

Company: Radwin Ltd

Test of: Outdoor Subscriber Radio Unit

To: CFR 47 Part 15.407, RSS-247 (Issue 2)

Report No.: RDWN45 - U4 Radiated Rev A DFS Bands

RADIATED TEST REPORT



RADIATED TEST REPORT

FROM



Test of: Radwin Outdoor Subscriber Radio Unit

to

To: CFR 47 Part 15.407, RSS-247 (Issue 2)

Test Report Serial No.: RDWN45 - U4 Radiated Rev A DFS Bands

This report supersedes: NONE

Master Document Number	Addendum Reports
RDWN45-U4_Master	RDWN41-U9_Conducted*
	RDWN41-U9_Radiated
	RDWN45-U4_Radiated
	RDWN41-U9_DFS*
	RDWN41-U5_(FCC Part 15B & ICES-003)*

RDWN45-U4 adds an additional antenna model to Radwin SU Pro, SU Air product previously tested and reported in MiCOM Labs test report RDWN41-U9.

Applicant: Radwin
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Product Function: Outdoor Subscriber Radio Unit

Issue Date: 6th April 2017

This Test Report is Issued Under the Authority of:

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1. TEST RESULTS

1.1. Radiated

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407 & RSS-247 Issue 2	Ambient Temp. (°C):	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	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

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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);

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

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

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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).

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1.1.1. TX Spurious & Restricted Band Emissions

1.1.1.1. RW-9614-5359

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5255.00	Data Rate:	15.00 MBit/s
Power Setting:	6.25	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	4799.92	57.62	3.52	-11.12	50.02	Max Peak	Vertical	159	0	74.0	-24.0	Pass
#2	4799.92	49.24	3.52	-11.12	41.64	Max Avg	Vertical	159	0	54.0	-12.4	Pass
#3	4823.94	60.30	3.54	-11.15	52.69	Max Peak	Vertical	175	358	74.0	-21.3	Pass
#4	4823.94	54.33	3.54	-11.15	46.72	Max Avg	Vertical	175	358	54.0	-7.3	Pass
#5	5256.92	81.58	3.64	-11.30	73.92	Fundamental	Horizontal	129	0	--	--	
#6	6432.10	52.40	3.99	-7.99	48.40	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	7006.74	61.23	4.17	-7.44	57.96	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5300.00	Data Rate:	15.00 MBit/s
Power Setting:	7.25	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	4800.02	59.33	3.52	-11.12	51.73	Max Peak	Vertical	170	1	74.0	-22.3	Pass
#2	4800.02	51.58	3.52	-11.12	43.98	Max Avg	Vertical	170	1	54.0	-10.0	Pass
#3	4823.95	63.13	3.54	-11.15	55.52	Max Peak	Vertical	176	1	74.0	-18.5	Pass
#4	4823.95	57.59	3.54	-11.15	49.98	Max Avg	Vertical	176	1	54.0	-4.0	Pass
#5	5299.03	86.19	3.81	-11.09	78.91	Fundamental	Horizontal	143	0	--	--	
#6	6431.99	52.92	3.99	-7.99	48.92	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	7066.61	55.77	4.18	-7.34	52.61	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5340.00	Data Rate:	15.00 MBit/s
Power Setting:	2.5	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	4799.99	56.35	3.52	-11.12	48.75	Max Peak	Vertical	172	5	74.0	-25.3	Pass
#2	4799.99	47.73	3.52	-11.12	40.13	Max Avg	Vertical	172	5	54.0	-13.9	Pass
#3	4823.94	60.84	3.54	-11.15	53.23	Max Peak	Vertical	180	0	74.0	-20.8	Pass
#4	4823.94	55.15	3.54	-11.15	47.54	Max Avg	Vertical	180	0	54.0	-6.5	Pass
#5	5326.65	44.82	3.72	-11.06	37.48	Fundamental	Horizontal	138	0	--	--	
#6	6431.99	53.41	3.99	-7.99	49.41	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	7119.97	53.07	4.19	-7.35	49.91	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5480.00	Data Rate:	15.00 MBit/s
Power Setting:	1	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	4799.93	57.75	3.52	-11.12	50.15	Max Peak	Vertical	180	1	74.0	-23.9	Pass
#2	4799.93	50.24	3.52	-11.12	42.64	Max Avg	Vertical	180	1	54.0	-11.4	Pass
#3	4824.04	60.17	3.54	-11.15	52.56	Max Peak	Vertical	178	0	74.0	-21.4	Pass
#4	4824.04	54.53	3.54	-11.15	46.92	Max Avg	Vertical	178	0	54.0	-7.1	Pass
#5	5481.39	69.87	3.74	-11.20	62.41	Fundamental	Horizontal	148	0	--	--	
#6	6432.10	52.34	3.99	-7.99	48.34	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5595.00	Data Rate:	15.00 MBit/s
Power Setting:	4.75	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	4800.01	57.37	3.52	-11.12	49.77	Max Peak	Vertical	171	0	74.0	-24.2	Pass
#2	4800.01	50.24	3.52	-11.12	42.64	Max Avg	Vertical	171	0	54.0	-11.4	Pass
#3	4823.96	59.44	3.54	-11.15	51.83	Max Peak	Vertical	173	0	74.0	-22.2	Pass
#4	4823.96	53.92	3.54	-11.15	46.31	Max Avg	Vertical	173	0	54.0	-7.7	Pass
#5	5594.51	76.98	3.77	-11.17	69.58	Fundamental	Horizontal	133	0	--	--	
#6	6079.58	54.67	3.87	-9.58	48.96	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	6267.17	54.78	3.93	-8.52	50.19	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5715.00	Data Rate:	15.00 MBit/s
Power Setting:	5	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5712.37	71.68	3.83	-10.77	64.74	Fundamental	Horizontal	151	0	--	--	
#2	6048.31	56.01	3.87	-9.66	50.22	Peak (NRB)	Vertical	151	0	--	--	Pass
#3	6169.49	56.24	3.93	-9.09	51.08	Peak (NRB)	Vertical	151	0	--	--	Pass
#4	6279.84	56.07	3.92	-8.48	51.51	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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1.1.2. Restricted Edge & Band-Edge Emissions

1.1.2.2. RW-9614-5359

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5470 - 5725 MHz

RW-9614-5359		Restricted-Edge Freq	Limit 74.0dB μ V/m	Limit 54.0dB μ V/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dB μ V/m	dB μ V/m	
10 MHz	5480.00	5460.00	71.20	49.15	1
20 MHz	5485.00	5460.00	73.90	53.88	4
40 MHz	5495.00	5460.00	71.85	51.77	1.25
80 MHz	5520.00	5460.00	73.68	46.97	-2

RW-9614-5359		Band-Edge Freq	Limit 68.23dB μ V/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dB μ V/m	
10 MHz	5480.00	5470.00	54.68	1
20 MHz	5485.00	5470.00	57.98	4
40 MHz	5495.00	5470.00	56.31	1.25
80 MHz	5520.00	5470.00	47.38	-2

5250 - 5350 MHz

RW-9614-5359		Band-Edge Freq	Limit 74.0dB μ V/m	Limit 54.0dB μ V/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dB μ V/m	dB μ V/m	
10 MHz	5340.00	5350.00	73.14	53.96	2.5
20 MHz	5340.00	5350.00	73.22	53.87	-8
40 MHz	5330.00	5350.00	73.38	52.87	-2
80 MHz	5310.00	5350.00	69.91	53.96	-9

Click on the links to view the data.

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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5480.00	Data Rate:	15.00 MBit/s
Power Setting:	1	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz

Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5454.29	33.11	3.79	34.30	71.20	Max Peak	Horizontal	162	0	74.0	-2.8	Pass
#2	5460.00	11.05	3.79	34.31	49.15	Max Avg	Horizontal	162	0	54.0	-4.9	Pass
#4	5470.00	16.60	3.76	34.32	54.68	Max Avg	Horizontal	162	0	68.2	-13.5	Pass
#3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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Serial #: RDWN45-U4 Radiated Rev A DFS Bands
Issue Date: 6th April 2017
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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	20 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5485.00	Data Rate:	15.00 MBit/s
Power Setting:	4	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz

Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5450.98	35.82	3.78	34.30	73.90	Max Peak	Horizontal	162	0	74.0	-0.1	Pass
#2	5460.00	15.78	3.79	34.31	53.88	Max Avg	Horizontal	162	0	54.0	-0.1	Pass
#4	5470.00	19.90	3.76	34.32	57.98	Max Avg	Horizontal	162	0	68.2	-10.2	Pass
#3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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To: FCC Part 15.407 & RSS-247 (Issue 2)
Serial #: RDWN45-U4 Radiated Rev A DFS Bands
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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	40 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5495.00	Data Rate:	15.00 MBit/s
Power Setting:	1.25	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz

Num	Frequency MHz	Raw dB μ V	Cable Loss dB	AF dB	Level dB μ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB μ V/m	Margin dB	Pass /Fail
#1	5459.40	33.75	3.79	34.31	71.85	Max Peak	Horizontal	162	0	74.0	-2.2	Pass
#2	5460.00	13.67	3.79	34.31	51.77	Max Avg	Horizontal	162	0	54.0	-2.2	Pass
#4	5470.00	18.23	3.76	34.32	56.31	Max Avg	Horizontal	162	0	68.2	-11.9	Pass
#3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	80 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5520.00	Data Rate:	15.00 MBit/s
Power Setting:	-2	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5459.40	35.58	3.79	34.31	73.68	Max Peak	Horizontal	162	0	74.0	-0.3	Pass
#2	5460.00	8.87	3.79	34.31	46.97	Max Avg	Horizontal	162	0	54.0	-7.0	Pass
#4	5470.00	9.30	3.76	34.32	47.38	Max Avg	Horizontal	162	0	68.2	-20.8	Pass
#3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	10 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5340.00	Data Rate:	15.00 MBit/s
Power Setting:	2.5	Tested By:	JMH

Test Measurement Results

5300.00 - 5460.00 MHz

Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5350.00	15.75	3.70	34.51	53.96	Max Avg	Vertical	157	0	54.0	0.0	Pass
#3	5354.81	34.93	3.71	34.50	73.14	Max Peak	Vertical	157	0	74.0	-0.9	Pass
#2	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	20 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5340.00	Data Rate:	15.00 MBit/s
Power Setting:	-8	Tested By:	JMH

Test Measurement Results

5300.00 - 5460.00 MHz

Num	Frequency MHz	Raw dB μ V	Cable Loss dB	AF dB	Level dB μ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB μ V/m	Margin dB	Pass /Fail
#1	5350.00	15.66	3.70	34.51	53.87	Max Avg	Horizontal	157	0	54.0	-0.1	Pass
#2	5350.00	35.01	3.70	34.51	73.22	Max Peak	Horizontal	157	0	74.0	-0.8	Pass
#3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	40 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5330.00	Data Rate:	15.00 MBit/s
Power Setting:	-2	Tested By:	JMH

Test Measurement Results

5300.00 - 5460.00 MHz

Num	Frequency MHz	Raw dB μ V	Cable Loss dB	AF dB	Level dB μ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB μ V/m	Margin dB	Pass /Fail
#1	5350.00	14.66	3.70	34.51	52.87	Max Avg	Horizontal	157	0	54.0	-1.1	Pass
#2	5350.00	35.17	3.70	34.51	73.38	Max Peak	Horizontal	157	0	74.0	-0.6	Pass
#3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	RW-9614-5359	Variant:	80 MHz
Antenna Gain (dBi):	23.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5310.00	Data Rate:	15.00 MBit/s
Power Setting:	-9	Tested By:	JMH

Test Measurement Results

5300.00 - 5460.00 MHz

Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5350.00	15.75	3.70	34.51	53.96	Max Avg	Horizontal	157	0	54.0	0.0	Pass
#2	5350.00	31.70	3.70	34.51	69.91	Max Peak	Horizontal	157	0	74.0	-4.1	Pass
#3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

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A. APPENDIX - GRAPHICAL IMAGES

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A.1. Radiated

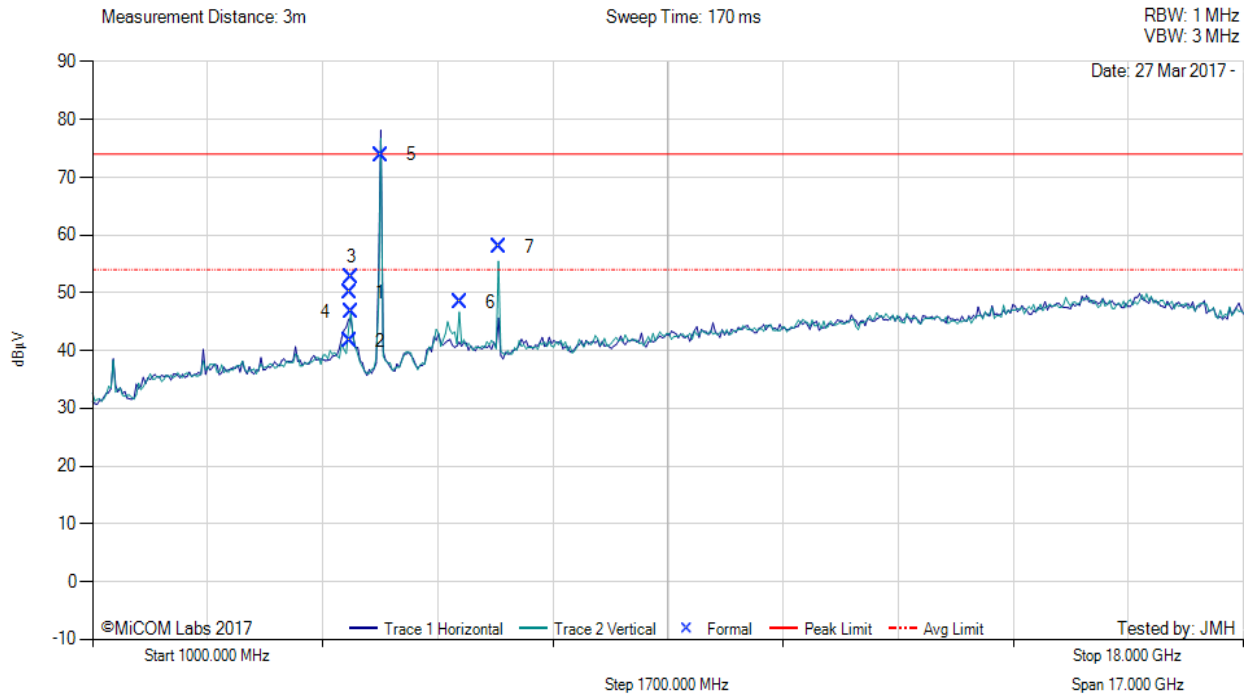
A.1.1. TX Spurious & Restricted Band Emissions

A.1.1.1. RW-9614-5359



TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10 MHz, Test Freq: 5255.00 MHz, Antenna: RW-9614-5359, Power Setting: 6.25, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	4799.92	57.62	3.52	-11.12	50.02	Max Peak	Vertical	159	0	74.0	-24.0	Pass
2	4799.92	49.24	3.52	-11.12	41.64	Max Avg	Vertical	159	0	54.0	-12.4	Pass
3	4823.94	60.30	3.54	-11.15	52.69	Max Peak	Vertical	175	358	74.0	-21.3	Pass
4	4823.94	54.33	3.54	-11.15	46.72	Max Avg	Vertical	175	358	54.0	-7.3	Pass
5	5256.92	81.58	3.64	-11.30	73.92	Fundamental	Horizontal	129	0	--	--	
6	6432.10	52.40	3.99	-7.99	48.40	Peak (NRB)	Vertical	151	0	--	--	Pass
7	7006.74	61.23	4.17	-7.44	57.96	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

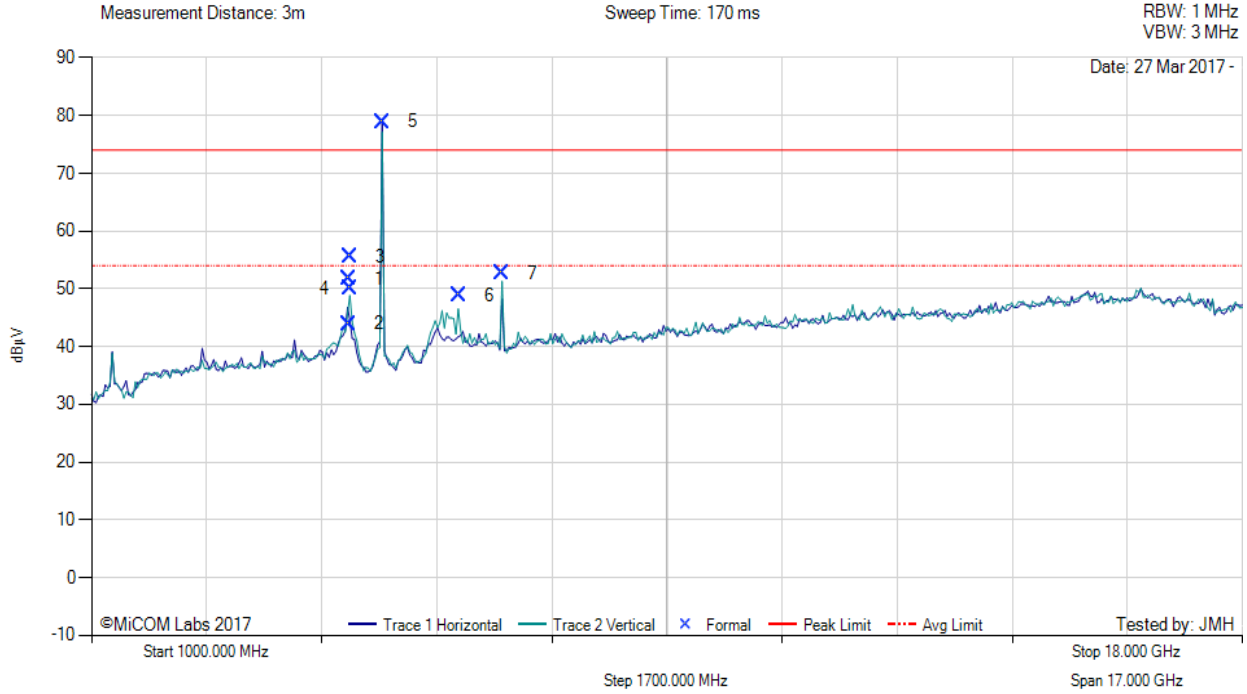
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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10 MHz, Test Freq: 5300.00 MHz, Antenna: RW-9614-5359, Power Setting: 7.25, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	4800.02	59.33	3.52	-11.12	51.73	Max Peak	Vertical	170	1	74.0	-22.3	Pass
2	4800.02	51.58	3.52	-11.12	43.98	Max Avg	Vertical	170	1	54.0	-10.0	Pass
3	4823.95	63.13	3.54	-11.15	55.52	Max Peak	Vertical	176	1	74.0	-18.5	Pass
4	4823.95	57.59	3.54	-11.15	49.98	Max Avg	Vertical	176	1	54.0	-4.0	Pass
5	5299.03	86.19	3.81	-11.09	78.91	Fundamental	Horizontal	143	0	--	--	
6	6431.99	52.92	3.99	-7.99	48.92	Peak (NRB)	Vertical	151	0	--	--	Pass
7	7066.61	55.77	4.18	-7.34	52.61	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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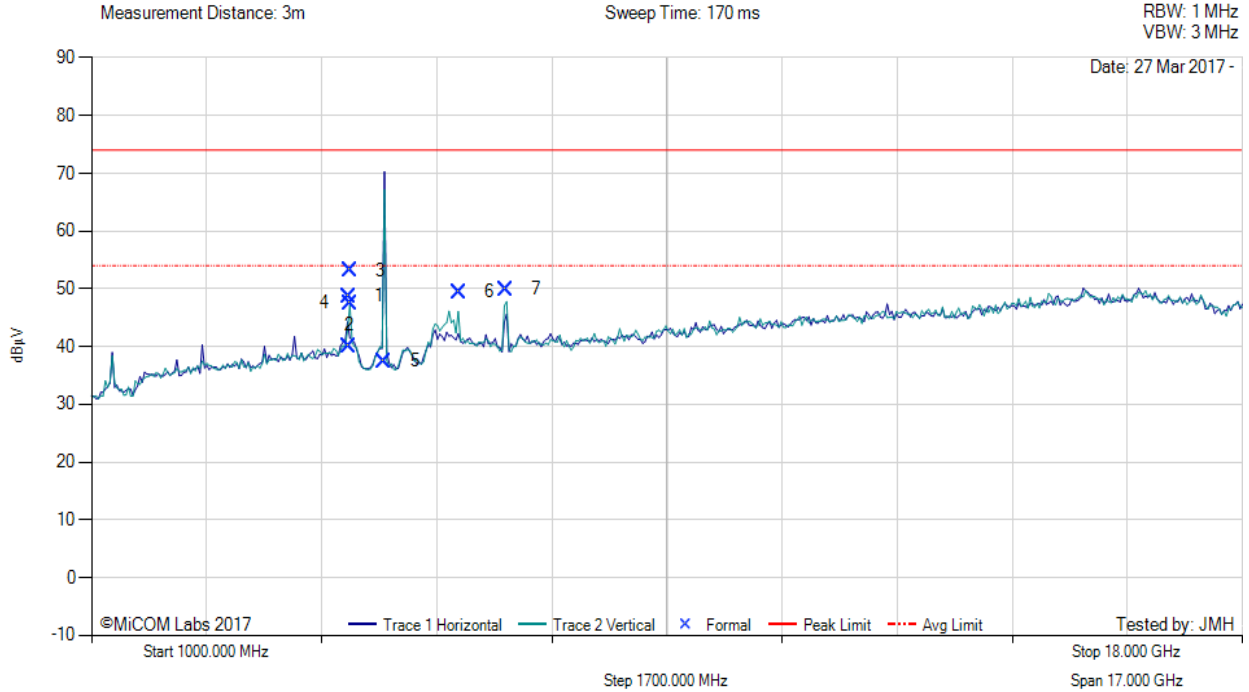


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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10 MHz, Test Freq: 5340.00 MHz, Antenna: RW-9614-5359, Power Setting: 2.5, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	4799.99	56.35	3.52	-11.12	48.75	Max Peak	Vertical	172	5	74.0	-25.3	Pass
2	4799.99	47.73	3.52	-11.12	40.13	Max Avg	Vertical	172	5	54.0	-13.9	Pass
3	4823.94	60.84	3.54	-11.15	53.23	Max Peak	Vertical	180	0	74.0	-20.8	Pass
4	4823.94	55.15	3.54	-11.15	47.54	Max Avg	Vertical	180	0	54.0	-6.5	Pass
5	5326.65	44.82	3.72	-11.06	37.48	Fundamental	Horizontal	138	0	--	--	
6	6431.99	53.41	3.99	-7.99	49.41	Peak (NRB)	Vertical	151	0	--	--	Pass
7	7119.97	53.07	4.19	-7.35	49.91	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

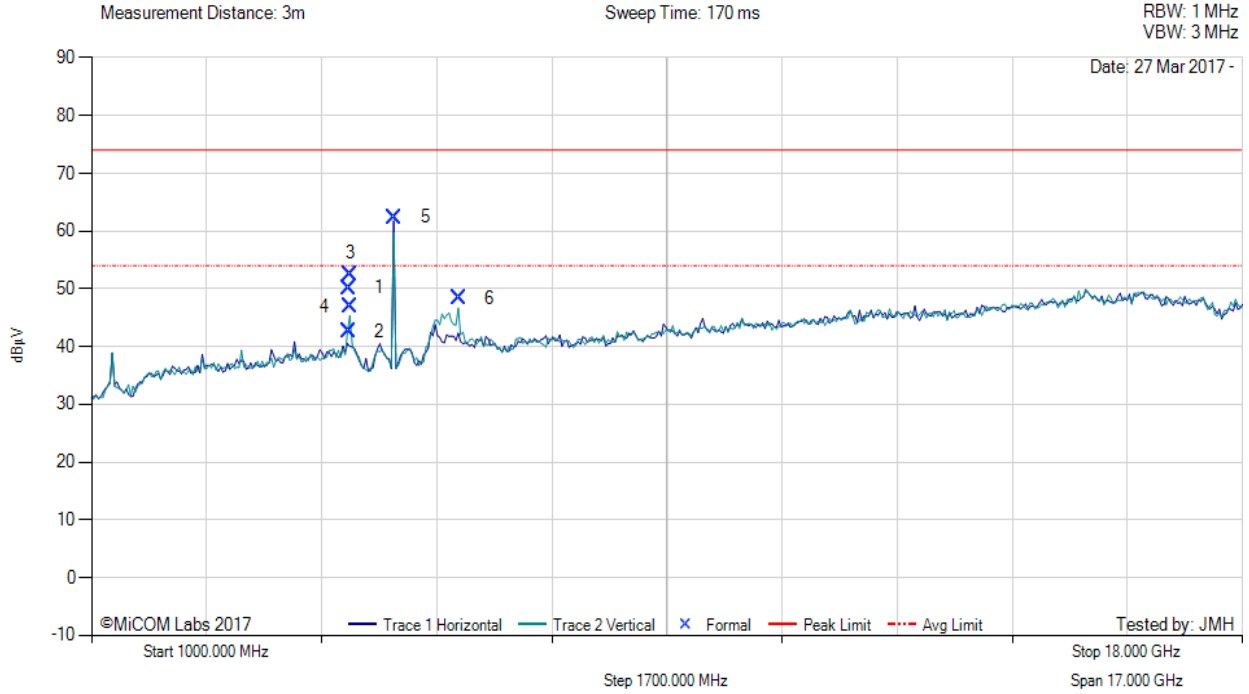
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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10 MHz, Test Freq: 5480.00 MHz, Antenna: RW-9614-5359, Power Setting: 1, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	4799.93	57.75	3.52	-11.12	50.15	Max Peak	Vertical	180	1	74.0	-23.9	Pass
2	4799.93	50.24	3.52	-11.12	42.64	Max Avg	Vertical	180	1	54.0	-11.4	Pass
3	4824.04	60.17	3.54	-11.15	52.56	Max Peak	Vertical	178	0	74.0	-21.4	Pass
4	4824.04	54.53	3.54	-11.15	46.92	Max Avg	Vertical	178	0	54.0	-7.1	Pass
5	5481.39	69.87	3.74	-11.20	62.41	Fundamental	Horizontal	148	0	--	--	
6	6432.10	52.34	3.99	-7.99	48.34	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

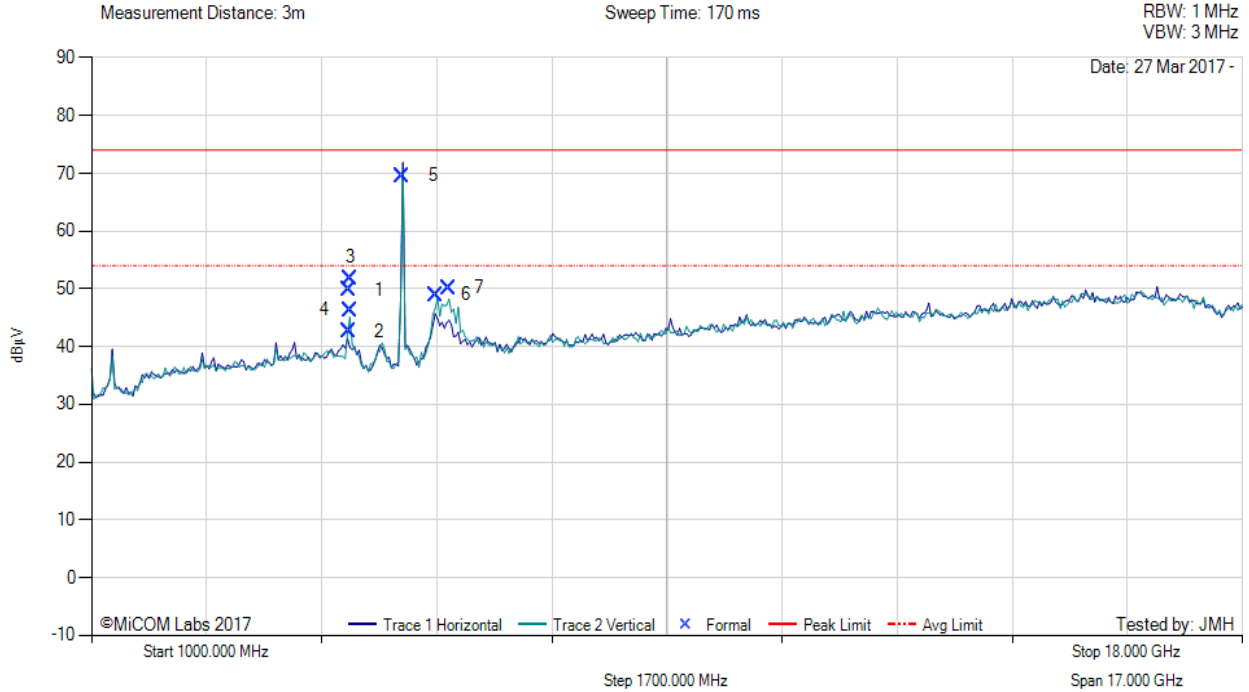
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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10 MHz, Test Freq: 5595.00 MHz, Antenna: RW-9614-5359, Power Setting: 4.75, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	4800.01	57.37	3.52	-11.12	49.77	Max Peak	Vertical	171	0	74.0	-24.2	Pass
2	4800.01	50.24	3.52	-11.12	42.64	Max Avg	Vertical	171	0	54.0	-11.4	Pass
3	4823.96	59.44	3.54	-11.15	51.83	Max Peak	Vertical	173	0	74.0	-22.2	Pass
4	4823.96	53.92	3.54	-11.15	46.31	Max Avg	Vertical	173	0	54.0	-7.7	Pass
5	5594.51	76.98	3.77	-11.17	69.58	Fundamental	Horizontal	133	0	--	--	
6	6079.58	54.67	3.87	-9.58	48.96	Peak (NRB)	Vertical	151	0	--	--	Pass
7	6267.17	54.78	3.93	-8.52	50.19	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

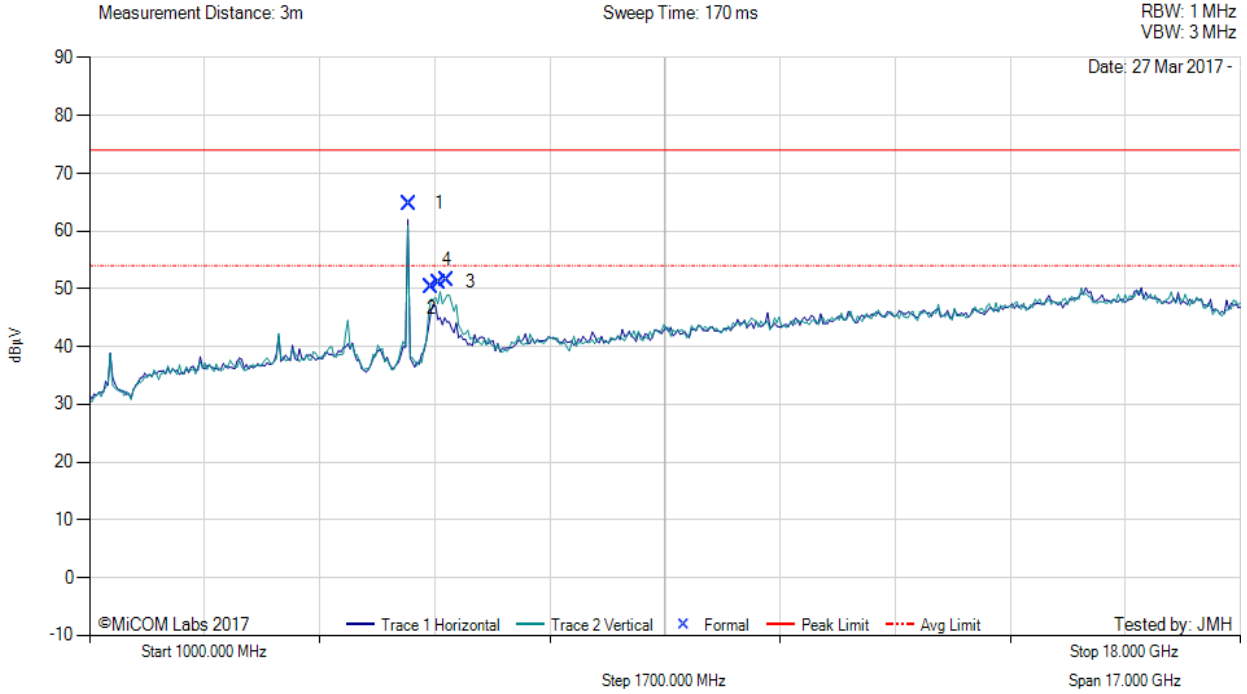
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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10 MHz, Test Freq: 5715.00 MHz, Antenna: RW-9614-5359, Power Setting: 5, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5712.37	71.68	3.83	-10.77	64.74	Fundamental	Horizontal	151	0	--	--	
2	6048.31	56.01	3.87	-9.66	50.22	Peak (NRB)	Vertical	151	0	--	--	Pass
3	6169.49	56.24	3.93	-9.09	51.08	Peak (NRB)	Vertical	151	0	--	--	Pass
4	6279.84	56.07	3.92	-8.48	51.51	Peak (NRB)	Vertical	151	0	--	--	Pass

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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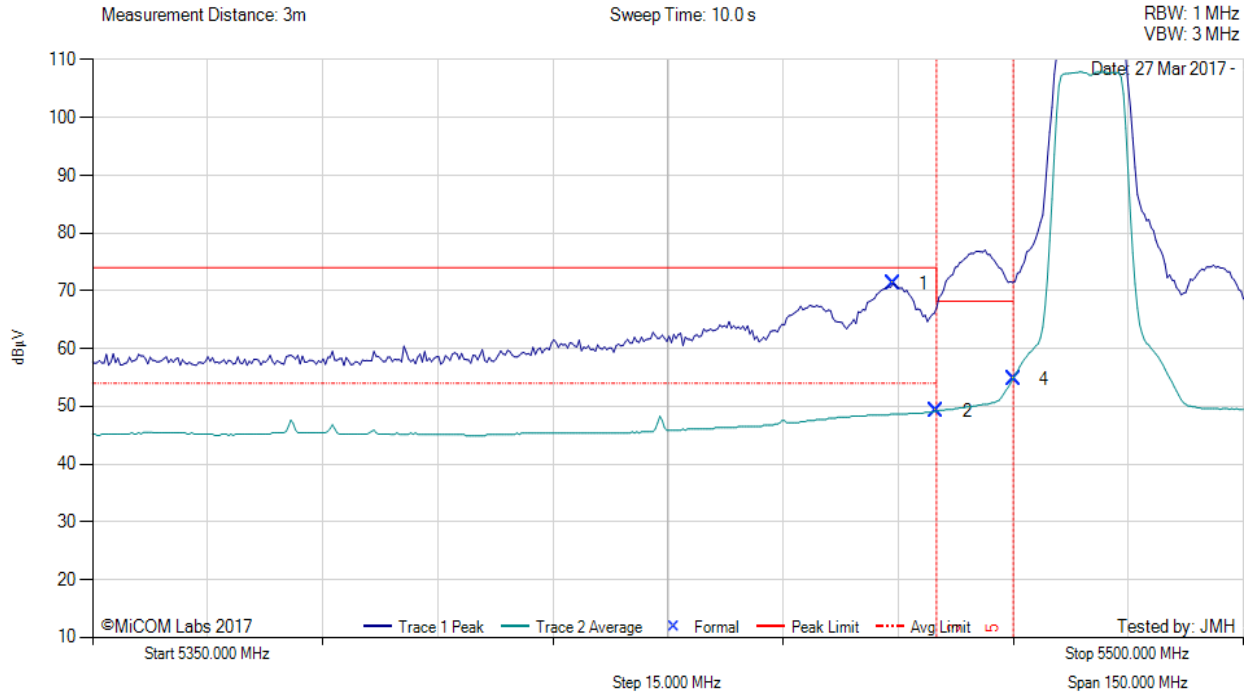
A.1.2. Restricted Edge & Band-Edge Emissions

A.1.2.2. RW-9614-5359



RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 10 MHz, Test Freq: 5480.00 MHz, Antenna: RW-9614-5359, Power Setting: 1, Duty Cycle (%): 99



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5454.29	33.11	3.79	34.30	71.20	Max Peak	Horizontal	162	0	74.0	-2.8	Pass
2	5460.00	11.05	3.79	34.31	49.15	Max Avg	Horizontal	162	0	54.0	-4.9	Pass
4	5470.00	16.60	3.76	34.32	54.68	Max Avg	Horizontal	162	0	68.2	-13.5	Pass
3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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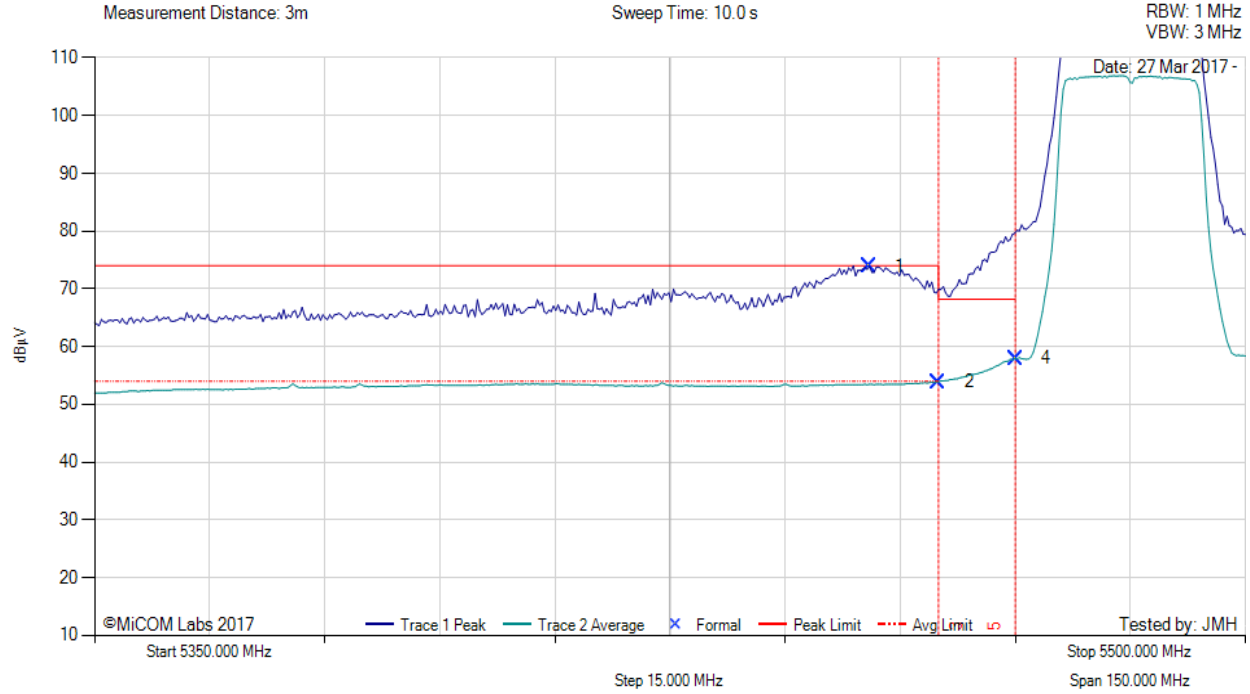


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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5485.00 MHz, Antenna: RW-9614-5359, Power Setting: 4, Duty Cycle (%): 99



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5450.98	35.82	3.78	34.30	73.90	Max Peak	Horizontal	162	0	74.0	-0.1	Pass
2	5460.00	15.78	3.79	34.31	53.88	Max Avg	Horizontal	162	0	54.0	-0.1	Pass
4	5470.00	19.90	3.76	34.32	57.98	Max Avg	Horizontal	162	0	68.2	-10.2	Pass
3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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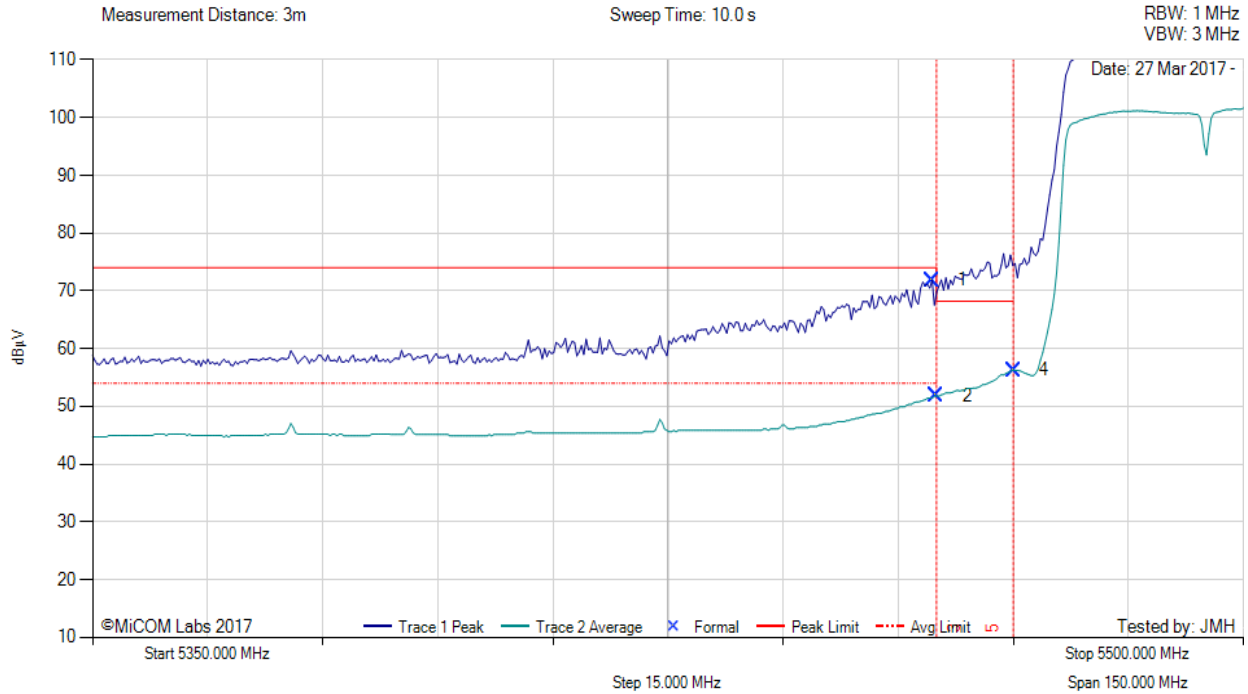


Title: Radwin Outdoor Subscriber Radio Unit
To: FCC Part 15.407 & RSS-247 (Issue 2)
Serial #: RDWN45-U4 Radiated Rev A DFS Bands
Issue Date: 6th April 2017
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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40 MHz, Test Freq: 5495.00 MHz, Antenna: RW-9614-5359, Power Setting: 1.25, Duty Cycle (%): 99



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5459.40	33.75	3.79	34.31	71.85	Max Peak	Horizontal	162	0	74.0	-2.2	Pass
2	5460.00	13.67	3.79	34.31	51.77	Max Avg	Horizontal	162	0	54.0	-2.2	Pass
4	5470.00	18.23	3.76	34.32	56.31	Max Avg	Horizontal	162	0	68.2	-11.9	Pass
3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

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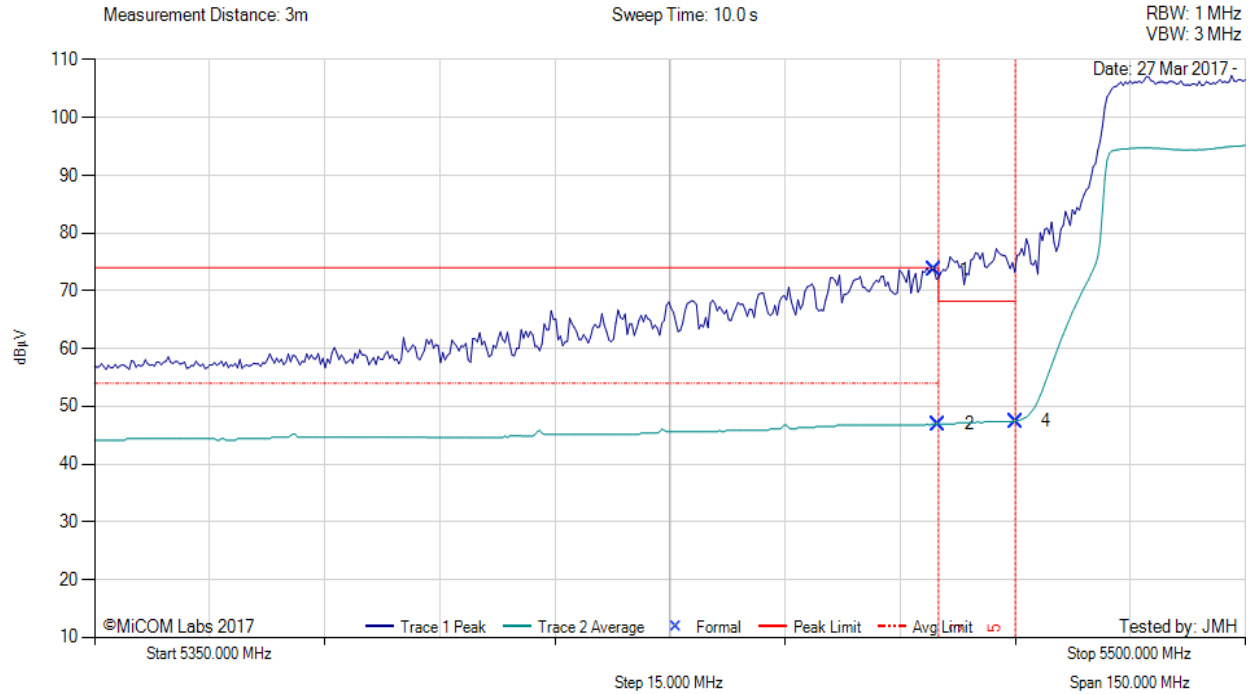


Title: Radwin Outdoor Subscriber Radio Unit
To: FCC Part 15.407 & RSS-247 (Issue 2)
Serial #: RDWN45-U4 Radiated Rev A DFS Bands
Issue Date: 6th April 2017
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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80 MHz, Test Freq: 5520.00 MHz, Antenna: RW-9614-5359, Power Setting: -2, Duty Cycle (%): 99



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5459.40	35.58	3.79	34.31	73.68	Max Peak	Horizontal	162	0	74.0	-0.3	Pass
2	5460.00	8.87	3.79	34.31	46.97	Max Avg	Horizontal	162	0	54.0	-7.0	Pass
4	5470.00	9.30	3.76	34.32	47.38	Max Avg	Horizontal	162	0	68.2	-20.8	Pass
3	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
5	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet Band Edge Limit

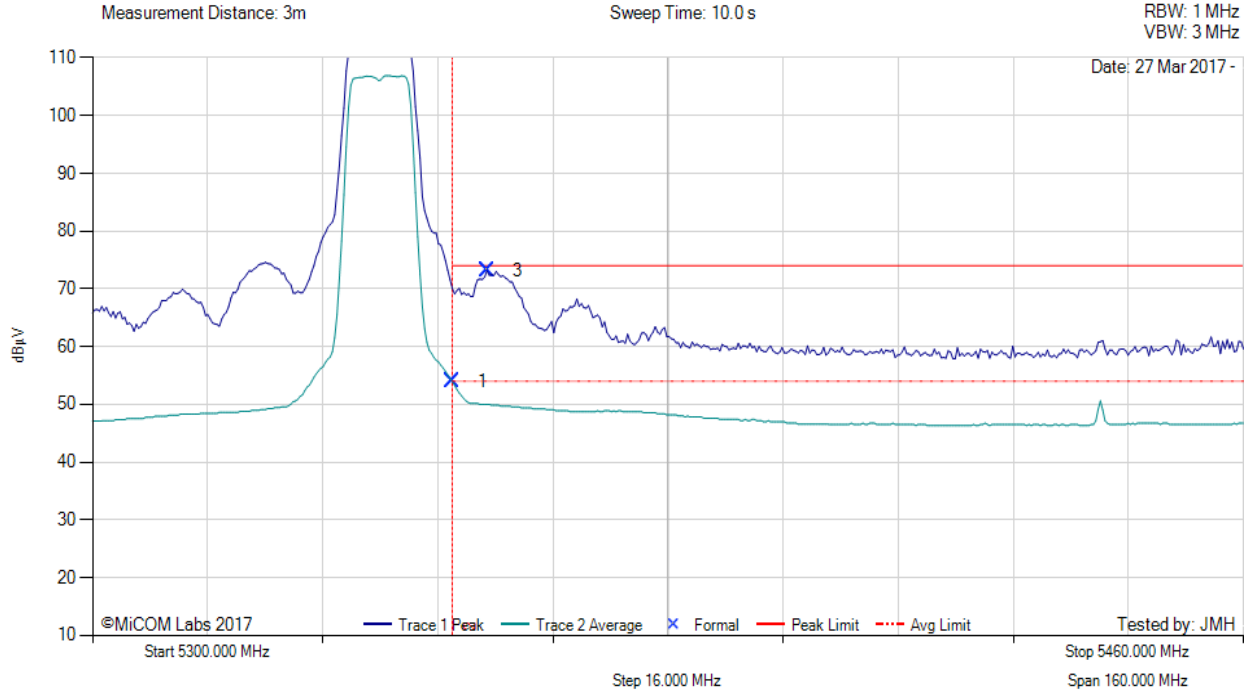
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RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 10 MHz, Test Freq: 5340.00 MHz, Antenna: RW-9614-5359, Power Setting: 2.5, Duty Cycle (%): 99



5300.00 - 5460.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5350.00	15.75	3.70	34.51	53.96	Max Avg	Vertical	157	0	54.0	0.0	Pass
3	5354.81	34.93	3.71	34.50	73.14	Max Peak	Vertical	157	0	74.0	-0.9	Pass
2	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

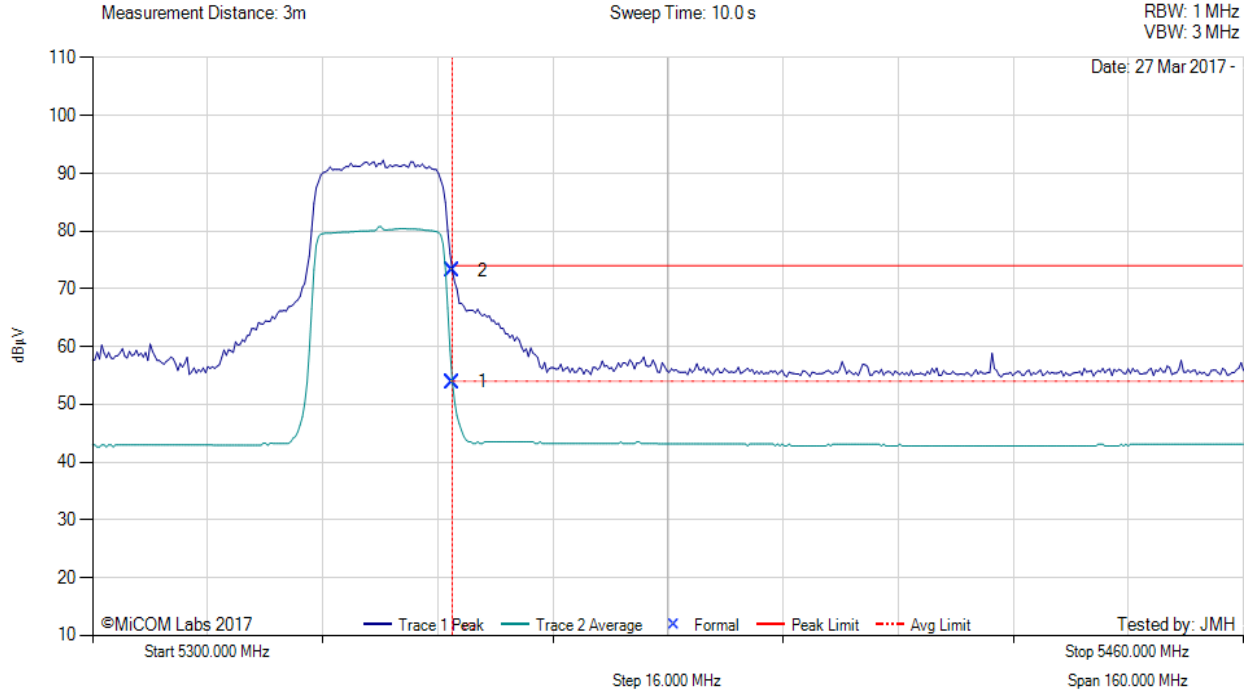
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RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5340.00 MHz, Antenna: RW-9614-5359, Power Setting: -8, Duty Cycle (%): 99



5300.00 - 5460.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5350.00	15.66	3.70	34.51	53.87	Max Avg	Horizontal	157	0	54.0	-0.1	Pass
2	5350.00	35.01	3.70	34.51	73.22	Max Peak	Horizontal	157	0	74.0	-0.8	Pass
3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

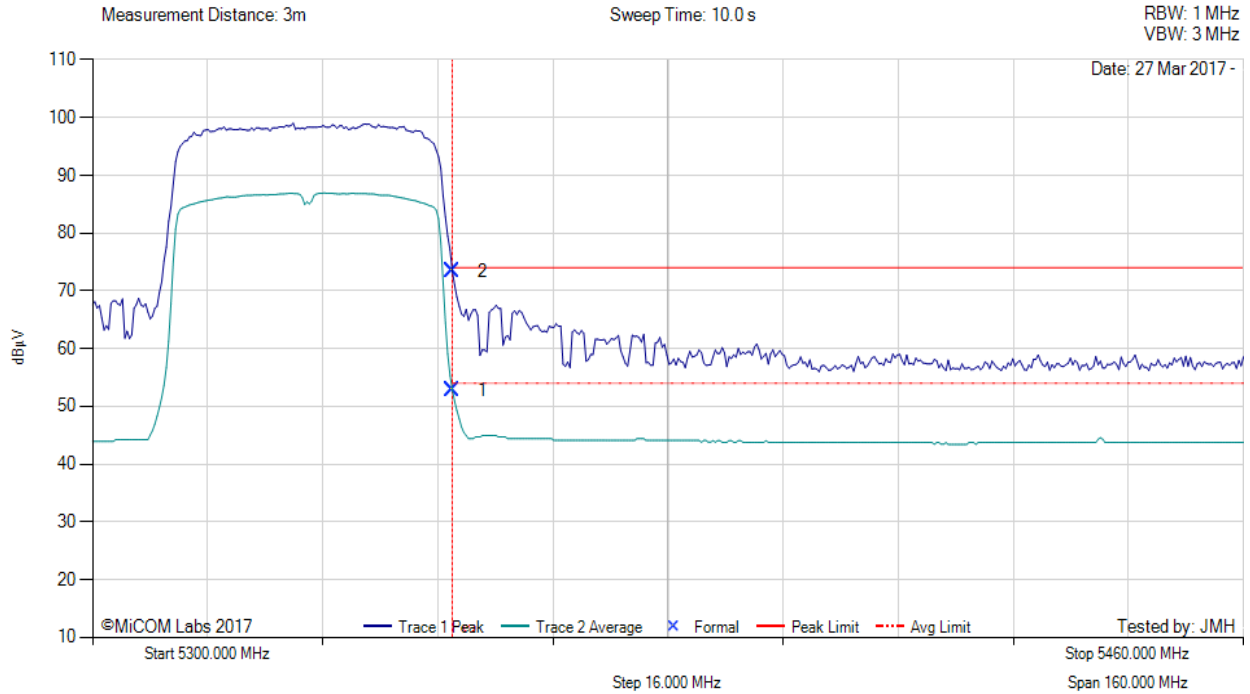
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RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 40 MHz, Test Freq: 5330.00 MHz, Antenna: RW-9614-5359, Power Setting: -2, Duty Cycle (%): 99



5300.00 - 5460.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5350.00	14.66	3.70	34.51	52.87	Max Avg	Horizontal	157	0	54.0	-1.1	Pass
2	5350.00	35.17	3.70	34.51	73.38	Max Peak	Horizontal	157	0	74.0	-0.6	Pass
3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

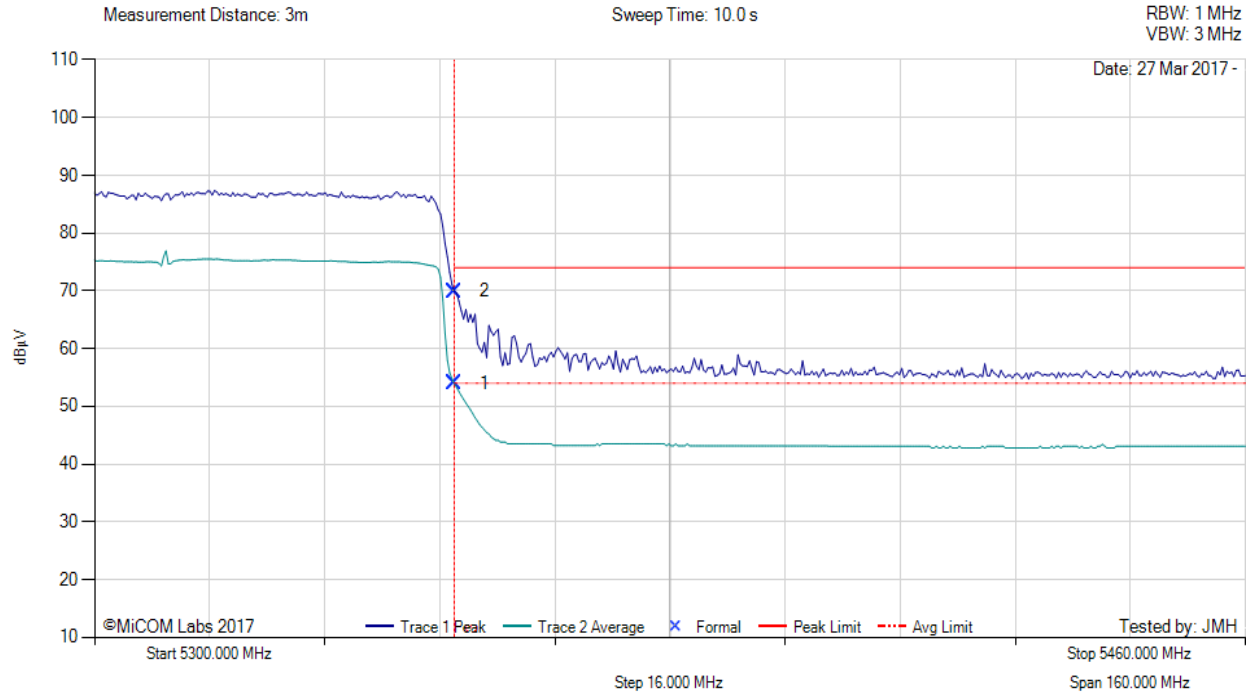
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RESTRICTED UPPER BAND-EDGE EMISSIONS

Variant: 80 MHz, Test Freq: 5310.00 MHz, Antenna: RW-9614-5359, Power Setting: -9, Duty Cycle (%): 99



5300.00 - 5460.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5350.00	15.75	3.70	34.51	53.96	Max Avg	Horizontal	157	0	54.0	0.0	Pass
2	5350.00	31.70	3.70	34.51	69.91	Max Peak	Horizontal	157	0	74.0	-4.1	Pass
3	5350.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

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