ETSI EN 301 893 V2.1.1 (2017-05)

TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD.

6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

Tested Model: OS3

Report Type: Original Report	**Product Type:** 5GHz 11ac 867Mbps 12dBi Outdoor CPE
Report Number:	DG2220302-06777E-22A
Report Date:	2022-05-12
Reviewed By:	Rocky Xiao RF Engineer
Approved By:	Ivan Cao Assistant Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:		5GHz 11ac 867Mbps 12dBi Outdoor CPE
EUT Model:		OS3
Rated Input Voltage:		DC 12V from adapter or 12V from POE
Adapter Information:	**Model:**	BN073-A12012E
	Input:	100-240Vac 50/60Hz 0.4A
	Output:	DC 12V 1A
Serial Number:		DG2220302-06777E-RF-S1
EUT Received Date:		2022.03.05
EUT Received Status:		Good

Technical Specification

Operation Frequency Range (MHz):		5470~5725MHz
RF Output Power (EIRP) (dBm):		26.82
Number of Chains	**Transmit:**	2
	Receive:	2
Antenna Gain (dBi)▲:		12
Beamforming Gain(dBi)▲:		3
Modulation Type:		OFDM

Objective

This report is prepared on behalf of ***SHENZHEN TENDA TECHNOLOGY CO.,LTD.*** in accordance with ETSI EN 301 893 V2.1.1 (2017-05) 5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine the compliance of EUT with: ETSI EN 301 893 V2.1.1 (2017-05).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 893 V2.1.1 (2017-05) 5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

Measurement Uncertainty

Parameter	F_{lab}	Maximum allow uncertainty
RF Frequency	$\pm 1\times10^{-6}$	$\pm 1\times10^{-5}$
RF power conducted	±0.61dB	±1,5dB
RF power radiated	±3.62dB	±6dB
Spurious emissions, conducted	±2.47dB	±3dB
Spurious emissions, radiated	±3.62dB	±6dB
Temperature	±1℃	±2℃
Humidity	±5%	±5%
Time	1%	±10%

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode, which was provided by manufacture. The system support 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80.

For 5470~5725 MHz band(W56), 12 channels are provided , 802.11a /n ht20 mode was tested with 5500MHz and 5700MHz; 802.11n ht40 mode was tested with 5510MHz and 5670MHz; 802.11ac vht80 mode was tested with 5530 MHz:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	112	5560
102	5510	116	5580
104	5520	132	5660
106	5530	134	5670
108	5540	136	5680
110	5550	140	5700

Test condition as below:
NT: Normal Temperature 25℃, LT: Low Temperature 0℃, HT: High Temperature +45℃

EUT Exercise Software

Software "QSPR▲" was used and the power level was configured as below. The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power and PSD across all data rates, bandwidths, and modulations▲.

Band	Mode	Frequency (MHz)	Data rate (Mbps)		Power level	
			Chain 0	Chain 1	Chain 0	Chain 1
5470-5725	802.11 a	5500	6	6	15	16
		5700	6	6	15	17
	802.11 n20	5500	MCS7	MCS7	14	14
		5700	MCS7	MCS7	13	13
	802.11 n40	5510	MCS7	MCS7	13	13
		5670	MCS7	MCS7	13	13
	802.11 ac20	5500	ACMCS8	ACMCS8	13	13
		5700	ACMCS8	ACMCS8	13	13
	802.11 ac40	5510	ACMCS8	ACMCS8	13	13
		5670	ACMCS8	ACMCS8	13	13
	802.11 ac80	5530	ACMCS8	ACMCS8	13	13

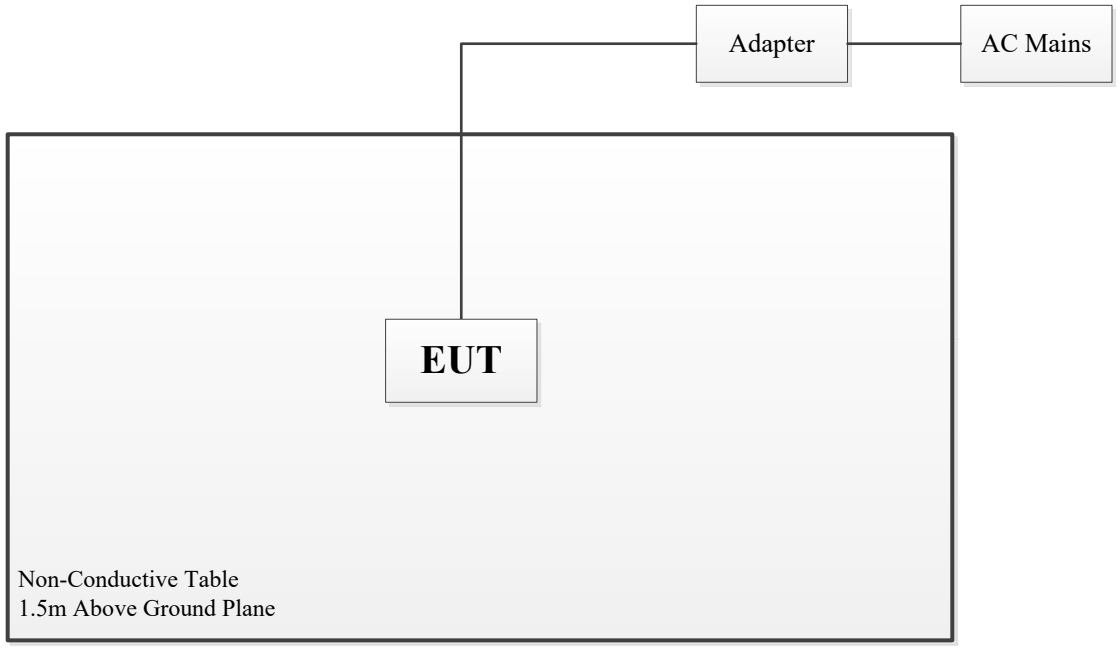
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	E6410	QDS-BRCM1017

Support Cable List and Details

Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
Adapter Cable	No	No	1.2	EUT	Adapter

Block Diagram of Test Setup



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated emissions below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2020-08-25	2023-08-25
R&S	EMI Test Receiver	ESCI	100224	2021-09-11	2022-09-10
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2021-08-19	2022-08-18
Sonoma	Amplifier	310N	185914	2021-08-19	2022-08-18
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2021-09-04	2022-09-03
Agilent	Signal Generator	E8247C	MY43321350	2021-04-25	2022-04-24
Radiated emissions above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021-10-12	2024-10-11
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2020-12-05	2023-12-04
Agilent	Spectrum Analyzer	E4440A	SG43360054	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2021-09-04	2022-09-03
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2021-06-27	2022-06-26
AH	Preamplifier	PAM-0118	469	2021-10-13	2022-10-12
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2021-06-27	2022-06-26
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021-10-12	2024-10-11
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2020-12-05	2023-12-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2021-09-04	2022-09-03
Agilent	Signal Generator	E8247C	MY43321350	2021-04-25	2022-04-24
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2021-05-06	2022-05-05
Mini Circuits	High Pass Filter	VHF-6010+	31118	2021-06-16	2022-06-15
RF conducted					
R&S	Spectrum Analyzer	FSV40	101589	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	2021-05-06	2022-05-05
				2022-05-06	2023-05-05
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	2021-09-04	2022-09-03
HP	Step Attenuator	8494B	1510A05007	2021-09-04	2022-09-03
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2021-07-22	2022-07-21
R&S	Wideband Radio Communication Tester	CMW500	147473	2021-09-22	2022-09-21
BACL	TEMP&HUMI Test Chamber	BTH-150	30022	2022-02-24	2023-02-23
Keysight	MXA Signal Analyzer	N9020	MY48490106	2021-10-26	2022-10-25
Agilent	MXG Analog Signal Generator	N5181A	MY48480126	2021-10-26	2022-10-25
Agilent	MXG Vector Signal Generator	N5182A	MY49060291	2021-10-26	2022-10-25
Tonscend	RF Control Unit	JS0806-2	19G8060182	2021-10-26	2022-10-25

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Test Site:	Radiated emissions below 1GHz	Radiated emissions above 1GHz	RF conducted
Temperature:	23 °C	24.1°C	24.5~24.9 °C
Relative Humidity:	56%	67%	53~60%
ATM Pressure:	101kPa	101.1kPa	100.4~100.6kPa
Tester:	Joe Li	Alex Hu	Fan Fan
Test Date:	2022.03.31	2022.04.07	2022.04.11~2022.05.12

SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 301 893 Clause 4.2.1	Carrier frequencies	Compliant
2	EN 301 893 Clause 4.2.2	Nominal channel bandwidth and occupied channel bandwidth	Compliant
3	EN 301 893 Clause 4.2.3	RF output power	Compliant
		Transmit power control (TPC)	Not applicable*
		Power Density	Compliant
4	EN 301 893 Clause 4.2.4.1	Transmitter unwanted emissions outside the 5 GHz RLAN bands	Compliant
5	EN 301 893 Clause 4.2.4.2	Transmitter unwanted emissions within the 5 GHz RLAN bands	Compliant
6	EN 301 893 Clause 4.2.5	Receiver spurious emissions	Compliant
7	EN 301 893 Clause 4.2.6	Dynamic frequency selection (DFS)	Compliant**
8	EN 301 893 Clause 4.2.7	Adaptivity	Compliant****
9	EN 301 893 Clause 4.2.8	Receiver blocking	Compliant
10	EN 301 893 Clause 4.2.9	User access restrictions	Compliant*
11	EN 301 893 Clause 4.2.10	Geo-location capability	Not applicable*

Note:
Not applicable*: The device without this function.
Compliant*: Please refer to the product information declared by the manufacturer.
Compliant**: Please refer to DFS report.
Compliant***: Please refer to report, No.: RDG200416001-22.

1 – CARRIER FREQUENCIES

Definition

The Nominal Centre Frequency is the centre of the Operating Channel.

Limit

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range fc ± 20 ppm.

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.2

Test Data

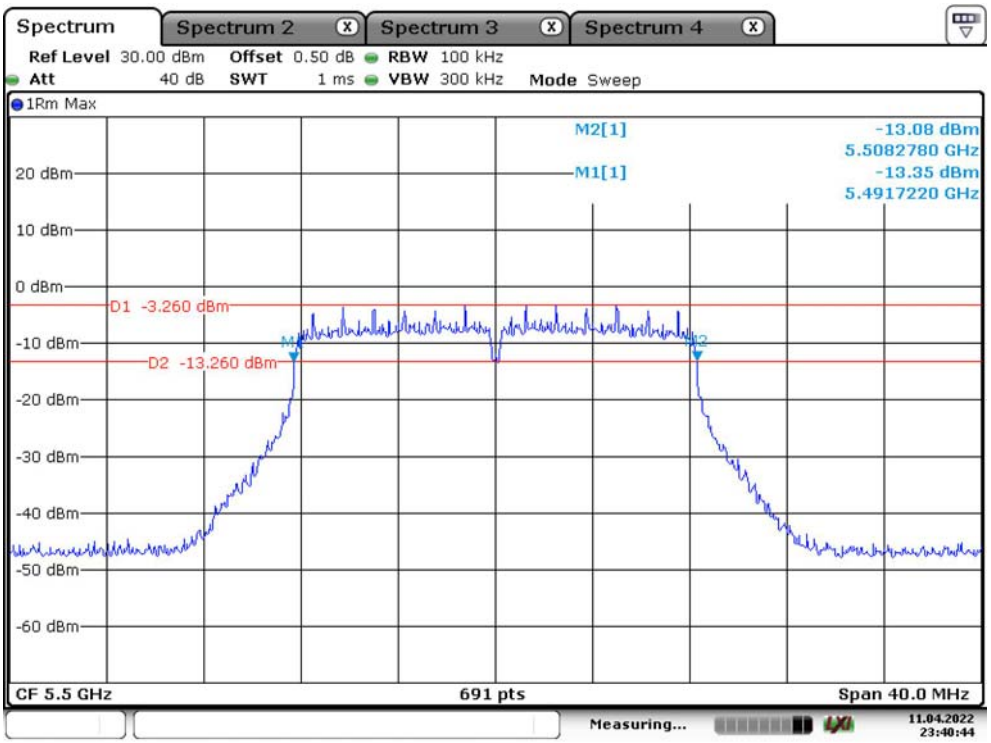
Test Result: *Compliant. Please refer to following table(s).*

Band	Mode	Fc (MHz)	F1 (MHz)	F2 (MHz)	Result (ppm)	Limit (ppm)
5470-5725	802.11 a	5500	5491.722	5508.278	0.000	±20
		5700	5691.722	5708.278	0.000	
	802.11 n20	5500	5491.085	5508.915	0.000	
		5700	5691.085	5708.915	0.000	
	802.11 n40	5510	5491.710	5528.290	0.000	
		5670	5651.710	5688.290	0.000	
	802.11 ac20	5500	5491.085	5508.915	0.000	
		5700	5691.085	5708.915	0.000	
	802.11 ac40	5510	5491.710	5528.410	10.890	
		5670	5651.710	5688.290	0.000	
	802.11 ac80	5530	5491.560	5568.440	0.000	

Note: Result = (F-Fc)/Fc*10^6, where F= (F1+F2)/2

The Normal condition test plots, please refer to following Plots:

A Low



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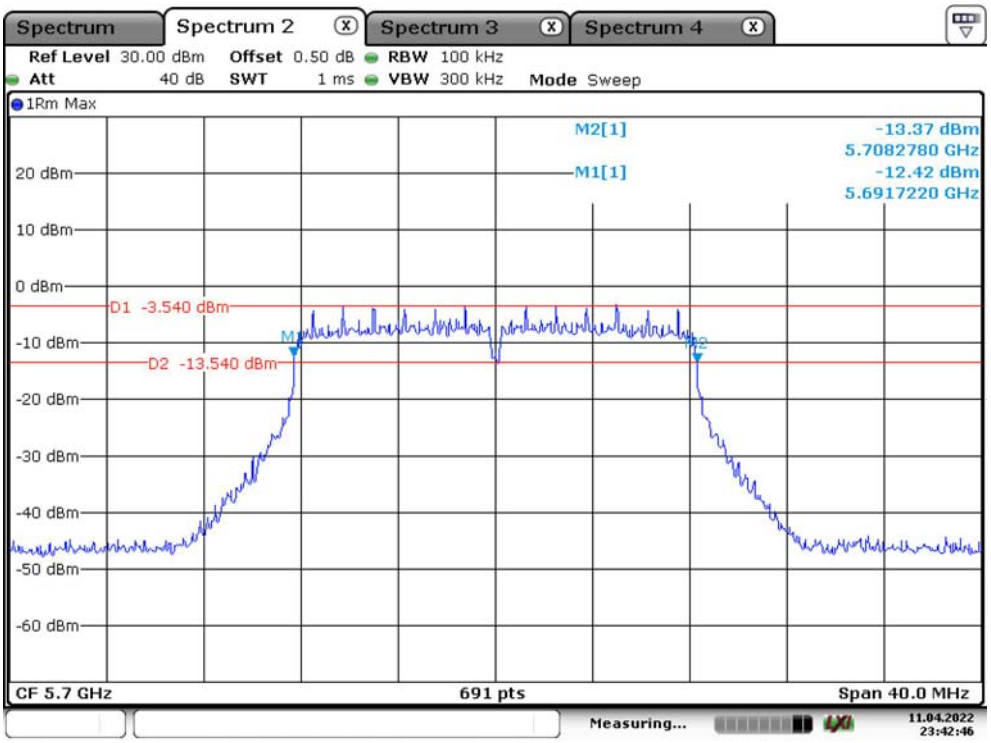
A High



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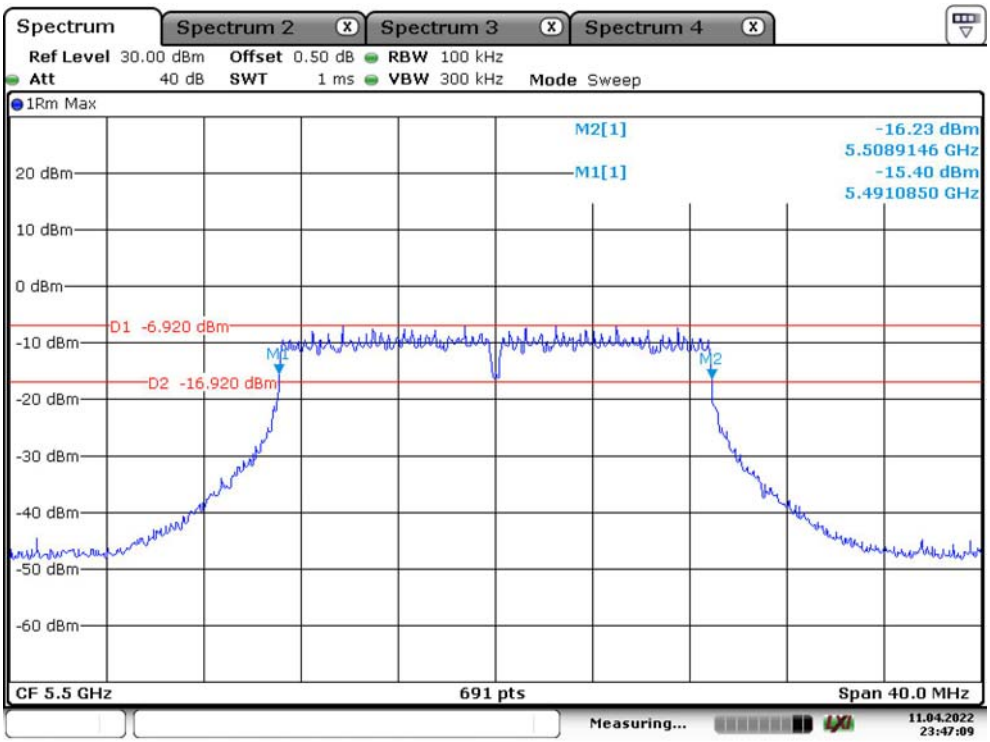
N20 Low



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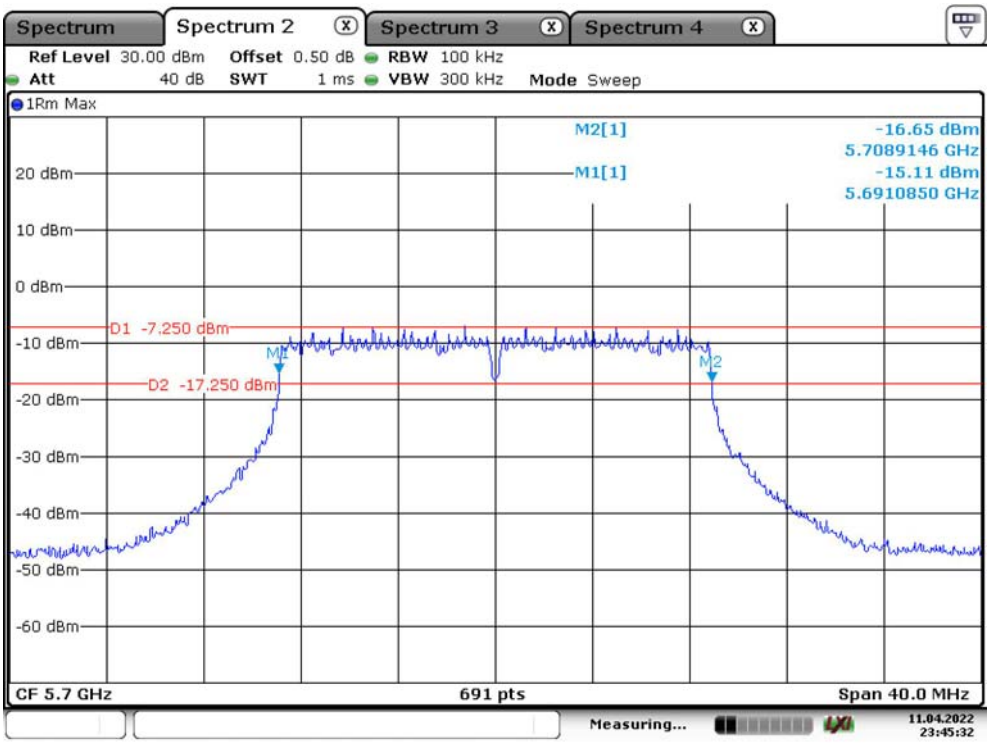

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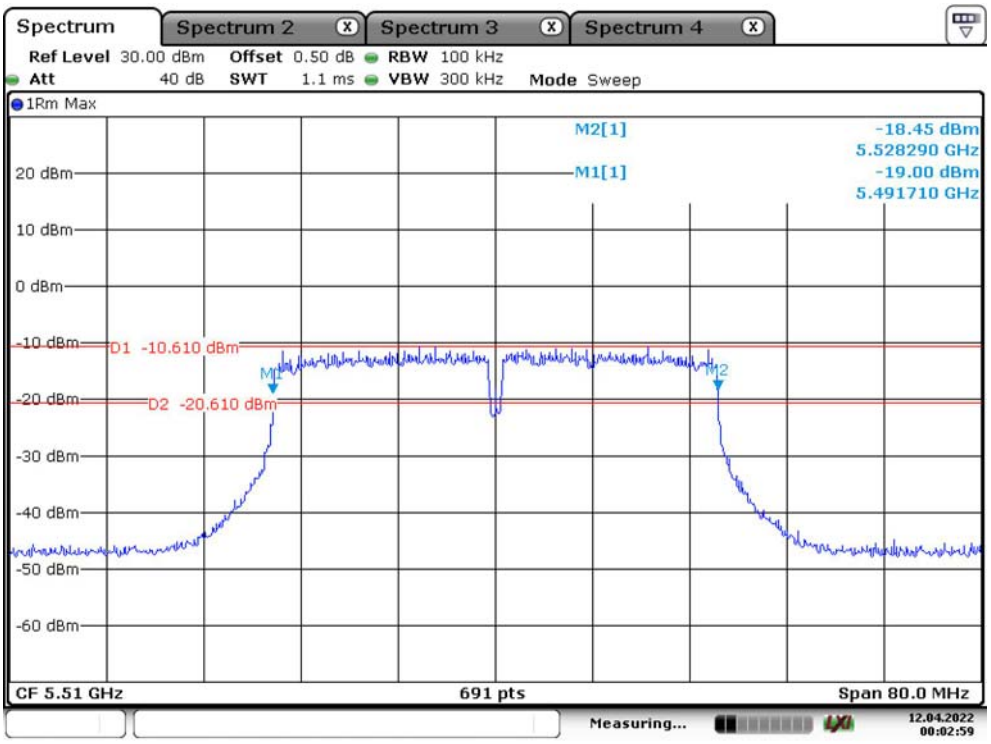
N40 Low



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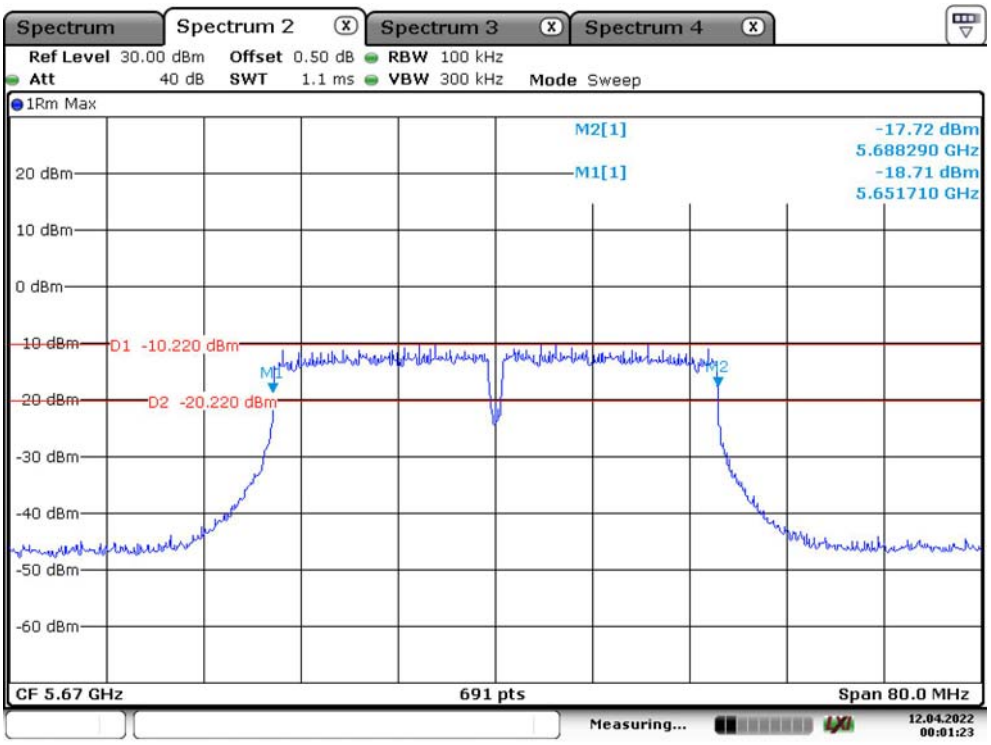
N40 High



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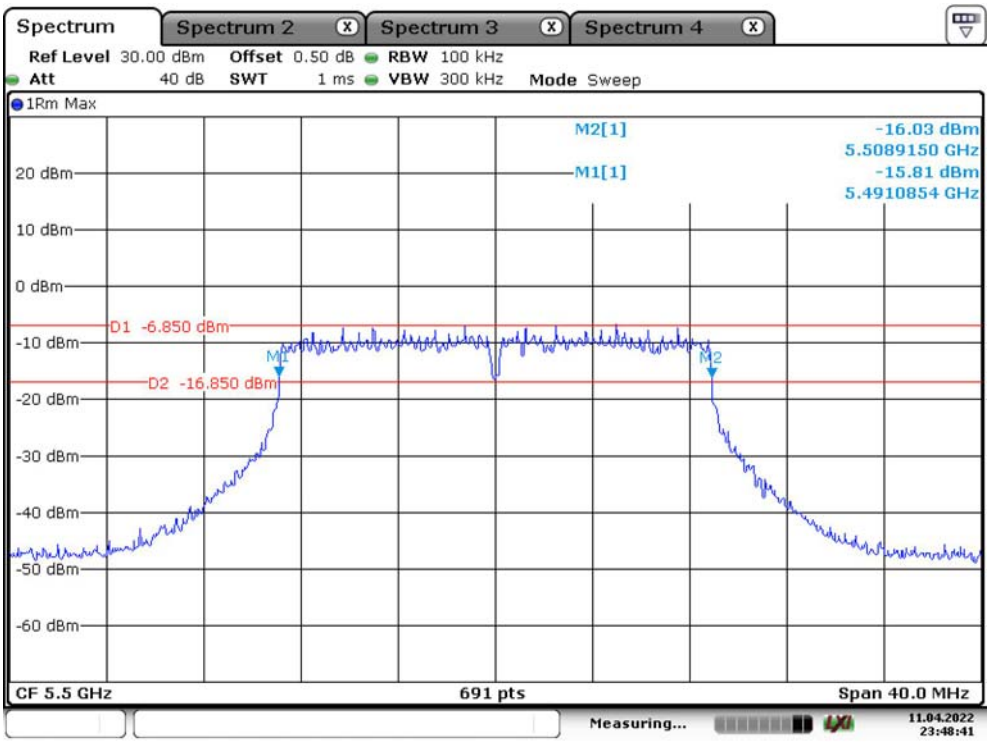
AC20 Low



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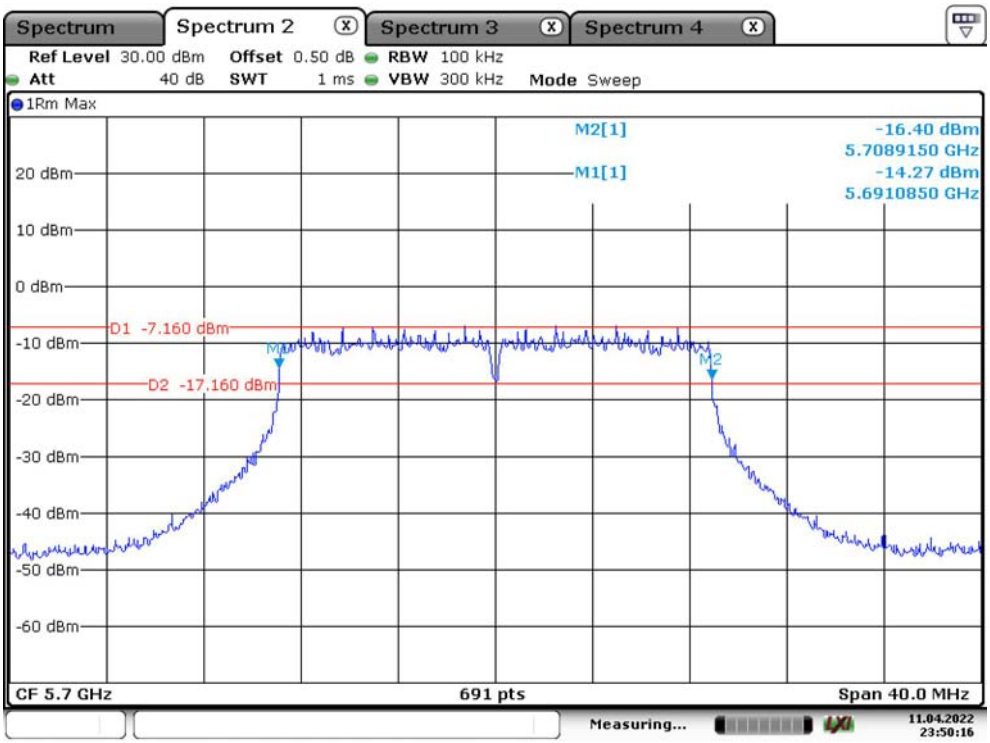
AC20 High



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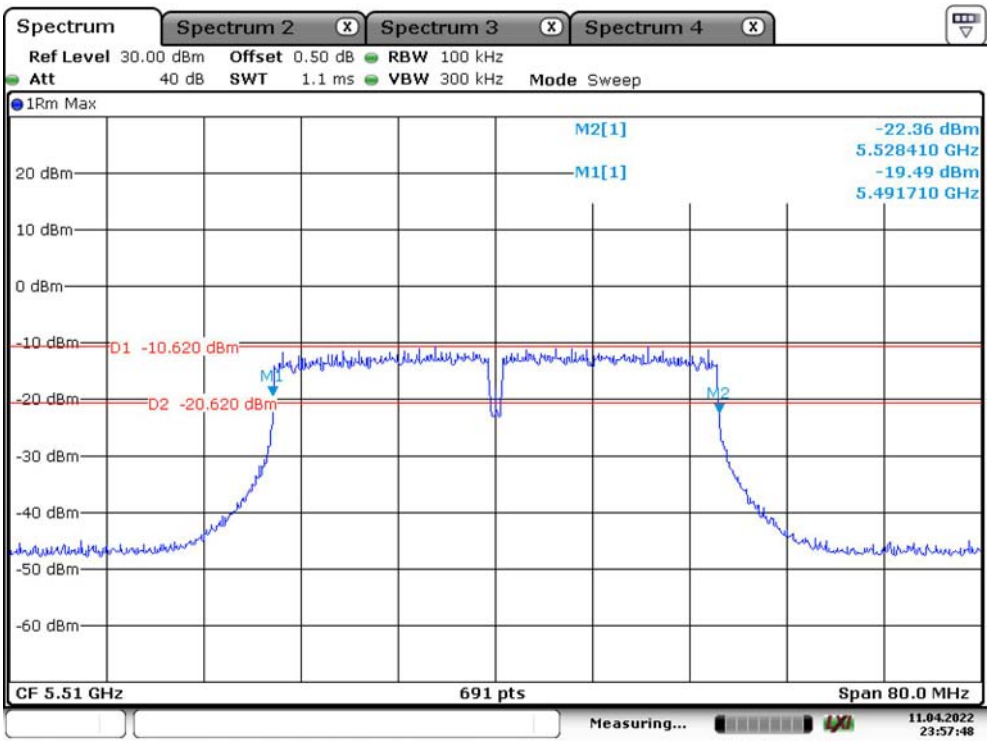
AC40 Low



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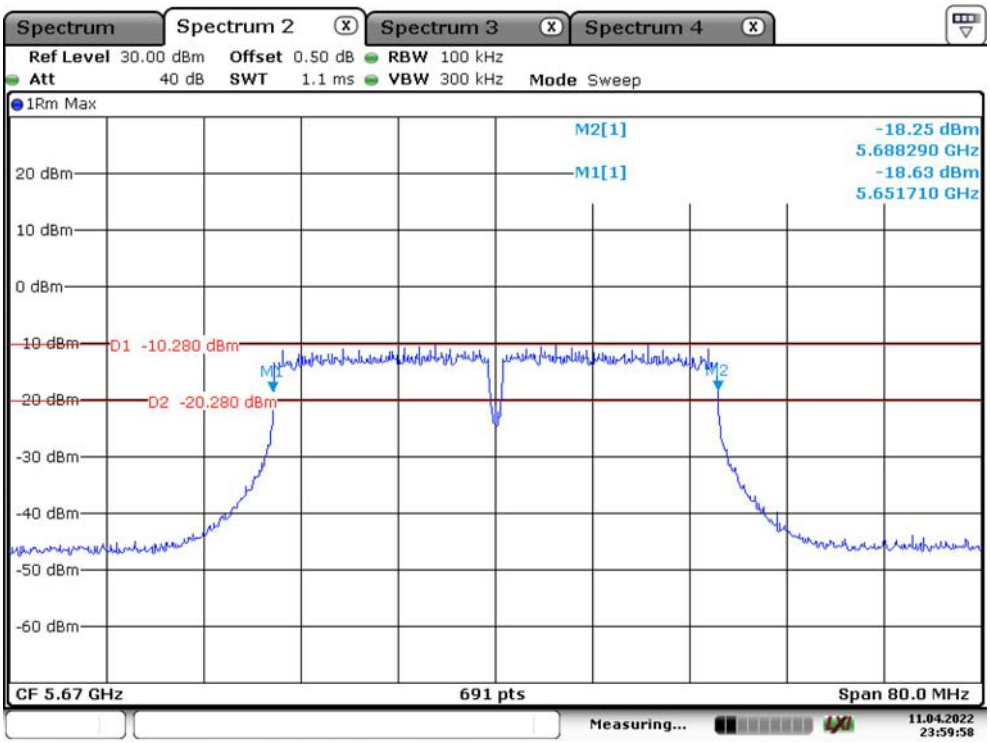
AC40 High



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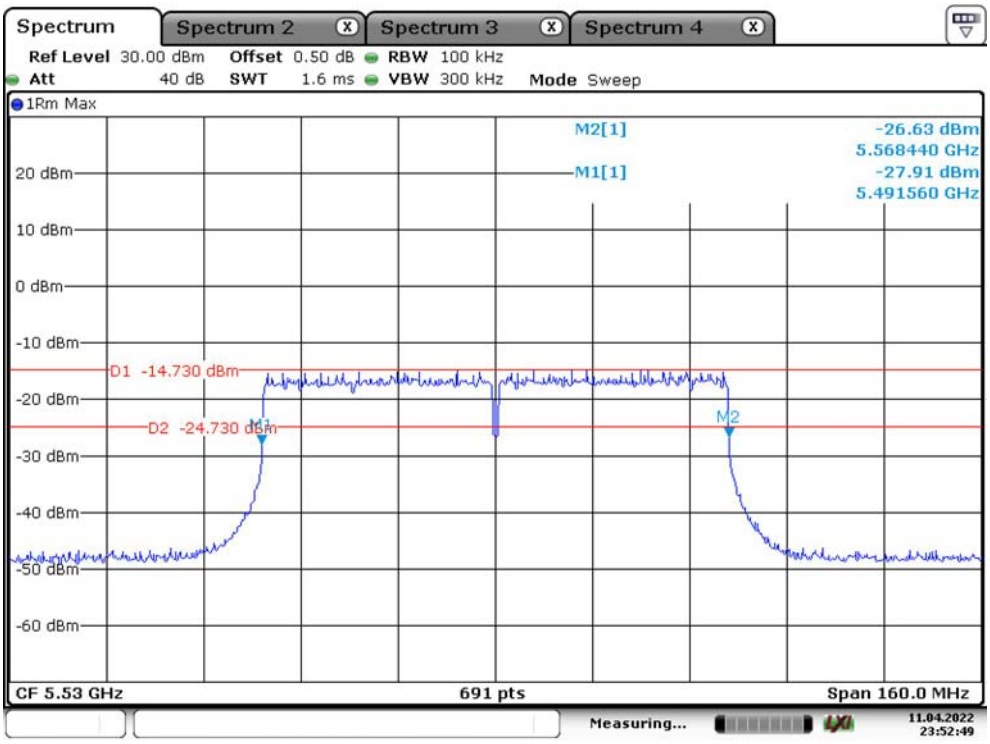
AC80



Date: 11.APR.2022 23:52:49

2 – NOMINAL CHANNEL BANDWIDTH AND OCCUPIED CHANNEL BANDWIDTH

Definition

The Nominal Channel Bandwidth is the widest band of frequencies, inclusive of guard bands, assigned to a single channel.

The Occupied Channel Bandwidth is the bandwidth containing 99 % of the power of the signal.

When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with an actual Nominal Channel Bandwidth of 'n' times the individual Nominal Channel Bandwidth where 'n' is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

Limit

The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.

Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster).
The Occupied Channel Bandwidth shall be between 80 % and 100 % of the Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

The Occupied Channel Bandwidth might change with time/payload.

During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz.

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.3

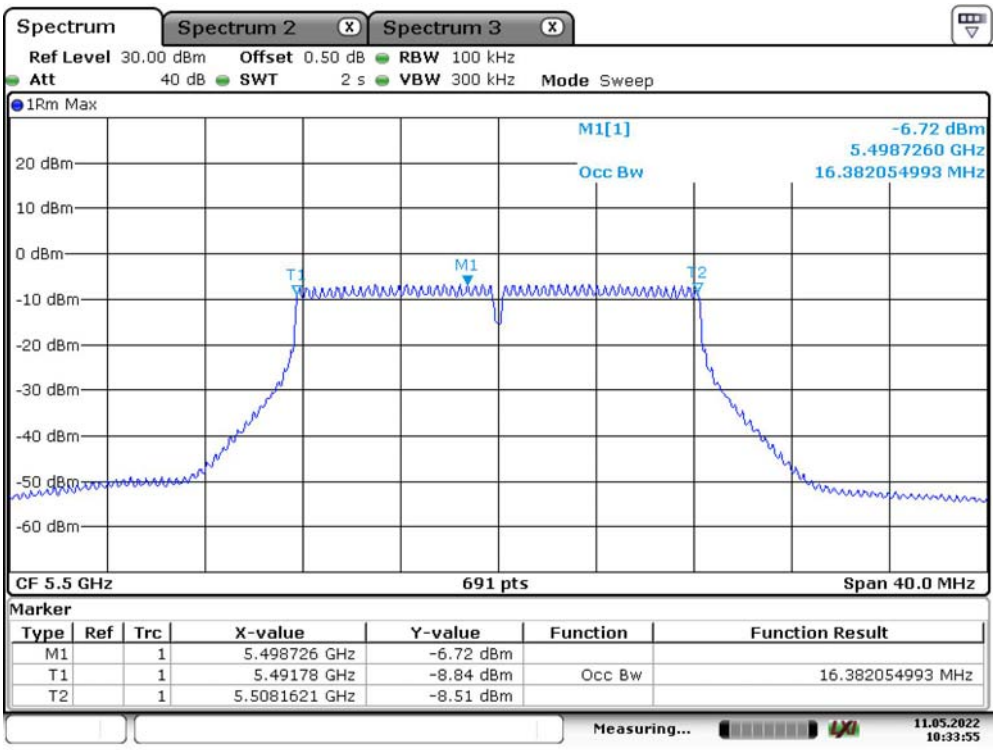
Test Data

Test Result: *Compliant. Please refer to following table(s).*

Band	Mode	Fc (MHz)	Nominal Channel Bandwidth (MHz)	Result (MHz)	Limit (MHz)
5470-5725	802.11 a	5500	20	16.382	16~20
		5700		16.382	
	802.11 n20	5500	20	17.656	16~20
		5700		17.656	
	802.11 n40	5510	40	36.237	32~40
		5670		36.237	
	802.11 ac20	5500	20	17.656	16~20
		5700		17.656	
	802.11 ac40	5510	40	36.237	32~40
		5670		36.237	
	802.11 ac80	5530	80	75.948	64~80

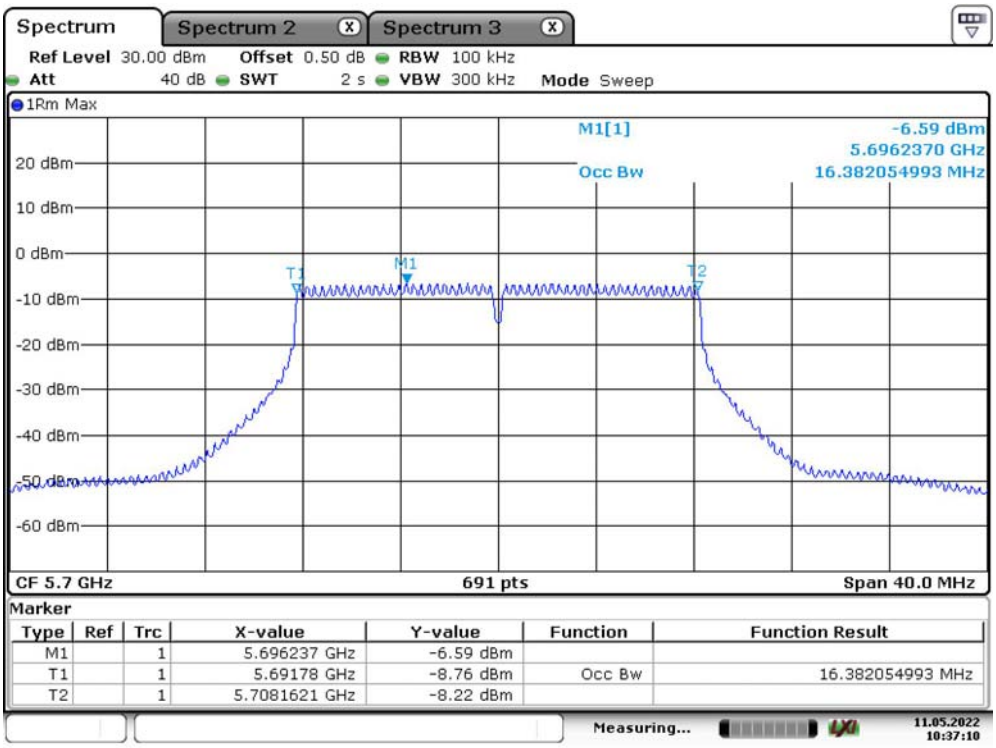
Please refer to following plots:

802.11 a-Low



Date: 11.MAY.2022 10:33:55

802.11 a-High



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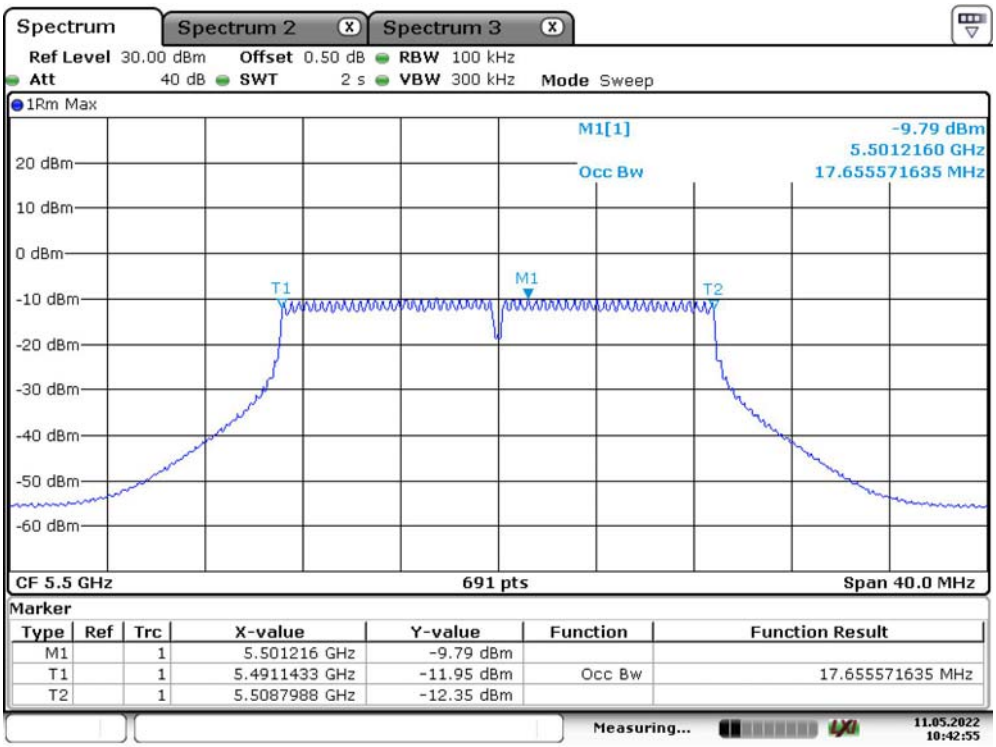
802.11 n20-Low



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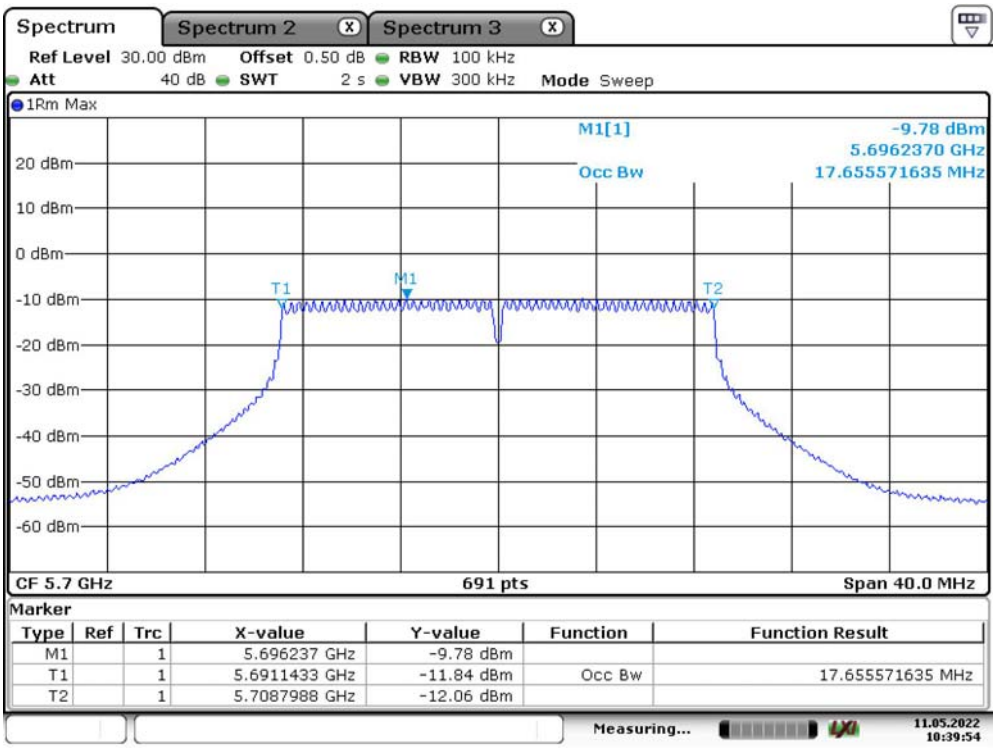
802.11 n20 High



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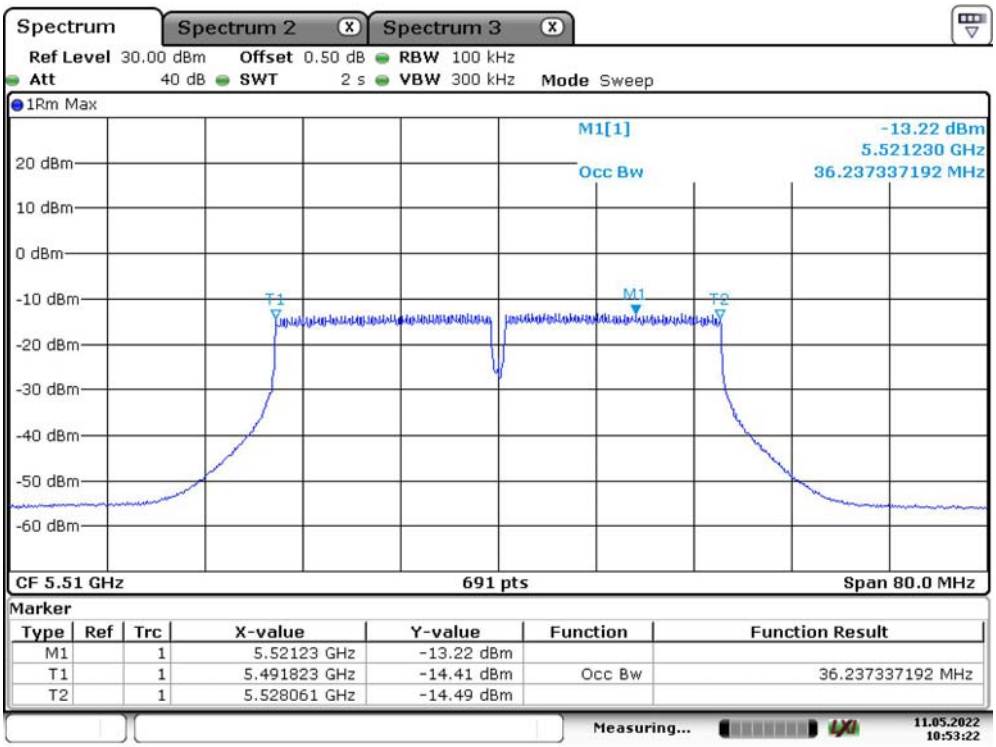
802.11 n40 Low



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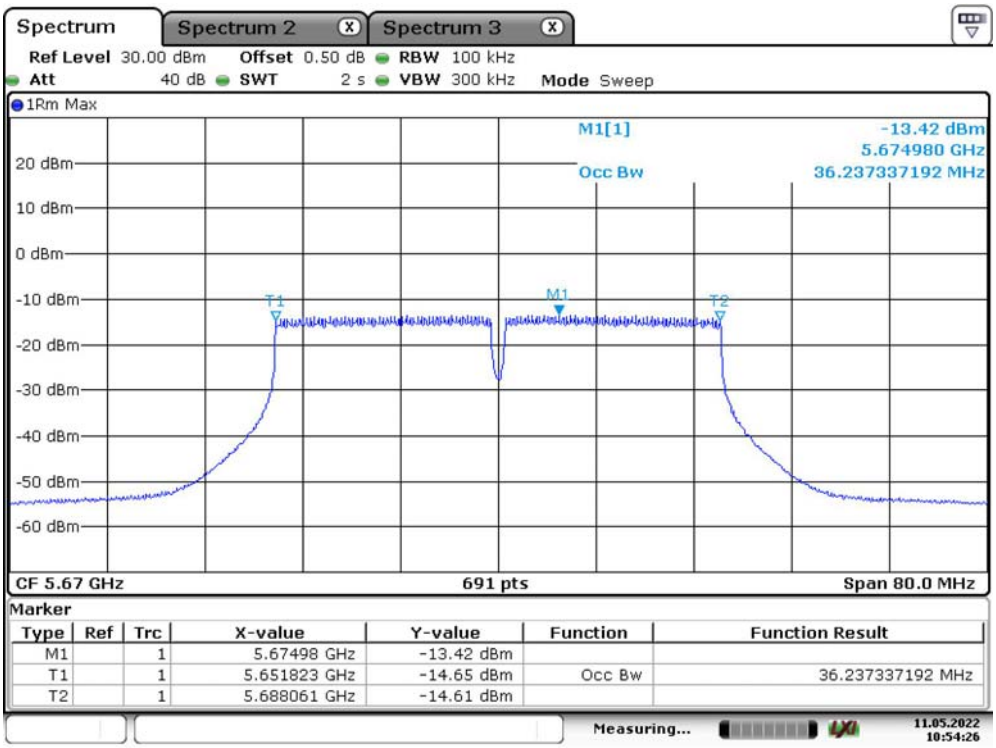
802.11 n40 High



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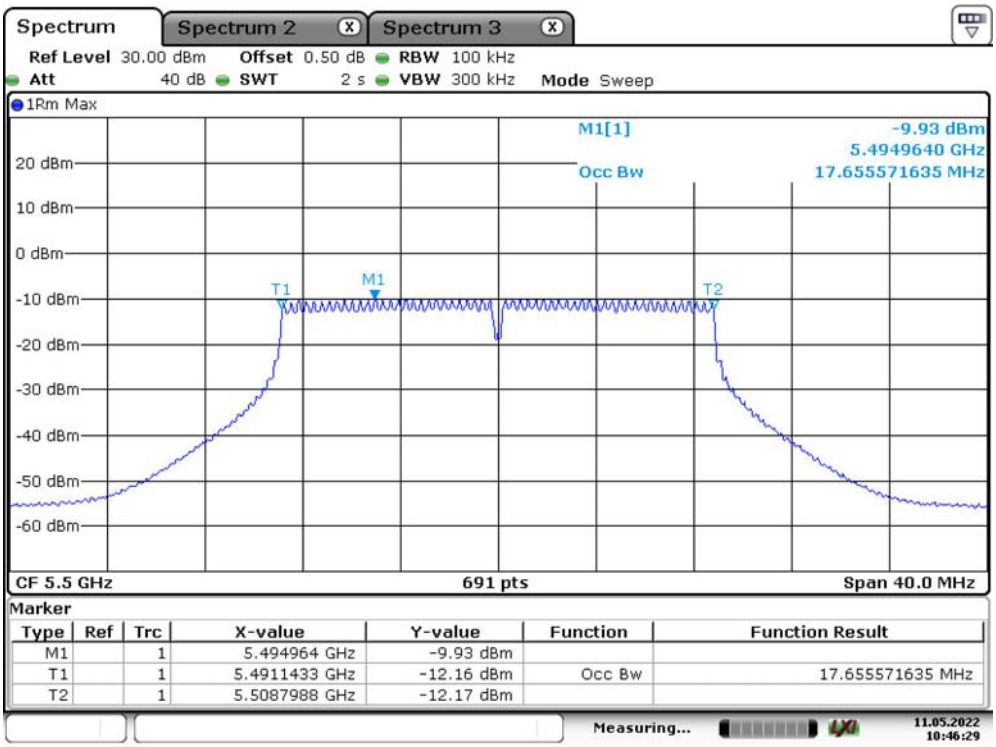

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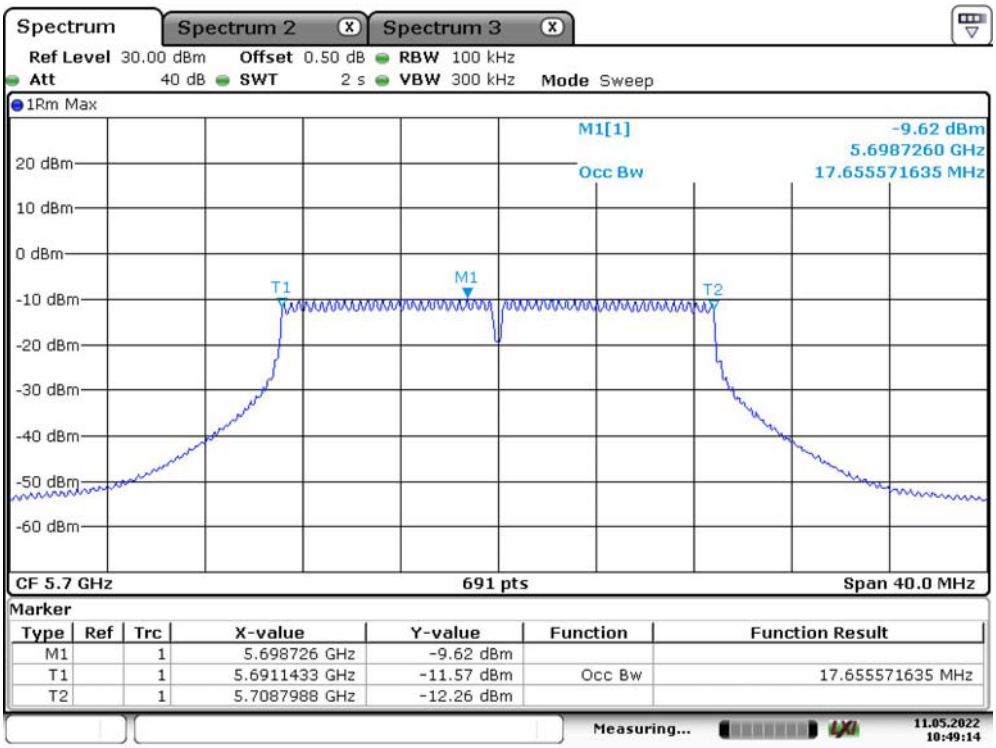
802.11 ac20 High



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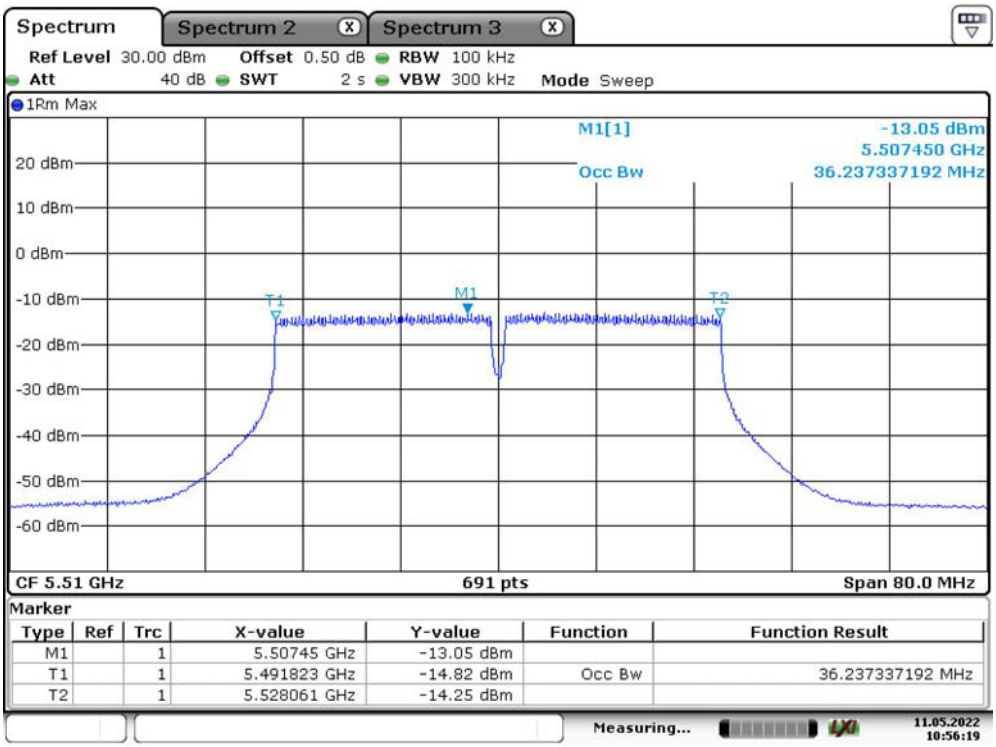

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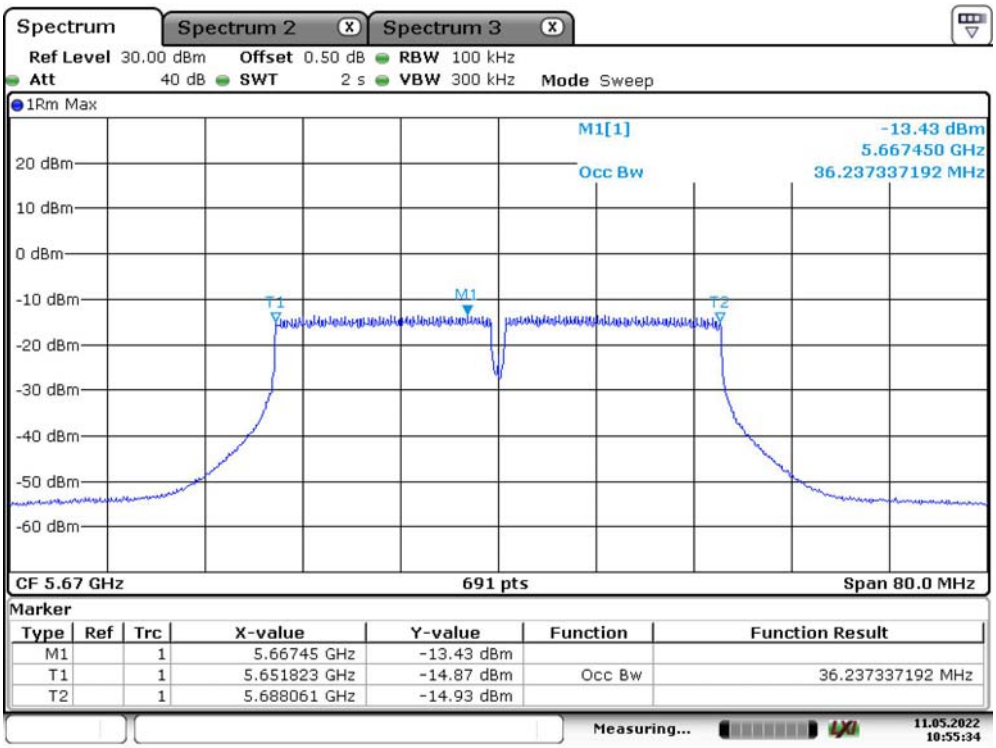
802.11 ac40 High



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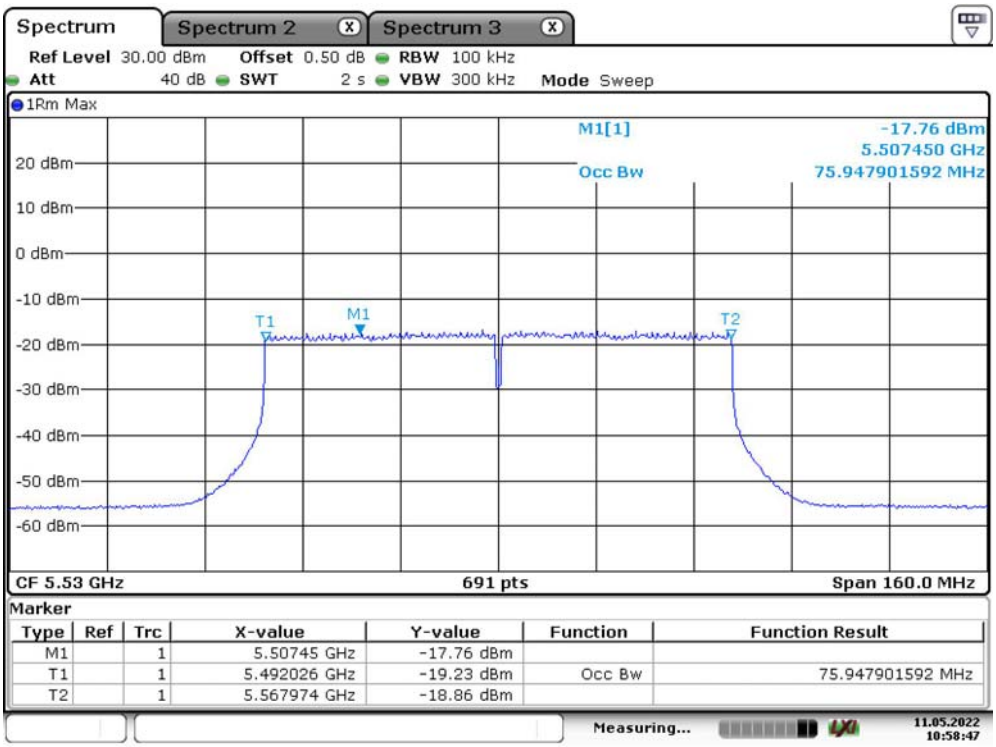
802.11 ac80



Date: 11.MAY.2022 10:58:47

3 – RF OUTPUT POWER, TRANSMIT POWER CONTROL (TPC), POWER DENSITY

Definition

RF Output Power:

The RF Output Power is the mean equivalent isotropically radiated power (e.i.r.p.) during a transmission burst.

Transmit Power Control (TPC):

Transmit Power Control (TPC) is a mechanism to be used by the RLAN device to ensure a mitigation factor of at least 3 dB on the aggregate power from a large number of devices. This requires the RLAN device to have a TPC range from which the lowest value is at least 6 dB below the values for mean e.i.r.p. given in table 2 for devices with TPC.

Power Density:

The Power Density is the mean Equivalent Isotropically Radiated Power (e.i.r.p.) density during a transmission burst.

Limit

TPC is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MH.

For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in table 2.

Devices are allowed to operate without TPC. See table 2 for the applicable limits in this case.

Table 2: Mean e.i.r.p. limits for RF output power and Power Density at the highest power level (P_H)

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)

NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.

NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.

NOTE 3: Slave devices without a *Radar Interference Detection* function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.

Table 3: Mean e.i.r.p. limits for RF Output Power at the lowest power level of the TPC range

Frequency range	Mean e.i.r.p. (dBm) limit for P_L
5 250 MHz to 5 350 MHz	17
5 470 MHz to 5 725 MHz	24 (see note)
NOTE: Slave devices without a *Radar Interference Detection* function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.	

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.4

Test Data

Test Result: *Compliant. Please refer to following table(s).*

RF output power, 802.11 a:

Band (MHz)	Fc (MHz)	Test condition	Conducted output power (dBm)		Result (dBm)		Limit (dBm)
			Chain 0	Chain 1	Chain 0	Chain 1	
5470-5725	5500	NT	14.76	14.45	26.76	26.45	27
		LT	14.78	14.47	26.78	26.47	
		HT	14.74	14.43	26.74	26.43	
	5700	NT	14.78	14.26	26.78	26.26	27
		LT	14.80	14.28	26.8	26.28	
		HT	14.76	14.24	26.76	26.24	

RF output power, 802.11 n20:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5500	NT	11.73	11.64	26.7	27
		LT	11.75	11.66	26.72	
		HT	11.71	11.62	26.68	
	5700	NT	11.45	11.61	26.54	27
		LT	11.47	11.63	26.56	
		HT	11.43	11.58	26.52	

RF output power, 802.11 n40:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5510	NT	11.63	11.42	26.54	27
		LT	11.65	11.44	26.56	
		HT	11.61	11.39	26.51	
	5670	NT	11.34	11.53	26.45	27
		LT	11.37	11.55	26.47	
		HT	11.32	11.51	26.43	

RF output power, 802.11 ac20:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5500	NT	11.74	11.56	26.66	27
		LT	11.76	11.58	26.68	
		HT	11.72	11.54	26.64	
	5700	NT	11.78	11.62	26.71	27
		LT	11.81	11.64	26.74	
		HT	11.76	11.60	26.69	

RF output power, 802.11 ac40:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5510	NT	11.57	11.45	26.52	27
		LT	11.59	11.47	26.54	
		HT	11.55	11.43	26.5	
	5670	NT	11.33	11.56	26.46	27
		LT	11.35	11.58	26.48	
		HT	11.31	11.54	26.44	

RF output power, 802.11 ac80:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5530	NT	8.75	8.53	26.65	27
		LT	8.78	8.55	26.68	
		HT	8.73	8.51	26.63	

Note: The antenna Gain was added into the result.

Beamforming:

RF output power, 802.11 n20:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5500	NT	8.59	8.36	26.49	27
		LT	8.61	8.38	26.51	
		HT	8.54	8.34	26.45	
	5700	NT	8.62	8.28	26.46	27
		LT	8.65	8.31	26.49	
		HT	8.61	8.26	26.45	

RF output power, 802.11 n40:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5510	NT	11.63	11.42	26.54	27
		LT	11.65	11.44	26.56	
		HT	11.61	11.39	26.51	
	5670	NT	11.34	11.53	26.45	27
		LT	11.37	11.55	26.47	
		HT	11.32	11.51	26.43	

RF output power, 802.11 ac20:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5500	NT	8.76	8.54	26.66	27
		LT	8.78	8.56	26.68	
		HT	8.74	8.52	26.64	
	5700	NT	8.81	8.29	26.57	27
		LT	8.83	8.31	26.59	
		HT	8.78	8.27	26.54	

RF output power, 802.11 ac40:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5510	NT	8.56	8.32	26.45	27
		LT	8.58	8.35	26.48	
		HT	8.54	8.31	26.44	
	5670	NT	8.63	8.07	26.37	27
		LT	8.65	8.09	26.39	
		HT	8.61	8.05	26.35	

RF output power, 802.11 ac80:

Band (MHz)	Fc (MHz)	Test condition	Result (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5470-5725	5530	NT	8.72	8.85	26.8	27
		LT	8.74	8.87	26.82	
		HT	8.68	8.83	26.77	

Note: The antenna Gain and Beamforming Gain were added into the result.

Power Density(Normal the worst)

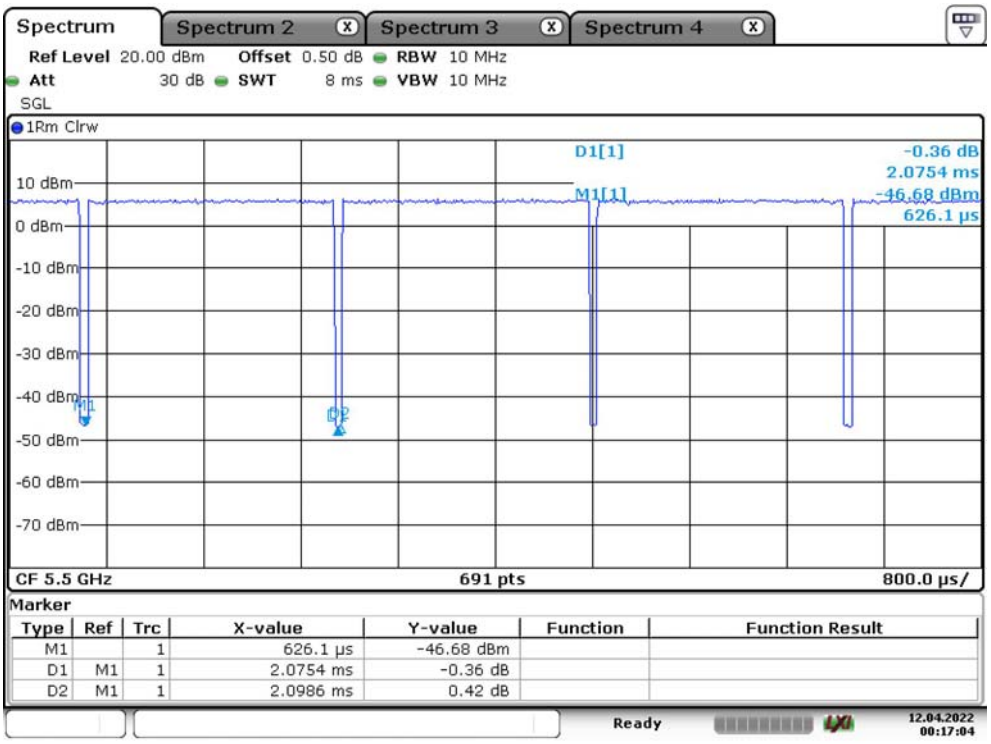
Band (MHz)	Mode	Fc (MHz)	Conducted power density (dBm/MHz)		Result (dBm/MHz)		Limit (dBm/MHz)
			Chain 0	Chain 1	Chain 0	Chain 1	
5470-5725	802.11 a	5500	1.49	1.92	13.54	13.97	14
		5700	1.53	1.36	13.58	13.41	
	802.11 n20	5500	-1.26	-1.50	13.72		
		5700	-1.13	-1.53	13.77		
	802.11 ac20	5510	-1.37	-1.74	13.56		
		5670	-1.25	-1.64	13.67		

Note:
1, The antenna gain and duty cycle factor were added into the result.
2, The Output Power of 20MHz mode is higher than other bandwith, and it is the narrowest bandwith, so the PSD of 20MHz is the worst case, 20MHz(802.11a and 802.11 n20) were selected for fullly PSD testing.
3, Duty cycle factor = 10*log(1/duty cycle)

Duty Cycle:

Mode	Ton (ms)	Toff (ms)	Duty Cycle(%)	Duty Cycle Factor (dB)
802.11 a	2.075	2.099	98.86	0.05
802.11 n20	2.049	2.090	98.04	0.09
802.11 ac20	1.715	1.755	97.72	0.10

802.11 a



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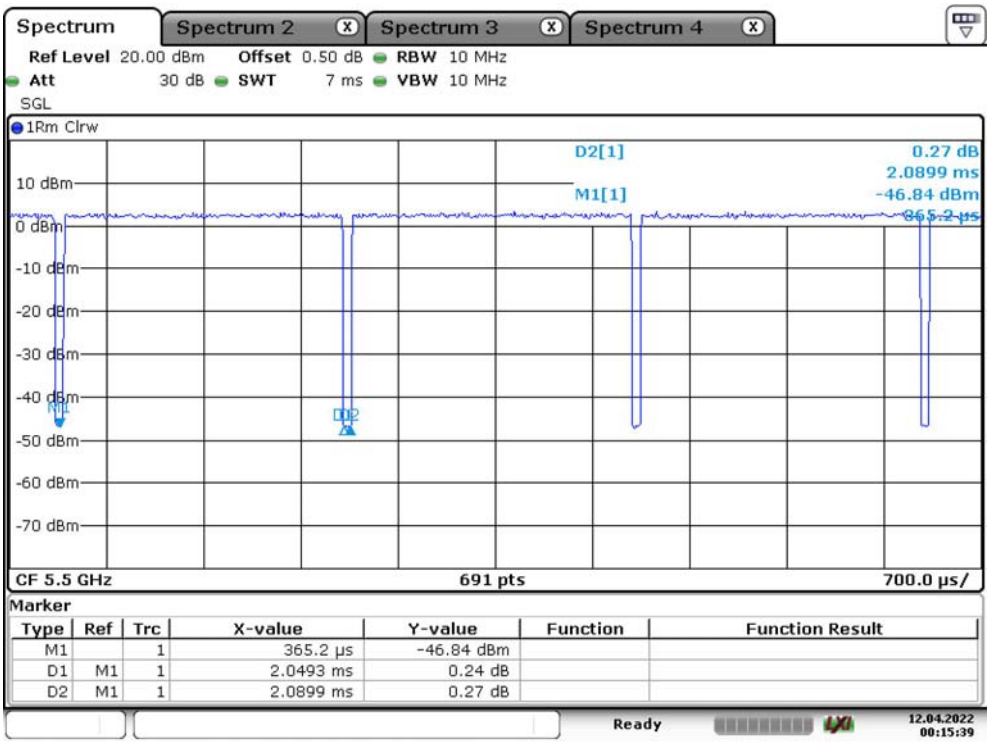
802.11 n20



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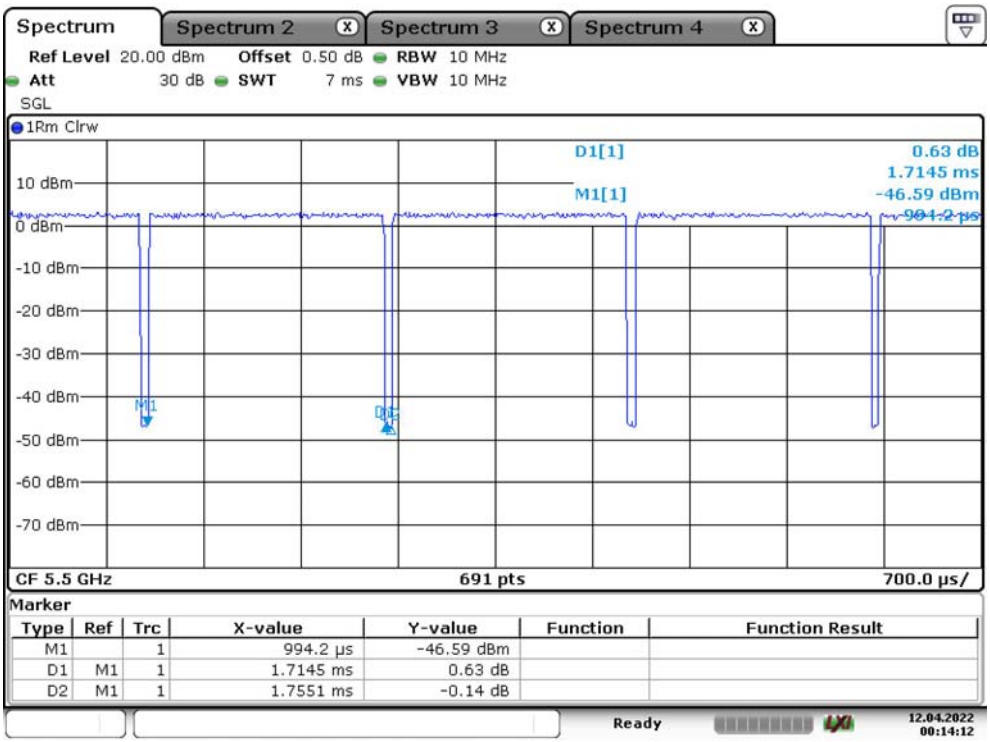
802.11 ac20



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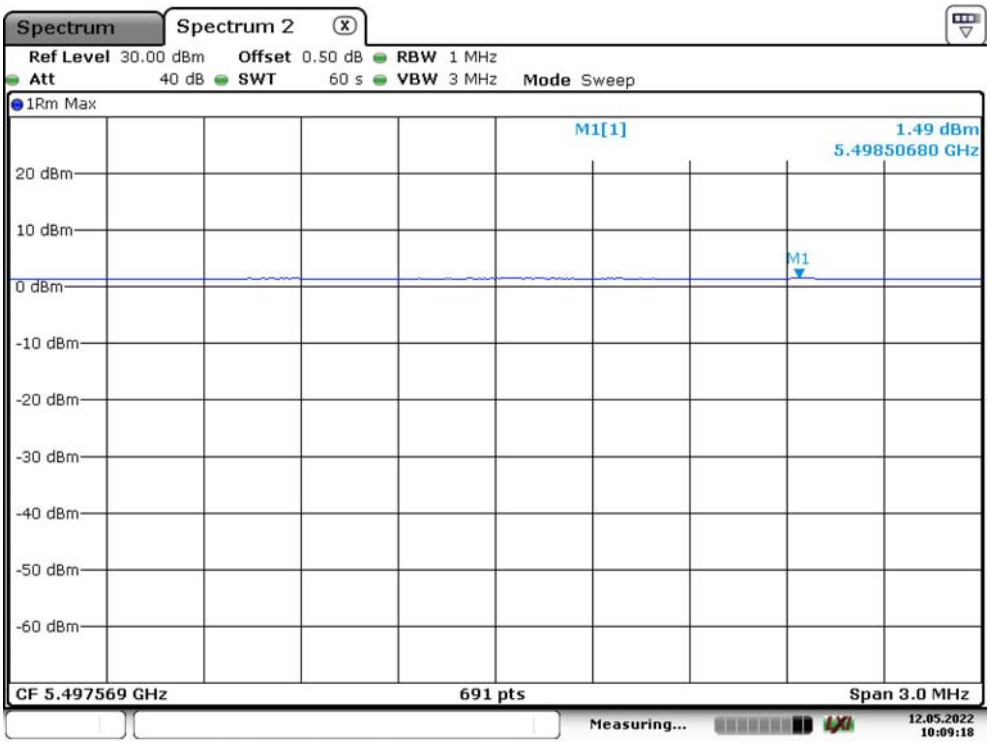
Power Density
Chain 0

A Low



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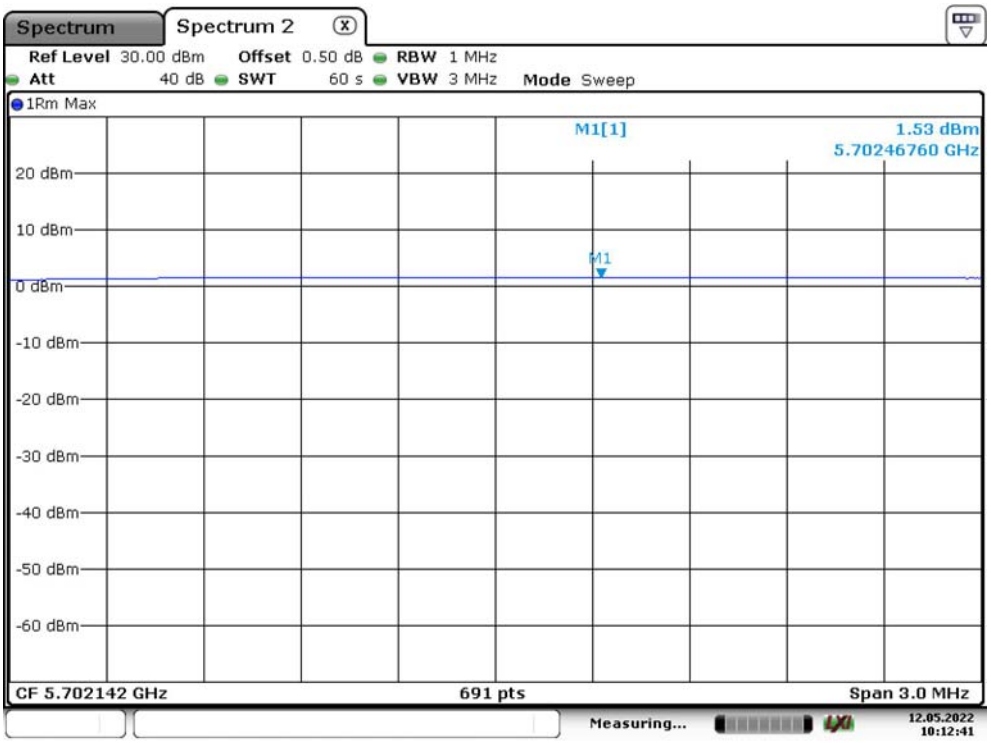
A High



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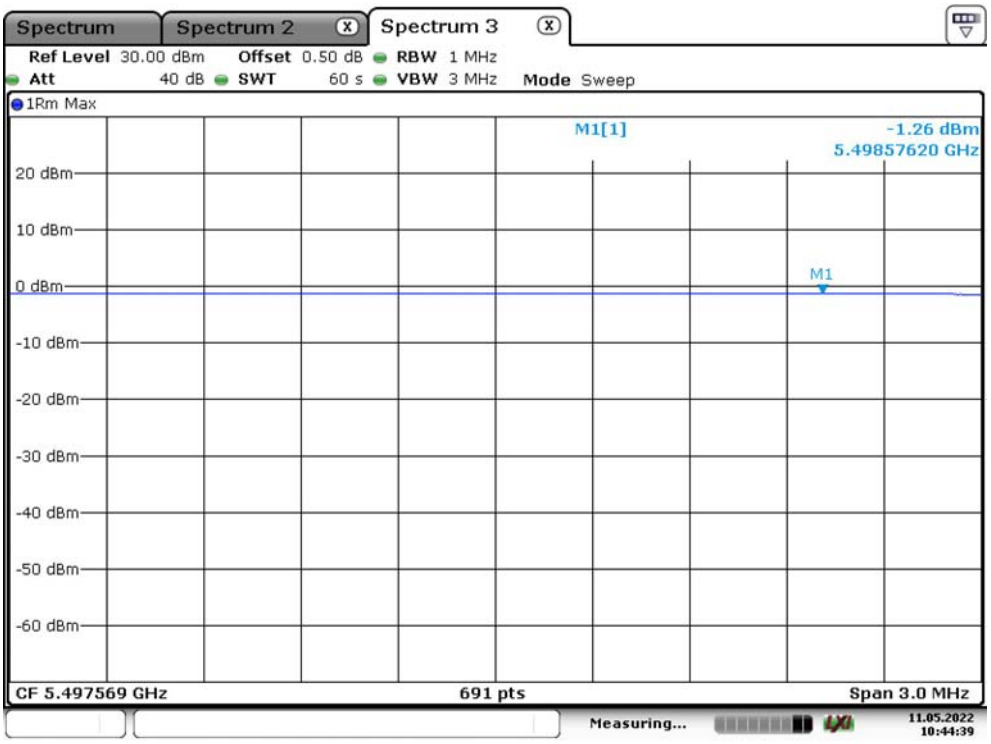
N20 Low



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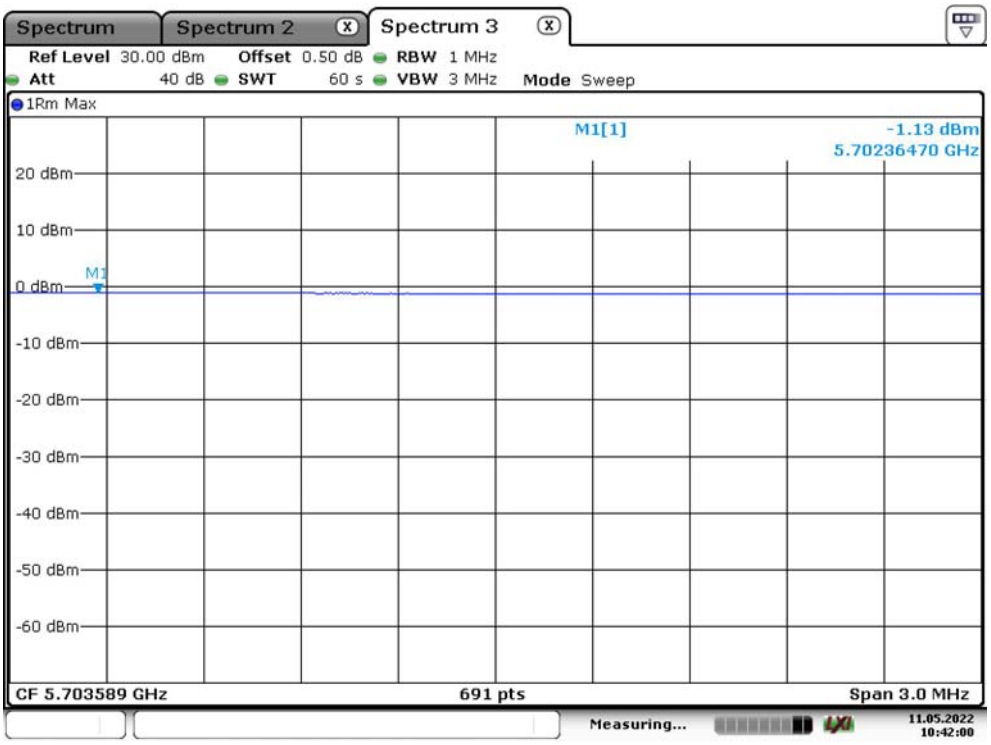
N20 High



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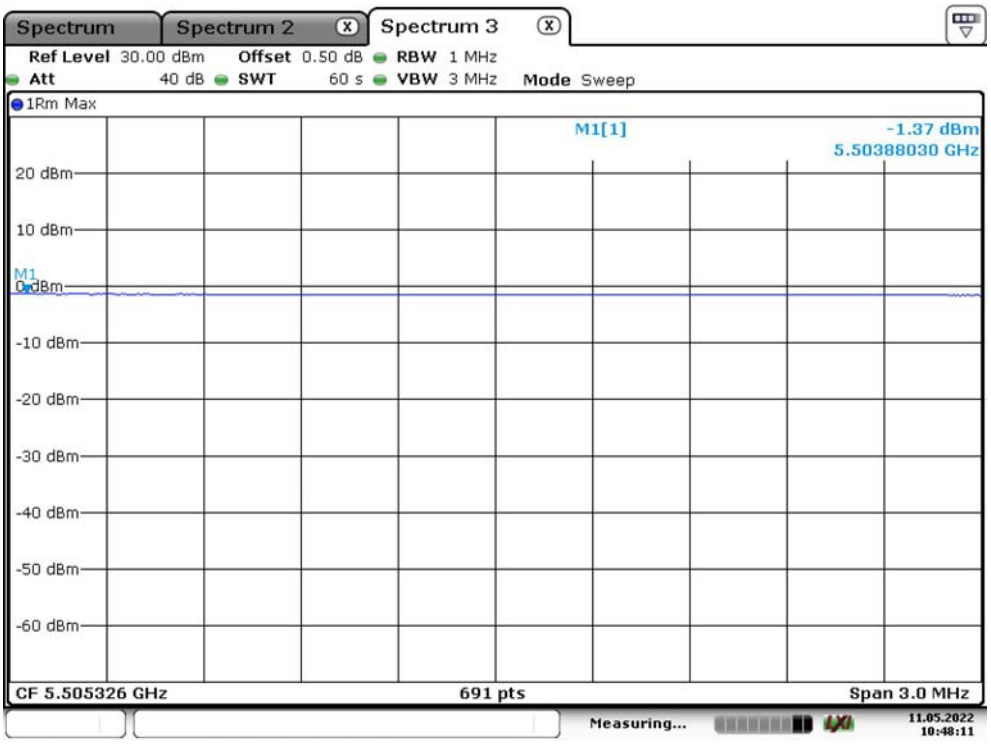
AC20 Low



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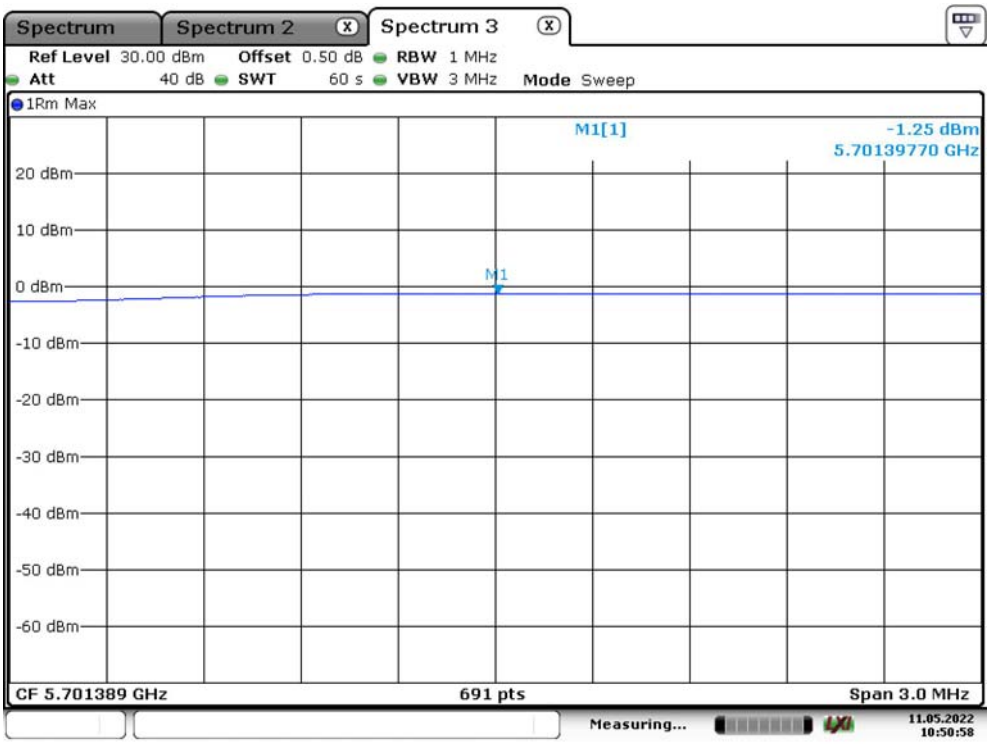
AC20 High



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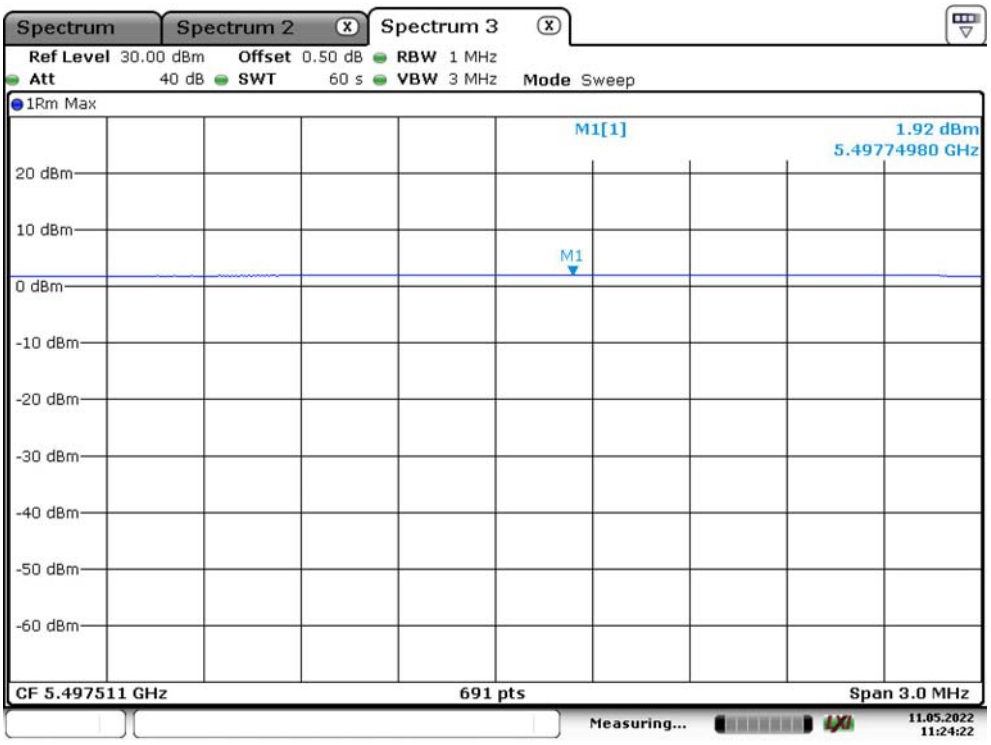
Chain 1

A Low



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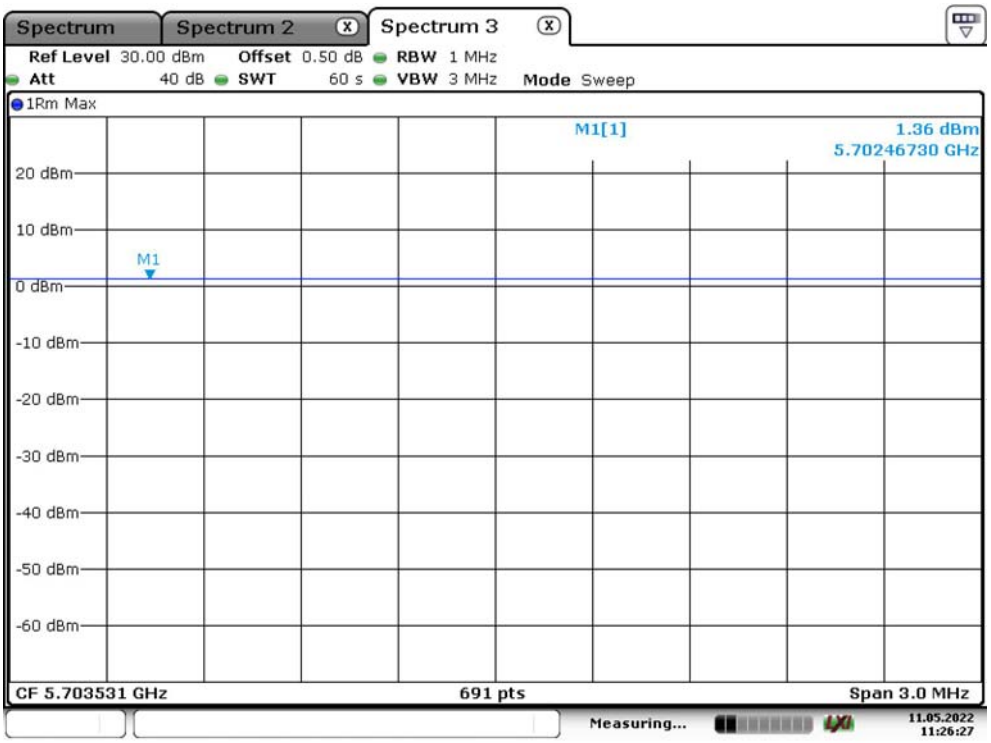
A High



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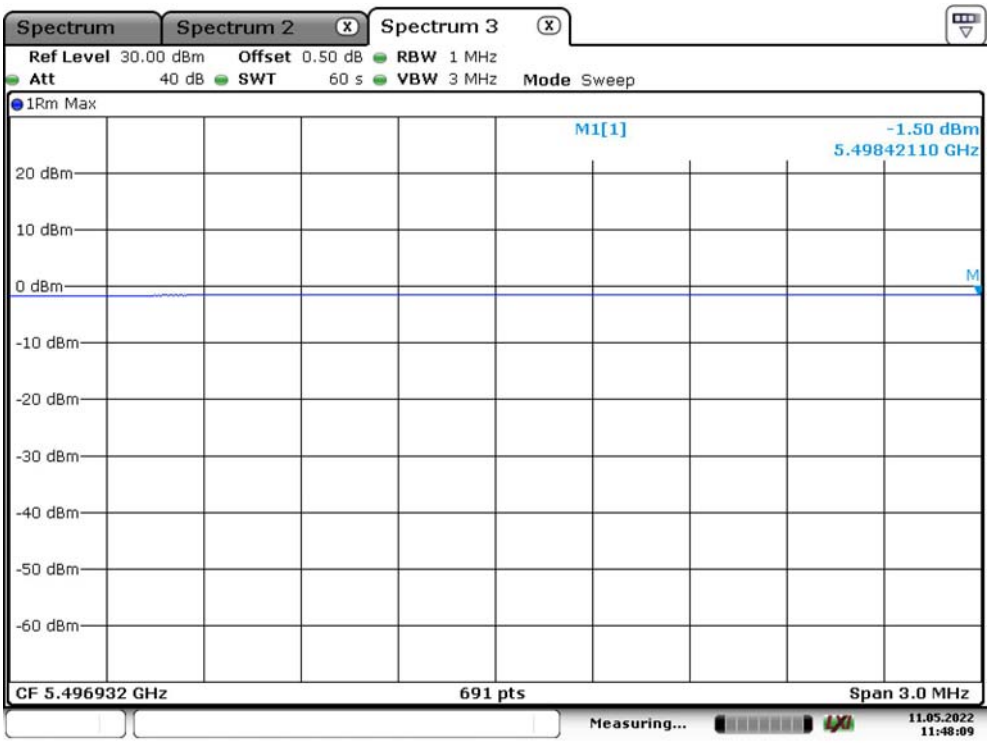
N20 Low



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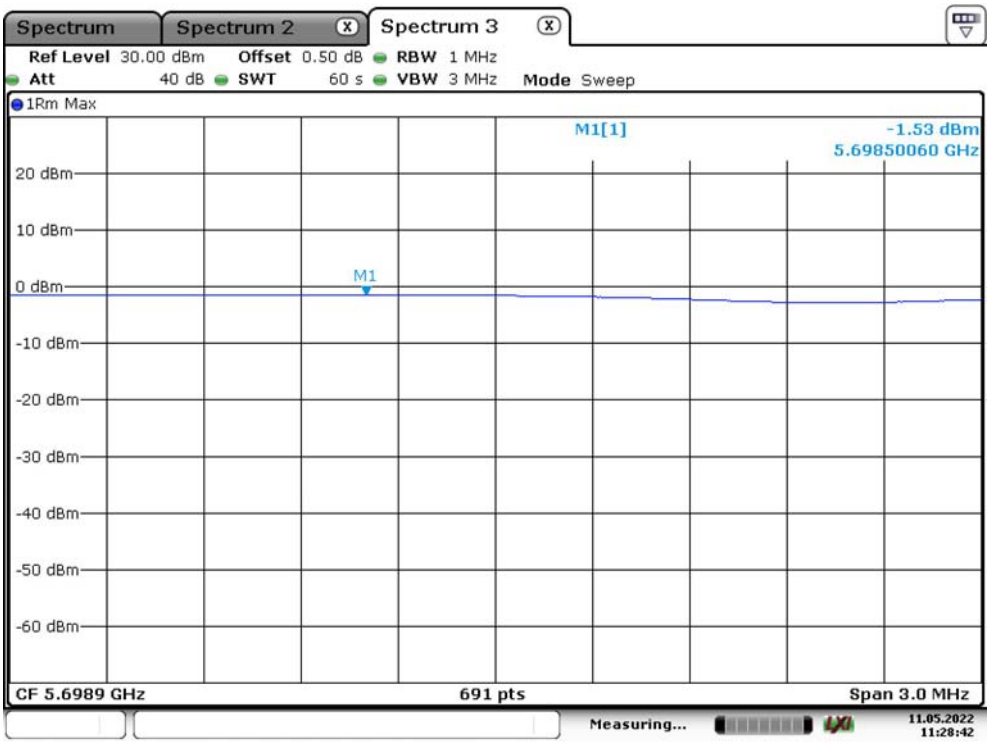
N20 High



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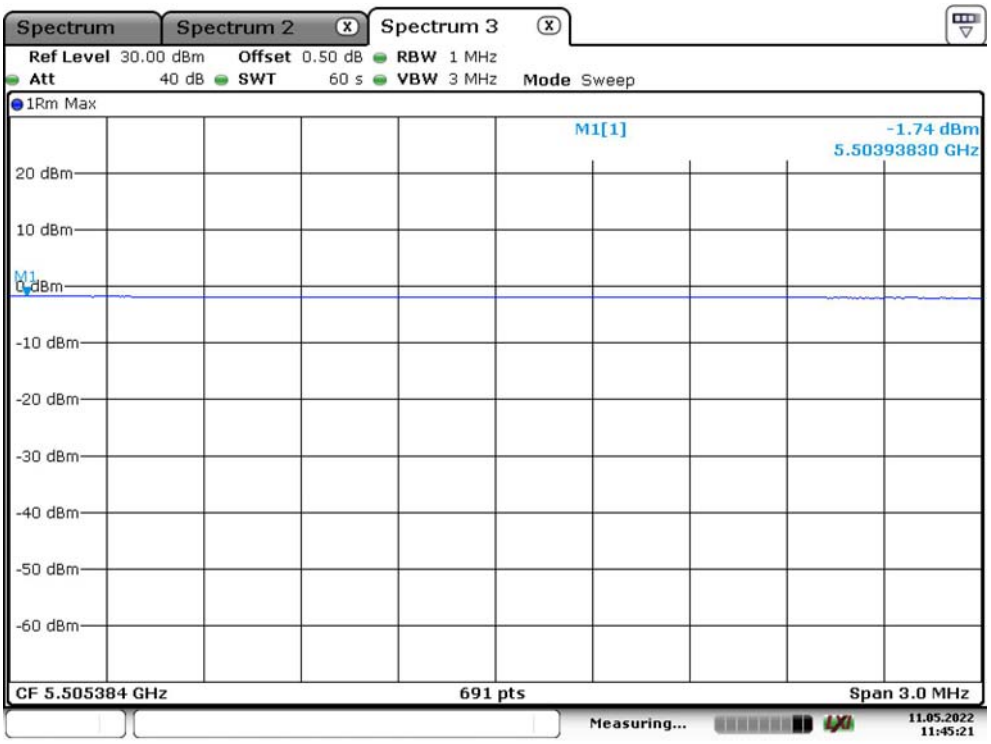
AC20 Low



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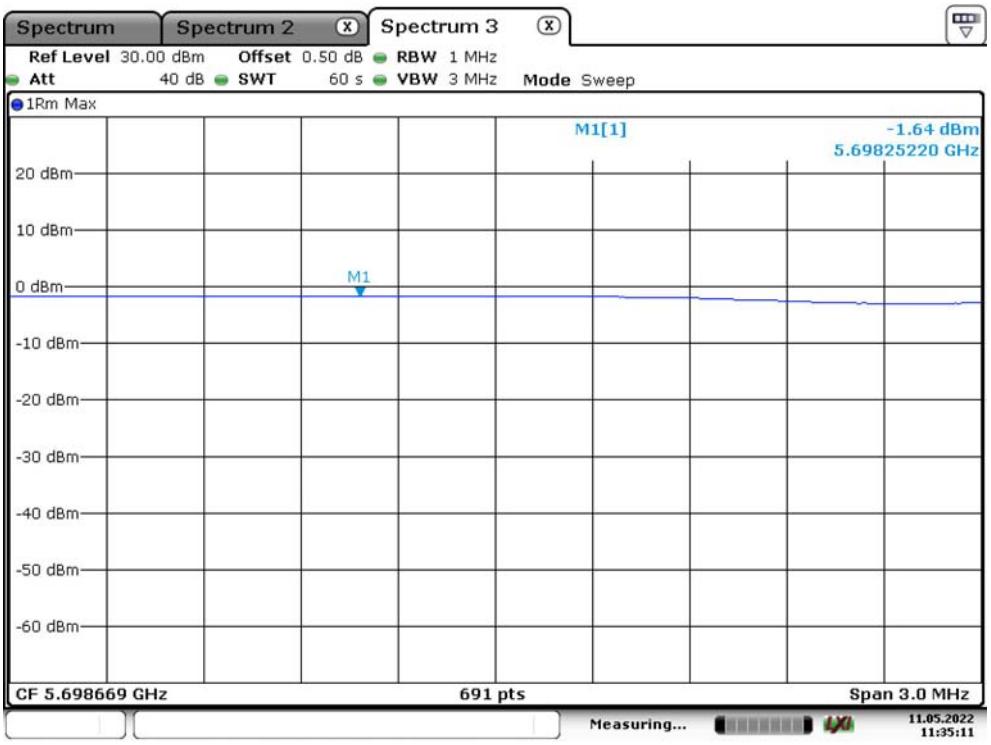
AC20 High



Date: 11.MAY.2022 11:35:11

4 – TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5 GHZ RLAN BANDS

Definition

Transmitter unwanted emissions outside the 5 GHz RLAN bands are radio frequency emissions outside the 5 GHz RLAN bands defined in clause 3.1.

Limit

The level of transmitter unwanted emissions outside the 5 GHz RLAN bands shall not exceed the limits given in table 4.

Table 4: Transmitter unwanted emission limits outside the 5 GHz RLAN bands

Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 5,15 GHz	-30 dBm	1 MHz
5,35 GHz to 5,47 GHz	-30 dBm	1 MHz
5,725 GHz to 26 GHz	-30 dBm	1 MHz

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.5

Test Data

Test Result: *Compliant. Pre-scan all modes, please refer to following tables.*

802.11 a_Chain 0 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11000.00	H	48.73	-49.82	13.10	0.82	-37.54	-30.00	7.54
11000.00	V	48.28	-49.65	13.10	0.82	-37.37	-30.00	7.37
72.44	H	50.72	-56.72	-3.78	0.18	-60.68	-54.00	6.68
70.84	V	53.89	-52.53	-4.58	0.18	-57.29	-54.00	3.29

802.11 a_Chain 0 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11400.00	H	48.75	-50.51	13.00	1.57	-39.08	-30.00	9.08
11400.00	V	49.31	-48.54	13.00	1.57	-37.11	-30.00	7.11
72.58	H	50.83	-56.61	-3.71	0.18	-60.50	-54.00	6.50
70.41	V	54.06	-52.43	-4.80	0.18	-57.41	-54.00	3.41

802.11 a_Chain 1 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11000.00	H	48.67	-49.88	13.10	0.82	-37.60	-30.00	7.60
11000.00	V	48.32	-49.61	13.10	0.82	-37.33	-30.00	7.33
72.65	H	50.23	-57.21	-3.68	0.18	-61.07	-54.00	7.07
70.26	V	53.97	-52.54	-4.87	0.18	-57.59	-54.00	3.59

802.11 a_Chain 1 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11400.00	H	48.26	-51.00	13.00	1.57	-39.57	-30.00	9.57
11400.00	V	48.13	-49.72	13.00	1.57	-38.29	-30.00	8.29
72.59	H	50.57	-56.87	-3.71	0.18	-60.76	-54.00	6.76
70.94	V	54.11	-52.30	-4.53	0.18	-57.01	-54.00	3.01

802.11 n20 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11000.00	H	49.49	-49.06	13.10	0.82	-36.78	-30.00	6.78
11000.00	V	48.54	-49.39	13.10	0.82	-37.11	-30.00	7.11
72.16	H	50.43	-57.01	-3.92	0.18	-61.11	-54.00	7.11
70.38	V	53.85	-52.64	-4.81	0.18	-57.63	-54.00	3.63

802.11 n20 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11400.00	H	48.96	-50.30	13.00	1.57	-38.87	-30.00	8.87
11400.00	V	47.89	-49.96	13.00	1.57	-38.53	-30.00	8.53
72.35	H	50.21	-57.23	-3.83	0.18	-61.24	-54.00	7.24
70.59	V	53.76	-52.70	-4.71	0.18	-57.59	-54.00	3.59

802.11 n40 **5510 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11020.00	H	48.75	-49.84	13.04	0.86	-37.66	-30.00	7.66
11020.00	V	48.15	-49.78	13.04	0.86	-37.60	-30.00	7.60
72.48	H	50.67	-56.77	-3.76	0.18	-60.71	-54.00	6.71
70.36	V	53.69	-52.81	-4.82	0.18	-57.81	-54.00	3.81

802.11 n40 **5670 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11340.00	H	49.21	-49.95	12.94	1.46	-38.47	-30.00	8.47
11340.00	V	48.76	-49.10	12.94	1.46	-37.62	-30.00	7.62
72.67	H	50.34	-57.10	-3.67	0.18	-60.95	-54.00	6.95
70.13	V	54.12	-52.41	-4.94	0.18	-57.53	-54.00	3.53

802.11 ac20 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11000.00	H	48.69	-49.86	13.10	0.82	-37.58	-30.00	7.58
11000.00	V	48.27	-49.66	13.10	0.82	-37.38	-30.00	7.38
72.43	H	50.48	-56.96	-3.79	0.18	-60.93	-54.00	6.93
70.96	V	53.89	-52.51	-4.52	0.18	-57.21	-54.00	3.21

802.11 ac20 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11400.00	H	49.36	-49.90	13.00	1.57	-38.47	-30.00	8.47
11400.00	V	48.77	-49.08	13.00	1.57	-37.65	-30.00	7.65
72.52	H	50.64	-56.80	-3.74	0.18	-60.72	-54.00	6.72
70.19	V	53.77	-52.75	-4.91	0.18	-57.84	-54.00	3.84

802.11 ac40 **5510 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11020.00	H	49.75	-48.84	13.04	0.86	-36.66	-30.00	6.66
11020.00	V	48.62	-49.31	13.04	0.86	-37.13	-30.00	7.13
72.35	H	50.74	-56.70	-3.83	0.18	-60.71	-54.00	6.71
70.28	V	53.81	-52.70	-4.86	0.18	-57.74	-54.00	3.74

802.11 ac40 **5670 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11340.00	H	48.39	-50.77	12.94	1.46	-39.29	-30.00	9.29
11340.00	V	48.71	-49.15	12.94	1.46	-37.67	-30.00	7.67
72.67	H	50.85	-56.59	-3.67	0.18	-60.44	-54.00	6.44
70.39	V	54.16	-52.33	-4.81	0.18	-57.32	-54.00	3.32

802.11 ac80 **5530 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
11060.00	H	48.66	-50.00	12.92	0.93	-38.01	-30.00	8.01
11060.00	V	48.47	-49.45	12.92	0.93	-37.46	-30.00	7.46
72.68	H	50.69	-56.75	-3.66	0.18	-60.59	-54.00	6.59
70.45	V	54.10	-52.38	-4.78	0.18	-57.34	-54.00	3.34

Note 1:The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

5 – TRANSMITTER UNWANTED EMISSIONS WITHIN THE 5 GHZ RLAN BANDS

Definition

Transmitter unwanted emissions within the 5 GHz RLAN bands are radio frequency emissions within the 5 GHz RLAN bands defined in clause 3.1.

Limit

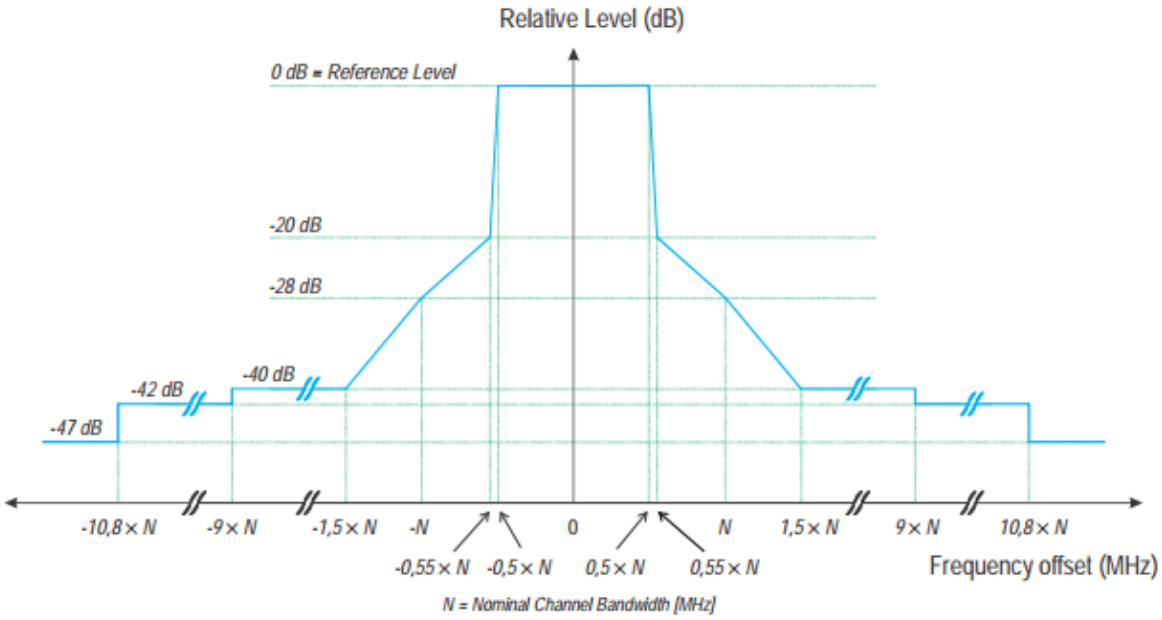


Figure 1: Transmit spectral power mask

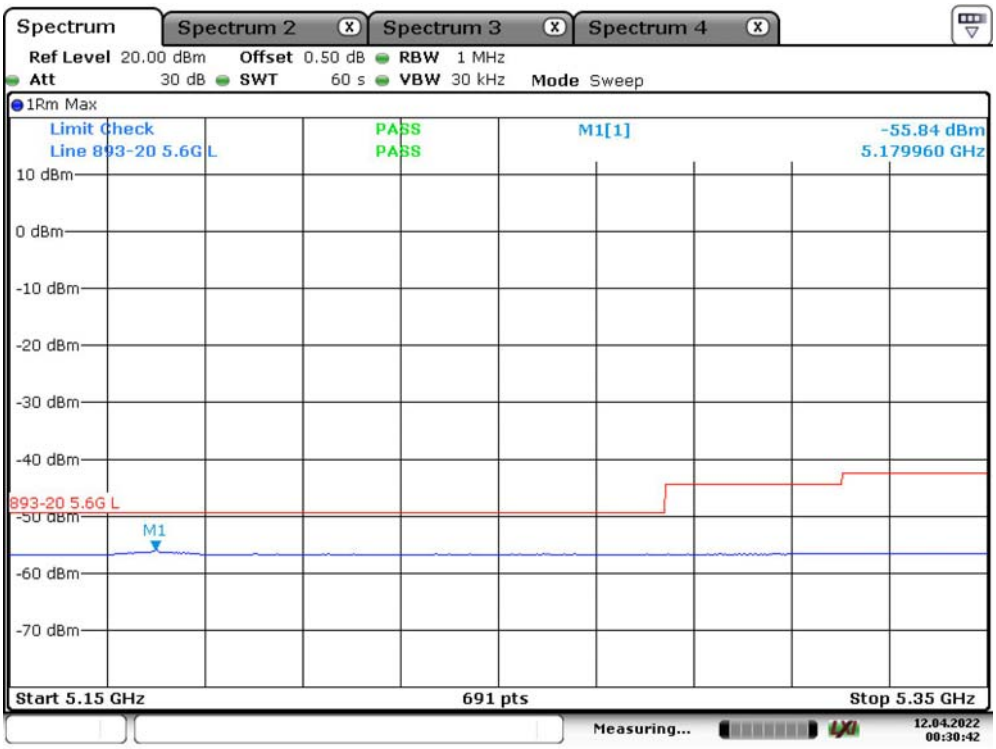
Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.6

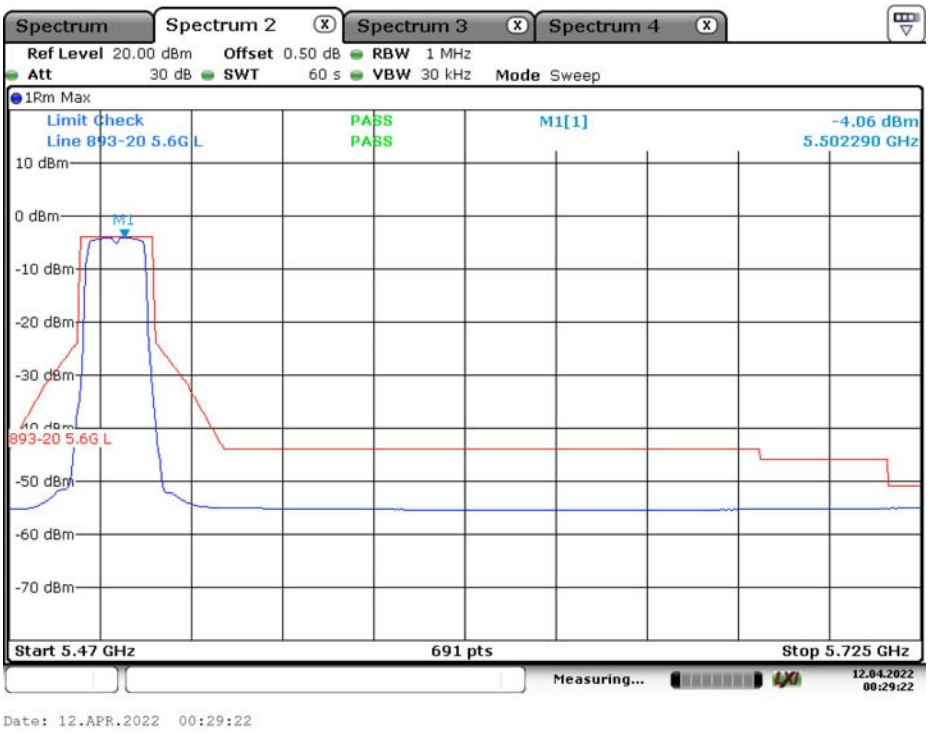
Test Data

Test Result: *Compliant. Please refer to following Plots.*
Chain 0

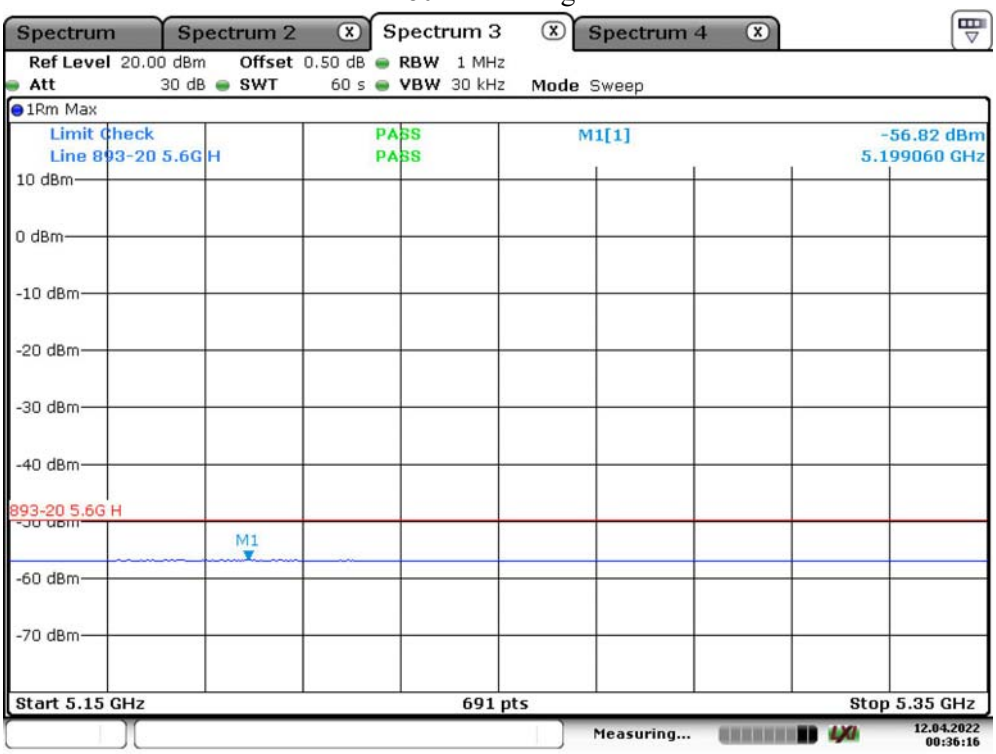
802.11 a-1 Low



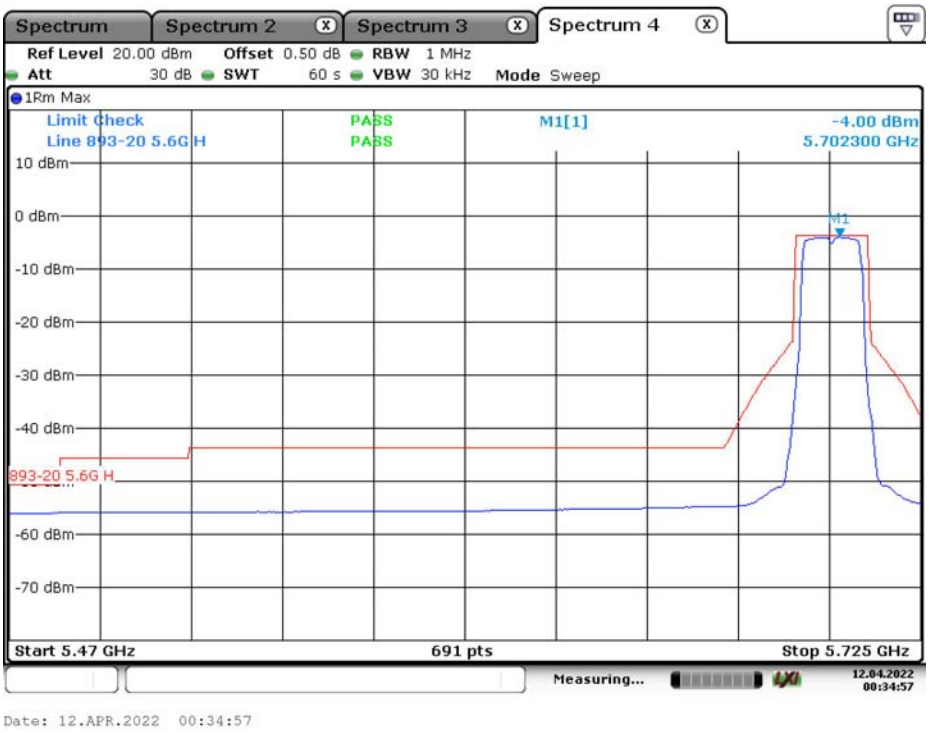
802.11 a-2 Low



802.11a-1 High

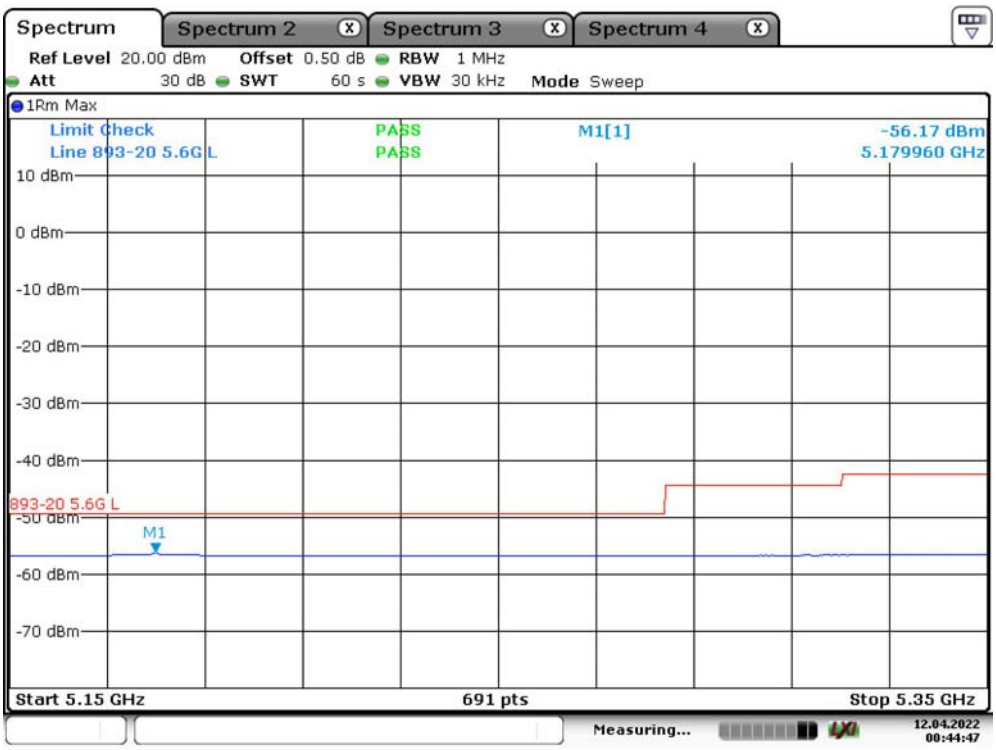


802.11 a-2 High

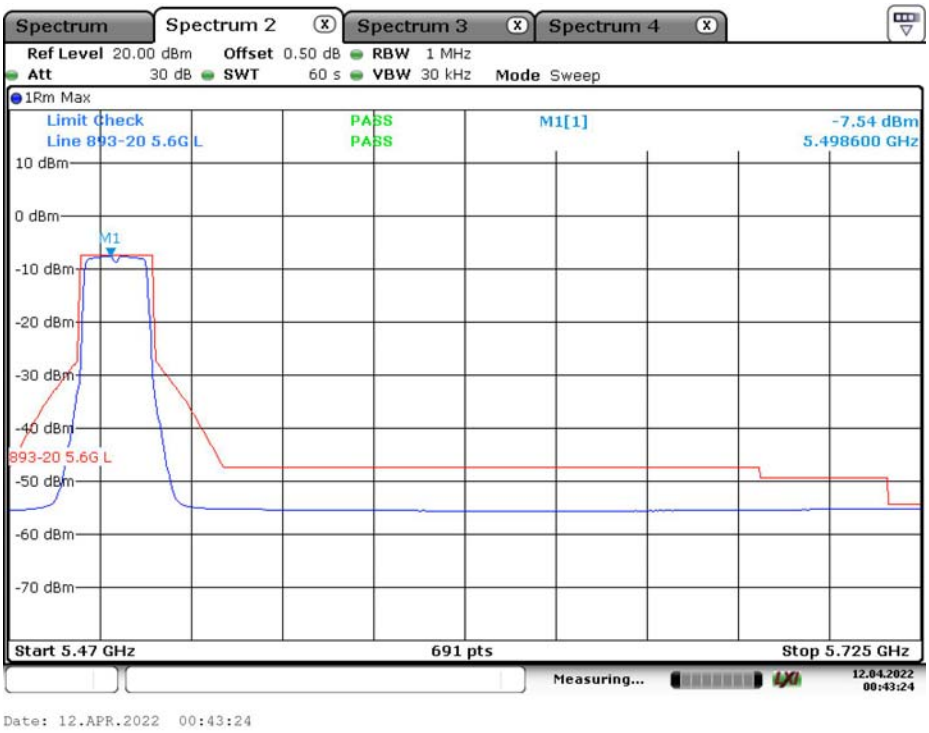


Date: 12.APR.2022 00:34:57

802.11 n20-1 Low

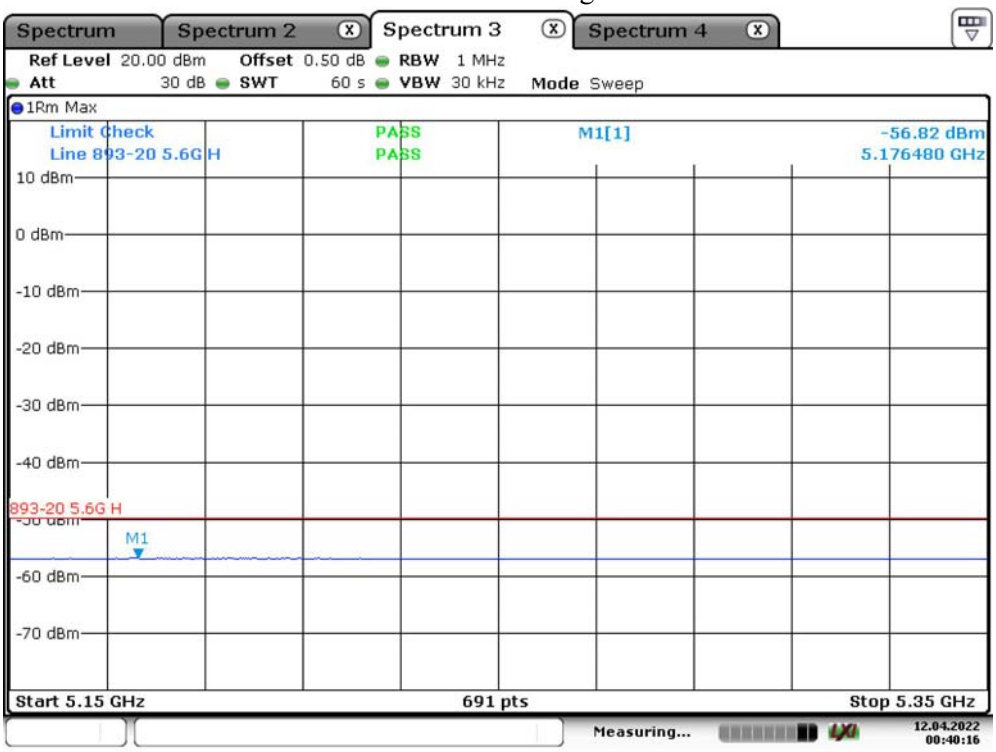


802.11 n20-2 Low

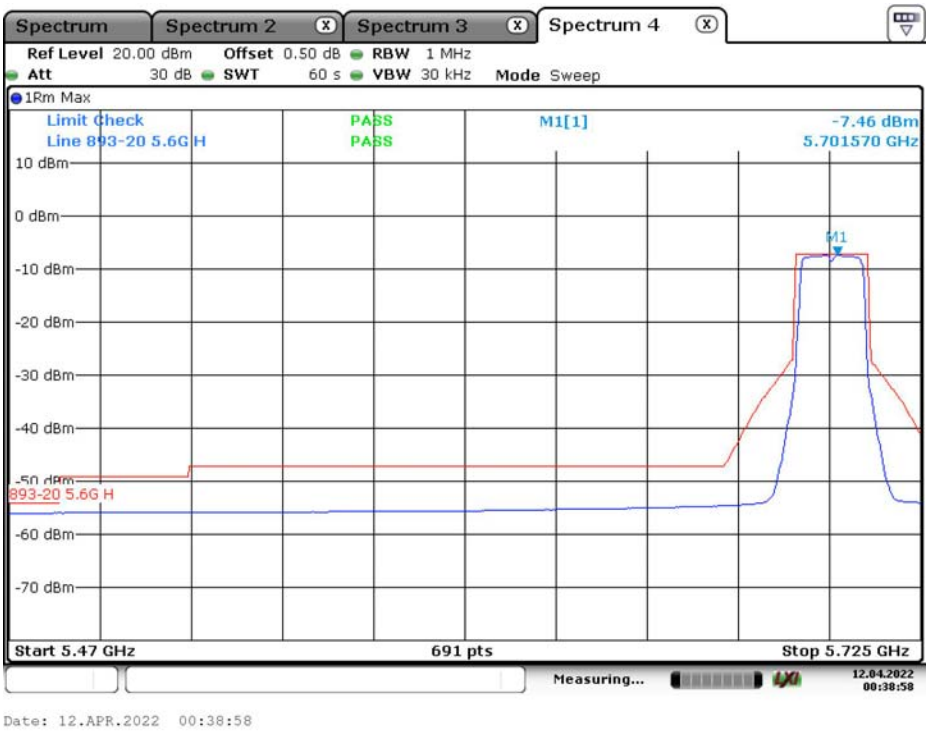


Date: 12.APR.2022 00:43:24

802.11 n20-1 High

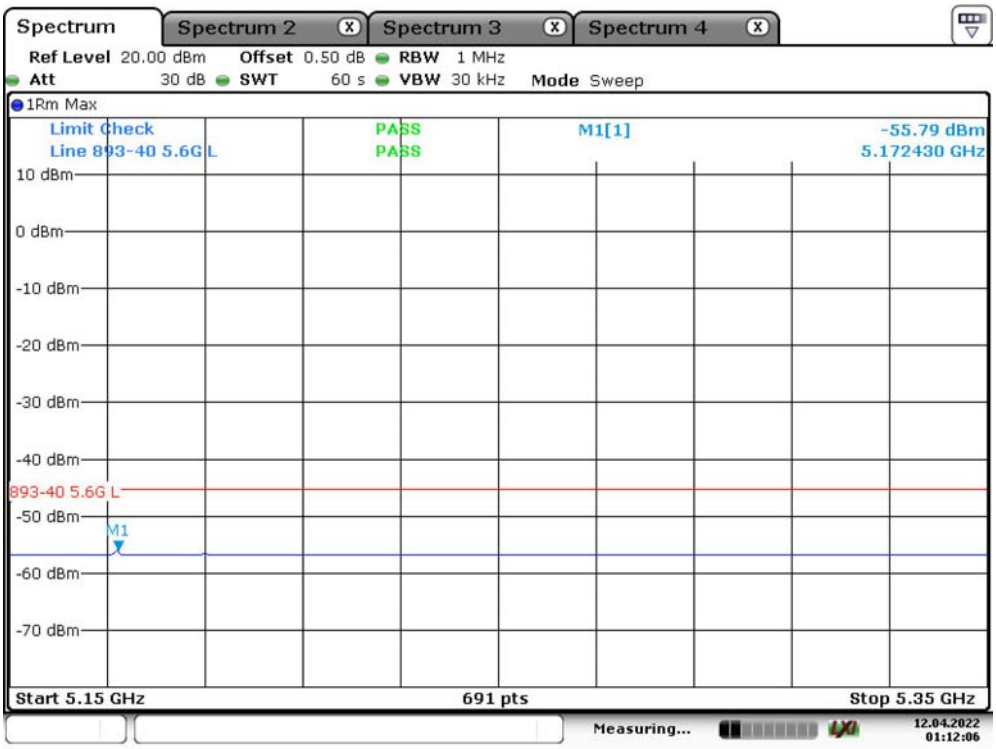


802.11 n20-2 High

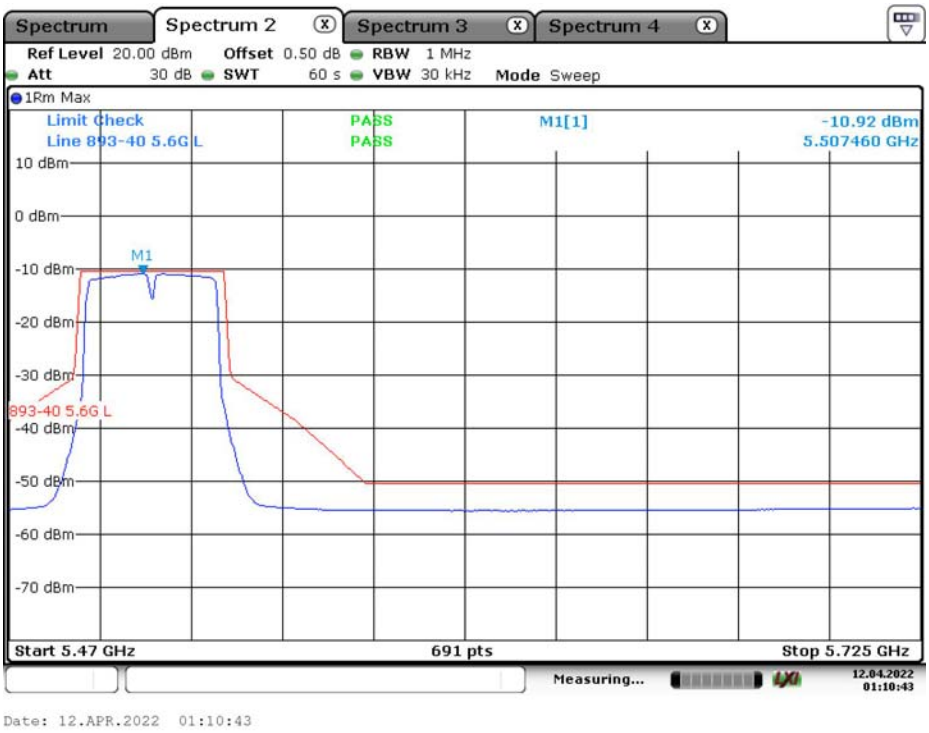


Date: 12.APR.2022 00:38:58

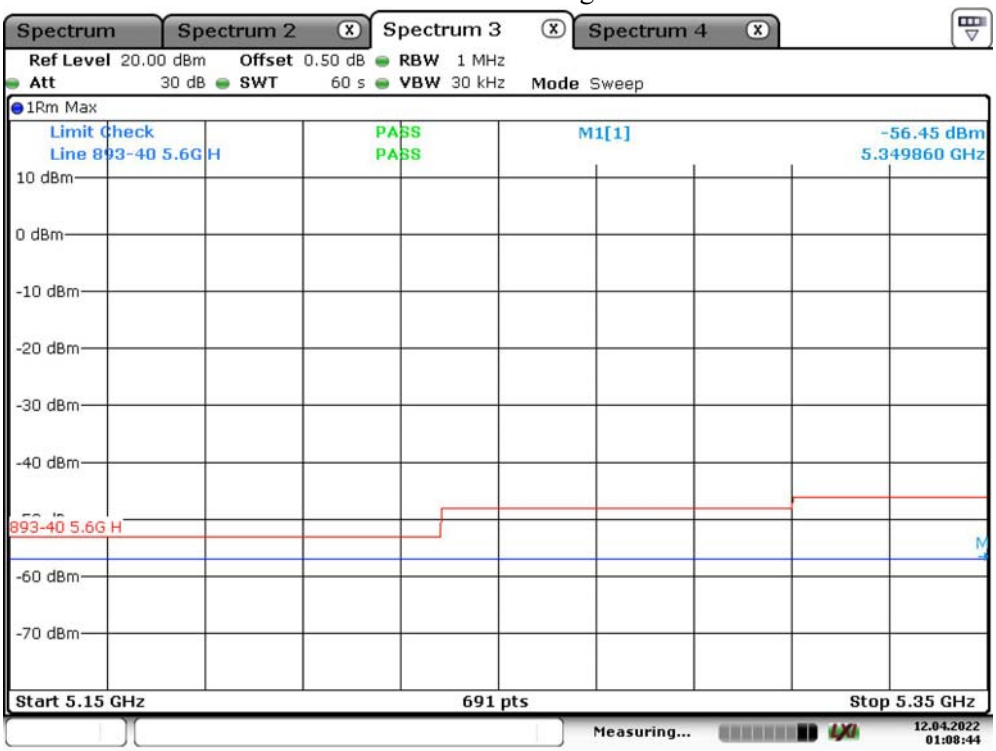
802.11 n40-1 Low



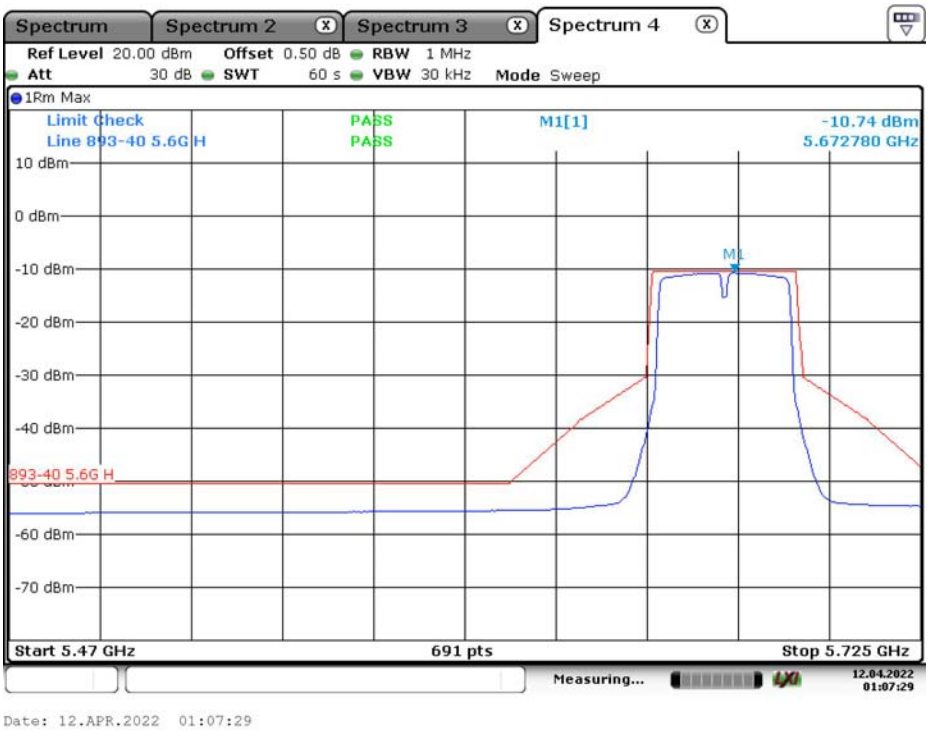
802.11 n40-2 Low



802.11 n40-1 High



802.11 n40-2 High



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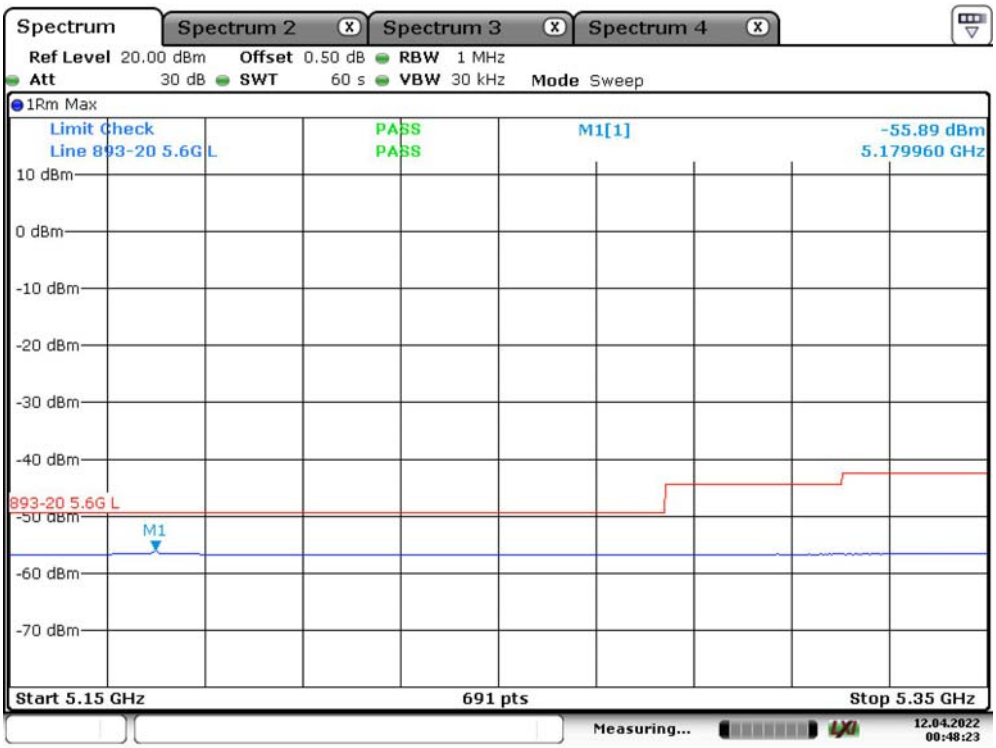
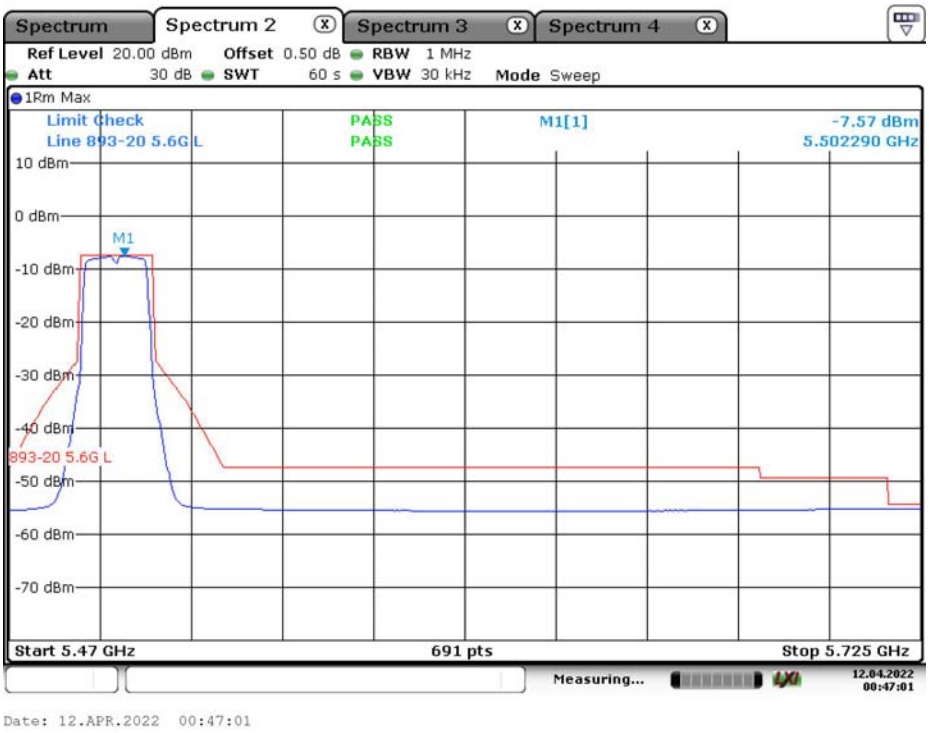
802.11 ac20-1 Low

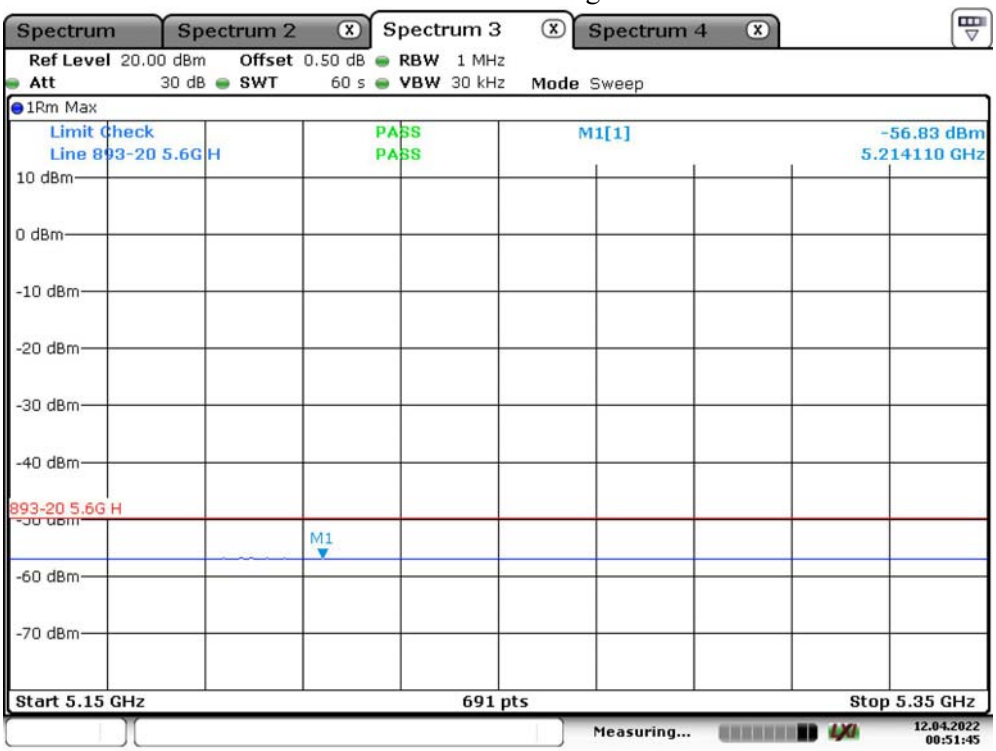


802.11ac20-2 Low

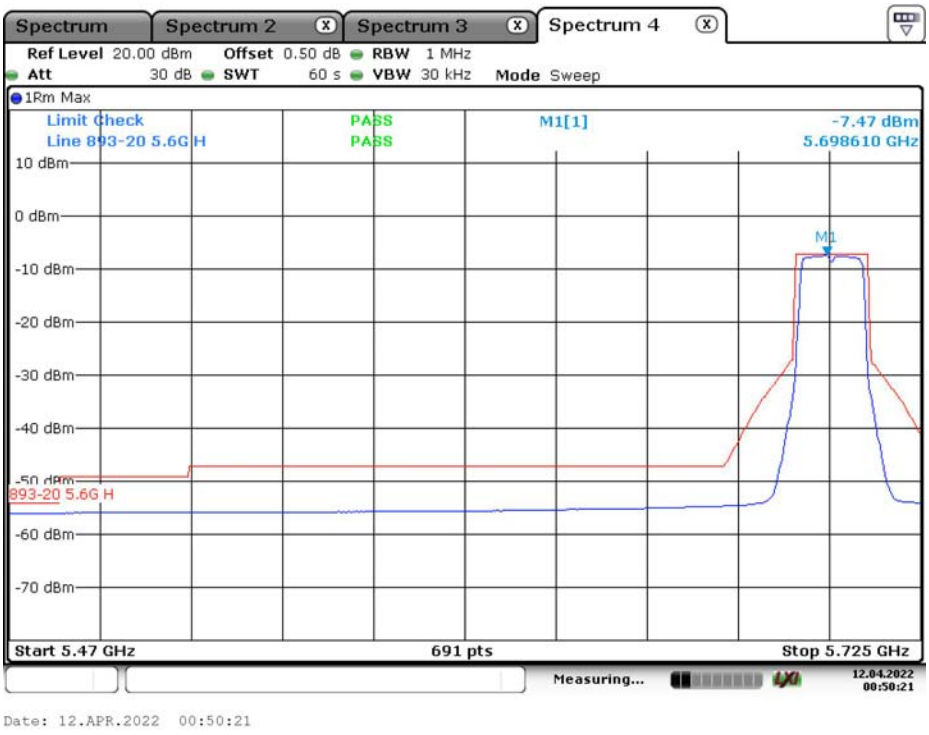


Date: 12.APR.2022 00:47:01

802.11 ac20-1 High

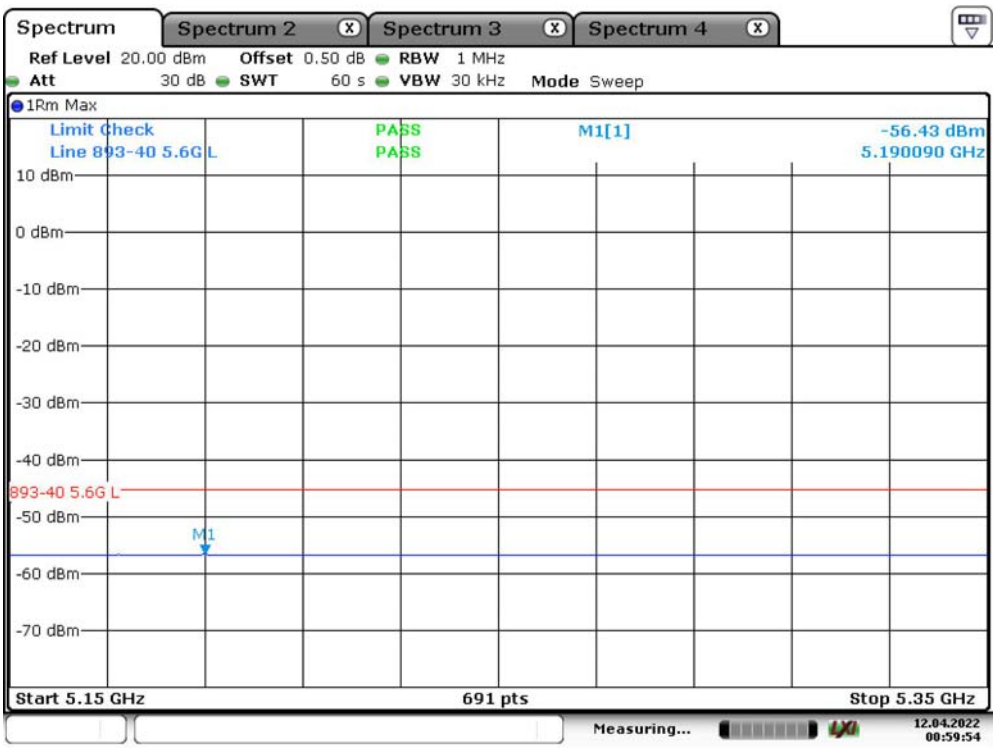


802.11 ac20-2 High



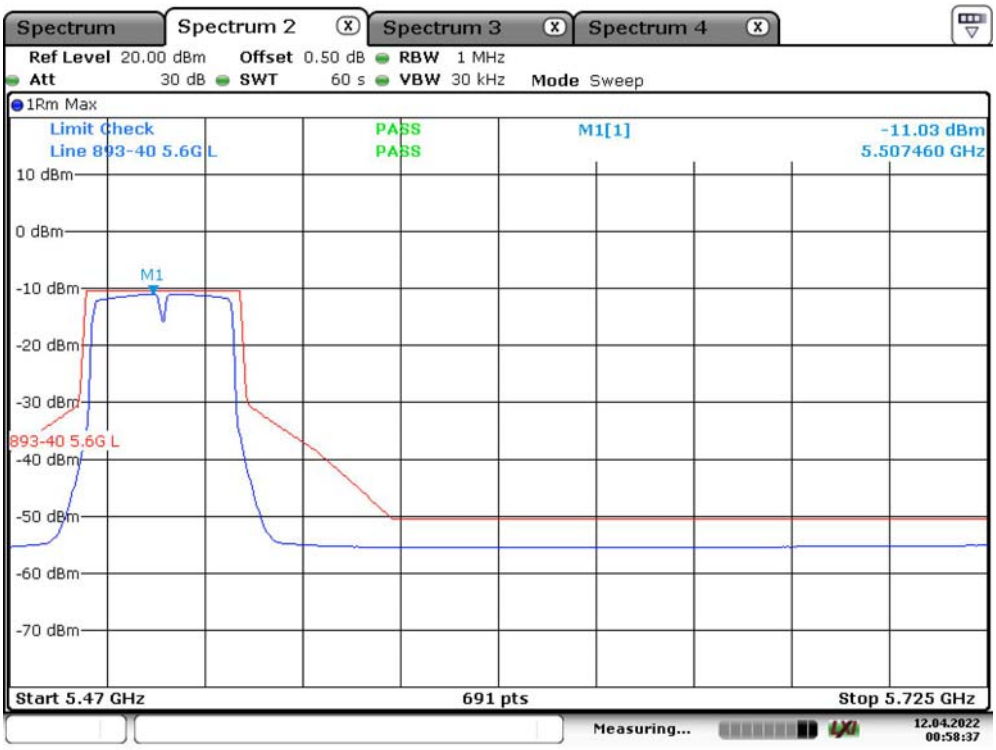
Date: 12.APR.2022 00:50:21

802.11 ac40-Low Channel-1



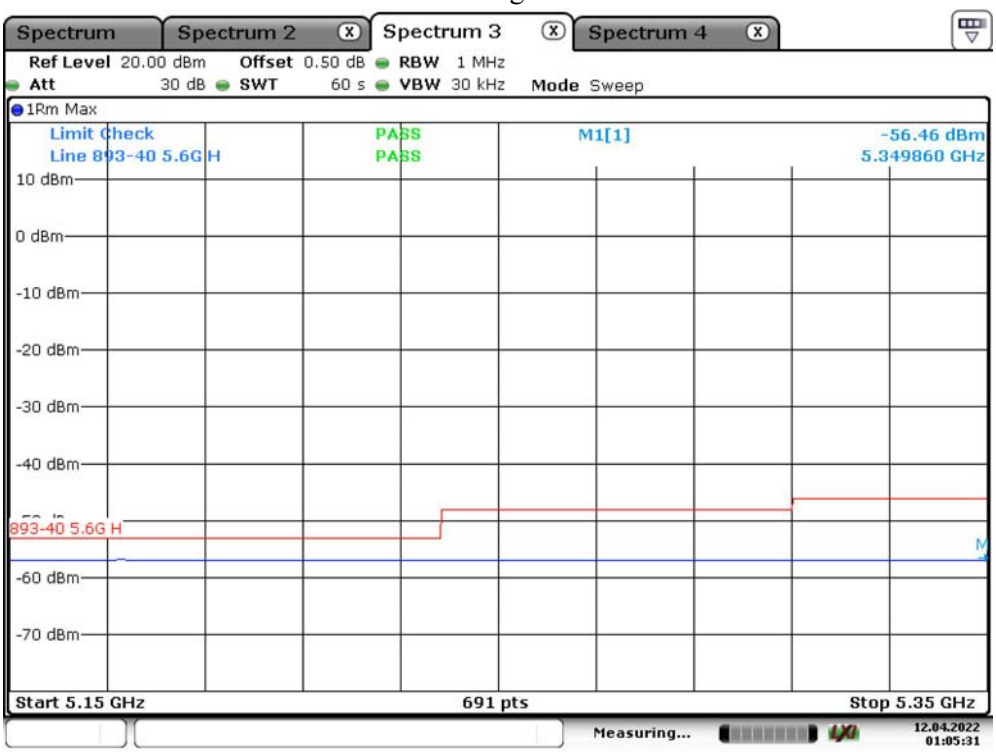
Date: 12.APR.2022 00:59:54

802.11 ac40-Low Channel-2



Date: 12.APR.2022 00:58:37

802.11 ac40-High Channel-1



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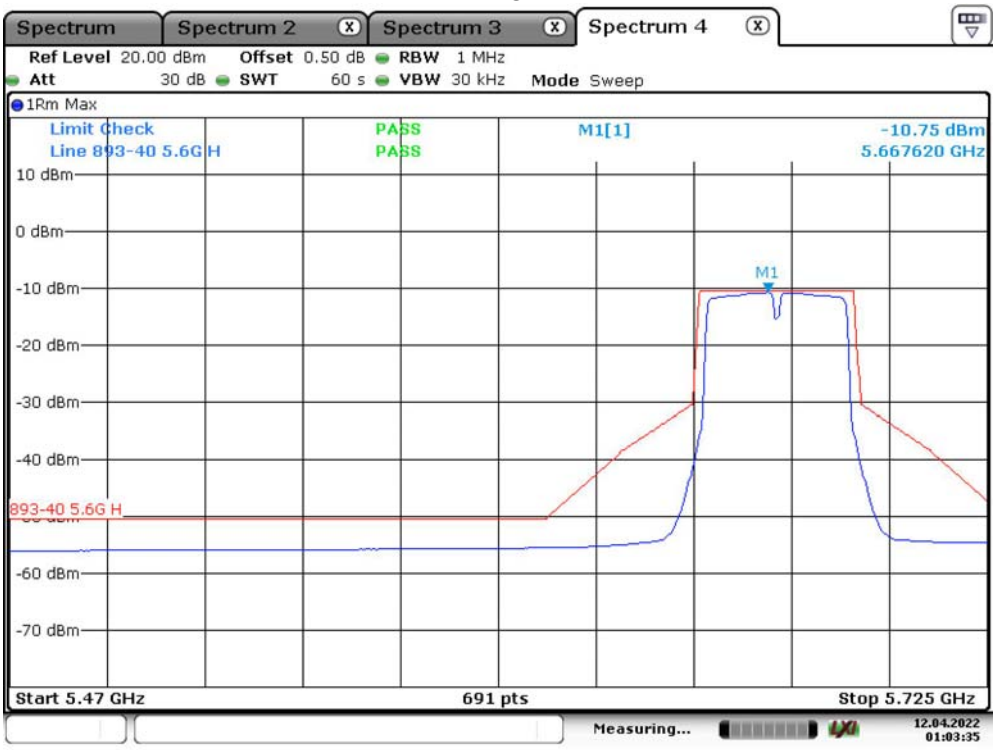
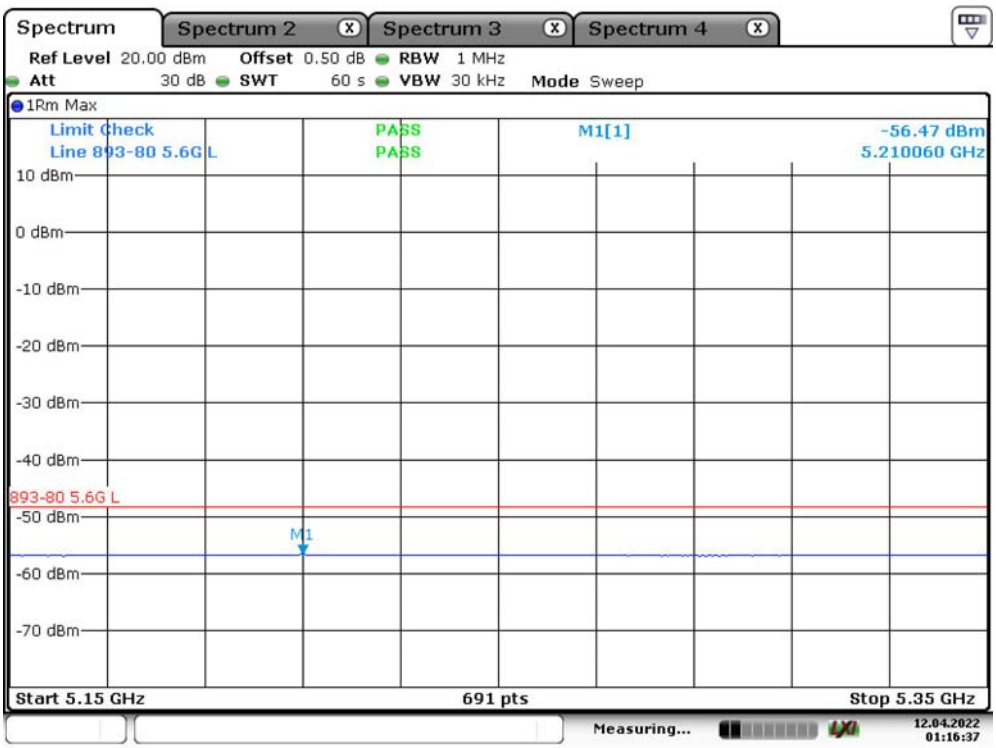
802.11 ac40-High Channel-2



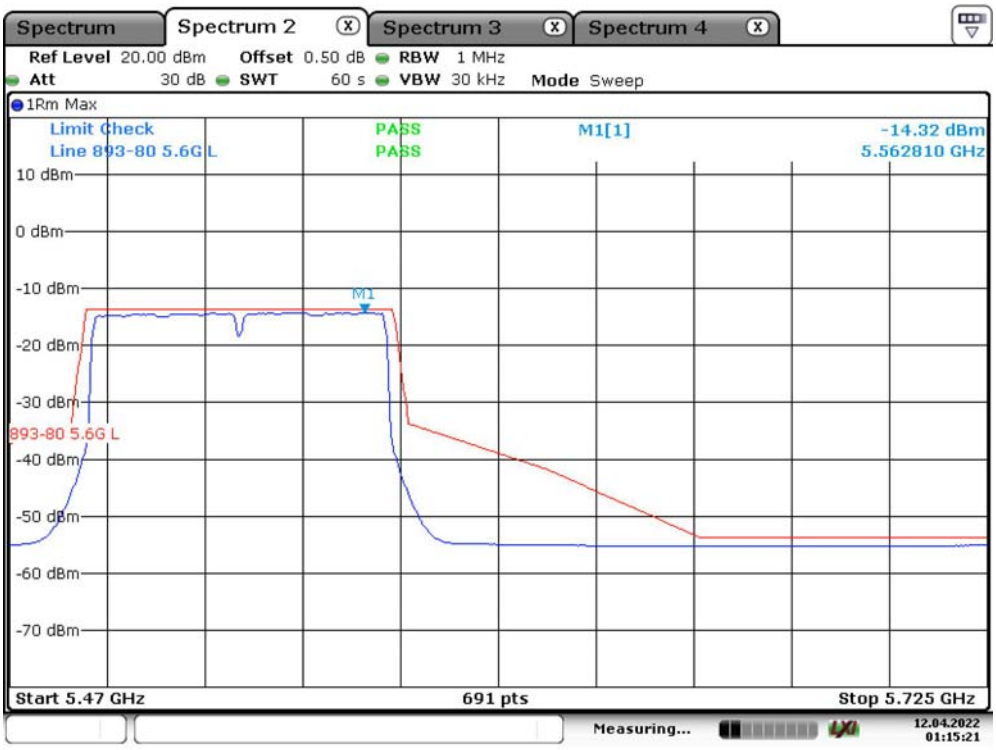
Date: 12.APR.2022 01:03:35

802.11 ac80 -1



Date: 12.APR.2022 01:16:38

802.11 ac80-2



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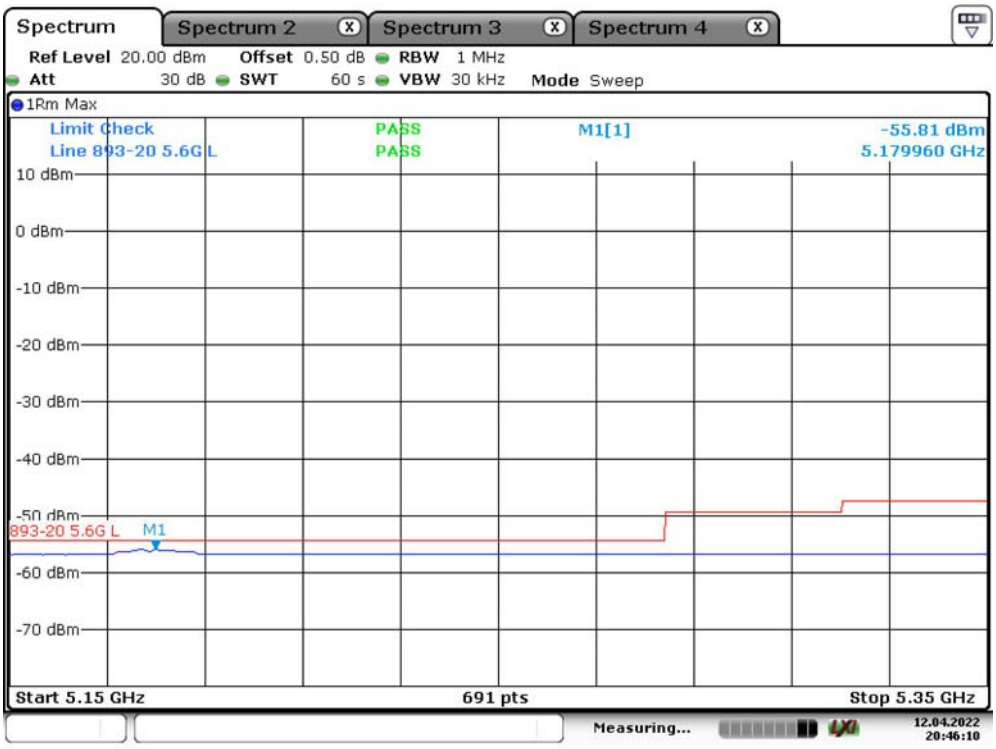
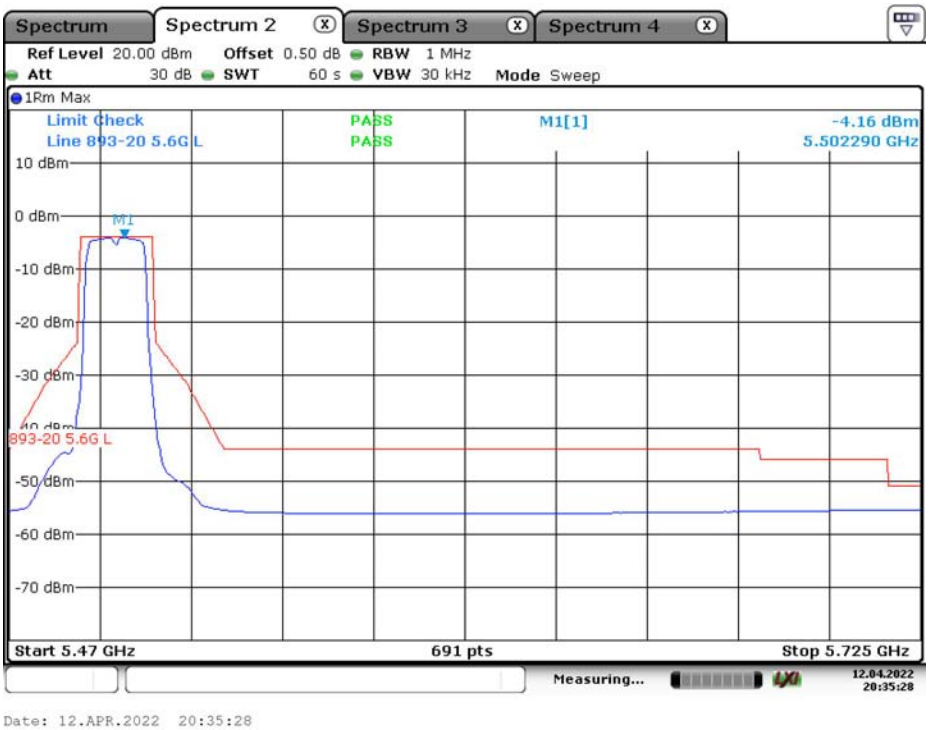
Chain 1

802.11 a-1 Low

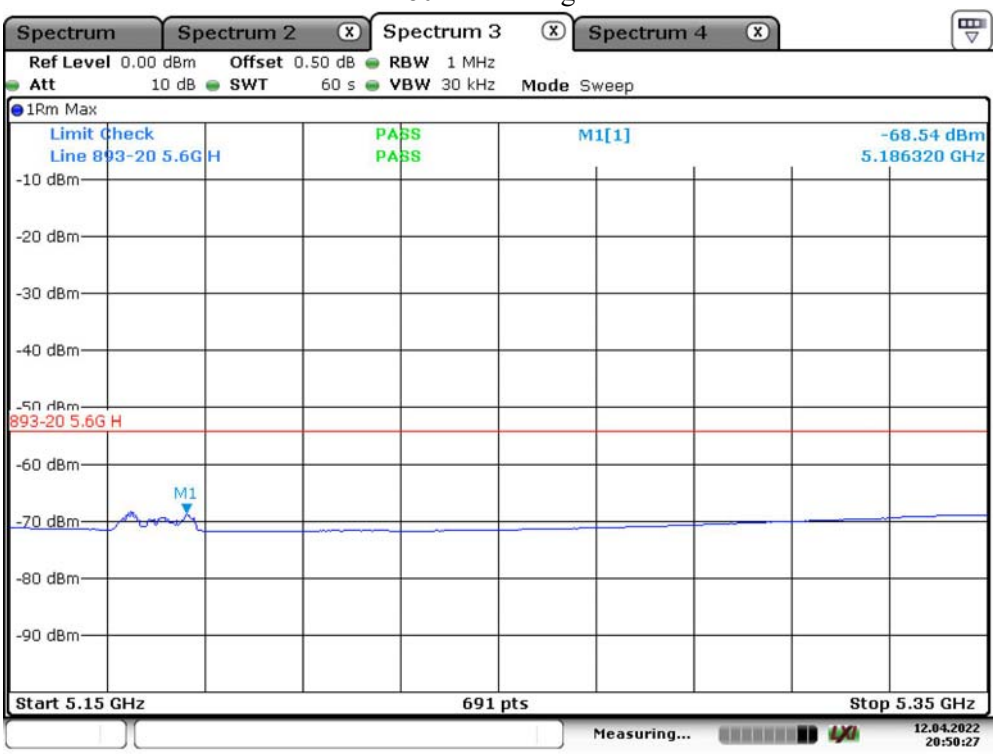


802.11 a-2 Low

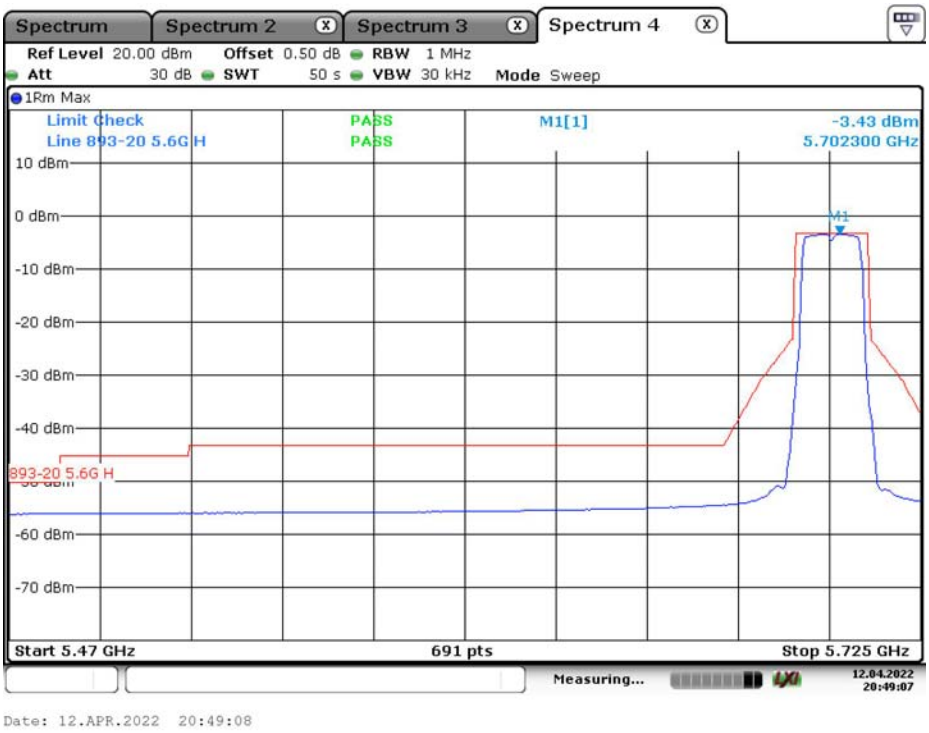


Date: 12.APR.2022 20:35:28

802.11a-1 High

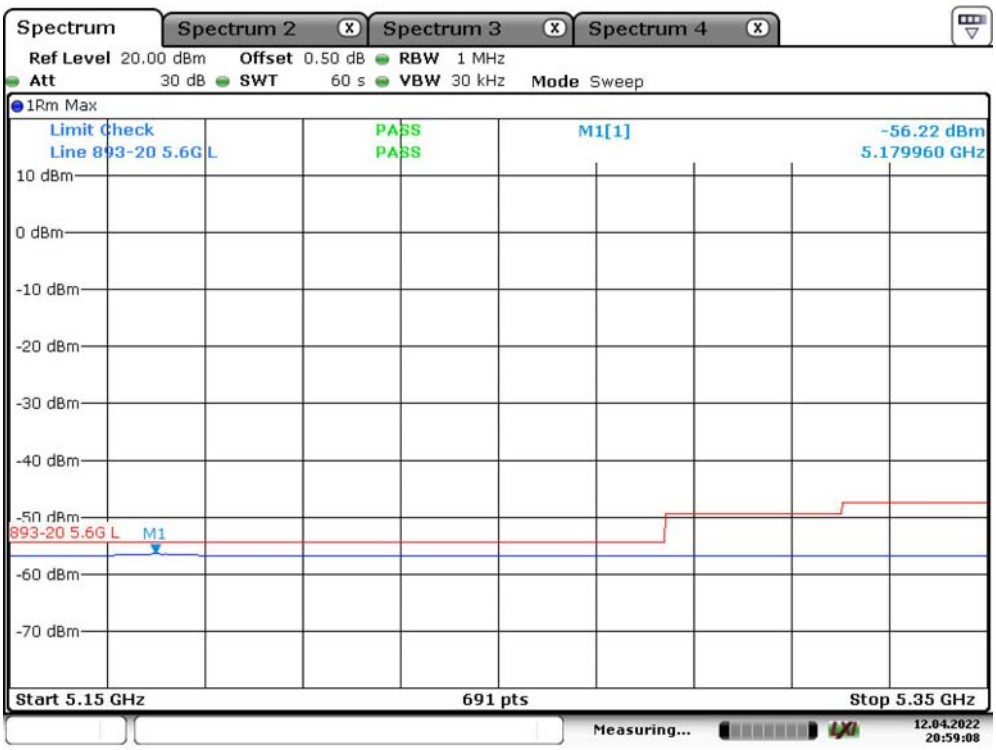


802.11 a-2 High

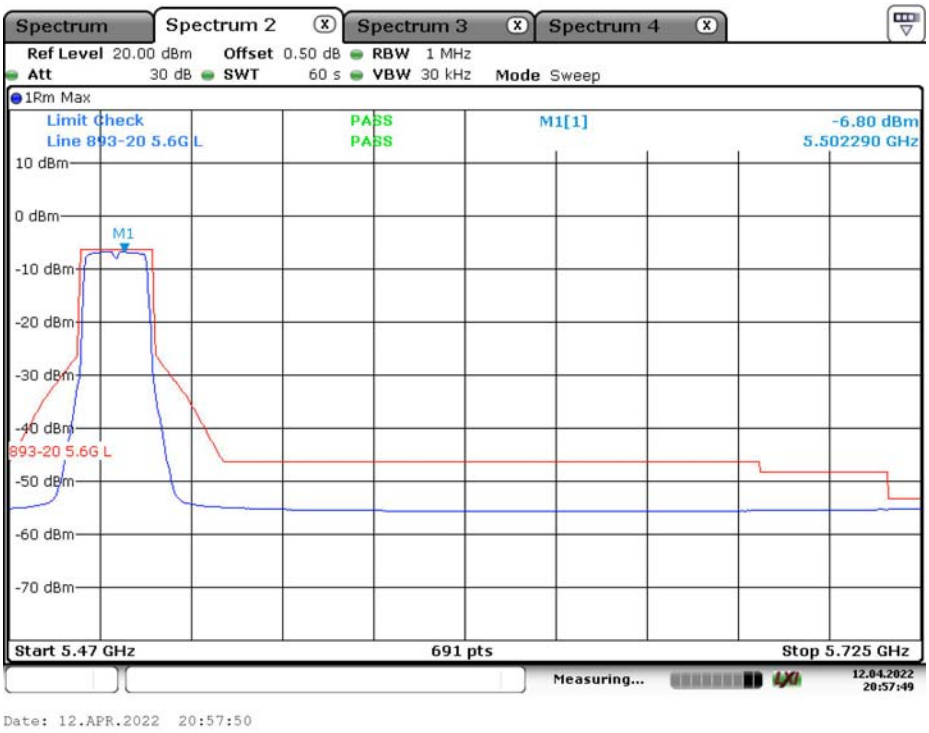


Date: 12.APR.2022 20:49:08

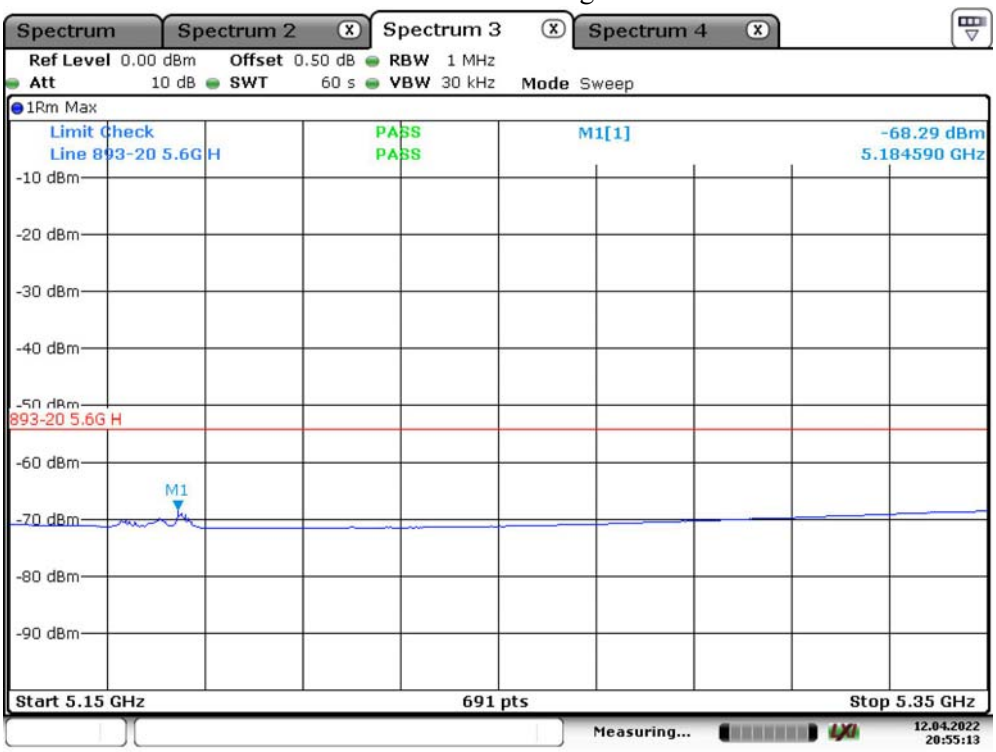
802.11 n20-1 Low



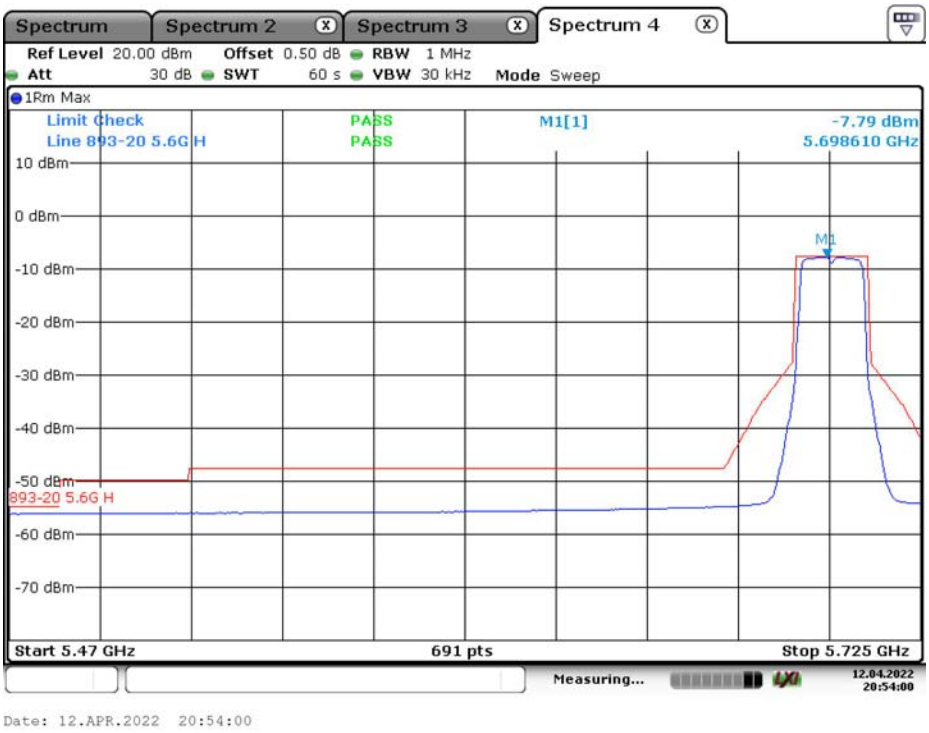
802.11 n20-2 Low



802.11 n20-1 High

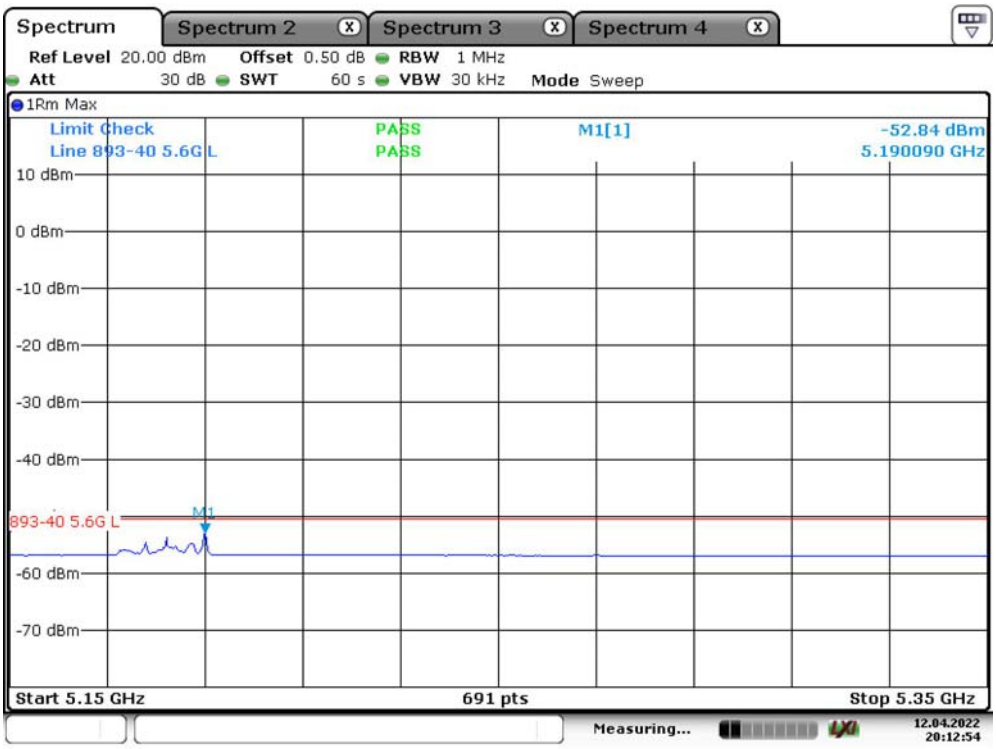


802.11 n20-2 High

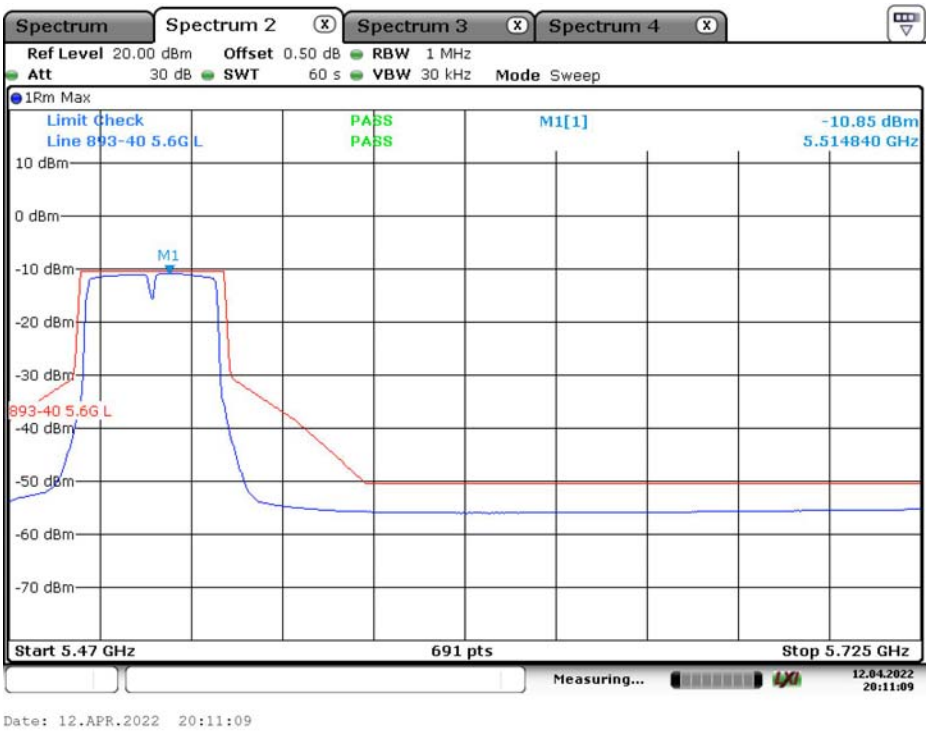


Date: 12.APR.2022 20:54:00

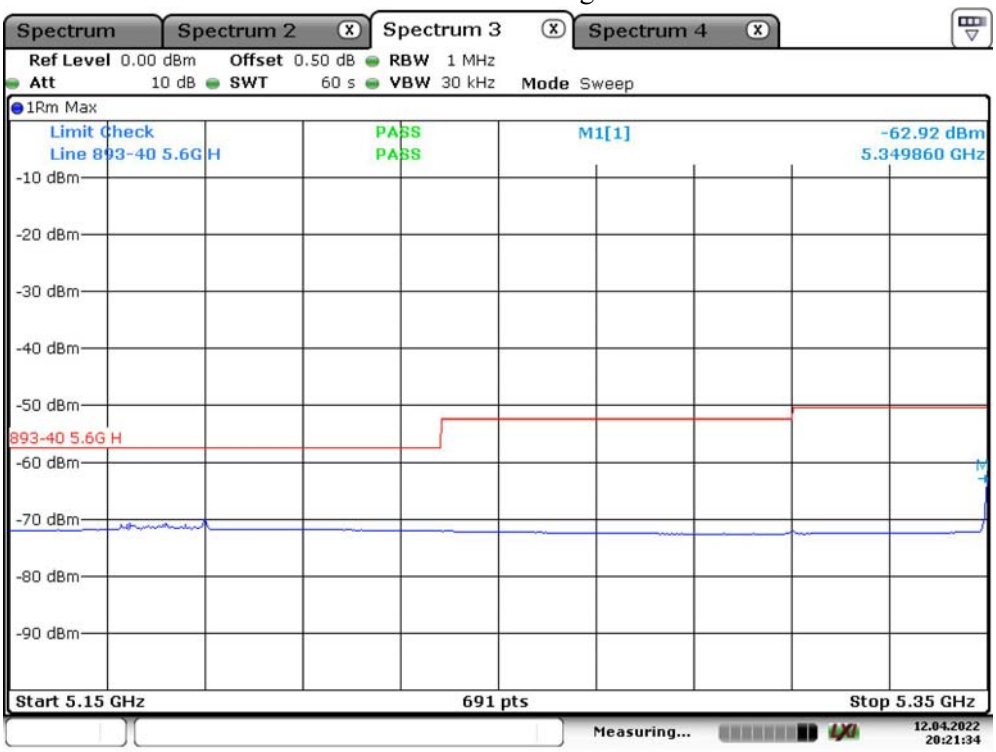
802.11 n40-1 Low



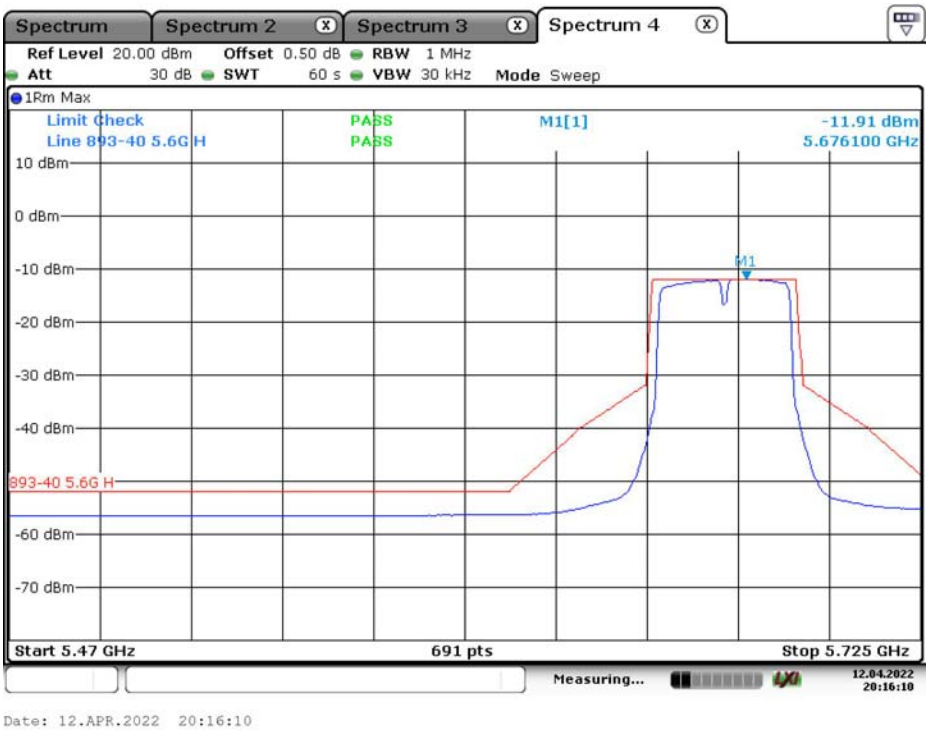
802.11 n40-2 Low



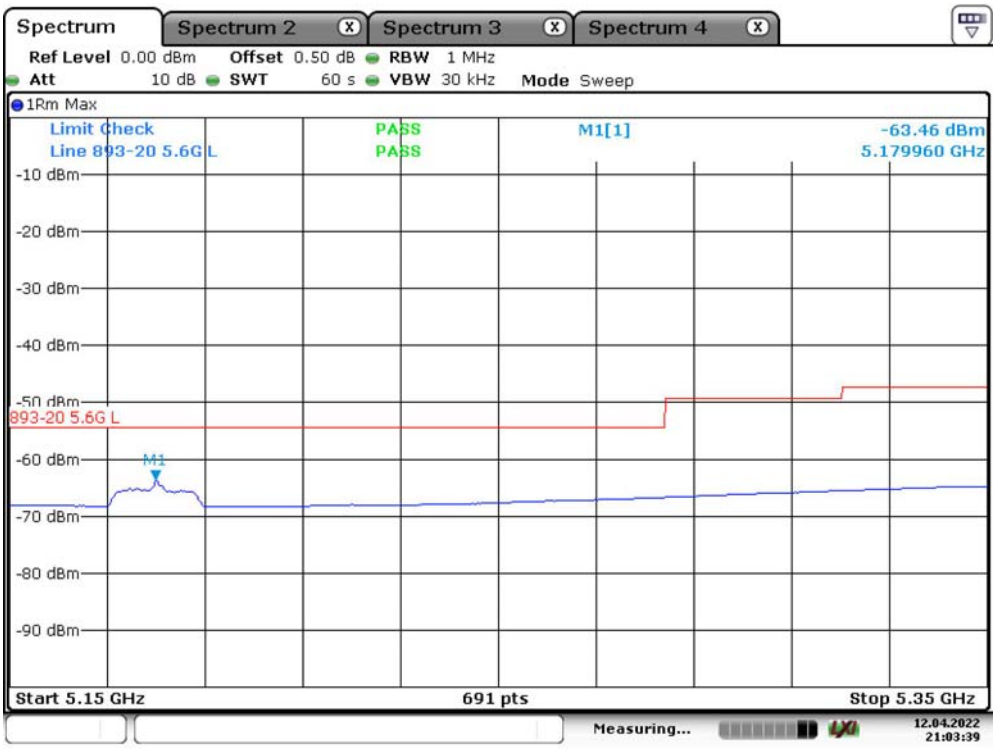
802.11 n40-1 High



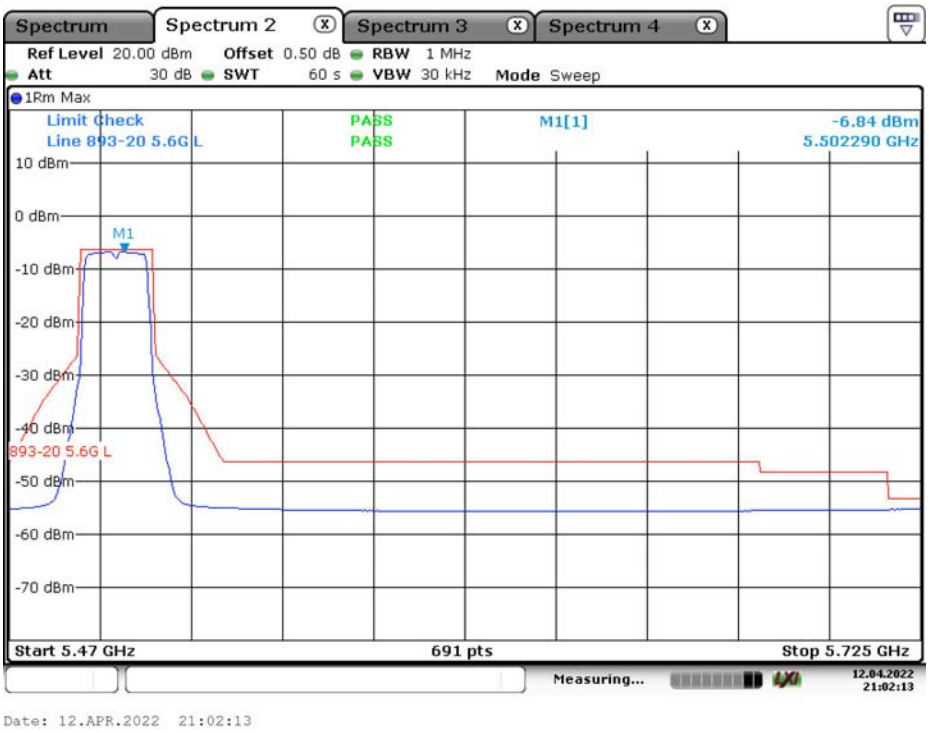
802.11 n40-2 High



802.11 ac20-1 Low

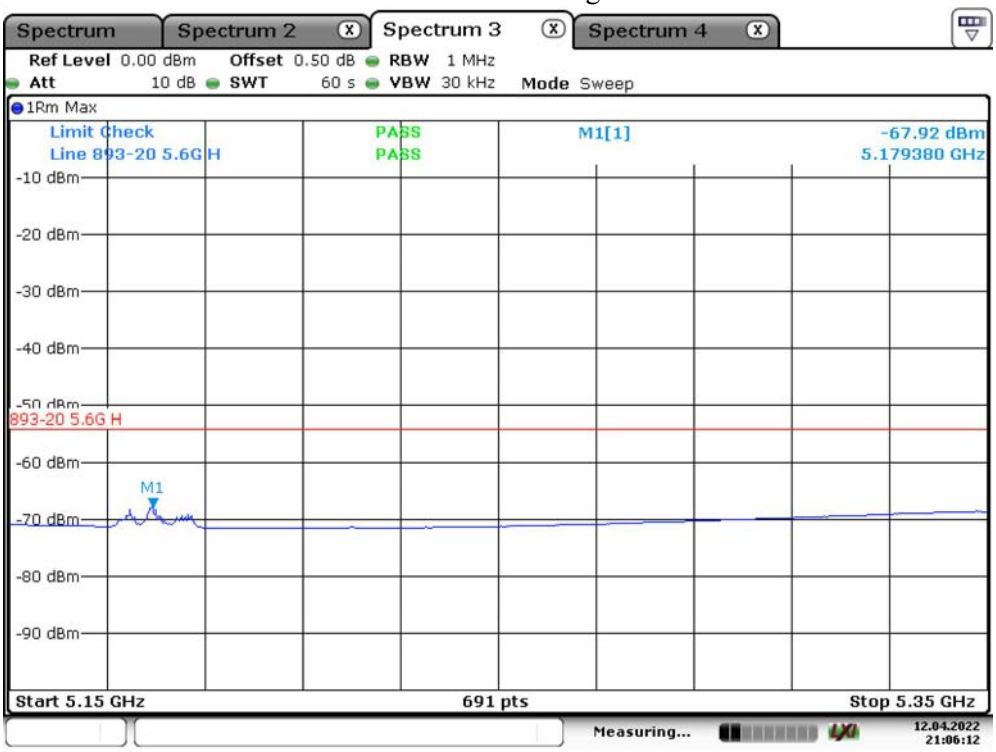


802.11ac20-2 Low

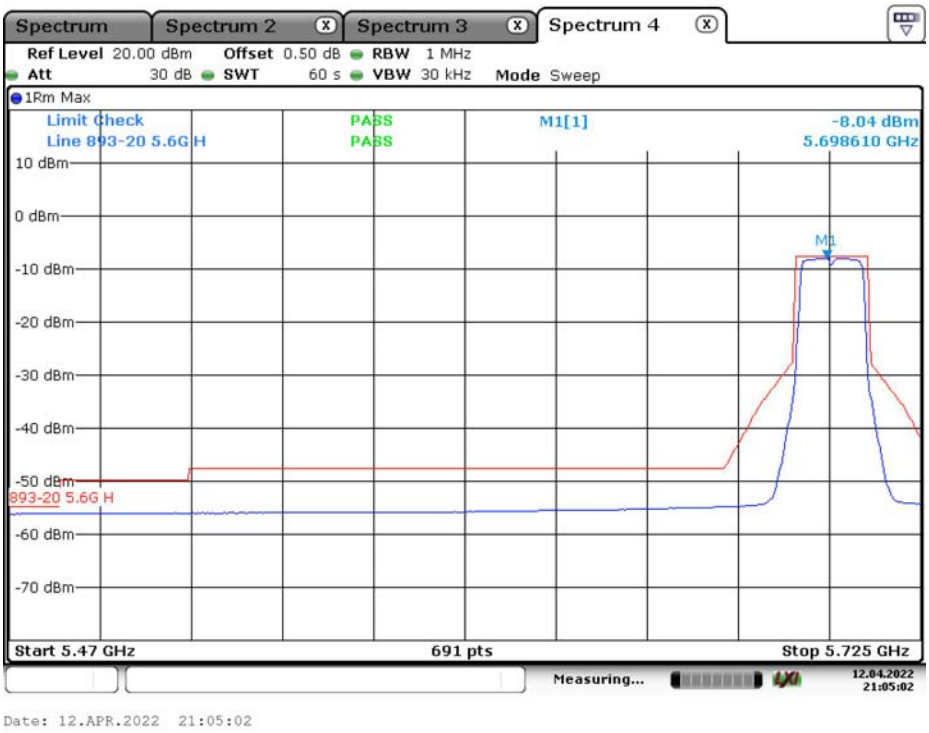


Date: 12.APR.2022 21:02:13

802.11 ac20-1 High

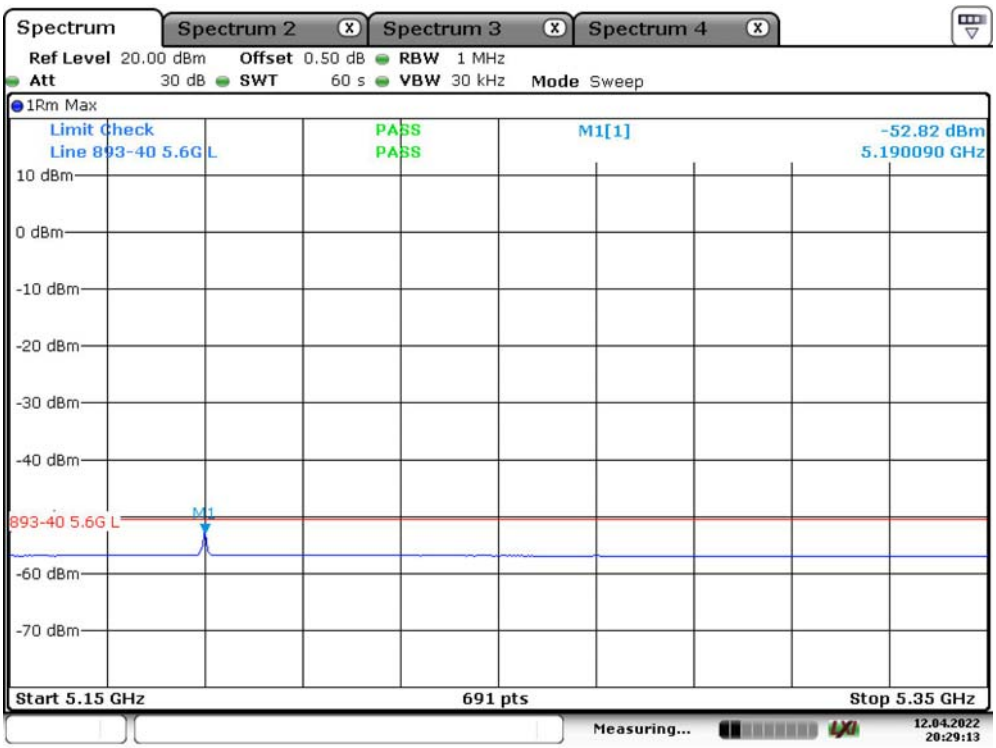


802.11 ac20-2 High



Date: 12.APR.2022 21:05:02

802.11 ac40-Low Channel-1

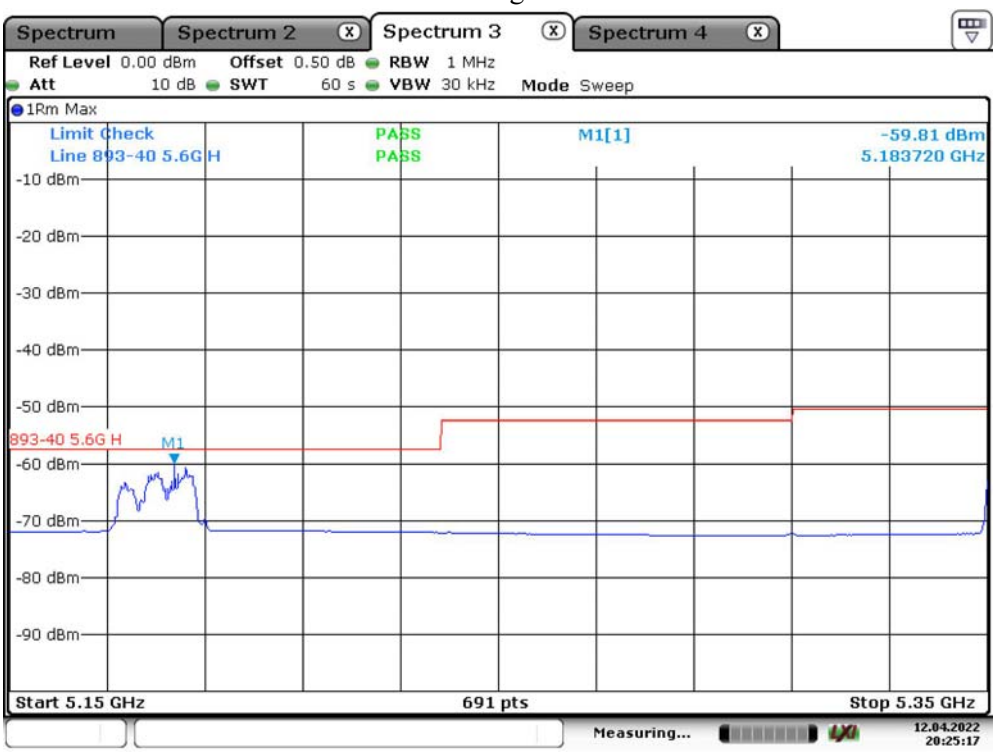


Date: 12.APR.2022 20:29:14

802.11 ac40-Low Channel-2

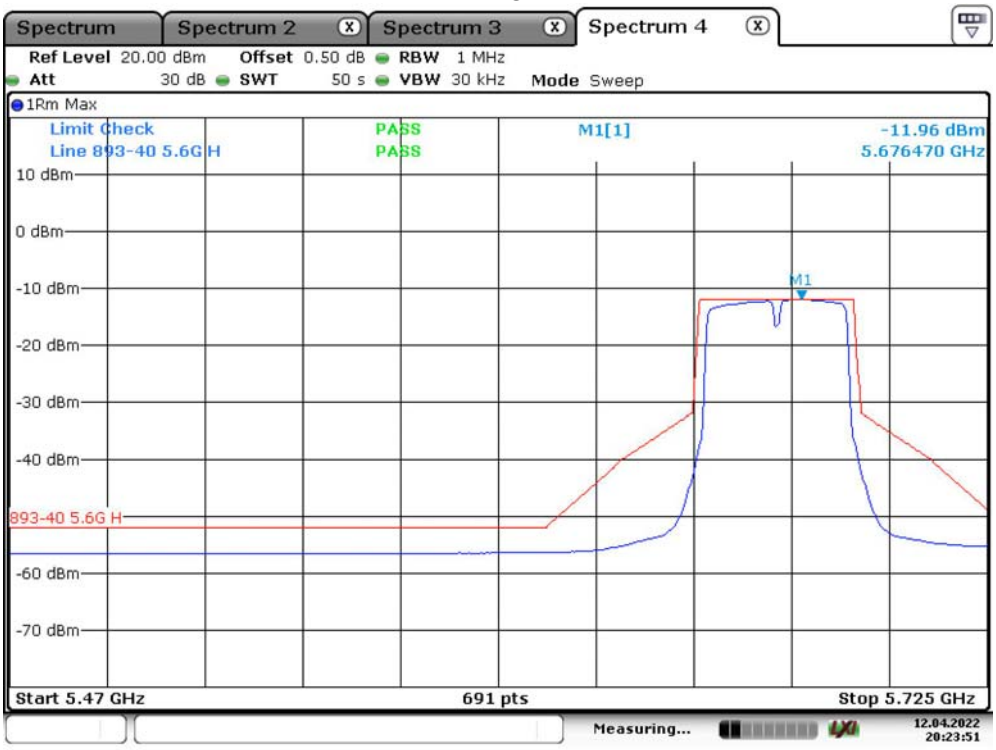
Date: 12.APR.2022 20:27:58

802.11 ac40-High Channel-1



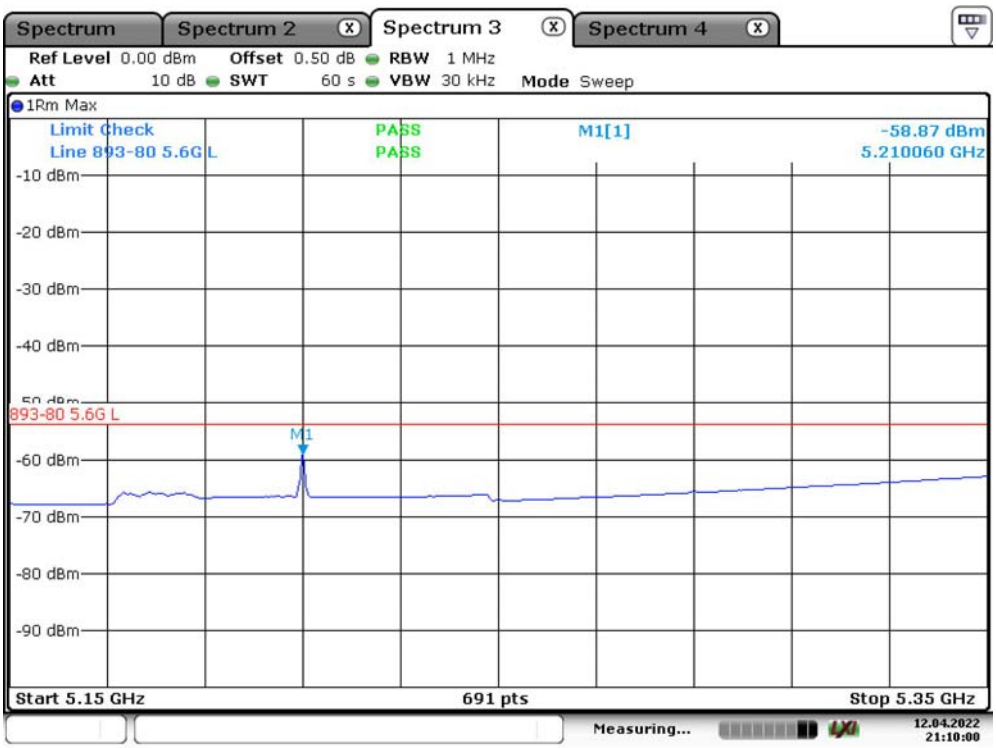
Date: 12.APR.2022 20:25:18

802.11 ac40-High Channel-2



Date: 12.APR.2022 20:23:51

802.11 ac80 -1



Date: 12.APR.2022 21:10:00

802.11 ac80 -2

Date: 12.APR.2022 19:12:25

6 – RECEIVER SPURIOUS EMISSIONS

Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

Limit

The spurious emissions of the receiver shall not exceed the limits given in table 5.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 5: Spurious radiated emission limits

Frequency range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26 GHz	-47 dBm	1 MHz

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.7

Test Data

Test Result: *Compliant. Pre-scan all modes, please refer to following tables.*

802.11 a_Chain 0 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1004.00	H	52.97	-66.14	7.88	0.75	-59.01	-47.00	12.01
2460.00	V	49.96	-66.14	12.78	1.26	-54.62	-47.00	7.62
76.56	H	45.50	-61.92	-1.72	0.18	-63.82	-57.00	6.82
35.82	V	45.47	-36.00	-24.39	0.10	-60.49	-57.00	3.49

802.11 a_Chain 0 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1125.00	H	51.68	-65.74	7.38	1.04	-59.40	-47.00	12.40
2532.00	V	49.27	-67.19	13.13	1.26	-55.32	-47.00	8.32
76.31	H	45.67	-61.75	-1.85	0.18	-63.78	-57.00	6.78
36.04	V	45.79	-35.99	-24.50	0.10	-60.59	-57.00	3.59

802.11 a_Chain 1 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1079.00	H	51.10	-66.84	7.51	0.96	-60.29	-47.00	13.29
3689.00	V	42.36	-69.56	14.01	1.79	-57.34	-47.00	10.34
76.48	H	45.19	-62.23	-1.76	0.18	-64.17	-57.00	7.17
35.51	V	45.28	-35.76	-24.24	0.10	-60.10	-57.00	3.10

802.11 a_Chain 1 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1103.00	H	51.36	-66.23	7.40	1.02	-59.85	-47.00	12.85
2478.00	V	40.21	-75.94	12.92	1.25	-64.27	-47.00	17.27
76.37	H	45.68	-61.74	-1.82	0.18	-63.74	-57.00	6.74
35.89	V	45.37	-36.20	-24.43	0.10	-60.73	-57.00	3.73

802.11 n20 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
6258.00	H	37.89	-67.44	13.58	1.54	-55.40	-47.00	8.40
4758.00	V	39.26	-71.27	14.34	1.62	-58.55	-47.00	11.55
76.29	H	45.13	-62.29	-1.86	0.18	-64.33	-57.00	7.33
35.97	V	45.84	-35.85	-24.47	0.10	-60.42	-57.00	3.42

802.11 n20 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
3526.00	H	38.62	-73.76	13.88	1.58	-61.46	-47.00	14.46
2960.00	V	48.60	-65.32	13.96	1.44	-52.80	-47.00	5.80
76.54	H	45.28	-62.14	-1.73	0.18	-64.05	-57.00	7.05
35.83	V	45.36	-36.13	-24.40	0.10	-60.63	-57.00	3.63

802.11 n40 **5510 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
3825.00	H	39.63	-71.25	13.55	1.51	-59.21	-47.00	12.21
2651.00	V	48.23	-68.10	13.15	1.28	-56.23	-47.00	9.23
76.39	H	45.57	-61.85	-1.81	0.18	-63.84	-57.00	6.84
35.72	V	45.61	-35.72	-24.35	0.10	-60.17	-57.00	3.17

802.11 n40 **5670 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2758.00	H	49.36	-66.33	13.10	1.31	-54.54	-47.00	7.54
4021.00	V	40.32	-71.60	13.94	1.43	-59.09	-47.00	12.09
76.88	H	45.67	-61.75	-1.56	0.18	-63.49	-57.00	6.49
35.34	V	45.05	-35.75	-24.16	0.10	-60.01	-57.00	3.01

802.11 ac20 **5500 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
3985.00	H	47.60	-64.24	13.91	1.46	-51.79	-47.00	4.79
2707.00	V	49.36	-66.36	13.10	1.26	-54.52	-47.00	7.52
76.43	H	45.74	-61.68	-1.79	0.18	-63.65	-57.00	6.65
35.71	V	45.13	-36.19	-24.34	0.10	-60.63	-57.00	3.63

802.11 ac20 **5700 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2658.00	H	48.69	-67.36	13.14	1.28	-55.50	-47.00	8.50
3940.00	V	47.36	-63.76	13.64	1.49	-51.61	-47.00	4.61
76.52	H	45.67	-61.75	-1.74	0.18	-63.67	-57.00	6.67
35.68	V	45.14	-36.14	-24.33	0.10	-60.57	-57.00	3.57

802.11 ac40 **5510 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2120.00	H	50.36	-66.07	11.28	1.11	-55.90	-47.00	8.90
3754.00	V	47.69	-63.58	13.78	1.65	-51.45	-47.00	4.45
76.69	H	45.72	-61.70	-1.66	0.18	-63.54	-57.00	6.54
35.21	V	44.79	-35.83	-24.10	0.10	-60.03	-57.00	3.03

802.11 ac40 **5670 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
7200.00	H	37.30	-65.76	12.90	1.63	-54.49	-47.00	7.49
2586.00	V	49.89	-66.98	13.19	1.30	-55.09	-47.00	8.09
76.48	H	45.36	-62.06	-1.76	0.18	-64.00	-57.00	7.00
35.44	V	45.23	-35.71	-24.21	0.10	-60.02	-57.00	3.02

802.11 ac80 **5530 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1438.00	H	51.30	-66.72	9.19	1.26	-58.79	-47.00	11.79
3654.00	V	40.30	-71.88	14.05	1.68	-59.51	-47.00	12.51
76.82	H	45.74	-61.68	-1.59	0.18	-63.45	-57.00	6.45
35.53	V	45.32	-35.75	-24.25	0.10	-60.10	-57.00	3.10

Note 1:The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

9 – RECEIVER BLOCKING

Applicable Standard

Receiver blocking is a measure of the capability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) on frequencies other than those of the operating bands provided in table 1.

Limit

The minimum performance criterion shall be a PER of less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment

While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.

Table 9: Receiver Blocking parameters

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.				

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.10

Block Diagram of Test Setup

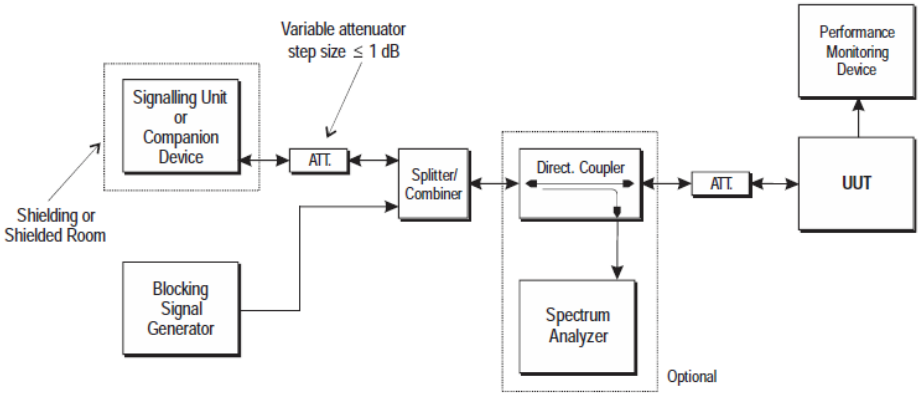


Figure 14: Test Set-up for receiver blocking

Test Data

Test Result: *Compliant. Please refer to following tables.*

Mode & Frequency (MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	PER (%)	Limit (%)
802.11 a (5500 MHz)	5100	-53	1.45	≤10
	4900	-47	1.35	
	5000	-47	1.24	
	5975	-47	1.42	

Note: CMW500 was used to monitor the PER, and the worst case as below.

EXHIBIT A – EUT PHOTOGRAPHS

For photos in this section, please refer to report No.: RDG200416001-02 EXHIBIT A.

EXHIBIT B – TEST SET UP PHOTOGRAPHS

Radiated Emission Below 1GHz View

Radiated Emission Above 1GHz View

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