

1.1. Radiated: Transmitter Spurious and Band-Edge

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407 ISSED RSS-247 Issue 2 ISSED RSS-Gen Issue 4	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 RSS-247 6.2.4.2 RSS-Gen 8.10	Pressure (mBars):	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions

Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

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

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

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Limits for Restricted Bands (15.205, 15.209)

Peak emission: 74 dBuV/m

Average emission: 54 dBuV/m

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where:

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

Example:

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

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

where P is the EIRP in Watts

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

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

Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m

48 dBmV/m = 250 mV/m

Restricted Bands of Operation (15.205)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.1.1.1. TX Spurious & Restricted Band Emissions

1.1.1.1.1. RADWIN AT0058760

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN AT0058760	Variant:	20 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	18.5	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4805.88	67.70	2.86	-12.42	58.14	Max Peak	Vertical	149	13	68.2	-10.1	Pass
#2	4805.88	53.41	2.86	-12.42	43.85	Max Avg	Vertical	149	13	54.0	-10.2	Pass
#3	4842.47	66.97	2.84	-12.55	57.26	Max Peak	Vertical	158	356	68.2	-11.0	Pass
#4	4842.47	52.95	2.84	-12.55	43.24	Max Avg	Vertical	158	356	54.0	-10.8	Pass
#5	5492.64	86.00	3.10	-11.65	77.45	Fundamental	Vertical	151	6	--	--	
#6	6217.59	58.41	3.31	-9.63	52.09	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	7320.00	60.51	3.60	-7.80	56.31	Max Peak	Vertical	198	22	68.2	-11.9	Pass
#8	7320.00	56.63	3.60	-7.80	52.43	Max Avg	Vertical	198	22	54.0	-1.6	Pass

Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload. PS reduced to 18.5

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN AT0058760	Variant:	20 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5590.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4805.91	64.83	2.86	-12.42	55.27	Max Peak	Vertical	178	353	68.2	-13.0	Pass
#2	4805.91	50.56	2.86	-12.42	41.00	Max Avg	Vertical	178	353	54.0	-13.0	Pass
#3	4836.26	66.22	2.81	-12.54	56.49	Max Peak	Vertical	160	352	68.2	-11.7	Pass
#4	4836.26	52.18	2.81	-12.54	42.45	Max Avg	Vertical	160	352	54.0	-11.6	Pass
#5	5582.71	80.05	3.12	-11.56	71.61	Fundamental	Vertical	100	0	--	--	
#6	6216.34	55.56	3.30	-9.63	49.23	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	7453.37	58.76	3.61	-7.77	54.60	Max Peak	Horizontal	136	313	68.2	-13.6	Pass
#8	7453.37	54.06	3.61	-7.77	49.90	Max Avg	Horizontal	136	313	54.0	-4.1	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN AT0058760	Variant:	20 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5705.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4837.85	64.32	2.81	-12.55	54.58	Max Peak	Vertical	164	353	68.2	-13.7	Pass
#2	4837.85	50.39	2.81	-12.55	40.65	Max Avg	Vertical	164	353	54.0	-13.4	Pass
#3	4866.19	63.78	2.93	-12.53	54.18	Max Peak	Vertical	164	0	68.2	-14.1	Pass
#4	4866.19	49.68	2.93	-12.53	40.08	Max Avg	Vertical	164	0	54.0	-13.9	Pass
#5	5700.36	77.21	3.19	-11.35	69.05	Fundamental	Vertical	151	154	--	--	
#6	6298.47	57.54	3.27	-9.28	51.53	Peak (NRB)	Vertical	148	0	--	--	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN AT0058760	Variant:	40 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	
Channel Frequency (MHz):	5500.00	Data Rate:	13.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4776.76	63.69	2.89	-12.46	54.12	Max Peak	Vertical	140	356	68.2	-14.1	Pass
#2	4776.76	49.30	2.89	-12.46	39.73	Max Avg	Vertical	140	356	54.0	-14.3	Pass
#3	4806.62	65.79	2.86	-12.43	56.22	Max Peak	Vertical	171	11	68.2	-12.0	Pass
#4	4806.62	51.21	2.86	-12.43	41.64	Max Avg	Vertical	171	11	54.0	-12.4	Pass
#5	5487.24	77.15	3.17	-11.70	68.62	Fundamental	Horizontal	100	0	--	--	
#6	6217.74	55.98	3.31	-9.63	49.66	Peak (NRB)	Vertical	149	0	--	--	Pass
#7	7333.21	59.23	3.57	-8.09	54.71	Max Peak	Vertical	99	12	68.2	-13.5	Pass
#8	7333.21	54.01	3.57	-8.09	49.49	Max Avg	Vertical	99	12	54.0	-4.5	Pass

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

Note: 40 MHz TX Spurious Included to show passing result with higher power for higher bandwidth emissions

Spurious emissions were measured up to 40 GHz, no emissions were found.

1.1.1.2. RADWIN RW-9105-5158

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9105-5158	Variant:	20 MHz
Antenna Gain (dBi):	18.0	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4835.76	63.88	2.82	-12.53	54.17	Max Peak	Horizontal	162	5	68.2	-14.1	Pass
#2	4835.76	49.69	2.82	-12.53	39.98	Max Avg	Horizontal	162	5	54.0	-14.0	Pass
#3	4865.41	64.06	2.92	-12.53	54.45	Max Peak	Horizontal	150	8	68.2	-13.8	Pass
#4	4865.41	50.03	2.92	-12.53	40.42	Max Avg	Horizontal	150	8	54.0	-13.6	Pass
#5	5491.65	83.10	3.12	-11.67	74.55	Fundamental	Horizontal	151	0	--	--	
#6	6269.69	61.65	3.35	-9.49	55.51	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	7319.98	59.61	3.60	-7.80	55.41	Max Peak	Vertical	155	33	68.2	-12.8	Pass
#8	7319.98	55.42	3.60	-7.80	51.22	Max Avg	Vertical	155	33	54.0	-2.8	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9105-5158	Variant:	20 MHz
Antenna Gain (dBi):	18.0	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5590.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4836.30	63.36	2.81	-12.54	53.63	Max Peak	Horizontal	169	353	68.2	-14.6	Pass
#2	4836.30	49.34	2.81	-12.54	39.61	Max Avg	Horizontal	169	353	54.0	-14.4	Pass
#3	5586.13	79.96	3.13	-11.56	71.53	Fundamental	Vertical	100	0	--	--	
#4	6274.07	63.25	3.35	-9.50	57.10	Peak (NRB)	Vertical	151	0	--	--	Pass
#5	7453.37	56.48	3.61	-7.77	52.32	Max Peak	Horizontal	164	288	68.2	-15.9	Pass
#6	7453.37	51.37	3.61	-7.77	47.21	Max Avg	Horizontal	164	288	54.0	-6.8	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9105-5158	Variant:	20 MHz
Antenna Gain (dBi):	18.0	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5705.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5697.93	77.96	3.19	-11.34	69.81	Fundamental	Vertical	148	0	--	--	
#2	6070.48	60.27	3.23	-10.10	53.40	Peak (NRB)	Horizontal	148	0	--	--	Pass
#3	6325.27	60.58	3.31	-9.29	54.60	Peak (NRB)	Vertical	148	0	--	--	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

1.1.1.3. RADWIN RW-9314-5158

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9314-5158	Variant:	20 MHz
Antenna Gain (dBi):	13.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4621.13	63.98	2.77	-12.24	54.51	Max Peak	Vertical	174	1	68.2	-13.7	Pass
#2	4621.13	49.71	2.77	-12.24	40.24	Max Avg	Vertical	174	1	54.0	-13.8	Pass
#3	4837.93	66.36	2.81	-12.55	56.62	Max Peak	Vertical	188	354	68.2	-11.6	Pass
#4	4837.93	52.23	2.81	-12.55	42.49	Max Avg	Vertical	188	354	54.0	-11.5	Pass
#5	5495.51	81.14	3.06	-11.64	72.56	Fundamental	Vertical	200	0	--	--	
#6	7320.02	57.58	3.59	-7.82	53.35	Max Peak	Vertical	110	94	68.2	-14.9	Pass
#7	7320.02	52.75	3.59	-7.82	48.52	Max Avg	Vertical	110	94	54.0	-5.5	Pass
Test Notes: EUT powered by POE.												

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9314-5158	Variant:	20 MHz
Antenna Gain (dBi):	13.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5590.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4833.87	66.17	2.83	-12.52	56.48	Max Peak	Vertical	192	0	68.2	-11.8	Pass
#2	4833.87	51.75	2.83	-12.52	42.06	Max Avg	Vertical	192	0	54.0	-11.9	Pass
#3	5585.91	85.94	3.13	-11.56	77.51	Fundamental	Vertical	200	0	--	--	
#4	7453.39	53.95	3.61	-7.77	49.79	Max Peak	Vertical	101	13	68.2	-18.4	Pass
#5	7453.39	47.44	3.61	-7.77	43.28	Max Avg	Vertical	101	13	54.0	-10.7	Pass

Test Notes: EUT powered by POE. 5G notch in front of amp to prevent overload.

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9314-5158	Variant:	20 MHz
Antenna Gain (dBi):	13.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5705.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4806.19	63.06	2.86	-12.43	53.49	Max Peak	Vertical	189	1	68.2	-14.7	Pass
#2	4806.19	48.94	2.86	-12.43	39.37	Max Avg	Vertical	189	1	54.0	-14.6	Pass
#3	5702.89	75.06	3.18	-11.34	66.90	Fundamental	Vertical	151	1	--	--	

Test Notes: EUT powered by POE. 5G notch in front of amp to prevent overload.

Spurious emissions were measured up to 40 GHz, no emissions were found.

1.1.1.4. RADWIN RW-9401-5004

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9401-5004	Variant:	20 MHz
Antenna Gain (dBi):	12.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4743.80	60.84	2.87	-12.34	51.37	Max Peak	Vertical	166	19	68.2	-16.9	Pass
#2	4743.80	47.15	2.87	-12.34	37.68	Max Avg	Vertical	166	19	54.0	-16.3	Pass
#3	5494.73	78.38	3.07	-11.64	69.81	Fundamental	Vertical	151	0	--	--	
#4	6189.88	57.59	3.27	-9.69	51.17	Peak (NRB)	Vertical	151	0	--	--	Pass
#5	7320.13	58.99	3.59	-7.82	54.76	Max Peak	Vertical	196	240	68.2	-13.5	Pass
#6	7320.13	54.05	3.59	-7.82	49.82	Max Avg	Vertical	196	240	54.0	-4.2	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9401-5004	Variant:	20 MHz
Antenna Gain (dBi):	12.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5590.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	4835.41	62.06	2.82	-12.53	52.35	Max Peak	Vertical	192	352	68.2	-15.9	Pass
#2	4835.41	48.53	2.82	-12.53	38.82	Max Avg	Vertical	192	352	54.0	-15.2	Pass
#3	5586.46	82.87	3.13	-11.56	74.44	Fundamental	Vertical	200	0	--	--	
#4	6273.56	57.74	3.35	-9.50	51.59	Peak (NRB)	Vertical	200	0	--	--	Pass
#5	7453.42	54.50	3.61	-7.77	50.34	Max Peak	Vertical	196	286	68.2	-17.9	Pass
#6	7453.42	46.84	3.61	-7.77	42.68	Max Avg	Vertical	196	286	54.0	-11.3	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN RW-9401-5004	Variant:	20 MHz
Antenna Gain (dBi):	12.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	5705.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5702.56	73.83	3.18	-11.34	65.67	Fundamental	Vertical	200	0	--	--	
#2	6043.28	57.20	3.22	-10.04	50.38	Peak (NRB)	Vertical	200	0	--	--	Pass
#3	6275.70	54.72	3.35	-9.48	48.59	Peak (NRB)	Vertical	200	0	--	--	Pass

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

Spurious emissions were measured up to 40 GHz, no emissions were found.

1.1.2. Restricted Edge & Band-Edge Emissions

1.1.2.5. RADWIN AT0058760

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5470 - 5725 MHz

RADWIN AT0058760		Restricted-Edge Freq	Limit 68.23	Limit 54.0	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
20 MHz	5490.00	5460.00	67.56	44.11	4.5
40 MHz	5500.00	5460.00	68.12	44.21	1.5
80 MHz	5525.00	5460.00	67.79	46.13	2.5

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN AT0058760	Variant:	20 MHz
Antenna Gain (dBi):	17.0	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	86
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	4.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	6.52	3.06	34.53	44.11	Max Avg	Vertical	164	4	54.0	-9.9	Pass
#3	5469.40	29.95	3.06	34.55	67.56	Max Peak	Vertical	164	4	68.2	-0.7	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE.PS reduced to 4.5 to meet band edge limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN AT0058760	Variant:	40 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	78
Channel Frequency (MHz):	5500.00	Data Rate:	13.50 Mbit/s
Power Setting:	1.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	5.54	3.06	34.53	44.21	Max Avg	Vertical	164	4	54.0	-9.8	Pass
#3	5470.00	30.51	3.06	34.55	68.12	Max Peak	Vertical	164	4	68.2	-0.1	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. PS reduced to 1.5 to meet band edge limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN AT0058760	Variant:	80 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	66
Channel Frequency (MHz):	5525.00	Data Rate:	29.30 Mbit/s
Power Setting:	2.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	6.74	3.06	34.53	46.13	Max Avg	Vertical	164	4	54.0	-7.9	Pass
#3	5469.02	30.18	3.06	34.55	67.79	Max Peak	Vertical	164	4	68.2	-0.4	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. PS reduced to 2.5 to meet band edge limit. *Includes Duty Cycle correction for Avg Measurement.

1.1.2.6. RADWIN RW-9105-5158

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5470 - 5725 MHz

RADWIN RW-9105-5158		Restricted-Edge Freq	Limit 68.23	Limit 54.0	Power Setting
Operational Mode	Operating Frequency (MHz)	dB μ V/m	dB μ V/m	dB μ V/m	
20 MHz	5490.00	5460.00	68.10	44.71	4.0
40 MHz	5500.00	5460.00	67.97	45.13	0
80 MHz	5525.00	5460.00	67.48	46.13	1

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9105-5158	Variant:	20 MHz
Antenna Gain (dBi):	18.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	86
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	4.0	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	7.12	3.06	34.53	44.71	Max Avg	Horizontal	198	1	54.0	-9.3	Pass
#3	5470.00	30.49	3.06	34.55	68.10	Max Peak	Horizontal	198	1	68.2	-0.1	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9105-5158	Variant:	40 MHz
Antenna Gain (dBi):	18.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	78
Channel Frequency (MHz):	5500.00	Data Rate:	13.50 Mbit/s
Power Setting:	0	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	7.54	3.06	34.53	45.13	Max Avg	Horizontal	198	1	54.0	-8.9	Pass
#3	5469.70	30.36	3.06	34.55	67.97	Max Peak	Horizontal	198	1	68.2	-0.3	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9105-5158	Variant:	80 MHz
Antenna Gain (dBi):	18.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	66
Channel Frequency (MHz):	5525.00	Data Rate:	29.30 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/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	8.54	3.06	34.53	46.13	Max Avg	Horizontal	198	1	54.0	-7.9	Pass
#3	5470.00	29.87	3.06	34.55	67.48	Max Peak	Horizontal	198	1	68.2	-0.8	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet limit. *Includes Duty Cycle correction for Avg Measurement.

1.1.2.7. RADWIN RW-9314-5158

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5470 - 5725 MHz

RADWIN RW-9314-5158		Restricted-Edge Freq	Limit 68.23	Limit 54.0	Power Setting
Operational Mode	Operating Frequency (MHz)	dBµV/m	dBµV/m	dBµV/m	
20 MHz	5490.00	5460.00	67.97	44.41	5.5
40 MHz	5500.00	5460.00	67.77	44.53	1.5
80 MHz	5525.00	5460.00	68.05	46.13	1.5

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9314-5158	Variant:	20 MHz
Antenna Gain (dBi):	13.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	86
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	5.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	6.82	3.06	34.53	44.41	Max Avg	Vertical	177	352	54.0	-9.6	Pass
#3	5470.00	30.36	3.06	34.55	67.97	Max Peak	Vertical	177	352	68.2	-0.3	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT Powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9314-5158	Variant:	40 MHz
Antenna Gain (dBi):	13.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	78
Channel Frequency (MHz):	5500.00	Data Rate:	13.50 Mbit/s
Power Setting:	1.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	6.94	3.06	34.53	44.53	Max Avg	Vertical	177	352	54.0	-9.5	Pass
#3	5469.70	30.16	3.06	34.55	67.77	Max Peak	Vertical	177	352	68.2	-0.5	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT Powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9314-5158	Variant:	80 MHz
Antenna Gain (dBi):	13.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	66
Channel Frequency (MHz):	5525.00	Data Rate:	29.30 Mbit/s
Power Setting:	1.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	8.54	3.06	34.53	46.13	Max Avg	Vertical	177	352	54.0	-7.9	Pass
#3	5467.60	30.43	3.07	34.55	68.05	Max Peak	Vertical	177	352	68.2	-0.2	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT Powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

1.1.2.8. RADWIN RW-9401-5004

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5470 - 5725 MHz

RADWIN RW-9401-5004		Restricted-Edge Freq	Limit 68.23	Limit 54.0	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
20 MHz	5490.00	5460.00	68.14	46.29	8
40 MHz	5500.00	5460.00	67.90	44.53	3.5
80 MHz	5525.00	5460.00	67.77	45.55	2.5

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9401-5004	Variant:	20 MHz
Antenna Gain (dBi):	12.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	86
Channel Frequency (MHz):	5490.00	Data Rate:	6.50 Mbit/s
Power Setting:	8	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	8.70	3.06	34.53	46.29	Max Avg	Vertical	185	3	54.0	-7.7	Pass
#3	5470.00	30.53	3.06	34.55	68.14	Max Peak	Vertical	185	3	68.2	-0.1	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9401-5004	Variant:	40 MHz
Antenna Gain (dBi):	12.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	
Channel Frequency (MHz):	5500.00	Data Rate:	13.50 Mbit/s
Power Setting:	3.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	6.94	3.06	34.53	44.53	Max Avg	Vertical	185	3	54.0	-9.5	Pass
#3	5470.00	30.29	3.06	34.55	67.90	Max Peak	Vertical	185	3	68.2	-0.3	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN RW-9401-5004	Variant:	80 MHz
Antenna Gain (dBi):	12.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	66
Channel Frequency (MHz):	5525.00	Data Rate:	29.30 Mbit/s
Power Setting:	2.5	Tested By:	JMH

Test Measurement Results

5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5460.00	6.16	3.06	34.53	45.55	Max Avg	Vertical	185	3	54.0	-8.5	Pass
#3	5469.70	30.16	3.06	34.55	67.77	Max Peak	Vertical	185	3	68.2	-0.5	Pass
#2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
#4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

1.1.3. Digital Emissions

Radiated Test Conditions for Radiated Digital Emissions (0.03 – 1 GHz)			
Standard:	FCC CFR 47:15.247 RSS-Gen Issue 4	Ambient Temp. (°C):	20.0 - 24.5
Test Heading:	Digital Emissions	Rel. Humidity (%):	32 - 45
Standard Section(s):	15.209 RSS-Gen: 8.9	Pressure (mBars):	999 - 1001
Reference Document(s):	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:

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

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

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

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
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.

Equipment Configuration for Digital Emissions

Antenna:	RADWIN AT0058760	Variant:	20 MHz
Antenna Gain (dBi):	17.00	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	86
Channel Frequency (MHz):	5590.00	Data Rate:	6.50 Mbit/s
Power Setting:	21	Tested By:	JMH

Test Measurement Results

30.00 - 1000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	30.52	38.78	3.54	-8.20	34.12	MaxQP	Vertical	111	328	40.0	-5.9	Pass
#2	80.93	55.95	3.94	-20.89	39.00	MaxQP	Horizontal	380	262	40.0	-1.0	Pass
#3	133.75	45.61	4.23	-14.82	35.02	MaxQP	Vertical	102	355	43.0	-8.0	Pass
#4	159.44	50.54	4.36	-15.90	39.00	MaxQP	Horizontal	175	131	43.0	-4.0	Pass
#5	320.00	51.98	4.99	-13.78	43.19	MaxQP	Horizontal	101	295	46.0	-2.8	Pass
#6	700.01	35.74	6.20	-7.22	34.72	MaxQP	Horizontal	111	174	46.0	-11.3	Pass
#7	899.97	33.09	6.76	-4.92	34.93	MaxQP	Horizontal	102	139	46.0	-11.1	Pass

Test Notes: EUT Powered by POE.

1.1.4. ac Wireline Emissions

Test Conditions for ac Wireline Emissions (0.15 – 30 MHz)			
Standard:	FCC CFR 47:15.247 RSS-Gen Issue 4	Ambient Temp. (°C):	20.0 - 24.5
Test Heading:	Conducted (ac Wireline Emissions)	Rel. Humidity (%):	32 - 45
Standard Section(s):	15.207 RSS-Gen 8.8	Pressure (mBars):	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for ac Wireline Emissions (0.15 – 30 MHz)

The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Test configuration and setup for ac Wireline Emission Measurement were per the ac Wireline Test Set-up specified in this document.

Limits for ac Wireline Emissions

- (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limits for conducted disturbance at the mains ports of class B ITE

Frequency of emission (MHz)	Quasi-peak dBuV	Average dBuV
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50
Note 1	* Decreases with the logarithm of the frequency	
Note 2	* The lower limit applies at the boundary between frequency ranges	

Limits for conducted disturbance at the mains ports of class A ITE

Frequency of emission (MHz)	Quasi-peak dBuV	Average dBuV
0.15–0.5	79	66
0.5–30	73	60
Note 1	* The lower limit shall apply at the transition frequency.	

The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- (1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- (2) For all other carrier current systems: 1000 μ V within the frequency band 535-1705 kHz, as measured using a 50 μ H/50 ohms LISN.
- (3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

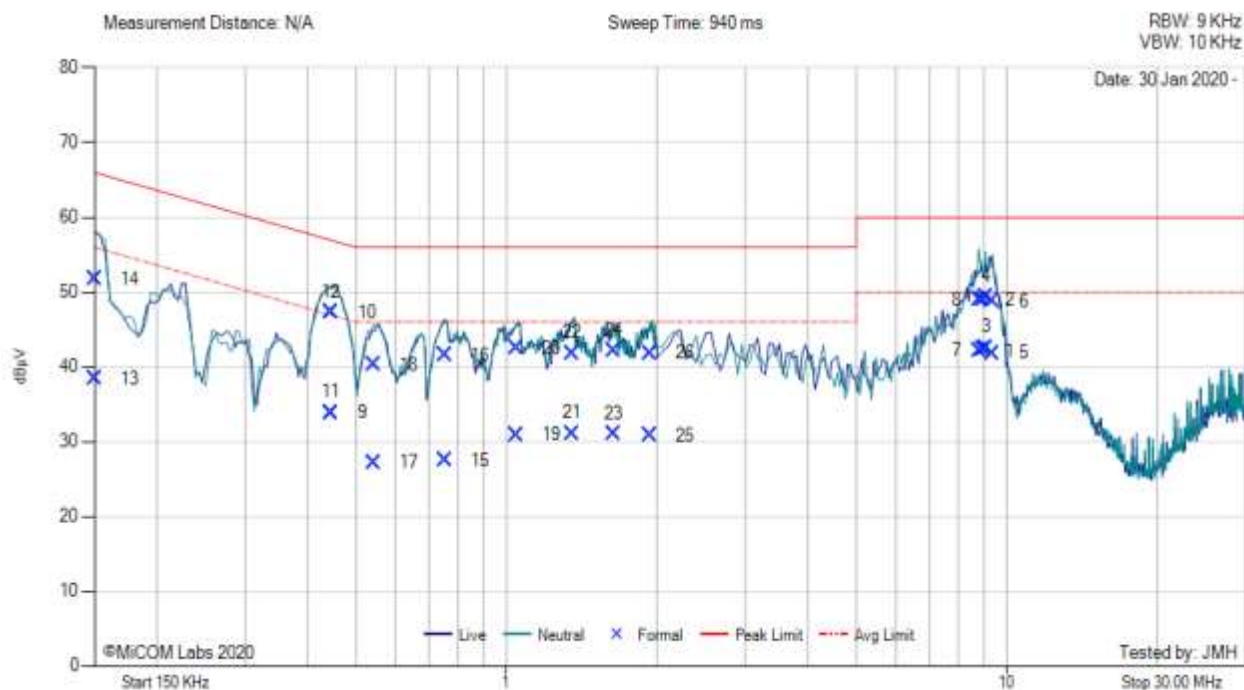
Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

Measurement Results for ac Wireline Conducted Emissions (150 kHz – 30 MHz)

Model:	AP0168031	Configuration tested:	AC/DC
Input power:	120V _{AC} /60Hz	Application	AC Mains



Variant: , Test Freq: 0.00 MHz



Num	Frequency MHz	Raw dBμV	Cable Loss dB	Factor dB	Total Correction dBμV	Corrected Value dBμV	Measurement Type	Line	Limit dBμV/m	Margin dB	Pass /Fail
1	8.816	31.51	0.44	10.21	10.65	42.16	Max Avg	Neutral	50.0	-7.8	Pass
2	8.816	38.34	0.44	10.21	10.65	48.99	Max Qp	Neutral	60.0	-11.0	Pass
3	9.101	31.92	0.44	10.22	10.66	42.58	Max Avg	Neutral	50.0	-7.4	Pass
4	9.101	38.69	0.44	10.22	10.66	49.35	Max Qp	Neutral	60.0	-10.7	Pass
5	9.386	31.18	0.44	10.21	10.65	41.83	Max Avg	Live	50.0	-8.2	Pass
6	9.386	38.12	0.44	10.21	10.65	48.77	Max Qp	Live	60.0	-11.2	Pass
7	8.958	31.64	0.44	10.20	10.64	42.28	Max Avg	Live	50.0	-7.7	Pass
8	8.958	38.30	0.44	10.20	10.64	48.94	Max Qp	Live	60.0	-11.1	Pass
9	0.447	23.86	0.06	9.93	9.99	33.85	Max Avg	Live	47.5	-13.7	Pass
10	0.447	37.31	0.06	9.93	9.99	47.30	Max Qp	Live	57.5	-10.2	Pass
11	0.447	23.88	0.06	9.93	9.99	33.87	Max Avg	Neutral	47.5	-13.6	Pass
12	0.447	37.26	0.06	9.93	9.99	47.25	Max Qp	Neutral	57.5	-10.3	Pass
13	0.150	28.44	0.05	9.92	9.97	38.41	Max Avg	Live	56.0	-17.6	Pass
14	0.150	41.79	0.05	9.92	9.97	51.76	Max Qp	Live	66.0	-14.2	Pass
15	0.753	17.39	0.12	9.93	10.05	27.44	Max Avg	Live	46.0	-18.6	Pass
16	0.753	31.51	0.12	9.93	10.05	41.56	Max Qp	Live	56.0	-14.4	Pass
17	0.541	17.18	0.09	9.92	10.01	27.19	Max Avg	Live	46.0	-18.8	Pass

18	0.541	30.30	0.09	9.92	10.01	40.31	Max Qp	Live	56.0	-15.7	Pass
19	1.048	20.92	0.08	9.94	10.02	30.94	Max Avg	Live	46.0	-15.1	Pass
20	1.048	32.41	0.08	9.94	10.02	42.43	Max Qp	Live	56.0	-13.6	Pass
21	1.353	21.03	0.11	9.94	10.05	31.08	Max Avg	Live	46.0	-14.9	Pass
22	1.353	31.81	0.11	9.94	10.05	41.86	Max Qp	Live	56.0	-14.1	Pass
23	1.635	20.95	0.15	9.97	10.12	31.07	Max Avg	Live	46.0	-14.9	Pass
24	1.635	32.04	0.15	9.97	10.12	42.16	Max Qp	Live	56.0	-13.8	Pass
25	1.931	20.69	0.18	9.97	10.15	30.84	Max Avg	Live	46.0	-15.2	Pass
26	1.931	31.69	0.18	9.97	10.15	41.84	Max Qp	Live	56.0	-14.2	Pass
32	0.000	0.05	--	--	--	--		--	--	--	--

Test Notes: EUT powered by POE. 120V 60 Hz

A. APPENDIX - GRAPHICAL IMAGES

A.1. Radiated

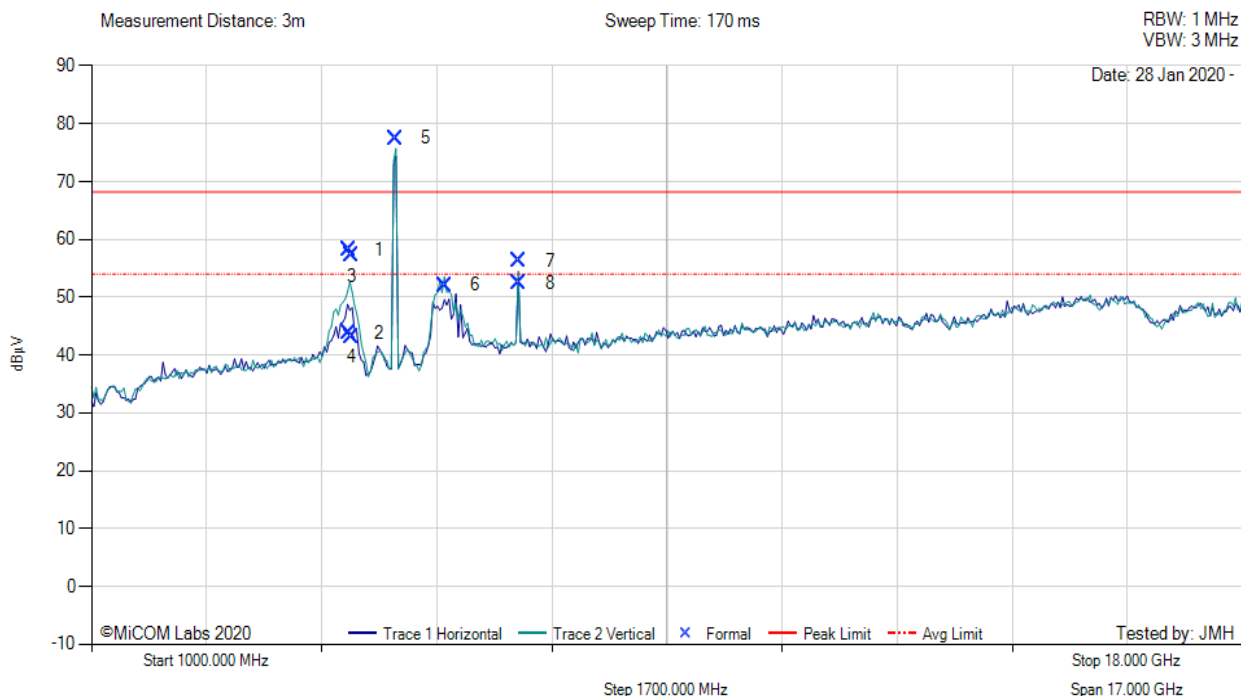
A.1.1. TX Spurious & Restricted Band Emissions

A.1.1.1. RADWIN AT0058760



TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 18.5, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBrV	Cable Loss dB	AF dB/m	Level dBrV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBrV/m	Margin dB	Pass /Fail
1	4805.88	67.70	2.86	-12.42	58.14	Max Peak	Vertical	149	13	68.2	-10.1	Pass
2	4805.88	53.41	2.86	-12.42	43.85	Max Avg	Vertical	149	13	54.0	-10.2	Pass
3	4842.47	66.97	2.84	-12.55	57.26	Max Peak	Vertical	158	356	68.2	-11.0	Pass
4	4842.47	52.95	2.84	-12.55	43.24	Max Avg	Vertical	158	356	54.0	-10.8	Pass
5	5492.64	86.00	3.10	-11.65	77.45	Fundamental	Vertical	151	6	--	--	
6	6217.59	58.41	3.31	-9.63	52.09	Peak (NRB)	Vertical	151	0	--	--	Pass
7	7320.00	60.51	3.60	-7.80	56.31	Max Peak	Vertical	198	22	68.2	-11.9	Pass
8	7320.00	56.63	3.60	-7.80	52.43	Max Avg	Vertical	198	22	54.0	-1.6	Pass

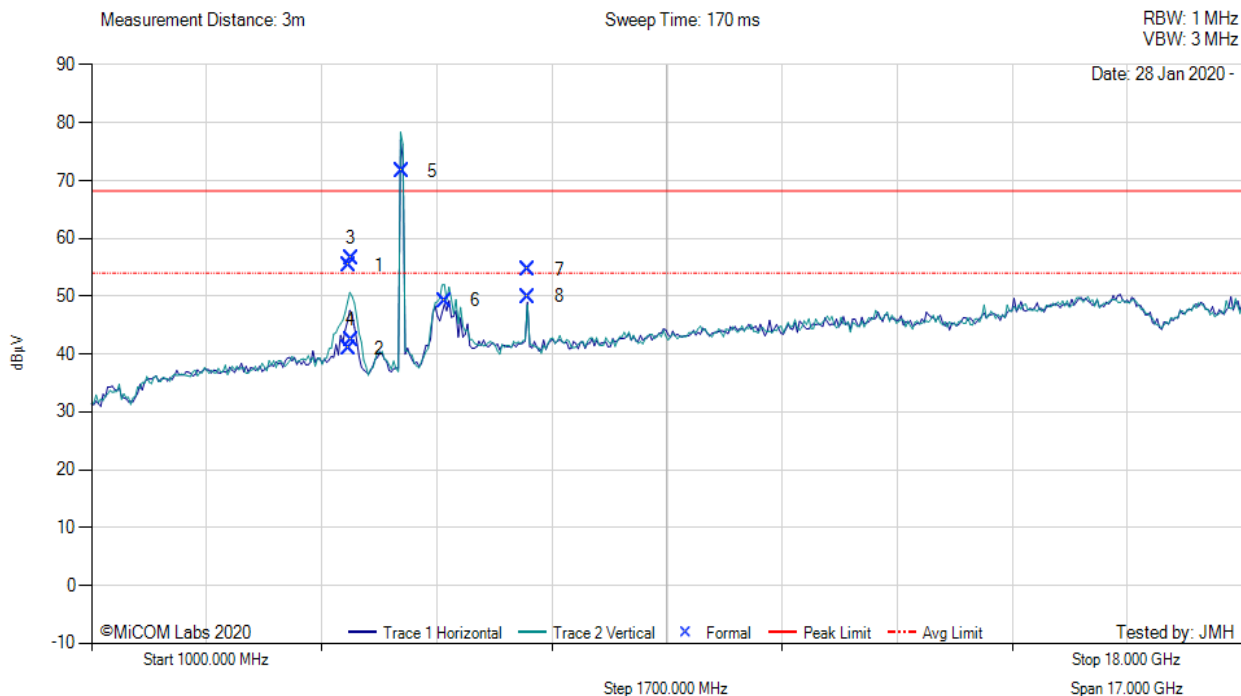
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload. PS reduced to 18.5

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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 MHz, Test Freq: 5590.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4805.91	64.83	2.86	-12.42	55.27	Max Peak	Vertical	178	353	68.2	-13.0	Pass
2	4805.91	50.56	2.86	-12.42	41.00	Max Avg	Vertical	178	353	54.0	-13.0	Pass
3	4836.26	66.22	2.81	-12.54	56.49	Max Peak	Vertical	160	352	68.2	-11.7	Pass
4	4836.26	52.18	2.81	-12.54	42.45	Max Avg	Vertical	160	352	54.0	-11.6	Pass
5	5582.71	80.05	3.12	-11.56	71.61	Fundamental	Vertical	100	0	--	--	
6	6216.34	55.56	3.30	-9.63	49.23	Peak (NRB)	Vertical	151	0	--	--	Pass
7	7453.37	58.76	3.61	-7.77	54.60	Max Peak	Horizontal	136	313	68.2	-13.6	Pass
8	7453.37	54.06	3.61	-7.77	49.90	Max Avg	Horizontal	136	313	54.0	-4.1	Pass

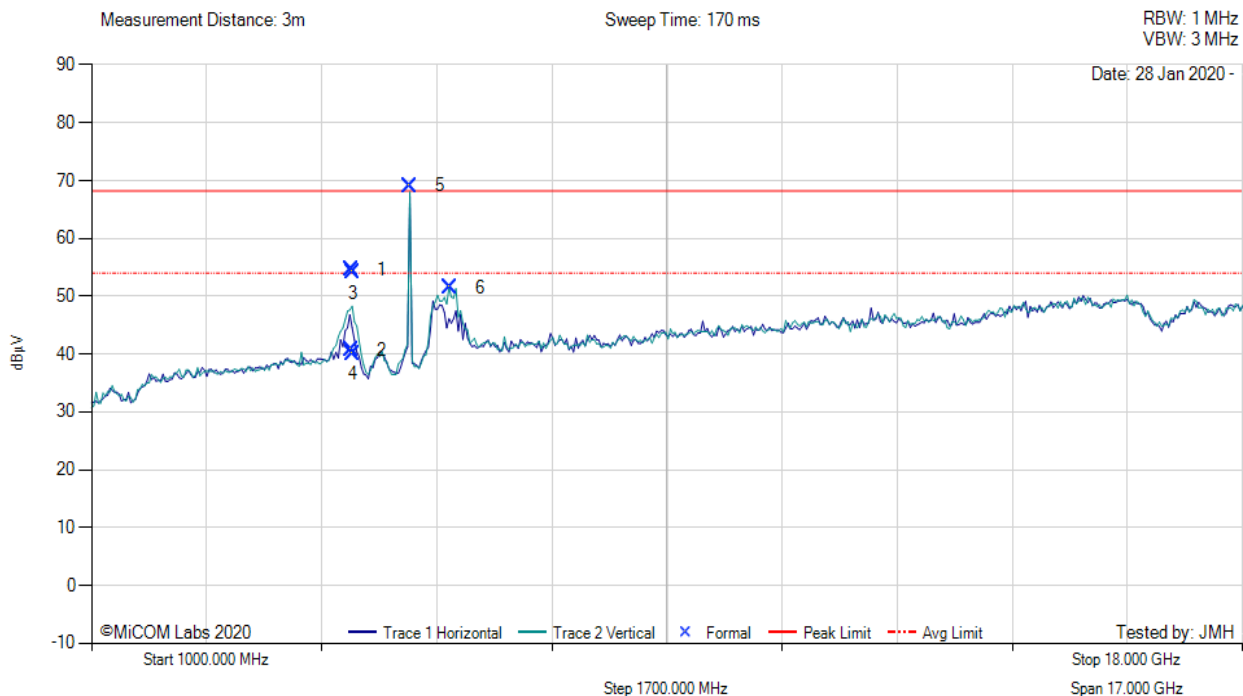
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 MHz, Test Freq: 5705.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4837.85	64.32	2.81	-12.55	54.58	Max Peak	Vertical	164	353	68.2	-13.7	Pass
2	4837.85	50.39	2.81	-12.55	40.65	Max Avg	Vertical	164	353	54.0	-13.4	Pass
3	4866.19	63.78	2.93	-12.53	54.18	Max Peak	Vertical	164	0	68.2	-14.1	Pass
4	4866.19	49.68	2.93	-12.53	40.08	Max Avg	Vertical	164	0	54.0	-13.9	Pass
5	5700.36	77.21	3.19	-11.35	69.05	Fundamental	Vertical	151	154	--	--	
6	6298.47	57.54	3.27	-9.28	51.53	Peak (NRB)	Vertical	148	0	--	--	Pass

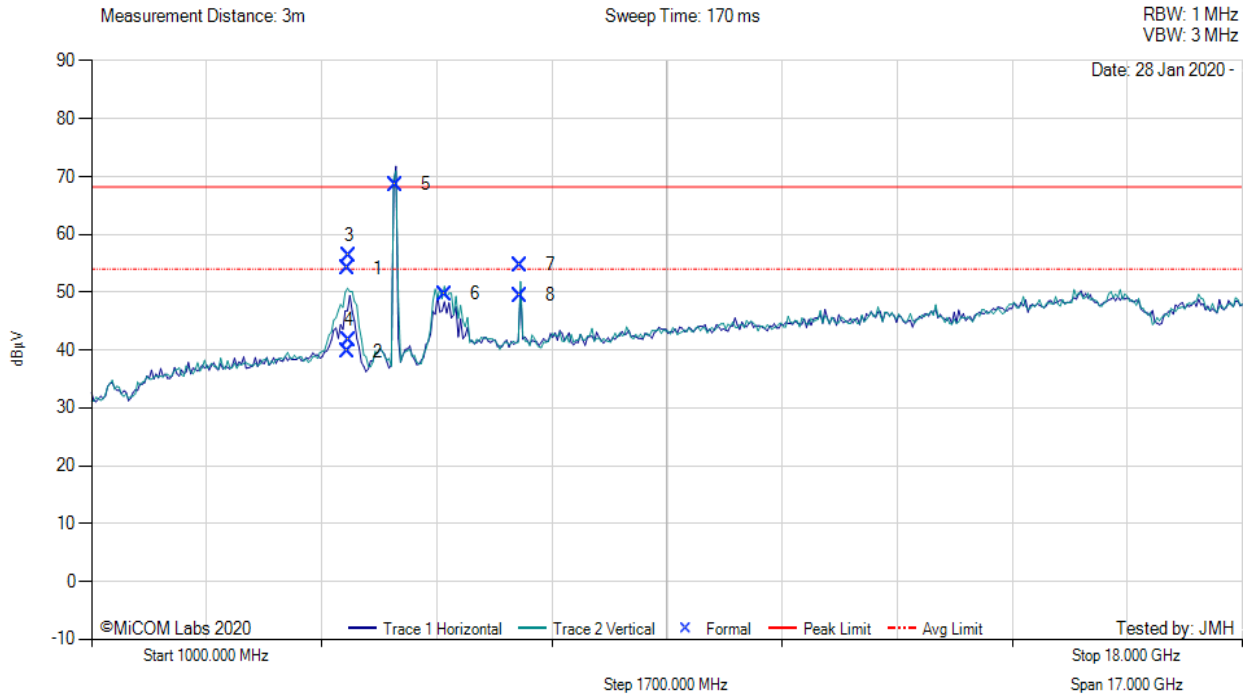
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 40 MHz, Test Freq: 5500.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 21



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4776.76	63.69	2.89	-12.46	54.12	Max Peak	Vertical	140	356	68.2	-14.1	Pass
2	4776.76	49.30	2.89	-12.46	39.73	Max Avg	Vertical	140	356	54.0	-14.3	Pass
3	4806.62	65.79	2.86	-12.43	56.22	Max Peak	Vertical	171	11	68.2	-12.0	Pass
4	4806.62	51.21	2.86	-12.43	41.64	Max Avg	Vertical	171	11	54.0	-12.4	Pass
5	5487.24	77.15	3.17	-11.70	68.62	Fundamental	Horizontal	100	0	--	--	
6	6217.74	55.98	3.31	-9.63	49.66	Peak (NRB)	Vertical	149	0	--	--	Pass
7	7333.21	59.23	3.57	-8.09	54.71	Max Peak	Vertical	99	12	68.2	-13.5	Pass
8	7333.21	54.01	3.57	-8.09	49.49	Max Avg	Vertical	99	12	54.0	-4.5	Pass

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

Note: 40 MHz TX Spurious Included to show passing result with higher power for higher bandwidth emissions

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A.1.1.2. RADWIN RW-9105-5158

TX SPURIOUS & RESTRICTED BAND EMISSIONS



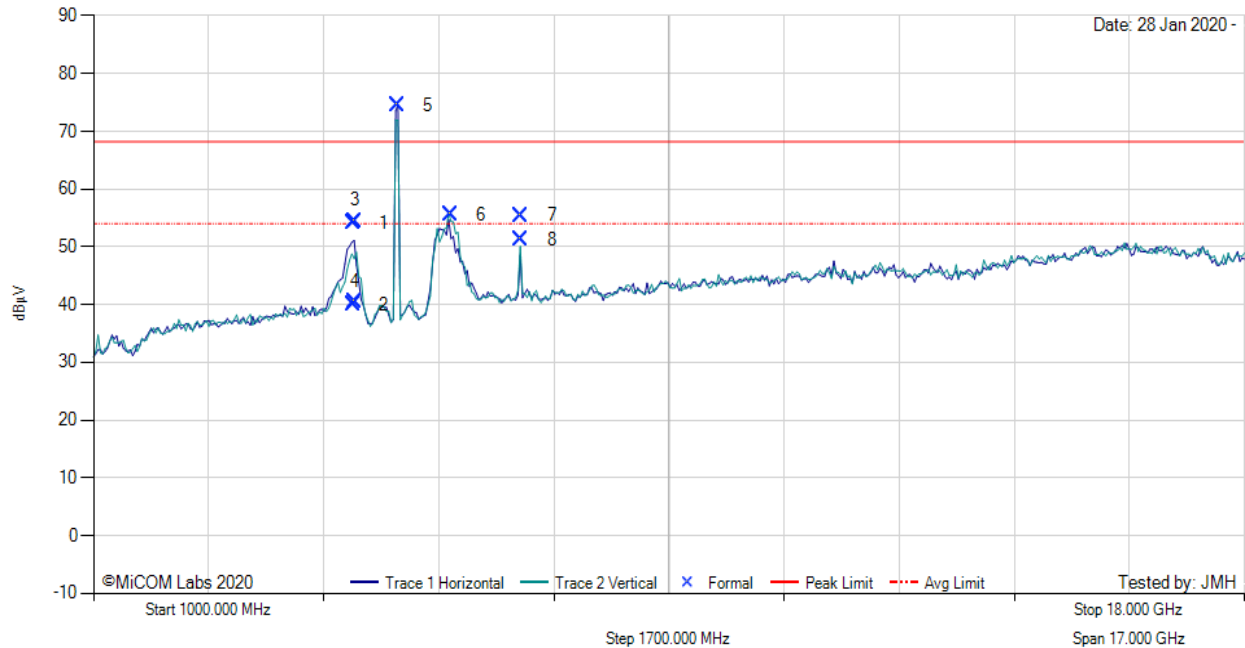
Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN RW-9105-5158, Power Setting: 21, Duty Cycle (%): 99

Measurement Distance: 3m

Sweep Time: 170 ms

RBW: 1 MHz
VBW: 3 MHz

Date: 28 Jan 2020 -



1000.00 - 18000.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4835.76	63.88	2.82	-12.53	54.17	Max Peak	Horizontal	162	5	68.2	-14.1	Pass
2	4835.76	49.69	2.82	-12.53	39.98	Max Avg	Horizontal	162	5	54.0	-14.0	Pass
3	4865.41	64.06	2.92	-12.53	54.45	Max Peak	Horizontal	150	8	68.2	-13.8	Pass
4	4865.41	50.03	2.92	-12.53	40.42	Max Avg	Horizontal	150	8	54.0	-13.6	Pass
5	5491.65	83.10	3.12	-11.67	74.55	Fundamental	Horizontal	151	0	--	--	
6	6269.69	61.65	3.35	-9.49	55.51	Peak (NRB)	Vertical	151	0	--	--	Pass
7	7319.98	59.61	3.60	-7.80	55.41	Max Peak	Vertical	155	33	68.2	-12.8	Pass
8	7319.98	55.42	3.60	-7.80	51.22	Max Avg	Vertical	155	33	54.0	-2.8	Pass

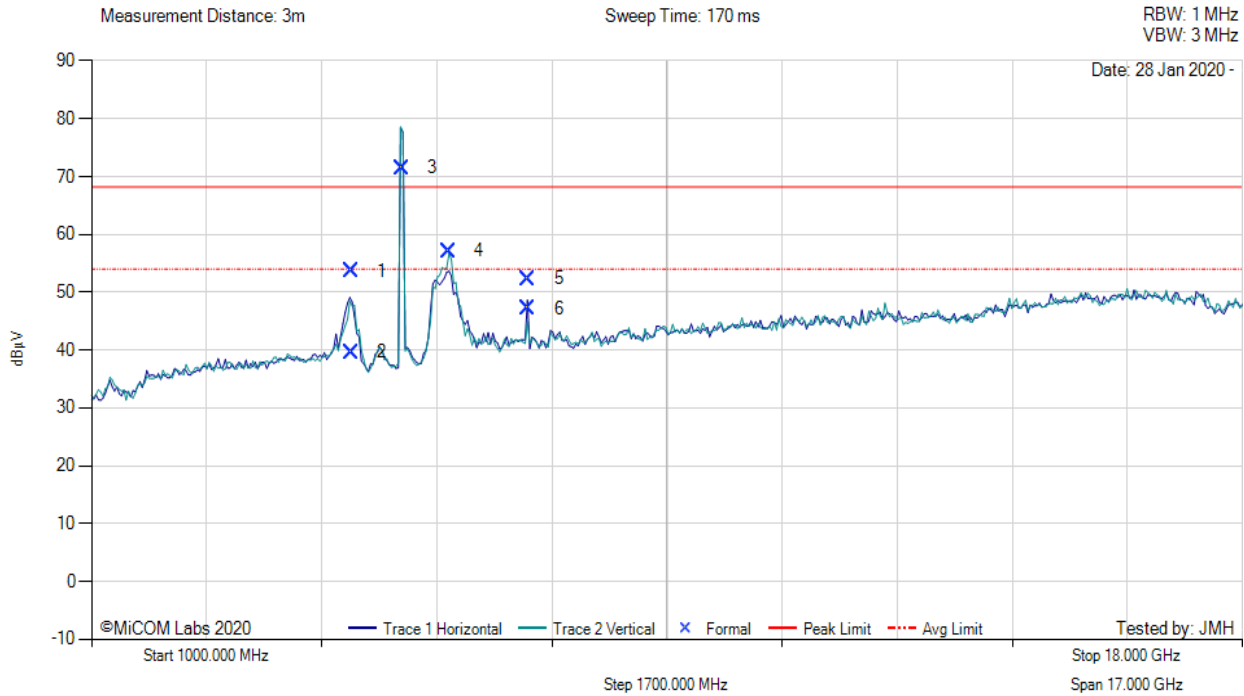
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5590.00 MHz, Antenna: RADWIN RW-9105-5158, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4836.30	63.36	2.81	-12.54	53.63	Max Peak	Horizontal	169	353	68.2	-14.6	Pass
2	4836.30	49.34	2.81	-12.54	39.61	Max Avg	Horizontal	169	353	54.0	-14.4	Pass
3	5586.13	79.96	3.13	-11.56	71.53	Fundamental	Vertical	100	0	--	--	
4	6274.07	63.25	3.35	-9.50	57.10	Peak (NRB)	Vertical	151	0	--	--	Pass
5	7453.37	56.48	3.61	-7.77	52.32	Max Peak	Horizontal	164	288	68.2	-15.9	Pass
6	7453.37	51.37	3.61	-7.77	47.21	Max Avg	Horizontal	164	288	54.0	-6.8	Pass

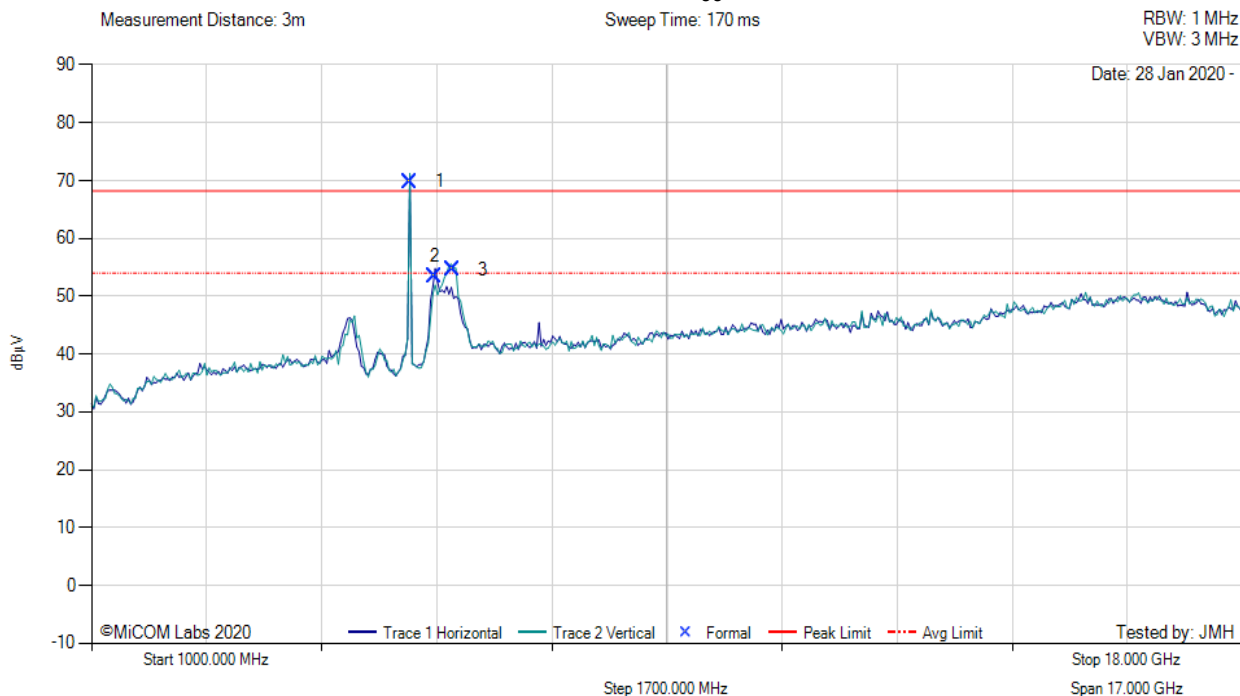
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5705.00 MHz, Antenna: RADWIN RW-9105-5158, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5697.93	77.96	3.19	-11.34	69.81	Fundamental	Vertical	148	0	--	--	
2	6070.48	60.27	3.23	-10.10	53.40	Peak (NRB)	Horizontal	148	0	--	--	Pass
3	6325.27	60.58	3.31	-9.29	54.60	Peak (NRB)	Vertical	148	0	--	--	Pass

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

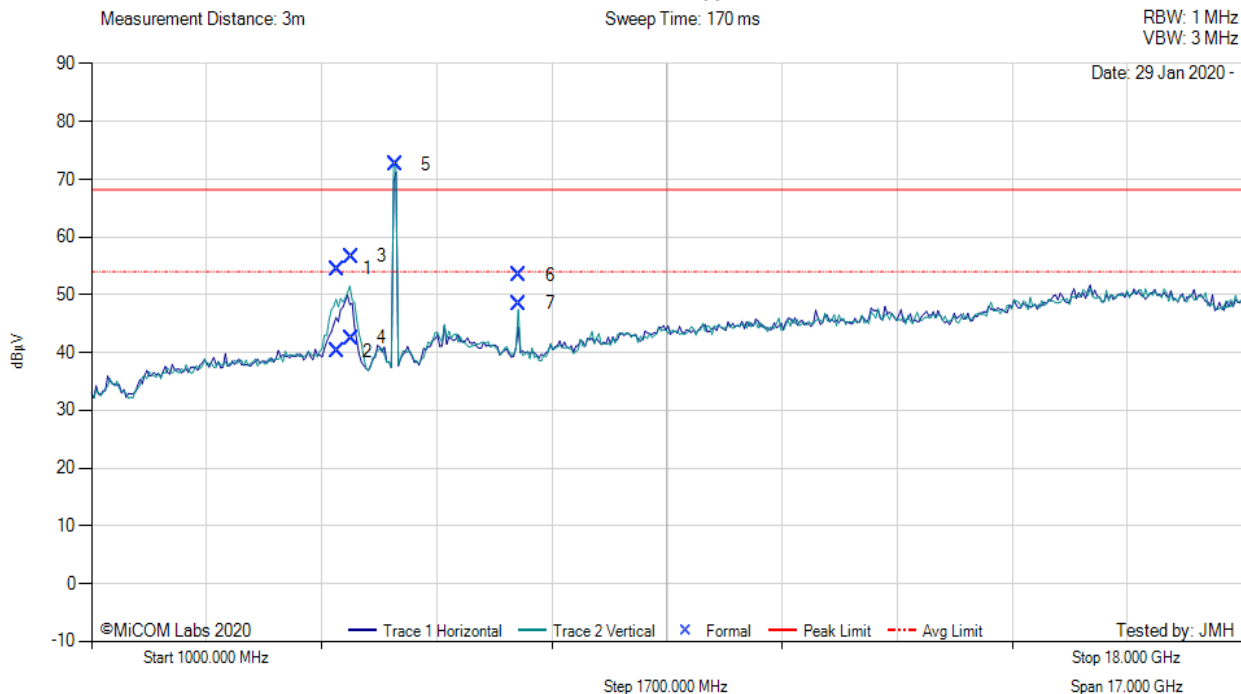
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A.1.1.3. RADWIN RW-9314-5158

TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN RW-9314-5158, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4621.13	63.98	2.77	-12.24	54.51	Max Peak	Vertical	174	1	68.2	-13.7	Pass
2	4621.13	49.71	2.77	-12.24	40.24	Max Avg	Vertical	174	1	54.0	-13.8	Pass
3	4837.93	66.36	2.81	-12.55	56.62	Max Peak	Vertical	188	354	68.2	-11.6	Pass
4	4837.93	52.23	2.81	-12.55	42.49	Max Avg	Vertical	188	354	54.0	-11.5	Pass
5	5495.51	81.14	3.06	-11.64	72.56	Fundamental	Vertical	200	0	--	--	
6	7320.02	57.58	3.59	-7.82	53.35	Max Peak	Vertical	110	94	68.2	-14.9	Pass
7	7320.02	52.75	3.59	-7.82	48.52	Max Avg	Vertical	110	94	54.0	-5.5	Pass

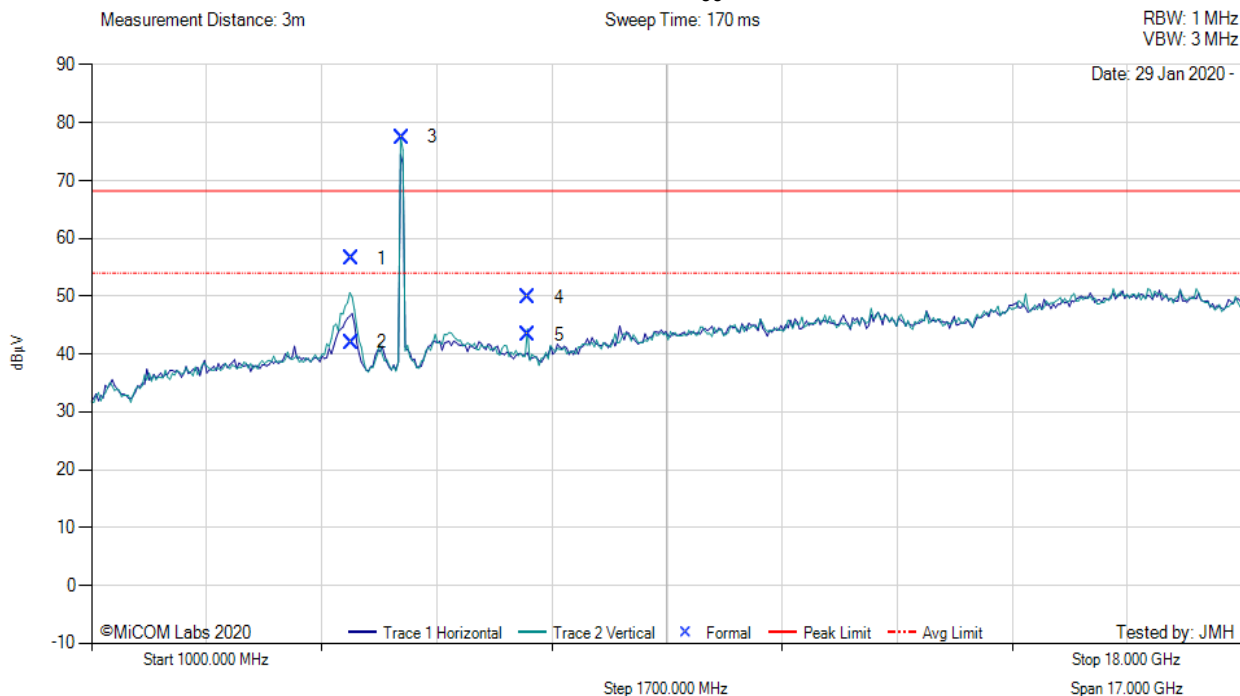
Test Notes: EUT powered by POE.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5590.00 MHz, Antenna: RADWIN RW-9314-5158, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4833.87	66.17	2.83	-12.52	56.48	Max Peak	Vertical	192	0	68.2	-11.8	Pass
2	4833.87	51.75	2.83	-12.52	42.06	Max Avg	Vertical	192	0	54.0	-11.9	Pass
3	5585.91	85.94	3.13	-11.56	77.51	Fundamental	Vertical	200	0	--	--	
4	7453.39	53.95	3.61	-7.77	49.79	Max Peak	Vertical	101	13	68.2	-18.4	Pass
5	7453.39	47.44	3.61	-7.77	43.28	Max Avg	Vertical	101	13	54.0	-10.7	Pass

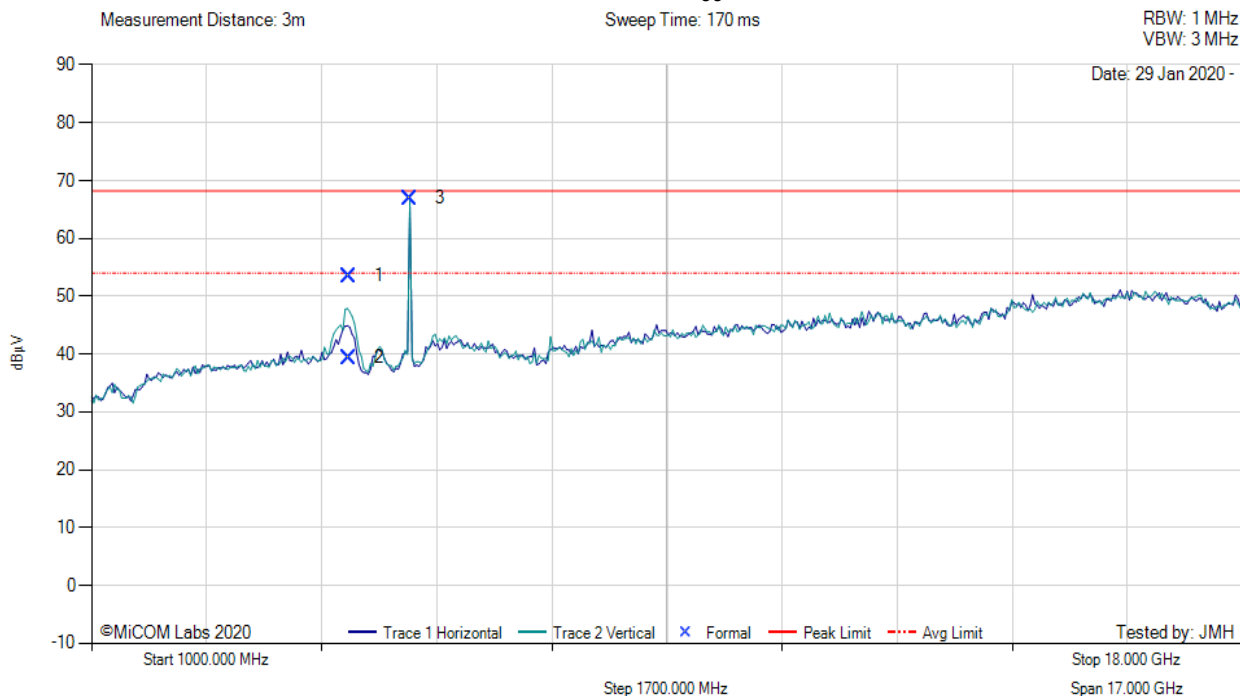
Test Notes: EUT powered by POE. 5G notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5705.00 MHz, Antenna: RADWIN RW-9314-5158, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4806.19	63.06	2.86	-12.43	53.49	Max Peak	Vertical	189	1	68.2	-14.7	Pass
2	4806.19	48.94	2.86	-12.43	39.37	Max Avg	Vertical	189	1	54.0	-14.6	Pass
3	5702.89	75.06	3.18	-11.34	66.90	Fundamental	Vertical	151	1	--	--	

Test Notes: EUT powered by POE. 5G notch in front of amp to prevent overload.

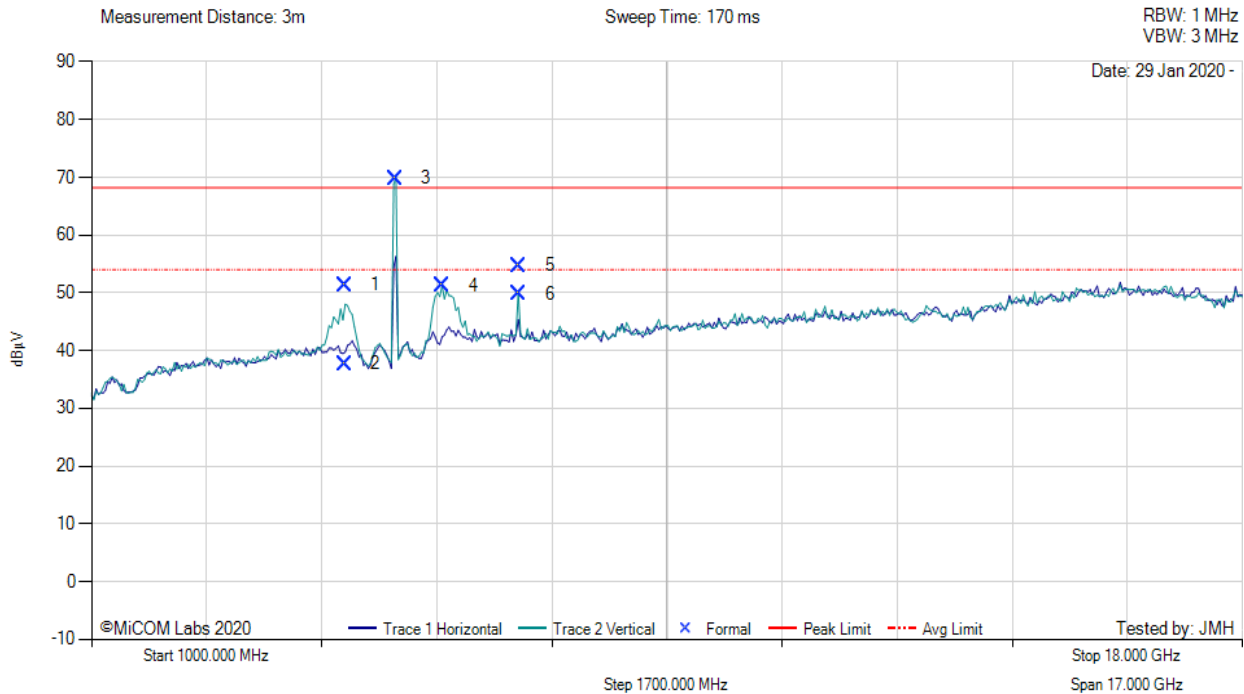
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A.1.1.4. RADWIN RW-9401-5004

TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN RW-9401-5004, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4743.80	60.84	2.87	-12.34	51.37	Max Peak	Vertical	166	19	68.2	-16.9	Pass
2	4743.80	47.15	2.87	-12.34	37.68	Max Avg	Vertical	166	19	54.0	-16.3	Pass
3	5494.73	78.38	3.07	-11.64	69.81	Fundamental	Vertical	151	0	--	--	
4	6189.88	57.59	3.27	-9.69	51.17	Peak (NRB)	Vertical	151	0	--	--	Pass
5	7320.13	58.99	3.59	-7.82	54.76	Max Peak	Vertical	196	240	68.2	-13.5	Pass
6	7320.13	54.05	3.59	-7.82	49.82	Max Avg	Vertical	196	240	54.0	-4.2	Pass

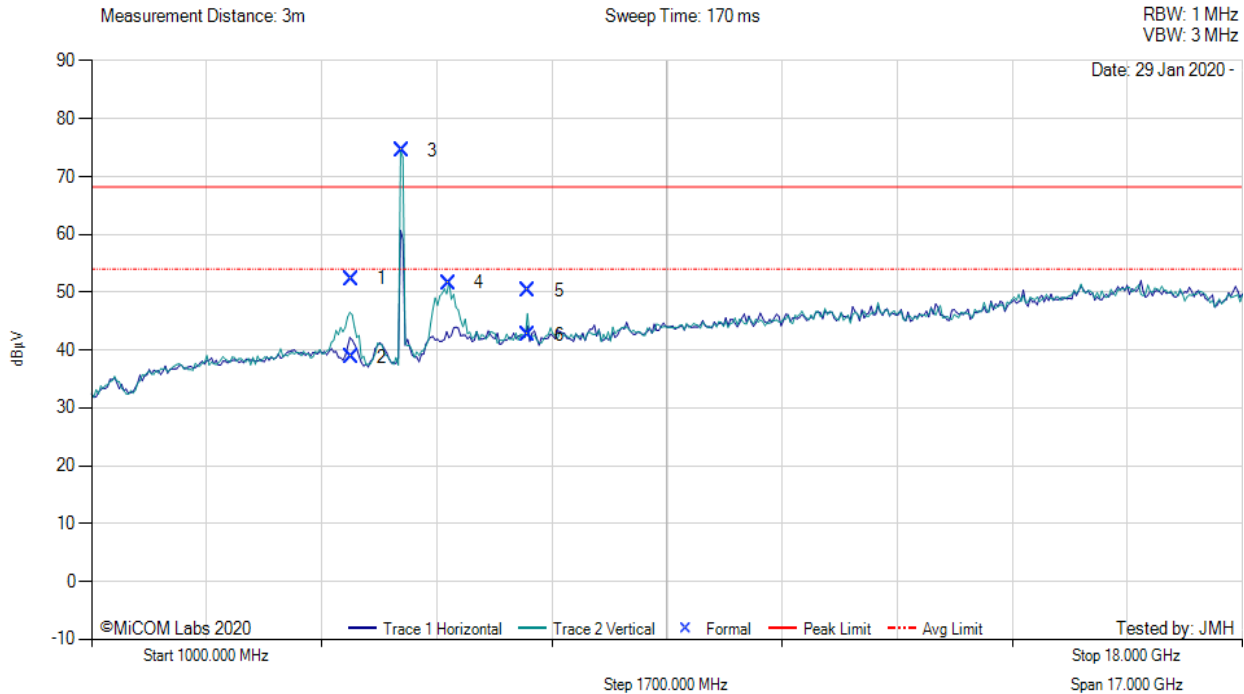
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5590.00 MHz, Antenna: RADWIN RW-9401-5004, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	4835.41	62.06	2.82	-12.53	52.35	Max Peak	Vertical	192	352	68.2	-15.9	Pass
2	4835.41	48.53	2.82	-12.53	38.82	Max Avg	Vertical	192	352	54.0	-15.2	Pass
3	5586.46	82.87	3.13	-11.56	74.44	Fundamental	Vertical	200	0	--	--	
4	6273.56	57.74	3.35	-9.50	51.59	Peak (NRB)	Vertical	200	0	--	--	Pass
5	7453.42	54.50	3.61	-7.77	50.34	Max Peak	Vertical	196	286	68.2	-17.9	Pass
6	7453.42	46.84	3.61	-7.77	42.68	Max Avg	Vertical	196	286	54.0	-11.3	Pass

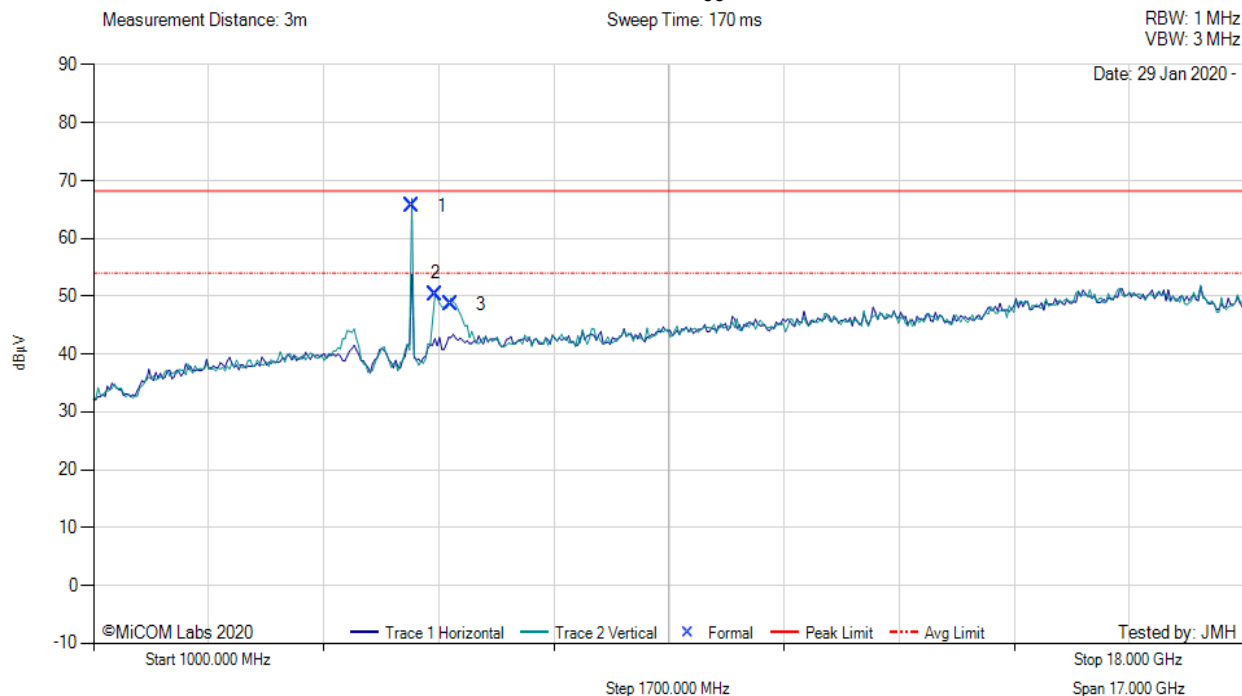
Test Notes: EUT powered by POE. 5G Notch in front of amp to prevent overload.

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TX SPURIOUS & RESTRICTED BAND EMISSIONS



Variant: 20 MHz, Test Freq: 5705.00 MHz, Antenna: RADWIN RW-9401-5004, Power Setting: 21, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5702.56	73.83	3.18	-11.34	65.67	Fundamental	Vertical	200	0	--	--	
2	6043.28	57.20	3.22	-10.04	50.38	Peak (NRB)	Vertical	200	0	--	--	Pass
3	6275.70	54.72	3.35	-9.48	48.59	Peak (NRB)	Vertical	200	0	--	--	Pass

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

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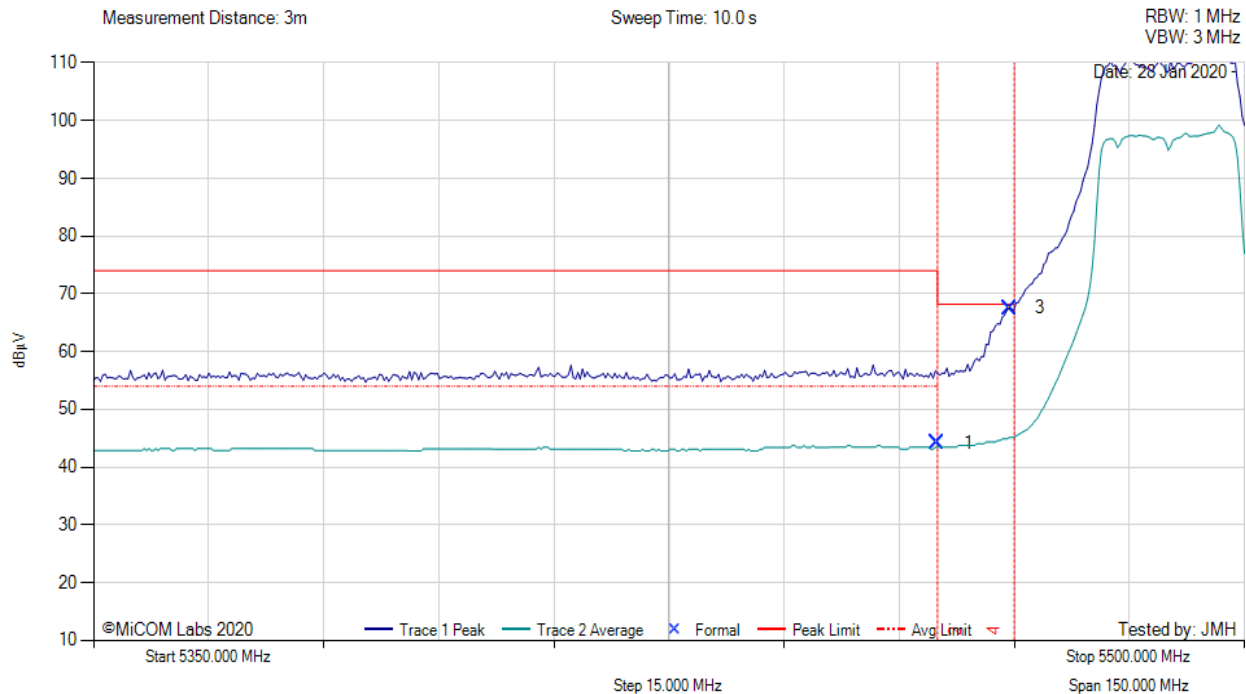
A.1.2. Restricted Edge & Band-Edge Emissions

A.1.2.5. RADWIN AT0058760



RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 4.5, Duty Cycle (%): 86



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.52	3.06	34.53	44.11	Max Avg	Vertical	164	4	54.0	-9.9	Pass
3	5469.40	29.95	3.06	34.55	67.56	Max Peak	Vertical	164	4	68.2	-0.7	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

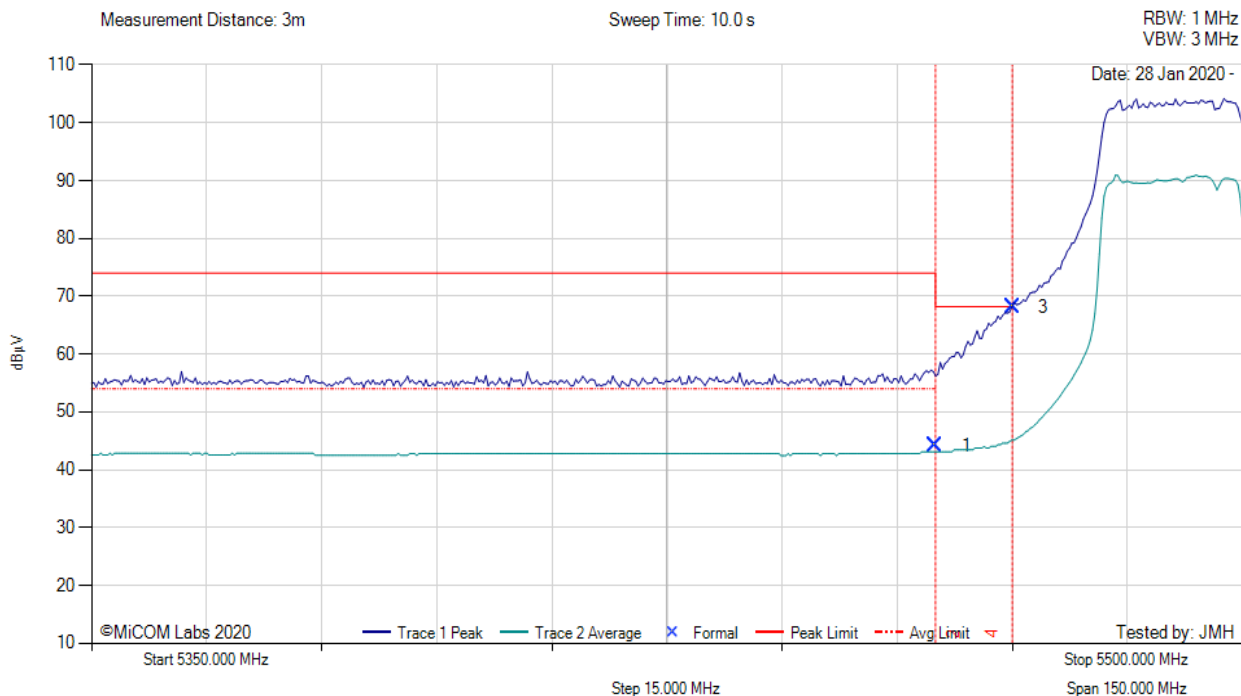
Test Notes: EUT powered by POE.PS reduced to 4.5 to meet band edge limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40 MHz, Test Freq: 5500.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 1.5, Duty Cycle (%): 78



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.62	3.06	34.53	44.21	Max Avg	Vertical	164	4	54.0	-9.8	Pass
3	5470.00	30.51	3.06	34.55	68.12	Max Peak	Vertical	164	4	68.2	-0.1	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

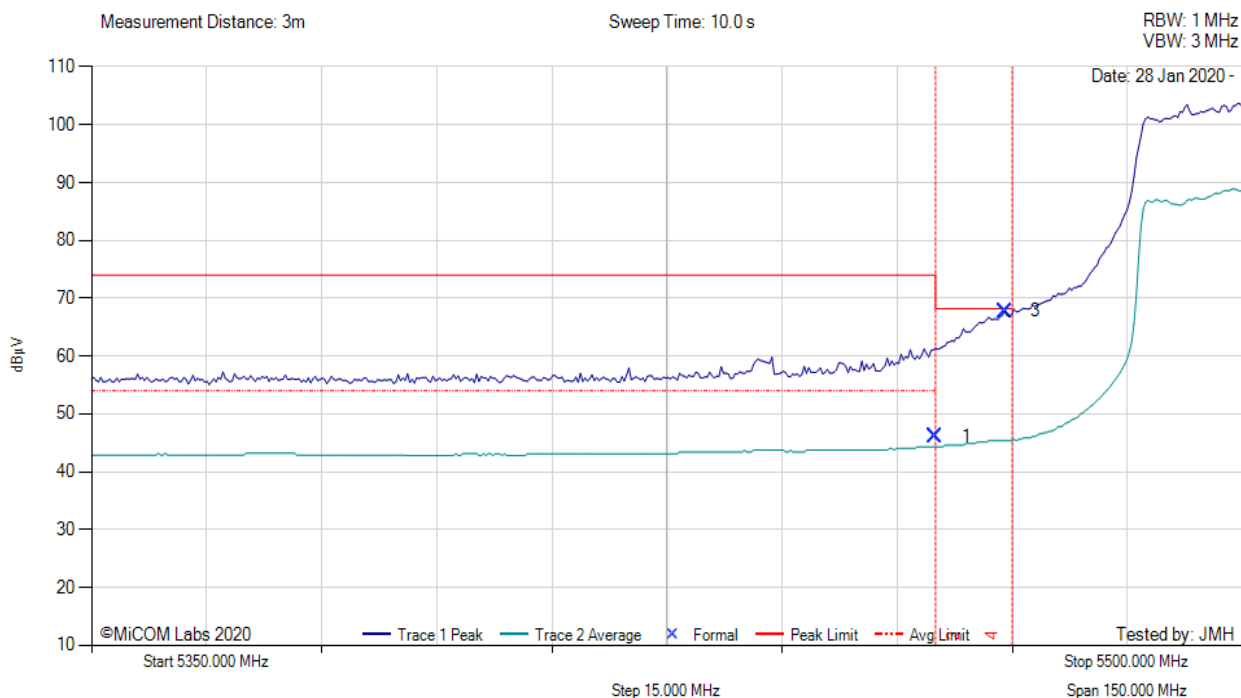
Test Notes: EUT powered by POE. PS reduced to 1.5 to meet band edge limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80 MHz, Test Freq: 5525.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 2.5, Duty Cycle (%): 66



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.74	3.06	34.53	46.13	Max Avg	Vertical	164	4	54.0	-7.9	Pass
3	5469.02	30.18	3.06	34.55	67.79	Max Peak	Vertical	164	4	68.2	-0.4	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. PS reduced to 2.5 to meet band edge limit. *Includes Duty Cycle correction for Avg Measurement.

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A.1.2.6. RADWIN RW-9105-5158

RESTRICTED LOWER BAND-EDGE EMISSIONS

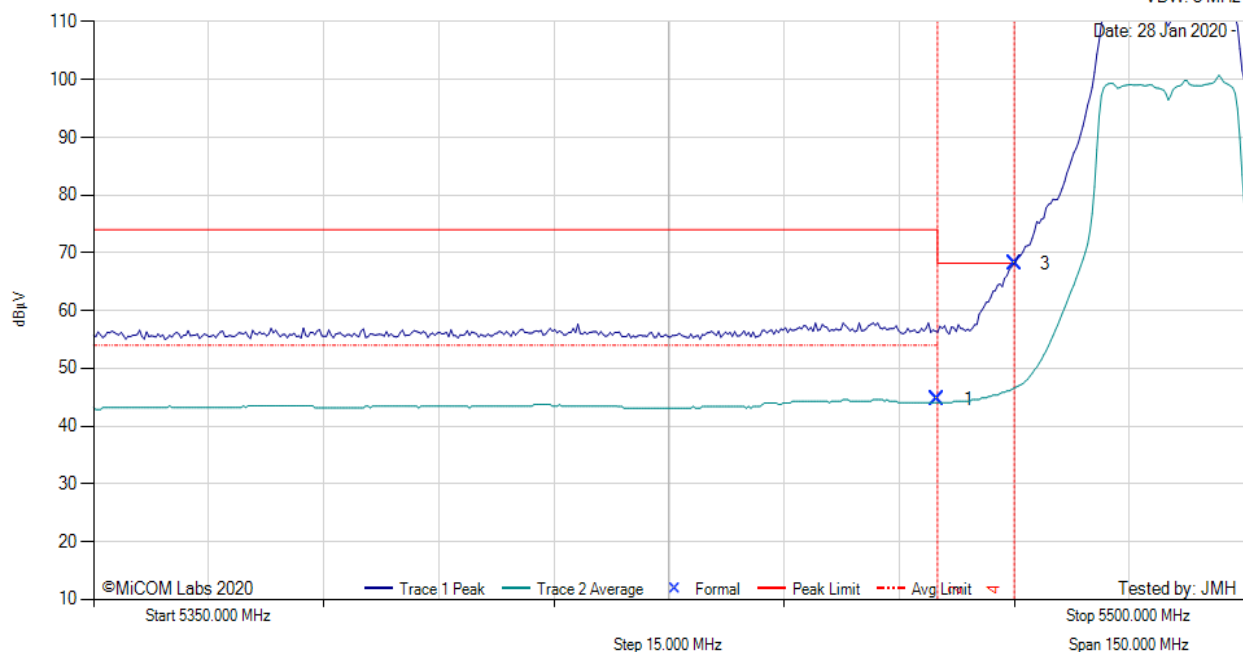


Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN RW-9105-5158, Power Setting: 4.0, Duty Cycle (%): 86

Measurement Distance: 3m

Sweep Time: 10.0 s

RBW: 1 MHz
VBW: 3 MHz



5350.00 - 5500.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	7.12	3.06	34.53	44.71	Max Avg	Horizontal	198	1	54.0	-9.3	Pass
3	5470.00	30.49	3.06	34.55	68.10	Max Peak	Horizontal	198	1	68.2	-0.1	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

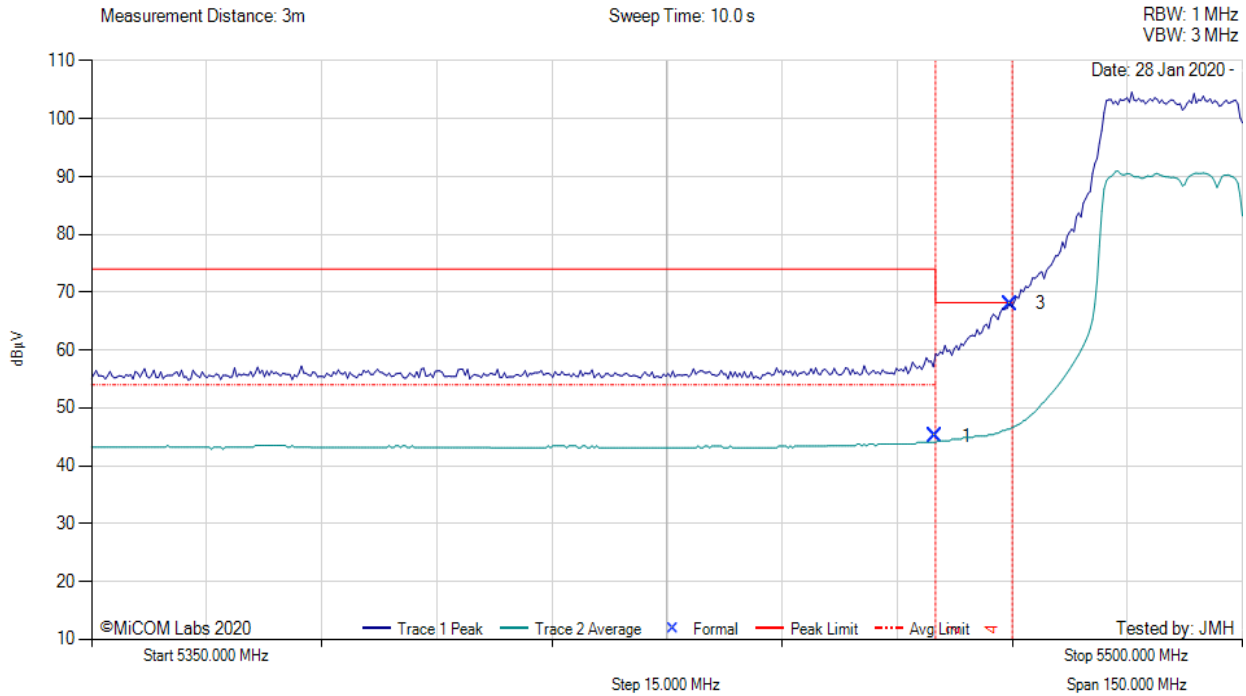
Test Notes: EUT powered by POE. Power reduced to meet limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40 MHz, Test Freq: 5500.00 MHz, Antenna: RADWIN RW-9105-5158, Power Setting: 0, Duty Cycle (%): 78



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.46	3.06	34.53	45.13	Max Avg	Horizontal	198	1	54.0	-8.9	Pass
3	5469.70	30.36	3.06	34.55	67.97	Max Peak	Horizontal	198	1	68.2	-0.3	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

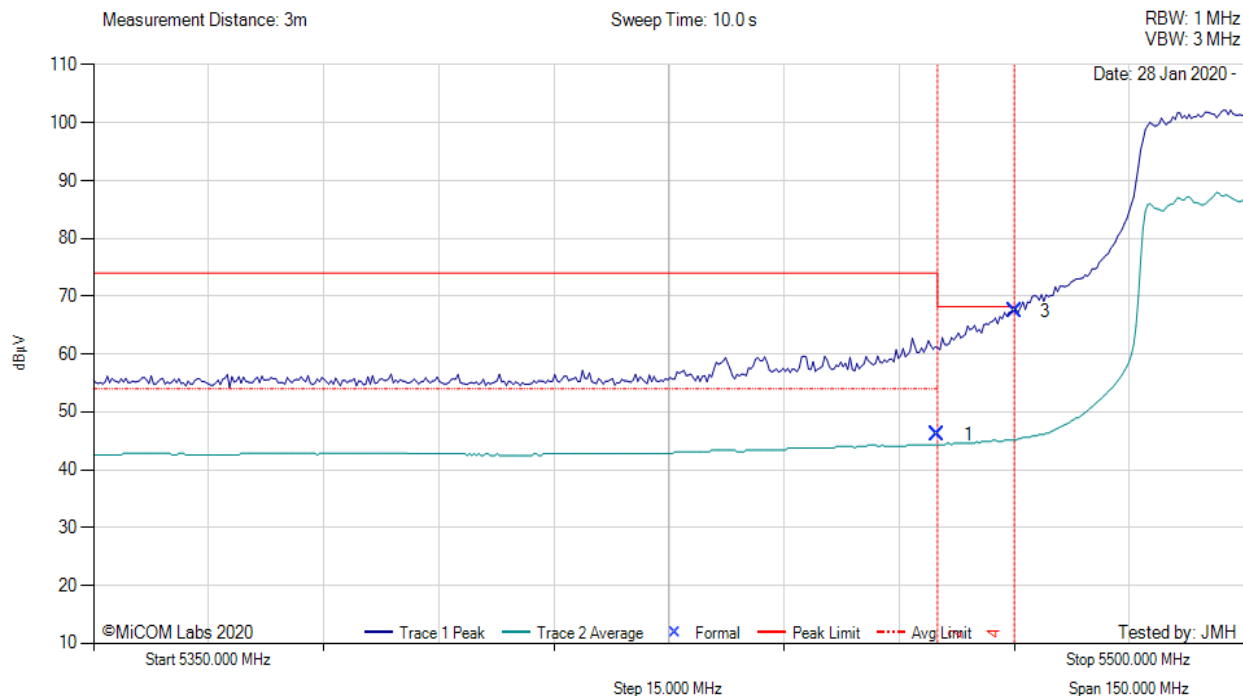
Test Notes: EUT powered by POE. Power reduced to meet limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80 MHz, Test Freq: 5525.00 MHz, Antenna: RADWIN RW-9105-5158, Power Setting: 1, Duty Cycle (%): 66



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	8.54	3.06	34.53	46.13	Max Avg	Horizontal	198	1	54.0	-7.9	Pass
3	5470.00	29.87	3.06	34.55	67.48	Max Peak	Horizontal	198	1	68.2	-0.8	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet limit. *Includes Duty Cycle correction for Avg Measurement.

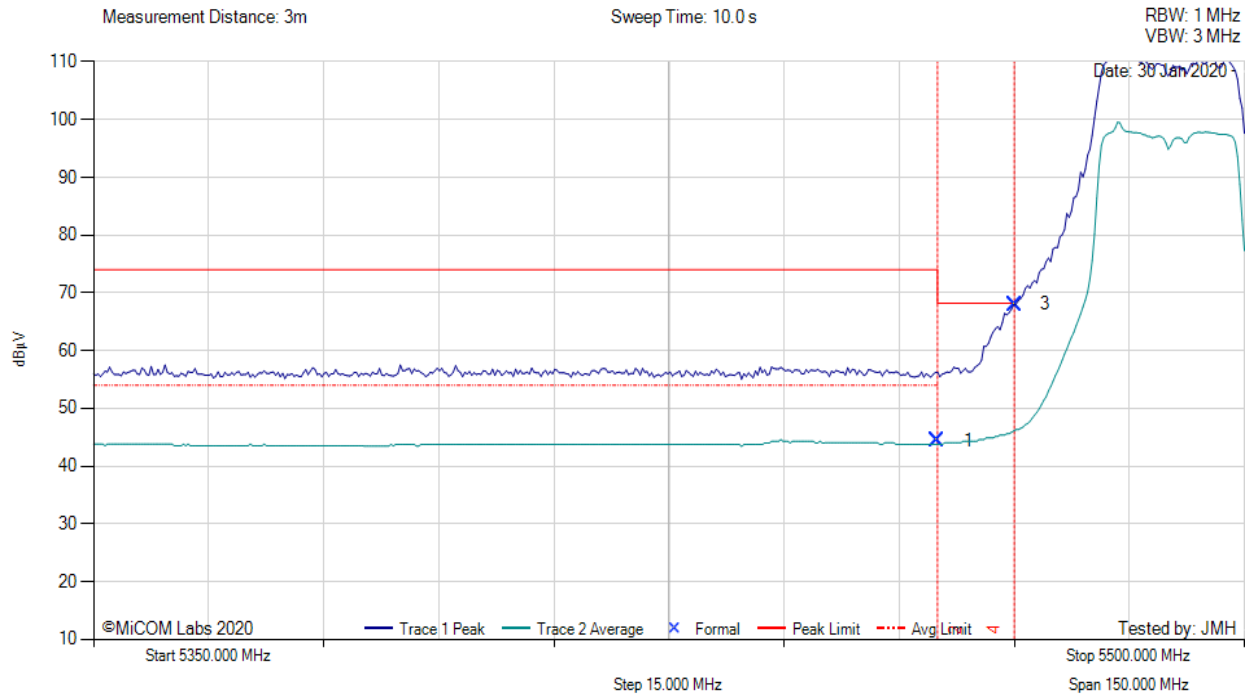
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A.1.2.7. RADWIN RW-9314-5158



RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN RW-9314-5158, Power Setting: 5.5, Duty Cycle (%): 86



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.82	3.06	34.53	44.41	Max Avg	Vertical	177	352	54.0	-9.6	Pass
3	5470.00	30.36	3.06	34.55	67.97	Max Peak	Vertical	177	352	68.2	-0.3	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

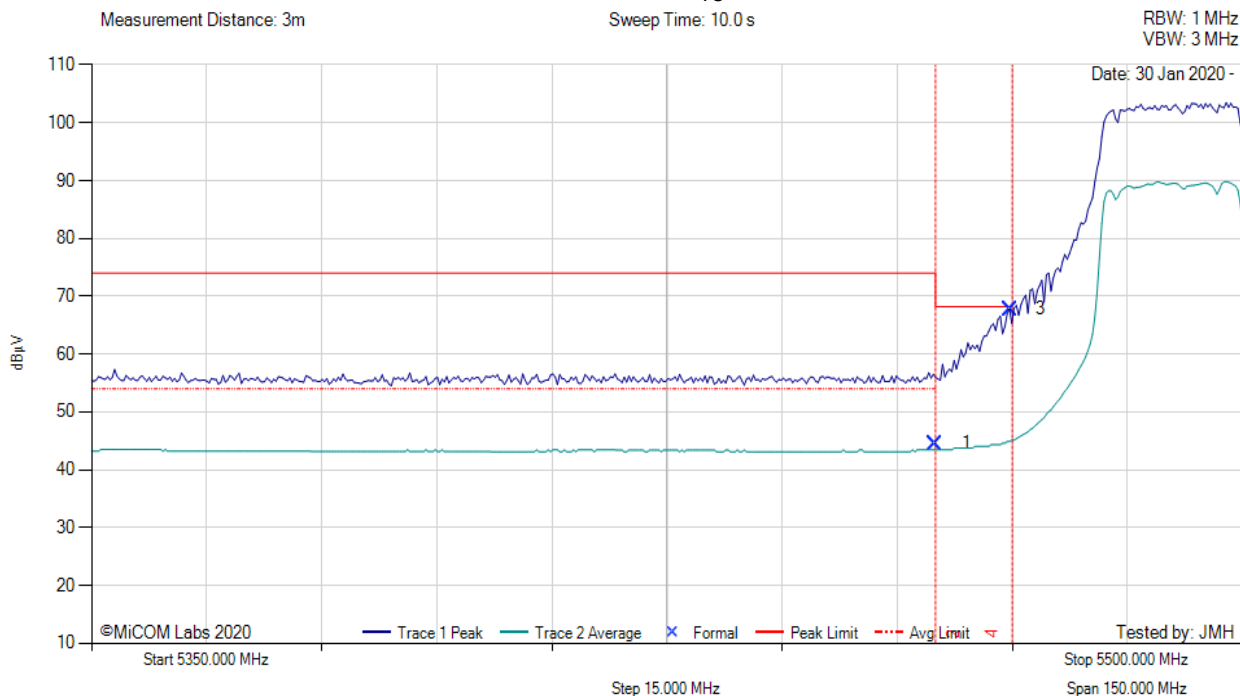
Test Notes: EUT Powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS



Variant: 40 MHz, Test Freq: 5500.00 MHz, Antenna: RADWIN RW-9314-5158, Power Setting: 1.5, Duty Cycle (%): 78



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.94	3.06	34.53	44.53	Max Avg	Vertical	177	352	54.0	-9.5	Pass
3	5469.70	30.16	3.06	34.55	67.77	Max Peak	Vertical	177	352	68.2	-0.5	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

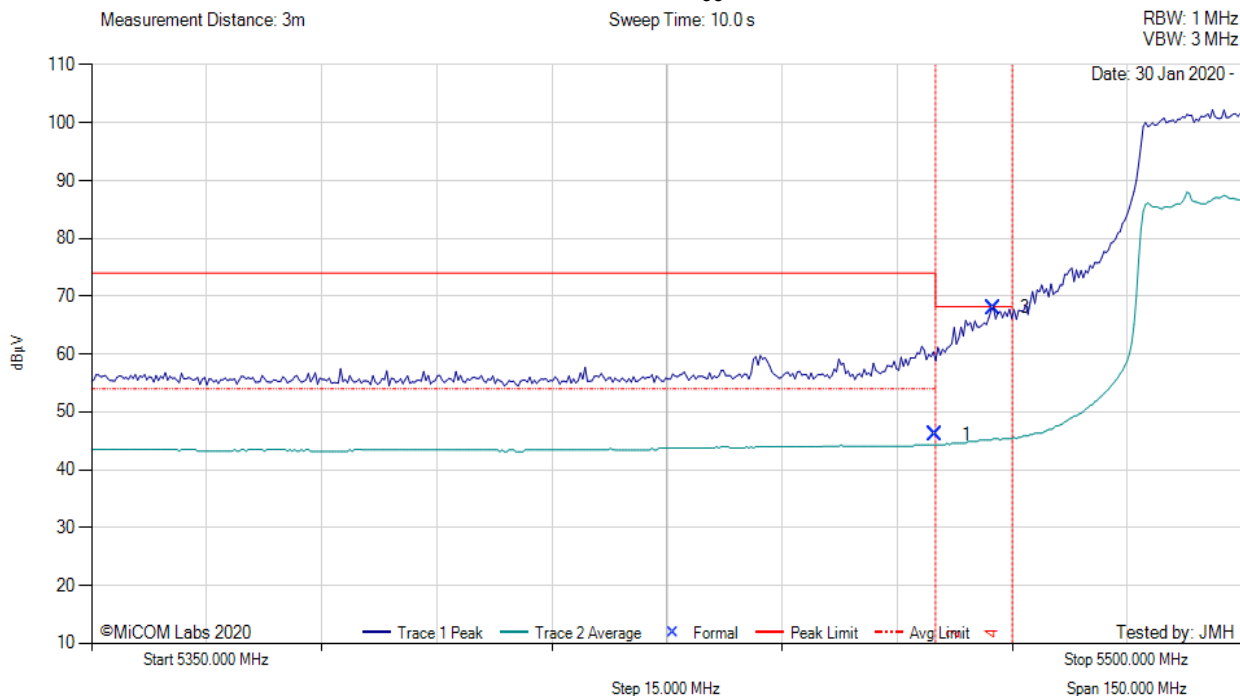
Test Notes: EUT Powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS



Variant: 80 MHz, Test Freq: 5525.00 MHz, Antenna: RADWIN RW-9314-5158, Power Setting: 1.5, Duty Cycle (%): 66



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	8.54	3.06	34.53	46.13	Max Avg	Vertical	177	352	54.0	-7.9	Pass
3	5467.60	30.43	3.07	34.55	68.05	Max Peak	Vertical	177	352	68.2	-0.2	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT Powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

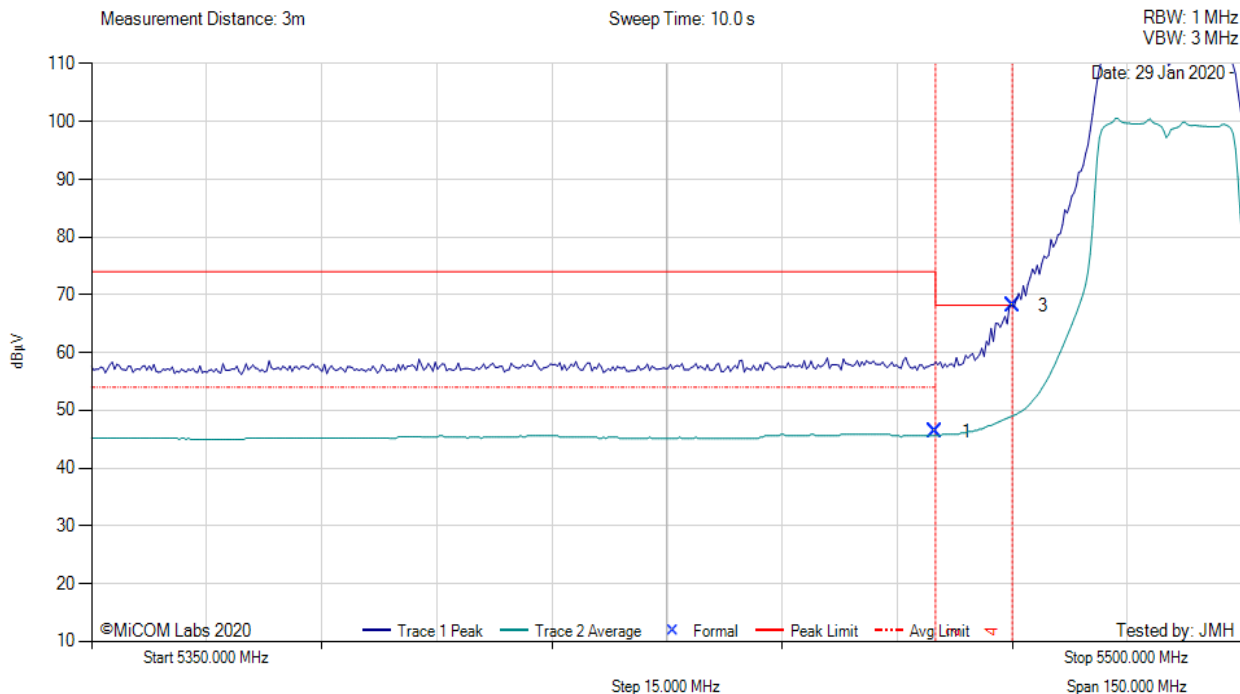
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A.1.2.8. RADWIN RW-9401-5004



RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20 MHz, Test Freq: 5490.00 MHz, Antenna: RADWIN RW-9401-5004, Power Setting: 8, Duty Cycle (%): 86



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	8.70	3.06	34.53	46.29	Max Avg	Vertical	185	3	54.0	-7.7	Pass
3	5470.00	30.53	3.06	34.55	68.14	Max Peak	Vertical	185	3	68.2	-0.1	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

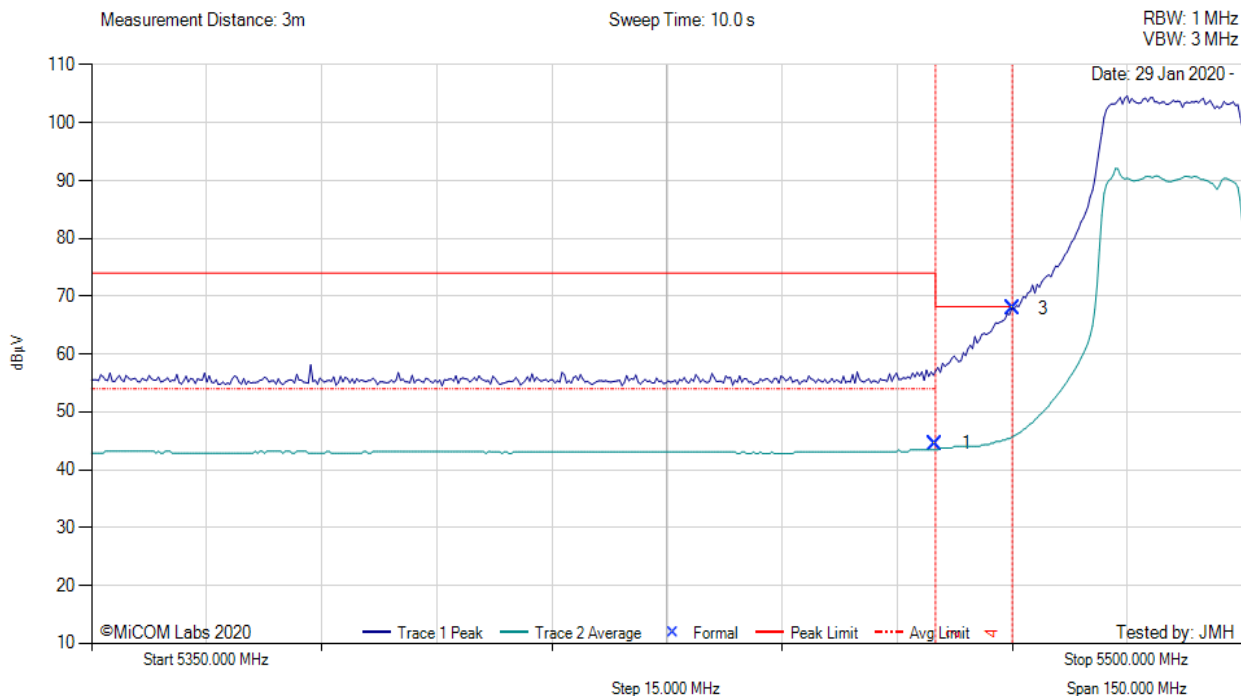
Test Notes: EUT powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40 MHz, Test Freq: 5500.00 MHz, Antenna: RADWIN RW-9401-5004, Power Setting: 3.5



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.94	3.06	34.53	44.53	Max Avg	Vertical	185	3	54.0	-9.5	Pass
3	5470.00	30.29	3.06	34.55	67.90	Max Peak	Vertical	185	3	68.2	-0.3	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

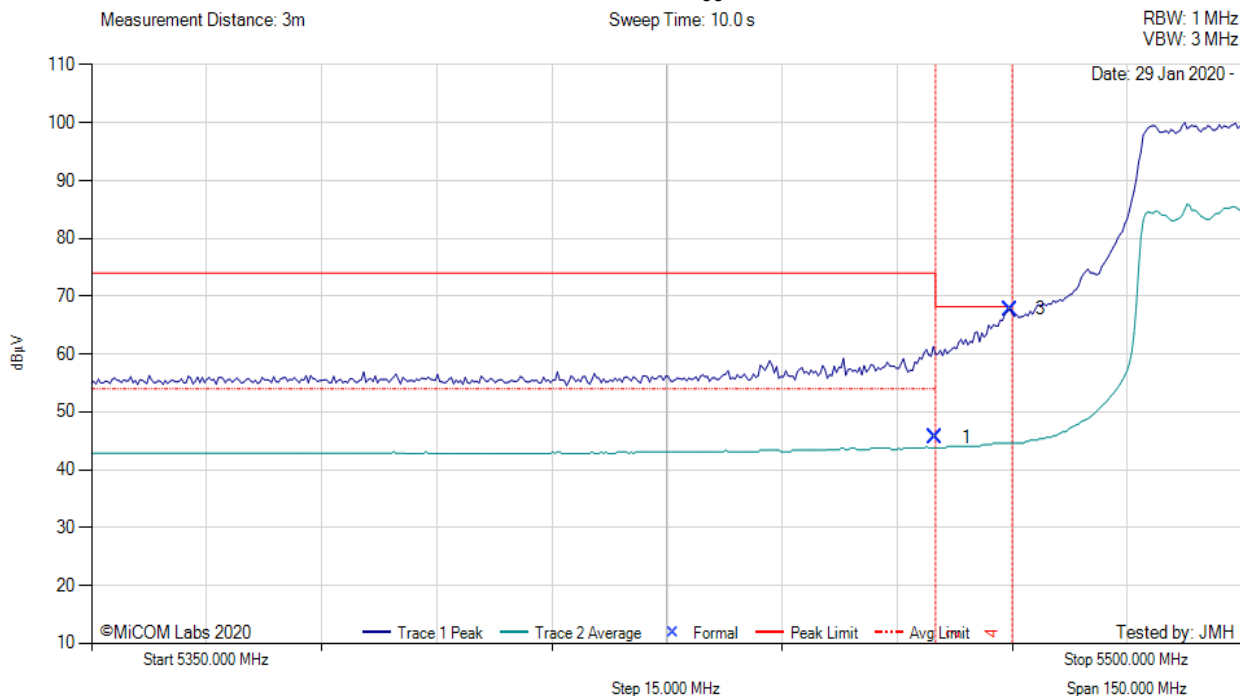
Test Notes: EUT powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

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RESTRICTED LOWER BAND-EDGE EMISSIONS



Variant: 80 MHz, Test Freq: 5525.00 MHz, Antenna: RADWIN RW-9401-5004, Power Setting: 2.5, Duty Cycle (%): 66



5350.00 - 5500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB/m	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5460.00	6.16	3.06	34.53	45.55	Max Avg	Vertical	185	3	54.0	-8.5	Pass
3	5469.70	30.16	3.06	34.55	67.77	Max Peak	Vertical	185	3	68.2	-0.5	Pass
2	5460.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
4	5470.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: EUT powered by POE. Power reduced to meet Peak Limit. *Includes Duty Cycle correction for Avg Measurement.

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A.1.3. Digital Emissions



DIGITAL EMISSIONS

Variant: 20 MHz, Test Freq: 5590.00 MHz, Antenna: RADWIN AT0058760, Power Setting: 21, Duty Cycle (%): 86



30.00 - 1000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB/m	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	30.52	38.78	3.54	-8.20	34.12	MaxQP	Vertical	111	328	40.0	-5.9	Pass
2	80.93	55.95	3.94	-20.89	39.00	MaxQP	Horizontal	380	262	40.0	-1.0	Pass
3	133.75	45.61	4.23	-14.82	35.02	MaxQP	Vertical	102	355	43.0	-8.0	Pass
4	159.44	50.54	4.36	-15.90	39.00	MaxQP	Horizontal	175	131	43.0	-4.0	Pass
5	320.00	51.98	4.99	-13.78	43.19	MaxQP	Horizontal	101	295	46.0	-2.8	Pass
6	700.01	35.74	6.20	-7.22	34.72	MaxQP	Horizontal	111	174	46.0	-11.3	Pass
7	899.97	33.09	6.76	-4.92	34.93	MaxQP	Horizontal	102	139	46.0	-11.1	Pass

Test Notes: EUT Powered by POE.

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