

Company: Radwin

Test of: Outdoor Subscriber Radio Unit

To: FCC CFR 47 Part 15 Subpart E 15.407

Report No.: RDWN45-U3 Radiated Rev A non DFS

**RADIATED TEST REPORT**



# RADIATED TEST REPORT

FROM



Test of: Radwin Outdoor Subscriber Radio Unit

to

To: FCC CFR 47 Part 15 Subpart E 15.407

Test Report Serial No.: RDWN45-U3 Radiated Rev A non DFS

This report supersedes: None

Master Document Number	Addendum Reports
RDWN45-U3_Master	RDWN41-U5_Conducted* (Band 1 only)
	RDWN41-U5_Radiated* (Band 1 only)
	RDWN44-U3*
	RDWN45-U3_Radiated
	RDWN41-U5 (FCC Part15B & ICES-003)*

\*RDWN45-U3 adds an additional antenna model to Radwin SU Pro, SU Air product previously tested and reported in MiCOM Labs test reports RDWN41-U5 and RDWN44-U3.

Applicant: Radwin  
27 Habarzel Street  
Tel Aviv, . 6971039  
Israel

Product Function: Outdoor Subscriber Radio Unit

Issue Date: 6<sup>th</sup> 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			
<b>Standard:</b>	FCC CFR 47:15.407	<b>Ambient Temp. (°C):</b>	20.0 - 24.5
<b>Test Heading:</b>	Radiated Spurious and Band-Edge Emissions	<b>Rel. Humidity (%):</b>	32 - 45
<b>Standard Section(s):</b>	15.407 (b), 15.205, 15.209	<b>Pressure (mBars):</b>	999 - 1001
<b>Reference Document(s):</b>	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 (dB $\mu$ V/m);

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

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dB $\mu$ V/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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**To:** FCC CFR 47 Part 15 Subpart E 15.407  
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**Issue Date:** 6<sup>th</sup> April 2017  
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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**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5160.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	2	<b>Tested By:</b>	JMH

##### **Test Measurement Results**

###### **1000.00 - 18000.00 MHz**

Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail
#1	4823.94	59.89	3.54	-11.15	52.28	Max Peak	Vertical	176	358	74.0	-21.7	Pass
#2	4823.94	54.12	3.54	-11.15	46.51	Max Avg	Vertical	176	358	54.0	-7.5	Pass
#3	5162.43	72.38	3.69	-11.55	64.52	Fundamental	Horizontal	151	0	--	--	
#4	6431.98	56.71	3.99	-7.99	52.71	Peak (NRB)	Vertical	151	0	--	--	Pass
#5	6879.96	60.65	4.10	-7.61	57.14	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**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5200.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	22	<b>Tested By:</b>	JMH

**Test Measurement Results**

1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	4800.07	64.10	3.52	-11.12	56.50	Max Peak	Vertical	173	0	74.0	-17.5	Pass	
#2	4800.07	54.56	3.52	-11.12	46.96	Max Avg	Vertical	173	0	54.0	-7.0	Pass	
#3	4824.02	66.37	3.54	-11.15	58.76	Max Peak	Vertical	169	0	74.0	-15.2	Pass	
#4	4824.02	59.29	3.54	-11.15	51.68	Max Avg	Vertical	169	0	54.0	-2.3	Pass	
#5	5202.78	78.30	3.65	-11.45	70.50	Fundamental	Vertical	100	0	--	--		
#6	6933.42	66.64	4.11	-7.49	63.26	Peak (NRB)	Vertical	151	0	--	--	Pass	
#7	10402.81	63.24	5.42	-5.02	63.64	Peak (NRB)	Horizontal	151	0	--	--	Pass	
#8	15607.62	63.16	6.01	-0.20	68.97	Max Peak	Horizontal	177	357	74.0	-5.0	Pass	
#9	15607.62	43.22	6.01	-0.20	49.03	Max Avg	Horizontal	177	357	54.0	-5.0	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**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5245.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	17.75	<b>Tested By:</b>	JMH

**Test Measurement Results**

1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	4799.94	63.57	3.52	-11.12	55.97	Max Peak	Vertical	175	0	74.0	-18.0	Pass	
#2	4799.94	54.67	3.52	-11.12	47.07	Max Avg	Vertical	175	0	54.0	-6.9	Pass	
#3	4824.01	66.37	3.54	-11.15	58.76	Max Peak	Vertical	169	1	74.0	-15.2	Pass	
#4	4824.01	59.52	3.54	-11.15	51.91	Max Avg	Vertical	169	1	54.0	-2.1	Pass	
#5	5242.69	78.04	3.63	-11.36	70.31	Fundamental	Horizontal	100	0	--	--		
#6	6993.40	66.74	4.12	-7.45	63.41	Peak (NRB)	Vertical	151	0	--	--	Pass	
#7	10489.85	62.96	5.45	-4.39	64.02	Peak (NRB)	Horizontal	151	0	--	--	Pass	
#8	15731.94	66.20	6.05	0.16	72.41	Max Peak	Horizontal	166	358	74.0	-1.6	Pass	
#9	15731.94	46.97	6.05	0.16	53.18	Max Avg	Horizontal	166	358	54.0	-0.8	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

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5730.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

#### Test Measurement Results

1000.00 - 18000.00 MHz														
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail		
#1	5728.36	79.81	3.79	-10.71	72.89	Fundamental	Vertical	151	0	--	--			
#2	6111.38	60.93	3.90	-9.44	55.39	Peak (NRB)	Vertical	151	0	--	--	Pass		
#3	6249.52	57.03	3.93	-8.57	52.39	Peak (NRB)	Vertical	151	0	--	--	Pass		
#4	6299.92	57.37	3.96	-8.43	52.90	Peak (NRB)	Vertical	151	0	--	--	Pass		
#5	11460.63	57.78	5.52	-4.89	58.41	Max Peak	Horizontal	144	248	74.0	-15.6	Pass		
#6	11460.63	44.20	5.52	-4.89	44.83	Max Avg	Horizontal	144	248	54.0	-9.2	Pass		
#7	17190.75	48.43	6.18	0.41	55.02	Peak (NRB)	Horizontal	151	0	--	--	Pass		

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**Equipment Configuration for TX Spurious & Restricted Band Emissions**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5785.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

**Test Measurement Results**

1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5788.44	80.46	3.79	-10.43	73.82	Fundamental	Horizontal	129	0	--	--		
#2	6076.15	61.19	3.87	-9.59	55.47	Peak (NRB)	Vertical	151	0	--	--	Pass	
#3	6169.72	59.61	3.93	-9.09	54.45	Peak (NRB)	Vertical	151	0	--	--	Pass	
#4	6254.70	57.07	3.94	-8.55	52.46	Peak (NRB)	Vertical	151	0	--	--	Pass	
#5	11566.23	57.42	5.52	-4.65	58.29	Max Peak	Horizontal	170	323	74.0	-15.7	Pass	
#6	11566.23	43.10	5.52	-4.65	43.97	Max Avg	Horizontal	170	323	54.0	-10.0	Pass	
#7	17357.46	50.73	6.28	-0.03	56.98	Peak (NRB)	Horizontal	200	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**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5845.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

**Test Measurement Results**

1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5843.13	82.83	3.84	-10.17	76.50	Fundamental	Vertical	151	0	--	--		
#2	6110.50	63.56	3.89	-9.44	58.01	Peak (NRB)	Vertical	151	0	--	--	Pass	
#3	6201.23	61.19	3.90	-8.91	56.18	Peak (NRB)	Vertical	151	0	--	--	Pass	
#4	11685.98	55.81	5.57	-4.44	56.94	Max Peak	Horizontal	194	319	74.0	-17.1	Pass	
#5	11685.98	41.55	5.57	-4.44	42.68	Max Avg	Horizontal	194	319	54.0	-11.3	Pass	
#6	17532.37	48.91	6.25	-0.88	54.28	Peak (NRB)	Horizontal	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

5150 - 5250 MHz

RW-9614-5359		Band-Edge Freq	Limit 74.0dB $\mu$ V/m	Limit 54.0dB $\mu$ V/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dB $\mu$ V/m	dB $\mu$ V/m	
10 MHz	5160.00	5150.00	73.73	52.85	2
20 MHz	5165.00	5150.00	71.06	52.83	1.5
40 MHz	5170.00	5150.00	69.76	52.83	2
80 MHz	5190.00	5150.00	67.11	53.87	-7

#### 5725 MHz Radiated Lower Band-Edge Emissions

RW-9614-5359		Band-Edge Freq	Limit 110.8 dB $\mu$ V/m	Limit 122.2dB $\mu$ V/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dB $\mu$ V/m	dB $\mu$ V/m	
10 MHz	5730.00	5725.00	105.48	113.09	28
20 MHz	5735.00	5725.00	93.52	97.42	28
40 MHz	5745.00	5725.00	65.21	99.50	20.5
80 MHz	5765.00	5725.00	68.16	90.90	18

#### 5850 MHz Radiated Higher Band-Edge Emissions

RW-9614-5359		Band-Edge Freq	Limit 122.2dB $\mu$ V/m	Limit 110.8dB $\mu$ V/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dB $\mu$ V/m	dB $\mu$ V/m	
10 MHz	5845.00	5850.00	119.04	105.66	28
20 MHz	5840.00	5850.00	110.27	106.29	28
40 MHz	5830.00	5850.00	101.43	67.59	20.5
80 MHz	5810.00	5850.00	92.26	66.74	18.5

Click on the links to view the data.

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**Equipment Configuration for Restricted Lower Band-Edge Emissions**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5160.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	2	<b>Tested By:</b>	JMH

**Test Measurement Results**

4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5146.99	35.94	3.68	34.11	73.73	Max Peak	Horizontal	168	0	74.0	-0.3	Pass	
#2	5150.00	15.07	3.67	34.11	52.85	Max Avg	Horizontal	168	0	54.0	-1.2	Pass	
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--	

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

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**Equipment Configuration for Restricted Lower Band-Edge Emissions**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	20 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5165.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	1.5	<b>Tested By:</b>	JMH

**Test Measurement Results**

4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5040.28	14.94	3.68	34.21	52.83	Max Avg	Horizontal	168	0	54.0	-1.2	Pass	
#2	5150.00	33.28	3.67	34.11	71.06	Max Peak	Horizontal	168	0	74.0	-2.9	Pass	
#3	5150.00	--	--	--	--	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 Lower Band-Edge Emissions**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	40 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5170.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	2	<b>Tested By:</b>	JMH

**Test Measurement Results**

4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5038.78	14.94	3.68	34.21	52.83	Max Avg	Horizontal	168	0	54.0	-1.2	Pass	
#2	5143.99	31.94	3.70	34.12	69.76	Max Peak	Horizontal	168	0	74.0	-4.2	Pass	
#3	5150.00	--	--	--	--	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 Lower Band-Edge Emissions**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	80 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5190.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	-7	<b>Tested By:</b>	JMH

**Test Measurement Results**

4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5150.00	16.09	3.67	34.11	53.87	Max Avg	Horizontal	168	0	54.0	-0.1	Pass	
#2	5150.00	29.33	3.67	34.11	67.11	Max Peak	Horizontal	168	0	74.0	-6.9	Pass	
#3	5150.00	--	--	--	--	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 5725 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5730.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

#### Test Measurement Results

5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5720.05	67.33	3.80	34.35	105.48	Max Avg	Horizontal	161	2	111.2	-5.7	Pass	
#2	5725.00	74.95	3.79	34.35	113.09	Max Avg	Horizontal	161	2	122.2	-9.1	Pass	
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

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#### Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	20 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5735.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

#### Test Measurement Results

5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5720.05	55.37	3.80	34.35	93.52	Max Avg	Horizontal	161	2	111.2	-17.7	Pass	
#2	5725.00	59.28	3.79	34.35	97.42	Max Avg	Horizontal	161	2	122.2	-24.8	Pass	
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

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#### Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	40 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5745.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	20.5	<b>Tested By:</b>	JMH

#### Test Measurement Results

5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5650.00	27.28	3.75	34.18	65.21	Max Avg	Horizontal	161	2	68.2	-3.0	Pass	
#2	5725.00	61.36	3.79	34.35	99.50	Max Avg	Horizontal	161	2	122.2	-22.7	Pass	
#3	5725.00	--	--	--	--	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 5725 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	80 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5765.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	18	<b>Tested By:</b>	JMH

#### Test Measurement Results

5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5650.00	30.23	3.75	34.18	68.16	Max Avg	Horizontal	161	2	68.2	-0.1	Pass	
#2	5725.00	52.76	3.79	34.35	90.90	Max Avg	Horizontal	161	2	122.2	-31.3	Pass	
#3	5725.00	--	--	--	--	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 5850 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5845.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

Test Measurement Results

5770.00 - 6000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5850.00	80.60	3.81	34.63	119.04	Max Avg	Horizontal	153	0	122.2	-3.2	Pass	
#3	5855.39	67.19	3.83	34.64	105.66	Max Avg	Horizontal	153	0	110.8	-5.1	Pass	
#2	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

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Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	20 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5840.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	28	<b>Tested By:</b>	JMH

Test Measurement Results

5770.00 - 6000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5850.00	71.83	3.81	34.63	110.27	Max Avg	Horizontal	153	0	122.2	-11.9	Pass	
#3	5855.39	67.82	3.83	34.64	106.29	Max Avg	Horizontal	153	0	110.8	-4.5	Pass	
#2	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

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#### Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	40 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5830.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	20.5	<b>Tested By:</b>	JMH

#### Test Measurement Results

5770.00 - 6000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5850.00	62.99	3.81	34.63	101.43	Max Avg	Horizontal	153	0	122.2	-20.8	Pass	
#3	5925.00	28.93	3.84	34.82	67.59	Max Avg	Horizontal	153	0	68.2	-0.6	Pass	
#2	5850.00	--	--	--	--	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 5850 MHz Radiated Band-Edge Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	80 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5810.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	18.5	<b>Tested By:</b>	JMH

#### Test Measurement Results

5770.00 - 6000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	5850.00	53.82	3.81	34.63	92.26	Max Avg	Horizontal	153	0	122.2	-30.0	Pass	
#3	5925.00	28.08	3.84	34.82	66.74	Max Avg	Horizontal	153	0	68.2	-1.5	Pass	
#2	5850.00	--	--	--	--	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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### 1.1.3. Colocation

Colocation: TX Spurious 1-18 GHz, 2462 and 5160 MHz

#### Equipment Configuration for Restricted Band Spurious Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	802.11
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2462, 5160	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	2462 MHz: 22, 5160 MHz: 2	<b>Tested By:</b>	JMH

#### Test Measurement Results

1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	2462.28	51.82	2.74	-11.67	42.89	Peak (NRB)	Vertical	151	263	--	--	Pass	
#2	3289.25	53.96	3.00	-11.18	45.78	Peak (NRB)	Horizontal	100	0	--	--	Pass	
#3	4799.91	56.10	3.52	-11.12	48.50	Max Peak	Horizontal	165	0	74.0	-25.5	Pass	
#4	4799.91	45.18	3.52	-11.12	37.58	Max Avg	Horizontal	165	0	54.0	-16.4	Pass	
#5	5163.09	70.93	3.70	-11.55	63.08	Fundamental	Horizontal	151	0	--	--		
#6	6880.05	57.11	4.10	-7.60	53.61	Peak (NRB)	Vertical	151	0	--	--	Pass	

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Colocation 5160 PS 2, 2462 PS 22

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Colocation: Band Edge 5150 MHz

**Equipment Configuration for 5150 MHz Radiated Band-Edge Emissions**

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	802.11
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2462, 5160	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	2462 MHz: 22, 5160 MHz: 2	<b>Tested By:</b>	JMH

**Test Measurement Results**

**4500.00 - 5250.00 MHz**

Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail
#1	5146.99	35.78	3.68	34.11	73.57	Max Peak	Horizontal	168	-1	74.0	-0.4	Pass
#2	5150.00	14.97	3.67	34.11	52.75	Max Avg	Horizontal	168	-1	54.0	-1.3	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Colocation 5160 PS 2, 2462 PS 22

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#### 1.1.4. Digital Emissions

Radiated Test Conditions for Radiated Digital Emissions (0.03 – 1 GHz)			
<b>Standard:</b>	FCC CFR 47:15.247	<b>Ambient Temp. (°C):</b>	20.0 - 24.5
<b>Test Heading:</b>	Digital Emissions	<b>Rel. Humidity (%):</b>	32 - 45
<b>Standard Section(s):</b>	15.209	<b>Pressure (mBars):</b>	999 - 1001
<b>Reference Document(s):</b>	See Normative References		

##### Test Procedure for Radiated Digital Emissions (0.03 – 1 GHz)

Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed.

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

##### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength

R = Measured Receiver Input Amplitude

AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss

AG = Amplifier Gain

For example:

Given a Receiver input reading of 51.5dBmV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3\text{dBmV/m}$$

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are done as:

$$\text{Level (dBmV/m)} = 20 * \text{Log}(\text{level (mV/m)})$$

$$40 \text{ dBmV/m} = 100\text{mV/m}$$

$$48 \text{ dBmV/m} = 250\text{mV/m}$$

##### Limits for Radiated Digital Emissions (0.03 – 1 GHz) (15.209)

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength		Measurement Distance (m)
	µV/m (microvolts/meter)	dBµV/m (dB microvolts/meter)	
0.009-0.490	2400/F(kHz)	--	300

---

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0.490-1.705	24000/F(kHz)	--	30
1.705-30.0	30	29.5	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46.0	3
Above 960	500	54.0	3

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges. (c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. (e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part. (f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device. (g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.



**Title:** Radwin Outdoor Subscriber Radio Unit  
**To:** FCC CFR 47 Part 15 Subpart E 15.407  
**Serial #:** RDWN45-U3-Radiated Rev A non DFS  
**Issue Date:** 6<sup>th</sup> April 2017  
**Page:** 30 of 53

#### Equipment Configuration for Digital Emissions

<b>Antenna:</b>	RW-9614-5359	<b>Variant:</b>	10 MHz
<b>Antenna Gain (dBi):</b>	23.00	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	5160.00	<b>Data Rate:</b>	15.00 MBit/s
<b>Power Setting:</b>	2	<b>Tested By:</b>	JMH

#### Test Measurement Results

30.00 - 1000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
#1	43.70	55.85	3.53	-20.36	39.02	MaxQP	Vertical	144	7	40.0	-1.0	Pass	
#2	49.30	57.67	3.57	-23.14	38.10	MaxQP	Vertical	101	47	40.0	-1.9	Pass	
#3	71.65	56.03	3.72	-23.08	36.67	MaxQP	Vertical	102	165	40.0	-3.3	Pass	
#4	82.44	49.46	3.79	-23.86	29.39	MaxQP	Horizontal	306	166	40.0	-10.6	Pass	
#5	94.21	57.30	3.85	-22.74	38.41	MaxQP	Vertical	132	142	43.0	-4.6	Pass	
#6	107.82	43.95	3.92	-19.22	28.65	MaxQP	Vertical	104	234	43.0	-14.4	Pass	

Test Notes: EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Transmitting at 5160 MHz

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**Title:** Radwin Outdoor Subscriber Radio Unit  
**To:** FCC CFR 47 Part 15 Subpart E 15.407  
**Serial #:** RDWN45-U3-Radiated Rev A non DFS  
**Issue Date:** 6<sup>th</sup> April 2017  
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## **A. APPENDIX - GRAPHICAL IMAGES**

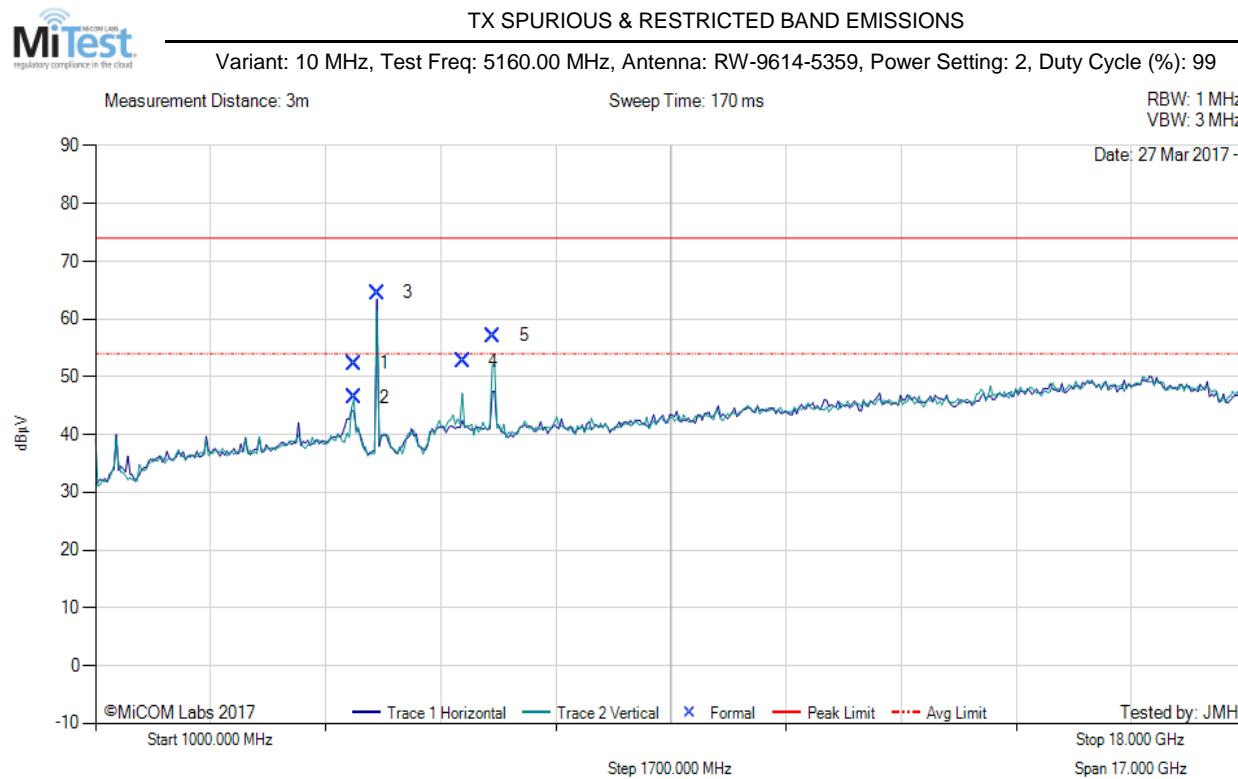
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## A.1. Radiated

### A.1.1. TX Spurious & Restricted Band Emissions

#### A.1.1.1. RW-9614-5359



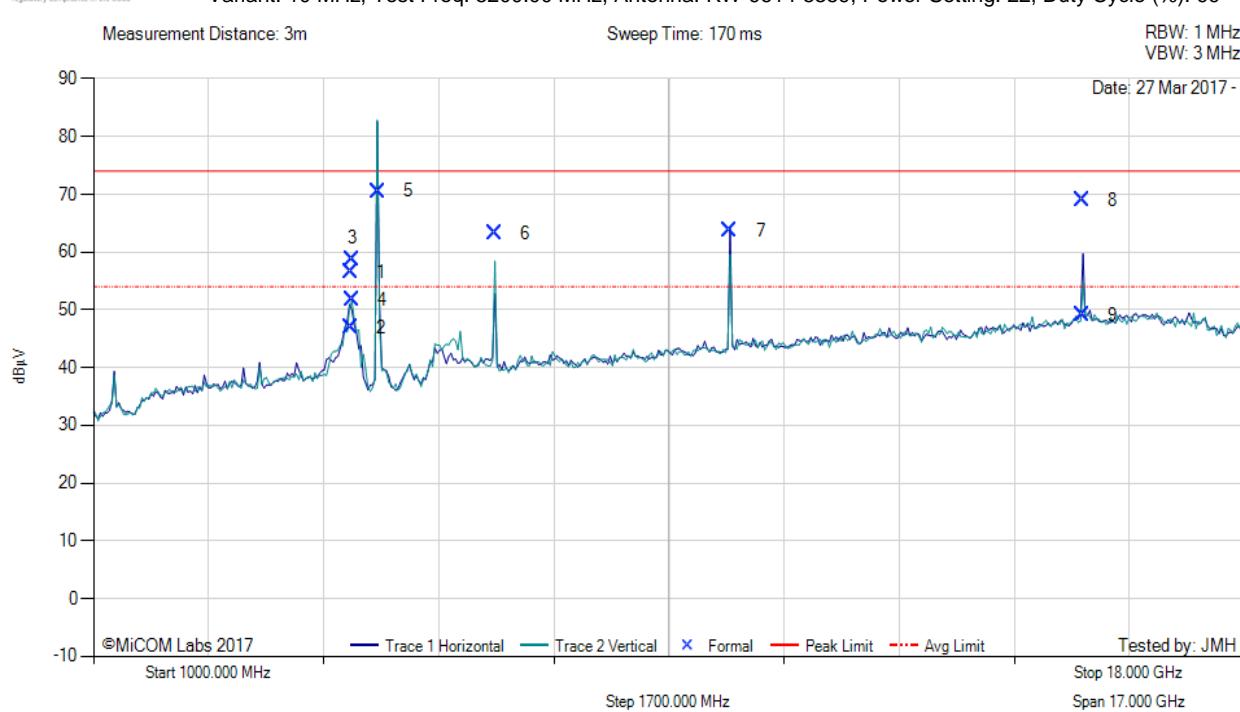
1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail	
1	4823.94	59.89	3.54	-11.15	52.28	Max Peak	Vertical	176	358	74.0	-21.7	Pass	
2	4823.94	54.12	3.54	-11.15	46.51	Max Avg	Vertical	176	358	54.0	-7.5	Pass	
3	5162.43	72.38	3.69	-11.55	64.52	Fundamental	Horizontal	151	0	--	--		
4	6431.98	56.71	3.99	-7.99	52.71	Peak (NRB)	Vertical	151	0	--	--	Pass	
5	6879.96	60.65	4.10	-7.61	57.14	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



1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	4800.07	64.10	3.52	-11.12	56.50	Max Peak	Vertical	173	0	74.0	-17.5	Pass	
2	4800.07	54.56	3.52	-11.12	46.96	Max Avg	Vertical	173	0	54.0	-7.0	Pass	
3	4824.02	66.37	3.54	-11.15	58.76	Max Peak	Vertical	169	0	74.0	-15.2	Pass	
4	4824.02	59.29	3.54	-11.15	51.68	Max Avg	Vertical	169	0	54.0	-2.3	Pass	
5	5202.78	78.30	3.65	-11.45	70.50	Fundamental	Vertical	100	0	--	--		
6	6933.42	66.64	4.11	-7.49	63.26	Peak (NRB)	Vertical	151	0	--	--	Pass	
7	10402.81	63.24	5.42	-5.02	63.64	Peak (NRB)	Horizontal	151	0	--	--	Pass	
8	15607.62	63.16	6.01	-0.20	68.97	Max Peak	Horizontal	177	357	74.0	-5.0	Pass	
9	15607.62	43.22	6.01	-0.20	49.03	Max Avg	Horizontal	177	357	54.0	-5.0	Pass	

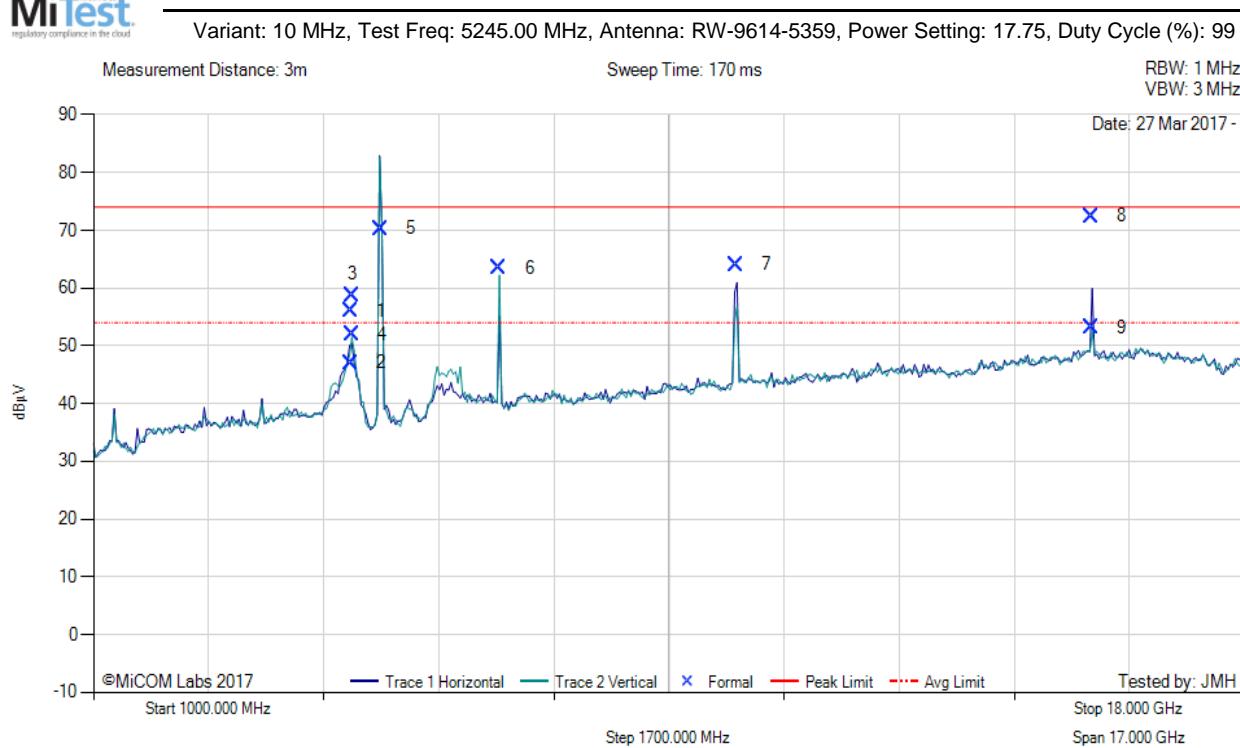
**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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### TX SPURIOUS & RESTRICTED BAND EMISSIONS



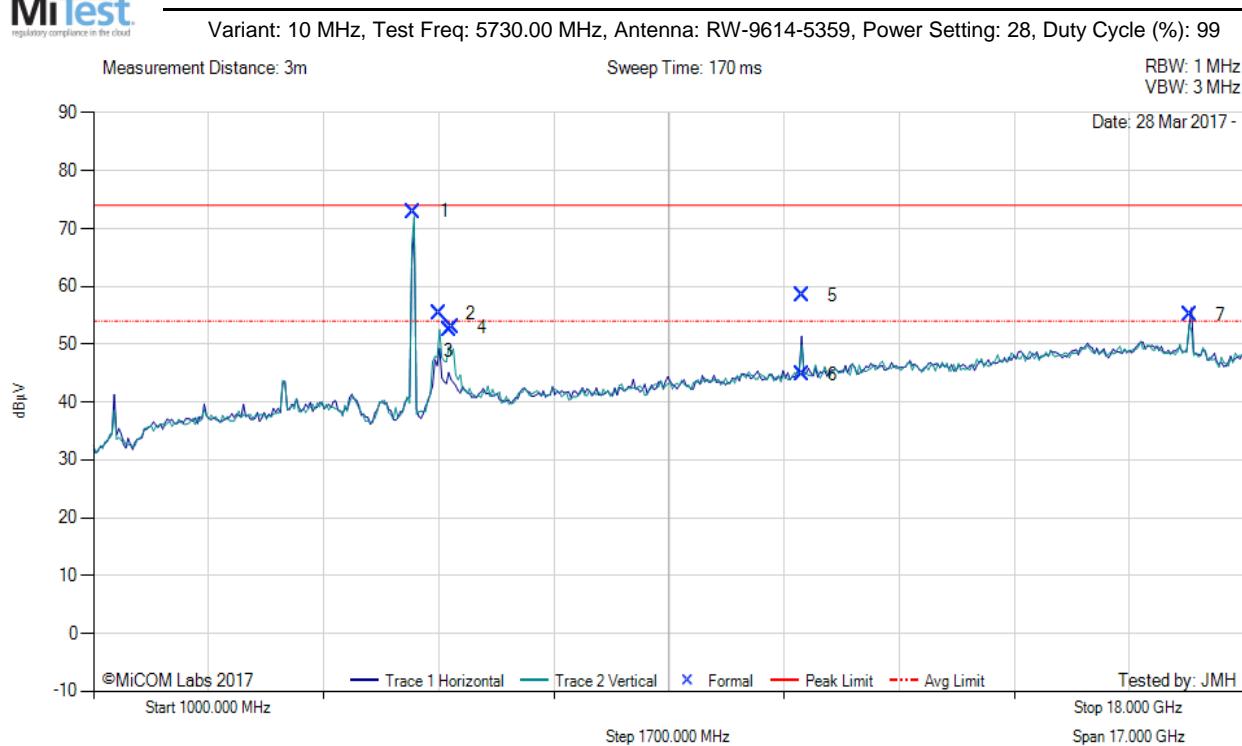
1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	4799.94	63.57	3.52	-11.12	55.97	Max Peak	Vertical	175	0	74.0	-18.0	Pass	
2	4799.94	54.67	3.52	-11.12	47.07	Max Avg	Vertical	175	0	54.0	-6.9	Pass	
3	4824.01	66.37	3.54	-11.15	58.76	Max Peak	Vertical	169	1	74.0	-15.2	Pass	
4	4824.01	59.52	3.54	-11.15	51.91	Max Avg	Vertical	169	1	54.0	-2.1	Pass	
5	5242.69	78.04	3.63	-11.36	70.31	Fundamental	Horizontal	100	0	--	--		
6	6993.40	66.74	4.12	-7.45	63.41	Peak (NRB)	Vertical	151	0	--	--	Pass	
7	10489.85	62.96	5.45	-4.39	64.02	Peak (NRB)	Horizontal	151	0	--	--	Pass	
8	15731.94	66.20	6.05	0.16	72.41	Max Peak	Horizontal	166	358	74.0	-1.6	Pass	
9	15731.94	46.97	6.05	0.16	53.18	Max Avg	Horizontal	166	358	54.0	-0.8	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



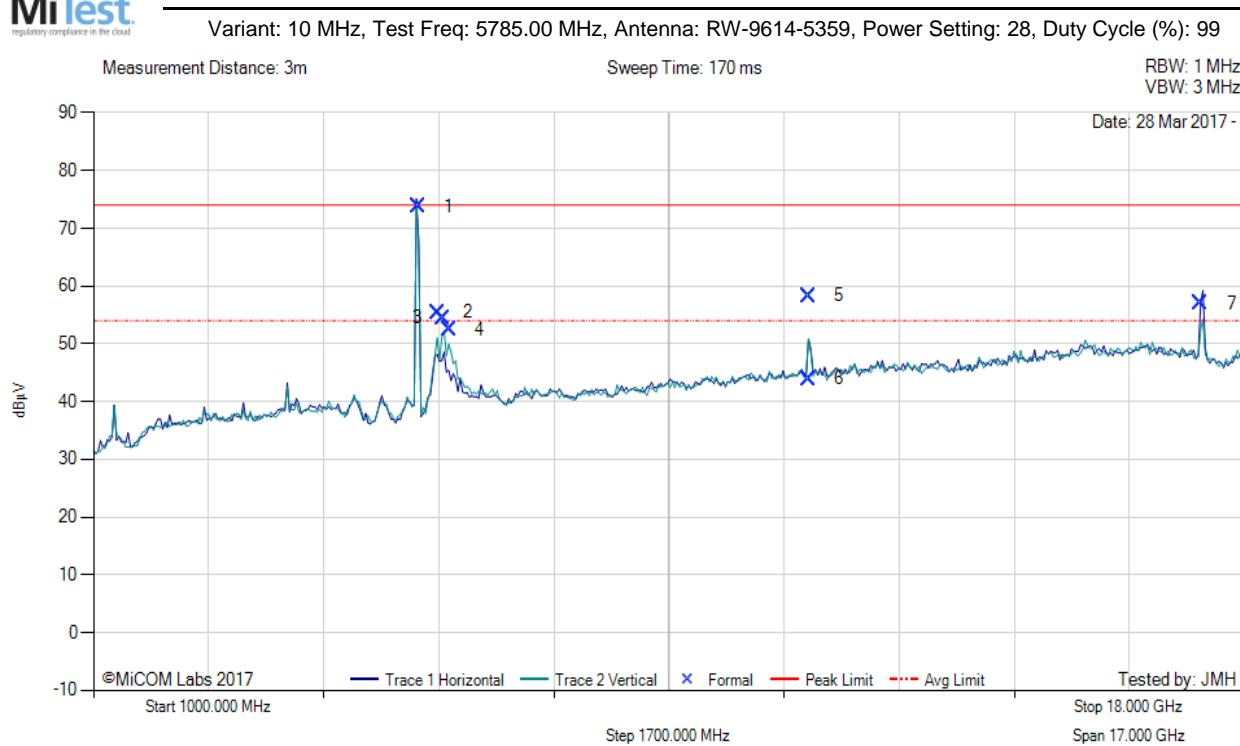
1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5728.36	79.81	3.79	-10.71	72.89	Fundamental	Vertical	151	0	--	--		
2	6111.38	60.93	3.90	-9.44	55.39	Peak (NRB)	Vertical	151	0	--	--	Pass	
3	6249.52	57.03	3.93	-8.57	52.39	Peak (NRB)	Vertical	151	0	--	--	Pass	
4	6299.92	57.37	3.96	-8.43	52.90	Peak (NRB)	Vertical	151	0	--	--	Pass	
5	11460.63	57.78	5.52	-4.89	58.41	Max Peak	Horizontal	144	248	74.0	-15.6	Pass	
6	11460.63	44.20	5.52	-4.89	44.83	Max Avg	Horizontal	144	248	54.0	-9.2	Pass	
7	17190.75	48.43	6.18	0.41	55.02	Peak (NRB)	Horizontal	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



1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5788.44	80.46	3.79	-10.43	73.82	Fundamental	Horizontal	129	0	--	--		
2	6076.15	61.19	3.87	-9.59	55.47	Peak (NRB)	Vertical	151	0	--	--	Pass	
3	6169.72	59.61	3.93	-9.09	54.45	Peak (NRB)	Vertical	151	0	--	--	Pass	
4	6254.70	57.07	3.94	-8.55	52.46	Peak (NRB)	Vertical	151	0	--	--	Pass	
5	11566.23	57.42	5.52	-4.65	58.29	Max Peak	Horizontal	170	323	74.0	-15.7	Pass	
6	11566.23	43.10	5.52	-4.65	43.97	Max Avg	Horizontal	170	323	54.0	-10.0	Pass	
7	17357.46	50.73	6.28	-0.03	56.98	Peak (NRB)	Horizontal	200	0	--	--	Pass	

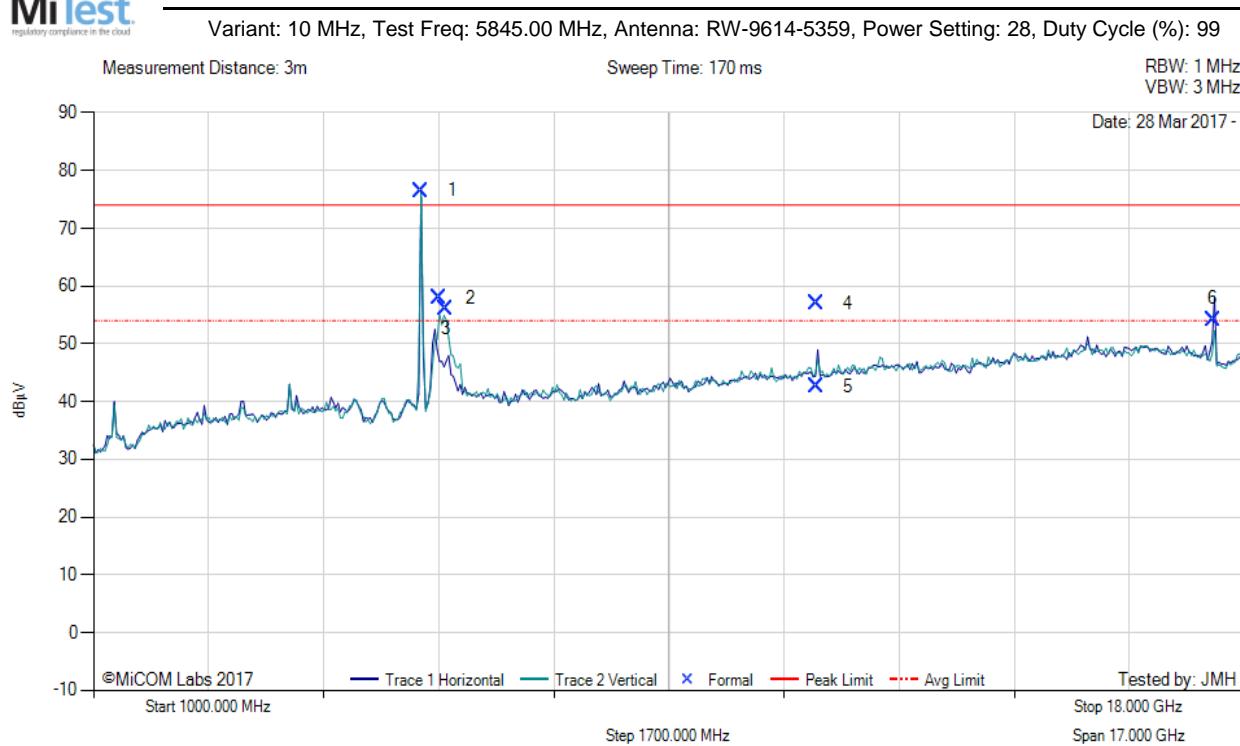
**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber

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### TX SPURIOUS & RESTRICTED BAND EMISSIONS



1000.00 - 18000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5843.13	82.83	3.84	-10.17	76.50	Fundamental	Vertical	151	0	--	--		
2	6110.50	63.56	3.89	-9.44	58.01	Peak (NRB)	Vertical	151	0	--	--	Pass	
3	6201.23	61.19	3.90	-8.91	56.18	Peak (NRB)	Vertical	151	0	--	--	Pass	
4	11685.98	55.81	5.57	-4.44	56.94	Max Peak	Horizontal	194	319	74.0	-17.1	Pass	
5	11685.98	41.55	5.57	-4.44	42.68	Max Avg	Horizontal	194	319	54.0	-11.3	Pass	
6	17532.37	48.91	6.25	-0.88	54.28	Peak (NRB)	Horizontal	151	0	--	--	Pass	

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

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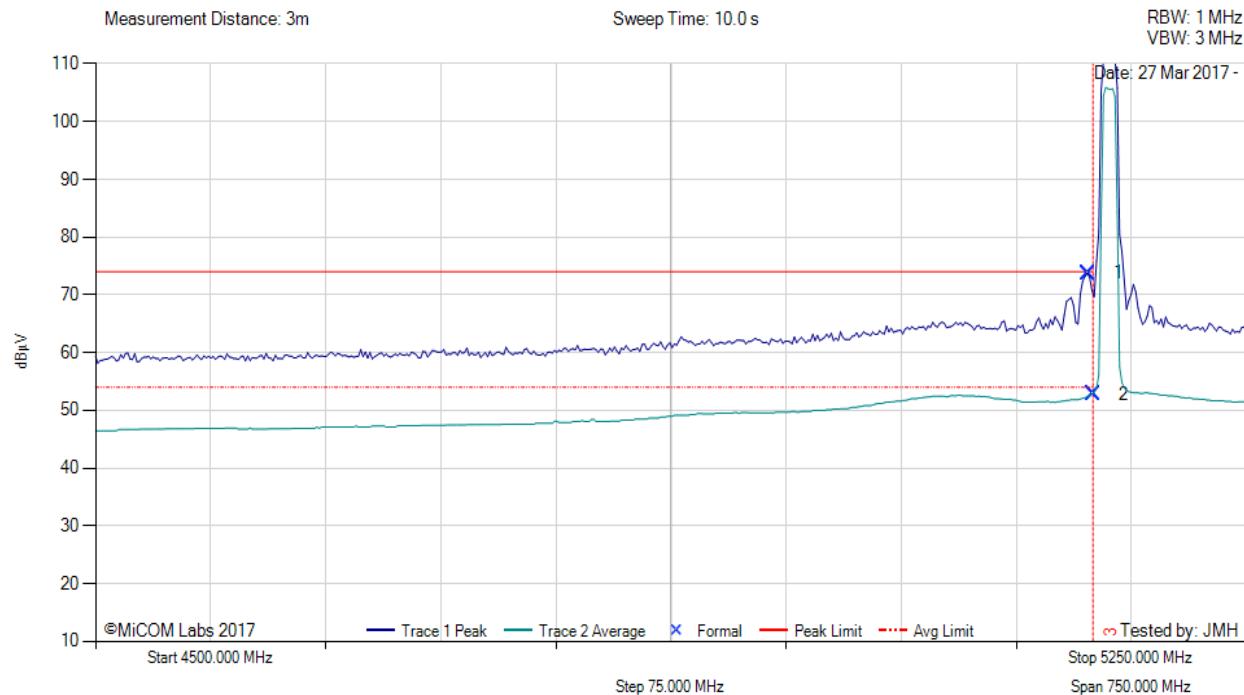
### A.1.2. Restricted Edge & Band-Edge Emissions

#### A.1.2.2. RW-9614-5359



#### RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 10 MHz, Test Freq: 5160.00 MHz, Antenna: RW-9614-5359, Power Setting: 2, Duty Cycle (%): 99



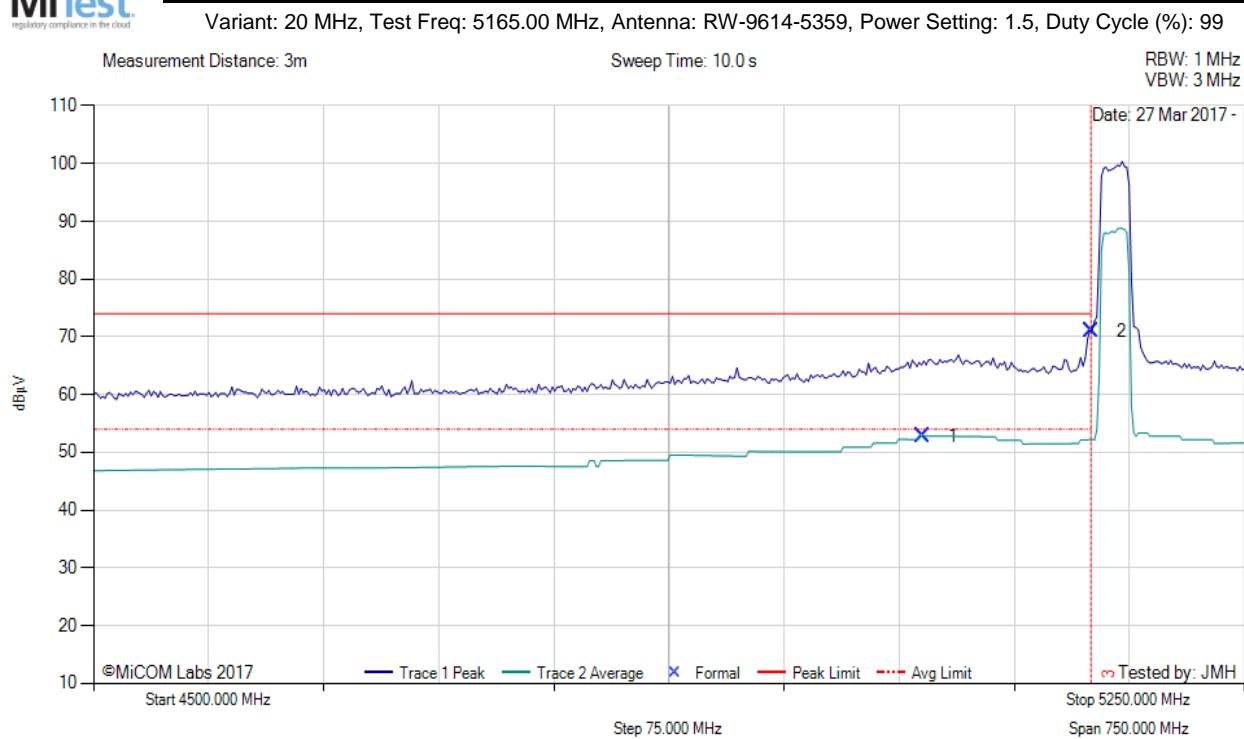
4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5146.99	35.94	3.68	34.11	73.73	Max Peak	Horizontal	168	0	74.0	-0.3	Pass	
2	5150.00	15.07	3.67	34.11	52.85	Max Avg	Horizontal	168	0	54.0	-1.2	Pass	
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--	

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

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### RESTRICTED LOWER BAND-EDGE EMISSIONS



4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5040.028	14.94	3.68	34.21	52.83	Max Avg	Horizontal	168	0	54.0	-1.2	Pass	
2	5150.00	33.28	3.67	34.11	71.06	Max Peak	Horizontal	168	0	74.0	-2.9	Pass	
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--	

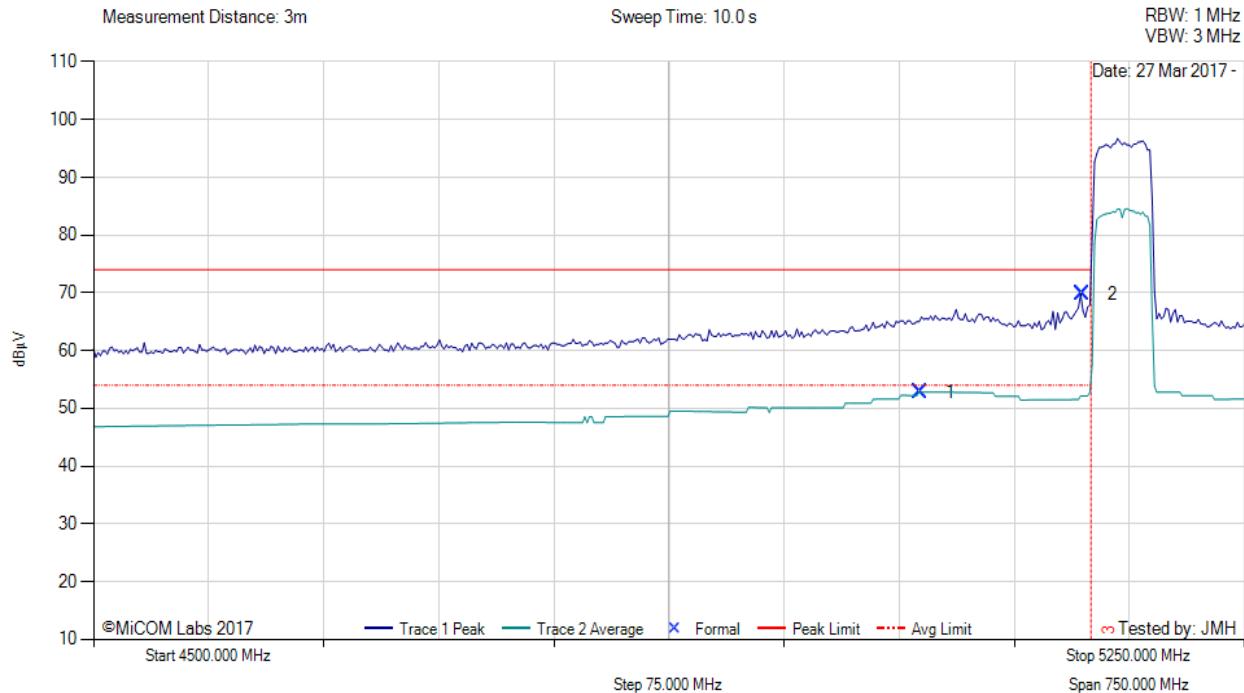
**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Power reduced to meet band edge limit.

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### RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40 MHz, Test Freq: 5170.00 MHz, Antenna: RW-9614-5359, Power Setting: 2, Duty Cycle (%): 99



4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5038.78	14.94	3.68	34.21	52.83	Max Avg	Horizontal	168	0	54.0	-1.2	Pass	
2	5143.99	31.94	3.70	34.12	69.76	Max Peak	Horizontal	168	0	74.0	-4.2	Pass	
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--	

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

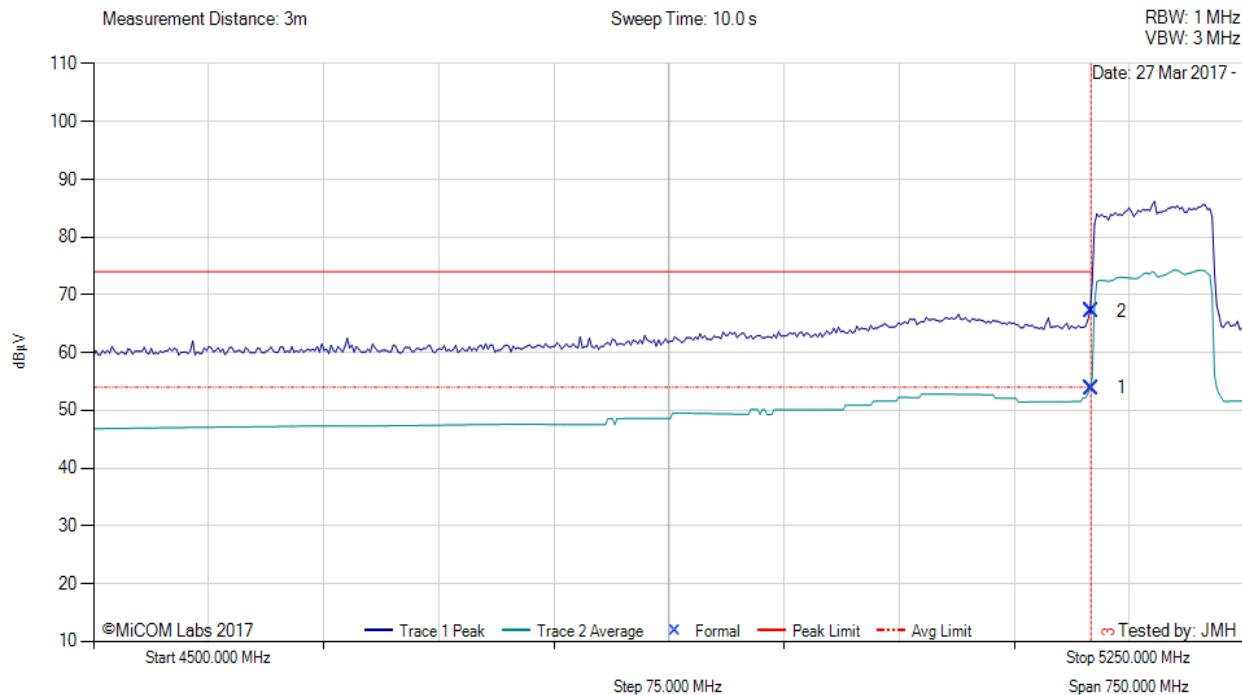
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### RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80 MHz, Test Freq: 5190.00 MHz, Antenna: RW-9614-5359, Power Setting: -7, Duty Cycle (%): 99



4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5150.00	16.09	3.67	34.11	53.87	Max Avg	Horizontal	168	0	54.0	-0.1	Pass	
2	5150.00	29.33	3.67	34.11	67.11	Max Peak	Horizontal	168	0	74.0	-6.9	Pass	
3	5150.00	--	--	--	--	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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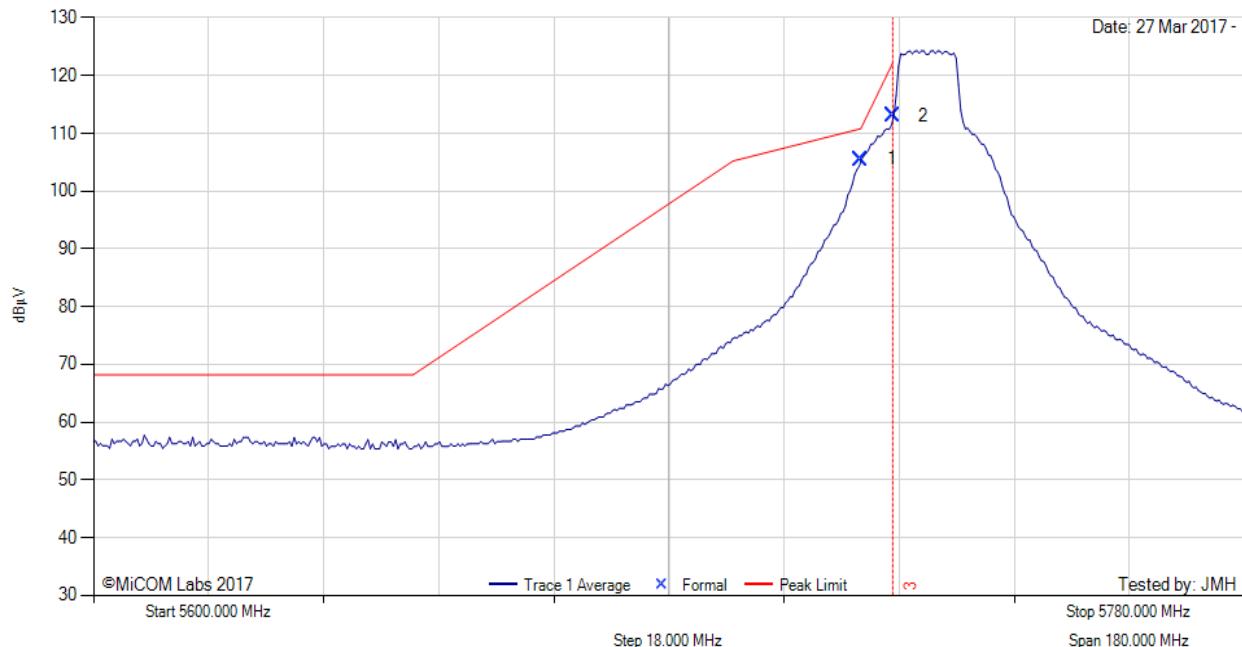
5725 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 10 MHz, Test Freq: 5730.00 MHz, Antenna: RW-9614-5359, Power Setting: 28, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 10.0 s

RBW: 1 MHz  
VBW: 3 MHz



5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5720.05	67.33	3.80	34.35	105.48	Max Avg	Horizontal	161	2	111.2	-5.7	Pass	
2	5725.00	74.95	3.79	34.35	113.09	Max Avg	Horizontal	161	2	122.2	-9.1	Pass	
3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

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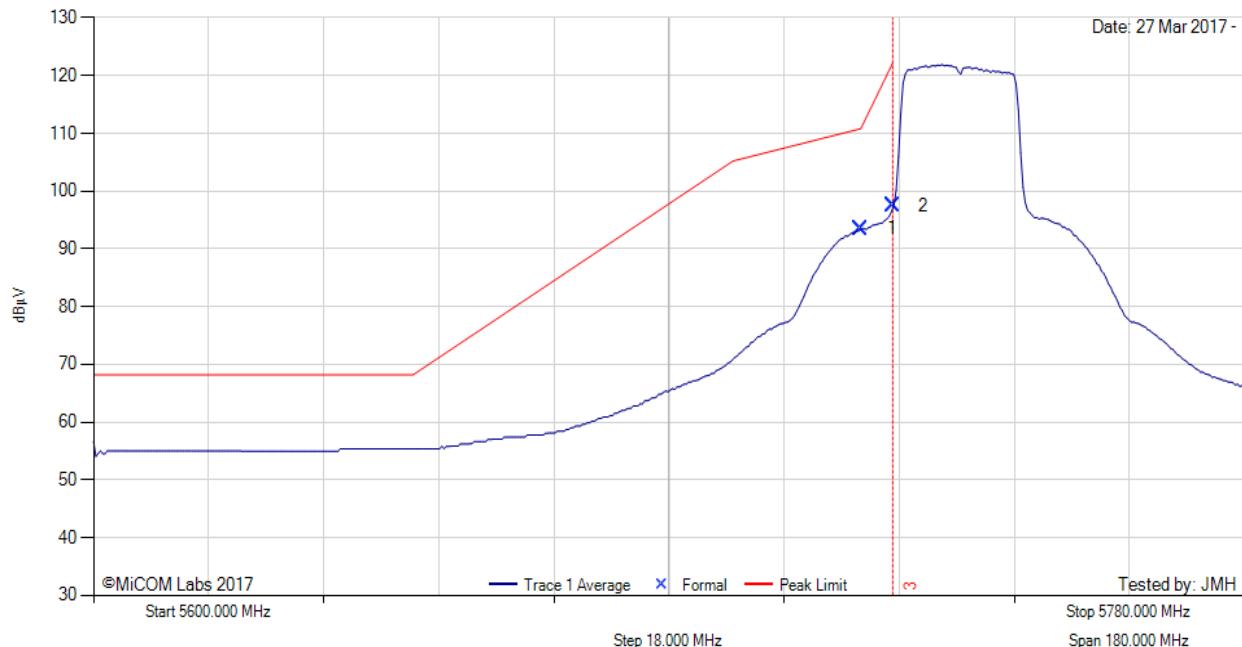
### 5725 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5735.00 MHz, Antenna: RW-9614-5359, Power Setting: 28, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 10.0 s

RBW: 1 MHz  
VBW: 3 MHz



5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5720.05	55.37	3.80	34.35	93.52	Max Avg	Horizontal	161	2	111.2	-17.7	Pass	
2	5725.00	59.28	3.79	34.35	97.42	Max Avg	Horizontal	161	2	122.2	-24.8	Pass	
3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

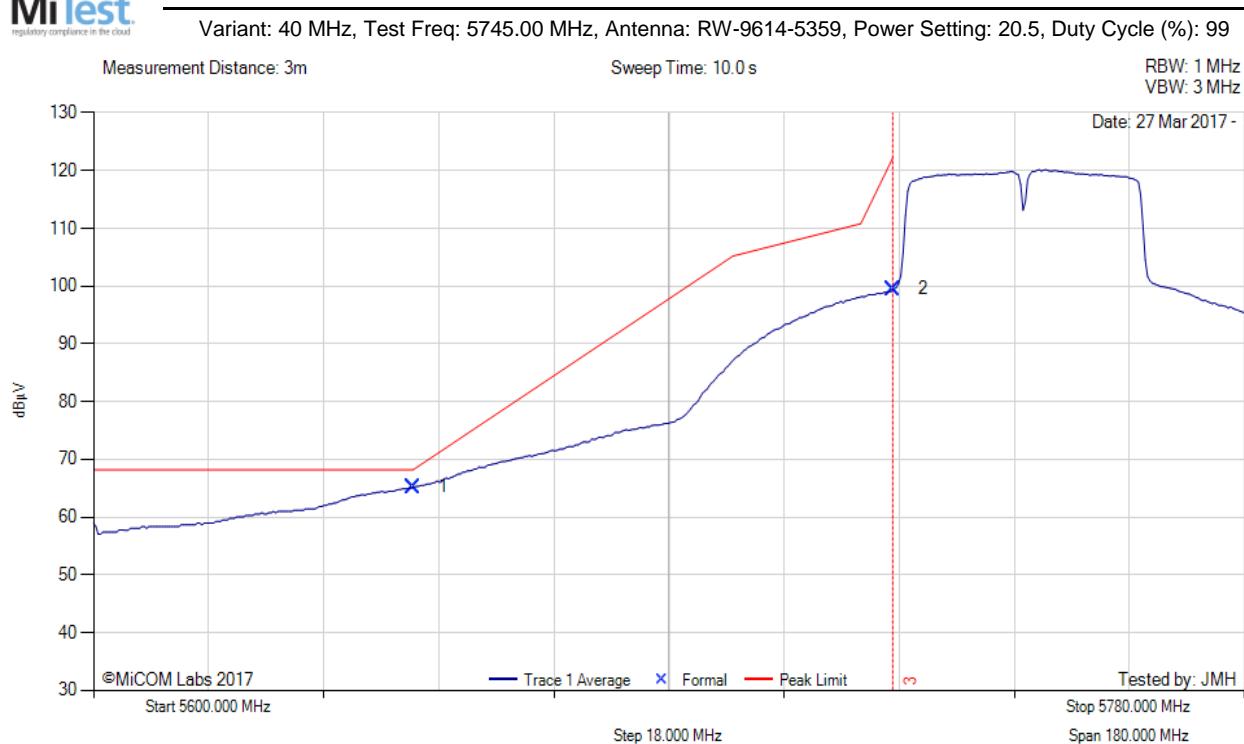
**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber

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### 5725 MHz RADIATED BAND-EDGE EMISSIONS



5600.00 - 5780.00 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	5650.00	27.28	3.75	34.18	65.21	Max Avg	Horizontal	161	2	68.2	-3.0	Pass	
2	5725.00	61.36	3.79	34.35	99.50	Max Avg	Horizontal	161	2	122.2	-22.7	Pass	
3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

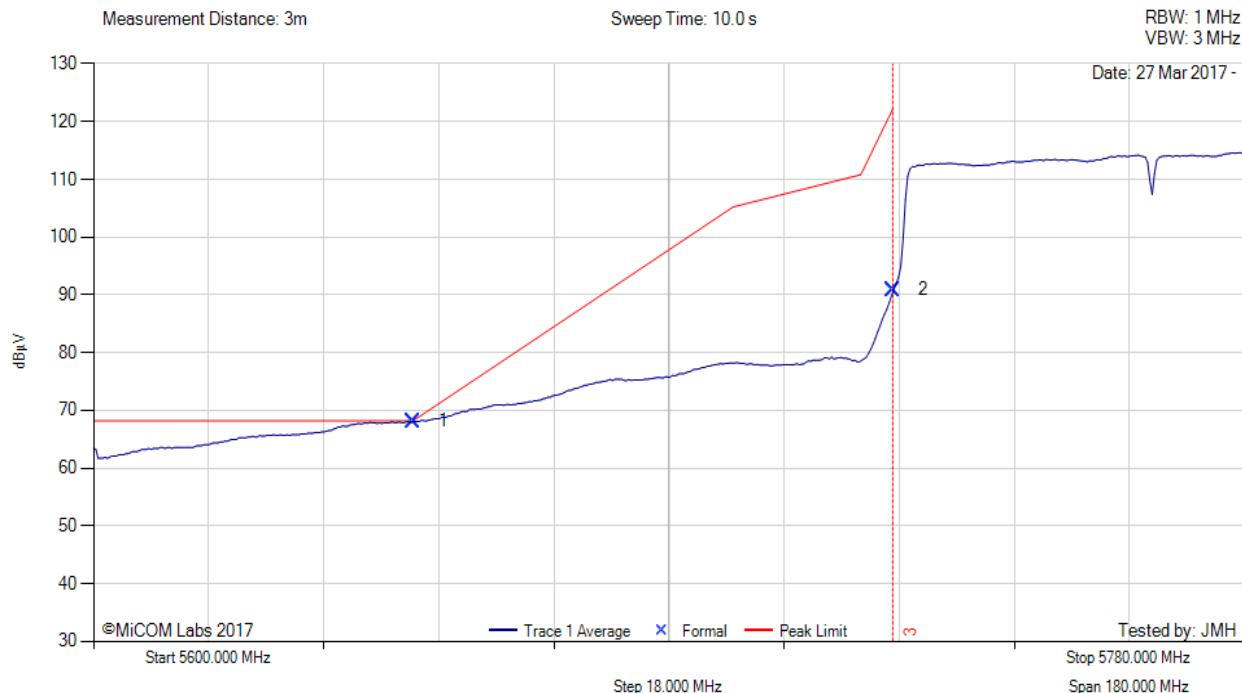
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### 5725 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 80 MHz, Test Freq: 5765.00 MHz, Antenna: RW-9614-5359, Power Setting: 18, Duty Cycle (%): 99



5600.00 - 5780.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5650.00	30.23	3.75	34.18	68.16	Max Avg	Horizontal	161	2	68.2	-0.1	Pass	
2	5725.00	52.76	3.79	34.35	90.90	Max Avg	Horizontal	161	2	122.2	-31.3	Pass	
3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

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

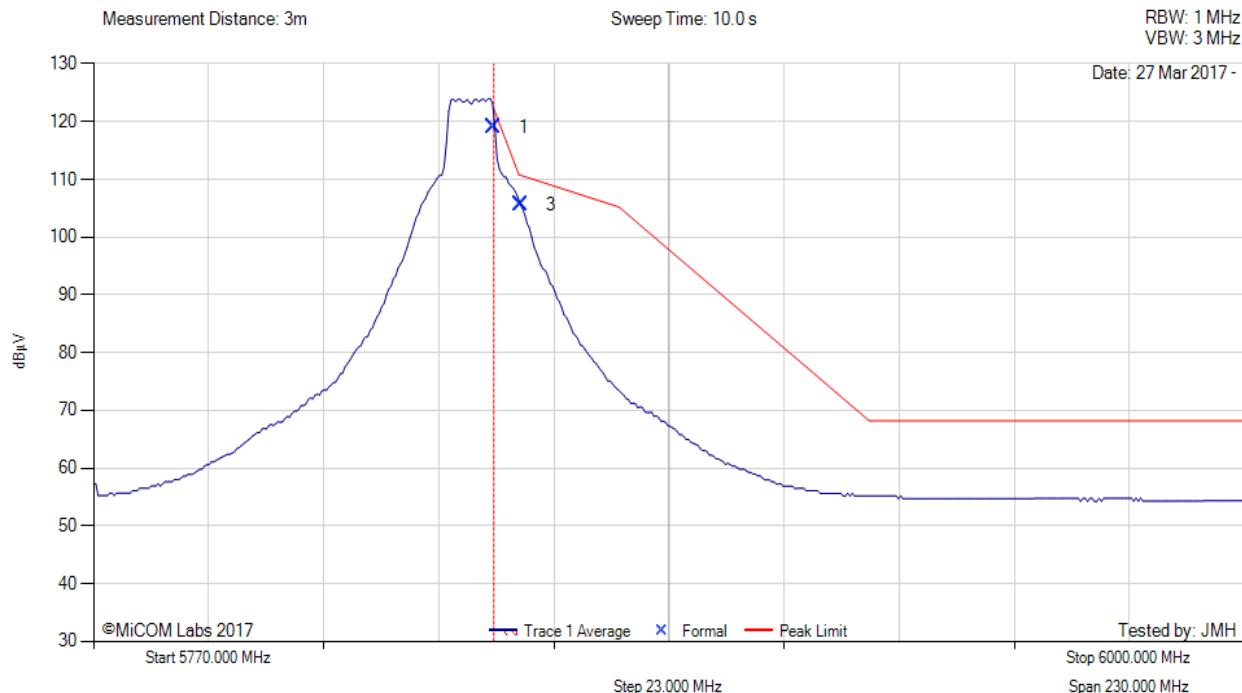
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### 5850 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 10 MHz, Test Freq: 5845.00 MHz, Antenna: RW-9614-5359, Power Setting: 28, Duty Cycle (%): 99



5770.00 - 6000.00 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	5850.00	80.60	3.81	34.63	119.04	Max Avg	Horizontal	153	0	122.2	-3.2	Pass		
3	5855.39	67.19	3.83	34.64	105.66	Max Avg	Horizontal	153	0	110.8	-5.1	Pass		
2	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--		

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

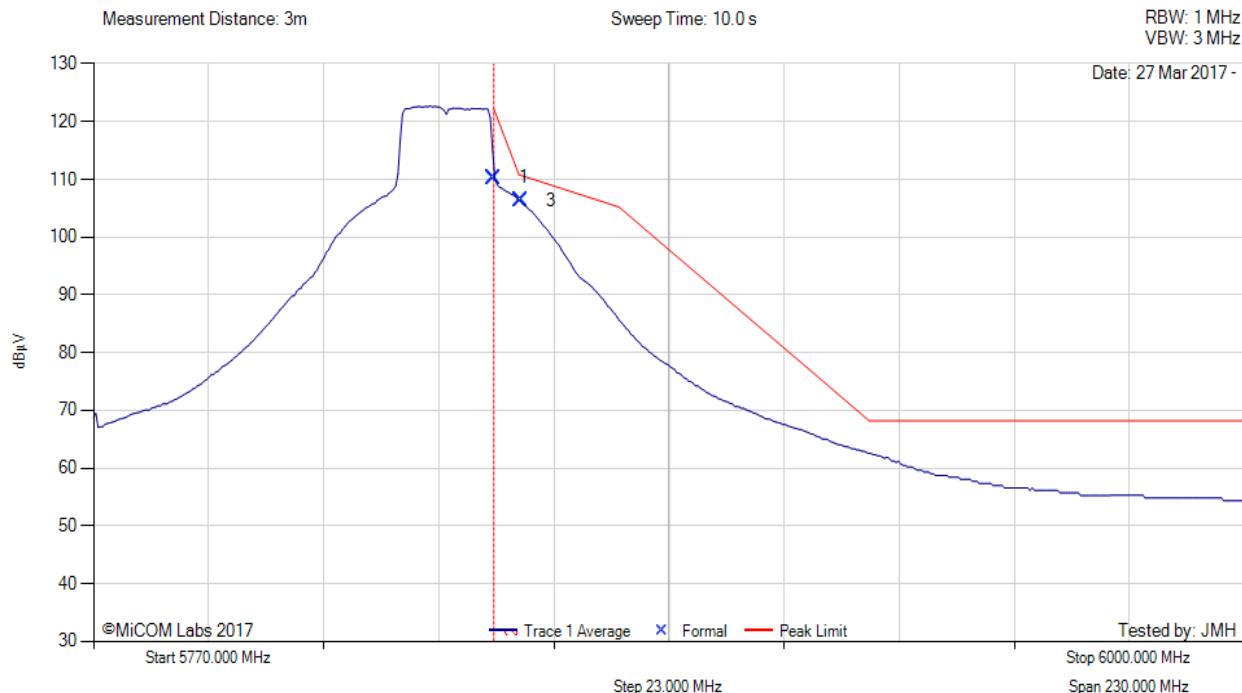
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### 5850 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5840.00 MHz, Antenna: RW-9614-5359, Power Setting: 28, Duty Cycle (%): 99



5770.00 - 6000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5850.00	71.83	3.81	34.63	110.27	Max Avg	Horizontal	153	0	122.2	-11.9	Pass	
3	5855.39	67.82	3.83	34.64	106.29	Max Avg	Horizontal	153	0	110.8	-4.5	Pass	
2	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--	

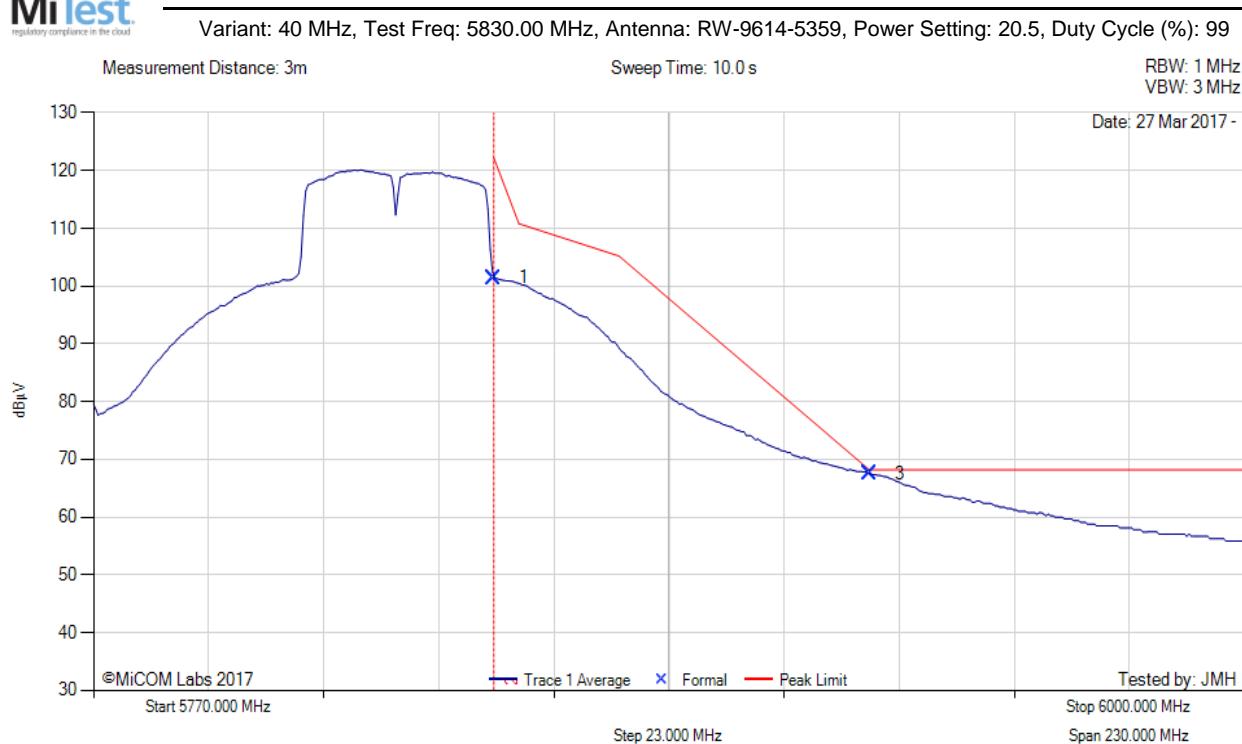
**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber.

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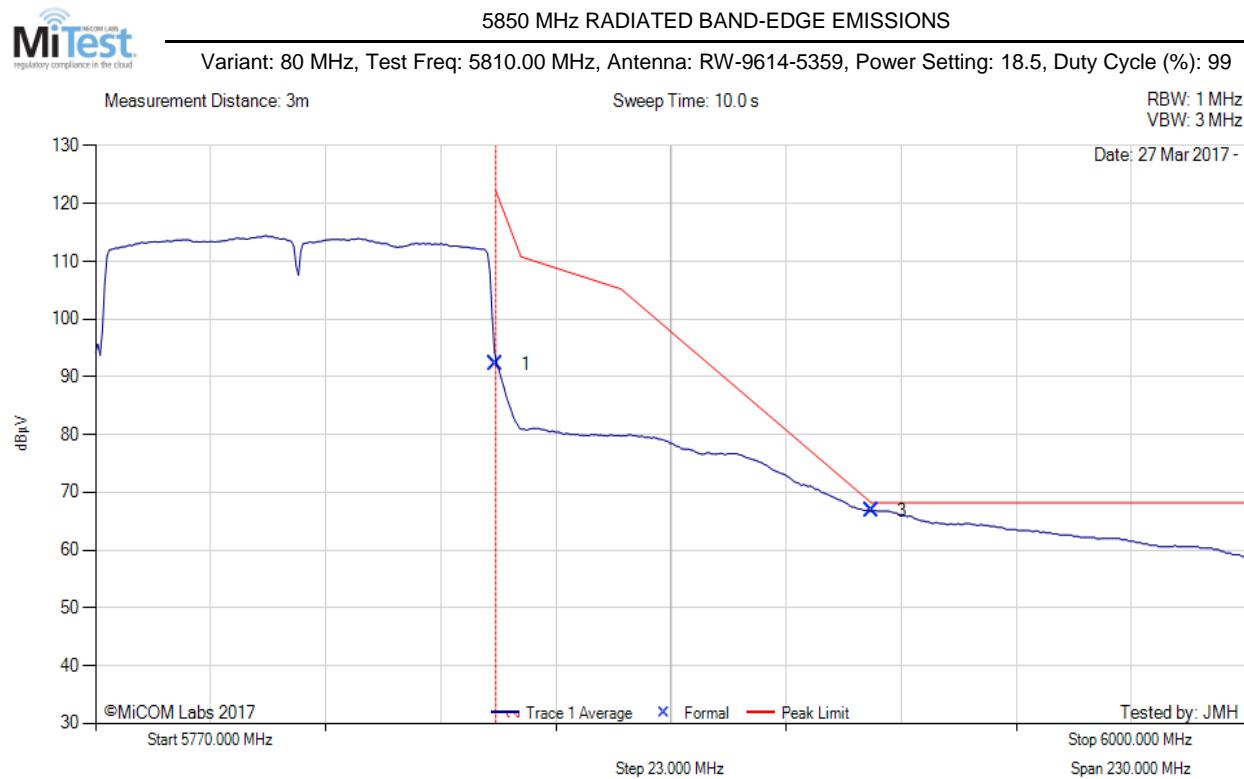
### 5850 MHz RADIATED BAND-EDGE EMISSIONS



5770.00 - 6000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	5850.00	62.99	3.81	34.63	101.43	Max Avg	Horizontal	153	0	122.2	-20.8	Pass	
3	5925.00	28.93	3.84	34.82	67.59	Max Avg	Horizontal	153	0	68.2	-0.6	Pass	
2	5850.00	--	--	--	--	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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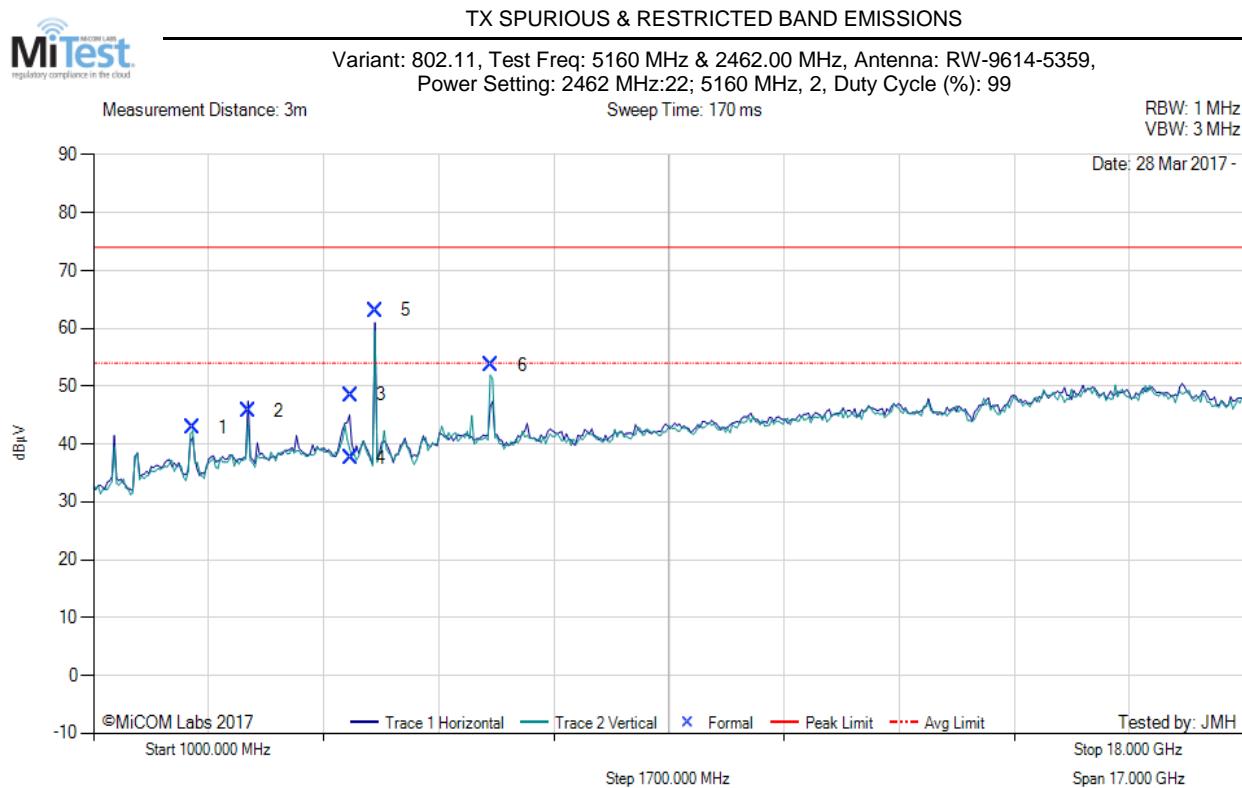
5770.00 - 6000.00 MHz												
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail
1	5850.00	53.82	3.81	34.63	92.26	Max Avg	Horizontal	153	0	122.2	-30.0	Pass
3	5925.00	28.08	3.84	34.82	66.74	Max Avg	Horizontal	153	0	68.2	-1.5	Pass
2	5850.00	--	--	--	--	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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### A.1.3. Colocation

Colocation: TX Spurious 1-18GHz



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	2462.28	51.82	2.74	-11.67	42.89	Peak (NRB)	Vertical	151	263	--	--	Pass	
2	3289.25	53.96	3.00	-11.18	45.78	Peak (NRB)	Horizontal	100	0	--	--	Pass	
3	4799.91	56.10	3.52	-11.12	48.50	Max Peak	Horizontal	165	0	74.0	-25.5	Pass	
4	4799.91	45.18	3.52	-11.12	37.58	Max Avg	Horizontal	165	0	54.0	-16.4	Pass	
5	5163.09	70.93	3.70	-11.55	63.08	Fundamental	Horizontal	151	0	--	--		
6	6880.05	57.11	4.10	-7.60	53.61	Peak (NRB)	Vertical	151	0	--	--	Pass	

**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Colocation 5160 PS 2, 2462 PS 22

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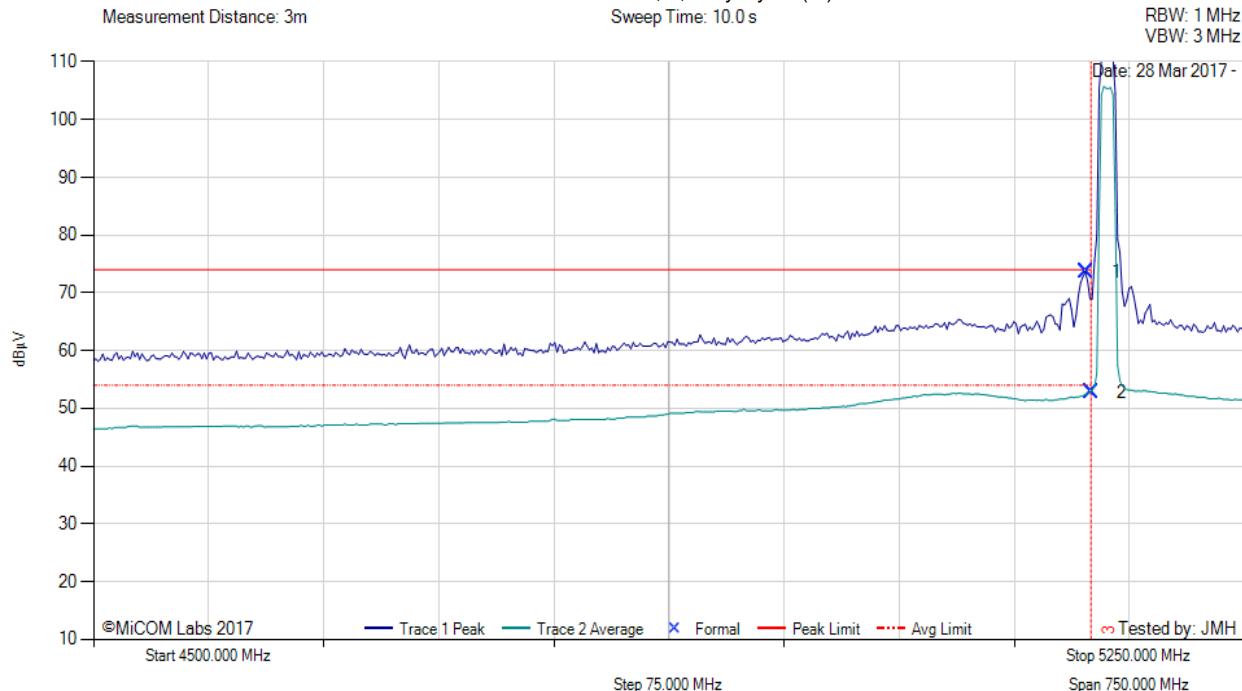
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Colocation: Band Edge 5150 MHz



TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11, Test Freq: 5160 MHz & 2462.00 MHz, Antenna: RW-9614-5359, Power Setting: 2462 MHz :22; 5160 MHz, 2, Duty Cycle (%): 99



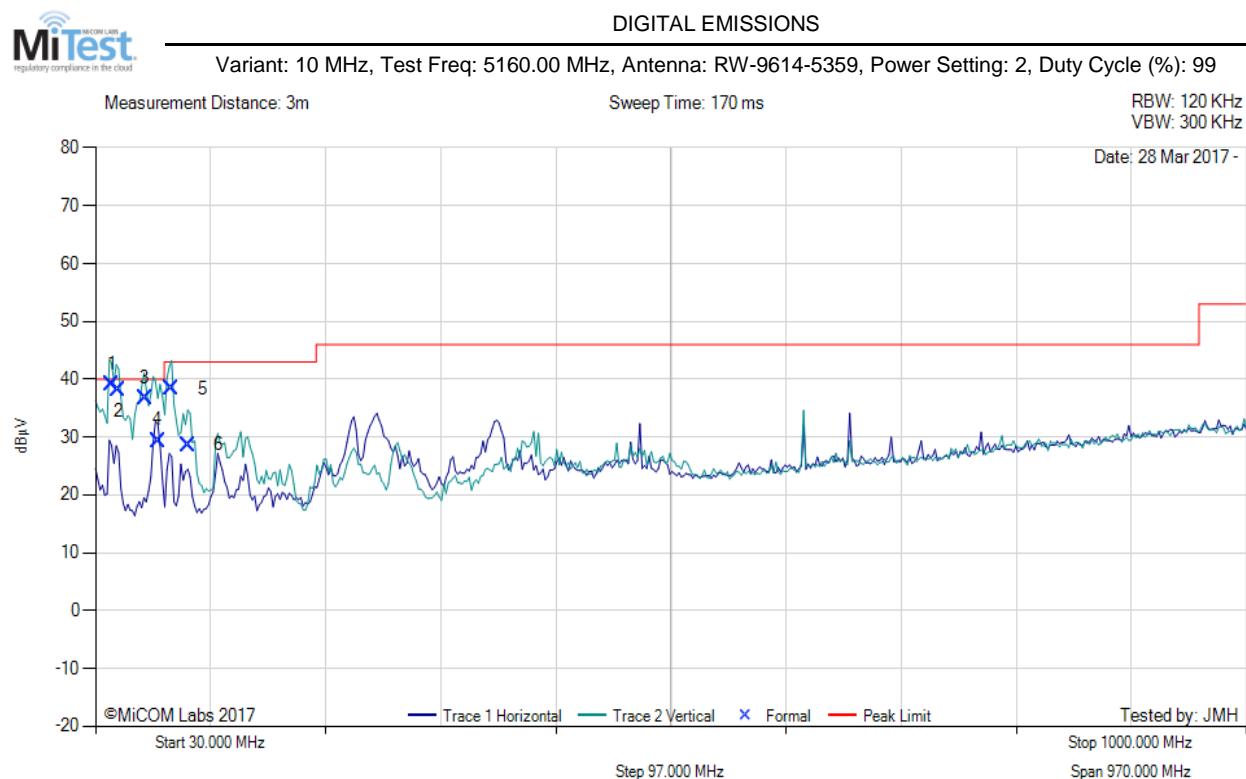
4500.00 - 5250.00 MHz													
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail	
1	5146.99	35.78	3.68	34.11	73.57	Max Peak	Horizontal	168	-1	74.0	-0.4	Pass	
2	5150.00	14.97	3.67	34.11	52.75	Max Avg	Horizontal	168	-1	54.0	-1.3	Pass	
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--	

**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Colocation 5160 MHz PS 2, 2462 MHz PS 22

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#### A.1.4. Digital Emissions



30.00 - 1000.00 MHz													
Num	Frequency MHz	Raw dB $\mu$ V	Cable Loss dB	AF dB	Level dB $\mu$ V/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dB $\mu$ V/m	Margin dB	Pass /Fail	
1	43.70	55.85	3.53	-20.36	39.02	MaxQP	Vertical	144	7	40.0	-1.0	Pass	
2	49.30	57.67	3.57	-23.14	38.10	MaxQP	Vertical	101	47	40.0	-1.9	Pass	
3	71.65	56.03	3.72	-23.08	36.67	MaxQP	Vertical	102	165	40.0	-3.3	Pass	
4	82.44	49.46	3.79	-23.86	29.39	MaxQP	Horizontal	306	166	40.0	-10.6	Pass	
5	94.21	57.30	3.85	-22.74	38.41	MaxQP	Vertical	132	142	43.0	-4.6	Pass	
6	107.82	43.95	3.92	-19.22	28.65	MaxQP	Vertical	104	234	43.0	-14.4	Pass	

**Test Notes:** EUT on 150cm table powered by POE. ENET connected to laptop outside chamber. Transmitting at 5160 MHz

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