REGULATORY COMPLIANCE TEST REPORT

FCC CFR 47 15.407, RSS-247 Issue 2

Report No.: MIKO101-U12 Radiated Rev A

Company: Mikrotikls SIA (MikroTik)

Model Name: RB921GS-5HPacD-15S-US,
RB921GS-5HPacD-19S-US

REGULATORY COMPLIANCE TEST REPORT

Company: Mikrotikls SIA (MikroTik)

Model Name: RB921GS-5HPacD-15S-US, RB921GS-5HPacD-19S-US

To: FCC CFR 47 Part 15 Subpart E 15.407

Test Report Serial No.: MIKO101-U12 Master Rev A

This report supersedes: NONE

Applicant: Mikrotikls SIA (MikroTik)
Brivibas gatve 214i
Riga, LV-1039
Latvia

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Master Document Number	Addendum Reports
MIKO101-U12 Master	MIKO101-U12 Conducted
	MIKO101-U12 Radiated
	MIKO101-U12 DFS

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Table of Contents

1. TEST RESULTS

1.1. Radiated

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407 ISED RSS-247	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (b), 15.205, 15.209 RSS-247: 6.2.2.2; 6.2.3.2	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.
Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Undesirable Measurement were per the Radiated Test Set-up specified in this document.

15.407 (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Limits for Restricted Bands (15.205, 15.209)
Peak emission: 74 dBuV/m
Average emission: 54 dBuV/m

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.
FS = R + AF + CORR - FO

where:

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss

Example:
The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBµV/m);

$$E = \frac{1000000 \times \sqrt{30P}}{3}\ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dBuV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

Restricted Bands of Operation (15.205)
(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Frequency Band			
MHz	**MHz**	**MHz**	**GHz**
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

Transmitter Spurious Emissions 18GHz to 40GHz:
Spurious emissions in the above frequency band was measured and no spurious emissions were observed within 6 dB of the limit.

1.1.1. TX Spurious & Restricted Band Emissions

1.1.1.1. MikroTik MTAS-5G-19D120

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5260.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5265.30	71.76	2.90	-12.23	62.43	Fundamental	Vertical	200	0	--	--	
Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.												

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5300.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5301.02	72.75	3.05	-11.98	63.82	Fundamental	Vertical	200	0	--	--	
Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.												

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5320.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5316.50	69.49	2.97	-12.02	60.44	Fundamental	Vertical	200	0	--	--	
Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.												

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5500.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5497.38	58.35	3.04	-11.62	49.77	Fundamental	Vertical	200	0	--	--	
Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.												

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5580.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5582.38	66.13	3.13	-11.56	57.70	Fundamental	Vertical	200	0	--	--	
Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.												

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5720.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5712.01	57.99	3.13	-11.34	49.78	Fundamental	Vertical	200	0	--	--	
Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.												

1.1.2. Restricted Edge & Band-Edge Emissions

1.1.2.2. MikroTik MTAS-5G-19D120

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5250 - 5350 MHz

MikroTik MTAS-5G-19D120		Band-Edge Freq	Limit 74.0 dBµV/m	Limit 54.0 dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11a	5320.00	5350.00	63.35	48.82	Default
802.11ac-80	5290.00	5350.00	68.20	51.98	Default
802.11n HT-20	5320.00	5350.00	62.86	48.99	Default
802.11n HT-40	5310.00	5350.00	63.44	49.40	Default

5470 - 5725 MHz

MikroTik MTAS-5G-19D120		Restricted-Edge Freq	Limit 68.2 dBµV/m	Limit 54.0 dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11a	5500.00	5460.00	62.37	45.87	Default
802.11ac-80	5530.00	5460.00	67.02	47.18	Default
802.11n HT-20	5500.00	5460.00	62.08	45.87	Default
802.11n HT-40	5510.00	5460.00	62.61	45.87	Default

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5500.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5460.00	8.28	3.06	34.53	45.87	Max Avg	Vertical	181	0	54.0	-8.1	Pass
#3	5469.70	24.76	3.06	34.55	62.37	Max Peak	Vertical	181	0	68.2	-5.9	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11ac-80
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	82
Channel Frequency (MHz):	5530.00	**Data Rate:**	29.30 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5460.00	9.59	3.06	34.53	47.18	Max Avg	Vertical	181	0	54.0	-6.8	Pass
#3	5470.00	29.41	3.06	34.55	67.02	Max Peak	Vertical	181	0	68.2	-1.2	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11n HT-20
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	98
Channel Frequency (MHz):	5500.00	**Data Rate:**	6.50 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5460.00	8.28	3.06	34.53	45.87	Max Avg	Vertical	181	0	54.0	-8.1	Pass
#3	5470.00	24.47	3.06	34.55	62.08	Max Peak	Vertical	181	0	68.2	-6.2	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11n HT-40
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	92
Channel Frequency (MHz):	5510.00	**Data Rate:**	13.50 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5460.00	8.28	3.06	34.53	45.87	Max Avg	Vertical	181	0	54.0	-8.1	Pass
#3	5467.21	24.98	3.08	34.55	62.61	Max Peak	Vertical	181	0	68.2	-5.6	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11a
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5320.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#2	5350.96	25.83	3.06	34.46	63.35	Max Peak	Vertical	182	0	74.0	-10.7	Pass
#3	5456.79	11.25	3.05	34.52	48.82	Max Avg	Vertical	182	0	54.0	-5.2	Pass
#1	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11ac-80
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	82
Channel Frequency (MHz):	5290.00	**Data Rate:**	29.30 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5350.00	14.46	3.06	34.46	51.98	Max Avg	Vertical	182	0	54.0	-2.0	Pass
#2	5350.00	30.68	3.06	34.46	68.20	Max Peak	Vertical	182	0	74.0	-5.8	Pass
#3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11n HT-20
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	98
Channel Frequency (MHz):	5320.00	**Data Rate:**	6.50 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#2	5353.55	25.34	3.05	34.47	62.86	Max Peak	Vertical	182	0	74.0	-11.1	Pass
#3	5458.40	11.42	3.05	34.52	48.99	Max Avg	Vertical	182	0	54.0	-5.0	Pass
#1	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	MikroTik MTAS-5G-19D120	**Variant:**	802.11n HT-40
Antenna Gain (dBi):	19.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	92
Channel Frequency (MHz):	5310.00	**Data Rate:**	13.50 MBit/s
Power Setting:	Default	**Tested By:**	JMH

Test Measurement Results

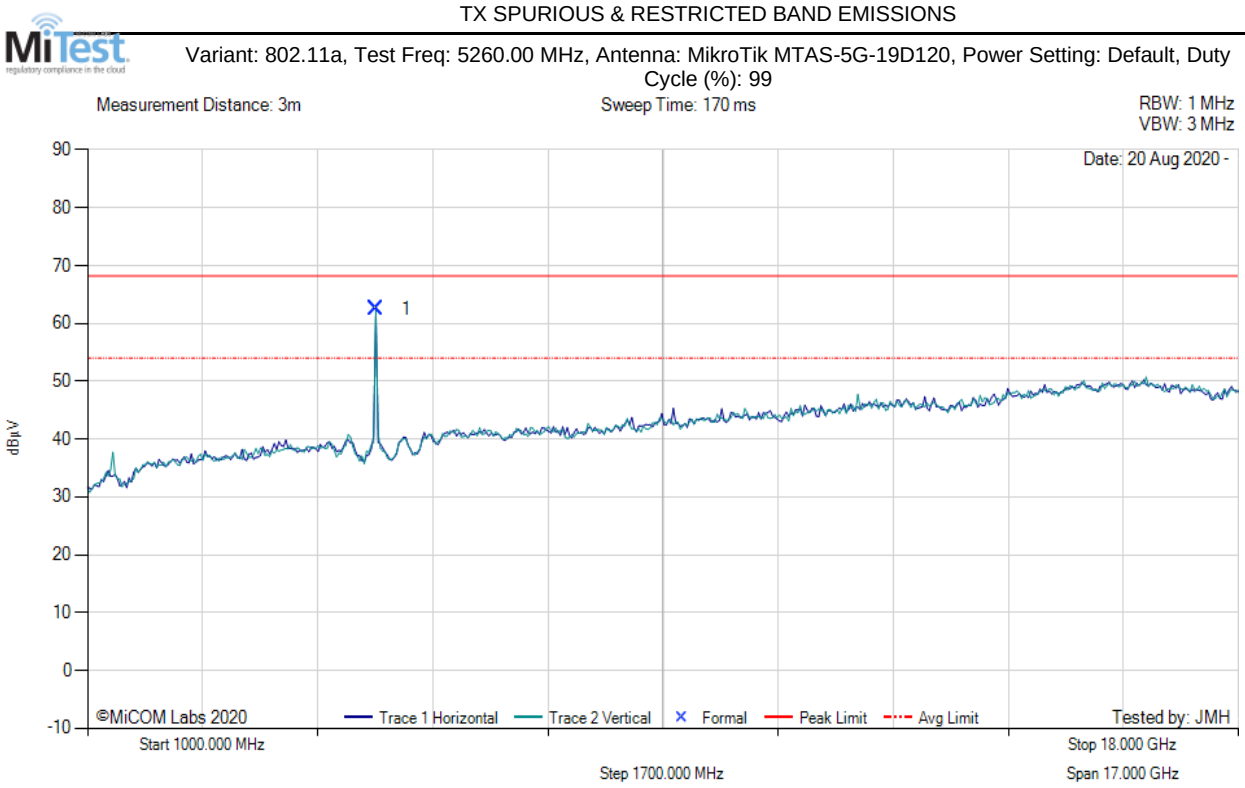
5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5350.00	11.88	3.06	34.46	49.40	Max Avg	Vertical	182	0	54.0	-4.6	Pass
#3	5352.24	25.92	3.06	34.46	63.44	Max Peak	Vertical	182	0	74.0	-10.6	Pass
#2	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE. Connected to laptop outside chamber.												

A. APPENDIX - GRAPHICAL IMAGES

A.1. Radiated

A.1.1. TX Spurious & Restricted Band Emissions

A.1.1.1. MikroTik MTAS-5G-19D120



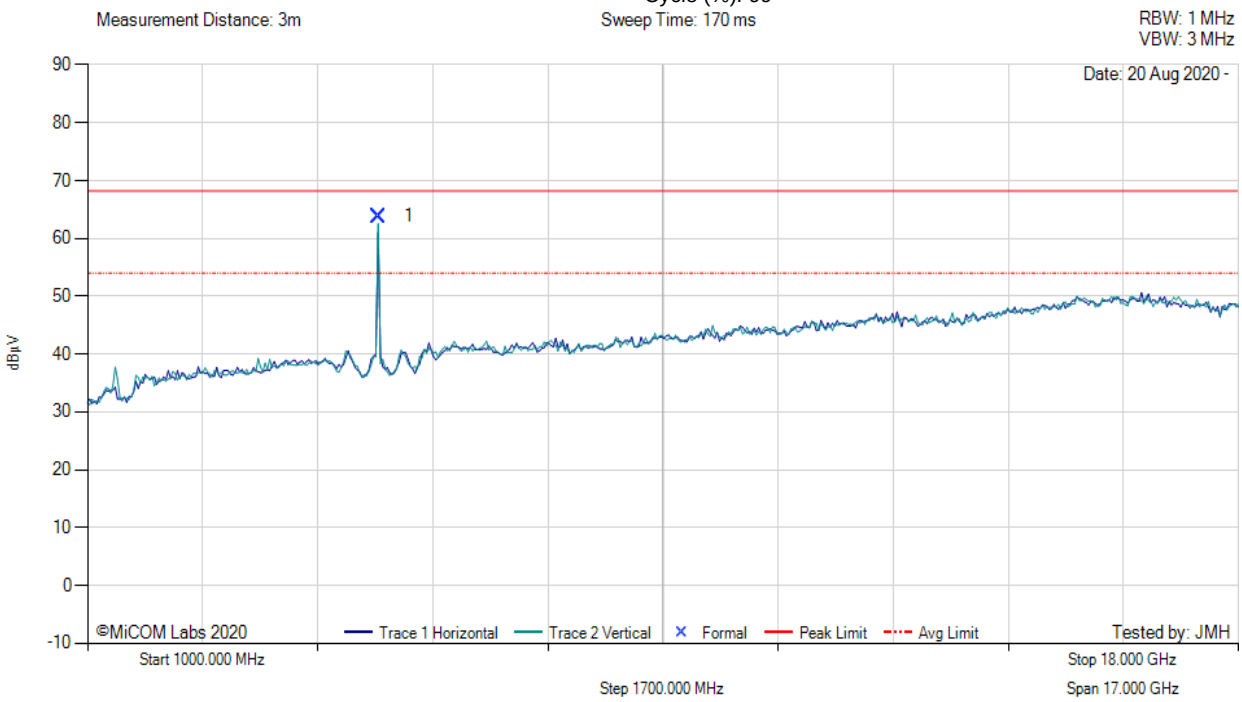
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5265.30	71.76	2.90	-12.23	62.43	Fundamental	Vertical	200	0	--	--	

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5300.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



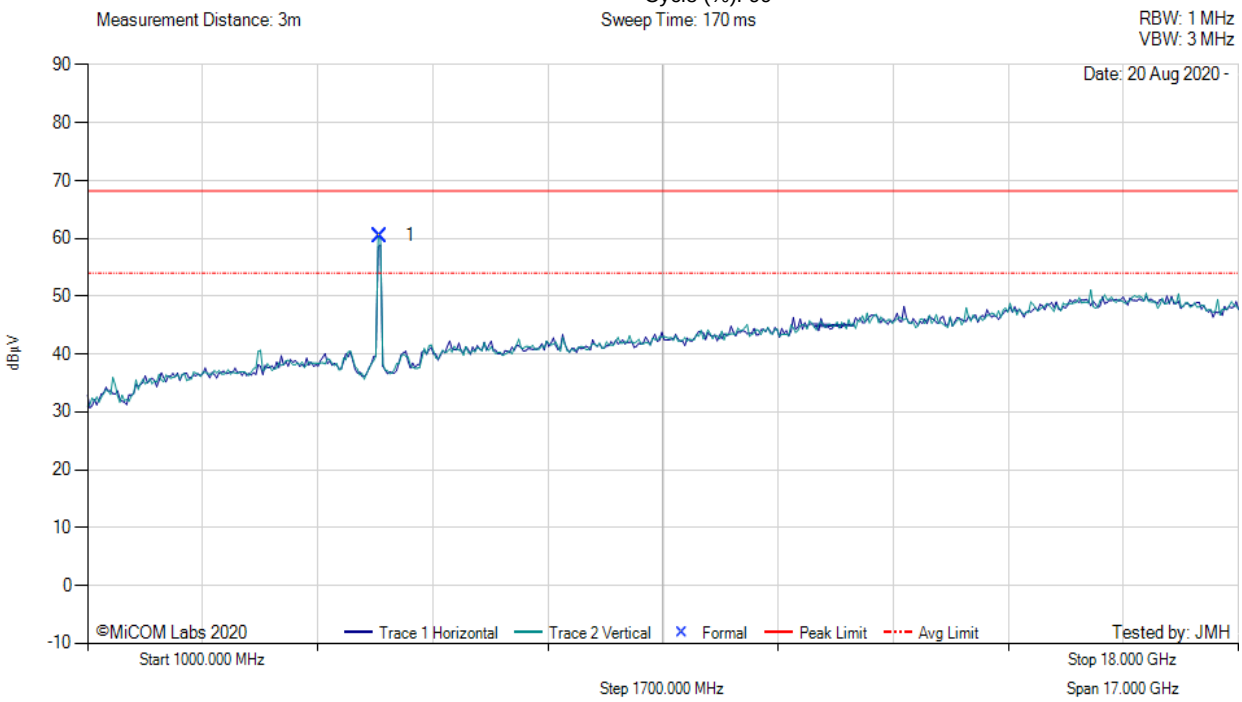
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5301.02	72.75	3.05	-11.98	63.82	Fundamental	Vertical	200	0	--	--	

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5320.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



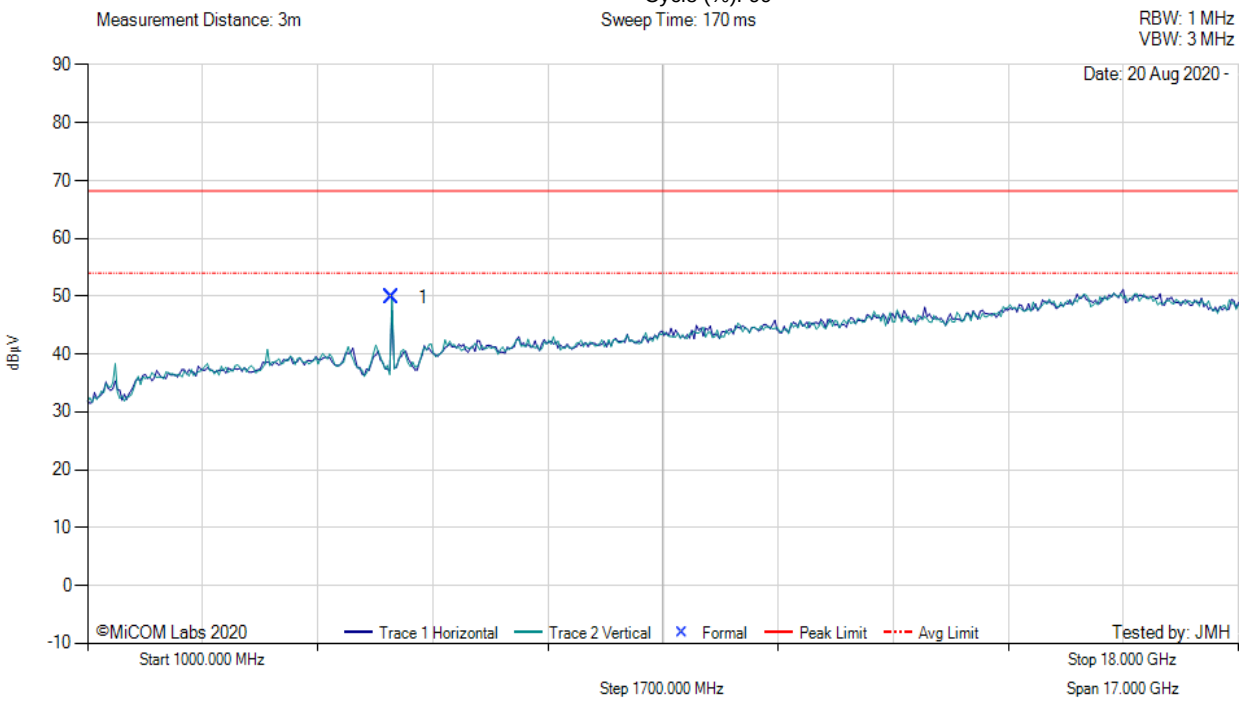
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5316.50	69.49	2.97	-12.02	60.44	Fundamental	Vertical	200	0	--	--	

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5500.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



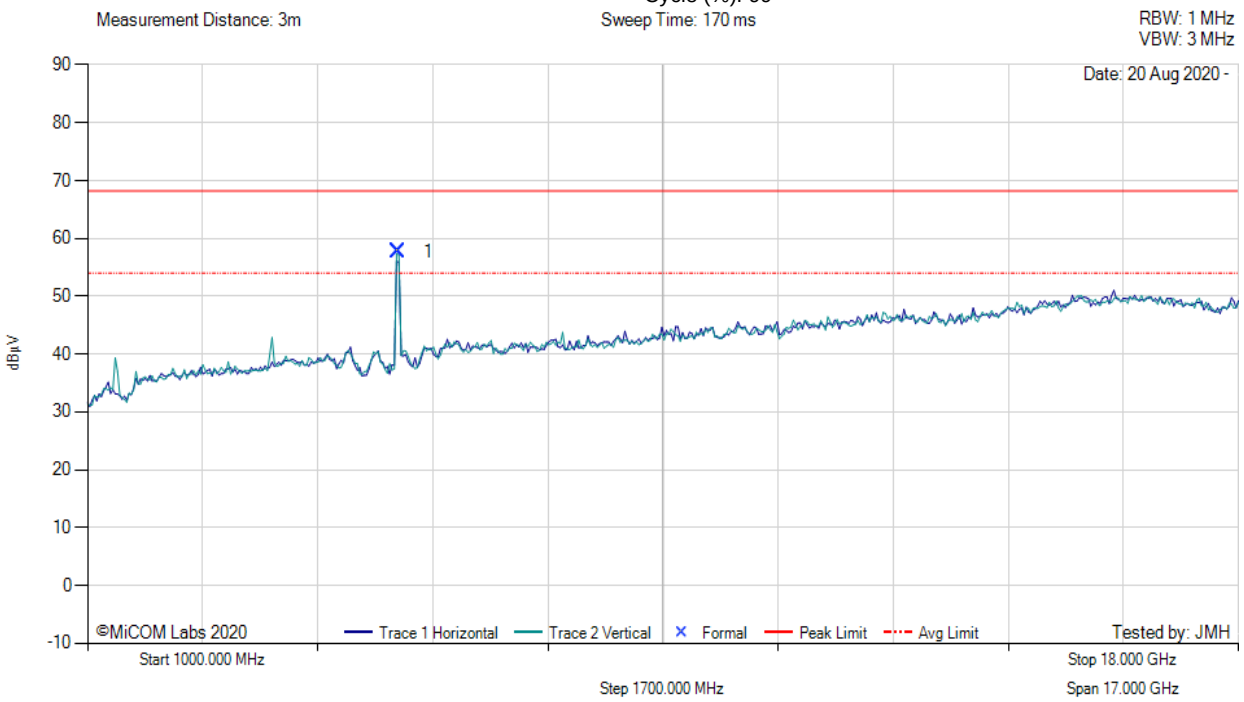
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5497.38	58.35	3.04	-11.62	49.77	Fundamental	Vertical	200	0	--	--	

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5580.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



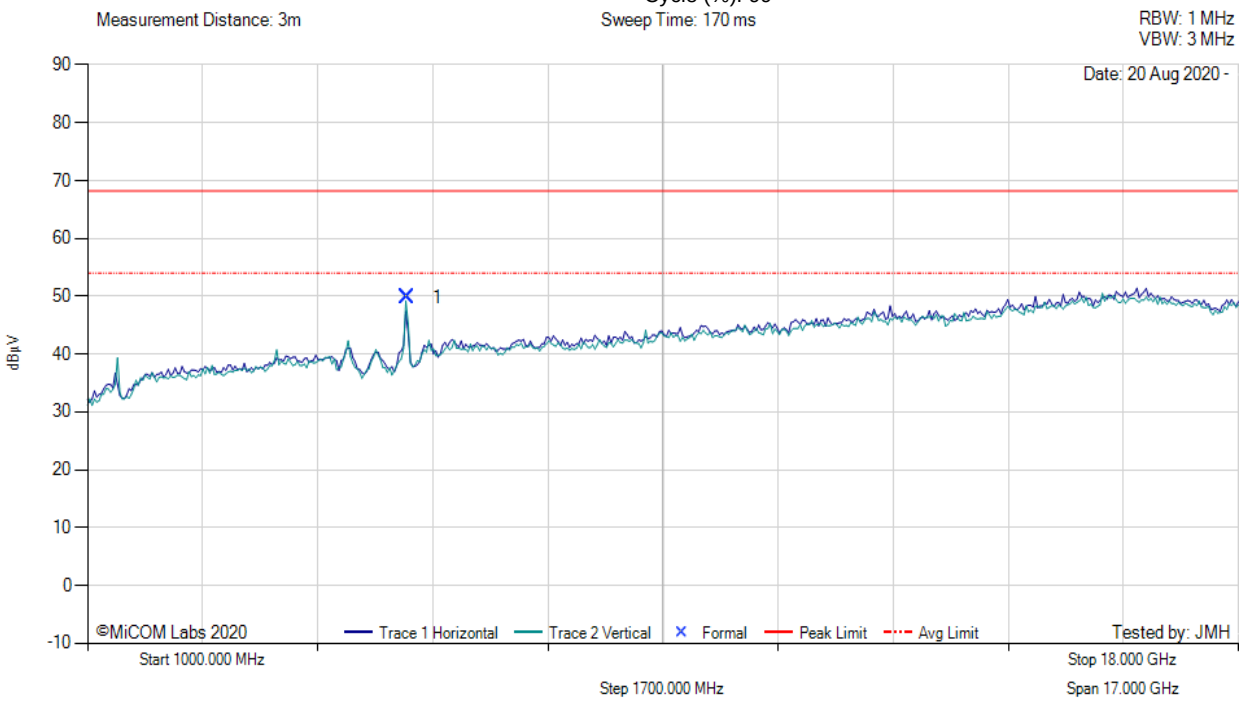
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5582.38	66.13	3.13	-11.56	57.70	Fundamental	Vertical	200	0	--	--	

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5720.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5712.01	57.99	3.13	-11.34	49.78	Fundamental	Vertical	200	0	--	--	

Test Notes: EUT powered by POE. Connected to laptop outside chamber. 5G Notch in front of amp to prevent overload.

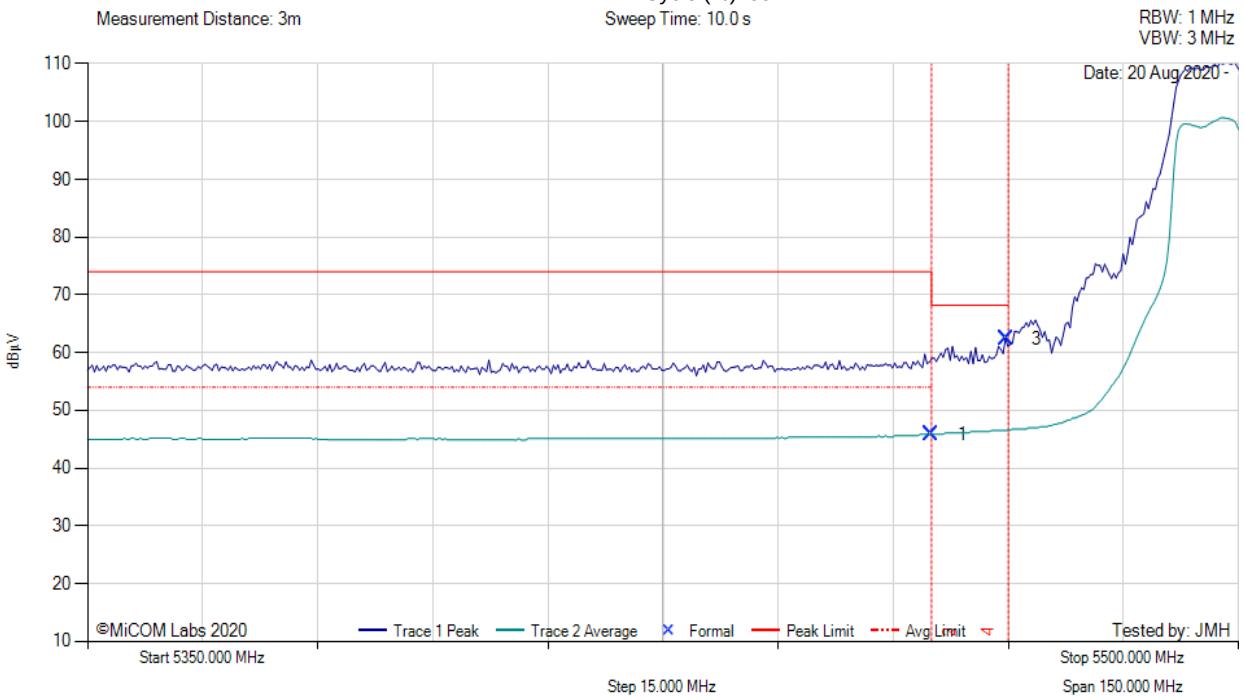
back to matrix

A.1.2. Restricted Edge & Band-Edge Emissions

A.1.2.2. MikroTik MTAS-5G-19D120

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 802.11a, Test Freq: 5500.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



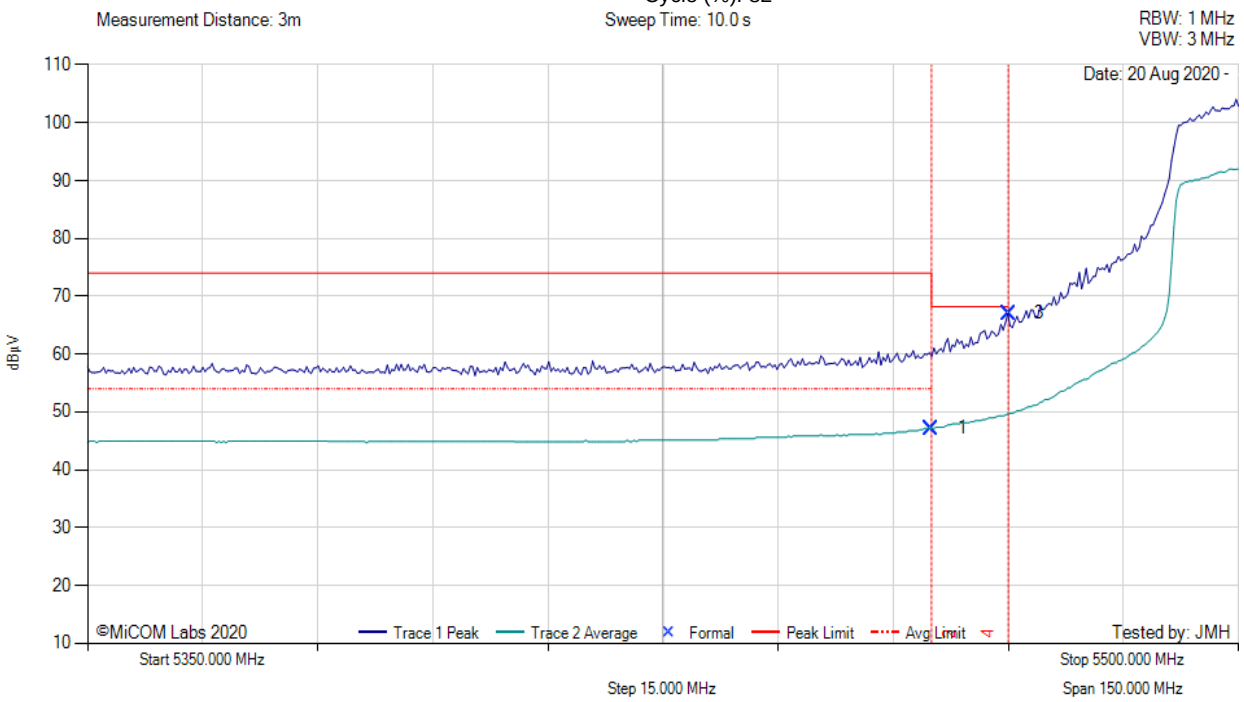
5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5460.00	8.28	3.06	34.53	45.87	Max Avg	Vertical	181	0	54.0	-8.1	Pass
3	5469.70	24.76	3.06	34.55	62.37	Max Peak	Vertical	181	0	68.2	-5.9	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 802.11ac-80, Test Freq: 5530.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 82



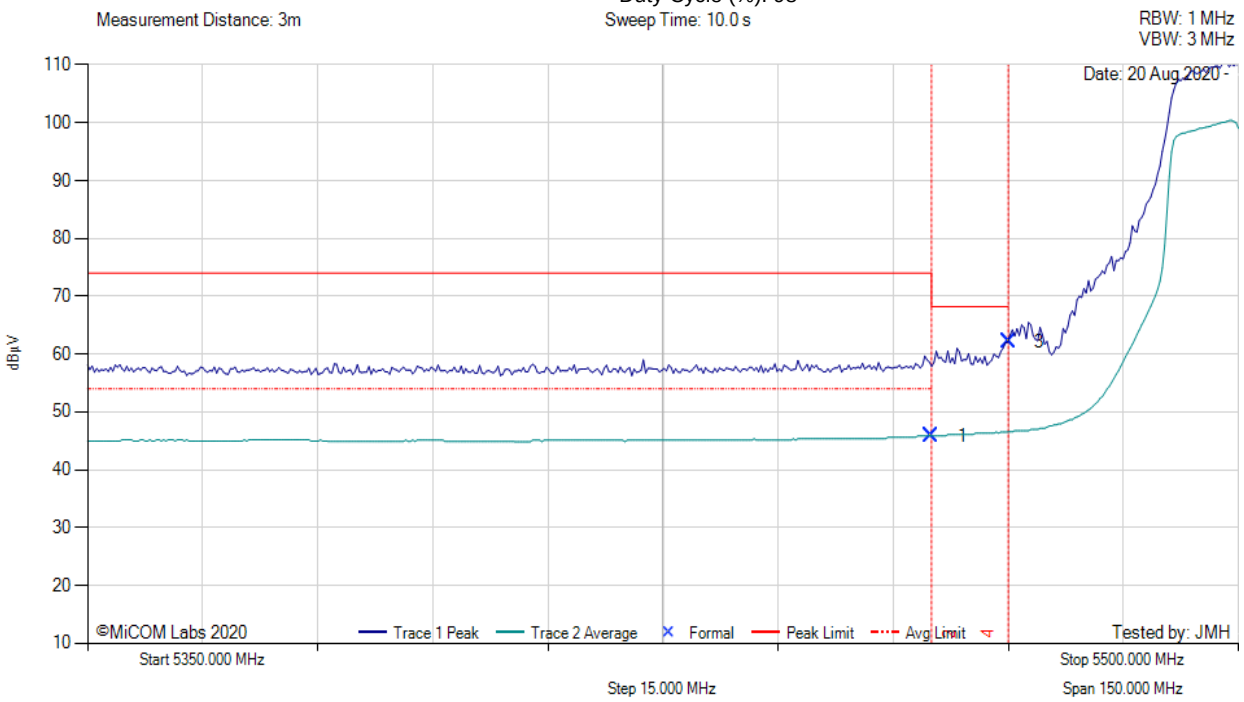
5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5460.00	9.59	3.06	34.53	47.18	Max Avg	Vertical	181	0	54.0	-6.8	Pass
3	5470.00	29.41	3.06	34.55	67.02	Max Peak	Vertical	181	0	68.2	-1.2	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 802.11n HT-20, Test Freq: 5500.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 98



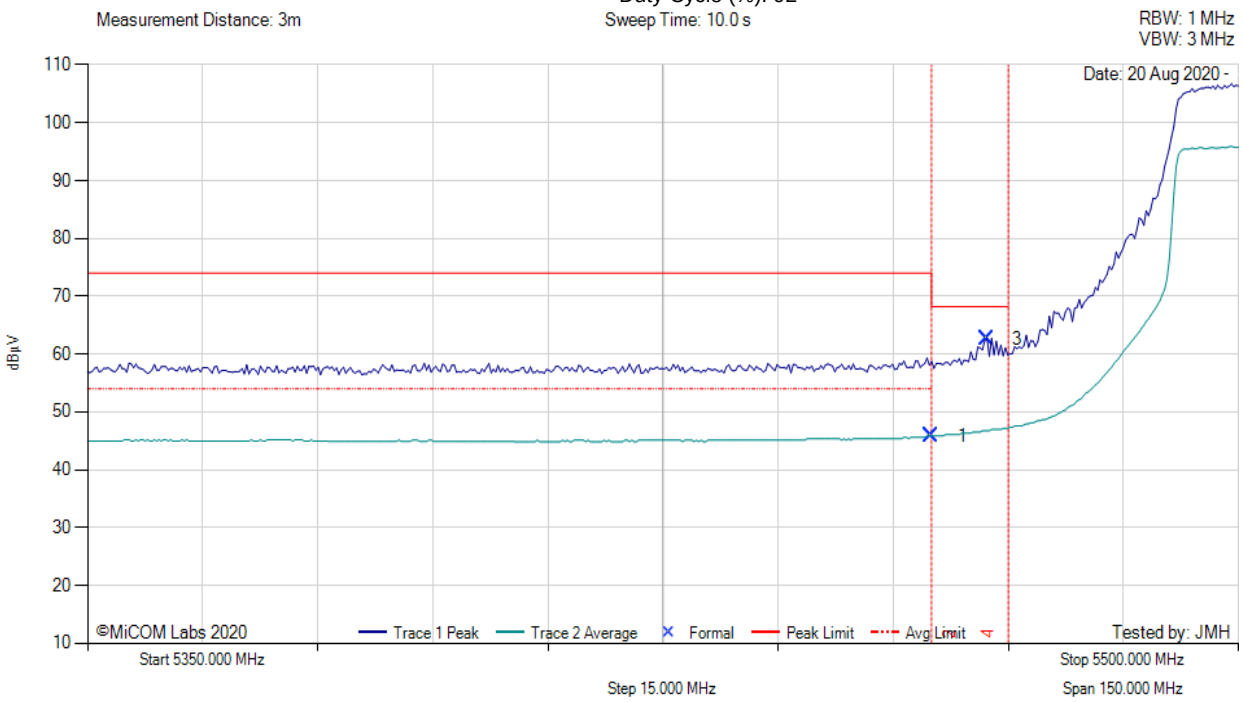
5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5460.00	8.28	3.06	34.53	45.87	Max Avg	Vertical	181	0	54.0	-8.1	Pass
3	5470.00	24.47	3.06	34.55	62.08	Max Peak	Vertical	181	0	68.2	-6.2	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 802.11n HT-40, Test Freq: 5510.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 92



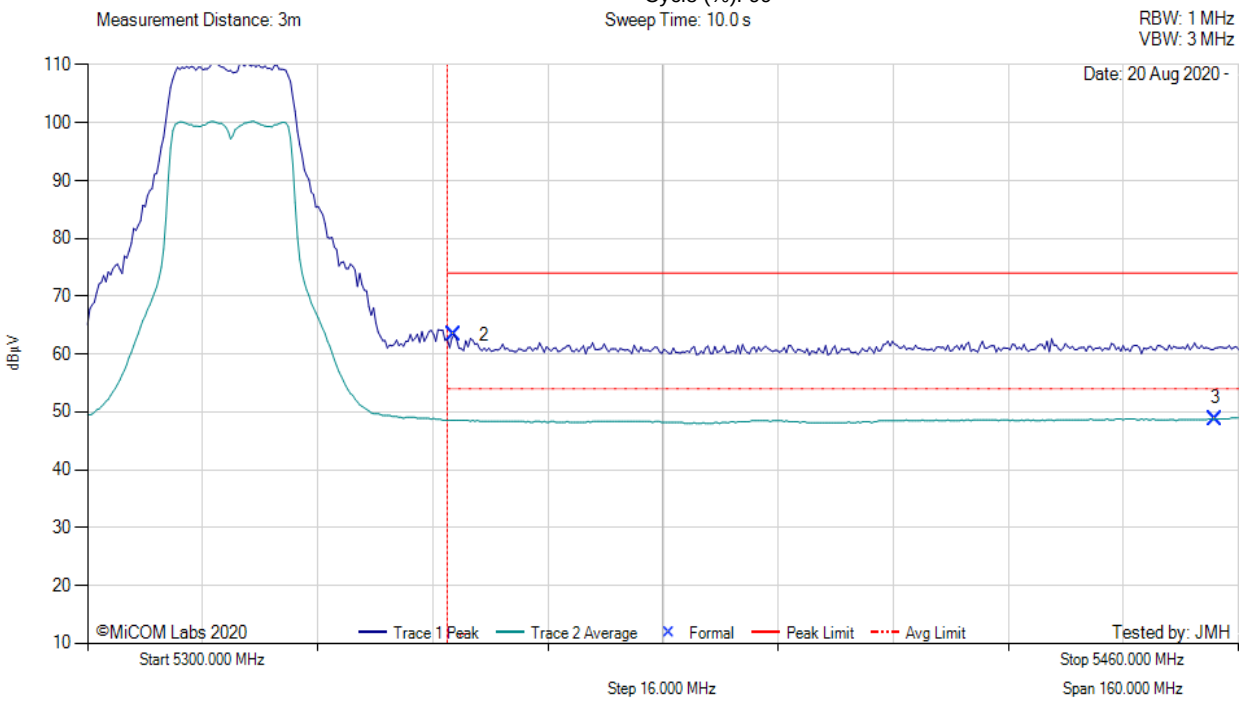
5350.00 - 5500.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5460.00	8.28	3.06	34.53	45.87	Max Avg	Vertical	181	0	54.0	-8.1	Pass
3	5467.21	24.98	3.08	34.55	62.61	Max Peak	Vertical	181	0	68.2	-5.6	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 802.11a, Test Freq: 5320.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 99



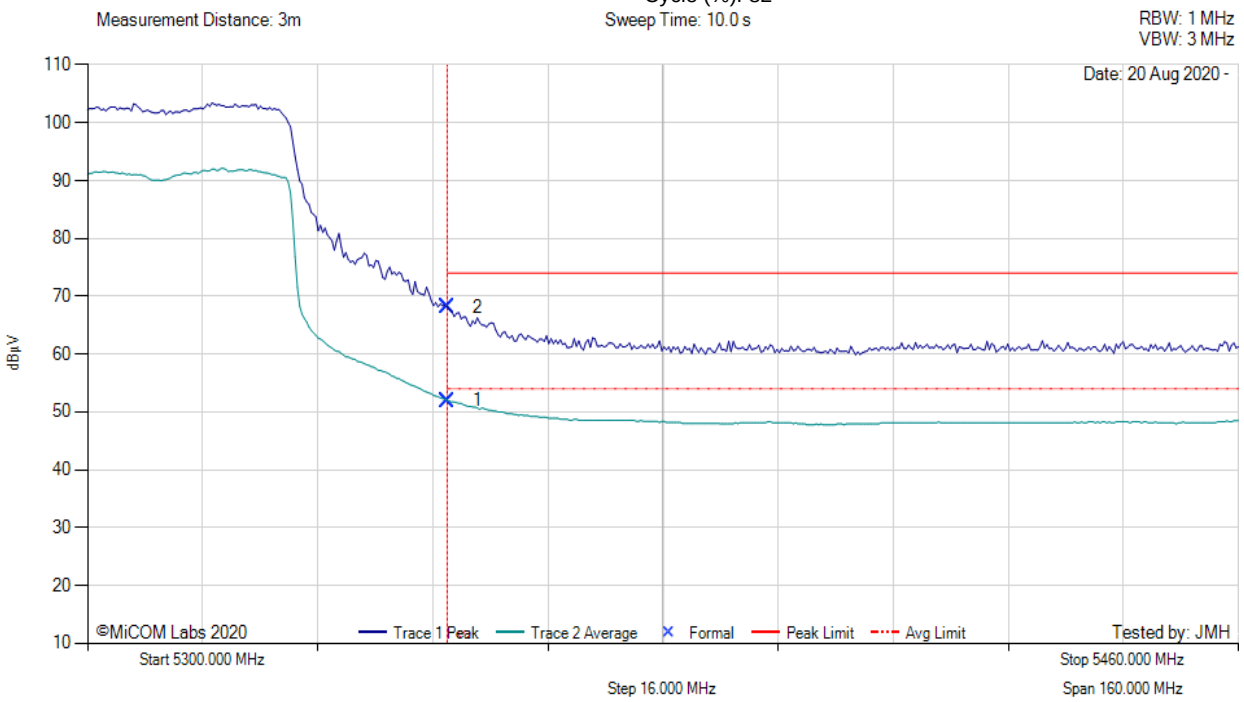
5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
2	5350.96	25.83	3.06	34.46	63.35	Max Peak	Vertical	182	0	74.0	-10.7	Pass
3	5456.79	11.25	3.05	34.52	48.82	Max Avg	Vertical	182	0	54.0	-5.2	Pass
1	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 802.11ac-80, Test Freq: 5290.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 82



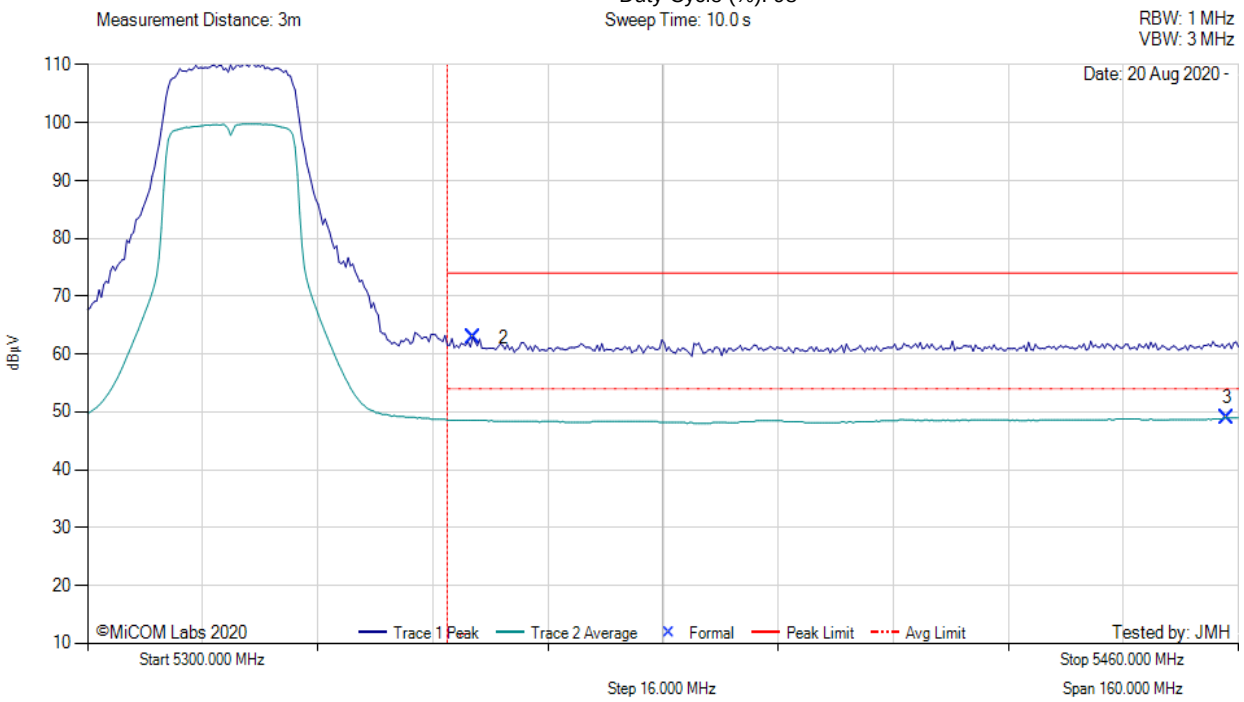
5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5350.00	14.46	3.06	34.46	51.98	Max Avg	Vertical	182	0	54.0	-2.0	Pass
2	5350.00	30.68	3.06	34.46	68.20	Max Peak	Vertical	182	0	74.0	-5.8	Pass
3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 802.11n HT-20, Test Freq: 5320.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 98



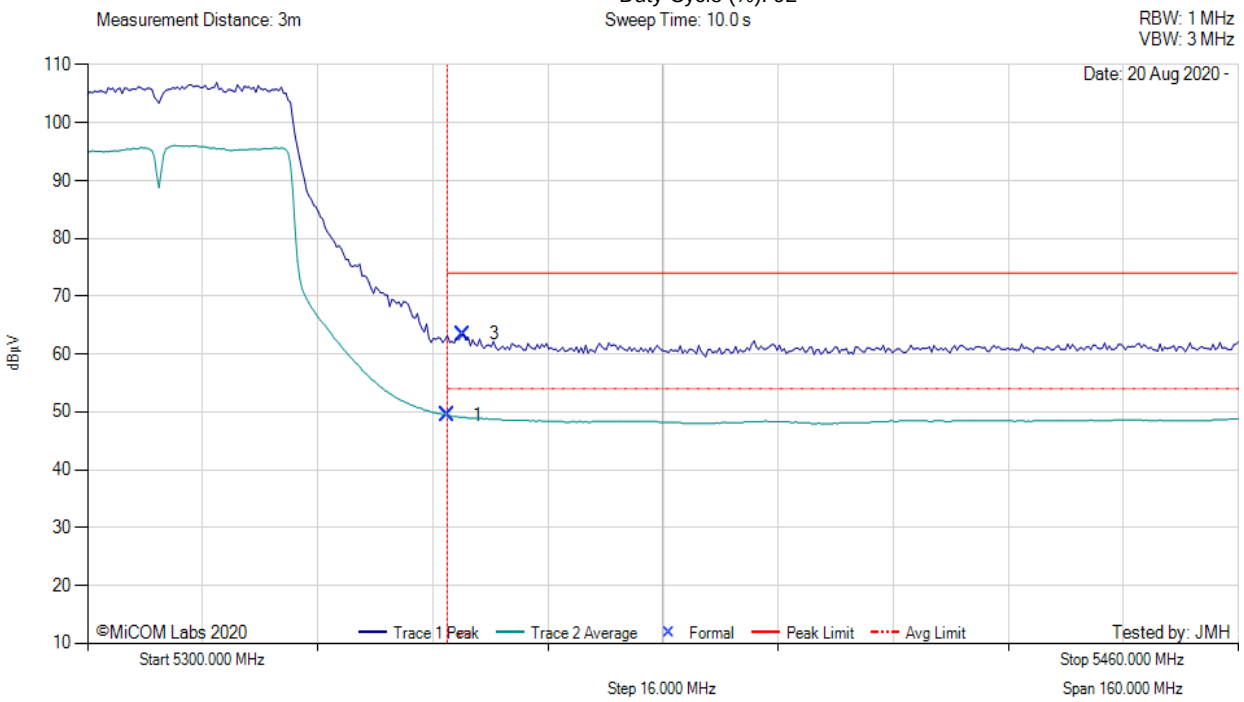
5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
2	5353.55	25.34	3.05	34.47	62.86	Max Peak	Vertical	182	0	74.0	-11.1	Pass
3	5458.40	11.42	3.05	34.52	48.99	Max Avg	Vertical	182	0	54.0	-5.0	Pass
1	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 802.11n HT-40, Test Freq: 5310.00 MHz, Antenna: MikroTik MTAS-5G-19D120, Power Setting: Default, Duty Cycle (%): 92



5300.00 - 5460.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5350.00	11.88	3.06	34.46	49.40	Max Avg	Vertical	182	0	54.0	-4.6	Pass
3	5352.24	25.92	3.06	34.46	63.44	Max Peak	Vertical	182	0	74.0	-10.6	Pass
2	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE. Connected to laptop outside chamber.

back to matrix

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