



9.5. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

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Doc No: 17-EM-F0876 / 6.0



Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

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Note:

- a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

Configuration	Average	
	RBW	VBW
802.11b	1MHz	Refer to section 6.6 for duty cycle.
802.11g		
802.11n (HT20)		
802.11n (HT40)		

- d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
- g. Test data of Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Preamp Factor (dB).
- h. Test data of Notation "@" = Fundamental Frequency
- i. Test data of Notation "*" = The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

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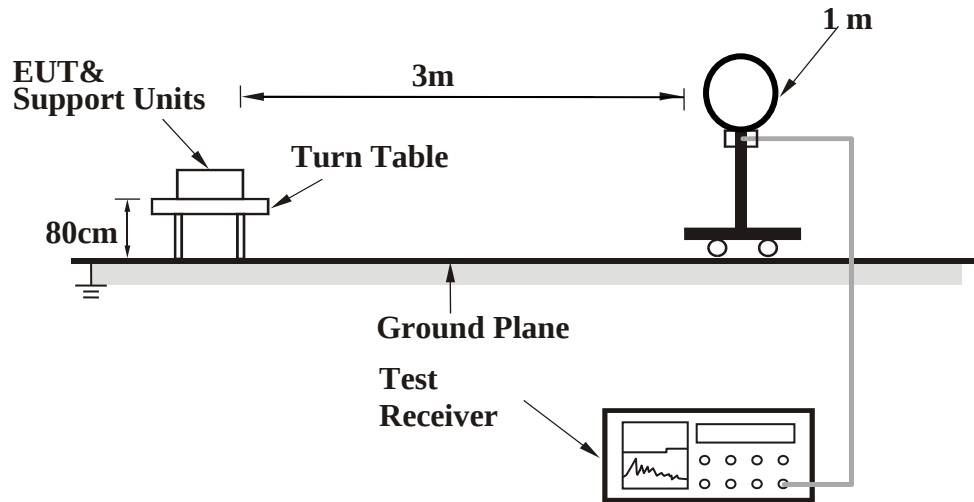
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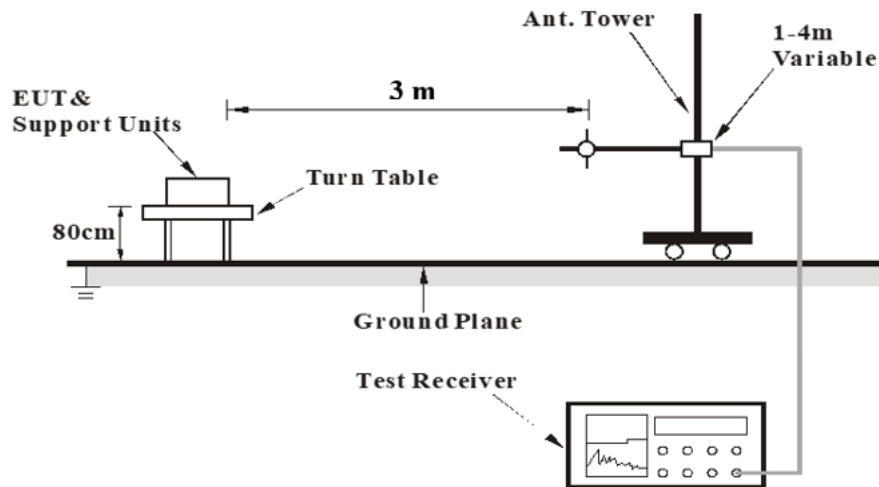
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Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



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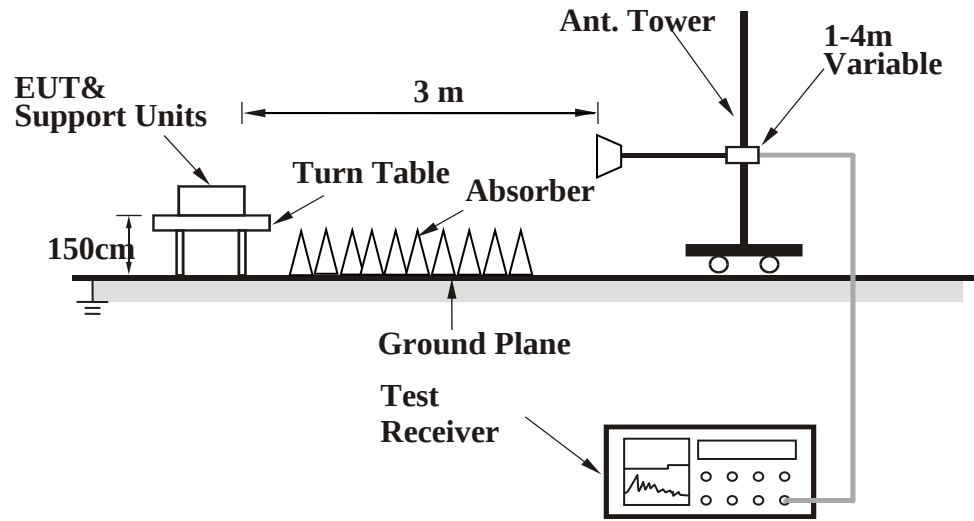
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<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.



Test Data

Above 1 GHz

Mode	802.11b	Channel	1
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Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal		2385.62	42.31	5.83	48.14	74	-25.86	PK
		2386.19	32.27	5.83	38.1	54	-15.9	AVG
	@	2412	97.87	5.83	103.7	N/A	N/A	PK
	@	2412	89.51	5.83	95.34	N/A	N/A	AVG
	*	4824	48.09	2.35	50.44	74	-23.56	PK
Vertical		2380.11	43.11	5.84	48.95	74	-25.05	PK
		2385.81	34.07	5.83	39.9	54	-14.1	AVG
	@	2412	100.29	5.83	106.12	N/A	N/A	PK
	@	2412	93.24	5.83	99.07	N/A	N/A	AVG
	*	4824	45.6	2.35	47.95	74	-26.05	PK

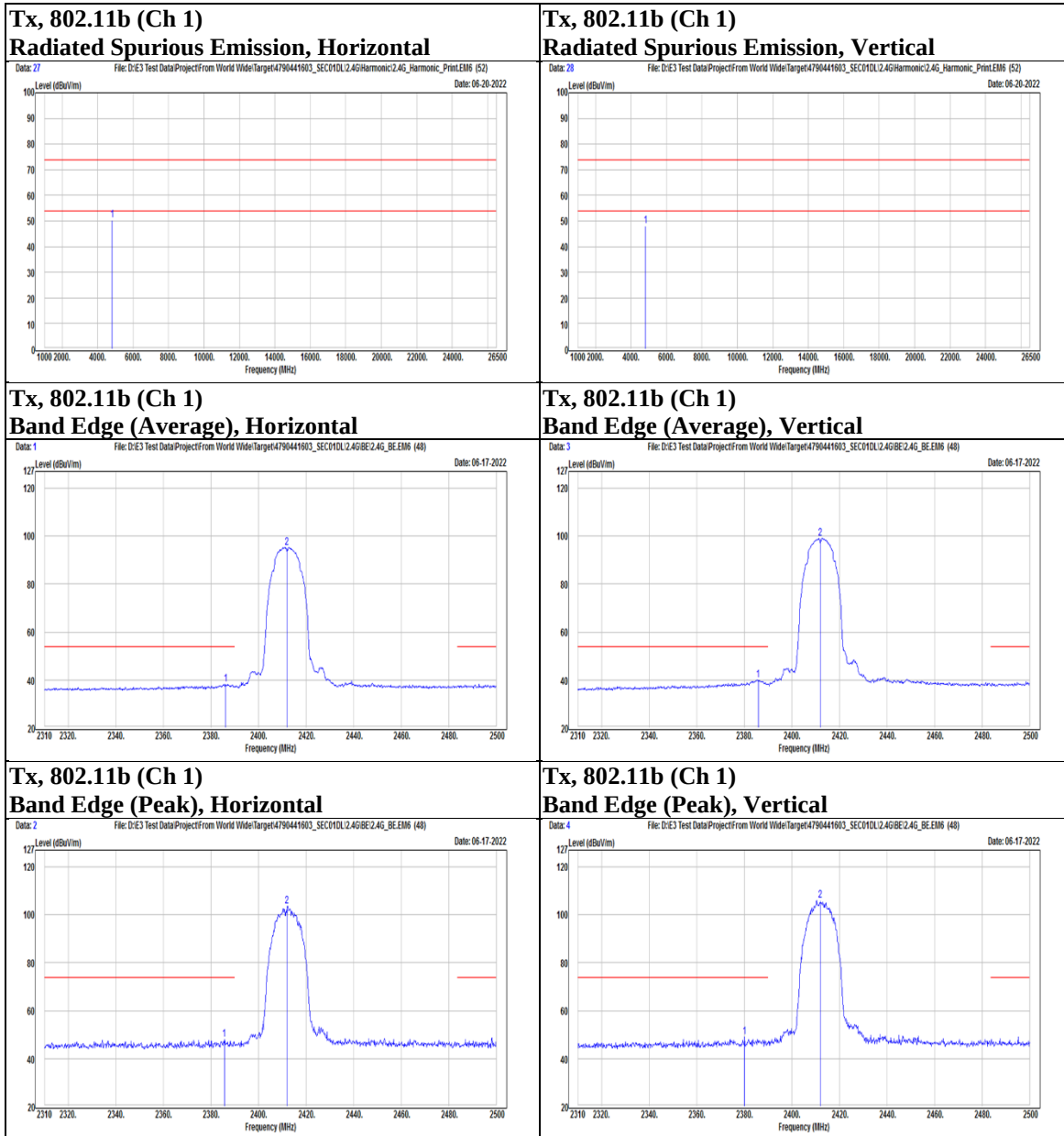
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Mode	802.11b	Channel	6
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2360.73	41.9	5.88	47.78	74	-26.22	PK
		2383.91	31.46	5.83	37.29	54	-16.71	AVG
	@	2437	97.76	5.92	103.68	N/A	N/A	PK
	@	2437	89.78	5.92	95.7	N/A	N/A	AVG
		2485.18	42.13	5.67	47.8	74	-26.2	PK
		2496.58	32.42	5.57	37.99	54	-16.01	AVG
	*	4874	47.38	2.4	49.78	74	-24.22	PK
Vertical		2363.2	42.22	5.88	48.1	74	-25.9	PK
		2381.44	32.37	5.83	38.2	54	-15.8	AVG
	@	2437	100.21	5.92	106.13	N/A	N/A	PK
	@	2437	92.82	5.92	98.74	N/A	N/A	AVG
		2487.27	43.09	5.66	48.75	74	-25.25	PK
		2497.53	33.49	5.57	39.06	54	-14.94	AVG
	*	4874	45.05	2.4	47.45	74	-26.55	PK

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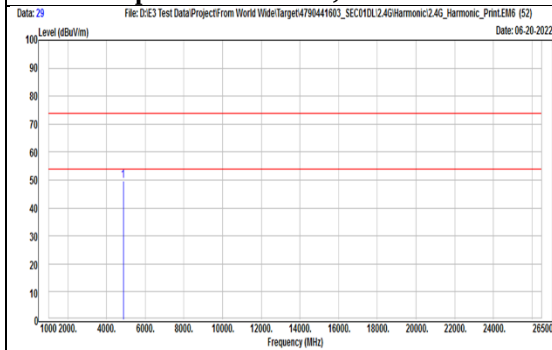
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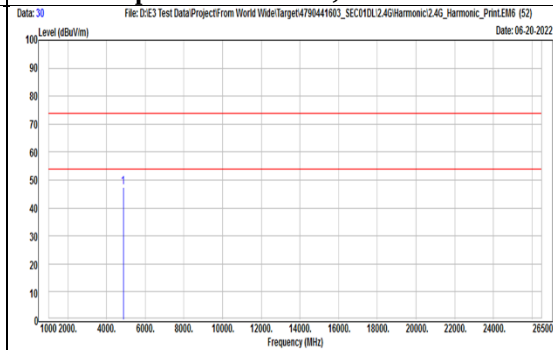
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Radiated Spurious Emission, Horizontal



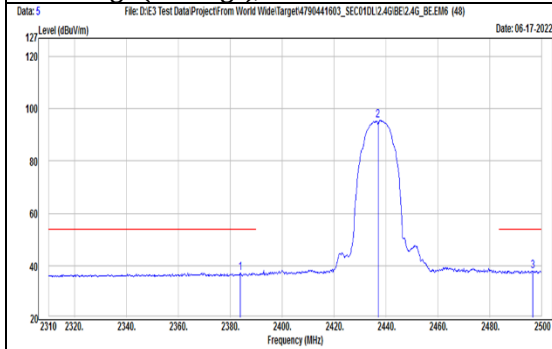
Tx, 802.11b (Ch 6)

Radiated Spurious Emission, Vertical



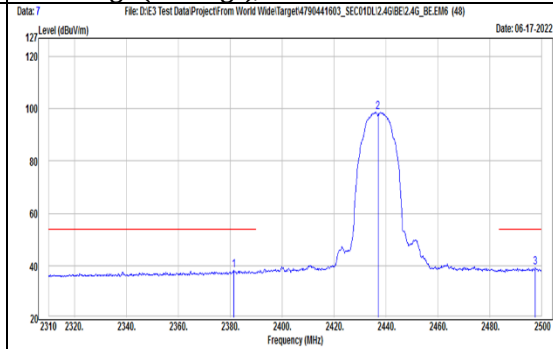
Tx, 802.11b (Ch 6)

Band Edge (Average), Horizontal



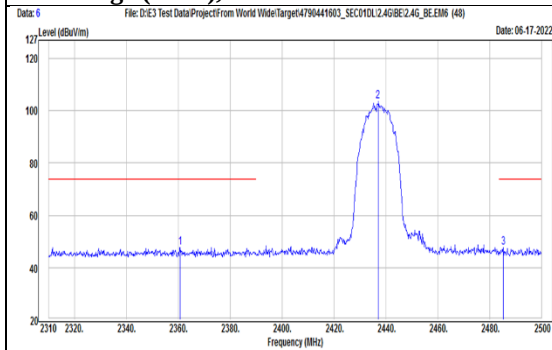
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Band Edge (Average), Vertical



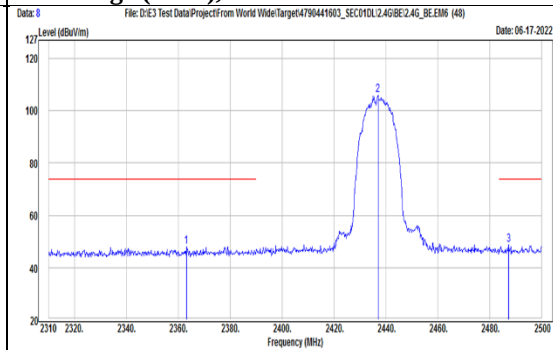
Tx, 802.11b (Ch 6)

Band Edge (Peak), Horizontal



Tx, 802.11b (Ch 6)

Band Edge (Peak), Vertical



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Mode	802.11b	Channel	11
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	2462	97.55	5.87	103.42	N/A	N/A	PK
	@	2462	90.1	5.87	95.97	N/A	N/A	AVG
		2488.41	33.14	5.65	38.79	54	-15.21	AVG
		2489.36	42.53	5.64	48.17	74	-25.83	PK
	*	4924	47.79	2.4	50.19	74	-23.81	PK
Vertical	@	2462	99.35	5.87	105.22	N/A	N/A	PK
	@	2462	92.29	5.87	98.16	N/A	N/A	AVG
		2486.89	34.31	5.66	39.97	54	-14.03	AVG
		2488.98	42.91	5.64	48.55	74	-25.45	PK
	*	4924	45.82	2.4	48.22	74	-25.78	PK

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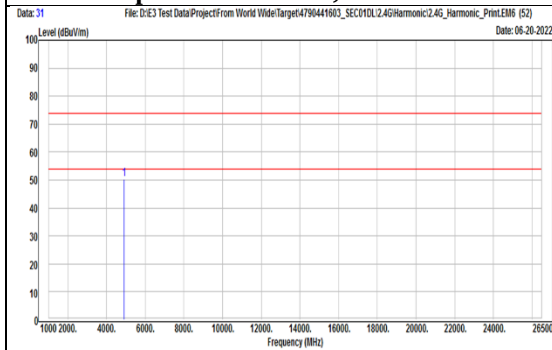
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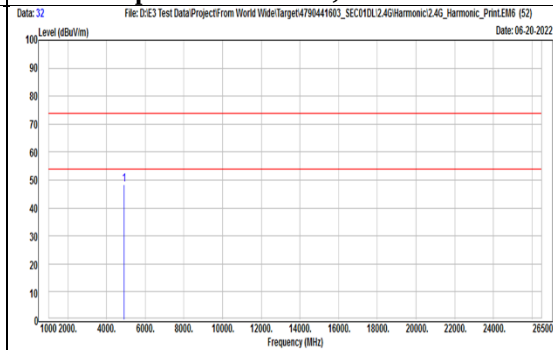
Tx, 802.11b (Ch 11)

Radiated Spurious Emission, Horizontal



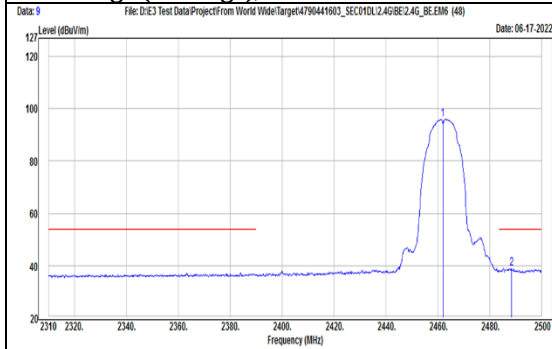
Tx, 802.11b (Ch 11)

Radiated Spurious Emission, Vertical



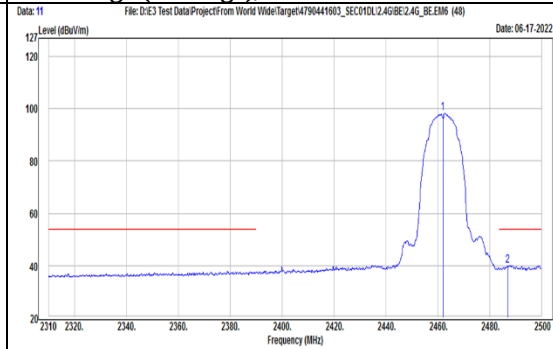
Tx, 802.11b (Ch 11)

Band Edge (Average), Horizontal



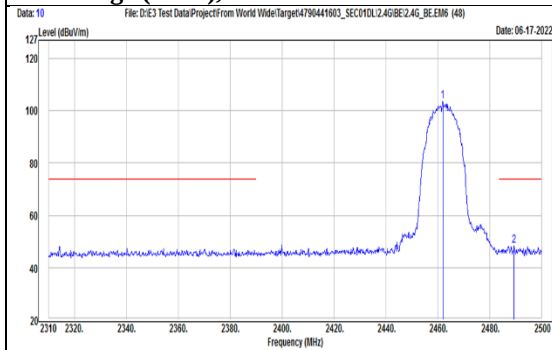
Tx, 802.11b (Ch 11)

Band Edge (Average), Vertical



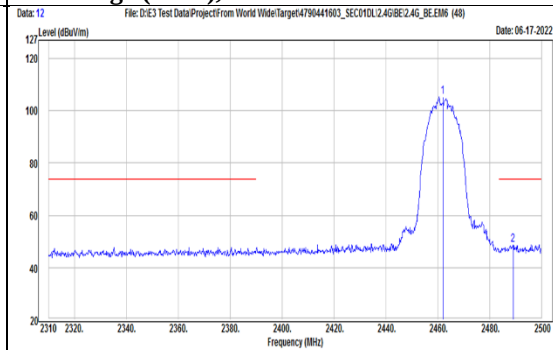
Tx, 802.11b (Ch 11)

Band Edge (Peak), Horizontal



Tx, 802.11b (Ch 11)

Band Edge (Peak), Vertical



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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2389.99	44.84	5.82	50.66	74	-23.34	PK
		2389.99	35	5.82	40.82	54	-13.18	AVG
	@	2412	93.68	5.83	99.51	N/A	N/A	PK
	@	2412	85.51	5.83	91.34	N/A	N/A	AVG
	*	4824	41.85	2.35	44.2	74	-29.8	PK
Vertical		2389.8	46.13	5.82	51.95	74	-22.05	PK
		2389.99	36.57	5.82	42.39	54	-11.61	AVG
	@	2412	96.13	5.83	101.96	N/A	N/A	PK
	@	2412	88.86	5.83	94.69	N/A	N/A	AVG
	*	4824	40.74	2.35	43.09	74	-30.91	PK

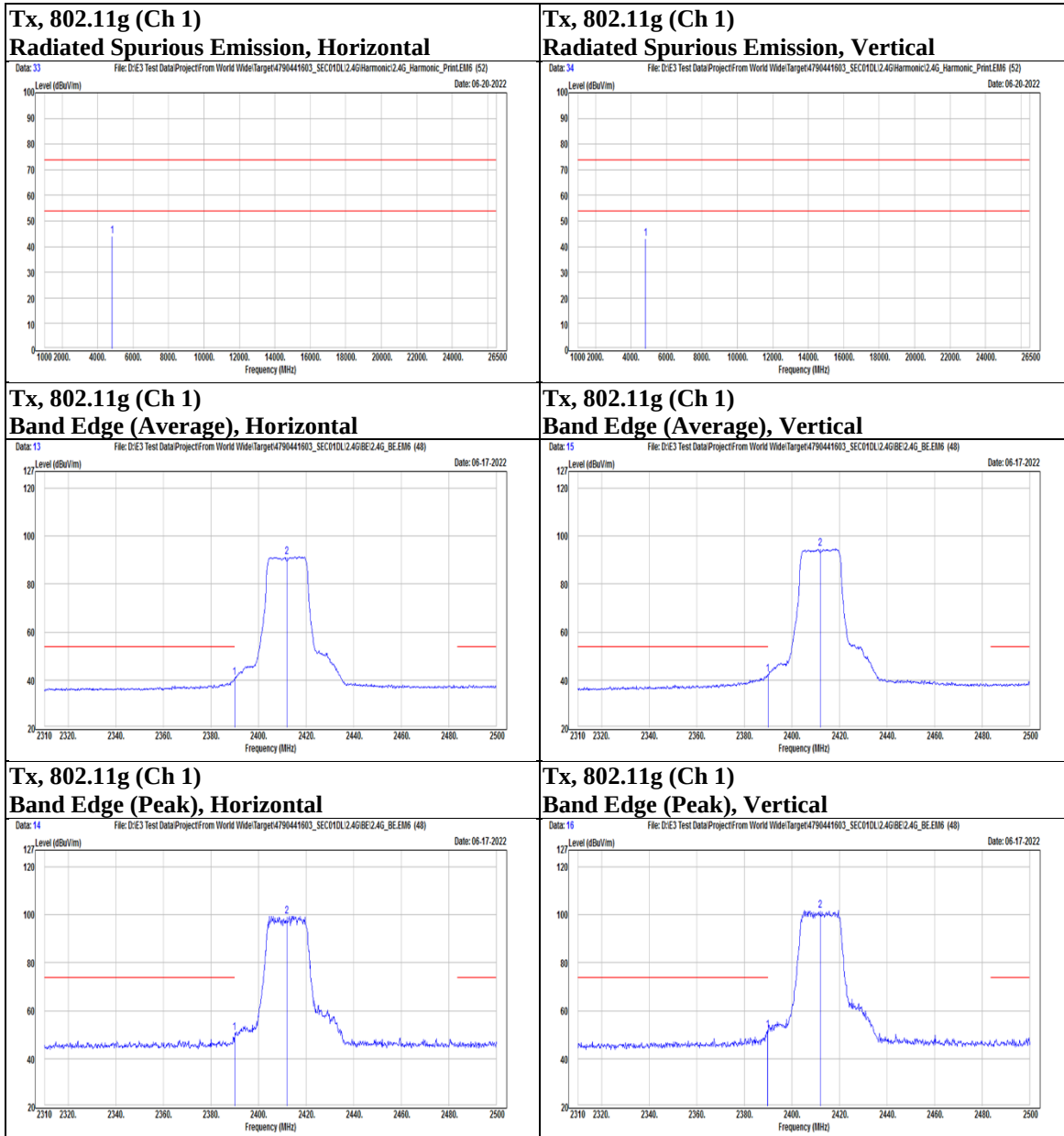
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Mode	802.11g	Channel	6
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2373.46	41.31	5.86	47.17	74	-26.83	PK
		2388.85	31.12	5.81	36.93	54	-17.07	AVG
	@	2437	94.18	5.92	100.1	N/A	N/A	PK
	@	2437	85.35	5.92	91.27	N/A	N/A	AVG
		2484.8	41.67	5.67	47.34	74	-26.66	PK
		2499.24	32.42	5.56	37.98	54	-16.02	AVG
	*	4874	41.89	2.4	44.29	74	-29.71	PK
Vertical		2388.09	42.26	5.82	48.08	74	-25.92	PK
		2389.99	32.53	5.82	38.35	54	-15.65	AVG
	@	2437	97.15	5.92	103.07	N/A	N/A	PK
	@	2437	88.42	5.92	94.34	N/A	N/A	AVG
		2495.25	33.33	5.59	38.92	54	-15.08	AVG
		2499.24	42.76	5.56	48.32	74	-25.68	PK
	*	4874	41.72	2.4	44.12	74	-29.88	PK

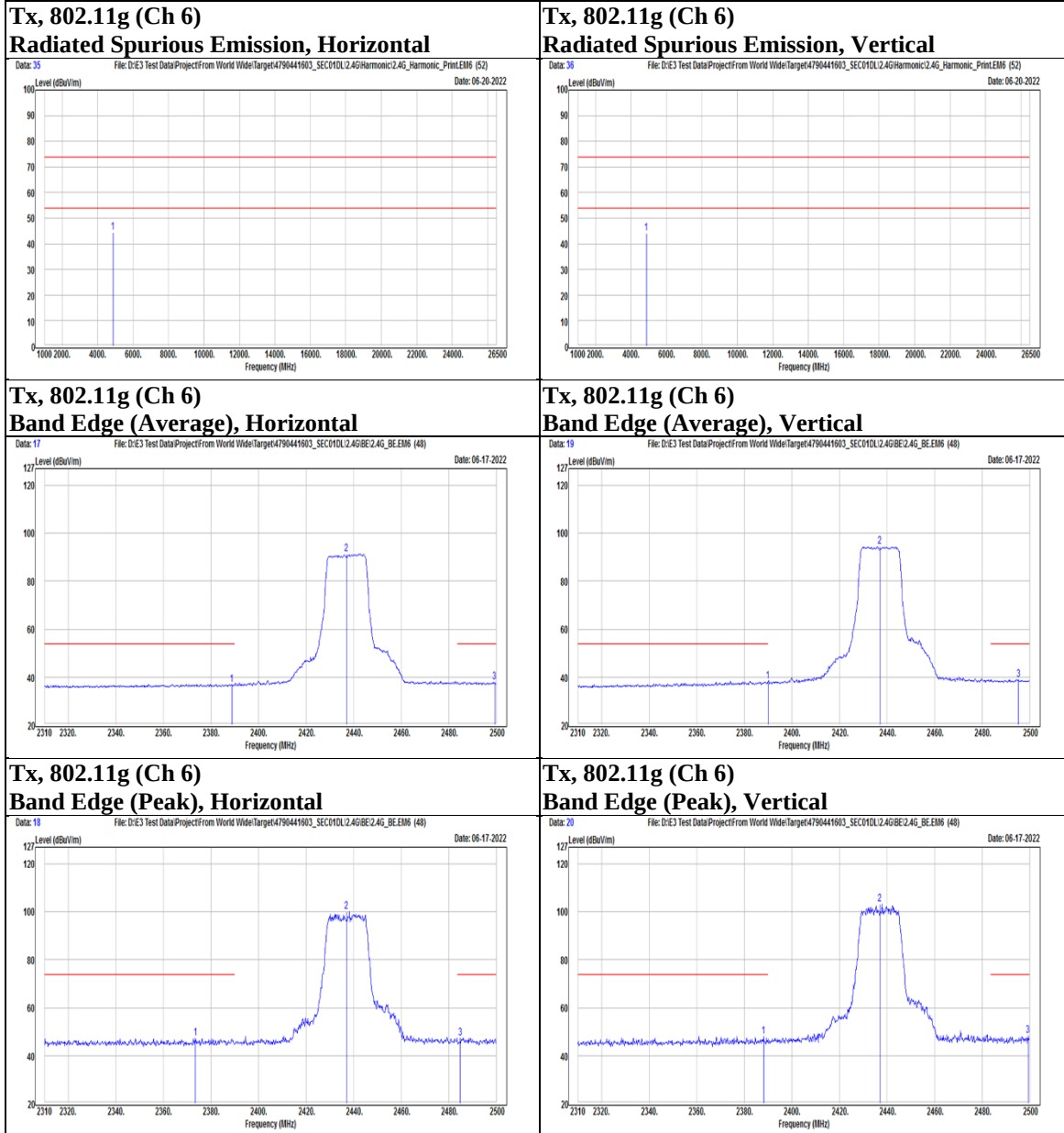
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Mode	802.11g	Channel	11
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	2462	95	5.87	100.87	N/A	N/A	PK
	@	2462	86.11	5.87	91.98	N/A	N/A	AVG
		2483.66	39.82	5.68	45.5	54	-8.5	AVG
		2484.8	49.81	5.67	55.48	74	-18.52	PK
	*	4924	43.58	2.4	45.98	74	-28.02	PK
Vertical	@	2462	96	5.87	101.87	N/A	N/A	PK
	@	2462	87.85	5.87	93.72	N/A	N/A	AVG
		2483.66	50.69	5.68	56.37	74	-17.63	PK
		2483.66	40.74	5.68	46.42	54	-7.58	AVG
	*	4924	41.43	2.4	43.83	74	-30.17	PK

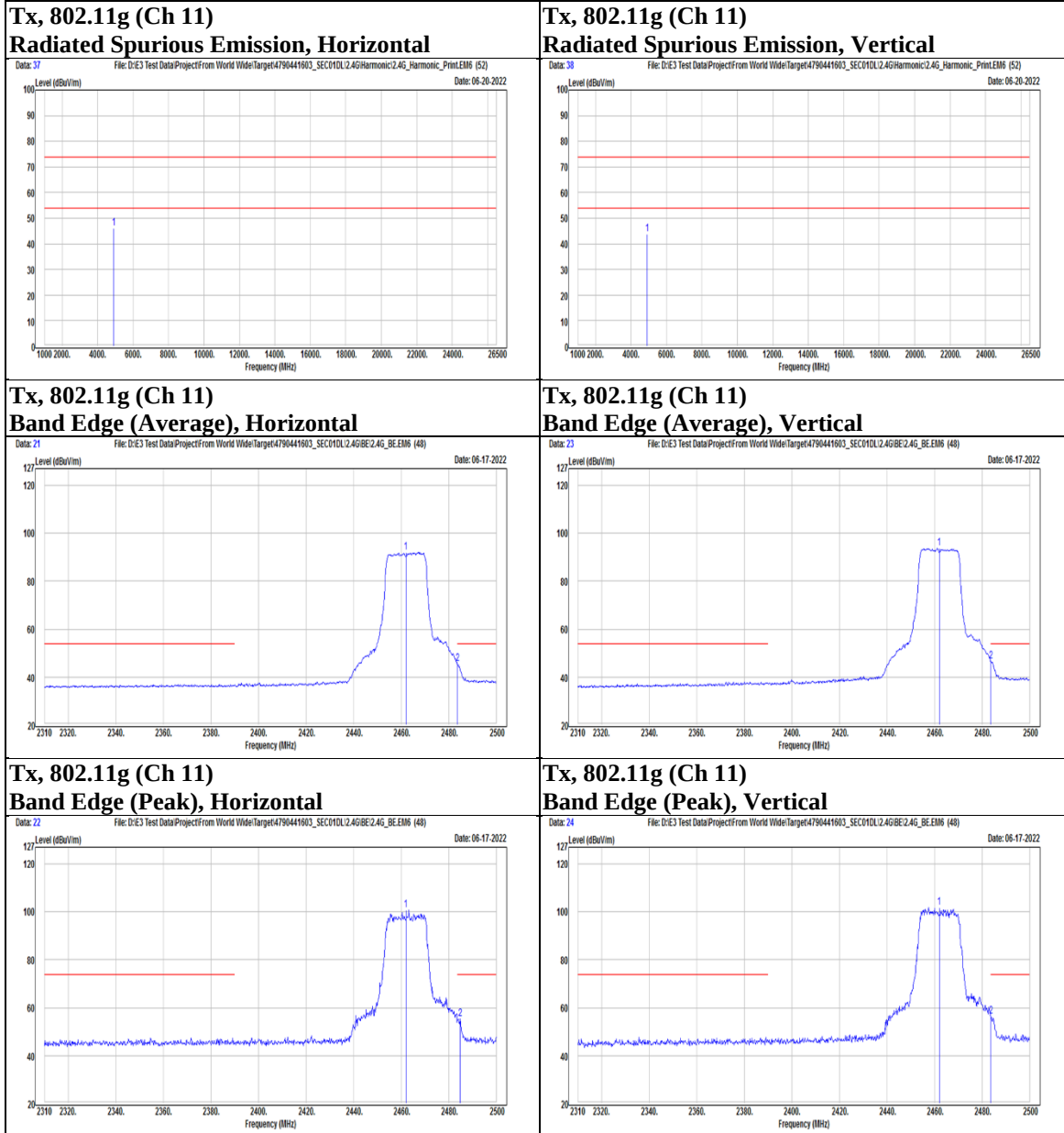
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2389.42	46.69	5.82	52.51	74	-21.49	PK
		2389.99	36.73	5.82	42.55	54	-11.45	AVG
	@	2412	93.11	5.83	98.94	N/A	N/A	PK
	@	2412	85.32	5.83	91.15	N/A	N/A	AVG
	*	4824	40.75	2.35	43.1	74	-30.9	PK
Vertical		2389.42	48.56	5.82	54.38	74	-19.62	PK
		2389.99	39.18	5.82	45	54	-9	AVG
	@	2412	96.19	5.83	102.02	N/A	N/A	PK
	@	2412	88.76	5.83	94.59	N/A	N/A	AVG
	*	4824	40.19	2.35	42.54	74	-31.46	PK

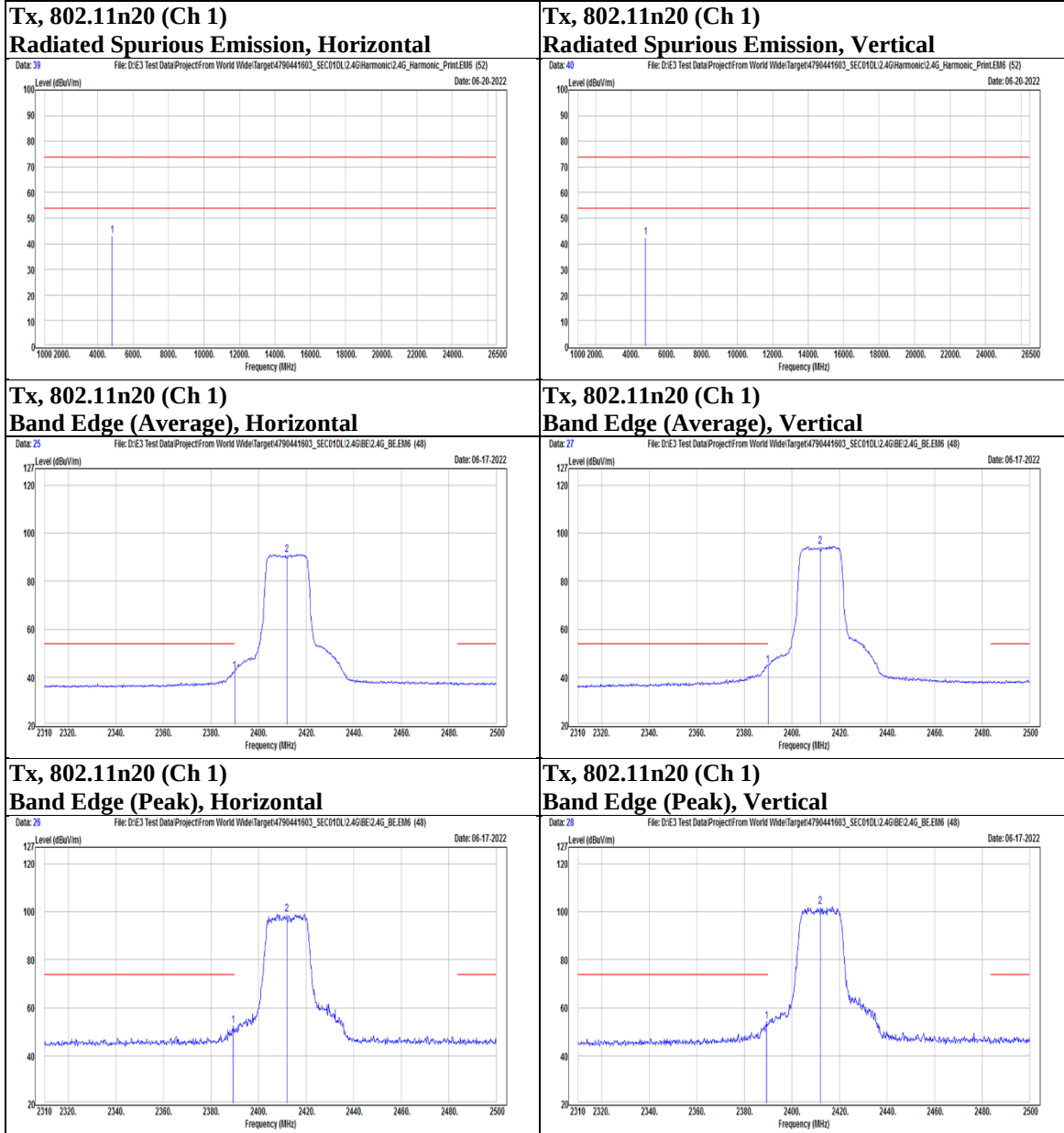
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2364.34	41.92	5.87	47.79	74	-26.21	PK
		2372.89	31.28	5.86	37.14	54	-16.86	AVG
	@	2437	93.85	5.92	99.77	N/A	N/A	PK
	@	2437	85.08	5.92	91	N/A	N/A	AVG
		2489.55	41.74	5.63	47.37	74	-26.63	PK
		2489.93	32.38	5.63	38.01	54	-15.99	AVG
	*	4874	41.45	2.4	43.85	74	-30.15	PK
Vertical		2362.06	41.86	5.88	47.74	74	-26.26	PK
		2381.63	32.06	5.83	37.89	54	-16.11	AVG
	@	2437	96.1	5.92	102.02	N/A	N/A	PK
	@	2437	88.29	5.92	94.21	N/A	N/A	AVG
		2497.15	33.45	5.58	39.03	54	-14.97	AVG
		2499.24	43.04	5.56	48.6	74	-25.4	PK
	*	4874	40.69	2.4	43.09	74	-30.91	PK

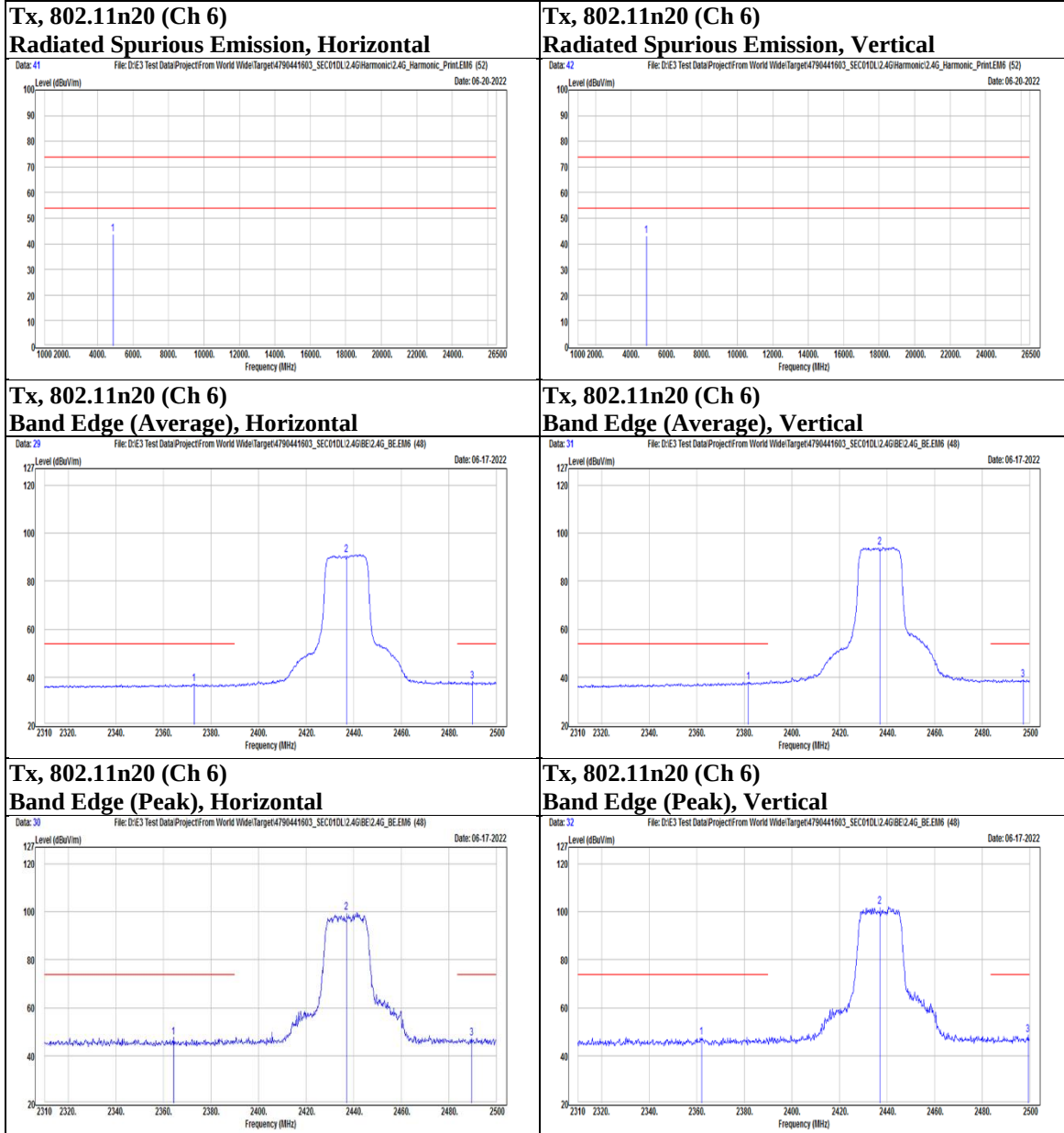
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Mode	802.11n20	Channel	11
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	2462	94.35	5.87	100.22	N/A	N/A	PK
	@	2462	86.78	5.87	92.65	N/A	N/A	AVG
		2483.66	53.42	5.68	59.1	74	-14.9	PK
		2483.66	40.44	5.68	46.12	54	-7.88	AVG
	*	4924	41.71	2.4	44.11	74	-29.89	PK
Vertical	@	2462	95.47	5.87	101.34	N/A	N/A	PK
	@	2462	88.92	5.87	94.79	N/A	N/A	AVG
		2483.66	41.85	5.68	47.53	54	-6.47	AVG
		2484.04	55.84	5.68	61.52	74	-12.48	PK
	*	4924	40.46	2.4	42.86	74	-31.14	PK

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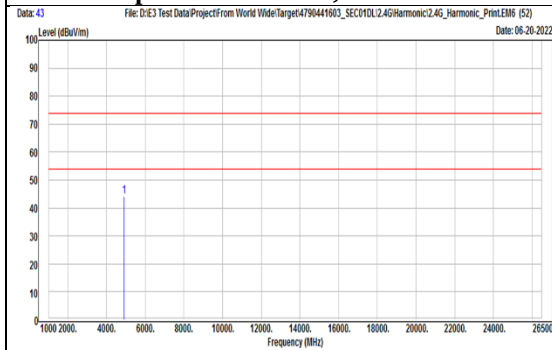
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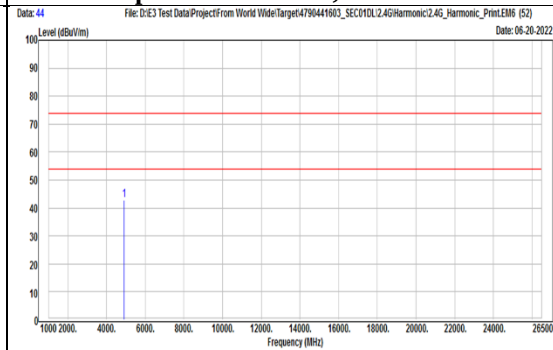
Tx, 802.11n20 (Ch 11)

Radiated Spurious Emission, Horizontal



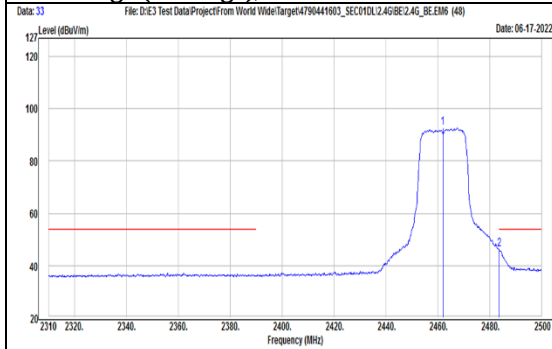
Tx, 802.11n20 (Ch 11)

Radiated Spurious Emission, Vertical



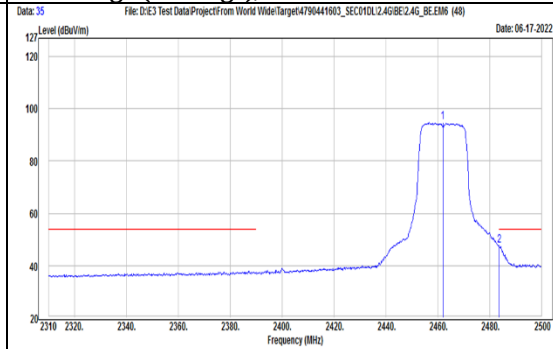
Tx, 802.11n20 (Ch 11)

Band Edge (Average), Horizontal



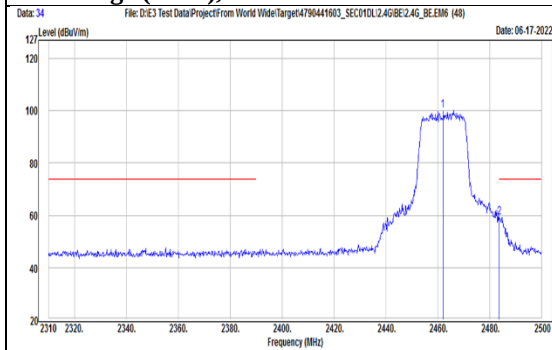
Tx, 802.11n20 (Ch 11)

Band Edge (Average), Vertical



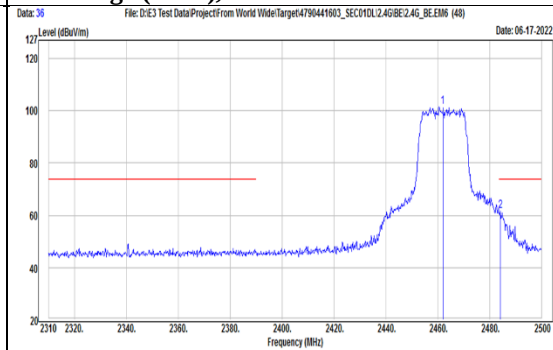
Tx, 802.11n20 (Ch 11)

Band Edge (Peak), Horizontal



Tx, 802.11n20 (Ch 11)

Band Edge (Peak), Vertical



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Mode	802.11n40	Channel	3
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2389.8	42.74	5.82	48.56	74	-25.44	PK
		2389.99	33.81	5.82	39.63	54	-14.37	AVG
	@	2422	92.99	5.86	98.85	N/A	N/A	PK
	@	2422	84.28	5.86	90.14	N/A	N/A	AVG
	*	4844	39.09	2.38	41.47	74	-32.53	PK
Vertical		2389.23	46.09	5.82	51.91	74	-22.09	PK
		2389.61	36.27	5.82	42.09	54	-11.91	AVG
	@	2422	94.42	5.86	100.28	N/A	N/A	PK
	@	2422	85.39	5.86	91.25	N/A	N/A	AVG
	*	4844	39.12	2.38	41.5	74	-32.5	PK

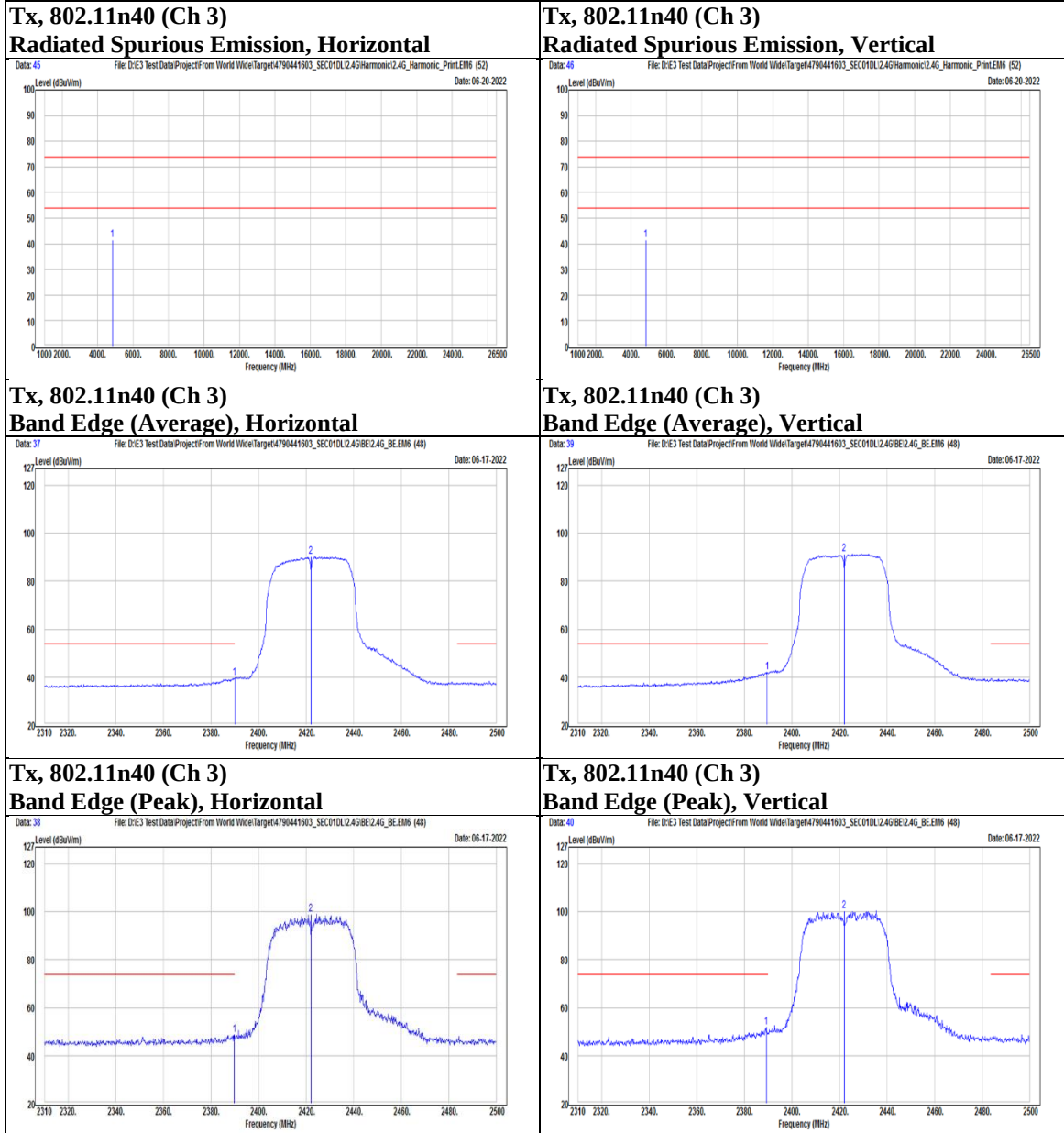
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Mode	802.11n40	Channel	6
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2366.81	42.15	5.86	48.01	74	-25.99	PK
		2371.18	31.97	5.86	37.83	54	-16.17	AVG
	@	2437	92.12	5.92	98.04	N/A	N/A	PK
	@	2437	82.84	5.92	88.76	N/A	N/A	AVG
		2483.66	32.23	5.68	37.91	54	-16.09	AVG
		2484.04	42.31	5.68	47.99	74	-26.01	PK
	*	4874	39.66	2.4	42.06	74	-31.94	PK
Vertical		2382.77	42.06	5.83	47.89	74	-26.11	PK
		2385.05	31.98	5.83	37.81	54	-16.19	AVG
	@	2437	94.71	5.92	100.63	N/A	N/A	PK
	@	2437	85.01	5.92	90.93	N/A	N/A	AVG
		2484.04	44.45	5.68	50.13	74	-23.87	PK
		2484.04	34.41	5.68	40.09	54	-13.91	AVG
	*	4874	39.2	2.4	41.6	74	-32.4	PK

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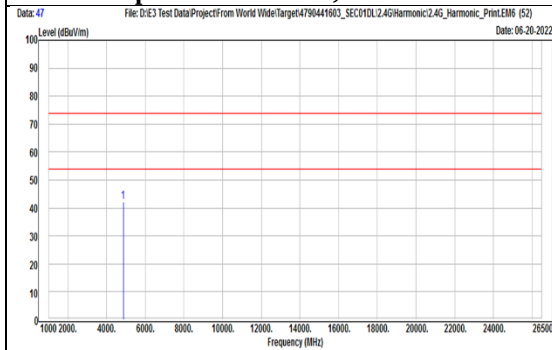
Facsimile (FAX) :+886-3-583-7948

Doc No: 17-EM-F0876 / 6.0



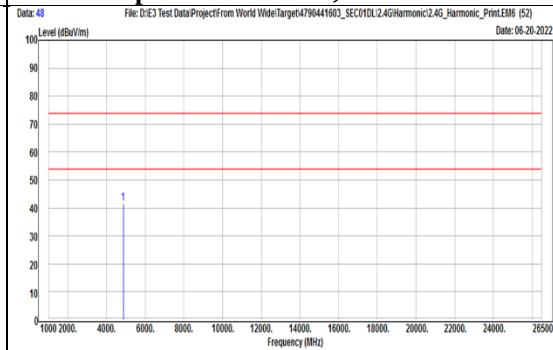
Tx, 802.11n40 (Ch 6)

Radiated Spurious Emission, Horizontal



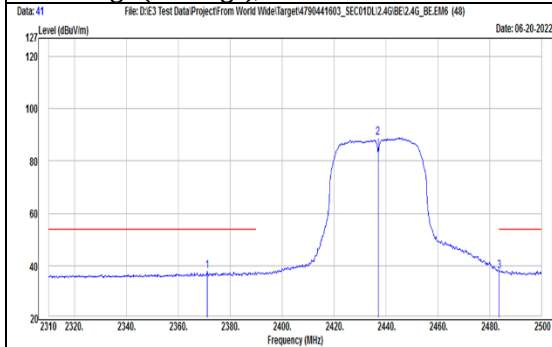
Tx, 802.11n40 (Ch 6)

Radiated Spurious Emission, Vertical



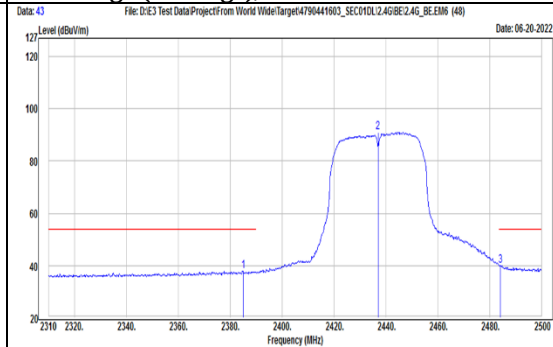
Tx, 802.11n40 (Ch 6)

Band Edge (Average), Horizontal



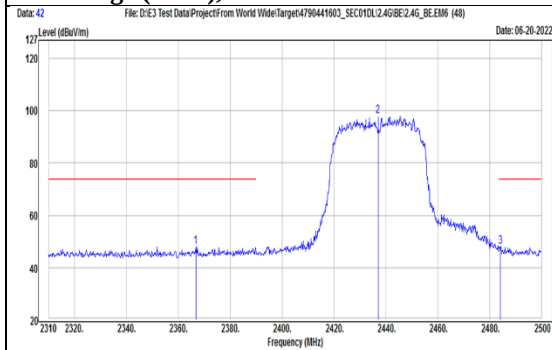
Tx, 802.11n40 (Ch 6)

Band Edge (Average), Vertical



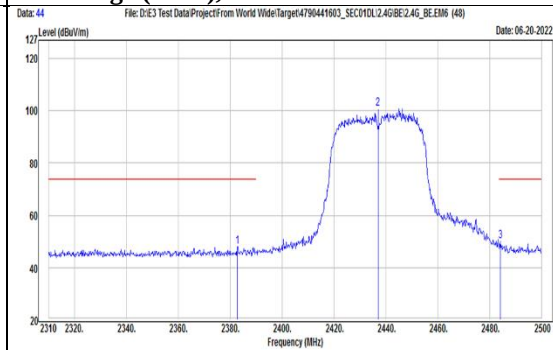
Tx, 802.11n40 (Ch 6)

Band Edge (Peak), Horizontal



Tx, 802.11n40 (Ch 6)

Band Edge (Peak), Vertical



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Mode	802.11n40	Channel	9
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	2452	91.89	5.96	97.85	N/A	N/A	PK
	@	2452	83.19	5.96	89.15	N/A	N/A	AVG
		2484.8	50.84	5.67	56.51	74	-17.49	PK
		2485.56	42.7	5.67	48.37	54	-5.63	AVG
	*	4904	39.92	2.42	42.34	74	-31.66	PK
Vertical	@	2452	93.5	5.96	99.46	N/A	N/A	PK
	@	2452	84.87	5.96	90.83	N/A	N/A	AVG
		2483.85	44.19	5.68	49.87	54	-4.13	AVG
		2488.03	53.18	5.65	58.83	74	-15.17	PK
	*	4904	39.72	2.42	42.14	74	-31.86	PK

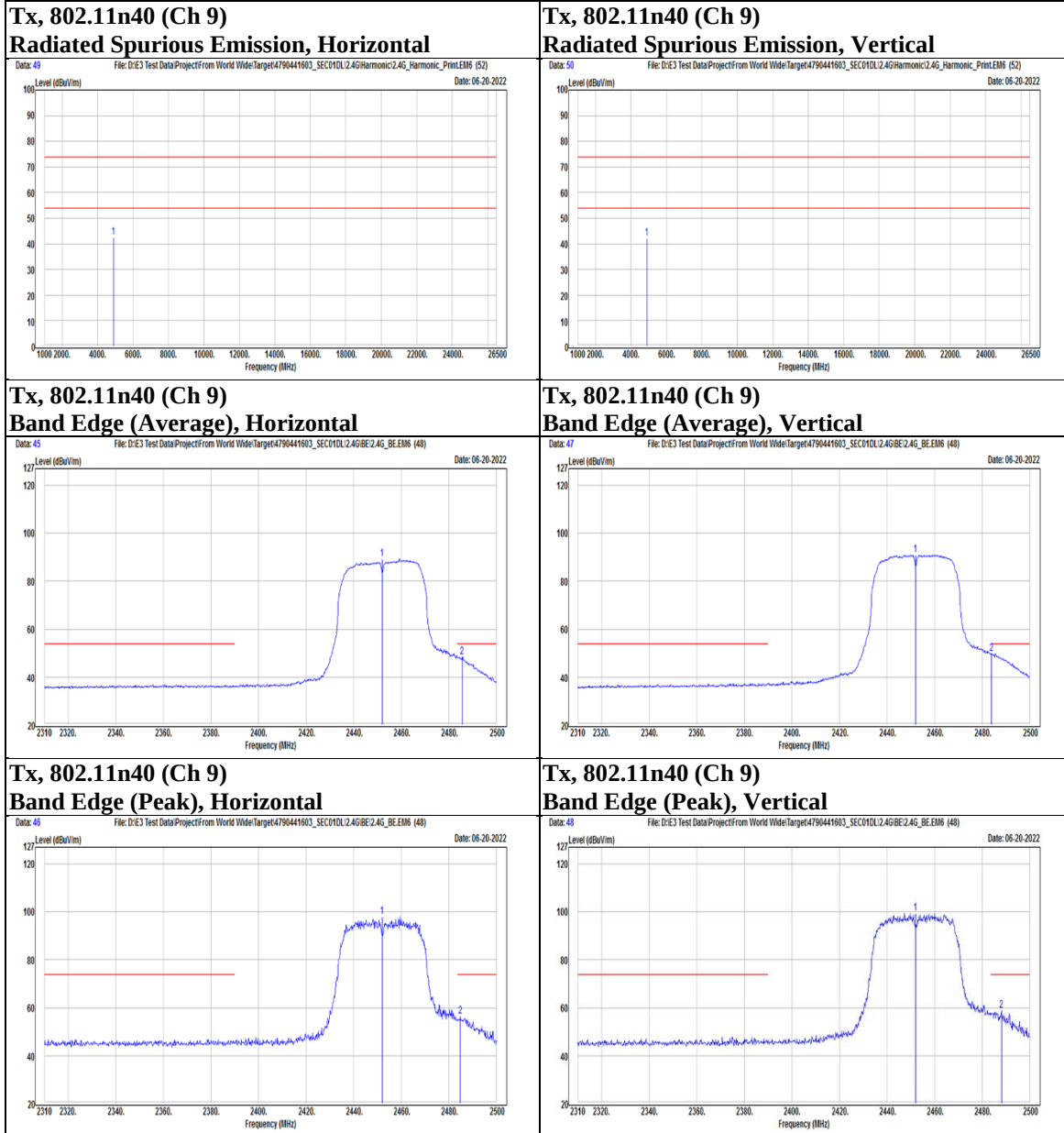
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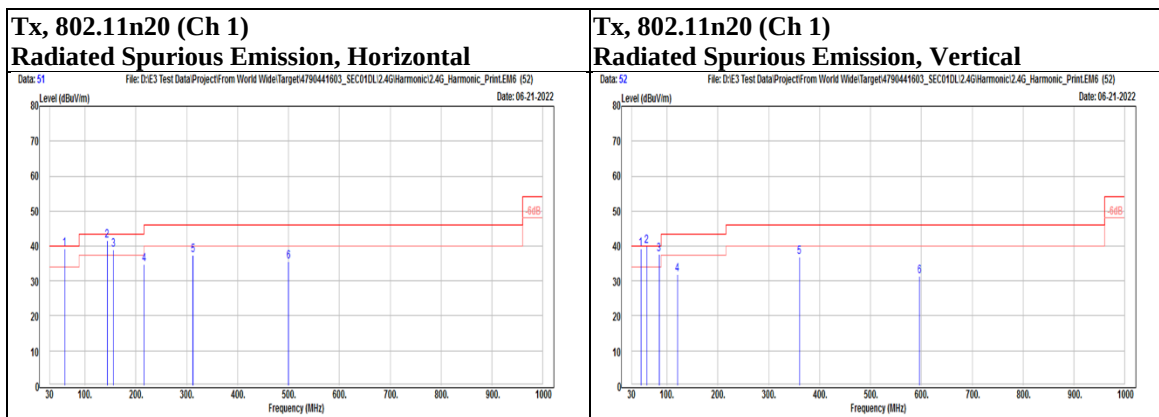




Below 1 GHz

Mode	802.11n20	Channel	1
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		60.07	51	-11.83	39.17	40	-0.83	QP
		143.49	53.41	-11.84	41.57	43.5	-1.93	PK
		156.1	50.08	-11.23	38.85	43.5	-4.65	PK
		216.24	47.99	-13.33	34.66	46	-11.34	PK
		312.27	47.19	-9.7	37.49	46	-8.51	PK
		500.45	40.34	-4.84	35.5	46	-10.5	PK
Vertical		48.43	50.41	-11.18	39.23	40	-0.77	QP
		60.07	51.7	-11.83	39.87	40	-0.13	QP
		84.32	55.06	-17.33	37.73	40	-2.27	PK
		120.21	46.3	-14.32	31.98	43.5	-11.52	PK
		360.77	45.12	-8.25	36.87	46	-9.13	PK
		596.48	33.58	-2.08	31.5	46	-14.5	PK



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9 kHz ~ 30 MHz Data:

For radiated emission of 9KHz to 30 MHz, we verify all modes of operation. The test results of the spurious emission were less than 20 dB of the limit, so it does not need to be recorded in the report.

No non-compliance noted:

KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

END OF REPORT

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