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Test Report No.:

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Antenna Polarization	Channel Frequency (MHz)	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	2480	2483.5(Pk)	52.16	74.00*	-21.84
		2483.5(Av)	37.67	54.00*	-16.33
		2480(Pk)	72.41	-	-
		2480(Av)	69.55	-	-
		4960(Pk)	43.12	74.00	-30.88
		4960(Av)	30.92	54.00	-23.08
		7440(Pk)	47.04	74.00	-26.96
		7440(Av)	35.05	54.00	-18.95
	2462	2483.5(Pk)	52.16	74.00*	-21.84
		2483.5(Av)	37.67	54.00*	-16.33
		2462(Pk)	102.45	-	-
		2462(Av)	94.22	-	-
		4924(Pk)	51.17	74.00	-22.83
		4924(Av)	45.57	54.00	-8.43
		7386(Pk)	46.86	74.00	-27.14
		7386(Av)	34.62	54.00	-19.38
Horizontal	2480	2483.5(Pk)	63.31	74.00*	-10.69
		2483.5(Av)	50.72	54.00*	-3.28
		2480(Pk)	80.24	-	-
		2480(Av)	77.36	-	-
		4960(Pk)	45.19	74.00	-28.81
		4960(Av)	34.07	54.00	-19.93
		7440(Pk)	47.70	74.00	-26.30
		7440(Av)	34.94	54.00	-19.06
	2462	2483.5(Pk)	63.31	74.00*	-10.69
		2483.5(Av)	50.72	54.00*	-3.28
		2462(Pk)	113.12	-	-
		2462(Av)	105.40	-	-
		4924(Pk)	49.36	74.00	-24.64
		4924(Av)	45.19	54.00	-8.81
		7386(Pk)	46.52	74.00	-27.48
		7386(Av)	34.18	54.00	-19.82

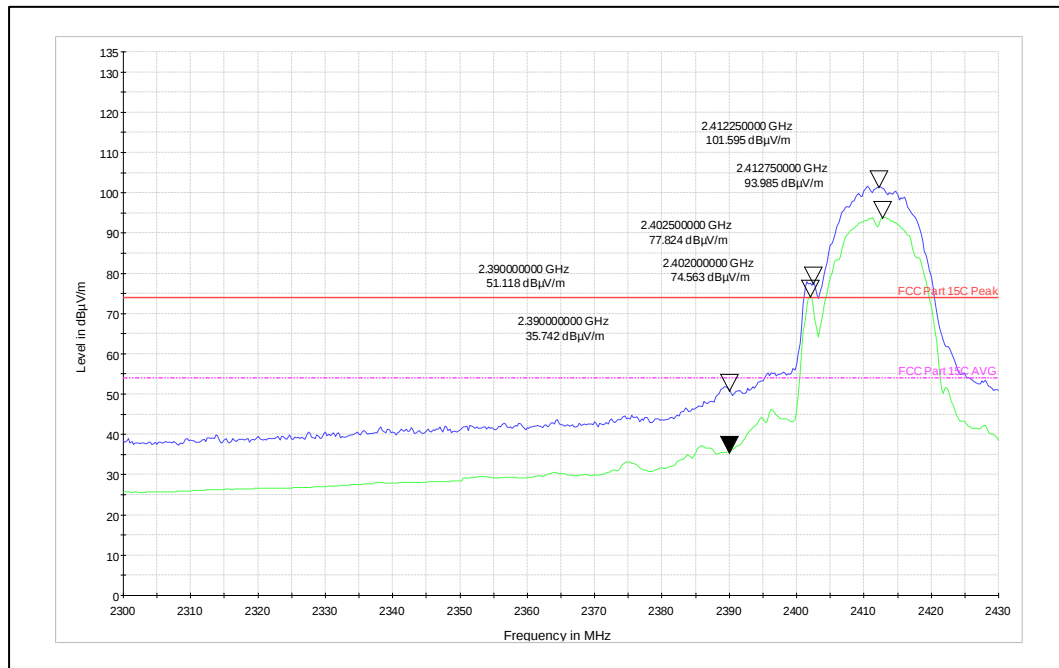
_ → Fundamental Frequency

*→ Restricted Band edges

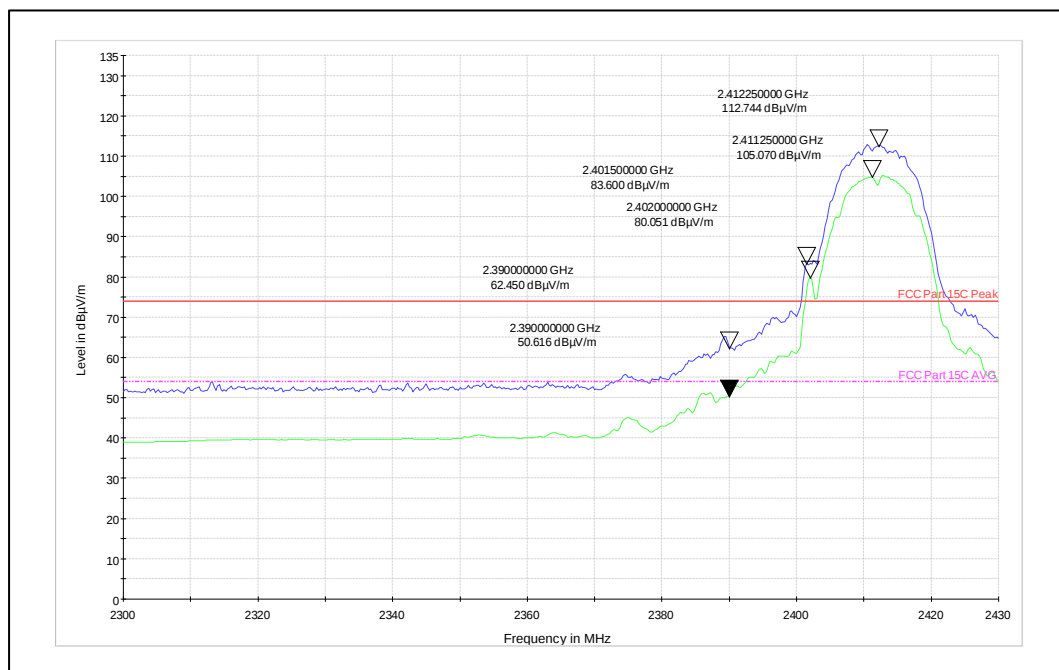
Pk: Peak Detector; Av: Average Detector

Test Plots:

Channel Frequency: 2402MHz for BLE & 2412MHz for Wi-Fi

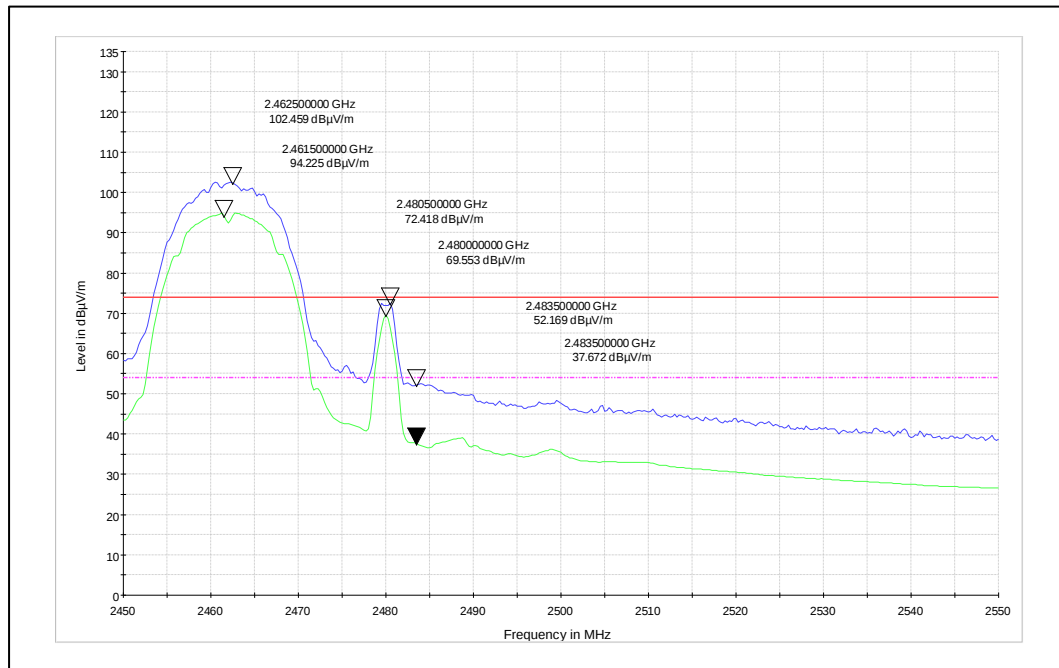


Antenna Polarization: Vertical

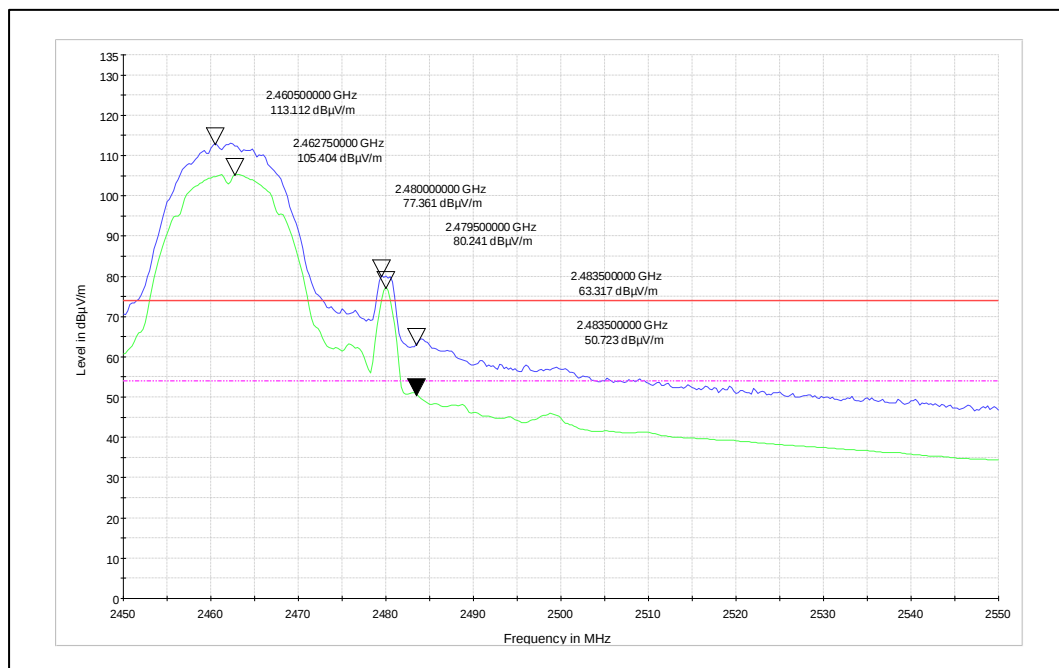


Antenna Polarization: Horizontal

Channel Frequency: 2480MHz for BLE & 2462MHz for Wi-Fi

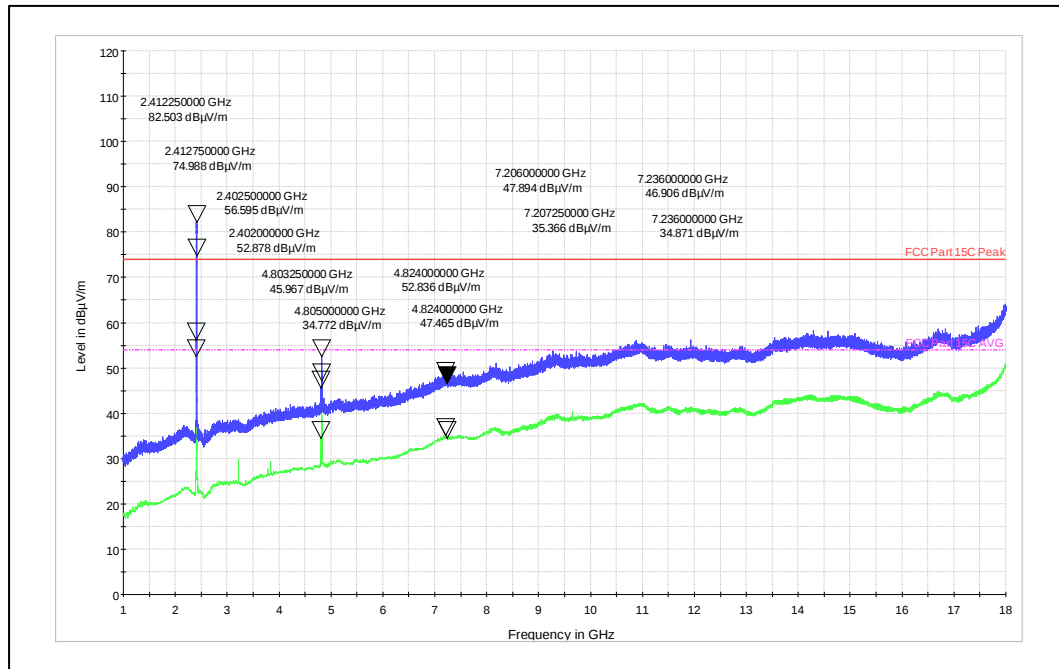


Antenna Polarization: Vertical

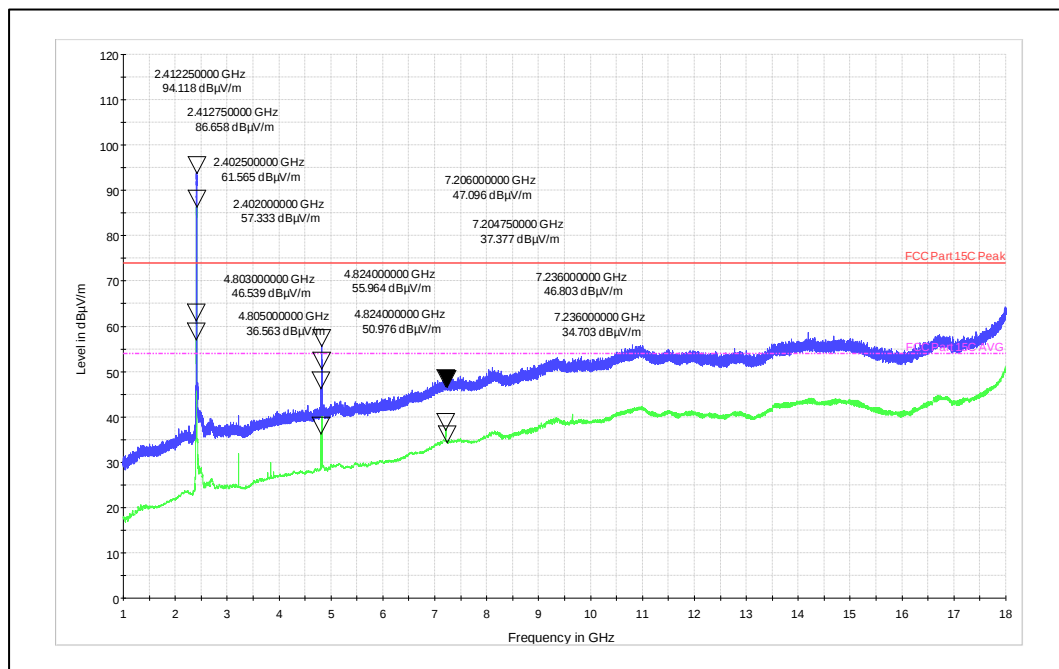


Antenna Polarization: Horizontal

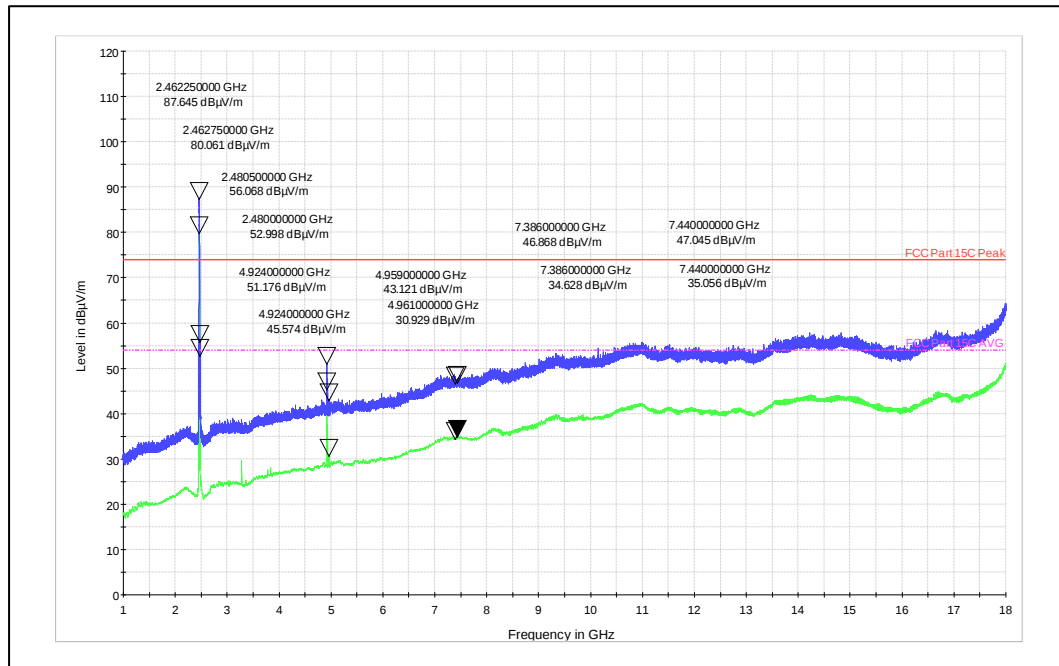
Frequency range 1GHz to 18GHz:



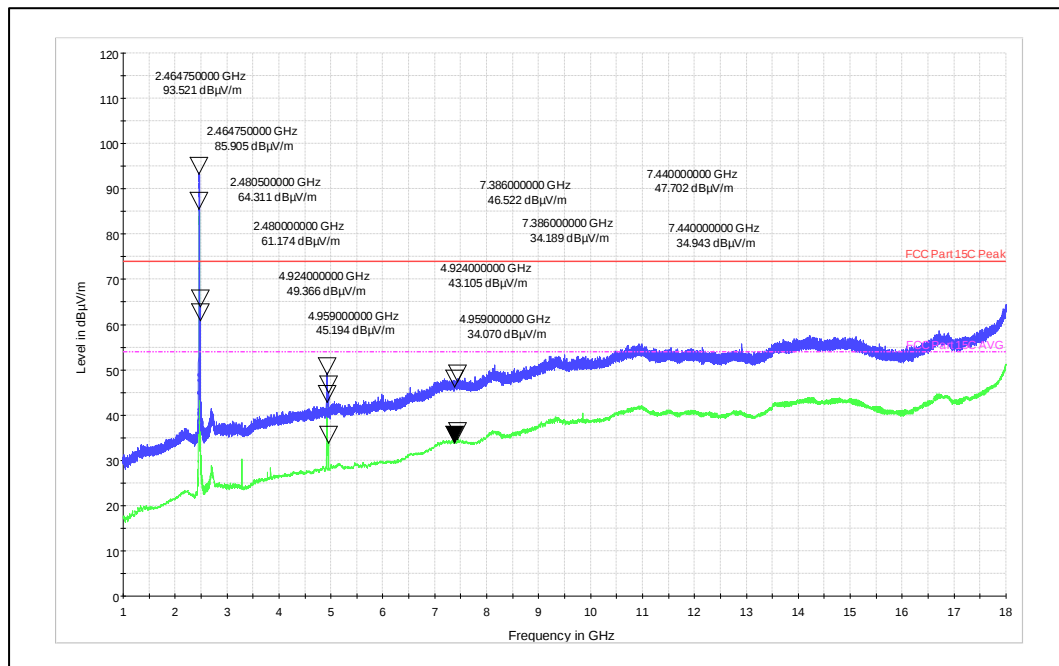
Antenna Polarization: Vertical



Antenna Polarization: Horizontal



Antenna Polarization: Vertical



Antenna Polarization: Horizontal

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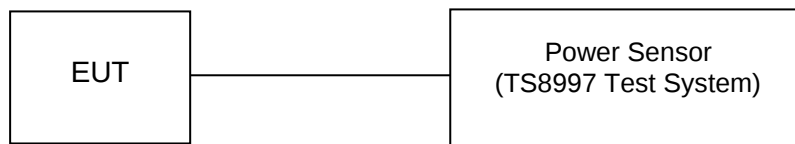
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8 TEST RESULTS FOR WI-FI

8.1 Maximum Conducted Output Power

<i>Result</i>	<i>Pass</i>
Test Specification	FCC part 15 Subpart C 15.247 (b)(3)
Test Method	Subclause 11.9.2.3.2 of ANSI C63.10
Detector	Gated RMS
Port of testing	Antenna port
Requirement	Power $\leq$ 1 W (30 dBm)

Test Method:



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.1 °C Voltage = 6VDC(4* 1.5V of AAA Batteries) Relative humidity: 65%

KDB Guidelines applied:

Measurements were made as per section 8.3.2.3 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

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Test results:

Note:

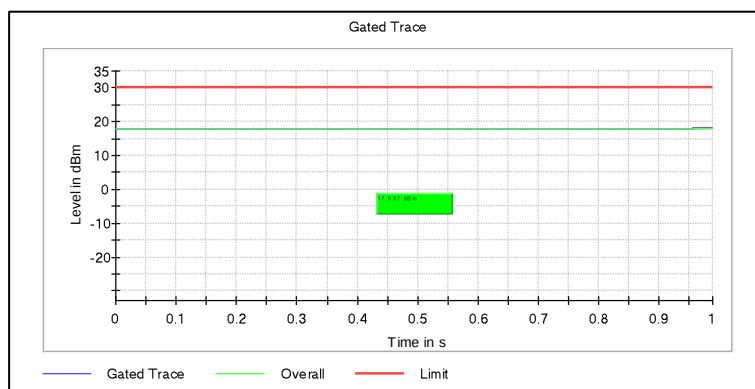
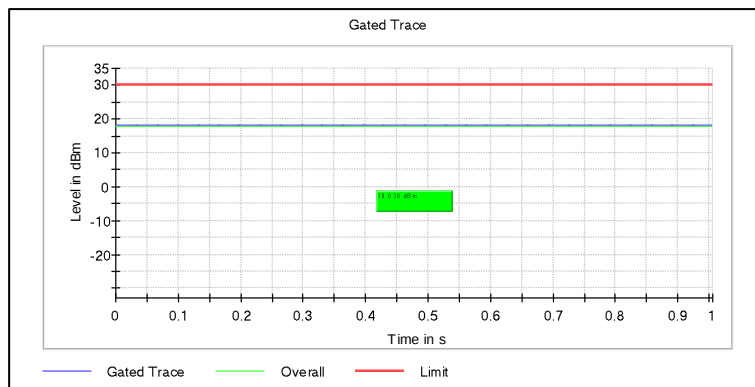
1. All the losses are included during measurement and final values are mentioned in the test report
2. This product do not support additional beamforming gain / directional gain, it uses single antenna and hence Directional gain of the single antenna is 3.2 dBi

Bandwidth (MHz)	Mode	Data rate	Measured Frequency (MHz)	Measured Gated RMS Power (dBm)	FCC Limit (dBm)	Margin (dB)
20	b	1Mbps	2412	18.03	30.00	-11.97
			2437	17.88	30.00	-12.12
			2462	17.70	30.00	-12.30
	g	6Mbps	2412	17.62	30.00	-12.38
			2437	16.80	30.00	-13.20
			2462	17.28	30.00	-12.72
	n-20	MCS0	2412	17.73	30.00	-12.27
			2437	16.44	30.00	-13.56
			2462	17.51	30.00	-12.49
40	n-40	MCS0	2422	17.02	30.00	-12.98
			2437	16.58	30.00	-13.42
			2452	16.94	30.00	-13.06

Test Plots:

Bandwidth: 20MHz

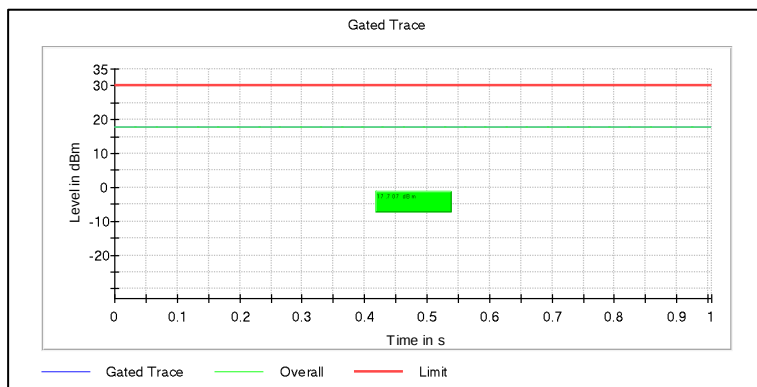
Data Rate: 1Mbps



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8.2 Spurious Radiated Emissions & Restricted Bands of Operation

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (d) / (15.209 & 15.205)
Test Method	ANSI C63.10
Measurement Location	Semi Anechoic Chamber 9kHz - 1 GHz Fully Anechoic Chamber 1 GHz - 40GHz
Measurement Bandwidth	100 kHz for frequency range < 1GHz 1 MHz for Frequency range >1GHz
Detector	Refer remarks below
Measuring Distance	3 m
Requirement	As per the limits mentioned in the below table
Test setup	Refer TEST METHODOLOGY

Table 11: Transmitter limits for Radiated emission

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

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.

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Test results:

Note: All the losses are included during measurement and final values are mentioned in the test report. Refer TEST METHODOLOGY for more details

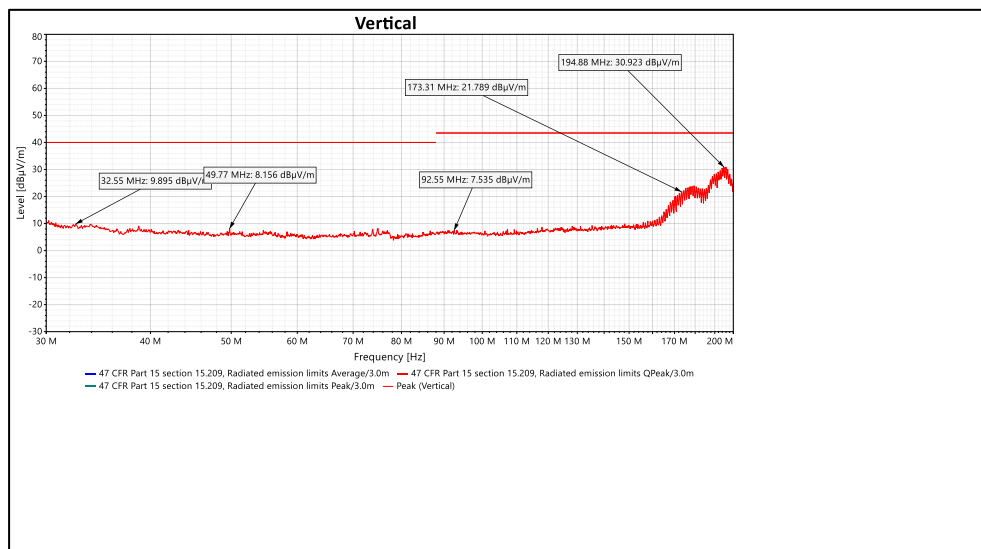
Test results for frequency range 9 kHz – 30 MHz

No emissions found in frequency range 9 kHz to 30 MHz, and measured levels are below 20dB from the limit line, hence not reported

Table 12: Test results for frequency range 30MHz – 200MHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	32.55	9.89	40.00	-30.11
	49.77	8.15	40.00	-31.85
	92.55	7.53	43.50	-35.97
	173.31	21.78	43.60	-21.82
	194.88	30.92	43.60	-12.68
Horizontal	34.62	10.22	40.00	-29.78
	77.16	7.26	40.00	-32.74
	174.33	19.85	43.50	-23.65
	194.88	30.86	43.50	-12.64

Test Plots:



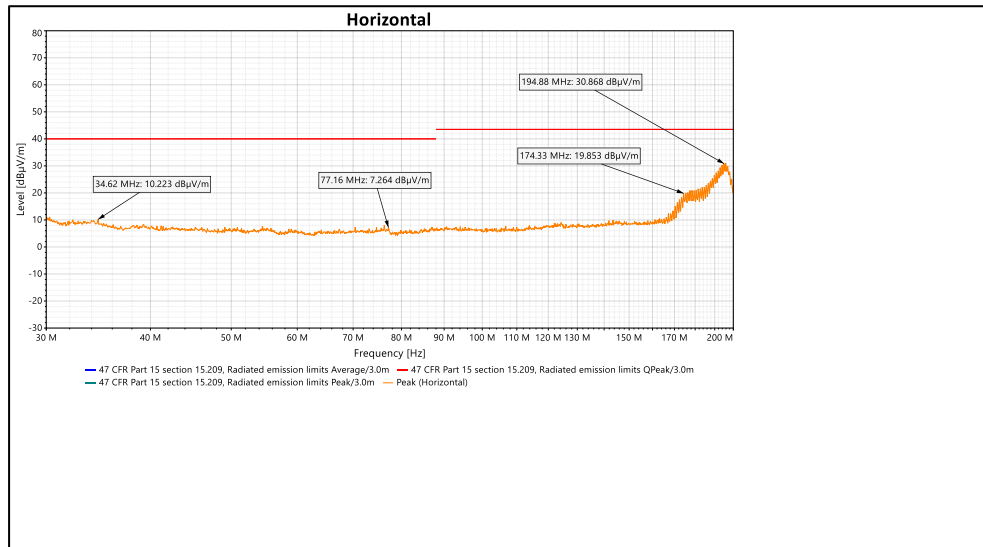
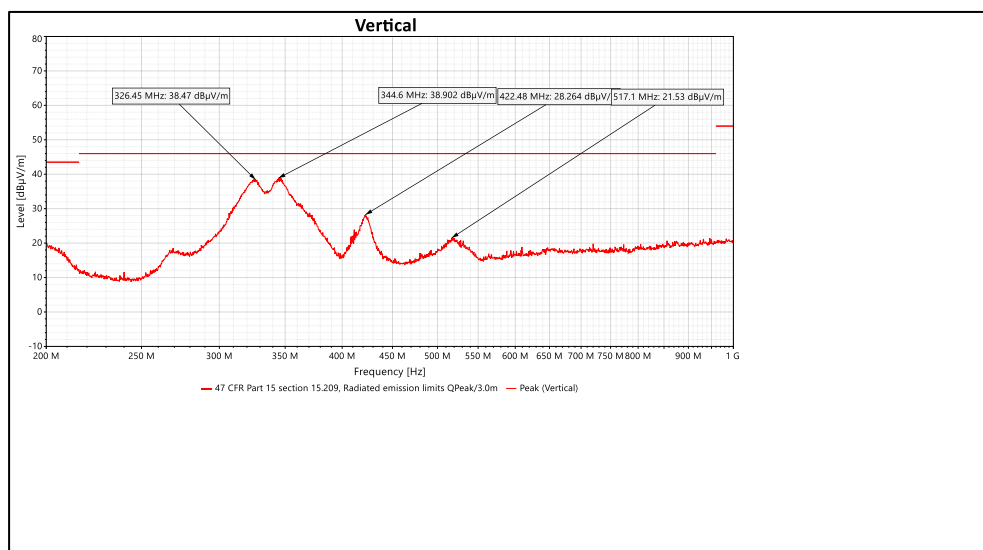
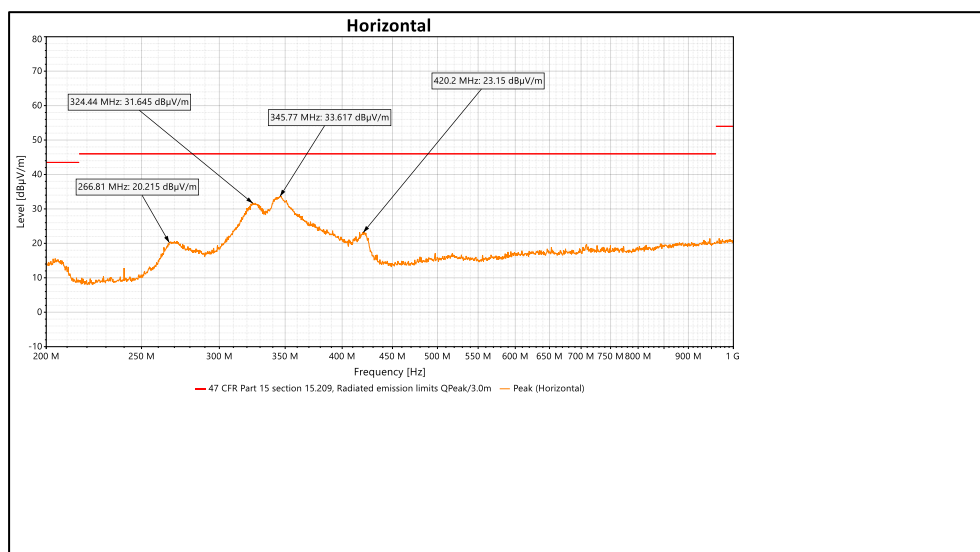


Table 13: Test results for frequency range 200MHz – 1GHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	326.45	38.47	46.00	-7.53
	344.60	38.90	46.00	-7.10
	422.48	28.26	46.00	-17.74
	517.10	21.53	46.00	-24.47
Horizontal	266.81	20.21	46.00	-25.79
	324.44	31.64	46.00	-14.36
	345.77	33.61	46.00	-12.39
	420.20	23.15	46.00	-22.85

Test Plots:





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Test Results for above 1GHz:

Modulation: 802.11b

Data rate: 1Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2412	2412(Pk)	Vertical	95.06	-	-
	2412(Av)		87.20	-	-
	2390(Pk)		43.65	74.00*	-30.35
	2390(Av)		29.57	54.00*	-24.43
	4824(Pk)		53.59	74.00	-20.41
	4824(Av)		48.07	54.00	-5.93
	7236(Pk)		46.89	74.00	-27.11
	7236(Av)		34.53	54.00	-19.47
	2412(Pk)	Horizontal	107.36	-	-
	2412(Av)		99.50	-	-
	2390(Pk)		56.87	74.00*	-17.13
	2390(Av)		40.98	54.00*	-13.02
	4824(Pk)		56.43	74.00	-17.57
	4824(Av)		51.64	54.00	-2.36
	7236(Pk)		46.56	74.00	-27.44
	7236(Av)		34.69	54.00	-19.31
2437	2437(Pk)	Vertical	95.37	-	-
	2437(Av)		87.80	-	-
	4874(Pk)		54.01	74.00	-19.99
	4874(Av)		48.69	54.00	-5.31
	7311(Pk)		46.75	74.00	-27.25
	7311(Av)		34.38	54.00	-19.62
	2437(Pk)	Horizontal	108.26	-	-
	2437(Av)		100.67	-	-
	4874(Pk)		52.18	74.00	-21.82
	4874(Av)		46.66	54.00	-7.34
	7311(Pk)		47.29	74.00	-26.71
	7311(Av)		34.49	54.00	-19.51
2462	2462(Pk)	Vertical	94.64	-	-
	2462(Av)		86.80	-	-
	2483.5(Pk)		44.26	74.00*	-29.74
	2483.5(Av)		30.82	54.00*	-23.18
	4924(Pk)		52.86	74.00	-21.14
	4924(Av)		47.61	54.00	-6.39
	7386(Pk)		46.71	74.00	-27.29
	7386(Av)		34.57	54.00	-19.43
	2462(Pk)	Horizontal	107.71	-	-
	2462(Av)		99.93	-	-
	2483.5(Pk)		58.13	74.00*	-15.87
	2483.5(Av)		43.30	54.00*	-10.70
	4924(Pk)		47.01	74.00	-26.99
	4924(Av)		40.14	54.00	-13.86
	7386(Pk)		46.90	74.00	-27.10
	7386(Av)		34.41	54.00	-19.59

_ → Fundamental Frequency

*→ Restricted Band edges

Pk: Peak Detector; Av: Average Detector

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Modulation: 802.11g

Data Rate: 6Mbps

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2412	2412(Pk)	Vertical	92.05	-	-
	2412(Av)		82.50	-	-
	2390(Pk)		59.71	74.00*	-14.29
	2390(Av)		40.09	54.00*	-13.91
	4824(Pk)		52.06	74.00	-21.94
	4824(Av)		39.52	54.00	-14.48
	7236(Pk)		46.03	74.00	-27.97
	7236(Av)		34.49	54.00	-19.51
	2412(Pk)	Horizontal	104.47	-	-
	2412(Av)		94.83	-	-
	2390(Pk)		72.78	74.00*	-1.22
	2390(Av)		53.50	54.00*	-0.50
	4824(Pk)		50.45	74.00	-23.55
	4824(Av)		37.30	54.00	-16.70
	7236(Pk)		46.73	74.00	-27.27
	7236(Av)		34.53	54.00	-19.47
2437	2437(Pk)	Vertical	92.89	-	-
	2437(Av)		82.81	-	-
	4874(Pk)		52.06	74.00	-21.94
	4874(Av)		37.64	54.00	-16.36
	7311(Pk)		46.22	74.00	-27.78
	7311(Av)		34.55	54.00	-19.45
	2437(Pk)	Horizontal	105.24	-	-
	2437(Av)		95.18	-	-
	4874(Pk)		48.86	74.00	-25.14
	4874(Av)		35.38	54.00	-18.62
	7311(Pk)		46.86	74.00	-27.14
	7311(Av)		34.45	54.00	-19.55
2462	2462(Pk)	Vertical	90.99	-	-
	2462(Av)		81.28	-	-
	2483.5(Pk)		54.38	74.00*	-19.62
	2483.5(Av)		34.77	54.00*	-19.23
	4924(Pk)		50.81	74.00	-23.19
	4924(Av)		36.59	54.00	-17.41
	7386(Pk)		47.35	74.00	-26.65
	7386(Av)		34.55	54.00	-19.45
	2462(Pk)	Horizontal	104.34	-	-
	2462(Av)		94.61	-	-
	2483.5(Pk)		70.83	74.00*	-3.17
	2483.5(Av)		48.98	54.00*	-5.02
	4924(Pk)		49.29	74.00	-24.71
	4924(Av)		33.95	54.00	-20.05
	7386(Pk)		46.77	74.00	-27.23
	7386(Av)		34.63	54.00	-19.37

_ → Fundamental Frequency

*→ Restricted Band edges

Pk: Peak Detector; Av: Average Detector

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Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2412	2412(Pk)	Vertical	90.58	-	-
	2412(Av)		80.48	-	-
	2390(Pk)		57.24	74.00*	-16.76
	2390(Av)		38.53	54.00*	-15.47
	4824(Pk)		50.42	74.00	-23.58
	4824(Av)		37.47	54.00	-16.53
	7236(Pk)		47.21	74.00	-26.79
	7236(Av)		34.46	54.00	-19.54
	2412(Pk)	Horizontal	103.91	-	-
	2412(Av)		93.98	-	-
	2390(Pk)		71.67	74.00*	-2.33
	2390(Av)		52.34	54.00*	-1.66
	4824(Pk)		48.76	74.00	-25.24
	4824(Av)		35.72	54.00	-18.28
	7236(Pk)		46.72	74.00	-27.28
	7236(Av)		34.46	54.00	-19.54
2437	2437(Pk)	Vertical	92.36	-	-
	2437(Av)		82.28	-	-
	4874(Pk)		50.72	74.00	-23.28
	4874(Av)		37.47	54.00	-16.53
	7311(Pk)		46.93	74.00	-27.07
	7311(Av)		34.53	54.00	-19.47
	2437(Pk)	Horizontal	105.29	-	-
	2437(Av)		95.21	-	-
	4874(Pk)		48.93	74.00	-25.07
	4874(Av)		35.72	54.00	-18.28
	7311(Pk)		47.50	74.00	-26.50
	7311(Av)		34.53	54.00	-19.47
2462	2462(Pk)	Vertical	92.02	-	-
	2462(Av)		82.11	-	-
	2483.5(Pk)		54.94	74.00*	-19.06
	2483.5(Av)		38.81	54.00*	-15.19
	4924(Pk)		48.59	74.00	-25.41
	4924(Av)		35.52	54.00	-18.48
	7386(Pk)		46.59	74.00	-27.41
	7386(Av)		34.54	54.00	-19.46
	2462(Pk)	Horizontal	104.46	-	-
	2462(Av)		94.36	-	-
	2483.5(Pk)		71.51	74.00*	-2.49
	2483.5(Av)		50.84	54.00*	-3.16
	4924(Pk)		46.76	74.00	-27.24
	4924(Av)		32.93	54.00	-21.07
	7386(Pk)		46.39	74.00	-27.61
	7386(Av)		34.51	54.00	-19.49

_ → Fundamental Frequency

*→ Restricted Band edges

Pk: Peak Detector; Av: Average Detector

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Data Rate: MCS0

Channel Frequency (MHz)	Measured Frequency (MHz)	Antenna Polarization	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2422	2422(Pk)	Vertical	88.82	-	-
	2422(Av)		79.06	-	-
	2390(Pk)		58.55	74.00*	-15.45
	2390(Av)		37.22	54.00*	-16.78
	4844(Pk)		46.40	74.00	-27.60
	4844(Av)		33.80	54.00	-20.20
	7266(Pk)		46.24	74.00	-27.76
	7266(Av)		34.41	54.00	-19.59
	2422(Pk)	Horizontal	100.95	-	-
	2422(Av)		91.20	-	-
	2390(Pk)		71.96	74.00*	-2.04
	2390(Av)		51.32	54.00*	-2.68
	4844(Pk)		46.31	74.00	-27.69
	4844(Av)		32.93	54.00	-21.07
	7266(Pk)		46.02	74.00	-27.98
	7266(Av)		34.37	54.00	-19.63
2437	2437(Pk)	Vertical	88.66	-	-
	2437(Av)		79.12	-	-
	4874(Pk)		47.10	74.00	-26.90
	4874(Av)		33.95	54.00	-20.05
	7311(Pk)		46.33	74.00	-27.67
	7311(Av)		34.51	54.00	-19.49
	2437(Pk)	Horizontal	101.40	-	-
	2437(Av)		91.91	-	-
	4874(Pk)		44.47	74.00	-29.53
	4874(Av)		29.63	54.00	-24.37
	7311(Pk)		46.30	74.00	-27.70
	7311(Av)		34.47	54.00	-19.53
2452	2452(Pk)	Vertical	87.82	-	-
	2452(Av)		78.12	-	-
	2483.5(Pk)		58.27	74.00*	-15.73
	2483.5(Av)		37.42	54.00*	-16.58
	4904(Pk)		45.88	74.00	-28.12
	4904(Av)		32.56	54.00	-21.44
	7356(Pk)		46.35	74.00	-27.65
	7356(Av)		34.38	54.00	-19.62
	2452(Pk)	Horizontal	101.25	-	-
	2452(Av)		91.59	-	-
	2483.5(Pk)		72.62	74.00*	-1.38
	2483.5(Av)		51.23	54.00*	-2.77
	4904(Pk)		45.05	74.00	-28.95
	4904(Av)		31.69	54.00	-22.31
	7356(Pk)		46.78	74.00	-27.22
	7356(Av)		34.41	54.00	-19.59

_ → Fundamental Frequency

*→ Restricted Band edges

Pk: Peak Detector; Av: Average Detector

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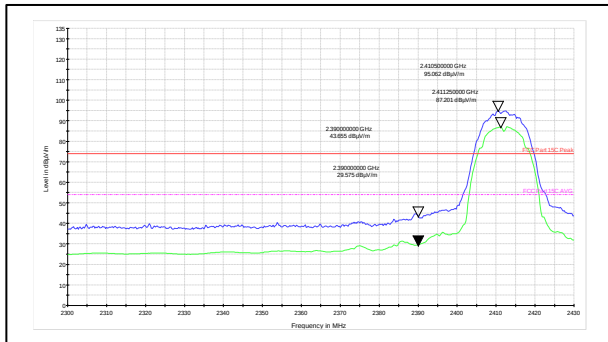
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Test Plots:

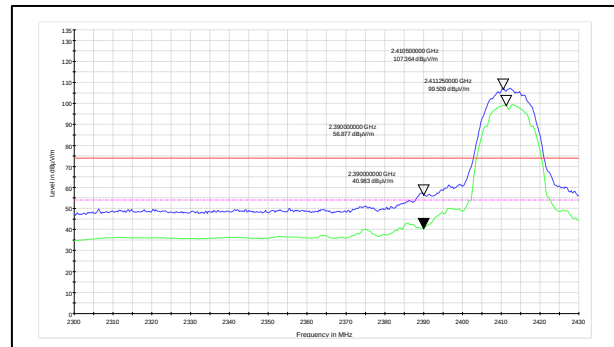
Restricted Bands of Operation:

Modulation: 802.11b

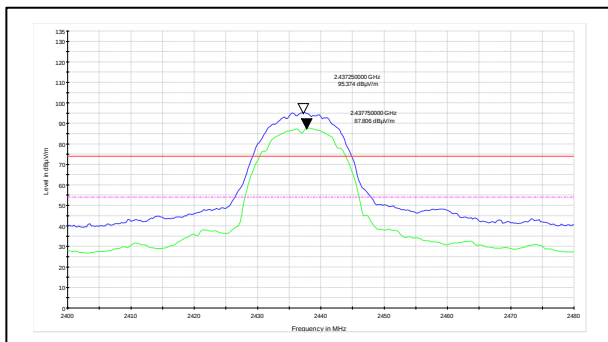
Data Rate: 1Mbps



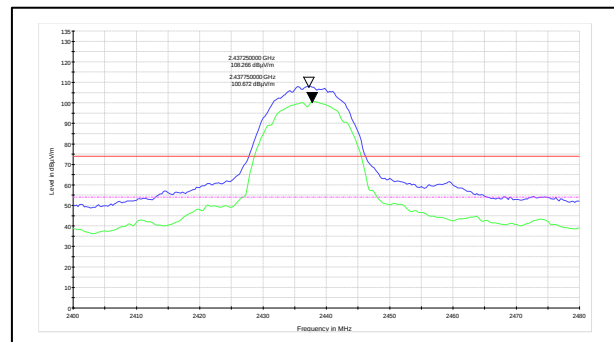
Channel Frequency: 2412MHz Polarization: Vertical



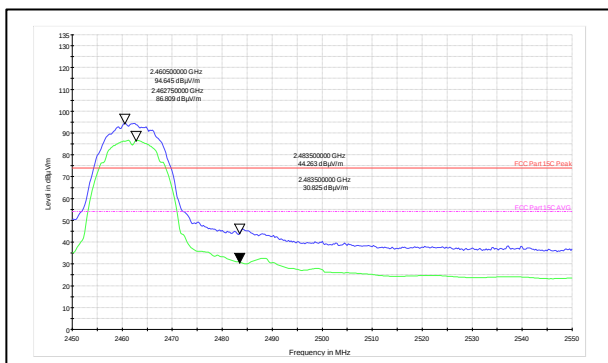
Channel Frequency: 2412MHz Polarization: Horizontal



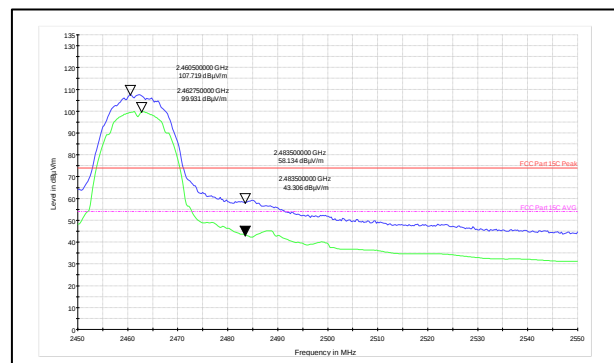
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



Channel Frequency: 2462MHz Polarization: Vertical



Channel Frequency: 2462MHz Polarization: Horizontal

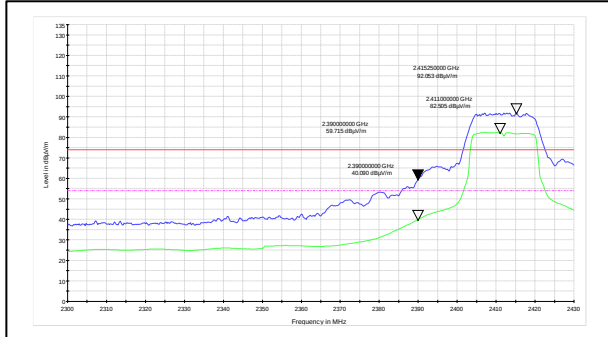
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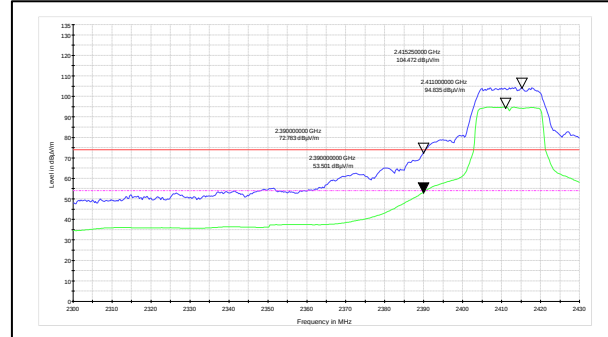
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Modulation: 802.11g

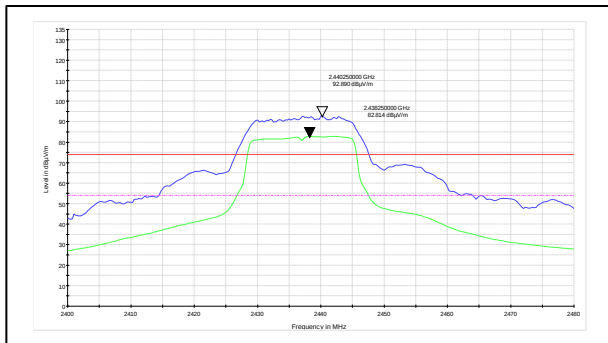
Data Rate: 6Mbps



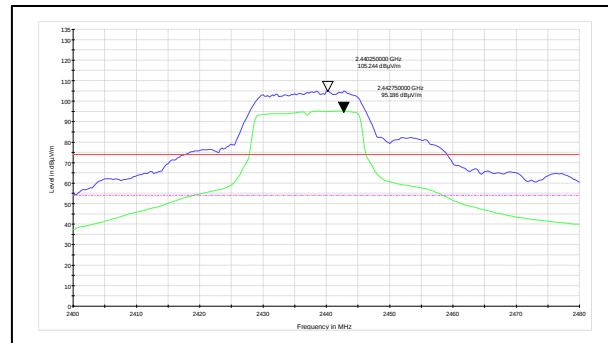
Channel Frequency: 2412MHz Polarization: Vertical



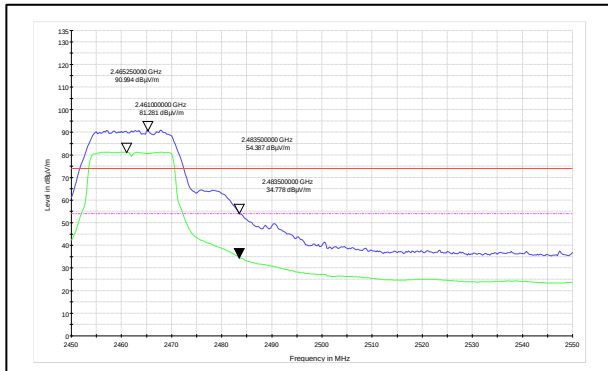
Channel Frequency: 2412MHz Polarization: Horizontal



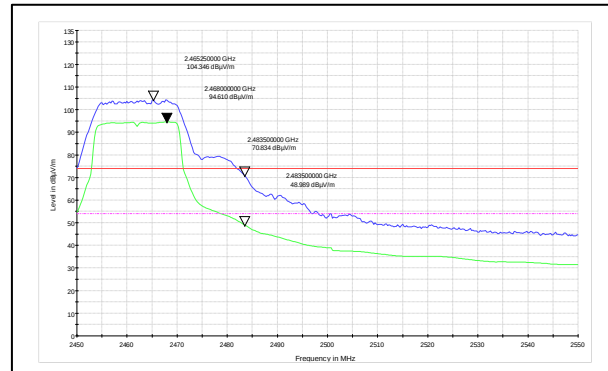
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



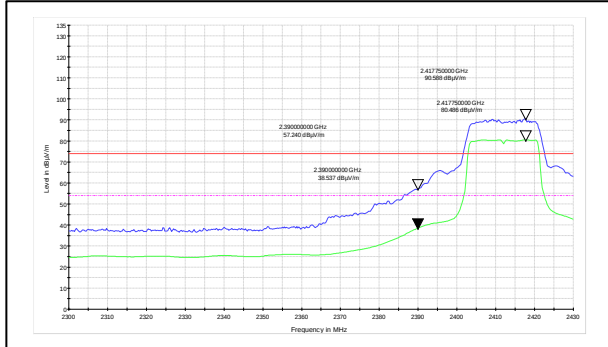
Channel Frequency: 2462MHz Polarization: Vertical



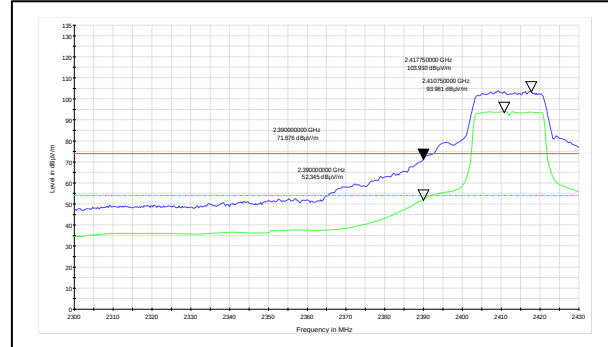
Channel Frequency: 2462MHz Polarization: Horizontal

Modulation: 802.11n-20MHz

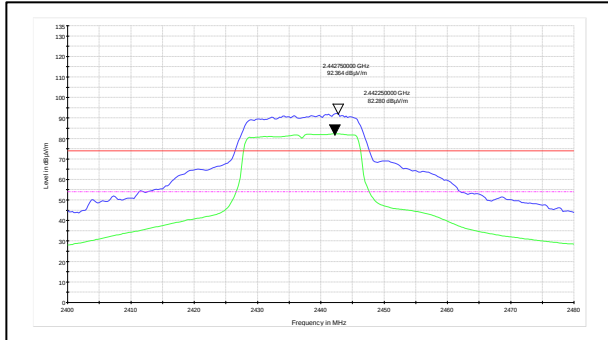
Data Rate: MCS0



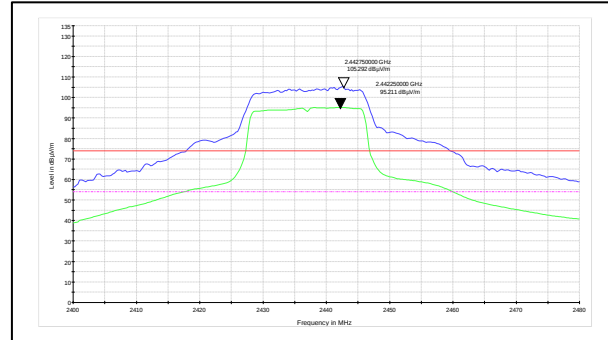
Channel Frequency: 2412MHz Polarization: Vertical



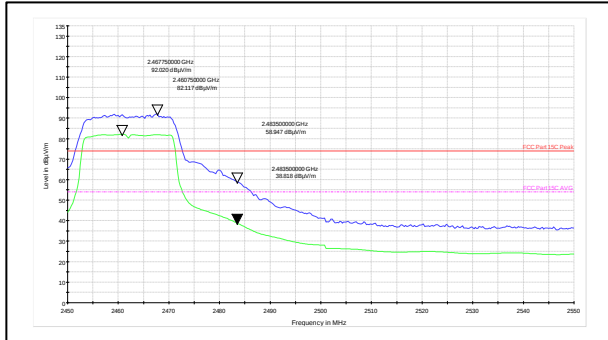
Channel Frequency: 2412MHz Polarization: Horizontal



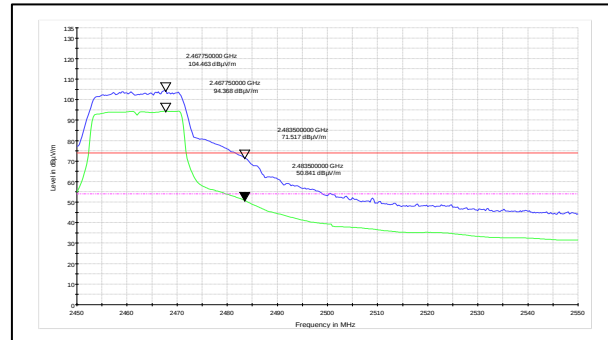
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



Channel Frequency: 2462MHz Polarization: Vertical



Channel Frequency: 2462MHz Polarization: Horizontal

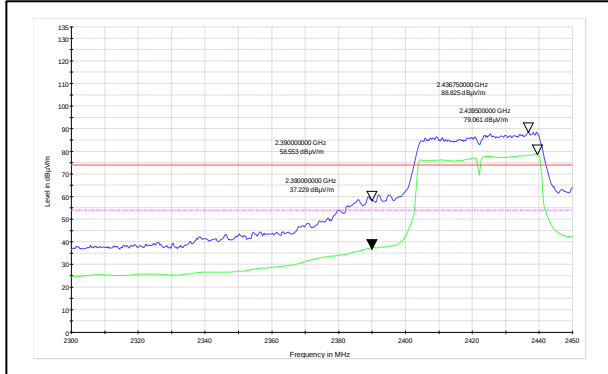
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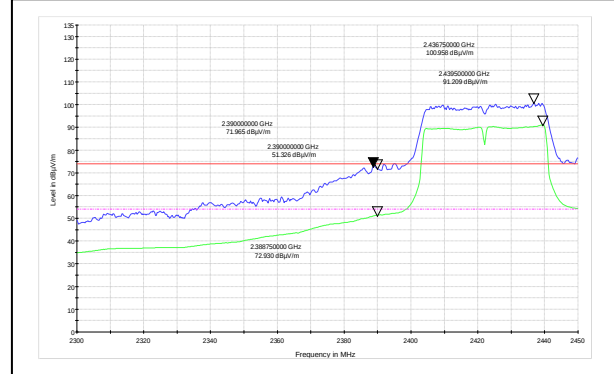
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Modulation: 802.11n-40MHz

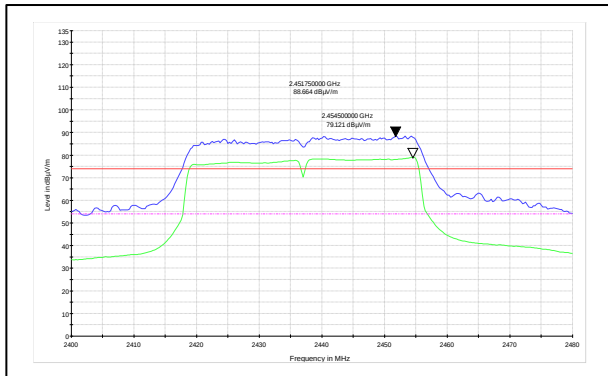
Data Rate: n-40MHz



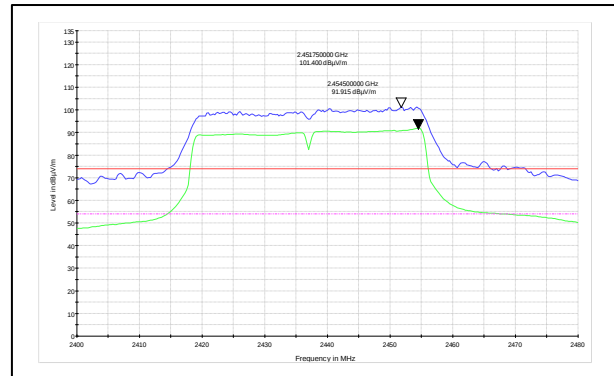
Channel Frequency: 2422MHz Polarization: Vertical



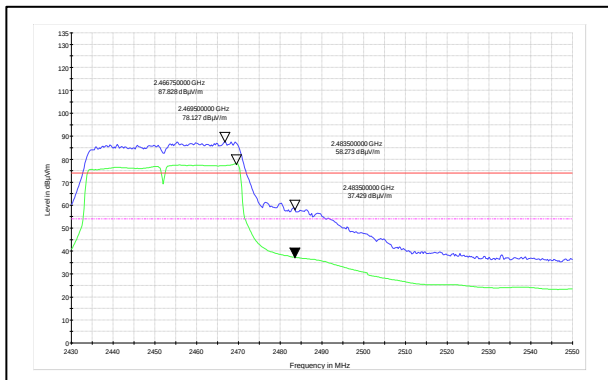
Channel Frequency: 2422MHz Polarization: Horizontal



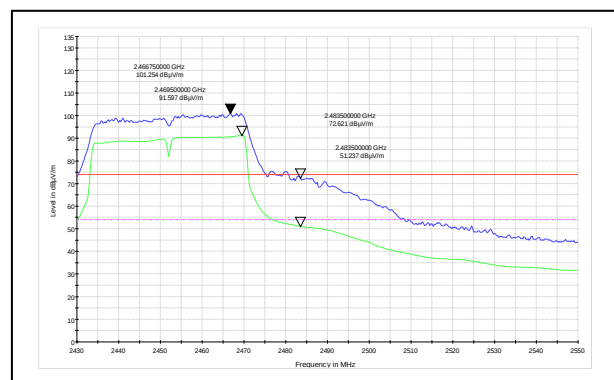
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



Channel Frequency: 2452MHz Polarization: Vertical



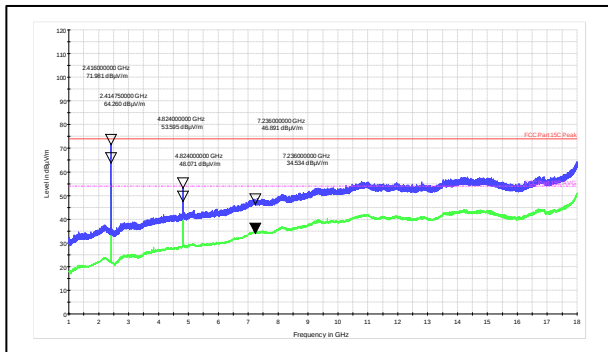
Channel Frequency: 2452MHz Polarization: Horizontal

Test Plots for Spurious Radiated emission:

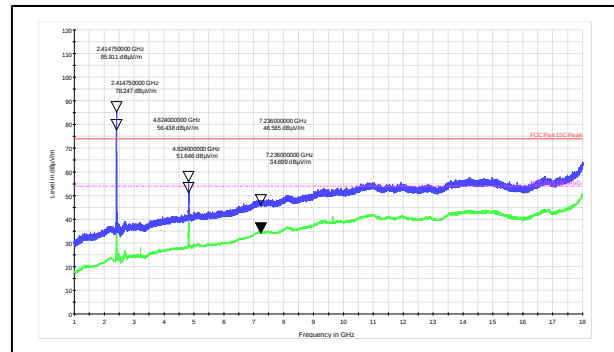
Frequency Range: 1GHz to 18GHz

Modulation: 802.11b

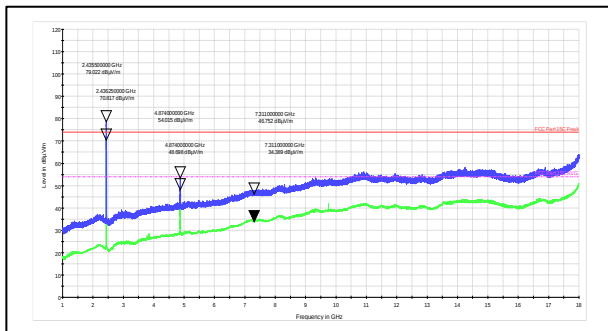
Data Rate: 1Mbps



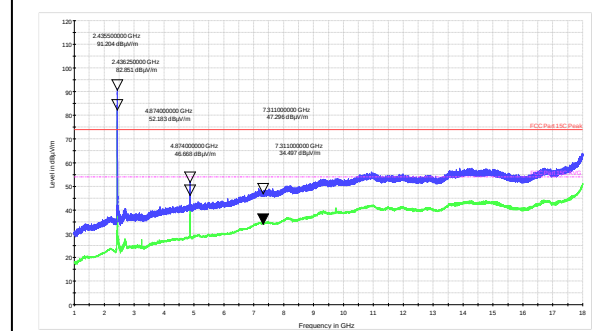
Channel Frequency: 2412MHz Polarization: Vertical



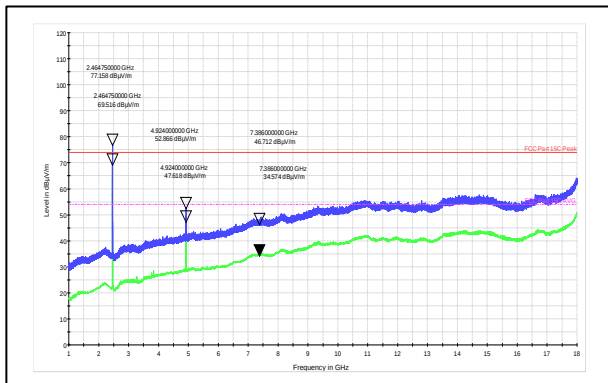
Channel Frequency: 2412MHz Polarization: Horizontal



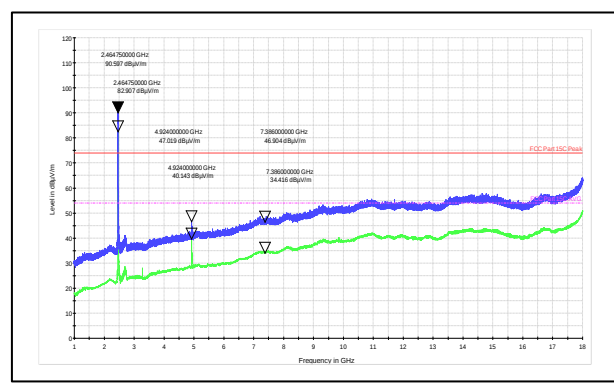
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



Channel Frequency: 2462MHz Polarization: Vertical



Channel Frequency: 2462MHz Polarization: Horizontal

Prüfbericht - Nr.:

Test Report No.:

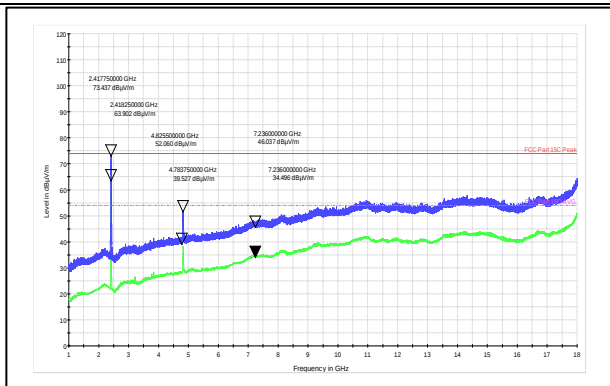
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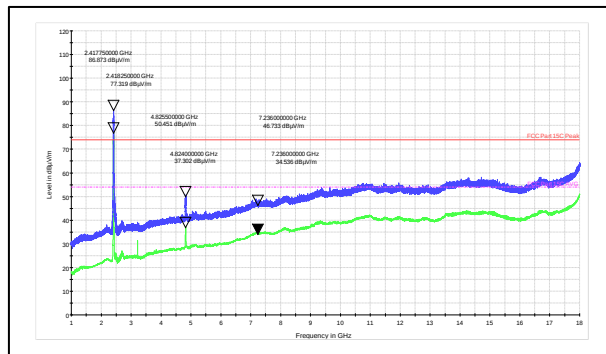
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Modulation: 802.11g

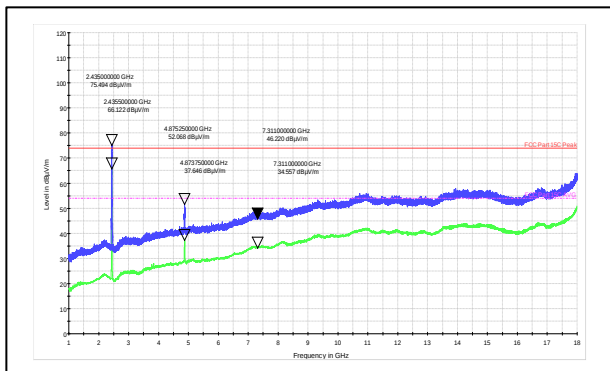
Data Rate: 6Mbps



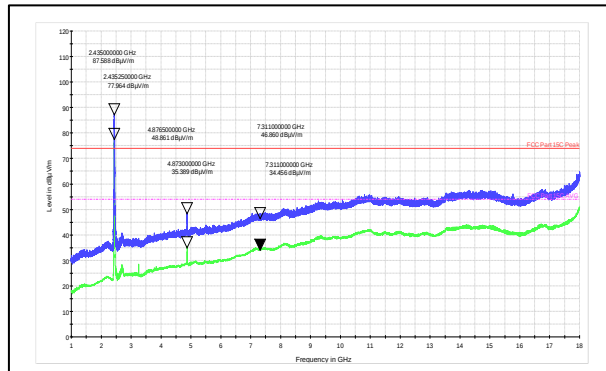
Channel Frequency: 2412MHz Polarization: Vertical



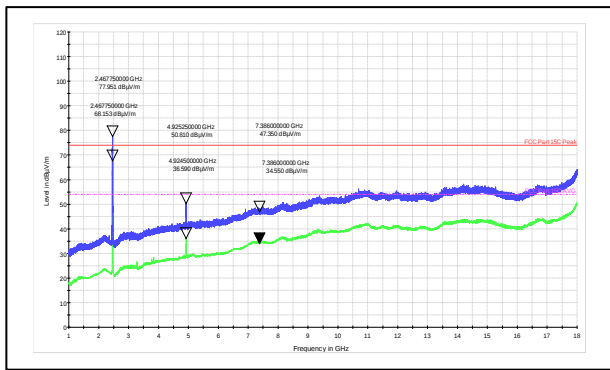
Channel Frequency: 2412MHz Polarization: Horizontal



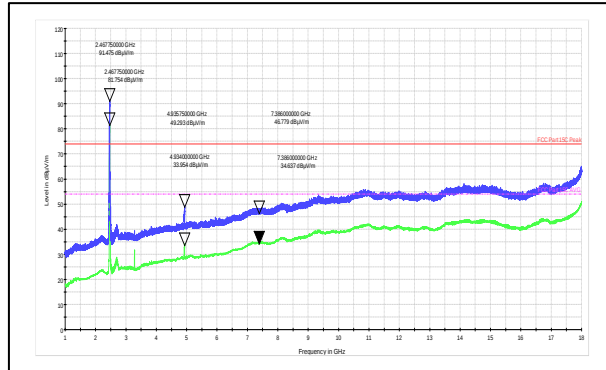
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



Channel Frequency: 2462MHz Polarization: Vertical



Channel Frequency: 2462MHz Polarization: Horizontal

Prüfbericht - Nr.:

Test Report No.:

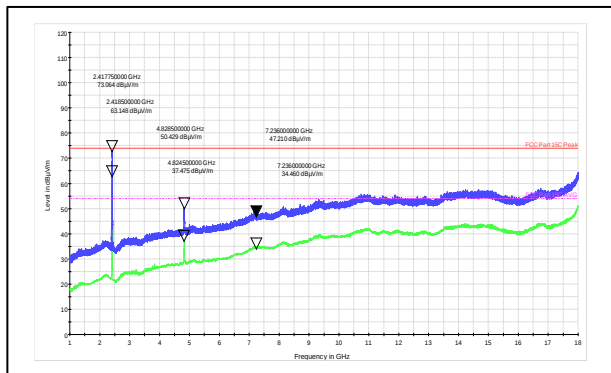
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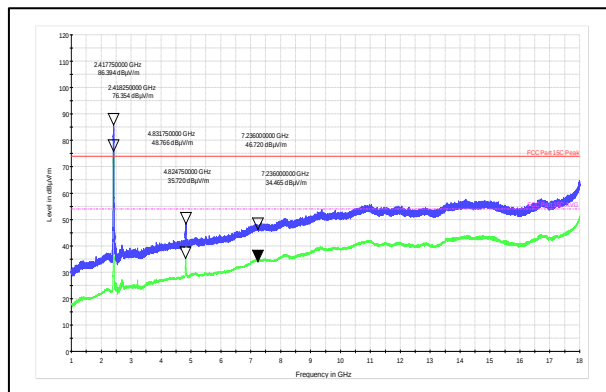
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Modulation: 802.11n-20MHz

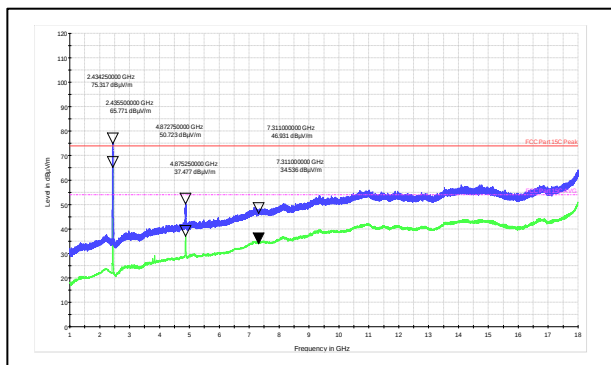
Data Rate: MCS0



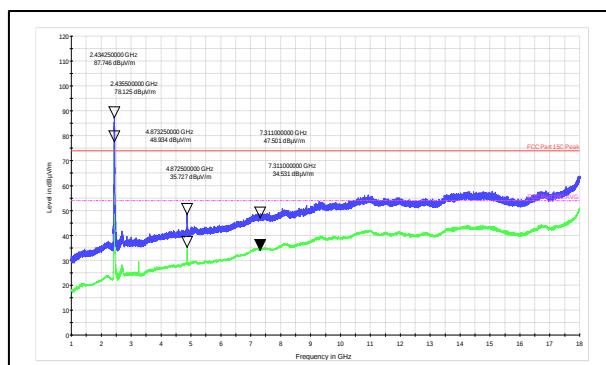
Channel Frequency: 2412MHz Polarization: Vertical



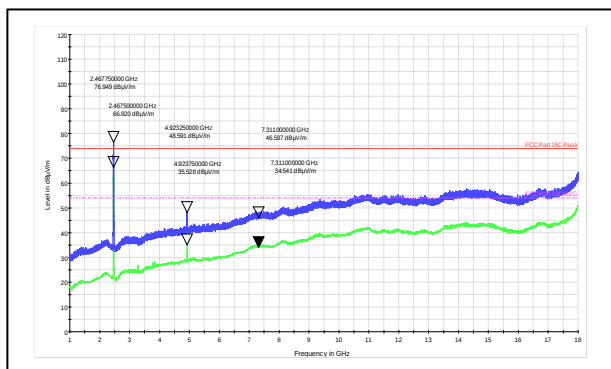
Channel Frequency: 2412MHz Polarization: Horizontal



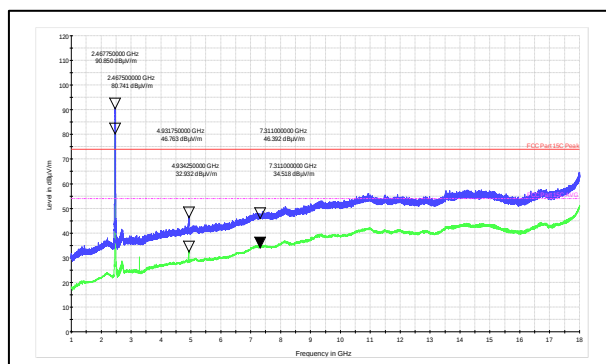
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal



Channel Frequency: 2462MHz Polarization: Vertical



Channel Frequency: 2462MHz Polarization: Horizontal

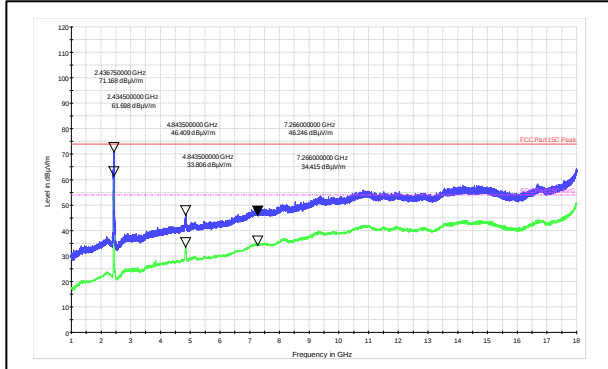
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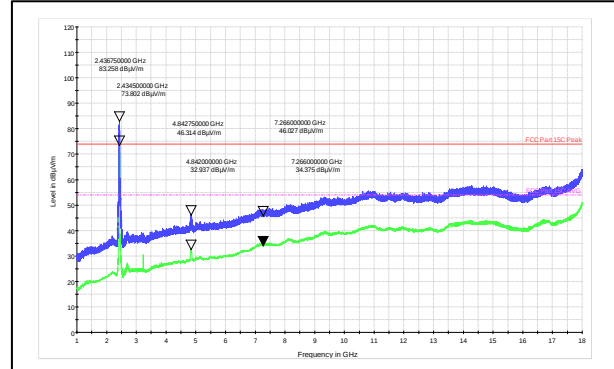
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Modulation: 802.11n-40MHz

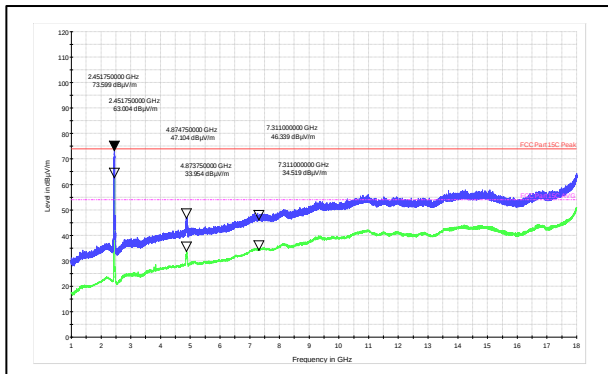
Data Rate: MCS0



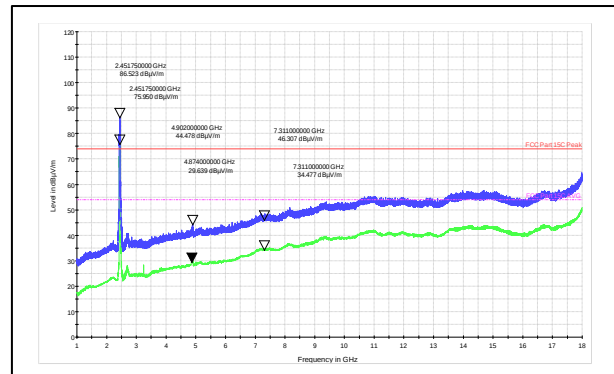
Channel Frequency: 2422MHz Polarization: Vertical



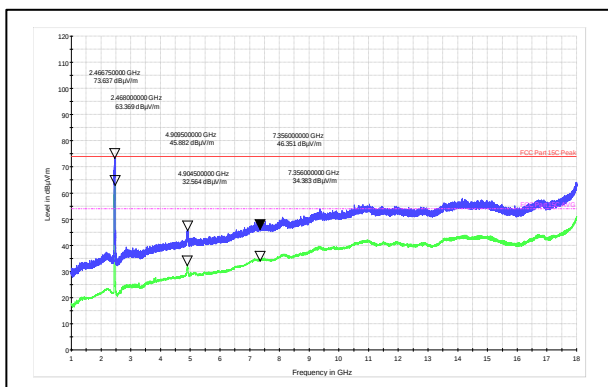
Channel Frequency: 2422MHz Polarization: Horizontal



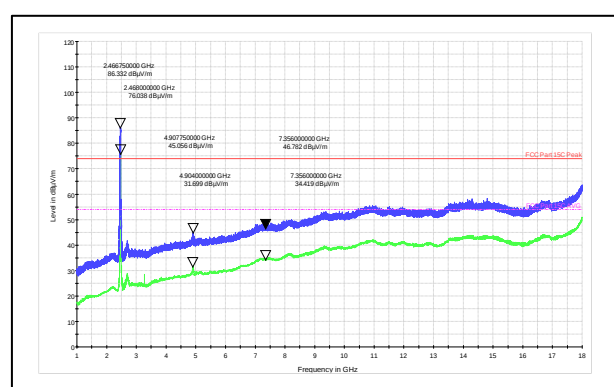
Channel Frequency: 2437MHz Polarization: Vertical



Channel Frequency: 2437MHz Polarization: Horizontal

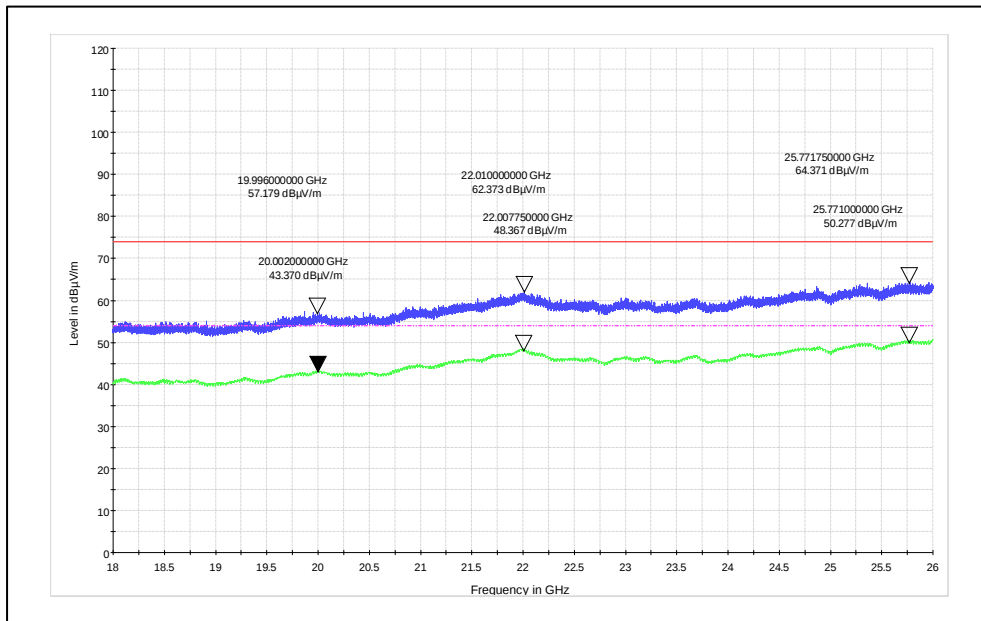


Channel Frequency: 2452MHz Polarization: Vertical

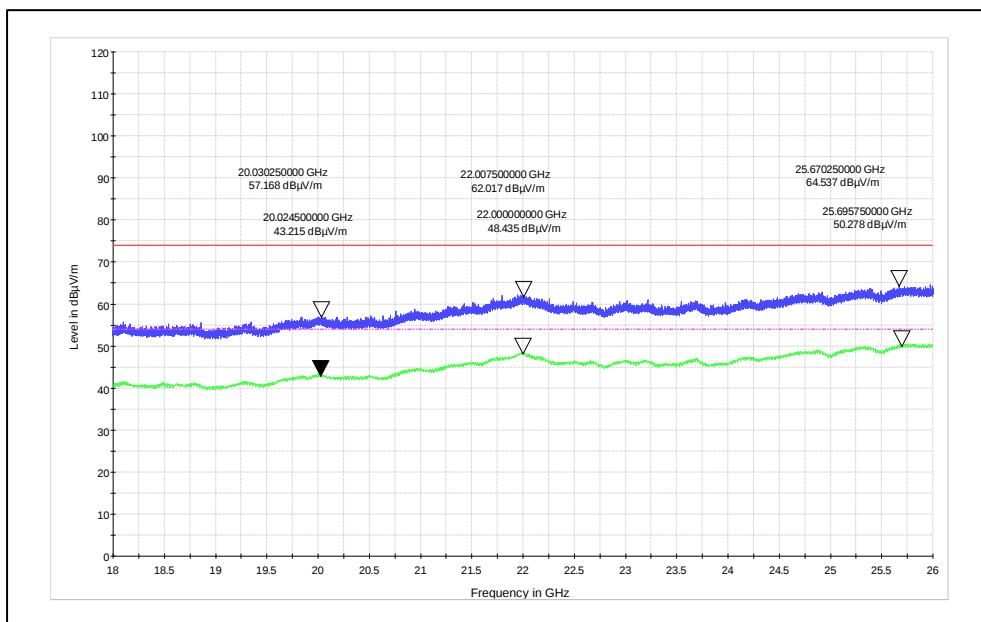


Channel Frequency: 2452MHz Polarization: Horizontal

Test Plots for above 18GHz



Polarization: Vertical



Polarization: Horizontal

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11 List of Power Table

Channel No	Channel Frequency (MHz)	802.11b	802.11g	802.11n/20M (MCS0)	802.11n/40M (MCS0)
1	2412	18.5	17.5	17	NA
2	2417	19	17.5	17	NA
3	2422	19	17.5	17	16.5
4	2427	19	17.5	17	16.5
5	2432	19	17.5	17	16.5
6	2437	18.5	17.5	17	16.5
7	2442	19	17.5	17	16.5
8	2447	19	17.5	17	16.5
9	2452	19	17.5	17	16.0
10	2457	19	17.5	17	16.5
11	2462	18.5	17	17	16.5

End of test report