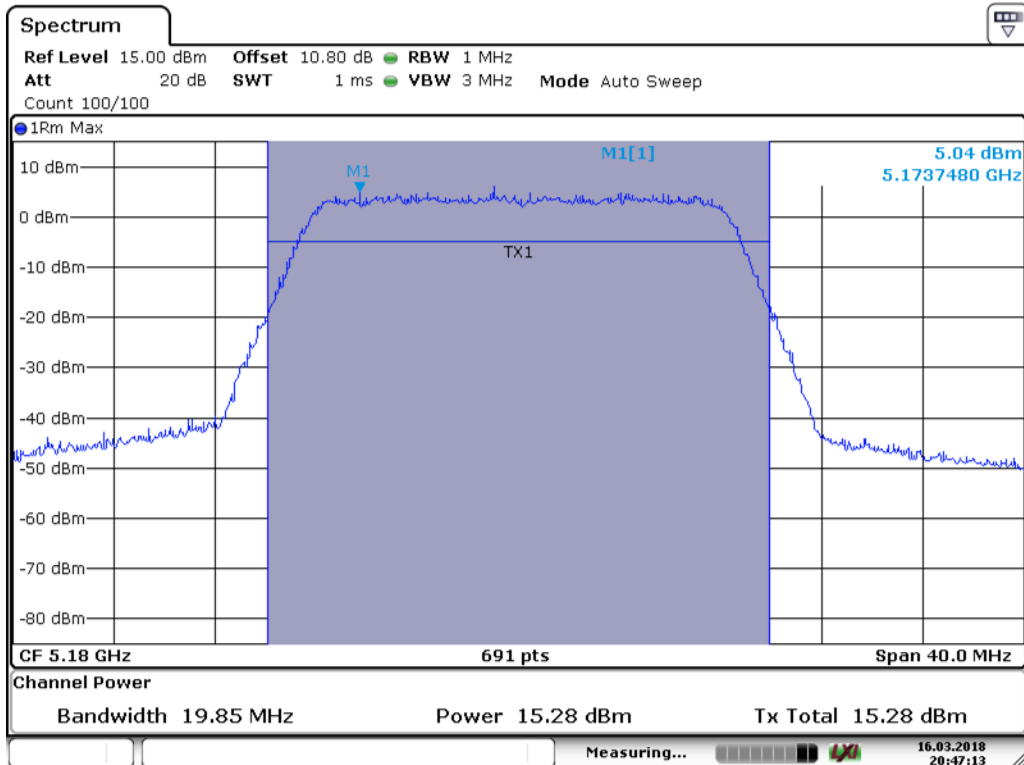
6 Mbps Channel low – 5180 MHz



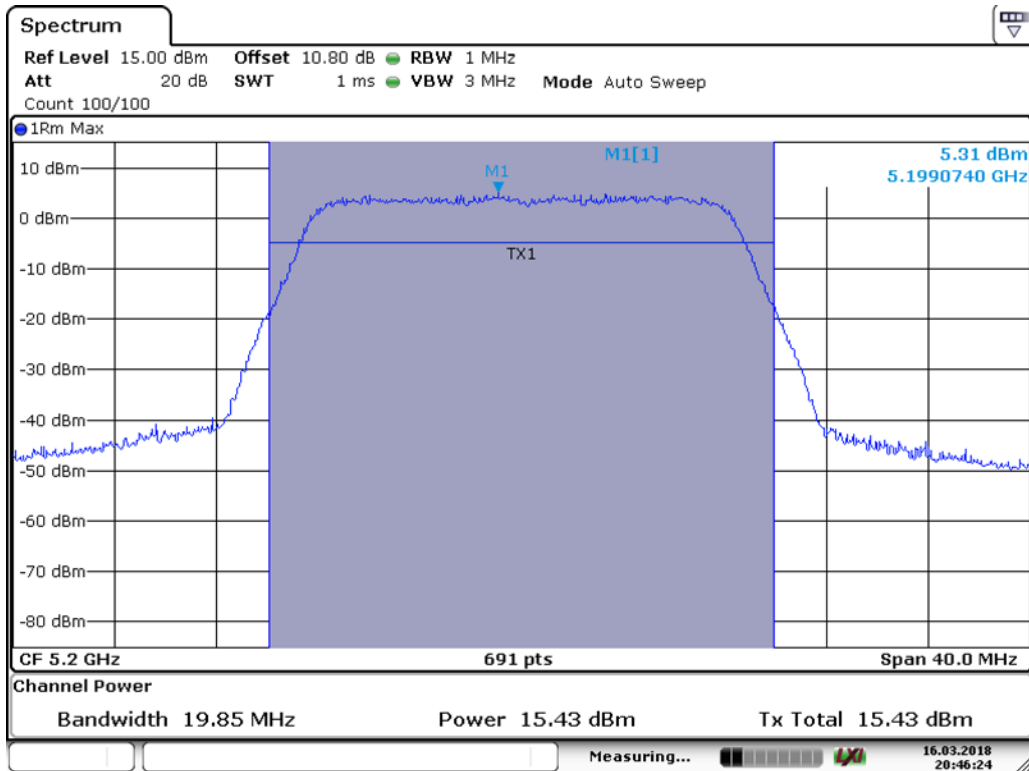
6 Mbps Channel mid – 5200 MHz



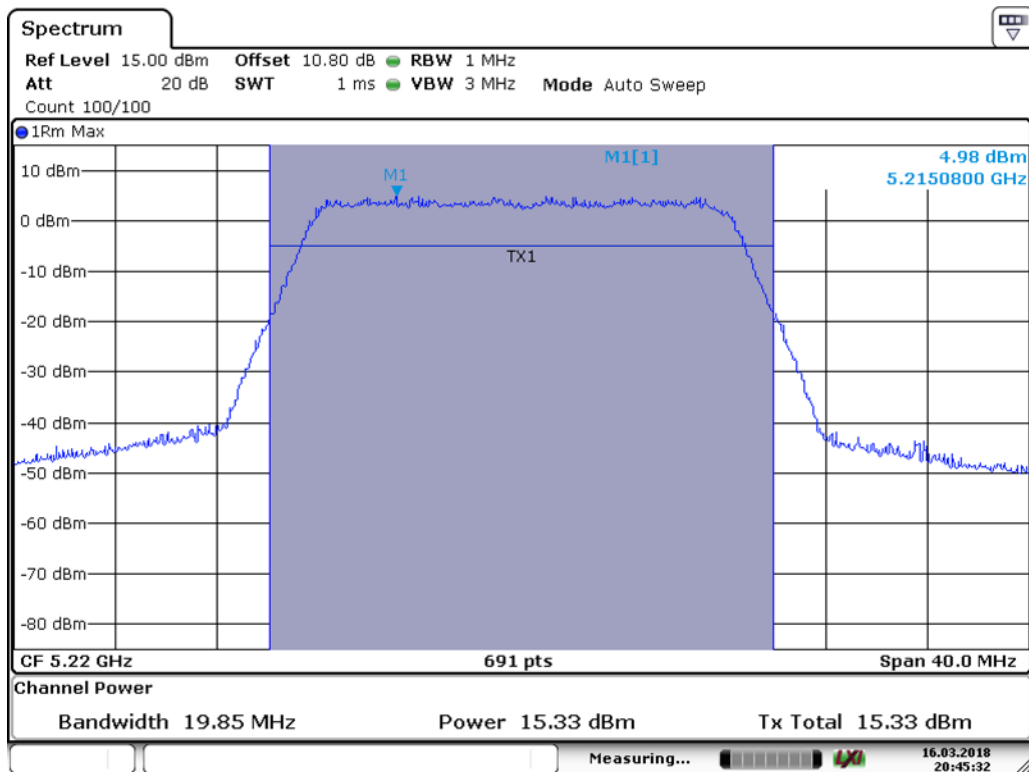
6 Mbps Channel High – 5220 MHz



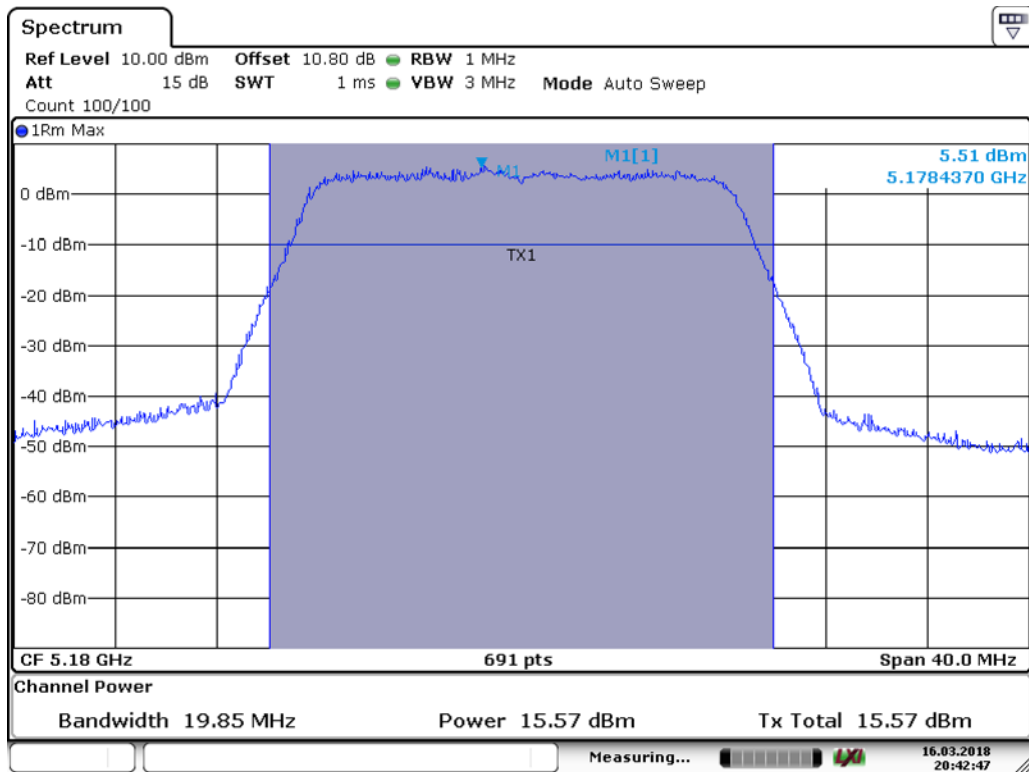
24 Mbps Channel low – 5180 MHz



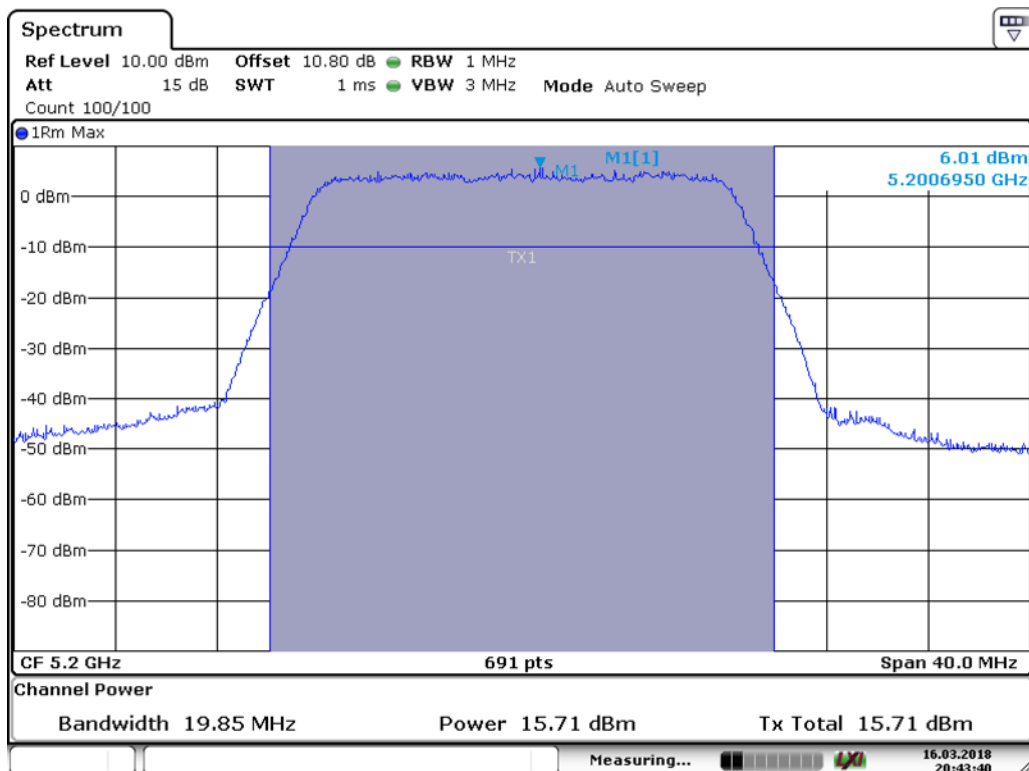
24 Mbps Channel mid – 5200 MHz



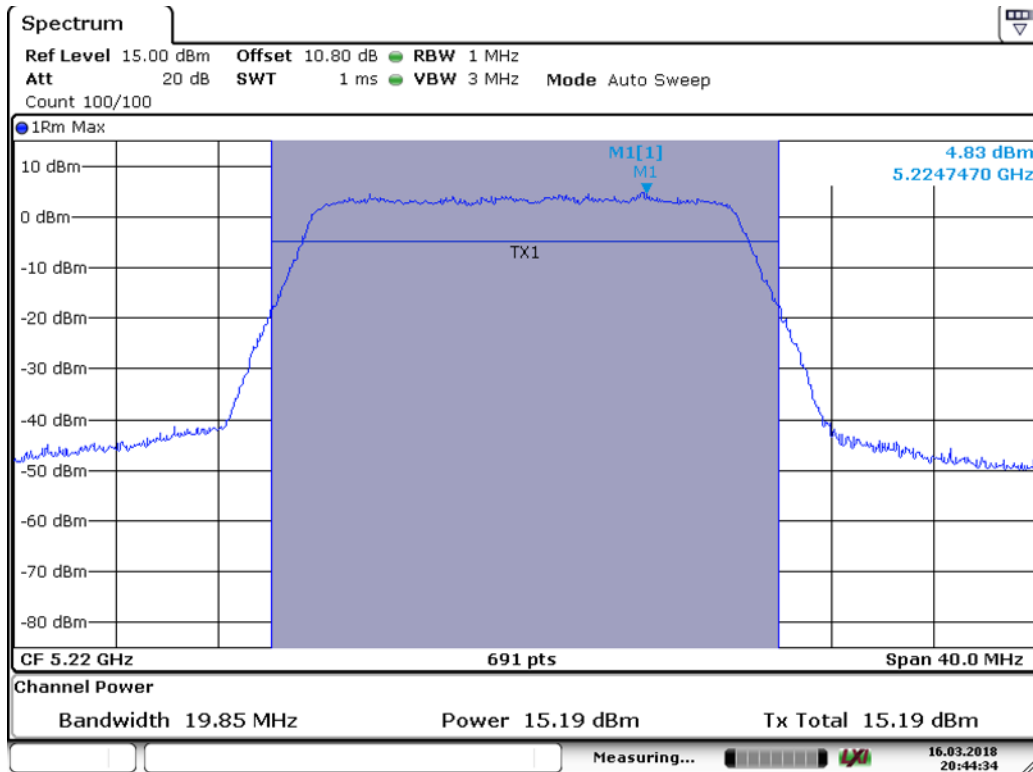
24 Mbps Channel High – 5220 MHz



54 Mbps Channel low – 5180 MHz



54 Mbps Channel mid – 5200 MHz



54 Mbps Channel High – 5220 MHz

6.3 Maximum Power Spectral density

Section 15.407 (a)

Result

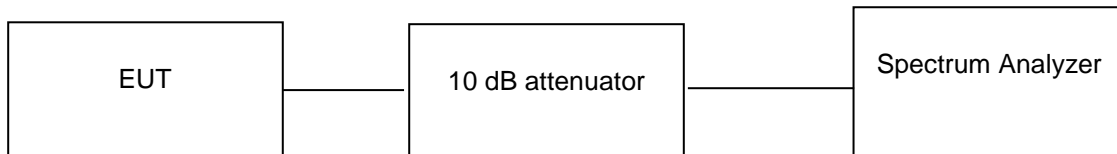
Pass

Test Specification Requirement

FCC part 15 Subpart C Section 15.407 (a)
For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band

Measurement Bandwidth 1 MHz

Test Method:



Test results:

10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

Note: Measurements were made as per section F in KDB 789033 D02 General UNII Test Procedures New Rules v02r01

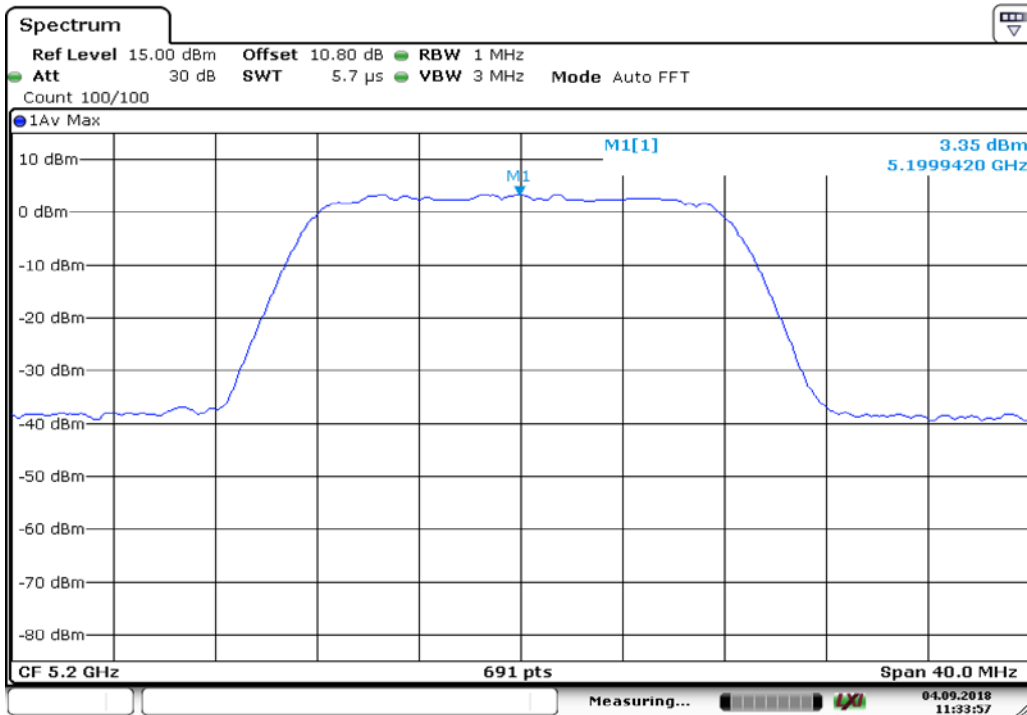
Modulation: 802.11a

Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD @1MHz bandwidth (dBm)	Limit (dBm)	Margin (dB)
6	36	5180	3.92	17	-13.08
	40	5200	3.35	17	-13.65
	44	5220	3.46	17	-13.54
24	36	5180	4.82	17	-12.18
	40	5200	4.39	17	-12.61
	44	5220	3.68	17	-13.32
54	36	5180	5.08	17	-11.92
	40	5200	4.2	17	-12.8
	44	5220	4.35	17	-12.65



Date: 4.SEP.2018 11:30:56

6Mbps Channel low – 5180 MHz



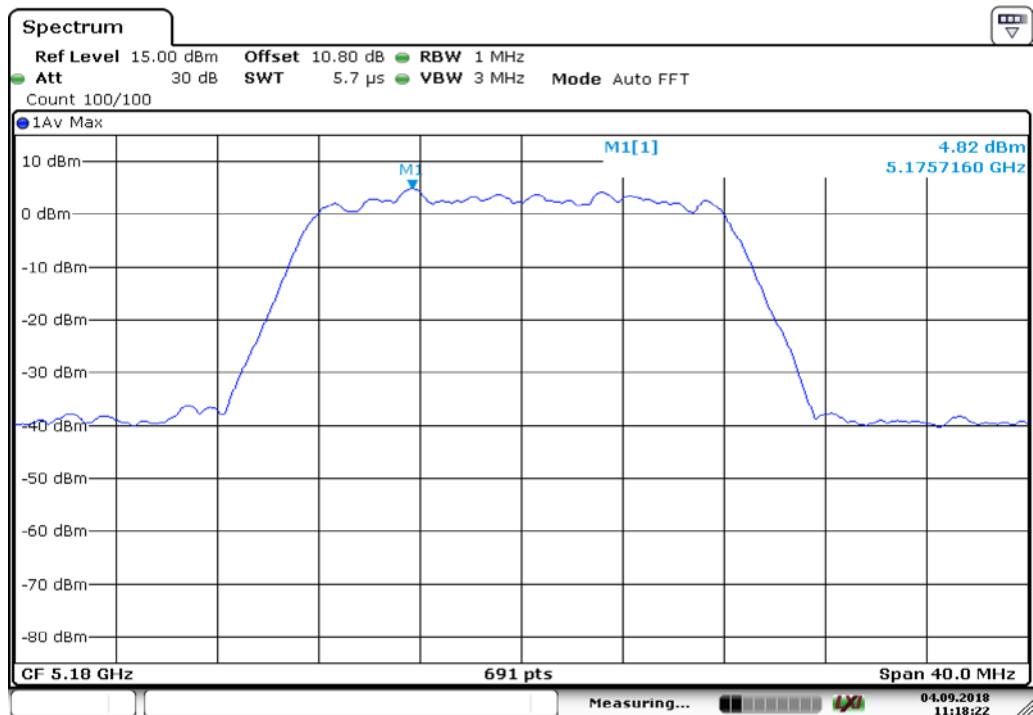
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6Mbps Channel mid – 5200 MHz



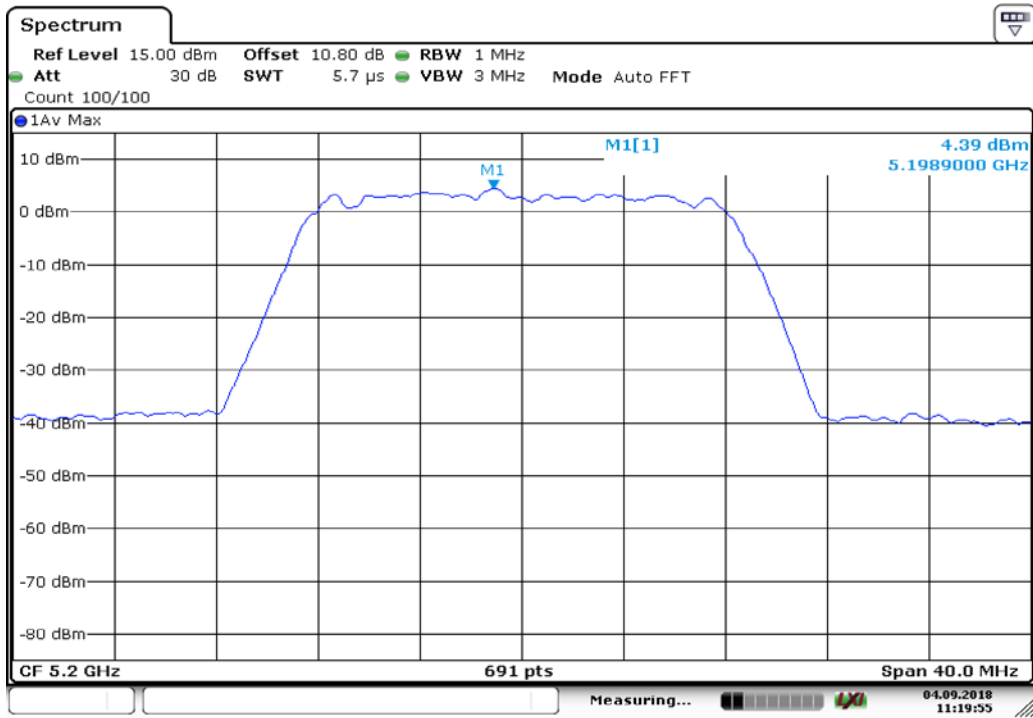
Date: 4.SEP.2018 11:35:53

6Mbps Channel High – 5220 MHz



Date: 4.SEP.2018 11:18:22

24 Mbps Channel low – 5180 MHz



Date: 4.SEP.2018 11:19:56

24 Mbps Channel Mid – 5200 MHz



Date: 4.SEP.2018 11:21:57

24 Mbps Channel High – 5220 MHz



Date: 4.SEP.2018 11:28:35

54 Mbps Channel low – 5180 MHz



Date: 4.SEP.2018 11:26:48

54 Mbps Channel Mid – 5200 MHz



Date: 4.SEP.2018 11:24:31

54 Mbps Channel High – 5220 MHz

6.4 Restricted bands of emissions & restricted bands of operation

Result

Pass

Test Specification	FCC part 15 Subpart C Section 15.407 (b) / (15.209 & 15.205)
Test Method	ANSI C 63.10 – 2013
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3 m
Detector	QP for frequency below 1 GHz, Average for frequency above 1 GHz
Requirement	As per the limits mentioned in the below table

Limits for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128-93.8, 73.80-62.95, 69.54 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test results:

No emissions found in frequency 9 kHz to 30 MHz

Test results for frequencies in the range 30 MHz – 1 GHz

FCC Part 15 Subpart B 15.109 Class A limits

Frequency MHz	Field Strength dBuV/m	Measured Distance (meter)	Field Strength (dBµV/m)
30-88	90.00	10.00	39.08
88-216	150.00	10.00	43.52
216-960	210.00	10.00	46.43
above 960	300.00	10.00	49.54

Test results for frequencies in the range 30 MHz – 200MHz

Polarization	Frequency (MHz)	Measured value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	33.33	36.32	39.08	-2.76
	43.8	29.72	39.08	-9.36
	100.02	36.61	43.52	-6.91
	122.53	38.64	43.52	-4.88
Horizontal	33.31	19.37	39.08	-19.71
	45.7	17.04	39.08	-22.04
	100	26.23	43.52	-17.29
	125.03	34.96	43.52	-8.56

Test results for frequencies in the range 200MHz – 1GHz

Polarization	Frequency (MHz)	Measured value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	250	36.58	46.43	-9.85
	720	43.15	46.43	-3.28
	836.4	39.7	46.43	-6.73
	900	40.33	46.43	-6.1
Horizontal	250	40.36	46.43	-6.07
	420	36.7	46.43	-9.73
	720	44.75	46.43	-1.68
	900	45.55	46.43	-0.88

Prüfbericht - Nr.:

19660380 001

Seite 36 von 39

Test Report No.:

Page 36 of 39

For frequency range: Above 1GHz

Test results:

802.11 a - 6Mbps

Channel No./ Frequency	Frequency (MHz)	Polarization	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
36 (5180MHz)	5150 (Pk)	Vertical	52.89	74	-21.11
	5150 (Av)		40.92	54	-13.08
	5180 (Pk)		82.98	*	
	5180 (Av)		74.38	*	
	10360 (Pk)		No Harmonics found		
	10360 (Av)		No Harmonics found		
	5150 (Pk)	Horizontal	52.57	74	-21.43
	5150 (Av)		41.09	54	-12.91
	5180 (Pk)		92.61	*	
	5180 (Av)		83.44	*	
	10360 (Pk)		No Harmonics found		
	10360 (Av)		No Harmonics found		
40 (5200 MHz)	5200(Pk)	Vertical	81.63	*	
	5200(Av)		72.37	*	
	10400 (Pk)		No Harmonics found		
	10400 (Av)	No Harmonics found			
	5200(Pk)	Horizontal	92.1	*	
	5200(Av)		82.77	*	
	10400 (Pk)		No Harmonics found		
	10400 (Av)		No Harmonics found		
44 (5220MHz)	5220 (Pk)	Vertical	81.54	*	
	5220 (Av)		72.51	*	
	10440 (Pk)		No Harmonics found		
	10440 (Av)	No Harmonics found			
	5220 (Pk)	Horizontal	91.16	*	
	5220 (Av)		82.41	*	
	10440 (Pk)		No Harmonics found		
	10440 (Av)		No Harmonics found		

24 Mbps

Channel No./ Frequency	Frequency (MHz)	Polarization	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)	
36 (5180MHz)	5150 (Pk)	Vertical	52.67	74	-21.33	
	5150 (Av)		40.97	54	-13.03	
	5180 (Pk)		83.93		*	
	5180 (Av)		73.17		*	
	10360 (Pk)		No Harmonics found			
	10360 (Av)		No Harmonics found			
	5150 (Pk)	Horizontal	52.81	74	-21.19	
	5150 (Av)		41.09	54	-12.91	
	5180 (Pk)		94.03		*	
	5180 (Av)		83.39		*	
	10360 (Pk)		No Harmonics found			
	10360 (Av)		No Harmonics found			
	40 (5200 MHz)	5200(Pk)	Vertical	82.21		*
		5200(Av)		72.38		*
10400 (Pk)		No Harmonics found				
10400 (Av)		No Harmonics found				
5200(Pk)		Horizontal	93.93		*	
5200(Av)			82.71		*	
10400 (Pk)			No Harmonics found			
10400 (Av)			No Harmonics found			
44 (5220MHz)	5220 (Pk)	Vertical	90.14		*	
	5220 (Av)		80.3		*	
	10440 (Pk)		No Harmonics found			
	10440 (Av)		No Harmonics found			
	5220 (Pk)	Horizontal	92.5		*	
	5220 (Av)		81.96		*	
	10440 (Pk)		No Harmonics found			
	10440 (Av)		No Harmonics found			

54 Mbps

Channel No./ Frequency	Frequency (MHz)	Polarization	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)	
36 (5180MHz)	5150 (Pk)	Vertical	52.68	74	-21.32	
	5150 (Av)		41.01	54	-12.99	
	5180 (Pk)		83.19	*		
	5180 (Av)		72.46	*		
	10360 (Pk)	No Harmonics found				
	10360 (Av)	No Harmonics found				
	5150 (Pk)	Horizontal	52.23	74	-21.77	
	5150 (Av)		41.09	54	-12.91	
	5180 (Pk)		93.46	*		
	5180 (Av)		82.94	*		
	10360 (Pk)		No Harmonics found			
	10360 (Av)		No Harmonics found			
40 (5200 MHz)	5200(Pk)	Vertical	82.36	*		
	5200(Av)		71.92	*		
	10400 (Pk)		No Harmonics found			
	10400 (Av)		No Harmonics found			
	5200(Pk)	Horizontal	93.31	*		
	5200(Av)		82.21	*		
	10400 (Pk)		No Harmonics found			
	10400 (Av)		No Harmonics found			
44 (5220MHz)	5220 (Pk)	Vertical	82.52	*		
	5220 (Av)		72.76	*		
	10440 (Pk)		No Harmonics found			
	10440 (Av)		No Harmonics found			
	5220 (Pk)	Horizontal	92.11	*		
	5220 (Av)		81.67	*		
	10440 (Pk)		No Harmonics found			
	10440 (Av)		No Harmonics found			

Note: Field Strength = Received value + Antenna factor + Cable loss – Pre-Amplifier Gain

7 LIST OF TABLES

Table 1: Test and measurements instrument used.....	5
Table 2: Ratings and System Details	6
Table 3: Measurement Uncertainty	6
Table 7: List of Wi-Fi Center Frequencies	7

8 LIST OF FIGURES

Figure 1: Frequency Range 9 kHz- 30 MHz	8
Figure 2: Frequency Range 30 MHz – 200 MHz	9
Figure 3: Frequency Range 200 MHz - 1GHz	9
Figure 4: Frequency Range above 1 GHz	10

*****END OF TEST REPORT*****